



Test Report

Product Name : MMDS TRANSCEIVER
Model No. : TRX-221
FCC ID. : OUP890200801

Applicant : TRANSYSTEM INC.

Address : No.1-2, Li-Hsin Rd. 1, Science-Based Industrial
Park, Hsinchu, Taiwan R.O.C.

Date of Receipt : 2011/12/07
Issued Date : 2011/12/16
Report No. : 11C179R-RFUSP35V01
Report Version : V1.0

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Test Report Certification

Issued Date : 2011/12/16

Report No. : 11C179R-RFUSP35V01



Product Name : MMDS TRANSCEIVER

Applicant : TRANSYSTEM INC.

Address : No.1-2, Li-Hsin Rd. 1, Science-Based Industrial Park,
Hsinchu, Taiwan R.O.C.

Manufacturer : TRANSYSTEM INC.

Model No. : TRX-221

FCC ID. : OUP890200801

EUT Voltage : AC 120V / 60Hz

Trade Name : TSI

Applicable Standard : FCC CFR Title 47 Part 2 and Part 27: 2010

Test Result : Complied

The test results relate only to the samples tested.

The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.

Documented By : Sandy Chuang
(Sandy Chuang / Adm. Specialist)

Reviewed By : Ben Huang
(Ben Huang / Engineer)

Approved By : Roy Wang
(Roy Wang / Manager)

TABLE OF CONTENTS

Description	Page
1. General Information	5
1.1. EUT Description	5
1.2. Operational Description	6
1.3. Test Mode	7
1.4. Tested System Details	8
1.5. Configuration of tested System	8
1.6. EUT Exercise Software	9
1.7. Test Facility	10
2. Peak Output Power	12
2.1. Test Equipment	12
2.2. Test Setup	13
2.3. Limits	14
2.4. Test Procedure	14
2.5. Uncertainty	14
2.6. Test Result	15
3. Occupied Bandwidth	24
3.1. Test Equipment	24
3.2. Test Setup	24
3.3. Limits	24
3.4. Test Procedure	24
3.5. Uncertainty	24
3.6. Test Result	25
4. Band Edge	45
4.1. Test Equipment	45
4.2. Test Setup	45
4.3. Limits	45
4.4. Test Procedure	46
4.5. Uncertainty	46
4.6. Test Result	47
5. Conducted Spurious Emission	51
5.1. Test Equipment	51
5.2. Test Setup	51
5.3. Limits	52
5.4. Test Procedure	52
5.5. Uncertainty	52
5.6. Test Result	53
6. Radiated Spurious Emission	71
6.1. Test Equipment	71
6.2. Test Setup	72
6.3. Limits	73
6.4. Test Procedure	73
6.5. Uncertainty	73
6.6. Test Result	74
6.7. Test Photo	90

7.	Frequency Stability Over Temperatures Variation.....	92
7.1.	Test Equipment.....	92
7.2.	Test Setup	92
7.3.	Limits	92
7.4.	Test Procedure	92
7.5.	Uncertainty	92
7.6.	Test Result.....	93
8.	Frequency Stability Over Voltage Variation	94
8.1.	Test Equipment.....	94
8.2.	Test Setup	94
8.3.	Limits	94
8.4.	Test Procedure	95
8.5.	Uncertainty	95
8.6.	Test Result.....	96
9.	AC Conducted Emission.....	97
9.1.	Test Equipment.....	97
9.2.	Test Setup	97
9.3.	Limits	98
9.4.	Test Procedure	98
9.5.	Uncertainty	98
9.6.	Test Result.....	99
9.7.	Test Photo	101
Attachement.....		102
	EUT Photograph.....	102

1. General Information

1.1. EUT Description

Product Name	MMDS TRANSCEIVER
Trade Name	TSI
Model No.	TRX-221
Frequency Range	2657 - 2687MHz
Modulation Type	QPSK, 16QAM
Antenna Gain	1.97dBi
Channel Control	AUTO
Antenna Type	Dipole

Upstream Symbol Rate (ksps)	QPSK Data Rate (kbps)	16QAM Data Rate (kbps)	Bandwidth Used (kHz)
160	320	640	200
320	640	1280	400
640	1280	2560	800
1280	2560	5120	1600
2560	5120	10240	3200

Note:

1. This device is a MMDS TRANSCEIVER included a 2.5GHz receiving function, and 2.6GHz transmitting function.
2. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27 for MMDS (Microwave Multipoint Distribution Systems) devices.
3. Regards to the frequency band operation; the highest rate that was included the lowest 、middle and highest frequency of channel were selected to perform the test, and then shown on this report.
4. This device is a composite device in accordance with Part 15 regulations. The function receiving was measured and made a test report that the report number is 11C179R-RFUSP37V02 under Declaration of Conformity.

1.3. Test Mode

QuieTek has verified the construction and function in typical operation. All the test modes were evaluated with the EUT in normal operation, which was shown in this test report and defined as below:

Evaluated Mode (Uplink)		
	Bandwidth(kHz)	Modulation
Mode 1: Transmit	200	QPSK
		16QAM
Mode 2: Transmit	400	QPSK
		16QAM
Mode 3: Transmit	800	QPSK
		16QAM
Mode 4: Transmit	1600	QPSK
		16QAM
Mode 5: Transmit	3200	QPSK
		16QAM

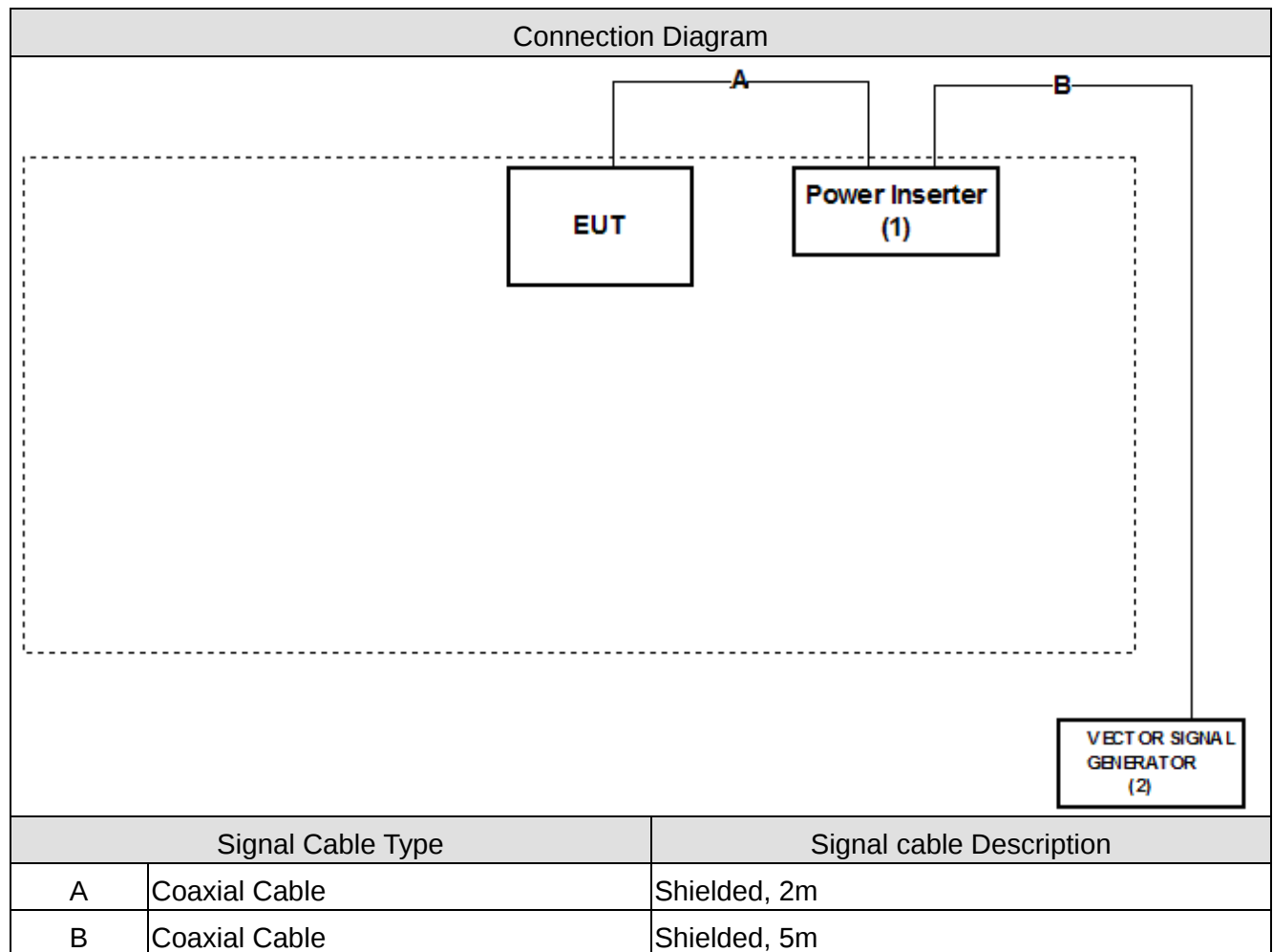
Final Test Mode & Test Item (Uplink)		
Test Item	QPSK	16 QAM
Peak Output Power	MODE 1 、 MODE 5	MODE 1 、 MODE 5
Band Edge	--	MODE 1 、 MODE 5
Occupied Bandwidth	MODE 1 、 MODE 2 MODE 3 、 MODE 4 MODE 5	MODE 1 、 MODE 2 MODE 3 、 MODE 4 MODE 5
Conducted Spurious Emission	--	MODE 1 、 MODE 5
Radiated Spurious Emission	--	MODE 1 、 MODE 5
Frequency Stability Over Temperatures Variation	Carrier Frequency	
Frequency Stability Over Voltage Variation	Carrier Frequency	
AC Conducted Emission	--	MODE 1 、 MODE 5

1.4. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1 Power Inserter	TRANSYSTEM INC.	M79102	N/A	DoC	N/A
2 VECTOR SIGNAL GENERATOR	R&S	SMU200A	102168	DoC	Non-Shielded, 1m

1.5. Configuration of tested System



1.6. EUT Exercise Software

1	Setup the EUT and VSG (Modulation Source) as shown on 1.5.
2	Turn on the power of EUT and VSG.
3	Data will transmit continuously from VSG to EUT.
4	All the peripheral will be retrieved during the test
5	Repeat the above procedure (3) to (4)

1.7. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 2.1046 and PART 27.50(h)(2) Peak Output Power	15 - 35	22
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 2.1049 and PART 27.53(l)(6) Occupied Bandwidth	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 2.1051 and PART 27.53(l)(4)(6) Band Edge	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 2.1051 and PART 27.53(l)(4)(6) Conducted Spurious Emission	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 2.1053 and PART 27.53(l)(4)(6) Radiated Spurious Emission	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 2.1055(a)(l) and PART 27.54 Frequency Stability Over Temperature Variation	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 2.1055(d) and PART 27.54 Frequency Stability Over Voltage Variation	15 - 35	22
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.207 AC Conducted Emission	15 - 35	25
Humidity (%RH)		25 - 75	50
Barometric pressure (mbar)		860 - 1060	950-1000

Site Description: September 27, 2010 File on
Federal Communications Commission
Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046
Registration Number: 365520



Accredited by TAF
Accreditation Number: 1313
Effective through: December 27, 2013



Accredited by NVLAP
NVLAP Lab Code: 200347-0
Effective through: September 30, 2012



Site Name: Quietek Corporation
Site Address: No. 75-2, 3rd Lin, Wangye Keng, Yonghxing
Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan
TEL : 886-3-5928858 / FAX : 886-3-5928859
E-Mail : service@quietek.com

2. Peak Output Power

2.1. Test Equipment

The following test equipments are used during the test:

Conducted peak power / SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2012/01/16

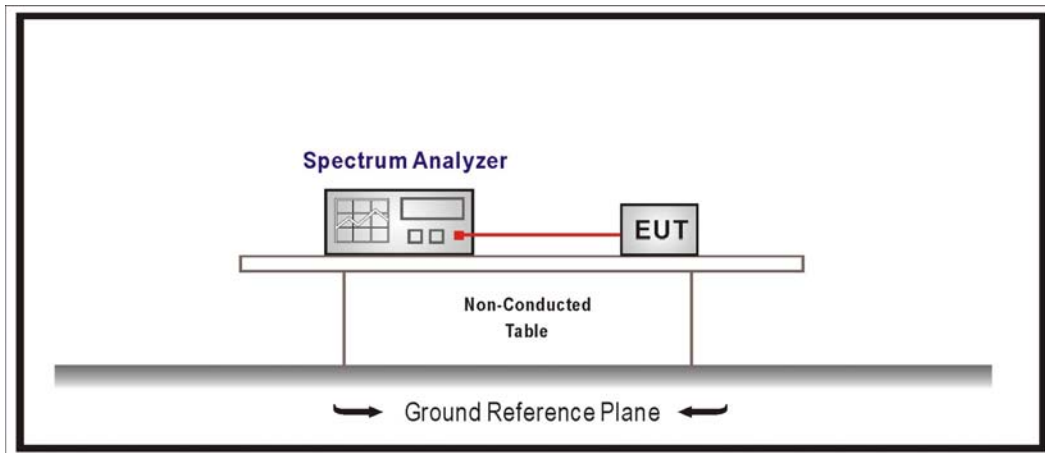
E.I.R.P peak power / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120D	743	2012/02/24
Pre-Amplifier	MITEQ	AMF-4D-005180-24-10P	888003	2012/12/05
Spectrum Analyzer	Agilent	E4440A	MY46187335	2012/01/06
Coaxial Cable	Huber+Suhner AG	Sucoflex 102	25623/2	2012/03/21

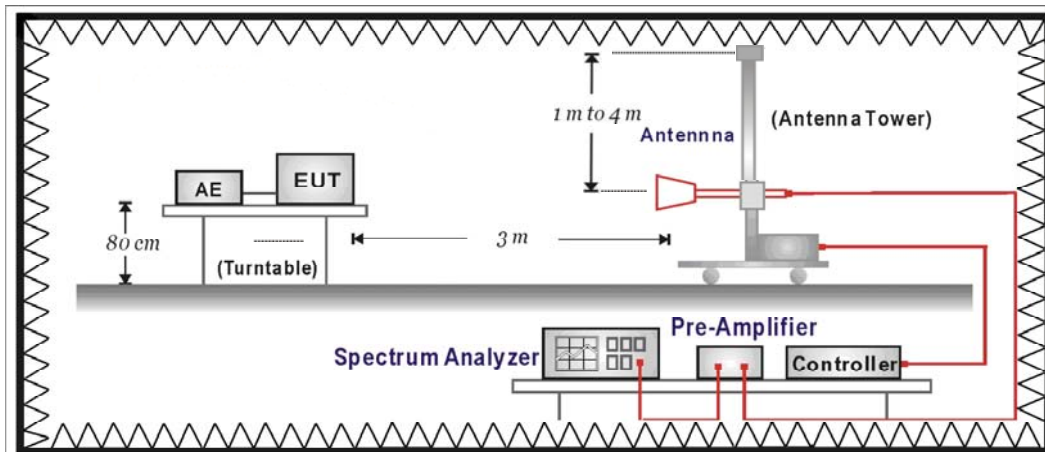
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

2.2. Test Setup

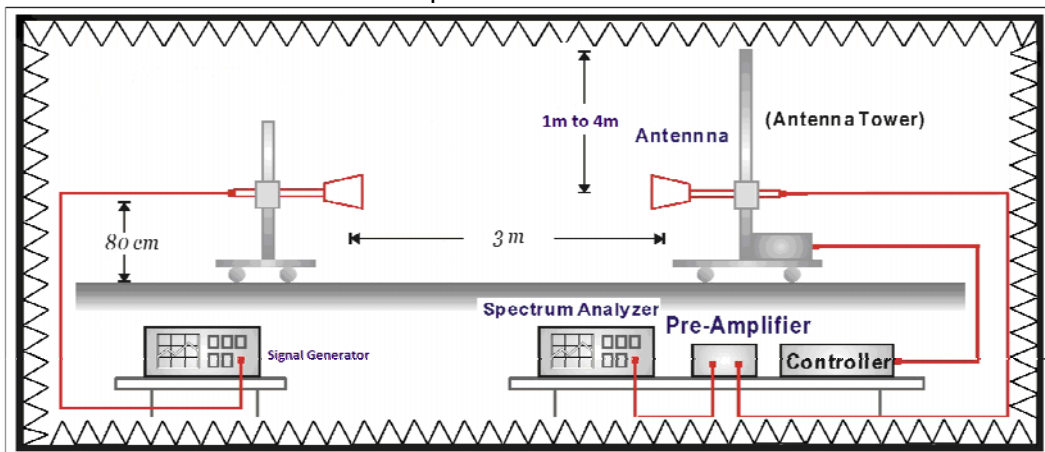
RF Conducted Measurement:



RF Radiated Measurement:



Substitution Measurement Setup:



2.3. Limits

(1) Main, Booster and Base Stations: Maximum E.I.R.P shall not exceed $33 \text{ dBW} + 10\log(X/Y)$ dBW, where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition.

(2) Mobile and Other User Stations: 2.0 Watts EIRP.

2.4. Test Procedure

The conducted peak output power is measured using R&S Spectrum Analyzer. The EUT was set up for the rated peak power. All measurements were done at 3 channels: low, middle and high operational frequency range.

For measuring E.I.R.P peak power, EUT was placed on the turn-table which was rotated around 360 degrees to search the maximum radiation power and receiver antenna was rotated vertical and horizontal polarization to find the maximum polarization radiated power.

The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission and level of signal generator adjusted to same level of emission. Both horizontal and vertical polarization of the antenna are set on measurement.

The radiated E.I.R.P power was calculated via the Correct factor, Reading Level, and Antenna gain as follows:

$$\text{E.I.R.P} = \text{Reading Level} + \text{Correct Factor} = \text{S.G.} - \text{Cable Loss} + \text{Antenna Gain}$$

2.5. Uncertainty

The measurement uncertainty is defined as $\pm 1.27 \text{ dB}$

2.6. Test Result

Product	MMDS TRANSCEIVER		
Test Item	Conducted Peak Output Power		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

Upstream Symbol Rate (ksps)	Test Mode	QPSK			16QAM		
		2657MHz	2672MHz	2687MHz	2657MHz	2672MHz	2687MHz
160	Mode 1	23.88dBm	23.95dBm	23.93dBm	23.80dBm	23.67dBm	23.82dBm
320	Mode 2	23.95dBm	24.01dBm	23.91dBm	24.04dBm	23.80dBm	23.82dBm
640	Mode 3	23.67dBm	23.68dBm	23.58dBm	23.73dBm	23.56dBm	23.66dBm
1280	Mode 4	23.94dBm	23.93dBm	23.90dBm	24.02dBm	23.77dBm	23.81dBm
2560	Mode 5	23.96dBm	24.02dBm	23.93dBm	24.05dBm	23.81dBm	23.84dBm

Test Mode: Mode 1

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 160 ksps



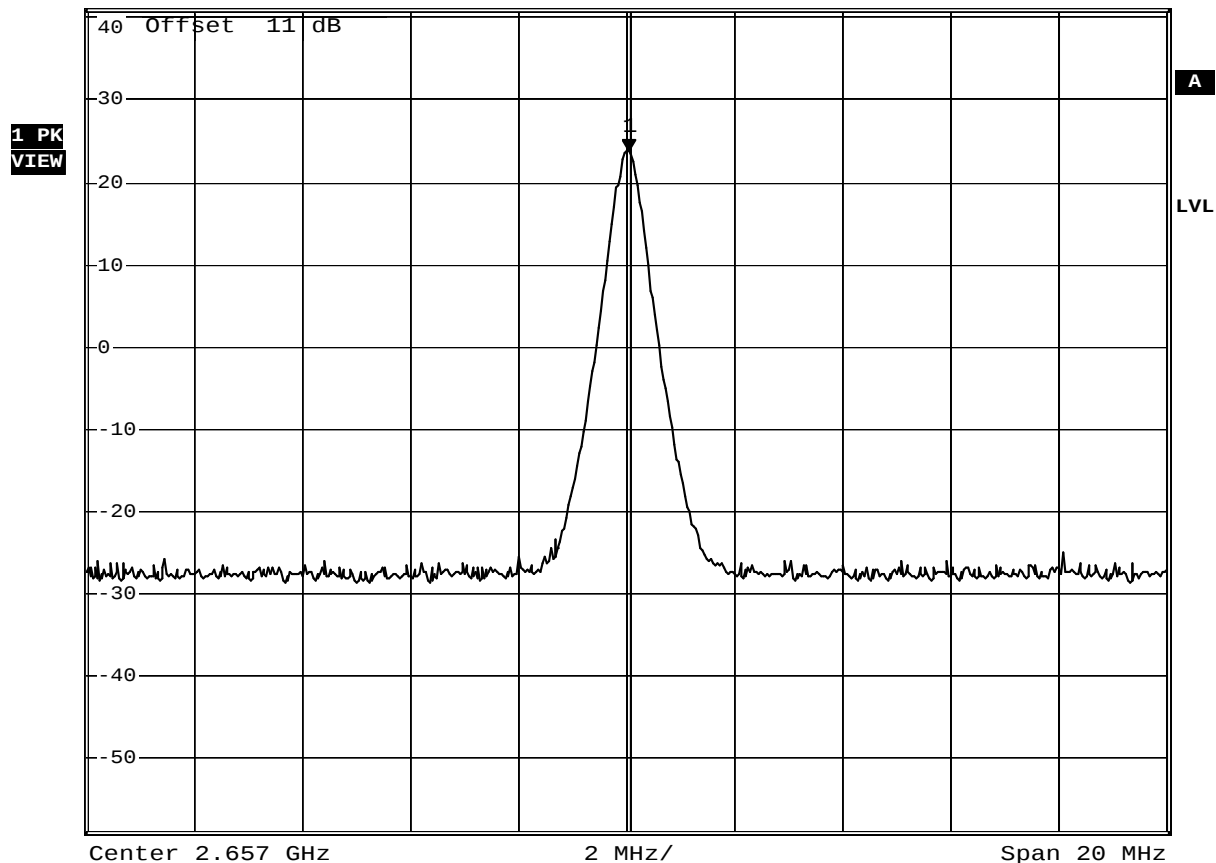
*RBW 300 kHz Marker 1 [T1]

*VBW 1 MHz 23.80 dBm

*SWT 100 ms 2.657040000 GHz

Ref 41 dBm

*Att 50 dB



Comment: A:\2

Date: 13.DEC.2011 15:48:48

Test Mode: Mode 1

Modulation Type: 16QAM

2672 MHz

Upstream Symbol Rate: 160 ksps



*RBW 300 kHz Marker 1 [T1]

*VBW 1 MHz 23.67 dBm

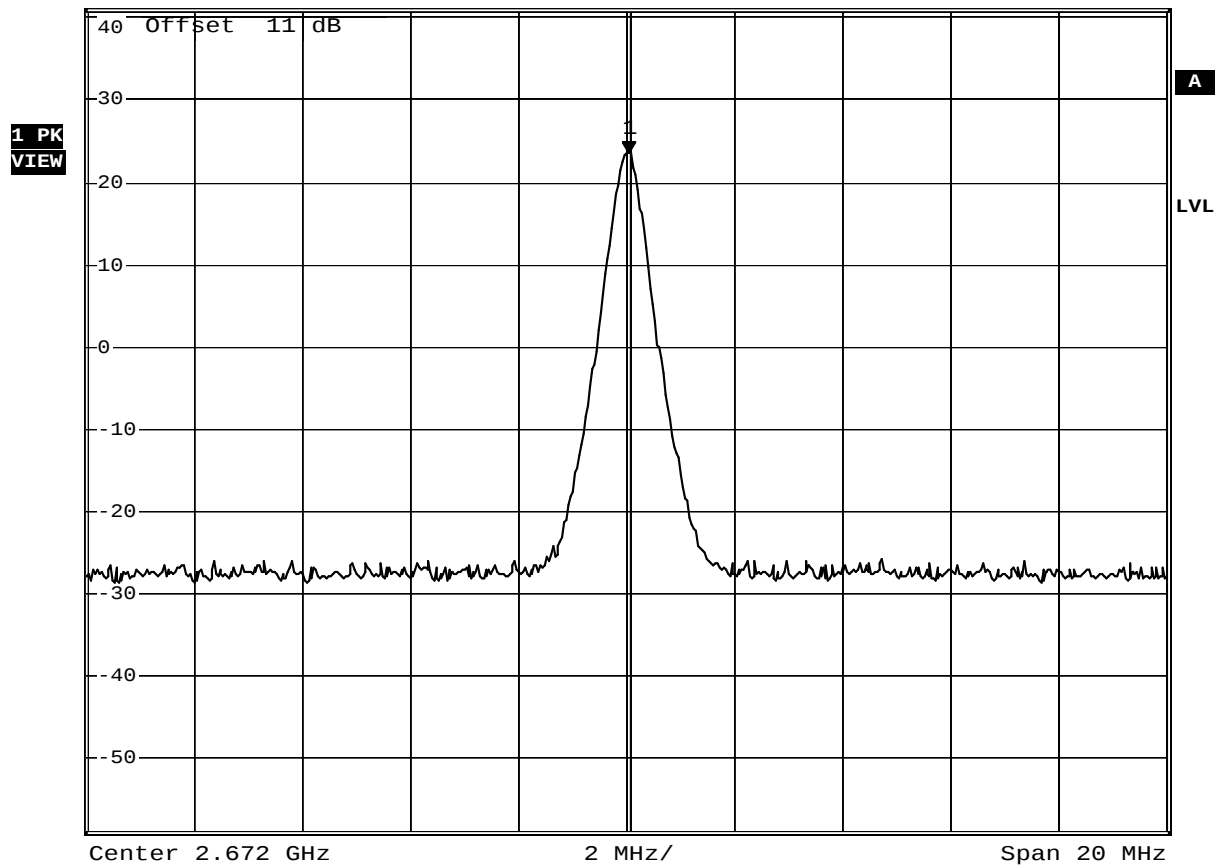
*SWT 100 ms 2.672040000 GHz

Ref 41 dBm

*Att 50 dB

*SWT 100 ms

2.672040000 GHz



Comment: A:\2

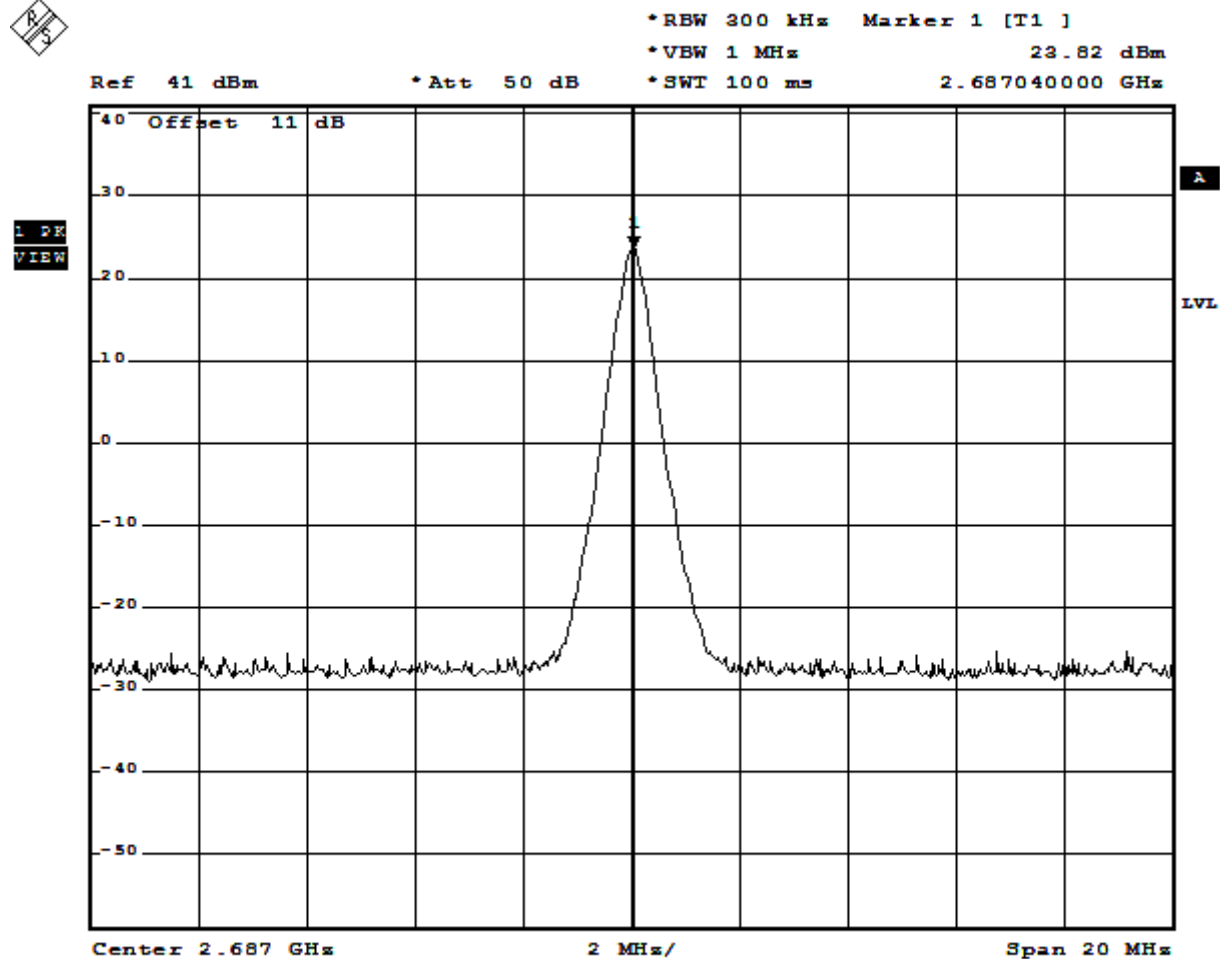
Date: 13.DEC.2011 15:49:54

Test Mode: Mode 1

Modulation Type: 16QAM

2687 MHz

Upstream Symbol Rate: 160 ksps



Comment: A:\2

Date: 13.DEC.2011 15:51:54

Test Mode: MODE 5

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 2560 ksps



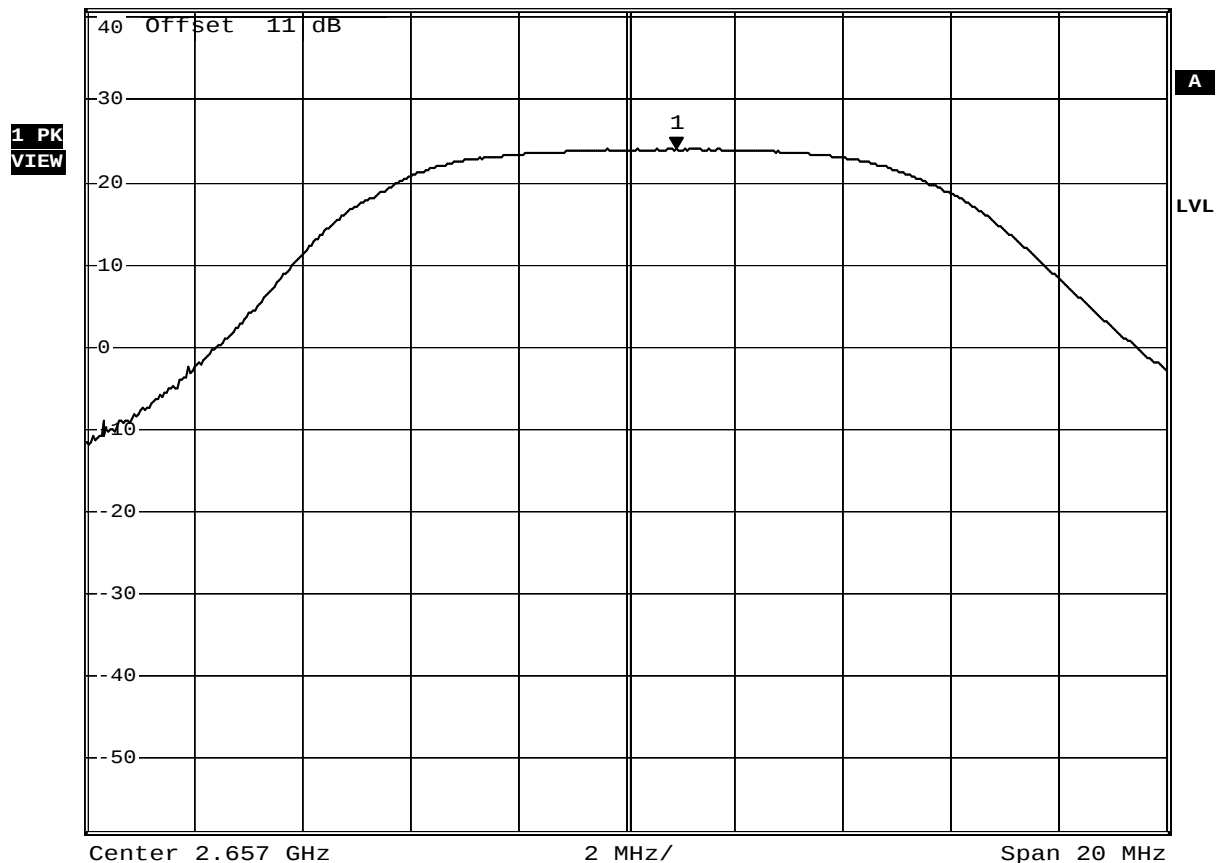
*RBW 10 MHz Marker 1 [T1]
 *VBW 10 MHz 24.05 dBm
 *SWT 100 ms 2.657920000 GHz

