

HCT CO., LTD.

CERTIFICATE OF COMPLIANCE FCC Certification

Applicant Name: Pantech Co., Ltd.

Address:

Pantech Bldg, I-2, DMC, Sangam-dong, Mapo-gu, Seoul, 121-792, Korea

Date of Issue: August 16, 2012 Location: HCT CO., LTD., 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, Korea Test Report No.: HCTR1207FR07-2 HCT FRN: 0005866421

FCC ID:	JYCSPARKLE	
APPLICANT:	Pantech Co., Ltd.	
FCC Model(s):	UML295	
EUT Type:	CDMA/GSM/WCDMA/LTE Dat	ta Dongle
FCC Classification:	PCS Licensed Transmitter (PC	CB)
FCC Rule Part(s):	§2,§27	
Tx Frequency:		ΓΕ_4: 5 MHz)/ 1715.0 MHz – 1750.0 MHz (LTE_4: 10 MHz) ΓΕ_4: 15 MHz)/ 1720.0 MHz – 1745.0 MHz (LTE_4: 20 MHz)
Max. RF Output Power:	Band 13 (10 MHz):	0.218W ERP (QPSK) (23.38 dBm) 0.228W ERP (16-QAM) (23.58 dBm)
	Band 4 (5 MHz):	1.052 W EIRP (QPSK) (28.40 dBm) 0.979 W EIRP (16-QAM) (28.37 dBm)
	Band 4 (10 MHz):	0.838 W EIRP (QPSK) (28.33 dBm) 0.778 W EIRP (16-QAM) (28.11 dBm)
	Band 4 (15 MHz):	0.914 W EIRP (QPSK) (28.51 dBm) 0.885 W EIRP (16-QAM) (28.47 dBm)
	Band 4 (20 MHz):	0.566 W EIRP (QPSK) (27.53 dBm) 0.593 W EIRP (16-QAM) (27.73 dBm)

The measurements shown in this report were made in accordance with the procedures specified in §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Repórt prèpàred by : Hyo Sun Kwak Test engineer of RF Team

Approved by : Chang Seok Choi Manager of RF Team

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCTR1207FR07 July 18, 2012		First Approval Report
HCTR1207FR07-1	July 30, 2012	Revise page 4
HCTR1207FR07-2 August 16, 2012		Revise section 7.5, 7.6 note

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	Pantech Co., Ltd.				
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FCC ID:	JYCSPARKLE				
Application Type:	Certification				
FCC Classification:	PCS Licensed Trans	smitter (PCB)			
FCC Rule Part(s):	§2 , §27	§2 , §27			
EUT Type:	CDMA/GSM/WCDM	IA/LTE Data Dongle			
FCC Model(s):	UML295				
Tx Frequency:	1717.5 MHz – 174	.5 MHz (LTE_4: 5 MHz)/ 1715.0 MHz – 1750.0 MHz (LTE_4: 10 MHz) 7.5 MHz (LTE_4: 15 MHz)/ 1720.0 MHz – 1745.0 MHz (LTE_4: 20			
Max. RF Output Power:	MHz) Band 13:	0.218W (23.38 dBm) ERP (QPSK) 0.228W (23.58 dBm) ERP (16-QAM)			
	Band 4 (5 MHz):	1.052 W EIRP (QPSK) (28.40 dBm) 0.979 W EIRP (16-QAM) (28.37 dBm)			
	Band 4 (10 MHz):	0.838 W EIRP (QPSK) (28.33 dBm) 0.778 W EIRP (16-QAM) (28.11 dBm)			
	Band 4 (15 MHz):	0.914 W EIRP (QPSK) (28.51 dBm) 0.885 W EIRP (16-QAM) (28.47 dBm)			
	Band 4 (20 MHz):	0.566 W EIRP (QPSK) (27.53 dBm) 0.593 W EIRP (16-QAM) (27.73 dBm)			
Emission Designator(s):	Band 13: Band 4 (5 MHz): Band 4 (10 MHz): Band 4 (15 MHz): Band 4 (20 MHz):	8M96G7D (QPSK) / 8M95W7D (16-QAM) 4M50G7D (QPSK) / 4M49W7D (16-QAM) 8M98G7D (QPSK) / 8M99W7D (16-QAM) 13M5G7D (QPSK) / 13M5W7D (16-QAM) 18M0G7D (QPSK) / 17M9W7D (16-QAM)			
Date(s) of Tests:	June 10, 2012 ~ Jul	y 13, 2012			
Antenna Specification	Manufacturer: Kar	am Solution			
	Antenna type: INT				
	Peak Gain: Band 4 Band 7	4 :3.77 dBi 13:1.58 dBi			

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2. INTRODUCTION

2.1. EUT DESCRIPTION

The Pantech Co., Ltd. UML295 CDMA/GSM/WCDMA/LTE Data Dongle consists of GSM850, GSM1900, GPRS Class10, GPRS mode Class B(GPRS and GSM, but not simultaneously), EDGE, WCDMA850, WCDMA1900, HSDPA and HSUPA.

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 105-1, Jangam-ri, Majang-Myeon, Icheon-si, Kyunggi-Do, 467-811, Korea. The site is constructed in conformance with the requirements of ANSI C63.4 and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated March 02, 2011 (Registration Number: 90661)

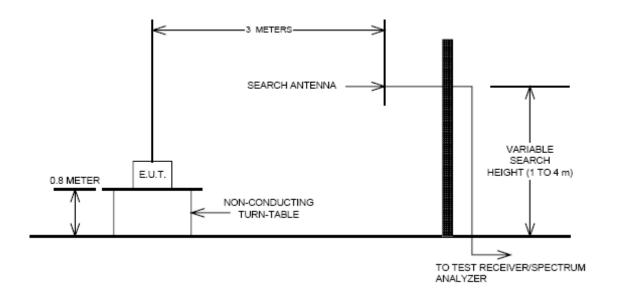
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3. DESCRIPTION OF TESTS

3.1 EFFECTIVE RADIATED POWER/EQUIVALENT ISOTROPIC RADIATED POWER

Test Set-up



Test Procedure

Radiated emission measurements were performed at an SAC(Semi-Anechoic Chamber)

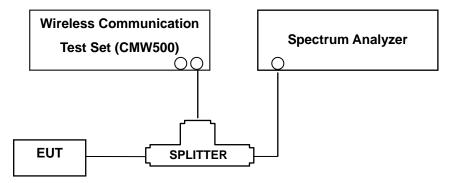
The equipment under test is placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. A styrofoam turntable was rotated 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the previously recorded signal was duplicated.

The maximum EIRP was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

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Test set-up



(Configuration of conducted Emission measurement) Test Procedure

The EUT was setup to maximum output power at its lowest channel. The occupied bandwidth was measured using a spectrum analyzer. The measurements are repeated for the highest and a middle channel. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. Plots of the EUT's occupied bandwidth are shown herein.

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3.3 BLOCK FREQUENCY RANGE

Two paired channels of 11 megahertz each are available for assignment in Block C in the 746–757 MHz and 776 – 787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746 – 757 MHz and 776 – 787 MHz bands will instead be made available for assignment at a subsequent auction as follows:

(i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746–752 MHz and 776–782 MHz bands.

(ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752–757 MHz and 782–787 MHz bands

MOBILE							
17	1710 1720		1730 1735		1740 1745		1755
	A	В	с	D	E	F	
	BLOCK 1: 1	710 – 1720 MHz (A)		BLOCK 4	k: 1735 – 1	740 MHz (D)	
		720 – 1730 MHz (B) 730 – 1735 MHz (C)				745 MHz (E) 755 MHz (F)	

3.4 AWS - MOBILE FREQUENCY BLOCKS

§27.5(h)

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§27.50(d)(5)

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a giver bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

3.6 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

The EUT was setup to maximum output power at its lowest channel. The Resolution BW of the analyzer is set to 1 % of the emission bandwidth to show compliance with the - 13 dBm limit, in the 1 MHz bands immediately outside and adjacent to the edge of the frequency block. The 1 MHz RBW was used to scan from 30 MHz to 26.5 GHz. A display line was placed at - 13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

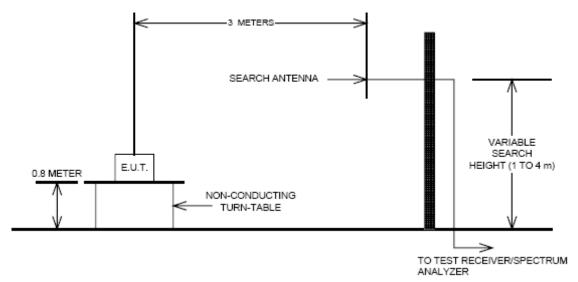
- Band Edge Requirement : In the 1MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. Limit, -13dBm.

