

FCC CFR47 PART 15 CERTIFICATION



TEST REPORT

FOR

802.11b 2.4GHz WIRELESS DSSS Tx/Rx MODULE

MODEL: LA4137

FCC ID: H9PLA4137

REPORT NUMBER: 01U1098-1

ISSUE DATE: January 24, 2002

Prepared for
SYMBOL TECHNOLOGIES, INC.
6480 VIA DEL ORO DRIVE
SAN JOSE, CA 95119-1208
USA

Prepared by
COMPLIANCE CERTIFICATION SERVICES
561 F MONTEREY ROAD
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888



TABLE OF CONTENT

1. TEST RESULT CERTIFICATION	3
2. EUT DESCRIPTION	4
3. TEST METHODOLOGY	4
4. TEST FACILITY	4
5. ACCREDITATION AND LISTING	4
5.1. Laboratory Accreditations and Listings	5
6. MEASURING INSTRUMENT CALIBRATION	6
6.1. Measurement Uncertainty	6
7. SUPPORT EQUIPMENT / TEST DIAGRAM	7
8. APPLICABLE RULES AND BRIEF TEST RESULT	8
9. TEST SETUP, PROCEDURE AND RESULT	13
9.1. PEAK POWER OUTPUT	13
9.2. 6 dB BANDWIDTH MEASUREMENT	20
9.3. CONDUCTED SPURIOUS EMISSION	22
9.4. PEAK POWER SPECTRAL DENSITY	26
9.5. PROCESSING GAIN	30
9.6. RESTRICTED BAND EDGE MEASUREMENT	31
9.7. RADIATED EMISSION	33
9.8. POWER LINE CONDUCTED EMISSION	39
9.9. SETUP PHOTOS	41

ATTACHMENTS

- EUT PHOTOGRAPHS

1. TEST RESULT CERTIFICATION

COMPANY NAME: SYMBOL TECHNOLOGIES, INC.
6480 VIA DEL ORO DRIVE
SAN JOSE, CA 85040 USA

CONTACT PERSON: NORM NELSON / SENIOR EMC ENGINEER

TELEPHONE NO: 408-528-2649

EUT DESCRIPTION: 802.11b 2.4 GHz WIRELESS DSSS Tx/Rx MODULE

MODEL NAME: LA4137

DATES TESTED: DECEMBER 13, 2001, January 22-24,2002

TYPE OF EQUIPMENT	INTENTIONAL RADIATOR
EQUIPMENT TYPE	2.4GHz TRANSCEIVER
MEASUREMENT PROCEDURE	ANSI 63.4 / 1992, TIA/EIA 603
PROCEDURE	CERTIFICATION
FCC RULE	CFR 47 PART 15.247

Compliance Certification Services, Inc. tested the above equipment for compliance with the requirement set forth in CFR 47, PART 15.247. The equipment in the configuration described in this report, shows the measured emission levels emanating from the equipment do not exceed the specified limit.

Note: This document reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document.

Approved & Released For CCS By:

Tested By:



STEVE CHENG
EMC ENGINEERING MANAGER
COMPLIANCE CERTIFICATION SERVICES



JESSE SALDIVAR
ASSOCIATE EMC ENGINEER
COMPLIANCE CERTIFICATION SERVICES

2. EUT DESCRIPTION

The PRO WIRELESS 2011B is an 802.11b 2.4GHz Direct Sequence Spread Spectrum Wireless Networking Transceiver Module. Its Frequency Range is from 2.412 to 2.462 GHz. Only one sleeved dipole antenna with a 2.2 dBi gain was tested to both ports to determine the worse case. Therefore, only the worse case test data was reported in the test report. The antenna is equipped with unique connector which cannot be replace by standard jack or electrical connector.

3. TEST METHODOLOGY

Both conducted and radiated testing were performed according to the procedures documented on chapter 13 of ANSI C63.4 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055 and 2.1057.

