FCC RADIO TEST REPORT

FCC ID	:	PU5-TP00161A
Equipment	:	Notebook Computer
Brand Name	:	Lenovo
Model Name	:	TP00161A
Applicant	:	Wistron Corporation 21F, No. 88, Sec. 1, Hsin Tai Wu Rd., Hsichih Dist, New Taipei City 221,Taiwan
Manufacturer	:	Lenovo PC HK Limited. 23/F, Lincoln House, Taikoo Place, 979 King's Road, Quarry Bay, Hong Kong, P.R. China
Standard	:	FCC 47 CFR Part 2, 96

Equipment: Quectel RM520N-GL tested inside of Lenovo Notebook Computer.

The product was received on Apr. 10, 2024 and testing was performed from May 05, 2024 to Jun. 05, 2024. We, Sporton International Inc. EMC & Wireless Communications 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 from Sporton International Inc. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

Sporton International Inc. EMC & Wireless Communications Laboratory

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History of this test report

Report No.	Version	Description	Issue Date
FG440813D	01	Initial issue of report	Jun. 07, 2024

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	12.63 dB under the limit at 14724.00 MHz

Note:
1. For host device, Radiated Spurious Emission and Equivalent Isotropic Radiated Power are verified and complies with the limit in this test report.
2. For host device, the Conducted Output Power is no difference after compared to module (Model: RM520N-GL)

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.

Reviewed by: Sheng Kuo

Report Producer: Michelle Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Notebook Computer
Brand Name	Lenovo
Model Name	TP00161A
FCC ID	PU5-TP00161A
Sample 1	EUT with AWAN Antenna
Sample 2	EUT with Luxshare-ICT Antenna
Integrated WLAN Module	Brand Name: Qualcomm Model Name: QCNCM825 FCC ID: J9C-QCNCM825
EUT supports Radios application	WCDMA/HSPA/LTE/5G NR/GNSS WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80/VHT160 WLAN 11ax HE20/HE40/HE80/HE160 WLAN 11be EHT20/ EHT40/EHT80/EHT160/EHT320 Bluetooth BR/EDR/LE
EUT Stage	Production Unit

Remark:

1. The above EUT's information was declared by manufacturer.
2. Equipment: Quectel RM520N-GL tested inside of Lenovo Notebook Computer.

Support band and evaluated information	
Supported band	B48, B48C
Evaluated and Tested band	B48, B48C
MIMO2 Antenna	B48, B48C

TDD band Power Class		
	PC3	**PC2**
B48	V	-
B48C	V	-

WWAN Antenna Information for Host				
MIMO2 Antenna	**Manufacturer**	AWAN	**Peak gain (dBi)**	LTE Band 48 : -0.37
	Part number	SA31H59592	**Type**	PIFA
	Manufacturer	Luxshare-ICT	**Peak gain (dBi)**	LTE Band 48 : -2.20
	Part number	SA31H59593	**Type**	PIFA

Remark: The above EUT's information was declared by manufacturer. Please refer to Disclaimer 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	Band 48: 20.45 dBm Band 48C: 21.78 dBm
Type of Modulation	QPSK / 16QAM / 64QAM / 256QAM

1.3 Modification of EUT

No modifications made to the EUT during the testing.

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
Test Engineer	Ekko You
Temperature (℃)	21.9~22.7
Relative Humidity (%)	52.9~57.6

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.**
	03CH16-HY (TAF Code: 3786)
Test Engineer	Bill Chang, Gary Guo and Steven Wu
Temperature (℃)	19.1~22.3
Relative Humidity (%)	62.5~68.3
Remark	The Radiated Spurious Emission test item subcontracted to Sporton International Inc. Wensan Laboratory

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 declared by 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 v03
- FCC KDB 412172 D01 Determining ERP and EIRP v01r01
- FCC KDB 414788 D01 Radiated Test Site v01r01

Remark:

1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
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.

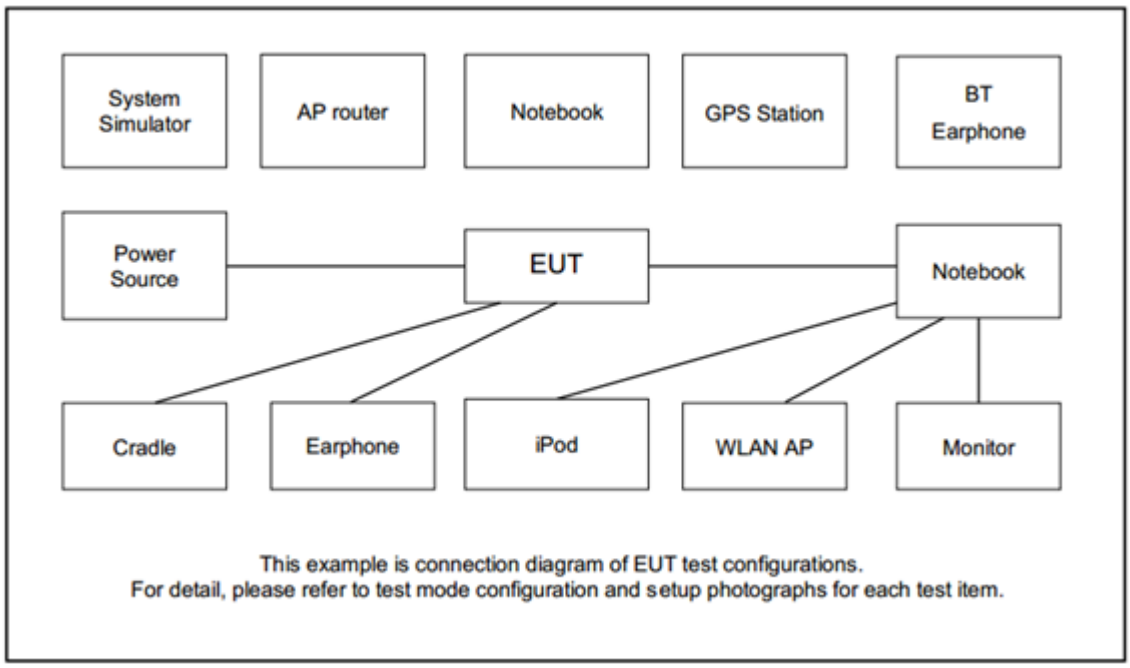
For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in Tablet Type (three orthogonal axis (X: flat, Y: portrait, Z: landscape)) and Notebook Type, and adjusting the measurement antenna orientation, following C63.26 exploratory test procedures and only the worst case emissions were reported in this report.

Modulation Type	Modulation
A	QPSK
B	16QAM
C	64QAM
D	256QAM

Test Item	Modulation Type	Bandwidth	RB Size	Channel
Conducted Power	A, B, C, D	All	1, Half, Full	L, M, H
EIRP	A, B, C, D	All	1, Half, Full	L, M, H
RSE	A	20 MHz or less	1RB	L, M, H

Remark:
1. Evaluated all the transmitter signal and reporting worst-case configuration among all modulation types.
2. 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.
3. During the RSE preliminary test, the standalone mode and charging modes were verified. It is determined that the charging modes is the worst case for the official test.
4. 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

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.	Earphone	Lenovo	N/A	N/A	N/A	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
20 + 20	PCC	Channel	55340	55891	56442
		Frequency	3560	3615.1	3670.2
	SCC	Channel	55538	56089	56640
		Frequency	3579.8	3634.9	3690.0
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
15 + 20	PCC	Channel	55318	55893	56469
		Frequency	3557.8	3615.3	3672.9
	SCC	Channel	55489	56064	56640
		Frequency	3574.9	3632.4	3690.0
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
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 + 5	PCC	Channel	55340	55965	56590
		Frequency	3560	3622.5	3685
	SCC	Channel	55457	56082	56707
		Frequency	3571.7	3634.2	3696.7
5 + 20	PCC	Channel	55273	55896	56523
		Frequency	3553.3	3615.6	3678.3
	SCC	Channel	55390	56015	56640
		Frequency	3565	3627.5	3690.0

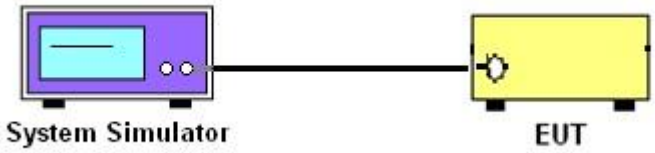
3 Conducted Test Items

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.

