FCC RADIO TEST REPORT

FCC ID	:	**COFNCT8101**
Equipment	:	**Infinitracker**
Brand Name	:	**Infinitracker**
Model Name	:	**NCT-8101**
Applicant	:	**Universal Global Scientific Industrial Co., Ltd. 141, Lane 351, Sec. 1, Taiping Road., Tsaotuen, Nantou 54261, Taiwan**
Manufacturer	:	**Universal Global Scientific Industrial Co., Ltd. 141, Lane 351, Sec. 1, Taiping Road., Tsaotuen, Nantou 54261, Taiwan**
Standard	:	**FCC 47 CFR Part 2, and 90(S)**

The product was received on May 25, 2020 and testing was started from Jun. 30, 2020 and completed on Aug. 04, 2020. 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 report apply exclusively to the tested model / sample. Without written approval of 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

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issued Date
FG052301D	01	Initial issue of report	Aug. 07, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	§2.1046	Conducted Output Power and Effective Radiated Power	Reporting only	-
3.3	-	Peak-to-Average Ratio	Reporting only	-
3.4	§2.1049 §90.209	Occupied Bandwidth and 26dB Bandwidth	Reporting only	-
3.5	§2.1051 §90.691	Emission masks – In-band emissions	Pass	-
3.6	§2.1051 §90.691	Emission masks – Out of band emissions	Pass	-
3.7	§2.1055 §90.213	Frequency Stability for Temperature & Voltage	Pass	-
3.8	§2.1053 §90.691	Field Strength of Spurious Radiation	Pass	Under limit 29.14 dB at 4072.000 MHz

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Dara Chiu

1 General Description

1.1 Feature of Equipment Under Test

LTE, Bluetooth, and GNSS

Product Specification subjective to this standard	
Antenna Type	WWAN: PCB Antenna Bluetooth: Chip Antenna GPS: Patch Antenna

1.2 Modification of EUT

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

1.3 Testing Site

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	**Sporton Site No.**
	TH05-HY
Test Engineer	Benjamin Lin
Temperature	23~25°C
Relative Humidity	50~55%

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH13-HY
Test Engineer	Daniel Lee, Jacky, and Wilson Wu
Temperature	22.5~23.8°C
Relative Humidity	48.4~53.9%

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

FCC Designation No.: TW1190 and TW0007

1.4 Applied Standards

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

- FCC 47 CFR Part 2, 90
- ANSI / TIA-603-E
- ANSI C63.26-2015
- FCC KDB 971168 D01 Power Meas. License Digital Systems v03r01
- FCC KDB 414788 D01 Radiated Test Site v01r01
- Interim Guidance for Equipment Authorization of Devices with Channel Bandwidths Combined Across Two Contiguous Service Rule Allocations OET/Lab/EACB, June 6, 2013

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.
3. The TAF code is not including all the FCC KDB listed without accreditation.

2 Test Configuration of Equipment Under Test

2.1 Test Mode

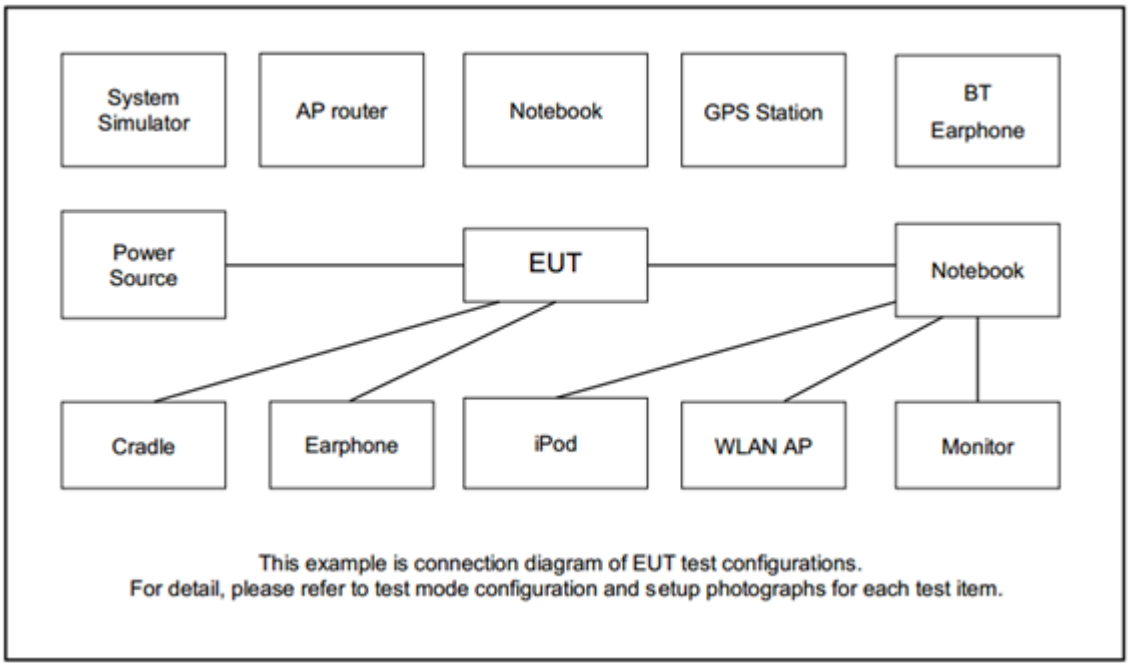
During all testing, EUT is in link mode with base station emulator at maximum power level.

For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

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

Test Items	LTE -NB1 Band	Subcarrier (kHz)		Modulation		Tone@		Test Channel		
		3.75	15	BPSK	QPSK	1	Full	L	M	H
Max. Output Power	26	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	26		v	v	v	v	v	v	v	v
26dB and 99% Bandwidth	26		v		v		v	v	v	v
Emission masks In-band emissions	26	v	v	v	v	v	v	v		v
Emission masks – Out of band emissions	26	v	v	v	v	v		v	v	v
Frequency Stability	26		v	v			v		v	
E.R.P.	26	v	v	v	v	v		v	v	v
Radiated Spurious Emission	26	Worst Case						v	v	v
Remark	1. The mark "**v**" means that this configuration is chosen for testing. 2. The mark "-" means that this bandwidth is not supported.									

2.2 Connection Diagram of Test System



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	MT8821C	N/A	N/A	Unshielded, 1.8 m

2.4 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 4.2 dB and a 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

2.5 Frequency List of Low/Middle/High Channels

LTE-NB IoT Band 26 Channel and Frequency List			
Channel/Frequency(MHz)	**Lowest**	**Middle**	**Highest**
Channel	26692	26740	26788
Frequency	814.2	819.0	823.8

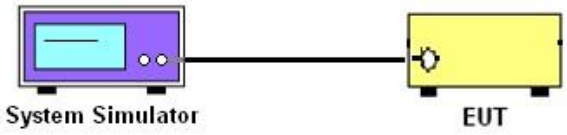
3 Conducted Test Items

3.1 Measuring Instruments

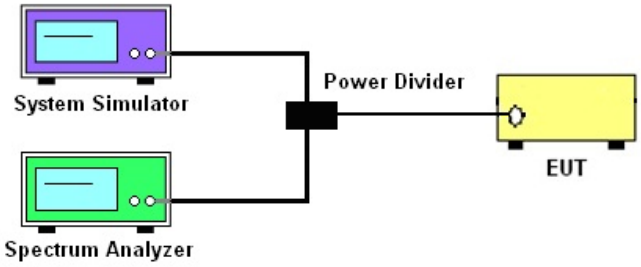
See list of measuring instruments of this test report.

3.1.1 Test Setup

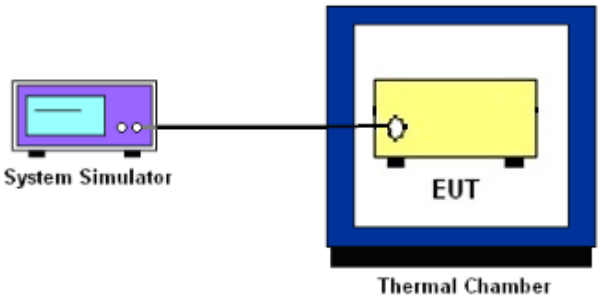
3.1.2 Conducted Output Power



3.1.3 Peak-to-Average Ratio, Occupied Bandwidth, Conducted Band-Edge, Emission Mask, Emissions Mask – Out Of Band Emissions, and Conducted Spurious Emission



3.1.4 Frequency Stability



3.1.5 Test Result of Conducted Test

Please refer to Appendix A.

3.2 Conducted Output Power Measurement and ERP Measurement

3.2.1 Description of the Conducted Output Power Measurement and ERP 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.

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 26.