4. TEST FACILITY

The open area test sites and conducted measurement facilities used to collect the radiated data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

5. ACCREDITATION AND LISTING

The test facilities used to perform radiated and conducted emissions tests are accredited by National Voluntary Laboratory Accreditation Program for the specific scope of accreditation under Lab Code: 200065-0 to perform Electromagnetic Interference tests according to FCC PART 15 AND CISPR 22 requirements. No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government. In addition, the test facilities are listed with Federal Communications Commission (reference no: 31040/SIT (1300B3) and 31040/SIT (1300F2))

5.1. Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	FCC Part 15, CISPR 22, AS/NZS 3548, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, CNS 13438	 200065-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	 R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	 ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	 ELA-171
Taiwan	BSMI	CNS 13438	 SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	 IC2324 A,B,C, and F

*No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government

6. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

TEST EQUIPMENTS LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Spectrum Analyzer	HP100Hz - 22GHz	8566B	2140A01296	5/4/02
Spectrum Display	HP	85662A	2152A03066	4/10/02
Quasi-Peak Detector	HP9K - 1GHz	85650A	2811A01155	5/4/02
Pre-Amplifier, 25 dB	HP 0.1 - 1300MHz	8447D (P_1M)	2944A06833	11/21/02
Antenna, BiLog	Chase 30 - 2000MHz	CBL6112	2049	12/11/02
LISN	Fisher Cus. Comm.	LISN-50/250-25-2	2023	8/5/02
EMI Test Receiver	Rohde & Schwarz	ESHS 20	827129/006	2/28/02
EMC Receiver (9K-26.5GHz)	HP	8593EM	3710A00205	6/20/02
Horn Antenna(1 - 18GHz)	EMCO	3115	2238	6/20/02
Horn Antenna,(18 - 26GHz)	Antenna Research Associate	MWH 1826/B	1013	7/26/02
Power Meter	HP	436A	2709A29209	2/8/02
High pass filter	FSM Microwave	HM 4570-9SS	3	N.C.R.

6.1. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

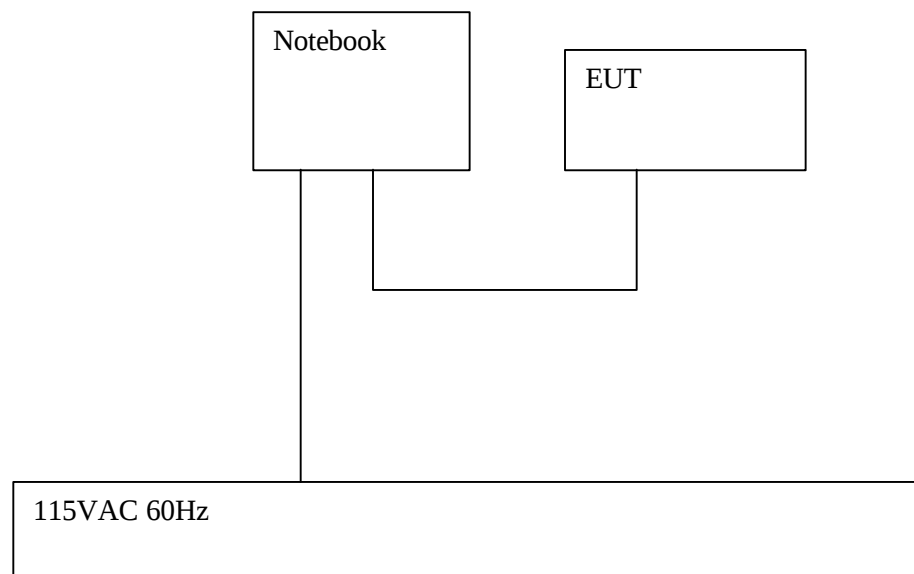
Any results falling within the above values are deemed to be marginal.

7. SUPPORT EQUIPMENT / TEST DIAGRAM

Support Equipment

One IBM NOTEBOOK PC.

Test Diagram



8. APPLICABLE RULES AND BRIEF TEST RESULT

§15.247 (b) (1) - POWER OUTPUT

(b) The maximum peak output power of the intentional radiator shall not exceed the following:

(1) For frequency hopping systems operating in the 2400-2483.5 MHz or 5725-5850 MHz band, and all direct sequence systems: 1 watt.

Spec limit: As specified above, 1W maximum.

Test result: No non-compliance noted.

<i>Channel</i>	<i>Frequency (MHz)</i>	<i>Output Power (dBm)</i>
1	2412	19.74
6	2437	19.97
11	2462	19.95

§15.247 (a) (2)- BANDWIDTH LIMITATION

(2) For direct sequence systems, the minimum 6 dB bandwidth shall be at least 500 kHz.