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3.7 RADIATED SPURIOUS AND HARMONIC EMISSIONS

Test Set-up



The measurement facilities used for this test have been documented in previous filings with the commission pursuant to section § 2.948. The Fully-anechoic chamber meets requirements in ANSI C63.4 –2003. A mast capable of lifting the receiving antenna from a height of one to four meters is used together with a rotatable platform mounted at three from the antenna mast.

- 1) The unit mounted on a turntable 1.5 m × 1.0 m × 0.80 m is 0.8 meter above test site ground level.
- 2) During the emission test, the turntable is rotated and the EUT is manipulated to find the configuration resulting in maximum emission under normal condition of installation and operation.
- 3) The antenna height and polarization are also varied from 1 to 4 meters until the maximum signal is found.
- 4) The spectrum shall be scanned up to the 10th harmonic of the fundamental frequency.

Test Procedure

The equipment under test is placed on a non-conductive table 3-meters from the receive antenna. A turntable was rotated 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the previously recorded signal was duplicated.

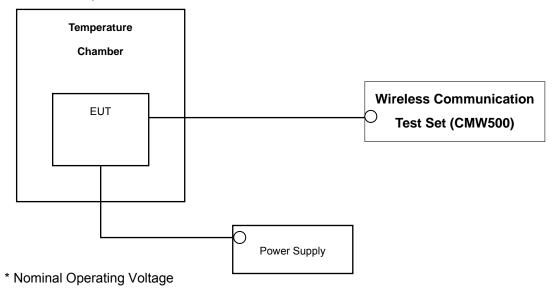
The maximum EIRP was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

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3.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



Test Procedure

The frequency stability of the transmitter is measured by:

a.) Temperature: The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from battery end point to 115 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within \pm 0.000 25 %(\pm 2.5 ppm) of the center frequency.

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

1. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one halfhour is provided to allow stabilization of the equipment at each temperature level. **NOTE: The EUT is tested down to the battery endpoint.**

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4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment Num		Calibration Interval	Calibration Due
Agilent	N9020A	MY51110020	Annual	09/23/2012
Agilent	E9327A/ Power Sensor	MY4442009	Annual	05/02/2013
R&S	CMW500/ Base Station	1201.0002K50_116858	Annual	01/17/2013
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/24/2012
Wainwright	WHK1.2/15G-10EF/H.P.F	2	Annual	05/02/2013
Wainwright	WHK3.3/18G-10EF/H.P.F 1		Annual	05/02/2013
Hewlett Packard	11667B / Power Splitter	10126	Annual	11/04/2012
Digital	EP-3010/ Power Supply	3110117	Annual	11/07/2012
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/11/2013
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	03/11/2013
Korea Engineering	KR-1005L / Chamber	KRAB05063-3CH	Annual	11/07/2012
Schwarzbeck	BBHA 9120D/ Horn Antenna	20D/ Horn Antenna 296		02/20/2014
Agilent	E4440A/Spectrum Analyzer	US45303008	Annual	05/02/2013
WEINSCHEL	ATTENUATOR	BR0592	Annual	11/07/2012
REOHDE&SCHWARZ	FSP30/Spectrum Analyzer	839117/011	Annual	02/09/2013
Agilent	8960 (E5515C)/ Base Station	GB44400269	Annual	02/10/2013

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5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049, 27.53(h)(1)	Occupied Bandwidth	N/A		PASS
2.1051, 27.53(h)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	< 43 +10 log ₁₀ (P[Watts]) at Band Edge and for all-of-band emissions		PASS
27.50(d)(5)	Peak-Average Ratio	< 13 dB	CONDUCTED	PASS
2.1046	Conducted Output Power	N/A		PASS
2.1055, 27.54	Frequency stability / variation of ambient temperature	< 2.5 ppm		PASS
27.50(c)(10)	Effective Radiated Power(Band 13)	< 3 Watts max. ERP		PASS
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 4)	< 1 Watts max. EIRP	RADIATED	PASS
2.1053, 27.53(h),27.53(g)	Undesirable Out-of-Band Emissions	< 43 +10 log10 (P[Watts]) for all out- of-band emissions		PASS

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6. SAMPLE CALCULATION

A. ERP Sample Calculation

Mode	Ch./ Freq.		Measured	Substitude	Ant Coin	<u></u>	Del	ERP	
	channel	Freq.(MHz)	Level(dBm)	LEVEL(dBm)	Ant. Gain	C.L	Pol.	w	dBm
LTE	23230	782	-11.56	34.28	-8.32	1.17	Н	0.30	24.79

ERP = SubstitudeLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a wooden tripod is 0.8 meter above test site ground level.

2) During the test, the turn table is rotated and the antenna height is also varied from 1 to 4 meters until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (**ERP**).

B. Emission Designator

QPSK Modulation

Emission Designator = 8M95G7D

- LTE BW = 8.95 MHz
- G = Phase Modulation
- 7 = Quantized/Digital Info
- D = Amplitude/Angle Modulated

16QAM Modulation

Emission Designator = 8M94W7D

LTE BW = 8.94 MHz

- D = Amplitude/Angle Modulated
- 7 = Quantized/Digital Info
- W = Combination (Audio/Data)

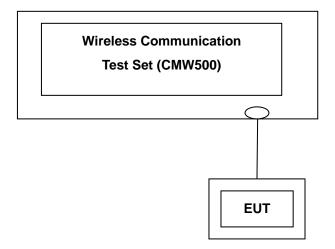
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7. TEST DATA

7.1 CONDUCTED OUTPUT POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Test Result

Band	Frequency(Mhz)	Channel	Resource	Resource Block	Average Po	Power [dBm] 16-QAM 21.75 21.76 20.72	
			Block Size	Offset	QPSK	16-QAM 21.75 21.76 20.72	
			1	0	23.10	21.75	
	790	22220	1	49	23.15	21.76	
LTE	782	23230	25	12	21.69	20.72	
			50	0	21.69	20.68	

LTE Conducted Average Output Powers (Band 13)

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Band Fre	Frequency(MHz)	Channel Resource Block Size	Resource Block	Average Po	wer [dBm]	
			Block Size	Offset	QPSK	16-QAM
		12.5 19975	1	0	23.96	22.51
LTE	1710 5		1	24	23.99	22.62
LIE	1712.5		12	6	22.97	21.90
			25	0	22.82	21.85

LTE Conducted Average Output Powers (5 MHz Band 4 LTE – Low Channel)

Band Frequency(MHz	Frequency(MHz)	Channel	Resource	Resource Block	Average Power [dBm]	
		Block Size	Offset	QPSK	16-QAM	
			1	0	23.86	22.65
LTE	1732.5	20175	1	24	23.74	22.57
	1732.5		12	6	22.83	21.70
			25	0	22.70	21.68

LTE Conducted Average Output Powers (5 MHz Band 4 LTE – Mid Channel)

Band Frequency(MH	Frequency(MHz)	Channel	Resource	Resource Block	Average Po	wer [dBm]
			Block Size	Offset	QPSK	16-QAM
		20275	1	0	23.65	22.39
	1752.5		1	24	23.89	22.69
LTE	1752.5	20375	12	6	22.73	21.65
			25	0	22.70	21.73

LTE Conducted Average Output Powers (5 MHz Band 4 LTE – High Channel)

