

FCC TEST REPORT

(PART 27)

REPORT NO.: RF140331C06-2

MODEL NO.: QMV7B

FCC ID: HFS-QMV7B

RECEIVED: Mar. 31, 2014

TESTED: Apr. 11, 2014 ~ Apr. 17, 2014

ISSUED: May 07, 2014

APPLICANT: Quanta Computer Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services
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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF140331C06-2	Original release	May 07, 2014

1 CERTIFICATION

PRODUCT: 7"Tablet PC

MODEL NO.: QMV7B

BRAND: Verizon

APPLICANT: Quanta Computer Inc.

TESTED: Apr. 11, 2014 ~ Apr. 17, 2014

TEST SAMPLE: Production Unit

TEST STANDARDS: FCC Part 27, Subpart C, L

FCC Part 2

ANSI C63.4-2003

ANSI/TIA/EIA-603-C 2004

The above equipment (model: QMV7B) 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 : Evonne Liu , **DATE:** May 07, 2014
Evonne Liu / Specialist

APPROVED BY : Sam chen , **DATE:** May 07, 2014
Sam Chen / Senior Project Engineer

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

LTE BAND 13			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
2.1046 27.50(C)(10)	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(g)	Occupied Bandwidth	PASS	Meet the requirement of limit.
27.50(d)(5)	Peak to Average Ratio	PASS	Meet the requirement of limit.
27.53(g)	Band Edge Measurements	PASS	Meet the requirement of limit.
2.1051 27.53(g)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
2.1053 27.53(g)	Radiated Spurious Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -9.97dB at 1564.00MHz.

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 -12.90dB at 3465.00MHz.

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	100744	Apr. 15, 2014	Apr. 14, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 21, 2013	Dec. 20, 2014
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 27, 2014	Feb. 26, 2015
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 19, 2014	Feb. 18, 2015
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Dec. 18, 2013	Dec. 17, 2014
Preamplifier EMCI	EMC 012645	980115	Dec. 26, 2013	Dec. 25, 2014
Preamplifier EMCI	EMC 184045	980116	Jan. 13, 2014	Jan. 12, 2015
Preamplifier EMCI	EMC 330H	980112	Dec. 27, 2013	Dec. 26, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 18, 2013	Oct. 17, 2014
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 18, 2013	Oct. 17, 2014
RF signal cable Worken	RG-213	NA	Nov. 07, 2013	Nov. 06, 2014
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
Mini-Circuits Power Splitter	ZN2PD-9G	NA	Jul. 18, 2013	Jul. 17, 2014
JFW 20dB attenuation	50HF-020-SMA	NA	NA	NA
Communications Tester-Wireless	E5515C	MY52102544	Sep. 05, 2012	Sep. 04, 2014
Radio Communication Analyzer	MT8820C	6201300640	Aug. 01, 2013	Jul. 31, 2014

- 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	7"Tablet PC	
MODEL NO.	QMV7B	
POWER SUPPLY	5Vdc (adapter or host equipment) 3.7Vdc (battery)	
MODULATION TECHNOLOGY	LTE Band 13	QPSK, 16QAM
	LTE Band 4	QPSK, 16QAM
FREQUENCY RANGE	LTE Band 13 Channel Bandwidth: 10MHz	782.0MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715.0MHz ~1750.0MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720.0MHz ~1745.0MHz
EMISSION DESIGNATOR	LTE Band 13 Channel Bandwidth: 10MHz	8M92G7D
	LTE Band 4 Channel Bandwidth: 5MHz	4M48G7D
	LTE Band 4 Channel Bandwidth: 10MHz	8M91G7D
	LTE Band 4 Channel Bandwidth: 20MHz	17M8W7D
MAX. ERP POWER	LTE Band 13 Channel Bandwidth: 10MHz	77.21mW
MAX. EIRP POWER	LTE Band 4 Channel Bandwidth: 5MHz	243.95mW
	LTE Band 4 Channel Bandwidth: 10MHz	258.29mW
	LTE Band 4 Channel Bandwidth: 20MHz	231.79mW
ANTENNA TYPE	Fixed Internal Antenna	
DATA CABLE	Refer to Note as below	
I/O PORTS	Refer to users' manual	
ACCESSORY DEVICES	Refer to Note as below	

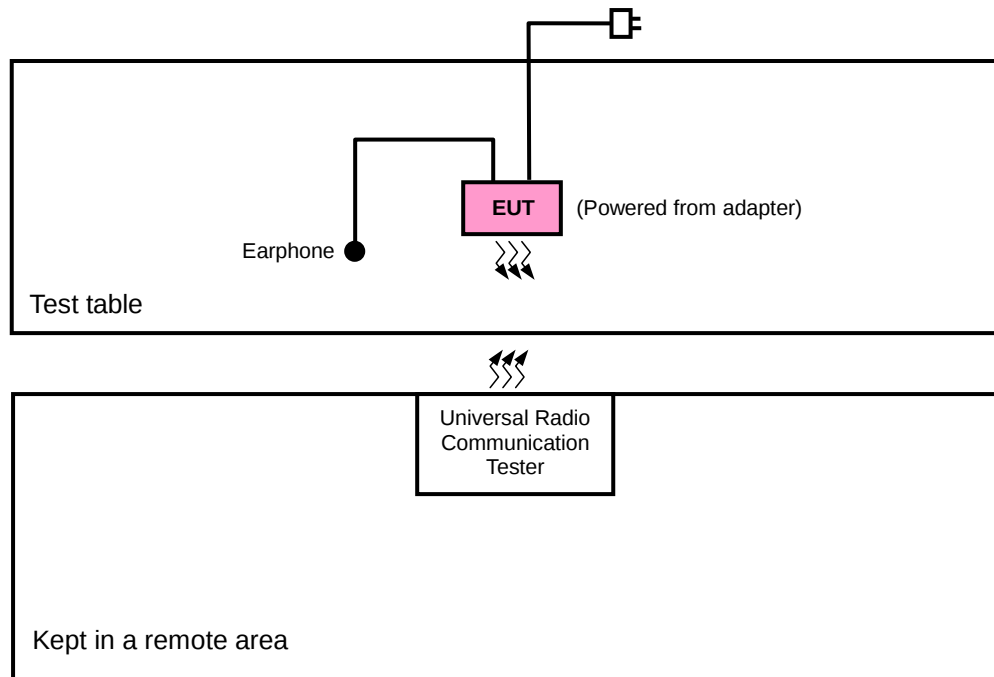
NOTE:

1. The EUT contains following accessory devices.

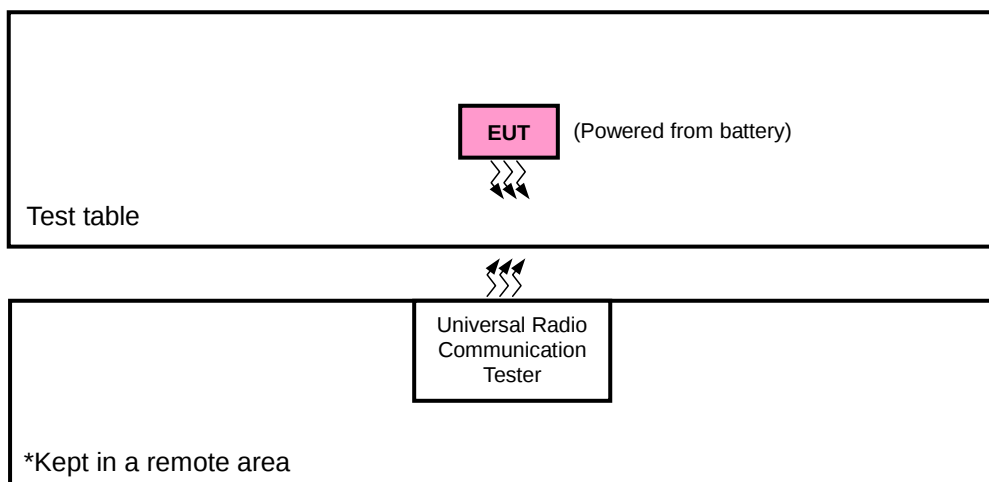
ITEM	BRAND	MODEL	SPECIFICATION
Adapter	ITE	AD83531	I/P: 100-240Vac, 50/60Hz, 0.3A O/P: 5Vdc, 2A
Battery	McNair	MLP3970125	3.7Vdc, 4000Ah
LTE Module	USI	Messi-V	--
BT/WiFi Module	MTK	MT6628QP	--

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 FOR RADIATION EMISSION TEST



FOR E.R.P. / E.I.R.P. TEST



3.3 DESCRIPTION OF SUPPORT UNITS

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

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 when positioned on Y-plane for ERP, Z-plane for EIRP, and Y-axis and Z-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

LTE Band 13

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

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



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LTE Band 4

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
-	EIRP	19975 to 20375	19975, 20175, 20375	5MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 50 RB Offset
-	FREQUENCY STABILITY	19975 to 20375	20175	5MHz	QPSK	1 RB / 12 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 50 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
		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 / 12 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 50 RB Offset
-	BAND EDGE	19975 to 20375	19975	5MHz	QPSK	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
		20000 to 20350	20375	5MHz	QPSK	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		20050 to 20300	20050	20MHz	QPSK	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
		20050 to 20300	20350	10MHz	QPSK	1 RB / 49 RB Offset
						50 RB / 0 RB Offset
-	CONDCUDED EMISSION	19975 to 20375	20175	5MHz	QPSK	1 RB / 12 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 50 RB Offset
-	RADIATED EMISSION	19975 to 20375	20175	5MHz	QPSK	1 RB / 12 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 50 RB Offset

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
ERP/EIRP	26deg. C, 58%RH	3.8Vdc	Dylan Yang
FREQUENCY STABILITY	26deg. C, 58%RH	3.8Vdc	Dylan Yang
OCCUPIED BANDWIDTH	26deg. C, 58%RH	3.8Vdc	Dylan Yang
PEAK TO AVERAGE RATIO	26deg. C, 58%RH	3.8Vdc	Dylan Yang
BAND EDGE	26deg. C, 58%RH	3.8Vdc	Dylan Yang
CONDCUDED EMISSION	26deg. C, 58%RH	3.8Vdc	Dylan Yang
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 777-787 MHz band are limited to 3 watts ERP

4.1.2 TEST PROCEDURES

EIRP MEASUREMENT:

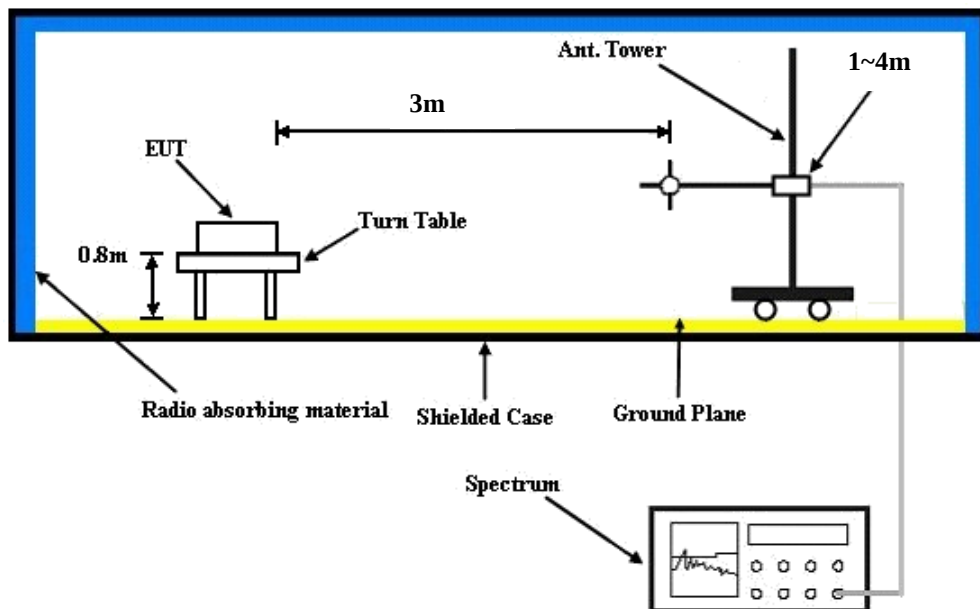
- All measurements were done at low, middle and high operational frequency range. RBW and VBW is 1MHz for GSM, GPRS & EDGE, 5MHz for CDMA & WCDMA, and 10MHz for LTE mode.
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, 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.
- 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
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

