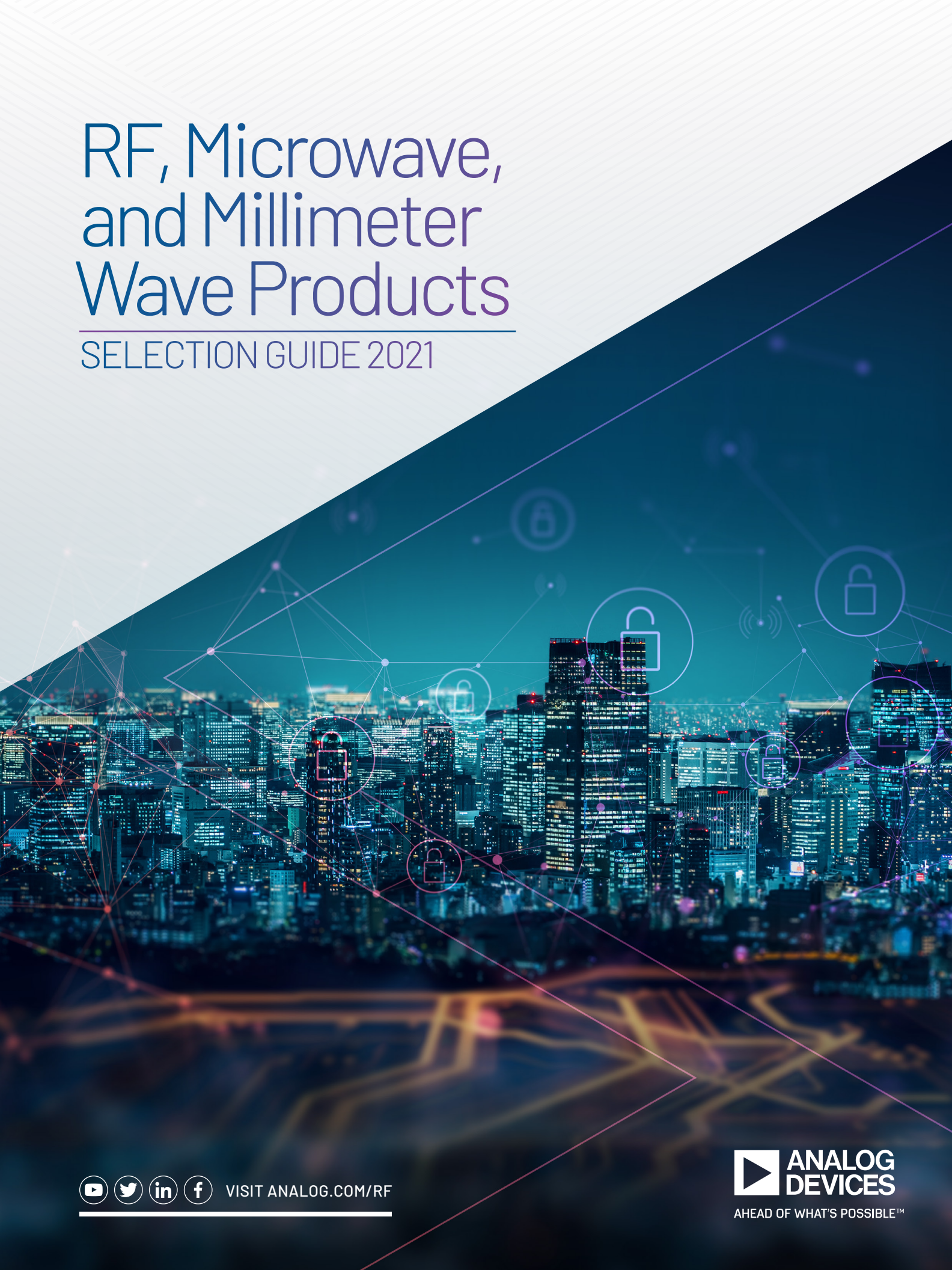


RF, Microwave, and Millimeter Wave Products

SELECTION GUIDE 2021



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AHEAD OF WHAT'S POSSIBLE™

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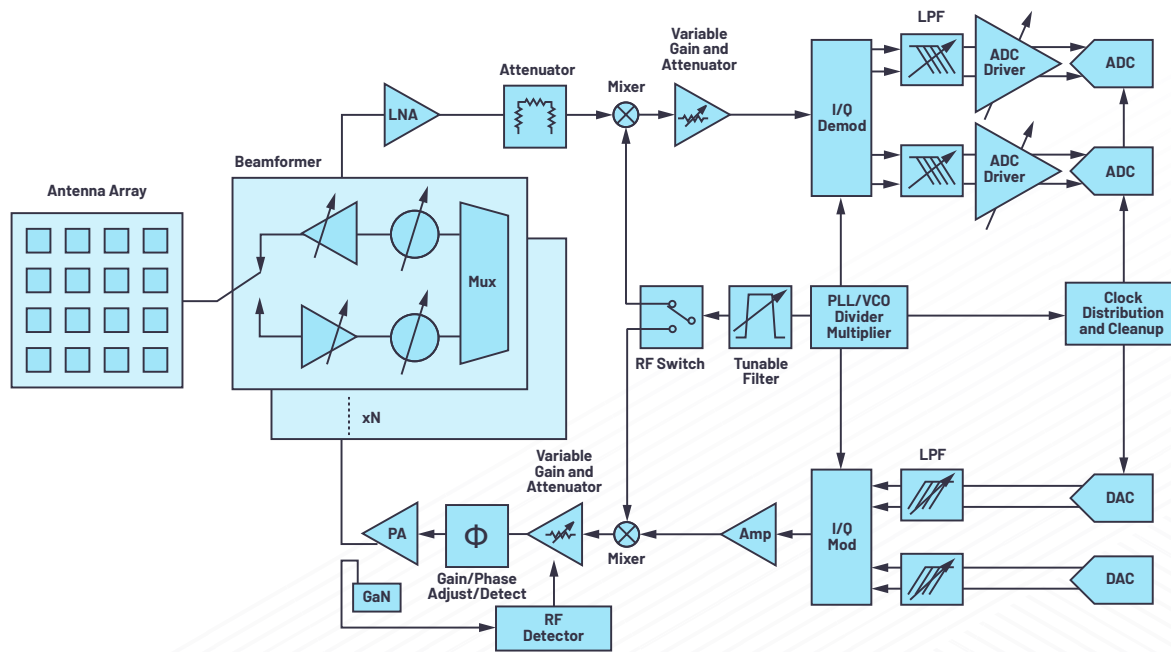
Introduction

1000+ Ways to Drive RF and Microwave Performance

A unique combination of design skills. Deep systems know-how. A diverse range of process technologies including GaAs, GaN, SiGe, SOI, and CMOS. That's the difference behind the industry's broadest portfolio of RF ICs, covering the entire RF signal chain from bits to beams, and from DC to beyond 100 GHz. With over 1000 high performance RF ICs, and a wide range of single-chip and module package options, Analog Devices offers a rich selection of high performance RF function blocks, as well as highly integrated transceiver solutions for virtually every application serving the communications, test and measurement instrumentation, industrial, commercial, and military/ aerospace markets.

These products are supported by a full complement of RF design and development resources, including free design tools, FMC rapid prototyping platforms, Circuits from the Lab® reference designs, and EngineerZone® technical forums.

ADI is committed to providing the best possible long-term support and service to our customers for a positive, successful engagement experience. We are pleased to have the opportunity to provide innovative solutions to help you develop a smarter and more connected world.



What's New in This Edition

RF/IF Differential Amplifiers

Part Number	Description	Frequency (MHz)	Gain Range (dB)	Output IP3 (dBm)	2 nd /3 rd Harmonic (dBc)	Noise Figure at Max Gain (dB)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5580	Resistor programmed	0 to 10,000	0 to 10	40.3	-66.4/-66.1	11.2	5/-1.8	276/-224	4 × 4 LGA	EAR99	ADL5580BCCZ-R7

Low Noise Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL9005	LNA	0.01 to 26.5	18.5	13.5	25	2.5	Internal	5	80	4 × 4 LFCSP	EAR99	ADL9005ACPZN
ADL8104	High OIP2 LNA	0.4 to 7.5	15	20	32	3.5	Internal	5	150	3 × 3 LFCSP	EAR99	ADL8104ACPZN
HMC8412	LNA	0.4 to 10	15	19	32	1.5	Internal	5	60	Die	EAR99	HMC8412CHIPS
ADL9006	LNA	2 to 20	15.5	18	23	2.5	Internal	5	53	5 × 5 LFCSP_CAV	EAR99	ADL9006ACGZN
ADL9006	LNA	2 to 28	15.5	17	21	2.5	Internal	5	55	Die	EAR99	ADL9006CHIPS

Low Phase Noise Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Additive Phase Noise (10 kHz Offset) (dBc/Hz)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL8150	Low phase noise	6 to 14	13	19	31.5	3.5	-172	Internal	5	76	Die	EAR99	ADL8150ACHIP
ADL8150	Low phase noise	6 to 14	12	18	30	3.6	-172	Internal	5	74	2 × 2 LFCSP	EAR99	ADL8150ACPZN

Linear and Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADPA7007	1 W WB PA	20 to 44	21.5	30	42.5	5.5	Internal	5	1400	7 × 7 LCC_HS	3A001.b.2.d	ADPA7007AEHZ
ADPA7004	Power amp	40 to 80	18.5	22	31	–	Internal	3.5	550	Die	3A001.b.2.g	ADPA7004CHIPS
ADPA7008	1 W PA	20 to 54	18	30.5	38	6	Internal	5	1500	Die	3A001.b.2.d	ADPA7008CHIP
ADPA7009	0.5 W PA	20 to 54	19.5	28.5	35	5.5	Internal	5	750	Die	3A001.b.2.d	ADPA7009CHIP

GaN Power Amps

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P4dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Operation	P _{SAT} (dBm)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADPA1105	40 W, GaN PA	0.9 to 1.6	34.5	–	–	–	Pulsed	46	50	400	5 × 5 LFCSP_CAV	EAR99	ADPA1105ACGZN

Analog Controlled VGAs

Part Number	Description	Bandwidth (GHz)	Gain Range (dB)	Output IP3 (dBV)	Noise Figure (dB)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6521	Dual analog VGA	0.01 to 3	-3 to +18	25.9	10.5	5	200	3 × 3 LFCSP	5A991.b	ADRF6521ACPZ

Single, Double, and Triple Balanced Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Noise Figure (dB)	Input P1dB (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC560A	Passive	24 to 38	22 to 38	0 to 18	-11	19	38	44	—	12	—	Die	EAR99	HMC560A
HMC787A	Passive	3 to 10	3 to 10	0 to 4	-8	22	47	44	8	15	17	Die	EAR99	HMC787AG

I/Q and Image Reject

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dBc)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Input P1dB (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC525A	I/Q and IRM	4 to 8.5	4 to 8.5	0 to 3.5	-8	20	30	47	23	8.5	18	Die	EAR99	HMC525A

mmWave Imaging Chipset

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Power (W)	Package (mm)	ECCN	Ordering Part Number
ADAR2001	10 GHz to 40 GHz, 1:4 channel, 4× frequency multiplier/filter	2.5 to 10	10 to 40	0.45	6 × 6 LGA	EAR99	ADAR2001ACCZ
ADAR2004	10 GHz to 40 GHz, 4-channel Rx mixer with 4× LO	10 to 40	0 to 0.8	0.910	7 × 7 LGA	EAR99	ADAR2004ACCZ

Quad-Band VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package Size (mm)	ECCN Code	Ordering Part Number
HMC8362	Quad-band VCO	11.9 to 18.3	-70	-97.5	-4 to +8	1 to 13.5	5	72	6 × 6 QFN	EAR99	HMC8362LP6GE
HMC8364	Quad-band VCO	18.1 to 26.6	-63.5	-91.5	-8 to +4	1 to 13.5	5	99	6 × 6 QFN	EAR99	HMC8364LP6GE

Digital Tunable Filters

Part Number	Description	Frequency (GHz)	Number of Bands	Wideband Rejection (dB)	Interface	Return Loss (dB)	BP Insertion Loss @ 9G (dB)	Package (mm)	ECCN Code	Ordering Part Number
ADMV8818	Digital tunable BP/LP/HP filter	2 to 18	4	>35	SPI	10	9	9 × 9 LGA	EAR99	ADMV8818SCCZ

ADI RadioVerse Integrated Transceivers

Part Number	Product Features	Functionality	RF Tuning Range	Bandwidth	Rx Image Rejection (dBc)*	Rx NF/IIP3**	Tx OIP3 (dBm)	Package Size (mm)	DPD Engine	SERDES Lanes
ADRV9010	3G/4G/5G quad-channel, massive MIMO/small cell TDD RF transceiver	4 Tx, 4 Rx, 2 ORx	650 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx and ORx	75	12 dB/+22 dBm	29	14 × 14 CSP_BGA	—	8 Rx, 8 Tx
ADRV9029	3G/4G/5G quad-channel, massive MIMO/small cell TDD and FDD RF transceiver with integrated DPD	4 Tx, 4 Rx, 2 ORx	75 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx and ORx	75	11.9 dB/+21 dBm	28	14 × 14 CSP_BGA	Linearization up to 200 MHz BW	4 Rx, 4 Tx
ADRV9002 New	Narrow-/wideband SDR, high dynamic range, CMOS/LVDS interface	2 Rx, 2 Tx (TDD/FDD)	30 MHz to 6 GHz	12 kHz to >40 MHz	80 to 90	12 dB/+26 dBm	>30	12 × 12 CSP_BGA	Yes, linearization Rx BW 40 MHz	—

Translation Loop PLL+VCO Module

Part Number	Description	Frequency (GHz)	Integrated VCO	Frequency Ref Input (MHz)	Phase Noise @ 10 kHz Offset, 6.45 GHz (dBc/Hz)	I _S (mA)	V _S (V)	Package (mm)	ECCN Code	Ordering Part Number
ADF4401A New	Translation loop PLL+VCO module	0.0625 to 8	Yes	10 to 500	-135	0.34/0.43	5.0/3.3	18 × 18 LGA_CAV	EAR99	ADF4401ABCEZ

Ultrawideband VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF5709	Ultrawideband VCO	9.85 to 20.5	-51	-83	0	-0.5 to 23	5	70	3.9 × 3.9 LCC	EAR99	ADF5709BEZ

SPDT

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input	Package (mm)	ECCN Code	Ordering Part Number
ADRF5300	SPDT with neg. supply	24 to 32	1.1	38	—	37	65	60/60	CMOS/LVTTL compatible	3 × 3 LGA	EAR99	ADRF5300BCCZN

SP3T, SP4T, SP6T, SP8T Switches

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input	Package (mm)	ECCN Code	Ordering Part Number
ADRF5042	SP4T, nonreflective	0.1 to 44	2.8	39	27	26	47	14	0/3.3	3 × 3 LGA	EAR99	ADRF5042BCCZN
ADRF5043	SP4T, nonreflective	9 kHz to 44 GHz	2.4	39	27	26	48	2.8 μs	0/3.3	3 × 3 LGA	EAR99	ADRF5043BCCZN

MEMS Switches

Part Number	Device Configuration	Switch R_{ON}	Leakage Switch Off	Frequency (GHz)	Insertion Loss (dB)	Off Isolation (dB)	IIP3 (dBm)	Input Power (dBm)	Specified @ Frequency (GHz)	Package (mm)	ECCN Code	Ordering Part Number
ADGM1004	(4:1) × 1	1.8	500 pA	0 to 13	0.45	24	67	32	2.5	5 × 4 LFCSP	EAR99	ADGM1004JCPZ-RL7
ADGM1304	(4:1) × 1	1.6	500 pA	0 to 14	0.26	24	69	36	2.5	5 × 4 LFCSP	EAR99	ADGM1304JCPZ-RL7

Massive MIMO RF Front Ends

Part Number	Device Configuration	Description	Frequency (GHz)	Insertion Loss (dB)	Input Power (dBm)	Gain (dB)	NF (dB)	Package (mm)	ECCN Code	Ordering Part Number
ADRF5515	Dual-channel bypassable LNA	2-stage LNA, high power SPDT	3.3 to 4.0	0.45	43	33	1	6 × 6 LFCSP	5A991.b	ADRF5515BCPZ
ADRF5519	Dual channel	2-stage LNA, high power SPDT	2.3 to 2.8	0.5	43	35	1	6 × 6 LFCSP	5A991.b	ADRF5519BCPZ

High Speed Analog-to-Digital Converters >20 MSPS

Part Number	Channels	Resolution (Bits)	Max Sample Rate (GSPS)	ADC SNR	INL	V_{IN}	Data Output Interface	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
AD9217	1	12	10	57	2.4	1.4	LVDS	4.2	12 × 12 BGA_ED	3A001.a.5.a.3	AD9217BBPZ-10G/ AD9217BBPZ-6G
AD9083	16	12	2	82	—	0.5 to 2	JESD204B	0.9	9 × 9 CSP_BGA	3A991.c.2	AD9083BBCZ

High Speed Digital-to-Analog Converters ≥30 MSPS

Part Number	Device Primary Function	No. of Channels	Resolution (Bits)	Update Rate (GSPS)	Noise Spectral Density (dBm/Hz)	SFDR (dB)	$I_{OUT FS}$ (mA)	Data Input Interface	Power (W)	Package Size (mm)	ECCN Code	Ordering Part Number
AD9166	Vector signal generator	1	16	12	154	46	41.3	JESD204B	4.88	15 × 15 BGA_ED	3A001.a.5.b.1	AD9166BBPZ

Mixed-Signal Front Ends

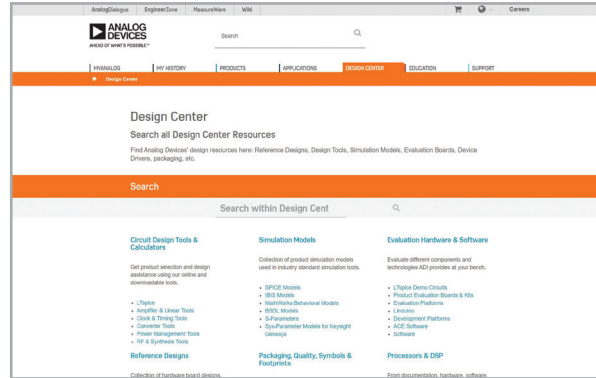
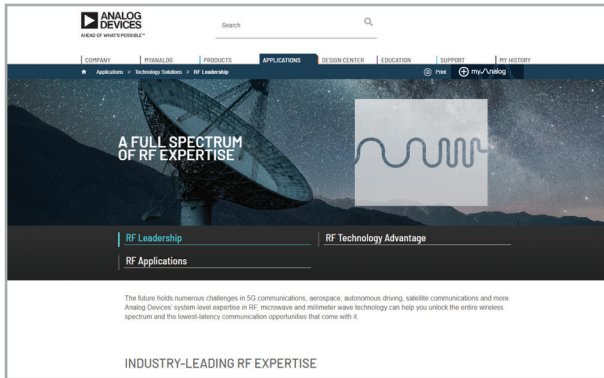
Part Number	Device Configuration	DAC/ADC Resolution (Bits)	DAC/ADC Sample Rate (GSPS)	ADC Analog BW	ADC Aperture	Product Description	Data Output Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9081	4 × ch IF/IF-to-bits Tx/Rx subsystem	16/12	12/4	0 to 7.5	65	MxFE quad, 16-bit 12 GSPS RF DAC and dual, 12-bit, 6 GSPS RF ADC	JESD204B, JESD204C	15 × 15 BGA_ED	3A001.a.5.a.3	AD9081BBPZ-4D4AC
AD9082	4 × ch IF/RF-to-bits Tx/Rx subsystem	12	6	0 to 7	16	2 Rx DPD observer, broadband wireline, triggered frequency hopping, wireless infrastructure	JESD204B, JESD204C	15 × 15 BGA_ED	3A001.a.5.a.3	AD9082BBPZ-4D2AC

New 5G mmWave Network Radio Solution and Massive MIMO Solution

ADI strives to provide the most advanced and most complete system solution whenever possible. Solutions may come in a combination of reference designs, single-chip functionality, multichip partitioning, module form, and/or with software algorithm. Our goal is to provide the optimal solution that enables our customers to solve their most challenging problems, add distinct features and values to differentiate themselves, and get to market with a competitive product at the fastest time.

For more information, please visit analog.com/rf.

For design resources, visit analog.com/en/design-center.



All Product Listings

RF and microwave technology is all around us—connecting us (ubiquitous mobility), guiding us (GPS/autonomous vehicle), moving us (aircraft), healing us (healthcare, MRI scanners), and elevating us by making our everyday lives more efficient.

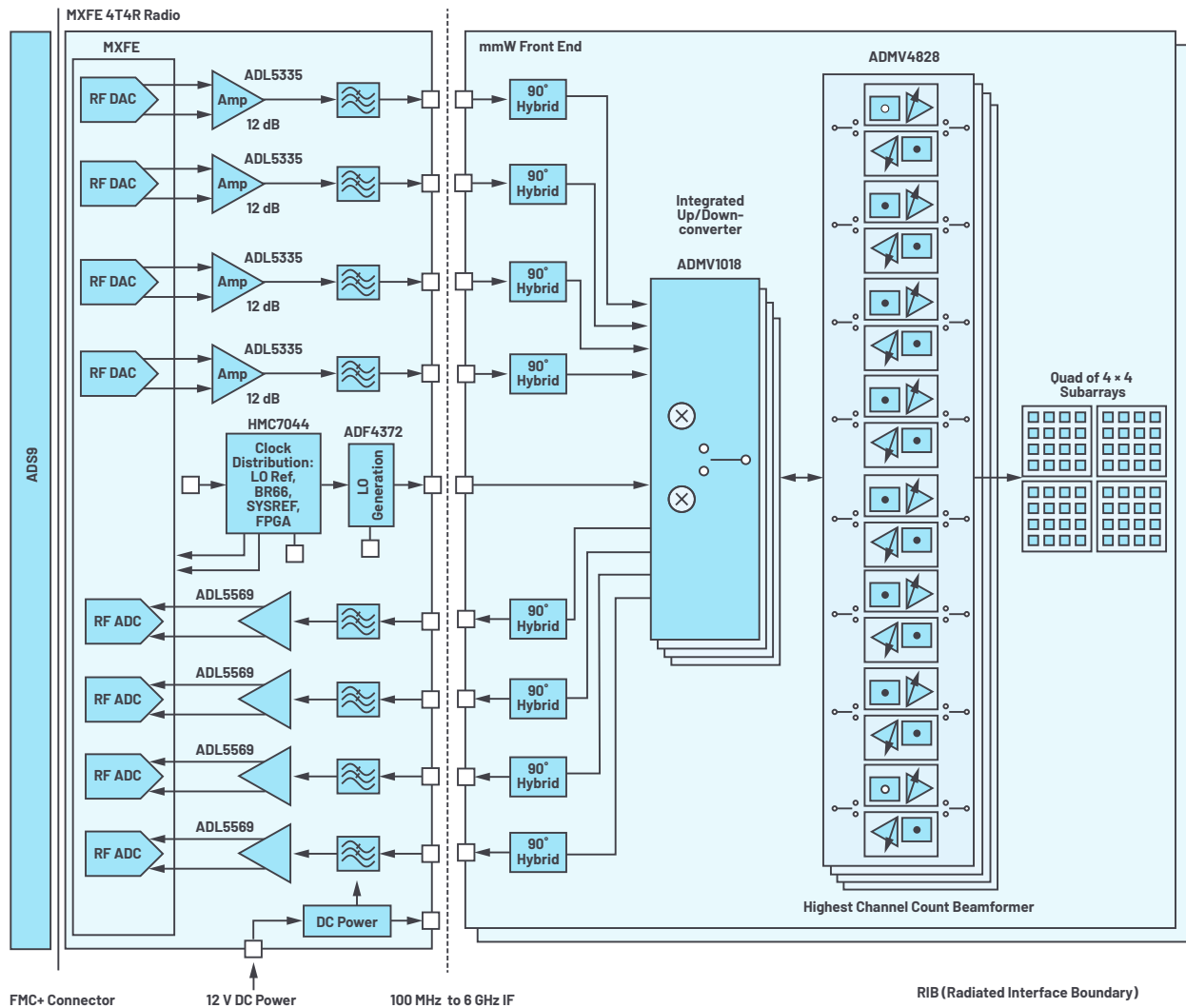


Most Complete, Scalable 28 GHz 5G Network Radio Solution in the Industry

- ▶ 16-channel beamformer chip provides the highest density for small size and low cost
- ▶ Integrated up/downconverter offers highest performance and unmatched feature set
- ▶ Quad RF ADC and RF DAC support >2 GHz bandwidth for multigigabit wireless datalink
- ▶ Smallest size for compact active antenna systems
- ▶ Flexible options for single polarization or horizontal and vertical polarization

Applications

- ▶ Highest channel count for cost-effective scalability



AD9081: MxFE Quad, 16-Bit, 12 GSPS RF DAC and Quad, 12-Bit, 4 GSPS RF ADC

- ▶ Flexible reconfigurable radio common platform
- ▶ RF DAC/RF ADC BW of 5.2 GHz and 7.5 GHz
- ▶ On-chip PLL with multichip synchronization
- ▶ JESD204B (8b/10b, 16 Gbps) and JESD204C

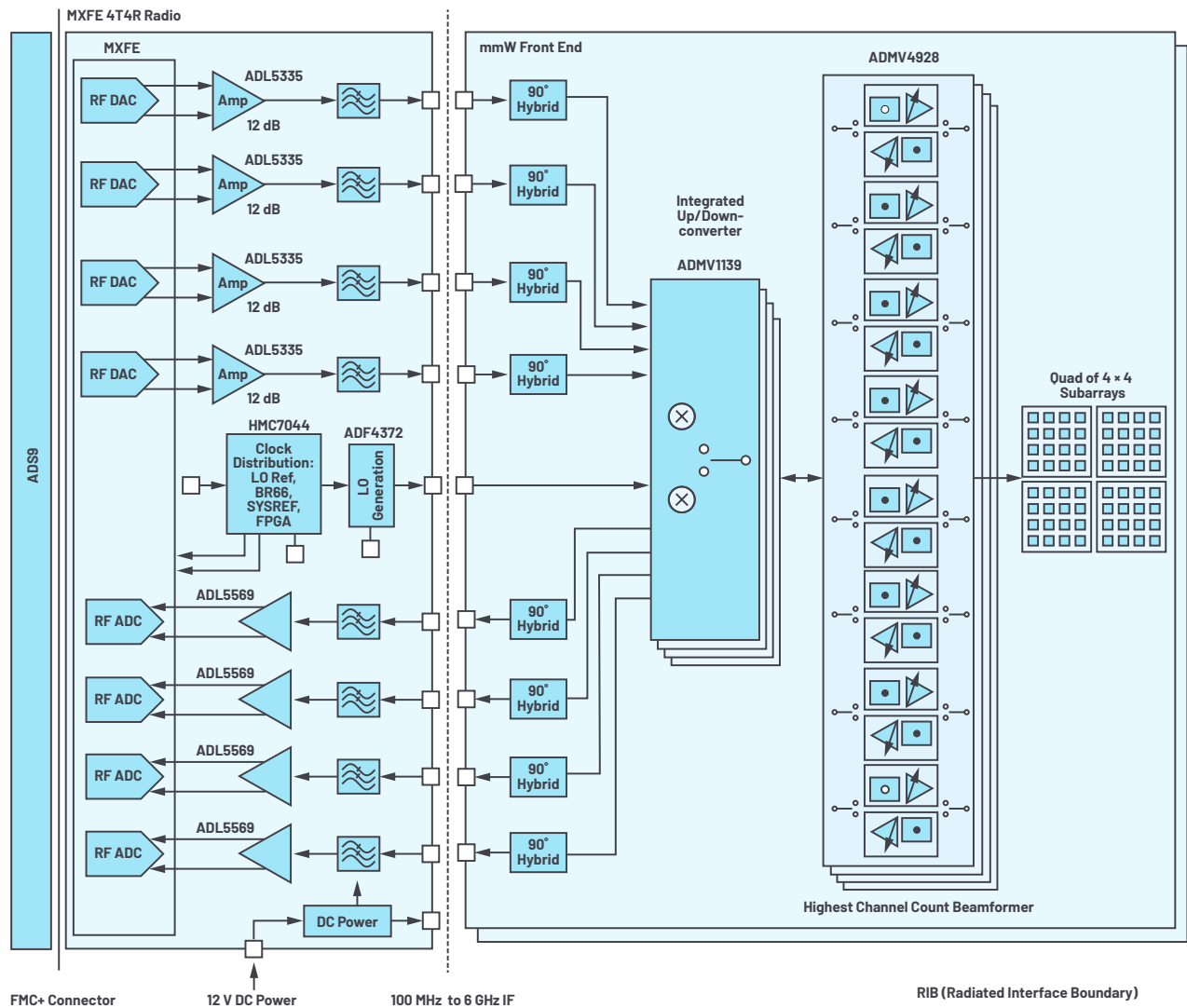
ADMV1018: 24 GHz to 29.5 GHz Single-Chip Up/Downconverter

- ▶ Addressing n257, n258, n261 bands
- ▶ 1.5 GHz I/Q bandwidth
- ▶ Two up/downconversion modes
- ▶ LO doubler ($\times 2$) and quadrupler ($\times 4$) modes

ADMV4828: 24 GHz to 29.5 GHz, 16-Channel Beamformer

- ▶ 16 selectable transmit/receive channels dual polarization
- ▶ Addressing n257, n258, n261 bands in one footprint
- ▶ Fast TDD switching time using external pins
- ▶ High resolution phase control
- ▶ High resolution DGAs for amplitude control
- ▶ Memory for transmitter and receiver beam positions
- ▶ Compact package

39 GHz to 47 GHz Solutions



ADMV1139: 37 GHz to 48 GHz Single-Chip Up/Downconverter

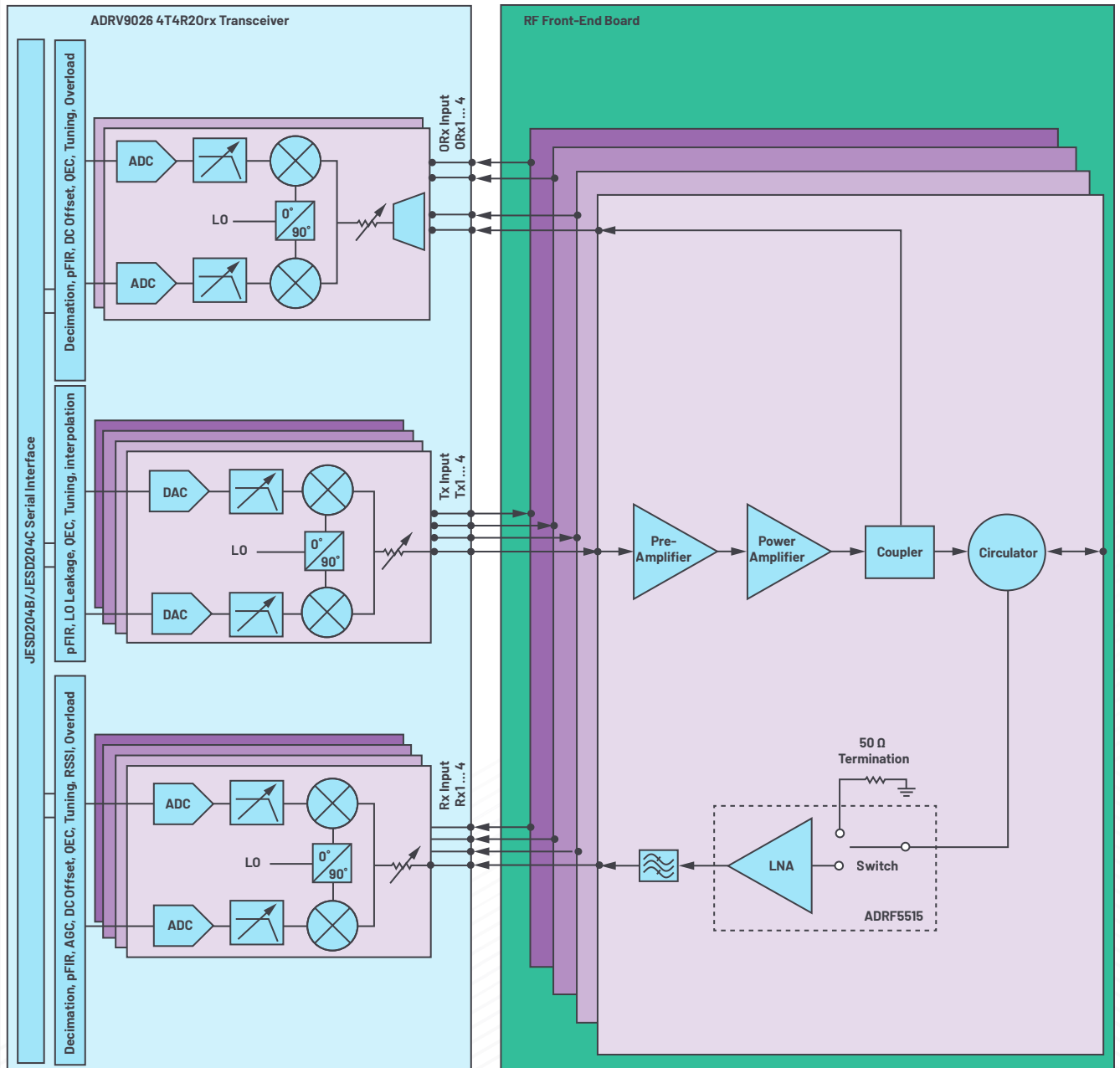
- ▶ CMOS up/downconverter with industry-leading efficiency and linear P_{OUT} with 5G NR
- ▶ 1.5 GHz I/Q bandwidth
- ▶ Two up/downconversion modes
- ▶ LO doubler ($\times 2$) and quadrupler ($\times 4$) modes

ADMV4928: 37 GHz to 43.5 GHz, 16-Channel Beamformer

- ▶ 16 selectable transmit/receive channels dual polarization
- ▶ Addressing n260 and future 40 GHz to 43.5 GHz bands in one footprint
- ▶ Fast TDD switching time using external pins
- ▶ High resolution phase control
- ▶ High resolution DGAs for amplitude control
- ▶ Memory for transmitter and receiver beam positions
- ▶ Compact package

Massive MIMO (M-MIMO): A Fast Track to the 5G Speed Race

A Complete 3.5 GHz M-MIMO Transceiver with RF Front-End Reference Design



Dual-Channel Receiver Front Ends

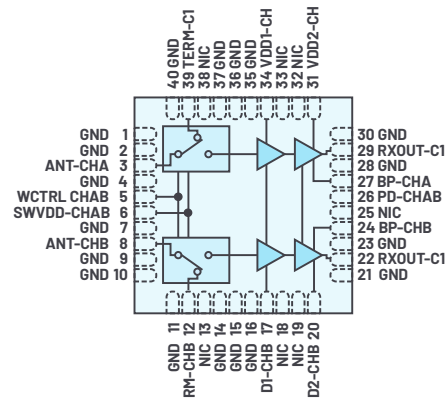
- ▶ ADRF5545A: 2.4 GHz to 4.2 GHz
- ▶ ADRF5547: 3.7 GHz to 5.3 GHz
- ▶ ADRF5549: 1.8 GHz to 2.8 GHz

Integrated High Power SPDT and 2-Stage LNA per Channel

- ▶ High power handling SPDT switch for LNA protection, solving a huge problem of protecting the receiver's front end in the presence of damaging RF power, while maintaining robust receiver performance
 - 10 W continuous wave at 105°C, lifetime operation
 - 10 W LTE average power (9 dB PAR) at 105°C, lifetime operation
 - 20 W LTE average power (9 dB PAR) at 105°C, single event
- ▶ Low noise figure: 1.45 dB at 3.6 GHz at receiver operation
- ▶ Low insertion loss: 0.65 dB at 3.6 GHz
- ▶ High channel isolation
- ▶ Integrated bias and matching circuits

Integrated 20 W SPDT and 2-Stage LNA per Channel

- ▶ ADRF5515: 3.3 GHz to 4.0 GHz
- ▶ 20 W LTE average power (9 dB PAR) at 105°C, lifetime operation
- ▶ Low noise figure: 1.0 dB at 3.6 GHz at receiver operation
- ▶ Low insertion loss: 0.45 dB at 3.6 GHz
- ▶ High channel isolation
- ▶ Integrated bias and matching circuits

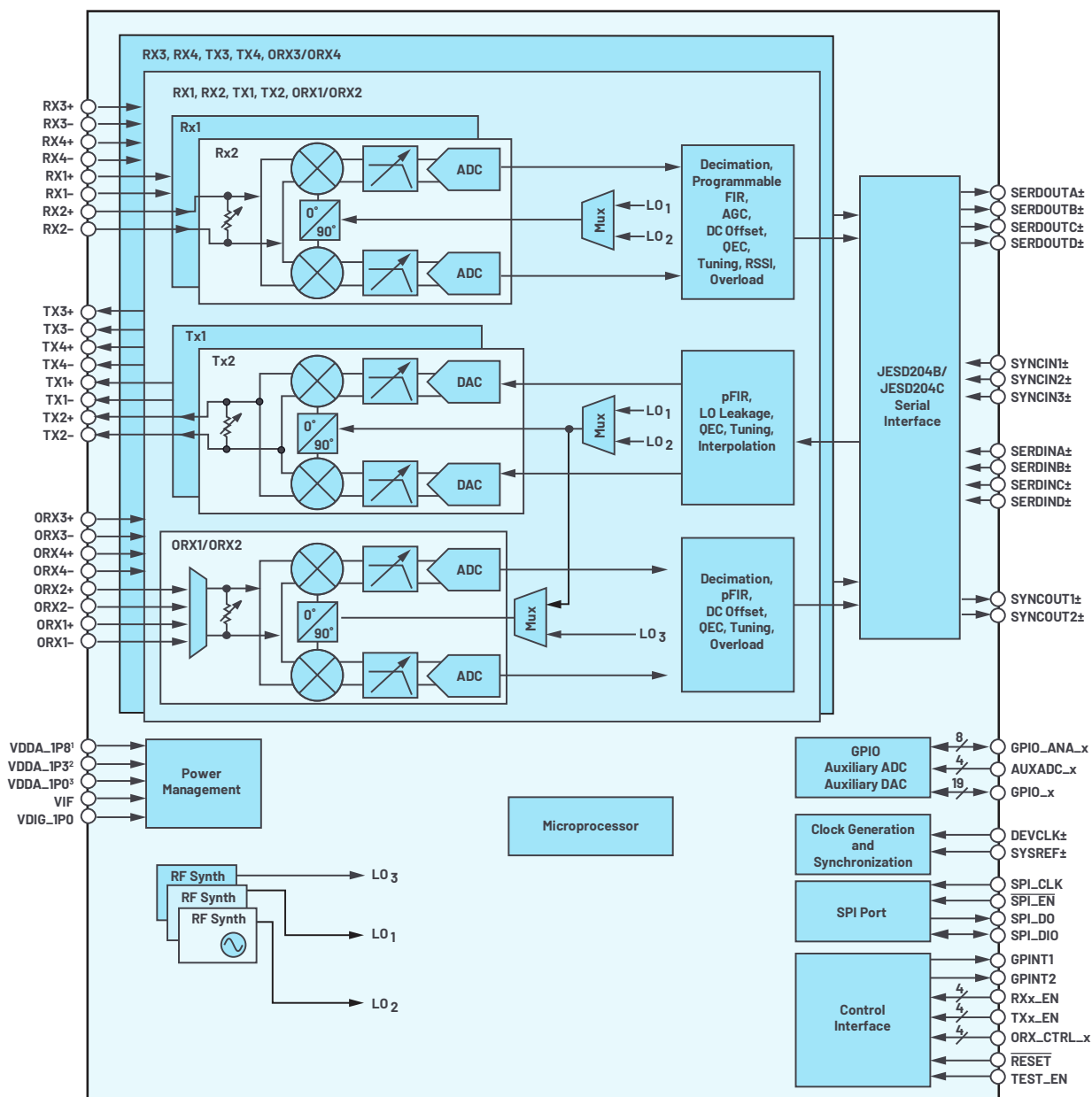


ADRV9026: Wideband Integrated Quad RF Transceiver with Observation Path

- ▶ Center frequency: 75 MHz to 6 GHz
- ▶ Four differential transmitters and receivers
- ▶ Two observation receivers with two inputs each
- ▶ Fully integrated fractional-N synthesizer and supports multichip LO phase synchronization
- ▶ Support for TDD and FDD applications
- ▶ Bandwidth: 200 MHz receiver, 450 MHz transmitter synthesis, and 450 MHz observation receiver
- ▶ Integrated AGC, DC offset, and quadrature error correction
- ▶ Interface: 24.33 Gbps JESD204B/JESD204C
- ▶ Package: 14 mm × 14 mm chip scale BGA



ADRV9026: Wideband Integrated Quad RF Transceiver with Observation Path



¹ VDDA_1P8 represents VCONV1_1P8, VCONV2_1P8, VANA1_1P8, VANA2_1P8, VANA3_1P8, VANA4_1P8, and VJVC0_1P8.

² VDDA_1P3 represents VANA1_1P3, VANA2_1P3, VCONV1_1P3, VCONV2_1P3, VRFVC01_1P3, VRFVC02_1P3, VAUXVC0_1P3, VCLKVC0_1P3, RFSYN1_1P3, VRFYSYN2_1P3, VCLKSYN_1P3, VAUXSYN_1P3, VRXLO_1P3, and VTXLO_1P3.

³ VDDA_1P0 represents VJSYN_1P0, VDES_1P0, VTT_DES, and VSER_1P0.

