TEST REPORT
FROM
RFI GLOBAL SERVICES LTD

Test of: Motorola WIBB
PTP25600

To: FCC Part 27: 2006

Test Report Serial No:
RFI/RPTE2/RP49146JD01A

Supersedes Test Report Serial No:
RFI/RPTE1/RP49146JD01A

This Test Report Is Issued Under The Authority Of Michael Derby , Radio Performance Service Leader: 	
Tested By: Ian Watch 	**Checked By: Michael Derby** 
Report Copy No: PDF01	
Issue Date: 27 June 2007	**Test Dates: 09 May 2007 to 31 May 2007**

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1. Client Information

Company Name:	Motorola Point to Point Fixed Wireless Solutions Group
Address:	Unit A1 Linhay Business Park Eastern Road Ashburton Devon TQ13 7UP UK
Contact Name:	Mr C Fisher

2. Equipment Under Test (EUT)

The following information has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Description:	Motorola 2.5 GHz Backhaul
Brand Name:	WIBB PTP25600
Model Name or Number:	PTP25600 ODU
Serial Number:	80:1E:70
Hardware Version Number:	Version 2
Software Version Number:	05
FCC ID (if applicable):	QWP25600
Country of Manufacturer:	UK
Date of Receipt:	09 May 2007

Description:	Network Card/Power Supply Unit
Brand Name:	Motorola PIDU Plus
Model Name or Number:	PTP600 Series
Serial Number:	0652503182
Hardware Version Number:	01
Software Version Number:	None stated
FCC ID (if applicable):	Not applicable
Country of Manufacturer:	China
Date of Receipt:	09 May 2007

Description:	Motorola 2.5 GHz Backhaul
Brand Name:	WIBB PTP25600
Model Name or Number:	TDD Synch Unit
Serial Number:	#2
Hardware Version Number:	1
Software Version Number:	None stated
FCC ID (if applicable):	Not applicable
Country of Manufacturer:	USA
Date of Receipt:	09 May 2007

2.2. Description Of EUT

The EUT was a Point to Point wireless Ethernet bridge, operating in the 2495 MHz to 2690 MHz frequency band with TDD Synch Unit containing GPS module and power supply.

The system operates with 5 MHz, 10 MHz and 15 MHz nominal channel bandwidths.
The channel widths allowed under Part 27 are 5.5 MHz and 6 MHz, depending on the sub-band used.
For the purpose of these tests, the 5 MHz channel bandwidth signal is used to represent both of these channels.
FCC Part 27 Regulations also allow the concatenation of 2 or 3 channels. The 10 MHz and 15 MHz channel bandwidth signals are used when the channels are concatenated.

The EUT can be used for Broadband Radio Service (BRS) or Educational Broadband Service (EBS), as defined in FCC Part 27.4.

2.3. Modifications Incorporated In EUT

The client has lowered the maximum power on the top channel only, in order to comply with the conducted emission at the band edge.

Please refer to Appendix 3 for further details on the modifications made, as declared by Motorola.

2.4. Additional Information Related To Testing

Power Supply Requirement:	110V 60 Hz, AC Mains Supply		
Intended Operating Environment:	Outdoor use, commercial environment		
Equipment Category:	2.5 GHz Backhaul Transceiver, fixed installation		
Type of Unit:	Base station, fixed location		
Weight:	<10 kg		
Dimensions:	305mm x 305mm x 80mm		
Interface Ports:	RJ45		
Transmit Frequency Range:	2499.25 MHz to 2687.25 MHz		
Transmit Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
5 MHz channel spacing:	Low	Band A	2499.25
	Mid	Band B	2593.00
	High	Band C	2687.25
Transmit Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
10 MHz channel spacing:	Low	Band A	2502.00
	Mid	Band B	2590.00
	High	Band C	2684.50
Transmit Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
15 MHz channel spacing:	Low	Band A	2504.75
	Mid	Band B	2593.00
	High	Band C	2681.75

Additional Information Related To Testing (Continued)

Receive Frequency Range	2499.25 MHz to 2687.25 MHz		
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
5 MHz channel spacing:	Bottom	Band A	2499.25
	Middle	Band B	2593.00
	Top	Band C	2687.25
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
10 MHz channel spacing:	Bottom	Band A	2502.00
	Middle	Band B	2590.00
	Top	Band C	2684.50
Receive Channels Tested:	**Channel ID**	**Channel Number**	**Channel Frequency (MHz)**
15 MHz channel spacing:	Bottom	Band A	2504.75
	Middle	Band B	2593.00
	Top	Band C	2681.75
Highest Fundamental Frequency	2687.75 MHz		
Highest Oscillator Frequency	4239.0 MHz		
Maximum Conducted Output Power: (excluding top channel*)	25.2 dBm		
Maximum Conducted Output Power: (Top channel, 5 MHz)	20.5 dBm		
Maximum Conducted Output Power: (Top channel, 10 MHz)	20.5 dBm		
Maximum Conducted Output Power: (Top channel, 15 MHz)	20.9 dBm		

* *As detailed in Appendix 3 of this report, the top channel was set to a lower power level.*

2.5. Support Equipment Details

Description:	Motorola 2.5 GHz Backhaul
Brand Name:	WIBB PTP25600
Model Name or Number:	PTP25600 ODU
Serial Number:	80:1E:65
Cable Length & Type:	0.5m, Coax
Connected to Port:	Antenna ports

Description:	Motorola
Brand Name:	PIDU Plus
Model Name or Number:	PTP600 Series
Serial Number:	0652503042
Cable Length & Type:	3m, Ethernet
Connected to Port:	Support WIBB PTP25600

Description:	RFI Laptop PC
Brand Name:	Dell
Model Name or Number:	Latitude D610
Serial Number:	PC370NT
Cable Length & Type:	3m, RJ45
Connected to Port:	Ethernet Port

2.6. Interface Ports on EUT

Port	Description	Type / Length	Applicability
1	Power supply	RJ45 / 1 meter	Yes
2	Ethernet	RJ45 / 1 meter	Yes
3	Antenna H	N type RF	Yes
4	Antenna V	N type RF	Yes

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 27: 2006: Sections 27.50, 27.53 and 27.54
Title:	Code of Federal Regulations, Part 27 (47CFR) Subpart C Miscellaneous Wireless Communications Services
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

Reference:	FCC Part 15: 2006 Class B, Sections: 15.107 and 15.109
Title:	Code of Federal Regulations, Part 15 (47CFR) Radio Frequency Devices: Digital Devices.
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI/TIA-603-B-2003
Land Mobile Communications Equipment, Measurements and performance Standards.

ANSI C63.2 (1996)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)
Title: American National Standard for Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1998)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)
Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1 (1999)
Title: Specification for radio disturbance and immunity measuring apparatus and methods. Part 1. Radio disturbance and immunity measuring apparatus.

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

There were no deviations from the test specification.

5. Operation Of The EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes:

Transmitter Modes:

Conducted and Radiated EMC tests, FCC part 15
– Acquisition Mode, operating frequency 2596 MHz, 10 MHz Channel.

Conducted Antenna port tests, FCC part 27
– Link established, 5 MHz, 10 MHz and 15 MHz channel widths.
– Modulation type 256QAM0.81, chosen by Motorola as it was deemed to be worst case.
– Conducted Spurious Emissions reported at the highest power setting, 10 MHz channel.

The EUT and slave units were controlled and monitored by a laptop PC, connected to the Ethernet port.

Receiver Modes:

The receiver was not tested as the unit operates continuously in duplex mode, as declared by Motorola.

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

Radiated emissions – the EUT was mounted on a metallic pole, supplied by Motorola, with the TDD Sync box and PIDU adjacent to the ODU.
The metallic pole was declared by Motorola to be a typical mounting configuration.

Conducted emissions – the EUT and slave unit RF ports were connected through RF cables and attenuators supplied by Motorola. The slave unit was connected through the Vertical and Horizontal RF ports using suitable attenuation, with a link established. Connection from the EUT to RFI's measurement equipment was though an RF splitter on one of the RF ports, allowing measurements to be made with a link maintained.

The TDD Synch Unit containing GPS module and power supply were positioned close to the EUT and connected for the duration of the tests, as per Motorola's instructions.

6. Summary Of Test Results

Transmit Mode

Range Of Measurements	Specification Reference	Port Type	Compliancy Status
AC Conducted Spurious Emissions (150 kHz to 30 MHz)	CFR 47: 2006 FCC Part 15 Section 15.107	AC Mains	Complied
Transmitter Carrier Output Power and EIRP	CFR 47: 2006 FCC Part 2.1046, Part 27.50	Antenna Terminals	Complied
Frequency Stability (Temperature Variation)	CFR 47: 2006 FCC Part 2.1055, Part 27.54	Antenna Terminals	Complied
Frequency Stability (Voltage Variation)	CFR 47: 2006 FCC Part 2.1055, Part 27.54	Antenna Terminals	Complied
Occupied Bandwidth	CFR 47: 2006 FCC Part 2.1049	Antenna Terminals	Complied
Conducted Emissions	CFR 47: 2006 FCC Part 2.1051, Part 27.53	Antenna Terminals	Complied
Conducted Emissions Band Edge	CFR 47: 2006 FCC Part 2.1051, Part 27.53	Antenna Terminals	Complied
Radiated Spurious Emissions	CFR 47: 2006 FCC Part 2.1051, Part 27.53	Enclosure	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, UK.

FCC Site Registration Number: 90895

IC Site Registration Number: 3485

7. Measurements, Examinations And Derived Results

7.1. General Comments

This section contains test results only. Details of the test methods and procedures can be found in Appendix 2 of this report.

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 8 for details of measurement uncertainties.

The power has been reduced on the top channel in order for the EUT to comply with the upper Band Edge conducted power limits. The power will be controlled by the manufacturer as described in Appendix 3.

7.2. Receive AC Conducted Spurious Emissions

The EUT was configured for AC conducted emissions measurements, as described in Appendix 2 of this report.

Tests were performed to identify the maximum emissions levels on the AC mains line of the EUT.

Results:

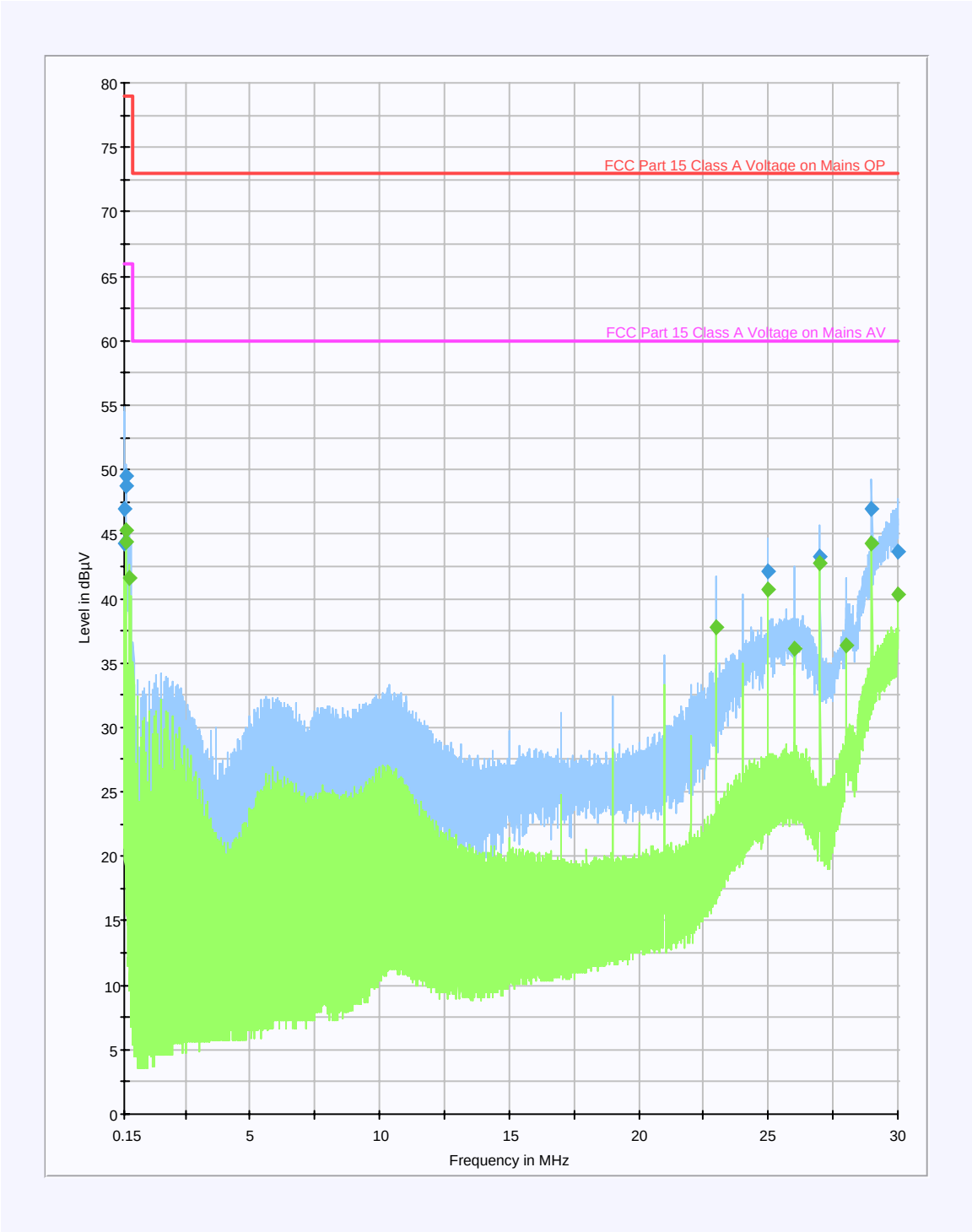
Quasi-Peak Detector Measurements on Live And Neutral Lines

Frequency (MHz)	Line	Q-P Level (dBμV)	Q-P Limit (dBμV)	Margin (dB)	Result
0.150000	Neutral	46.9	79.0	32.1	Complied
0.174000	Live	44.3	79.0	34.7	Complied
0.222000	Live	48.7	79.0	30.3	Complied
0.226000	Live	49.4	79.0	29.6	Complied
25.002000	Neutral	42.1	73.0	30.9	Complied
27.002000	Neutral	43.3	73.0	29.7	Complied
29.002000	Live	47.0	73.0	26.0	Complied
29.998000	Neutral	43.6	73.0	29.4	Complied

Average Detector Measurements on Live And Neutral Lines

Frequency (MHz)	Line	Av Level (dBμV)	Av. Limit (dBμV)	Margin (dB)	Result
0.222000	Live	44.4	66.0	21.6	Complied
0.226000	Live	45.2	66.0	20.8	Complied
0.334000	Live	41.6	66.0	24.4	Complied
23.002000	Live	37.7	60.0	22.3	Complied
25.002000	Neutral	40.7	60.0	19.3	Complied
26.002000	Neutral	36.1	60.0	23.9	Complied
27.002000	Live	42.7	60.0	17.3	Complied
28.002000	Neutral	36.4	60.0	23.6	Complied
29.002000	Live	44.2	60.0	15.8	Complied
30.000000	Live	40.3	60.0	19.7	Complied

Receive AC Conducted Spurious Emissions (Continued)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

7.3. Transmitter Carrier Output Power and Equivalent Isotropic Radiated Power (EIRP)

The EUT was configured as for conducted RF output power as described in Appendix 2 of this report.

The equivalent isotropic radiated power (EIRP) was calculated by adding the Client's declared antenna gain to the figure measured for conducted RF output power.