Spec limit: > 500 kHz.

Test result: No non-compliance noted.

<i>Channel</i>	<i>Frequency (MHz)</i>	<i>Bandwidth(MHz)</i>
1	2412	11.25
6	2437	11.13
11	2462	11.56

§15.247 (d) - PEAK POWER SPECTRAL DENSITY

(d) For direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Spec limit: < 8dBm.

Test result: No non-compliance noted.

Main unit

<i>Channel</i>	<i>Frequency (MHz)</i>	<i>Results (dBm)</i>
1	2412	-3.8
6	2437	-4.4
11	2462	-5.1

§15.247- PROCESS GAIN

(e) The processing gain of a direct sequence system shall be at least 10 dB. The processing gain represents the improvement to the received signal-to-noise ratio, after filtering to the information bandwidth, from the spreading/despreading function.

Spec limit: >10dBm.

Test result: No non-compliance noted.

§15.205- RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
¹ 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(²)
13.36 - 13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

Spec limit: As specified above,.

Test result: No non-compliance noted. See section 9.7 Radiated Emission.

§15.209- RADIATED EMISSION LIMITS; GENERAL REQUIREMENTS

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (micro volts/meter)	Measurement Distance (meters)
30 - 88	100 **	3
88 - 216	150 **	3
216 - 960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

(b) In the emission table above, the tighter limit applies at the band edges.

FCC PART 15 CLASS A

MEASURING DISTANCE OF 10 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	90	39.1
88-216	150	43.5
216-960	210	46.4
Above 960	300	49.5

FCC PART 15 CLASS B

MEASURING DISTANCE OF 3 METER		
FREQUENCY RANGE (MHz)	FIELD STRENGTH (Microvolts/m)	FIELD STRENGTH (dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Spec limit: As specified above.

Test result: No non-compliance noted.

§15.207- CONDUCTED LIMITS

(a) For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 microvolts. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

FCC CLASS A

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-1.705MHz	1000	60
1.705MHz - 30MHz	3000	69.54

FCC CLASS B

FREQUENCY RANGE	FIELD STRENGTH (Microvolts)	FIELD STRENGTH (dBuV)/QP
450kHz-30MHz	250	48

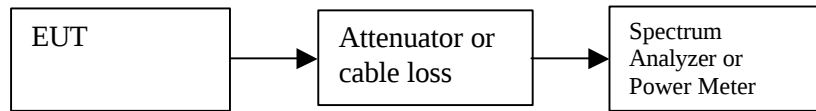
Spec limit: As specified above.

Test result: No non-compliance noted. No radiated emissions were detected other than the fundamental frequency and harmonics. Line conducted emissions comply.