RF Amplifiers

RF/IF Differential Amplifiers

Part Number	Description	Frequency (MHz)	Gain Range (dB)	Output IP3 (dBm)	2 nd /3 rd Harmonic (dBc)	Noise Figure at Max Gain (dB)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
LT1994	R/R output, resistor programmed	0 to 70	0 to 40	—	–88/–84	—	3, 5, ±5	14.8	3 × 3 DFN MSOP	EAR99	LT1994CDD#TRPBF LT1994IDD#TRPBF LT1994HDD#TRPBF LT19994MPDD#TRPBF LT19994CMS8#TRPBF LT19994IMS8#TRPBF
AD8372	Dual DVGA, 1 dB step	1 to 130	–9 to +32	35	–78/–85	7.9	5	212	5 × 5 LFCSP	EAR99	AD8372ACPZ–R7
LTC6403–1	Resistor programmed	0 to 200	0 to 40	28	–76/–74	10.8	3, 5	11	3 × 3 QFN	EAR99	LTC6403CUD–1#TRPBF LTC6403IUD–1#TRPBF
LT6402–6	Fixed 6 dB gain	0 to 300	6	36	–84/–84	12.6	5	30	3 × 3 QFN	EAR99	LT6402CUD–6#TRPBF LT6402IUD–6#TRPBF
LT6402–12	Fixed 12 dB gain	0 to 300	12	37	–82/–73	15.1	5	30	3 × 3 QFN	EAR99	LT6402CUD–12#TRPBF LT6402IUD–12#TRPBF
LT6402–20	Fixed 20 dB gain	0 to 300	20	36.5	–80/–80	12.5	5	30	3 × 3 QFN	EAR99	LT6402CUD–20#TRPBF LTC6402IUD–20#TRPBF
LTC6404–1	Unity-gain stable, resistor programmed	0 to 500	0	41.5	–102/–90	13.4	3, 5	27.8	3 × 3 QFN	EAR99	LTC6404CUD–1#TRPBF LTC6404IUD–1#TRPBF LTC6404HUD–1#TRPBF
AD8375	Dual DVGA, 1 dB step	15 to 630	–4 to +20	50	–85/–92	8.3	5	125	4 × 4 LFCSP	EAR99	AD8375ACPZ–R7
LT6411	Dual selectable gain	0.1 to 650	+1, –2, –1	30	–63/–52	24.7	5, 12	16	3 × 3 QFN	EAR99	LT6411CUD#TRPBF LT6411IUD#TRPBF
LTC6405	Resistor programmed	0 to 700	0 to 40	23.4	–82/–65	7.5	5	18	3 × 3 QFN	EAR99	LTC6405CUD#TRPBF LTC6405IUD#TRPBF
LT1993–10	Fixed 20 dB gain	0 to 700	20	40	–77/–67	12.7	5	100	3 × 3 QFN	EAR99	LT1993CUD–10#TRPBF LT1993IUD–10#TRPBF
AD8376	Dual DVGA, 1 dB step	15 to 700	–4 to +20	50	–82/–91	8.7	5	250	5 × 5 LFCSP	EAR99	AD8376ACPZ–R7
AD8370	DVGA, <1 dB step	10 to 750	–8 to +34	35	–65/–62	7.2	3, 5	79	TSSOP	EAR99	AD8370AREZ–RL7
LT1993–2	Fixed 6 dB gain	0 to 800	6	38	–72/–69	12.3	5	100	3 × 3 QFN	EAR99	LT1993CUD–2#TRPBF LT1993IUD–2#TRPBF
LT1993–4	Fixed 12 dB gain	0 to 900	12	40	–76/–70	14.5	5	100	3 × 3 QFN	EAR99	LT1993CUD–4#TRPBF LT1993IUD–4#TRPBF
LTC6404–2	>6 dB gain resistor programmed	0 to 900	>6	45	–98/–98	10	3, 5	30.4	3 × 3 QFN	EAR99	LTC6404CUD–2#TRPBF LTC6404IUD–2#TRPBF LTC6404HUD–2#TRPBF
AD8350	Fixed gain	1 to 900	15	28	–66/–65	6.8	5	28, 30	SOIC	EAR99	AD8350ARMZ15–REEL7
AD8350	Fixed gain	1 to 900	20	28	–66/–65	6.8	5	28, 30	MSOP	EAR99	AD8350ARMZ20–REEL7
LTC6401–20	Fixed 20 dB gain	0 to 1300	20	30.5	–80/–57	6.4	3	50	3 × 3 QFN	EAR99	LTC6401CUD–20#TRPBF LTC6401IUD–20#TRPBF
LTC6421–20	Dual matched differential amplifiers	0 to 1300	20	33.2	–74/–78	6.2	3	80	3 × 4 QFN	EAR99	LTC6421CUDC–20#TRPBF LTC6421IUDC–20#TRPBF
LTC6432–15	Low noise to 100 kHz, fixed gain	0.1 to 1400	15.9	50.3	–92.2/–90	3.2	5	166	4 × 4 QFN	EAR99	LTC6432AIUF–15#TRPBF
LTC6432–15	Low noise to 100 kHz, fixed gain	0.1 to 1400	15.9	47	–92.2/–90	3.2	5	166	4 × 4 QFN	EAR99	LTC6432BIUF–15#TRPBF
LTC6410–6	Configurable R _{in}	0 to 1400	6	36	–85/–69	8	3, 5	125	3 × 3 QFN	EAR99	LTC6410CUD–6#TRPBF LTC6410IUD–6#TRPBF
LTC6401–26	Fixed 26 dB gain	0 to 1600	26	40	–81/–54	6.5	3	45	3 × 3 QFN	EAR99	LTC6401CUD–26#TRPBF LTC6401IUD–26#TRPBF
LTC6417	Differential buffer with fast clamp	0 to 1600	0	39	–100/–66	13	5	123	3 × 4 QFN	EAR99	LTC6417CUDC#TRPBF LTC6417IUDC#TRPBF
LTC6420–20	Dual matched differential amplifiers	0 to 1800	20	37.2	–80/–88	6.2	3	160	3 × 4 QFN	EAR99	LTC6420CUDC–20#TRPBF LTC6420IUDC–20#TRPBF

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

RF/IF Differential Amplifiers (Continued)

Part Number	Description	Frequency (MHz)	Gain Range (dB)	Output IP3 (dBm)	2 nd /3 rd Harmonic (dBc)	Noise Figure at Max Gain (dB)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5205	Dual DVGA, parallel and serial control, 1 dB step	0 to 1700	-9 to +26	48.5	-75/-87.5	6.6	3.3, 5	175	6 × 6 LFCSP	5A991.b	ADL5205ACPZ-R7
LTC6404-4	>12 dB gain resistor programmed	0 to 1700	>12	45.5	-100/-100	8	3, 5	31	3 × 3 QFN	EAR99	LTC6404CUD-4#TRPBF LTC6404IUD-4#TRPBF LTC6404HUD-4#TRPBF
LTC6400-20	Fixed 20 dB gain	0 to 1800	20	41.5	-74/-74	6.5	3	90	3 × 3 QFN	EAR99	LTC6400CUD-20#TRPBF LTC6400IUD-20#TRPBF
LTC6400-14	Fixed 14 dB gain	0 to 1900	14	38	-78/-74	7.7	3	85	3 × 3 QFN	EAR99	LTC6400CUD-14#TRPBF
LTC6400-26	Fixed 26 dB gain	0 to 1900	26	38	-83/-72	6.9	3	85	3 × 3 QFN	EAR99	LTC6400CUD-26#TRPBF LTC6400IUD-26#TRPBF
LTC6401-14	Fixed 14 dB gain	0 to 2000	14	33	-79/-57	7.4	3	45	3 × 3 QFN	EAR99	LTC6401CUD-14#TRPBF LTC6401IUD-14#TRPBF
LTC6430-15	Fixed 15.2 dB gain	20 to 2000	15.2	50	-80.5/-87	3	5	160	4 × 4 QFN	EAR99	LTC6430AIUF-15#TRPBF
LTC6430-15	Fixed 15.2 dB gain	20 to 2000	15.2	47	-80.5/-87	3	5	160	4 × 4 QFN	EAR99	LTC6430BIUF-15#TRPBF
LTC6430-20	Fixed 20 dB gain	20 to 2060	20.8	51	-79.8/-80.9	2.9	5	170	4 × 4 QFN	EAR99	LTC6430AIUF-20#TRPBF
LTC6430-20	Fixed 20 dB gain	20 to 2060	20.8	47	-79.8/-80.9	2.9	5	170	4 × 4 QFN	EAR99	LTC6430BIUF-20#TRPBF
LTC6416	Differential buffer with programmed output clamp	0.1 to 2000	0	40	-75/-59	6.4	3	42	3 × 2 DFN	EAR99	LTC6416CDD#TRPBF LTC6416IDD#TRPBF
LTC6400-8	Fixed 8 dB gain	0 to 2200	8	37.5	-86/-71	7.7	3	85	3 × 3 QFN	EAR99	LTC6400CUD-8#TRPBF LTC6400IUD-8#TRPBF
LTC6401-8	Fixed 8 dB gain	0 to 2200	8	33.5	-78/-59	12.3	3	45	3 × 3 QFN	EAR99	LTC6401CUD-8#TRPBF LTC6401IUD-8#TRPBF
AD8351	Resistor programmed	10 to 2200	0 to 26	31	-79/-81	15.5	3, 5	28	MSOP	EAR99	AD8351ACPZ-R7
AD8352	Resistor programmed	10 to 2200	3 to 25	41	-83/-82	15.5	3, 5	37	3 × 3 LFCSP	EAR99	AD8352ACPZ-R7
ADL5561	Pin strap	10 to 2900	6, 12, 15.5	49	-95/-87	8	3.3	40	3 × 3 LFCSP	EAR99	ADL5561ACPZ-R7
LTC6406	Resistor programmed	0 to 3000	0 to 40	24.4	-77/-65	7.5	3	18	3 × 3 QFN MSOP	EAR99	LTC6406CUD#TRPBF LTC6406IUD#TRPBF LTC6406CMS8E#TRPBF LTC6406IMS8E#TRPBF
ADA4961	DVGA, parallel and serial control, 1 dB step	10 to 3200	-3 to +18	50	-84/-100	5.6	3, 5	150	4 × 4 LFCSP	EAR99	ADA4961ACPZN-R7
ADL5562	Pin strap	0 to 3300	6, 12, 15.5	47	-104/-87	7.3	3.3	80	3 × 3 LFCSP	EAR99	ADL5562ACPZ-R7
ADL5567	Dual	0 to 4300	20	49.8	-94/-103	7.1	3.3, 5	148	4 × 4 LFCSP	EAR99	ADL5567ACPZN-R7
ADL5566	Dual	0 to 4500	16	51	-94.7/-100	6.58	3, 5	140, 160	4 × 4 LFCSP	EAR99	ADL5566ACPZ-R7
ADL5569	Differential amplifier/ADC driver	0 to 6500	20	41	-78/-71	9.3	5	86	2.5 × 3 LFCSP	EAR99	ADL5569BCPZ
ADL5565	Pin strap	0 to 7000	6, 12, 15.5	53	-108/-103	8.7	3, 5	70, 80	3 × 3 LFCSP	EAR99	ADL5565ACPZ-R7
New ADL5580	Resistor programmed	0 to 10,000	0 to 10	40.3	-66.4/-66.1	11.2	5/-1.8	276/-224	4 × 4 LGA	EAR99	ADL5580BCCZ-R7
LTC6409	Resistor programmed	0 to 10,000	0 to 52	39	-88/-93	6.9	3, 5	52	3 × 2 QFN	EAR99	LTC6409CUD#TRPBF LTC6409IUD#TRPBF LTC6409HUD#TRPBF
LTC6419	Dual, resistor programmed	0 to 10,000	0 to 52	33.5	-85/-83	6.9	3, 5	104	4 × 3 LQFN	EAR99	LTC6419IV#PBF LTC6419HV#PBF

Low Noise Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC356	LNA	0.35 to 0.55	17	21	38	1	External	5	104	3 × 3 LFCSP	EAR99	HMC356LP3E
ADL8104 New	Hlgh OIP2 LNA	0.4 to 7.5	15	20	32	3.5	Internal	5	150	3 × 3 LFCSP	EAR99	ADL8104ACPZN
HMC373	LNA	0.7 to 1	14	20	35	1	Internal	5	90	3 × 3 LFCSP	EAR99	HMC373LP3E
HMC376	LNA	0.7 to 1	15	21	36	0.7	Internal	5	73	3 × 3 LFCSP	EAR99	HMC376LP3E
HMC618A	LNA	1.2 to 2.2	19	20	36	0.75	External	5	117	3 × 3 LFCSP	EAR99	HMC618ALP3E
HMC374	LNA	0.3 to 3	15	22	37	1.5	Internal	5	90	SOT-26	EAR99	HMC374E
HMC374*	LNA	0.3 to 3	15	17	35	1.6	Internal	3.3	75	SC70	EAR99	HMC374SC70E
ADL5521*	LNA	0.4 to 4	20.8	22	37	0.9	External	5	60	3 × 3 LFCSP	5A991.b	ADL5521ACPZ-R7
ADL5523*	LNA	0.4 to 4	21.5	21	34	0.8	External	5	60	3 × 3 LFCSP	5A991.b	ADL5523ACPZ-R7
HMC609	LNA	2 to 4	20.5	21	36	3	Internal	6	170	Die	EAR99	HMC609
HMC609	LNA	2 to 4	20	21.5	36.5	3.5	Internal	6	170	4 × 4 LFCSP	EAR99	HMC609LC4
HMC717A	LNA	4.8 to 6	14.5	18	29.5	1.3	External	5	68	3 × 3 LFCSP	EAR99	HMC717ALP3E
HMC392A	LNA	3.5 to 7	17.2	19.5	32.5	1.7	Internal	5	59	Die	EAR99	HMC392A
ADL8111*	LNA	0.01 to 8	12.5	17	34	2.8	Internal	5	70	6 × 6 LGA	EAR99	ADL8111ACCZN
HMC392A	LNA	3.5 to 8	17	19	34.5	1.8	Internal	5	61	4 × 4 LFCSP	EAR99	HMC392ALC4
ADL5721	LNA	5.9 to 8.5	25.9	16.6	29.9	1.6	Internal	3.3	86.5	2 × 2 LFCSP	EAR99	ADL5721ACPZN-R7
HMC8410	LNA	0.01 to 10	19.5	21.5	33	1.1	Internal	5	65	2 × 2 LFCSP	EAR99	HMC8410LP2FE
HMC8410	LNA	0.01 to 10	19	21	33	1.3	Internal	5	65	Die	EAR99	HMC8410
HMC8411*	Wideband LNA	0.01 to 10	15	20	34	1.7	Internal	3, 5	55	2 × 2 LFCSP	EAR99	HMC8411LP2FE
HMC639	LNA	0.2 to 4	13	22	38	2.3	Internal	5	110	SOT-89	EAR99	HMC639ST89E
ADRF5545A	Bypassable LNA	2.4 to 4.2	32	19	32	1.45	External	5	86	6 × 6 LFCSP	EAR99	ADRF5545ABCPZN
ADRF5547	Bypassable LNA	3.7 to 5.3	33	18	31	1.6	External	5	86	6 × 6 LFCSP	EAR99	ADRF5547BCPZN
HMC8412 New	LNA	0.4 to 10	15	19	32	1.5	Internal	5	60	Die	EAR99	HMC8412CHIPS
HMC8412	LNA	0.4 to 11	15	18	33	1.5	Internal	5	60	2 × 2 LFCSP	EAR99	HMC8412LP2FE
ADRF5549	Bypassable LNA	1.8 to 2.8	35	19	32	1.4	External	5	85	6 × 6 LFCSP	EAR99	ADRF5549BCPZN
HMC902*	LNA	5 to 10	19	16	28	1.8	Internal	3.5	80	3 × 3 LFCSP	EAR99	HMC902LP3E
HMC902	LNA	5 to 10	20	16	28	1.6	Internal	3.5	80	Die	EAR99	HMC902
HMC753	LNA	1 to 11	17	18	30	1.5	Internal	5	55	4 × 4 LFCSP	EAR99	HMC753LP4E
ADL5723	LNA	10.1 to 11.7	24.5	14.5	26.7	2.2	Internal	3.3	109.1	2 × 2 LFCSP	EAR99	ADL5723ACPZN-R7
HMC-ALH444	LNA	1 to 12	17	19	28	1.5	Internal	5	55	Die	EAR99	HMC-ALH444
HMC772	LNA	2 to 12	15	13	25	1.8	Internal	4	45	4 × 4 LFCSP	EAR99	HMC772LC4
HMC564	LNA	7 to 14	17	12	24	1.8	Internal	3	51	Die	EAR99	HMC564
HMC564*	LNA	7 to 14	17	13	25	1.8	Internal	3	51	4 × 4 LFCSP	EAR99	HMC564LC4
ADL5724	LNA	12.7 to 15.4	26.4	15.4	28.4	2.1	Internal	3.3	109.7	2 × 2 LFCSP	EAR99	ADL5724ACPZN-R7
HMC490	LNA	12 to 16	27	25	35	2.5	Internal	5	200	5 × 5 LFCSP	EAR99	HMC490LP5E
HMC490	LNA	12 to 17	27	26	35	2	Internal	5	200	Die	EAR99	HMC490
HMC903*	LNA	6 to 17	18	14	25	1.7	Internal	3.5	80	3 × 3 LFCSP	EAR99	HMC903LP3E
HMC903	LNA	6 to 18	19	15	27	1.6	Internal	3.5	90	Die	EAR99	HMC903
HMC516*	LNA	9 to 18	20	13	25	2	Internal	3	65	5 × 5 LFCSP	EAR99	HMC516LC5
HMC516	LNA	9 to 18	21	13	20	2	Internal	3	65	Die	EAR99	HMC516
ADL5725	LNA	17.7 to 19.7	27.8	13.8	26.3	2.4	Internal	3.3	108	2 × 2 LFCSP	EAR99	ADL5725ACPZN-R7
HMC462	LNA and distributed	2 to 20	13	14	25	2.5	Internal	5	66	5 × 5 LFCSP	EAR99	HMC462LP5
HMC462	LNA and distributed	2 to 20	15	15	27	2.5	Internal	5	63	Die	EAR99	HMC462
ADL9006 New	LNA	2 to 20	15.5	18	23	2.5	Internal	5	53	5 × 5 LFCSP_CAV	EAR99	ADL9006ACGZN

Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave

Low Noise Amplifiers(Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC-ALH435	LNA	5 to 20	13	16	25	2.2	Internal	5	30	Die	EAR99	HMC-ALH435
HMC565	LNA	6 to 20	21	10	20	2.5	Internal	3	53	5 × 5 LFCSP	EAR99	HMC565LC5
HMC565	LNA	6 to 20	22	10	20	2.3	Internal	3	53	Die	EAR99	HMC565
ADL5726	LNA	21.2 to 23.6	24.7	15.2	25.7	3.3	Internal	3.3	92.4	2 × 2 LFCSP	EAR99	ADL5726ACPZN-R7
HMC342	LNA	13 to 25	20	5	13	3.5	Internal	3	43	Die	EAR99	HMC342
HMC342*	LNA	13 to 25	22	9	20	3.5	Internal	3	43	3 × 3 LFCSP	EAR99	HMC342LC4
HMC517*	LNA	17 to 26	19	13	23	2.5	Internal	3	67	4 × 4 LFCSP	EAR99	HMC517LC4
HMC517	LNA	17 to 26	20	11	23	2	Internal	3	65	Die	EAR99	HMC517
ADL9005 New	LNA	0.01 to 26.5	18.5	13.5	25	2.5	Internal	5	80	4 × 4 LFCSP	EAR99	ADL9005ACPZN
HMC963*	LNA	6 to 26.5	22	10	18	2.5	Internal	3.5	45	4 × 4 LFCSP	EAR99	HMC963LC4
HMC962*	LNA	7.5 to 26.5	13	13	23	2.5	Internal	3.5	70	4 × 4 LFCSP	EAR99	HMC962LC4
HMC-ALH216	LNA	14 to 27	18	14	—	2.5	Internal	4	90	Die	5A991.h	HMC-ALH216
HMC504	LNA	14 to 27	19.5	17	26	2.2	Internal	4	90	4 × 4 LFCSP	5A991.h	HMC504LC4B
HMC-ALH476	LNA	14 to 27	20	14	—	2	Internal	4	90	Die	5A991.h	HMC-ALH476
HMC751	LNA	17 to 27	25	13	25	2.2	Internal	4	73	4 × 4 LCC	EAR99	HMC751LC4
HMC8401	LNA	0.01 to 28	14.5	16.5	26	1.5	Internal	7.5	60	Die	EAR99	HMC8401
ADL9006 New	LNA	2 to 28	15.5	17	21	2.5	Internal	5	55	Die	EAR99	ADL9006CHIPS
HMC7950	LNA	2 to 28	15	16	26	2	Internal	5	64	6 × 6 QFN	EAR99	HMC7950LS6
HMC752	LNA	24 to 28	25	13	26	2.5	Internal	3	70	4 × 4 LFCSP	EAR99	HMC752LC4
HMC341	LNA	21 to 29	13	6	16	2.5	Internal	3	30	Die	EAR99	HMC341
HMC341	LNA	21 to 29	13	8	19	2.5	Internal	3	35	3 × 3 LFCSP	EAR99	HMC341LC3B
HMC8400	LNA	0.2 to 30	13.5	14.5	26.5	2	Internal	5	67	Die	3A001.b.2.d	HMC8400
HMC8402	LNA	2 to 30	13.5	21.5	26	2	Internal	7	68	Die	3A001.b.2.d	HMC8402
HMC519*	LNA	18 to 31	14.4	11	23	3	Internal	3	75	4 × 4 LFCSP	EAR99	HMC519LC4
HMC519	LNA	18 to 31	15	14	23	3	Internal	3	75	Die	EAR99	HMC519
HMC518	LNA	20 to 32	15	12	23	3	Internal	3	65	Die	3A001.b.2.d	HMC518
HMC-ALH364	LNA	24 to 32	21	7	—	2	Internal	5	68	Die	3A001.b.2.d	HMC-ALH364
HMC263	LNA	24 to 36	20	8	18	2.2	Internal	3	58	3 × 3 LFCSP	3A001.b.2.d	HMC263LP4E
HMC263	LNA	24 to 36	22	8	17	2	Internal	3	58	Die	3A001.b.2.d	HMC263
HMC566	LNA	29 to 36	20	12	24	2.8	Internal	3	80	Die	3A001.b.2.d	HMC566
HMC566*	LNA	29 to 36	21	12	24	2.8	Internal	3	82	4 × 4 LFCSP	3A001.b.2.d	HMC566LP4E
HMC-ALH445 [^]	LNA	18 to 40	10	12	—	3.9	Internal	5	45	Die	3A001.b.2.d	HMC-ALH445
HMC-ALH140	LNA	24 to 40	11.5	15	—	4	Internal	4	60	Die	3A001.b.2.d	HMC-ALH140
HMC-ALH244	LNA	24 to 40	12	13	—	3.5	Internal	4	45	Die	3A001.b.2.d	HMC-ALH244
HMC-ALH369	LNA	24 to 40	22	11	—	2	Internal	5	66	Die	3A001.b.2.d	HMC-ALH369
HMC1040	LNA	24 to 43.5	22	12	22	2.7	Internal	2.5	70	3 × 3 LFCSP	3A001.b.2.d	HMC1040LP3CE
HMC1040*	LNA	20 to 44	21	14	25.5	2.5	Internal	2.5	70	Die	3A001.b.2.d	HMC1040CHIPS
HMC-ALH376	LNA	35 to 45	16	6	—	2	Internal	4	87	Die	3A001.b.2.d	HMC-ALH376
HMC-ALH382*	LNA	57 to 65	21	12	—	4	Internal	2.5	64	Die	EAR99	HMC-ALH382
HMC8325	LNA	71 to 86	21	13	22	3.6	Internal	3	50	Die	3A001.b.2.g	HMC8325
ADL7003	LNA	50 to 95	14	14	21	5	Internal	3	120	Die	3A001.b.2.7	ADL7003CHIPS

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave ^ = Part supports single positive supply operation.

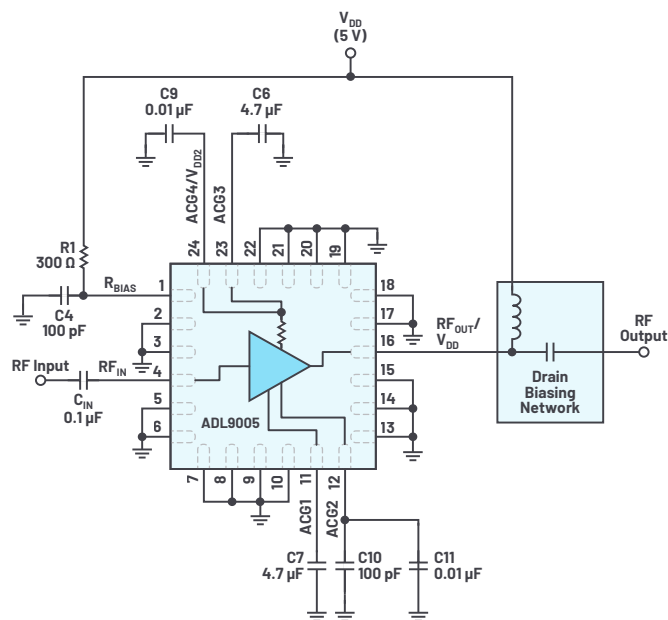
ADL9005: Wideband, Low Noise Amplifier, Single Positive Supply, 0.01 GHz to 26.5 GHz

Key Features

- ▶ Single positive supply
- ▶ Low noise figure: 2.5 dB typical from 0.01 GHz to 14 GHz
- ▶ High gain: 17.5 dB typical from 0.01 GHz to 14 GHz
- ▶ OP1dB: 13.5 dBm typical from 0.01 GHz to 20 GHz
- ▶ High OIP3: 26 dBm typical from 0.01 GHz to 14 GHz
- ▶ RoHS-compliant, 4 mm × 4 mm, 24-lead LFCSP

Applications

- ▶ Test instrumentation
- ▶ Military
- ▶ Communications



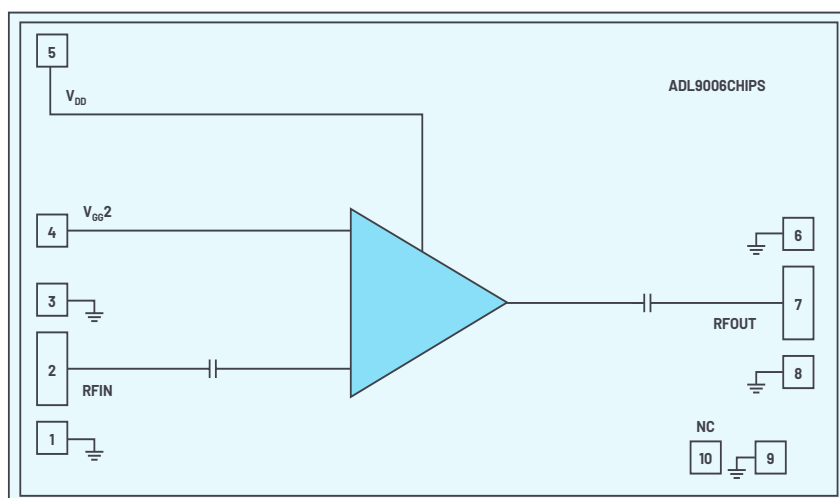
ADL9006CHIPS: 2 GHz to 28 GHz, GaAs, pHEMT, MMIC Low Noise Amplifier

Key Features

- ▶ Single positive supply
- ▶ Low noise figure: 2.5 dB typical from 0.01 GHz to 14 GHz
- ▶ High gain: 17.5 dB typical from 0.01 GHz to 14 GHz
- ▶ OP1dB: 13.5 dBm typical from 0.01 GHz to 20 GHz
- ▶ High OIP3: 26 dBm typical from 0.01 GHz to 14 GHz
- ▶ RoHS-compliant, 4 mm × 4 mm, 24-lead LFCSP

Applications

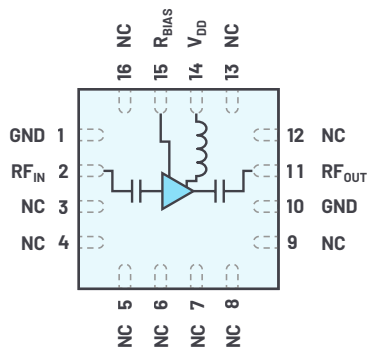
- ▶ Test instrumentation
- ▶ Military
- ▶ Communications



ADL8104: Wideband, High Linearity, Low Noise Amplifier, 0.4 GHz to 7.5 GHz

Key Features

- ▶ Single positive supply (self biased)
- ▶ High OIP2: 52 dBm typical at 0.6 GHz to 7.5 GHz
- ▶ High gain: 15 dB typical at 0.6 GHz to 6 GHz
- ▶ High OIP3: 32 dBm typical
- ▶ Low noise figure: 3.5 dB typical at 0.4 GHz to 6 GHz
- ▶ RoHS-compliant, 3 mm × 3 mm, 16-lead LFCSP



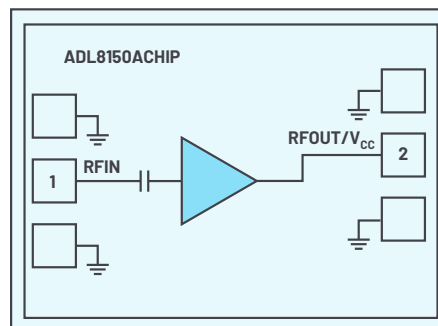
Applications

- ▶ Test instrumentation
- ▶ Military communications

ADL8150: GaAs, HBT, MMIC, Low Phase Noise Amplifier, 6 GHz to 14 GHz

Key Features

- ▶ OP1dB: 18 dBm (typical at 7 GHz to 12 GHz)
- ▶ PSAT: 22 dBm (typical at 7 GHz to 12 GHz)
- ▶ Gain: 12 dB (typical at 7 GHz to 12 GHz)
- ▶ OIP3: 30 dBm typical
- ▶ Phase noise: -172 dBc/Hz at 10 kHz offset
- ▶ Supply voltage: 5 V at 74 mA
- ▶ 6-lead, 2 mm × 2 mm LFCSP



Applications

- ▶ Military and space
- ▶ Test instrumentation
- ▶ Communications

ADPA7008/ADPA7009: 22 GHz to 54 GHz, GaAs, pHEMT, MMIC, Wideband Power Amplifier

Key Features

- Freq range: 22 GHz to 54 GHz

ADPA7008

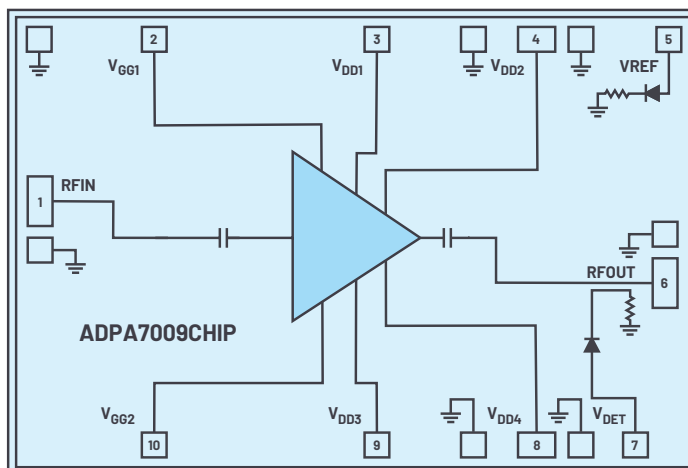
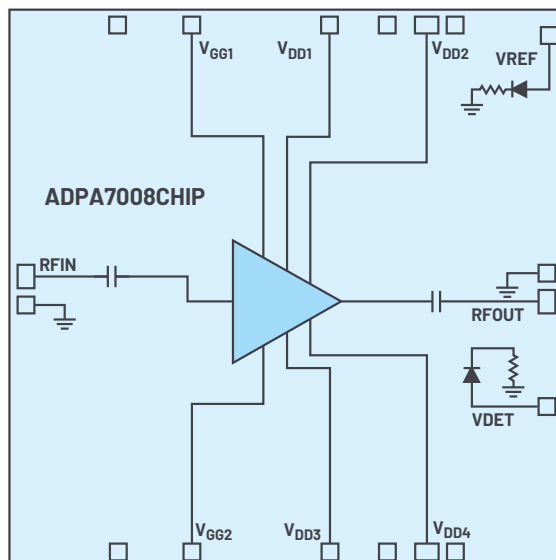
- P1dB: 30.5 dBm
- P_{SAT} : 31 dBm
- Typ gain: 18 dB
- V_{DD} : 5 V @ 1.5 A

ADPA7009

- P1dB: 28.5 dBm
- P_{SAT} : 29 dBm
- Typ gain: 19.5 dB
- V_{DD} : 5 V @ 750 mA
- Integrated power detector
- 50 Ω matched input and output
- Integrate into MCMs

Applications

- Test instrumentation
- Military and space
- Telecommunications infrastructure



Gain Blocks and Driver Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5534	Gain block	0.02 to 0.5	21	20	40	2.5	Internal	5	98	5 × 5 LFCSP	EAR99	ADL5534ACPZ-R7
ADL5531	Gain block	0.02 to 0.5	20.9	20	41	2.5	Internal	5	100	3 × 3 LFCSP	EAR99	ADL5531ACPZ-R7
ADL5530*	Gain block	0 to 1	16.8	22	37	3	Internal	3	110	2 × 3 LFCSP	EAR99	ADL5530ACPZ-WP
ADL5536*	Gain block	0.02 to 1	20	20	45	2.6	Internal	5	105	SOT-89	EAR99	ADL5536ARKZ-R7
ADL5535*	Gain block	0.02 to 1	16	19	46	3.2	Internal	5	97	SOT-89	EAR99	ADL5535ARKZ-R7
ADL5605	1 W driver amp	0.7 to 1	23	31	44	4.8	External	5	307	4 × 4 LFCSP	EAR99	ADL5605ACPZ-R7
LTC6433-15	Gain block	0.0001 to 1.4	15.9	19.2	47	3.22	Internal	5	95	4 × 4 QFN	EAR99	LTC6433AIUF-15#TRPBF
LTC6433-15	Gain block	0.0001 to 1.4	15.9	19.2	45	3.22	Internal	5	95	4 × 4 QFN	EAR99	LTC6433BIUF-15#TRPBF
LTC6431-20	Gain block	0.02 to 1.4	20.8	22	46.2	2.6	Internal	5	93	4 × 4 QFN	EAR99	LTC6431AIUF-20#TRPBF
LTC6431-20	Gain block	0.02 to 1.4	20.8	22	45.7	2.6	Internal	5	93	4 × 4 QFN	EAR99	LTC6431BIUF-20#TRPBF
LTC6431-15	Gain block	0.02 to 1.7	15.5	20.6	47	3.33	Internal	5	85.1	4 × 4 QFN	EAR99	LTC6431AIUF-15#TRPBF
LTC6431-15	Gain block	0.02 to 1.7	15.5	20.6	45.5	3.33	Internal	5	85.1	4 × 4 QFN	EAR99	LTC6431BIUF-15#TRPBF
AD8354*	Gain block	0.001 to 2.7	20	5	19	4.2	Internal	3	25	2 × 3 LFCSP	EAR99	AD8354ACPZ-REEL7
AD8353	Gain block	0.001 to 2.7	20	9	24	5.6	Internal	3	42	2 × 3 LFCSP	EAR99	AD8353ACPZ-REEL7
ADL5320*	0.25 W driver amp	0.4 to 2.7	13.2	26	42	4.4	External	3.3	47	SOT-89	EAR99	ADL5320ARKZ-R7
ADL5606	1 W driver amp	1.8 to 2.7	24.3	31	46	4.7	External	5	362	4 × 4 LFCSP	EAR99	ADL5606ACPZ-R7
HMC789*	0.25 W driver amp	0.7 to 2.8	18	25	42	3.8	External	5	125	SOT-89	EAR99	HMC789ST89E
HMC741*	Gain block	0.05 to 3	20	19	42	2.5	Internal	5	96	SOT-89	EAR99	HMC741ST89E
HMC740*	Gain block	0.05 to 3	15	18	40	3.5	Internal	5	88	SOT-89	EAR99	HMC740ST89E
HMC395	Gain block	0 to 4	15	15	28	4.5	Internal	5	54	Die	EAR99	HMC395
HMC589A*	Gain block	0 to 4	21	21	33	4.5	Internal	5	82	SOT-89	EAR99	HMC589AST89E
ADL5601*	Gain block	0.05 to 4	15	19	43	3.7	Internal	5	83	SOT-89	EAR99	ADL5601ARKZ-R7
ADL5602*	Gain block	0.05 to 4	19.3	19	42	3.3	Internal	5	89	SOT-89	EAR99	ADL5602ARKZ-R7
HMC636*	Gain block	0.2 to 4	13	22	40	2.2	Internal	5	155	SOT-89	EAR99	HMC636ST89
ADL5324*	0.5 W driver amp	0.4 to 4	14	29	44	3.5	External	3.3	60	SOT-89	EAR99	ADL5324ARKZ-R7
ADL5321*	0.25 W driver amp	2.3 to 4	14	26	41	4	External	3.3	37	SOT-89	EAR99	ADL5321ARKZ-R7
HMC326	0.25 W driver amp	3 to 4.5	21	24	36	5	Internal	5	130	MSOP	EAR99	HMC326MS86
HMC480*	Gain block	0 to 5	19	20	34	2.9	Internal	8	82	SOT-89	EAR99	HMC480ST89
HMC313	Gain block	0 to 6	17	14	27	6.5	Internal	5	50	SOT-26	EAR99	HMC313
HMC311*	Gain block	0 to 6	15	16	32	5	External	5	55	SOT-89	EAR99	HMC311ST89E
HMC311*	Gain block	0 to 6	14.5	16	32	4.5	External	5	55	3 × 3 LFCSP	EAR99	HMC311LP3E
ADL5545*	Gain block	0.03 to 6	24.1	18	36	2.9	Internal	5	56	SOT-89	EAR99	ADL5545ARKZ-R7
ADL5544*	Gain block	0.03 to 6	17.4	18	35	2.9	Internal	5	55	SOT-89	EAR99	ADL5544ARKZ-R7
ADL5610*	Gain block	0.03 to 6	18.4	21	38	2.1	Internal	5	91	SOT-89	EAR99	ADL5610ARKZ-R7
ADL5611*	Gain block	0.03 to 6	22.1	21	39	2.1	Internal	5	91	SOT-89	EAR99	ADL5611ARKZ-R7
ADL5542	Gain block	0.05 to 6	18.7	18	39	3.2	Internal	5	93	3 × 3 LFCSP	EAR99	ADL5542ACPZ-R7
ADL5541	Gain block	0.05 to 6	14.7	16	39	3.8	Internal	5	90	3 × 3 LFCSP	EAR99	ADL5541ACPZ-R7

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.* = X-Microwave.

Gain Blocks and Driver Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC311*	Gain block	0 to 8	15	15	30	5	External	5	55	SC70	EAR99	HMC311SC70E
HMC396	Gain block	0 to 8	12	14	30	6	Internal	5	56	Die	EAR99	HMC396
HMC405	Gain block	0 to 10	16	13	25	4	Internal	5	50	Die	EAR99	HMC405
HMC397	Gain block	0 to 10	15	13	24	4.5	Internal	5	56	Die	EAR99	HMC397
HMC788A	Gain block	0 to 10	14	20	33	7	Internal	5	76	2 × 2 LFCSP	EAR99	HMC788ALP2E
HMC3587	Gain block	4 to 10	14.5	11	25	3.5	Internal	5	44	3 × 3 LFCSP	EAR99	HMC3587LP3BE
ADL8150	Low phase noise	6 to 14	13	19	31.5	3.5	Internal	5	76	Die	EAR99	ADL8150ACHIP
ADL8150	Low phase noise	6 to 14	12	18	30	3.6	Internal	5	74	2 × 2 LFCSP	EAR99	ADL8150ACPZN
HMC3653*	Gain block	7 to 15	15	15	28	4	Internal	5	44	3 × 3 LFCSP	EAR99	HMC3653LP3BE

Low Phase Noise Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Additive Phase Noise (10 kHz Offset) (dBc/Hz)	Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC589A*	Gain block	0 to 4	21	21	33	4.5	-172	Internal	5	82	SOT-89	EAR99	HMC589AST89E
ADL5602*	Gain block	0.05 to 4	19.3	19	42	3.3	-162	Internal	5	89	SOT-89	EAR99	ADL5602ARKZ-R7
HMC326	0.25 W driver amp	3 to 4.5	21	24	36	5	-167	Internal	5	130	MSOP	EAR99	HMC326MS8G
HMC311*	Gain block	0 to 6	15	16	32	5	-165	External	5	55	SOT-89	EAR99	HMC311ST89E
HMC311*	Gain block	0 to 6	14.5	16	32	4.5	-165	External	5	55	3 × 3 LFCSP	EAR99	HMC311LP3E
ADL5611*	Gain block	0.03 to 6	22.1	21	39	2.1	-156	Internal	5	91	SOT-89	EAR99	ADL5611ARKZ-R7
ADL5544*	Gain block	0.03 to 6	17.4	18	35	2.9	-156	Internal	5	55	SOT-89	EAR99	ADL5544ARKZ-R7
HMC637B	Distributed	0 to 7.5	15.5	28	39	3.5	-163	Internal	12	345	5 × 5 LFCSP	EAR99	HMC637BPM5E
HMC311*	Gain block	0 to 8	15	15	30	5	-165	External	5	55	SC70	EAR99	HMC311SC70E
HMC788A*	Gain block	0 to 10	14	20	33	7	-153	Internal	5	76	2 × 2 LFCSP	EAR99	HMC788ALP2E
HMC8410*	LNA	0.01 to 10	19.5	21.5	33	1.1	-157	Internal	5	65	2 × 2 LFCSP	EAR99	HMC8410LP2FE
HMC8410	LNA	0.01 to 10	19	21	33	1.3	-157	Internal	5	65	Die	EAR99	HMC8410
HMC8411*	LNA	0.01 to 10	15.5	20	34	1.7	-161	Internal	3.3, 5	55	2 × 2 LFCSP	EAR99	HMC8411LP2FE
ADL8150 New	Low phase noise	6 to 14	13	19	31.5	3.5	-172	Internal	5	76	Die	EAR99	ADL8150ACHIP
ADL8150 New	Low phase noise	6 to 14	12	18	30	3.6	-172	Internal	5	74	2 × 2 LFCSP	EAR99	ADL8150ACPZN
HMC3587*	Gain block	4 to 10	14.5	11	25	3.5	-161	Internal	5	44	3 × 3 LFCSP	EAR99	HMC3587LP3BE
HMC3653*	Gain block	7 to 15	15	15	28	4	-160	Internal	5	44	3 × 3 LFCSP	EAR99	HMC3653LP3BE
HMC606	Low phase noise	2 to 18	12.5	13	22	7	-166	Internal	—	64	Die	EAR99	HMC606
HMC606*	Low phase noise	2 to 18	13.5	15	—	—	-166	—	—	—	5 × 5 LFCSP	EAR99	HMC606LC5
HMC460	Distributed	0 to 20	14	16	29	2.5	-155	Internal	8	75	Die	EAR99	HMC460
HMC460*	Distributed	0 to 20	14	17	30	2.5	-155	Internal	8	75	5 × 5 LFCSP	EAR99	HMC460LC5
HMC797A	1 W, distributed	0 to 22	15	29	41	3	-161	Internal	10	400	Die	EAR99	HMC797A
HMC797A*	1 W, distributed	0 to 22	15	29	41	3.5	-161	Internal	10	400	5 × 5 LFCSP	EAR99	HMC797APM5E
HMC994A*	0.8 W, distributed	0 to 28	15	28	38	3.5	-161	Internal	10	250	5 × 5 LFCSP	EAR99	HMC994APM5E

— = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave

Low Phase Noise Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output PldB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Additive Phase Noise (10 kHz Offset) (dBc/Hz)	Device Match	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC994A	0.5 W, distributed	0 to 30	14.5	28	39	3.5	-161	Internal	10	250	Die	EAR99	HMC994A
HMC519*	LNA	18 to 31	14.4	11	23	3	-150	Internal	3	75	4 × 4 LFCSP	EAR99	HMC519LC4
HMC519	LNA	18 to 31	15	14	23	3	-150	Internal	3	75	Die	EAR99	HMC519

Wideband Distributed Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output PldB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC637A*	Distributed	0 to 6	13	29	44	5	Internal	12	400	5 × 5 LFCSP	EAR99	HMC637ALP5E
HMC637A	1 W, output distributed	0 to 6	14	30.5	41	4	Internal	12	400	Die	EAR99	HMC637A
HMC637B	Distributed	0 to 7.5	15.5	28	39	3.5	Internal	12	345	5 × 5 LFCSP	EAR99	HMC637BPM5E
HMC659	Distributed	0 to 15	19	27	35	2	Internal	8	300	Die	EAR99	HMC659
HMC659*	Distributed	0 to 15	19	28	35	2.5	Internal	8	300	5 × 5 LFCSP	EAR99	HMC659LC5
HMC633	Distributed	5 to 17	29	23	30	8	Internal	5	180	Die	EAR99	HMC633
HMC633*	Distributed	5.5 to 17	30	23	30	8	Internal	5	180	4 × 4 LFCSP	EAR99	HMC633LC4
HMC459	Distributed	0 to 18	17	25	32	3	Internal	8	290	Die	EAR99	HMC459
HMC606	Low phase noise	2 to 18	12.5	13	22	7	Internal	—	64	Die	EAR99	HMC606
HMC606*	Low phase noise	2 to 18	13.5	15	—	—	—	—	—	5 × 5 LFCSP	EAR99	HMC606LC5
HMC1049	LNA, distributed	0.3 to 19	16	15	27	1.7	Internal	7	70	Die	EAR99	HMC1049
HMC1049*	LNA, distributed	0.3 to 20	15	15	29	1.8	Internal	7	70	5 × 5 LFCSP	EAR99	HMC1049LP5E
HMC559	Distributed	0 to 20	14	28	36	4	Internal	10	400	Die	EAR99	HMC559
HMC460	Distributed	0 to 20	14	16	29	2.5	Internal	8	75	Die	EAR99	HMC460
HMC460*	Distributed	0 to 20	14	17	30	2.5	Internal	8	75	5 × 5 LFCSP	EAR99	HMC460LC5
HMC465	Distributed	0 to 20	17	22	30	2.5	Internal	8	160	Die	EAR99	HMC465
HMC465*	Distributed	0 to 20	15	23	28	3	Internal	8	160	5 × 5 LFCSP	EAR99	HMC465LP5
HMC-ALH482	LNA, distributed	2 to 20	16	14	—	1.7	Internal	4	45	Die	EAR99	HMC-ALH482
HMC-ALH102	Distributed	2 to 20	10	10	—	2.5	Internal	2	55	Die	EAR99	HMC-ALH102
HMC464	Distributed	2 to 20	16	26	30	4	Internal	8	290	Die	EAR99	HMC464
HMC464*	Distributed	2 to 20	14	26	30	4	Internal	8	290	5 × 5 LFCSP	EAR99	HMC464LP5E
HMC463	Distributed	2 to 20	14	16	28	2.5	Internal	5	60	Die	EAR99	HMC463
HMC463*	Distributed	2 to 20	13	18	26	3	Internal	5	60	5 × 5 LFCSP	EAR99	HMC463LP5
HMC463	Distributed	2 to 20	14	18	28	2.5	Internal	5	60	LFCSP	EAR99	HMC463LH250
HMC462	Distributed	2 to 20	15	15	27	2.5	Internal	5	63	Die	EAR99	HMC462
HMC462*	Distributed	2 to 20	13	14	25	2.5	Internal	5	66	5 × 5 LFCSP	EAR99	HMC462LP5
HMC634	Distributed	5 to 20	22	23	31	7.5	Internal	5	180	Die	EAR99	HMC634
HMC634*	Distributed	5 to 20	21	22	29	7.5	Internal	5	180	4 × 4 LFCSP	EAR99	HMC634LC4
HMC998A	2 W, distributed	0 to 22	14.5	32.5	43	2.5	Internal	15	500	Die	EAR99	HMC998A
HMC998A	2 W, distributed	0 to 22	15	32	42	3	Internal	15	500	5 × 5 LFCSP	EAR99	HMC998APM5E
HMC797A	1 W, distributed	0 to 22	15	29	41	3	Internal	10	400	Die	EAR99	HMC797A
HMC797A*	1 W, distributed	0 to 22	15	29	41	3.5	Internal	10	400	5 × 5 LFCSP	EAR99	HMC797APM5E
HMC907A	0.6 W, distributed	0.2 to 22	14	28	41	3	Internal	10	350	Die	EAR99	HMC907A
HMC907A	0.6 W, distributed	0.2 to 22	14	28	40	3	Internal	10	350	5 × 5 LFCSP	EAR99	HMC907APM5E
HMC994A	0.8 W, distributed	0 to 28	15	28	38	3.5	Internal	10	250	5 × 5 LFCSP	EAR99	HMC994APM5E

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Wideband Distributed Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC994A	0.5 W, distributed	0 to 30	14.5	28	39	3.5	Internal	10	250	Die	EAR99	HMC994A
HMC562	Distributed	2 to 35	12.5	18	27	3	Internal	8	80	Die	3A001.b.2.d	HMC562
HMC930A	0.25 W, distributed	0 to 40	13	22	33.5	5	Internal	10	175	Die	3A001.b.2.d	HMC930A
HMC5805A*	0.25 W, distributed	0 to 40	11.5	24.5	29	4	Internal	10	175	6 × 6 LFCSP	3A001.b.2.d	HMC5805ALS6
HMC635	Distributed	18 to 40	19.5	23	29	8	Internal	5	280	Die	3A001.b.2.d	HMC635
HMC635	Distributed	18 to 40	18.5	22	27	8	Internal	5	280	4 × 4 LFCSP	3A001.b.2.d	HMC635LC4
HMC1022A	Power amp	0 to 48	11.5	21	29	5.5	Internal	10	150	Die	3A001.b.2.d	HMC1022ACHIPS
HMC1127	Distributed	2 to 50	14	12	22	—	—	5	65	Die	3A001.b.2.d	HMC1127
HMC1126	Distributed	2 to 50	11	15	28	—	—	5	66	Die	3A001.b.2.d	HMC1126
HMC-AUH312	Distributed	0.5 to 65	10	—	—	—	Internal	8	60	Die	3A001.b.2.f	HMC-AUH312

Linear and Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC450	0.7 W driver	0.8 to 1	26	26	40	8	External	5	310	QSOP	EAR99	HMC450QS16GE
HMC453	1.6 W PA	0.4 to 2.2	22	33	50	6.5	External	5	725	QSOP	EAR99	HMC453QS16GE
HMC452*	1 W PA	0.4 to 2.2	21	30	49	7.5	External	5	510	SOT-89	EAR99	HMC452ST89
HMC452	1 W PA	0.4 to 2.2	23	30	48	7	External	5	485	QSOP	EAR99	HMC452QS16GE
HMC453*	1.6 W PA	0.45 to 2.2	21	32	49	6.5	External	5	725	SOT-89	EAR99	HMC453ST89
HMC454*	0.5 W PA	0.4 to 2.5	13	27	42	6	External	5	150	SOT-89	EAR99	HMC454ST89
HMC455	0.5 W PA	1.7 to 2.5	13	27	42	—	External	5	150	3 × 3 LFCSP	EAR99	HMC455LP3E
HMC414	1 W PA	2.2 to 2.8	20	27	39	—	External	5	300	MSOP	EAR99	HMC414MS8GE
HMC409	1 W PA	3.3 to 3.8	31	31	46	5.8	External	5	615	3 × 3 LFCSP	EAR99	HMC409LP4E
HMC327*	0.5 W PA	3 to 4	21	27	40	5	Internal	5	250	MSOP	EAR99	HMC327MS8GE
HMC637B	Distributed	0 to 7.5	15.5	28	39	3.5	Internal	12	345	5 × 5 LFCSP	EAR99	HMC637BPM5E
HMC415	0.2 W driver	4.9 to 5.9	20	22	32	6	External	3	285	3 × 3 LFCSP	EAR99	HMC415LP3E
HMC408	1 W PA	5.1 to 5.9	20	30	43	6	External	5	750	3 × 3 QFN	EAR99	HMC408LP3E
HMC406*	0.25 W PA	5 to 6	17	27	38	6	Internal	5	300	MSOP	EAR99	HMC406MS8GE
HMC407	0.32 W PA	5 to 7	15	25	40	5.5	Internal	5	230	MSOP	EAR99	HMC407MS8GE
HMC1121	4 W PA	5.5 to 8.5	27	36	44	—	Internal	7	2200	6 × 6 LFCSP	3A001.b.2.b	HMC1121LP6GE
HMC7357	2 W PA	5.5 to 8.5	29	35	42	—	Internal	8	1200	4 × 4 QFN	EAR99	HMC7357LP5GE
HMC591	2 W PA	6 to 9.5	18	33	41	—	Internal	7	1340	5 × 5 QFN	EAR99	HMC591LP5E
ADPA9002	Power amp	0 to 10	15.5	28	40.5	4	Internal	10	385	5 × 5 LFCSP_CAV	EAR99	ADPA9002ACGZN
HMC591	2 W PA	6 to 10	23	33	43	—	Internal	7	1340	Die	EAR99	HMC591
HMC590	1 W PA	6 to 10	25	32	41	—	Internal	7	820	Die	EAR99	HMC590
HMC590	1 W PA	6 to 10	21	31	40	—	Internal	7	820	5 × 5 QFN	EAR99	HMC590LP5E
HMC608	0.5 W driver	9.5 to 11.5	29	27	33	6	Internal	5	310	4 × 4 QFN	EAR99	HMC608LC4
HMC487	2 W PA	9 to 12	20	32	36	8	Internal	7	1300	5 × 5 QFN	EAR99	HMC487LP5E
HMC441	0.06 W driver	6.5 to 13.5	14	18	29	4.5	Internal	5	95	3 × 3 QFN	EAR99	HMC441LP3
HMC952A	2 W PA	9 to 14	33	36	43	—	Internal	6	1400	5 × 5 LFCSP	EAR99	HMC952ALP5GE
HMC441	0.08 W driver	7 to 15.5	16	19	30	4.5	Internal	5	90	1 × 1 QFN	EAR99	HMC441LM1
HMC441	0.08 W driver	7 to 15.5	15	20	32	4.8	Internal	5	90	5 × 5 LFCSP	EAR99	HMC441LH5

— = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave

Linear and Power Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC451	0.125 W driver amp	5 to 18	18	19.5	28	7	Internal	5	120	3 × 3 LFCSP	EAR99	HMC451LP3E
HMC1082	Driver amp	5.5 to 18	24	25.5	36	—	Internal	5	220	Die	EAR99	HMC1082CHIP
HMC1082*	0.25 W driver	5.5 to 18	22	24	35	—	Internal	5	220	4 × 4 QFN	EAR99	HMC1082LP4E
HMC441	0.08 W driver	6 to 18	16	20	32	4.5	Internal	5	95	Die	EAR99	HMC441
HMC441*	0.1 W driver	6 to 18	17	20	32	4.5	Internal	5	95	3 × 3 QFN	EAR99	HMC441LC3B
HMC451	0.1 W driver	5 to 20	22	20	30	—	Internal	5	127	Die	EAR99	HMC451
HMC451*	0.08 W driver	5 to 20	19	19	30	7	Internal	5	114	3 × 3 QFN	EAR99	HMC451LC3
HMC6981	2 W PA	15 to 20	26	34	44	—	External	6	1100	6 × 6 QFN	EAR99	HMC6981LS6
HMC498	0.25 W driver	17 to 24	24	25	34	—	Internal	5	250	Die	EAR99	HMC498
HMC498*	0.3 W driver	17 to 24	22	25	36	4	Internal	5	250	4 × 4 QFN	EAR99	HMC498LC4
HMC442	0.1 W driver	17.5 to 24	14	22	28	6.5	Internal	5	85	1.35 LCC	EAR99	HMC442LM1
HMC442	0.14 W driver	17.5 to 25.5	15	22	28	5.5	Internal	5	84	Die	EAR99	HMC442
HMC442	0.16 W driver	17.5 to 25.5	13	22	27	8	Internal	5	84	3 × 3 QFN	EAR99	HMC442LC3B
HMC863A	0.5 W PA	24 to 29.5	24	27	38.5	4.5	Internal	5.5	350	4 × 4 QFN	EAR99	HMC863ALC4
HMC383	0.04 W driver	12 to 30	16	16	25	7	Internal	5	100	Die	EAR99	HMC383
HMC383*	0.04 W driver	12 to 30	15	17	25	7.5	Internal	5	100	4 × 4 QFN	EAR99	HMC383LC4
HMC943A	2 W PA	24 to 34	23	33	37.5	—	Internal	5.5	1300	5 × 5 LFCSP	3A001.b.2.d	HMC943APM5E
HMC7441	2 W PA	27.5 to 31.5	23	34	38	—	Internal	6	1000	Die	3A001.b.2.c	HMC7441
HMC499	0.25 W driver	21 to 32	16	24	33	—	Internal	5	200	Die	3A001.b.2.d	HMC499
HMC499*	0.2 W driver	21 to 32	17	23	34	5	Internal	5	200	4 × 4 QFN	3A001.b.2.d	HMC499LC4
HMC1132	1 W PA	27 to 32	24	29	37	5.5	Internal	5	650	5 × 5 LFCSP	3A001.b.2.d	HMC1132PM5E
HMC-APH596*	0.25 W driver	16 to 33	17	24	33	—	Internal	5	400	Die	5A991.h	HMC-APH596
HMC906A	2 W PA	27.3 to 33.5	26.5	33	43	—	Internal	5	1200	Die	3A001.b.2.d	HMC906A
HMC1131*	0.2 W driver	24 to 35	22	24	35	—	Internal	5	225	4 × 4 LFCSP	3A001.b.2.d	HMC1131LC4
HMC7229	1 W PA	33 to 40	24.5	31.5	39.5	—	Internal	6	1200	Die	3A001.b.2.d	HMC7229
HMC7229	1 W PA	37 to 40	24	32	40	—	Internal	6	1200	6 × 6 LFCSP	3A001.b.2.d	HMC7229LS6
HMC-AUH256	0.1 W driver	17.5 to 41	21	20	27	—	Internal	5	295	Die	3A001.b.2.d	HMC-AUH256
HMC-ABH264	0.06 W driver	34 to 42	19	18	29	6.5	Internal	5	120	Die	3A001.b.2.d	HMC-ABH264
ADPA7002	0.5 W PA	18 to 44	17	28	38	5	Internal	5	700	6 × 6 LCC_HS	3A001.b.2.d	ADPA7002AEHZ
ADPA7002	0.5 W PA	20 to 44	15	28	40	5	Internal	5	600	Die	3A001.b.2.d	ADPA7002CHIP
ADPA7005 Upcoming	1 W PA	18 to 44	15.5	31	39	7	Internal	5	1400	7 × 7 LCC_HS	3A001.b.2.d	ADPA7005AEHZ
ADPA7005	1 W PA	20 to 44	17	31	41	7	Internal	5	1200	Die	3A001.b.2.d	ADPA7005CHIP
ADPA7006	0.5 W PA	18 to 44	23	29	37.5	7	Internal	5	800	6 × 6 LCC_HS	3A001.b.2.d	ADPA7006AEHZ
ADPA7006	0.5 W WB PA	20 to 44	23.5	29	38	—	Internal	5	800	Die	3A001.b.2.d	ADPA7006CHIP
ADPA7007*	1 W PA	18 to 44	22	30	41	5.5	Internal	5	1400	Die	3A001.b.2.d	ADPA7007CHIP
ADPA7007 New	1 W WB PA	20 to 44	21.5	30	42.5	5.5	Internal	5	1400	7 × 7 LCC_HS	3A001.b.2.d	ADPA7007AEHZ
ADPA7008 New	1 W PA	20 to 54	18	30.5	38	6	Internal	5	1500	Die	3A001.b.2.d	ADPA7008CHIP
ADPA7009 New	0.5 W PA	20 to 54	19.5	28.5	35	5.5	Internal	5	750	Die	3A001.b.2.d	ADPA7009CHIP
HMC-ABH209*	0.04 W driver	55 to 65	13	16	25	—	Internal	5	80	Die	3A001.b.2.f	HMC-ABH209
HMC1144	0.126 W driver	40 to 70	19	21	28	—	Internal	4	320	Die	3A001.b.2.f	HMC1144
ADMV7710	1 W PA	71 to 76	24	28	34	—	Internal	4	800	Die	5A991.b, EAR99	ADMV7710CHIPS

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Linear and Power Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P1dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Device Match	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADPA7004 New	Power amp	40 to 80	18.5	22	31	–	Internal	3.5	550	Die	3A001.b.2.g	ADPA7004CHIPS
ADMV7810	1 W PA	81 to 86	20	28	33	–	Internal	4	800	Die	5A991.b, EAR99	ADMV7810CHIPS
ADPA7001*	0.056 W PA	50 to 95	14.5	17	25	–	Internal	3.5	350	Die	3A001.b.2.g	ADPA7001CHIPS

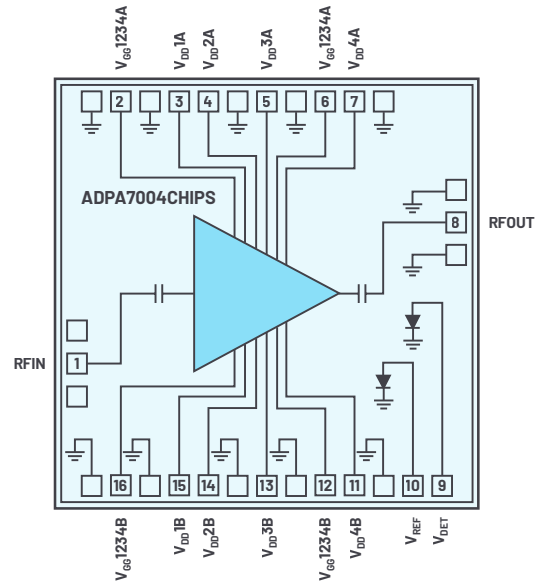
ADPA7004: 40 GHz to 80 GHz, GaAs, pHEMT, MMIC, Wideband Power Amplifier

Key Features

- ▶ Gain: 18.5 dB typical at 45 GHz to 75 GHz
- ▶ Input return loss: 20.0 dB typical at 45 GHz to 75 GHz
- ▶ Output return loss: 22.0 dB typical at 45 GHz to 75 GHz
- ▶ Output P1dB: 22.0 dBm typical at 45 GHz to 75 GHz
- ▶ P_{SAT} : 24.0 dBm typical at 45 GHz to 75 GHz
- ▶ Output IP3: 31.0 dBm typical at 45 GHz to 75 GHz
- ▶ Supply voltage: 3.5 V at 550 mA
- ▶ 50 Ω matched input and output
- ▶ Die size: 2.940 mm $\times$ 3.320 mm $\times$ 0.05 mm

Applications

- ▶ Test instrumentation
- ▶ Military and space
- ▶ Telecommunications infrastructure



ADPA7005: GaAs pHEMT 18 GHz to 44 GHz, >1 W MMIC Power Amplifier

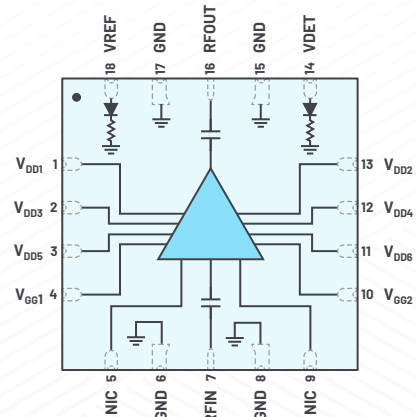
Upcoming

Key Features

- ▶ High P1dB: 31 dBm
- ▶ P_{SAT} : 32 dBm
- ▶ Gain: 15.5 dB
- ▶ Output IP3: 42.5 dBm
- ▶ Supply: 5 V at 1400 mA
- ▶ 50 Ω matched input and output
- ▶ 18-terminal, 7 mm $\times$ 7 mm LCC_HS package

Applications

- ▶ Millimeter wave 5G network radios
- ▶ Transmit PA modules
- ▶ Military radar



GaN Power Amplifiers

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P4dB (dBm)	Output IP3 (dBm)	Noise Figure (dB)	Operation	P_{SAT} (dBm)	V_S (V)	I_S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1099	10 W, GaN PA	0.01 to 1.1	18	30	47.5	5	CW	41	28	100	5 $\times$ 5 LFCSP	EAR99	HMC1099PM5E
ADPA1105 <i>New</i>	40 W, GaN PA	0.9 to 1.6	34.5	—	—	—	Pulsed	46	50	400	5 $\times$ 5 LFCSP_CAV	EAR99	ADPA1105ACGZN
HMC8500*	10 W, GaN PA	0.01 to 2.8	15	40	47	4.5	CW	40	28	100	5 $\times$ 5 LFCSP	EAR99	HMC8500PM5E
HMC1114	10 W, GaN PA	2.7 to 3.8	24	41.5	44	5	CW	41.5	28	150	5 $\times$ 5 LFCSP	EAR99	HMC1114PM5E
HMC8205	35 W, GaN PA	0.3 to 6	20	45	47	—	CW and pulsed	46	50	1300	LDCC (flange)	3A001.b.2.a.4	HMC8205BF10
HMC8205	35 W, GaN PA	0.4 to 6	20	45	47	—	CW and pulsed	46	50	1300	Die	3A001.b.2.a.4	HMC8205BCHIPS

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

GaN Power Amplifiers (Continued)

Part Number	Description	Frequency (GHz)	Gain (dB)	Output P _{4dB} (dBm)	Output IP ₃ (dBm)	Noise Figure (dB)	Operation	P _{SAT} (dBm)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1086	25 W, GaN PA	2 to 6	22	41	48	14	CW	44.5	28	1100	Die	3A001.b.2.a.4	HMC1086
HMC1086	25 W, GaN PA	2 to 6	22	41	46	14	CW	44.5	28	1100	Flange	3A001.b.2.a.4	HMC1086F10
HMC7149	40 W, GaN PA	6 to 18	20	35	39.5	—	CW	40	28	680	Die	3A001.b.2.c	HMC7149
HMC8415	40 W, GaN PA	9 to 10.5	23	35	—	—	Pulsed	46	28	1000	6 × 6 LFCSP	3A001.b.2.d	HMC8415LP6GE
HMC1087	8 W, GaN PA	2 to 20	11	38	44	5.5	CW	39	28	850	Die	3A001.b.2.c	HMC1087
HMC1087	8 W, GaN PA	2 to 20	11	38	44	5.5	CW	39	28	850	Flange	3A001.b.2.c	HMC1087F10

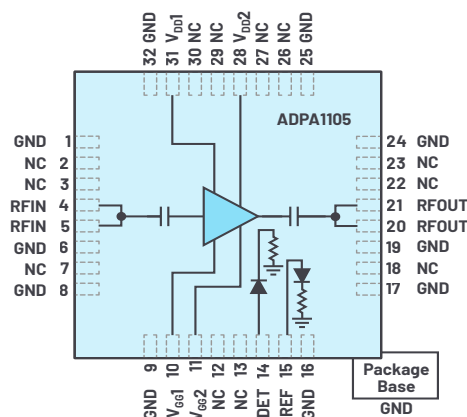
ADPA1105: 46 dBm (40 W), 0.9 GHz to 1.6 GHz, GaN Power Amplifier

Key Features

- ▶ Output power with P_{IN} = 19 dBm: 46 dBm typical
- ▶ Small signal gain: 34.5 dB typical at 0.9 GHz to 1.4 GHz
- ▶ Power gain with P_{IN} = 19 dBm: 27 dB typical
- ▶ Bandwidth: 0.9 GHz to 1.6 GHz
- ▶ PAE with P_{IN} = 19 dBm: 60% typical at 0.9 GHz to 1.4 GHz
- ▶ Supply voltage: V_{DD} = 50 V at 400 mA on 10% duty cycle
- ▶ 32-lead, 5 mm × 5 mm, LFSCP_CAV package

Applications

- ▶ Weather radar
- ▶ Marine radar
- ▶ Military radar



Active Bias Controllers

Part Number	Description	V _{SUPPLY} (V)	V _{SUPPLY} Drain (V)	I _{DRAIN} (mA)	I _{GATE} Drive (mA)	V _{GATE} (V)	Over/Under I _{DRAIN} Alarm	Low V _{SUPPLY} Alarm	Package (mm)	ECCN Code	Ordering Part Number
HMC920*	Active bias controller	5 to 16.5	3 to 15	0 to 500	-4 to +4	-2.5 to +2	Yes	Yes	5 × 5 LFCSP	EAR99	HMC920LP5E
HMC980	Active bias controller	5 to 16.5	5 to 16.5	0.05 to 1600	-4 to +4	-2.46 to +2.04	Yes	No	Die	EAR99	HMC980
HMC980*	Active bias controller	5 to 16.5	5 to 16.5	0.05 to 1600	-4 to +4	-2.46 to +2.04	Yes	No	4 × 4 LFCSP	EAR99	HMC980LP4E
HMC981	Active bias controller	4 to 12	4 to 12	20 to 200	-0.8 to +0.8	-2.5 to +2	No	No	Die	EAR99	HMC981
HMC981*	Active bias controller	4 to 12	4 to 12	20 to 200	-0.8 to +0.8	-2.5 to +2	No	No	3 × 3 LFCSP	EAR99	HMC981LP3E

Limiting Amplifiers

Part Number	Data Rate (Gbps)	BW 3 dB (GHz)	Gain (dB)	V _{IN} Sensitivity (mV p-p)	V _{OUT} Diff (mV p-p)	V-Loss (mV)	BW Select	Jitter Random RMS	V (max)	Package (mm)	ECCN Code	Ordering Part Number
HMC914	12.5	9.5	32	15	750	110	Yes	0.2 p	3.6	3 × 3 LFCSP	EAR99	HMC914LP4E
HMC750*	12.5	11	44	2	800	—	Yes	0.2 p	4.5	3 × 3 LFCSP	EAR99	HMC750LP4E
HMC865*	32	25	30	10	800	—	Yes	0.3 p	3.47	3 × 3 LFCSP	EAR99	HMC865LC3
HMC866	43	25	29	20	800	—	Yes	0.3 p	3.47	3 × 3 LFCSP	EAR99	HMC866LC3

Variable Gain Amplifiers

Analog Controlled VGAs

Part Number	Description	Bandwidth (GHz)	Gain Range (dB)	Output IP3 (dBm)	Noise Figure (dB)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8367	Single-ended, with AGC	LF to 0.5	-2.5 to +42.5	36.5	6.2	3 to 5	26	TSSOP	EAR99	AD8367ARUZ
AD8368	Single-ended, with AGC	LF to 0.8	-12 to +22	34	9.5	5	60	4 × 4 LFCSP	EAR99	AD8368ACPZ-REEL7
LTC6412	Analog VGA	LF to 0.8	-14.9 to +17.1	38	10	3.3	110	4 × 4 QFN	EAR99	LTC6412CUF#TRPBF LTC6412IUF#TRPBF
ADL5331	Differential Tx VGA	0.001 to 1.2	—	47	9	5	240	4 × 4 LFCSP	EAR99	ADL5331ACPZ-R7
ADL5330	Differential Tx VGA	0.01 to 3	-32 to +21	31.5	9	5	215	4 × 4 LFCSP	EAR99	ADL5330ACPZ-R2
ADRF6521 New	Dual analog VGA	0.01 to 3	-3 to +18	25.9 (dBV)	10.5	5	200	3 × 3 LFCSP	5A991.b	ADRF6521ACPZ
HMC996	Analog VGA	5 to 12	-3.5 to +18.5	34	2	5	120	4 × 4 LFCSP	EAR99	HMC996LP4E
HMC694	Analog VGA	6 to 17	0 to +23	30	5	5	170	Die	EAR99	HMC694
HMC694	Analog VGA	6 to 17	0 to +23	30	6	5	170	4 × 4 LFCSP	EAR99	HMC694LP4E
HMC997	Analog VGA	17 to 27	5.5 to 20.5	30	3.5	5	170	4 × 4 LFCSP	EAR99	HMC997LC4
HMC6187	Analog VGA	27 to 31.5	6 to 19	31	4.5	5	230	4 × 4 LFCSP	3A001.b.2.d	HMC6187LP4E
HMC8120	Analog VGA/driver amp	71 to 76	15	30	—	4	250	Die	5A991.b	HMC8120
HMC8121	Analog VGA/driver amp	81 to 86	17	27.5	—	4	265	Die	5A991.b	HMC8121

Digitally Controlled VGAs

Part Number	Description	Bandwidth (GHz)	Gain Range (dB)	Step (dB)	Output IP3 (dBm)	Noise Figure (dB)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC960*	Dual-channel diff VGA with serial/parallel control	0 to 0.1	0 to +40	0.5	30	6	5	70	4 × 4 LFCSP	EAR99	HMC960LP4E
HMC681A	6-bit VGA serial control	0 to 1	13.5 to 45	0.5	36	2.7	5	176	5 × 5 LFCSP	EAR99	HMC681ALP5E
AD8372	Programmable, dual	LF to 0.13	-9 to +32	1	35	7.9	5	2 × 106	5 × 5 LFCSP	EAR99	AD8372ACPZ-R7
LT5524	Diff VGA with parallel control	LF to 0.54	4.5 to 27	1.5	40	8.6	5	75	20-lead TSSOP	EAR99	LT5524EFE#TRPBF
AD8366	Diff VGA	LF to 0.6	4.5 to 20.25	0.25	45	11.4	5	2 × 90	5 × 5 LFCSP	EAR99	AD8366ACPZ-R7
AD8369	Diff VGA	LF to 0.63	-5 to +40	3	19.5	7	3 to 5	37	TSSOP	EAR99	AD8369ARUZ
AD8375	Dual diff VGA	LF to 0.7	-4 to +20	1	50	8.3	5	125	4 × 4 LFCSP	EAR99	AD8375ACPZ-R7
AD8376	Diff VGA parallel/serial control	LF to 0.8	-4 to +20	1	50	8.7	5	2 × 125	5 × 5 LFCSP	EAR99	AD8376ACPZ-R7
LT5514	Diff VGA with parallel control	LF to 0.85	10.5 to 33	1.5	47	7.4	5	148	20-lead TSSOP	EAR99	LT5514EFE#TRPBF
AD8370	5-bit diff VGA	0.03 to 0.4	-8 to +34	Variable	35	7.2	3 to 5	79	TSSOP	EAR99	AD8370AREZ
LT5554	Diff VGA with parallel control	LF to 1	1.725 to 17.6	0.125	47	10	5	110	5 × 5 QFN	EAR99	LT5554IUH#TRPBF
HMC680	Dual VGA	LF to 0.6	-4 to +19	1	40	5	5	250	4 × 4 LFCSP	EAR99	HMC680LP4E
HMC742A	6-bit VGA serial/parallel control	0.5 to 4	-19.5 to +12	0.5	39	4	5	150	5 × 5 LFCSP	EAR99	HMC742ALP5E
ADL5335	Differential-in, single-ended out, serial control	0.7 to 4.2	-8 to +12	0.5	33	5.4	5	125	4 × 4 LFCSP	5A991.g	ADL5335ACPZN
HMC625B	Gain block/VGA/driver amp parallel/serial control	0 to 5	-13.5 to +18	0.5	33	6	5	87.5	5 × 5 LFCSP	EAR99	HMC625BLP5E
ADL6316	Differential in, single-ended out, serial control	0.5 to 1	-3.4 to +31.1	0.45	41.8	5.95	5	435	10.5 × 5.5 LGA	5A991.b	ADL6316ACCZ
ADL6317	Differential in, single-ended out, serial control	1.5 to 3	-2.4 to +33.6	0.5	38.4	6.0	5	435	10.5 × 5.5 LGA	5A991.b	ADL6317ACCZ

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Baseband Programmable VGA Filters

Part Number	Description	Bandwidth (MHz)	Gain Range (dB)	Output IP3 (dBm)	Noise Figure (dB)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC900	Dual with programmable LPF	3.5 to 50	0/10	30	12	5	130	5 × 5 LFCSP	EAR99	HMC900LP5E
HMC1023	Dual with programmable LPF	5 to 72	0/10	30	10	5	240	5 × 5 LFCSP	EAR99	HMC1023LP5E
AD8366	Dual	LF to 600	4.5 to 20.25	38	11.4	5	180	5 × 5 LFCSP	EAR99	AD8366ACPZ-R7
ADRF6520	Dual with selectable LPF for E-band	LF to 1250	-6 to +54	27 dBV	11	3.3	420	5 × 5 LFCSP	EAR99	ADRF6520ACPZ-R7

Attenuators

Digital Step Attenuators

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Atten Range (dB)	Step (dB)	Input IP3 (dBm)	PO.1 dB (dBm)	Settling Time (ns)	Control Input (V _{OC})	Package (mm)	ECCN Code	Ordering Part Number
HMC759	7-bit serial DSA	0.01 to 0.3	3.3	3.3 to 31.75	0.25	40	—	15	0/+5	3 × 3 LFCSP	EAR99	HMC759LP3E
HMC470A	5-bit DSA	0 to 3	1.7	0 to 32.3	1	48	27	70	0/+5	3 × 3 LFCSP	EAR99	HMC470ALP3E
HMC424A	6-bit DSA	0.1 to 3	3	0 to 31.5	0.5	46	23	50	0/-5	MSOP	EAR99	HMC424AG16
HMC1095	6-bit DSA	0 to 3	1.3	0 to 31.5	0.5	57	30	90	0/+5	4 × 4 LFCSP	EAR99	HMC1095LP4E
HMC8073	6-bit serial DSA	0.6 to 3	2.2	0 to 31.5	0.5	52	28	260	0/+5	3 × 3 LFCSP	EAR99	HMC8073LP3DE
HMC273A	5-bit DSA	0.7 to 3.7	2.8	0 to 31	1	48	—	1300	0/+5	MSOP	EAR99	HMC273AMS10GE
HMC306A	5-bit DSA	0.7 to 3.8	1.5	0 to 15.5	0.5	52	25	600	0/+5	MSOP	EAR99	HMC306AMS10
HMC472A	6-bit DSA	0 to 3.8	1.7	0 to 31.5	0.5	54	30	60	0/+5	4 × 4 LFCSP	EAR99	HMC472ALP4E
HMC291S	2-bit DSA	0.7 to 4	0.9	0 to 12.7	4	54	26	300	3.3 to 5	SOT-26	EAR99	HMC291SE
HMC539A	5-bit DSA	0 to 4	1	0 to 8.45	0.25	50	28	52	0/+5	3 × 3 LFCSP	EAR99	HMC539ALP3E
HMC542B	6-bit serial DSA	0 to 4	1.7	0 to 31.5	0.5	50	30	100	0/+5	4 × 4 LFCSP	EAR99	HMC542BLP4E
HMC468A	3-bit DSA	0 to 6	0.7	0 to 7	1	55	26	80	0/+5	3 × 3 LFCSP	EAR99	HMC468ALP3E
HMC629A	4-bit serial/parallel DSA	0 to 6	2.5	0 to 45	3	50	—	120	0/+5	4 × 4 LFCSP	EAR99	HMC629ALP4E
HMC1122	6-bit DSA	0.1 to 6	1.2	0 to 31.5	0.5	55	30	200	0/+5	4 × 4 LFCSP	EAR99	HMC1122LP4ME
HMC792A	6-bit serial DSA	0 to 6	1.8	0 to 15.75	0.25	53	31	150	0/+5	4 × 4 LFCSP	EAR99	HMC792ALP4E
HMC624A	6-bit serial/parallel DSA	0 to 6	2.2	0 to 31.5	0.5	55	30	90	0/+5	4 × 4 LFCSP	EAR99	HMC624ALP4E
HMC1119	7-bit serial/parallel DSA	0.1 to 6	1.5	0 to 33.5	0.25	54	30	200	TTL/CMOS	4 × 4 LFCSP	EAR99	HMC1119LP4ME
HMC305S	5-bit, glitch-free DSA	0.4 to 7	1.4	0 to 15.5	0.5	52	28	160	0/+5	4 × 4 LFCSP	EAR99	HMC305SLP4E
HMC540S	4-bit parallel DSA	0.1 to 8	0.8	0 to 15	1	54	31	129	0/+5	3 × 3 LFCSP	EAR99	HMC540SLP3E
HMC425A	6-bit DSA	2.2 to 8	3.6	0 to 31.5	0.5	45	24	420	0/+5	3 × 3 LFCSP	EAR99	HMC425ALP3E
HMC802A	1-bit DSA	0 to 10	1.5	0 to 20	20	55	30	90	0/+5	3 × 3 LFCSP	EAR99	HMC802ALP3E
HMC424A	6-bit DSA	0 to 13	3.4	0 to 31.5	0.5	42	24	50	0/-5	Die	EAR99	HMC424A
HMC424A	6-bit DSA	0 to 13	3.3	0 to 31.5	0.5	45	23	50	0/-5	3 × 3 QFN	EAR99	HMC424ALP3E
HMC424A	6-bit DSA	0.1 to 13	3.3	0 to 31.5	0.5	40	23	55	0/-5	5 × 5 QFN	EAR99	HMC424ALH5
HMC1019A*	5-bit DSA	0.1 to 30	4	0 to 15.5	0.5	45	25	90	0/+5	4 × 4 LFCSP	EAR99	HMC1019ALP4E
HMC1018A*	5-bit DSA	0.1 to 30	5.5	0 to 35.5	1	42	22	90	0/+5	4 × 4 LFCSP	EAR99	HMC1018ALP4E
HMC941A	5-bit DSA	0.1 to 30	4	0 to 18	0.5	43	24	50	0/+5	Die	EAR99	HMC941A
HMC941A	5-bit DSA	0.1 to 33	4	0 to 18	0.5	43	24	50	0/+5	4 × 4 LFCSP	EAR99	HMC941ALP4E
HMC939A	5-bit DSA	0.1 to 33	5.5	0 to 31	1	43	23	60	0/+5	4 × 4 LFCSP	EAR99	HMC939ALP4E
HMC939A	5-bit DSA	0.1 to 40	7	0 to 31	1	40	24	70	0/+5	Die	EAR99	HMC939A
ADRF5720*	6-bit DSA	9 kHz to 40	4.5	0 to 31.5	0.5	50	30	8 μs	CMOS/LVTTL	4 × 4 LGA	EAR99	ADRF5720BCCZN
ADRF5721*	4-bit DSA	9 kHz to 40	3.4	0 to 30	2	50	30	8.5 μs	CMOS/LVTTL	2.5 × 2.5 LGA	EAR99	ADRF5721BCCZN
ADRF5730*	6-bit DSA	0.1 to 40	4.8	0 to 31.5	0.5	50	30	250	CMOS/LVTTL	4 × 4 LGA	EAR99	ADRF5730BCCZN
ADRF5731*	4-bit DAS	0.1 to 40	3.5	0 to 30	2	50	30	230	CMOS/LVTTL	2.5 × 2.5 LGA	EAR99	ADRF5731BCCZN
ADRF5740*	4-bit DSA	0.1 to 60	2.2	0 to 22	2	45	25.5	175	CMOS/LVTTL	2.5 × 2.5 LGA	EAR99	ADRF5740BCCZN

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

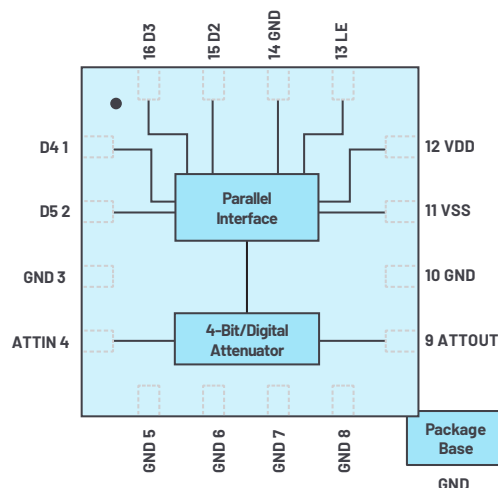
ADRF5740: 100 MHz to 60 GHz Wideband SOI Digital Attenuator

Key Features

- ▶ 22 dB attenuation range, 2 dB steps
- ▶ Low insertion loss:
 - 1.7 dB up to 26 GHz
 - 2.5 dB up to 44 GHz
 - 2.9 dB up to 50 GHz
- ▶ Accurate attenuation: ± 0.2 dB +4% of attenuation state
- ▶ High IP3: 44 dBm
- ▶ Input handling power: 24 dBm
- ▶ Positive logic attenuation control
- ▶ ± 3 V supply, < 110 μ A
- ▶ Tiny 2.5 mm $\times$ 2.5 mm LGA package

Applications

- ▶ Millimeter wave 5G network radios
- ▶ Test and instrumentation
- ▶ Military/aerospace electronics
- ▶ Satellite radio



Voltage Variable Attenuators

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Attenuation Range (dB)	Input IP3 (dBm)	Settling Time (ns)	Control Input (V _{DC})	Package (mm)	ECCN Code	Ordering Part Number
HMC973A*	Analog VVA	0.5 to 6	3.5	3.5 to 29.5	35	—	0 to +5	3 $\times$ 3 LFCSP	EAR99	HMC973ALP3E
HMC346A	Analog VVA	0 to 8	2.1	5 to 29	30	16	0 to -5	MSOP	EAR99	HMC346AMS8GE
HMC346A	Analog VVA	0 to 14	2.7	5 to 30	30	16	0 to -5	3 $\times$ 3 LFCSP	EAR99	HMC346ALP3E
HMC346A	Analog VVA	0 to 18	2.8	5 to 30	30	16	0 to -5	3 $\times$ 3 LFCSP	EAR99	HMC346ALC3B
HMC712A	Analog VVA	5 to 26.5	3.5	10 to 42	32	—	0 to -5	3 $\times$ 3 LFCSP	EAR99	HMC712ALP3CE
HMC812A	Analog VVA	5 to 30	2.2	3 to 33	28	—	0 to -5	4 $\times$ 4 LFCSP	EAR99	HMC812ALC4
HMC985A	Analog VVA	10 to 40	3	3 to 33	33	—	0 to -3	4 $\times$ 4 LFCSP	EAR99	HMC985ALP4KE
HMC985A	Analog VVA	20 to 50	3.5	3 to 33	30	—	0 to -3	Die	EAR99	HMC985A

* = X-Microwave.

Fixed Attenuators

Part Number	Description	Frequency (GHz)	Nominal Attenuation Range (dB)	Attenuation Accuracy	Max Input Power (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC652*	Fixed passive	0 to 25	2	±0.5	27	2 × 2 QFN	EAR99	HMC652LP2E
HMC653*	Fixed passive	0 to 25	3	±0.5	26	2 × 2 QFN	EAR99	HMC653LP2E
HMC654*	Fixed passive	0 to 25	4	±0.5	25	2 × 2 QFN	EAR99	HMC654LP2E
HMC655	Fixed passive	0 to 25	6	±0.5	25	2 × 2 QFN	EAR99	HMC655LP2E
HMC656*	Fixed passive	0 to 25	10	±1.5	25	2 × 2 QFN	EAR99	HMC656LP2E
HMC657	Fixed passive	0 to 25	15	±2	25	2 × 2 QFN	EAR99	HMC657LP2E
HMC658	Fixed passive	0 to 25	20	±2	25	2 × 2 QFN	EAR99	HMC658LP2E
HMC650	Through line	0 to 50	0.15	±0.2	—	Die	EAR99	HMC650
HMC651	Through line	0 to 50	0.15	±0.2	—	Die	EAR99	HMC651
HMC652	Fixed passive	0 to 50	2	±0.2	27	Die	EAR99	HMC652
HMC653	Fixed passive	0 to 50	3	±0.2	26	Die	EAR99	HMC653
HMC654	Fixed passive	0 to 50	4	±0.2	25	Die	EAR99	HMC654
HMC655	Fixed passive	0 to 50	6	±0.5	25	Die	EAR99	HMC655
HMC656	Fixed passive	0 to 50	10	±0.1	25	Die	EAR99	HMC656
HMC657	Fixed passive	0 to 50	15	±0.4	25	Die	EAR99	HMC657
HMC658	Fixed passive	0 to 50	20	±0.5	25	Die	EAR99	HMC658

RF Mixers

Single, Double, and Triple Balanced Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Noise Figure (dB)	Input P1dB (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
AD831	Active	0 to 0.5	0 to 0.5	0 to 0.2	0	24	70	30	10.3	10	-10	PLCC	EAR99	AD831APZ
HMC684	With LO amp	0.7 to 1	0.6 to 1	0 to 0.45	-7	32	23	30	7	25	0	4 × 4 LFCSP	EAR99	HMC684LP4E
HMC683	Dual Rx with LO amp	0.7 to 1	0.57 to 0.9	0.06 to 0.5	7.5	23	16	20	11	11	0	6 × 6 LFCSP	EAR99	HMC683LP6CE
AD8344	Active Rx	0.4 to 1.2	0.47 to 1.6	0.07 to 0.4	4.5	24	48	23	10.5	24	0	3 × 3 LFCSP	EAR99	AD8344ACPZ-REEL7
LTC5540	Passive, with IF gain	0.6 to 1.3	0.7 to 1.2	0.005 to 0.5	7.9	25.9	33	42	9.9	11	0	5 × 5 QFN	EAR99	LTC5540IUH#TRPBF
LT5519	Active upconverting mixer	0.7 to 1.4	0.3 to 1.8	LF to 0.4	-0.6	17.1	39	35	13.6	5.5	-5	4 × 4 QFN	EAR99	LT5519EUF#TRPBF
HMC686	With LO amp	0.7 to 1.5	0.85 to 1.5	0 to 0.5	-7.5	34	26	41	7.5	24	0	4 × 4 LFCSP	EAR99	HMC686LP4E
LTC5590	Dual passive, with IF gain	0.6 to 1.7	0.7 to 1.5	0.005 to 0.5	8.7	26	39	28	9.7	10.7	0	5 × 5 QFN	EAR99	LTC5590IUH#TRPBF
LT5526	Active low power mixer	0.0001 to 2	0.0001 to 2.5	0.0001 to 1	0.4	14.1	50	34	13.7	1	-5	4 × 4 QFN	EAR99	LT5526EUF#TRPBF
HMC687*	With LO amp	1.7 to 2.2	1.7 to 2.4	0 to 0.5	-8	35	32	29	8	23	0	4 × 4 QFN	EAR99	HMC687LP4E
HMC685	With LO amp	1.7 to 2.2	1.5 to 2.2	0 to 0.5	-8	35	30	30	8	24	0	4 × 4 QFN	EAR99	HMC685LP4E
HMC682	Dual Rx with LO amp	1.7 to 2.2	1.4 to 2	0.06 to 0.4	6	25	25	22	12	15	0	6 × 6 QFN	EAR99	HMC682LP6CE
LT5520	Active upconverting mixer	1.3 to 2.3	0.9 to 2.7	DC to 0.4	-1	15.9	36	30	15	4	-5	4 × 4 QFN	EAR99	LT5520EUF#TRPBF
LTC5541	Passive, with IF gain	1.3 to 2.3	1.4 to 2	0.005 to 0.5	7.8	26.4	33	38	9.6	11.3	0	5 × 5 QFN	EAR99	LTC5541IUH#TRPBF
LTC5591	Dual passive, with IF gain	1.3 to 2.3	1.4 to 2.1	0.005 to 0.5	8.5	26.2	37	40	9.9	10.7	0	5 × 5 QFN	EAR99	LTC5591IUH#TRPBF
AD8343	Active	0 to 2.5	0 to 2.5	0 to 2.5	7	17	18	44	14	3	-10	TSSP	EAR99	AD8343ARUZ
LT5525	Active low power mixer	0.8 to 2.5	0.5 to 3	LF to 1	-2	17.6	40	40	15.1	4	-5	4 × 4 QFN	EAR99	LT5525EUF#TRPBF
LT5578	Active upconversion mixer	0.4 to 2.7	0.4 to 3	LF to 0.6	-0.7	25	49	22	10.5	10	0	5 × 5 QFN	EAR99	LT5578IUH#TRPBF
LT5522	Active	0.4 to 2.7	0.4 to 2.7	LF to 1	-0.1	21.5	45	60	13.9	8	-5	4 × 4 QFN	EAR99	LT5522EUF#TRPBF
LTC5542	Passive, with IF gain	1.6 to 2.7	1.7 to 2.5	0.005 to 0.5	8	26.8	35	45	9.9	11.3	0	5 × 5 QFN	EAR99	LTC5542IUH#TRPBF
LTC5592	Dual passive, with IF gain	1.6 to 2.7	1.5 to 2.5	0.005 to 0.5	8.3	27.3	35	38	9.8	11	0	5 × 5 QFN	EAR99	LTC5592IUH#TRPBF
HMC689	With LO amp	2 to 2.7	2 to 3	0 to 0.8	-7.5	32	34	26	7.5	23	0	4 × 4 QFN	EAR99	HMC689LP4E
HMC688	With LO amp	2 to 2.7	1.7 to 2.4	0 to 0.7	-7.5	35	25	27	7.5	25	0	4 × 4 QFN	EAR99	HMC688LP4E
LT5512	Active	0 to 3	0 to 3	0 to 2	0	21	40	35	11	10.1	-10	4 × 4 QFN	EAR99	LT5512EUF#TRPBF
LT5511	Active upconverting mixer	0.01 to 3	0.03 to 2.7	0.001 to 0.3	0	17	36	—	15	5.9	-10	TSSOP	EAR99	LT5511EFE#TRPBF
LTC5551	Ultrahigh dynamic range passive	0.3 to 3.5	0.2 to 3.5	0.005 to 1	2.4	35.5	27	30	9.7	18	0	4 × 4 QFN	EAR99	LTC5551IUF#TRPBF

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Single, Double, and Triple Balanced Mixers (Continued)

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Noise Figure (dB)	Input P1dB (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
LT5527	Active	0.4 to 3.7	0.38 to 3.5	LF to 0.6	2.3	23.5	45	60	12.5	9	0	4 × 4 QFN	EAR99	LT5527EUF#TRPBF
AD8342	Active	0.001 to 3.8	0.001 to 4.1	0 to 2.4	3.7	23	55	27	12.2	8	0	3 × 3 LFCSP	EAR99	AD8342ACPZ-R2
LT5557	Active, medium power	0.4 to 3.8	0.38 to 4.2	DC to 0.6	2.9	24.7	46	50	11.7	8.8	0	4 × 4 QFN	EAR99	LT5557EUF#TRPBF
LT5579	Active upconversion mixer	0.9 to 3.8	0.75 to 4.3	LF to 1	1.3	27.5	36	26	12	13.7	0	5 × 5 QFN	EAR99	LT5579IUH#TRPBF
HMC666	With LO amp	3.1 to 3.9	2.8 to 3.6	0 to 0.8	-9	31	27	29	9	23	0	4 × 4 LFCSP	EAR99	HMC666LP4E
LT5560	Active, low power	0 to 4	0 to 4	0 to 4	2.4	9	52	41	9.3	-2.8	-2	3 × 3 DFN	EAR99	LT5560EDD#TRPBF
ADL5350	Passive	0.001 to 4	0.001 to 4	0.001 to 4	-6.7	25	13	29	6.4	19	4	2 × 3 LFCSP	EAR99	ADL5350ACPZ-R2
LTC5569	Dual active	0.3 to 4	0.35 to 4.5	LF to 1.6	2	26.8	54	40	11.7	10.2	0	4 × 4 QFN	EAR99	LTC5569IUF#TRPBF
LTC5567	Active	0.3 to 4	0.3 to 4.5	0.005 to 2.5	1.9	26.9	60	42	11.8	10.1	0	4 × 4 QFN	EAR99	LTC5567IUF#TRPBF
LTC5543	Passive, with IF gain	2.2 to 4	2.4 to 3.6	0.005 to 0.6	8.4	24.5	29	37	10.2	10.9	0	5 × 5 QFN	EAR99	LTC5543IUH#TRPBF
HMC213B	Passive	1.5 to 4.5	1.5 to 4.5	0 to 1.5	-10	21	32	30	10	11	13	MSOP	EAR99	HMC213BMS8GE
LTC5593	Dual passive, with IF gain	2.3 to 4.5	2.1 to 3.8	0.005 to 0.6	8.5	27.7	35	44	9.5	10.4	0	5 × 5 QFN	EAR99	LTC5593IUH#TRPBF
LTC5510	Active	0.001 to 6	0.001 to 6.5	0.001 to 6	1.1	25	65	35	11.6	11.5	0	4 × 4 QFN	EAR99	LTC5510IUF#TRPBF
ADL5801	Active	0.001 to 6	0.001 to 6	0.001 to 0.6	1.8	29	31	27	9.75	13	0	4 × 4 LFCSP	5A991.b	ADL5801ACPZ-R7
ADL5802	Dual active	0.1 to 6	0.1 to 6	0 to 3	1.5	28	30	37	11	12	0	4 × 4 LFCSP	EAR99	ADL5802ACPZ-R7
LTC5577	Active	0.3 to 6	0.3 to 6	0.001 to 1.5	0.7	30.2	67	35	11.8	15.2	0	4 × 4 QFN	EAR99	LTC5577IUF#TRPBF
LTC5566	Dual active, with IF VGA	0.3 to 6	0.15 to 6	0.001 to 0.5	-1.6 to +10.6	24.1	58	47	13	6.1 to 13.3	0	5 × 5 QFN	EAR99	LTC5566IUH#TRPBF
LTC5544	Passive, with IF gain	4 to 6	4.2 to 5.8	0.005 to 1	7.4	25.9	30	28	11.3	11.4	0	5 × 5 QFN	EAR99	LTC5544IUF#TRPBF
LTC5562	Active, low power	LF to 7	DC to 9	DC to 7	1	18	34	38	14.6	5	-1	2 × 2 QFN	EAR99	LTC5562IUC#TRPBF
LTC5555	Active with VGA	1.5 to 7	0.5 to 8	0.001 to 0.9	-6.2 to +9.2	22.6	50	55	15.1	10.8	0	4 × 5 QFN	EAR99	LTC5555IUF#TRPBF
LTC5556	Dual active, with VGA	1.5 to 7	0.5 to 8	0.001 to 0.9	-6.1 to +9.1	23	46	—	15.2	10.9	0	5 × 5 QFN	EAR99	LTC5556IUH#TRPBF
HMC557A	Passive	2.5 to 7	2.5 to 7	0 to 3	-7	22	47	34	7	10	15	4 × 4 LFCSP	EAR99	HMC557ALC4
HMC219B	Passive	2.5 to 7	2.5 to 7	0 to 3	-9	18	40	35	9	11	13	MSOP	EAR99	HMC219BMS8GE
LTC5576	Active upconversion mixer	3 to 8	1 to 8	0.03 to 6	-0.6	25.6	40	35	14.1	10.4	0	4 × 4 QFN	EAR99	LTC5576IUF#TRPBF
HMC218B	Passive	3.5 to 8	3.5 to 8	0 to 1.6	-7	17	38	32	7	10	13	MSOP	EAR99	HMC218BMS8GE
HMC129A	Passive	4 to 8	4 to 8	0 to 3	-7	17	40	40	7	10	15	4 × 4 LFCSP	EAR99	HMC129ALC4
HMC787A*	Passive	3 to 10	3 to 10	0 to 4	-9	24	43	26	9	17	13	3 × 3 LFCSP	EAR99	HMC787ALC3B
HMC787A New	Passive	3 to 10	3 to 10	0 to 4	-8	22	47	44	8	15	17	Die	EAR99	HMC787AG

— = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Single, Double, and Triple Balanced Mixers (Continued)

