FCC RF Test Report

APPLICANT	:	Viavi Solutions Inc.
EQUIPMENT	:	5G Sub-6 GHz M.2 Module with WCDMA and LTE
BRAND NAME	:	VIAVI
MODEL NAME	:	RM520N-GL
FCC ID	:	WUW-RM520NGL
STANDARD	:	47 CFR Part 90(R)
CLASSIFICATION	:	PCS Licensed Transmitter (PCB)
TEST DATE(S)	:	Jul. 30, 2024

The product was installed into a host (Brand Name: VIAVI, Model Name: NXE-DEVICE-4M) during the test, only Conducted Power, ERP and RSE test items are tested in this report.

We, Sporton International Inc. (Kunshan), 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. (Kunshan), the test report shall not be reproduced except in full.

Jason Jia

Approved by: Jason Jia

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FG452001E	Rev. 01	Initial issue of report	Dec. 18, 2024

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.2	§2.1046	Conducted Output Power	—	Reporting only	-
	§90.542 (a)(7)	Effective Radiated Power	ERP < 3Watt	PASS	-
-	-	Peak-to-Average Ratio	—	Reporting only	1
-	§2.1049	Occupied Bandwidth	—	Reporting only	1
-	§2.1053 §90.543 (e)(2)(3)	Conducted Band Edge Measurement	Refer standard	PASS	1
-	§2.1051 §90.210(n)	Emission Mask	Mask B	PASS	1
-	§2.1053 §90.543 (e)(3)	Conducted Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	1
-	§2.1055 §90.539 (e)	Frequency Stability Temperature & Voltage	< ±1.25 ppm	PASS	1
4.4	§2.1053 §90.543 (e)(3) §90.543 (f)	Radiated Spurious Emission	< $43+10\log_{10}$(P[Watts])	PASS	Under limit 11.55 dB at 1584.000 MHz

Remark 1: Test results are leveraged from module RF report No “SEWA2204000008RG01”

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

Viavi Solutions Inc.
1445 South Spectrum Boulevard, Suite 102, Chandler, Arizona 85286

1.2 Manufacturer

Viavi Solutions Inc.
1445 South Spectrum Boulevard, Suite 102, Chandler, Arizona 85286

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	5G Sub-6 GHz M.2 Module with WCDMA and LTE
Brand Name	VIAVI
Model Name	RM520N-GL
FCC ID	WUW-RM520NGL
Tx Frequency	LTE Band 14: 788 MHz ~ 798 MHz
Rx Frequency	LTE Band 14: 758 MHz ~ 768 MHz
Bandwidth	5MHz / 10MHz
Maximum Output Power to Antenna	**< Module A>** **<Ant.0>** 23.23 **< Module B>** **<Ant.0>** 23.32 **< Module C>** **<Ant.0>** 23.13 **< Module D>** **<Ant.0>** 23.28
Antenna Gain	**<Module A/B/C/D>** **<Ant.0>** 6.0dBi
Type of Modulation	QPSK / 16QAM / 64QAM / 256QAM
EUT Stage	Identical Prototype

Host Product Feature	
Equipment	XEDGE 2.0
Brand Name	VIAVI
Model Name	NXE-DEVICE-4M
IMEI Code	Conducted : IMEI A: 868371051639645 IMEI B: 868371051635213 IMEI C: 868371051635338 IMEI D: 868371051639819 Radiation : IMEI A: 868371051120539 IMEI B: 868371051121032 IMEI C: 868371051143184 IMEI D: 868371051635312
Applicant	**Viavi Solutions Inc.** 1445 South Spectrum Boulevard, Suite 102, Chandler, Arizona 85286
Manufacturer	**Viavi Solutions Inc.** 1445 South Spectrum Boulevard, Suite 102, Chandler, Arizona 85286

Remark:

1. The maximum ERP is calculated from max output power and max antenna gain, so only the maximum ERP of Antenna 0 for Band14 (Modem B) is shown in the report.
2. The four Modules are the same include Power setting, but we still verified the real power, which is within the uncertainty range, so we chose the module of the higher power for testing, each Module has four antennas, for LTE band14, only Ant.0 supports TX/RX function, the others are RX only.
3. For RSE testing, we choice the module of the higher conducted Power to test, because between four modules do not support MIMO mode.