9. TEST SETUP, PROCEDURE AND RESULT

9.1. PEAK POWER OUTPUT

TEST SETUP



*Note Att/cable loss = 1.2 dB in this test

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak	☒ 1 MHz	☒ 1 MHz

TEST PROCEDURE

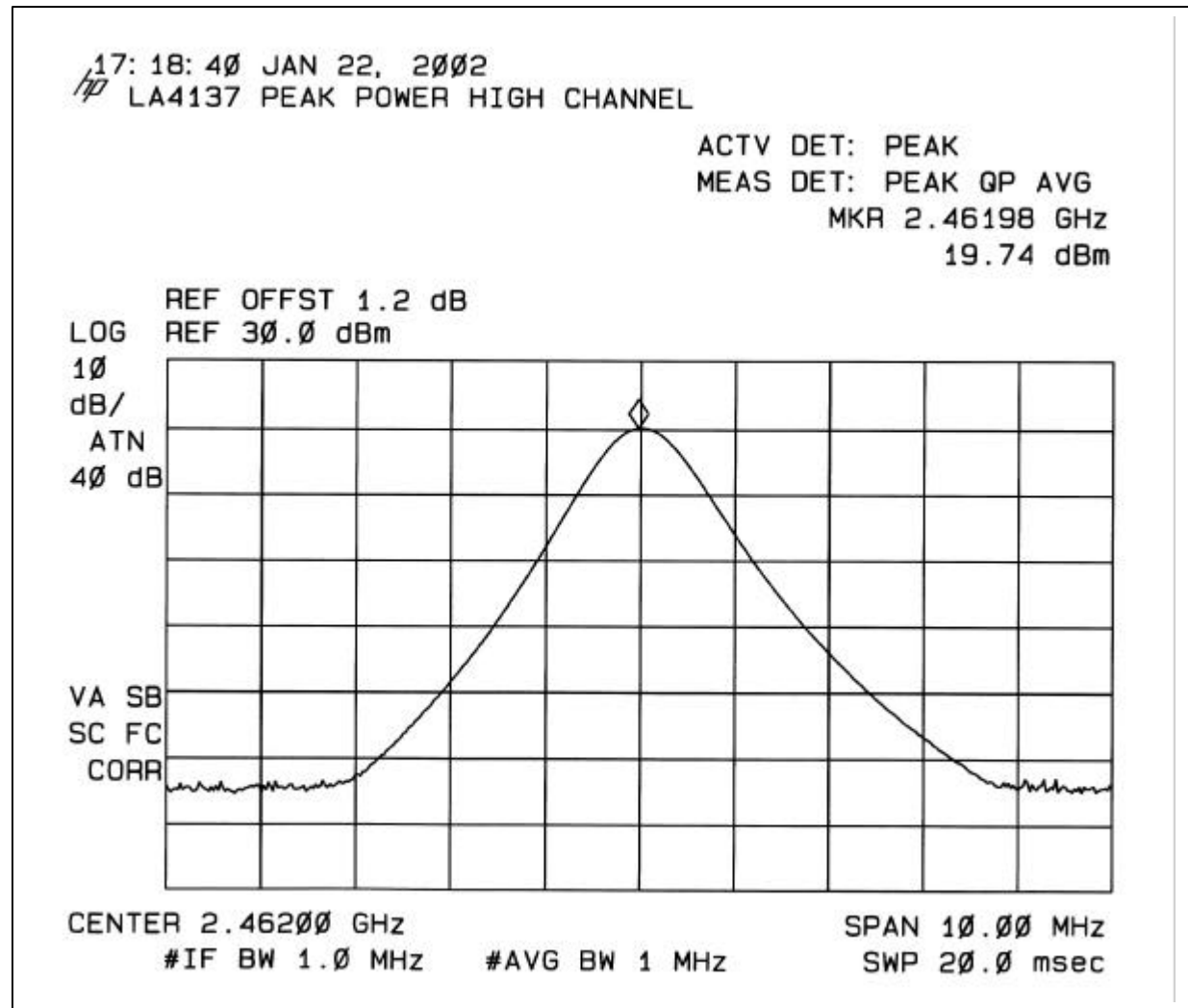
The EUT is configured on a test bench as shown above in a continuously transmitting mode. To achieve the peak power measurement with spectrum analyzer without the bandwidth correlation, the EUT modulation function had been turn off to reduce the occupied bandwidth but still maintain the maximum available output power at specified frequency. While the transceiver started, the analyzer MAX HOLD function is used to capture the emissions and a plot is made with the marker at the peak emission.

