



FCC RADIO TEST REPORT

FCC ID : 2AW3A-1NAC21ACUCM
Equipment : EV Charger
Brand Name : RIVIAN
Model Name : PT00057322
 : PT00261633
 : PT00401761
 : PT00340197
Marketing Name : RIVIAN WAYPOINTS CHARGER
 : RIVIAN FLEET AC DISPENSER
Applicant : Rivian Automotive LLC.
 : 607 Hansen Way, Palo Alto, CA 94304
Manufacturer : Lite-On Technology Corporation
 : 15F , No.555, Siyuan Rd., Xinzhuang
 : Dist., New Taipei City, Taiwan (R.O.C.)
Standard : FCC 47 CFR Part 2, 22(H), 24(E), 27

The product was received on Mar. 17, 2022 and testing was performed from Apr. 29, 2022 to May 15, 2022. 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.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. Wensan Laboratory

No. 58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City 333010, Taiwan (R.O.C.)



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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.2	§2.1046	Conducted Output Power	Reporting only	-
	§22.913 (a)(5)	Effective Radiated Power (Band 5)	Pass	
	§27.50 (b)(10) §27.50 (c)(10)	Effective Radiated Power (Band 12) (Band 13)		
	§24.232 (c)	Equivalent Isotropic Radiated Power (Band 2) (Band 25)		
	§27.50 (d)(4)	Equivalent Isotropic Radiated Power (Band 4)		
-	§24.232 (d) §27.50 (d)(5)	Peak-to-Average Ratio	-	See Note
-	§2.1049	Occupied Bandwidth	-	See Note
-	§2.1051 §22.917 (a) §24.238 (a) §27.53 (c)(2)(4) §27.53 (g) §27.53 (h)	Conducted Band Edge Measurement (Band 2) (Band 4) (Band 5) (Band 12) (Band 13) (Band 25)	-	See Note
-	§2.1051 §22.917 (a) §24.238 (a) §27.53 (c)(2) §27.53 (g) §27.53 (h)	Conducted Spurious Emission (Band 2) (Band 4) (Band 5) (Band 12) (Band 13) (Band 25)	-	See Note
-	§2.1055 §22.355 §24.235 §27.54	Frequency Stability Temperature & Voltage	-	See Note



Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
4.2	§2.1053 §22.917 (a) §24.238 (a) §27.53 (c)(2) §27.53 (f) §27.53 (g) §27.53 (h)	Radiated Spurious Emission (Band 2) (Band 4) (Band 5) (Band 12) (Band 13) (Band 25)	Pass	Under limit 2.32 dB at 1564.000 MHz

Remark: The module (Model: BG96, BG96 MINPCIE) makes no difference after verifying output power, this report reuses test data from the module report.

Declaration of Conformity:

1. 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.
2. The measurement uncertainty please refer to this 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.

Reviewed by: Yun Huang

Report Producer: Cindy Liu



1 General Description

1.1 Product Feature of Equipment Under Test

GSM/LTE, Bluetooth - LE, Wi-Fi 2.4GHz 802.11b/g/n and NFC.

Product Feature	
Sample 1	SKU 1
Sample 2	SKU 2
Sample 3	SKU 3
Sample 4	SKU 4
Antenna Type	WWAN: Fixed External Antenna WLAN: FPC Antenna Bluetooth: Internal Antenna NFC: PCB Loop Antenna
Antenna Gain (dBi)	LTE Band 2 : 2.9 LTE Band 4 : 2.6 LTE Band 5 : 2.7 LTE Band 12 : 3.6 LTE Band 13 : 2.3 LTE Band 25 : 2.9

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

	SKU 1	SKU 2	SKU 3	SKU 4
	Public	Fleet	Fleet	Fleet
	LITEON: W1-UC166-0TH1ER	LITEON: W1-UC16A-00H1ER	LITEON: W1-UC168-00H1ER	LITEON: W1-UC166-00H1ER
	RIVIAN: PT00057322	RIVIAN:PT00261633	RIVIAN: PT00340197	RIVIAN:PT00401761
LCD Panel	Yes	NO	NO	NO
Charge Plug	25ft	32ft	25ft	18ft
LTE module	YES	YES	YES	YES
BLE module	YES	YES	YES	YES
Wi-Fi module	YES	YES	YES	YES
RFID module	YES	YES	YES	YES
Holster	YES	NO	NO	NO
Holster cover	YES	YES	YES	YES

1.2 Modification of EUT

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



1.3 Testing Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. TH03-HY (TAF Code: 1190)
Test Engineer	HaoEn Zhang
Temperature (°C)	21.6~23.5
Relative Humidity (%)	51.1~52.6
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, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No. 03CH11-HY
Test Engineer	Theodore, Fu Chen and Troye Hsieh
Temperature (°C)	20.1~21.7
Relative Humidity (%)	56.1~67.5

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

FCC Designation No.: TW1190 and TW3786

1.4 Applicable 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, 22(H), 24(E), 27
- ♦ FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- ♦ 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.



