FCC RF Test Report

APPLICANT	:	CHEP
EQUIPMENT	:	Asset Tracker
BRAND NAME	:	CHEP
MODEL NAME	:	Gen 4 Ultra Short
FCC ID	:	2APRD-GEN4SHORT
STANDARD	:	47 CFR Part 90(S)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
Test Date(s)	:	Jul. 19, 2024 ~ Aug. 06, 2024

This product installed a RF module (Brand Name: Quectel, Model Name: BG95-M3, FCC ID: XMR201910BG95M3) during the test, only Conducted Power, ERP/EIRP and RSE test items are tested in this report, all the other test results are leveraged from module RF report.

We, Sporton International Inc. (ShenZhen), would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.26-2015 and shown compliance with the applicable technical standards.
The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (ShenZhen), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

Sporton International Inc. (ShenZhen)
1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG470213C	Rev. 01	Initial issue of report	Aug. 23, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	§2.1046	Conducted Output Power	—	PASS	-
-	§2.1049 §90.209	Occupied Bandwidth and 26dB Bandwidth	—	PASS	1
-	§2.1051 §90.691	Emission masks – In-band emissions	< $50+10\log_{10}$(P[Watts])	PASS	1
-	§2.1051 §90.691	Emission masks – Out of band emissions	< $43+10\log_{10}$(P[Watts])	PASS	1
3.2	§2.1053 §90.691	Field Strength of Spurious Radiation	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 28.29 dB at 1632.00 MHz
-	§2.1055 §90.213	Frequency Stability for Temperature & Voltage	< 2.5 ppm	PASS	1

Remark 1: Test results are leveraged from module RF report No “R1907A0446-R8”.

Conformity Assessment Condition:
1. The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account. 2. The measurement uncertainty please refer to each test result in the section “Measurement Uncertainty”
Disclaimer:
The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.

1 General Description

1.1 Applicant

CHEP
2901 Tasman Drive Suite 101 Santa Clara, CA 95054

1.2 Manufacturer

MINEWING VIET NAM ELECTRONICS CO., LTD
Lot CN2, Yen Phong industrial park, Dong Phong commune and, Long Chau commune, Yen Phong District, Bac Ninh province, Vietnam

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Asset Tracker
Brand Name	CHEP
Model Name	Gen 4 Ultra Short
FCC ID	2APRD-GEN4SHORT
IMEI Code	866901065466072
HW Version	v14
SW Version	v10.00.0002
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	814 ~ 824 MHz
Rx Frequency	859 ~ 869 MHz
Bandwidth	1.4MHz / 3MHz / 5MHz / 10MHz
Maximum Output Power to Antenna	19.58 dBm
Antenna Gain	1.6 dBi
Type of Modulation	LTE Cat M1: QPSK / 16QAM

Note: LTE Band 26 only support Cat M1.

1.5 Modification of EUT

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

1.6 Maximum Conducted Power and Emission Designator

LTE Band 26		QPSK	16QAM
BW (MHz)	Frequency Range (MHz)	Maximum Conducted power (W)	Maximum Conducted power (W)
1.4	814.7 ~ 823.3	0.0891	0.0902
3	815.5 ~ 822.5	0.0906	0.0891
5	816.5 ~ 821.5	0.0908	0.0889
10	819.0	0.0881	0.0879

1.7 Testing Site

Sporton International Inc. (ShenZhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	TH01-SZ	CN1256	421272

Test Firm	Sporton International Inc. (ShenZhen)		
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City, Guangdong Province 518103 People's Republic of China TEL: +86-755-86066985		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH03-SZ	CN1256	421272

1.8 Test Software

Item	Site	Manufacture	Name	Version
1.	03CH03-SZ	AUDIX	E3	6.2009-8-24

1.9 Applied Standards

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

- 47 CFR 90(S)
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 971168 D02 Misc Rev Approv License Devices v02r01