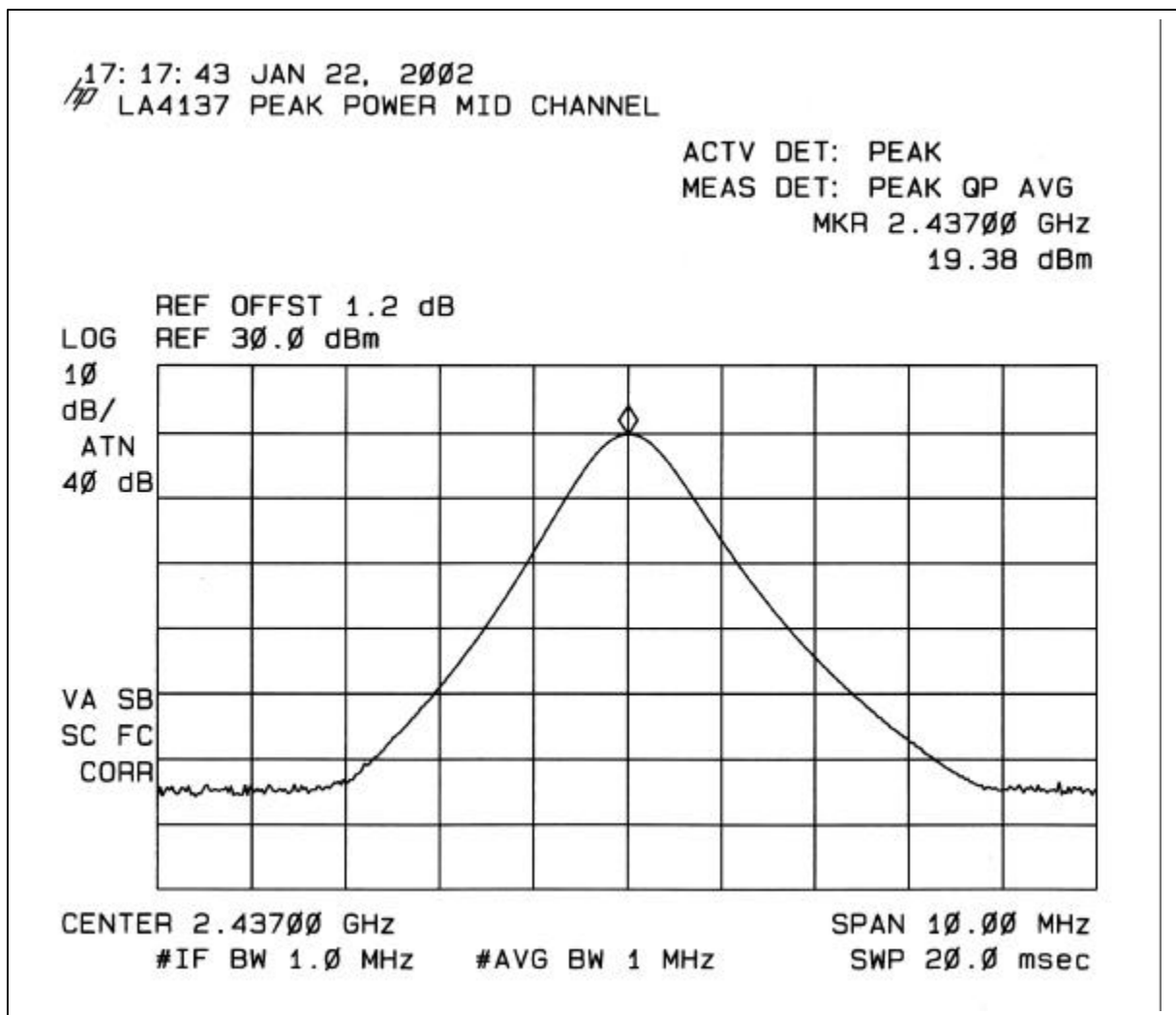
Base Unit (Antenna Port 1)