Ref 41 dBm

*Att 50 dB

*SWT 100 ms

2.657920000 GHz



Comment: A:\2

Date: 13.DEC.2011 16:03:38

Test Mode: MODE 5

Modulation Type: 16QAM

2672 MHz

Upstream Symbol Rate: 2560 kpsps



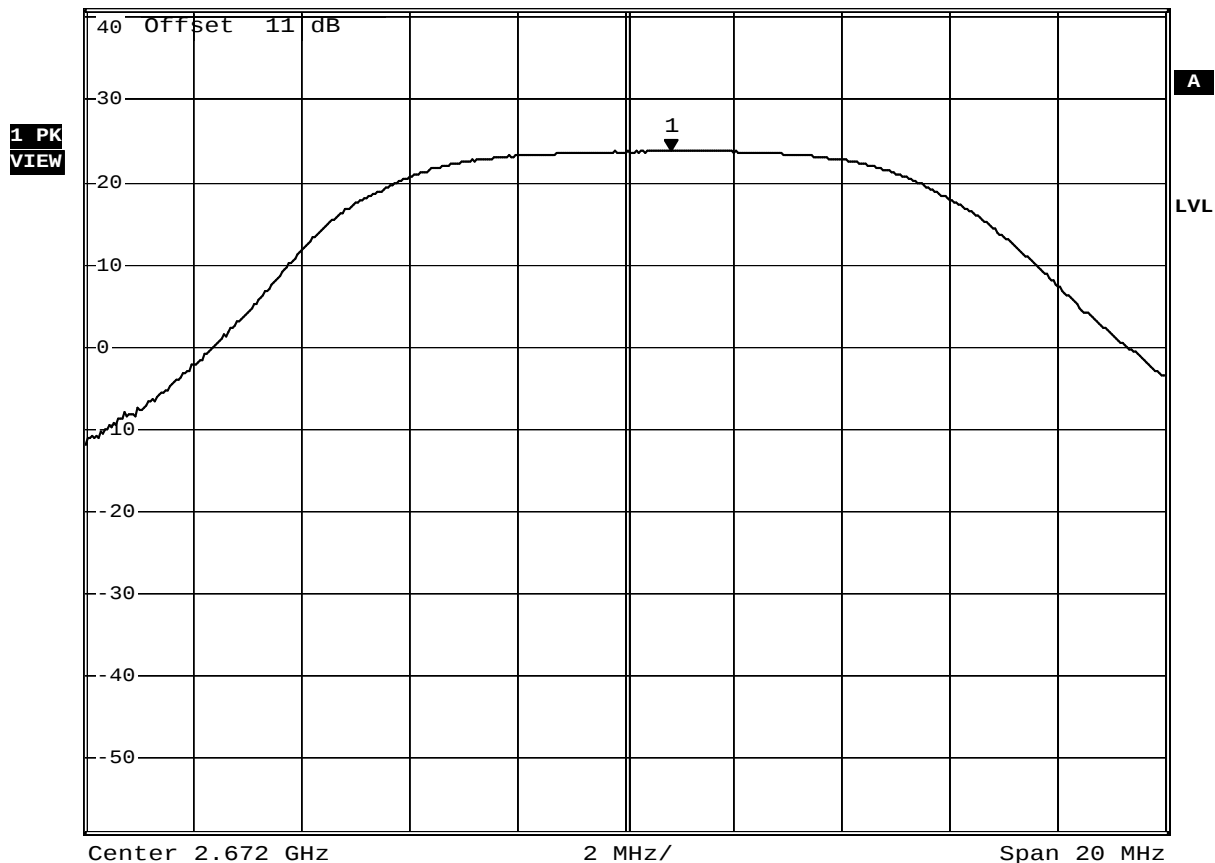
*RBW 10 MHz Marker 1 [T1]
 *VBW 10 MHz 23.81 dBm
 *SWT 100 ms 2.672840000 GHz

Ref 41 dBm

*Att 50 dB

*SWT 100 ms

2.672840000 GHz



Comment: A:\2

Date: 13.DEC.2011 16:04:19

Test Mode: MODE 5

Modulation Type: 16QAM

2687 MHz

Upstream Symbol Rate: 2560 ksps



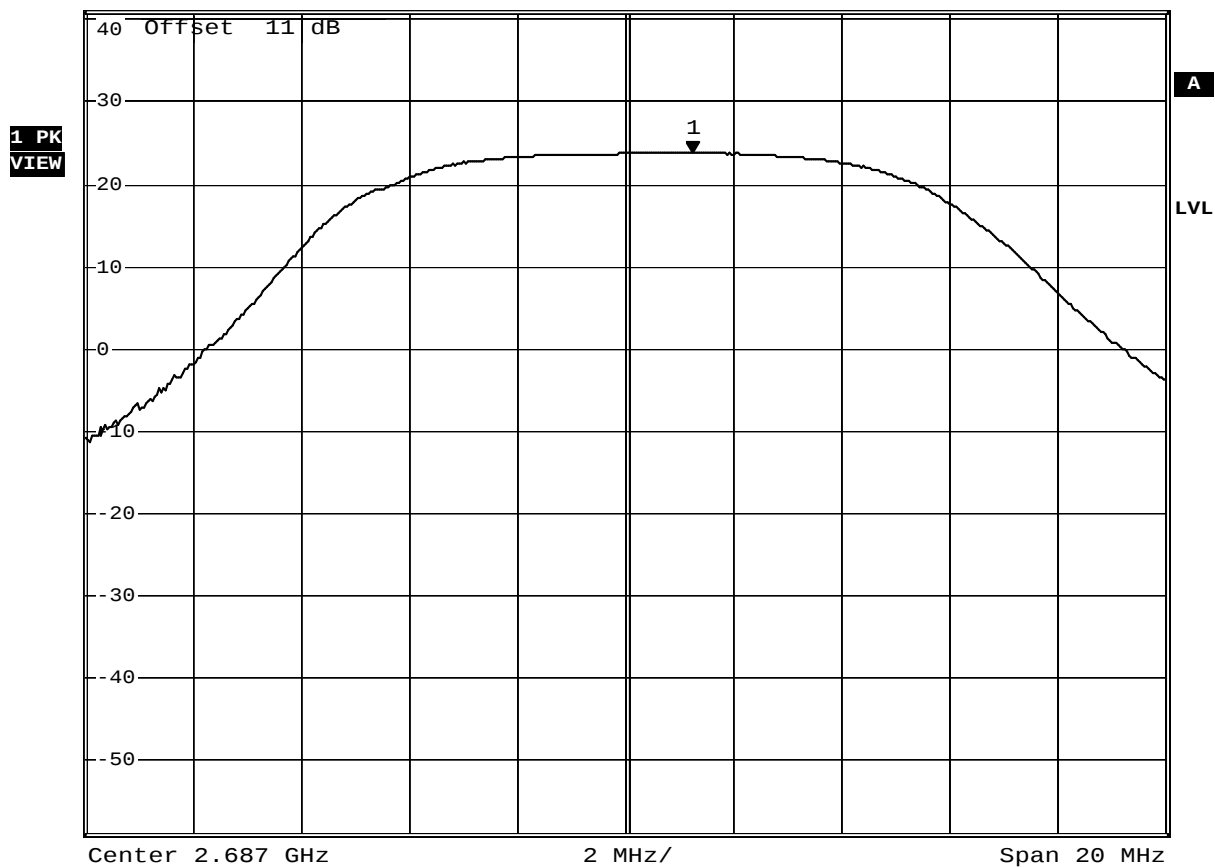
*RBW 10 MHz Marker 1 [T1]
 *VBW 10 MHz 23.84 dBm
 *SWT 100 ms 2.688240000 GHz

Ref 41 dBm

*Att 50 dB

*SWT 100 ms

2.688240000 GHz



Comment: A:\2

Date: 13.DEC.2011 16:05:00

Product	MMDS TRANSCEIVER		
Test Item	E.I.R.P Peak Power		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

Mode1: 16QAM-200kHz

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	E.I.R.P (dBm)	E.I.R.P (mW)
Horizontal					
Low	2657	44.006	-16.200	27.806	603.3926
Middle	2672	44.017	-18.440	25.577	361.1603
High	2687	44.028	-19.310	24.718	296.3466
Vertical					
Low	2657	43.216	-24.410	18.806	75.9626
Middle	2672	43.238	-28.790	14.448	27.8484
High	2687	43.259	-30.530	12.729	18.7456

Mode2: 16QAM-400kHz

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	E.I.R.P (dBm)	E.I.R.P (mW)
Horizontal					
Low	2657	44.006	-17.680	27.326	540.2565
Middle	2672	44.017	-20.640	24.377	273.9681
High	2687	44.028	-19.410	24.618	289.6010
Vertical					
Low	2657	43.216	-29.680	13.536	22.5736
Middle	2672	43.238	-29.190	14.048	25.3980
High	2687	43.259	-29.780	13.479	22.2792

E.I.R.P = Reading Level + Correct Factor = S.G. – Cable Loss + Antenna Gain

Mode3: 16QAM-800kHz

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	E.I.R.P (dBm)	E.I.R.P (mW)
Horizontal					
Low	2657	44.006	-17.120	26.886	488.2025
Middle	2672	44.017	-19.590	24.427	277.1405
High	2687	44.028	-19.410	24.618	289.6010
Vertical					
Low	2657	43.216	-29.090	15.126	32.5537
Middle	2672	43.238	-28.960	14.278	26.7793
High	2687	43.259	-29.490	13.769	23.8177

Mode4: 16QAM-1600kHz

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	E.I.R.P (dBm)	E.I.R.P (mW)
Horizontal					
Low	2657	44.006	-18.180	25.876	386.9011
Middle	2672	44.017	-20.100	23.917	246.4336
High	2687	44.028	-19.980	24.048	253.9803
Vertical					
Low	2657	43.216	-30.090	13.126	20.5400
Middle	2672	43.238	-29.430	13.808	24.0326
High	2687	43.259	-30.260	12.999	19.9480

Mode5: 16QAM-3200kHz

Channel	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	E.I.R.P (dBm)	E.I.R.P (mW)
Horizontal					
Low	2657	44.007	-16.860	27.147	518.4418
Middle	2672	44.018	-18.170	25.848	384.4147
High	2687	44.028	-19.020	25.008	316.8108
Vertical					
Low	2657	43.217	-27.170	16.047	40.2439
Middle	2672	43.238	-28.020	15.218	33.2506
High	2687	43.259	-27.990	15.269	33.6434

E.I.R.P = Reading Level + Correct Factor = S.G. – Cable Loss + Antenna Gain

3. Occupied Bandwidth

3.1. Test Equipment

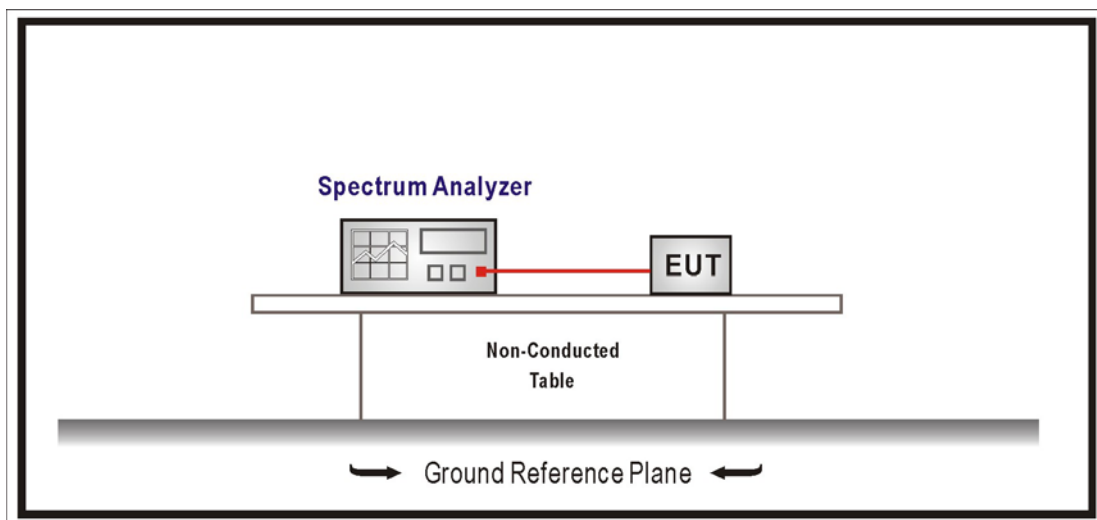
The following test equipments are used during the test:

Occupied Bandwidth/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2012/01/16

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

3.2. Test Setup



3.3. Limits

The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

3.4. Test Procedure

The occupied bandwidth is measured using R&S Spectrum Analyzer with a resolution bandwidth of 100 kHz, video bandwidth of 300 kHz. The EUT was set up for the rated peak power under transmission mode and specific channel frequency. The standards required a measurement bandwidth is the fundamental emission below 26dB bandwidth.

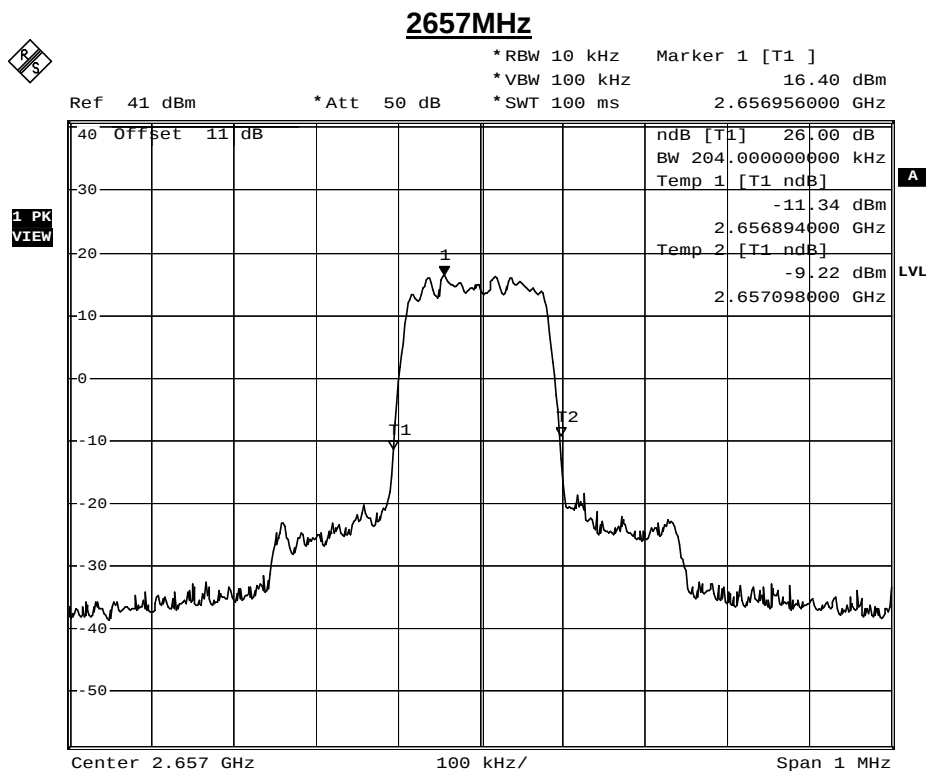
3.5. Uncertainty

The measurement uncertainty is defined as ± 50 kHz

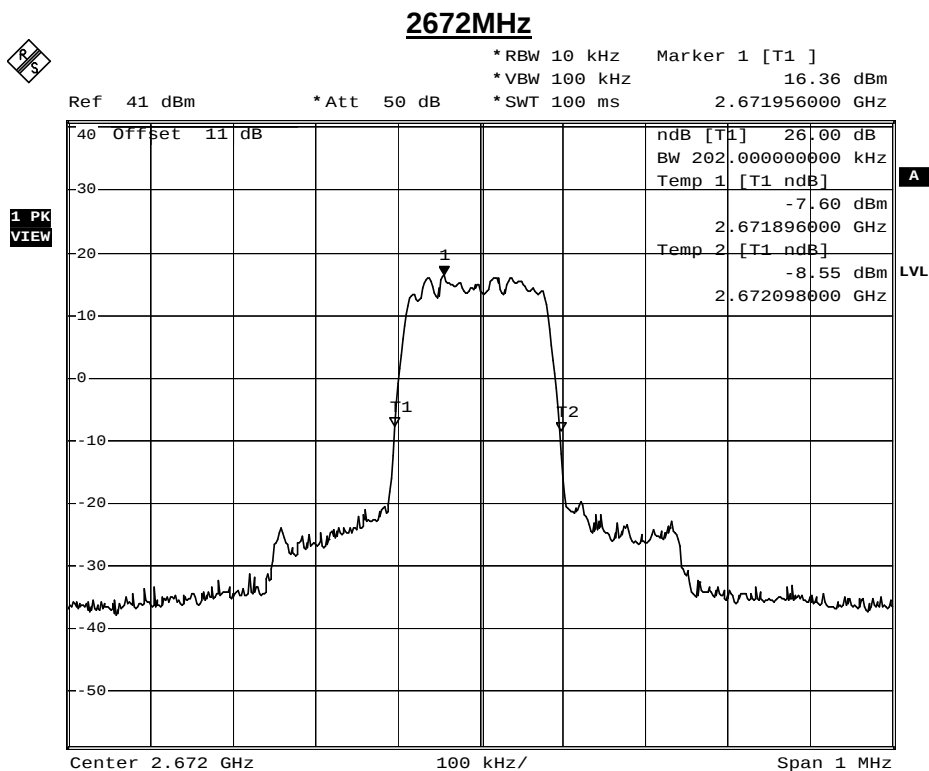
3.6. Test Result

Product	MMDS TRANSCEIVER		
Test Item	Occupied Bandwidth		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

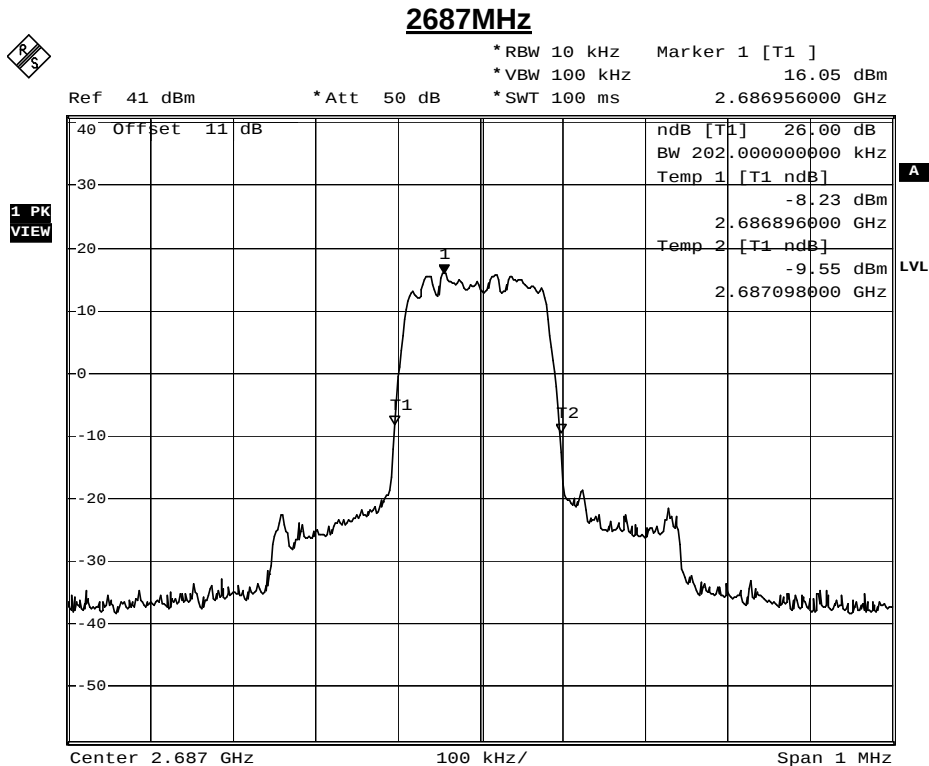
Mode 1: QPSK-200kHz				
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	0.204	--	Pass
Middle	2672	0.202	--	Pass
High	2687	0.202	--	Pass



Comment: A:\2
Date: 13.DEC.2011 22:00:05



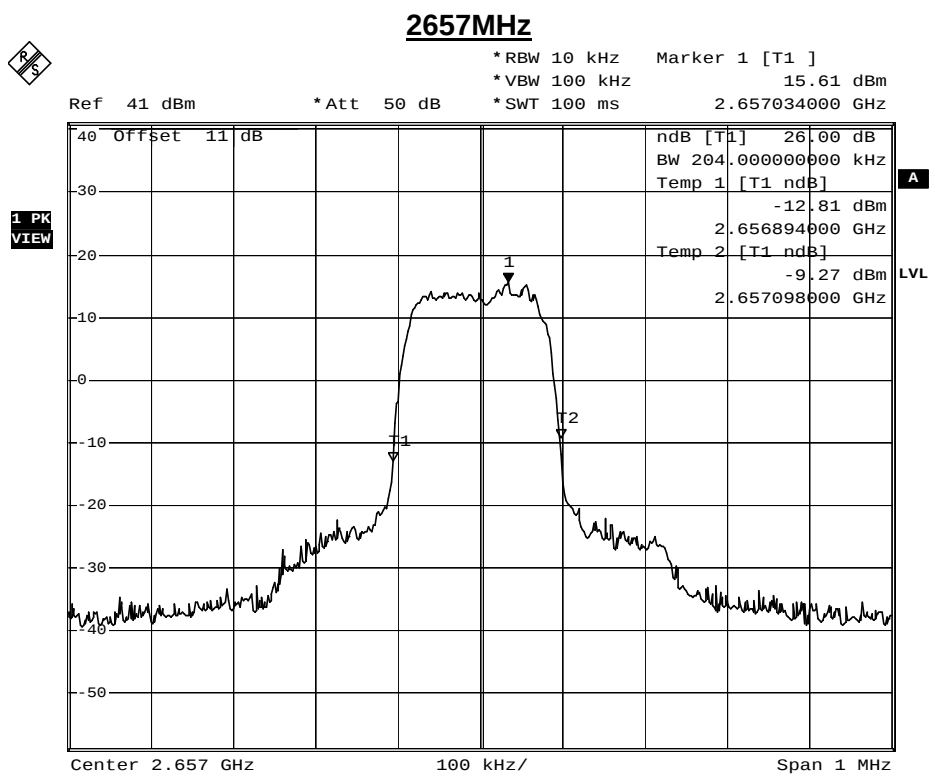
Comment: A:\2
Date: 13.DEC.2011 22:02:04



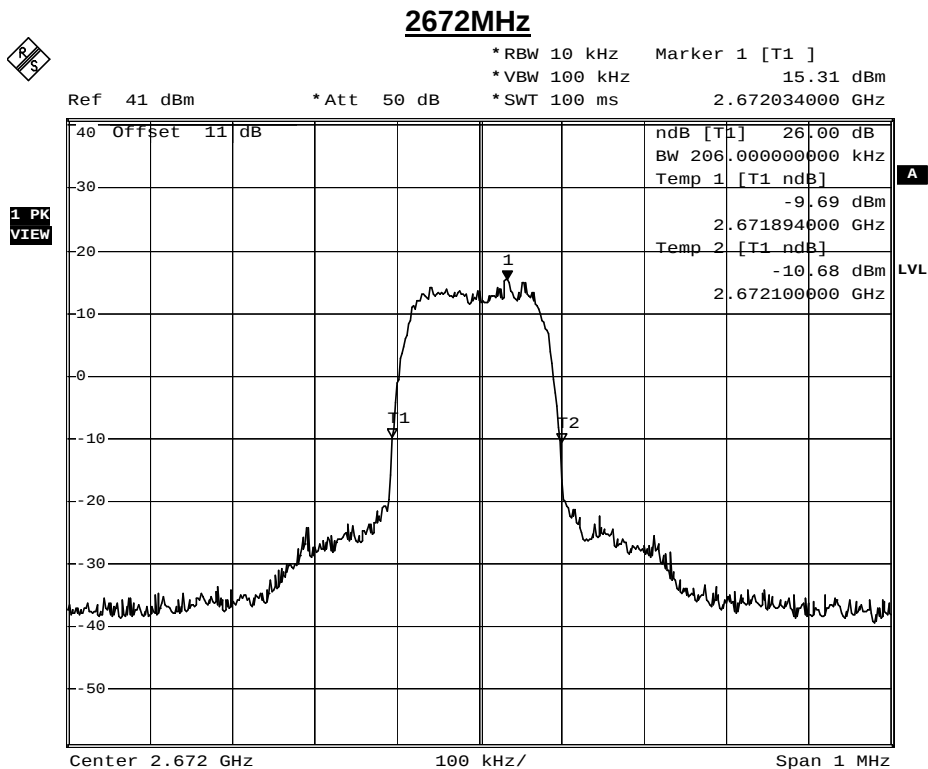
Comment: A:\2
Date: 13.DEC.2011 22:02:43

Mode 1: 16QAM-200kHz

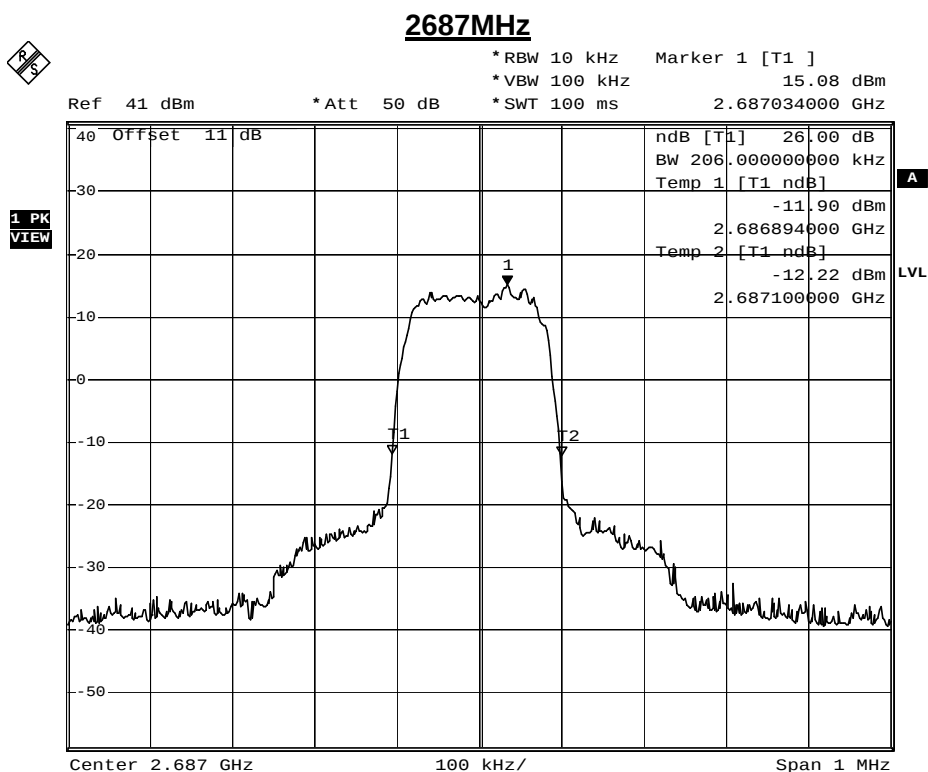
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	0.204	--	Pass
Middle	2672	0.206	--	Pass
High	2687	0.206	--	Pass



