



# FCC RF Test Report

**Product Name: LTE CPE**

**Model Number: B593u-501**

**Report No: SYBH(Z-RF)023062012-2004  
FCC ID: QISB593U-501**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China  
Tel: +86 755 28780808 Fax: +86 755 89652518

## Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
4. The test report is invalid if not marked with "exclusive stamp for the test report".
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<b>Applicant:</b>	Huawei Technologies Co., Ltd.
<b>Address:</b>	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
<b>Date of Receipt Test Item:</b>	Jun., 21, 2012
<b>Start Date of Test:</b>	July., 03, 2012
<b>End Date of Test:</b>	July., 09, 2012
<b>Test Result:</b>	Pass

Approved By Senior Engineer July., 12, 2012 Dai Linjun  
Date Name Signature

Reviewed By July, 12, 2012 Cousy Xu  
Date Name Signature

Operated By July, 12, 2012 Huang Qiuliang  
Date Name Signature

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# 1 General Information

<b>1.1 Applied Standard</b>	
Applied Rules:	47 CFR FCC Part 2:2011, Subpart J 47 CFR FCC Part 27:2011, Subpart C&L ANSI/TIA 603C:2004
<b>1.2 Test Location</b>	
Test Location 1:	Reliability Laboratory of Huawei Technologies Co., Ltd.
Address:	Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China
<b>1.3 Test Environmental Condition</b>	
Ambient Temperature:	20 – 25 °C
Ambient Relative Humidity:	45 – 55 %
Atmospheric Pressure:	101 kPa

## 2 Summary

Table 1 Summary of results

Test Case	FCC Part No.	Requirements	Result
Band17			
Transmitter Output Power	2.1046 & 27.50(d)	Peak EIRP not exceed 30 W	Pass
Modulation Characteristics	2.1047	Digital modulation	Pass
Occupied Bandwidth	2.1049	(Not specified)	Pass
Band Edges Compliance	2.1051 & 27.53(h)	Below -13 dBm/1%*EBW, in 1 MHz range	Pass
Spurious Emission at Antenna Terminals	2.1051 & 27.53(h)	Below -13 dBm/1 MHz, 30 MHz to 10 <sup>th</sup> harmonics	Pass
Field Strength of Spurious Radiation	2.1053 & 27.53(h)	Below -13 dBm/1 MHz	Pass
Frequency Stability	2.1055 & 27.54	Stay within the authorized bands of operation	Pass

### 3 Product Description

#### 3.1 Product Information

##### 3.1.1 General Description

B593u-501 LTE/WCDMA/GSM three mode 10 bands CPE is subscriber equipment in the LTE/UMTS/GSM system and support wifi 802.11b/g/n. B593u-501 implement such functions as RF signal receiving/transmitting, LTE/WCDMA/GSM protocol processing, data service etc. Externally it provides USB interface (to connect to the printer etc.), USIM card interface , RJ45 Ethernet interface. B593u-501 has two internal antennas and two External Antenna, can automatic switch.

##### 3.1.2 Board Information

Table 2 Board Information

LTE CPE		
B593u-501		
Board and Module		
Equipment Designation / Description	Hardware Version	Software Version
MAINBOARD	B593RW2A CL2EM930U501M	V100R003

##### 3.1.3 Adapter Technical Data

AC/DCAdapter Model	HW-120200U1W
Manufacturer	FUHUA
Input Voltage	90Vac~270Vac 50/60Hz 0.8A
Output Voltage	+12V 2.0A
Rated Power	24W(max)

AC/DCAdapter Model	HW-120200U1W
Manufacturer	HuntKey
Input Voltage	90Vac~270Vac 50/60Hz 0.8A
Output Voltage	+12V 2.0A
Rated Power	24W(max)



## 4 Test Description

### 4.1 Supported Frequency Range

Characteristics	Description
Downlink	734 to 746 MHz
Uplink	704 to 716 MHz

### 4.2 Transmitter / Receiver Characteristics

Characteristics	Description
System Type	LTE
TX Output Power (per Antenna Port)	LTE system: 23dBm
Channel Spacing(s) / Bandwidth(s)	LTE system: 9 MHz
Designation of Emissions	LTE system: 8M94F0W

### 4.3 Antenna Gain

Antenna Gain(dBi)	2
Antenna Gain(dBd)	-0.15

### 4.4 Power Supply

Specification	Description
Power Supply Type	Directly Connected to DC /AC Power Supply
Input to EUT (DC power)	DC Voltage Nominal: $\approx$ -12 V
Input to EUT (AC power)	AC Voltage Nominal: ~ 230 V (50/60 Hz) AC Voltage Range: ~ 90 V to 270 V

## 5 General Test Conditions / Configurations

### 5.1 RF Channels under Test

Test Mode	TX / RX	RF Channel		
		Low (L)	Middle (M)	High (H)
LTE	TX(10M)	Channel23780	Channel23790	Channel23800
		709MHz	710MHz	711MHz
	RX(10M)	Channel 1537	Channel 1637	Channel 1738
		739 MHz	740 MHz	741 MHz

### 5.2 Test Modes

Test Mode	Test Modes Description
TM1	LTE QPSK modulation
TM2	LTE 16QAM modulation

### 5.3 Test Environment

Environment Parameter	Selected Values During Tests	
Relative Humidity	Ambient	
Temperature	TN	Ambient
Voltage	VL	9.6V
	VN	12V
	VH	14.4V

NOTE: VL= lower extreme test voltage

VN= nominal voltage

VH= upper extreme test voltage

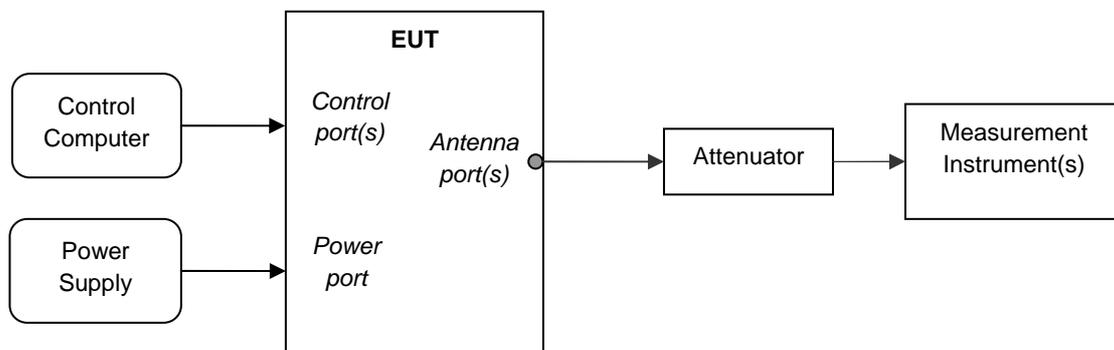
TN= normal temperature

## 5.4 Test Setup

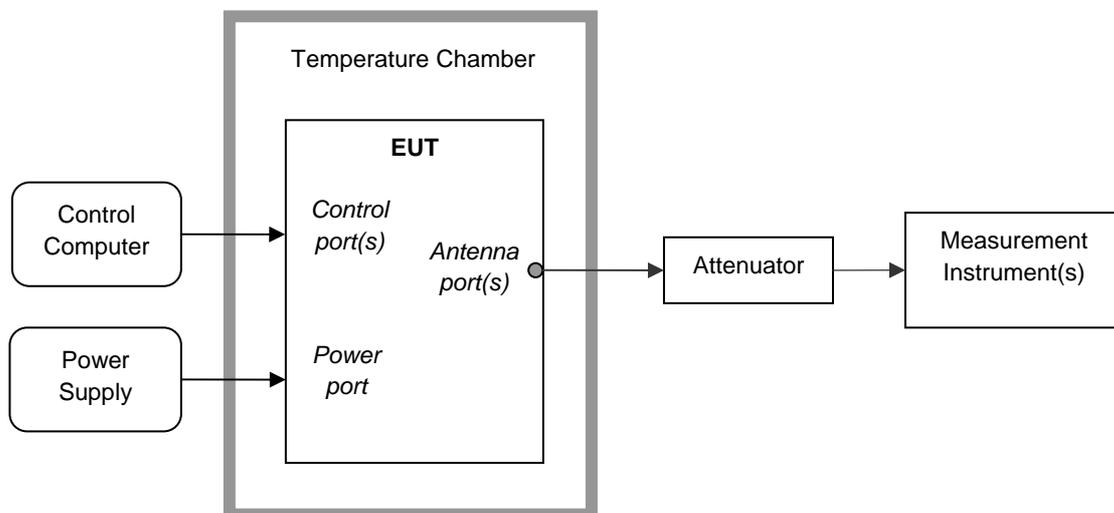
### 5.4.1 General Test Setup Configurations

Configuration	Description
Test Antenna Ports	Until otherwise declared, all TX tests are ONLY performed at the main Transmitter antenna port (e.g. TRXA, TXA and so on) of the EUT, and all RX tests are ONLY performed at the main Receiver antenna port (e.g. TRXA, RXA and so on) of the EUT.
Multiple RF Sources	Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.

### 5.4.2 Test Setup 1



### 5.4.3 Test Setup 2



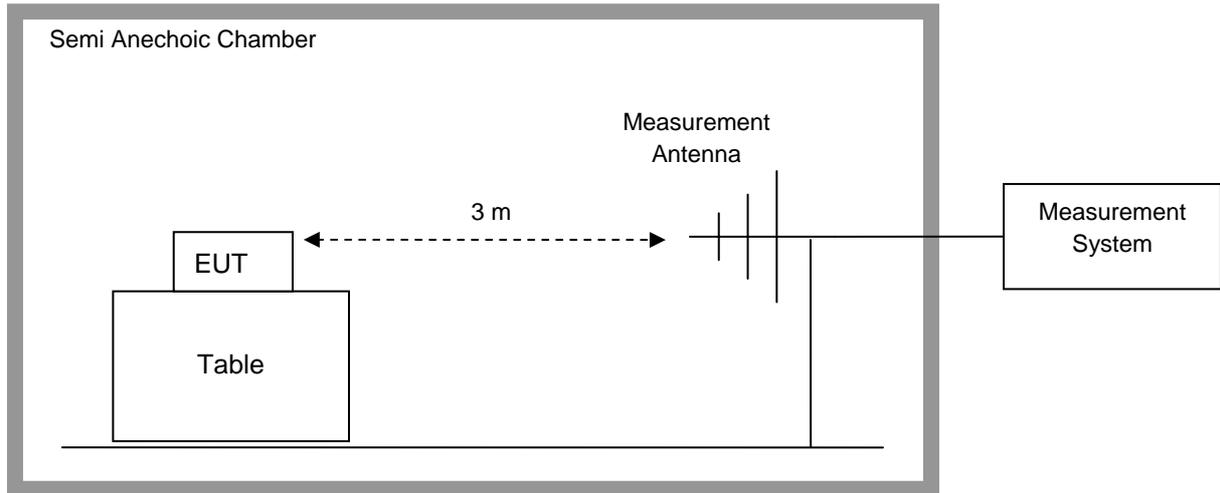
#### 5.4.4 Test Setup 3

NOTE1: Effective radiated power (ERP) or Effective Isotropic radiated power (EIRP) refers to the EUT radiation power output, assuming all emissions are radiated from half-wave dipole antennas or horn antennas.

NOTE2: The EUT was set on insulator 80cm above the Ground Plane. The setup and test methods were according to ANSI-TIA-603C 2004. The measurements were carried through with a Rohde and Schwarz Test Receiver and control software.

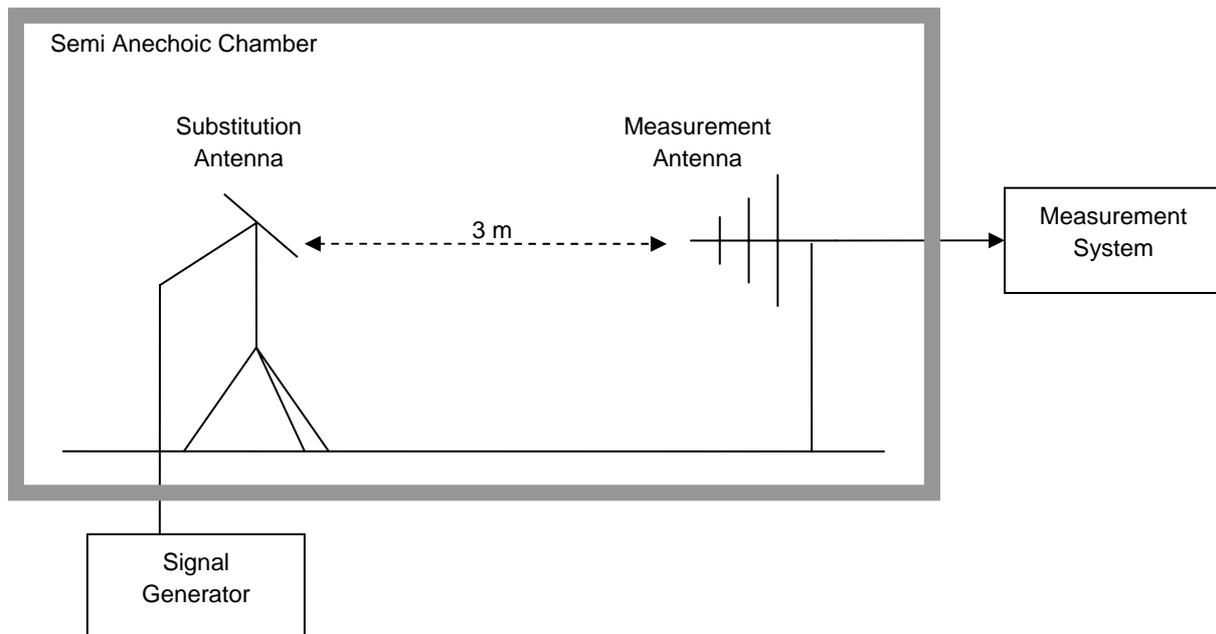
#### Step 1: Pre-test to find the Maximum ERP or EIRP

1. Connect the test system according to the following figure. EUT is running for 30 minutes before test, and measurement instruments are warming-up for 30 minutes.
2. Set up communication link between Universal radio communication tester and EUT, set EUT working frequency, and control EUT to transmit at maximum power.
3. Set the center frequency of the signal analyzer or receiver to the EUT's operating frequency, the RBW is equal to the emission bandwidth of the signal. Set RMS detector for the test, and the span is equal to 2 times of emission bandwidth, the other settings should remain automatic. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0° to 360°. The receiver antenna has two polarizations V and H. A portable or small unlicensed wireless device shall be placed on a non-metallic test fixture or other non-metallic support during testing. The supporting fixture shall permit orientation of the EUT in each of three orthogonal (x, y, z) axis positions such that emissions from the EUT are maximized. Measure the EUT maximum RF power and record the result.
4. Changing EUT working frequency and measuring the RF power at channel L, M, H respectively.  
Complete the test data.



## Step 2: Substitution method to verify the maximum ERP or EIRP

1. Measurement setup is according to the following figure. EUT was substituted by antenna, and the polarization is identical with the test antenna; the signal generator was connected to the substitution antenna.
2. The radiated output power, measured by signal analyzer set, is the same as recorded in above item 5). Then this power level is matched by a signal from a calibrated signal generator which is substituted for EUT. The power supplied by the generator is then equal to the ERP or EIRP after corrected by the antenna gain and cable loss.



## 5.5 Test Conditions

Test Case	Test Conditions	
Transmitter Output Power	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1 & Test Setup 3
	RBW	> emission bandwidth
	VBW	> 3 x RBW
	Detector	RMS
	RF Channels (TX)	L, M, H
	Test Mode	TM1/TM2
Modulation Characteristics	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	RF Channels (TX)	M
	Test Mode	TM1/TM2
Occupied Bandwidth	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	PK
	RF Channels (TX)	L, M, H
	Test Mode	TM1/TM2
Band Edges Compliance	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	RMS
	RF Channels (TX)	B, T
	Test Mode	TM1/TM2
Spurious Emission at Antenna Terminals	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 1
	Detector	PK
	RF Channels (TX)	L, M, H
	Test Mode	TM1
Field Strength of Spurious Radiation	Test Configuration	Ambient Temperature & Rated Voltage
	Test Setup	Test Setup 3
	Detector	PK
	RF Channels (TX)	M
	Test Mode	TM1
Frequency Stability	Test Configuration	(1) -30 °C to +50 °C with step 10 °C at Rated Voltage; (2) 85%, 100% and 115% of Rated Voltage at Ambient



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Test Case	Test Conditions	
		Temperature.
	Test Setup	Test Setup 2
	RF Channels (TX)	M
	Test Mode	TM1

## 6 Main Test Instruments

Table 3 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sept., 27, 2012
Universal Radio Communication Tester	R&S	CMU200	105822	Oct., 24, 2012
Wireless Communication Test set	Agilent	N4010A	MY49081592	Dec., 14, 2012
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug., 31, 2012
Spectrum Analyzer	Agilent	E4440A	MY49420179	Apr., 20, 2013
Signal Analyzer	R&S	FSQ31	200021	Sept., 27, 2012
Temperature Chamber	WEISS	WKL64	24600294	Jan., 03, 2013
Signal generator	Agilent	E8257D	MY49281095	Jul., 09, 2013
Vector Signal Generator	R&S	SMU200A	104162	Sept., 07, 2012
Test receiver	R&S	ESU26	100150	May., 24, 2013
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec., 13, 2012
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec., 13, 2012
Horn Antenna	R & S	HF906	100683	May., 16, 2013
Horn Antenna	R & S	HF906	100684	May., 16, 2013
Broadband Antenna	Schwarzbeck	VULB 9163	9163-357	Sept., 15, 2012
Broadband Antenna	Schwarzbeck	VULB 9163	9163-356	Sept., 15, 2012

Note: All the equipments are calibrated once a year. When it's almost due, we will arrange calibration again before the calibration deadline.

