



FCC RADIO TEST REPORT

FCC ID : 2AJN7-TP00145AU
Equipment : Notebook Computer
Brand Name : Lenovo
Compliance ID : TP00145A; TP00145B
Applicant : LC Future Center Limited Taiwan Branch
7F., No.780, Beian Rd., Zhongshan Dist., Taipei 104, Taiwan
Manufacturer : LCFC (HeFei) Electronics Technology Co., Ltd.
No. 3188-1, Yungu Road (Hefei Export Processing Zone), Hefei
Economics & Technology Development Area, Anhui, CHINA
Standard : FCC 47 CFR Part 2, 96

Equipment: Fibocom FM350-GL tested inside of Lenovo Notebook Computer.

The product was received on Nov. 14, 2022 and testing was performed from Dec. 16, 2022 to Jan. 12, 2023. We, Sporton International Inc. Wensan Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI / TIA-603-E and has been in compliance with the applicable technical standards.

The test results in this partial report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Wensan Laboratory, the test report shall not be reproduced except in full.

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description	5
1.1 Product Feature of Equipment Under Test	5
1.2 Product Specification of Equipment Under Test	6
1.3 Modification of EUT	6
1.4 Testing Location	7
1.5 Applied Standards	7
2 Test Configuration of Equipment Under Test	8
2.1 Test Mode.....	8
2.2 Connection Diagram of Test System	9
2.3 Support Unit used in test configuration	9
2.4 Frequency List of Low/Middle/High Channels.....	9
3 Conducted Test Items.....	11
3.1 Measuring Instruments.....	11
3.2 Conducted Output Power	12
3.3 EIRP	13
4 Radiated Test Items	14
4.1 Measuring Instruments.....	14
4.2 Test Setup	14
4.3 Test Result of Radiated Test.....	15
4.4 Radiated Spurious Emission	16
5 List of Measuring Equipment.....	17
6 Uncertainty of Evaluation.....	18
Appendix A. Test Results of Conducted Test	
Appendix B. Test Results of Radiated Test	
Appendix C. Test Setup Photographs	



History of this test report

Report No.	Version	Description	Issue Date
FG2N1462K	01	Initial issue of report	Jan. 19, 2023
FG2N1462K	02	Revise Product Feature	Feb. 20, 2023
FG2N1462K	03	Revise cover page and Product Feature	Feb. 22, 2023



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
-	§96.41	Peak-to-Average Ratio	-	See Note
3.3	§96.41	Effective Isotropic Radiated Power	Pass	-
-	§2.1049 §96.41	Occupied Bandwidth	-	See Note
-	§2.1051 §96.41	Conducted Band Edge Measurement	-	See Note
-	§2.1051 §96.41	Conducted Spurious Emission	-	See Note
-	§2.1055	Frequency Stability for Temperature & Voltage	-	See Note
4.4	§2.1051 §96.41	Radiated Spurious Emission	Pass	0.41 dB at under the limit 7362.000 MHz

Note: The certified module (model: FM350-GL) which supports normal mode and TX switching mode being integrated into a notebook computer. Spot check on both modes were performed and no degradation occur. Thus additionally reporting the spot check results in this report.

Declaration of Conformity:

- The test results (PASS/FAIL) with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
- The measurement uncertainty please refer to report "Uncertainty of Evaluation".

Comments and Explanations:

- The product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.
- The purpose of different model name is for CPU (Intel/AMD).

Reviewed by: Sheng Kuo
Report Producer: Ruby Zou



1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Notebook Computer
Brand Name	Lenovo
Compliance ID	TP00145A; TP00145B
FCC ID	2AJN7-TP00145AU
Sample 1	EUT with Amphenol Taiwan Corporation Antenna
Sample 2	EUT with Speed Antenna
Integrated WLAN Module	Brand Name: Qualcomm Model Name: QCNFA725 FCC ID: A5M-QCNFA725
	Brand Name: Intel Model Name: AX211D2W FCC ID: PD9AX211D2
Integrated NFC Module	Brand Name: Foxconn Model Name: T77H747
EUT supports Radios application	WCDMA/HSPA/LTE/5G NR/GNSS/NFC WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 Bluetooth BR/EDR/LE
EUT Stage	Production Unit

Remark:

1. The above EUT's information was declared by manufacturer.
2. Equipment: Fibocom FM350-GL tested inside of Lenovo Notebook Computer.
3. All the test results were performed with TP00145A.

	Normal mode	TX switching mode
	TX/RX	TX/RX
Ant_0 (Main)	WCDMA : 2/4/5 LTE : 2/4/5/7/12/13/14/17/25/26/30/38/66/71 NR : 2/5/7/25/30/38/66/71	WCDMA : 5 LTE : 5/12/13/14/17/26/41/48/71 NR : 5/41/71/77/78
Ant_2 (MIMO2)	LTE : 41/48 NR : 41/77/78	WCDMA : 2/4 LTE : 2/4/7/25/30/38/66 NR : 2/7/25/30/38/66

WWAN Antenna Information				
Main Antenna	Manufacturer	Amphenol Taiwan Corporation	Peak gain (dBi)	LTE Band 48: 0.9
	Part number	DC33001YS50	Type	PIFA
	Manufacturer	Speed	Peak gain (dBi)	LTE Band 48: 0.9
	Part number	DC33001YT50	Type	PIFA
MIMO 2 Antenna	Manufacturer	Amphenol Taiwan Corporation	Peak gain (dBi)	LTE Band 48: 0.9
	Part number	DC33001YS40	Type	PIFA
	Manufacturer	Speed	Peak gain (dBi)	LTE Band 48: 0.9
	Part number	DC33001YT40	Type	PIFA

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.2 Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx Frequency	3552.5 MHz ~ 3697.5 MHz
Rx Frequency	3552.5 MHz ~ 3697.5 MHz
Bandwidth	5 MHz / 10 MHz / 15 MHz / 20 MHz
Maximum Output Power to Antenna	Main Antenna: LTE Band 48: 19.53 dBm LTE Band 48C: 19.99 dBm MIMO 2 Antenna: LTE Band 48: 21.14 dBm LTE Band 48C: 19.89 dBm
Type of Modulation	QPSK / 16QAM / 64QAM / 256QAM

1.3 Modification of EUT

No modifications are made to the EUT during all test items.



