TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test Of: Axxcelera Broadband Wireless UK Ltd.
Access Point (AP) & AP Wall-Box.

To: FCC Part 15 Subpart C: 2002
(Intentional Radiators)
Section 15.247

Test Report Serial No:
RFI/MPTB2/RP44358JD01A

Supersedes Test Report Serial No:
RFI/MPTB1/RP44358JD01A

This Test Report Is Issued Under The Authority Of Richard Jacklin, Operations Director: 	**Checked By:** 
Tested By: Andrew Thomas and Tony Henriques 	**Release Version No: PDF01**
Issue Date: 10 September 2003	**Test Dates: 30 January 2003 to 26 February 2003 and 17 July 2003**

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Note: Test Report Serial No: RFI/MPTB2/RP44358JD01A supersedes Test Report Serial No: RFI/MPTB1/RP44358JD01A.

1. Client Information

Company Name:	Axxcelera Broadband Wireless UK Ltd.
Address:	Building 5 The Westbrook Centre Milton Road Cambridge CB4 1YQ
Contact Name:	Mr M Wilkinson

2. Equipment Under Test (EUT)

The following information (with the exception of the Date of Receipt) has been supplied by the client:

2.1. Identification Of Equipment Under Test (EUT)

Brand Name:	AB-Access
Model Name or Number:	Access Point (AP) & AP "Wall-Box"
Unique Type Identification:	AB-ACCESS AP
Serial Number:	SE460021GC
Country of Manufacture:	USA
Date of Receipt:	30 January 2003
FCC ID:	OJBAB-ACCESS-AP02

Brand Name:	Artesyn
Model Name or Number:	P/N: 703360-501 Rev: 9A
Unique Type Identification:	PSU
Serial Number:	ZCPZ1437
Country of Manufacture:	China
Date of Receipt:	30 January 2003

2.2. Description Of EUT

The equipment under test is a Point-to-Multipoint fixed digital radio transceiver comprising Time Division Duplex (TDD) system with downstream and upstream bursts sharing the same radio channel.

2.3. Modifications Incorporated In EUT

The EUT has not been modified from what is described by the Model Number and Unique Type Identification stated above.

2.4. Additional Information Related To Testing

Power Supply Requirement:	Nominal 115 V, 60 Hz AC Mains Supply 13 Amp (max)		
Intended Operating Environment:	Outdoor, -40.0 ºC to +55.0 ºC ambient temperature		
Equipment Category:	Fixed		
Type of Unit:	Point-to-Multipoint fixed wireless access communications system		
Weight:	5 Kg		
Dimensions:	510 x 250 x 80 mm (Access Point) 85x85x40mm (Wall Box)		
Interface Ports:	RJ45 -> (10bT Ethernet + Power)		
Transmit Frequency Range	5.745 GHz to 5.835 GHz		
Transmit Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (GHz)**
	Bottom	10	5.745
	Middle	13	5.775
	Top	16	5.835
Receive Frequency Range	5.745 GHz to 5.835 GHz		
Receive Channels Tested	**Channel ID**	**Channel Number**	**Channel Frequency (GHz)**
	Bottom	10	5.745
	Middle	13	5.775
	Top	16	5.835
Occupied Bandwidth	BPSK: -15.84 MHz QPSK: - 17.67 MHz		
Antenna Gain	Vertical :- 15.8 dBi Horizontal:- 17.5 dBi		
Highest Oscillator Frequency	5.835 GHz		

2.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

Description:	PC
Brand Name:	DELL
Model Name or Number:	Latitude Cpi
Serial Number:	DP/N: 0009321C-1280-93B-4235
Cable Length And Type:	Not applicable
Connected to Port:	Wall-Box

Description:	PSU for PC
Brand Name:	DELL
Model Name or Number:	PA-6
Serial Number:	DP/N: 0004983D Rev: A01
Cable Length And Type:	1 m DC
Connected to Port:	PC Input

Description:	Network cable
Brand Name:	Not stated
Model Name or Number:	EVERNEW-CM
Serial Number:	Not stated
Cable Length And Type:	10 Metres of CAT5
Connected to Port:	Network Port

3. Test Specification, Methods And Procedures

3.1. Test Specification

Reference:	FCC Part 15 Subpart C: 2001 (Section 15.247)
Title:	Code of Federal Regulations, Part 15 (47CFR15) Radio Frequency Devices
Comments:	A description of the test facility used for this test is on file with, and has been accepted by, the Federal Communications Commission as required by Section 2.948 of Federal Rules.
Purpose of Test:	To determine whether the equipment complied with the requirements of the specification for the purposes of certification.

3.2. Methods And Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1987)
Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2001)
Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)
Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

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

CISPR 16-1: (1999)
Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

DA00-705 (2000)
Title: Filing and Frequency Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

3.3. Definition Of Measurement Equipment

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

4. Deviations From The Test Specification

None.

5. Operation Of The EUT During Testing

5.1. Operating Conditions

The EUT was tested in a normal laboratory environment.

During testing, the EUT was powered by a nominal 115 V, 60 Hz AC Mains power supply (13 Amp max)

5.2. Operating Modes

The EUT was tested in the following operating modes, unless otherwise stated.

Radiated Emissions.

All transmitter radiated spurious pre-scan tests were performed on the middle channel of the assigned frequency block with the EUT set to BPSK modulation mode.

Final measurements were then performed on any indicated spurious emissions on the top, middle and bottom channels in both QPSK and BPSK modulation mode.

Band edge testing was performed in both QPSK and BPSK modulation mode.

Conducted Emissions.

All transmitter conducted spurious emissions tests were performed with the EUT set to BPSK modulation mode and on the vertical antenna port.

Transmitter peak power and peak power spectral density tests were performed with the software set to BPSK and QPSK modulation modes on both the vertical and horizontal ports.

Transmitter bandwidth testing was performed with the software set to BPSK and QPSK modulation modes on the vertical port.

AC Mains Conducted Emissions.

AC Mains Conducted Emissions were performed at full power on the middle channel of the assigned frequency block, with the software set to the BPSK modulation mode.

The reason for choosing these modes was that the client defined it as being likely to be the worst case with regards EMC.

5.3. Configuration And Peripherals

The EUT was tested in the following configuration:

The EUT has two internal antenna ports one for the vertical antenna and one for the horizontal antenna.

The EUT may be operated in QPSK or BPSK modulation modes; these are selected via software control. Both modes of modulation use the same hardware.

Also, please refer to the Schematic diagram in Appendix 3

The reason for choosing this configuration was that the client defined it as being likely to be the worst case with regards EMC.

6. Summary Of Test Results

Range Of Measurements	Specification Reference	Port Type	Compliancy Status
Conducted Emissions (AC Mains)	C.F.R. 47 FCC Part 15: 2002 Section 15.207	AC Mains	Complied
Transmitter Minimum Bandwidth	C.F.R. 47 FCC Part 15: 2002 Section 15.247(a)(2)	Antenna Terminals	Complied
Transmitter Maximum Peak Output Power	C.F.R. 47 FCC Part 15: 2002 Section 15.247(b)(4)	Antenna Terminals	Complied
Transmitter Conducted Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247 (c)	Antenna Terminals	Complied
Transmitter Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c) Section 15.209(a)	Antenna	Complied
Transmitter Peak Power Spectral Density	C.F.R. 47 FCC Part 15: 2002 Section 15.247(d)	Antenna Terminals	Complied
Transmitter Band Edge Radiated Emission	C.F.R. 47 FCC Part 15: 2002 Section 15.247(c) Section 15.209(a)	Antenna	Complied

6.1. Location Of Tests

All the measurements described in this report were performed at the premises of Radio Frequency Investigation Ltd, Ewhurst Park, Ramsdell, Basingstoke, Hampshire, RG26 5RQ, England.

7. Measurements, Examinations And Derived Results

7.1. General Comments

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

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

7.2. Conducted Emissions: AC Mains

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

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

Quasi-Peak Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Q-P Level (dBμV)	Q-P Limit (dBμV)	Margin (dB)	Result
0.20521	Neutral	46.01	63.40	17.39	Complied
0.28437	Neutral	35.82	60.69	24.87	Complied
0.40531	Live	37.27	57.74	20.47	Complied
0.50033	Neutral	35.98	56.00	20.02	Complied
0.65561	Neutral	36.76	56.00	19.24	Complied
8.72083	Neutral	44.08	60.00	15.92	Complied
14.31016	Live	34.96	60.00	25.04	Complied

Average Detector Measurements on Live and Neutral Lines

Frequency (MHz)	Line	Q-P Level (dBμV)	Q-P Limit (dBμV)	Margin (dB)	Result
0.20521	Live	34.07	53.40	19.33	Complied
0.28437	Neutral	26.76	50.69	23.93	Complied
0.40531	Neutral	24.68	47.74	23.06	Complied
0.50033	Neutral	20.59	46.00	25.41	Complied
0.65561	Live	20.39	46.00	25.61	Complied
8.72083	Live	29.88	50.00	20.12	Complied
14.31016	Live	24.83	50.00	25.17	Complied

7.3.Transmitter Minimum Bandwidth

7.3.1. The EUT was configured as for Transmitter Minimum measurements as described in Appendix 2 of this report.

7.3.2. Tests were performed to identify the 6 dB bandwidth of the fundamental signal.

Result: BPSK Mode

Channel	Transmitter 6dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	7.33	0.5	6.83	Complied
Middle	5.77	0.5	5.27	Complied
Top	5.53	0.5	5.03	Complied

Result: QPSK Mode

Channel	Transmitter 6dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	11.54	0.5	11.04	Complied
Middle	11.02	0.5	10.52	Complied
Top	10.76	0.5	10.26	Complied

7.4. Transmitter Peak Output Power

7.4.1. The EUT was configured as for Transmitter Peak Output Power measurements as described in Appendix 2 of this report.

7.4.2. Tests were performed to identify the maximum transmit power from the EUT.

Results: BPSK Mode

Channel	Antenna Polarity (H/V)	Input Voltage (AC)	Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	Vert.	97.75	18.1	15.8	33.9	36.0	2.1	Complied
Bottom	Horiz.	97.75	18.0	17.5	35.5	36.0	0.5	Complied
Bottom	Vert.	115.00	18.1	15.8	33.9	36.0	2.1	Complied
Bottom	Horiz.	115.00	18.0	17.5	35.5	36.0	0.5	Complied
Bottom	Vert.	132.25	18.1	15.8	33.9	36.0	2.1	Complied
Bottom	Horiz.	132.25	18.0	17.5	35.5	36.0	0.5	Complied
Middle	Vert.	97.75	18.5	15.8	34.3	36.0	1.7	Complied
Middle	Horiz.	97.75	18.2	17.5	35.7	36.0	0.3	Complied
Middle	Vert.	115.00	18.5	15.8	34.3	36.0	1.7	Complied
Middle	Horiz.	115.00	18.2	17.5	35.7	36.0	0.3	Complied
Middle	Vert.	132.25	18.4	15.8	34.2	36.0	1.8	Complied
Middle	Horiz.	132.25	18.1	17.5	35.6	36.0	0.4	Complied
Top	Vert.	97.75	18.2	15.8	34.0	36.0	2.0	Complied
Top	Horiz.	97.75	18.3	17.5	35.8	36.0	0.2	Complied
Top	Vert.	115.00	18.3	15.8	34.1	36.0	1.9	Complied
Top	Horiz.	115.00	18.4	17.5	35.9	36.0	0.1	Complied
Top	Vert.	132.25	18.2	15.8	34.0	36.0	2.0	Complied
Top	Horiz.	132.25	18.3	17.5	35.8	36.0	0.2	Complied

Results: QPSK Mode

Channel	Antenna Polarity (H/V)	Input Voltage (AC)	Output Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	Limit EIRP (dBm)	Margin (dB)	Result
Bottom	Vert.	97.75	17.6	15.8	33.4	36.0	2.6	Complied
Bottom	Horiz.	97.75	17.3	17.5	34.8	36.0	1.2	Complied
Bottom	Vert.	115.00	17.7	15.8	33.5	36.0	2.5	Complied
Bottom	Horiz.	115.00	17.4	17.5	34.9	36.0	1.1	Complied
Bottom	Vert.	132.25	17.6	15.8	33.4	36.0	2.6	Complied
Bottom	Horiz.	132.25	17.4	17.5	34.9	36.0	1.1	Complied
Middle	Vert.	97.75	17.9	15.8	33.7	36.0	2.3	Complied
Middle	Horiz.	97.75	17.7	17.5	35.2	36.0	0.8	Complied
Middle	Vert.	115.00	17.9	15.8	33.7	36.0	2.3	Complied
Middle	Horiz.	115.00	17.7	17.5	35.2	36.0	0.8	Complied
Middle	Vert.	132.25	17.9	15.8	33.7	36.0	2.3	Complied
Middle	Horiz.	132.25	17.8	17.5	35.3	36.0	0.7	Complied
Top	Vert.	97.75	17.7	15.8	33.5	36.0	2.5	Complied
Top	Horiz.	97.75	17.9	17.5	35.4	36.0	0.6	Complied
Top	Vert.	115.00	17.7	15.8	33.5	36.0	2.5	Complied
Top	Horiz.	115.00	17.8	17.5	35.3	36.0	0.7	Complied
Top	Vert.	132.25	17.7	15.8	33.5	36.0	2.5	Complied
Top	Horiz.	132.25	17.8	17.5	35.3	36.0	0.7	Complied

Note: - The EUT is configured so that, where applicable, the peak output power has been reduced by the amount that the antenna gain exceeded 6 dBi.

7.5. Transmitter Conducted Emissions

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

7.5.2. Tests were performed to identify the maximum conducted spurious emission levels.

Results: QPSK/BPSK Mode

Highest Peak Level: Bottom

Frequency (GHz)	Peak level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
36.575	-16.33	-9.33	7.00	Complied

Highest Peak Level: Middle

Frequency (GHz)	Peak level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
36.633	-16.83	-9.33	7.50	Complied

Highest Peak Level: Top

Frequency (GHz)	Peak level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
36.275	-16.67	-9.33	7.34	Complied

Note: - No spurious emissions were indicated on the measuring receiver as such; values of the instruments noise floor were recorded only

7.6. Transmitter Radiated Emissions

7.6.1. Electric Field Strength Measurements: 30 to 1000 MHz.

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

7.6.1.2. Tests were performed to identify the maximum radiated spurious emissions levels in the 30 MHz to 1000 MHz bands.

Results:

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
133.6149	Vertical	26.1	43.5	17.4	Complied

Note: Levels were found to be identical in both BPSK and QPSK modes of modulation and across all three channels.

Transmitter Radiated Emissions

7.6.2. Electric Field Strength Measurements: 1.0 to 40.0 GHz

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

7.6.2.2. Tests were performed to identify the maximum transmitter radiated spurious emission levels above 1 GHz.

Highest Average Level:

Frequency (GHz)	Antenna Polarity (H/V)	Average Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBμV/m)	Average Limit (dBμV/m)	Margin (dB)	Result
11.580	Vertical	25.1	20.8	2.82	48.6	54.0	5.4	Complied

Highest Peak Level:

Frequency (GHz)	Antenna Polarity (H/V)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Margin (dB)	Result
11.580	Vertical	37.9	20.8	2.82	61.5	74.0	12.5	Complied

Note: Note: - No spurious emissions were indicated on the measuring receiver as such; values of the instruments noise floor were recorded only

7.7. Transmitter Band Edge Radiated Emissions

7.7.1. Electric Field Strength Measurements

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

7.7.1.2. Tests were performed to identify the maximum emissions level at the band edges of the frequency block that the EUT will operate over.

Peak Level: BPSK Mode

Frequency (MHz)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5715.068	49.1	24.3	1.9	75.3	123.7	48.4	Complied
5850.790	67.0	24.3	1.9	93.2	124.2	31.0	Complied

Peak Level: QPSK Mode

Frequency (MHz)	Peak Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Peak Level (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	Result
5715.390	40.7	24.3	1.9	66.9	121.9	55.0	Complied
5856.837	55.0	24.3	1.9	81.2	121.9	40.7	Complied

7.8.Transmitter Peak Power Spectral Density

7.8.1. The EUT was configured as for Transmitter Peak Power Spectral Density measurements as described in Appendix 2 of this report.

7.8.2. Tests were performed to identify the maximum peak power spectral density of the Fundamental emission.

Results: BPSK mode.

Channel	Antenna Port (H/V)	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	Vertical	-5.37	8.00	13.37	Complied
Bottom	Horizontal	-5.70	8.00	13.70	Complied
Middle	Vertical	-5.03	8.00	13.03	Complied
Middle	Horizontal	-5.87	8.00	13.87	Complied
Top	Vertical	-5.37	8.00	13.37	Complied
Top	Horizontal	-5.53	8.00	13.53	Complied

Results: QPSK mode.

Channel	Antenna Port (H/V)	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	Vertical	-12.37	8.00	20.37	Complied
Bottom	Horizontal	-10.53	8.00	18.53	Complied
Middle	Vertical	-10.53	8.00	18.53	Complied
Middle	Horizontal	-10.70	8.00	18.70	Complied
Top	Vertical	-10.87	8.00	18.87	Complied
Top	Horizontal	-10.20	8.00	18.20	Complied

8. Measurement Uncertainty

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

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

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

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

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
AC Conducted Spurious Emissions	0.15 MHz to 30.0 MHz	95%	+/- 3.25 dB
Carrier Output Power	Not applicable	95%	+/- 0.46 dB
Conducted Emissions Antenna Port	30.0 MHz to 40.0 GHz	95%	+/- 1.2 dB
Effective Isotropic Radiated Power (EIRP)	Not applicable	95%	+/- 1.78 dB
Spectral Power Density	Not applicable	95%	+/- 1.2 dB
Minimum Bandwidth	Not applicable	95%	+/- 0.12 %
Radiated Spurious Emissions	30.0 MHz to 1000.0 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1.0 GHz to 26.0 GHz	95%	+/- 1.78 dB

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

Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
A027	Horn Antenna	Eaton	9188-2	301
A067	LISN	Rohde & Schwarz	ESH3-Z5	890603/002
A1037	Chase Bilog Antenna	Chase EMC Ltd	CBL6112B	2413
A1095	Sony MVC-FD73	Sony	MVC - FD73	29548
A197	Site 2 Controller SC144	Unknown	SC144	150720
A256	WG 18 Microwave Horn	Flann Microwave	18240-20	400
A258	Variable Power Supply	Zenith Electric	SVA 10	None
A276	OATS Positioning Controller	Rohde & Schwarz	HCC	-
A427	WG 14 horn	Flann	14240-20	150
A428	WG 12 horn	Flann	12240-20	134
A429	WG 16 horn	Flann	16240-20	561
A490	Bilog Antenna	Chase	CBL6111A	1590
C1025	Rosenberger Cable	Rosenberger	FA210A-1-020m	FA00B 7564
C1078	Rosenberger 3m Cable	Rosenberger	FA210A1030M5050	28464-2
C160	Cables	Rosenberger	UFA210A-1-1181-70x70	None
C202	Rosenberger cable	Rosenberger	UFA 210A-1-1180-70X70	1543
C337	Cable	RFI	RG58	None
C461	Cable	Rosenberger	UFA210A-1-1182-704704	98H0305
C468	N-Type Coaxial Cable	Rosenberger	UFA210A-1-3937-504504	98L0440

Test Equipment Used (continued)

RFI No.	Instrument	Manufacturer	Type No.	Serial No.
M003	Spectrum Monitor	Rohde & Schwarz	EZM	883 580/008
M044	ESVP Receiver	Rohde & Schwarz	ESVP	891 845/026
M088	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:835862/018 RU:835387/006
M090	Receiver / Spectrum Analyser System	Rohde & Schwarz	ESBI	DU:838494/005 RU:836833/001
M072	Spectrum Analyser	Rohde & Schwarz	FSM	862 967/010 863 912/048
M105	77 DVM	Fluke	77	963 580770
M173	Turntable Controller	R.H.Electrical Services	RH351	3510020
M191	Thermo-Hygro	RS Components	RS212-124	M191-212-124
M244	Thermometer/Barometer/Hygrometer	Oregan Scientific	BA 116	None
S201	Site 1	RFI	1	-
S202	Site 2	RFI	2	-

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

Appendix 2. Measurement Methods

AC Mains Conducted Emissions

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

The test was performed in a shielded enclosure with the equipment arranged as detailed in the standard on a wooden bench using the floor of the screened enclosure as the ground reference plane. The EUT powered with 115V 60 Hz AC mains supplied via a Line Impedance Stabilisation Network (LISN)

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

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

The EUT was configured in accordance with section 5.2 of this report.

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

Receiver Function	Initial Scan	Final Measurements
Detector Type:	Peak	Quasi-Peak (CISPR)*
Mode:	Max Hold	Not applicable
Bandwidth:	9 kHz	9 kHz
Amplitude Range:	100 dB	20 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

* In some instances an Average detector function may also have been used, where this was the case it would have been documented in the relevant section.

Radiated Field Strength Emissions

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

Initial measurements covering the entire measurement band in the form of swept scans in a shielded enclosure were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies from the EUT that should be re-measured in full on the open area test site. In order to minimise the time taken for the swept measurements, a Peak detector was used in conjunction with the appropriate detector IF measuring bandwidth (see table below). Repetitive scans were performed to allow for emissions with low repetition rates.

The initial scans were performed using an antenna height of 1.5 m and a measurement distance of 3 m. Following the initial scans, graphs were produced giving an overview of the emissions from the EUT plotted against the appropriate specification limit. Any emission within 20 dBs of the limit were then measured on the open area test site, except in cases where the noise floor was within 20dBs of the limit, in these cases the emission between the noise floor and the limit line or the highest point of the noise floor was measured.

In either case the measurement was made at the appropriate distance using a measuring receiver with a Quasi-Peak detector for measurements below 1000 MHz and an Average and Peak detector for measurements above 1000 MHz.

All measurements on the open area test site were performed using broadband antennas.

On the open area test site, at each frequency where a signal was to be measured, the trace was maximised by rotating a turntable through 360°. The angle at which the maximum signal was observed was locked out. For frequencies below 1000 MHz the test antenna was varied in height between 1 m and 4 m in order to further maximise the target emission.

For frequencies above 1000 MHz where a horn antenna was used, height searching was performed to locate the optimal height of the horn with respect to the EUT. At this point the horn was locked off and the turntable was again rotated through 360° to maximise the target signal. It should be noted that the received signal from the EUT would diminish very quickly after it exits the beam width of the horn antenna, for this reason it may not be necessary to fully height search with the horns.

At this point, any signals found to be between the limit and a level 6 dB below it were further maximised by changing the configuration of the EUT, e.g. re-routing cables to peripherals and moving peripherals with respect to the EUT.

Scans were performed to the upper frequency limit as stated in 15.33(a)(1)

Final measurements were performed on the worst-case configuration as described in Part 15.31(i).

Radiated Field Strength Emissions (Continued)

The EUT was configured in accordance with section 5.2 of this report for radiated emissions testing.

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

Receiver Function	Initial Scan Below 1000 MHz	Final Measurements Below 1000 MHz
Detector Type:	Peak	Quasi-Peak (CISPR)
Mode:	Max Hold	Not applicable
Bandwidth:	100 kHz	120 kHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Receiver Function	Initial Scan Above 1000 MHz	Final Measurements Above 1000 MHz
Detector Type:	Peak	Peak/Average
Mode:	Max Hold	Max Hold where applicable
Bandwidth:	1 MHz	1 MHz
Amplitude Range:	100 dB	100 dB
Measurement Time:	Not applicable	> 1 s
Observation Time:	Not applicable	> 15 s
Step Size:	Continuous sweep	Not applicable
Sweep Time:	Coupled	Not applicable

Conducted Antenna Port Emissions

Conducted Antenna Port Emissions measurements were performed in accordance with the standard, against appropriate limits for each detector function.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequency range. For each measurement range the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the losses in the measurement set up.

A limit line was set to 20 dB below the maximum in band emission as stated in 15.247(c).

Initial measurements covering the entire frequency band in the form of swept scans were performed in order to identify frequencies on which the EUT was generating interference. This determined the frequencies on which final measurements were necessary. To make the final measurements a peak detector was used in conjunction with the appropriate detector IF measuring bandwidth.

Repetitive scans were performed to allow for emissions with low repetition rates.

Scans were performed to the upper frequency limit as stated in 15.33(a)(1)

Final measurements were performed on the worst-case configuration as described in Part 15.31(i) for conducted emissions.

The EUT was configured in accordance with section 5.2 of this report.

Minimum Bandwidth

The EUT and spectrum analyser were configured as for conducted antenna port measurements, and as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine the occupied bandwidth, a resolution bandwidth of 30 kHz was used, which is greater than 1% of the 6 dB bandwidth. A video bandwidth of a least the same value was used. The spectrum analyser was set to maximum hold to capture the profile of the signal under investigation. The peak level was then determined and a reference line established 6 dB below the peak level. The minimum bandwidth was calculated by working out the delta from the upper and lower frequencies where the power envelope intercepted the 6dB reference line.

The EUT was configured in accordance with section 5.2 of this report.

Peak Output Power

The EUT and spectrum analyser were configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required frequencies. For each frequency to be measured, the calibrated level of the attenuator and cable were entered as an offset into a wideband power meter to compensate for the measurement set up.

To determine the transmitter output power, the EUT was operated at maximum power and a result was obtained from the wideband power meter.

The EUT was configured in accordance with section 5.2 of this report

Band Edge Compliance of RF Radiated Emissions

The EUT and spectrum analyser were configured as for Radiated measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

To determine band-edge compliance, the analyser resolution bandwidth was set to >= 1% of the analyser span. The video bandwidth was set to be no less than the resolution bandwidth. The sweep was set to auto and the detector to peak. The trace was set to max hold and a trace was produced.

A plot of the upper band edge of the allocated frequency band was produced. A limit line was set to the level of the highest in-band emission with a further limit line set to 20 dB below this. A marker was then placed on the highest out of band emission (The specification states that either the band edge level must be measured or the highest out of band emission, whichever is the greater). The plots show that the highest out of band emission complies with the 20 dBc Limit. The above procedure was then repeated for the lower band edge.

It the upper or lower band edges fell on a restricted band edge then the limit set for the restricted band would be applied instead of the 20 dBc limit.

(Final measurements were performed on the worst-case configuration as described in Part 15.31(i).)

The EUT was configured in accordance with section 5.2 of this report

Spectral Power Density

The EUT and spectrum analyser was configured as for conducted antenna port measurements, And as per FCC Public Notice DA 00-705, Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems.

Prior to testing being performed a suitable RF attenuator and cable were calibrated for the required test frequencies. For each frequency to be measured, the calibrated level of the attenuator and cable were entered as an offset into the spectrum analyser to compensate for the measurement set up.

A spectrum analyser was tuned to the fundamental frequency of the EUT with a resolution bandwidth setting of 3KHz set. The analyser was set to use a zero span with the trace being set to max hold. A reading in dBm/3kHz was then taken at the maximum point of the trace.