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Noise Figure (dB)	Input P1dB (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC220B*	Passive	5 to 12	5 to 12	0 to 4	-10	18	57	38	10	9.5	10	MSOP	EAR99	HMC220BMS8GE
LTC5548	With 2× LO	2 to 14	1 to 12	DC to 6	-10.2	18.7	29	32	9.6	15.2	0	3 × 2 QFN	EAR99	LTC5548IUDB#TRPBF
LTC5549	With 2× LO	2 to 14	1 to 12	0.5 to 6	-10.8	22.8	30	23	10.4	14.3	0	3 × 2 QFN	EAR99	LTC5549IUDB#TRPBF
HMC558A*	Passive	5.5 to 14	5.5 to 14	0 to 6	-9	22	33	33	7.5	11.5	15	3 × 3 LFCSP	EAR99	HMC558ALC3B
HMC558A	Passive	5.5 to 14	5.5 to 14	DC to 6	-9	21	33	35	8.5	12	15	Die	EAR99	HMC558A
HMC553A*	Passive	6 to 14	6 to 14	0 to 5	-7.5	17.5	37	33	7.5	11.5	13	3 × 3 LFCSP	EAR99	HMC553ALC3B
HMC553A	Passive	6 to 14	6 to 14	DC to 5	-8	17	37	33	8	10.5	13	Die	EAR99	HMC553AG
HMC412B*	Passive	9 to 15	9 to 15	0 to 2.5	-8.4	18	44	41	8.4	11	13	MSOP	EAR99	HMC412BMS8GE
HMC1048A*	Passive	2.25 to 18	2.25 to 18	0 to 4	-10	20	30	30	10	11	13	3 × 3 LFCSP	EAR99	HMC1048ALC3B
LTC5553	With integrated LO buffer	3 to 20	1 to 20	0.5 to 9	-11.6	21.5	32	20	12.1	14.8	0	3 × 2 QFN	EAR99	LTC5553IUDB#TRPBF
LTC5552	With integrated LO buffer	3 to 20	1 to 20	DC to 6	-10.8	18.5	24	19	11.7	14.8	0	3 × 2 QFN	EAR99	LTC5552IUDB#TRPBF
HMC554A	Passive	10 to 20	10 to 20	0 to 6	-8.5	20	38	52	8.5	12	13	Die	EAR99	HMC554A
HMC554A*	Passive	10 to 20	10 to 20	0 to 6	-8.5	20	37	41	9.5	21	13	3 × 3 LFCSP	EAR99	HMC554ALC3B
HMC773A*	Passive	6 to 26	6 to 26	0 to 8	-9	19	37	37	9	10	13	3 × 3 LFCSP	EAR99	HMC773ALC3B
HMC773A	Passive	6 to 26	6 to 26	0 to 10	-10	21	39	33	10	12	13	Die	EAR99	HMC773A
HMC260A*	Passive	10 to 26	10 to 26	0 to 8	-9	23	40	43	10	13	13	3 × 3 LFCSP	EAR99	HMC260ALC3B
HMC260A	Passive	10 to 26	10 to 26	0 to 8	-8.5	22	40	37	11.5	12	13	Die	EAR99	HMC260A
HMC292A*	Passive	14 to 30	14 to 30	0 to 8	-9	19	48	40	10.5	12	13	3 × 3 LFCSP	EAR99	HMC292ALC3B
HMC292A	Passive	14 to 32	14 to 32	0 to 8	-9	20	46	34	11	12	13	Die	EAR99	HMC292A
HMC329A*	Passive	24 to 32	24 to 32	0 to 8	-10.5	20	36.5	35.5	10.5	12	13	3 × 3 QFN	EAR99	HMC329ALC3B
HMC1106*	Passive	15 to 36	20 to 50	0 to 24	-11	16	38	32	9	0	15	Die	EAR99	HMC1106
HMC774A*	Passive	7 to 40	7 to 40	0 to 10	-11	20	32	50	12	12	13	Die	EAR99	HMC774A
ADAR2004 New	4-channel Rx with 4× LO	10 to 40	3.4 to 10.1	0 to 0.8	20	-11	—	-80	11	-20	20	7 × 7 LGA	EAR99	ADAR2004ACCZ
HMC560A New	Passive	24 to 38	22 to 38	DC to 18	-10.5	21	31	35	10.5	14	—	Die	EAR99	HMC560A
HMC560A*	Passive	22 to 38	22 to 38	0 to 18	-11	19.5	38	31	11.5	11.5	13	5 × 5 LGA	EAR99	HMC560ALM3
HMC329A*	Passive	22 to 38	22 to 38	0 to 8	-11	21	36	27	14	13.5	13	Die	EAR99	HMC329A
HMC774A*	Passive	7 to 34	7 to 34	0 to 8	-12	20	30	23	12	12	15	3 × 3 LFCSP	EAR99	HMC774ALC3B
HMC-MDB169	Passive	54 to 64	54 to 64	0 to 5	-8	13	30	25	8	4	13	Die	5A991.h	HMC-MDB169
ADMV1550 Upcoming	Passive	15 to 67	15 to 67	DC to 20	-7	20	40	40	—	12	15	4 × 4 LGA	EAR99	ADMV1550ACCZ
HMC1081	Passive	50 to 75	40 to 85	0 to 26	-7.5	16	30	20	7.5	10	12	Die	EAR99	HMC1081
HMC-MDB277	Passive	70 to 90	70 to 90	0 to 18	-12	—	—	—	—	—	14	Die	5A991.h	HMC-MDB277

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

ADMV1550: 15 GHz to 67 GHz, GaAs, MMIC, Double Balanced Mixer

Upcoming

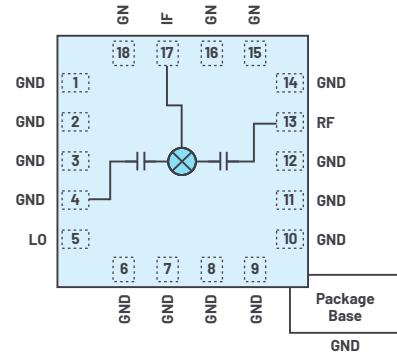
Key Features

- Conversion loss (downconverter): 7 dB typical
- LO to RF isolation: 40 dB typical
- IIP3 (downconverter): 20 dBm typical
- 18-terminal, RoHS compliant, 4 mm × 4 mm LGA package

- Military electronic warfare (EW)
- Electronic countermeasure (ECM)
- Command, control, communications, and intelligence (C3I)

Applications

- Microwave and very small aperture terminal (VSAT) radios
- Test equipment



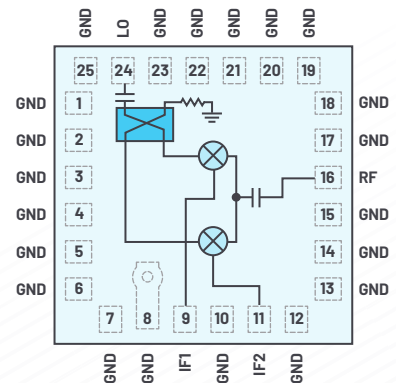
HMC8192: 20 GHz to 42 GHz Passive, Wideband I/Q Mixer

Key Features

- Image rejection: 25 dB
- Conversion loss: 9 dB
- Wide IF bandwidth: DC to 5 GHz
- RF and LO range: 20 GHz to 42 GHz
- High LO to RF isolation: 42 dB
- High LO to IF isolation: 45 dB
- IIP3 (downconverter): 24 dBm
- 25-terminal, 4.0 mm × 4.0 mm LGA package

Applications

- Point-to-point microwave links
- 5G test and measurement instrumentation
- Military/aerospace radars and radio



I/Q Mixers and Image Reject Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dB)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Input P1dB (dBm)	LO Drive Nominal (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC8193*	I/Q and IRM	2.5 to 8.5	2.5 to 8.5	0 to 4	-9	20	25	48	38	13	18	4 × 4 LFCSP	EAR99	HMC8193LC4
HMC525A New	I/Q and IRM	4 to 8.5	4 to 8.5	DC to 3.5	-8	20	30	47	23	8.5	18	Die	EAR99	HMC525A
HMC525A	I/Q and IRM	4 to 8.5	4 to 8.5	0 to 3.5	-8	20	30	47	23	13	15	4 × 4 LFCSP	EAR99	HMC525ALC4
HMC520A	I/Q and IRM	6 to 10	6 to 10	0 to 3.5	-8	19	23	43	25	10	15	4 × 4 LFCSP	EAR99	HMC520ALC4
HMC1056	I/Q and IRM	8 to 12	8 to 12	0 to 4	-8	18	21	40	37	9	10	4 × 4 LFCSP	EAR99	HMC1056LP4BE
HMC521A	I/Q and IRM	8.5 to 13.5	8.5 to 13.5	0 to 3.5	-9	16	27.5	39	18.5	8.3	15	4 × 4 LFCSP	EAR99	HMC521ALC4
HMC521A	I/Q and IRM	8.5 to 13.5	8.5 to 13.5	0 to 3.5	-7	17	21	38	18	8	15	Die	EAR99	HMC521ACHIPS
HMC8191*	I/Q and IRM	6 to 26.5	6 to 26.5	0 to 5	-9	24	25	40	40	15	18	4 × 4 LFCSP	EAR99	HMC8191LC4
HMC8191	I/Q and IRM	6 to 26.5	6 to 26.5	DC to 5	-9.5	22	29.5	43.5	42	15	18	Die	EAR99	HMC8191
HMC1063	I/Q and IRM	24 to 28	24 to 28	0 to 3	-9.5	17	21	38	40	8	10	3 × 3 LFCSP	EAR99	HMC1063LP3E
HMC524A	I/Q and IRM	22 to 32	22 to 32	0 to 4.5	-9	18	26	35	25	17	17	3 × 3 LFCSP	EAR99	HMC524ALC3B
HMC-MDB172	I/Q and IRM	19 to 33	19 to 33	0 to 5	-8	17	25	35	23	8	16	Die	5A991.h	HMC-MDB172
HMC8192*	I/Q and IRM	20 to 42	20 to 42	0 to 5	-8	24	25	42	55	16	18	Die	EAR99	HMC8192
HMC-MDB171	Subharmonic I/Q	35 to 45	35 to 45	0 to 5	-12.5	17	25	35	20	8	16	Die	5A991.h	HMC-MDB171
HMC-MDB218	Subharmonic I/Q	54 to 64	27 to 32	0 to 3	-12.5	7	30	30	30	-2	10	Die	5A991.h	HMC-MDB218

Subharmonic Mixers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	LO/RF Isolation (dB)	LO/IF Isolation (dB)	Input P1dB (dBm)	Image Rejection (dB)	LO Drive (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC337	Subharmonic	17 to 25	9 to 12	0 to 3	-9	10	27	47	0	—	-5	Die	EAR99	HMC337
HMC264	Subharmonic	20 to 30	10 to 15	0 to 4	-9	12	35	40	4	—	-4	3 × 3 QFN	EAR99	HMC264LM3
HMC264	Subharmonic	21 to 31	10.5 to 15.5	0 to 6	-9	12	30	40	3	—	-4	3 × 3 LFCSP	EAR99	HMC264LC3B
HMC264	Subharmonic	20 to 32	10 to 16	0 to 6	-10	13	37	40	4	—	-4	Die	EAR99	HMC264
HMC265	Subharmonic	20 to 31	10 to 15.5	0.7 to 3	3	10	28	47	2	—	-4	3 × 3 QFN	EAR99	HMC265LM3
HMC265	Subharmonic	20 to 32	10 to 16	0.7 to 3	3	10	30	55	2	—	-4	Die	EAR99	HMC265
HMC338	Subharmonic	26 to 33	13 to 16.5	0 to 2.5	-9	10	32	40	1	—	-5	Die	5A991.b	HMC338
HMC338	Subharmonic	24 to 34	12 to 16.5	0 to 3	-11	13	33	50	5	—	-5	3 × 3 LFCSP	5A991.b	HMC338LC3B
HMC798A	Subharmonic	24 to 34	12 to 18	0 to 4	-10.5	20	36	27	6	—	4	3.9 × 3.9 CLCC	EAR99	HMC798ALC4
HMC404	Subharmonic I/Q	26 to 33	13 to 16.5	0 to 3	-11	16	35	35	6	22	2	Die	EAR99	HMC404
HMC339	Subharmonic	33 to 42	16.5 to 21	0 to 3	-10	10	37	40	0	—	2	Die	EAR99	HMC339
HMC1093	Subharmonic	37 to 46.5	8.5 to 11	0 to 7.5	-11	26	15	18	18	—	-1	Die	EAR99	HMC1093
HMC1057	Subharmonic I/Q	71 to 86	29 to 43	0 to 12	-12	13	50	30	0	16	13	Die	EAR99	HMC1057
HMC1058	Subharmonic	71 to 86	29 to 43	0 to 12	-11	6	28	20	0	—	9	Die	EAR99	HMC1058

I/Q Downconverters/Receivers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dBc)	Noise Figure (dB)	LO Drive Nominal (dBm)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC951A	Low noise, I/Q downconverter	5.6 to 8.6	4.5 to 12.1	DC to 3.5	13	3	32	2	0	5	155	4 × 4	EAR99	HMC951ALP4E
HMC951B	I/Q downconverter	5.6 to 8.6	5.6 to 8.6	0 to 3.5	13	1	24	2	2	3.5	160	4 × 4 LFCSP	EAR99	HMC951BLP4E
HMC8108	I/Q downconverter	9 to 10	9 to 10	0.02 to 1	13	6	20	2	-5	3, 3, 1.5	20, 30, 40	5 × 5 LFCSP	EAR99	HMC8108LC5
HMC908A	I/Q downconverter	9 to 12	8.5 to 15.5	0 to 3.5	11	0	25	46	26	-8	12	4 × 4 CLCC	EAR99	HMC908ALC5
ADMV1010	I/Q downconverter	12.6 to 15.4	9 to 12.6	2.7 to 3.5	15	1	25	2	0	4	160	4.9 × 4.9 LCC	EAR99	ADMV1010AEZ
HMC113	I/Q downconverter	10 to 16	10 to 16	0 to 3.5	12	1	25	2	6	3, 4	160	5 × 5 LFCSP	EAR99	HMC113LP5E

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

I/Q Downconverters/Receivers(Continued)

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Input IP3 (dBm)	Image Rejection (dBc)	Noise Figure (dB)	LO Drive Nominal (dBm)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC966	I/Q downconverter	17 to 20	7.5 to 11.75	0 to 3.5	14	0	40	3	6	3.5	160	4 × 4 LFCSP	EAR99	HMC966LP4E
HMC570	I/Q downconverter	17 to 21	7 to 12	0 to 3.5	12	1	22	4	3.5	3.5	125	Die	EAR99	HMC570
HMC570	I/Q downconverter	17 to 21	7 to 12	0 to 3.5	10	2	17	3	4	3.5	125	5 × 5 LFCSP	EAR99	HMC570LC5
ADMV4420	K-band downconverter with PLL and VCO	16.95 to 22.05	16.35 to 21.15	0.9 to 2.5	36	-20	—	7	Internal VCO	5	380	5 × 5 LFCSP	5A991.b	ADMV4420ACPZ
ADMV1012	I/Q downconverter	17.5 to 24	7 to 13.5	2.5 to 3.5	15	3	25	2.1	0	3.3	238	4.9 × 4.9 LCC	EAR99	ADMV1012AEZ
HMC904	I/Q downconverter	17 to 24	7.5 to 12.3	0 to 3.5	12	0	32	3	4	3.5	160	5 × 5 LFCSP	EAR99	HMC904LC5
HMC967	I/Q downconverter	21 to 24	8.8 to 13.5	0 to 3.5	15	1	25	3	6	3.5	170	4 × 4 LFCSP	EAR99	HMC967LP4E
HMC571	I/Q downconverter	21 to 25	9 to 14	0 to 3.5	11	5	24	3	4	3.5	125	Die	EAR99	HMC571
HMC571	I/Q downconverter	21 to 25	9 to 14	0 to 3.5	11	6	23	3	4	3.5	125	5 × 5 LFCSP	EAR99	HMC571LC5
HMC572	I/Q downconverter	23 to 28	9 to 15.5	0 to 3.5	10	6	20	4	4	3.5	125	5 × 5 LFCSP	EAR99	HMC572LC5
HMC977*	I/Q downconverter	20 to 28	8.3 to 15.7	0 to 3.5	14	2	21	3	6	3.5	170	4 × 4 LFCSP	EAR99	HMC977LP4E
HMC1065	I/Q downconverter	27 to 34	11.5 to 19	0 to 4	12	-2	17	3	2	3	240	4 × 4 LFCSP	EAR99	HMC1065LP4E
ADMV1014*	Wideband I/Q downconverter with 4× LO	24 to 44	5.4 to 10.25	0 to 6	17	0	30	5.5	0	3.3	437	5 × 5 LGA	EAR99	ADMV1014ACCZ
HMC6147A	I/Q downconverter	37 to 44	16.5 to 22	0 to 4	13	2	25	4	3	3	225	5 × 5 LFCSP	EAR99	HMC6147ALC5A
HMC6789B	I/Q downconverter	37 to 44	16.5 to 24	0 to 4	14	-1	14	3.5	3	3, 3	150, 75	5 × 5 LFCSP	EAR99	HMC6789BLC5A
HMC7586	E-band I/Q downconverter	71 to 76	11.83 to 14.33	0 to 10	12.5	-1	28	5	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7586
ADMV7410	E-band I/Q downconverter SiP	71 to 76	11.5 to 13	DC to 2	13	1	30	5	4	4, 2, 1.5	66, 175, 80	11 × 13 LGA_CAV	EAR99	ADMV7410BCEZ
ADMV7420	E-band I/Q downconverter SiP	81 to 86	13.2 to 14.6	DC to 2	10	1	30	5	4	4, 2, 1.5	66, 175, 80	11 × 13 LGA_CAV	EAR99	ADMV7420BCEZ
HMC7587	E-band I/Q downconverter	81 to 86	11.83 to 14.33	0 to 10	10	-2	30	6	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7587

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

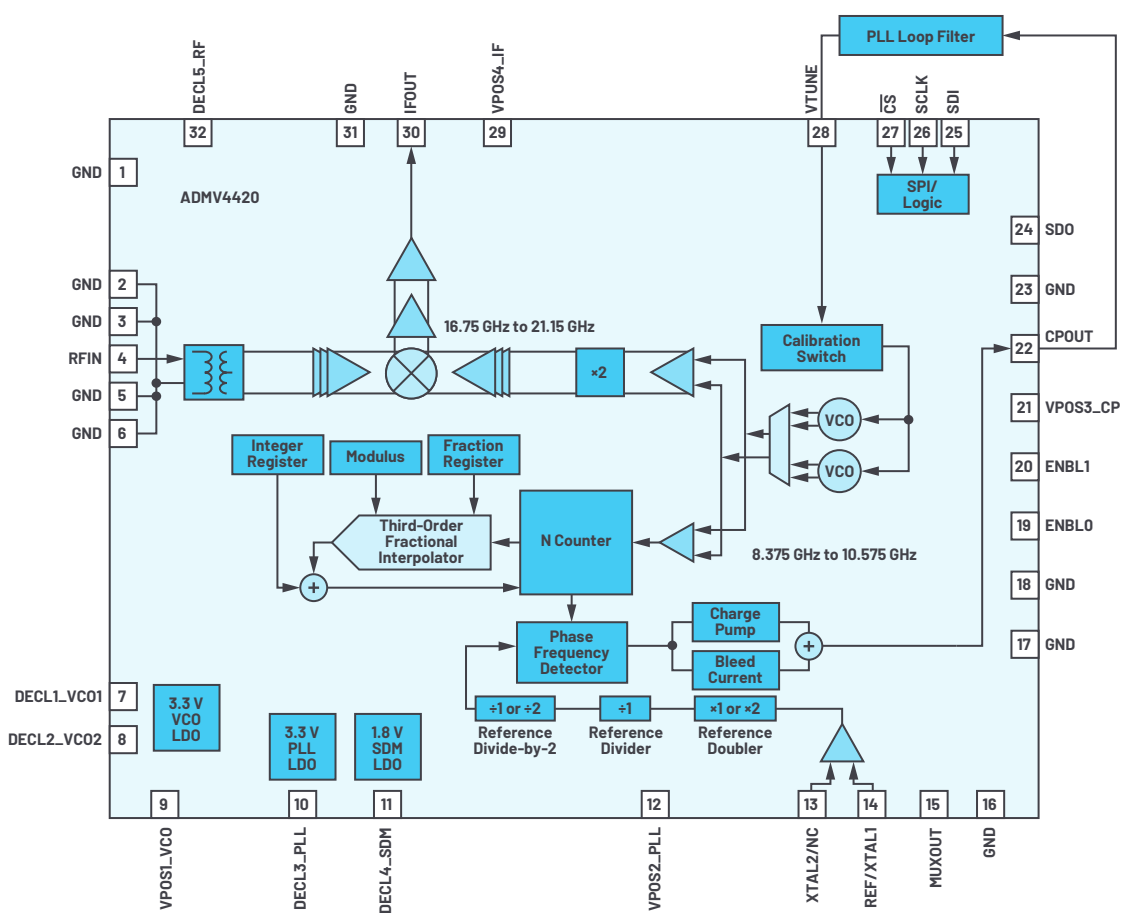
ADMV4420: K-Band Downconverter with Integrated PLL/VCO

Key Features

- ▶ RF input frequency: 16.95 GHz to 22.05 GHz
- ▶ IF input frequency range: 900 MHz to 2.5 GHz
- ▶ RF front end with integrated RF balun and LNA
- ▶ Integrated low phase noise fractional-N PLL/VCO
- ▶ Programmable via 4-wire SPI
- ▶ Output P1dB: 7 dBm
- ▶ Noise figure: 7 dB
- ▶ Conversion gain: 36 dB
- ▶ Single-ended 50 Ω input and 75 Ω IF output
- ▶ 32-lead, 5 mm $\times$ 5 mm LFCSP package

Applications

- ▶ Microwave point-to-point radios
- ▶ K-band satellite communications



I/Q Upconverters/Transmitters

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	Output IP3 (dBm)	Sideband Rejection (dBc)	LO Drive Nominal (dBm)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC6505A	I/Q upconverter	5.6 to 8.6	2.5 to 11.6	0 to 3	15	35	22	4	5	225	5 × 5 LFCSP	EAR99	HMC6505ALC5
ADMV1009	Differential I/Q upconverter	12.7 to 15.4	9 to 12.6	2.8 to 4	21	35	20	0	+5, -1.1	250, 60	5 × 5 LFCSP	EAR99	ADMV1009AEZ
HMC7911	I/Q upconverter	17 to 20	8.5 to 11.75	0 to 3.5	18	33	30	4	5	320	5 × 5 LFCSP	EAR99	HMC7911LP5E
ADRF6780*	Wideband I/Q upconverter	5.9 to 23.6	5.4 to 14	0 to 3.5	13	26	25	0	3.3, 5	400, 160	5 × 5 LFCSP	5A991.h	ADRF6780ACPZN-R7
ADMV1011	I/Q upconverter	17 to 24	8 to 12	2 to 4	21	33	32	0	+3.5, +5, -1.8	160, 220, 75	4.9 × 4.9 LCC	EAR99	ADMV1011AEZ
HMC7912	I/Q upconverter	21 to 24	8.75 to 12	0 to 3.5	15	33	22	4	5	320	5 × 5 LFCSP	EAR99	HMC7912LP5E
HMC815B*	I/Q upconverter	21 to 27	10.5 to 14.5	0 to 3.75	12	27	22	4	4.5	350	5 × 5 LFCSP	EAR99	HMC815BLC5
HMC6787A	I/Q upconverter	37 to 40	16.5 to 22	0 to 4	10	26	17	4	3	350	5 × 5 LFCSP	EAR99	HMC6787ALC5A
ADMV1013*	Wideband I/Q upconverter with 4× LO	24 to 44	5.4 to 10.25	0 to 6	18	23	26	0	3.3	550	6 × 6 LGA	EAR99	ADMV1013ACCZ
HMC6146B	I/Q upconverter	40 to 44	18 to 22	0 to 4	11	28	18	4	3	350	5 × 5 LFCSP	EAR99	HMC6146BLC5A
HMC8118	E-band I/Q upconverter	71 to 76	11.83 to 14.33	0 to 10	11	—	22	2	4, 1.5	175, 80	Die	5A991.b	HMC8118
ADMV7310	E-band I/Q upconverter SiP	71 to 76	11.8 to 12.7	DC to 2	35	31	20	4	—	—	16 × 14 LGA_CAV	EAR99	ADMV7310BCEZ
HMC8119	E-band I/Q upconverter	81 to 86	11.83 to 14.33	0 to 10	10	—	22	2	4, 1.5	175, 80	Die	5A991.b	HMC8119
ADMV7320	E-band I/Q upconverter SiP	81 to 86	13.4 to 14.6	DC to 2	33	31	—	4	—	—	16 × 14 LGA_CAV	EAR99	ADMV7320BCEZ

— = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Part Number	Description	RF (GHz)	LO (GHz)	1 dB I/Q Bandwidth (MHz)	IF Bandwidth (GHz)	RF Gain (dB)	Output IP3	Sideband Rejection (dBc)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADMV4530	Ka-band upconverter with LO	27 to 31	25.6 to 30	500	2 to 3	21	29	-35	4	520	6 × 6 LGA	5A991.b	ADMV4530ACCZ

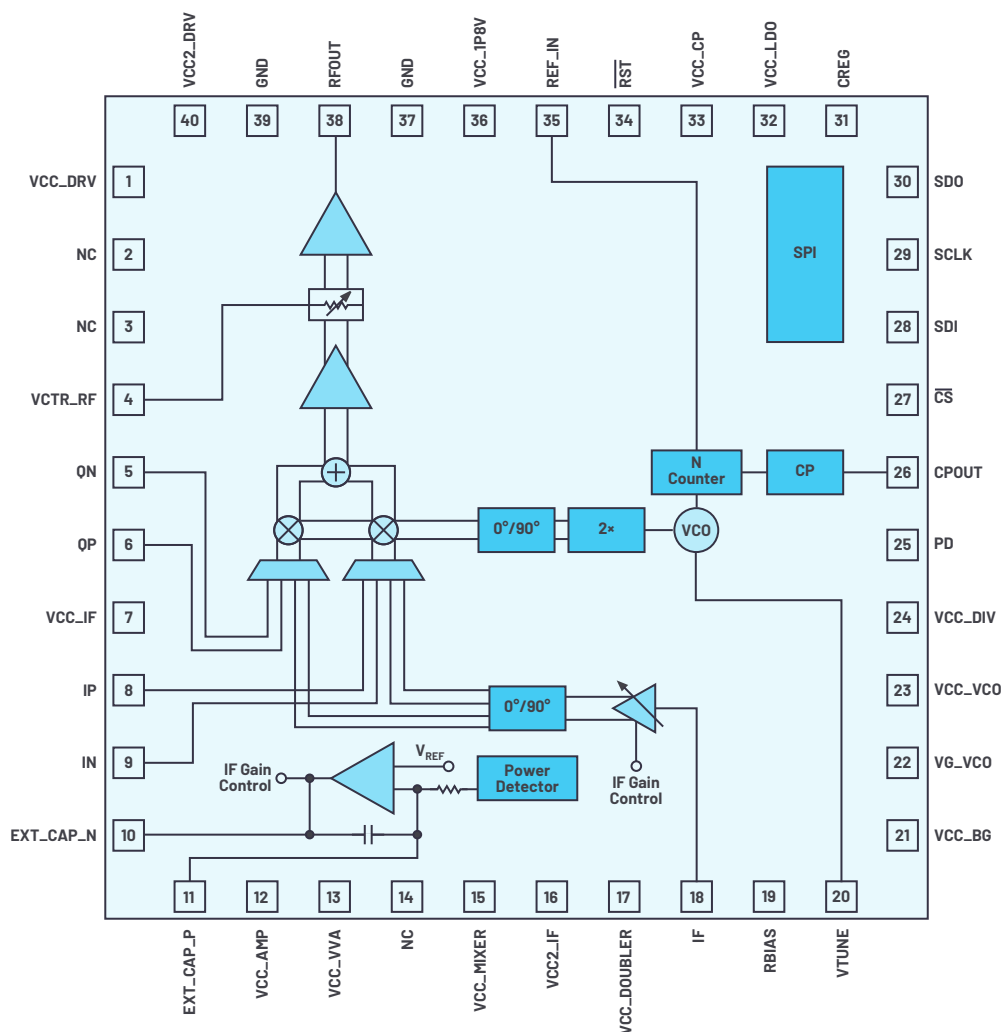
ADMV4530: Dual-Mode Ka-Band Upconverter with Integrated PLL/VCO

Key Features

- ▶ RF output frequency: 27 GHz to 31 GHz
- ▶ Two upconverter modes
- ▶ Direct upconversion from differential baseband I/Q (I/Q mode)
- ▶ Single upper sideband upconversion (IF mode)
- ▶ I/Q 1 dB bandwidth: 500 MHz
- ▶ IF input frequency range: 2 GHz to 3 GHz
- ▶ Combined RF and IF gain dynamic range: 70 dB
- ▶ Sideband rejection and carrier feedthrough optimization
- ▶ Integrated low phase noise frac-N PLL/VCO
- ▶ Programmable via 3-wire or 4-wire SPI
- ▶ 40-terminal, 6 mm × 6 mm LGA package

Applications

- ▶ Microwave point-to-point radios
- ▶ Ka-band satellite communications



I/Q Upconverters/Downconverters/Transceivers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Upconversion Mode			Downconversion Mode			LO Drive Nominal (dBm)	V _{SUPPLY} (V)	Pwr Consumption (W)	Package (mm)	ECCN Code	Ordering Part Number
					CG (dB)	Output IP3 (dBm)	Uncalibrated Sideband Rejection (dBc)	CG (dB)	Input IP3 (dBm)	Uncalibrated Image Reject (dBc)						
ADMV1128 <i>Upcoming</i>	1T1R 5G mmW microwave up/downconverter	24 to 29.5	4 to 7.5 (×4) 8 to 15 (×2)	DC to 1.5 (BB) 2 to 8 (IF)	12 (BB) 24 (IF)	25 (IF)	25 (IF)	20 (BB) 22 (IF)	-1 @ 18 dB gain (IF)	25	-10	1.8	1	6 × 6.5 BGA	5A991.b	ADMV1128BBCZ
ADMV1017	1T1R 5G mmW microwave up/downconverter	24 to 29.5	5 to 15	DC to 1.5 (BB) 3 to 10.5 (IF)	14 (BB) 29 (IF)	22 (BB) 25 (IF)	37 (BB) 71 (IF)	14 (BB) 18 (IF)	-1 (BB) -1 (IF)	37 (BB) 35 (IF)	-8	3.3/ 1.8/1.5	1.75	9 × 8 LGA	EAR99	ADMV1017BCCZ
ADMV1018	1T1R 5G mmW microwave up/downconverter	24 to 29.5	5 to 15	DC to 1.5 (BB) 2 to 9.5 (IF)	17 (BB) 32 (IF)	22 (BB) 25 (IF)	37 (BB) 52 (IF)	16 (BB) 19 (IF)	-2 (BB) -1 (IF)	37 (BB) 35 (IF)	-8	3.3/ 1.8/1.5	1.75	9 × 8 LGA	EAR99	ADMV1018BCCZ
ADMV1139 <i>Upcoming</i>	1T1R 5G mmW microwave up/downconverter	37 to 48	7.25 to 12.05	DC to 1.5 (BB) 2 to 8 (IF)	12 (BB) 24 (IF)	25 (IF)	28 (IF)	20 (BB) 22 (IF)	-1 @ 18 dB gain (IF)	25	-10	1.8	1	6 × 6.5 BGA	5A991.b	ADMV1139BBCZ

ADMV1139: 37 GHz to 48 GHz, 5G, Microwave Upconverter and Downconverter

Key Features

- ▶ Integration of upconverter, downconverter, and LO chain with multiplier in one chip
- ▶ CMOS up/downconverter with industry-leading efficiency and linear P_{OUT} with 5G NR
- ▶ RF input/output frequency range: 37 GHz to 48 GHz
- ▶ Integrated RF switch
- ▶ Supports both half- and full-duplex operation
- ▶ Two operation modes for both up and downconverter configurations:
 - Direct conversion of differential baseband I/Q (baseband mode)
 - Single-ended complex-IF operation (IF mode)
- ▶ IF mode supports both internal or external hybrid
- ▶ Programmable baseband I/Q common-mode voltage
- ▶ Matched, 50 Ω impedance, single-ended RF input and output
- ▶ Matched, 50 Ω impedance single-ended LO input
- ▶ Low phase variation vs. gain control
- ▶ Upconversion mode
 - Sideband rejection and carrier feedthrough optimization
 - Envelope detector for automatic, on-chip calibration
- ▶ Downconversion mode
 - Image rejection and I/Q imbalance optimization
 - Receiver mixer power detector for receiver gain setting
 - Baseband I/Q DC offset correction
- ▶ LO chain features:
 - Variable gain to accommodate various LO drive strength values
 - Programmable LO harmonic reject filter
 - 360° phase control shifter for LO synchronization
 - I/Q phase correction
- ▶ Fast TDD switching time via external pins
- ▶ Programmable via a 3-wire or 4-wire SPI interface, compatible with ADMV4928 and ADMV4728 interface

Applications

- ▶ 5G mmW communications
- ▶ Sat comms
- ▶ Military
- ▶ Test and measurement



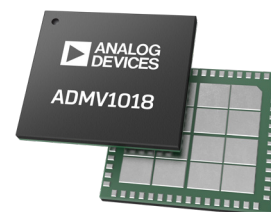
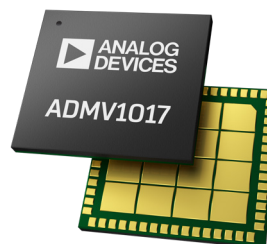
ADMV1017 and ADMV1018: 24 GHz to 29.5 GHz Up/Downconverter for mmWave 5G Radios

Key Features

- ▶ 3GPP 5G network compliant core supports n257, n258, and n261 bands radios
- ▶ Best-in-class performance
- ▶ 1.5 GHz I/Q bandwidth
- ▶ Two conversion modes:
 - Direct conversion I/Q baseband
 - Single-ended, complex IF conversion
- ▶ High level integration eases design, reduces size
- ▶ Integrated LO doubler and quadrupler with harmonic filter
- ▶ Integrated variable gain controlled amplifiers
- ▶ ADMV1018 in optimized package for improved performance

Applications

- ▶ Millimeter wave 5G network radio
- ▶ 5G microwave backhaul
- ▶ Private communications networks
- ▶ Millimeter wave test equipment



Mixers with Integrated LO

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Power Gain (dB)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	VCO Phase Noise @ 1 MHz Offset (dBc/Hz)	Input IP3 (dBm)	Noise Figure (dB)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1190A	Dual Rx with frac-N PLL and VCO	0.7 to 2.39	0.05 to 4	0.05 to 0.35	8.9	-118	-139	27	9	5, 3.3	—	6 × 6 LFSCP	EAR99	HMC1190ALP6NETR
ADRF6658	Dual Rx with IF amp	0.69 to 3.8	—	—	Programmable 26.5	—	—	12 to 29	13	3.3	Selectable 260 to 440	7 × 7 LFCSP	5A991.g	ADRF6658BCPZ-RL7

I/Q Modulators and Demodulators

I/Q Modulators

Part Number	Description	RF Frequency (GHz)	LO Spur (dBm)	Sideband Suppression (dBc)	Noise (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5590	Narrow-band	0.869 to 0.9	—	−50	−157	16	29	250	5	170	6 × 6 LFCSP	5A991.b	ADL5590ACPZ-R7
AD8345	Low power	0.14 to 1	−42	−42	−155	2.5	25	80	3, 5	58, 62	TSSOP	5A991.b	AD8345AREZ
ADL5370	Narrow-band	0.3 to 1	−50	−41	−160	11	24	500	5	205	4 × 4 LFCSP	5A991.b	ADL5370ACPZ-R7
LT5568	Wideband	0.7 to 1.05	−43	−46	−160.3	8.3	22.9	380	5	117	4 × 4 QFN	EAR99	LT5568EUF#TRPBF
LT5568-2	GSM optimized	0.7 to 1.05	−43	−52	−159.4	8.6	22.9	380	5	110	4 × 4 QFN	EAR99	LT5568-2EUF#TRPBF
LT5558	Narrow-band	0.6 to 1.1	−43.7	−49	−158	7.8	22.4	400	5	108	4 × 4 QFN	EAR99	LT5558EUF#TRPBF
LT5571	Narrow-band	0.62 to 1.1	−42	−53	−159	8.1	21.7	400	5	97	4 × 4 QFN	EAR99	LT5571EUF#TRPBF
LTC5599	Low power	0.03 to 1.3	−51.5	−52.6	−156.7	5	20.8	57	3.3	28	4 × 4 QFN	EAR99	LTC5599IUF#TRPBF
ADL5371	Narrow-band	0.5 to 1.5	−50	−55	−159	14.5	27	500	5	175	4 × 4 LFCSP	5A991.b	ADL5371ACPZ-R7
LTC5598	Wideband	0.005 to 1.6	−51	−55	−160.9	8.4	25.5	400	5	165	4 × 4 QFN	EAR99	LTC5598IUF#TRPBF
ADL5591	Narrow-band	0.805 to 1.905	—	−47	−157	16	30	250	5	170	6 × 6 LFCSP	5A991.b	ADL5591ACPZ-R7
ADL5385	Broadband	0.3 to 2.2	−46	−50	−159	11	26	500	5	215	4 × 4 LFCSP	5A991.b	ADL5385ACPZ-R7
LT5528	Narrow-band	1.5 to 2.4	−42	−45	−159.3	7.9	21.8	400	5	125	4 × 4 QFN	EAR99	LT5528EUF#TRPBF
LT5572	Narrow-band	1.5 to 2.5	−39.4	−41.2	−158.6	9.3	21.6	460	5	120	4 × 4 QFN	EAR99	LT5572EUF#TRPBF
ADL5372	Narrow-band	1.5 to 2.5	−45	−45	−158	14.2	27	500	5	165	4 × 5 LFCSP	5A991.b	ADL5372ACPZ-R2
AD8346	Low power	0.8 to 2.5	−42	−36	−147	−3	20	70	3, 5	43, 45	TSSOP	5A991.b	AD8346ARUZ
AD8349	Low power	0.7 to 2.7	−45	−35	−155	7.6	21	160	5	135	TSSOP	5A991.b	AD8349AREZ
HMC795	With VGA	0.05 to 2.8	—	−53	−156	11	25	440	3.3, 5	127	5 × 5 QFN	EAR99	HMC795LP5E
ADL5373	Narrow-band	2.3 to 3	−32	−57	−157	13.8	26	500	5	174	4 × 4 LFCSP	5A991.b	ADL5373ACPZ-WP
HMC1097	Wideband	0.1 to 6	−40	−40	−162	11	29	700	5	170	4 × 4 LFCSP	EAR99	HMC1097LP4E
LTC5588-1	Wideband	0.2 to 6	−39.6	−56.6	−160.6	12	31	600	3.3	303	4 × 4 QFN	EAR99	LTC5588IPF-1#TRPBF
ADL5375	Broadband	0.4 to 6	−46	−52	−160	9.4	26.8	750	5	200	4 × 4 LFCSP	5A991.b	ADL5375-05ACPZ-R2
LTC5589	Low power	0.7 to 6	−40.2	−41.5	−158.1	3.9	17.5	167	3.3	29.5	4 × 4 QFN	EAR99	LTC5589IUF#TRPBF
ADRF6780	Wideband	5.9 to 23.6	−25	25	−147	11	27	750	3.3, 5	490, 160	5 × 5 LFCSP	5A991.h	ADRF6780ACPZN-R7

I/Q Demodulators

Part Number	Description	RF Frequency (GHz)	Gain Error (dB)	Phase Error (°)	Noise Figure (dB)	Input P1dB (dBm)	Input IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
LT5546	Low power, 2× LO, 55 dB VGA	0.04 to 0.5	0.14	0.6	7.8	−10	−1	17	1.8 to 5.25	24	4 × 4 QFN	EAR99	LT5546EUF#TRPBF
LT5506	Low power, 2× LO, 55 dB VGA	0.04 to 0.5	0.2	0.6	6.8	−11.5	−0.5	8.8	1.8 to 5.25	26.6	4 × 4 QFN	EAR99	LT5506EUF#TRPBF
LT5517	Low frequency, 2× LO	0.04 to 0.9	0.03	0.7	12.4	10	21	130	5	90	4 × 4 QFN	EAR99	LT5517EUF#TRPBF
AD8348	Broadband with VGA	0.05 to 1	0.25	0.5	10.75	13	28	125	3, 5	47, 51	TSSOP	5A991.b	AD8348ARUZ
LTC5584	Broadband	0.03 to 1.4	0.01	0.7	10	13.1	28	530	5	200	4 × 4 QFN	EAR99	LTC5584IUF#TRPBF
LT5516	Narrow-band	0.8 to 1.5	0.2	1	12.8	6.6	21.5	260	5	117	4 × 4 QFN	EAR99	LT5516EUF#TRPBF
ADL5387	2× LO, broadband	0.03 to 2	0.05	0.2	12	13	31	240	5	180	4 × 4 LFCSP	5A991.b	ADL5387ACPZ-WP
LT5515	Narrow-band	1.5 to 2.5	0.3	1	16.8	9	20	260	5	125	4 × 4 QFN	EAR99	LT5515EUF#TRPBF
ADL5382	Broadband	0.7 to 2.7	0.05	0.2	15.6	14.4	30.5	370	5	220	4 × 4 LFCSP	5A991.b	ADL5382ACPZ-WP
AD8347	I/Q demodulator and VGA	0.8 to 2.7	0.3	1	11	−2	11.5	65	3, 5	64, 68	4 × 4 LFCSP	5A991.b	AD8347ARUZ
LT5575	Broadband	0.8 to 2.7	0.01	0.4	12.7	11.2	22.6	490	5	132	4 × 4 QFN	EAR99	LT5575EUF#TRPBF
LTC5585	Broadband	0.4 to 4	0.05	0.7	12.7	16	25.7	530	5	200	4 × 4 QFN	EAR99	LTC5585IUF#TRPBF

I/Q Demodulators (Continued)

Part Number	Description	RF Frequency (GHz)	Gain Error (dB)	Phase Error (°)	Noise Figure (dB)	Input P1dB (dBm)	Input IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5380*	Broadband	0.4 to 6	0.07	0.2	11.7	11.6	27.8	390	5	245	4 × 4 LFCSP	5A991.b	ADL5380ACPZ-WP
LTC5586	Ultrawideband with VGA, digital IR cal	0.3 to 6	0.06	0.06	19.5	13	30	1000	5	440	5 × 5 QFN	EAR99	LTC5586IUH#TRPBF
LTC5594	Ultrawideband with VGA, digital IR cal	0.3 to 9	0.06	1.6	21.2	4	27.8	1000	5	470	5 × 5 QFN	EAR99	LTC5594IUH#TRPBF

I/Q Modulators with Integrated LO

Part Number	Description	RF Frequency (GHz)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	PLL Phase Noise @ 1 MHz Offset (dBc/Hz)	LO Spur (dBm)	Sideband Suppression (dBc)	Noise (dBm/Hz)	Output P1dB (dBm)	Output IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6750	With integrated LO	0.95 to 1.575	-93	-133	-45	-45	-162	8.5	23	600	5	310	8 × 8 LFCSP	5A991.b	ADRF6750ACPZ-R7
ADRF6755	With integrated LO	0.1 to 2.4	-93	-133	-45	-45	-162	8	21	600	5	380	8 × 8 LFCSP	5A991.b	ADRF6755ACPZ
HMC1197	With integrated LO	0.1 to 4	-110	-134.5	-40	-45	-160	11	30	600	5, 3.3	320	7 × 7 QFN	EAR99	HMC1197LP7FE

I/Q Demodulators with Integrated LO

Part Number	Description	RF Frequency (GHz)	PLL Phase Noise @ 10 kHz Offset (dBc/Hz)	PLL Phase Noise @ 1 MHz Offset (dBc/Hz)	Gain Error (dB)	Phase Error (°)	Noise Figure (dB)	Input P1dB (dBm)	Input IP3 (dBm)	Baseband Bandwidth @ 3 dB (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADRF6850	With frac-N PLL and VCO	0.1 to 1	-98	-136	0.1	0.5	11	12	22.5	300	3	350	8 × 8 LFCSP	5A991.b	ADRF6850BCPZ
ADRF6821	DPD receiver with frac-N PLL/VCO	0.45 to 2.8	-97	-138	0.12	<0.5	17	2	24	500	3.3	273, 303	8 × 8 LFCSP	5A991.b	ADRF6821ACPZ

* = X-Microwave.