1.4 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333
Test Site No.	Sporton Site No.
	TH03-HY (TAF Code: 1190)
Test Engineer	Mike Yeh
Temperature (°C)	22.2~23.1
Relative Humidity (%)	51~56
Remark	The Conducted test item subcontracted to Sporton International Inc. EMC & Wireless Communications Laboratory

Test Site	Sporton International Inc. Wensan Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010
Test Site No.	Sporton Site No.
	03CH12-HY
Test Engineer	Jesse Fan, Tim Lee and Wilson Wu
Temperature (°C)	20~25
Relative Humidity (%)	50~60

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC Designation No.: TW1190 and TW3786

1.5 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ ANSI C63.26-2015
- ♦ ANSI / TIA-603-E
- ♦ FCC 47 CFR Part 2, 96
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ FCC KDB 940660 D01 Part 96 CBRS Eqpt v01
- ♦ FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.



2 Test Configuration of Equipment Under Test

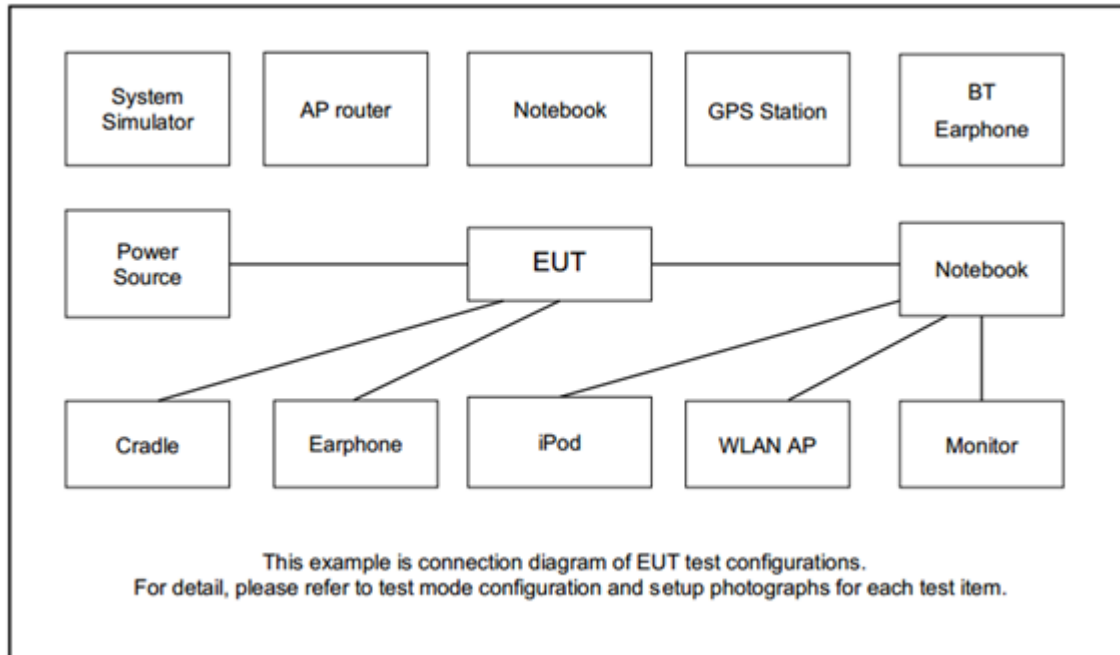
2.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v03r01 with maximum output power.

Test Items	Band	Bandwidth (MHz)						Modulation				RB #			Test Channel				
		1.4	3	5	10	15	20	QPSK	16QAM	64QAM	256QAM	1	Half	Full	L	M	H		
Max. Output Power	48	-	-	v	v	v	v	v	v					v			v	v	v
E.I.R.P.	48	-	-	v	v	v	v	v	v					Max. Power					
Radiated Spurious Emission	48	-	-					v	v					v			v	v	v
Remark	<ol style="list-style-type: none"> The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. For modulation of 64QAM/256QAM, the maximum power of 64QAM/256QAM is lower than other modulation (QPSK/16QAM), therefore, according to engineering evaluation, we choose higher power (QPSK/16QAM) to perform all tests and show in the report, and verified the TX switching mode of Radiated Spurious Emission and Conducted power. All the radiated test cases were performed with Battery 1 and Sample 1. 																		

Test Items	Band	Bandwidth (MHz)										Modulation				RB #			Test Channel		
		20+20	20+15	15+20	20+10	10+20	20+5	5+20	15+15	15+10	10+15	QPSK	16QAM	64QAM	256QAM	1	Half	Full	L	M	H
Max. Output Power	48_CA	v	v	v	v	v	v	v	-	-	-	v	v			v			v	v	v
E.I.R.P.	48_CA	v	v	v	v	v	v	v	-	-	-	v	v			Max. Power					
Radiated Spurious Emission	48_CA	v							-	-	-	v				v			v	v	v
Remark	<ol style="list-style-type: none"> The mark "v" means that this configuration is chosen for testing The mark "-" means that this bandwidth is not supported. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. For modulation of 64QAM/256QAM, the maximum power of 64QAM/256QAM is lower than other modulation (QPSK/16QAM), therefore, according to engineering evaluation, we choose higher power (QPSK/16QAM) to perform all tests and show in the report, and verified the TX switching mode of Radiated Spurious Emission and Conducted power. All the radiated test cases were performed with Battery 1 and Sample 1. 																				