## 7 Test Results

No.	Test Item	Test Result
1	Transmitter Output Power	Appendix A
2	Modulation Characteristics	Appendix B
3	Occupied Bandwidth	Appendix C
4	Band Edges Compliance	Appendix D
5	Spurious Emission at Antenna Terminals	Appendix E
6	Field Strength of Spurious Radiation	Appendix F
7	Frequency Stability	Appendix G
8	Photos of Test Setup	Appendix H

NOTE: There is no test data in Appendix H, only Photos of Test Setup for Field Strength of Spurious Radiation.

## 8 Measurement Uncertainty

For a 95% confidence level ( $k=2$ ), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Test Item		Extended Uncertainty
Transmitter Output Power	Power (dBm)	U =0.39 dB
Occupied Bandwidth	Magnitude (%)	U=0.2%
Band Edge Compliance	Disturbance Power (dBm)	U=2.0 dB
Conducted Spurious Emissions	Disturbance Power (dBm)	U=2.0 dB
Field Strength of Spurious Radiation	ERP (dBm)	U=4.6 dB (30 MHz – 1GHz) U=3.0 dB (above 1 GHz)
Frequency Stability	Frequency Accuracy (ppm)	U=0.21 ppm

-----The END-----



# Appendix A

## Transmitter Output Power According to FCC Part 2.1046 & Part 27 Subpart C&L



## Conducted Power of Transmitter

Table 1 Measurement Results(LTE)

TM1 & TM2 RF Output Power(Conducted)				
Test Mode	TN/VN			
	Modulation	RB	Measured (dBm)	Limit (dBm )
Channel (B) 10MHz(BW)	QPSK	1 RB/#0	21.17	30.0
		1 RB/#max	21.10	30.0
		25 RB/#13	20.31	30.0
		Full	20.34	30.0
	16QAM	1 RB/#0	20.47	30.0
		1 RB/#max	20.41	30.0
		25 RB/#13	19.67	30.0
		Full	19.66	30.0
Channel (M) 10MHz(BW)	QPSK	1 RB/#0	21.32	30.0
		1 RB/#max	21.16	30.0
		25 RB/#13	20.25	30.0
		Full	20.20	30.0
	16QAM	1 RB/#0	20.73	30.0
		1 RB/#max	20.42	30.0
		25 RB/#13	19.38	30.0
		Full	19.39	30.0
Channel (T) 10MHz(BW)	QPSK	1 RB/#0	21.24	30.0
		1 RB/#max	20.92	30.0
		25 RB/#13	20.36	30.0
		Full	20.18	30.0
	16QAM	1 RB/#0	20.72	30.0
		1 RB/#max	20.46	30.0
		25 RB/#13	19.77	30.0
		Full	19.31	30.0

Note: RBW > emission bandwidth, VBW > 3 x RBW.



## Peak-to-Average Ratio

Table 2 Measurement Results(LTE)

TM1 & TM2 RF Output Power(Conducted)				
Test Mode	TN/VN			
	Modulation	RB	Measured (dBm)	Limit (dBm )
Channel (B) 10MHz(BW)	QPSK	1 RB/#0	5.63	13.0
		1 RB/#max	5.58	13.0
		25 RB/#13	5.54	13.0
		Full	5.51	13.0
	16QAM	1 RB/#0	6.08	13.0
		1 RB/#max	5.98	13.0
		25 RB/#13	6.01	13.0
		Full	6.05	13.0
Channel (M) 10MHz(BW)	QPSK	1 RB/#0	5.77	13.0
		1 RB/#max	5.72	13.0
		25 RB/#13	5.68	13.0
		Full	5.64	13.0
	16QAM	1 RB/#0	6.22	13.0
		1 RB/#max	6.12	13.0
		25 RB/#13	6.15	13.0
		Full	6.19	13.0
Channel (T) 10MHz(BW)	QPSK	1 RB/#0	5.56	13.0
		1 RB/#max	5.51	13.0
		25 RB/#13	5.47	13.0
		Full	5.43	13.0
	16QAM	1 RB/#0	6.01	13.0
		1 RB/#max	5.91	13.0
		25 RB/#13	5.94	13.0
		Full	5.98	13.0

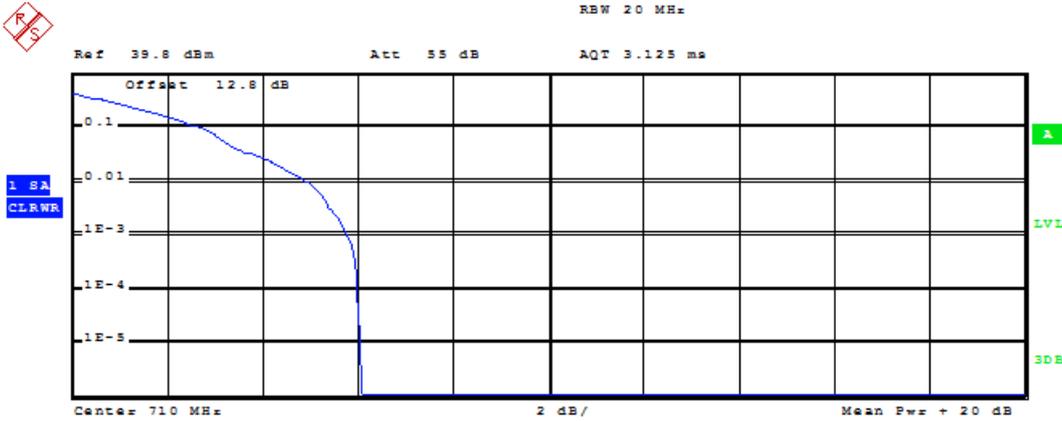


## Test Plot of Peak-to-Average Ratio

Note: All relevant operation modes have been tested, and the worst case Plot is included in this report.

TM1

LTE 10MHz(BW)-(QPSK)



Complementary Cumulative Distribution Function  
NOF samples: 100000, Usable BW: 23.7MHz

Trace 1	
Mean	21.30 dBm
Peak	27.36 dBm
Crest	6.07 dB
10 %	2.66 dB
1 %	4.90 dB
.1 %	5.77 dB
.01 %	5.99 dB

Date: 27.JUN.2012 20:27:20

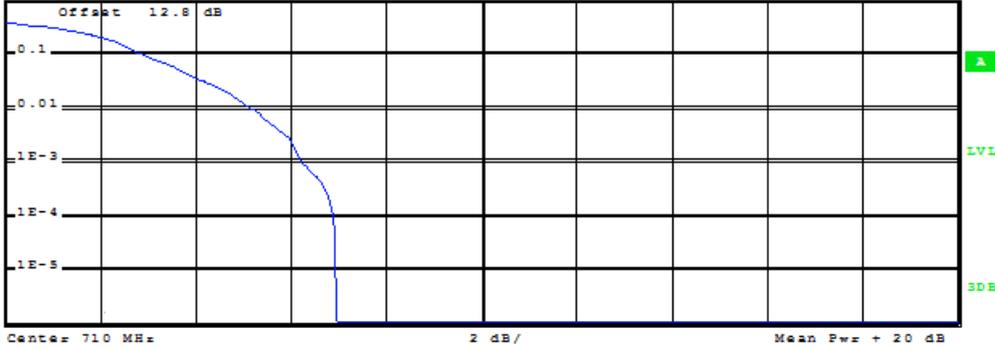


**TM2**  
**LTE 10MHz(BW)-(16QAM)**



RBW 20 MHz

Ref 39.8 dBm Att 55 dB AQT 3.125 ms



Complementary Cumulative Distribution Function  
NOF samples: 100000, Usable BW: 23.7MHz

	Trace 1
Mean	19.93 dBm
Peak	26.87 dBm
Crest	6.94 dB
10 %	2.88 dB
1 %	5.16 dB
.1 %	6.22 dB
.01 %	6.89 dB

Date: 27.JUN.2012 20:27:43

## Efficient Isotropic Radiated Power(EIRP)

Table 3 Substitution Results (LTE)

Test Mode			Meas. Level [dBm]	Substitution Antenna Type	SGP[dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	FCC limit [dBm]	Result
Channel	Modulation	RB								
Channel (B) 10MHz(BW)	QPSK	1 RB/#0	21.02	Horn Ant.	17.44	4.5	1	20.94	30	Pass
		1 RB/#max	20.95	Horn Ant.	17.37	4.5	1	20.87	30	Pass
		25 RB/#13	20.16	Horn Ant.	16.58	4.5	1	20.08	30	Pass
		Full	20.19	Horn Ant.	16.61	4.5	1	20.11	30	Pass
	16QAM	1 RB/#0	20.32	Horn Ant.	16.74	4.5	1	20.24	30	Pass
		1 RB/#max	20.26	Horn Ant.	16.68	4.5	1	20.18	30	Pass
		25 RB/#13	19.52	Horn Ant.	15.94	4.5	1	19.44	30	Pass
		Full	19.51	Horn Ant.	15.93	4.5	1	19.43	30	Pass
Channel (M) 10MHz(BW)	QPSK	1 RB/#0	21.17	Horn Ant.	17.59	4.5	1	21.09	30	Pass
		1 RB/#max	21.01	Horn Ant.	17.43	4.5	1	20.93	30	Pass
		25 RB/#13	20.1	Horn Ant.	16.52	4.5	1	20.02	30	Pass
		Full	20.05	Horn Ant.	16.47	4.5	1	19.97	30	Pass
	16QAM	1 RB/#0	20.58	Horn Ant.	17	4.5	1	20.5	30	Pass
		1 RB/#max	20.27	Horn Ant.	16.69	4.5	1	20.19	30	Pass
		25 RB/#13	19.23	Horn Ant.	15.65	4.5	1	19.15	30	Pass
		Full	19.24	Horn Ant.	15.66	4.5	1	19.16	30	Pass
Channel (T) 10MHz(BW)	QPSK	1 RB/#0	21.09	Horn Ant.	17.21	4.8	1	21.01	30	Pass
		1 RB/#max	20.77	Horn Ant.	16.89	4.8	1	20.69	30	Pass
		25 RB/#13	20.21	Horn Ant.	16.33	4.8	1	20.13	30	Pass



		Full	20.03	Horn Ant.	16.15	4.8	1	19.95	30	Pass
	16QA M	1 RB/#0	20.57	Horn Ant.	16.69	4.8	1	20.49	30	Pass
		1 RB/#max	20.31	Horn Ant.	16.43	4.8	1	20.23	30	Pass
		25 RB/#13	19.62	Horn Ant.	15.74	4.8	1	19.54	30	Pass
		Full	19.16	Horn Ant.	15.28	4.8	1	19.08	30	Pass

Note: a, For getting the EIRP (Efficient Isotropic Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$

b, SGP=Signal Generator Level

c, RBW > emission bandwidth, VBW > 3 x RBW

-----The END-----



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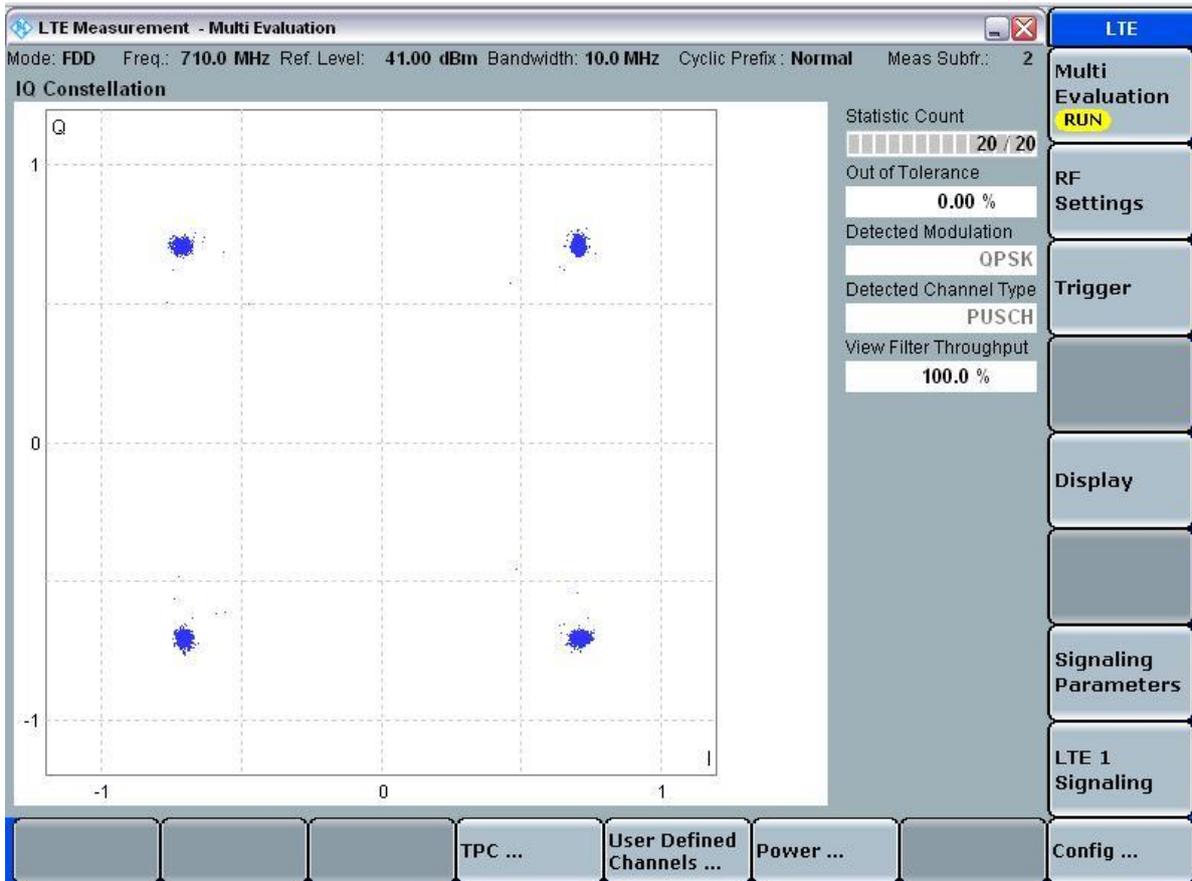
## **Appendix B**