Comment: A:\2
 Date: 13.DEC.2011 22:17:25



Comment: A:\2
Date: 13.DEC.2011 22:18:11

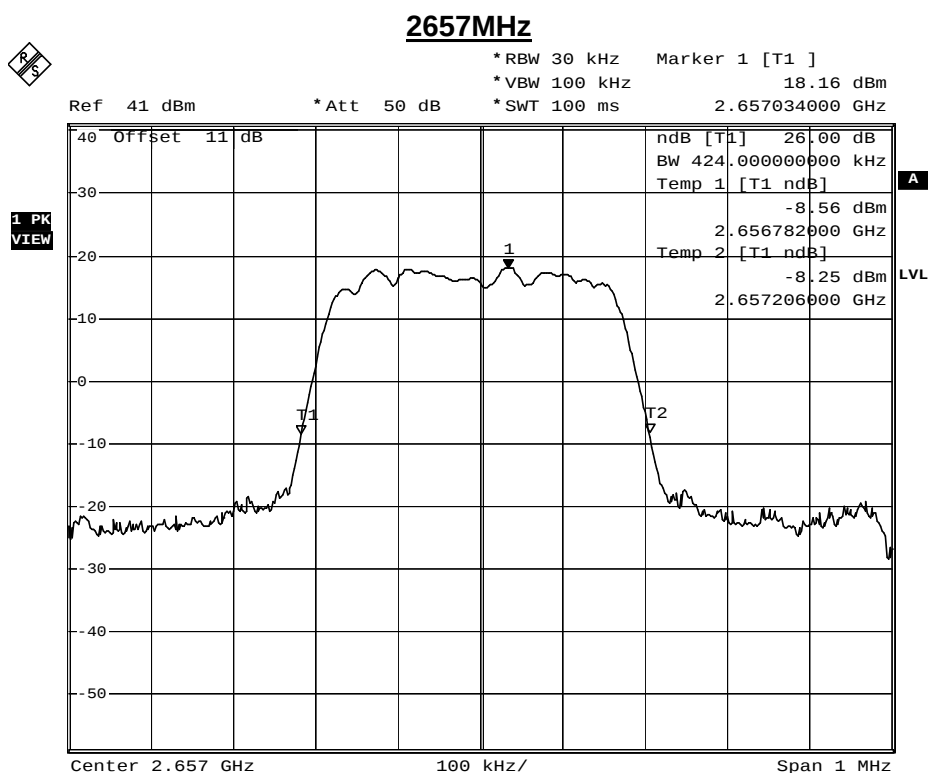


Comment: A:\2
Date: 13.DEC.2011 22:18:45

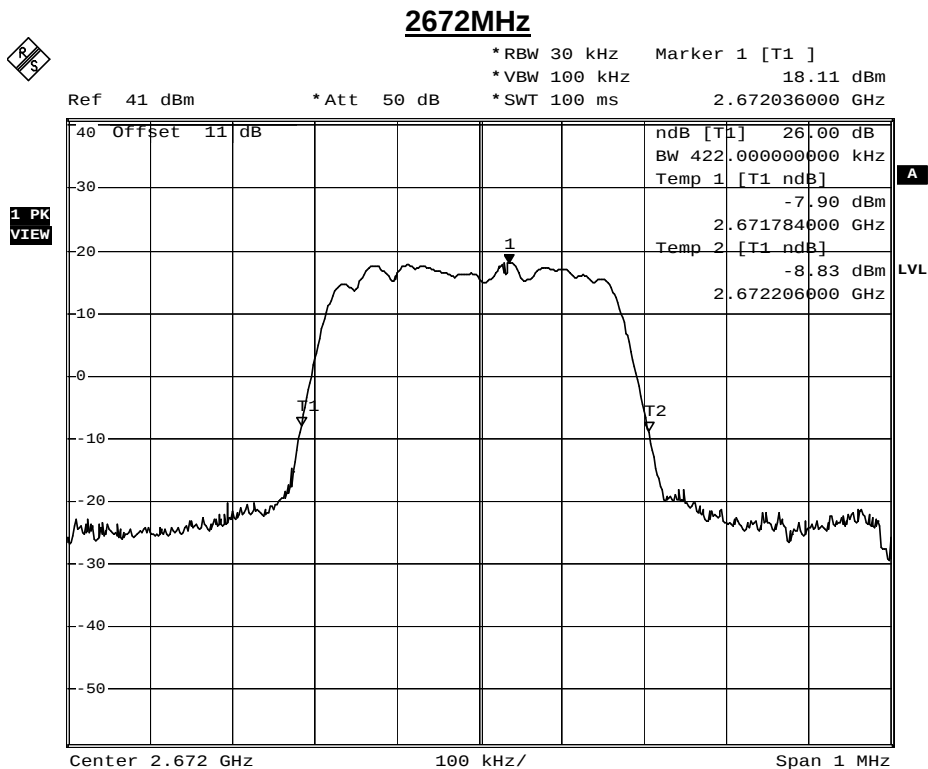
Product	MMDS TRANSCEIVER		
Test Item	Occupied Bandwidth		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

Mode 2: QPSK-400kHz

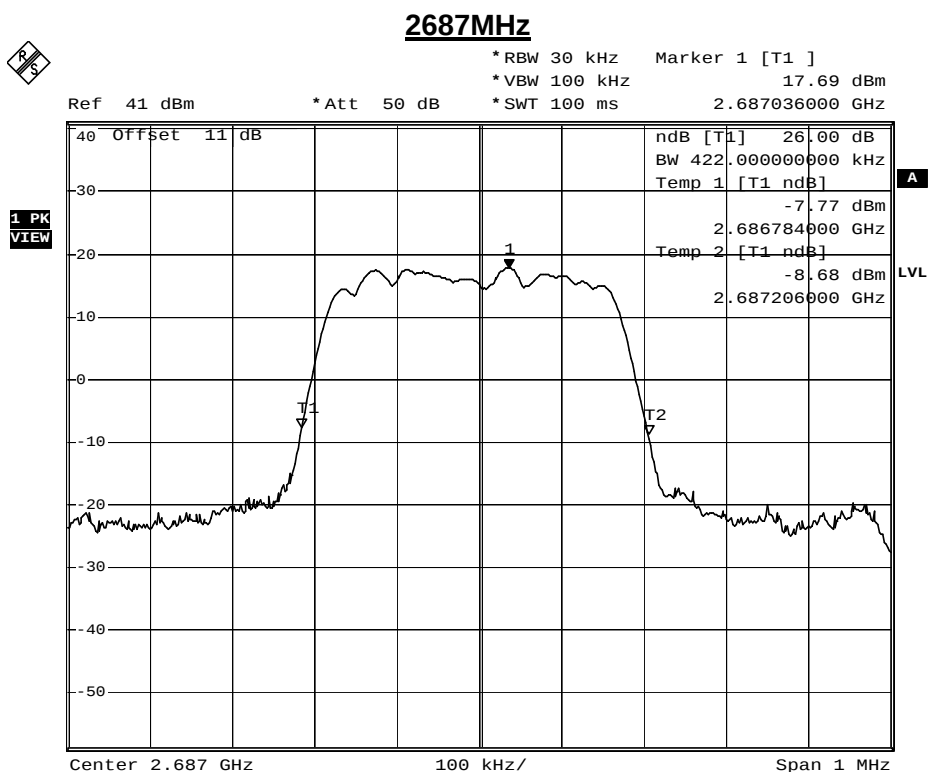
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	0.424	--	Pass
Middle	2672	0.422	--	Pass
High	2687	0.422	--	Pass



Comment: A:\2
Date: 13.DEC.2011 22:07:36



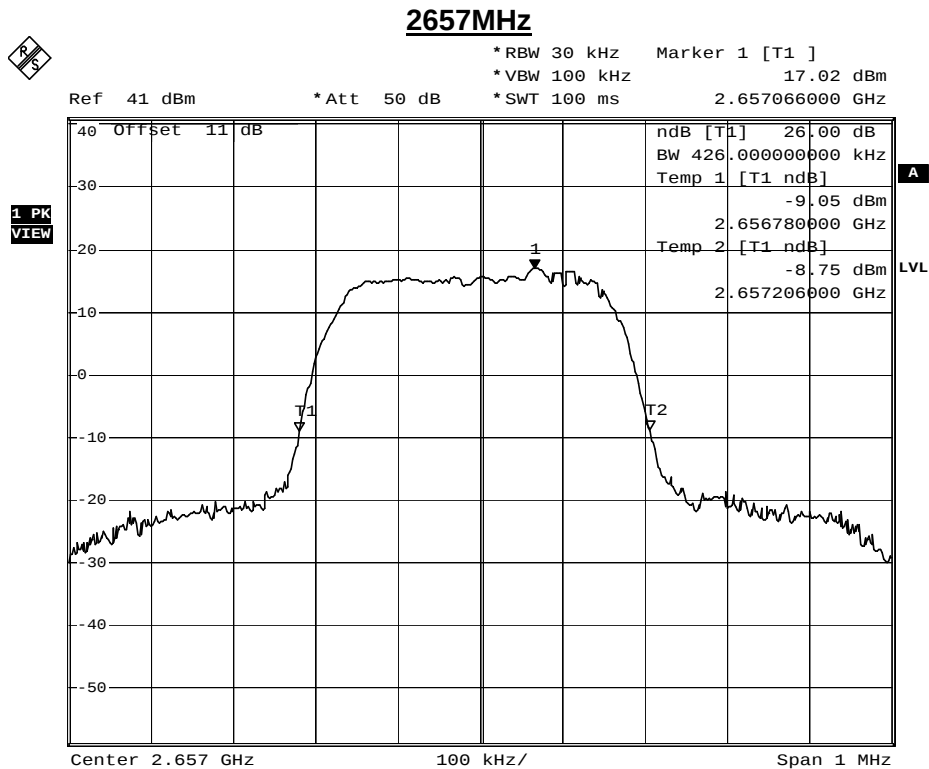
Comment: A:\2
 Date: 13.DEC.2011 22:08:09



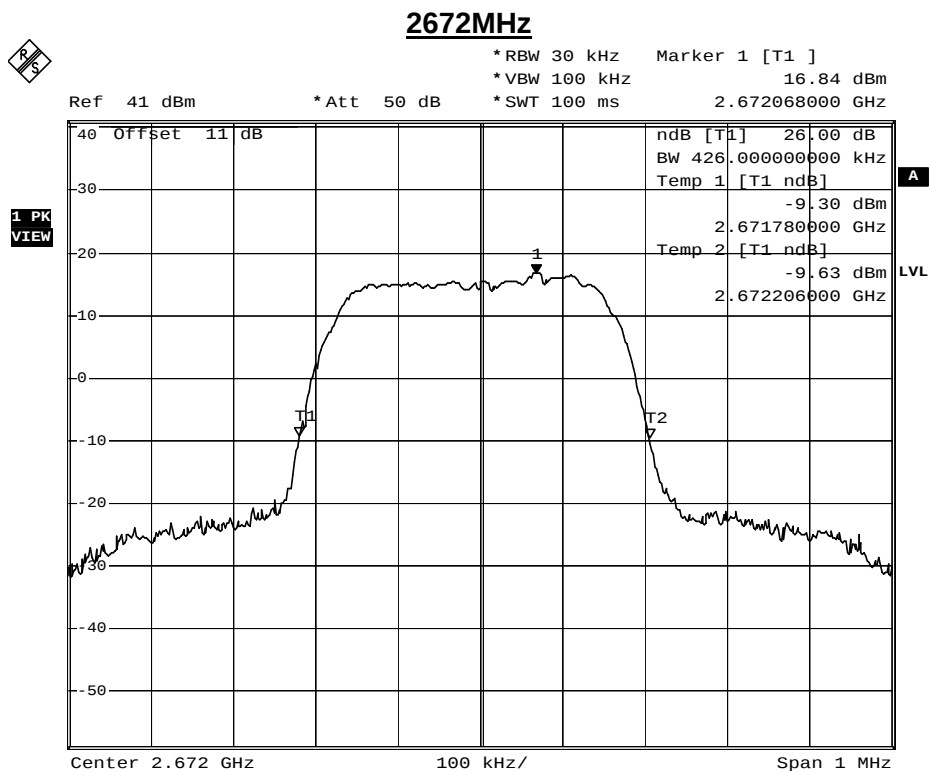
Comment: A:\2
 Date: 13.DEC.2011 22:08:40

Mode 2: 16QAM-400kHz

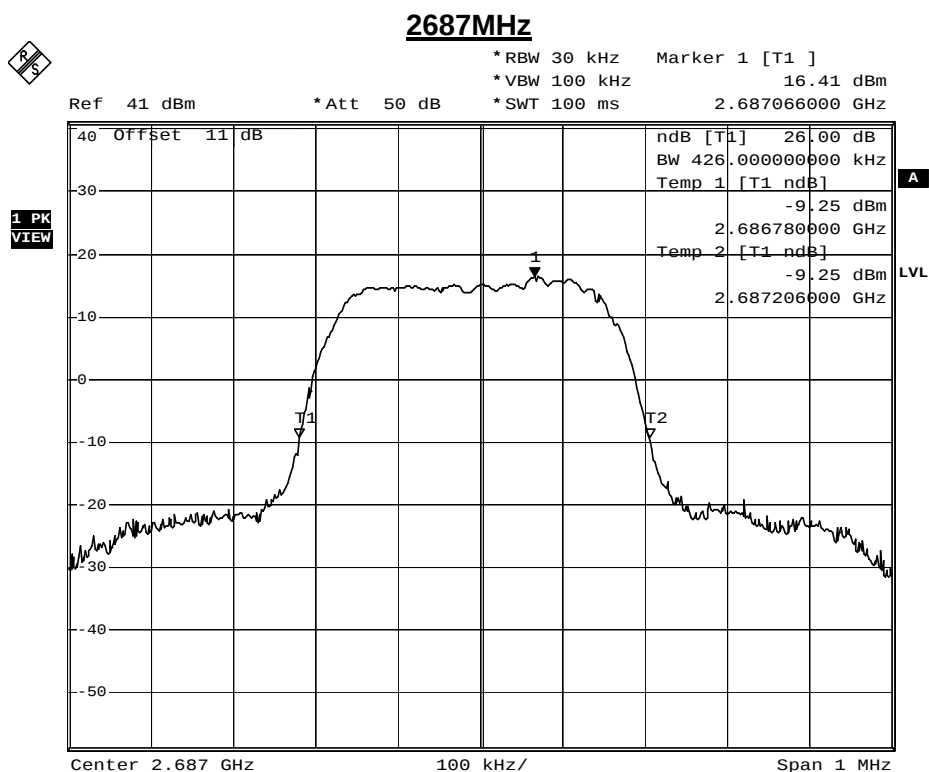
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	0.426	--	Pass
Middle	2672	0.426	--	Pass
High	2687	0.426	--	Pass



Comment: A:\2
 Date: 13.DEC.2011 22:21:54



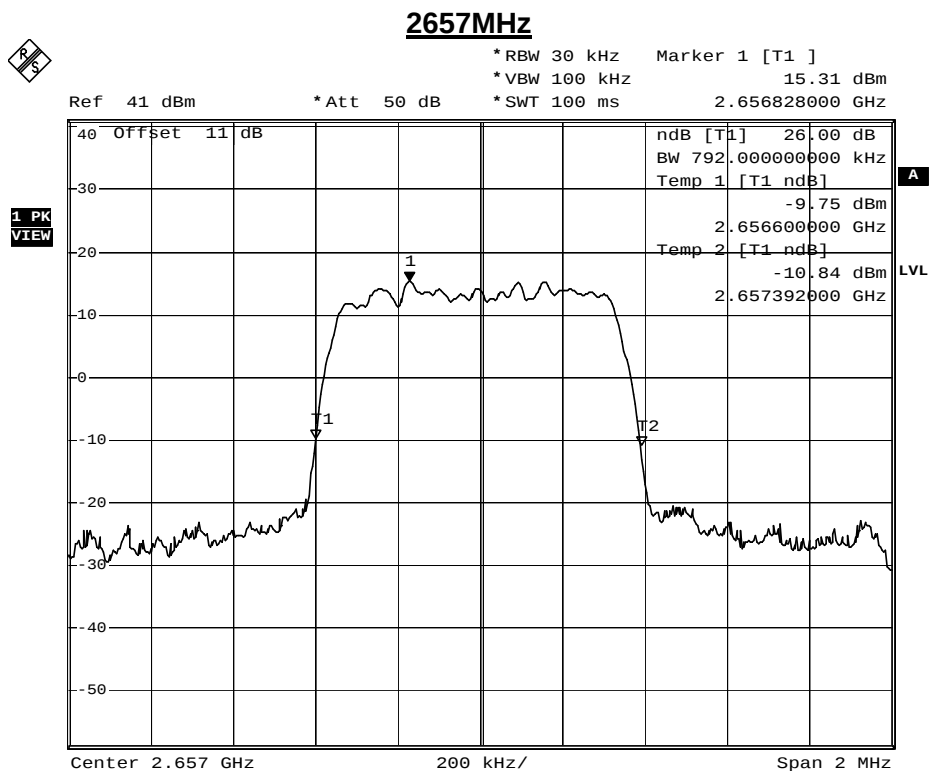
Comment: A:\2
Date: 13.DEC.2011 22:22:29



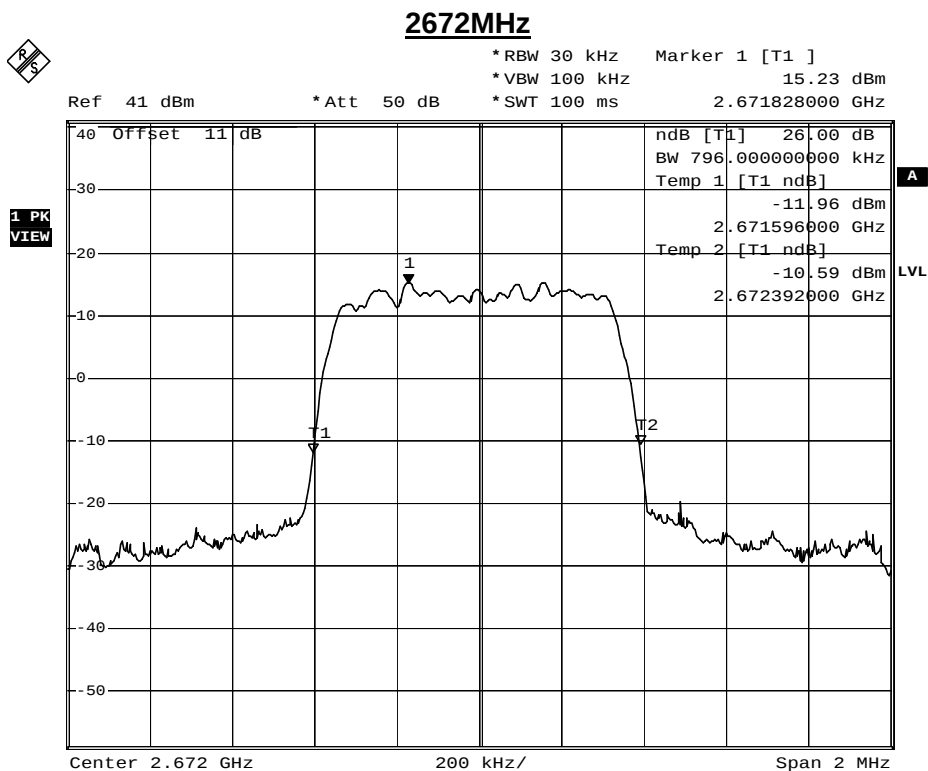
Comment: A:\2
Date: 13.DEC.2011 22:23:01

Product	MMDS TRANSCEIVER		
Test Item	Occupied Bandwidth		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

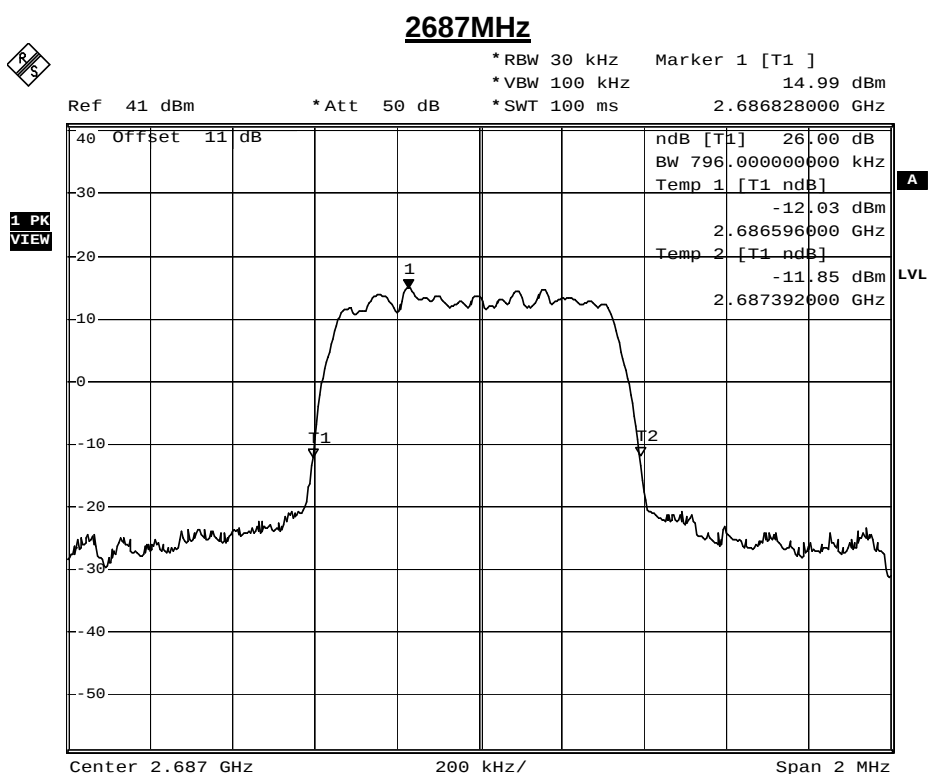
Mode 3: QPSK-800kHz				
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	0.792	--	Pass
Middle	2672	0.796	--	Pass
High	2687	0.796	--	Pass



Comment: A:\2
 Date: 13.DEC.2011 22:11:20

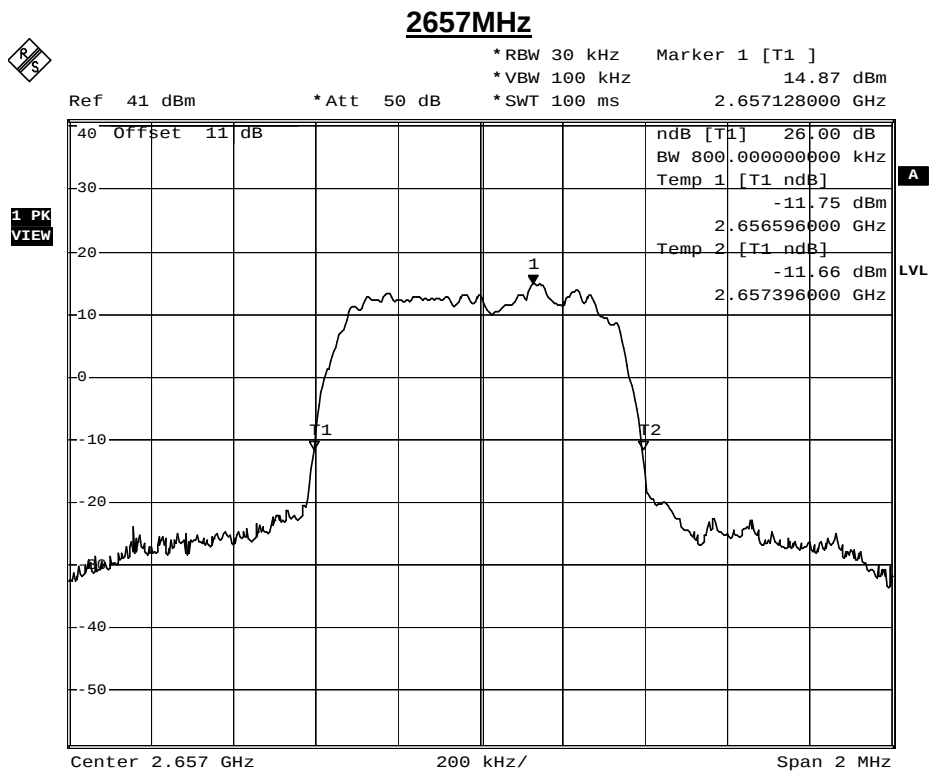


Comment: A:\2
Date: 13.DEC.2011 22:10:43

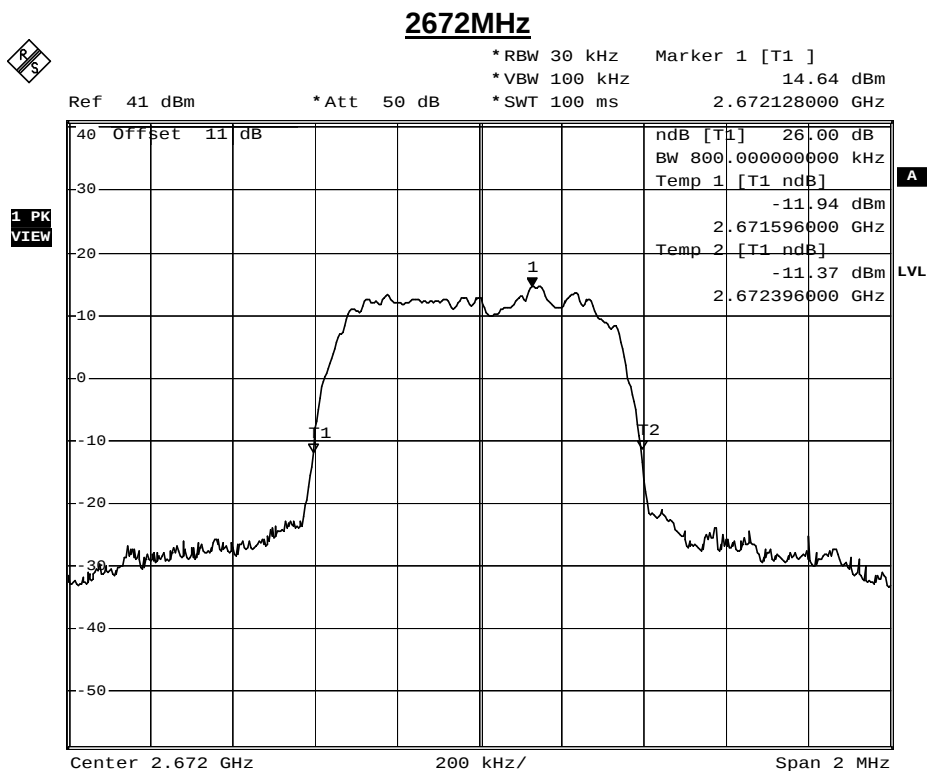


Comment: A:\2
Date: 13.DEC.2011 22:10:15

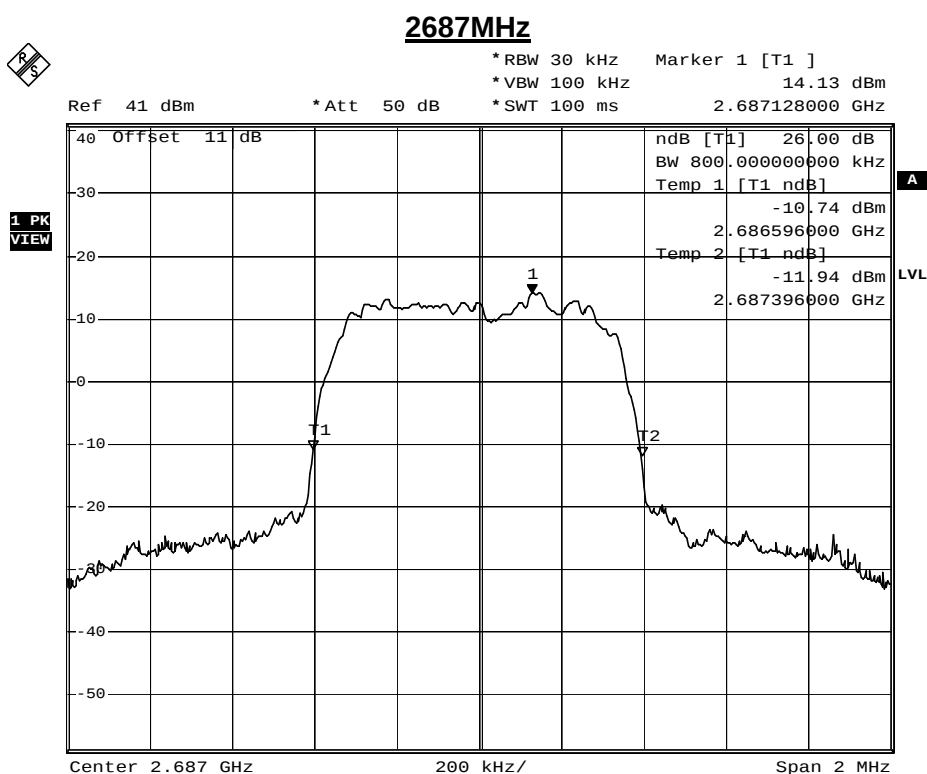
Mode 3: 16QAM-800kHz				
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	0.80	--	Pass
Middle	2672	0.80	--	Pass
High	2687	0.80	--	Pass



Comment: A:\2
Date: 13.DEC.2011 22:24:56



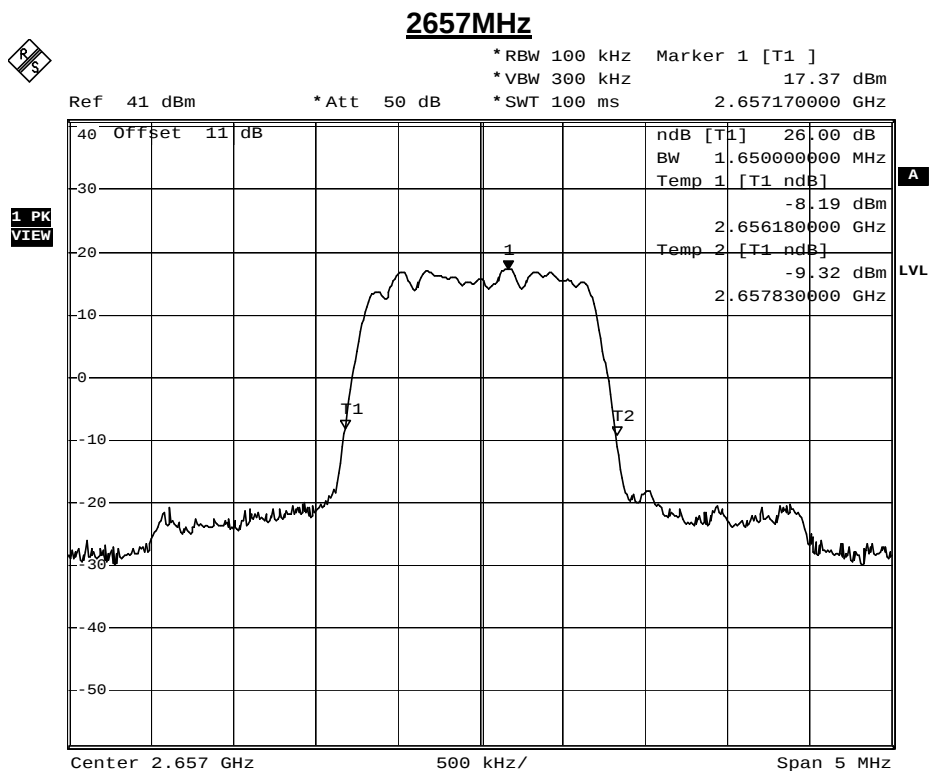
Comment: A:\2
Date: 13.DEC.2011 22:24:33



Comment: A:\2
Date: 13.DEC.2011 22:23:42

Product	MMDS TRANSCEIVER		
Test Item	Occupied Bandwidth		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

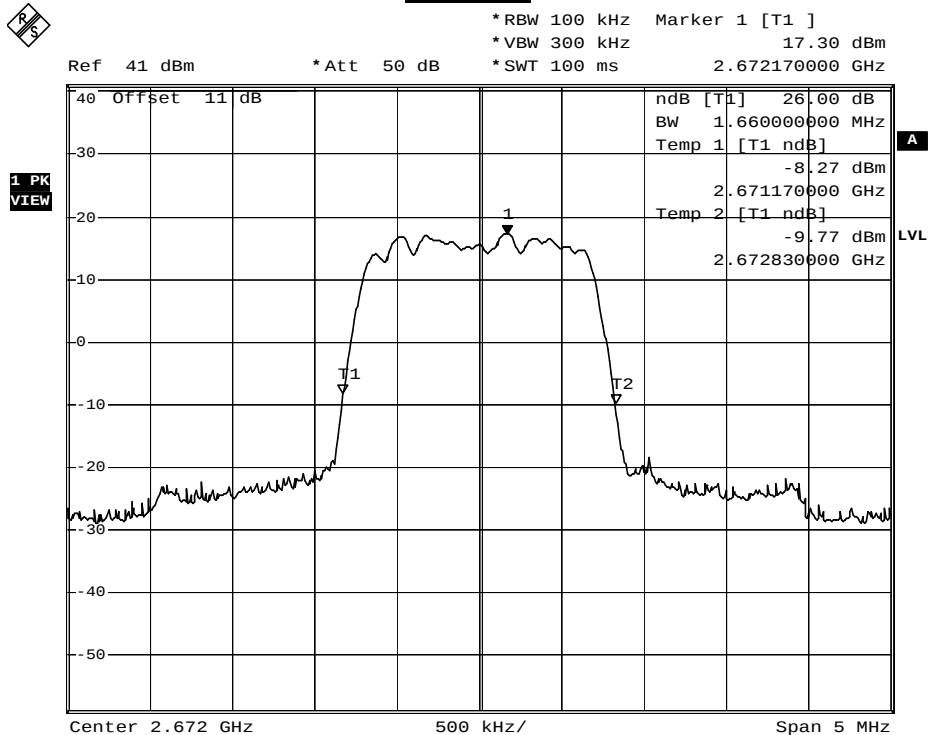
Mode 4: QPSK-1600kHz				
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	1.65	--	Pass
Middle	2672	1.66	--	Pass
High	2687	1.65	--	Pass