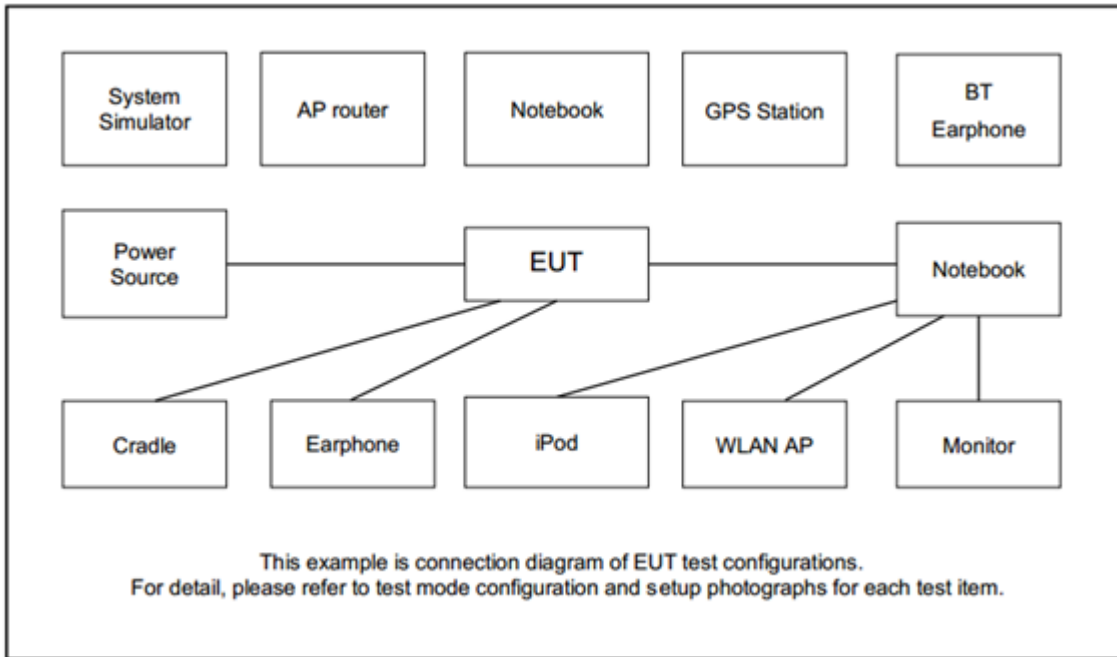
2 Test Configuration of Equipment Under Test

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	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	5	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	12	v	v	v	v	-	-	v	v	v	v	v	v	v	v
	13	-	-	v	v	-	-	v	v	v	v	v	v	v	v
	25	v	v	v	v	v	v	v	v	v	v	v	v	v	v
E.R.P / E.I.R.P	2	v	v	v	v	v	v	v	v	Max. Power					
	4	v	v	v	v	v	v	v	v						
	5	v	v	v	v	-	-	v	v						
	12	v	v	v	v	-	-	v	v						
	13	-	-	v	v	-	-	v	v						
	25	v	v	v	v	v	v	v	v						
Radiated Spurious Emission	2	Covered by Band 25													
	4						v	v		v			v	v	v
	5				v	-	-	v		v			v	v	v
	12				v	-	-	v		v			v	v	v
	13	-	-	v	v	-	-	v		v			v	v	v
	25						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. Wider operating range bandwidth covers narrower one when the power is higher or the same. All the radiated test cases were performed with Sample 1. 														

2.2 Connection Diagram of Test System



2.3 Support Unit used in test configuration and system

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



2.4 Frequency List of Low/Middle/High Channels

LTE Band 2 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	18700	18900	19100
	Frequency	1860	1880	1900
15	Channel	18675	18900	19125
	Frequency	1857.5	1880	1902.5
10	Channel	18650	18900	19150
	Frequency	1855	1880	1905
5	Channel	18625	18900	19175
	Frequency	1852.5	1880	1907.5
3	Channel	18615	18900	19185
	Frequency	1851.5	1880	1908.5
1.4	Channel	18607	18900	19193
	Frequency	1850.7	1880	1909.3

LTE Band 4 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	20050	20175	20300
	Frequency	1720	1732.5	1745
15	Channel	20025	20175	20325
	Frequency	1717.5	1732.5	1747.5
10	Channel	20000	20175	20350
	Frequency	1715	1732.5	1750
5	Channel	19975	20175	20375
	Frequency	1712.5	1732.5	1752.5
3	Channel	19965	20175	20385
	Frequency	1711.5	1732.5	1753.5
1.4	Channel	19957	20175	20393
	Frequency	1710.7	1732.5	1754.3



LTE Band 5 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	20450	20525	20600
	Frequency	829	836.5	844
5	Channel	20425	20525	20625
	Frequency	826.5	836.5	846.5
3	Channel	20415	20525	20635
	Frequency	825.5	836.5	847.5
1.4	Channel	20407	20525	20643
	Frequency	824.7	836.5	848.3

LTE Band 12 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	23060	23095	23130
	Frequency	704	707.5	711
5	Channel	23035	23095	23155
	Frequency	701.5	707.5	713.5
3	Channel	23025	23095	23165
	Frequency	700.5	707.5	714.5
1.4	Channel	23017	23095	23173
	Frequency	699.7	707.5	715.3



LTE Band 13 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23230	-
	Frequency	-	782	-
5	Channel	23205	23230	23255
	Frequency	779.5	782	784.5

LTE Band 25 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
20	Channel	26140	26340	26590
	Frequency	1860	1880	1905
15	Channel	26115	26340	26615
	Frequency	1857.5	1880	1907.5
10	Channel	26090	26340	26640
	Frequency	1855	1880	1910
5	Channel	26065	26340	26665
	Frequency	1852.5	1880	1912.5
3	Channel	26055	26340	26675
	Frequency	1851.5	1880	1913.5
1.4	Channel	26047	26340	26683
	Frequency	1850.7	1880	1914.3

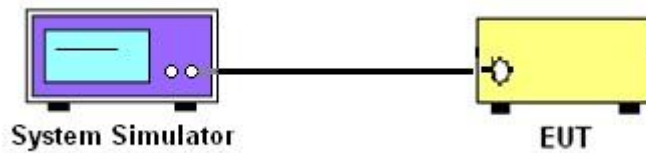
3 Conducted Test Items

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 and ERP/EIRP

3.2.1 Description of the Conducted Output Power Measurement and ERP/EIRP 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.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 12 and Band 13

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2 and Band 25

The EIRP of mobile transmitters must not exceed 1 Watts for LTE Band 4

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, 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

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.

