



FCC TEST REPORT (PART 27)

REPORT NO.: RF130527C07B
MODEL NO.: Messi-V
FCC ID: IXMMESSI-V
RECEIVED: Jul. 08, 2013
TESTED: Jul. 14, 2013 ~ Jul. 22, 2013
ISSUED: Jul. 22, 2013

APPLICANT: Universal Scientific Industrial Co., Ltd.

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ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch

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TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF130527C07B	Original release	Jul. 22, 2013



1 CERTIFICATION

PRODUCT: LTE Module
MODEL NO.: Messi-V
BRAND: Universal Global Scientific Industrial Co., Ltd.
APPLICANT: Universal Scientific Industrial Co., Ltd.
TESTED: Jul. 14, 2013 ~ Jul. 22, 2013
TEST SAMPLE: Production Unit
TEST STANDARDS: **FCC Part 27, Subpart C, F, L**
FCC Part 2
ANSI C63.4-2003

The above equipment (model: Messi-V) 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 EMC characteristics under the conditions specified in this report.

PREPARED BY : Vera Huang , **DATE:** Jul. 22, 2013
Vera Huang / Specialist

APPROVED BY : Sam chen , **DATE:** Jul. 22, 2013
Sam Chen / Assistant Manager

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

LTE BAND 13			
STANDARD SECTION	TEST TYPE	RESULT	REMARK
2.1046 27.50(d)(4)	Maximum Peak Output Power Limit: max. 3 watts e.r.p peak power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 27.53(h)	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to average ratio	PASS	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -4.90dB at 1572.80MHz.

LTE BAND 4			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50(d)(4)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
2.1055 27.54	Frequency Stability	PASS	Meet the requirement of limit.
2.1049 27.53(h)	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to average ratio	PASS	Meet the requirement of limit.
27.53(h)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(h)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -9.51dB at 6903.60MHz.

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	UNCERTAINTY
Conducted emissions	150kHz~30MHz	2.44 dB
Radiated emissions	30MHz ~ 200MHz	2.93 dB
	200MHz ~1000MHz	2.95 dB
	1GHz ~ 18GHz	2.26 dB
	18GHz ~ 40GHz	1.94 dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

2.2 TEST SITE AND INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	DATE OF CALIBRATION	DUE DATE OF CALIBRATION
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Aug. 21, 2012	Aug. 20, 2013
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2012	Dec. 16, 2013
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Mar. 25, 2013	Mar. 24, 2014
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Jan. 07, 2013	Jan. 06, 2014
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 25, 2012	Dec. 24, 2013
Loop Antenna	HFH2-Z2	100070	Jan. 31, 2012	Jan. 30, 2014
Preamplifier EMCI	EMC 012645	980115	Dec. 28, 2012	Dec. 27, 2013
Preamplifier EMCI	EMC 184045	980116	Dec. 28, 2012	Dec. 27, 2013
Preamplifier EMCI	EMC 330H	980112	Dec. 28, 2012	Dec. 27, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4	Oct. 19, 2012	Oct. 18, 2013
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 19, 2012	Oct. 18, 2013
RF signal cable Worken	RG-213	NA	Dec. 29, 2012	Dec. 28, 2013
Software	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 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 HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC 7450F-10.

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

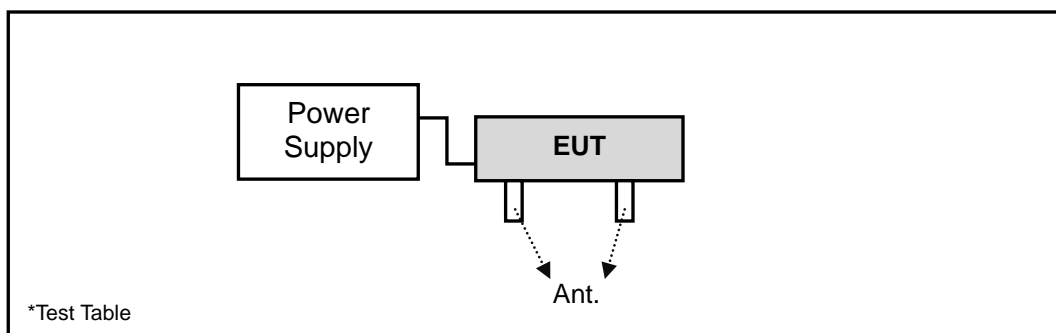
PRODUCT	LTE Module	
MODEL NO.	Messi-V	
POWER SUPPLY	3.3Vdc from power supply	
MODULATION TECHNOLOGY	LTE Band 13	QPSK, 16QAM
	LTE Band 4	QPSK, 16QAM
FREQUENCY RANGE	LTE Band 13 Channel Bandwidth: 5MHz	779.5MHz ~ 784.5MHz
	LTE Band 13 Channel Bandwidth: 10MHz	782MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715MHz ~1750MHz
	LTE Band 4 Channel Bandwidth: 15MHz	1717.5MHz ~1747.5MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720MHz ~1745MHz
EMISSION DESIGNATOR	LTE Band 13 Channel Bandwidth: 5MHz	4M49G7D
	LTE Band 13 Channel Bandwidth: 10MHz	8M94W7D
	LTE Band 4 Channel Bandwidth: 5MHz	4M49G7D
	LTE Band 4 Channel Bandwidth: 10MHz	8M92G7D
	LTE Band 4 Channel Bandwidth: 15MHz	13M4W7D
	LTE Band 4 Channel Bandwidth: 20MHz	17M9W7D
MAX. ERP POWER (W)	LTE Band 13 Channel Bandwidth: 5MHz	156.31mW
	LTE Band 13 Channel Bandwidth: 10MHz	148.25mW
MAX. EIRP POWER (mW)	LTE Band 4 Channel Bandwidth: 5MHz	242.49mW
	LTE Band 4 Channel Bandwidth: 10MHz	236.59mW
	LTE Band 4 Channel Bandwidth: 15MHz	250.44mW
	LTE Band 4 Channel Bandwidth: 20MHz	241.55mW

CATEGORY	3
ANTENNA TYPE	Fixed External Antenna
DATA CABLE	Refer to Note as below
I/O PORTS	Refer to users' manual
ACCESSORY DEVICES	Refer to Note as below

NOTE:

1. The above EUT information was 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



3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	POWER SUPPLY	TOP WARD	6306A	713585	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

NOTE: All power cords of the above support units are non shielded (1.8m).

3.4 DESCRIPTION OF TEST MODES

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 as listed below for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

	BAND	AXIS FOR RADIATED EMISSION
ERP/EIRP	LTE Band 13	X
	LTE Band 4	Z
RADIATED EMISSION	LTE Band 13	X
	LTE Band 4	X

LTE Band 13

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		23230	10MHz	QPSK, 16QAM	1 RB / 49 RB Offset
FREQUENCY STABILITY	23205 to 23255	23205, 23230, 23255	5MHz	QPSK	1 RB / 12 RB Offset
		23230	10MHz	QPSK	1 RB / 49 RB Offset
OCCUPIED BANDWIDTH	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23230	10MHz	QPSK, 16QAM	25 RB / 0 RB Offset
PEAK TO AVERAGE RATIO	23205 to 23255	23205, 23230, 23255	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
BAND EDGE	23205 to 23255	23205	5MHz	QPSK	1 RB / 0 RB Offset
				QPSK	25 RB / 0 RB Offset
		23255	5MHz	QPSK	1 RB / 24 RB Offset
				QPSK	25 RB / 0 RB Offset
		23230	10MHz	QPSK	1 RB / 0 RB Offset
				QPSK	50 RB / 0 RB Offset
CONDCUDED EMISSION	23205 to 23255	23230	5MHz	QPSK	1 RB / 0 RB Offset
		23230	10MHz	QPSK	1 RB / 0 RB Offset
RADIATED EMISSION	23205 to 23255	23205, 23230, 23255	5MHz	QPSK	1 RB / 12 RB Offset
					25 RB / 0 RB Offset
		23230	10MHz	QPSK	1 RB / 49 RB Offset
					50 RB / 0 RB Offset

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



LTE Band 4

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
FREQUENCY STABILITY	19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
	20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
	20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
	20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset
OCCUPIED BANDWIDTH	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
PEAK TO AVERAGE RATIO	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20025 to 20325	20025, 20175, 20325	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
BAND EDGE	19975 to 20375	19975	5MHz	QPSK	1 RB / 0 RB Offset
		20375	5MHz	QPSK	25 RB / 0 RB Offset
		20000	10MHz	QPSK	1 RB / 24 RB Offset
		20350	10MHz	QPSK	25 RB / 0 RB Offset
	20000 to 20350	20000	10MHz	QPSK	1 RB / 0 RB Offset
		20350	10MHz	QPSK	50 RB / 0 RB Offset
		20025	15MHz	QPSK	1 RB / 49 RB Offset
		20325	15MHz	QPSK	50 RB / 0 RB Offset
	20025 to 20325	20025	15MHz	QPSK	1 RB / 0 RB Offset
		20325	15MHz	QPSK	75 RB / 0 RB Offset
		20050	20MHz	QPSK	1 RB / 74 RB Offset
		20300	20MHz	QPSK	75 RB / 0 RB Offset
20050 to 20300	20050	20MHz	QPSK	1 RB / 0 RB Offset	
	20300	20MHz	QPSK	100 RB / 0 RB Offset	
	20050	20MHz	QPSK	1 RB / 99 RB Offset	
	20300	20MHz	QPSK	100 RB / 0 RB Offset	

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
CONDCUDETED EMISSION	19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
	20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
	20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
	20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset
RADIATED EMISSION	19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
	20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
	20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
	20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset

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

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP/EIRP	25deg. C, 65%RH	3.3Vdc	Howard Kao
FREQUENCY STABILITY	25deg. C, 65%RH	3.3Vdc	Howard Kao
OCCUPIED BANDWIDTH	25deg. C, 65%RH	3.3Vdc	Howard Kao
BAND EDGE	25deg. C, 65%RH	3.3Vdc	Howard Kao
CONDCUDETED EMISSION	25deg. C, 65%RH	3.3Vdc	Howard Kao
RADIATED EMISSION	25deg. C, 65%RH	120Vac, 60Hz	Kay Wu

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 27

ANSI C63.4-2003

ANSI/TIA/EIA-603-C 2004

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

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 704-716 MHz band are limited to 3 watts ERP.

Portable stations (hand-held devices) operating in the 777-787MHz, 776-793 MHz band are limited to 3 watts ERP.

4.1.2 TEST PROCEDURES

EIRP / ERP MEASUREMENT:

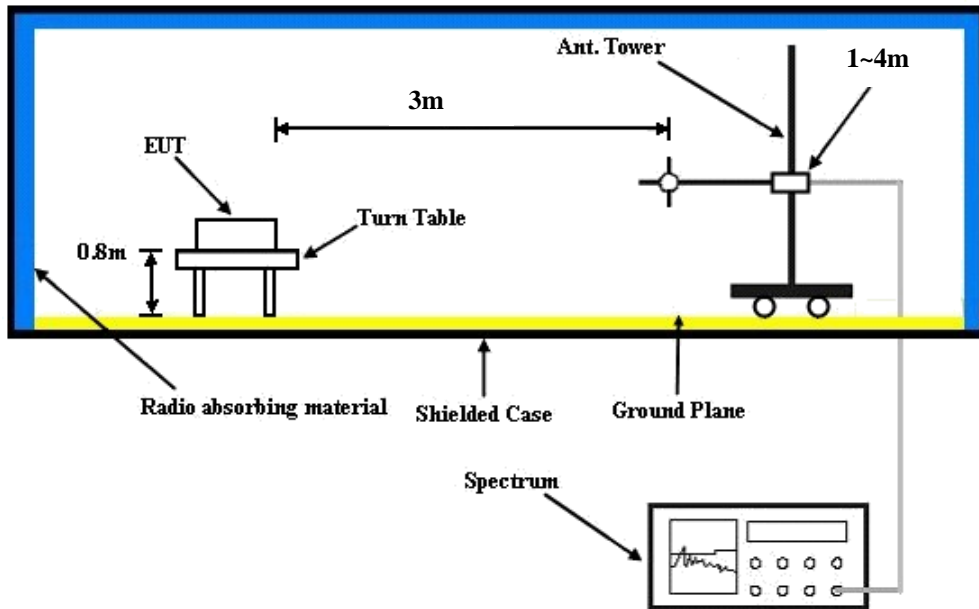
- a. All measurements were done at low, middle and high operational frequency range.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m 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 form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15\text{dBi}$.

CONDUCTED POWER MEASUREMENT:

The EUT was set up for the maximum power with 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:



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

CONDUCTED POWER MEASUREMENT:



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

4.1.4 TEST RESULTS

AVERAGE CONDUCTED OUTPUT POWER (dBm)

LTE Band 13								
BW	Modulation	CH	Frequency (MHz)	RB	RB Offset	MPR	Target Power	Measured Power
5 MHz	QPSK	23205	779.5	1	0	0	23.8	22.91
		23230	782	1	0	0	23.8	23.32
		23255	784.5	1	0	0	23.8	23.31
		23205	779.5	1	12	0	23.8	23.43
		23230	782	1	12	0	23.8	23.41
		23255	784.5	1	12	0	23.8	23.32
		23205	779.5	1	24	0	23.8	23.38
		23230	782	1	24	0	23.8	23.21
		23255	784.5	1	24	0	23.8	23.3
		23205	779.5	12	0	1	23.8	23.41
		23230	782	12	0	1	23.8	23.79
		23255	784.5	12	0	1	23.8	23.34
		23205	779.5	12	6	1	23.8	23.65
		23230	782	12	6	1	23.8	23.47
		23255	784.5	12	6	1	23.8	23.39
		23205	779.5	12	13	1	23.8	23.45
		23230	782	12	13	1	23.8	23.55
		23255	784.5	12	13	1	23.8	23.6
		23205	779.5	25	0	1	23.8	23.42
		23230	782	25	0	1	23.8	23.44
23255	784.5	25	0	1	23.8	23.59		



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LTE Band 13								
BW	Modulation	CH	Frequency (MHz)	RB	RB Offset	MPR	Target Power	Measured Power
5 MHz	16QAM	23205	779.5	1	0	1	23.8	22.68
		23230	782	1	0	1	23.8	23.09
		23255	784.5	1	0	1	23.8	23.08
		23205	779.5	1	12	1	23.8	23.2
		23230	782	1	12	1	23.8	23.18
		23255	784.5	1	12	1	23.8	23.09
		23205	779.5	1	24	1	23.8	23.15
		23230	782	1	24	1	23.8	22.98
		23255	784.5	1	24	1	23.8	23.07
		23205	779.5	12	0	2	23.8	23.18
		23230	782	12	0	2	23.8	23.56
		23255	784.5	12	0	2	23.8	23.11
		23205	779.5	12	6	2	23.8	23.42
		23230	782	12	6	2	23.8	23.24
		23255	784.5	12	6	2	23.8	23.16
		23205	779.5	12	13	2	23.8	23.22
		23230	782	12	13	2	23.8	23.32
		23255	784.5	12	13	2	23.8	23.37
23205	779.5	25	0	2	23.8	23.19		
23230	782	25	0	2	23.8	23.21		
23255	784.5	25	0	2	23.8	23.36		

LTE Band 13								
BW	Modulation	CH	Frequency (MHz)	RB	RB Offset	MPR	Target Power	Measured Power
10 MHz	QPSK	23230	782	1	0	0	23.9	23.1
		23230	782	1	24	0	23.9	23.77
		23230	782	1	49	0	23.9	23.81
		23230	782	25	0	1	23.9	23.42
		23230	782	25	12	1	23.9	23.57
		23230	782	25	25	1	23.9	23.61
		23230	782	50	0	1	23.9	23.42
	16QAM	23230	782	1	0	1	23.9	22.86
		23230	782	1	24	1	23.9	23.53
		23230	782	1	49	1	23.9	23.57
		23230	782	25	0	2	23.9	23.18
		23230	782	25	12	2	23.9	23.33
		23230	782	25	25	2	23.9	23.37
		23230	782	50	0	2	23.9	23.18