5 MHz Channel Width

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (dBW)	Limit EIRP (dBW)	Margin (dB)	Result
Bottom	2499.25	29.0	18.0	47.0	17.0	44.9	27.9	Complied
Middle	2593.00	30.1	18.0	48.1	18.1	44.5	26.4	Complied
Top	2687.25	25.5	18.0	43.5	13.5	44.7	31.2	Complied

10 MHz Channel Width

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (dBW)	Limit EIRP (dBW)	Margin (dB)	Result
Bottom	2502.00	30.2	18.0	48.2	18.2	47.7	29.5	Complied
Middle	2590.00	29.0	18.0	47.0	17.0	47.4	30.4	Complied
Top	2684.50	25.5	18.0	43.5	13.5	47.8	34.3	Complied

15 MHz Channel Width

Channel	Frequency (MHz)	Conducted RF O/P Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	EIRP (dBW)	Limit EIRP (dBW)	Margin (dB)	Result
Bottom	2504.75	29.0	18.0	47.0	17.0	49.5	32.5	Complied
Middle	2593.00	28.3	18.0	46.3	16.3	49.0	32.8	Complied
Top	2681.75	25.9	18.0	43.9	13.9	49.5	35.6	Complied

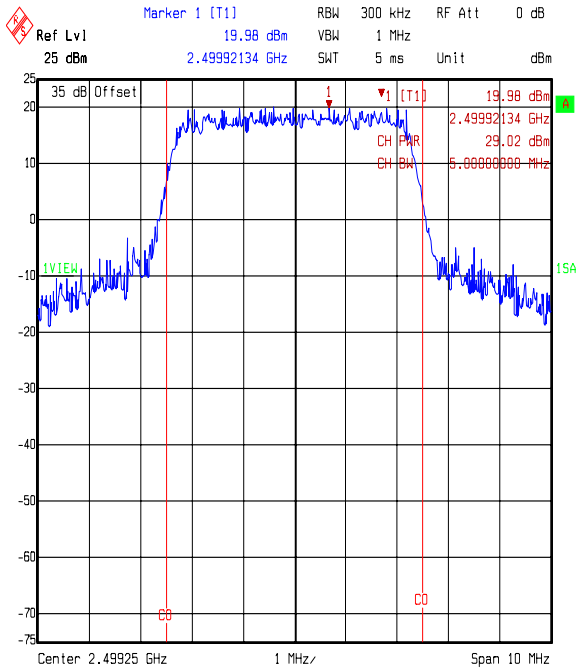
Note(s):

1. *The limit is calculated as: 33 + 10 log (Occupied Bandwidth / Y) + 10 log (360 / Beamwidth) dBW. (where Y is 6 MHz for channels in the MBS, and 5.5 MHz for channels in the LBS and UBS)*
2. *Declared antenna gain is +18 dBi.*
3. *Declared antenna beamwidth is 20 degrees.*
4. *Occupied Bandwidth taken from the measured values, shown in Section 7.6 of this report.*

Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**

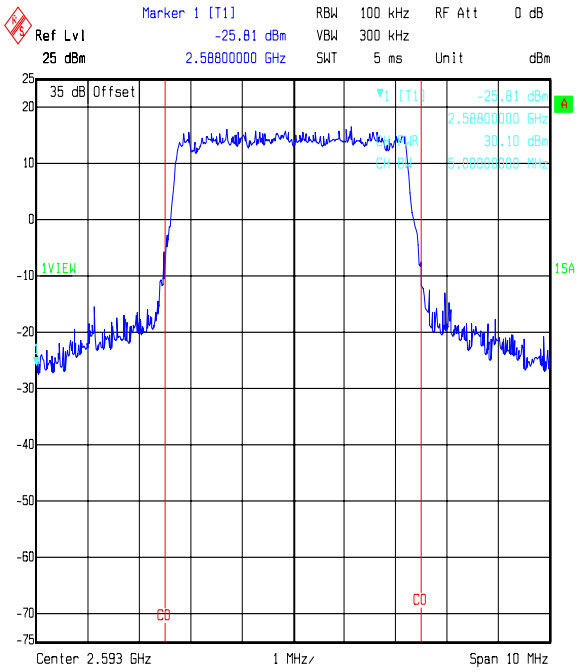
Transmitter Output Power and EIRP Limitations (Continued) - 5 MHz Channel Width

Bottom Channel



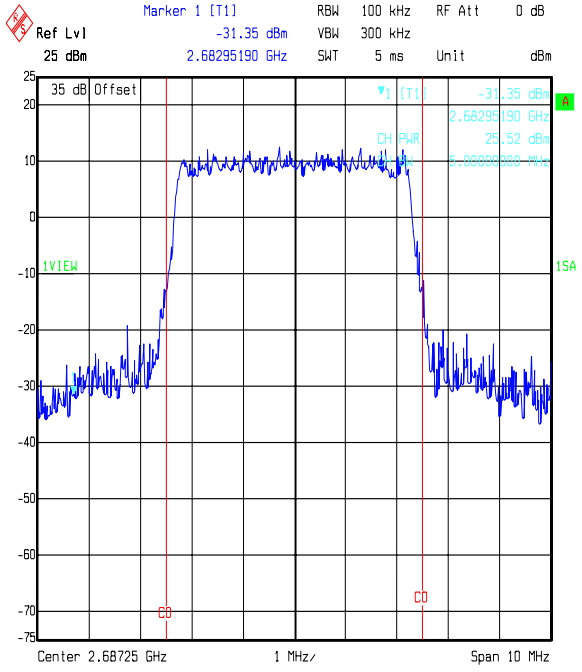
Title: 49146JD01
Comment A: FCC PART 27 5 MHZ CHANNEL POWER BOTTOM CHANNEL
Date: 17.MAY 2007 13:34:52

Middle Channel



Title: 49146JD01
Comment A: FCC PART 27 5 MHZ CHANNEL CENTRE CHANNEL
Date: 31.MAY 2007 14:37:06

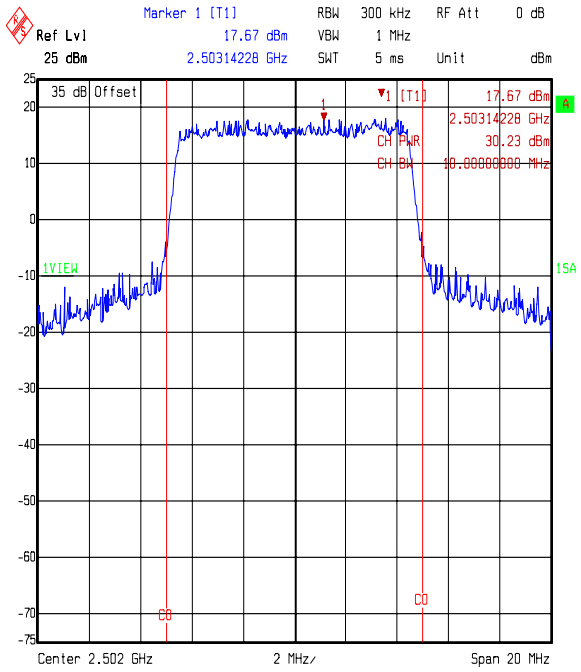
Top Channel



Title: 49146JD01
Comment A: FCC PART 27 5 MHZ CHANNEL POWER TOP CHANNEL
Date: 31.MAY 2007 14:03:08

Transmitter Output Power and EIRP Limitations (Continued) - 10 MHz Channel Width

Bottom Channel



Title: 49146JD01
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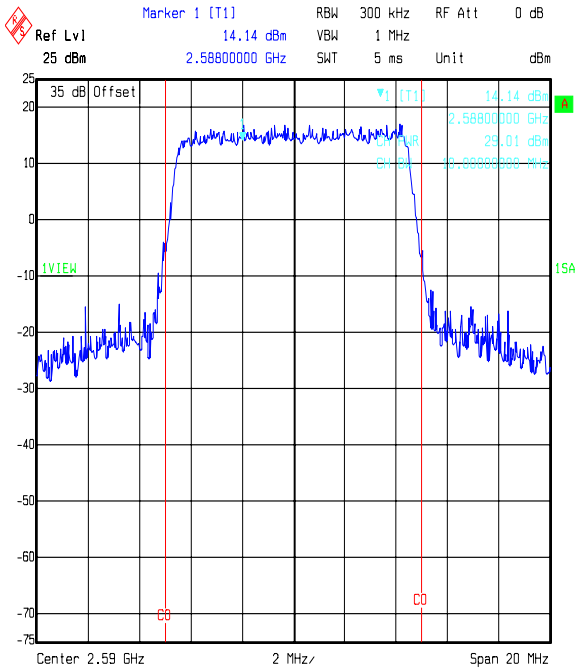
Date: 17.MAY 2007 13:28:06

Middle Channel



Title: 49146JD01
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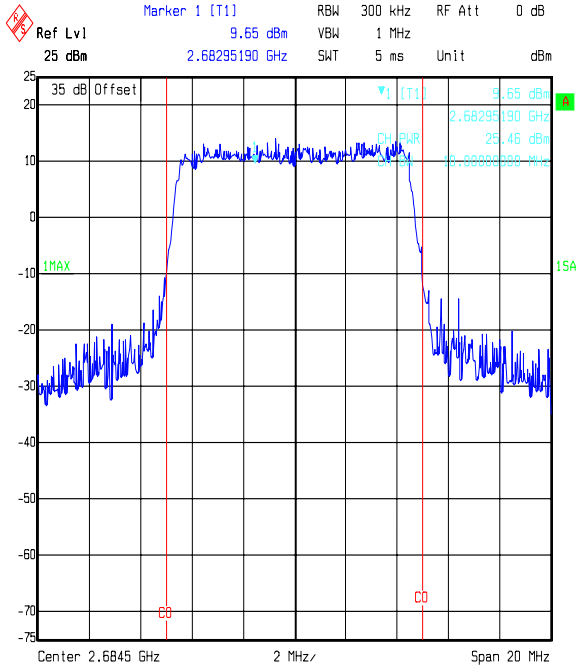
Date: 31.MAY 2007 14:47:39

Top Channel

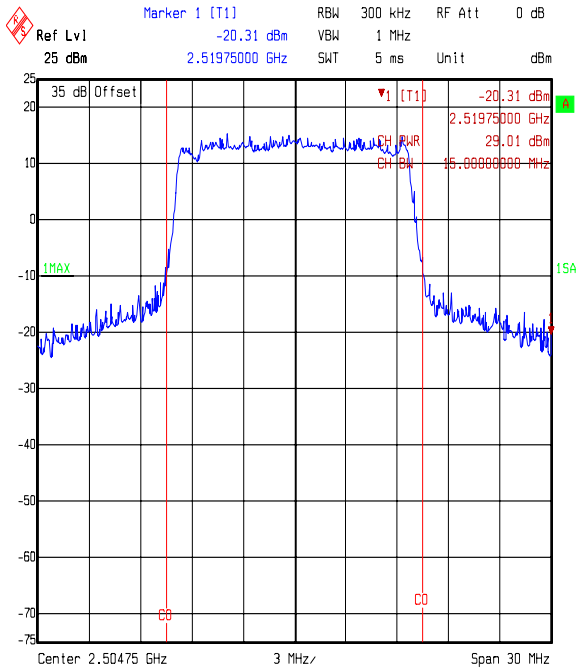


Title: 49146JD01
Comment A: FCC PART 27 10 MHZ CHANNEL POWER TOP CHANNEL
Date: 31.MAY 2007 13:57:21

Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**

Transmitter Output Power and EIRP Limitations (Continued) - 15 MHz Channel Width

Bottom Channel



Title: 49146JD01
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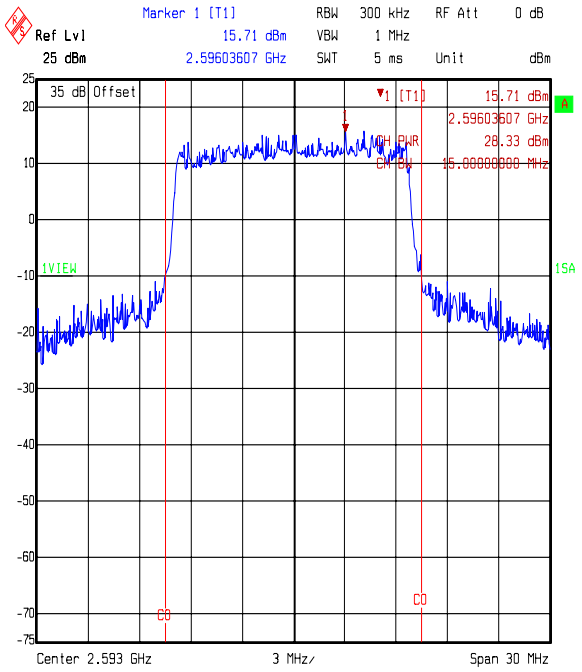
Date: 17.MAY 2007 12:52:54

Middle Channel



Title: 49146JD01
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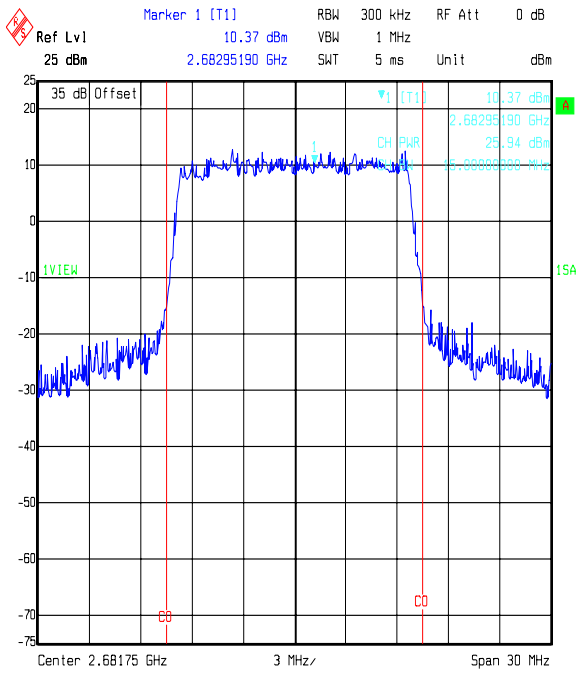
Date: 17.MAY 2007 12:27:59

Top Channel



Title: 49146JD01
Comment A: FCC PART 27 15 MHZ CHANNEL POWER TOP CHANNEL
Date: 31.MAY 2007 13:51:19

7.4. Transmitter Frequency Stability: (Temperature Variation)

The EUT was configured for frequency stability measurements, as described in Appendix 2 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in ambient temperature.

Results:

5 MHz Bandwidth, Bottom Channel (2499.25 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2499.219941	-30.06
-20	2499.219941	-30.06
-10	2499.229960	-20.04
0	2499.239980	-10.02
+10	2499.219940	-30.06
+20	2499.219940	-30.06
+30	2499.219994	-30.01
+40	2499.223950	-26.05
+50	2499.213928	-36.07

5 MHz Bandwidth, Middle Channel (2593.00 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2592.969940	-30.06
-20	2592.979960	-20.04
-10	2592.979960	-20.04
0	2592.959920	-40.08
+10	2592.979960	-20.04
+20	2592.979960	-20.04
+30	2592.954910	-45.09
+40	2592.960922	-39.08
+50	2592.959920	-40.08

Transmitter Frequency Stability: (Temperature Variation) (Continued)

5 MHz Bandwidth, Top Channel (2687.25 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2687.219940	-30.06
-20	2687.219941	-30.06
-10	2687.219940	-30.06
0	2687.229960	-20.04
+10	2687.219940	-30.06
+20	2687.229060	-20.04
+30	2687.234970	-15.03
+40	2687.219941	-30.06
+50	2687.209921	-40.08

10 MHz Bandwidth, Bottom Channel (2502.00 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2501.979960	- 20.04
-20	2501.959920	-40.08
-10	2501.979960	-20.04
0	2501.979960	-20.04
+10	2502.000000	0.00
+20	2502.000000	0.00
+30	2501.969930	-30.07
+40	2501.979959	-20.04
+50	2501.959920	-40.08

Transmitter Frequency Stability: (Temperature Variation) (Continued)

10 MHz Bandwidth, Middle Channel (2590.00 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2589.979960	-20.04
-20	2589.959920	-40.08
-10	2589.979960	-20.04
0	2589.979960	-20.04
+10	2590.020040	20.04
+20	2590.000000	0.00
+30	2589.984970	3.26
+40	2589.988978	-11.02
+50	2589.979961	-20.04

10 MHz Bandwidth, Top Channel (2684.50 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2684.480962	-19.04
-20	2684.479960	-20.04
-10	2684.479960	-20.04
0	2684.500000	0.00
+10	2684.479960	-20.04
+20	2684.479960	-20.04
+30	2684.492236	-7.76
+40	2684.479959	-20.04
+50	2684.459920	-40.08

Transmitter Frequency Stability: (Temperature Variation) (Continued)

15 MHz Bandwidth, Bottom Channel (2504.75 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2504.729960	-20.04
-20	2504.729960	-20.04
-10	2504.709920	-40.08
0	2504.729960	-20.04
+10	2504.729960	-20.04
+20	2504.749958	-0.04
+30	2504.735000	-14.78
+40	2504.709922	-40.08
+50	2504.709920	-40.08

15 MHz Bandwidth, Middle Channel (2593.00 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2592.979962	-20.04
-20	2592.979960	-20.04
-10	2592.979960	-20.04
0	2593.000000	0.00
+10	2593.000000	0.00
+20	2593.000000	0.00
+30	2593.000000	0.00
+40	2592.979962	-20.04
+50	2593.000000	0.00

Transmitter Frequency Stability: (Temperature Variation) (Continued)

15 MHz Bandwidth, Top Channel (2681.75 MHz)

Temp (ºC)	Measured Frequency (MHz)	Frequency Error (kHz)
-30	2681.709922	-40.08
-20	2681.729962	-20.04
-10	2681.709920	-40.08
0	2681.729960	-20.04
+10	2681.729960	-20.04
+20	2681.729962	-20.04
+30	2681.729960	-20.04
+40	2681.729960	-20.04
+50	2681.729960	-20.04

7.5. Transmitter Frequency Stability: (Voltage Variation)

The EUT was configured for frequency stability measurements, as described in Appendix 2 of this report.