Comment: A:\2
 Date: 13.DEC.2011 22:12:14



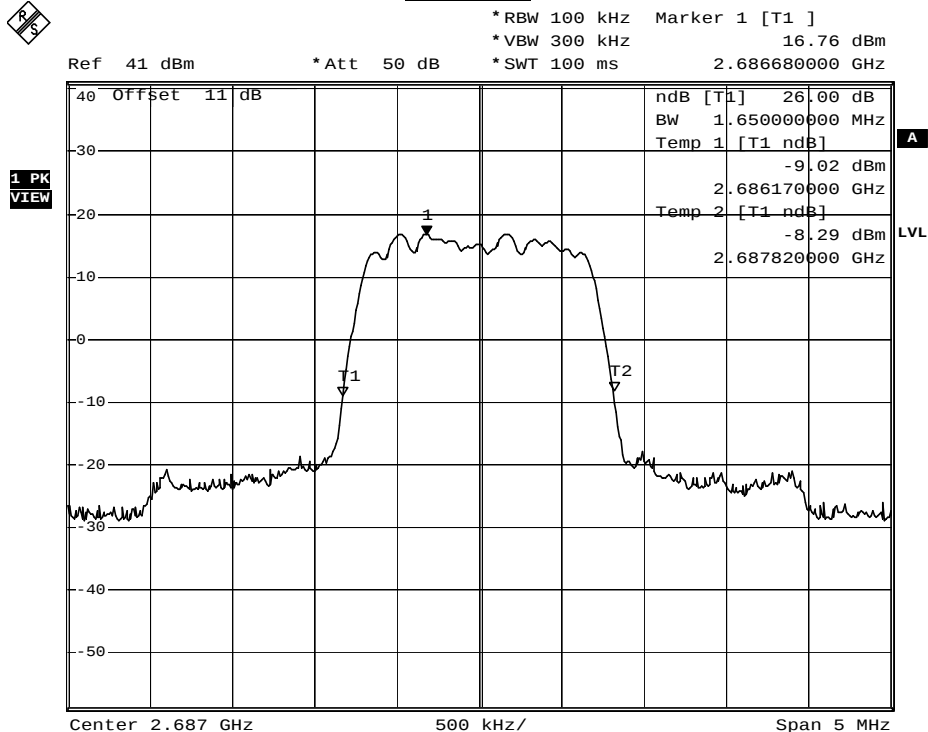
2672MHz



Comment: A:\2
 Date: 13.DEC.2011 22:12:41

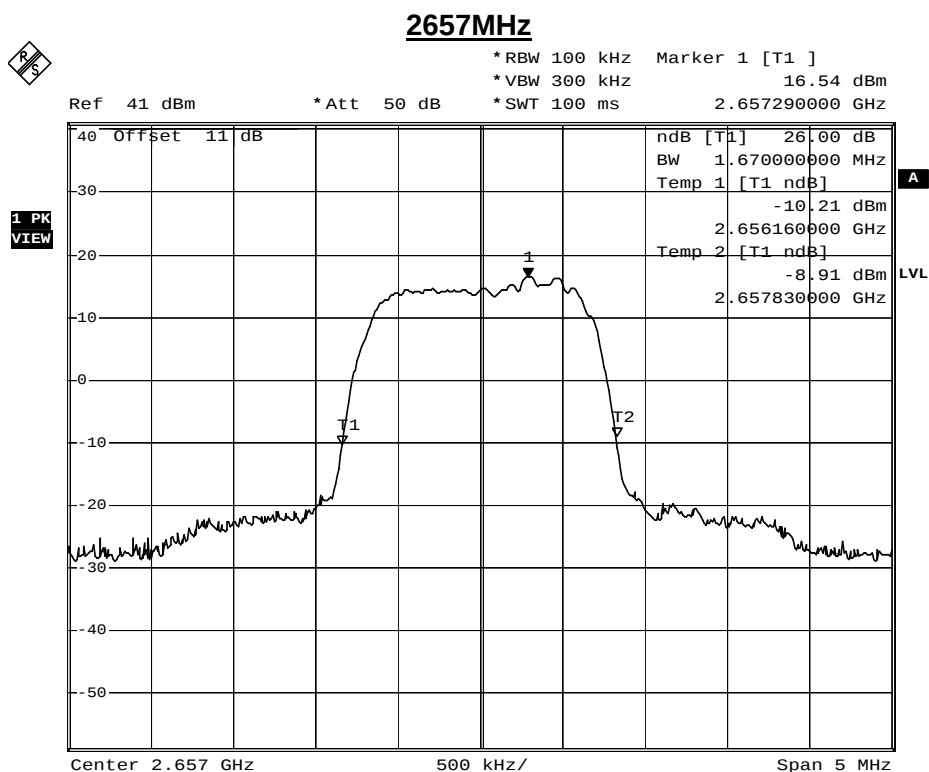


2687MHz

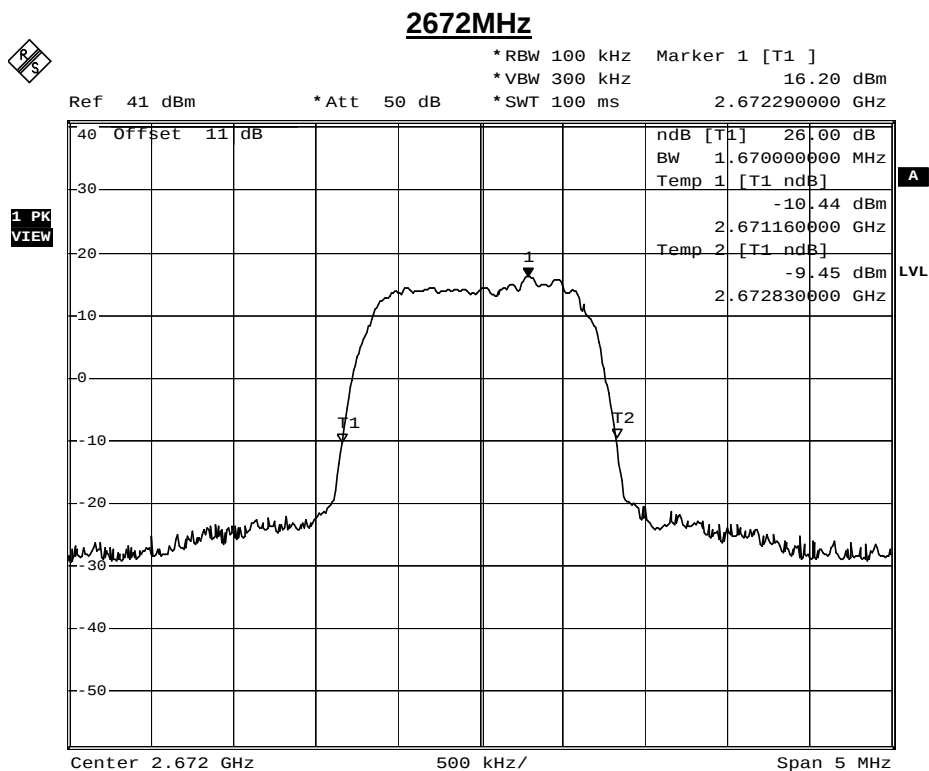


Comment: A:\2
 Date: 13.DEC.2011 22:13:12

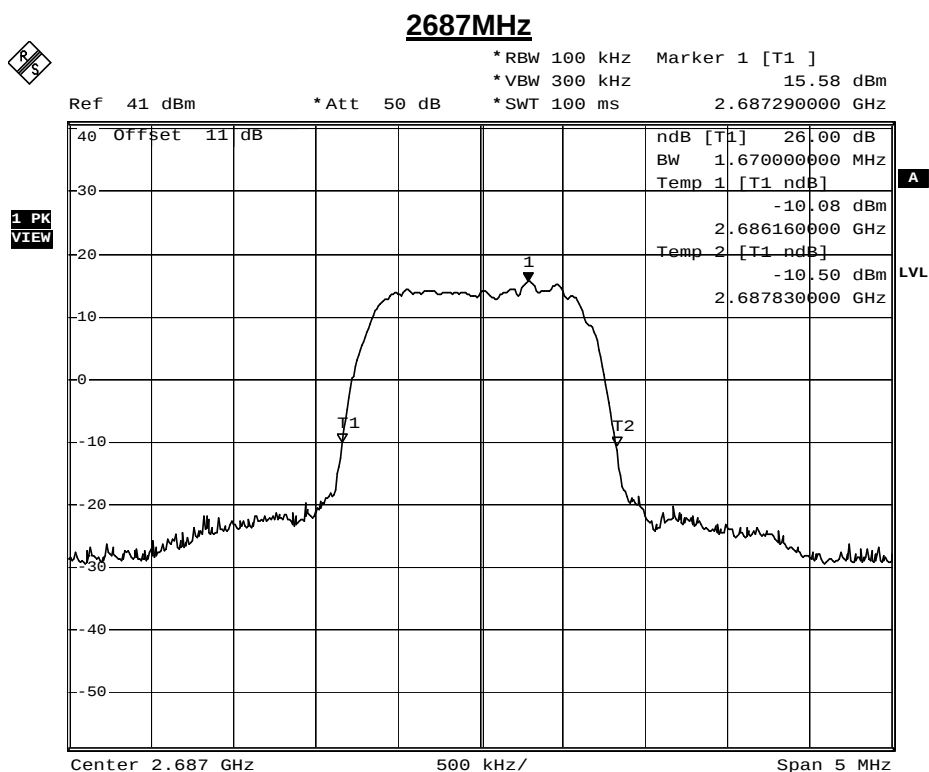
Mode 4: 16QAM-1600kHz				
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	1.67	--	Pass
Middle	2672	1.67	--	Pass
High	2687	1.67	--	Pass



Comment: A:\2
Date: 13.DEC.2011 22:25:52



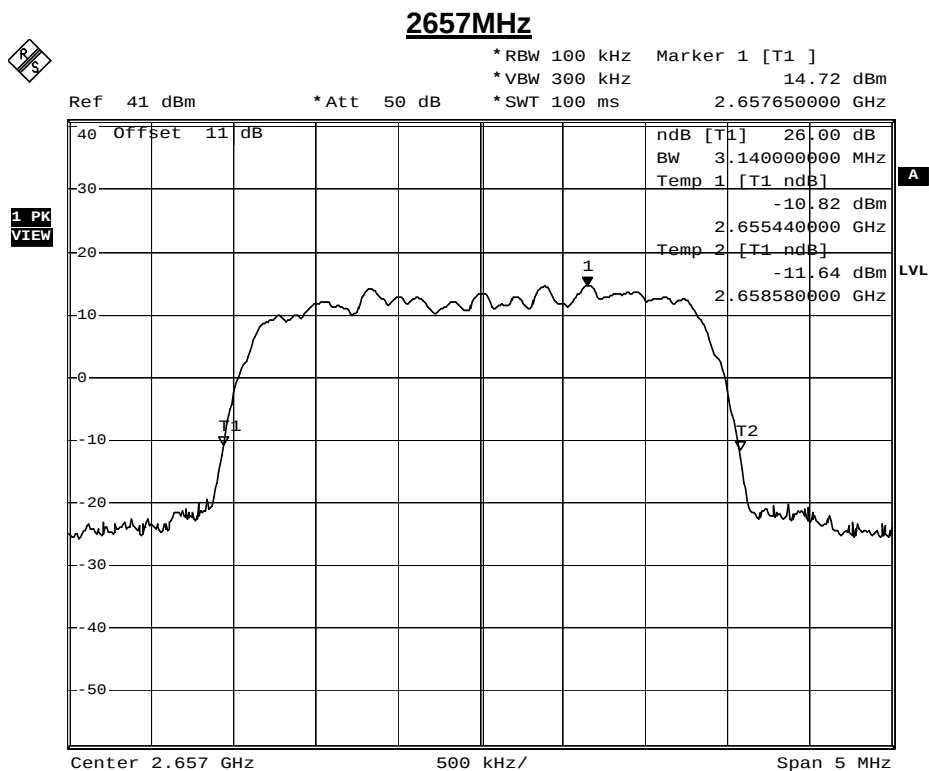
Comment: A:\2
Date: 13.DEC.2011 22:26:18



Comment: A:\2
Date: 13.DEC.2011 22:26:56

Product	MMDS TRANSCEIVER		
Test Item	Occupied Bandwidth		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

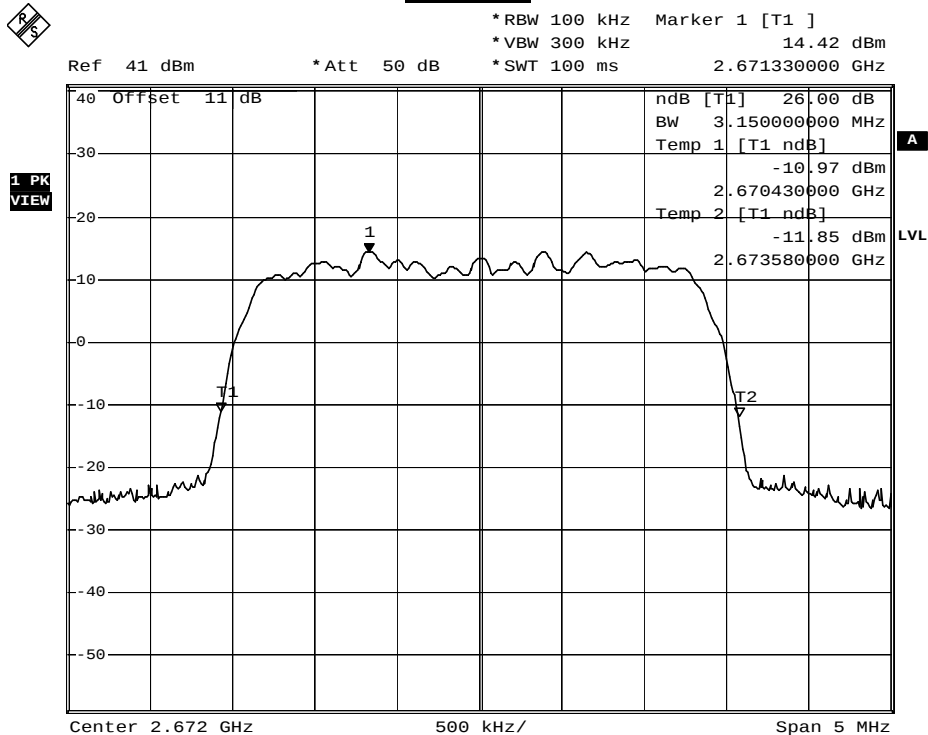
Mode 5: QPSK-3200kHz				
Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	3.14	--	Pass
Middle	2672	3.15	--	Pass
High	2687	3.14	--	Pass



Comment: A:\2
 Date: 13.DEC.2011 22:06:17



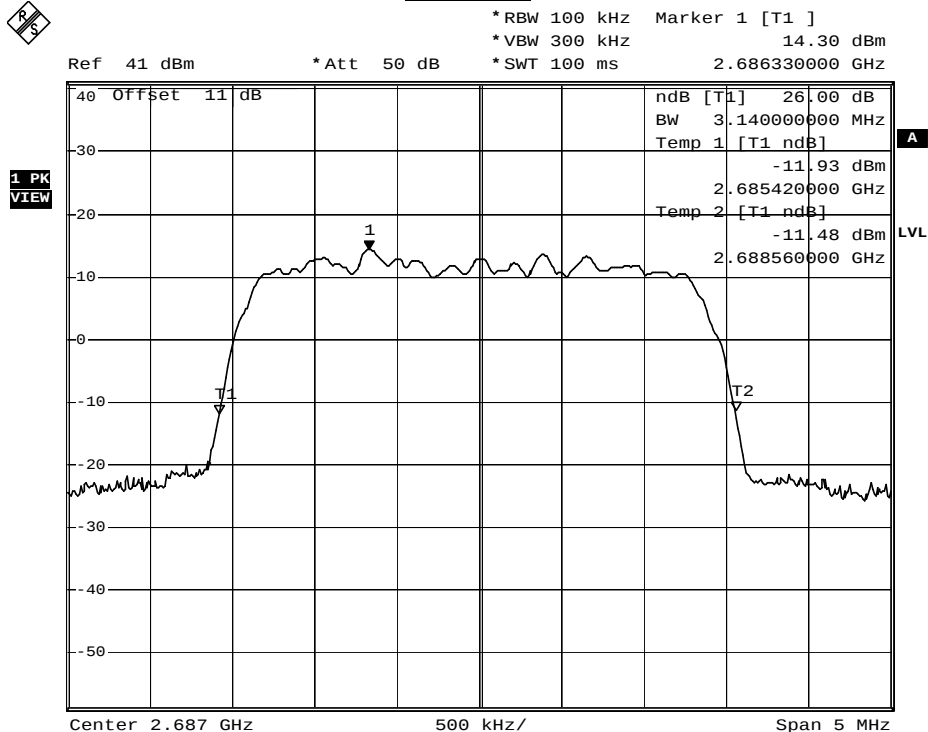
2672MHz



Comment: A:\2
 Date: 13.DEC.2011 22:05:11



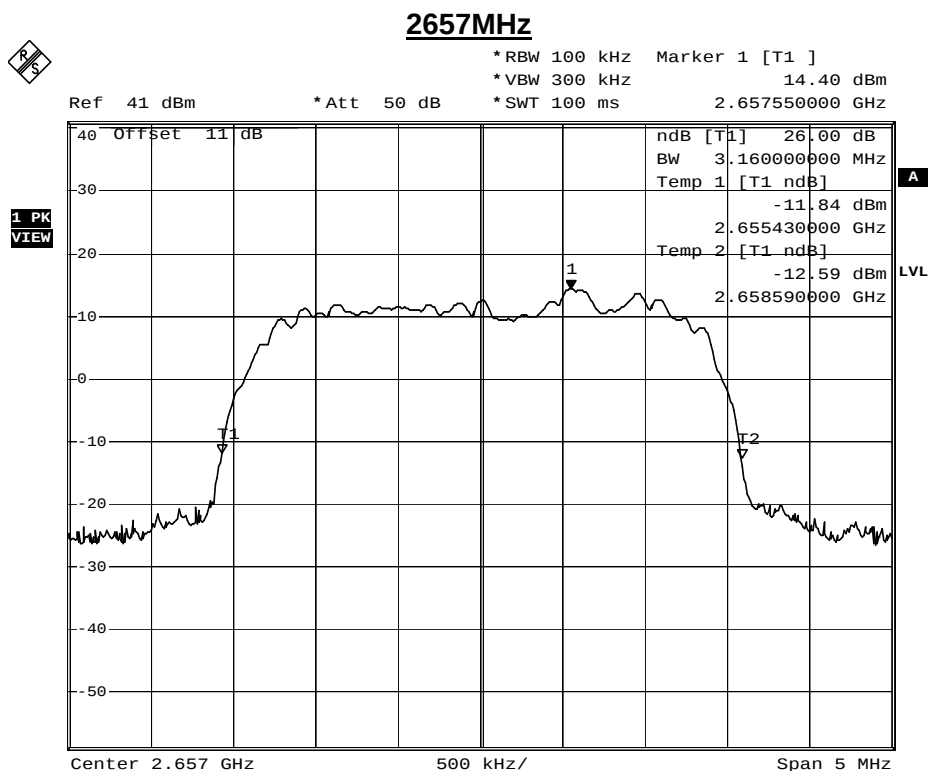
2687MHz



Comment: A:\2
 Date: 13.DEC.2011 22:04:25

Mode 5: 16QAM-3200kHz

Channel No.	Frequency (MHz)	Measurement Level (MHz)	Required Limit (MHz)	Result
Low	2657	3.16	--	Pass
Middle	2672	3.17	--	Pass
High	2687	3.17	--	Pass

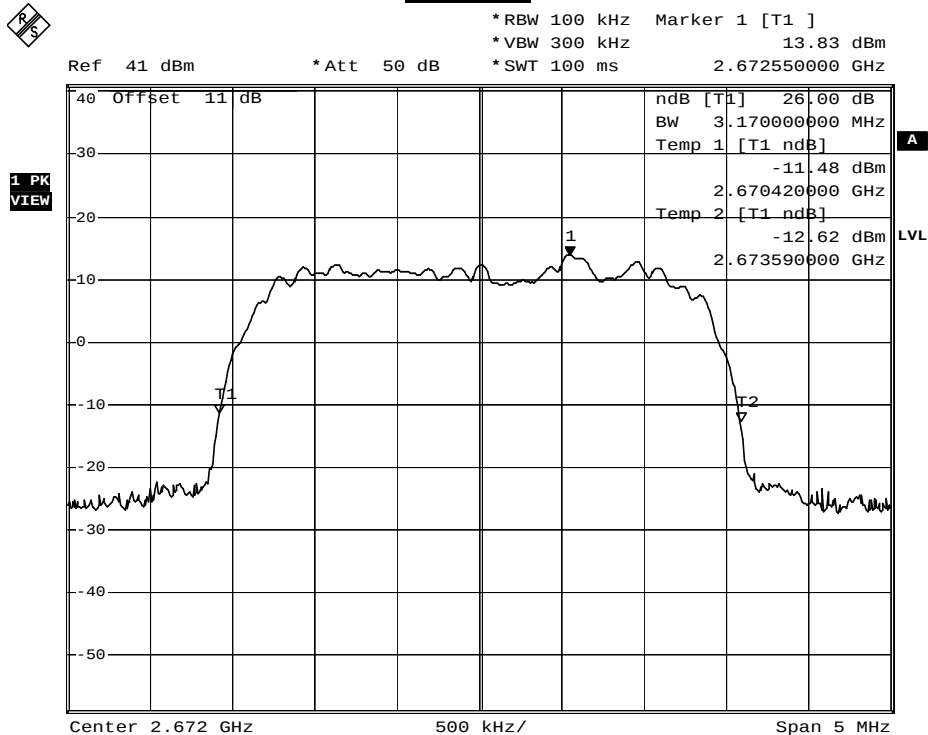


Comment: A:\2

Date: 13.DEC.2011 22:20:54



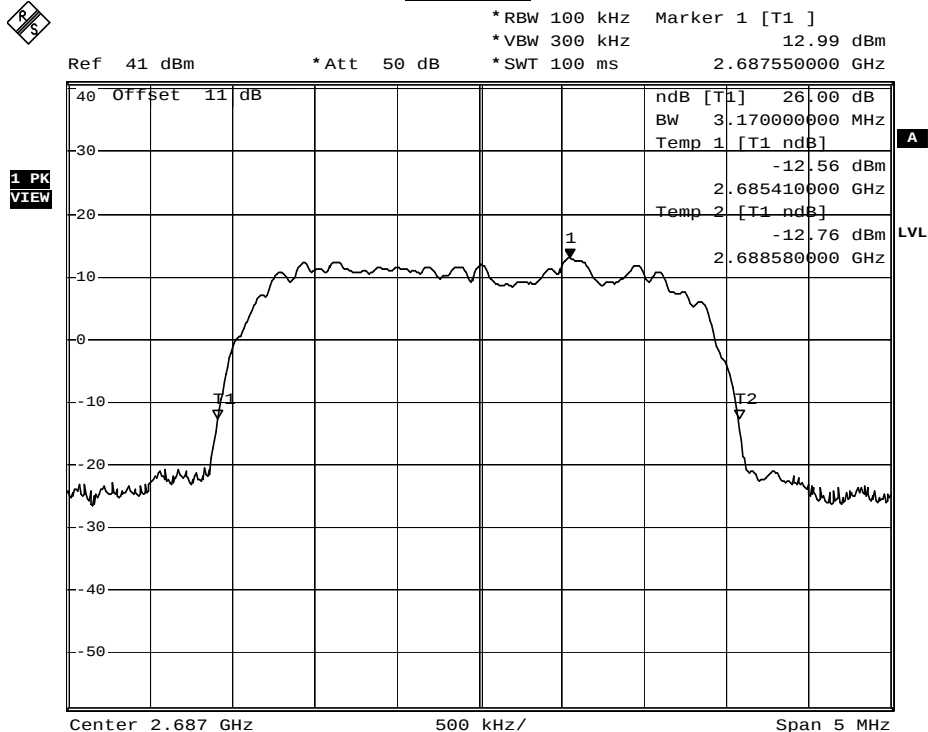
2672MHz



Comment: A:\2
 Date: 13.DEC.2011 22:20:05



2687MHz



Comment: A:\2
 Date: 13.DEC.2011 22:19:38

4. Band Edge

4.1. Test Equipment

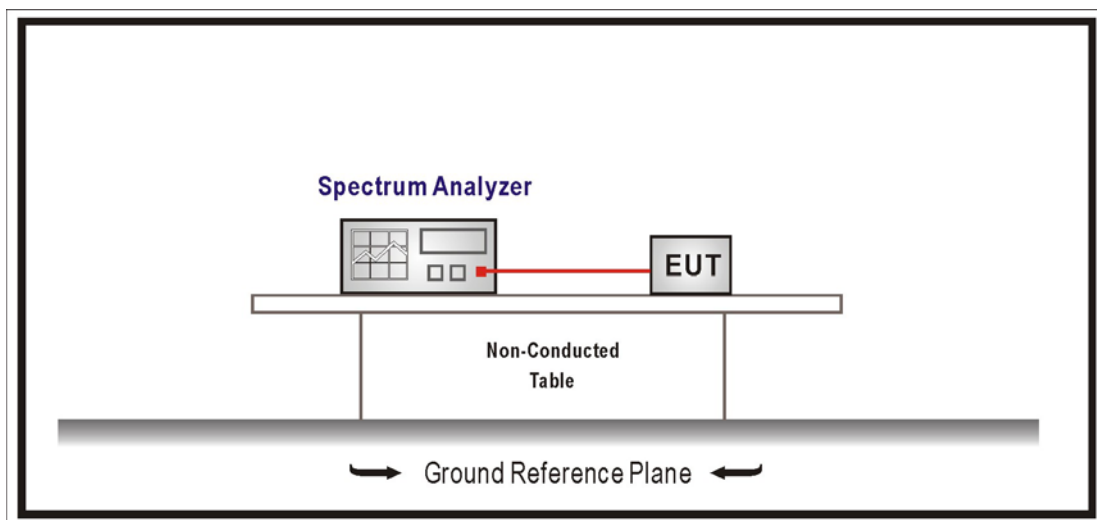
The following test equipments are used during the test:

Band edge/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2012/01/16

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

4.2. Test Setup



4.3. Limits

- (1) Fixed and Temporary Fixed Digital Stations: not less than $43 + \log (P)$ dB
- (2) Mobile Digital Stations: not less than $43 + \log (P)$ dB at the channel edge and $55 + \log (P)$ dB at 5.5 MHz from the channel edges

Sample Calculation:

Assume the EUT Output Power is 2 W = 33 dBm

$$43 + \log (P) \text{ dB}$$

$$43 + \log (2) = 46 \text{ dB}$$

$$33 \text{ dBm} - 46 \text{ dB} = -13 \text{ dBm}$$

$$55 + \log (2) = 58 \text{ dB}$$

$$33 \text{ dBm} - 58 \text{ dB} = -25 \text{ dBm}$$

4.4. Test Procedure

The EUT was set up for the rated peak power. The band edge was measured with Spectrum Analyzer with a resolution bandwidth of 100 kHz and video bandwidth of 300 kHz. All measurements were done at 2 channels: low and high operational frequency range.

The center frequency of spectrum is the band edge frequency. The resolution bandwidth of spectrum is 100 kHz and video bandwidth of spectrum is 300 kHz.

Record the max trace plot into the test report.