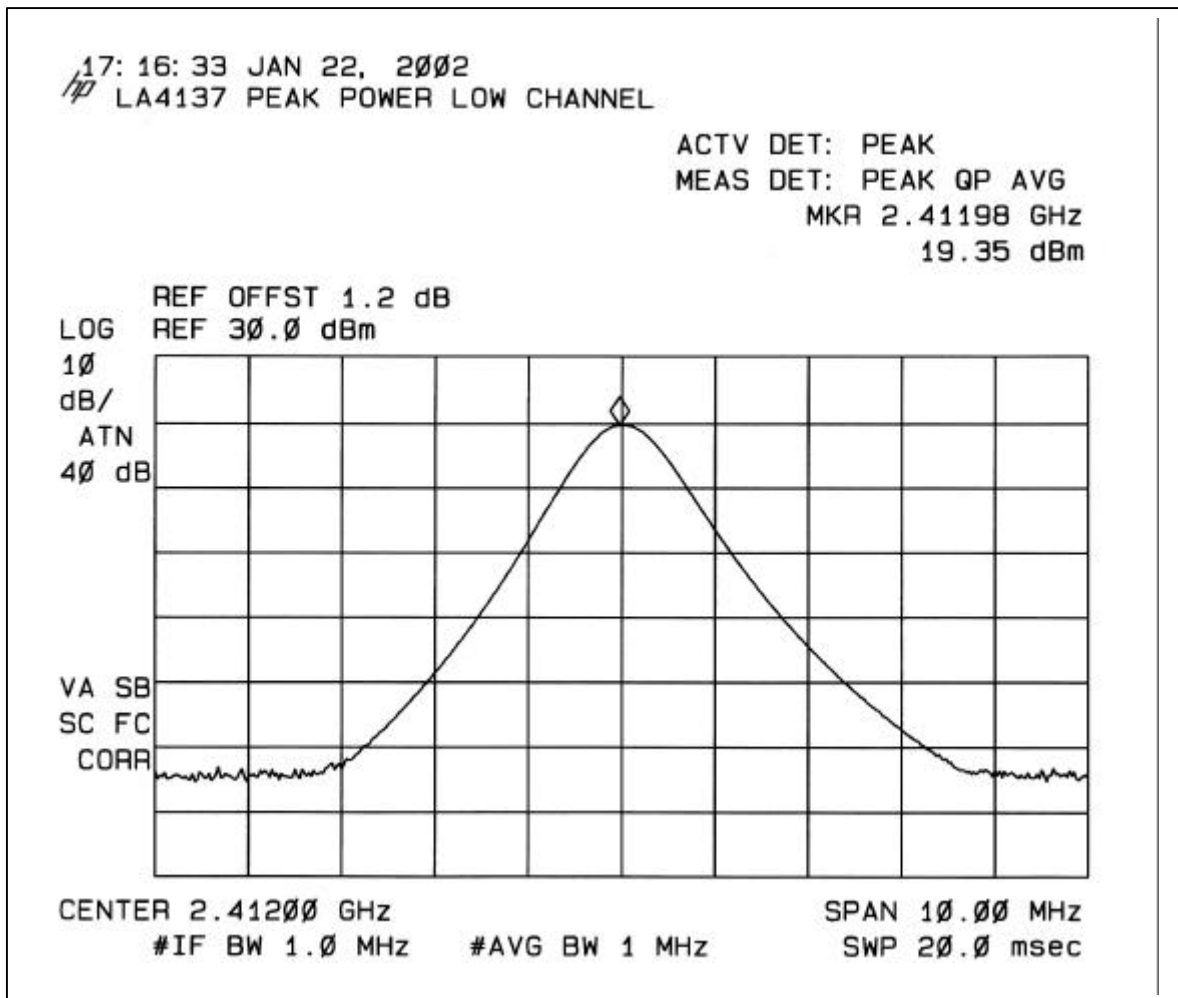
Channel	Frequency (MHz)	Peak Power (dBm)
1	2412	19.74
6	2437	19.38
11	2462	19.35

Base Unit (Antenna Port 2)