# Modulation Characteristics

According to FCC Part 2.1047 & Part 27 Subpart C&L

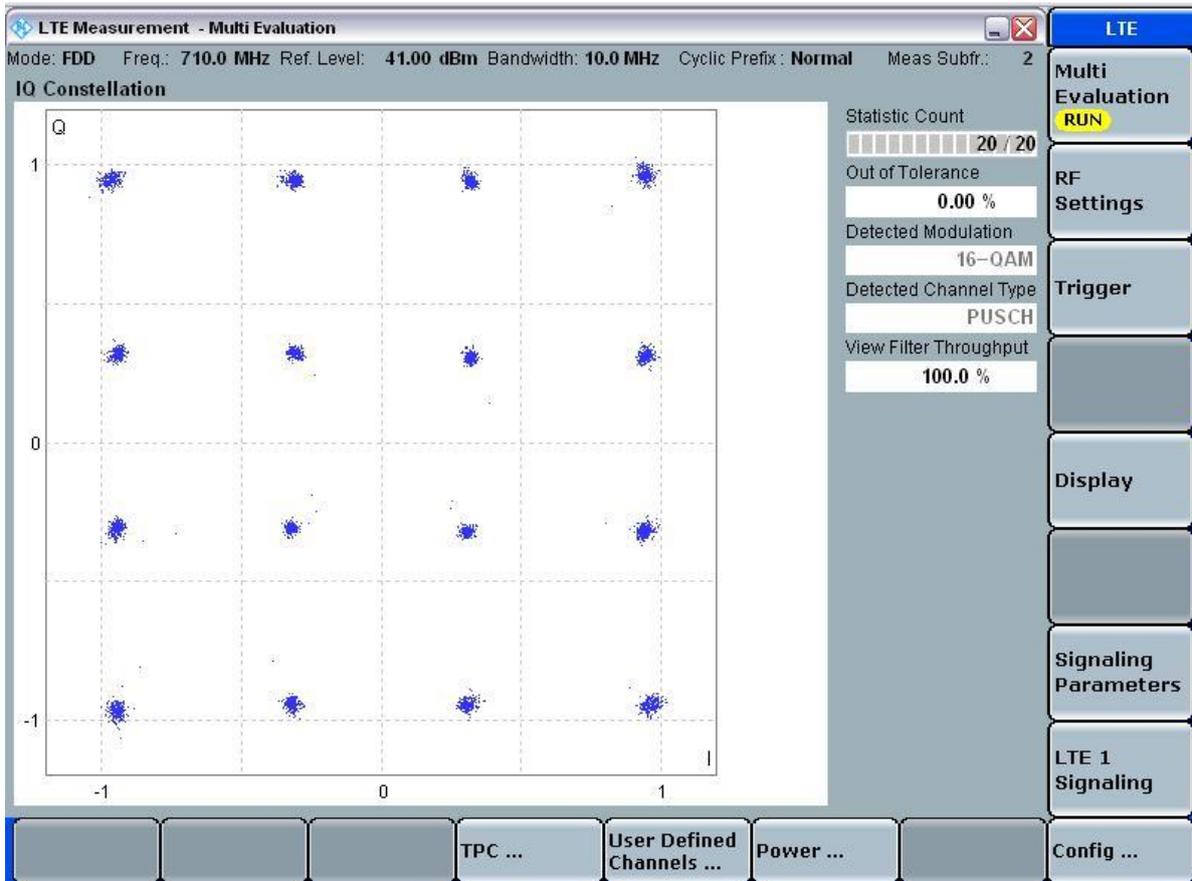


# TM1: LTE Band17 Channel 23790 10MHz (BW) QPSK





# Channel 23790 10MHz (BW) 16QAM



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# Appendix C

## Occupied Bandwidth

According to FCC Part 2.1049 & Part 27 Subpart C&L



**Result Table**

Table 1 Measurement Results

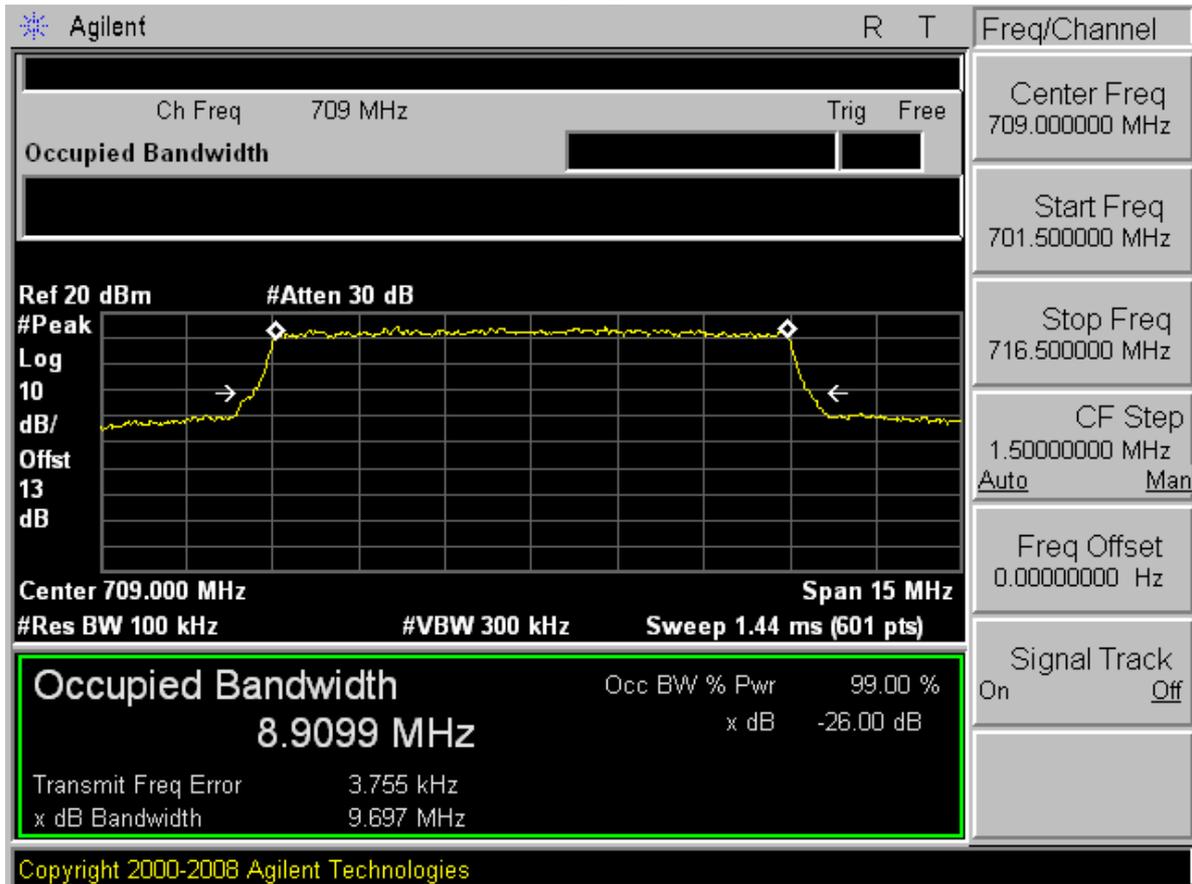
Test Mode	Carrier Conf.	RF Channel	RB/RB SIZE	Modulation	Occupied Bandwidth [MHz]	Verdict
TM1	10MHz	23780	Full	QPSK	8.91	Pass
			Full	16QAM	8.91	Pass
		23790	Full	QPSK	8.91	Pass
			Full	16QAM	8.91	Pass
		23800	Full	QPSK	8.92	Pass
			Full	16QAM	8.91	Pass

26 dB Band Width

Test Mode	Carrier Conf.	RF Channel	RB/RB SIZE	Modulation	Occupied Bandwidth [MHz]	Verdict
TM1	10MHz	23780	Full	QPSK	9.70	Pass
			Full	16QAM	9.72	Pass
		23790	Full	QPSK	9.67	Pass
			Full	16QAM	9.72	Pass
		23800	Full	QPSK	9.81	Pass
			Full	16QAM	9.72	Pass

