TEST REPORT
FROM
RADIO FREQUENCY
INVESTIGATION LTD.

Test Of: Axxcelera Broadband Wireless UK Ltd.
Subscriber Unit (SU) & SU Wall-Box

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

Test Report Serial No:
RFI/MPTB2/RP44358JD03A

Supersedes Test Report Serial No:
RFI/MPTB1/RP44358JD03A

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/RP44358JD03A supersedes Test Report Serial No: RFI/MPTB1/RP44358JD03A.

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:	Subscriber Unit (SU) & SU "Wall-Box"
Unique Type Identification:	AB-ACCESS SU
Serial Number:	SE460021FM
Country of Manufacture:	USA
Date of Receipt:	30 January 2003
FCC ID:	OJBAB-ACCESS-SU02

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-Point fixed radio transceiver with 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-Point fixed wireless access communications system		
Weight:	3.5 kg		
Dimensions:	250 x 250 x 80 mm (Subscriber Unit) 85 x 85 x 40 mm (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: - 17.43 MHz QPSK: - 17.41 MHz		
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: 2002 (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.

All receiver radiated emissions were carried out with the unit set to forced receive 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
Receiver Radiated Emissions	C.F.R. 47 FCC Part 15: 2002 Section 15.109	Antenna	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)(3)	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

Frequency (MHz)	Line	Q-P Level (dBμV)	Q-P Limit (dBμV)	Margin (dB)	Result
0.19574	Neutral	46.03	63.79	17.76	Complied
0.29424	Neutral	37.25	60.40	23.15	Complied
0.37493	Neutral	39.02	58.39	19.37	Complied
0.44024	Neutral	36.31	57.06	20.75	Complied
0.65941	Neutral	40.24	56.00	15.76	Complied
3.03932	Neutral	35.82	56.00	20.18	Complied
9.15503	Neutral	42.22	60.00	17.78	Complied
13.01008	Neutral	38.29	60.00	21.71	Complied

Average Detector Measurements

Frequency (MHz)	Line	Q-P Level (dBμV)	Q-P Limit (dBμV)	Margin (dB)	Result
0.19574	Neutral	34.40	53.79	19.39	Complied
0.29424	Neutral	25.87	50.40	24.53	Complied
0.37493	Neutral	26.38	48.39	22.01	Complied
0.44024	Neutral	20.11	47.06	26.95	Complied
0.65941	Neutral	24.75	46.00	21.25	Complied
3.03932	Neutral	18.30	46.00	27.70	Complied
9.15503	Neutral	28.54	50.00	21.46	Complied
13.01008	Live	27.14	50.00	22.86	Complied

7.3. Receiver Radiated Emissions: Section 15.109

7.3.1. Electric Field Strength Measurements (Frequency Range: 30 to 1000 MHz)

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

7.3.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
50.044	Vertical	33.60	40.00	6.50	Complied
62.606	Vertical	26.10	40.00	13.90	Complied
66.799	Vertical	22.50	40.00	17.50	Complied
120.01	Vertical	22.15	43.52	21.37	Complied

7.4. Receiver Radiated Emissions: Section 15.109

7.4.1. Electric Field Strength Measurements (Frequency Range: 1.0 to 40.0 GHz)

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

7.4.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

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)	Average Margin (dB)	Result
11.5867	Vertical	25.1	20.8	2.8	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)	Peak Margin (dB)	Result
11.5867	Vertical	37.8	20.8	2.8	61.4	74.0	12.6	Complied

Note: No spurious emissions were indicated on the measuring receiver as such, the value recorded above is indicative of the instrument's maximum noise floor.

7.5.Transmitter Minimum Bandwidth

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

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

Results: BPSK

Channel	Transmitter 6dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	11.02	0.5	10.52	Complied
Middle	11.13	0.5	10.63	Complied
Top	11.12	0.5	10.62	Complied

Results: QPSK

Channel	Transmitter 6dB Bandwidth (MHz)	Limit (MHz)	Margin (MHz)	Result
Bottom	11.07	0.5	10.57	Complied
Middle	11.15	0.5	10.65	Complied
Top	11.15	0.5	10.65	Complied

7.6. Transmitter Peak Output Power

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

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

Results: BPSK

Channel	Antenna Port (H/V))	Input Voltage (AC)	Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Vert.	97.75	17.8	30.00	12.2	Complied
Bottom	Horiz.	97.75	17.7	30.00	12.3	Complied
Bottom	Vert.	115.00	17.9	30.00	12.1	Complied
Bottom	Horiz.	115.00	17.7	30.00	12.3	Complied
Bottom	Vert.	132.25	17.9	30.00	12.1	Complied
Bottom	Horiz.	132.25	17.8	30.00	12.2	Complied
Middle	Vert.	97.75	18.2	30.00	11.8	Complied
Middle	Horiz.	97.75	18.2	30.00	11.8	Complied
Middle	Vert.	115.00	18.4	30.00	11.6	Complied
Middle	Horiz.	115.00	18.1	30.00	11.9	Complied
Middle	Vert.	132.25	18.4	30.00	11.6	Complied
Middle	Horiz.	132.25	18.3	30.00	11.7	Complied
Top	Vert	97.75	18.1	30.00	11.9	Complied
Top	Horiz.	97.75	17.9	30.00	12.1	Complied
Top	Vert	115.00	18.0	30.00	12.0	Complied
Top	Horiz.	115.00	17.9	30.00	12.1	Complied
Top	Vert	132.25	18.1	30.00	11.9	Complied
Top	Horiz.	132.25	18.0	30.00	12.0	Complied

Results: QPSK

Channel	Antenna Port (H/V))	Input Voltage (AC)	Output Power (dBm)	Limit (dBm)	Margin (dB)	Result
Bottom	Vert.	97.75	17.9	30.00	12.1	Complied
Bottom	Horiz.	97.75	17.8	30.00	12.2	Complied
Bottom	Vert.	115.00	18.1	30.00	11.9	Complied
Bottom	Horiz.	115.00	17.9	30.00	12.1	Complied
Bottom	Vert.	132.25	18.2	30.00	11.8	Complied
Bottom	Horiz.	132.25	17.9	30.00	12.1	Complied
Middle	Vert.	97.75	18.5	30.00	11.5	Complied
Middle	Horiz.	97.75	18.1	30.00	11.9	Complied
Middle	Vert.	115.00	18.5	30.00	11.5	Complied
Middle	Horiz.	115.00	18.2	30.00	11.8	Complied
Middle	Vert.	132.25	18.5	30.00	11.5	Complied
Middle	Horiz.	132.25	18.2	30.00	11.8	Complied
Top	Vert	97.75	18.0	30.00	12.0	Complied
Top	Horiz.	97.75	18.0	30.00	12.0	Complied
Top	Vert	115.00	18.2	30.00	11.8	Complied
Top	Horiz.	115.00	18.0	30.00	12.0	Complied
Top	Vert	132.25	18.3	30.00	11.7	Complied
Top	Horiz.	132.25	18.0	30.00	12.0	Complied

7.7. Transmitter Conducted Emissions

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

7.7.2. 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
36.691	-16.00	-8.6	7.40	Complied

Highest Peak Level: Middle

Frequency (GHz)	Peak level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
36.800	-16.17	-8.6	7.57	Complied

Highest Peak Level: Top

Frequency (GHz)	Peak level (dBm)	Peak Limit (dBm)	Peak Margin (dB)	Result
36.941	-16.17	-8.6	7.57	Complied

Note: No spurious emissions were indicated on the measuring receiver as such, the value recorded above is indicative of the instrument's maximum noise floor.

7.8. Transmitter Radiated Emissions

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

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

7.8.1.2. Tests were performed to identify the maximum radiated spurious emissions levels.

Results: Middle Channel

Frequency (MHz)	Ant. Pol.	Q-P Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
48.438	Vert.	19.4	40.0	20.6	Complied
66.810	Vert.	30.2	40.0	9.8	Complied
120.011	Vert.	29.5	43.5	14.0	Complied
600.011	Horiz.	25.6	46.0	20.4	Complied

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

Transmitter Radiated Emissions (continued)

7.8.2. Electric Field Strength Measurements: 1.0 to 40 GHz

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

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

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)	Average Margin (dB)	Result
11.5867	Vertical	25.1	20.8	2.8	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)	Peak Margin (dB)	Result
11.5867	Vertical	37.8	20.8	2.8	61.4	74.0	12.6	Complied

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

7.9.Transmitter Peak Power Spectral Density

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

7.9.2. Tests were performed to identify the maximum Peak Power Spectral Density of the Fundamental.

Results: BPSK

Channel	Antenna Port (H/V)	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	Vert.	-10.43	8.00	18.43	Complied
Bottom	Horiz.	-10.93	8.00	18.93	Complied
Middle	Vert.	-10.27	8.00	18.27	Complied
Middle	Horiz.	-10.93	8.00	18.93	Complied
Top	Vert.	-10.60	8.00	18.60	Complied
Top	Horiz.	-11.10	8.00	19.10	Complied

Results: QPSK

Channel	Antenna Port (H/V)	Output Power (dBm/3kHz)	Limit (dBm/3kHz)	Margin (dB)	Result
Bottom	Vert.	-10.77	8.00	18.77	Complied
Bottom	Horiz.	-10.10	8.00	18.10	Complied
Middle	Vert.	-10.77	8.00	18.77	Complied
Middle	Horiz.	-9.77	8.00	17.77	Complied
Top	Vert.	-10.93	8.00	18.93	Complied
Top	Horiz.	-9.93	8.00	17.93	Complied

7.10. Transmitter Band Edge Radiated Emissions

7.10.1. Electric Field Strength Measurements

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

7.10.1.2. 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)	Average Detector level (dBμV)	Antenna factor (dB)	Cable loss (dB)	Actual Average Level (dBμV/m)	Average Limit (dBμV/m)	Average Margin (dB)	Result
5721.391	53.4	24.3	1.9	79.6	105.6	29.0	Complied
5821.104	57.0	24.3	1.9	83.2	105.6	25.4	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
5713.351	52.6	24.3	1.9	78.8	105.0	26.2	Complied
5851.546	57.3	24.3	1.9	83.5	105.0	21.5	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 MHz	95%	+/- 3.25 dB
Carrier Output Power	Not applicable	95%	+/- 0.46 dB
Conducted Emissions Antenna Port	30 MHz to 40 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 MHz to 1000 MHz	95%	+/- 5.26 dB
Radiated Spurious Emissions	1 GHz to 40 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 and with the EUT powered via a 115V 60 Hz AC mains supply.

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	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

* In some instances an Average detector function may also have been used.

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 on which the EUT 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 dB of the limit were then measured on the open area test site, except in cases where the noise floor was within 20dB of the limit, in these cases 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).

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.

Initial measurements covering the entire measurement 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 analyser was set for a maximum hold scan to capture the profile of the signal. The peak level was then determined, and a reference established 6 dB below the peak level. The bandwidth was determined at the points where the 6 dB reference crossed the profile of the emission.

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.

(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 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 the spectrum analyser to compensate for the measurement set up.

Prior to the measurement being taken the spectrum analyser was tuned to the fundamental frequency of the EUT.

A resolution bandwidth of 3KHz was selected and the analyser was set to zero span the trace was max held and a reading was taken at the peak point of the trace.

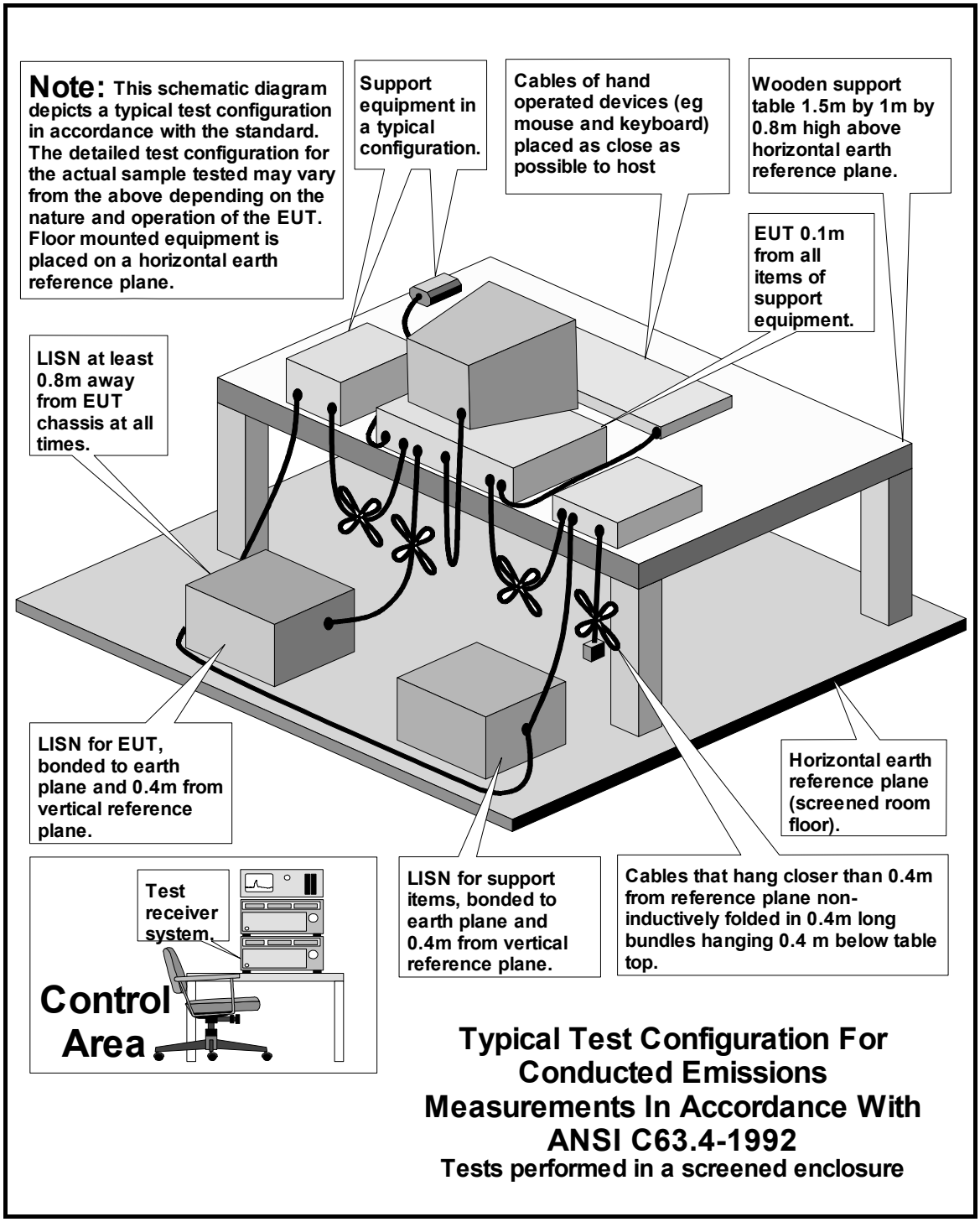
The EUT was configured in accordance with section 5.2 of this report.

Appendix 3. Test Configuration Drawings

This appendix contains the following drawings:

Drawing Reference Number	Title
DRG\44358JD03\EMICON	Test configuration for measurement of conducted emissions
DRG\44358JD03\EMIRAD	Test configuration for measurement of radiated emissions
DRG\44358JD03\001	Schematic diagram of the EUT, support equipment and interconnecting cables used for the test

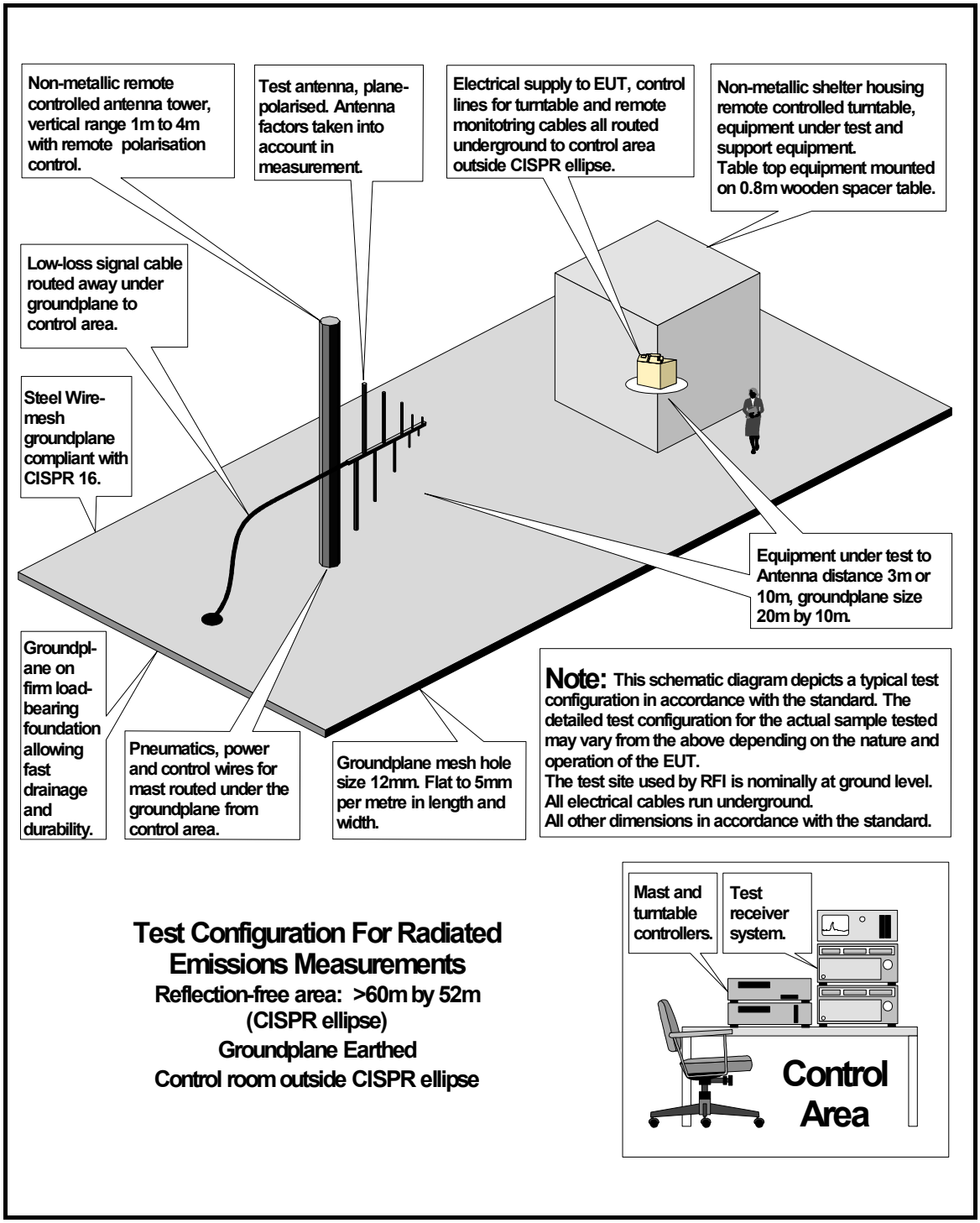
DRG\44358JD03\EMICON



Typical Test Configuration For Conducted Emissions Measurements In Accordance With ANSI C63.4-1992

Tests performed in a screened enclosure

DRG\44358JD03\EMIRAD

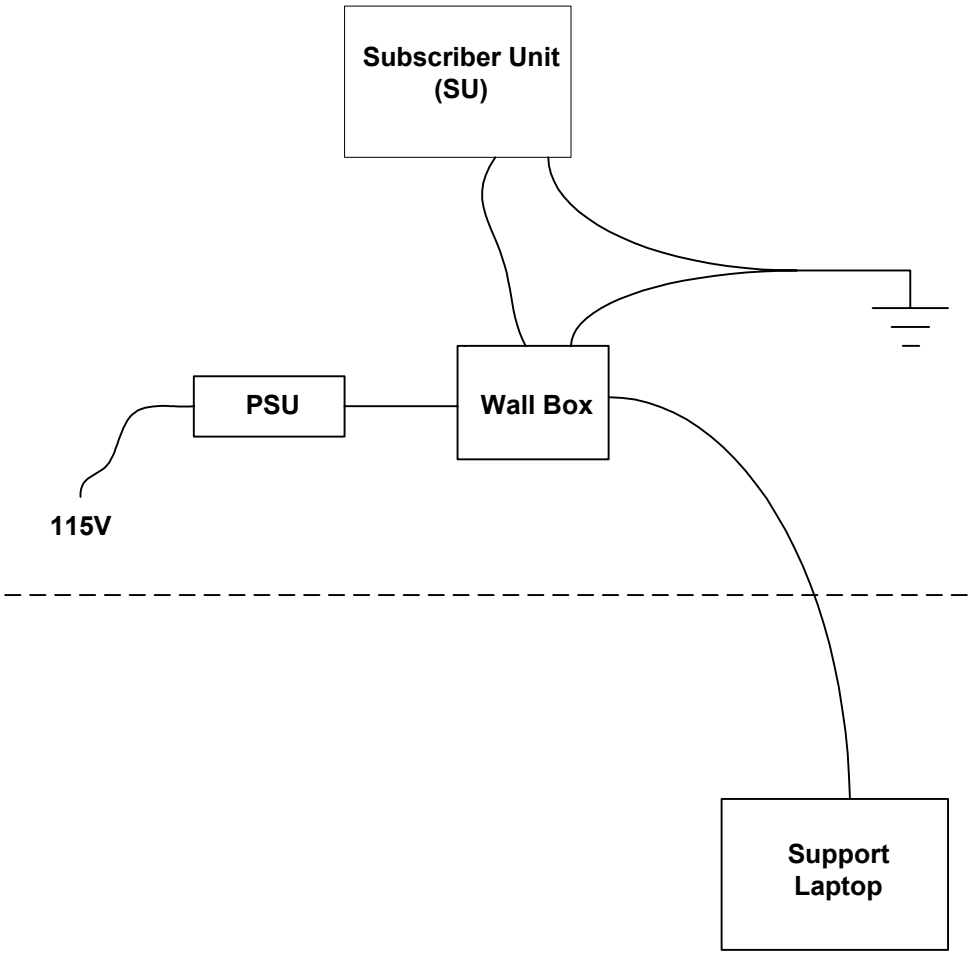


Test Configuration For Radiated Emissions Measurements

Reflection-free area: >60m by 52m
(CISPR ellipse)
Groundplane Earthed
Control room outside CISPR ellipse

DRG\44358JD03\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\44358JD03\001	AC Conducted Emissions (0.15 MHz to 30.0 MHz)
GPH\44358CE\055	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (30.0 MHz to 1.0 GHz)
GPH\44358CE\056	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (30.0 MHz to 1.0 GHz)
GPH\44358CE\057	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (30.0 MHz to 1.0 GHz)
GPH\44358CE\058	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (1.0 GHz to 5.0 GHz)
GPH\44358CE\059	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (1.0 GHz to 5.0 GHz)
GPH\44358CE\060	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (1.0 GHz to 5.0 GHz)
GPH\44358CE\061	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (5.0 GHz to 10.0 GHz)
GPH\44358CE\062	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (5.0 GHz to 10.0 GHz)
GPH\44358CE\063	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (5.0 GHz to 10.0 GHz)
GPH\44358CE\064	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (10.0 GHz to 15.0 GHz)
GPH\44358CE\065	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (10.0 GHz to 15.0 GHz)
GPH\44358CE\066	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (10.0 GHz to 15.0 GHz)

Graphical Test Results (continued)

Graph Reference Number	Title
GPH\44358CE\067	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (15.0 GHz to 20.0 GHz)
GPH\44358CE\068	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (15.0 GHz to 20.0 GHz)
GPH\44358CE\069	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (15.0 GHz to 20.0 GHz)
GPH\44358CE\070	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (20.0 GHz to 25.0 GHz)
GPH\44358CE\071	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (20.0 GHz to 25.0 GHz)
GPH\44358CE\072	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (20.0 GHz to 25.0 GHz)
GPH\44358CE\073	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (25.0 GHz to 30.0 GHz)
GPH\44358CE\074	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (25.0 GHz to 30.0 GHz)
GPH\44358CE\075	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (25.0 GHz to 30.0 GHz)
GPH\44358CE\076	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (30.0 GHz to 35.0 GHz)
GPH\44358CE\077	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (30.0 GHz to 35.0 GHz)
GPH\44358CE\078	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (30.0 GHz to 35.0 GHz)
GPH\44358CE\079	Conducted Emissions. Modulation QPSK. Operating Condition – Bottom Channel (35.0 GHz to 40.0 GHz)

Graphical Test Results (continued)

Graph Reference Number	Title
GPH\44358CE\080	Conducted Emissions. Modulation QPSK. Operating Condition – Middle Channel (35.0 GHz to 40.0 GHz)
GPH\44358CE\081	Conducted Emissions. Modulation QPSK. Operating Condition – Top Channel (35.0 GHz to 40.0 GHz)
GPH\44358\011	Radiated Emissions. Transmit Mode (30.0 MHz to 1.0 GHz)
GPH\44358\012	Radiated Emissions. Transmit Mode (1.0 GHz to 2.0 GHz)
GPH\44358\013	Radiated Emissions. Transmit Mode (2.0 GHz to 4.0 GHz)
GPH\44358JD03\002	Radiated Emissions. Transmit Mode (4.0 GHz to 6.0 GHz)
GPH\44358JD03\003	Radiated Emissions. Transmit Mode (6.0 GHz to 8.0 GHz)
GPH\44358JD03\004	Radiated Emissions. Transmit Mode (8.0 GHz to 12.5 GHz)
GPH\44358JD03\005	Radiated Emissions. Transmit Mode (12.5 GHz to 18.0 GHz)
GPH\44358JD03\006	Radiated Emissions. Transmit Mode (18.0 GHz to 26.5 GHz)
GPH\44358JD03\007	* Radiated Emissions. Transmit Mode (26.5 GHz to 40.0 GHz)
GPH\44358\018	Radiated Emissions. Receive Mode (30.0 MHz to 1.0 GHz)
GPH\44358\019	Radiated Emissions. Receive Mode (1.0 GHz to 2.0 GHz)

Graphical Test Results (continued)

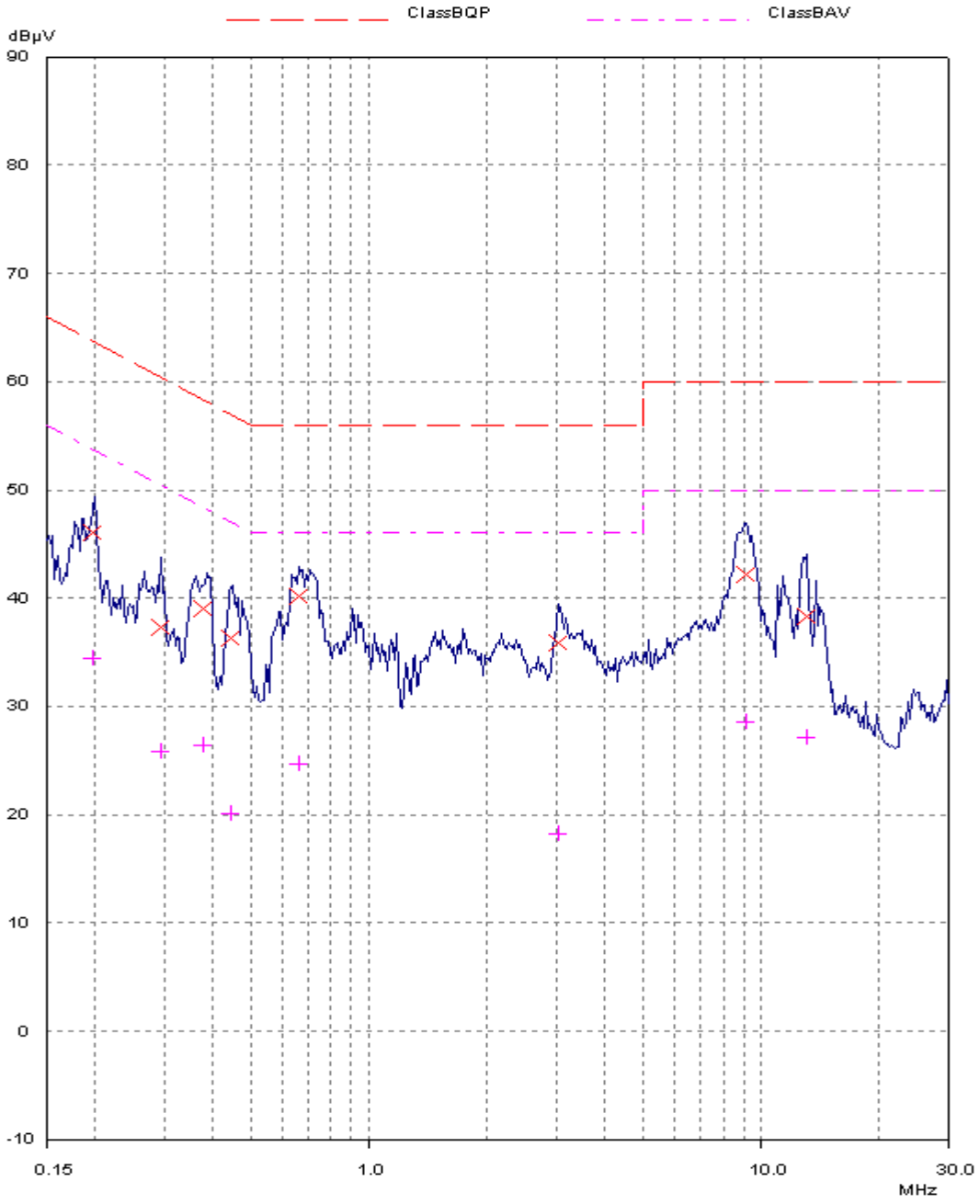
Graph Reference Number	Title
GPH\44358\020	Radiated Emissions. Receive Mode (2.0 GHz to 4.0 GHz)
GPH\44358JD03\008	Radiated Emissions. Receive Mode (4.0 GHz to 6.0 GHz)
GPH\44358JD03\009	Radiated Emissions. Receive Mode (6.0 GHz to 8.0 GHz)
GPH\44358JD03\010	Radiated Emissions. Receive Mode (8.0 GHz to 12.5 GHz)
GPH\44358JD03\011	Radiated Emissions. Receive Mode (12.5 GHz to 18.0 GHz)
GPH\44358JD03\012	Radiated Emissions. Receive Mode (18.0 GHz to 26.5 GHz)
GPH\44358JD03\013	*Radiated Emissions. Receive Mode (26.5 GHz to 40.0 GHz)

* Note: GPH\44358JD03\007 & GPH\44358JD03\013 are hard copy graphs, therefore these are not included in the total number of pages for this report and have been placed at the end of the graph section.

