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SEQUANS COMMUNICATIONS CA410 Complete LTE Module Owner's Manual

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About this Data Sheet

Purpose and Scope

The CA410 is a complete LTE module including baseband, RF and memory, designed for CAT-4 devices.

This document provides technical information about the CA410 module. The CA410 is based on Sequans's Cassiopeia platform.

Who Should Read this Data Sheet?

This document is intended for engineers who are developing User Equipment (UE) for LTE systems.

Changes in this Document

This is the third revision of the *CA410 Data Sheet*.

Table 1: Change History

Revision	Date	Changes
1	June 2023	N/A
2	June 2023	Add 1.4 MHz bandwidth for B8. New laser marking. New Chapter 5 (Regulatory). Adjust CA410 pin names in the M.2 connector pin-out table.
3	August 2023	Adapt the data sheet to fit the two sub-models M and L.
3a	October 2023	Add reference power figures per band in the FCC/ISED regulatory sections.

References

[1] Core technology specifications:

- 3GPP E-UTRA 21 series Release 9 (EPS)
- 3GPP E-UTRA 22 series Release 9 (IMEI)
- 3GPP E-UTRA 23 series Release 9 (NAS, SMS)
- 3GPP E-UTRA 24 series Release 9 (NAS)
- 3GPP E-UTRA 31 series Release 9 (UICC)
- 3GPP E-UTRA 33 series Release 9 (security)
- 3GPP E-UTRA 36 series Release 9 (RAN)
- 3GPP2 C.S0015-A v1.0 (SMS)

- IETF, RFC 3261, 4861, 4862, 6434

For more information, consult:

- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/21_series/**
- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/22_series/**
- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/23_series/**
- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/24_series/**
- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/31_series/**
- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/33_series/**
- **ftp://ftp.3gpp.org/Specs/latest/Rel-9/36_series/**
- **http://www.3gpp2.org/public_html/specs/CS0015-0.pdf**
- **https://tools.ietf.org/html/**

[2] • Test specifications: 3GPP E-UTRA 36 series Release 10 (RAN): **ftp://ftp.3gpp.org/Specs/latest/Rel-10/36_series** [3] Vocabulary reference:

- 3GPP TR 21.905: "Vocabulary for 3GPP Specifications"

    For more information, see **http://www.3gpp.org/ftp/specs/archive/21_series/21.905/**

[4] • "Universal Serial Bus Specification", Revision 2.0, April 27, 2000 (**http://www.usb.org/developers/docs/**). ECM (Ethernet Networking Control Model) is specified in "USB Class Definitions for Communication Devices", Version 1.1, January 19,1999, section 3.3.2. EEM (CDC Ethernet Emulation Model) is specified in "Universal Serial Bus Communications Class Subclass Specification for Ethernet Emulation Model Devices", Revision 1.0, February 2, 2005.

Product Summary

General Description

The CA410 is a complete LTE module including base-band, RF and memory. This document provides technical information about the CA410 module

Frequency Band

The CA410 supports 10 bands:

Table 2: Supported Bands

Band(s) #	Type	Bandwidth (MHz)
B48	TDD	5 / 10 / 15 / 20
B8	FDD	1.4 / 3
B2/4/5/12/13/14/26/66	FDD	3GPP compliant

Applications

CA410 is ideal for adding LTE connectivity to electronics devices for industrial Internet of Things (IoT), Machine-to-Machine (M2M) and broadband consumer applications. CA410 is compliant with CBRS networks operating on LTE band 48 in USA, with US B8 – known as Anterix band – and with other US MNO bands: bands 2/4/5/12/13/66 as well as Firstnet LTE band 14 and band 26 used in private networks.

Block Diagram

Figure 1: CA410 Block Diagram

Table 3: General Features

Physical Characteristics	M.2 board Size: 42 mm × 30 mm × 3.2 mm LCC Module – 144 pins Size: 32 mm × 29 mm × 2.4 mm (height)
Temperature Range and Humidity	Functional temperature range: -40 (ambient) to +85°C (board temperature, measured by the module with AT commands) 3GPP RF specification compliant temperature range: -30 (ambient) to +85°C (board temperature, measured by the module with AT commands) Humidity: 10% to 85% Storage: MSL3
Power Supply	Functional power supply range: 3.2 to 4.6 V. 3GPP RF compliant power supply range: 3.2 to 4.4 V
Tx Power	+23 dBm
Antenna Interfaces	MAIN and RxDIVERSITY antennas.