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

2 Test Configuration of Equipment Under Test

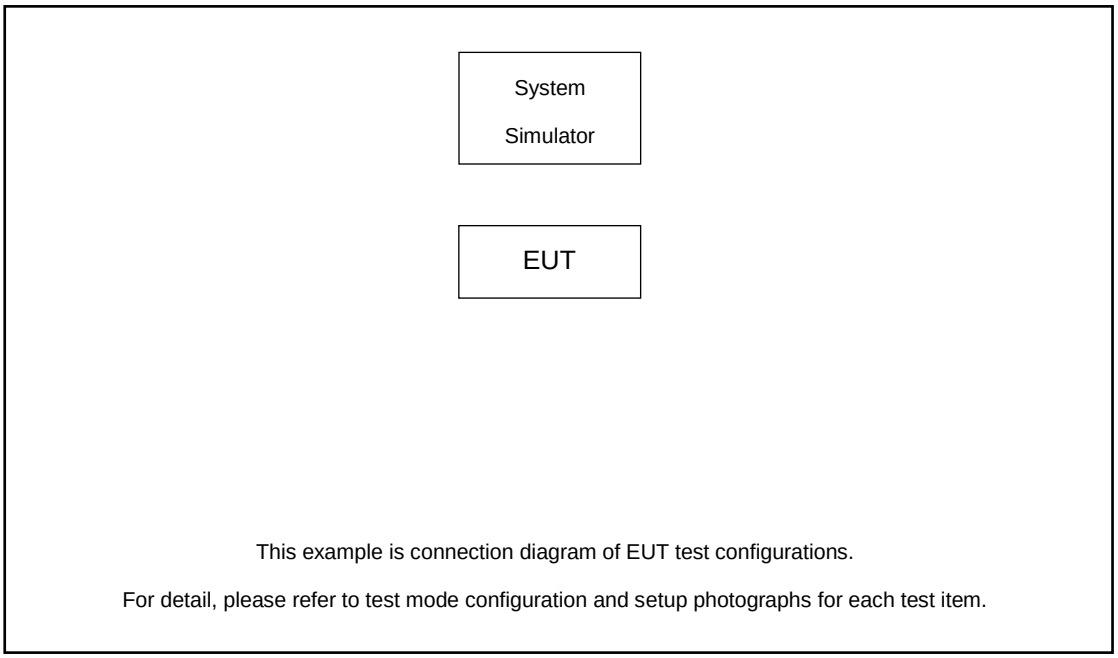
2.1 Test Mode

During all testing, EUT is in link mode with base station emulator at maximum power level. The spurious emission measurements were carried out in semi-anechoic chamber with 3-meter test range, and EUT is rotated on three test planes to find out the worst emission.

Frequency range investigated for radiated emission is 30 MHz to 9000 MHz.

Test Items	Band	Bandwidth (MHz)						Modulation				RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16 QAM	64 QAM	256 QAM	1	Half	Full	L	M	H
Max. Output Power	26	v	v	v	v	v	-	v	v	-	-	v	v	v	v	v	v
Radiated Spurious Emission	26			v	v	v	-	v		-	-	v			v	v	v
Note	1. The mark "**v** " means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported. 3. LTE Band26 transmit frequency for part22 rule is 824MHz-849MHz, for part90 rule is 814MHz-824MHz. ERP over 15MHz bandwidth complies the ERP limit line of part22 rule, therefore ERP of the partial frequency spectrum which falls within part 22 also complies. 4. For QAM modulation mode, the whole testing has assessed 16QAM&64QAM mode by referring to the higher conducted power.																

2.2 Connection Diagram of Test System



This example is connection diagram of EUT test configurations.

For detail, please refer to test mode configuration and setup photographs for each test item.

2.3 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model No.	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 26 Channel and Frequency List				
BW [MHz]	**Channel/ Frequency(MHz)**	**Lowest**	**Middle**	**Highest**
10	Channel	-	26740	-
	Frequency	-	819	-
5	Channel	26715	26740	26765
	Frequency	816.5	819	821.5
3	Channel	26705	26740	26775
	Frequency	815.5	819	822.5
1.4	Channel	26697	26740	26783
	Frequency	814.7	819	823.3

3 Test Result

3.1 Conducted Output Power Measurement

3.1.1 Description of the Conducted Output Power Measurement

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

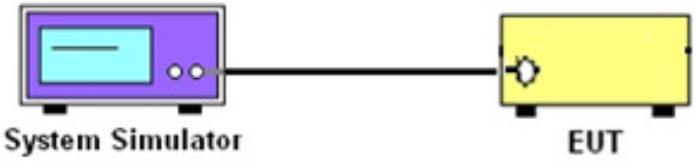
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 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.