4.5. Uncertainty

The measurement uncertainty

Conducted is defined as $\pm 1.27\text{dB}$

Radiated is defined as $\pm 3.9\text{dB}$

4.6. Test Result

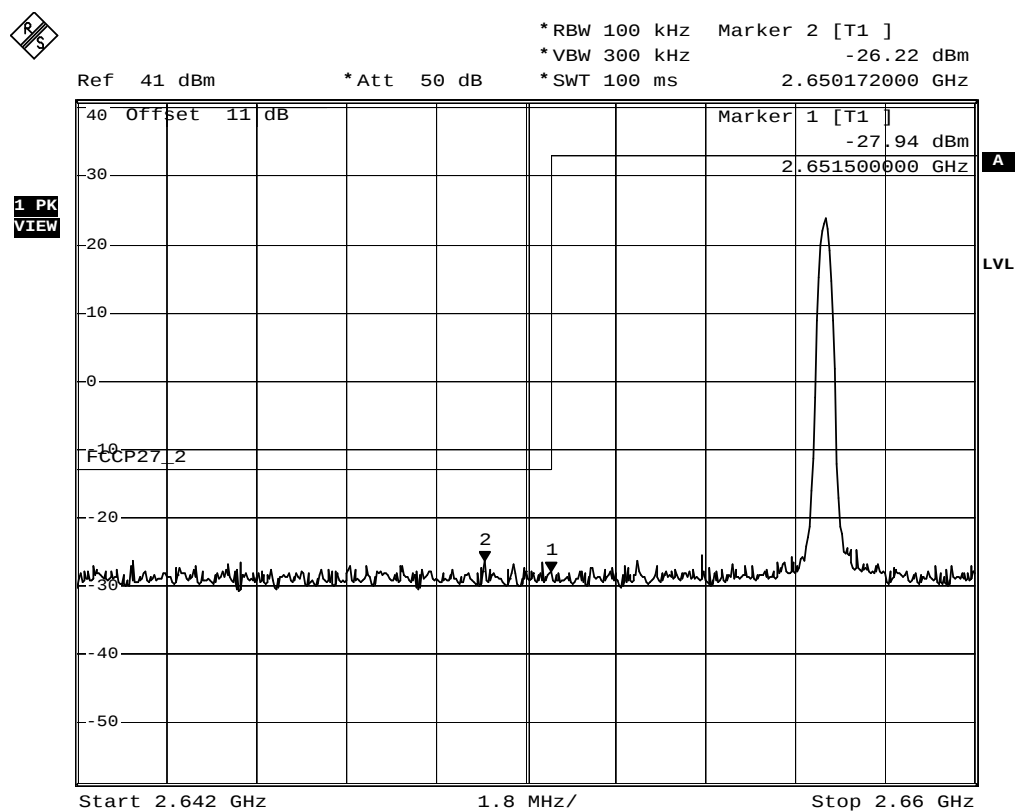
Product	MMDS TRANSCEIVER		
Test Item	Band Edge		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

Test Mode: Mode 1

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 160 ksps



Comment: A:\2

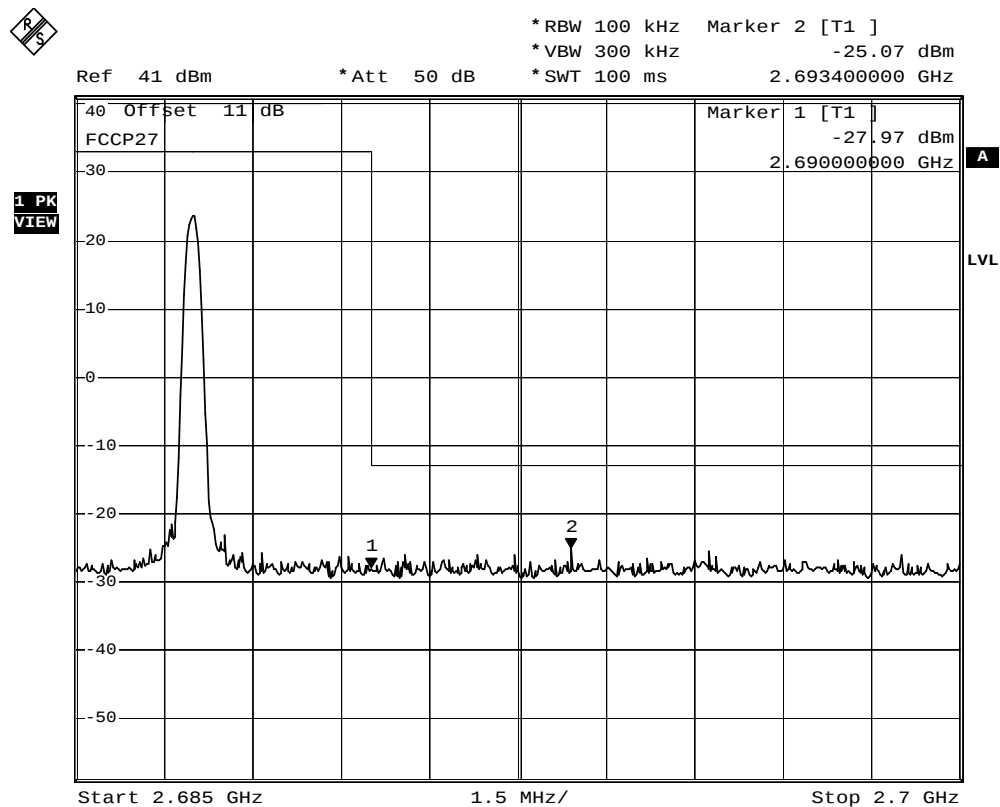
Date: 14.DEC.2011 19:19:32

Test Mode: Mode 1

Modulation Type: 16QAM

2687 MHz

Upstream Symbol Rate: 160 ksps



Comment: A:\2

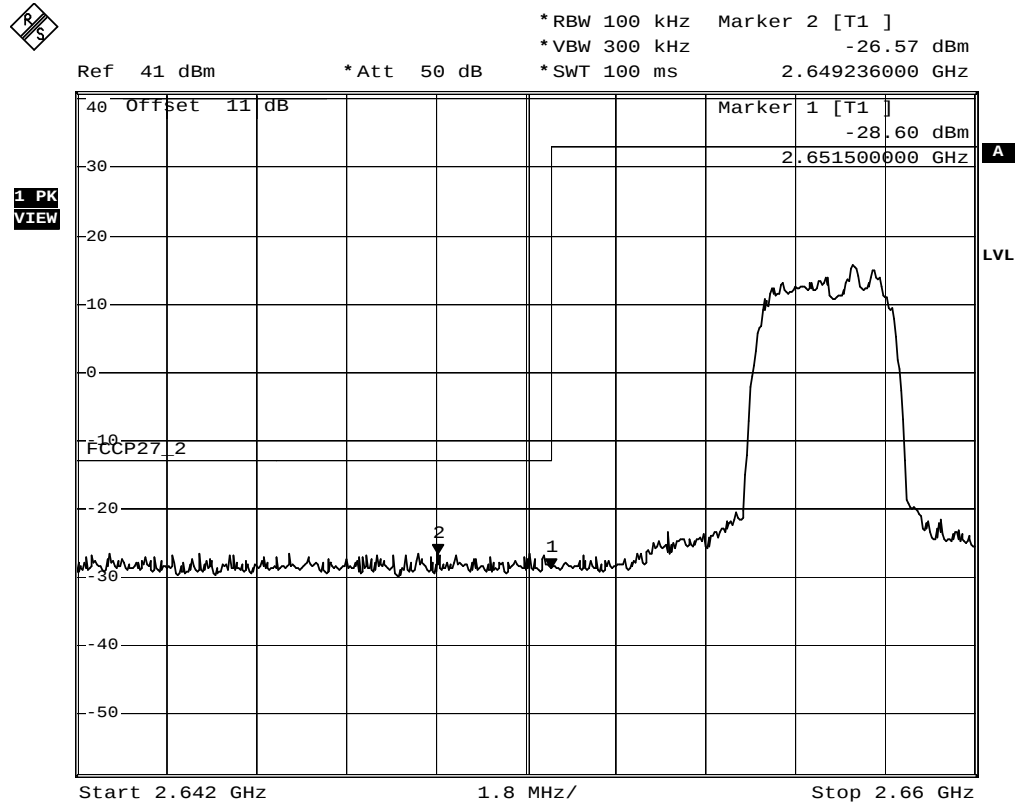
Date: 14.DEC.2011 19:18:20

Test Mode: Mode 5

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 2560 kps



Comment: A:\2

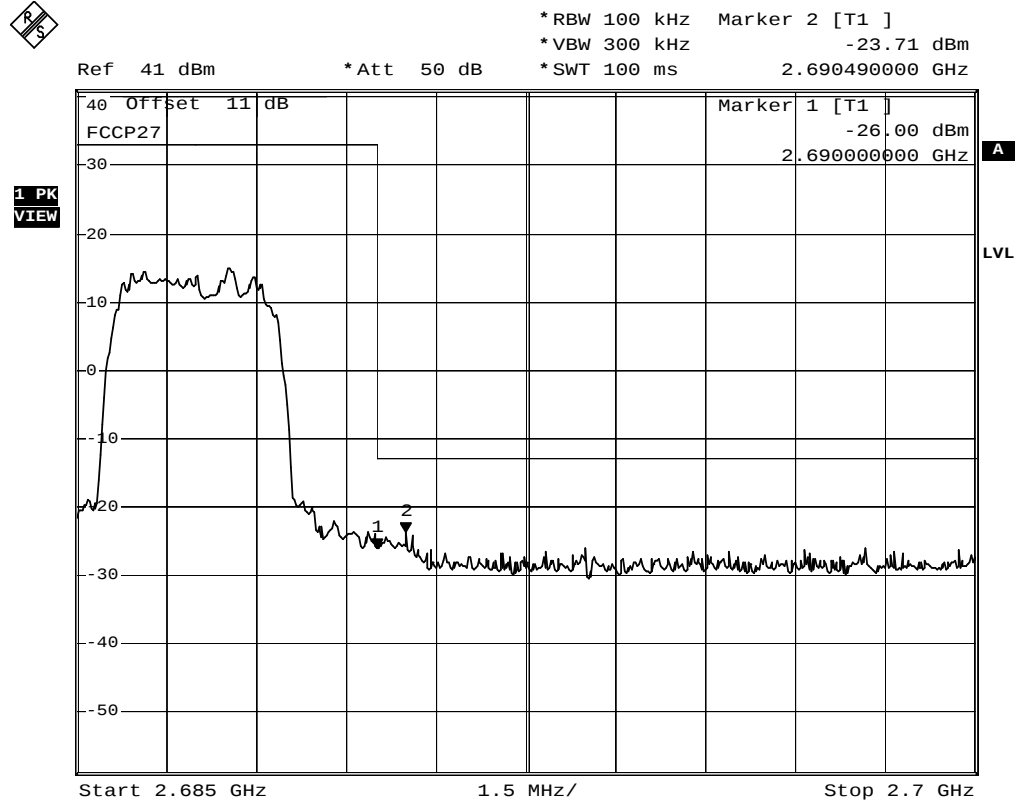
Date: 14.DEC.2011 19:20:06

Test Mode: MODE 5

Modulation Type: 16QAM

2687 MHz

Upstream Symbol Rate: 2560 kps



Comment: A:\2

Date: 14.DEC.2011 19:17:33

5. Conducted Spurious Emission

5.1. Test Equipment

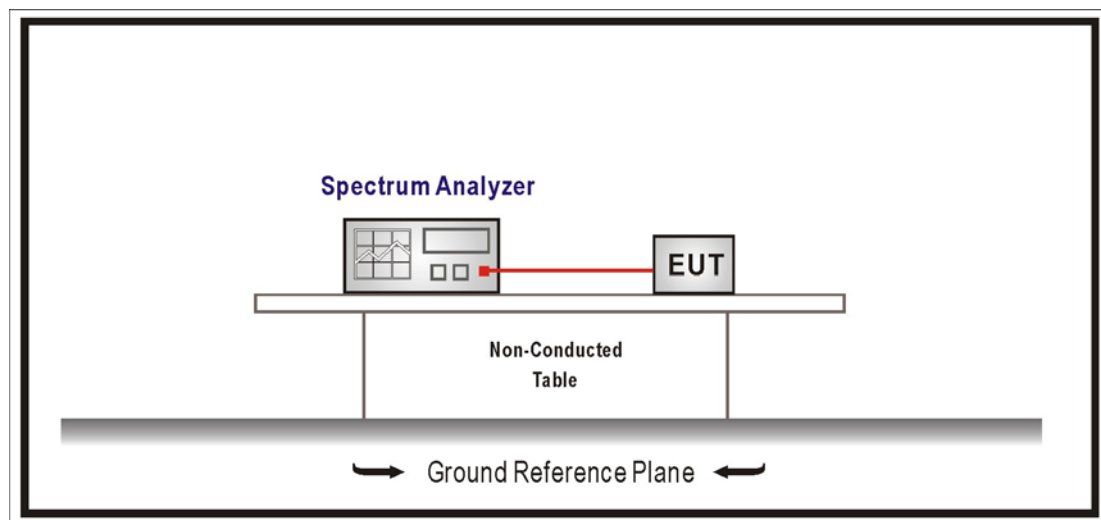
The following test equipments are used during the test:

Conducted Spurious Emission/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2012/01/16

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

5.2. Test Setup



5.3. Limits

- (1) Fixed and Temporary Fixed Digital Stations: not less than $43 + \log (P)$ dB
- (2) Mobile Digital Stations: not less than $43 + \log (P)$ dB at the channel edge and $55 + \log (P)$ dB at 5.5 MHz from the channel edges

Sample Calculation:

Assume the EUT Output Power is 2 W = 33 dBm

$$43 + \log (P) \text{ dB}$$

$$43 + \log (2) = 46 \text{ dB}$$

$$33 \text{ dBm} - 46 \text{ dB} = -13 \text{ dBm}$$

$$55 + \log (2) = 58 \text{ dB}$$

$$33 \text{ dBm} - 58 \text{ dB} = -25 \text{ dBm}$$

5.4. Test Procedure

The EUT was set up for the rated peak power. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels: low, middle and high operational frequency range.

When the spectrum scanned from 30MHz to 27GHz, it connected to the 10dB attenuator to the carried frequency. The spectrum set RBW = 1MHz, VBW = 3MHz. and using peak detection mode.

5.5. Uncertainty

The measurement uncertainty is defined as ± 1.27 dB

5.6. Test Result

Product	MMDS TRANSCEIVER		
Test Item	Conducted Spurious Emission		
Test Mode	Transmit		
Date of Test	2011/12/13	Test Site	SR7

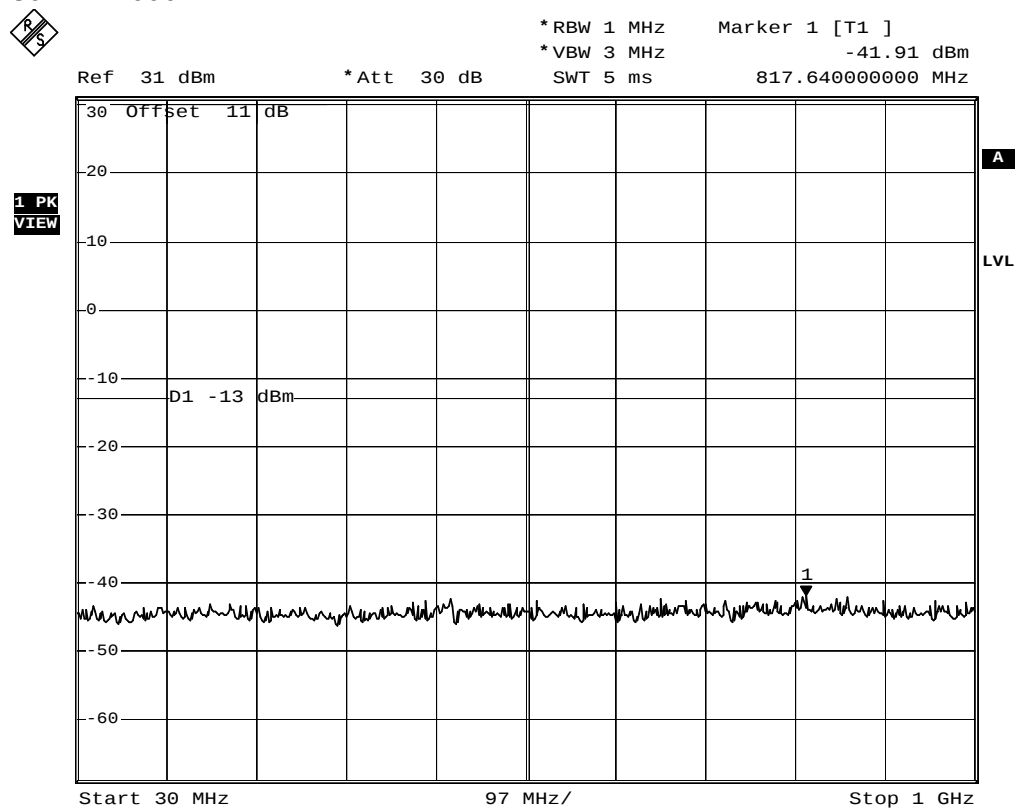
Test Mode: Mode 1

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 160 ksps

30MHz-1000MHz



Comment: A:\2

Date: 14.DEC.2011 16:18:40

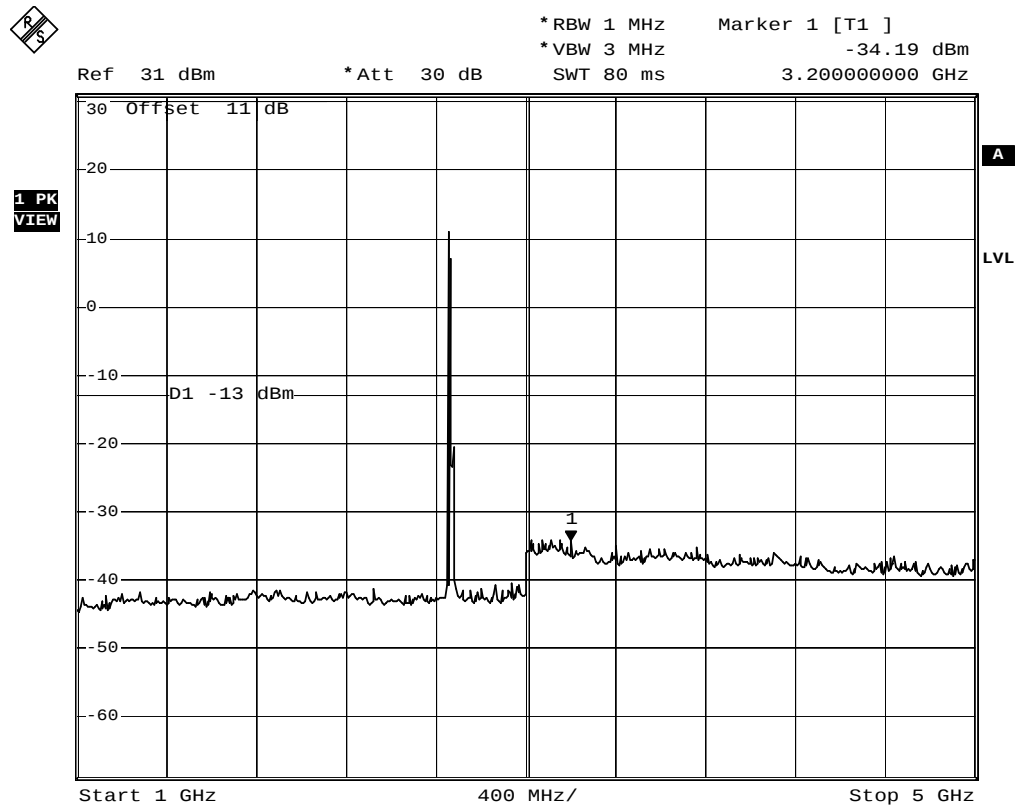
Test Mode: Mode 1

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 160 ksps

1000MHz-5000MHz



Comment: A:\2
Date: 14.DEC.2011 16:20:06

Test Mode: Mode 1

Modulation Type: 16QAM

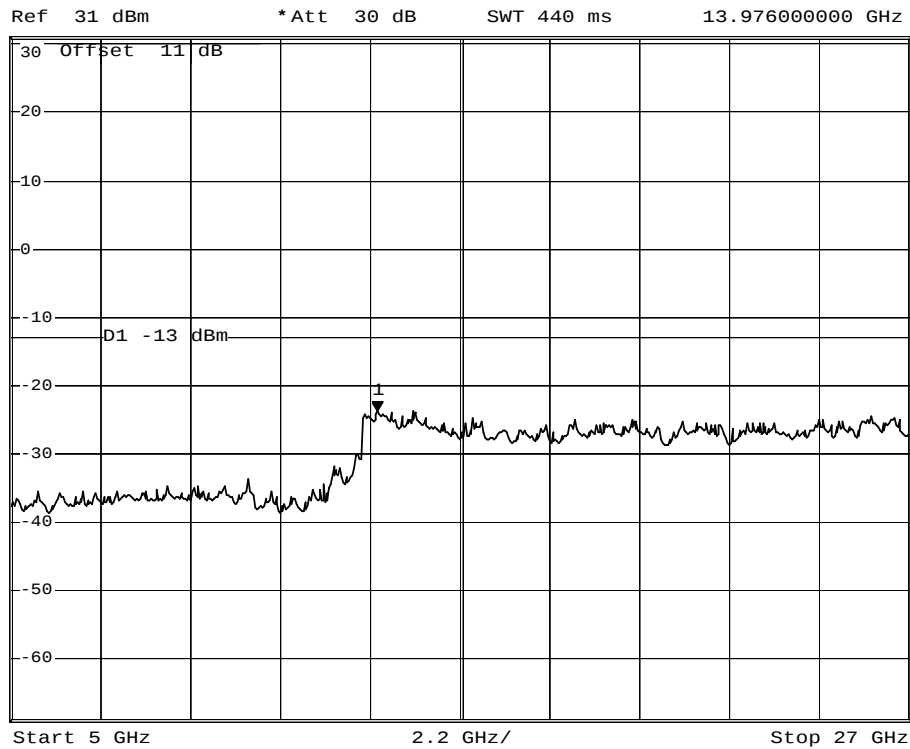
2657 MHz

Upstream Symbol Rate: 160 ksps

5000MHz-27000MHz



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -23.73 dBm
 SWT 440 ms 13.976000000 GHz



Comment: A:\2

Date: 14.DEC.2011 16:20:40

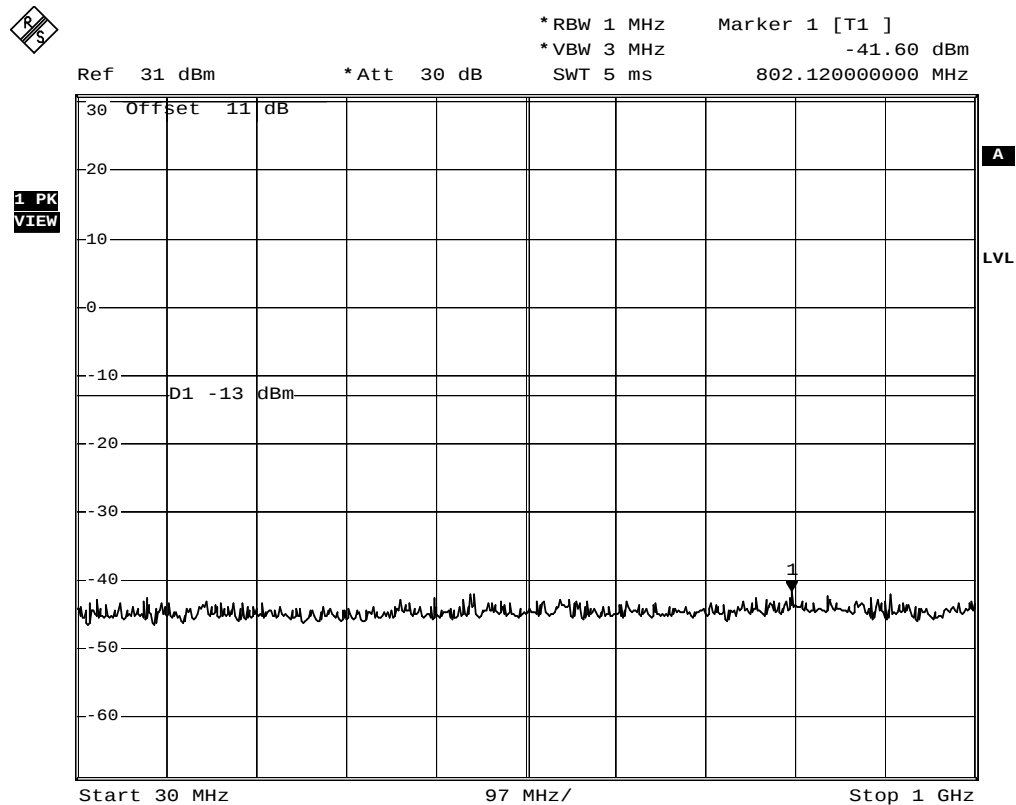
Test Mode: Mode 1

Modulation Type: 16QAM

2672 MHz

Upstream Symbol Rate: 160 ksps

30MHz-1000MHz



Comment: A:\2

Date: 14.DEC.2011 16:27:22

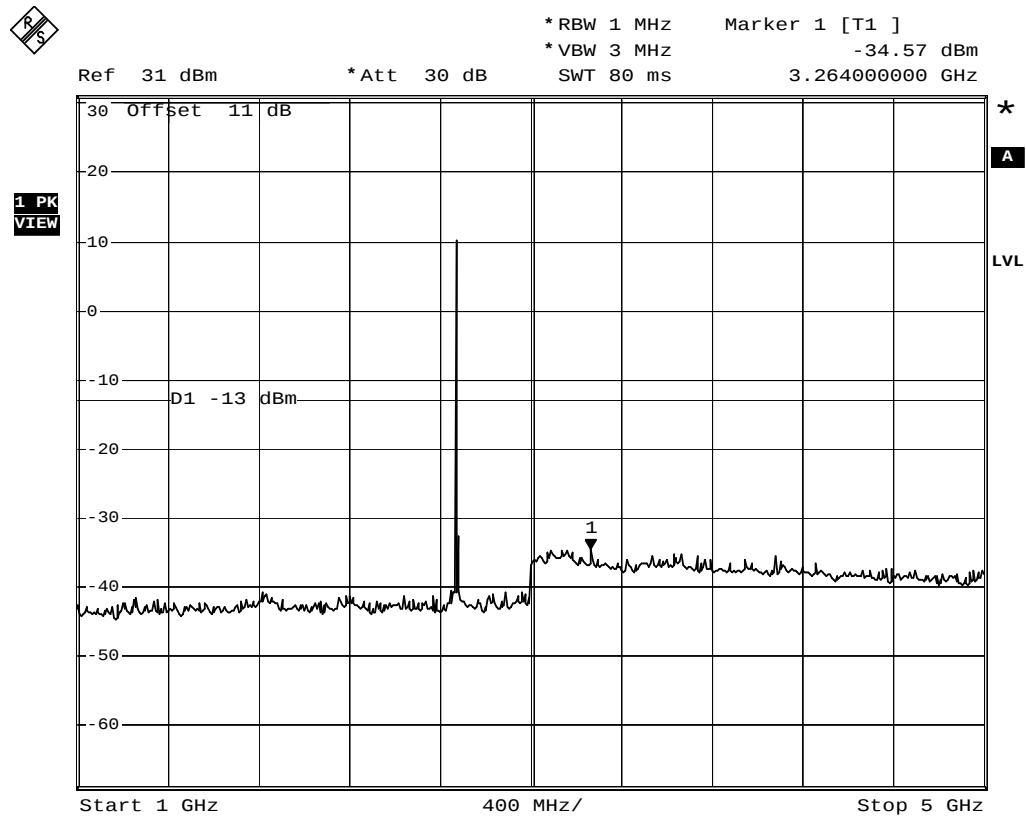
Test Mode: Mode 1

Modulation Type: 16QAM

2672 MHz

Upstream Symbol Rate: 160 ksps

1000MHz-5000MHz



Comment: A:\2

Date: 14.DEC.2011 16:26:58

Test Mode: Mode 1

Modulation Type: 16QAM

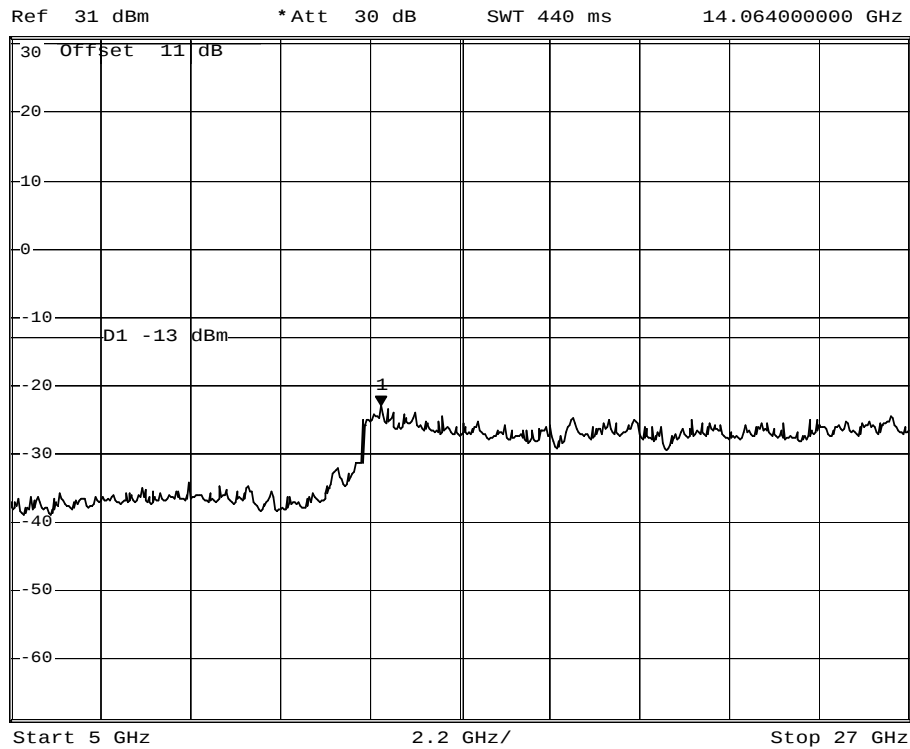
2672 MHz

Upstream Symbol Rate: 160 ksps

5000MHz-27000MHz



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -23.02 dBm
 SWT 440 ms 14.064000000 GHz