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LTE Band 4								
BW	Modulation	CH	Frequency	RB	RB Offset	MPR	Target	Measured
			(MHz)				Power	Power
5 MHz	QPSK	19975	1712.5	1	0	0	23.9	22.4
		20175	1732.5	1	0	0	23.9	22.84
		20375	1752.5	1	0	0	23.9	22.12
		19975	1712.5	1	12	0	23.9	22.7
		20175	1732.5	1	12	0	23.9	22.58
		20375	1752.5	1	12	0	23.9	22.1
		19975	1712.5	1	24	0	23.9	22.28
		20175	1732.5	1	24	0	23.9	22.06
		20375	1752.5	1	24	0	23.9	22.05
		19975	1712.5	12	0	1	23.9	23.45
		20175	1732.5	12	0	1	23.9	23.33
		20375	1752.5	12	0	1	23.9	22.97
		19975	1712.5	12	6	1	23.9	23.4
		20175	1732.5	12	6	1	23.9	23.02
		20375	1752.5	12	6	1	23.9	22.86
		19975	1712.5	12	13	1	23.9	23.4
		20175	1732.5	12	13	1	23.9	22.92
		20375	1752.5	12	13	1	23.9	22.75
	19975	1712.5	25	0	1	23.9	23.3	
	20175	1732.5	25	0	1	23.9	22.9	
	20375	1752.5	25	0	1	23.9	22.74	
	19975	1712.5	1	0	1	23.9	22.25	
	20175	1732.5	1	0	1	23.9	22.69	
	20375	1752.5	1	0	1	23.9	21.97	
	19975	1712.5	1	12	1	23.9	22.55	
	20175	1732.5	1	12	1	23.9	22.43	
	20375	1752.5	1	12	1	23.9	21.95	
	19975	1712.5	1	24	1	23.9	22.13	
	20175	1732.5	1	24	1	23.9	21.91	
	20375	1752.5	1	24	1	23.9	21.9	
	19975	1712.5	12	0	2	23.9	23.3	
	20175	1732.5	12	0	2	23.9	23.18	
	20375	1752.5	12	0	2	23.9	22.82	
	19975	1712.5	12	6	2	23.9	23.25	
	20175	1732.5	12	6	2	23.9	22.87	
	20375	1752.5	12	6	2	23.9	22.71	
19975	1712.5	12	13	2	23.9	23.25		
20175	1732.5	12	13	2	23.9	22.77		
20375	1752.5	12	13	2	23.9	22.6		
19975	1712.5	25	0	2	23.9	23.15		
20175	1732.5	25	0	2	23.9	22.75		
20375	1752.5	25	0	2	23.9	22.59		



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LTE Band 4								
BW	Modulation	CH	Frequency	RB	RB Offset	MPR	Target	Measured
			(MHz)				Power	Power
10MHz	QPSK	20000	1715	1	0	0	23.9	22.49
		20175	1732.5	1	0	0	23.9	22.93
		20350	1750	1	0	0	23.9	22.21
		20000	1715	1	24	0	23.9	22.79
		20175	1732.5	1	24	0	23.9	22.67
		20350	1750	1	24	0	23.9	22.19
		20000	1715	1	49	0	23.9	22.37
		20175	1732.5	1	49	0	23.9	22.15
		20350	1750	1	49	0	23.9	22.14
		20000	1715	25	0	1	23.9	23.54
		20175	1732.5	25	0	1	23.9	23.42
		20350	1750	25	0	1	23.9	23.06
		20000	1715	25	12	1	23.9	23.49
		20175	1732.5	25	12	1	23.9	23.11
		20350	1750	25	12	1	23.9	22.95
		20000	1715	25	25	1	23.9	23.49
		20175	1732.5	25	25	1	23.9	23.01
		20350	1750	25	25	1	23.9	22.84
	20000	1715	50	0	1	23.9	23.39	
	20175	1732.5	50	0	1	23.9	22.99	
	20350	1750	50	0	1	23.9	22.83	
	20000	1715	1	0	1	23.9	22.15	
	20175	1732.5	1	0	1	23.9	22.59	
	20350	1750	1	0	1	23.9	21.87	
	20000	1715	1	24	1	23.9	22.45	
	20175	1732.5	1	24	1	23.9	22.33	
	20350	1750	1	24	1	23.9	21.85	
	20000	1715	1	49	1	23.9	22.03	
	20175	1732.5	1	49	1	23.9	21.81	
	20350	1750	1	49	1	23.9	21.8	
	20000	1715	25	0	2	23.9	23.2	
	20175	1732.5	25	0	2	23.9	23.08	
	20350	1750	25	0	2	23.9	22.72	
	20000	1715	25	12	2	23.9	23.15	
	20175	1732.5	25	12	2	23.9	22.77	
	20350	1750	25	12	2	23.9	22.61	
20000	1715	25	25	2	23.9	23.15		
20175	1732.5	25	25	2	23.9	22.67		
20350	1750	25	25	2	23.9	22.5		
20000	1715	50	0	2	23.9	23.05		
20175	1732.5	50	0	2	23.9	22.65		
20350	1750	50	0	2	23.9	22.49		



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LTE Band 4								
BW	Modulation	CH	Frequency	RB	RB Offset	MPR	Target	Measured
			(MHz)				Power	Power
15 MHz	QPSK	20025	1717.5	1	0	0	23.9	22.58
		20175	1732.5	1	0	0	23.9	23.02
		20325	1747.5	1	0	0	23.9	22.3
		20025	1717.5	1	37	0	23.9	22.88
		20175	1732.5	1	37	0	23.9	22.76
		20325	1747.5	1	37	0	23.9	22.28
		20025	1717.5	1	74	0	23.9	22.46
		20175	1732.5	1	74	0	23.9	22.24
		20325	1747.5	1	74	0	23.9	22.23
		20025	1717.5	36	0	1	23.9	23.63
		20175	1732.5	36	0	1	23.9	23.51
		20325	1747.5	36	0	1	23.9	23.15
		20025	1717.5	36	19	1	23.9	23.58
		20175	1732.5	36	19	1	23.9	23.2
		20325	1747.5	36	19	1	23.9	23.04
		20025	1717.5	36	39	1	23.9	23.58
		20175	1732.5	36	39	1	23.9	23.1
		20325	1747.5	36	39	1	23.9	22.93
	20025	1717.5	75	0	1	23.9	23.48	
	20175	1732.5	75	0	1	23.9	23.08	
	20325	1747.5	75	0	1	23.9	22.92	
	20025	1717.5	1	0	1	23.9	22.43	
	20175	1732.5	1	0	1	23.9	22.87	
	20325	1747.5	1	0	1	23.9	22.15	
	20025	1717.5	1	37	1	23.9	22.73	
	20175	1732.5	1	37	1	23.9	22.61	
	20325	1747.5	1	37	1	23.9	22.13	
	20025	1717.5	1	74	1	23.9	22.31	
	20175	1732.5	1	74	1	23.9	22.09	
	20325	1747.5	1	74	1	23.9	22.08	
	20025	1717.5	36	0	2	23.9	23.48	
	20175	1732.5	36	0	2	23.9	23.36	
	20325	1747.5	36	0	2	23.9	23	
	20025	1717.5	36	19	2	23.9	23.43	
	20175	1732.5	36	19	2	23.9	23.05	
	20325	1747.5	36	19	2	23.9	22.89	
20025	1717.5	36	39	2	23.9	23.43		
20175	1732.5	36	39	2	23.9	22.95		
20325	1747.5	36	39	2	23.9	22.78		
20025	1717.5	75	0	2	23.9	23.33		
20175	1732.5	75	0	2	23.9	22.93		
20325	1747.5	75	0	2	23.9	22.77		

LTE Band 4								
BW	Modulation	CH	Frequency	RB	RB Offset	MPR	Target	Measured
			(MHz)				Power	Power
20MHz	QPSK	20050	1720	1	0	0	23.9	22.81
		20175	1732.5	1	0	0	23.9	23.25
		20300	1745	1	0	0	23.9	22.53
		20050	1720	1	50	0	23.9	23.11
		20175	1732.5	1	50	0	23.9	22.99
		20300	1745	1	50	0	23.9	22.51
		20050	1720	1	99	0	23.9	22.69
		20175	1732.5	1	99	0	23.9	22.47
		20300	1745	1	99	0	23.9	22.46
		20050	1720	50	0	1	23.9	23.86
		20175	1732.5	50	0	1	23.9	23.74
		20300	1745	50	0	1	23.9	23.38
		20050	1720	50	25	1	23.9	23.81
		20175	1732.5	50	25	1	23.9	23.43
		20300	1745	50	25	1	23.9	23.27
		20050	1720	50	50	1	23.9	23.81
		20175	1732.5	50	50	1	23.9	23.33
		20300	1745	50	50	1	23.9	23.16
	20050	1720	100	0	1	23.9	23.71	
	20175	1732.5	100	0	1	23.9	23.31	
	20300	1745	100	0	1	23.9	23.15	
	20050	1720	1	0	1	23.9	22.45	
	20175	1732.5	1	0	1	23.9	22.89	
	20300	1745	1	0	1	23.9	22.17	
	20050	1720	1	50	1	23.9	22.75	
	20175	1732.5	1	50	1	23.9	22.63	
	20300	1745	1	50	1	23.9	22.15	
	20050	1720	1	99	1	23.9	22.33	
	20175	1732.5	1	99	1	23.9	22.11	
	20300	1745	1	99	1	23.9	22.1	
	20050	1720	50	0	2	23.9	23.5	
	20175	1732.5	50	0	2	23.9	23.38	
	20300	1745	50	0	2	23.9	23.02	
	20050	1720	50	25	2	23.9	23.45	
	20175	1732.5	50	25	2	23.9	23.07	
	20300	1745	50	25	2	23.9	22.91	
20050	1720	50	50	2	23.9	23.45		
20175	1732.5	50	50	2	23.9	22.97		
20300	1745	50	50	2	23.9	22.8		
20050	1720	100	0	2	23.9	23.35		
20175	1732.5	100	0	2	23.9	22.95		
20300	1745	100	0	2	23.9	22.79		

AVERAGE ERP (dBm)
LTE BAND 13
CHANNEL BANDWIDTH: 5MHz QPSK

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
X	23205	779.5	-8.52	32.24	21.57	143.55	H
	23230	782	-8.08	32.17	21.94	156.31	H
	23255	784.5	-8.13	32.11	21.83	152.41	H
	23205	779.5	-27.15	32.43	3.13	2.06	V
	23230	782	-26.74	32.42	3.53	2.25	V
	23255	784.5	-26.87	32.46	3.44	2.21	V

CHANNEL BANDWIDTH: 5MHz 16QAM

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
X	23205	779.5	-8.60	32.24	21.49	140.93	H
	23230	782	-8.68	32.17	21.34	136.14	H
	23255	784.5	-8.46	32.11	21.50	141.25	H
	23205	779.5	-27.14	32.43	3.14	2.06	V
	23230	782	-26.78	32.42	3.49	2.23	V
	23255	784.5	-26.57	32.46	3.74	2.37	V

CHANNEL BANDWIDTH: 10MHz QPSK

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
X	23230	782	-8.57	32.17	21.45	139.64	H
	23230	782	-26.45	32.42	3.82	2.41	V

CHANNEL BANDWIDTH: 10MHz 16QAM

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
X	23230	782	-8.31	32.17	21.71	148.25	H
	23230	782	-26.53	32.42	3.74	2.37	V

AVERAGE EIRP (dBm)

LTE BAND 4

CHANNEL BANDWIDTH: 5MHz QPSK

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	19975	1712.5	-33.37	36.45	3.08	2.03	H
	20175	1732.5	-33.65	36.80	3.15	2.06	H
	20375	1752.5	-33.22	36.94	3.72	2.36	H
	19975	1712.5	-13.65	37.28	23.63	230.52	V
	20175	1732.5	-14.19	37.63	23.44	220.80	V
	20375	1752.5	-14.22	37.64	23.42	219.79	V

CHANNEL BANDWIDTH: 5MHz 16QAM

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	19975	1712.5	-33.44	36.45	3.01	2.00	H
	20175	1732.5	-33.27	36.80	3.53	2.25	H
	20375	1752.5	-33.57	36.94	3.37	2.17	H
	19975	1712.5	-13.43	37.28	23.85	242.49	V
	20175	1732.5	-14.37	37.63	23.26	211.84	V
	20375	1752.5	-13.81	37.64	23.83	241.55	V



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CHANNEL BANDWIDTH: 10MHz QPSK

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20000	1715	-33.08	36.45	3.37	2.17	H
	20175	1732.5	-33.68	36.80	3.12	2.05	H
	20350	1750	-33.36	36.94	3.58	2.28	H
	20000	1715	-14.28	37.28	23.00	199.39	V
	20175	1732.5	-14.49	37.63	23.14	206.06	V
	20350	1750	-14.08	37.64	23.56	226.99	V

CHANNEL BANDWIDTH: 10MHz 16QAM

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20000	1715	-33.22	36.45	3.23	2.10	H
	20175	1732.5	-33.35	36.80	3.45	2.21	H
	20350	1750	-33.78	36.94	3.16	2.07	H
	20000	1715	-14.13	37.28	23.15	206.40	V
	20175	1732.5	-13.89	37.63	23.74	236.59	V
	20350	1750	-14.60	37.64	23.04	201.37	V



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CHANNEL BANDWIDTH: 15MHz QPSK

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20025	1717.5	-33.43	36.45	3.02	2.00	H
	20175	1732.5	-33.38	36.80	3.42	2.20	H
	20325	1747.5	-33.40	36.94	3.54	2.26	H
	20025	1717.5	-13.29	37.28	23.99	250.44	V
	20175	1732.5	-13.73	37.63	23.90	245.47	V
	20325	1747.5	-14.23	37.64	23.41	219.28	V

CHANNEL BANDWIDTH: 15MHz 16QAM

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20025	1717.5	-33.01	36.45	3.44	2.21	H
	20175	1732.5	-32.98	36.80	3.82	2.41	H
	20325	1747.5	-33.37	36.94	3.57	2.28	H
	20025	1717.5	-14.05	37.28	23.23	210.23	V
	20175	1732.5	-13.66	37.63	23.97	249.46	V
	20325	1747.5	-13.89	37.64	23.75	237.14	V



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CHANNEL BANDWIDTH: 20MHz QPSK

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20050	1720	-33.35	36.45	3.10	2.04	H
	20175	1732.5	-33.40	36.80	3.40	2.19	H
	20300	1745	-33.55	36.94	3.39	2.18	H
	20050	1720	-13.51	37.28	23.77	238.07	V
	20175	1732.5	-13.80	37.63	23.83	241.55	V
	20300	1745	-14.54	37.64	23.10	204.17	V

CHANNEL BANDWIDTH: 20MHz 16QAM

Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20050	1720	-33.14	36.45	3.31	2.14	H
	20175	1732.5	-33.13	36.80	3.67	2.33	H
	20300	1745	-33.06	36.94	3.88	2.45	H
	20050	1720	-14.14	37.28	23.14	205.92	V
	20175	1732.5	-14.13	37.63	23.50	223.87	V
	20300	1745	-14.17	37.64	23.47	222.33	V

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

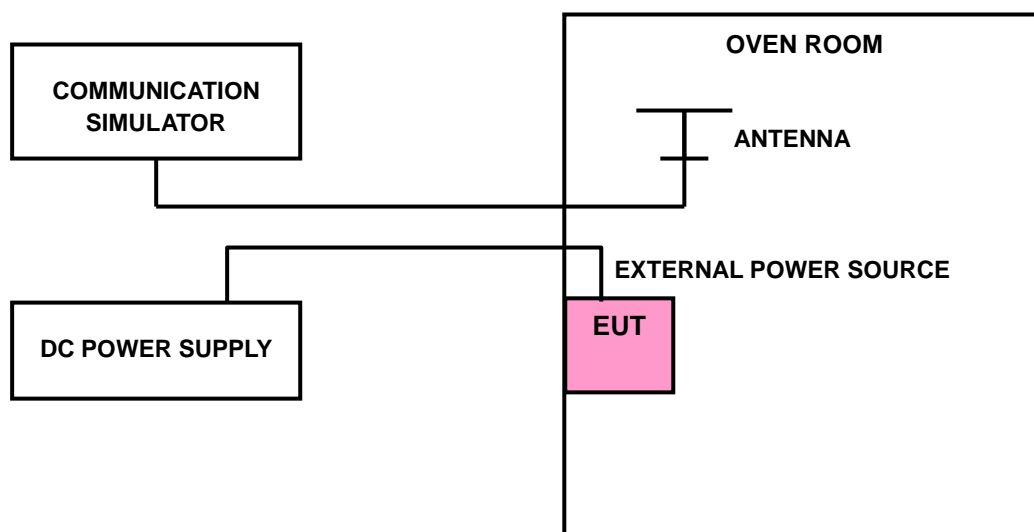
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.2.2 TEST PROCEDURE

- a. 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.
- b. 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.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ 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

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)						LIMIT (ppm)
	LTE BAND 4				LTE BAND 13		
	5MHz	10MHz	15MHz	20MHz	5MHz	10MHz	
3.3	0.0045	0.0062	0.0077	0.0019	-0.005	-0.005	2.5
3.125	0.0080	0.0085	0.0062	-0.0034	0.003	0.002	2.5
4.4	0.0098	0.0023	0.0037	0.0021	-0.025	0.002	2.5

NOTE: The applicant defined the normal working voltage of the power supply is from 3.125Vdc to 4.4Vdc.

