

FCC Test Report (Spot Check: Part 22: CA mode)

Report No.: RF200109E02E-5

FCC ID: 2AQ68T99W175M

Original FCC ID: 2AQ68T99W175

Test Model: T99W175M

Received Date: May 29, 2020

Test Date: Jul. 03 ~ Aug. 02, 2020

Issued Date: Aug. 10, 2020

Applicant: Hon Lin Technology Co., Ltd.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

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FCC Registration / 788550 / TW0003

Designation Number:



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Release Control Record

Issue No.	Description	Date Issued
RF200109E02E-5	Original release	Aug. 10, 2020

1 Certificate of Conformity

Product: 5G WWAN Module

Brand: Foxconn

Test Model: T99W175M

Sample Status: Engineering Sample

Applicant: Hon Lin Technology Co., Ltd.

Test Date: Jul. 03 ~ Aug. 02, 2020

Standards: FCC Part 22, Subpart H

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Pettie Chen , **Date:** Aug. 10, 2020
Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Aug. 10, 2020
Bruce Chen / Senior Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 22 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 22.913 (a)	Effective radiated power	Pass	Meet the requirement of limit.
2.1053 22.917	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -32.8dB at 83.42MHz.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (\pm)
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.63 dB
	200MHz ~ 1000MHz	3.64 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2020	Jun. 11, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 08, 2020	Jun. 07, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 18, 2020	Feb. 17, 2021
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Jan. 18, 2020	Jan. 17, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jan. 18, 2020	Jan. 17, 2021
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 01, 2020	May 31, 2021
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
True RMS Clamp Meter Fluke	325	31130711WS	Jun. 06, 2020	Jun. 05, 2021
DC power supply	U8002A	MY56330015	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 9.

3 General Information

3.1 General Description of EUT

Product	5G WWAN Module				
Brand	Foxconn				
Test Model	T99W175M				
Sample Status	Engineering Sample				
Power Supply Rating	5 Vdc (Host equipment) 3.135Vdc~3.63Vdc (Module)				
Modulation Type	LTE: QPSK, 16QAM, 64QAM, 256QAM				
Operating Frequency	LTE Band 5 (CA 5B)	829.0~844.0MHz			
Max. ERP Power	LTE Band 5 (CA 5B) (10MHz+10MHz)	QPSK	16QAM	64QAM	256QAM
		353.183mW (25.48dBm)	317.687mW (25.02dBm)	288.403mW (24.60dBm)	226.986mW (23.56dBm)
Emission Designator	LTE Band 5 (CA 5B) (10MHz+10MHz)	18M8G7D	18M7D7W	18M7D7W	18M9D7W
Antenna Type	Refer to Note as below				
Antenna Connector	Refer to Note as below				
Accessory Device	NA				
Cable Supplied	NA				

Note:

- This report is a supplementary report to the original BV CPS report no.: RF200109E02B-5. The difference compared with original report is only adding mmWave hardware, mmWave function is disabled by software. Exhibit prepared for FCC Spot Check Verification report, the format, test items and amount of spot-check test data are decided by applicant's engineering judgment, for more details please refer to declaration letter exhibit. Radiated emission and output power verification worst test refer to original report.
- There are four Difference HW of T99W175M.

Brand	Model	HW
Foxconn	T99W175M	1. 3G+LTE+Sub6+mmWave+eSIM
		2. 3G+LTE+Sub6+mmWave+w/o eSIM
		3. 3G+LTE+Sub6+mmWave+eSIM+GNSS connector
		4. 3G+LTE+Sub6+mmWave+w/o eSIM+GNSS connector

*After pre-testing, "HW: 1. 3G+LTE+Sub6+mmWave+eSIM" is the worst for the final tests.

- For CA mode configuration, please consult the manufacturer to declare the test mode.
- E-UTRA CA configuration / Bandwidth combination set.

E-UTRA CA configuration / Bandwidth combination set					
E-UTRA CA configuration	Uplink CA configurations	Component carriers in order of increasing carrier frequency		Maximum aggregated bandwidth [MHz]	Bandwidth combination set
		Channel bandwidths for carrier [MHz]	Channel bandwidths for carrier [MHz]		
CA_5B	CA_5B	5, 10	10	20	0
		10	5		

*5B is continuous CA and maximum combination is 10M+10M.

