
TEST REPORT

FCC Part 15 E Testing in support of an Application for Grant of Equipment Authorisation of
a Symbol WSAP-5030 Access Port
FCC ID: H9PWSAP5030

Report Number: OR610776/04/Issue 2

October 2003

REPORT ON FCC Part 15 E Testing in support of an Application for Grant of
Equipment Authorisation of a Symbol WSAP-5030 Access Port

FCC ID: H9PWSAP5030

Report No OR610776/04/Issue 2

October 2003

EQUIPMENT: WSAP-5030 Access Port

FCC ID: H9PWSAP5030

SPECIFICATION: 47 CFR 15 Subpart E, 2002-08

PREPARED FOR: Symbol Technologies Inc
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APPROVED BY:



C Gould
UKAS Signatory

DATED: 10-10-03

DISTRIBUTION Symbol Technologies
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STATUS

OBJECTIVE	To undertake measurements to determine the Equipment Under Test's (EUT's) compliance with the specification.
MANUFACTURING DESCRIPTION	Access Port
APPLICANT	Symbol Technologies Symbol Place Winnersh Triangle Berkshire RG41 5TP
MANUFACTURERS TYPE NUMBER	WSAP-5030
MANUFACTURERS PART NUMBER	WSAP-5030
SERIAL NUMBER	No 2 and No 5
HARDWARE REVISION	DVT3.1
TEST SPECIFICATION NUMBER	FCC Part 15 Subpart E, 2002-08
REGISTRATION NUMBER	OR610776
QUANTITY OF ITEMS TESTED	One
SECURITY CLASSIFICATION OF EUT	Unclassified
INCOMING RELEASE SERIAL NUMBER DATE	Declaration of Build Status 610776 29 th June 2003
DISPOSAL REFERENCE NUMBER DATE	Held pending disposal N/A N/A
START OF TEST FINISH OF TEST	5 th July 2003 15 th August 2003
TEST ENGINEERS	Brian Airs Anthony Guy Phil Harrison Steve Hartley Graeme Lawler Malcolm Terry
RELATED DOCUMENTS	FCC Part 15 Subpart C, 2002-08 ANSI C63.4 2001. Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz. FCC Public Notice document (DA 00-705 released 30 March 2000)



TEST RATIONALE

This report has been re-issued as Issue 2 to cover some minor typographical errors and also include some test clause references that were omitted from the original report. This report is intended to replace the original report OR610776-04 Issued in September 2003.

The information contained within this report is intended to show verification of compliance of the Symbol Technologies Inc WSAP-5030 Access Port to the requirements of FCC Specification Part 15.

FCC ID H9PWSAP5030

The unit supplied for testing was a WSAP-5030 Access Port, which offers 5GHz 802.11a Wireless LAN connectivity.

For all measurements made radiated for 5.15-5.25GHz Unit No 5 was configured in a WSAP-5030 Access Port using Integral Antennas and a 120V, 60Hz Power Supply Unit Symbol Part No SNP-PA5T.

For all measurements made radiated for 5.25-5.35GHz and 5.725-5.825GHz Unit No 5 was configured in a WSAP-5030 Access Port using Dipole Antennas and a 120V, 60Hz Power Supply Unit Symbol Part No SNP-PA5T.

For all measurements made conducted through the antenna port Unit No 2 was configured in a WSAP-5030 Access Port using a DC Power Supply Unit.

This report details testing carried out in accordance with:

- FCC: Part 15.407(a)(1)(2)(3), Peak Output Power
- FCC: Part 15.407(a)(1)(2)(3), Peak Power Spectral Density
- FCC: Part 15.407(b)(1-7), Undesirable Emission Limits
- FCC: Part 15.407(g), 2.1055, Frequency Stability Under Temperature Variations
- FCC: Part 15.407(a)(6), Peak Excursion
- FCC: Part 15.407(c), Emission Bandwidth

Location Of Testing

BABT Engineers, Brian Airs, Anthony Guy, Phil Harrison, Steve Hartley and Graeme Lawler, conducted all testing (except Spurious Radiated Emissions from 30MHz to 1GHz, which were performed at our Bearley Site) at the premises BABT, Segensworth Road, Fareham, Hampshire, PO15 5RH. Spurious Radiated Emissions measurements were performed in a 3 metre Anechoic Chamber. A complete site description is on file with the FCC Laboratory Division, Registration Number: 90987. See Annex A.

BABT Engineer Malcolm Terry, conducted all Spurious Radiated Emissions (from 30MHz to 1GHz) testing at the premises BABT, Snitterfield Road, Bearley, Stratford upon Avon, Warwickshire, CV37 0EX. A complete site description is on file with the FCC Laboratory Division, Registration Number: 90986. See Annex A.



SYSTEM CONFIGURATION DURING EMC TESTING

The EUT was set-up simulating a typical user installation on the Alternative Open Field Test Site identified in Annex A, and tested in accordance with the specification.

The test software in the EUT enabled the Test Engineer to select full power and continuous transmit on the following channels;

5GHz functionality

Part 1

Bottom Channel:	5180 MHz
Middle Channel:	5220 MHz
Top Channel:	5240 MHz

The Output Power level (controlled by application software) was set to 1 (max power).

Part 2

Bottom Channel:	5260 MHz
Middle Channel:	5280 MHz
Top Channel:	5320 MHz

The Output Power level (controlled by application software) was set to 1 (max power).

Part 3

Bottom Channel:	5745 MHz
Middle Channel:	5805 MHz
Top Channel:	5830 MHz

The Output Power level (controlled by application software) was set to 1 (max power).

TEST SETUP PHOTOGRAPH

The photograph below shows the EUT configuration during Radiated Emission testing for 5.15-5.25GHz.



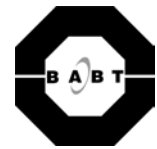
Photograph 1

TEST SETUP PHOTOGRAPH

The photograph below shows the EUT configuration during Radiated Emission testing for 5.25-5.35GHz and 5.725-5.825GHz.



Photograph 2



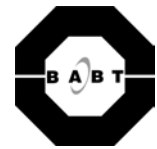
EQUIPMENT INFORMATION

Equipment under Test (EUT):

Equipment:	Access Port	Power Supply Unit	Integral Antenna (5.15-5.25GHz only)	Dipole Antenna (Rubber Duck) (5.25-5.35GHz & 5.725-5.825GHz)
Manufacturer:	Symbol Technologies Inc	Skynet	Tecom	Cushcraft
Type No.	WSAP-5030	1119327	Not Applicable	Not Applicable
Part No:	WSAP-5030	Not applicable	WSM-5030-210-WW	ML-5299-APA
Serial No:	No 2 and No 5	S/N03	Not Applicable	Not Applicable
Drawing Revision:	DVT3.1	Not Applicable	Not Applicable	Not Applicable

Test Equipment and Ancillaries Used For Test

Instrument	Manufacturer	Type No	EMC	Cal. Due
Emi Test Receiver	ROH	ESH3	2840	21 Nov 03
Test Receiver	ROH	ESH3	1805	17 July 04
Receiver	ROH	ESVP	1806	21 June 04
Esvp Test Receiver	ROH	ESVP	1807	24 July 04
Spectrum Analyser	ROH	EZM	1811	TU
Biconical Antenna	EMC	3104	1846	TU
Log Periodic Antenna	EMC	3146	1850	TU
Bilog Antenna	YRK	CBL6111B	2451	07 Oct 03
LISN	ROH	ESH3-Z5	1814	12 Feb 04
Turntable Controller	VAR	RH253	1858	TU
Mast Controller	EMC	1050	1844	TU
Antenna Mast	EMC	1050	1845	TU
Antenna Mast	ELE	AMU 74A	1853	TU
Screened Room	RAY	1993	1804	TU
Open Area Site 2	ASS	OATS2	2280	28 Nov 05
Aneroid Barometer	VAR	750-1210-02	1932	TU
Power Analyser	VOL	PM3000ACE	2791	21 Jan 04
Reference Impedance	VLT	IMP555	2792	21 Jan 04
Power Source	VLT	140AMX-UPC12	2793	21 Jan 04
Power Supply Quad Mode Dual	THU	PL33OQMD	INV4077	TU
Chamber	MON	2F3,BLD 8	INV3037	21 Aug 03
Oscilloscope	LEC	LC534L	INV4005	18 Dec 03



EQUIPMENT INFORMATION-continued

Test Equipment and Ancillaries Used For Test-continued

Instrument	Manufacturer	Type No	EMC	Cal. Due
Spectrum Analyser	ROH	FSEM	INV4034	16 Dec 03
Crystal Detector	HEW	8470B	INV4209	TU
Hygromer	RTC	I-1000	INV3227	02 Oct 03
High Pass Filter	LOR	9HP7-7000-SR	INV4903	TU
Attenuator 20dB 2W	WEI	1	INV2651	TU
Hygrometer	RTC	A1	INV4167	13 Sept 03
Frequency Counter	HEW	5343A	665	12 Aug 04
Signal Generator	HEW	8673B	953	05 June 04
µwave Amplifier	HEW	8349B	1542	TU
Multi meter	FLU	8050A	1544	29 Apr 04
Signal Generator	HEW	8673B	2551	14 June 04
2mtr N-type Cable	REY	269-0195-2000	5015	TU
Millimeter µw Source	HEW	83554A*	1556	TU
Precision Rotary Attenuator	FLA	FLANN 2211	1564	TU
Spectrum Analyser	HEW	EE4407B	2783	18 Mar 04
Emi Test Receiver	ROH	ESIB40	2917	04 Feb 02
Turntable Controller	H-D	HD 050	2528	TU
DRG Ant	EMC	3115	2397	04 July 04
Horn Ant	EMC	3115	2297	04 July 04
EMI Receiver	ROH	8542E	2286	13 Dec 03
Bilog Antenna	CHA	CBL 6143	2860	11Apr 04
Turntable & Controller	HD	HD 050	2528	TU
Antenna Mast	EMC	2070	-	TU
Antenna Mast Controller	EMC	2090	-	TU
Screened Room 5	SIE	EAC 54300	2533	TU
Low Noise Amplifier (1-8GHz)	MIT	AMF-3D-001080-18-13P	2457	TU
Signal Generator	HEW	8672A	411	26 Feb 04
Transient Limiter	HEW	11947A	2243	23 Jan 04
Three Phase LISN	ROH	ESH2-Z5	2380	09 Jan 04
Test Receiver	ROH	ESIB 40	2917	04 Feb 04
Amplifier (8-18GHz)	AVA	AWT-18036	1081	26 June 04
YIG Filter (4-40GHz)	FIL	FD 3103	-	TU
Horn (18-40GHz)	ADV	AM180HA-K-TU2	2945	15 May 05
Amplifier (18-40GHz)	NAR	DB02-0447	2936	23 Apr 04
Barometer	DIP	-	1938	TU
Hygrometer	Rotronic	A1	INV4066	28 Oct 03
Barometer	DIP	-	1938	TU

Note(s)

All items are calibrated annually, except where labelled T/U (Traceability Unscheduled). These items are calibrated within the test configurations using calibrated equipment.



EQUIPMENT INFORMATION-continued

Test Equipment and Ancillaries Used For Test-continued

Key To Manufacturers

ASS No Data
ELE Electrometrics
EMC Emco
FLA Flann
FLU Fluke
HEW Hewlett Packard
LOR Lorch
LEC LeCroy
H-D No Data
MON Montford
RAY Rayproof
REY Reynolds
ROH Rohde & Schwarz
RTC Rotronic
THU Thurlby
WEI Weinschel
VAR Various
VLT Voltech
VOL Volteck
YRK York Electronics

INSTRUMENTATION USED FOR EXERCISING THE EUT

Instrument	Manufacturer	Type No	INV No
Laptop Computer	Dell	Latitude CPI	N/A
Laptop Computer	Dell	Latitude C400	N/A



PART 1
5.15 –5.25 GHz



Test Case : Band Edge Measurements
Test Date : 14th August 2003
Rule Parts : 15.407(b)(6)

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(6) and Subpart C Section 15.205, for Restricted Bands of Operation was carried out on the Measurement Test Facility detailed in Annex A.

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

EUT was operating at maximum power at 11Mbps.

Step 1

Bottom Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
5.180	V	100	180	110.80	97.91

Step 2

Determine Marker delta amplitude between 5.180GHz fundamental and 5.150GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

The Marker Delta = 48.79dB

Step 3

By subtracting the Marker Delta obtained from Step 2 from the 5.180GHz Field Strength measurement from Step 1, gives following Result

Peak of 110.80dBµV/m – 48.79dB (Delta) = 62.01dBµV/m (Limit is 74.0dBµV/m = Pass)

Average of 97.91dBµV/m – 48.79dB (Delta) = 49.12dBµV/m (Limit is 54.0dBµV/m = Pass)

Performed by: B Airs, Radio Engineer.



Test Case : Band Edge Measurements
Test Date : 14th August 2003
Rule Parts : 15.407(b)(6)

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(6) and Subpart C Section 15.205, for Restricted Bands of Operation was carried out on the Measurement Test Facility detailed in Annex A.

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

EUT was operating at maximum power at 11Mbps.

Step 1

Top Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
5.240	V	100	182	112.55	100.77

Step 2

Determine Marker delta amplitude between 5.240GHz fundamental and 5.350GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

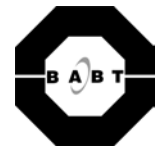
The Marker Delta = 57.92dB

Step 3

By subtracting the Marker Delta obtained from Step 2 from the 5.240GHz Field Strength measurement from Step 1, gives following Result

Peak of 112.55dBµV/m – 57.92dB (Delta) = 54.63dBµV/m (Limit is 74.0dBµV/m = Pass)

Average of 100.77dBµV/m – 57.92dB (Delta) = 42.85dBµV/m (Limit is 54.0dBµV/m = Pass)



Test Case : Peak Output Power
 Test Date : 11th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

Measurement Method

The EUT was connected to a Digital Storage Oscilloscope via an attenuator and Crystal Detector. The DC output from the Crystal Detector was measured on the Oscilloscope. The EUT was then substituted for a Signal Generator. The generators frequency was adjusted to that of the EUT and the amplitude increased to give the same DC level as measured from the EUT. The level was read from the Signal Generator, which gave the peak output power.

Measurements were made with the EUT transmitting on the following channels.

Bottom Channel: 5180MHz
 Middle Channel: 5220MHz
 Top Channel: 5240MHz

Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)	Result (mW)
5180	6	16.55	45.19
5220	6	16.81	48.02
5240	6	16.82	48.08
5180	54	16.65	46.24
5220	54	16.23	41.98
5240	54	16.70	46.77

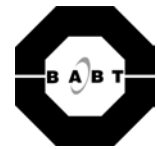
Limits

Frequency Band (GHz)	Limit
5.15 – 5.25	50mW or 48.08mW*

* 26dB Bandwidth = 19.14MHz

$$\therefore 4 + 10\log B = 4 + 10 \log 19.14 = 16.82\text{dBm} = 48.08\text{mW}$$

Performed by: B Airs, Radio Engineer.



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

Measurement Method

The EUT was connected to the Spectrum Analyser via a 20dB Attenuator. The EUT was set to transmit at maximum power on all three channels and at the highest and lowest data rates.

With the EUT transmitting, the trace was adjusted to display the 26dB bandwidth of the fundamental. The RBW was adjusted to 1MHz with the VBW set to 3MHz. The Spectrum Analyser detector was set to Sample. The trace was then averaged using the Power Averaging function over 200 samples. The peak response was then measured and recorded.

The results are recorded in the table below.

Results

Frequency Band: 5150 – 5250MHz

Frequency (MHz)	Data Rate (Mbps)	Measurement Bandwidth (MHz)	Result (dBm)
5180	6	1	1.451
5220	6	1	1.542
5240	6	1	1.877
5180	54	1	1.435
5220	54	1	1.543
5240	54	1	2.045

Limit	≤ +4dBm/1MHz
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Remarks

The EUT met the requirements specified in Clause 15.407(a)(1). The Peak Power Spectral Density was below the +4dBm/MHz limit.

Procedure: Test Performed In Accordance With 15.407(a)(1)

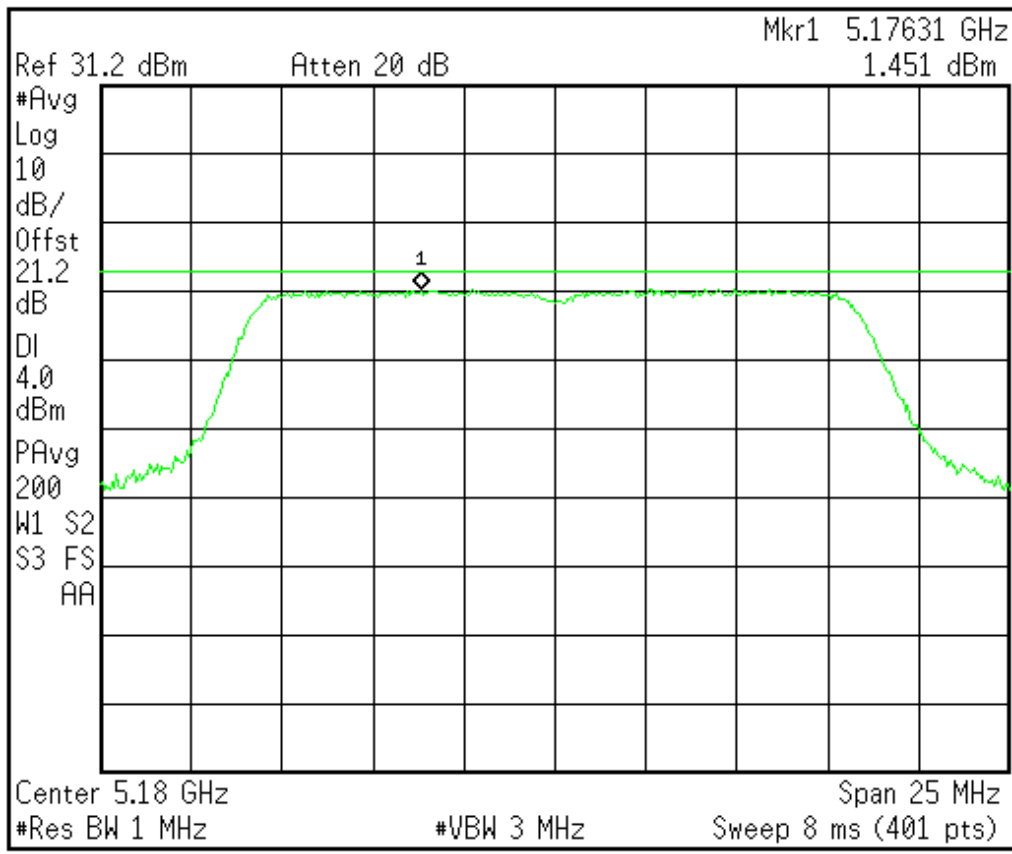
Performed by: B Airs, Radio Engineer.



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

5180.0MHz – Maximum Power 6Mbps

Agilent 10:53:27 Aug 13, 2003



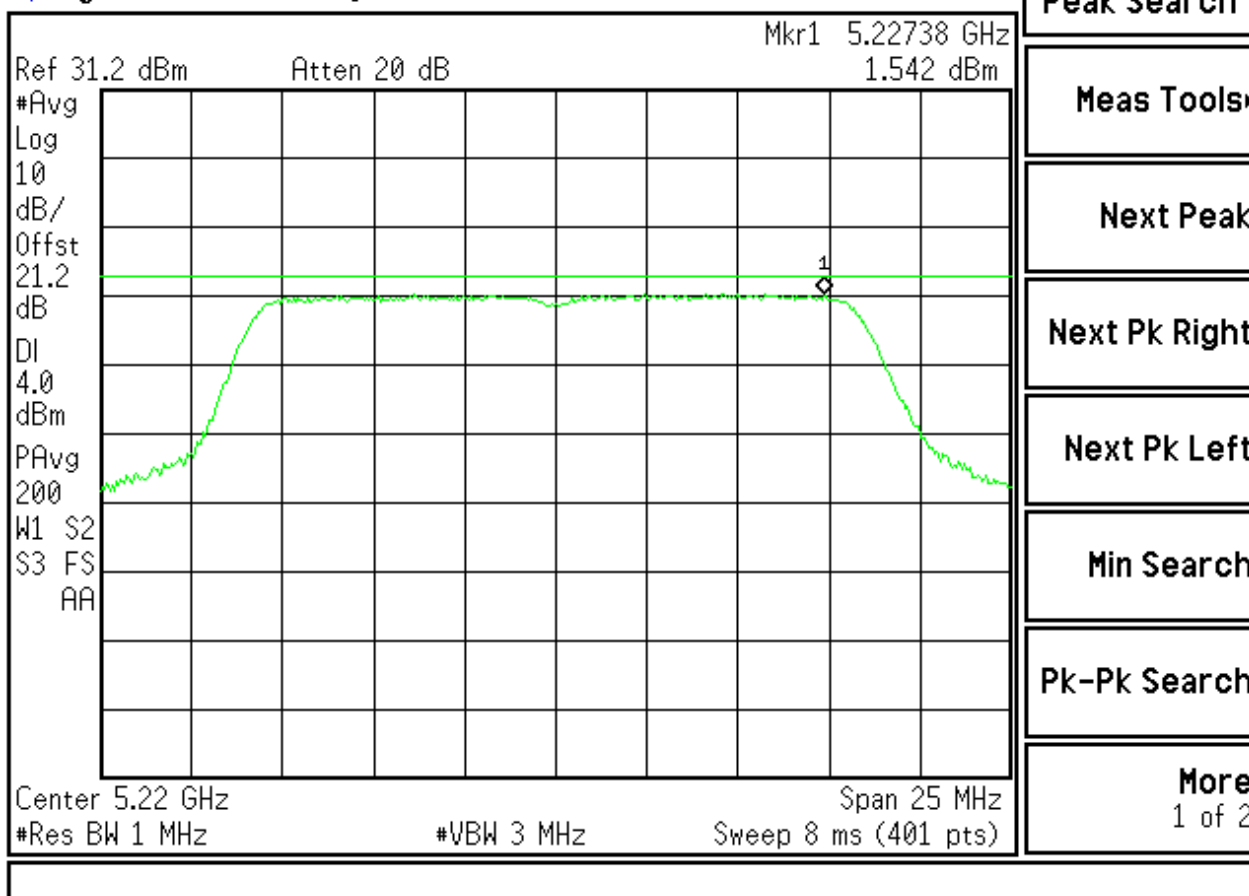
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2

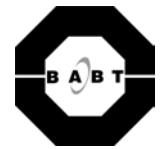


Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

5220.0MHz – Maximum Power 6Mbps

Agilent 11:02:53 Aug 13, 2003

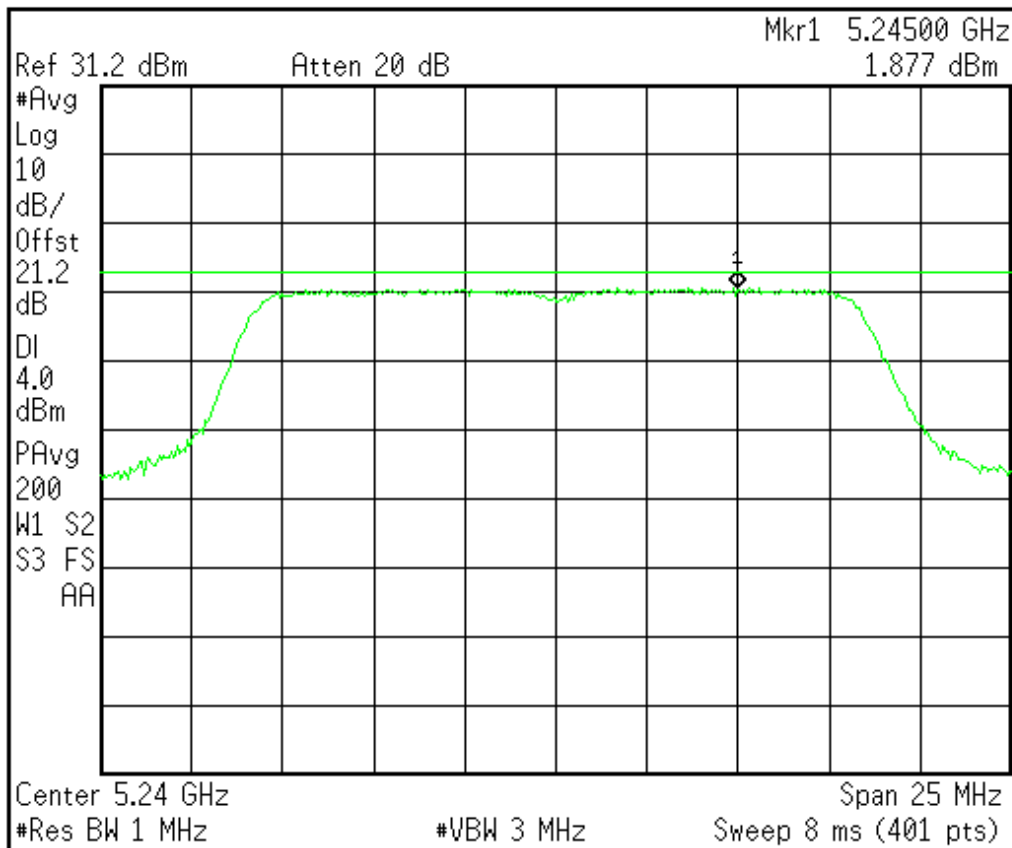




Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

5240.0MHz – Maximum Power 6Mbps

Agilent 11:06:14 Aug 13, 2003



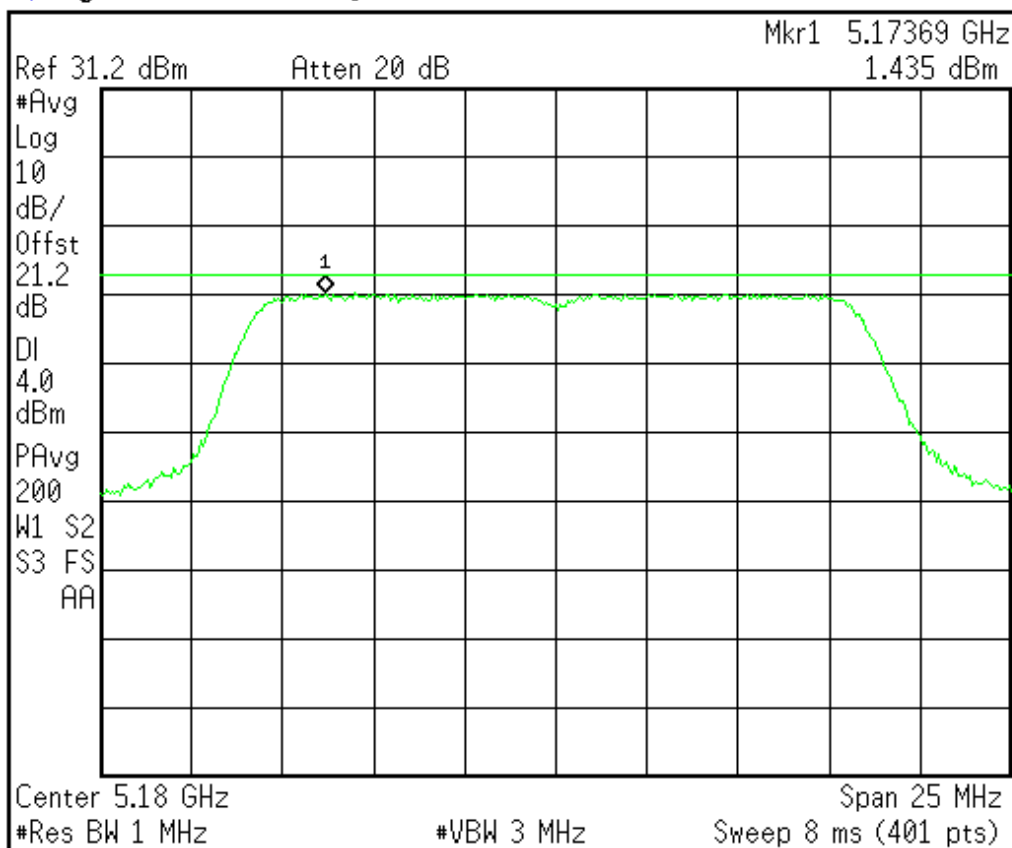
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



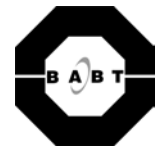
Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

5180.0MHz – Maximum Power 54Mbps

Agilent 10:57:44 Aug 13, 2003



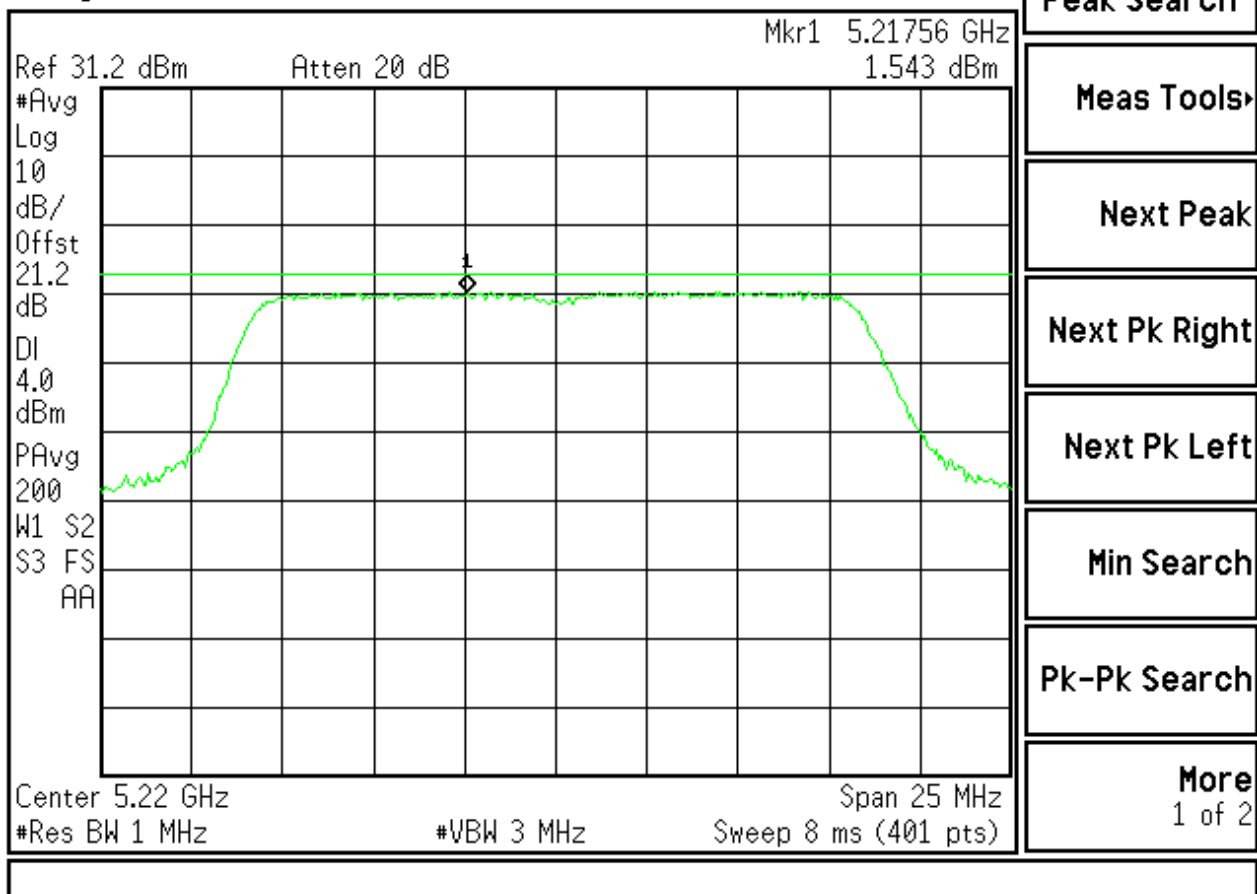
File
Catalog
Save
Load
Delete
Copy
Rename
More 1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

5220.0MHz – Maximum Power 54Mbps

Agilent 12:57:59 Aug 13, 2003

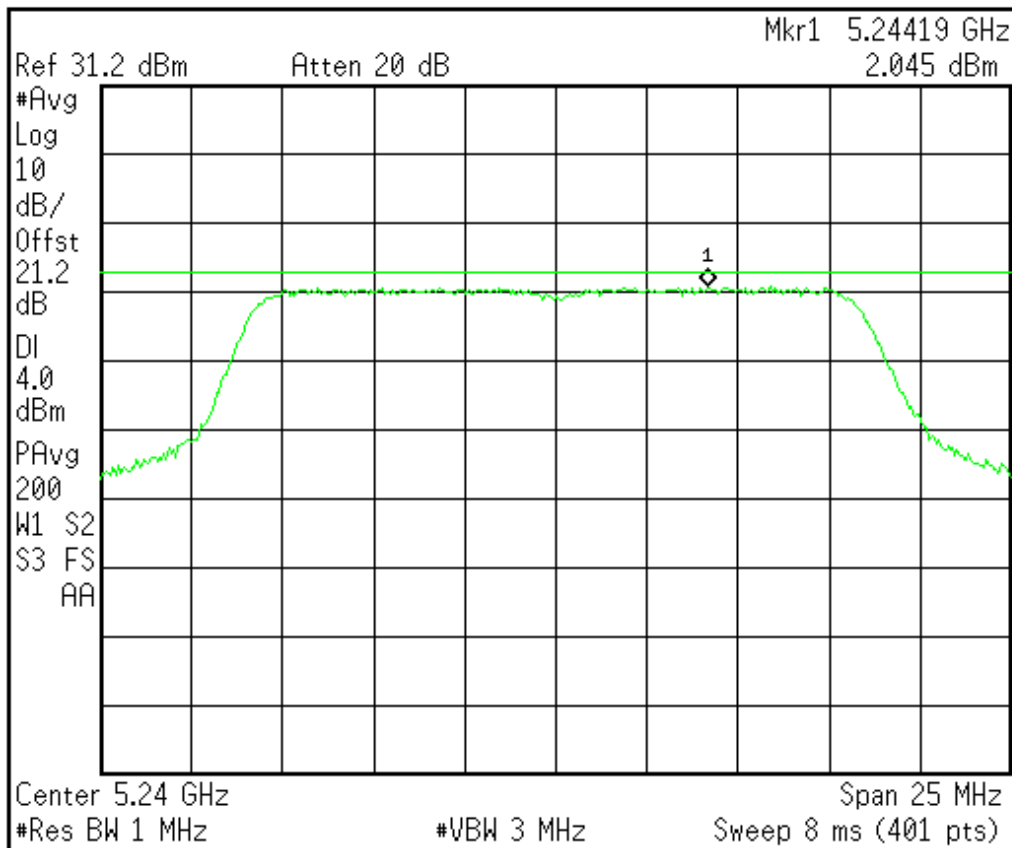




Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(1)

5240.0MHz – Maximum Power 54Mbps

Agilent 11:08:55 Aug 13, 2003



Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

Measurement Method

The EUT was connected to the Spectrum Analyser using a 20dB Attenuator and cables. The RBW was set to 300kHz and the VBW to 1MHz. The Span was adjusted to encompass the whole of the fundamental. The Peak detector was selected and the trace was set to View. The peak of the fundamental was searched. From this point, the marker delta function of the Analyser was used to establish the -26dBc points. The resultant difference in the markers was recorded as the Emission Bandwidth.

Results

Frequency Band: 5150 – 5250MHz

Frequency, (MHz)	Data Rate, (Mbps)	Emission Bandwidth, (MHz)
5180	6	19.138277
5220	6	19.739479
5240	6	19.939880
5180	54	19.839679
5220	54	19.338677
5240	54	19.438878

Remarks

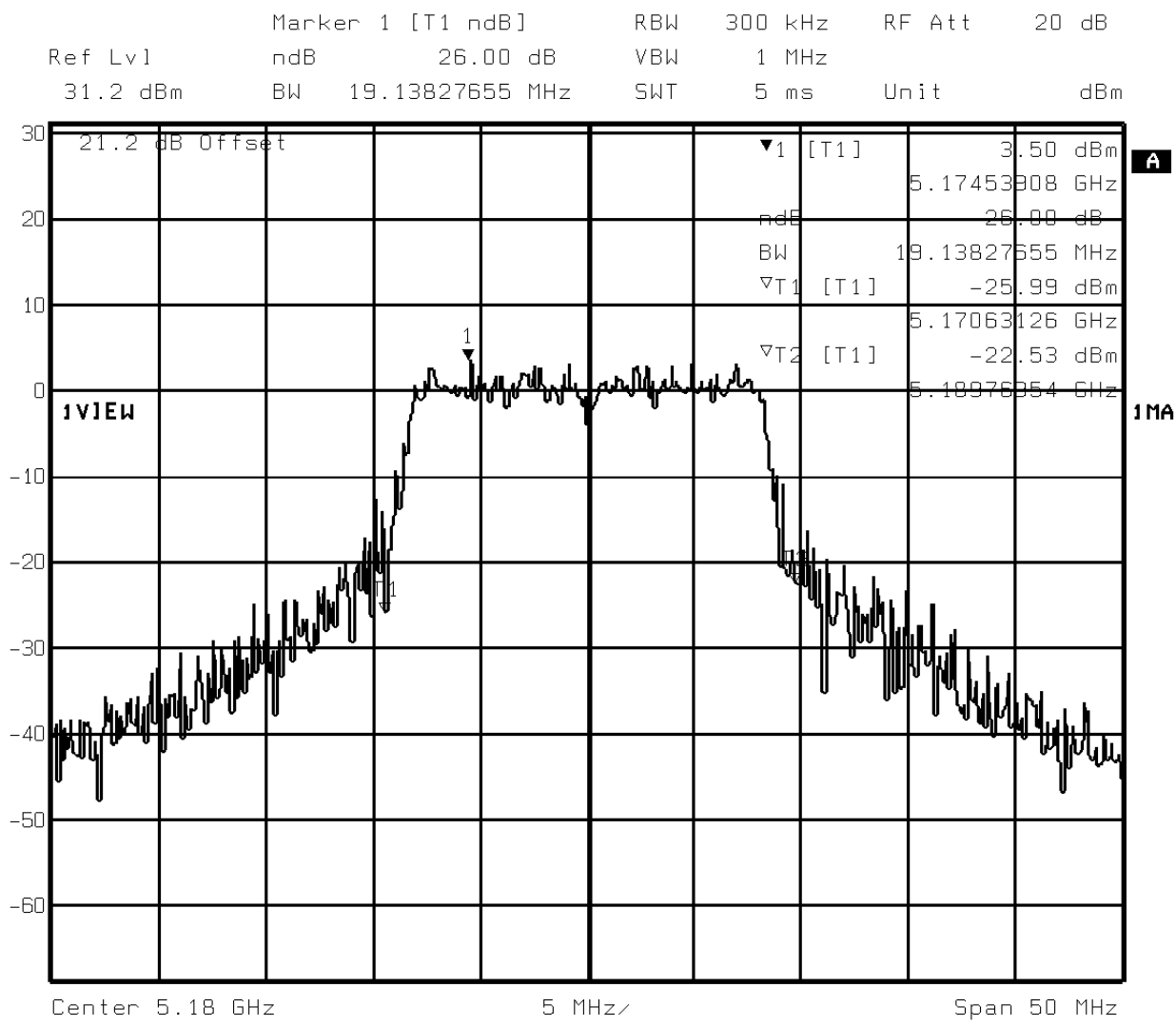
Procedure: Test Performed In Accordance With 15.407(a)(1)(2)(3)

Performed by: B Airs, Radio Engineer.



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5180.0MHz – Maximum Power 6Mbps

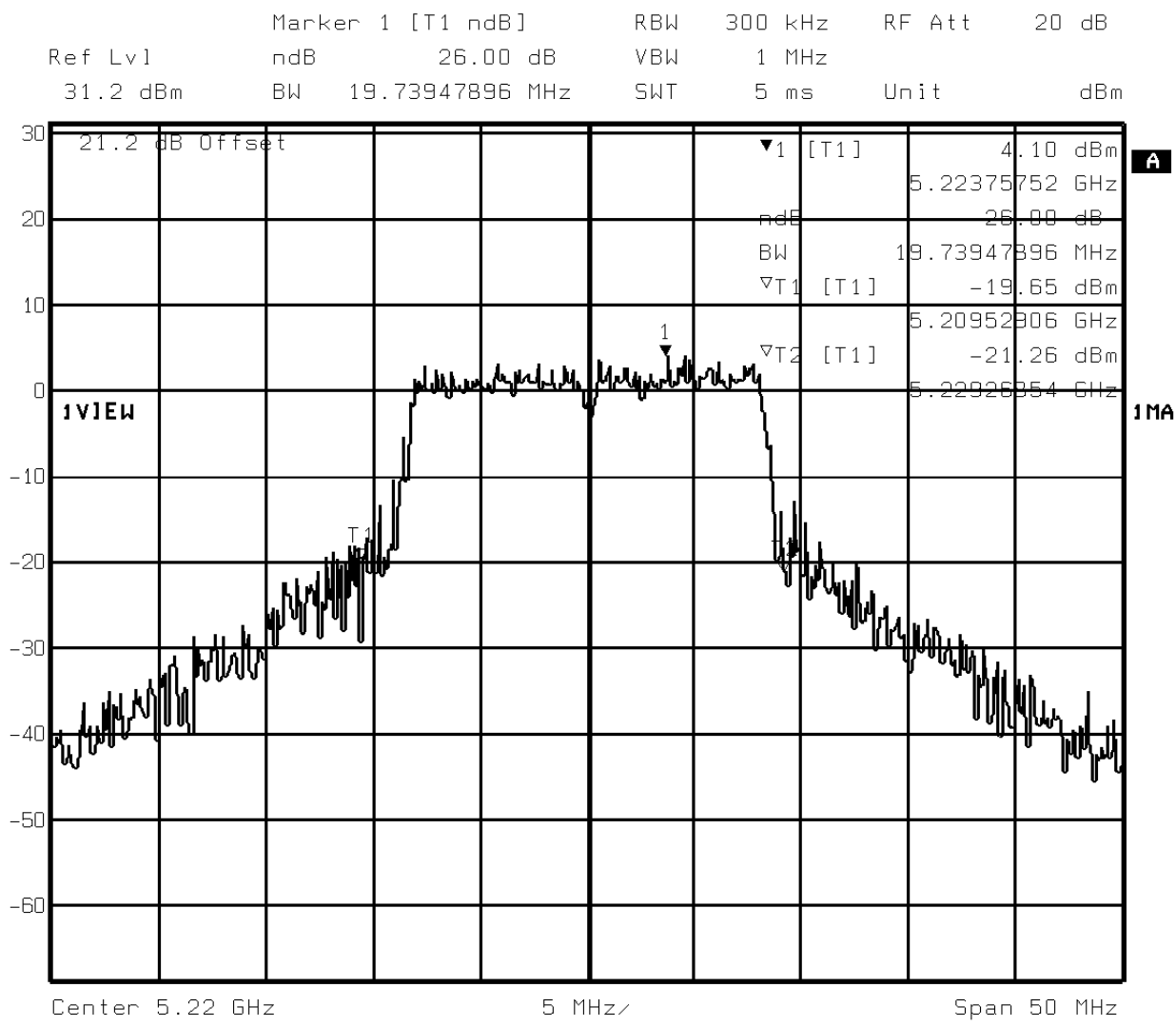


Date: 14.AUG.03 8:44:10



Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5220.0MHz – Maximum Power 6Mbps



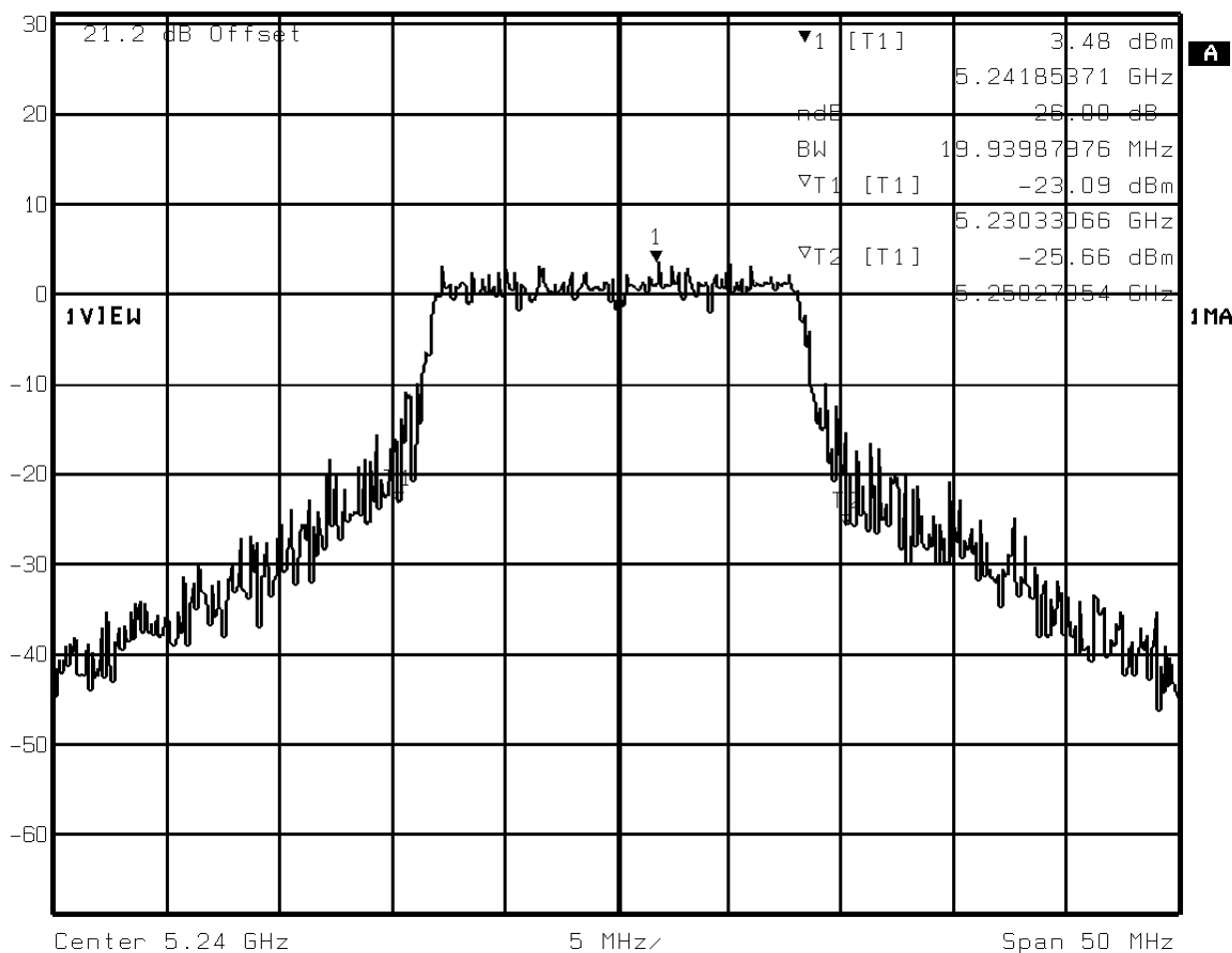
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Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5240.0MHz – Maximum Power 6Mbps

	Marker 1 [T1 ndB]	RBW	300 kHz	RF Att	20 dB
Ref Lvl	ndB	26.00 dB	VBW	1 MHz	
31.2 dBm	BW	19.93987976 MHz	SWT	5 ms	Unit dBm



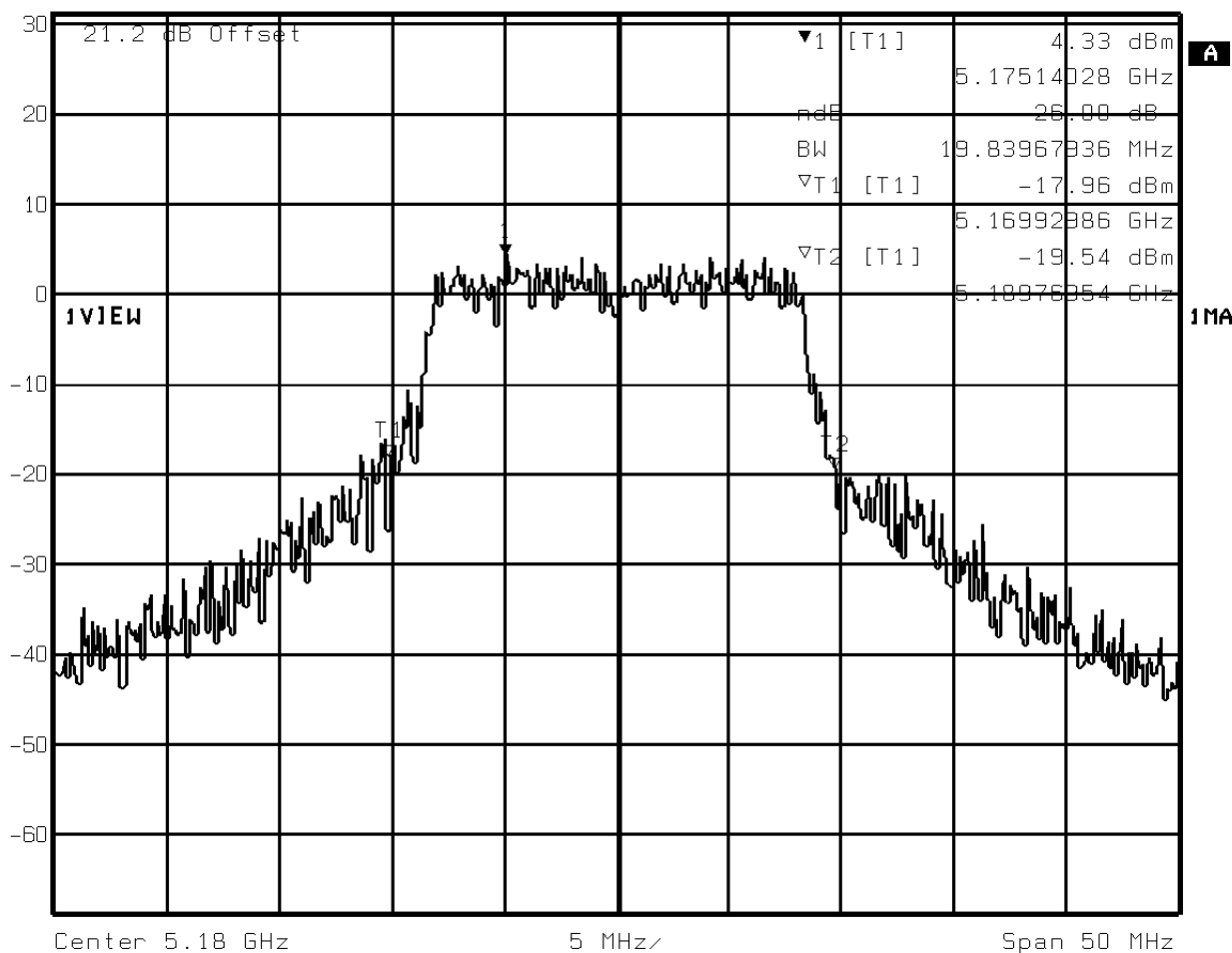
Date: 14.AUG.03 8:53:29



Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5180.0MHz – Maximum Power 54Mbps

	Marker 1 [T1 ndB]	RBW	300 kHz	RF Att	20 dB
Ref Lvl	ndB	26.00 dB	VBW	1 MHz	
31.2 dBm	BW	19.83967936 MHz	SWT	5 ms	Unit dBm



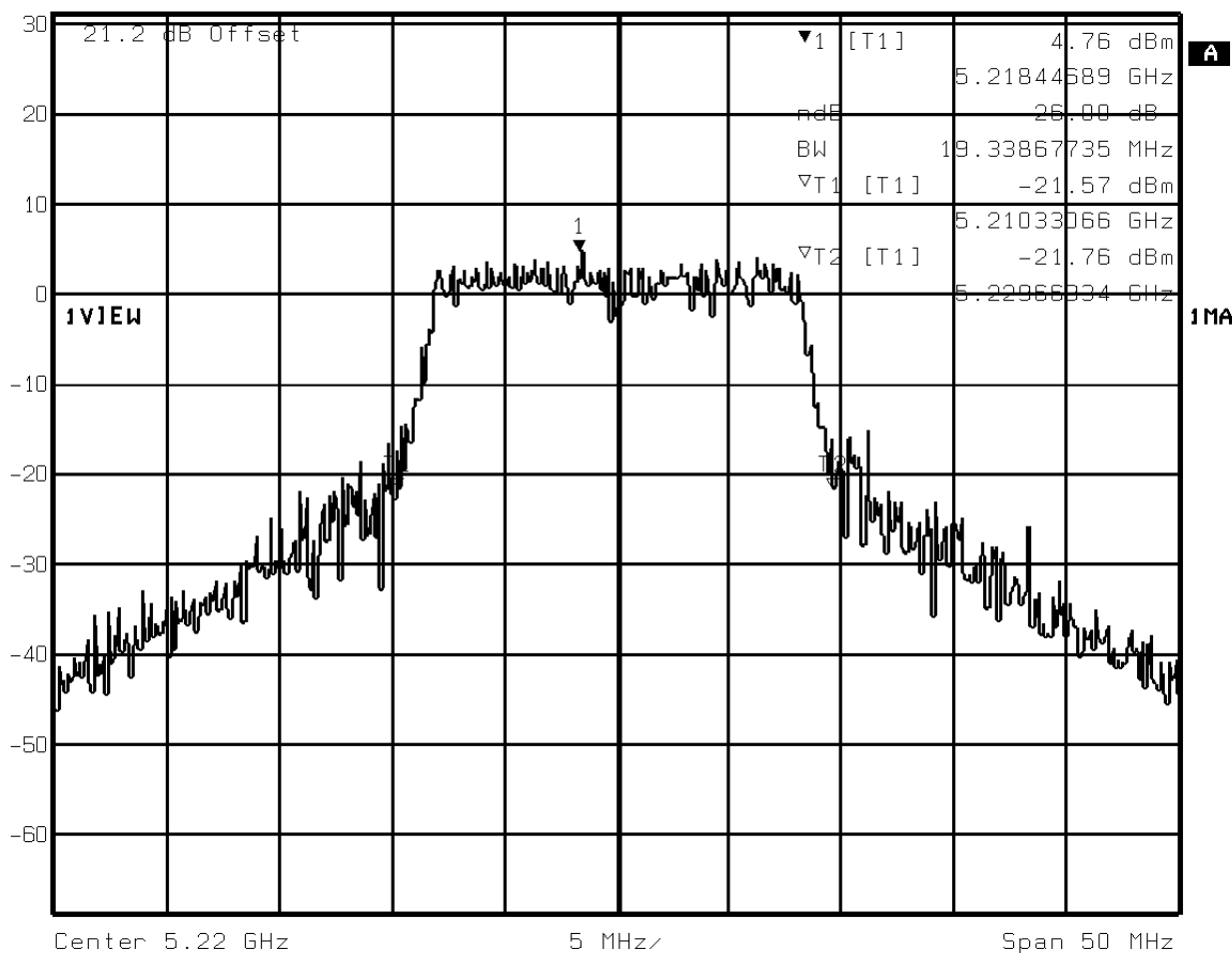
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Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5220.0MHz – Maximum Power 54Mbps

	Marker 1 [T1 ndB]	RBW	300 kHz	RF Att	20 dB
Ref Lvl	ndB	26.00 dB	VBW	1 MHz	
31.2 dBm	BW	19.33867735 MHz	SWT	5 ms	Unit dBm

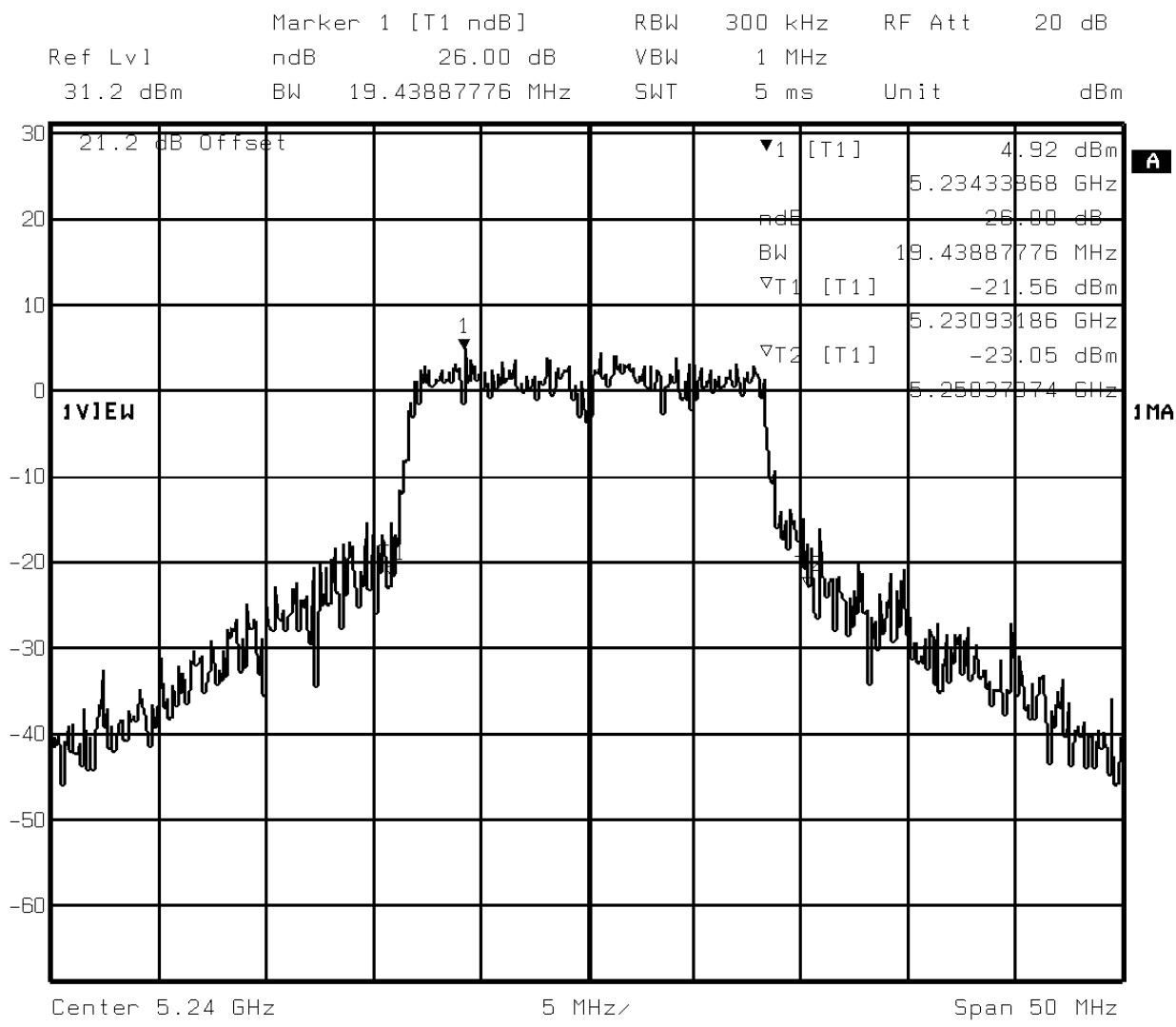


Date: 14.AUG.03 8:48:14



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5240.0MHz – Maximum Power 54Mbps



Date: 14.AUG.03 8:55:54



Test Case: : Frequency Stability Under Temperature Variations
Test Date: : 13th August 2003
Rule Parts: : 2.1055, 15.407(g)

Measurement Method

The EUT was set to transmit on maximum power with no modulation. A Frequency Counter was used to measure the frequency. The maximum frequency error was recorded. The temperature was adjusted between -30°C and $+50^{\circ}\text{C}$ in 10° steps as per 2.1055.