Interfaces	• (U)SIM Card Interface: Device supports removable UICC, ISIM • USB Interface Compliant with USB 2.0 specification (Device), data transfer rate up to 480 Mbps Used for AT command communication, data transmission, software debugging and firmware upgrade Support USB drivers for Windows 7, Windows 10, Linux 2.6/3.x/4.1 and MacOS • UART Interface UART0: Used for module debugging and log output. Up to 115200 bauds. Default frame format is 8N1 (8 data bits, no parity, 1 stop bit), no flow control
LTE Features	3GPP E-UTRA Release 10 compliant LTE Category 4 One UL and two DL transceivers FDD, TDD Modulation: DL: QPSK, 16QAM, 64QAM and UL: QPSK, 16QAM Channel bandwidths: 3, 5, 10, 15, and 20 MHz Antenna Rx diversity: MRC (Maximum Ratio Combining) MIMO 2×2 Fast scanning IPv4, IPv6 Ciphering and deciphering: NULL, AES, SNOW 3G Integrity and protection: AES, SNOW 3G Intra and inter-frequency measurements and handover[1] Frequency Hopping Connected Mode Mobility SMS over NAS LTE IP Messaging
SMS	Text and PDU modes
Network Indication	One LED pin for network connectivity status indication
Firmware Upgrade	USB Interface, FOTA
RoHS	All hardware components are fully compliant with EU RoHS directive, bromine free

Available Part Numbers

Table 4: CA410 Available Part Numbers

Type	Part Number
M.2 without IPR	CA41N11GTZ

Type	Part Number
M.2 with IPR	CA41N11GTZ_IPR
LCC without IPR	CA41Q87GRZ
LCC with IPR	CA41Q87GRZ_IPR

Interfaces

Interfaces Description for M.2 Model

The following data applies to the M.2 model of the CA410.

Pin Assignment

M2 CONNECTOR – BOTTOM		M2 CONNECTOR – TOP	
pin	Signal	Signal	pin
74	3.3V	CONFIG_2	75
72	3.3V	GND	73
70	3.3V	GND	71
68	N/C	CONFIG_1	69
66	SIM_DETECT (I)	RESET# (I)(0/1.8V)	67
64	N/C	UART0_SIN	65
62	N/C	UART0_SOUT	63
60	N/C	N/C	61
58	N/C	N/C	59
56	N/C	GND	57
54	N/C	N/C	55
52	N/C	N/C	53
50	N/C	GND	51
48	N/C	N/C	49
46	N/C	N/C	47
44	N/C	GND	45
42	N/C	N/C	43
40	N/C	N/C	41
38	N/C	GND	39
36	UIM-PWR (O)	N/C	37
34	UIM-DATA (IO)	N/C	35
32	UIM-CLK (O)	GND	33
30	UIM-RESET (O)	N/C	31
28	AUDIO_3/AUDIO_3/RFU/IPC_6-AUDIO_3 (I/O) (0/1.8V) N/C		29

M2 CONNECTOR – BOTTOM		M2 CONNECTOR – TOP	
pin	Signal	Signal	pin
26	N/C	GND	27
24	AUDIO_2/AUDIO_2/RFU/IPC_5-AUDIO_2 (I/O) (0/1.8V) N/C		25
22	AUDIO_1/AUDIO_1/RFU/AUDIO_1 (I/O)(0/1.8V)	WoWWAN#	23
20	AUDIO_0/AUDIO_0/RFU/AUDIO_0 (I/O)(0/1.8V)	CONFIG_0	21
18	Module Key	Module Key	19
16	Module Key	Module Key	17
14	Module Key	Module Key	15
12	Module Key	Module Key	13
10	LED_1#/LED_1#/LED_1# (O)(OD)(0/3.3V)	GND	11
8	W_DISABLE1# (I)(0/3.3V)	USB_D-	9
6	FULL_CARD_POWER_OFF# (I)(0/1.8V)	USB_D+	7
4	3.3V	GND	5
2	3.3V	GND	3
		CONFIG_3	1

Pin Description

Pin	M.2 Standard Signal Name	CA410 Signal Name	Dir	Voltage	Description
1	CONFIG_3	Not Connected	–	–	
2	3.3V	VBAT	In	3.3 V	DC Power Supply
3	GND	GND	–	–	Ground
4	3.3V	VBAT	In	3.3 V	DC Power Supply
5	GND	GND	–	–	Ground
6	FULL_CARD_POWER_OFF#	MODULE_PWR_EN	In	1.8 V	To power ON/OFF the module
7	USB_D+	USB_D+	In/Out	–	USB data positive
8	W_DISABLE1#	W_DISABLE_N	–	–	Reserved. Do not connect.
9	USB_D-	USB_D-	In/Out	–	USB data negative
10	LED_1#	NETWORK_LED_N	Out	1.8 V	HIGH when network interface inactive (LED off) LOW when network interface active (LED on)
11	GND	GND	–	–	Ground
12	Module Key	Module Key	–	–	
13	Module Key	Module Key	–	–	
14	Module Key	Module Key	–	–	
15	Module Key	Module Key	–	–	
16	Module Key	Module Key	–	–	
17	Module Key	Module Key	–	–	