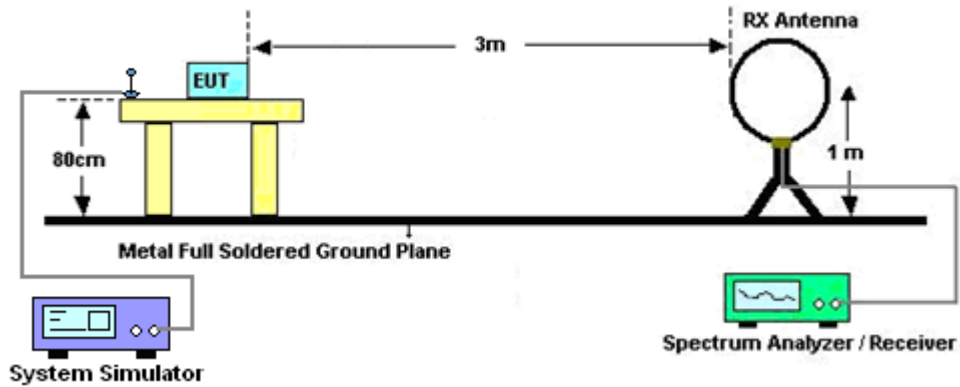
4 Radiated Test Items

4.1 Measuring Instruments

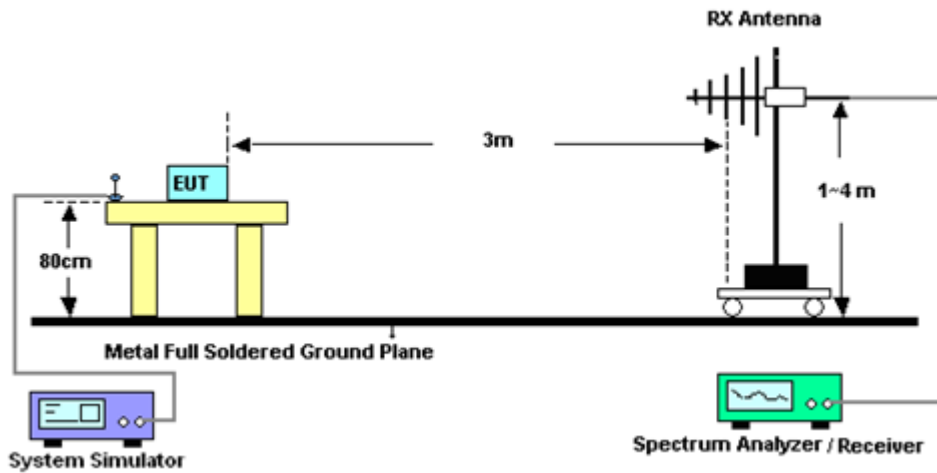
See list of measuring instruments of this test report.