Results

48V DC Supply

Temperature Interval ($^{\circ}\text{C}$)	Test Frequency (GHz)	Deviation (kHz)	Limit (kHz)
-30	5220	-11.287	\pm
-20	5220	7.992	\pm
-10	5220	20.061	\pm
0	5220	16.520	\pm
+10	5220	6.336	\pm
+20	5220	-7.205	\pm
+30	5220	-3.347	\pm
+40	5220	-16.308	\pm
+50	5220	-19.613	\pm

Remarks

The frequency stability of the EUT is sufficient to keep it within the allocated frequency bands at any temperature interval across the measured range.

Performed by: B Airs, Radio Engineer.



Test Case : Spurious Conducted Emissions on Power Lines
Test Date : 31st July 2003
Rule Parts : 15.407(b)(5)

Test Procedure

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(5) which also requires Rule parts 15.207 to be applied. for Conducted Emissions was carried out on the Measurement Test Facility detailed in Annex A.

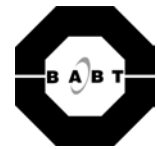
Conducted Emission Measurements were undertaken within the semi-anechoic chamber. Emissions were measured on the Live and Neutral Lines.

Emissions were formally measured using a Quasi-Peak Detector, which meets the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the tables below.

The EUT was connected to a 120V 60Hz supply.

The Conducted Emission measurements were made using a Hewlett Packard 8542E EMI Receiver.

The test was performed in accordance with ANSI C63.4.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Bottom Channel (5.180GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2834	43.9	60.7	39.6	50.7
0.3178	39.2	59.8	35.7	49.8
0.4952	39.8	56.1	29.7	46.1
0.6225	37.5	56.0	37.1	46.0
2.3390	36.5	56.0	30.2	46.0
2.6210	36.8	56.0	31.3	46.0

The margin between the specification requirements and all other emissions were 18.8dB or more below the specified Quasi-Peak limit and 17.4dB or more below the Average limit.

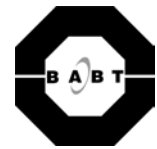
Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2830	44.5	60.7	39.7	50.7
0.3181	40.0	59.8	35.6	49.8
0.4964	38.7	56.1	32.4	46.1
0.6227	37.4	56.0	37.0	46.0
0.7788	34.7	56.0	24.9	46.0
2.3380	36.1	56.0	29.5	46.0

The margin between the specification requirements and all other emissions were 21.3dB or more below the specified Quasi-peak limit and 21.1dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Middle Channel (5.220GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2835	43.9	60.7	39.7	50.7
0.3186	39.4	59.8	35.9	49.8
0.4953	39.9	56.1	29.7	46.1
0.6024	37.2	56.0	28.5	46.0
0.6212	37.7	56.0	37.3	46.0
2.5890	36.5	56.0	30.2	46.0

The margin between the specification requirements and all other emissions were 21.1dB or more below the specified Quasi-Peak limit and 19.7dB or more below the Average limit.

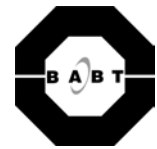
Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2840	44.3	60.7	39.5	50.7
0.3179	40.0	59.8	35.5	49.8
0.4962	38.7	56.1	32.4	46.1
0.6219	37.7	56.0	37.3	46.0
0.7787	34.9	56.0	25.3	46.0
2.5850	36.4	56.0	29.9	46.0

The margin between the specification requirements and all other emissions was 21.1dB or more below the specified Quasi-peak limit and 20.7dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5))

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Top Channel (5.240GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2833	43.9	60.7	39.7	50.7
0.3185	39.4	59.7	35.9	49.7
0.4966	39.9	56.1	29.5	46.1
0.6021	37.3	56.0	28.7	46.0
0.6219	37.6	60.0	37.2	50.0
2.6230	36.4	60.0	30.7	50.0

The margin between the specification requirements and all other emissions was 20.8dB or more below the specified Quasi-Peak limit and 16.3dB or more below the Average limit.

Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2831	44.5	60.7	39.7	50.7
0.3194	39.9	59.7	35.4	49.7
0.4966	38.6	56.1	32.4	46.1
0.6210	37.8	56.0	37.5	46.0
0.7787	34.8	60.0	25.0	50.0
2.5850	36.5	60.0	29.9	50.0

The margin between the specification requirements and all other emissions was 21.2dB or more below the specified Quasi-peak limit and 21.0dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

Measurement Method

The EUT was connected to the Spectrum Analyser via a 20dB Attenuator. The EUT was set to transmit at maximum power on all three channels and at the highest and lowest data rates.

With the EUT transmitting, the trace was adjusted to display the entire emission bandwidth of the fundamental. The RBW was adjusted to 1MHz with the VBW set to 3MHz. Trace 1 was set to Max Hold with a peak detector. Trace 2 was then selected with a sample detector. The VBW on trace 2 was reduced to 30kHz and the trace set to max hold. Using the marker delta function, the difference between the two traces was measured.

The measurement plots are shown on the following pages.

Remarks

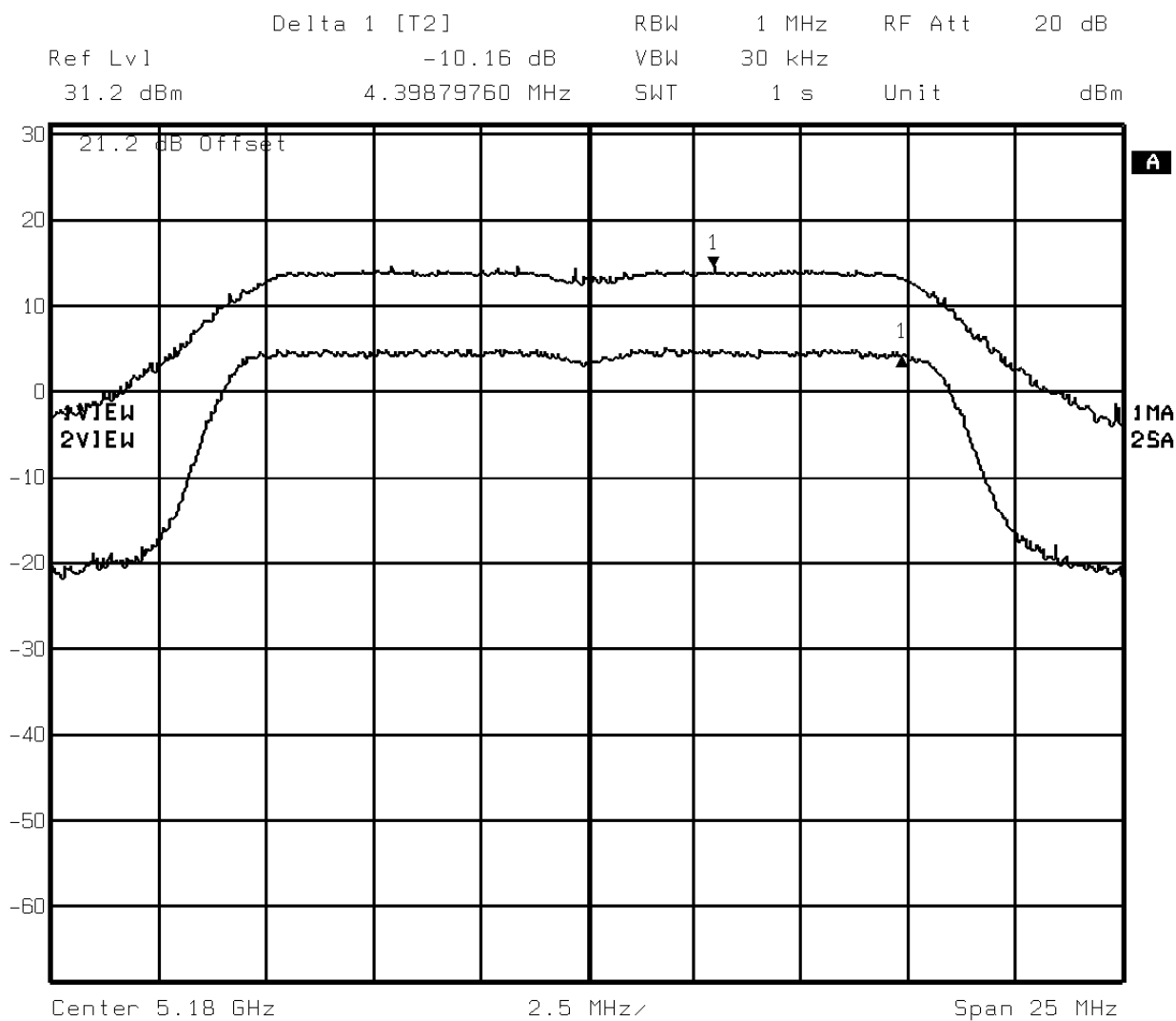
The equipment met the requirements outlined in Clause 15.407(a)(6) where the peak excursion was less than 13dB.

Performed by: B Airs, Radio Engineer.



Test Case: : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5180.0MHz – Maximum Power 6Mbps

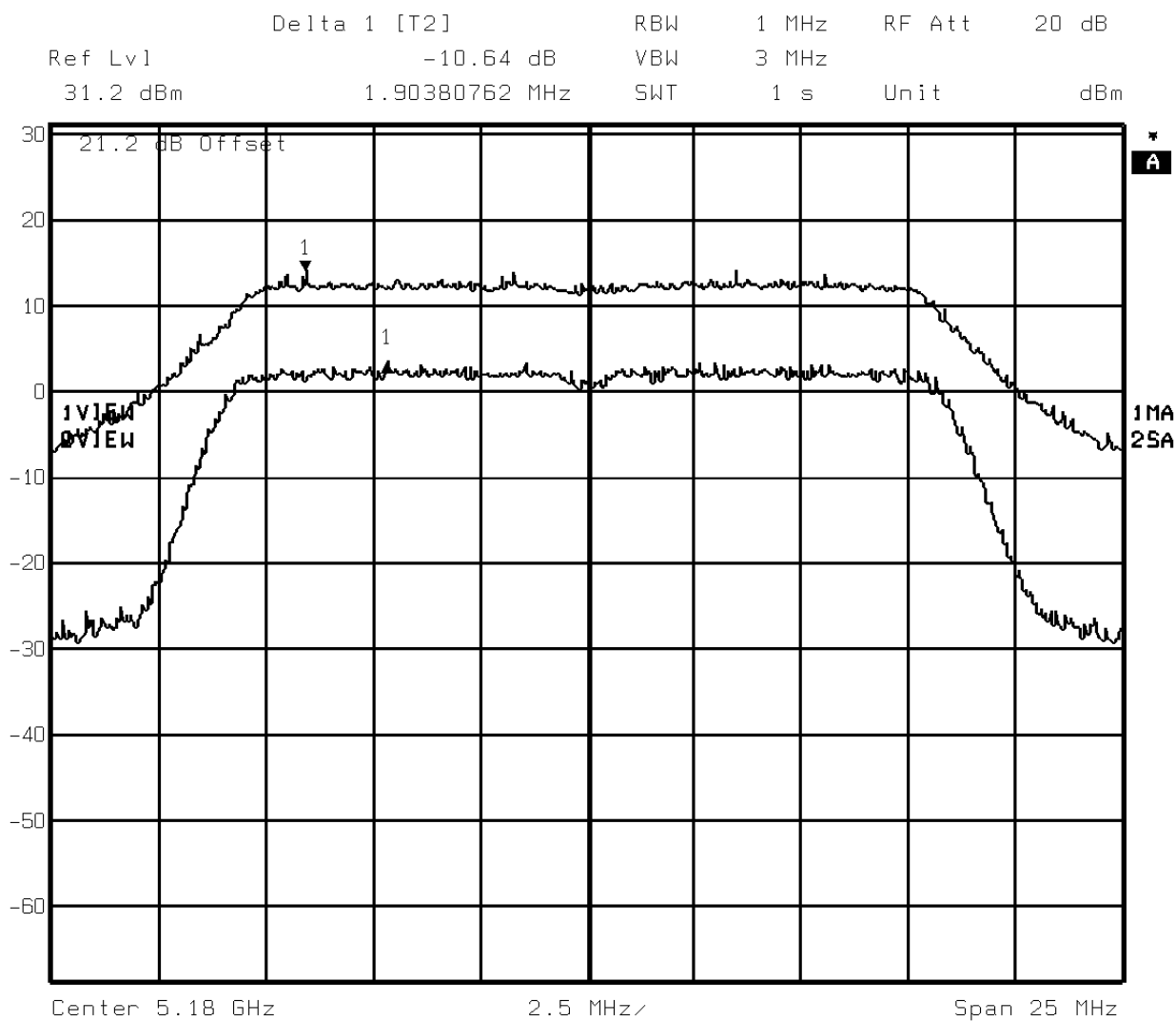


Date: 15.AUG.03 10:12:20



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5180.0MHz – Maximum Power 54Mbps

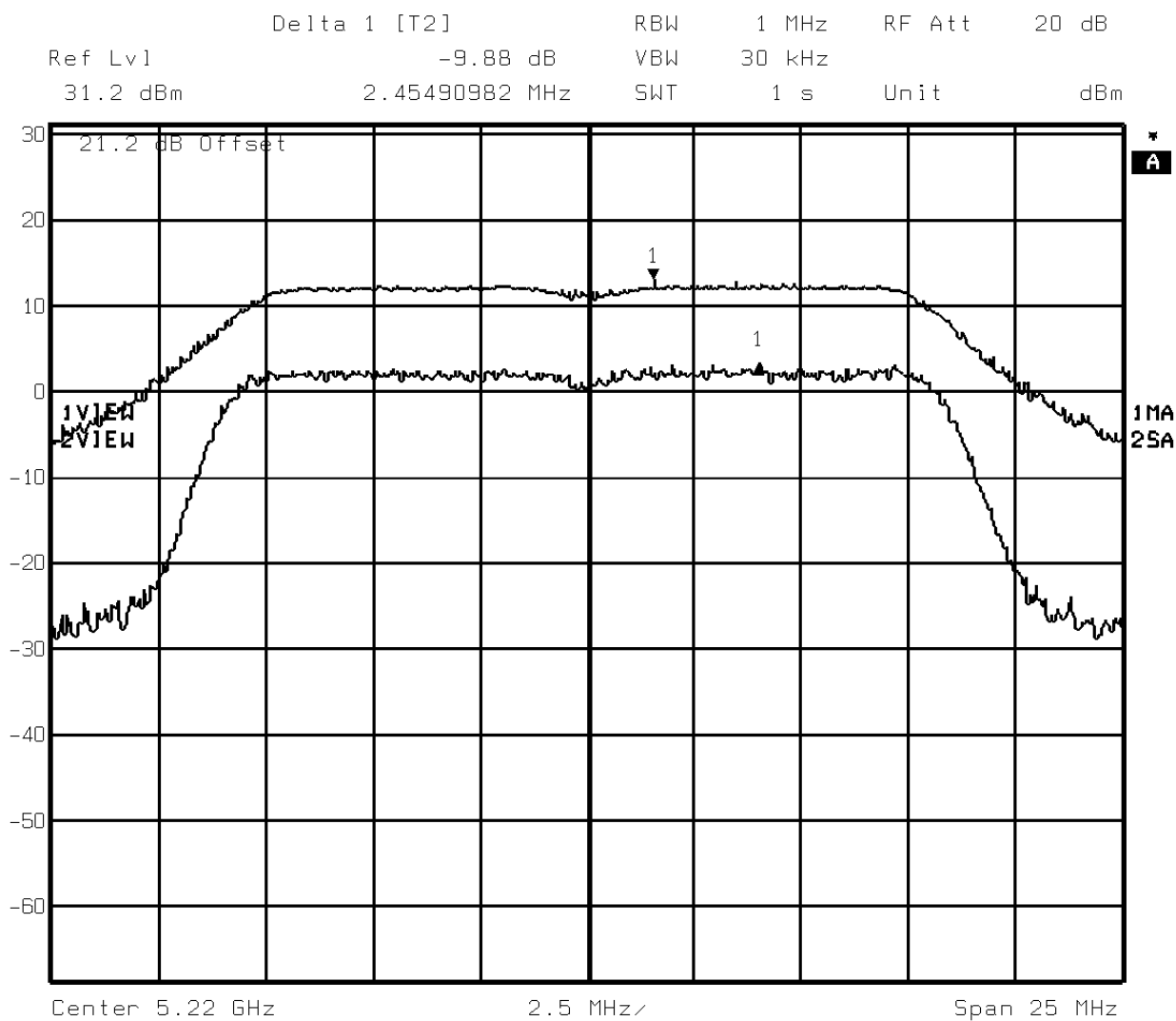


Date: 15.AUG.03 10:20:03



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5220.0MHz – Maximum Power 6Mbps

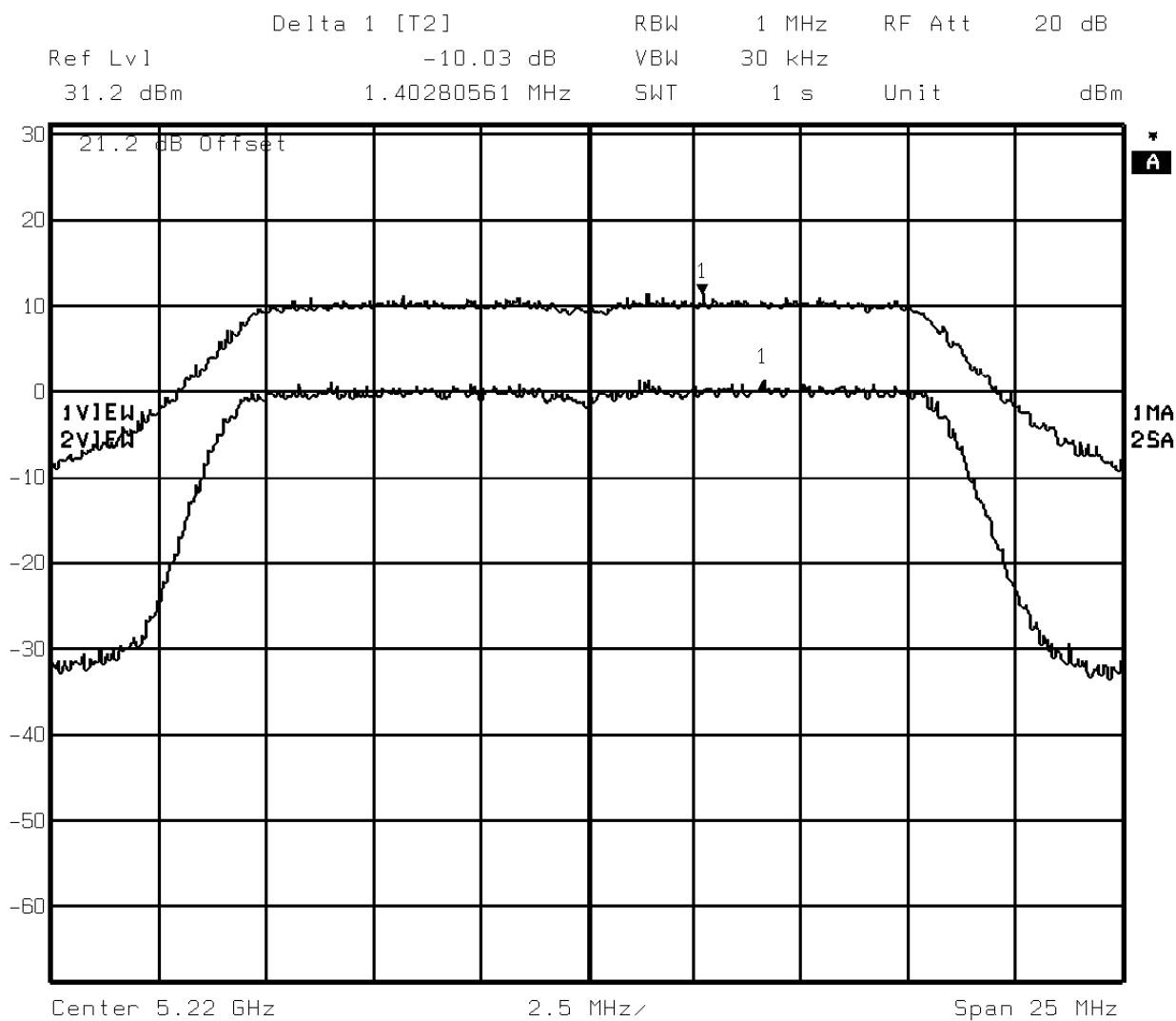


Date: 15.AUG.03 10:50:25



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5220.0MHz – Maximum Power 54Mbps

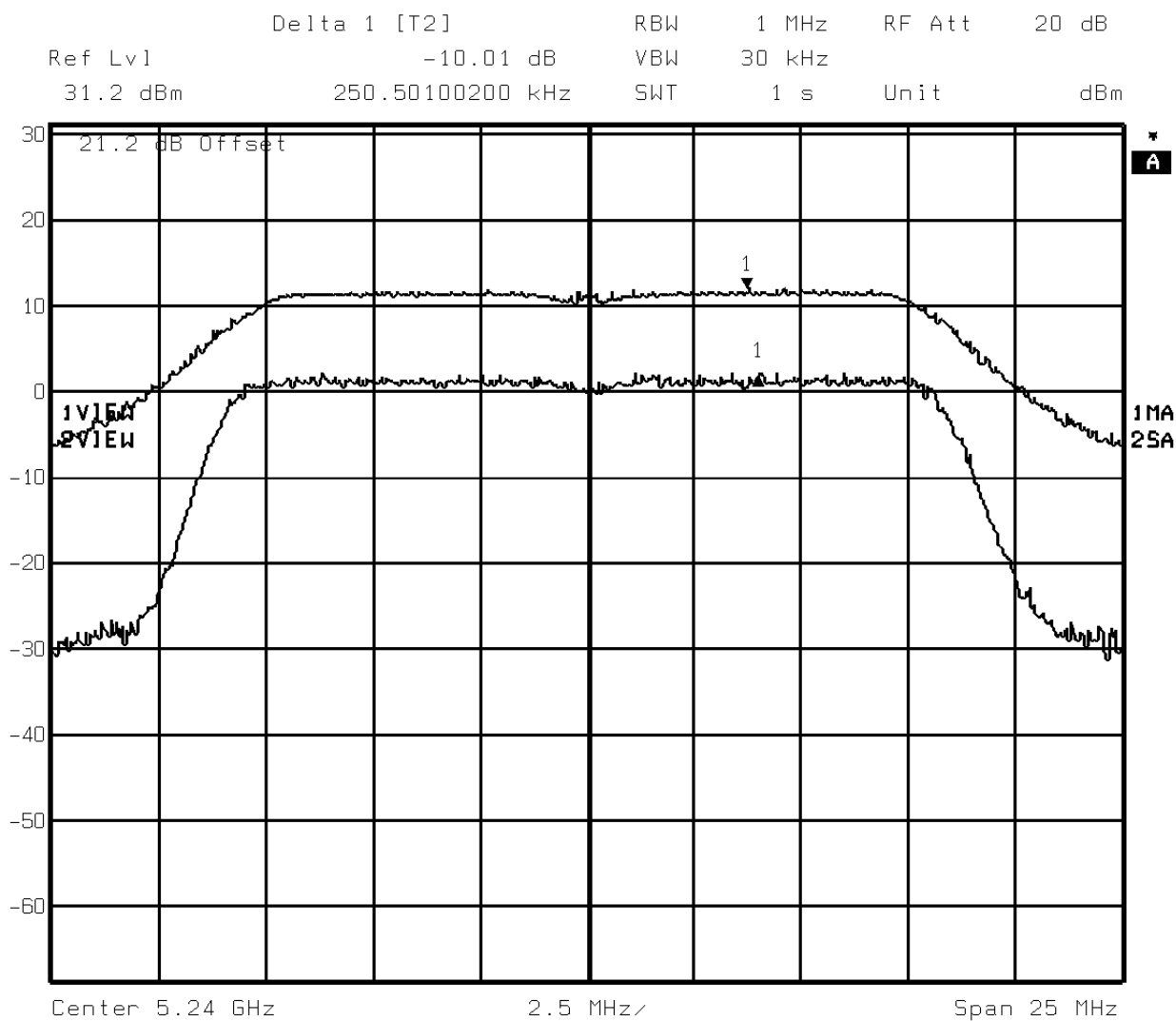


Date: 15.AUG.03 10:42:48



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5240.0MHz – Maximum Power 6Mbps

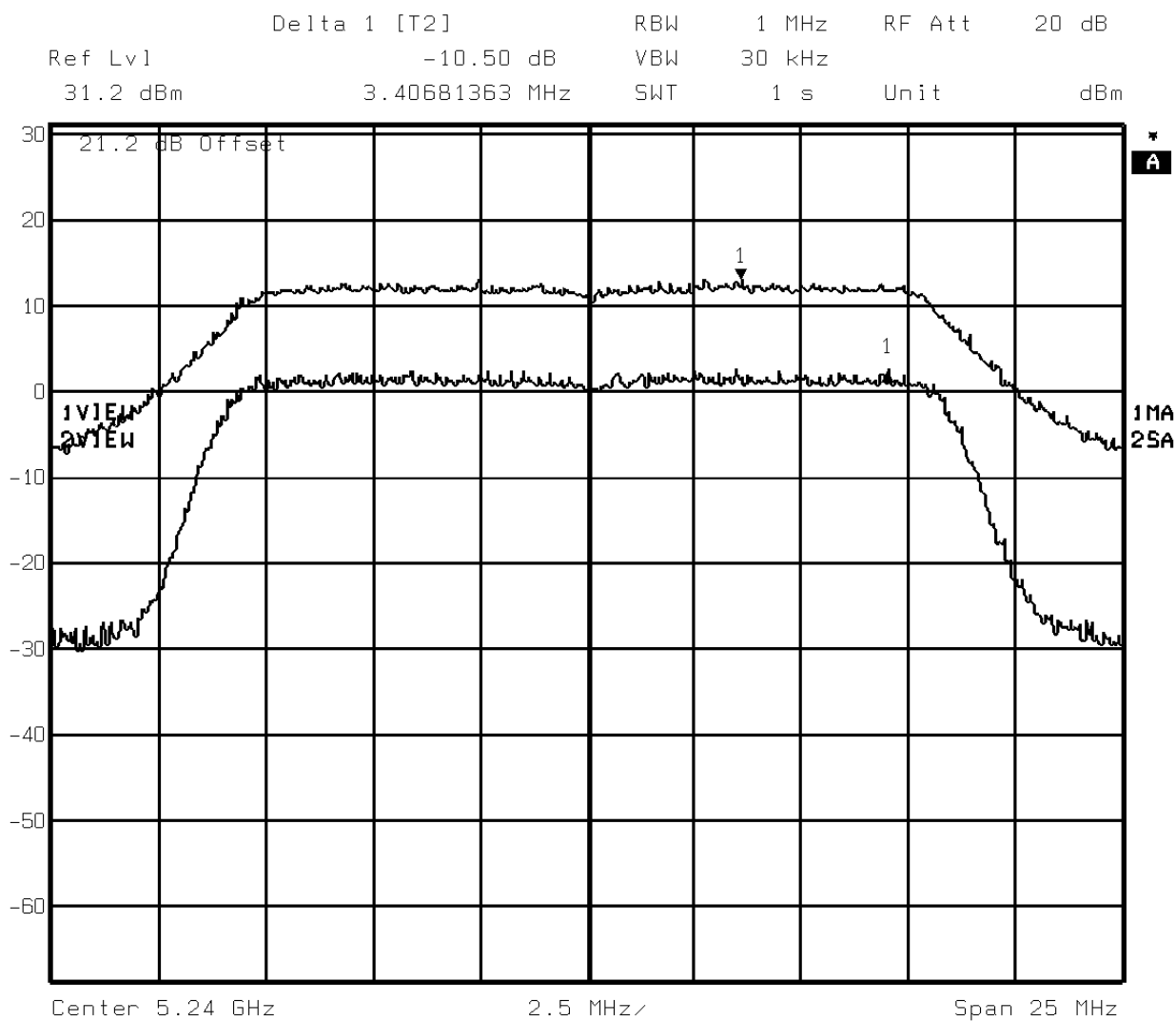


Date: 15.AUG.03 10:54:41



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5240.0MHz – Maximum Power 54Mbps



Date: 15.AUG.03 10:59:33



Test Case : Spurious Radiated Emissions
Test Date : 5th July 2003
Rule Parts : 15.407(b)(5) (6)

Measurement Method

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(5) (6), for Radiated Electric Field Emissions was carried out on the Measurement Test Facility detailed in Annex A. Section 15.407(b)(5) (6) also requires Rule parts 15.205 and 15.209 to be applied.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 25GHz. The list of worst-case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector. 1GHz – 25GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was operating via the internal power supply of the Host.

Measurements were made with the EUT transmitting on the following channels.

Bottom Channel: 5180MHz
Middle Channel: 5220MHz
Top Channel: 5240MHz

Spurious Radiated Emissions from 30MHz to 1GHz were made using a HP 8542E Test Receiver.

Spurious Radiated Emissions from 1GHz to 25GHz were made using a Rhode and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.



Test Case : Spurious Radiated Emissions (cont'd)
Test Date : 14th August 2003
Rule Parts : 15.407(b)(5) (6)

30MHz - 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15.407(b)(5) (6), 15.205 and 15.209 for Radiated Emissions (30MHz – 1GHz).

EUT Tx on Bottom Channel (5.180GHz)

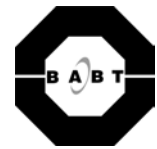
30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
38.8401	V	100	79	34.2	51.3	40.0	100.0
39.6763	V	100	90	34.0	50.1	40.0	100.0
56.7751	V	100	173	34.0	50.1	40.0	100.0
60.8051	V	100	138	38.2	81.3	40.0	100.0
62.2520	V	100	112	38.2	81.3	40.0	100.0
81.1884	V	100	216	37.9	78.5	40.0	100.0

EUT Tx on Middle Channel (5.220GHz)

30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
39.5603	V	100	76	34.7	54.3	40.0	100.0
58.7807	V	100	77	35.7	61.0	40.0	100.0
59.2502	V	100	95	34.1	50.7	40.0	100.0
60.8111	V	100	111	38.8	87.1	40.0	100.0
62.0659	V	100	142	36.7	68.4	40.0	100.0
62.9427	V	100	114	35.9	62.4	40.0	100.0



Test Case : Spurious Radiated Emissions (cont'd)
Test Date : 14th August 2003
Rule Parts : 15.407(b)(5)(6)

30MHz - 25GHz Frequency Range

EUT Tx on Top Channel (5.240GHz)

30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
39.5603	V	100	92	34.5	53.1	40.0	100.0
40.3381	V	100	88	33.6	47.9	40.0	100.0
58.7467	V	100	84	35.7	61.0	40.0	100.0
60.8271	V	100	95	39.3	92.3	40.0	100.0
62.0179	V	100	145	38.4	83.2	40.0	100.0
81.1994	V	100	212	38.5	84.1	40.0	100.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: M Terry, S Hartley and T Guy, EMC Engineer.



PART 2
5.25 –5.35 GHz



Test Case : Band Edge Measurements
Test Date : 17th July 2003
Rule Parts : 15.407(b)

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(6) and Subpart C Section 15.205, for Restricted Bands of Operation was carried out on the Measurement Test Facility detailed in Annex A.

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

EUT was operating at maximum power at 11Mbps.

Step 1

Bottom Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dB μ V/m	dB μ V/m
5.260	V	100	151	108.91	99.79

Step 2

Determine Marker delta amplitude between 5.260GHz fundamental and 5.150GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

The Marker Delta = 56.16dB

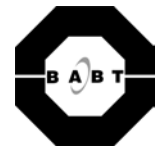
Step 3

By subtracting the Marker Delta obtained from Step 2 from the 5.260GHz Field Strength measurement from Step 1, gives following Result

Peak of 108.91dB μ V/m – 56.16dB (Delta) = 52.75dB μ V/m (Limit is 74.0dB μ V/m = Pass)

Average of 99.79dB μ V/m – 56.16dB (Delta) = 43.63dB μ V/m (Limit is 54.0dB μ V/m = Pass)

Performed by: B Airs, Radio Engineer.



Test Case : Band Edge Measurements
Test Date : 17th July 2003
Rule Parts : 15.407(b)

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(6) and Subpart C Section 15.205, for Restricted Bands of Operation was carried out on the Measurement Test Facility detailed in Annex A.

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

EUT was operating at maximum power at 11Mbps.

Step 1

Top Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	cm	deg	dBµV/m	dBµV/m
5.320	V	100	182	109.16	100.43

Step 2

Determine Marker delta amplitude between 5.320GHz fundamental and 5.350GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

The Marker Delta = 48.12dB

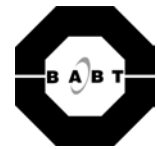
Step 3

By subtracting the Marker Delta obtained from Step 2 from the 5.320GHz Field Strength measurement from Step 1, gives following Result

Peak of 109.16dBµV/m – 48.12dB (Delta) = 61.04dBµV/m (Limit is 74.0dBµV/m = Pass)

Average of 100.43dBµV/m – 48.12dB (Delta) = 52.31dBµV/m (Limit is 54.0dBµV/m = Pass)

Performed by: B Airs, Radio Engineer.



Test Case : Peak Output Power
 Test Date : 11th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

Measurement Method

The EUT was connected to a Digital Storage Oscilloscope via an attenuator and Crystal Detector. The DC output from the Crystal Detector was measured on the Oscilloscope. The EUT was then substituted for a Signal Generator. The generators frequency was adjusted to that of the EUT and the amplitude increased to give the same DC level as measured from the EUT. The level was read from the Signal Generator, which gave the peak output power.

Measurements were made with the EUT transmitting on the following channels.

Bottom Channel: 5260MHz
 Middle Channel: 5280MHz
 Top Channel: 5320MHz

Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)	Result (mW)
5260	6	18.35	68.39
5280	6	18.40	69.18
5320	6	17.80	60.26
5260	54	17.50	56.23
5280	54	16.85	48.42
5320	54	16.65	46.24

Remarks

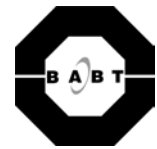
Limits

Frequency Band (GHz)	Limit
5.25 – 5.35	250mW or 243.35mW*

* 26dB Bandwidth = 19.34MHz

$$\therefore 11 + 10\log B = 11 + 10 \log 19.34 = 23.86\text{dBm} = 243.35\text{mW}$$

Performed by: B Airs, Radio Engineer.



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

Measurement Method

The EUT was connected to the Spectrum Analyser via a 20dB Attenuator. The EUT was set to transmit at maximum power on all three channels and at the highest and lowest data rates.

With the EUT transmitting, the trace was adjusted to display the 26dB bandwidth of the fundamental. The RBW was adjusted to 1MHz with the VBW set to 3MHz. The Spectrum Analyser detector was set to Sample. The trace was then averaged using the Power Averaging function over 200 samples. The peak response was then measured and recorded.

The results are recorded in the table below.

Results

Frequency Band: 5250 – 5350MHz

Frequency (MHz)	Data Rate (Mbps)	Measurement Bandwidth (MHz)	Result (dBm)
5260	6	1	2.138
5280	6	1	3.182
5320	6	1	3.350
5260	54	1	2.445
5280	54	1	2.494
5320	54	1	3.177

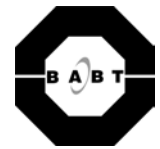
Limit	≤ +11dBm/1MHz
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Remarks

The EUT met the requirements specified in Clause 15.407(a)(2). The Peak Power Spectral Density was below the +11dBm/MHz limit.

Procedure: Test Performed In Accordance With 15.407(a)(2)

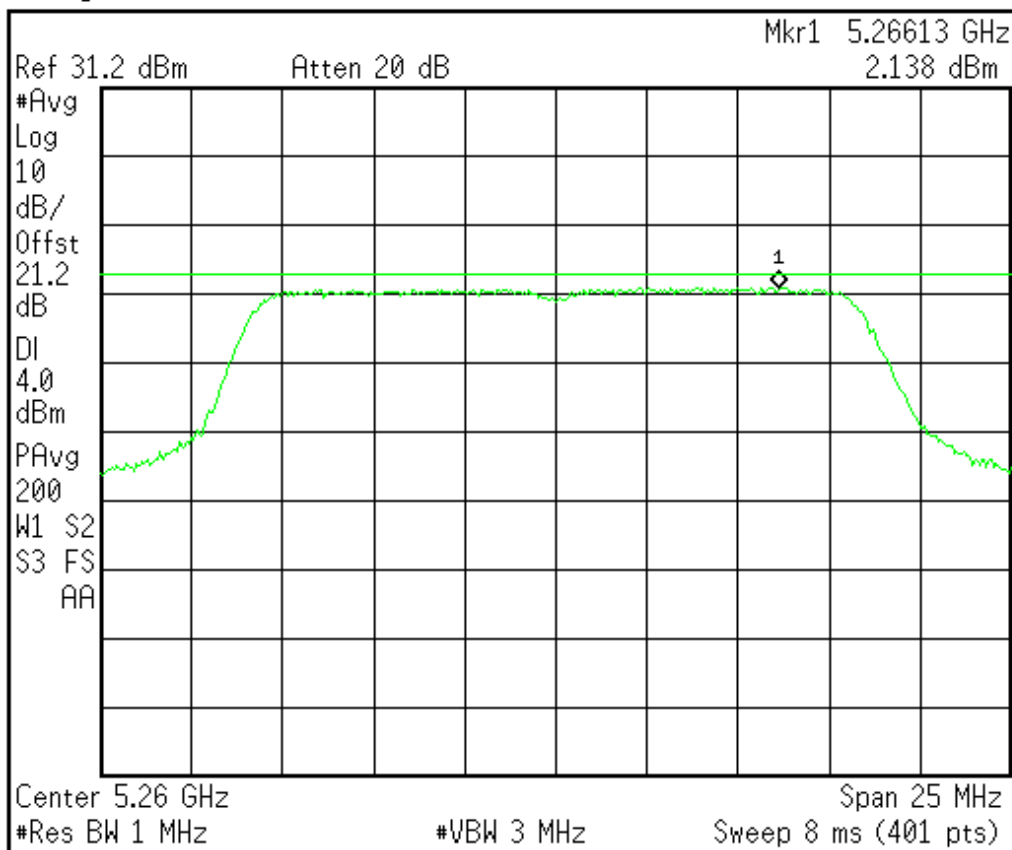
Performed by: B Airs, Radio Engineer.



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

5260.0MHz – Maximum Power 6Mbps

Agilent 11:16:44 Aug 13, 2003



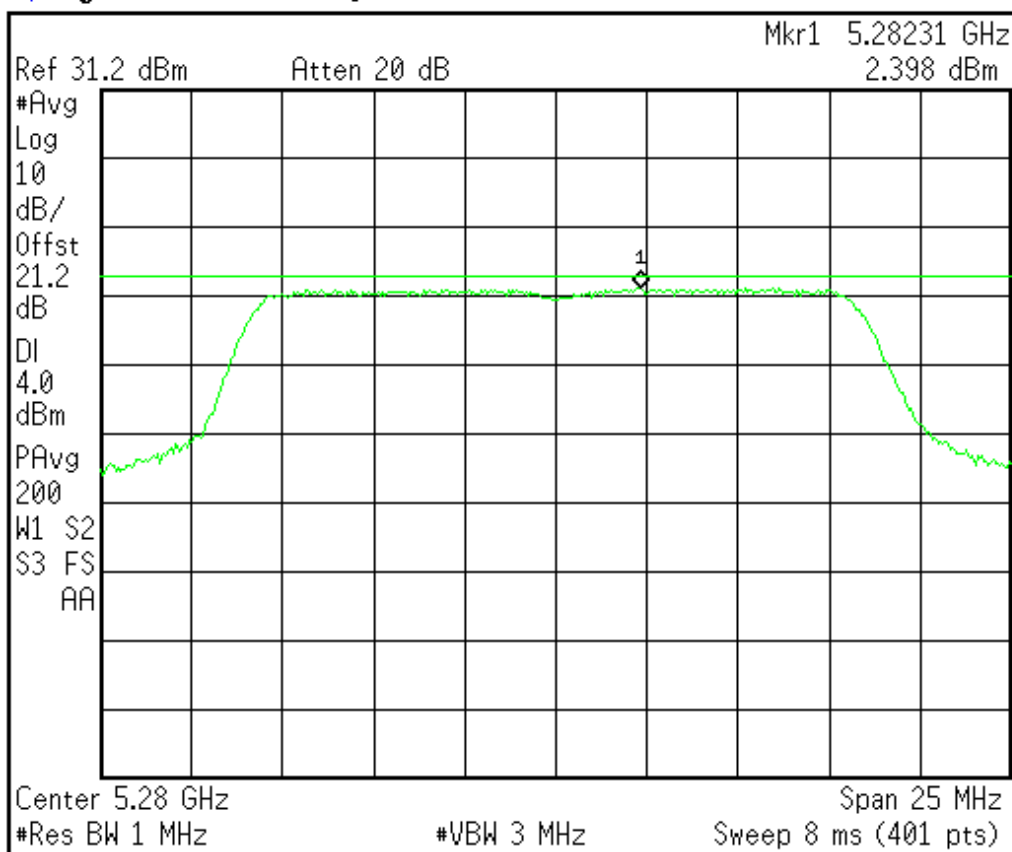
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

5280.0MHz – Maximum Power 6Mbps

Agilent 11:22:54 Aug 13, 2003



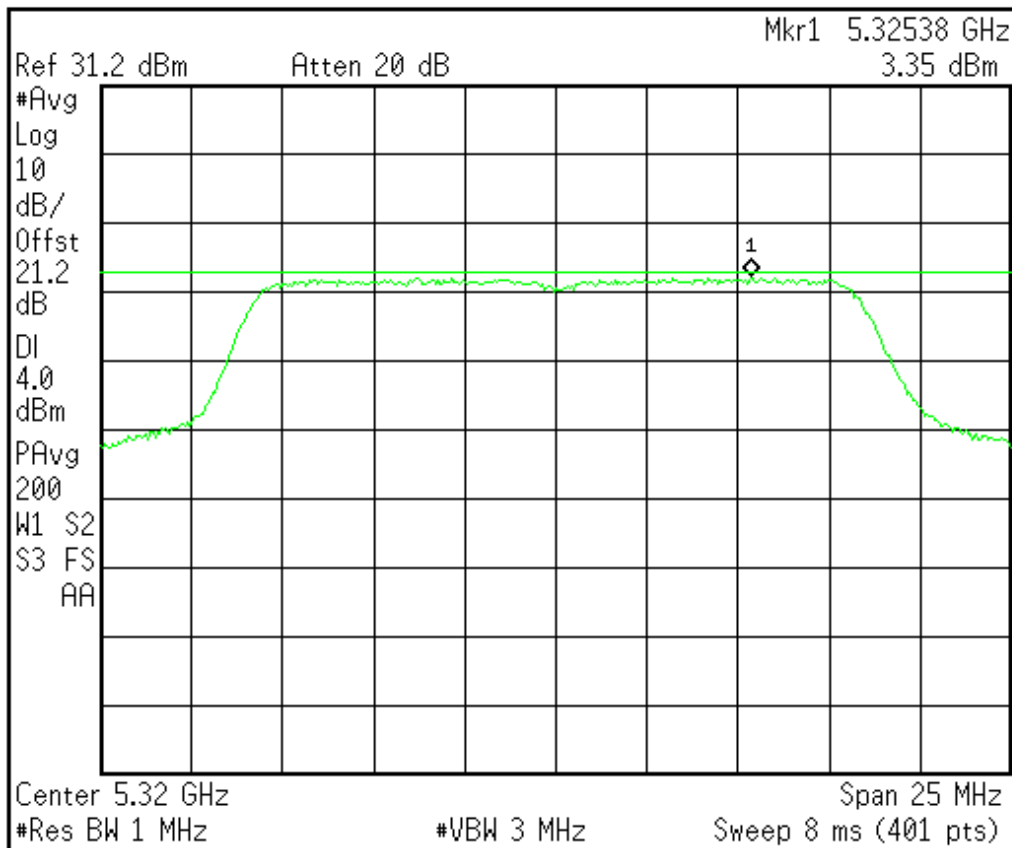
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



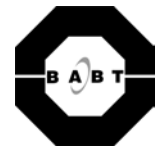
Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

5320.0MHz – Maximum Power 6Mbps

Agilent 13:07:02 Aug 13, 2003



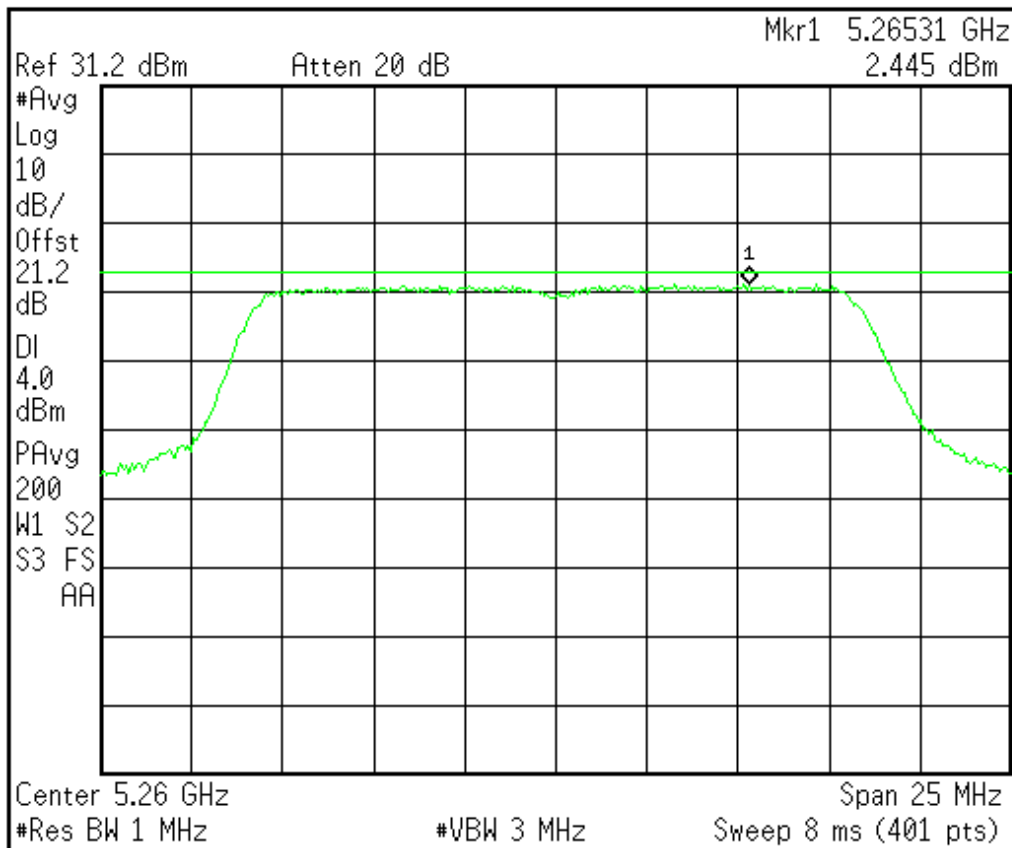
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

5260.0MHz – Maximum Power 54Mbps

Agilent 11:18:59 Aug 13, 2003



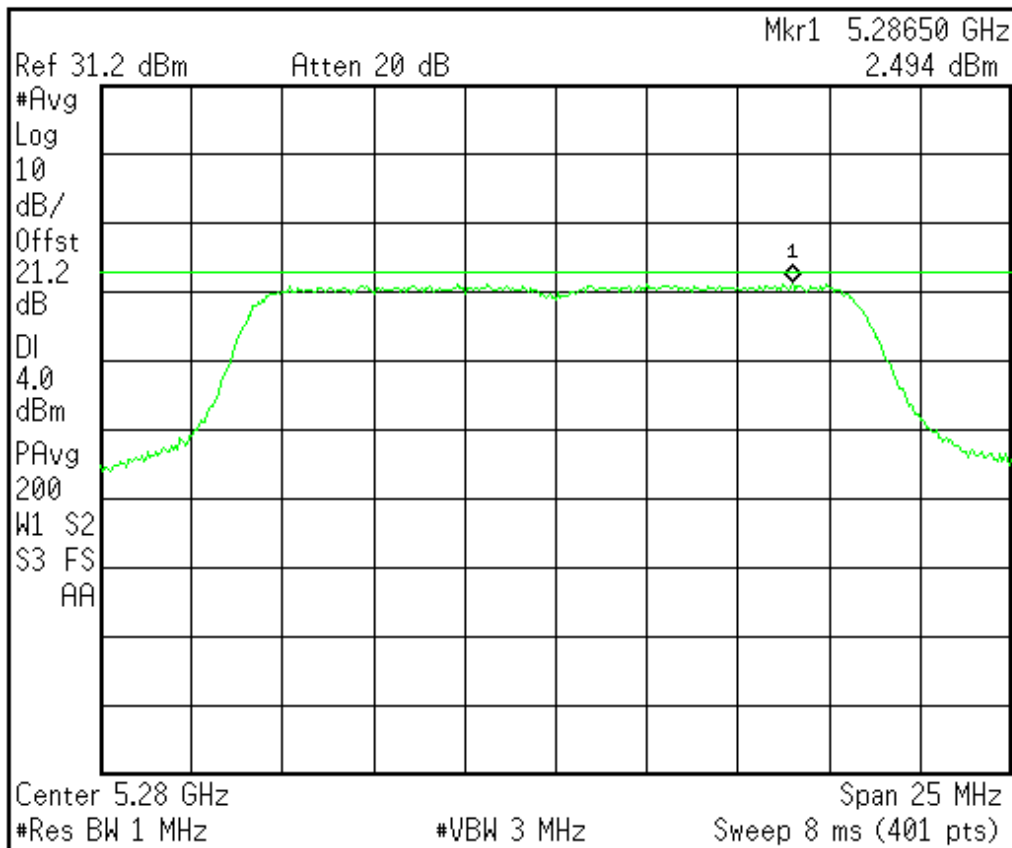
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

5280.0MHz – Maximum Power 54Mbps

Agilent 11:20:45 Aug 13, 2003



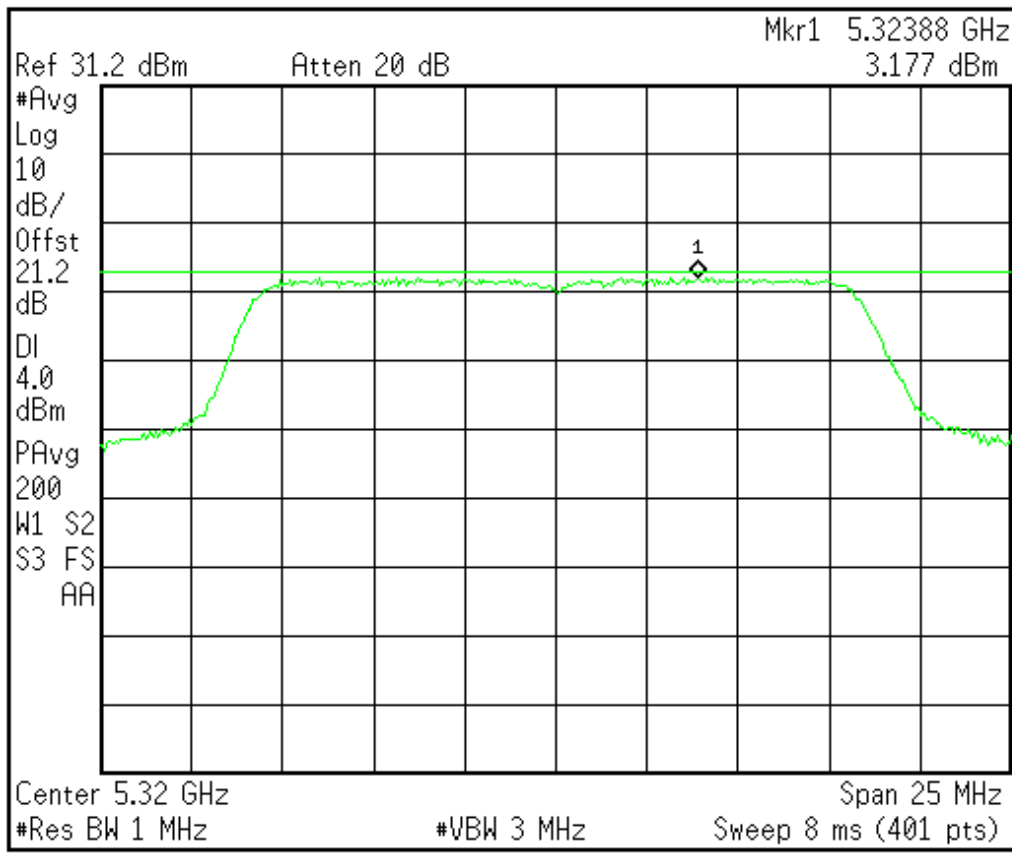
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



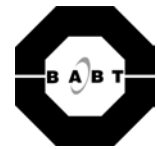
Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(2)

5320.0MHz – Maximum Power 54Mbps

Agilent 11:51:00 Aug 13, 2003



Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

Measurement Method

The EUT was connected to the Spectrum Analyser using a 20dB Attenuator and cables. The RBW was set to 300kHz and the VBW to 1MHz. The Span was adjusted to encompass the whole of the fundamental. The Peak detector was selected and the trace was set to View. The peak of the fundamental was searched. From this point, the marker delta function of the Analyser was used to establish the -26dBc points. The resultant difference in the markers was recorded as the Emission Bandwidth.