1.4 Maximum ERP Power

LTE Band 14		QPSK		16QAM/64QAM/256QAM	
BW (MHz)	**Frequency Range (MHz)**	**Maximum ERP(W)**	**Emission Designator (99%OBW)**	**Maximum ERP(W)**	**Emission Designator (99%OBW)**
5	**790.5~795.5**	0.5105	-	0.3999	-
10	**793**	0.5212	-	0.4083	-

1.5 Testing Site

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	**Sporton Site No.**	**FCC Designation No.**	**FCC Test Firm Registration No.**
	03CH04-KS TH01-KS	CN1257	314309

1.6 Test Software

Item	Site	Manufacture	Name	Version
1.	TH01-KS	SPORTON	FCC LTE_Ver2.0 Auto_china_210503	2.0
2.	03CH04-KS	AUDIX	E3	210616

1.7 Applied Standards

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

- 47 CFR Part 90(R)
- ANSI C63.26
- KDB 971168 D01 Power Meas License Digital Systems v03r01
- KDB 412172 D01 Determining ERP and EIRP v01r01

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

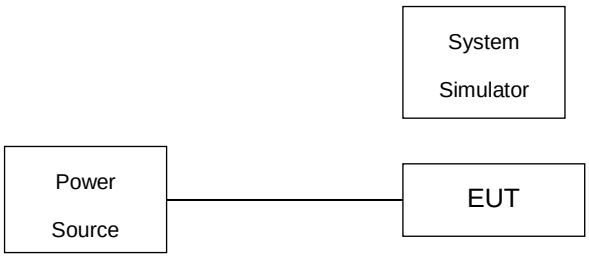
2.1 Test Mode

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.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission. (Y Plane)

Conducted Test Cases	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	14	-	-	v	-	-	-	v	v			v	v	v	v	v	v
	14	-	-		v	-	-	v	v	v	v	v	v	v		v	
E.R.P	14	-	-	v		-	-	v	v			v			v	v	v
	14	-	-		v	-	-	v	v	v	v	v				v	
Radiated Spurious Emission	14	Worse Case													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. 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.																

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.	LTE Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m

2.4 Frequency List of Low/Middle/High Channels

LTE Band 14 Channel and Frequency List				
BW [MHz]	Channel/Frequency(MHz)	Lowest	Middle	Highest
10	Channel	-	23330	-
	Frequency	-	793	-
5	Channel	23305	23330	23355
	Frequency	790.5	793	795.5

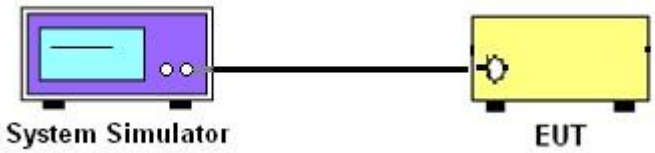
3 Conducted Test Items

3.1 Measuring Instruments

See list of measuring instruments of this test report.

3.1.1 Test Setup

3.1.2 Conducted Output Power



3.2 Conducted Output Power and ERP

3.2.1 Description of the Conducted Output Power Measurement and ERP

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

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 14.

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 testing follows ANSI C63.26 Section 5.2
2. The transmitter output port was connected to the system simulator.
3. Set EUT at maximum power through the system simulator.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure and record the power level from the system simulator.

