

FCC Test Report

(PART 24)

Report No.: RF171114D13

FCC ID: P27-TPM10

Test Model: TPM10

Received Date: Nov. 14, 2017

Test Date: Dec. 06, 2017 ~ Jan. 10, 2018

Issued Date: Jan. 18, 2018

Applicant: Sercomm Corp.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Test Location (1): No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF171114D13	Original Release	Jan. 18, 2018

1 Certificate of Conformity

Product: Cat-M1 Module

Brand: Sercomm

Test Model: TPM10

Sample Status: Identical Prototype

Applicant: Sercomm Corp.

Test Date: Dec. 06, 2017 ~ Jan. 10, 2018

Standards: FCC Part 24, Subpart E

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :

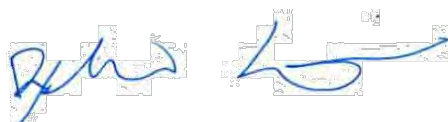


Date:

Jan. 18, 2018

Vera Huang / Specialist

Approved by :



Date:

Jan. 18, 2018

Dylan Chiou / Project Engineer

2 Summary of Test Results

Applied Standard: FCC Part 24 & Part 2			
FCC Clause	Test Item	Result	Remarks
2.1046 24.232	Effective Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1046 24.232(d)	Peak to Average Ratio	Pass	Meet the requirement of limit.
2.1055 24.235	Frequency Stability	Pass	Meet the requirement of limit.
2.1049 24.238(b)	Occupied Bandwidth	Pass	Meet the requirement of limit.
24.238(b)	Band Edge Measurements	Pass	Meet the requirement of limit.
2.1051 24.238	Conducted Spurious Emissions	Pass	Meet the requirement of limit.
2.1053 24.238	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -30.66 dB at 5700.00 MHz.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Test Site And Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Feb. 17, 2017	Feb. 16, 2018
Spectrum Analyzer Agilent	N9010A	MY52220314	Nov. 24, 2017	Nov. 23, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	100115	Nov. 23, 2017	Nov. 22, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Dec. 27, 2016	Dec. 26, 2017
			Dec. 12, 2017	Dec. 11, 2018
Double Ridge Guide Horn Antenna EMCO	3115	5619	Nov. 30, 2017	Nov. 29, 2018
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 06, 2017	Dec. 05, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 01, 2017	Nov. 30, 2018
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 23, 2017	Jun. 22, 2018
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 24, 2017	Oct. 23, 2018
Loop Antenna	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier EMCI	EMC001340	980201	Nov. 01, 2017	Oct. 30, 2018
Bluetooth Tester	CBT	100946	Jul. 29, 2016	Jul. 28, 2018
Preamplifier EMCI	EMC 012645	980115	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 184045	980116	Oct. 20, 2017	Oct. 19, 2018
Preamplifier EMCI	EMC 330H	980112	Oct. 13, 2017	Oct. 12, 2018
Power Meter Anritsu	ML2495A	1012010	Aug. 15, 2017	Aug. 14, 2018
Power Sensor Anritsu	MA2411B	1315050	Aug. 15, 2017	Aug. 14, 2018
RF Coaxial Cable HUBER+SUHNNER	EMC104-SM-SM-8 000&3000	140811+170717	Oct. 20, 2017	Oct. 19, 2018

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
RF Coaxial Cable HUBER+SUHNNER	SUCOFLEX 104	EMC104-SM-SM-1000(140807)	Oct. 20, 2017	Oct. 19, 2018
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 20, 2017	Oct. 19, 2018
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

3 General Information

3.1 General Description of EUT

Product	Cat-M1 Module	
Brand	Sercomm	
Test Model	TPM10	
Status of EUT	Identical Prototype	
Power Supply Rating	5.0 Vdc (adapter)	
Modulation Type	LTE	QPSK, 16QAM
Frequency Range	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1850.7 ~ 1909.3 MHz
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1851.5 ~ 1908.5 MHz
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1852.5 ~ 1907.5 MHz
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1855.0 ~ 1905.0 MHz
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1857.5 ~ 1902.5 MHz
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1860.0 ~ 1900.0 MHz
Max. EIRP Power	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	209.07 mW
	LTE Band 2 (Channel Bandwidth: 3 MHz)	215.43 mW
	LTE Band 2 (Channel Bandwidth: 5 MHz)	220.44 mW
	LTE Band 2 (Channel Bandwidth: 10 MHz)	226.62 mW
	LTE Band 2 (Channel Bandwidth: 15 MHz)	231.37 mW
	LTE Band 2 (Channel Bandwidth: 20 MHz)	235.67 mW
Emission Designator	LTE Band 2 (Channel Bandwidth: 1.4 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 3 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 5 MHz)	1M08G7D
	LTE Band 2 (Channel Bandwidth: 10 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 15 MHz)	1M09G7D
	LTE Band 2 (Channel Bandwidth: 20 MHz)	1M09G7D
Antenna Type	Dipole Antenna	
Accessory Device	Refer to Note as below	
Data Cable Supplied	Refer to Note as below	

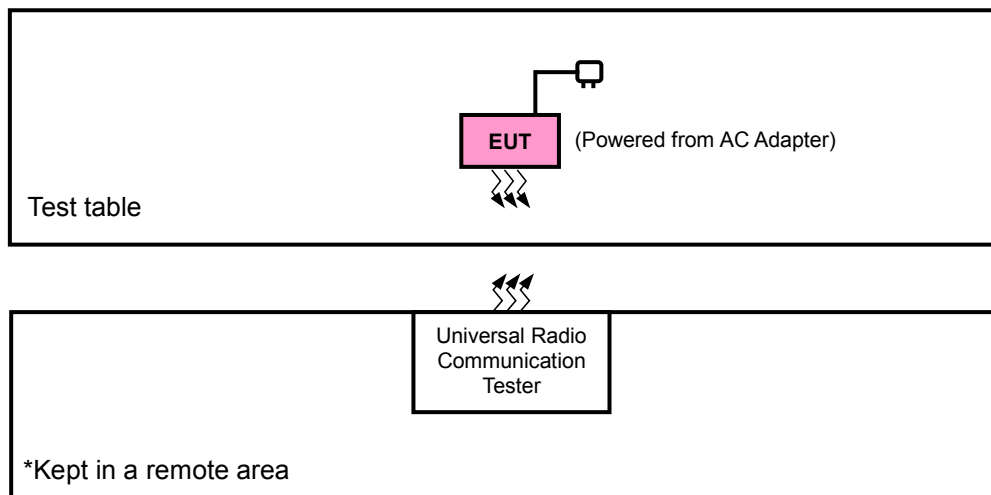
Note:

1. The EUT contains following accessory devices.

Product	Brand	Model	Description
Adapter	LINKSYS	MT10-1050200-A1	I/P: 100-120 Vac, 50/60 Hz, 0.5 A O/P: 5 Vdc, 2 A

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Configuration of System under Test



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports.

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission
LTE Band 2	Z-plane	Z-axis

LTE Band 2

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
-	Frequency Stability	18607 to 19193	18607, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18615 to 19185	18615, 19185	3 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18625 to 19175	18625, 19175	5 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18650 to 19150	18650, 19150	10 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18675 to 19125	18675, 19125	15 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18700 to 19100	18700, 19100	20 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
-	Occupied Bandwidth	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	6 RB / 0 RB Offset / 0 RB Index
-	Peak to Average Ratio	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset / 0 RB Index

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	Band Edge	18607 to 19193	18607	1.4 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
			19193	1.4 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
		18615 to 19185	18615	3 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
			19185	3 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
		18625 to 19175	18625	5 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
			19175	5 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
		18650 to 19150	18650	10 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
			19150	10 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
		18675 to 19125	18675	15 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
			19125	15 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
						6 RB / 0 RB Offset / 0 RB Index
-	Conducted Emission	18607 to 19193	18607, 18900, 19193	1.4 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18615 to 19185	18615, 18900, 19185	3 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18625 to 19175	18625, 18900, 19175	5 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18650 to 19150	18650, 18900, 19150	10 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18675 to 19125	18675, 18900, 19125	15 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
		18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index
-	Radiated Emission	18700 to 19100	18700, 18900, 19100	20 MHz	QPSK	1 RB / 0 RB Offset / 0 RB Index

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	26 deg. C, 58 % RH	3.23 Vdc	Jisyong Wang
Frequency Stability	26 deg. C, 58 % RH	3.23 Vdc	Carlos Chen
Occupied Bandwidth	26 deg. C, 58 % RH	3.23 Vdc	Carlos Chen
Band Edge	26 deg. C, 58 % RH	3.23 Vdc	Carlos Chen
Peak to Average Ratio	26 deg. C, 58 % RH	3.23 Vdc	Carlos Chen
Conducted Emission	26 deg. C, 58 % RH	3.23 Vdc	Carlos Chen
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 24

KDB 971168 D01 Power Meas License Digital Systems v02r02

ANSI/TIA/EIA-603-E 2016

ANSI 63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

Mobile / Portable station are limited to 2 watts e.i.r.p.

4.1.2 Test Procedures

EIRP / ERP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1 MHz for GSM, GPRS & EDGE, 5 MHz for WCDMA and CDMA, and 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
- d. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$. E.R.P power can be calculated from E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}$.

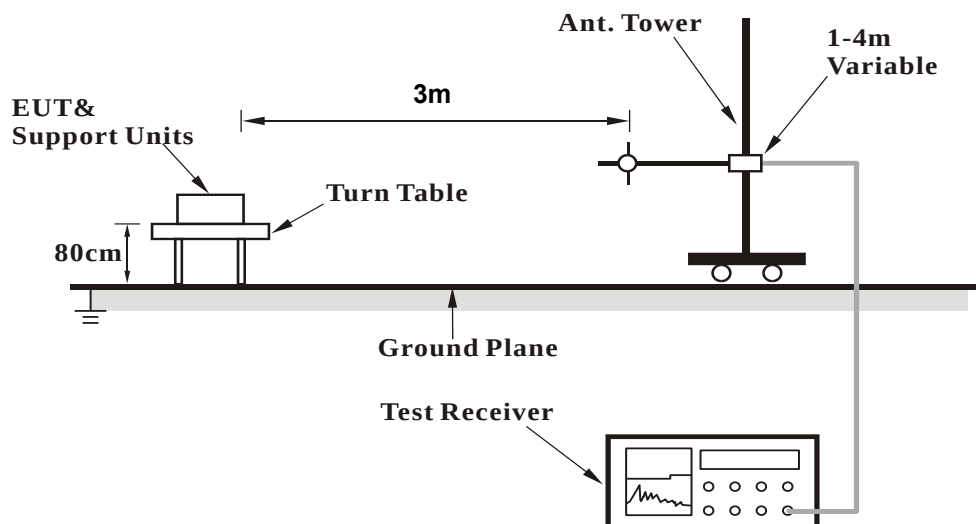
Conducted Power Measurement:

The EUT was set up for the maximum power with GSM, GPRS, EDGE, WCDMA, CDMA, and LTE link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

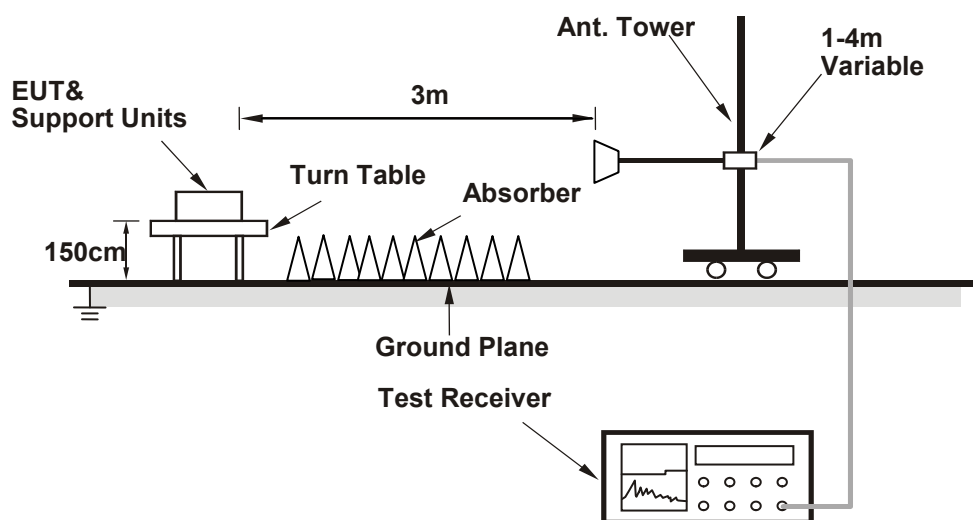
4.1.3 Test Setup

EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

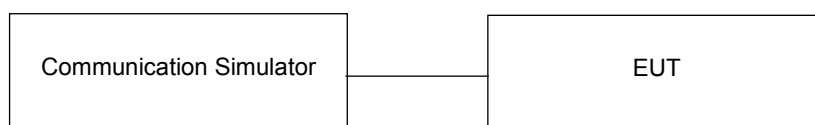


<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:



4.1.4 Test Results

Conducted Output Power (dBm)

Band / BW	RB Size	RB Offset	RB Index	QPSK			16QAM		
				Low Ch 18607	Mid Ch 18900	High Ch 19193	Low Ch 18607	Mid Ch 18900	High Ch 19193
				1850.7 MHz	1880.0 MHz	1909.3 MHz	1850.7 MHz	1880.0 MHz	1909.3 MHz
2 / 1.4M	1	0	0	23.39	23.33	23.85	22.54	22.46	22.98
	1	5	0	23.34	23.31	23.82	22.46	22.42	22.93
	3	3	0	22.66	22.43	22.99	21.68	21.57	22.13
	6	0	0	21.73	21.61	22.21	21.84	21.51	22.25

Band / BW	RB Size	RB Offset	RB Index	QPSK			16QAM		
				Low Ch 18615	Mid Ch 18900	High Ch 19185	Low Ch 18615	Mid Ch 18900	High Ch 19185
				1851.5 MHz	1880.0 MHz	1908.5 MHz	1851.5 MHz	1880.0 MHz	1908.5 MHz
2 / 3M	1	0	0	23.44	23.29	23.88	22.75	22.61	23.17
	1	5	0	23.39	23.26	23.87	22.64	22.55	23.16
	1	0	1	23.31	23.18	23.79	22.39	22.26	22.88
	1	5	1	23.26	23.15	23.66	22.29	22.19	22.72
	3	3	0	22.52	22.37	23.05	21.78	21.65	22.34
	3	3	1	22.34	22.17	22.87	21.58	21.39	22.12
	6	0	0	21.72	21.57	22.13	21.54	21.38	21.94
	6	0	1	21.63	21.42	22.05	21.33	21.15	21.76

Band / BW	RB Size	RB Offset	RB Index	QPSK			16QAM		
				Low Ch 18625	Mid Ch 18900	High Ch 19175	Low Ch 18625	Mid Ch 18900	High Ch 19175
				1852.5 MHz	1880.0 MHz	1907.5 MHz	1852.5 MHz	1880.0 MHz	1907.5 MHz
2 / 5M	1	0	0	23.58	23.45	23.98	23.2	23.03	23.58
	1	5	0	23.41	23.3	23.88	22.95	22.82	23.4
	1	0	1	23.37	23.28	23.86	23.06	23	23.56
	1	5	1	23.27	23.09	23.7	22.87	22.61	23.3
	1	0	3	23.41	23.3	23.88	22.76	22.59	23.2
	1	5	3	23.23	23.18	23.77	22.55	22.5	23.07
	3	0	0	22.52	22.41	22.97	21.92	21.82	22.32
	3	3	3	22.41	22.28	22.82	22.11	21.95	22.52
	6	0	0	22.58	22.43	23.06	21.54	21.4	21.95
	6	0	1	22.44	22.34	22.91	21.32	21.2	21.79
	6	0	3	22.5	22.31	22.87	21.66	21.39	21.97

Band / BW	RB Size	RB Offset	RB Index	QPSK			16QAM		
				Low Ch 18650	Mid Ch 18900	High Ch 19150	Low Ch 18650	Mid Ch 18900	High Ch 19150
				1855.0 MHz	1880.0 MHz	1905.0 MHz	1855.0 MHz	1880.0 MHz	1905.0 MHz
2 / 10M	1	0	0	23.62	23.47	23.97	22.98	22.89	23.34
	1	5	0	23.56	23.39	23.95	22.86	22.7	23.24
	1	0	3	23.49	23.34	23.76	22.92	22.78	23.17
	1	5	3	23.35	23.2	23.74	22.64	22.51	23.03
	1	0	7	23.42	23.28	23.81	22.91	22.83	23.28
	1	5	7	23.46	23.29	23.84	23.01	22.78	23.33
	4	0	0	23.49	23.28	23.82	22.5	22.29	22.87
	4	2	7	23.38	23.07	23.69	22.51	22.18	22.84
	6	0	0	22.58	22.27	22.87	22.36	22.08	22.72
	6	0	7	22.44	22.19	22.78	22.16	21.96	22.51

Band / BW	RB Size	RB Offset	RB Index	QPSK			16QAM		
				Low Ch 18675	Mid Ch 18900	High Ch 19125	Low Ch 18675	Mid Ch 18900	High Ch 19125
				1857.5 MHz	1880.0 MHz	1902.5 MHz	1857.5 MHz	1880.0 MHz	1902.5 MHz
2 / 15M	1	0	0	23.61	23.45	23.83	23.03	22.88	23.21
	1	5	0	23.46	23.36	23.77	22.86	22.73	23.18
	1	0	5	23.52	23.33	23.68	23.05	22.82	23.14
	1	5	5	23.27	23.19	23.65	22.73	22.71	23.09
	1	0	11	23.52	23.34	23.69	22.95	22.78	23.14
	1	5	11	23.29	23.28	23.56	22.9	22.96	23.19
	3	0	0	23.52	23.38	23.66	23.15	23.02	23.27
	3	3	11	23.35	23.3	23.46	22.91	22.83	23
	6	0	0	23.51	23.35	23.79	22.9	22.74	23.19
	6	0	11	23.36	23.22	23.68	22.77	22.63	23.06