Results

Frequency Band: 5250 – 5350MHz

Frequency, (MHz)	Data Rate, (Mbps)	Emission Bandwidth, (MHz)
5260	6	19.839679
5280	6	19.338677
5320	6	20.440882
5260	54	20.541082
5280	54	19.438878
5320	54	20.040080

Remarks

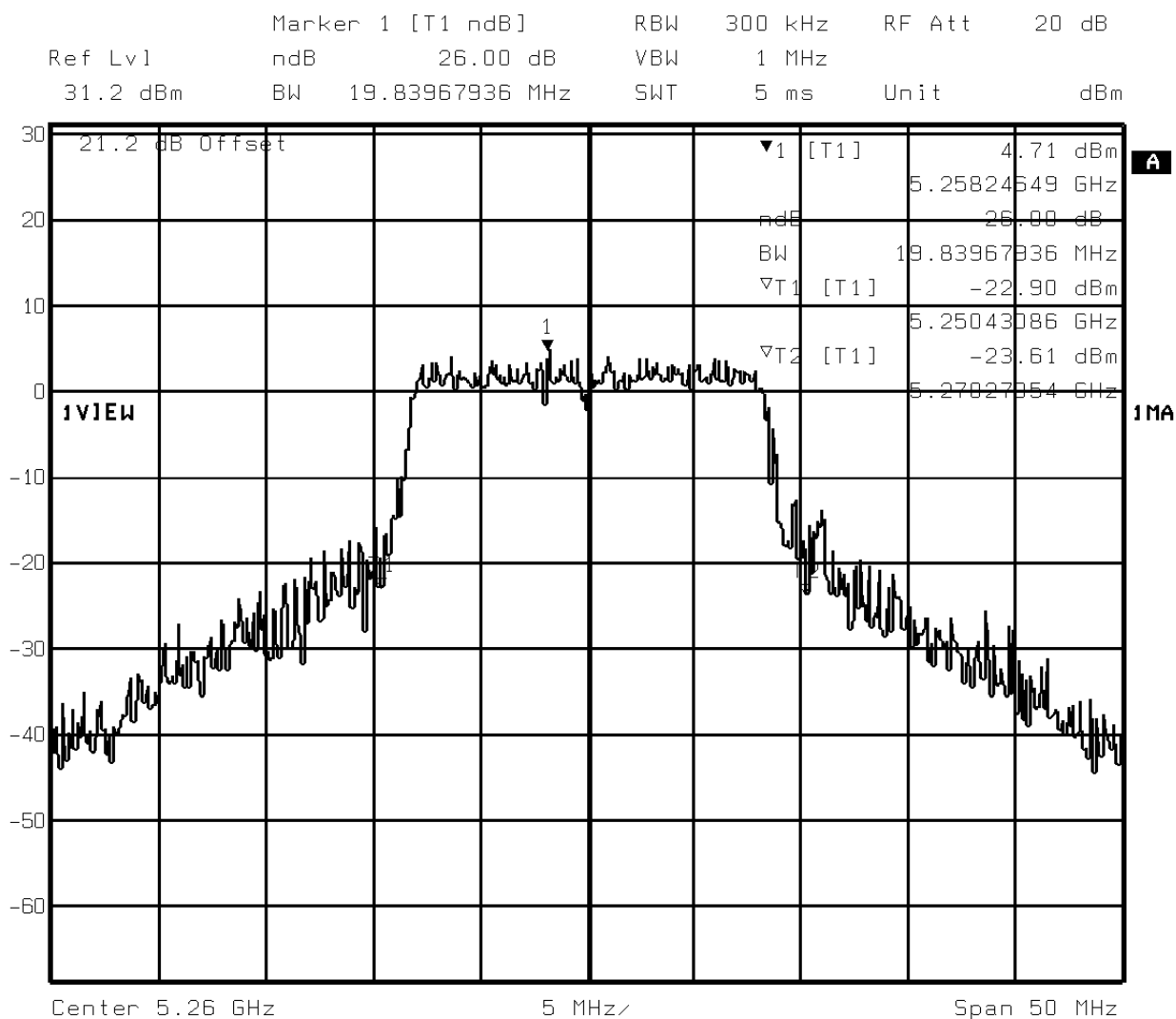
Procedure: Test Performed In Accordance With 15.407(a)(1)(2)(3)

Performed by: B Airs, Radio Engineer.



Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5260.0MHz – Maximum Power 6Mbps

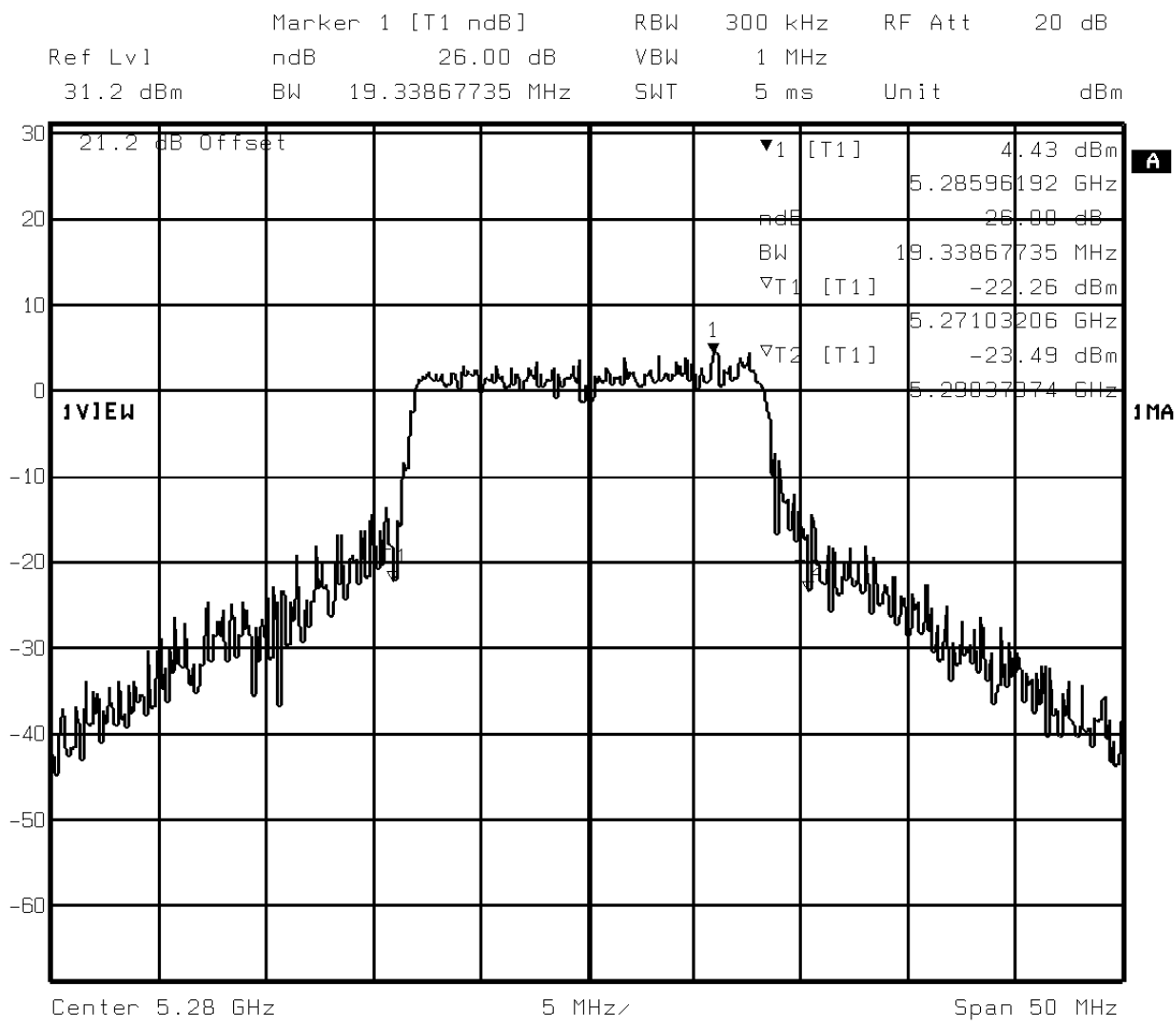


Date: 14.AUG.03 9:01:55



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5280.0MHz – Maximum Power 6Mbps

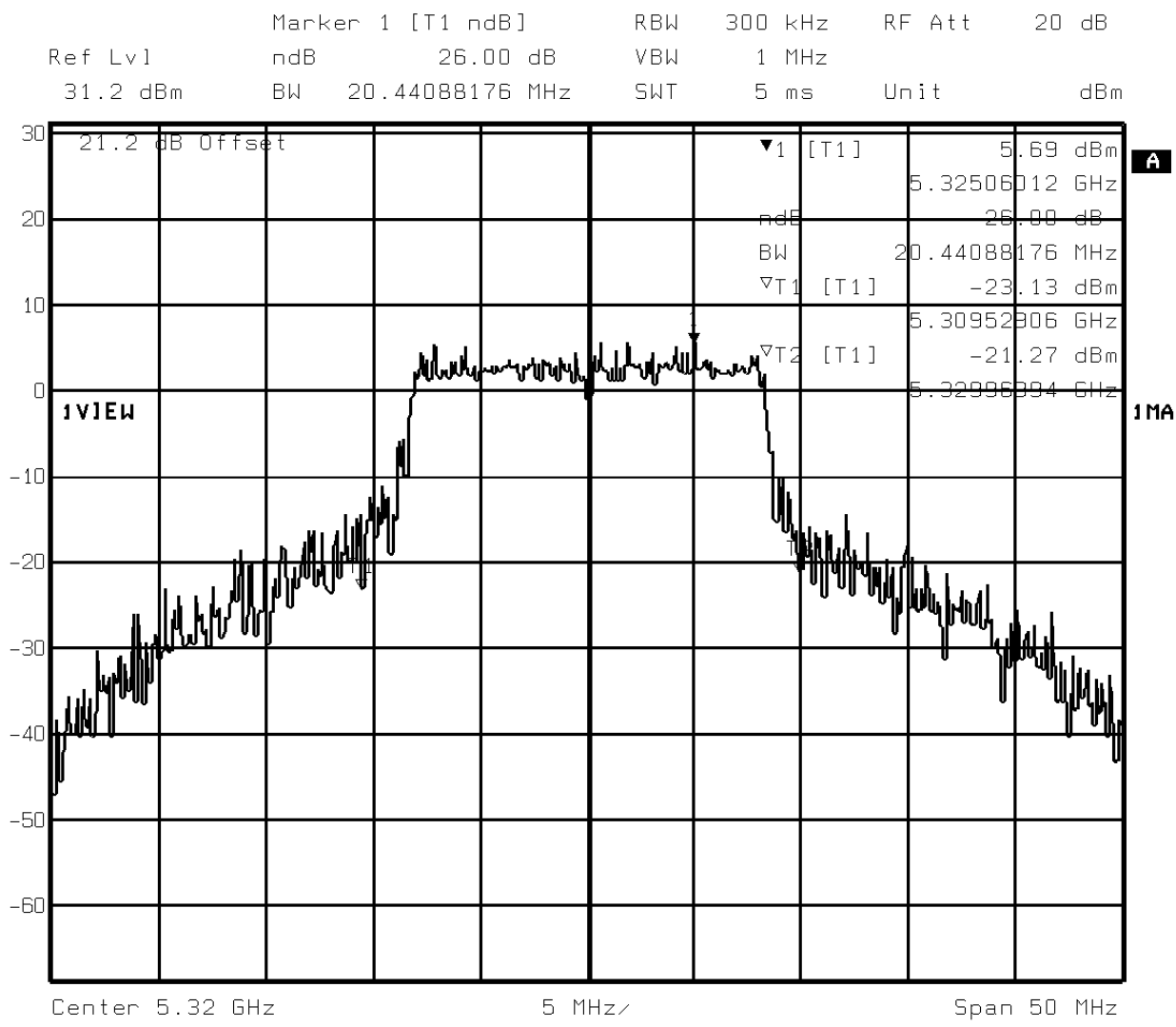


Date: 14.AUG.03 9:03:40



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5320.0MHz – Maximum Power 6Mbps



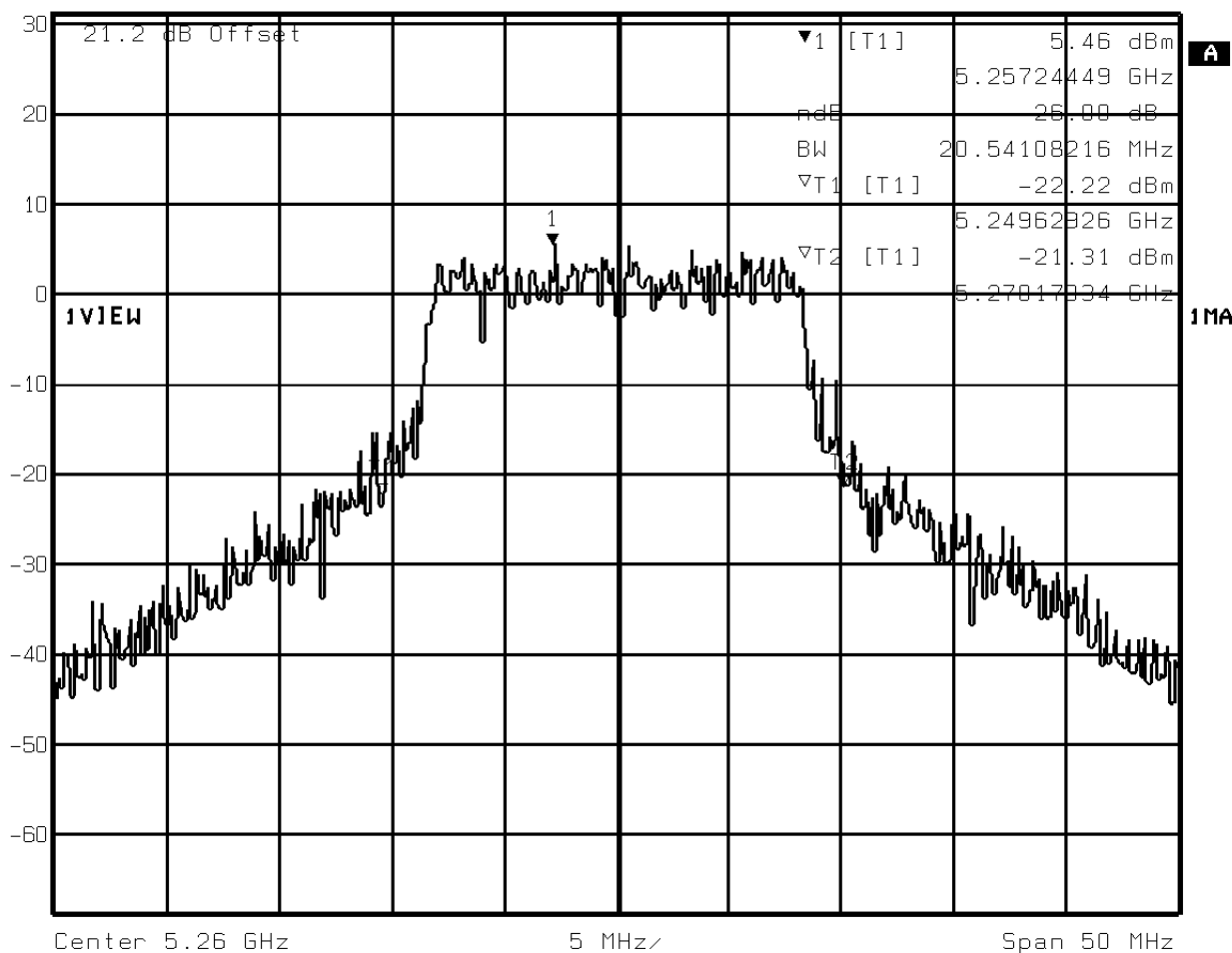
Date: 14.AUG.03 9:08:54



Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5260.0MHz – Maximum Power 54Mbps

	Marker 1 [T1 ndB]	RBW	300 kHz	RF Att	20 dB
Ref Lvl	ndB	26.00 dB	VBW	1 MHz	
31.2 dBm	BW	20.54108216 MHz	SWT	5 ms	Unit dBm



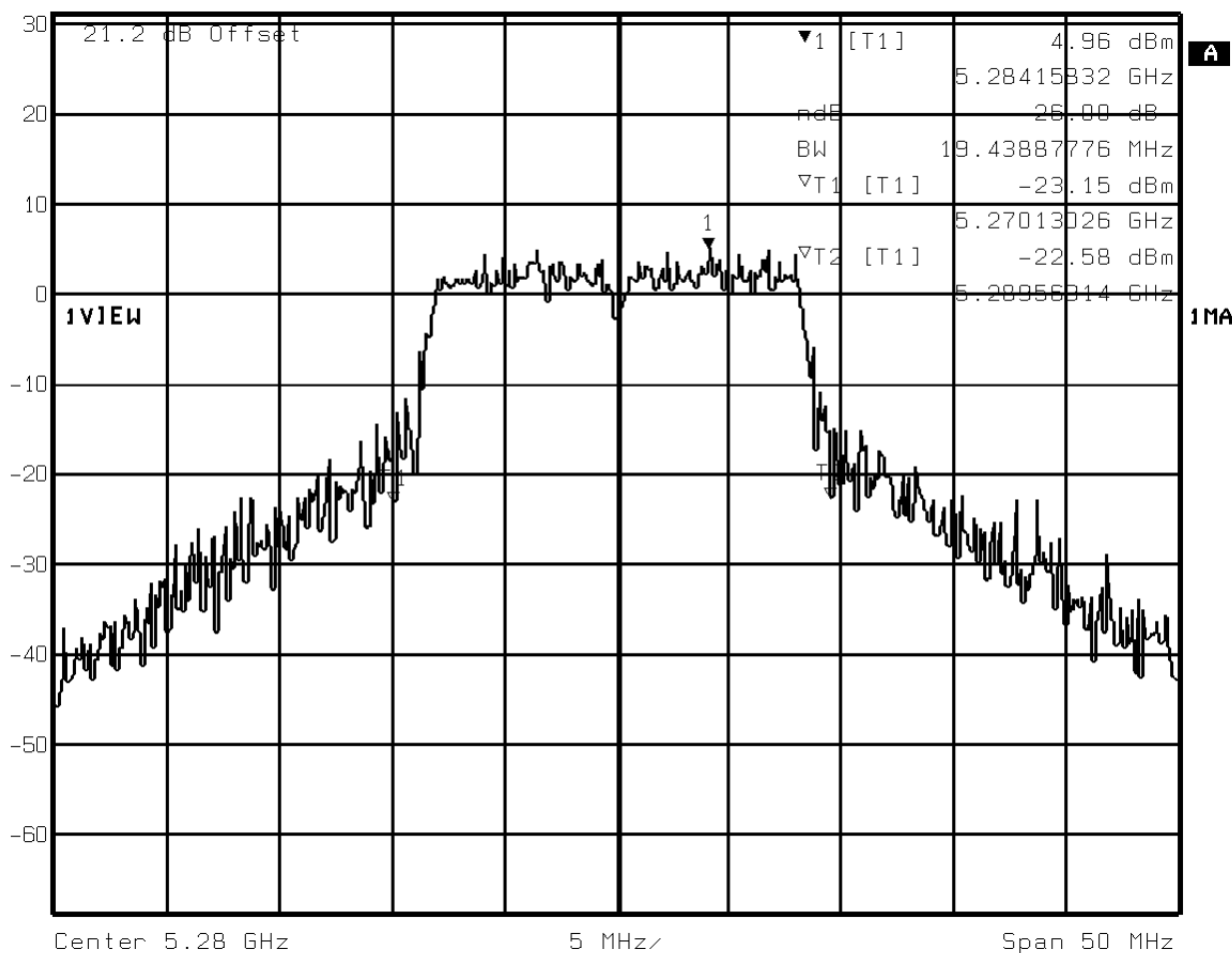
Date: 14.AUG.03 8:59:47



Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5280.0MHz – Maximum Power 54Mbps

	Marker 1 [T1 ndB]	RBW	300 kHz	RF Att	20 dB
Ref Lvl	ndB	26.00 dB	VBW	1 MHz	
31.2 dBm	BW	19.43887776 MHz	SWT	5 ms	Unit dBm

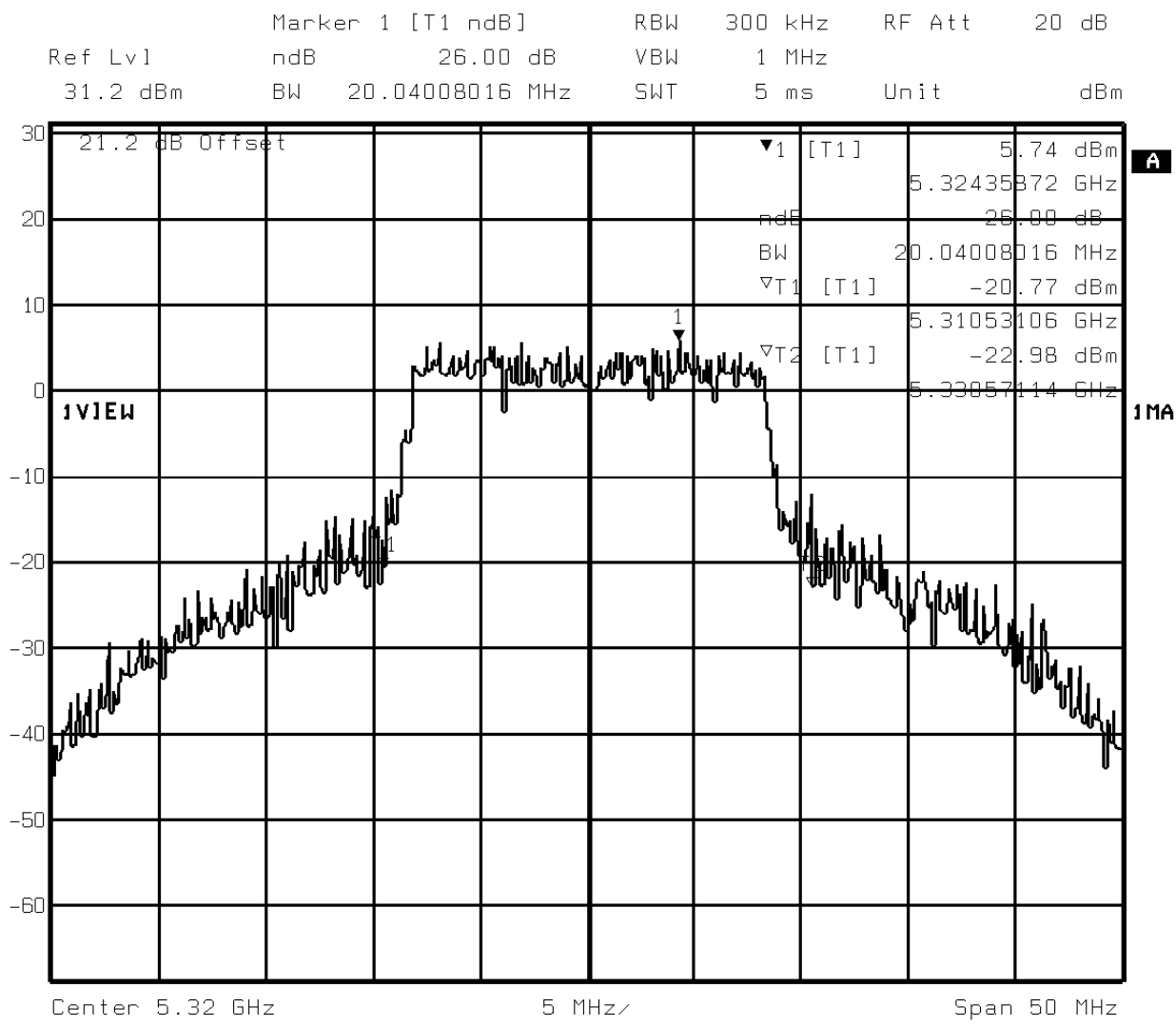


Date: 14.AUG.03 9:06:37

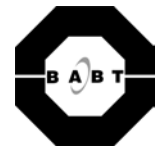


Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5320.0MHz – Maximum Power 54Mbps



Date: 14.AUG.03 9:11:05



Test Case: : Frequency Stability Under Temperature Variations
Test Date: : 13th August 2003
Rule Parts: : 2.1055, 15.407(g)

Measurement Method

The EUT was set to transmit on maximum power with no modulation. A Frequency Counter was used to measure the frequency. The maximum frequency error was recorded. The temperature was adjusted between -30°C and $+50^{\circ}\text{C}$ in 10° steps as per 2.1055.

Results

48V DC Supply

Temperature Interval ($^{\circ}\text{C}$)	Test Frequency (GHz)	Deviation (Hz)	Limit (kHz)
-30	5280	-12.377	\pm
-20	5280	8.184	\pm
-10	5280	20.277	\pm
0	5280	16.481	\pm
+10	5280	7.015	\pm
+20	5280	-7.164	\pm
+30	5280	-5.135	\pm
+40	5280	-16.810	\pm
+50	5280	-19.745	\pm

Remarks

The frequency stability of the EUT is sufficient to keep it within the allocated frequency bands at any temperature interval across the measured range.

Performed by: B Airs, Radio Engineer.



Test Case : Spurious Conducted Emissions
Test Date : 14th/15th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

Measurement Method

In accordance with FCC CFR 47: Part 15 Subpart E, Part 15.407(1)(2)(3), the Spurious Conducted Emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9kHz to 40GHz. The EUT was set to transmit on full power at maximum and minimum data rates. The EUT was tested on Bottom, Middle and Top channels. The resolution and video bandwidths were set to 1MHz and 3MHz respectively in accordance with 15.407(4). The spectrum analyser detector was set to Max Hold.

For measuring the range 9kHz to 7GHz, a 20dB attenuator was used. From 7 to 18GHz, high pass filter was used. From 18 to 26GHz and 26 to 40GHz, pieces of waveguide were used as a high pass filters.

The display line function on the Spectrum Analyser was used to show the appropriate limits for the band.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

Remarks

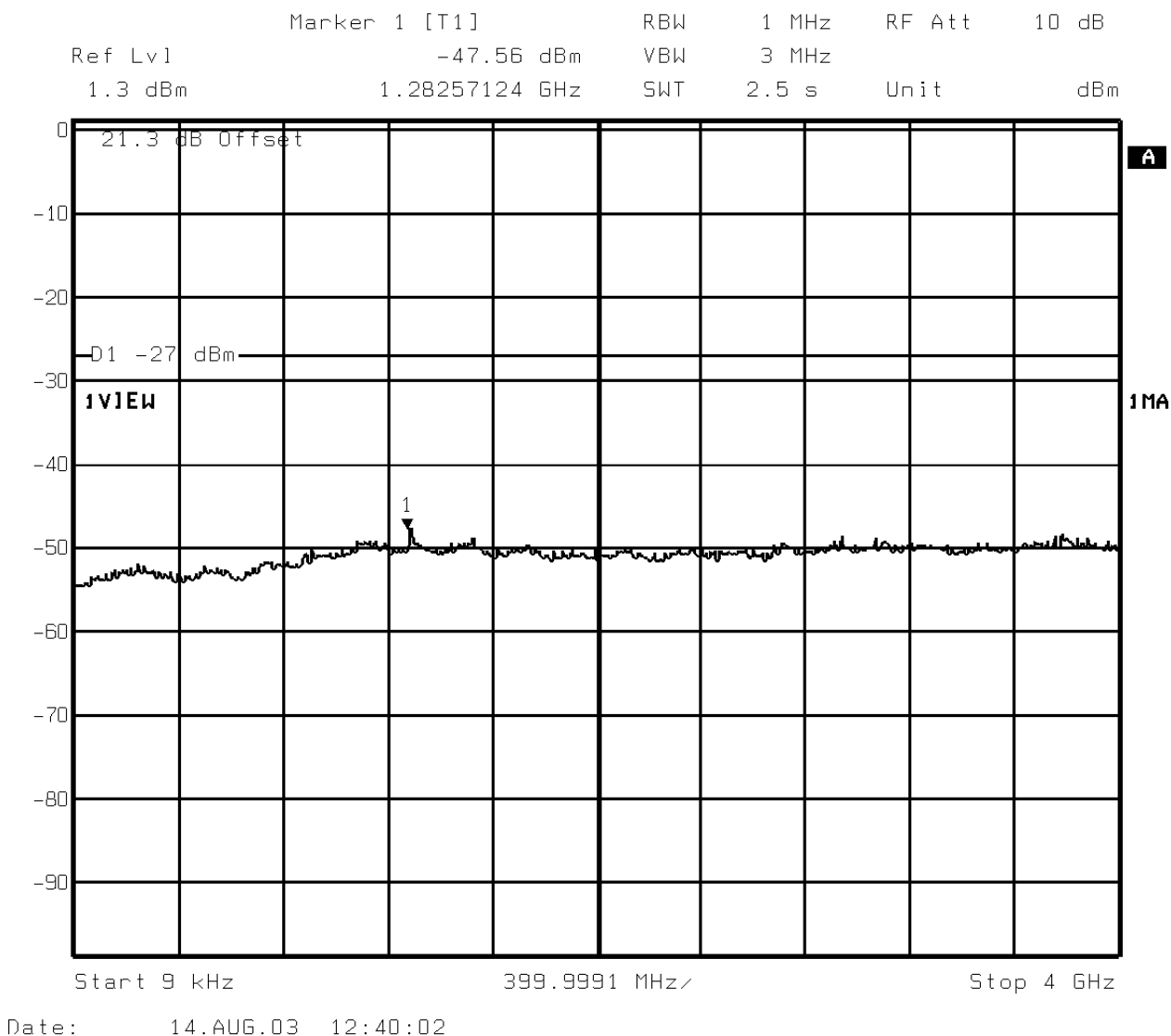
The equipment met the requirements of this test clause.

Performed by: B Airs, Radio Engineer.



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

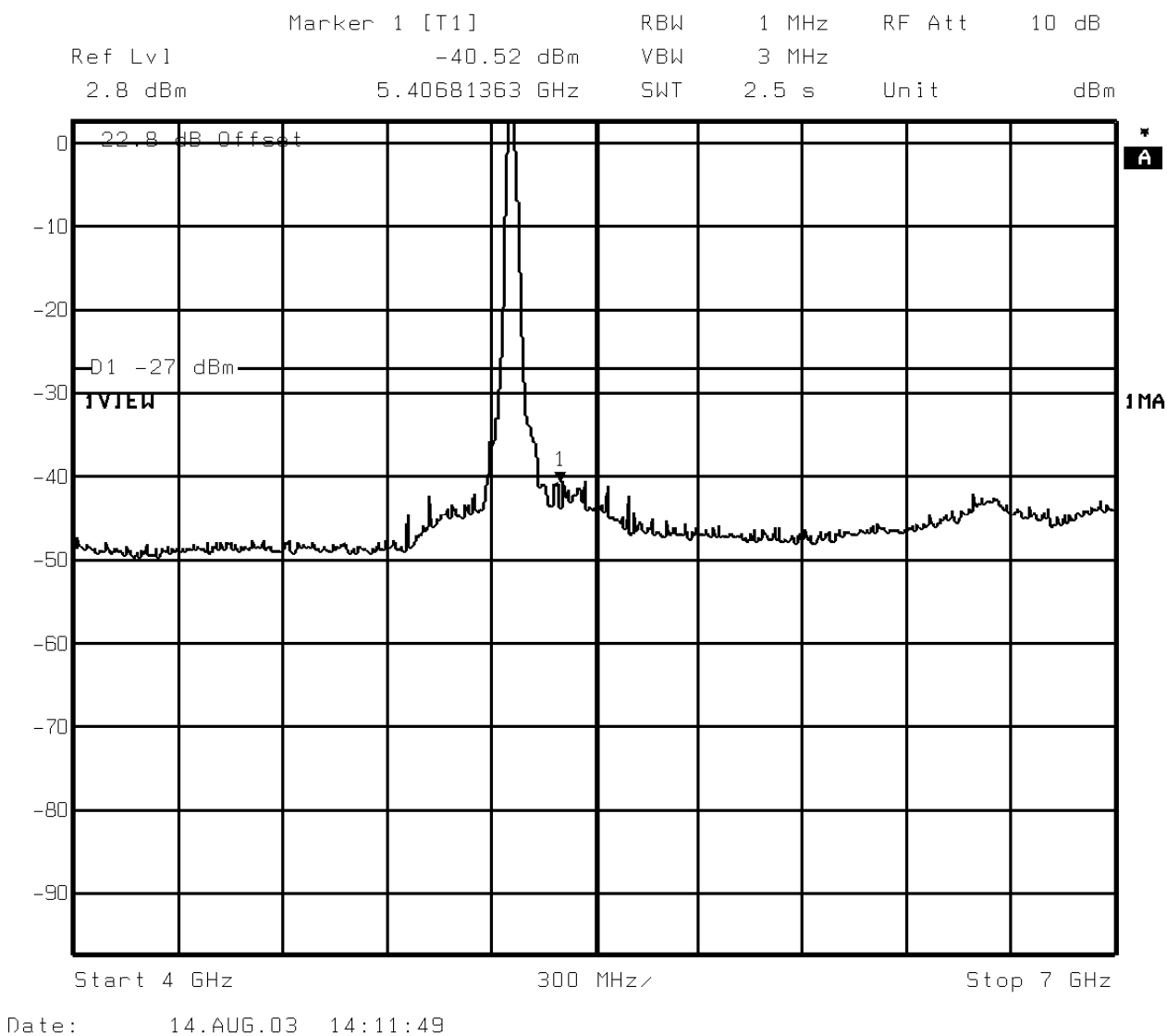
5260.0MHz – Maximum Power 6Mbps 9kHz – 4GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

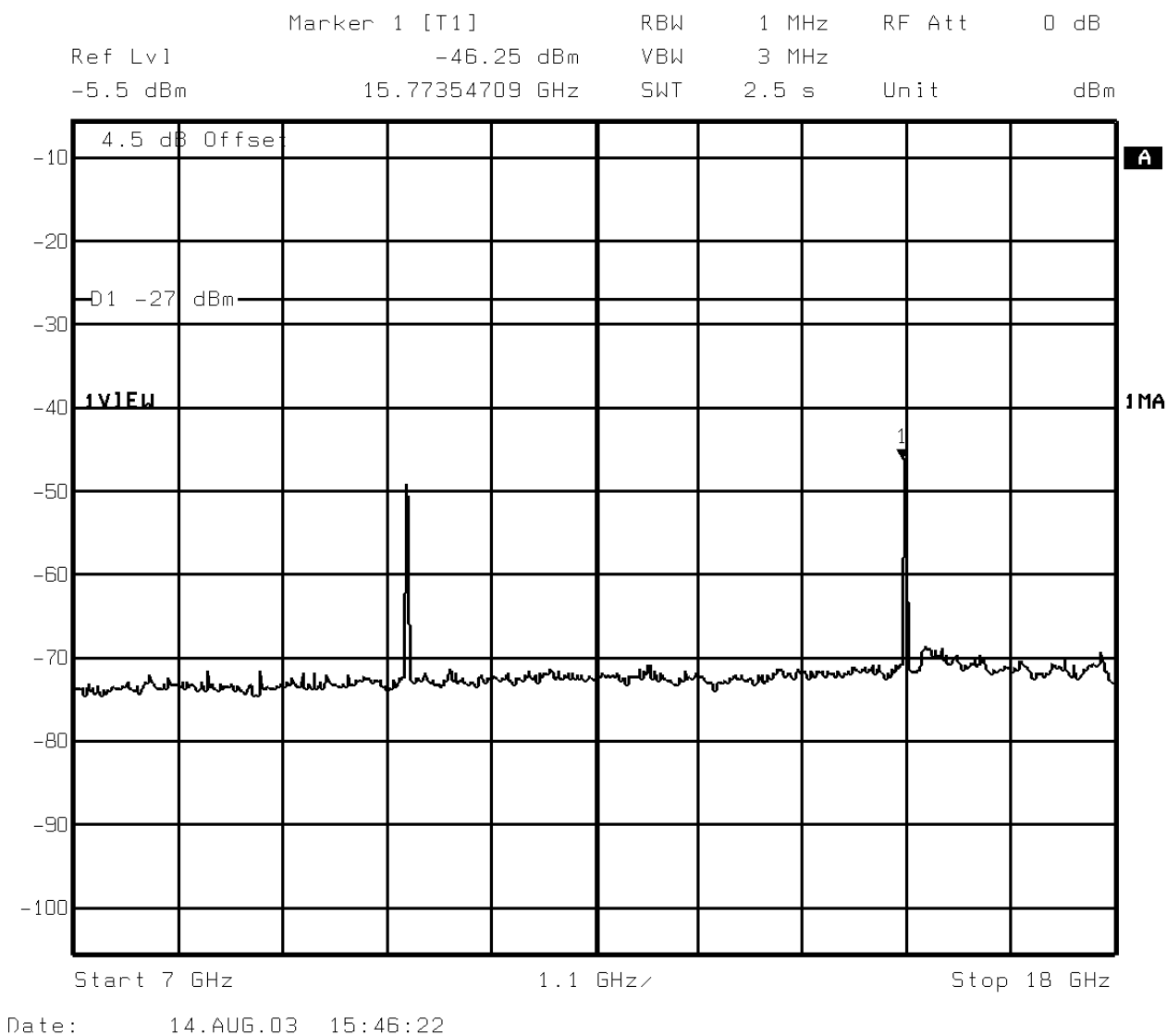
5260.0MHz – Maximum Power 6Mbps 4GHz – 7GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

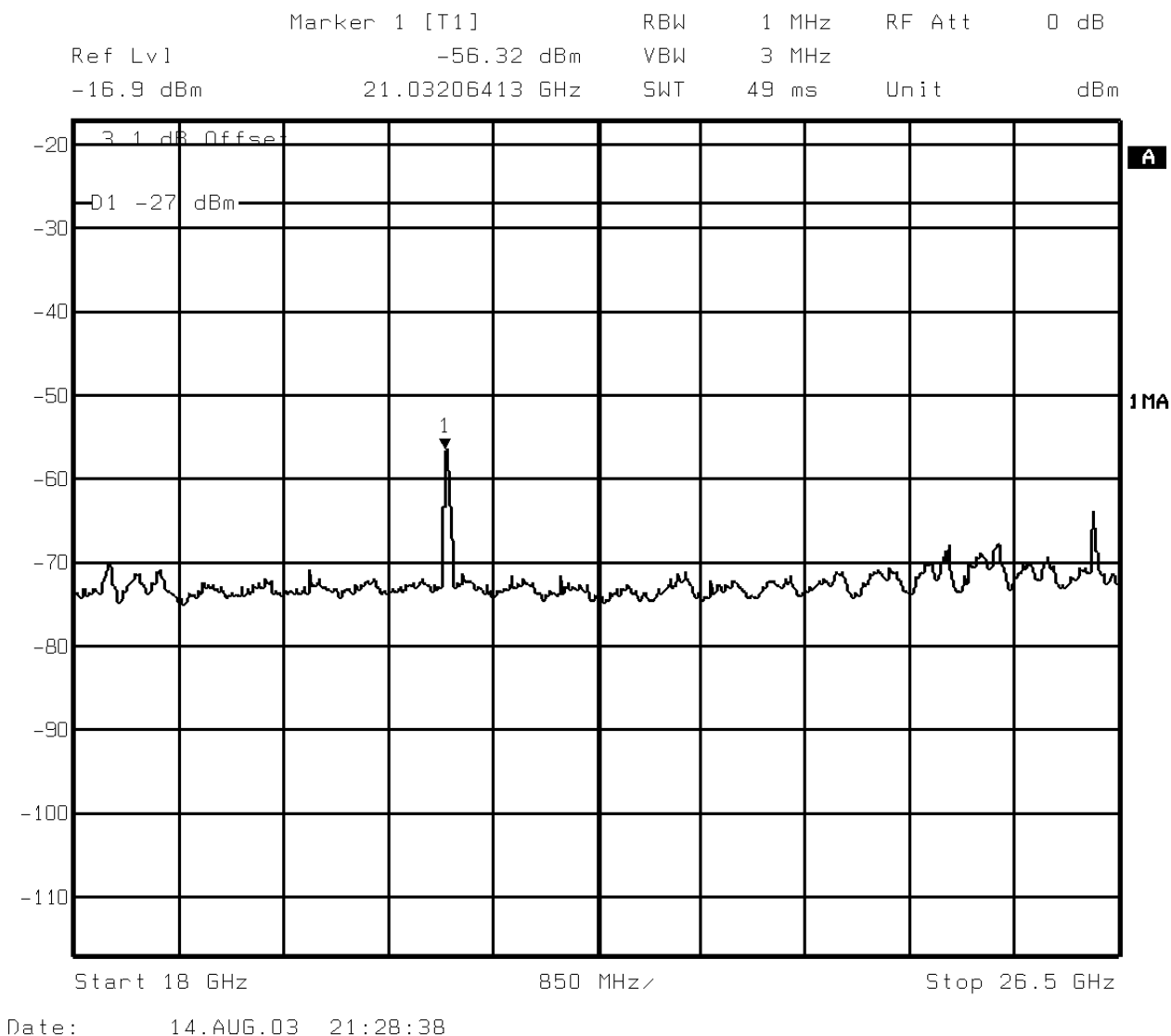
5260.0MHz – Maximum Power 6Mbps 7GHz – 18GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5260.0MHz – Maximum Power 6Mbps 18GHz – 26GHz





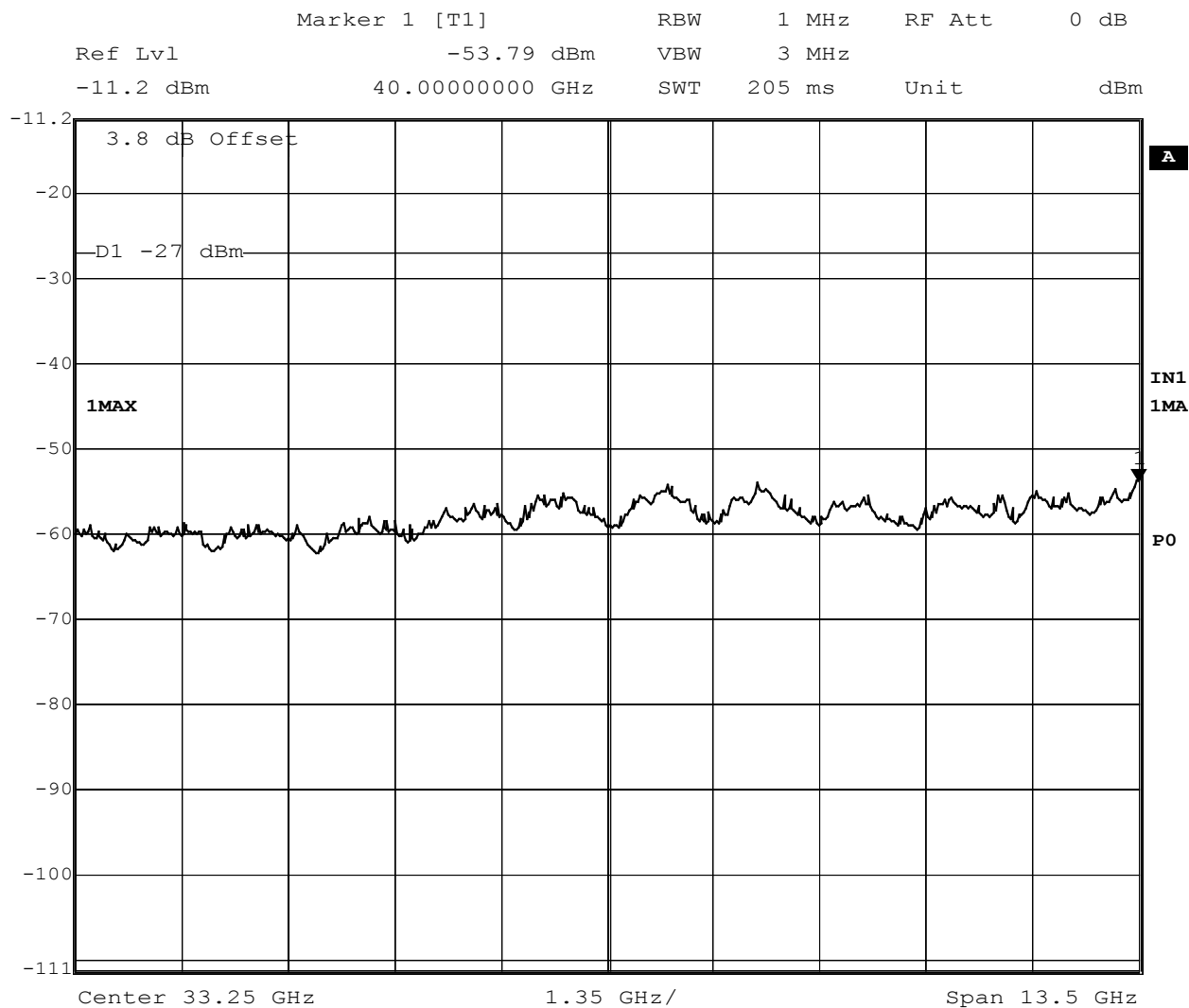
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5260.0MHz – Maximum Power 6Mbps

26GHz – 40GHz

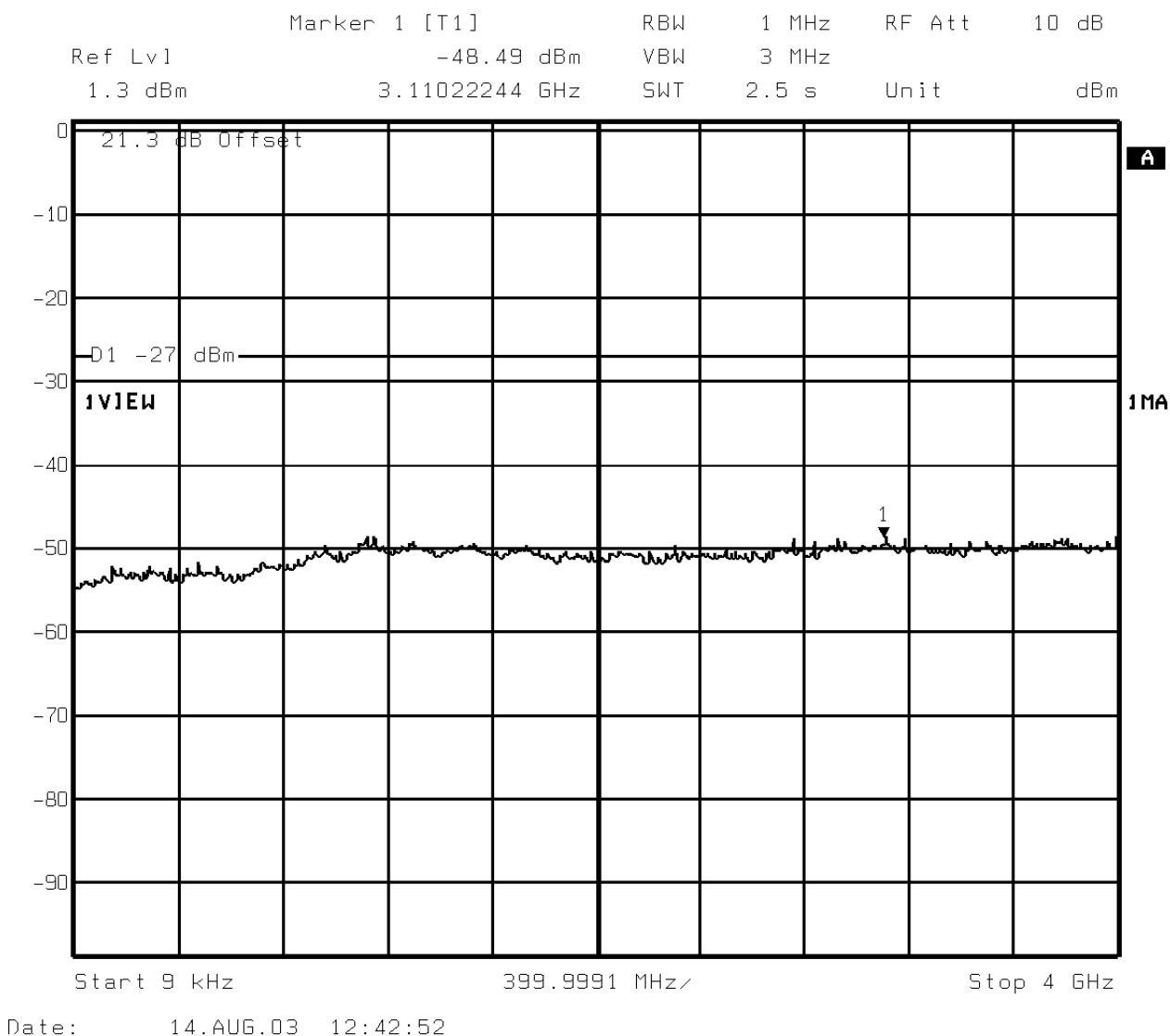


Date: 14.AUG.2003 20:05:00



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

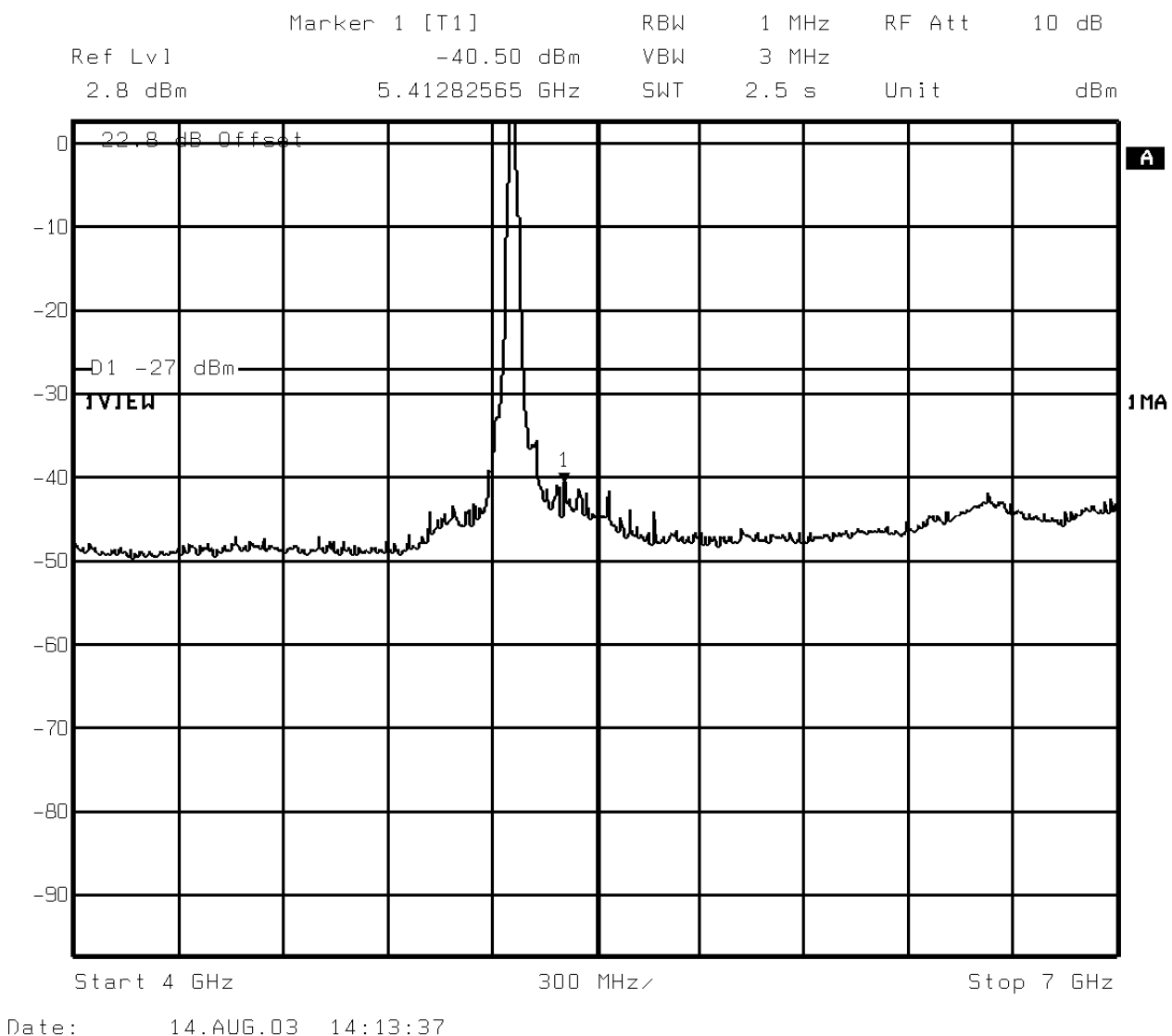
5260.0MHz – Maximum Power 54Mbps 9kHz – 4GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

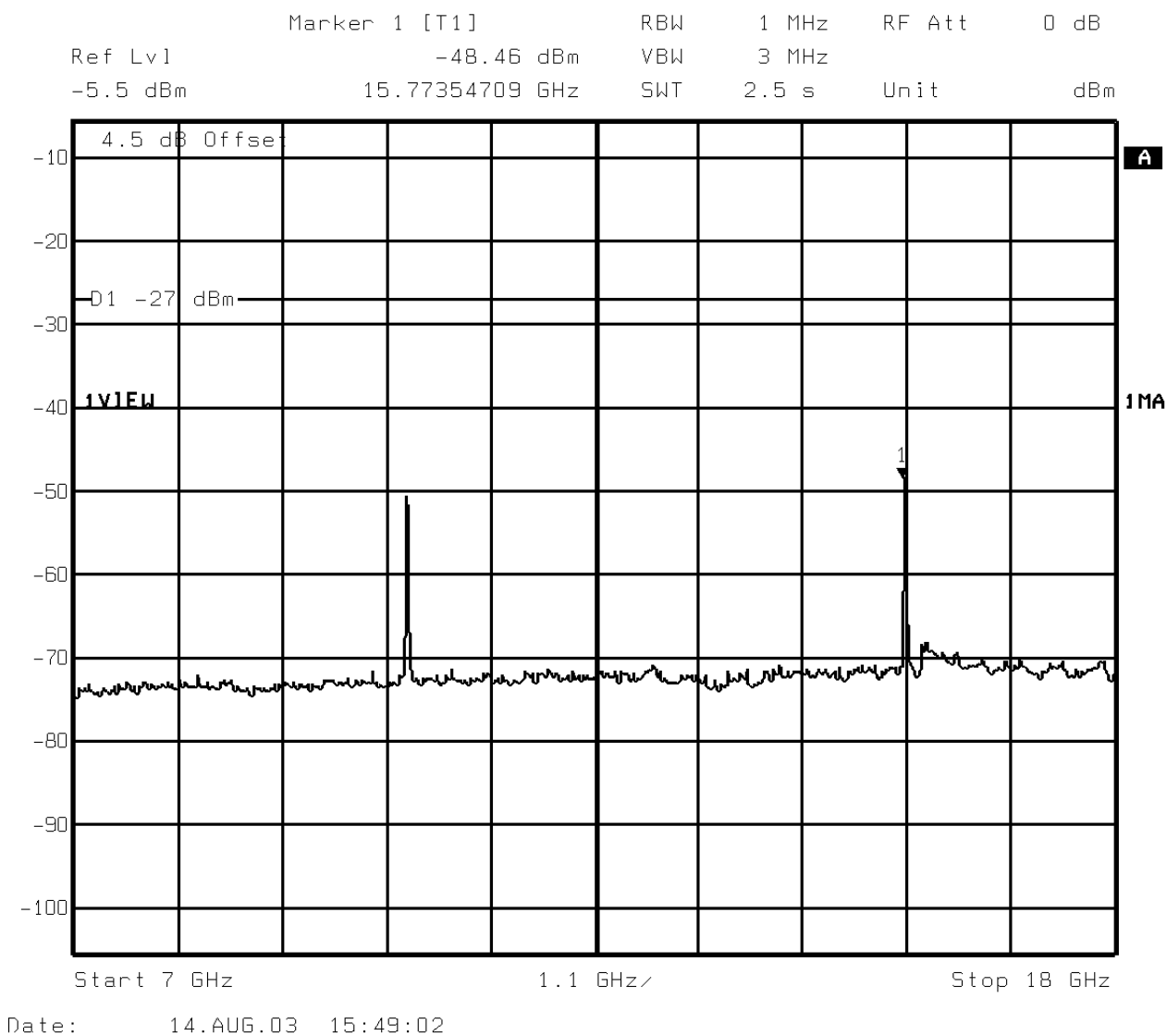
5260.0MHz – Maximum Power 54Mbps 4GHz – 7GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