Pin	M.2 Standard Signal Name	CA410 Signal Name	Dir	Voltage	Description

18	Module Key	Module Key	–	–	
19	Module Key	Module Key	–	–	
20	AUDIO_0	PCM_CLK	In/Out	1.8 V	GPIO
21	CONFIG_0	GND	–	–	Ground
22	AUDIO_1	PCM_RXD	In	1.8 V	GPIO
23	WoWWAN#	WAKE_ON_WAN_N	Out	1.8 V	Wake signal for host
24	AUDIO_2	PCM_TXD	Out	1.8 V	GPIO
25	DPR	Not Connected	–	–	
26	W_DISABLE2#	Not Connected	–	–	
27	GND	GND	–	–	Ground
28	AUDIO_3	PCM_FS	In/Out	1.8 V	GPIO
29	SSIC-TxN	Not Connected	–	–	
30	UIM-RESET	SIM_RST	Out	USIM_PWR	USIM Reset
31	SSIC-TxP	Not Connected	–	–	
32	UIM-CLK	SIM_CLK	Out	USIM_PWR	USIM Clock
33	GND	GND	–	–	Ground
34	UIM-DATA	SIM_IO	In/Out	USIM_PWR	USIM I/O pin
35	SSIC-RxN	Not Connected	–	–	
36	UIM-PWR	SIM_VCC	Out	USIM_PWR	USIM Vcc supply
37	SSIC-RxP	Not Connected	–	–	
38	Not Connected	Not Connected	–	–	
39	GND	GND	–	–	Ground
40	GNSS_SCL	Not Connected	–	–	
41	Not Connected	Not Connected	–	–	
42	GNSS_SDA	Not Connected	–	–	
43	Not Connected	Not Connected	–	–	
44	GNSS_IRQ	Not Connected	–	–	
45	GND	GND	–	–	Ground
46	GNSS_0	Not Connected	–	–	
47	Not Connected	Not Connected	–	–	
48	/GNSS_1	Not Connected	–	–	
49	Not Connected	Not Connected	–	–	
50	Not Connected	Not Connected	–	–	

51	GND	GND	–	–	Ground
52	Not Connected	Not Connected	–	–	
53	Not Connected	Not Connected	–	–	
54	Not Connected	Not Connected	–	–	
55	Not Connected	Not Connected	–	–	

Pin	M.2 Standard Signal Name	CA410 Signal Name	Dir	Voltage	Description
56	Not Connected	Not Connected	–	–	
57	GND	GND	–	–	Ground
58	Not Connected	Not Connected	–	–	
59	ANTCTL0	Not Connected	–	–	
60	COEX3	Not Connected	–	–	
61	ANTCTL1	Not Connected	–	–	
62	COEX2	Not Connected	–	–	
63	ANTCTL2	UART0_SOUT	Out	1.8 V	Debug UART from the module
64	COEX1	Not Connected	–	–	
65	ANTCTL3	UART0_SIN	In	1.8 V	Debug UART from the module
66	SIM_DETECT	SIM_DETECT [2]	In	USIM_PWR	
67	RESET#	RESET_N [3]	In	1.8 V	Hardware reset of the module
68	SYSCLK (32kHz)	Not Connected	–	–	
69	CONFIG_1	GND	–	–	Ground
70	3.3V	VBAT_PA	In	3.3 V	DC Power Supply.
71	GND	GND	–	–	Ground
72	3.3V	VBAT_PA	In	3.3 V	DC Power Supply.
73	GND	GND	–	–	Ground
74	3.3V	VBAT_PA	In	3.3 V	DC Power Supply.
75	CONFIG_2	GND	–	–	Ground

Antennas

Two MHF.4 antenna connectors are available on the M.2 board: 'Main' and 'RxDiversity'.

The figure below shows the location of both connectors on the M.2 board.

[1] Handover is supported within FDD and TDD bands, but not between those two sets.
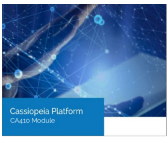
2

- In order to support hot insertion/removal of SIM cards, the tray must provide a presence sensor so that the software can process any event immediately. SIM_DETECT is enabled by default.
- Sequans recommends to use a SIM card tray with SIM_DETECT support. If this is not possible, the SIM_DETECT signal must be tied to 1.8 V to avoid any glitch, and the SIM card must be present during power on.

[3] This signal is active low (RESET). The host must drive this signal which should be pulled up using a 100 kΩ resistor to 1.8 V supply

Documents / Resources

	SEQUANS COMMUNICATIONS CA410 Complete LTE Module [pdf] Owner's Manual CA410 Complete LTE Module, CA410, Complete LTE Module, LTE Module, Module

References

- 📄 **Directory Listing /ftp/Specs/latest/Rel-10/36_series**
- 📄 **Directory Listing /ftp/Specs/latest/Rel-9/21_series/**
- 📄 **Directory Listing /ftp/Specs/latest/Rel-9/22_series/**
- 📄 **Directory Listing /ftp/Specs/latest/Rel-9/23_series/**
- 📄 **Directory Listing /ftp/Specs/latest/Rel-9/24_series/**
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- 🔲 **5G/4G Chips & Modules for Cellular IoT**
- **User Manual**