Band / BW	RB Size	RB Offset	RB Index	QPSK			16QAM		
				Low Ch 18700	Mid Ch 18900	High Ch 19100	Low Ch 18700	Mid Ch 18900	High Ch 19100
				1860.0 MHz	1880.0 MHz	1900.0 MHz	1860.0 MHz	1880.0 MHz	1900.0 MHz
2 / 20M	1	0	0	23.58	23.54	23.68	23.08	23.09	23.22
	1	5	0	23.51	23.42	23.55	22.96	22.93	23.06
	1	0	7	23.4	23.35	23.49	22.87	22.87	22.97
	1	5	7	23.36	23.21	23.34	22.97	22.82	22.94
	1	0	15	23.46	23.37	23.51	22.98	22.86	23.01
	1	5	15	23.34	23.23	23.38	22.77	22.68	22.84
	3	0	0	23.48	23.27	23.52	23.01	22.78	23.02
	3	3	15	23.39	23.15	23.31	22.79	22.53	22.73
	6	0	0	23.5	23.38	23.63	23.19	23.07	23.38
	6	0	15	23.42	23.29	23.46	23.14	23	23.2

EIRP Power (dBm)

LTE Band 2							
Channel Bandwidth: 1.4 MHz / QPSK (1 RB / 0 RB Offset / 0 RB Index)							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18607	1850.7	-25.59	36.57	10.98	12.54	H
	18900	1880.0	-26.17	37.22	11.05	12.75	
	19193	1909.3	-26.23	37.18	10.95	12.45	
	18607	1850.7	-14.53	37.65	23.12	205.16	V
	18900	1880.0	-14.38	37.58	23.20	209.07	
	19193	1909.3	-14.31	37.48	23.17	207.49	
Channel Bandwidth: 1.4 MHz / 16QAM (1 RB / 0 RB Offset / 0 RB Index)							
Z	18607	1850.7	-25.82	36.57	10.75	11.89	H
	18900	1880.0	-26.43	37.22	10.79	12.01	
	19193	1909.3	-26.51	37.18	10.67	11.67	
	18607	1850.7	-15.11	37.65	22.54	179.51	V
	18900	1880.0	-14.95	37.58	22.63	183.36	
	19193	1909.3	-14.92	37.48	22.56	180.30	

LTE Band 2							
Channel Bandwidth: 3 MHz / QPSK (1 RB / 0 RB Offset / 0 RB Index)							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18615	1851.5	-25.41	36.57	11.16	13.07	H
	18900	1880.0	-26.02	37.22	11.20	13.19	
	19185	1908.5	-26.11	37.18	11.07	12.80	
	18615	1851.5	-14.36	37.65	23.29	213.35	V
	18900	1880.0	-14.25	37.58	23.33	215.43	
	19185	1908.5	-14.22	37.48	23.26	211.84	
Channel Bandwidth: 3 MHz / 16QAM (1 RB / 0 RB Offset / 0 RB Index)							
Z	18615	1851.5	-25.74	36.57	10.83	12.11	H
	18900	1880.0	-26.35	37.22	10.87	12.23	
	19185	1908.5	-26.43	37.18	10.75	11.89	
	18615	1851.5	-15.02	37.65	22.63	183.27	V
	18900	1880.0	-14.83	37.58	22.75	188.50	
	19185	1908.5	-14.83	37.48	22.65	184.08	

LTE Band 2							
Channel Bandwidth: 5 MHz / QPSK (1 RB / 0 RB Offset / 0 RB Index)							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18625	1852.5	-25.22	36.57	11.35	13.65	H
	18900	1880.0	-25.82	37.22	11.40	13.82	
	19175	1907.5	-25.80	37.18	11.38	13.75	
	18625	1852.5	-14.28	37.65	23.37	217.32	V
	18900	1880.0	-14.15	37.58	23.43	220.44	
	19175	1907.5	-14.12	37.48	23.36	216.77	
Channel Bandwidth: 5 MHz / 16QAM (1 RB / 0 RB Offset / 0 RB Index)							
Z	18625	1852.5	-25.65	36.57	10.92	12.37	H
	18900	1880.0	-26.23	37.22	10.99	12.57	
	19175	1907.5	-26.31	37.18	10.87	12.22	
	18625	1852.5	-14.94	37.65	22.71	186.68	V
	18900	1880.0	-14.78	37.58	22.80	190.68	
	19175	1907.5	-14.71	37.48	22.77	189.23	

LTE Band 2							
Channel Bandwidth: 10 MHz / QPSK (1 RB / 0 RB Offset / 0 RB Index)							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18650	1855.0	-25.16	36.57	11.41	13.84	H
	18900	1880.0	-25.76	37.22	11.46	14.01	
	19150	1905.0	-25.76	37.18	11.42	13.87	
	18650	1855.0	-14.22	37.65	23.43	220.34	V
	18900	1880.0	-14.03	37.58	23.55	226.62	
	19150	1905.0	-14.01	37.48	23.47	222.33	
Channel Bandwidth: 10 MHz / 16QAM (1 RB / 0 RB Offset / 0 RB Index)							
Z	18650	1855.0	-25.59	36.57	10.98	12.54	H
	18900	1880.0	-26.19	37.22	11.03	12.69	
	19150	1905.0	-26.24	37.18	10.94	12.42	
	18650	1855.0	-14.82	37.65	22.83	191.91	V
	18900	1880.0	-14.67	37.58	22.91	195.57	
	19150	1905.0	-14.62	37.48	22.86	193.20	

LTE Band 2							
Channel Bandwidth: 15 MHz / QPSK (1 RB / 0 RB Offset / 0 RB Index)							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18675	1857.5	-25.05	36.57	11.52	14.20	H
	18900	1880.0	-25.64	37.22	11.58	14.40	
	19125	1902.5	-25.62	37.18	11.56	14.33	
	18675	1857.5	-14.13	37.65	23.52	224.96	V
	18900	1880.0	-13.94	37.58	23.64	231.37	
	19125	1902.5	-13.89	37.48	23.59	228.56	
Channel Bandwidth: 15 MHz / 16QAM (1 RB / 0 RB Offset / 0 RB Index)							
Z	18675	1857.5	-25.50	36.57	11.07	12.80	H
	18900	1880.0	-26.11	37.22	11.11	12.92	
	19125	1902.5	-26.16	37.18	11.02	12.65	
	18675	1857.5	-14.70	37.65	22.95	197.29	V
	18900	1880.0	-14.52	37.58	23.06	202.44	
	19125	1902.5	-14.51	37.48	22.97	198.15	

LTE Band 2							
Channel Bandwidth: 20 MHz / QPSK (1 RB / 0 RB Offset / 0 RB Index)							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
Z	18700	1860.0	-24.96	36.57	11.61	14.49	H
	18900	1880.0	-25.57	37.22	11.65	14.64	
	19100	1900.0	-25.55	37.18	11.63	14.56	
	18700	1860.0	-14.05	37.65	23.60	229.14	V
	18900	1880.0	-13.86	37.58	23.72	235.67	
	19100	1900.0	-13.79	37.48	23.69	233.88	
Channel Bandwidth: 20 MHz / 16QAM (1 RB / 0 RB Offset / 0 RB Index)							
Z	18700	1860.0	-25.43	36.57	11.14	13.01	H
	18900	1880.0	-26.04	37.22	11.18	13.13	
	19100	1900.0	-26.05	37.18	11.13	12.98	
	18700	1860.0	-14.59	37.65	23.06	202.35	V
	18900	1880.0	-14.40	37.58	23.18	208.11	
	19100	1900.0	-14.43	37.48	23.05	201.84	

4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

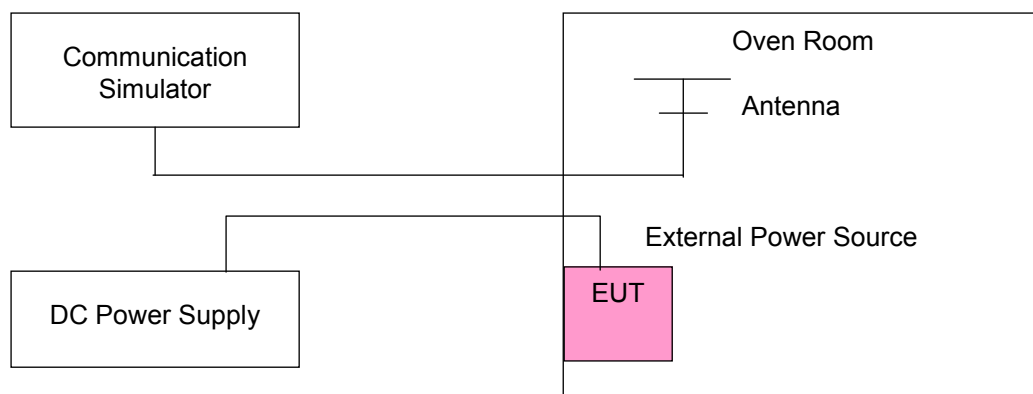
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

4.2.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup



4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1850.700001	0.001	1909.300001	0.001	2.5
3.23	1850.699998	-0.001	1909.299998	-0.001	2.5
4.37	1850.699996	-0.002	1909.299996	-0.002	2.5

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 1.4 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1850.700001	0.001	1909.300002	0.001	2.5
-20	1850.700003	0.002	1909.300003	0.001	2.5
-10	1850.700003	0.002	1909.300004	0.002	2.5
0	1850.700002	0.001	1909.300004	0.002	2.5
10	1850.700004	0.002	1909.300002	0.001	2.5
20	1850.699996	-0.002	1909.299998	-0.001	2.5
30	1850.699997	-0.001	1909.299999	-0.001	2.5
40	1850.699997	-0.002	1909.299997	-0.001	2.5
50	1850.699997	-0.002	1909.299996	-0.002	2.5
60	1850.699997	-0.002	1909.299998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1851.500001	0.001	1907.500001	0.001	2.5
3.23	1851.499998	-0.001	1907.499998	-0.001	2.5
4.37	1851.499996	-0.002	1907.499996	-0.002	2.5

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 3 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1851.500003	0.001	1907.500003	0.001	2.5
-20	1851.500002	0.001	1907.500002	0.001	2.5
-10	1851.500004	0.002	1907.500003	0.002	2.5
0	1851.500002	0.001	1907.500004	0.002	2.5
10	1851.500002	0.001	1907.500003	0.002	2.5
20	1851.499999	-0.001	1907.499997	-0.002	2.5
30	1851.499998	-0.001	1907.499998	-0.001	2.5
40	1851.499996	-0.002	1907.499999	-0.001	2.5
50	1851.499998	-0.001	1907.499999	-0.001	2.5
60	1851.499999	-0.001	1907.499998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1852.500001	0.001	1907.500001	0.001	2.5
3.23	1852.499998	-0.001	1907.499998	-0.001	2.5
4.37	1852.499996	-0.002	1907.499996	-0.002	2.5

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 5 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1852.500002	0.001	1907.500003	0.002	2.5
-20	1852.500001	0.001	1907.500003	0.002	2.5
-10	1852.500002	0.001	1907.500002	0.001	2.5
0	1852.500002	0.001	1907.500001	0.001	2.5
10	1852.500004	0.002	1907.500002	0.001	2.5
20	1852.499997	-0.002	1907.499996	-0.002	2.5
30	1852.499998	-0.001	1907.499997	-0.002	2.5
40	1852.499997	-0.002	1907.499996	-0.002	2.5
50	1852.499996	-0.002	1907.499997	-0.002	2.5
60	1852.499998	-0.001	1907.499998	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1855.000001	0.001	1905.000001	0.001	2.5
3.23	1854.999998	-0.001	1904.999998	-0.001	2.5
4.37	1854.999996	-0.002	1904.999996	-0.002	2.5

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 10 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1855.000004	0.002	1905.000002	0.001	2.5
-20	1855.000002	0.001	1905.000002	0.001	2.5
-10	1855.000002	0.001	1905.000003	0.001	2.5
0	1855.000003	0.001	1905.000002	0.001	2.5
10	1855.000003	0.002	1905.000003	0.001	2.5
20	1854.999998	-0.001	1904.999997	-0.001	2.5
30	1854.999999	-0.001	1904.999997	-0.001	2.5
40	1854.999996	-0.002	1904.999998	-0.001	2.5
50	1854.999998	-0.001	1904.999997	-0.001	2.5
60	1854.999997	-0.002	1904.999997	-0.001	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1857.500001	0.001	1902.500001	0.001	2.5
3.23	1857.499998	-0.001	1902.499998	-0.001	2.5
4.37	1857.499996	-0.002	1902.499996	-0.002	2.5

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 15 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1857.500002	0.001	1902.500003	0.002	2.5
-20	1857.500002	0.001	1902.500004	0.002	2.5
-10	1857.500003	0.002	1902.500002	0.001	2.5
0	1857.500003	0.002	1902.500002	0.001	2.5
10	1857.500004	0.002	1902.500003	0.001	2.5
20	1857.499997	-0.002	1902.499996	-0.002	2.5
30	1857.499999	-0.001	1902.499998	-0.001	2.5
40	1857.499998	-0.001	1902.499998	-0.001	2.5
50	1857.499998	-0.001	1902.499997	-0.002	2.5
60	1857.499999	-0.001	1902.499997	-0.002	2.5

Frequency Error vs. Voltage

Voltage (Volts)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	1860.000001	0.001	1900.000001	0.001	2.5
3.23	1859.999998	-0.001	1899.999998	-0.001	2.5
4.37	1859.999996	-0.002	1899.999996	-0.002	2.5

Note: The applicant defined the normal working voltage is from 3.23 Vdc to 4.37 Vdc.

Frequency Error vs. Temperature

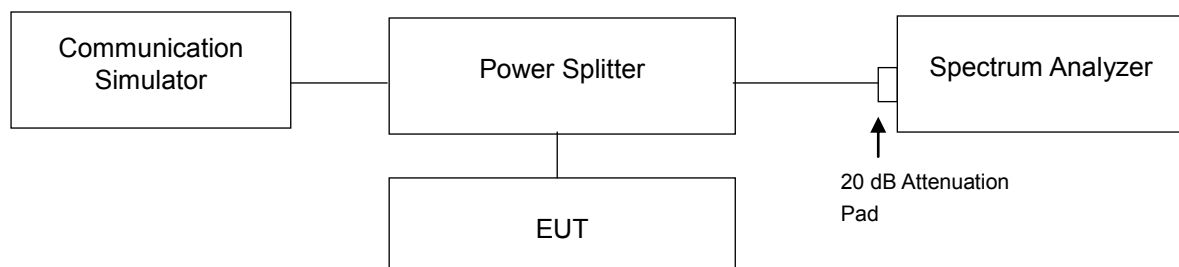
Temp. (°C)	LTE Band 2				Limit (ppm)
	Channel Bandwidth: 20 MHz				
	Low Channel		High Channel		
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	1860.000002	0.001	1900.000004	0.002	2.5
-20	1860.000003	0.002	1900.000002	0.001	2.5
-10	1860.000004	0.002	1900.000004	0.002	2.5
0	1860.000002	0.001	1900.000002	0.001	2.5
10	1860.000002	0.001	1900.000001	0.001	2.5
20	1859.999998	-0.001	1899.999997	-0.002	2.5
30	1859.999997	-0.001	1899.999996	-0.002	2.5
40	1859.999996	-0.002	1899.999997	-0.002	2.5
50	1859.999999	-0.001	1899.999999	-0.001	2.5
60	1859.999997	-0.002	1899.999997	-0.001	2.5

4.3 Occupied Bandwidth Measurement

4.3.1 Test Procedure

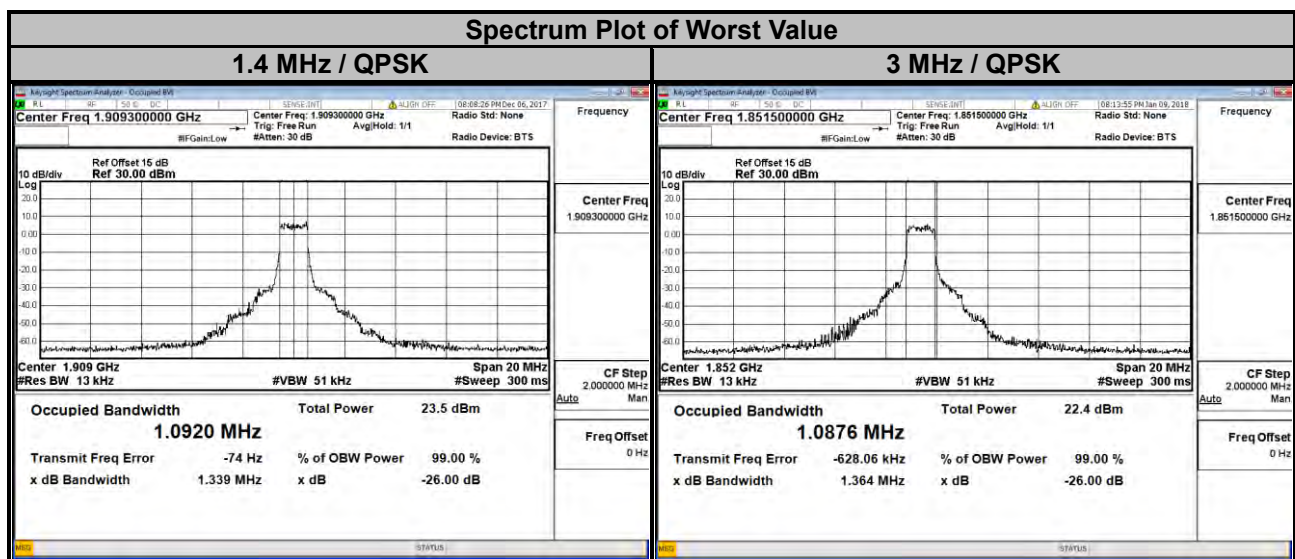
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