5. The following antennas were provided to the EUT.

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type
1		WHA YU	C107-511720-A	4.41	660~803	PCB	I-PEX
2		WHA YU	C107-511721-A	3.81 4.03	791~960 1447.9~1606	PCB	I-PEX
3		WHA YU	C107-511722-A	4.27 5.31	1710~2170 2500~2690	PCB	I-PEX
4		WHA YU	C107-511723-A	2.99 0.92	2300~2400 3500~3700	PCB	I-PEX
5		WHA YU	C107-511724-A	6.45	5150~5925	PCB	I-PEX
6		WHA YU	C107-511725-A	4.89	3400~3700	PCB	I-PEX
7		AVX	5000106-R1-X01	2.91	699~803	Monopole	I-PEX
8		AVX	5000107-R1-X01	2.59	791~960	Monopole	I-PEX
9		AVX	5000108-R1-X01	2.85	1427~1610	Monopole	I-PEX
10		AVX	5000109-R1-X01	2.23 2.94	1710~2200 5150~5925	Monopole	I-PEX
11		AVX	5000110-R1-X01	0.9	2300~2690	Monopole	I-PEX
12		AVX	5000111-R1-X01	0.87	3300~5000	Monopole	I-PEX
13	Tx1/ Rx1	Ethertronics	5003806	0.4 -1.61 0.39 2.95 1.98 0.38 0.83 2.31	698-821 824-960 1425-1515 1710-2200 2300-2690 3300-4200 4400-5000 5150-5925	PIFA	I-PEX
	Rx2	Ethertronics	5003807	-2.24 -4.52 2.87 2.99 2.93 2.91 2.23 -0.85 -3.04	716-821 824-960 1425-1515 1557-1610 1805-2200 2300-2690 3300-4200 4400-5000 5150-5925	PIFA	I-PEX
	Tx2/ Rx3	Ethertronics	5003806	2.21 2.25 -0.45 2.6	1710-2200 2300-2690 3300-4200 4400-5000	PIFA	I-PEX
	Rx4	Ethertronics	5003700	1.38 2.87 0.6 -2.09	1805-2200 2300-2690 3300-4200 4400-5000	PIFA	I-PEX

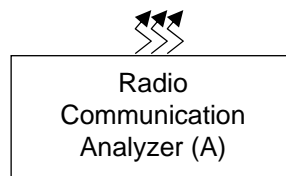
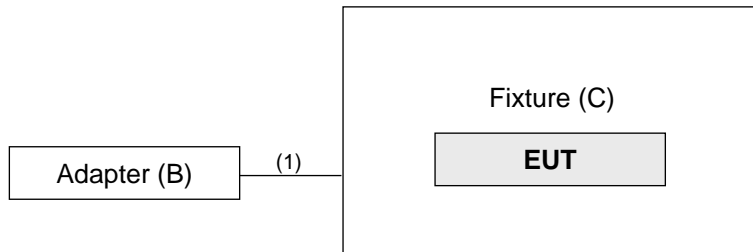
Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type
14	Ant. 0 (TX/RX)	Master Wave	NA	2.4	880~960	PCB	I-PEX
				2.2	1020~2170		
				2.9	2545~2595		
				2.9	3565~3600		
				2.9	3900~4000		
	NA	GPS					
	Ant. 2 (TX/RX)	Master Wave	NA	NA	880~960	PCB	I-PEX
				2.2	1020~2170		
				2.8	2545~2595		
				2.9	3565~3600		
				2.8	3900~4000		
	NA	GPS					
	Ant. 1 (RX)	Master Wave	NA	NA	880~960	PCB	I-PEX
				5.3	1020~2170		
				5.1	2545~2595		
				4.3	3565~3600		
4.5				3900~4000			
NA	GPS						
Ant. 3 (RX)	Master Wave	NA	1.3	880~960	PCB	I-PEX	
			6.8	1020~2170			
			3.7	2545~2595			
			6.4	3565~3600			
			6.2	3900~4000			
3.7	GPS						

*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

*The antenna for the final tests as following table.