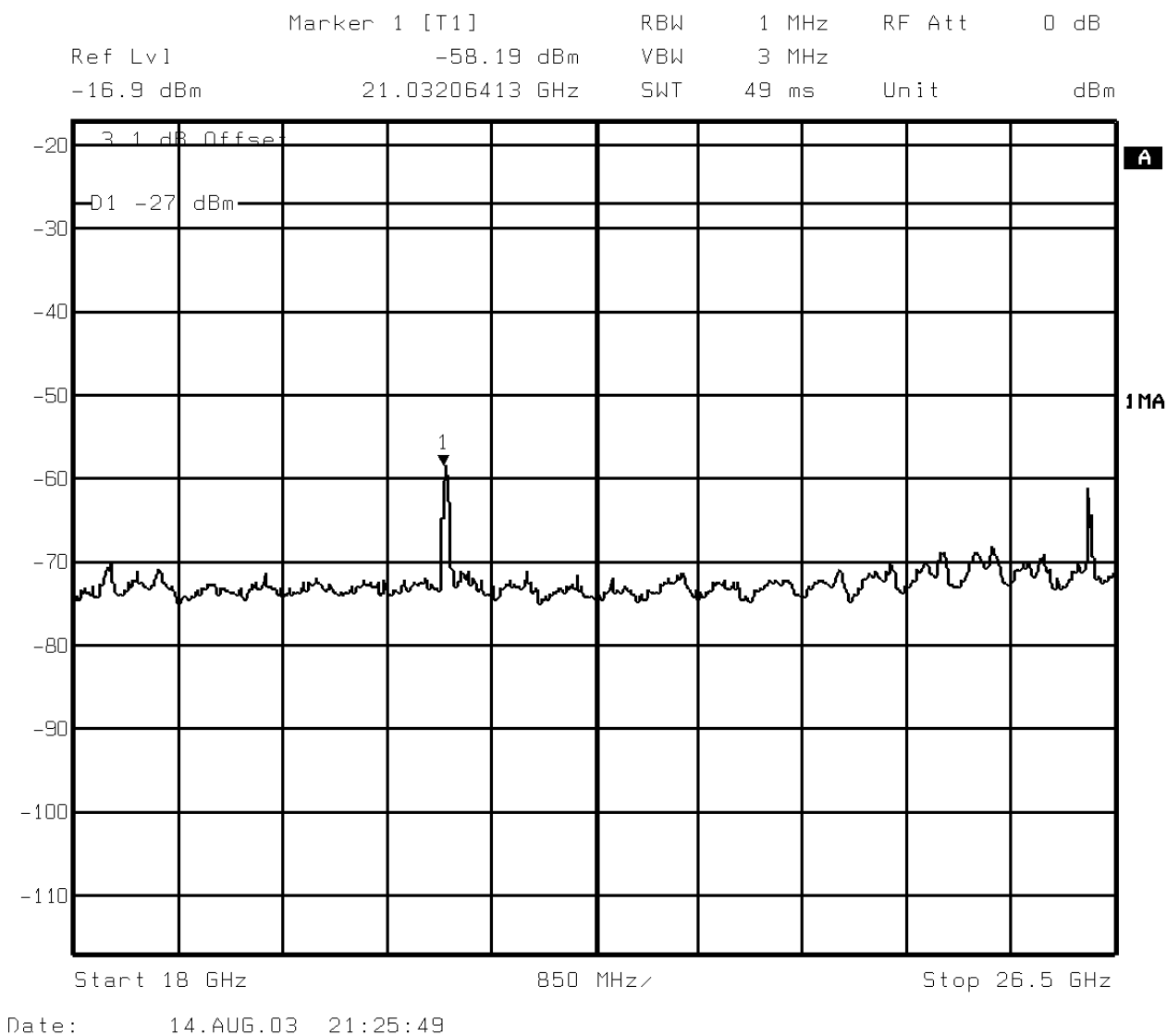
5260.0MHz – Maximum Power 54Mbps 7GHz – 18GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

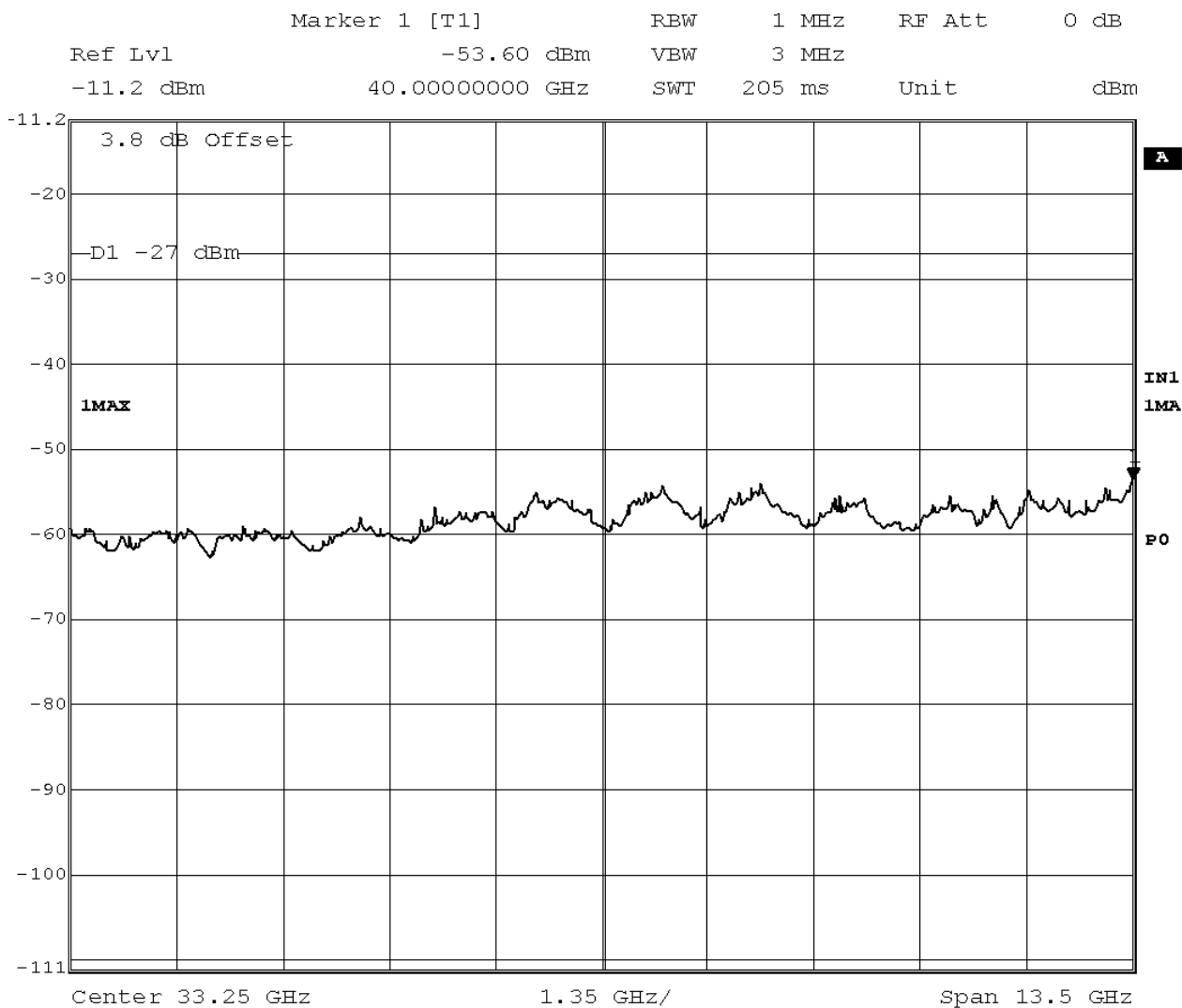
5260.0MHz – Maximum Power 54Mbps 18GHz – 26GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5260.0MHz – Maximum Power 54Mbps 26GHz – 40GHz

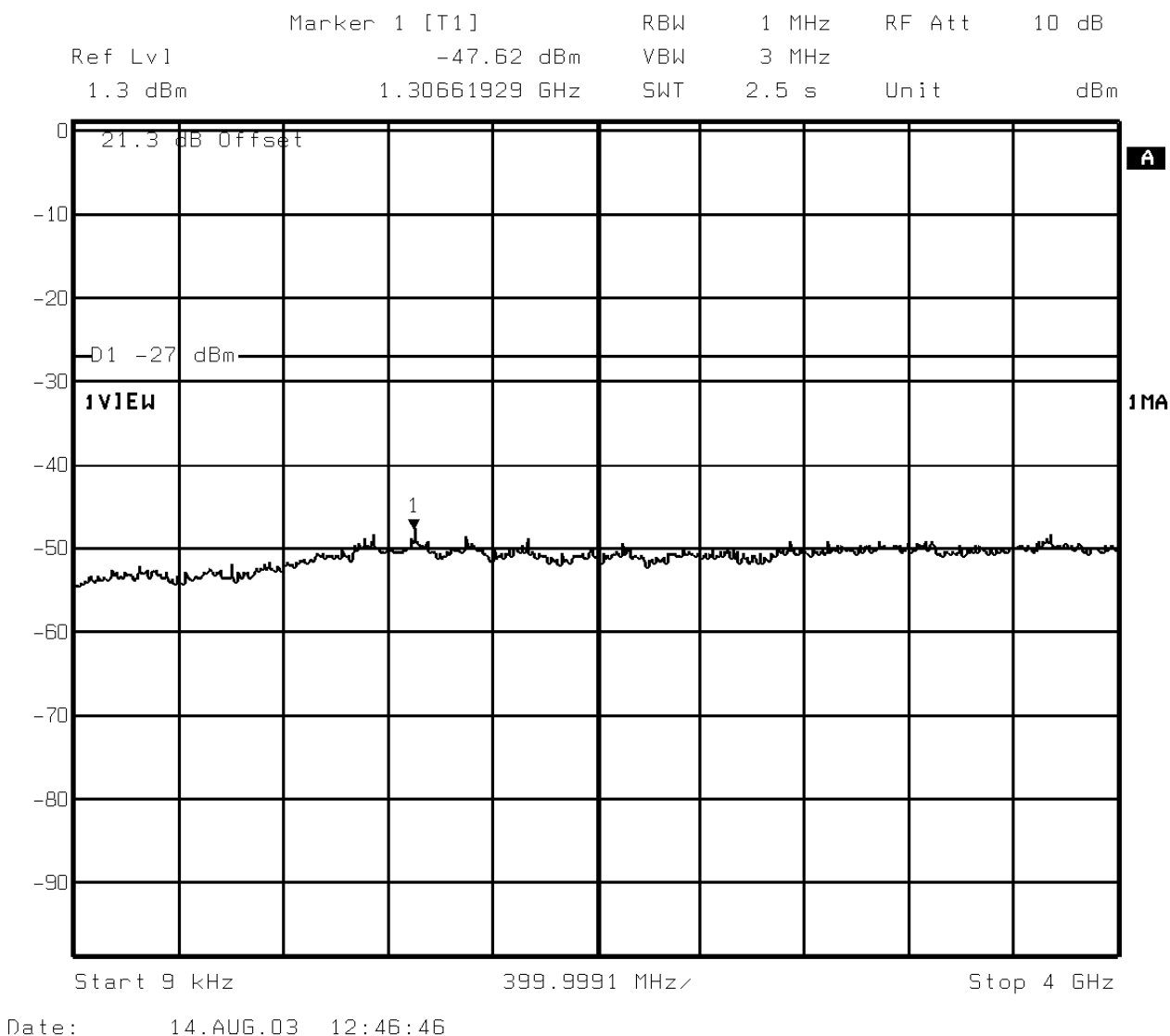


Date: 14.AUG.2003 20:07:36



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 6Mbps 9kHz – 4GHz





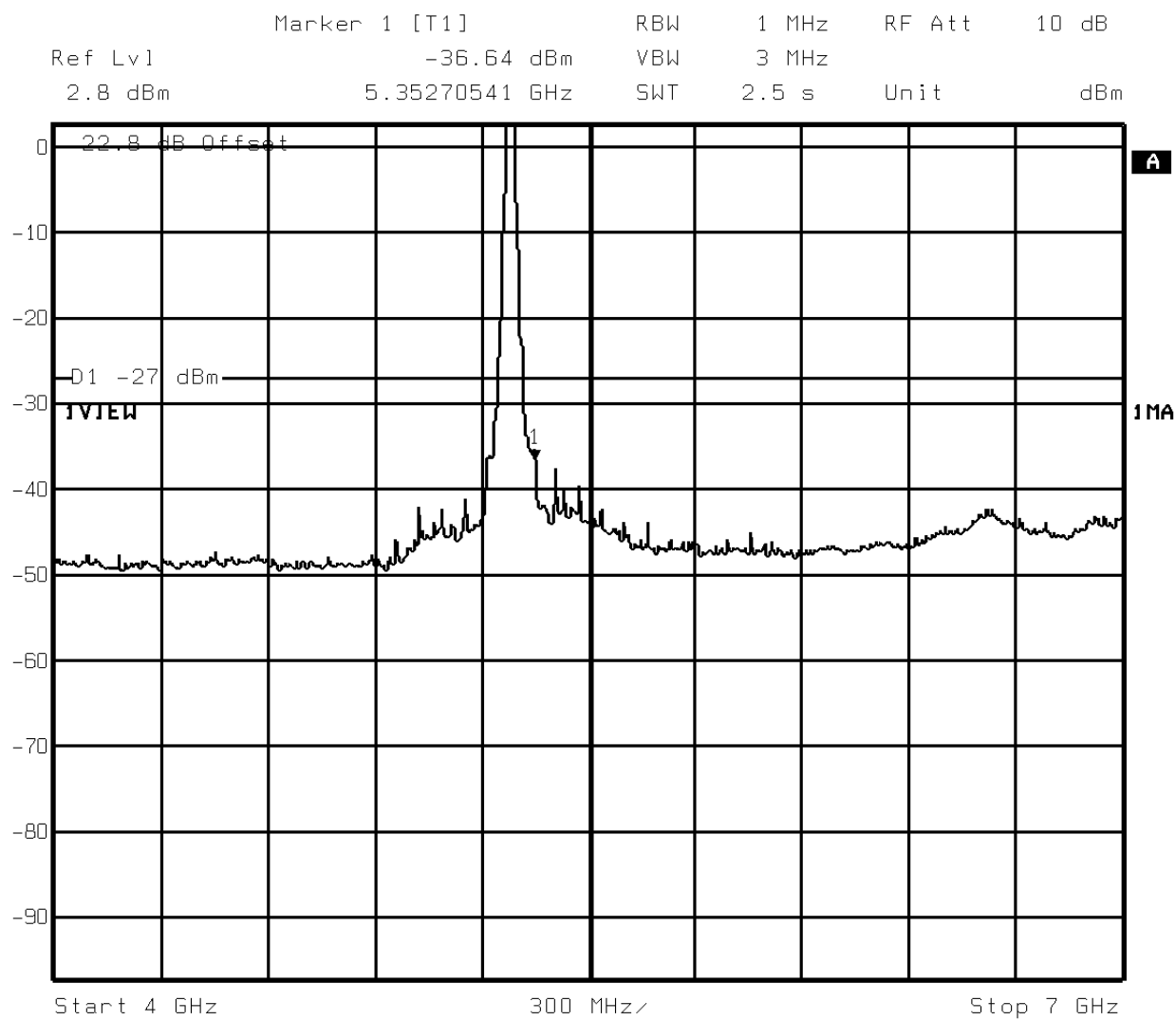
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 6Mbps

4GHz – 7GHz



Date: 14.AUG.03 14:24:02



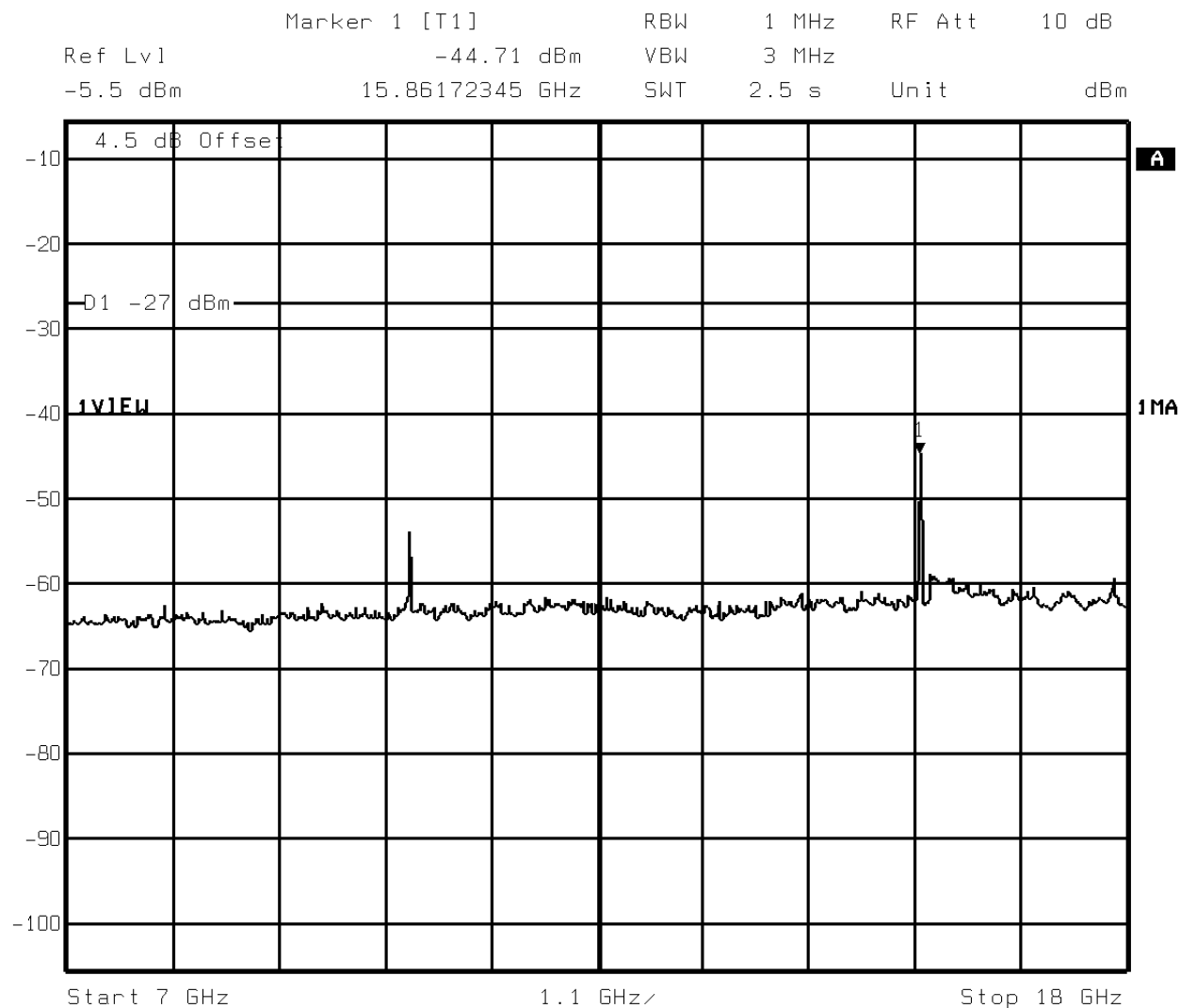
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 6Mbps

7GHz – 18GHz

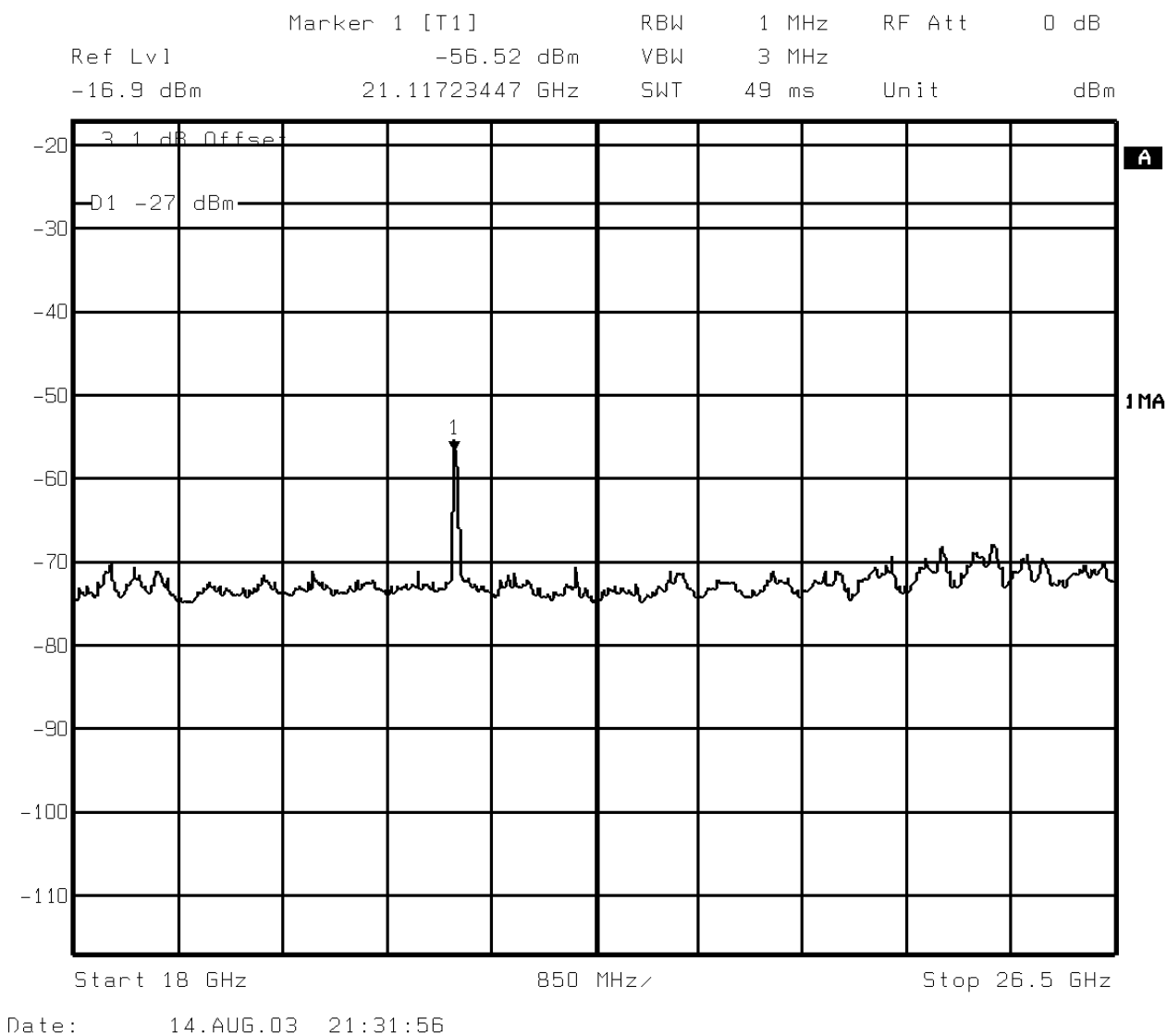


Date: 14.AUG.03 15:54:21



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 6Mbps 18GHz – 26GHz





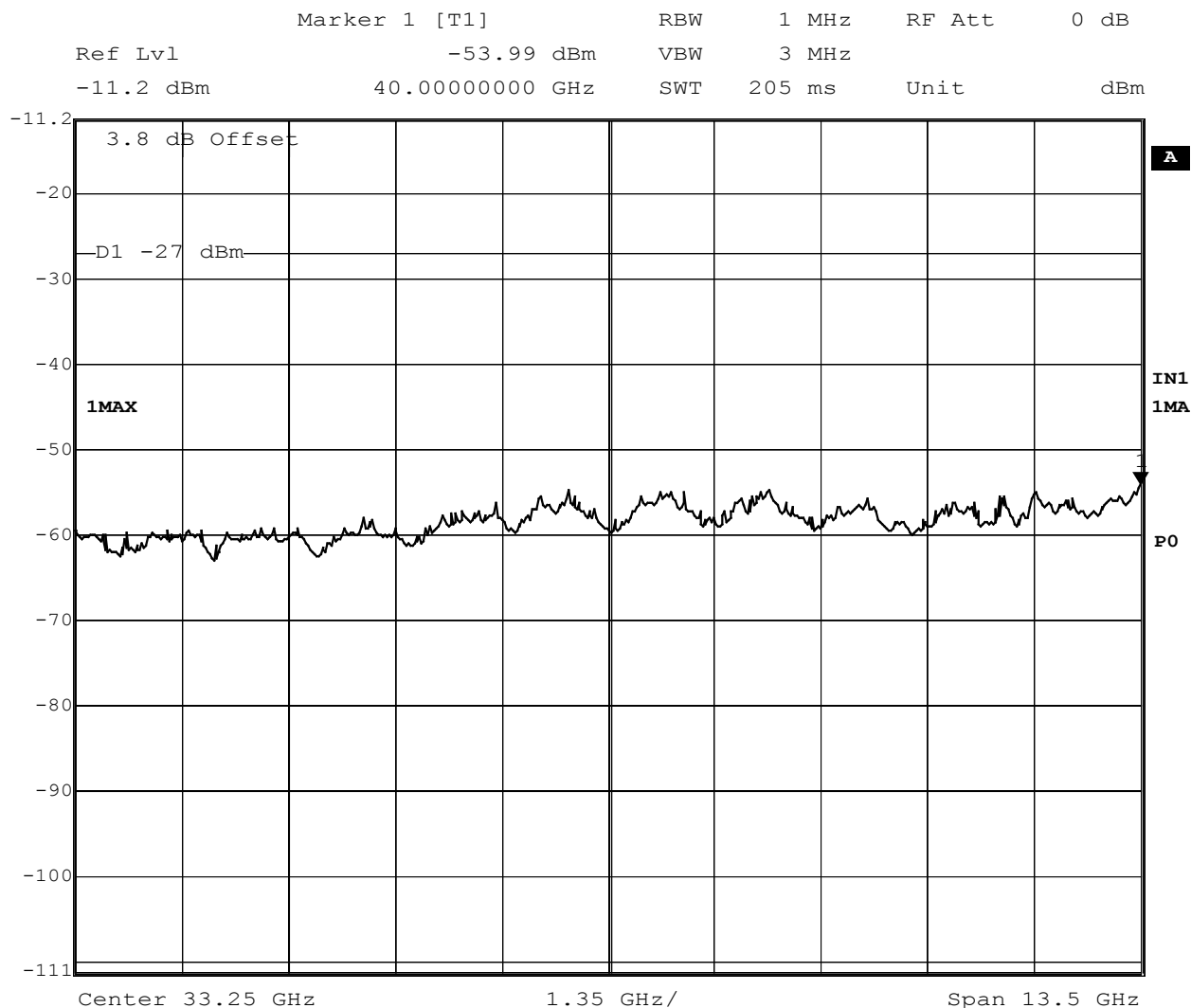
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 6Mbps

26GHz – 40GHz

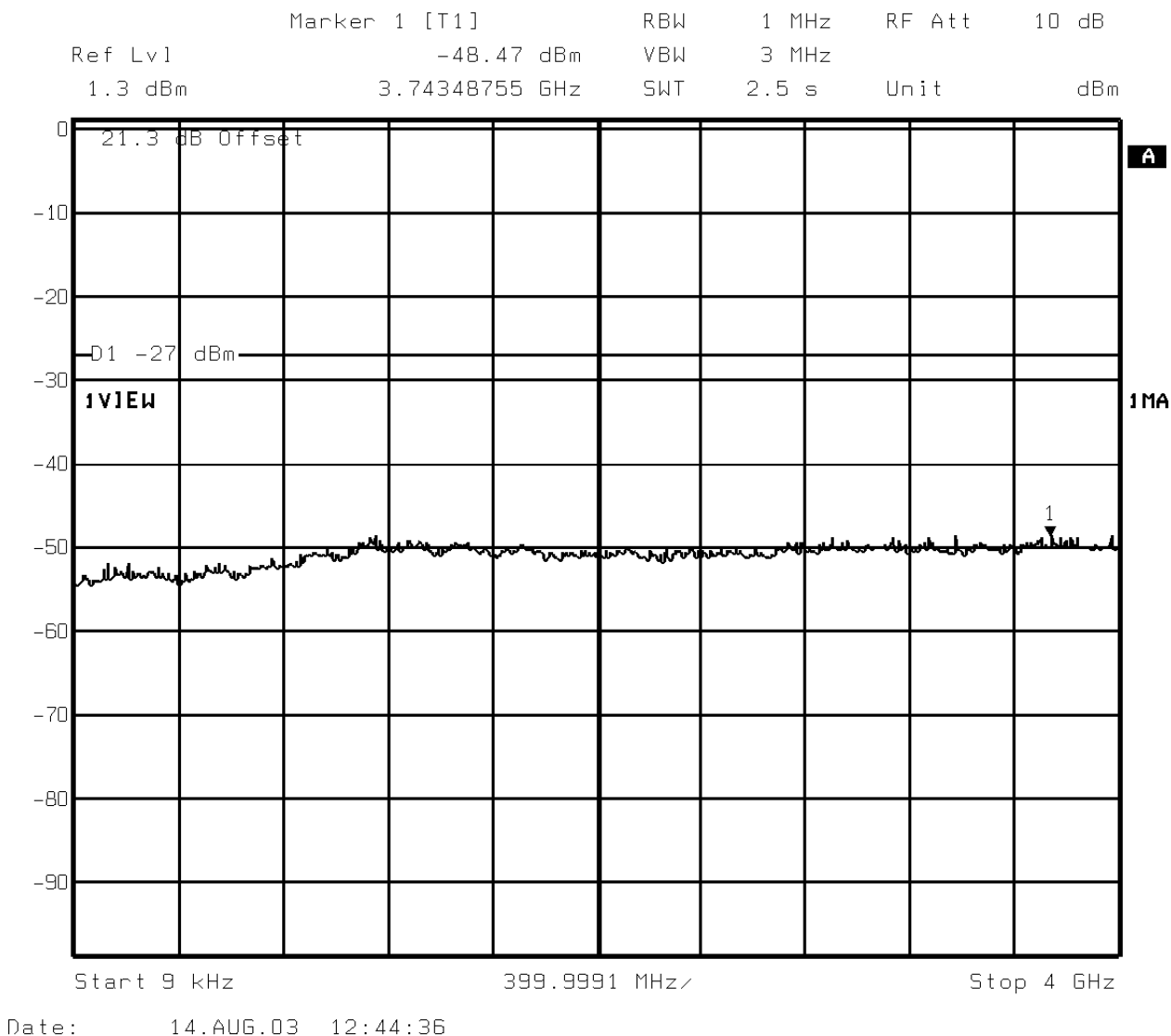


Date: 14.AUG.2003 20:03:12



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

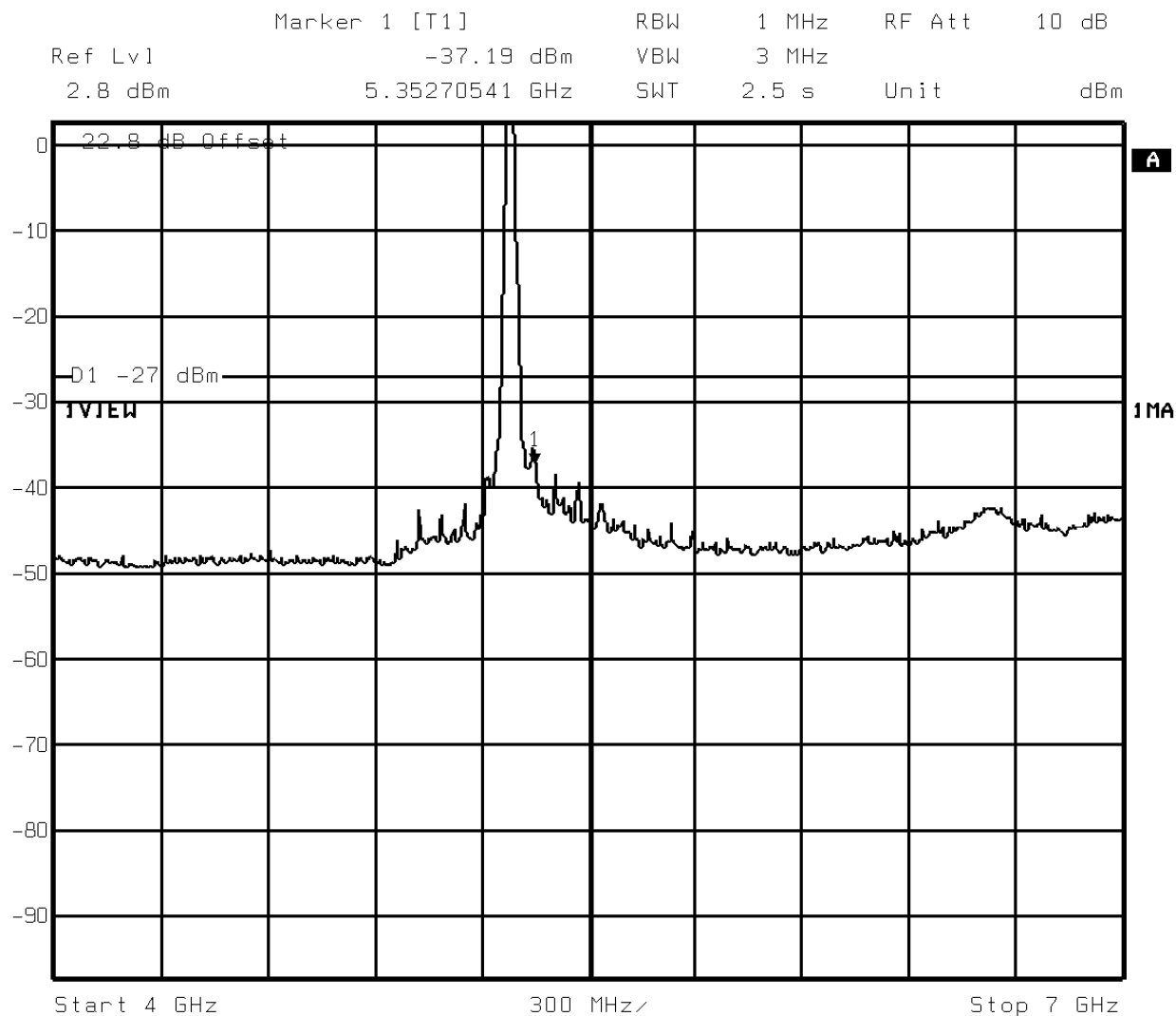
5280.0MHz – Maximum Power 54Mbps 9kHz – 4GHz





Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 54Mbps 4GHz – 7GHz



Date: 14.AUG.03 14:20:33



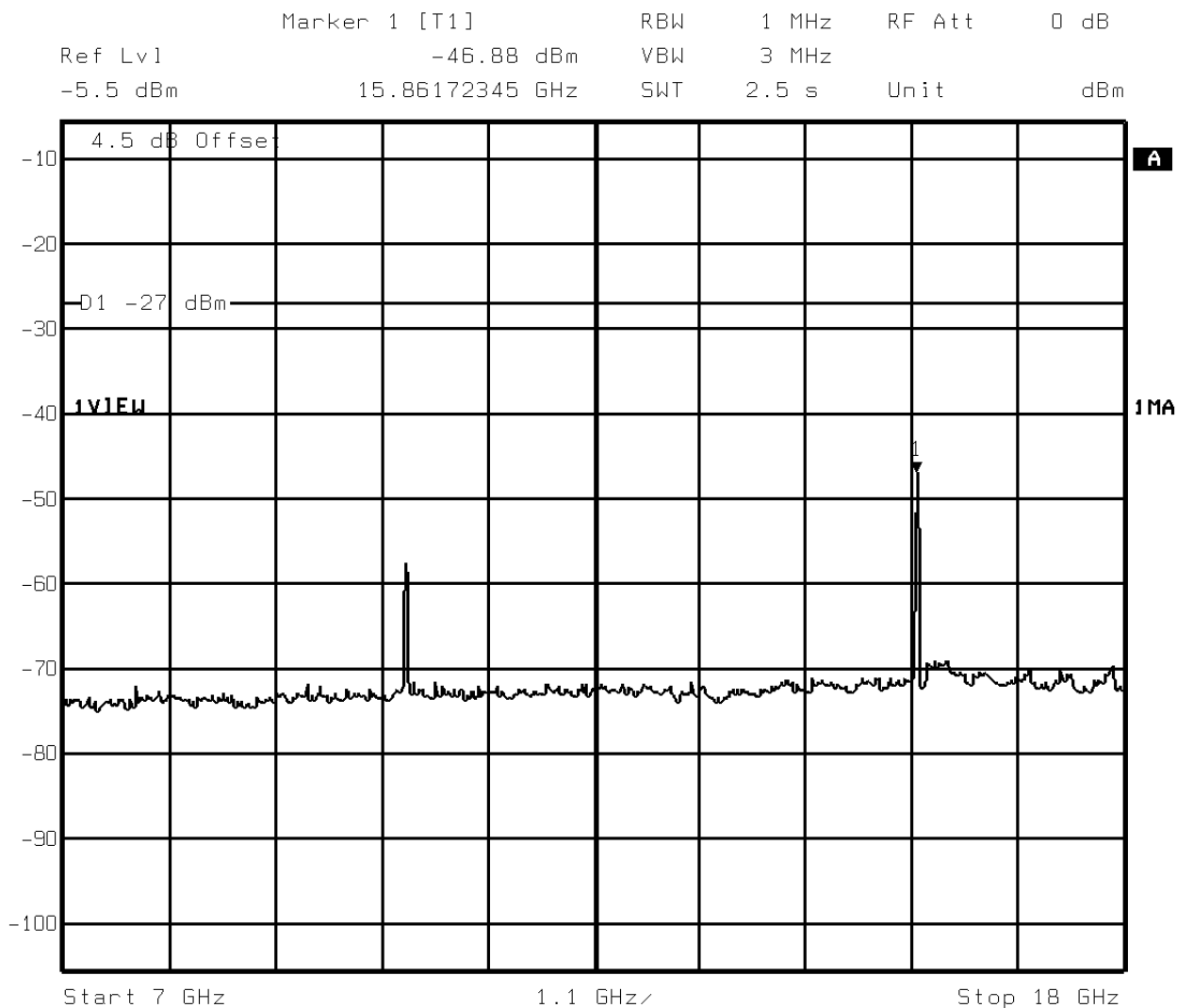
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 54Mbps

7GHz – 18GHz



Date: 14.AUG.03 15:50:52



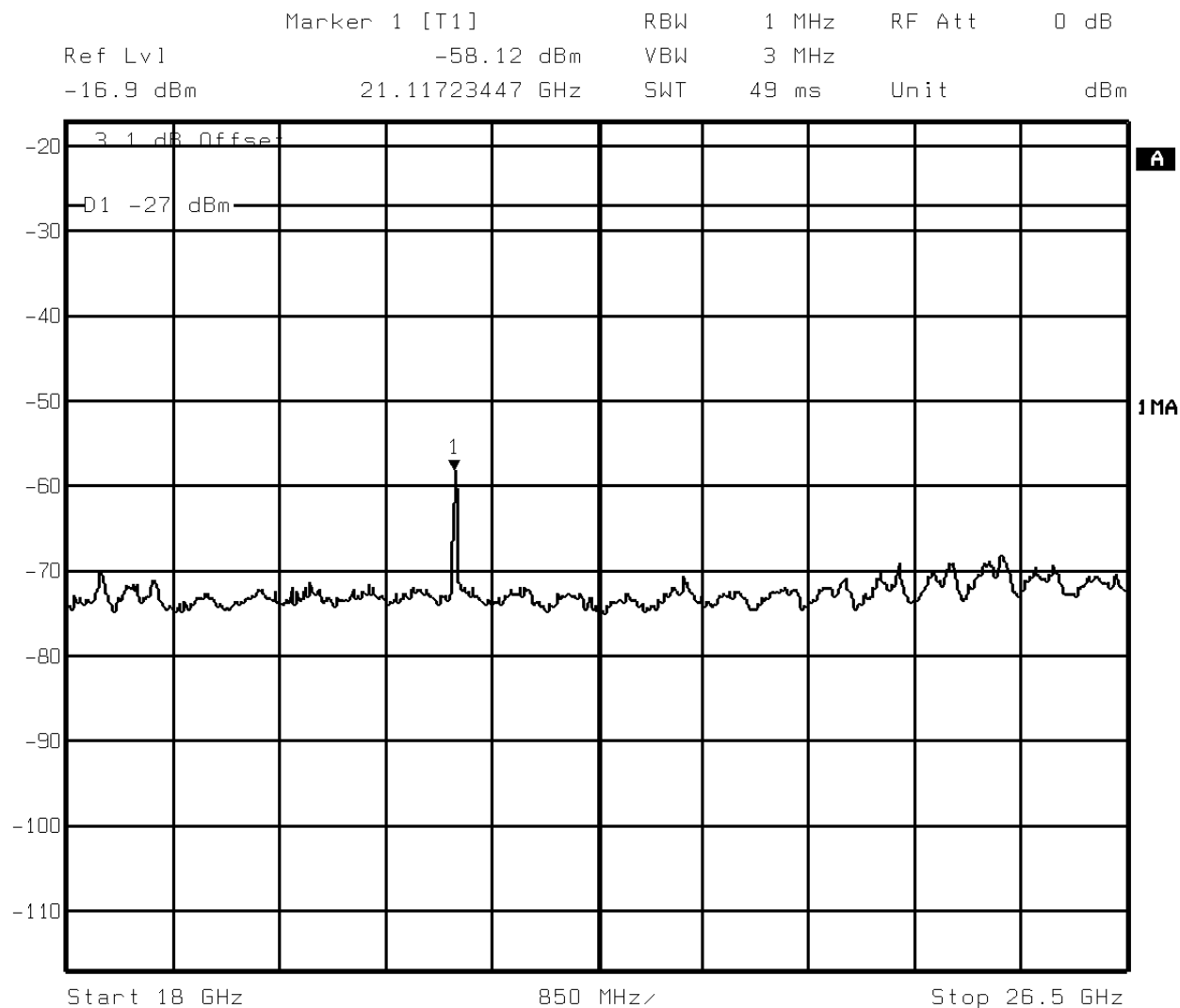
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 54Mbps

18GHz – 26GHz



Date: 14.AUG.03 21:34:17



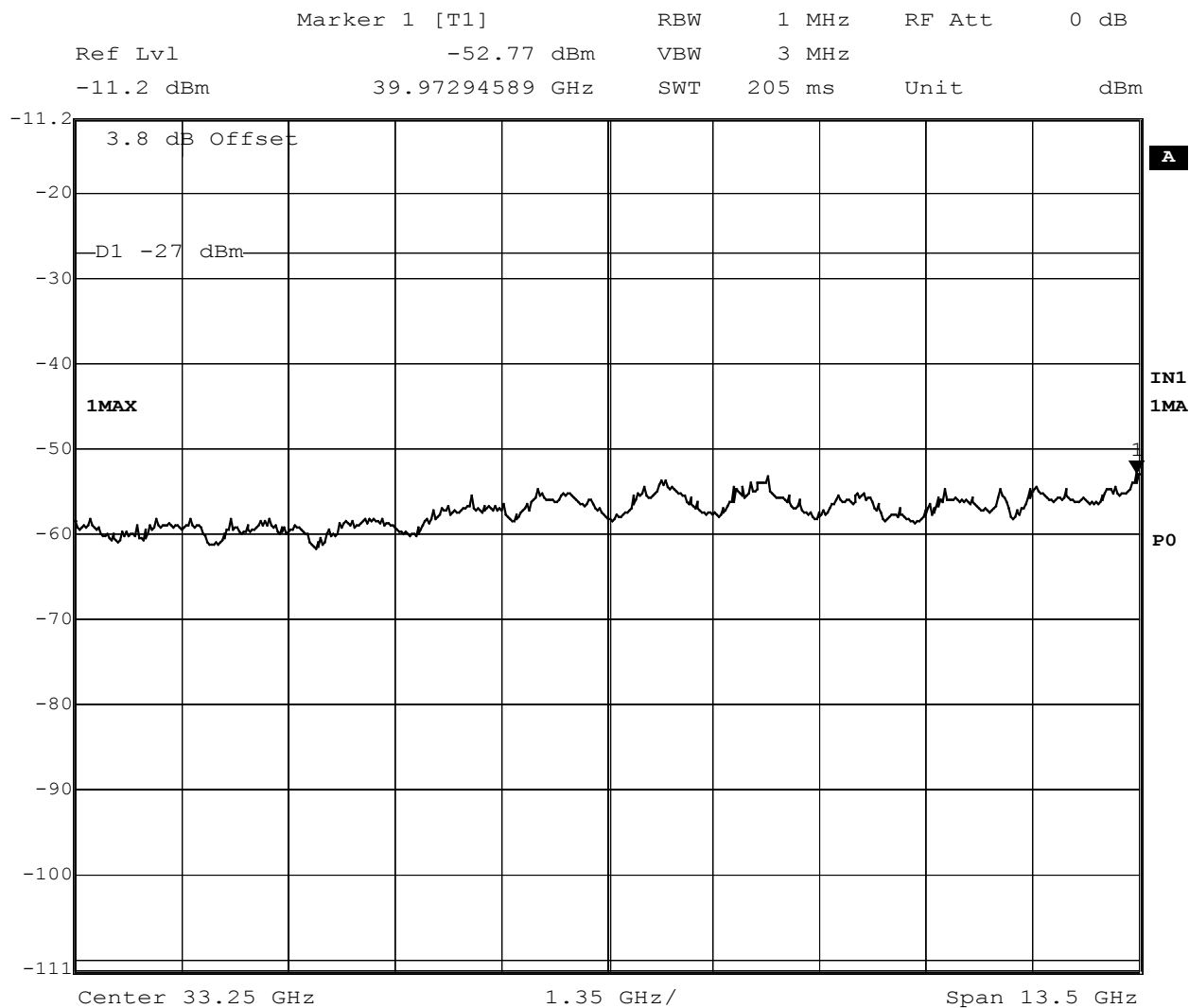
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5280.0MHz – Maximum Power 54Mbps

26GHz – 40GHz

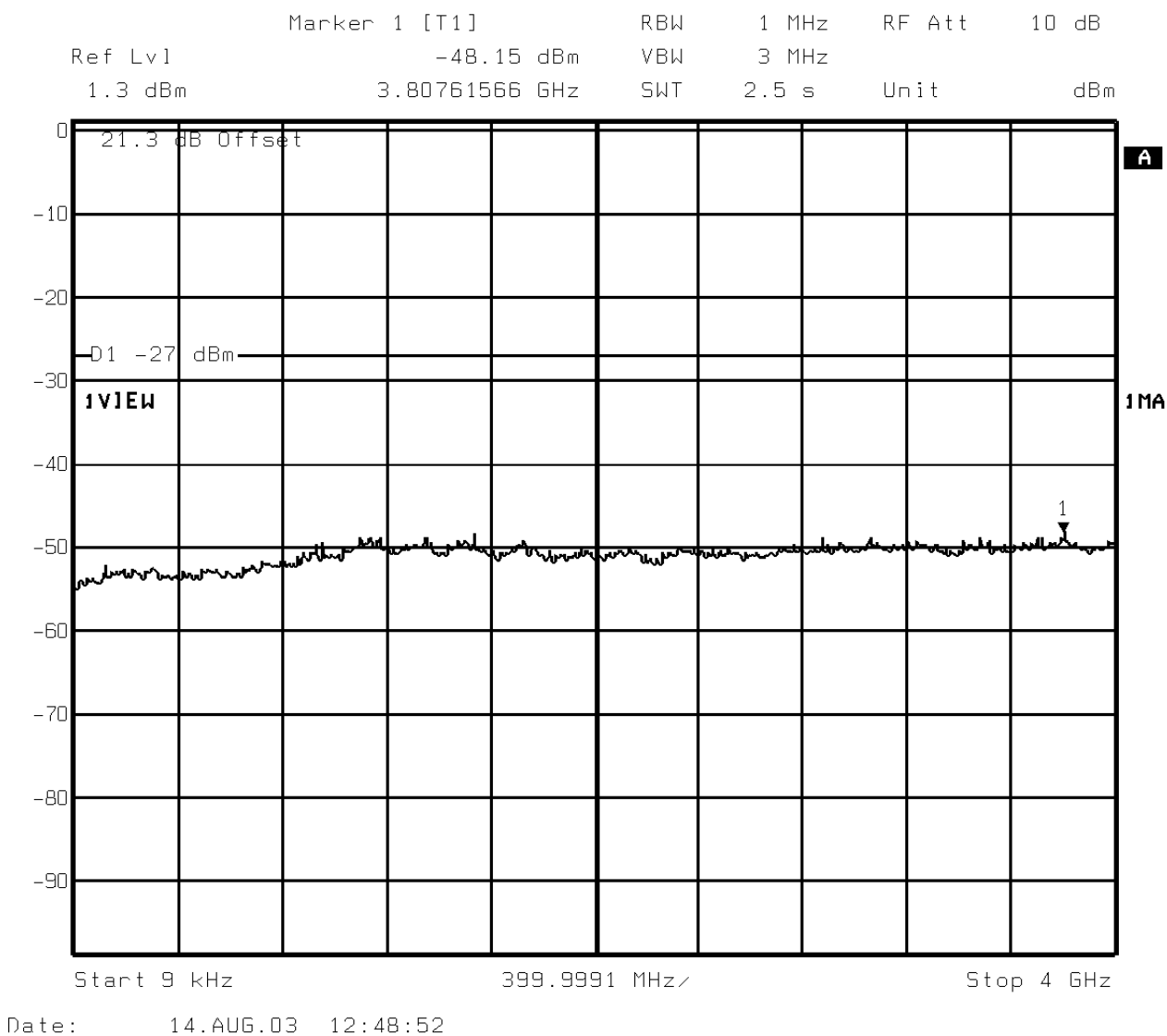


Date: 14.AUG.2003 19:58:20



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 6Mbps 9kHz – 4GHz





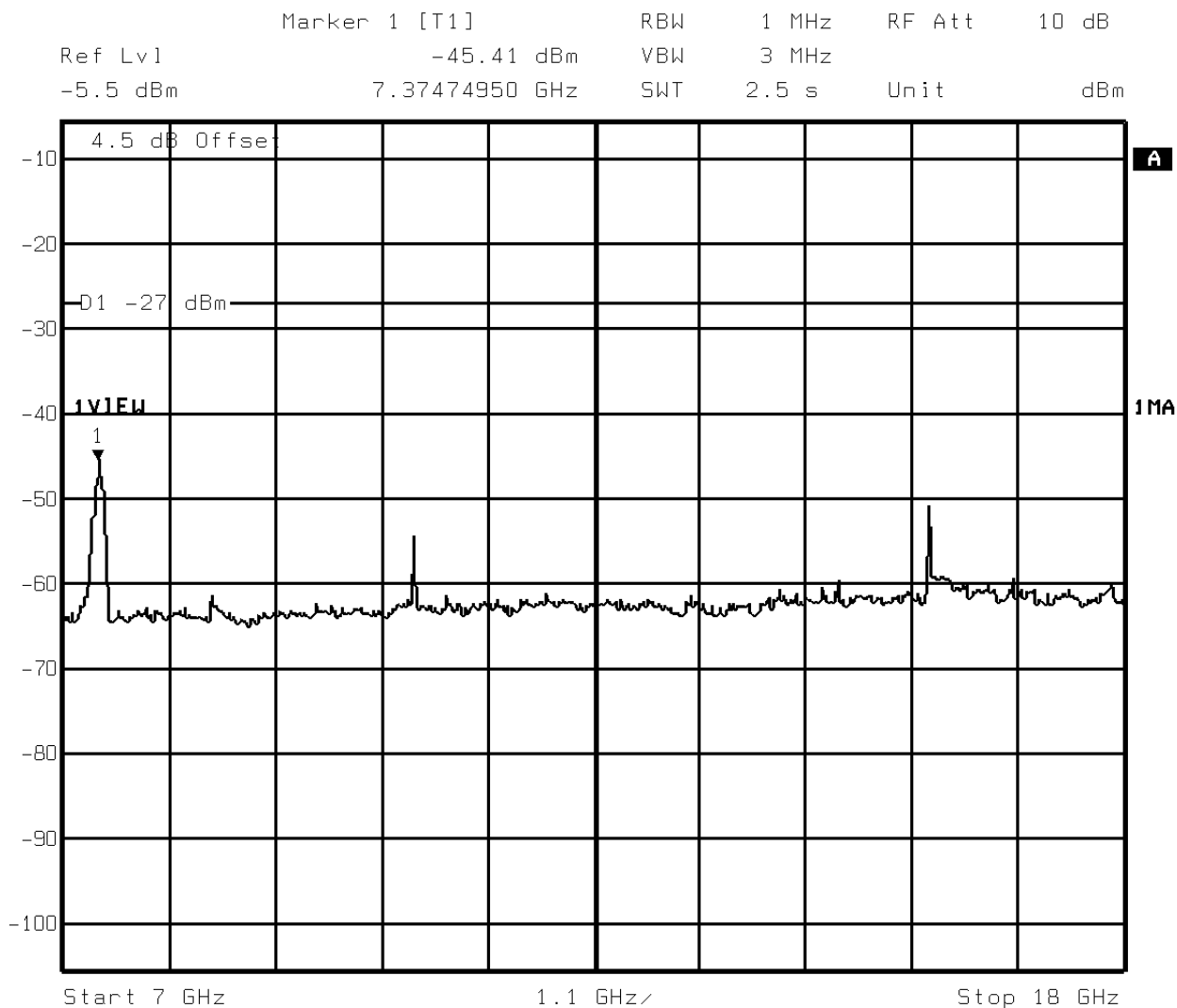
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 6Mbps

7GHz – 18GHz



Date: 14.AUG.03 15:57:13



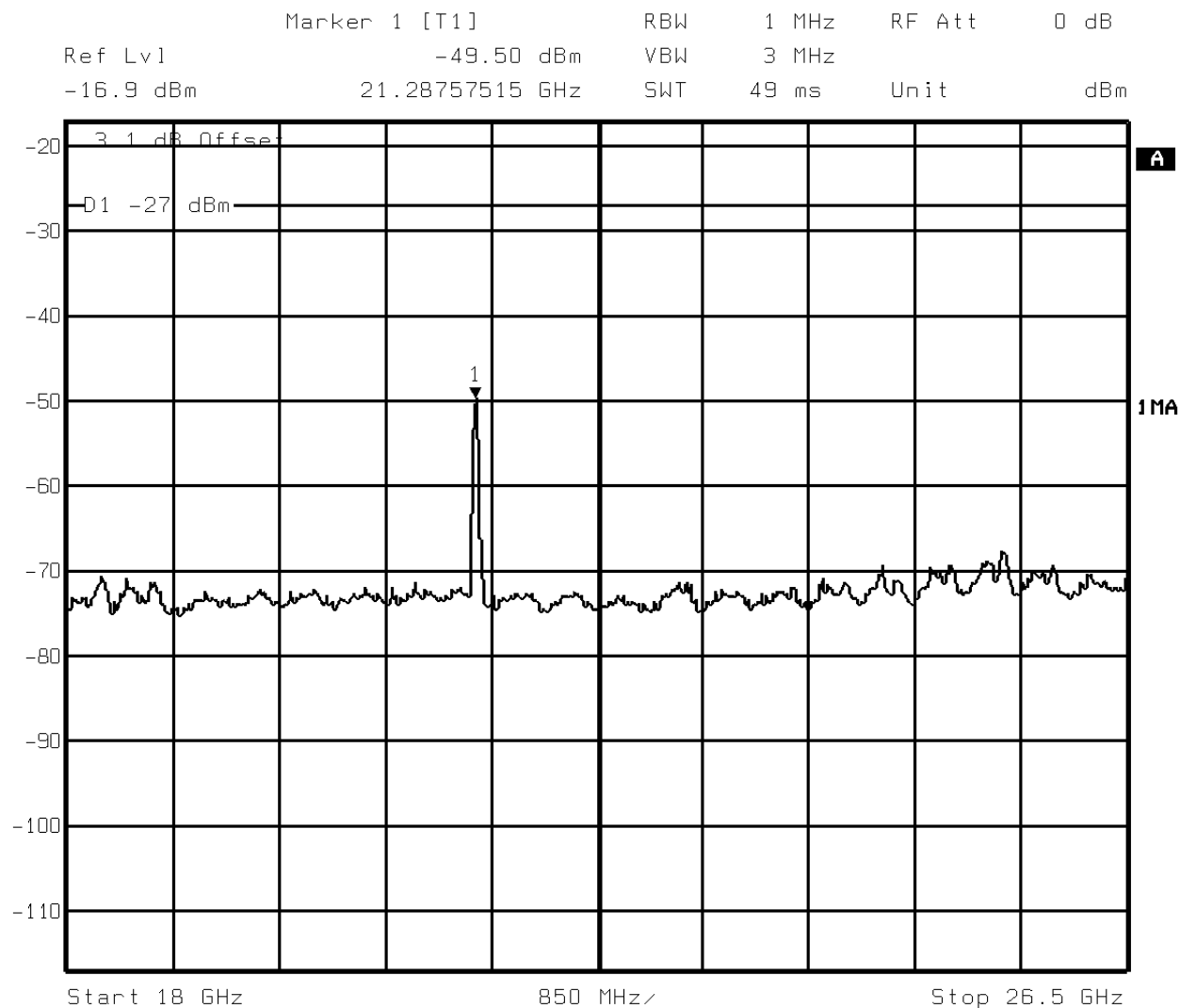
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 6Mbps