4.3.2 Test Setup



4.3.3 Test Result

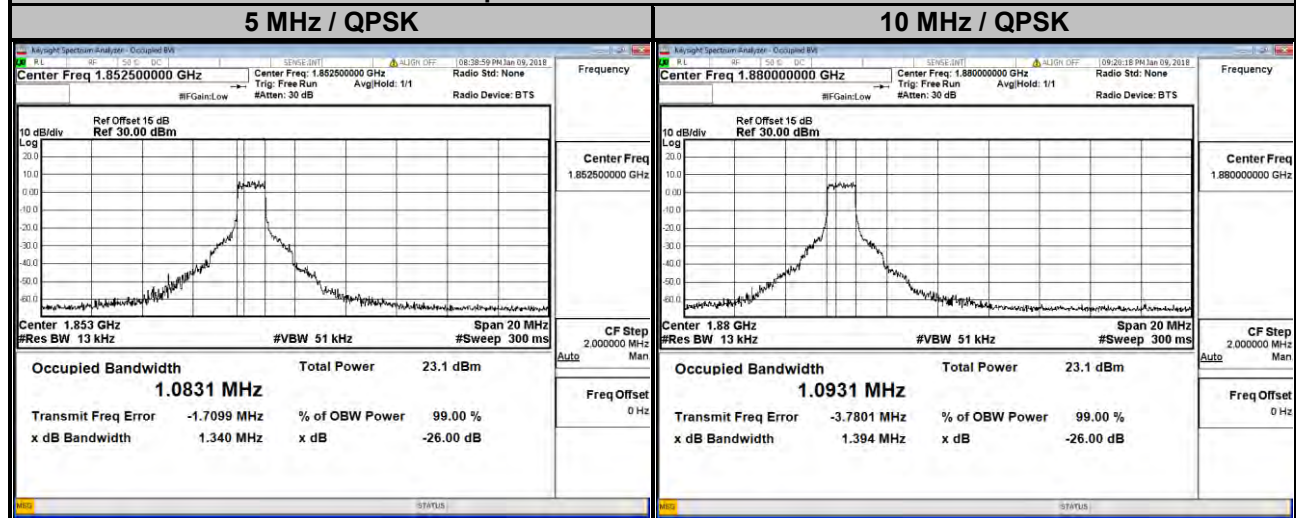
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	1.0887	0.9141	18615	1851.5	1.0876	0.9138
18900	1880.0	1.0914	0.9137	18900	1880.0	1.0850	0.9228
19193	1909.3	1.0920	0.9151	19185	1908.5	1.0863	0.9075



LTE Band 2

Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	1.0831	0.9184	18650	1855.0	1.0901	0.9152
18900	1880.0	1.0791	0.9139	18900	1880.0	1.0931	0.9160
19175	1907.5	1.0783	0.9094	19150	1905.0	1.0904	0.9153

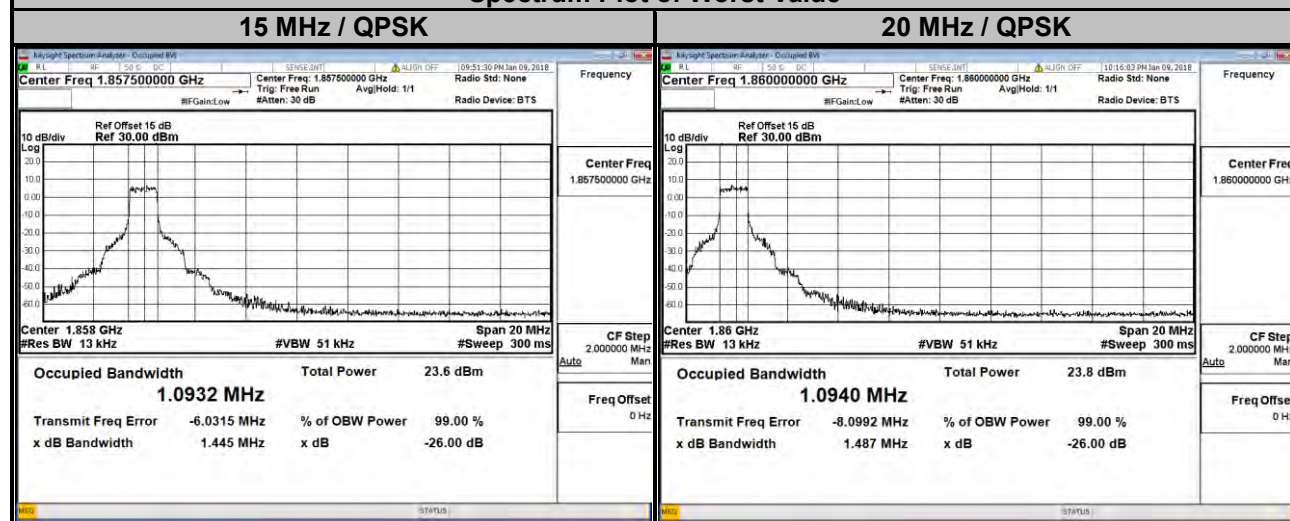
Spectrum Plot of Worst Value



LTE Band 2

Channel Bandwidth: 15 MHz				Channel Bandwidth: 20 MHz			
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	1.0932	0.9236	18700	1860.0	1.0940	0.9188
18900	1880.0	1.0883	0.9256	18900	1880.0	1.0917	0.9187
19125	1902.5	1.0899	0.9277	19100	1900.0	1.0917	0.9263

Spectrum Plot of Worst Value

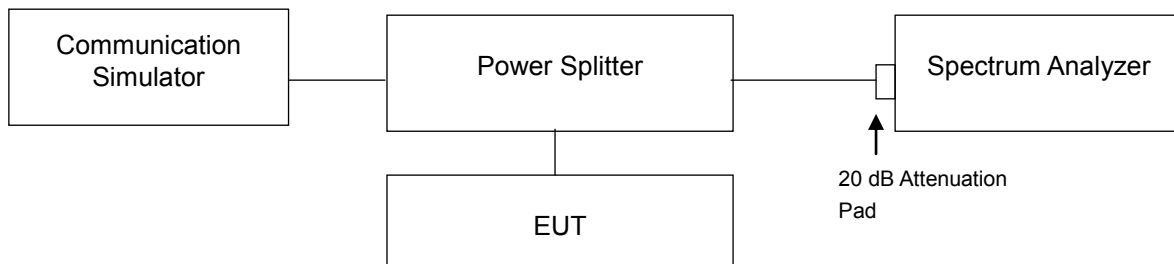


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

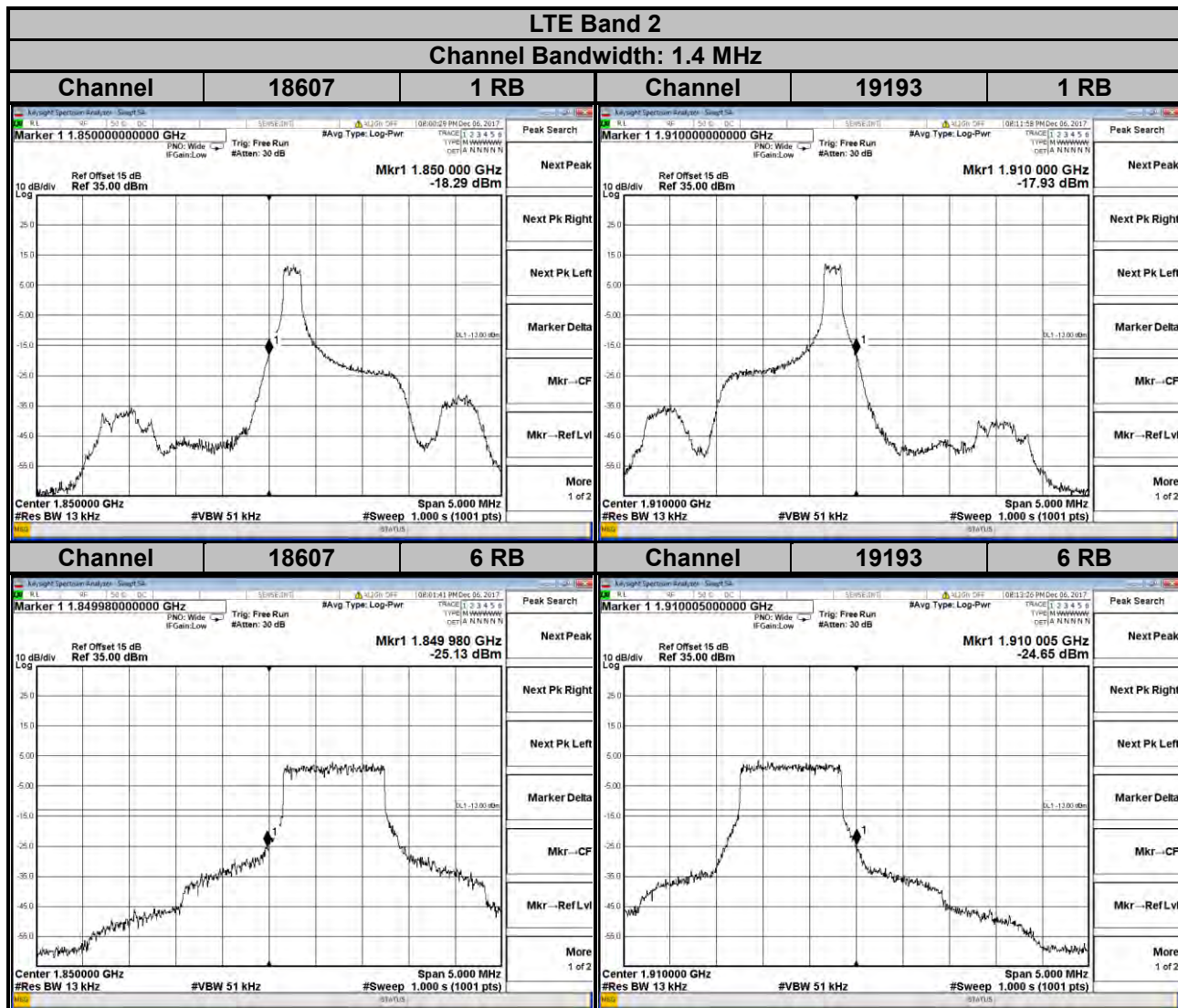
4.4.2 Test Setup

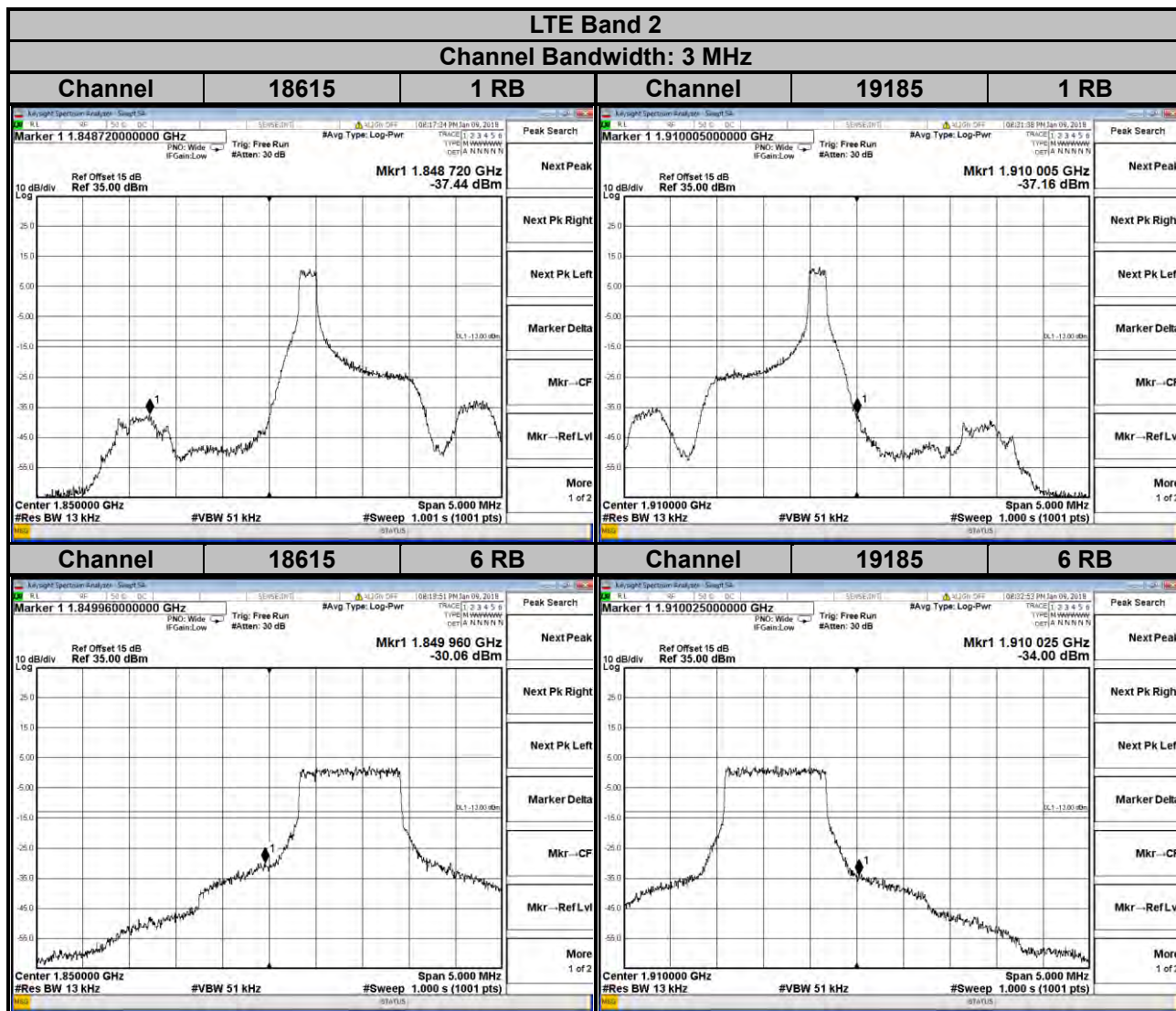


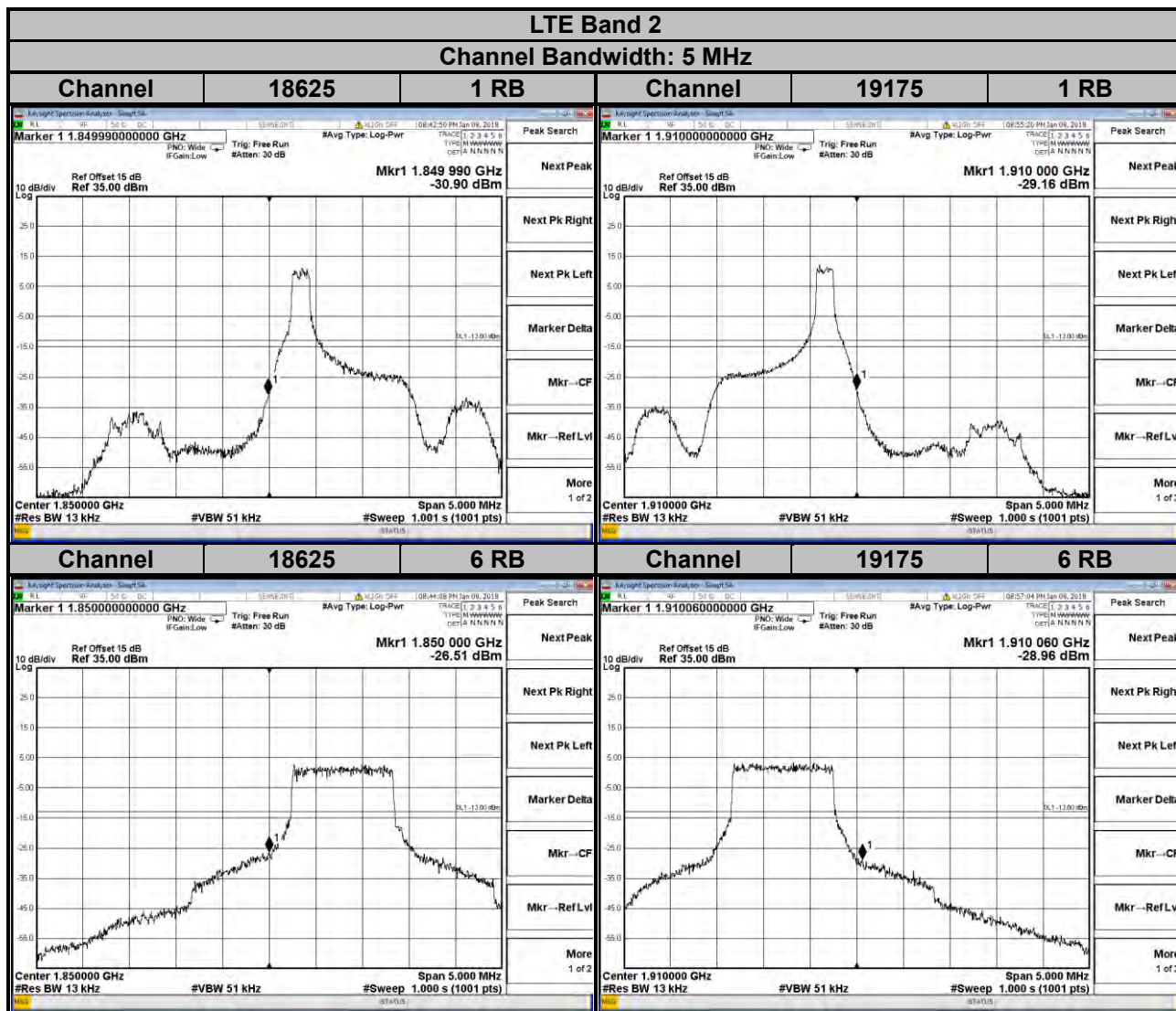
4.4.3 Test Procedures

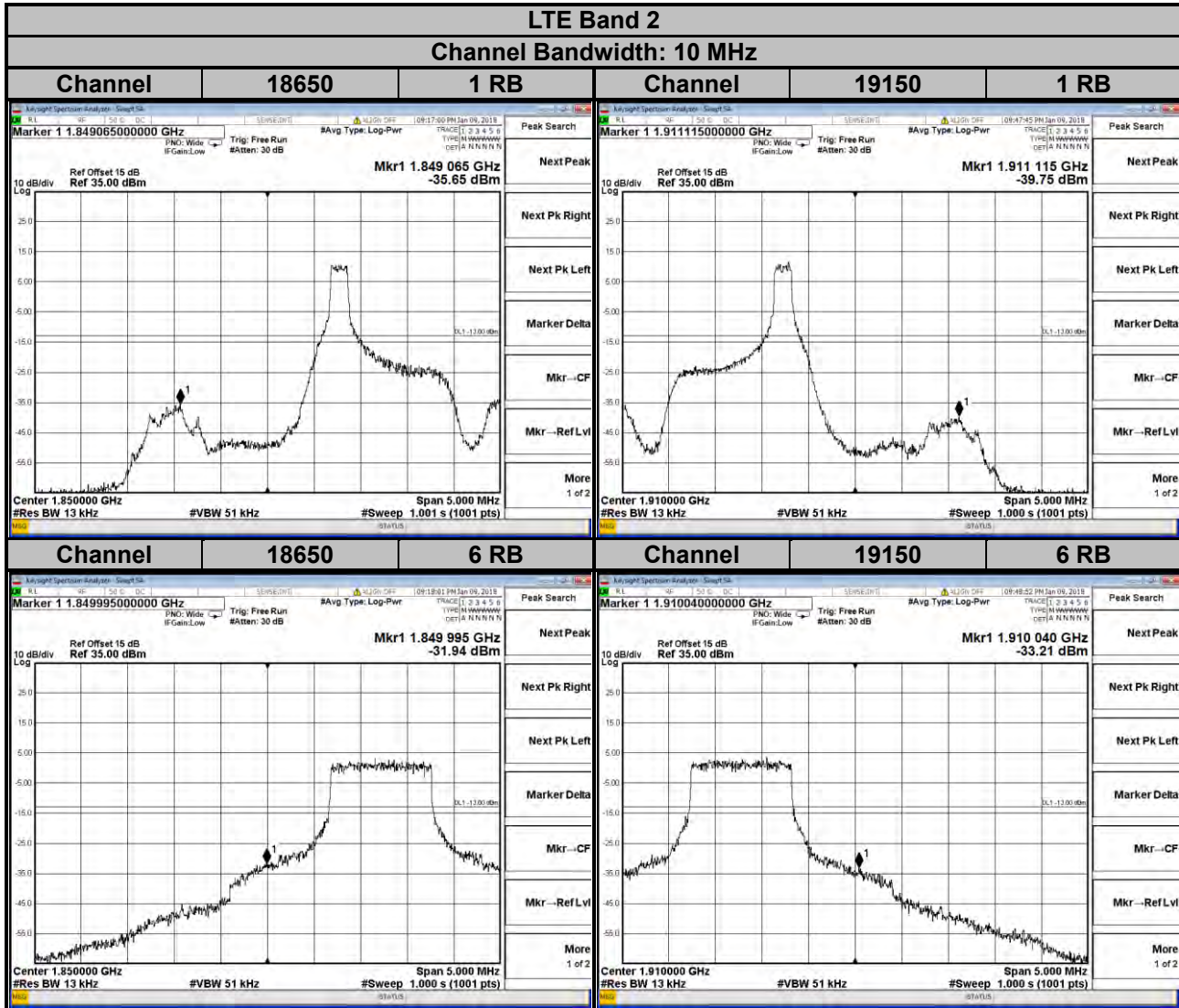
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 13 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 3 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5 MHz/10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 180 kHz and VB of the spectrum is 560 kHz (LTE Bandwidth 20 MHz).
- Record the max trace plot into the test report.

