

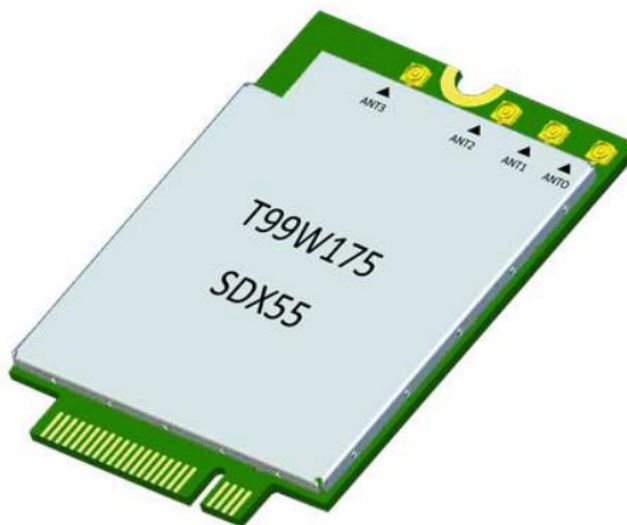
HON LIN T99W175 LTE-Advanced PCI Express M.2 Module User Manual

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T99W175 LTE-Advanced PCI Express M.2 Module User Manual

Engineering Requirements Specification



Project code: T99W175M
Solution: SDX55+SDR865+PMX55
SKU: WW-1-5G

Foxconn PN	Customer PN
T99W175.06	K1YCW
T99W175.08	JP18Y
T99W175.09	FTY9X
T99W175.30	1TFY5
T99W175.31	H75GC
T99W175.32	01PCT

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Reviewers

Department	Name	Signature	Review Dates	
			* Plan	** Results
Project Manager	Ai-Ning Song			
Project Leader	Michael. Xiao			
Hardware Engineer	Lynn. Liu			

Modification History

Rev	Date	Originator	Comment
R1.0	2019/5/9	Lynn. Liu	Initial release
R1.1	2019/5/20	Lynn. Liu	Update based on the customer requirements
R1.2	2019/5/28	Lynn. Liu	Update item 2.4 for antenna requirements; item 1.4.2 for USIM2
R1.3	2019/5/30	Lynn. Liu	Update Pin38/60 description and item 1.5.12 for Coexistence
R1.4	2019/7/9	Lynn. Liu	1. Remove n25/38/40& B43 support due to Qualcomm update (item 1.1); 2. Remove n71 & GPS L5 due to not being in POR and B48 as TBD; 3. Update mmWave IF connector pin definition (item 2.4.2); 4. Update ME drawing (item 3.2)
R1.5	2019/7/25	Lynn. Liu	1. Update PCIe connection guideline (item 1.5.4); 2. Update ME drawing (item 3.2); 3. Update antenna configuration (item 2.4.2); 4. Update LTE Rx sensitivity Spec; 5. Update W_Disable# (item 1.5.5)
R1.6	2019/9/12	Lynn. Liu	1. Update Pin29/31/35/37(USB3.0) to NC; 2. Need Platform side reserve USB2.0 for factory test (WinPE) (item 1.42)
R1.7	2019/10/08	Lynn. Liu	1. Disable B48 for NA (item 1); 2. Update operating temperature (item 4.1); 3. Update antenna configuration (item 2.4.2 Figure 2-2); 4. Update golden plating drawing; 5. Pin29/31/35/37 as NC and reserve with PCIe Lane 2
R1.8	2020/2/24	Lynn. Liu	1. Remove mmW for Sub6G only SKU; 2. Enable B48 for US& EU; 3. Remove Reset (Pin67) requirement; 4. Update antenna configuration (Item 2.4.2 Figure 2-2); 5. Update HW feature (Item 2); 6. Update initial power consumption Spec (Item 4.2); 7. Update RF performance Spec (Item 5.1 & 5.2) & support bandwidth; 8. Add DPS feature
R1.9	2020/3/27	Lynn. Liu	1. Add PN for Olympic MLK& Andrews; 2. Disable B40 to meet FCC requirements; 3. Update Power on/off sequence requirement (Item 1.5.13); 4. Reserve 0.1uF on Pin6(Full card power off) & Pin50 (PERST#) Item 1.5.3& 1.5.4; 5. Add n71 for new Platform POR