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration

Item	Equipment	Brand Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8821C	N/A	N/A	Unshielded, 1.8 m
2.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.4 Frequency List of Low/Middle/High Channels

LTE Band 48 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	55340	55990	56640
	Frequency	3560.0	3625.0	3690.0
15	Channel	55315	55990	56665
	Frequency	3557.5	3625.0	3692.5
10	Channel	55290	55990	56690
	Frequency	3555.0	3625.0	3695.0
5	Channel	55265	55990	56715
	Frequency	3552.5	3625.0	3697.5



LTE Band 48C Channel and Frequency List_CA					
BW [MHz]	Channel/Frequency(MHz)		Lowest	Middle	Highest
5 + 20	PCC	Channel	55273	55898	56523
		Frequency	3553.3	3615.8	3678.3
	SCC	Channel	55390	56015	56640
		Frequency	3565	3627.5	3690
20 + 5	PCC	Channel	55340	55965	56590
		Frequency	3560	3622.5	3685
	SCC	Channel	55457	56082	56707
		Frequency	3571.7	3634.2	3696.7
10 + 20	PCC	Channel	55295	55896	56496
		Frequency	3555.5	3615.6	3675.6
	SCC	Channel	55439	56040	56640
		Frequency	3569.9	3630	3690
20 + 10	PCC	Channel	55340	55941	56541
		Frequency	3560	3620.1	3680.1
	SCC	Channel	55484	56085	56685
		Frequency	3574.4	3634.5	3694.5
15 + 20	PCC	Channel	55318	55893	56469
		Frequency	3557.8	3615.3	3672.9
	SCC	Channel	55489	56064	56640
		Frequency	3574.9	3632.4	3690
20 + 15	PCC	Channel	55340	55916	56491
		Frequency	3560	3617.6	3675.1
	SCC	Channel	55511	56087	56662
		Frequency	3577.1	3634.7	3692.2
20 + 20	PCC	Channel	55340	55891	56442
		Frequency	3560	3615.1	3670.2
	SCC	Channel	55538	56089	56640
		Frequency	3579.8	3634.9	3690

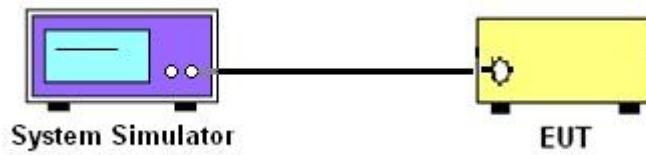
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.1.3 Test Result of Conducted Test

Please refer to Appendix A.



3.2 Conducted Output Power

3.2.1 Description of the Conducted Output Power Measurement

A system simulator was used to establish communication with the EUT. Its parameters were set to force the EUT transmitting at maximum output power. The measured power in the radio frequency on the transmitter output terminals shall be reported.

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through the system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.



3.3 EIRP

3.3.1 Description of the EIRP Measurement

The EIRP of mobile transmitters must not exceed 23 dBm /10 megahertz for LTE Band 48.

The testing follows ANSI C63.26-2015 Section 5.2.5.5

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB

Device	Maximum EIRP (dBm/10 MHz)	Maximum PSD (dBm/MHz)
End User Device	23	n/a

Remark: Total channel power is complied with EIRP limit 23dBm/10MHz.

3.3.1 Test Procedures

The testing follows procedure in Section 5.2 of ANSI C63.26-2015 and KDB 940660 D01 Part 96 CBRS Eqpt v03 Section 3.2(b)(2)

Determine the EIRP by adding the effective antenna gain to the measured average conducted power level.