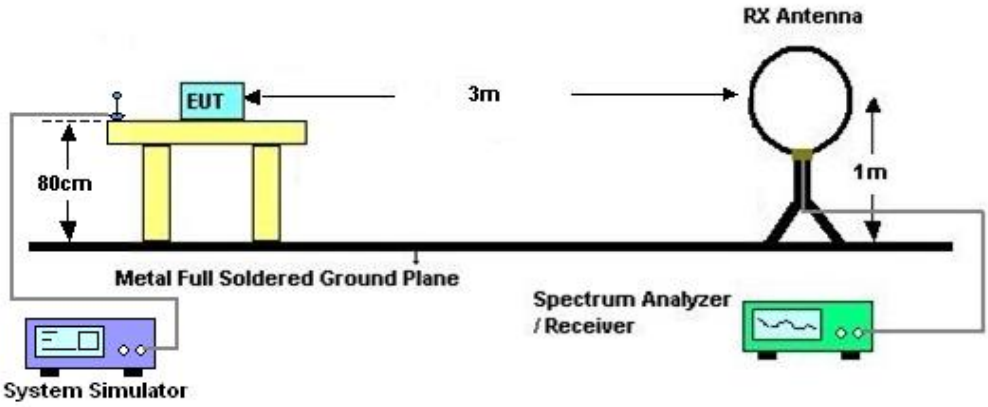
4 Radiated Test Items

4.1 Measuring Instruments

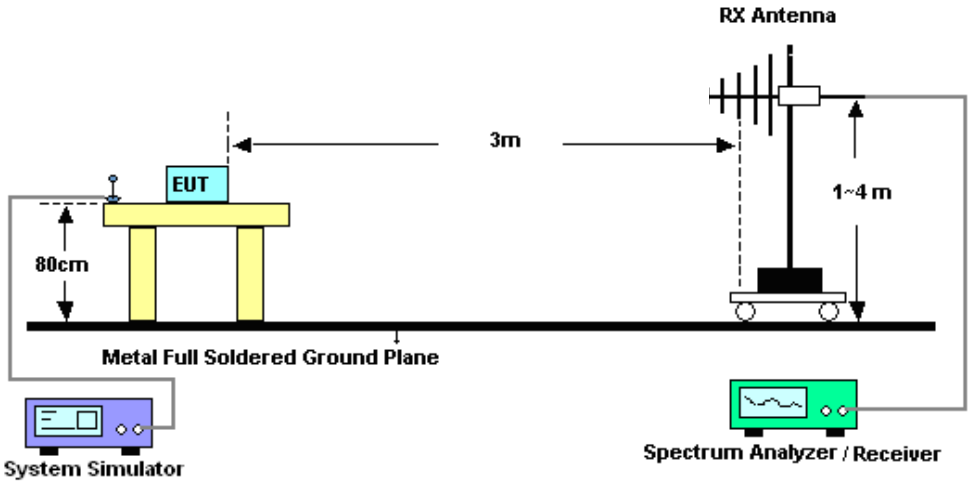
See list of measuring instruments of this test report.