4.1.1 Test Setup

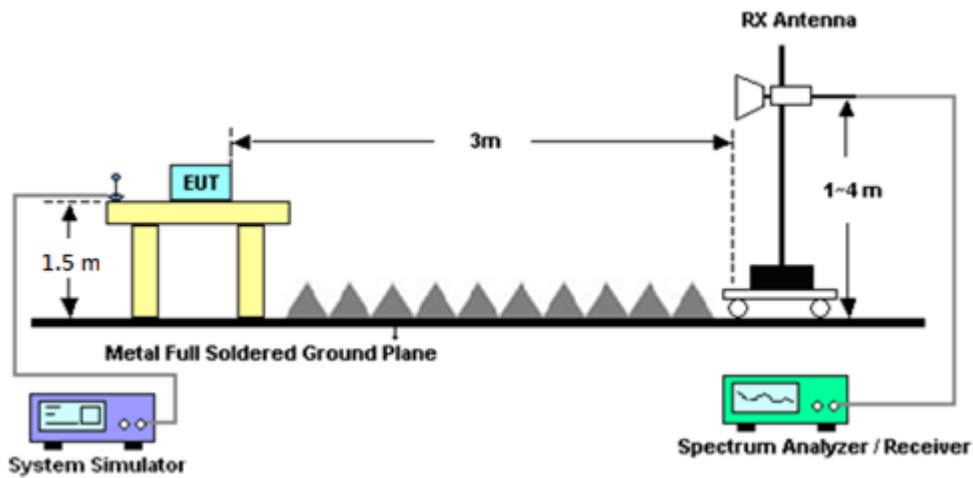
For radiated test below 30MHz



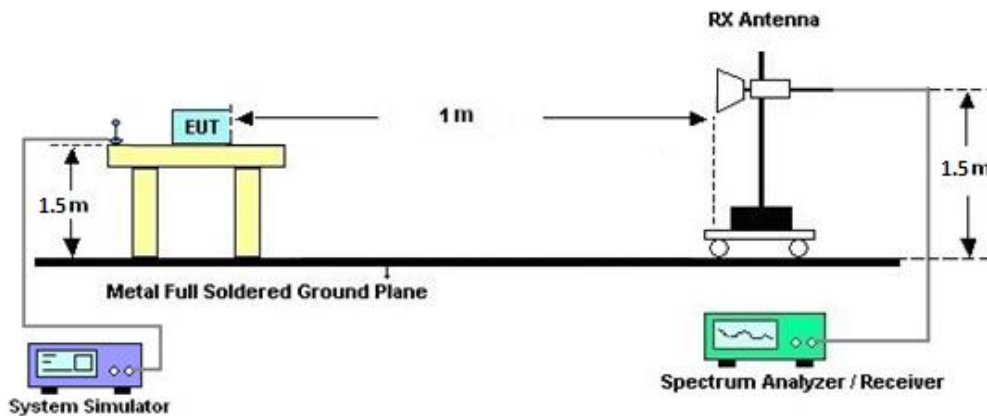
For radiated test from 30MHz to 1GHz



For radiated test from 1GHz to 18GHz



For radiated test above 18GHz



4.1.2 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.



4.2 Radiated Spurious Emission Measurement

4.2.1 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 $43 + 10 \log (P)$ dB.

For LTE Band 13

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

4.2.2 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 for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was 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 one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from $43 + 10\log(P)$ dB below the transmitter power P(Watts)

$EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$

$ERP \text{ (dBm)} = EIRP - 2.15$



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	100315	9 kHz~30 MHz	Jan. 07, 2022	May 08, 2022~ May 15, 2022	Jan. 06, 2023	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & N-6-06	35414 & AT-N0602	30MHz~1GHz	Oct. 09, 2021	May 08, 2022~ May 15, 2022	Oct. 08, 2022	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	37059 & 01	30MHz~1GHz	Oct. 09, 2021	May 08, 2022~ May 15, 2022	Oct. 08, 2022	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1212	1GHz ~ 18GHz	Mar. 10, 2022	May 08, 2022~ May 15, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1328	1GHz~18GHz	Dec. 03, 2021	May 08, 2022~ May 15, 2022	Dec. 02, 2022	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA9170	00993	18GHz~40GHz	Nov. 30, 2021	May 08, 2022~ May 15, 2022	Nov. 29, 2022	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA9170	00993	18GHz~40GHz	Nov. 04, 2021	May 08, 2022~ May 15, 2022	Nov. 03, 2022	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Dec. 10, 2021	May 08, 2022~ May 15, 2022	Dec. 09, 2022	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2021	May 08, 2022~ May 15, 2022	Nov. 09, 2022	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	1710001800 055007	1GHz~18GHz	Jun. 16, 2021	May 08, 2022~ May 15, 2022	Jun. 15, 2022	Radiation (03CH11-HY)
Preamplifier	EMEC	EM18G40G	060801	18GHz~40GHz	Jun. 22, 2021	May 08, 2022~ May 15, 2022	Jun. 21, 2022	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200486	10Hz~44GHz	Oct. 15, 2021	May 08, 2022~ May 15, 2022	Oct. 14, 2022	Radiation (03CH11-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	May 08, 2022~ May 15, 2022	N/A	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	May 08, 2022~ May 15, 2022	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	May 08, 2022~ May 15, 2022	N/A	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001053	N/A	N/A	May 08, 2022~ May 15, 2022	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 10, 2022	May 08, 2022~ May 15, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	9kHz-30MHz	Mar. 10, 2022	May 08, 2022~ May 15, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4PE	30MHz-18GHz	Mar. 10, 2022	May 08, 2022~ May 15, 2022	Mar. 09, 2023	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 0SS	SN3	3GHz High Pass Filter	Sep. 13, 2021	May 08, 2022~ May 15, 2022	Sep. 12, 2022	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-900- 1000-15000-6 0SS	SN12	1GHz High Pass Filter	Nov. 04, 2021	May 08, 2022~ May 15, 2022	Nov. 03, 2022	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP140325	N/A	Nov. 26, 2021	May 08, 2022~ May 15, 2022	Nov. 25, 2022	Radiation (03CH11-HY)
Hygrometer	TECPEL	DTM-303B	TP200880	N/A	Sep. 30, 2021	May 08, 2022~ May 15, 2022	Sep. 29, 2022	Radiation (03CH11-HY)
Radio Communicatio n Analyzer	Anritsu	MT8821C	6201664755	2/3/4G/LTE FDD/TDD with44)/LTE-3C C DLCA/2CC ULCA, CatM1/NB1/NB2	Jul. 21, 2021	Apr. 29, 2022~ May 01, 2022	Jul. 20, 2022	Conducted (TH03-HY)
Base Station (Measure)	Rohde & Schwarz	CMU200	117995	GSM / GPRS / WCDMA / CDMA	Jul. 13, 2021	Apr. 29, 2022~ May 01, 2022	Jul. 12, 2022	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% ($U = 2Uc(y)$)	3.09 dB
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Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	3.56 dB
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Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.00 dB
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Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power & ERP/EIRP)