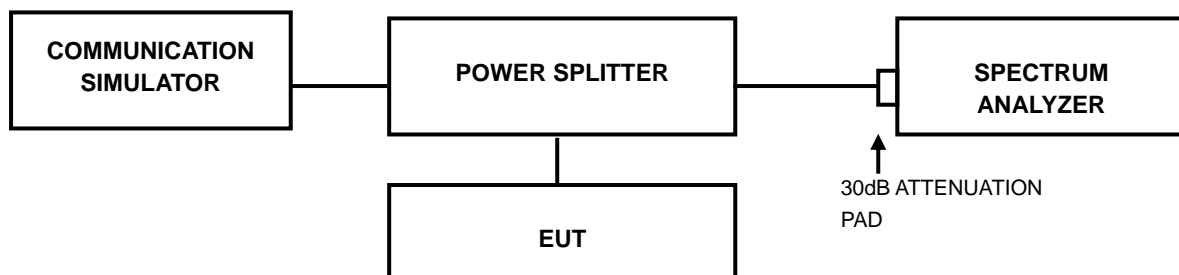
TEMP. (°C)	FREQUENCY ERROR (ppm)						LIMIT (ppm)
	LTE BAND 4				LTE BAND 13		
	5MHz	10MHz	15MHz	20MHz	5MHz	10MHz	
-30	0.0011	-0.0060	0.0010	0.0041	-0.002	0.010	2.5
-20	0.0034	0.0076	-0.0005	-0.0006	-0.014	0.005	2.5
-10	0.0010	0.0025	-0.0007	0.0040	-0.017	-0.004	2.5
0	0.0076	0.0062	0.0069	0.0020	-0.023	-0.001	2.5
10	0.0057	0.0029	0.0070	0.0068	-0.029	-0.003	2.5
20	-0.0090	-0.0085	-0.0026	0.0109	0.002	-0.002	2.5
30	-0.0020	-0.0029	0.0002	0.0047	-0.008	0.005	2.5
40	0.0077	-0.0012	0.0095	0.0002	-0.016	0.003	2.5
50	0.0111	0.0017	-0.0042	0.0027	0.007	0.002	2.5

4.3 OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

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 power of a given emission.

4.3.2 TEST SETUP



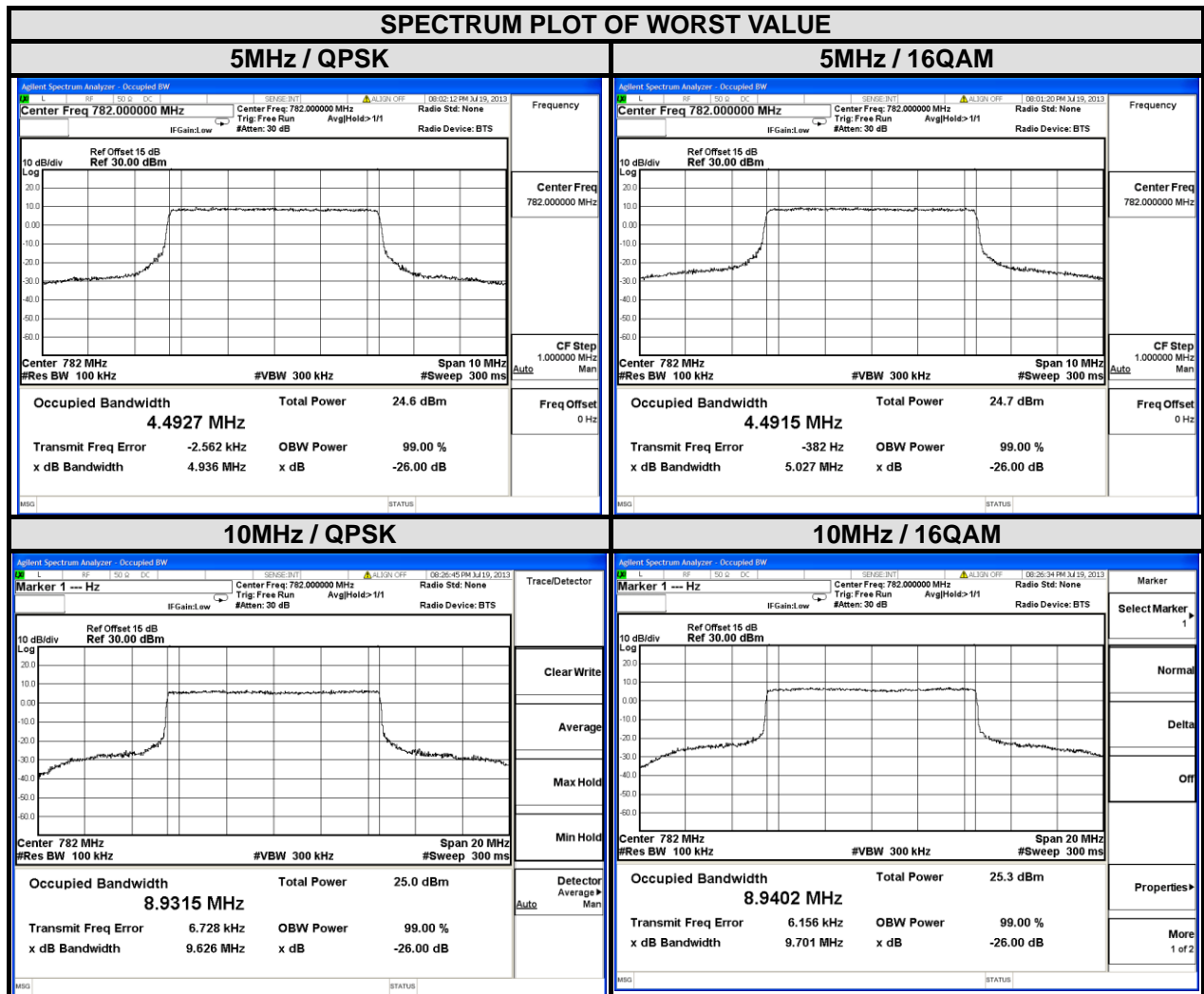
4.3.3 TEST PROCEDURES

- a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.



4.3.4 TEST RESULTS

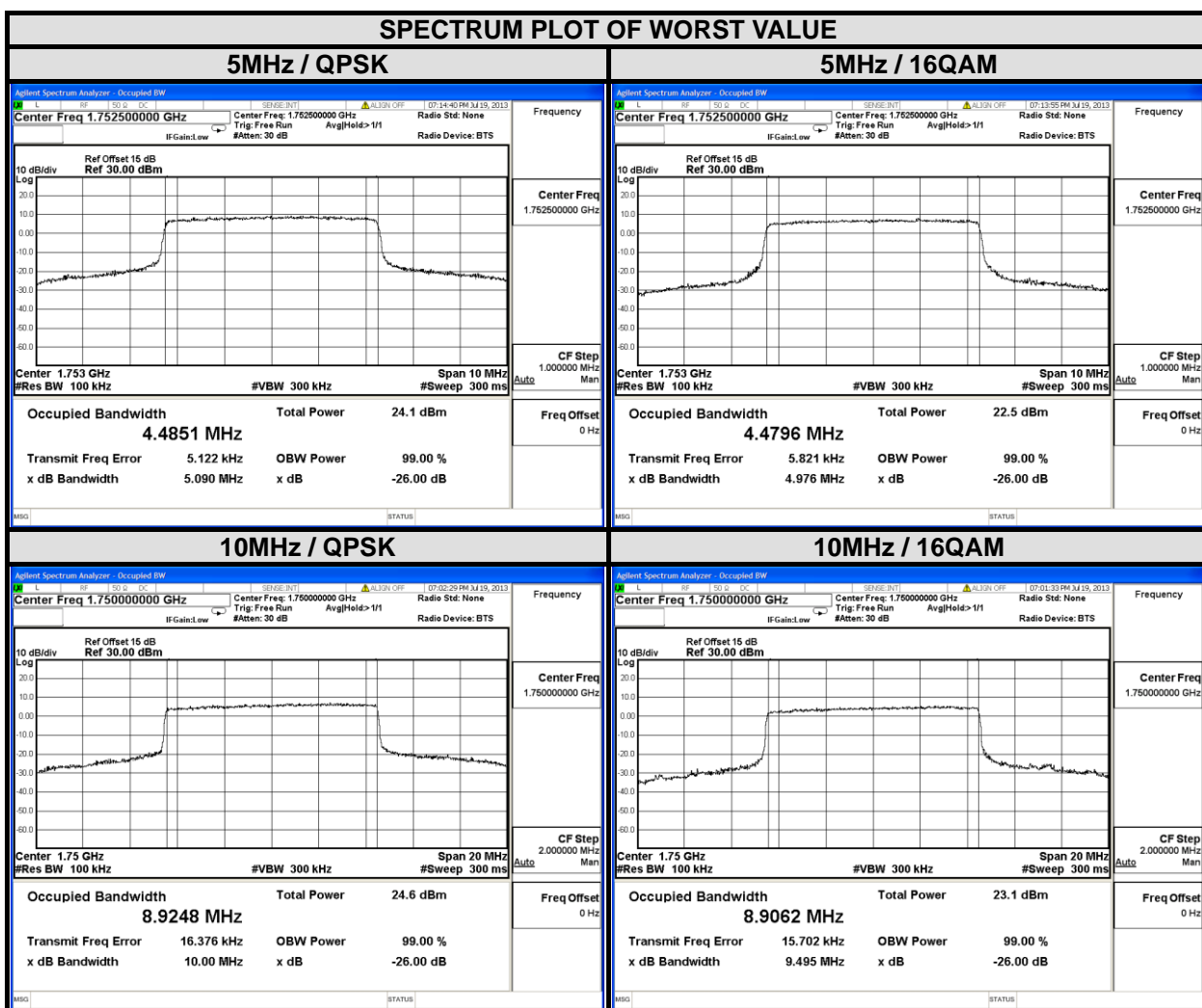
LTE BAND 13							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	4.4830	4.4839	23230	782.0	8.9315	8.9402
23230	782.0	4.4927	4.4915				
23255	784.5	4.4844	4.4854				





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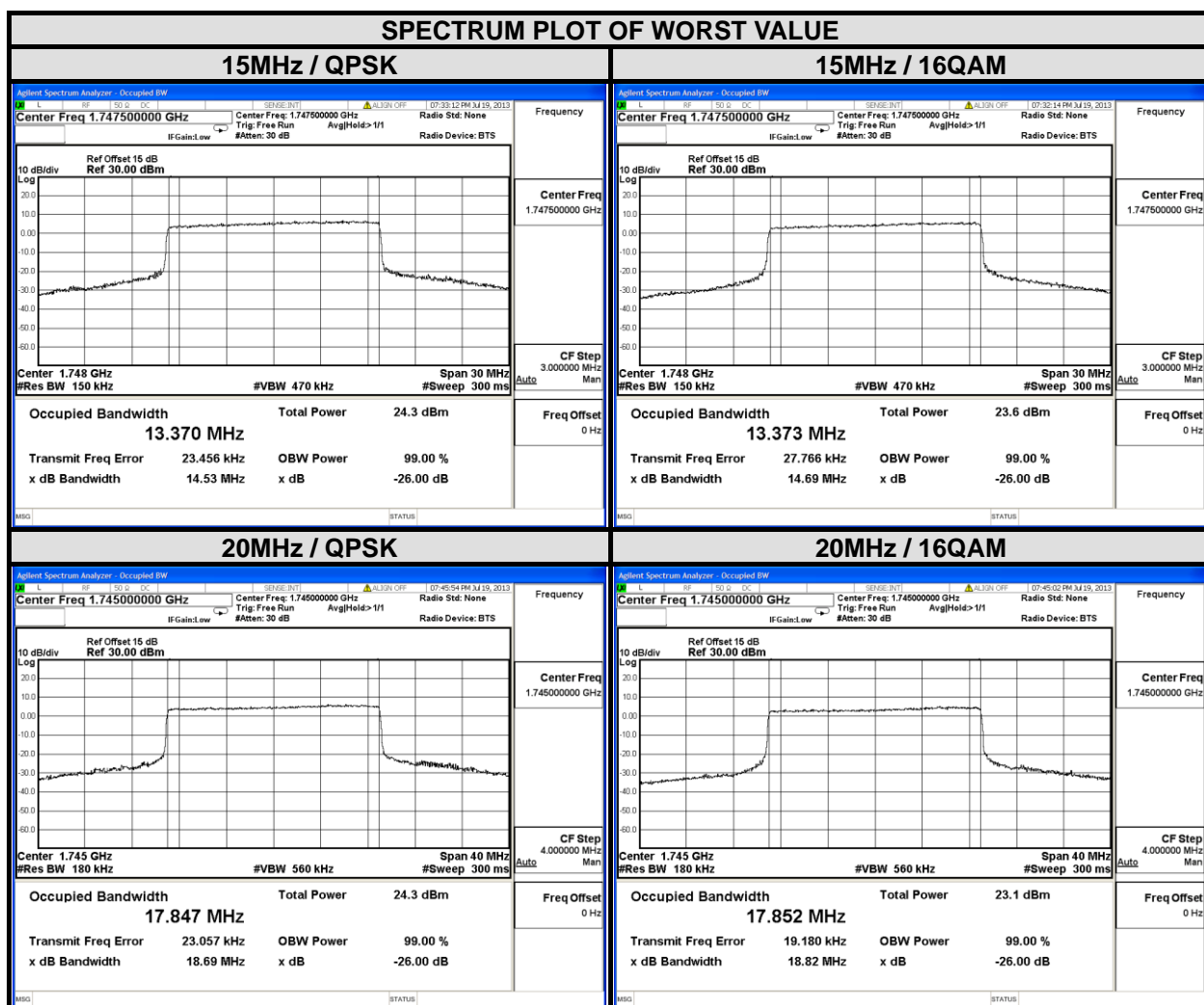
LTE BAND 4							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	4.4787	4.4763	20000	1715.0	8.9091	8.8997
20175	1732.5	4.4771	4.4785	20175	1732.5	8.9093	8.9023
20375	1752.5	4.4851	4.4796	20350	1750.0	8.9248	8.9062





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LTE BAND 4							
CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	13.312	13.317	20050	1720	17.709	17.715
20175	1732.5	13.343	13.354	20175	1732.5	17.770	17.782
20325	1747.5	13.370	13.373	20300	1745	17.847	17.852