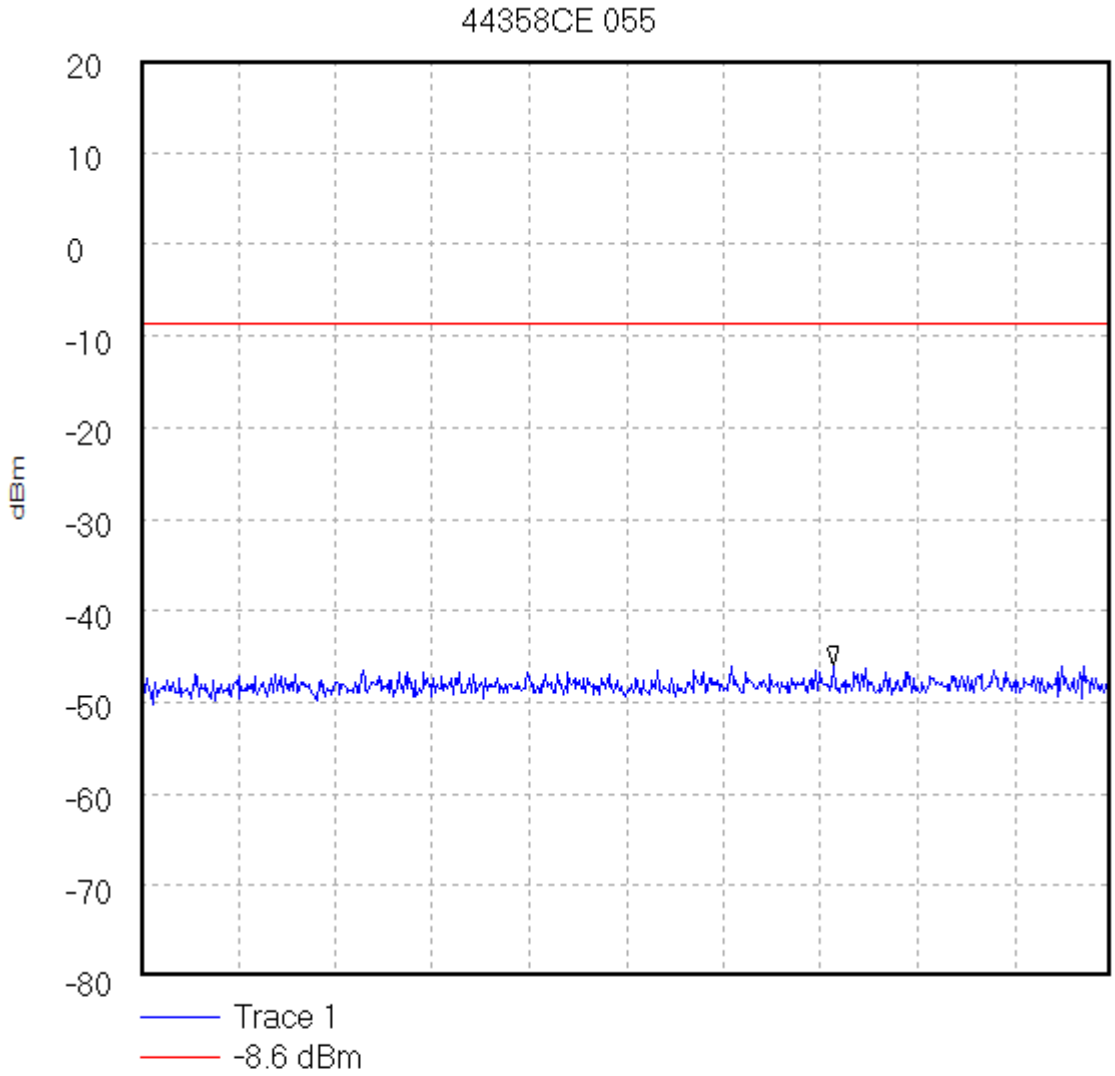
Graphical Test Results (continued)

Graph Reference Number	Title
GPH\44358JD03\014	Transmitter Band Edge Radiated Emissions. BPSK Mode - Bottom Channel.
GPH\44358JD03\015	Transmitter Band Edge Radiated Emissions. BPSK Mode - Top Channel.
GPH\44358JD03\016	Transmitter Band Edge Radiated Emissions. QPSK Mode - Bottom Channel.
GPH\44358JD03\017	Transmitter Band Edge Radiated Emissions. QPSK Mode - Top Channel.
GPH\44358JD03\018	6 dB Bandwidth BPSK Modulation. Bottom Channel
GPH\44358JD03\019	6 dB Bandwidth BPSK Modulation. Middle Channel
GPH\44358JD03\020	6 dB Bandwidth BPSK Modulation. Top Channel
GPH\44358JD03\021	6 dB Bandwidth QPSK Modulation. Bottom Channel
GPH\44358JD03\022	6 dB Bandwidth QPSK Modulation. Middle Channel
GPH\44358JD03\023	6 dB Bandwidth QPSK Modulation. Top Channel

GPH\44358JD03\001
AC Conducted Emissions
(0.15 MHz to 30.0 MHz)

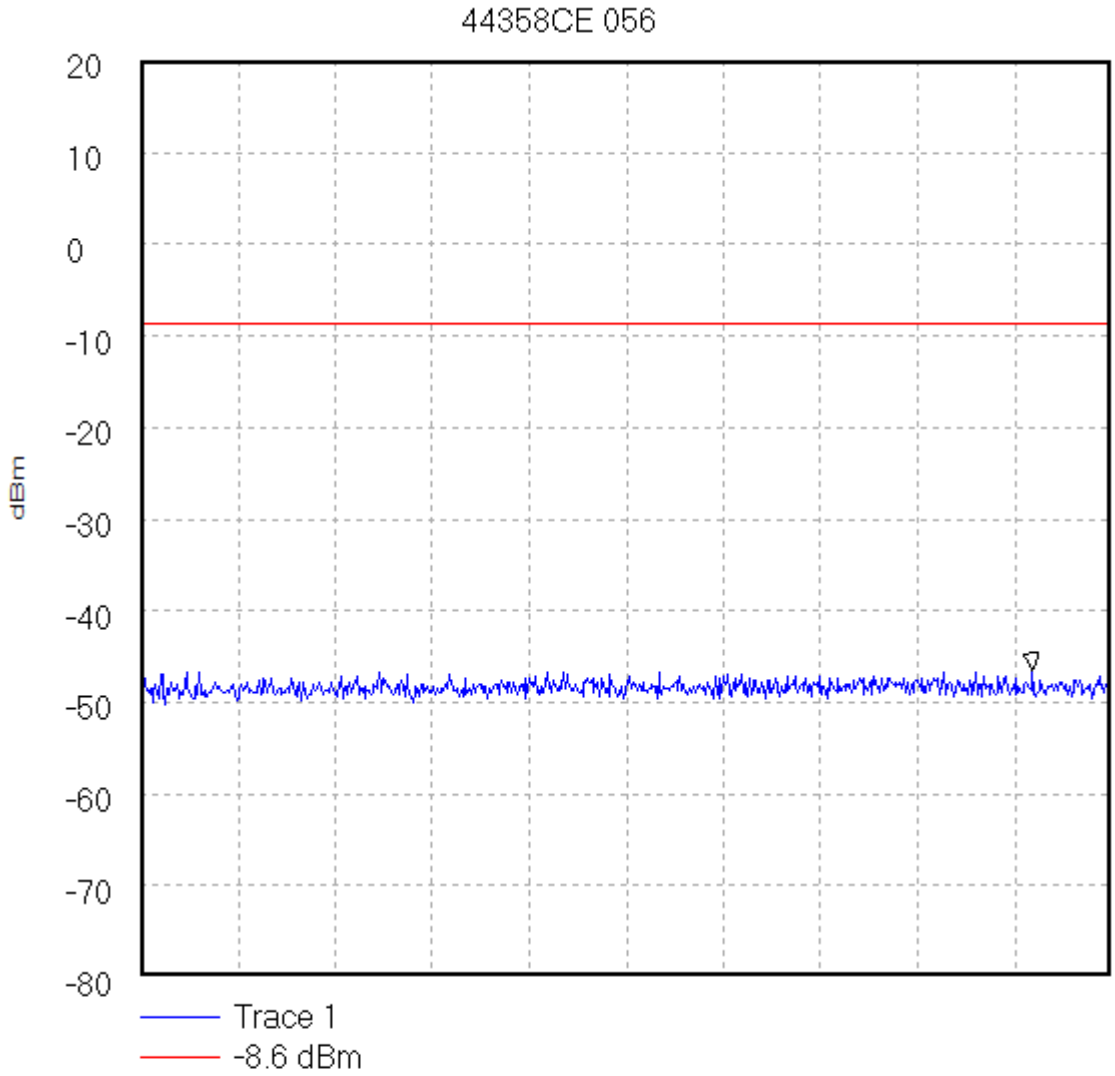


GPH\44358CE\055
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(30.0 MHz to 1.0 GHz)



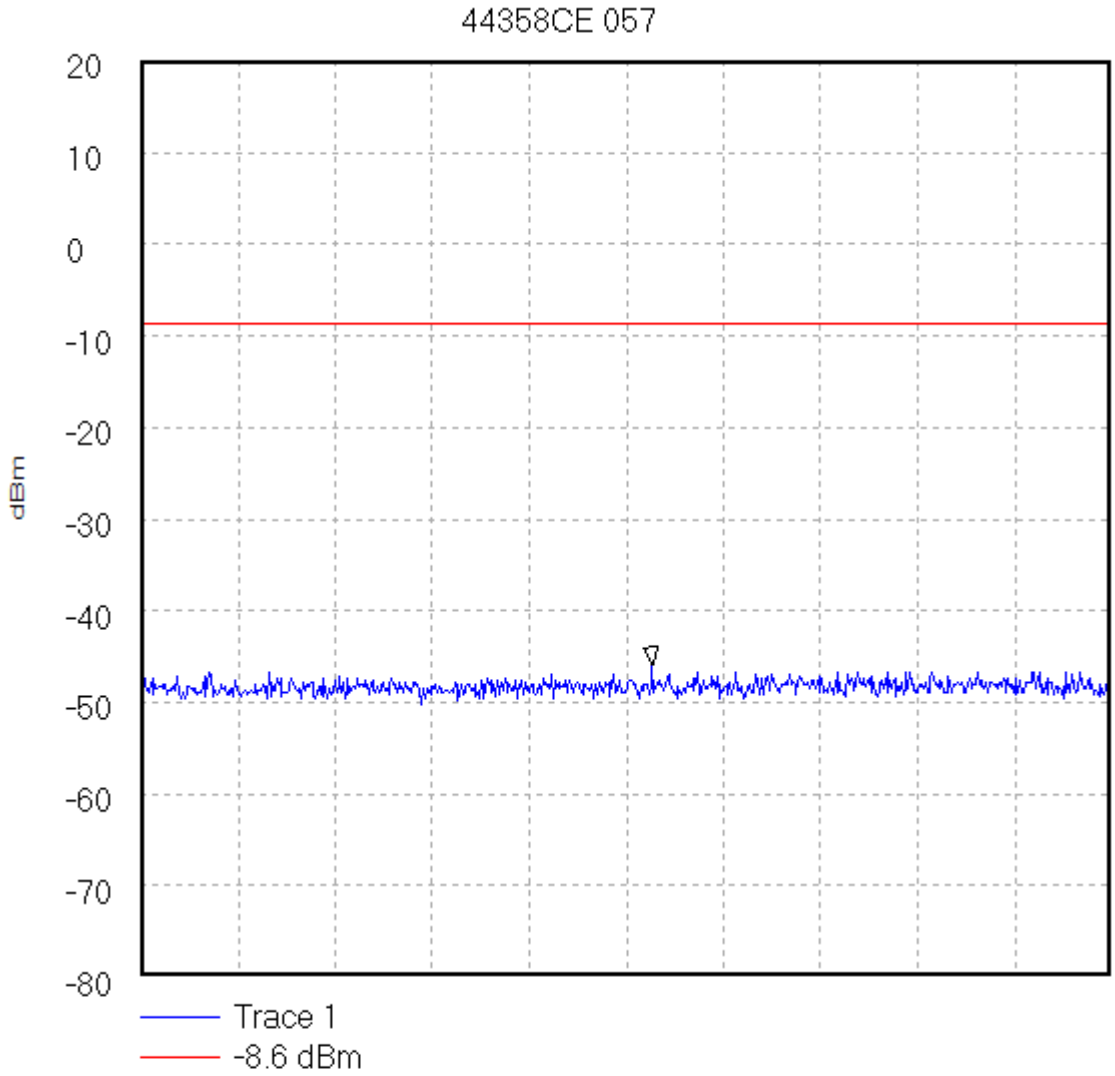
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 31.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 721.933333 MHz, -46.0 dBm
Display Line: -8.6 dBm;
07/02/2003 15:08:51

GPH\44358CE\056
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(30.0 MHz to 1.0 GHz)



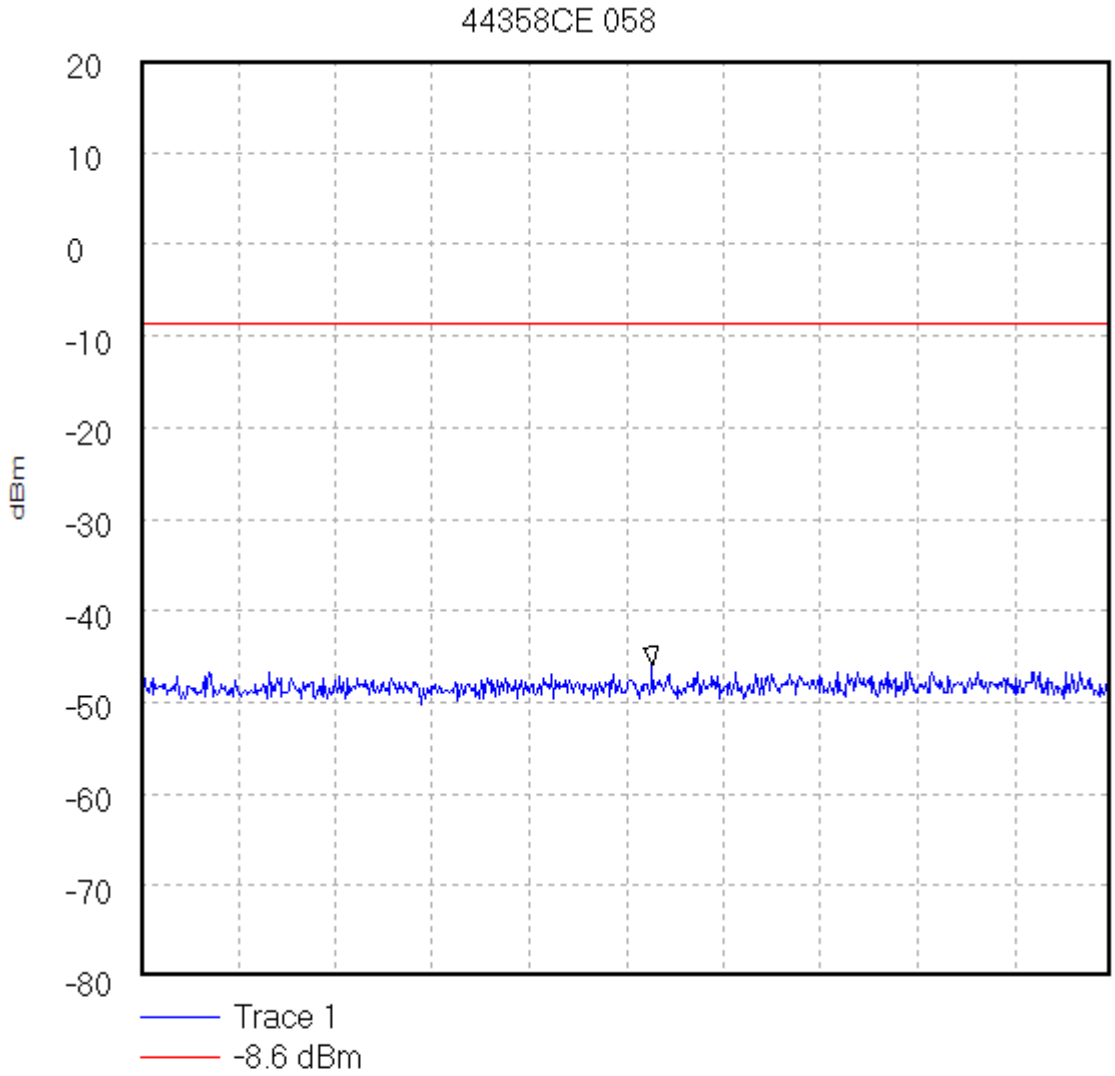
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 31.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 920.783333 MHz, -46.5 dBm
Display Line: -8.6 dBm;
07/02/2003 15:09:27

GPH\44358CE\057
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(30.0 MHz to 1.0 GHz)



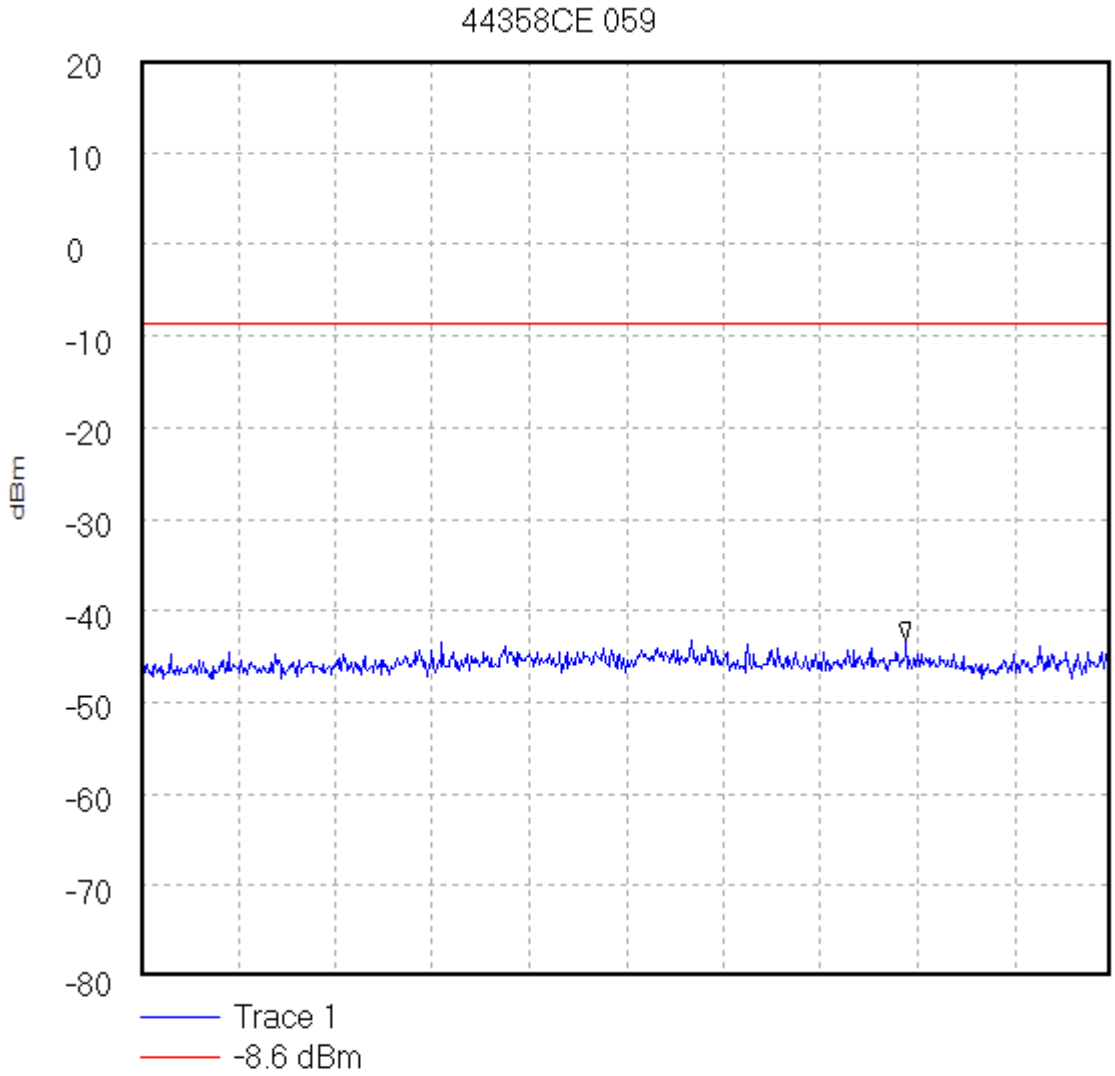
Start 30.0 MHz; Stop 1.0 GHz
Ref 20 dBm; Ref Offset 31.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 250.0 mS
Peak 540.866667 MHz, -46.0 dBm
Display Line: -8.6 dBm;
07/02/2003 15:09:49

GPH\44358CE\058
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(1.0 GHz to 5.0 GHz)



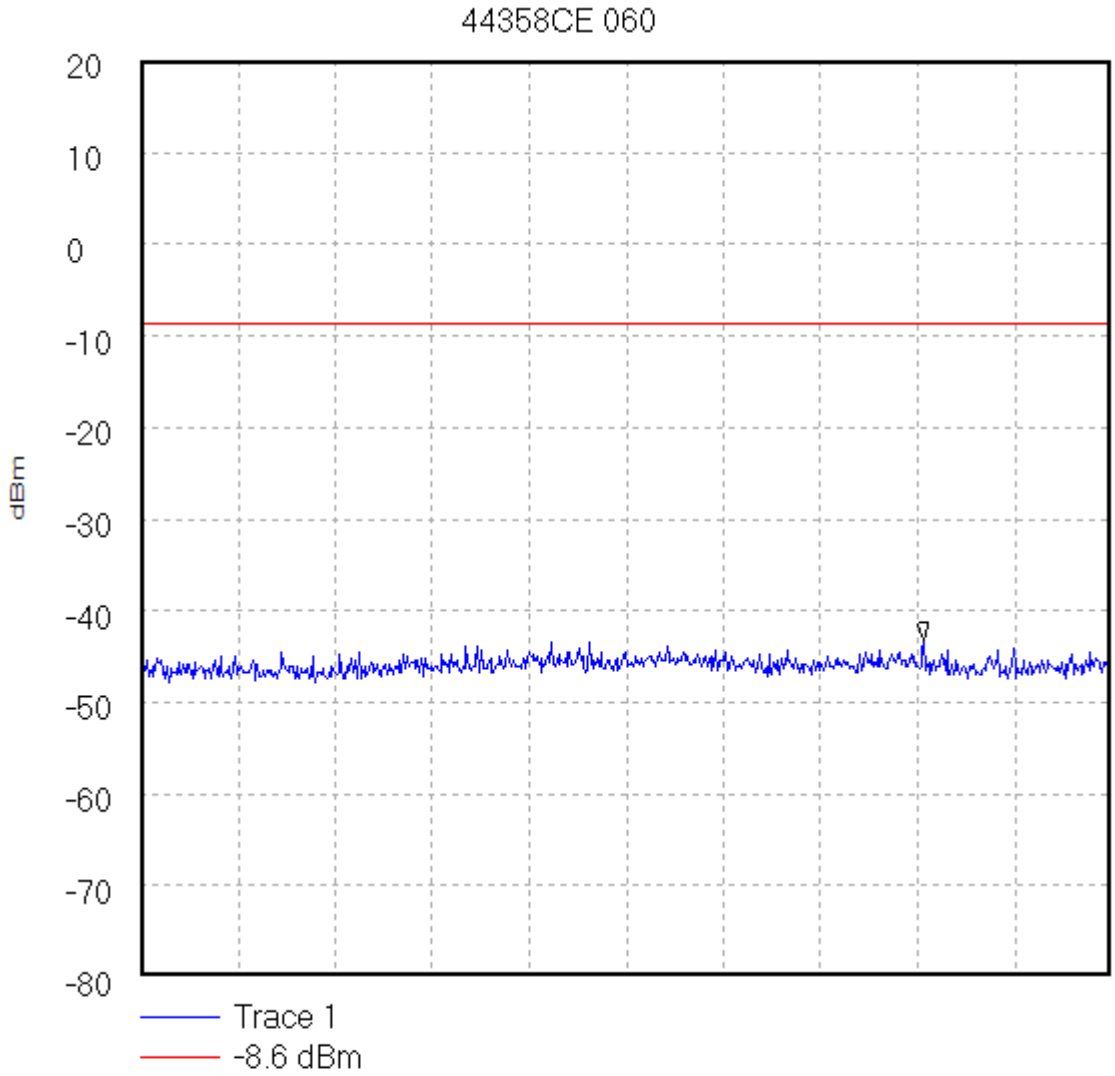
Start 1.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.0 S
Peak 3.106667 GHz, -46.0 dBm
Display Line: -8.6 dBm;
07/02/2003 15:10:31

GPH\44358CE\059
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(1.0 GHz to 5.0 GHz)



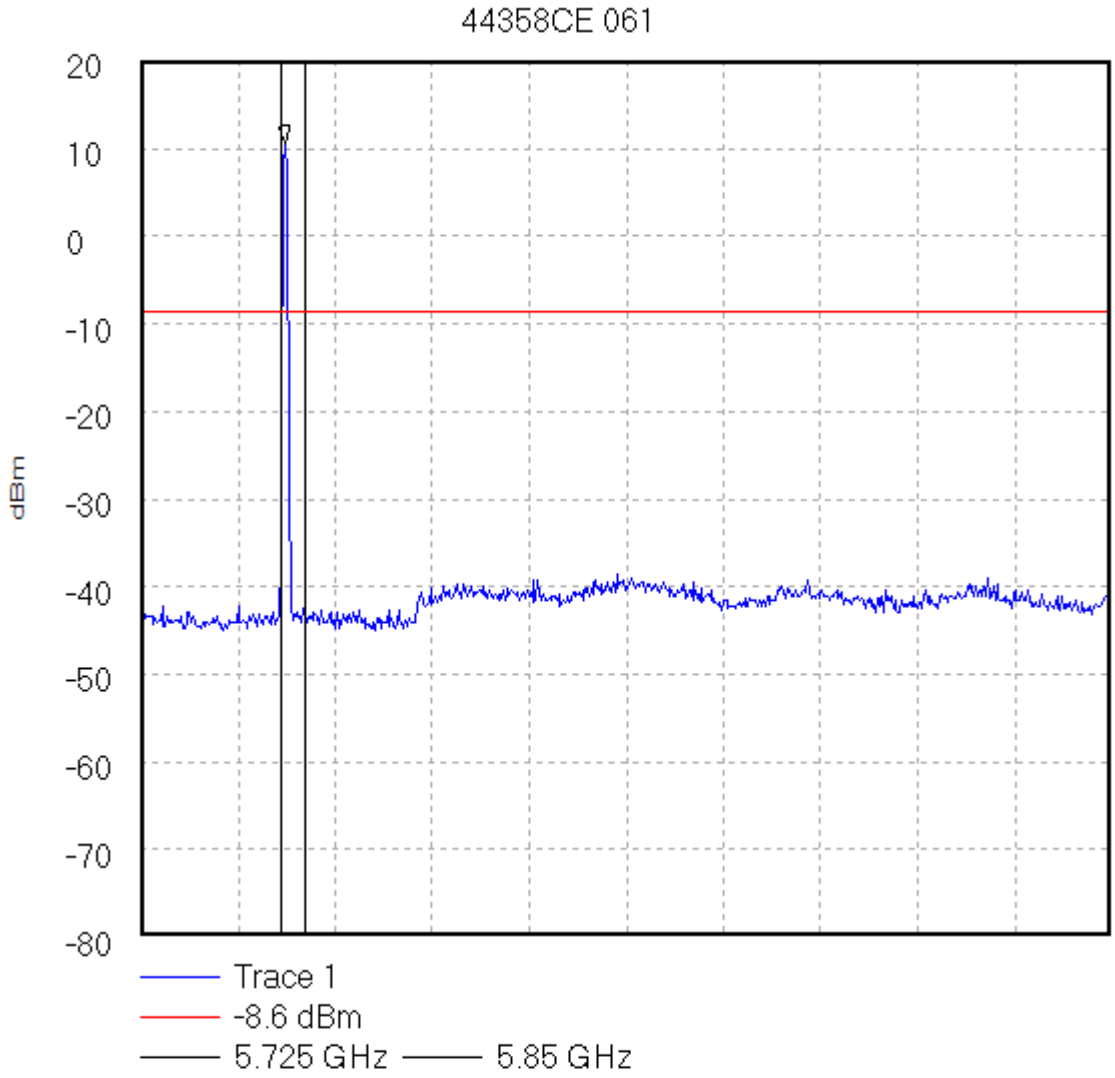
Start 1.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.0 S
Peak 4.153333 GHz, -43.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:10:53

GPH\44358CE\060
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(1.0 GHz to 5.0 GHz)