3.1.4 Test Setup



3.1.5 Test Result of Conducted Output Power

Please refer to Appendix A.

3.2 Field Strength of Spurious Radiation Measurement

3.2.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI C63.26. The power of any emission FCC Part 90.691 on any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth at least 43 + 10 log (P) dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.2.2 Measuring Instruments

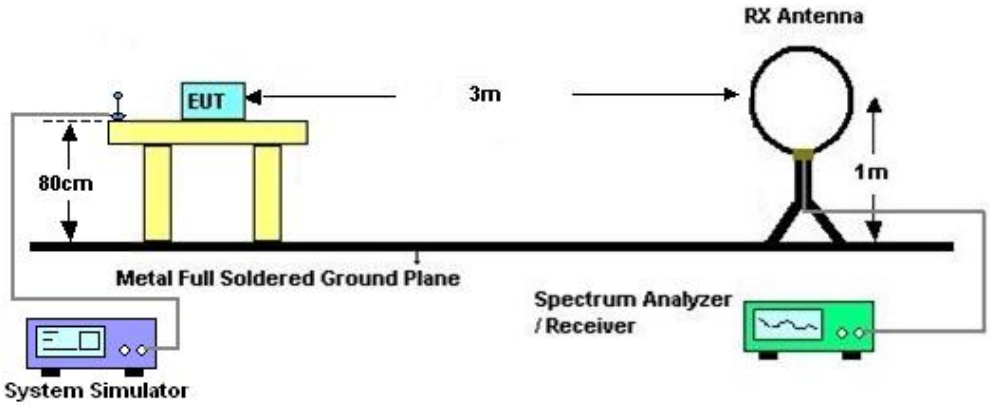
The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

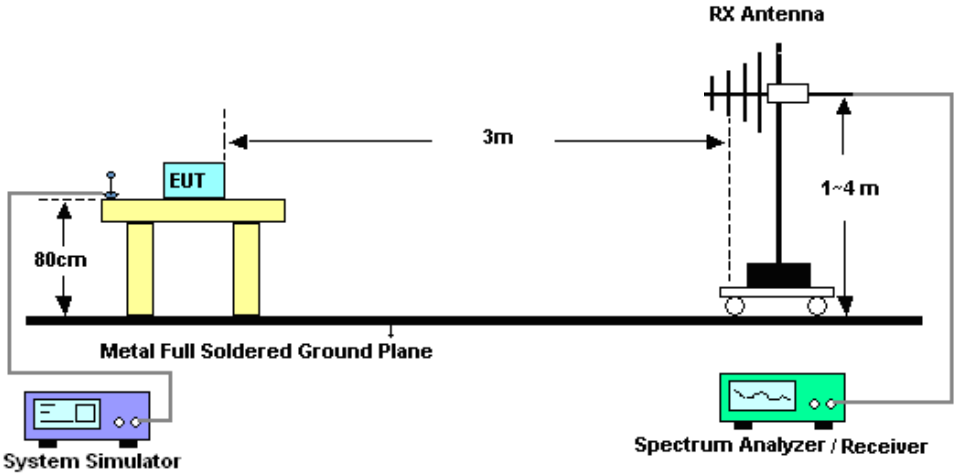
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position 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, Sweep = 500ms, 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. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
11. ERP (dBm) = EIRP - 2.15
12. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
13. The limit line is derived from 43 + 10log(P) dB below the transmitter power P(Watts)