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.

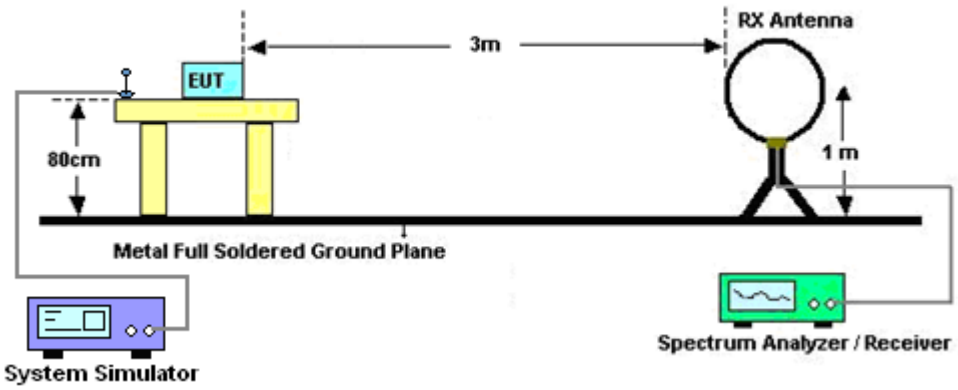
4 Radiated Test Items

4.1 Measuring Instruments

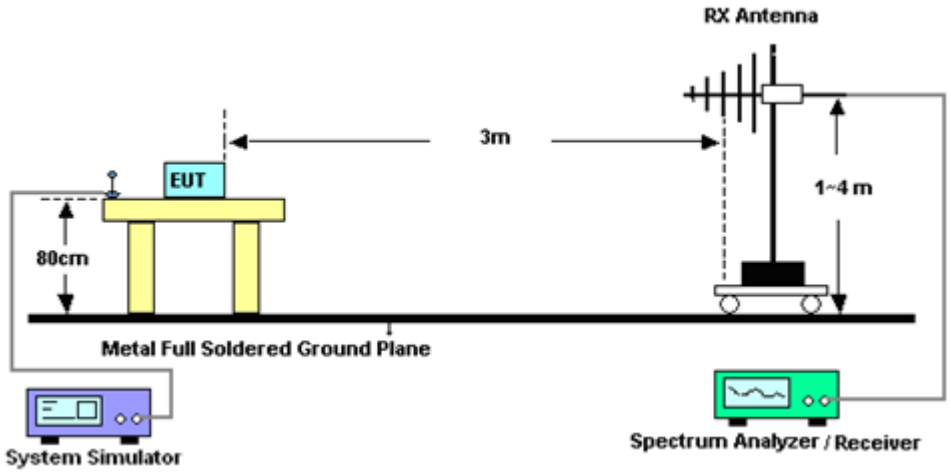
See list of measuring instruments of this test report.

4.2 Test Setup

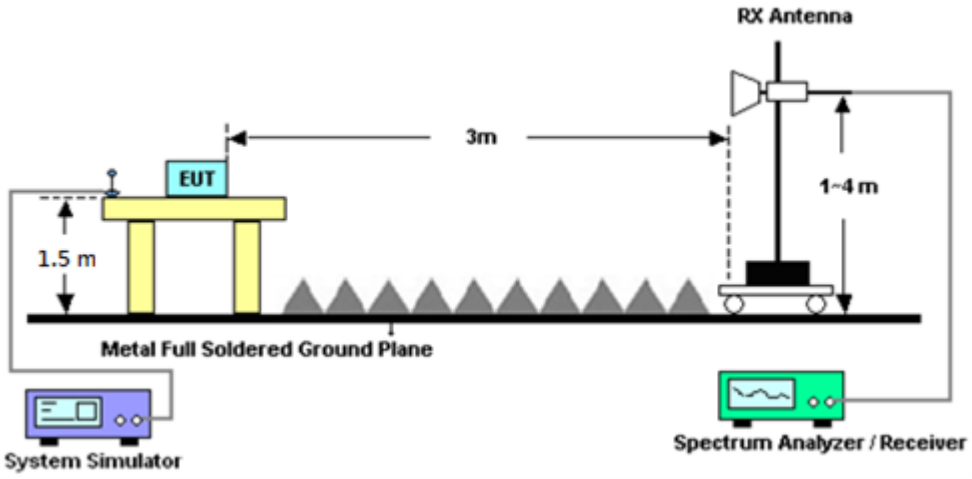
For radiated emissions below 30MHz



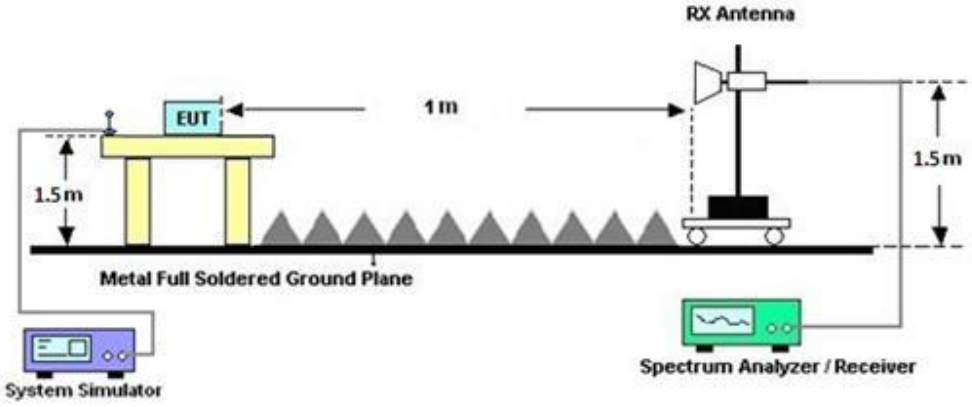
For radiated emissions from 30MHz to 1GHz



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 C63.26-2015 section 5.5.4 Radiated measurement using the field strength method.

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. To convert spectrum reading E(dBuV/m) to EIRP(dBm)

   EIRP(dBm) = Level (dBuV/m) + 20log(d) -104.77,

   where d is the distance at which filed strength limit is specified in the rules
8. Field Strength Level (dBm) = Spectrum Reading (dBm) + Antenna Factor + Cable Loss + Read Level - Preamp Factor.
9. ERP (dBm) = EIRP (dBm) - 2.15
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