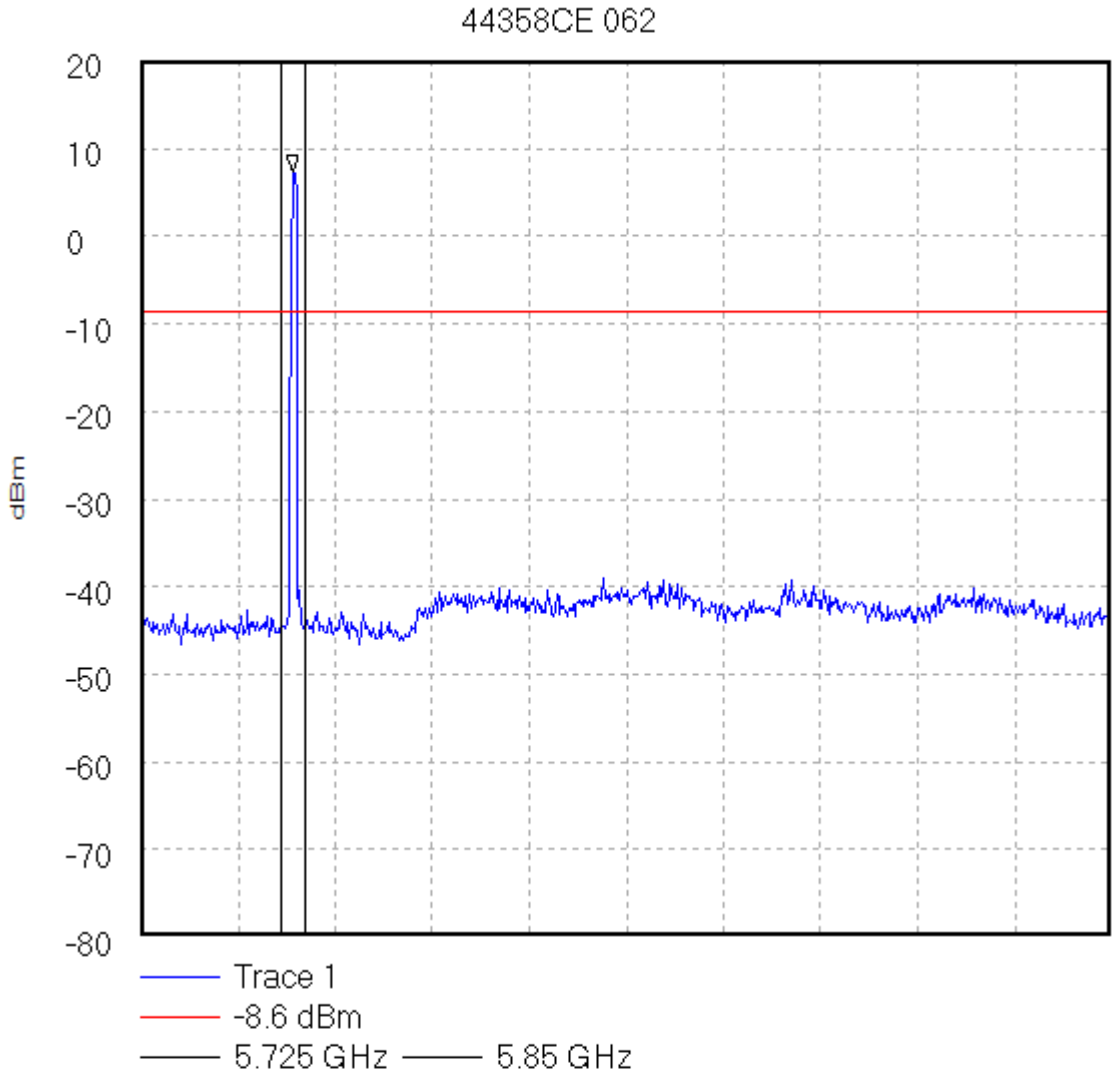
Start 1.0 GHz; Stop 5.0 GHz
Ref 20 dBm; Ref Offset 33.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.0 S
Peak 4.226667 GHz, -43.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:11:07

GPH\44358CE\061
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(5.0 GHz to 10.0 GHz)



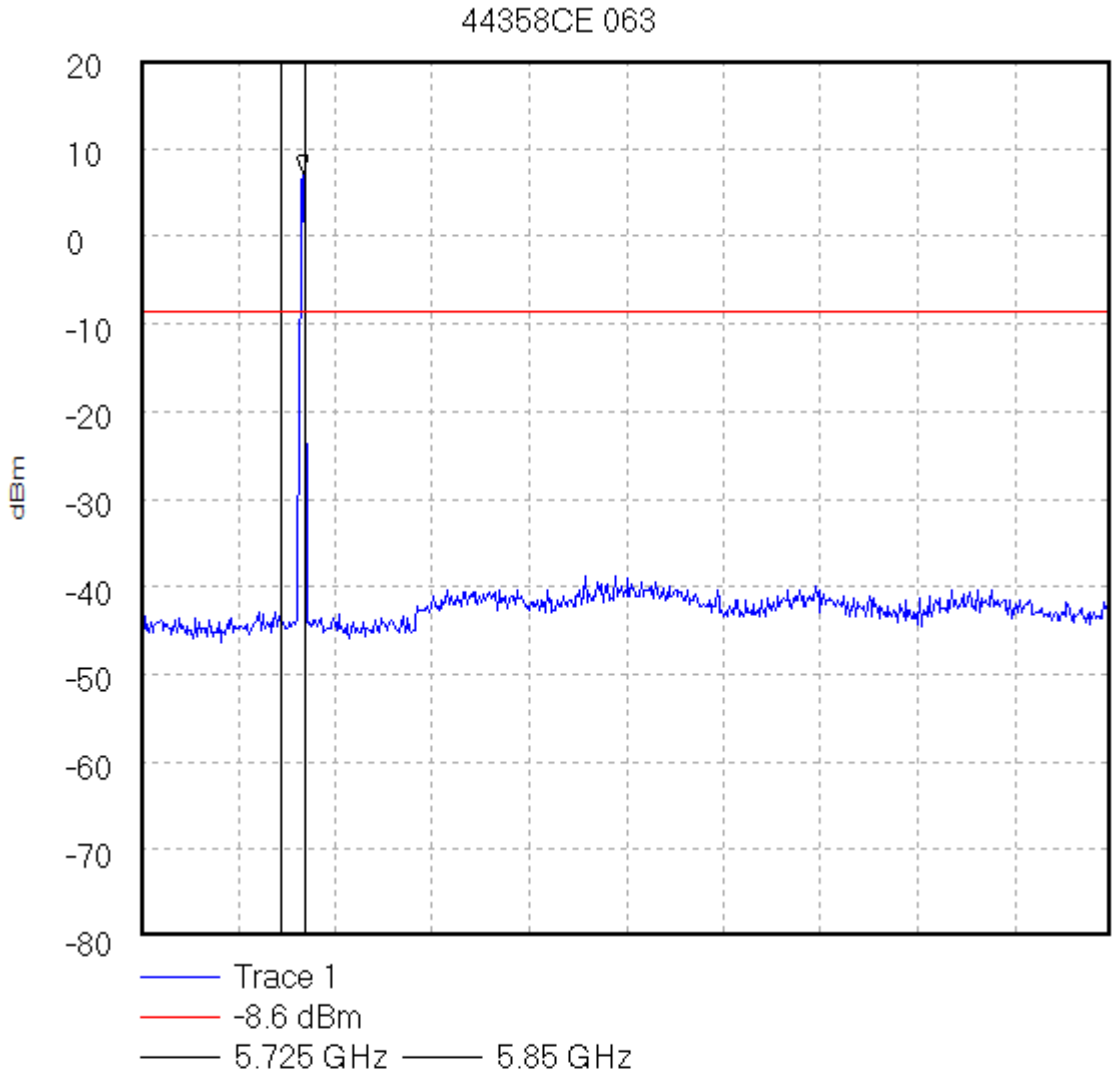
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 34.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 5.741667 GHz, 10.67 dBm
Display Line: -8.6 dBm;
07/02/2003 15:12:44

GPH\44358CE\062
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(5.0 GHz to 10.0 GHz)



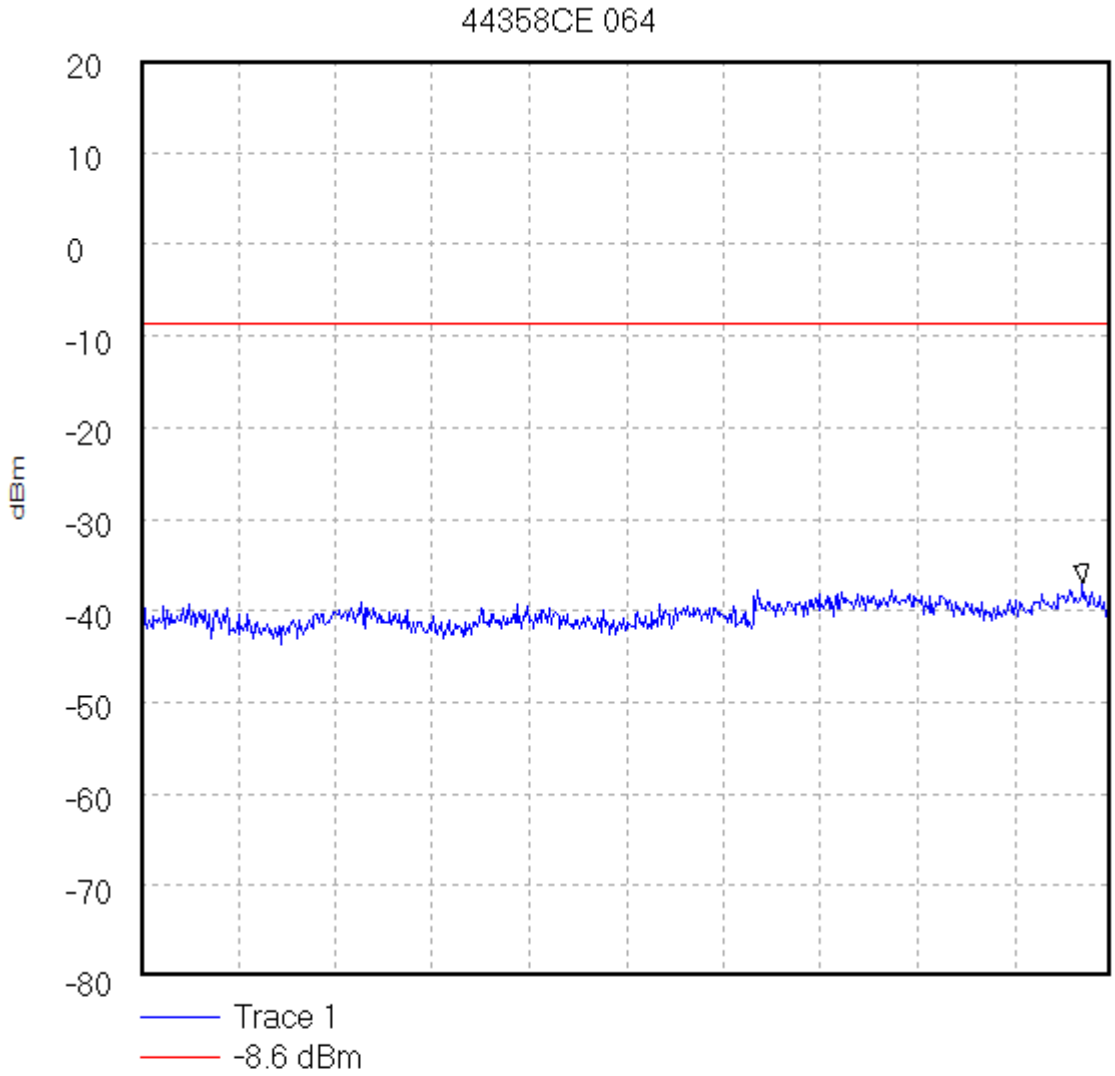
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 34.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 5.783333 GHz, 7.33 dBm
Display Line: -8.6 dBm;
07/02/2003 15:13:06

GPH\44358CE\063
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(5.0 GHz to 10.0 GHz)



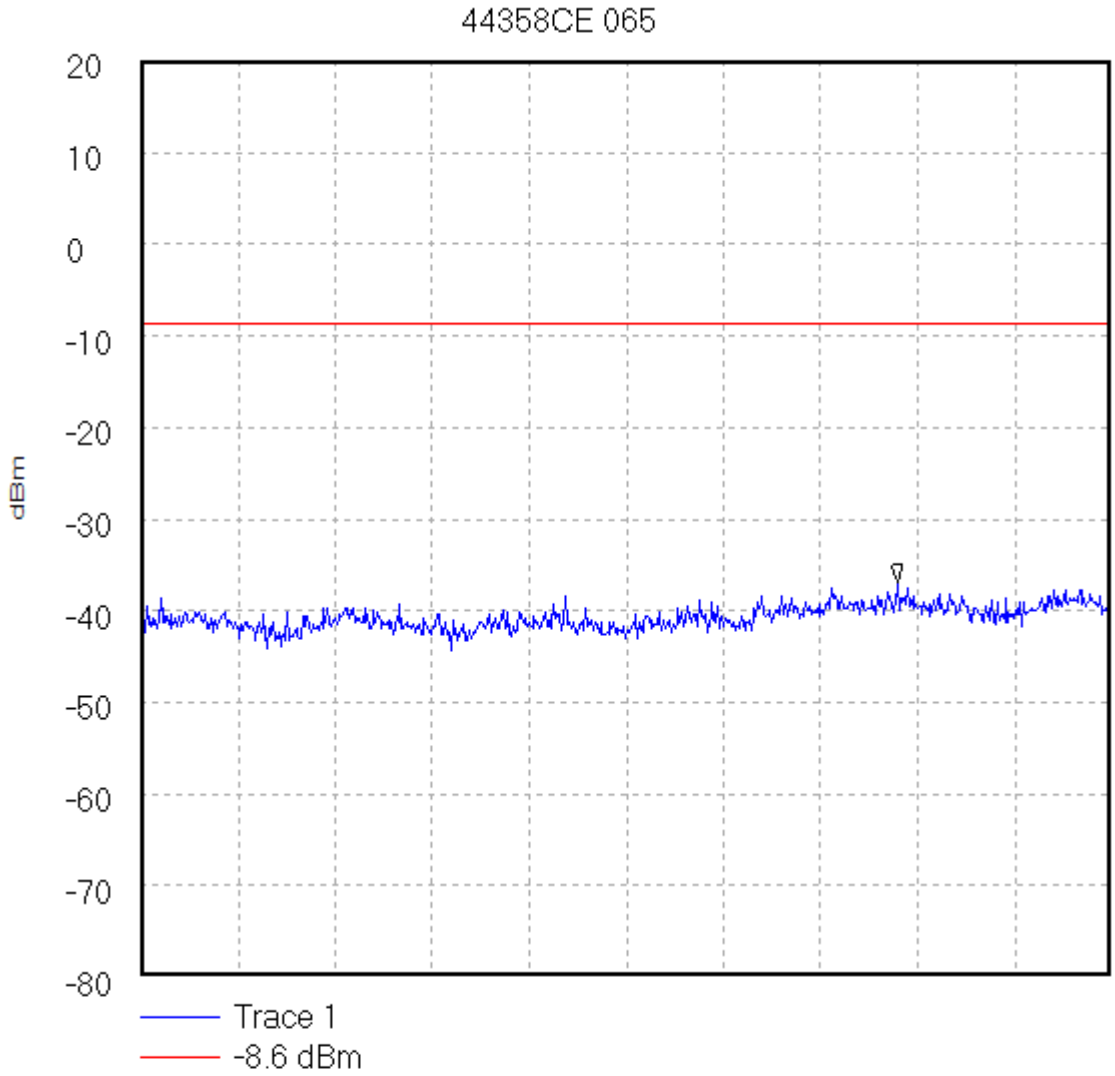
Start 5.0 GHz; Stop 10.0 GHz
Ref 20 dBm; Ref Offset 34.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 5.833333 GHz, 7.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:13:29

GPH\44358CE\064
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(10.0 GHz to 15.0 GHz)



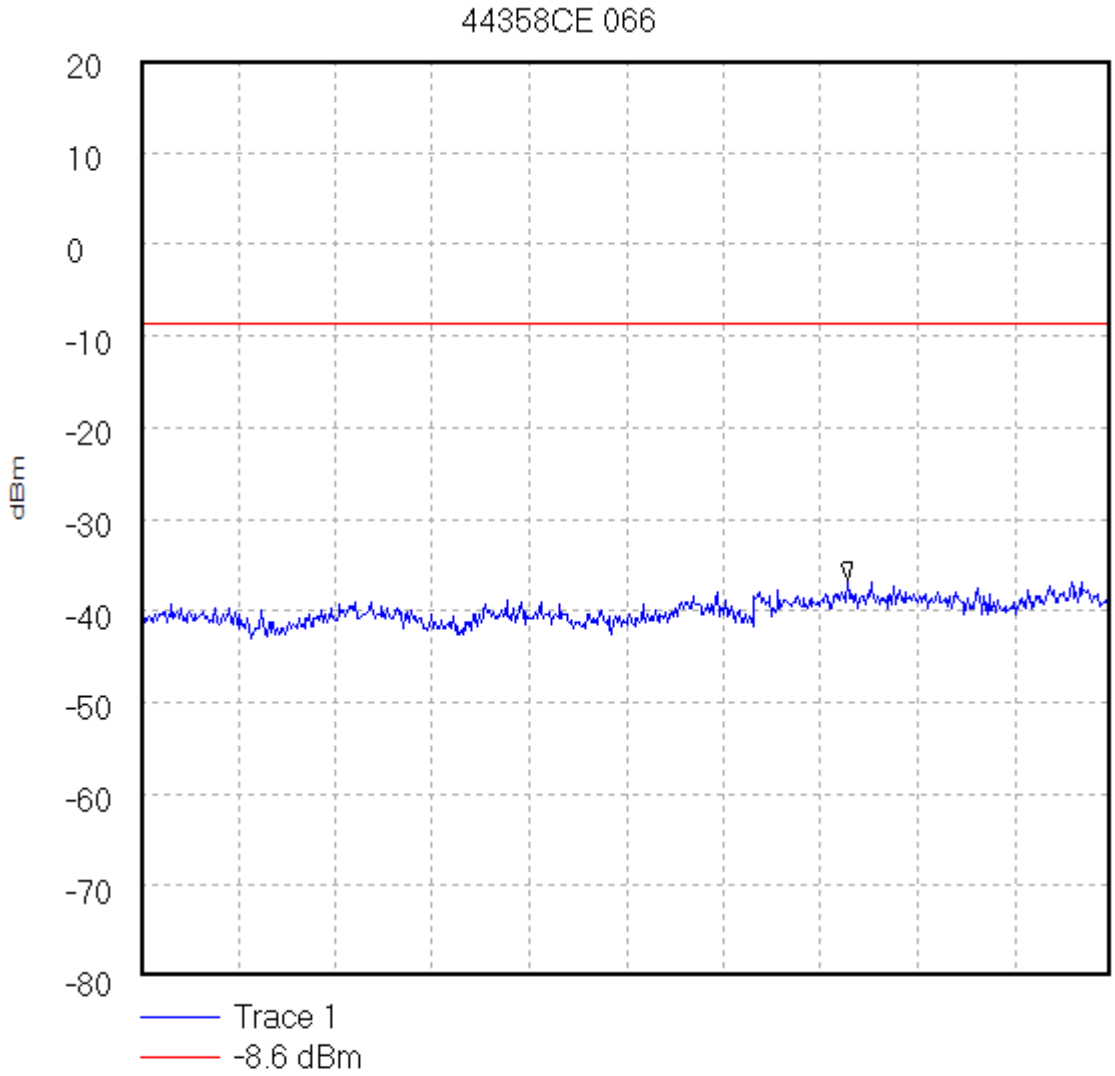
Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 14.85 GHz, -37.0 dBm
Display Line: -8.6 dBm;
07/02/2003 15:14:31

GPH\44358CE\065
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(10.0 GHz to 15.0 GHz)



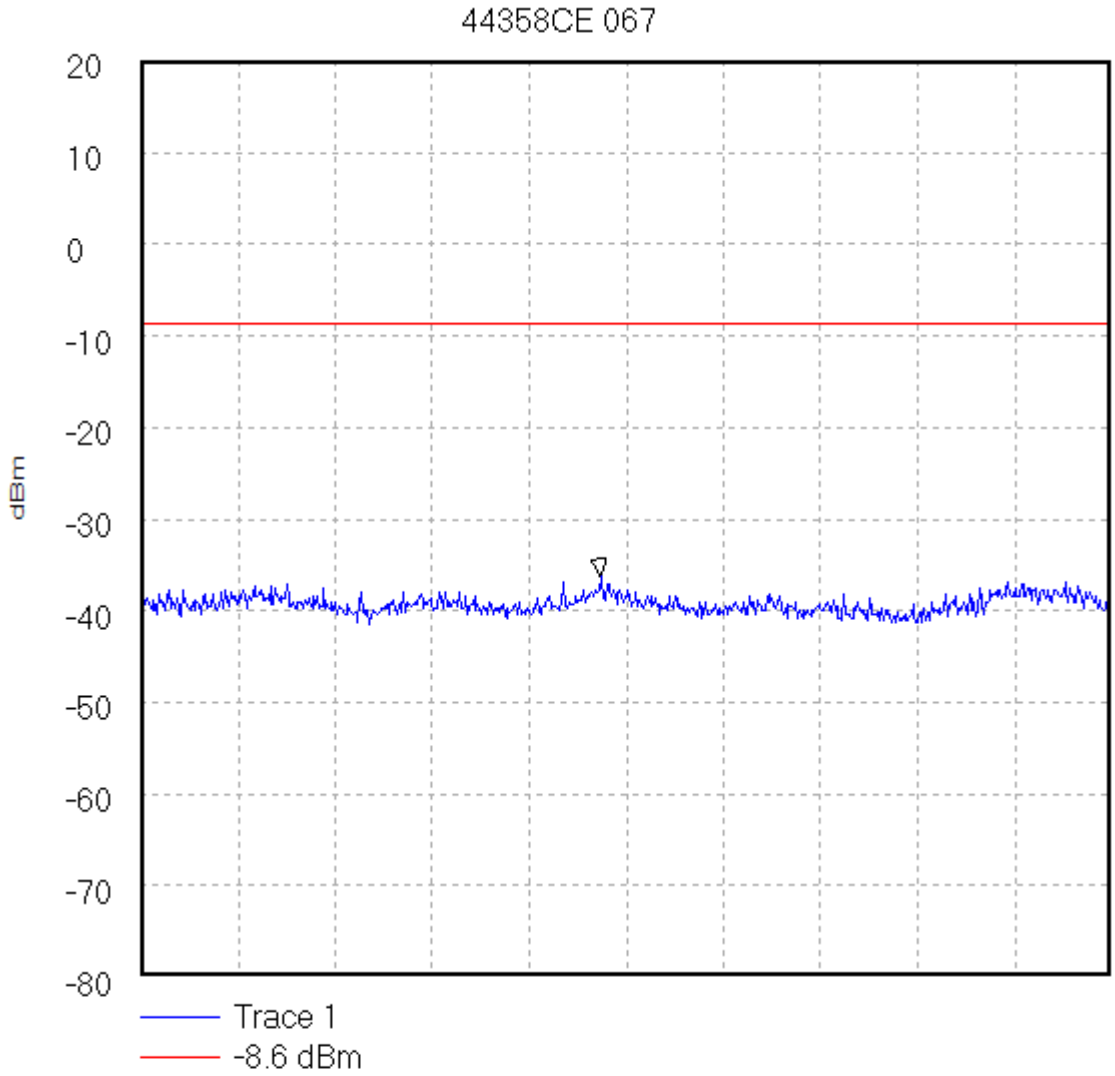
Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 13.9 GHz, -36.83 dBm
Display Line: -8.6 dBm;
07/02/2003 15:15:02

GPH\44358CE\066
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(10.0 GHz to 15.0 GHz)



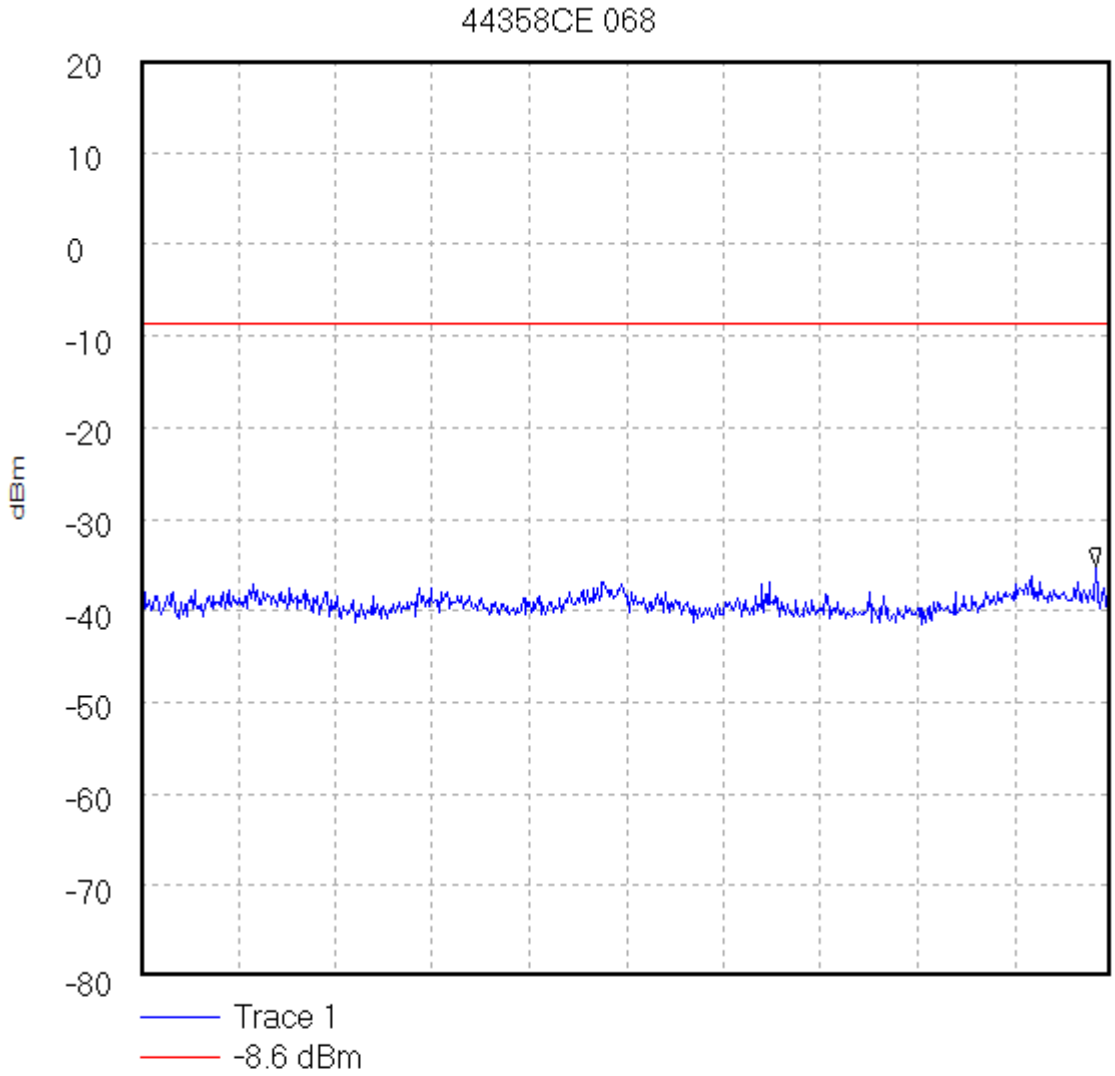
Start 10.0 GHz; Stop 15.0 GHz
Ref 20 dBm; Ref Offset 35.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 13.641667 GHz, -36.67 dBm
Display Line: -8.6 dBm;
07/02/2003 15:15:32

GPH\44358CE\067
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(15.0 GHz to 20.0 GHz)



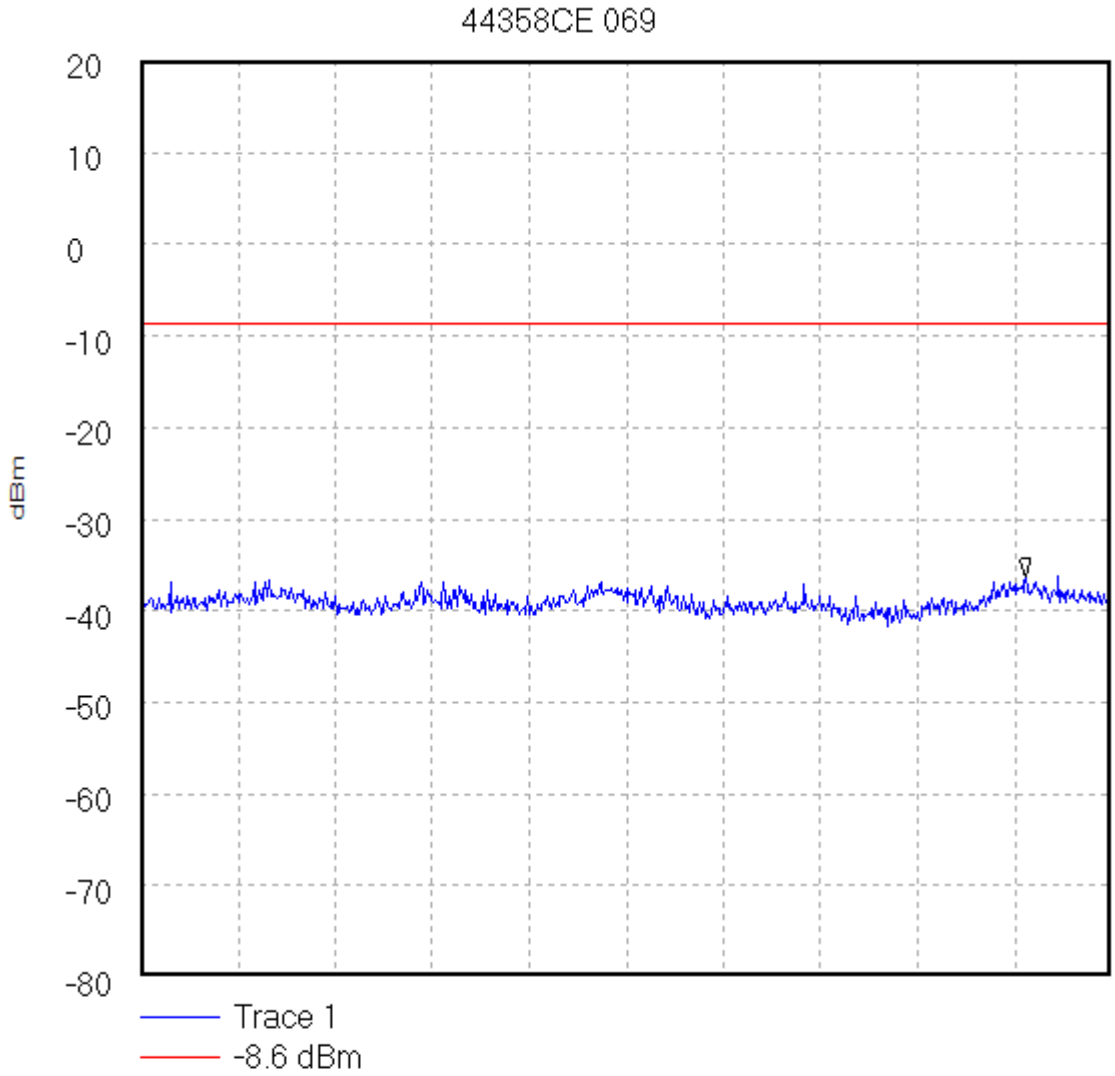
Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 17.366667 GHz, -36.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:16:36