General Description

T99W175M is designed to enable wireless data connectivity for a notebook computer or any other device compatible with the PCI Express M.2 Specification 3042 type Key B lot. T99W175M is the data card solution that delivers wireless wide-area network (WWAN) connectivity for the 5G NR (Sub 6G), LTE, UMTS (HSDPA/HSUPA/HSPA+DC- HSPA+), and GPS/Glonass/ Beidou/ Galileo protocols in one hardware configuration.

SKU		WW-1-5G / T99W175M
Carrier Support		NA: AT&T, Verizon, Sprint WW: Vodafone, Telefonica-02 APAC: Telstra, Docomo, KDDI, Softbank * Carrier engagement based on the real business agreement
QCT Solution		OCT Solution _iSDX55+SDR865+SMR526+PMX55
5G	FR1 (Sub 6G)	LB: n5/8/12/20/28/71; MB: n1/2/3/66; HB: n7/38/41/77/78/79
	FR2 (mmWave)	NA
	4x4 MIMO	n1/2/3/66/7/38/41/77/78/79
	UE Capability	UL (TBD); DL(TBD)4
4G	LB: S support Band 4x4 MIMO	B26(5/18/19)/8/12(17)/13/14/20/28/29/71 MB: B1/2(25)/3/4(66)/32 HB: B7/30/34/38/39/40(Disable for FCC)/41/42/48 /25(2)/3/66(4)/7/30/40/41(38)/42/48
	LAA JB46	(DL only)
	LTE Cat.	ue-CategoryUL 13 (UL: 150Mbps) + ue-CategoryDL 20 (DL: 2Gbps); 7xDL CA, 2xUL CA (Intra-band), 5xDL CA+4X4 MIMO (Up to Cat20)
3G	WCDMA	HSPA+ Re18 (DUUL: up to 42/11 Mbps)
	Support Band	B1/2/4/5(6/19)/8/9
GNSS		Dual-Frequency GNSS: L1 GPS/Glonass/Beidou/Galileo,
USIM		SDua1 SIM interface, Dual SIM Single Active (DSSA)
eSIM		eSIM Dual SIM with eSIM on board (eSIM is option), Dual SIM Single Active (DSSA)
Interface		PCIe3.0; Reserve USB2.0 for factory test (WinPE)
Form factor		3042 PCIe M.2 Key.

System Main Feature

Feature	Description
Physical	PCI express M.2 module, size 3042, Key. B,75Pin golden finger
Electrical	Single VCC supply (3.135V-3.63V)
Dimension	Dimensions (L x W x H): 42 mm x 30 mm x 2.5 mm, maximum height=2.6mm (ad d PCB tolerance=0.1mm)