LTE Band 2 Maximum Average Power [dBm] (GT - LC = 2.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
20	1	0	QPSK	22.97	23.13	22.82	26.03	0.4009
20	1	5		22.92	23.08	22.83		
20	6	0		22.91	23.11	22.74		
20	1	0	16-QAM	22.72	22.82	22.61	26.09	0.4064
20	1	5		22.72	22.78	22.76		
20	5	0		23.13	23.19	22.96		
15	1	0	QPSK	22.89	23.15	22.81	26.05	0.4027
15	1	5		22.88	23.11	22.79		
15	6	0		22.96	23.11	22.71		
15	1	0	16-QAM	22.53	22.95	22.56	26.22	0.4188
15	1	5		22.49	22.92	22.66		
15	5	0		23.20	23.32	22.87		
10	1	0	QPSK	22.96	23.12	22.80	26.03	0.4009
10	1	5		22.90	23.06	22.81		
10	6	0		22.87	23.13	22.72		
10	1	0	16-QAM	22.71	22.88	22.61	26.02	0.3999
10	1	5		22.77	22.79	22.77		
10	5	0		23.10	23.12	22.95		
5	1	0	QPSK	22.91	23.09	22.79	26.06	0.4036
5	1	5		22.86	23.10	22.83		
5	6	0		22.82	23.16	22.71		
5	1	0	16-QAM	22.77	22.82	22.66	26.01	0.3990
5	1	5		22.69	22.77	22.76		
5	5	0		23.08	23.11	22.91		
3	1	0	QPSK	22.95	23.16	22.82	26.11	0.4083
3	1	5		22.89	23.11	22.88		
3	6	0		22.83	23.21	22.73		
3	1	0	16-QAM	22.81	22.85	22.69	26.06	0.4036
3	1	5		22.76	22.82	22.71		
3	5	0		23.15	23.16	22.86		
1.4	1	0	QPSK	22.93	23.13	22.77	26.09	0.4064
1.4	1	5		22.87	23.11	22.89		
1.4	6	0		22.88	23.19	22.77		
1.4	1	0	16-QAM	22.76	22.76	22.69	26.10	0.4074
1.4	1	5		22.75	22.74	22.77		
1.4	5	0		23.09	23.20	22.95		
Limit	EIRP < 2W			Result			Pass	



LTE Band 25 Maximum Average Power [dBm] (GT - LC = 2.9 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
20	1	0	QPSK	23.49	23.55	23.44	26.55	0.4519
20	1	5		23.48	23.59	23.41		
20	6	0		23.65	23.53	23.56		
20	1	0	16-QAM	23.30	23.31	23.31	26.65	0.4624
20	1	5		23.36	23.30	23.33		
20	5	0		23.69	23.75	23.59		
15	1	0	QPSK	23.52	23.61	23.48	26.56	0.4529
15	1	5		23.55	23.62	23.45		
15	6	0		23.66	23.59	23.60		
15	1	0	16-QAM	23.36	23.36	23.33	26.67	0.4645
15	1	5		23.35	23.35	23.36		
15	5	0		23.72	23.77	23.64		
10	1	0	QPSK	23.44	23.52	23.40	26.50	0.4467
10	1	5		23.41	23.51	23.39		
10	6	0		23.60	23.55	23.50		
10	1	0	16-QAM	23.23	23.28	23.31	26.60	0.4571
10	1	5		23.30	23.29	23.29		
10	5	0		23.65	23.70	23.55		
5	1	0	QPSK	23.50	23.52	23.51	26.50	0.4467
5	1	5		23.52	23.46	23.46		
5	6	0		23.60	23.45	23.55		
5	1	0	16-QAM	23.33	23.31	23.31	26.62	0.4592
5	1	5		23.31	23.32	23.33		
5	5	0		23.70	23.69	23.72		
3	1	0	QPSK	23.53	23.56	23.57	26.53	0.4498
3	1	5		23.56	23.55	23.55		
3	6	0		23.63	23.58	23.58		
3	1	0	16-QAM	23.34	23.41	23.36	26.71	0.4688
3	1	5		23.32	23.36	23.38		
3	5	0		23.72	23.75	23.81		
1.4	1	0	QPSK	23.55	23.63	23.52	26.57	0.4539
1.4	1	5		23.56	23.66	23.51		
1.4	6	0		23.67	23.65	23.66		
1.4	1	0	16-QAM	23.40	23.45	23.37	26.69	0.4667
1.4	1	5		23.36	23.46	23.38		
1.4	5	0		23.77	23.79	23.69		
Limit	EIRP < 2W			Result			Pass	



LTE Band 4 Maximum Average Power [dBm] (GT - LC = 2.6 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
20	1	0	QPSK	22.62	22.52	22.21	25.22	0.3327
20	1	5		22.58	22.57	22.14		
20	6	0		22.62	22.61	22.19		
20	1	0	16-QAM	22.40	22.76	22.24	25.44	0.3499
20	1	5		22.35	22.65	22.18		
20	5	0		22.84	22.52	22.29		
15	1	0	QPSK	22.64	22.58	22.25	25.24	0.3342
15	1	5		22.60	22.59	22.21		
15	6	0		22.63	22.63	22.20		
15	1	0	16-QAM	22.44	22.78	22.26	25.49	0.3540
15	1	5		22.39	22.66	22.19		
15	5	0		22.89	22.55	22.31		
10	1	0	QPSK	22.65	22.62	22.30	25.26	0.3357
10	1	5		22.66	22.61	22.29		
10	6	0		22.64	22.66	22.31		
10	1	0	16-QAM	22.46	22.75	22.28	25.52	0.3565
10	1	5		22.45	22.64	22.22		
10	5	0		22.92	22.58	22.36		
5	1	0	QPSK	22.58	22.54	22.22	25.20	0.3311
5	1	5		22.56	22.55	22.13		
5	6	0		22.60	22.56	22.15		
5	1	0	16-QAM	22.35	22.72	22.20	25.36	0.3436
5	1	5		22.36	22.60	22.15		
5	5	0		22.76	22.48	22.26		
3	1	0	QPSK	22.55	22.48	22.20	25.16	0.3281
3	1	5		22.52	22.49	22.12		
3	6	0		22.56	22.51	22.10		
3	1	0	16-QAM	22.33	22.60	22.16	25.28	0.3373
3	1	5		22.31	22.56	22.12		
3	5	0		22.68	22.44	22.21		
1.4	1	0	QPSK	22.61	22.54	22.30	25.22	0.3327
1.4	1	5		22.58	22.55	22.25		
1.4	6	0		22.62	22.56	22.16		
1.4	1	0	16-QAM	22.40	22.68	22.21	25.30	0.3388
1.4	1	5		22.42	22.62	22.22		
1.4	5	0		22.70	22.46	22.26		
Limit	EIRP < 1W			Result			Pass	