Band Frequency(N	Frequency(MHz)		Resource	Resource Block	Average Power [dBm]	
			Block Size	Offset	QPSK	16-QAM
		20000	1	0	23.76	22.47
	1715.0		1	49	23.92	22.62
LTE	1715.0		25	12	22.80	21.81
			50	0	22.75	21.78

LTE Conducted Average Output Powers (10 MHz Band 4 LTE – Low Channel)

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Band	Frequency(MHz)	Channel	Resource	Resource Block	Average Power [dBm]	
			Block Size	Offset	QPSK	16-QAM
			1	0	23.79	22.45
LTE	1732.5	20175	1	49	23.69	22.36
LIE	1732.5		25	12	22.71	21.75
			50	0	22.73	21.69

LTE Conducted Average Output Powers (10 MHz Band 4 LTE – Mid Channel)

Band Frequency(M	Frequency(MHz)	Channel Resource Block Size	Resource Block	Average Power [dBm]		
			Block Size	Offset	QPSK	16-QAM
			1	0	23.54	22.06
	1750.0	20250	1	49	23.56	22.24
LTE	1750.0	20350	25	12	22.30	21.38
			50	0	22.20	21.18

LTE Conducted Average Output Powers (10 MHz Band 4 LTE – High Channel)

Band Frequency(M	Frequency(MHz)	quency(MHz) Channel Resource Block Size		Resource Block	Average Po	wer [dBm]
			Block Size	Offset	QPSK	16-QAM
		20025	1	0	23.99	22.72
LTE	1717.5		1	74	23.92	22.67
LIE	1717.5		36	18	22.80	21.77
			75	0	22.70	21.72

LTE Conducted Average Output Powers (15 MHz Band 4 LTE – Low Channel)

Band Frequenc	Frequency(MHz)	(MHz) Channel	Resource	Resource Block	Average Power [dBm]	
			Block Size	Offset	QPSK	16-QAM
		20175	1	0	23.68	22.51
	1720 5		1	74	23.67	22.40
LTE	1732.5		36	18	22.47	21.46
			75	0	22.48	21.33

LTE Conducted Average Output Powers (15 MHz Band 4 LTE – Mid Channel)

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Band Frequen	Frequency(MHz)	Resource	Resource Block	Average Po	wer [dBm]	
			Block Size	Offset	QPSK	16-QAM
		20225	1	0	23.60	22.23
	1747.5		1	74	23.70	22.57
LTE	1747.5	20325	36	18	22.32	21.35
			75	0	22.36	21.33

LTE Conducted Average Output Powers (15 MHz Band 4 LTE – High Channel)

Band Frequency(M	Frequency(MHz)	Resource	Resource Block	Average Power [dBm]		
			Block Size	Offset	QPSK	16-QAM
		20050	1	0	23.90	22.78
	1720.0		1	99	23.93	22.72
LTE	1720.0		50	25	22.74	21.68
			100	0	22.73	21.74

LTE Conducted Average Output Powers (20 MHz Band 4 LTE – Low Channel)

Band	Band Frequency(MHz)		Resource	Resource Block	Average Powe	
			Block Size	Offset	QPSK	16-QAM
		20175	1	0	23.83	22.78
LTE	1732.5		1	99	23.53	22.33
LTE 1732.5	1732.5		50	25	22.61	21.55
			100	0	22.59	21.58

LTE Conducted Average Output Powers (20 MHz Band 4 LTE – Mid Channel)

Band	Frequency(MHz)	Channel	Resource	Resource Block	Average Power [dBm	
	,		Block Size	Offset	QPSK	16-QAM
		20300	1	0	23.63	22.65
	1745 0		1	99	23.55	22.60
LTE 1745.0	1745.0		50	25	22.23	21.30
			100	0	22.29	21.38

LTE Conducted Average Output Powers (20 MHz Band 4 LTE – High Channel)

Note : Detecting mode is average.

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7.2 PEAK-TO-AVERAGE RATIO

Band	Channel	Frequency(MHz)	Bandwidth	Modulation	PAR
LTE BAND 13			10 MHz	QPSK	4.50
LTE DAND 13	23230	782	TO WITZ	16-QAM	5.42
LTE BAND 4	20175	1732.5	5 MHz	QPSK	4.39
			10 MHz	QPSK	4.59
			15 MHz	QPSK	4.54
			20 MHz	QPSK	4.78

- Plots of the EUT's Peak- to- Average Ratio are shown Page 43 ~ 45.

7.3 OCCUPIED BANDWIDTH

Band 13

Band	Frequency(Mhz)	Modulation	Resource Block Size	Resource Block Offset	Data(RB 1:KHz / RB 25,50:MHz)
	782		1	0	-
	782	QPSK	1	49	-
	782		25	12	-
LTE	782		50	-	8.9641
	782		1	0	-
	782	16.04M	1	49	-
	782	16-QAM	25	12	-
	782		50	-	8.9535

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Band 4

Band	Frequency(MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (RB 1 : KHz / RB 25,50 : MHz)
			1	0	-
		QPSK	1	24	-
		QFOR	12	6	-
			25	0	4.5033
			1	0	-
		16-QAM	1	24	-
			12	6	-
			25	0	4.4943
			1	0	-
		QPSK	1	49	-
		QFSK	25	12	-
			50	0	8.9827
		16-QAM	1	0	-
			1	49	-
			25	12	-
LTE	1732.5		50	0	8.9860
Band 4	1752.5	QPSK	1	0	-
			1	74	-
			36	18	-
			75	0	13.4480
			1	0	-
		16-QAM	1	74	-
		10-QAM	36	18	-
			75	0	13.4790
			1	0	-
		QPSK	1	99	-
		QF SN	50	25	-
			100	0	17.9740
			1	0	-
		16-QAM	1	99	-
			50	25	-
			100	0	17.9190

- Plots of the EUT's Occupied Bandwidth are shown Page 38 ~ 42.

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7.4 CONDUCTED SPURIOUS EMISSIONS

Band 13

Band	Frequency (Mhz)	Modulation	Resource Block Size	Resource Block Offset	Frequency of Maximum Harmonic (GHz)	Maximum Data [dBm]
	782		1	0	-	-
-	782	QPSK	1	49	7.7140	-39.064
	782		25	12	-	-
LTE	782		50	-	-	-
	782		1	0	-	-
	782	10.0444	1	49	6.0970	-38.670
	782	16-QAM	25	12	-	-
	782		50	-	-	-

Band 4

Band	Frequency (Mhz)	Modulation	Resource Block Size	Resource Block Offset	Frequency of Maximum Harmonic (GHz)	Maximum Data [dBm]
	1712.5	QPSK	1	24	3.42977	-39.030
	1732.5		1	0	3.42977	-39.399
	1752.5	(5 MHz) QPSK	1	24	3.50953	-36.546
	1715.0		1	49	3.43974	-35.212
	1732.5		1	0	3.45968	-42.765
LTE	1750.0	(10 MHz)	1	49	3.50953	-36.767
Band 4	1717.5	QPSK	1	0	3.41980	-34.205
	1732.5		1	0	3.44971	-35.006
	1747.5	(15 MHz)	1	0	3.47962	-30.466
	1720.0		1	99	3.45968	-34.151
	1732.5		1	0	3.44971	-37.799
	1745.0	(20 MHz)	1	0	3.46965	-34.292

- Plots of the EUT's Conducted Spurious Emissions are shown Page 66 ~ 79.

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7.4.1 BAND EDGE

Note : In the 763 – 775 MHz and 793 – 805 MHz band, the FCC limit is 65 + 10log₁₀(P_[Watts]) = - 35 dBm in a 6.25 KHz bandwidth. By using a 10KHz bandwidth, the limit was adjusted by 10log₁₀(10KHz/6.25KHz) = 2.04 dB.

<u>LIMIT : - 35 dBm + 2.04 dB = - 32.96 dBm.</u>

- Plots of the EUT's Band Edge are shown Page 46 ~ 65.