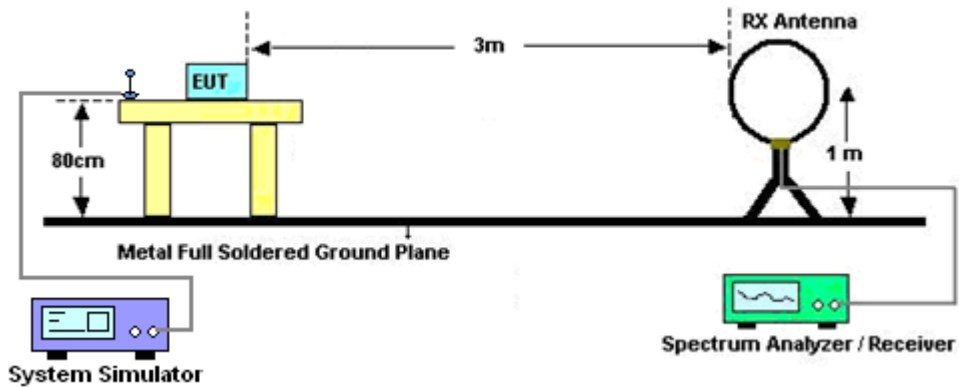
4 Radiated Test Items

4.1 Measuring Instruments

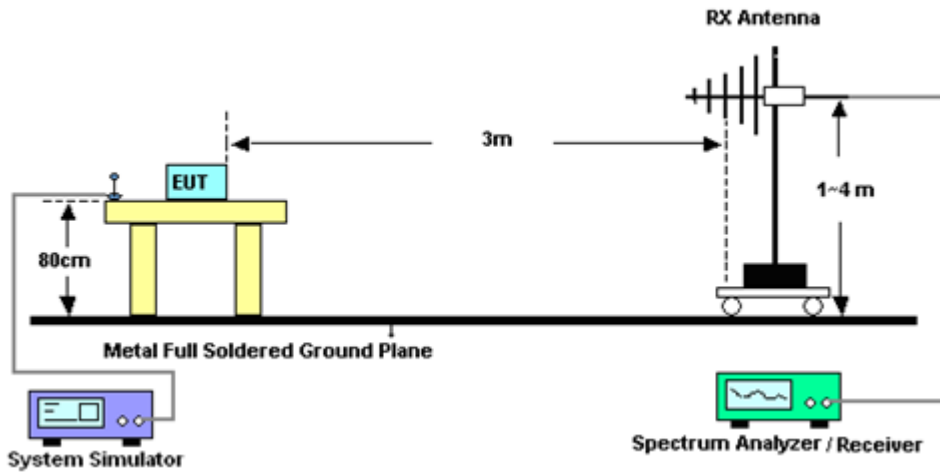
See list of measuring instruments of this test report.

4.2 Test Setup

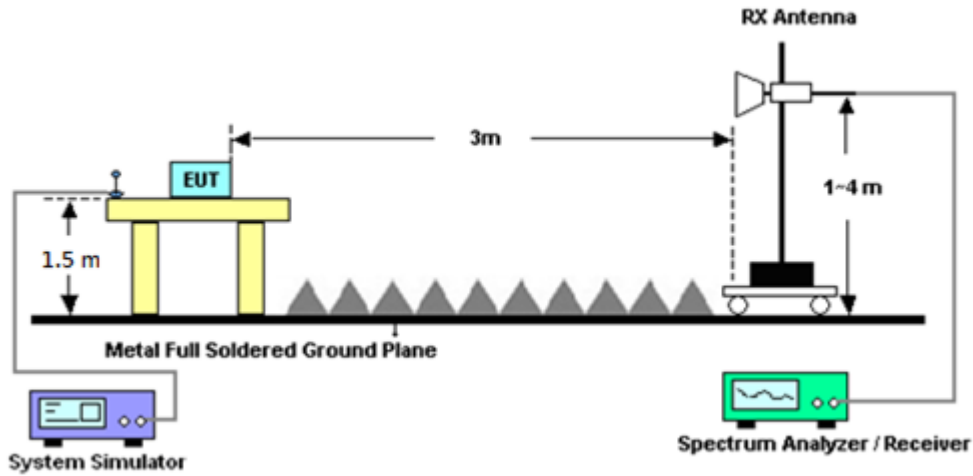
For radiated test below 30MHz



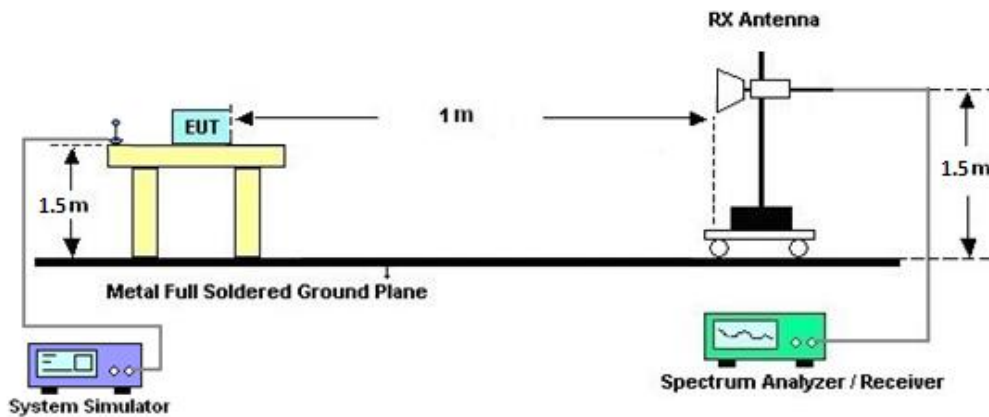
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



4.3 Test Result of Radiated Test

Please refer to Appendix B.

Note:

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is adequate comparison measurement of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, and the result came out very similar.



4.4 Radiated Spurious Emission

4.4.1 Description of Radiated Spurious Emission Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least -40dBm / MHz. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.4.2 Test Procedures

The testing follows FCC KDB 971168 D01 v03r01 Section 7 and ANSI / TIA-603-E Section 2.2.12.

1. The EUT was placed on a turntable with 0.8 meter height for frequency below 1GHz and 1.5 meter height for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between 1m to 4m to search the maximum spurious emission for both horizontal and vertical polarizations.
5. During the measurement, the system simulator parameters were set to force the EUT transmitting at maximum output power.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
7. A horn antenna was substituted in place of the EUT and was driven by a signal generator. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
ERP (dBm) = EIRP - 2.15
8. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
The limit line is -40dBm/MHz