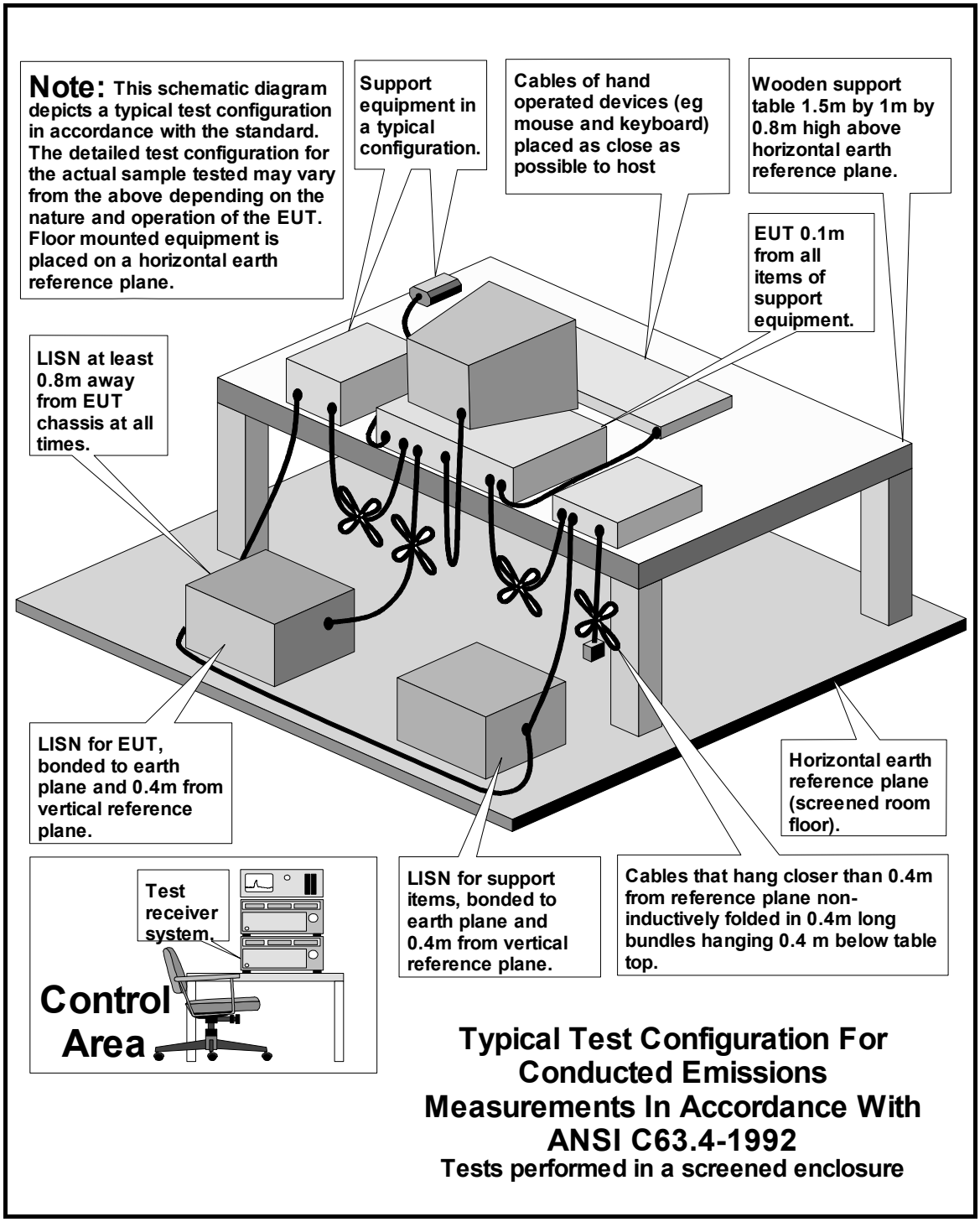
The EUT was configured in accordance with section 5.2 of this report.

Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

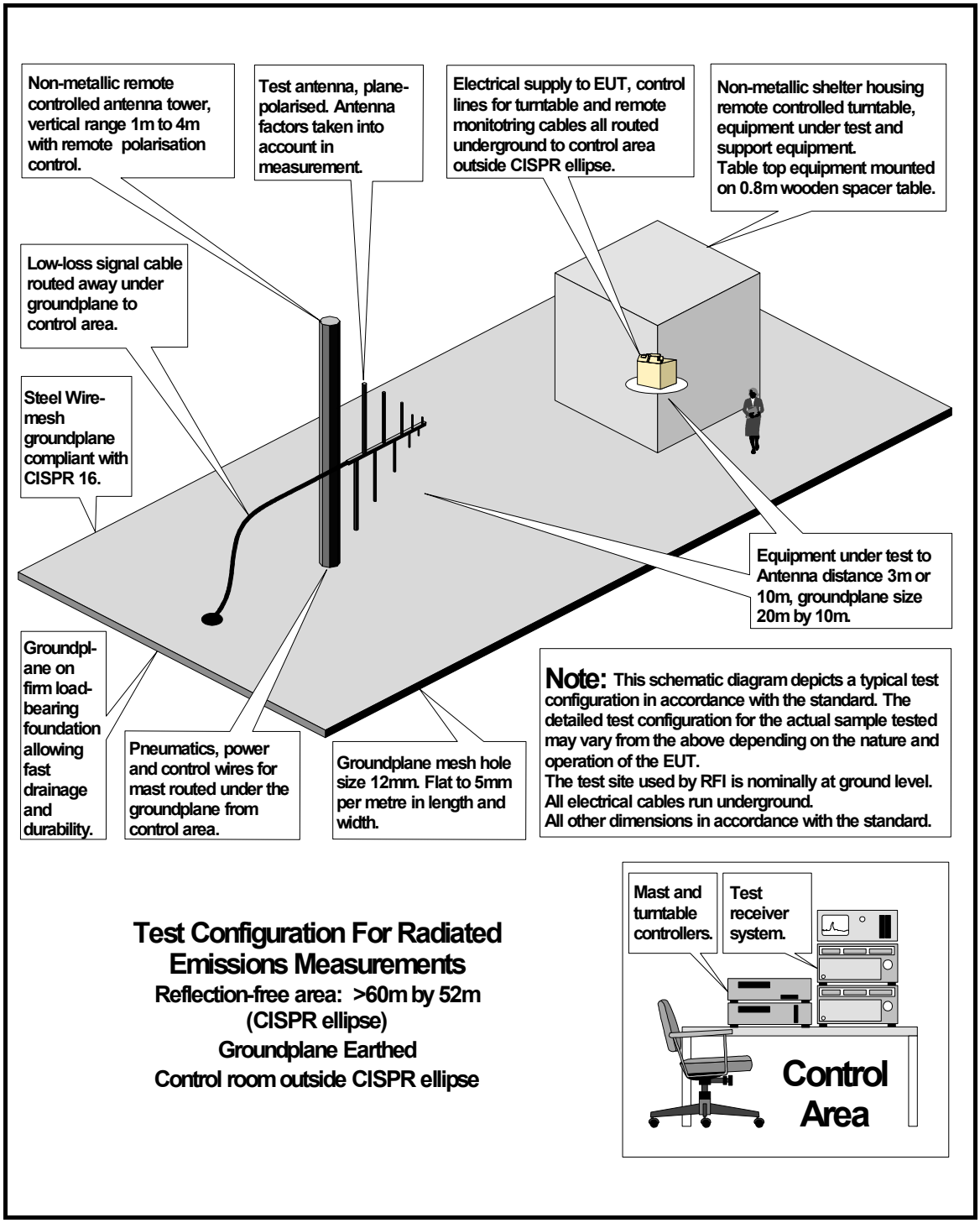
Drawing Reference Number	Title
DRG\44358JD01\EMICON	Test configuration for measurement of conducted emissions
DRG\44358JD01\EMIRAD	Test configuration for measurement of radiated emissions
DRG\44358JD01\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

DRG\44358JD01\EMICON



Typical Test Configuration For Conducted Emissions Measurements In Accordance With ANSI C63.4-1992
Tests performed in a screened enclosure

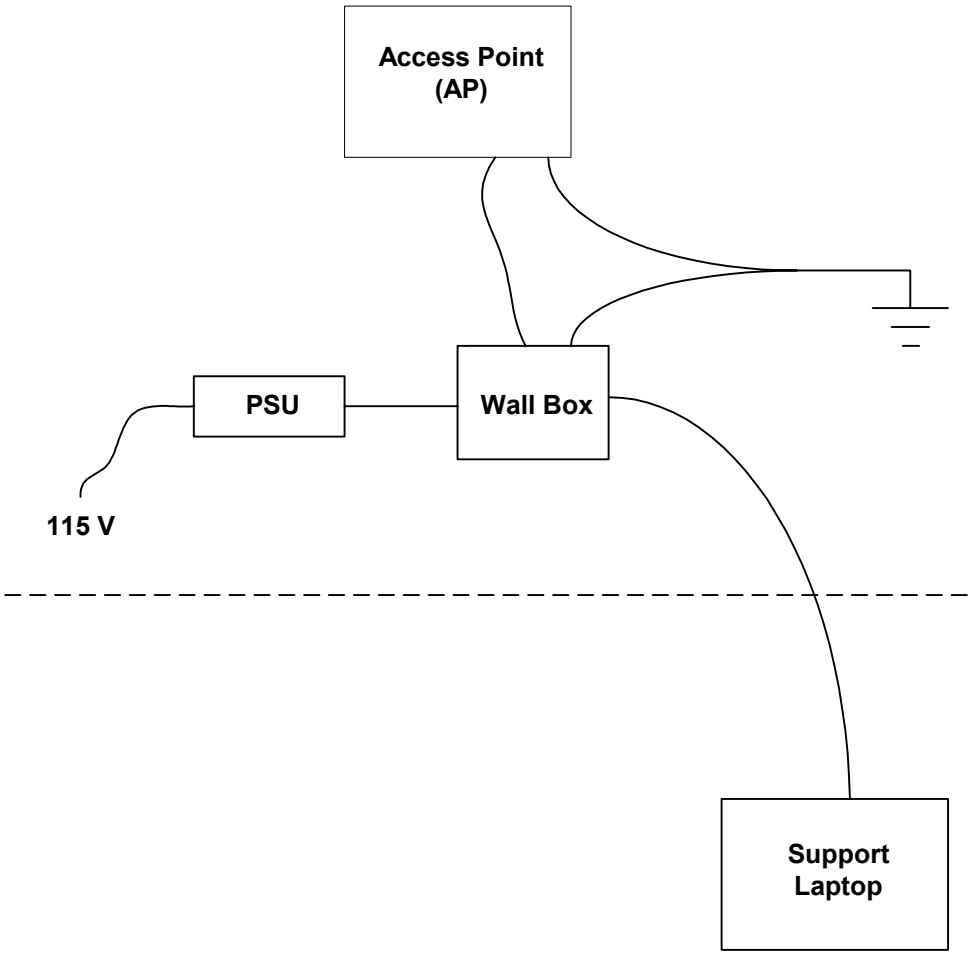
DRG\44358JD01\EMIRAD



Test Configuration For Radiated Emissions Measurements
Reflection-free area: >60m by 52m (CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse

DRG\44358JD01\001

Configuration of EUT and Local Support Equipment



Configuration of Remote Support Equipment

Appendix 4. Graphical Test Results

This appendix contains the following graphs:

Graph Reference Number	Title
GPH\44358CE\028	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (30.0 MHz to 1.0 GHz)
GPH\44358CE\029	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (30.0 MHz to 1.0 GHz)
GPH\44358CE\030	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (30.0 MHz to 1.0 GHz)
GPH\44358CE\031	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (1.0 GHz to 5.0 GHz)
GPH\44358CE\032	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (1.0 GHz to 5.0 GHz)
GPH\44358CE\033	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (1.0 GHz to 5.0 GHz)
GPH\44358CE\034	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (5.0 GHz to 10.0 GHz)
GPH\44358CE\035	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (5.0 GHz to 10.0 GHz)
GPH\44358CE\036	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (5.0 GHz to 10.0 GHz)
GPH\44358CE\037	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (10.0 GHz to 15.0 GHz)
GPH\44358CE\038	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (10.0 GHz to 15.0 GHz)

Graphical Test Results (continued)

Graph Reference Number	Title
GPH\44358CE\039	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (10.0 GHz to 15.0 GHz)
GPH\44358CE\040	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (15.0 GHz to 20.0 GHz)
GPH\44358CE\041	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (15.0 GHz to 20.0 GHz)
GPH\44358CE\042	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (15.0 GHz to 20.0 GHz)
GPH\44358CE\043	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (20.0 GHz to 25.0 GHz)
GPH\44358CE\044	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (20.0 GHz to 25.0 GHz)
GPH\44358CE\045	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (20.0 GHz to 25.0 GHz)
GPH\44358CE\046	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (25.0 GHz to 30.0 GHz)
GPH\44358CE\047	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (25.0 GHz to 30.0 GHz)
GPH\44358CE\048	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (25.0 GHz to 30.0 GHz)
GPH\44358CE\049	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (30.0 GHz to 35.0 GHz)
GPH\44358CE\050	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (30.0 GHz to 35.0 GHz)
GPH\44358CE\051	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (30.0 GHz to 35.0 GHz)

Graphical Test Results (continued)

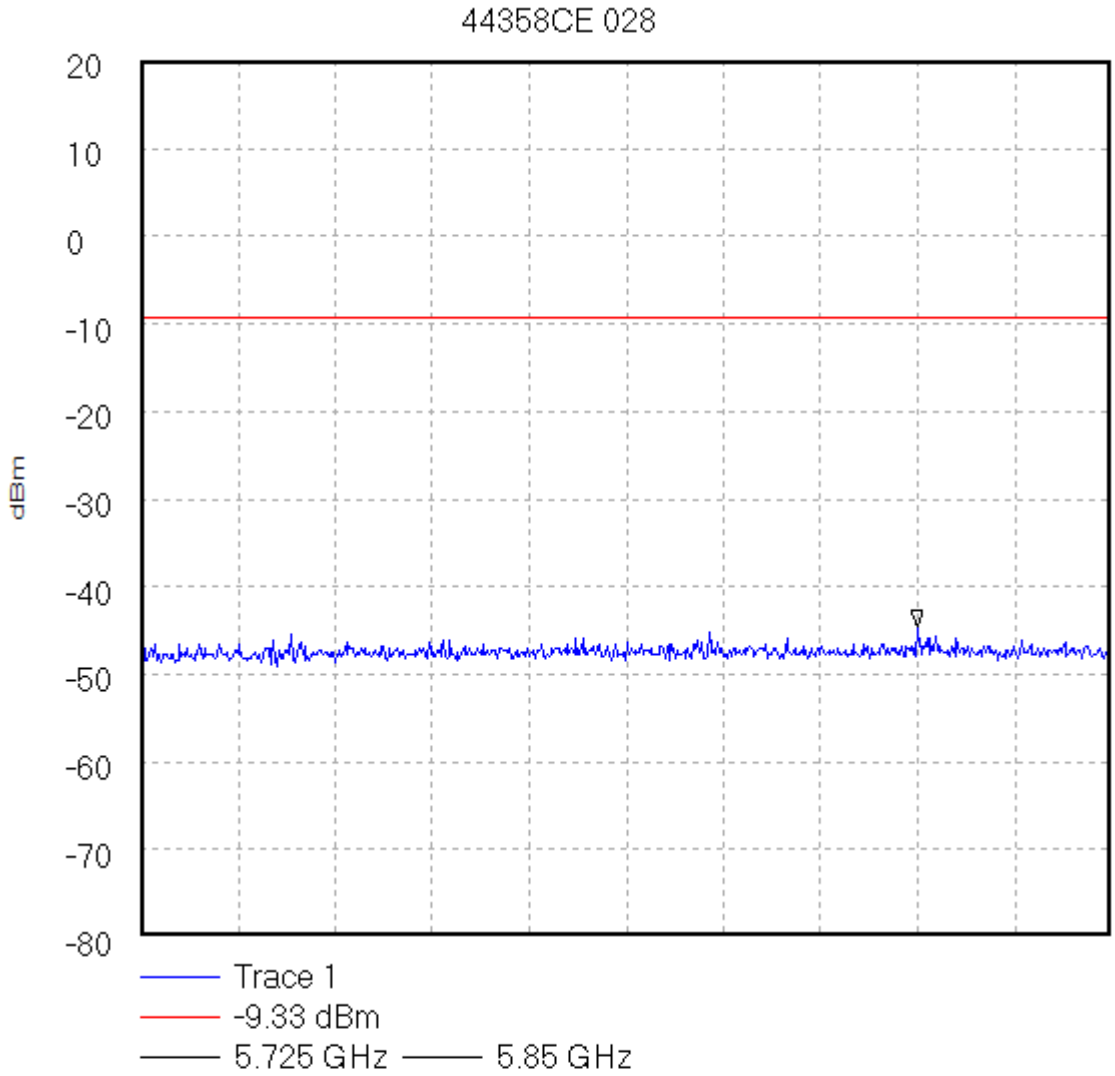
Graph Reference Number	Title
GPH\44358CE\052	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Bottom Channel (35.0 GHz to 40.0 GHz)
GPH\44358CE\053	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (35.0 GHz to 40.0 GHz)
GPH\44358CE\054	Conducted Spurious Emissions. Modulation BPSK. Operating Conditions – Top Channel (35.0 GHz to 40.0 GHz)
GPH\44358\017	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (30.0 MHz to 1.0 GHz)
GPH\44358\015	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (1.0 GHz to 2.0 GHz)
GPH\44358\016	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (2.0 GHz to 4.0 GHz)
GPH\44358JD01\002	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (4.0 GHz to 6.0 GHz)
GPH\44358JD01\003	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (6.0 GHz to 8.0 GHz)
GPH\44358JD01\004	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (8.0 GHz to 12.5 GHz)
GPH\44358JD01\005	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (12.5 GHz to 18.0 GHz)
GPH\44358JD01\006	Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (18.0 GHz to 26.5 GHz)
GPH\44358JD01\007	*Radiated Spurious Emissions. Modulation BPSK. Operating Conditions – Middle Channel (26.5GHz to 40.0 GHz)

* Note: GPH\44358JD01\007 is a hard copy graph, therefore is not included in the total number of pages for this report and has been placed at the end of the graph section.

Graphical Test Results (continued)

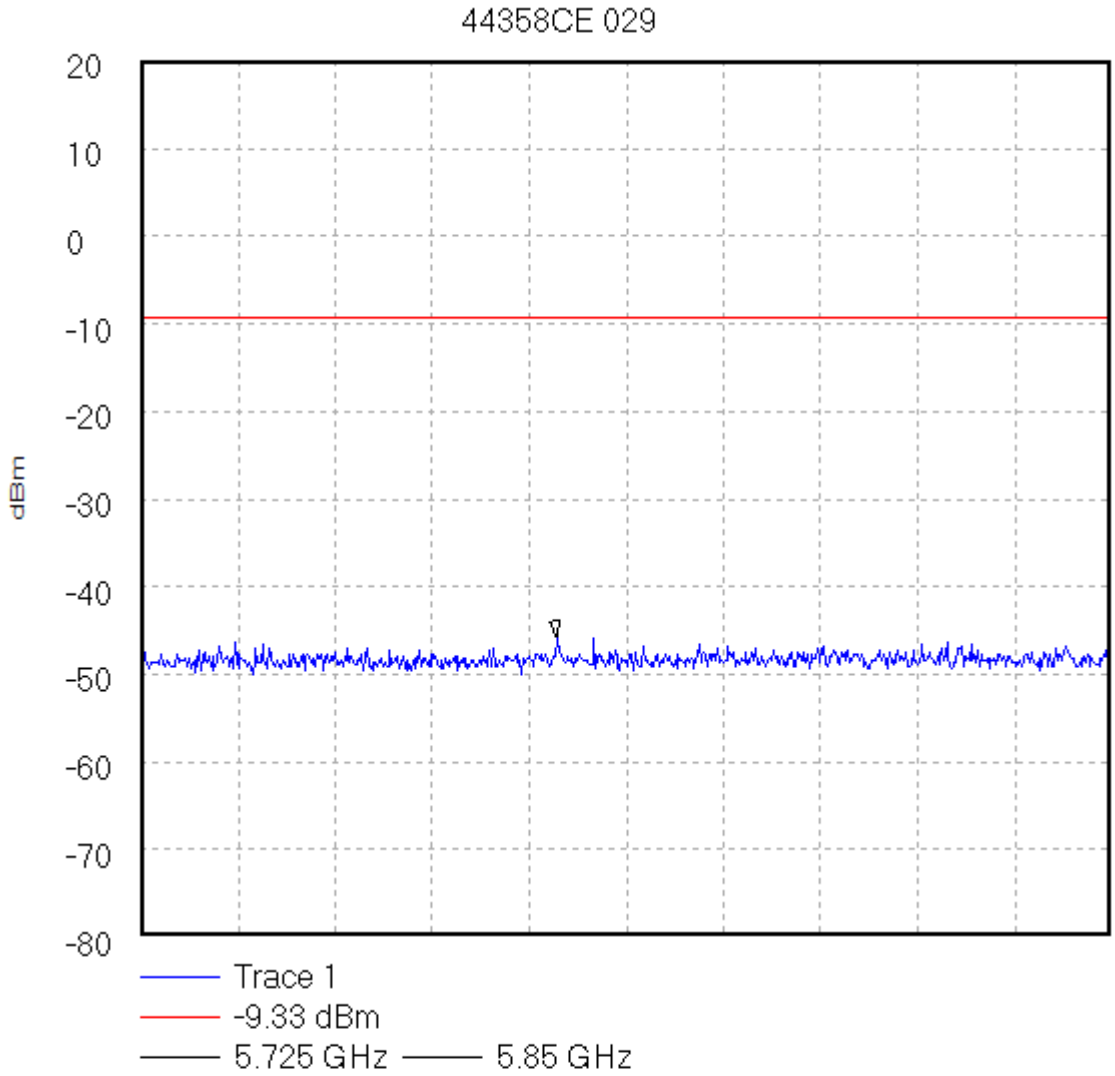
Graph Reference Number	Title
GPH\44358JD01\008	Transmitter Band Edge Radiated Emissions. BPSK Mode - Bottom Channel.
GPH\44358JD01\009	Transmitter Band Edge Radiated Emissions. BPSK Mode - Top Channel.
GPH\44358JD01\010	Transmitter Band Edge Radiated Emissions. QPSK Mode - Bottom Channel.
GPH\44358JD01\011	Transmitter Band Edge Radiated Emissions. QPSK Mode - Top Channel.
GPH\44358JD01\012	6 dB Bandwidth QPSK Modulation. Bottom Channel
GPH\44358JD01\013	6 dB Bandwidth QPSK Modulation. Middle Channel
GPH\44358JD01\014	6 dB Bandwidth QPSK Modulation. Top Channel
GPH\44358JD01\015	6 dB Bandwidth BPSK Modulation. Bottom Channel
GPH\44358JD01\016	6 dB Bandwidth BPSK Modulation. Middle Channel
GPH\44358JD01\017	6 dB Bandwidth BPSK Modulation. Top Channel

GPH\44358CE\028
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



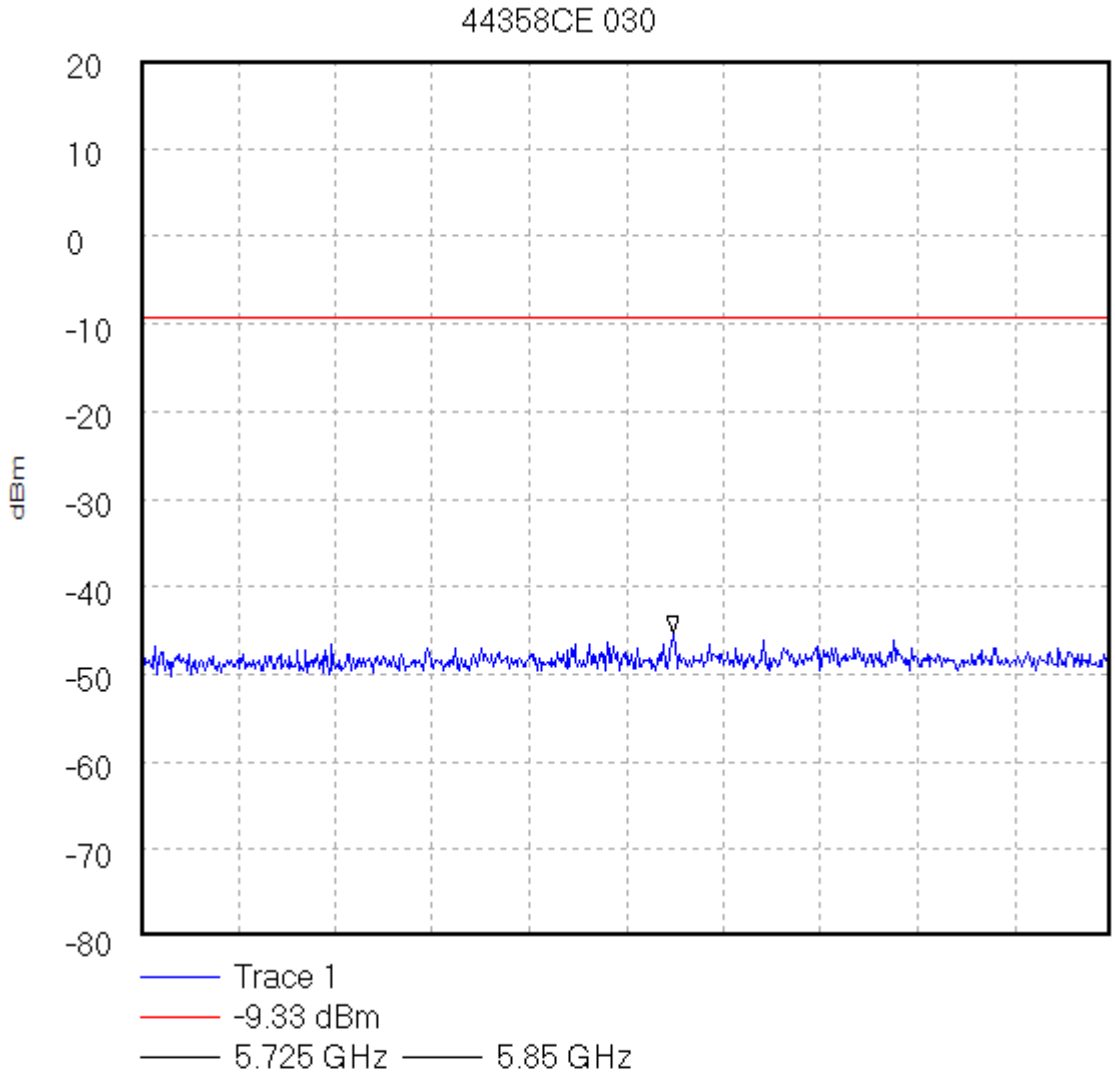
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 31.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 806.0 MHz, -44.67 dBm
Display Line: -9.33 dBm;
07/02/2003 11:37:29

GPH\44358CE\029
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



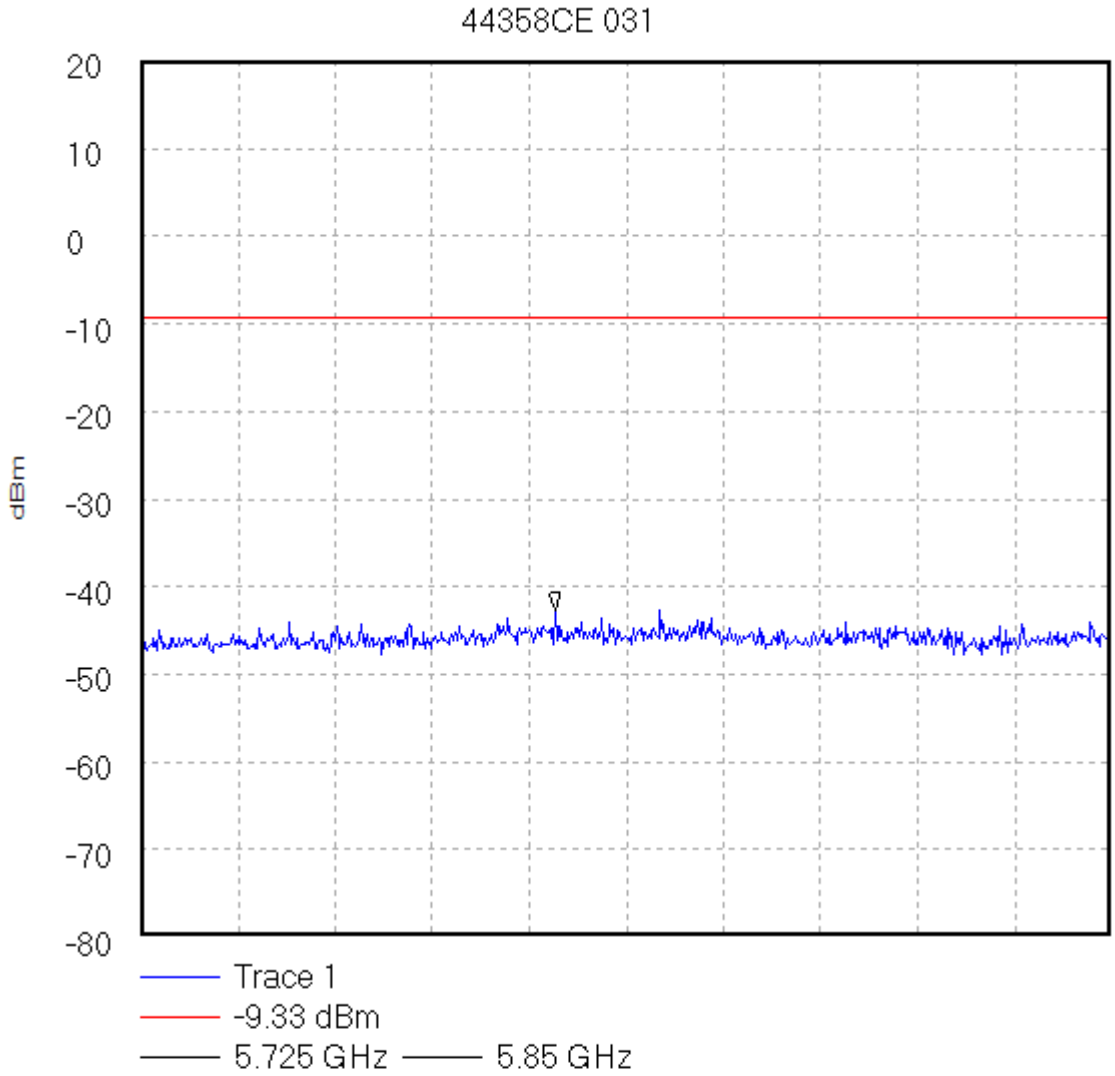
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 31.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 445.483333 MHz, -45.83 dBm
Display Line: -9.33 dBm;
07/02/2003 11:37:55