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

3.2.2 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through 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 Peak-to-Average Ratio

3.3.1 Description of the PAR Measurement

Reporting only

3.3.2 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

3.4 99% Occupied Bandwidth and 26dB Bandwidth Measurement

3.4.1 Description of (Occupied) Bandwidth Limitations Measurement

The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.4.2 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

3.5 Emissions Mask Measurement

3.5.1 Description of Emissions Mask Measurement

Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of FCC Part 90.691.(a)

(a) Out-of-band emission requirement shall apply only to the "outer" channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log_{10}(f/6.1) decibels or 50 + 10 Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log_{10}(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

3.5.2 Test Procedures

1. The EUT was connected to spectrum analyzer and base station via power divider.
2. The emissions mask of low and high channels for the highest RF powers were measured.
3. The measured RBW and the VBW set 3 times of RBW are then set in spectrum analyzer, and
4. the RBW correction factor 10log (1% of OBW/measured RBW)(dB) was compensated, if required.
5. The test results were shown below plots with a correction offset factor including cable loss, insertion loss of power divider.

3.6 Emissions Mask – Out Of Band Emissions Measurement

3.6.1 Description of Conducted Emissions Out of band emissions measurement

The power of any emission FCC Part 90.691 (a)(2) on any frequency removed from the assigned frequency by out of the authorized bandwidth at least 43 + 10 log (P) dB. It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

3.6.2 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from 43 + 10log(P)dB below the transmitter power P(Watts)

3.7 Frequency Stability Measurement

3.7.1 Description of Frequency Stability Measurement

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

3.7.2 Measuring Instruments

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

3.7.3 Test Procedures for Temperature Variation

1. The EUT was set up in the thermal chamber and connected with the base station.
1. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized for three hours. Power was applied and the maximum change in frequency was recorded within one minute.
2. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

3.7.4 Test Procedures for Voltage Variation

1. The EUT was placed in a temperature chamber at 20±5° C and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured for the worst case.

3.8 Field Strength of Spurious Radiation Measurement

3.8.1 Description of Field Strength of Spurious Radiated Measurement

The radiated spurious emission was measured by substitution method according to ANSI / TIA-603-E. 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.

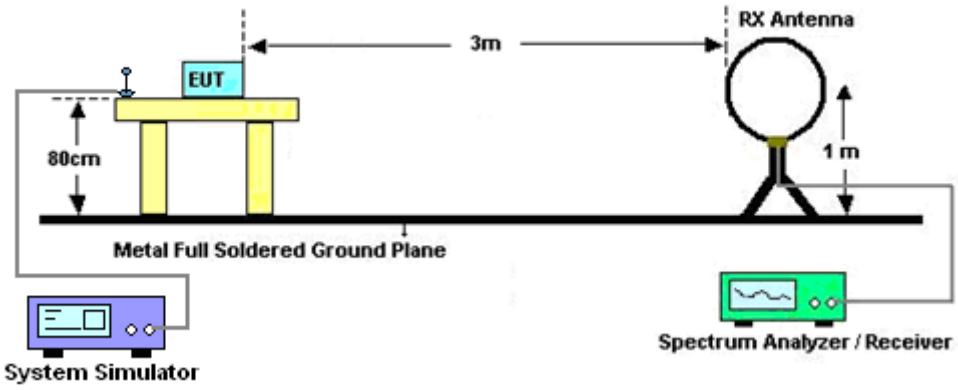
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43+10\log_{10}(P[\text{Watts}])$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.

3.8.2 Test Procedures

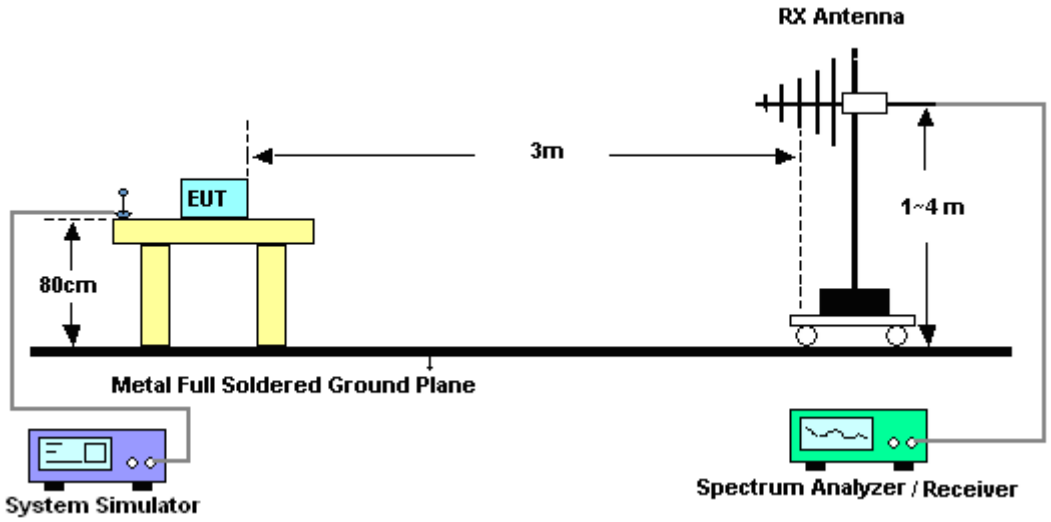
1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position 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)