5 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	May 13, 2022	Dec. 23, 2022~Jan. 12, 2023	May 12, 2023	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-02114	1GHz~18GHz	Aug. 09, 2022	Dec. 23, 2022~Jan. 12, 2023	Aug. 08, 2023	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N-06	40103 & 07	30MHz~1GHz	Apr. 24, 2022	Dec. 23, 2022~Jan. 12, 2023	Apr. 23, 2023	Radiation (03CH12-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 08, 2022	Dec. 23, 2022~Jan. 12, 2023	Oct. 07, 2023	Radiation (03CH12-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1212	1GHz~18GHz	Mar. 10, 2022	Dec. 23, 2022~Jan. 12, 2023	Mar. 09, 2023	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	00993	18GHz~40GHz	Nov. 24, 2022	Dec. 23, 2022~Jan. 12, 2023	Nov. 23, 2023	Radiation (03CH12-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz~40GHz	May 14, 2022	Dec. 23, 2022~Jan. 12, 2023	May 13, 2023	Radiation (03CH12-HY)
Preamplifier	COM-POWER	PA-103	161075	10MHz~1GHz	Mar. 23, 2022	Dec. 23, 2022~Jan. 12, 2023	Mar. 22, 2023	Radiation (03CH12-HY)
Preamplifier	Aglient	8449B	3008A02375	1GHz~26.5GHz	May 24, 2022	Dec. 23, 2022~Jan. 12, 2023	May 23, 2023	Radiation (03CH12-HY)
Preamplifier	E-INSTRUMENT TECH LTD.	ERA-100M-18G-56-01-A70	EC1900249	1GHz-18GHz	Dec. 21, 2022	Dec. 23, 2022~Jan. 12, 2023	Dec. 20, 2023	Radiation (03CH12-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 07, 2022	Dec. 23, 2022~Jan. 12, 2023	Dec. 06, 2023	Radiation (03CH12-HY)
Spectrum Analyzer	Keysight	N9010A	MY53470118	10Hz~44GHz	Jan. 12, 2022	Dec. 23, 2022~Jan. 04, 2023	Jan. 11, 2023	Radiation (03CH12-HY)
Signal Analyzer	Keysight	N9010B	MY60241055	N/A	Jul. 22, 2022	Jan. 05, 2023~Jan. 12, 2023	Jul. 21, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0058/126E	30MHz~18GHz	Dec. 20, 2022	Dec. 23, 2022~Jan. 12, 2023	Dec. 19, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz~40GHz	Dec. 20, 2022	Dec. 23, 2022~Jan. 12, 2023	Dec. 19, 2023	Radiation (03CH12-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803953/2	30MHz~40GHz	Dec. 20, 2022	Dec. 23, 2022~Jan. 12, 2023	Dec. 19, 2023	Radiation (03CH12-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN2	6.75GHz High Pass Filter	Mar. 15, 2022	Dec. 23, 2022~Jan. 12, 2023	Mar. 14, 2023	Radiation (03CH12-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Oct. 03, 2022	Dec. 23, 2022~Jan. 12, 2023	Oct. 02, 2023	Radiation (03CH12-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Dec. 23, 2022~Jan. 12, 2023	N/A	Radiation (03CH12-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Dec. 23, 2022~Jan. 12, 2023	N/A	Radiation (03CH12-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Dec. 23, 2022~Jan. 12, 2023	N/A	Radiation (03CH12-HY)
Software	Audix	E3 6.2009-8-24	RK-000989	N/A	N/A	Dec. 23, 2022~Jan. 12, 2023	N/A	Radiation (03CH12-HY)
Radio Communication Analyzer	Anritsu	MT8821C	6262025353	LTE FDD/TDD LTE-2CC DLCA/ULCA	Oct. 13, 2022	Dec. 16, 2022~Dec. 23, 2022	Oct. 12, 2023	Conducted (TH03-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#B	1-18GHz	Jan. 07, 2022	Dec. 16, 2022~Dec. 23, 2022	Jan. 06, 2023	Conducted (TH03-HY)



6 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.31 dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.25 dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.81 dB
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power & EIRP)

<Main Antenna>

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
20	1	0	QPSK	19.19	19.27	19.53	20.43	0.1104
20	1	0	16-QAM	18.19	18.37	18.55	19.45	0.0881
Limit	EIRP < 23dBm/10MHz			Result			Pass	

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
15	1	0	QPSK	19.04	19.04	19.35	20.25	0.1059
15	1	0	16-QAM	18.00	18.29	18.44	19.34	0.0859
Limit	EIRP < 23dBm/10MHz			Result			Pass	

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
10	1	0	QPSK	19.01	19.15	19.36	20.26	0.1062
10	1	0	16-QAM	18.15	18.24	18.54	19.44	0.0879
Limit	EIRP < 23dBm/10MHz			Result			Pass	

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
5	1	0	QPSK	19.00	19.13	19.46	20.36	0.1086
5	1	0	16-QAM	18.15	18.24	18.41	19.31	0.0853
Limit	EIRP < 23dBm/10MHz			Result			Pass	

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = 0.9 dB)										
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
	RB Size	RB Offset	RB Size	RB Offset						
20+20	1	99	1	0	QPSK	19.56	19.72	19.18	20.62	0.1153
20+20	1	99	1	0	16-QAM	18.79	18.72	18.68	19.69	0.0931
20+15	1	74	1	0	QPSK	19.59	19.47	19.31	20.49	0.1119
20+15	1	74	1	0	16-QAM	18.84	18.81	18.60	19.74	0.0942
15+20	1	74	1	0	QPSK	19.99	19.59	19.68	20.89	0.1227
15+20	1	74	1	0	16-QAM	19.15	18.77	19.05	20.05	0.1012
Limit	EIRP < 23dBm/10MHz					Result			Pass	

LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = 0.9 dB)										
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
	RB Size	RB Offset	RB Size	RB Offset						
20+10	1	99	1	0	QPSK	19.69	19.72	19.73	20.63	0.1156
20+10	1	99	1	0	16-QAM	18.97	18.98	18.95	19.88	0.0973
10+20	1	49	1	0	QPSK	19.86	19.88	19.72	20.78	0.1197
10+20	1	49	1	0	16-QAM	19.18	19.14	19.01	20.08	0.1019
20+5	1	99	1	0	QPSK	19.68	19.74	19.81	20.71	0.1178
20+5	1	99	1	0	16-QAM	19.01	19.01	19.07	19.97	0.0993
Limit	EIRP < 23dBm/10MHz					Result			Pass	

LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = 0.9 dB)										
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
	RB Size	RB Offset	RB Size	RB Offset						
5+20	1	24	1	0	QPSK	19.28	19.74	19.71	20.64	0.1159
5+20	1	24	1	0	16-QAM	19.05	19.08	18.99	19.98	0.0995
Limit	EIRP < 23dBm/10MHz					Result			Pass	