Comment: A:\2

Date: 14.DEC.2011 16:26:36

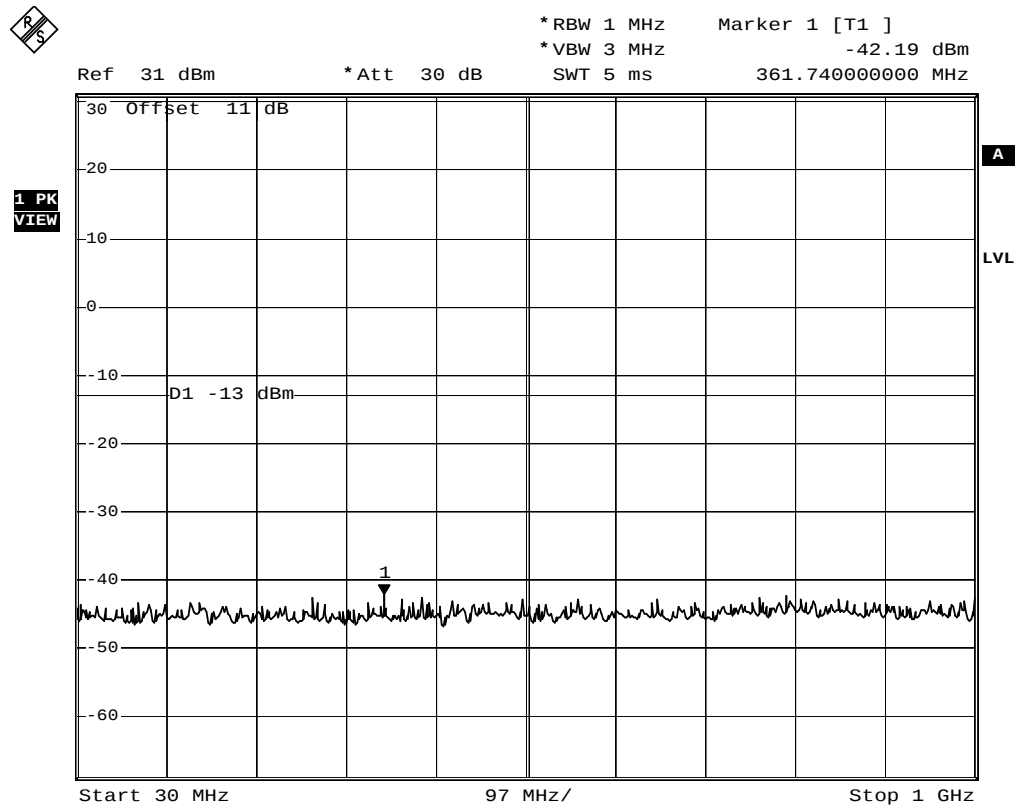
Test Mode: Mode 1

Modulation Type: 16QAM

2687MHz

Upstream Symbol Rate: 160 ksps

30MHz-1000MHz



Comment: A:\2

Date: 14.DEC.2011 16:28:06

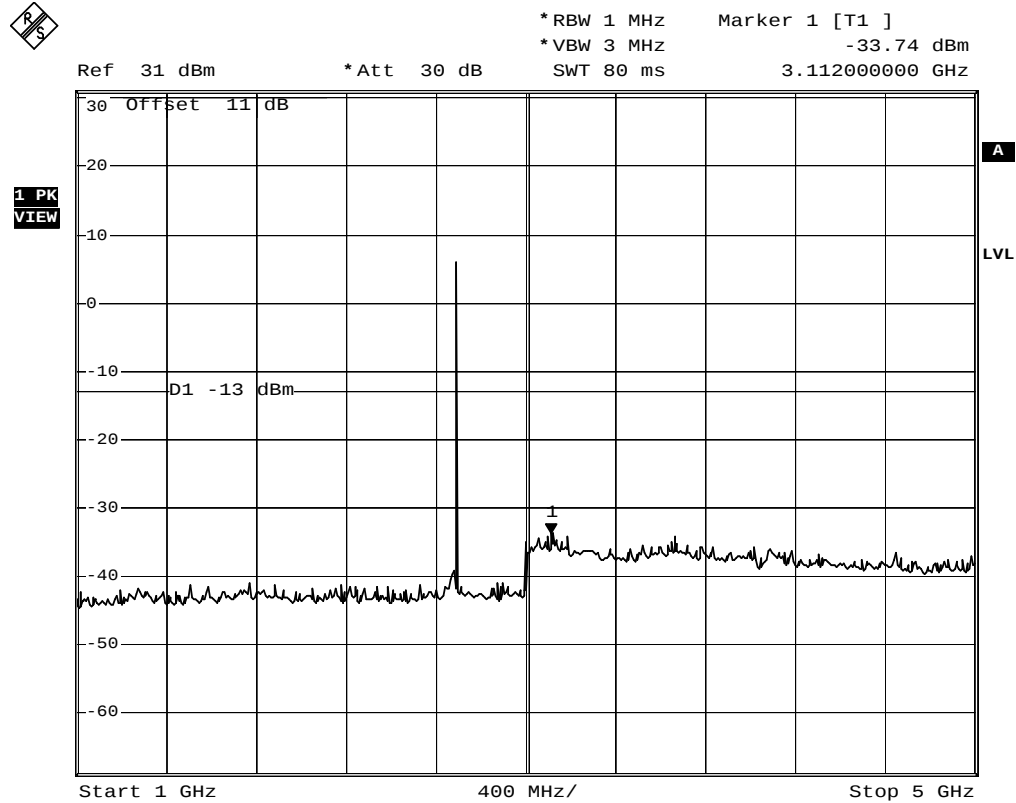
Test Mode: Mode 1

Modulation Type: 16QAM

2687MHz

Upstream Symbol Rate: 160 ksps

1000MHz-5000MHz



Comment: A:\2

Date: 14.DEC.2011 16:28:31

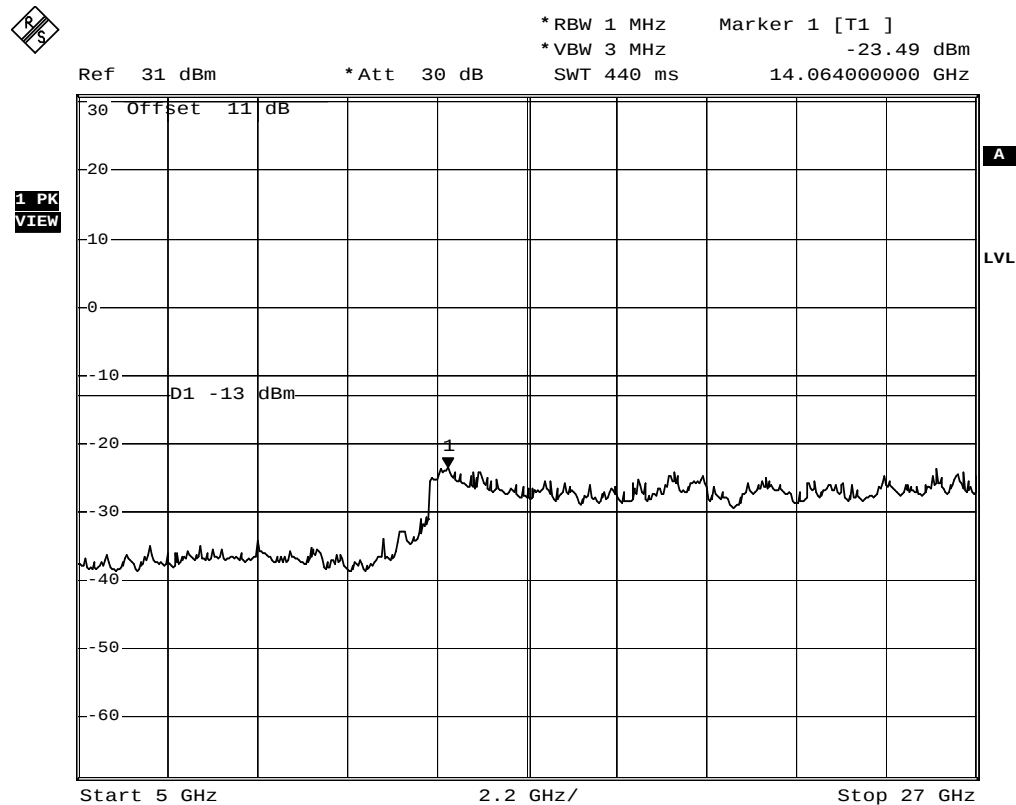
Test Mode: Mode 1

Modulation Type: 16QAM

2687MHz

Upstream Symbol Rate: 160 ksps

5000MHz-27000MHz



Comment: A:\2

Date: 14.DEC.2011 16:29:31

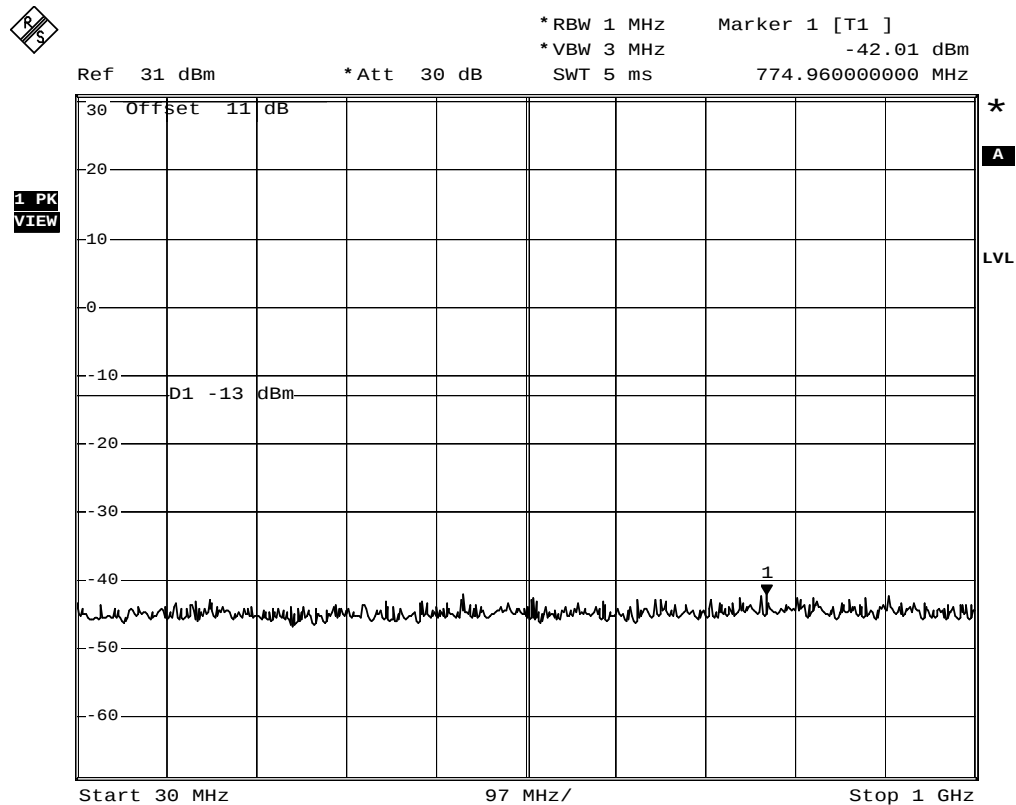
Test Mode: Mode 5

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 2560 ksps

30MHz-1000MHz



Comment: A:\2

Date: 14.DEC.2011 16:22:30

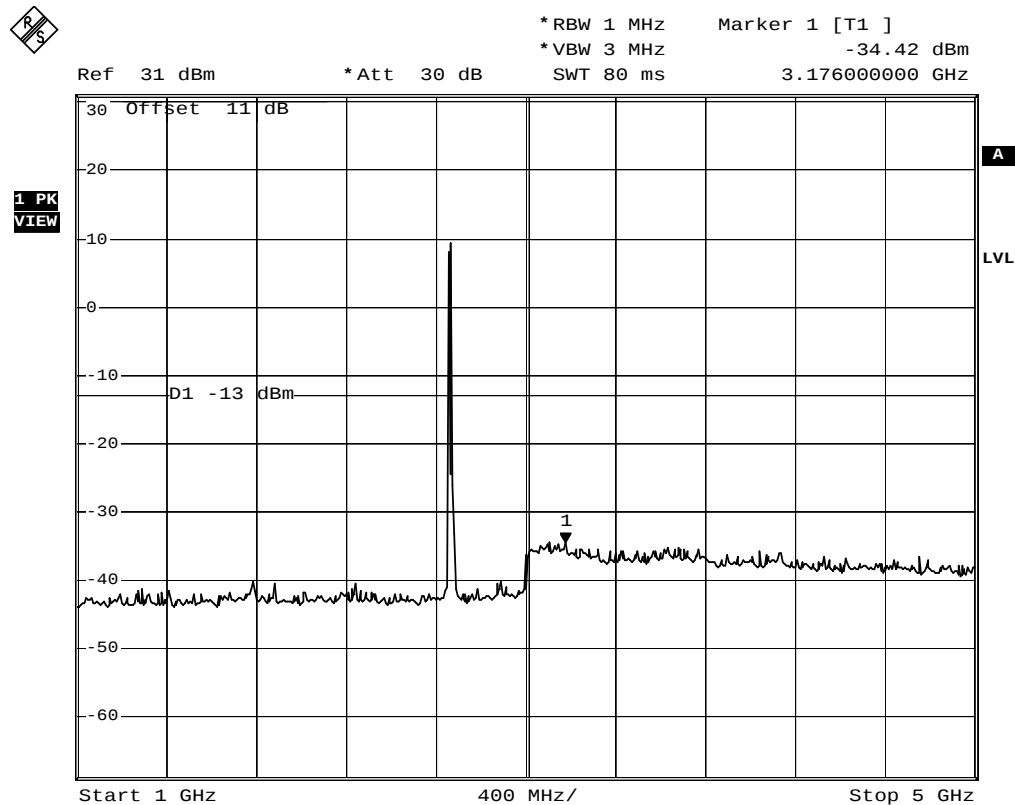
Test Mode: Mode 5

Modulation Type: 16QAM

2657 MHz

Upstream Symbol Rate: 2560 ksps

1000MHz-5000MHz



Comment: A:\2

Date: 14.DEC.2011 16:21:58

Test Mode: Mode 5

Modulation Type: 16QAM

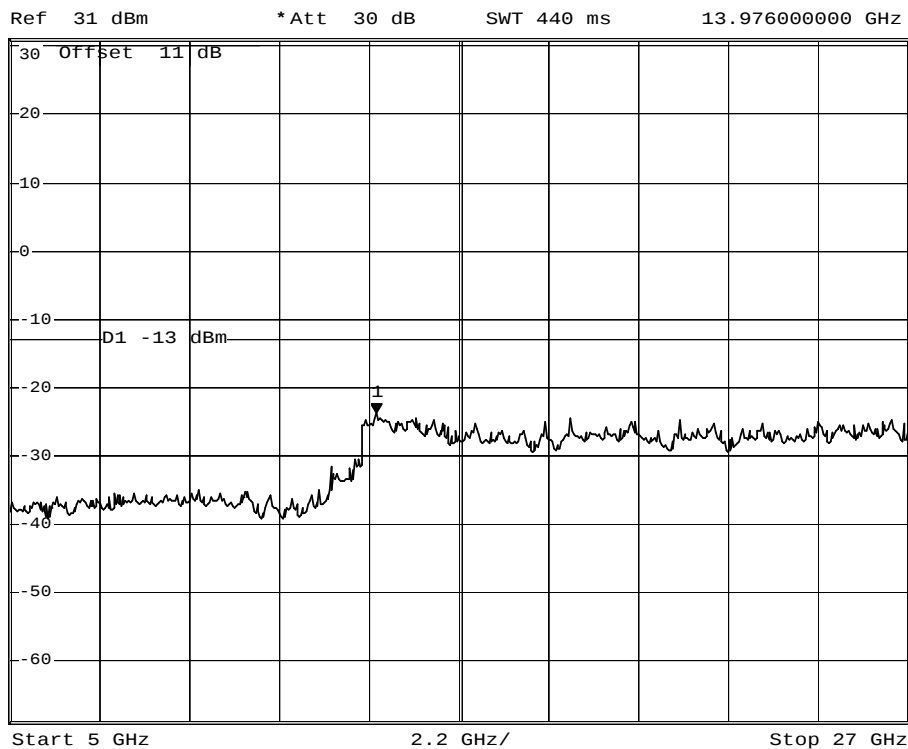
2657 MHz

Upstream Symbol Rate: 2560 ksps

5000MHz-27000MHz



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -23.59 dBm
 SWT 440 ms 13.976000000 GHz



Comment: A:\2

Date: 14.DEC.2011 16:21:22

Test Mode: Mode 5

Modulation Type: 16QAM

2672 MHz

Upstream Symbol Rate: 2560 ksps

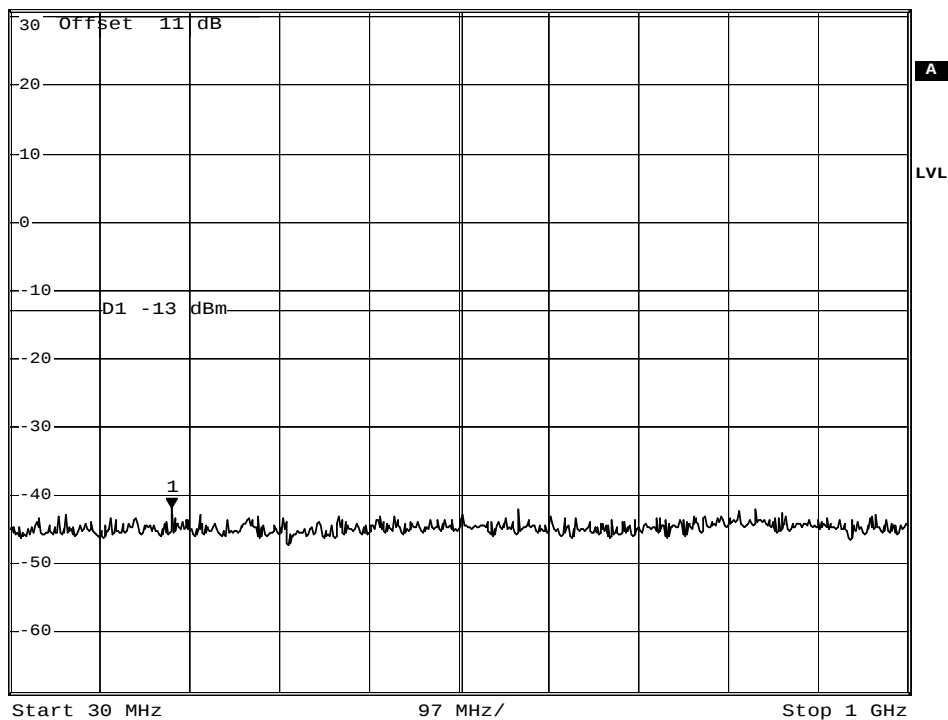
30MHz-1000MHz



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -41.84 dBm
 SWT 5 ms 204.600000000 MHz

Ref 31 dBm *Att 30 dB

1 PK
VIEW



Comment: A:\2

Date: 14.DEC.2011 16:24:51

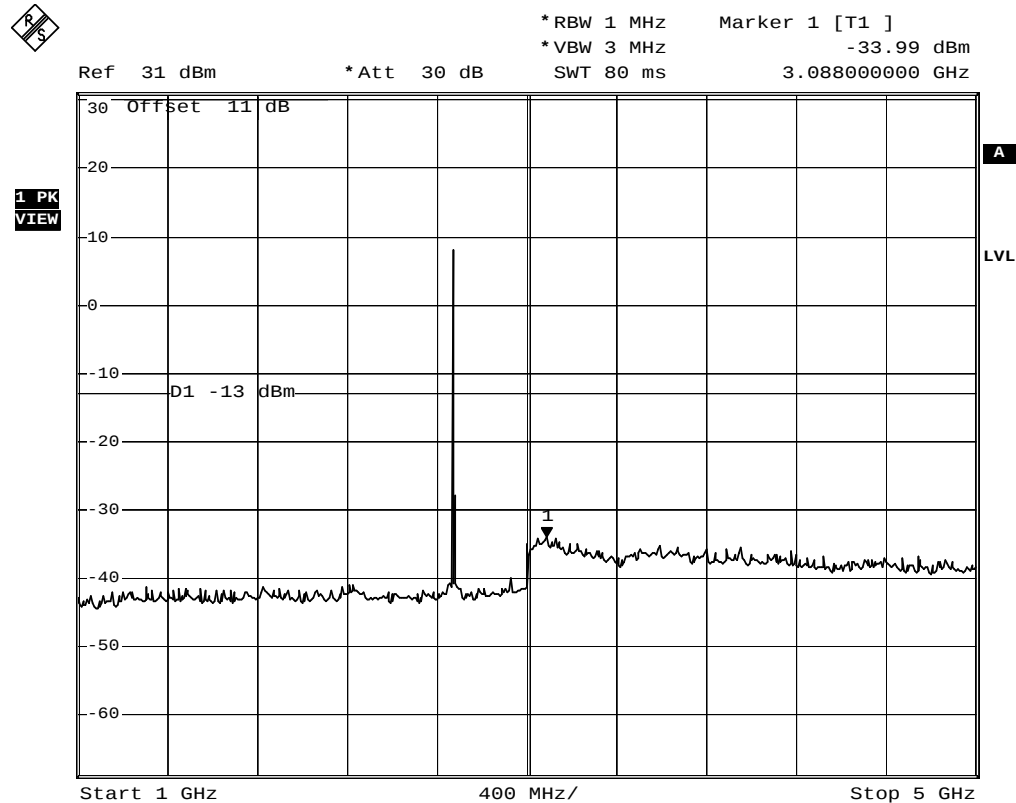
Test Mode: Mode 5

Modulation Type: 16QAM

2672 MHz

Upstream Symbol Rate: 2560 ksps

1000MHz-5000MHz



Comment: A:\2

Date: 14.DEC.2011 16:25:23

Test Mode: Mode 5

Modulation Type: 16QAM

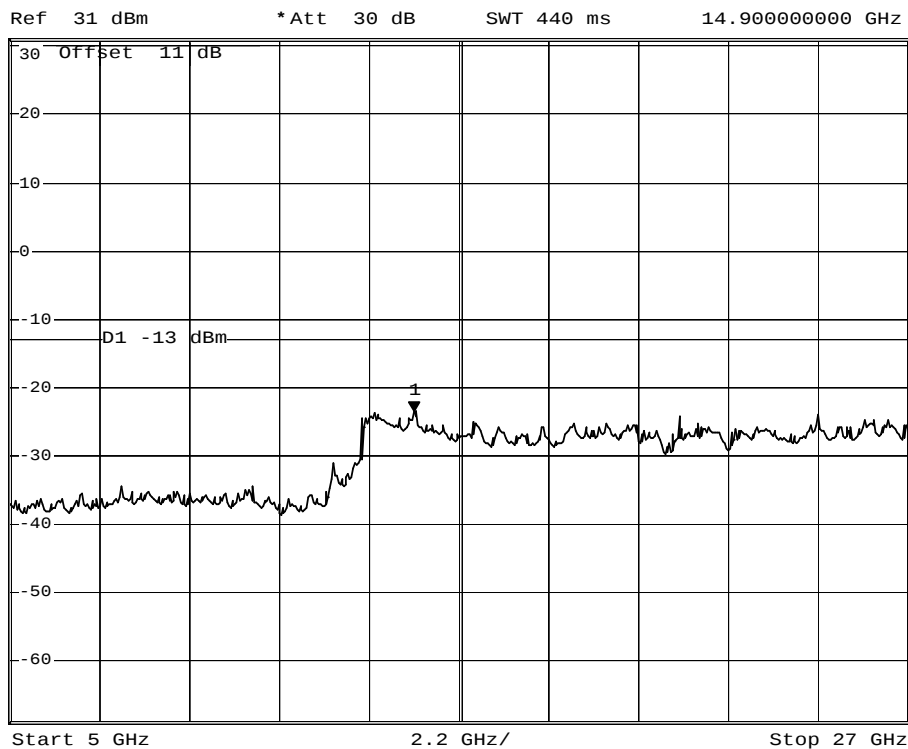
2672 MHz

Upstream Symbol Rate: 2560 ksps

5000MHz-27000MHz



*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -23.47 dBm
 SWT 440 ms 14.900000000 GHz



Comment: A:\2

Date: 14.DEC.2011 16:25:50

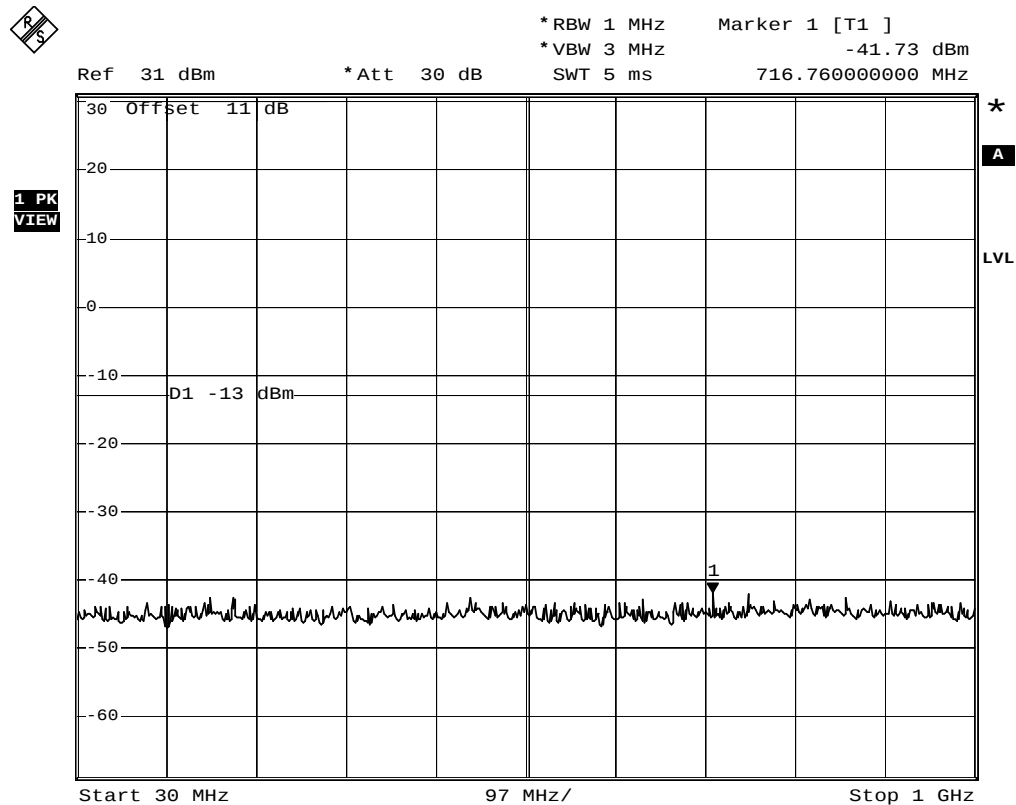
Test Mode: Mode 5

Modulation Type: 16QAM

2687MHz

Upstream Symbol Rate: 2560 ksps

30MHz-1000MHz



Comment: A:\2

Date: 14.DEC.2011 16:30:54

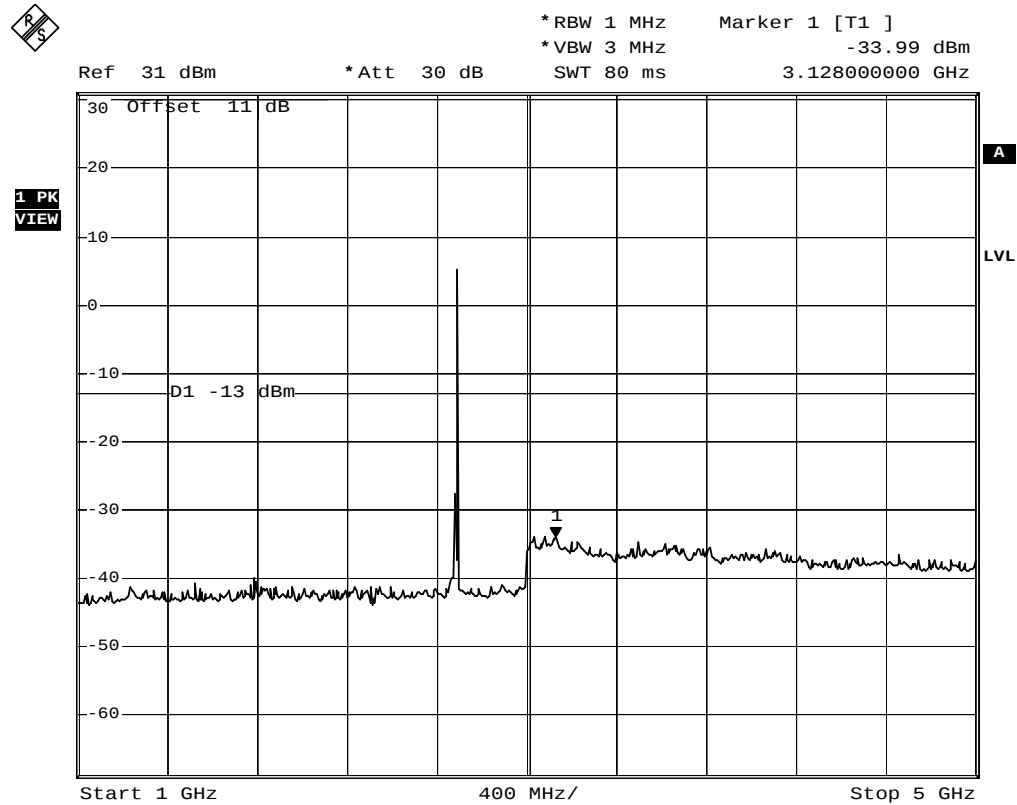
Test Mode: Mode 5

Modulation Type: 16QAM

2687MHz

Upstream Symbol Rate: 2560 ksps

1000MHz-5000MHz



Comment: A:\2

Date: 14.DEC.2011 16:30:29

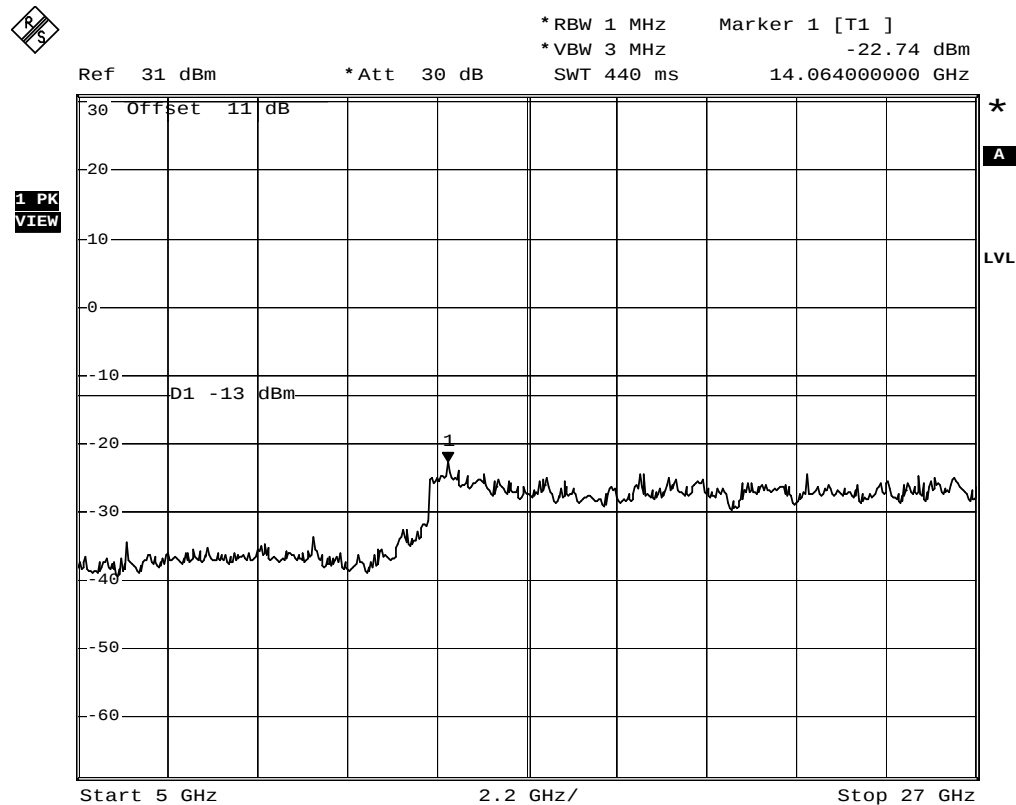
Test Mode: Mode 5

Modulation Type: 16QAM

2687MHz

Upstream Symbol Rate: 2560 ksps

5000MHz-27000MHz



Comment: A:\2

Date: 14.DEC.2011 16:29:59

6. Radiated Spurious Emission

6.1. Test Equipment

The following test equipments are used during the test:

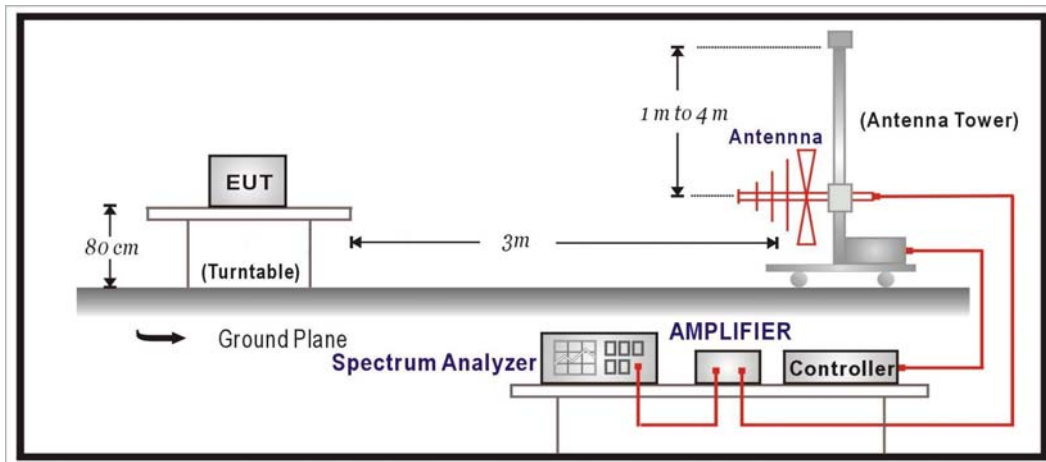
Radiated Spurious Emission / CB1

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Bilog Antenna	SCHAFFNER	CBL6112B	2895	2012/08/14
Double Ridged Guide Horn Antenna	Schwarzback	BBHA 9120D	743	2012/02/24
Pre-Amplifier	MITEQ	AMF-4D-005180-24-10P	888003	2012/12/05
Pre-Amplifier	QuieTek	AP-025C	CHM-0706049	2012/03/10
Spectrum Analyzer	Agilent	E4440A	MY46187335	2012/01/06
Coaxial Cable	Huber+Suhner AG	Sucoflex 102	25623/2	2012/03/21

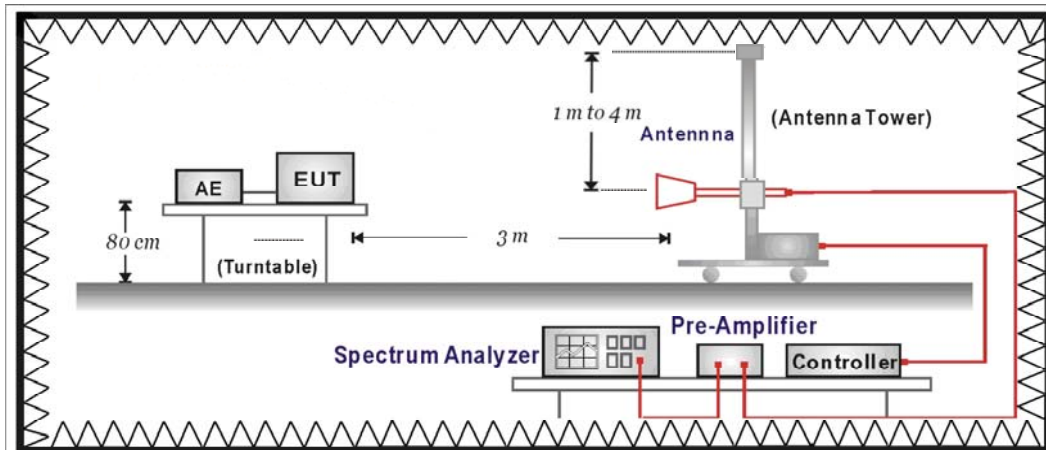
Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

6.2. Test Setup

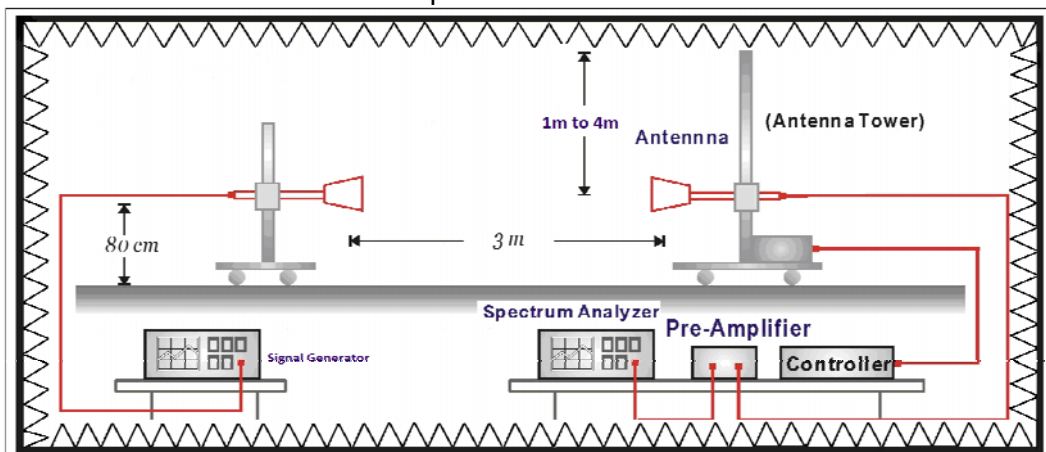
Under 1GHz Test Setup:



Above 1GHz Test Setup: RF Radiated Measurement:



Substitution Measurement Setup:



Measure Level = Signal Generator-Cable Loss + Antenna Gain

6.3. Limits

- (1) Fixed and Temporary Fixed Digital Stations: not less than $43 + \log (P)$ dB.
- (2) Mobile Digital Stations: not less than $43 + \log (P)$ dB at the channel edge and $55 + \log (P)$ dB at 5.5 MHz from the channel edges.