3.8.3 Test Setup

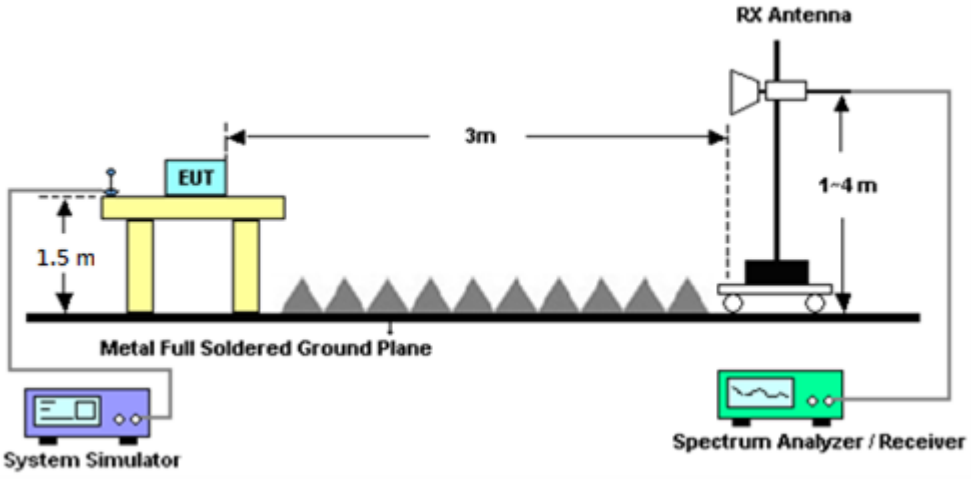
For radiated emissions below 30MHz



For radiated test from 30MHz to 1GHz



For radiated test above 1GHz



3.8.4 Test Result of Field Strength of Spurious Radiated

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 a comparison data 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 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Base Station (Measure)	Anritsu	MT8821C	6201664755	2/3/4G/LTE FDD/TDD with44)/LTE-3CC DLCA/2CC ULCA, CatM1/NB1/NB2	Jul. 16, 2020	Jul. 18, 2020~ Aug. 03, 2020	Jul. 15, 2021	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSV40	101908	10Hz~40GHz	May 13, 2020	Jul. 18, 2020~ Aug. 03, 2020	May 12, 2021	Conducted (TH05-HY)
Temperature Chamber	ESPEC	SH-641	92013720	-40℃~90℃	Sep. 02, 2019	Jul. 18, 2020~ Aug. 03, 2020	Sep. 01, 2020	Conducted (TH05-HY)
Programmable Power Supply	GW Instek	PSS-2005	EL890094	1V~20V 0.5A~5A	Oct. 09, 2019	Jul. 18, 2020~ Aug. 03, 2020	Oct. 08, 2020	Conducted (TH05-HY)
Coupler	Warison	20dB 25W SMA Directional Coupler	#A	1-18GHz	Jan. 13, 2020	Jul. 18, 2020~ Aug. 03, 2020	Jan. 12, 2021	Conducted (TH05-HY)
Amplifier	Sonoma-Instrument	310 N	187282	9KHz~1GHz	Dec. 17, 2019	Jun. 30, 2020~ Aug. 04, 2020	Dec. 16, 2020	Radiation (03CH13-HY)
Bilog Antenna	TESEQ	CBL 6111D&00800N1D01N-06	40103&07	30MHz to 1GHz	Apr. 29, 2020	Jun. 30, 2020~ Aug. 04, 2020	Apr. 28, 2021	Radiation (03CH13-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1212	1GHz~18GHz	May 20, 2020	Jun. 30, 2020~ Aug. 04, 2020	May 19, 2021	Radiation (03CH13-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1590074	1GHz~18GHz	May 19, 2020	Jun. 30, 2020~ Aug. 04, 2020	May 18, 2021	Radiation (03CH13-HY)
Preamplifier	Keysight	83017A	MY53270147	1GHz~26.5GHz	Oct. 28, 2019	Jun. 30, 2020~ Aug. 04, 2020	Oct. 27, 2020	Radiation (03CH13-HY)
Signal Generator	Rohde & Schwarz	SMF100A	101107	100kHz~40GHz	Aug. 27, 2019	Jun. 30, 2020~ Aug. 04, 2020	Aug. 26, 2020	Radiation (03CH13-HY)
Spectrum Analyzer	Keysight	N9010A	MY55370526	10Hz~44GHz	Mar. 20, 2020	Jun. 30, 2020~ Aug. 04, 2020	Mar. 19, 2021	Radiation (03CH13-HY)
Controller	EMEC	EM1000	N/A	Control Turn table & Ant Mast	N/A	Jun. 30, 2020~ Aug. 04, 2020	N/A	Radiation (03CH13-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1m~4m	N/A	Jun. 30, 2020~ Aug. 04, 2020	N/A	Radiation (03CH13-HY)
Turn Table	EMEC	TT2000	N/A	0~360 Degree	N/A	Jun. 30, 2020~ Aug. 04, 2020	N/A	Radiation (03CH13-HY)
Software	Audix	E3 6.2009-8-24	RK-000992	N/A	N/A	Jun. 30, 2020~ Aug. 04, 2020	N/A	Radiation (03CH13-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Jun. 30, 2020~ Aug. 04, 2020	Dec. 12, 2020	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 126E	0030/126E	30M-18G	Feb. 12, 2020	Jun. 30, 2020~ Aug. 04, 2020	Feb. 11, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	804793/4	30M-18G	Feb. 12, 2020	Jun. 30, 2020~ Aug. 04, 2020	Feb. 11, 2021	Radiation (03CH13-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30M~40GHz	Feb. 25, 2020	Jun. 30, 2020~ Aug. 04, 2020	Feb. 24, 2021	Radiation (03CH13-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170980	18GHz~40GHz	Jan. 10, 2020	Jun. 30, 2020~ Aug. 04, 2020	Jan. 09, 2021	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-2700-3000-18000-60SS	SN2	3GHz High Pass Filter	Jul. 13, 2020	Jun. 30, 2020~ Aug. 04, 2020	Jul. 12, 2021	Radiation (03CH13-HY)
Filter	Wainwright	WHKX12-1080-1200-15000-60SS	SN1	1.2GHz High Pass Filter	Mar. 18, 2020	Jun. 30, 2020~ Aug. 04, 2020	Mar. 17, 2021	Radiation (03CH13-HY)
Hygrometer	TECPEL	DTM-303A	TP190075	N/A	Apr. 23, 2020	Jun. 30, 2020~ Aug. 04, 2020	Apr. 22, 2021	Radiation (03CH13-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.21

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.24

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	3.99

Appendix A. Test Results of Conducted Test

Conducted Output Power(Average power)

LTE-NB1 Band 26 Maximum Average Power [dBm]					
Sub-carrier Spacing [kHz]	Mod	Number of Tones	Lowest	Middle	Highest
3.75	BPSK	1T0	22.94	22.88	22.96
3.75		1T47	22.88	22.82	22.91
3.75	QPSK	1T0	22.95	22.92	22.98
3.75		1T47	22.89	22.85	22.91
15	BPSK	1T0	22.86	22.97	22.89
15		1T11	22.85	22.95	22.87
15	QPSK	1T0	22.87	22.99	22.90
15		1T11	22.85	22.97	22.91
15		12T0	20.88	21.15	20.86

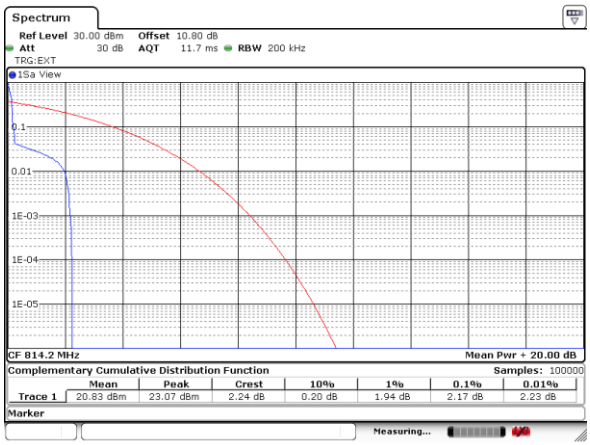
LTE Band 26

Peak-to-Average Ratio

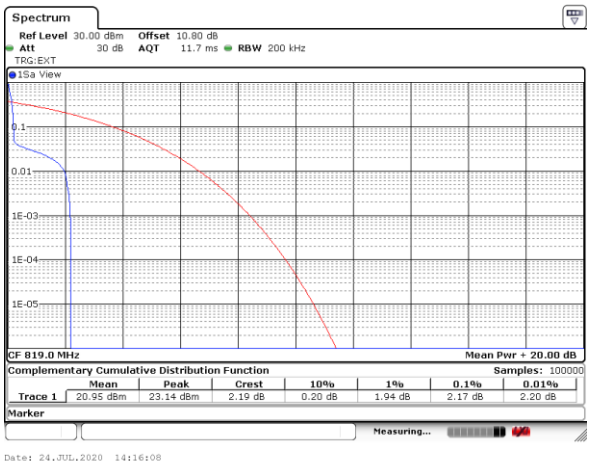
Mode	LTE Band 26 / 15kHz			
Mod.	BPSK	QPSK		Limit: 13dB
T Size	1T	1T	Full T	Result
Lowest CH	2.17	1.68	3.71	PASS
Middle CH	2.17	1.68	3.74	
Highest CH	2.12	1.68	3.80	