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7.5 EFFECTIVE RADIATED POWER OUTPUT

Ch /	Freq		Measured	Substitude	Ant.		5.1	ERP	
channel	Freq (MHz)	Modulation	Level (dBm)	Level (dBm)	Gain(dBd)	C.L	Pol	w	dBm
22220	792.00	QPSK	-12.75	35.43	-10.52	1.53	Н	0.218	23.38
23230 782.00	16-QAM	-12.55	35.63	-10.52	1.53	Н	0.228	23.58	

Effective Radiated Power Output Data (Band 13_10 MHz)

Note: Worst case is 1 resource block size and 49 resource block offset. This unit was tested with a notebook computer.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For 1 MHz BW signals, a peak detector is used, with RBW = VBW = 1 MHz. For 10 MHz BW signals, a peak detector is used, with RBW = VBW = 10 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is x plane in LTE mode. Also worst case of detecting Antenna is horizontal polarization in LTE mode.

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Freq	Bandwidth	Modulation	Measured Level (dBm)	Substitude	Ant.	C.L	Pol	ER	RP.
(MHz)				Level (aBm)	Gain(dBi)			W	dBm
1712.5		QPSK	-10.87	20.49	9.55	1.64	V	0.69	28.40
1712.5		16-QAM	-10.90	20.46	9.55	1.64	V	0.69	28.37
1732.5	5 MHz	QPSK	-13.23	18.27	9.65	1.65	V	0.42	26.27
1732.5		16-QAM	-13.71	17.79	9.65	1.65	V	0.38	25.79
1752.5		QPSK	-12.68	18.84	9.75	1.69	V	0.49	26.90
		16-QAM	-12.81	18.71	9.75	1.69	V	0.48	26.77

7.6 EQUIVALENT ISOTROPIC RADIATED POWER OUTPUT

Equivalent Isotropic Radiated Power Output Data (Band 4_5 MHz)

Note: Worst case is low channel(1712.5MHz), 1 resource block size and 24 resource block offset.

Freq	Bandwidth	Modulation	Measured Si Level (dBm) Le	Substitude	Ant.	C.L	Pol	ERP	
(MHz)				Level (dBm)	Gain(dBi)			W	dBm
1715.0	0	QPSK	-10.94	20.42	9.55	1.64	V	0.68	28.33
1715.0		16-QAM	-11.16	20.20	9.55	1.64	V	0.65	28.11
1732.5	10 MHz	QPSK	-13.04	18.46	9.65	1.65	V	0.44	26.46
1752.5		16-QAM	-13.01	18.49	9.65	1.65	V	0.45	26.49
1750.0		QPSK	-12.46	19.06	9.75	1.69	V	0.52	27.12
		16-QAM	-12.62	18.90	9.75	1.69	V	0.50	26.96

Equivalent Isotropic Radiated Power Output Data (Band 4_10 MHz)

Note: Worst case is low channel(1715.0MHz), 1 resource block size and 49 resource block offset.

Freq	Bandwidth	Modulation	Measured	Substitude	Ant.	C.L	Pol	EF	RP
(MHz)			Level (dBm)	Level (aBm)	Gain(dBi)			W	dBm
1717 5		QPSK	-10.76	20.60	9.55	1.64	V	0.71	28.51
1717.5		16-QAM	-10.80	20.56	9.55	1.64	V	0.70	28.47
1732.5	15 MHz	QPSK	-12.95	18.55	9.65	1.65	V	0.45	26.55
1752.5		16-QAM	-13.19	18.31	9.65	1.65	V	0.43	26.31
1747 5		QPSK	-11.89	19.63	9.75	1.69	V	0.59	27.69
1747.5		16-QAM	-12.04	19.48	9.75	1.69	V	0.57	27.54

Equivalent Isotropic Radiated Power Output Data (Band 4_15 MHz)

Note: Worst case is low channel(1717.5MHz), 1 resource block size and 0 resource block offset.

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Freq	Bandwidth	Modulation	Measured	Substitude	Ant.	C.L	Pol	ER	P
(MHz)			Level (dBm)	Level (dBm)	Gain(dBi)			W	dBm
1720.0		QPSK	-13.71	18.04	10.03	1.71	V	0.433	26.36
1720.0		16-QAM	-13.44	18.31	10.03	1.71	V	0.460	26.63
1732.5	20 MHz	QPSK	-12.52	19.20	10.06	1.73	V	0.566	27.53
1732.5		16-QAM	-12.32	19.40	10.06	1.73	V	0.593	27.73
1745.0	745.0	QPSK	-13.23	18.50	10.10	1.73	V	0.486	26.87
1745.0		16-QAM	-13.07	18.66	10.10	1.73	V	0.505	27.03

Equivalent Isotropic Radiated Power Output Data (Band 4_20 MHz)

Note: Worst case is mid channel(1732.5MHz), 1 resource block size and 0 resource block offset.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For 1 MHz BW signals, a peak detector is used, with RBW = VBW = 1 MHz. For 10 MHz BW signals, a peak detector is used, with RBW = VBW = 10 MHz. A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the Horn antenna is measured. The difference between the gain of the horn and an isotropic antenna is taken into consideration and the EIRP is recorded.

Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is x plane in LTE mode. Also worst case of detecting Antenna is horizontal polarization in LTE mode.

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7.7 RADIATED SPURIOUS EMISSIONS

7.7.1 RADIATED SPURIOUS EMISSIONS (Band 13)

- OPERATING FREQUENCY : 782.00 MHz
- MEASURED OUTPUT POWER: 23.58 dBm = 0.228 W
- MODULATION SIGNAL: QPSK
- DISTANCE:
- LIMIT: (43 + 10 log10 (W)) =

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
23230 (782.00)	2346.00	-55.77	10.57	-61.21	2.14	V	-52.78	-76.36
	3128.00	-	-	-	-	-	-	-
	3910.00	-	-	-	-	-	-	-

3 meters

- 36.58 dBc

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

4. Worst case is 1 resource block.

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7.7.2 RADIATED SPURIOUS EMISSIONS (Band 4)

OPERATING FREQUENCY : 1712.5 MHz

MEASURED OUTPUT POWER: <u>30.22 dBm = 0.692W</u>

MODULATION SIGNAL: 5 MHz QPSK

DISTANCE:

■ LIMIT: - (43 + 10 log10 (W)) = _____ - 41.40 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
19975	3,425.00	-42.55	12.03	-46.64	5.14	V	-39.75	-68.15
	5,137.50	-	-	-	-	-	-	-
(1712.5)	6,850.00	-	-	-	-	-	-	-
20175	3,465.00	-51.52	12.12	-55.78	4.56	Н	-48.22	-76.62
	5,197.50	-	-	-	-	-	-	-
(1732.5)	6,930.00	-	-	-	-	-	-	-
20375 (1752.5)	3,505.00	-44.73	12.22	-47.68	5.07	V	-40.53	-68.93
	5,257.50	-	-	-	-	-	-	-
	7,010.00	-	-	-	-	-	-	-

<u>3 meters</u>

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

4. Worst case is 1 resource block.

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- OPERATING FREQUENCY : 1715.0 MHz
- MEASURED OUTPUT POWER: 28.33 dBm = 0.681W
- MODULATION SIGNAL: <u>10 MHz QPSK</u>

DISTANCE:

■ LIMIT: - (43 + 10 log10 (W)) = _____ - 41.33 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20000	3,430.00	-45.31	12.03	-49.40	5.14	Н	-42.51	-70.84
(1715.0)	5,145.00	-	-	-	-	I	-	-
(1715.0)	6,860.00	-	-	-	-	I	-	-
20175	3,465.00	-52.02	12.12	-56.28	4.56	Н	-48.72	-77.05
(1732.5)	5,197.50	-	-	-	-	-	-	-
(1752.5)	6,930.00	-	-	-	-	-	-	-
20250	3,500.00	-45.72	12.22	-48.67	5.07	Н	-41.52	-69.85
20350 (1750.0)	5,250.00	-	-	-	-	-	-	-
	7,000.00	-	-	-	-	-	-	-

3 meters

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

<u>3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.</u>
 <u>4. Worst case is 1 resource block.</u>