	Band	Antenna
WCDMA	2	Antenna 3
	4	Antenna 3
	5	Antenna 2
LTE	2	Antenna 3
	4	Antenna 3
	5	Antenna 2
	7	Antenna 3
	12	Antenna 1
	13	Antenna 1
	14	Antenna 1
	17	Antenna 1
	25	Antenna 3
	26	Antenna 2
	30	Antenna 4
	66	Antenna 3
	71	Antenna 1
	38	Antenna 3
	41	Antenna 3
42	Antenna 4	
48	Antenna 4	

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Radio Communication Analyzer	Anritsu	MT8821C	6261806803	NA	-
B.	Adapter	LITEON	PA-1050-39	NA	NA	-
C.	Fixture	NA	NA	NA	NA	Provided by client.

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.5	Y	0	-

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Z-plane. Following channel(s) was (were) selected for the final test as listed below.

LTE Band 5 (CA 5B)

EUT Configure Mode	Test item	Available channel	Tested channel	Channel Bandwidth	Modulation	Mode
-	ERP	20450 to 20501 20549 to 20600	20450(829.0MHz)+ 20549(838.9MHz), 20476(831.6MHz)+ 20575(841.5MHz), 20501(834.1MHz)+ 20600(844.0MHz)	10MHz + 10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 1 RB / 24 RB Offset
		20428 to 20528 20500 to 20600	20428 (826.8MHz)+ 20500 (834.0MHz), 20478 (831.8MHz)+ 20550 (839.0MHz), 20528 (836.8MHz)+ 20600 (844.0MHz)	5MHz + 10MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 1 RB / 24 RB Offset
		20450 to 20550 20522 to 20622	20450 (829.0MHz)+ 20522 (836.2MHz), 20500 (834.0MHz)+ 20572 (841.2MHz), 20550 (839.0MHz)+ 20622 (846.2MHz)	10MHz + 5MHz	QPSK / 16QAM / 64QAM / 256QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 1 RB / 24 RB Offset
-	Radiated Emission Below 1GHz	20450 to 20501 20549 to 20600	20476(831.6MHz)+ 20575(841.5MHz)	10MHz + 10MHz	QPSK	1 RB / 49 RB Offset 1 RB / 0 RB Offset
-	Radiated Emission Above 1GHz	20450 to 20501 20549 to 20600	20476(831.6MHz)+ 20575(841.5MHz)	10MHz + 10MHz	QPSK	1 RB / 49 RB Offset 1 RB / 0 RB Offset

Test Condition:

Test Item	Environmental Conditions	Input Power (system)	Tested By
ERP	25deg. C, 70%RH	5Vdc	James Yang
Radiated Emission	22deg. C, 65%RH 22deg. C, 68%RH	120Vac, 60Hz	Greg Lin

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and References:

Test Standard:

FCC 47 CFR Part 2

FCC 47 CFR Part 22

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

All test items have been performed and recorded as per the above standards.

References Test Guidance:

KDB 971168 D01 Power Meas License Digital Systems v03r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 7 watts e.r.p.

4.1.2 Test Procedures

Conducted Power Measurement:

The EUT was set up for the maximum power with LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

Maximum EIRP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}}$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively
(expressed in the same units as P_{Meas} , e.g., dBm or dBW)

P_{Meas} measured transmitter output power or PSD, in dBm or dBW

G_{T} gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP)

4.1.3 Test Setup

Conducted Power Measurement:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.4 Test Results

Conducted Output Power (dBm)

LTE Band 5 (CA 5B)