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	Sep. 12, 2023	May 05, 2024~ May 28, 2024	Sep. 11, 2024	Radiation (03CH16-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA9170	00993	18GHz-40GHz	Nov. 24, 2023	May 05, 2024~ May 28, 2024	Nov. 23, 2024	Radiation (03CH16-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00802N1D01N-06	47020 & 06	30MHz to 1GHz	Oct. 07, 2023	May 05, 2024~ May 28, 2024	Oct. 06, 2024	Radiation (03CH16-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Mar. 28, 2024	May 05, 2024~ May 28, 2024	Mar. 27, 2025	Radiation (03CH16-HY)
Amplifier	SONOMA	310N	371607	9kHz~1GHz	Jul. 03, 2023	May 05, 2024~ May 28, 2024	Jul. 02, 2024	Radiation (03CH16-HY)
Preamplifier	Keysight	83017A	MY53270264	1GHz~26.5GHz	Dec. 07, 2023	May 05, 2024~ May 28, 2024	Dec. 06, 2024	Radiation (03CH16-HY)
Preamplifier	EMEC	EM1G18G	060812	1GHz~18GHz	Dec. 25, 2023	May 05, 2024~ May 28, 2024	Dec. 24, 2024	Radiation (03CH16-HY)
Preamplifier	EMEC	EM18G40G	060872	18GHz~40GHz	Sep. 06, 2023	May 05, 2024~ May 28, 2024	Sep. 05, 2024	Radiation (03CH16-HY)
Filter	Wainwright	WLK4-1000-1530-8000-40SS	SN17	1.53GHz Low Pass Filter	Jan. 15, 2024	May 05, 2024~ May 28, 2024	Jan. 14, 2025	Radiation (03CH16-HY)
Filter	Wainwright	WHKX12-900-1000-15000-60SS	SN11	1GHz High Pass Filter	Mar. 13, 2024	May 05, 2024~ May 28, 2024	Mar.12, 2025	Radiation (03CH16-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60ST	SN3	3GHz High Pass Filter	Jun. 29, 2023	May 05, 2024~ May 28, 2024	Jun. 28, 2024	Radiation (03CH16-HY)
Filter	Wainwright	WHKX8-5872.5-6750-18000-40ST	SN27	6.75GHz High Pass Filter	Nov. 13, 2023	May 05, 2024~ May 28, 2024	Nov. 12, 2024	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	803951/2	9K~30M	Mar. 06, 2024	May 05, 2024~ May 28, 2024	Mar. 05, 2025	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102/SUCOFLEX 104	EC-A5-300-5757,805935/4,802434/4	30MHz~18GHz	Aug. 08, 2023	May 05, 2024~ May 28, 2024	Aug. 07, 2024	Radiation (03CH16-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	804011/2,804012/2	18-40GHz	Jan. 02, 2024	May 05, 2024~ May 28, 2024	Jan. 01, 2025	Radiation (03CH16-HY)
Software	Audix	E3 230621 V9	RK-002393	N/A	N/A	May 05, 2024~ May 28, 2024	N/A	Radiation (03CH16-HY)
Controller	ChainTek	3000-1	N/A	Control Turn table & Ant Mast	N/A	May 05, 2024~ May 28, 2024	N/A	Radiation (03CH16-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	May 05, 2024~ May 28, 2024	N/A	Radiation (03CH16-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	May 05, 2024~ May 28, 2024	N/A	Radiation (03CH16-HY)
Radio Communication Analyzer	Anritsu	MT8821C	6262025353	LTE FDD/TDD LTE-2CC DLCA/ULCA	Oct. 03, 2023	May 25, 2024~ Jun. 05, 2024	Oct. 02, 2024	Conducted (TH03-HY)
Coupler+10dB + RFcable	Warison+WoKen+ echannel	20dB 25W SMA Directional Coupler+ 10dB 18GHz_5W+SFL405_1.5M	#A+#1+#1+#7	1-18GHz	Jan. 02, 2024	May 25, 2024~ Jun. 05, 2024	Jan. 01, 2025	Conducted (TH03-HY)
Software	Sporton	LTE Conducted Test Tools	N/A	Conducted Test Item	N/A	May 25, 2024~ Jun. 05, 2024	N/A	Conducted (TH03-HY)

6 Measurement Uncertainty

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.09 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**3.55 dB**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.02 dB**

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power & ERP/EIRP)

LTE Band 48 Maximum Average Power [dBm] (GT - LC = -0.37 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
20	1	0	QPSK	20.36	20.45	20.41	20.08	0.1019
20	1	49		20.21	20.33	20.34		
20	1	99		20.13	20.15	20.15		
20	50	0		19.35	19.43	19.38		
20	50	24		19.28	19.31	19.30		
20	50	50		19.27	19.33	19.33		
20	100	0		19.32	19.42	19.29		
20	1	0	16-QAM	19.31	19.53	19.46	19.16	0.0824
20	1	49		19.28	19.30	19.29		
20	1	99		19.24	19.15	19.20		
20	50	0		18.30	18.39	18.35		
20	50	24		18.35	18.34	18.40		
20	50	50		18.27	18.33	18.34		
20	100	0		18.32	18.31	18.39		
20	1	0	64-QAM	18.36	18.32	18.33	17.99	0.0630
20	1	49		18.08	18.34	18.27		
20	1	99		18.15	18.20	18.03		
20	50	0		17.29	17.37	17.36		
20	50	24		17.38	17.34	17.39		
20	50	50		17.30	17.37	17.30		
20	100	0		17.32	17.31	17.38		
20	1	0	256-QAM	15.32	15.37	15.34	15.08	0.0322
20	1	49		15.24	15.24	15.24		
20	1	99		15.24	15.30	15.24		
20	50	0		15.28	15.37	15.20		
20	50	24		15.24	15.45	15.38		
20	50	50		15.22	15.23	15.24		
20	100	0		15.18	15.10	15.13		
Limit	EIRP < 23dBm/10MHz			Result			Pass	

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

LTE Band 48 Maximum Average Power [dBm] (GT - LC = -0.37 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
15	1	0	QPSK	20.21	20.37	20.32	20.00	0.1000
15	1	37		20.15	20.28	20.28		
15	1	74		20.08	20.07	20.09		
15	36	0		19.29	19.37	19.32		
15	36	20		19.20	19.23	19.22		
15	36	39		19.20	19.26	19.24		
15	75	0		19.25	19.35	19.22		
15	1	0	16-QAM	19.26	19.46	19.41	19.09	0.0811
15	1	37		19.22	19.24	19.24		
15	1	74		19.15	19.07	19.11		
15	36	0		18.21	18.33	18.26		
15	36	20		18.30	18.26	18.34		
15	36	39		18.18	18.25	18.26		
15	75	0		18.27	18.24	18.33		
15	1	0	64-QAM	18.30	18.24	18.28	17.93	0.0621
15	1	37		18.09	18.27	18.22		
15	1	74		18.07	18.14	18.07		
15	36	0		17.22	17.28	17.27		
15	36	20		17.29	17.26	17.34		
15	36	39		17.22	17.32	17.25		
15	75	0		17.26	17.24	17.33		
15	1	0	256-QAM	15.32	15.40	15.31	15.10	0.0324
15	1	37		15.22	15.23	15.26		
15	1	74		15.24	15.24	15.30		
15	36	0		15.25	15.38	15.20		
15	36	20		15.28	15.47	15.40		
15	36	39		15.25	15.21	15.21		
15	75	0		15.18	15.07	15.15		
Limit	EIRP < 23dBm/10MHz			Result			Pass	

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

LTE Band 48 Maximum Average Power [dBm] (GT - LC = -0.37 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
10	1	0	QPSK	20.21	20.39	20.34	20.02	0.1005
10	1	25		20.16	20.24	20.27		
10	1	49		20.05	20.08	20.06		
10	25	0		19.27	19.37	19.33		
10	25	12		19.23	19.23	19.21		
10	25	25		19.21	19.28	19.25		
10	50	0		19.23	19.35	19.22		
10	1	0	16-QAM	19.24	19.46	19.37	19.09	0.0811
10	1	25		19.20	19.23	19.21		
10	1	49		19.18	19.10	19.11		
10	25	0		18.23	18.34	18.30		
10	25	12		18.28	18.25	18.32		
10	25	25		18.19	18.26	18.27		
10	50	0		18.25	18.23	18.33		
10	1	0	64-QAM	18.27	18.26	18.26	17.90	0.0617
10	1	25		18.01	18.27	18.22		
10	1	49		18.08	18.13	18.05		
10	25	0		17.22	17.29	17.29		
10	25	12		17.29	17.27	17.33		
10	25	25		17.24	17.32	17.21		
10	50	0		17.26	17.26	17.29		
10	1	0	256-QAM	15.32	15.38	15.29	15.10	0.0324
10	1	25		15.20	15.23	15.22		
10	1	49		15.21	15.24	15.24		
10	25	0		15.27	15.35	15.20		
10	25	12		15.25	15.47	15.39		
10	25	25		15.20	15.23	15.25		
10	50	0		15.20	15.09	15.13		
Limit	EIRP < 23dBm/10MHz			Result			Pass	