GPH\44358CE\030
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



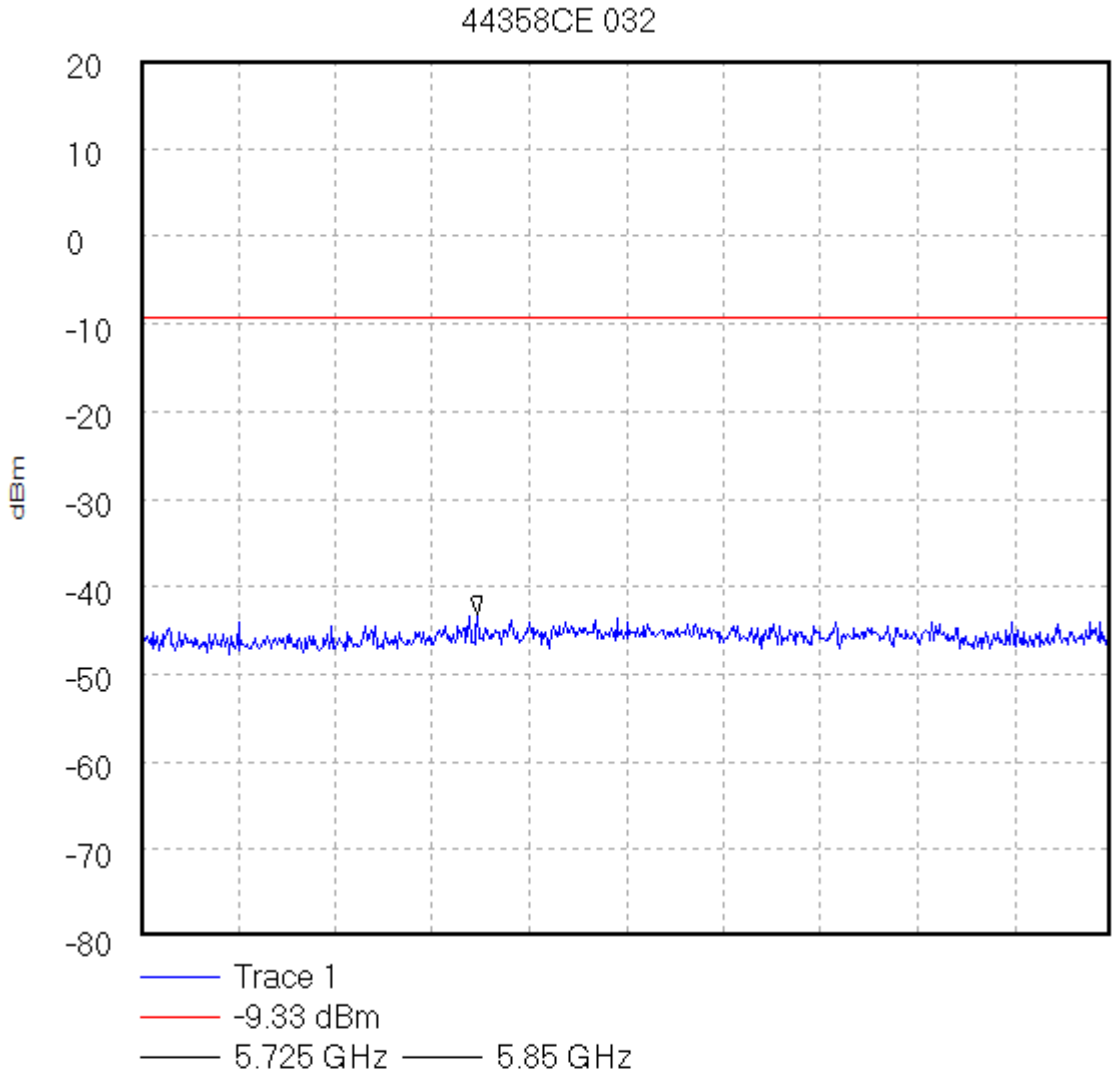
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 31.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 561.883333 MHz, -45.33 dBm
Display Line: -9.33 dBm;
07/02/2003 11:38:11

GPH\44358CE\031
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



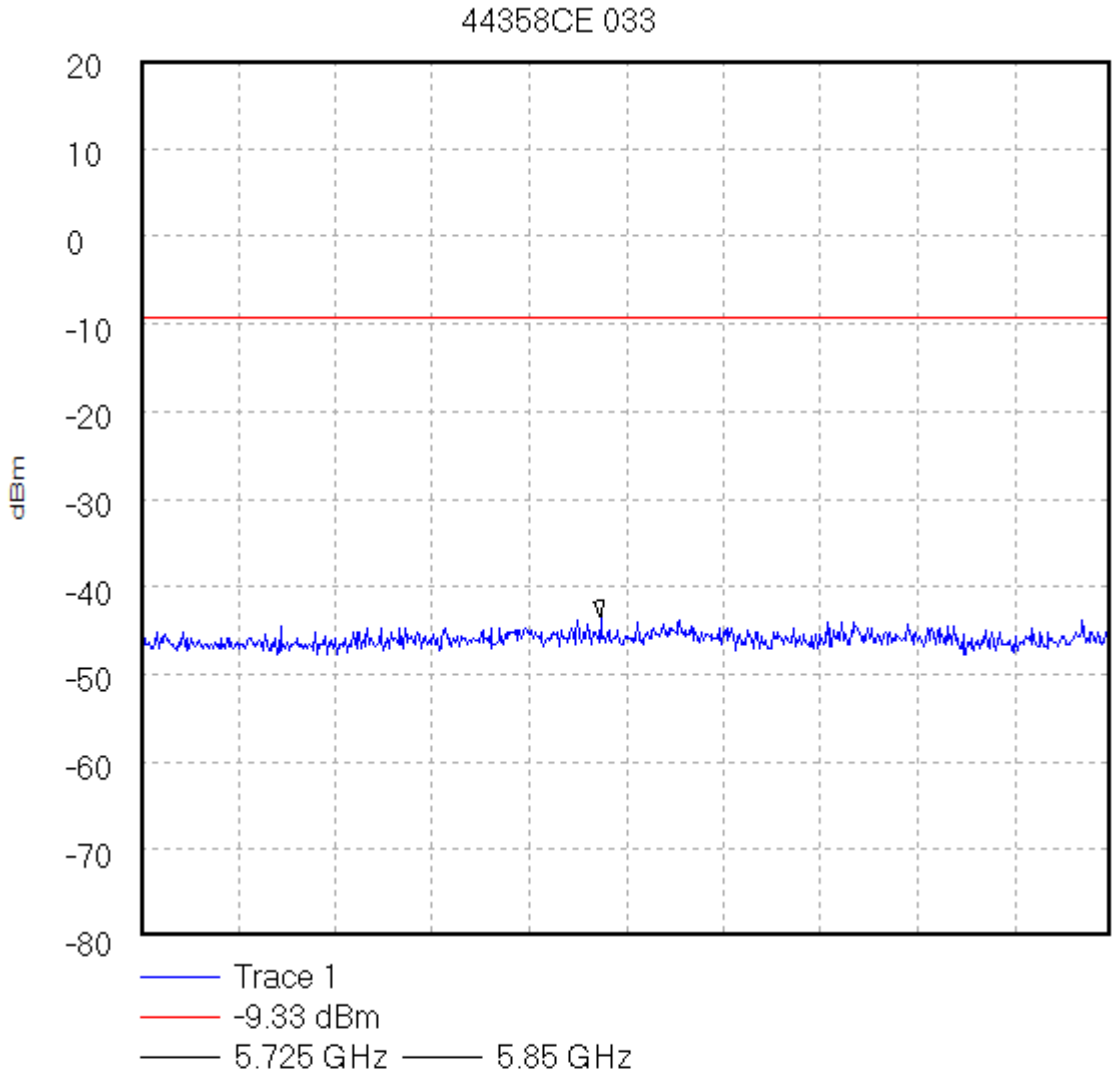
Start 1.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.0 S
Peak 2.706667 GHz, -42.67 dBm
Display Line: -9.33 dBm;
07/02/2003 11:39:16

GPH\44358CE\032
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



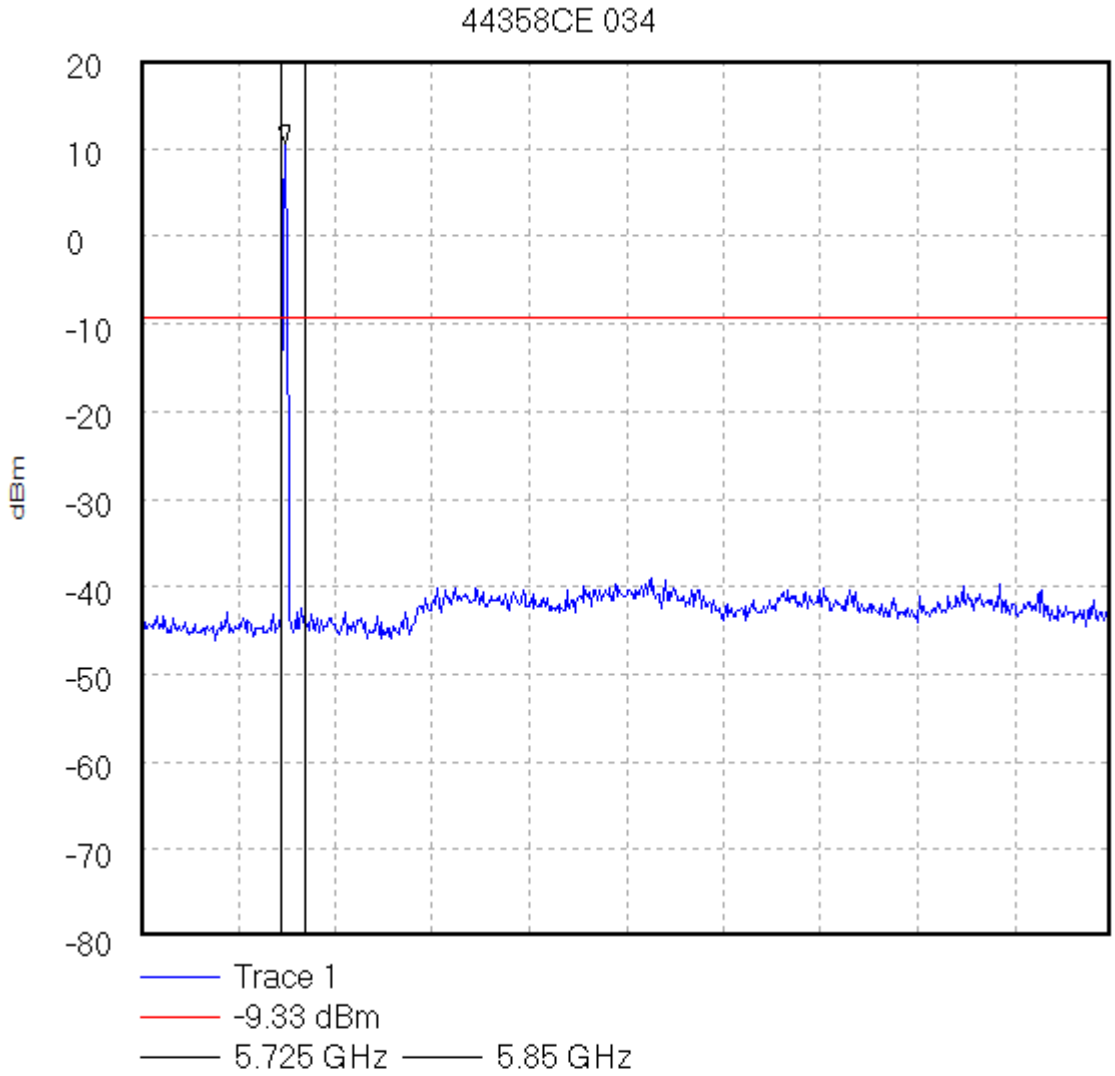
Start 1.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.0 S
Peak 2.386667 GHz, -43.17 dBm
Display Line: -9.33 dBm;
07/02/2003 11:39:42

GPH\44358CE\033
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



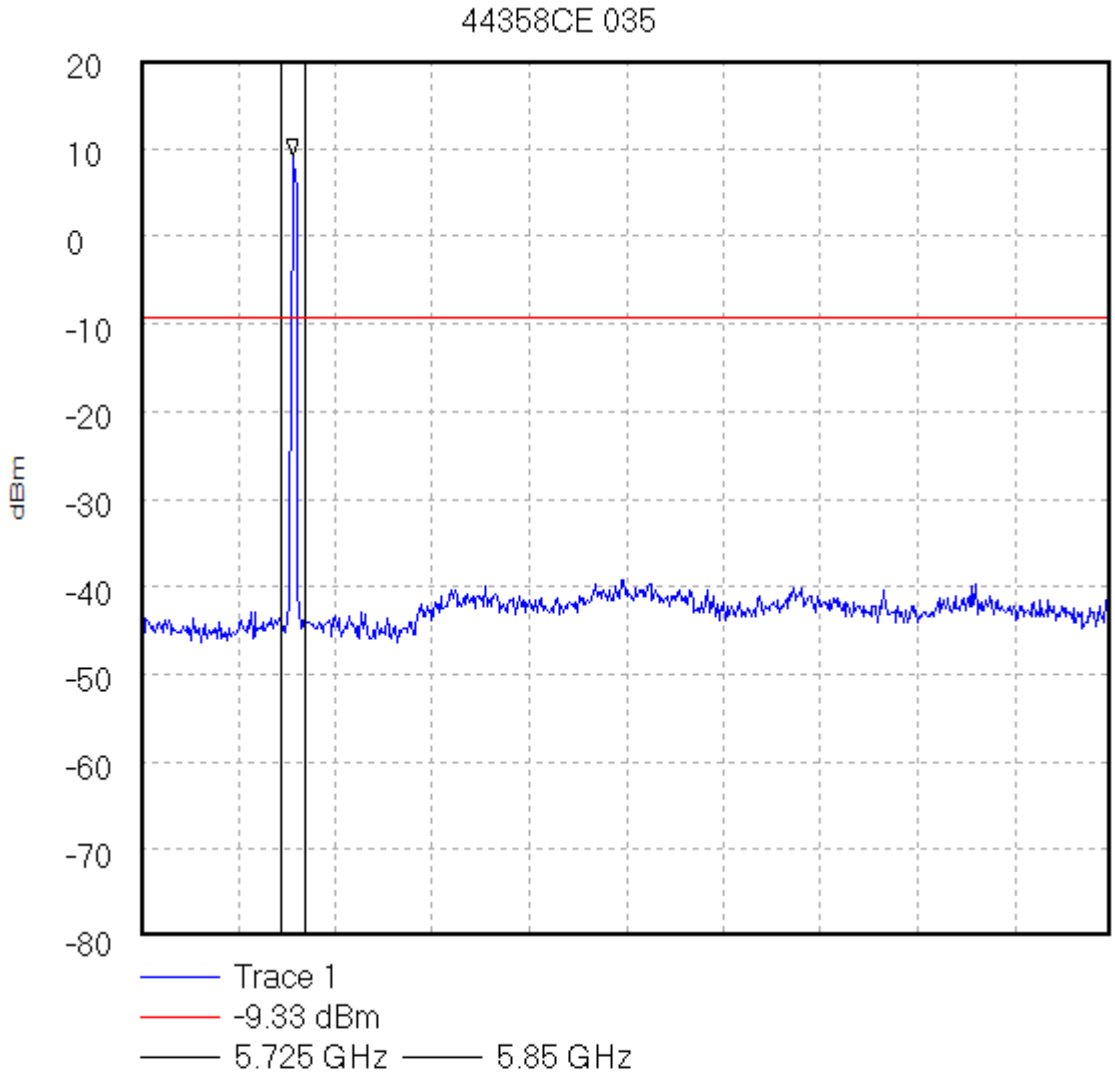
Start 1.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.0 S
Peak 2.893333 GHz, -43.5 dBm
Display Line: -9.33 dBm;
07/02/2003 11:40:16

GPH\44358CE\034
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



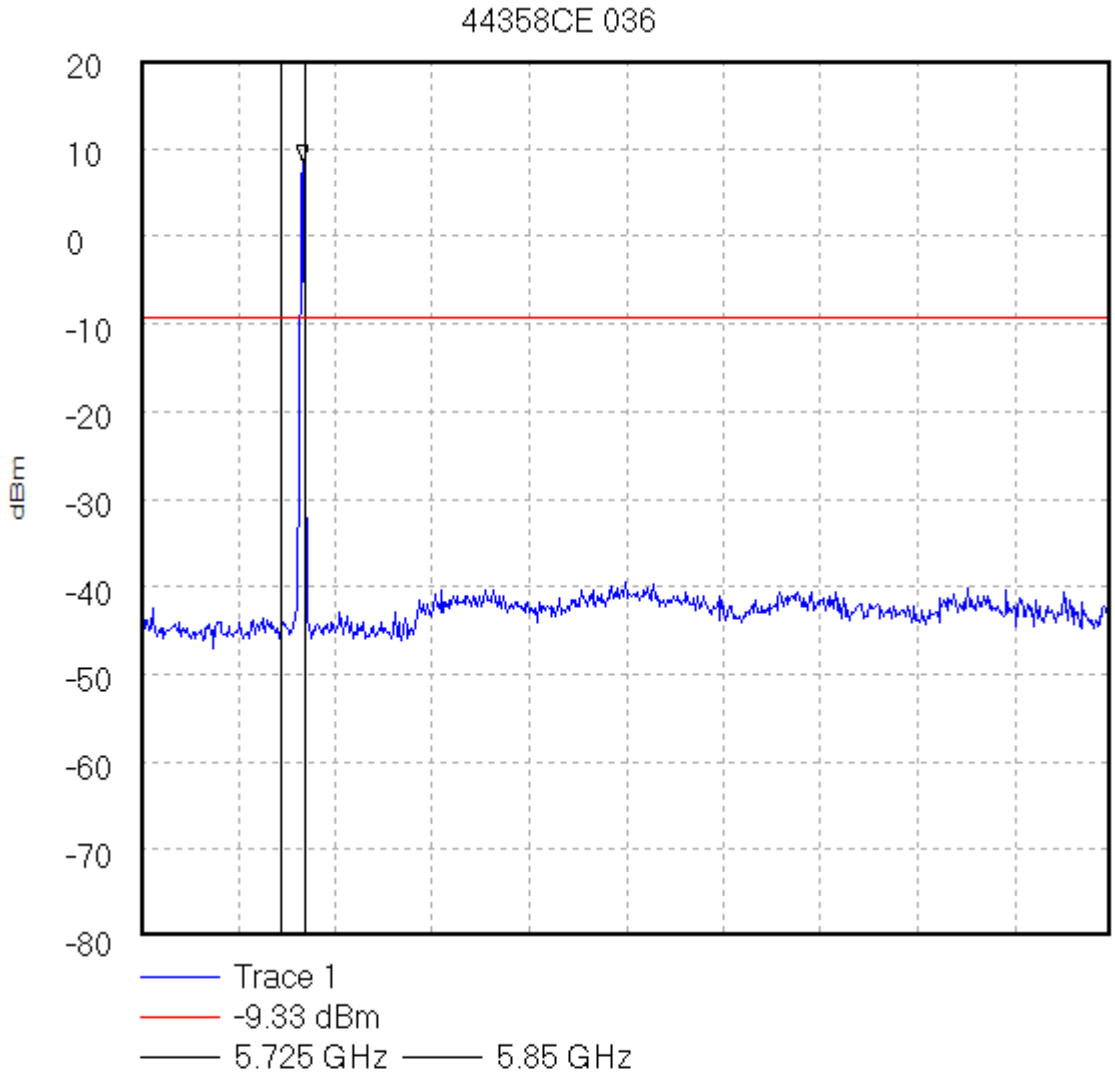
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 34.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 5.741667 GHz, 10.67 dBm
Display Line: -9.33 dBm;
07/02/2003 11:41:12

GPH\44358CE\035
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



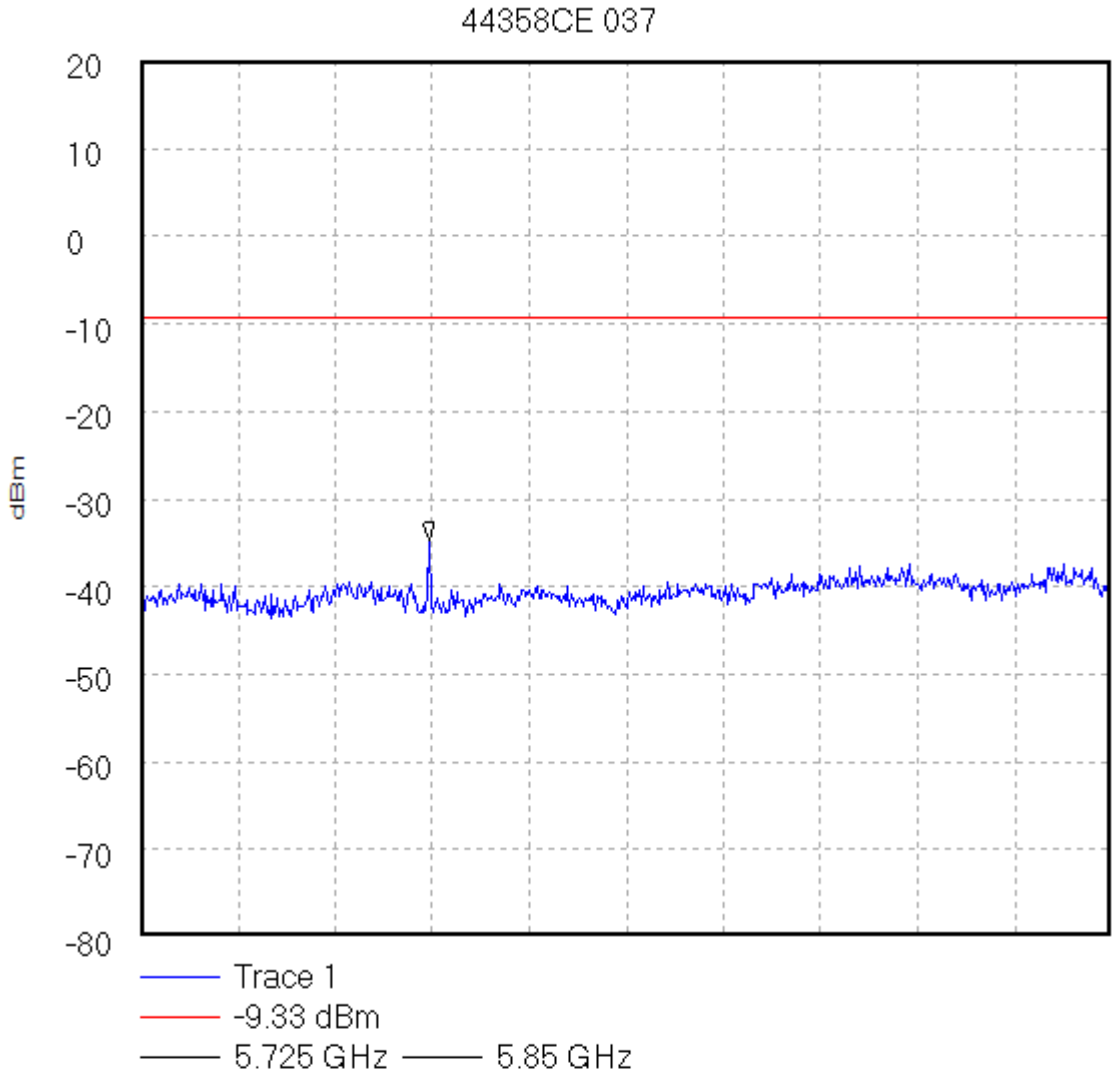
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 34.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 5.783333 GHz, 9.17 dBm
Display Line: -9.33 dBm;
07/02/2003 11:41:38

GPH\44358CE\036
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



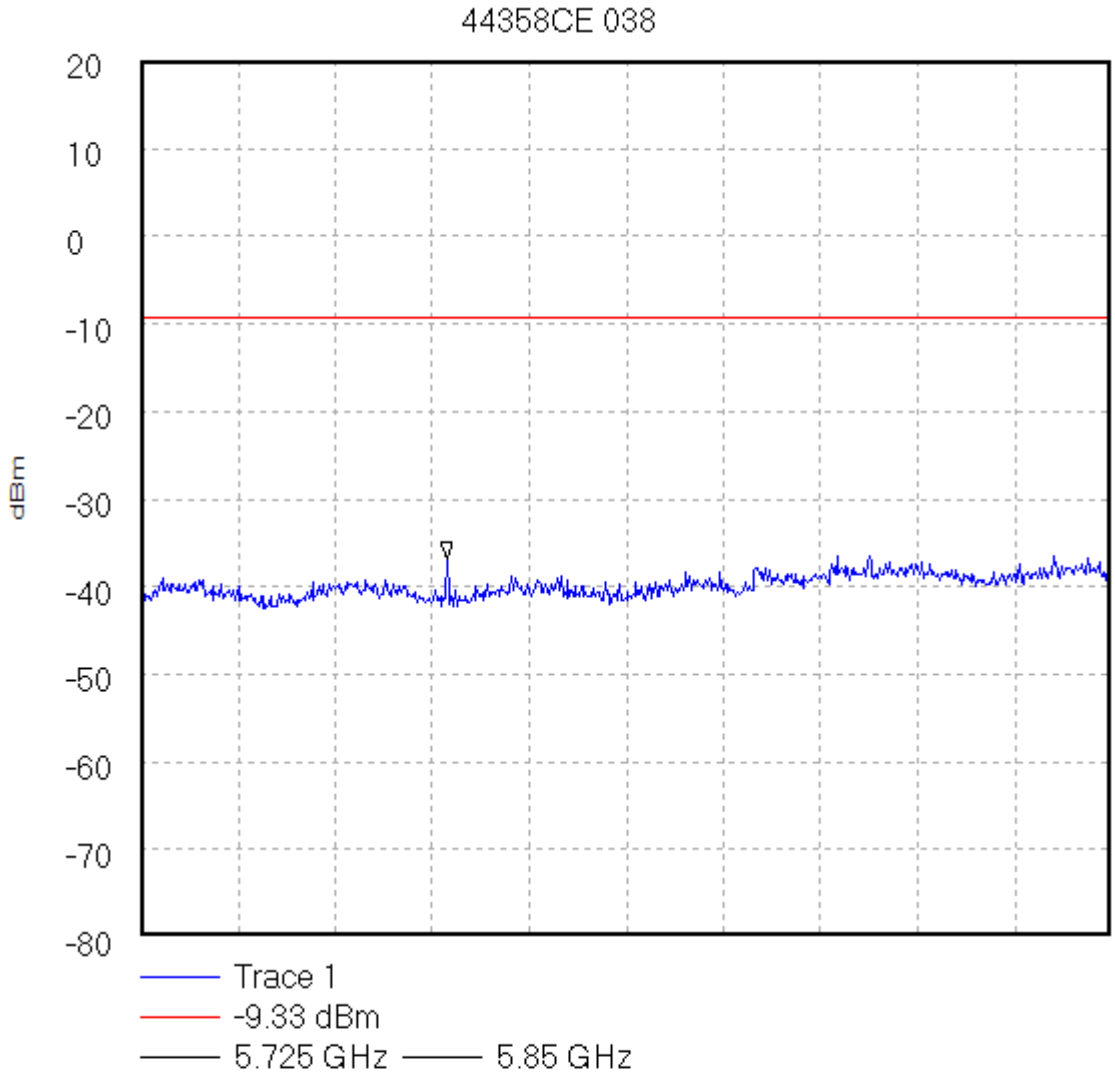
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 34.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 5.833333 GHz, 8.5 dBm
Display Line: -9.33 dBm;
07/02/2003 11:41:58