Con-figuration	Com-bination	PCC							SCC							Measurement Power
		Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Tx Power with UL-CA Active (dBm)
																Total
Intra Band Contiguous	CA_5B	5	10	QPSK	1	0	20450	829	5	10	QPSK	1	49	20549	838.9	12.93
					1	49						23.56				
		5	10	QPSK	1	0	20476	831.6	5	10	QPSK	1	49	20575	841.5	13.24
					1	49						23.82				
		5	10	QPSK	1	0	20501	834.1	5	10	QPSK	1	49	20600	844.0	13.28
					1	49						23.64				
Intra Band Contiguous	CA_5B	5	5	QPSK	1	0	20428	826.8	5	10	QPSK	1	49	20500	834	12.62
					1	49						23.44				
		5	5	QPSK	1	0	20478	831.8	5	10	QPSK	1	49	20550	839	12.99
					1	49						23.67				
		5	5	QPSK	1	0	20528	836.8	5	10	QPSK	1	49	20600	844	13.03
					1	49						23.57				
Intra Band Contiguous	CA_5B	5	10	QPSK	1	0	20450	829	5	5	QPSK	1	49	20522	836.2	13.00
					1	49						23.55				
		5	10	QPSK	1	0	20500	834	5	5	QPSK	1	49	20572	841.2	13.12
					1	49						23.69				
		5	10	QPSK	1	0	20550	839	5	5	QPSK	1	49	20622	846.2	13.10
					1	49						23.63				

Con-figuration	Com-bination	PCC							SCC							Measurement Power
		Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modulation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Tx Power with UL-CA Active (dBm)
																Total
Intra Band Contiguous	CA_5B	5	10	16QAM	1	0	20450	829	5	10	16QAM	1	49	20549	838.9	12.49
					1	49						23.00				
		5	10	16QAM	1	0	20476	831.6	5	10	16QAM	1	49	20575	841.5	12.74
					1	49						23.36				
		5	10	16QAM	1	0	20501	834.1	5	10	16QAM	1	49	20600	844	12.86
					1	49						23.28				
Intra Band Contiguous	CA_5B	5	5	16QAM	1	0	20428	826.8	5	10	16QAM	1	49	20500	834	11.97
					1	49						22.68				
		5	5	16QAM	1	0	20478	831.8	5	10	16QAM	1	49	20550	839	12.26
					1	49						23.00				
		5	5	16QAM	1	0	20528	836.8	5	10	16QAM	1	49	20600	844	12.26
					1	49						22.79				
Intra Band Contiguous	CA_5B	5	10	16QAM	1	0	20450	829	5	5	16QAM	1	49	20522	836.2	12.25
					1	49						22.79				
		5	10	16QAM	1	0	20500	834	5	5	16QAM	1	49	20572	841.2	12.46
					1	49						23.05				
		5	10	16QAM	1	0	20550	839	5	5	16QAM	1	49	20622	846.2	12.37
					1	49						22.88				

Con- figure	Com- bination	PCC							SCC							Measurement Power	
		Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Tx Power with UL-CA Active (dBm)	Total
Intra Band Conti- guous	CA_5B	5	10	64QAM	1	0	20450	829	5	10	64QAM	1	49	20549	838.9	12.10	
					1	49						22.53					
		5	10	64QAM	1	0	20476	831.6	5	10	64QAM	1	49	20575	841.5	12.38	
					1	49						22.94					
		5	10	64QAM	1	0	20501	834.1	5	10	64QAM	1	49	20600	844	12.31	
					1	49						22.85					
Intra Band Conti- guous	CA_5B	5	5	64QAM	1	0	20428	826.8	5	10	64QAM	1	49	20500	834	11.50	
					1	49						22.28					
		5	5	64QAM	1	0	20478	831.8	5	10	64QAM	1	49	20550	839	11.93	
					1	49						22.46					
		5	5	64QAM	1	0	20528	836.8	5	10	64QAM	1	49	20600	844	11.90	
					1	49						22.50					
Intra Band Conti- guous	CA_5B	5	10	64QAM	1	0	20450	829	5	5	64QAM	1	49	20522	836.2	11.88	
					1	49						22.56					
		5	10	64QAM	1	0	20500	834	5	5	64QAM	1	49	20572	841.2	12.14	
					1	49						22.61					
		5	10	64QAM	1	0	20550	839	5	5	64QAM	1	49	20622	846.2	12.06	
					1	49						22.32					