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



<MIMO2 Antenna>

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
20	1	0	QPSK	20.69	21.10	20.78	22.00	0.1585
20	1	0	16-QAM	19.72	21.14	19.83	22.04	0.1600
Limit	EIRP < 23dBm/10MHz			Result			Pass	

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
15	1	0	QPSK	20.59	20.99	20.69	21.89	0.1545
15	1	0	16-QAM	19.66	21.06	19.83	21.96	0.1570
Limit	EIRP < 23dBm/10MHz			Result			Pass	

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
10	1	0	QPSK	20.65	20.98	20.78	21.88	0.1542
10	1	0	16-QAM	19.69	20.98	19.82	21.88	0.1542
Limit	EIRP < 23dBm/10MHz			Result			Pass	

LTE Band 48 Maximum Average Power [dBm] (GT - LC = 0.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
5	1	0	QPSK	20.62	21.12	20.77	22.02	0.1592
5	1	0	16-QAM	19.70	21.12	19.73	22.02	0.1592
Limit	EIRP < 23dBm/10MHz			Result			Pass	

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = 0.9 dB)										
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
	RB Size	RB Offset	RB Size	RB Offset						
20+20	1	99	1	0	QPSK	19.76	19.63	19.40	20.66	0.1164
20+20	1	99	1	0	16-QAM	18.91	18.79	18.51	19.81	0.0957
20+15	1	74	1	0	QPSK	19.87	19.73	19.45	20.77	0.1194
20+15	1	74	1	0	16-QAM	18.97	18.81	18.57	19.87	0.0971
15+20	1	74	1	0	QPSK	19.89	19.77	19.53	20.79	0.1199
15+20	1	74	1	0	16-QAM	18.98	18.87	18.61	19.88	0.0973
Limit	EIRP < 23dBm/10MHz					Result			Pass	

LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = 0.9 dB)										
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
	RB Size	RB Offset	RB Size	RB Offset						
20+10	1	99	1	0	QPSK	19.77	19.61	19.37	20.67	0.1167
20+10	1	99	1	0	16-QAM	18.88	18.73	18.45	19.78	0.0951
10+20	1	49	1	0	QPSK	19.77	19.68	19.49	20.67	0.1167
10+20	1	49	1	0	16-QAM	18.88	18.76	18.59	19.78	0.0951
20+5	1	99	1	0	QPSK	19.80	19.71	19.42	20.70	0.1175
20+5	1	99	1	0	16-QAM	18.85	18.71	18.44	19.75	0.0944
Limit	EIRP < 23dBm/10MHz					Result			Pass	

LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = 0.9 dB)										
BW [MHz]	PCC		SCC		Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
	RB Size	RB Offset	RB Size	RB Offset						
5+20	1	24	1	0	QPSK	19.87	19.76	19.65	20.77	0.1194
5+20	1	24	1	0	16-QAM	19.00	18.86	18.65	19.90	0.0977
Limit	EIRP < 23dBm/10MHz					Result			Pass	

Total EIRP power is less than partial EIRP limit 23 dBm/10MHz.



Appendix B. Test Results of Radiated Test

<Main Antenna>

LTE Band 48

LTE Band 48 / 20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	7102	-42.24	-40	-2.24	-39.89	-51.94	1.84	11.55	H
	10653	-51.34	-40	-11.34	-53.03	-59.81	2.23	10.71	H
	14204	-50.46	-40	-10.46	-58.26	-60.09	2.65	12.28	H
	21306	-61.84	-40	-21.84	-75.51	-76.69	3.32	18.17	H
	24857	-58.90	-40	-18.90	-76.38	-73.67	3.71	18.49	H
	28411	-56.79	-40	-16.79	-76.3	-72.26	3.99	19.45	H
									H
	7102	-42.92	-40	-2.91	-40.81	-52.62	1.84	11.55	V
	10653	-50.15	-40	-10.15	-51.43	-58.62	2.23	10.71	V
	14204	-50.40	-40	-10.40	-58.07	-60.03	2.65	12.28	V
	21306	-62.08	-40	-22.08	-75.44	-76.93	3.32	18.17	V
	24857	-59.42	-40	-19.42	-76.58	-74.19	3.71	18.49	V
	28411	-56.56	-40	-16.56	-75.65	-72.03	3.99	19.45	V
									V



Middle	7232	-44.63	-40	-4.63	-42.65	-54.09	1.86	11.32	H
	10848	-50.42	-40	-10.42	-52.44	-58.80	2.22	10.59	H
	14464	-50.39	-40	-10.39	-58.26	-59.89	2.62	12.12	H
	18080	-61.54	-40	-21.54	-72.34	-75.91	3.23	17.60	H
	21696	-61.00	-40	-21.00	-75.38	-76.17	3.42	18.60	H
	25312	-58.76	-40	-18.76	-76.34	-73.76	3.77	18.77	H
									H
	7232	-43.33	-40	-3.33	-41.7	-52.79	1.86	11.32	V
	10848	-46.42	-40	-6.42	-48.21	-54.80	2.22	10.59	V
	14464	-43.69	-40	-3.69	-52	-53.19	2.62	12.12	V
	18080	-61.88	-40	-21.88	-72.38	-76.25	3.23	17.60	V
	21696	-61.04	-40	-21.04	-75.09	-76.21	3.42	18.60	V
	25312	-58.96	-40	-18.96	-76.25	-73.96	3.77	18.77	V
									V
Highest	7362	-43.90	-40	-3.90	-42.26	-53.36	1.92	11.38	H
	11043	-46.42	-40	-6.42	-48.85	-54.75	2.22	10.55	H
	14724	-49.72	-40	-9.72	-57.84	-59.72	2.59	12.59	H
	18405	-61.84	-40	-21.84	-73.01	-76.20	3.24	17.60	H
	22087	-58.66	-40	-18.66	-73.33	-74.03	3.52	18.88	H
	25768	-59.36	-40	-19.36	-77.21	-74.53	3.88	19.05	H
									H
	7362	-42.91	-40	-2.91	-41.42	-52.37	1.92	11.38	V
	11043	-43.87	-40	-3.87	-46.23	-52.20	2.22	10.55	V
	14724	-44.03	-40	-4.03	-53.11	-54.03	2.59	12.59	V
	18405	-62.14	-40	-22.14	-73.08	-76.50	3.24	17.60	V
	22087	-58.94	-40	-18.94	-73.23	-74.31	3.52	18.88	V
	25768	-59.15	-40	-19.15	-76.71	-74.32	3.88	19.05	V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