Tests were performed to identify the maximum frequency error of the EUT with variations in nominal operating voltage.

Results:

5 MHz Bandwidth, Bottom Channel (2499.25 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2499.209920	-40.08
110.0	2499.209922	-40.08
126.5	2499.209923	-40.08

5 MHz Bandwidth, Middle Channel (2593.00 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2592.959920	-40.08
110.0	2592.959920	-40.08
126.5	2592.959920	-40.08

5 MHz Bandwidth, Top Channel (2687.25 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2687.209920	-40.08
110.0	2687.209920	-40.08
126.5	2687.209921	-40.08

Transmitter Frequency Stability: (Voltage Variation) (Continued)

10 MHz Bandwidth, Bottom Channel (2502.00 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2502.000000	0
110.0	2501.979960	-20.04
126.5	2501.979960	-20.04

10 MHz Bandwidth, Middle Channel (2590.00 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2589.979961	-20.04
110.0	2589.959921	-40.08
126.5	2589.979959	-20.04

10 MHz Bandwidth, Top Channel (2684.50 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2684.479961	-20.04
110.0	2684.479960	-20.04
126.5	2684.479961	-20.04

Transmitter Frequency Stability: (Voltage Variation) (Continued)

15 MHz Bandwidth, Bottom Channel (2504.75 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2504.709920	-40.08
110.0	2504.729960	-20.04
126.5	2504.709920	-40.08

15 MHz Bandwidth, Middle Channel (2593.00 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2592.979962	-20.04
110.0	2592.979960	-20.04
126.5	2592.979960	-20.04

15 MHz Bandwidth, Top Channel (2681.75 MHz)

Supply Voltage (VAC)	Measured Frequency (MHz)	Frequency Error (kHz)
93.5	2681.729960	-20.04
110.0	2681.729945	-20.05
126.5	2681.729962	-20.04

7.6. Transmitter Occupied Bandwidth

The EUT was configured for Occupied Bandwidth measurements, as described in Appendix 2 of this report.

Tests were performed to identify the maximum bandwidth occupied by the fundamental frequency of the EUT.

Transmitter Occupied Bandwidth (Continued)

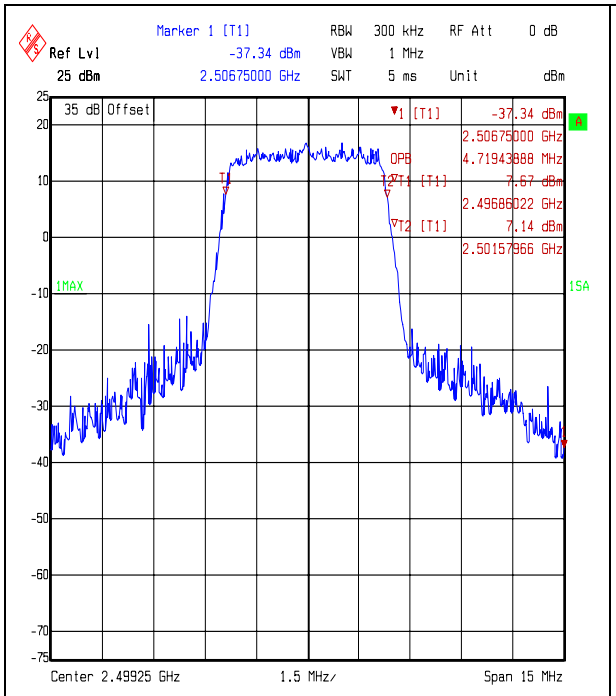
Results: 5 MHz Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	2499.25	300	1000	4.719
Middle	2593.00	300	1000	4.719
Top	2687.25	100	300	4.539

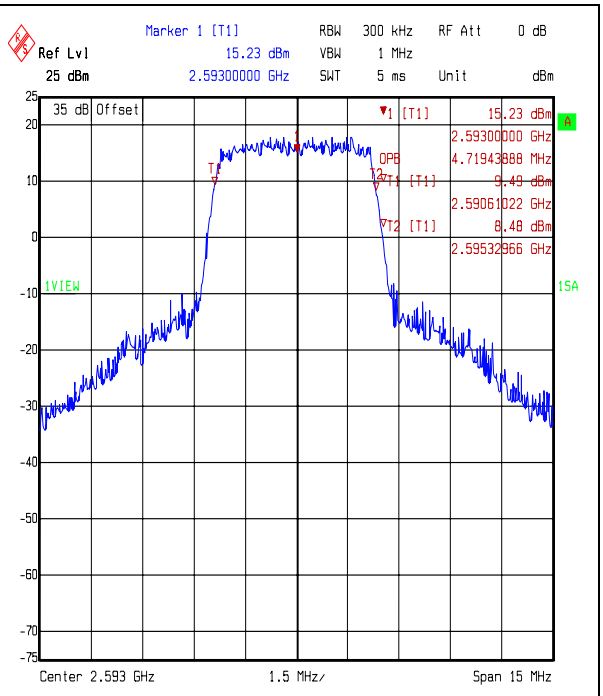
Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**

Transmitter Occupied Bandwidth (Continued)

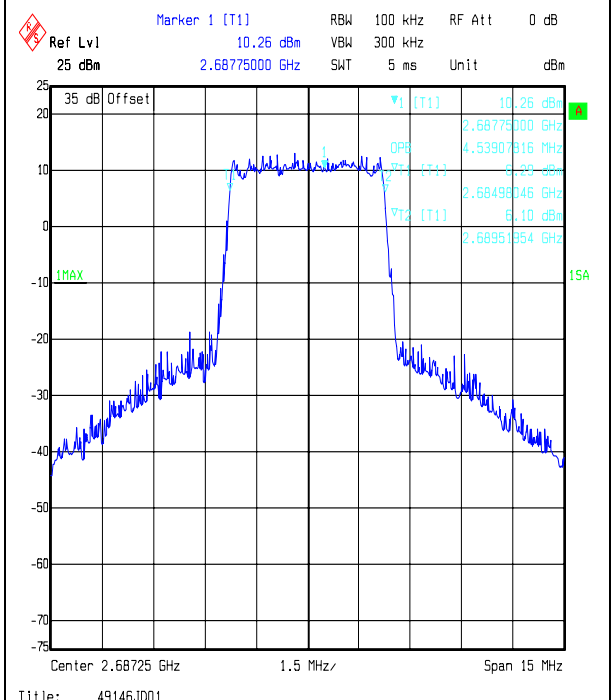
Results: 5 MHz Bandwidth



Title: 49146JD01
Comment A: FCC PART 27 5 MHZ CHANNEL OBW BOTTOM CHANNEL
Date: 17.MAY 2007 15:44:57



Title: 49146JD01
Comment A: FCC PART 27 5 MHZ CHANNEL OBW CENTRE CHANNEL
Date: 17.MAY 2007 14:46:02



Title: 49146JD01
Comment A: FCC PART 27 5 MHZ CHANNEL OBW TOP CHANNEL
Date: 31.MAY 2007 13:24:13

Transmitter Occupied Bandwidth (Continued)

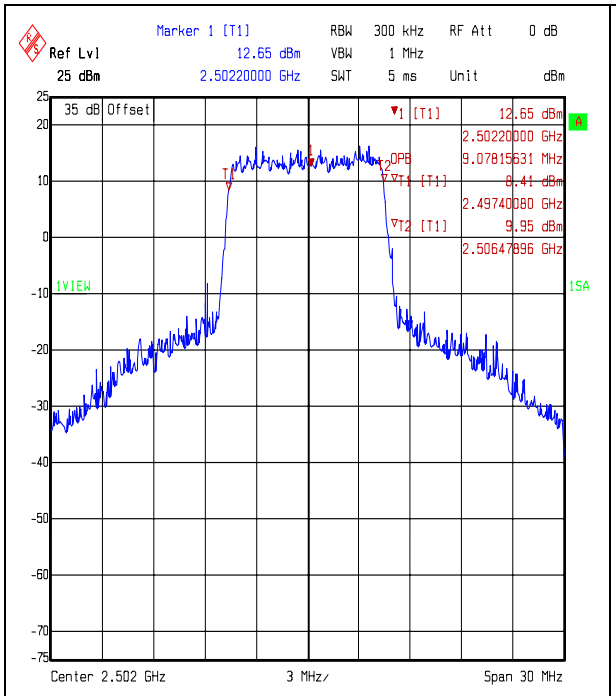
Results: 10 MHz Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	2502.0	300	1000	9.078
Middle	2596.0	300	1000	9.078
Top	2684.5	300	1000	9.138

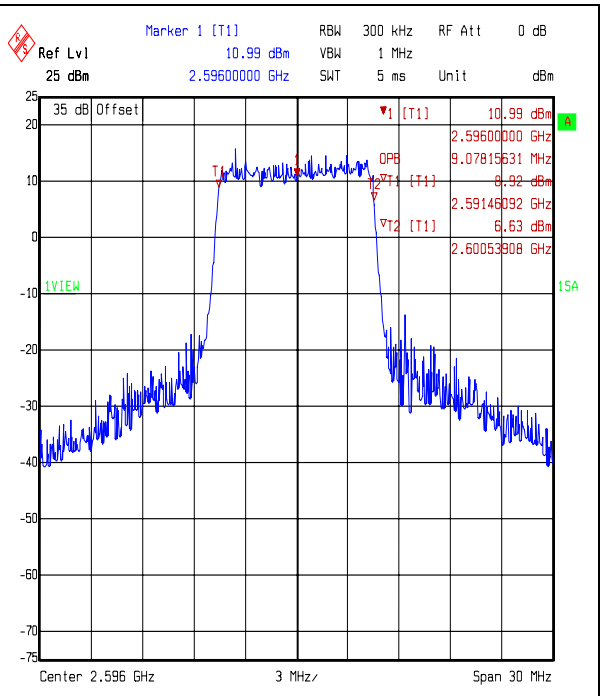
Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**

Transmitter Occupied Bandwidth (Continued)

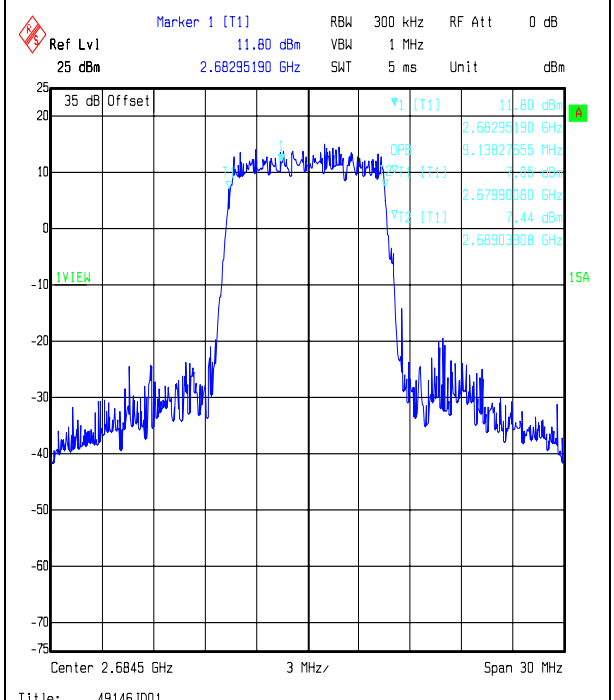
Results: 10 MHz Bandwidth



Title: 49146JD01
Comment A: FCC PART 27 10 MHZ CHANNEL OBW BOTTOM CHANNEL
Date: 17.MAY 2007 14:24:09



Title: 49146JD01
Comment A: FCC PART 27 10 MHZ CHANNEL OBW CENTRE CHANNEL
Date: 17.MAY 2007 14:50:53



Title: 49146JD01
Comment A: FCC PART 27 10 MHZ CHANNEL OBW TOP CHANNEL
Date: 31.MAY 2007 13:29:38

Transmitter Occupied Bandwidth (Continued)

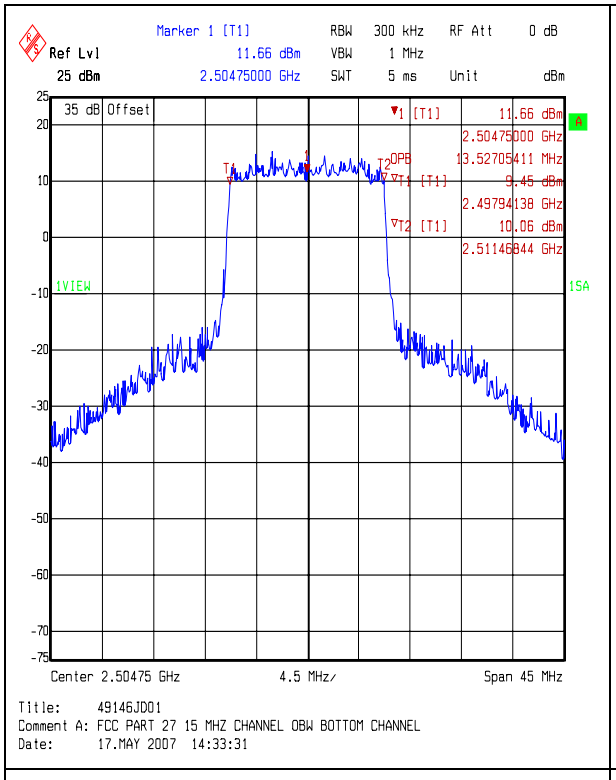
Results: 15 MHz Bandwidth

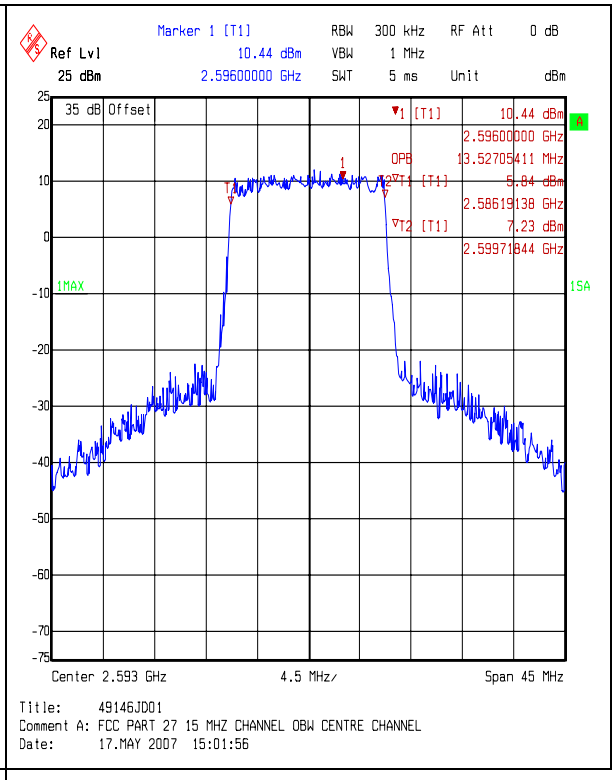
Channel	Frequency (MHz)	Resolution Bandwidth (kHz)	Video Bandwidth (kHz)	Occupied Bandwidth (MHz)
Bottom	2504.75	300	1000	13.527
Middle	2593.00	300	1000	13.527
Top	2681.75	300	1000	13.527

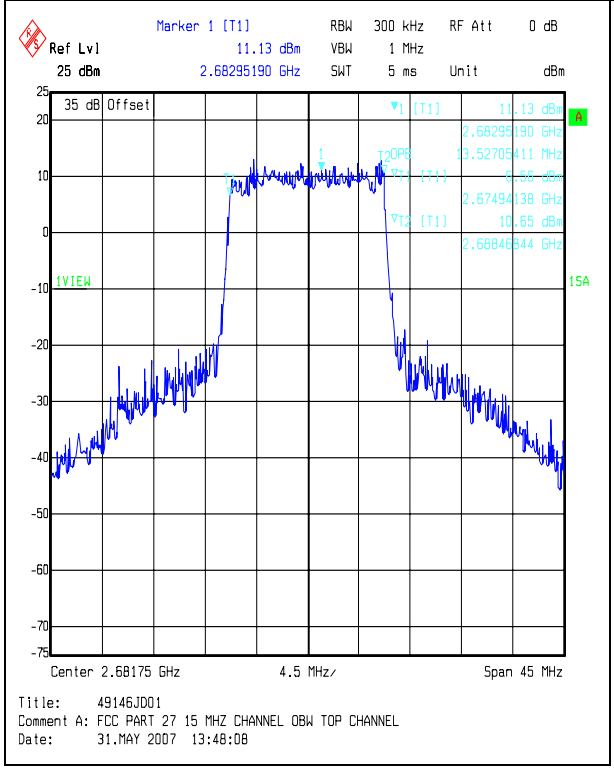
Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**

Transmitter Occupied Bandwidth (Continued)

Results: 15 MHz Bandwidth







7.7. Transmitter Conducted Emissions (Band Edge)

The EUT was configured for conducted emissions measurements, as described in Section 9 of this report.