Con- figure	Com- bination	PCC							SCC							Measurement Power	
		Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Tx Power with UL-CA Active (dBm)	Total
Intra Band Conti- guous	CA_5B	5	10	256 QAM	1	0	20450	829	5	10	256 QAM	1	49	20549	838.9	11.17	
					1	49						21.90					
		5	10	256 QAM	1	0	20476	831.6	5	10	256 QAM	1	49	20575	841.5	11.49	
					1	49						21.90					
		5	10	256 QAM	1	0	20501	834.1	5	10	256 QAM	1	49	20600	844	11.35	
					1	49						21.85					
Intra Band Conti- guous	CA_5B	5	5	256 QAM	1	0	20428	826.8	5	10	256 QAM	1	49	20500	834	10.69	
					1	49						21.72					
		5	5	256 QAM	1	0	20478	831.8	5	10	256 QAM	1	49	20550	839	11.05	
					1	49						21.58					
		5	5	256 QAM	1	0	20528	836.8	5	10	256 QAM	1	49	20600	844	10.71	
					1	49						21.79					
Intra Band Conti- guous	CA_5B	5	10	256 QAM	1	0	20450	829	5	5	256 QAM	1	49	20522	836.2	10.91	
					1	49						21.58					
		5	10	256 QAM	1	0	20500	834	5	5	256 QAM	1	49	20572	841.2	11.12	
					1	49						21.81					
		5	10	256 QAM	1	0	20550	839	5	5	256 QAM	1	49	20622	846.2	11.16	
					1	49						21.38					

ERP Power (dBm)

LTE Band 5 (CA 5B)

Con-figuration	Com-bination	PCC							SCC							Measurement Power	
		Band	BW (MHz)	Modu-lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modu-lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	ERP (dBm)	Total
Intra Band Contiguous	CA_5B	5	10	QPSK	1	0	20450	829	5	10	QPSK	1	49	20549	838.9	14.59	
					1	49						25.22					
		5	10	QPSK	1	0	20476	831.6	5	10	QPSK	1	49	20575	841.5	14.90	
					1	49						25.48					
		5	10	QPSK	1	0	20501	834.1	5	10	QPSK	1	49	20600	844.0	14.94	
					1	49						25.30					
Intra Band Contiguous	CA_5B	5	5	QPSK	1	0	20428	826.8	5	10	QPSK	1	49	20500	834	14.28	
					1	49						25.10					
		5	5	QPSK	1	0	20478	831.8	5	10	QPSK	1	49	20550	839	14.65	
					1	49						25.33					
		5	5	QPSK	1	0	20528	836.8	5	10	QPSK	1	49	20600	844	14.69	
					1	49						25.23					
Intra Band Contiguous	CA_5B	5	10	QPSK	1	0	20450	829	5	5	QPSK	1	49	20522	836.2	14.66	
					1	49						25.21					
		5	10	QPSK	1	0	20500	834	5	5	QPSK	1	49	20572	841.2	14.78	
					1	49						25.35					
		5	10	QPSK	1	0	20550	839	5	5	QPSK	1	49	20622	846.2	14.76	
					1	49						25.29					

Con-figuration	Com-bination	PCC							SCC							Measurement Power	
		Band	BW (MHz)	Modu-lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modu-lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	ERP (dBm)	Total
Intra Band Contiguous	CA_5B	5	10	16QAM	1	0	20450	829	5	10	16QAM	1	49	20549	838.9	14.15	
					1	49						24.66					
		5	10	16QAM	1	0	20476	831.6	5	10	16QAM	1	49	20575	841.5	14.40	
					1	49						25.02					
		5	10	16QAM	1	0	20501	834.1	5	10	16QAM	1	49	20600	844	14.52	
					1	49						24.94					
Intra Band Contiguous	CA_5B	5	5	16QAM	1	0	20428	826.8	5	10	16QAM	1	49	20500	834	13.63	
					1	49						24.34					
		5	5	16QAM	1	0	20478	831.8	5	10	16QAM	1	49	20550	839	13.92	
					1	49						24.66					
		5	5	16QAM	1	0	20528	836.8	5	10	16QAM	1	49	20600	844	13.92	
					1	49						24.45					
Intra Band Contiguous	CA_5B	5	10	16QAM	1	0	20450	829	5	5	16QAM	1	49	20522	836.2	13.91	
					1	49						24.45					
		5	10	16QAM	1	0	20500	834	5	5	16QAM	1	49	20572	841.2	14.12	
					1	49						24.71					
		5	10	16QAM	1	0	20550	839	5	5	16QAM	1	49	20622	846.2	14.03	
					1	49						24.54					