Integrated Transceivers, Transmitters, and Receivers

Microwave and Millimeter Wave Integrated Transmitters/Receivers

V-Band Transmitters/Receivers

Part Number	Description	Frequency (GHz)	I/Q Bandwidth (GHz)	Max Gain (dB)	RF Control Range (dB)	IF Control Range (dB)	IP3 (dBm)	Image/Sideband Rejection (dBc)	Noise Figure (dB)	P1dB (dBm)	Power Dissipation (W)	Package (mm)	ECCN Code	Ordering Part Number
HMC6300	60 GHz integrated transmitter	57 to 64	1.8	35	22	14	20 (OIP3)	40	—	12 (single end)/15 (balanced)	0.88 (single end)/1.0 (balanced)	BGA	5A991.b	HMC6300BG46
HMC6301	60 GHz integrated receiver	57 to 64	1.8	67	6	12 (analog)/15 (digital)	−9 (IIP3)	35	8	30	0.82 (single end)/0.57 (external LO)	BGA	5A991.h	HMC6301BG46

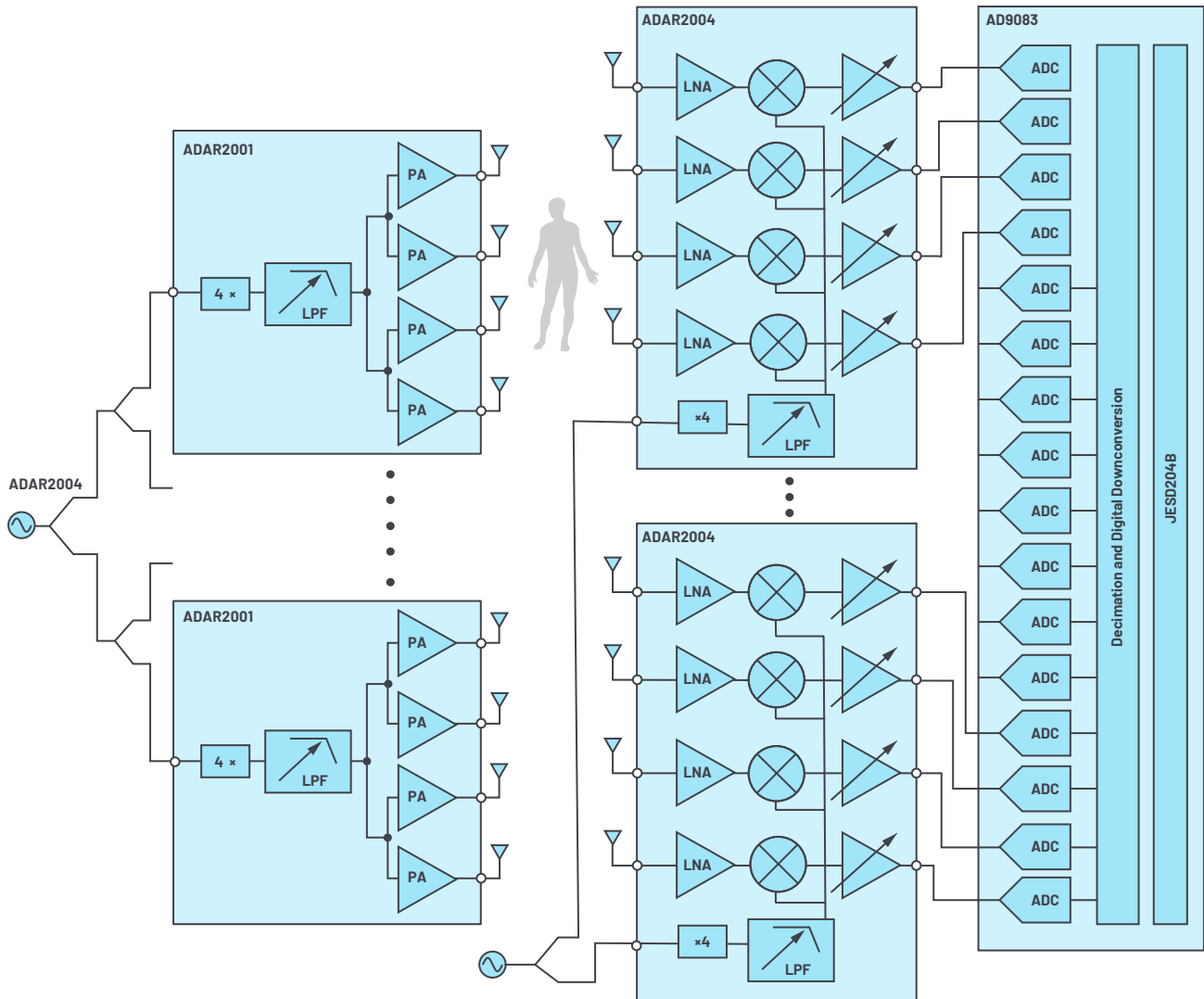
E-Band Transmitters/Receivers

Part Number	Description	RF (GHz)	LO (GHz)	IF (GHz)	Conversion Gain (dB)	IP3 (dBm)	Image/Sideband Rejection (dBc)	Noise Figure (dB)	LO Drive Nominal (dBm)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC7586	E-band I/Q receiver	71 to 76	11.83 to 14.33	0 to 10	12.5	−1 (IIP3)	28	5	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7586
ADMV7410	E-band I/Q downconverter SiP	71 to 76	11.5 to 13	DC to 2	13	1	30	5	4	4, 2, 1.5	66, 175, 80	11 × 13 LGA_CAV	EAR99	ADMV7410BCEZ
HMC8118	E-band I/Q upconverter	71 to 76	11.83 to 14.33	0 to 10	11	—	22	—	2	4, 1.5	175, 80	Die	5A991.b	HMC8118
ADMV7310	E-band I/Q upconverter SiP	71 to 76	11.8 to 12.7	DC to 2	35	31	20	26	4	—	—	16 × 14 LGA_CAV	EAR99	ADMV7310BCEZ
ADMV7420	E-band I/Q downconverter SiP	81 to 86	13.2 to 14.6	DC to 2	10	1	30	5	4	4, 2, 1.5	66, 175, 80	11 × 13 LGA_CAV	EAR99	ADMV7420BCEZ
ADMV7320	E-band I/Q upconverter SiP	81 to 86	13.4 to 14.6	DC to 2	33	31	—	—	—	—	—	16 × 14 LGA_CAV	EAR99	ADMV7320BCEZ
HMC7587	E-band I/Q Receiver	81 to 86	11.83 to 14.33	0 to 10	10	−2 (IIP3)	30	6	2	4, 1.5, 3	175, 80, 50	Die	5A991.b	HMC7587
HMC8119	E-band I/Q upconverter	81 to 86	11.83 to 14.33	0 to 10	10	—	22	—	2	4, 1.5	175, 80	Die	5A991.b	HMC8119

mmWave Imaging Chipset

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
ADAR2001 New	10 GHz to 40 GHz, 1:4 channel, 4× frequency multiplier/filter	2.5 to 10	10 to 40	0.45	6 × 6 LGA	EAR99	ADAR2001ACCZ
ADAR2004 New	10 GHz to 40 GHz, 4-channel Rx mixer with 4× LO	10 to 40	0 to 0.8	0.910	7 × 7 LGA	EAR99	ADAR2004ACCZ

ADAR2004 and ADAR2001: Millimeter Wave Imaging Applications



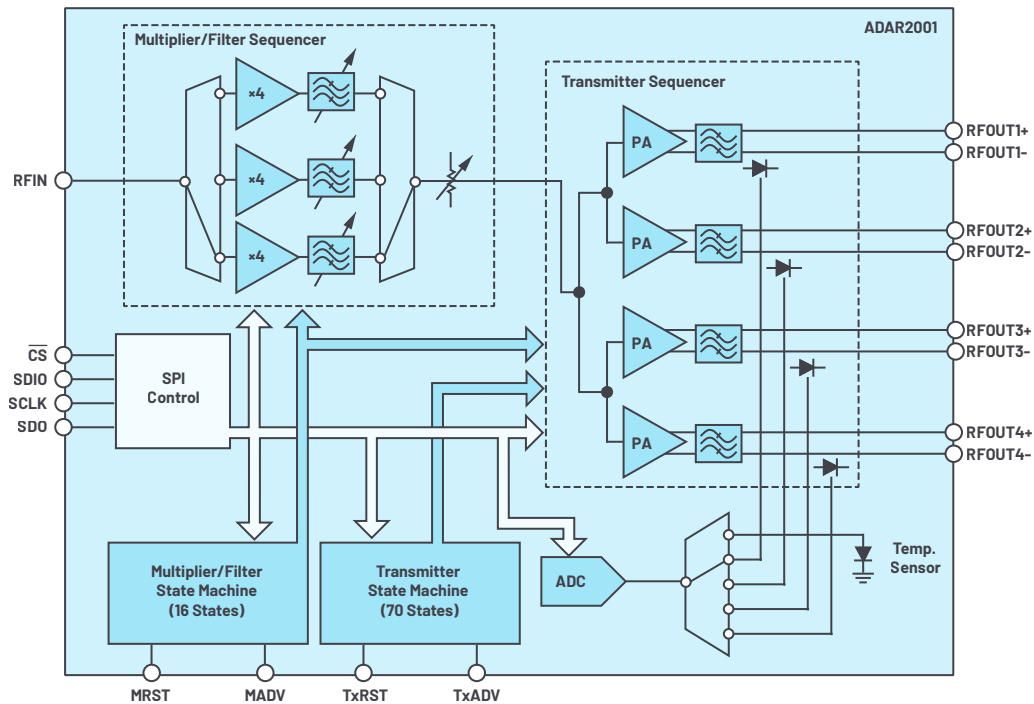
ADAR2001: 10 GHz to 40 GHz, 1:4 Channel, 4× Frequency Multiplier/Filter

Key Features

- ▶ RF input frequency: 2.5 GHz to 10 GHz
- ▶ RF output frequency: 10 GHz to 40 GHz
- ▶ Quad differential output PAs with enable function
- ▶ Integrated harmonic filter (25 dB to 30 dB rejection)
- ▶ 3-wire and 4-wire SPI control of all functions
- ▶ Typical input power: -20 dBm single ended (50 Ω)
- ▶ DC power: 450 mW (2.5 V supply)
- ▶ On-chip temperature sensor, power detector, and ADC
- ▶ Used with ADAR2004 quad-channel receiver/mixer
- ▶ 40-terminal, 6 mm × 6 mm LGA package

Applications

- ▶ Millimeter wave imaging equipment
- ▶ Military radio, radar, and ECM equipment



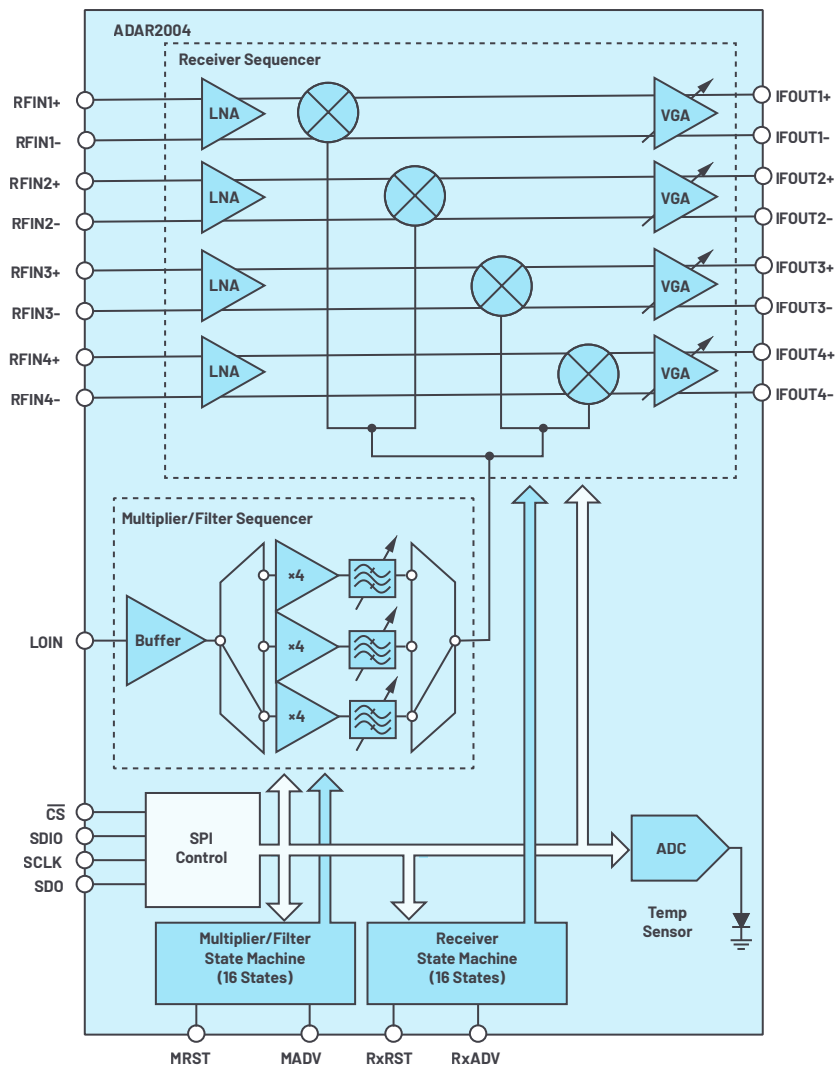
ADAR2004: 10 GHz to 40 GHz, 4-Channel Receiver Mixer with 4× LO Multiplier

Key Features

- ▶ Quad LNA, mixer, IF VGA
- ▶ 4× LO multiplier with programmable harmonic filter
- ▶ Input frequency range: 10 GHz to 40 GHz
- ▶ IF frequency range: 0 MHz to 700 MHz
- ▶ LO frequency range: 2.5 GHz to 10 GHz
- ▶ Gain range: 20 dB to 40 dB
- ▶ IP1dB: -17.5 dBm (at min gain)
- ▶ Noise figure: 7.5 dB at max gain
- ▶ Filtered LO harmonics: 20 dB to 30 dB at all frequencies
- ▶ 3-wire or 4-wire SPI control
- ▶ On-chip programmable state machines for fast multiplier/filter and receiver switching and control
- ▶ On-chip temperature sensor and ADC
- ▶ DC power: 985 mW
- ▶ Package: 7 mm × 7 mm, 48-lead LGA package

Applications

- ▶ Millimeter wave imaging equipment
- ▶ Military radio, radar, and ECM equipment



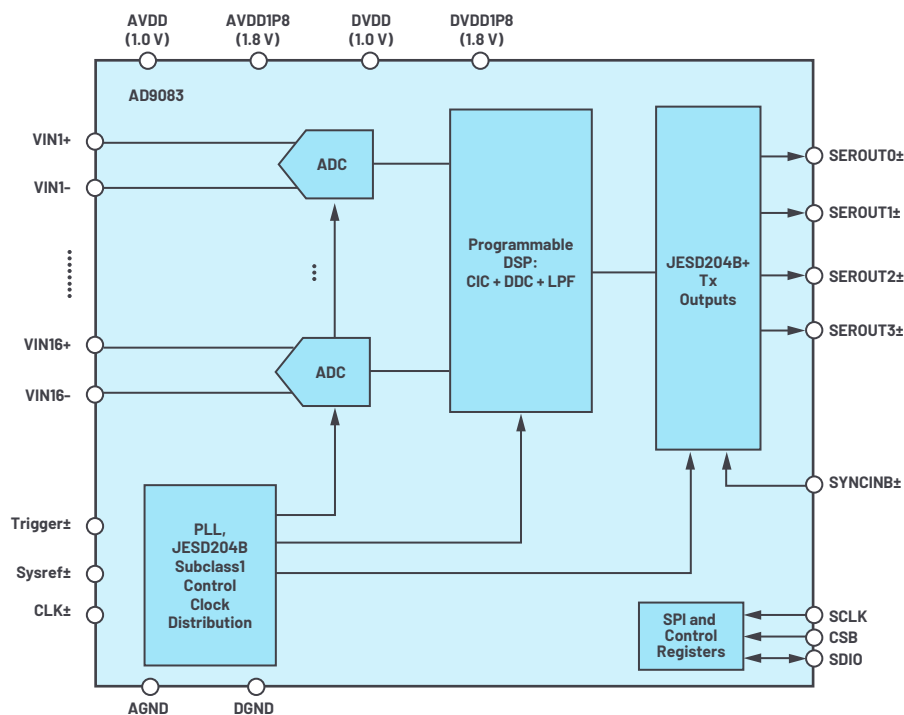
AD9083: 16-Channel, 125 MHz Bandwidth, JESD204B, Analog-to-Digital Converter

Key Features

- ▶ 125 MHz usable analog input bandwidth
- ▶ Sample rate: 2 GSPS
- ▶ Noise density: -147 dBFS/Hz
- ▶ SNR: 66 dBFS in 125 MHz BW, 2 GSPS encode
- ▶ SFDR: 70 dBc in 125 MHz BW, 2 GSPS encode
- ▶ Power per channel: 90 mW at 2 GSPS
- ▶ Flexible input range: 0.5 V p-p to 1.5 V p-p differential
- ▶ Isolation/crosstalk: >80 dB
- ▶ Supply voltages: 1.0 V and 1.8 V
- ▶ JESD204B subclass 1 encoded outputs
- ▶ Supports up to 16 Gbps/lane
- ▶ Flexible JES204B lane configuration and sample data processing
- ▶ Digital processor features
- ▶ CIC decimation filter
- ▶ Programmable DDCs (three per ADC channel) and FIR filter
- ▶ Data gating and FIFO with 32 sample depth
- ▶ 100-ball, 9 mm × 9 mm BGA package

Applications

- ▶ Millimeter wave imaging
- ▶ Electronic beamforming and phased array
- ▶ Multichannel wideband communication receivers



Intermediate Frequency Subsystems

Part Number	Description	RF (MHz)	IF (MHz)	Conversion Gain (dB)	RF VGA Dynamic Range (dB)	IF VGA Dynamic Range (dB)	Output IP3 (dBm)	Image Rejection (dBc)	Noise Figure (dB)	V _{SUPPLY} (V)	I _{SUPPLY} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC8100	Intermediate frequency receiver	800 to 4000	80 to 200	85	47	49	18	36	5	3.3	600	6 × 6 LFCSP	5A991.b	HMC8100LP6JE
HMC8200	Intermediate frequency transmitter	800 to 4000	200 to 700	34	35	—	31	15	6	3.3	540	5 × 5 LFCSP	5A991.b	HMC8200LP5ME

24 GHz ADAS Radar Solutions

Part Number	Description	Function	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD _{MAX} (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4158	6 GHz, frac-N FMCW ramping PLL	Ramp generator	0.5 to 6.1	-216	32	3	23	4 × 4 LFCSP	EAR99	ADF4158CCPZ
ADF4159*	13 GHz, frac-N FMCW ramping PLL	Ramp generator	0.5 to 13	-224	110	3	33	4 × 4 LFCSP	EAR99	ADF4159CCPZ

Part Number	Description	Function	RF (GHz)	Signal Bandwidth (MHz)	Phase Noise @ 10 MHz Offset (dBc/Hz)	Output Power (dBm)	Input	ADC Resolution	V _{TUNE} (V)	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
ADF5901	ISM band, 2-ch FMCW transmitter	Tx MMIC	24 to 24.25	250	-128	2 to 10	Single ended	8-bit	1 to 2.8	0.002	5 × 5 LFCSP	EAR99	ADF5901WCCPZ
ADF5902	ISM band, 2-ch FMCW transmitter with integrated FMCW PLL	Tx MMIC	24 to 24.25	250	-128	2 to 12	Single ended	8-bit	1 to 2.8	0.002	5 × 5 LFCSP	EAR99	ADF5902WCCPZ

Part Number	Description	Function	RF (GHz)	Signal Bandwidth (MHz)	Rx Channel Gain (dB)	P1dB (dBm)	RF/IF Isolation (dB)	Noise Figure (dB)	Package (mm)	ECCN Code	Ordering Part Number
ADF5904	ISM band, 4-ch receiver	Rx MMIC	24 to 24.25	250	22	-10	30	10	5 × 5 LFCSP	EAR99	ADF5904ACPZ

Part Number	Description	Function	Sample Rate (MSPS)	Gain (dB)	Low-Pass Filter BW (MHz)	SNR (dB)	SFDR (dB)	Noise (nV/√Hz)	Antialiasing Filter	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
AD8283	6-ch, LNA/PGA/AAF with ADC	AFE	72	16 to 34 (programmable)	1 to 12 (programmable)	67	68	3.5	Included	0.17	10 × 10 LFCSP	—	AD8283WBPCPZ
AD8284	6-ch, LNA/PGA/AAF with ADC	AFE	60	17 to 35 (programmable)	9 to 15 (programmable)	67	68	3.5	Included	0.345	10 × 10 TQFP	—	AD8284WCSVZ
ADAR7251	4-ch, 16-bit, continuous time data acquisition ADC	AFE	0.3 to 1.2	0 to 45 (programmable)	—	—	—	2.4	Not required	0.4	7 × 7 LFCSP	—	ADAR7251WBSCZ

Part Number	Description	Function	Operating Frequency (MHz)	Core	On-Chip L1 SRAM (kB)	On-Chip L2 SRAM (MB)	On-Chip L2 ROM (kB)	On-Chip RAM (MB)	On-Chip ROM (MB)	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
ADSP-BF70x	Low power ADSP-BF70x series of Blackfin+® embedded DSP processors with 512 kB L2 SRAM and DDR2/LPDDR interface	DSP	200 to 400	16-bit, 32-bit	136	256	512	—	—	<1	12 × 12 LFCSP, 12 × 12 BGA	5A992.c	ADSP-BF702/ ADSP-BF703/ ADSP-BF704/ ADSP-BF705/ ADSP-BF706/ ADSP-BF707
ADSP-2147x	ADSP-2147x SHARC® DSP	DSP	200 to 300	32-bit, 40-bit	—	—	—	2 to 5	4	—	LFCSP BGA	3A991.a.2	—

* = X-Microwave.

ADI RadioVerse Integrated Transceivers

Part Number	Product Features	Functionality	RF Tuning Range	Bandwidth	Rx Image Rejection (dBc)*	Rx NF/IIP3**	Tx OIP3 (dBm)	Package Size (mm)	DPD Engine	SERDES Lanes
AD9361	General-purpose SDR; low power; JESD207 CMOS/LVDS	2 Rx, 2 Tx	70 MHz to 6 GHz	56 MHz	50	3 dB/-14 dBm	19	10 × 10	—	—
AD9364	General-purpose SDR; low power; JESD207 CMOS/LVDS	1 Rx, 1 Tx	70 MHz to 6 GHz	56 MHz	50	3 dB/-14 dBm	19	10 × 10	—	—
AD9363	General-purpose SDR; low power; CMOS/LVDS digital	2 Rx, 2 Tx	325 MHz to 3.8 GHz	20 MHz	50	3 dB/-14 dBm	19	10 × 10	—	—
AD9371	Improved dynamic range; scalable MIMO; 6 Gbps JESD204B	2 Tx, 2 Rx, ORx, and SnRx	300 MHz to 6 GHz	100 MHz Rx, 250 MHz Tx, ORx	75	13.5 dB/+22 dBm	27	12 × 12	—	4 Rx, 4 Tx
AD9375	Improved dynamic range; low power DPD; scalable MIMO; 6 Gbps JESD204B	2 Tx, 2 Rx, ORx, and SnRx	300 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx/ORx	75	13.5 dB/+22 dBm	27	12 × 12	Linearization bandwidth up to 40 MHz	4 Rx, 4 Tx
ADRV9002 New	Narrow-/wideband SDR, high dynamic range, CMOS/LVDS interface	2 Rx, 2 Tx (TDD/FDD)	30 MHz to 6 GHz	12 kHz to >40 MHz	80 to 90	12 dB/+26 dBm	>30	12 × 12	Yes, linearization Rx BW 40 MHz	—
ADRV9009	Multichip sync for massive MIMO; integrated AGC; dc offset; QEC correction; digital filters; 12 Gbps JESD204B	2 Tx, 2 Rx (TDD)	100 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx/ORx	75	12 dB/+15 dBm	27	12 × 12	—	4 Rx, 4 Tx
ADRV9008-1/ADRV9008-2	Multichip sync for massive MIMO; integrated AGC; DC offset; QEC correction; digital filters; 12 Gbps JESD204B	2 Rx, 2 Tx, 1 ORx (FDD)	100 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx/ORx	75	12 dB/+15 dBm	27	12 × 12	—	4 Rx, 4 Tx
ADRV9026	3G/4G/5G quad-channel, massive MIMO TDD/FDD RF transceiver	4 Tx, 4 Rx, 2 ORx	75 MHz to 6 GHz***	200 MHz Rx, 450 MHz Tx	75	11.9 dB/+21 dBm	28	14 × 14	—	4 Rx, 4 Tx
ADRV9003 Upcoming	Narrow-/wideband SDR, high dynamic range, CMOS/LVDS interface	2 Rx, 1 Tx (TDD/FDD)	30 MHz to 6 GHz	12 kHz to >40 MHz	80 to 90	12 dB/+26 dBm	>30	12 × 12	No	—
ADRV9004 Upcoming	Narrow-/wideband SDR, high dynamic range, CMOS/LVDS interface	2 Rx, 2 Tx (TDD/FDD)	30 MHz to 6 GHz	12 kHz to >40 MHz	80 to 90	12 dB/+26 dBm	>30	12 × 12	No	—
ADRV9010 New	3G/4G/5G quad-channel, massive MIMO/small cell TDD RF transceiver	4 Tx, 4 Rx, 2 ORx	650 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx and ORx	75	12 dB/+22 dBm	29	14 × 14	—	8 Rx, 8 Tx
ADRV9029 New	3G/4G/5G quad-channel, massive MIMO/small cell TDD and FDD RF transceiver with integrated DPD	4 Tx, 4 Rx, 2 ORx	75 MHz to 6 GHz	200 MHz Rx, 450 MHz Tx and ORx	75	11.9 dB/+21 dBm	28	14 × 14	Linearization up to 200 MHz BW	4 Rx, 4 Tx

ADRV9026: Wideband Integrated Quad RF Transceiver with Observation Path

Key Features

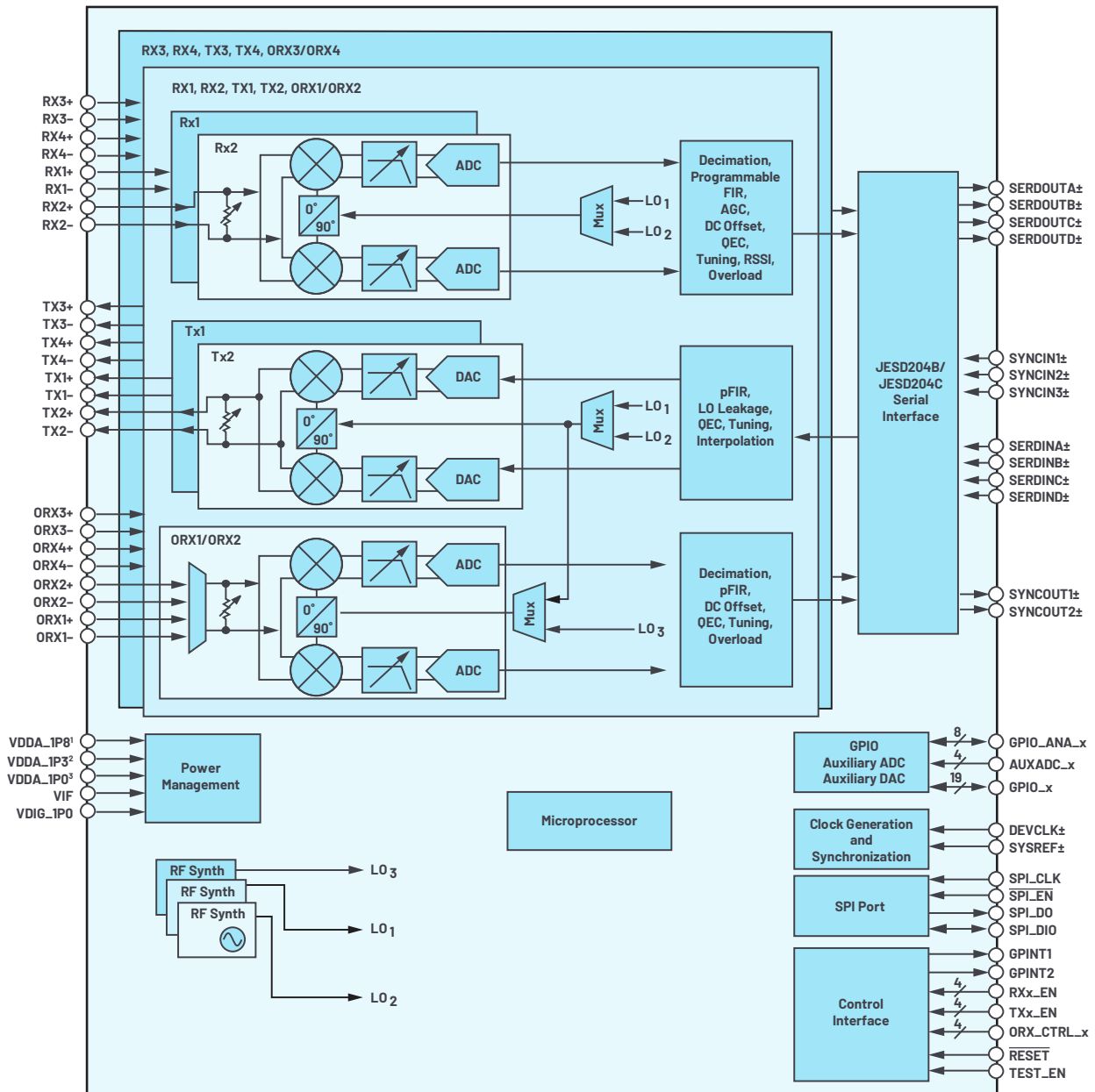
- ▶ Center frequency: 75 MHz to 6 GHz
- ▶ Four differential transmitters and receivers
- ▶ Two observation receivers with two inputs each
- ▶ Fully integrated frac-N synthesizer and supports multichip LO phase synchronization
- ▶ Support for TDD and FDD applications
- ▶ Bandwidth: 200 MHz receiver, 450 MHz transmitter synthesis, and 450 MHz observation receiver
- ▶ Integrated AGC, DC offset, and quadrature error correction
- ▶ Interface: 24.33 Gbps JESD204B/JESD204C
- ▶ Package: 14 mm × 14 mm chip scale BGA



Applications

- ▶ Macro base stations
- ▶ 5G massive MIMO
- ▶ Small cell designs
- ▶ Software-defined radios
- ▶ Military EW and ECM equipment

ADRV9026: Wideband Integrated Quad RF Transceiver with Observation Path



¹ VDDA_1P8 represents VCONV1_1P8, VCONV2_1P8, VANA1_1P8, VANA2_1P8, VANA3_1P8, VANA4_1P8, and VJVC0_1P8.

² VDDA_1P3 represents VANA1_1P3, VANA2_1P3, VCONV1_1P3, VCONV2_1P3, VRFVC01_1P3, VRFVC02_1P3, VAUXVCO_1P3, VCLKVCO_1P3, RFSYNL_1P3, VRFSYN2_1P3, VCLKSYN_1P3, VAUXSYN_1P3, VRXL0_1P3, and VTXL0_1P3.

³ VDDA_1P0 represents VJSYN_1P0, VDES_1P0, VTT_DES, and VSER_1P0.

PLL/Synthesizers

Integer-N PLLs

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD _{max} (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4001	Integer-N	0.01 to 0.2	-217	—	2.7 to 5.5	4.5	4 × 4 LFCSP	EAR99	ADF4001BCPZ-RL7
ADF4002*	Integer-N	0.005 to 0.4	-222	104	3	5	4 × 4 LFCSP	EAR99	ADF4002BCPZ-RL7
HMC1031	Integer-N	0 to 0.5	-208	140	3	2	MSOP	EAR99	HMC1031MS8E
ADF4110	Integer-N	0.05 to 0.55	-213	—	2.7 to 5.5	4.5	4 × 4 LFCSP	EAR99	ADF4110BCPZ-RL7
ADF4116	Integer-N	0.08 to 0.55	-211	55	2.7 to 5.5	4.5	TSSOP	EAR99	ADF4116BRUZ-REEL7
ADF4111	Integer-N	0.08 to 1.2	-213	—	2.7 to 5.5	4.5	TSSOP	EAR99	ADF4111BRUZ-RL7
ADF4117	Integer-N	0.1 to 1.2	-213	55	2.7 to 5.5	4.5	TSSOP	EAR99	ADF4117BRUZ
ADF4212L	Integer-N	0.2 to 2.4	-215	75	3	7.5	TSSOP	EAR99	ADF4212LBRUZ
HMC440	Integer-N	0.01 to 2.8	-233	1300	5	250	QSOP	EAR99	HMC440QS16GE
HMC4069	Integer-N	0.01 to 2.9	-233	1300	5	295	4 × 4 LFCSP	EAR99	HMC4069LP4E
ADF4118	Integer-N	0.1 to 3	-216	55	2.7 to 5.5	6.5	TSSOP	EAR99	ADF4118YRUZ-RL7
ADF4113	Integer-N	0.2 to 3.7	-217	—	2.7 to 5.5	8.5	4 × 4 LFCSP	EAR99	ADF4113BCPZ-RL7
ADF4113HV	Integer-N	0.2 to 3.7	-212	5	2.7 to 5.5	11	4 × 4 LFCSP	5A991.b	ADF4113HVBCPZ-RL7
LTC6945	Integer-N	0.35 to 6	-226	100	3.3	110	4 × 5 LFCSP	EAR99	LTC6945IUFD#TRPBF
ADF4106	Integer-N	0.5 to 6	-223	104	3	13	4 × 4 LFCSP	EAR99	ADF4106BCPZ-R7
HMC698	Integer-N	0.08 to 7	-233	1300	5	310	5 × 5 LFCSP	EAR99	HMC698LP5E
HMC699	Integer-N	0.16 to 7	-233	1300	5	310	5 × 5 LFCSP	EAR99	HMC699LP5E
ADF4107	Integer-N	1 to 7	-223	104	3	17	4 × 4 LFCSP	EAR99	ADF4107BCPZ-REEL7
ADF4007	Integer-N	1 to 7.5	-219	120	3	15	4 × 4 LFCSP	EAR99	ADF4007BCPZ-RL7
ADF4108	Integer-N	1 to 8	-223	104	3	15	4 × 4 LFCSP	EAR99	ADF4108BCPZ-RL7
ADF41020	Integer-N	4 to 18	-221	100	3	30	4 × 4 LFCSP	EAR99	ADF41020BCPZ-RL7

Fractional-N/Integer-N PLLs

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD _{max} (MHz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4150HV	Frac-N/int-N PLL, 30 V charge pump	0.3 to 3	-213	26	3.3	50	5 × 5 LFCSP	EAR99	ADF4150HVBCPZ-RL7
ADF4252	Frac-N/int-N PLLs	0.25 to 3	-214	RF PFD 30 IF PFD 55	3	13	4 × 4 LFCSP	EAR99	ADF4252BCPZ-R7
ADF4193	Frac-N/int-N PLLs	0.4 to 3.5	-216	30	3	68	5 × 5 LFCSP	EAR99	ADF4193BCPZ-RL7
ADF4151	Int-N and frac-N	0.5 to 3.5	-221	32	3.3	42	5 × 5 LFCSP	EAR99	ADF4151BCPZ-RL7
ADF4153A	Frac-N/int-N PLLs	0.5 to 4	-223	32	3	20	TSSOP	EAR99	ADF4153ABRUZ
ADF4153A	Frac-N/int-N PLLs	0.5 to 4	-223	32	3	20	4 × 4 LFCSP	EAR99	ADF4153ABCPZ-RL7
ADF4153	Frac-N/int-N PLLs	0.5 to 4	-220	32	3	20	TSSOP	EAR99	ADF4153BRUZ-RL7
ADF4153	Frac-N/int-N PLLs	0.5 to 4	-220	32	3	20	4 × 4 LFCSP	EAR99	ADF4153BCPZ-RL7
ADF4154	Frac-N/int-N PLLs	0.5 to 4	-220	32	3	20	TSSOP	EAR99	ADF4154BRUZ-RL7
ADF4154	Frac-N/int-N PLLs	0.5 to 4	-220	32	3	20	4 × 4 LFCSP	EAR99	ADF4154BCPZ-RL7
ADF4150	Frac-N/int-N PLLs	0.031 to 4.4	-223	32	3.3	50	4 × 4 LFCSP	EAR99	ADF4150BCPZ-RL7
ADF4152HV	Frac-N/int-N PLL, 30 V charge pump	0.5 to 5	-213	26	3.3	50	5 × 5 LFCSP	EAR99	ADF4152HVBCPZ-RL7
LTC6947	Frac-N/int-N PLLs	0.35 to 6	-226	76/100	3.3	110	4 × 5 LFCSP	EAR99	LTC6947IUFD#TRPBF
ADF4196	Int-N and frac-N	0.4 to 6	-216	25	3	68	5 × 5 LFCSP	5A991.b	ADF4196BCPZ-RL7
ADF4157	Frac-N/int-N PLLs	0.5 to 6	-211	32	3	23	TSSOP	EAR99	ADF4157BRUZ-RL7
ADF4157	Frac-N/int-N PLLs	0.5 to 6	-211	32	3	23	4 × 4 LFCSP	EAR99	ADF4157BCPZ-RL7
ADF4158	Int-N and frac-N	0.5 to 6.1	-216	32	3	23	4 × 4 LFCSP	EAR99	ADF4158CCPZ-RL7
ADF4156	Frac-N	0.5 to 6.2	-220	32	3	26	TSSOP	EAR99	ADF4156BRUZ-RL7
ADF4156	Frac-N	0.5 to 6.2	-220	32	3	26	4 × 4 LFCSP	EAR99	ADF4156BCPZ-RL7

— = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Fractional-N/Integer-N PLLs (Continued)

Part Number	Description	Frequency (GHz)	Figure of Merit (dBc/Hz)	PFD _{MAX} (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC704	Frac-N	~0 to 8	-230	100	3.3, 5	52, 6	4 × 4 LFCSP	EAR99	HMC704LP4E
HMC703	Frac-N with sweeper	~0 to 8	-230	100	3.3, 5	54, 7	4 × 4 LFCSP	EAR99	HMC703LP4E
HMC701	Frac-N with sweeper	~0 to 8	-221	70	3.3, 5	90, 37	6 × 6 LFCSP	EAR99	HMC701LP6CE
ADF4155	Int-N and frac-N	0.5 to 8	-223	125	3.3	38	4 × 4 LFCSP	EAR99	ADF4155BCPZ-RL7
ADF4159*	Swept frequency int-N and frac-N	0.5 to 13	-224	110	3	33	4 × 4 LFCSP	EAR99	ADF4159CCPZ-RL7
ADF4169*	Frac-N/int-N PLLs	0.5 to 13.5	-224	130	3.3	65	4 × 4 LFCSP	EAR99	ADF4169CCPZ-RL7
HMC702	Frac-N with sweeper	~0 to 14	-221	70	3.3, 5	135, 26	6 × 6 LFCSP	EAR99	HMC702LP6CE
ADF41513	Frac-N/int-N	1 to 26.5	-235	250	3.3	95.1	4 × 4 LFCSP	EAR99	ADF41513BCPZ

Integer-N PLLs with Integrated VCOs

Part Number	Description	Frequency (GHz)	Open-Loop VCO Phase Noise @ 100 kHz (dBc/Hz)	@ F _{OUT} (GHz)	Divider	VCO Tuning Inductor	Figure of Merit (dBc/Hz)	PFD _{MAX} (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADF4360-9*	Int-N PLLs with VCO	~0 to 0.2	-120	0.16	/2 to /62	Ext L sets frequency range	-218	8	3.3	20 to 40	4 × 4 LFCSP	EAR99	ADF4360-9BCPZRL7
ADF4360-8*	Int-N PLLs with VCO	0.065 to 0.4	-120	0.16	No	Ext L sets frequency range	-216	8	3.3	20 to 40	4 × 4 LFCSP	EAR99	ADF4360-8BCPZRL7
ADF4360-6*	Int-N PLLs with VCO	1.05 to 1.25	-110	1.15	/1, /2	Internal	-216	8	3.3	25 to 45	4 × 4 LFCSP	EAR99	ADF4360-6BCPZRL7
ADF4360-5*	Int-N PLLs with VCO	1.2 to 1.4	-110	1.3	/1, /2	Internal	-216	8	3.3	25 to 45	4 × 4 LFCSP	EAR99	ADF4360-5BCPZRL7
ADF4360-4*	Int-N PLLs with VCO	1.45 to 1.75	-110	1.6	/1, /2	Internal	-216	8	3.3	25 to 50	4 × 4 LFCSP	EAR99	ADF4360-4BCPZRL7
ADF4360-7*	Int-N PLLs with VCO	0.35 to 1.8	-116	0.5	/1, /2	Ext L sets frequency range	-216	8	3.3	25 to 45	4 × 4 LFCSP	EAR99	ADF4360-7BCPZRL7
ADF4360-3*	Int-N PLLs with VCO	1.6 to 1.95	-110	1.8	/1, /2	Internal	-216	8	3.3	25 to 50	4 × 4 LFCSP	EAR99	ADF4360-3BCPZRL7
ADF4360-2*	Int-N PLLs with VCO	1.85 to 2.17	-110	2	/1, /2	Internal	-216	8	3.3	25 to 50	4 × 4 LFCSP	EAR99	ADF4360-2BCPZRL7
ADF4360-1*	Int-N PLLs with VCO	2.05 to 2.45	-110	2.25	/1, /2	Internal	-216	8	3.3	25 to 50	4 × 4 LFCSP	EAR99	ADF4360-1BCPZRL7
ADF4360-0*	Int-N PLLs with VCO	2.4 to 2.75	-110	2.6	/1, /2	Internal	-216	8	3.3	25 to 50	4 × 4 LFCSP	EAR99	ADF4360-0BCPZRL7
LTC6946-1	Int-N PLLs with VCO	0.373 to 3.74	-110	3	/1 to /6	Internal	-226	100	3.3/5	80/40	4 × 5 LFCSP	EAR99	LTC6946IUFD-1#TRPBF
LTC6946-2	Int-N PLLs with VCO	0.513 to 4.91	-106	4	/1 to /6	Internal	-226	100	3.3/5	80/40	4 × 5 LFCSP	EAR99	LTC6946IUFD-2#TRPBF
LTC6946-3	Int-N PLLs with VCO	0.640 to 5.79	-103	5	/1 to /6	Internal	-226	100	3.3/5	80/40	4 × 5 LFCSP	EAR99	LTC6946IUFD-3#TRPBF
LTC6946-4	Int-N PLLs with VCO	0.700 to 6.39	-101	6	/1 to /6	Internal	-226	100	3.3/5	80/40	4 × 5 LFCSP	EAR99	LTC6946IUFD-4#TRPBF

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Narrow-Band RF Fractional-N/Integer-N PLLs with VCOs

Part Number	Description	Frequency (GHz)	Open-Loop VCO Phase Noise @ 100 kHz (dBc/Hz)	Open-Loop VCO Phase Noise @ 1 MHz (dBc/Hz)	P _{OUT} (dBm)	Figure of Merit (dBc/Hz)	PFD _{MAX} Frac-N Mode (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1032	Clock generator with frac-N PLL w/ int VCO	0.125 to 0.350	-130	-155	—	-230	100	3.3/5	52/178	6 × 6 LFCSP	EAR99	HMC1032LP6GE
HMC1033	Clock generator with frac-N PLL	0.025 to 0.55	-130	-153	—	-227	100	3.3	195	6 × 6 LFCSP	EAR99	HMC1033LP6GE
HMC1034	Clock generator with frac-N PLL w/ int VCO	0.125 to 3	-130	-153	—	-230	100	3.3/5	52/178	6 × 6 LFCSP	EAR99	HMC1034LP6GE
HMC1035	Clock generator with frac-N PLL w/ int VCO	0.025 to 2.5	-125	-148	—	-227	100	3.3	221	6 × 6 LFCSP	EAR99	HMC1035LP6GE
HMC824	Frac-N PLL	0.78 to 0.87	-123	-148	14	-229	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC824LP6CE
HMC822	Frac-N PLL, triband VCO	0.665 to 0.825, 1.33 to 1.65, 2.66 to 3.3	-124, -118, -112	-148, -142, -136	+11, +6.5, +4	-229	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC822LP6CE
HMC838	Frac-N PLL, triband VCO	0.795 to 0.945, 1.59 to 1.89, 3.18 to 3.78	-123, -118, -112	-148, -118, -112	+10, +7.5, -4	-229	FVCO/20	3.3/5	51/77	6 × 6 LFCSP	EAR99	HMC838LP6CE
HMC821	Frac-N PLL, triband VCO	0.86 to 1.04, 1.72 to 2.08, 3.44 to 4.16	-122, -116, -110	-147, -141, -135	+10, +6.5, -4	-227	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC821LP6CE
HMC837	Frac-N PLL, triband VCO	1.025 to 1.15, 2.05 to 2.3, 4.1 to 4.6	-120, -114, -108	-147, -141, -135	+12, +10.5, -0.5	-230	FVCO/20	3.3/5	47/94	6 × 6 LFCSP	EAR99	HMC837LP6CE
HMC839	Frac-N PLL, triband VCO	1.05 to 1.205, 2.1 to 2.41, 4.2 to 4.82	-121, -116, -109	-146, -140, -135	+10, +7.5, -4	-229	FVCO/20	3.3/5	51/78	6 × 6 LFCSP	EAR99	HMC839LP6CE
HMC820	Frac-N PLL, triband VCO	1.095 to 1.275, 2.19 to 2.55, 4.38 to 5.1	-122, -116, -110	-147, -141, -135	+10, +6.5, -4	-227	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC820LP6CE
HMC840	Frac-N PLL, triband VCO	1.31 to 1.415, 2.62 to 2.83	-117, -111	-145, -139	+10, +9	-230	FVCO/20	3.3/5	47/97	6 × 6 LFCSP	EAR99	HMC840LP6CE
HMC826	Frac-N PLL	0.99 to 1.105	-121	-146	11	-229	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC826LP6CE
HMC828	Frac-N PLL	1.285 to 1.415	-118	-143	10	-229	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC828LP6CE
HMC831	Frac-N PLL	1.815 to 2.01	-118	-143	7.5	-229	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC831LP6CE
HMC836	Frac-N PLL	3.365 to 3.705	-111	-136	0	-227	FVCO/20	3.3/5	51/97	6 × 6 LFCSP	EAR99	HMC836LP6CE

Additional PLLs can be found in the Clock Generation and Distribution section on page 95.