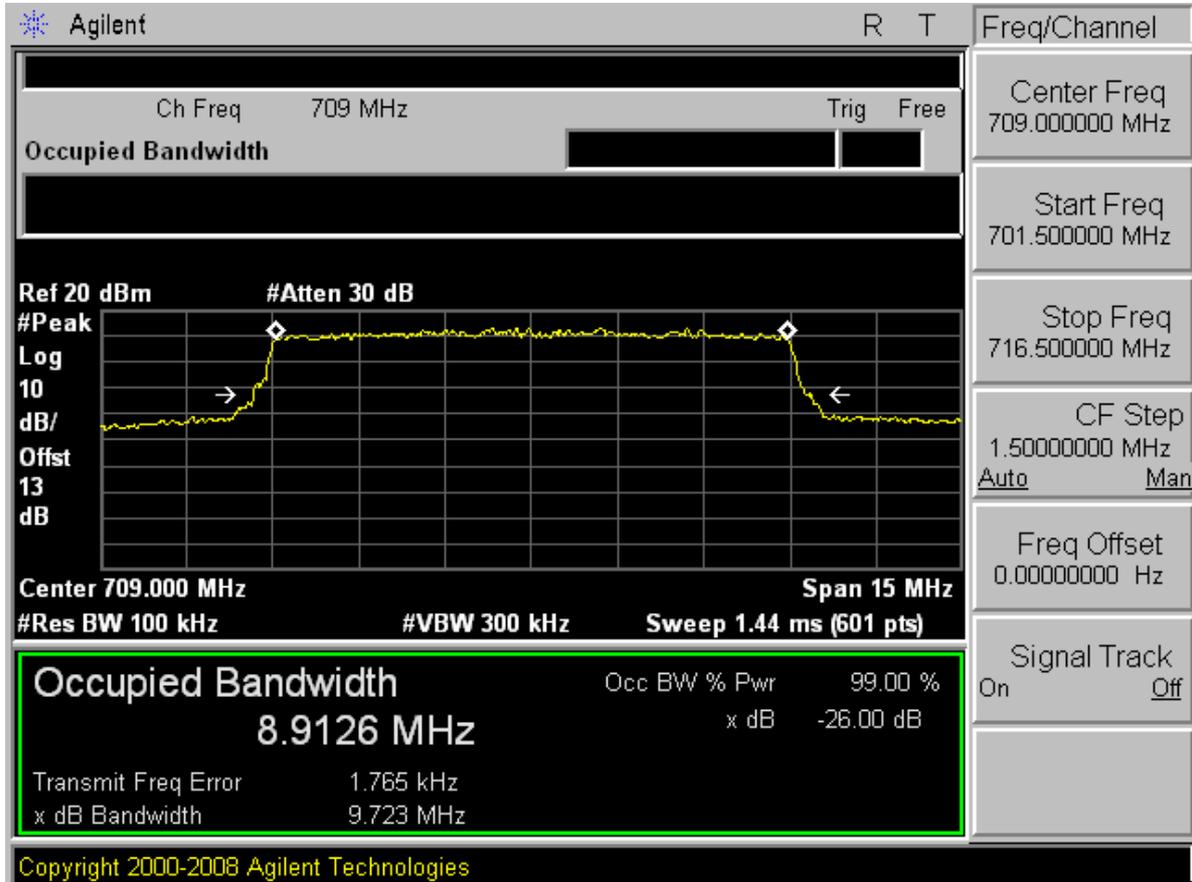


TM1:  
 Channel 23780  
 10MHz (BW)  
 QPSK



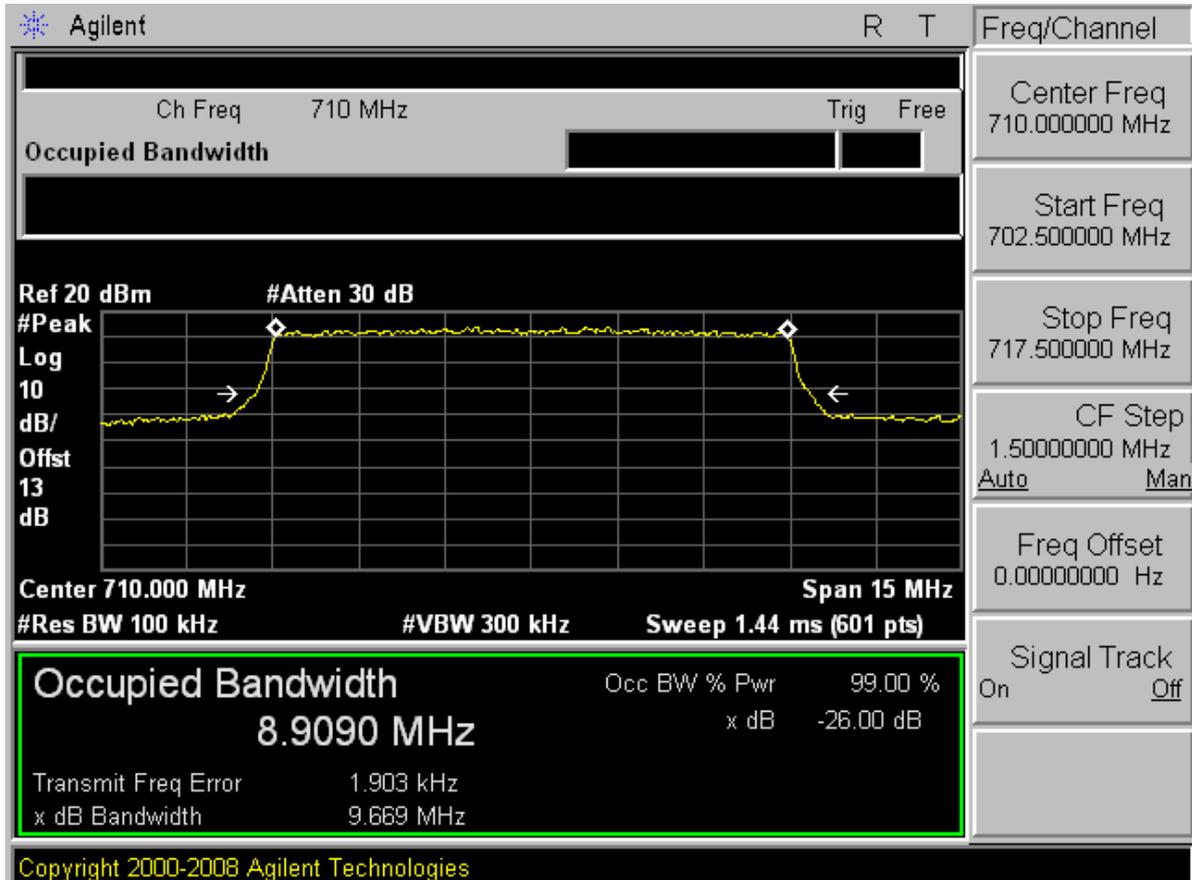


Channel 23780  
10MHz (BW)  
16-QAM



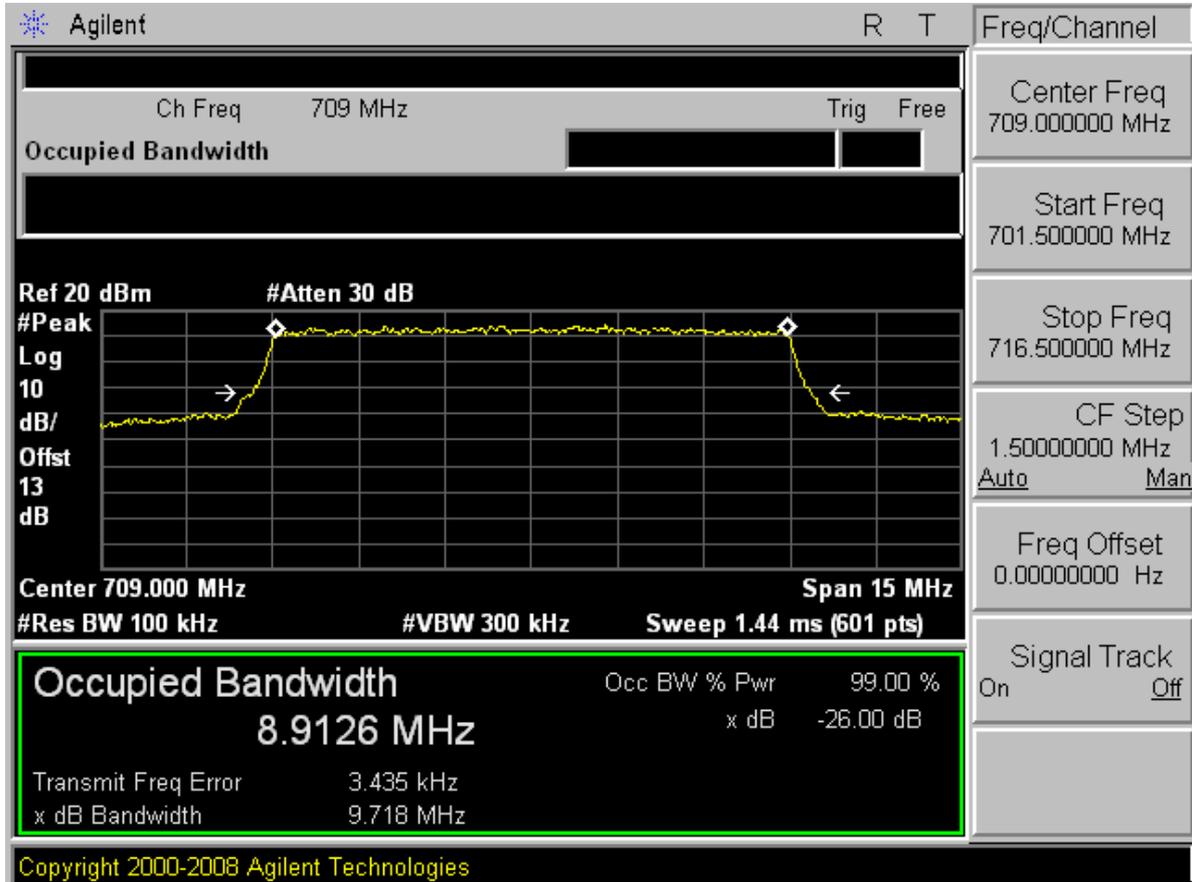


Channel 23790  
 10MHz (BW)  
 QPSK



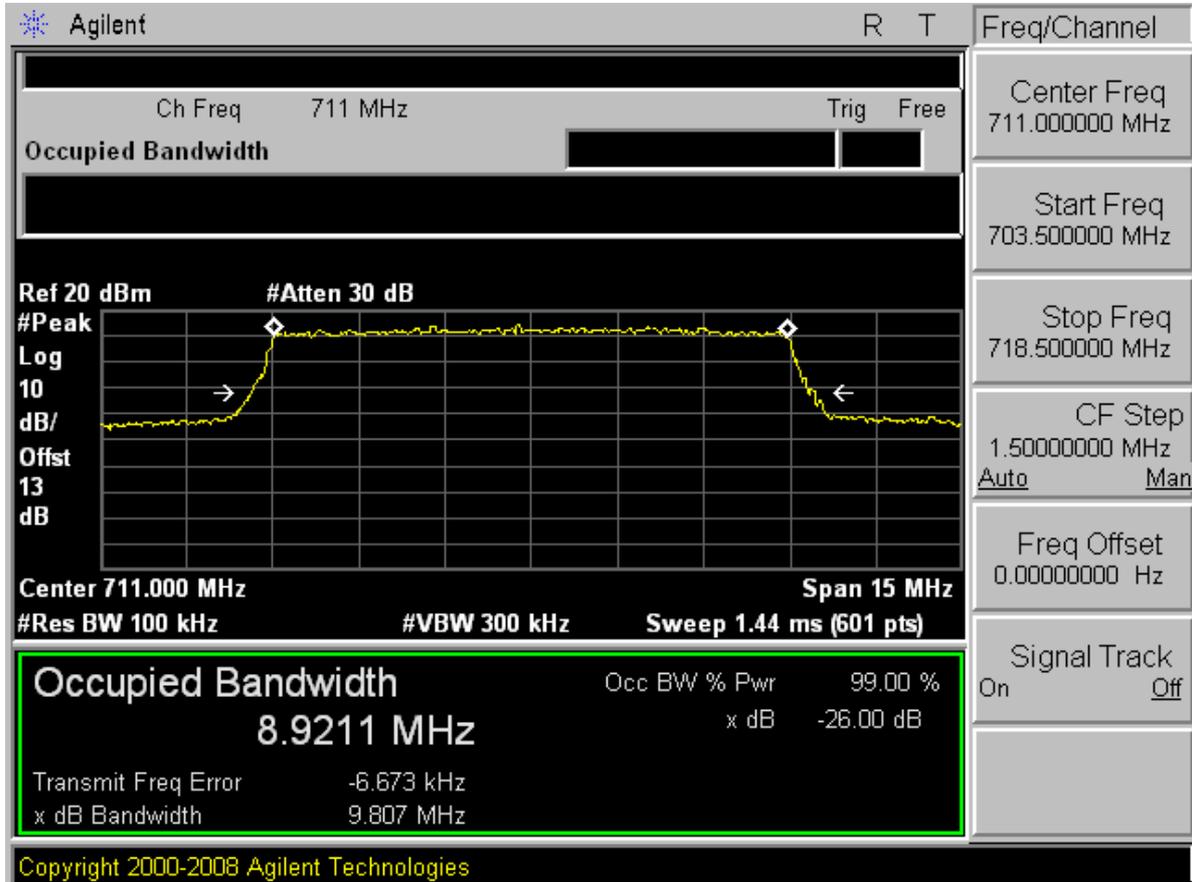


Channel 23790  
10MHz (BW)  
16-QAM



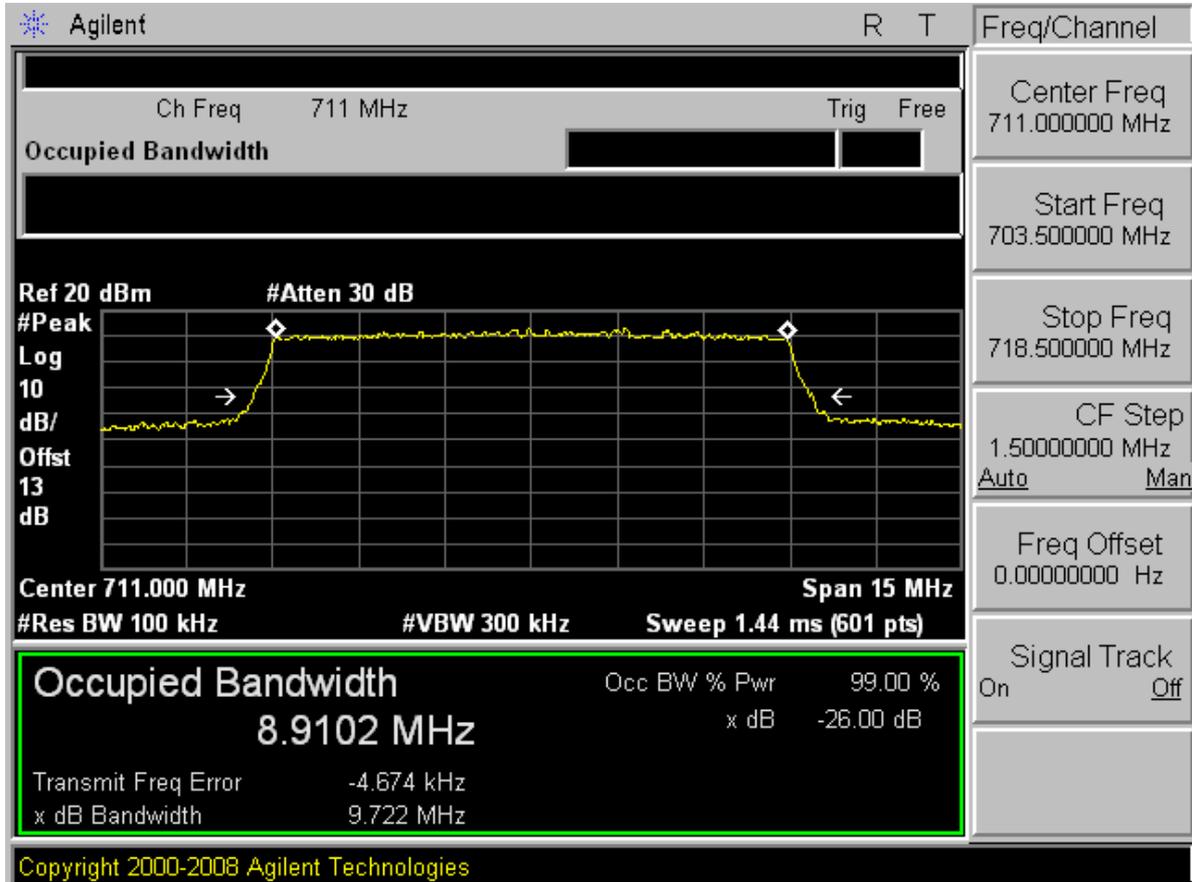


Channel 23800  
 10MHz (BW)  
 QPSK





Channel 23800  
10MHz (BW)  
16-QAM



-----End-----



# Appendix D

## Band Edges Compliance

According to FCC Part 2.1051 & Part 27 Subpart C&L

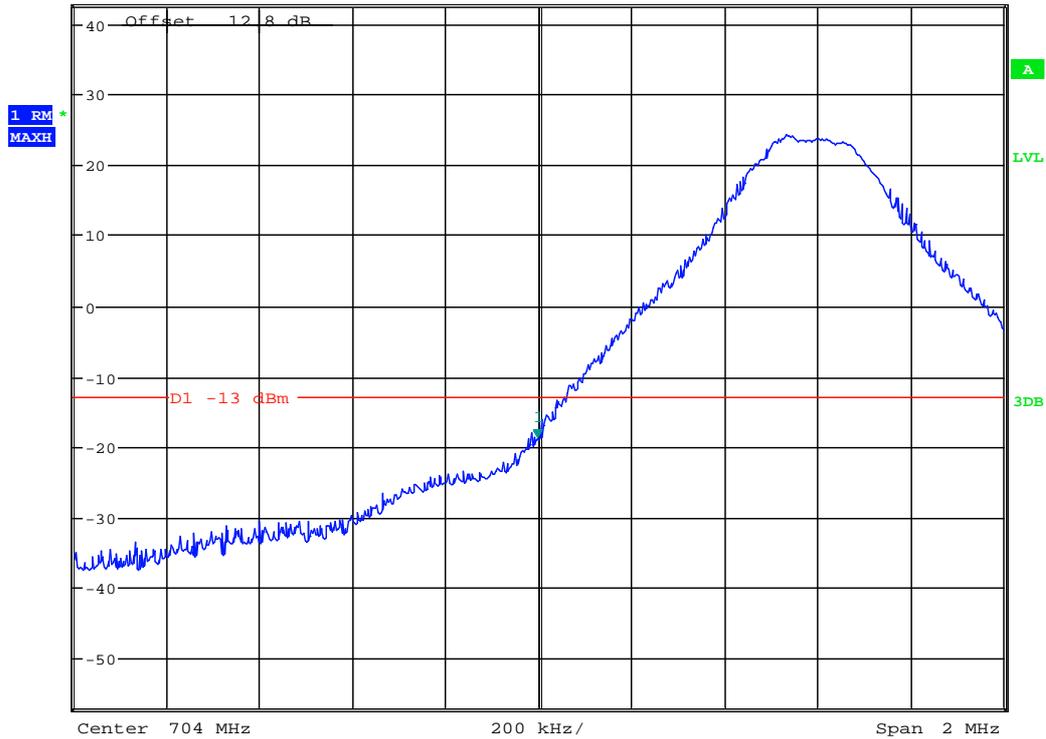


**TM1**  
 Left Edge  
 10MHz (BW)  
 Channel 23780  
 QPSK/1 RB/RB #0



\*RBW 100 kHz      Marker 1 [T1 ]  
 \*VBW 300 kHz      -18.87 dBm  
 SWT 2.5 ms      703.996794890 MHz

Ref 42.8 dBm      \*Att 30 dB



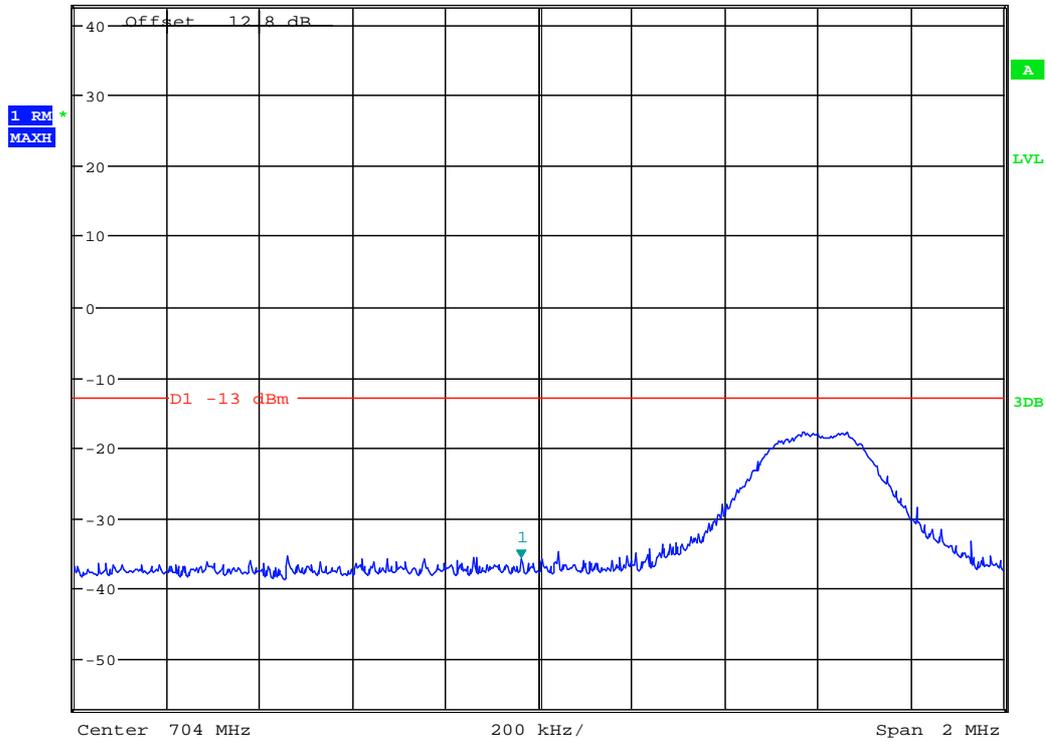
Date: 27.JUN.2012 16:05:27



QPSK/1 RB/RB #Max



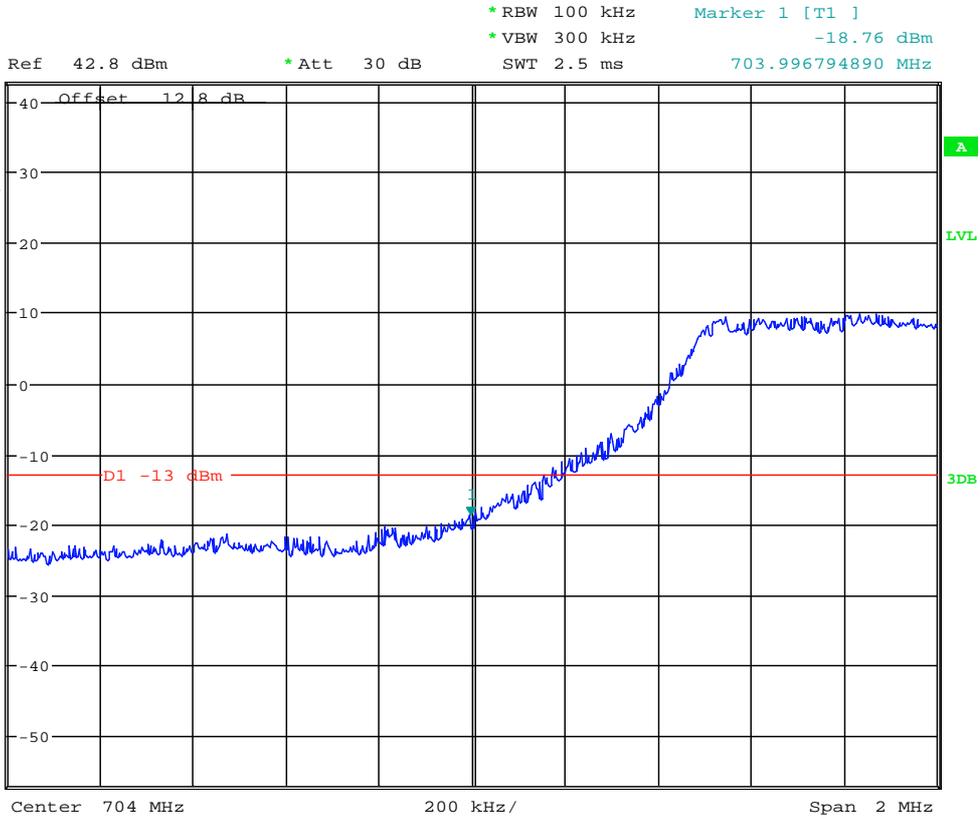
\*RBW 100 kHz      Marker 1 [T1 ]  
 \*VBW 300 kHz      -35.86 dBm  
 Ref 42.8 dBm      \*Att 30 dB      SWT 2.5 ms      703.961538479 MHz



Date: 27.JUN.2012 16:08:01



### QPSK/full RBs



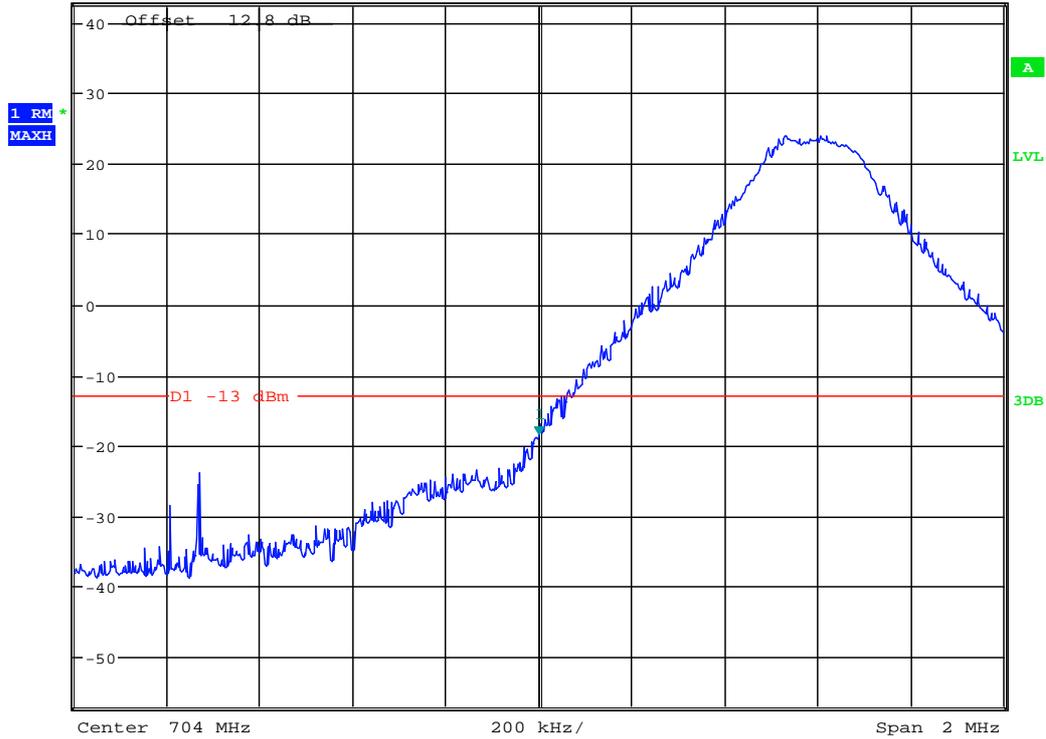
Date: 27.JUN.2012 16:03:35



**TM2**  
Left Edge  
10MHz (BW)  
Channel 23780  
16QAM/1 RB/RB #0



Ref 42.8 dBm      \* Att 30 dB      \* RBW 100 kHz      Marker 1 [T1 ]  
\* VBW 300 kHz      -18.63 dBm  
SWT 2.5 ms      704.000000018 MHz



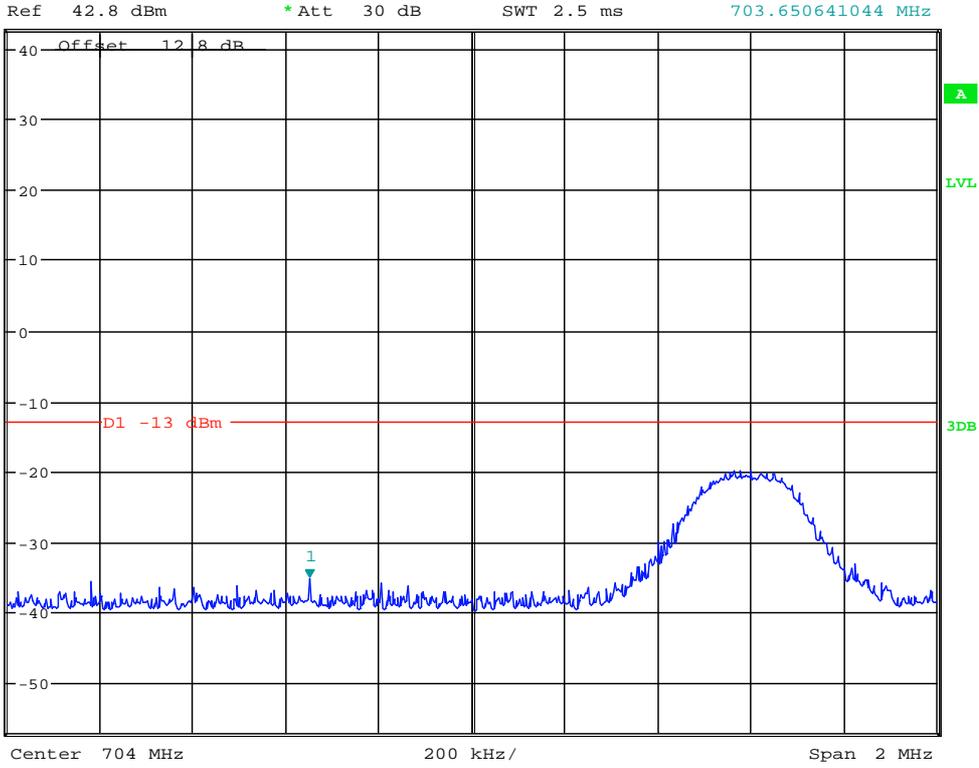
Date: 27.JUN.2012 16:09:28



16QAM /1 RB/RB #max



\*RBW 100 kHz      Marker 1 [T1 ]  
\*VBW 300 kHz      -35.34 dBm  
SWT 2.5 ms      703.650641044 MHz