Tests were performed to determine compliance with the out of band power requirements at frequencies adjacent to the channel occupied by the fundamental frequency of the EUT.

Results:

Results are presented graphically, in the following graphs. As can be seen from the plots, the EUT complies with the requirements of the relevant part of the regulations.

Note(s):

1. *The EUT was configured using an Installation tool to transmit at 24 dBm on bottom and middle channel frequencies. For the top channel, the EUT was configured to transmit at 21 dBm on the 5 MHz bandwidth, 22 dBm on the 10 MHz bandwidth and 23 dBm on the 15 MHz bandwidth.*

2. *Measurements at the lower band edge were made with a 1 MHz Resolution Bandwidth as specified in FCC Part 27 (l)(6). All emissions were compliant using this Resolution Bandwidth; therefore no further measurements were required with a lower Resolution Bandwidth.*

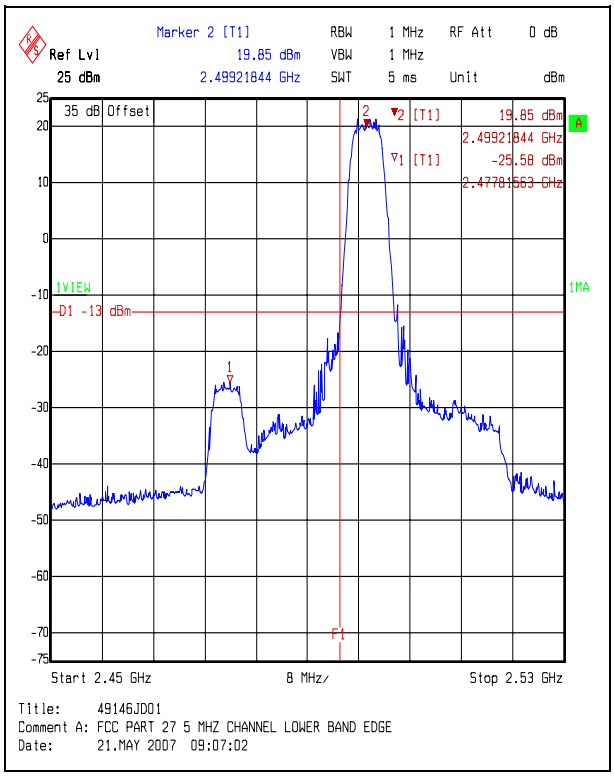
3. *Measurements at the upper band edge, in the first 1 MHz outside the band, were made with a 100 kHz or 200 kHz Resolution Bandwidth, depending on the occupied bandwidth of the signal, as permitted in FCC Part 27 (l)(6). All emissions were compliant.*

4. *Measurements at the upper band edge, in the second 1 MHz outside the band, were made with a 100 kHz or 200 kHz Resolution Bandwidth, depending on the occupied bandwidth of the signal, and integrated up to 1 MHz, as permitted in FCC Part 27 (l)(6). All emissions were compliant.*

5. *Measurements were made on both Vertical and Horizontal antenna ports and the results were found to be equivalent.*

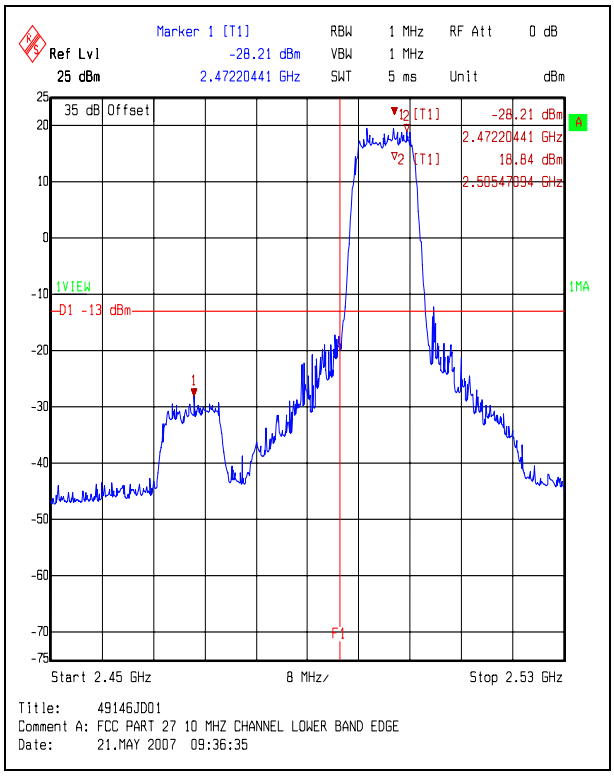
Transmitter Conducted Emissions (Lower Band Edge) (Continued)

Results: 5 MHz Bandwidth



Transmitter Conducted Emissions (Lower Band Edge) (Continued)

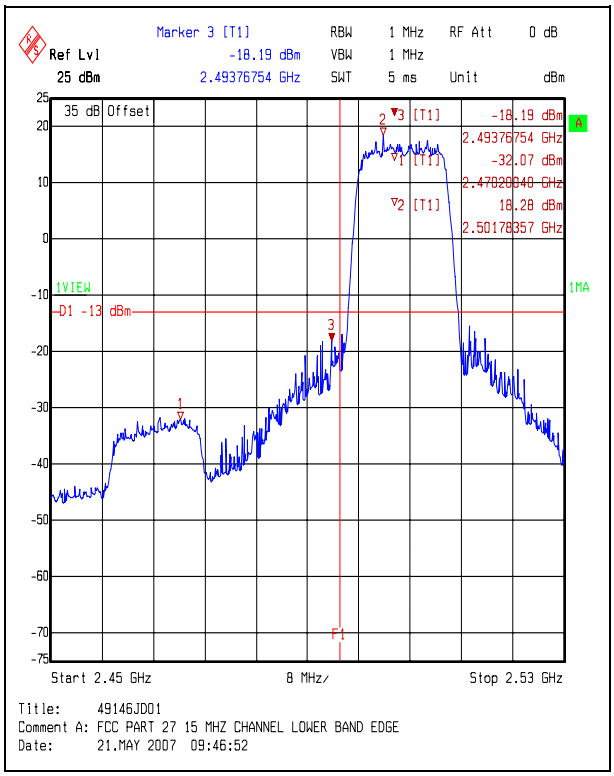
Results: **10 MHz Bandwidth**



Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**

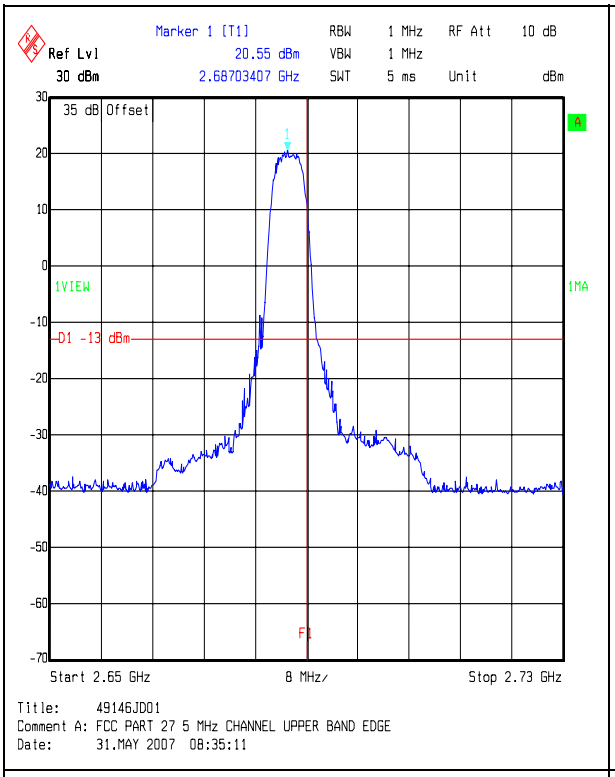
Transmitter Conducted Emissions (Lower Band Edge) (Continued)

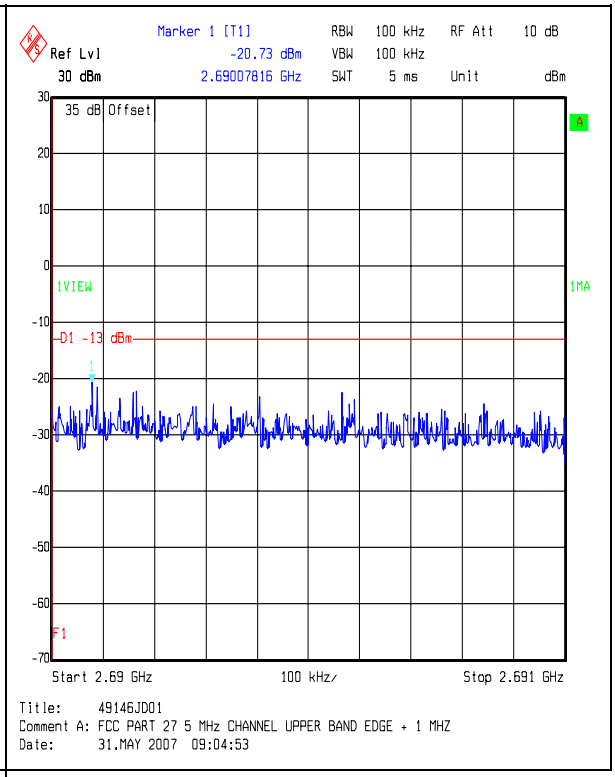
Results: **15 MHz Bandwidth**

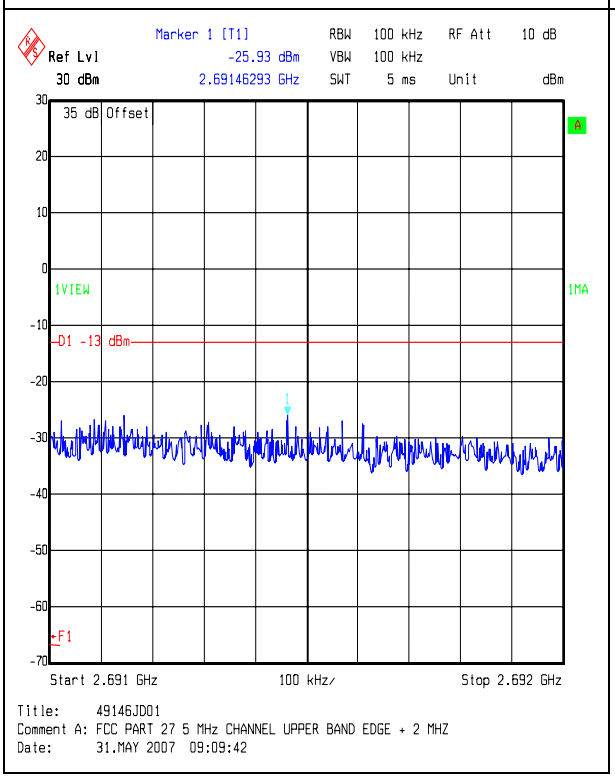


7.8. Transmitter Conducted Emissions (Upper Band Edge)

Results: **5 MHz Bandwidth**







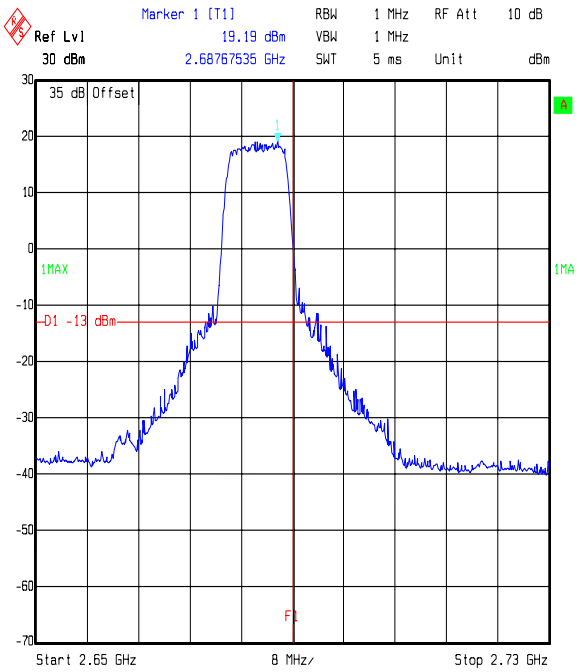
Transmitter Conducted Emissions (Upper Band Edge) (Continued)

Results: 5 MHz Bandwidth. Integrated Results

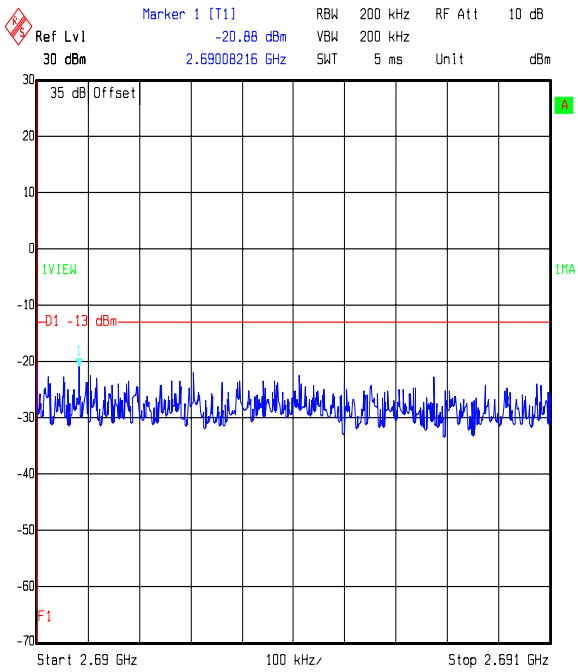
TX = 21 dBm	2691 MHz to 2692 MHz	
Port = H		
Measured power	**dBm**	**MilliWatt**
1	-26.8	0.0021
2	-26.2	0.0024
3	-27.8	0.0017
4	-27.3	0.0019
5	-25.9	0.0026
6	-27.2	0.0019
7	-27.8	0.0017
8	-30.5	0.0009
9	-30.0	0.0010
10	-30.2	0.0010
Sum		0.0172
Integrated Result		**dBm**
		-17.6447

Transmitter Conducted Emissions (Upper Band Edge) (Continued)

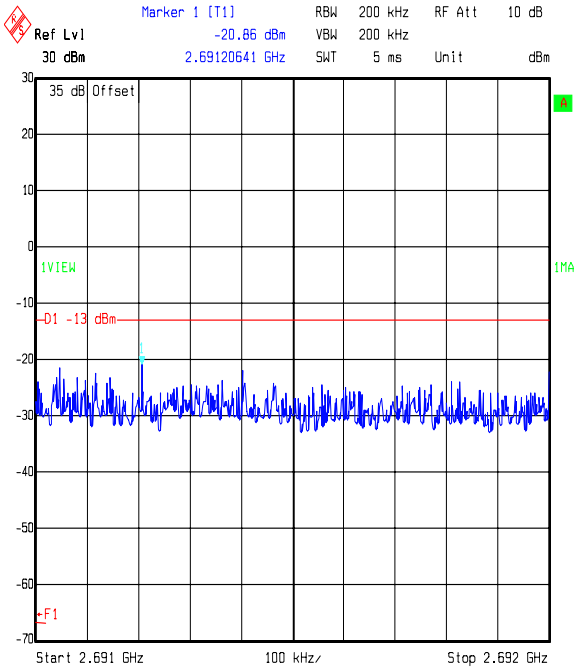
Results: 10 MHz Bandwidth



Title: 49146JD01
Comment A: FCC PART 27 10 MHz CHANNEL UPPER BAND EDGE
Date: 31.MAY 2007 09:40:42



Title: 49146JD01
Comment A: FCC PART 27 10 MHz CHANNEL UPPER BAND EDGE + 1 MHZ
Date: 31.MAY 2007 09:58:44



Title: 49146JD01
Comment A: FCC PART 27 10 MHz CHANNEL UPPER BAND EDGE + 2 MHZ
Date: 31.MAY 2007 10:03:49