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

LTE Band 48 Maximum Average Power [dBm] (GT - LC = -0.37 dB)								
BW [MHz]	RB Size	RB Offset	Mod	Lowest	Middle	Highest	EIRP (dBm)	EIRP (W)
5	1	0	QPSK	20.19	20.40	20.36	20.03	0.1007
5	1	12		20.15	20.24	20.28		
5	1	24		20.08	20.10	20.06		
5	12	0		19.28	19.37	19.33		
5	12	7		19.21	19.25	19.22		
5	12	13		19.21	19.27	19.28		
5	25	0		19.26	19.34	19.20		
5	1	0	16-QAM	19.22	19.47	19.41	19.10	0.0813
5	1	12		19.19	19.25	19.23		
5	1	24		19.15	19.08	19.15		
5	12	0		18.24	18.31	18.26		
5	12	7		18.27	18.25	18.34		
5	12	13		18.21	18.26	18.27		
5	25	0		18.27	18.24	18.30		
5	1	0	64-QAM	18.28	18.27	18.25	17.92	0.0619
5	1	12		18.09	18.29	18.18		
5	1	24		18.09	18.12	18.08		
5	12	0		17.22	17.32	17.31		
5	12	7		17.29	17.29	17.31		
5	12	13		17.22	17.28	17.21		
5	25	0		17.23	17.26	17.30		
5	1	0	256-QAM	15.30	15.37	15.29	15.07	0.0321
5	1	12		15.20	15.23	15.24		
5	1	24		15.23	15.30	15.26		
5	12	0		15.26	15.33	15.25		
5	12	7		15.23	15.44	15.41		
5	12	13		15.19	15.23	15.24		
5	25	0		15.15	15.06	15.11		
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 = -0.37 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	21.41	21.32	21.33	21.04	0.1271
20+20	1	99	1	0	16-QAM	21.02	20.91	20.90	20.65	0.1161
20+15	1	74	1	0	QPSK	21.74	21.55	21.41	21.37	0.1371
20+15	1	74	1	0	16-QAM	21.42	21.32	21.12	21.05	0.1274
15+20	1	74	1	0	QPSK	21.70	21.54	21.44	21.33	0.1358
15+20	1	74	1	0	16-QAM	21.49	21.25	21.21	21.12	0.1294
Limit	EIRP < 23dBm/10MHz					Result			Pass	

LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = -0.37 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	21.69	21.65	21.54	21.32	0.1355
20+10	1	99	1	0	16-QAM	21.45	21.39	21.12	21.08	0.1282
10+20	1	49	1	0	QPSK	21.78	21.65	21.57	21.41	0.1384
10+20	1	49	1	0	16-QAM	21.46	21.41	21.21	21.09	0.1285
20+5	1	99	1	0	QPSK	21.67	21.65	21.48	21.30	0.1349
20+5	1	99	1	0	16-QAM	21.46	21.32	21.19	21.09	0.1285
Limit	EIRP < 23dBm/10MHz					Result			Pass	

LTE Band 48C_CA Maximum Average Power [dBm] (GT - LC = -0.37 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	21.75	21.65	21.54	21.38	0.1374
5+20	1	24	1	0	16-QAM	21.30	21.23	21.15	20.93	0.1239
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

B1. Summary of each worse mode

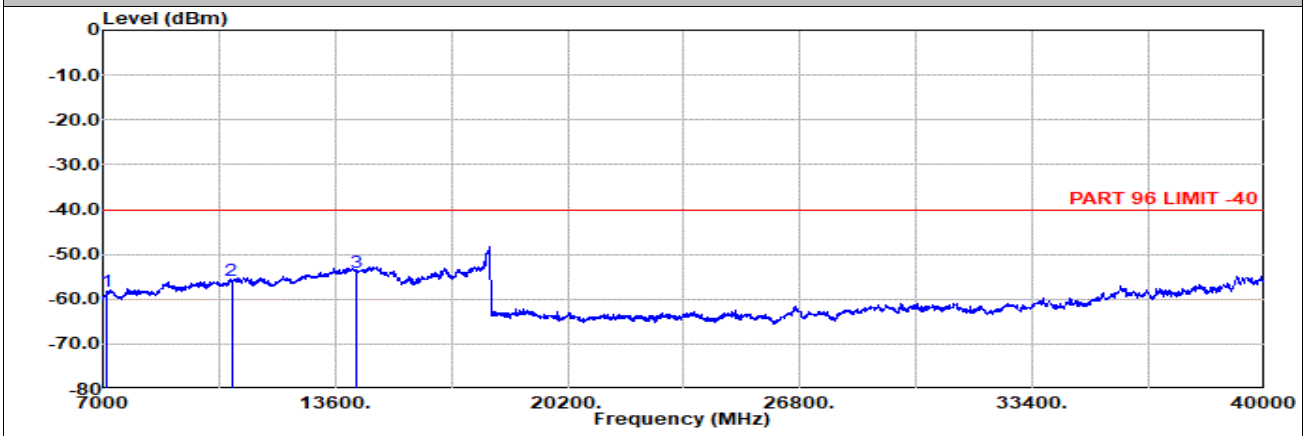
Mode	Part	Band	Ch	Freq (MHz)	Level (dBm)	Det	Ant Factor (dB)	Amp\Cbl (dB)	Filter (dB)	EIRPCF (dB)	Reading (dBuV)	Limit (dBm)	Margin (dB)	Pol	Ant
1	Part 96	LTE B48	H	14724	-52.63	RMS	40.35	-46.60	0.50	-95.23	48.35	-40.00	-12.63	H	MIMO2
2	Part 96	LTE CA B48C	H	14716	-52.68	RMS	40.37	-46.60	0.50	-95.23	48.28	-40.00	-12.68	V	MIMO2