Shielding design	Shield case on board design, NC additional shielding requirement
Weight	Approximately -8g
USIM	Off-board USIM connector supported on Host through USIM1/ USIM2
Operating Bands	WCDMA/HSDPA/HSUPA/HSPA+ operating bands: Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL) Band 2: 1850 to 1910 M Hz (UL), 1930 to 1990 MHz (DL) Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 M Hz (DL) Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) Band 6: 830 to 840 MHz (UL), 875 to 885 MHz (DL) Band 8: 880 to 915 MHz (UL) , 925 to 960 MHz (DL) Band 9: 1750 to 1785 MHz (UL), 1845to 1880 MHz (DL) B and 19: 830 to 845 MHz (UL), 875 to 890 MHz (DL)
	LTE FDD/TDD operating bands: Band 1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL) Band 2: 1850 to 1910 M Hz (UL), 1930 to 1990 MHz (DL) Band 3: 1710 to 1785 MHz (UL), 1805 to 1880 M Hz (DL) Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL) Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) Band 7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL) Band 8: 880 to 915 MHz (UL), 925 to 960 MHz (DL) Band 12: 699 to 716 MHz (UL), 729 to 746 MHz (DL) Band 13: 777 to 787 MHz (UL), 746 to 756 MHz (DL) Band 14: 788 to 798 MHz (UL), 758 to 768 MHz (DL) Band 17: 704 to 716 MHz (UL), 734 to 746 MHz (DL) B and 18: 815 to 830 MHz (UL), 860 to 875 MHz (DL) Band 19: 830 to 845 MHz (U L), 875 to 890 MHz (DL) Band 20: 832 to 862 MHz (UL), 791 to 821 MHz (DL) Band 25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL) Band 26: 814 to 849 M Hz (UL), 859 to 894 MHz (DL) Band 28: 703 to 748 MHz (UL), 758 to 803 MHz (D L) Band 29: 717 to 728 MHz (DL) Band 30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL) Band 32: 1452 to 1496 MHz (DL) Band 34: 2010 to 2025 MHz (UUDL) Band 38: 2570 to 2620 MHz (UL/DL) Band 39: 1880 to 1920 MHz (UUDL) Band 40: 2300 to 2400 MHz (UUDL) Band 41: 2496 to 2690 MHz (UL/DL) Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) Band 71: 663 to 698 M Hz (UL), 617 to 652 MHz (DL)
	LTE 3.5G Band 42: 3400 to 3600 MHZ (UUDL) Band 48: 3550 to 3700 MHZ (UUDL)
	LAA Band 46: 5150 to 5925 MHZ (DL)

Operating Bands	5GNR Sub 6GHZ n1: 1920 to 1980 MHz (UL), 2110 to 2170 MHz (DL) n2:1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL) n3:1710 to 1785 MHz (UL), 1805 to 1880 MHz (DL) n5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) n7:2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL) n8:880 to 915 MHz (UL), 925 to 960 MHz (DL) n12: 699 to 716 MHz (UL), 729 to 746 MHz (DL) n20: 832 to 862 MHz (UL), 791 to 821 MHz (DL) n28: 703 to 748 MHz (UL), 758 to 803 MHz (DL) n38: 2570 to 2620 MHz (UL/DL) n41: 2496 to 2690 MHz (UL/DL) n66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) n71: 663 to 698 MHz (UL), 617 to 652 MHz (DL) n77:3300 to 4200 MHz (UL/DL) n78:3300 to 3800 MHz (UL/DL) n79:4400 to 5000 MHz (UL/DL)
	5GNR mmWave NA
Diversity/2nd Rx	All UMTS operating bands All LTE operating bands
4×4 MIMO Rx	LTE-B1/25(2)/3/66(4)/7/30/40/41(38)/42/48 5GNR-n1/2/3/66/7/41/77/78/79
GNSS	GPS: L1 (1575.42MHz); GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42);
USIM Voltage	Support 1.8V and 2.85V, and auto detects follow SIM card type
Antenna connectors	ANT0: Support all 5GNR Sub 6G& LTE& UMTS bands ANT1: Support 5GNR Sub 6G& LTE M/H/UHB& UMTS bands ANT2:Support 5GNR Sub 6G& LTE M/H/UHB& UMTS bands ANT3:Support all 5GNR Sub 6G& LTE& UMTS bands and GPS L1 simultaneously ANT4/5/6: NA
Throughput	WCDMA CS: DL 64 kbps /UL 64 kbps WCDMA PS: DL 384 kbps /UL 384 kbps HSPA+:DL 21.6 Mbps /UL 5.76 Mbps DC-HSPA+: DL 42 Mbps/UL 5.76 Mbps LTE Cat20: DL:2Gbps/UL 150 Mbps 5GNR Sub 6G: DL: TBD/UL (TBD) 5GNR mmWave: NA
ENDC DPS	Support NSA mode ENDC Dynamic Power Sharing feature