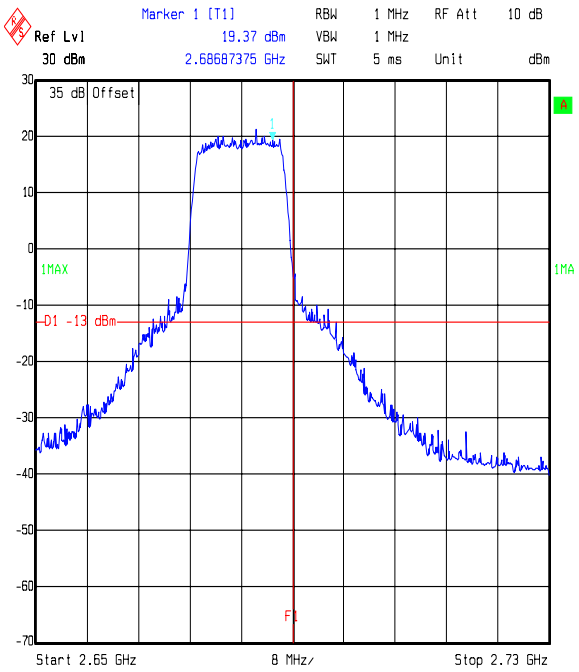
7.9. Transmitter Conducted Emissions (Upper Band Edge)

Results: **10 MHz Bandwidth. Integrated Results**

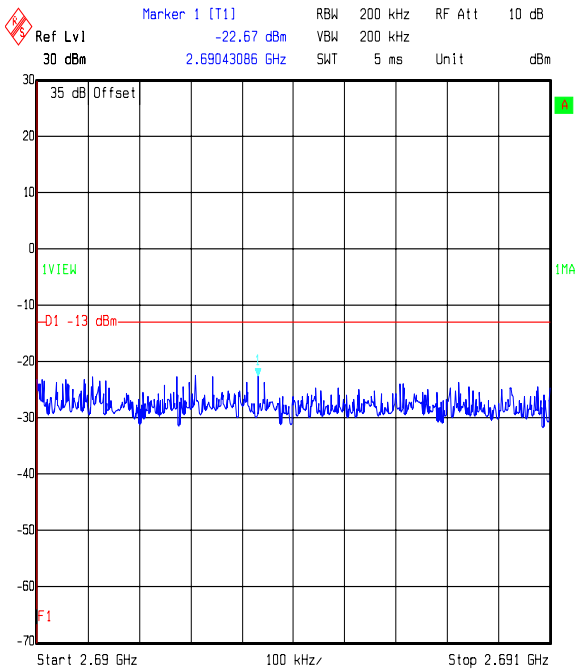
TX = 22 dBm	2691 MHz to 2692 MHz	
Port = H		
Measured power	**dBm**	**MilliWatt**
1	-21.7	0.0068
2	-22.8	0.0052
3	-20.9	0.0081
4	-24.0	0.0040
5	-24.4	0.0036
6	-24.6	0.0035
7	-25.2	0.0030
8	-24.6	0.0035
9	-24.2	0.0038
10	-26.1	0.0025
Sum		0.0440
Integrated Result		**dBm**
		-17.6447

Transmitter Conducted Emissions (Upper Band Edge) (Continued)

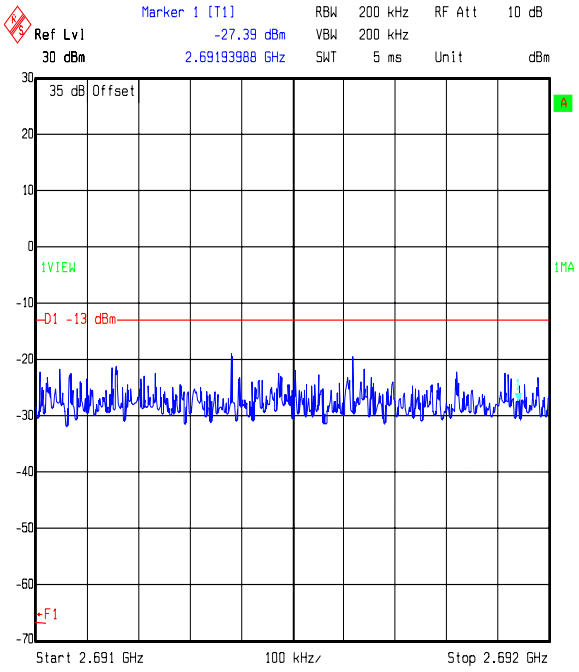
Results: 15 MHz Bandwidth. Integrated Results



Title: 49146JD01
Comment A: FCC PART 27 15 MHz CHANNEL UPPER BAND EDGE
Date: 31.MAY 2007 11:38:38



Title: 49146JD01
Comment A: FCC PART 27 15 MHz CHANNEL UPPER BAND EDGE +1 MHZ
Date: 31.MAY 2007 11:23:30



Title: 49146JD01
Comment A: FCC PART 27 15 MHz CHANNEL UPPER BAND EDGE +2 MHZ
Date: 31.MAY 2007 11:29:36

Transmitter Conducted Emissions (Upper Band Edge) (Continued)

Results: 15 MHz Bandwidth. Integrated Results

TX = 23 dBm	2691 MHz to 2692 MHz	
Port = H		
Measured power	**dBm**	**MilliWatt**
1	-25.0	0.0032
2	-23.2	0.0048
3	-25.2	0.0030
4	-23.2	0.0048
5	-23.5	0.0045
6	-23.6	0.0044
7	-23.9	0.0041
8	-23.9	0.0041
9	-21.4	0.0072
10	-25.3	0.0030
Sum		0.0429
Integrated Result		**dBm**
		-13.6754

7.10. Transmitter Conducted Emissions

The EUT was configured for conducted emissions measurements, as described in Appendix 2 of this report.

Tests were performed to identify the maximum transmitter conducted emission levels.

Tests were performed on the channel bandwidth setting that gave the highest output power, 10 MHz.

Result: **Bottom Channel (10 MHz Bandwidth)**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2415.046	-20.4	-13.0	7.4	Complied
2768.932	-18.0	-13.0	5.0	Complied
2826.011	-40.9	-13.0	27.9	Complied

Result: **Middle Channel (10 MHz Bandwidth)**

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2415.046	-20.4	-13.0	7.4	Complied
2706.917	-30.4	-13.0	17.4	Complied
2765.306	-42.1	-13.0	29.1	Complied

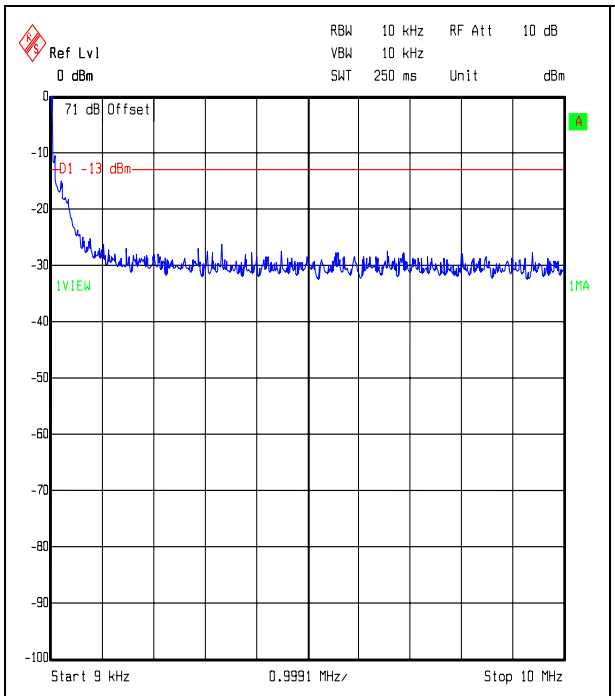
Result: **Top Channel (10 MHz Bandwidth)**

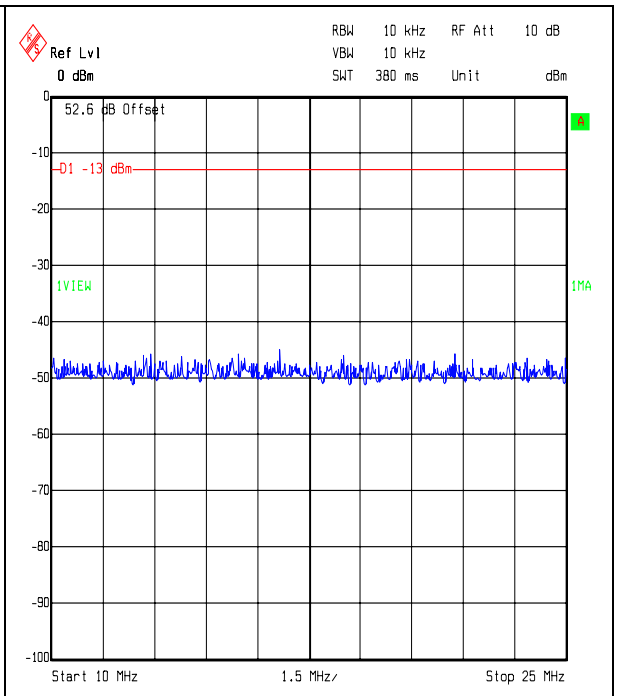
Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
2415.046	-20.4	-13.0	7.4	Complied
2723.383	-28.2	-13.0	15.2	Complied
2477.434	-24.4	-13.0	11.4	Complied
2593.697	-40.3	-13.0	27.3	Complied

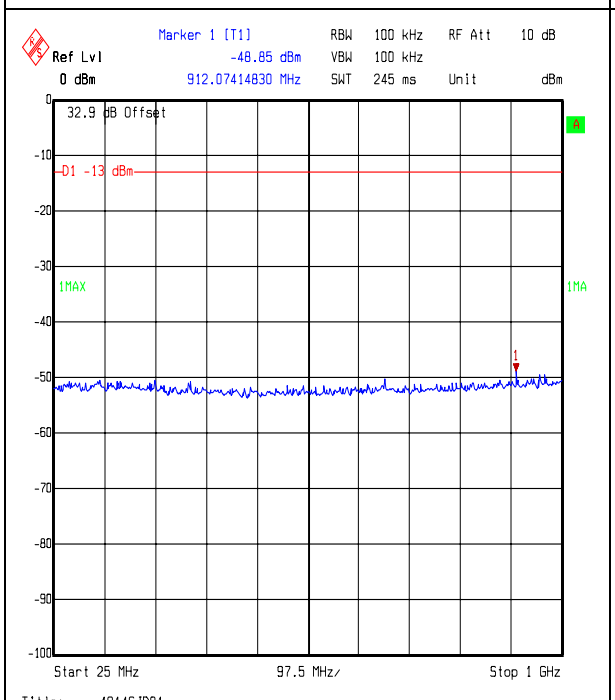
Note(s):

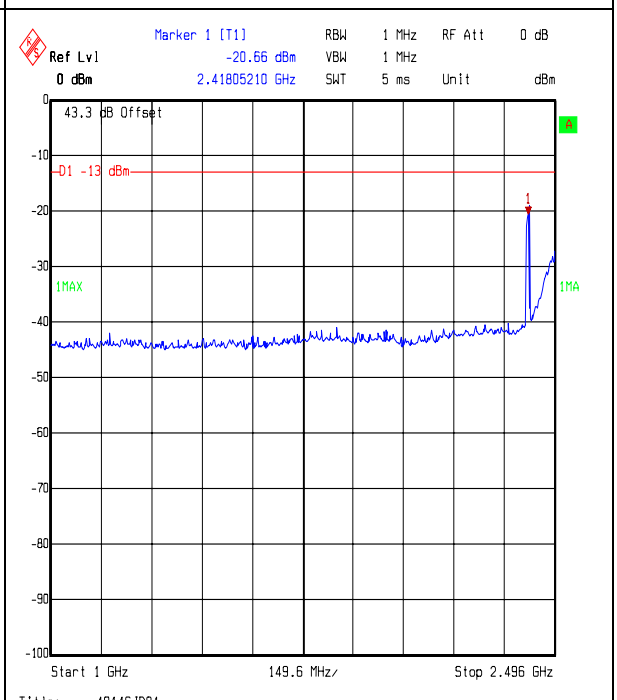
1. *The limit is calculated according to FCC Section 27.53(l)(2) as follows:*
   *43 + 10*log(P), where P is the transmitter power in Watts.*

Transmitter Conducted Emissions (Continued)



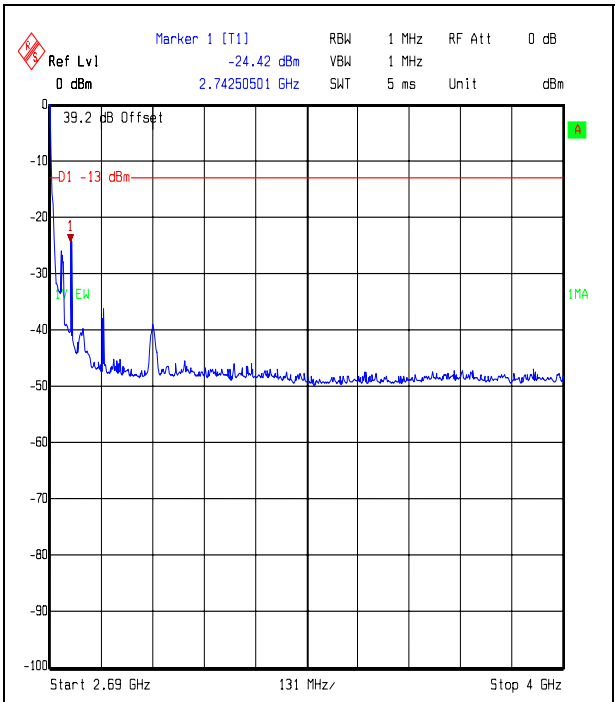




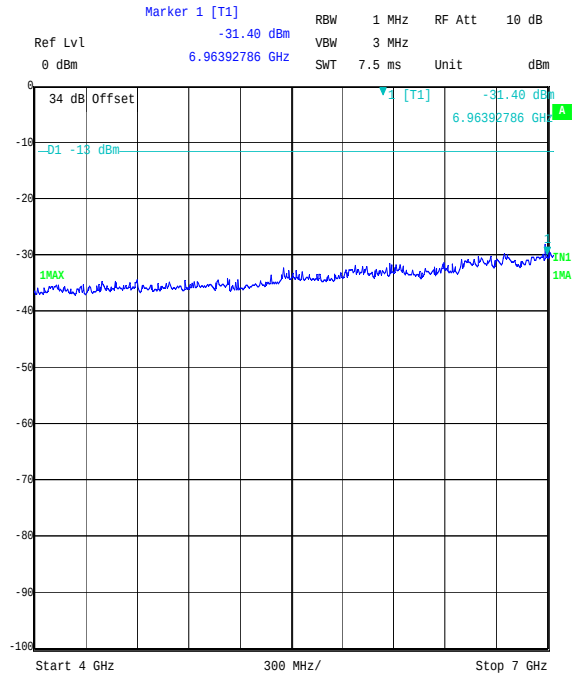


Note: The signal shown at 9 kHz was confirmed to be the low frequency content of the spectrum analyser, not an emission from the EUT.