*ERP = Conducted + antenna gain (3.81dBi)-2.15

Con- figure	Com- bination	PCC							SCC							Measurement Power	
		Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	ERP (dBm)	
																Total	
Intra Band Conti- guous	CA_5B	5	10	64QAM	1	0	20450	829	5	10	64QAM	1	49	20549	838.9	13.76	
					1	49						24.19					
		5	10	64QAM	1	0	20476	831.6	5	10	64QAM	1	49	20575	841.5	14.04	
					1	49						24.60					
		5	10	64QAM	1	0	20501	834.1	5	10	64QAM	1	49	20600	844	13.97	
					1	49						24.51					
Intra Band Conti- guous	CA_5B	5	5	64QAM	1	0	20428	826.8	5	10	64QAM	1	49	20500	834	13.16	
					1	49						23.94					
		5	5	64QAM	1	0	20478	831.8	5	10	64QAM	1	49	20550	839	13.59	
					1	49						24.12					
		5	5	64QAM	1	0	20528	836.8	5	10	64QAM	1	49	20600	844	13.56	
					1	49						24.16					
Intra Band Conti- guous	CA_5B	5	10	64QAM	1	0	20450	829	5	5	64QAM	1	49	20522	836.2	13.54	
					1	49						24.22					
		5	10	64QAM	1	0	20500	834	5	5	64QAM	1	49	20572	841.2	13.80	
					1	49						24.27					
		5	10	64QAM	1	0	20550	839	5	5	64QAM	1	49	20622	846.2	13.72	
					1	49						23.98					

Con- figure	Com- bination	PCC							SCC							Measurement Power	
		Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	Band	BW (MHz)	Modu- lation	RB Size	RB Offset	UL Chan.	UL Freq. (MHz)	ERP (dBm)	
																Total	
Intra Band Conti- guous	CA_5B	5	10	256 QAM	1	0	20450	829	5	10	256 QAM	1	49	20549	838.9	12.83	
					1	49						23.56					
		5	10	256 QAM	1	0	20476	831.6	5	10	256 QAM	1	49	20575	841.5	13.15	
					1	49						23.56					
		5	10	256 QAM	1	0	20501	834.1	5	10	256 QAM	1	49	20600	844.0	13.01	
					1	49						23.51					
Intra Band Conti- guous	CA_5B	5	5	256 QAM	1	0	20428	826.8	5	10	256 QAM	1	49	20500	834	12.35	
					1	49						23.38					
		5	5	256 QAM	1	0	20478	831.8	5	10	256 QAM	1	49	20550	839	12.71	
					1	49						23.24					
		5	5	256 QAM	1	0	20528	836.8	5	10	256 QAM	1	49	20600	844	12.37	
					1	49						23.45					
Intra Band Conti- guous	CA_5B	5	10	256 QAM	1	0	20450	829	5	5	256 QAM	1	49	20522	836.2	12.57	
					1	49						23.24					
		5	10	256 QAM	1	0	20500	834	5	5	256 QAM	1	49	20572	841.2	12.78	
					1	49						23.47					
		5	10	256 QAM	1	0	20550	839	5	5	256 QAM	1	49	20622	846.2	12.82	
					1	49						23.04					

*ERP = Conducted + antenna gain (3.81dBi)-2.15

4.2 Radiated Emission Measurement

4.2.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13dBm .

4.2.2 Test Procedure

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $\text{E.R.P power} = \text{E.I.R.P power} - 2.15\text{dBi}$.