Narrow-Band Microwave Fractional-N/Integer-N PLLs with Integrated VCOs

Part Number	Description	Frequency (GHz)	Open-Loop VCO Phase Noise @ 1 MHz (dBc/Hz)	P _{OUT} (dBm)	Figure of Merit (dBc/Hz)	PFD _{MAX} Frac-N Mode (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC764	Frac-N/int-N PLL with VCO	7.3 to 8.2	-140	15	-226	70	3.3/5	90/245	6 × 6 LFCSP	EAR99	HMC764LP6CE
HMC765	Frac-N/int-N PLL with VCO	7.8 to 8.8	-140	13	-226	70	3.3/5	90/245	6 × 6 LFCSP	EAR99	HMC765LP6CE
HMC767	Frac-N/int-N PLL with VCO	8.45 to 9.55	-138	12	-230	100	3.3/5	54/257	6 × 6 LFCSP	EAR99	HMC767LP6CE
HMC769	Frac-N/int-N PLL with VCO	9.05 to 10.15	-140	12	-230	100	3.3/5	54/272	6 × 6 LFCSP	EAR99	HMC769LP6CE

Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Narrow-Band Microwave Fractional-N/Integer-N PLLs with Integrated VCOs (Continued)

Part Number	Description	Frequency (GHz)	Open-Loop VCO Phase Noise @ 1 MHz (dBc/Hz)	P _{OUT} (dBm)	Figure of Merit (dBc/Hz)	PFD _{MAX} Frac-N Mode (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC778	Frac-N/int-N PLL with VCO	9.6 to 10.8	-140	9	-230	100	3.3/5	54/272	6 × 6 LFCSP	EAR99	HMC778LP6CE
HMC783	Frac-N/int-N PLL with VCO	11.5 to 12.5	-134	10	-226	70	3.3/5	90/145	6 × 6 LFCSP	EAR99	HMC783LP6CE
HMC807	Frac-N/int-N PLL with VCO	12.4 to 13.4	-132	8	-226	70	3.3/5	90/205	6 × 6 LFCSP	EAR99	HMC807LP6CE

Wideband Fractional-N/Integer-N PLLs with Integrated VCOs

Part Number	Description	Frequency (GHz)	Open-Loop VCO Phase Noise @ 100 kHz (dBc/Hz)	Open-Loop VCO Phase Noise @ 1 MHz (dBc/Hz)	@ F _{OUT} (GHz)	Figure of Merit (dBc/Hz)	PFD _{MAX} Frac-N Mode (MHz)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC829	Wideband frac-N/int-N PLL and VCO	0.045 to 1.05, 1.4 to 2.1, 2.8 to 4.2	-108	-134	4	-227	100	3.3/5	52/185	6 × 6 LFCSP	EAR99	HMC829LP6GE
HMC834	Wideband frac-N/int-N PLL and VCO	0.045 to 1.05, 1.4 to 2.1, 2.8 to 4.2, 5.6 to 8.4	-108	-134	4	-227	100	3.3/5	52/185	6 × 6 LFCSP	EAR99	HMC834LP6GE
HMC832	Wideband frac-N/int-N PLL and VCO	0.025 to 3	-116	-139	2	-226	100	3.3	219	6 × 6 LFCSP	EAR99	HMC832LP6GE
HMC830	Wideband frac-N/int-N PLL and VCO	0.025 to 3	-116	-141	2	-227	100	3.3/5	52/185	6 × 6 LFCSP	EAR99	HMC830LP6GE
LTC6948-1	Wideband frac-N/int-N PLL and VCO	0.373 to 3.74	-110	-130	3	-225	76	3.3/5	90/40	4 × 5 LFCSP	EAR99	LTC6948IUFD-1#TRPBF
HMC835*	Wideband frac-N/int-N PLL and VCO	0.033 to 4.1	-108	-134	4	-227	100	3.3/5	48/220	6 × 6 LFCSP	5A991.b	HMC835LP6GE
ADF4355-2*	Wideband frac-N/int-N PLL and VCO	0.055 to 4.4	-120	-142	2.2	-223	125	3.3/5	110/80	5 × 5 LFCSP	EAR99	ADF4355-2BCPZ
ADF4351	Wideband frac-N/int-N PLL and VCO	0.035 to 4.4	-114	-134	2.2	-221	32	3.3	112 to 148	5 × 5 LFCSP	EAR99	ADF4351BCPZ
ADF4350	Wideband frac-N/int-N PLL and VCO	0.1375 to 4.4	-114	-134	2.2	-220	32	3.3	112 to 136	5 × 5 LFCSP	EAR99	ADF4350BCPZ
LTC6948-2	Wideband frac-N/int-N PLL and VCO	0.513 to 4.91	-105	-128	4	-225	76	3.3/5	90/40	4 × 5 LFCSP	EAR99	LTC6948IUFD-2#TRPBF
LTC6948-3	Wideband frac-N/int-N PLL and VCO	0.640 to 5.79	-103	-125	5	-225	76	3.3/5	90/40	4 × 5 LFCSP	EAR99	LTC6948IUFD-3#TRPBF
HMC833	Wideband frac-N/int-N PLL and VCO	0.025 to 6	-116	-141	2	-227	100	3.3/5	52/185	6 × 6 LFCSP	EAR99	HMC833LP6GE
LTC6948-4	Wideband frac-N/int-N PLL and VCO	0.700 to 6.39	-100	-122	6	-225	76	3.3/5	90/40	4 × 5 LFCSP	EAR99	LTC6948IUFD-4#TRPBF
ADF4355-3*	Wideband frac-N/int-N PLL and VCO	5.156 to 6.6	-118	-140	2.2	-223	125	3.3	146	5 × 5 LFCSP	EAR99	ADF4355-3BCPZ
ADF4355*	Wideband frac-N/int-N PLL and VCO	0.055 to 6.8	-116	-138	2.2	-223	125	3.3/5	110/80	5 × 5 LFCSP	EAR99	ADF4355BCPZ
ADF4356*	Wideband frac-N/int-N PLL and VCO	0.053 to 6.8	-115	-137	3.4	-227	125	3.3/5	110/80	5 × 5 LFCSP	EAR99	ADF4356BCPZ
ADF5355*	Wideband frac-N/int-N PLL and VCO	0.053 to 13.6	-107	-129	10	-221	125	3.3/5	110/80	5 × 5 LFCSP	EAR99	ADF5355BCPZ
ADF5356*	Wideband frac-N/int-N PLL and VCO	0.053 to 13.6	-107	-129	10	-227	125	3.3/5	110/80	5 × 5 LFCSP	EAR99	ADF5356BCPZ
ADF5610	Wideband frac-N/int-N PLL and VCO	0.057 to 14.6	-114	-135	10	-229	100	3.3/5	126.7/110	7 × 7 LGA	EAR99	ADF5610BCCZ
ADF4372	Wideband frac-N/int-N PLL and VCO	0.062 to 16.0	-116	-137	8	-234	160	3.3/5	190/135	7 × 7 LGA	EAR99	ADF4372BCCZ
ADF4371*	Wideband frac-N/int-N PLL and VCO	0.062 to 32.0	-100	-123	24	-234	160	3.3/5	190/135	7 × 7 LGA	EAR99	ADF4371BCCZ

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

Translation Loop PLL+VCO Module

Part Number	Description	Frequency (GHz)	Integrated VCO	Frequency Ref Input (MHz)	Phase Noise @ 10 kHz Offset, 6.45 GHz (dBc/Hz)	I_s (mA)	V_s (V)	Package (mm)	ECCN Code	Ordering Part Number
ADF4401A <i>New</i>	Translation loop PLL+VCO module	0.0625 to 8	Yes	10 to 500	-135	0.34/0.43	5.0/3.3	18 × 18 LGA_CAV	EAR99	ADF4401ABCEZ

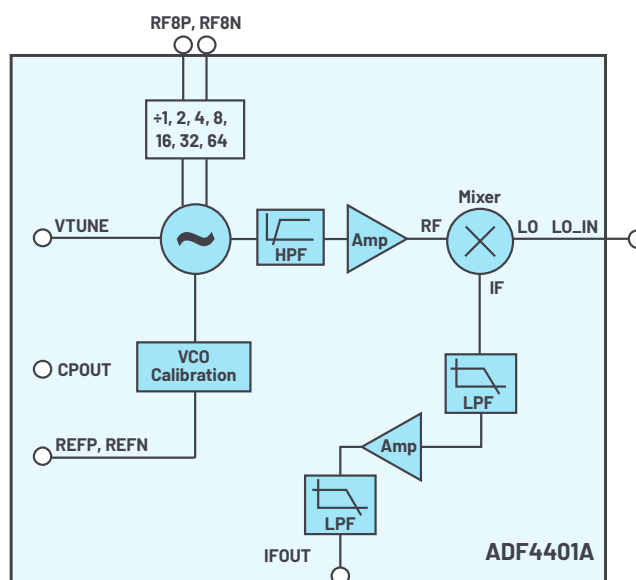
ADF4401A: Translation Loop, PLL, VCO Module

Key Features

- ▶ RF output frequency range: 62.5 MHz to 8000 MHz
- ▶ 9 fs rms jitter at 8 GHz output
- ▶ 17 dBm IF output power at 6 GHz RF output
- ▶ 90 dBc LO_IN to RF output
- ▶ 90 dBc spurious-free dynamic range
- ▶ Low phase noise, voltage controlled oscillator
- ▶ Programmable divide by 1, 2, 4, 8, 16, 32, or 64 output
- ▶ 3.3 V analog, digital, and mixer power supplies
- ▶ 5 V amplifier and VCO power supply
- ▶ RF output mute function
- ▶ 18.00 mm × 18.00 mm, 80-terminal LGA_CAV
- ▶ Supported in the ADIsimPLL design tool

Applications

- ▶ Instrumentation and measurement
- ▶ Automated test equipment
- ▶ Aerospace and defense



ADF4372: 62.5 MHz to 16.0 GHz PLL and Ultralow Phase Noise VCO

ADF4371: 62.5 MHz to 32.0 GHz PLL and Ultralow Phase Noise VCO

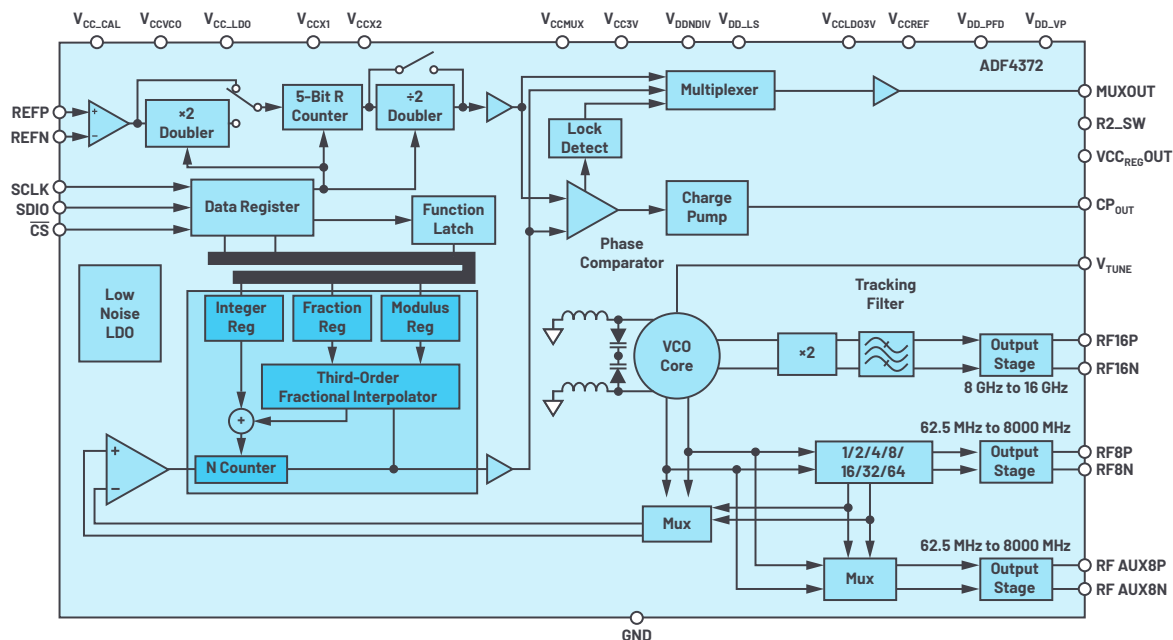
Best Harmonics, Excellent Phase Noise, Lowest Spurs, Widest Frequency Ranges,
Integrated LO Supply Regulators

Key Features

- ▶ RF bandwidth:
 - 62.5 MHz to 16 GHz (ADF4372)
 - 62.5 MHz to 32 GHz (ADF4371)
- ▶ Low phase noise VCO
 - -111 dBc/Hz at 100 kHz offset at 8 GHz
 - -134 dBc/Hz at 1 MHz offset at 8 GHz
 - -105 dBc/Hz at 100 kHz offset at 16 GHz
 - -128 dBc/Hz at 1 MHz offset at 16 GHz
 - -98 dBc/Hz at 100 kHz offset at 32 GHz (ADF4371 only)
 - -122 dBc/Hz at 1 MHz offset at 32 GHz (ADF4371 only)
- ▶ Integrated jitter: 38 fs
(1 kHz to 100 MHz integration bandwidth)
- ▶ FOM: -234 dBc/Hz (integer-N),
-232 dBc/Hz (fractional-N)
- ▶ 1/f FOM: -127.4 dBc/Hz
- ▶ Integrated tracking filters to reduce subharmonics
 - -55 dBc nominal 0.5 harmonic at 16 GHz
 - -30 dBc nominal 0.5 harmonic at 32 GHz (ADF4371 only)
- ▶ Low spurs: -100 dBc PFD spurs, -60 dBc IBS
- ▶ High max PFD frequency: 155 MHz
(fractional-N), 250 MHz (integer-N)
- ▶ Phase adjust and resync
- ▶ Lock time: <30 μ s with autocalibration bypassed
- ▶ Power supply: 3.3 V and 5 V
- ▶ 48-terminal, 7 mm $\times$ 7 mm LGA package

Applications

- ▶ Microwave point-to-point and millimeter wave 5G radios
- ▶ Electronic test and measurement
- ▶ Wideband military radio, radar, ECM, VSAT,
and EW

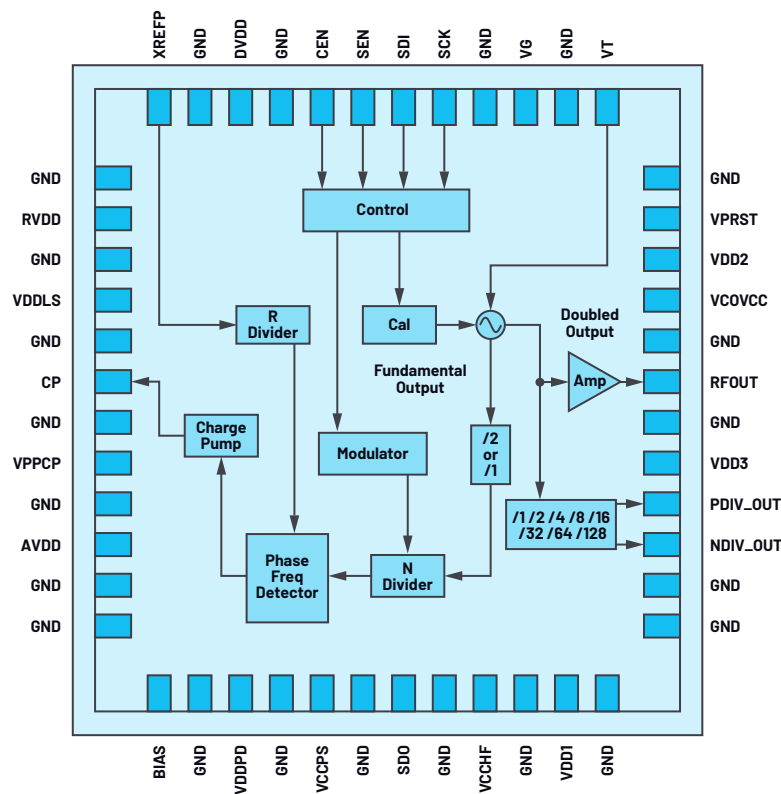


ADF5610: 55 MHz to 14.6 GHz Wideband Synthesizer with Integrated VCO

Low Spurious PLL Integrated with Lowest Phase Noise and Highest Output Power VCO

Key Features

- ▶ RF output frequency range: 55 MHz to 14.6 GHz
- ▶ Industry-leading voltage-controlled oscillator performance
- ▶ Phase noise: -116 dBc/Hz typical at 100 kHz (7 GHz)
- ▶ Phase noise: -114 dBc/Hz typical at 100 kHz (10 GHz)
- ▶ Phase noise: -109 dBc/Hz max at 100 kHz (15 GHz)
- ▶ Fractional-N synthesizer FOM: -226 dBc/Hz
- ▶ Integer-N synthesizer FOM: -229 dBc/Hz
- ▶ High resolution, 24-bit sigma-delta modulator
- ▶ Phase frequency detector (PFD) operation to 100 MHz
- ▶ Reference frequency operation to 350 MHz
- ▶ Maintains frequency lock over -40°C to +85°C
- ▶ Programmable ÷ by 1, 2, 4, 8, 16, 32, 64, or 128 output
- ▶ Analog and digital power supplies: 3.3 V, 3.8 V typical
- ▶ VCO power supplies: 5 V, typical
- ▶ Programmable output power level: up to 5 dBm
- ▶ Analog and digital lock detect



Voltage Controlled Oscillators

Low Current VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC384	With buffer	2.05 to 2.25	-89	-112	3.5	0 to 10	3	35	4 × 4 LFCSP	EAR99	HMC384LP4E
HMC385	With buffer	2.25 to 2.5	-89	-115	4.5	0 to 10	3	35	4 × 4 LFCSP	EAR99	HMC385LP4E
HMC386	With buffer	2.6 to 2.8	-88	-115	5	0 to 10	3	35	4 × 4 LFCSP	EAR99	HMC386LP4E
HMC416	With buffer	2.75 to 3	-89	-114	4.5	0 to 10	3	37	4 × 4 LFCSP	EAR99	HMC416LP4E
HMC388	With buffer	3.15 to 3.4	-88	-113	4.9	0 to 10	3	39	4 × 4 LFCSP	EAR99	HMC388LP4E
HMC389	With buffer	3.35 to 3.55	-89	-112	4.7	0 to 10	3	41	4 × 4 LFCSP	EAR99	HMC389LP4E
HMC390	With buffer	3.55 to 3.9	-87	-112	4.7	0 to 10	3	42	4 × 4 LFCSP	EAR99	HMC390LP4E
HMC391	With buffer	3.9 to 4.45	-81	-106	5	0 to 10	3	30	4 × 4 LFCSP	EAR99	HMC391LP4E
HMC429	With buffer	4.45 to 5	-79	-105	4	0 to 10	3	30	4 × 4 LFCSP	EAR99	HMC429LP4E
HMC430	With buffer	5 to 5.5	-80	-103	2	0 to 10	3	27	4 × 4 LFCSP	EAR99	HMC430LP4E
HMC431	With buffer	5.5 to 6.1	-80	-102	2	0 to 10	3	27	4 × 4 LFCSP	EAR99	HMC431LP4E
HMC358	With buffer	5.8 to 6.8	-82	-110	11	0 to 10	3	100	MSOP	EAR99	HMC358MS8GE
HMC466	With buffer	6.1 to 6.72	-73	-101	4.5	0 to 10	3	13	4 × 4 LFCSP	EAR99	HMC466LP4E
HMC505	With buffer	6.8 to 7.4	-80	-106	11	1 to 11	3	80	4 × 4 LFCSP	EAR99	HMC505LP4E
HMC532	With buffer	7.1 to 7.9	-80	-101	14	1 to 13	3	85	4 × 4 LFCSP	EAR99	HMC532LP4E
HMC506	With buffer	7.8 to 8.7	-80	-103	14	1 to 11	3	77	4 × 4 LFCSP	EAR99	HMC506LP4E

High Performance VCOs

Part Number	Description	Frequency (GHz)	Primary Divide Output (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC507*	With f ₀ /2	6.65 to 7.65	3.325 to 3.825	-90	-115	16	2 to 13	5	230	5 × 5 LFCSP	EAR99	HMC507LP5E
HMC508*	With f ₀ /2	7.3 to 8.2	3.65 to 4.1	-90	-116	17	2 to 13	5	240	5 × 5 LFCSP	EAR99	HMC508LP5E
HMC509*	With f ₀ /2	7.8 to 8.8	3.9 to 4.4	-90	-115	15	2 to 13	5	250	5 × 5 LFCSP	EAR99	HMC509LP5E
HMC160*	With f ₀ /2	8.45 to 9.3	4.225 to 4.65	-90	-116	17	2 to 13	5	260	5 × 5 LFCSP	EAR99	HMC160LP5E
HMC510*	With f ₀ /2 and divide by 4	8.45 to 9.55	4.225 to 4.775	-92	-116	15	2 to 13	5	315	5 × 5 LFCSP	EAR99	HMC510LP5E
HMC161*	With f ₀ /2	8.71 to 9.55	4.355 to 4.775	-90	-115	11	2 to 13	5	250	5 × 5 LFCSP	EAR99	HMC161LP5E
HMC511*	With f ₀ /2	9.05 to 10.15	4.525 to 5.075	-88	-115	16	2 to 13	5	265	5 × 5 LFCSP	EAR99	HMC511LP5E
HMC162*	With f ₀ /2	9.25 to 10.1	4.625 to 5.05	-86	-115	11	2 to 13	5	230	5 × 5 LFCSP	EAR99	HMC162LP5E
HMC163*	With f ₀ /2	9.65 to 10.41	4.825 to 5.205	-87	-114	11	2 to 13	5	205	5 × 5 LFCSP	EAR99	HMC163LP5E
HMC530*	With f ₀ /2 and divide by 4	9.5 to 10.8	4.75 to 5.4	-85	-110	14	2 to 13	5	350	5 × 5 LFCSP	EAR99	HMC530LP5E
HMC512*	With f ₀ /2 and divide by 4	9.6 to 10.8	4.8 to 5.4	-85	-111	15	2 to 13	5	330	5 × 5 LFCSP	EAR99	HMC512LP5E
HMC164*	With f ₀ /2	10.38 to 11.3	5.19 to 5.65	-86	-114	8	2 to 13	5	200	5 × 5 LFCSP	EAR99	HMC164LP5E
HMC513*	With f ₀ /2 and divide by 4	10.43 to 11.46	5.215 to 5.73	-85	-110	10	2 to 13	5	275	5 × 5 LFCSP	EAR99	HMC513LP5E
HMC165*	With f ₀ /2	11.07 to 11.62	5.535 to 5.81	-88	-113	8	2 to 13	5	210	5 × 5 LFCSP	EAR99	HMC165LP5E
HMC534*	With f ₀ /2 and divide by 4	10.6 to 11.8	5.3 to 5.9	-82	-110	14	2 to 13	5	350	5 × 5 LFCSP	EAR99	HMC534LP5E
HMC514*	With f ₀ /2 and divide by 4	11.17 to 12.02	5.585 to 6.01	-87	-110	10	2 to 13	3	275	5 × 5 LFCSP	3A001.a.11.b	HMC514LP5E
HMC582*	With f ₀ /2 and divide by 4	11.1 to 12.4	5.55 to 6.2	-83	-110	12	2 to 13	5	350	5 × 5 LFCSP	EAR99	HMC582LP5E
HMC515*	With f ₀ /2 and divide by 4	11.5 to 12.5	5.75 to 6.25	-83	-110	15	2 to 13	5	200	5 × 5 LFCSP	EAR99	HMC515LP5E
HMC166*	With f ₀ /2	11.41 to 12.62	5.705 to 6.31	-89	-115	11	2 to 13	5	220	5 × 5 LFCSP	EAR99	HMC166LP5E

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.* = X-Microwave

High Performance VCOs (Continued)

Part Number	Description	Frequency (GHz)	Primary Divide Output (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC583*	With f ₀ /2 and divide by 4	11.5 to 12.8	5.75 to 6.4	-80	-110	13	2 to 13	5	350	5 × 5 LFCSP	EAR99	HMC583LP5E
HMC1167*	With f ₀ /2	12.17 to 13.3	6.085 to 6.65	-86	-113	10.5	2 to 13	5	200	5 × 5 LFCSP	EAR99	HMC1167LP5E
HMC529*	With f ₀ /2 and divide by 4	12.4 to 13.4	6.2 to 6.7	-83	-110	10	2 to 13	5	260	5 × 5 LFCSP	EAR99	HMC529LP5E
HMC1168*	With f ₀ /2	12.47 to 13.72	6.235 to 6.86	-85	-113	10	2 to 13	5	190	5 × 5 LFCSP	EAR99	HMC1168LP5E
HMC584*	With f ₀ /2 and divide by 4	12.5 to 13.9	6.25 to 6.95	-81	-110	14	2 to 13	5	330	5 × 5 LFCSP	EAR99	HMC584LP5E
HMC1169*	With f ₀ /2	12.92 to 14.07	6.46 to 7.035	-86	-113	11.5	2 to 13	5	220	5 × 5 LFCSP	EAR99	HMC1169LP5E
HMC531*	With f ₀ /2 and divide by 4	13.6 to 14.9	6.8 to 7.45	-81	-110	10	2 to 13	5	330	5 × 5 LFCSP	EAR99	HMC531LP5E
HMC632*	With f ₀ /2 and divide by 4	14.25 to 15.65	7.125 to 7.825	-80	-107	12	2 to 13	5	350	5 × 5 LFCSP	EAR99	HMC632LP5E

Higher Power and Frequency VCOs

Part Number	Description	Frequency (GHz)	Primary Divide Output (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC734*	With divide by 4	8.6 to 10.2	2.15 to 2.55	-70	-100	22	1 to 13	5	218	5 × 5 LFCSP	EAR99	HMC734LP5E
HMC735*	With divide by 4	10.5 to 12.2	2.625 to 3.05	-75	-100	21	1 to 13	5	217	5 × 5 LFCSP	EAR99	HMC735LP5E
HMC736*	With f ₀ /2	14.5 to 15	7.25 to 7.5	-80	-105	9	1 to 13	4.2	150	4 × 4 LFCSP	EAR99	HMC736LP4E
HMC738*	With f ₀ /2 and divide by 16	20.9 to 23.9	10.45 to 11.95	-65	-95	15	1 to 13	5	200	4 × 4 LFCSP	EAR99	HMC738LP4E
HMC533	With divide by 16	23.8 to 24.8	1.4875 to 1.55	-70	-95	12	1 to 13	5	220	4 × 4 LFCSP	EAR99	HMC533LP4E
HMC739*	With f ₀ /2 and divide by 16	23.8 to 26.8	11.9 to 13.4	-64	-93	14	1 to 13	5	200	4 × 4 LFCSP	EAR99	HMC739LP4E

Ultrawideband VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC6475	WB VCO with buffer	3.9 to 7.5	-79	-106	5	0 to 23	5	53	4 × 4 CLCC	EAR99	HMC6475LC4B
HMC586*	Wideband VCO	4 to 8	-75	-100	5	0 to 18	5	55	4 × 4 LFCSP	EAR99	HMC586LC4B
HMC587*	Wideband VCO	5 to 10	-65	-95	5	0 to 18	5	55	4 × 4 LFCSP	EAR99	HMC587LC4B
HMC732*	Wideband VCO	6 to 12	-65	-95	1	0 to 23	5	57	4 × 4 LFCSP	EAR99	HMC732LC4B
HMC8074	Quad-band VCO	8.3 to 15.2	-68	-98	0	0.5 to 13	4.75 (5 max)	60	6 × 6 LFCSP	EAR99	HMC8074LP6GE
HMC6380*	WB VCO with buffer	8 to 16	-64	-92	6	0 to 23	5	75	4 × 4 CLCC	EAR99	HMC6380LC4B
HMC733*	Wideband VCO	10 to 20	-60	-90	3	-0.25 to +23	5	70	4 × 4 LFCSP	EAR99	HMC733LC4B
HMC8362 New	Quad-band VCO	11.9 to 18.3	-70	-97.5	-4 to +8	1 to 13.5	5	72	6 × 6 QFN	EAR99	HMC8362LP6GE
HMC8364 New	Quad-band VCO	18.1 to 26.6	-63.5	-91.5	-8 to +4	1 to 13.5	5	99	6 × 6 QFN	EAR99	HMC8364LP6GE
ADF5709 New	Ultrawideband VCO	9.85 to 20.5	-51	-83	0	-0.5 to 23	5	70	3.9 × 3.9 LCC	EAR99	ADF5709BEZ

Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.* = X-Microwave.

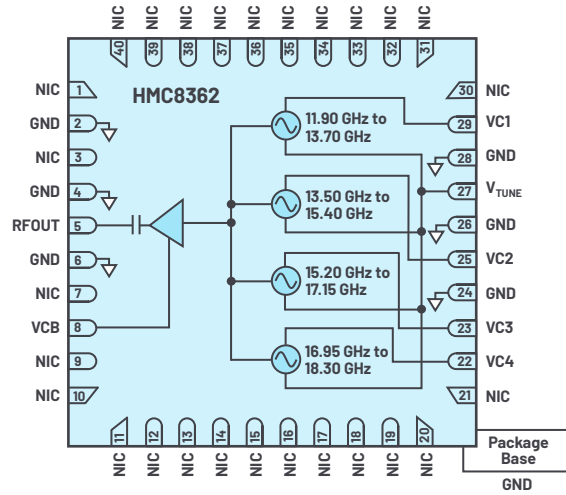
HMC8362: 11.90 GHz to 18.30 GHz Quad-Band VCO
HMC8364: 18.10 GHz to 26.60 GHz Quad-Band VCO

Key Features

- ▶ Set of four narrow-band VCOs with consistent sensitivity vs. frequency
- ▶ RF and tuning ports common to all four VCOs RF output operates from fundamental oscillators with no subharmonic oscillations
- ▶ Up to 8 dBm RF output power (HMC8362)
- ▶ Up to 4 dBm RF output power (HMC8364)
- ▶ Power mute capability
- ▶ No external resonator required
- ▶ 40-lead, 6 mm × 6 mm LFCSP

Applications

- ▶ Electronic test and measurement
- ▶ Industrial and medical instrumentation
- ▶ Point-to-point and multi-point radios
- ▶ Aerospace and defense
- ▶ Wireless communication infrastructure



Quad-Band VCOs

Part Number	Description	Frequency (GHz)	VCO Phase Noise @ 10 kHz (dBc/Hz)	VCO Phase Noise @ 100 kHz (dBc/Hz)	P _{OUT} (dBm)	V _{TUNE} (V)	V _{CC} (V)	I _{CC} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC8074	Quad-band VCO	8.3 to 15.2	-68	-98	0	0.5 to 13	4.75 (5 max)	60	6 × 6 LFCSP	EAR99	HMC8074LP6GE
HMC8362 New	Quad-band VCO	11.9 to 18.3	-70	-97.5	-4 to +8	1 to 13.5	5	72	6 × 6 QFN	EAR99	HMC8362LP6GE
HMC8364 New	Quad-band VCO	18.1 to 26.6	-63.5	-91.5	-8 to +4	1 to 13.5	5	99	6 × 6 QFN	EAR99	HMC8364LP6GE

Frequency Dividers, Multipliers, and Detectors

Frequency Dividers, Prescalers, and Counters

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	Phase Noise @ 100 kHz Offset (dBc/Hz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC794*	Programmable divide by n = 1 to 4	0.2 to 2	Variable	-2 to +10	10	-160	5	135	3 × 3 LFCSP	EAR99	HMC794LP3E
HMC394	5-bit counter, divide by n = 2 to 32	0.1 to 2.2	Variable	-15 to +10	4	-153	5	194	4 × 4 LFCSP	EAR99	HMC394LP4E
HMC905*	Programmable divide by n = 1 to 4	0.4 to 6	Variable	0 to +10	3	-158	3.3	100	3 × 3 LFCSP	EAR99	HMC905LP3E
HMC705*	Programmable divide by n = 1 to 17	0.1 to 6.5	Variable	-15 to +10	0	-153	5	190	4 × 4 LFCSP	EAR99	HMC705LP4E
HMC983	48-bit Σ - Δ programmable	0 to 7	Variable	-15 to -30	2 V p-p into 100 Ω	-160	5, 3.3	1, 244	5 × 5 LFCSP	EAR99	HMC983LP5E
HMC432*	Fixed divide by 2	0 to 8	0 to 4	-12 to +12	-3	-148	3	42	SOT-26	EAR99	HMC432E
HMC361*	Fixed divide by 2	0 to 10	0 to 5	-15 to +10	3	-148	5	83	SOIC	EAR99	HMC361S8GE
HMC361	Fixed divide by 2	0 to 12	0 to 6	-15 to +10	3	-148	5	83	Die	EAR99	HMC361
HMC361*	Fixed divide by 2	0 to 13	0 to 6.5	-15 to +10	4	-148	5	83	Hermetic SMT	EAR99	HMC361G8
HMC492*	Fixed divide by 2	0 to 18	0 to 9	-20 to +10	-4	-150	5	78	3 × 3 LFCSP	EAR99	HMC492LP3E
ADF5000*	Fixed divide by 2	4 to 18	2 to 9	-10 to +10	-5	-147	3.3	30	3 × 3 LFCSP	EAR99	ADF5000BCPZ-RL7
HMC437*	Fixed divide by 3	0 to 7	0 to 2.334	-12 to +12	-1	-153	5	69	MSOP	EAR99	HMC437MS8GE
HMC433*	Fixed divide by 4	0 to 8	0 to 2	-12 to +12	-2	-150	3	53	SOT-26	EAR99	HMC433
HMC362	Fixed divide by 4	0 to 12	0 to 3	-15 to +10	-6	-149	5	68	Die	EAR99	HMC362
HMC362*	Fixed divide by 4	0 to 12	0 to 3	-15 to +10	-6	-149	5	68	SOIC	EAR99	HMC362S8GE
HMC365	Fixed divide by 4	0 to 13	0 to 3.25	-15 to +10	5	-151	5	120	Die	EAR99	HMC365
HMC365*	Fixed divide by 4	0 to 13	0 to 3.25	-15 to +10	7	-151	5	120	Hermetic SMT	EAR99	HMC365G8
HMC365*	Fixed divide by 4	0 to 13	0 to 3.25	-15 to +10	5	-151	5	120	SOIC	EAR99	HMC365S8GE
HMC493*	Fixed divide by 4	0 to 18	0 to 4.5	-20 to +10	-4	-150	5	96	3 × 3 LFCSP	EAR99	HMC493LP3E
ADF5001*	Fixed divide by 4	4 to 18	2 to 4.5	-10 to +10	-5	-150	3.3	30	3 × 3 LFCSP	EAR99	ADF5001BCPZ-RL7
HMC447*	Fixed divide by 4	10 to 26	2.5 to 5.5	-15 to +10	-4	-150	5	96	3 × 3 LFCSP	EAR99	HMC447LC3
HMC438*	Fixed divide by 5	0 to 7	0 to 1.4	-15 to +10	-1	-153	5	80	MSOP	EAR99	HMC438MS8GE
HMC434	Fixed divide by 8	0 to 8	0 to 1	-10 to +12	-2	-150	3	62	SOT-26	EAR99	HMC434E
HMC862A	Programmable divider n = 1 to 8	0.1 to 24	Variable	-5 to +10	-3 to +6	-153	5	73	3 × 3 LFCSP	EAR99	HMC862ALP3E
HMC363*	Fixed divide by 8	0 to 12	0 to 1.5	-15 to +10	-6	-153	5	90	Die	EAR99	HMC363
HMC363*	Fixed divide by 8	0 to 12	0 to 1.5	-15 to +10	4	-153	5	90	Hermetic SMT	EAR99	HMC363G8
HMC363*	Fixed divide by 8	0 to 12	0 to 1.5	-15 to +10	-6	-153	5	90	SOIC	EAR99	HMC363S8GE
HMC494*	Fixed divide by 8	0 to 18	0 to 2.25	-20 to +10	-4	-150	5	103	3 × 3 LFCSP	EAR99	HMC494LP3E
ADF5002*	Fixed divide by 8	4 to 18	0.5 to 2.25	-10 to +10	-5	-153	3.3	30	3 × 3 LFCSP	EAR99	ADF5002BCPZ-RL7

Frequency Multipliers—Active

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	100 kHz Phase Noise (dBc/Hz)	V _s (V)	I _s (mA)	Package (mm)	ECCN ICode	Ordering Part Number
HMC1096	×2 active	1.9 to 2.8	3.7 to 5.6	0	12	-142	5	100	3 × 3 LFCSP	EAR99	HMC1096LP3E
HMC575	×2 active	3 to 4.5	6 to 9	3	17	-140	5	90	4 × 4 LFCSP	EAR99	HMC575LP4E
HMC369	×2 active	4.95 to 6.35	9.9 to 12.7	0	4	-142	5	46	3 × 3 LFCSP	EAR99	HMC369LP3E
HMC368	×2 active	4.5 to 8	9 to 16	2	13	-140	5	75	4 × 4 LFCSP	EAR99	HMC368LP4E
HMC561	×2 active	4 to 10.5	8 to 21	5	17	-139	5	98	Die	EAR99	HMC561

* = X-Microwave.

Frequency Multipliers—Active (Continued)

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Power (dBm)	Output Power (dBm)	100 kHz Phase Noise (dBc/Hz)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC561*	×2 active	4 to 10.5	8 to 21	5	17	-139	5	98	3 × 3 LFCSP	EAR99	HMC561LP3E
HMC573*	×2 active	4 to 11	8 to 22	5	12	-134	5	92	3 × 3 LFCSP	EAR99	HMC573LC3B
HMC814	×2 active	6.5 to 12.3	13 to 24.6	4	17	-136	5	88	Die	EAR99	HMC814
HMC814*	×2 active	6.5 to 12.3	13 to 24.6	4	17	-136	5	88	3 × 3 LFCSP	EAR99	HMC814LC3B
HMC448	×2 active	9.5 to 12.5	19 to 25	0	11	-135	5	48	Die	EAR99	HMC448
HMC576*	×2 active	9 to 14.5	18 to 29	3	17	-132	5	82	Die	EAR99	HMC576
HMC576*	×2 active	9 to 14.5	18 to 29	3	17	-132	5	82	3 × 3 LFCSP	EAR99	HMC576LC3B
HMC942*	×2 active	12 to 15.5	25 to 31	4	17	—	4.5	214	4 × 4 LFCSP	EAR99	HMC942LP4E
HMC577*	×2 active	13.5 to 15.5	27 to 31	5	20	-128	5	213	4 × 4 LFCSP	EAR99	HMC577LC4B
HMC578	×2 active	12 to 16.5	24 to 33	3	17	-132	5	81	Die	EAR99	HMC578
HMC578*	×2 active	12 to 16.5	24 to 33	3	17	-132	5	81	3 × 3 LFCSP	EAR99	HMC578LC3B
HMC598	×2 active	11 to 23	22 to 46	5	15	—	5	175	Die	EAR99	HMC598
HMC579*	×2 active	16 to 23	32 to 46	3	9	-127	5	70	Die	EAR99	HMC579
ADAR2001 <i>New</i>	4× active	2.5 to 10	10 to 40	-20	5	-120	2.5	180	6 × 6 LGA	EAR99	ADAR2001ACCZ
HMC443*	×4 active	2.45 to 2.8	9 to 11.2	-15	4	-142	5	52	4 × 4 LFCSP	EAR99	HMC443LP4E
HMC695*	×4 active	2.85 to 3.3	11.4 to 13.2	-15	7	-140	5	60	4 × 4 LFCSP	EAR99	HMC695LP4E
HMC370*	×4 active	3.6 to 4.1	14.4 to 16.4	-15	0	-140	5	55	4 × 4 LFCSP	EAR99	HMC370LP4E
HMC110	×6 active	11.83 to 14.33	71 to 86	3	13	—	4	255	Die	EAR99	HMC110
HMC444*	×8 active	1.2375 to 1.4	9.9 to 11.2	-15	6	-136	5	68	4 × 4 LFCSP	EAR99	HMC444LP4E
HMC445*	×16 active	0.61875 to 0.6875	9.9 to 11	-15	7	-130	5	78	4 × 4 LFCSP	EAR99	HMC445LP4E

Frequency Multipliers—Passive

Part Number	Description	Input Frequency (GHz)	Output Frequency (GHz)	Input Drive (dBm)	Conversion Loss (dB)	1 F0 Isolation (dB)	4 F0 Isolation (dB)	Package (mm)	ECCN Code	Ordering Part Number
HMC-XDB112	×2 passive	10 to 15	20 to 30	10 to 15	13	30	—	Die	5A991.h	HMC-XDB112
HMC1105*	×2 passive	20 to 40	40 to 80	11 to 15	11	41	46	Die	EAR99	HMC1105
HMC-XTB110	×3 passive	24 to 30	72 to 90	10 to 15	19	—	—	Die	5A991.h	HMC-XTB110

Phase Frequency Detectors

Part Number	Description	Input Frequency (GHz)	Input Power (dBm)	10 kHz Phase Noise (dBc/Hz)	Output Level (mA)	V _{cc} (V)	I _{cc} (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC984	With charge pump	0 to 0.35	+3 to +12	—	0.02 to 2.5	5, 3	97, 27	4 × 4 LFCSP	EAR99	HMC984LP4E
HMC439	Ultralow phase noise	0.01 to 1.3	-10 to +10	-153	2 V p-p	5	96	QSOP	EAR99	HMC439QS16GE
HMC3716	Ultralow phase noise	0.01 to 1.3	-10 to +5	-153	2 V p-p	5	115	4 × 4 LFCSP	EAR99	HMC3716LP4E

* = X-Microwave.

Analog Tunable Low-Pass/Band-Pass Filters

Part Number	Description	Frequency (GHz)	Control	Cutoff Freq Range (MHz)	Stop Band Frequency (Rej > 20 dB)	Tuning Response (ns)	Insertion Loss (dB)	Package (mm)	ECCN Code	Ordering Part Number
HMC1044	Programmable, harmonic low-pass filter	0 to 3.025	Digital three bits	1000 to 3000	—	10	6	3 × 3 LFCSP	EAR99	HMC1044LP3E
HMC890A	Tunable band-pass filter	1 to 1.9	f_c and BW, analog 0 V to 14 V	10% f_c	$\pm 10\% f_c$	200	12	5 × 5 LFCSP	EAR99	HMC890ALP5E
HMC891A	Tunable band-pass filter	1.95 to 3.4	f_c and BW, analog 0 V to 14 V	9% f_c	$\pm 10\% f_c$	200	8	5 × 5 LFCSP	EAR99	HMC891ALP5E
HMC881A	Tunable low-pass filter	0 to 4	f_c , analog 0 V to 14 V	2.4 to 4	$1.35 \times f_{3dB}$	200	3	5 × 5 LFCSP	EAR99	HMC881ALP5E
HMC892A	Tunable band-pass filter	3.45 to 6.25	f_c and BW, analog 0 V to 14 V	8.7% f_c	$\pm 10\% f_c$	200	9.5	5 × 5 LFCSP	EAR99	HMC892ALP5E
HMC882A	Tunable low-pass filter	3.95 to 6.9	f_c , analog 0 V to 14 V	3.95 to 6.9	$1.28 \times f_{3dB}$	200	3	5 × 5 LFCSP	EAR99	HMC882ALP5E
ADMV8416	Tunable band-pass filter	6 to 18	f_c , 0 V to 15 V, high/low band	16%	$0.8 \times f_c$, $1.17 \times f_c$	200	8	6 × 6 LFCSP	EAR99	ADMV8416ACPZ
ADMV8420	Tunable band-pass filter	10 to 21.7	f_c , analog 0 V to 14 V	22% f_c	+20% f_c , -40% f_c	200	5	4 × 4 LFCSP	EAR99	ADMV8420ACPZ
ADMV8432	Tunable band-pass filter	16 to 32	f_c , 0 V to 15 V, high/low band	17%	$0.75 \times f_c$, $1.25 \times f_c$	200	9	6 × 6 LFCSP	EAR99	ADMV8432ACPZ

Digital Tunable Filters

Part Number	Description	Frequency (GHz)	Number of Bands	Wideband Rejection (dB)	Interface	Return Loss (dB)	BP Insertion Loss @ 9G (dB)	Package (mm)	ECCN Code	Ordering Part Number
ADMV8818 New	Digital tunable BP/LP/HP filter	2 to 18	4	>35	SPI	10	9	9 × 9 LGA	EAR99	ADMV8818SCCZ
ADMV8052 Upcoming	Digital tunable BP/LP/HP filter	0.03 to 0.52	3	20	SPI	20	1	22 × 22 LGA	TBD	ADMV8052ACCZ
ADMV8913 Upcoming	Digital tunable BP/LP/HP filter	7 to 12	2	>35	SPI	10	1	6 × 3 LGA	TBD	ADMV8913ACCZ

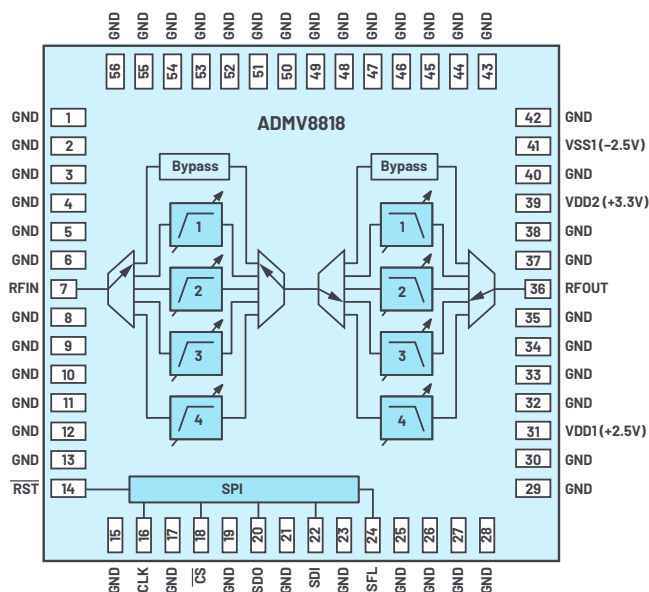
ADMV8818: 2 GHz to 18 GHz, Digitally Tunable, High-Pass and Low-Pass Filter

Key Features

- ▶ Digitally tunable, multioctave, high-pass and low-pass tuning
- ▶ Independent 3 dB frequency control for up to 4 GHz of bandwidth
- ▶ Optimal wideband rejection: 35 dB
- ▶ Single chip replacement for discrete filter banks
- ▶ Compact 9 mm × 9 mm, 56-terminal LGA package

Applications

- ▶ Test and measurement equipment
- ▶ Military radar, electronic warfare, and electronic countermeasures
- ▶ Satellite communications and space
- ▶ Industrial and medical equipment



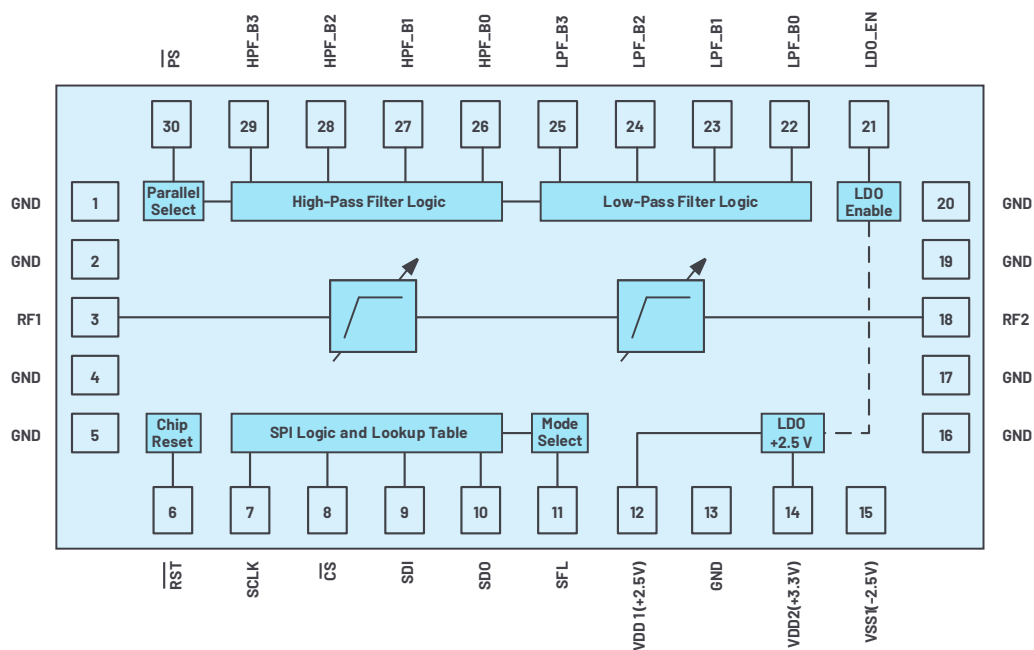
ADMV8913: X-Band, Digitally Tunable, High-Pass and Low-Pass Filter

Key Features

- ▶ Digitally tunable, lower and upper 3 dB cutoff frequencies
- ▶ Optimal wideband rejection: 35 dB
- ▶ Single chip replacement for discrete filter banks
- ▶ Compact 6 mm × 3 mm × 0.89 mm LGA package

Applications

- ▶ Test and measurement equipment
- ▶ Military radar and electronic warfare/electronic countermeasures
- ▶ Satellite communications
- ▶ Industrial and medical equipment



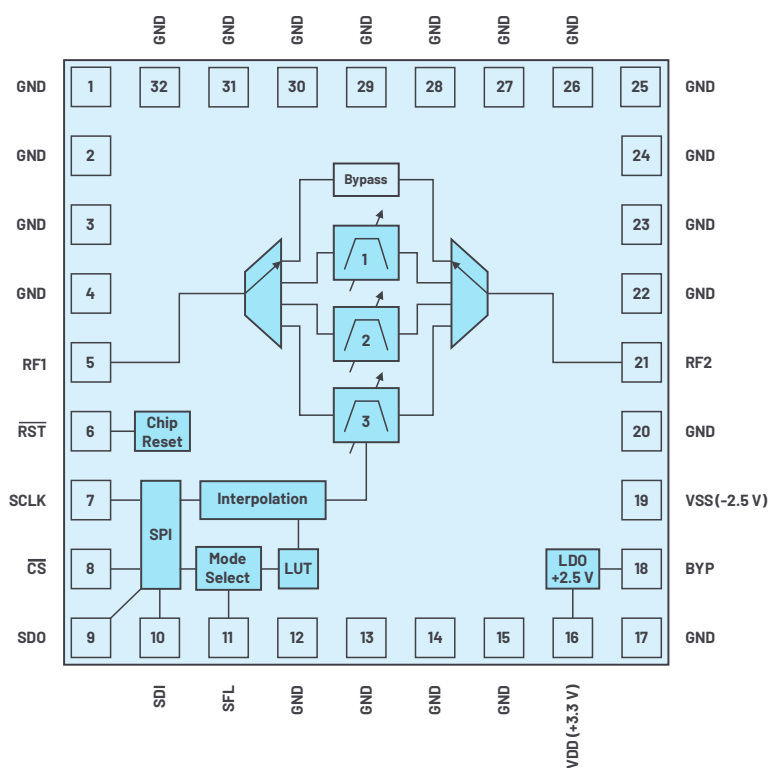
ADMV8052: 30 MHz to 520 MHz Digitally Tunable Band-Pass Filter

Key Features

- ▶ Digitally tunable, multioctave, band-pass tuning
- ▶ 3 dB bandwidth (BW): 7 to 11%
- ▶ Low insertion loss: 4 dB @ 9% BW
- ▶ Excellent rejection: 20 dB @ $2 \times$ BW
- ▶ Great linearity
- ▶ Single chip replacement for discrete solutions
- ▶ Compact 22 mm $\times$ 22 mm $\times$ 5.73 mm LGA package

Applications

- ▶ Land mobile radio
- ▶ Test and measurement equipment
- ▶ Military radar and electronic warfare/electronic countermeasures
- ▶ Satellite communications
- ▶ Industrial and medical equipment