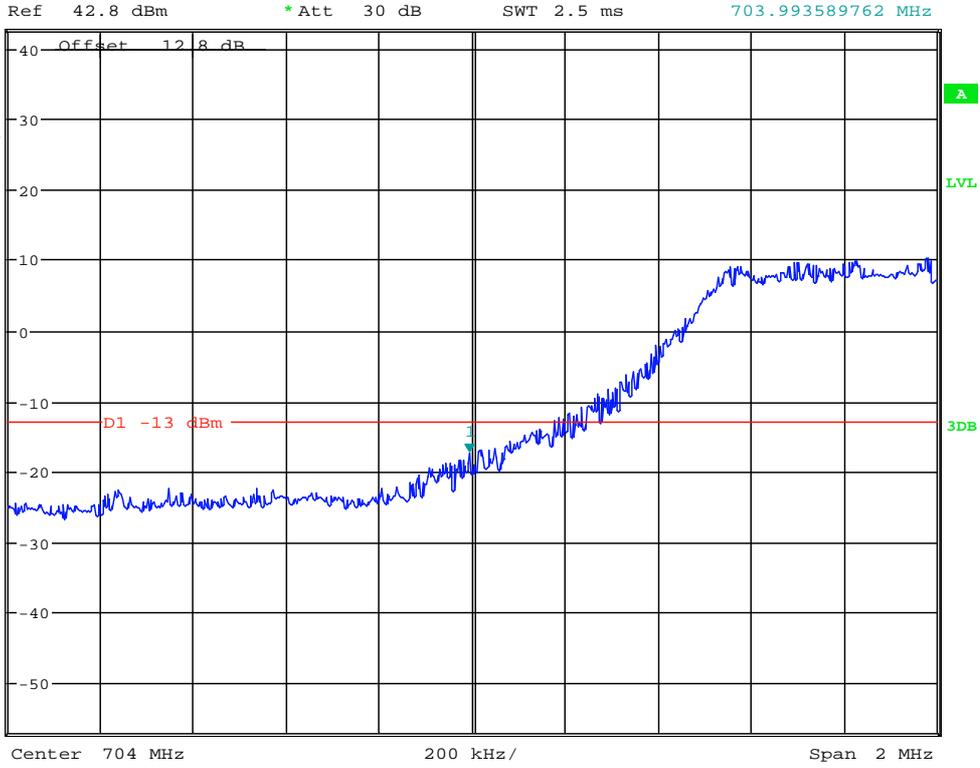
Date: 27.JUN.2012 16:08:49



### 16QAM/full RBs



\*RBW 100 kHz      Marker 1 [T1 ]  
\*VBW 300 kHz      -17.39 dBm  
SWT 2.5 ms      703.993589762 MHz



Date: 27.JUN.2012 16:04:08

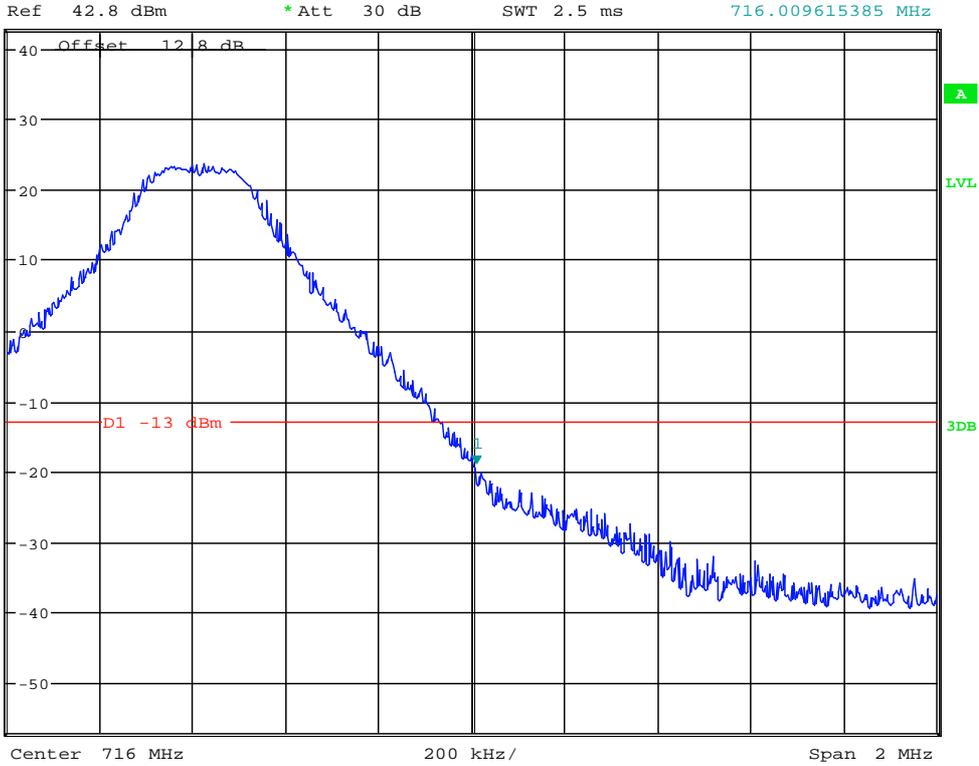




### QPSK/1 RB/RB #max



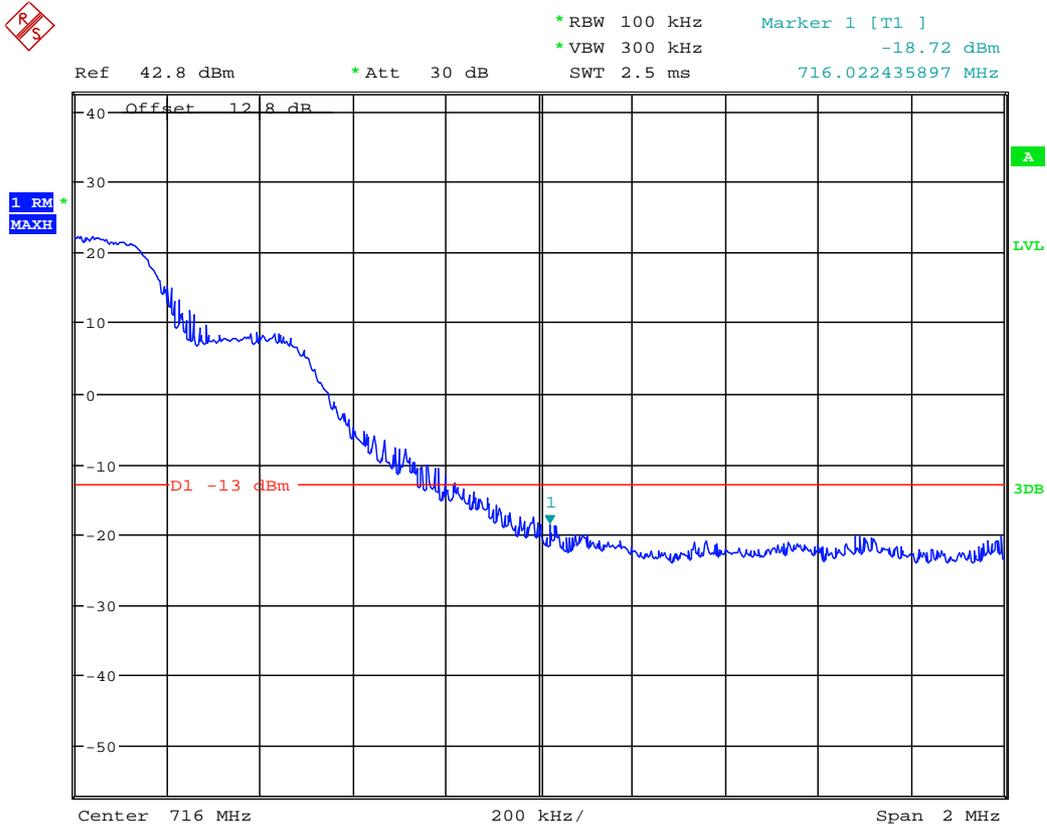
\*RBW 100 kHz      Marker 1 [T1 ]  
\*VBW 300 kHz      -19.00 dBm  
SWT 2.5 ms      716.009615385 MHz



Date: 27.JUN.2012 16:13:18



### QPSK/full RBs



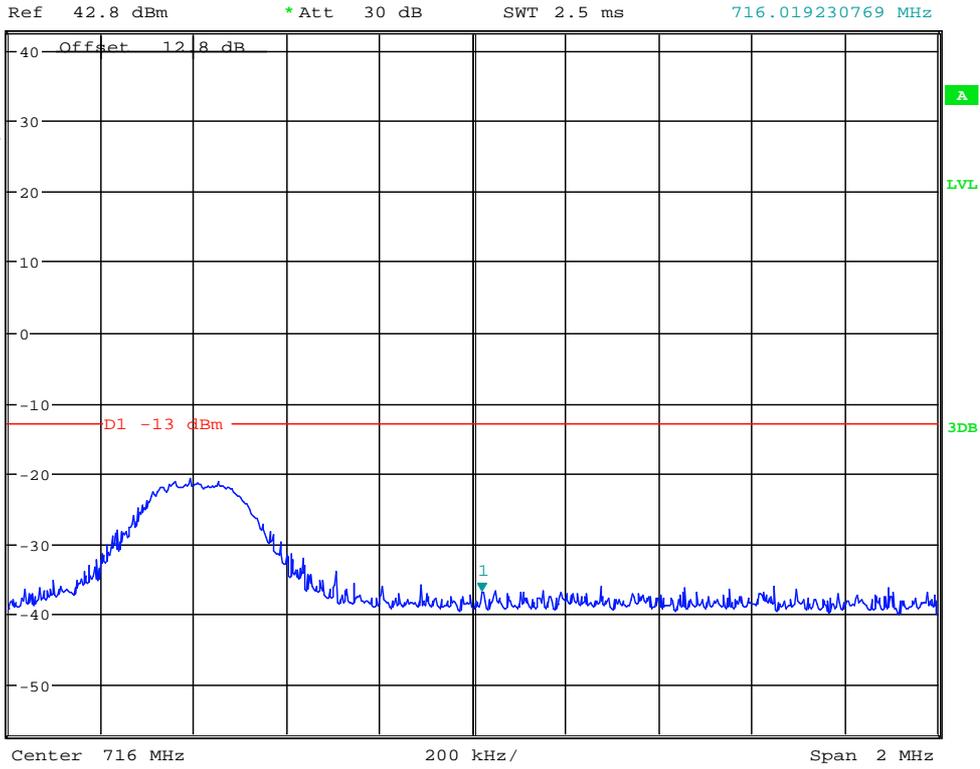
Date: 27.JUN.2012 16:14:56



**TM2**  
Right Edge  
10MHz(BW)  
Channel 23800  
16QAM /1 RB/RB #0



\*RBW 100 kHz      Marker 1 [T1 ]  
\*VBW 300 kHz      -37.01 dBm  
SWT 2.5 ms      716.019230769 MHz



Date: 27.JUN.2012 16:12:02

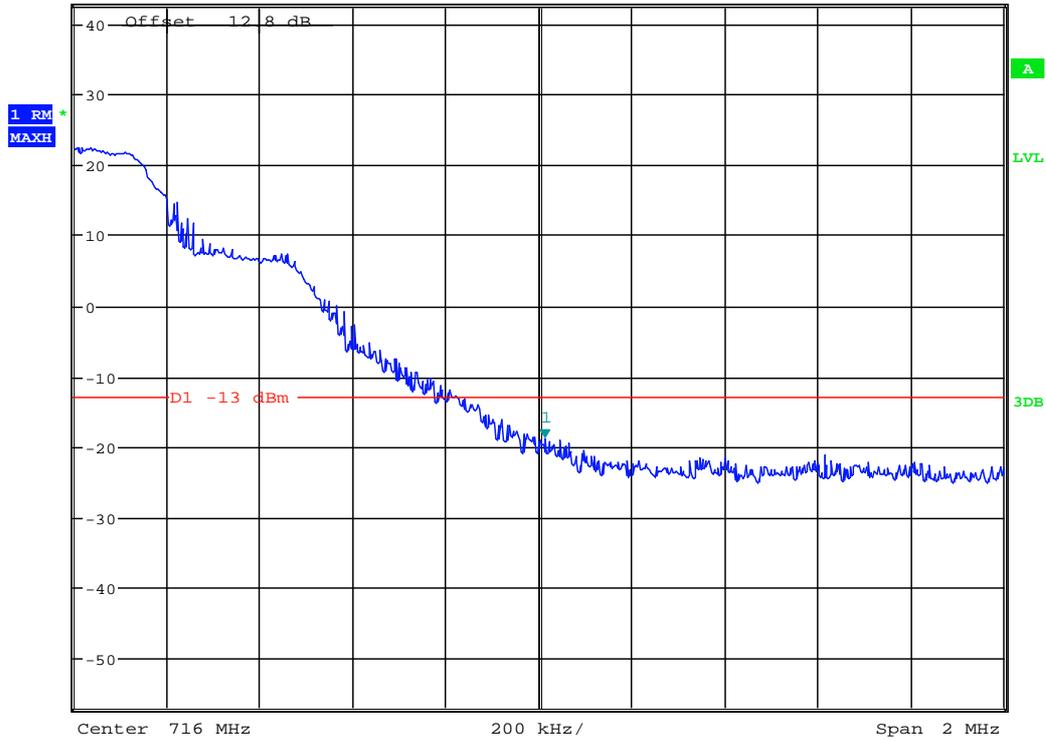




### 16QAM /full RBS



Ref 42.8 dBm      \* Att 30 dB      \* RBW 100 kHz      Marker 1 [T1 ]  
 \* VBW 300 kHz      -18.87 dBm  
 SWT 2.5 ms      716.012820513 MHz



Date: 27.JUN.2012 16:15:30

-----END-----



## Appendix E

# Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & Part 27 Subpart C&L



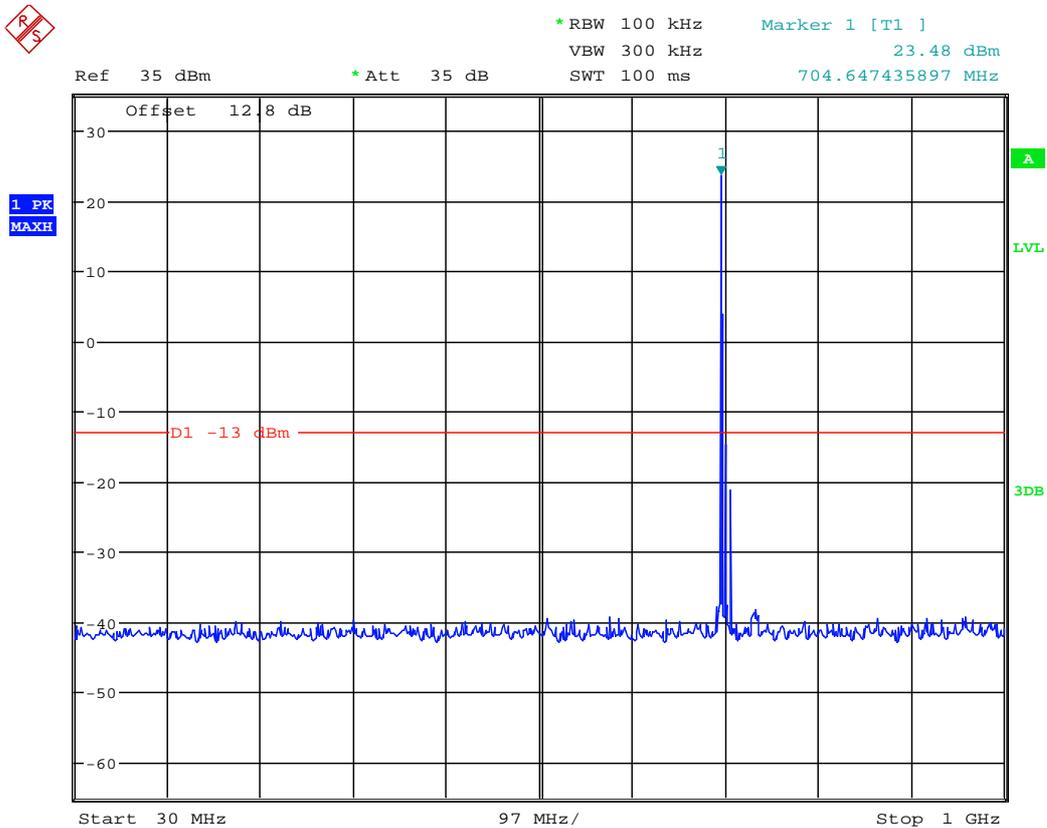
## TM1 (QPSK)

NOTE1: QPSK output power higher than 16QAM, so only test the QPSK mode.

NOTE2: All relevant operation modes have been tested, and the worst case data (1RB&full RB) is included in this report.