GPH\44358CE\037
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



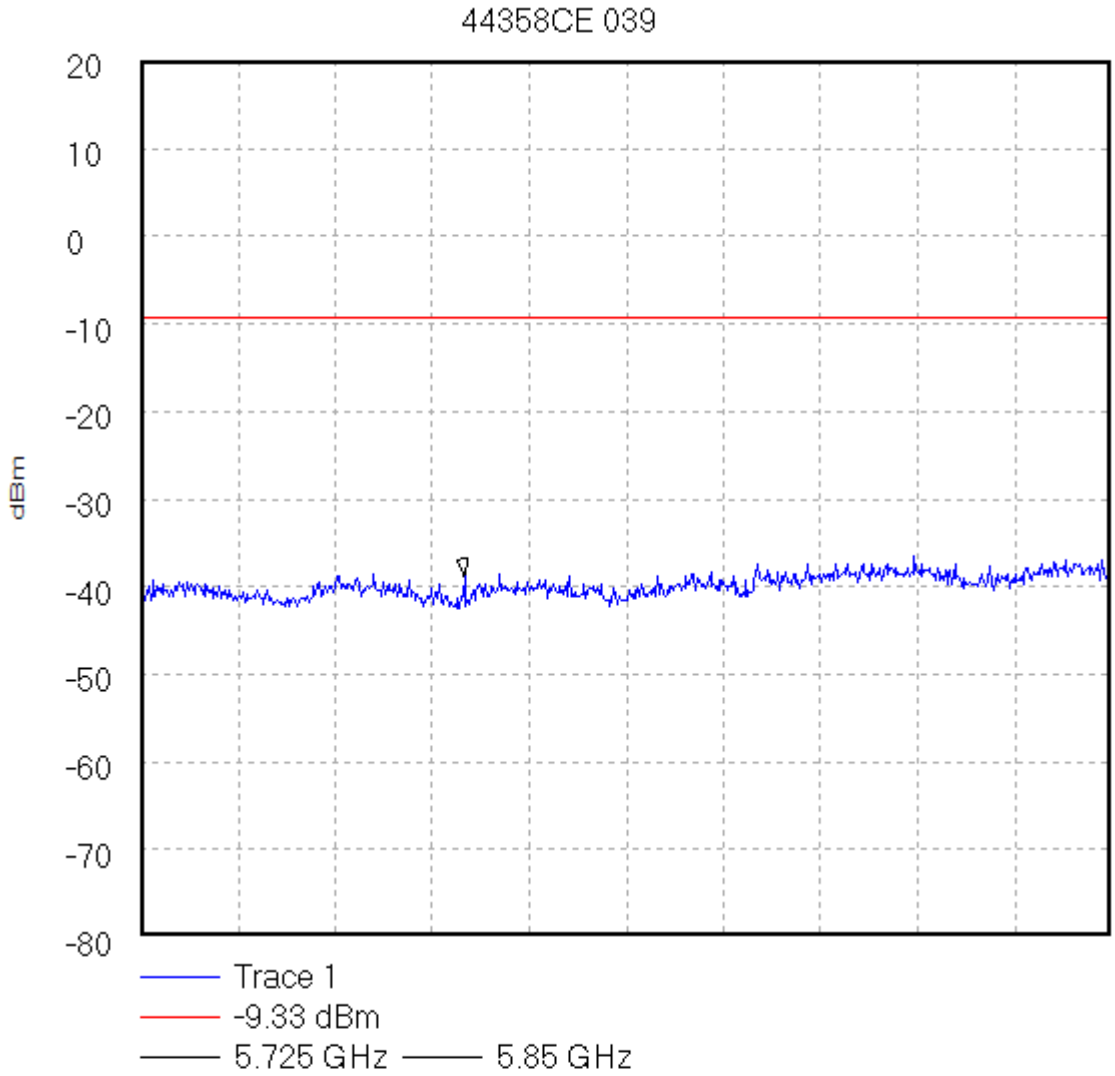
Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 11.483333 GHz, -34.67 dBm
Display Line: -9.33 dBm;
07/02/2003 11:43:57

GPH\44358CE\038
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



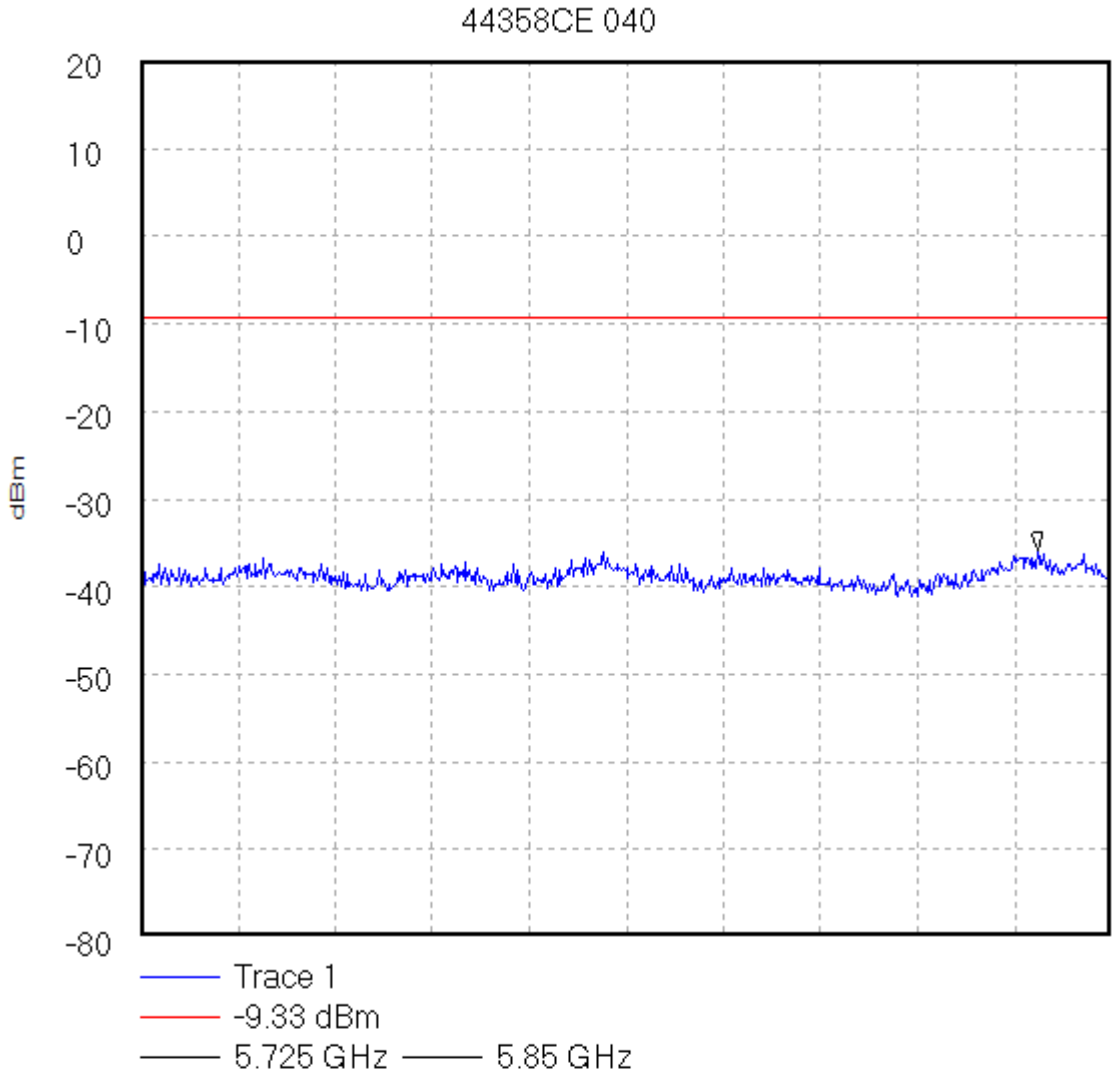
Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Marker 11.575 GHz, -36.83 dBm
Display Line: -9.33 dBm;
07/02/2003 11:45:01

GPH\44358CE\039
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



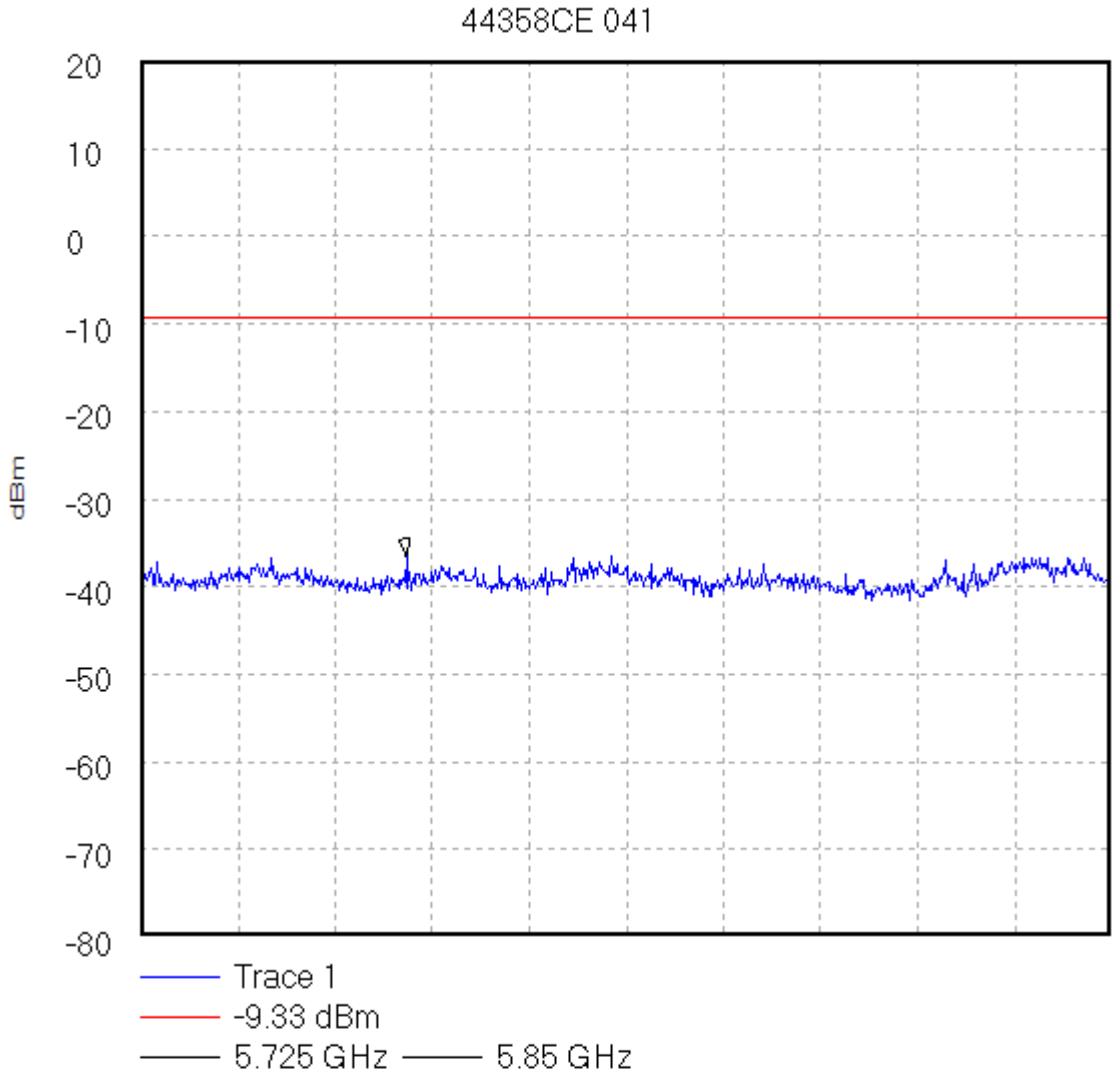
Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Marker 11.666667 GHz, -38.83 dBm
Display Line: -9.33 dBm;
07/02/2003 11:46:07

GPH\44358CE\040
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



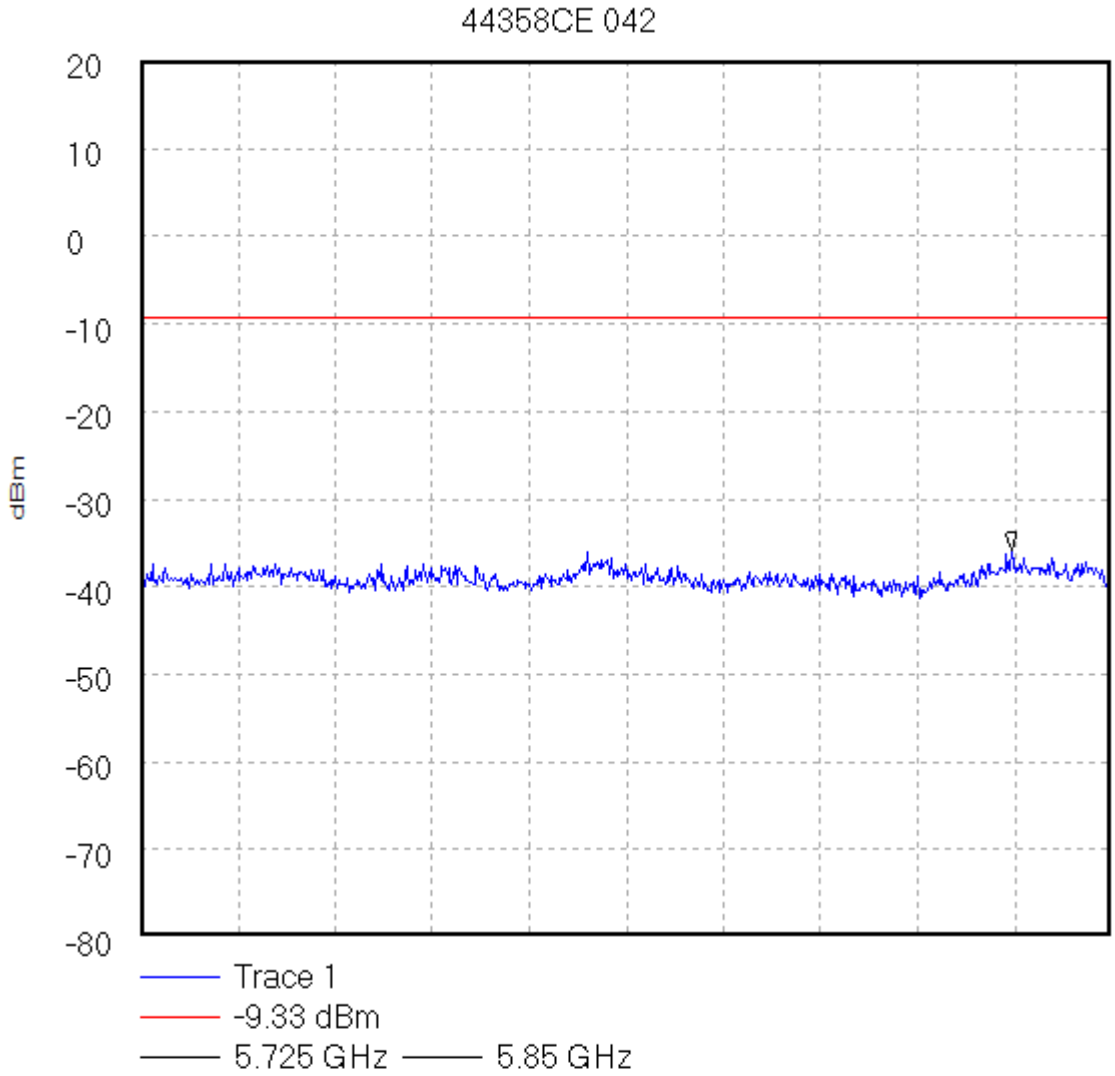
Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 19.616667 GHz, -35.83 dBm
Display Line: -9.33 dBm;
07/02/2003 11:47:42

GPH\44358CE\041
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



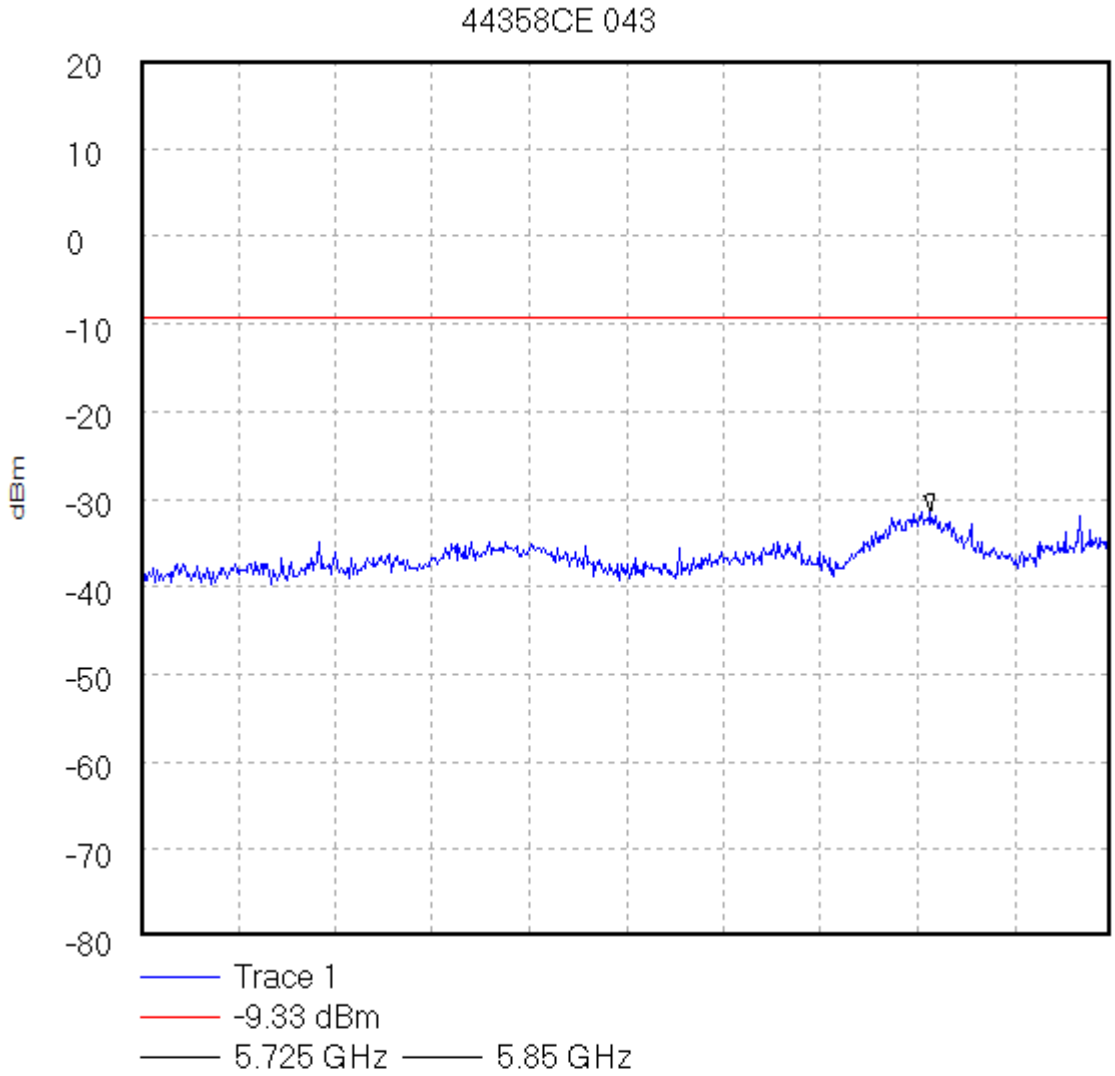
Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 16.366667 GHz, -36.5 dBm
Display Line: -9.33 dBm;
07/02/2003 11:48:03

GPH\44358CE\042
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



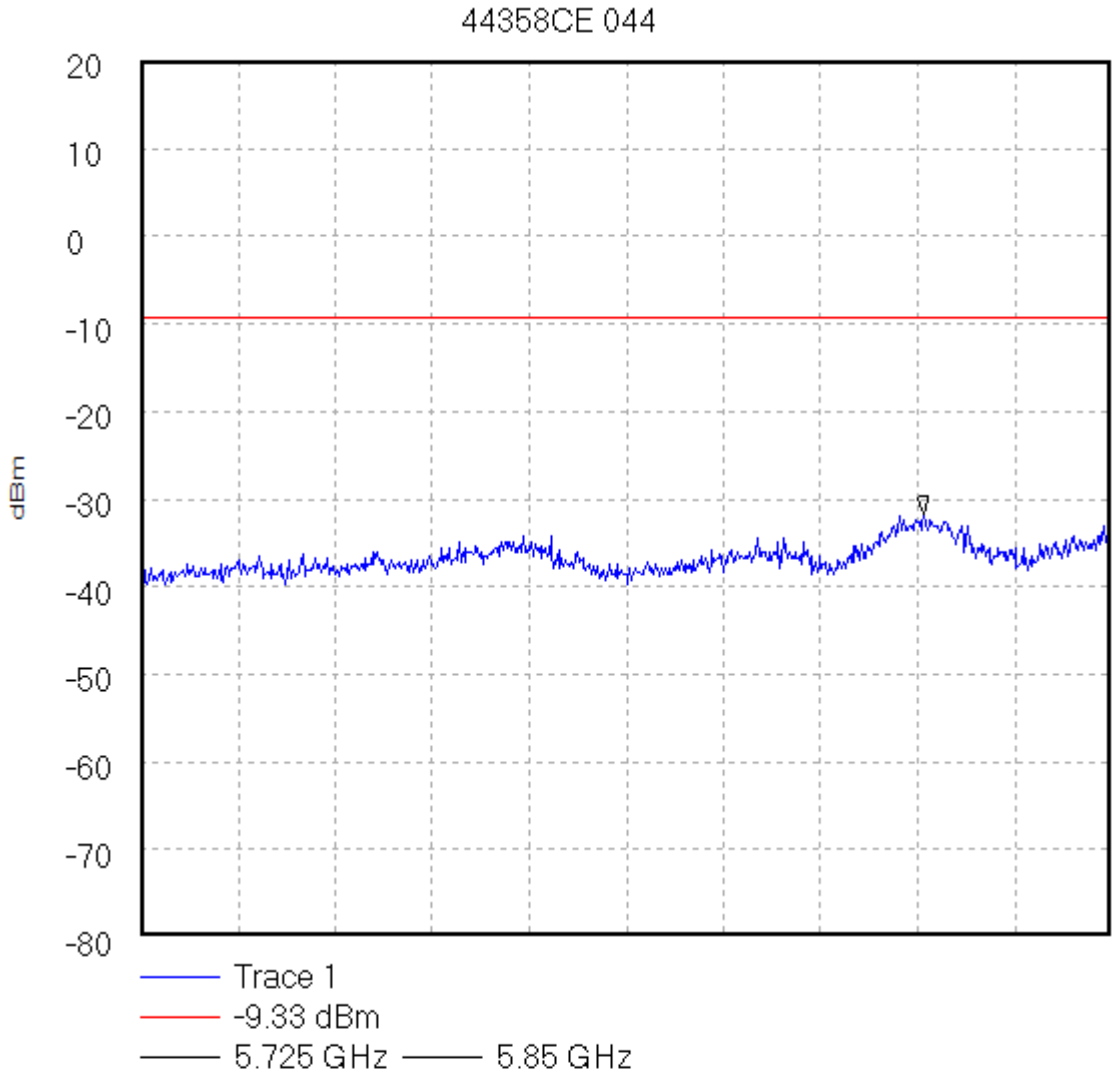
Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 19.483333 GHz, -35.83 dBm
Display Line: -9.33 dBm;
07/02/2003 11:49:04

GPH\44358CE\043
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



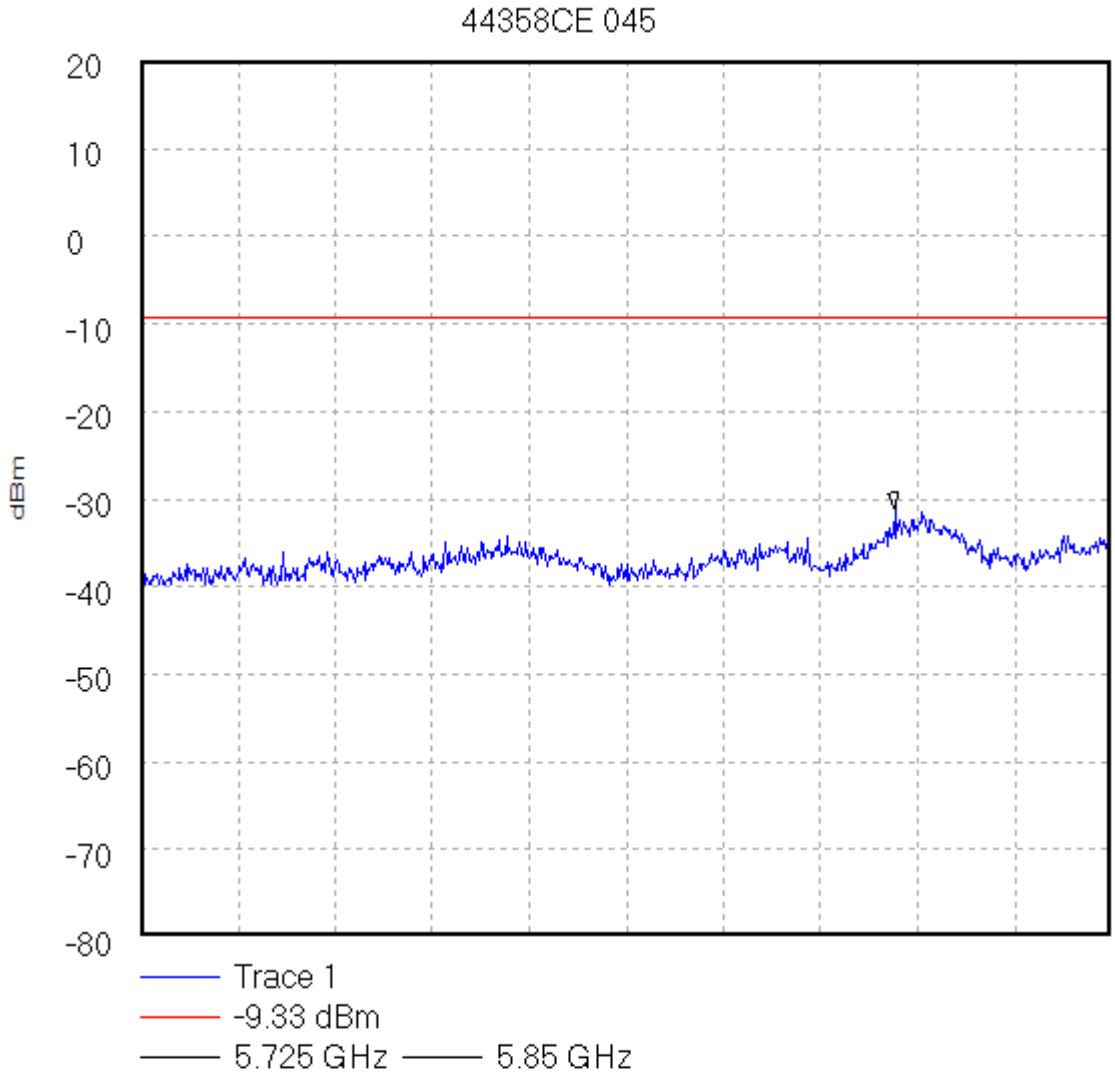
Start 20.0 GHz; Stop 25.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 24.066667 GHz, -31.33 dBm
Display Line: -9.33 dBm;
07/02/2003 11:50:03