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- OPERATING FREQUENCY : 1717.5 MHz
- MEASURED OUTPUT POWER: 28.51 dBm = 0.710W
- MODULATION SIGNAL: 15 MHz QPSK

DISTANCE:

■ LIMIT: - (43 + 10 log10 (W)) = _____ - 41.51 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20025	3,435.00	-39.81	12.03	-43.90	5.14	Н	-37.01	-65.52
(1717.5)	5,152.50	-	-	-	-	I	-	-
(1717.5)	6,870.00	-	-	-	-	I	-	-
20175	3,465.00	-51.39	12.12	-55.65	4.56	Н	-48.09	-76.60
	5,197.50	-	-	-	-	-	-	-
(1732.5)	6,930.00	-	-	-	-	-	-	-
20225	3,495.00	-49.60	12.22	-52.55	5.07	Н	-45.40	-73.91
20325 (1747.5)	5,242.50	-	-	-	-	-	-	-
	6,990.00	-	-	-	_	-	-	-

3 meters

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u> <u>according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:</u>

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

<u>3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.</u>
<u>4. Worst case is 1 resource block.</u>

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- OPERATING FREQUENCY : 1732.50 MHz
- MEASURED OUTPUT POWER: 27.73 dBm = 0.593W
- MODULATION SIGNAL: 20 MHz 16-QAM
- DISTANCE:

■ LIMIT: - (43 + 10 log10 (W)) = _____ - 40.73 dBc

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitude Level (dBm)	C.L	Pol	ERP (dBm)	dBc
20050	3,440.00	-50.06	12.16	-56.63	2.52	Н	-46.99	-74.72
	5,160.00	-	-	-	-	-	-	-
(1720.0)	6,880.00	-	-	-	-	-	-	-
20175	3,465.00	-47.04	12.24	-53.51	2.49	Н	-43.76	-71.49
	5,197.50	-	-	-	-	-	-	-
(1732.5)	6,930.00	-	-	-	-	-	-	-
20200	3,490.00	-50.94	12.34	-56.96	2.53	Н	-47.15	-74.88
20300	5,235.00	-	-	-	-	-	-	-
(1745.0)	6,980.00	-	-	-	-	-	-	-

3 meters

 NOTES:
 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method

 according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for all channel.

<u>3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.</u>
<u>4. Worst case is 1 resource block.</u>

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7.7.3 RADIATED SPURIOUS EMISSIONS (1559 ~ 1610 MHz Band)_Band 13

OPERATING FREQUENCY :	782.00 MHz

- MODULATION SIGNAL: QPSK
- DISTANCE: <u>3 meters</u>
- NARROWBAND EMISSION LIMIT: _____ 50 dBm

WIDEBAND EMISSION LIMIT: - 40 dBm/MHz

FREQUENCY (MHz)	EMISSION TYPE	Measured Level (dBm)		Substitude Level (dBm)	C.L	Pol	ERP (dBm)	MARGIN (dB)
1596.1	WIDEBAND	-53.75	8.91	-62.25	1.71	H	-55.05	-15.05

NOTES: <u>1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method</u>

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

2. The magnitude of spurious emissions attenuated more than 20dB below the limit above 5th Harmonic for <u>all channel.</u>

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

4. Worst case is 1 resource block.

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7.8 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE 7.8.1 FREQUENCY STABILITY (LTE Band 13)

OPERATING FREQUENCY:

CHANNEL:

REFERENCE VOLTAGE:

DEVIATION LIM IT:

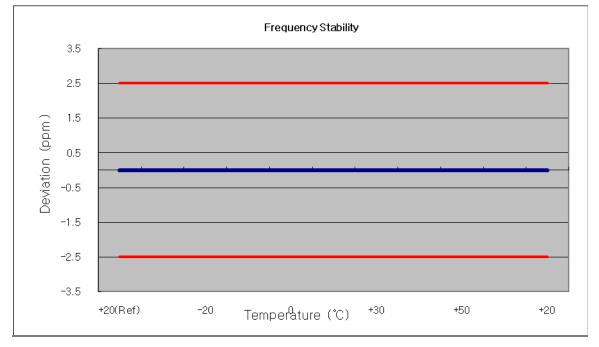
± 0.000 25 % or 2.5 ppm

782,000,000 Hz

23230

5 VDC

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°°)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	781 999 999	0	0.000 000	0.000
100%		-30	781 999 998	-2.20	0.000 000	-0.003
100%		-20	781 999 997	-3.10	0.000 000	-0.004
100%		-10	781 999 999	-0.51	0.000 000	-0.001
100%	3.700	0	782 000 003	3.09	0.000 000	0.004
100%		+10	781 999 997	-2.95	0.000 000	-0.004
100%		+30	782 000 002	1.76	0.000 000	0.002
100%		+40	781 999 998	-1.60	0.000 000	-0.002
100%		+50	781 999 997	-3.20	0.000 000	-0.004
115%	4.255	+20	781 999 995	-4.56	-0.000 001	-0.006
Batt. Endpoint	3.400	+20	782 000 001	1.12	0.000 000	0.001



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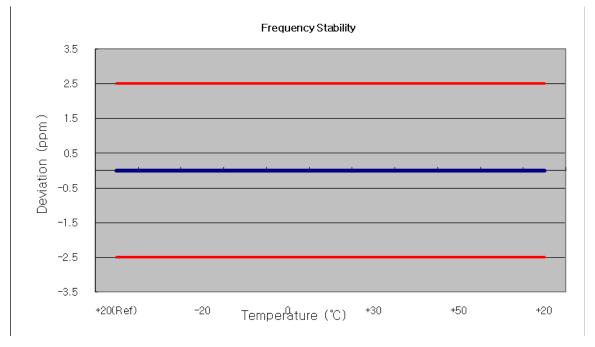


7.8.2 FREQUENCY STABILITY (LTE Band 4)

OPERATING FREQUENCY:	1732,500,000 Hz
CHANNEL:	20175 (5 MHz)
REFERENCE VOLTAGE:	3.70 VDC

DEVIATION LIM IT:

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°°)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	1732 499 998	0	0.000 000	0.000
100%		-30	1732 500 005	5.14	0.000 000	0.003
100%		-20	1732 500 003	3.18	0.000 000	0.002
100%		-10	1732 500 007	7.16	0.000 000	0.004
100%	3.700	0	1732 500 005	4.82	0.000 000	0.003
100%		+10	1732 499 998	-1.93	0.000 000	-0.001
100%		+30	1732 500 002	2.26	0.000 000	0.001
100%		+40	1732 500 002	1.97	0.000 000	0.001
100%		+50	1732 499 998	-1.65	0.000 000	-0.001
115%	4.255	+20	1732 500 001	0.90	0.000 000	0.001
Batt. Endpoint	3.400	+20	1732 500 004	3.99	0.000 000	0.002



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OPERATING FREQUENCY:

CHANNEL:

1732,500,000 Hz

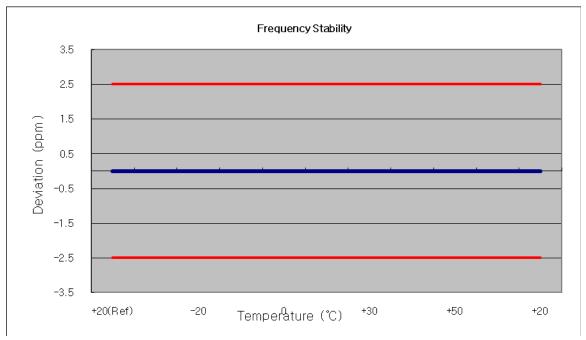
20175 (10 MHz)

REFERENCE VOLTAGE:

DEVIATION LIM IT:

3.70 VDC

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°°)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	1732 499 998	0	0.000 000	0.000
100%		-30	1732 500 004	4.18	0.000 000	0.002
100%		-20	1732 499 999	-1.39	0.000 000	-0.001
100%		-10	1732 500 002	1.89	0.000 000	0.001
100%	3.700	0	1732 500 001	0.67	0.000 000	0.000
100%		+10	1732 500 002	2.25	0.000 000	0.001
100%		+30	1732 500 003	2.78	0.000 000	0.002
100%		+40	1732 499 998	-2.15	0.000 000	-0.001
100%		+50	1732 500 002	1.82	0.000 000	0.001
115%	4.255	+20	1732 499 998	-1.77	0.000 000	-0.001
Batt. Endpoint	3.400	+20	1732 500 008	7.60	0.000 000	0.004



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OPERATING FREQUENCY:

CHANNEL:

1732,500,000 Hz

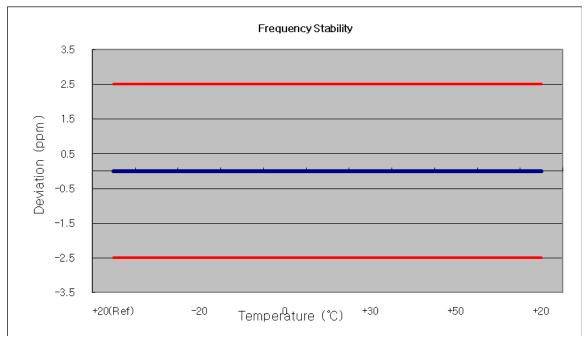
20175 (15 MHz)

REFERENCE VOLTAGE:

DEVIATION LIM IT:

3.70 VDC

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°°)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	1732 500 003	0	0.000 000	0.000
100%		-30	1732 500 002	2.42	0.000 000	0.001
100%		-20	1732 500 004	4.17	0.000 000	0.002
100%		-10	1732 499 997	-3.00	0.000 000	-0.002
100%	3.700	0	1732 500 004	3.91	0.000 000	0.002
100%		+10	1732 499 997	-3.12	0.000 000	-0.002
100%		+30	1732 500 005	5.06	0.000 000	0.003
100%		+40	1732 500 002	1.56	0.000 000	0.001
100%		+50	1732 500 005	4.76	0.000 000	0.003
115%	4.255	+20	1732 500 000	-0.44	0.000 000	0.000
Batt. Endpoint	3.400	+20	1732 500 005	5.25	0.000 000	0.003



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OPERATING FREQUENCY:

CHANNEL:

1732,500,000 Hz

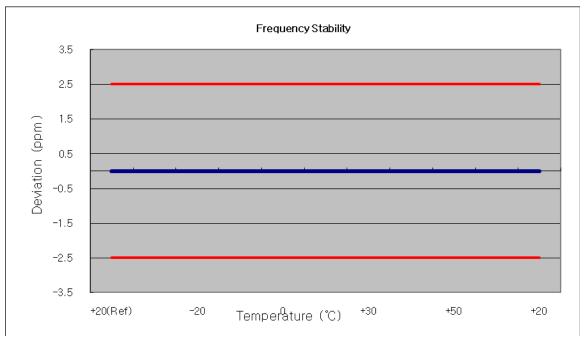
20175 (20 MHz)

REFERENCE VOLTAGE:

DEVIATION LIM IT:

3.70 VDC

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°°)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	1732 500 002	0	0.000 000	0.000
100%		-30	1732 500 006	6.38	0.000 000	0.004
100%		-20	1732 499 996	-4.36	0.000 000	-0.003
100%	3.700	-10	1732 499 999	-1.03	0.000 000	-0.001
100%		0	1732 500 002	1.96	0.000 000	0.001
100%		+10	1732 499 998	-2.31	0.000 000	-0.001
100%		+30	1732 500 005	4.75	0.000 000	0.003
100%		+40	1732 499 996	-3.59	0.000 000	-0.002
100%		+50	1732 500 004	4.35	0.000 000	0.003
115%	4.255	+20	1732 500 006	5.71	0.000 000	0.003
Batt. Endpoint	3.400	+20	1732 500 003	2.76	0.000 000	0.002



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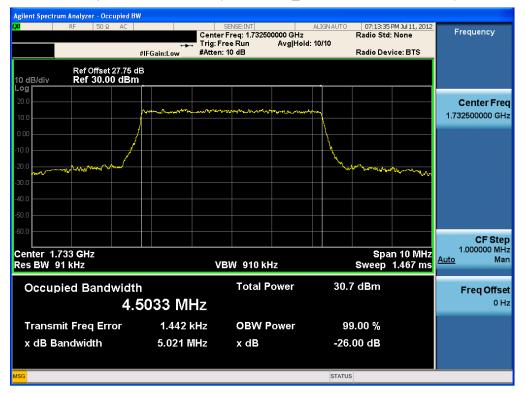
Occupied Bandwidth (LTE Band 13_QPSK – RB Size 50)

Occupied Bandwidth (LTE Band 13_16-QAM – RB Size 50)

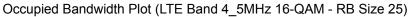


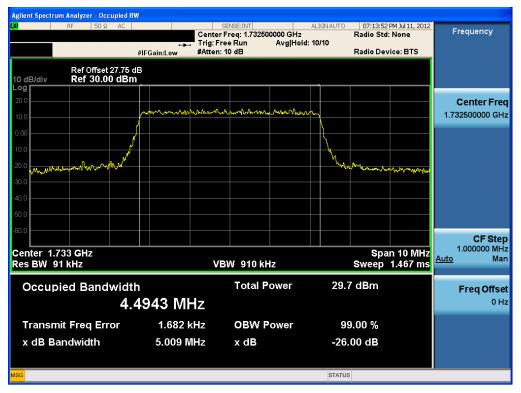
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Occupied Bandwidth Plot (LTE Band 4_5MHz QPSK - RB Size 25)





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Agilent Spectrum Analyzer - Occupied BW 09:15:14 PM Jul 11, 2012 Radio Std: None ALIGN AUTO Frequency Center Freq: 1.732500000 GHz Trig: Free Run Avg|Hold: 10/10 #Atten: 10 dB Radio Device: BTS #IFGain:Low Ref Offset 27.55 dB Ref 30.00 dBm 10 dB/div Log **Center Freq** 1.732500000 GHz CF Step 2.000000 MHz Man Center 1.733 GHz Res BW 180 kHz Span 20 MHz Sweep 1 ms <u>Auto</u> VBW 1.8 MHz Total Power 30.4 dBm **Occupied Bandwidth** Freq Offset 8.9827 MHz 0 Hz 5.813 kHz **OBW Power** Transmit Freq Error 99.00 % x dB Bandwidth 9.814 MHz x dB -26.00 dB STATUS

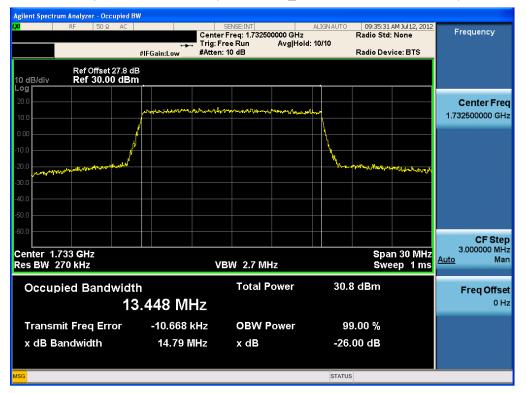
Occupied Bandwidth Plot (LTE Band 4_10MHz QPSK - RB Size 50)

Agilent Spectrum Analyzer - Occupie	ed BW				
ΙΧΙ RF 50 Ω Α(Cente	SENSE:INT Freq: 1.732500000 GHz Free Run Avg Hol h: 10 dB			Frequency
Ref Offset 27.5 10 dB/div Ref 30.00 di					
20.0	man mulliment	no-man	mue		Center Freq 1.732500000 GHz
0.00					
-20.0 white house and the solution			Munited March By Krawk	m Marsenethard	
-40.0					
-60.0					CF Step 2.000000 MHz
Center 1.733 GHz Res BW 180 kHz	V	/BW 1.8 MHz	Spa Sw	an 20 MHz eep 1 ms	<u>Auto</u> Man
Occupied Bandwi	^{dth} 8.9860 MHz	Total Power	29.7 dBm		Freq Offset 0 Hz
Transmit Freq Error	-9.568 kHz	OBW Power	99.00 %		
x dB Bandwidth	9.854 MHz	x dB	-26.00 dB		
MSG			STATUS		