LTE Band 5 Maximum Average Power [dBm] (GT - LC = 2.7 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)
10	1	0	QPSK	22.36	22.37	22.22	23.14	0.2061
10	1	5		22.32	22.59	22.23		
10	6	0		22.38	22.57	22.39		
10	1	0	16-QAM	22.42	22.34	22.34	23.34	0.2158
10	1	5		22.15	22.32	22.32		
10	5	0		22.51	22.63	22.79		
5	1	0	QPSK	22.38	22.49	22.28	23.15	0.2065
5	1	5		22.33	22.60	22.27		
5	6	0		22.40	22.55	22.45		
5	1	0	16-QAM	22.46	22.34	22.36	23.35	0.2163
5	1	5		22.25	22.36	22.31		
5	5	0		22.55	22.68	22.80		
3	1	0	QPSK	22.40	22.52	22.30	23.16	0.2070
3	1	5		22.36	22.61	22.33		
3	6	0		22.44	22.56	22.56		
3	1	0	16-QAM	22.52	22.38	22.37	23.40	0.2188
3	1	5		22.30	22.40	22.38		
3	5	0		22.61	22.72	22.85		
1.4	1	0	QPSK	22.30	22.54	22.32	23.16	0.2070
1.4	1	5		22.29	22.55	22.33		
1.4	6	0		22.41	22.61	22.46		
1.4	1	0	16-QAM	22.40	22.36	22.29	23.22	0.2099
1.4	1	5		22.20	22.44	22.32		
1.4	5	0		22.45	22.66	22.67		
Limit	ERP < 7W			Result			Pass	



LTE Band 12 Maximum Average Power [dBm] (GT - LC = 3.6 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)
10	1	0	QPSK	22.64	22.72	22.38	24.19	0.2624
10	1	5		22.68	22.60	22.37		
10	6	0		22.68	22.74	22.43		
10	1	0	16-QAM	22.61	22.71	22.31	24.24	0.2655
10	1	5		22.65	22.63	22.32		
10	5	0		22.75	22.76	22.79		
5	1	0	QPSK	22.68	22.65	22.41	24.21	0.2636
5	1	5		22.72	22.62	22.39		
5	6	0		22.71	22.76	22.45		
5	1	0	16-QAM	22.66	22.70	22.33	24.26	0.2667
5	1	5		22.68	22.65	22.36		
5	5	0		22.79	22.81	22.81		
3	1	0	QPSK	22.60	22.68	22.35	24.18	0.2618
3	1	5		22.64	22.58	22.31		
3	6	0		22.65	22.73	22.40		
3	1	0	16-QAM	22.56	22.66	22.29	24.19	0.2624
3	1	5		22.58	22.59	22.28		
3	5	0		22.64	22.70	22.74		
1.4	1	0	QPSK	22.70	22.66	22.43	24.22	0.2642
1.4	1	5		22.69	22.65	22.45		
1.4	6	0		22.77	22.77	22.55		
1.4	1	0	16-QAM	22.68	22.71	22.36	24.28	0.2679
1.4	1	5		22.65	22.68	22.38		
1.4	5	0		22.80	22.83	22.70		
Limit	ERP < 3W			Result			Pass	



LTE Band 13 Maximum Average Power [dBm] (GT - LC = 2.3 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	ERP (dBm)	ERP (W)
10	1	0	QPSK	-	22.84	-	23.02	0.2004
10	1	5			22.86			
10	6	0			22.87			
10	1	0	16-QAM	-	22.68	-	23.16	0.2070
10	1	5			22.65			
10	5	0			23.01			
5	1	0	QPSK	22.71	22.85	22.45	23.05	0.2018
5	1	5		22.73	22.89	22.46		
5	6	0		22.74	22.90	22.69		
5	1	0	16-QAM	22.62	22.71	22.51	23.20	0.2089
5	1	5		22.64	22.72	22.48		
5	5	0		22.79	23.05	22.71		
Limit	ERP < 3W			Result			Pass	