GPH\44358CE\068
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(15.0 GHz to 20.0 GHz)



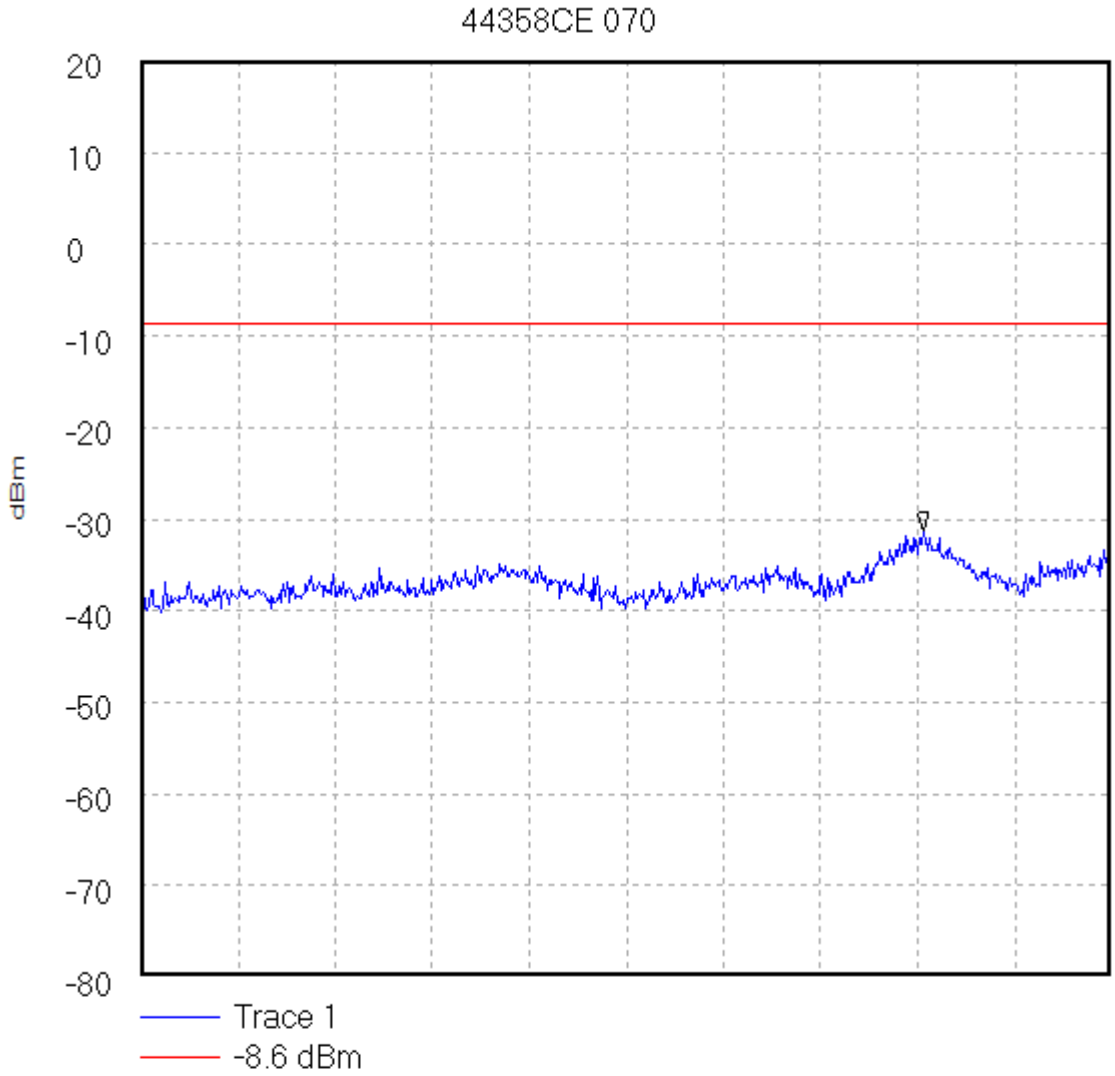
Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 19.916667 GHz, -35.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:16:52

GPH\44358CE\069
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(15.0 GHz to 20.0 GHz)



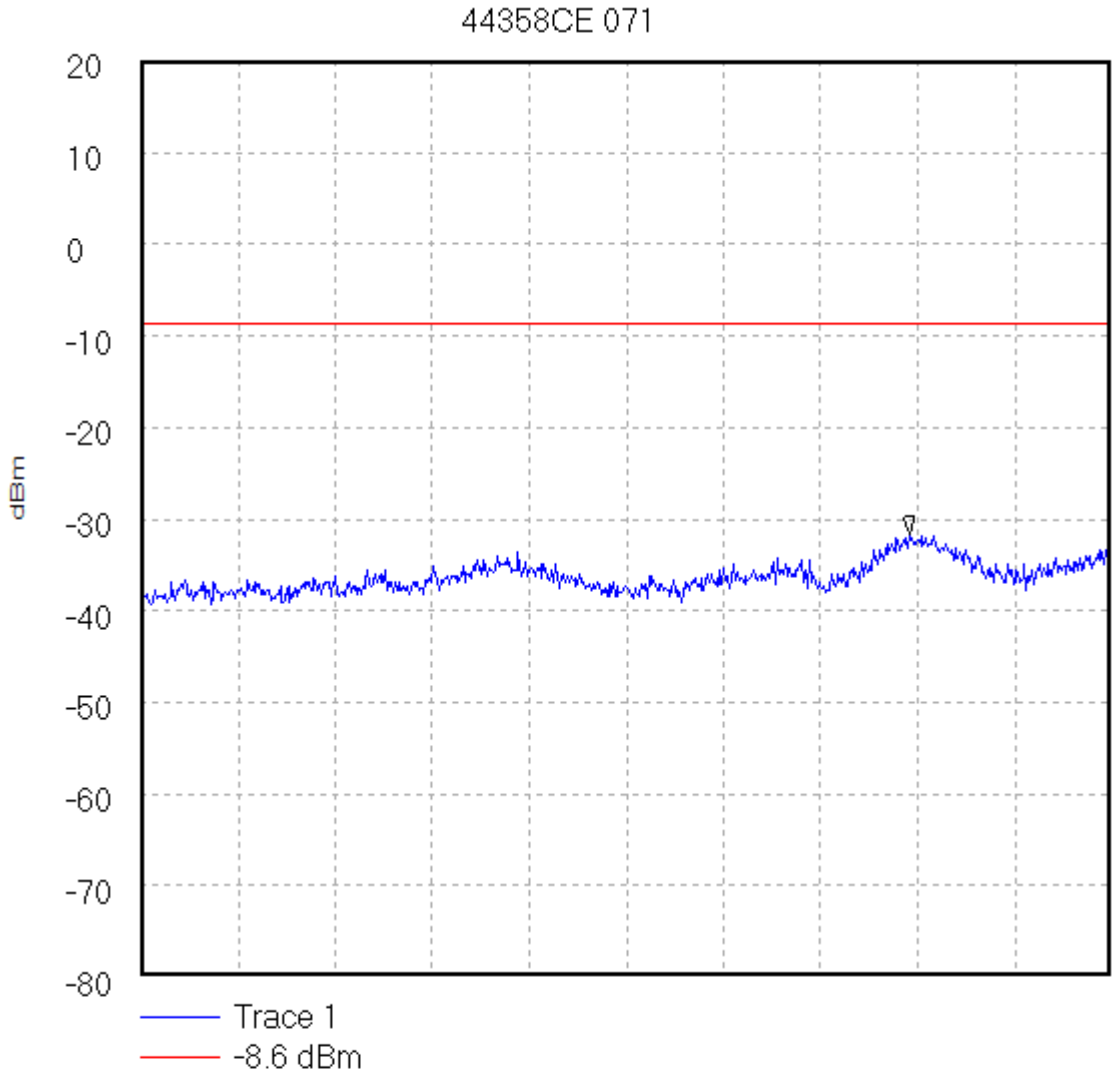
Start 15.0 GHz; Stop 20.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 19.558333 GHz, -36.33 dBm
Display Line: -8.6 dBm;
07/02/2003 15:17:19

GPH\44358CE\070
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(20.0 GHz to 25.0 GHz)



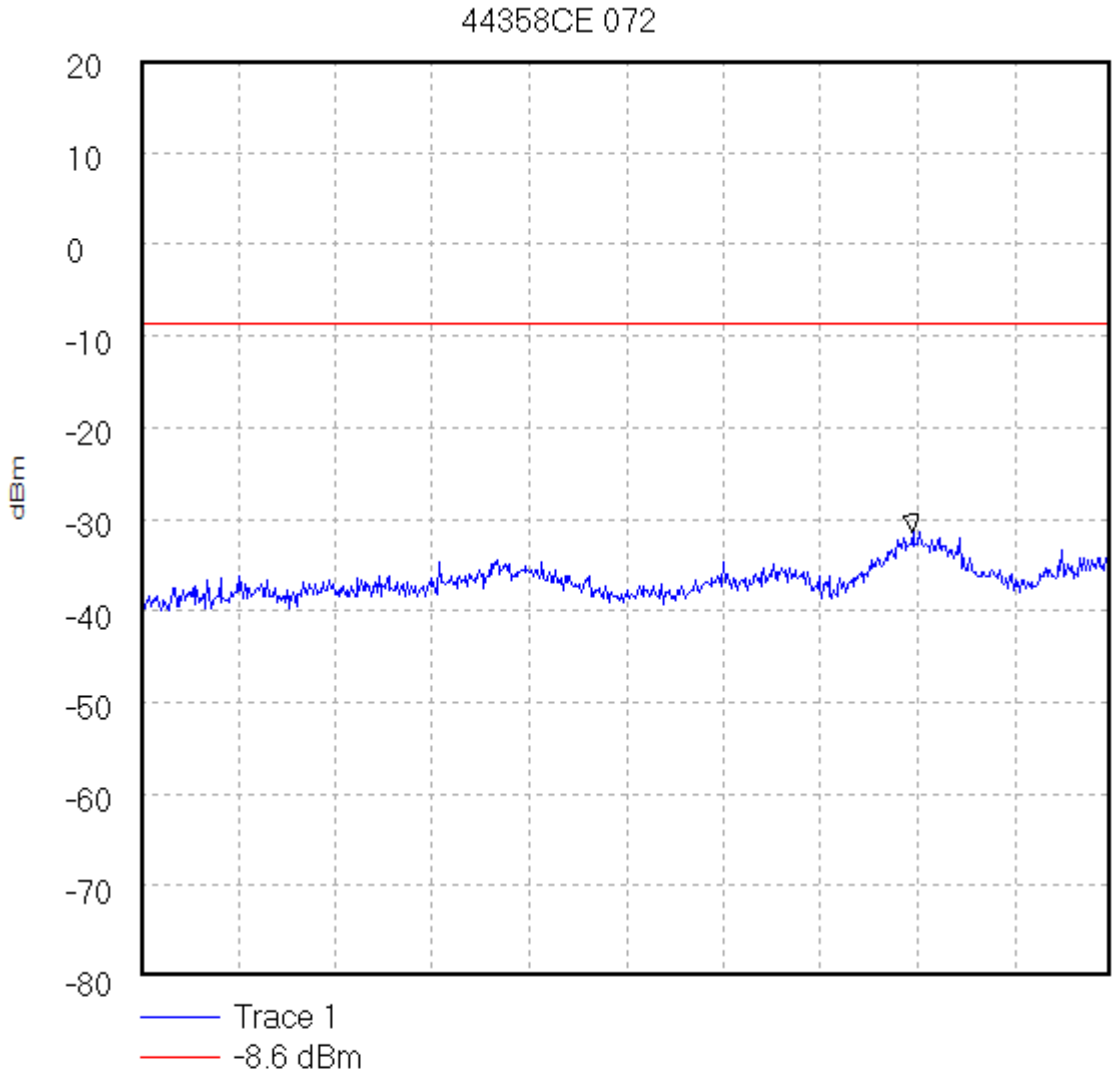
Start 20.0 GHz; Stop 25.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 24.033333 GHz, -31.33 dBm
Display Line: -8.6 dBm;
07/02/2003 15:18:17

GPH\44358CE\071
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(20.0 GHz to 25.0 GHz)



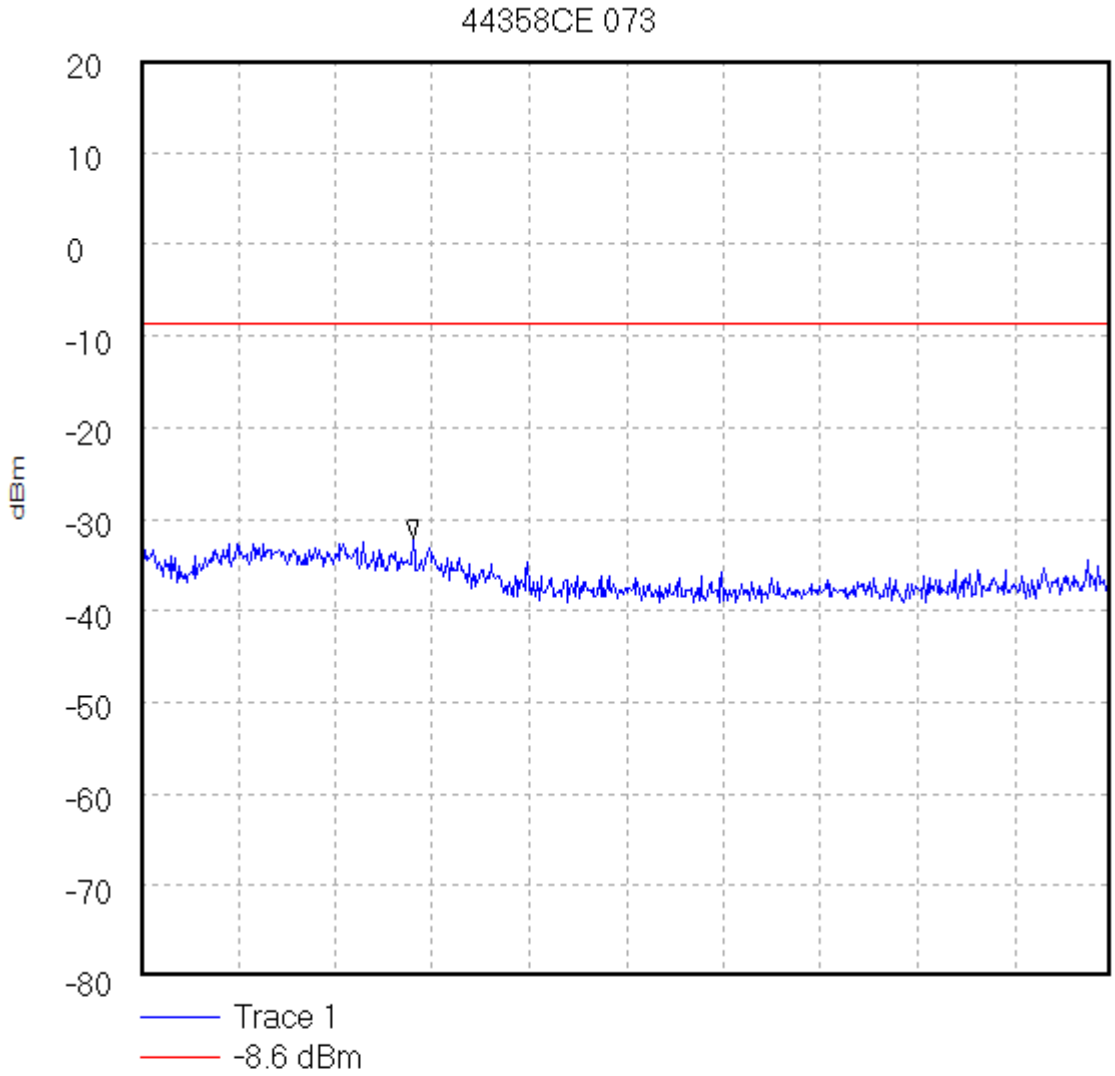
Start 20.0 GHz; Stop 25.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 23.958333 GHz, -31.67 dBm
Display Line: -8.6 dBm;
07/02/2003 15:18:58

GPH\44358CE\072
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(20.0 GHz to 25.0 GHz)



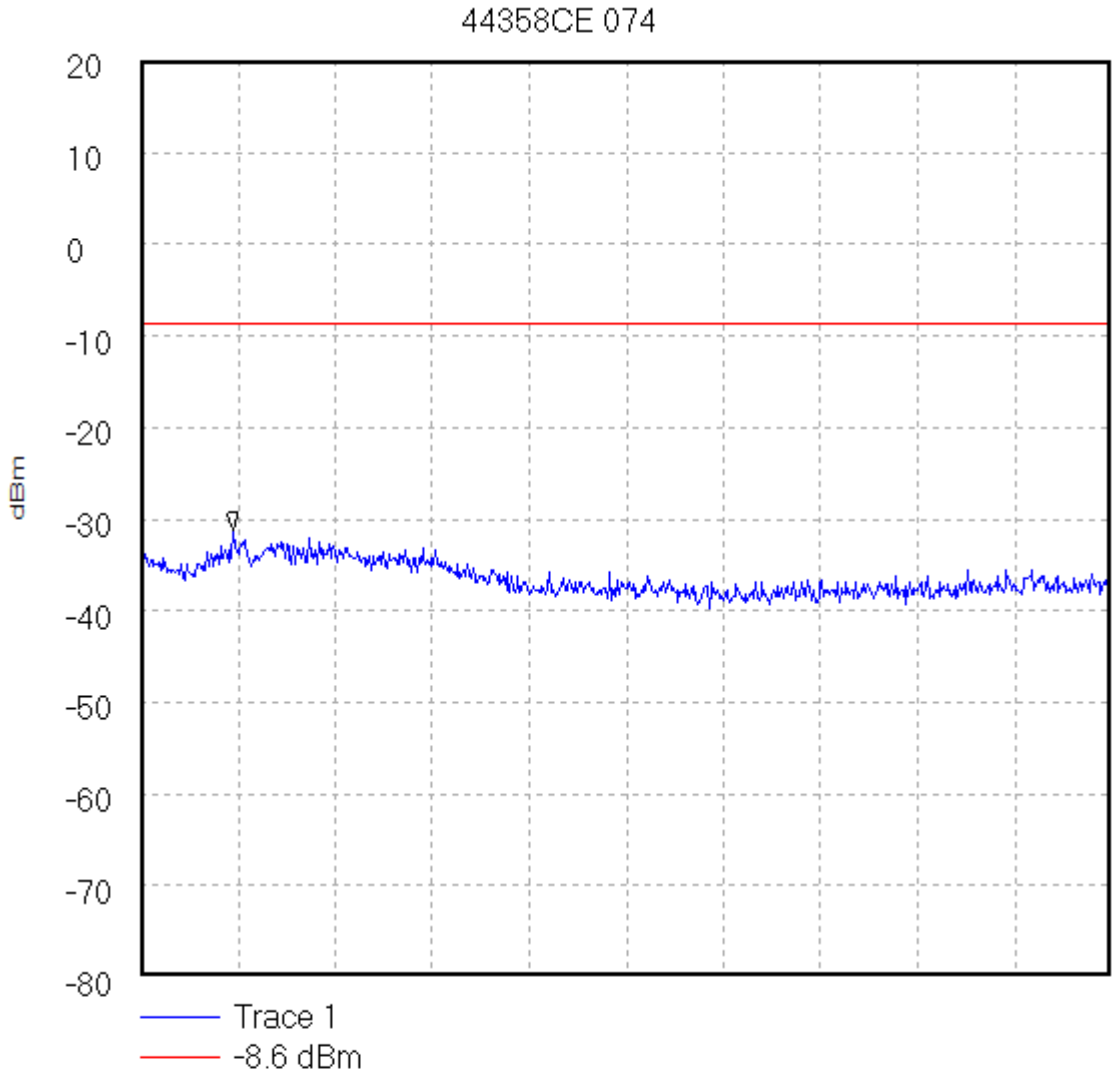
Start 20.0 GHz; Stop 25.0 GHz
Ref 20 dBm; Ref Offset 36.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 23.975 GHz, -31.5 dBm
Display Line: -8.6 dBm;
07/02/2003 15:19:18

GPH\44358CE\073
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(25.0 GHz to 30.0 GHz)



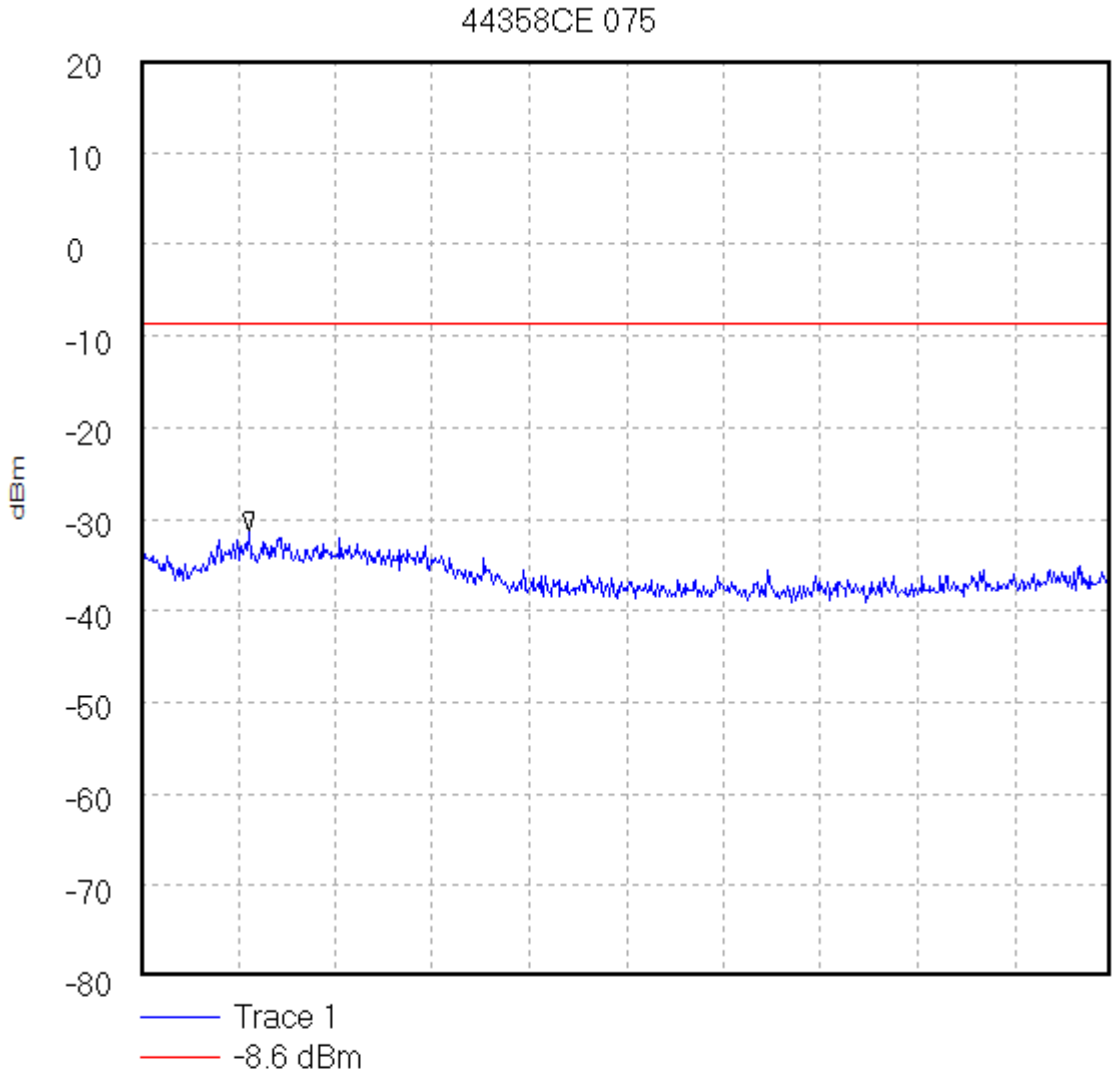
Start 25.0 GHz; Stop 30.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 26.4 GHz, -32.0 dBm
Display Line: -8.6 dBm;
07/02/2003 15:20:07

GPH\44358CE\074
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(25.0 GHz to 30.0 GHz)



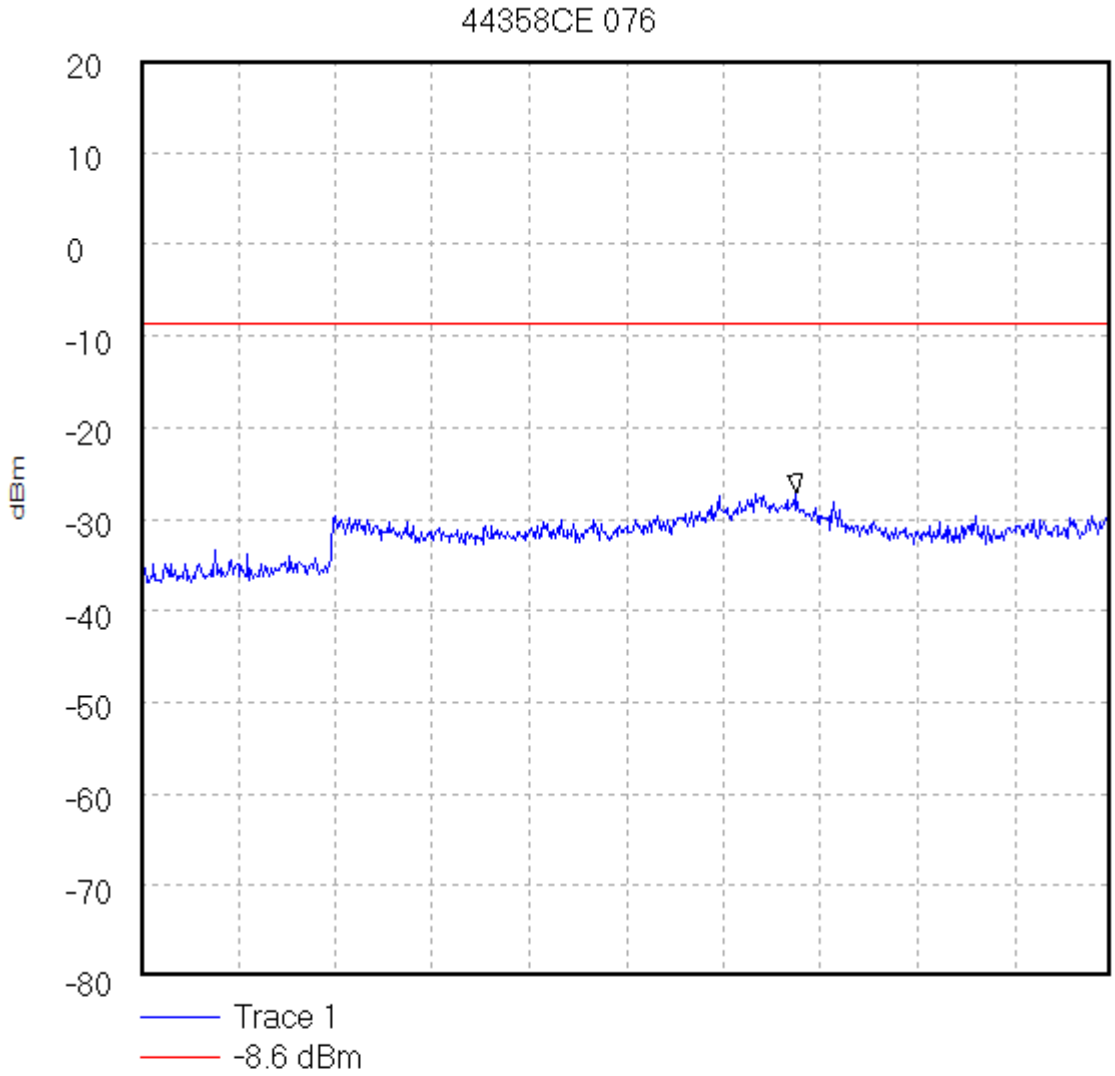
Start 25.0 GHz; Stop 30.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 25.475 GHz, -31.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:20:23

GPH\44358CE\075
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(25.0 GHz to 30.0 GHz)