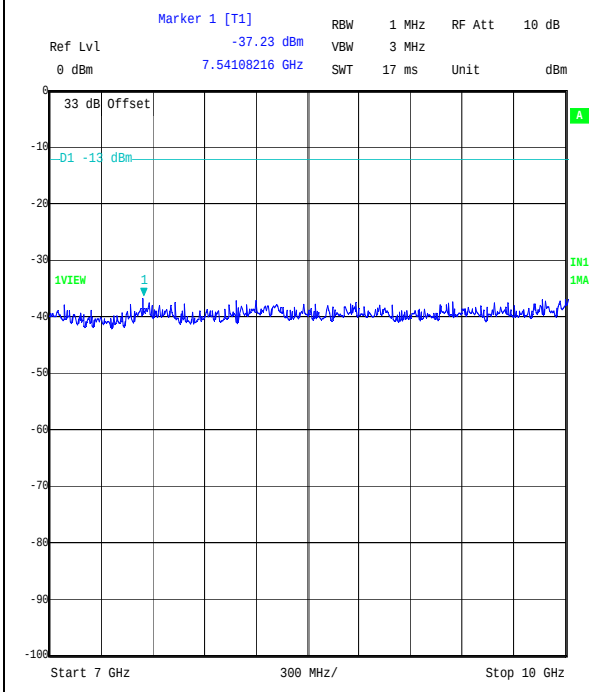
Test Of: **Motorola WIBB PTP25600**
To: **FCC Part 27**



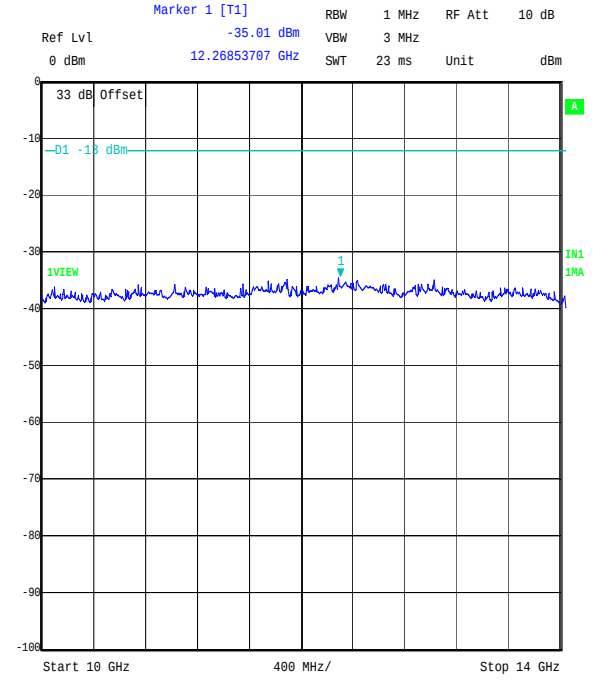
Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 17.MAY 2007 10:52:52



Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:31:03

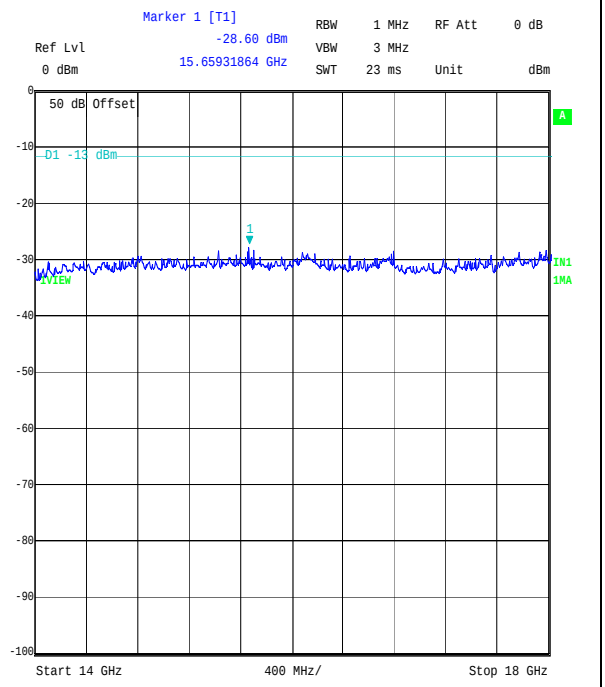


Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:34:56

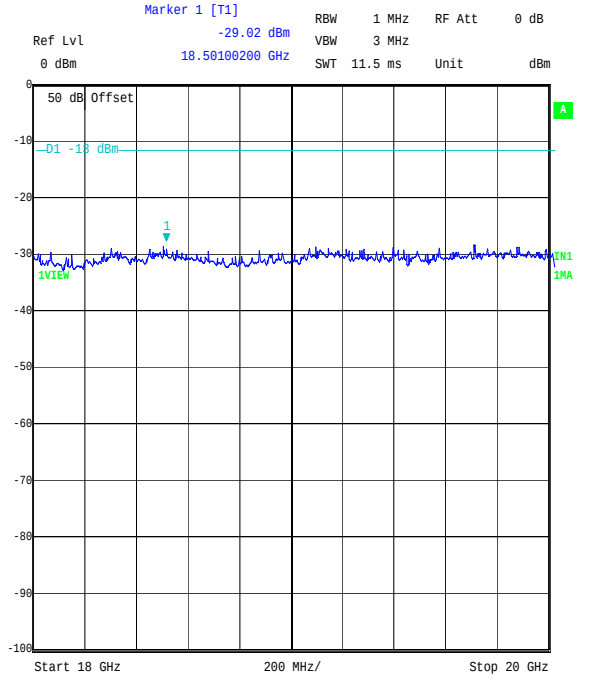


Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:36:50

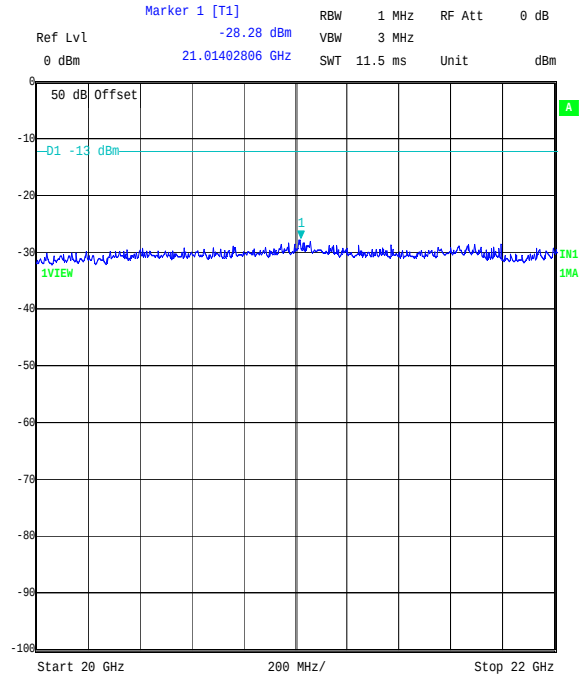
Transmitter Conducted Emissions (Continued)



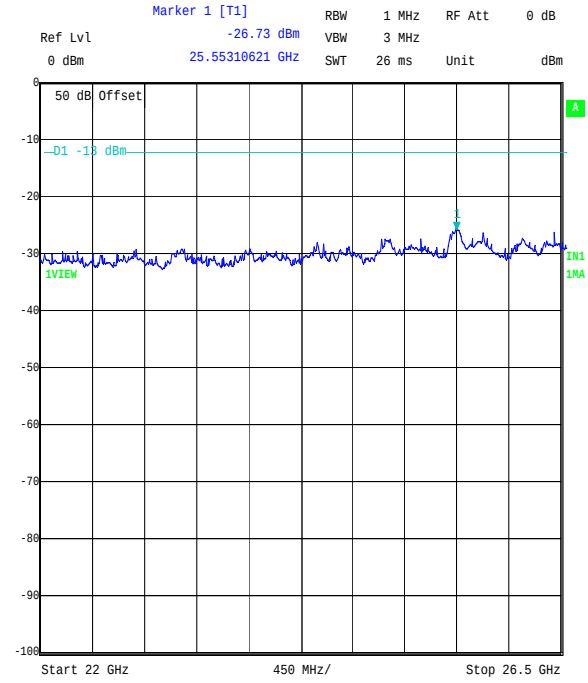
Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:39:29



Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:41:23

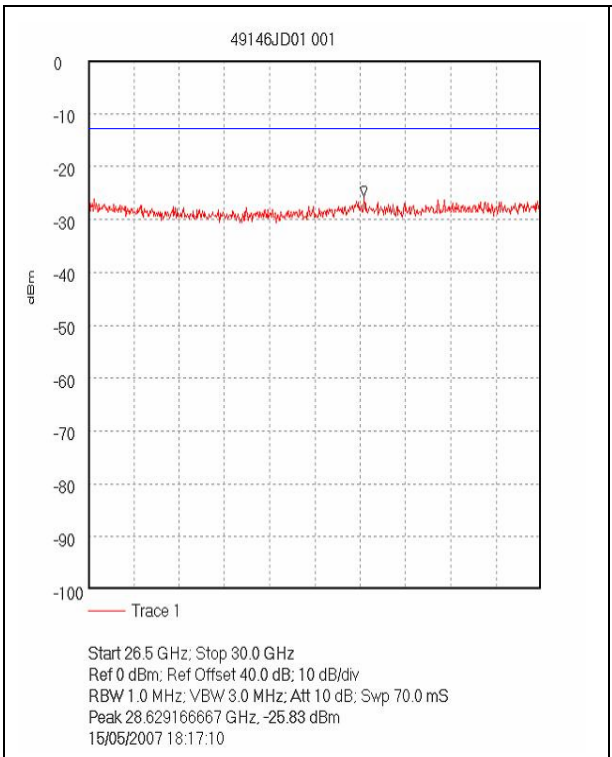


Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:43:10

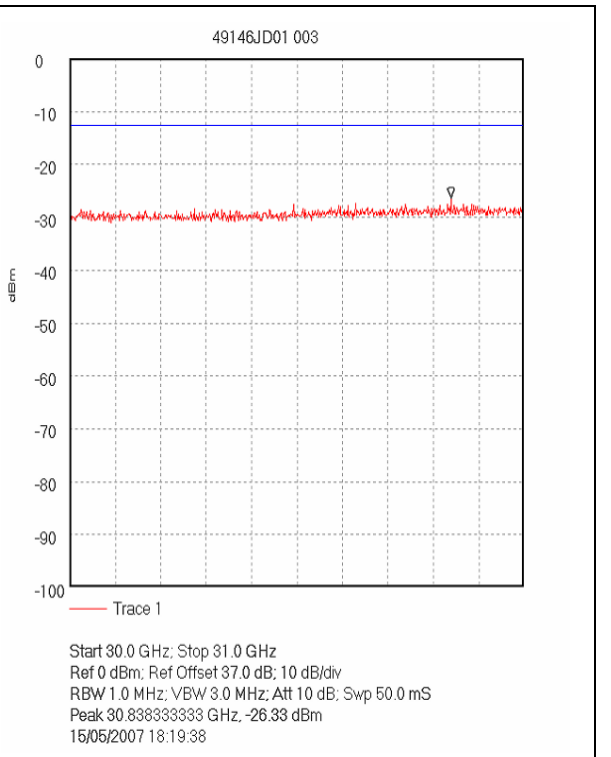


Title: 49146JD01
Comment A: FCC PART 27 TX CONDUCTED EMISSIONS TOP CHANNEL V PORT
Date: 22.MAR.2007 16:44:22

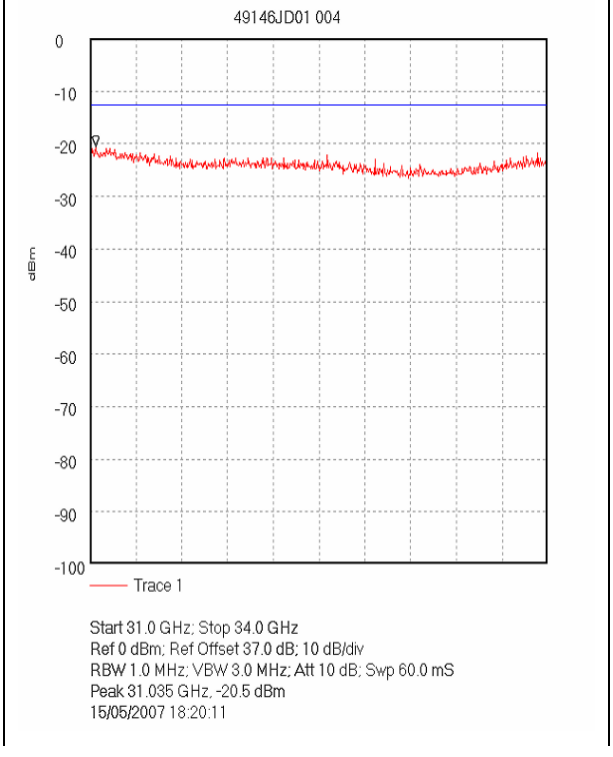
Transmitter Conducted Emissions (Continued)



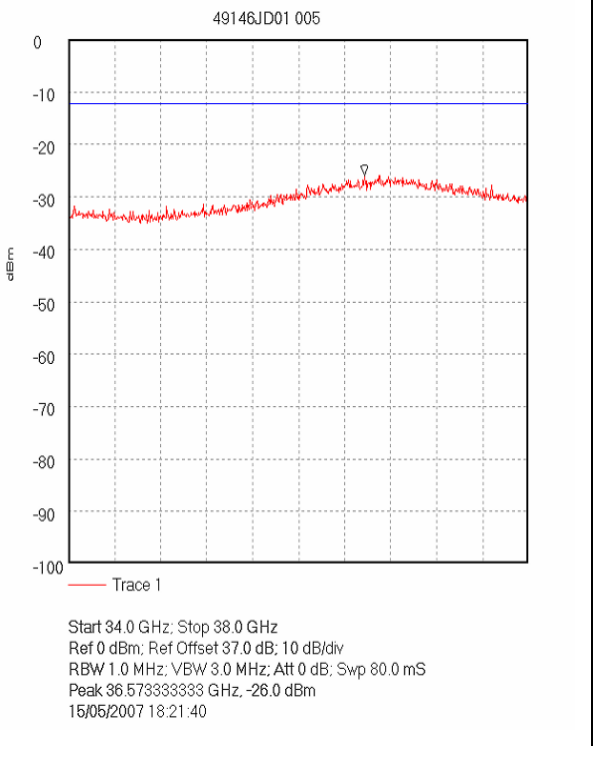
Start 26.5 GHz; Stop 30.0 GHz
Ref 0 dBm; Ref Offset 40.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 70.0 mS
Peak 28.629166667 GHz, -25.83 dBm
15/05/2007 18:17:10



Start 30.0 GHz; Stop 31.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 30.838333333 GHz, -26.33 dBm
15/05/2007 18:19:38

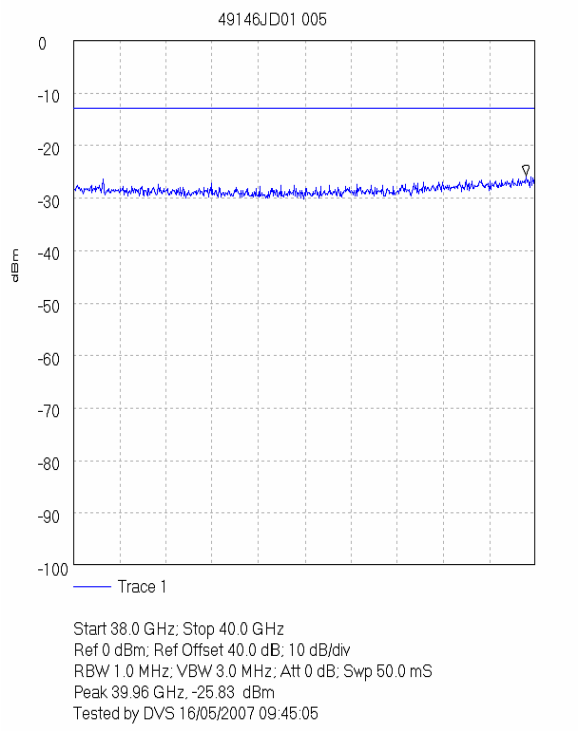


Start 31.0 GHz; Stop 34.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 60.0 mS
Peak 31.035 GHz, -20.5 dBm
15/05/2007 18:20:11



Start 34.0 GHz; Stop 38.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 80.0 mS
Peak 36.573333333 GHz, -26.0 dBm
15/05/2007 18:21:40

Transmitter Conducted Emissions (Continued)



7.11. Transmitter Radiated Emissions

The EUT was configured for transmitter radiated emissions testing, as described in Appendix 2 of this report.

Tests were performed to identify the maximum transmitter radiated emission levels.

Tests were performed on the channel bandwidth setting that gave the highest output power, 10 MHz.