10MHz (BW)  
 Channel 23780

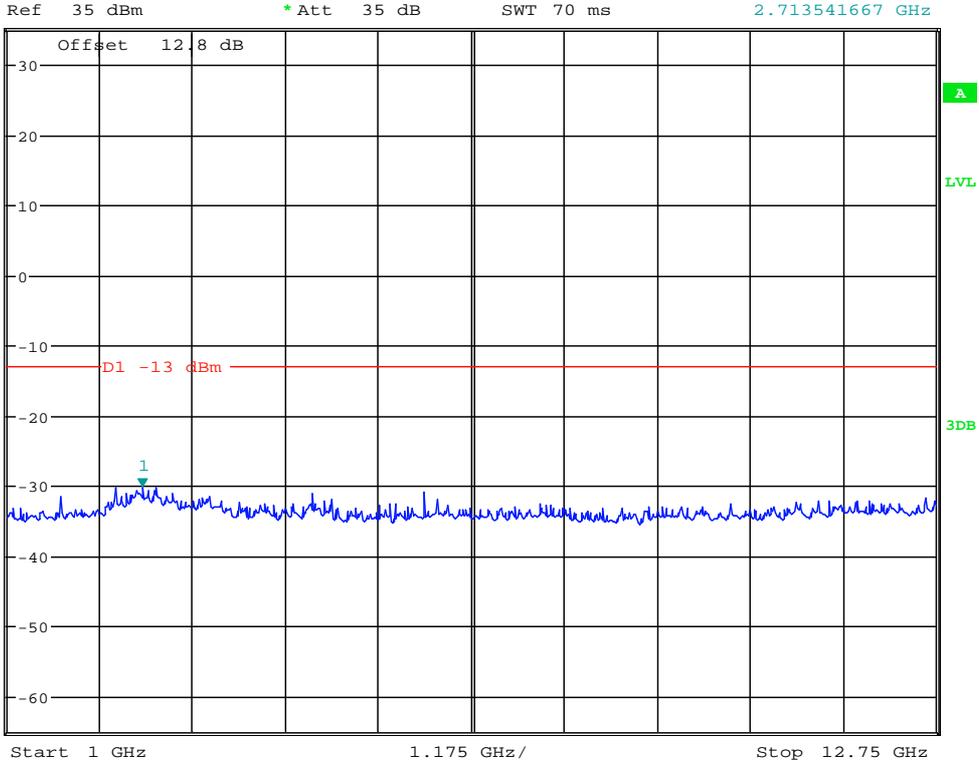
1 RB/RB #0



Date: 28.JUN.2012 11:57:46



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.31 dBm  
SWT 70 ms      2.713541667 GHz



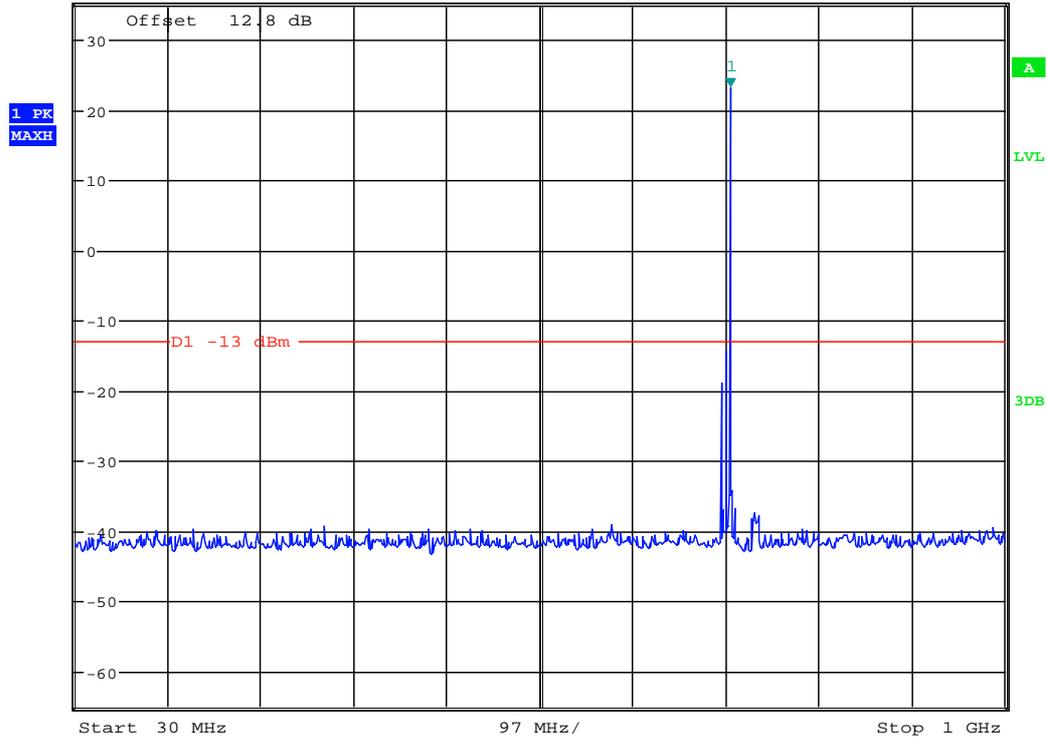
Date: 28.JUN.2012 11:52:29



### 1 RB/RB #max



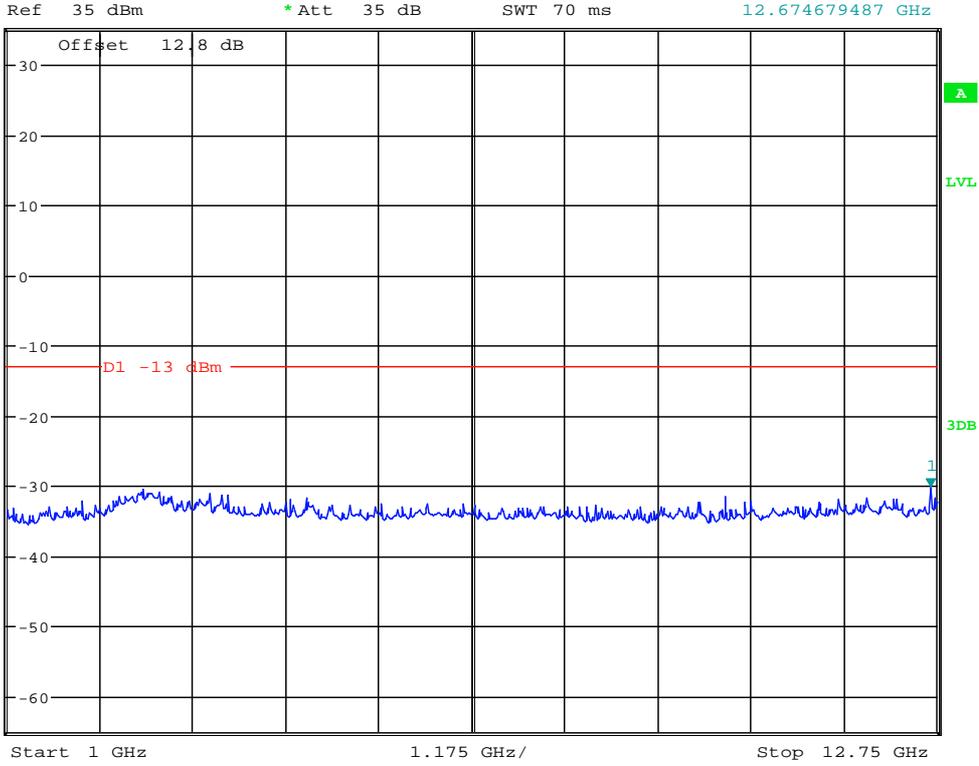
Ref 35 dBm      \*Att 35 dB      \*RBW 100 kHz      Marker 1 [T1 ]  
VBW 300 kHz      23.08 dBm  
SWT 100 ms      713.974358974 MHz



Date: 28.JUN.2012 11:58:13



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.15 dBm  
SWT 70 ms      12.674679487 GHz



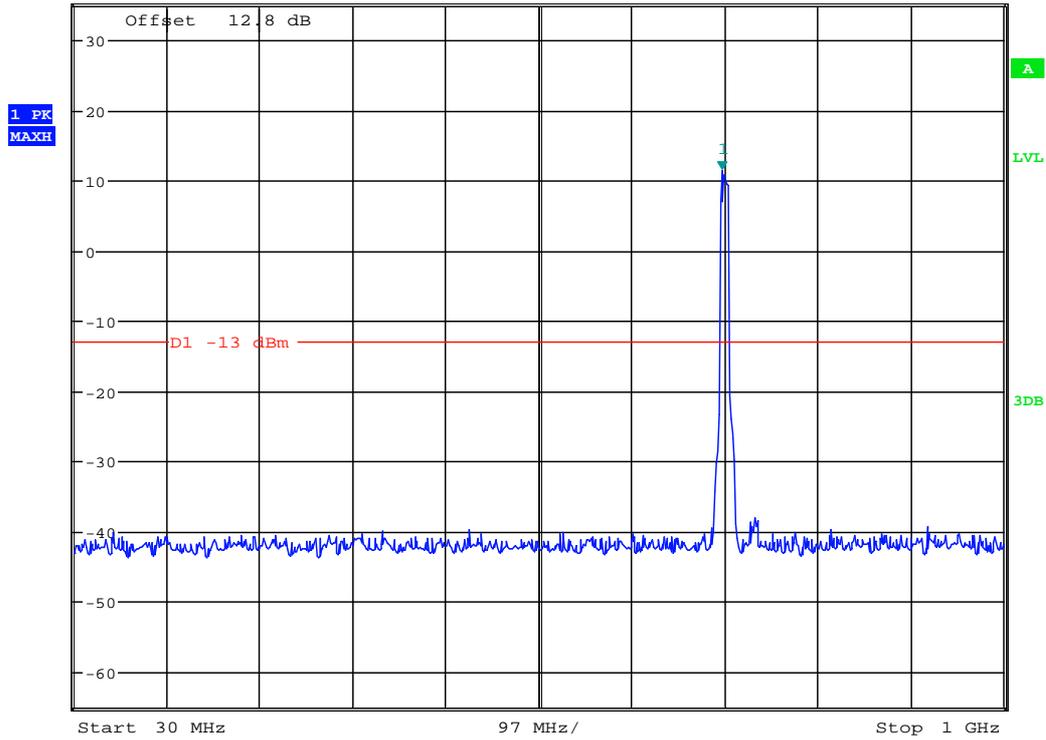
Date: 28.JUN.2012 11:52:49



full RBs



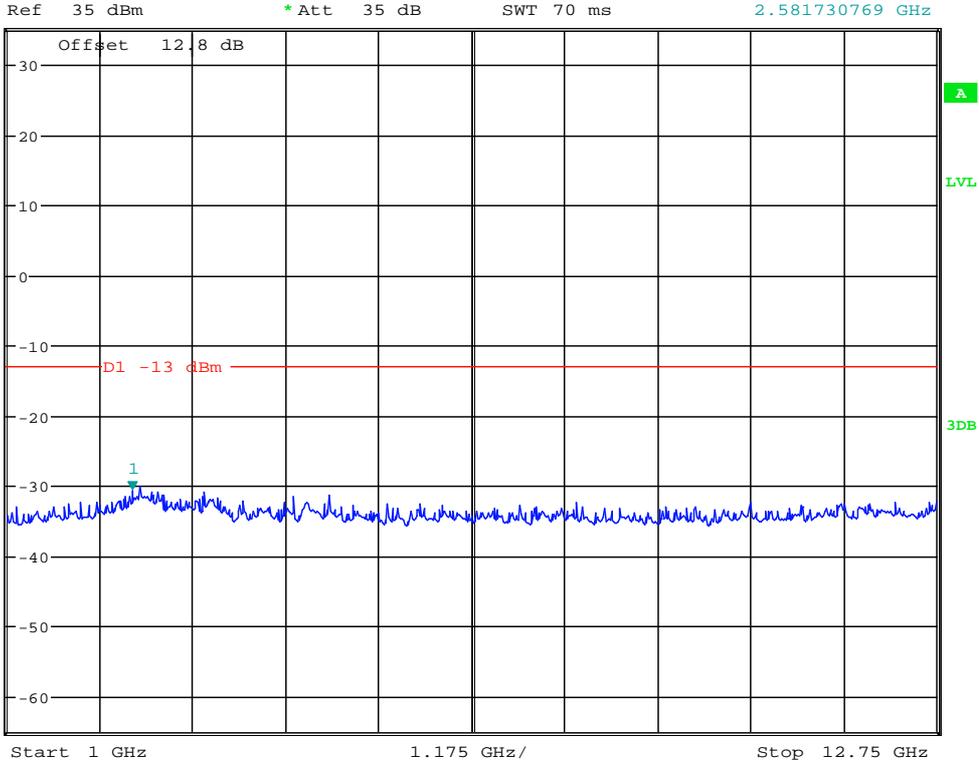
Ref 35 dBm      \*Att 35 dB      \*RBW 100 kHz      Marker 1 [T1 ]  
 VBW 300 kHz      11.33 dBm  
 SWT 100 ms      706.201923077 MHz



Date: 28.JUN.2012 11:59:32



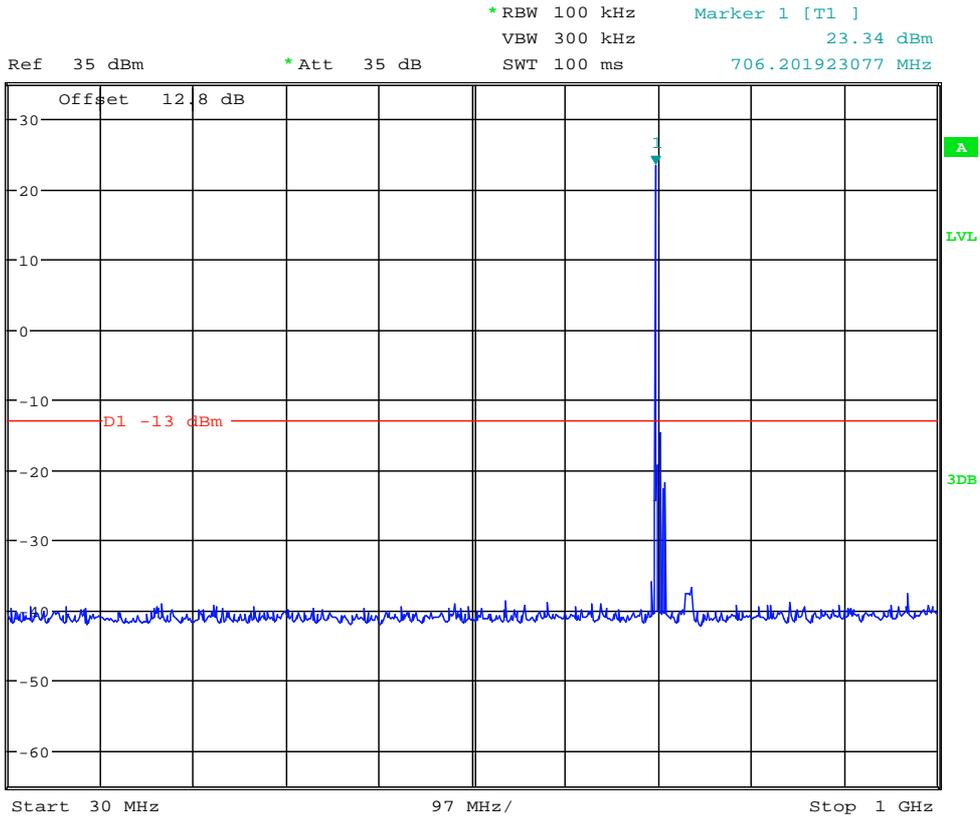
\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.71 dBm  
SWT 70 ms      2.581730769 GHz



Date: 28.JUN.2012 11:53:04



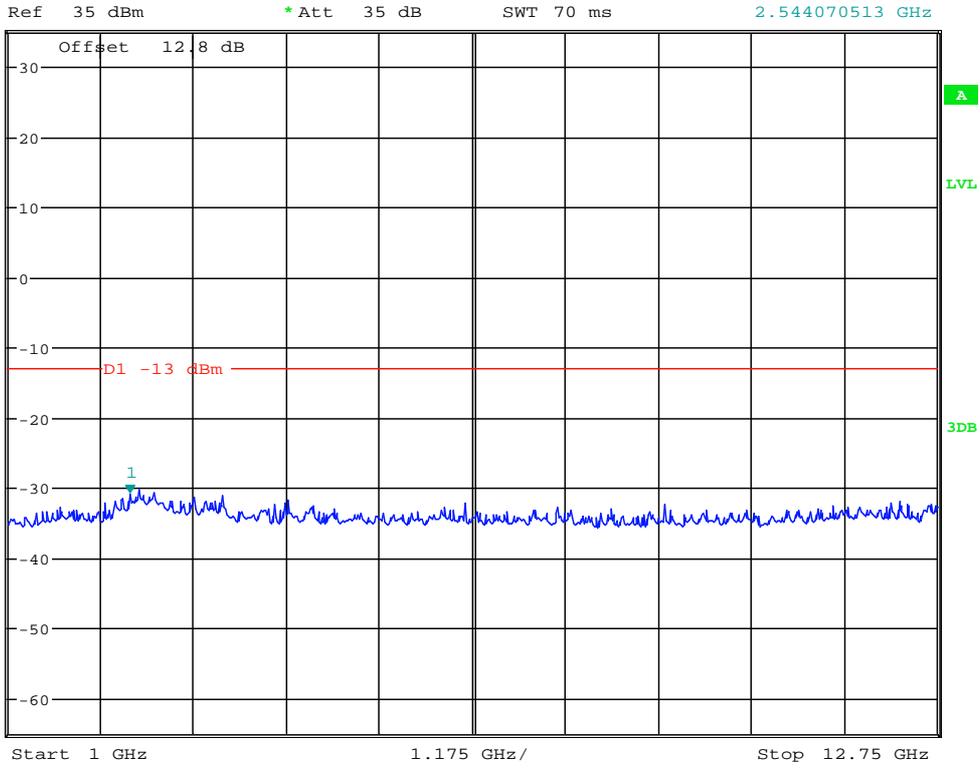
10MHz (BW)  
Channel 23790  
1 RB/RB #0



Date: 28.JUN.2012 11:55:53



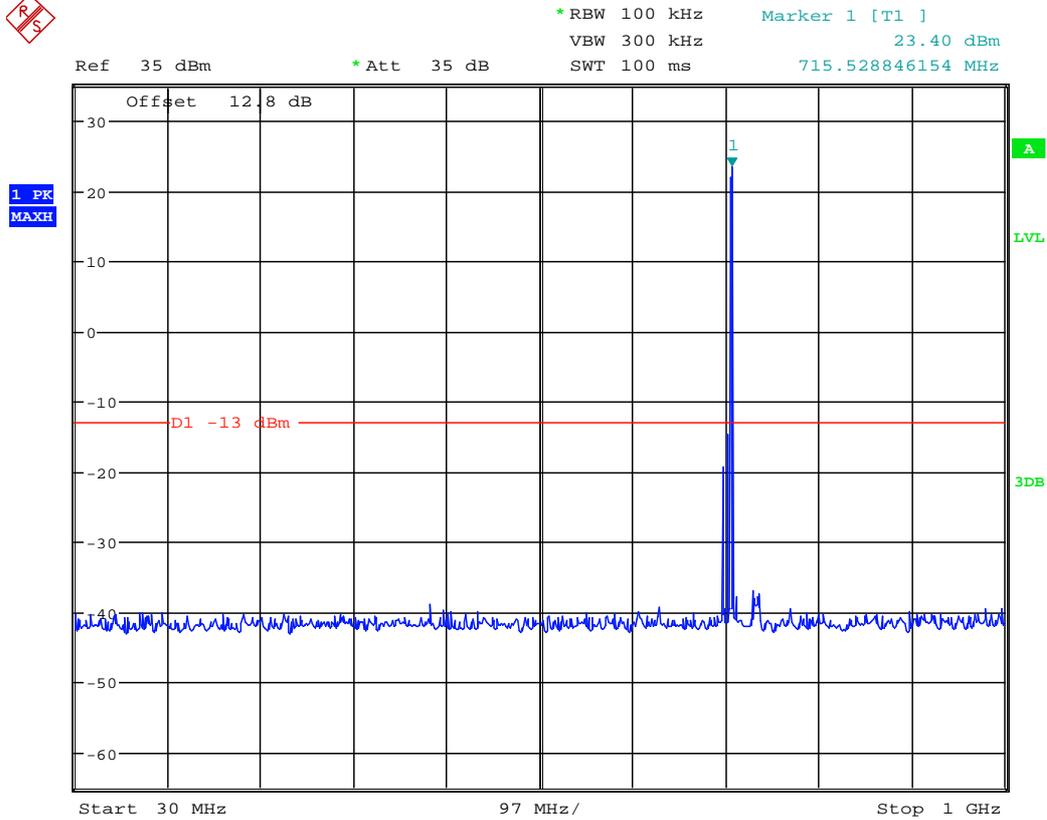
\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.91 dBm  
SWT 70 ms      2.544070513 GHz