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:



CONDUCTED POWER MEASUREMENT:



4.1.4 TEST RESULTS

Average Conducted Output Power (dBm)

Band / BW	RB Size	RB Offset	QPSK	3GPP MPR (dB)	16QAM	3GPP MPR (dB)
			Mid CH 23230		Mid CH 23230	
			782.0 MHz		782.0 MHz	
13 / 10M	1	0	22.49	0	21.45	1
	1	24	22.62	0	21.58	1
	1	49	22.13	0	21.09	1
	25	0	21.14	1	21.10	2
	25	12	21.30	1	21.26	2
	25	25	21.33	1	21.29	2
	50	0	21.47	1	21.43	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			19975	20175	20375		19975	20175	20375	
			1712.5 MHz	1732.5 MHz	1752.5 MHz		1712.5 MHz	1732.5 MHz	1752.5 MHz	
4 / 5M	1	0	23.10	23.61	23.37	0	22.20	22.71	22.47	1
	1	12	23.77	23.76	23.28	0	22.87	22.86	22.38	1
	1	24	23.02	23.53	23.03	0	22.12	22.63	22.13	1
	12	0	23.01	23.51	23.31	1	22.11	22.61	22.41	2
	12	6	22.82	23.60	23.22	1	21.92	22.70	22.32	2
	12	13	22.24	23.37	23.35	1	21.34	22.47	22.45	2
	25	0	22.23	22.89	22.63	1	21.33	21.99	21.73	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			20000	20175	20350		20000	20175	20350	
			1715.0 MHz	1732.5 MHz	1750.0 MHz		1715.0 MHz	1732.5 MHz	1750.0 MHz	
4 / 10M	1	0	23.38	23.89	23.65	0	22.30	22.81	22.57	1
	1	24	23.05	23.85	23.56	0	22.95	22.96	22.48	1
	1	49	23.30	23.81	23.31	0	22.22	22.73	22.23	1
	25	0	22.29	22.79	22.59	1	22.21	22.71	22.51	2
	25	12	22.10	22.88	22.50	1	22.02	22.80	22.42	2
	25	25	22.52	22.65	22.63	1	21.44	22.57	22.55	2
	50	0	22.51	22.17	22.91	1	22.43	22.09	22.83	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low CH	Mid CH	High CH		Low CH	Mid CH	High CH	
			20050	20175	20300		20050	20175	20300	
			1720.0 MHz	1732.5 MHz	1745.0 MHz		1720.0 MHz	1732.5 MHz	1745.0 MHz	
4 / 20M	1	0	23.47	23.55	23.74	0	22.39	22.99	22.66	1
	1	50	23.14	23.98	23.65	0	22.06	22.05	22.57	1
	1	99	23.39	23.90	23.40	0	22.31	22.82	22.32	1
	50	0	22.38	22.88	22.68	1	22.30	22.80	22.60	2
	50	25	22.19	22.97	22.59	1	22.11	22.89	22.51	2
	50	50	22.61	22.74	22.72	1	21.53	22.66	22.64	2
	100	0	22.60	22.26	22.05	1	21.52	21.18	21.92	2

AVERAGE ERP (dBm)

LTE Band 13							
Channel Bandwidth: 10MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Y	23230	782.0	-11.71	32.737	18.88	77.21	H
	23230	782.0	-15.13	32.52	15.24	33.42	V

LTE Band 13							
Channel Bandwidth: 10MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	ERP(dBm)	ERP(mW)	Polarization (H/V)
Y	23230	782.0	-11.90	32.737	18.69	73.91	H
	23230	782.0	-15.22	32.52	15.15	32.73	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	-19.13	42.46	23.33	215.18	H
	20175	1732.5	-18.67	42.29	23.62	230.25	
	20375	1752.5	-19.09	42.96	23.87	243.95	
	19975	1712.5	-22.93	42.73	19.80	95.46	V
	20175	1732.5	-22.41	42.74	20.33	107.89	
	20375	1752.5	-22.19	42.30	20.11	102.57	

LTE Band 4							
Channel Bandwidth: 5MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	19975	1712.5	-19.01	42.46	23.45	221.21	H
	20175	1732.5	-18.95	42.29	23.34	215.87	
	20375	1752.5	-19.25	42.96	23.71	235.13	
	19975	1712.5	-22.76	42.73	19.97	99.27	V
	20175	1732.5	-22.78	42.74	19.96	99.08	
	20375	1752.5	-23.23	42.30	19.07	80.72	

LTE Band 4							
Channel Bandwidth: 10MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20000	1715.0	-18.57	42.69	24.12	258.29	H
	20175	1732.5	-18.21	42.29	24.08	255.86	
	20350	1750.0	-17.98	42.01	24.03	253.05	
	20000	1715.0	-22.40	42.09	19.69	93.11	V
	20175	1732.5	-22.08	42.74	20.66	116.41	
	20350	1750.0	-22.75	42.09	19.34	85.90	

LTE Band 4							
Channel Bandwidth: 10MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20000	1715.0	-18.77	42.69	23.92	246.66	H
	20175	1732.5	-18.81	42.29	23.48	222.84	
	20350	1750.0	-18.68	42.01	23.33	215.38	
	20000	1715.0	-22.78	42.09	19.31	85.31	V
	20175	1732.5	-22.90	42.74	19.84	96.38	
	20350	1750.0	-22.32	42.09	19.77	94.84	

LTE Band 4							
Channel Bandwidth: 20MHz / QPSK							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20050	1720.0	-19.04	42.69	23.65	231.79	H
	20175	1732.5	-18.77	42.29	23.52	224.91	
	20300	1745.0	-18.39	42.01	23.62	230.25	
	20050	1720.0	-22.43	42.09	19.66	92.47	V
	20175	1732.5	-23.05	42.74	19.69	93.11	
	20300	1745.0	-22.61	42.09	19.48	88.72	

LTE Band 4							
Channel Bandwidth: 20MHz / 16QAM							
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor(dB)	EIRP(dBm)	EIRP(mW)	Polarization (H/V)
Z	20050	1720.0	-20.24	42.69	22.45	175.83	H
	20175	1732.5	-19.32	42.29	22.97	198.15	
	20300	1745.0	-19.87	42.01	22.14	163.76	
	20050	1720.0	-23.35	42.09	18.74	74.82	V
	20175	1732.5	-24.02	42.74	18.72	74.47	
	20300	1745.0	-23.73	42.09	18.36	68.55	

4.2 FREQUENCY STABILITY MEASUREMENT

4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

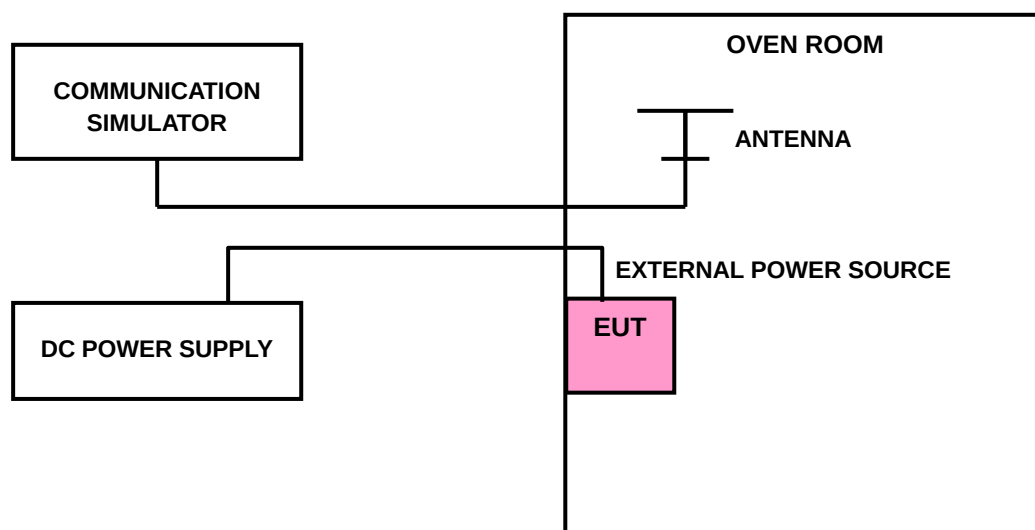
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.2.2 TEST PROCEDURE

- 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 $\pm 0.5^{\circ}\text{C}$ 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

FREQUENCY ERROR vs. VOLTAGE

VOLTAGE (Volts)	FREQUENCY ERROR (ppm)				LIMIT (ppm)
	LTE BAND 13	LTE BAND 4			
	10MHz	5MHz	10MHz	20MHz	
3.8	0.009207161	0.01015873	0.006580087	-0.002655123	2.5
3.4	0.013682864	-0.003001443	-0.004559885	-0.003405483	2.5
4.2	0.007033248	0.002597403	0.003751804	0.003059163	2.5

NOTE: The applicant defined the normal working voltage of the battery is from 3.4Vdc to 4.2Vdc.

FREQUENCY ERROR vs. TEMPERATURE

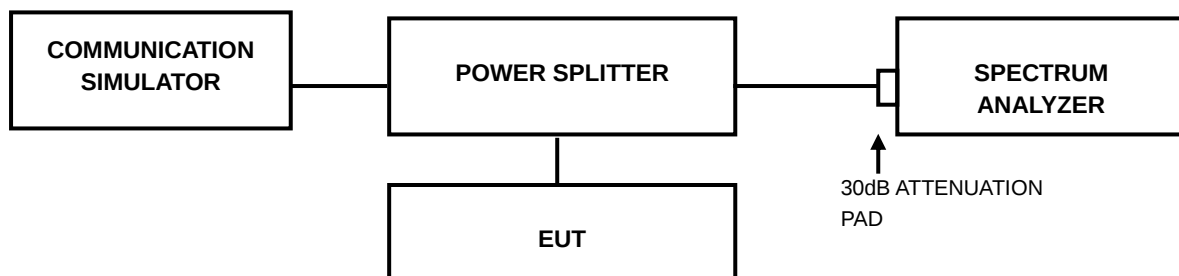
TEMP. (°C)	FREQUENCY ERROR (ppm)				LIMIT (ppm)
	LTE BAND 13	LTE BAND 4			
	10MHz	5MHz	10MHz	20MHz	
-30	-0.010997442	0.002539683	0.004444444	0.009292929	2.5
-20	0.001662404	-0.000692641	-0.000923521	-0.008888889	2.5
-10	0.002813299	0.005483405	0.003347763	0.003059163	2.5
0	-0.003836317	0.009177489	-0.006637807	-0.003463203	2.5
10	-0.002173913	0.002655123	-0.001269841	0.003001443	2.5
20	-0.006905371	-0.000634921	-0.005541126	0.007619048	2.5
30	0.004603581	0.003982684	0.006118326	-0.003694084	2.5
40	-0.018286445	-0.001212121	-0.00046176	0.006406926	2.5
50	-0.012404092	-0.001500722	0.005483405	-0.007157287	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