18GHz – 26GHz



Date: 14.AUG.03 21:41:11



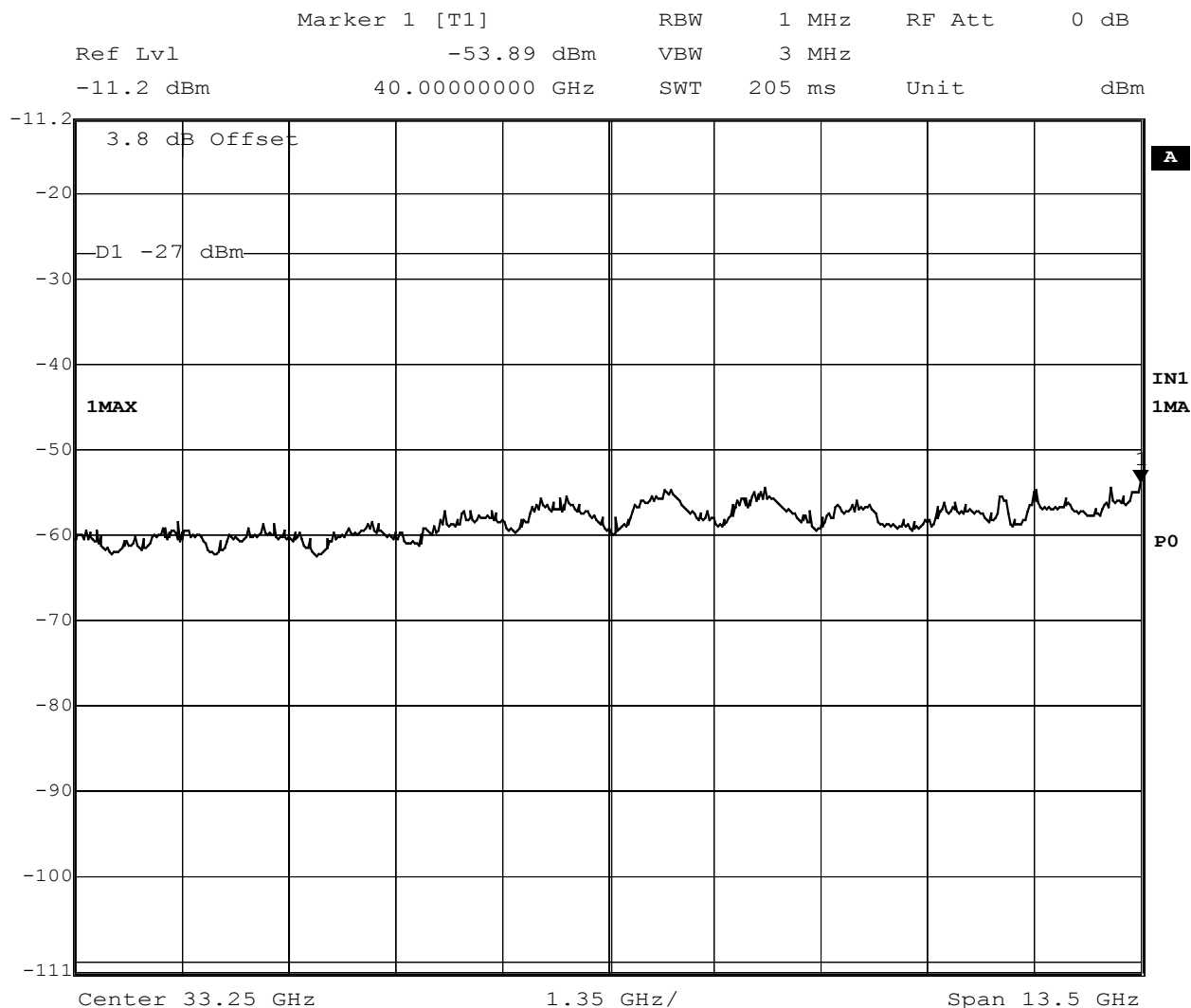
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 6Mbps

26GHz – 40GHz

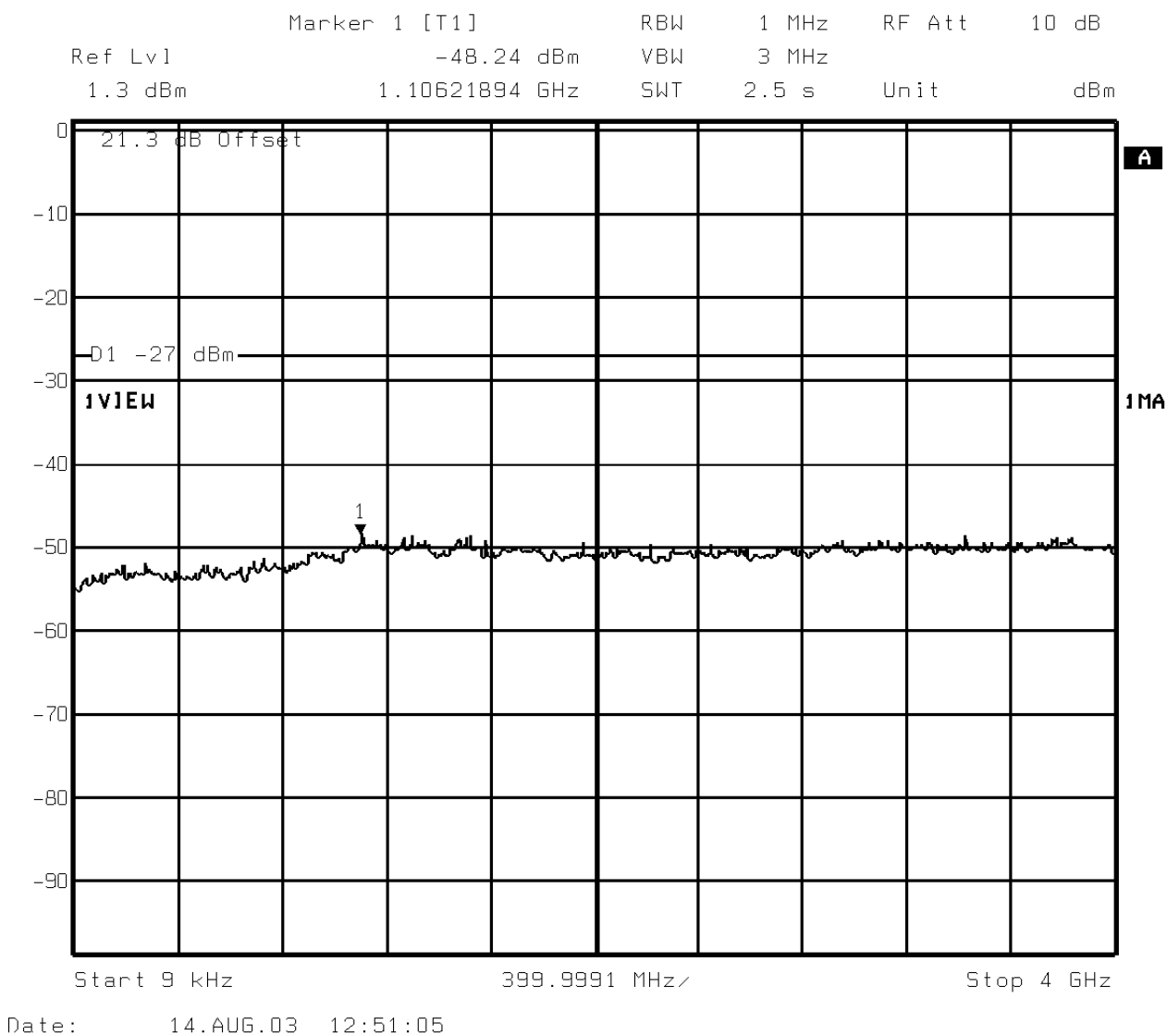


Date: 14.AUG.2003 20:10:09



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 54Mbps 9kHz – 4GHz





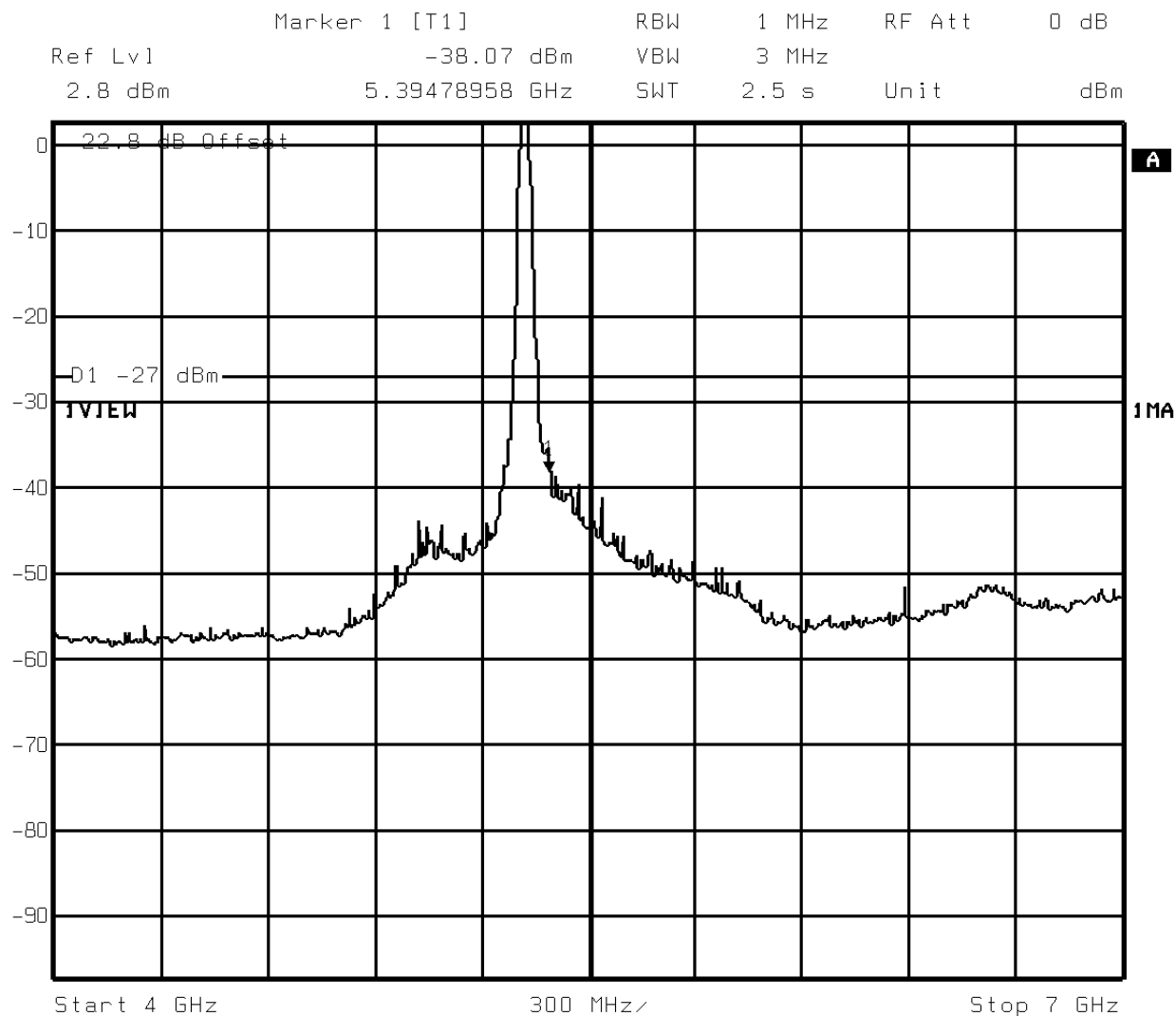
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 54Mbps

4GHz – 7GHz



Date: 14.AUG.03 14:51:00



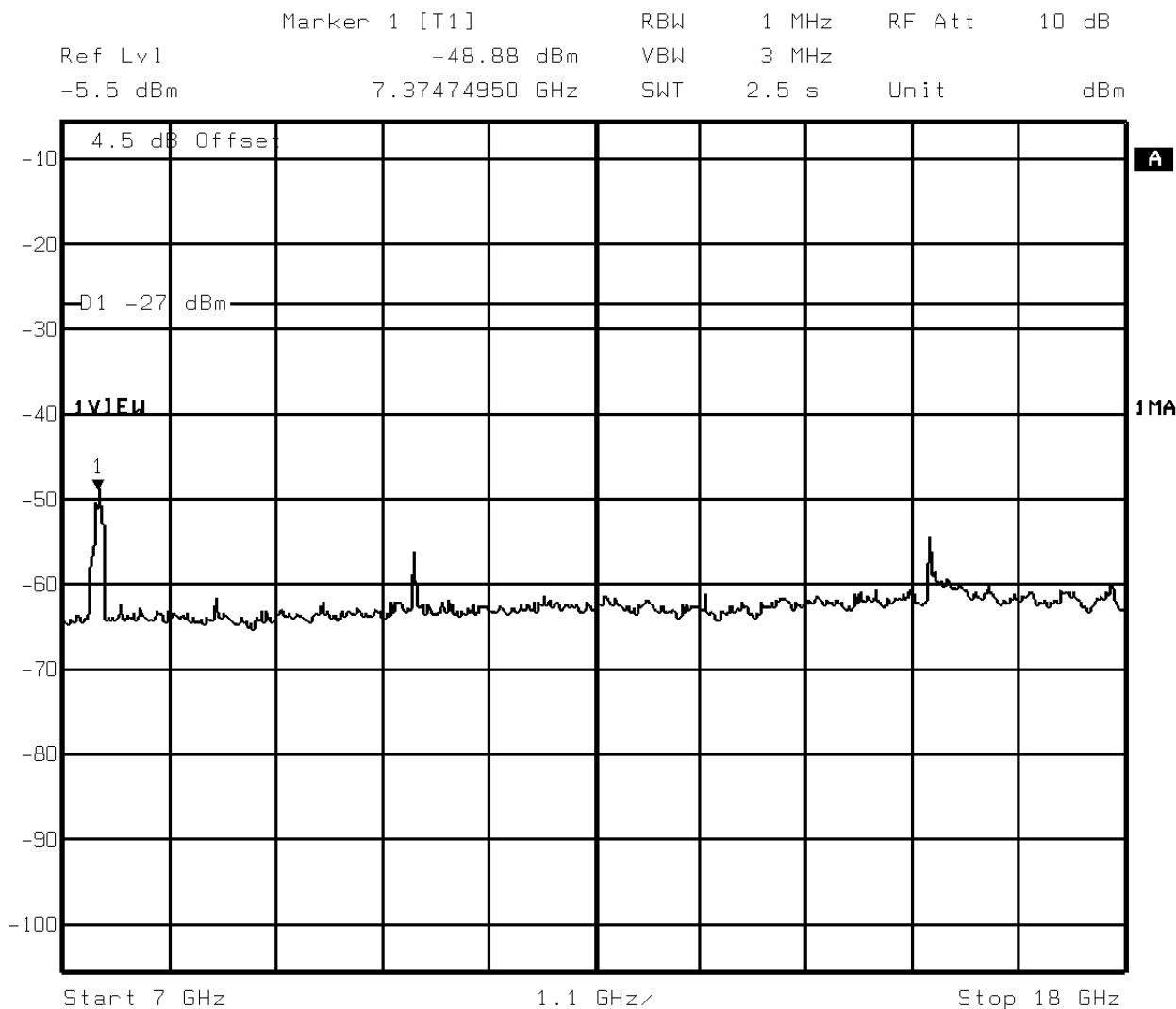
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 54Mbps

7GHz – 18GHz



Date: 14.AUG.03 15:58:54



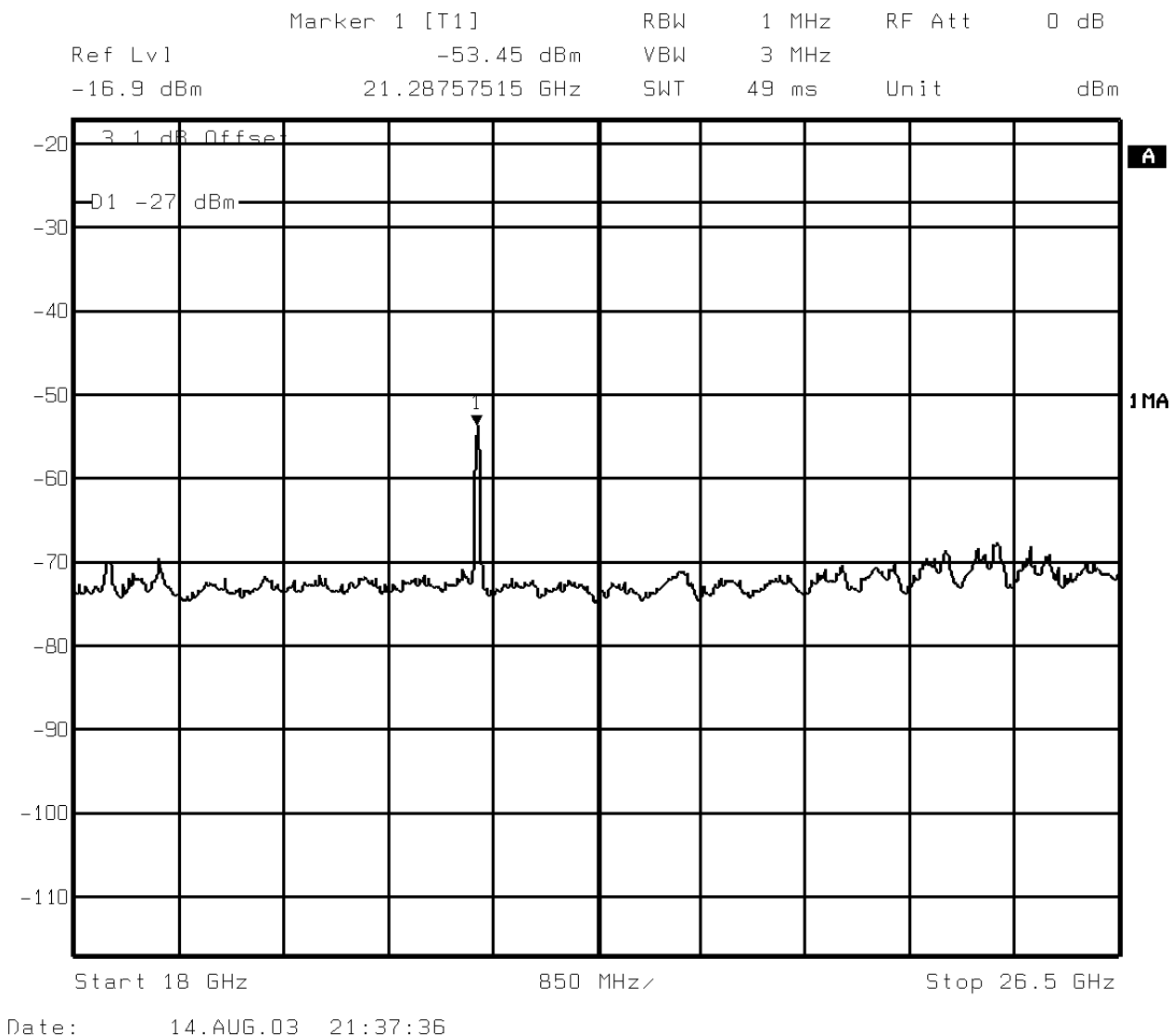
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 54Mbps

18GHz – 26GHz





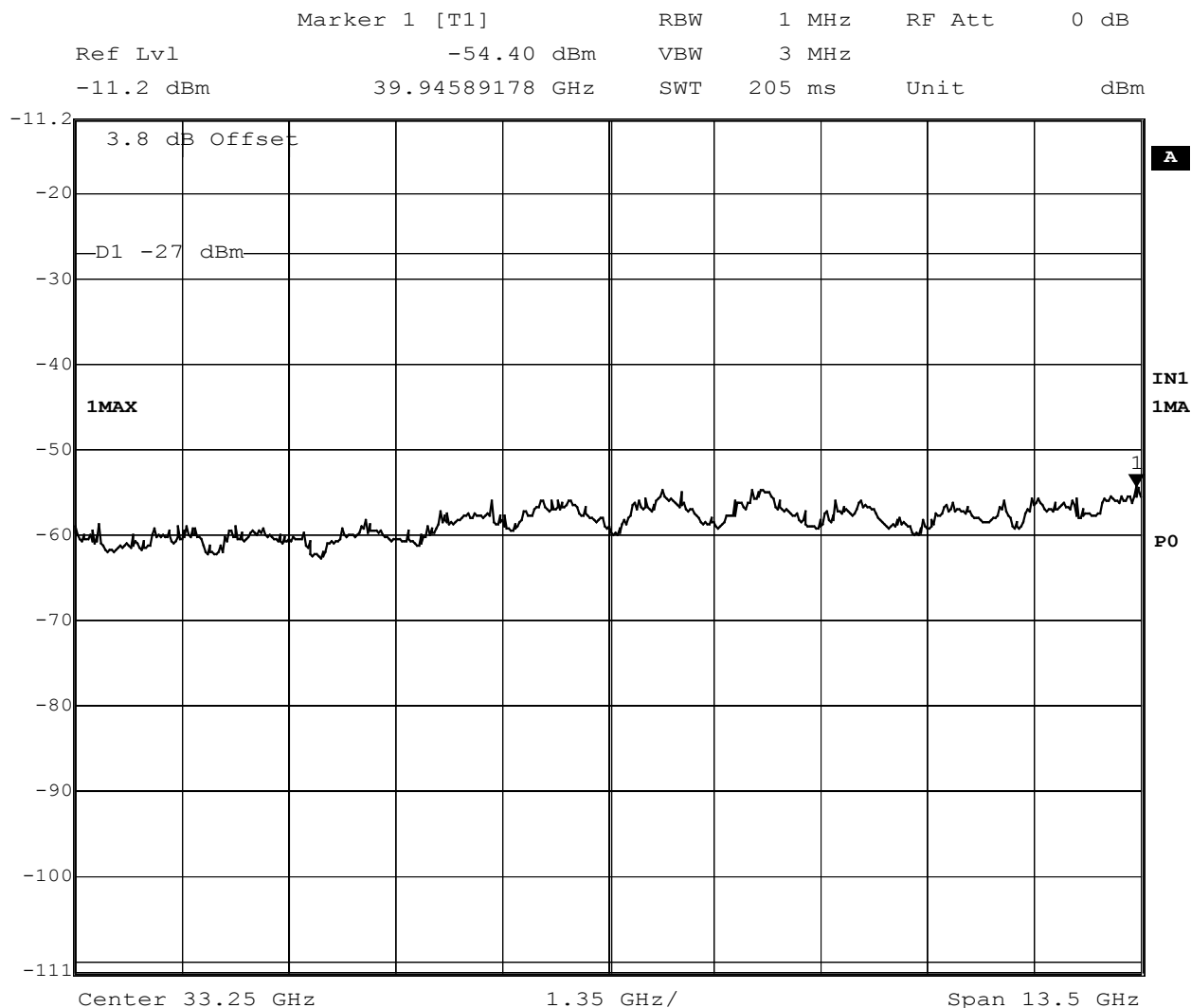
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5320.0MHz – Maximum Power 54Mbps

26GHz – 40GHz



Date: 14.AUG.2003 20:08:56



Test Case : Spurious Conducted Emissions on Power Lines
Test Date : 31st July 2003
Rule Parts : 15.407(b)(5)

Test Procedure

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(5) which also requires Rule part 15.207 to be applied. for Conducted Emissions was carried out on the Measurement Test Facility detailed in Annex A.

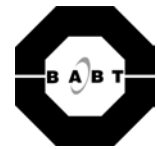
Conducted Emission Measurements were undertaken within the semi-anechoic chamber. Emissions were measured on the Live and Neutral Lines.

Emissions were formally measured using a Quasi-Peak Detector, which meets the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the tables below.

The EUT was connected to a 120V 60Hz supply.

The Conducted Emission measurements were made using a Hewlett Packard 8542E EMI Receiver.

The test was performed in accordance with ANSI C63.4.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Bottom Channel (5.260GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2845	43.8	60.7	39.6	50.7
0.3182	39.3	59.8	35.8	49.8
0.4953	40.0	56.1	29.9	46.1
0.6010	37.2	56.0	28.1	46.0
0.6211	38.1	56.0	37.7	46.0
2.6200	36.7	56.0	31.0	46.0

The margin between the specification requirements and all other emissions were 20.8dB or more below the specified Quasi-Peak limit and 19.1dB or more below the Average limit.

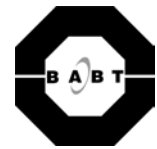
Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2830	44.5	60.7	39.7	50.7
0.3186	40.1	59.7	35.6	49.7
0.4971	38.3	56.0	32.1	46.1
0.6210	37.9	56.0	37.5	46.0
0.7788	35.0	56.0	25.3	46.0
2.5660	36.5	56.0	29.8	46.0

The margin between the specification requirements and all other emissions were 23.2dB or more below the specified Quasi-peak limit and 23.3dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Middle Channel (5.280GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2833	43.9	60.7	39.6	50.7
0.3183	39.3	59.8	35.9	49.8
0.4970	39.7	56.0	29.5	46.0
0.6022	37.4	56.0	28.7	46.0
0.6229	36.9	56.0	36.5	46.0
2.6200	37.2	56.0	31.5	46.0

The margin between the specification requirements and all other emissions were 20.8dB or more below the specified Quasi-Peak limit and 19.4dB or more below the Average limit.

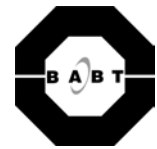
Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2872	44.5	60.6	39.6	50.6
0.3177	39.8	59.8	35.4	49.8
0.4951	38.8	56.1	32.7	46.1
0.6217	37.7	56.0	37.3	46.0
0.7797	34.8	56.0	25.5	46.0
2.5860	36.7	56.0	30.3	46.0

The margin between the specification requirements and all other emissions was 23.5dB or more below the specified Quasi-peak limit and 24.5dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Spurious Conducted Emissions on Power Lines-continued
Test Date : 31st July 2003
Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15.407(b)(5) and 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Top Channel (5.320GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)
0.2833	43.9	60.7	39.6	50.7
0.3184	39.4	59.8	35.8	49.8
0.4965	40.0	56.0	29.7	46.0
0.6021	37.2	56.0	28.3	46.0
0.6201	37.4	60.0	37.0	50.0
2.3270	36.8	60.0	30.4	50.0

The margin between the specification requirements and all other emissions was 20.8dB or more below the specified Quasi-Peak limit and 19.3dB or more below the Average limit.

Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dB μ V)	Quasi-Peak Limit (dB μ V)	Average Level (dB μ V)	Average Limit (dB μ V)
0.2828	44.5	60.7	39.7	50.7
0.3180	40.0	59.8	35.6	49.8
0.4954	39.8	56.1	32.7	46.1
0.6206	37.5	56.0	31.7	46.0
0.7798	34.6	60.0	24.6	50.0
2.5860	36.6	60.0	29.8	50.0

The margin between the specification requirements and all other emissions was 23.2dB or more below the specified Quasi-peak limit and 23.6dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

Measurement Method

The EUT was connected to the Spectrum Analyser via a 20dB Attenuator. The EUT was set to transmit at maximum power on all three channels and at the highest and lowest data rates.

With the EUT transmitting, the trace was adjusted to display the entire emission bandwidth of the fundamental. The RBW was adjusted to 1MHz with the VBW set to 3MHz. Trace 1 was set to Max Hold with a peak detector. Trace 2 was then selected with a sample detector. The VBW on trace 2 was reduced to 30kHz and the trace set to max hold. Using the marker delta function, the difference between the two traces was measured.

The measurement plots are shown on the following pages.

Remarks

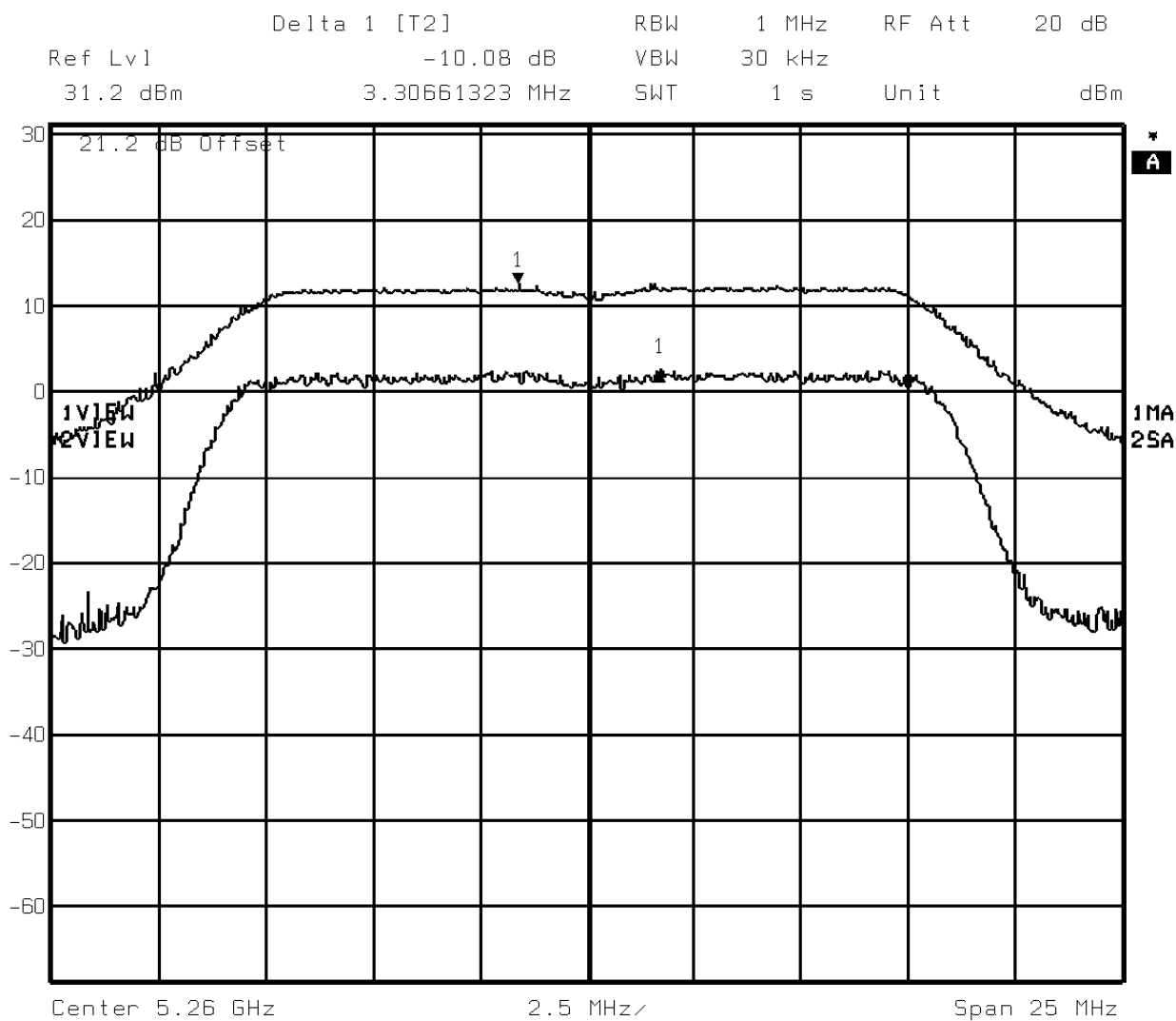
The equipment met the requirements outlined in Clause 15.407(a)(6) where the peak excursion was less than 13dB.

Performed by: B Airs, Radio Engineer.



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5260.0MHz – Maximum Power 6Mbps

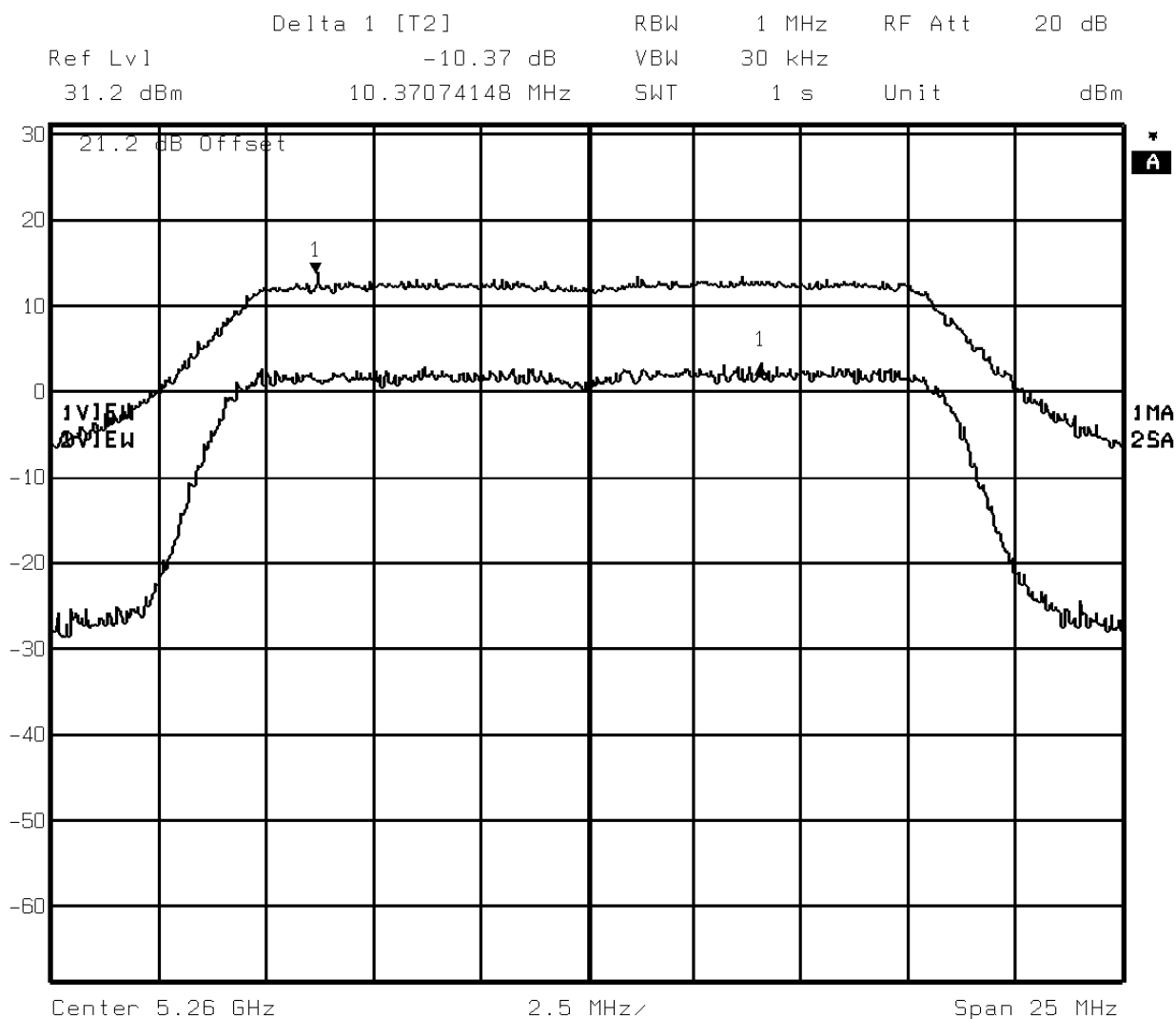


Date: 15.AUG.03 11:10:22



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5260.0MHz – Maximum Power 54Mbps

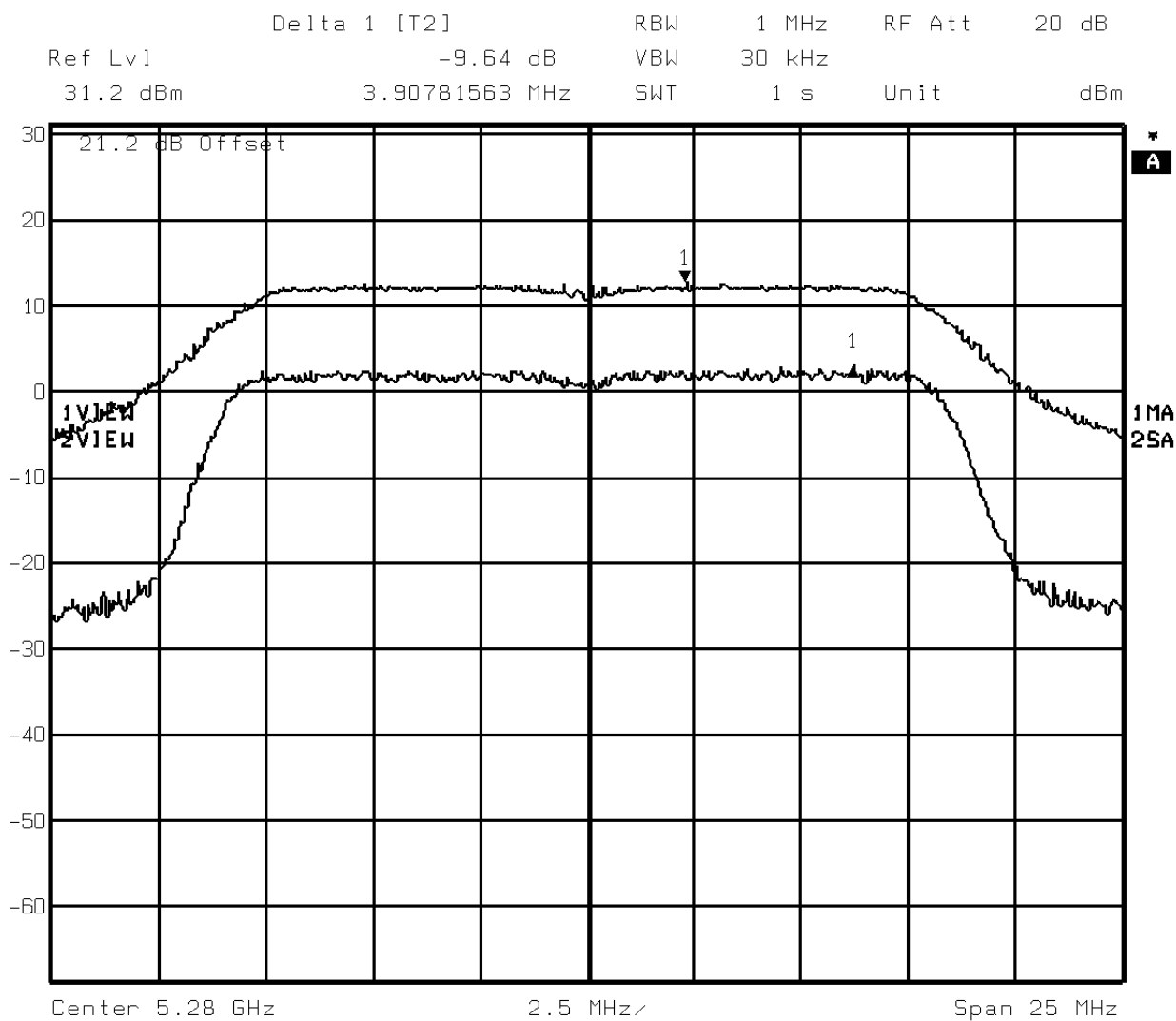


Date: 15.AUG.03 11:08:09



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5280.0MHz – Maximum Power 6Mbps

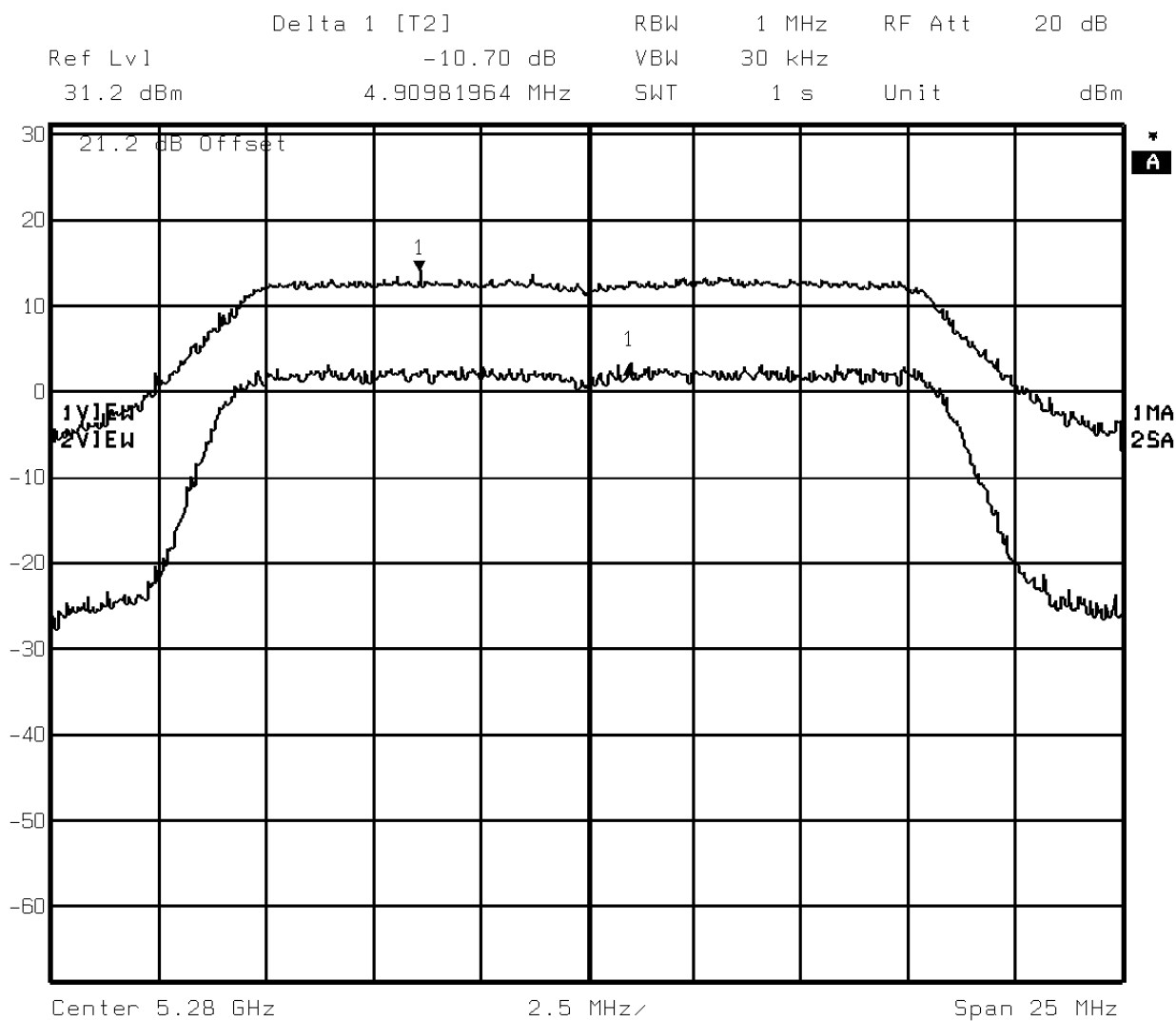


Date: 15.AUG.03 11:13:39



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5280.0MHz – Maximum Power 54Mbps

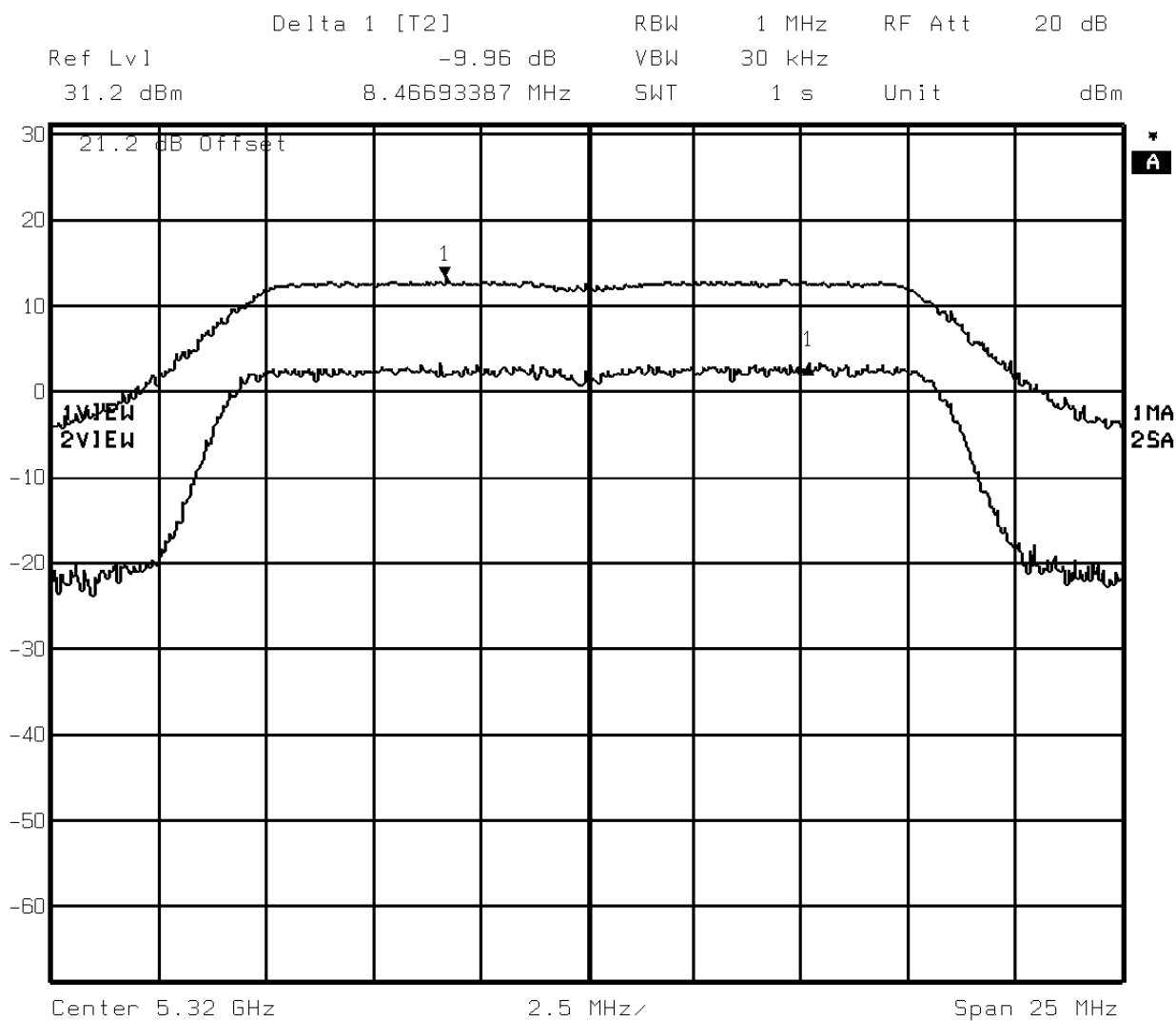


Date: 15.AUG.03 11:16:34



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5320.0MHz – Maximum Power 6Mbps

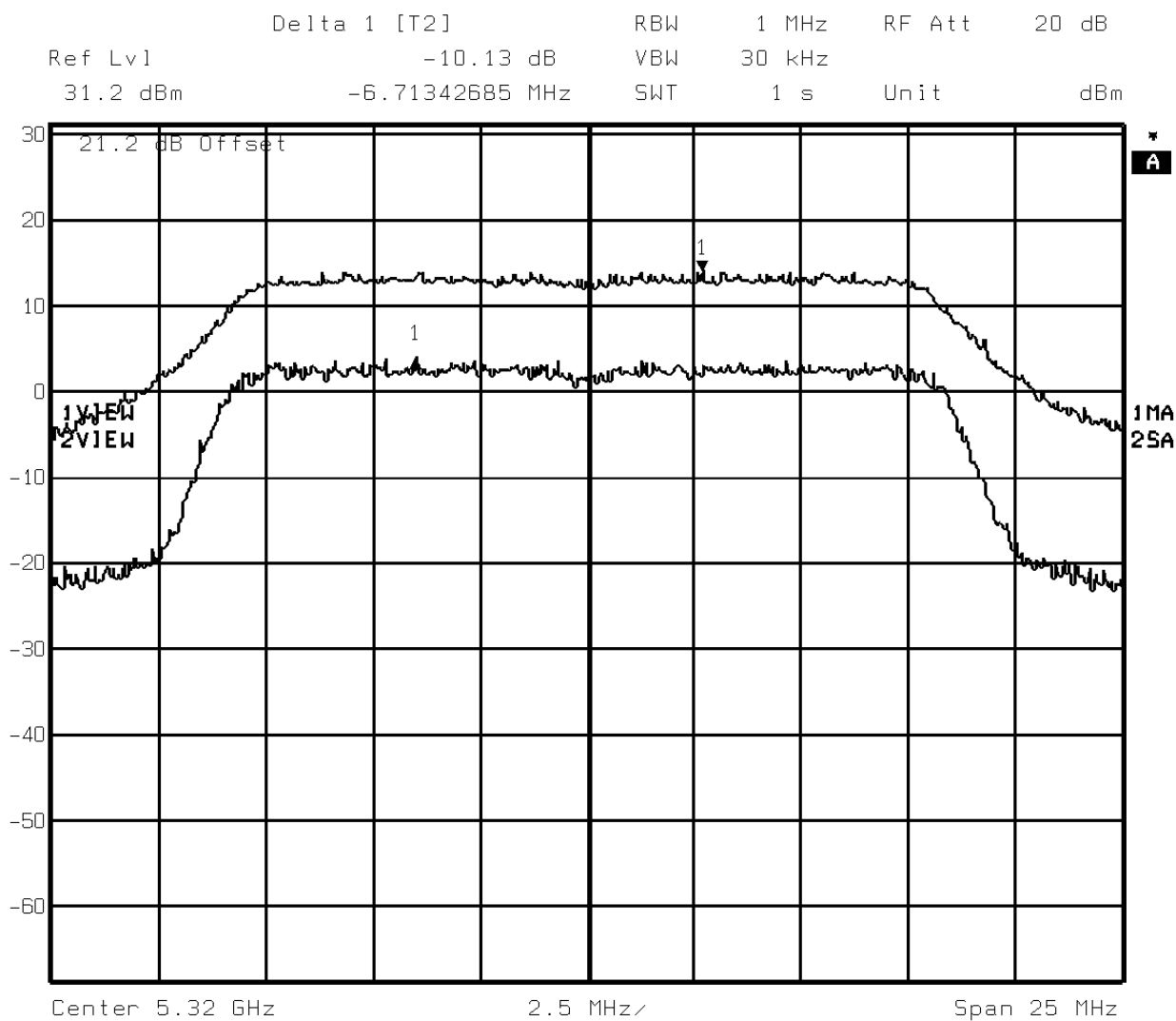


Date: 15.AUG.03 11:26:55



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5320.0MHz – Maximum Power 54Mbps



Date: 15.AUG.03 11:24:18



Test Case : Spurious Radiated Emissions
Test Date : 17th July 2003
Rule Parts : 15.407(b)(5) (6)

Measurement Method

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(5) (6), for Radiated Electric Field Emissions was carried out on the Measurement Test Facility detailed in Annex A. Section 15.407(b)(5) (6) also requires Rule parts 15.205 and 15.209 to be applied.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 25GHz. The list of worst-case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector. 1GHz – 25GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was operating via the internal power supply of the Host.

Measurements were made with the EUT transmitting on the following channels.

Bottom Channel:	5260MHz
Middle Channel:	5280MHz
Top Channel:	5320MHz

Spurious Radiated Emissions from 30MHz to 1GHz were made using a HP 8542E Test Receiver.

Spurious Radiated Emissions from 1GHz to 25GHz were made using a Rhode and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.



Test Case : Spurious Radiated Emissions (cont'd)
Test Date : 7th August 2003
Rule Parts : 15.407(b)(5) (6)

30MHz - 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15.407(b)(5) (6), 15.205 and 15.209 for Radiated Emissions (30MHz – 25GHz).

EUT Tx on Bottom Channel (5.260GHz)

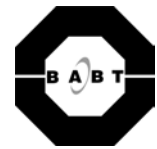
30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azim	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
37.4600	V	101	99	33.7	48.4	40.0	100.0
40.3381	V	100	35	33.3	46.2	40.0	100.0
56.7851	V	101	353	35.6	60.3	40.0	100.0
58.7467	V	100	175	37.0	70.8	40.0	100.0
60.2325	V	100	191	37.1	71.6	40.0	100.0
60.8271	V	101	175	35.2	57.5	40.0	100.0

EUT Tx on Middle Channel (5.280GHz)

30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azim	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
37.4600	V	101	100	33.6	47.9	40.0	100.0
40.3381	V	100	35	32.9	44.2	40.0	100.0
54.1655	V	100	185	33.3	46.2	40.0	100.0
60.2322	V	101	191	37.0	70.8	40.0	100.0
60.8271	V	100	187	35.1	56.9	40.0	100.0
61.9499	V	101	174	33.3	46.2	40.0	100.0



Test Case : Spurious Radiated Emissions (cont'd)
Test Date : 7th August 2003
Rule Parts : 15.407(b)(5) (6)

30MHz - 25GHz Frequency Range

EUT Tx on Top Channel (5.320GHz)

30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
40.3381	V	100	35	33.2	45.7	40.0	100.0
54.1618	V	101	159	33.5	47.3	40.0	100.0
58.7467	V	101	175	36.8	69.2	40.0	100.0
60.2325	V	101	191	36.9	70.0	40.0	100.0
60.8271	V	100	181	35.0	56.2	40.0	100.0
62.0119	V	100	163	33.8	49.0	40.0	100.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: P J Harrison & M Terry, EMC Engineer.



PART 3
5.725 –5.825 GHz



Test Case : Band Edge Measurements
Test Date : 17th July 2003
Rule Parts : 15.407(b)

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(6) and Subpart C Section 15.205, for Restricted Bands of Operation was carried out on the Measurement Test Facility detailed in Annex A.

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'.

EUT was operating at maximum power at 11Mbps.

Step 1

Bottom Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	Cm	deg	dB μ V/m	dB μ V/m
5.745	V	100	151	107.47	97.11

Step 2

Determine Marker delta amplitude between 5.745GHz fundamental and 5.150GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

The Marker Delta = 53.08dB

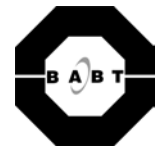
Step 3

By subtracting the Marker Delta obtained from Step 2 from the 5.180GHz Field Strength measurement from Step 1, gives following Result

Peak of 107.47dB μ V/m – 53.08dB (Delta) = 54.39dB μ V/m (Limit is 74.0dB μ V/m = Pass)

Average of 97.11dB μ V/m – 53.08dB (Delta) = 44.03dB μ V/m (Limit is 54.0dB μ V/m = Pass)

Performed by: B Airs, Radio Engineer.



Test Case : Band Edge Measurements
Test Date : 17th July 2003
Rule Parts : 15.407(b)

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(6) and Subpart C Section 15.205, for Restricted Bands of Operation was carried out on the Measurement Test Facility detailed in Annex A.

The following Test Results were obtained using the FCC Public Notice document (DA 00-705 released 30 March 2000) for making measurements at the Band Edge, incorporating the 'Marker Delta Method'. EUT was operating at maximum power at 11Mbps.

Step 1

Top Channel Fundamental Field Strength Measurement.

Performed in accordance with ANSI C63.4

Peak measurements performed utilising a Resolution Bandwidth and Video Bandwidth of 1MHz.
Average measurements performed utilising a Resolution Bandwidth of 1MHz and Video Bandwidth of 10Hz.

Freq	Ant Pol	Hgt	Azi	Peak Field Strength	Average Field Strength
GHz	H/V	Cm	deg	dB μ V/m	dB μ V/m
5.830	V	100	182	107.69	97.11

Step 2

Determine Marker delta amplitude between 5.830GHz fundamental and 5.350GHz the Band Edge under investigation.

Using a span of 30MHz with Resolution Bandwidth and Video Bandwidth of 300kHz.

The Marker Delta = 52.90dB

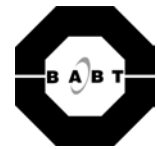
Step 3

By subtracting the Marker Delta obtained from Step 2 from the 5.830GHz Field Strength measurement from Step 1, gives following Result

Peak of 107.69dB μ V/m – 52.90dB (Delta) = 54.79dB μ V/m (Limit is 74.0dB μ V/m = Pass)

Average of 97.11dB μ V/m – 52.90dB (Delta) = 44.21dB μ V/m (Limit is 54.0dB μ V/m = Pass)

Performed by: B Airs, Radio Engineer.



Test Case : Peak Output Power
Test Date : 11th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

Measurement Method

The EUT was connected to a Digital Storage Oscilloscope via an attenuator and Crystal Detector. The DC output from the Crystal Detector was measured on the Oscilloscope. The EUT was then substituted for a Signal Generator. The generators frequency was adjusted to that of the EUT and the amplitude increased to give the same DC level as measured from the EUT. The level was read from the Signal Generator, which gave the peak output power.

The measurement method above was repeated for the frequency band shown below.

Frequency Band: 5725 – 5825MHz

Frequency (MHz)	Data Rate (Mbps)	Output Power (dBm)	Result (mW)
5745	6	16.65	46.24
5805	6	16.10	40.74
5830	6	15.20	33.11
5745	54	15.45	35.08
5805	54	15.30	33.88
5830	54	15.40	34.67

Remarks

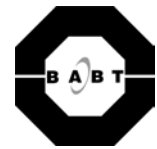
Limits

Frequency Band (GHz)	Limit
5.725 – 5.825	1W or 0.989W*

* 26dB Bandwidth = 19.74MHz

$$\therefore 17 + 10\log B = 17 + 10 \log 19.74 = 29.95\text{dBm} = 988.55\text{mW}$$

Performed by: B Airs, Radio Engineer.



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

Measurement Method

The EUT was connected to the Spectrum Analyser via a 20dB Attenuator. The EUT was set to transmit at maximum power on all three channels and at the highest and lowest data rates.

With the EUT transmitting, the trace was adjusted to display the 26dB bandwidth of the fundamental. The RBW was adjusted to 1MHz with the VBW set to 3MHz. The Spectrum Analyser detector was set to Sample. The trace was then averaged using the Power Averaging function over 200 samples. The peak response was then measured and recorded.

The results are recorded in the table below.