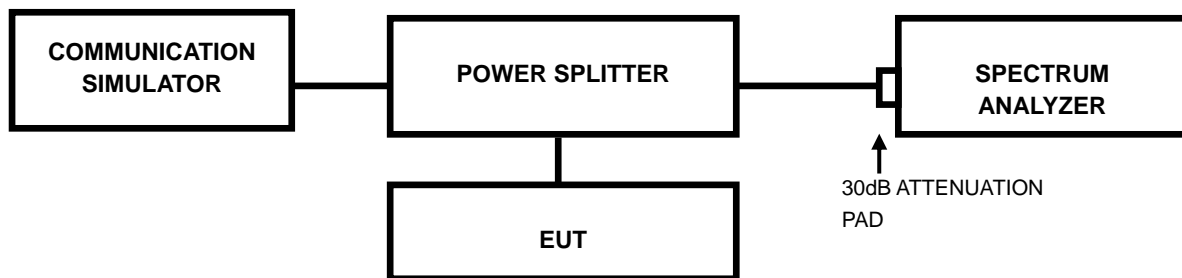


4.4 PEAK TO AVERAGE RATIO

4.4.1 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

4.4.2 TEST SETUP

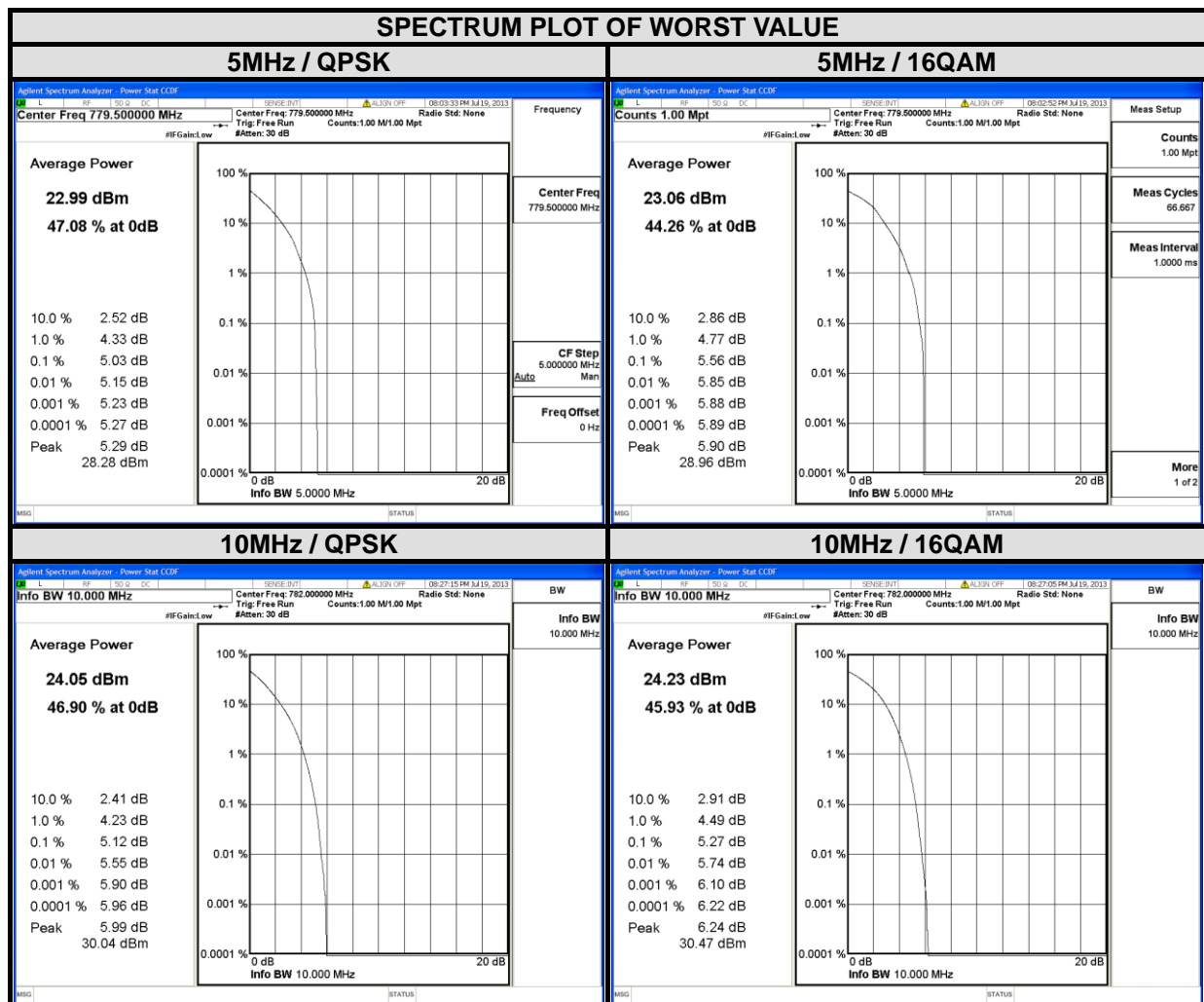


4.4.3 TEST PROCEDURES

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%.

4.4.4 TEST RESULTS

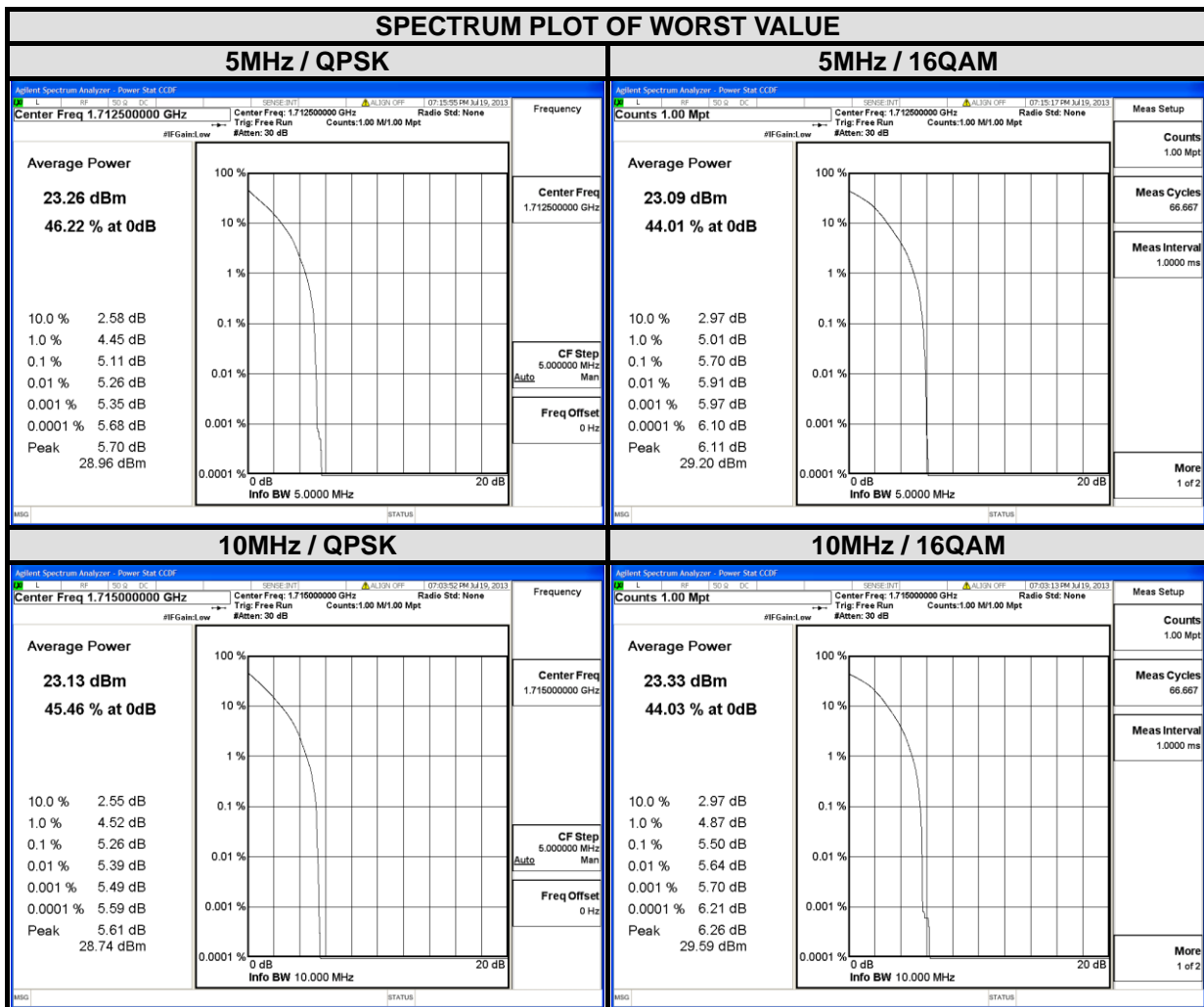
LTE BAND 13							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
23205	779.5	5.03	5.56	23230	782.0	5.12	5.27
23230	782.0	4.45	5.12				
23255	784.5	4.68	5.22				





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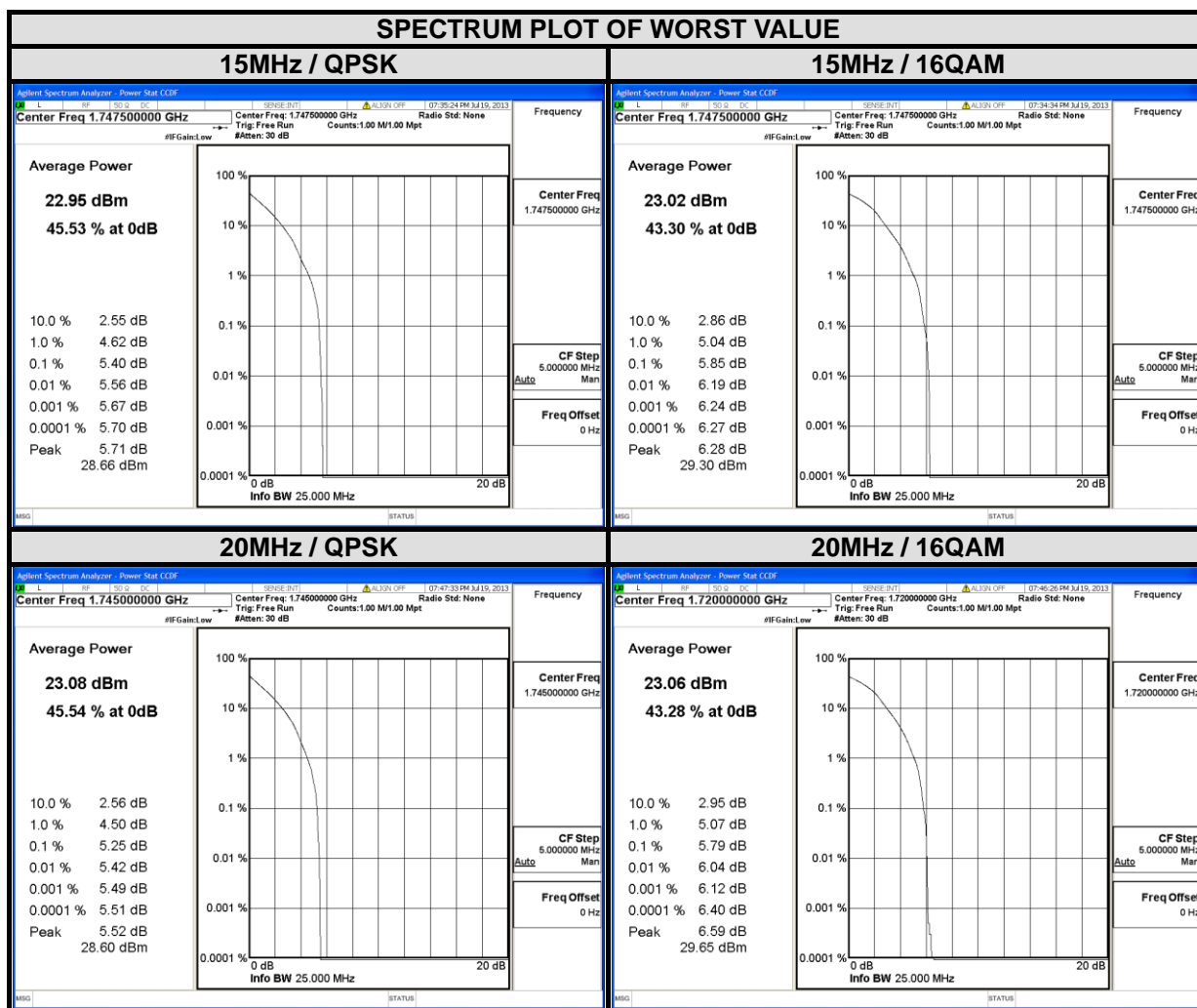
LTE BAND 4							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	5.11	5.70	20000	1715.0	5.26	5.50
20175	1732.5	4.55	5.12	20175	1732.5	4.40	4.99
20375	1752.5	4.11	4.60	20350	1750.0	5.14	5.50





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LTE BAND 4							
CHANNEL BANDWIDTH: 15MHz				CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
20025	1717.5	5.18	5.71	20050	1720	5.21	5.79
20175	1732.5	4.27	4.76	20175	1732.5	4.13	4.70
20325	1747.5	5.40	5.85	20300	1745	5.25	5.79



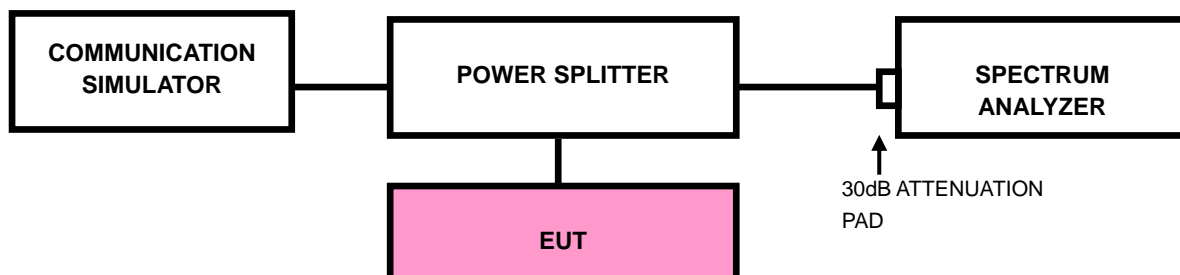
4.5 BAND EDGE MEASUREMENT

4.5.1 LIMITS OF BAND EDGE MEASUREMENT

For operations in the 704-716 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

For operations in the 1710 – 1755 MHz MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