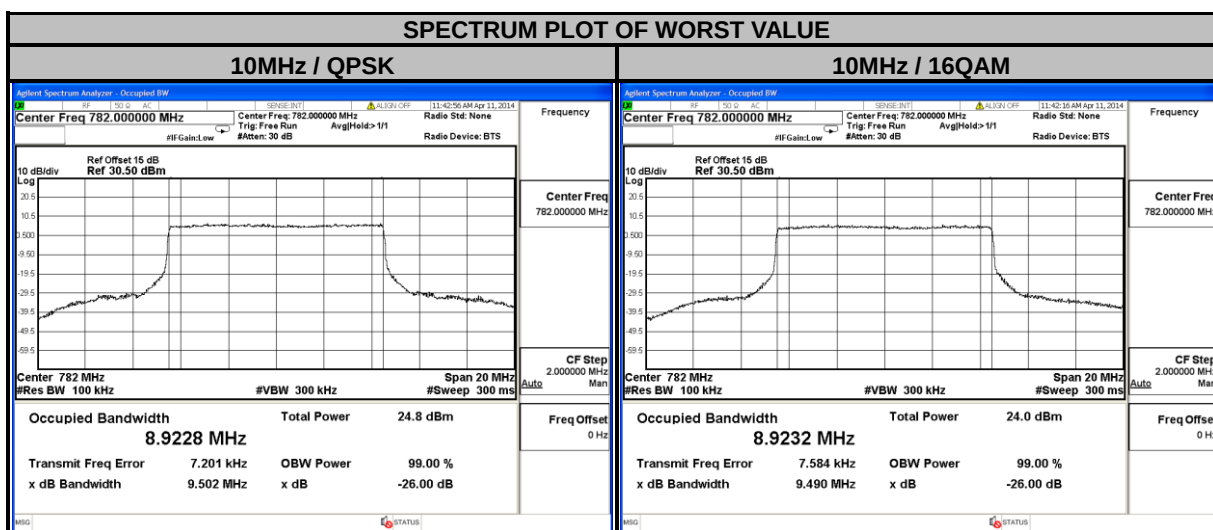


4.3.3 TEST PROCEDURES

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

4.3.4 TEST RESULTS

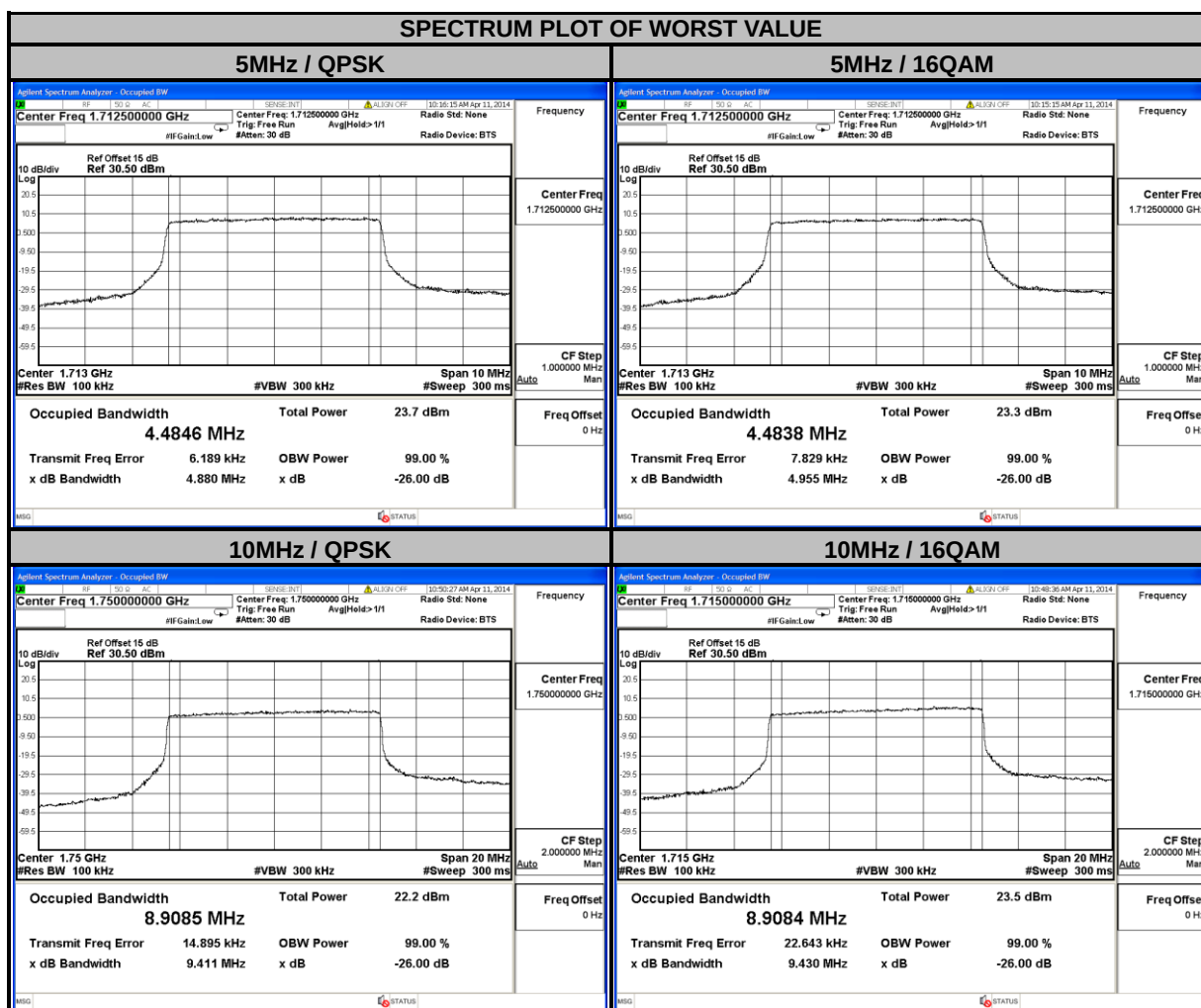
LTE BAND 13			
CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM
23230	782.0	8.92	8.92





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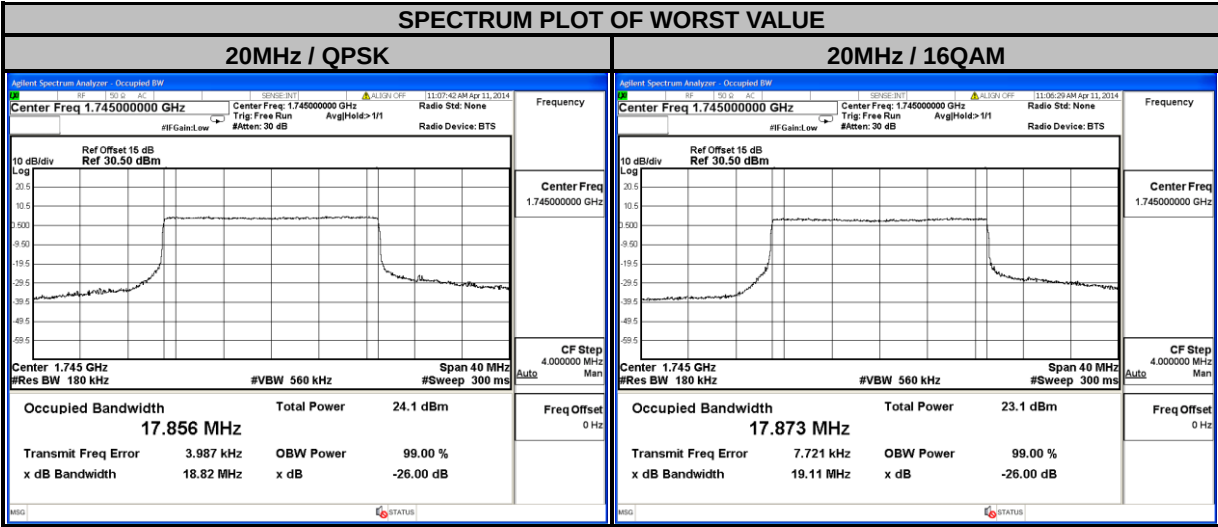
LTE BAND 4							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)		CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	4.48	4.48	20000	1715.0	8.91	8.91
20175	1732.5	4.48	4.48	20175	1732.5	8.89	8.90
20375	1752.5	4.48	4.48	20350	1750.0	8.91	8.91





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LTE BAND 4			
CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	99% OCCUPIED BANDWIDTH (MHz)	
		QPSK	16QAM
20050	1720.0	17.71	17.72
20175	1732.5	17.76	17.77
20300	1745.0	17.86	17.87