Occupied Bandwidth Plot (LTE Band 4_10MHz 16-QAM - RB Size 50)

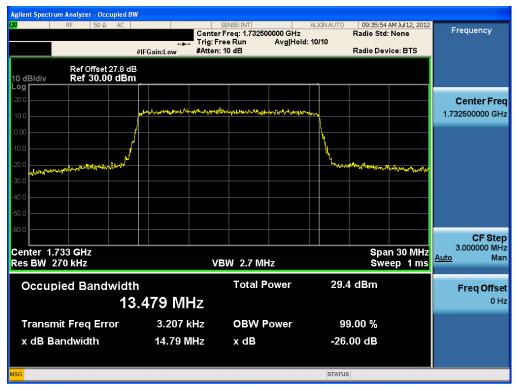
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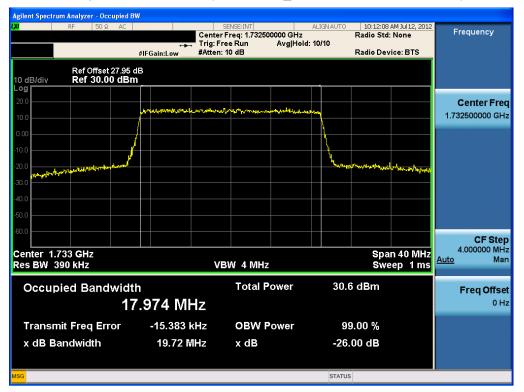
Occupied Bandwidth Plot (LTE Band 4_15MHz QPSK - RB Size 75)

Occupied Bandwidth Plot (LTE Band 4_	15MHz 16-QAM - RB Size 75)

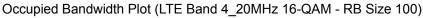


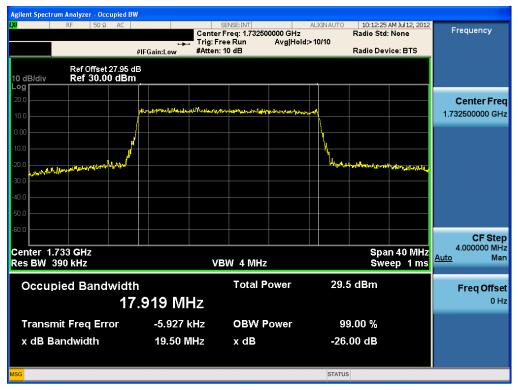
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Occupied Bandwidth Plot (LTE Band 4_20MHz QPSK - RB Size 100)



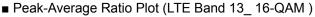


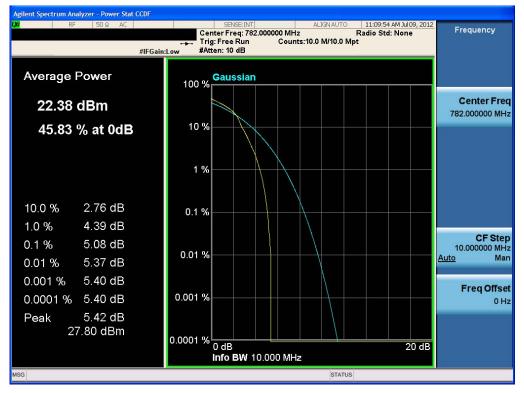
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■ Peak-Average Ratio Plot (LTE Band 13_ QPSK)

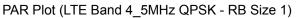


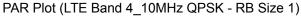


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■ Low Band Edge (LTE Band 13_QPSK – RB Size 50)

■ Upper Band Edge (LTE Band 13_ QPSK – RB Size 50)



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RF 50 Ω	AC	SENSE:INT	ALIGN AUTO	11:28:59 AM Jul 09, 2012	E
	PNO: Wide ↔ IFGain:Low	- Trig: Free Run #Atten: 10 dB	Avg Type: RMS Avg Hold: 100/100	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A N N N N N	Frequency
Ref Offset 27.1 dB/div Ref 23.00 dE			Mkr	1 776.000 MHz -33.232 dBm	Auto Tur
3.0					Center Fre 776.000000 Mi
				-13.00 dBm	Start Fr 773.000000 Mi
7.0		1			Stop Fr 779.000000 M
7.0	·····				CF Ste 600.000 k Auto M
.0					Freq Offs 0
7.0 tart 773.000 MHz Res BW 100 kHz	#VBW	/ 100 kHz*	Sweep	Stop 779.000 MHz I.00 ms (1001 pts)	
3			STATUS		

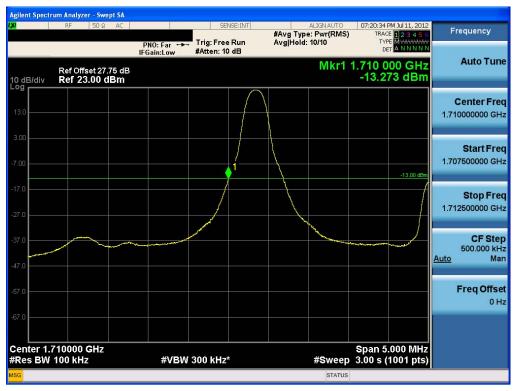
■ Low Band Edge (LTE Band 13_16-QAM – RB Size 50)

■ Upper Band Edge (LTE Band 13_16-QAM – RB Size 50)



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Lower Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 1, Offset 0)

Lower Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 25, Offset 0)



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Lower Band Edge Plot (LTE Band 4_10MHz QPSK - RB Size 1, Offset 0)

Lower Band Edge Plot (LTE Band 4_10MHz QPSK - RB Size 50, Offset 0)

RF 50 Ω AC		SENSE:INT	ALIGNAUTO	09:20:38 PM Jul 11, 2012	Frequency
	PNO: Fast	Trig: Free Run #Atten: 10 dB	Avg Type: Pwr(RMS) Avg Hold: 10/10	TRACE 1 2 3 4 5 6 TYPE MWWWWW DET A N N N N N	Trequency
Ref Offset 27.55 dB dB/div Ref 23.00 dBm			Mkr1	1.710 00 GHz -27.331 dBm	Auto Tun
3.0					Center Fre 1.710000000 GH
.00				-13.00 dBm	Start Fre 1.695000000 G⊦
7.0		1			Stop Fre 1.725000000 GH
7.0					CF Ste 3.000000 Mł <u>Auto</u> Ma
7.0					Freq Offs 01
enter 1.71000 GHz Res BW 100 kHz	#VBW	300 kHz*	#Sweep	Span 30.00 MHz 3.00 s (1001 pts)	

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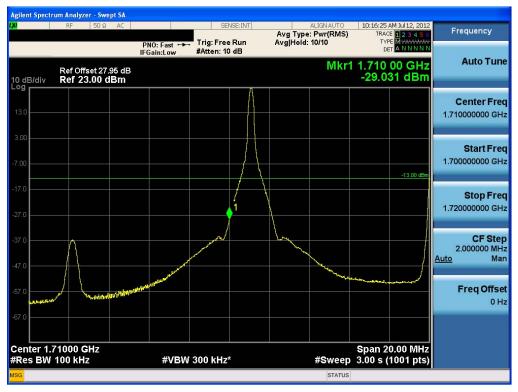
Lower Band Edge Plot (LTE Band 4_15MHz QPSK - RB Size 1, Offset 0)

Lower Band Edge Plot (LTE Band 4_15MHz QPSK - RB Size 75, Offset 0)



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Lower Band Edge Plot (LTE Band 4_20MHz QPSK - RB Size 1, Offset 0)

Lower Band Edge Plot (LTE Band 4_20MHz QPSK - RB Size 100, Offset 0)