4.5.2 TEST SETUP

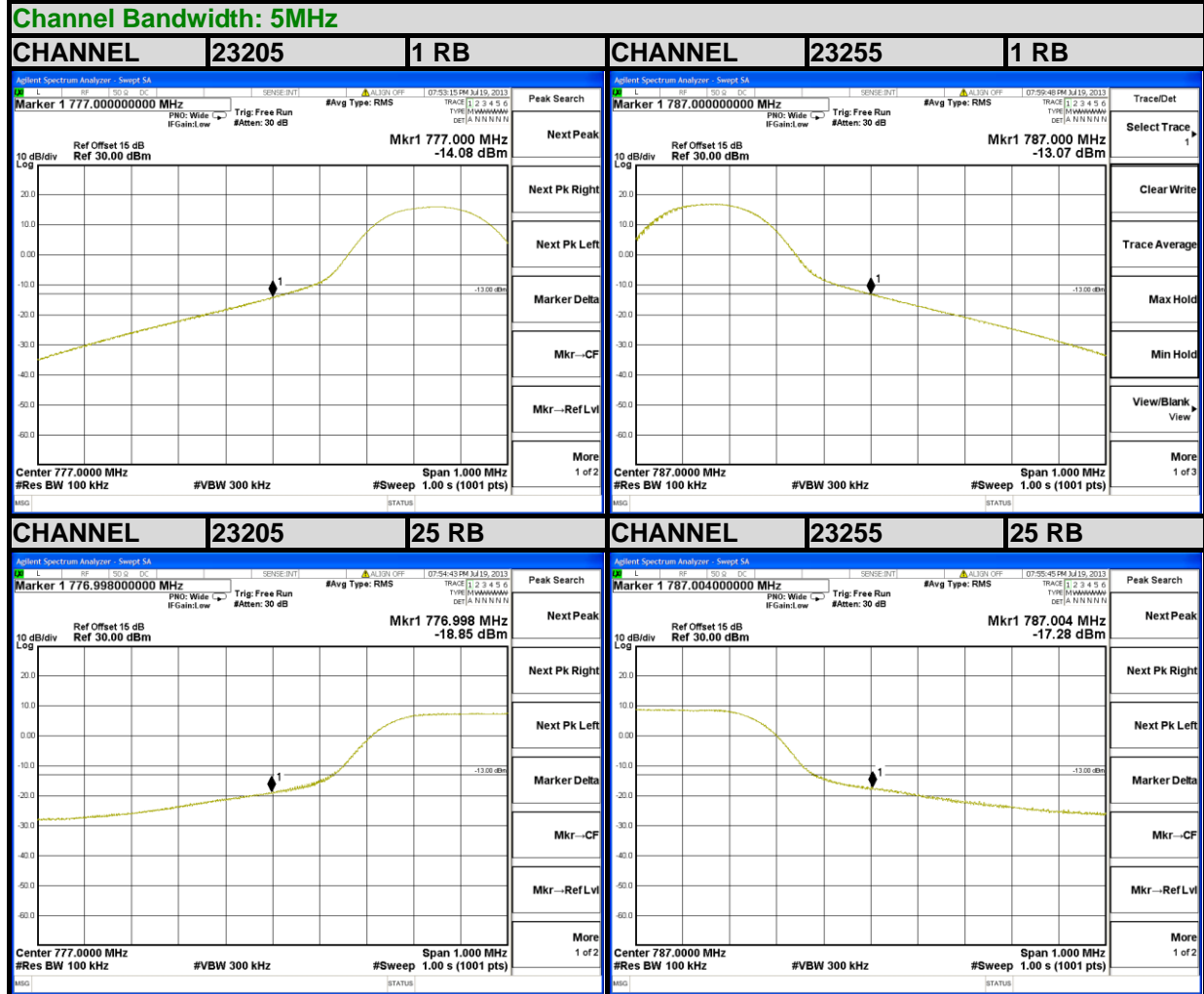


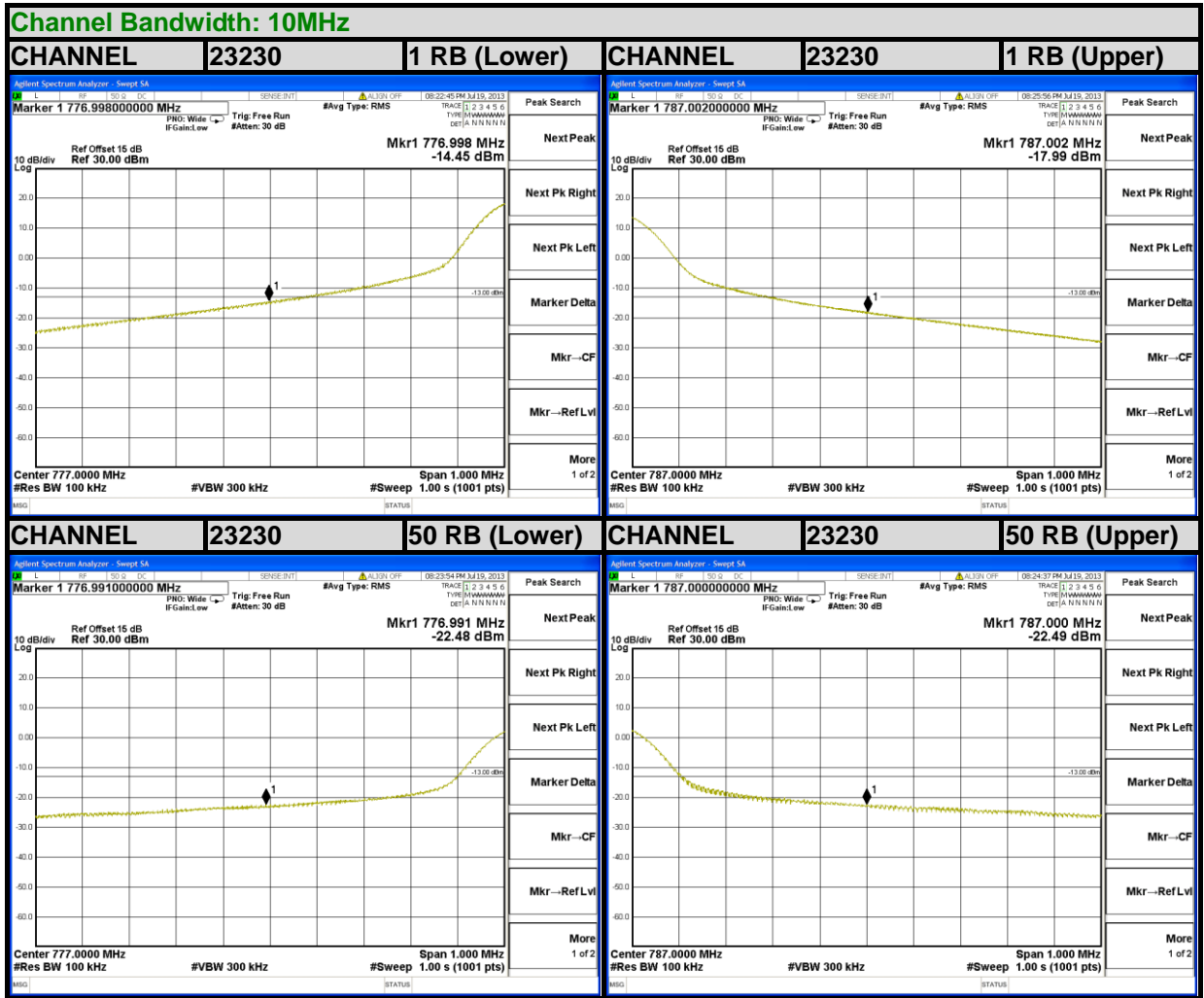
4.5.3 TEST PROCEDURES

- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 100kHz and VB of the spectrum is 300kHz.
- d. Record the max trace plot into the test report.

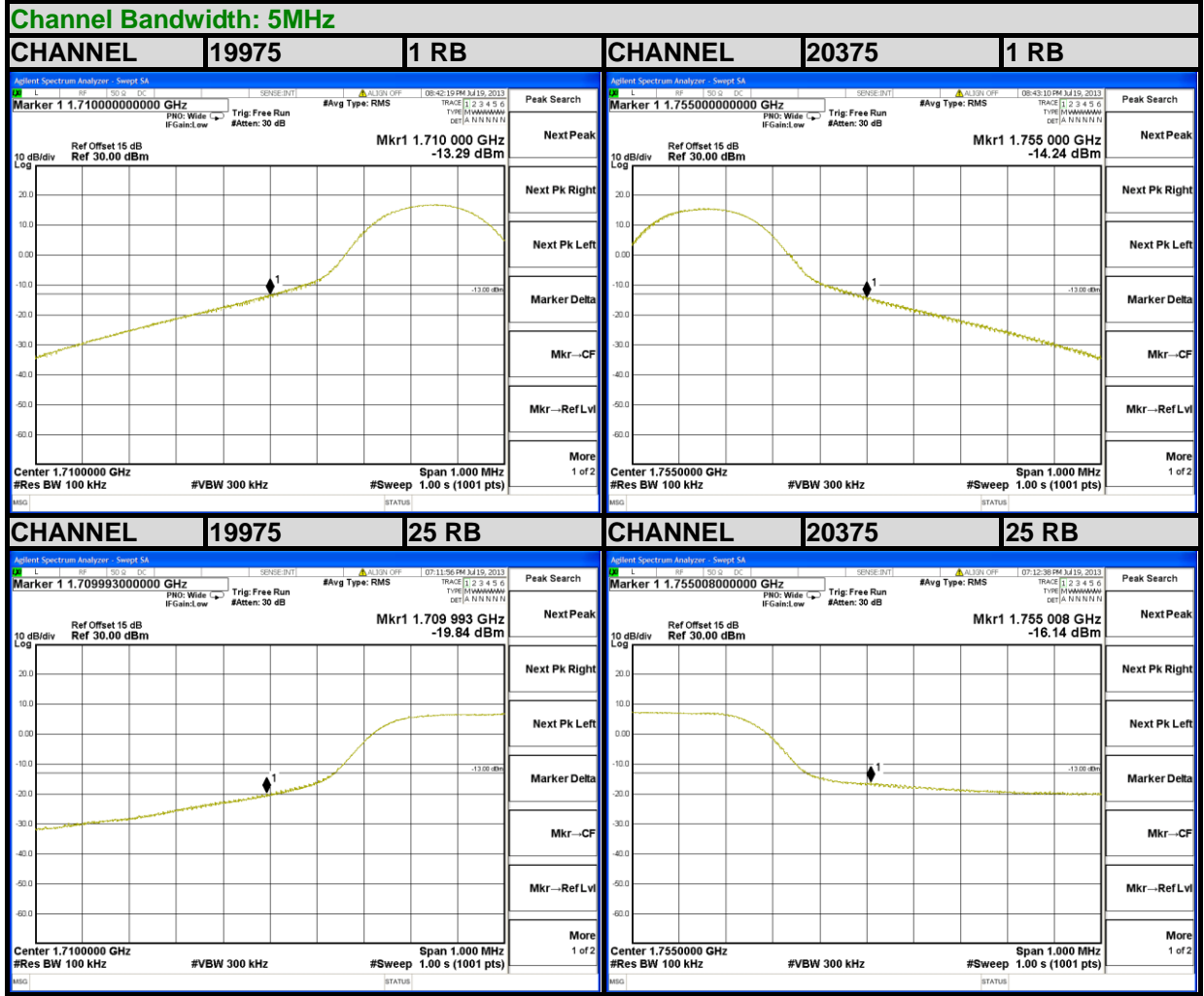
4.5.4 TEST RESULTS

LTE BAND 13



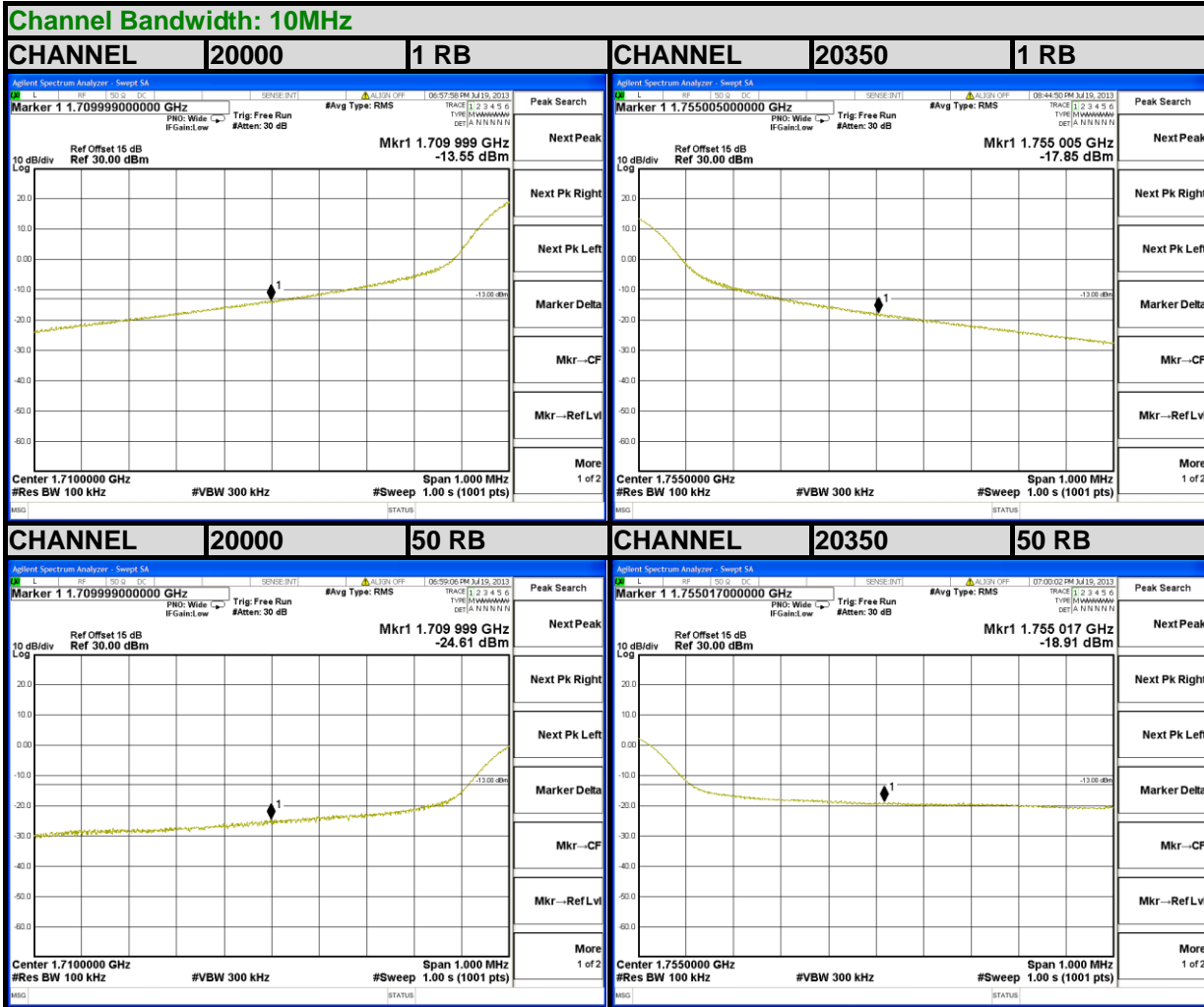


LTE BAND 4





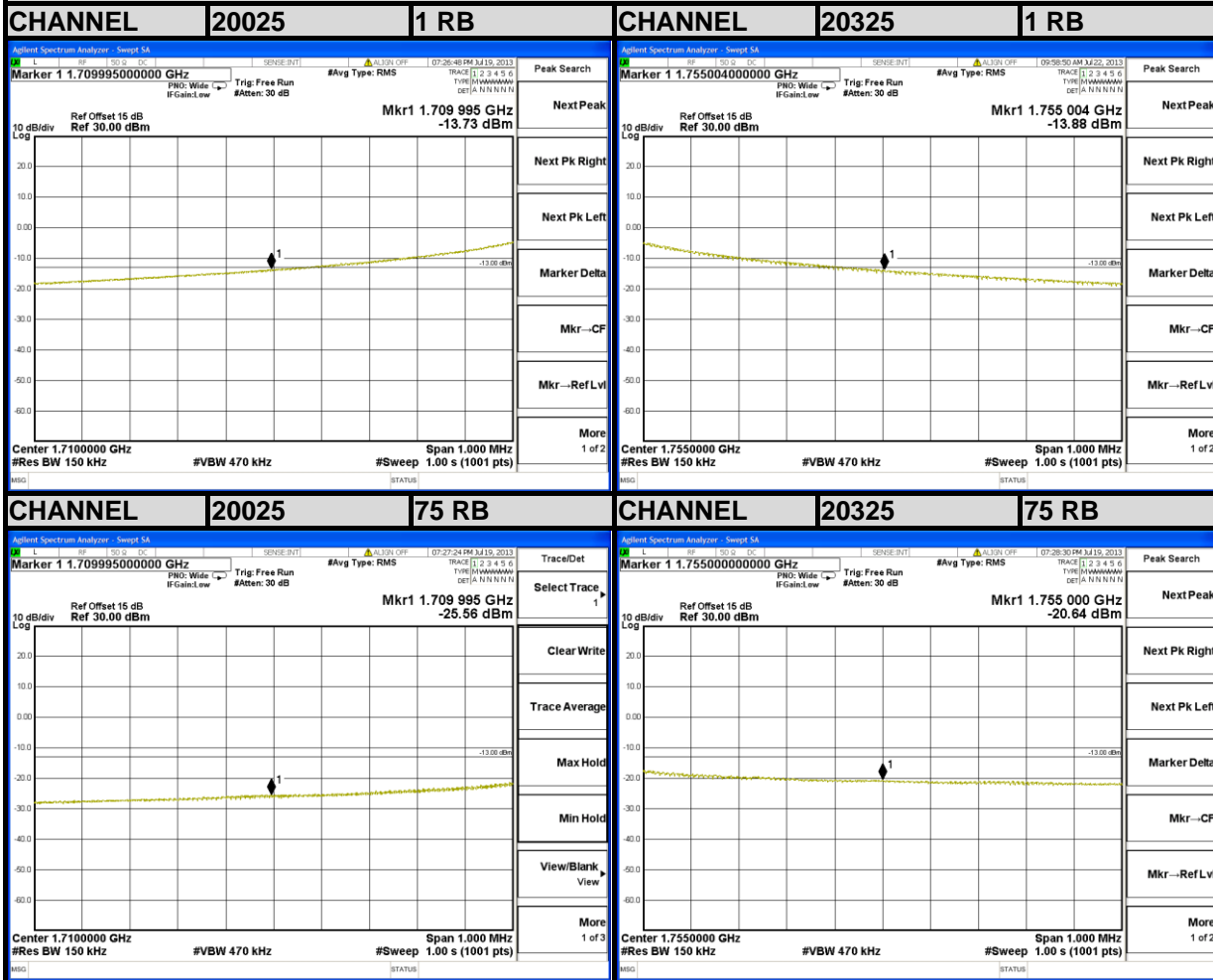
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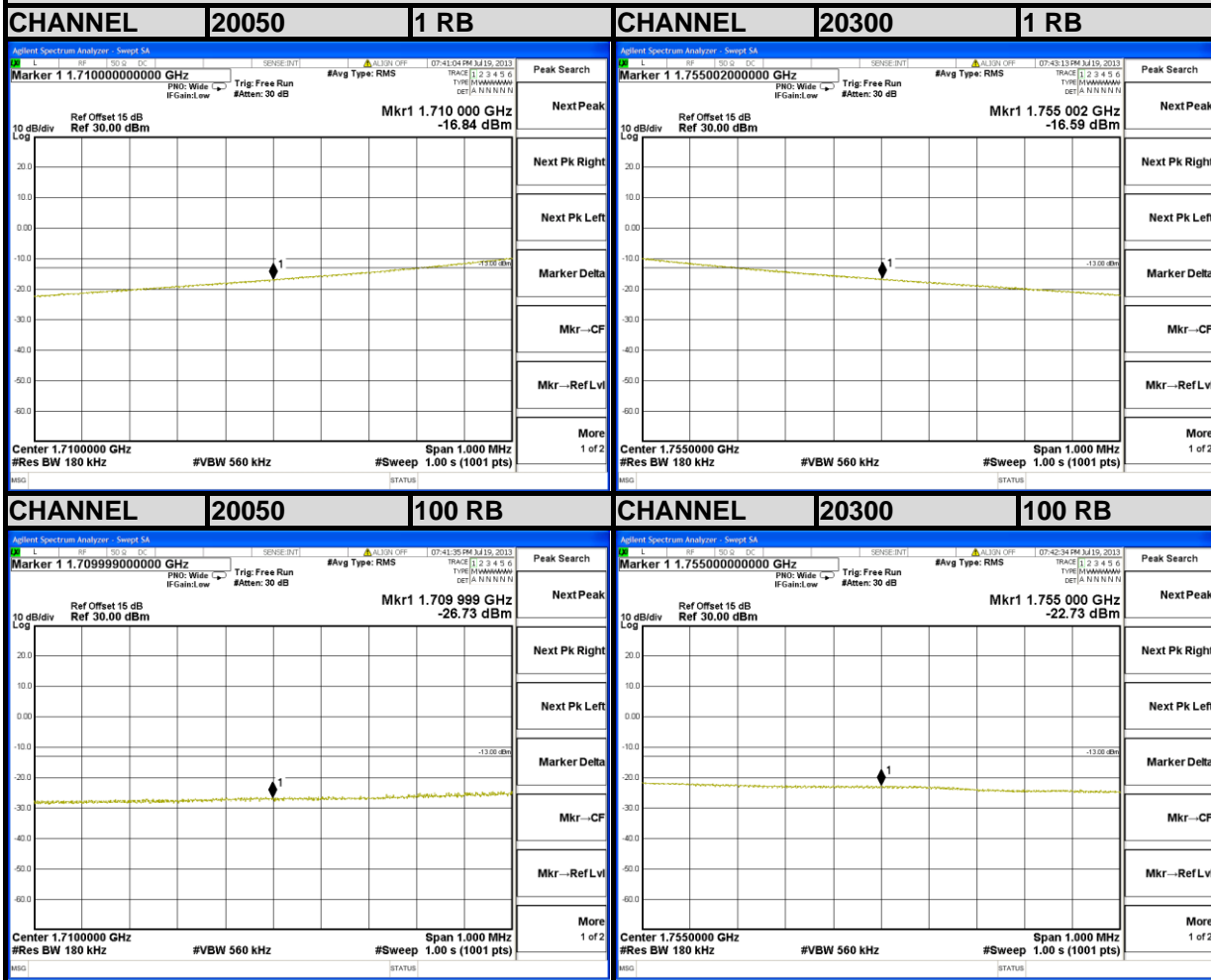
Channel Bandwidth: 15MHz