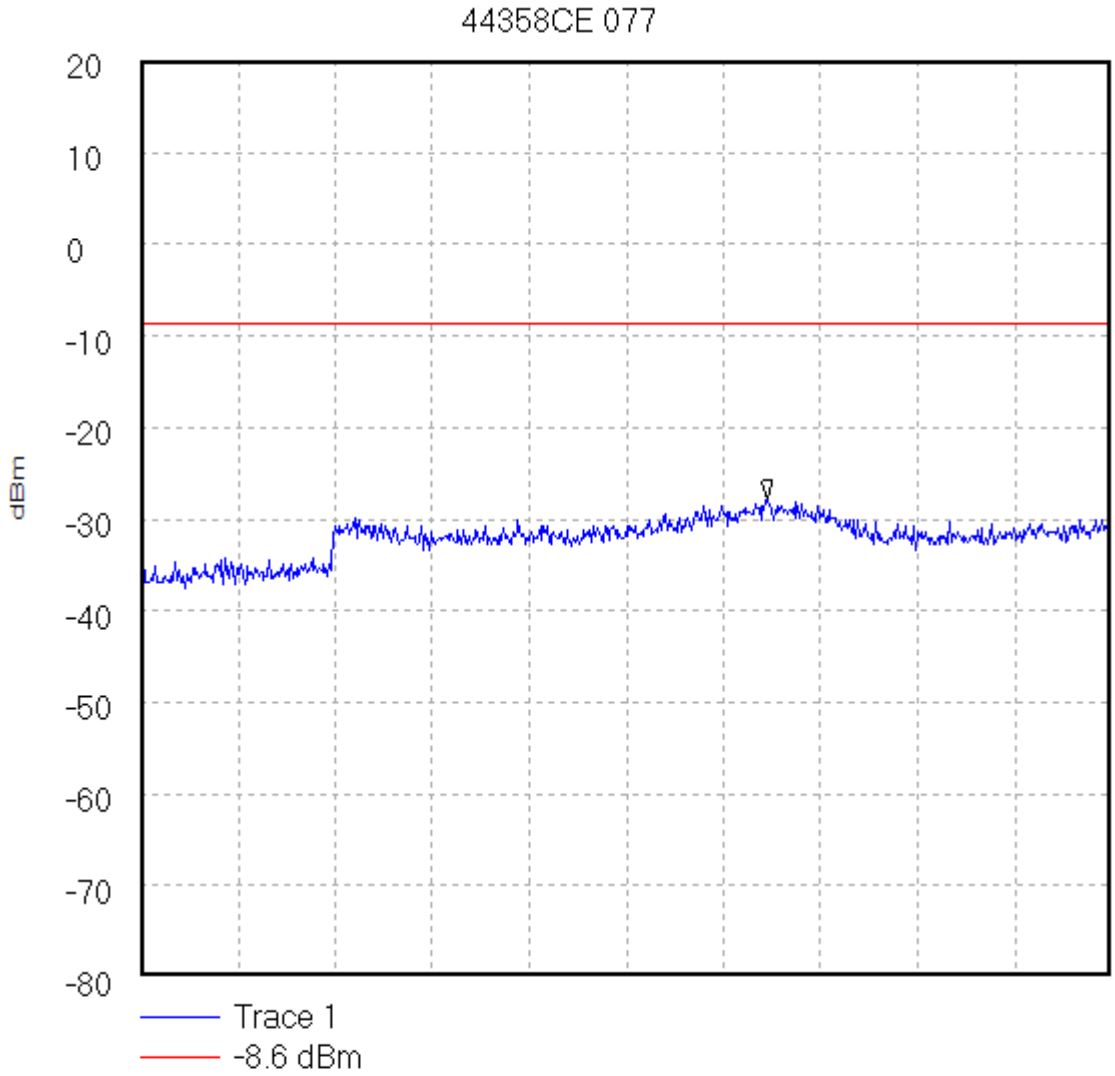
Start 25.0 GHz; Stop 30.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 25.558333 GHz, -31.33 dBm
Display Line: -8.6 dBm;
07/02/2003 15:20:42

GPH\44358CE\076
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(30.0 GHz to 35.0 GHz)



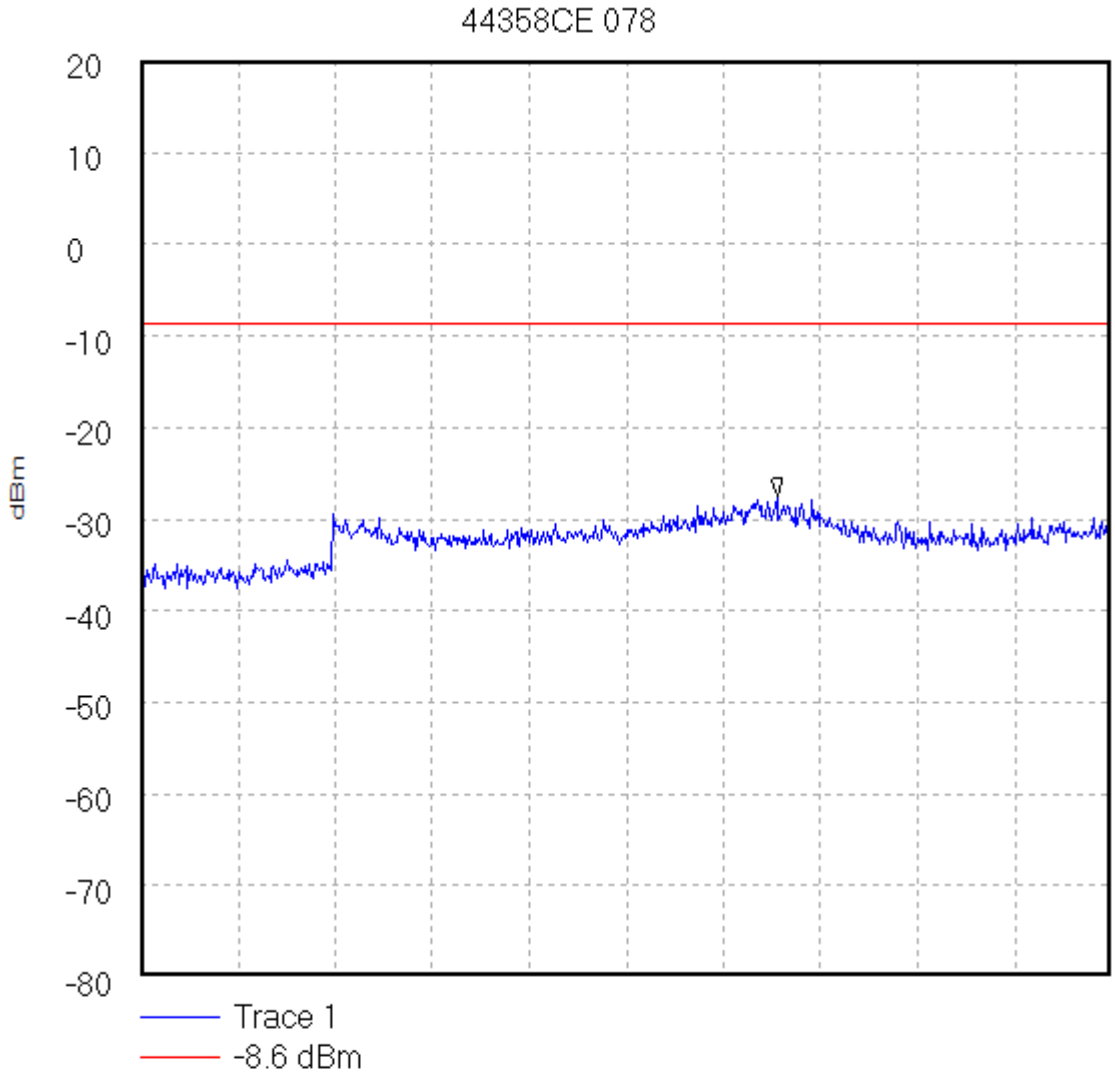
Start 30.0 GHz; Stop 35.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 33.375 GHz, -27.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:21:41

GPH\44358CE\077
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(30.0 GHz to 35.0 GHz)



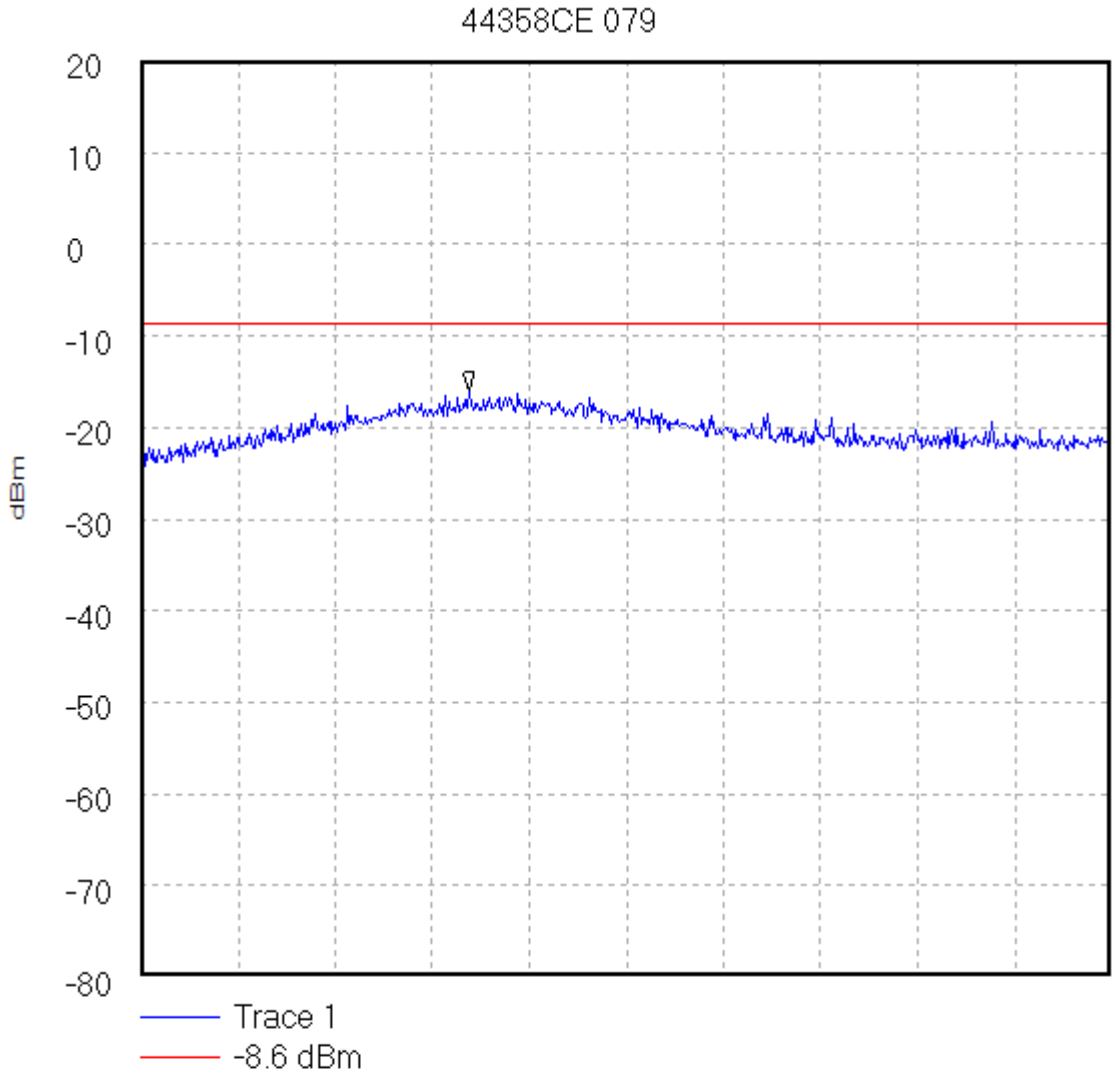
Start 30.0 GHz; Stop 35.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 33.225 GHz, -27.83 dBm
Display Line: -8.6 dBm;
07/02/2003 15:22:01

GPH\44358CE\078
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(30.0 GHz to 35.0 GHz)



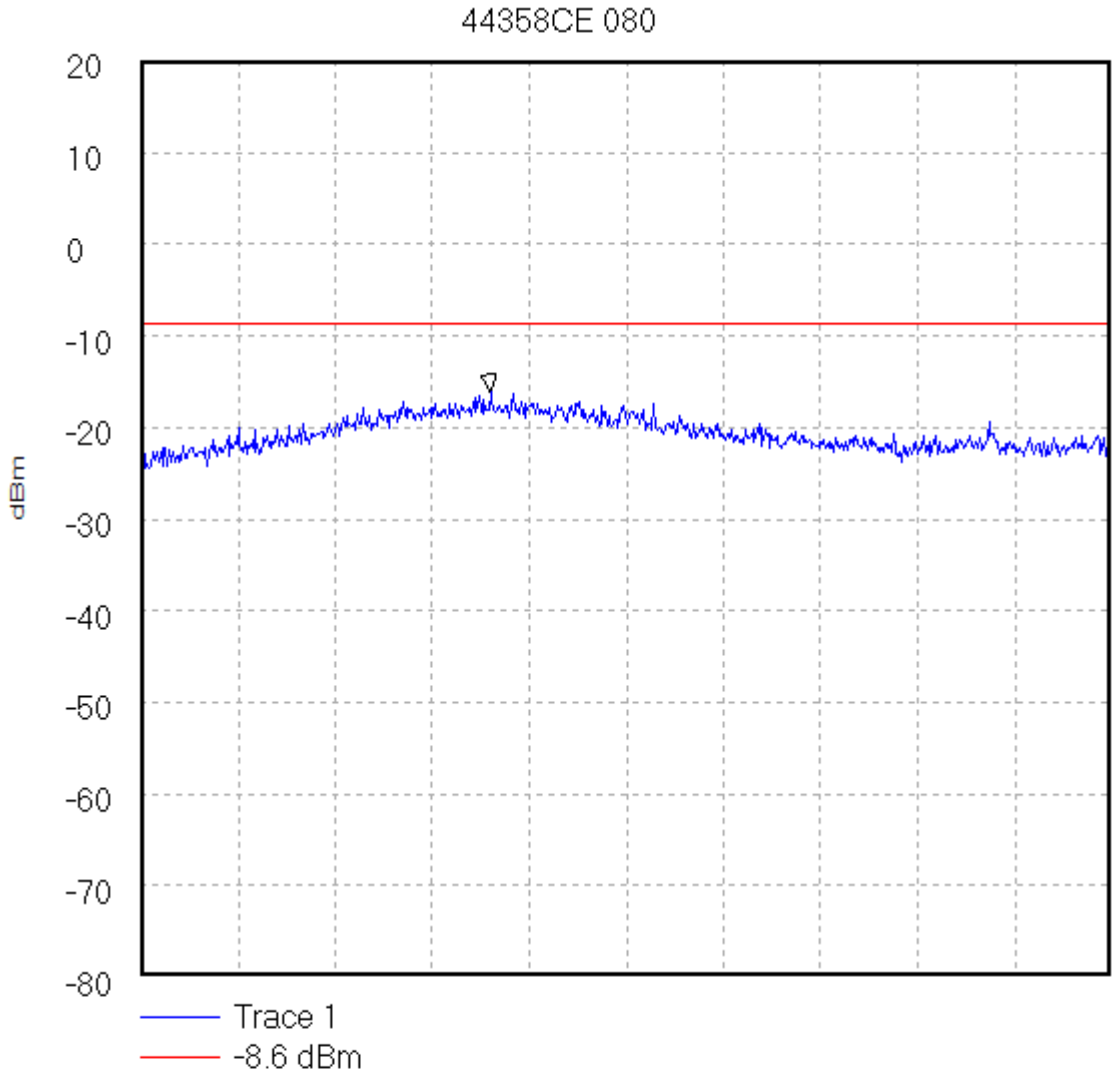
Start 30.0 GHz; Stop 35.0 GHz
Ref 20 dBm; Ref Offset 37.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 33.275 GHz, -27.5 dBm
Display Line: -8.6 dBm;
07/02/2003 15:22:22

GPH\44358CE\079
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Bottom Channel.
(35.0 GHz to 40.0 GHz)



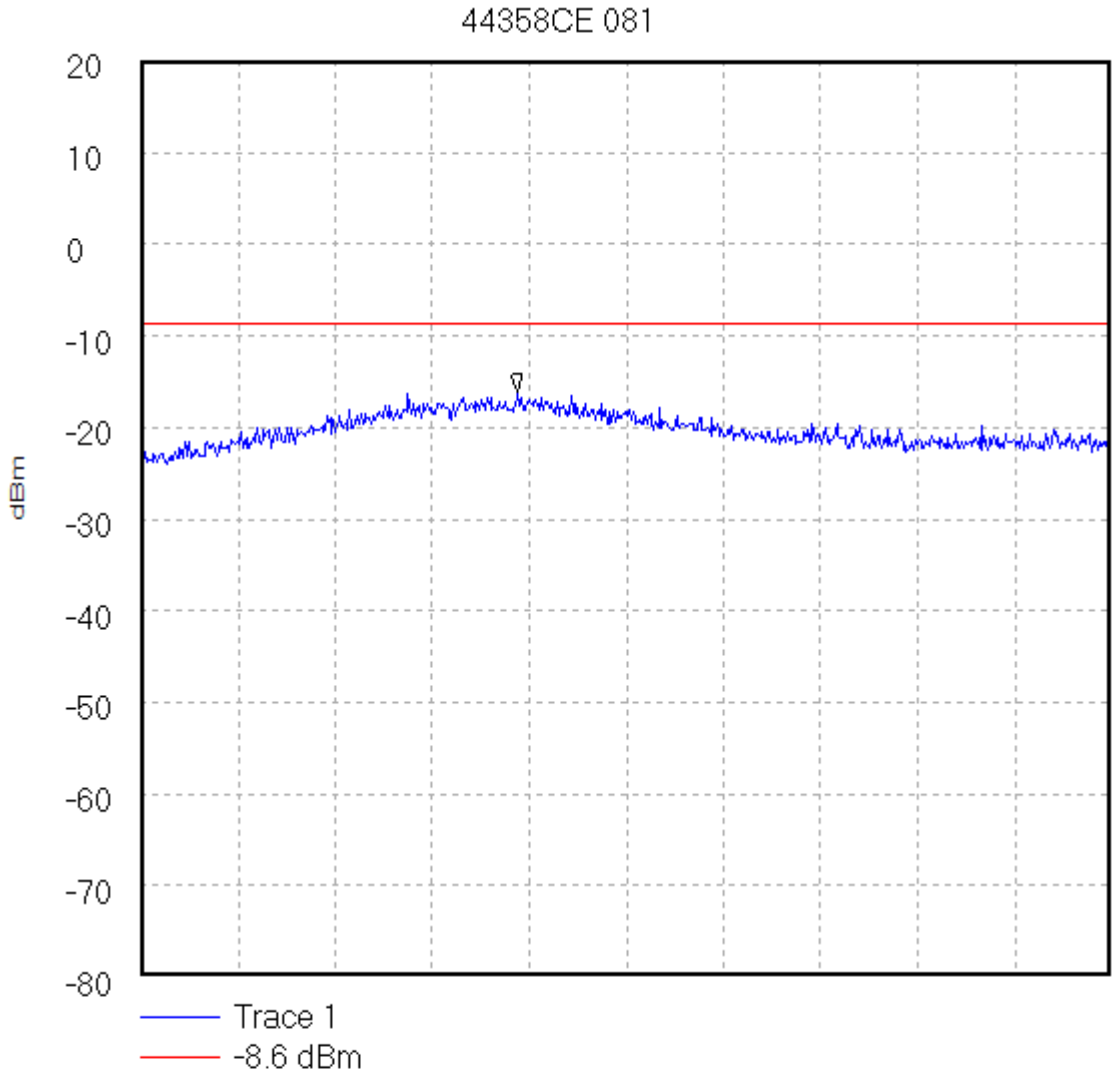
Start 35.0 GHz; Stop 40.0 GHz
Ref 20 dBm; Ref Offset 44.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 36.691667 GHz, -16.0 dBm
Display Line: -8.6 dBm;
07/02/2003 15:24:24

GPH\44358CE\080
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Middle Channel.
(35.0 GHz to 40.0 GHz)



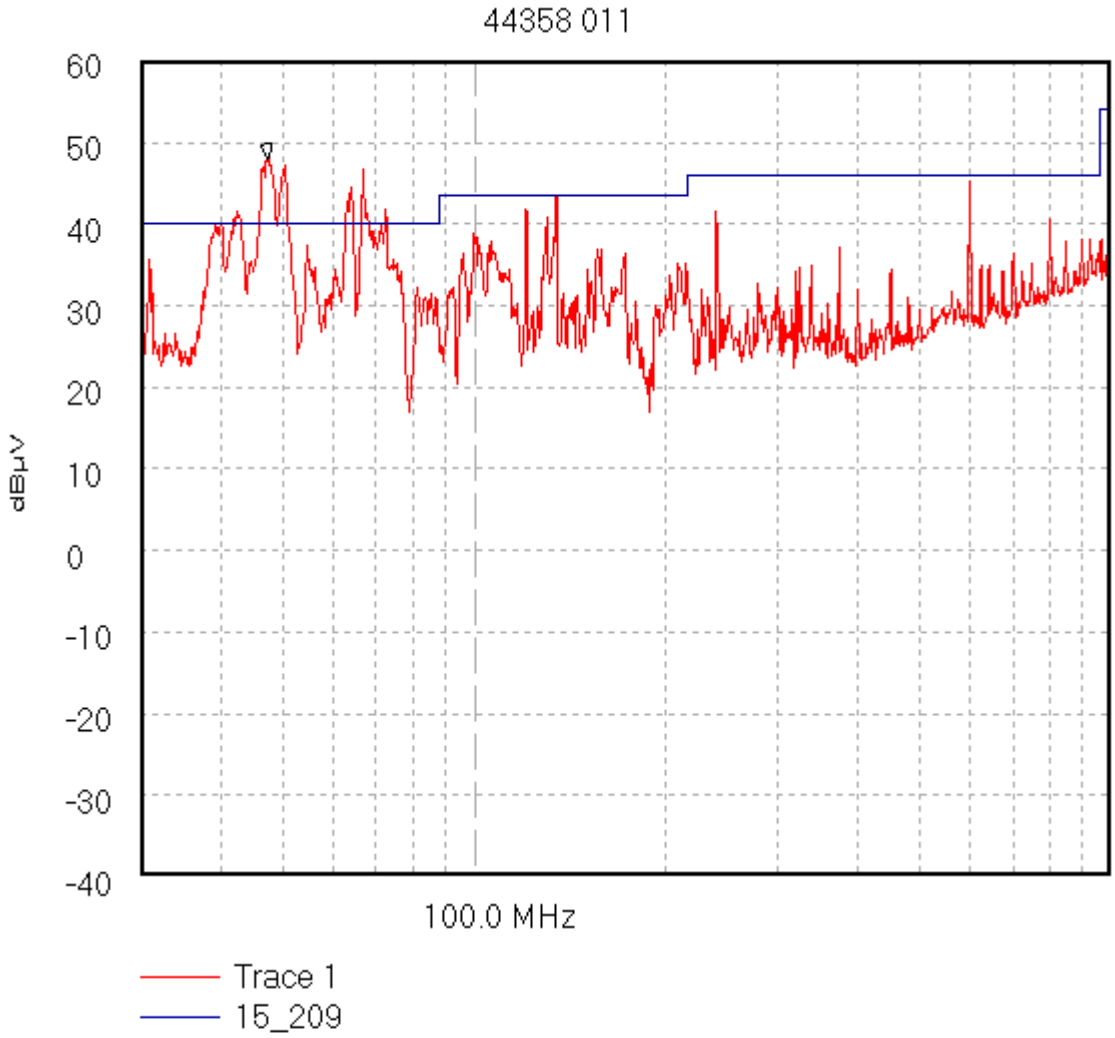
Start 35.0 GHz; Stop 40.0 GHz
Ref 20 dBm; Ref Offset 44.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 36.8 GHz, -16.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:24:46

GPH\44358CE\081
Conducted Emissions. Modulation:- QPSK
Operating Condition: - Top Channel.
(35.0 GHz to 40.0 GHz)



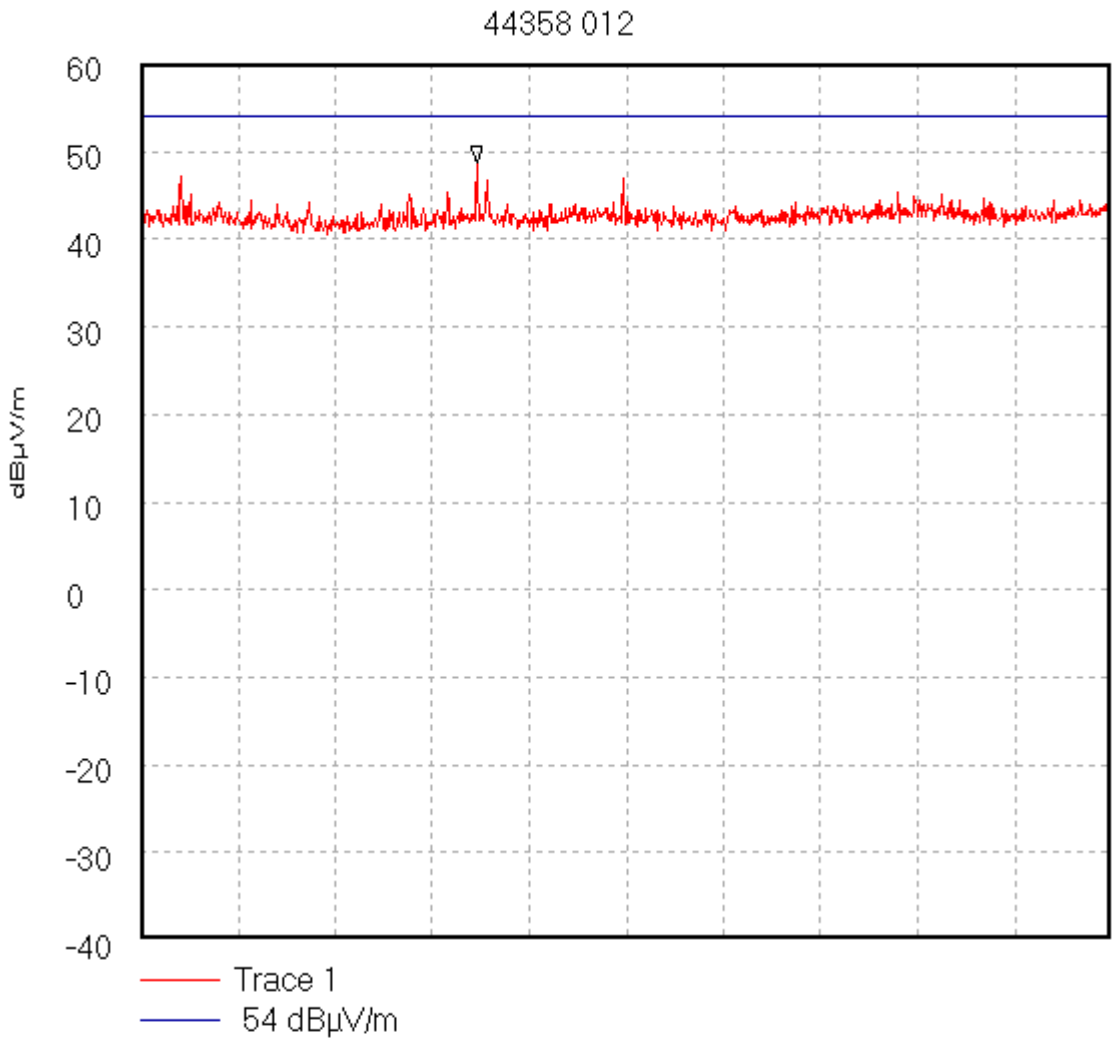
Start 35.0 GHz; Stop 40.0 GHz
Ref 20 dBm; Ref Offset 44.0 dB; 10 dB/div
RBW 100.0 kHz; VBW 100.0 kHz; Att 10 dB; Swp 1.3 S
Peak 36.941667 GHz, -16.17 dBm
Display Line: -8.6 dBm;
07/02/2003 15:25:17

GPH\44358\011
Radiated Emissions. Transmit mode.
(30.0 MHz to 1.0 GHz)



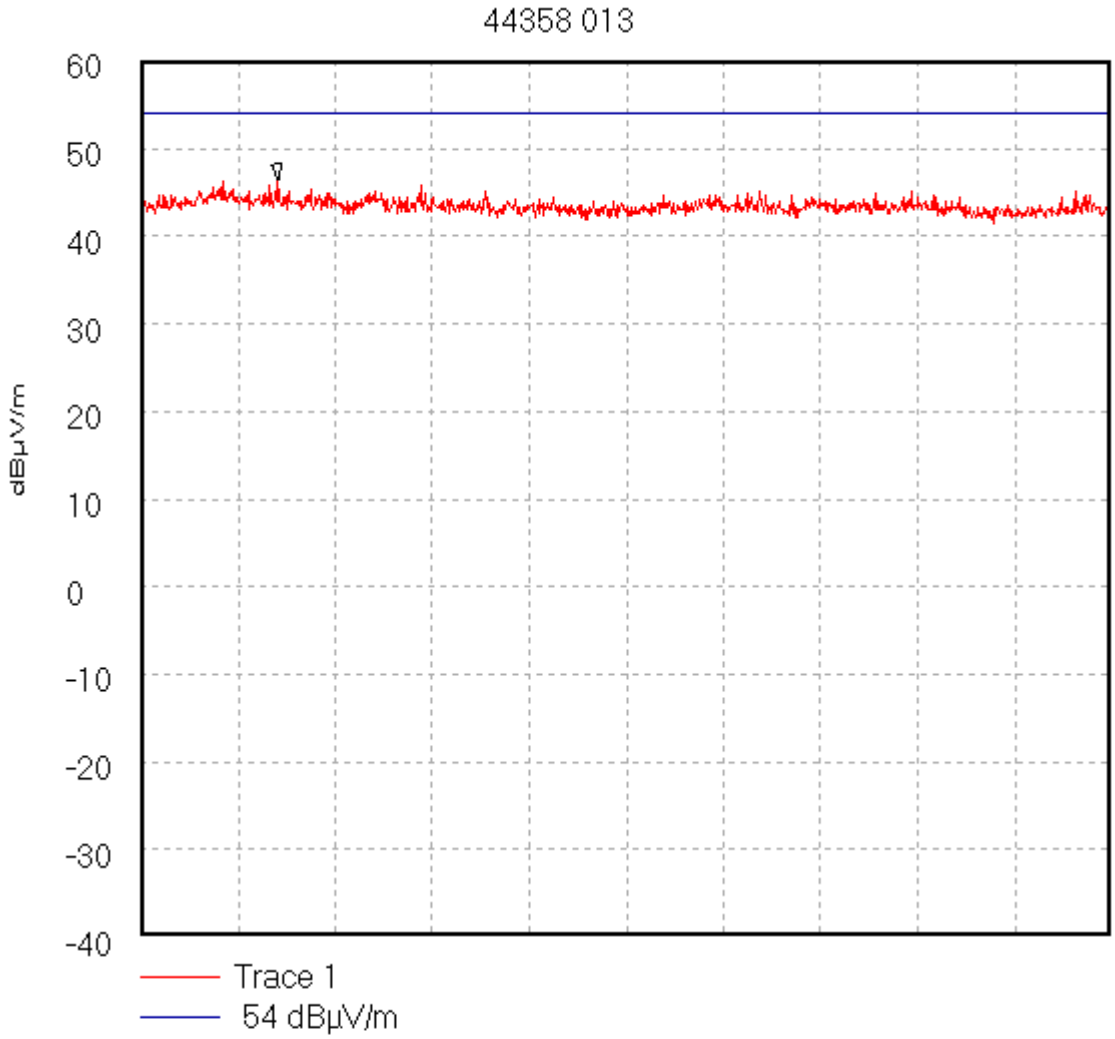
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV; Ref Offset 0.0 dB; 10 dB/div
RBW 120.052 kHz; VBW 100.0 kHz; Att 0 dB; Swp 220.0 mS
Peak 47.51028 MHz, 47.89 dBµV
Limit/Mask: 15_209;
Transducer Factors: A490
30/01/2003 17:33:19