Result: Bottom Channel, 10 MHz Bandwidth

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1266.193	-30.9	-13.0	17.9	Complied
2532.354	-46.3	-13.0	33.3	Complied
3503.957	-41.6	-13.0	28.6	Complied
5065.350	-44.1	-13.0	31.1	Complied
6331.763	-48.7	-13.0	35.7	Complied
7598.126	-49.6	-13.0	36.6	Complied
8864.199	-43.8	-13.0	30.8	Complied

Result: Middle Channel, 10 MHz Bandwidth

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1266.193	-30.9	-13.0	17.9	Complied
2532.354	-46.3	-13.0	33.3	Complied
3597.951	-41.9	-13.0	28.9	Complied
5065.350	-44.1	-13.0	31.1	Complied
6331.763	-48.7	-13.0	35.7	Complied
8864.199	-49.6	-13.0	36.6	Complied

Transmitter Radiated Emissions (Continued)

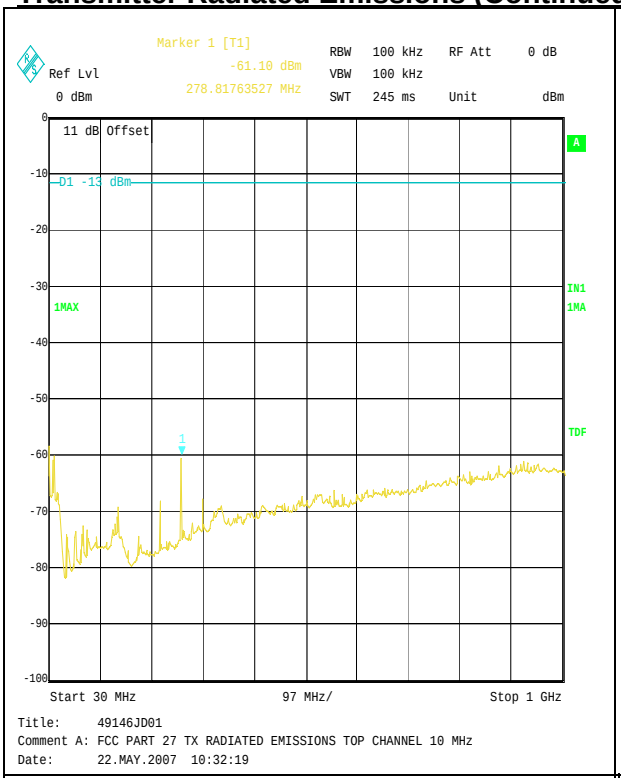
Result: Top Channel, 10 MHz Bandwidth

Frequency (MHz)	Emission Level (dBm)	Limit (dBm)	Margin (dB)	Result
1266.193	-30.9	-13.0	17.9	Complied
2532.354	-46.3	-13.0	33.3	Complied
3657.215	-42.6	-13.0	29.6	Complied
3686.909	-45.9	-13.0	32.9	Complied
5065.350	-43.8	-13.0	30.8	Complied
6331.763	-49.0	-13.0	36.0	Complied
8864.199	-43.6	-13.0	30.6	Complied

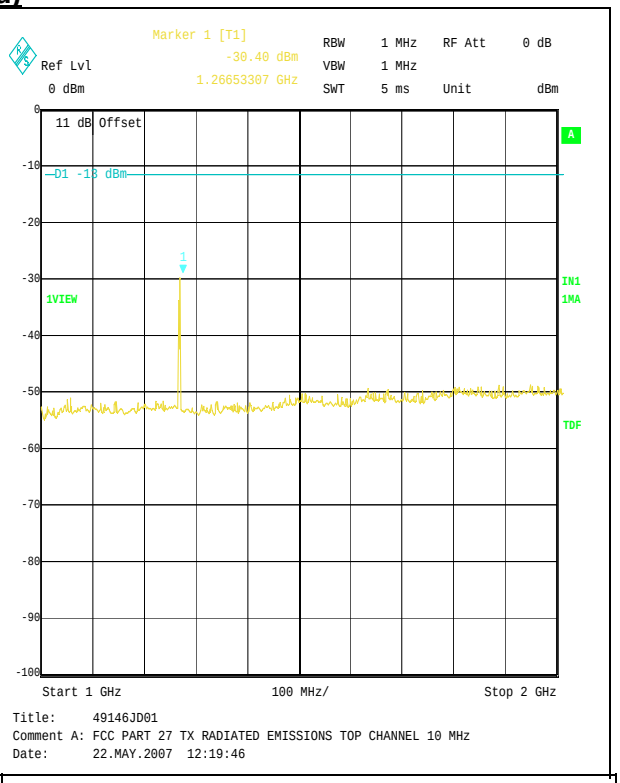
Note(s):

1. *The limit is calculated according to FCC Section 27.53(l)(2) as follows:*
   *43 + 10*log(P), where P is the transmitter power in Watts.*

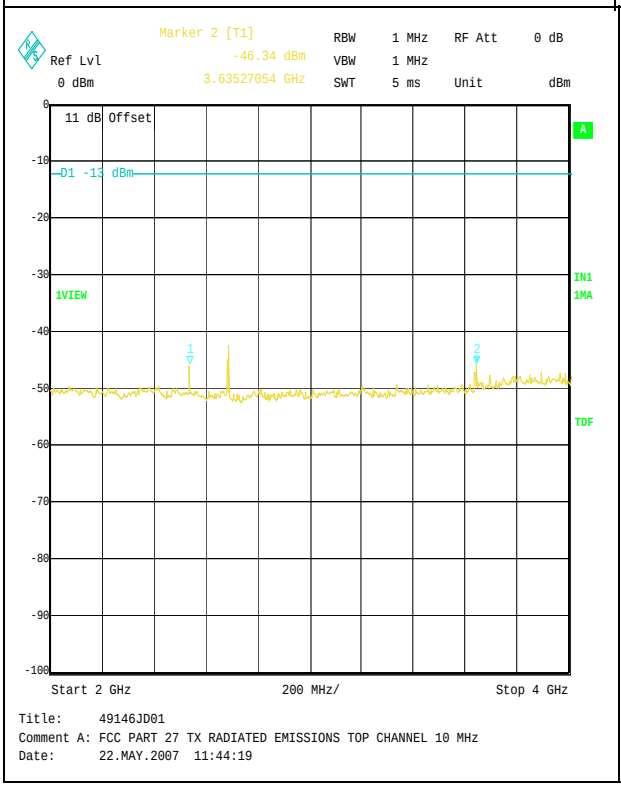
Transmitter Radiated Emissions (Continued)



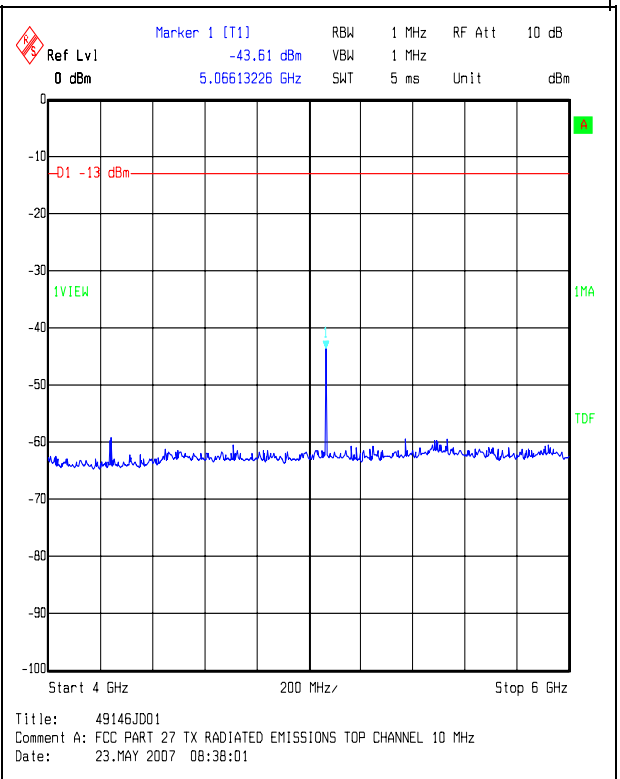
Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 22.MAY.2007 10:32:19



Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 22.MAY.2007 12:19:46

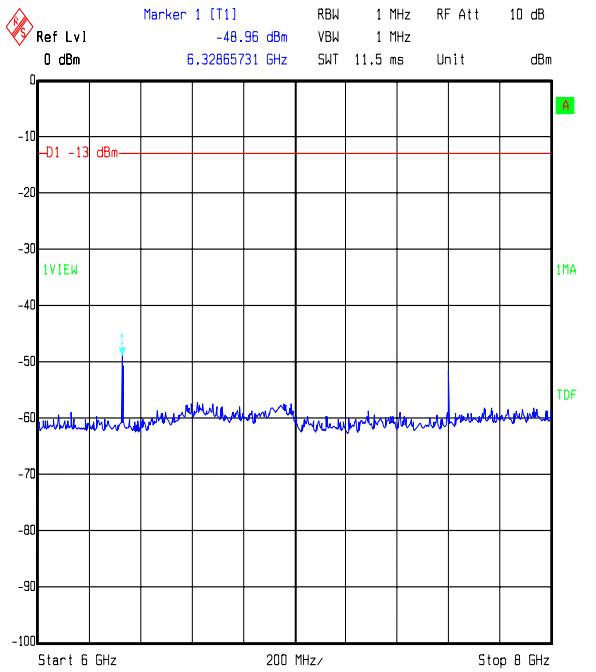


Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 22.MAY.2007 11:44:19

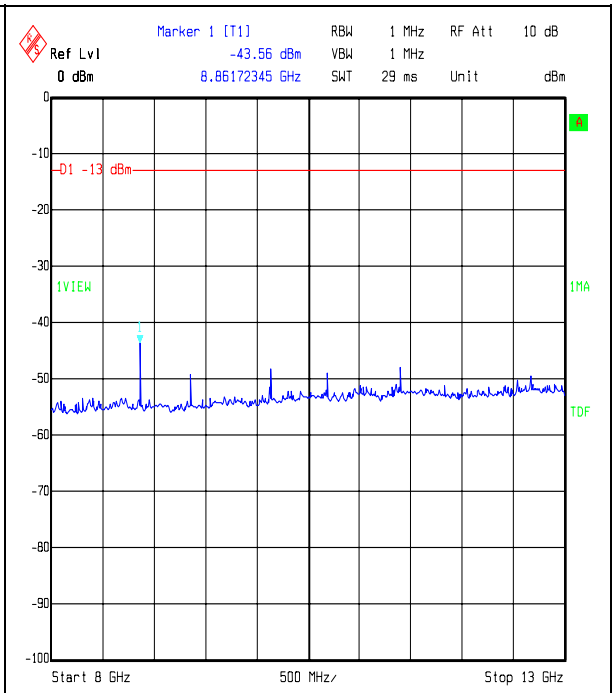


Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 23.MAY 2007 08:38:01

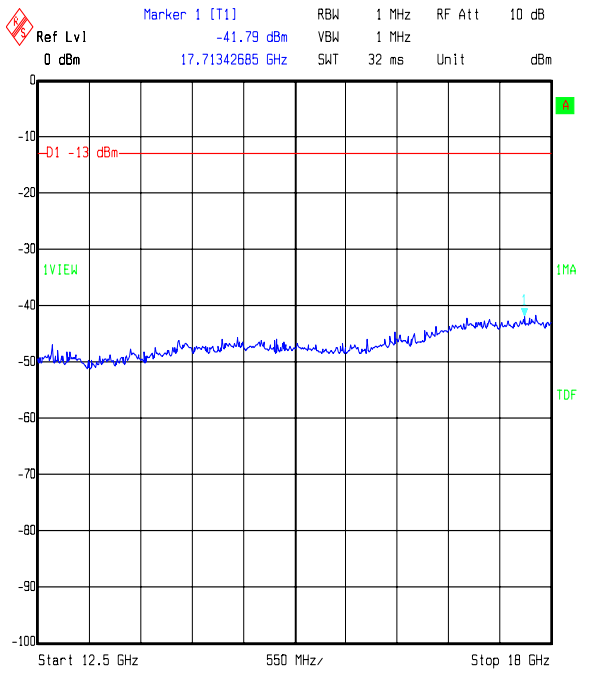
Transmitter Radiated Emissions (Continued)



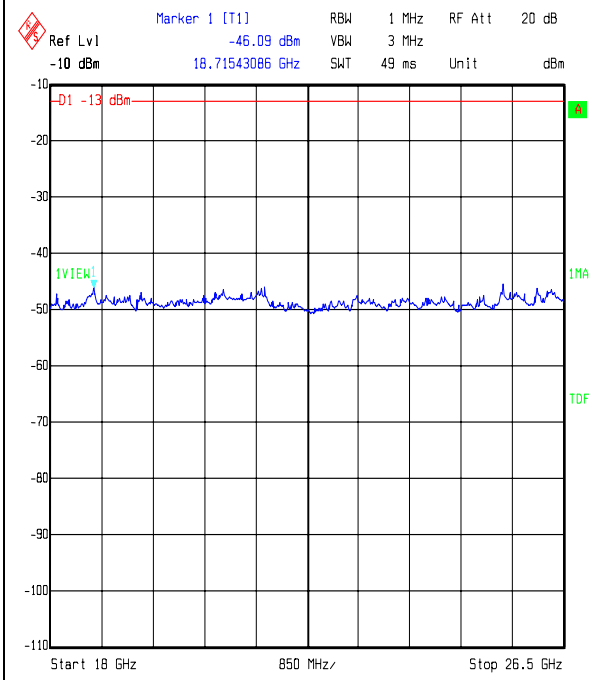
Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 23.MAY 2007 11:51:41



Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 23.MAY 2007 11:44:15

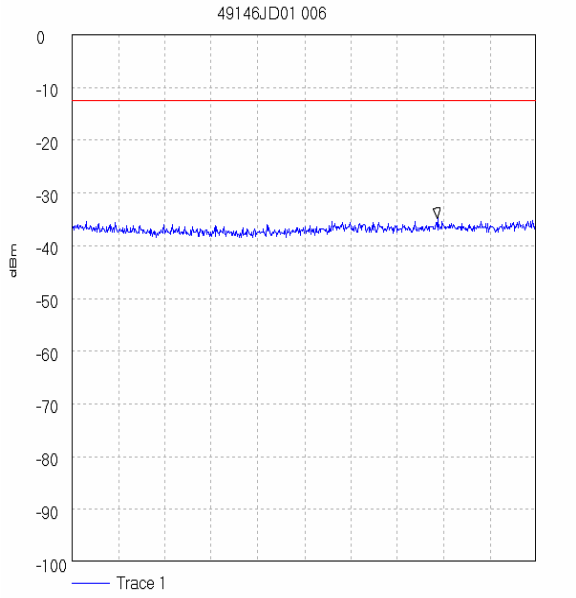


Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL 10 MHz
Date: 23.MAY 2007 11:39:24

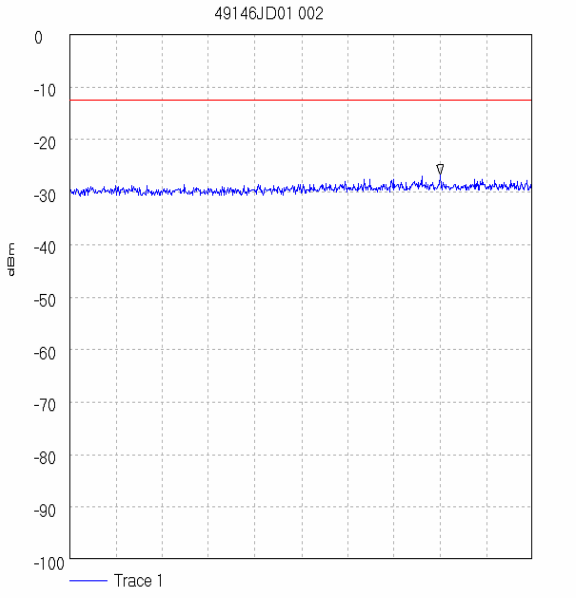


Title: 49146JD01
Comment A: FCC PART 27 TX RADIATED EMISSIONS TOP CHANNEL
Date: 10.MAY 2007 12:00:56

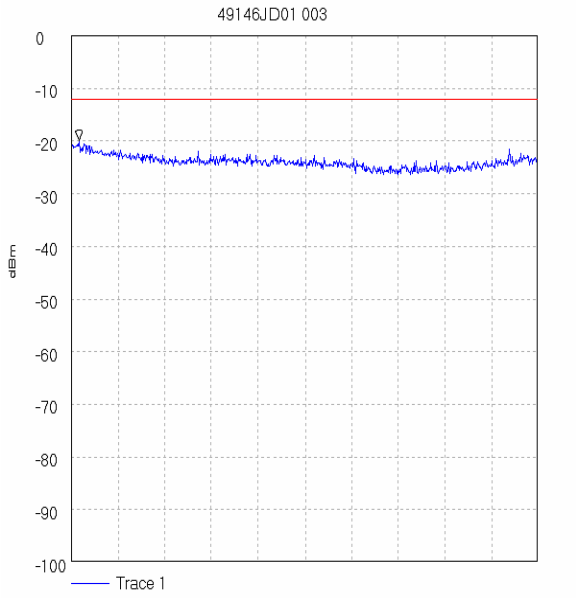
Transmitter Radiated Emissions (Continued)



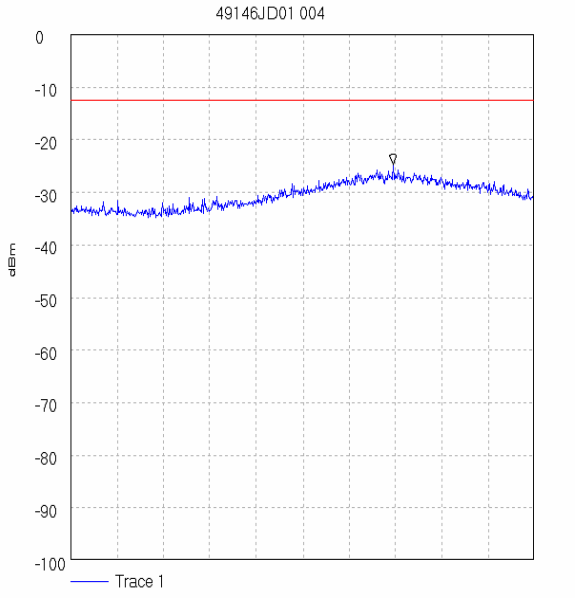
Start 26.5 GHz; Stop 30.0 GHz
Ref 0 dBm; Ref Offset 40.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 70.0 mS
Peak 29.25333 GHz, -34.83 dBm
Tested by DVS 16/05/2007 09:48:44