LTE Band 48C

LTE Band 48C / 20+20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	7140	-56.33	-40	-16.33	-54.09	-65.94	1.84	11.45	H
	10705	-54.54	-40	-14.54	-56.32	-62.99	2.23	10.68	H
	14279	-50.54	-40	-10.54	-58.37	-60.13	2.64	12.23	H
	21418	-61.55	-40	-21.55	-75.55	-76.50	3.35	18.30	H
	24981	-58.99	-40	-18.99	-76.47	-73.70	3.70	18.41	H
	28556	-56.89	-40	-16.89	-76.51	-72.29	3.99	19.39	H
									H
	7140	-53.62	-40	-13.62	-51.68	-63.23	1.84	11.45	V
	10705	-55.27	-40	-15.27	-56.69	-63.72	2.23	10.68	V
	14279	-50.35	-40	-10.35	-58.21	-59.94	2.64	12.23	V
	21418	-61.65	-40	-21.65	-75.34	-76.60	3.35	18.30	V
	24981	-59.52	-40	-19.52	-76.68	-74.23	3.70	18.41	V
	28556	-57.53	-40	-17.53	-76.73	-72.93	3.99	19.39	V
									V



Middle	7250	-52.94	-40	-12.94	-51.01	-62.40	1.87	11.33	H
	10870	-53.59	-40	-13.59	-55.66	-61.95	2.21	10.58	H
	14498	-50.27	-40	-10.27	-58.16	-59.75	2.62	12.10	H
	18120	-61.48	-40	-21.48	-72.32	-75.85	3.23	17.60	H
	21744	-61.42	-40	-21.42	-75.82	-76.63	3.44	18.64	H
	25370	-58.86	-40	-18.86	-76.46	-73.92	3.79	18.84	H
									H
	7250	-51.48	-40	-11.48	-49.87	-60.94	1.87	11.33	V
	10870	-54.15	-40	-14.15	-56	-62.51	2.21	10.58	V
	14498	-50.02	-40	-10.02	-58.42	-59.50	2.62	12.10	V
	18120	-62.11	-40	-22.11	-72.66	-76.48	3.23	17.60	V
	21744	-61.62	-40	-21.62	-75.68	-76.83	3.44	18.64	V
	25370	-59.08	-40	-19.08	-76.4	-74.14	3.79	18.84	V
									V
Highest	7360	-51.52	-40	-11.52	-49.86	-60.98	1.92	11.38	H
	11040	-54.73	-40	-14.73	-57.14	-63.06	2.22	10.55	H
	14718	-50.83	-40	-10.83	-58.95	-60.82	2.59	12.58	H
	18395	-61.80	-40	-21.80	-72.96	-76.16	3.24	17.60	H
	22073	-61.23	-40	-21.23	-75.88	-76.60	3.51	18.89	H
	25758	-59.15	-40	-19.15	-76.99	-74.32	3.88	19.05	H
									H
	7360	-52.17	-40	-12.17	-50.67	-61.63	1.92	11.38	V
	11040	-54.67	-40	-14.67	-57	-63.00	2.22	10.55	V
	14718	-49.43	-40	-9.43	-58.48	-59.42	2.59	12.58	V
	18395	-61.46	-40	-21.46	-72.38	-75.82	3.24	17.60	V
	22073	-61.47	-40	-21.47	-75.74	-76.84	3.51	18.89	V
	25758	-58.98	-40	-18.98	-76.53	-74.15	3.88	19.05	V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



<MIMO2 Antenna>

LTE Band 48

LTE Band 48 / 20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	7102	-54.09	-40	-14.09	-51.75	-63.79	1.84	11.55	H
	10653	-55.03	-40	-15.03	-56.72	-63.50	2.23	10.71	H
	14204	-51.09	-40	-11.09	-58.89	-60.72	2.65	12.28	H
	21306	-61.61	-40	-21.61	-75.28	-76.46	3.32	18.17	H
	24857	-59.10	-40	-19.10	-76.58	-73.87	3.71	18.49	H
	28411	-56.60	-40	-16.60	-76.11	-72.07	3.99	19.45	H
									H
	7102	-47.19	-40	-7.19	-45.09	-56.89	1.84	11.55	V
	10653	-50.76	-40	-10.76	-52.04	-59.23	2.23	10.71	V
	14204	-49.44	-40	-9.44	-57.12	-59.07	2.65	12.28	V
	21306	-61.97	-40	-21.97	-75.33	-76.82	3.32	18.17	V
	24857	-59.13	-40	-19.13	-76.29	-73.90	3.71	18.49	V
	28411	-57.25	-40	-17.25	-76.34	-72.72	3.99	19.45	V
									V