GPH\44358\012
Radiated Emissions. Transmit mode.
(1.0 GHz to 2.0 GHz)



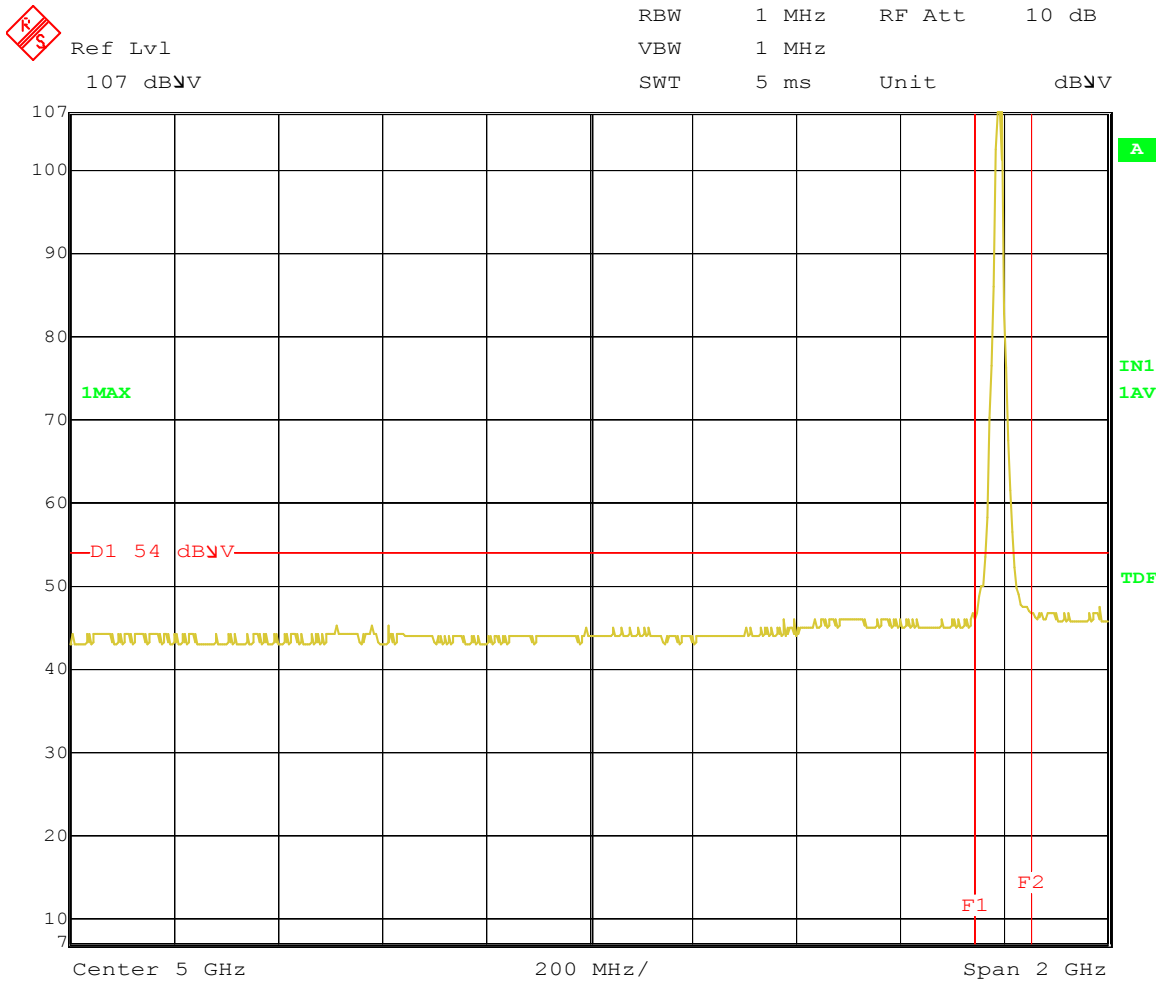
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.346667 GHz, 48.68 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 1 to 2
30/01/2003 17:57:08

GPH\44358\013
Radiated Emissions. Transmit mode.
(2.0 GHz to 4.0 GHz)



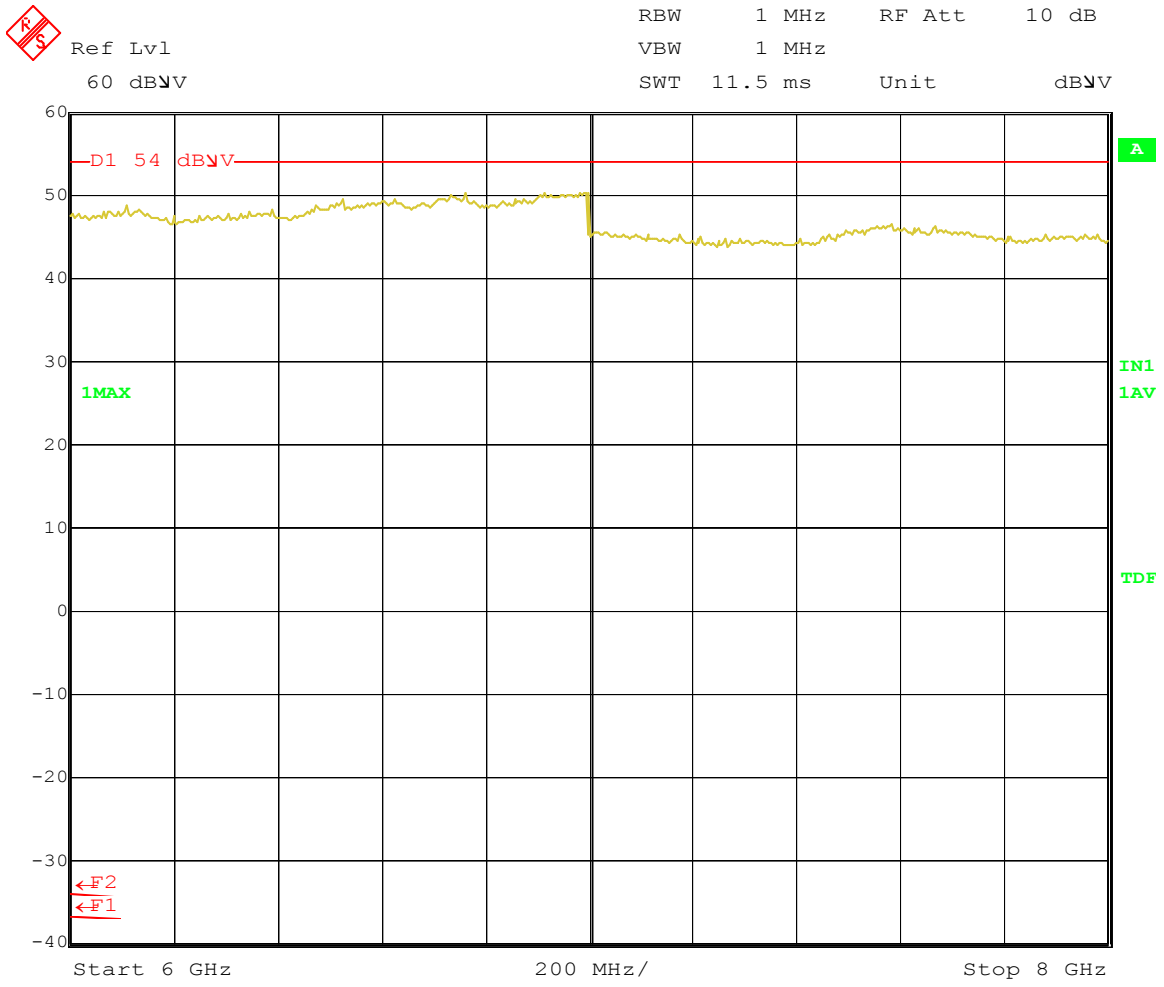
Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.282222 GHz, 46.34 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 2 to 4
30/01/2003 18:04:57

GPH\44358JD03\002
Radiated Emissions. Transmit Mode
(4.0 GHz to 6.0 GHz)



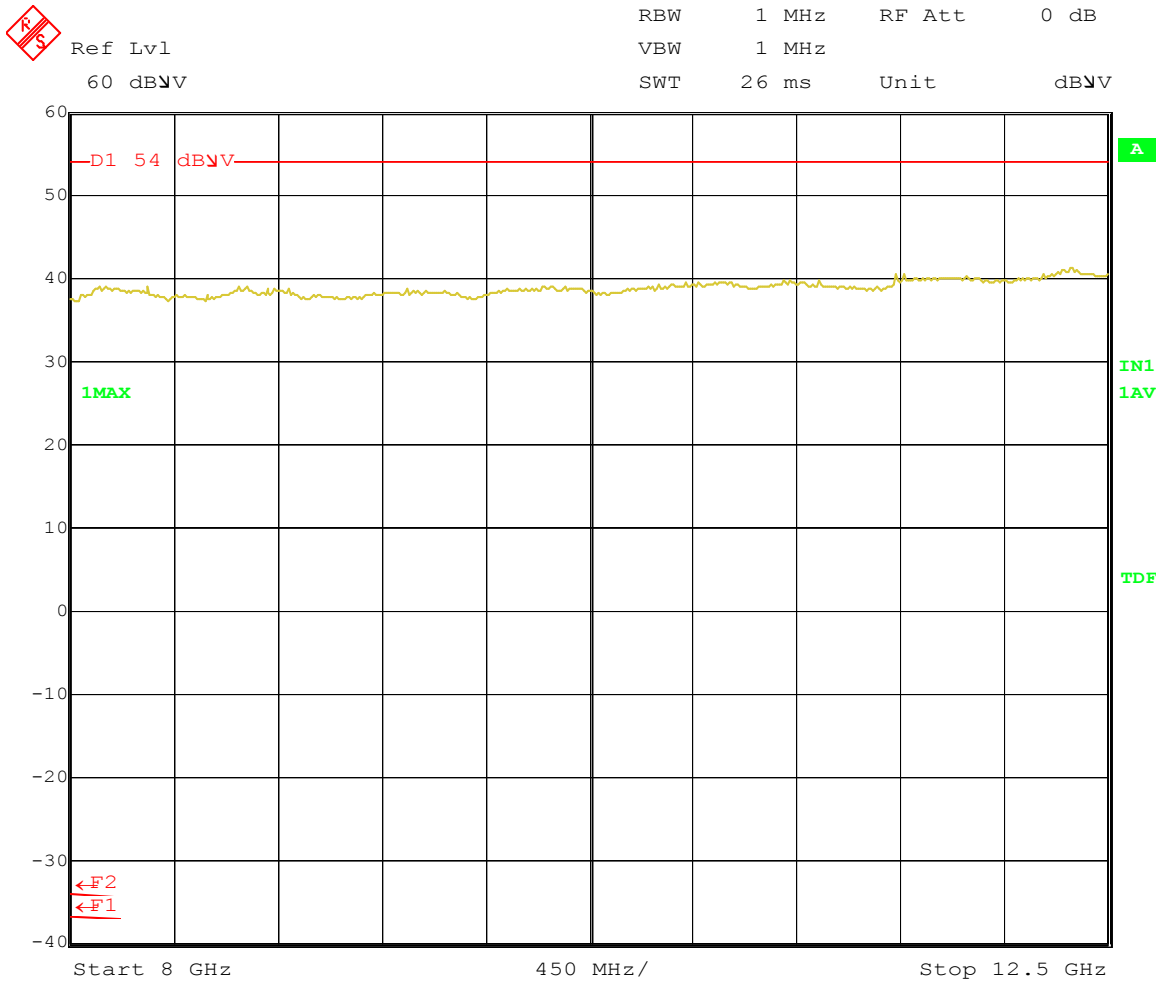
Date: 10.JAN.1997 18:10:02

GPH\44358JD03\003
Radiated Emissions. Transmit Mode
(6.0 GHz to 8.0 GHz)

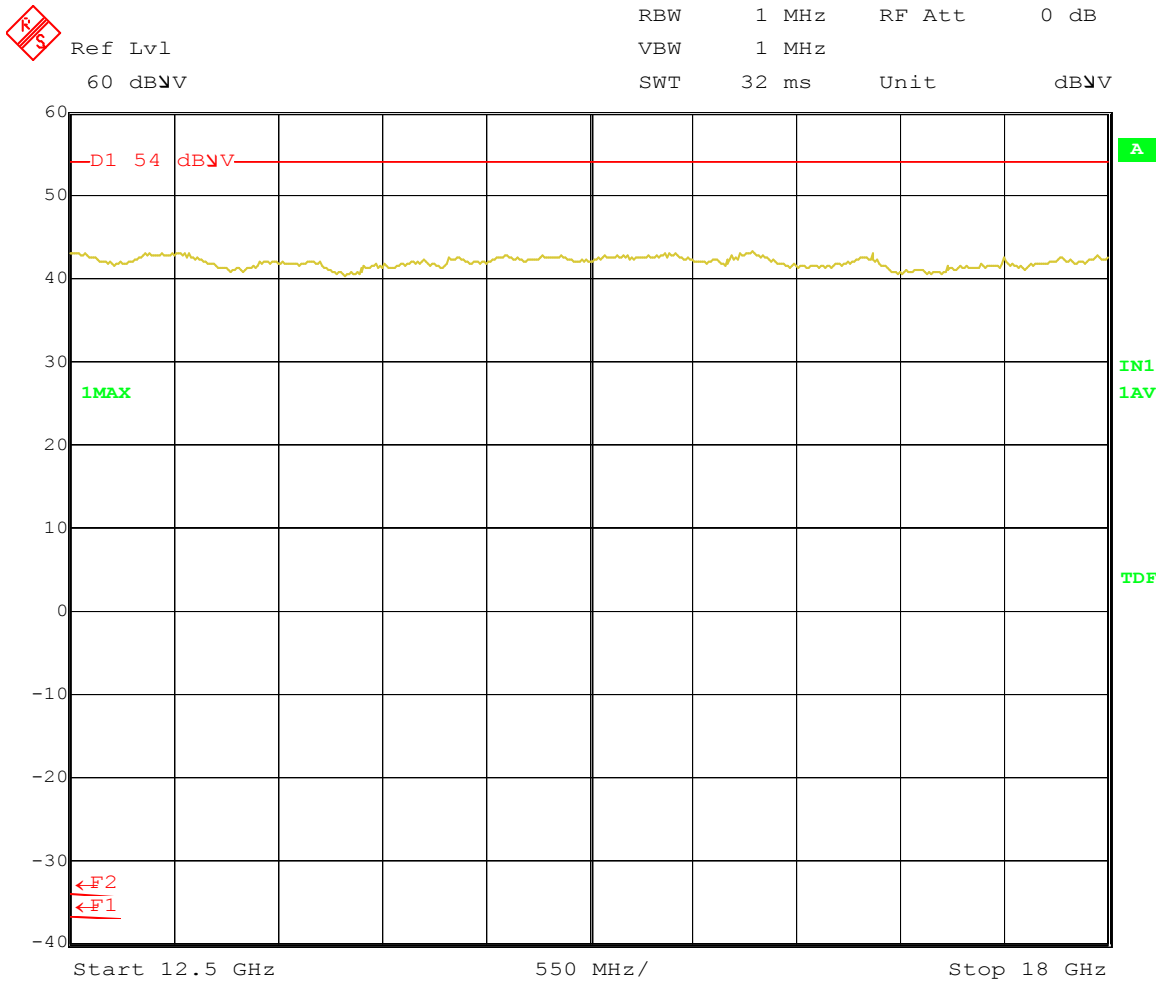


Test Of: Axxcelera Broadband Wireless UK Ltd.
Subscriber Unit (SU) & SU Wall-Box
To: FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247

GPH\44358JD03\004
Radiated Emissions. Transmit Mode
(8.0 GHz to 12.5 GHz)

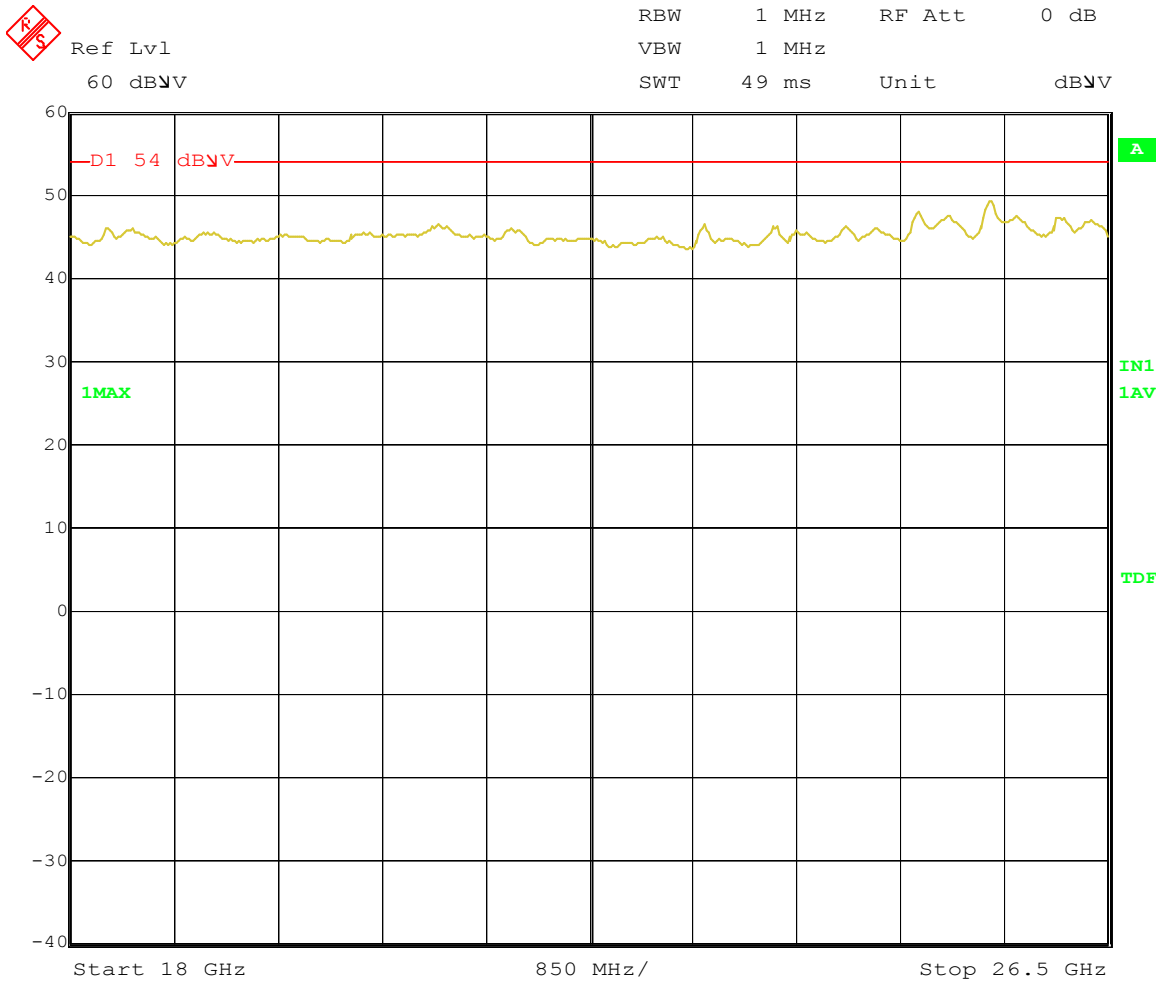


GPH\44358JD03\005
Radiated Emissions. Transmit Mode
(12.5 GHz to 18.0 GHz)



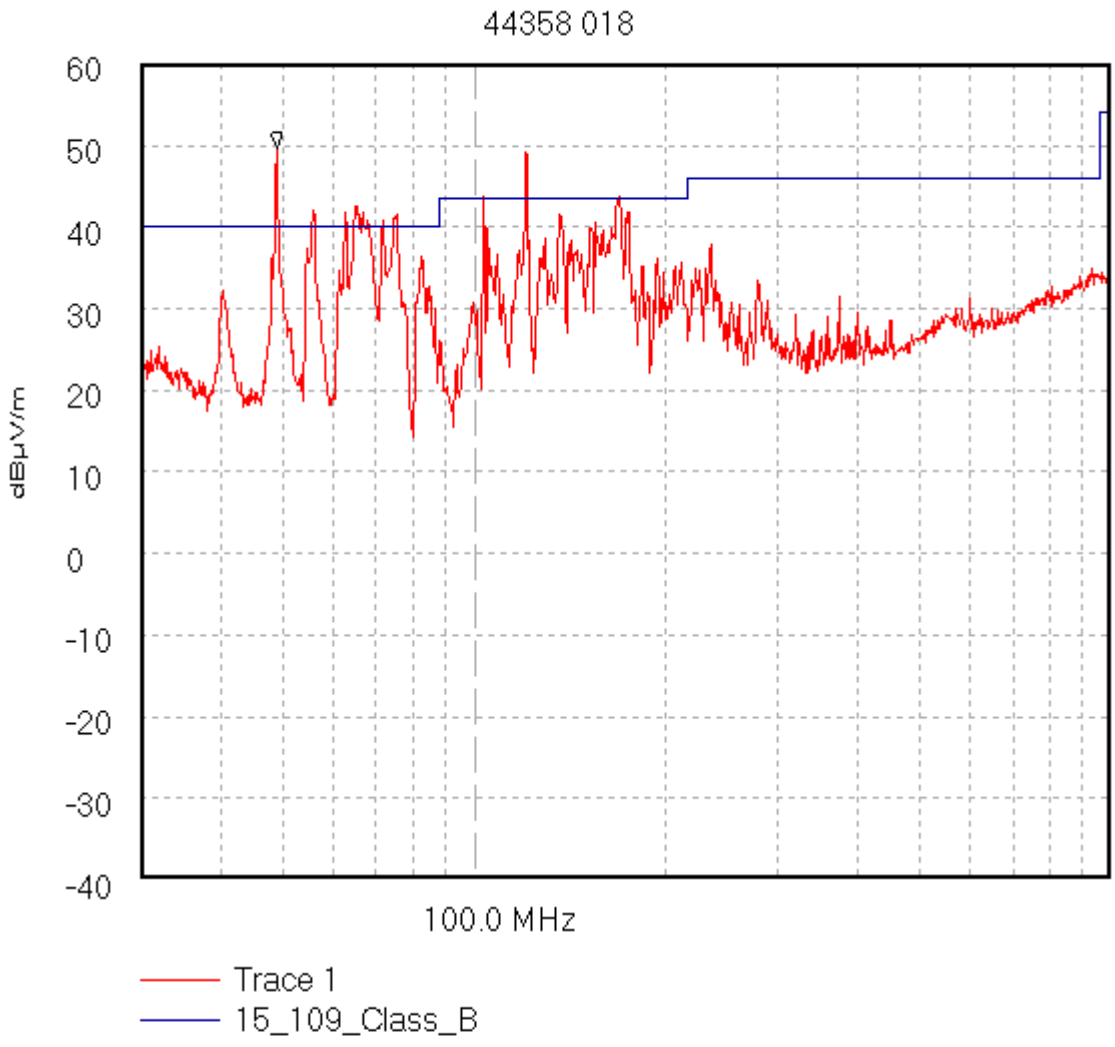
Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Subscriber Unit (SU) & SU Wall-Box
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

GPH\44358JD03\006
Radiated Emissions. Transmit Mode
(18.0 GHz to 26.5 GHz)



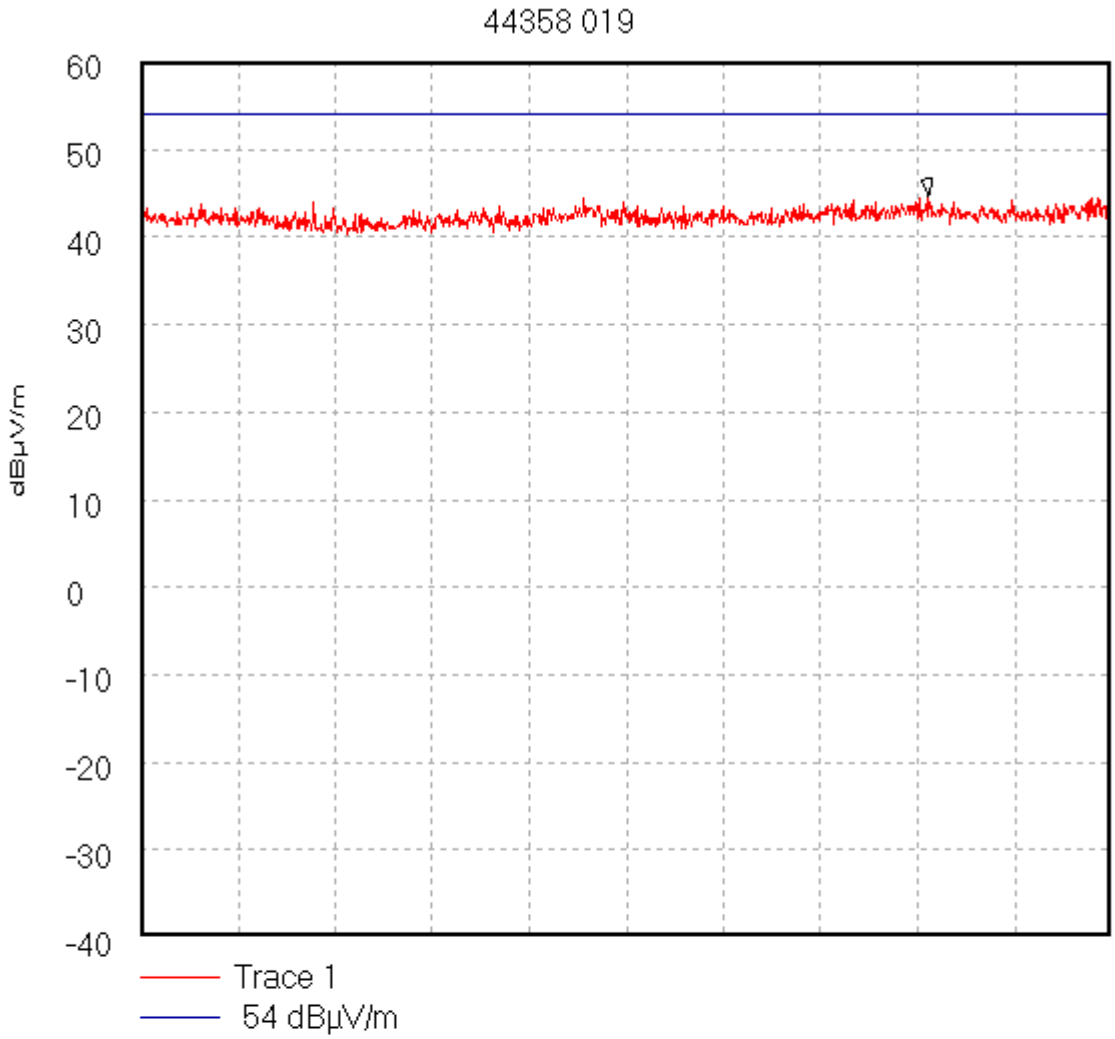
Date: 10.JAN.1997 19:05:19

GPH\44358\018
Radiated Emissions. Receive Mode
(30.0 MHz to 1.0 GHz)



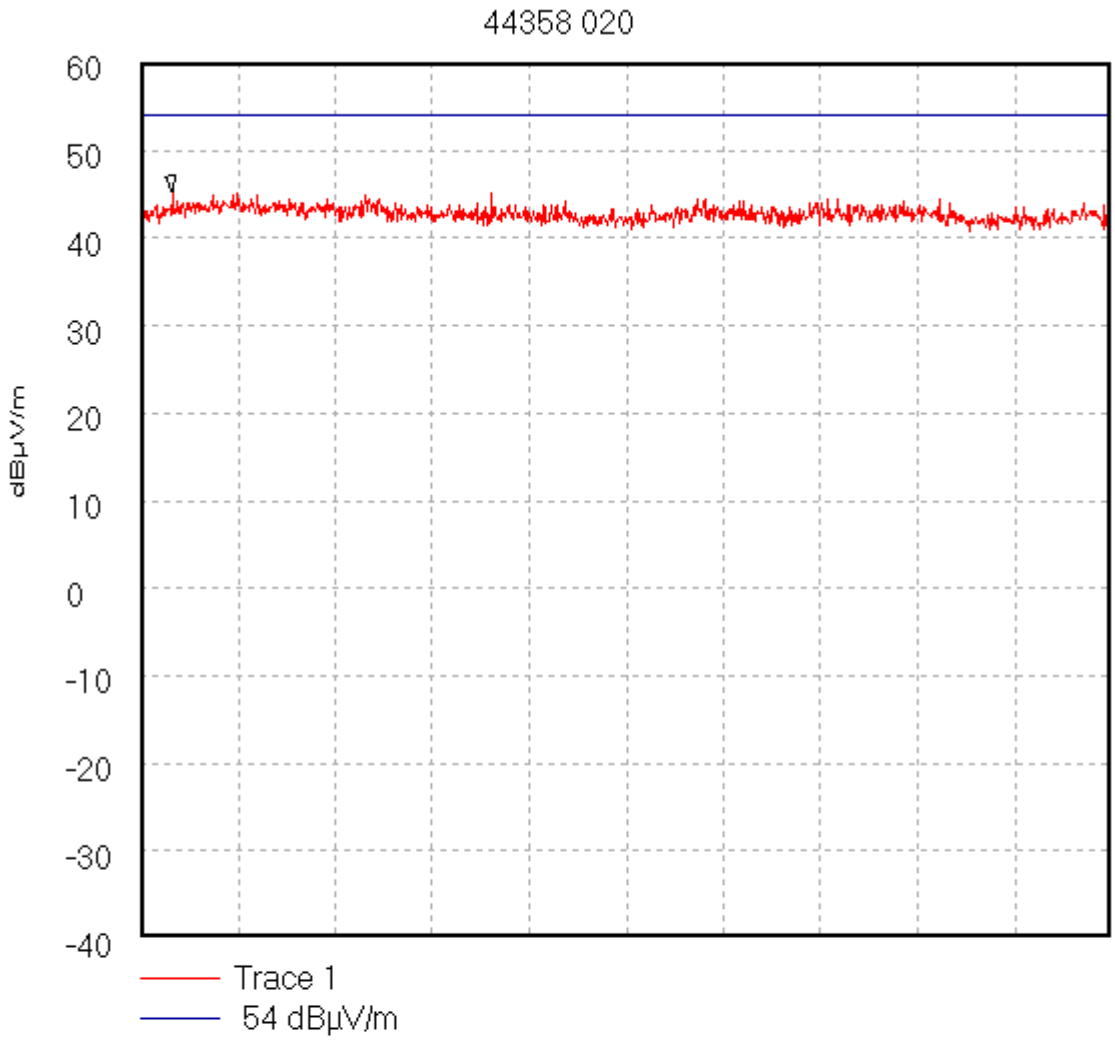
Start 30.0 MHz; Stop 1.0 GHz - Log Scale
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 120.052 kHz; VBW 100.0 kHz; Att 0 dB; Swp 40.0 mS
Peak 49.014464 MHz, 49.64 dBµV/m
Limit/Mask: 15_109_Class_B;
Transducer Factors: A490
13/02/2003 11:13:07