Sample Calculation:

Assume the EUT Output Power is 2 W = 33 dBm

$43 + \log (P)$ dB

$43 + \log (2) = 46$ dB

$33 \text{ dBm} - 46 \text{ dB} = -13 \text{ dBm}$

$55 + \log (2) = 58$ dB

$33 \text{ dBm} - 58 \text{ dB} = -25 \text{ dBm}$

6.4. Test Procedure

For measuring E.I.R.P peak power, EUT was placed on the turn-table which was rotated around 360 degrees to search the maximum radiation power and receiver antenna was rotated vertical and horizontal polarization to find the maximum polarization radiated power.

The EUT is replaced by a horn antenna connected to a signal generator tuned to the frequency of emission and level of signal generator adjusted to same level of emission. Both horizontal and vertical polarization of the antenna are set on measurement.

On any frequency, the limits shown are based on measuring equipment employing a peak detector function. The resolution bandwidth of spectrum analyzer is 1MHz. and video bandwidth is 3MHz.

The radiated E.I.R.P power was calculated via the Correct factor, Reading Level, and Antenna gain as follows:

$\text{E.I.R.P} = \text{Reading Level} + \text{Correct Factor} = \text{S.G.} - \text{Cable Loss} + \text{Antenna Gain}$

6.5. Uncertainty

The measurement uncertainty

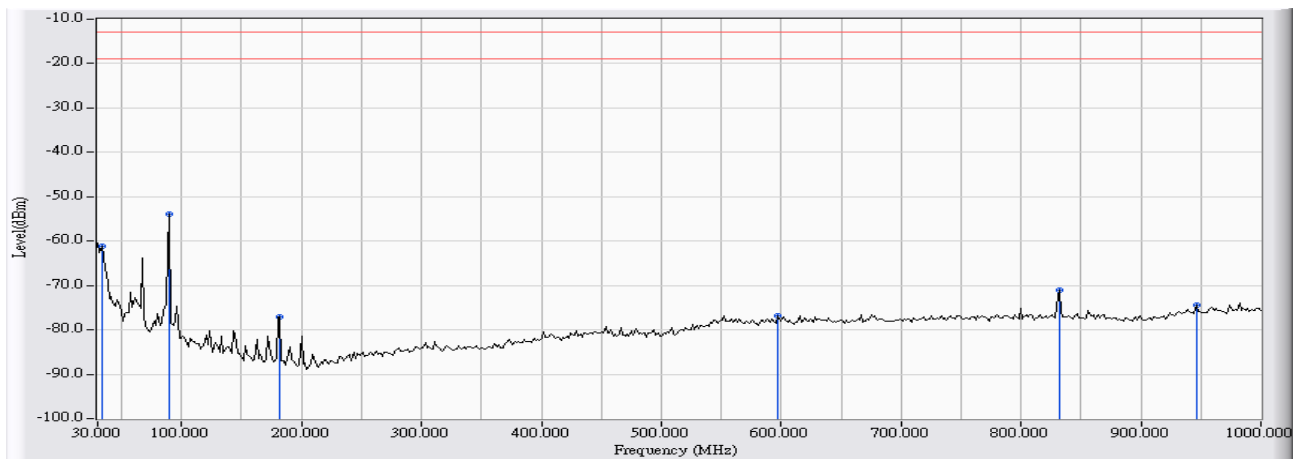
30MHz~1GHz as $\pm 3.19\text{dB}$

1GHz~27GHz as $\pm 3.9\text{dB}$

6.6. Test Result

30 MHz – 1 GHz Spurious:

Site : CB1	Time : 2011/12/13 - 10:07
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_30-1G-1_0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM (2672MHz)

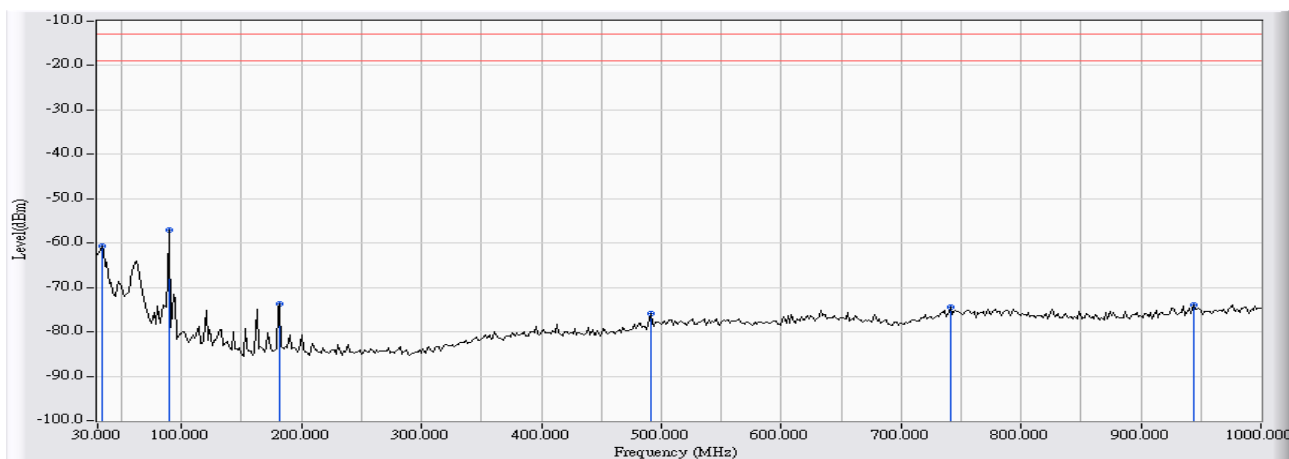


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		33.233	11.647	-72.804	-61.157	-48.157	-13.000	PEAK
2	*	89.817	2.552	-56.390	-53.838	-40.838	-13.000	PEAK
3		181.967	-2.299	-74.790	-77.089	-64.089	-13.000	PEAK
4		597.450	6.748	-83.571	-76.822	-63.822	-13.000	PEAK
5		831.867	8.353	-79.435	-71.082	-58.082	-13.000	PEAK
6		946.650	9.624	-83.983	-74.359	-61.359	-13.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. “ * ”, means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : CB1	Time : 2011/12/13 - 10:01
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_30-1G-1_0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM (2672MHz)

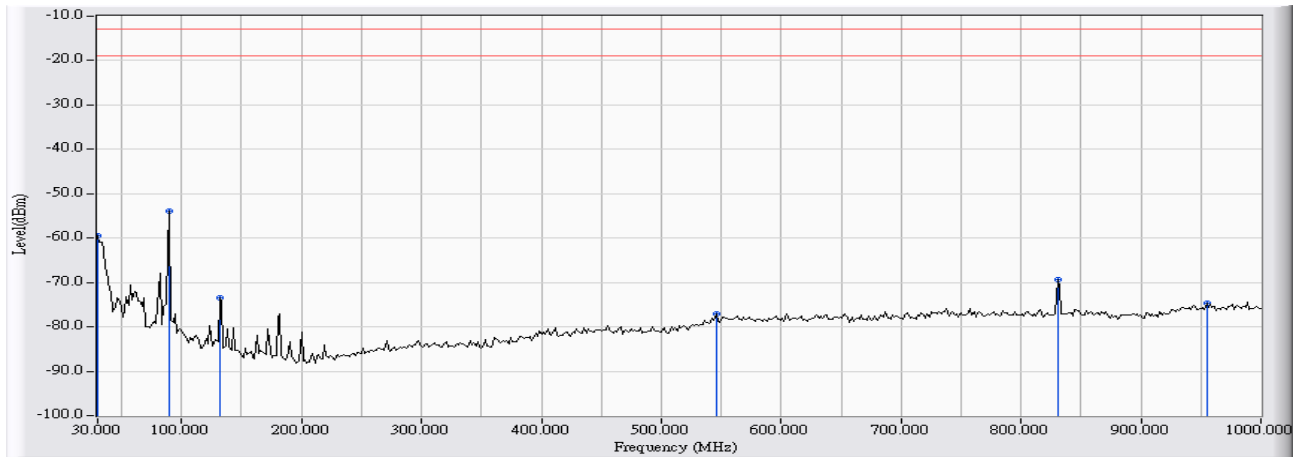


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		33.233	4.771	-65.468	-60.697	-47.697	-13.000	PEAK
2	*	89.817	2.793	-59.759	-56.965	-43.965	-13.000	PEAK
3		181.967	0.795	-74.602	-73.806	-60.806	-13.000	PEAK
4		490.750	6.609	-82.500	-75.892	-62.892	-13.000	PEAK
5		741.333	9.240	-83.753	-74.514	-61.514	-13.000	PEAK
6		943.417	9.975	-83.872	-73.897	-60.897	-13.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : CB1	Time : 2011/12/13 - 10:19
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_30-1G-1_0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM (2672MHz)

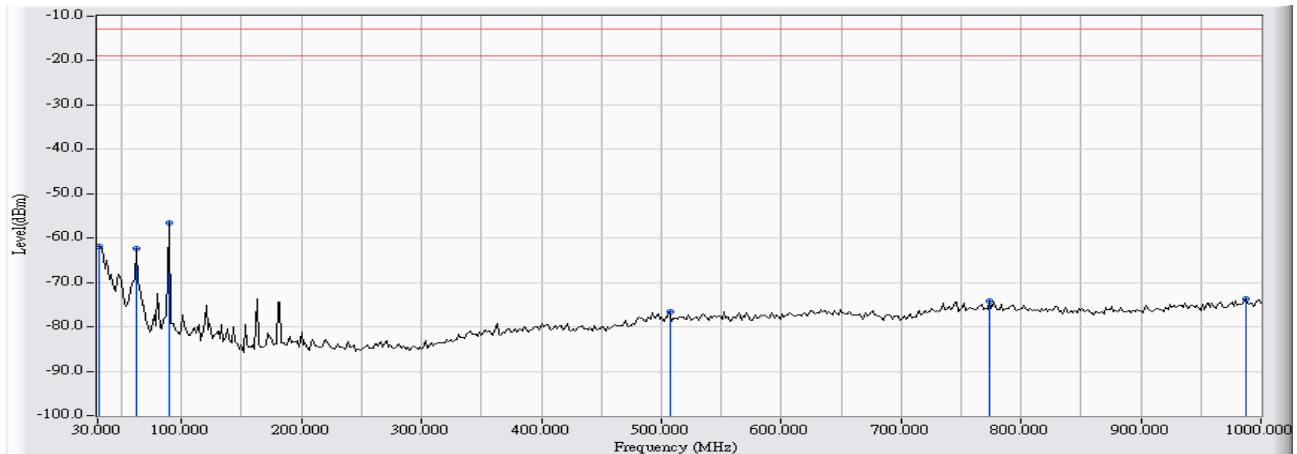


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		30.000	12.280	-71.783	-59.503	-46.503	-13.000	PEAK
2	*	89.817	2.552	-56.529	-53.977	-40.977	-13.000	PEAK
3		131.850	-0.631	-72.778	-73.410	-60.410	-13.000	PEAK
4		545.717	6.515	-83.665	-77.151	-64.151	-13.000	PEAK
5		830.250	8.338	-77.701	-69.362	-56.362	-13.000	PEAK
6		954.733	9.771	-84.548	-74.777	-61.777	-13.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

Site : CB1	Time : 2011/12/13 - 10:13
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_30-1G-1_0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM (2672MHz)



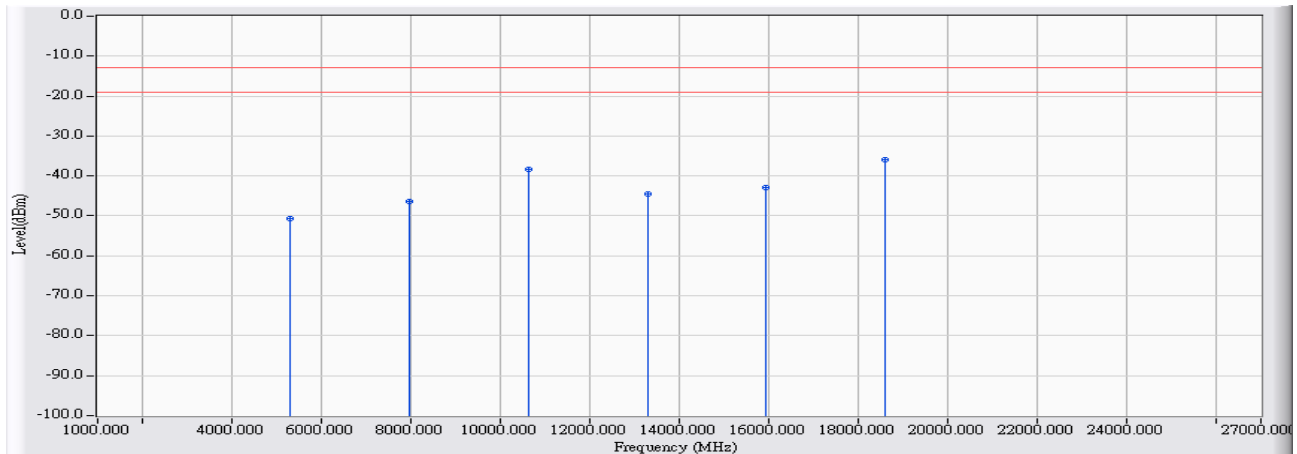
	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1	31.617	4.665	-66.658	-61.993	-48.993	-13.000	PEAK
2	62.333	3.190	-65.556	-62.365	-49.365	-13.000	PEAK
3	* 89.817	2.793	-59.359	-56.565	-43.565	-13.000	PEAK
4	506.917	7.037	-83.750	-76.713	-63.713	-13.000	PEAK
5	773.667	9.534	-83.758	-74.224	-61.224	-13.000	PEAK
6	987.067	10.730	-84.502	-73.772	-60.772	-13.000	PEAK

Note:

1. All Reading Levels are Peak value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor

1 GHz – 26 GHz Spurious:

Site : CB1	Time : 2011/12/14 - 19:52
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM(2657MHz)

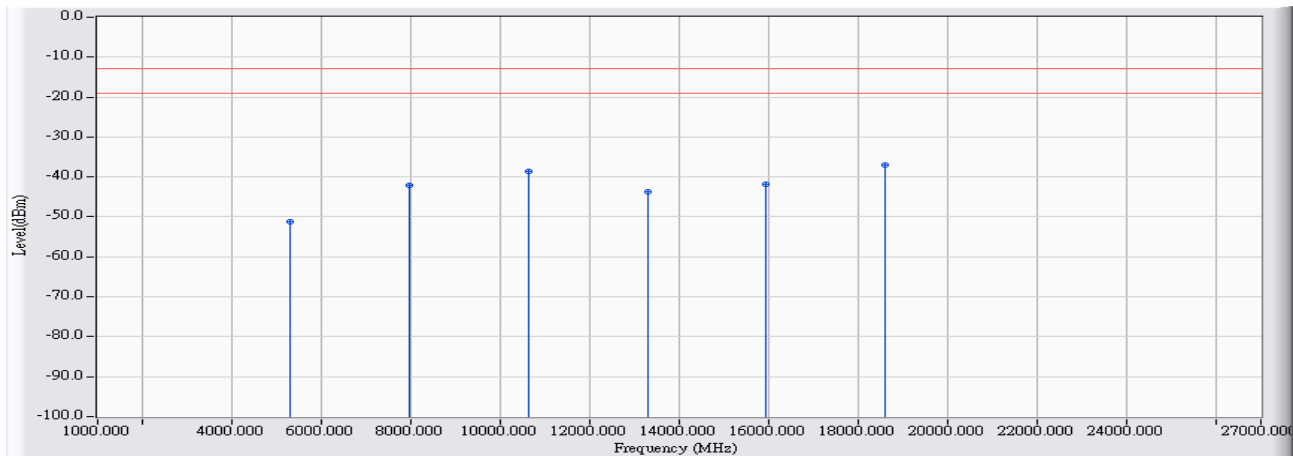


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5313.783	14.778	-65.320	-50.542	-37.542	-13.000	PEAK
2		7970.917	22.273	-68.750	-46.477	-33.477	-13.000	PEAK
3		10628.133	22.064	-60.340	-38.276	-25.276	-13.000	PEAK
4		13285.133	26.517	-70.940	-44.422	-31.422	-13.000	PEAK
5		15941.700	28.599	-71.430	-42.830	-29.830	-13.000	PEAK
6	*	18598.967	36.690	-72.660	-35.970	-22.970	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 19:48
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM(2657MHz)

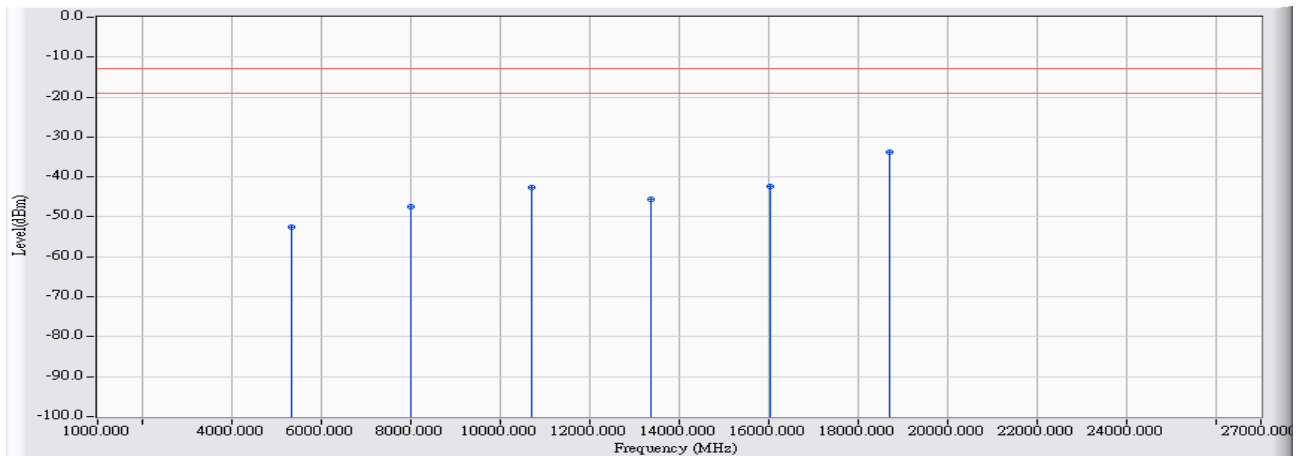


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5313.933	14.546	-65.650	-51.104	-38.104	-13.000	PEAK
2		7970.967	21.583	-63.740	-42.157	-29.157	-13.000	PEAK
3		10628.100	21.137	-59.730	-38.592	-25.592	-13.000	PEAK
4		13284.933	27.969	-71.570	-43.600	-30.600	-13.000	PEAK
5		15942.583	28.308	-70.160	-41.853	-28.853	-13.000	PEAK
6	*	18598.667	36.650	-73.560	-36.910	-23.910	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:09
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM(2672MHz)

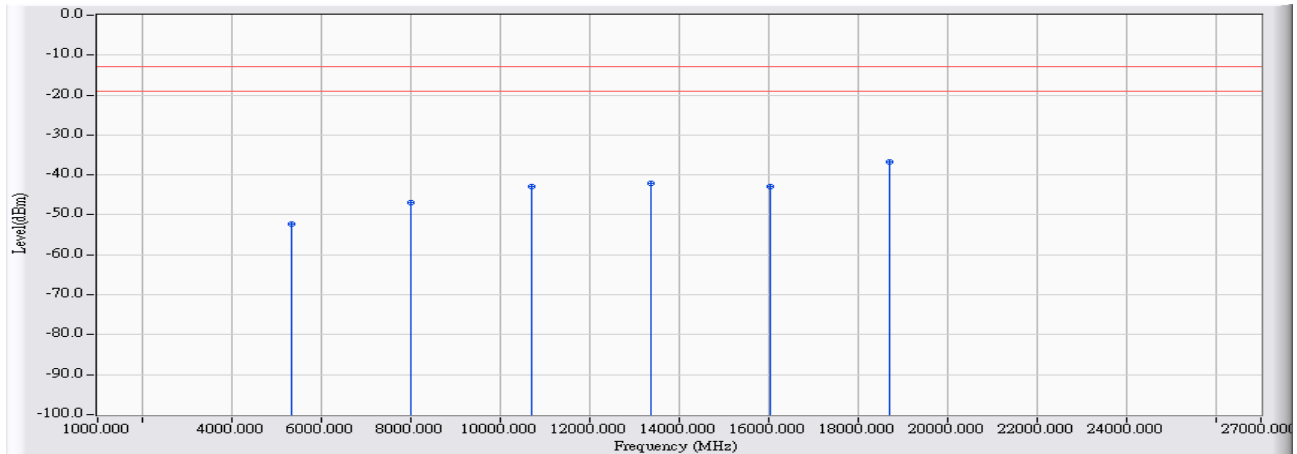


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5343.933	14.786	-67.300	-52.514	-39.514	-13.000	PEAK
2		8016.133	22.313	-69.890	-47.577	-34.577	-13.000	PEAK
3		10688.000	22.146	-64.760	-42.614	-29.614	-13.000	PEAK
4		13359.900	26.589	-72.180	-45.592	-32.592	-13.000	PEAK
5		16032.167	28.877	-71.300	-42.422	-29.422	-13.000	PEAK
6	*	18703.417	36.690	-70.590	-33.900	-20.900	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:05
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM(2672MHz)

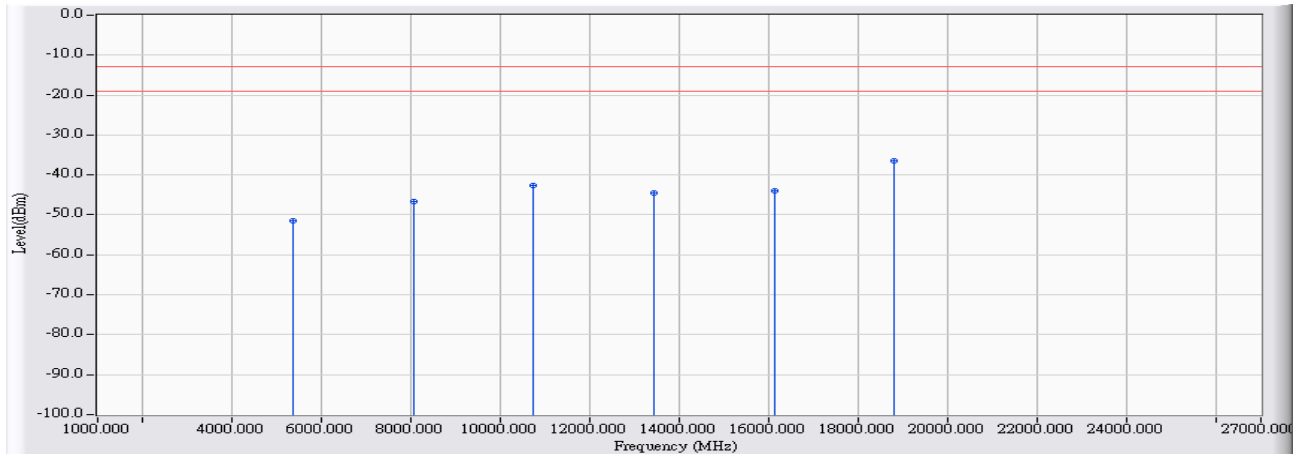


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5344.167	14.567	-66.870	-52.302	-39.302	-13.000	PEAK
2		8016.083	21.597	-68.590	-46.994	-33.994	-13.000	PEAK
3		10688.067	21.141	-64.160	-43.019	-30.019	-13.000	PEAK
4		13360.433	28.121	-70.340	-42.219	-29.219	-13.000	PEAK
5		16032.100	28.511	-71.460	-42.949	-29.949	-13.000	PEAK
6	*	18704.367	36.650	-73.360	-36.710	-23.710	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:22
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM(2687MHz)

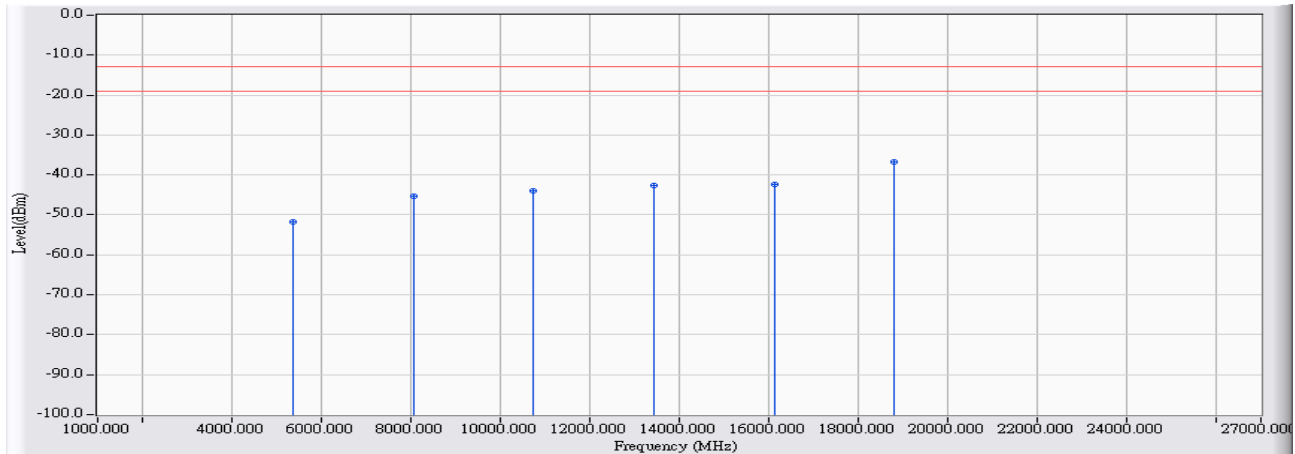


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5374.200	14.795	-66.150	-51.355	-38.355	-13.000	PEAK
2		8061.167	22.208	-68.990	-46.782	-33.782	-13.000	PEAK
3		10747.850	22.227	-64.880	-42.653	-29.653	-13.000	PEAK
4		13434.983	26.659	-71.110	-44.451	-31.451	-13.000	PEAK
5		16121.983	29.569	-73.650	-44.081	-31.081	-13.000	PEAK
6	*	18809.183	36.690	-73.040	-36.350	-23.350	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:19
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode1:16-QAM(2687MHz)