4.4.4 Test Results



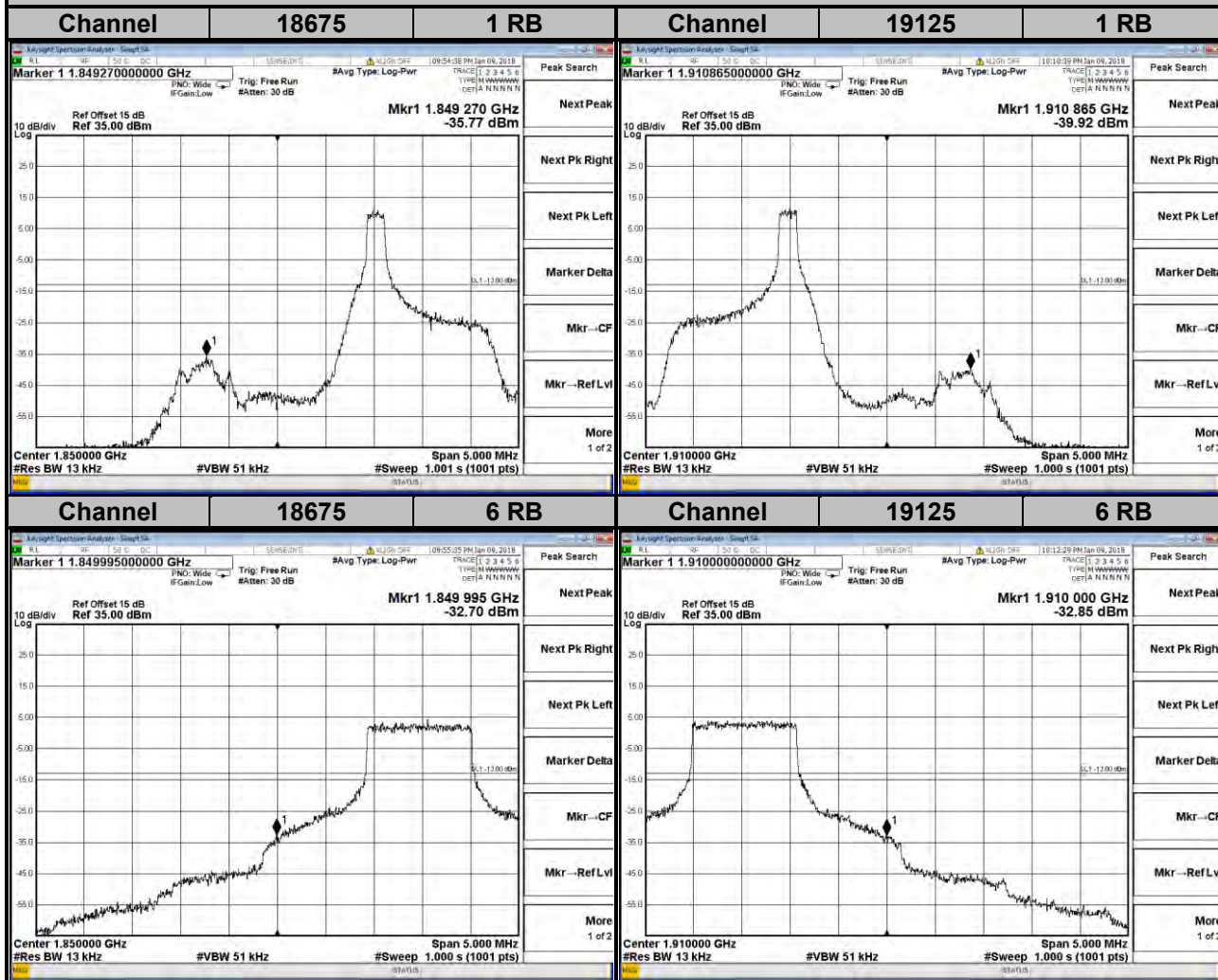






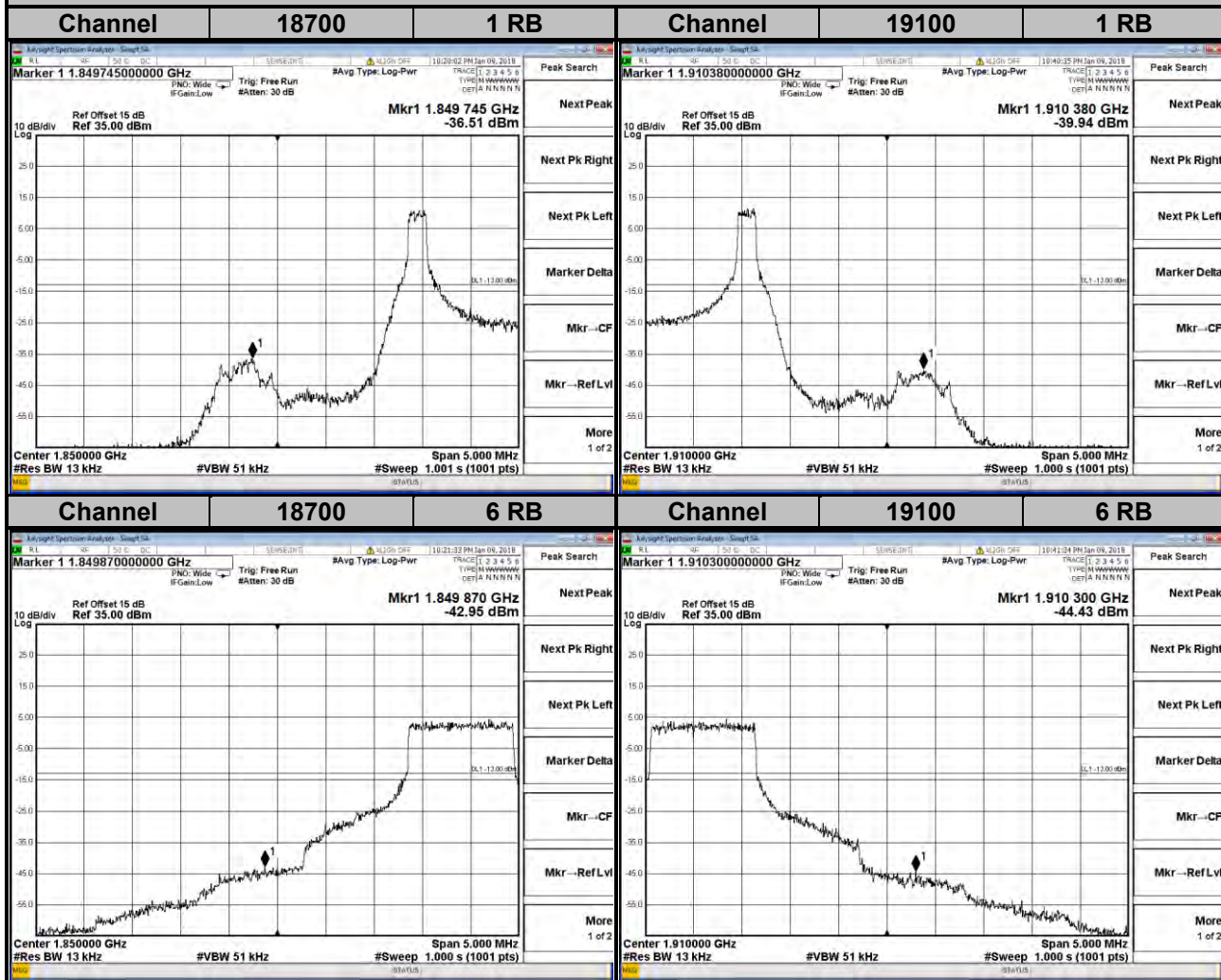
LTE Band 2

Channel Bandwidth: 15 MHz



LTE Band 2

Channel Bandwidth: 20 MHz

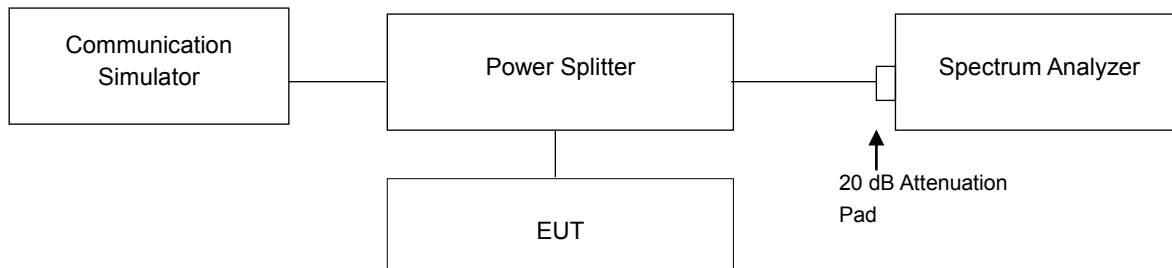


4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.5.2 Test Setup

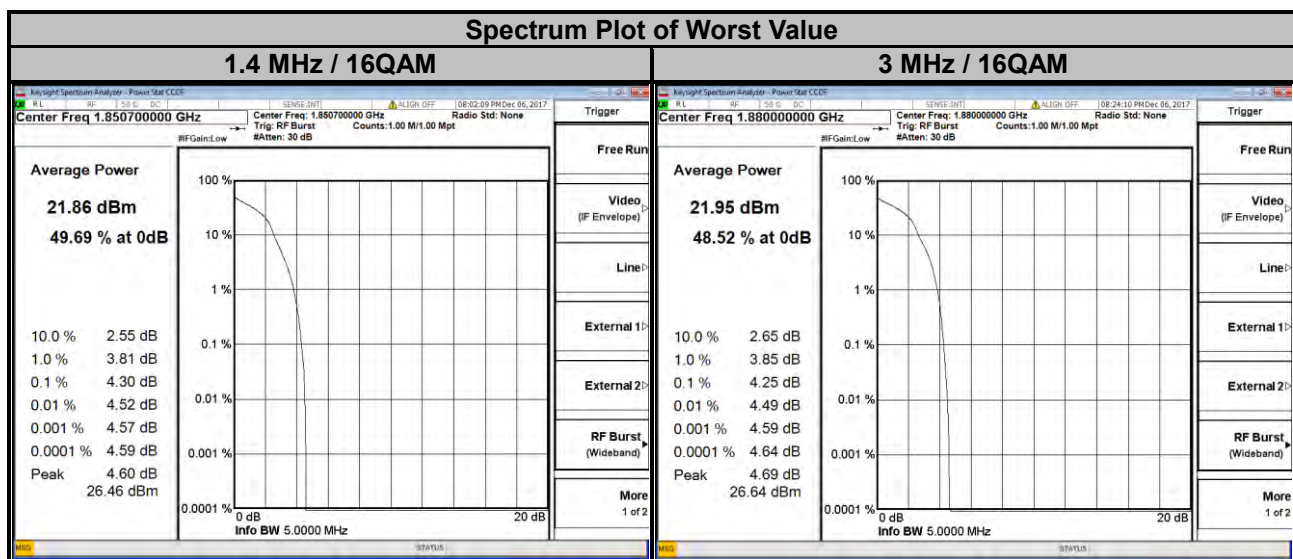


4.5.3 Test Procedures

1. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

4.5.4 Test Results

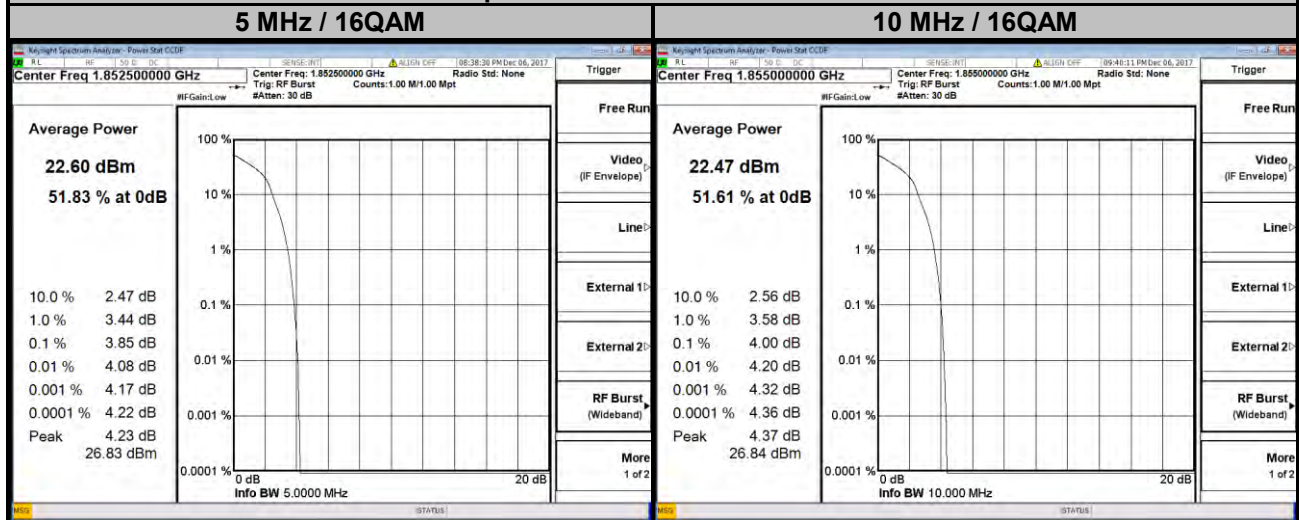
LTE Band 2							
Channel Bandwidth: 1.4 MHz				Channel Bandwidth: 3 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18607	1850.7	3.64	4.30	18615	1851.5	3.72	3.56
18900	1880.0	3.60	4.25	18900	1880.0	3.63	4.25
19193	1909.3	3.51	4.15	19185	1908.5	3.51	4.22



LTE Band 2

Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz			
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18625	1852.5	3.64	3.85	18650	1855.0	3.63	4.00
18900	1880.0	3.59	3.82	18900	1880.0	3.56	3.77
19175	1907.5	3.50	3.72	19150	1905.0	3.50	3.76

Spectrum Plot of Worst Value



LTE Band 2

Channel Bandwidth: 15 MHz

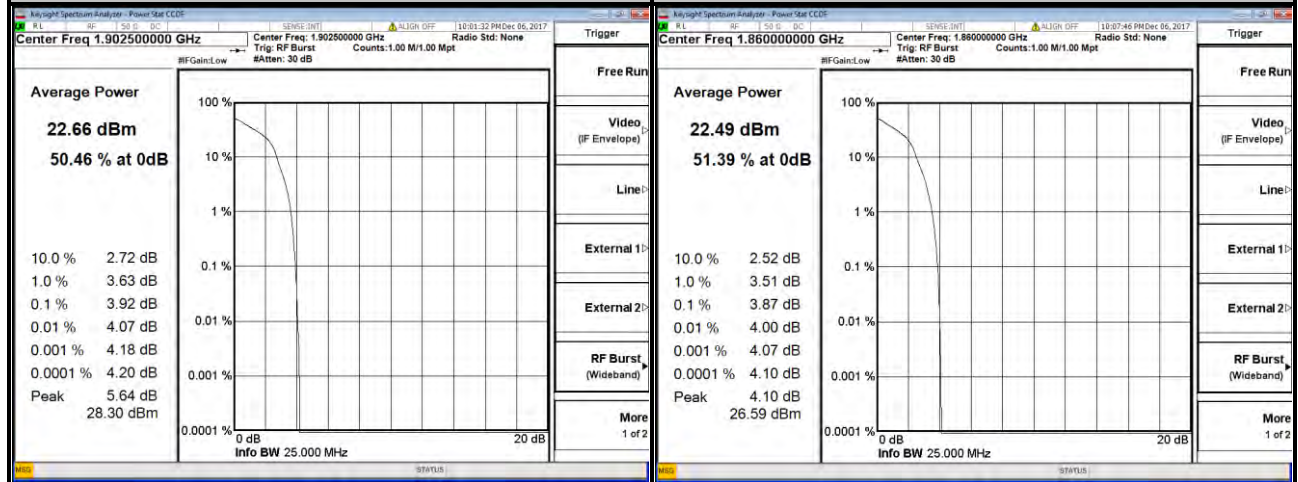
Channel Bandwidth: 20 MHz

Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency (MHz)	Peak to Average Ratio (dB)	
		QPSK	16QAM			QPSK	16QAM
18675	1857.5	3.62	3.80	18700	1860.0	3.59	3.87
18900	1880.0	3.58	3.86	18900	1880.0	3.58	3.78
19125	1902.5	3.49	3.92	19100	1900.0	3.51	3.83

Spectrum Plot of Worst Value

15 MHz / 16QAM

20 MHz / 16QAM

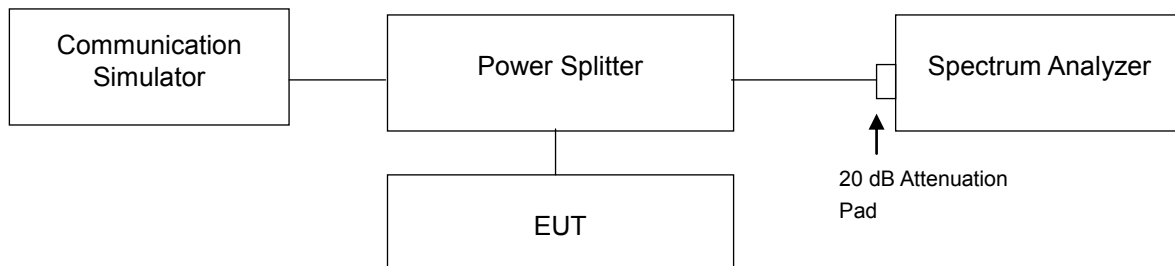


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit equal to -13 dBm.