LTE Band 26 / 15kHz / BPSK

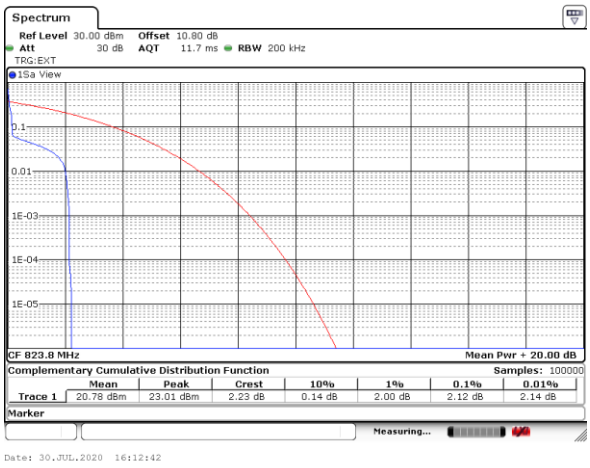
Lowest Channel / 1T



Middle Channel/ 1T

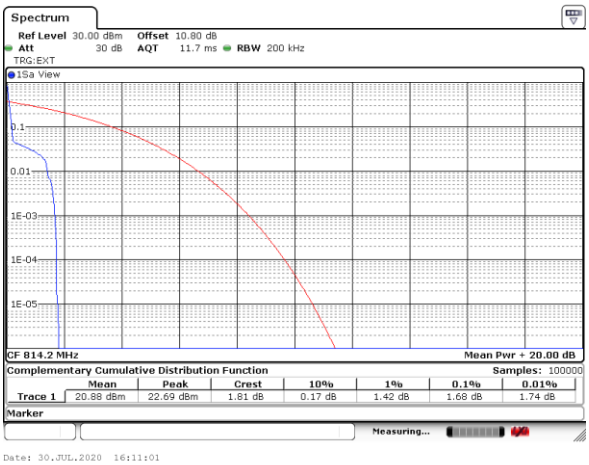


Highest Channel/ 1T

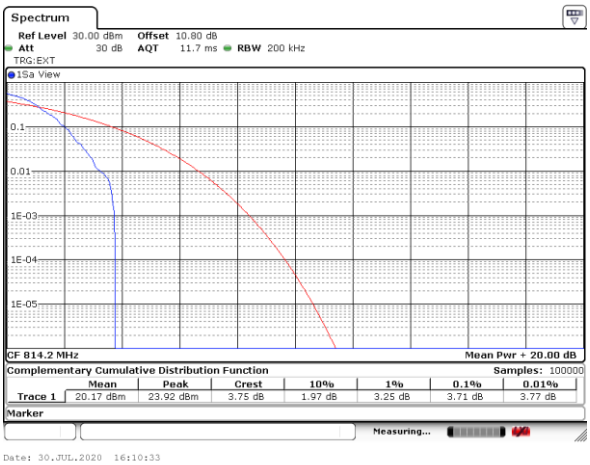


LTE Band 26 / 15kHz / QPSK

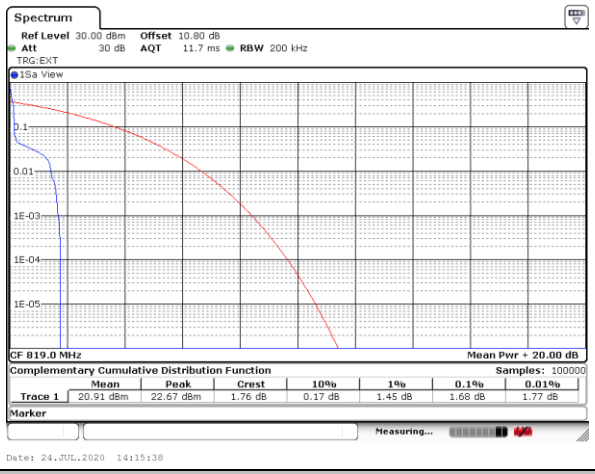
Lowest Channel / 1T



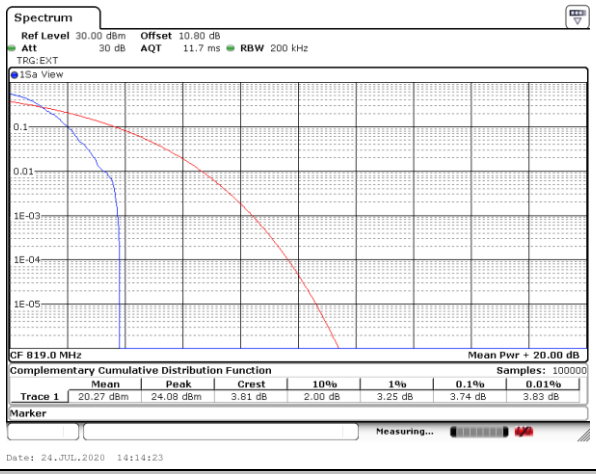
Lowest Channel / Full T



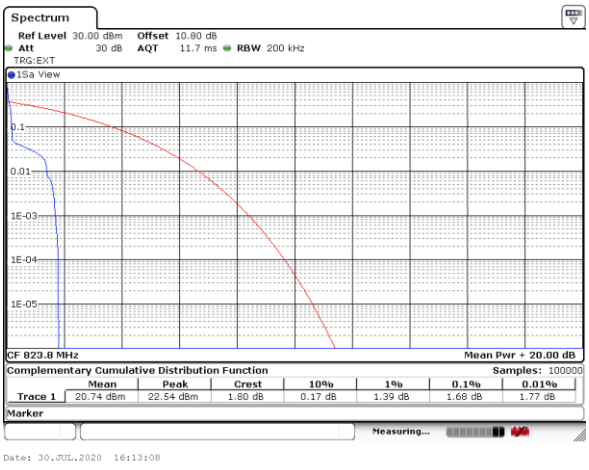
Middle Channel/ 1T



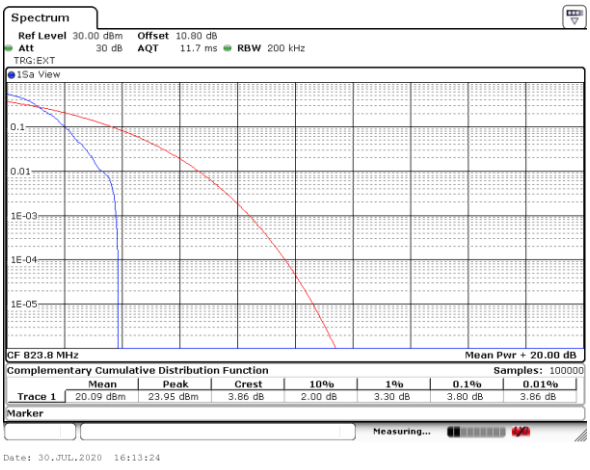
Middle Channel / Full T



Highest Channel/ 1T



Highest Channel / Full T

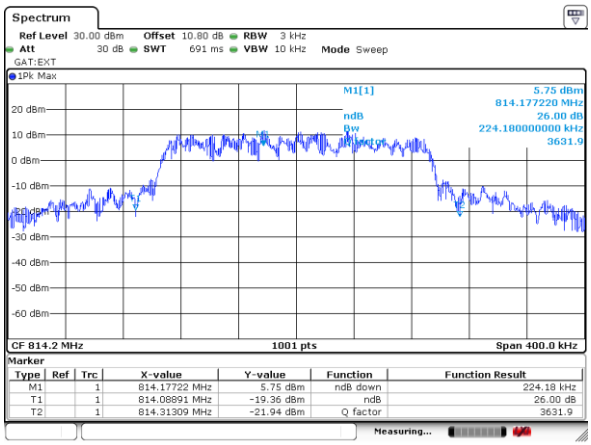


26dB Bandwidth

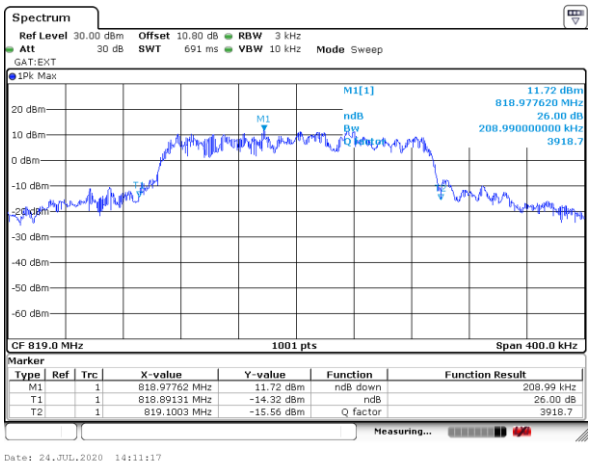
Mode	LTE Band 26 : 26dB(kHz)
Subcarrier Spacing	15kHz
Mod.	QPSK
Lowest CH	224.18
Middle CH	208.99
Highest CH	209.39

LTE Band 26

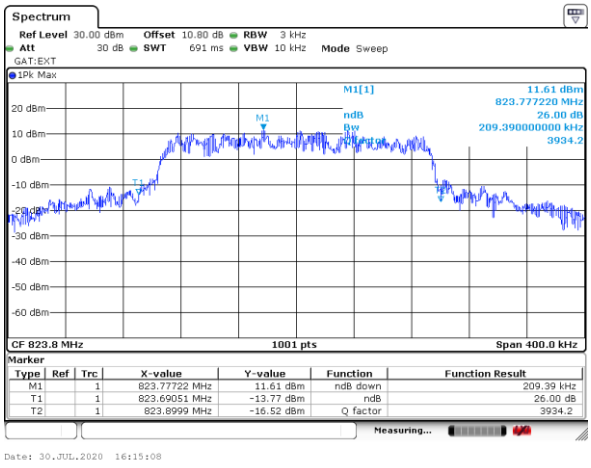
Lowest Channel / 15kHz / QPSK



Middle Channel / 15kHz / QPSK



Highest Channel / 15kHz / QPSK

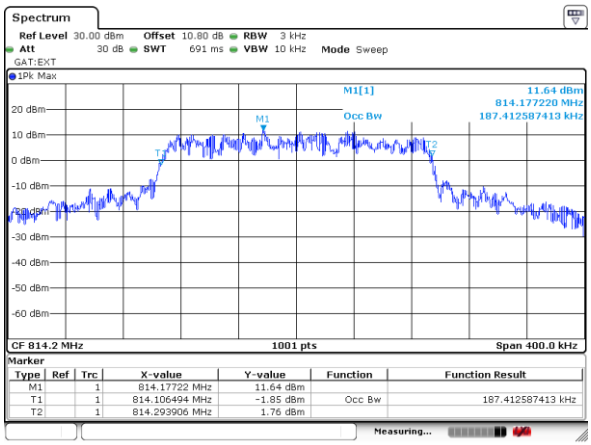


Occupied Bandwidth

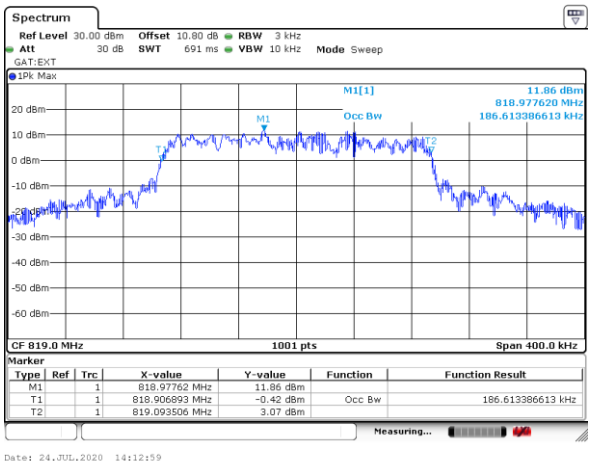
Mode	LTE Band 26 : OB(kHz)
Subcarrier Spacing	15kHz
Mod.	QPSK
Lowest CH	187.41
Middle CH	186.61
Highest CH	187.01