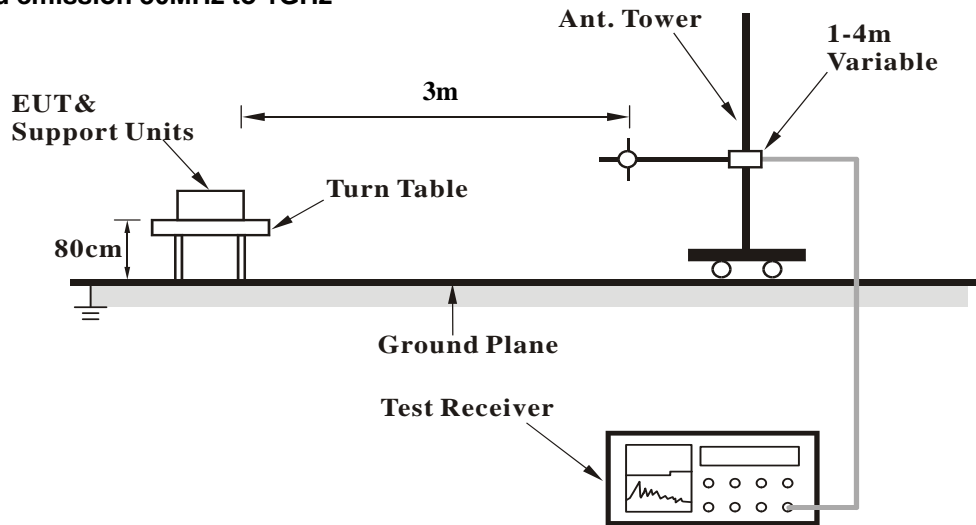
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1MHz/3MHz.

4.2.3 Deviation from Test Standard

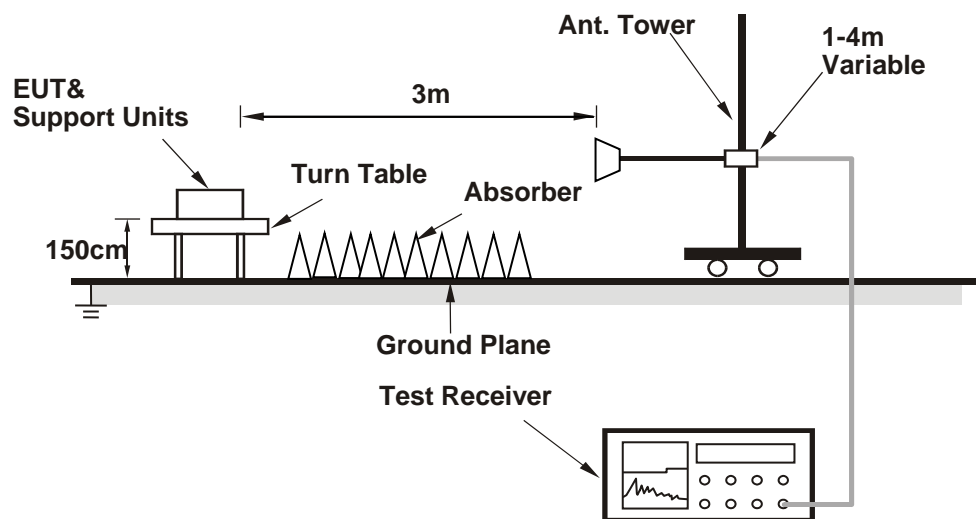
No deviation.

4.2.4 Test Setup

For radiated emission 30MHz to 1GHz



For radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.5 Test Results

Below 1GHz

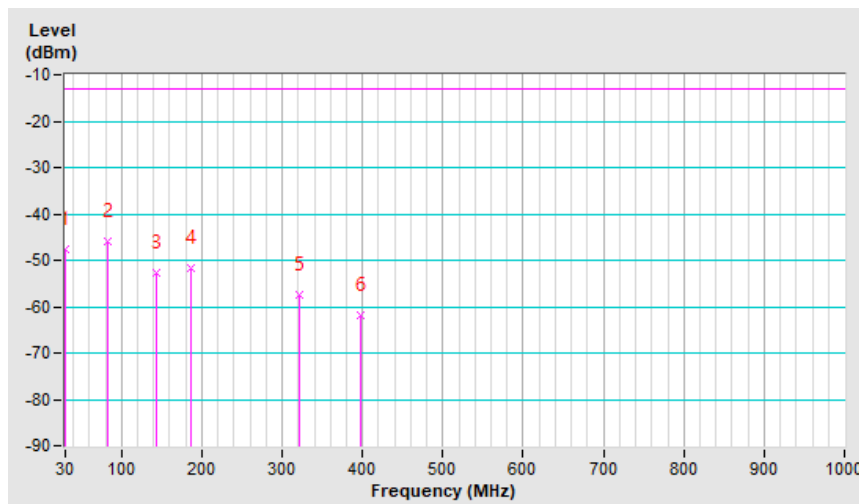
LTE Band 5 (CA 5B), Channel Bandwidth: 10MHz+10MHz