4.6.2 Test Setup

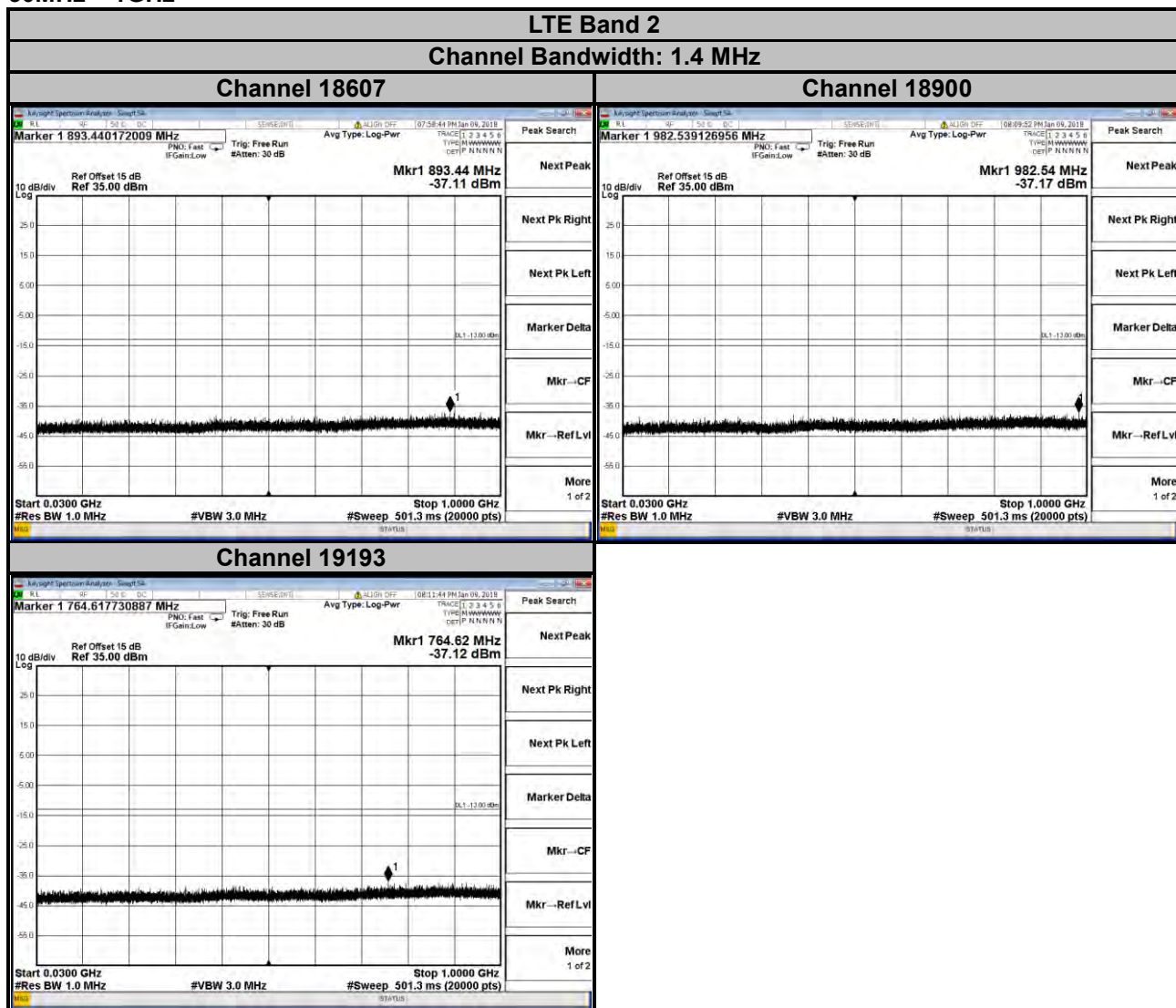


4.6.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 30MHz to 1 GHz, 1 GHz to 10GHz, and 10 GHz to 26.5GHz. 20 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz is used for conducted emission measurement.

4.6.4 Test Results

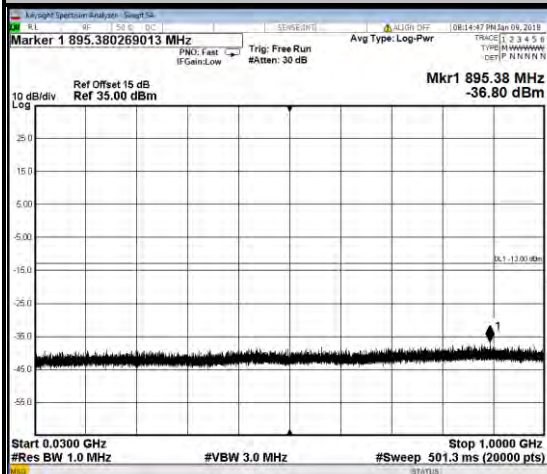
30MHz ~ 1GHz



LTE Band 2

Channel Bandwidth: 3 MHz

Channel 18615



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

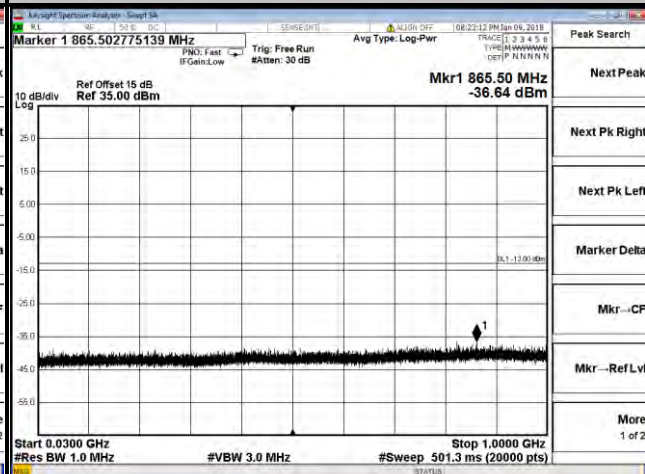
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 18900



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

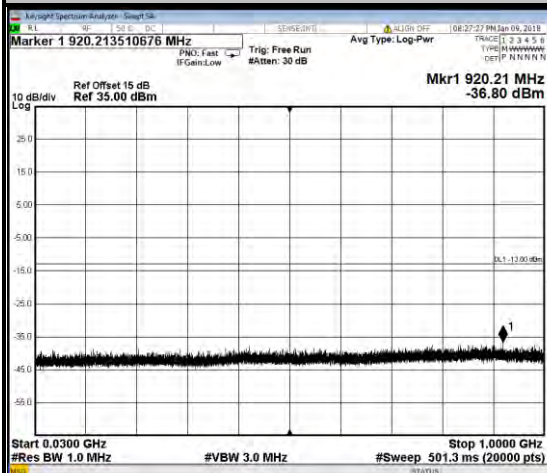
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 19185



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr--CF

Mkr--Ref Lvl

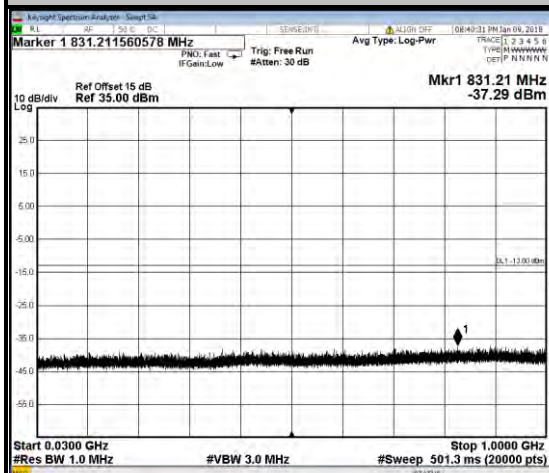
More

1 of 2

LTE Band 2

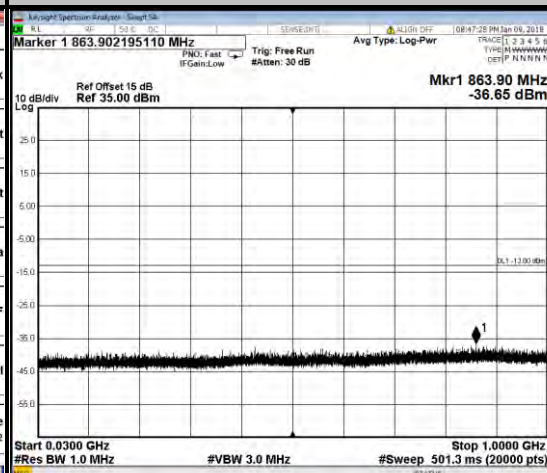
Channel Bandwidth: 5 MHz

Channel 18625



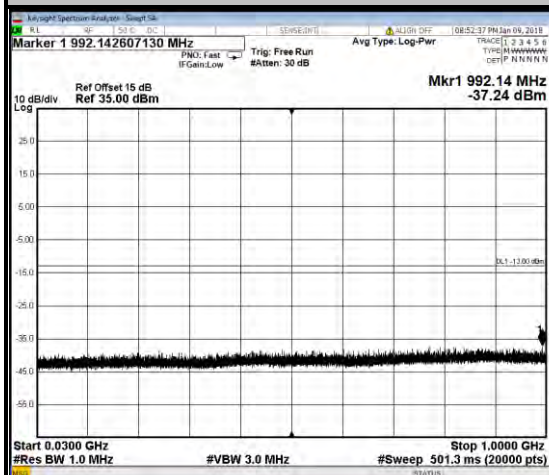
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 18900



Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 19175

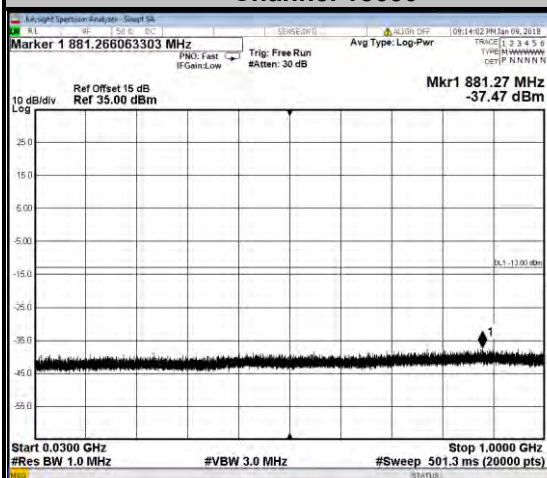


Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

LTE Band 2

Channel Bandwidth: 10 MHz

Channel 18650



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

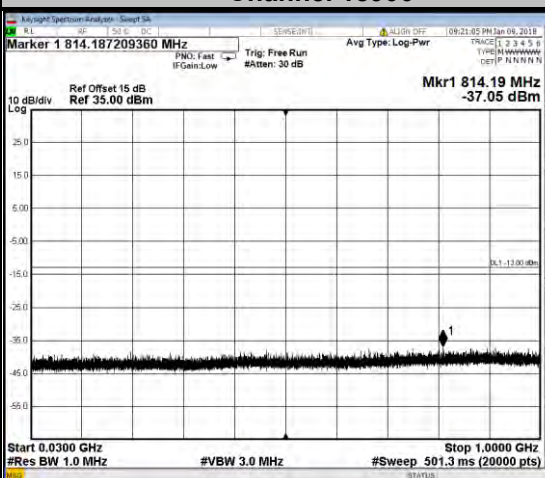
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 18900



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

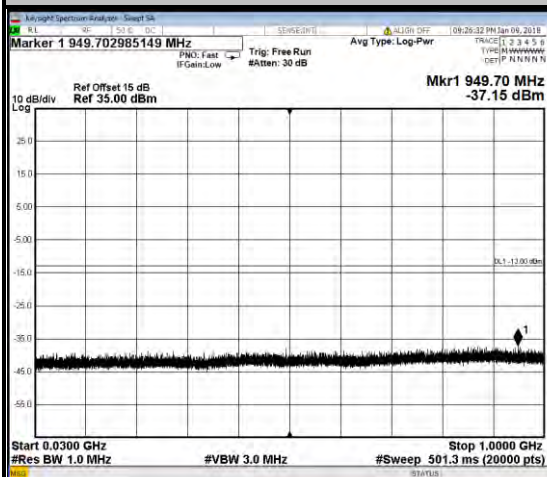
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 19150



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr--CF

Mkr--Ref Lvl

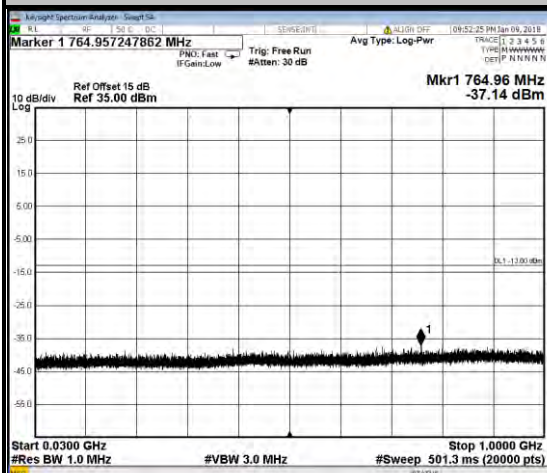
More

1 of 2

LTE Band 2

Channel Bandwidth: 15 MHz

Channel 18675



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

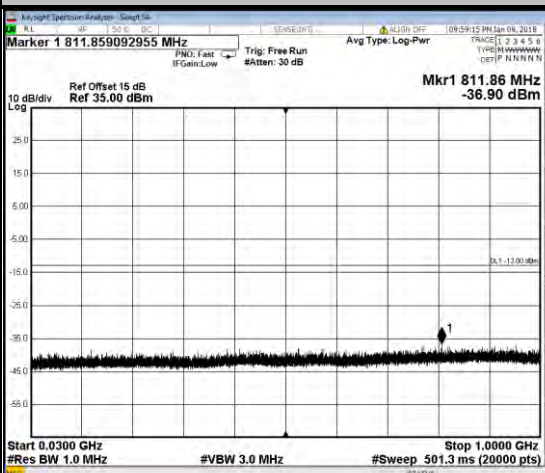
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 18900



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

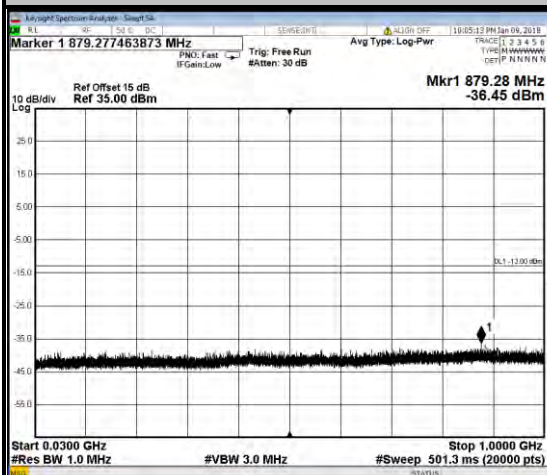
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 19125