LTE Band 26

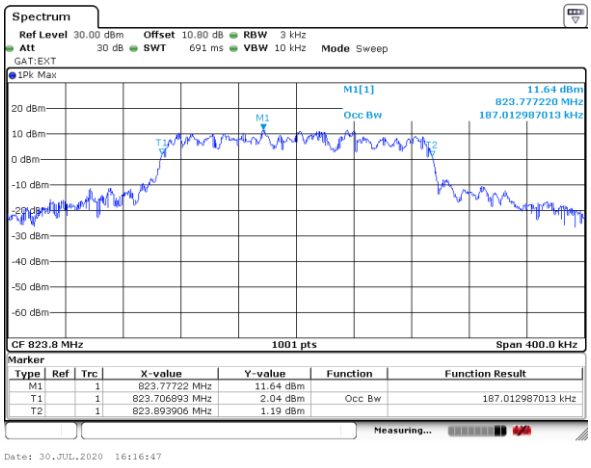
Lowest Channel / 15kHz / QPSK



Middle Channel / 15kHz / QPSK



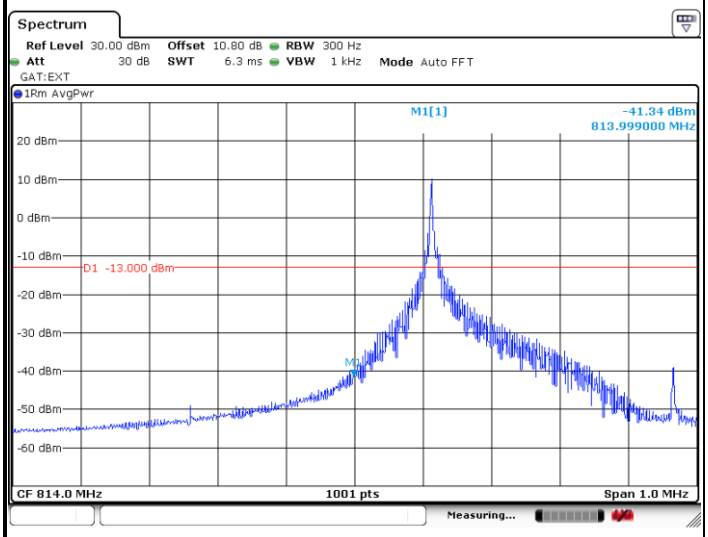
Highest Channel / 15kHz / QPSK



Conducted Band Edge

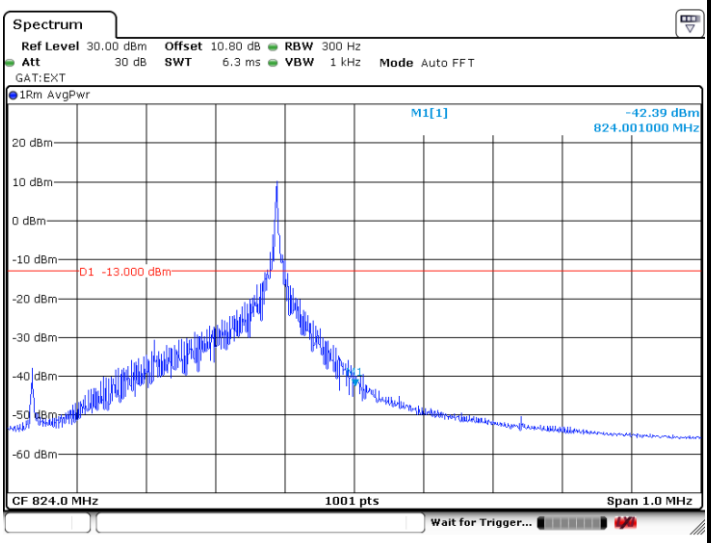
LTE Band 26 / 3.75kHz / BPSK

Lowest Band Edge / 1 T



Date: 30.JUL.2020 15:57:33

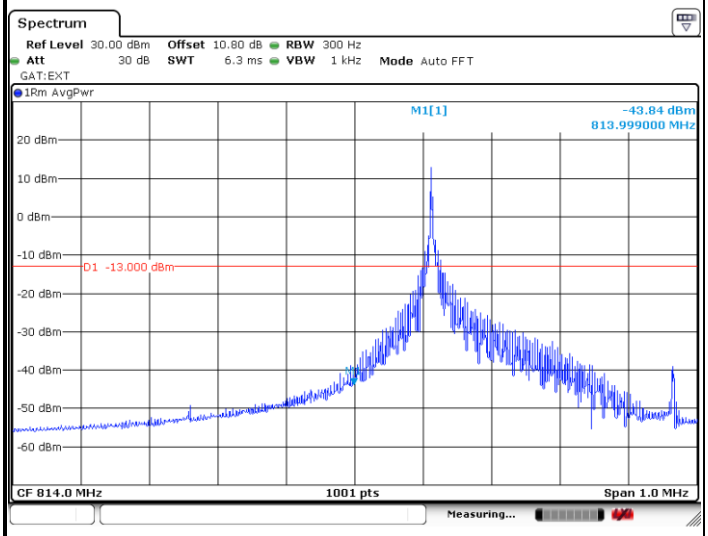
Highest Band Edge / 1 T



Date: 30.JUL.2020 16:24:00

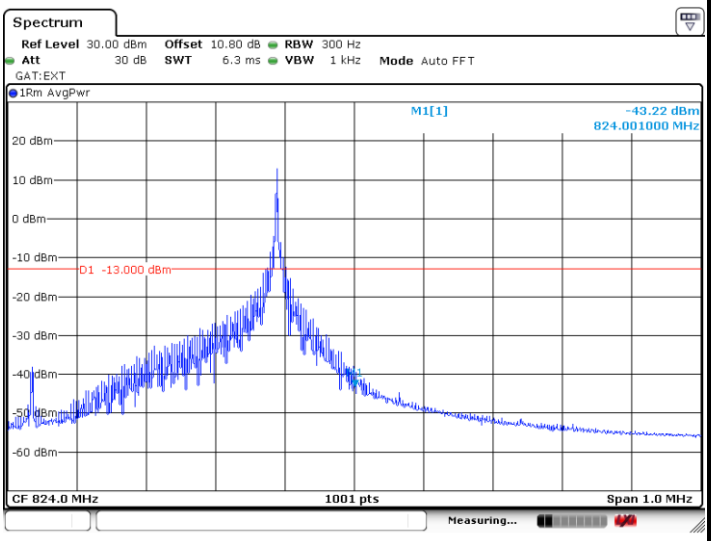
LTE Band 26 / 3.75kHz / QPSK

Lowest Band Edge / 1 T

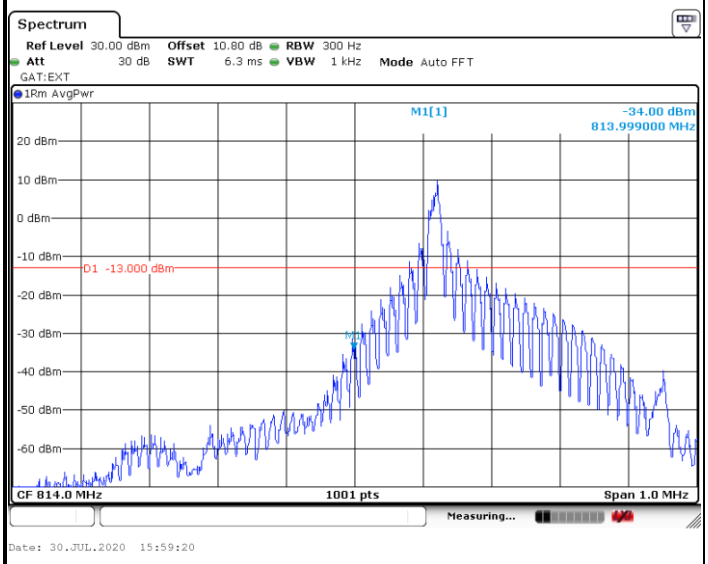
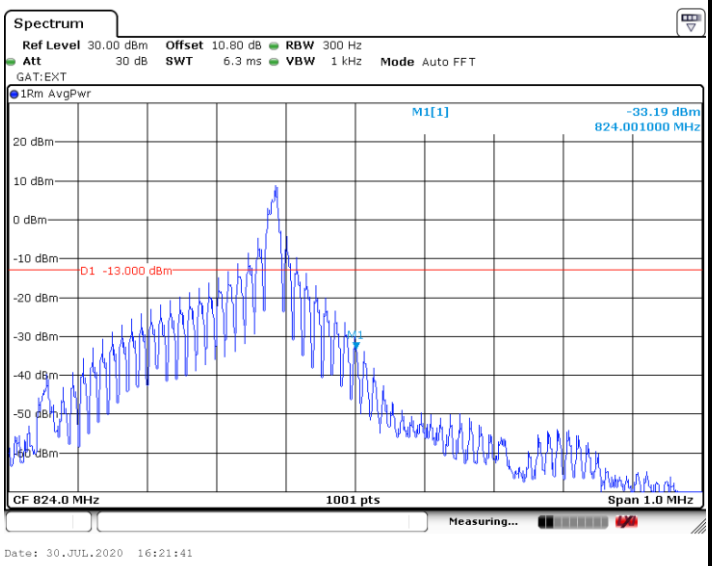