Date: 28.JUN.2012 11:53:15



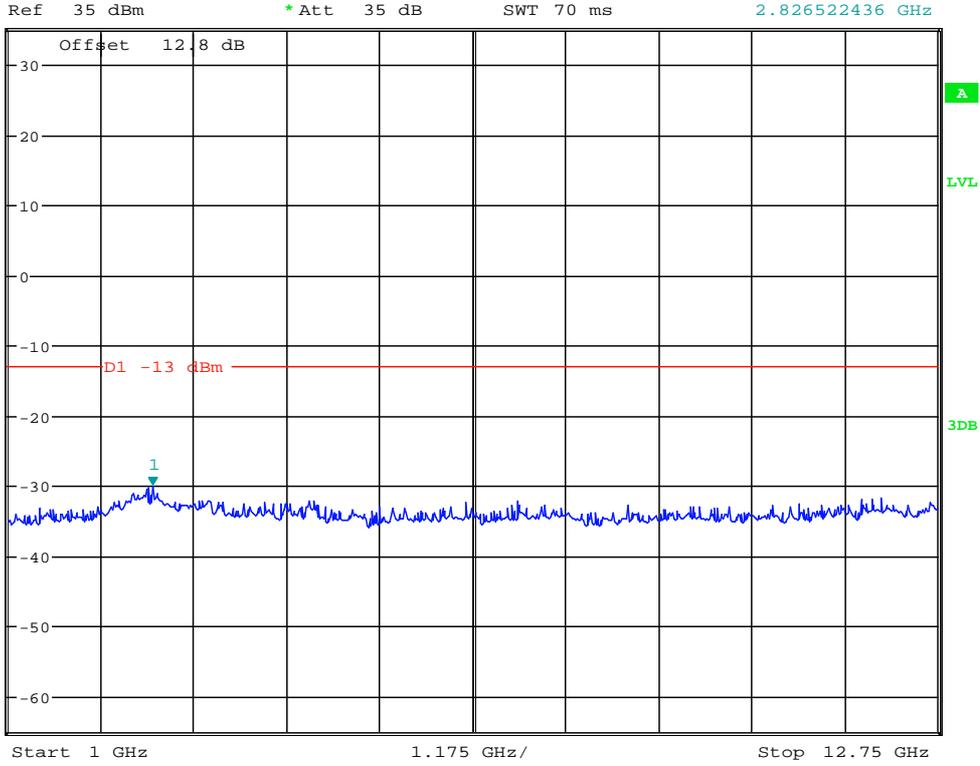
### 1 RB/RB #max



Date: 28.JUN.2012 11:56:21



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.12 dBm  
SWT 70 ms      2.826522436 GHz



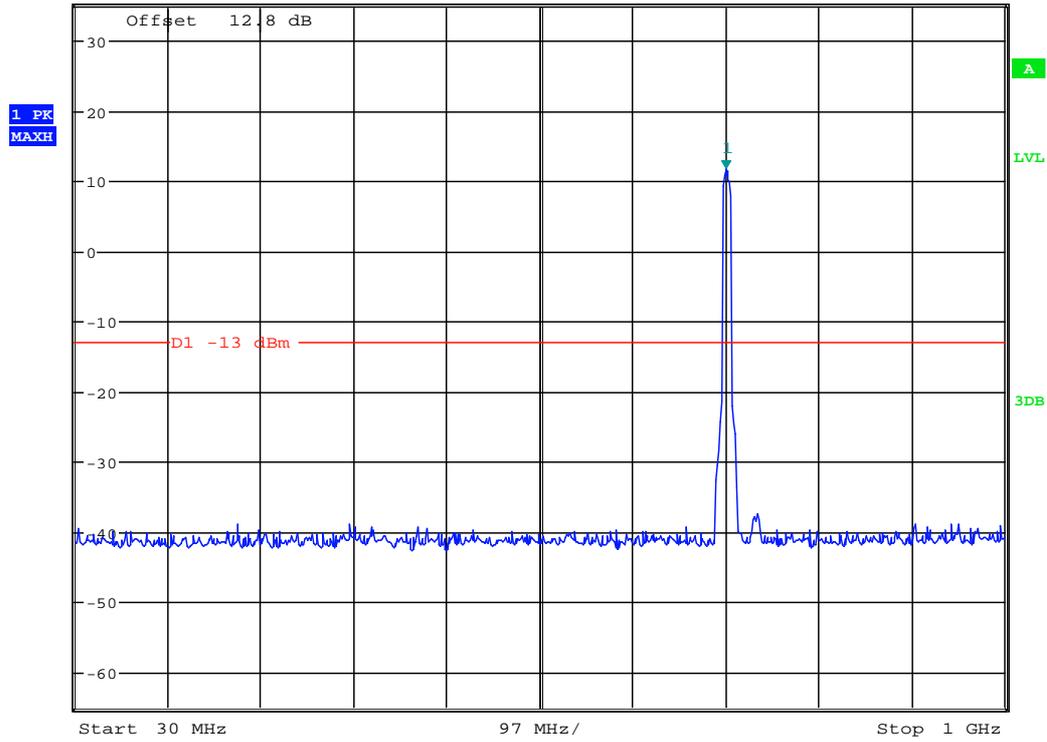
Date: 28.JUN.2012 11:53:28



### full RBs



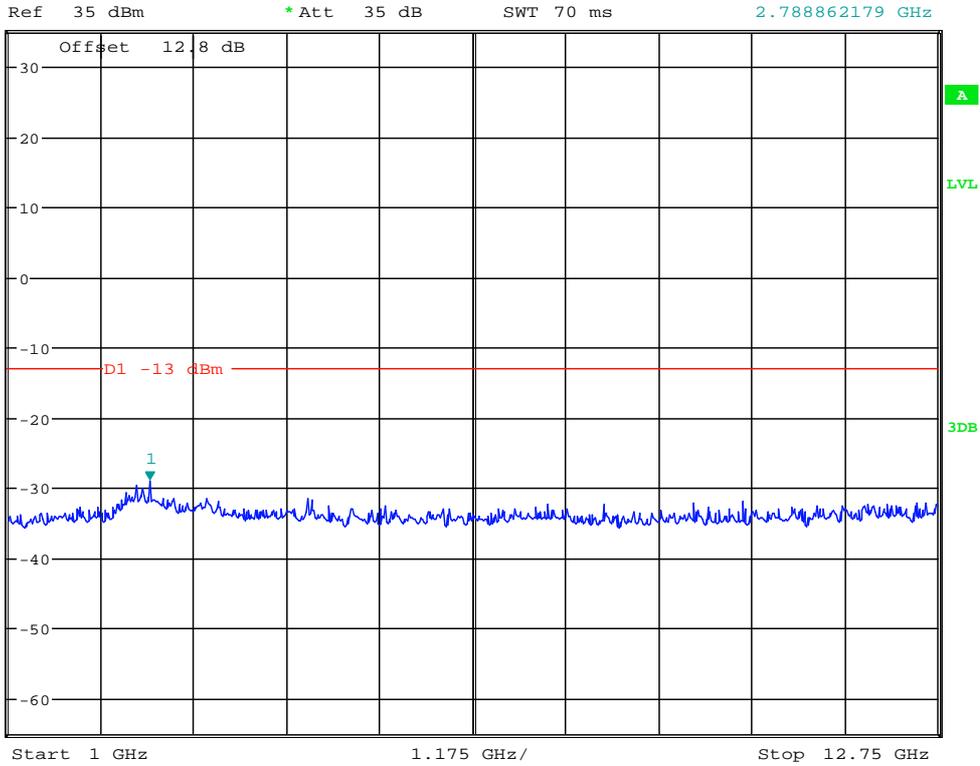
Ref 35 dBm      \*Att 35 dB      \*RBW 100 kHz      Marker 1 [T1 ]  
VBW 300 kHz      11.58 dBm  
SWT 100 ms      709.310897436 MHz



Date: 28.JUN.2012 11:56:58



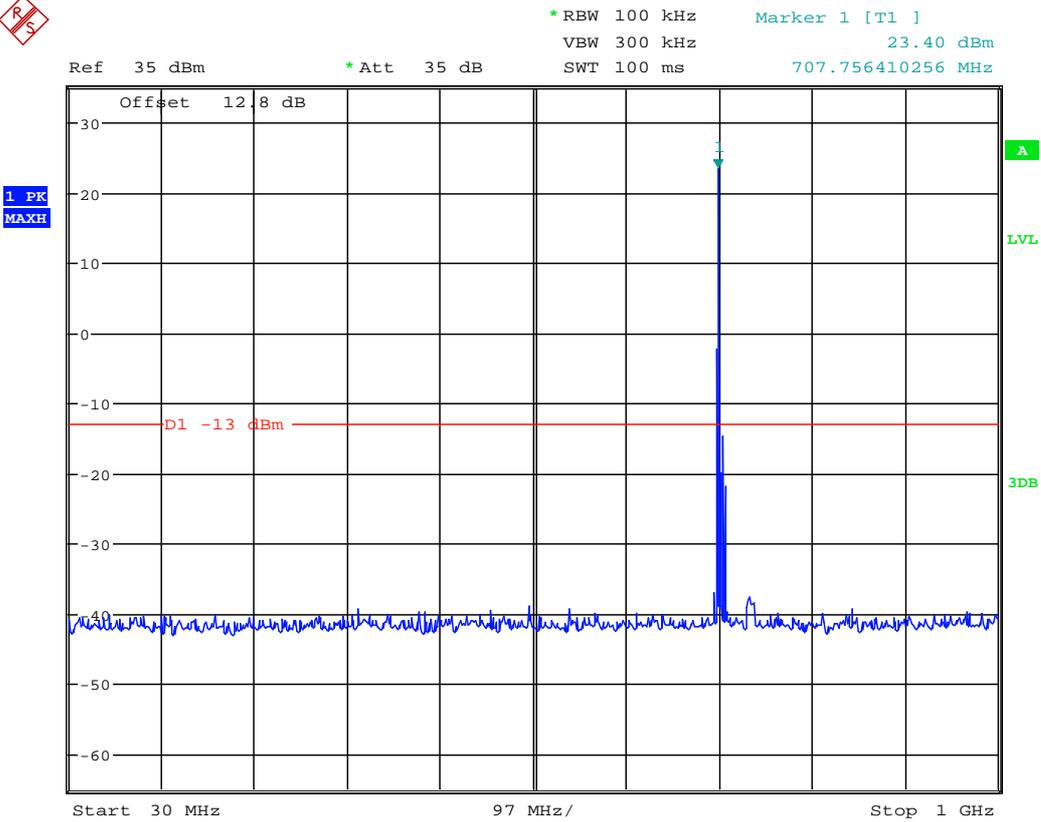
\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -29.05 dBm  
SWT 70 ms      2.788862179 GHz



Date: 28.JUN.2012 11:53:43



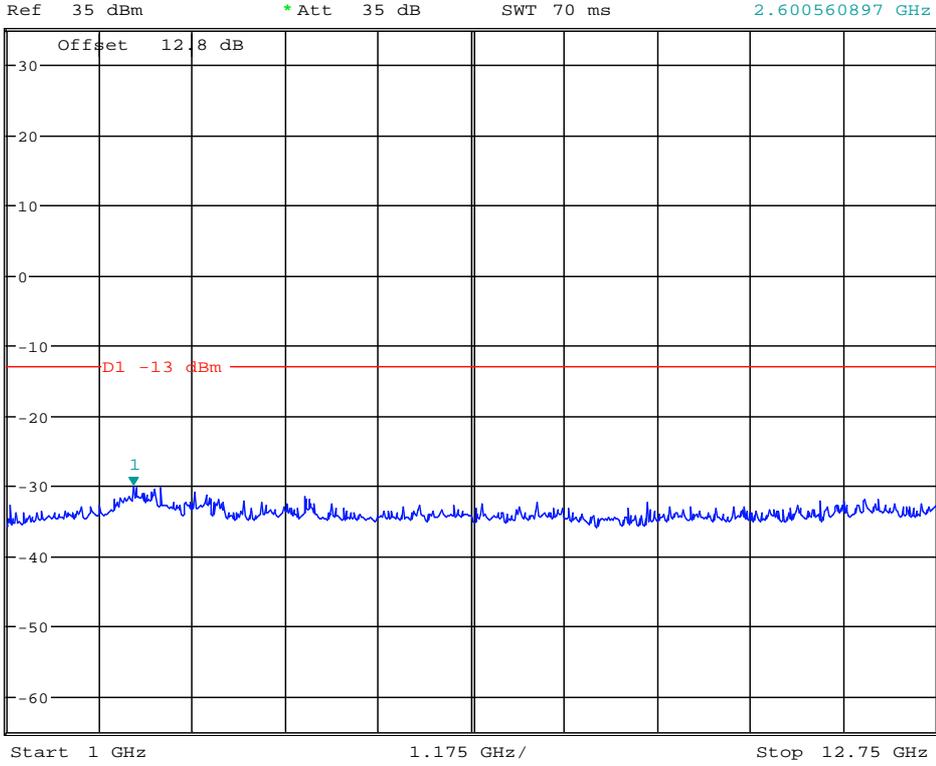
10MHz (BW)  
Channel 23800  
1 RB/RB #0



Date: 28.JUN.2012 12:01:49



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.09 dBm  
SWT 70 ms      2.600560897 GHz