Peak Search

Next Peak

Next Pk Right

Next Pk Left

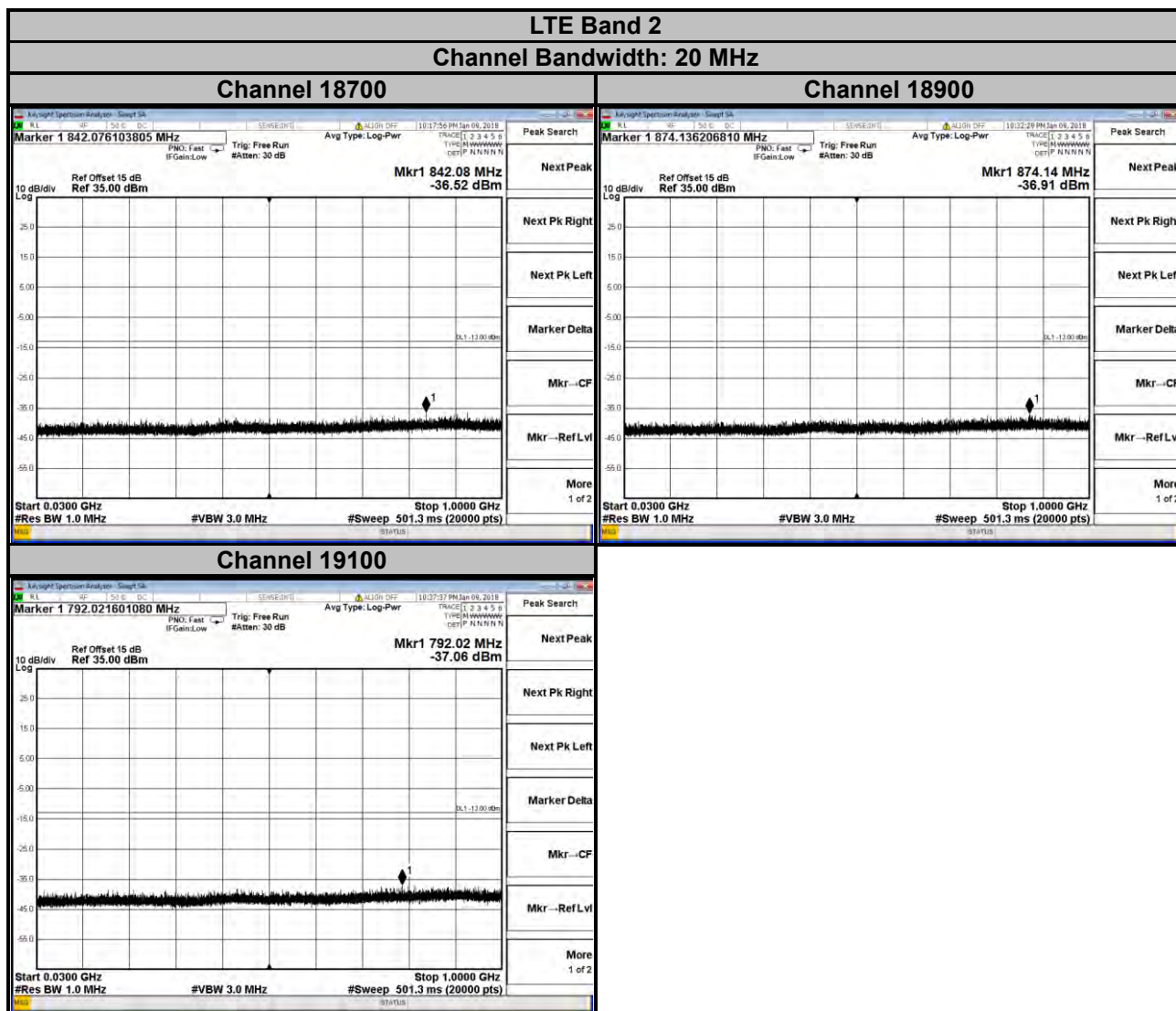
Marker Delta

Mkr--CF

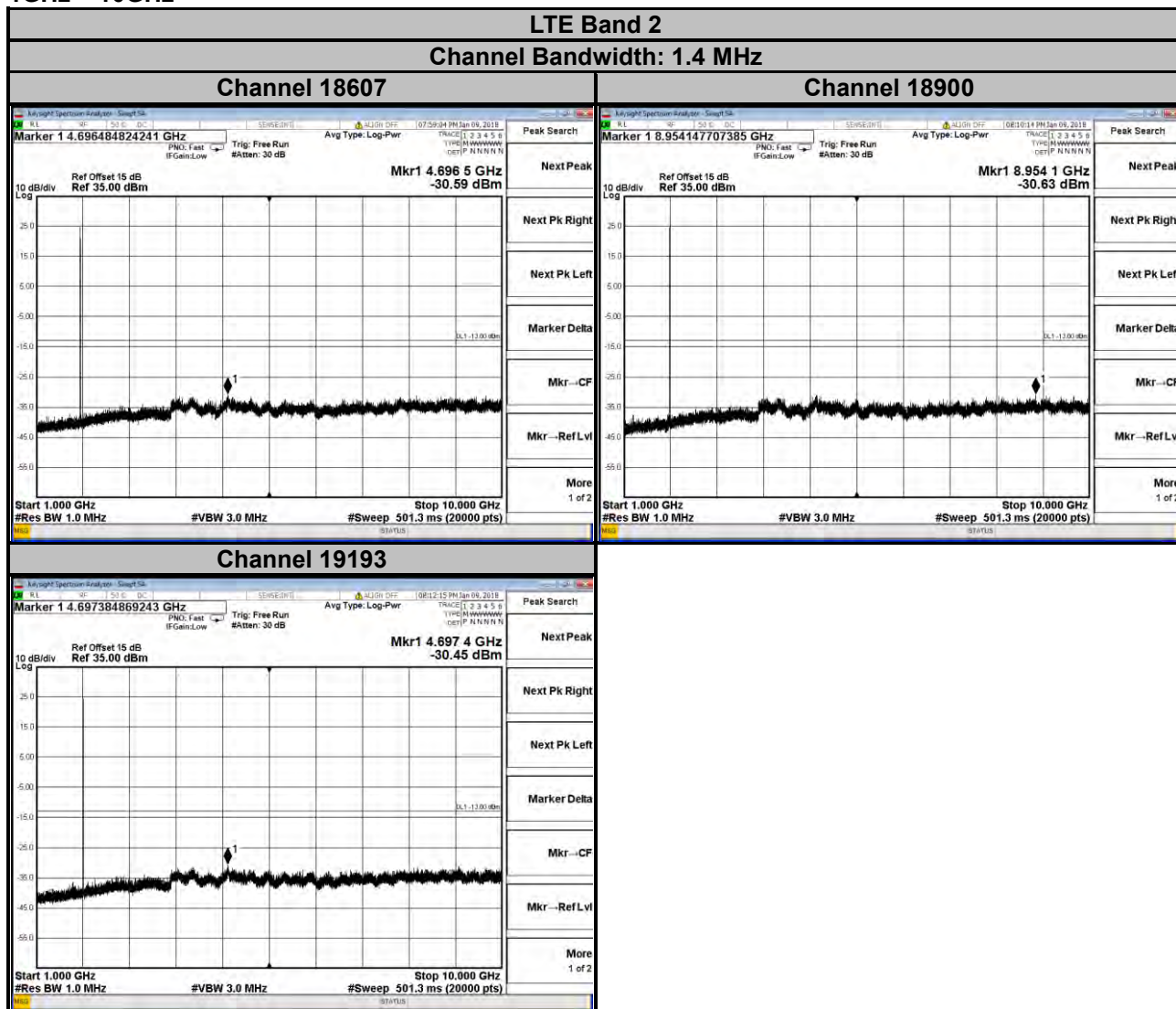
Mkr--Ref Lvl

More

1 of 2



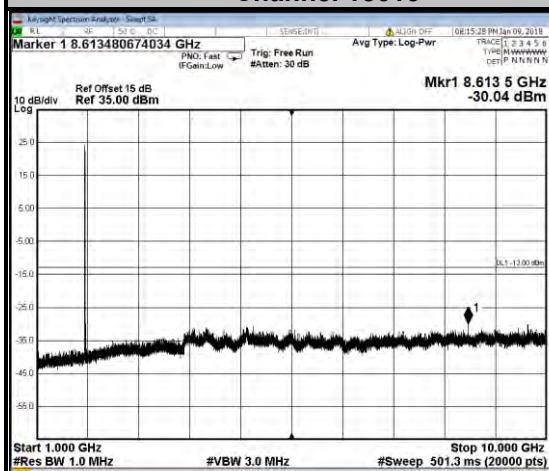
1GHz ~ 10GHz



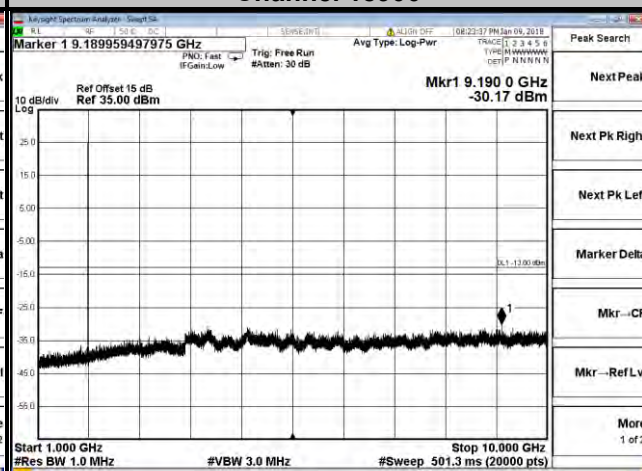
LTE Band 2

Channel Bandwidth: 3 MHz

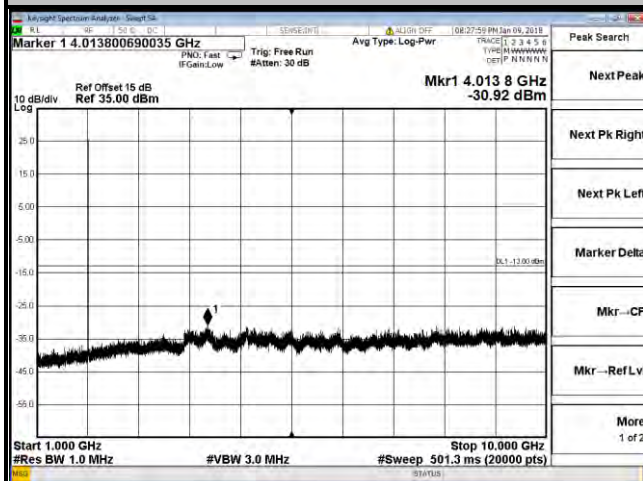
Channel 18615



Channel 18900



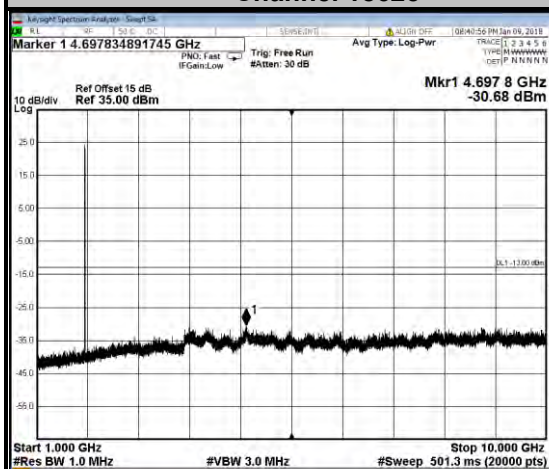
Channel 19185



LTE Band 2

Channel Bandwidth: 5 MHz

Channel 18625



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

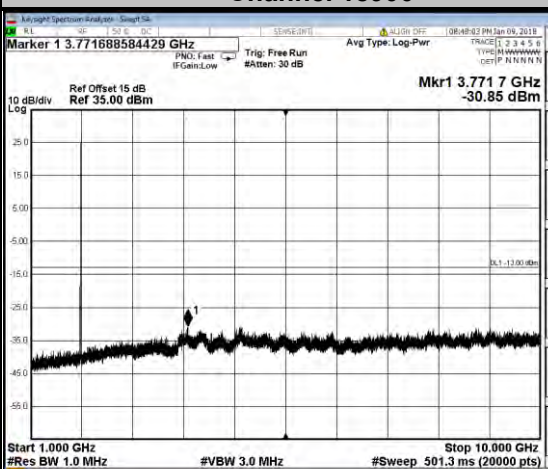
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 18900



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

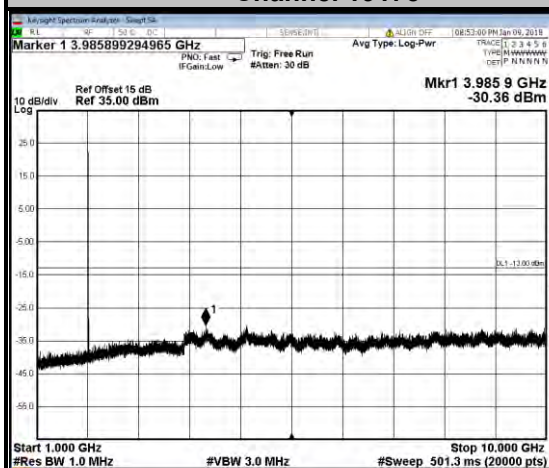
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 19175



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr--CF

Mkr--Ref Lvl

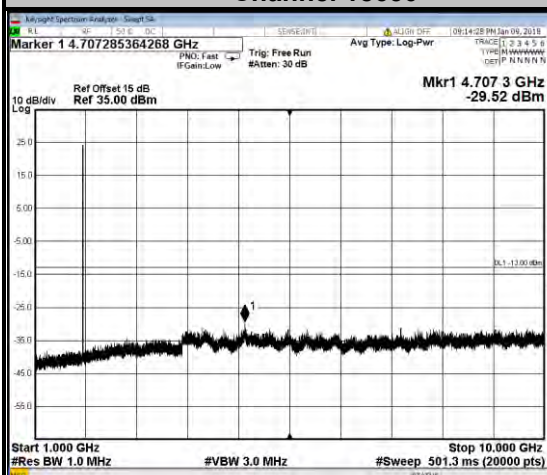
More

1 of 2

LTE Band 2

Channel Bandwidth: 10 MHz

Channel 18650



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

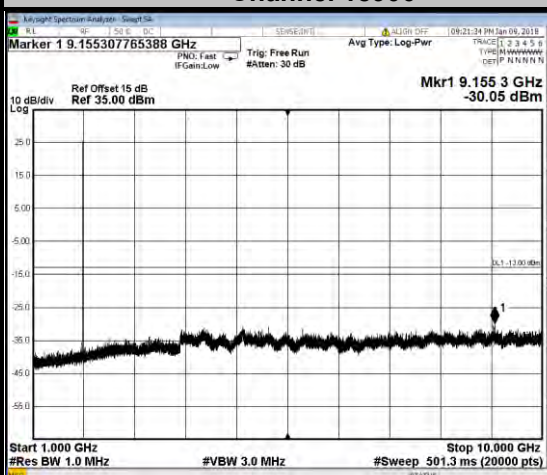
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 18900



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

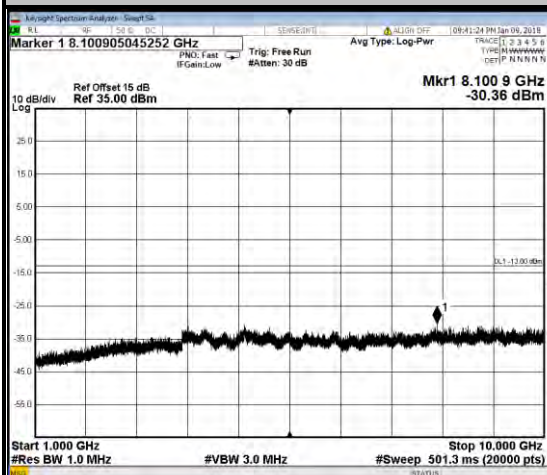
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 19150



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr--CF

Mkr--Ref Lvl

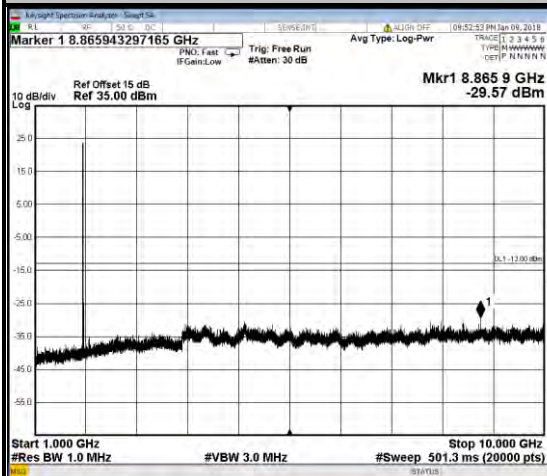
More

1 of 2

LTE Band 2

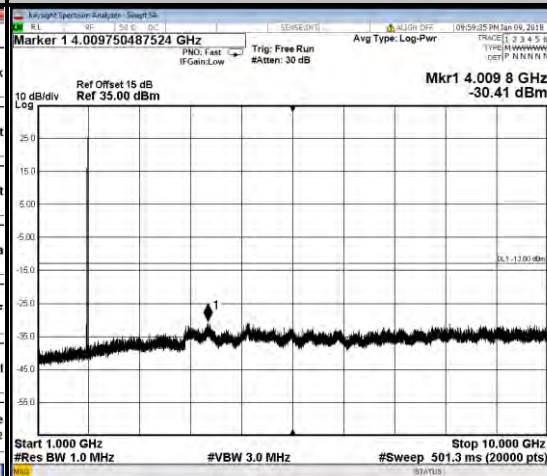
Channel Bandwidth: 15 MHz

Channel 18675



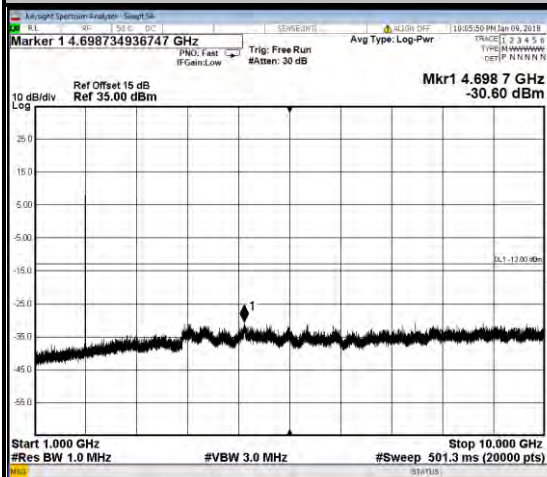
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 18900



Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 19125

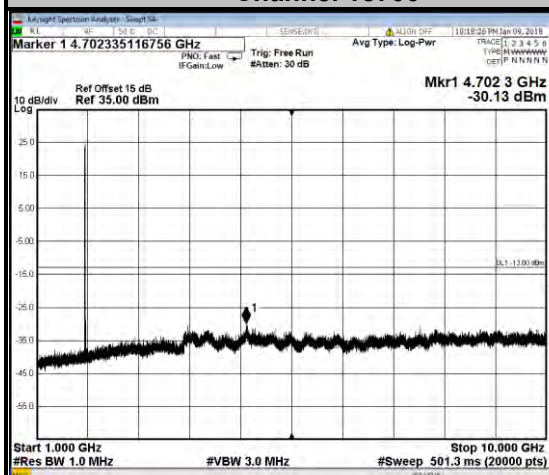


Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

LTE Band 2

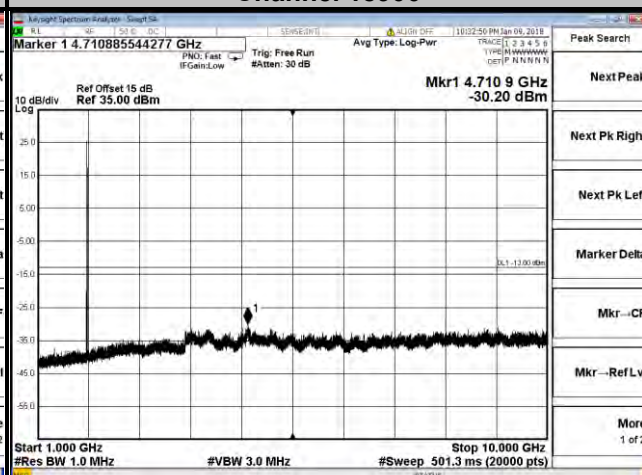
Channel Bandwidth: 20 MHz

Channel 18700



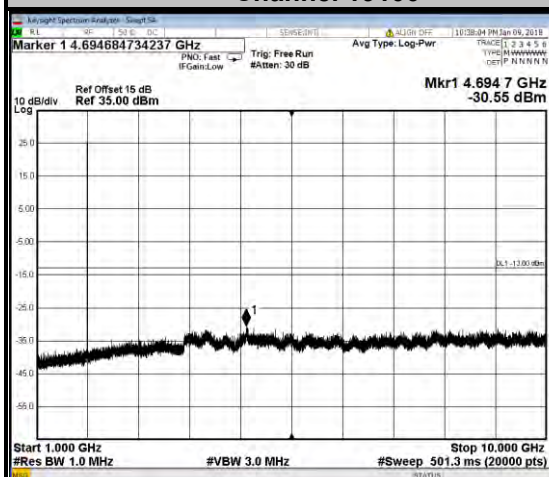
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 18900