Results

Frequency Band: 5725 – 5825MHz

Frequency (MHz)	Data Rate (Mbps)	Measurement Bandwidth (MHz)	Result (dBm)
5745	6	1	0.958
5805	6	1	0.388
5830	6	1	0.406
5745	54	1	1.03
5805	54	1	0.519
5830	54	1	0.499

Limit	≤ +17dBm/1MHz
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Remarks

The EUT met the requirements specified in Clause 15.407(a)(2). The Peak Power Spectral Density was below the +17dBm/MHz limit.

Procedure: Test Performed In Accordance With 15.407(a)(3)

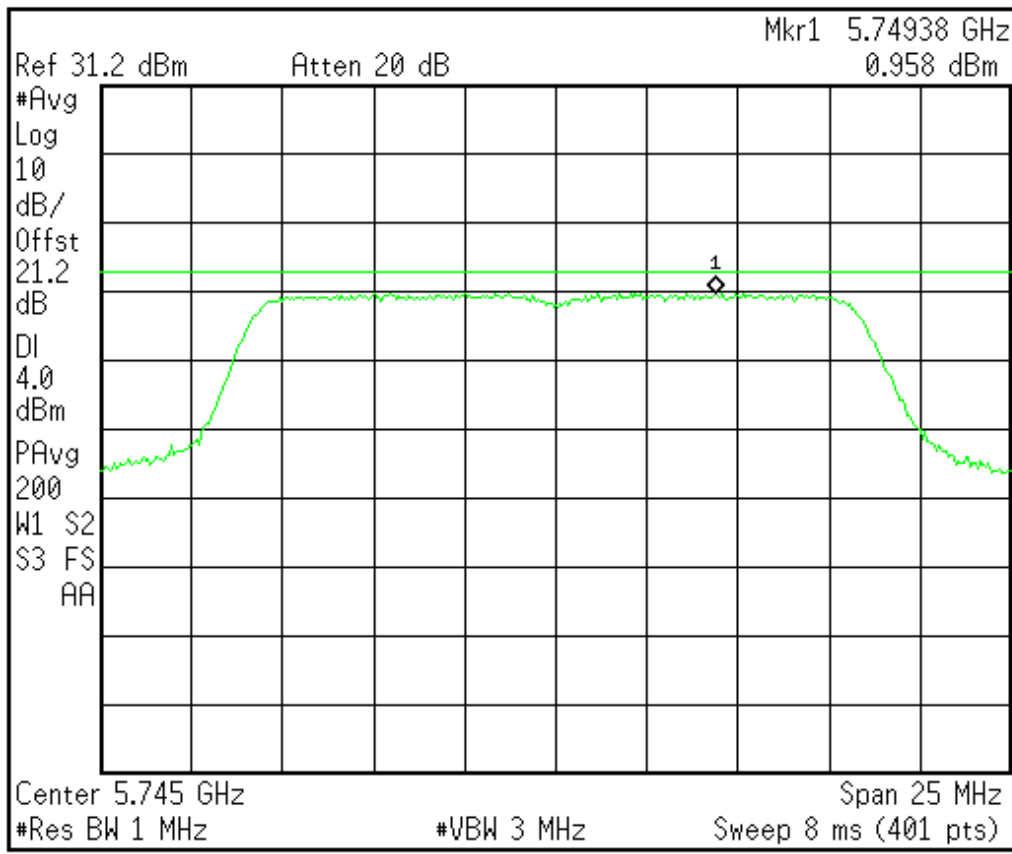
Performed by: B Airs, Radio Engineer.



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

5745.0MHz – Maximum Power 6Mbps

Agilent 11:37:31 Aug 13, 2003



Peak Search

Meas Tools

Next Peak

Next Pk Right

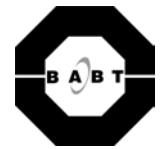
Next Pk Left

Min Search

Pk-Pk Search

More

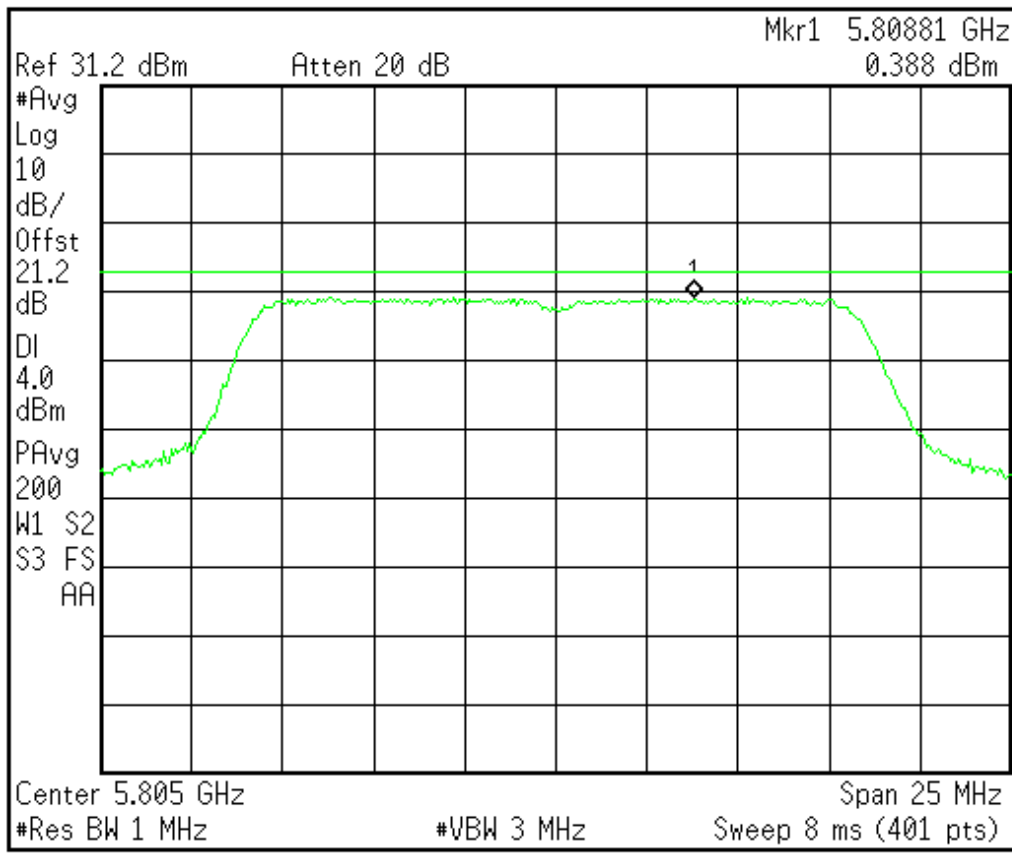
1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

5805.0MHz – Maximum Power 6Mbps

Agilent 12:03:01 Aug 13, 2003



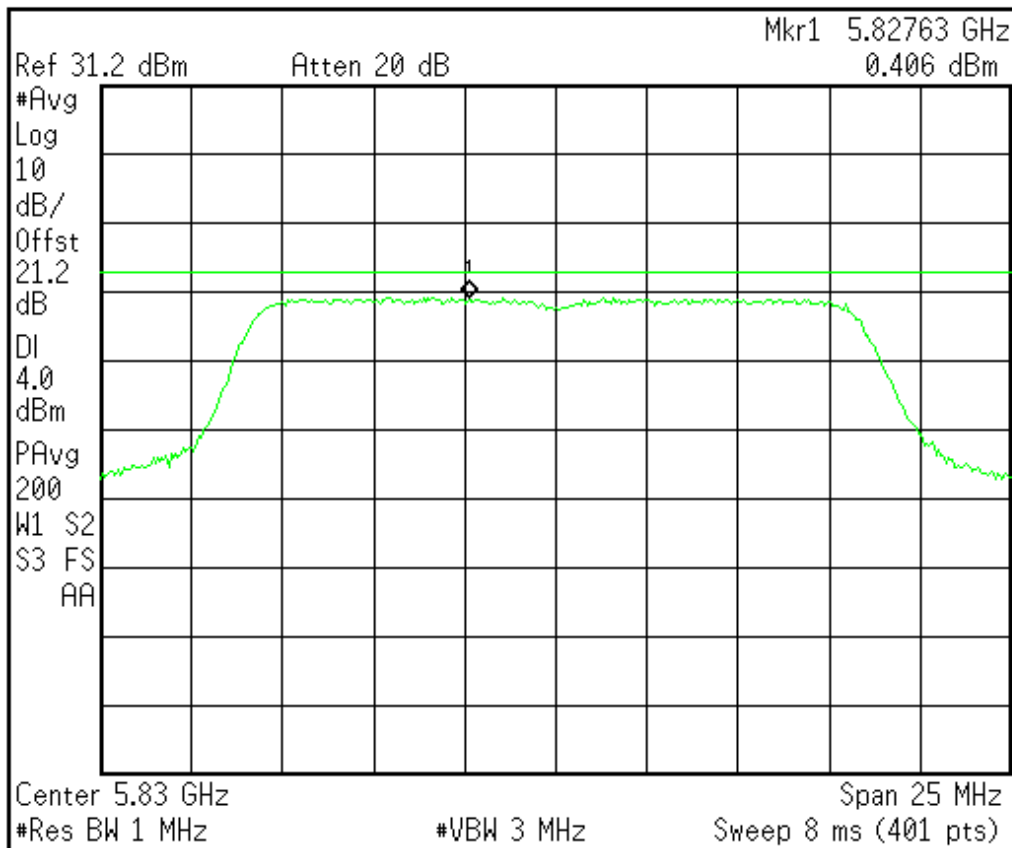
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



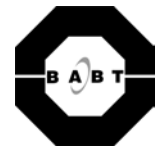
Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

5830.0MHz – Maximum Power 6Mbps

Agilent 12:05:19 Aug 13, 2003



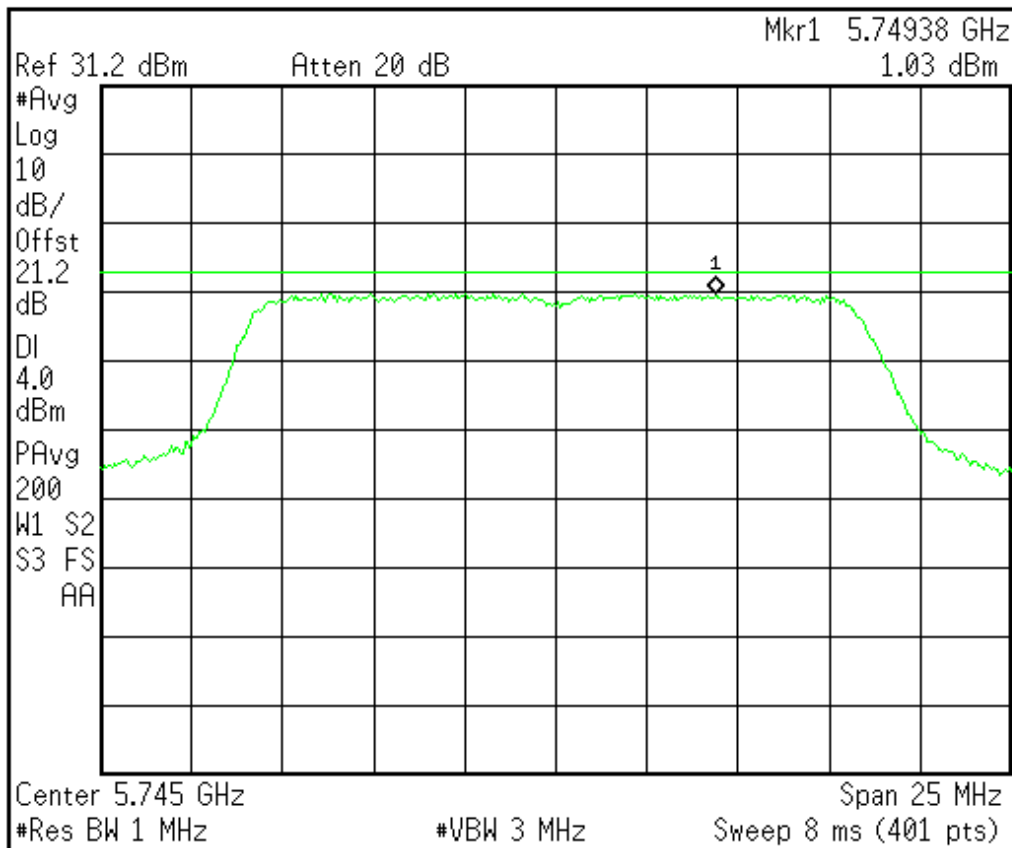
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

5745.0MHz – Maximum Power 54Mbps

Agilent 11:40:24 Aug 13, 2003



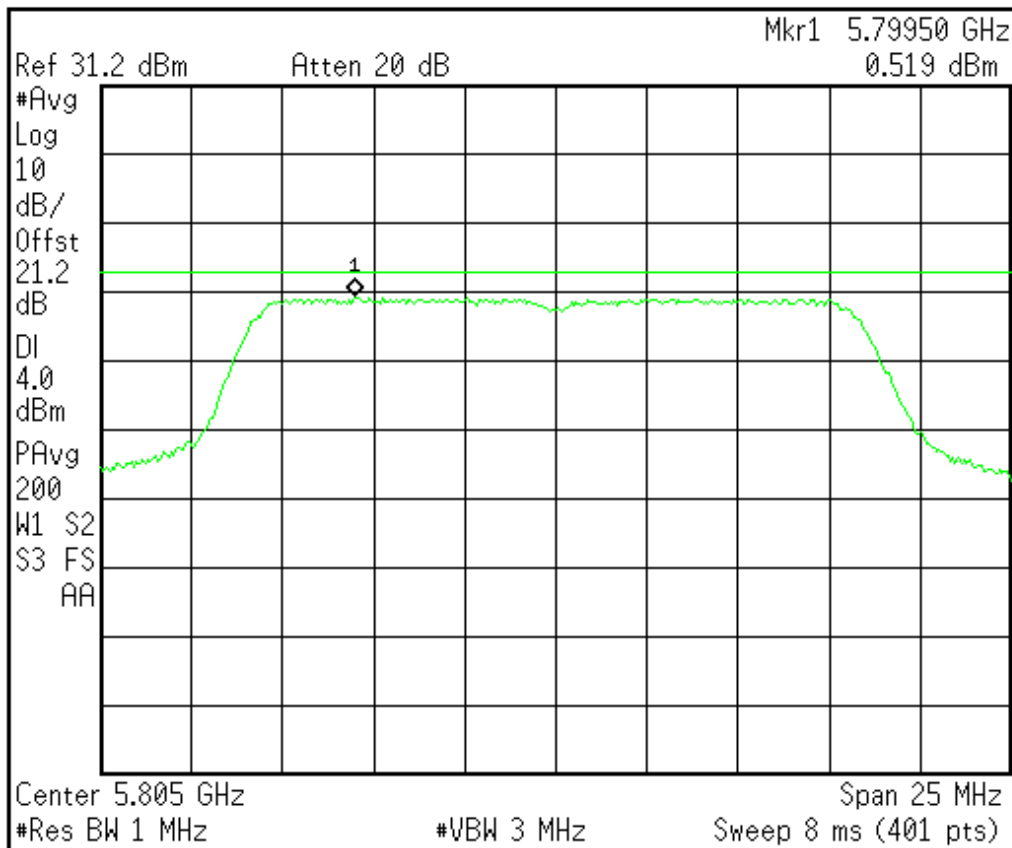
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

5805.0MHz – Maximum Power 54Mbps

Agilent 12:01:38 Aug 13, 2003



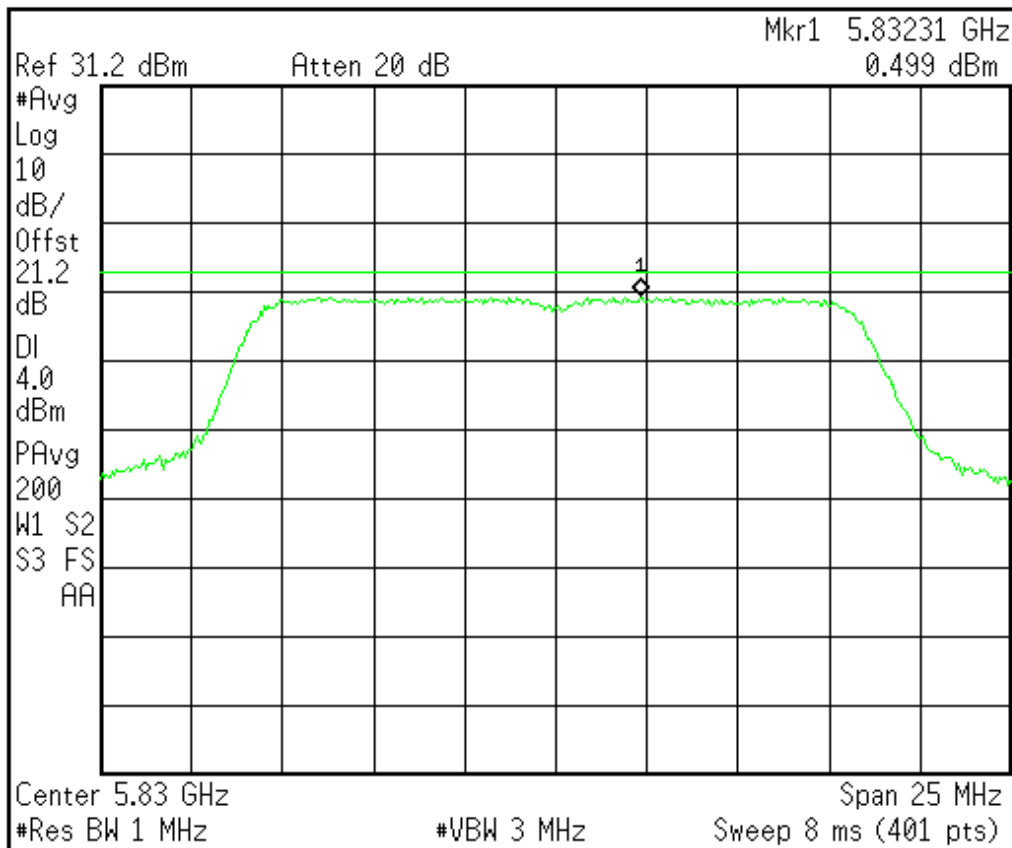
Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



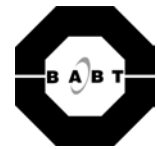
Test Case : Peak Power Spectral Density
Test Date : 13th August 2003
Rule Parts : 15.407(a)(3)

5830.0MHz – Maximum Power 54Mbps

Agilent 12:08:05 Aug 13, 2003



Peak Search
Meas Tools
Next Peak
Next Pk Right
Next Pk Left
Min Search
Pk-Pk Search
More 1 of 2



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

Measurement Method

The EUT was connected to the Spectrum Analyser using a 20dB Attenuator and cables. The RBW was set to 300kHz and the VBW to 1MHz. The Span was adjusted to encompass the whole of the fundamental. The Peak detector was selected and the trace was set to View. The peak of the fundamental was searched. From this point, the marker delta function of the Analyser was used to establish the -26dBc points. The resultant difference in the markers was recorded as the Emission Bandwidth.

Results

Frequency Band: 5725 – 5825MHz

Frequency, (MHz)	Data Rate, (Mbps)	Emission Bandwidth, (MHz)
5745	6	20.541082
5805	6	20.340681
5830	6	20.040080
5745	54	20.240481
5805	54	19.739479
5830	54	19.939880

Remarks

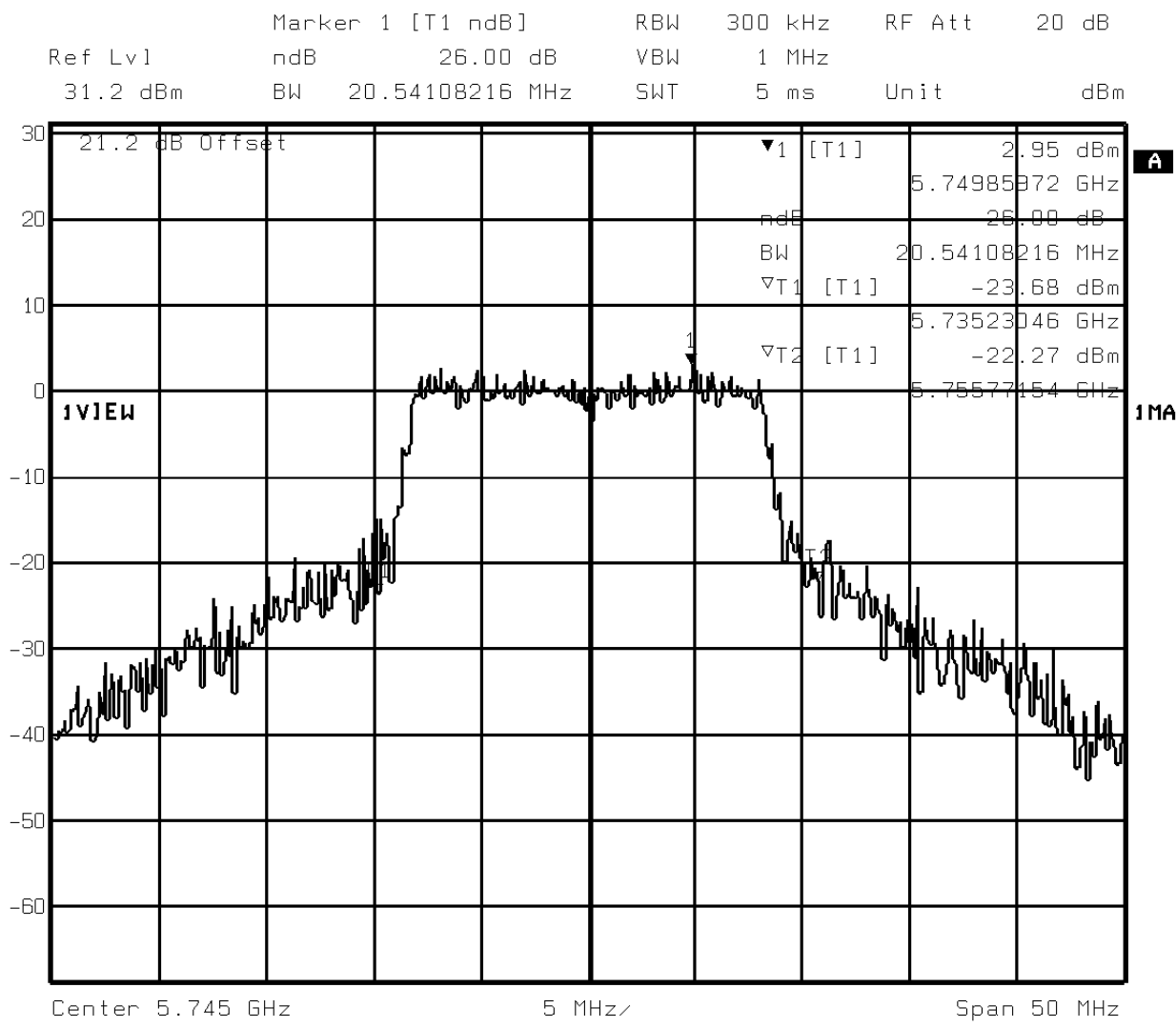
Procedure: Test Performed In Accordance With 15.407(a)(1)(2)(3)

Performed by: B Airs, Radio Engineer.



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5745.0MHz – Maximum Power 6Mbps

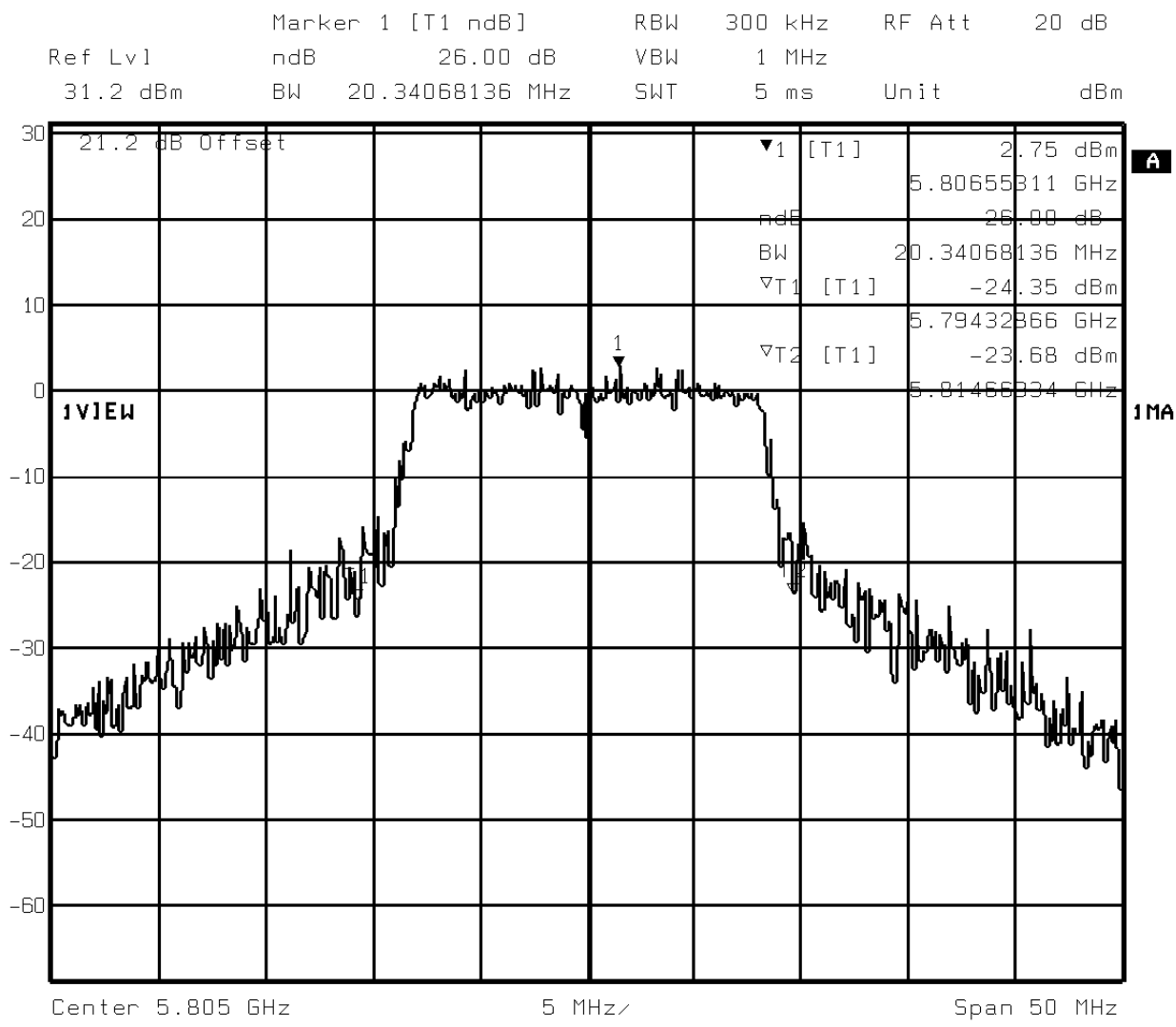


Date: 14.AUG.03 9:14:59



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5805.0MHz – Maximum Power 6Mbps

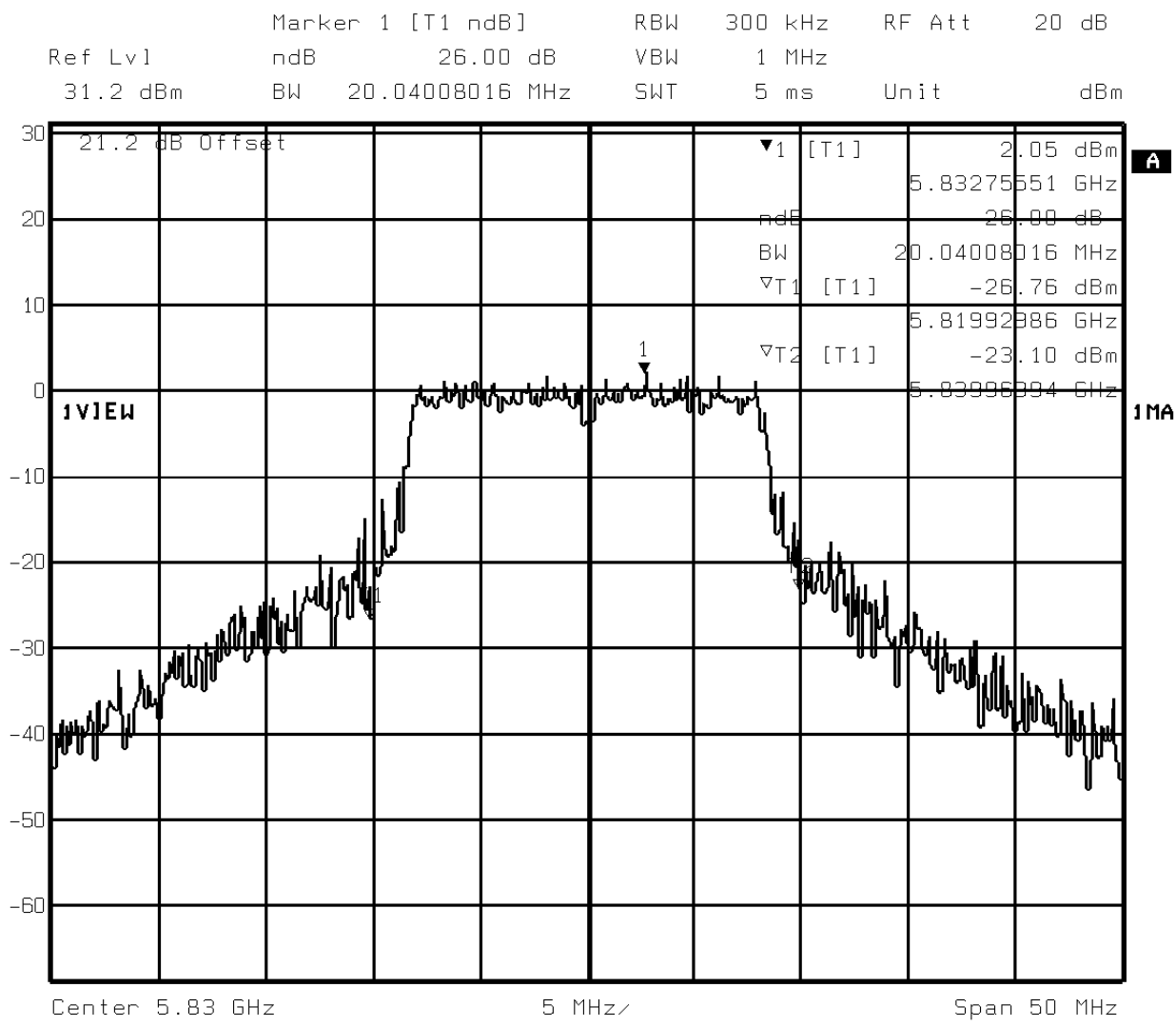


Date: 14.AUG.03 9:25:27



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5830.0MHz – Maximum Power 6Mbps



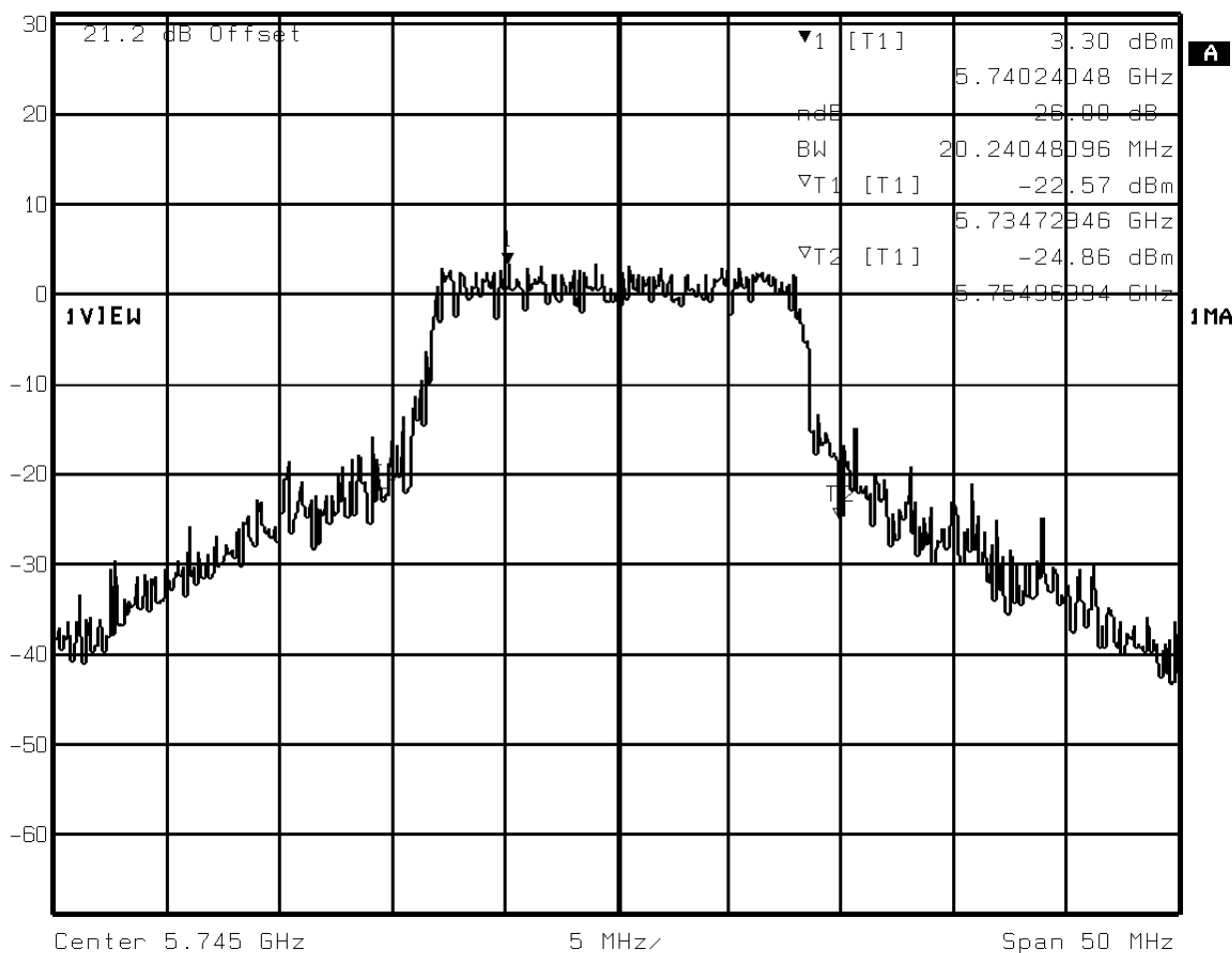
Date: 14.AUG.03 9:28:55



Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5745.0MHz – Maximum Power 54Mbps

Marker 1 [T1 ndB] RBW 300 kHz RF Att 20 dB
 Ref Lvl ndB 26.00 dB VBW 1 MHz
 31.2 dBm BW 20.24048096 MHz SWT 5 ms Unit dBm

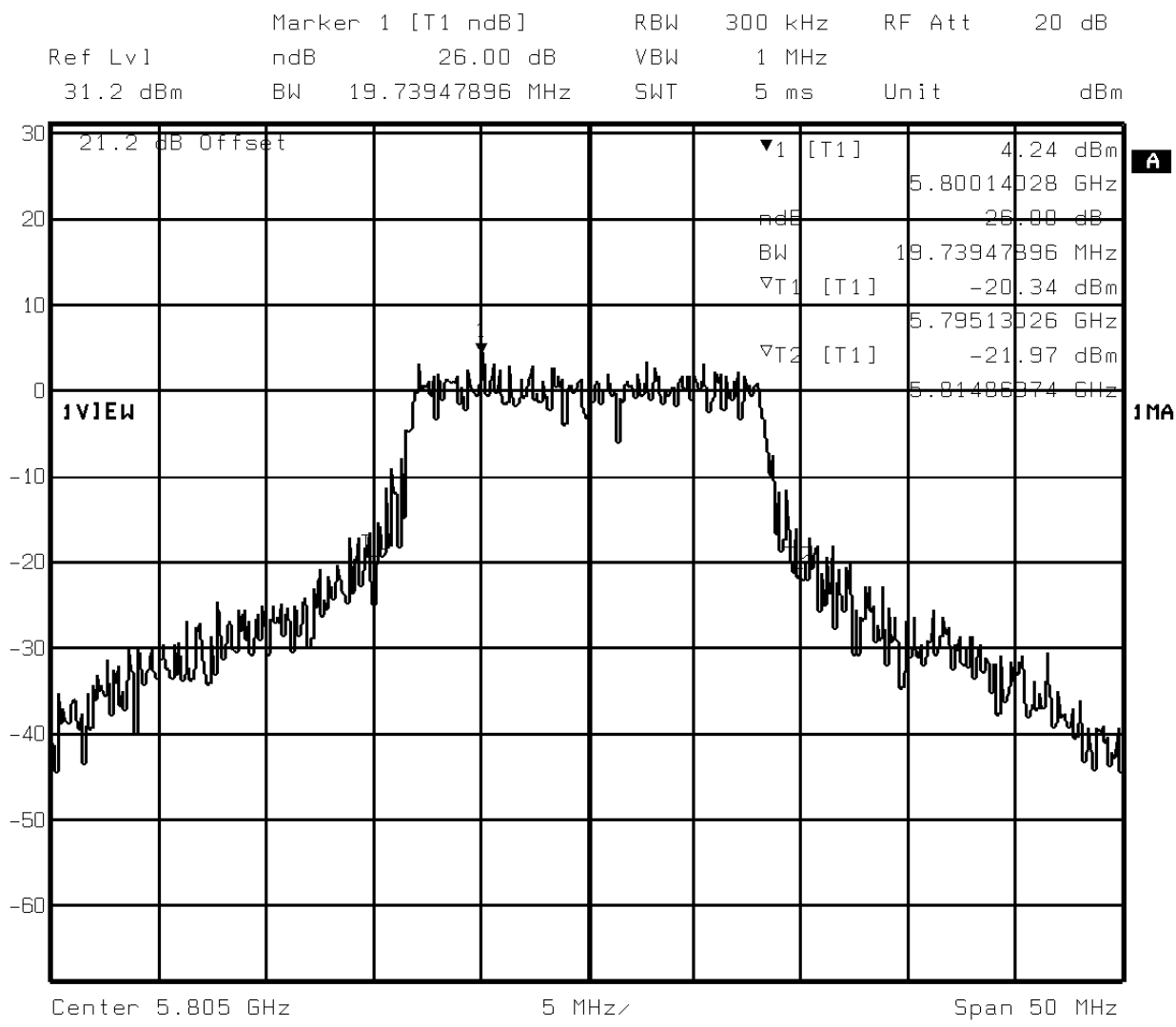


Date: 14.AUG.03 9:21:58



Test Case : Emission Bandwidth
Test Date : 14th August 2003
Rule Parts : 15.407(a)(1)(2)(3)

5805.0MHz – Maximum Power 54Mbps



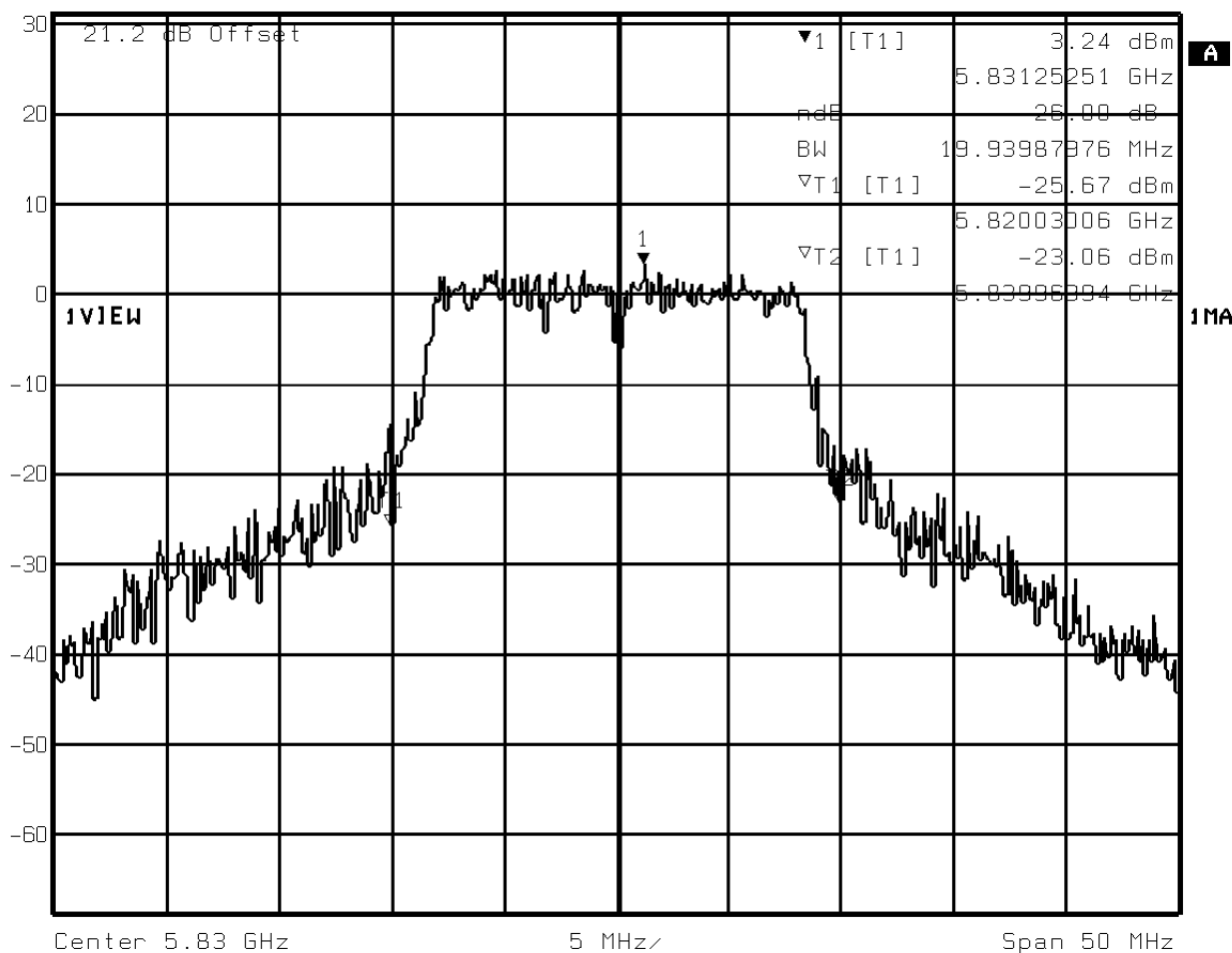
Date: 14.AUG.03 9:23:38



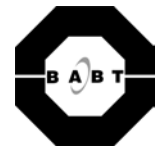
Test Case : Emission Bandwidth
 Test Date : 14th August 2003
 Rule Parts : 15.407(a)(1)(2)(3)

5830.0MHz – Maximum Power 54Mbps

	Marker 1 [T1 ndB]	RBW	300 kHz	RF Att	20 dB
Ref Lvl	ndB	26.00 dB	VBW	1 MHz	
31.2 dBm	BW	19.93987976 MHz	SWT	5 ms	Unit dBm



Date: 14.AUG.03 9:32:18



Test Case: : Frequency Stability Under Temperature Variations
Test Date: : 13th August 2003
Rule Parts: : 2.1055, 15.407(g)

Measurement Method

The EUT was set to transmit on maximum power with no modulation. A Frequency Counter was used to measure the frequency. The maximum frequency error was recorded. The temperature was adjusted between -30°C and $+50^{\circ}\text{C}$ in 10° steps as per 2.1055.

Results

48V DC Supply

Temperature Interval (°C)	Test Frequency (GHz)	Deviation (Hz)	Limit (kHz)
-30	5805	-12.588	±
-20	5805	9.516	±
-10	5805	22.293	±
0	5805	17.997	±
+10	5805	8.998	±
+20	5805	-7.361	±
+30	5805	-7.277	±
+40	5805	-18.659	±
+50	5805	-22.791	±

Remarks

The frequency stability of the EUT is sufficient to keep it within the allocated frequency bands at any temperature interval across the measured range.

Performed by: B Airs, Radio Engineer.



Test Case : Spurious Conducted Emissions
Test Date : 14th/15th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

Measurement Method

In accordance with FCC CFR 47: Part 15 Subpart E, Part 15.407(1)(2)(3), the Spurious Conducted Emissions from the antenna terminal were measured. The transmitter output power was attenuated using a combination of filters and attenuators and the frequency spectrum investigated from 9kHz to 40GHz. The EUT was set to transmit on full power at maximum and minimum data rates. The EUT was tested on Bottom, Middle and Top channels. The resolution and video bandwidths were set to 1MHz and 3MHz respectively in accordance with 15.407(4). The spectrum analyser detector was set to Max Hold.

For measuring the range 9kHz to 7GHz, a 20dB attenuator was used. From 7 to 18GHz, high pass filter was used. From 18 to 26GHz and 26 to 40GHz, pieces of waveguide were used as a high pass filters.

The display line function on the Spectrum Analyser was used to show the appropriate limits for the band.

The maximum path loss across the measurement band was used as the reference level offset to ensure worst case.

Remarks

The equipment met the requirements of this test clause.



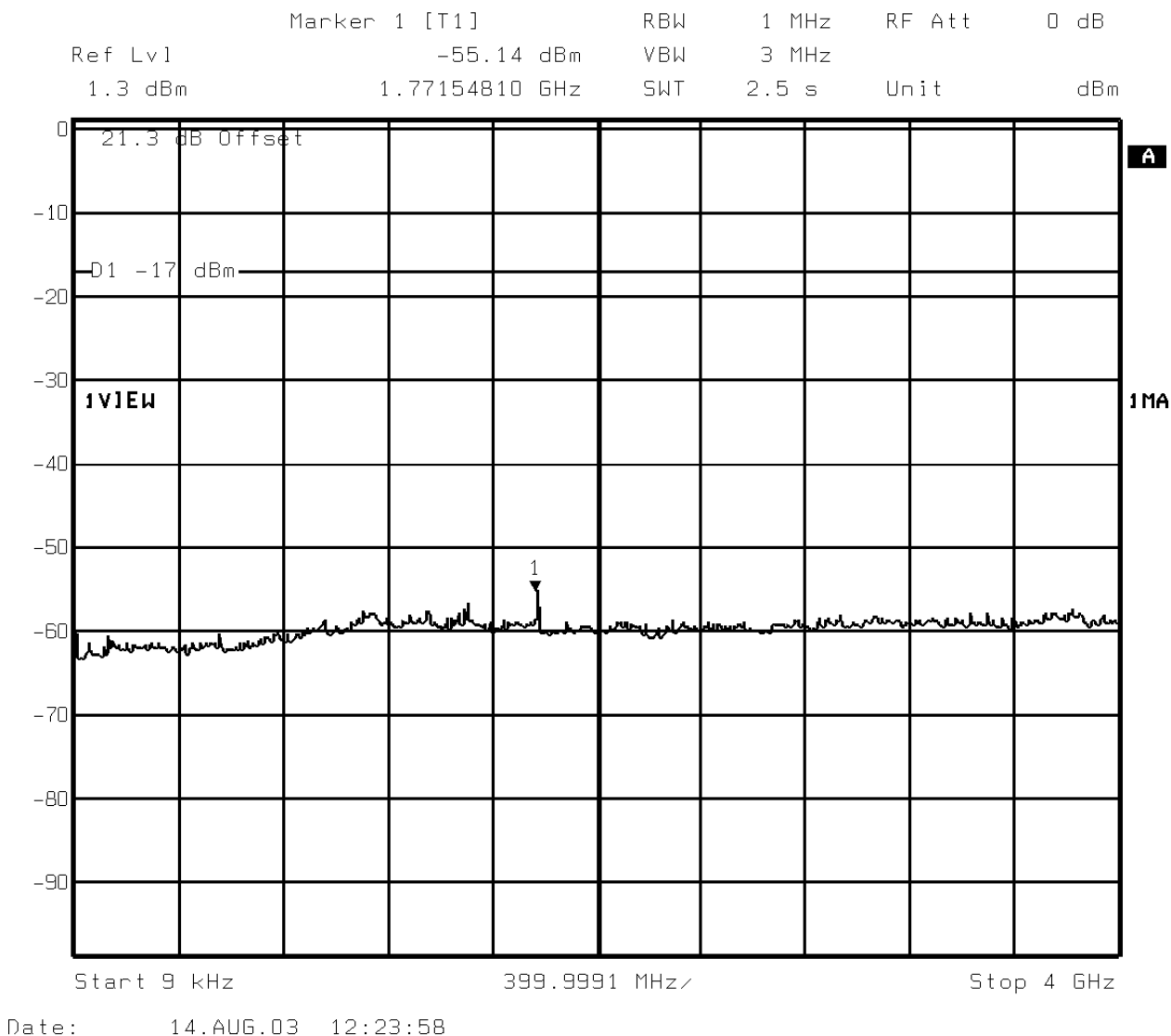
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 6Mbps

9kHz – 4GHz





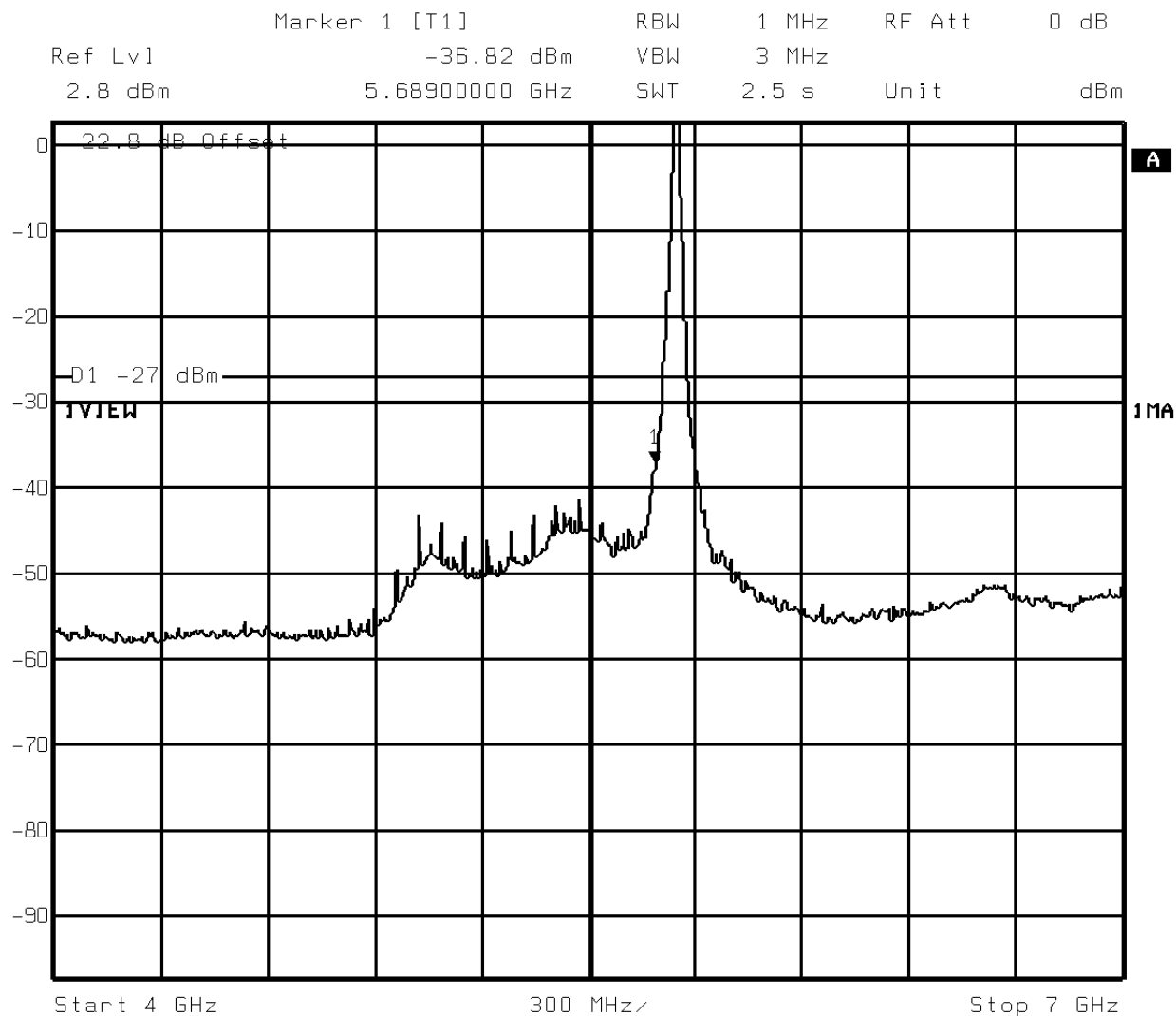
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 6Mbps

4GHz – 7GHz



Date: 14.AUG.03 14:54:43



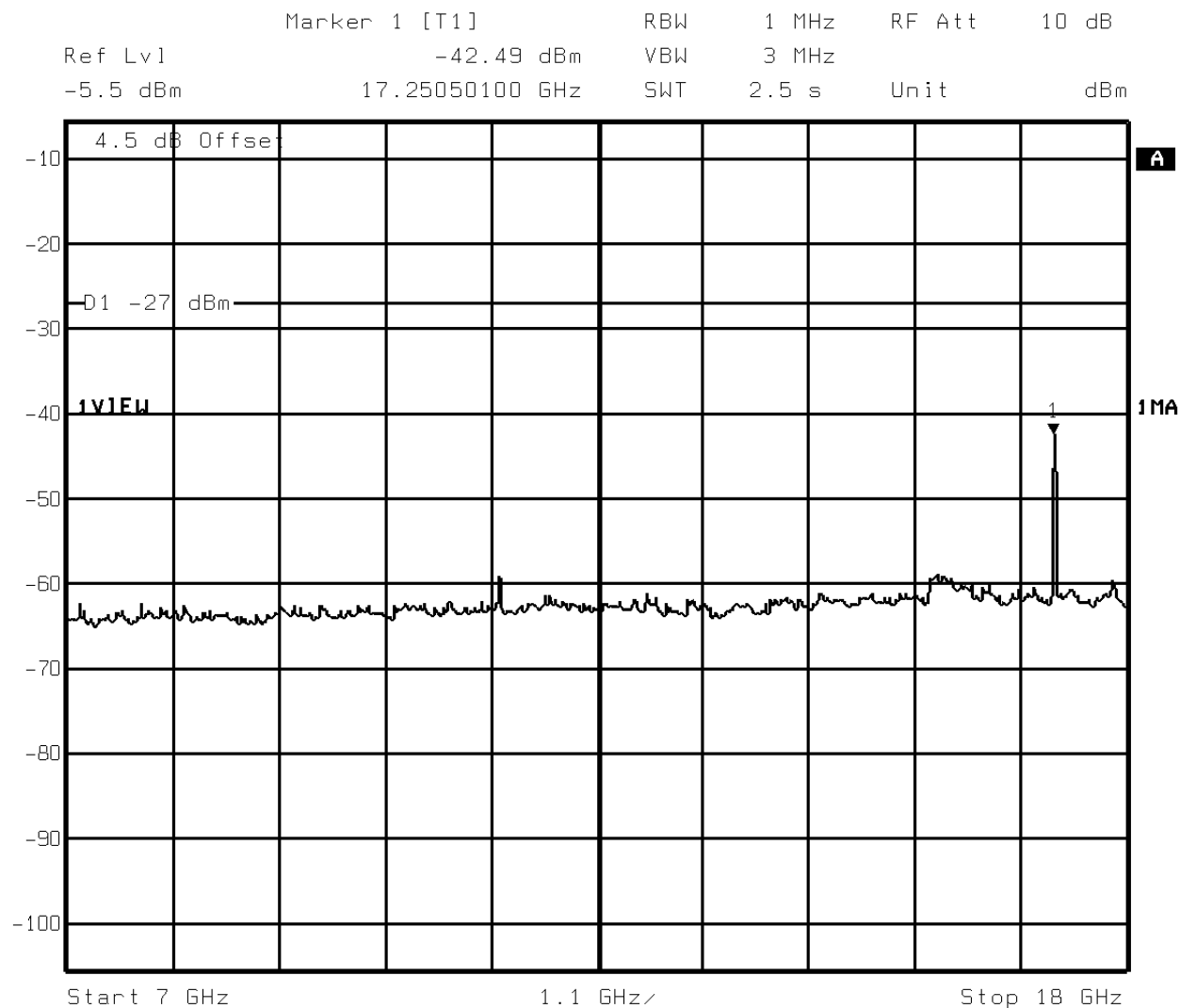
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 6Mbps