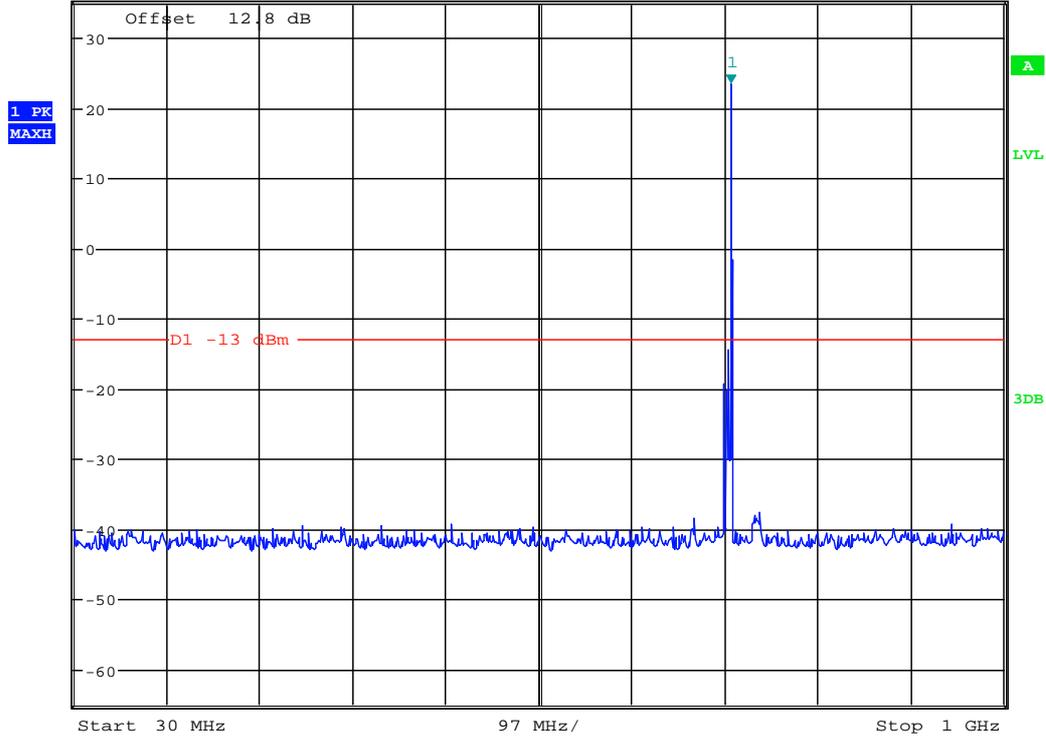
Date: 28.JUN.2012 11:53:56



### 1 RB/RB #max



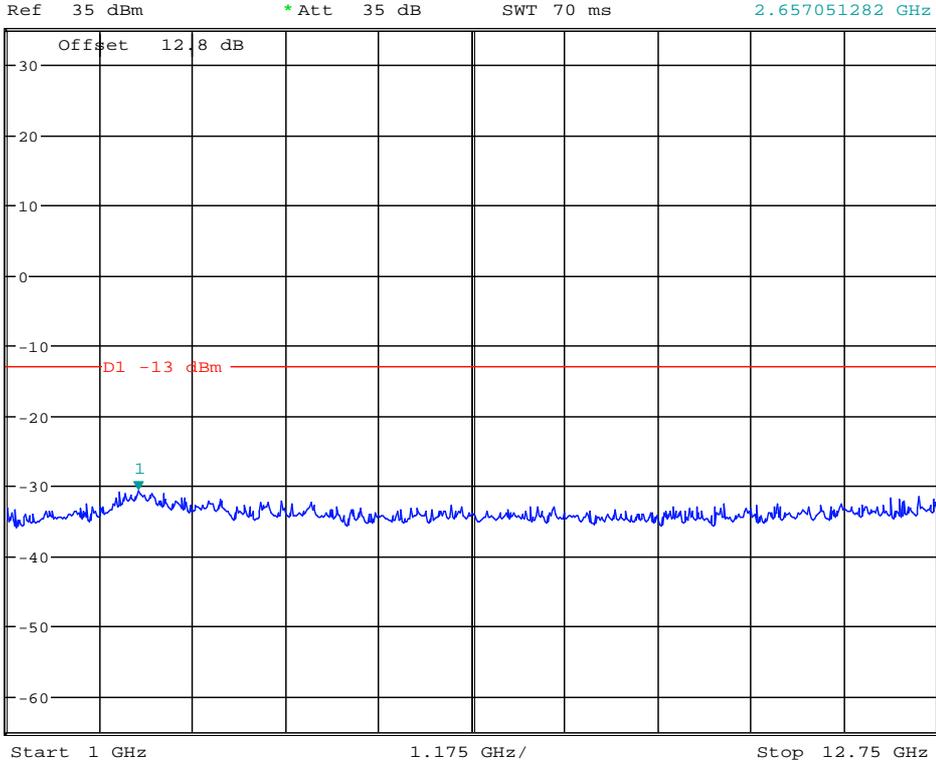
Ref 35 dBm      \*Att 35 dB      \*RBW 100 kHz      Marker 1 [T1 ]  
VBW 300 kHz      23.29 dBm  
SWT 100 ms      715.528846154 MHz



Date: 28.JUN.2012 12:02:11



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -30.71 dBm  
SWT 70 ms      2.657051282 GHz



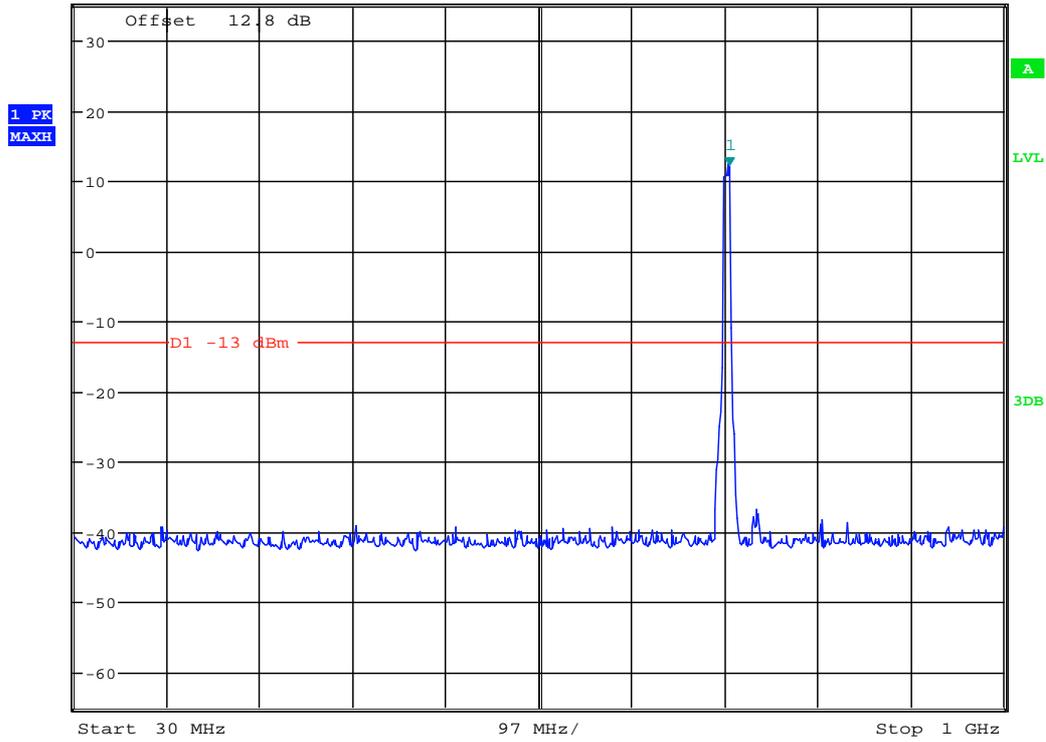
Date: 28.JUN.2012 11:54:13



### full RBs



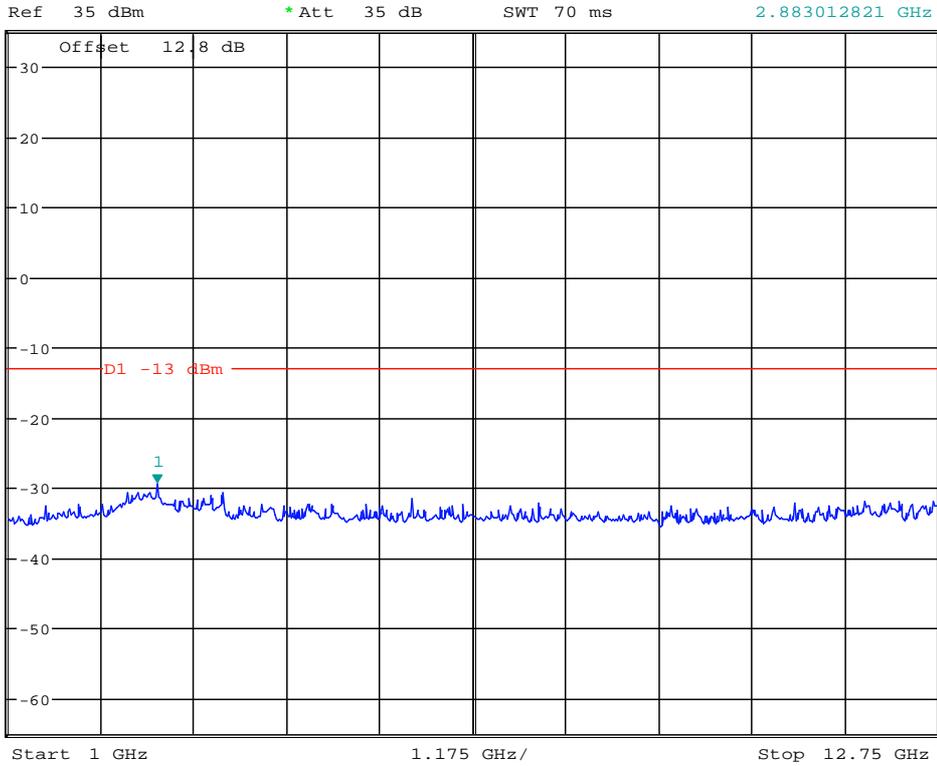
Ref 35 dBm      \*Att 35 dB      \*RBW 100 kHz      Marker 1 [T1 ]  
VBW 300 kHz      11.93 dBm  
SWT 100 ms      713.974358974 MHz



Date: 28.JUN.2012 12:06:06



\*RBW 1 MHz      Marker 1 [T1 ]  
VBW 3 MHz      -29.47 dBm  
SWT 70 ms      2.883012821 GHz



Date: 28.JUN.2012 11:54:31

-----END-----



# **Appendix F**

## **Radiated spurious emission**

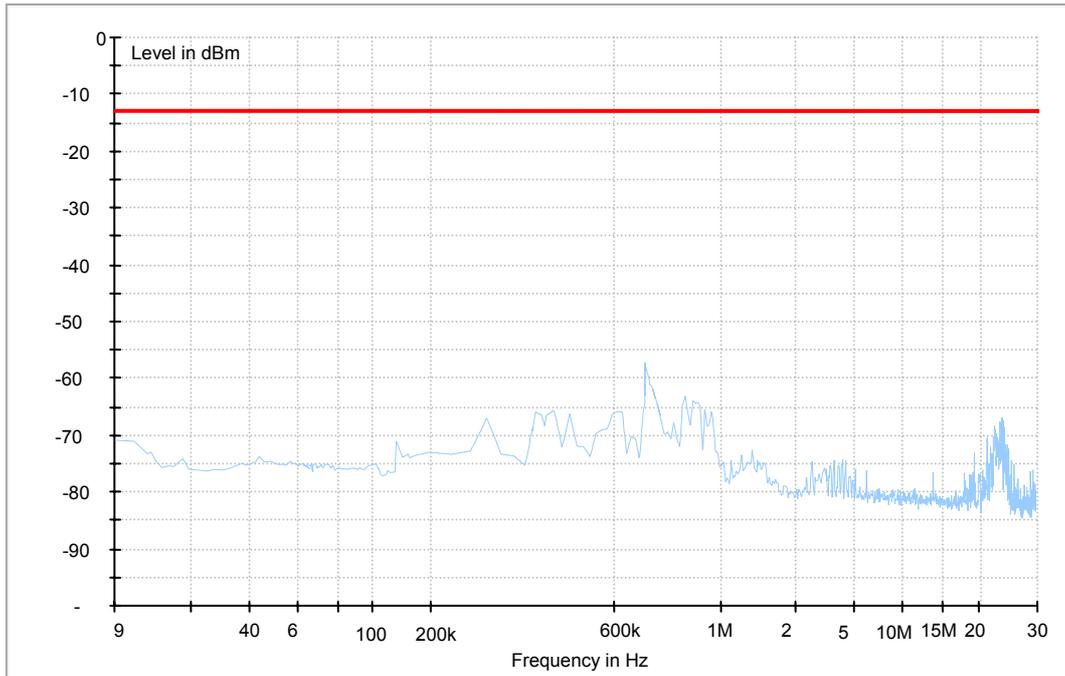
According to FCC Part 2.1051 & Part 27 Subpart C&L

- Note: 1. Simultaneous transmission was investigated and no new emissions were found.
2.  $RBW \geq 1\text{MHz}$ ,  $VBW > 3 \times RBW$ .

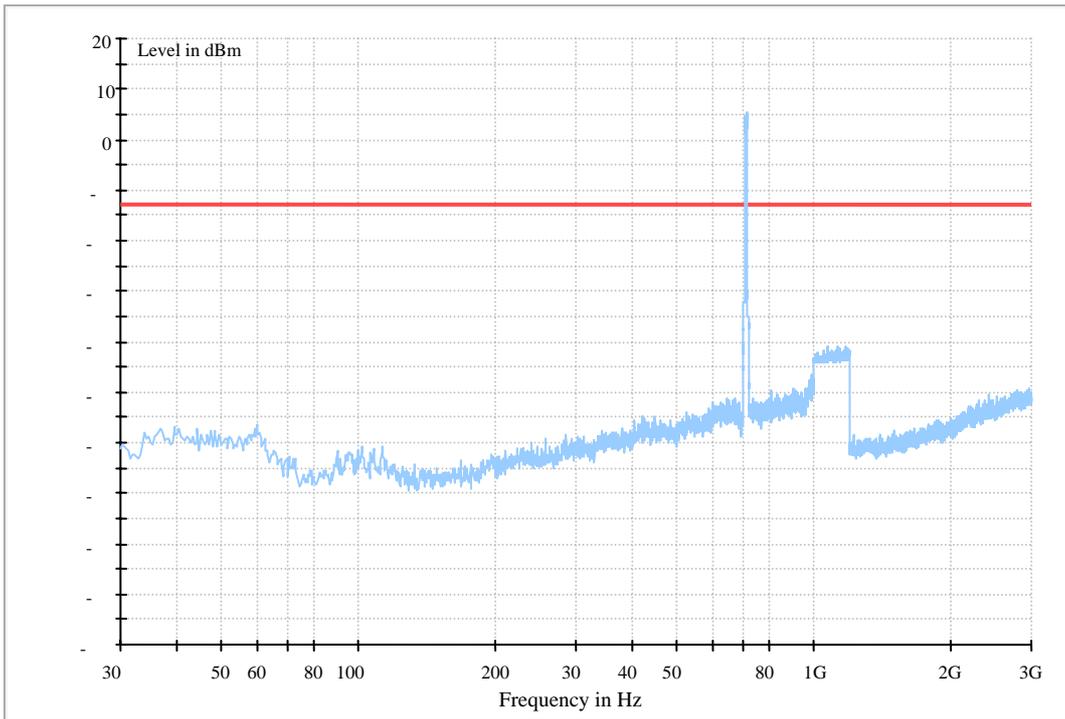
## LTE BAND 17

Bandwidth=10M

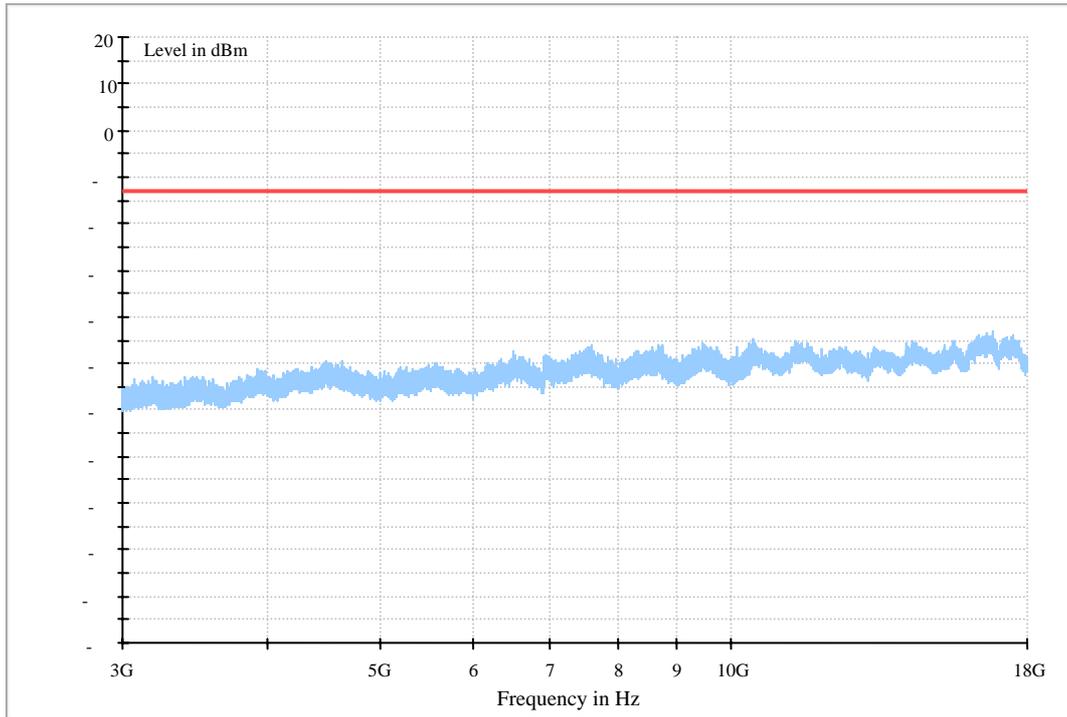
Traffic Mode (9kHz-30MHz)



Traffic Mode (30MHz-3GHz)



### Traffic Mode (3GHz-18GHz)





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# Appendix G

## Frequency Stability

According to FCC Part 2.1055 & Part 27.54



### Frequency Error vs. Temperature:

Test Mode	RF Ch.	Volt.	Temp.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Freq. vs. 20 °C [ppm]	Limit [ppm]	Verdict
TM 1(10M)	M	VN	-30 °C	-13	-0.0183	---	±2.5	Pass
			-20 °C	-19	-0.0268	---	±2.5	Pass
			-10 °C	9	0.01268	---	±2.5	Pass
			0 °C	-21	-0.0296	---	±2.5	Pass
			10 °C	12	0.0169	---	±2.5	Pass
			20 °C	-17	-0.0239	---	±2.5	Pass
			30 °C	-20	-0.0282	---	±2.5	Pass
			40 °C	10	0.01408	---	±2.5	Pass
			50 °C	-17	-0.0239	---	±2.5	Pass

### Frequency Error vs. Voltage:

Test Mode	RF Ch.	Temp.	Volt.	Freq. Error [Hz]	Freq. vs. rated [ppm]	Freq. vs. 20 °C [ppm]	Limit [ppm]	Verdict
TM1(10M)	M	20 °C	VL	11	0.01549	---	±2.5	Pass
			VN	-14	-0.0197	---	±2.5	Pass
			VH	14	0.01972	---	±2.5	Pass

-----The END-----



## Appendix H

# Photos of Radiated Spurious Emissions



# Photos of Test Setup



# 1 Radiated Spurious Emissions



Radiated Spurious Emission (below 3GHz)





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Radiated Spurious Emission (3GHz to18GHz)



Radiated Spurious Emission (18GHz to26.5GHz)