5G NR Air Interface

- 3GPP Rel15 5G NR Sub-6 Sub-6G
- Modulation UL: 256 QAM; DL: 256 QAM
- Waveform UL: CP-OFDM and DFT-S-OFDM; DL: CP-OFDM
- Sub-Carrier Spacing (SCS): 15 kHz, 30 kHz
- Duplex mode: FDD and TDD
- Operation mode: Standalone mode (SA) and Non-Standalone mode (NSA)
- CA capability: DLCA
- MIMO DL: 4 × 4 MIMO;
- EN-DC: LTE and NR sub-6 GHz dual connectivity

LTE Air Interface

LTE Rel15

- 20 layers and 2 Gbps downlink (DL) throughput – 4 × 4 MIMO across 5x CA
- 150 Mbps uplink (UL) throughput – 40 MHz ULCA and 256 QAM
- LAA (Licensed assist access) across 80 MHz
- CA capability:
 - DLCA
 - Inter-band DLCA
 - Intra band contiguous CA
 - Intra band noncontiguous
 - ULCA
 - Inter band ULCA (Depend on Customer requirements) Intra band contiguous CA
- Modulation UL: 256 QAM; DL: 256 QAM
- 4 × 2 MIMO 7x CA (R15)
- 4 × 4 MIMO 5x CA (R15)
- FDD + TDD CA

WCDMA/HSPA Air Interface

- R99:
 - All modes and data rates for WCDMA FDD
- R5 HSDPA
 - PS data speeds up to 7.2 Mbps on the downlink
- R6 HSUPA
 - E-DCH data rates of up to 5.76 Mbps for 2 ms TTI (UE category 6) uplink
- R7 HSPA+
 - Downlink 64 QAM SISO: up to 21 Mbps
 - Downlink 16 QAM 2X2 MIMO: up to 28 Mbps
- R8 DC-HSPA+
 - Downlink dual carrier with 64 QAM (SISO); up to 42 Mbps

GNSS

- GPS, GLONASS, Galileo, and BeiDou support
- Two GNSS paths to support simultaneous L1
- Customizable tracking session
 - Automatic tracking session on startup
 - Concurrent standalone GPS, GLONASS, BeiDou, and Galileo
 - gpsOneXTRA with GPS + GLONASS + BeiDou+ Galileo support

EUTRA -NR- Dual Connectivity & Carrier Aggregation Combination

TBD

For US SKU Spec.

Feature	Description
Physical	PCI express M.2 module, size 3042, Key. B,75Pin golden finger
Electrical	5Vdc (Host Equipment) 3.135Vdc-3.63Vdc (Module)
Shielding design	Shield case on board design, no additional shielding requirement
Operating Bands	WCDMA/HSDPA/HSUPA/HSPA+ operating bands: Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL) Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL) Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) Band 6 (cover by B5): 830 to 840 MHz (UL), 875 to 885 MHz (DL) Band 19 (cover by B5): 830 to 845 MHz (UL), 875 to 890 MHz (DL)
	LTE FDD/TDD operating bands: Band 2: 1850 to 1910 MHz (UL), 1930 to 1990 MHz (DL) Band 4: 1710 to 1755 MHz (UL), 2110 to 2155 MHz (DL) Band 5: 824 to 849 MHz (UL), 869 to 894 MHz (DL) Band 7: 2500 to 2570 MHz (UL), 2620 to 2690 MHz (DL) Band 12: 699 to 716 MHz (UL), 729 to 746 MHz (DL) Band 13: 777 to 787 MHz (UL), 746 to 756 MHz (DL) Band 14: 788 to 798 MHz (UL), 758 to 768 MHz (DL) Band 17: 704 to 716 MHz (UL), 734 to 746 MHz (DL) Band 25: 1850 to 1915 MHz (UL), 1930 to 1995 MHz (DL) Band 26: 814 to 849 MHz (UL), 859 to 894 MHz (DL) Band 30: 2305 to 2315 MHz (UL) 2350 to 2360 MHz (DL) Band 38: 2570 to 2620 MHz (UL/DL) Band 41: 2496 to 2690 MHz (UL/DL) Band 66: 1710 to 1800 MHz (UL), 2110 to 2200 MHz (DL) Band 71: 663 to 698 MHz (UL), 617 to 652 MHz (DL)