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Channel Bandwidth: 20MHz



4.6 CONDUCTED SPURIOUS EMISSIONS

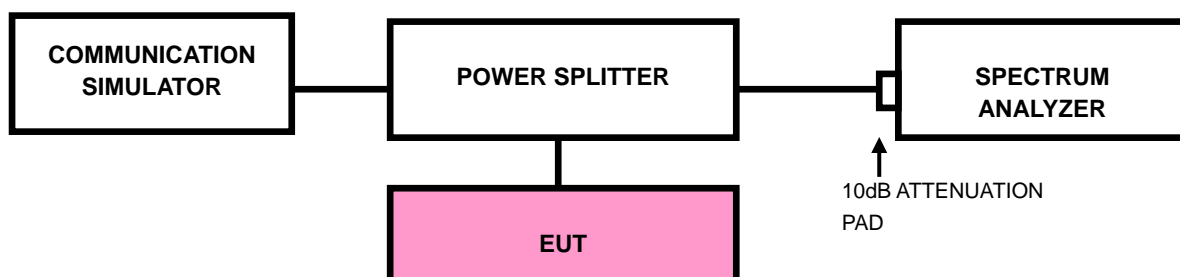
4.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

4.6.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30 MHz to 8GHz for LTE Band 17 and from 30MHz to 18GHz for LTE Band 4. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

4.6.3 TEST SETUP

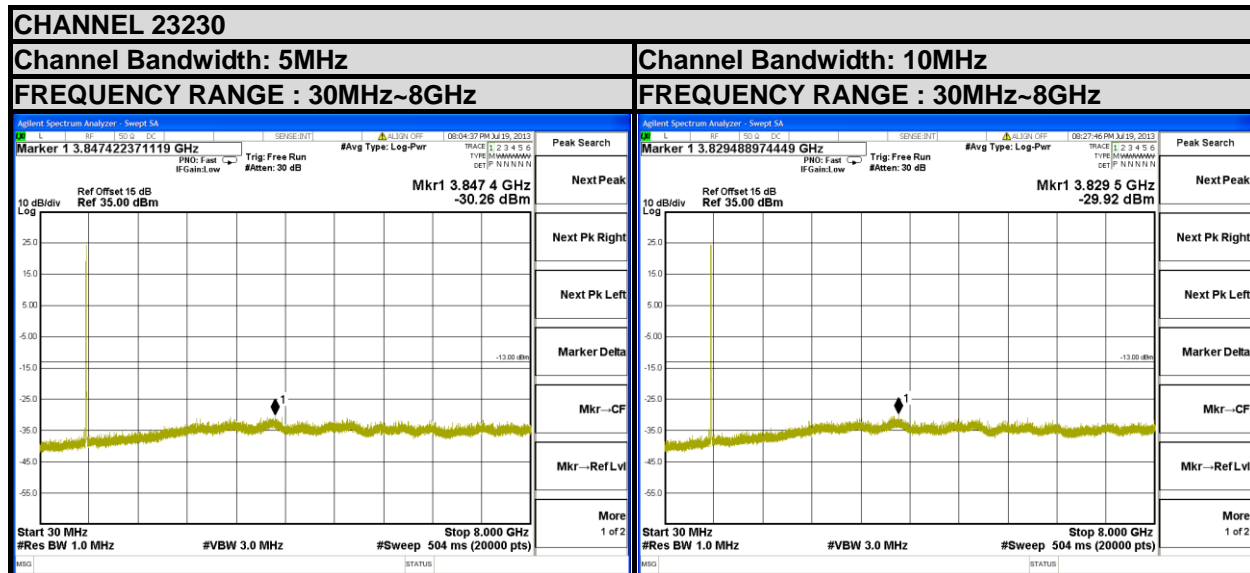




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4.6.4 TEST RESULTS

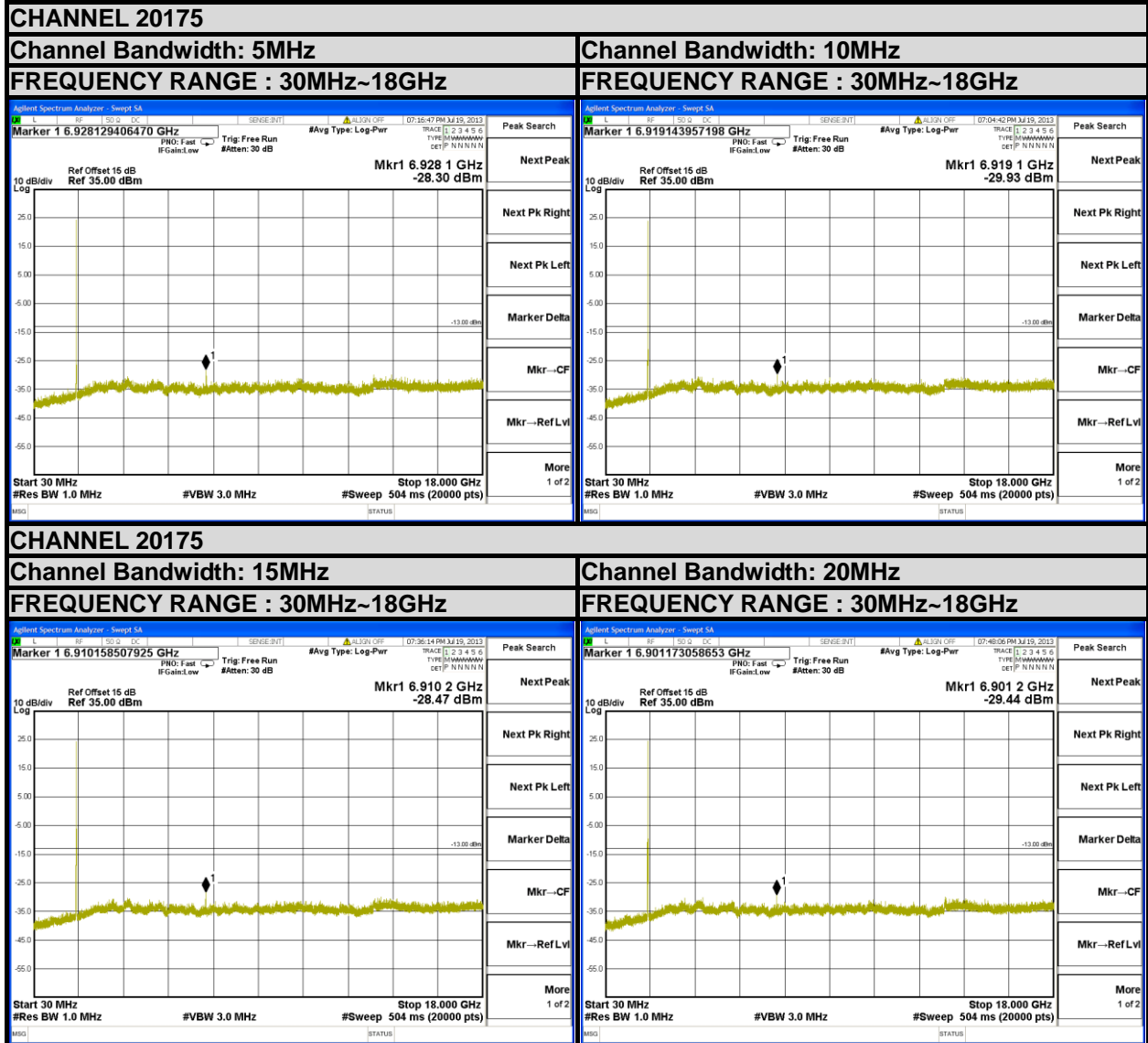
LTE BAND 13





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LTE BAND 4



4.7 RADIATED EMISSION MEASUREMENT

4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB. The limit of emission equal to -13dBm

For operations in the 746 – 763 MHz, 775 – 793 MHz, and 805 – 806 MHz bands, emissions in the band 1559 – 1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth.

4.7.2 TEST PROCEDURES

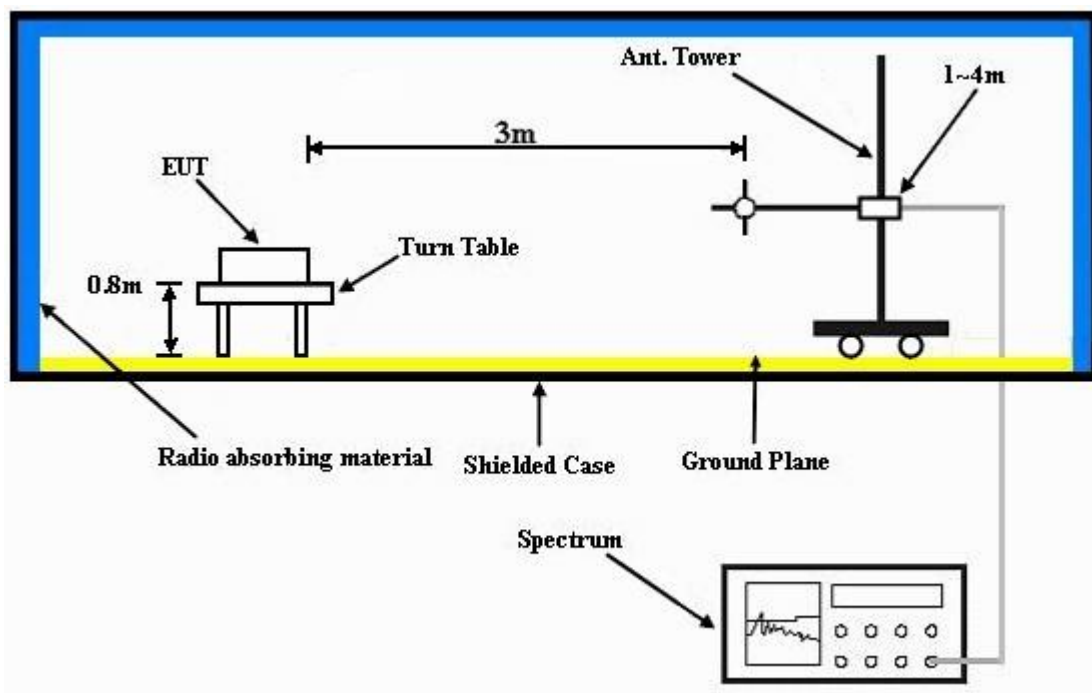
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- b. 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
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi.}$

NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.7.3 DEVIATION FROM TEST STANDARD

No deviation

4.7.4 TEST SETUP



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

4.7.5 TEST RESULTS

LTE BAND 13

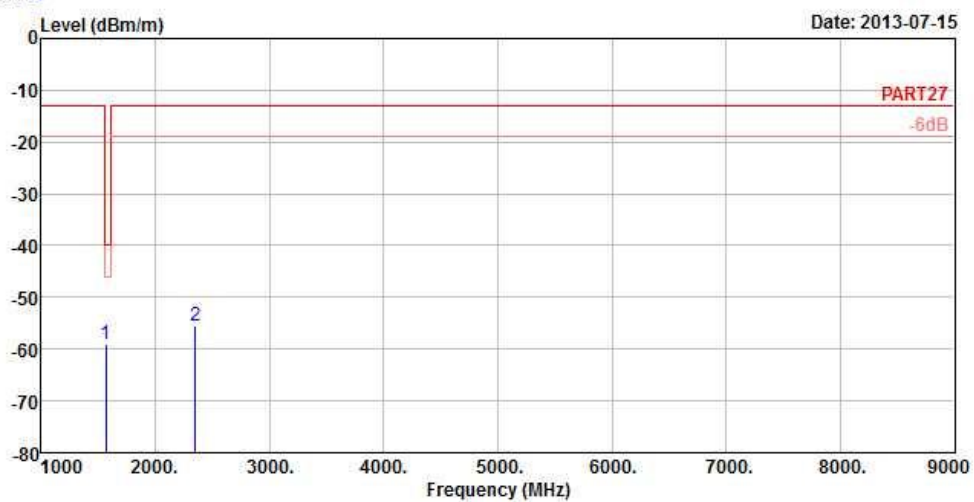
CHANNEL BANDWIDTH: 5MHZ / QPSK (1 RB / 12 RB OFFSET)



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 5



Site : 966 Chamber 5
 Condition : PART27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band13_5M_QPSK(1,12)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

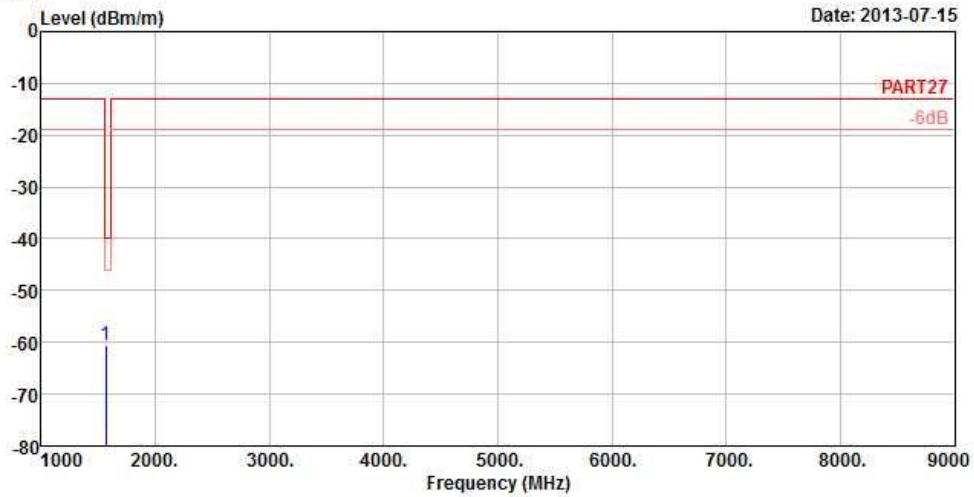
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp 1564.00	-58.97	-45.17	-40.00	-18.97	-13.80	Peak
2	2346.00	-55.60	-44.99	-13.00	-42.60	-10.61	Peak