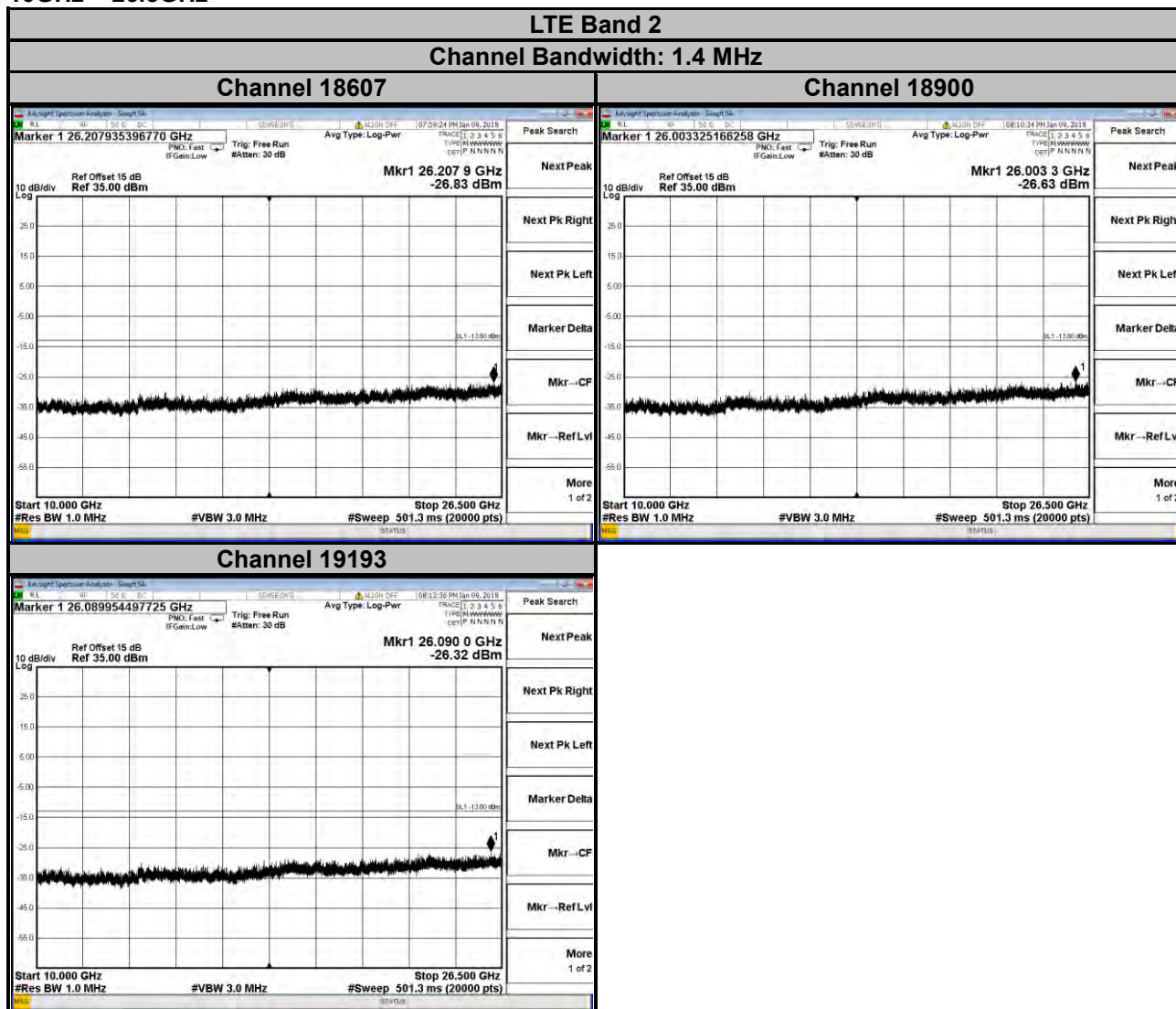
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 19100



Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

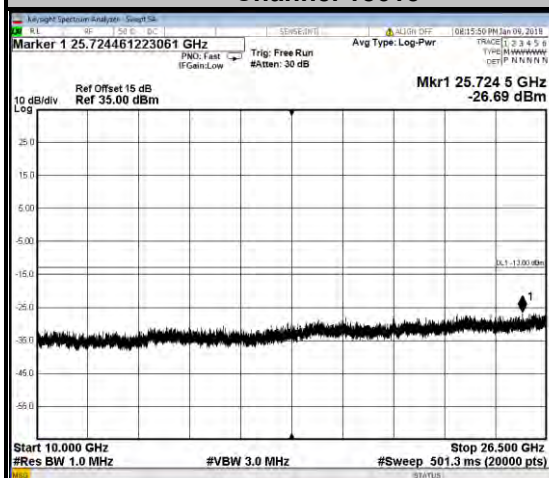
10GHz ~ 26.5GHz



LTE Band 2

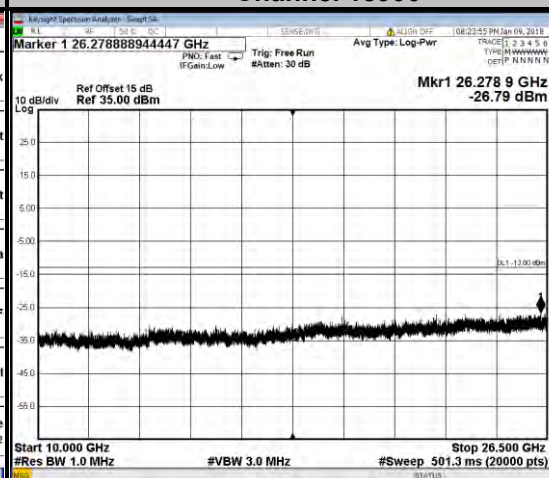
Channel Bandwidth: 3 MHz

Channel 18615



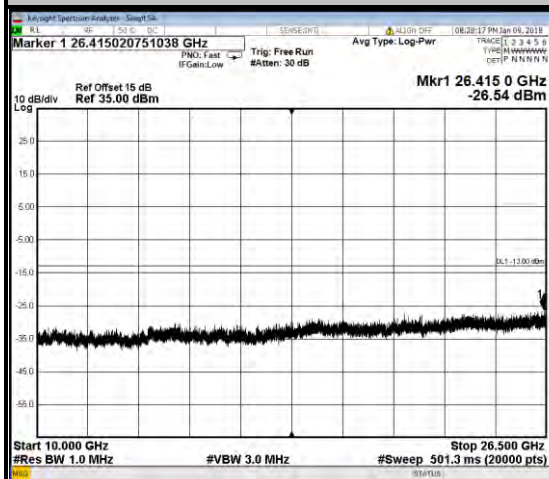
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 18900



Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 19185

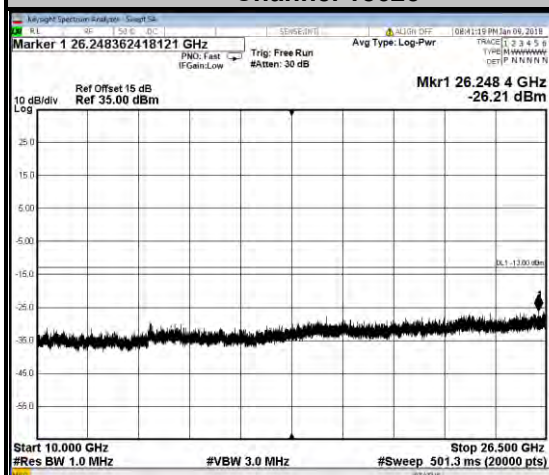


Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

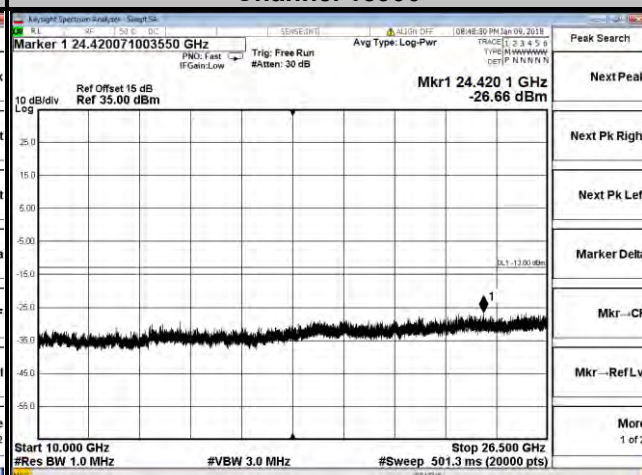
LTE Band 2

Channel Bandwidth: 5 MHz

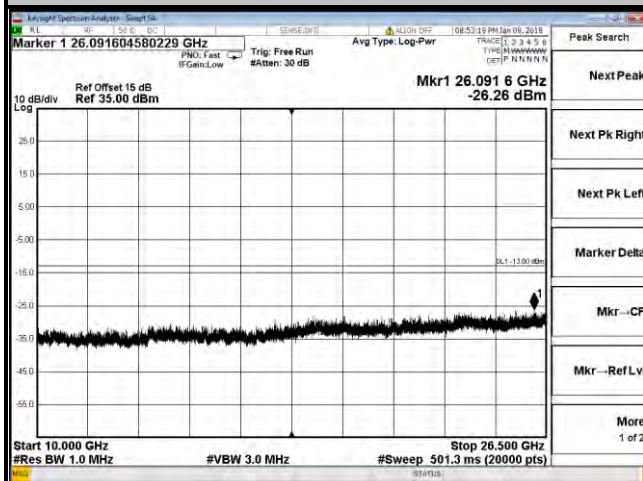
Channel 18625



Channel 18900



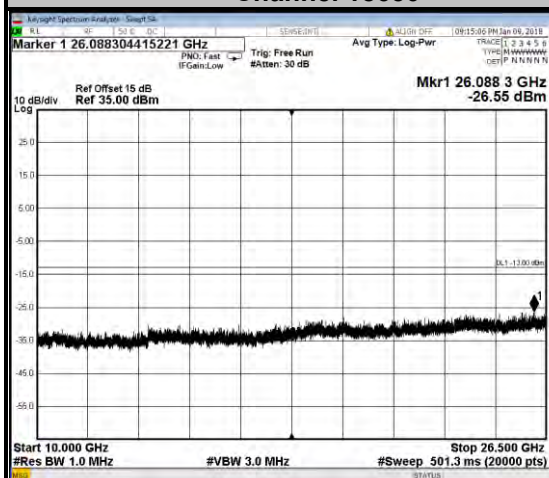
Channel 19175



LTE Band 2

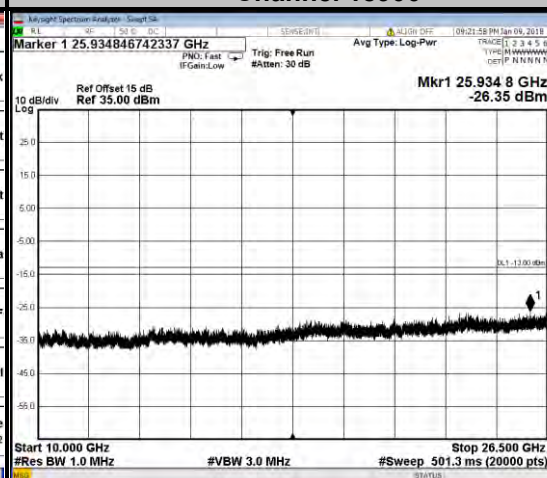
Channel Bandwidth: 10 MHz

Channel 18650



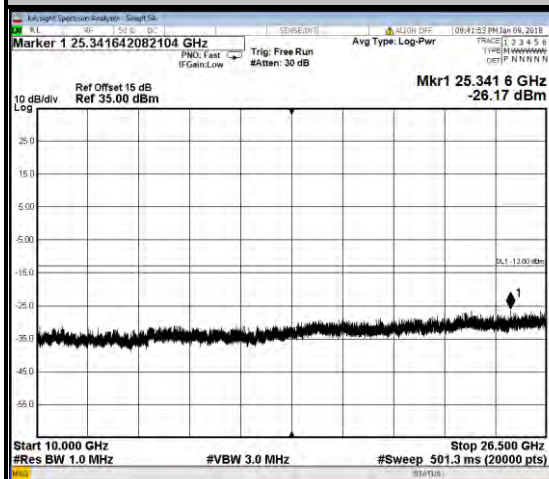
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 18900

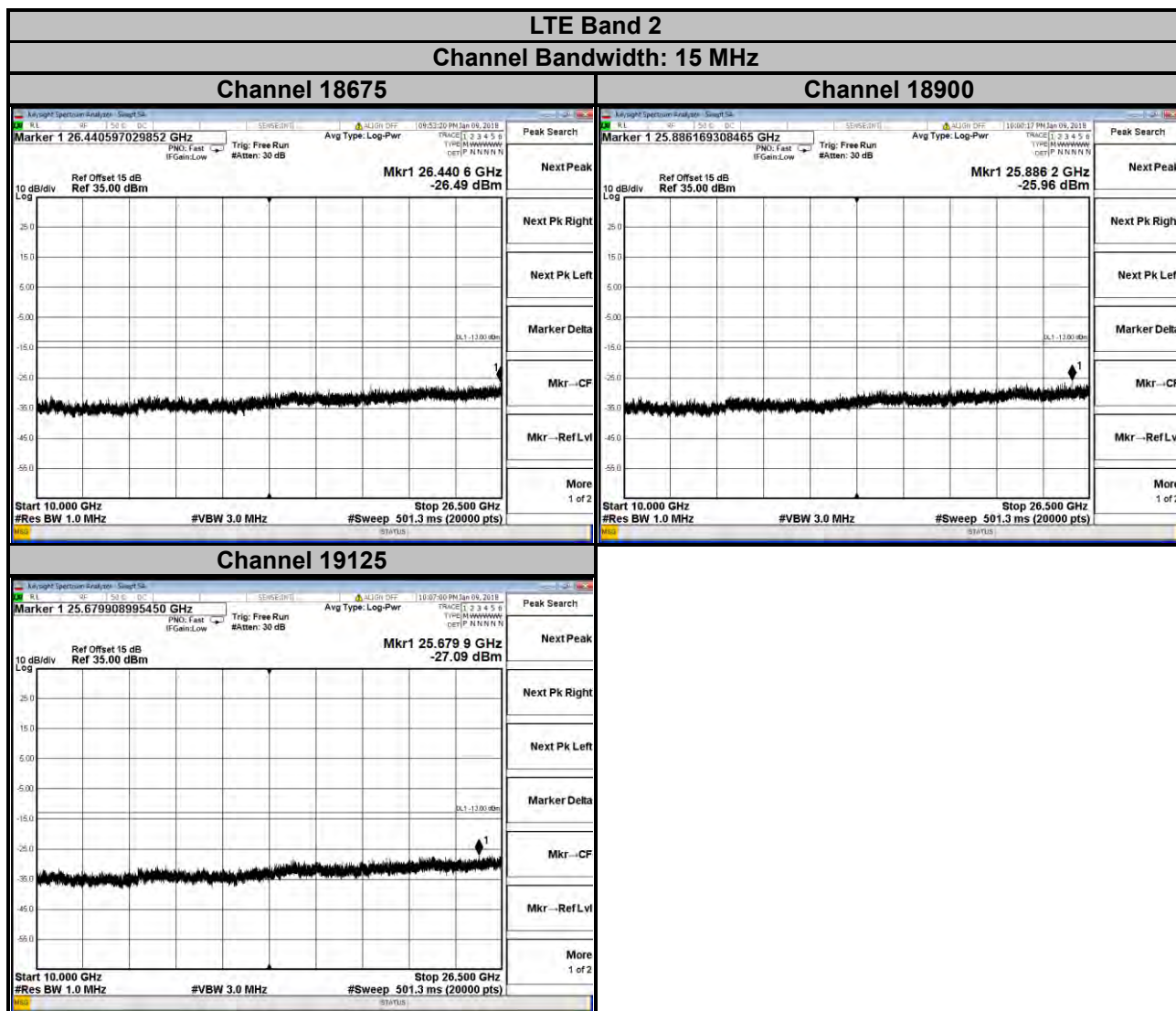


Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2

Channel 19150



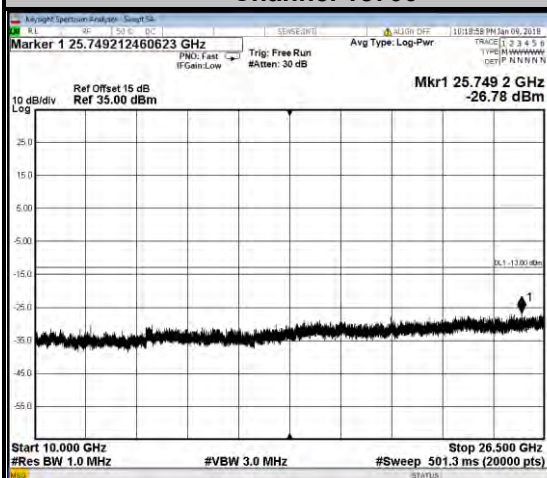
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr--CF
Mkr--Ref Lvl
More
1 of 2



LTE Band 2

Channel Bandwidth: 20 MHz

Channel 18700



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

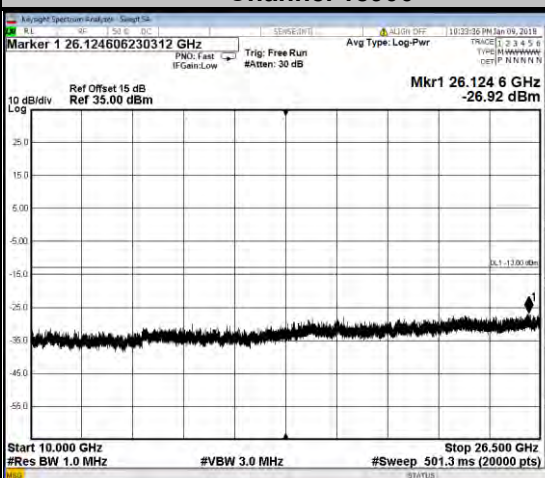
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 18900



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

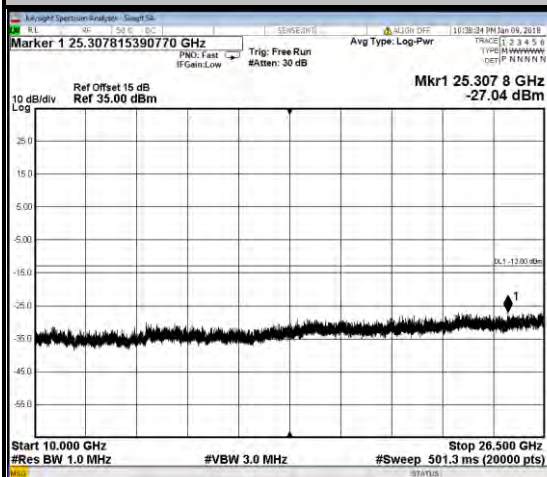
Mkr--CF

Mkr--Ref Lvl

More

1 of 2

Channel 19100



Peak Search

Next Peak

Next Pk Right

Next Pk Left

Marker Delta

Mkr--CF

Mkr--Ref Lvl

More

1 of 2

4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The emission limit is equal to -13 dBm.