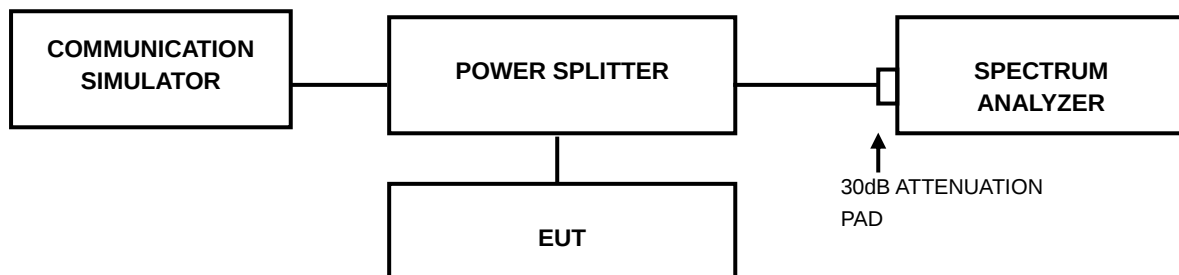


4.4 PEAK TO AVERAGE RATIO

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

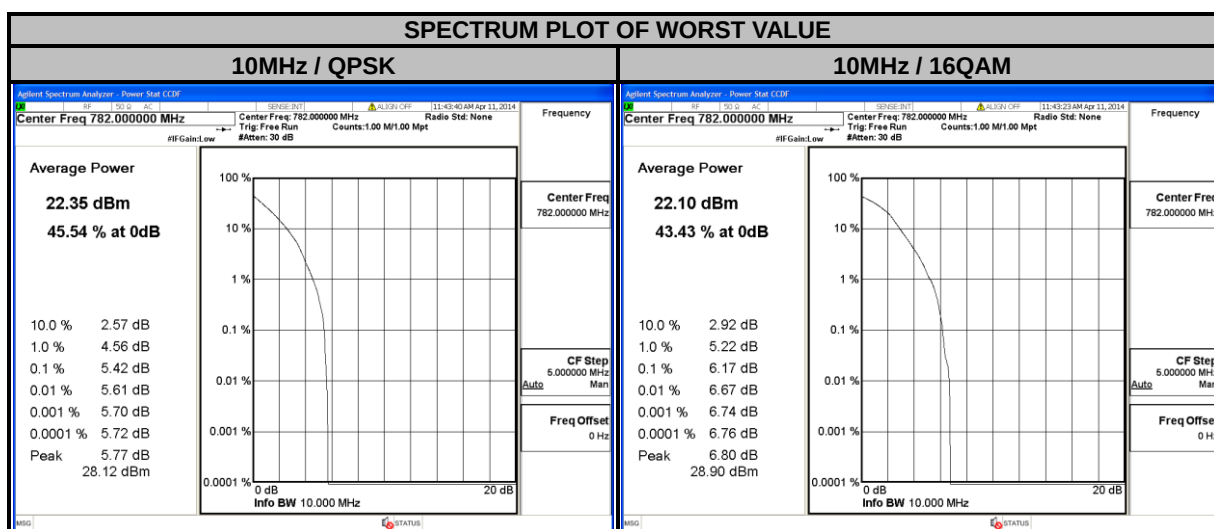


4.4.3 TEST PROCEDURES

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

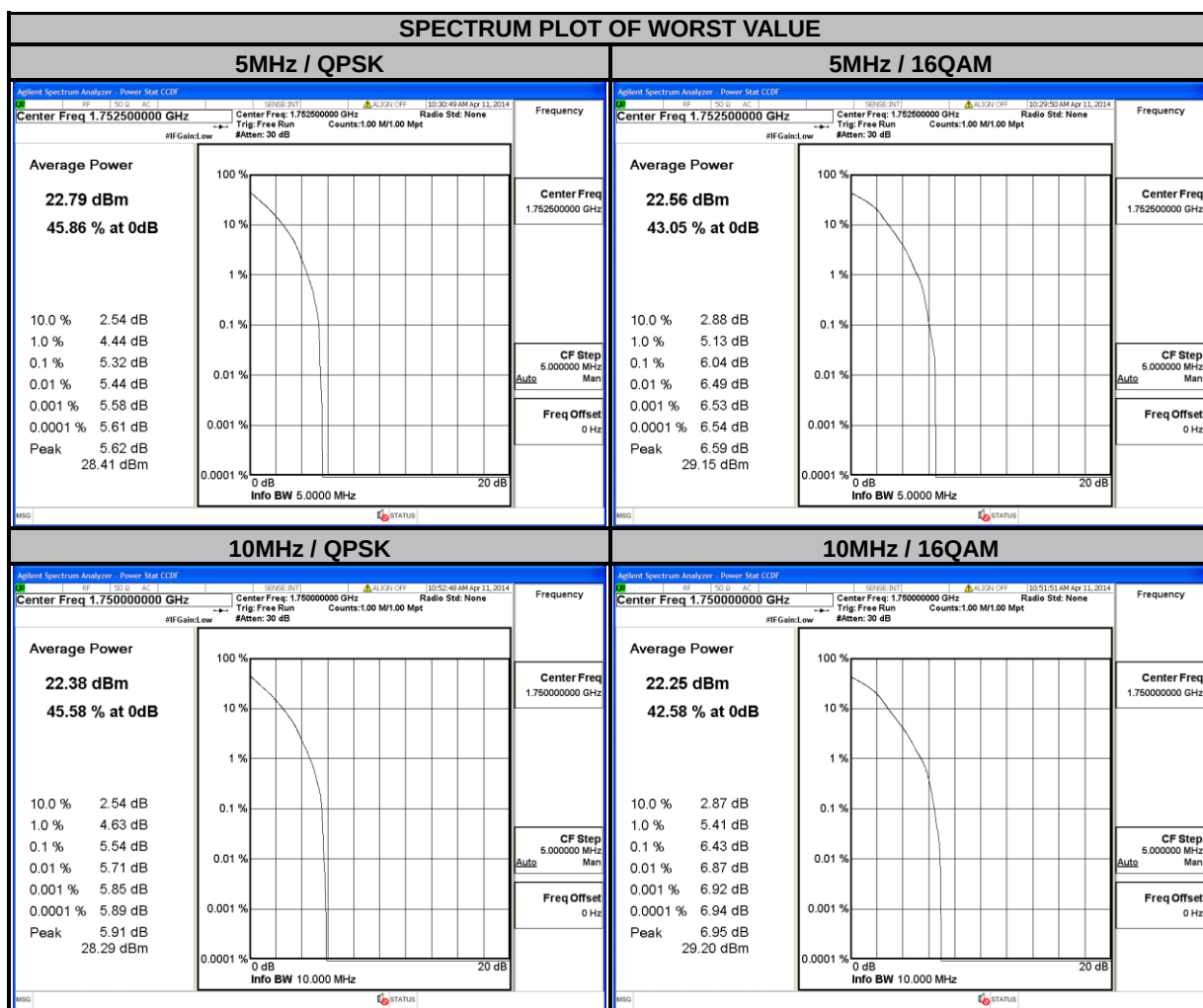
LTE BAND 13			
CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
23230	782.0	5.42	6.17





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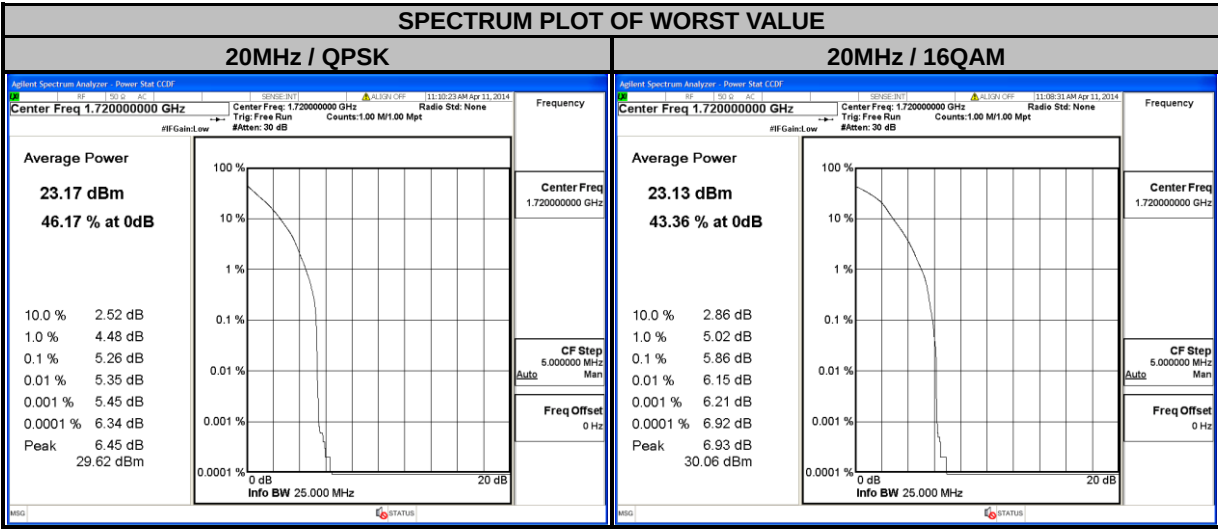
LTE BAND 4							
CHANNEL BANDWIDTH: 5MHz				CHANNEL BANDWIDTH: 10MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)		CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM			QPSK	16QAM
19975	1712.5	5.22	5.88	20000	1715.0	5.20	5.77
20175	1732.5	4.34	4.85	20175	1732.5	4.34	4.69
20375	1752.5	5.32	6.04	20350	1750.0	5.54	6.43





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LTE BAND 4			
CHANNEL BANDWIDTH: 20MHz			
CHANNEL	FREQUENCY (MHz)	PEAK TO AVERAGE RATIO (dB)	
		QPSK	16QAM
20050	1720.0	5.26	5.86
20175	1732.5	4.58	5.01
20300	1745.0	4.98	5.51



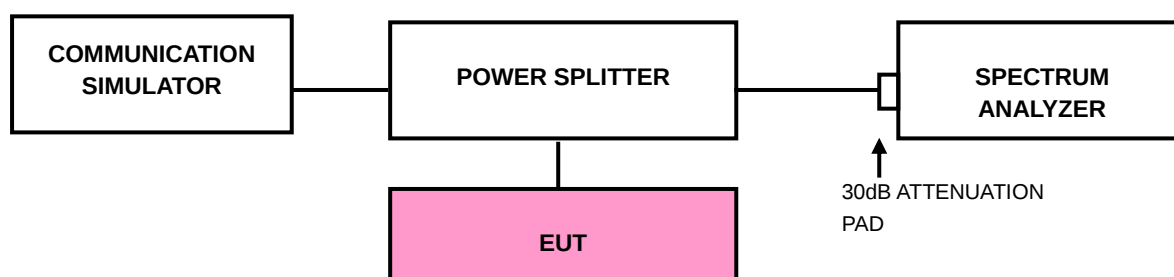
4.5 BAND EDGE MEASUREMENT

4.5.1 LIMITS OF BAND EDGE MEASUREMENT

For operations in the 777-787 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 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



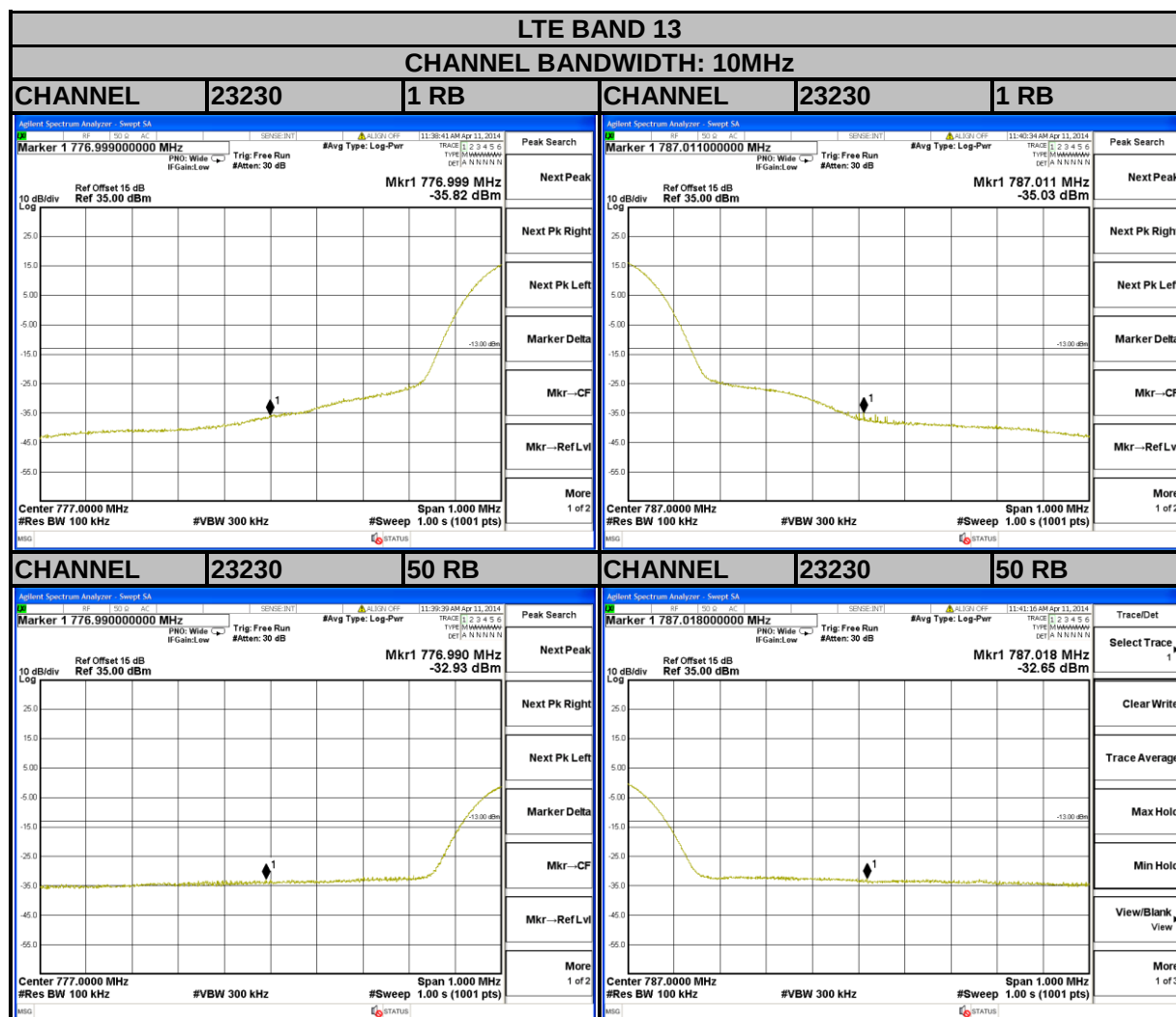
4.5.3 TEST PROCEDURES

- 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. The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 91kHz and VB of the spectrum is 300kHz (LTE Band 4 Bandwidth 5MHz).
- e. Record the max trace plot into the test report.