MIMO2 Antenna

Part 96 Mode 1

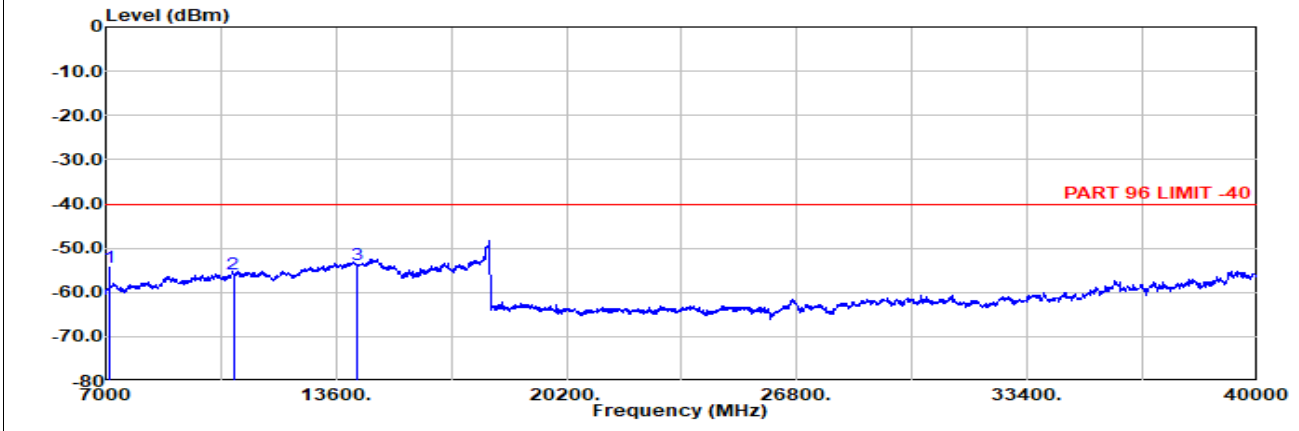
LTE B48 20M Ch55340 1RB0 QPSK

L



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal
: LTE Band 48 20M Ch55340 1RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7102.00	-58.23	RMS	36.31	-52.33	1.13	-95.23	51.89	-40.00	-18.23	Horizontal
2	10653.00	-55.88	RMS	39.09	-49.82	0.45	-95.23	49.63	-40.00	-15.88	Horizontal
3	14204.00	-53.93	RMS	40.90	-46.76	0.44	-95.23	46.72	-40.00	-13.93	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical
: LTE Band 48 20M Ch55340 1RB0 QPSK

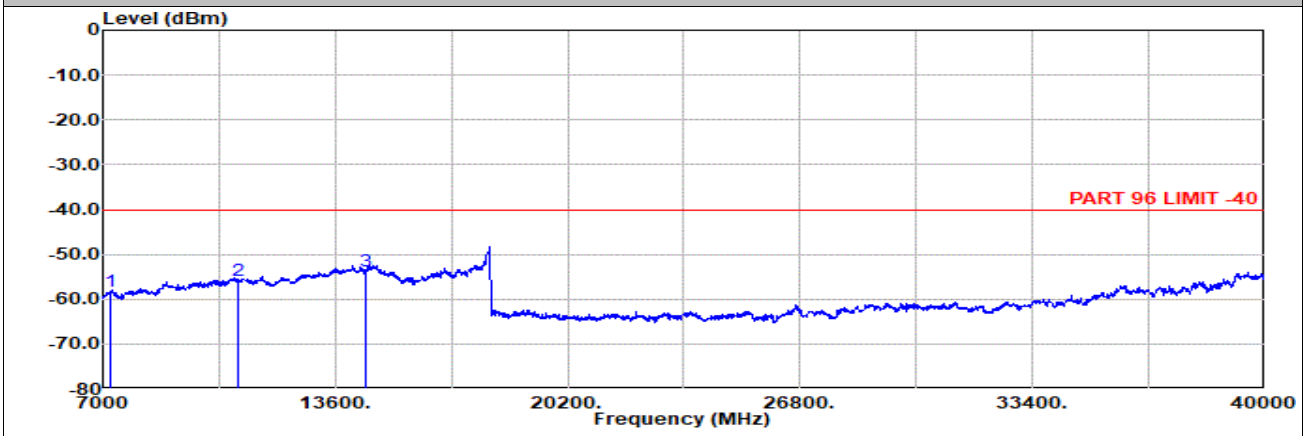
	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7102.00	-54.45	RMS	36.31	-52.33	1.13	-95.23	55.67	-40.00	-14.45	Vertical
2	10653.00	-55.93	RMS	39.09	-49.82	0.45	-95.23	49.58	-40.00	-15.93	Vertical
3	14204.00	-53.85	RMS	40.90	-46.76	0.44	-95.23	46.80	-40.00	-13.85	Vertical

MIMO2 Antenna

Part 96 Mode 1

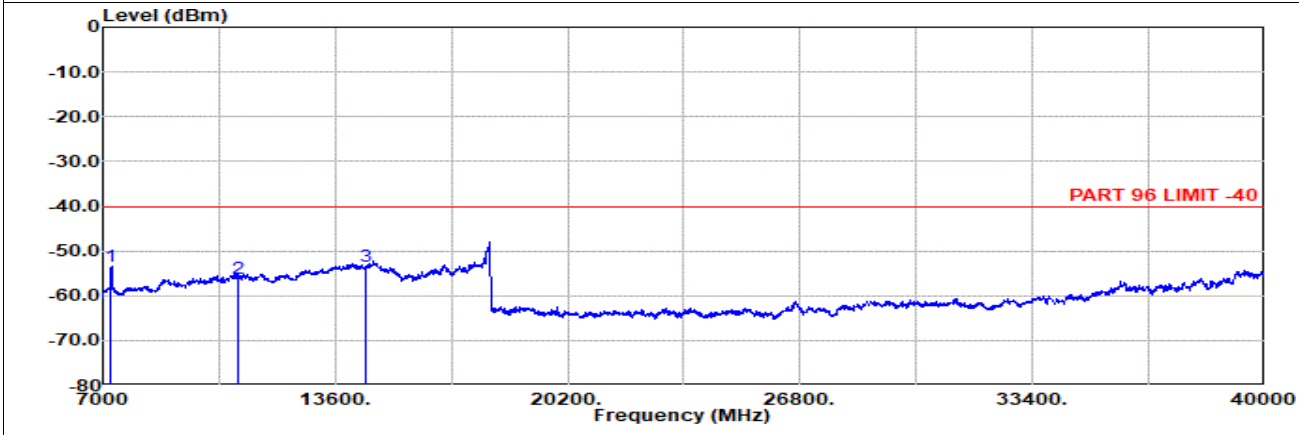
LTE B48 20M Ch55990 1RB0 QPSK

M



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal
: LTE Band 48 20M Ch55990 1RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7232.00	-58.19	RMS	36.93	-52.20	0.92	-95.23	51.39	-40.00	-18.19	Horizontal
2	10848.00	-55.77	RMS	38.91	-49.35	0.45	-95.23	49.45	-40.00	-15.77	Horizontal
3	14464.00	-53.70	RMS	40.53	-46.70	0.47	-95.23	47.23	-40.00	-13.70	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical
: LTE Band 48 20M Ch55990 1RB0 QPSK

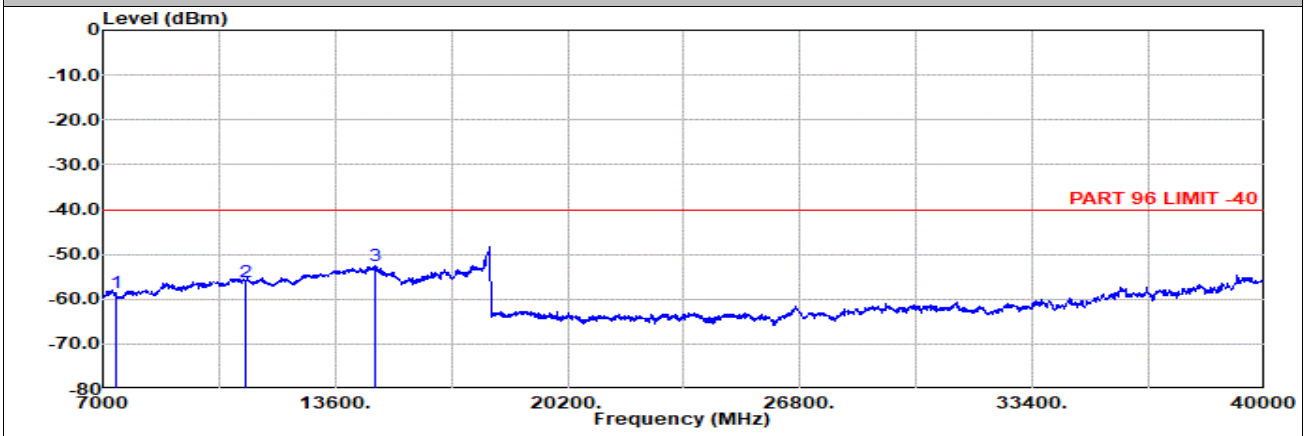
	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7232.00	-53.45	RMS	36.93	-52.20	0.92	-95.23	56.13	-40.00	-13.45	Vertical
2	10848.00	-56.27	RMS	38.91	-49.35	0.45	-95.23	48.95	-40.00	-16.27	Vertical
3	14464.00	-53.58	RMS	40.53	-46.70	0.47	-95.23	47.35	-40.00	-13.58	Vertical