Appendix B. Test Results of Radiated Test

LTE Cat-M1 Band 5

LTE Cat-M1 Band 5 / 10MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1649	-31.62	-13	-18.62	-42.02	-35.08	3.88	9.49	H
	2473	-39.81	-13	-26.81	-54.51	-43.41	4.80	10.55	H
	3298	-40.89	-13	-27.89	-57.81	-45.37	5.55	12.19	H
	4122	-41.87	-13	-28.87	-61.7	-46.19	6.28	12.74	H
	4947	-49.96	-13	-36.96	-71.9	-53.23	7.39	12.81	H
									H
									H
	1649	-38.22	-13	-25.22	-48.75	-41.68	3.88	9.49	V
	2473	-40.22	-13	-27.22	-55.27	-43.82	4.80	10.55	V
	3298	-41.66	-13	-28.66	-59.06	-46.14	5.55	12.19	V
	4122	-44.81	-13	-31.81	-64.48	-49.13	6.28	12.74	V
	4947	-52.65	-13	-39.65	-74.76	-55.92	7.39	12.81	V
								V	
Middle	1664	-28.80	-13	-15.80	-39.27	-32.33	3.90	9.58	H
	2496	-32.70	-13	-19.70	-47.37	-36.32	4.83	10.59	H
	3328	-36.78	-13	-23.78	-53.66	-41.36	5.58	12.31	H
	4160	-37.11	-13	-24.11	-57.02	-41.46	6.30	12.80	H
	4992	-46.86	-13	-33.86	-68.69	-49.95	7.47	12.72	H
									H
									H
	1664	-34.48	-13	-21.48	-45.08	-38.01	3.90	9.58	V
	2496	-38.14	-13	-25.14	-53.24	-41.76	4.83	10.59	V
	3328	-37.56	-13	-24.56	-54.93	-42.14	5.58	12.31	V
	4160	-42.58	-13	-29.58	-62.34	-46.93	6.30	12.80	V
	4992	-50.04	-13	-37.04	-71.74	-53.13	7.47	12.72	V
								V	



Highest	1679	-26.64	-13	-13.64	-37.19	-30.25	3.92	9.67	H
	2518	-33.73	-13	-20.73	-48.42	-37.44	4.85	10.71	H
	3358	-35.06	-13	-22.06	-51.9	-39.72	5.61	12.42	H
	4197	-36.14	-13	-23.14	-56.16	-40.46	6.33	12.80	H
	5037	-48.02	-13	-35.02	-69.98	-50.99	7.51	12.63	H
									H
									H
	1679	-31.17	-13	-18.17	-41.7	-34.78	3.92	9.67	V
	2518	-34.83	-13	-21.83	-49.89	-38.54	4.85	10.71	V
	3358	-37.00	-13	-24.00	-54.35	-41.66	5.61	12.42	V
	4197	-41.83	-13	-28.83	-61.69	-46.15	6.33	12.80	V
	5037	-49.93	-13	-36.93	-71.93	-52.9	7.51	12.63	V
									V
									V

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



LTE Cat-M1 Band 25

LTE Cat-M1 Band 25 / 20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3702	-39.01	-13	-26.01	-57.59	-45.38	5.93	12.30	H
	5553	-49.66	-13	-36.66	-73.38	-55.22	7.74	13.31	H
	7404	-47.45	-13	-34.45	-77.82	-49.93	8.72	11.20	H
									H
									H
									H
									H
	3702	-37.28	-13	-24.28	-55.91	-43.65	5.93	12.30	V
	5553	-51.64	-13	-38.64	-75.67	-57.2	7.74	13.31	V
	7404	-46.77	-13	-33.77	-77.05	-49.25	8.72	11.20	V
									V
									V
									V
									V
Middle	3742	-38.97	-13	-25.97	-57.62	-45.31	5.96	12.30	H
	7613	-52.58	-13	-39.58	-76.13	-55.39	8.81	11.63	H
	7484	-47.62	-13	-34.62	-77.68	-50.07	8.75	11.20	H
									H
									H
									H
									H
	3742	-40.42	-13	-27.42	-59.16	-46.76	5.96	12.30	V
	7613	-53.29	-13	-40.29	-77.31	-56.1	8.81	11.63	V
	7484	-47.52	-13	-34.52	-77.5	-49.97	8.75	11.20	V
									V
									V
									V
									V



Highest	3792	-43.38	-13	-30.38	-62.12	-49.67	6.01	12.30	H
	5688	-53.20	-13	-40.20	-76.92	-58.85	7.85	13.50	H
	7584	-47.60	-13	-34.60	-77.03	-50.34	8.80	11.54	H
									H
									H
									H
									H
	3792	-42.31	-13	-29.31	-61.19	-48.6	6.01	12.30	V
	5688	-52.50	-13	-39.50	-76.67	-58.15	7.85	13.50	V
	7584	-47.04	-13	-34.04	-77.07	-49.78	8.80	11.54	V
									V
									V
									V
									V

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



LTE Cat-M1 Band 4

LTE Cat-M1 Band 4 / 20MHz / QPSK									
Channel	Frequency (MHz)	EIRP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	3422	-35.60	-13	-22.60	-53.4	-42.43	5.67	12.50	H
	5133	-53.47	-13	-40.47	-75.94	-58.39	7.55	12.47	H
	6844	-49.22	-13	-36.22	-77.76	-52.99	8.44	12.21	H
									H
									H
									H
									H
	3422	-40.27	-13	-27.27	-58.55	-47.1	5.67	12.50	V
	5133	-54.44	-13	-41.44	-76.92	-59.36	7.55	12.47	V
	6844	-49.79	-13	-36.79	-78.28	-53.56	8.44	12.21	V
									V
									V
									V
									V
Middle	3447	-39.12	-13	-26.12	-57.14	-45.93	5.69	12.50	H
	5170	-54.05	-13	-41.05	-76.65	-59.15	7.56	12.66	H
	6894	-49.30	-13	-36.30	-77.63	-52.85	8.48	12.02	H
									H
									H
									H
									H
	3447	-38.98	-13	-25.98	-57.43	-45.79	5.69	12.50	V
	5170	-54.69	-13	-41.69	-77.29	-59.79	7.56	12.66	V
	6894	-49.47	-13	-36.47	-78.14	-53.02	8.48	12.02	V
									V
									V
									V
									V
								V	