7GHz – 18GHz



Date: 14.AUG.03 16:04:06



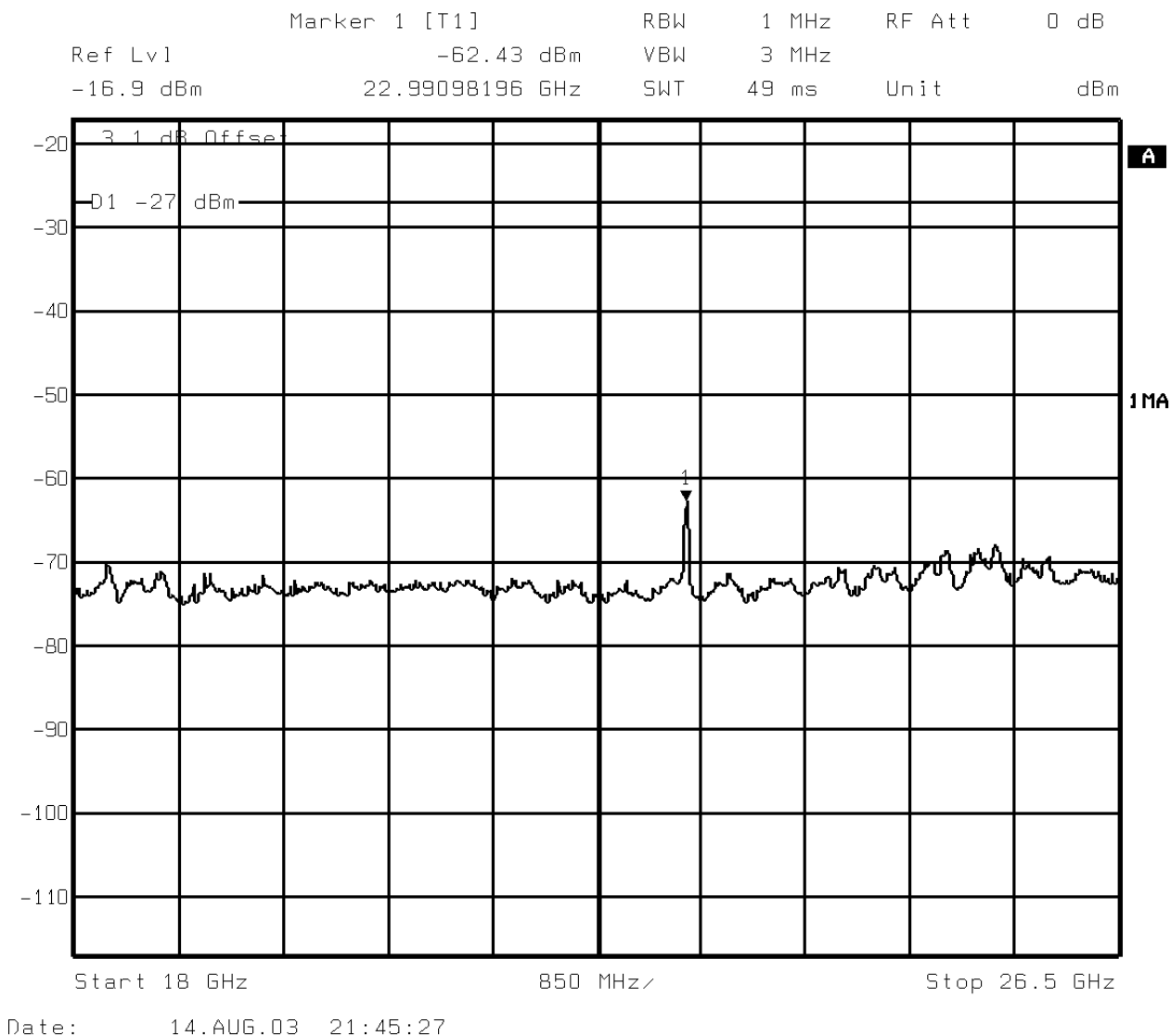
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 6Mbps

18GHz – 26GHz





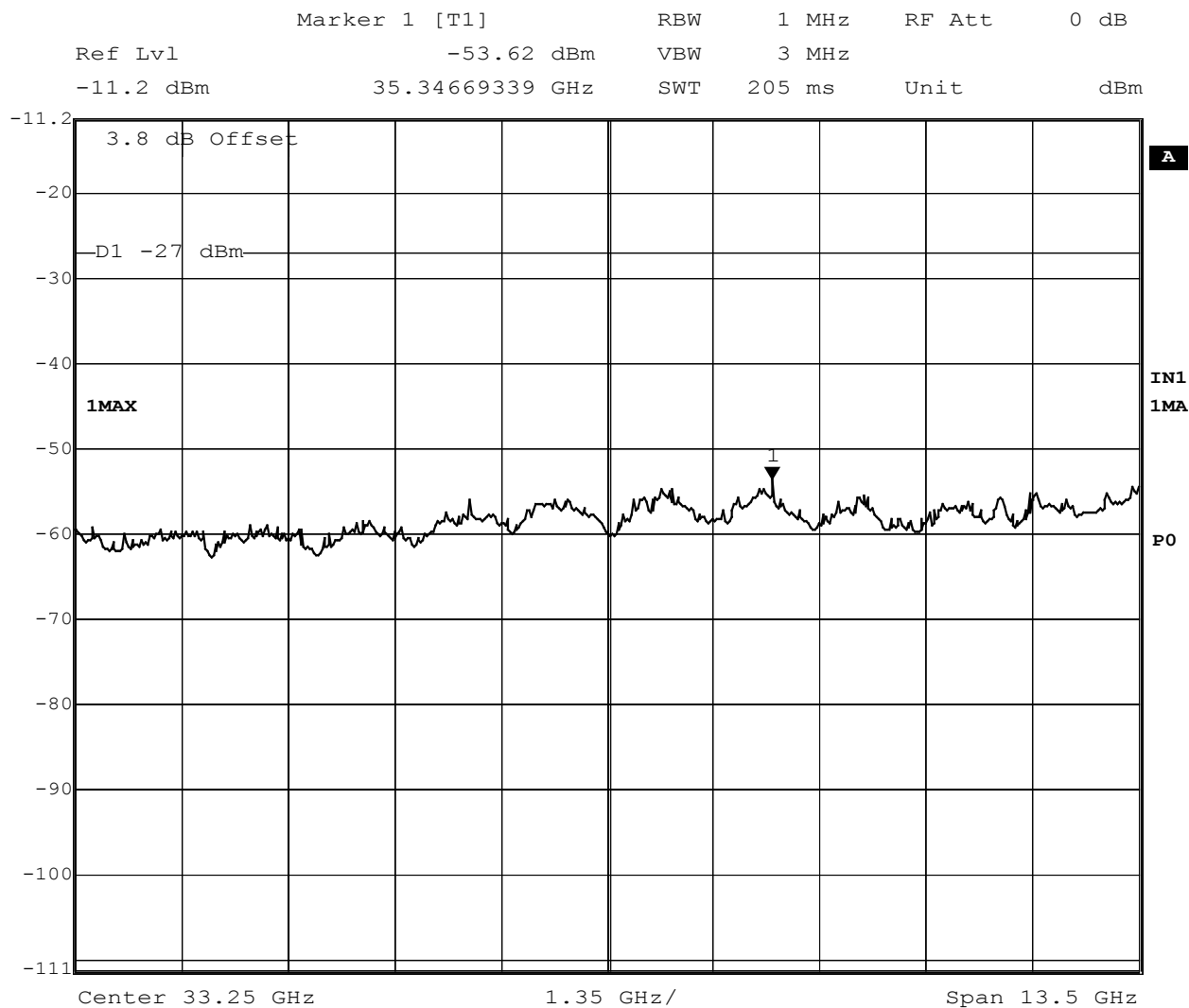
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 6Mbps

26GHz – 40GHz

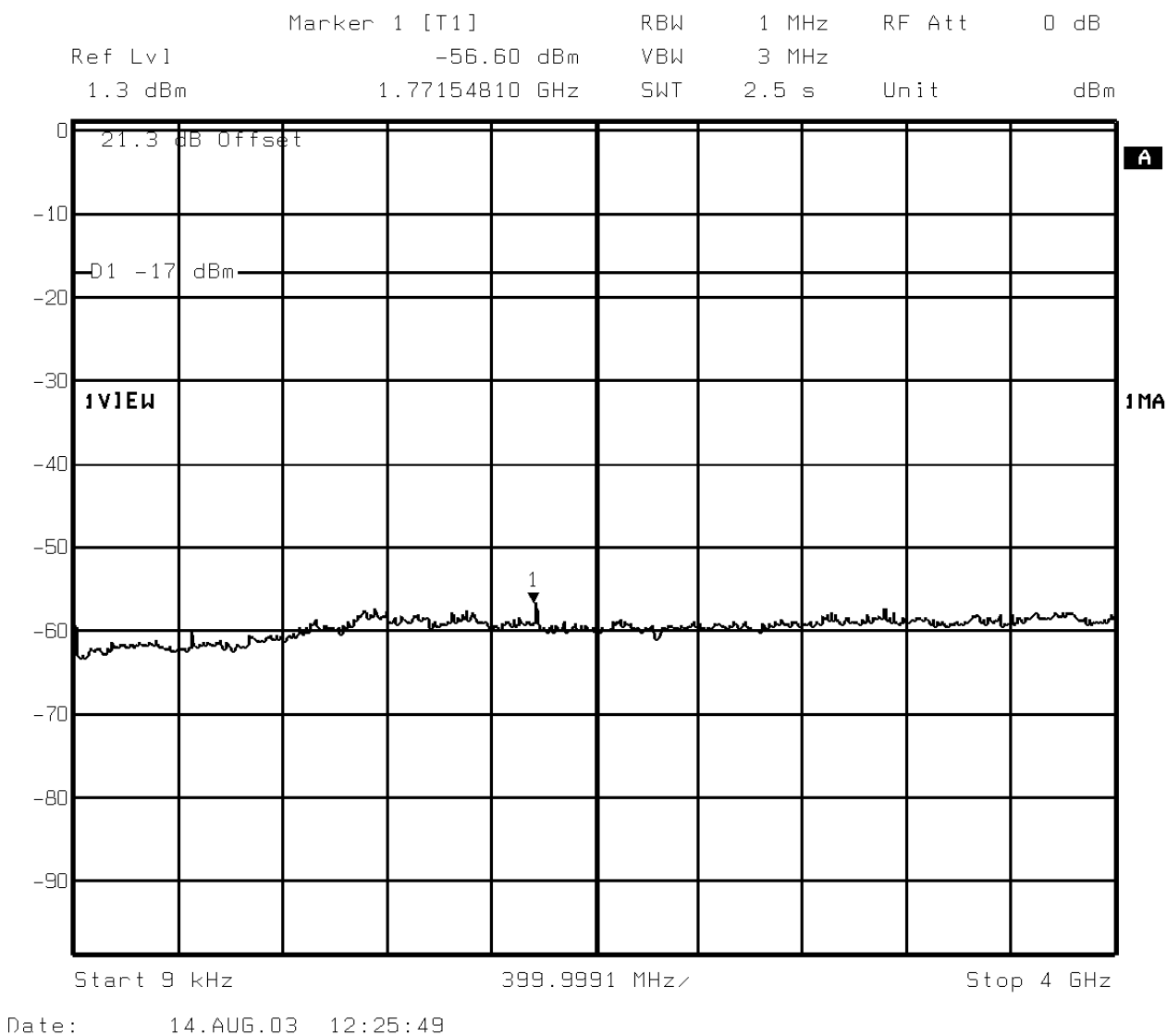


Date: 14.AUG.2003 20:25:38



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 54Mbps 9kHz – 4GHz





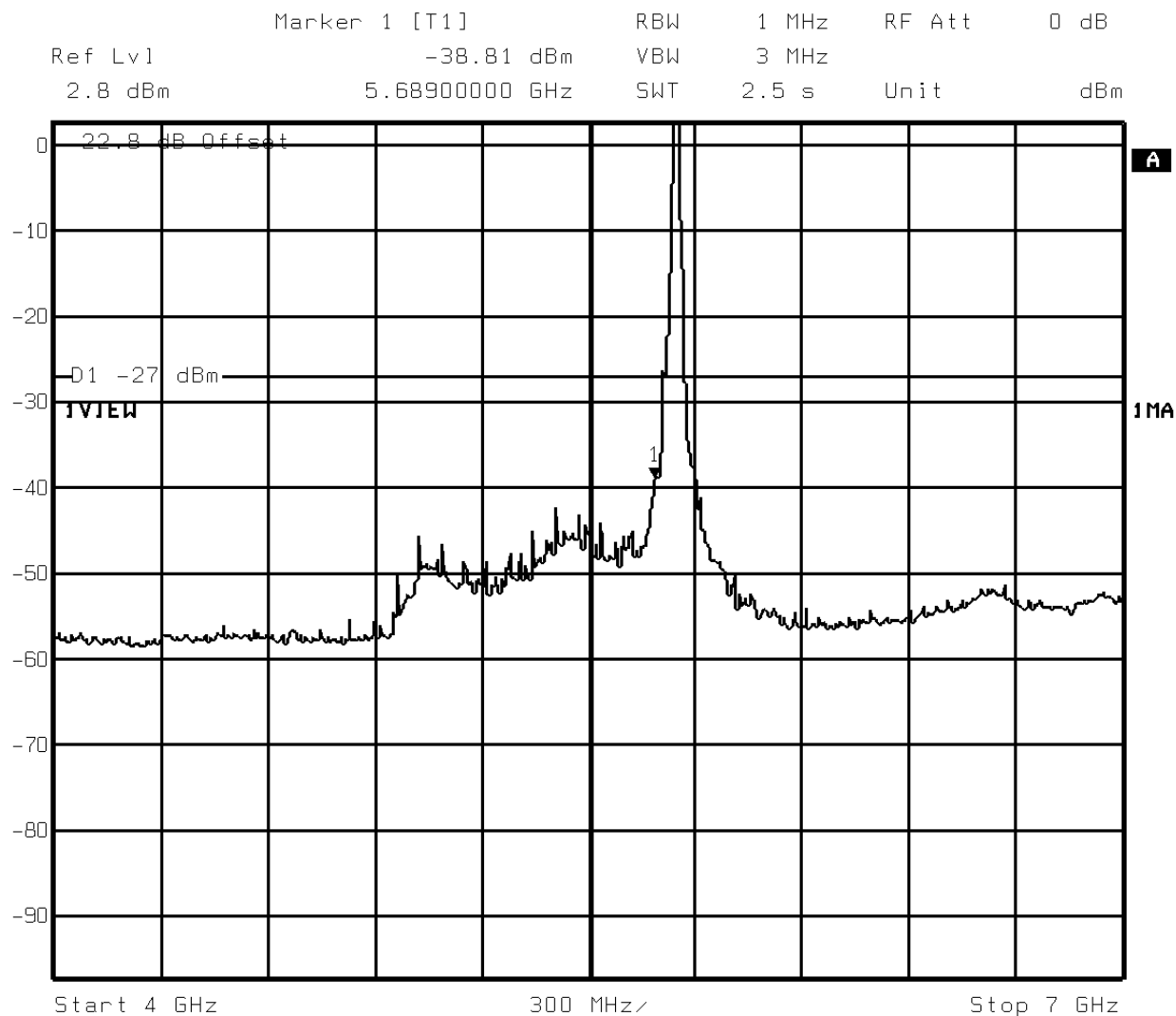
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 54Mbps

4GHz – 7GHz



Date: 14.AUG.03 14:56:19



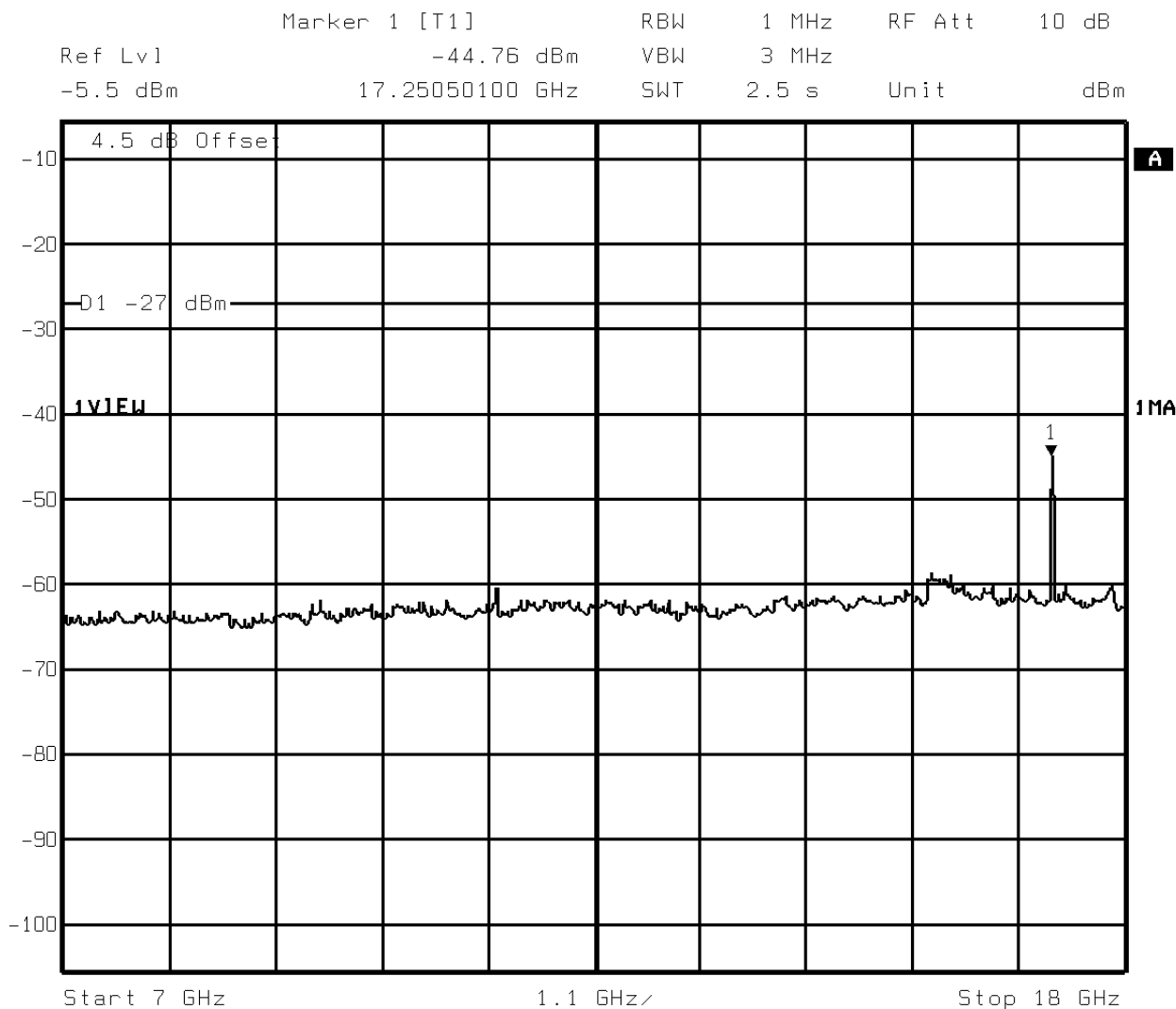
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 54Mbps

7GHz – 18GHz



Date: 14.AUG.03 16:01:55



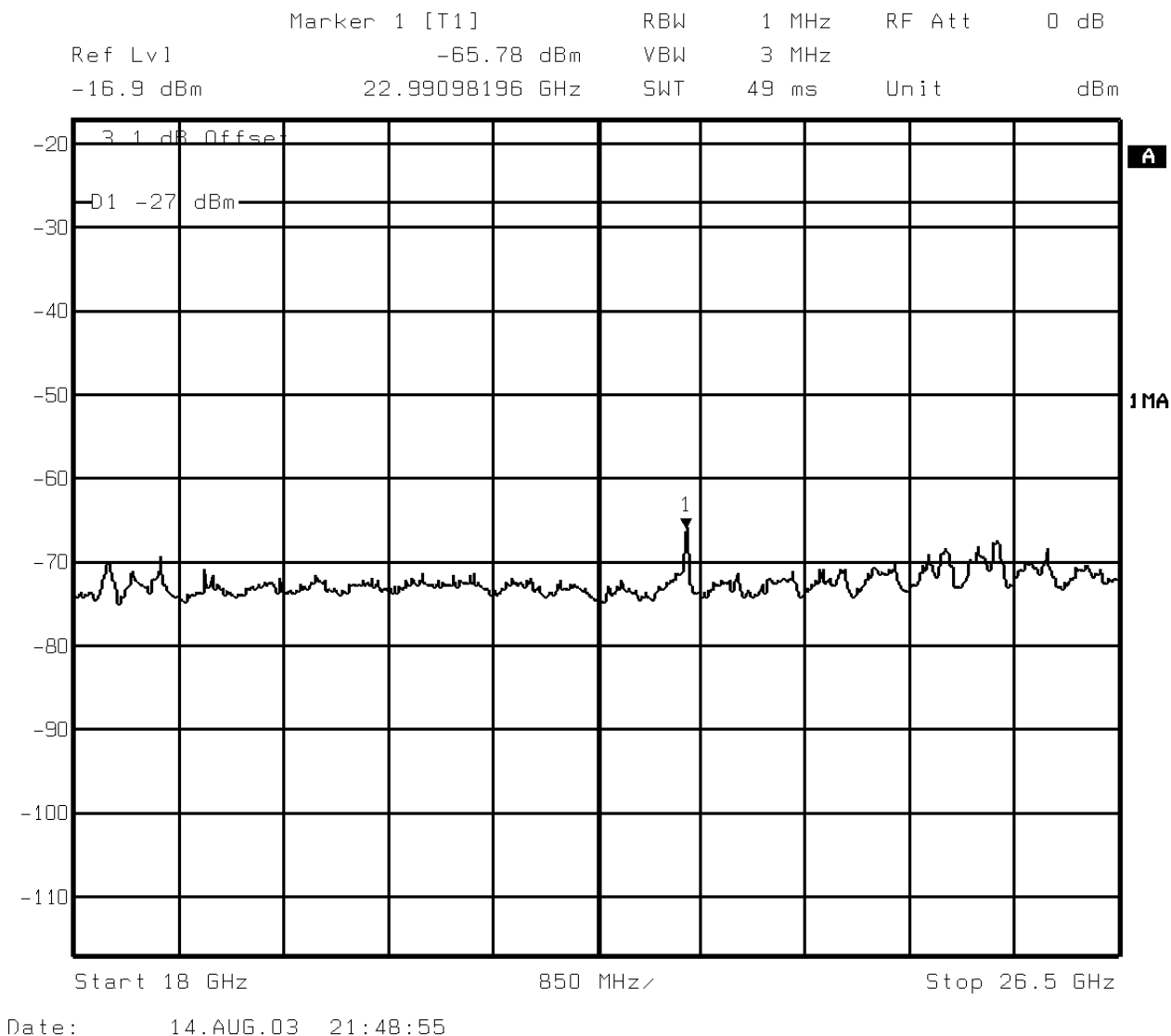
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 54Mbps

18GHz – 26GHz





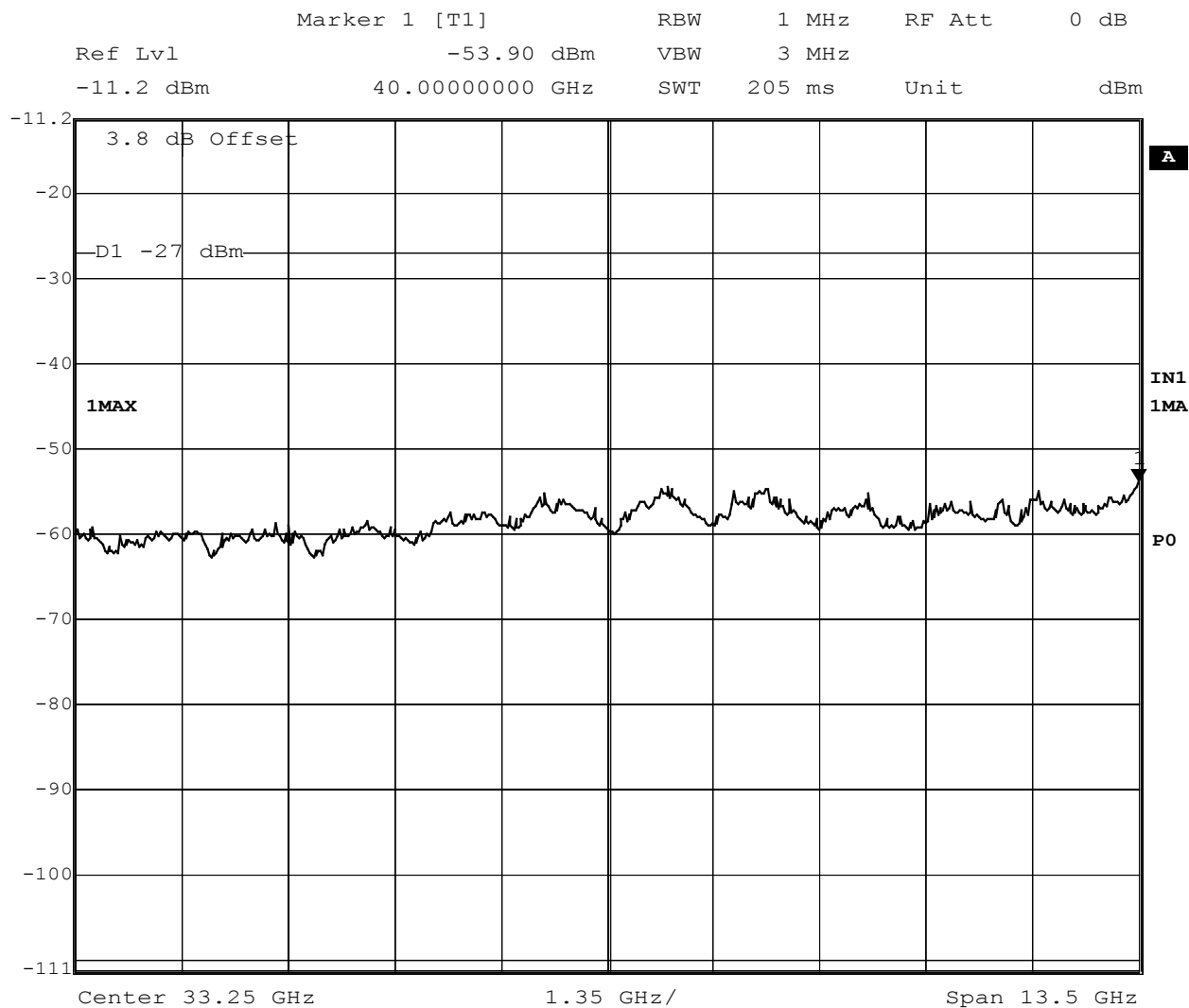
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5745.0MHz – Maximum Power 54Mbps

26GHz – 40GHz

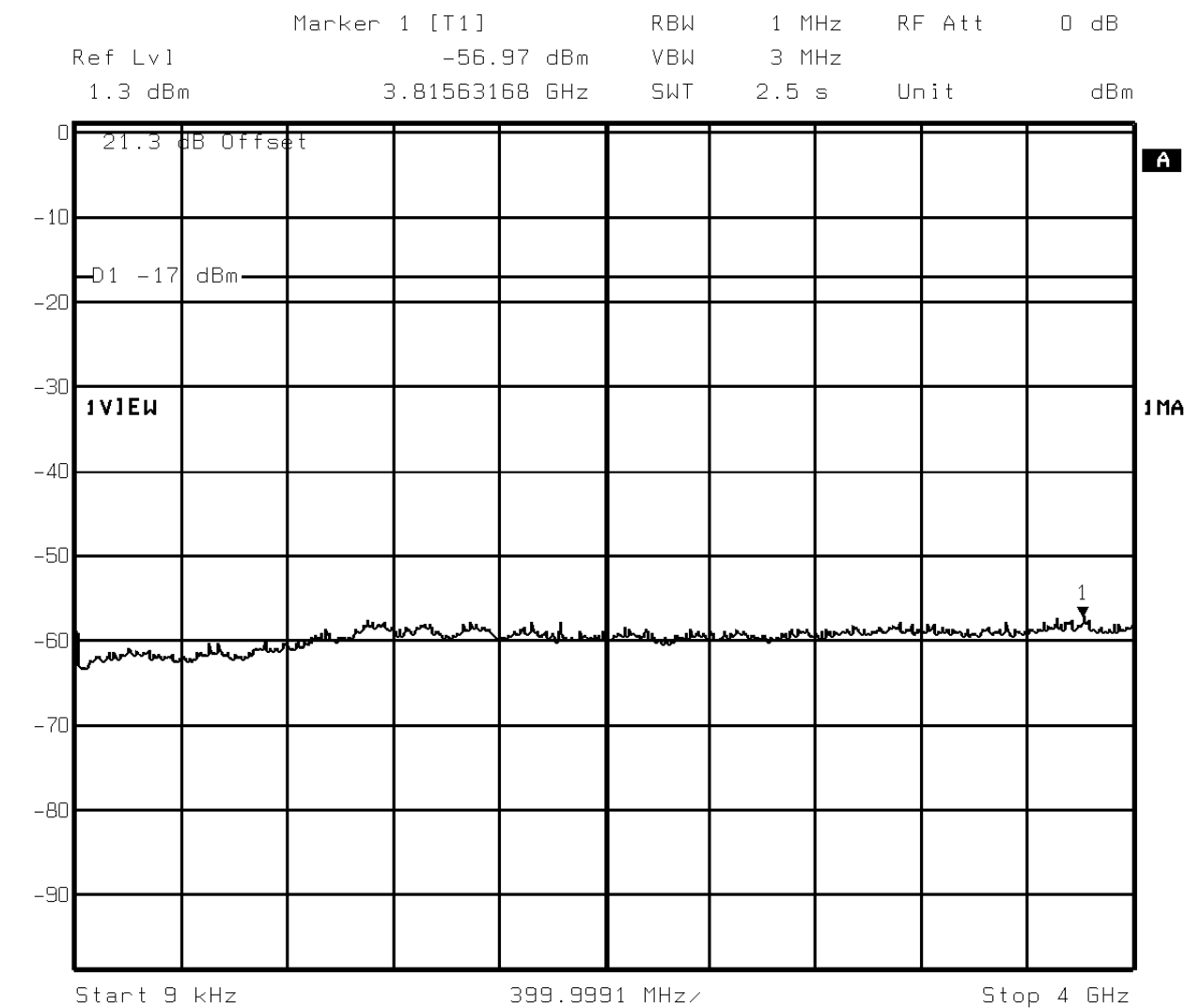


Date: 14.AUG.2003 20:24:21



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 6Mbps 9kHz – 4GHz

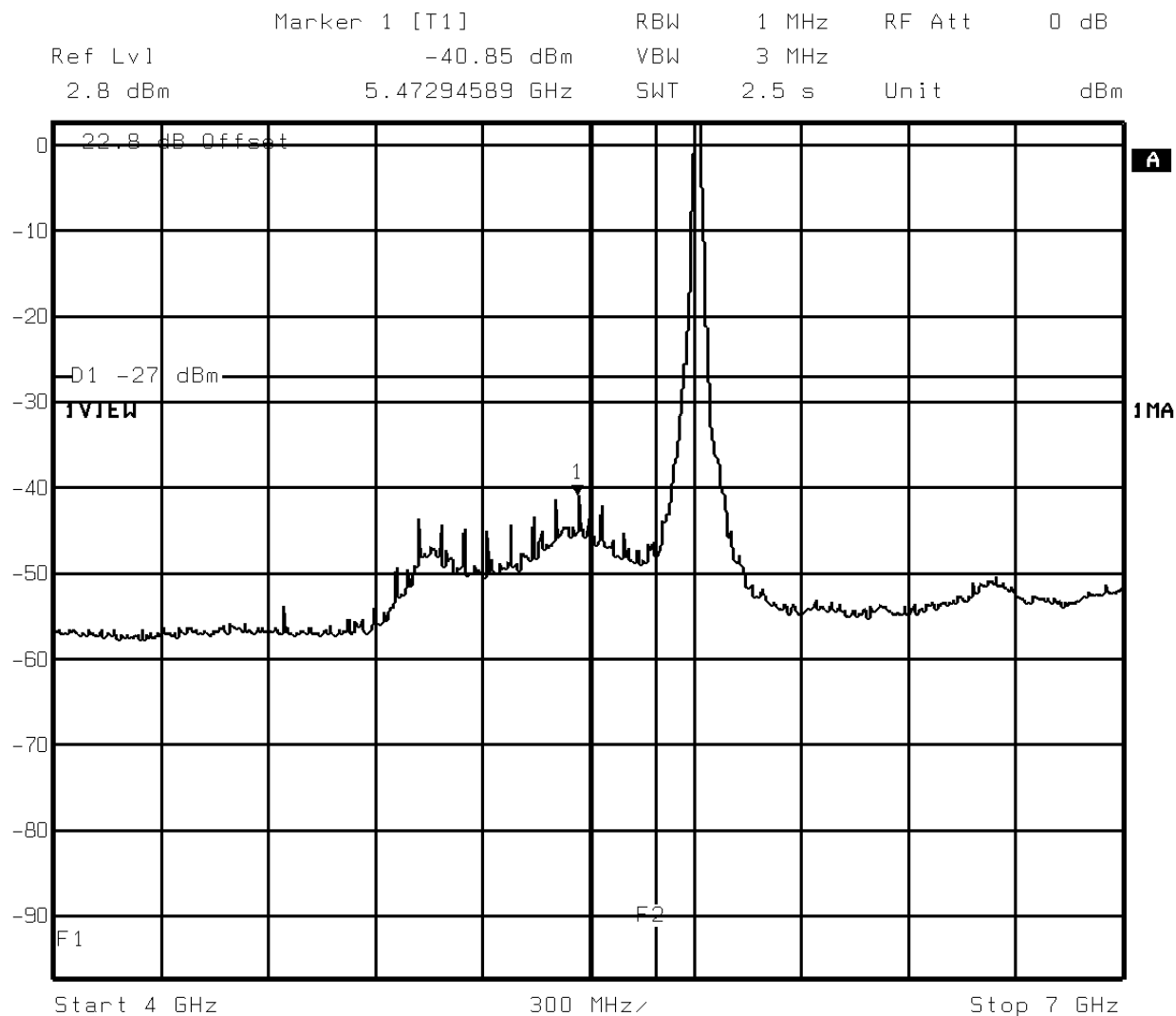


Date: 14.AUG.03 12:29:56



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 6Mbps 4GHz – 7GHz



Date: 14.AUG.03 15:03:33



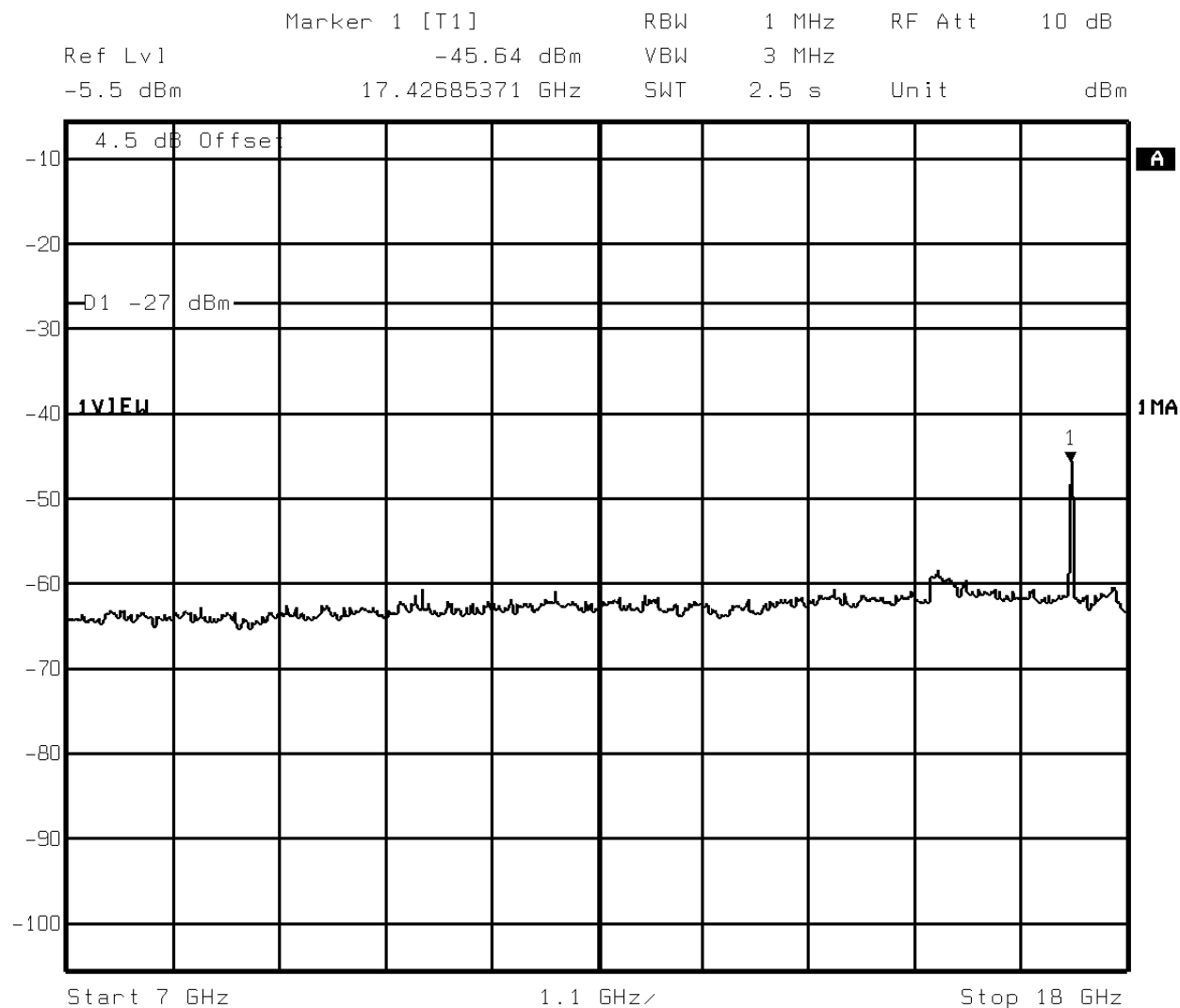
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 6Mbps

7GHz – 18GHz



Date: 14.AUG.03 16:05:49



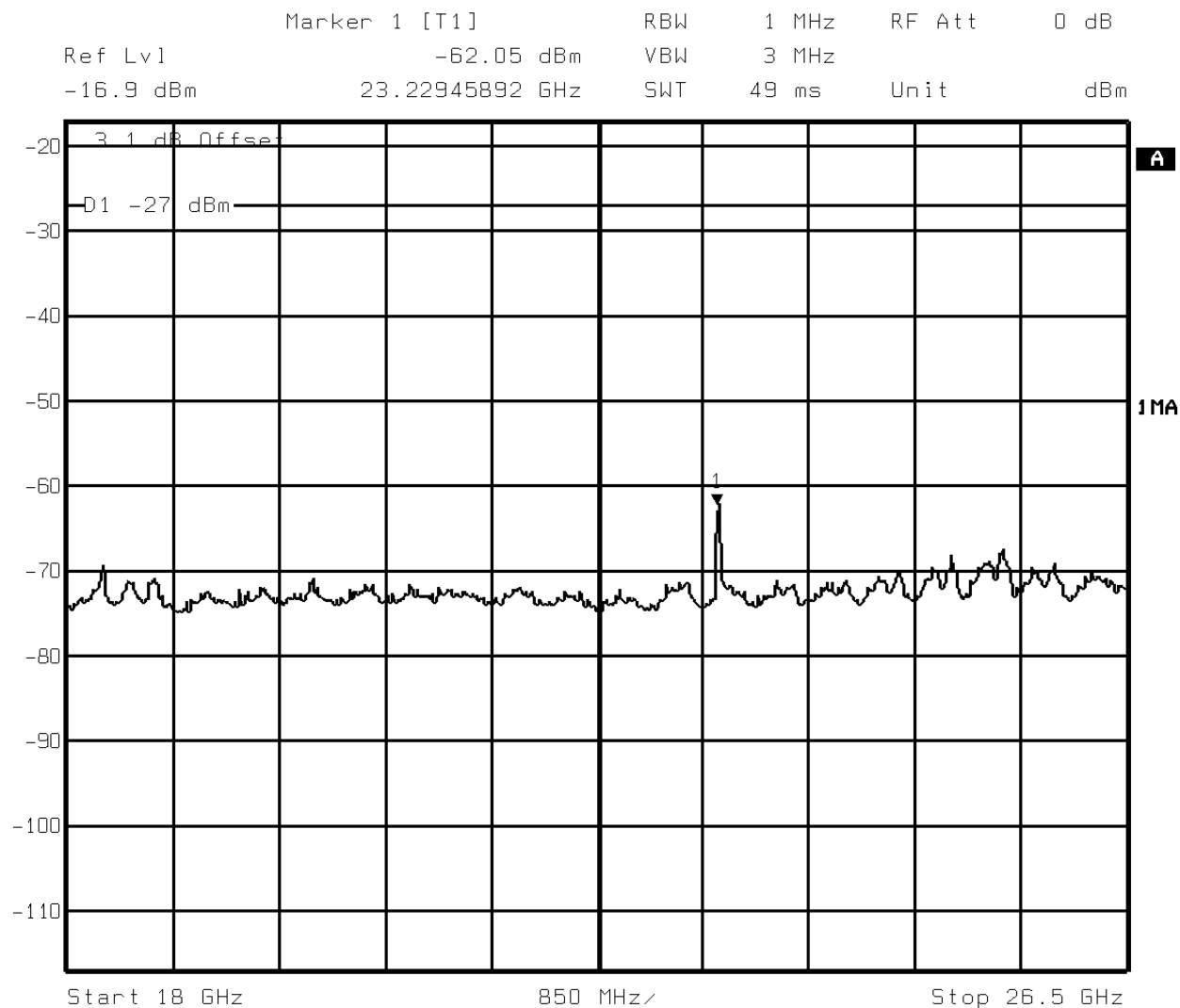
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 6Mbps

18GHz – 26GHz



Date: 14.AUG.03 21:54:35



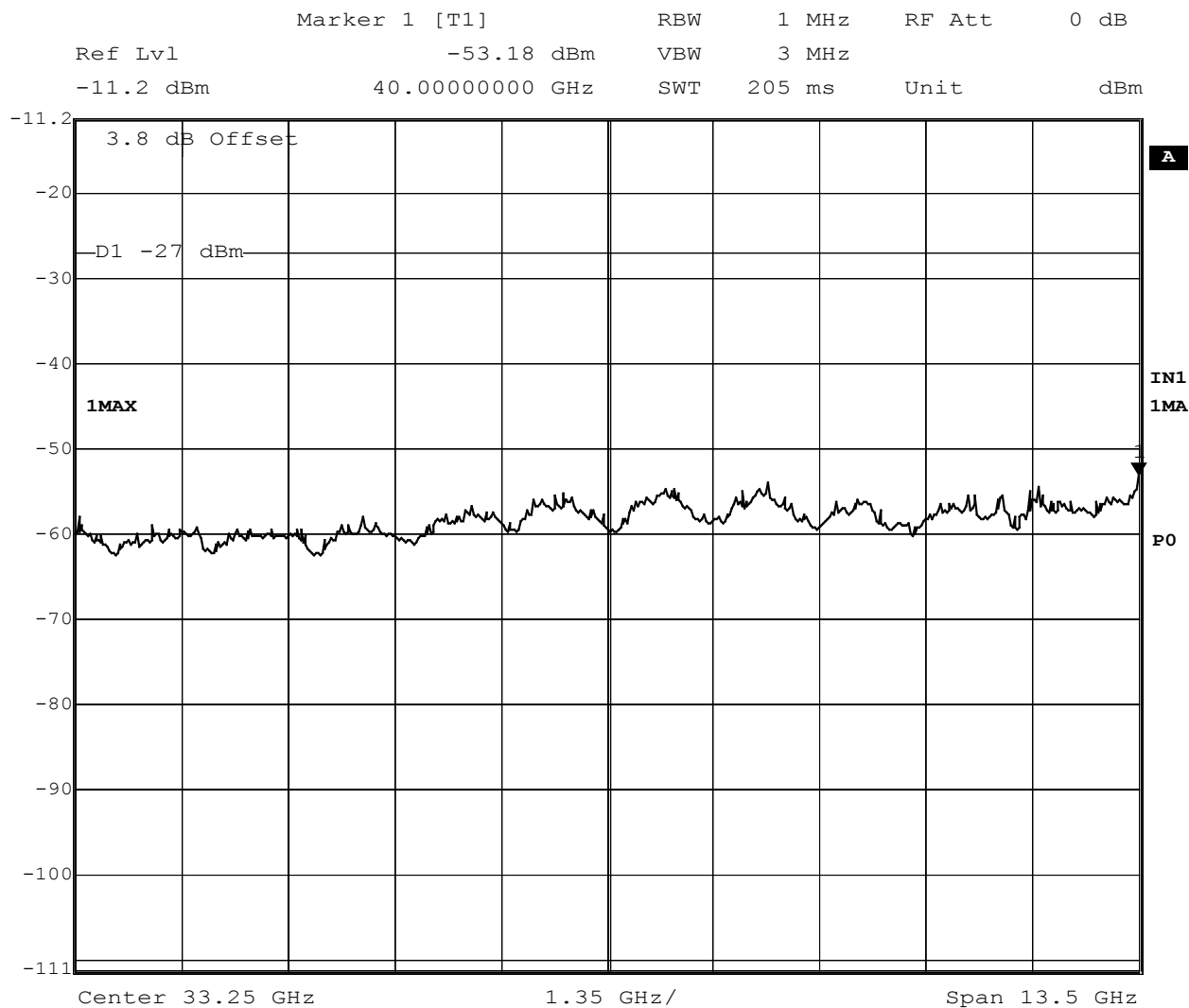
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 6Mbps

26GHz – 40GHz

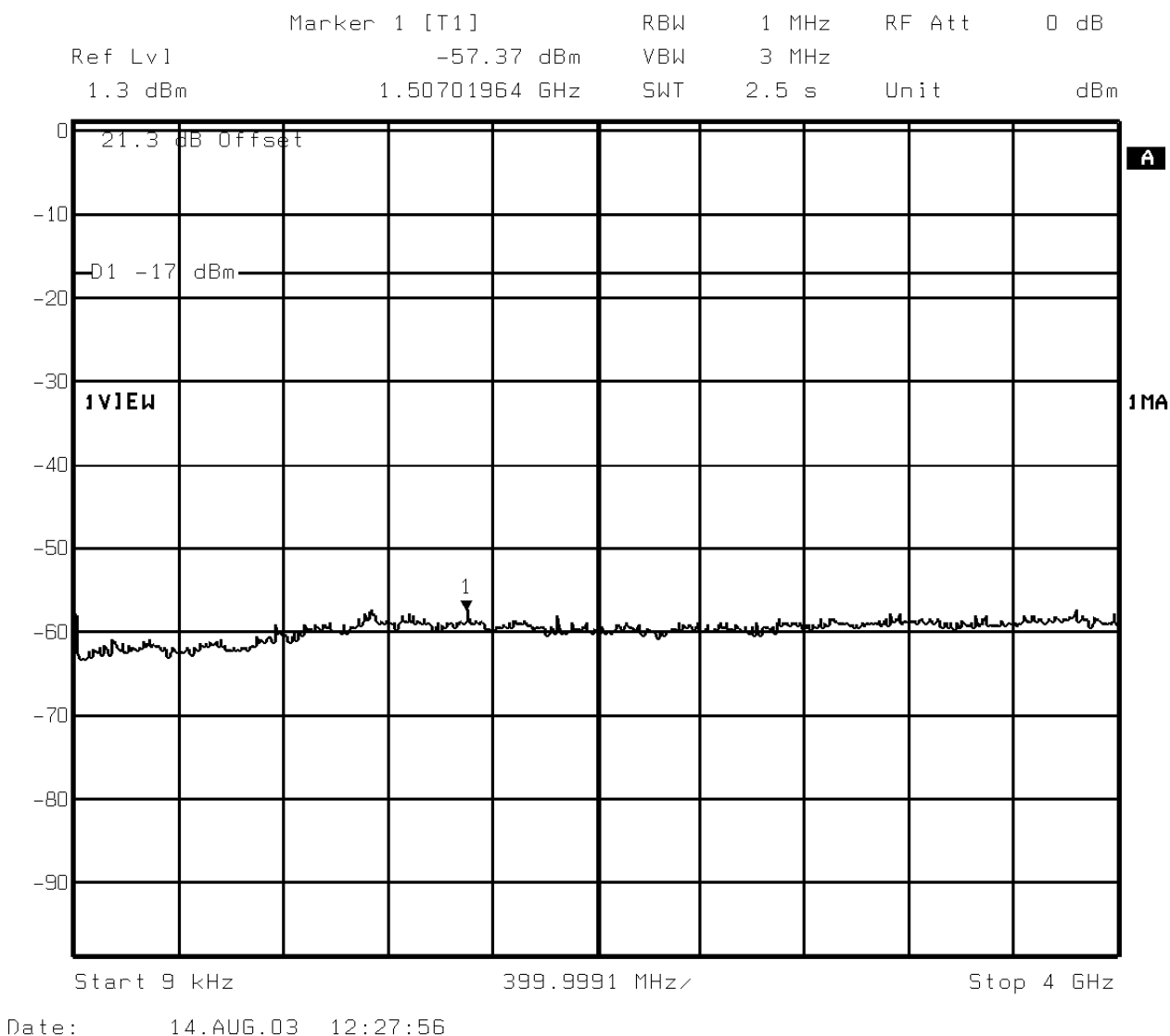


Date: 14.AUG.2003 20:27:08



Test Case : Spurious Conducted Emissions
Test Date : 14th August 2003
Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 54Mbps 9kHz – 4GHz





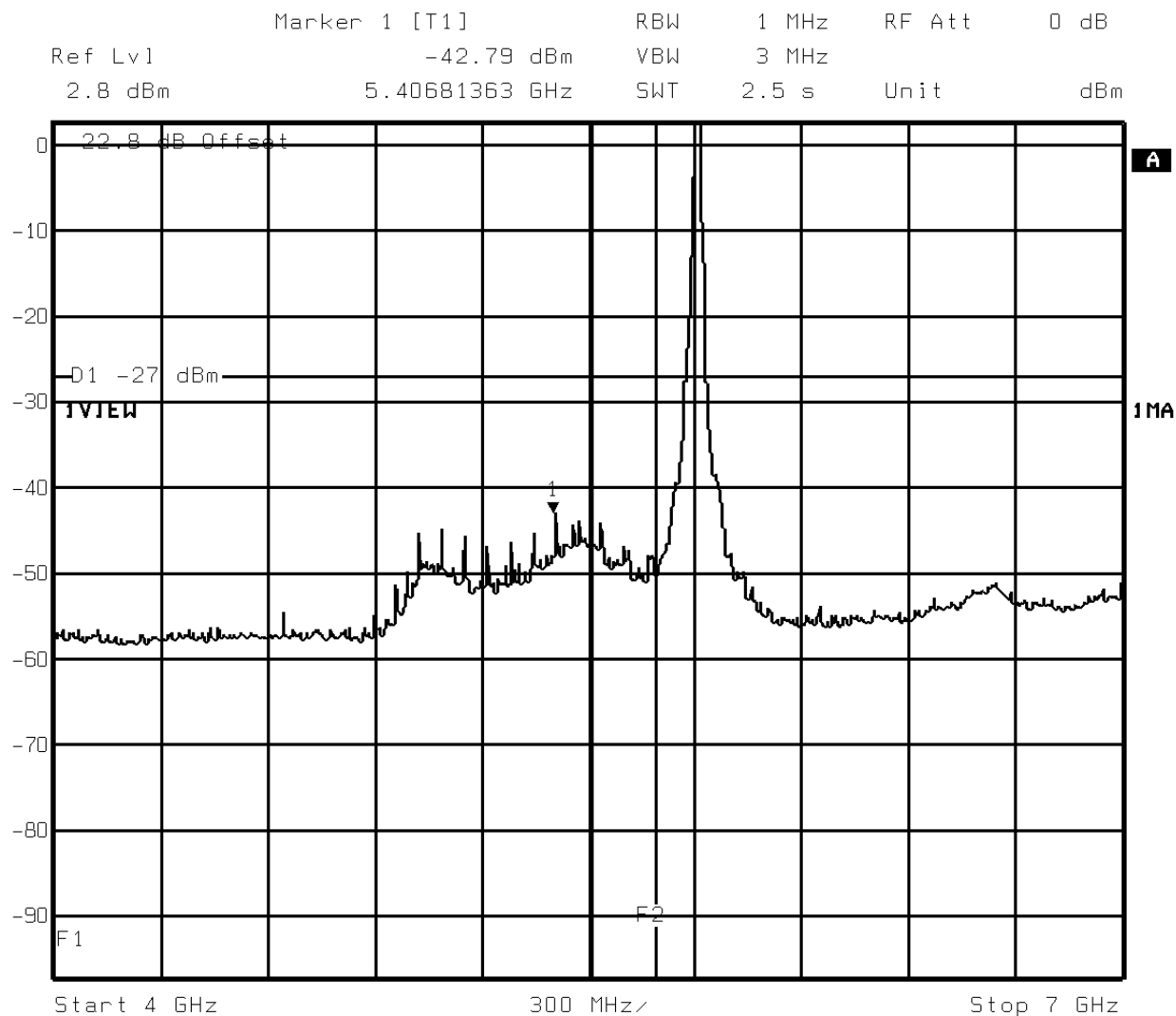
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 54Mbps

4GHz – 7GHz



Date: 14.AUG.03 14:59:18



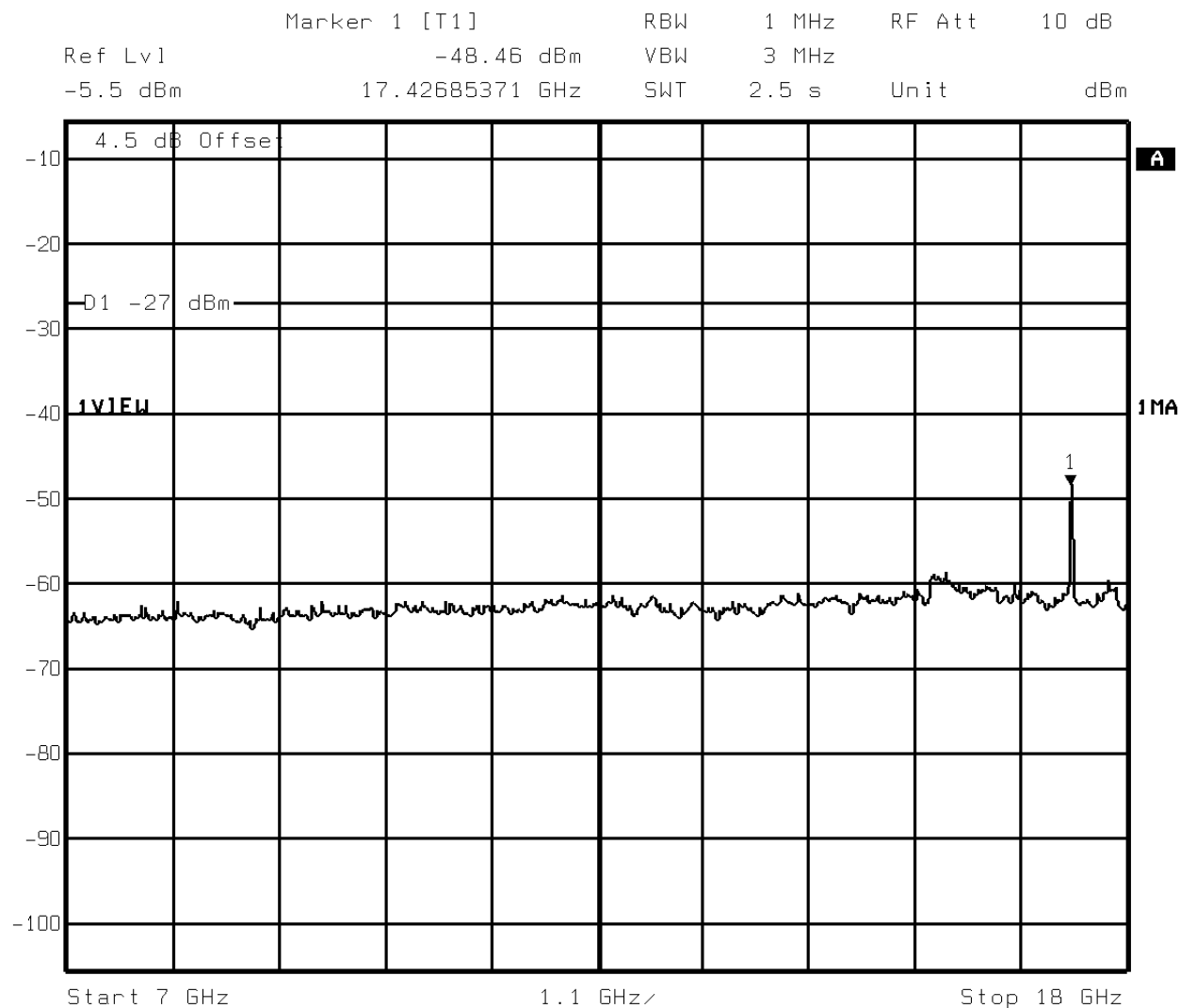
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 54Mbps

7GHz – 18GHz



Date: 14.AUG.03 16:08:04



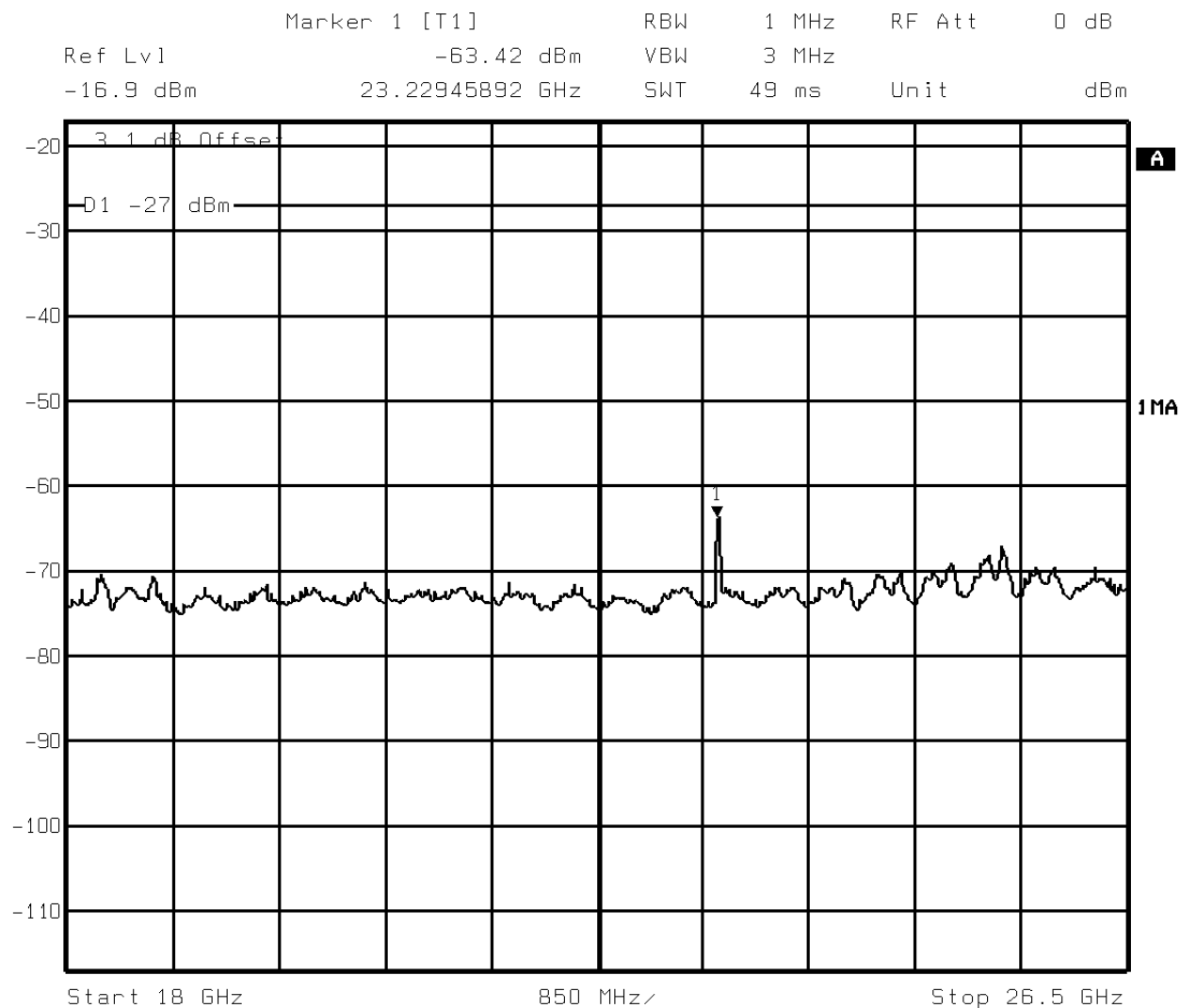
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 54Mbps

18GHz – 26GHz



Date: 14.AUG.03 22:01:41



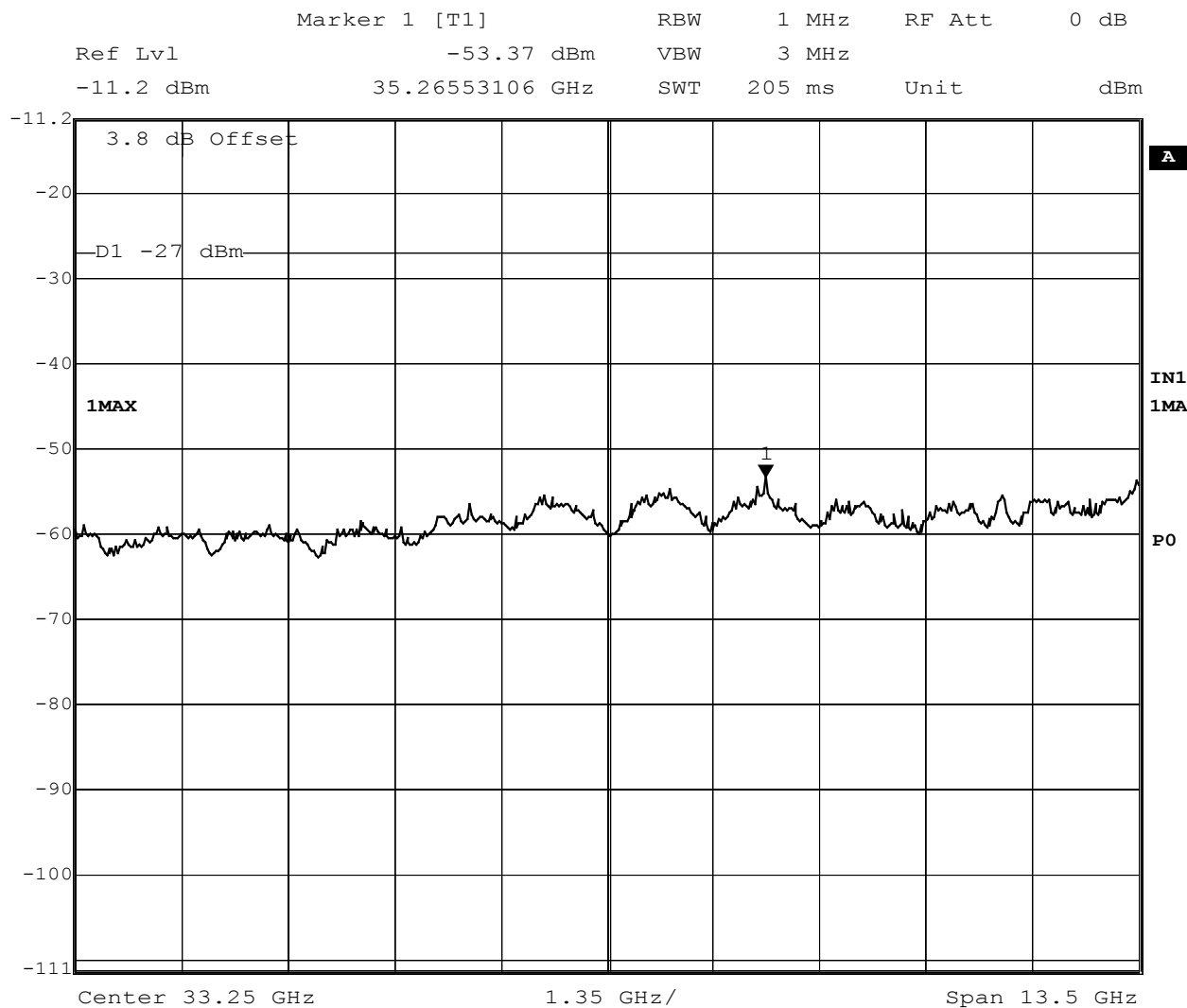
Test Case : Spurious Conducted Emissions

Test Date : 14th August 2003

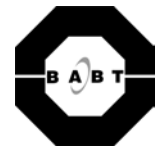
Rule Parts : 15.407(b)(1)(2)(3)

5805.0MHz – Maximum Power 54Mbps

26GHz – 40GHz



Date: 14.AUG.2003 20:28:24



Test Case : Spurious Conducted Emissions on Power Lines
Test Date : 31st July 2003
Rule Parts : 15.407(b)(5)

Test Procedure

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(5) which also requires Rule parts 15.207 to be applied, For Conducted Emissions was carried out on the Measurement Test Facility detailed in Annex A.