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A D T

Data: 6



Site : 966 Chamber 5
 Condition : PART27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band13 _5M_QPSK(1,12)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp 1564.00	-60.58	-46.78	-40.00	-20.58	-13.80	Peak

LTE BAND 13

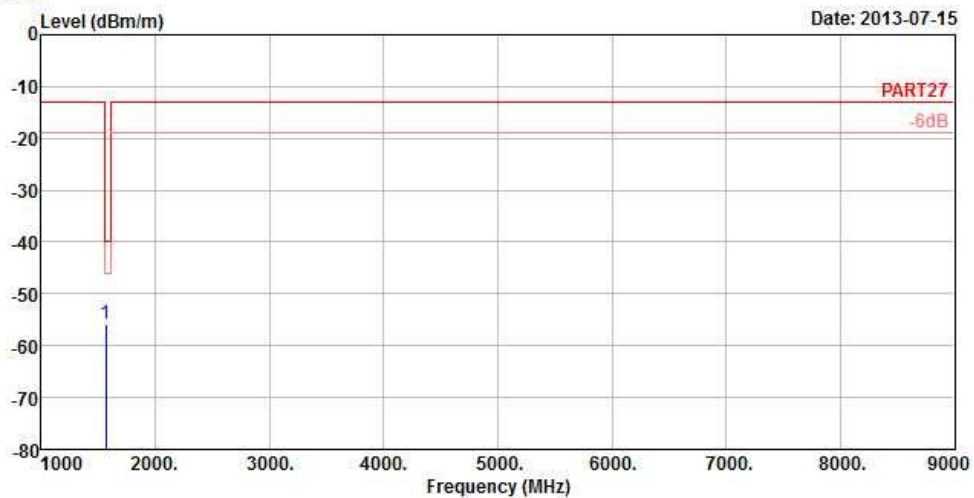
CHANNEL BANDWIDTH: 5MHZ / QPSK (25 RB / 0 RB OFFSET)



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 Chamber 5
 Condition : PART27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band13 _5M_QPSK(25,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Read	Limit	Over		
Freq	Level	Level	Line	Limit	Factor
MHz	dBm/m	dBm	dBm/m	dB	dB/m
1 pp 1564.00	-55.81	-42.01	-40.00	-15.81	-13.80 Peak



A D T

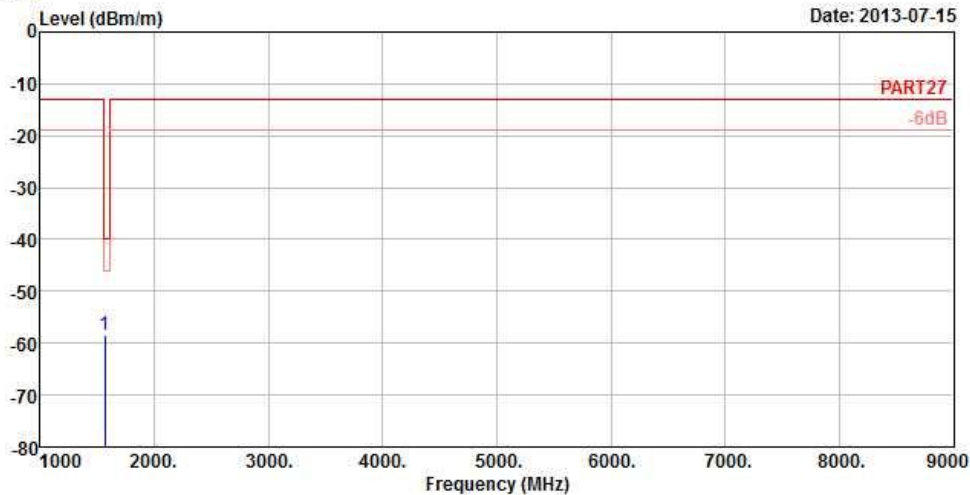


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A D T

Data: 6

Date: 2013-07-15



Site : 966 Chamber 5
 Condition : PART27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band13 _5M_QPSK(25,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp 1564.00	-58.31	-44.51	-40.00	-18.31	-13.80	Peak

LTE BAND 13

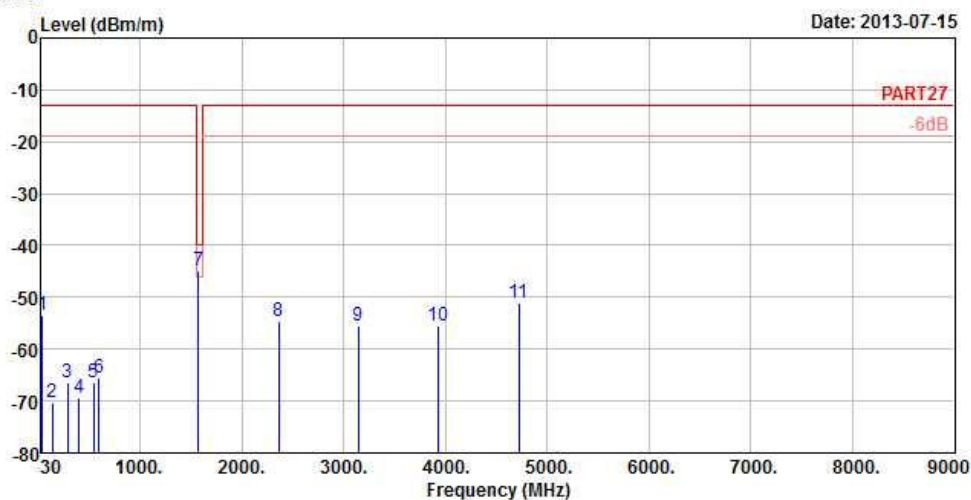
CHANNEL BANDWIDTH: 10MHZ / QPSK (1 RB / 49 RB OFFSET)



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A D T

Data: 9



Site : 966 Chamber 5
 Condition : PART27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band13_10M_QPSK(1,49)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	42.96	-53.47	-52.14	-13.00	-40.47	-1.33	Peak
2	139.35	-70.40	-64.73	-13.00	-57.40	-5.67	Peak
3	287.04	-66.52	-60.32	-13.00	-53.52	-6.20	Peak
4	402.20	-69.46	-63.89	-13.00	-56.46	-5.57	Peak
5	543.60	-66.45	-64.53	-13.00	-53.45	-1.92	Peak
6	595.40	-65.66	-65.18	-13.00	-52.66	-0.48	Peak
7 pp	1572.80	-44.90	-31.05	-40.00	-4.90	-13.85	Peak
8	2359.20	-54.56	-44.06	-13.00	-41.56	-10.50	Peak
9	3145.60	-55.63	-46.39	-13.00	-42.63	-9.24	Peak
10	3932.00	-55.47	-47.98	-13.00	-42.47	-7.49	Peak
11	4718.40	-51.11	-46.79	-13.00	-38.11	-4.32	Peak



A D T

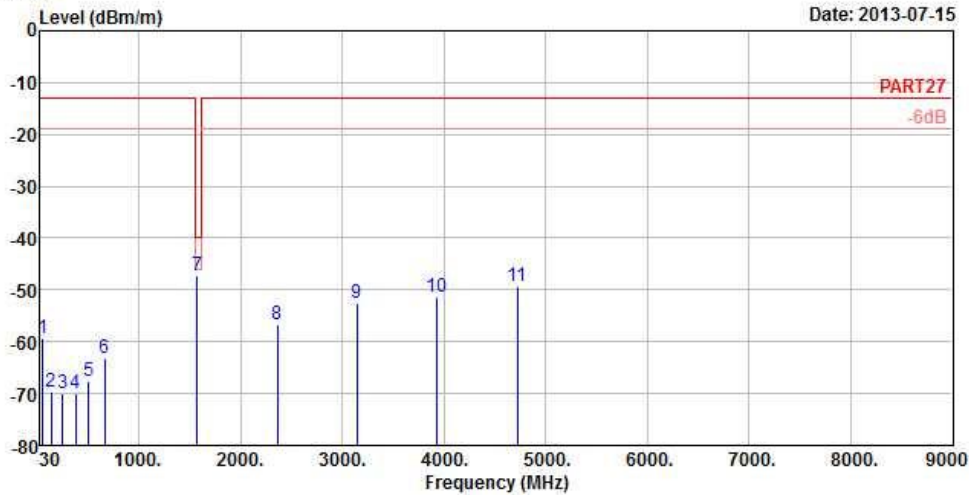


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A D T

Data: 10

Date: 2013-07-15



Site : 966 Chamber 5
 Condition : PART27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band13_10M_QPSK(1,49)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	57.27	-59.43	-53.78	-13.00	-46.43	-5.65	Peak
2	133.95	-69.78	-62.56	-13.00	-56.78	-7.22	Peak
3	253.02	-70.00	-64.28	-13.00	-57.00	-5.72	Peak
4	377.00	-70.05	-64.24	-13.00	-57.05	-5.81	Peak
5	504.40	-67.71	-64.73	-13.00	-54.71	-2.98	Peak
6	661.90	-63.28	-64.03	-13.00	-50.28	0.75	Peak
7 pp	1572.80	-47.12	-33.27	-40.00	-7.12	-13.85	Peak
8	2359.20	-56.81	-46.31	-13.00	-43.81	-10.50	Peak
9	3145.60	-52.59	-43.35	-13.00	-39.59	-9.24	Peak
10	3932.00	-51.31	-43.82	-13.00	-38.31	-7.49	Peak
11	4718.40	-49.43	-45.11	-13.00	-36.43	-4.32	Peak

LTE BAND 13

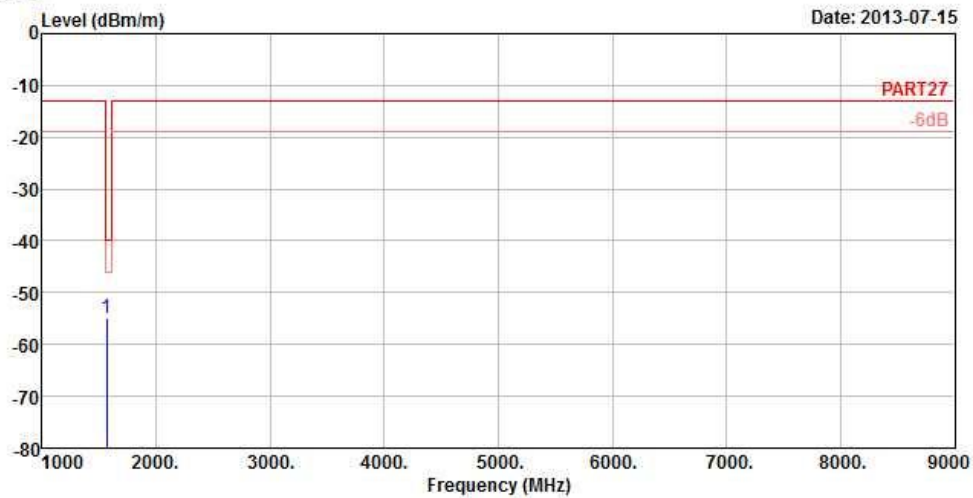
CHANNEL BANDWIDTH: 10MHZ / QPSK (50 RB / 0 RB OFFSET)



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A D T

Data: 5



Site : 966 Chamber 5
 Condition : PART27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band13 _10M_QPSK(50,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 pp 1564.00	-54.96	-41.16	-40.00	-14.96	-13.80	Peak

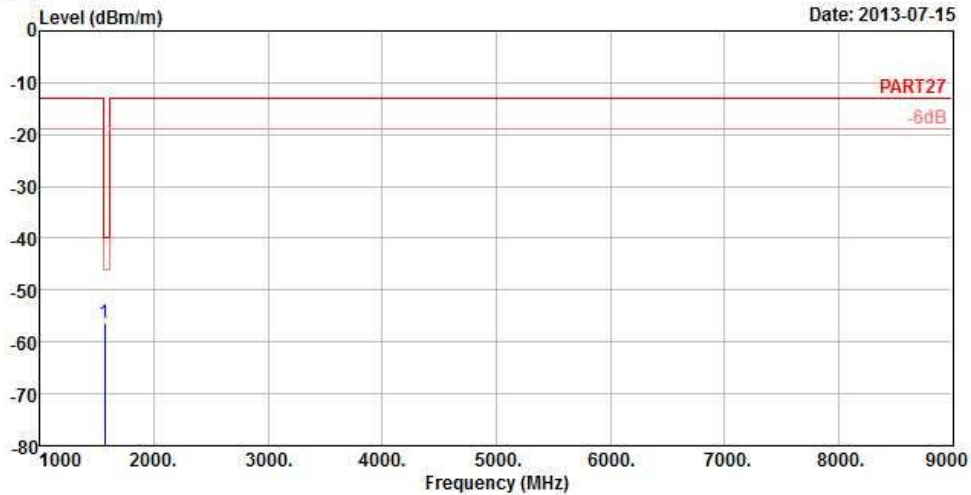


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A D T

Data: 6

Date: 2013-07-15



Site : 966 Chamber 5
 Condition : PART27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band13_10M_QPSK(50,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp 1564.00	-56.45	-42.65	-40.00	-16.45	-13.80	Peak



A D T

LTE BAND 4 CHANNEL BANDWIDTH: 5MHz / QPSK (1 RB / 0 RB OFFSET)

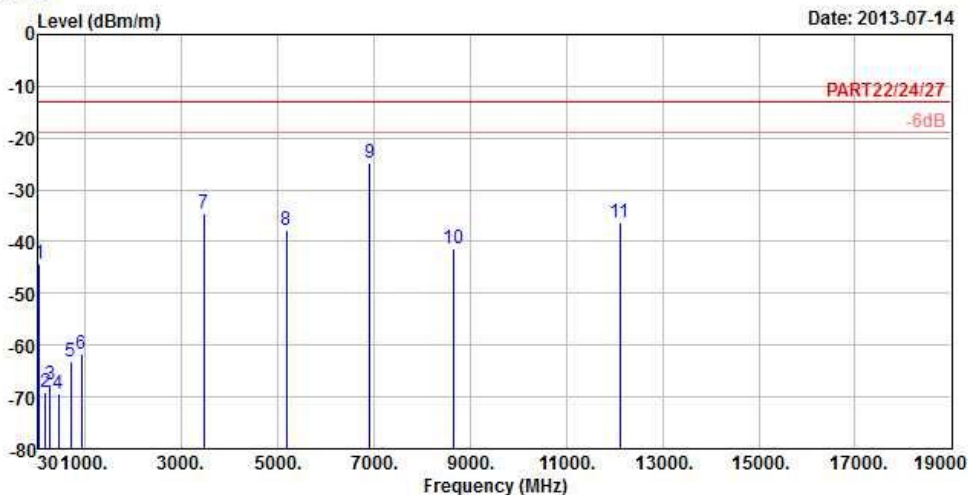


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A D T

Data: 15

Date: 2013-07-14



Site : 966 Chamber 5
 Condition : PART22/24/27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _5M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	47.28	-44.16	-41.27	-13.00	-31.16	-2.89	Peak
2	185.79	-69.15	-62.80	-13.00	-56.15	-6.35	Peak
3	268.14	-67.69	-61.75	-13.00	-54.69	-5.94	Peak
4	443.50	-69.34	-64.80	-13.00	-56.34	-4.54	Peak
5	706.70	-63.11	-64.61	-13.00	-50.11	1.50	Peak
6	924.40	-61.75	-64.93	-13.00	-48.75	3.18	Peak
7	3460.60	-34.49	-25.47	-13.00	-21.49	-9.02	Peak
8	5190.90	-37.90	-34.84	-13.00	-24.90	-3.06	Peak
9 pp	6921.20	-24.79	-27.09	-13.00	-11.79	2.30	Peak
10	8651.50	-41.47	-46.27	-13.00	-28.47	4.80	Peak
11	12112.10	-36.33	-44.71	-13.00	-23.33	8.38	Peak