MIMO2 Antenna

Part 96 Mode 1

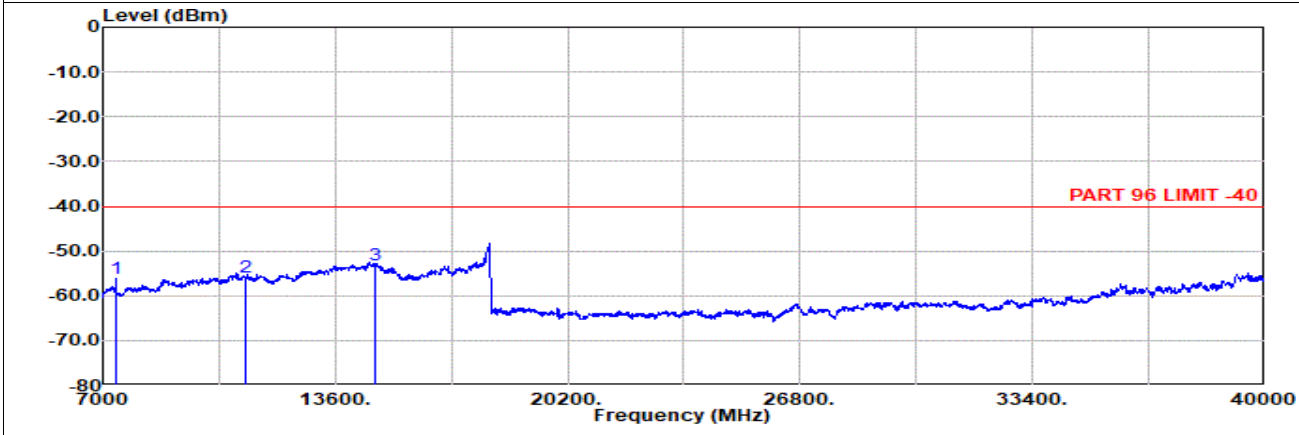
LTE B48 20M Ch56640 1RB0 QPSK

H



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal
: LTE Band 48 20M Ch56640 1RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7362.00	-58.71	RMS	36.55	-52.05	0.90	-95.23	51.12	-40.00	-18.71	Horizontal
2	11043.00	-56.08	RMS	38.70	-48.96	0.44	-95.23	48.97	-40.00	-16.08	Horizontal
3	14724.00	-52.63	RMS	40.35	-46.60	0.50	-95.23	48.35	-40.00	-12.63	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical
: LTE Band 48 20M Ch56640 1RB0 QPSK

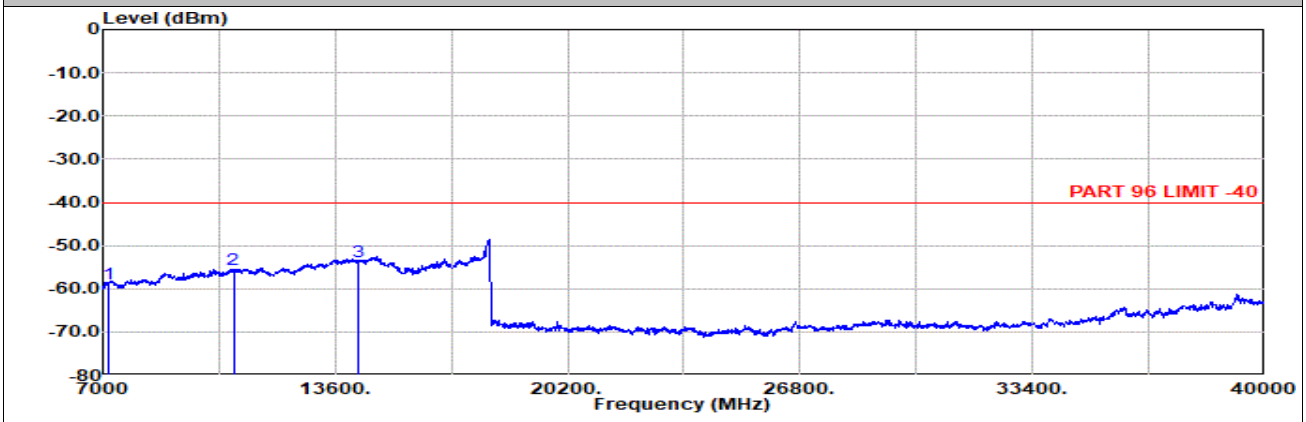
	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7362.00	-56.11	RMS	36.55	-52.05	0.90	-95.23	53.72	-40.00	-16.11	Vertical
2	11043.00	-55.99	RMS	38.70	-48.96	0.44	-95.23	49.06	-40.00	-15.99	Vertical
3	14724.00	-53.11	RMS	40.35	-46.60	0.50	-95.23	47.87	-40.00	-13.11	Vertical

MIMO2 Antenna

Part 96 Mode 2

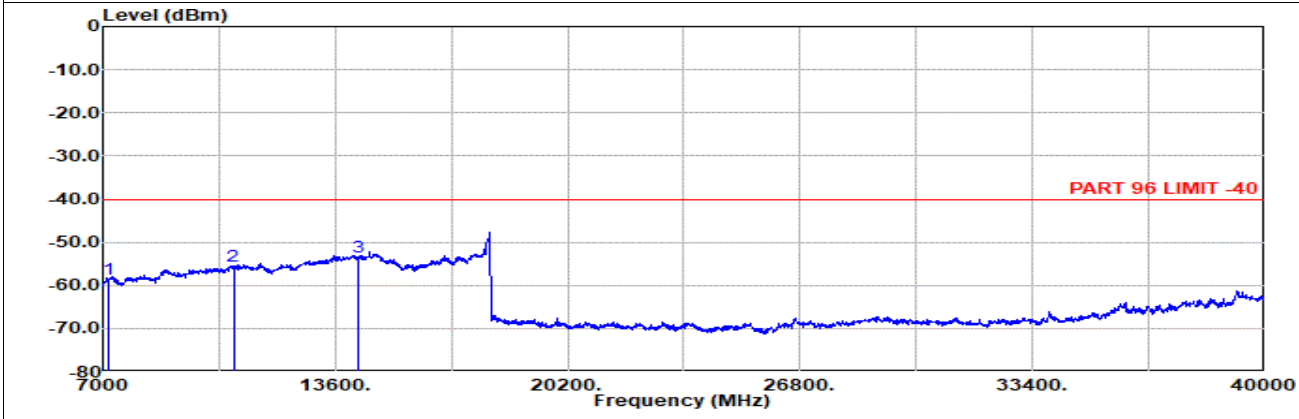
LTE CA B48C 20M + 20M Ch55340 1RB99 QPSK + Ch55538 1RB0 QPSK

L



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal
: LTE Band 48 20M Ch55340 1RB99 QPSK
: LTE Band 48 20M Ch55538 1RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7138.00	-58.84	RMS	36.53	-52.29	1.05	-95.23	51.10	-40.00	-18.84	Horizontal
2	10707.00	-55.58	RMS	39.00	-49.69	0.45	-95.23	49.89	-40.00	-15.58	Horizontal
3	14276.00	-53.59	RMS	40.90	-46.74	0.45	-95.23	47.03	-40.00	-13.59	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical
: LTE Band 48 20M Ch55340 1RB99 QPSK
: LTE Band 48 20M Ch55538 1RB0 QPSK