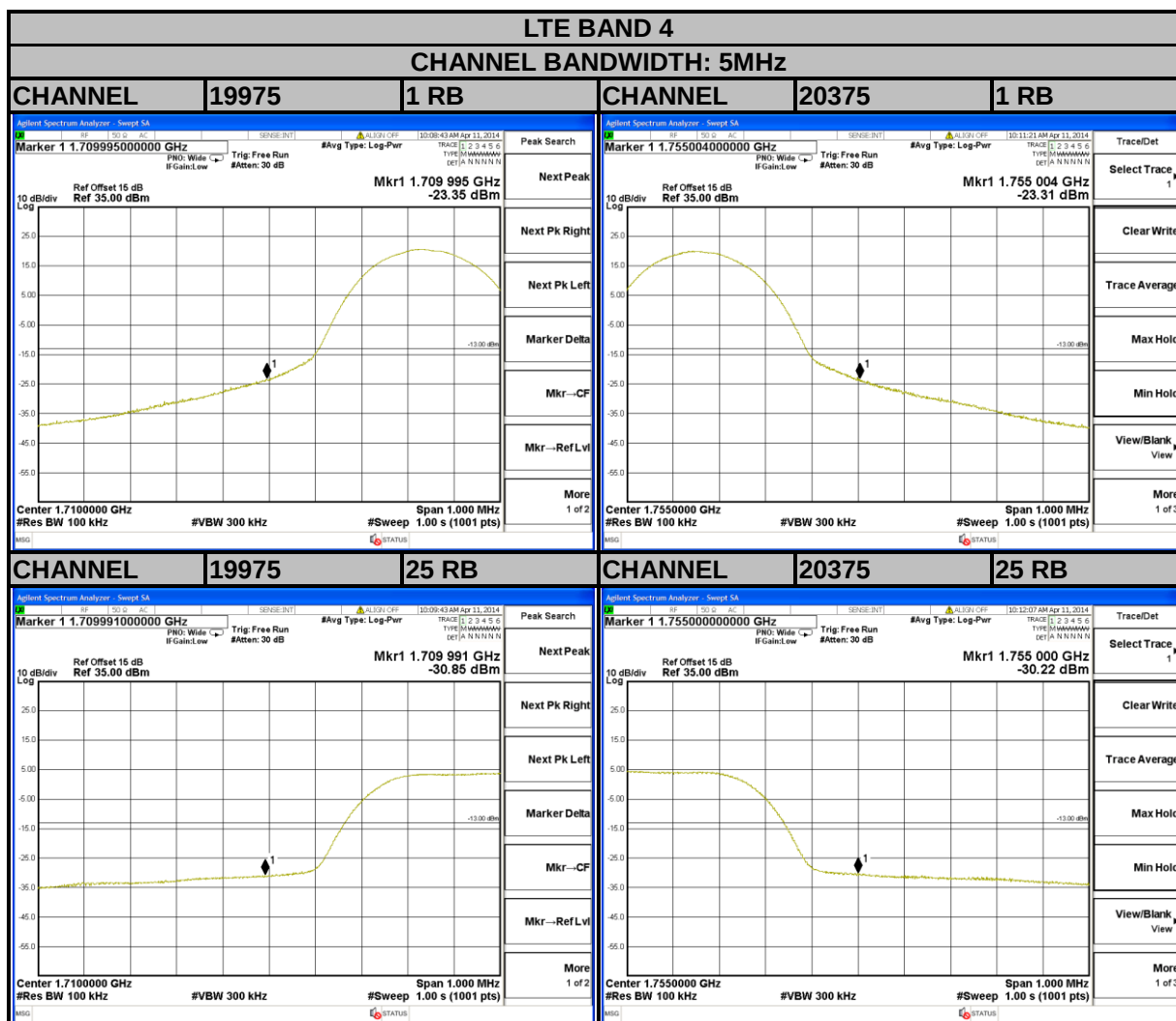
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4.5.4 TEST RESULTS



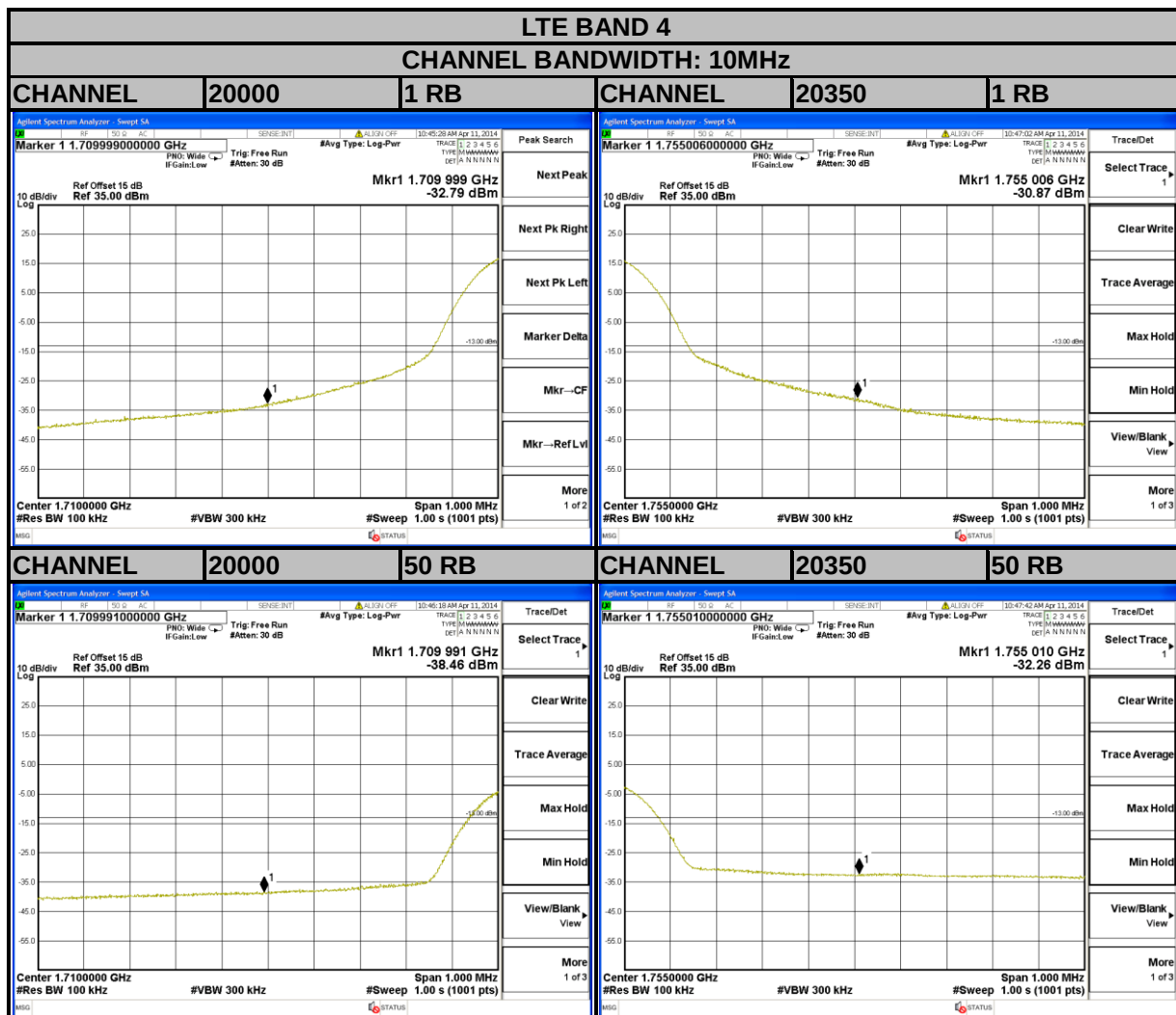


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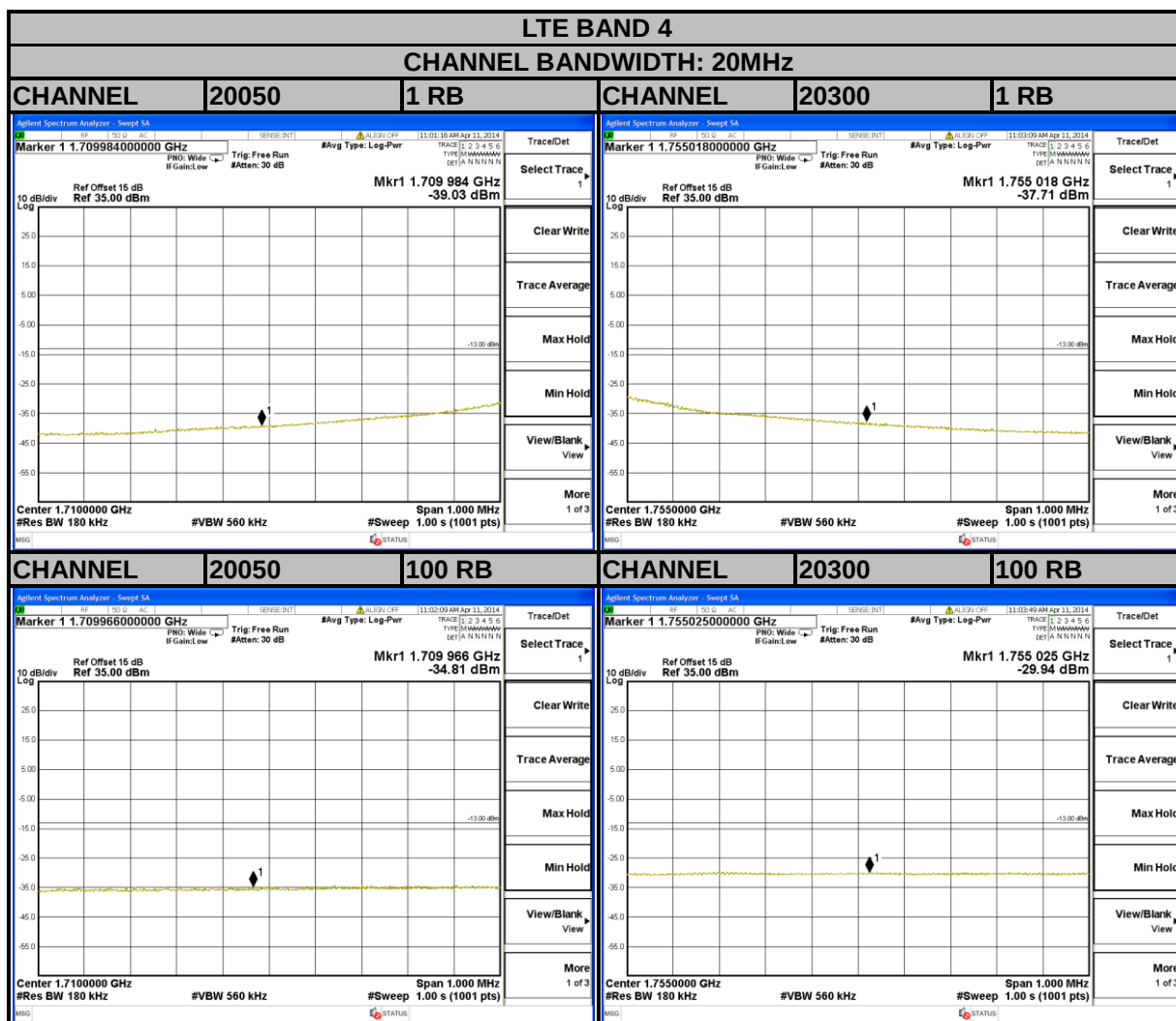


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4.6 CONDUCTED SPURIOUS EMISSIONS

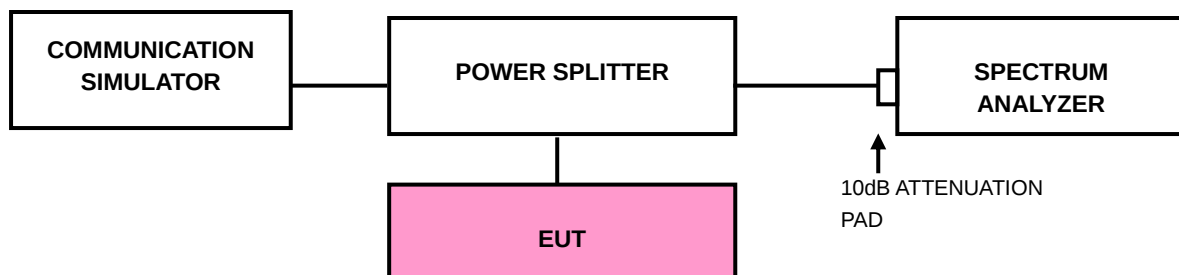
4.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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 is equal to -13dBm.