4.2 Test Setup

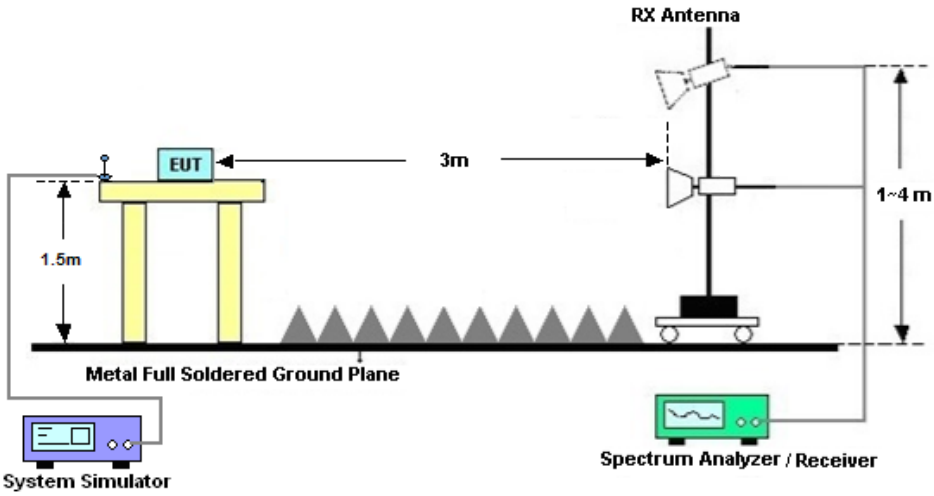
4.2.1 For radiated test below 30MHz



4.2.2 For radiated test from 30MHz to 1GHz



4.2.3 For radiated test above 1GHz



4.3 Test Result of Radiated Test

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.

4.4 Radiated Spurious Emission Measurement

4.4.1 Description of Radiated Spurious Emission

The radiated spurious emission was measured by substitution method according to ANSI C63.26. 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 operations in the 758-775 MHz and 788-805 MHz bands, all emissions including harmonics 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. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

4.4.2 Test Procedures

1. The testing follows ANSI C63.26 Section 5.5
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.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain
10. ERP (dBm) = EIRP - 2.15
11. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
    The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)
    = P(W)- [43 + 10log(P)] (dB)
    = [30 + 10log(P)] (dBm) - [43 + 10log(P)] (dB)
    = -13dBm.

5 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSV40	101040	10Hz~40GHz	Oct. 11, 2023	Jul. 30, 2024	Oct. 10, 2024	Conducted (TH01-KS)
Power divider	STI	STI08-0055	-	0.5~40GHz	NCR	Jul. 30, 2024	NCR	Conducted (TH01-KS)
EXA Spectrum Analyzer	Keysight	N9010B	MY57471079	10Hz-44G,MAX 30dB	Oct. 11, 2023	Jul. 30, 2024	Oct. 10, 2024	Radiation (03CH04-KS)
Loop Antenna	R&S	HFH2-Z2E	101125	9kHz~30MHz	Sep. 09, 2023	Jul. 30, 2024	Sep. 08, 2024	Radiation (03CH04-KS)
Bilog Antenna	TeseQ	CBL6111D	44483	30MHz-1GHz	Dec. 06, 2023	Jul. 30, 2024	Dec. 05, 2024	Radiation (03CH04-KS)
Double Ridge Horn Antenna	ETS-Lindgren	3117	75957	1GHz~18GHz	Oct. 23, 2023	Jul. 30, 2024	Oct. 22, 2024	Radiation (03CH04-KS)
SHF-EHF Horn	Com-power	AH-840	101070	18GHz~40GHz	Jan. 27, 2024	Jul. 30, 2024	Jan. 26, 2025	Radiation (03CH04-KS)
Amplifier	SONOMA	310N	413740	9KHz-1GHz	Jan. 03, 2024	Jul. 30, 2024	Jan. 02, 2025	Radiation (03CH04-KS)
Amplifier	EM	EM18G40GA	060728	18~40GHz	Jan. 02, 2024	Jul. 30, 2024	Jan. 01, 2025	Radiation (03CH04-KS)
high gain Amplifier	EM	EM01G18GA	060840	1Ghz-18Ghz	Oct. 11, 2023	Jul. 30, 2024	Oct. 10, 2024	Radiation (03CH04-KS)
Amplifier	EM	EM01G18GA	060892	1Ghz-18Ghz	Oct. 11, 2023	Jul. 30, 2024	Oct. 10, 2024	Radiation (03CH04-KS)
AC Power Source	Chroma	61601	F104090004	N/A	NCR	Jul. 30, 2024	NCR	Radiation (03CH04-KS)
Turn Table	ChamPro	EM 1000-T	060762-T	0~360 degree	NCR	Jul. 30, 2024	NCR	Radiation (03CH04-KS)
Antenna Mast	ChamPro	EM 1000-A	060762-A	1 m~4 m	NCR	Jul. 30, 2024	NCR	Radiation (03CH04-KS)