Mode	TX channel 20476(831.6MHz)+ TX channel 20575(841.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	30.00	-48.5	-35.4	-12.2	-47.6	-13.0	-34.6
2	83.42	-37.3	-45.1	-0.7	-45.8	-13.0	-32.8
3	142.46	-45.3	-52.5	-0.3	-52.8	-13.0	-39.8
4	186.04	-41.1	-55.3	3.7	-51.6	-13.0	-38.6
5	321.00	-51.5	-62.7	5.2	-57.5	-13.0	-44.5
6	396.91	-59.3	-67.0	5.2	-61.8	-13.0	-48.8

Remarks:

- ERP (dBm) = S.G Value (dBm) + Correction Factor (dB).
- Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB) + 2.15dB.

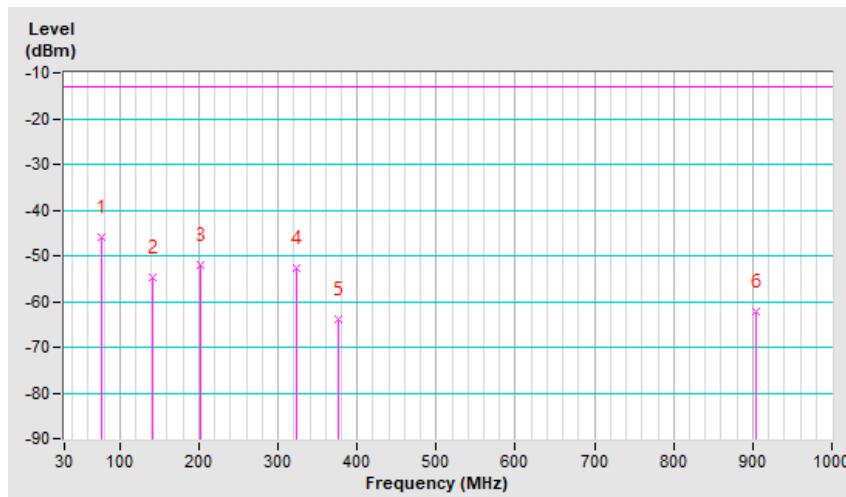


Mode	TX channel 20476(831.6MHz)+ TX channel 20575(841.5MHz)	Frequency Range	Below 1000 MHz
Environmental Conditions	22deg. C, 65%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	76.39	-38.1	-43.2	-2.8	-46.0	-13.0	-33.0
2	141.06	-49.8	-54.5	-0.3	-54.8	-13.0	-41.8
3	202.91	-48.5	-57.3	5.4	-51.9	-13.0	-38.9
4	322.41	-50.7	-57.9	5.2	-52.7	-13.0	-39.7
5	375.83	-61.5	-69.1	5.3	-63.8	-13.0	-50.8
6	904.41	-69.2	-66.1	3.9	-62.2	-13.0	-49.2

Remarks:

- ERP (dBm) = S.G Value (dBm) + Correction Factor (dB).
- Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB) + 2.15dB.



Above 1GHz

LTE Band 5 (CA 5B), Channel Bandwidth: 10MHz+10MHz

Mode	TX channel 20476 (831.6MHz)+ TX channel 20575 (841.5MHz)	Frequency Range	1GHz ~ 10GHz
Environmental Conditions	22deg. C, 68%RH	Input Power	120Vac, 60Hz
Tested By	Greg Lin		

Antenna Polarity & Test Distance: Horizontal at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1673.00	-64.5	-56.8	0.8	-56.0	-13.0	-43.0
Antenna Polarity & Test Distance: Vertical at 3 M							
No.	Freq. (MHz)	Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)	ERP (dBm)	Limit (dBm)	Margin (dB)
1	1673.00	-62.4	-55.1	0.8	-54.3	-13.0	-41.3

Remarks:

1. ERP (dBm) = S.G Value (dBm) + Correction Factor (dB).
2. Correction Factor (dB) = Substitution Antenna Gain (dB) + Cable Loss (dB) + 2.15dB.

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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