Operating Bands	LTE 3.5G Band 48: 3550 to 3700 MHz (UL/DL) 5G NR Sub 6GHz (STA Mode) n38: 2570 to 2620 MHz (UL/DL)5G NR FR1 EN_DC			
	5G NR	FCC 5G FR1		ENDC
		Band	SCS	
		n2	15kHz	Band 5/12/13/30/48/66
		n5	15kHz	Band 2/7/12/48/66
		n7	15kHz	Band 5/12
		n12	15kHz	Band 2/66
		n41	30kHz	Band 2/25/26/66/41
		n66	15kHz	Band 5/12/13/30/48/71
		n71	15kHz	Band 2/7/66
Diversity/2nd Rx	All UMTS operating bands All LTE operating bands			
MIMO 4 Rx	LTE-B1/25(2)/3/66(4)/7/30/40/41(38)/42/48 5G NR-n1/2/3/66/7/41/77/78/79			
GNSS	GPS: L1 (1575.42MHz); L5 (1176MHz) GLONASS: L1 (1602MHz) BeidouB1(1561.098MHz) Galileo E1 (1575.42); E5a (1176MHz)			
Throughput	WCDMA CS: DL 64 kbps /UL 64 kbps WCDMA PS: DL 384 kbps /UL 384 kbps HSPA+:DL 21.6 Mbps /UL 5.76 Mbps DC-HSPA+: DL 42 Mbps/UL 5.76 Mbps LTE Cat20: DL:2Gbps/UL 150 Mbps 5G NR Sub 6G: DL: TBD/UL (TBD)			

5G NR Air Interface

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- Modulation UL: 256 QAM; DL: 256 QAM
- Waveform UL: CP-OFDM and DFT-S-OFDM; DL: CP-OFDM
- Sub-Carrier Spacing (SCS): 15 kHz, 30 kHz
- Duplex mode: FDD and TDD
- Operation mode: Standalone mode (SA) and Non-Standalone mode (NSA)
- CA capability: DLCA
- EN-DC: LTE and NR sub-6 GHz dual connectivity
- MIMO: 1 TX × 4 RX

LTE Air Interface
 LTE Rel14

- 20 layers and 2 Gbps downlink (DL) throughput –4 RX MIMO across 5x CA
- 200 Mbps uplink (UL) throughput – 40 MHz ULCA and 256 QAM
- LAA (Licensed assist access) across 80 MHz
- CA capability:
 - DLCA
 - Inter-band DLCA
 - Intra band contiguous CA
 - Intra band noncontiguous
 - ULCA
 - Intra band contiguous CA
- Modulation UL: 256 QAM; DL: 1024 QAM
- FDD + TDD CA
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WCDMA/HSPA Air Interface

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- GPS, GLONASS, Galileo, and BeiDou support
- Two GNSS paths to support simultaneous L1 and /L5
- Customizable tracking session
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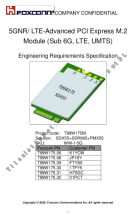
Host integration instructions

Install module through the golden finger.

Host product testing guidance

HOST must follow section 3 of KDB 996369 D04 Module Integration Guide v01, to verify that the host product meets all the applicable FCC rules.

Documents / Resources

	HON LIN T99W175 LTE-Advanced PCI Express M.2 Module [pdf] User Manual T99W175M, 2AQ68T99W175M, T99W175, LTE-Advanced PCI Express M.2 Module, T99W175 LTE-Advanced PCI Express M.2 Module
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