NCR: No Calibration Required

6 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

Conducted Power	**±0.50 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.83 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.83 dB**

Uncertainty of Radiated Emission Measurement (18 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.82 dB**

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

Appendix A. Test Results of Conducted Test

Test Engineer :	Smile	Temperature :	24~26℃
		Relative Humidity :	50~53%

Conducted Output Power(Average power) and ERP

LTE Band14_Ant.0（Module B）:

BW [MHz]	Modulation	RB Size	RB Offset	Power Low Ch. / Freq.	Power Middle Ch. / Freq.	Power High Ch. / Freq.	ERP(W)		
Channel					23330				
Frequency (MHz)					793			M	
10	QPSK	1	0		23.32			0.5212	
10	QPSK	1	49		23.15			0.5012	
10	QPSK	50	0		22.37			0.4188	
10	16QAM	1	0		22.26			0.4083	
10	64QAM	1	0		21.25			0.3236	
10	256QAM	1	0		19.00			0.1928	
Channel				23305	23330	23355	ERP(W)		
Frequency (MHz)				790.5	793	795.5	L	M	H
5	QPSK	1	0	23.09	23.23	23.17	0.4943	0.5105	0.5035
5	16QAM	1	0	22.05	22.14	22.17	0.3890	0.3972	0.3999

Appendix B. Test Results of Radiated Test

Field Strength of Spurious Radiated

Test Engineer :	Bruce	Temperature :	23~25℃
		Relative Humidity :	41~42%

LTE Band 14/ 5MHz / QPSK / Ant.0								
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Lowest	1576	-59.31	-42.15	-17.16	-61.94	1.09	5.87	H
	2368	-46.85	-13	-33.85	-49.25	1.37	5.92	H
	3152	-57.02	-13	-44.02	-60.91	1.64	7.68	H
	1576	-55.35	-42.15	-13.20	-57.98	1.09	5.87	V
	2368	-49.14	-13	-36.14	-51.54	1.37	5.92	V
	3152	-55.78	-13	-42.78	-59.67	1.64	7.68	V
Middle	1584	-53.70	-42.15	-11.55	-56.33	1.09	5.87	H
	2376	-54.19	-13	-41.19	-56.59	1.37	5.92	H
	3160	-48.27	-13	-35.27	-52.16	1.64	7.68	H
	1584	-53.95	-42.15	-11.80	-56.58	1.09	5.87	V
	2376	-40.60	-13	-27.60	-43.00	1.37	5.92	V
	3160	-50.21	-13	-37.21	-54.10	1.64	7.68	V
Highest	1584	-57.71	-42.15	-15.56	-60.34	1.09	5.87	H
	2376	-45.71	-13	-32.71	-48.11	1.37	5.92	H
	3176	-60.75	-13	-47.75	-64.64	1.64	7.68	H
	1584	-60.27	-42.15	-18.12	-62.90	1.09	5.87	V
	2376	-45.48	-13	-32.48	-47.88	1.37	5.92	V
	3176	-60.94	-13	-47.94	-64.83	1.64	7.68	V

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

LTE Band 14/ 10MHz / QPSK / Ant.0								
Channel	Frequency (MHz)	ERP (dBm)	Limit (dBm)	Over Limit (dB)	S.G. Power (dBm)	TX Cable loss (dB)	TX Antenna Gain (dBi)	Polarization (H/V)
Middle	1576	-61.09	-42.15	-18.94	-63.72	1.09	5.87	H
	2368	-49.05	-13	-36.05	-51.45	1.37	5.92	H
	3152	-55.92	-13	-42.92	-59.81	1.64	7.68	H
	1576	-57.15	-42.15	-15.00	-59.78	1.09	5.87	V
	2368	-42.45	-13	-29.45	-44.85	1.37	5.92	V
	3152	-55.10	-13	-42.10	-58.99	1.64	7.68	V

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