GPH\44358CE\044
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



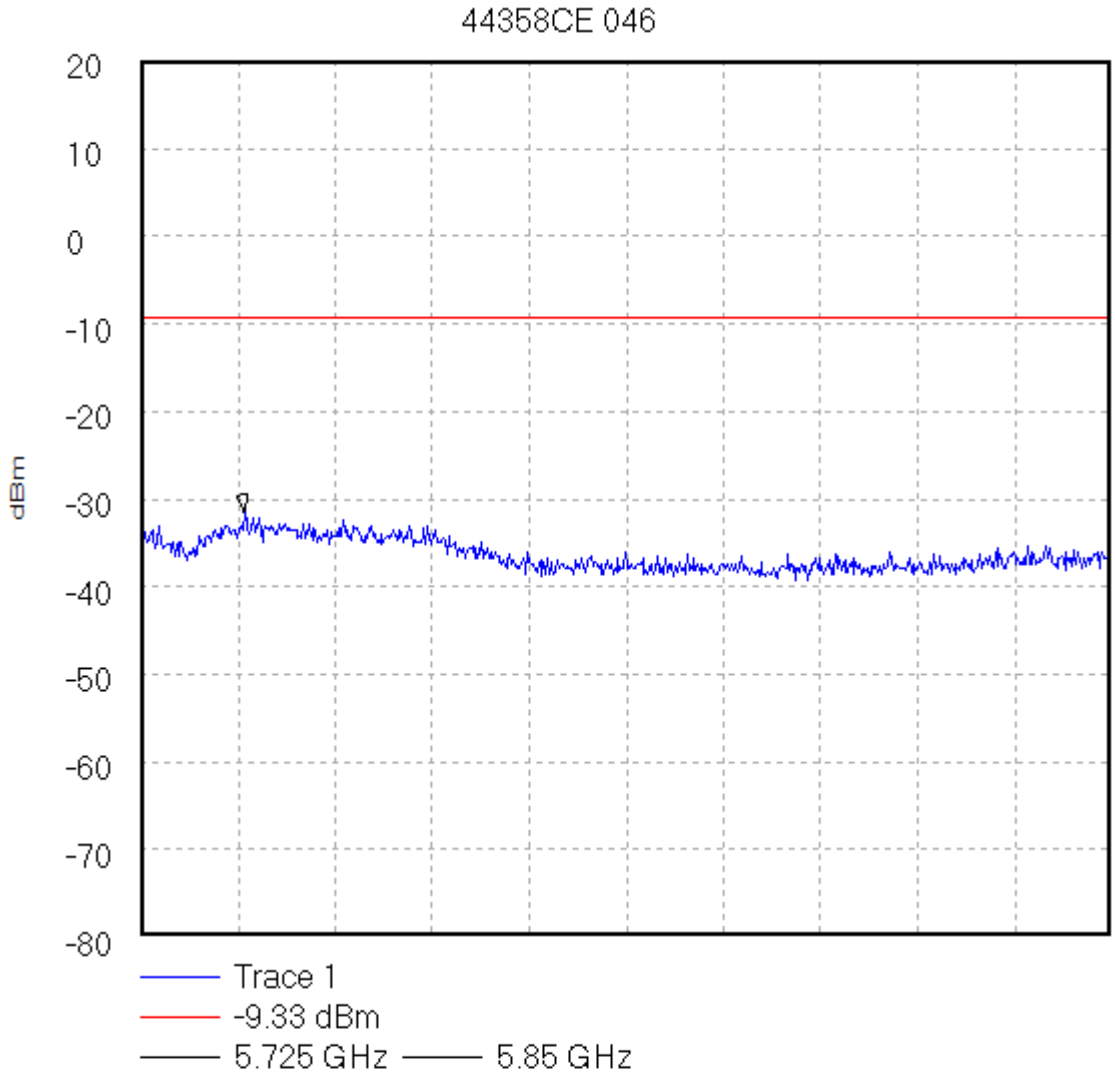
Start 20.0 GHz; Stop 25.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 24.033333 GHz, -31.67 dBm
Display Line: -9.33 dBm;
07/02/2003 11:50:28

GPH\44358CE\045
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



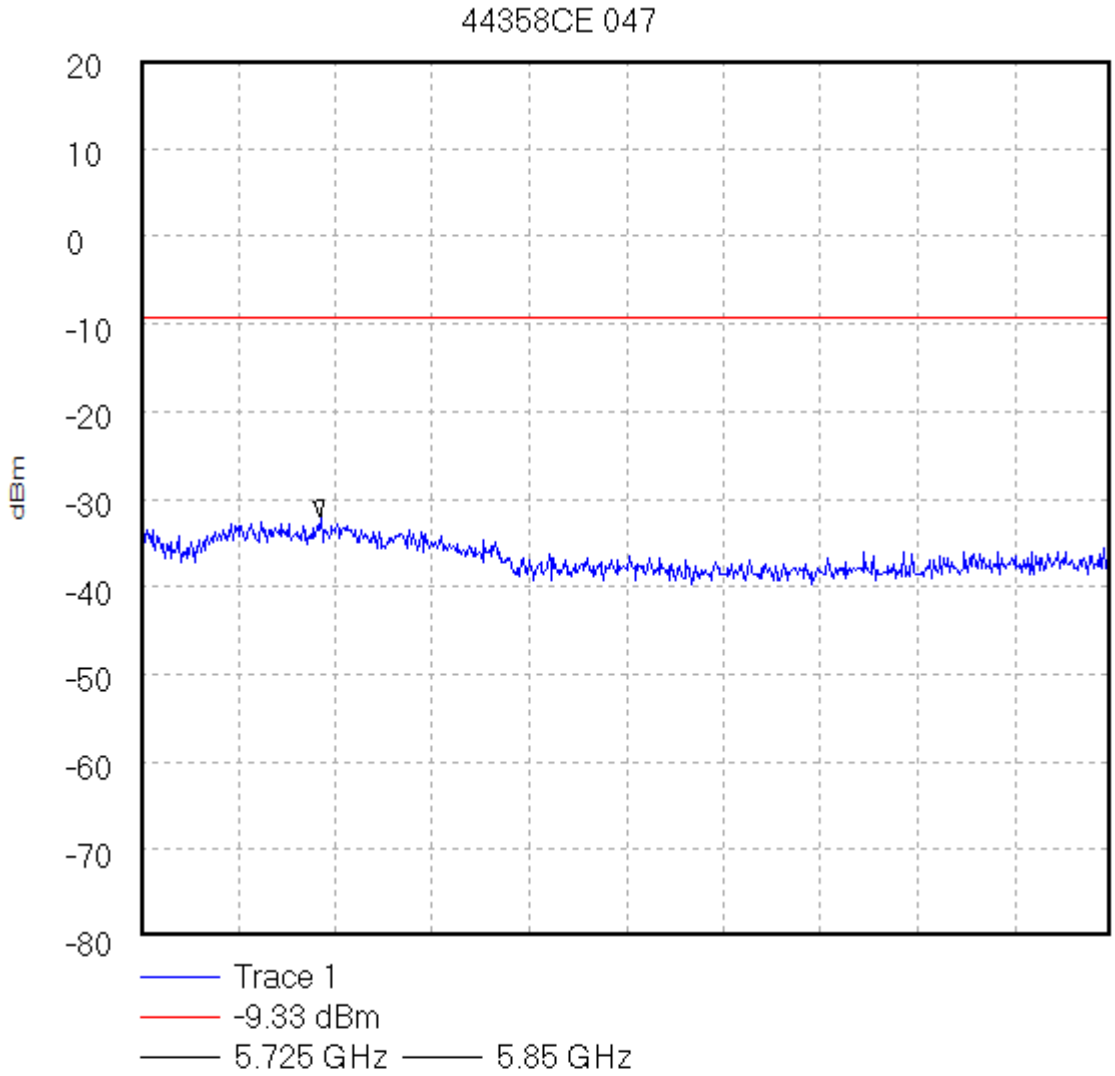
Start 20.0 GHz; Stop 25.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 23.883333 GHz, -31.17 dBm
Display Line: -9.33 dBm;
07/02/2003 11:50:42

GPH\44358CE\046
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



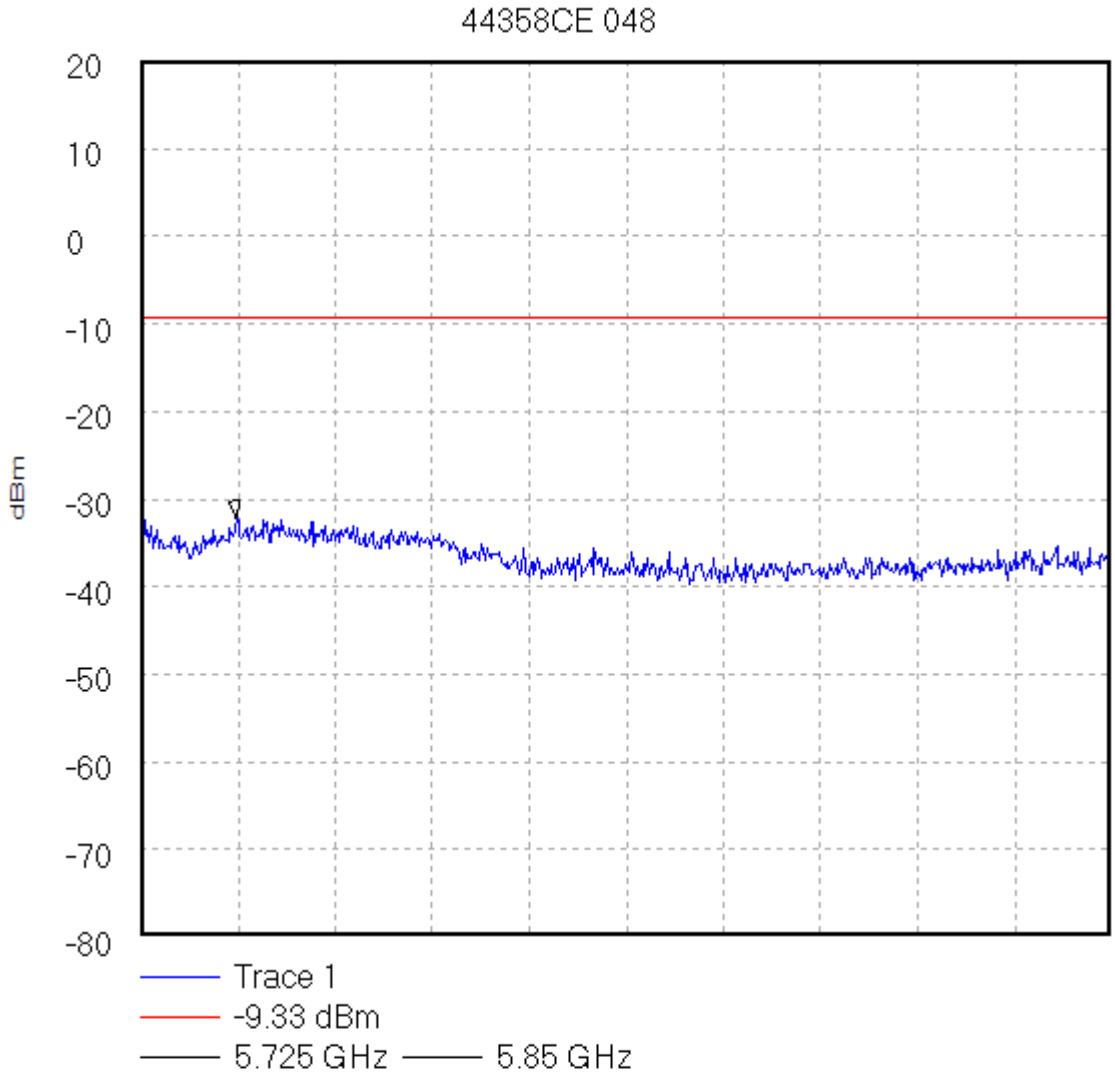
Start 25.0 GHz; Stop 30.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 25.533333 GHz, -31.5 dBm
Display Line: -9.33 dBm;
07/02/2003 11:52:22

GPH\44358CE\047
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



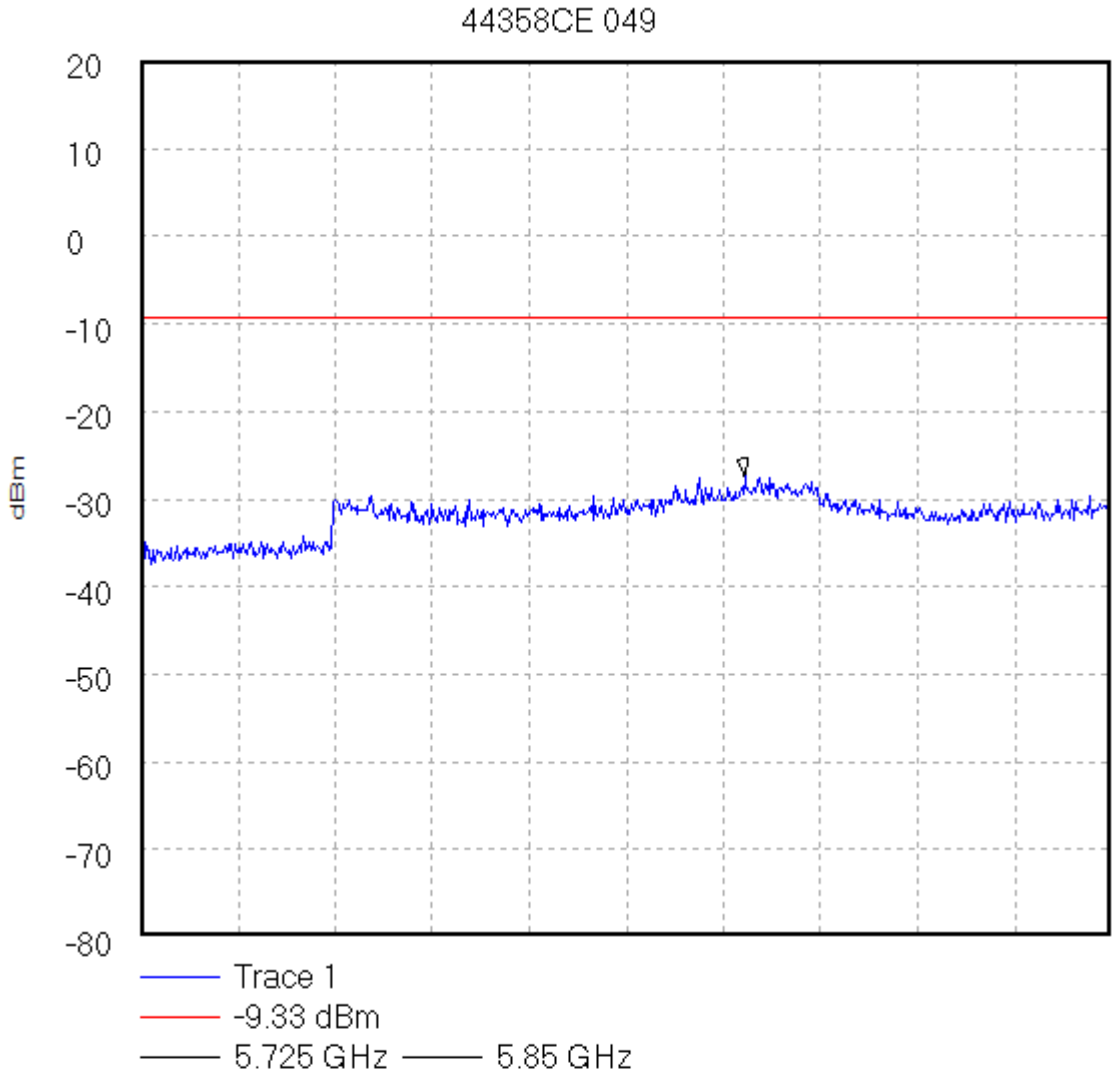
Start 25.0 GHz; Stop 30.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 25.925 GHz, -32.0 dBm
Display Line: -9.33 dBm;
07/02/2003 11:52:40

GPH\44358CE\048
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



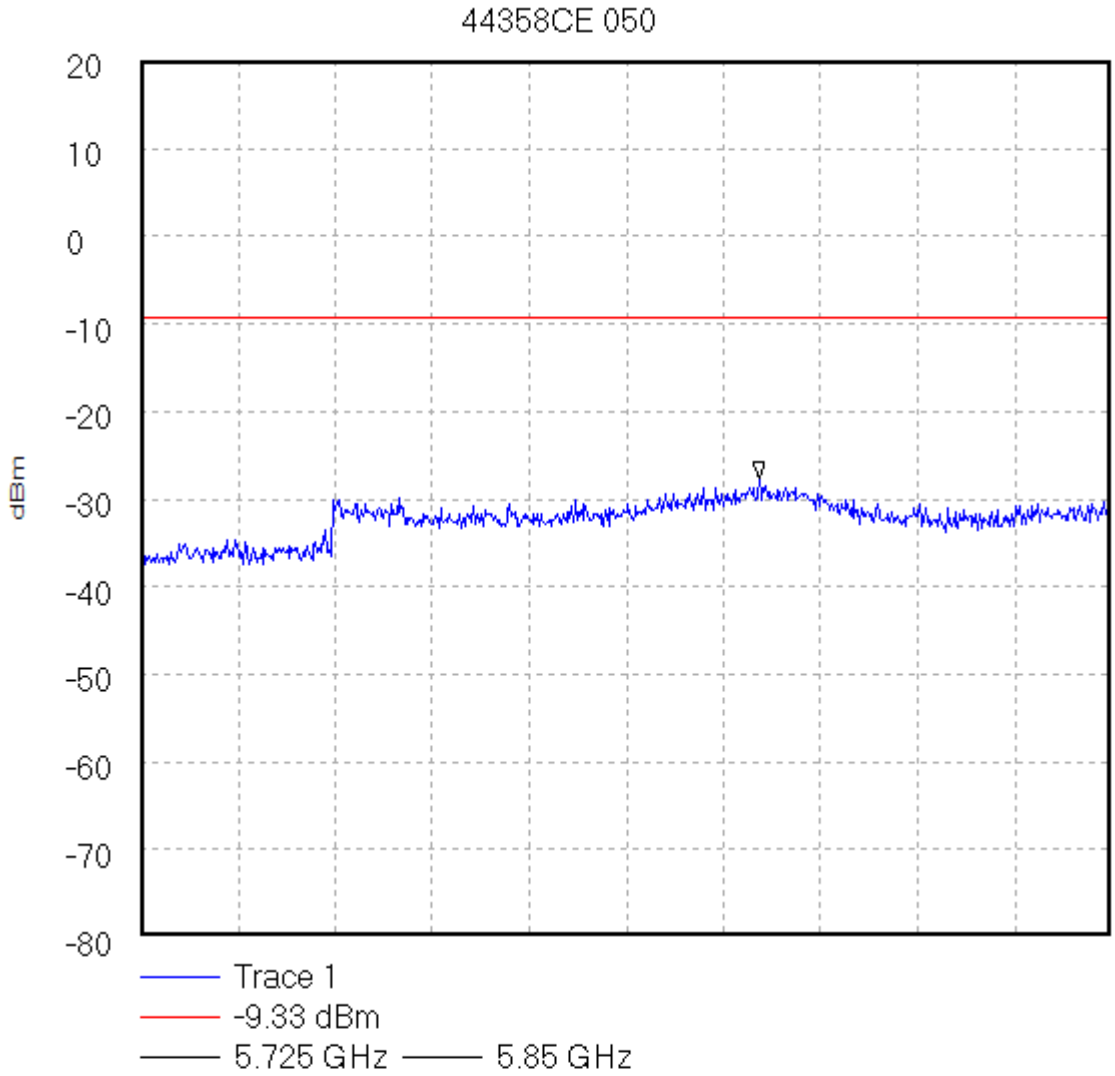
Start 25.0 GHz; Stop 30.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 25.491667 GHz, -32.17 dBm
Display Line: -9.33 dBm;
07/02/2003 11:52:57

GPH\44358CE\049
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



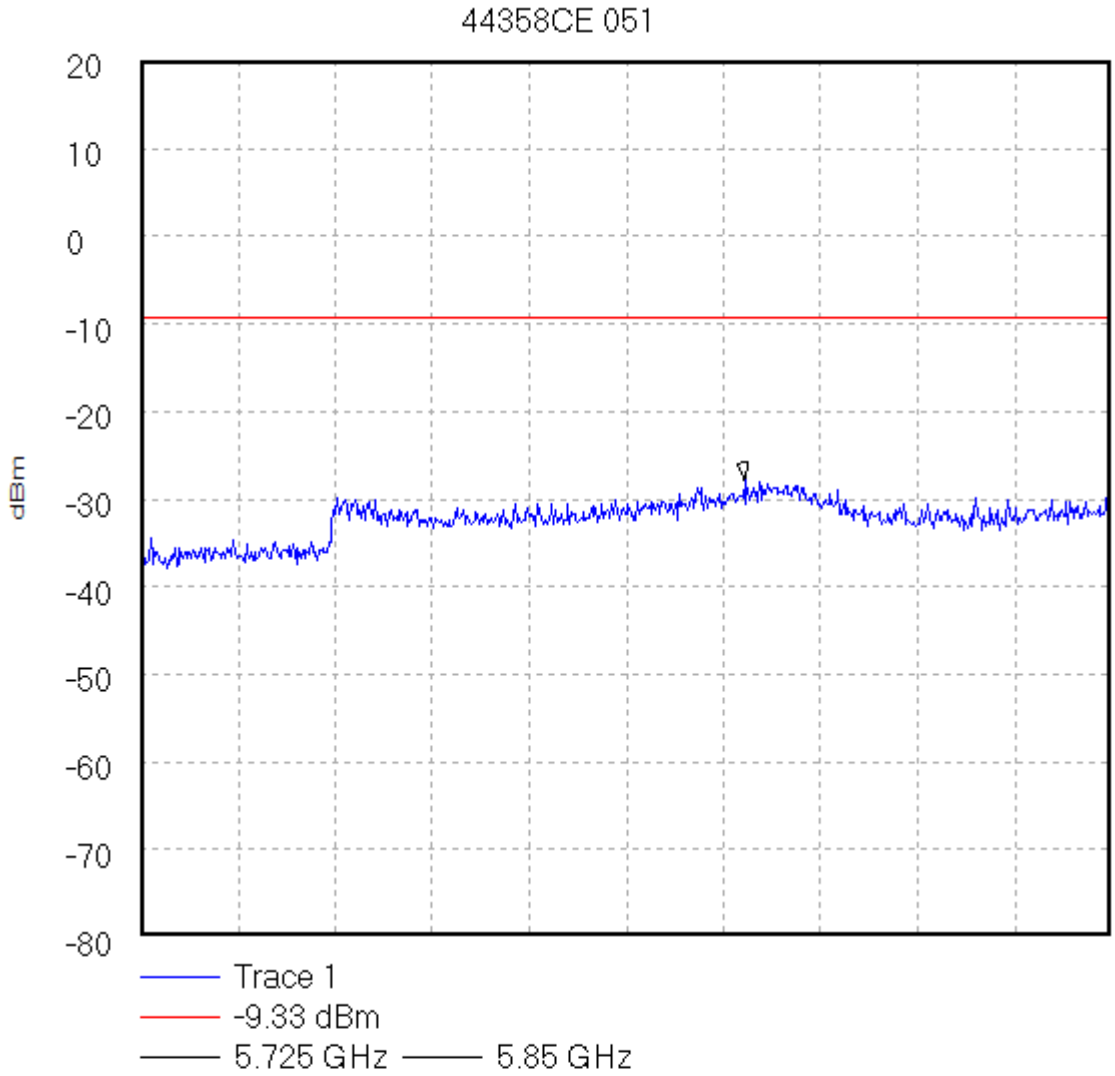
Start 30.0 GHz; Stop 35.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 33.108333 GHz, -27.33 dBm
Display Line: -9.33 dBm;
07/02/2003 11:53:44

GPH\44358CE\050
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



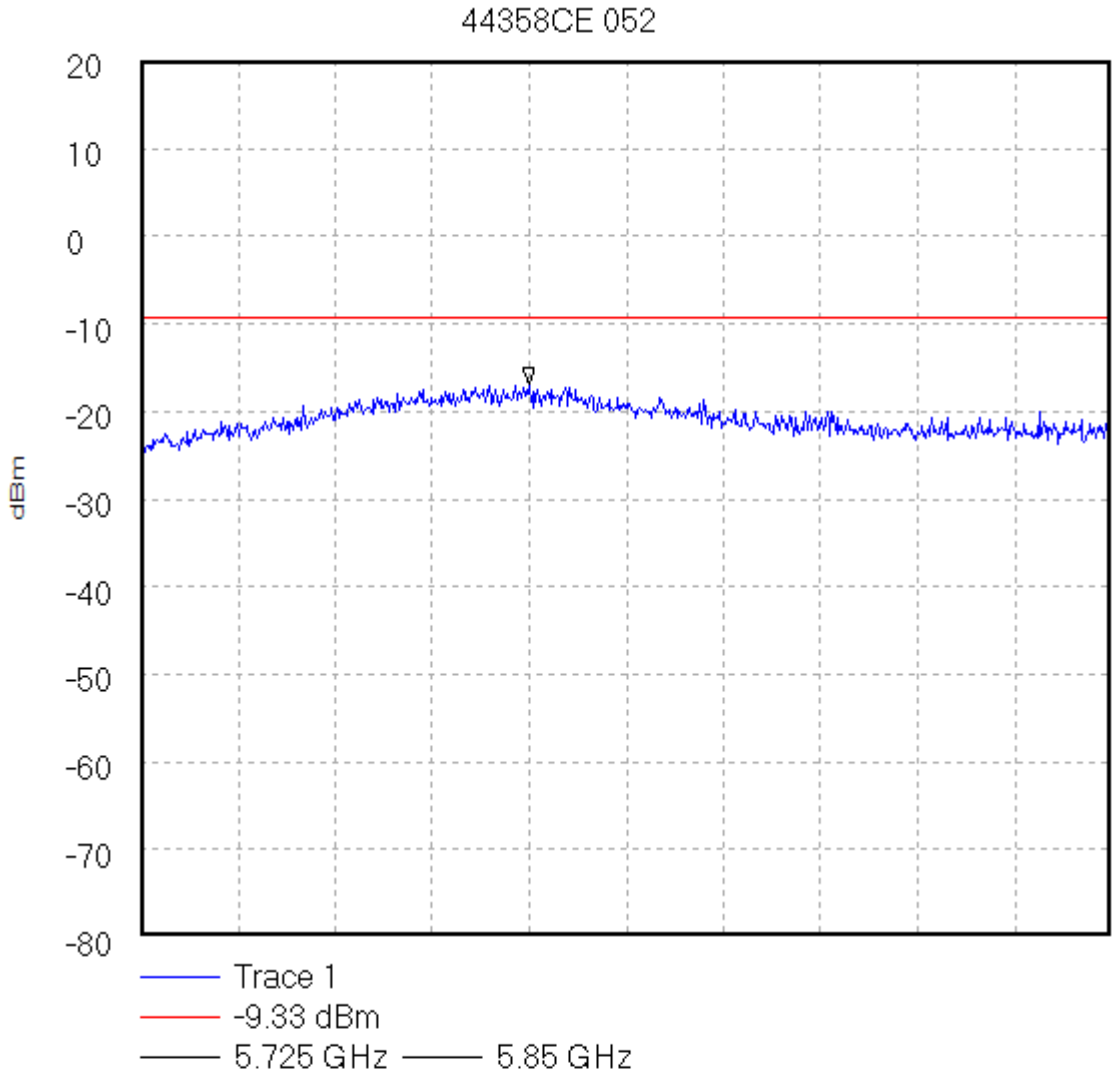
Start 30.0 GHz; Stop 35.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 33.183333 GHz, -27.67 dBm
Display Line: -9.33 dBm;
07/02/2003 11:54:01