Channel	Frequency (MHz)	Peak Power (dBm)
1	2412	19.68
6	2437	19.97
11	2462	19.95







09:21:37 JAN 24, 2002

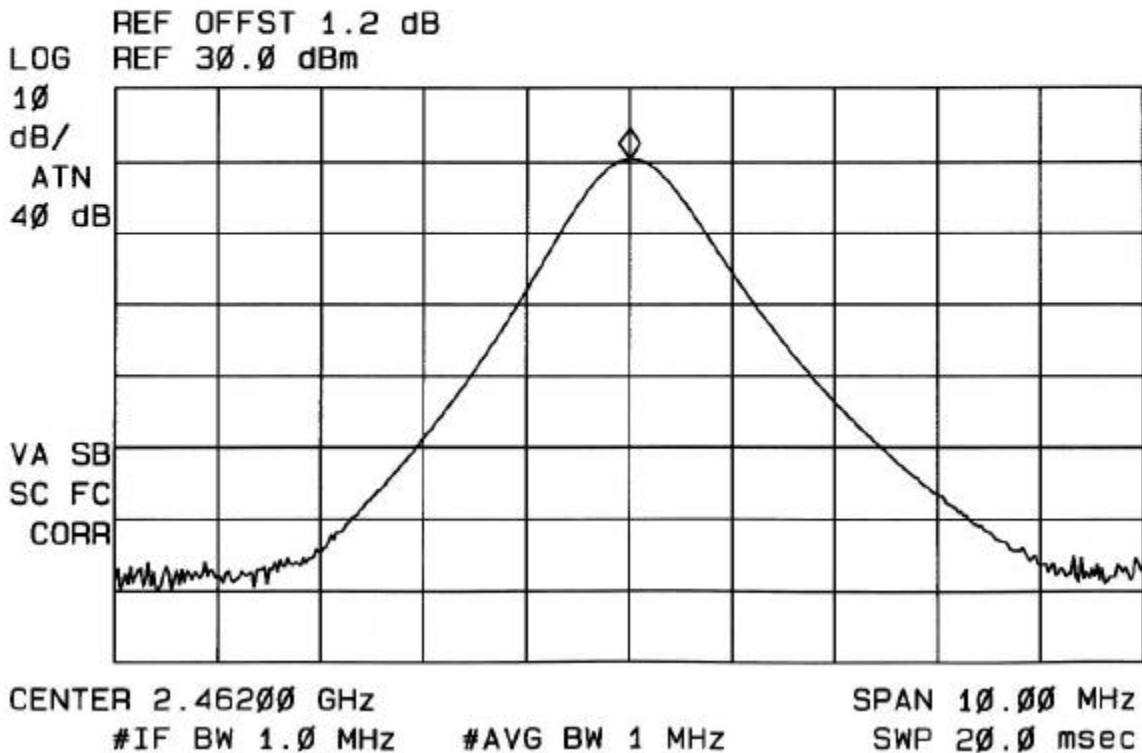
LA4137 POWER OUTPUT HIGH CH ANT 2

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 2.46200 GHz

19.95 dBm



09:20:10 JAN 24, 2002

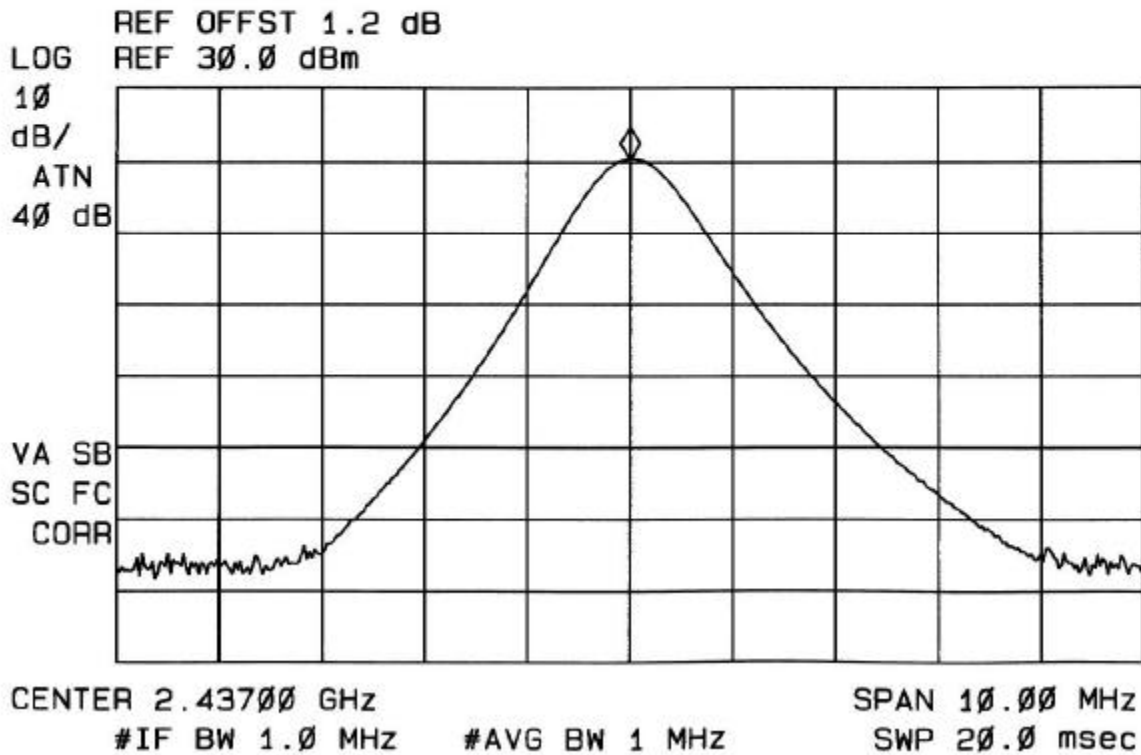
LA4137 POWER OUTPUT MID CH ANT 2

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 2.43700 GHz

19.97 dBm