Date: 30.JUL.2020 15:57:55

Highest Band Edge / 1 T

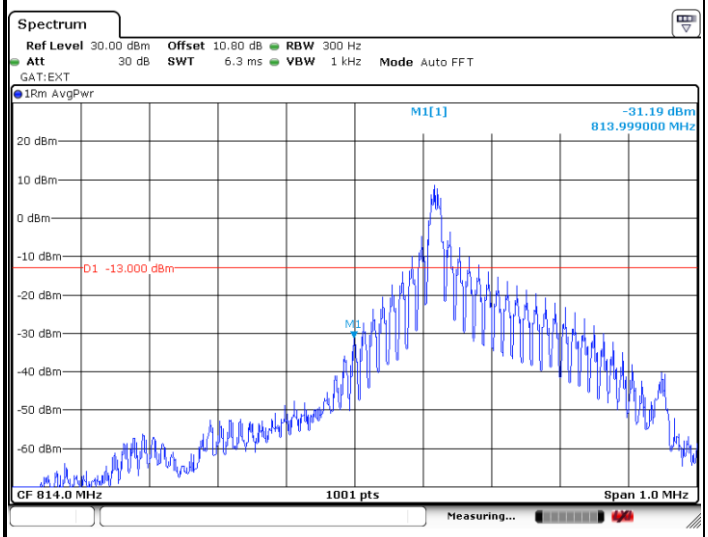


Date: 30.JUL.2020 16:23:15

LTE Band 26 / 15kHz / BPSK	
Lowest Band Edge / 1 T	Highest Band Edge / 1 T
	

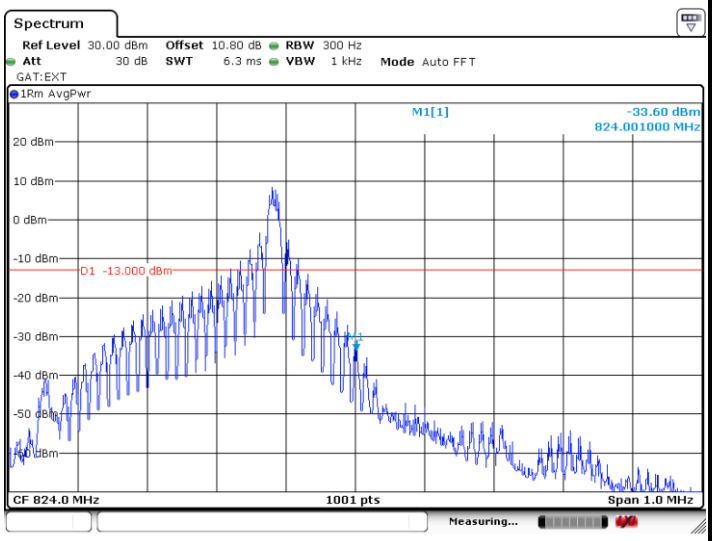
LTE Band 26 / 15kHz / QPSK

Lowest Band Edge / 1 T



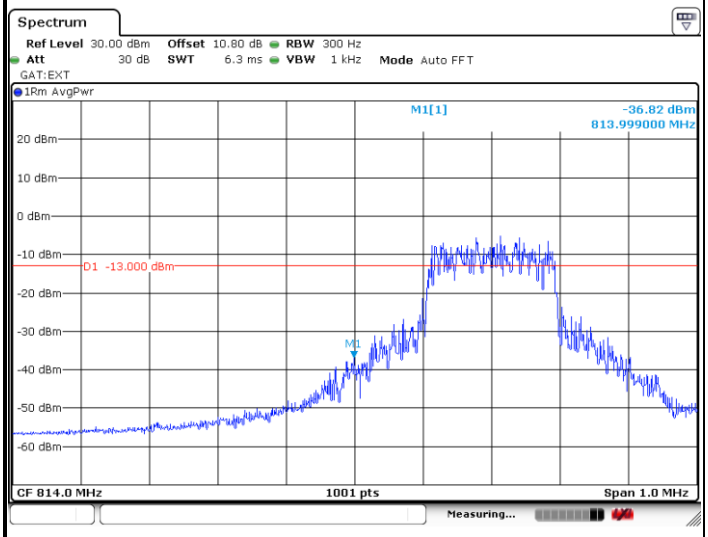
Date: 30.JUL.2020 15:58:50

Highest Band Edge / 1 T



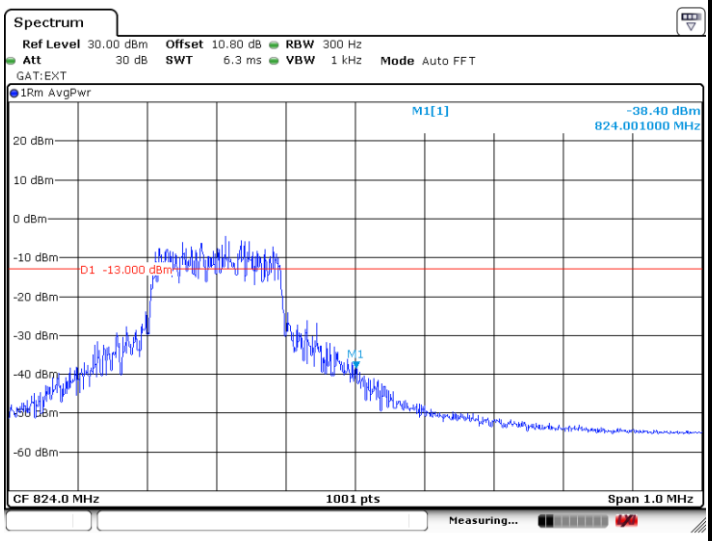
Date: 30.JUL.2020 16:21:18

Lowest Band Edge / Full T