RF Power Detectors

TruPwr RMS Responding Detectors

Part Number	Description	Input Frequency (GHz)	Input Range (dBm)	Dynamic Range (dB)	Rise/Fall Time (μs)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8361	Linear in V/V rms	LF to 2.5	-21 to +9	30	5/5	3 to 5	1.1	SOT-23	EAR99	AD8361ARTZ-RL7
AD8361	Linear in V/V rms	LF to 2.5	-21 to +9	30	5/5	3 to 5	1.1	SOIC	EAR99	AD8361ARMZ-REEL7
AD8364	Dual linear-in-dB	LF to 2.7	-58 to +2	60	—	5	70	5 × 5 LFCSP	EAR99	AD8364ACPZ-WP
AD8362	Linear-in-dB	LF to 3.8	-55 to +12	65	0.045/0.4	5	20	TSSOP	EAR99	AD8362ARUZ-REEL7
HMC1010	Linear-in-dB	0 to 3.9	-52 to +10	60	0.8/1.1	5	48	4 × 4 LFCSP	EAR99	HMC1010LP4E
HMC1020	Linear-in-dB	0 to 3.9	-64 to +7	71	0.1/1.1	5	55	4 × 4 LFCSP	EAR99	HMC1020LP4E
HMC1021	Linear-in-dB with envelope detector	0 to 3.9	-62 to +8	70	0.1/1.1	5	75	4 × 4 LFCSP	EAR99	HMC1021LP4E
HMC1030	Dual linear-in-dB with envelope detector	0 to 3.9	-61 to +10	70	0.1/1.1	5	143	5 × 5 LFCSP	EAR99	HMC1030LP5E
HMC1120	Linear-in-dB with envelope detector	0 to 3.9	-62 to +10	72	0.2/10	3	70	4 × 4 LFCSP	EAR99	HMC1120LP4E
HMC909	Linear-in-dB	0 to 5.8	-51 to -11	40	0.08/2	5	42	4 × 4 LFCSP	EAR99	HMC909LP4E
ADL5511	Linear in V/V rms with envelope detector	0 to 6	-30 to +17	47	0.9/1.1	5	21.5	4 × 4 LFCSP	EAR99	ADL5511ACPZ-R7
AD8363	Linear-in-dB	~0 to 6	-52 to +0	52	3/15	5	60	4 × 4 LFCSP	EAR99	AD8363ACPZ-WP
LT5581	Linear-in-dB	0.01 to 6	-35 to +8	40	1/8	2.7 to 5	1.4	3 × 2 DFN	EAR99	LT5581IDB#TRPBF
LTC5587	Linear-in-dB, integrated 12-bit ADC	0.01 to 6	-35 to +8	40	1/8	3.3	3	3 × 3 DFN	EAR99	LTC5587IDD#TRPBF
LTC5583	Dual-channel, linear-in-dB, VSWR, peak detect	0.04 to 6	-57 to +3	60	140/3.5	3.3	80.5	4 × 4 QFN	EAR99	LTC5583IUF#TRPBF
ADL5501	Linear in V/V rms	0.05 to 6	-19 to +11	30	6/6	3 to 5	1.1	2 × 2 SC70	EAR99	ADL5501AKSZ-R2
ADL5500	Linear in V/V rms	0.1 to 6	-20 to +10	30	—	3 to 5	1	1 × 1 WLCSP	EAR99	ADL5500ACBZ-P7
ADL5903	Linear-in-dB	0.2 to 6	-22 to +13	35	0.1/1.1	3 to 5	2.5	2 × 2 LFCSP	EAR99	ADL5903ACPZN-R7
ADL5502	Linear in V/V rms with peak/envelope detector	0.45 to 6	-25 to +12	37	2/10	3	3	3 × 3 WLCSP	EAR99	ADL5502ACBZ-P7
ADL5504	Linear in V/V rms excellent rms accuracy	0.45 to 6	-22 to +15	35	3/3	3	1.8	1.2 × 0.8 WLCSP	EAR99	ADL5504ACBZ-P7
ADL5505	Linear in V/V rms	0.45 to 6	-22 to +14	35	2/6	3	1.8	0.8 × 0.8 WLCSP	EAR99	ADL5505ACBZ-P7
ADL5904	Linear-in-dB rms with threshold detector	0 to 6	-30 to +15	45	0.5/6μ	3.3	3	3 × 3 LFCSP	EAR99	ADL5904ACPZN-R7
ADL5920	Bidirectional bridge, dual rms detector	~0 to 7	-20 to +30	50	18/75	5	160	5 × 5 LFCSP	EAR99	ADL5920ACPZ-R2
ADL5902	Linear-in-dB	0.05 to 9	-62 to +3	65	3/25	5	73	4 × 4 LFCSP	EAR99	ADL5902ACPZ-WP
ADL5906	Linear-in-dB	0.01 to 10	-60 to +5	65	0.1/14.5	5	70	4 × 4 LFCSP	EAR99	ADL5906ACPZN-R2
LTC5582*	Linear-in-dB	0.04 to 10	-56 to +1	57	0.090/5	3.3	41.6	3 × 3 DFN	EAR99	LTC5582IDD#TRPBF
LTC5596	Linear-in-dB	0.1 to 40	-32 to +3	35	2.9/8.2	3.3	30	2 × 2 DFN	EAR99	LTC5596IDC#TRPBF
LTC5597	Linear-in-dB	0.1 to 70	-40 to +1	35	2.9/8.2	2.7 to 3.6	33.5	2 × 2 DFN	EAR99	LTC5597HMC#TRMPBF LTC5597IDC#TRMPBF

= Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

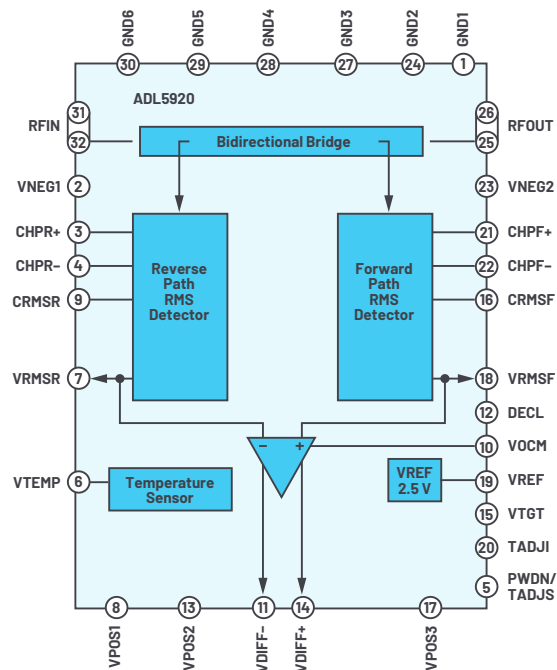
ADL5920: 9 kHz to 7 GHz Bidirectional RMS and VSWR Detector

Key Features

- ▶ Input range: 49 dB (–19 dBm min at 1 GHz)
- ▶ Max input power: 30 dBm (open or short termination)
- ▶ Input and output return loss and VSWR
- ▶ 1 GHz: 22 dB/1.15:1
- ▶ 3 GHz: 14 dB/1.5:1
- ▶ 6 GHz: 12 dB/1.7:1
- ▶ Linear in dB rms outputs (crest factor insensitive)
- ▶ Directivity: 29 dB at 1 GHz, 13 dB at 3 GHz
- ▶ Supply voltage: 5 V at 160 mA
- ▶ 32-lead, 5.0 mm × 5.0 mm LFCSP package

Applications

- ▶ Broadband inline power and return loss measurement
- ▶ Power control and automatic level control in diverse wireless and electronic test and measurement systems
- ▶ Condition-based monitoring in system modules and cables



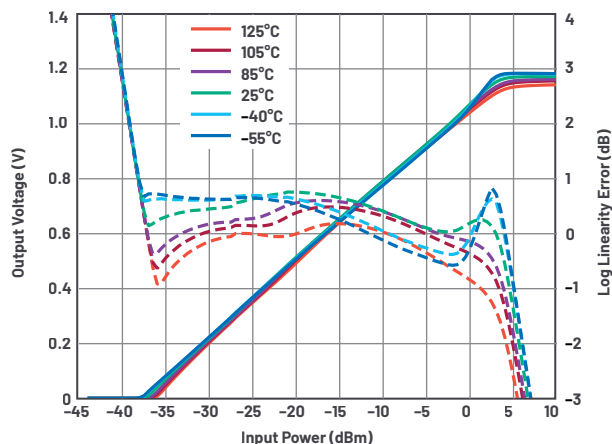
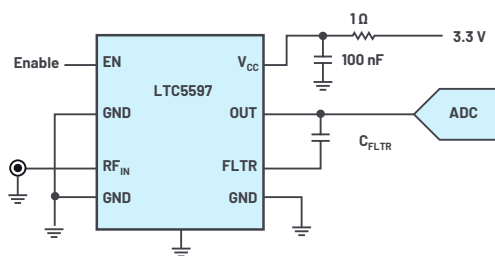
LTC5597: 100 MHz to 70 GHz Linear-in-dB RMS Power Detector

Key Features

- ▶ Linear dynamic range: >35 dB (± 1 dB error)
- ▶ Flat response: $\leq \pm 2$ dB from 0.1 GHz to 60 GHz
- ▶ Logarithmic slope: 29 mV/dB
- ▶ High crest factor (up to 12 dB) modulated waveform, rms power measurement capability
- ▶ Low supply current: 33 mA at 3.3 V
- ▶ Low power shutdown mode
- ▶ 8-lead, 2.0 mm $\times$ 2.0 mm LFCSP package

Applications

- ▶ Receiver and transmitter gain and power control
- ▶ High crest factor rms power measurements
- ▶ Electronic test and measurement instrumentation
- ▶ Satellite and point-to-point communication links



Log Detectors/Amplifiers

Part Number	Description	Input Frequency (GHz)	Input Range (dBm)	Dynamic Range (dB)	Rise/Fall Time (ns)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
AD8306	Log/limiting amplifier	0.005 to 0.4	-91 to +9	100	73/73	3 to 5	16	Die	EAR99	AD8306ACHIPS
AD8306	Log/limiting amplifier	0.005 to 0.4	-91 to +9	100	73/73	3 to 5	16	SOP	EAR99	AD8306ARZ-RL7
AD8310	Log detector	0 to 0.44	-90 to +5	95	15/30	3 to 5	8	Die	EAR99	AD8310ACHIPS
AD8310	Log detector	0 to 0.44	-90 to +5	95	15/30	3 to 5	8	MSOP	EAR99	AD8310ARMZ-REEL7
AD8307	Log detector	0 to 0.5	-75 to +17	92	400/400	3 to 5	8	SOIC	EAR99	AD8307ARZ-RL7
AD8307	Log detector	0 to 0.5	-75 to +17	92	400/400	3 to 5	8	PDIP	EAR99	AD8307ANZ
AD8309	Log/limiter amplifier	0.005 to 0.5	-76 to +20	100	400/400	3 to 5	16	TSSOP	EAR99	AD8309ARUZ-REEL7
LT5537	Log detector	<0.01 to 1	-71 to +12	83	110/115	2.7 to 5	13.5	3 $\times$ 2 DFN	EAR99	LT5537EDDB#TRPBF
AD8313	Log detector/controller	0.1 to 2.5	-72 to 0	70	60/60	3 to 5	13.7	MSOP	EAR99	AD8313ARMZ-REEL7
AD8314	Log detector/controller	0.1 to 2.7	-65 to -14	45	100/140	3 to 5	4.5	MSOP	EAR99	AD8314ARMZ-REEL7
AD8314	Log detector/controller	0.1 to 2.7	-65 to -14	45	100/140	3 to 5	4.5	2 $\times$ 3 LFCSP	EAR99	AD8314ACPZ-RL7
AD8302	Gain and phase detector	0 to 2.7	-60 to 0	60	50/60	3 to 5	19	TSSOP	EAR99	AD8302ARUZ-RL7
LT5534	Log detector	0.05 to 3	-55 to -3	60	40/70	2.7 to 5	7	2 $\times$ 2 SC70	EAR99	LT5534ESC6#TRPBF
AD8312	Log detector	0.05 to 3.5	-50 to +2	45	85/120	3 to 5	4.2	1 $\times$ 1.5 WLCSP	EAR99	AD8312ACBZ-P2
LT5538	Log detector	0.04 to 3.8	-65 to +1	70	100/180	3 to 5	29	3 $\times$ 3 DFN	EAR99	LT5538IDD#TRPBF
HMC600	Log detector/controller	0.05 to 4	-61 to 0	70	90/90	3 to 5	29	4 $\times$ 4 LFCSP	EAR99	HMC600LP4E
HMC601	Log detector/controller	0.01 to 4	-64 to +2	75	15/15	3 to 5	30	4 $\times$ 4 LFCSP	EAR99	HMC601LP4E
ADL5513	Log detector/controller	0.001 to 4	-64 to +6	80	20/21	3 to 5	31	3 $\times$ 3 WLCSP	EAR99	ADL5513ACPZ-WP
ADL5506	Log detector	0.03 to 4.5	-44 to +2	45	65/145	3 to 5	3.75	0.8 $\times$ 1.2 WLCSP	EAR99	ADL5506ACBZ-R7

Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools.

Log Detectors/Amplifiers (Continued)

Part Number	Description	Input Frequency (GHz)	Input Range (dBm)	Dynamic Range (dB)	Rise/Fall Time (ns)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC713	Log detector/controller	0.05 to 8	-55 to 0	54	24/36	3 to 5	17	3 × 3 LFCSP	EAR99	HMC713LP3E
HMC713	Log detector/controller	0.05 to 8	-55 to 0	54	24/70	3 to 5	17	MSOP	EAR99	HMC713MS8E
AD8318	Log detector/controller	0.001 to 8	-60 to -3	60	10/12	5	68	4 × 4 LFCSP	EAR99	AD8318ACPZ-WP
HMC602	Log detector/controller	0.001 to 8	-55 to +8	70	9.5/10	5	113	4 × 4 LFCSP	EAR99	HMC602LP4E
AD8319	Log detector/controller	0.001 to 10	-54 to -4	45	10/6	3.3 to 5	22	2 × 3 LFCSP	EAR99	AD8319ACPZ-WP
AD8317	Log detector/controller	0.001 to 10	-59 to -4	55	10/6.1	3.3 to 5	22	2 × 2 LFCSP	EAR99	AD8317ACPZ-WP
AD8317	Log detector/controller	0.001 to 10	-59 to -4	55	10/6.1	3.3 to 5	22	Die	EAR99	AD8317ACHIPS
HMC611	Log detector/controller	0.001 to 10	-57 to +6	63	10/10	5	106	Die	EAR99	HMC611
HMC611	Log detector/controller	0.001 to 10	-57 to +6	69	10/10	5	106	4 × 4 LFCSP	EAR99	HMC611LP4E
ADL5519	Dual log detector/controller	0.001 to 10	-60 to -5	62	8/6	3.3 to 5	60	5 × 5 LFCSP	EAR99	ADL5519ACPZ-WP
HMC1094	Millimeter wave log detector	1 to 23	-47 to 0	50	12/65	3.3	85	3 × 3 LFCSP	EAR99	HMC1094LP3E
HMC948	Millimeter wave log detector	1 to 23	-40 to +10	54	5/7	3.3	91	3 × 3 LFCSP	EAR99	HMC948LP3E
HMC662	Millimeter wave log detector	8 to 30	-42 to +10	54	5/10	3.3	88	3 × 3 LFCSP	EAR99	HMC662LP3E
HMC7447	E-band detector	71 to 86	-0.5 to +23.5	24	—	—	—	Die	EAR99	HMC7447

Envelope and Peak Detectors

Part Number	Description	Frequency (GHz)	Envelope Bandwidth (MHz)	Input Range (dBm)	Dynamic Range (dB)	Rise Time (ns)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
LTC5507	Schottky peak detector with gain compression	0.0001 to 1	1	-18 to +14	32	—	2.7 to 6	0.55	TSOT-23	EAR99	LTC5507ES6#TRPBF
LTC5509	Schottky peak detector with no gain compression	0.3 to 3	1.5	-18 to +7	25	—	2.7 to 6	0.58	SC70	EAR99	LTC5509ESC6#TRPBF
LTC5505-1	Schottky peak detector with gain compression	0.3 to 3	4	-20 to +18	38	—	2.7 to 6	0.5	SOT-23	EAR99	LTC5505-1ES5#TRPBF
LTC5505-2	Schottky peak detector with gain compression	0.3 to 3.5	4	-20 to +12	32	—	2.7 to 6	0.5	SOT-23	EAR99	LTC5505-2ES5#TRPBF
HMC1030	Dual rms linear-in-dB with envelope detector	0 to 3.9	150	-61 to +10	70	50	5	143	5 × 5 LFCSP	EAR99	HMC1030LP5E
HMC1120	Linear-in-dB with envelope detector	0.1 to 3.9	150	-60 to +10	70	200	3	70	4 × 4 LFCSP	EAR99	HMC1120LP4E
HMC1021	RMS detector with envelope tracker	0 to 3.9	150	-62 to +8	70	50	5	75	4 × 4 LFCSP	EAR99	HMC1021LP4E
ADL5502	RMS crest factor detector	0.45 to 6	10	-25 to +12	37	3000	3	3	3 × 3 WLCSP	EAR99	ADL5502ACBZ-P7
ADL5910	Threshold detector	0 to 6	100	-30 to +15	45	12	3.3	3.5	3 × 3 LFCSP	EAR99	ADL5910ACPZN-R7
ADL5511	RMS linear-in-V/V with envelope detector	0 to 6	130	-30 to +17	47	4	5	21.5	4 × 4 LFCSP	EAR99	ADL5511ACPZ-R7
LTC5530	Schottky peak detector with gain adjust	0.3 to 7	2	-24 to +7	30	—	2.7 to 5.5	0.5	TSOT-23	EAR99	LTC5530ES6#TRPBF
LTC5531	Schottky peak detector with offset adjust	0.3 to 7	2	-24 to +7	30	—	2.7 to 5.5	0.5	TSOT-23	EAR99	LTC5531ES6#TRPBF
LTC5532	Schottky peak detector with gain and offset adjust	0.3 to 7	2	-24 to +7	30	—	2.7 to 5.5	0.5	TSOT-23	EAR99	LTC5532ES6#TRPBF
LTC5508	Schottky peak detector with gain compression	0.3 to 7	2	-24 to +12	36	—	2.7 to 6	0.55	SC70	EAR99	LTC5508ESC6#TRPBF
LTC5536	Schottky peak detector and 20 ns comparator	0.6 to 7	—	-20 to +12	32	20	2.7 to 5.5	2.1	TSOT-23	EAR99	LTC5536ES6#TRPBF
LTC5535	Schottky peak detector	0.6 to 7	12	-20 to +9	30	40	2.7 to 5.5	2	TSOT-23	EAR99	LTC5535ES6#TRPBF
LTC5533	Dual Schottky peak detector	0.3 to 11	2	-20 to +7	30	—	2.7 to 6	0.9	4 × 3 DFN	EAR99	LTC5533EDE#TRPBF

Envelope and Peak Detectors (Continued)

Part Number	Description	Frequency (GHz)	Envelope Bandwidth (MHz)	Input Range (dBm)	Dynamic Range (dB)	Rise Time (ns)	V _S (V)	I _S (mA)	Package (mm)	ECCN Code	Ordering Part Number
LTC5564	Ultrafast Schottky peak detector with 9 ns comparator	0.6 to 15	75	-10 to +16	26	7	3 to 5.5	44	3 × 3 QFN	EAR99	LTC5564IUD#TRPBF
ADL6010	Envelope detector	0.5 to 43.5	40	-30 to +15	45	4	5	3	2 × 2 LFCSP	5A991.b	ADL6010ACPZN-R7
ADL6010	Envelope detector	0.5 to 43.5	40	-30 to +15	45	4	5	3	Die	EAR99	ADL6010CHIPS
ADL6012*	Envelope detector	2.0 to 67	500	-10 to +25	40	2	5	28.6	3 × 2 LFCSP	5A991.b	ADL6012ACPZN

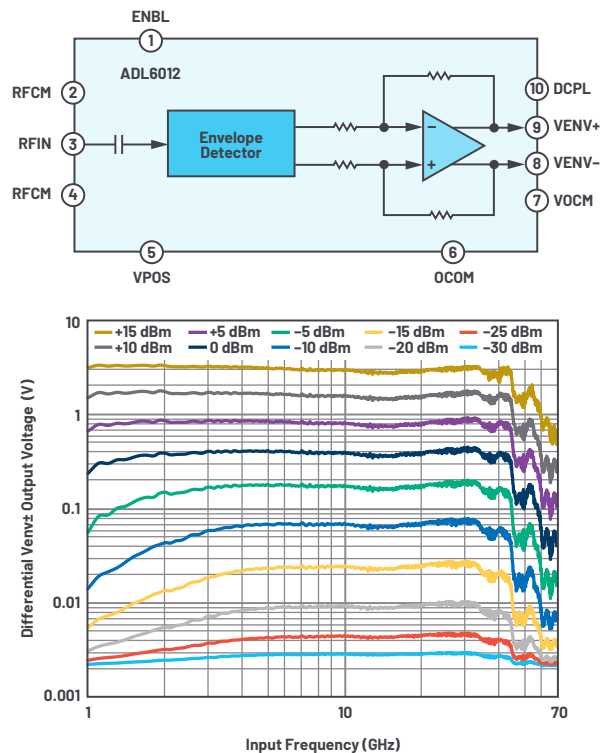
ADL6012: 2 GHz to 67 GHz Ultrawideband Envelope Detector

Key Features

- Envelope bandwidth: 500 MHz
- Fast response times
 - 0.6 ns output rise time
 - 0.5 ns output propagation delay (rising edge)
 - 1.3 ns fall time at 10 dBm to no RF input
 - 1.0 ns propagation delay at 10 dBm (falling edge)
- Adjustable common-mode output voltage
- Flat frequency response: <± 1 dB error up to 43.5 GHz
- Dynamic range: 40 dB at 43.5 GHz
- Adjustable supply voltage: 3.15 V to 5.25 V
- 10-lead, 3.0 mm × 2.0 mm LFCSP package

Applications

- Wideband envelope tracking
- Electronic test and measurement
- Wideband PA linearization
- Pulsed radar and microwave communication systems



Vector Power Measurement

Part Number	Description	Frequency (GHz)	Power Range (dBm)	Directivity @ 1 GHz (dB)	Phase Range (°)	Phase Sync	V _S (V)	I _{SV} (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5960 Upcoming	Integrated vector network analyzer front end	0.01 to 20	-80 to +28	27	>360	Yes	5	200	3 × 4 QFN	EAR99	ADL5960ACRZ-R7
ADL5920	Bidirectional rms and VSWR detector	LF to 7	-20 to +30	20	—	—	5	160	5 × 5 QFN	EAR99	ADL5920ACPZ-R7
AD8302	Gain and phase detector	LF to 2.7	-60 to 0	—	0 to 180	No	3 to 5	19	5 × 6.4 TSSOP	EAR99	AD8302ARUZ-RL7

* = X-Microwave.

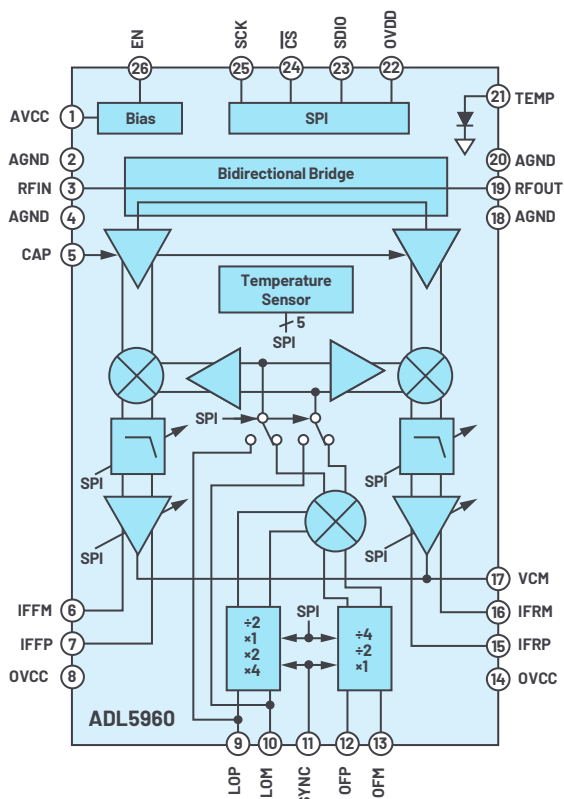
ADL5960: Integrated Vector Network Analyzer Front End

Key Features

- ▶ Integrated wideband bidirectional bridge:
- ▶ High directivity >15 dB up to 15 GHz
- ▶ IF signal path:
 - Wideband, high sensitivity mixers
 - IF amplifiers with individually programmable gain
- ▶ Multiconfiguration LO chain:
 - LO multipliers and dividers: to operate from 6 GHz LO
 - Optional built-in frequency offset mixer enables zero-offset frequency sweeps (RF=LO)
- ▶ Very small size: 3 mm × 4 mm, 26-lead QFN
- ▶ Low power shutdown
- ▶ SPI readable 5-bit temperature sensor

Applications

- ▶ Automated test equipment (ATE)
- ▶ Portable equipment
- ▶ Industrial metering (electromagnetic spectroscopy)



SDLVAs

Part Number	Description	Frequency (GHz)	Rise/Fall Time (ns)	Input Range (dBm)	Dynamic Range (dB)	Prop Delay (ns)	Threshold (dBm)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC1013	High range SDLVA	0.5 to 18.5	4/10	-57 to +10	67	10	-62	3.3	183	4 × 4 LFCSP	EAR99	HMC1013LP4E
HMC613	SDLVA	0.1 to 20	4/18	-54 to +5	59	14	-54	3.3	83	4 × 4 LFCSP	EAR99	HMC613LC4B
HMC913	SDLVA	0.6 to 20	5/10	-54 to +5	59	14	-54	3.3	80	Die	EAR99	HMC913
HMC913	SDLVA	0.6 to 20	5/10	-54 to +5	59	14	-54	3.3	80	4 × 4 LFCSP	EAR99	HMC913LC4B
HMC813	SDLVA with limited output	1 to 26	4/10	-48 to +5	55	15	-53	3.3	150	Die	EAR99	HMC813
HMC813	SDLVA with limited output	1 to 26	5/10	-41 to +10	55	15	-53	3.3	150	4 × 4 LFCSP	EAR99	HMC813LC4B

RF Switches

Massive MIMO RF Front Ends

Part Number	Device Configuration	Description	Frequency (GHz)	Insertion Loss (dB)	Continuous Input Power (dBm)	Gain (dB)	NF (dB)	Package (mm)	ECCN Code	Ordering Part Number
ADRF5549	Dual-channel bypassable LNA	2-stage LNA, high power SPDT	1.8 to 2.8	0.6	40	35	1.4	6 × 6 LFCSP	EAR99	ADRF5549BCPZN
ADRF5519 New	Dual channel	2-stage LNA, high power SPDT	2.3 to 2.8	0.5	43	35	1	6 × 6 LFCSP	5a991.b	ADRF5519BCPZ
ADRF5515 New	Dual-channel bypassable LNA	2-stage LNA, high power SPDT	3.3 to 4.0	0.45	43	33	1	6 × 6 LFCSP	5A991.b	ADRF5515BCPZ
ADRF5545A	Dual-channel bypassable LNA	2-stage LNA, high power SPDT	2.4 to 4.2	0.65	40	32	1.45	6 × 6 LFCSP	EAR99	ADRF5545ABCPZN
ADRF5547	Dual-channel bypassable LNA	2-stage LNA, high power SPDT	3.7 to 5.3	0.5	40	33	1.6	6 × 6 LFCSP	EAR99	ADRF5547BCPZN

SPST Switches

Part Number	Description	RF Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dB)	Input P0.1dB (dB)	Input IP3 (dBm)	On/Off Time (ns)	Control Input (V _{DC})	Package (mm)	ECCN Code	Ordering Part Number
ADG901*	Absorptive	0 to 2.5	0.8	40	17	—	36	3.6/5.8	CMOS/LVTTL	MSOP	EAR99	ADG901BRMZ
ADG902*	Reflective	0 to 2.5	0.8	40	17	—	36	3.6/5.8	CMOS/LVTTL	MSOP	EAR99	ADG902BRMZ
HMC1055	Nonreflective	0 to 3.5	0.6	36	32	28	63	50	0/3	SOT-26	EAR99	HMC1055LP2CE
HMC550A	Fail-safe	0 to 6	0.7	25	—	32	52	30/30	0/2.2 to 5	SOT-26	EAR99	HMC550AE

SPDT Switches

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input (V _{DC})	Package (mm)	ECCN Code	Ordering Part Number
ADG918*	Absorptive	0 to 2	0.8	43	17	—	36	6.6/6.5	CMOS/LVTTL	MSOP	EAR99	ADG918BRMZ
ADG919*	Reflective	0 to 2	0.8	43	17	—	36	6.6/6.5	CMOS/LVTTL	MSOP	EAR99	ADG919BRMZ
ADG936	Dual absorptive	0 to 2	0.9	36	16	—	32	11/10	CMOS/LVTTL	TSSOP	EAR99	ADG936BRUZ
ADG936-R	Dual reflective	0 to 2	0.9	36	16	—	32	11/10	CMOS/LVTTL	TSSOP	EAR99	ADG936BRUZ-R
HMC199A	Dual switch	0 to 2.5	0.4	25	28	27	55	40/40	0/5	MSOP	EAR99	HMC199AMS8E
HMC546	10 W, fail-safe	0.2 to 2.7	0.4	22	—	41	64	102/36	0/3 to 8	MSOP	EAR99	HMC546MS8GE
HMC546	10 W, fail-safe	0.2 to 2.7	0.3	27	—	21	45	102/36	0/3 to 8	2 × 2 DFN	EAR99	HMC546LP2E
HMC197B	Reflective	0 to 3	0.4	28	30	28	45	10/10	0/3	SOT-26	EAR99	HMC197BE
HMC194A	High isolation	0 to 3	0.5	55	30	28	53	20/20	0/5	8-lead MSOP	EAR99	HMC194AMS8E
HMC221B	Reflective	0 to 3	0.4	29	30	27	55	10/10	0/3	SOT-26	EAR99	HMC221BE
HMC190B	Reflective	0 to 3	0.4	30	30	27	55	10/10	0/3	8-lead MSOP	EAR99	HMC190BMS8E
HMC545A	Reflective	0 to 3	0.27	31	30	27	46	90/90	0/3.3 to 5	QSOP	EAR99	HMC545AE
HMC284A	Nonreflective	0 to 3.5	0.5	45	29	27	50	5	0/5	8-lead MSOP	EAR99	HMC284AMS8GE
ADRF5130	44 W, reflective	0.7 to 3.5	0.7	41	—	46	65	750/750	TTL/CMOS	3 × 3 LFCSP	EAR99	ADRF5130BCPZ
HMC349A	High isolation	0.1 to 4	1.2	57	34	30	53	150/150	0/5	4 × 4 LFCSP	EAR99	HMC349ALP4CE
HMC349A	High isolation	0.1 to 4	1.8	45	34	32	53	160/160	0/5	MSOP	EAR99	HMC349AMS8GE
HMC435A	Nonreflective	0 to 4	1.2	40	30	27	51	60/60	0/5	MSOP	EAR99	HMC435AMS8GE
ADRF5160	80 W, reflective	0.7 to 4	0.8	40	—	47	70	1.2/1.2μs	TTL/CMOS	5 × 5 LFCSP	EAR99	ADRF5160BCPZ-R7
ADRF5132*	20 W, reflective	0.7 to 5	0.65	42	—	42.5	65	550/550	TTL/CMOS	3 × 3 LFCSP	EAR99	ADRF5132BCPZN
HMC849A	Nonreflective	0 to 6	0.9	60	34	32	52	150/150	0/3 to 5	4 × 4 LFCSP	EAR99	HMC849ALP4CE

■ = Simulation models available in ADI's ADIsimRF and/or ADIsimPLL simulation tools. * = X-Microwave.

SPDT Switches (Continued)

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input (V _{cc})	Package (mm)	ECCN Code	Ordering Part Number
HMC8038	Nonreflective	0.1 to 6	0.8	60	36	35	60	150/150	5 V to 1.8 V logic	4 × 4 LFCSP	EAR99	HMC8038LP4CE
HMC270A	Nonreflective	0 to 8	1	45	28	—	42	50/50	0/-5	MSOP	EAR99	HMC270AMS8GE
HMC232A*	High isolation	0 to 12	1.5	57	30	27	47	25/25	0/-5	4 × 4 LFCSP	EAR99	HMC232ALP4E
HMC118 ^A	Nonreflective	9 kHz to 13	0.68	48	37	35	62	2.7/2.7 μs	CMOS/LVTTL	3 × 3 LFCSP	EAR99	HMC118LP3DE
ADRF5019 ^{*,A}	Nonreflective	0.1 to 13	0.8	45	39	38	60	150	CMOS/LVTTL	3 × 3 LFCSP	EAR99	ADRF5019BCPZN
HMC347A*	Nonreflective	0.1 to 14	2.1	46	29	—	47	10/10	0/-5	3 × 3 LFCSP	EAR99	HMC347ALP3E
HMC347A	Nonreflective	0.1 to 20	1.7	45	29	—	45	10/10	0/-5	Die	EAR99	HMC347A
HMC347B	Nonreflective	0.1 to 20	1.7	45	25	—	41	10/10	—	Die	EAR99	HMC347B
HMC547A*	Nonreflective	0 to 20	2	45	23	—	47	10/10	0/-5	3 × 3 LFCSP	EAR99	HMC547ALP3E
HMC547A	Nonreflective	0 to 28	1.9	45	22	—	41	6/6	0/-5	3 × 3 LFCSP	EAR99	HMC547ALC3
ADRF5020 ^{A*}	Nonreflective	0.1 to 30	1.4	56	27	—	50	10/10	CMOS/LVTTL	3 × 3 LGA	EAR99	ADRF5020BCCZN
ADRF5021 ^{A*}	Nonreflective	9 kHz to 30	2	60	—	27	52	1.1/1.1 μs	CMOS/LVTTL	3 × 3 LGA	EAR99	ADRF5021BCCZN
ADRF5300 New	SPDT with neg. supply	24 to 32	1.1	38	—	37	65	60/60	CMOS/LVTTL compatible	3 × 3 LGA	EAR99	ADRF5300BCCZN
ADRF5026*	SPDT, nonreflective	0.1 to 44	2.4	50	26	—	53	14/14	CMOS/LVTTL	3 × 3 LGA	EAR99	ADRF5026BCCZN
ADRF5027*	SPDT, nonreflective	9 kHz to 44	2.2	48	—	—	54	3.6/3.6 μs	CMOS/LVTTL	3 × 3 LGA	EAR99	ADRF5027BCCZN
ADRF5024*	SPDT, reflective	0.1 to 44	1.4	36	—	27	50	10/10	CMOS/LVTTL	2.25 × 2.25 LGA	EAR99	ADRF5024BCCZN
ADRF5025*	SPDT, reflective	9 kHz to 44	1.4	36	—	27	50	1.7/1.7 μs	CMOS/LVTTL	2.25 × 2.25 LGA	EAR99	ADRF5025BCCZN
ADRF5301 Upcoming	SPDT with neg. supply	35 to 44	1.8	28	—	37	52	35/35	CMOS/LVTTL compatible	3 × 3 LGA	EAR99	ADRF5301BCCZN
HMC986A	Reflective	0.1 to 50	1.7	36	25	21	40	11/11	0/-3	Die	EAR99	HMC986A
HMC646	40 W, T/R	0.1 to 2.1	0.7	32	—	46	74	320/320	0/3 to 8	2 × 2 LFCSP	EAR99	HMC646LP2E
HMC574A	5 W, T/R	0 to 3	0.25	30	38	36	63	70/70	0/3 to 8	8-lead MSOP	EAR99	HMC574AMS8E
HMC595A	3 W, T/R	0 to 3	0.25	30	38	36	64	100/100	0/3 to 10	SOT-26	EAR99	HMC595AE
HMC544A	T/R	0 to 4	0.25	23	39	37	55	50/50	0/3 to 5	SOT-26	EAR99	HMC544AE
HMC784A	10 W, T/R	0.1 to 4	0.4	28	38	36	62	112/112	0/3 to 8	MSOP	EAR99	HMC784AMS8GE
HMC536	T/R	0 to 6	0.5	27	—	33	52	30/30	0/3 to 5	8-lead MSOP	EAR99	HMC536MS8GE
HMC536	T/R	0 to 6	0.7	30	—	34	52	70/70	0/3 to 5	2 × 2 DFN	EAR99	HMC536LP2E

SP3T, SP4T, SP6T, SP8T Switches

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input (V _{cc})	Package (mm)	ECCN Code	Ordering Part Number
HMC245A	SP3T	0 to 2.5	0.5	44	26	24	48	150/150	TTL/CMOS	TSSOP	EAR99	HMC245AQS16E
ADG904	SP4T, absorptive	0 to 2.5	0.4	37	16	—	31	8.5/13	CMOS/LVTTL	TSSOP LFCSP	EAR99	ADG904BCPZ ADG904BRUZ
ADG904-R	SP4T, reflective	0 to 2.5	0.4	37	16	—	31	8.5/13	CMOS/LVTTL	TSSOP LFCSP	EAR99	ADG904BCPZ-R-REEL ADG904BRUZ-R
HMC252A	SP6T	0 to 3	0.8	45	24	—	47	70	0/3.3 to 5	QSOP	EAR99	HMC252AQS24E
HMC253A	SP8T	0 to 3.5	1.2	36	24	20	43	100/100	TTL/CMOS	4 × 4 LFCSP	EAR99	HMC253ALC4
HMC253A	SP8T	0 to 3.5	1.2	36	24	20	43	90/90	TTL/CMOS	QSOP	EAR99	HMC253AQS24E
HMC241A	SP4T	0 to 4	0.7	43	30	26	47	100/100	TTL/CMOS	3 × 3 LFCSP	EAR99	HMC241ALP3E
HMC241A	SP4T	0 to 4	0.8	41	29	26	48	150/150	TTL/CMOS	TSSOP	EAR99	HMC241AQS16E
HMC244A	SP4T	0 to 4	0.7	40	26	22	47	150/150	TTL/CMOS	Hermetic SMT	EAR99	HMC244AG16
HMC322A	SP8T	0 to 8	2.5	35	26	22	40	150/150	0/-5	4 × 4 LFCSP	EAR99	HMC322ALP4E

SP3T, SP4T, SP6T, SP8T Switches (Continued)

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input (V _{CC})	Package (mm)	ECCN Code	Ordering Part Number
HMC345A	SP4T	0 to 8	2.2	32	21	19	45	100/100	0/5	3 × 3 LFCSP	EAR99	HMC345ALP3E
HMC7992	SP4T	0.1 to 6	0.7	45	35	33	58	150/150	5 V to 1.8 V logic	3 × 3 LFCSP	EAR99	HMC7992LP3DE
ADRF5250	SP5T	0.1 to 6	1.5	50	—	34	57	150/150	1.8 V logic	4 × 4 LFCSP	EAR99	ADRF5250BCPZ
HMC344A	SP4T	0.1 to 8	2.1	32	28	19	44	75/75	0/-5	3 × 3 LFCSP	EAR99	HMC344ALP3E
HMC321A	SP8T	0.1 to 8	2.5	35	23	—	40	150/150	0/5	4 × 4 LFCSP	EAR99	HMC321ALP4E
ADRF5040	SP4T	~0 to 12	0.8	34	—	34	58	3.5/3.5 μs	CMOS/LVTTL	4 × 4 LFCSP	EAR99	ADRF5040
HMC641A	SP4T	0.1 to 18	2.1	42	25	—	41	95/95	0/-5	Die	EAR99	HMC641A
HMC641A	SP4T	0 to 20	2.3	43	22	—	38	100/100	0/-5	4 × 4 LFCSP	EAR99	HMC641ALC4
HMC641A	SP4T	0 to 20	2.3	41	22	—	36	100/100	0/-5	4 × 4 LFCSP	EAR99	HMC641ALP4E
ADRF5044	SP4T	0.1 to 30	2.9	43	28	26	50	19/19	CMOS/LVTTL	4 × 4 LGA	EAR99	ADRF5044BCCZN
HMC1084	SP4T	23 to 30	2.8	26	—	—	47	53/53	0/-3	4 × 4 LFCSP	EAR99	HMC1084LC4
ADRF5045*	SP4T	~0 to 30	2.9	45	28	26	50	4/4 μs	CMOS/LVTTL	4 × 4 LGA	EAR99	ADRF5045BCCZN
ADRF5042 New	SP4T, nonreflective	0.1 to 44	2.8	39	—	26	47	14	0/3.3	3 × 3 LGA	EAR99	ADRF5042BCCZN
ADRF5043 New	SP4T, nonreflective	9 kHz to 44 GHz	2.4	39	27	26	48	2.8 μs	0/3.3	3 × 3 LGA	EAR99	ADRF5043BCCZN
ADRF5046	SP4T, reflective	0.1 to 44	2.5	33	—	27.5	50	16/16	CMOS/LVTTL	3 × 3 LGA	EAR99	ADRF5046BCCZN
ADRF5047	SP4T, reflective	9 kHz to 44 GHz	2.7	31	—	26.5	50	3.4/3.4 μs	CMOS/LVTTL	3 × 3 LGA	EAR99	ADRF5047BCCZN

Bypass, Diversity, Matrix, and Transfer

Part Number	Description	Frequency (GHz)	Insertion Loss (dB)	Isolation (dB)	Input P1dB (dBm)	Input P0.1 dB (dBm)	Input IP3 (dBm)	On/Off Time (ns)	Control Input (V _{CC})	Package (mm)	ECCN Code	Ordering Part Number
HMC596	4 × 2 matrix	0.2 to 3	6.5	43	22	—	27	6.5/6.5	0/3 to 5	4 × 4 LFCSP	EAR99	HMC596LP4E
HMC427A	Transfer	0.1 to 8	1.6	38	30	—	47	10/10	0/5	3 × 3 LFCSP	EAR99	HMC427ALP3E

MEMS Switches

Part Number	Device Configuration	Switch R _{ON}	Leakage Switch Off	Frequency (GHz)	Insertion Loss (dB)	Off Isolation (dB)	Input IP3 (dBm)	Input Power (dBm)	Specified @ Frequency (GHz)	Package (mm)	ECCN Code	Ordering Part Number
ADGM1004 New	(4:1) × 1	1.8	500 p	0 to 13	0.45	24	67	32	2.5	5 × 4 LFCSP	EAR99	ADGM1004JCPZ-RL7
ADGM1304 New	(4:1) × 1	1.6	500 p	0 to 14	0.26	24	69	36	2.5	5 × 4 LFCSP	EAR99	ADGM1304JCPZ-RL7

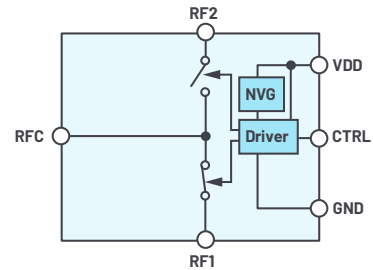
ADRF5300: 24 GHz to 32 GHz Silicon SPDT Switch *Released*
ADRF5301: 35 GHz to 44 GHz Silicon SPDT Switch *Upcoming*

Key Features

- ▶ Reflective design
 - 1.1 dB at 30 GHz (ADRF5300)
 - 1.8 dB at 44 GHz (ADRF5301)
- ▶ Single supply (internal negative supply)
- ▶ Very low insertion loss:
 - 1.8 dB at 44 GHz (ADRF5301)
- ▶ High IP3: 52 dBm
- ▶ 28 dBm switch power handling
- ▶ <52 ns switch settling time
- ▶ 3 mm × 3 mm LGA package

Applications

- ▶ Industrial scanners
- ▶ Test instrumentation
- ▶ Millimeter wave 5G network radios
- ▶ Military radios, radars, and ECM
- ▶ Microwave radios
- ▶ Satellite communications



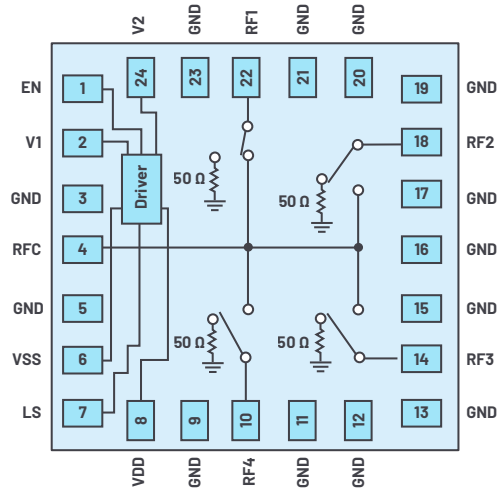
ADRF5042 and ADRF5043: 9 kHz to 44 GHz Silicon Nonreflective SP4T Switch

Key Features

- ▶ Ultrawide bandwidth
- ▶ Nonreflective 50 Ω designs
- ▶ Low insertion loss:
 - 1.9 dB to 18 GHz
 - 2.6 dB to 40 GHz
 - 3.0 dB to 44 GHz
- ▶ High isolation: 40 dB
- ▶ High IP3: 50 dBm
- ▶ PO. 1 dB: 26 dBm
- ▶ Fast switching and settling time:
 - 25 ns to 0.1 dB (ADRF5042)
 - 5.2 μ s to 0.1 dB (ADRF5043)
- ▶ Positive logic control
- ▶ 3 mm × 3 mm LGA package

Applications

- ▶ Industrial millimeter wave scanners
- ▶ Electronic test and measurement instrumentation
- ▶ Military radios, radars, and ECM equipment



ADRF5042 and ADRF5043 are pin-compatible

Beamformers, Phase Shifters, and Vector Modulators

Beamformers

Part Number	Description	Frequency (GHz)	Phase Adj Range (°)	Phase Adj Step (°)	Ampl Adj Range (dB)	Ampl Adj Step (dB)	V _{SUPPLY} (V)	Power Consumption per Channel (W)	Package (mm)	ECCN Code	Ordering Part Number
ADAR1000	4-ch, X-/Ku-band with unswitched Tx/Rx FE	8 to 16	360	2.8	31	0.5	3.3	300 mW/channel Tx 200 mW/channel Rx	7 × 7 LGA	EAR99	ADAR1000ACCZN
ADMV4801	16T16R beamformer	24 to 29.5	360	5.625	34 Tx/ 17 Rx	1 Tx/ 0.5 Rx	3.3	—	10 × 10 LGA	5A991.b	ADMV4801BCCZ
ADMV4821	16T16R dual polarization beamformer	24 to 29.5	360	5.625	32.4 (Tx) 17.1 (Rx)	1/0.5	3.3	0.66 (HP) P _o =17.5 dBm 0.44 (LP) P _o =16 dBm	10 × 10 LGA	5A991.b	ADMV4821BCCZ
ADMV4828 <i>Upcoming</i>	Tx/Rx dual polarization beamformer	24 to 29.5	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	5A991.b	ADMV4828BBCZ
ADMV4928 <i>Upcoming</i>	Tx/Rx dual polarization beamformer	37 to 43.5	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	5A991.b	ADMV4928BBCZ
ADAR3000 <i>Upcoming</i>	4-beam/16-channel Ka-band beamformer	17 to 22	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	5A991.b	ADAR3000ABCZ
ADAR3001 <i>Upcoming</i>	4-beam/16-channel Ka-band beamformer	27.5 to 31	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	5A991.b	ADAR3001ABCZ
ADMV4728 <i>Upcoming</i>	Tx/Rx dual polarization beamformer	47.2 to 48.2	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	Contact ADI	5A991.b	ADMV4728BBCZ

ADMV4828: 24 GHz to 29.5 GHz Tx/Rx Dual Polarization Beamformer *Upcoming*

ADMV4928: 37 GHz to 43.5 GHz Tx/Rx Dual Polarization Beamformer *Upcoming*

ADMV4728: 47.2 GHz to 48.2 GHz Tx/Rx Dual Polarization Beamformer *Upcoming*

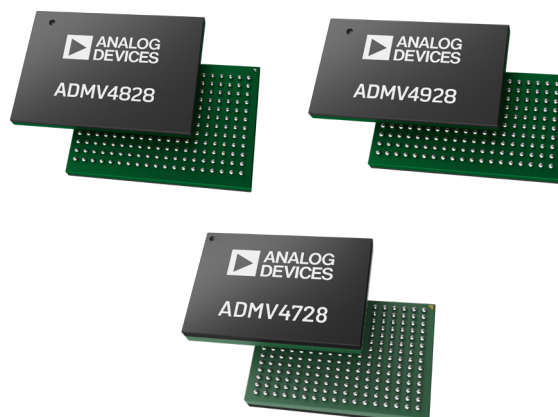
Key Features

- ▶ **ADMV4828:** RF frequency range: 24 GHz to 29.5 GHz, addressing n257, n258, n261 bands in one footprint
- ▶ **ADMV4928:** RF frequency range: 37 GHz to 43.5 GHz, addressing n260 and future 40 GHz to 43.5 GHz bands in one footprint
- ▶ **ADMV4728:** RF frequency range: 47.2 GHz to 48.2 GHz
- ▶ CMOS beamformer with industry-leading efficiency and linear P_{OUT} with 5G NR
- ▶ No degradation in EVM at wide 5G NR channel bandwidths
- ▶ 16 configurable transmit and receive channels
- ▶ Dual polarization: eight horizontal and eight vertical channels
- ▶ Fast TDD switching time using external pins
- ▶ Integrated transmitter power detectors and temperature sensor
- ▶ Efficient heat transfer package
- ▶ Matched 50 Ω single-ended RF inputs and outputs
- ▶ Nonvolatile memory for full-array phase and gain calibration
- ▶ High resolution vector modulators for phase control
- ▶ High resolution DGAs for amplitude control
- ▶ Temperature compensation