Conducted Emission Measurements were undertaken within the semi-anechoic chamber. Emissions were measured on the Live and Neutral Lines.

Emissions were formally measured using a Quasi-Peak Detector, which meets the CISPR requirements. The details of the worst-case emissions for the Live and Neutral Lines are presented in the tables below respectively.

The EUT was connected to a 120V 60Hz supply.

The Conducted Emission measurements were made using a Hewlett Packard 8542E EMI Receiver.

The test was performed in accordance with ANSI C63.4.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15.407(b)(5) and 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Bottom Channel (5.745GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2831	43.8	60.7	39.6	50.7
0.3183	39.1	59.8	35.8	49.8
0.4958	40.3	56.0	30.0	46.0
0.6024	36.3	56.0	27.0	46.0
0.6214	37.6	56.0	37.2	46.0
2.5850	37.6	56.0	31.9	46.0

The margin between the specification requirements and all other emissions were 20.9dB or more below the specified Quasi-Peak limit and 19.5dB or more below the Average limit.

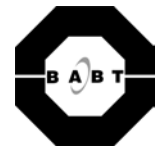
Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2834	44.3	60.7	39.5	50.7
0.3179	33.9	59.8	35.5	49.8
0.4958	38.6	56.1	32.5	46.1
0.6207	37.6	56.0	37.2	46.0
0.7778	34.5	56.0	25.5	46.0
2.5840	36.7	56.0	30.8	46.0

The margin between the specification requirements and all other emissions were 23.5dB or more below the specified Quasi-peak limit and 23.7dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Middle Channel (5.805GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2824	43.9	60.8	39.6	50.7
0.3178	39.2	59.8	35.8	49.8
0.4954	40.2	56.1	29.9	46.1
0.6013	37.2	56.0	28.4	46.0
0.6207	37.7	56.0	37.3	46.0
2.6200	36.8	56.0	31.1	46.0

The margin between the specification requirements and all other emissions were 20.8dB or more below the specified Quasi-Peak limit and 19.4dB or more below the Average limit.

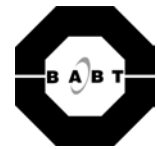
Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2832	44.4	60.7	39.6	50.7
0.3176	39.8	59.8	35.4	49.8
0.4958	38.9	56.1	32.8	46.1
0.6210	37.7	56.0	37.4	46.0
0.7790	35.0	56.0	25.0	46.0
2.2660	36.4	56.0	29.5	46.0

The margin between the specification requirements and all other emissions was 23.0dB or more below the specified Quasi-peak limit and 23.1dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Spurious Conducted Emissions on Power Lines-continued
 Test Date : 31st July 2003
 Rule Parts : 15.407(b)(5)

Test Results

The EUT met the Class B requirements of 47 CFR 15, Subpart E, Section 15.407(b)(5) and Subpart C, Section 15.207 for Conducted Emissions on the Live and Neutral Lines.

EUT Tx on Top Channel (5.830GHz)

Conducted Emissions - Live Line

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2825	43.9	60.7	39.6	50.7
0.3176	39.3	59.7	35.9	49.7
0.4951	40.2	56.1	30.0	46.1
0.6022	37.1	56.0	28.2	46.0
0.6211	37.6	60.0	37.2	50.0
2.5850	37.3	60.0	31.3	50.0

The margin between the specification requirements and all other emissions was 20.9dB or more below the specified Quasi-Peak limit and 19.5dB or more below the Average limit.

Conducted Emissions Neutral Line :

Emission Frequency (MHz)	Quasi-Peak Level (dBµV)	Quasi-Peak Limit (dBµV)	Average Level (dBµV)	Average Limit (dBµV)
0.2828	44.5	60.7	39.6	50.7
0.3179	40.0	59.8	35.6	49.8
0.4956	39.0	56.1	32.8	46.1
0.6210	37.5	56.0	37.1	46.0
0.7790	35.1	60.0	25.7	50.0
2.6210	36.3	60.0	30.3	50.0

The margin between the specification requirements and all other emissions was 23.1dB or more below the specified Quasi-peak limit and 23.5dB or more below the specified Average limit.

Procedure: Test performed in accordance with ANSI C63.4.

Performed by: G Lawler, EMC Engineer.



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

Measurement Method

The EUT was connected to the Spectrum Analyser via a 20dB Attenuator. The EUT was set to transmit at maximum power on all three channels and at the highest and lowest data rates.

With the EUT transmitting, the trace was adjusted to display the entire emission bandwidth of the fundamental. The RBW was adjusted to 1MHz with the VBW set to 3MHz. Trace 1 was set to Max Hold with a peak detector. Trace 2 was then selected with a sample detector. The VBW on trace 2 was reduced to 30kHz and the trace set to max hold. Using the marker delta function, the difference between the two traces was measured.

The measurement plots are shown on the following pages.

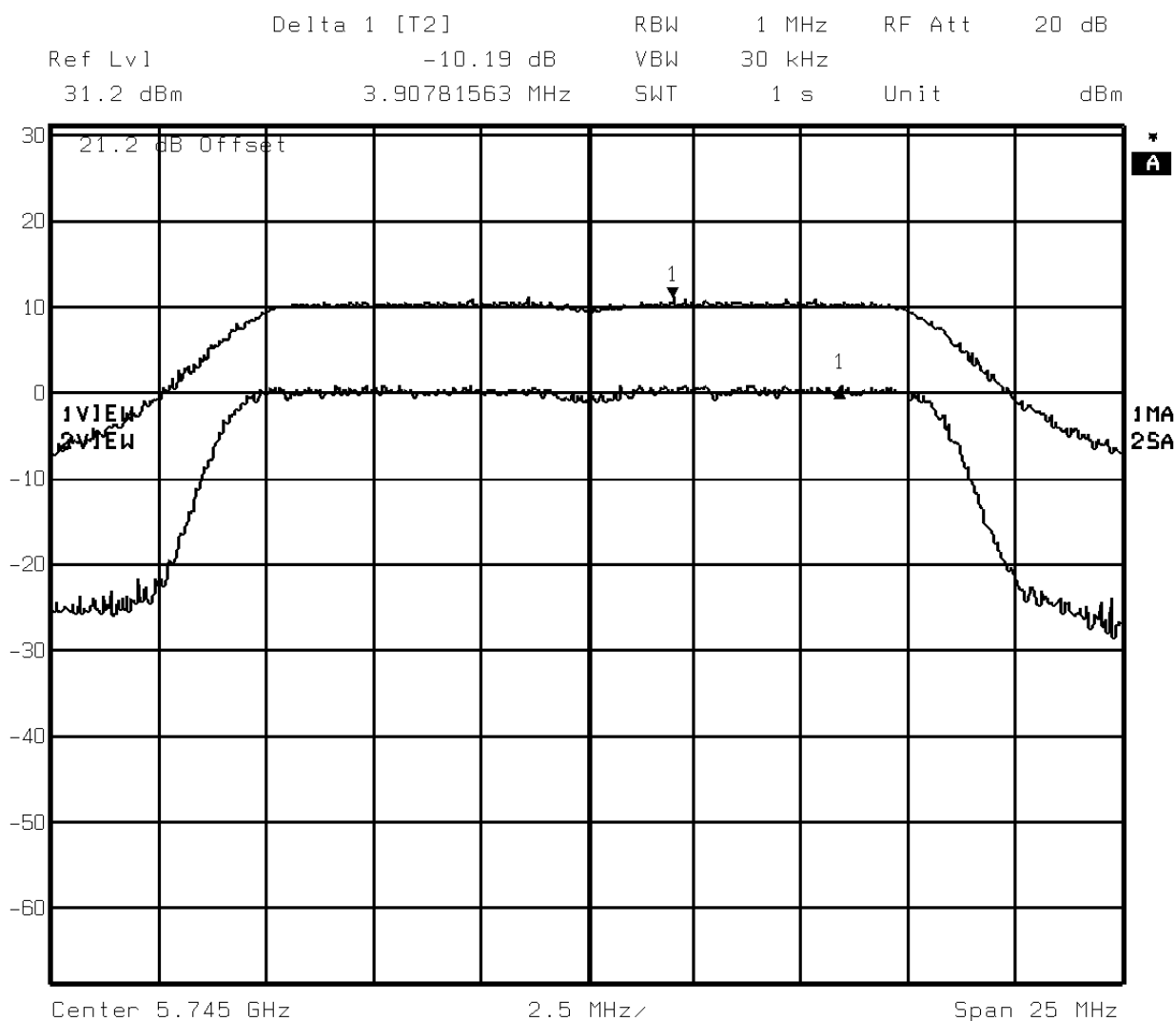
Remarks

The equipment met the requirements outlined in Clause 15.407(a)(6) where the peak excursion was less than 13dB.



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5745.0MHz – Maximum Power 6Mbps

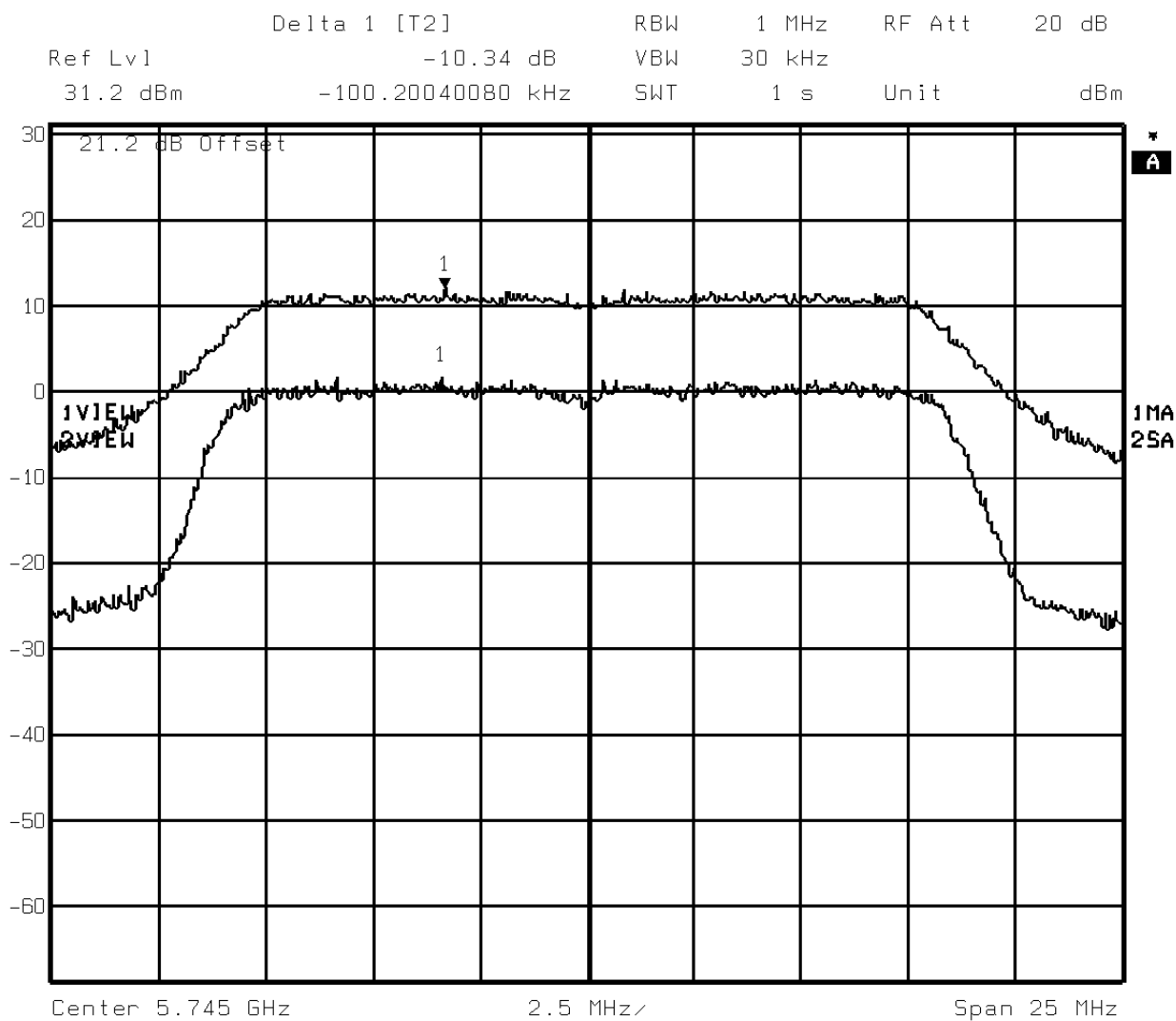


Date: 15.AUG.03 11:29:28



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5745.0MHz – Maximum Power 54Mbps

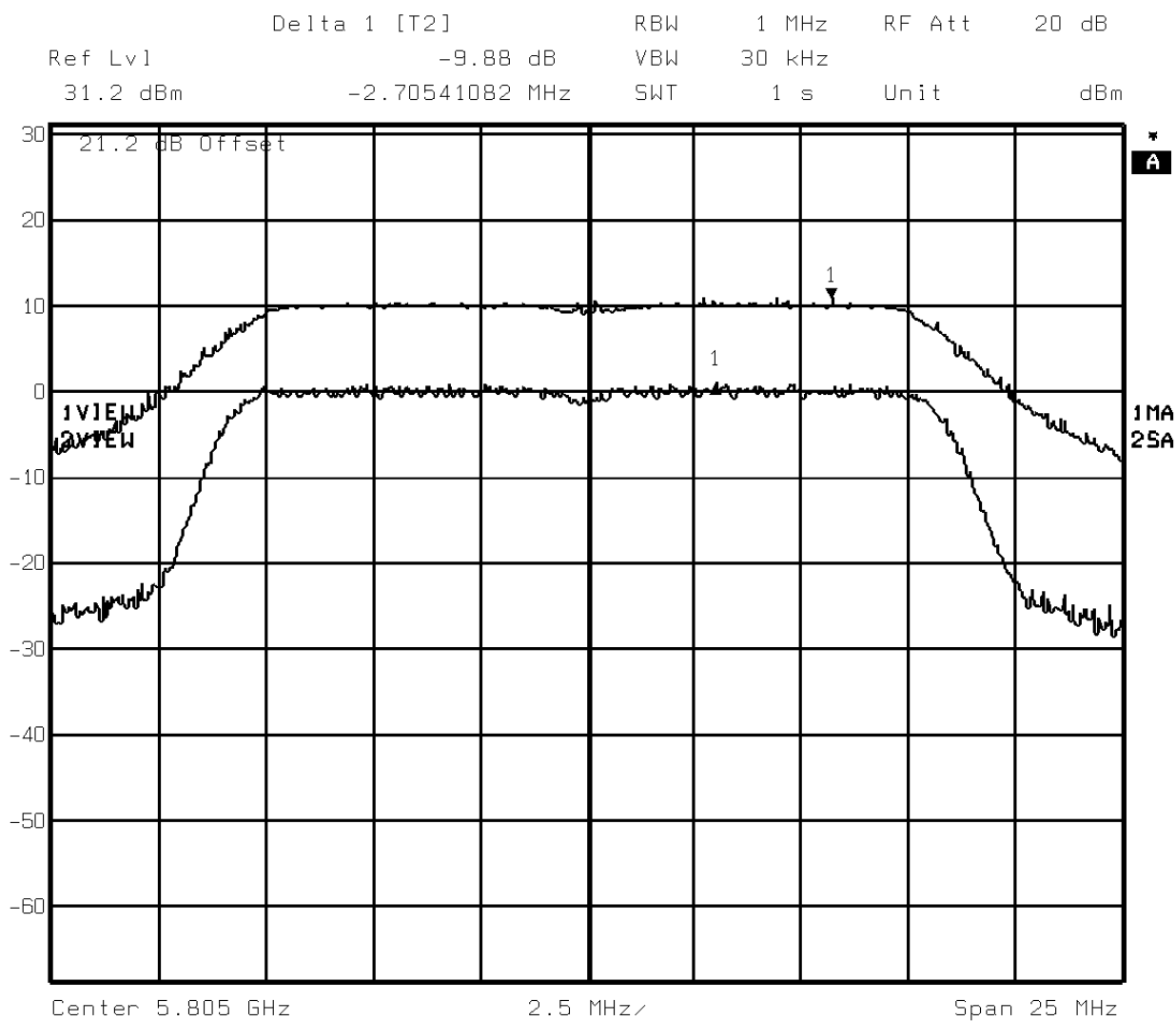


Date: 15.AUG.03 11:32:39



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5805.0MHz – Maximum Power 6Mbps

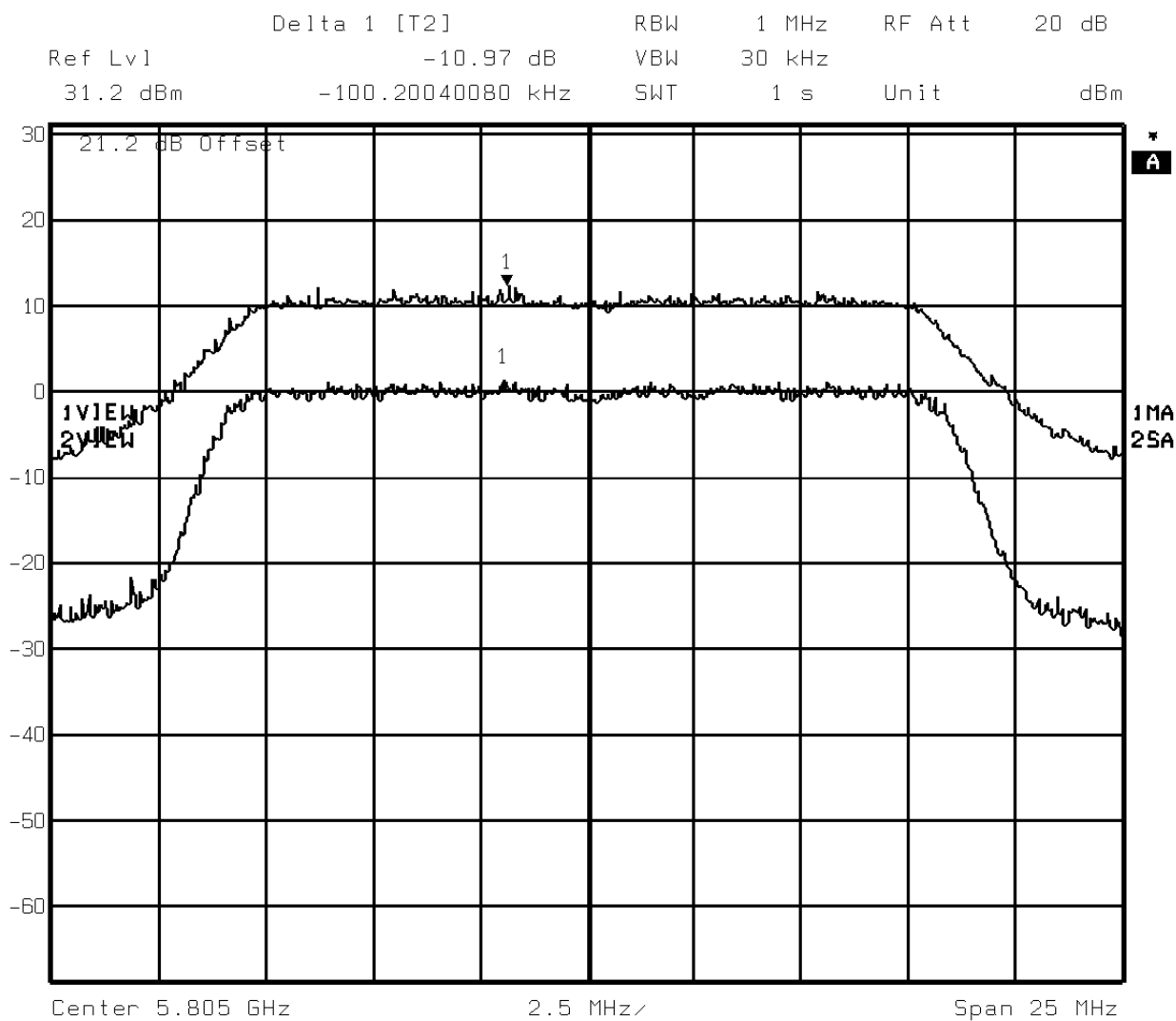


Date: 15.AUG.03 11:38:46



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5805.0MHz – Maximum Power 54Mbps

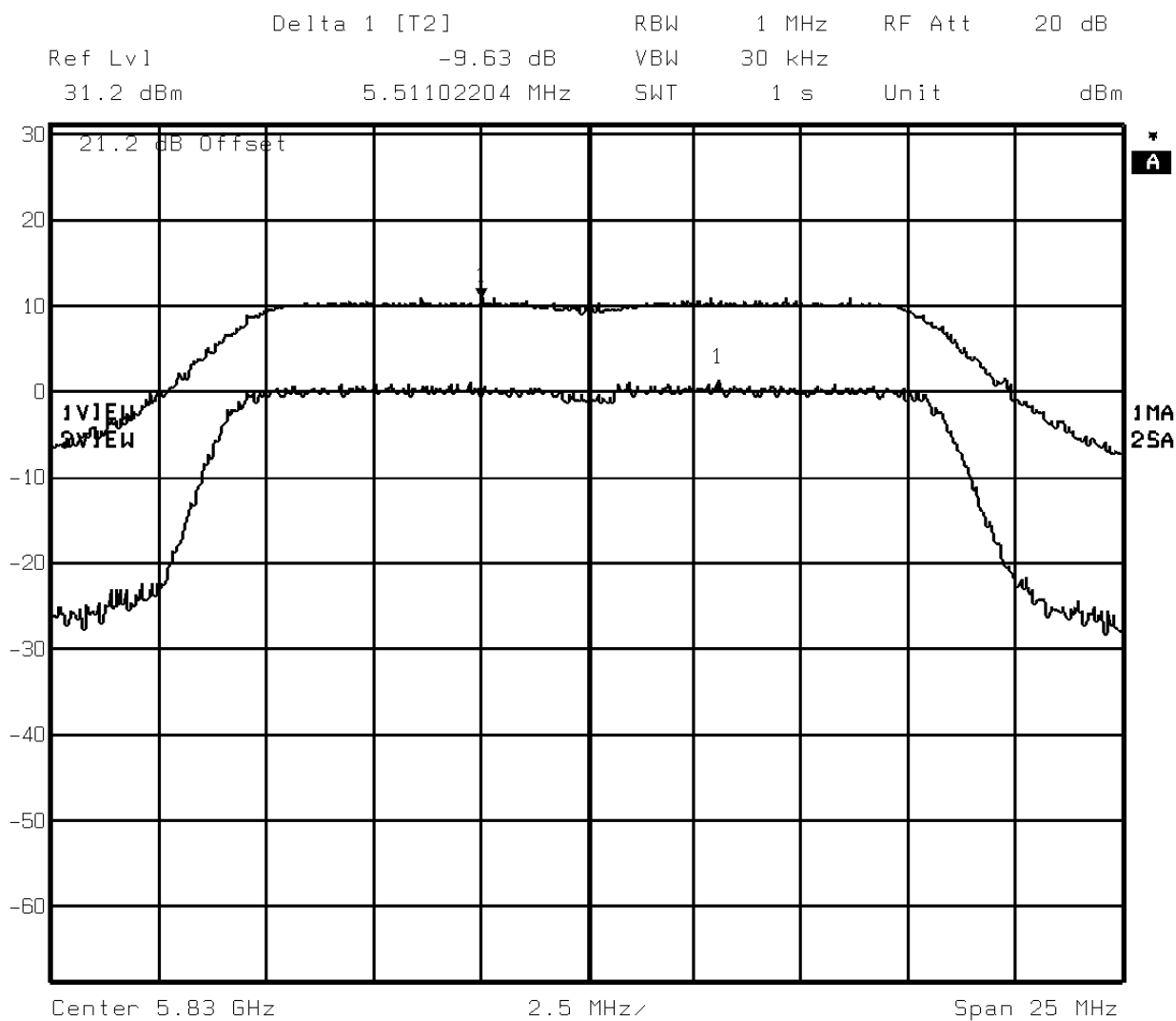


Date: 15.AUG.03 11:36:13



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5830.0MHz – Maximum Power 6Mbps

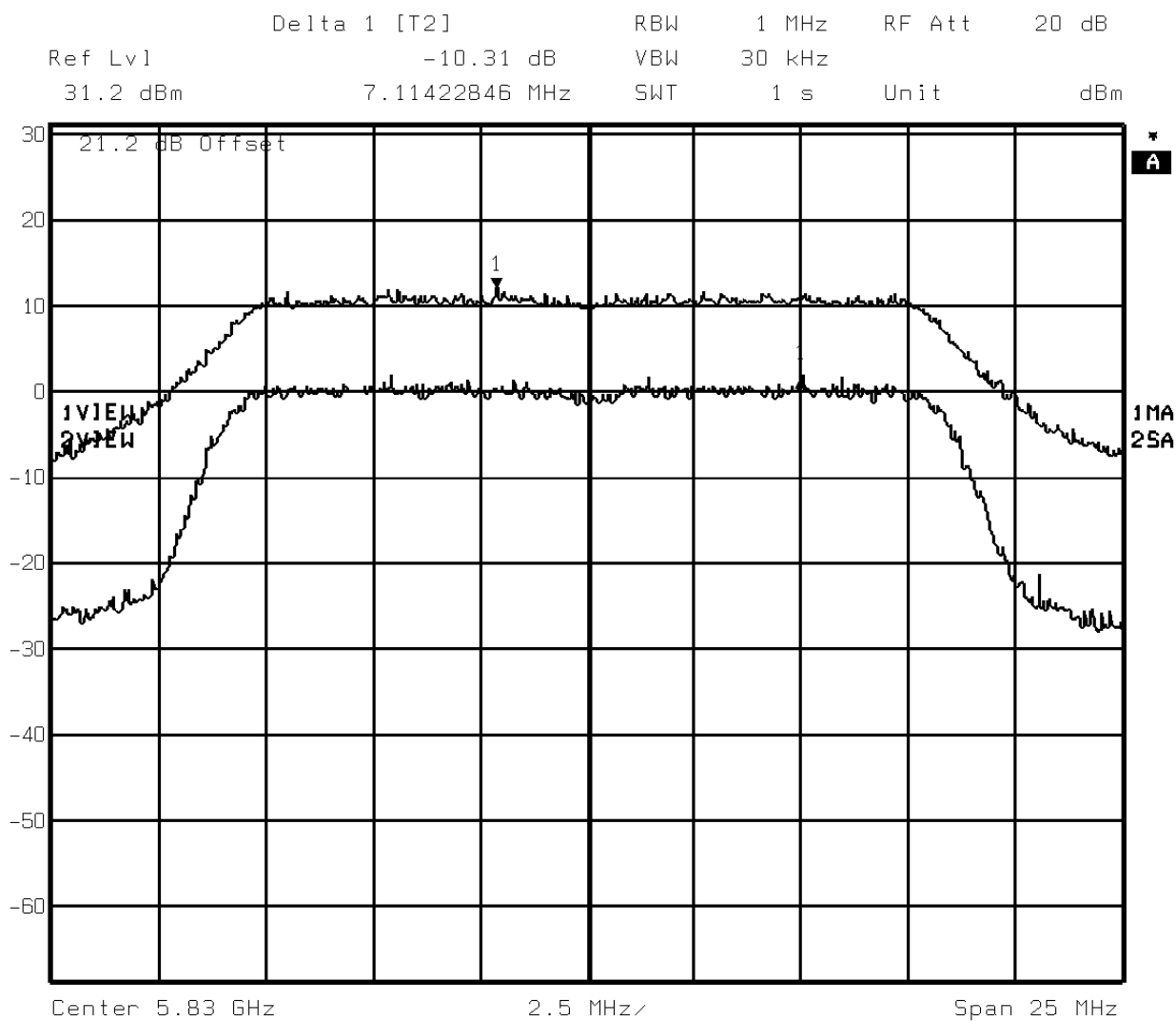


Date: 15.AUG.03 11:55:15



Test Case : Peak Excursion
Test Date : 15th August 2003
Rule Parts : 15.407(a)(6)

5830.0MHz – Maximum Power 54Mbps



Date: 15.AUG.03 11:58:43



Test Case : Spurious Radiated Emissions
Test Date : 8th August 2003
Rule Parts : 15.407(b)(5) (6)

Measurement Method

Testing to the requirements of FCC CFR 47: Part 15 Subpart E, Section 15.407(b)(5) (6), for Radiated Electric Field Emissions was carried out on the Measurement Test Facility detailed in Annex A. Section 15.407(b)(5) (6) also requires Rule parts 15.205 and 15.209 to be applied.

A preliminary profile of the Spurious Radiated Emissions was obtained by operating the Equipment Under Test (EUT) on a remotely controlled turntable within a semi-anechoic chamber; measurements were taken at a 3m distance unless otherwise stated. Measurements of emissions from the EUT were obtained with the Measurement Antenna in both Horizontal and Vertical Polarisations. The profiling produced a list of the worst-case emissions together with the EUT azimuth and antenna polarisation.

Using the information from the preliminary profiling of the EUT, a search was made in the frequency range 30MHz to 25GHz. The list of worst-case emissions was then confirmed or updated under Open Site conditions. Emission levels were maximised by adjusting the antenna height, antenna polarisation and turntable azimuth.

30MHz – 1GHz emissions levels were then formally measured using a CISPR Quasi-Peak detector. 1GHz – 25GHz emissions levels were then formally measured using Peak and Average detectors.

(Note: Peak measurements performed using a Resolution and Video Bandwidth of 1MHz, Average measurements performed using a Resolution Bandwidth of 1MHz and a Video Bandwidth of 10Hz)

The EUT was operating via the internal power supply of the Host.

Measurements were made with the EUT transmitting on the following channels.

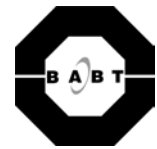
Channel 1: 5745MHz
Channel 6: 5805MHz
Channel 11: 5830MHz

Spurious Radiated Emissions from 30MHz to 1GHz were made using a HP 8542E Test Receiver.

Spurious Radiated Emissions from 1GHz to 25GHz were made using a Rhode and Schwarz ESIB 40 Test Receiver.

The test was performed in accordance with ANSI C63.4.

The measurements were performed at a 3m distance unless otherwise stated.



Test Case : Spurious Radiated Emissions (cont'd)
Test Date : 8th August 2003
Rule Parts : 15.407(b)(5) (6)

30MHz - 25GHz Frequency Range

Equipment Designation: Intentional Radiator.

The EUT met the requirements of FCC CFR 47: Part 15.407(b)(5) (6), 15.205 and 15.209 for Radiated Emissions (30MHz – 25GHz).

EUT Tx on Bottom Channel (5.745GHz)

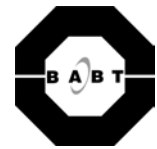
30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azim	Field Strength at 3m		Specification Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
37.5310	V	100	98	35.1	56.9	40.0	100.0
39.5103	V	100	98	34.1	50.7	40.0	100.0
40.3511	V	100	30	34.2	51.3	40.0	100.0
56.7721	V	100	343	36.6	67.6	40.0	100.0
58.7447	V	100	166	36.1	63.8	40.0	100.0
60.2065	V	100	185	36.3	65.3	40.0	100.0

EUT Tx on Middle Channel (5.805GHz)

30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azim	Field Strength at 3m		Specification Limit	
				dBµV/m	µV/m	dBµV/m	µV/m
37.5400	V	100	107	34.1	50.7	40.0	100.0
40.3491	V	100	25	33.9	49.5	40.0	100.0
58.7497	V	101	203	36.0	63.1	40.0	100.0
60.2075	V	100	213	36.2	64.6	40.0	100.0
60.8361	V	100	177	34.5	53.1	40.0	100.0
62.0310	V	100	156	33.7	48.4	40.0	100.0



Test Case : Spurious Radiated Emissions (cont'd)
Test Date : 8th August 2003
Rule Parts : 15.407(b)(5) (6)

30MHz - 25GHz Frequency Range

EUT Tx on Top Channel (5.830GHz)

30MHz – 25GHz Alternative Open Area Test Site Results: The levels of the six highest emissions measured in accordance with the specification are presented below: -

Emission Frequency	Pol	Hgt	Azm	Field Strength at 3m		Specification Limit	
				MHz	H/V	cm	deg
37.5379	V	100	76	34.4	52.5	40.0	100.0
39.5354	V	100	12	33.2	45.7	40.0	100.0
40.3461	V	100	40	33.3	46.2	40.0	100.0
58.7177	V	100	191	35.3	58.2	40.0	100.0
60.2155	V	100	199	36.1	63.8	40.0	100.0
60.8171	V	100	193	34.0	50.1	40.0	100.0

ABBREVIATIONS FOR ABOVE TABLES

H	Horizontal Polarisation	V	Vertical Polarisation
Pol	Polarisation	Hgt	Height
deg	degree	Azm	Azimuth

Procedure: Test Performed in accordance with ANSI C63.4.

Performed by: P J Harrison and M Terry, EMC Engineers.

PHOTOGRAPHS OF EQUIPMENT



Photograph 3
Front View Symbol WSAP 5030 Access Port Integral Antenna (5.15-5.25GHz only)

PHOTOGRAPHS OF EQUIPMENT



Photograph 4
Rear View Symbol WSAP 5030 Access Port Integral Antenna (5.15-5.25GHz only)

PHOTOGRAPHS OF EQUIPMENT



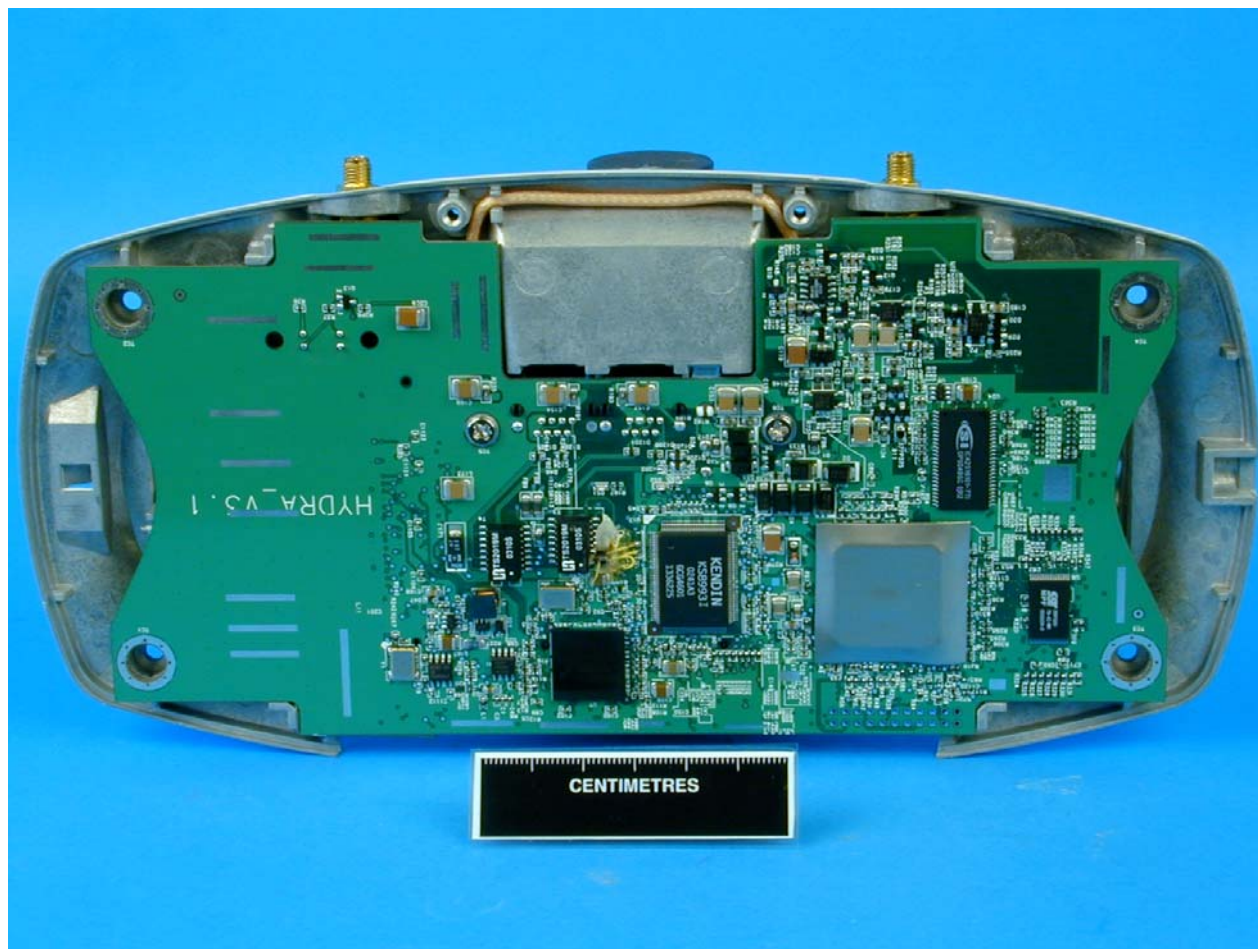
Photograph 5
Front View Symbol WSAP 5030 Access Port with
Dipole (Rubber Duck) Antennas (5.25-5.35 and 5.725-5.825GHz)

PHOTOGRAPHS OF EQUIPMENT



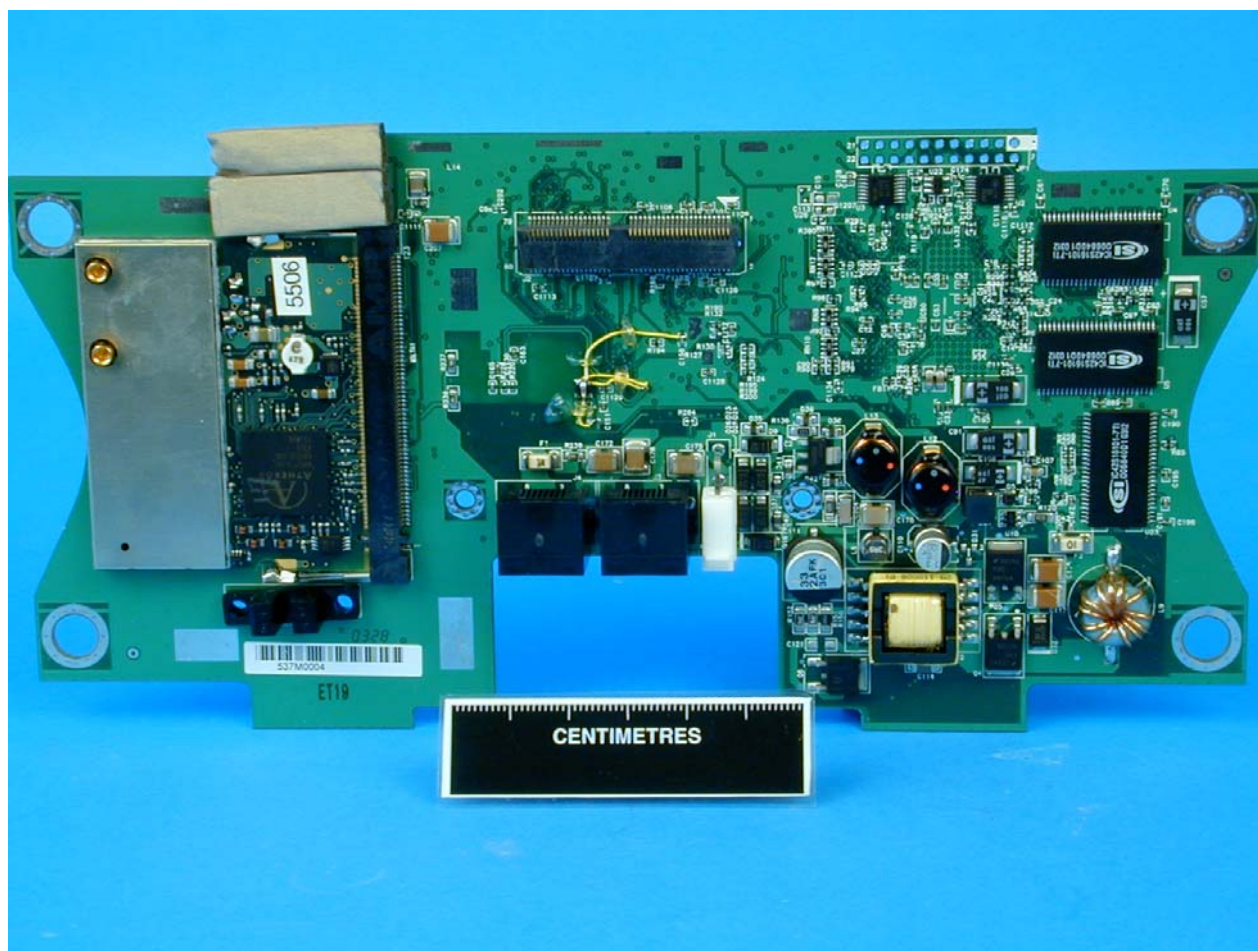
Photograph 6
Rear View Symbol WSAP 5030 Access Port
External Antenna Connectors (5.25-5.35 and 5.725-5.825GHz)

PHOTOGRAPHS OF EQUIPMENT



Photograph 7
Internal View Symbol WSAP 5030 Access Port

PHOTOGRAPHS OF EQUIPMENT



Photograph 8
Internal View Symbol WSAP 5030 Access Port

PHOTOGRAPHS OF EQUIPMENT



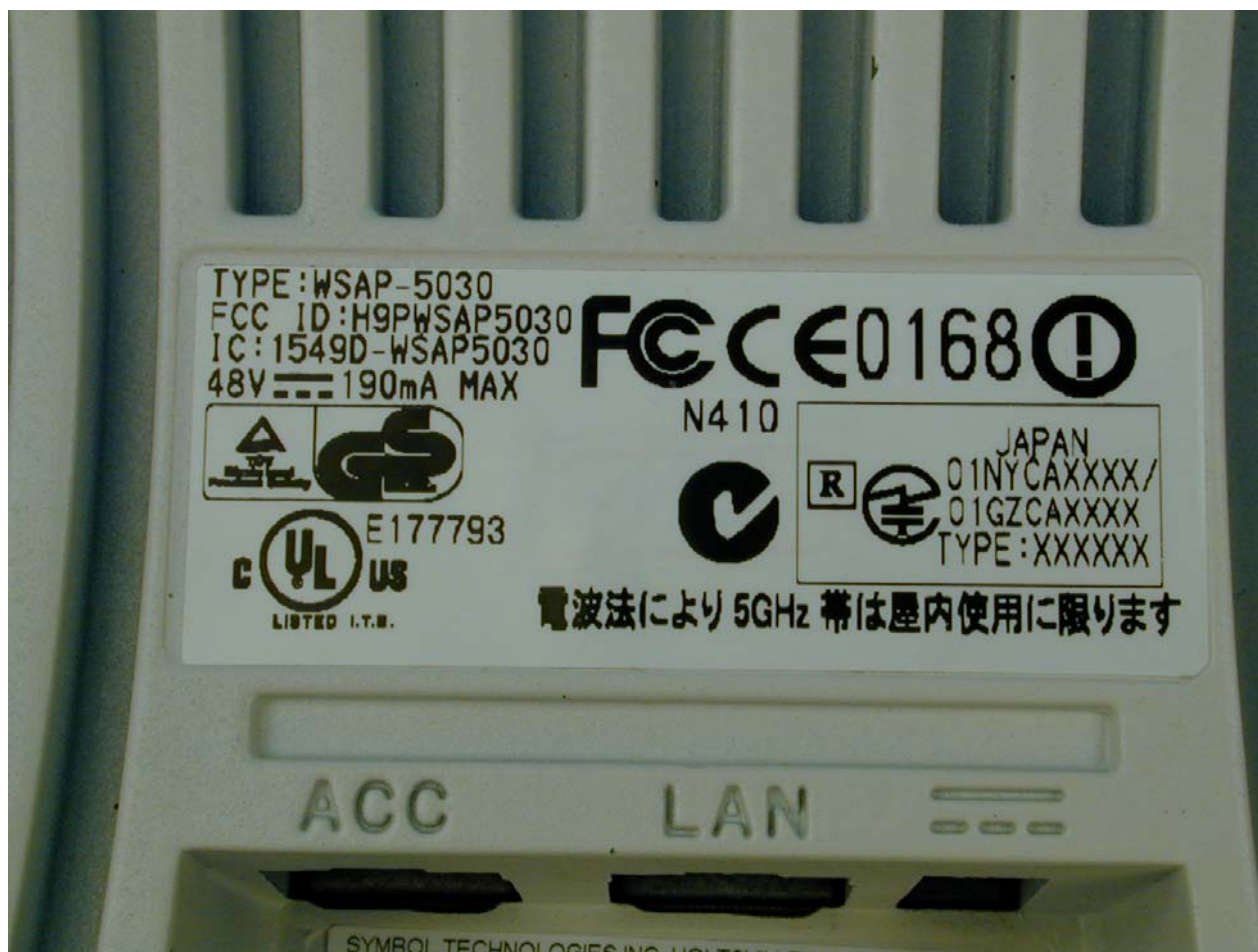
Photograph 9
Internal View Symbol WSAP 5030 Access Port
Integral Antenna (5.15-5.25GHz only)

PHOTOGRAPHS OF EQUIPMENT



Photograph 10
View of 5GHz and 2.4GHz Antennas Symbol WSAP 5030 Access Port (5.25-5.35 and 5.725-5.825GHz)

PHOTOGRAPHS OF EQUIPMENT

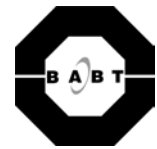


Photograph 11
Label View Symbol WSAP 5030 Access Port

PHOTOGRAPHS OF EQUIPMENT



Photograph 12
Label View Symbol WSAP 5030 Access Port



MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are: -

In the frequency range 30MHz to 1000MHz

For Spurious Radiated Emissions, Quasi-Peak Measurements using the ESVP Test Receiver and Bilog

Antenna: - Frequency $\pm 5\text{ppm} + 500\text{Hz}$ Amplitude $\pm 4.1\text{dB}$

For 6dB Bandwidth

Frequency	$\pm 210.894\text{kHz}$
Amplitude	$\pm 0.5\text{dB}$

For Maximum Output Power

Amplitude	$\pm 0.5\text{dB}$
-----------	--------------------

For Spurious Conducted Emissions

Amplitude	$\pm 3.0\text{dB}$
-----------	--------------------

In the frequency range 1GHz to 25GHz

For Spurious Radiated Emissions measurements: -

Frequency	$\pm 2 \times 10^{-7} \times \text{Centre Frequency}$
-----------	---

Amplitude	$\pm 3.4\text{dB}$
-----------	--------------------

For Peak Power Spectral Density

Amplitude	$\pm 1.8\text{dB}$
-----------	--------------------



This report relates only to the actual item/items tested.

UKAS Accreditation's do not cover opinions and interpretations and any expressed herein are outside the scope of any UKAS Accreditation.

Results of tests not yet included in our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).

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ANNEX A
FCC SITE COMPLIANCE LETTERS

FEDERAL COMMUNICATIONS COMMISSION

**Laboratory Division
7435 Oakland Mills Road
Columbia, MD 21046**

October 18, 2002

Registration Number: 90987

TUV Product Service Ltd
Segensworth Road
Titchfield
Fareham, Hampshire, PO15 5RH
United Kingdom
Attention: Kevan Adsetts

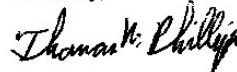
Re: Measurement facility located at Titchfield
Anechoic chamber (3 meters) and 3 & 10 meter OATS
Date of Listing: October 18, 2002

Gentlemen:

Your request for registration of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC rules. The information has, therefore, been placed on file and the name of your organization added to the list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that the file must be updated for any changes made to the facility and the registration must be renewed at least every three years.

Measurement facilities that have indicated that they are available to the public to perform measurement services on a fee basis may be found on the FCC website www.fcc.gov under E-Filing, OET Equipment Authorization Electronic Filing, Test Firms.

Sincerely,



Thomas W Phillips
Electronics Engineer

FEDERAL COMMUNICATIONS COMMISSION
Laboratory Division
7435 Oakland Mills Road
Columbia, MD. 21046

September 08, 2000

Registration Number: 90986

BABT Product Service
Snitterfield Road
Bearley, Stratford-upon-Avon
Warwickshire CV37 0EX
United Kingdom
Attention: Jensen Adams

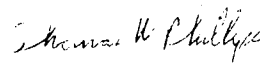
Re: Measurement facility located at Bearley
3 & 10 meter site
Date of Listing: September 08, 2000

Gentlemen:

Your submission of the description of the subject measurement facility has been reviewed and found to be in compliance with the requirements of Section 2.948 of the FCC Rules. The description has, therefore, been placed on file and the name of your organization added to the Commission's list of facilities whose measurement data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Please note that this filing must be updated for any changes made to the facility, and at least every three years from the date of listing the data on file must be certified as current.

If requested, the above mentioned facility has been added to our list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

Sincerely,



Thomas W Phillips
Electronics Engineer