4.7.2 Test Procedure

- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}.$

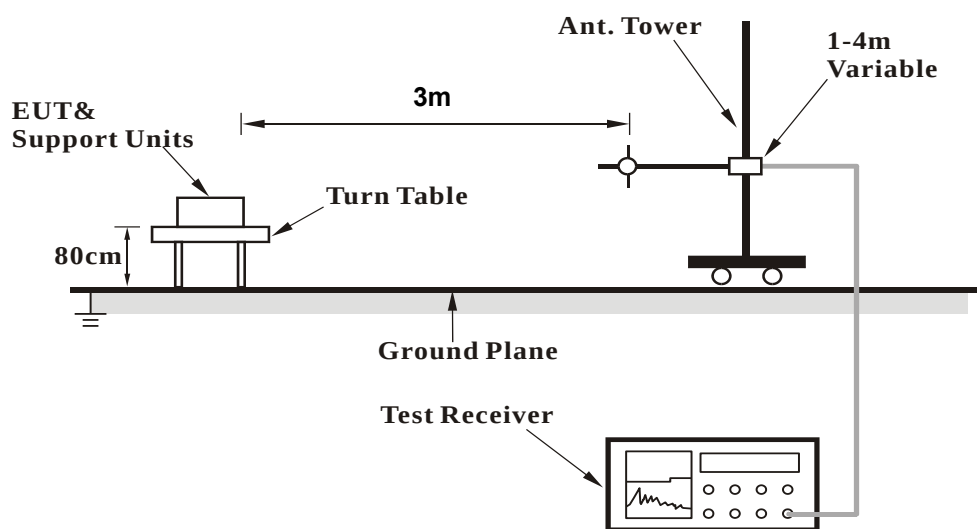
NOTE: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz/3 MHz.

4.7.3 Deviation from Test Standard

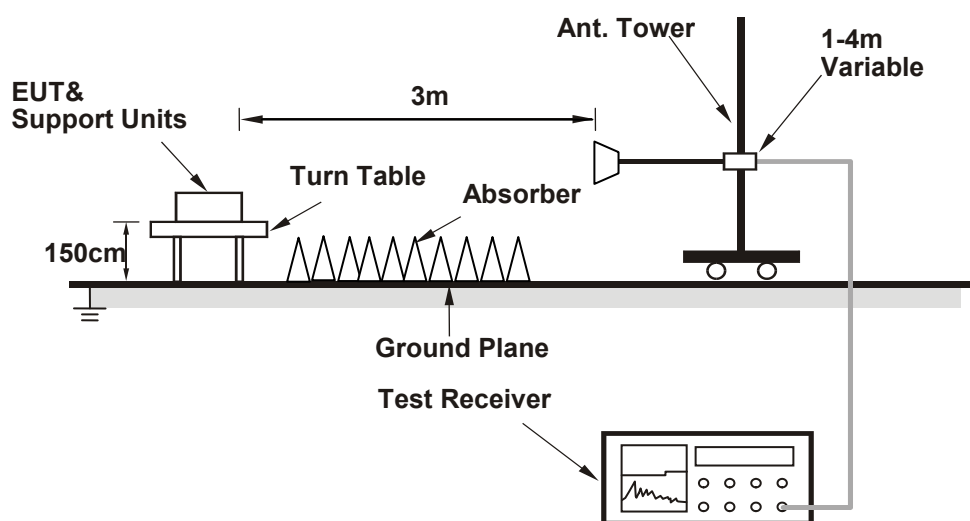
No deviation.

4.7.4 Test Setup

<Radiated Emission below or equal 1 GHz>



<Radiated Emission above 1 GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.7.5 Test Results

LTE Band 2

Channel Bandwidth: 20 MHz / QPSK

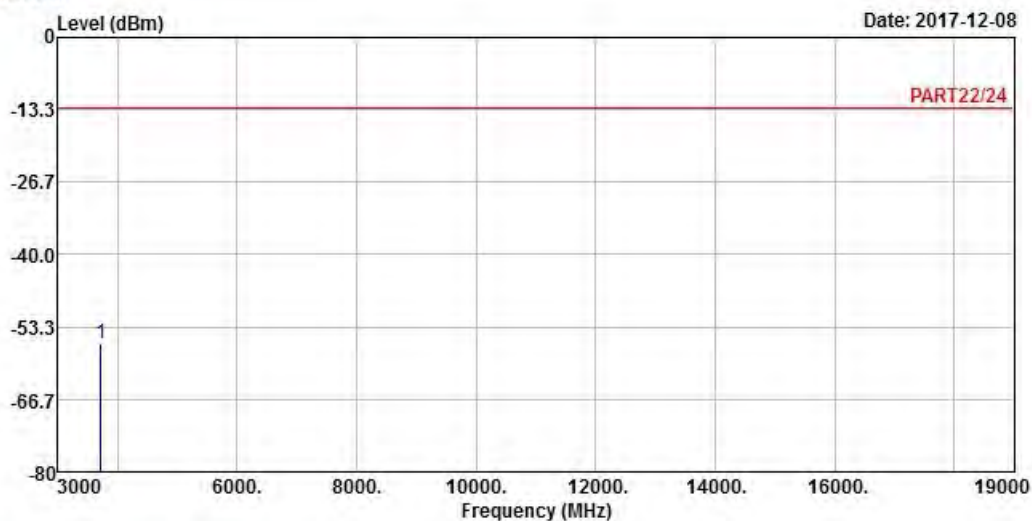
Low Channel



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A D T

Data: 5



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_20M Link_L-CH

Tested by: Jisyong Wang

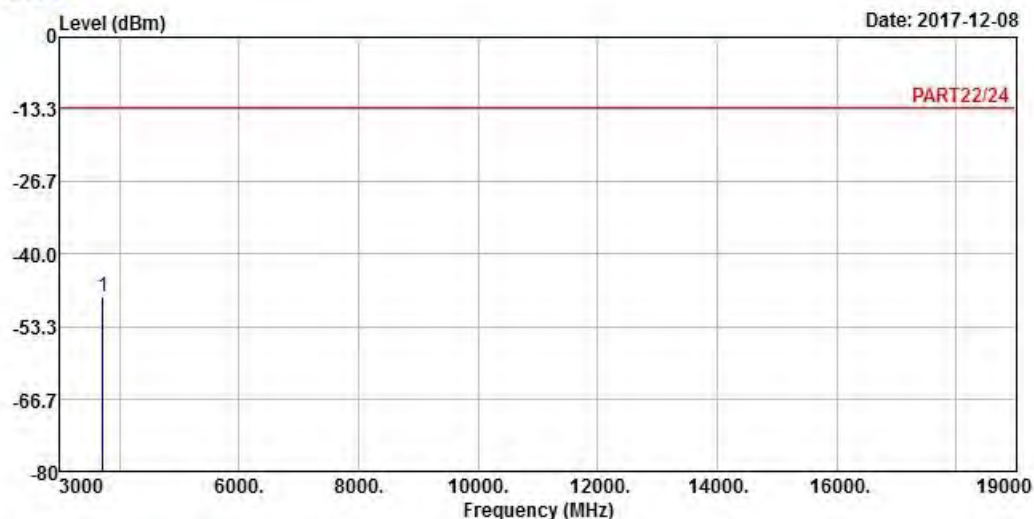
		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	
1 pp 3720.00	-56.49	-48.36	-13.00	-43.49	-8.13	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_20M Link_L-CH

Tested by: Jisyong Wang

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3720.00 -47.95 -39.82 -13.00 -34.95 -8.13 Peak

Middle Channel

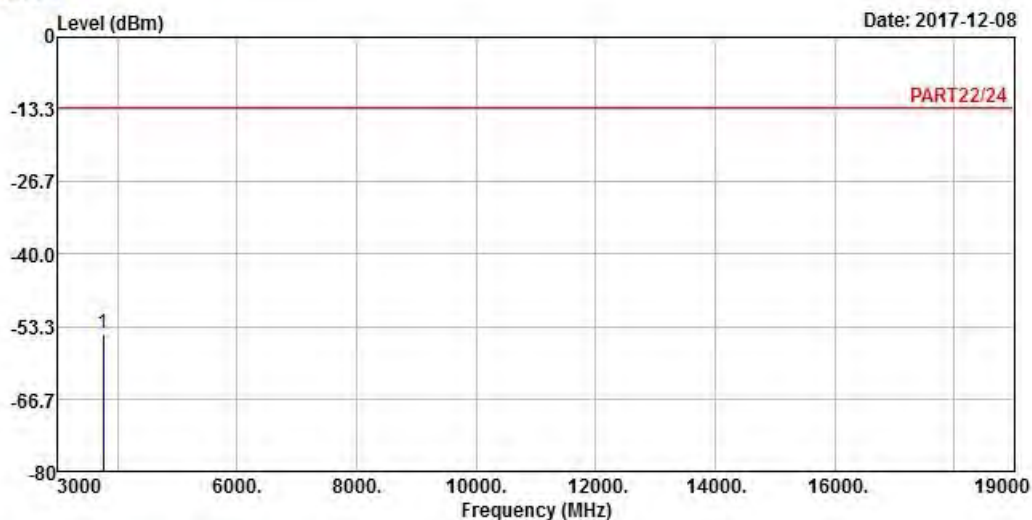


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A D T

Data: 9

Date: 2017-12-08



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_20M Link-M-CH

Tested by: Jisyong Wang

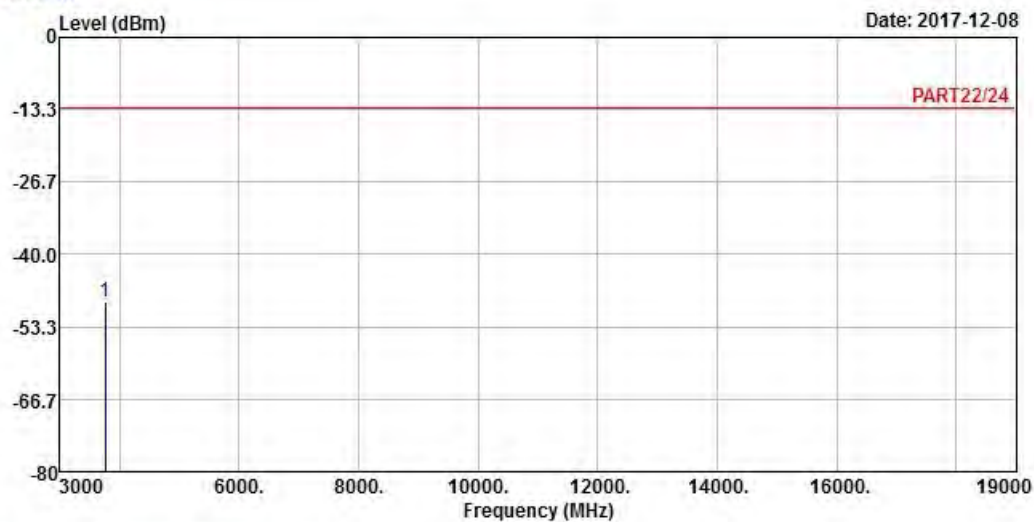
		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	
1 pp 3760.00	-54.69	-46.63	-13.00	-41.69	-8.06	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_20M Link-M-CH

Tested by: Jisyong Wang

		Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm	dBm	dBm	dB	dB	

1 pp 3760.00 -48.77 -40.71 -13.00 -35.77 -8.06 Peak

High Channel

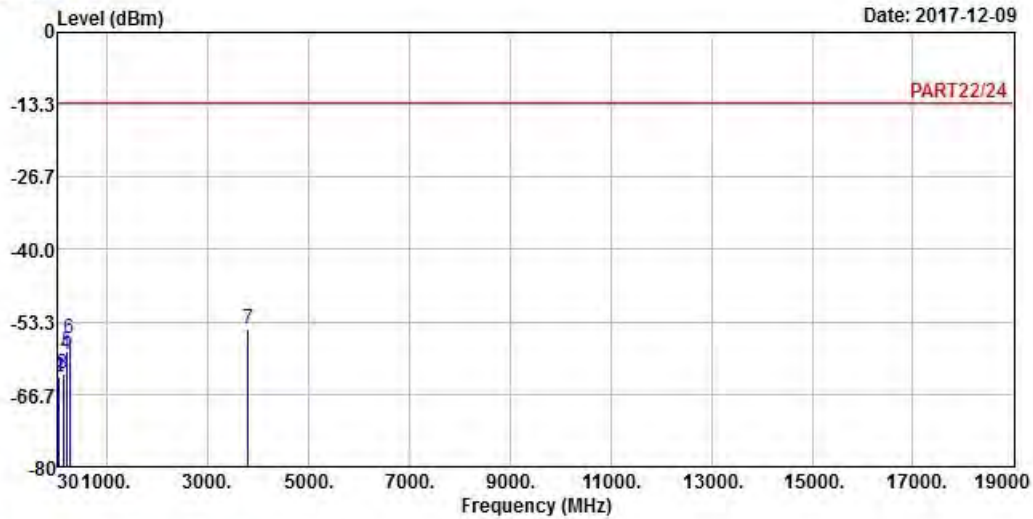


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2017-12-09



Site : 966 Chamber 5

Condition: PART22/24 HORIZONTAL

Remak : LTE Band 2 QPSK_20M Link_H-CH

Tested by: Jisyong Wang

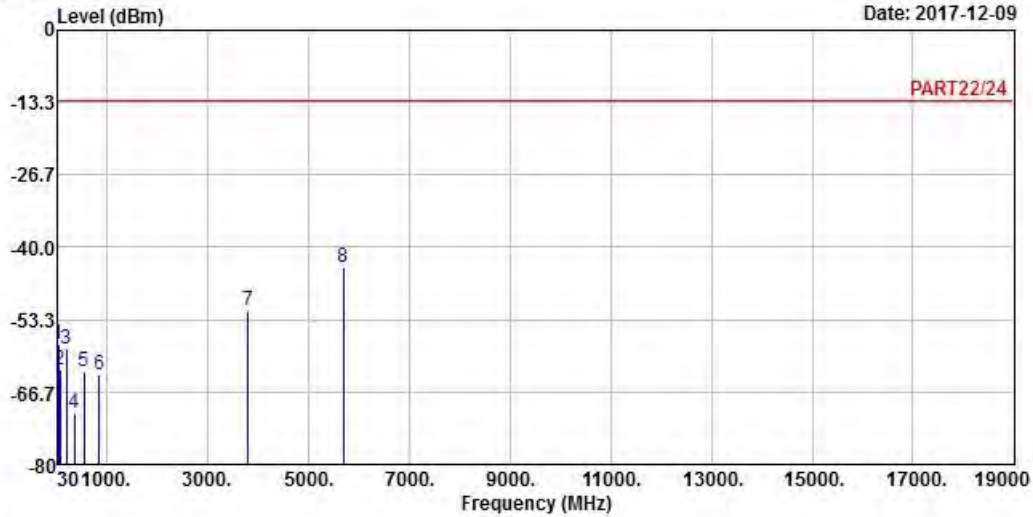
			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	43.23	-63.38	-61.91	-13.00	-50.38	-1.47	Peak
2	53.76	-63.56	-57.75	-13.00	-50.56	-5.81	Peak
3	129.63	-62.96	-54.27	-13.00	-49.96	-8.69	Peak
4	199.02	-59.36	-51.43	-13.00	-46.36	-7.93	Peak
5	204.42	-58.66	-50.83	-13.00	-45.66	-7.83	Peak
6	265.17	-56.34	-50.05	-13.00	-43.34	-6.29	Peak
7 pp	3800.00	-54.70	-46.92	-13.00	-41.70	-7.78	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10



Site : 966 Chamber 5

Condition: PART22/24 VERTICAL

Remak : LTE Band 2 QPSK_20M Link_H-CH

Tested by: Jisyong Wang

		Read	Limit	Over			
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm	dBm	dBm	dB	dB	
1	32.97	-57.88	-56.79	-13.00	-44.88	-1.09	Peak
2	72.12	-62.49	-53.64	-13.00	-49.49	-8.85	Peak
3	199.83	-58.76	-50.74	-13.00	-45.76	-8.02	Peak
4	352.50	-70.58	-64.35	-13.00	-57.58	-6.23	Peak
5	550.60	-62.76	-59.95	-13.00	-49.76	-2.81	Peak
6	839.70	-63.36	-63.74	-13.00	-50.36	0.38	Peak
7	3800.00	-51.60	-43.82	-13.00	-38.60	-7.78	Peak
8 pp	5700.00	-43.66	-41.71	-13.00	-30.66	-1.95	Peak

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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