4.6.2 TEST PROCEDURE

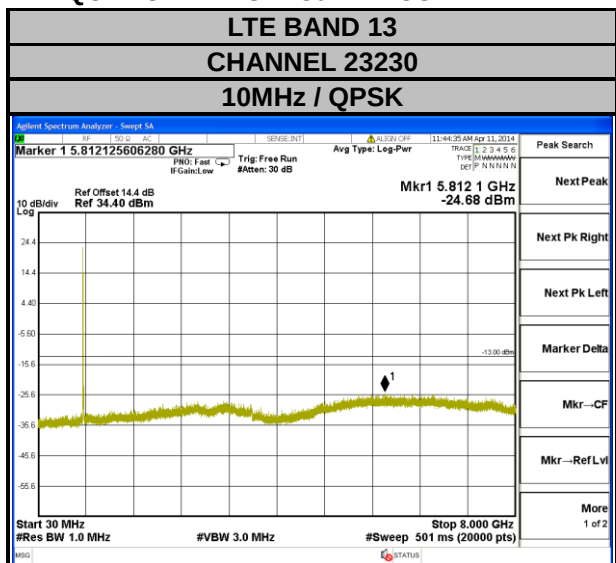
- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 30 MHz to 8GHz for LTE Band 17 and from 30MHz to 18GHz for LTE Band 4. 10dB attenuation pad is connected with spectrum. RBW=1MHz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

4.6.3 TEST SETUP



4.6.4 TEST RESULTS

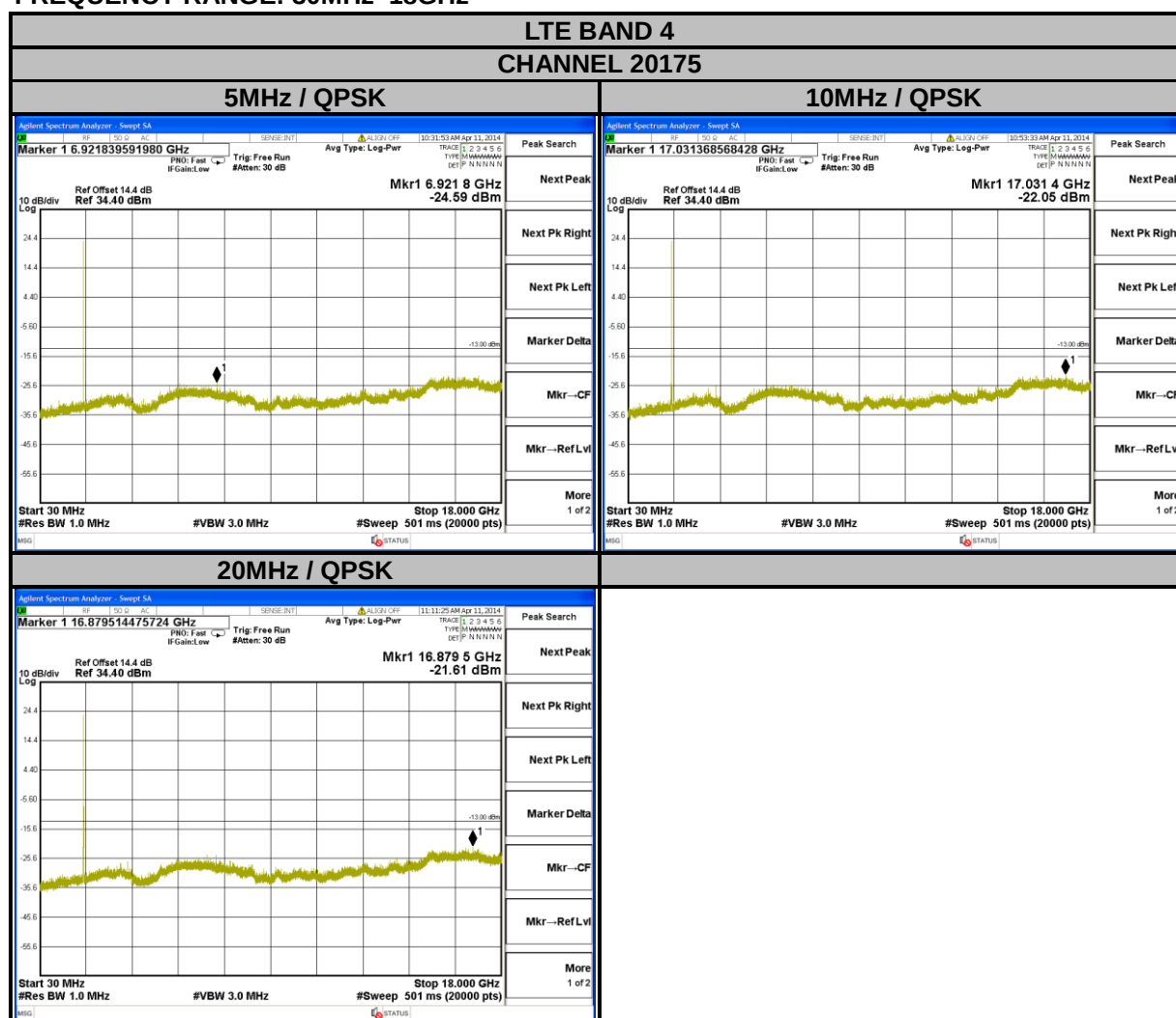
FREQUENCY RANGE: 30MHz~8GHz





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FREQUENCY RANGE: 30MHz~18GHz



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

4.7.2 TEST PROCEDURES

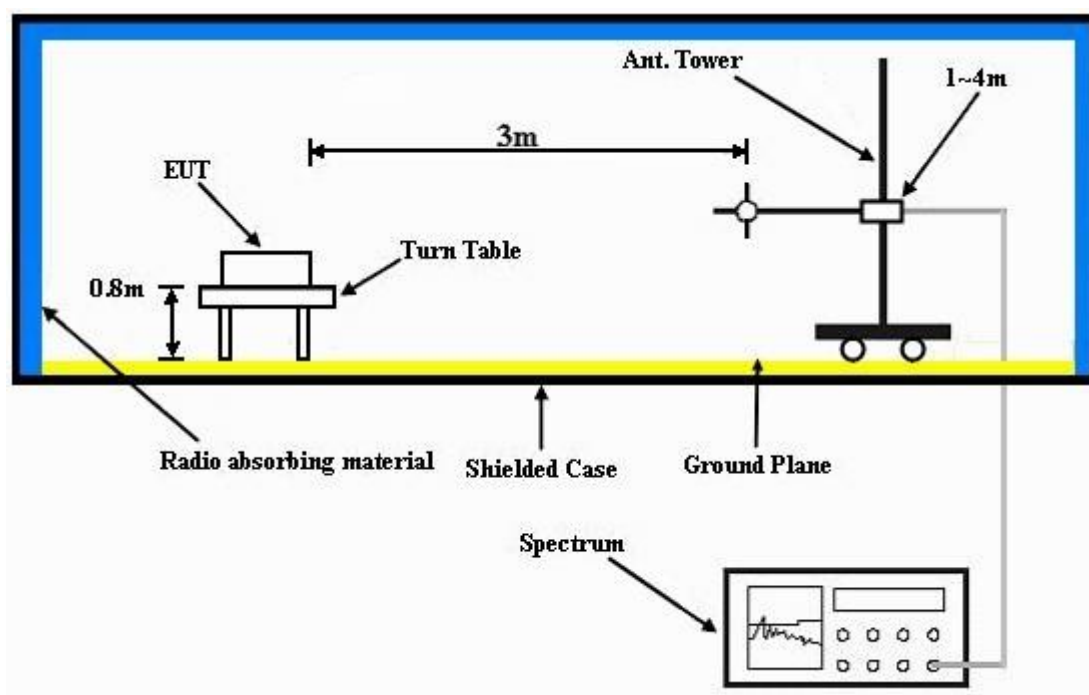
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from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

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: 10MHz / QPSK

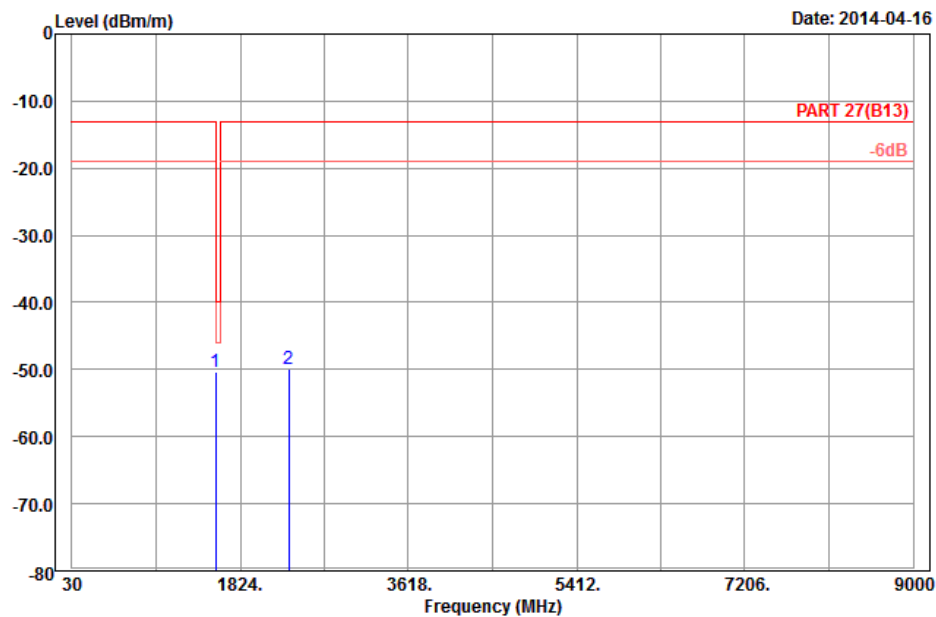


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Data: 9

Date: 2014-04-16



Site : 966 chamber 5
Condition: PART 27(B13) 3m Horizontal
Remark : LTE_Band 13_QPSK(1,24)_10M_CH23230
Tested by: Kay Wu
Plane : Z