Date: 30.JUL.2020 16:00:53

Highest Band Edge / Full T

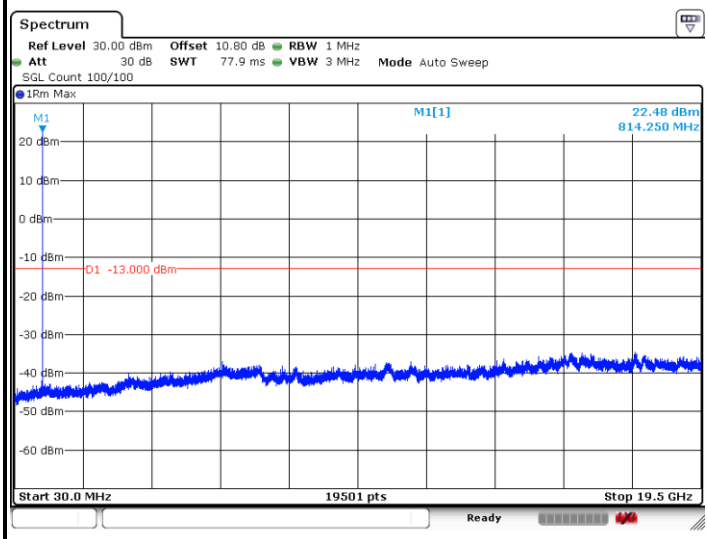


Date: 30.JUL.2020 16:20:17

Conducted Spurious Emission

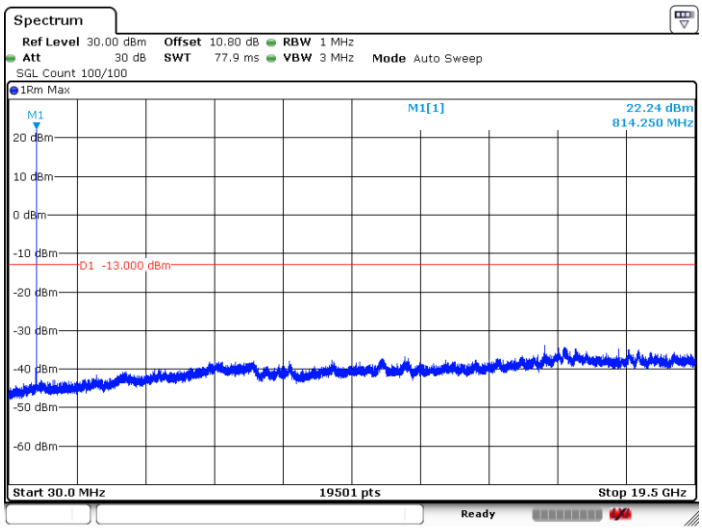
LTE Band 26 / 3.75kHz

Lowest Channel / BPSK



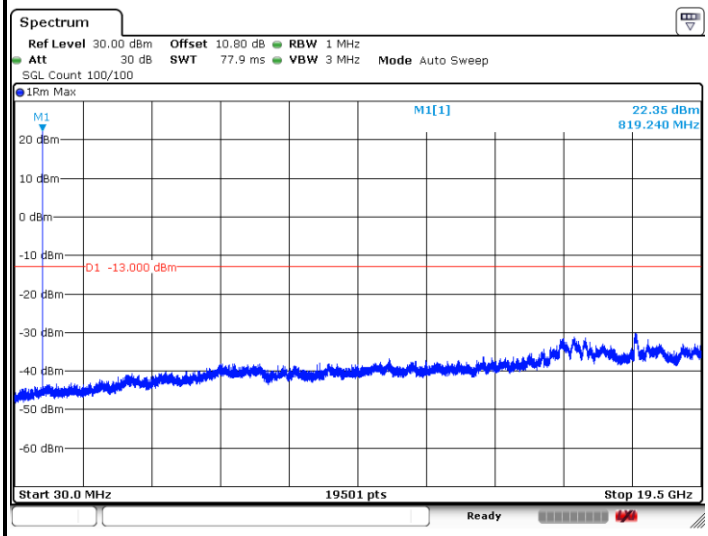
Date: 30.JUL.2020 15:54:00

Lowest Channel / QPSK



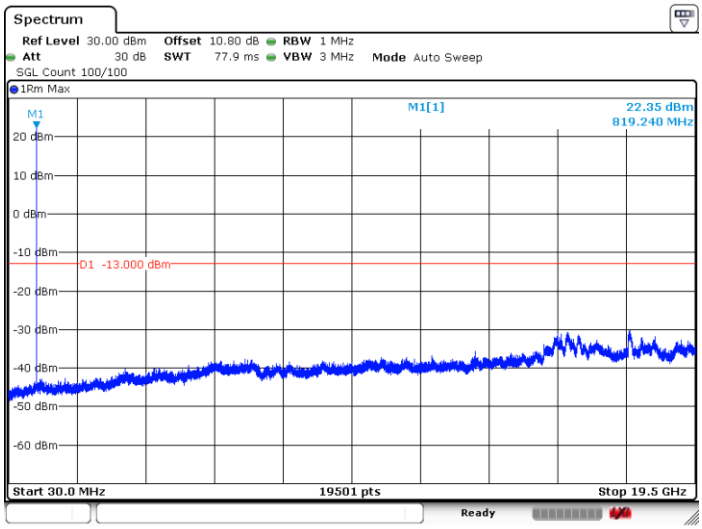
Date: 30.JUL.2020 15:53:03

Middle Channel / BPSK

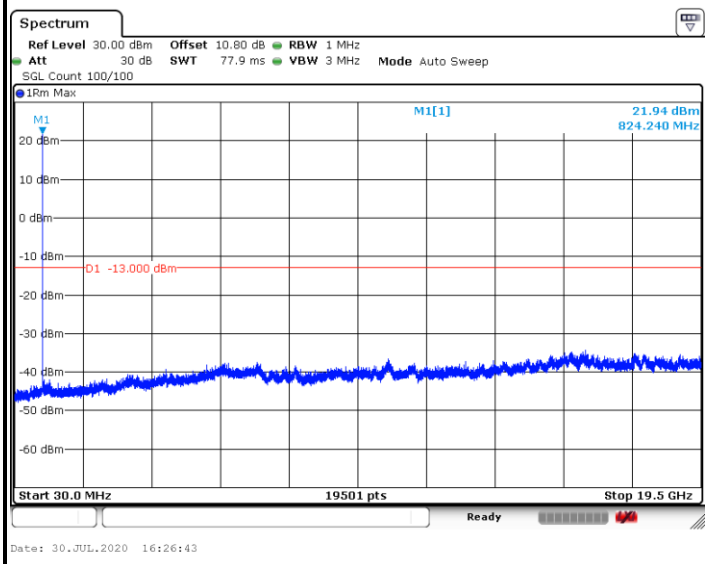
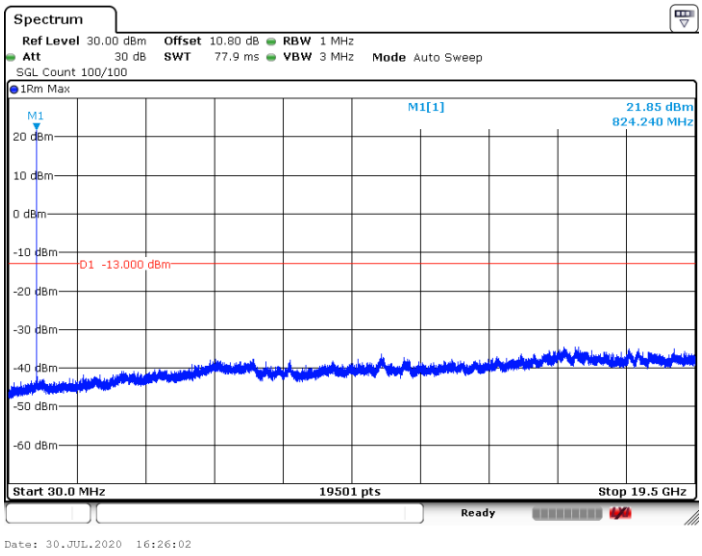