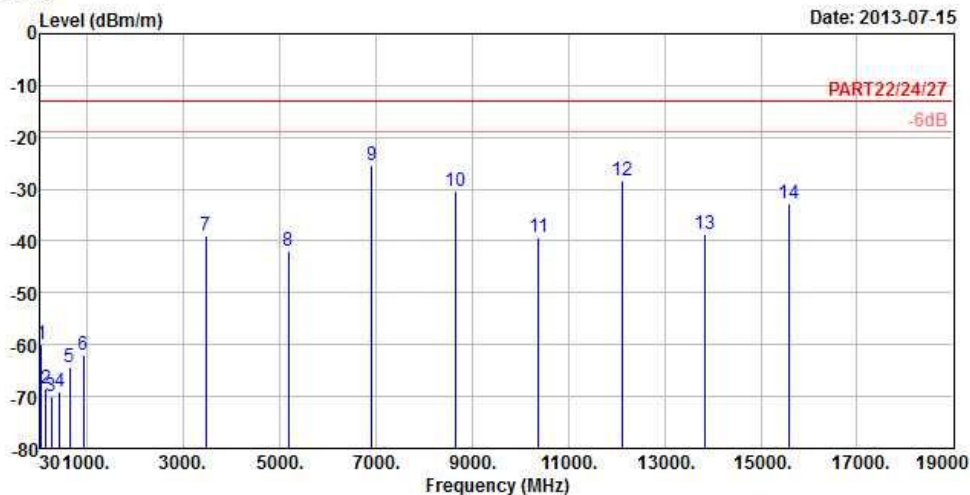
A D T



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 16



Date: 2013-07-15

Site : 966 Chamber 5
 Condition : PART22/24/27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _5M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	56.73	-60.01	-54.36	-13.00	-47.01	-5.65	Peak
2	142.32	-68.55	-62.69	-13.00	-55.55	-5.86	Peak
3	250.59	-69.93	-64.25	-13.00	-56.93	-5.68	Peak
4	432.30	-68.97	-64.16	-13.00	-55.97	-4.81	Peak
5	645.10	-64.25	-64.70	-13.00	-51.25	0.45	Peak
6	926.50	-62.01	-65.23	-13.00	-49.01	3.22	Peak
7	3460.60	-38.99	-29.97	-13.00	-25.99	-9.02	Peak
8	5190.90	-41.78	-38.72	-13.00	-28.78	-3.06	Peak
9 pp	6921.20	-25.24	-27.54	-13.00	-12.24	2.30	Peak
10	8651.50	-30.48	-35.28	-13.00	-17.48	4.80	Peak
11	10381.80	-39.15	-46.26	-13.00	-26.15	7.11	Peak
12	12112.10	-28.43	-36.81	-13.00	-15.43	8.38	Peak
13	13842.40	-38.77	-46.69	-13.00	-25.77	7.92	Peak
14	15572.70	-32.86	-41.45	-13.00	-19.86	8.59	Peak

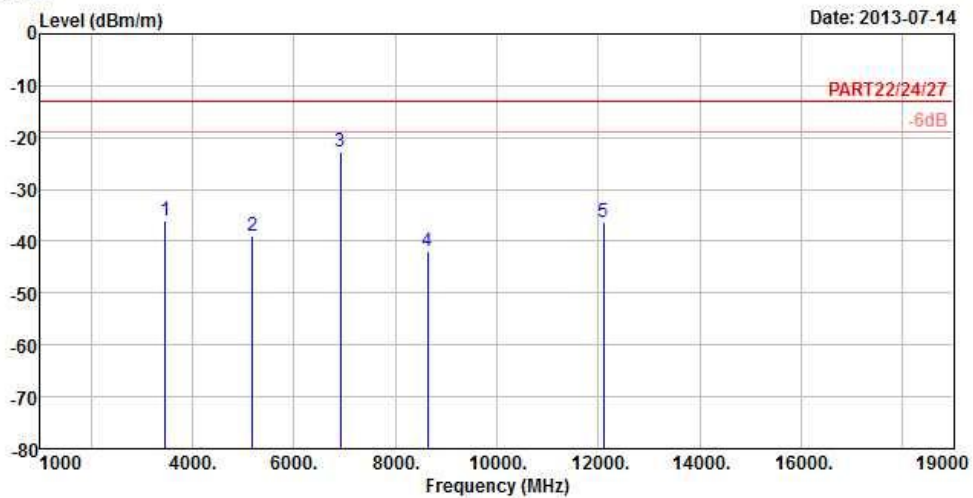
LTE BAND 4
CHANNEL BANDWIDTH: 10MHZ / QPSK (1 RB / 0 RB OFFSET)



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 11



Site : 966 Chamber 5
Condition : PART22/24/27 3m HORIZONTAL
Brand/Model: Messi_V
Remark : LTE_Band4 _10M_QPSK(1,0)
Tested by : Kay Wu
Temperature : 25°C
Humidity : 65%
Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	3456.20	-36.12	-27.03	-13.00	-23.12	-9.09	Peak
2	5184.30	-38.97	-35.82	-13.00	-25.97	-3.15	Peak
3 pp	6912.40	-22.73	-24.94	-13.00	-9.73	2.21	Peak
4	8640.50	-41.81	-46.46	-13.00	-28.81	4.65	Peak
5	12096.70	-36.22	-44.56	-13.00	-23.22	8.34	Peak



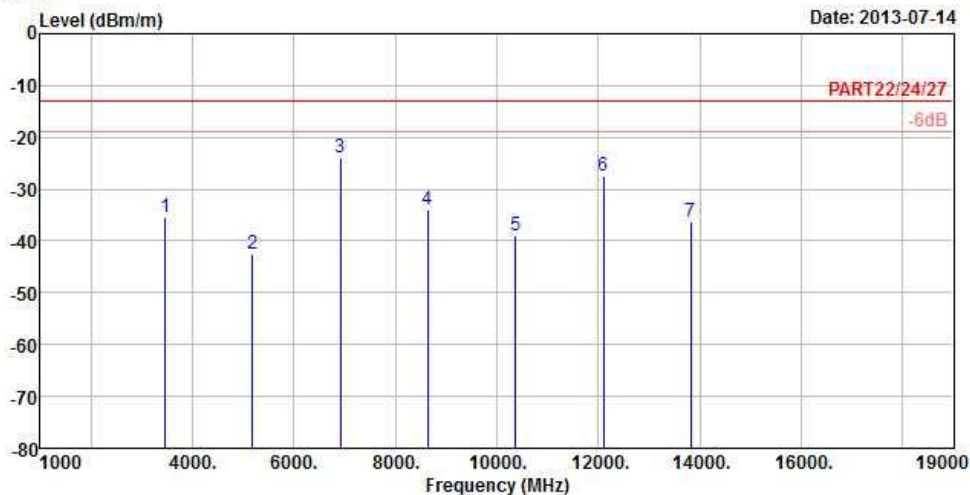
A D T



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 12



Site : 966 Chamber 5
 Condition : PART22/24/27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _10M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	3456.20	-35.49	-26.40	-13.00	-22.49	-9.09	Peak
2	5184.30	-42.60	-39.45	-13.00	-29.60	-3.15	Peak
3 pp	6912.40	-23.90	-26.11	-13.00	-10.90	2.21	Peak
4	8640.50	-33.92	-38.57	-13.00	-20.92	4.65	Peak
5	10368.60	-39.04	-46.12	-13.00	-26.04	7.08	Peak
6	12096.70	-27.57	-35.91	-13.00	-14.57	8.34	Peak
7	13824.80	-36.43	-44.40	-13.00	-23.43	7.97	Peak

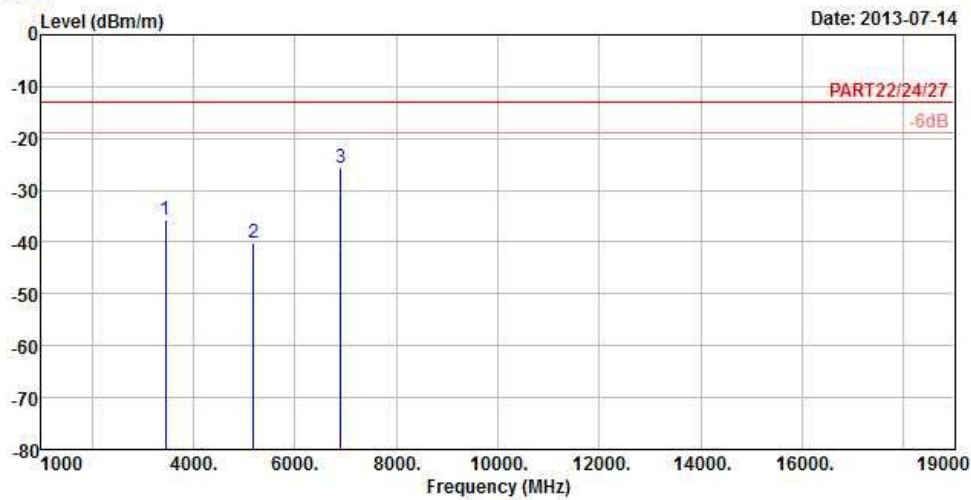
LTE BAND 4
CHANNEL BANDWIDTH: 15MHZ / QPSK (1 RB / 0 RB OFFSET)



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 11



Site : 966 Chamber 5
 Condition : PART22/24/27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _15M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

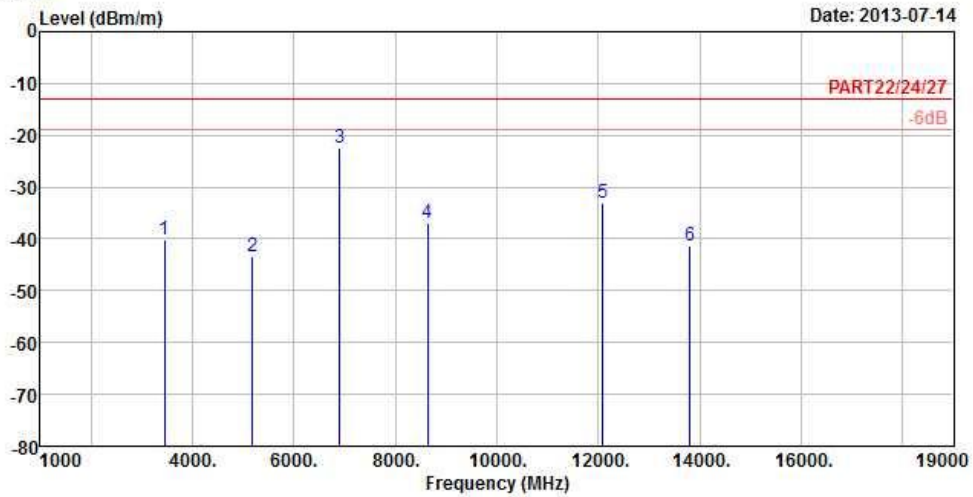
	Freq	Level	Read	Limit	Over		
	MHz	dBm/m	Level	Line	Limit	Factor	Remark
			dBm	dBm/m	dB	dB/m	
1	3451.80	-35.78	-26.69	-13.00	-22.78	-9.09	Peak
2	5177.70	-40.19	-37.04	-13.00	-27.19	-3.15	Peak
3 pp	6903.60	-25.55	-27.76	-13.00	-12.55	2.21	Peak



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 12



Date: 2013-07-14

Site : 966 Chamber 5
 Condition : PART22/24/27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _15M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	3451.80	-40.22	-31.13	-13.00	-27.22	-9.09	Peak
2	5177.70	-43.27	-40.12	-13.00	-30.27	-3.15	Peak
3 pp	6903.60	-22.51	-24.72	-13.00	-9.51	2.21	Peak
4	8629.50	-36.81	-41.46	-13.00	-23.81	4.65	Peak
5	12081.30	-33.07	-41.41	-13.00	-20.07	8.34	Peak
6	13807.20	-41.44	-49.41	-13.00	-28.44	7.97	Peak

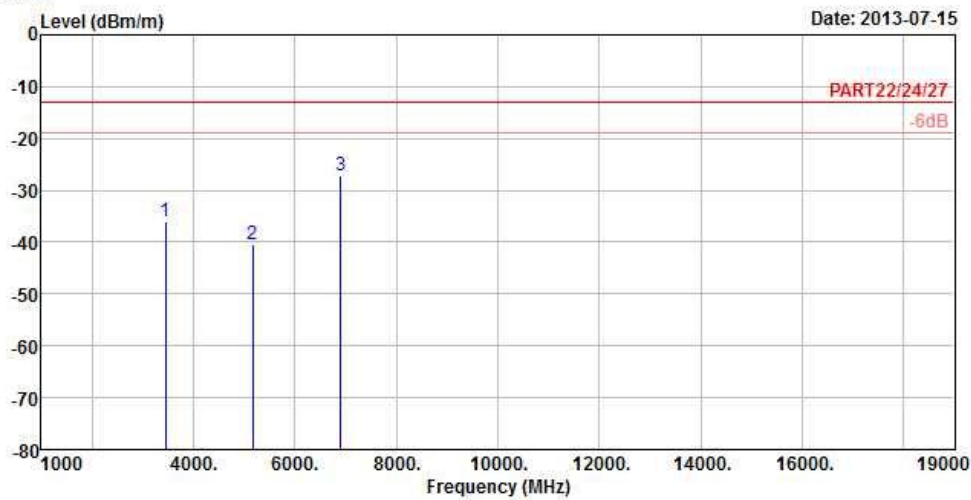
LTE BAND 4
CHANNEL BANDWIDTH: 20MHZ / QPSK (1 RB / 0 RB OFFSET)



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 11



Site : 966 Chamber 5
 Condition : PART22/24/27 3m HORIZONTAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _20M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	3447.40	-35.90	-26.81	-13.00	-22.90	-9.09	Peak
2	5171.10	-40.31	-37.16	-13.00	-27.31	-3.15	Peak
3 pp	6894.80	-27.17	-29.34	-13.00	-14.17	2.17	Peak



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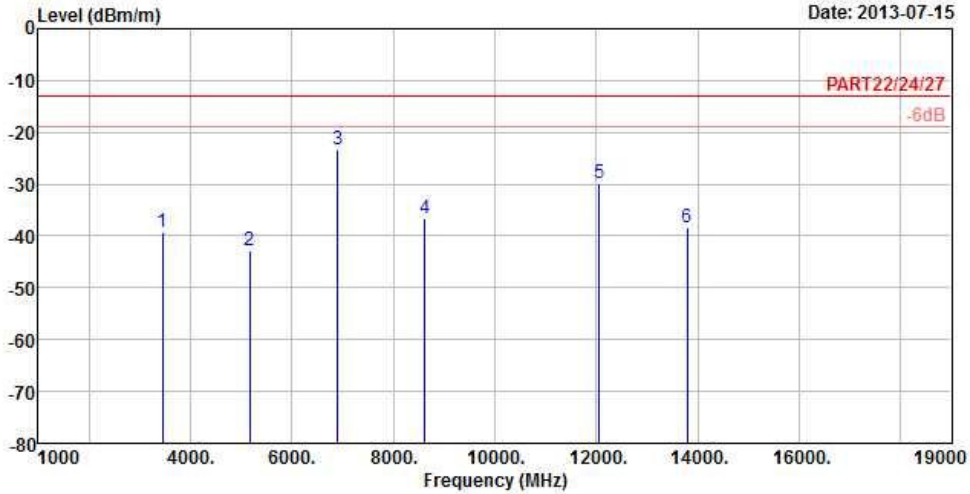


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 12

Date: 2013-07-15



Site : 966 Chamber 5
 Condition : PART22/24/27 3m VERTICAL
 Brand/Model: Messi_V
 Remark : LTE_Band4 _20M_QPSK(1,0)
 Tested by : Kay Wu
 Temperature : 25°C
 Humidity : 65%
 Plane : X

	Read	Limit	Over			
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	3447.40	-39.12	-30.03	-13.00	-26.12	-9.09 Peak
2	5171.10	-42.69	-39.54	-13.00	-29.69	-3.15 Peak
3 pp	6894.80	-23.46	-25.63	-13.00	-10.46	2.17 Peak
4	8618.50	-36.73	-41.22	-13.00	-23.73	4.49 Peak
5	12065.90	-29.93	-38.23	-13.00	-16.93	8.30 Peak
6	13789.60	-38.25	-46.27	-13.00	-25.25	8.02 Peak



5 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 accredited and approved according to ISO/IEC 17025.

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

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

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Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

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

6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

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