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp 1564.00	-50.41	-57.27	-40.00	-10.41	6.86	Peak
2	2346.00	-50.02	-60.96	-13.00	-37.02	10.94	Peak



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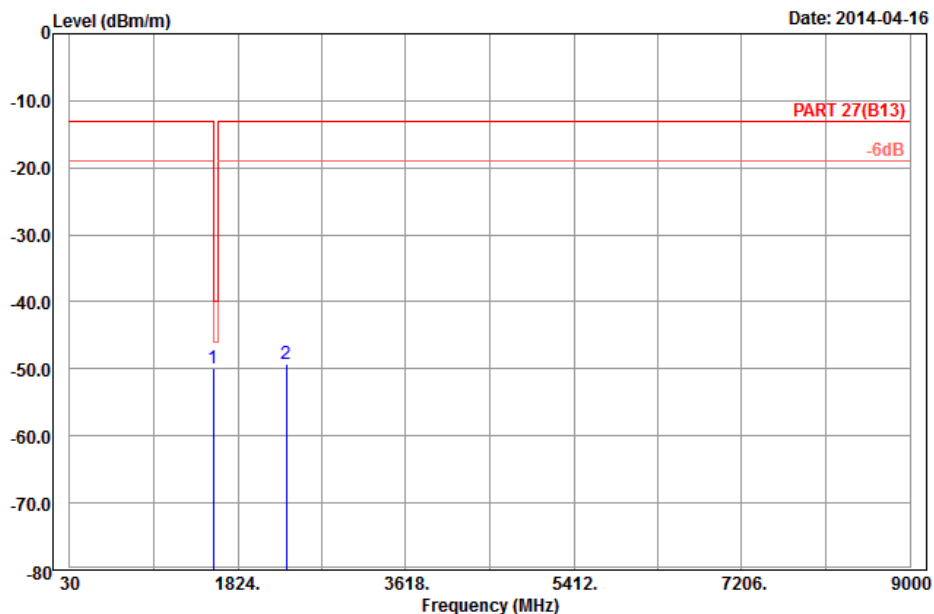


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A D T

Data: 10

Date: 2014-04-16



Site : 966 chamber 5
Condition: PART 27(B13) 3m Vertical
Remark : LTE_Band 13_QPSK(1,24)_10M_CH23230
Tested by: Kay Wu
Plane : Z

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp	1564.00	-49.97	-56.83	-40.00	-9.97	6.86 Peak
2		2346.00	-49.21	-60.15	-13.00	-36.21	10.94 Peak



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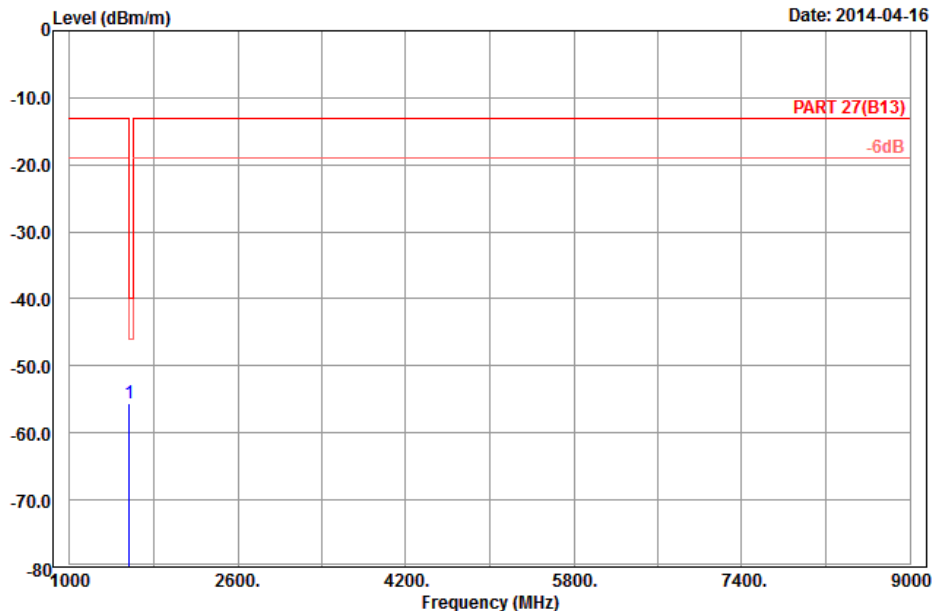


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Data: 5

Date: 2014-04-16



Site : 966 chamber 5
Condition: PART 27(B13) 3m Horizontal
Remark : LTE_Band 13_QPSK(50,0)_10M_CH23230
Tested by: Kay Wu
Plane : Z

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp	1564.00	-55.55	-62.41	-40.00	-15.55	6.86 Peak



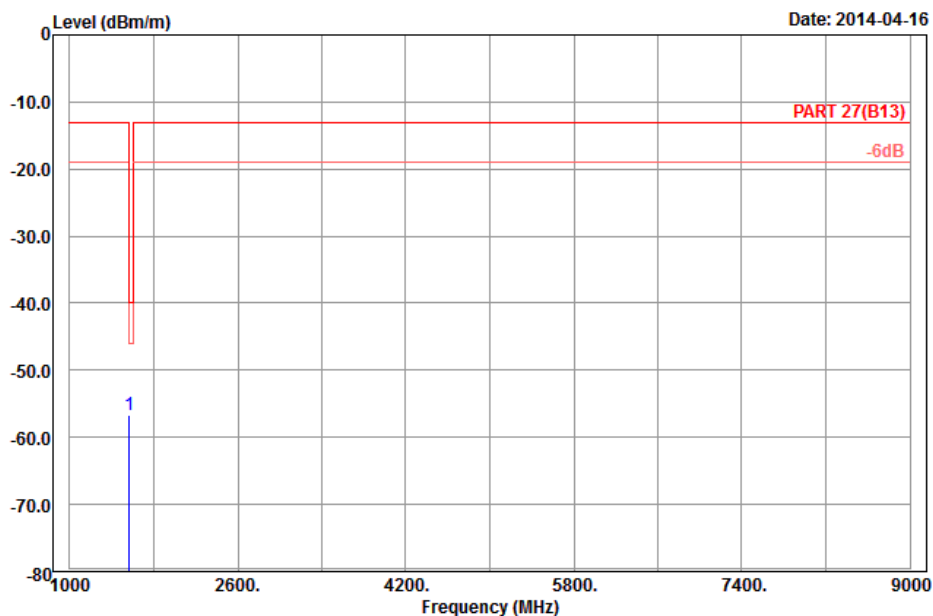
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Data: 6



Site : 966 chamber 5
Condition: PART 27(B13) 3m Vertical
Remark : LTE_Band 13_QPSK(50,0)_10M_CH23230
Tested by: Kay Wu
Plane : Z

		Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m
1	pp 1564.00	-56.68	-63.54	-40.00	-16.68	6.86 Peak



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LTE BAND 4

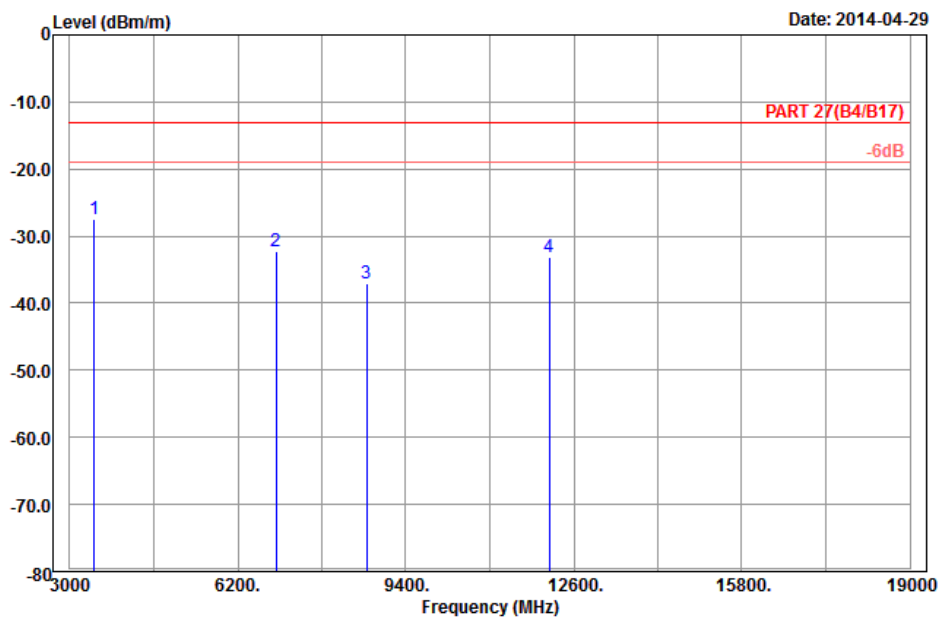
CHANNEL BANDWIDTH: 5MHz / QPSK



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Data: 9



Site : 966 chamber 5
Condition: PART 27(B4/B17) 3m Horizontal
Remark : LTE_Band 4_QPSK(1,12)_5M_CH20175
Tested by: Kay Wu
Plane : Y

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 pp	3465.00	-27.54	-41.88	-13.00	-14.54	14.34	Peak
2	6930.00	-32.33	-55.20	-13.00	-19.33	22.87	Peak
3	8662.50	-37.04	-61.25	-13.00	-24.04	24.21	Peak
4	12127.50	-33.04	-62.43	-13.00	-20.04	29.39	Peak



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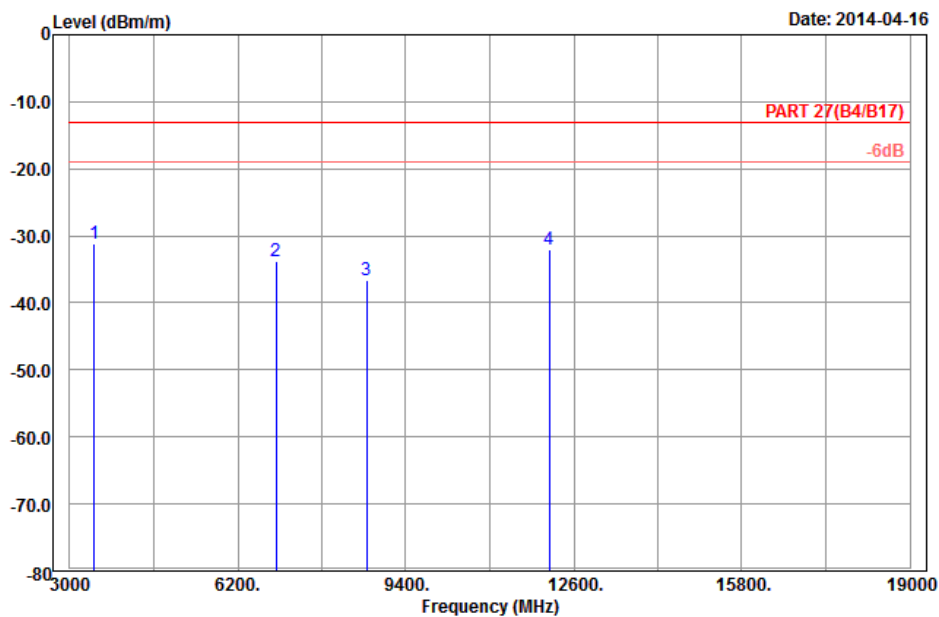