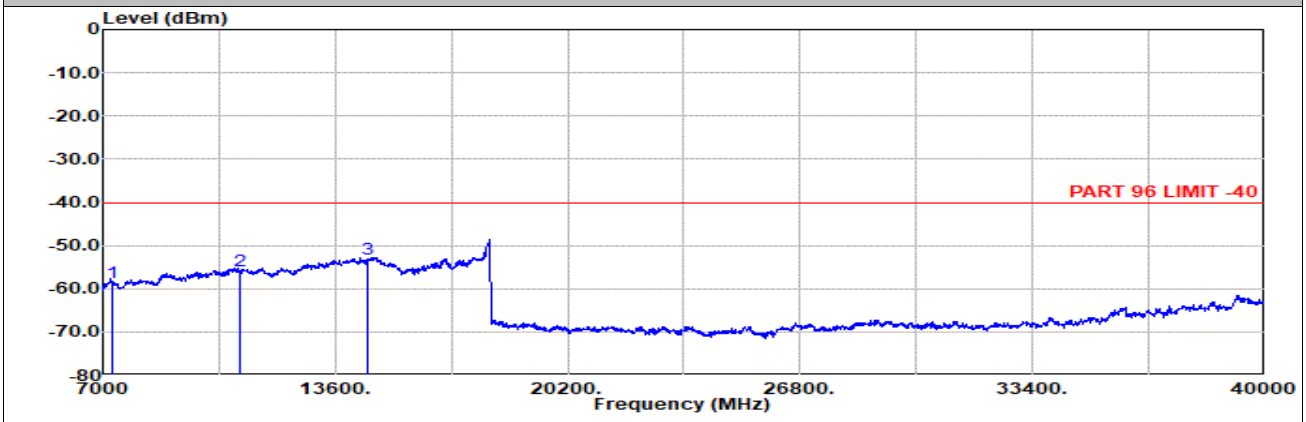
	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7138.00	-58.43	RMS	36.53	-52.29	1.05	-95.23	51.51	-40.00	-18.43	Vertical
2	10707.00	-55.42	RMS	39.00	-49.69	0.45	-95.23	50.05	-40.00	-15.42	Vertical
3	14276.00	-53.53	RMS	40.90	-46.74	0.45	-95.23	47.09	-40.00	-13.53	Vertical

MIMO2 Antenna

Part 96 Mode 2

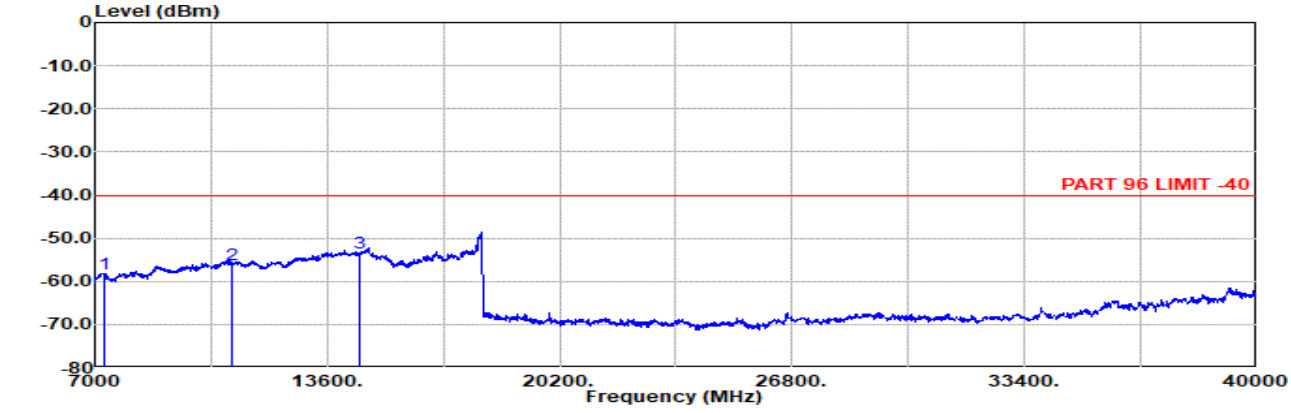
LTE CA B48C 20M + 20M Ch55891 1RB99 QPSK + Ch56089 1RB0 QPSK

M



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal
: LTE Band 48 20M Ch55891 1RB99 QPSK
: LTE Band 48 20M Ch56089 1RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7248.00	-58.65	RMS	36.99	-52.18	0.92	-95.23	50.85	-40.00	-18.65	Horizontal
2	10872.00	-55.91	RMS	38.86	-49.29	0.45	-95.23	49.30	-40.00	-15.91	Horizontal
3	14496.00	-53.14	RMS	40.59	-46.69	0.47	-95.23	47.72	-40.00	-13.14	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical
: LTE Band 48 20M Ch55891 1RB99 QPSK
: LTE Band 48 20M Ch56089 1RB0 QPSK

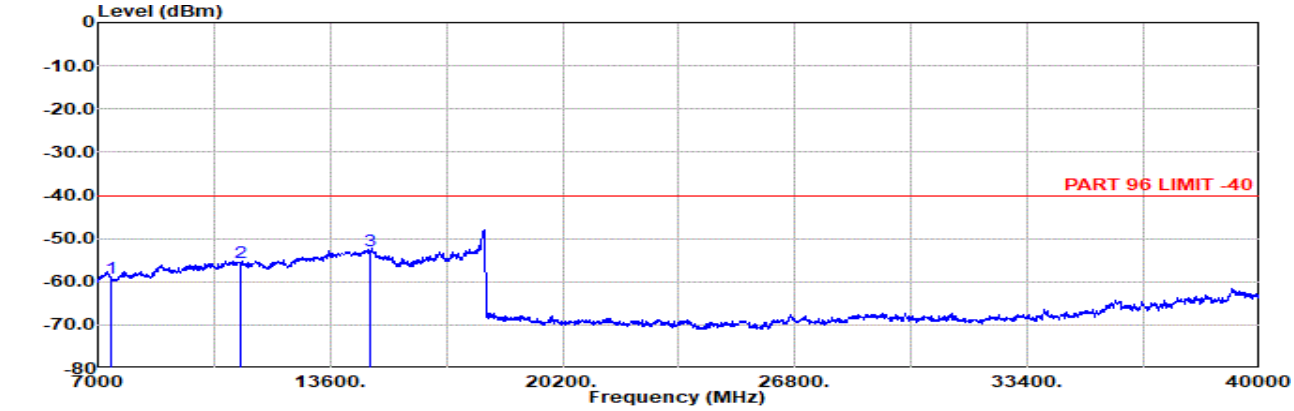
	Freq	Level	Detector	Ant Factor	Amp\Cbl	Filter	EIRPCF	Reading	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7248.00	-58.18	RMS	36.99	-52.18	0.92	-95.23	51.32	-40.00	-18.18	Vertical
2	10872.00	-56.15	RMS	38.86	-49.29	0.45	-95.23	49.06	-40.00	-16.15	Vertical
3	14496.00	-53.43	RMS	40.59	-46.69	0.47	-95.23	47.43	-40.00	-13.43	Vertical