GPH\44358\019
Radiated Emissions. Receive Mode
(1.0 GHz to 2.0 GHz)



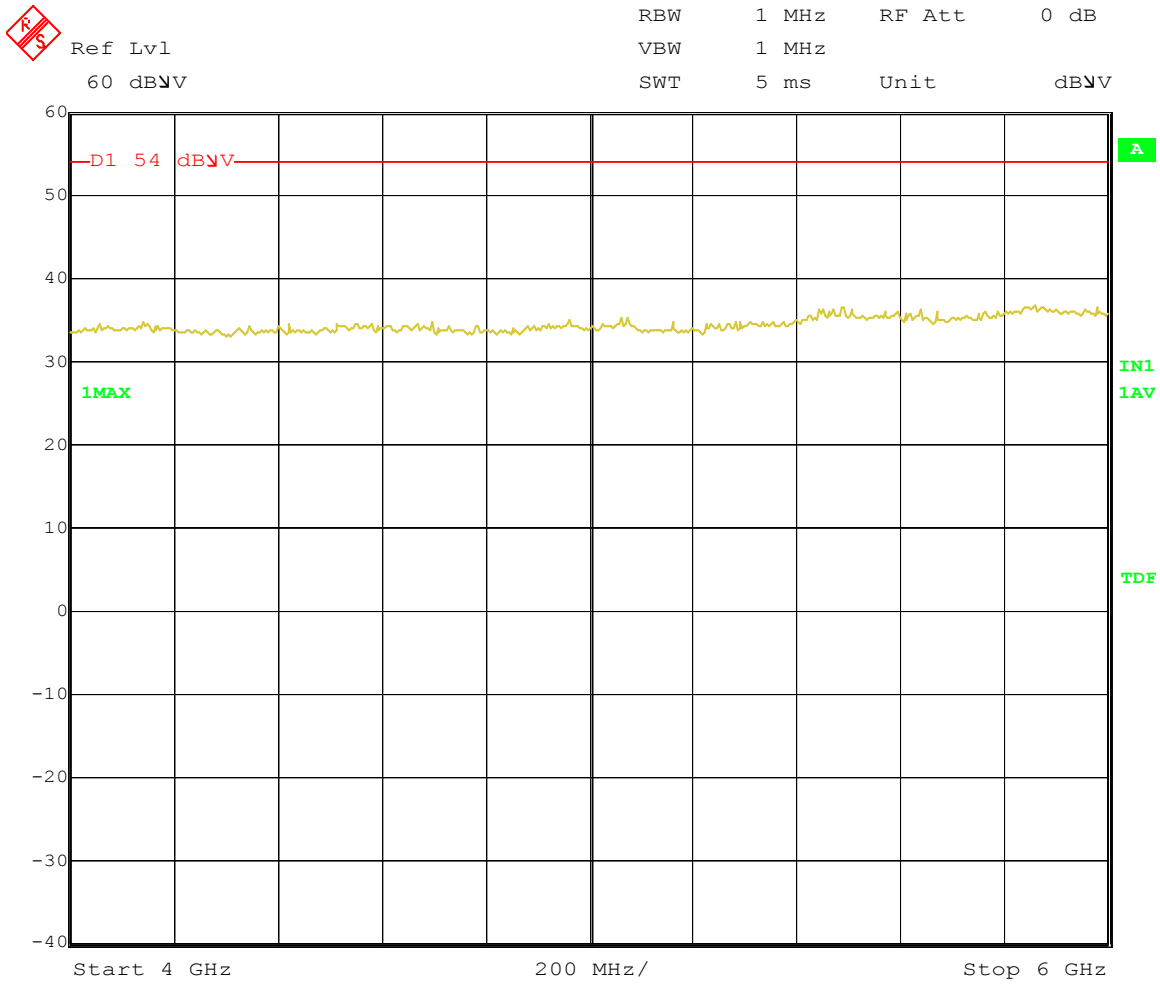
Start 1.0 GHz; Stop 2.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 1.811111 GHz, 44.69 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 1 to 2
13/02/2003 11:19:46

GPH\44358\020
Radiated Emissions. Receive Mode
(2.0 GHz to 4.0 GHz)

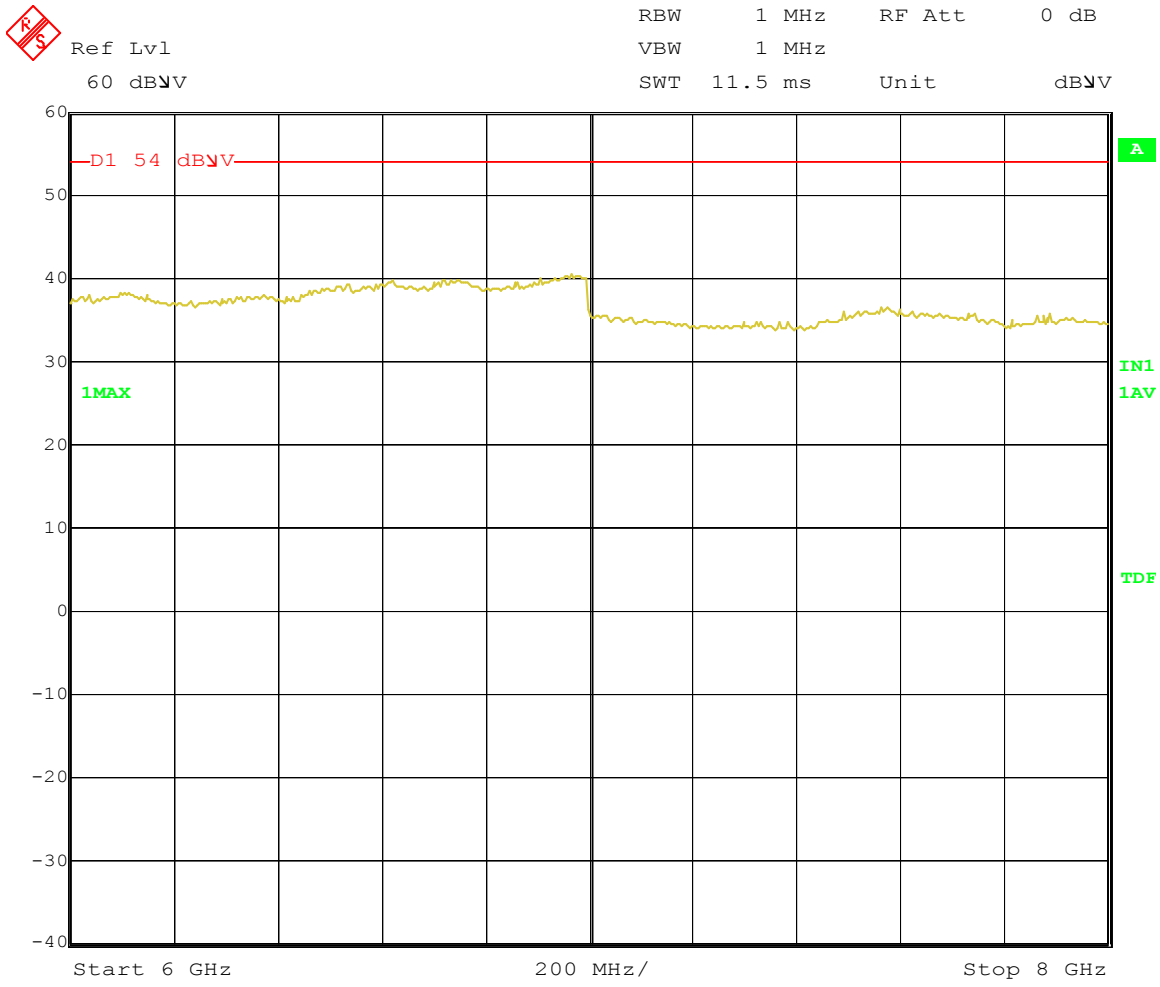


Start 2.0 GHz; Stop 4.0 GHz
Ref 60 dBµV/m; Ref Offset 0.0 dB; 10 dB/div
RBW 1.0 MHz; VBW 1.0 MHz; Att 0 dB; Swp 20.0 mS
Peak 2.064444 GHz, 45.23 dBµV/m
Display Line: 54 dBµV/m;
Transducer Factors: 2 to 4
13/02/2003 14:04:19

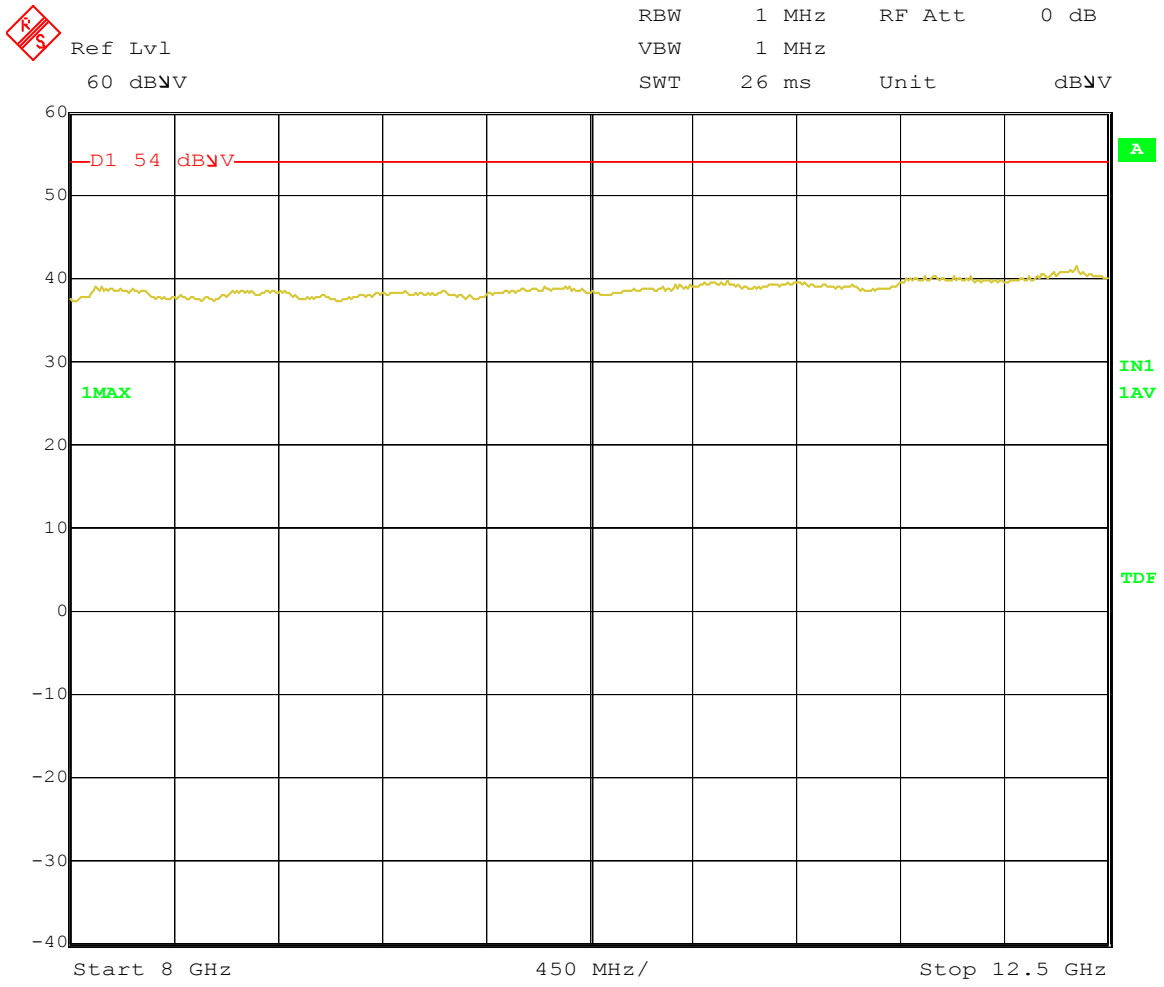
GPH\44358JD03\008
Radiated Emissions. Receive Mode
(4.0 GHz to 6.0 GHz)



GPH\44358JD03\009
Radiated Emissions. Receive Mode
(6.0 GHz to 8.0 GHz)

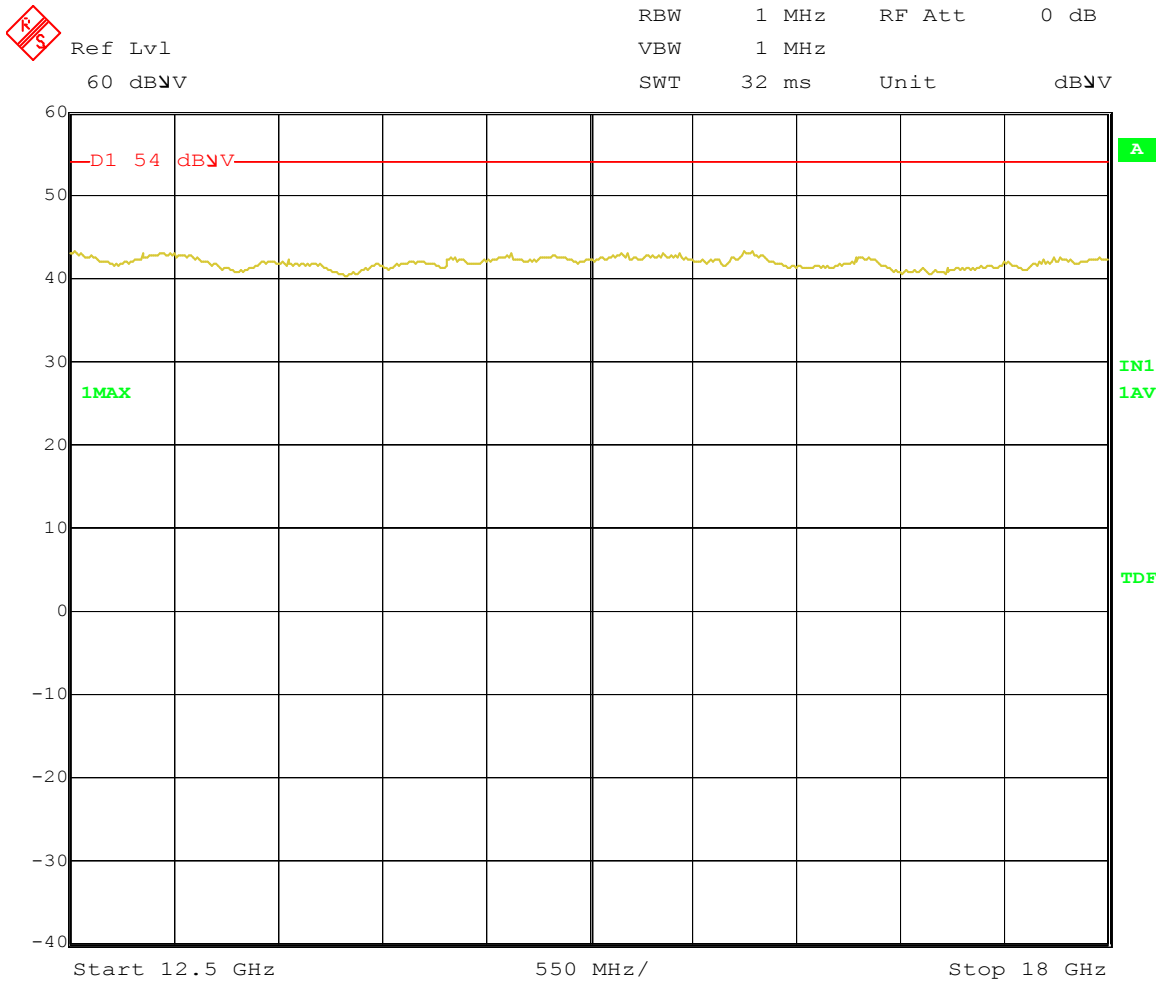


GPH\44358JD03\010
Radiated Emissions. Receive Mode
(8.0 GHz to 12.5 GHz)

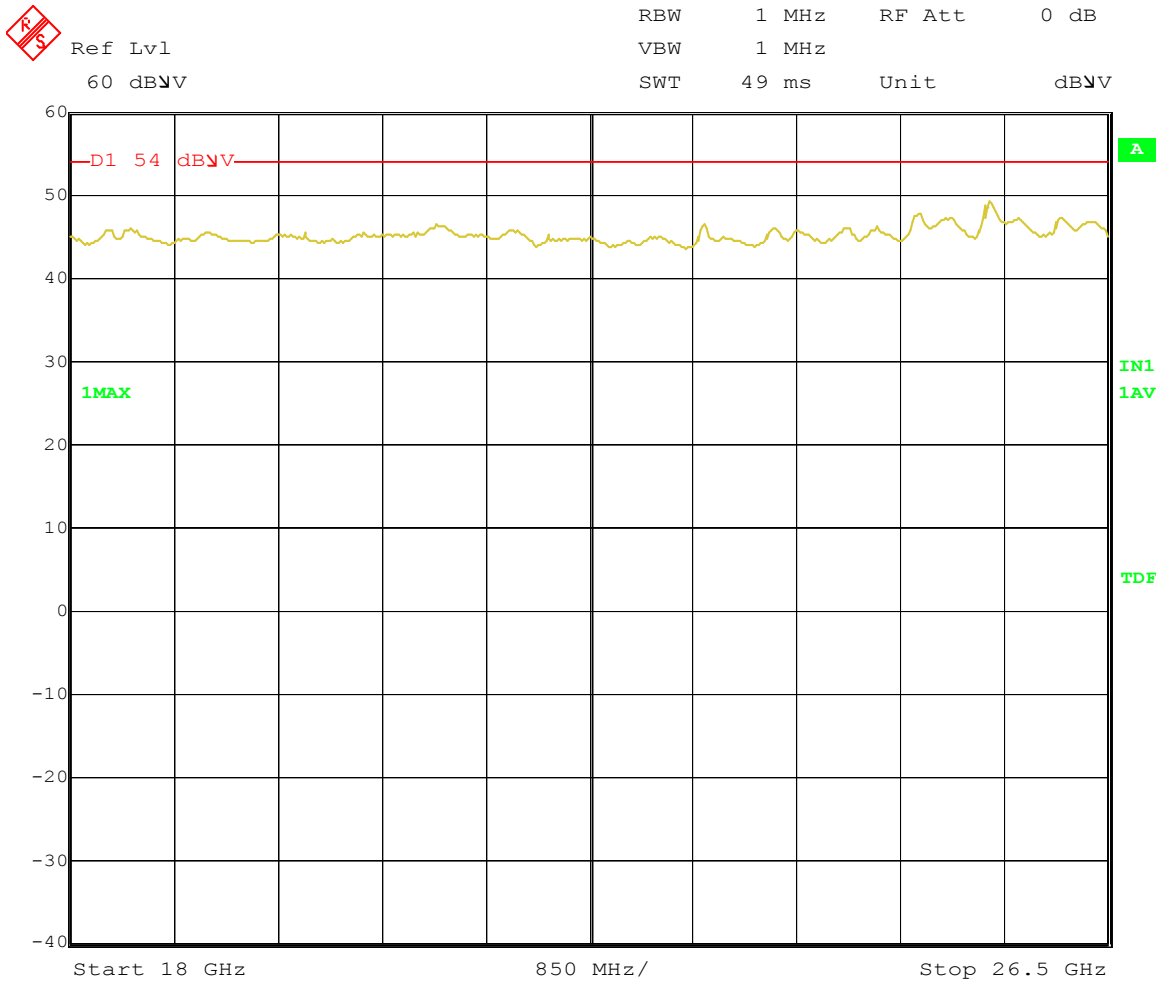


Date: 10.JAN.1997 19:27:46

GPH\44358JD03\011
Radiated Emissions. Receive Mode
(12.5 GHz to 18.0 GHz)

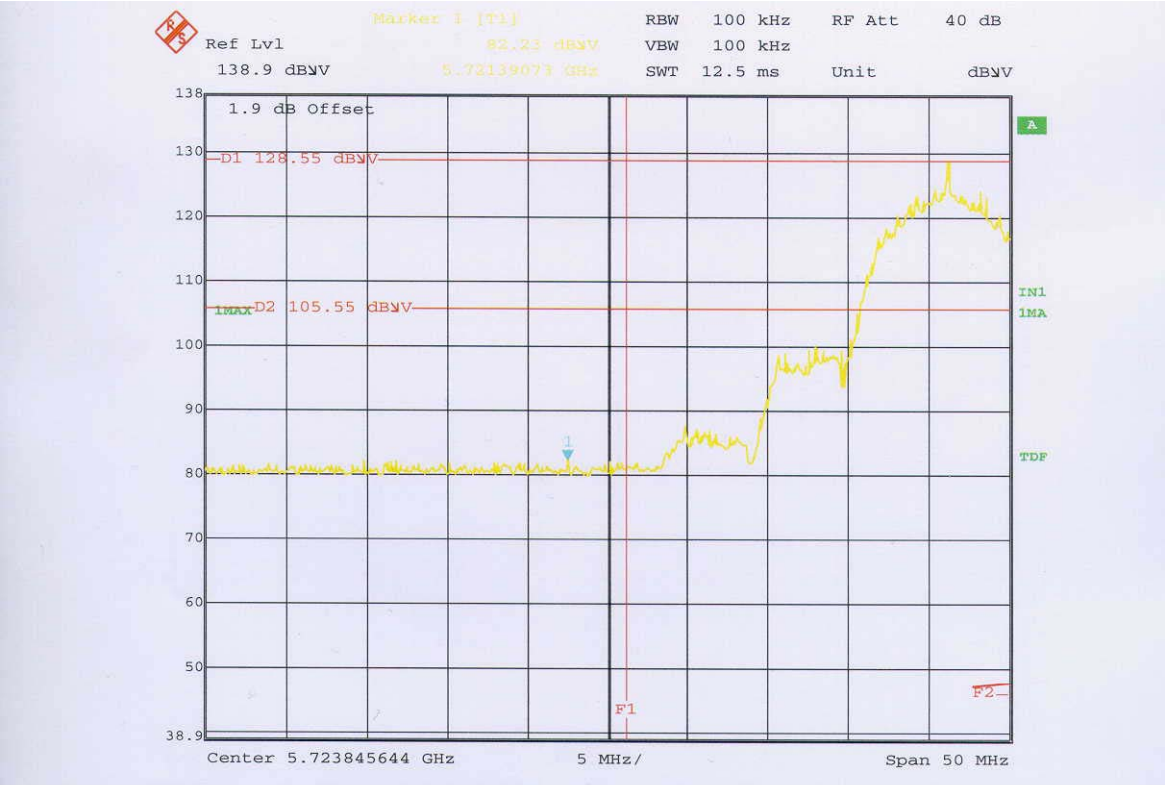


GPH\44358JD03\012
Radiated Emissions. Receive Mode
(18.0 GHz to 26.5 GHz)

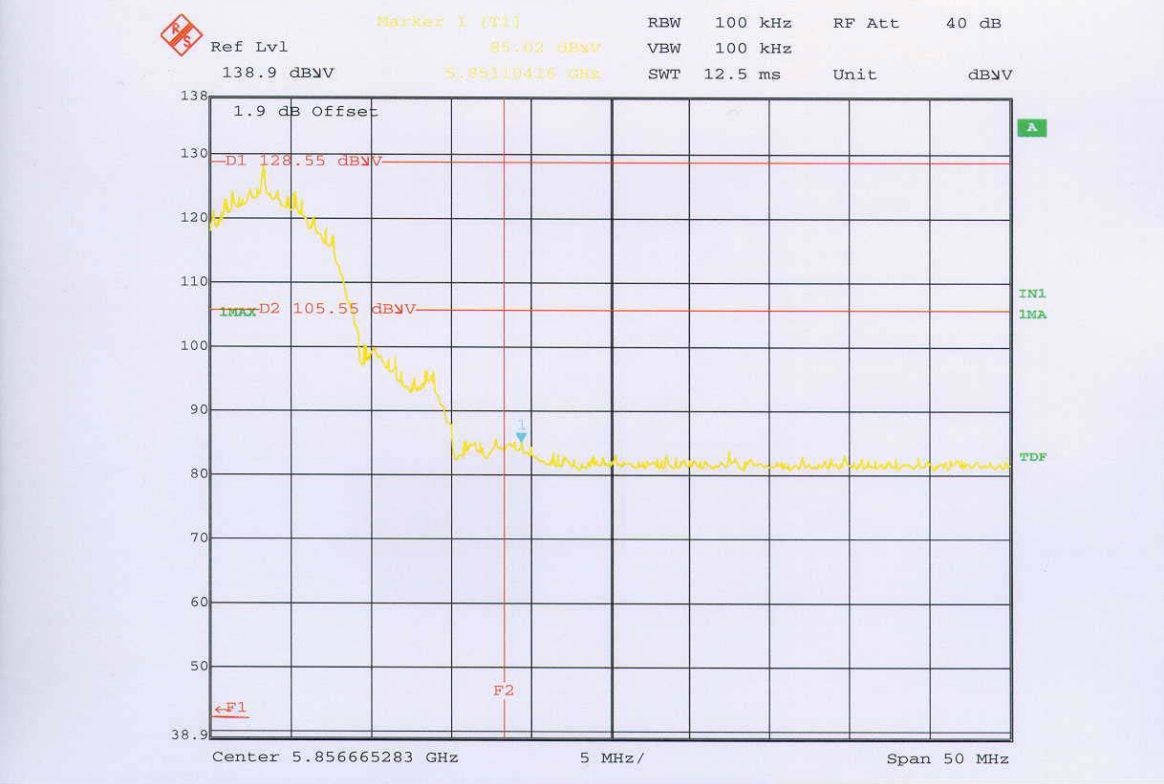


Date: 10.JAN.1997 20:48:31

GPH/44358JD03/014
Transmitter Band Edge Radiated Emissions.
BPSK Mode - Bottom Channel.

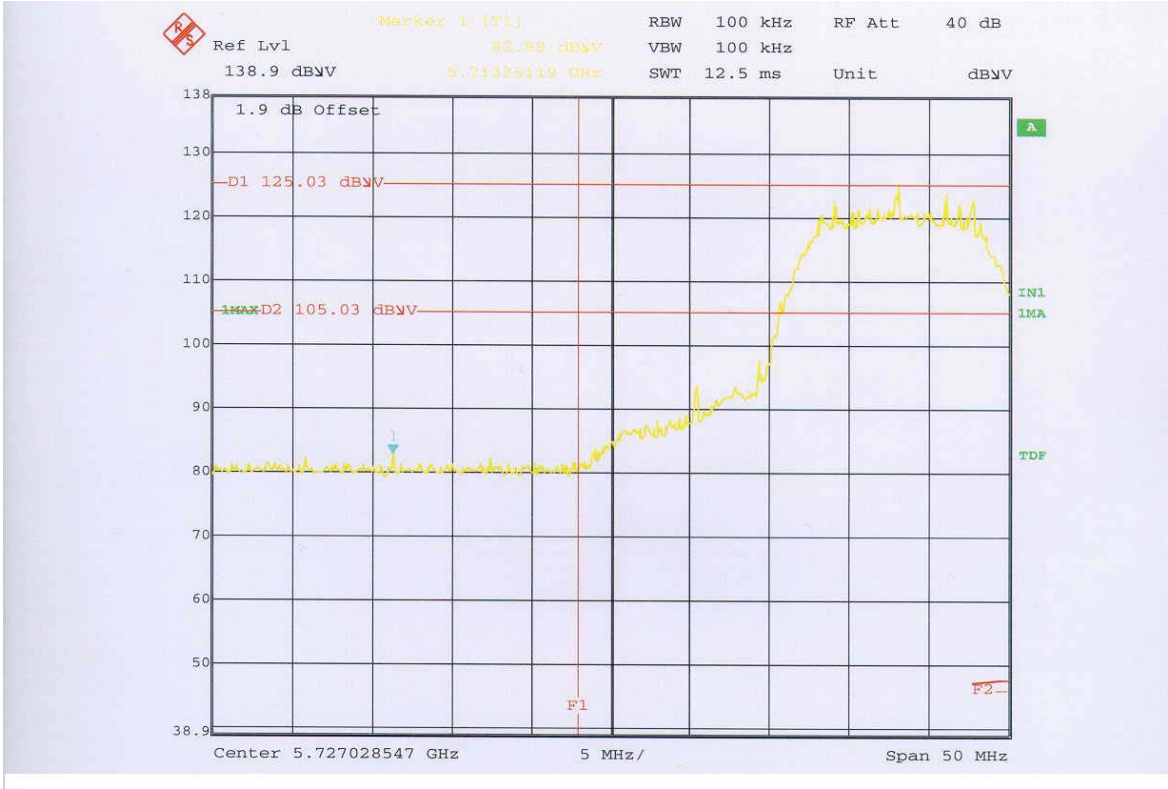


GPH/44358JD03/015
Transmitter Band Edge Radiated Emissions.
BPSK Mode - Top Channel.