Date: 24.JUL.2020 14:24:03

Middle Channel / QPSK

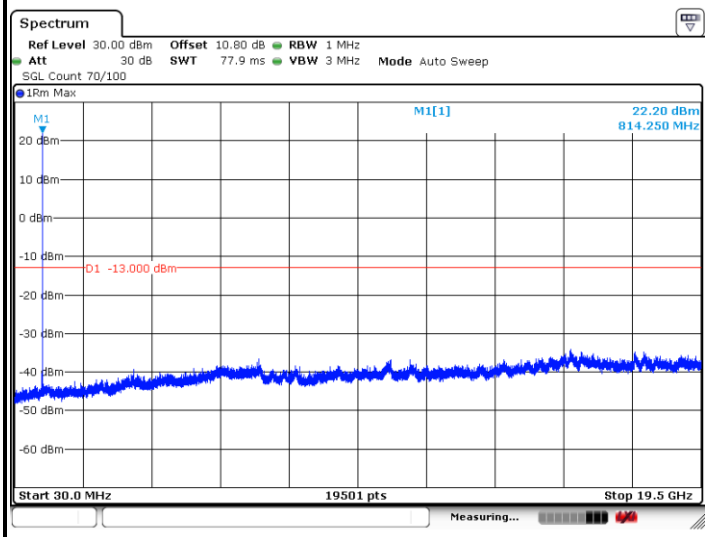


Date: 24.JUL.2020 14:22:43

LTE Band 26 / 3.75kHz	
Highest Channel / BPSK	Highest Channel / QPSK
	

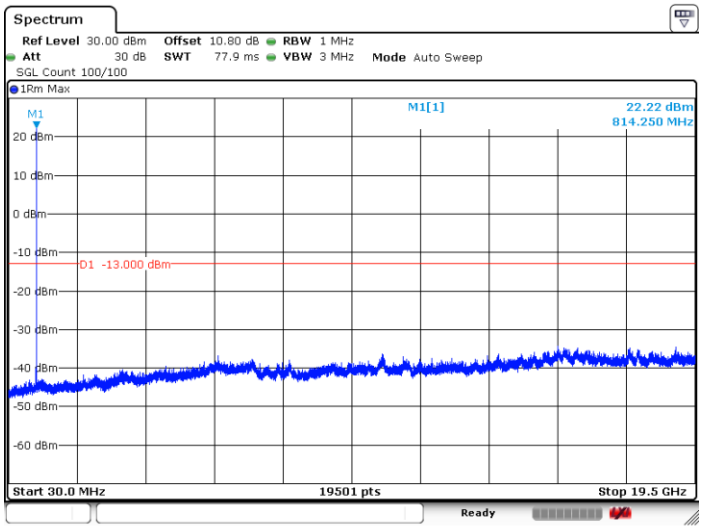
LTE Band 26 / 15kHz

Lowest Channel / BPSK



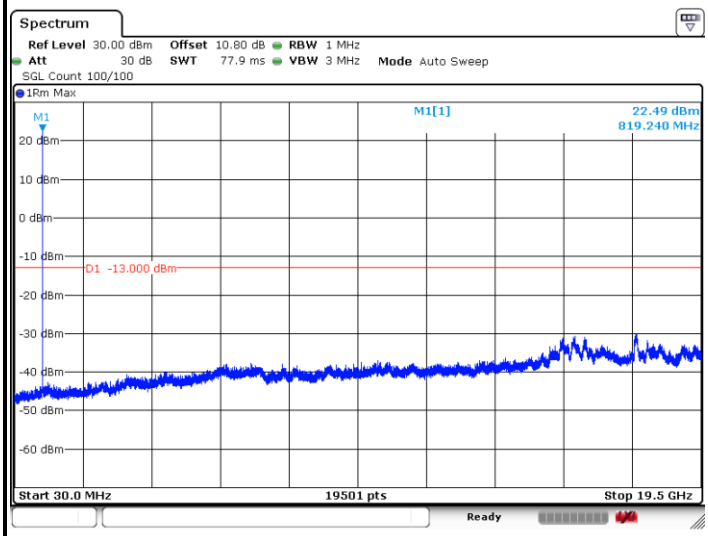
Date: 30.JUL.2020 15:50:15

Lowest Channel / QPSK



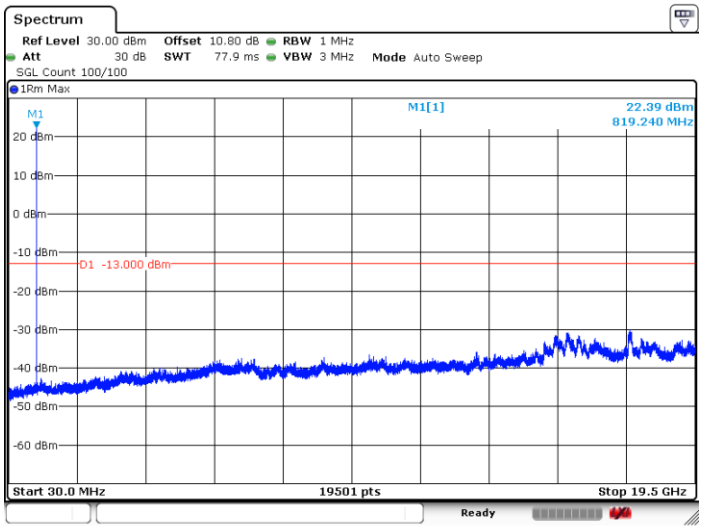
Date: 30.JUL.2020 15:52:09

Middle Channel / BPSK

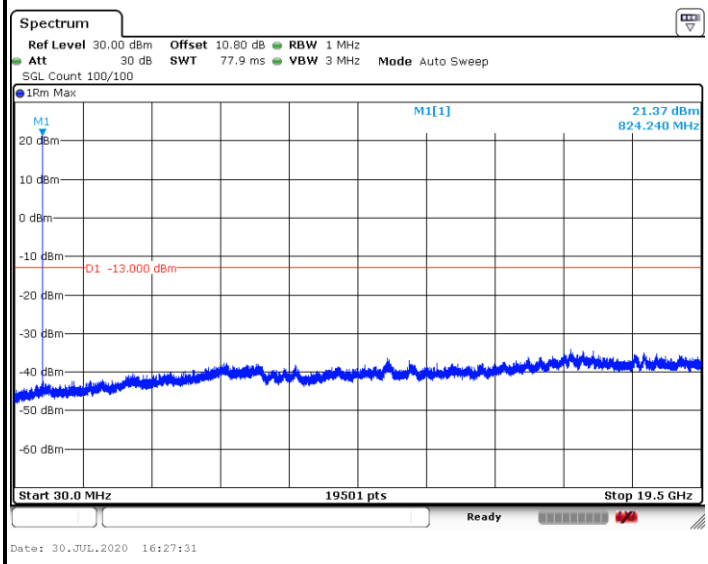
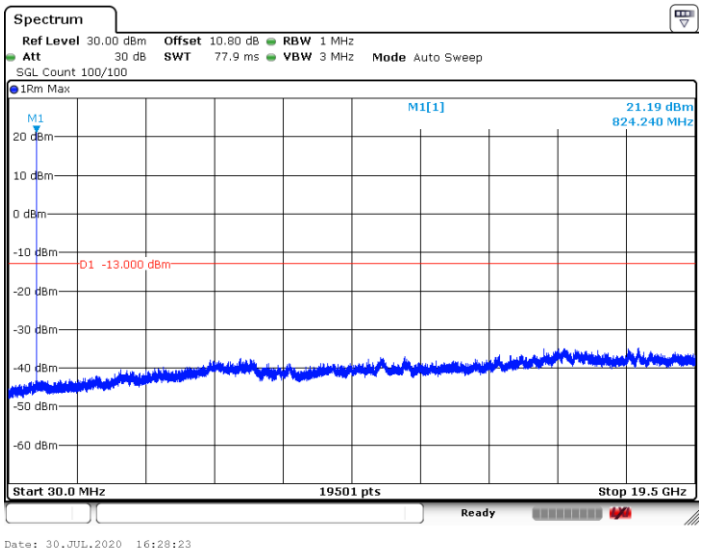


Date: 24.JUL.2020 14:19:47

Middle Channel / QPSK



Date: 24.JUL.2020 14:20:53

LTE Band 26 / 15kHz	
Highest Channel / BPSK	Highest Channel / QPSK
	

Frequency Stability

Test Conditions		LTE Band 26 (BPSK) / Middle Channel	Limit
Temperature (°C)	Voltage (Volt)	BW 15kHz	Note 2.
		Deviation (ppm)	Result
50	Normal Voltage	0.0115	PASS
40	Normal Voltage	0.0137	
30	Normal Voltage	0.0071	
20(Ref.)	Normal Voltage	0.0000	
10	Normal Voltage	0.0121	
0	Normal Voltage	0.0001	
-10	Normal Voltage	0.0100	
-20	Normal Voltage	0.0107	
-30	Normal Voltage	0.0136	
20	Maximum Voltage	0.0167	
20	Normal Voltage	0.0000	
20	Battery End Point	0.0165	

Note:

1. Normal Voltage =3.6 V.；Battery End Point (BEP) =3.3 V.；Maximum Voltage =3.7 V.

2. The frequency fundamental emissions stay within the authorized frequency block.

Appendix B. Test Results of ERP and Radiated Test

ERP

<Reporting Only>

LTE NB1 Band 26 / 3.75KHz (Average) (Average) (GT - LC = 0.59 dB)						
Channel	Mode	Tones	Conducted		ERP	
			Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	BPSK	1T/0	22.94	0.1968	21.38	0.14
Middle			22.88	0.1941	21.32	0.14
Highest			22.96	0.1977	21.40	0.14
Lowest	QPSK	1T/0	22.95	0.1972	21.39	0.14
Middle			22.92	0.1959	21.36	0.14
Highest			22.98	0.1986	21.42	0.14
Limit	ERP < 100W		Result		PASS	

LTE NB1 Band 26 / 15KHz (Average) (Average) (GT - LC = 0.59 dB)						
Channel	Mode	Tones	Conducted		ERP	
			Power (dBm)	Power (Watts)	ERP(dBm)	ERP(W)
Lowest	BPSK	1T/0	22.86	0.1932	21.30	0.13
Middle			22.97	0.1982	21.41	0.14
Highest			22.89	0.1945	21.33	0.14
Lowest	QPSK	1T/0	22.87	0.1936	21.31	0.14
Middle			22.99	0.1991	21.43	0.14
Highest			22.9	0.1950	21.34	0.14
Limit	ERP < 100W		Result		#VALUE!	

Radiated Spurious Emission

LTE NB IOT Band 26

LTE NB IOT Band 26 / 15Khz / BPSK									
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	1632	-54.52	-13	-41.52	-67.42	-59.85	1.22	8.70	H
	2440	-53.55	-13	-40.55	-70.32	-60.42	1.43	10.45	H
	3256	-45.01	-13	-32.01	-63.83	-52.86	1.67	11.67	H
	4072	-45.85	-13	-32.85	-66.26	-53.69	2.11	12.10	H
									H
									H
	1632	-59.54	-13	-46.54	-72.3	-64.87	1.22	8.70	V
	2440	-53.02	-13	-40.02	-70.2	-59.89	1.43	10.45	V
	3256	-43.04	-13	-30.04	-62.13	-50.89	1.67	11.67	V
	4072	-42.14	-13	-29.14	-63.07	-49.98	2.11	12.10	V
									V
									V
Middle	1640	-60.04	-13	-47.04	-73	-65.40	1.22	8.73	H
	2456	-56.12	-13	-43.12	-72.98	-63.00	1.43	10.46	H
	3272	-47.12	-13	-34.12	-65.87	-55.00	1.68	11.72	H
	4096	-43.09	-13	-30.09	-63.49	-50.94	2.10	12.10	H
									H
									H
	1640	-54.64	-13	-41.64	-67.47	-60.00	1.22	8.73	V
	2456	-55.10	-13	-42.10	-72.31	-61.98	1.43	10.46	V
	3272	-42.52	-13	-29.52	-61.6	-50.40	1.68	11.72	V
	4096	-45.58	-13	-32.58	-66.53	-53.43	2.10	12.10	V
									V
									V

Highest	1648	-52.90	-13	-39.90	-65.83	-58.29	1.23	8.76	H
	2472	-51.95	-13	-38.95	-68.65	-58.84	1.44	10.48	H
	3296	-43.50	-13	-30.50	-62.05	-51.44	1.70	11.79	H
	4120	-44.77	-13	-31.77	-65.1	-52.63	2.09	12.10	H
									H
									H
	1648	-58.83	-13	-45.83	-71.64	-64.22	1.23	8.76	V
	2472	-52.44	-13	-39.44	-69.43	-59.33	1.44	10.48	V
	3296	-45.34	-13	-32.34	-64.29	-53.28	1.70	11.79	V
	4120	-42.19	-13	-29.19	-63.09	-50.05	2.09	12.10	V
									V
									V

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