Middle	7232	-51.89	-40	-11.89	-49.9	-61.35	1.86	11.32	H
	10848	-53.18	-40	-13.18	-55.21	-61.56	2.22	10.59	H
	14464	-50.94	-40	-10.94	-58.81	-60.44	2.62	12.12	H
	18080	-61.36	-40	-21.36	-72.16	-75.73	3.23	17.60	H
	21696	-61.28	-40	-21.28	-75.66	-76.45	3.42	18.60	H
	25312	-58.46	-40	-18.46	-76.04	-73.46	3.77	18.77	H
									H
	7232	-43.90	-40	-3.90	-42.26	-53.36	1.86	11.32	V
	10848	-49.04	-40	-9.04	-50.84	-57.42	2.22	10.59	V
	14464	-48.41	-40	-8.41	-56.71	-57.91	2.62	12.12	V
	18080	-61.89	-40	-21.89	-72.39	-76.26	3.23	17.60	V
	21696	-64.48	-40	-24.48	-75.53	-79.65	3.42	18.60	V
	25312	-59.35	-40	-19.35	-76.64	-74.35	3.77	18.77	V
									V
Highest	7362	-42.65	-40	-2.65	-41	-52.11	1.92	11.38	H
	11043	-50.50	-40	-10.50	-52.94	-58.83	2.22	10.55	H
	14724	-51.11	-40	-11.11	-59.24	-61.11	2.59	12.59	H
	18405	-61.89	-40	-21.89	-73.06	-76.25	3.24	17.60	H
	22086	-60.71	-40	-20.71	-75.38	-76.08	3.52	18.88	H
	25767	-58.78	-40	-18.78	-76.63	-73.95	3.88	19.05	H
									H
	7362	-40.41	-40	-0.41	-38.91	-49.87	1.92	11.38	V
	11043	-47.17	-40	-7.17	-49.54	-55.50	2.22	10.55	V
	14724	-49.51	-40	-9.51	-58.59	-59.51	2.59	12.59	V
	18405	-61.88	-40	-21.88	-72.82	-76.24	3.24	17.60	V
	22086	-58.73	-40	-18.73	-73.02	-74.10	3.52	18.88	V
	25767	-59.29	-40	-19.29	-76.85	-74.46	3.88	19.05	V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.



LTE Band 48C

LTE Band 48C / 20+20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Margin (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	7138	-55.74	-40	-15.74	-53.5	-65.35	1.84	11.46	H
	10707	-54.78	-40	-14.78	-56.56	-63.23	2.23	10.68	H
	14276	-50.86	-40	-10.86	-58.69	-60.45	2.64	12.23	H
	21413	-61.50	-40	-21.50	-75.5	-76.45	3.35	18.30	H
	24982	-58.95	-40	-18.95	-76.43	-73.66	3.70	18.41	H
	28551	-56.88	-40	-16.88	-76.5	-72.28	3.99	19.39	H
									H
	7138	-52.03	-40	-12.03	-50.09	-61.64	1.84	11.46	V
	10707	-55.37	-40	-15.37	-56.79	-63.82	2.23	10.68	V
	14276	-50.33	-40	-10.33	-58.18	-59.92	2.64	12.23	V
	21413	-61.85	-40	-21.85	-75.54	-76.80	3.35	18.30	V
	24982	-59.51	-40	-19.51	-76.67	-74.22	3.70	18.41	V
	28551	-57.50	-40	-17.50	-76.7	-72.90	3.99	19.39	V
									V



Middle	7250	-54.37	-40	-14.37	-52.44	-63.83	1.87	11.33	H
	10870	-53.48	-40	-13.48	-55.55	-61.84	2.21	10.58	H
	14498	-50.84	-40	-10.84	-58.73	-60.32	2.62	12.10	H
	18120	-61.72	-40	-21.72	-72.56	-76.09	3.23	17.60	H
	21744	-61.49	-40	-21.49	-75.89	-76.70	3.44	18.64	H
	25368	-58.73	-40	-18.73	-76.33	-73.78	3.79	18.84	H
									H
	7250	-50.93	-40	-10.93	-49.32	-60.39	1.87	11.33	V
	10870	-53.90	-40	-13.90	-55.75	-62.26	2.21	10.58	V
	14498	-50.40	-40	-10.40	-58.8	-59.88	2.62	12.10	V
	18120	-62.06	-40	-22.06	-72.61	-76.43	3.23	17.60	V
	21744	-61.12	-40	-21.12	-75.18	-76.33	3.44	18.64	V
	25370	-59.43	-40	-19.43	-76.75	-74.49	3.79	18.84	V
									V
Highest	7360	-53.27	-40	-13.27	-51.62	-62.73	1.92	11.38	H
	11040	-53.92	-40	-13.92	-56.33	-62.25	2.22	10.55	H
	14718	-50.32	-40	-10.32	-58.44	-60.31	2.59	12.58	H
	18396	-61.68	-40	-21.68	-72.84	-76.04	3.24	17.60	H
	22075	-61.22	-40	-21.22	-75.87	-76.59	3.51	18.89	H
	25754	-58.90	-40	-18.90	-76.74	-74.07	3.88	19.05	H
									H
	7360	-51.57	-40	-11.57	-50.07	-61.03	1.92	11.38	V
	11040	-54.71	-40	-14.71	-57.04	-63.04	2.22	10.55	V
	14718	-49.26	-40	-9.26	-58.31	-59.25	2.59	12.58	V
	18396	-61.96	-40	-21.96	-72.88	-76.32	3.24	17.60	V
	22075	-61.25	-40	-21.25	-75.52	-76.62	3.51	18.89	V
	25754	-58.90	-40	-18.90	-76.45	-74.07	3.88	19.05	V
									V

Remark: Spurious emissions within 30-1000MHz were found more than 20dB below limit line.