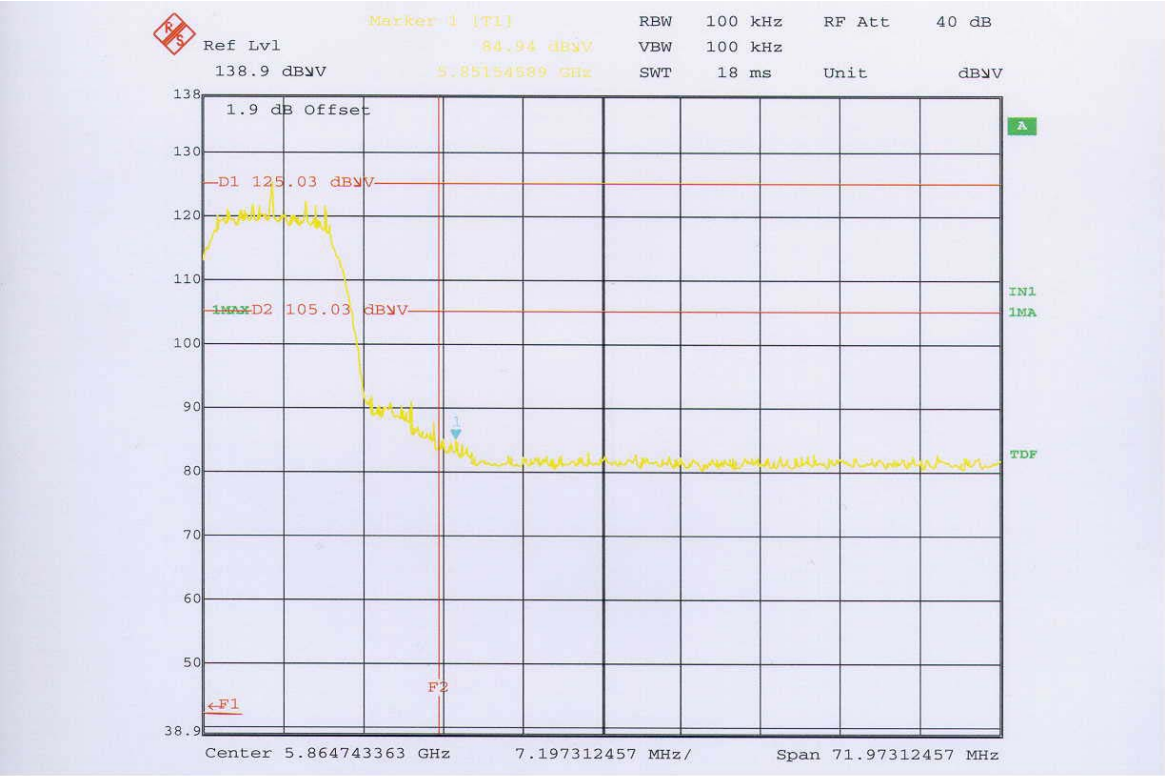


Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Subscriber Unit (SU) & SU Wall-Box
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

GPH/44358JD03/016
Transmitter Band Edge Radiated Emissions.
QPSK Mode - Bottom Channel.

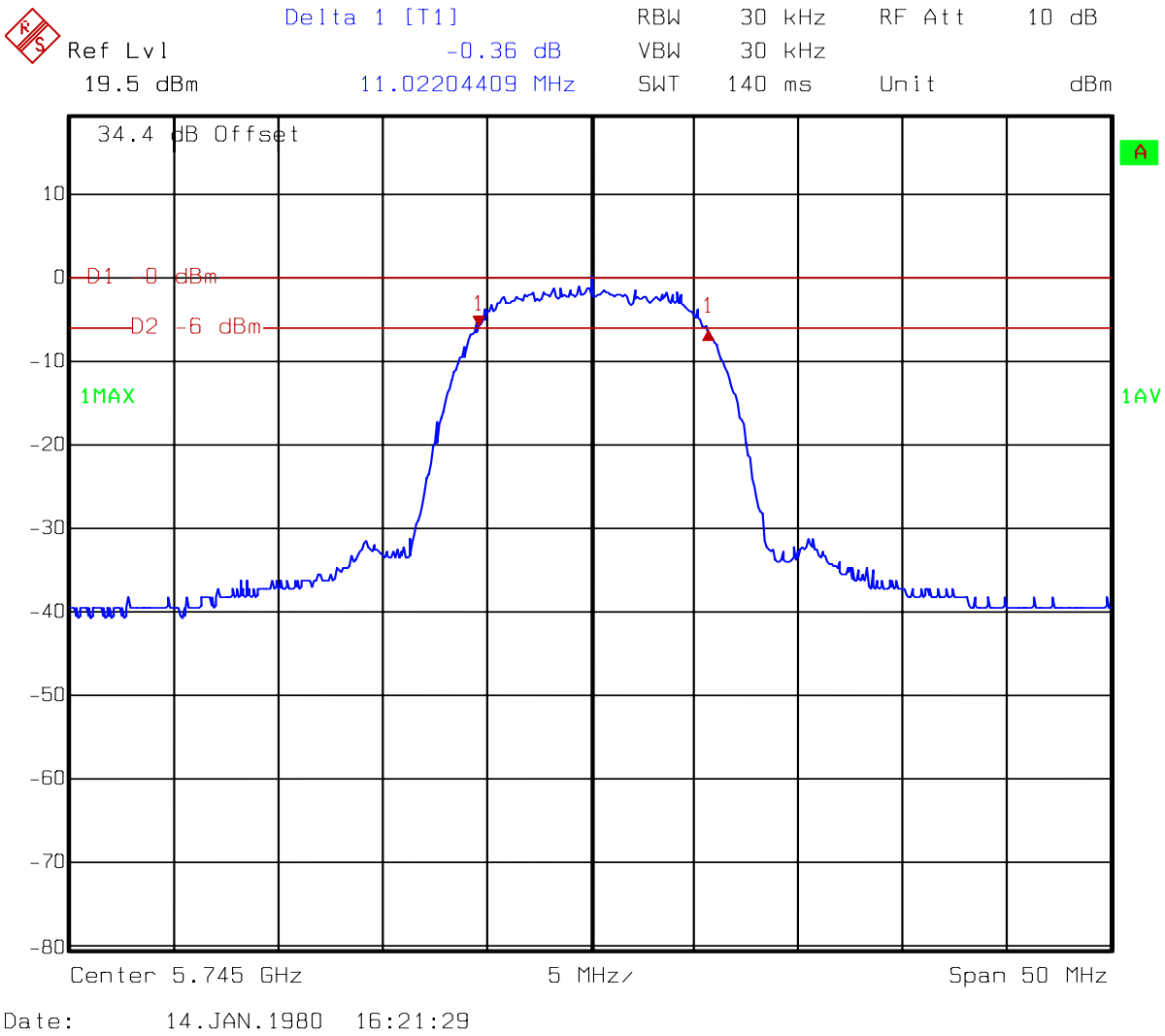


GPH/44358JD03/017
Transmitter Band Edge Radiated Emissions.
QPSK Mode - Top Channel.



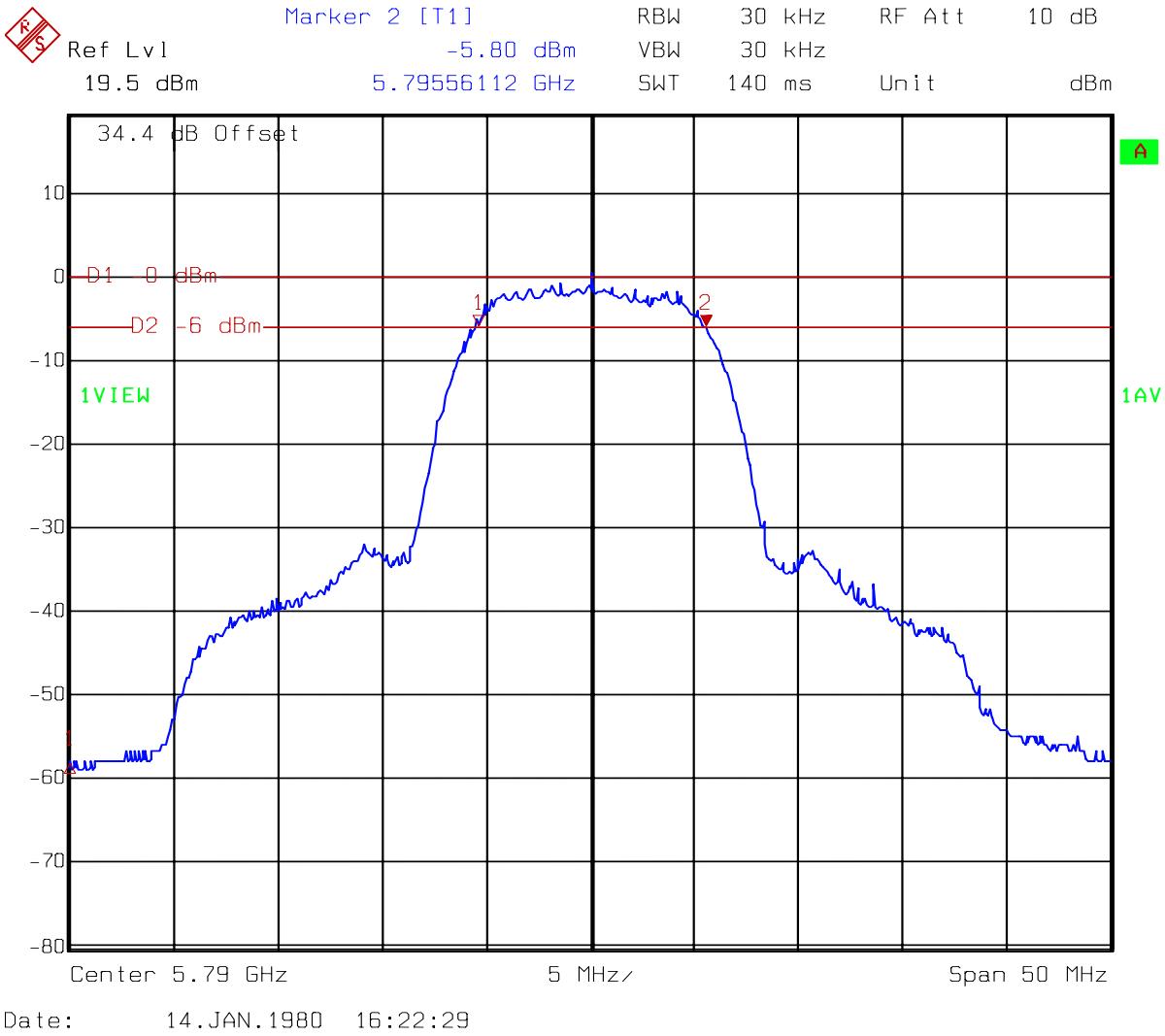
Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Subscriber Unit (SU) & SU Wall-Box
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

GPH/44358JD03/018
6 dB Bandwidth BPSK Modulation
Bottom Channel

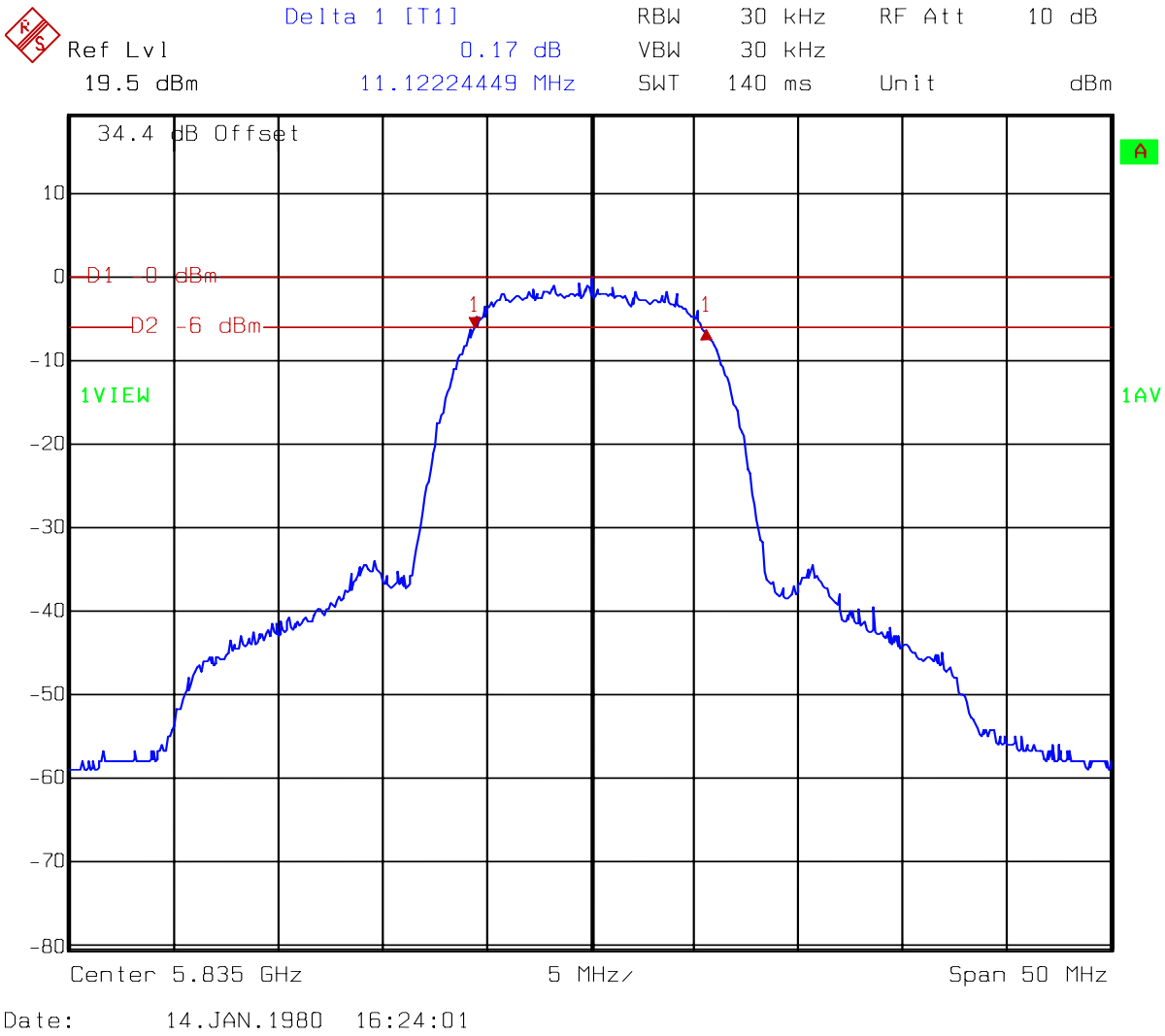


Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Subscriber Unit (SU) & SU Wall-Box
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

GPH/44358JD03/019
6 dB Bandwidth BPSK Modulation
Middle Channel

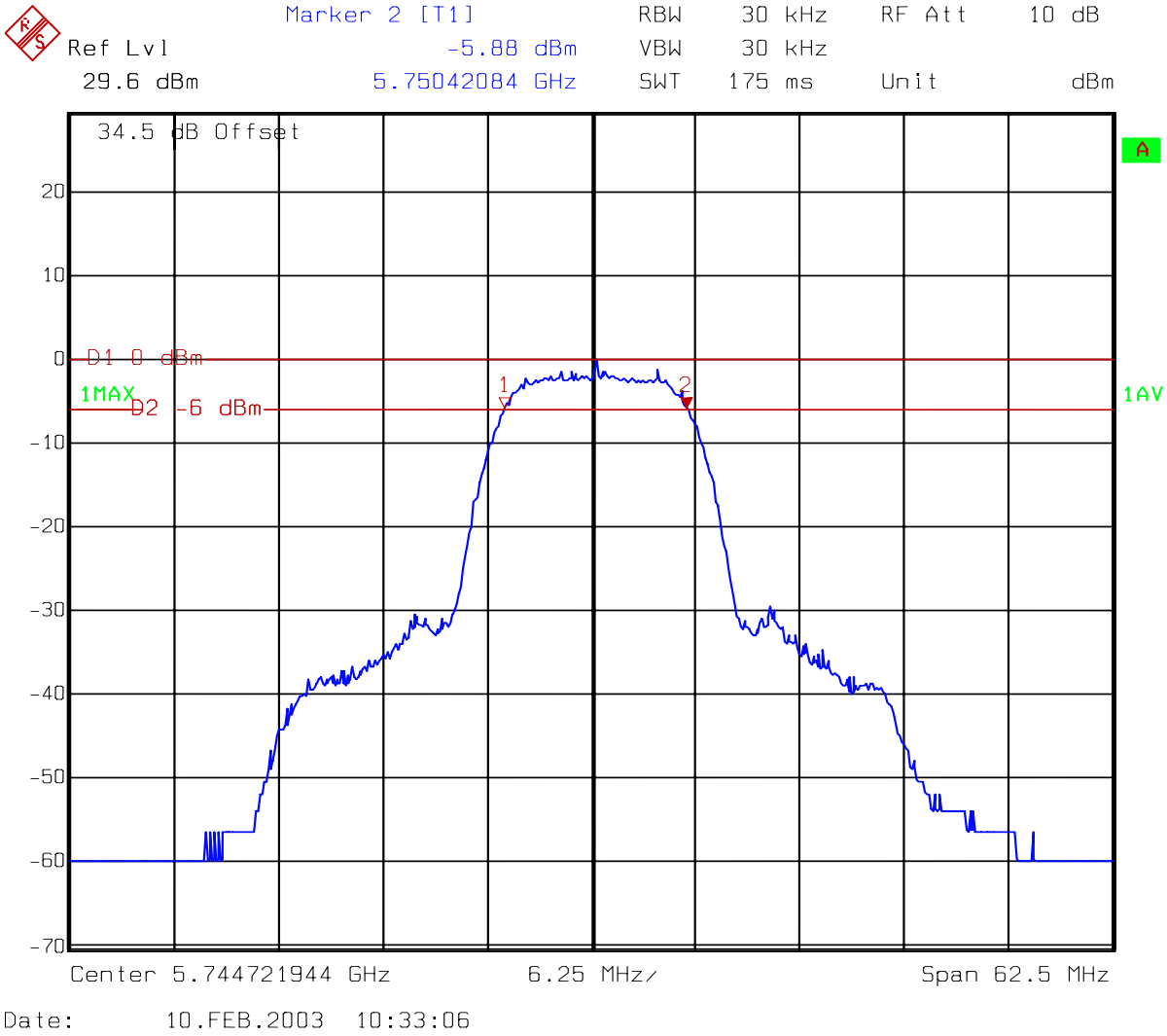


GPH/44358JD03/020
6 dB Bandwidth BPSK Modulation
Top Channel

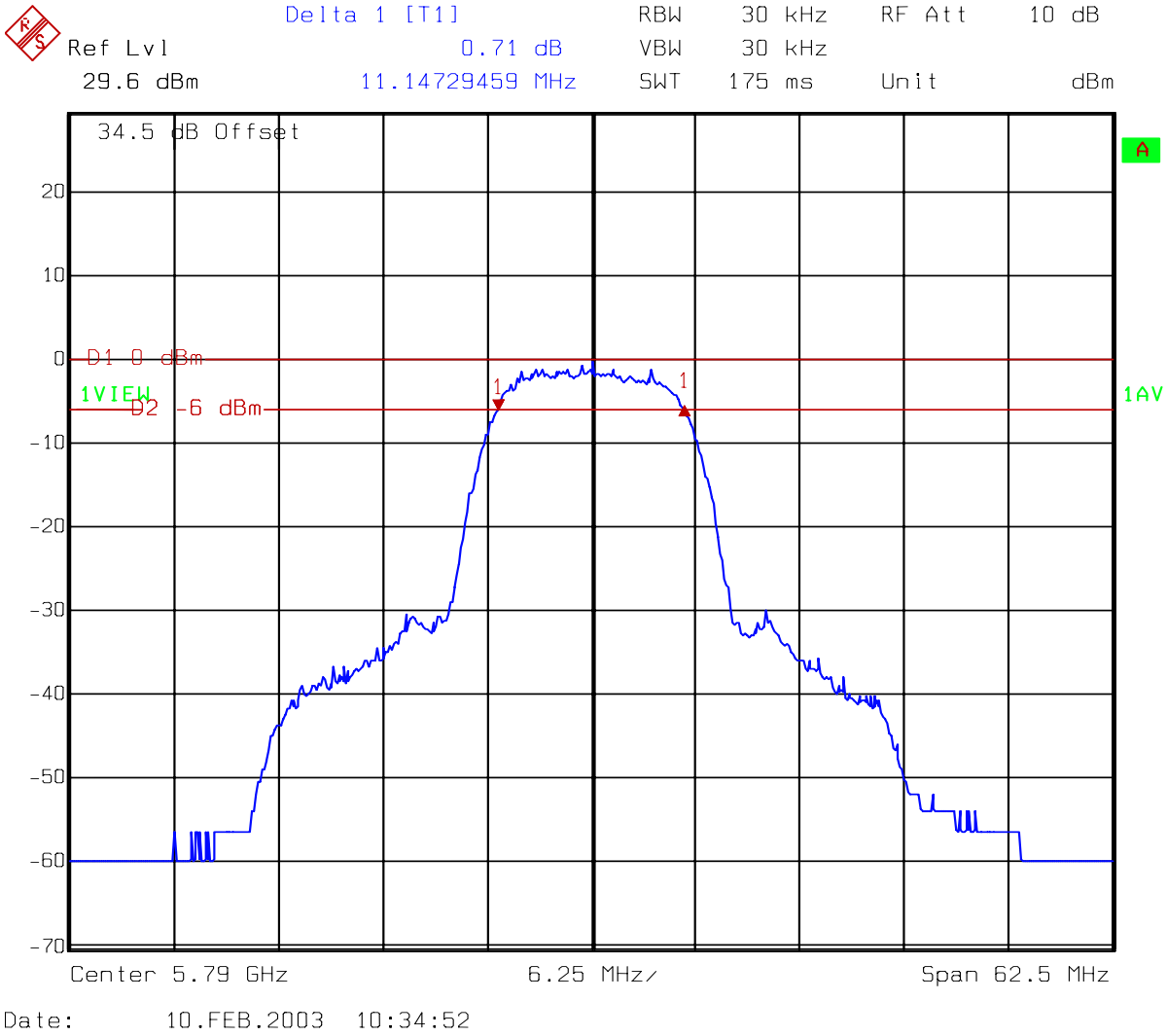


Test Of: **Axxcelera Broadband Wireless UK Ltd.**
Subscriber Unit (SU) & SU Wall-Box
To: **FCC Part 15 Subpart C: 2002 (Intentional Radiators) Section 15.247**

GPH/44358JD03/021
6 dB Bandwidth QPSK Modulation
Bottom Channel

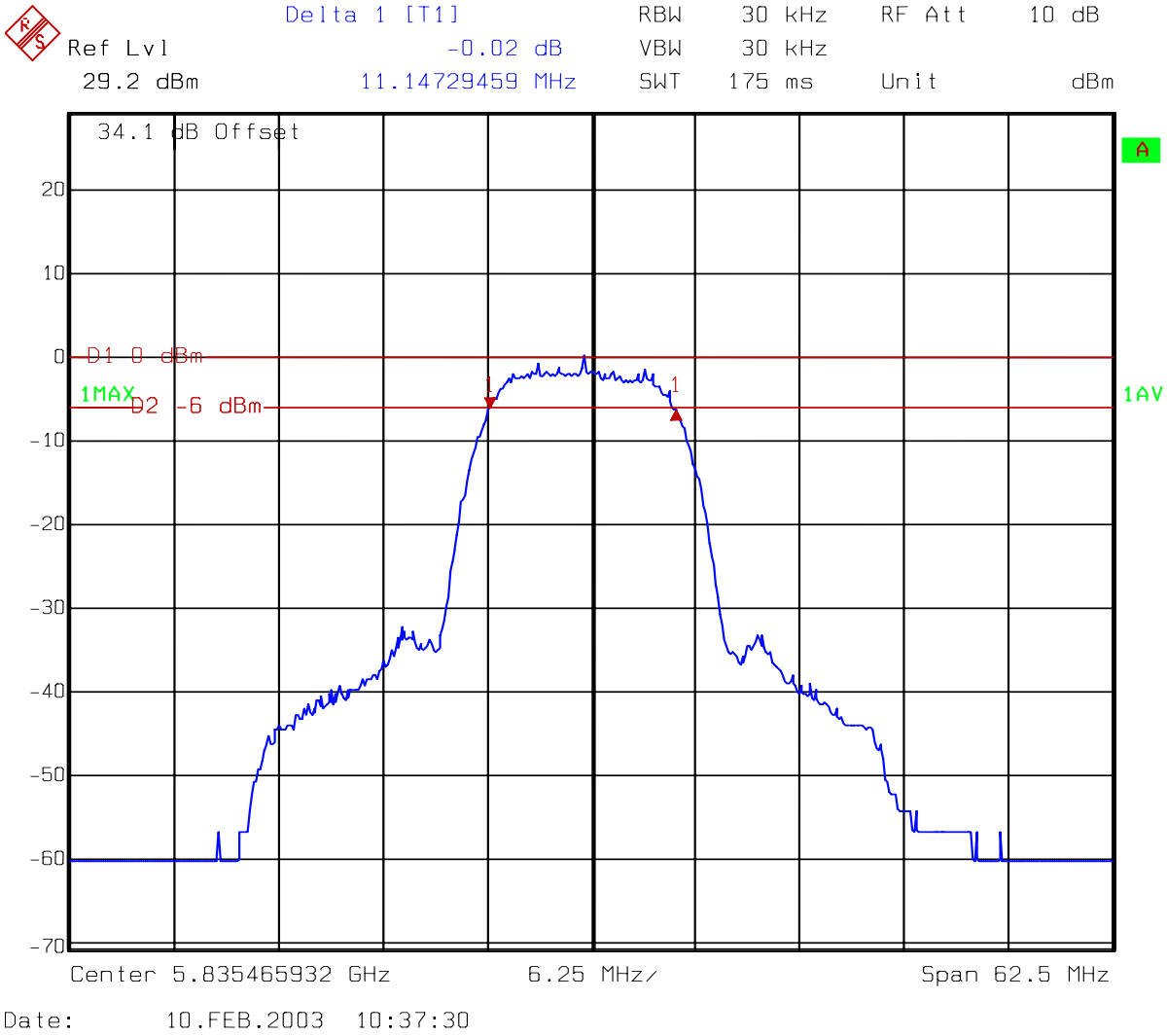


GPH/44358JD03/022
6 dB Bandwidth QPSK Modulation
Middle Channel



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

GPH/44358JD03/023
6 dB Bandwidth QPSK Modulation
Top Channel



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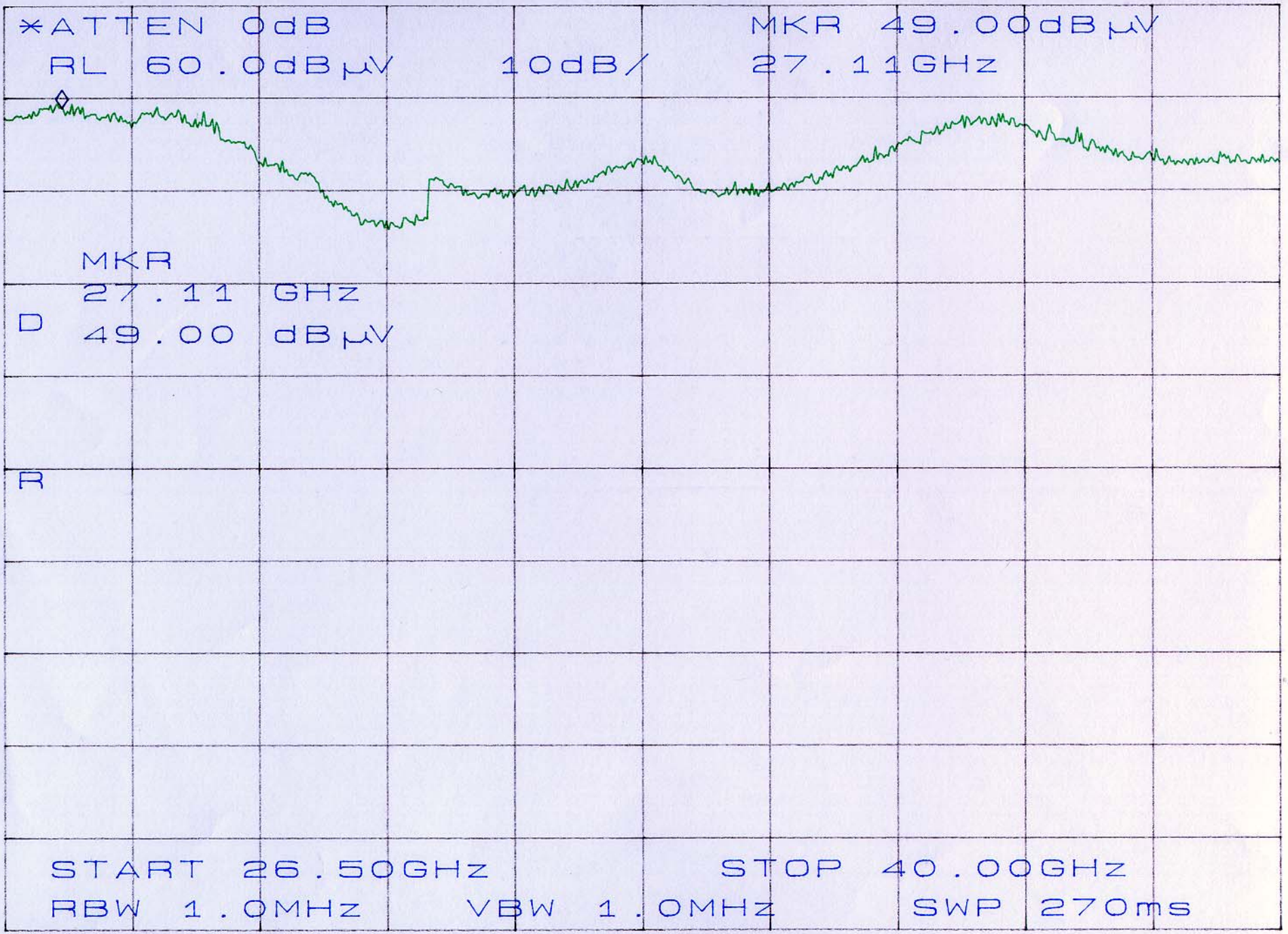

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