3.2.4 Test Setup

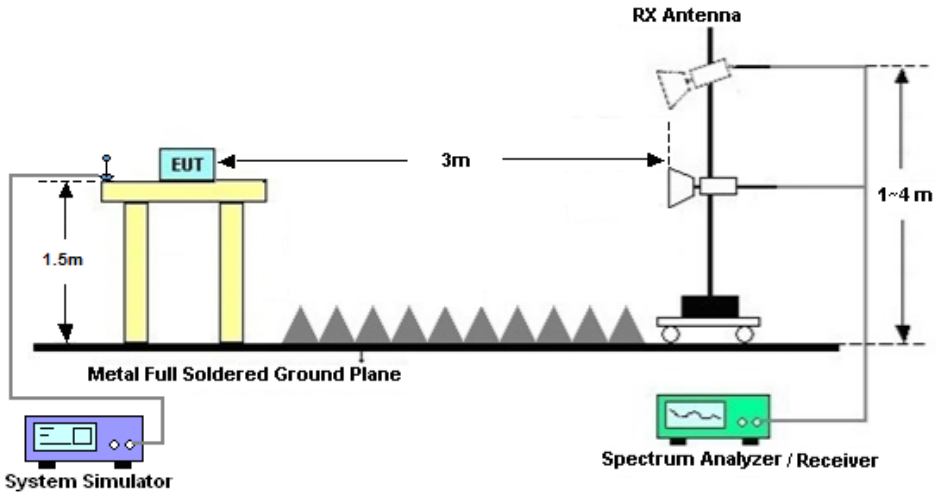
For radiated test from 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



3.2.5 Test Result of Field Strength of Spurious Radiated

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.

Please refer to Appendix B.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101078	10Hz~40GHz	Apr. 09, 2024	Aug. 06, 2024	Apr. 08, 2025	Conducted (TH01-SZ)
DC Power Supply	TTI	PL330P	290070	Max 32V，3A	Oct. 16, 2023	Aug. 06, 2024	Oct. 15, 2024	Conducted (TH01-SZ)
Power Divider	TOJOIN	PS-2SM-04265	60.06.020.0077	0.4GHz~26.5GHz	Dec. 25, 2023	Aug. 06, 2024	Dec. 24, 2024	Conducted (TH01-SZ)
Thermal Chamber	Ten Billion Hongzhangroup	LP-150U	H2014081803	-40~+150°C	Jul. 03, 2024	Aug. 06, 2024	Jul. 02, 2025	Conducted (TH01-SZ)
EMI Test Receiver&SA	KEYSIGHT	N9038A	MY54450083	20Hz~8.4GHz	Apr. 09, 2024	Jul. 19, 2024	Apr. 08, 2025	Radiation (03CH03-SZ)
EXA Spectrum Anaiyzer	KEYSIGHT	N9010A	MY55150246	10Hz~44GHz;	Apr. 09, 2024	Jul. 19, 2024	Apr. 08, 2025	Radiation (03CH03-SZ
Loop Antenna	R&S	HFH2-Z2	100354	9kHz~30MHz	Jun. 27, 2024	Jul. 19, 2024	Jun. 26, 2025	Radiation (03CH03-SZ)
Bilog Antenna	TeseQ	CBL6112D	35408	30MHz-2GHz	Aug. 20, 2023	Jul. 19, 2024	Aug. 19, 2025	Radiation (03CH03-SZ)
Double Ridge Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-1355	1GHz~18GHz	Apr. 09, 2024	Jul. 19, 2024	Apr. 08, 2025	Radiation (03CH03-SZ)
Amplifier	Burgeon	BPA-530	102211	0.01Hz ~3000MHz	Oct. 18, 2023	Jul. 19, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Amplifier	Agilent Technologies	83017A	MY39501302	500MHz~26.5GHz	Dec. 27, 2023	Jul. 19, 2024	Dec. 26, 2024	Radiation (03CH03-SZ)
AC Power Source	Chroma	61601	616010002729	N/A	Oct. 18, 2023	Jul. 19, 2024	Oct. 17, 2024	Radiation (03CH03-SZ)
Turn Table	EM	EM1000	N/A	0~360 degree	NCR	Jul. 19, 2024	NCR	Radiation (03CH03-SZ)
Antenna Mast	EM	EM1000	N/A	1 m~4 m	NCR	Jul. 19, 2024	NCR	Radiation (03CH03-SZ)