Start 30.0 GHz; Stop 31.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 50.0 mS
Peak 30.8 GHz, -26.67 dBm
Tested by DVS 16/05/2007 09:39:02

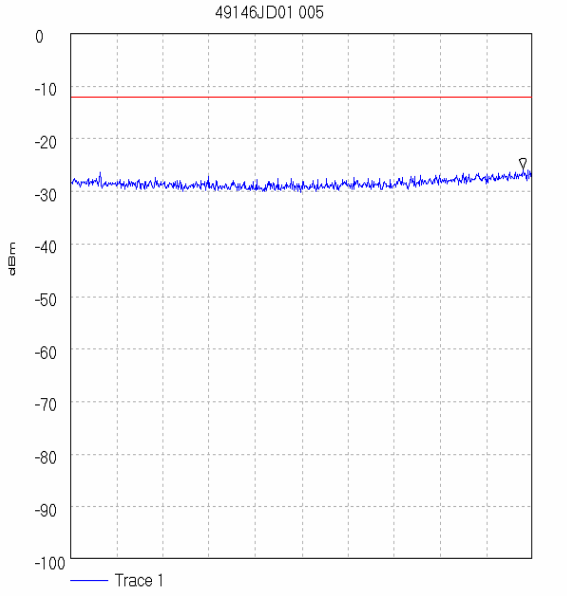


Start 31.0 GHz; Stop 34.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 10 dB; Swp 60.0 mS
Peak 31.05 GHz, -20.0 dBm
Tested by DVS 16/05/2007 09:40:34

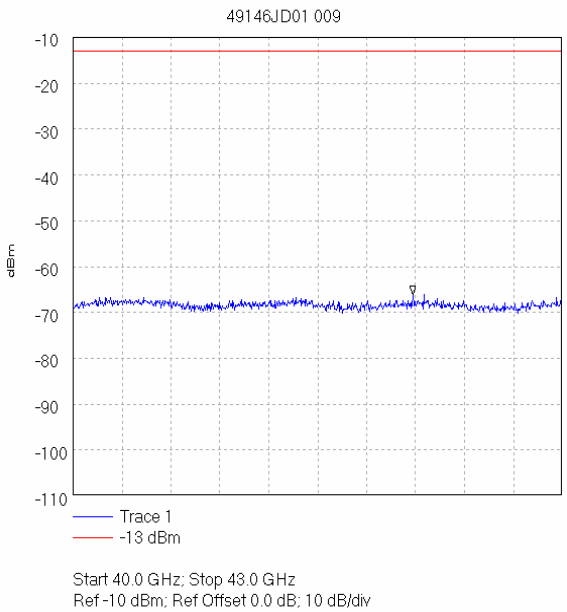


Start 34.0 GHz; Stop 38.0 GHz
Ref 0 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 80.0 mS
Peak 36.78 GHz, -24.83 dBm
Tested by DVS 16/05/2007 09:42:29

Transmitter Radiated Emissions (Continued)



Start 38.0 GHz; Stop 40.0 GHz
Ref 0 dBm; Ref Offset 40.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Att 0 dB; Swp 50.0 mS
Peak 39.96 GHz, -25.83 dBm
Tested by DVS 16/05/2007 09:45:05



Start 40.0 GHz; Stop 43.0 GHz
Ref -10 dBm; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 3.0 MHz; Cnv Loss 23.5 dB; Swp 50.0 mS
External Mixer On; PreSelected; Full Band = U
Peak 42.085 GHz, -66.17 dBm
Display Line: -13 dBm; ; Limit Test Passed
Tested by DVS 16/05/2007 13:37:45

8. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently, the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor, such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level	Calculated Uncertainty
Carrier Output Power	Not applicable	95%	+/- 0.46 dB
Frequency Stability	Not applicable	95%	+/- 20 Hz
Occupied Bandwidth	Not applicable	95%	+/- 0.12 %
Conducted Emissions	9 kHz to 26 GHz	95%	+/- 1.2 dB
Radiated Spurious Emissions	30 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 50 GHz	95%	+/- 1.78 dB
AC Conducted Spurious Emissions	0.15 MHz to 30 MHz	95%	+/- 3.25 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty, the published guidance of the appropriate accreditation body is followed.

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A003	ESH3 receiver pulse limiter	Rohde & Schwarz	ESH3-Z2	357 881/052	Cal before use	-
A028	Horn Antenna 1-2 GHz	Eaton	91888-2	304	08 Jun 2006	36
A031	2 to 4 GHz Horn Antenna	Eaton	91889-2	557	08 Jun 2006	36
A067	Line Impedance Stabilization Network	Rohde & Schwarz	ESH3-Z5	890603/002	23 Apr 2007	12
A075	Attenuator 20dB	Narda	769-20	02878	Cal before use	-
A090	Step Attenuator 0-60dB	Narda	743-60	01057	Cal before use	-
A1037	Bilog Antenna	Chase EMC Ltd	CBL6112B	2413	20 Sep 2006	12
A145	10 dB Attenuator	Narda	NONE	NONE	Cal before use	-
A197	Site 2 Controller SC144	Unknown	SC144	150720	Not calibrated	-
A256	WG 18 Microwave Horn	Flann Microwave	18240-20	400	17 Nov 2006	36
A258	Zenith Variable Power Supply	Zenith Electric	SVA 10	None	Cal before use	-
A276	OATS Positioning Controller	Rohde & Schwarz	HCC		Not calibrated	-
A427	WG 14 Horn Antenna	Flann	14240-20	150	17 Nov 2006	36
A428	WG 12 Horn Antenna	Flann	12240-20	134	17 Nov 2006	36
A429	WG 16 Horn Antenna	Flann	16240-20	561	17 Nov 2006	36
A436	WG 20 Horn Antenna	Flann	20240-20	330	24 Apr 2006	36
A490	30 to 1000 MHz, 50 W	Chase	CBL6111A	1590	25 Jan 2007	12

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
A532	RHT & Barometer	RS Components	216-935	N/A	Not calibrated	-
C1078	Cable	Rosenberger	FA210A1030M5050	28464-2	Cal before use	-
C1079	Cable	Rosenberger	FA210A1010M5050	28462-1	Cal before use	-
C1082	Cable	Rosenberger	FA210A1020M5050	28463-1	Cal before use	-
C160	Cable	Rosenberger	UFA210A-1-1181-70x70	None	Cal before use	-
C202	Cable	Rosenberger	UFA 210A-1-1180-70X70	1543	Cal before use	-
C342	Cable	Andrews	None	None	Cal before use	-
C344	Cable	Rosenberger	UFA210A-1-1181-70x70	1934	Cal before use	-
C363	Cable	Rosenberger	RG142	None	Cal before use	-
C457	Cable	Rosenberger	RG142XX-002-RFIB	C457-10081998	Cal before use	-
C461	Cable	Rosenberger	UFA210A-1-1182-704704	98H0305	Cal before use	-
E009	Temperature Chamber	Thermotron Corporation	S-8-E Mini Max	25-2407-0	Cal during use	-
G013	SMHU Signal Generator	Rohde & Schwarz	SMHU	894 055/003	30 Aug 2006	12

Test Equipment Used (Continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval
G046	Signal Generator	Gigatronics	7100/.01-20	749474	Cal before use	-
M084	Single channel power meter	Rohde & Schwarz	NRVS	864268/006	22 May 2007	12
M090	Spectrum Analyser	Rohde & Schwarz	ESBI	838494/005 836833/001	16 Nov 2006	12
M127	Spectrum Analyser	Rohde & Schwarz	FSEB 30	842 659/016	07 Aug 2006	12
M173	OATS controller	R.H.Electrical Services	RH351	3510020	Not calibrated	-
S201	3m & 10m OATS	RFI	1		25 May 2007	12
S202	3m OATS	RFI	2	S202-15011990	17 Nov 2006	12
S209	Emissions Screened Room	RFI	9		Not calibrated	-
S212	Emissions Screened Room	RFI	12		Not calibrated	-
S216	Microwave Lab.	RFI	16	None	Not calibrated	-

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.

Appendix 2. Measurement Methods

A2.1 Conducted Output Power

The test was performed in an indoor laboratory environment.

The EUT was connected to a spectrum analyser using cable, and RF attenuators.

The connection was made to the EUT antenna port.

The total loss of the cables & attenuators were measured and entered as a reference level offset into the spectrum analyser to correct for the losses.

The EUT was set to a specified channel and the transmitter set to operate at full power.

This test was carried out on the bottom, middle and top channels.

A2.2 Effective Isotropic Radiated Power (EIRP)

In order to obtain an EIRP measurement the manufacturer's declared antenna gain was added to the measured conducted output power.

A2.3 Frequency Stability

The test was performed in a laboratory environment.

The requirement was to determine the frequency stability of the device under specified environmental operating conditions

The EUT was situated within an environmental test chamber and connected via cables and attenuator(s) to the spectrum analyser.

Measurements were performed with the EUT operating under extremes of temperature in 10 degree increments within the range -30ºC to +50ºC. Temperature was monitored over the required range using a calibrated thermometer.

The EUT was switched off for a minimum of 30 minutes between each stage of testing while the environmental chamber stabilised at the next temperature within the stated temperature range.

Once the environmental chamber had reached thermal equilibrium, the nominal frequency of the EUT was measured and recorded. The recorded frequency was compared to the requirements of the specification.

Measurements were also performed at voltage extremes as stated in the specification. Voltage was monitored over the required range using a calibrated multimeter.

Measurements were made on the top, middle and bottom channels using a spectrum analyser.
The channel centre frequency was taken to be the mid-point between the -3 dBc points above and below the carrier

In order to show compliance, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorised band of operation according to Section 27.54.

A2.4 Occupied Bandwidth

The test was performed in a laboratory environment.

The EUT was connected to a spectrum analyser at its antenna port.

Measurements were performed to determine the occupied bandwidth in accordance with FCC Part 2.1049. The occupied bandwidth was measured of the fundamental emission at the bottom, middle and top channels.

The occupied bandwidth was measured using the built in occupied bandwidth function of the Rohde and Schwarz ESI spectrum analyser. It was set to measure the bandwidth where 99% of the signal power was contained. The analyser settings were set as per those outlined in the ESI user manual for this measurement.

A2.5 Conducted Emissions Measurements

Spurious emission measurements at the antenna port were performed from the lowest declared frequency to 10 times the highest EUT fundamental frequency.

A spectrum analyser was connected to the antenna port of the EUT via a suitable cable and RF attenuator. The total loss of both the cable and the attenuator were measured and entered as a reference level offset into the measuring receiver to correct for the losses.

The frequency band described above was investigated with the transmitter operating at full power on the bottom, middle and top channels. Any spurious emissions noted were then measured.

The recorded emission level was then calculated as a spurious attenuation level using the following formula as described in TIA-EIA-603B.

$$dB = 10 \log_{10} \left(\frac{TX\ power\ in\ watts}{0.001} \right) - \text{spurious level (dBm)}$$

The limit in the standard states that emissions shall be attenuated by at least 43+10 log (P) dB below the transmitter power (P), where (P) is the maximum measured fundamental power in Watts for the channel under test. This calculation always gives an absolute level of -13 dBm therefore the limit is -13 dBm.

The frequency band described above was investigated with the transmitter operating at full power. Any spurious observed were then recorded and compared to the -13 dBm limit. The requirement is for the emission to be less than -13 dBm. The margin between emission and limit is recorded and should always be positive to indicate compliance.

It should be noted that FCC Part 27.53 states that in the 1 MHz bands immediately outside and adjacent to the applicants declared frequency block may be measured using a resolution bandwidth of at least 1% of the emission bandwidth.

For the measurements of emissions at the channel edge, plots of the spectral distribution including the fundamental frequency were recorded using a spectrum analyser for the EUT transmitting on bottom and top channels. The method is in accordance with the measurement method detailed in Part 27.53 for measurements in the 1 MHz bands immediately outside and adjacent to the channel edge. A resolution bandwidth of 100 kHz or 200 kHz was used depending on the EUT channel width.

.The test equipment settings for conducted antenna port measurements were as follows:

Receiver Function	**Settings**
Detector Type:	Peak
Mode:	Max Hold
Bandwidth:	1 MHz >1 GHz
Bandwidth:	100 kHz <1 GHz
Bandwidth:	10 kHz <30 MHz
Amplitude Range:	100 dB
Sweep Time:	Coupled

A2.6 FCC Part 15: AC Mains Conducted Emissions

The test was performed in a laboratory environment.

AC mains conducted emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane.

Initial measurements in the form of swept scans covering the entire measurement band were performed in order to identify frequencies on which the EUT was generating interference. In order to minimise the time taken for these swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidths (see table below). Repetitive scans were performed to allow for emissions with low repetition rates, and the duty cycle of the EUT. The test configuration was the same for the initial scans as for the final measurements.

During the swept measurements (and also during subsequent final measurements on single frequencies) any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Following the initial scans, a graph was produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. A tolerance line was set 6 dB below the specification limit and levels above the tolerance line were re-tested (at individual frequencies) using the appropriate detector function.

The test equipment settings for conducted emissions measurements were as follows:

Receiver Function	**Initial Scan**	**Final Measurements**
Detector Type:	Peak	Quasi-Peak (CISPR)/Average
Mode:	Max Hold	Not applicable
Bandwidth:	10 kHz*	9 kHz*
Amplitude Range:	60 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

A2.7 Transmitter Radiated Emissions

Radiated emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Initial pre-scans covering the entire measurement band from the lowest generated frequency declared up to 10 times the highest fundamental frequency stated in Section 2.5 of this report (rounded up for convenience) were performed within a screened chamber below 4 GHz and on an open area test site above 4 GHz in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT that required further examination. Repetitive scans were performed to allow for emissions with low repetition rates, and for the duty cycle of the EUT.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m, below 4 GHz; above 4 GHz a 1 m measurement distance was used. A limit line was set to the specification limit. Levels within 20 dB of this limit were measured where possible, on occasion; the receiver noise floor came within the 20 dB boundary. On these occasions, the system noise floor may have been recorded.

An open area test site using the appropriate test distance and spectrum analyser with an average detector was used for final measurements.

On the open area test site, at each frequency where a signal was found, the levels were maximised by initially rotating the turntable through 360° and then varying the antenna height between 1 m and 4 m in the horizontal polarisation. At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT. The procedure was repeated for the vertical polarisation.

Once the final amplitude (maximised) had been obtained and noted, the EUT was replaced by a substitution antenna, and a substitution method applied.

The substitution antennas used were a horn antenna for measurements greater then or equal to 1 GHz and a dipole for measurements below 1 GHz.

The centre of the substitution antenna was set to approximately the same centre location as the EUT. The substitution antenna was set to the horizontal polarity. The substitution antenna was then connected to and fed by a signal generator tuned to the EUT's frequency under test.

Transmitter Radiated Emissions (Continued)

The test antenna was then raised and lowered to obtain a maximum reading on the spectrum analyser. The level of the signal generator output was then adjusted until the previously recorded maximum level for this set of conditions was obtained. This procedure was repeated with both antennas vertically polarised. The EIRP was then taken as:-

EIRP = Signal Generator Level - Cable Loss + Antenna Gain

Once the EIRP was obtained, the difference between it and the level of the fundamental emission for the EIRP of the channel under test was noted at the spurious attenuation level in dBc. The following formula was used as described in TIA_EIA_603B

$$dB = 10 \log_{10} \left(\frac{TX\ power\ in\ watts}{0.001} \right) - \text{spurious level (dBm)}$$

The limit stated in the standard states that emissions shall be attenuated by at least 43+10 Log (P) dB below the transmitter power (P), where (P) is the average 6 MHz channel transmitter output power level for the channel under test.

The tabulated results in the result section of this report show the spurious emission in dBm and as attenuation relative to the carrier in dBc.

Appendix 3. Modifications Statement from Customer.

MOTOROLA

May 31, 2007

To RFIGlobal Services Limited:

For the attention of Ian Watch

Motorola Point to Point Fixed Wireless Solutions Group would like to confirm the operation of the PTP25600 product will be controlled to provide lower transmit power at the highest operating channel (15MHz channel width) and that the power level will be reduced further for the 5/10MHz channel widths. The product design will ensure that the power levels measured by RFI will not be exceeded in the production units at any combination of the operating channel and channel bandwidths.

Yours Sincerely,

Clem Fisher
RF Development Manager
Motorola Point to Point Fixed Wireless Solutions Group