RF 50 Ω AC	SENSE:INT	ALIGNAUTO Avg Type: Pwr(RMS)	10:17:50 AM Jul 12, 2012 TRACE 1 2 3 4 5 5	Frequency
	PNO: Fast +++ Trig: Free Run IFGain:Low #Atten: 10 dB	Avg Hold: 10/10	TYPE MWWWWW DET A N N N N N	
Ref Offset 27.95 dB dB/div Ref 23.00 dBm		Mkr1	1.710 00 GHz -31.609 dBm	Auto Tun
				Center Fre 1.710000000 GH
.00		an a	-13.00 dBm	Start Fre 1.685000000 GF
7.0	1			Stop Fre 1.735000000 GF
7.0			Lanna	CF Ste 5.000000 Mi <u>Auto</u> Mi
7.0				Freq Offs 01
enter 1.71000 GHz Res BW 100 kHz	#VBW 300 kHz*	#Sweep	Span 50.00 MHz 3.00 s (1001 pts)	

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Lower Extended Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 1, Offset 0)



Agilent Spectrum LXI		annel Power AC			INSE:INT		ALIGN AUTO		PM Jul 11, 2012	Fragueses
		#IF	⊶ Gain:Low	T . .		0000 GHz Avg Hold	: 10/10	Radio Std Radio Dev		Frequency
10 dB/div	Ref Offset Ref 30.0									
20.0							ar granden sjær (Taler,		Non	Center Freq 1.707000000 GHz
	PHANMERIAN	urneranda	and the second	nt ^{ala} na ang ang ang ang ang ang ang ang ang a	and the real of the second				YWWHM 	
-40.0										
Center 1.70 #Res BW 1				#VE	зміз мн	z			n 20 MHz ep 1 ms	CF Step 2.000000 MHz <u>Auto</u> Man
Channe	el Power				Power	Specti	ral Dens	sity		Freq Offset 0 Hz
4	-3.08 dBm / 4 MHz			-69.10 dBm /нz						
MSG							STATUS	6		

Lower Extended Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 25, Offset 0)

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Lower Extended Band Edge Plot (LTE Band 4_10MHz QPSK - RB Size 1, Offset 0)



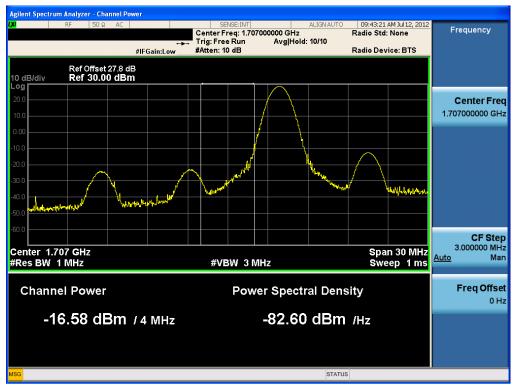
nt Spectrum Analyzer - Channel Power SENSE:INT ALIGNAUTO Center Freq: 1.707000000 GHz Trig: Free Run Avg|Hold: 10/10 #Atten: 10 dB 09:22:03 PM Jul 11, 2012 Radio Std: None Frequency Radio Device: BTS #IFGain:Low Ref Offset 27.55 dB Ref 30.00 dBm 10 dB/di Log **Center Freq** 1.707000000 GHz All and the what have a present of the second ANA PR AND POP CF Step 3.000000 MHz Center 1.707 GHz #Res BW 1 MHz Span 30 MHz Sweep 1 ms <u>Auto</u> Man #VBW 3 MHz **Freq Offset Channel Power Power Spectral Density** 0 Hz -72.08 dBm /Hz -6.06 dBm / 4 MHz STATUS

Lower Extended Band Edge Plot (LTE Band 4_10MHz QPSK - RB Size 50, Offset 0)

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Lower Extended Band Edge Plot (LTE Band 4_15MHz QPSK - RB Size 1, Offset 0)





Lower Extended Band Edge Plot (LTE Band 4_15MHz QPSK - RB Size 75, Offset 0)

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Lower Extended Band Edge Plot (LTE Band 4_20MHz QPSK - RB Size 1, Offset 0)





Lower Extended Band Edge Plot (LTE Band 4_20MHz QPSK - RB Size 100, Offset 0)

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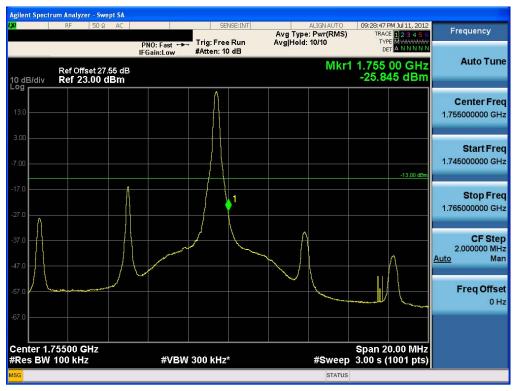
Upper Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 1, Offset 24)

Upper Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 25, Offset 0)



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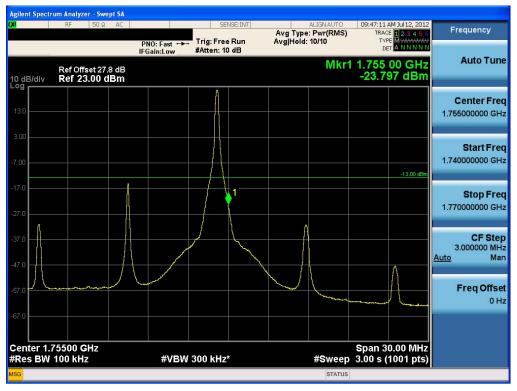
Upper Band Edge Plot (LTE Band 4_10MHz QPSK - RB Size 1, Offset 49)

Upper Band Edge Plot (LTE Band 4_10MHz QPSK - RB Size 50, Offset 0)

a l	um Analyzer - Swept SA RF 50 Ω AC		SENSE:INT	A	LIGN AUTO	09:29:53 PM Jul 11, 2012	
		PNO: Fast ++-	Trig: Free Run #Atten: 10 dB	Avg Type: Avg Hold: 1		TRACE 1 2 3 4 5 6 TYPE MWWWWW DET A N N N N N	Frequency
0 dB/div	Ref Offset 27.55 dB Ref 23.00 dBm	IFGain:Low	#Atten: 10 dB		Mkr1	1.755 00 GHz -23.093 dBm	Auto Tuno
- og							Center Free 1.755000000 GH
7.00						-13.00 dBm	Start Fre 1.740000000 G⊢
17.0 27.0			1				Stop Fre 1.770000000 G⊦
37.0 					land and the second sec		CF Ste 3.000000 MH <u>Auto</u> Ma
i7.0							Freq Offso 0 H
enter 1.7	75500 GHz 100 kHz	#VBW	300 kHz*		#Sween	Span 30.00 MHz 3.00 s (1001 pts)	
SG					STATUS	(100 pts)	

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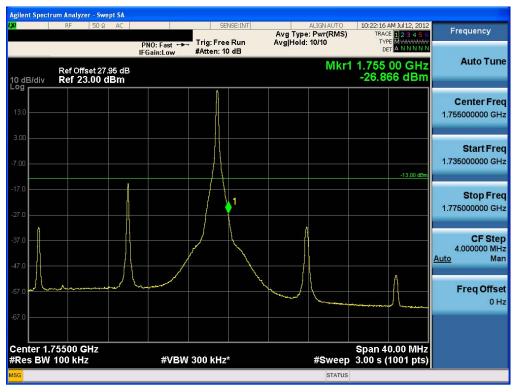
Upper Band Edge Plot (LTE Band 4_15MHz QPSK - RB Size 1, Offset 74)

Upper Band Edge Plot (LTE Band 4_15MHz QPSK - RB Size 75, Offset 0)



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Upper Band Edge Plot (LTE Band 4_20MHz QPSK - RB Size 1, Offset 99)

Upper Band Edge Plot (LTE Band 4_20MHz QPSK - RB Size 100, Offset 0)



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Upper Extended Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 1, Offset 24)





Upper Extended Band Edge Plot (LTE Band 4_5MHz QPSK - RB Size 25, Offset 0)

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