GPH\44358CE\051
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



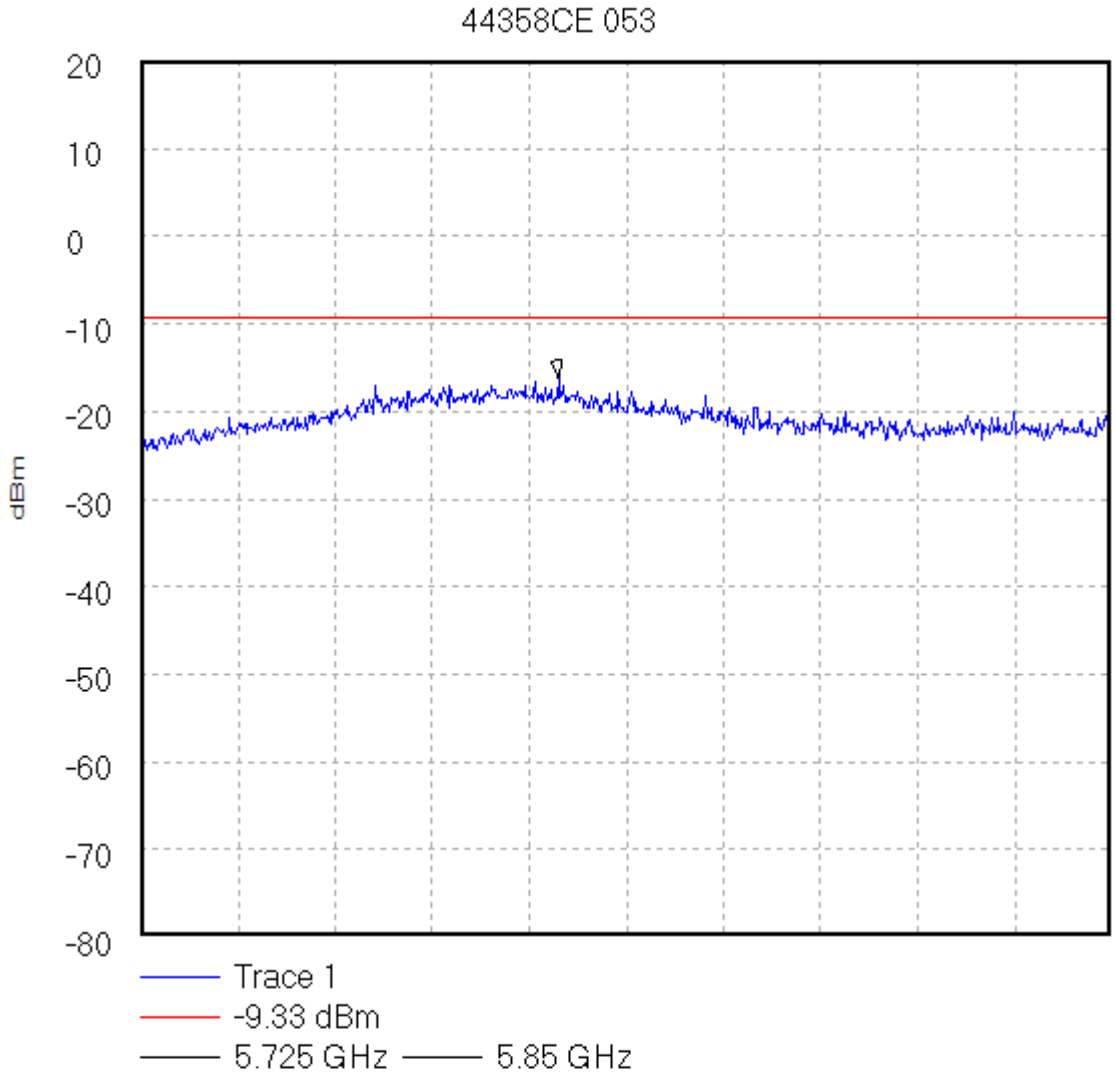
Start 30.0 GHz; Stop 35.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 33.108333 GHz, -27.83 dBm
Display Line: -9.33 dBm;
07/02/2003 11:54:40

GPH\44358CE\052
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Bottom Channel.



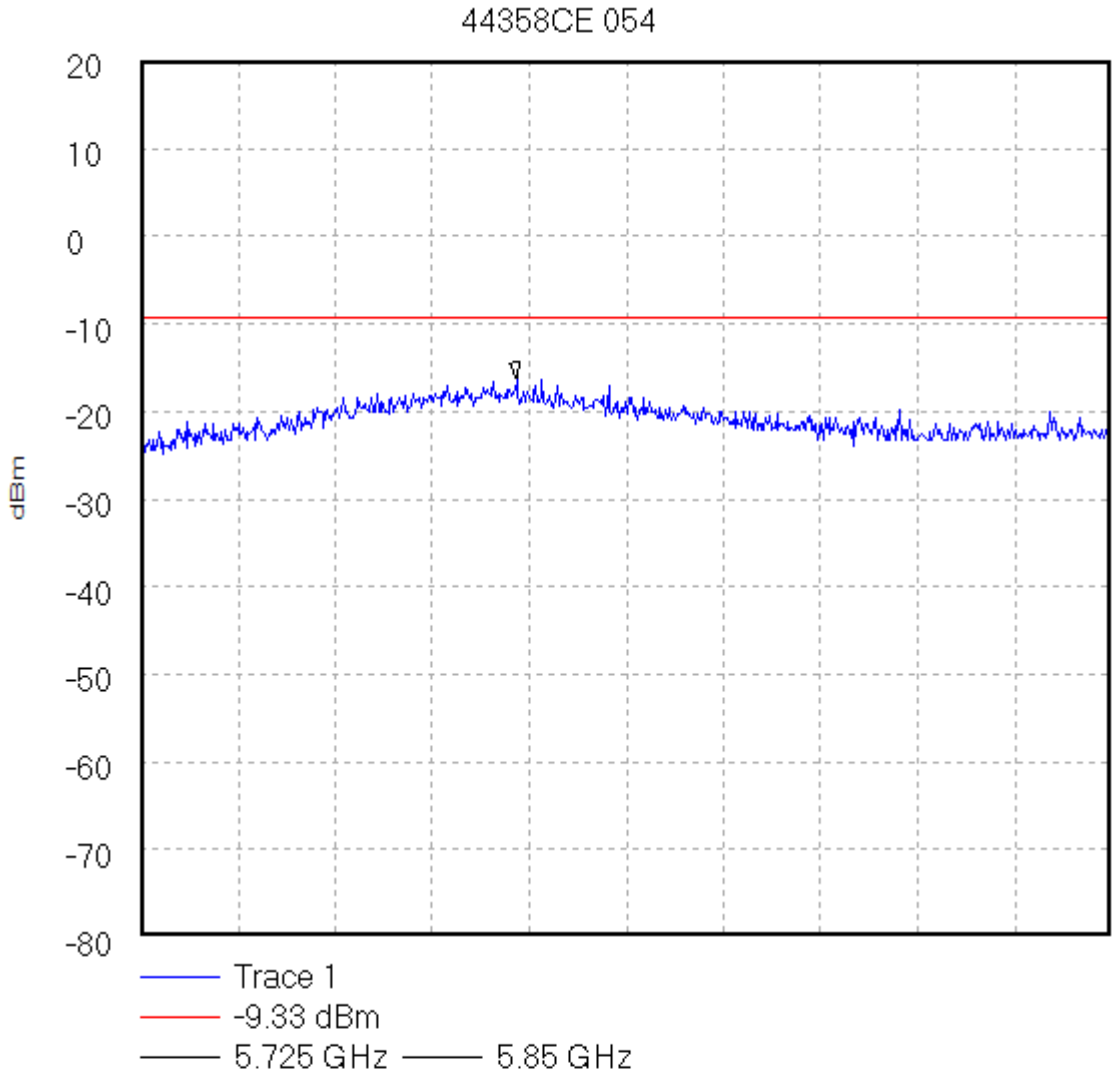
Start 35.0 GHz; Stop 40.0 GHz
Ref 20 dBm; Ref Offset 44.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 37.0 GHz, -17.0 dBm
Display Line: -9.33 dBm;
07/02/2003 11:55:33

GPH\44358CE\053
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Middle Channel.



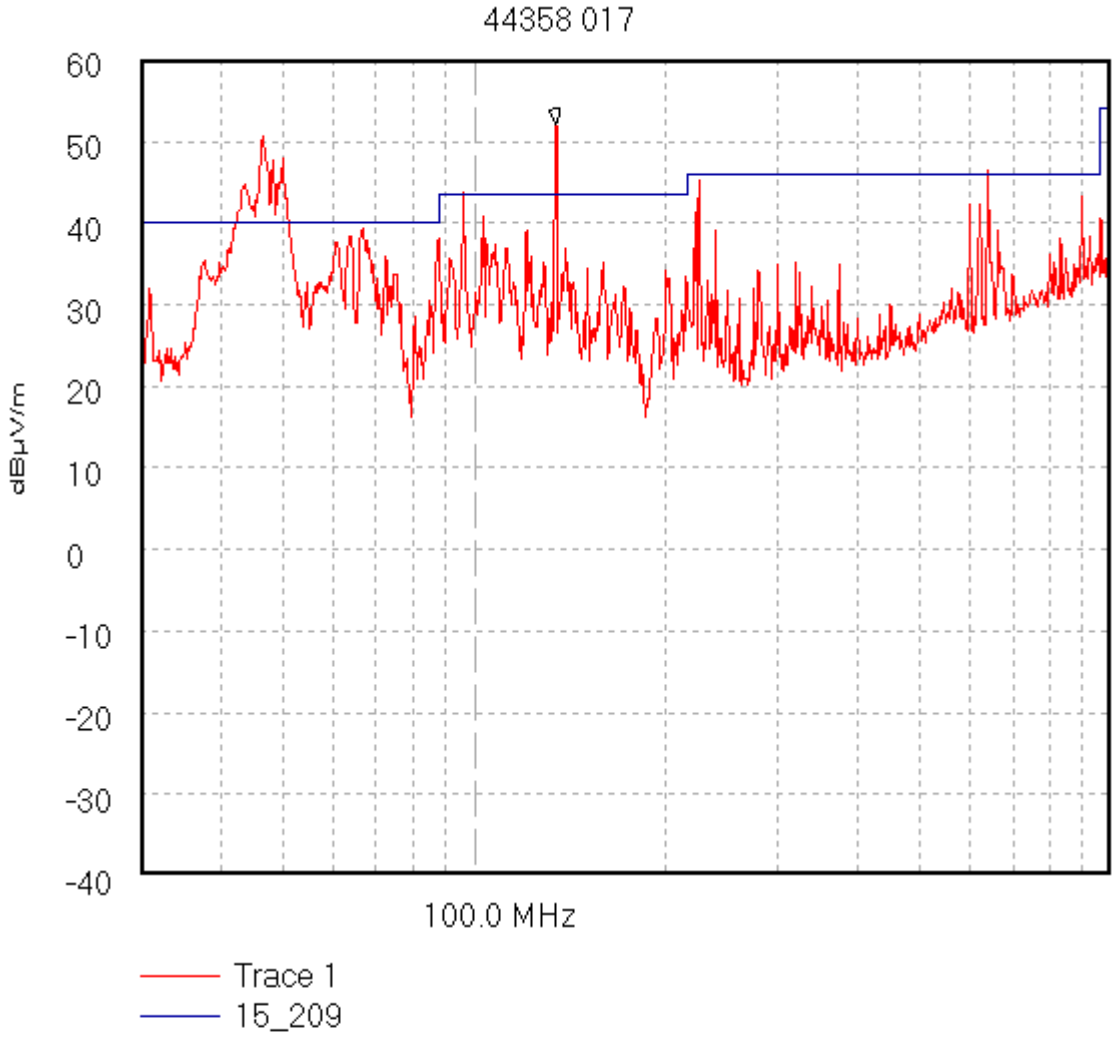
Start 35.0 GHz; Stop 40.0 GHz
Ref 20 dBm; Ref Offset 44.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 37.15 GHz, -16.17 dBm
Display Line: -9.33 dBm;
07/02/2003 11:55:51

GPH\44358CE\054
Conducted Emissions. Modulation:- BPSK
Operating Condition: - Top Channel.



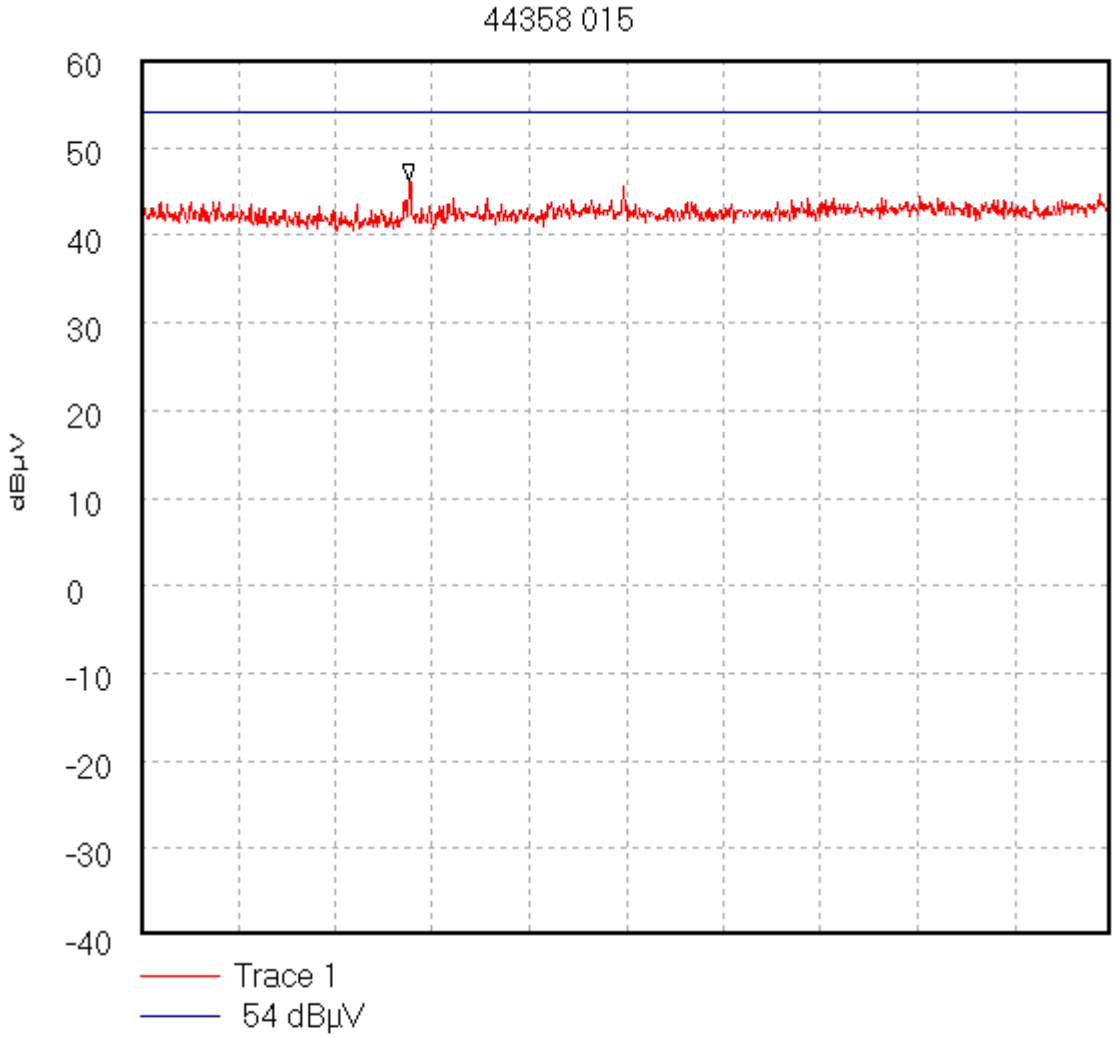
Start 35.0 GHz; Stop 40.0 GHz
Ref 20 dBm; Ref Offset 44.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 36.933333 GHz, -16.33 dBm
Display Line: -9.33 dBm;
07/02/2003 11:56:10

GPH\44358\017
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(30.0 MHz to 1.0 GHz)



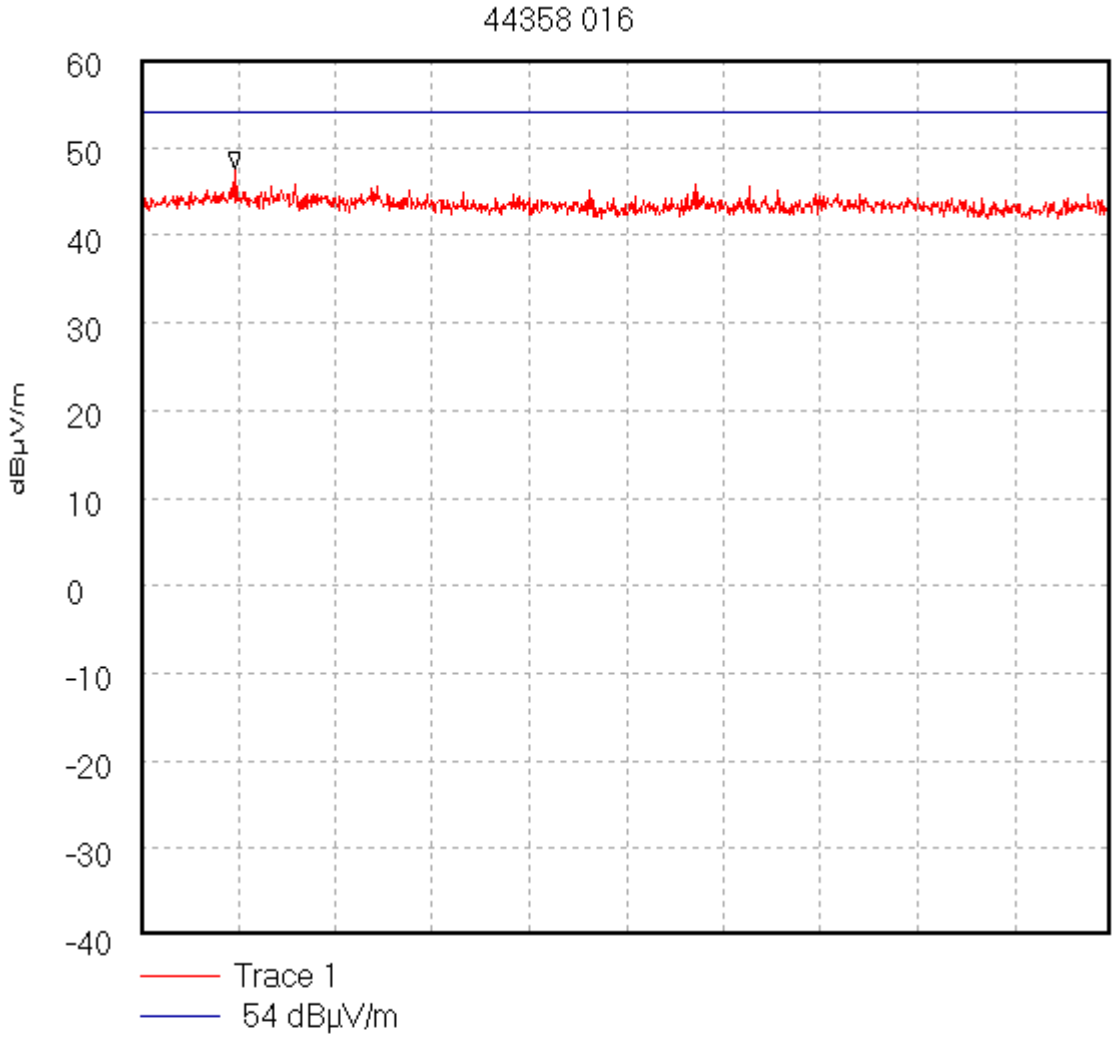
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 118.796 kHz; VBW 100.0 kHz; Att 0 dB; Swp 220.0 mS
Peak 134.454368 MHz, 52.21 dBµV/m
Limit/Mask: 15_209;
Transducer Factors: A490
31/01/2003 10:43:11

GPH\44358\015
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(1.0 GHz to 2.0 GHz)



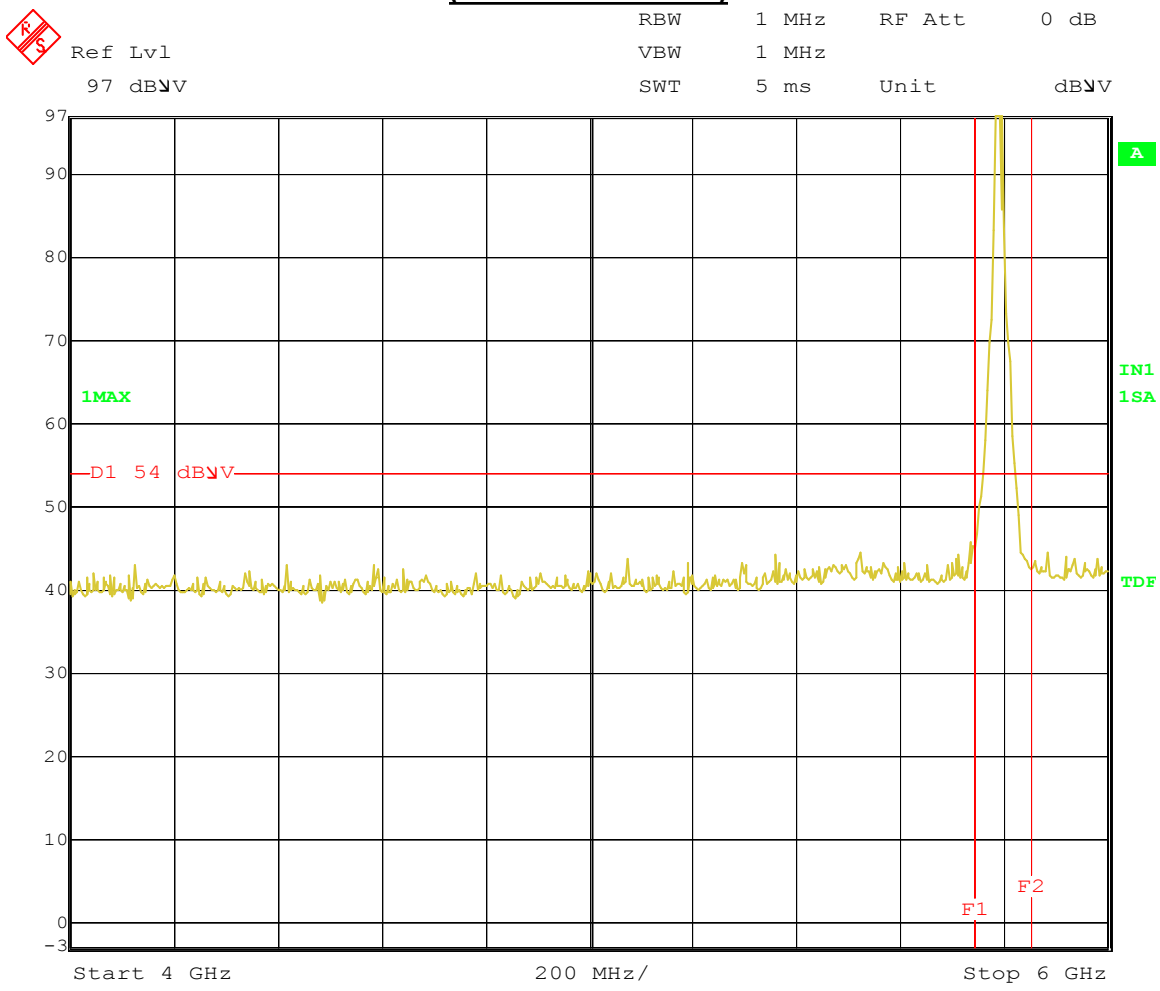
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.276667 GHz, 46.14 dBµV
Display Line: 54 dBµV;
Transducer Factors: 1 to 2
31/01/2003 10:27:15

GPH\44358\016
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(2.0 GHz to 4.0 GHz)



Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.193333 GHz, 47.54 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 2 to 4
31/01/2003 10:35:05

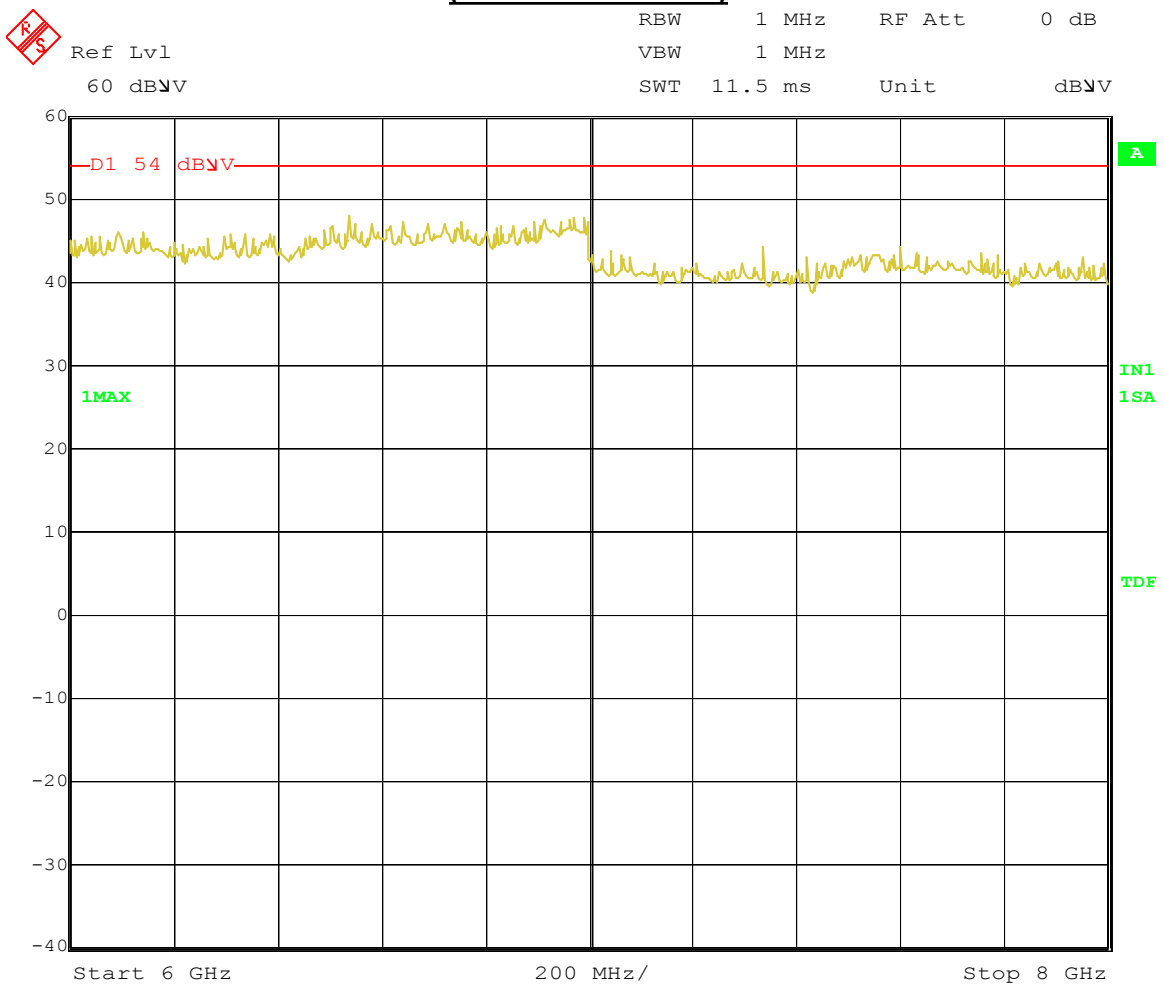
GPH/44358JD01/002
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(4.0 GHz to 6.0 GHz)