Highest	3472	-38.38	-13	-25.38	-56.61	-45.12	5.71	12.46	H
	5208	-54.42	-13	-41.42	-77.18	-59.79	7.58	12.95	H
	6944	-49.65	-13	-36.65	-77.74	-53.05	8.51	11.91	H
									H
									H
									H
									H
	3472	-39.07	-13	-26.07	-57.67	-45.81	5.71	12.46	V
	5208	-54.95	-13	-41.95	-77.69	-60.32	7.58	12.95	V
	6944	-48.65	-13	-35.65	-77.48	-52.05	8.51	11.91	V
									V
									V
									V
									V

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



LTE Cat-M1 Band 13

LTE Cat-M1 Band 13 / 10MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1555	-33.55	-13	-20.55	-43.9	-36.47	3.77	8.84	H
	2332	-39.29	-13	-26.29	-54.21	-42.22	4.65	9.73	H
	3110	-50.76	-13	-37.76	-67.65	-54.53	5.38	11.30	H
	3887	-54.46	-13	-41.46	-73.39	-58.41	6.10	12.20	H
									H
									H
									H
	1555	-32.31	-13	-19.31	-42.78	-35.23	3.77	8.84	V
	2332	-35.29	-13	-22.29	-50.5	-38.22	4.65	9.73	V
	3110	-52.39	-13	-39.39	-69.47	-56.16	5.38	11.30	V
	3887	-54.80	-13	-41.80	-73.74	-58.75	6.10	12.20	V
									V
									V
									V

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



LTE Cat-M1 Band 13

LTE Cat-M1 Band 13 / 5MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1554	-43.83	-13	-30.83	-54.14	-46.74	3.77	8.83	H
	2332	-38.78	-13	-25.78	-53.65	-41.71	4.65	9.73	H
	3109	-54.49	-13	-41.49	-71.36	-58.26	5.38	11.30	H
									H
									H
									H
									H
	1554	-51.29	-13.00	-38.29	-61.72	-54.20	3.77	8.83	V
	2332	-37.98	-13	-24.98	-53.14	-40.91	4.65	9.73	V
	3109	-55.36	-13	-42.36	-72.43	-59.13	5.38	11.30	V
									V
									V
									V
									V
Middle	1559	-44.66	-42.15	-2.51	-54.96	-47.60	3.78	8.87	H
	2339	-40.48	-13	-27.48	-55.34	-43.43	4.66	9.76	H
	3119	-52.26	-13	-39.26	-69.16	-56.02	5.39	11.30	H
									H
									H
									H
									H
	1559	-45.37	-42.15	-3.22	-55.78	-48.31	3.78	8.87	V
	2339	-40.37	-13	-27.37	-55.50	-43.32	4.66	9.76	V
	3119	-54.66	-13	-41.66	-71.78	-58.42	5.39	11.30	V
									V
									V
									V
									V
								V	



Highest	1564	-44.47	-42.15	-2.32	-53.76	-47.45	3.78	8.91	H
	2347	-39.98	-13	-26.98	-54.84	-42.95	4.66	9.79	H
	3129	-53.54	-13	-40.54	-70.46	-57.29	5.40	11.30	H
									H
									H
									H
									H
	1564	-46.79	-42.15	-4.64	-57.20	-49.77	3.78	8.91	V
	2347	-37.49	-13	-24.49	-52.60	-40.46	4.66	9.79	V
	3129	-58.25	-13	-45.25	-75.42	-62.00	5.40	11.30	V
									V
									V
									V
									V

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



LTE Cat-M1 Band 12

LTE Cat-M1 Band 12 / 10MHz / QPSK									
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	SPA Reading (dBm)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1399	-31.66	-13.00	-18.66	-41.72	-33.33	3.57	7.39	H
	2098	-39.08	-13.00	-26.08	-52.90	-42.25	4.40	9.72	H
	2798	-51.40	-13.00	-38.40	-67.49	-55.15	5.10	11.00	H
									H
									H
									H
									H
	1399	-34.47	-13.00	-21.47	-44.55	-36.14	3.57	7.39	V
	2098	-40.86	-13.00	-27.86	-55.20	-44.03	4.40	9.72	V
	2798	-51.96	-13.00	-38.96	-68.22	-55.71	5.10	11.00	V
									V
									V
									V
									V
Middle	1406	-37.65	-13.00	-24.65	-47.75	-39.34	3.58	7.42	H
	2109	-43.79	-13.00	-30.79	-57.72	-46.86	4.41	9.63	H
	2812	-53.74	-13.00	-40.74	-69.87	-57.48	5.11	11.00	H
									H
									H
									H
									H
	1406	-37.86	-13.00	-24.86	-47.98	-39.55	3.58	7.42	V
	2109	-45.30	-13.00	-32.30	-59.77	-48.37	4.41	9.63	V
	2812	-53.72	-13.00	-40.72	-70.00	-57.46	5.11	11.00	V
									V
									V
									V
									V
								V	



Highest	1413	-34.89	-13.00	-21.89	-45.02	-36.60	3.59	7.45	H
	2119	-39.16	-13.00	-26.16	-53.22	-42.14	4.42	9.55	H
	2826	-53.92	-13.00	-40.92	-70.10	-57.65	5.12	11.00	H
									H
									H
									H
									H
	1413	-35.06	-13.00	-22.06	-45.22	-36.77	3.59	7.45	V
	2119	-41.41	-13.00	-28.41	-56.02	-44.39	4.42	9.55	V
	2826	-49.91	-13.00	-36.91	-66.22	-53.64	5.12	11.00	V
									V
									V
									V
									V

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