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A D T

Data: 10

Date: 2014-04-16



Site : 966 chamber 5
Condition: PART 27(B4/B17) 3m Vertical
Remark : LTE_Band 4_QPSK(1,12)_5M_CH20175
Tested by: Kay Wu
Plane : Y

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 pp	3465.00	-31.12	-45.46	-13.00	-18.12	14.34	Peak
2	6930.00	-33.75	-56.62	-13.00	-20.75	22.87	Peak
3	8662.50	-36.64	-60.85	-13.00	-23.64	24.21	Peak
4	12127.50	-32.11	-61.50	-13.00	-19.11	29.39	Peak

CHANNEL BANDWIDTH: 10MHz / QPSK

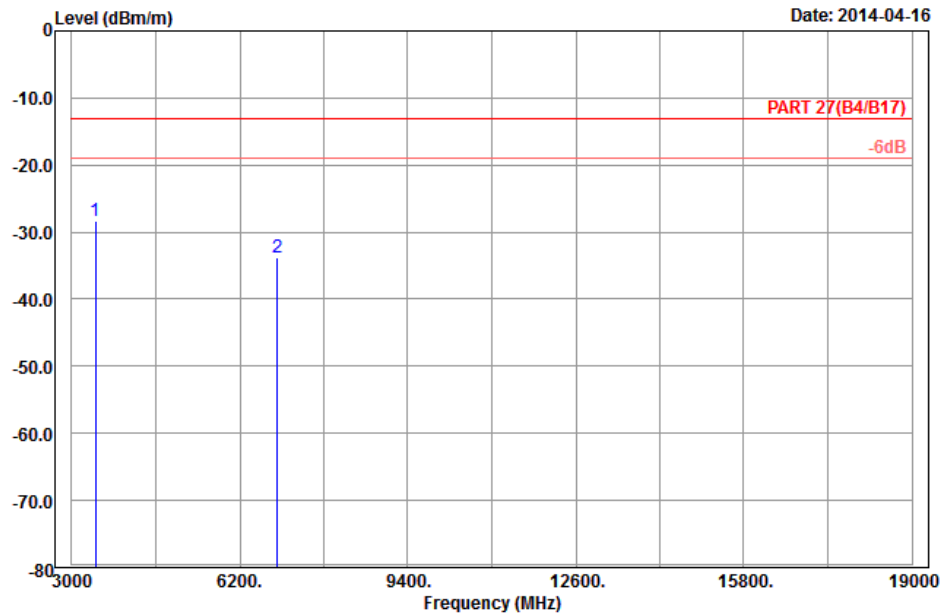


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A D T

Data: 9

Date: 2014-04-16



Site : 966 chamber 5
Condition: PART 27(B4/B17) 3m Horizontal
Remark : LTE_Band 4_QPSK(1,0)_10M_CH20175
Tested by: Kay Wu
Plane : Y

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 pp	3456.20	-28.24	-42.59	-13.00	-15.24	14.35	Peak
2	6912.40	-33.69	-56.52	-13.00	-20.69	22.83	Peak

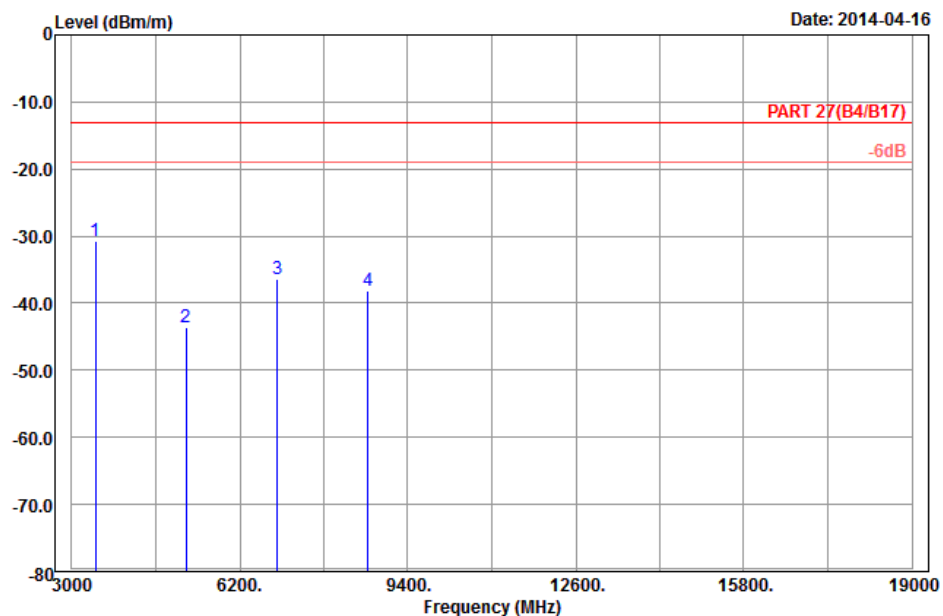


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A D T

Data: 10

Date: 2014-04-16



Site : 966 chamber 5
Condition: PART 27(B4/B17) 3m Vertical
Remark : LTE_Band 4_QPSK(1,0)_10M_CH20175
Tested by: Kay Wu
Plane : Y

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp	3456.20	-30.70	-45.05	-13.00	-17.70	14.35 Peak
2		5184.30	-43.66	-63.68	-13.00	-30.66	20.02 Peak
3		6912.40	-36.50	-59.33	-13.00	-23.50	22.83 Peak
4		8640.50	-38.07	-62.22	-13.00	-25.07	24.15 Peak



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CHANNEL BANDWIDTH: 20MHz / QPSK

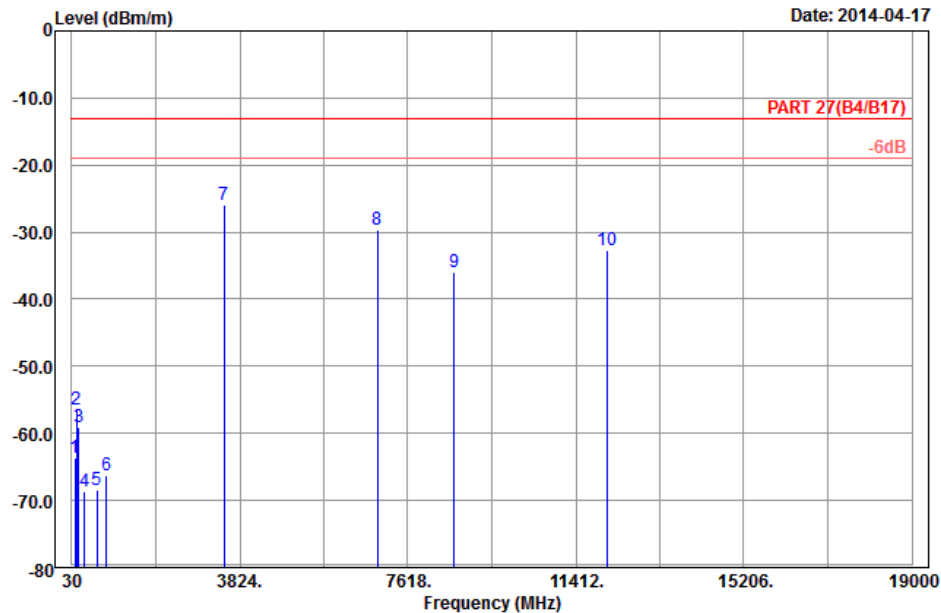


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Data: 13

Date: 2014-04-17



Site : 966 chamber 5
Condition: PART 27(B4/B17) 3m Horizontal
Remark : LTE_Band 4_QPSK(1,50)_20M_CH20175
Tested by: Kay Wu
Plane : Y

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	108.84	-63.57	-54.50	-13.00	-50.57	-9.07	Peak
2	138.27	-56.39	-48.70	-13.00	-43.39	-7.69	Peak
3	182.28	-59.14	-53.53	-13.00	-46.14	-5.61	Peak
4	310.50	-68.71	-62.87	-13.00	-55.71	-5.84	Peak
5	595.40	-68.38	-68.61	-13.00	-55.38	0.23	Peak
6	807.50	-66.37	-68.29	-13.00	-53.37	1.92	Peak
7 pp	3465.00	-25.90	-40.24	-13.00	-12.90	14.34	Peak
8	6930.00	-29.55	-52.42	-13.00	-16.55	22.87	Peak
9	8662.50	-36.07	-60.28	-13.00	-23.07	24.21	Peak
10	12127.50	-32.59	-61.98	-13.00	-19.59	29.39	Peak



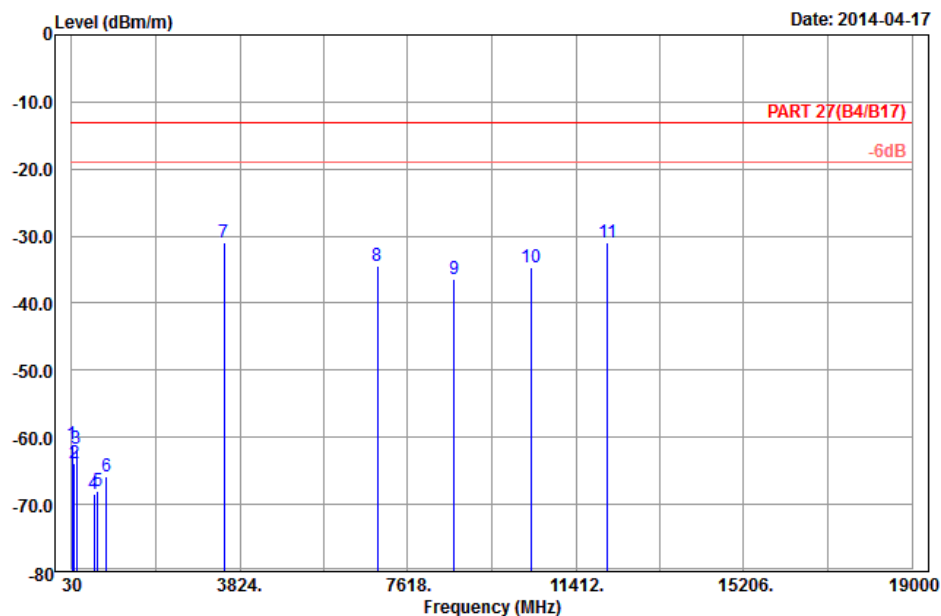
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Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 14



Site : 966 chamber 5
Condition: PART 27(B4/B17) 3m Vertical
Remark : LTE_Band 4_QPSK(1,50)_20M_CH20175
Tested by: Kay Wu
Plane : Y

	Read	Limit	Over			
Freq	Level	Level	Line	Limit	Factor	Remark
MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	31.62 -61.03	-50.27	-13.00	-48.03	-10.76	Peak
2	82.11 -63.85	-52.30	-13.00	-50.85	-11.55	Peak
3	139.35 -61.79	-54.10	-13.00	-48.79	-7.69	Peak
4	525.40 -68.50	-65.06	-13.00	-55.50	-3.44	Peak
5	615.70 -67.92	-68.17	-13.00	-54.92	0.25	Peak
6	808.20 -65.88	-67.80	-13.00	-52.88	1.92	Peak
7 pp	3465.00 -31.05	-45.39	-13.00	-18.05	14.34	Peak
8	6930.00 -34.39	-57.26	-13.00	-21.39	22.87	Peak
9	8662.50 -36.51	-60.72	-13.00	-23.51	24.21	Peak
10	10395.00 -34.76	-61.52	-13.00	-21.76	26.76	Peak
11	12127.50 -31.05	-60.44	-13.00	-18.05	29.39	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:

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Fax: 886-2-26051924

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Web Site: www.adt.com.tw

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



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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.

---END---