Date: 10.JAN.1997 21:25:56

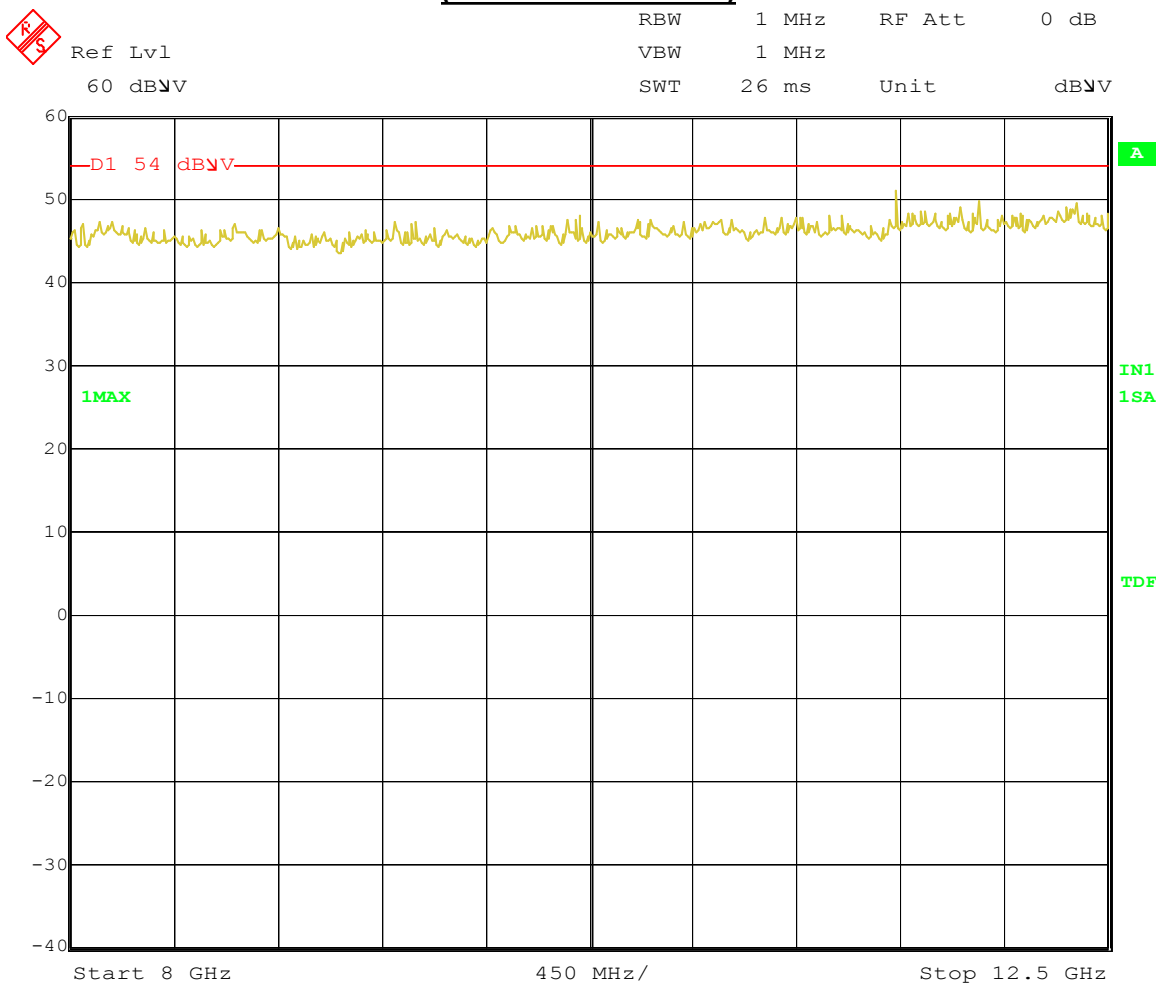
Test Of: Axxcelera Broadband Wireless UK Ltd.
Access Point (AP) & AP Wall-Box.
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

GPH/44358JD01/003
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(6.0 GHz to 8.0 GHz)



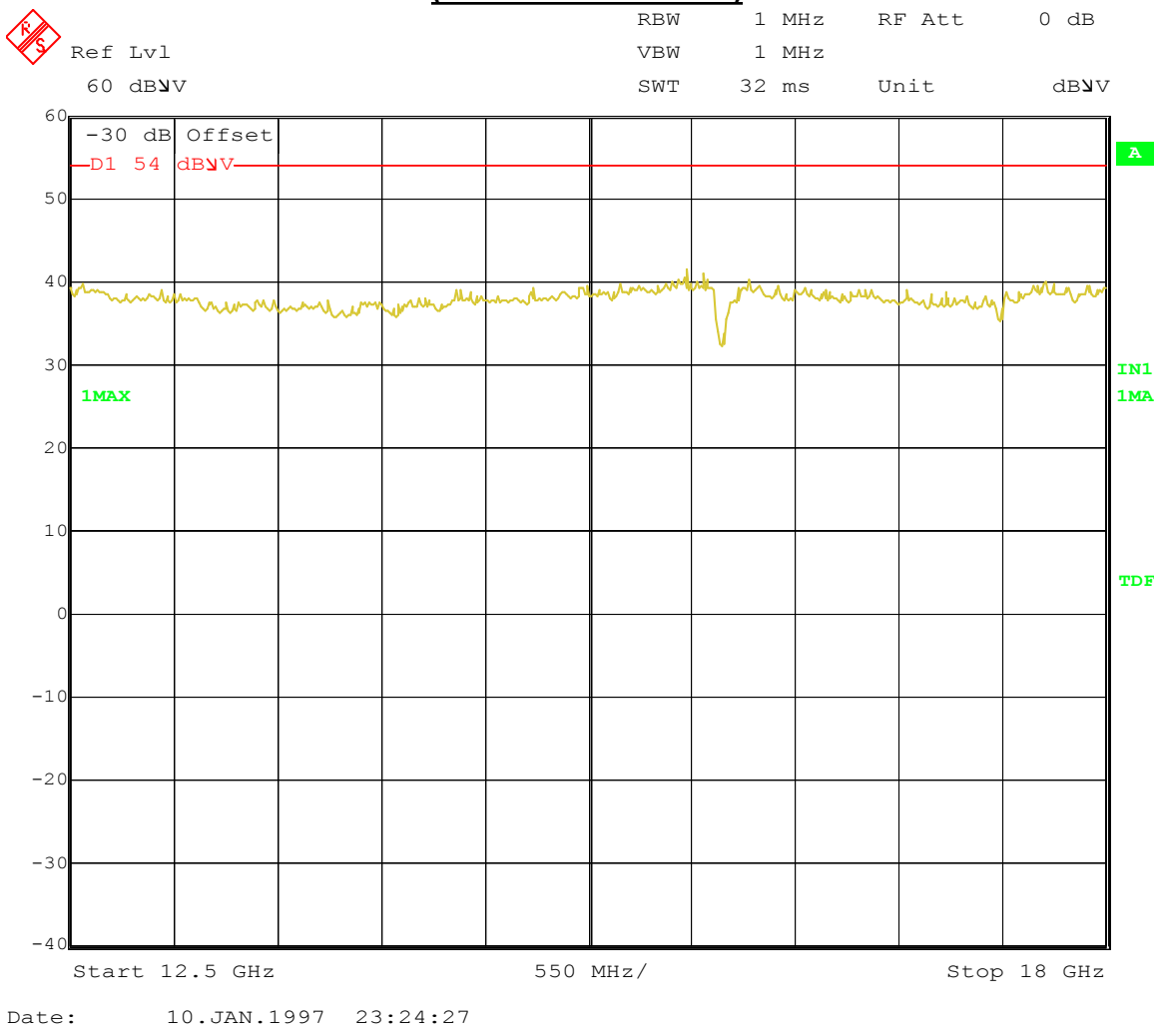
Date: 10.JAN.1997 21:30:59

GPH/44358JD01/004
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(8.0 GHz to 12.5 GHz)

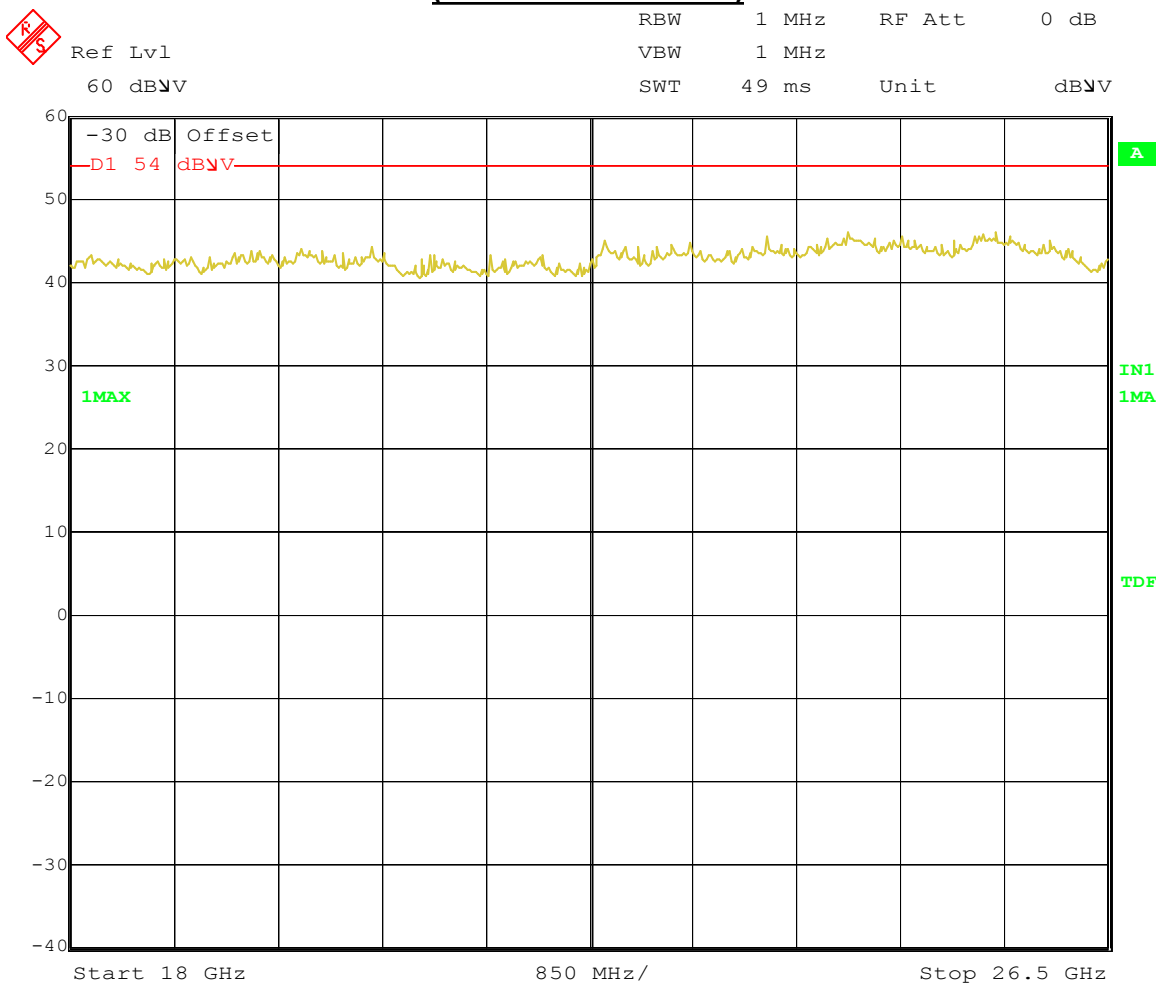


Date: 10.JAN.1997 21:36:09

GPH/44358JD01/005
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(12.5 GHz to 18.0 GHz)

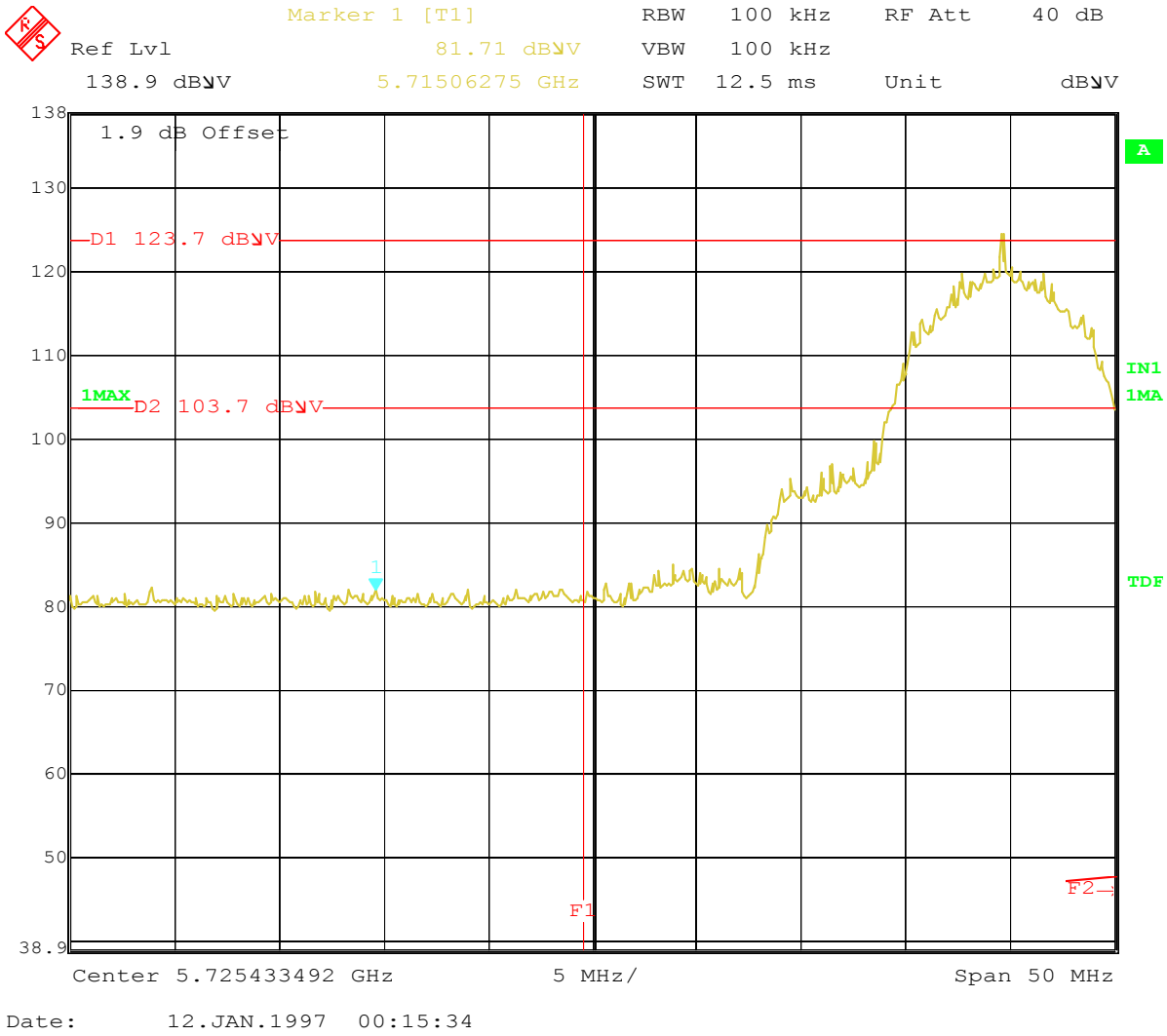


GPH/44358JD01/006
Radiated Spurious Emissions. Modulation BPSK.
Operating Conditions – Middle Channel
(18.0 GHz to 26.5 GHz)



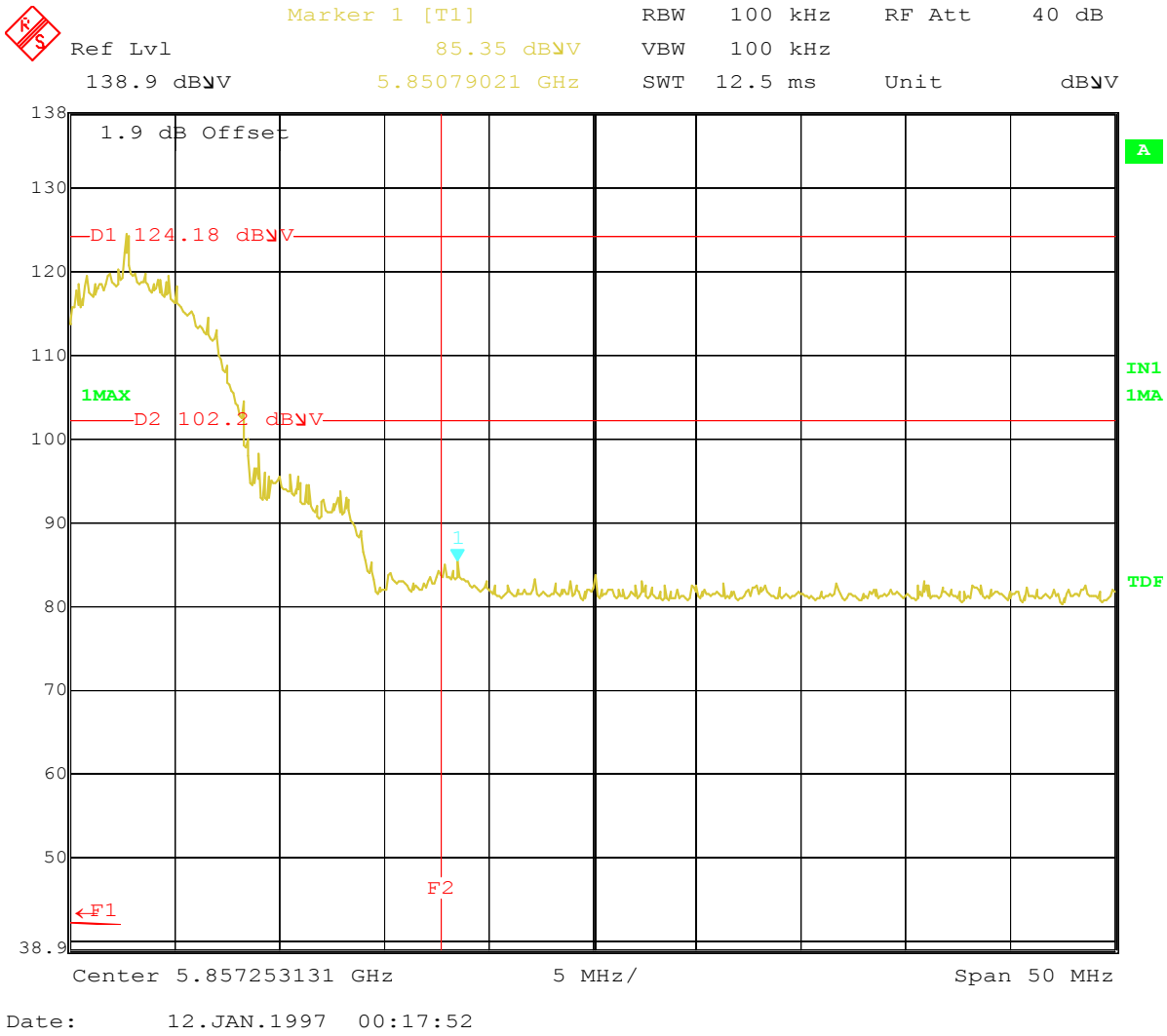
Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Access Point (AP) & AP Wall-Box.
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

GPH/443578JD01/008
Transmitter Band Edge Radiated Emissions.
BPSK Mode - Bottom Channel.



Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Access Point (AP) & AP Wall-Box.
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

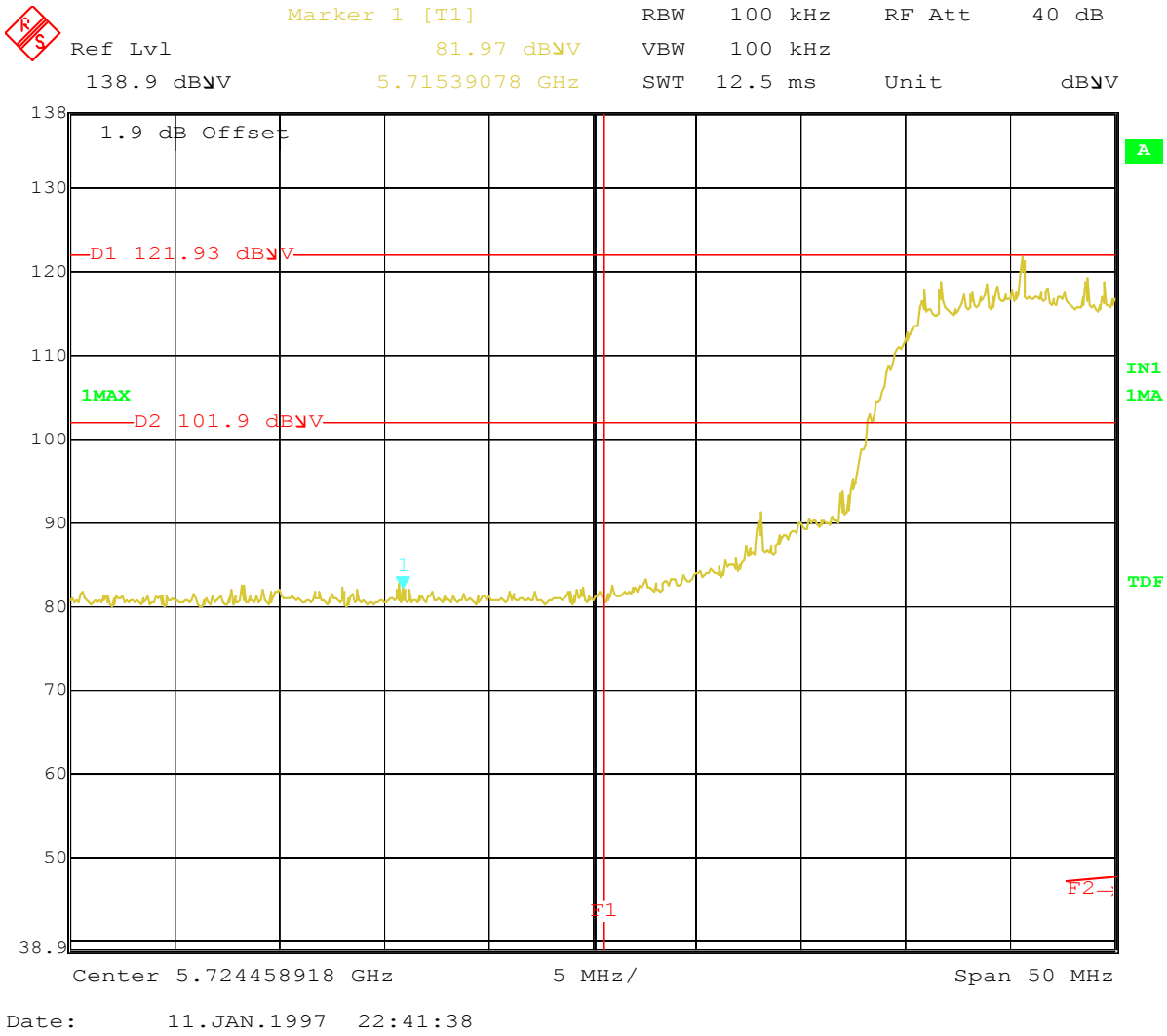
GPH/443578JD01/009
Transmitter Band Edge Radiated Emissions.
BPSK Mode - Top Channel.



Date: 12.JAN.1997 00:17:52

Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Access Point (AP) & AP Wall-Box.
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

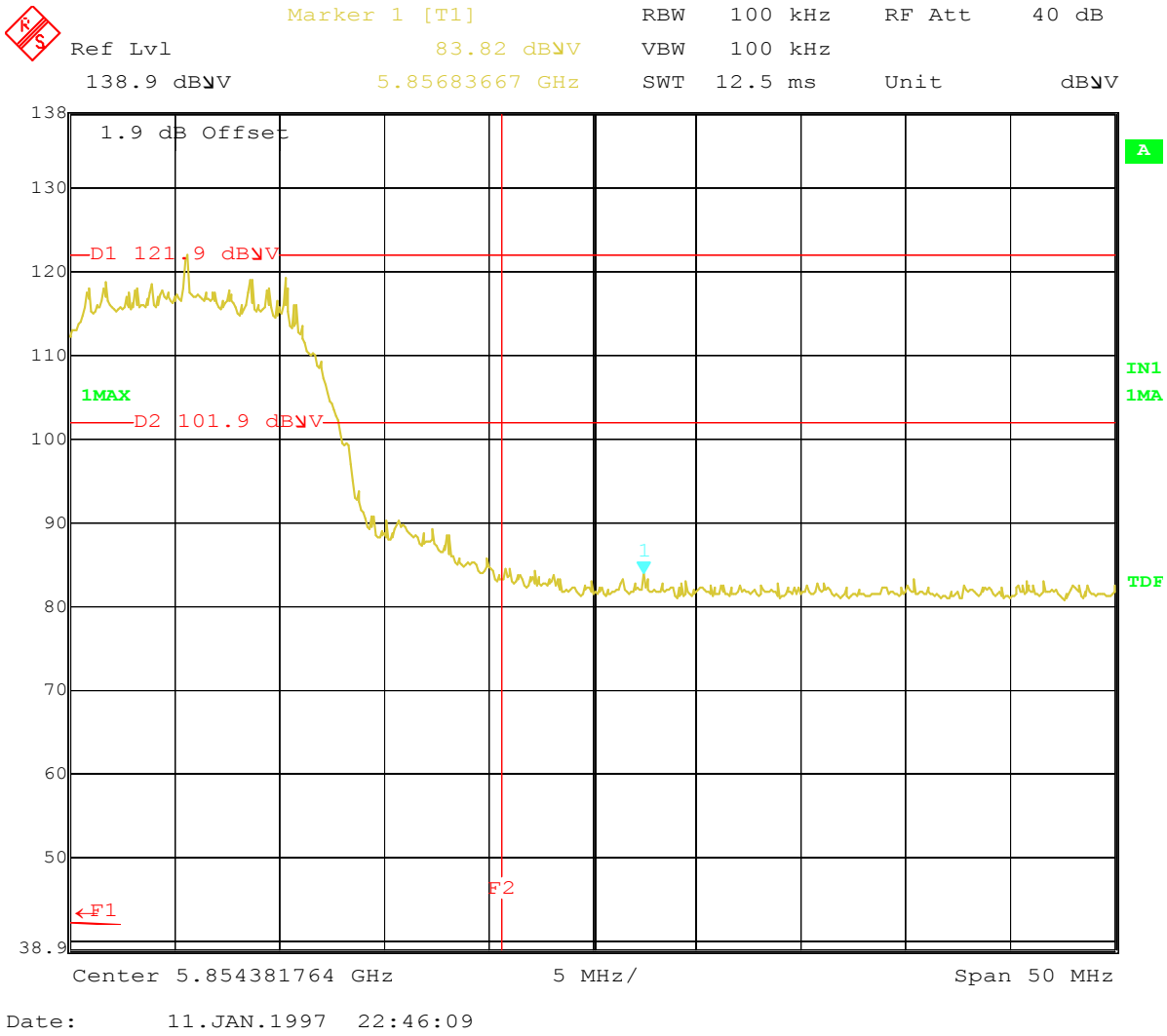
GPH/443578JD01/010
Transmitter Band Edge Radiated Emissions.
QPSK Mode - Bottom Channel.