MIMO2 Antenna

Part 96 Mode 2

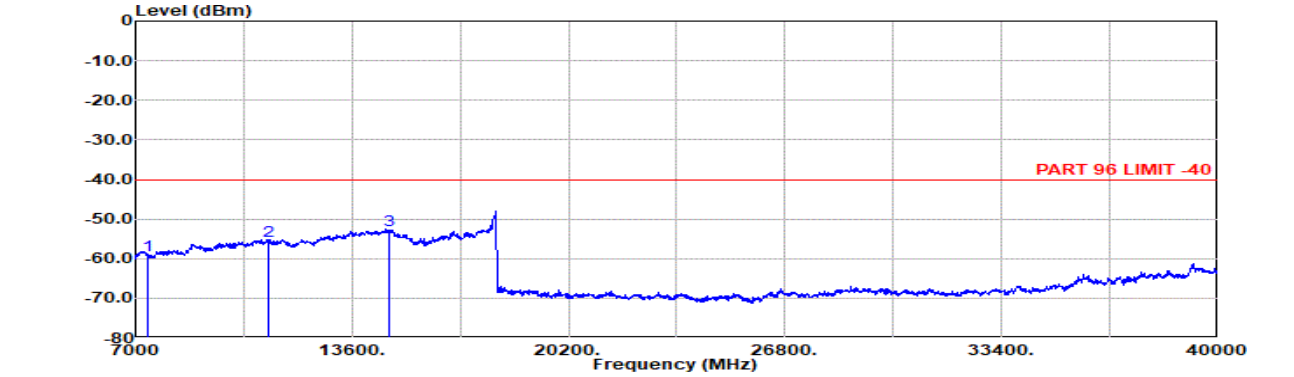
LTE CA B48C 20M + 20M Ch56442 1RB99 QPSK + Ch56640 1RB0 QPSK

H



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Horizontal
: LTE Band 48 20M Ch56442 1RB99 QPSK
: LTE Band 48 20M Ch56640 1RB0 QPSK

	Freq	Level	Detector	Ant Factor	Amp\Cb l	Filter	EIRPCF	Readin g	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7358.00	-59.23	RMS	36.57	-52.05	0.90	-95.23	50.58	-40.00	-19.23	Horizontal
2	11037.00	-55.40	RMS	38.70	-48.96	0.44	-95.23	49.65	-40.00	-15.40	Horizontal
3	14716.00	-52.97	RMS	40.37	-46.60	0.50	-95.23	47.99	-40.00	-12.97	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 1m SHF_00993_231124 Vertical
: LTE Band 48 20M Ch56442 1RB99 QPSK
: LTE Band 48 20M Ch56640 1RB0 QPSK

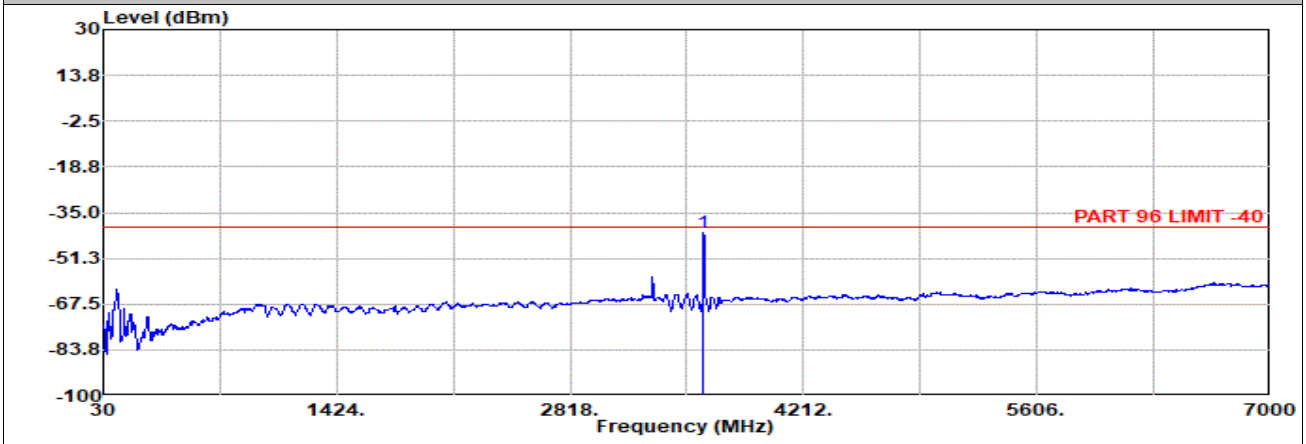
	Freq	Level	Detector	Ant Factor	Amp\Cb l	Filter	EIRPCF	Readin g	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	7358.00	-59.06	RMS	36.57	-52.05	0.90	-95.23	50.75	-40.00	-19.06	Vertical
2	11037.00	-55.61	RMS	38.70	-48.96	0.44	-95.23	49.44	-40.00	-15.61	Vertical
3	14716.00	-52.68	RMS	40.37	-46.60	0.50	-95.23	48.28	-40.00	-12.68	Vertical

MIMO2 Antenna

Part 96 Mode 1

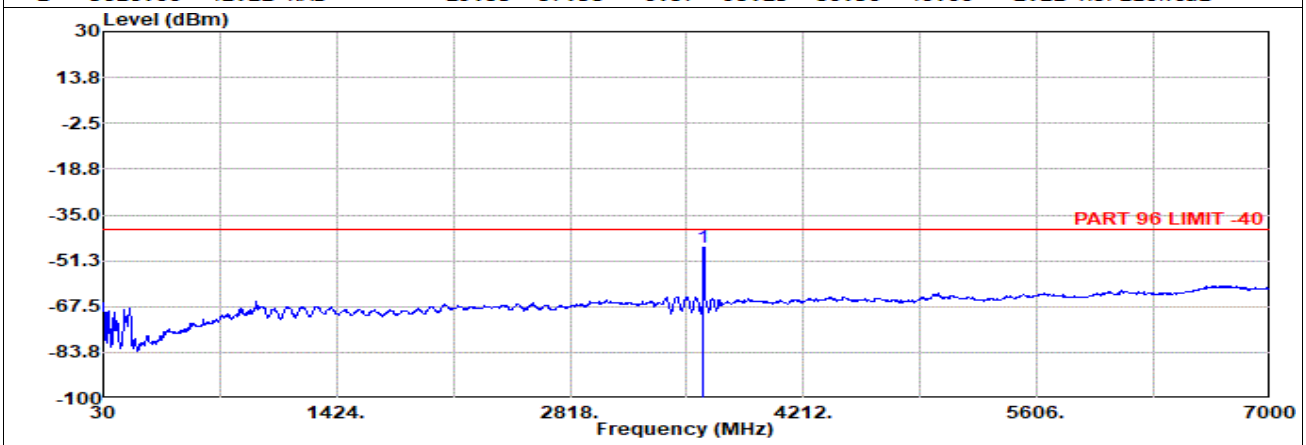
LTE B48 20M Ch56640 1RB0 QPSK

H



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 3m 9120D-1522_240328 Horizontal
: LTE Band 48 20M Ch56640 1RB0 QPSK
: #1 is fundamental signal which can be ignored.

	Freq	Level	Detector	Ant Factor	Amp\Cb l	Filter	EIRPCF	Readin g	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	3616.00	-42.21	RMS	29.53	-57.38	0.57	-95.23	80.30	-40.00	-2.21	Horizontal



Site : 03CH16-HY
Condition: PART 96 LIMIT -40 3m 9120D-1522_240328 Vertical
: LTE Band 48 20M Ch56640 1RB0 QPSK
: #1 is fundamental signal which can be ignored.

	Freq	Level	Detector	Ant Factor	Amp\Cb l	Filter	EIRPCF	Readin g	Limit	Margin	Pol
	MHz	dBm		dB/m	dB	dB	dB	dBuV	dBm	dB	
1	3616.00	-46.37	RMS	29.53	-57.38	0.57	-95.23	76.14	-40.00	-6.37	Vertical

Remark: The over limit signal #1 is fundamental signal which can be ignored.