- ▶ Memory for transmitter and receiver beam positions
- ▶ 3GPP specification compliant
- ▶ Common SPI register map across ADMV4828/ADMV4928/ADMV4728

Applications

- ▶ 5G mmW communications
- ▶ Sat comms
- ▶ Phased array radar
- ▶ Test and measurement



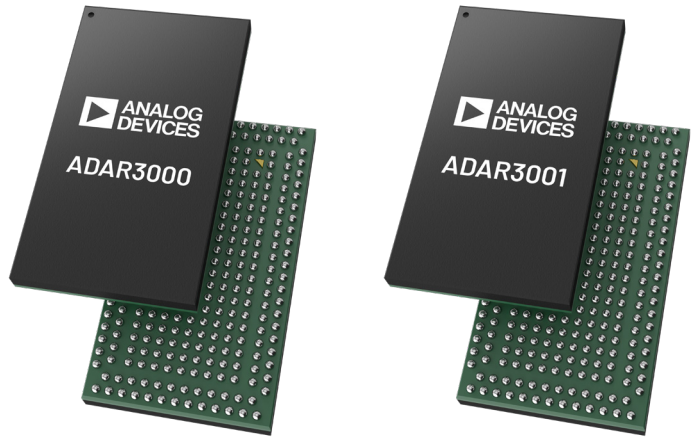
ADAR3000 and ADAR3001: Ka-/K-Band Beamformers

Key Features

- ▶ **ADAR3000:** 17 GHz to 22 GHz frequency range
- ▶ **ADAR3001:** 27.5 GHz to 31 GHz frequency range
- ▶ >31 dB gain adjustment range
- ▶ <0.5 dB gain resolution
- ▶ Memory for 256 prestored beam positions
 - 64 beamstates/beam × 4 beams
- ▶ User-programmable sequencer for beamstate selection
- ▶ FIFO memory for 64 beam positions
 - 16 beamstates/beam × 4 beams
- ▶ Variable SPI length for flexible & efficient beam commands
 - Update, reset, and mute from 1 up to 16 beams
- ▶ Integrated temperature sensor
- ▶ Integrated 8-bit ADC for
 - Temperature sensor
 - General analog inputs
- ▶ Programmable bias modes
- ▶ 4-wire SPI interface
- ▶ Ball grid array package

Applications

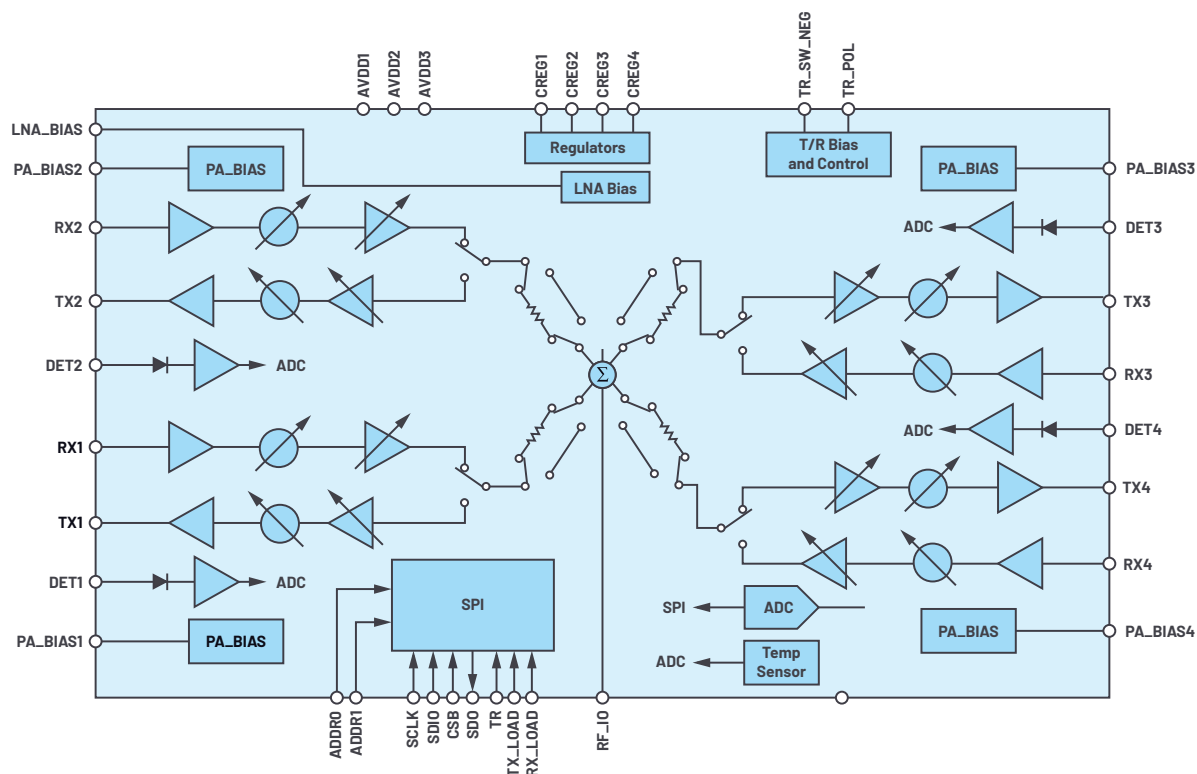
- ▶ GEO HTS
- ▶ LEO constellations
- ▶ Mobile terminals (land, air, sea)
- ▶ Terrestrial/airborne/sat



ADAR1000: 4-Channel X-/Ku-Band Beamformer

Key Features

- ▶ 8 GHz to 16 GHz frequency range
- ▶ Half-duplex to transmit and receive
- ▶ Single pin transmit/receive control
- ▶ 360° phase control, <2.8° phase resolution
- ▶ 31 dB gain control, 0.5 dB resolution
- ▶ Single-ended RF pins
- ▶ Bias and control for external transmit/receive modules
- ▶ Memory for prestored beam positions
- ▶ ±2 dB power detector
- ▶ ±10° temperature sensor
- ▶ Auxiliary 8-bit ADC for power detectors and temperature sensors
- ▶ Supports low power modes
- ▶ 4-wire SPI interface



Part Number	Tx Gain (dB)	Tx P _{SAT} (dBm)	Tx PAE (%)	Rx Gain (dB)	Rx P1dB (dBm)	Rx NF (dB)	Rx OIP3 (dBm)	Package (mm)	ECCN Code	Ordering Part Number
ADTR1107*	22	25	20	18	14	2.5	26	5 × 5 LGA	EAR99	ADTR1107ACCZ

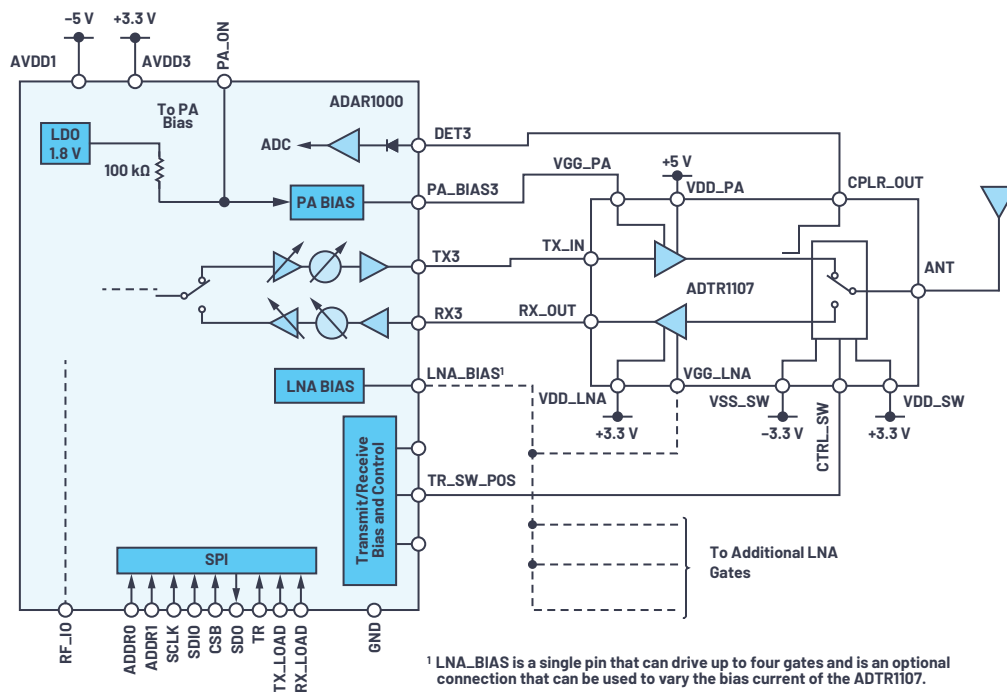
ADTR1107: 6 GHz to 18 GHz Transmit and Receiver Front-End IC

Key Features

- ▶ Front-end IC with integrated power amplifier, LNA, and SPDT
- ▶ Transceiver P_{SAT}: 25 dBm
- ▶ Transceiver gain: 22 dB
- ▶ Receiver gain: 18 dBm
- ▶ Receiver output IP3: 26 dBm
- ▶ Receiver P1dB: 14 dBm
- ▶ Receiver noise figure: 2.5 dB
- ▶ Fast switching time: 10 ns T_{ON}/T_{OFF}
- ▶ Amplifier supply: 5 V at 220 mA (PA), 3.3 V at 80 mA (LNA),
- ▶ Switch supply : -3.3 V/+3.3 V
- ▶ Ideal front-end IC for ADAR1000 beamformer
- ▶ 50 Ω matched input and output
- ▶ 24-terminal, 5 mm × 5 mm LGA package

Applications

- ▶ Military and weather radar
- ▶ X-band and Ku-band phased array antennas
- ▶ Military EW and ECM equipment



Analog Phase Shifters

Part Number	Description	Frequency (GHz)	Loss (dB)	Phase Range @ Min Frequency (°)	Phase Range @ Max Frequency (°)	2 nd Harmonic @ Lead = -10 dBm (dBc)	Input IP3 (dBm)	Control Voltage Range (V)	Package (mm)	ECCN Code	Ordering Part Number
HMC247	Analog phase shifter	5 to 18	4	400	120	-80	32	0 to -10	Die	EAR99	HMC247
HMC877	Analog time delay/phase shifter	8 to 23	—	504	485	-35	—	2.7 to 3.9	3 × 3 SMT	EAR99	HMC877LC3

Digital Phase Shifters

Part Number	Description	Frequency (GHz)	Loss (dB)	Phase Range Frequency (°)	Phase Adjust Resolution	RMS Phase Error (°)	Input IP3 (dBm)	Input P1dB (dBm)	Package (mm)	ECCN Code	Ordering Part Number
HMC936A*	6-bit digital phase shifter	1.2 to 1.4	5	360	6-bit, 5.625°	1.2	45	29	6 × 6 LFCSP	EAR99	HMC936ALP6E
HMC648A*	6-bit digital phase shifter	2.9 to 3.9	5	360	6-bit, 5.625°	1.2	45	31	6 × 6 LFCSP	EAR99	HMC648ALP6E
HMC649A*	6-bit digital phase shifter	3 to 6	8	360	6-bit, 5.625°	4	40	31	6 × 6 LFCSP	EAR99	HMC649ALP6E
HMC1133	6-bit digital phase shifter	5 to 6	5	360	6-bit, 5.625°	2.8	46	30	5 × 5 LFCSP	EAR99	HMC1133LP5E
HMC543A	4-bit digital phase shifter	8 to 12	6.5	360	4-bit, 22.5°	4	40	24.5	4 × 4 LFCSP	EAR99	HMC543ALC4B
HMC642A*	6-bit digital phase shifter	9 to 12.5	7	360	6-bit, 5.625°	4.5	35	30	5 × 5 LFCSP	EAR99	HMC642ALC5
HMC644A	5-bit digital phase shifter	15 to 18.5	7.5	360	5-bit, 11.25°	3.5	40	23	5 × 5 LFCSP	EAR99	HMC644ALC5
HMC647A*	6-bit digital phase shifter	2.5 to 31	4	360	6-bit, 5.625°	1.5	50	31	6 × 6 LFCSP	EAR99	HMC647ALP6E

Vector Modulators

Part Number	Description	Frequency (GHz)	I/O Bandwidth (MHz)	Noise Floor (dBm/Hz)	Gain Range (dB)	Phase Range (°)	Input IP3 (dBm)	P1dB (dBm)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
HMC630	Vector modulator	0.7 to 1	180	-162	40	360	34	17	8	92	3 × 3 LFCSP	EAR99	HMC630LP3E
AD8340	Vector modulator	0.7 to 1	230	-149	—	360	—	11	5	130	4 × 4 LFCSP	5A991.b	AD8340ACPZ-WP
HMC500	Vector modulator	1.8 to 2.2	150	-162	40	360	33	16	8	90	3 × 3 LFCSP	EAR99	HMC500LP3E
ADL5390	Vector modulator	0.2 to 2.4	230	-150	—	360	—	13	5	130	4 × 4 LFCSP	5A991.b	ADL5390ACPZ-REEL7
AD8341	Vector modulator	1.5 to 2.4	230	-151	—	360	—	8.5	5	130	4 × 4 LFCSP	5A991.b	AD8341ACPZ-WP
HMC631	Vector modulator	1.8 to 2.7	160	-160	40	360	35	21	8	93	3 × 3 LFCSP	EAR99	HMC631LP3E

Analog Multipliers

Part Number	Description	Frequency (GHz)	Dynamic Range (dB)	Accuracy (dB)	Response Time (ns)	V _s (V)	I _s (mA)	Package (mm)	ECCN Code	Ordering Part Number
ADL5391	RF/IF multiplier	0 to 2	60	±0.2	60	4.75 to 5.5	135	3 × 3 LFCSP	5A991.b	ADL5391ACPZ-WP

* = X-Microwave.

High Speed Data Converters

High Speed Analog-to-Digital Converters >20 MSPS

Part Number	Channels	Resolution (Bits)	Max Sample Rate	ADC SNR (dBFS)	INL (LSB)	V _{IN} Range (V p-p)	Data Output Interface	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
AD9083 <i>New</i>	16	12	2 GSPS	82	**	0.5 to 2	JESD204B	0.9	9 × 9 CSP_BGA	3A991.c.2	AD9083BBCZ
AD9213	1	12	6 GSPS	58.2	2.4	1.4	JESD204B	5.1	12 × 12 BGA_ED	3A001.a.5.a.3	AD9213BBPZ-6G
AD9213	1	12	10.25 GSPS	57.5	2.4	1.4	JESD204B	5.1	12 × 12 BGA_ED	3A001.a.5.a.3	AD9213BBPZ-10G
AD9697	1	14	1.3 GSPS	65.6	1	1.59	JESD204B	1.01	9 × 9 LFCSP	3A001.a.5.a.4	AD9697BCPZ-1300
AD9689	2	14	2 GSPS	62.7	2	1.59	JESD204B	2.5	12 × 12 BGA	3A001.a.5.a.4	AD9689BBPZ-2000
AD9689	2	14	2.6 GSPS	61.3	6	1.59	JESD204B	3.1	12 × 12 BGA	3A001.a.5.a.4	AD9689BBPZ-2600
AD9695	2	14	1.3 GSPS	65.6	1	1.59	JESD204B	1.6	9 × 9 LFCSP	3A001.a.5.a.4	AD9695BCPZ-1300
AD9208	2	14	3 GSPS	60.2	6	1.7	JESD204B	3.3	12 × 12 BGA	3A001.a.5.a.4	AD9208BBPZ-3000
AD9694	4	14	500 MSPS	67.1	1	1.8	JESD204B	1.66	10 × 10 LFCSP	3A001.a.5.a.4	AD9694BCPZ-500
AD9691	2	14	1250 MSPS	63.4	2.6	1.58	JESD204B	3.8	12 × 12 LFCSP	3A001.a.5.a.4	AD9691BCPZ-1250
AD9625	1	12	2 GSPS	59.5	0.9	1.1	JESD204B	3.48	12 × 12 BGA	3A001.a.5.a.3	AD9625BBPZ-2.0
AD9625	1	12	2.5 GSPS	58.3	1	1	JESD204B	3.9	12 × 12 BGA	3A001.a.5.a.3	AD9625BBPZ-2.5
AD9680	2	14	1.25 GSPS	63.6	3	1.58	JESD204B	3.7	9 × 9 LFCSP	3A001.a.5.a.4	AD9680BCPZ-1250
AD9217 <i>New</i>	1	12	10 GSPS	57	2.4	1.4	LVDS	4.2	12 × 12 BGA_ED	3A001.a.5.a.3	AD9217BBPZ-10G/ AD9217BBPZ-6G

**INL not applicable on AD9083 as it is a sigma-delta ADC, not pipeline.

High Speed Digital-to-Analog Converters ≥30 MSPS

Part Number	Device Primary Function	# of Channels	Resolution (Bits)	Update Rate (GSPS)	Noise Spectral Density (dBm/Hz)	SFDR (dB)	I _{OUT} FS (mA)	Data Input Interface	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
AD9166 <i>Upcoming</i>	High speed DAC + buffer	1	16	12	145	70	16.3	JESD204B, SPI	4.9	15 × 15 CSPBGA	3A001.a.5.b.1	AD9166BBPZ
AD9174	High speed DAC	2	16	12.6	165	72	26	JESD204B, SPI	2.55	10 × 10 ball	3A001.a.5.b.2	AD9174BBPZ
AD9175	High speed DAC	2	16	12.6	165	72	26	JESD204B, SPI	2.55	10 × 10 ball	EAR99	AD9175BBPZ
AD9176	High speed DAC	2	16	12.6	165	72	26	JESD204B, SPI	2.55	10 × 10 ball	3A001.a.5.b.2a	AD9176BBPZ
AD9171	High speed DAC	2	16	6	165	72	26	JESD204B, SPI	2.55	10 × 10 ball	EAR99	AD9171BBPZ
AD9173	High speed DAC	2	16	12.6	165	72	26	JESD204B, SPI	2.55	10 × 10 ball	EAR99	AD9173BBPZ
AD9172	High speed DAC	2	16	12.6	165	72	26	JESD204B, SPI	2.55	10 × 10 ball	3A001.a.5.b.2a	AD9172BBPZ
AD9161	High speed DAC	1	11	12	155	65	41.3	JESD204B, SPI	2.35	11 × 11 CSPBGA	EAR99	AD9161BBCZ
AD9162	High speed DAC	1	16	12	164	70	41.3	JESD204B, SPI	2.35	11 × 11 CSPBGA	3A001.a.5.b.2	AD9162BBCAZ
AD9163	High speed DAC	1	16	12	164	70	41.3	JESD204B, SPI	2.65	11 × 11 CSPBGA	EAR99	AD9163BBCZ
AD9164	High speed DAC	1	16	12	164	70	41.3	JESD204B, SPI	2.35	11 × 11 CSPBGA	3A001.a.5.b.1	AD9164BBCAZ

Direct Digital Synthesis

Part Number	Description	# of Channels	DAC Resolution (Bits)	Clock Input (GHz)	Tuning Word Width	Power (mW)	Package (mm)	ECCN Code	Ordering Part Number
AD9102	DDS, waveform generator	1	14	0.18	24	96	5 × 5 LFCSP	EAR99	AD9102BCPZ
AD9106	DDS, waveform generator	4	12	0.18	24	315	5 × 5 LFCSP	EAR99	AD9106BCPZ
AD9914	DDS	1	12	3.5	32	2400	12 × 12 LFCSP	3A001.a.13.b	AD9914BCPZ
AD9915	DDS	1	12	2.5	32	2200	12 × 12 LFCSP	3A001.a.13.b	AD9915BCPZ

Direct Digital Synthesis (Continued)

Part Number	Description	# of Channels	DAC Resolution (Bits)	Clock Input (GHz)	Tuning Word Width	Power (mW)	Package (mm)	ECCN Code	Ordering Part Number
AD9910	DDS	1	14	1	32	715	14 × 14 TQFP	EAR99	AD9910BSVZ
AD9911	DDS	1	10	0.5	32	241	8 × 8 LFCSP	EAR99	AD9911BCPZ
AD9837	DDS, waveform generator	1	10	0.016	28	12.21	3 × 3 LFCSP	EAR99	AD9837ACPZ-RL7
AD9838	DDS, waveform generator	1	10	0.016	28	15.18	4 × 4 LFCSP	EAR99	AD9838ACPZ-RL7
AD9912	DDS	1	14	1	48	637	9 × 9 LFCSP	EAR99	AD9912ABCPZ
AD9913	DDS	1	10	0.25	32	50	5 × 5 LFCSP	EAR99	AD9913BCPZ
AD5932	DDS, waveform generator	1	10	0.05	24	20.26	5 × 4.40 TSSOP	EAR99	AD5932YRUZ
AD5930	DDS, waveform generator	1	10	0.05	24	20.26	6.50 × 4.40 TSSOP	EAR99	AD5930YRUZ
AD5933	DDS, impedance calculator-DDS core	1	12	0.016	27	33	6.20 × 5.30 SSOP	EAR99	AD5933YRSZ
AD9958	DDS	2	10	0.5	32	350	8 × 8 LFCSP	EAR99	AD9958BCPZ
AD5934	DDS, impedance calculator-DDS core	1	12	0.016	27	33	6.20 × 5.30 SSOP	EAR99	AD5934YRSZ
AD9959	DDS	4	10	0.5	32	580	8 × 8 LFCSP	EAR99	AD9959BCPZ
AD9956	DDS	1	14	0.4	48	400	7 × 7 LFCSP	EAR99	AD9956YCPZ
AD9859	DDS	1	10	0.4	32	162	7 × 7 TQFP	EAR99	AD9859YSVZ
AD9951	DDS	1	14	0.4	32	162	7 × 7 TQFP	EAR99	AD9951YSVZ
AD9952	DDS	1	14	0.4	32	162	7 × 7 TQFP	EAR99	AD9952YSVZ
AD9953	DDS	1	14	0.4	32	162	7 × 7 TQFP	EAR99	AD9953YSVZ
AD9954	DDS	1	14	0.4	32	162	7 × 7 TQFP	EAR99	AD9954YSVZ
AD9858	DDS	1	10	1	32	2000	14 × 14 TQFP	EAR99	AD9858BSVZ
AD9833	DDS, waveform generator	1	10	0.025	28	14.85	3 × 3 MSOP	EAR99	AD9833BRMZ
AD9834	DDS, waveform generator	1	10	0.075	28	19.14	6.50 × 4.40 TSSOP	EAR99	AD9834BRUZ
AD9851	DDS	1	10	0.18	32	555	10.20 × 5.30 SSOP	EAR99	AD9851BRSZ
AD9835	DDS	1	10	0.05	32	73.5	5 × 4.40 TSSOP	EAR99	AD9835BRUZ
AD9832	DDS	1	10	0.025	32	87.5	6.40 × 5 TSSOP	EAR99	AD9832BRUZ
AD9831	DDS	1	10	0.025	32	40	7 × 7 TQFP	EAR99	AD9831ASTZ
AD9830	DDS	1	10	0.05	32	250	7 × 7 LQFP	EAR99	AD9830ASTZ
AD9850	DDS	1	10	0.125	32	380	10.20 × 5.30 SSOP	EAR99	AD9850BRSZ

High Speed RF DAC and Direct Digital Synthesis

Part Number	Device Primary Function	# of Channels	Resolution (Bits)	Update Rate (GSPS)	Noise Spectral Density (dBm/Hz)	SFDR (dBc)	I_{OUT} FS (mA)	Data Input Interface	Power (W)	Package (mm)	ECCN Code	Ordering Part Number
AD9166 New	Vector signal generator	1	16	12	154	46	41.3	JESD204B	4.88	15 × 15 BGA_ED	3A001.a.5.b.1	AD9166BBPZ
AD9174	High speed RF DAC & DDS	2	16	12.6	165	72	26	JESD204B, SPI	2.55	10 × 10 BGA_ED	3A001.a.5.b.2	AD9174BBPZ
AD9164	High speed RF DAC & DDS	1	16	12	164	70	41.3	JESD204B, SPI	2.35	11 × 11 CSP_BGA	3A001.a.5.b.1	AD9164BBCAZ

Mixed-Signal Front Ends

Part Number	Device Configuration	DAC/ADC Resolution (Bits)	DAC/ADC Sample Rate (GSPS)	ADC Analog BW (GHz)	ADC Aperture Jitter (fs rms)	Product Description	Data Output Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9081 New	4 × ch IF/IF-to-bits Tx/Rx subsystem	16/12	12/4	0 to 7.5	65	MxFE quad, 16-bit, 12 GSPS RF DAC, and dual, 12-bit, 6 GSPS RF ADC	JESD204B, JESD204C	15 × 15 BGA_ED	3A001.a.5.a.3	AD9081BBPZ-4D4AC
AD9082	4 × ch IF/IF-to-bits Tx/Rx subsystem	16/12	12/6	0 to 8	65	MxFE quad, 16-bit 12 GSPS RF DAC and dual, 12-bit, 6 GSPS RF ADC	JESD204B, JESD204C	15 × 15 BGA_ED	3A001.a.5.a.3	AD9082BBPZ-4D2AC

AD9166: Wideband DC to 9 GHz, Vector Signal Generator

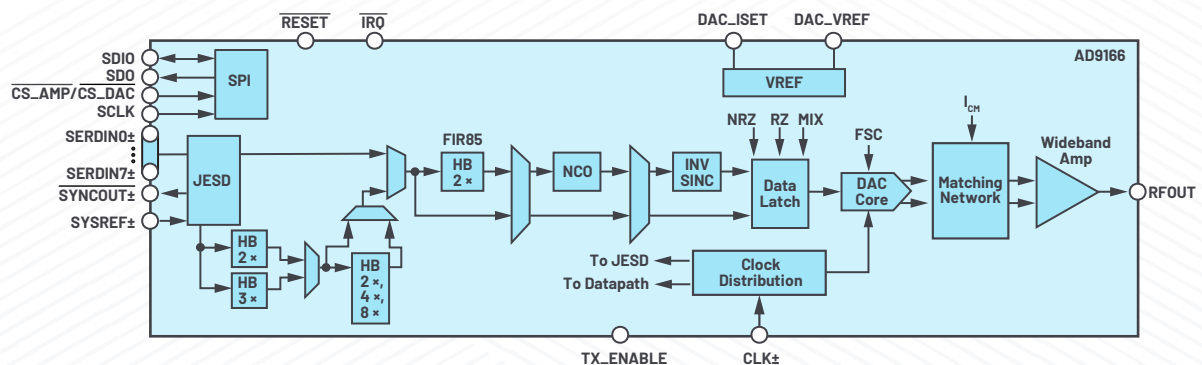
Key Features

- ▶ DC-coupled, 50 Ω matched output
- ▶ Up to 4 dBm output power, with a -3 dB bandwidth of >6 GHz
- ▶ Instantaneous (complex) signal bandwidth
 - 1.8 GHz in NRZ mode
 - 1.5 GHz in mix mode
- ▶ DAC core update rate up to 12 GSPS (minimum)
 - DC to 2.5 GHz in base-band mode
 - DC to 9 GHz in 2× NRZ mode
 - 1 GHz to 9 GHz in mix mode
- ▶ Bypass able data path interpolation
 - 2×, 3×, 4×, 6×, 8×, 12×, 16×, 24×

- ▶ Fast frequency hopping
- ▶ Integrated BiCMOS buffer amplifier
- ▶ 324-ball, 15 mm × 15 mm, 0.8 mm pitch CSP_BGA package

Applications

- ▶ High speed instrumentation and automated test equipment
- ▶ Broadband communications systems
- ▶ EW, ECM, and radar jamming equipment
- ▶ Local oscillator driver

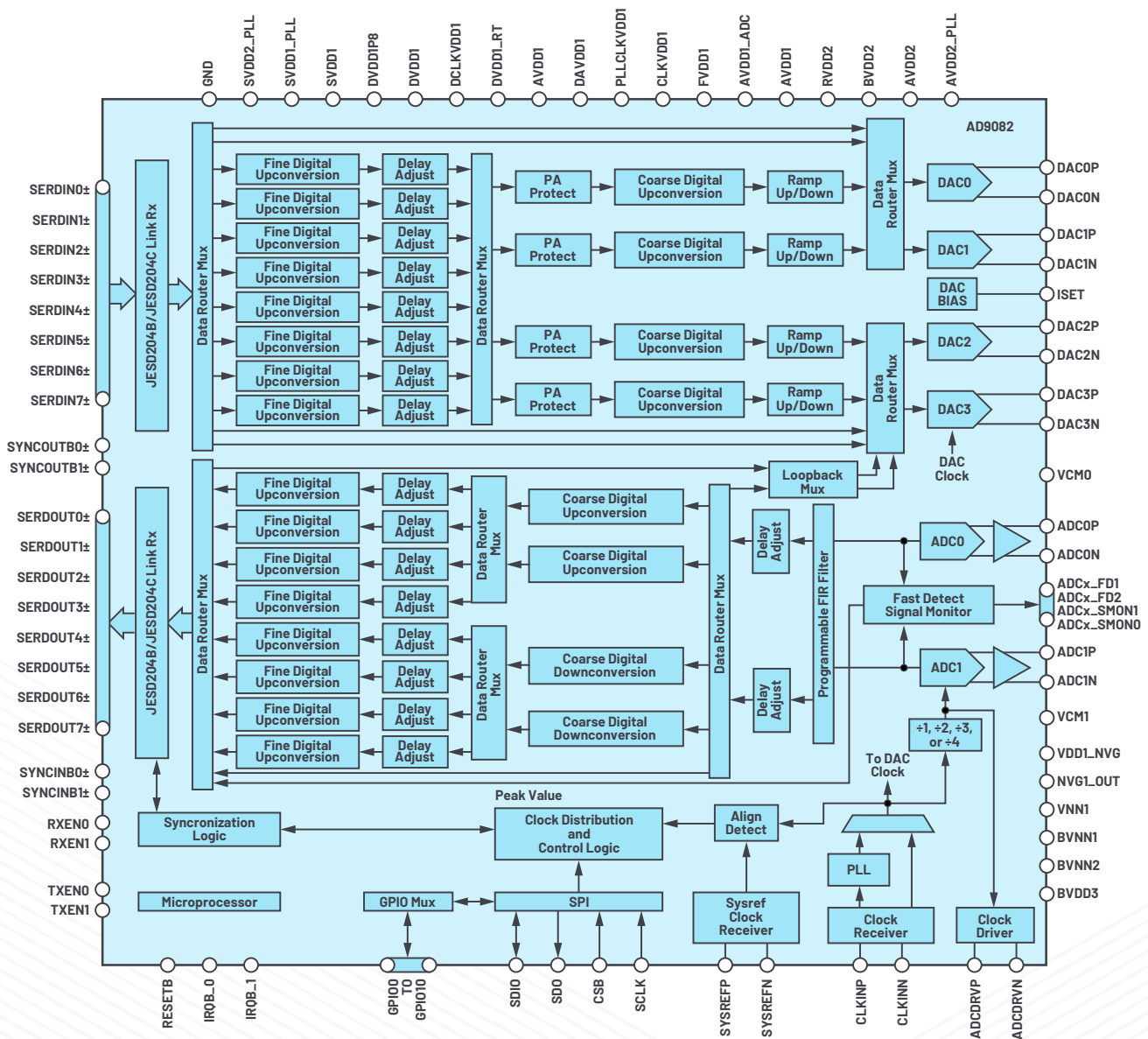


- Notes
1. FSC is full-scale current.
 2. I_{CM} is the input common-mode current of the buffer amplifier.

MxFE AD9081 and AD9082: Software-Defined Radio Platform Low Power, Wide Bandwidth RF ADCs Provide the High Dynamic Range Across Multiband Signal Capture

Key Features

- ▶ AD9081 four 12-bit, 4 GSPS RF ADCs
 - Core power: 800 mW
 - NSD of -151 dBfs/Hz up to 2.7 GHz AIN
 - SFDR < -70 dBc at 2.7 GHz at -7 dBfs
 - SFDR (excl. H2, H3, I/L) < -90 dBc
- ▶ AD9082 two 12-bit, 6 GSPS RF ADCs
 - RF input range up to 7.2 GHz
 - On-chip input programmable input buffer
 - 100 Ω termination
 - 1 V common mode; 1.4 V p-p full scale
- ▶ Voltage supplies: 2 V and 1 V
- ▶ GPIO voltage of 1.8 V to 2 V
- ▶ ADC to ADC isolation > 75 dBc
- ▶ ADC to DAC isolation > 75 dBc
 - Channel BW table and isolation



Timing ICs and Clocks

Clock Dividers and Distribution

Part Number	Clock Function	Configuration/ Programming Interface	Number of Outputs	Output Frequency (MHz)	Output Logic	Power Dissipation (W)	Input Frequency (MHz)	Package (mm)	ECCN Code	Ordering Part Number
AD9513	Distribution	Pin select	3	250	CMOS, LVDS	0.46	0 to 1600	5 × 5 LFCSP	EAR99	AD9513BCPZ-REEL7
ADN4670	Distribution	Serial	10	1100	LVDS	0.350	1 to 1100	5 × 5 LFCSP_WQ	EAR99	ADN4670BCPZ
LTC6954-1	Distribution	SPI	3	1400	LVPECL	1	1 to 1400	4 × 7 LFCSP	EAR99	LTC6954IUUF-1#TRPBF
LTC6954-2	Distribution	SPI	3	1400	CMOS, LVDS, LVPECL	0.94	1 to 1400	4 × 7 LFCSP	EAR99	LTC6954IUUF-2#TRPBF
LTC6954-3	Distribution	SPI	3	1400	CMOS, LVDS, LVPECL	0.9	1 to 1400	4 × 7 LFCSP	EAR99	LTC6954IUUF-3#TRPBF
LTC6954-4	Distribution	SPI	3	1400	CMOS, LVDS	0.9	1 to 1400	4 × 7 LFCSP	EAR99	LTC6954IUUF-4#TRPBF
AD9515	Distribution	Pin select	2	1600	CMOS, LVDS, LVPECL	0.37	0 to 1600	5 × 5 LFCSP	EAR99	AD9515BCPZ-REEL7
AD9514	Distribution	Pin select	3	1600	CMOS, LVDS, LVPECL	0.525	0 to 1600	5 × 5 LFCSP_VQ	EAR99	AD9514BCPZ
AD9508	Distribution	SPI, pin select, I ² C	4	1650	LVDS, HSTL, CMOS	0.5	0 to 1650	4 × 4 LFCSP	EAR99	AD9508BCPZ
HMC7043	Distribution	SPI	14	3200	CMOS, LVDS, LVPECL, CML	1.5	200 to 6000	7 × 7 LFCSP	EAR99	HMC7043LP7FE
HMC6832	Distribution	Pin select	8	3500	LVDS, LVPECL	0.5	10 to 3500	5 × 5 LFCSP	EAR99	HMC6832ALP5LE
LTC6953	Clock distribution with sync	SPI	11	4500	CML	1.8	LF to 4500	7 × 8 LFCSP	EAR99	LTC6953IUKG#TRPBF
ADCLK948	Distribution	Pin select, serial	8	4800	LVPECL	1.2	4500 to 4800	5 × 5 LFCSP	EAR99	ADCLK948BCPZ
ADCLK944	Distribution	Serial	4	7000	LVPECL	0.5	6200 to 7000	3 × 3 LFCSP_WQ	EAR99	ADCLK944BCPZ-R7
ADCLK950	Distribution	Pin select, serial	10	4800	LVPECL	1.4	4500 to 4800	6 × 6 LFCSP	EAR99	ADCLK950BCPZ

Multioutput Clock Generators

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9522-0	3.3	2	24/12	4	0	Yes	800	LVDS, CMOS	<0.4	Serial with EEPROM	64-lead LFCSP	EAR99	AD9522-0BCPZ-REEL7
AD9510	3.3	1	8	8	2	No	1200	CMOS, LVDS, LVPECL	0.225	Serial	64-lead LFCSP	EAR99	AD9510BCPZ-REEL7
AD9511	3.3	1	5	5	1	No	1200	CMOS, LVDS, LVPECL	0.225	Serial	48-lead LFCSP	EAR99	AD9511BCPZ-REEL7
LTC6950	3.3	1	5	5	0	No	1400	CMOS, LVDS, LVPECL	0.115	Serial	48-lead LFCSP	EAR99	LTC6950IUHH#TRPBF
AD9516-4	3.3	2	14	5	4	Yes	1800	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR99	AD9516-4BCPZ-REEL7
AD9517-4	3.3	2	12	6	4	Yes	1800	CMOS, LVDS, LVPECL	0.275	Serial	48-lead LFCSP	EAR99	AD9517-4ABCPZ-RL7
AD9518-4	3.3	2	6	3	0	Yes	1800	LVPECL	0.225	Serial	48-lead LFCSP	EAR99	AD9518-4ABCPZ-RL7
AD9516-3	3.3	2	14	5	4	Yes	2250	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR99	AD9516-3BCPZ-REEL7
AD9517-3	3.3	2	12	6	4	Yes	2250	CMOS, LVDS, LVPECL	0.275	Serial	48-lead LFCSP	EAR99	AD9517-3ABCPZ-RL7
AD9518-3	3.3	2	6	3	0	Yes	2250	LVPECL	0.225	Serial	48-lead LFCSP	EAR99	AD9518-3ABCPZ-RL7
AD9520-3	3.3	2	12/24	4	0	Yes	1800, 2250	CMOS, LVPECL	0.225	Serial	64-lead LFCSP	EAR99	AD9520-3BCPZ-REEL7
AD9516-2	3.3	2	14	5	4	Yes	2335	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR99	AD9516-2BCPZ-REEL7

Multiooutput Clock Generators (Continued)

Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9517-2	3.3	2	12	6	4	Yes	2335	CMOS, LVDS, LVPECL	0.275	Serial	48-lead LFCSP	EAR99	AD9517-2ABCPZ-RL7
AD9518-2	3.3	2	6	3	0	Yes	2335	LVPECL	0.225	Serial	48-lead LFCSP	EAR99	AD9518-2ABCPZ-RL7
AD9520-2	3.3	2	12/24	4	0	Yes	2335	CMOS, LVPECL	0.225	Serial	64-lead LFCSP	EAR99	AD9520-2BCPZ-REEL7
AD9516-5	3.3	2	14	5	4	No	2400	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR99	AD9516-5BCPZ-REEL7
AD9520-5	3.3	2	12/24	4	0	No	2400	CMOS, LVPECL	0.225	Serial	64-lead LFCSP	EAR99	AD9520-5BCPZ-REEL7
LTC6951	3.3/5	1	5	5	0	Yes	2500	LVDS, CML	0.105	Serial	40-lead LFCSP	EAR99	LTC6951UHF#TRPBF
AD9517-1	3.3	2	12	6	4	Yes	2650	CMOS, LVDS, LVPECL	0.275	Serial	48-lead LFCSP	EAR99	AD9517-1ABCPZ-RL7
AD9516-1	3.3	2	14	5	4	Yes	2650	CMOS, LVDS, LVPECL	<0.4	Serial	64-lead LFCSP	EAR99	AD9516-1BCPZ-REEL7
AD9518-1	3.3	2	6	3	0	Yes	2650	LVPECL	0.225	Serial	48-lead LFCSP	EAR99	AD9518-1ABCPZ-RL7
AD9520-1	3.3	1	12	4	4	Yes	2650	LVPECL, CMOS	0.33	Serial	9 × 9 LFCSP	EAR99	AD9520-1BCPZ-REEL7
LTC6951-1	3.3/5	1	5	5	5	Yes	2700	LVDS, CML	0.115	Serial	5 × 7 LFCSP	EAR99	LTC6951UHF-1#TRPBF
AD9516-0	3.3	1	14	5	5	No	2950	CMOS, LVDS, LVPECL	<0.4	Serial	9 × 9 LFCSP	EAR99	AD9516-0BCPZ-REEL7
AD9517-0	3.3	1	12	4	4	Yes	2950	CMOS, LVDS, LVPECL	0.275	Serial	7 × 7 LFCSP	EAR99	AD9517-0ABCPZ-RL7
AD9518-0	3.3	1	3	3	3	Yes	2950	LVPECL	0.225	Serial	7 × 7 LFCSP	EAR99	AD9518-0ABCPZ-RL7
AD9520-0	3.3	1	12/24	4	4	Yes	2950	LVPECL, CMOS	0.225	Serial with EEPROM	9 × 9 LFCSP	EAR99	AD9520-0BCPZ-REEL7
HMC7044	3.3	4	14	14	14	Yes	3200	CMOS, LVDS, LVPECL	0.044	Serial	10 × 10 LFCSP	EAR99	HMC7044LP10BETR
AD9525	3.3	3	9	0	0	No	3600	LVPECL, CMOS	0.08	Serial	7 × 7 LFCSP	EAR99	AD9525BCPZ-REEL7
AD9522-1	3.3	1	12/24	4	4	Yes	2650	LVPECL, CMOS	0.08	Serial with EEPROM	9 × 9 LFCSP	EAR99	AD9522-1BCPZ-REEL7
AD9522-2	3.3	1	12/24	4	4	Yes	2400	LVPECL, CMOS	0.242	Serial with EEPROM	9 × 9 LFCSP	EAR99	AD9522-2BCPZ-REEL7
AD9522-3	3.3	1	12/24	4	4	Yes	2250	LVPECL, CMOS	0.242	Serial with EEPROM	9 × 9 LFCSP	EAR99	AD9522-3BCPZ-REEL7
AD9522-4	3.3	1	12/24	4	4	Yes	1800	LVPECL, CMOS	0.242	Serial with EEPROM	9 × 9 LFCSP	EAR99	AD9522-4BCPZ-REEL7
AD9522-5	3.3	1	12/24	4	4	No	2400	LVPECL, CMOS	0.242	Serial with EEPROM	9 × 9 LFCSP	EAR99	AD9522-5BCPZ-REEL7
AD9523-1	3.3	2	14/29	14	14	Yes	3100	LVPECL, LVCMOS	0.124	Serial with EEPROM	10 × 10 LFCSP	EAR99	AD9523-1BCPZ-REEL7
LTC6952	3.3/5	1	11	11	11	No	4500	CML	0.065	Serial with sync	7 × 8 LFCSP	EAR99	LTC6952IUKG#PBF
AD9528	3.3	2	14	14	14	Yes	1.25 G	HSTL, LVDS	0.160	I ² C, serial, SPI	72-lead LFCSP	EAR99	AD9528BCPZ
AD9576	3.3	3	11	5	11	Yes	1250	CMOS, HCSL, HSTL, LVDS	<0.3	I ² C, pin select, serial, SPI	9 × 9 LFCSP	EAR99	AD9576BCPZ

Clock Generators and Synchronizers

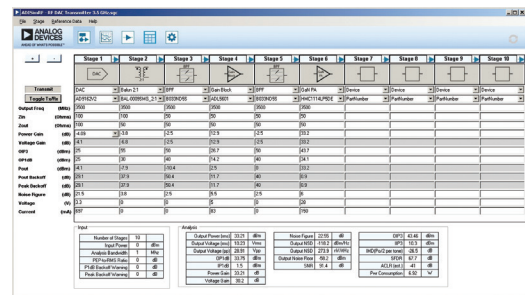
Part Number	Supply Voltage (V)	Number of Reference Inputs	Number of Outputs	Number of Dividers	Number of Delay Lines	On-Chip VCO or DCO	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
AD9545	1.8	4	5	5	5	Yes	500 M	CML, HCSL, LVDS	0.220	I ² C, Serial, SPI	7 × 7 LFCSP	EAR99	AD9545BCPZ
AD9547	1.8, 3.3	2	2	2	1	Yes	450	LVDS, LVPE	0.7	Serial	64-lead LFCSP	EAR99	AD9547BCPZ-REEL7
AD9548	1.8, 3.3	8	8	4	1	Yes	450	LVDS, LVPECL, CMOS	0.7	Serial	88-lead LFCSP	EAR99	AD9548BCPZ-REEL7
AD9549	1.8, 3.3	2	2	1	0	Yes	750	CMOS, HSTL	0.6	Serial	64-lead LFCSP	EAR99	AD9549ABCPZ-REEL7
AD9550	1.8, 3.3	1	2	2	0	Yes	810	LVPECL, LV	0.5	—	32-lead LFCSP	EAR99	AD9550BCPZ-REEL7
AD9553	1.8, 3.3	3	2	2	0	Yes	810	LVDS, LVPE	0.5	Serial	32-lead LFCSP	EAR99	AD9553BCPZ-REEL7
AD9552	1.8, 3.3	2	2	2	0	Yes	900	LVDS, LVPE	0.5	Serial	32-lead LFCSP	EAR99	AD9552BCPZ-REEL7
AD9557	1.8, 3.3	2	2	2	0	Yes	1250	HSTL, LVDS	0.5	Serial	40-lead LFCSP	EAR99	AD9557BCPZ-REEL7
AD9558	1.8, 3.3	4	6	4	0	Yes	1250	HSTL, LVDS	0.5	Serial	64-lead LFCSP	EAR99	AD9558BCPZ-REEL7
AD9559	1.8, 3.3	4	4	4	0	Yes	1250	HSTL, LVDS	0.5	Serial	72-lead LFCSP	EAR99	AD9559BCPZ-REEL7

Clock Buffers

Part Number	Supply Voltage (V)	Number of Inputs	Number of Outputs	Max Output Frequency (MHz)	Output Logic	Wideband Random Jitter (ps rms)	I/O Interface	Package (mm)	ECCN Code	Ordering Part Number
LTC6957-1	3.3	1	2	300	LVPECL	0.12	—	12-lead QFN, LFCSP	EAR99	LTC6957IDD-1#TRPBF
LTC6957-2	3.3	1	2	300	LVDS	0.12	—	12-lead QFN, LFCSP	EAR99	LTC6957IDD-2#TRPBF
LTC6957-3	3.3	1	2	300	CMOS	0.12	—	12-lead QFN, LFCSP	EAR99	LTC6957IDD-3#TRPBF
LTC6957-4	3.3	1	2	300	CMOS	0.12	—	12-lead QFN, LFCSP	EAR99	LTC6957IDD-4#TRPBF
ADCLK854	1.8	2	12	1200	LVDS, CMOS	0.15	—	48-lead LFCSP	EAR99	ADCLK854BCPZ-REEL7
ADCLK846	1.8	1	6	1200	LVDS, CMOS	0.15	—	24-lead LFCSP	EAR99	ADCLK846BCPZ-REEL7
HMC6832	2.5 or 3.3	2	8	3500	LVDS, LVPECL	0.01	Pin select	28-lead LFCSP	EAR99	HMC6832ALP5LE
ADCLK946	3.3	1	6	4800	LVPECL	0.075	—	24-lead LFCSP	EAR99	ADCLK946BCPZ-REEL7
ADCLK954	3.3	2	12	4800	LVPECL	0.075	—	40-lead LFCSP	EAR99	ADCLK954BCPZ-REEL7
ADCLK905	2.5 to 3.3	1	1	6000	ECL, PECL, LVPECL	0.06	—	16-lead LFCSP	EAR99	ADCLK905BCPZ-WP
ADCLK907	2.5 to 3.3	2	2	6000	ECL, PECL, LVPECL	0.06	—	16-lead LFCSP	EAR99	ADCLK907BCPZ-WP
ADCLK925	2.5 to 3.3	1	2	6000	ECL, PECL, LVPECL	0.06	—	16-lead LFCSP	EAR99	ADCLK925BCPZ-WP
ADCLK914	3.3	1	1	7500	HVDS, CML	0.11	—	16-lead LFCSP	EAR99	ADCLK914BCPZ-WP
LTC6955	3.3	1	11	7500	CML	0.045	Pin select	7 × 8 LFCSP	EAR99	LTC6955IUKG#TRPBF
LTC6955-1	3.3	1	10/1	7500	CML	0.045	Pin select	7 × 8 LFCSP	EAR99	LTC6955IUKG-1#TRPBF
HMC987	3.3	1	9	8000	LVPECL, LVDS, CML, CMOS	0.05	Serial	32-lead, 5 × 5 LFCSP	EAR99	HMC987LP5E

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