Date: 11.JAN.1997 22:41:38

Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Access Point (AP) & AP Wall-Box.
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

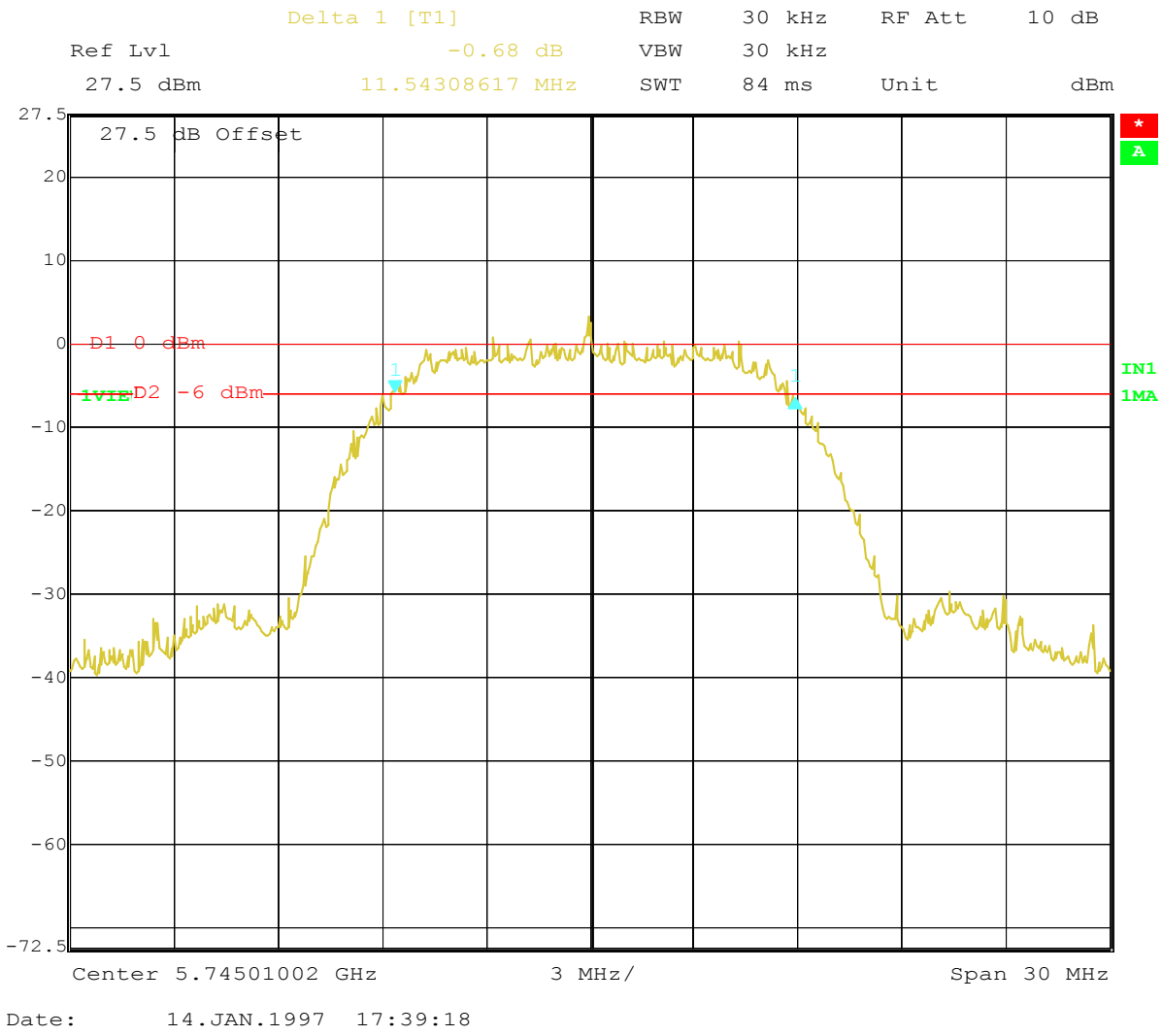
GPH/443578JD01/011
Transmitter Band Edge Radiated Emissions.
QPSK Mode - Top Channel.



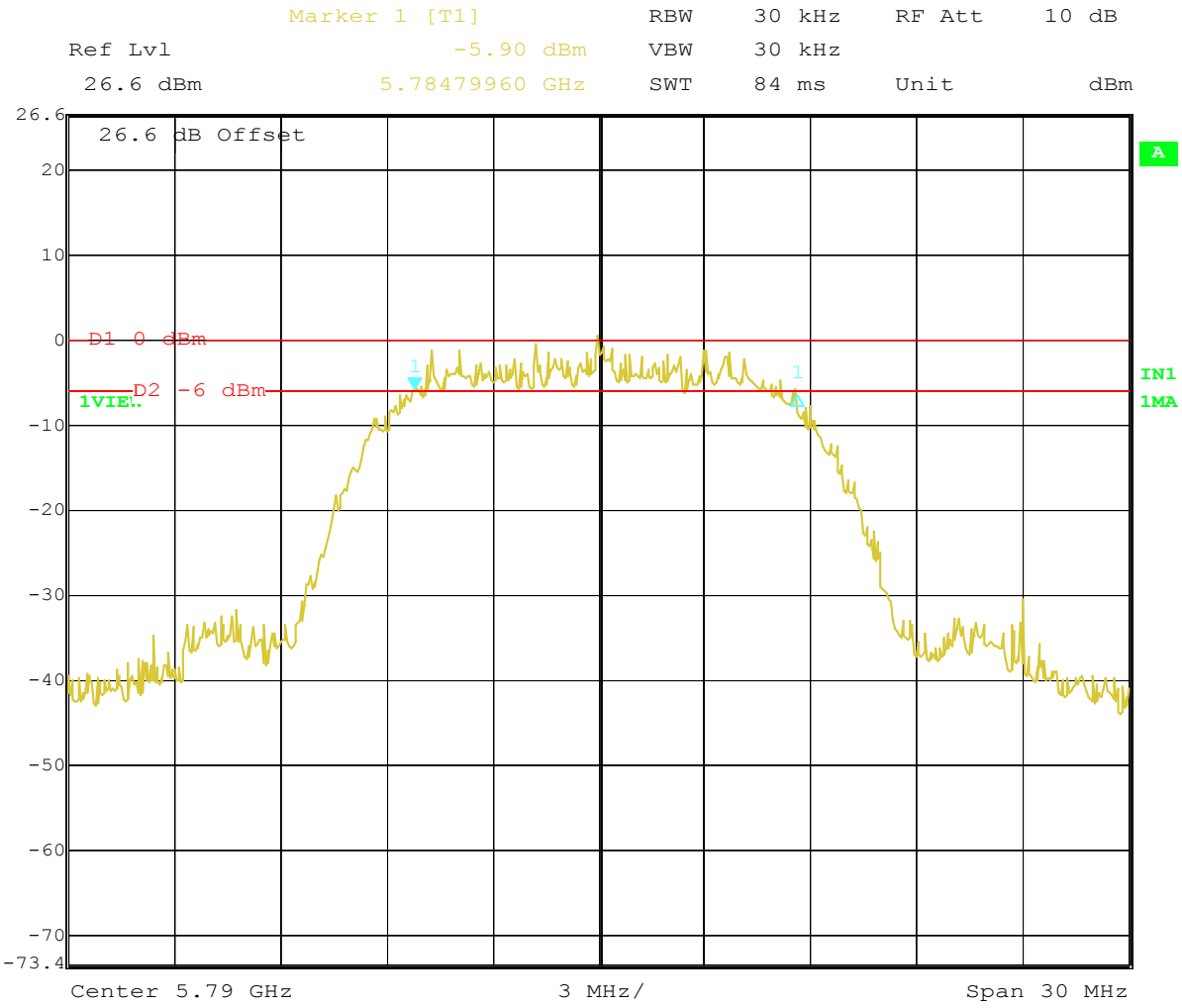
Date: 11.JAN.1997 22:46:09

Test Of: Axxcelera Broadband Wireless UK Ltd.
Access Point (AP) & AP Wall-Box.
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

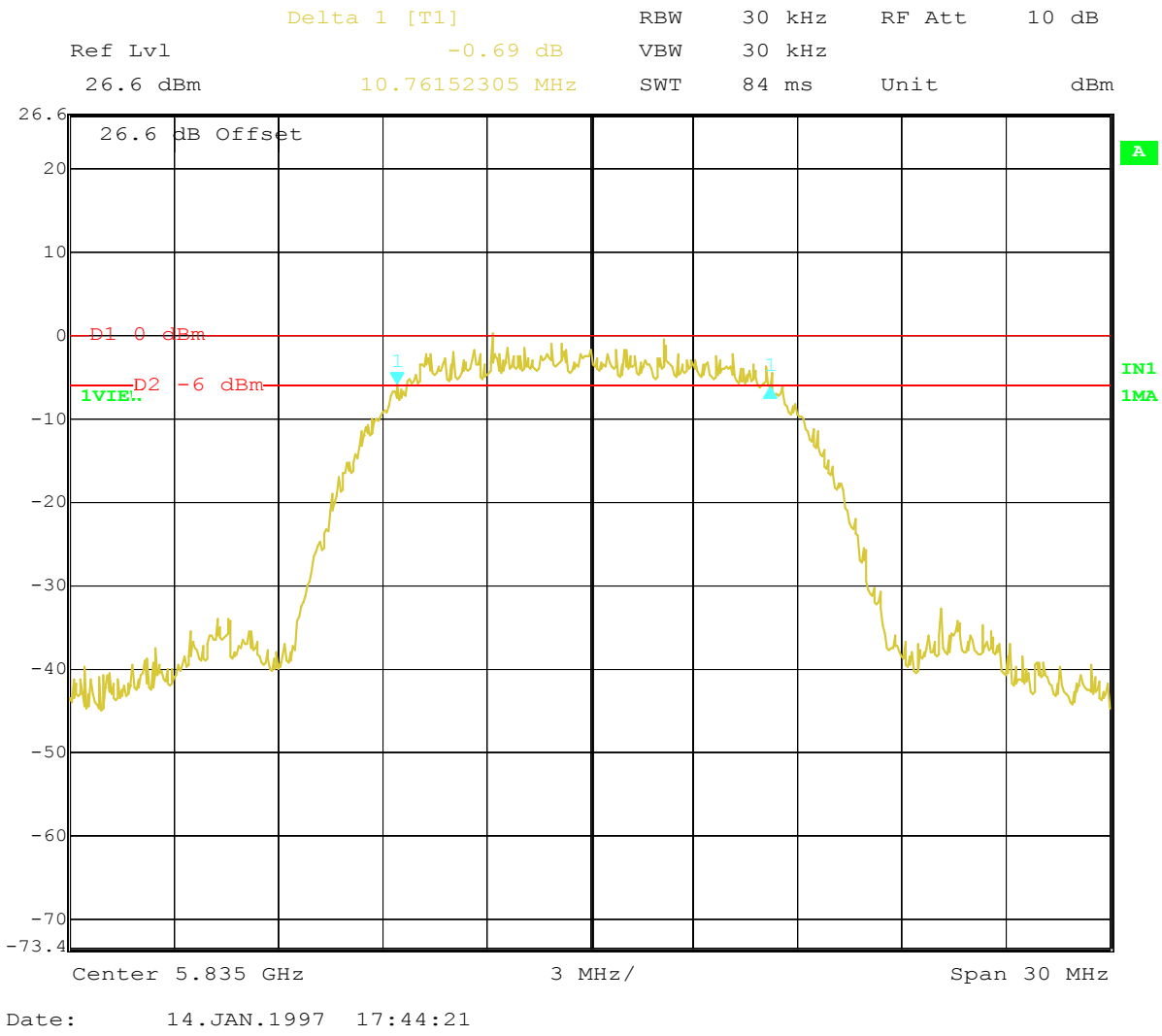
GPH/443578JD01/012
6 dB Bandwidth QPSK Modulation
Bottom Channel



GPH/443578JD01/013
6 dB Bandwidth QPSK Modulation
Middle Channel

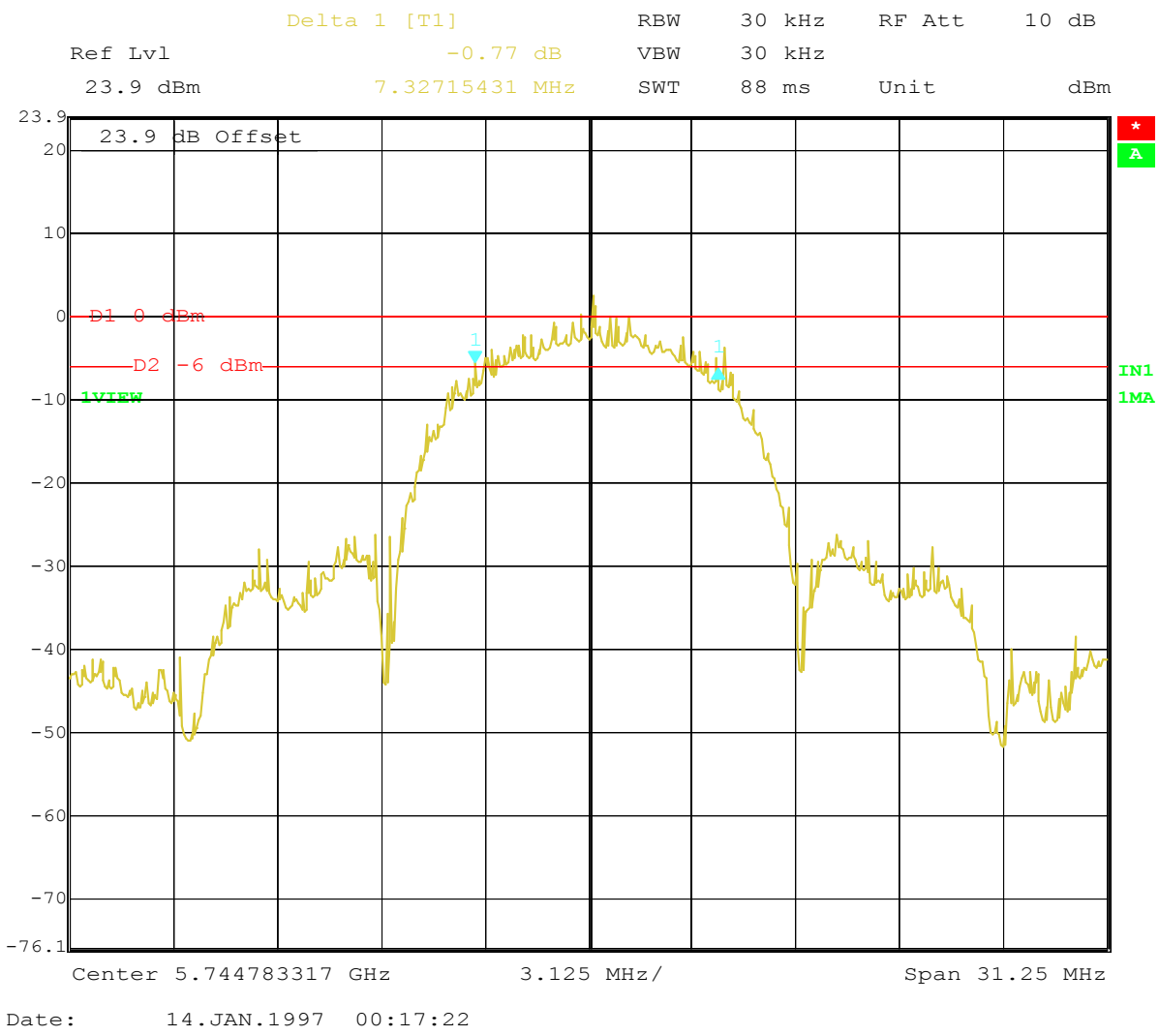


GPH/443578JD01/014
6 dB Bandwidth QPSK Modulation
Top Channel



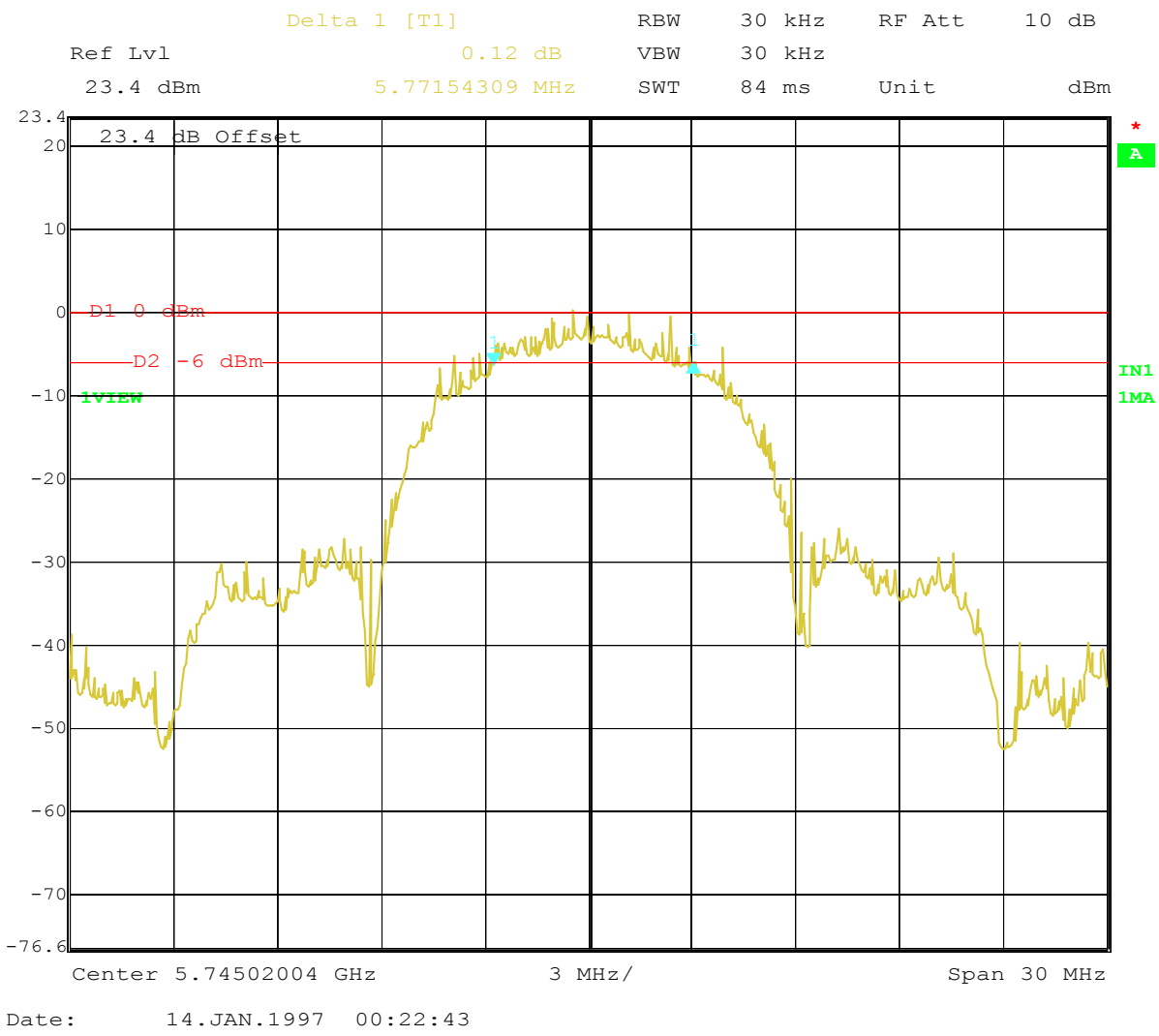
Test Of: Axxcelera Broadband Wireless UK Ltd.
Access Point (AP) & AP Wall-Box.
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

GPH/443578JD01/015
6 dB Bandwidth BPSK Modulation
Bottom Channel



Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Access Point (AP) & AP Wall-Box.
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

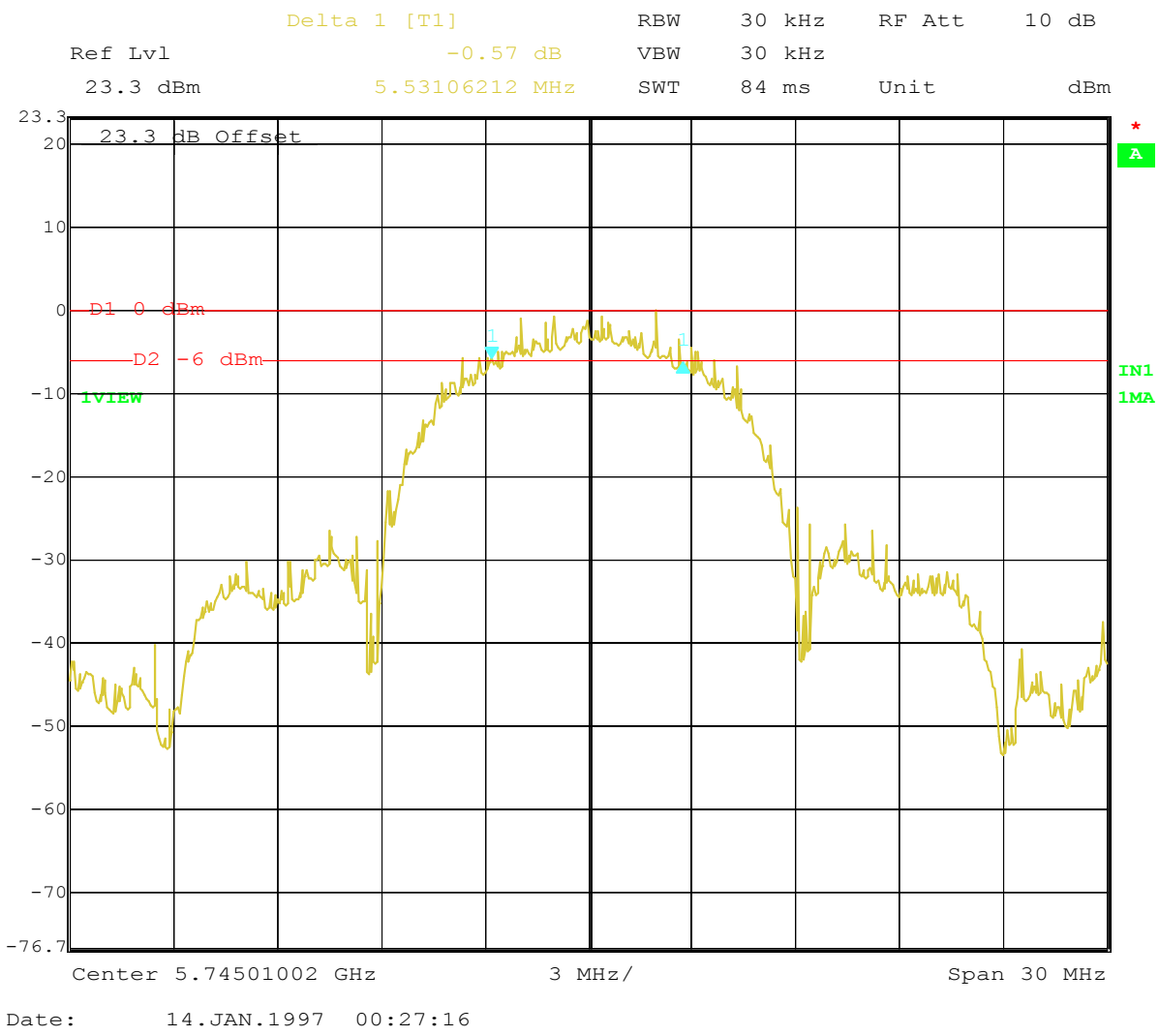
GPH/443578JD01/016
6 dB Bandwidth BPSK Modulation
Middle Channel

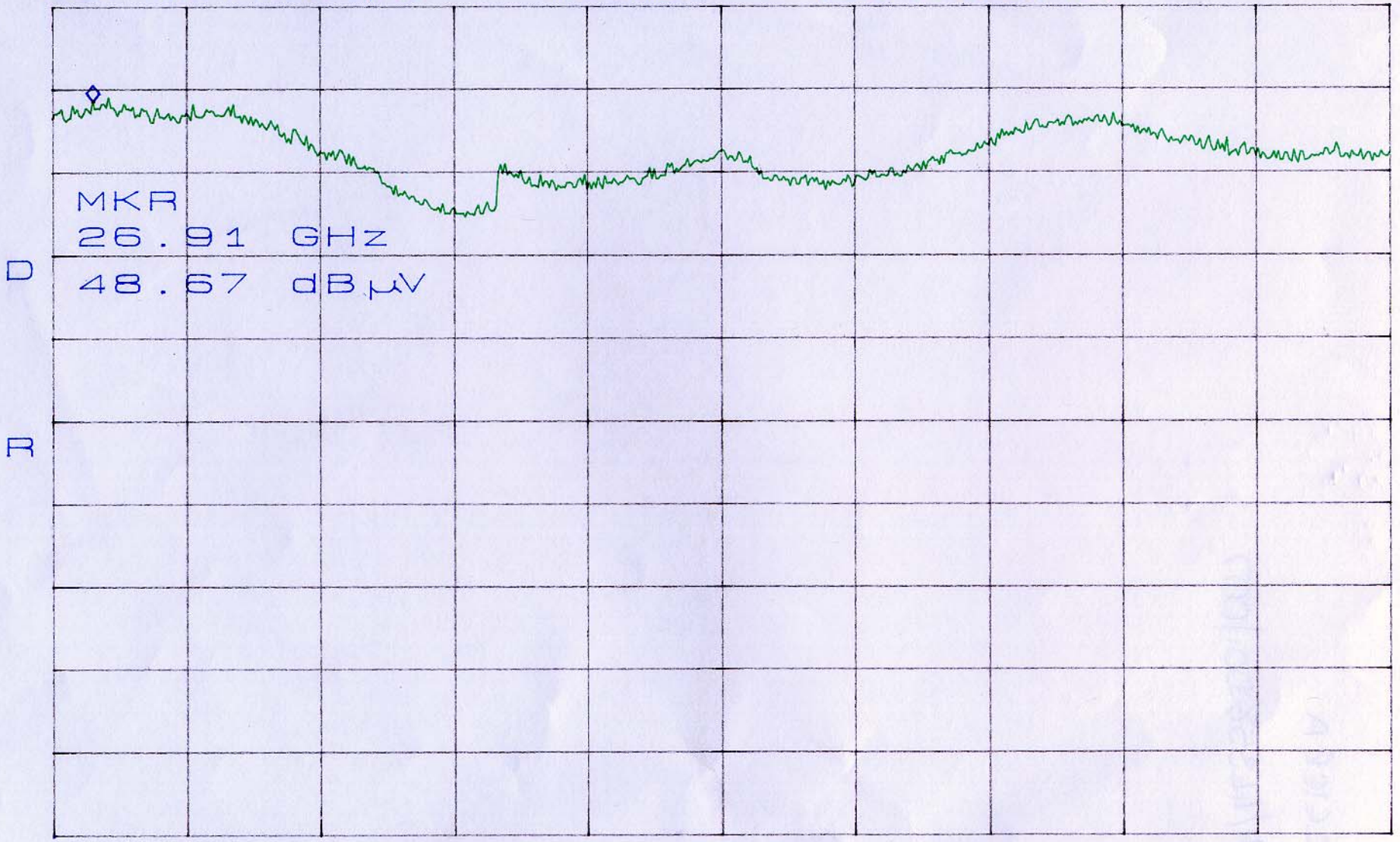


Test Of: Axxcelera Broadband Wireless UK Ltd.
Access Point (AP) & AP Wall-Box.

To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

GPH/443578JD01/017
6 dB Bandwidth BPSK Modulation
Top Channel





GPH\44358JD01\007