NCR: No Calibration Required

5 Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI 63.26-2015. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence. The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Measurement

Test Item	Uncertainty
Conducted Power	±1.34 dB

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.0dB

Uncertainty of Radiated Emission Measurement (1 GHz ~ 18 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.6dB

---------- THE END ----------

Appendix A. Test Results of Conducted Test

Test Engineer :	Khan Zhen	Temperature :	22~23℃
		Relative Humidity :	40~42%

Conducted Output Power (Average power)

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.
Channel					26740	
Frequency (MHz)					819	
10	QPSK	1	0		19.41	
10	QPSK	1	5		19.32	
10	QPSK	3	0		19.45	
10	QPSK	3	3		19.42	
10	QPSK	6	0		19.28	
10	16QAM	1	0		19.44	
Channel				26715	26740	26765
Frequency (MHz)				816.5	819	821.5
5	QPSK	1	0	19.58	19.50	19.32
5	16QAM	1	0	19.49	19.40	19.22
Channel				26705	26740	26775
Frequency (MHz)				815.5	819	822.5
3	QPSK	1	0	19.57	19.53	19.22
3	16QAM	1	0	19.50	19.43	19.17
Channel				26697	26740	26783
Frequency (MHz)				814.7	819	823.3
1.4	QPSK	1	0	19.50	19.48	19.26
1.4	16QAM	1	0	19.55	19.37	19.25

Appendix B. Test Results of Radiated Test

Radiated Spurious Emission

Test Engineer :	Jia Kuang	Temperature :	22~25℃
		Relative Humidity :	48~52%

LTE Band 26 / 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	1640	-60.70	-13	-47.70	-66.99	-63.93	3.98	9.36	H
	2424	-55.34	-13	-42.34	-65.81	-58.89	4.85	10.55	H
	3192	-60.65	-13	-47.65	-73.82	-65.58	5.50	12.58	H
	1640	-60.27	-13	-47.27	-66.51	-63.50	3.98	9.36	V
	2456	-61.40	-13	-48.40	-72.15	-64.95	4.85	10.55	V
	3192	-62.46	-13	-49.46	-76.23	-67.39	5.50	12.58	V
Middle	1632	-59.76	-13	-46.76	-66.07	-63.01	4.00	9.40	H
	2464	-59.87	-13	-46.87	-70.23	-63.44	4.88	10.60	H
	3264	-64.16	-13	-51.16	-76.84	-69.09	5.52	12.60	H
	1640	-57.00	-13	-44.00	-63.24	-60.25	4.00	9.40	V
	2464	-64.02	-13	-51.02	-74.74	-67.59	4.88	10.60	V
	3264	-63.55	-13	-50.55	-76.74	-68.48	5.52	12.60	V
Highest	1640	-59.46	-13	-46.46	-65.75	-62.63	4.10	9.42	H
	2472	-62.05	-13	-49.05	-72.40	-65.63	4.90	10.63	H
	3296	-63.57	-13	-50.57	-76.00	-68.49	5.55	12.62	H
	1648	-54.07	-13	-41.07	-60.23	-57.24	4.10	9.42	V
	2472	-58.78	-13	-45.78	-69.49	-62.36	4.90	10.63	V
	3296	-64.02	-13	-51.02	-76.91	-68.94	5.55	12.62	V

LTE Band 26 / 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	1632	-41.29	-13	-28.29	-47.60	-44.54	4.00	9.40	H
	2440	-48.07	-13	-35.07	-58.49	-51.64	4.88	10.60	H
	3256	-47.60	-13	-34.60	-60.35	-52.53	5.52	12.60	H
	4072	-54.49	-13	-41.49	-69.98	-58.96	6.00	12.62	H
	1632	-42.08	-13	-29.08	-48.41	-45.33	4.00	9.40	V
	2440	-49.82	-13	-36.82	-60.63	-53.39	4.88	10.60	V
	3256	-47.21	-13	-34.21	-60.48	-52.14	5.52	12.60	V
	4120	-59.89	-13	-46.89	-75.57	-64.36	6.00	12.62	V

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