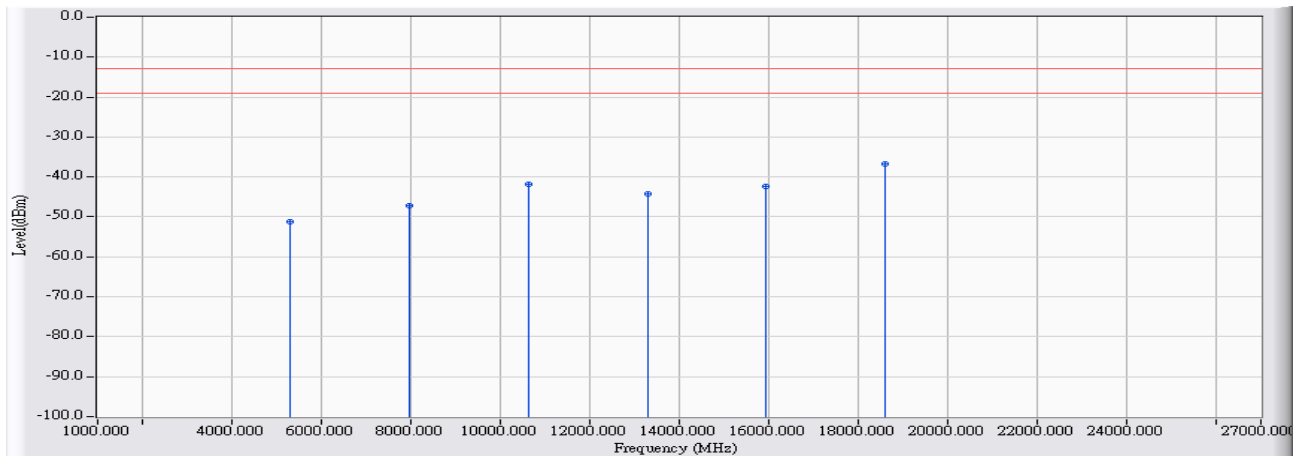


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5372.533	14.589	-66.420	-51.832	-38.832	-13.000	PEAK
2		8061.133	21.558	-67.000	-45.441	-32.441	-13.000	PEAK
3		10747.817	21.145	-65.020	-43.875	-30.875	-13.000	PEAK
4		13434.650	28.269	-71.010	-42.741	-29.741	-13.000	PEAK
5		16121.567	29.406	-71.670	-42.264	-29.264	-13.000	PEAK
6	*	18808.933	36.650	-73.510	-36.860	-23.860	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:01
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(2657MHz)

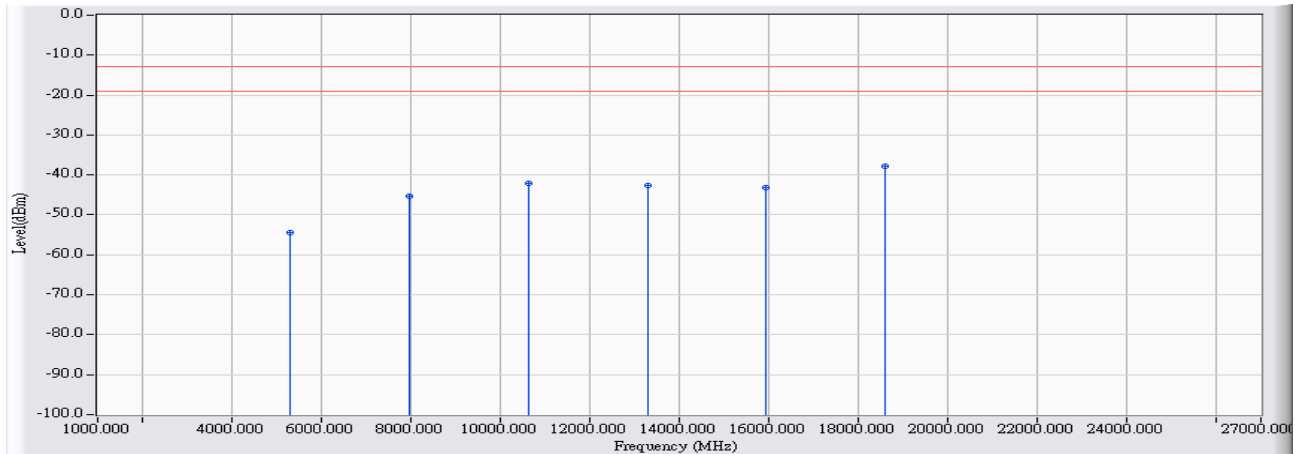


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5313.867	14.778	-66.070	-51.292	-38.292	-13.000	PEAK
2		7970.550	22.272	-69.500	-47.228	-34.228	-13.000	PEAK
3		10629.117	22.066	-63.930	-41.864	-28.864	-13.000	PEAK
4		13285.150	26.517	-70.670	-44.152	-31.152	-13.000	PEAK
5		15942.670	28.601	-70.890	-42.290	-29.290	-13.000	PEAK
6	*	18599.100	36.690	-73.300	-36.610	-23.610	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 19:57
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(2657MHz)

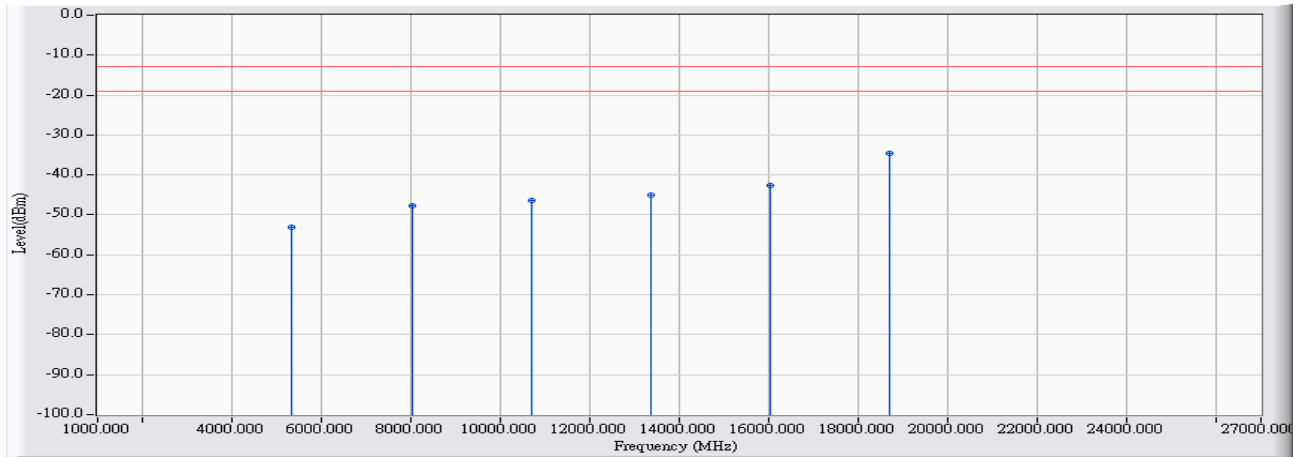


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5313.833	14.546	-68.850	-54.304	-41.304	-13.000	PEAK
2		7970.550	21.582	-67.020	-45.438	-32.438	-13.000	PEAK
3		10630.767	21.138	-63.310	-42.172	-29.172	-13.000	PEAK
4		13284.917	27.969	-70.470	-42.500	-29.500	-13.000	PEAK
5		15942.283	28.308	-71.400	-43.092	-30.092	-13.000	PEAK
6	*	18599.367	36.650	-74.500	-37.850	-24.850	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:15
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(2672MHz)

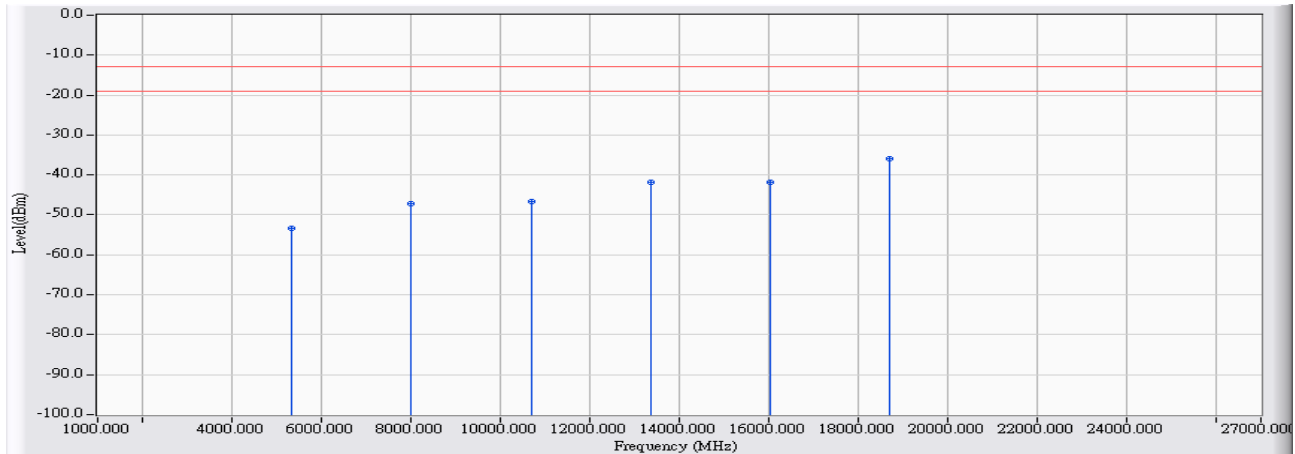


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5343.117	14.786	-67.910	-53.124	-40.124	-13.000	PEAK
2		8016.817	22.311	-69.960	-47.649	-34.649	-13.000	PEAK
3		10687.900	22.146	-68.480	-46.334	-33.334	-13.000	PEAK
4		13360.267	26.589	-71.570	-44.981	-31.981	-13.000	PEAK
5		16031.567	28.873	-71.510	-42.637	-29.637	-13.000	PEAK
6	*	18704.267	36.690	-71.380	-34.690	-21.690	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:12
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(2672MHz)

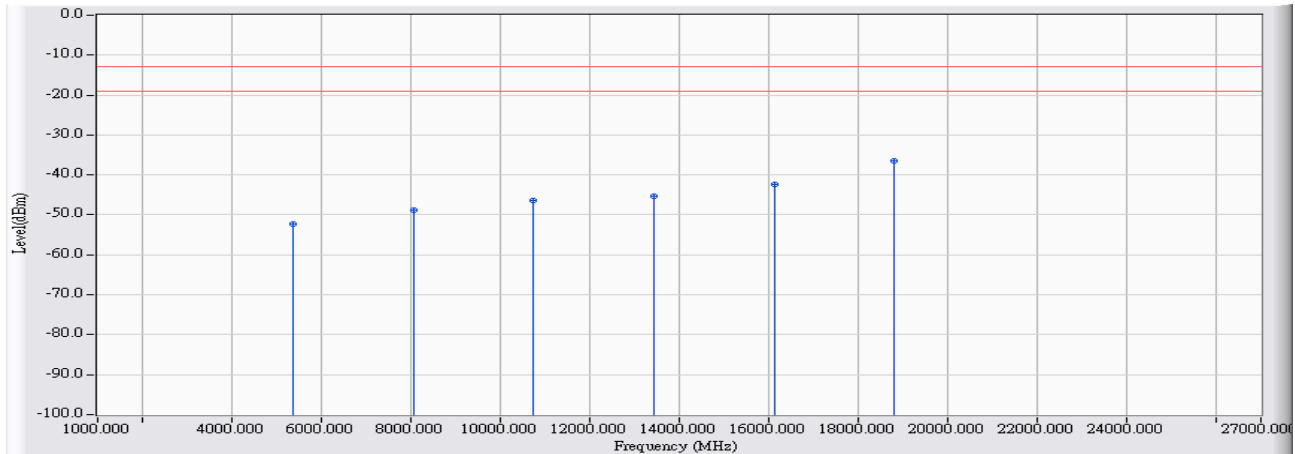


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5343.917	14.567	-67.820	-53.252	-40.252	-13.000	PEAK
2		8016.267	21.597	-68.690	-47.094	-34.094	-13.000	PEAK
3		10686.683	21.141	-67.910	-46.769	-33.769	-13.000	PEAK
4		13359.630	28.120	-70.050	-41.931	-28.931	-13.000	PEAK
5		16032.850	28.518	-70.210	-41.691	-28.691	-13.000	PEAK
6	*	18703.800	36.650	-72.600	-35.950	-22.950	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:28
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - HORIZONTAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(2687MHz)

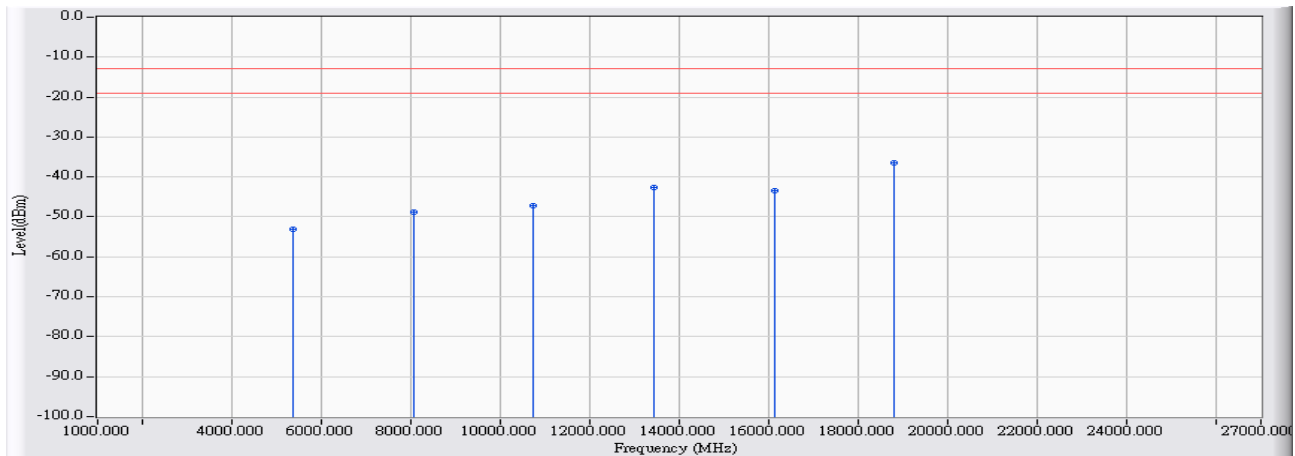


		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5374.233	14.796	-67.170	-52.375	-39.375	-13.000	PEAK
2		8060.850	22.208	-70.890	-48.681	-35.681	-13.000	PEAK
3		10748.167	22.227	-68.640	-46.413	-33.413	-13.000	PEAK
4		13435.167	26.659	-72.030	-45.371	-32.371	-13.000	PEAK
5		16122.067	29.570	-71.800	-42.230	-29.230	-13.000	PEAK
6	*	18809.183	36.690	-73.150	-36.460	-23.460	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

Site : CB1	Time : 2011/12/14 - 20:26
Limit : PART27/PLMN09(Fixed_station)_00M_PK	Margin : 6
Probe : CB1_FCC_Sub_1-18G-1-0901 - VERTICAL	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(2687MHz)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBm)	Measure Level (dBm)	Margin (dB)	Limit (dBm)	Detector Type
1		5374.583	14.590	-67.770	-53.180	-40.180	-13.000	PEAK
2		8061.033	21.558	-70.250	-48.691	-35.691	-13.000	PEAK
3		10748.267	21.145	-68.300	-47.155	-34.155	-13.000	PEAK
4		13435.267	28.271	-70.850	-42.579	-29.579	-13.000	PEAK
5		16122.233	29.412	-72.880	-43.468	-30.468	-13.000	PEAK
6	*	18808.467	36.650	-73.140	-36.490	-23.490	-13.000	PEAK

Note:

1. All readings above 1GHz are performed with peak and/or average measurements as necessary.
2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
4. " * ", means this data is the worst emission level.
5. Measurement Level = Reading Level + Correct Factor.
6. The average measurement was not performed when the peak measured data under the limit of average detection.
7. The Emission above 18GHz were not included is because their levels are too low.

7. Frequency Stability Over Temperatures Variation

7.1. Test Equipment

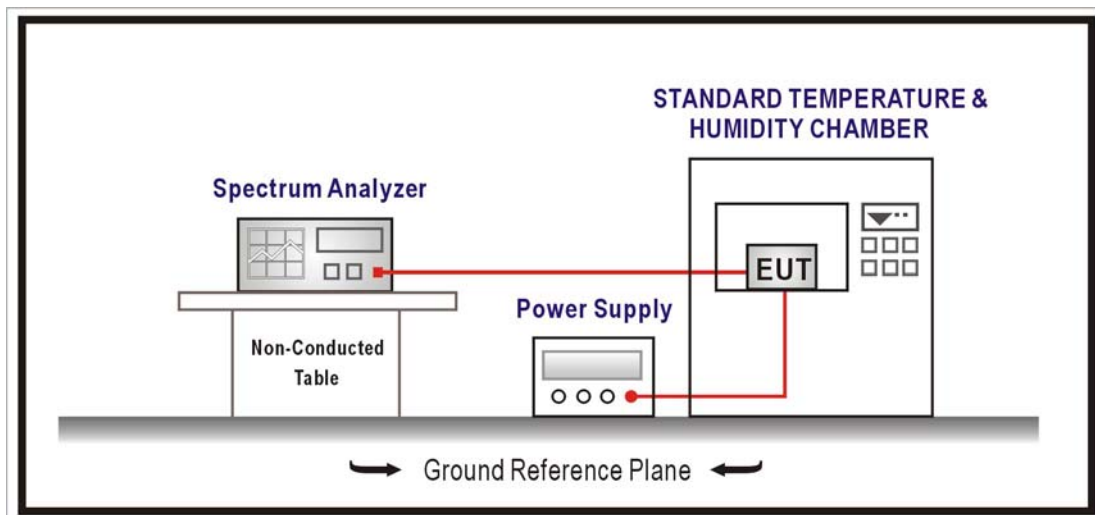
The following test equipments are used during the test:

Frequency Stability Over Temperatures Variation/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2012/01/16
Standard Temperature & Humidity Chamber	WIT	TH-1S-B	1082101	2012/01/30

Note: 1. All equipments that need to calibrate are with calibration period of 1 year.

7.2. Test Setup



7.3. Limits

The frequency stability shall be measured with variation of ambient temperature as follows: From -30° to +50° centigrade for all equipment. Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° centigrade through the range.

7.4. Test Procedure

Power must be turned off when changing from one temperature to another. Power warm up is at least 15 min and power applied should perform before recording frequency error. The temperature range step is 10 degrees in this test items. All temperature levels shall be holding 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.

7.5. Uncertainty

The measurement uncertainty is defined as $\pm 100\text{KHz}$

7.6. Test Result

Product	MMDS TRANSCEIVER		
Test Item	Frequency Stability Over Temperatures Variation		
Test Mode	Carrier Signal		
Date of Test	2011/12/14	Test Site	SR7

Carrier Signal		
2657MHz		
Frequency Error Over Temperatures		
Temp. (°C)	Frequency (MHz)	Frequency Error (ppm)
50	2686.9971	-1.079
40	2686.9971	-1.079
30	2686.9970	-1.116
25	2686.9970	-1.116
20	2686.9970	-1.116
10	2686.9971	-1.079
0	2686.9971	-1.079
-10	2686.9972	-1.042
-20	2686.9970	-1.116

2672MHz		
Frequency Error Over Temperatures		
Temp. (°C)	Frequency (MHz)	Frequency Error (ppm)
50	2671.9972	-1.048
40	2671.9972	-1.048
30	2671.9972	-1.048
25	2671.9970	-1.123
20	2671.9970	-1.123
10	2671.9970	-1.123
0	2671.9971	-1.085
-10	2671.9971	-1.085
-20	2671.9972	-1.048

2687MHz		
Frequency Error Over Temperatures		
Temp. (°C)	Frequency (MHz)	Frequency Error (ppm)
50	2656.9971	-1.091
40	2656.9970	-1.129
30	2656.9971	-1.091
25	2656.9970	-1.129
20	2656.9970	-1.129
10	2656.9970	-1.129
0	2656.9971	-1.091
-10	2656.9971	-1.091
-20	2656.9971	-1.091

8. Frequency Stability Over Voltage Variation

8.1. Test Equipment

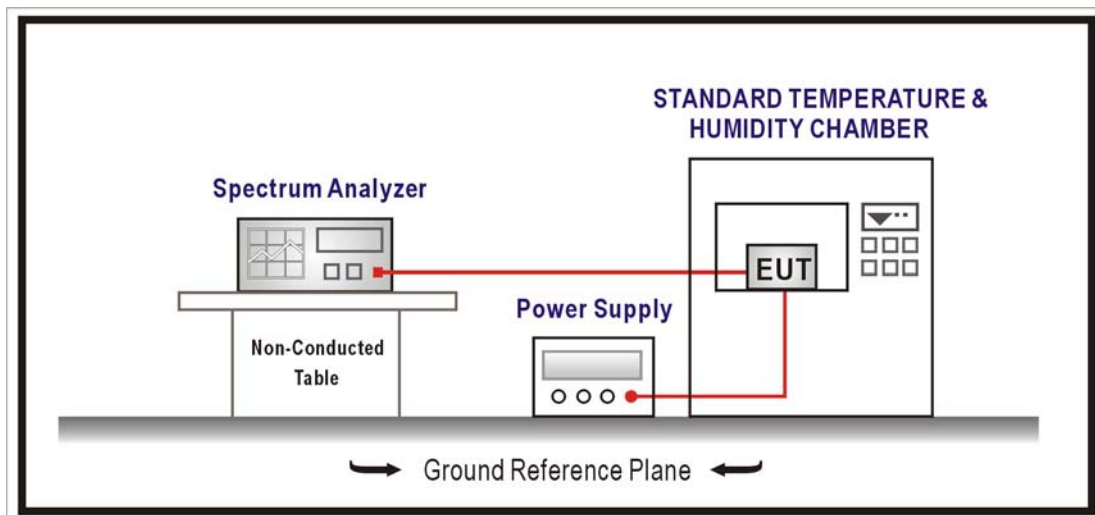
The following test equipments are used during the test:

Frequency Stability Over Temperatures Variation/ SR7

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
Spectrum Analyzer	R&S	FSP	100561	2012/01/16
Standard Temperature & Humidity Chamber	WIT	TH-1S-B	1082101	2012/01/30

Note: 1. all equipments that need to calibrate are with calibration period of 1 year.

8.2. Test Setup



8.3. Limits

The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

8.4. Test Procedure

Power must be removed when changing from one voltage to another voltage. 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 various Volts set from the minimum 4.5 Volts to 5.5 Volts. Each step shall be record the frequency error rate.

8.5. Uncertainty

The measurement uncertainty is defined as $\pm 100\text{KHz}$.

8.6. Test Result

Product	MMDS TRANSCEIVER		
Test Item	Frequency Stability Over Voltage Variation		
Test Mode	Carrier Signal		
Date of Test	2011/12/14	Test Site	No.7 Shielding Room

Carrier Signal		
2657MHz		
Frequency Error Over Voltage		
Voltage	Frequency (MHz)	Frequency Error (ppm)
138	2656.9970	-1.129
120	2656.9970	-1.129
102	2656.9970	-1.129

2672MHz		
Frequency Error Over Voltage		
Voltage	Frequency (MHz)	Frequency Error (ppm)
138	2671.9970	-1.123
120	2671.9970	-1.123
102	2671.9970	-1.123

2687MHz		
Frequency Error Over Voltage		
Voltage	Frequency (MHz)	Frequency Error (ppm)
138	2686.9960	-1.489
120	2686.9970	-1.116
102	2686.9970	-1.116

9. AC Conducted Emission

9.1. Test Equipment

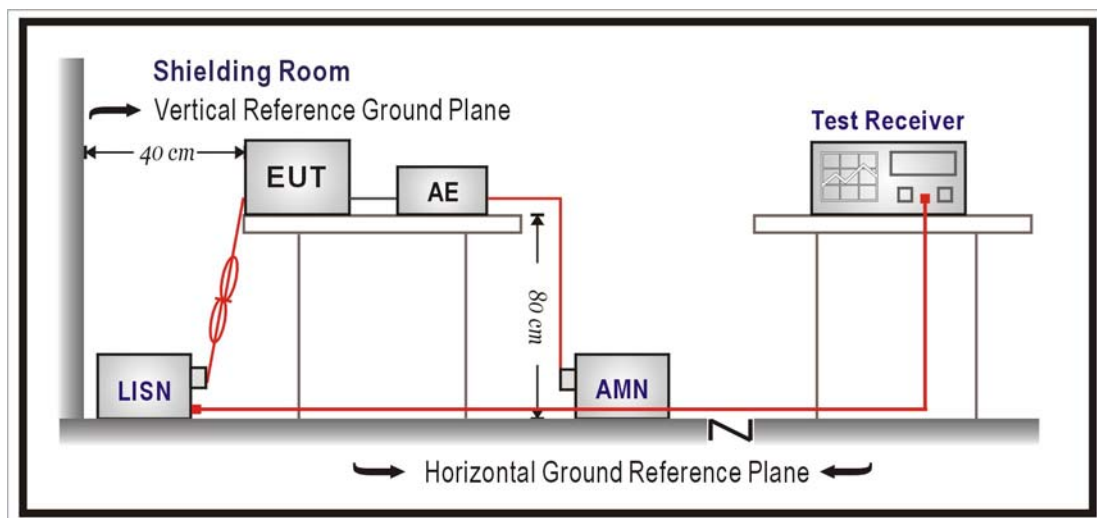
The following test equipments are used during the test:

Conducted Emission / SR3

Instrument	Manufacturer	Model No.	Serial No	Next Cal. Date
LISN	R&S	ENV216	100096	2012/09/06
LISN	R&S	ESH3-Z5	836679/022	2012/02/10
Test Receiver	R&S	ESCS 30	825442/017	2012/01/16

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

9.2. Test Setup



9.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

9.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2009 on conducted measurement.

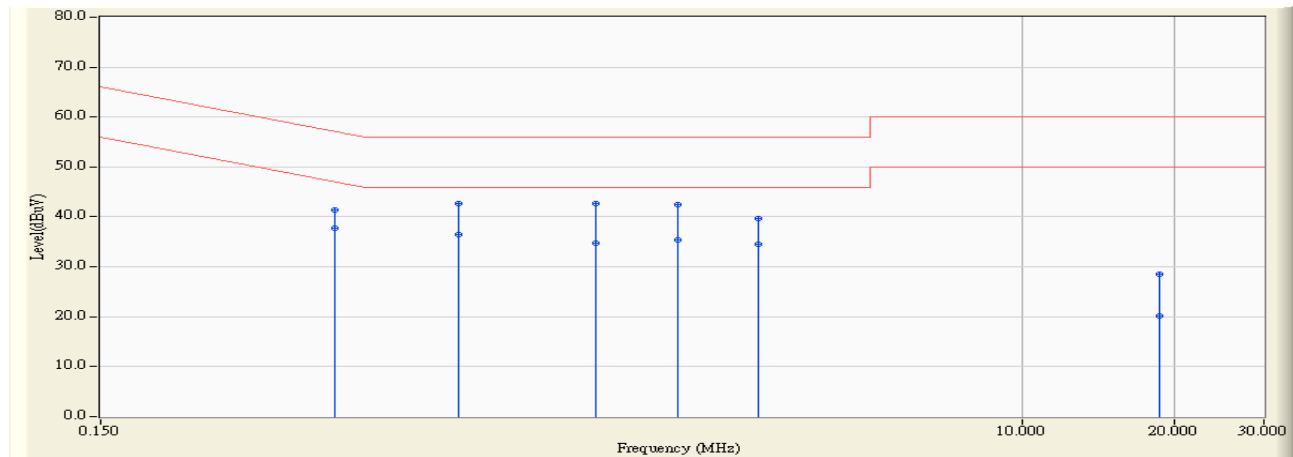
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

9.5. Uncertainty

The measurement uncertainty is defined as ± 2.26 dB

9.6. Test Result

Site : SR3	Time : 2011/12/13 - 11:24
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR3_LISN(16A)-1_0907 - Line1	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(Transmit)

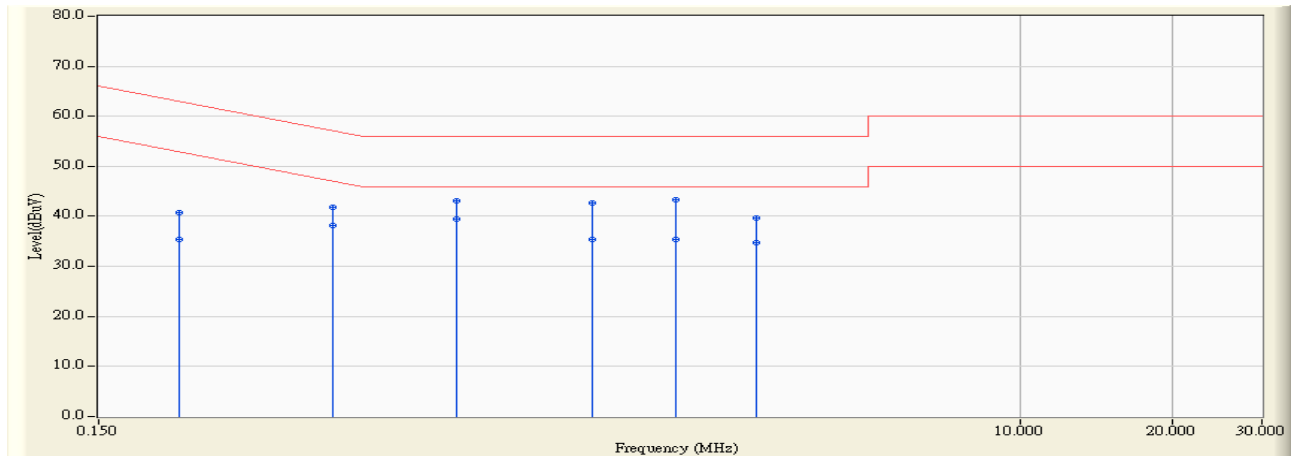


	Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1	0.435	9.692	31.760	41.451	-15.703	57.154	QUASIPeAK
2	0.435	9.692	27.960	37.651	-9.503	47.154	AVERAGE
3	0.763	9.743	32.840	42.583	-13.417	56.000	QUASIPeAK
4	*	9.743	26.810	36.553	-9.447	46.000	AVERAGE
5	1.427	9.844	32.750	42.594	-13.406	56.000	QUASIPeAK
6	1.427	9.844	25.000	34.844	-11.156	46.000	AVERAGE
7	2.072	9.933	32.510	42.443	-13.557	56.000	QUASIPeAK
8	2.072	9.933	25.360	35.293	-10.707	46.000	AVERAGE
9	3.009	9.972	29.660	39.632	-16.368	56.000	QUASIPeAK
10	3.009	9.972	24.540	34.512	-11.488	46.000	AVERAGE
11	18.627	10.289	18.180	28.469	-31.531	60.000	QUASIPeAK
12	18.627	10.289	9.840	20.129	-29.871	50.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Site : SR3	Time : 2011/12/13 - 11:27
Limit : CISPR_B_00M_QP	Margin : 10
Probe : SR3_LISN(16A)-1_0907 - Line2	Power : AC 120V/60Hz
EUT : MMDS TRANSCEIVER	Note : Mode5:16-QAM(Transmit)



		Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV)	Margin (dB)	Limit (dBuV)	Detector Type
1		0.216	9.669	31.000	40.669	-22.286	62.956	QUASIPeAK
2		0.216	9.669	25.630	35.299	-17.656	52.956	AVERAGE
3		0.435	9.701	32.120	41.821	-15.333	57.154	QUASIPeAK
4		0.435	9.701	28.370	38.071	-9.083	47.154	AVERAGE
5		0.767	9.747	33.380	43.127	-12.873	56.000	QUASIPeAK
6	*	0.767	9.747	29.640	39.387	-6.613	46.000	AVERAGE
7		1.420	9.843	32.750	42.593	-13.407	56.000	QUASIPeAK
8		1.420	9.843	25.440	35.283	-10.717	46.000	AVERAGE
9		2.076	9.934	33.370	43.304	-12.696	56.000	QUASIPeAK
10		2.076	9.934	25.490	35.424	-10.576	46.000	AVERAGE
11		3.009	9.982	29.680	39.662	-16.338	56.000	QUASIPeAK
12		3.009	9.982	24.670	34.652	-11.348	46.000	AVERAGE

Note:

1. All Reading Levels are Quasi-Peak and average value.
2. " * ", means this data is the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.