09:18:56 JAN 24, 2002

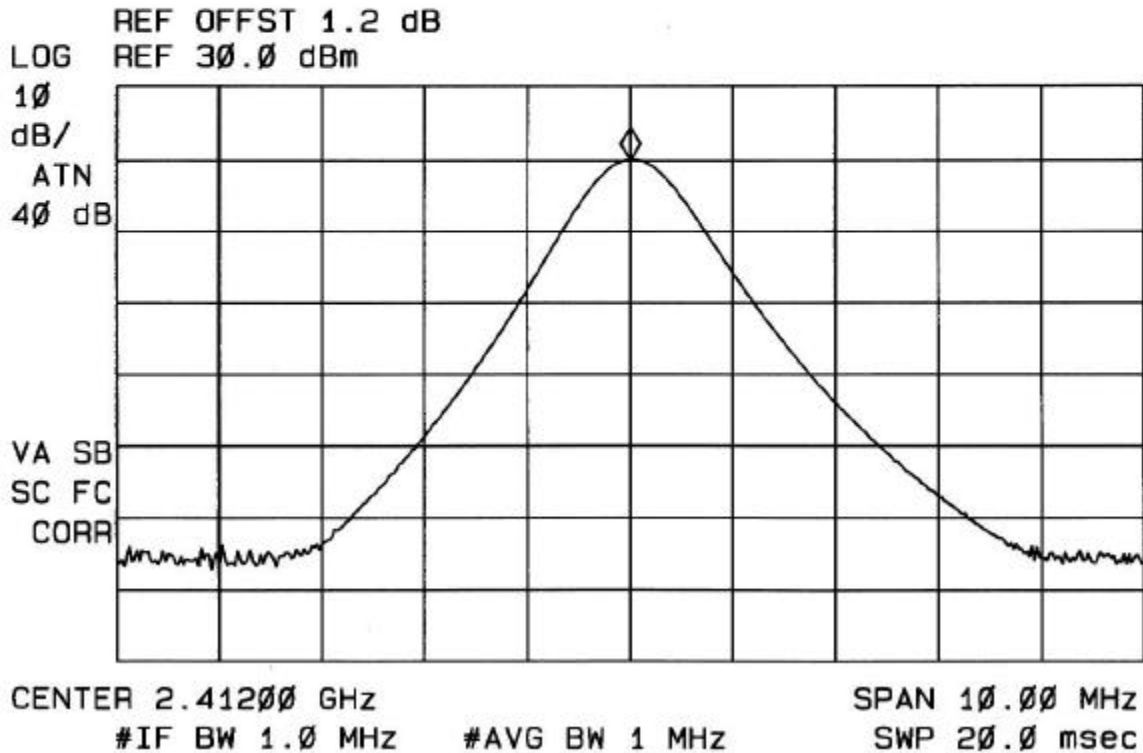
LA4137 POWER OUTPUT LOW CH ANT 2

ACTV DET: PEAK

MEAS DET: PEAK QP AVG

MKR 2.41200 GHz

19.68 dBm



9.2. 6 dB BANDWIDTH MEASUREMENT

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 100 kHz ☐ 1 MHz	☒ 100 kHz ☐ 1 MHz

TEST SETUP



TEST PROCEDURE

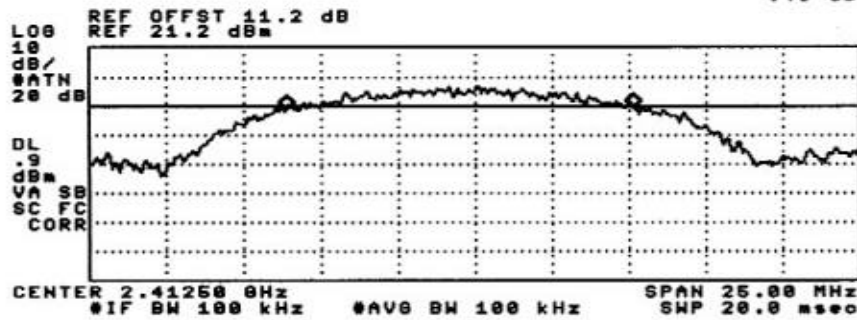
The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 100 kHz VBW.

RESULT

No non-compliance noted.

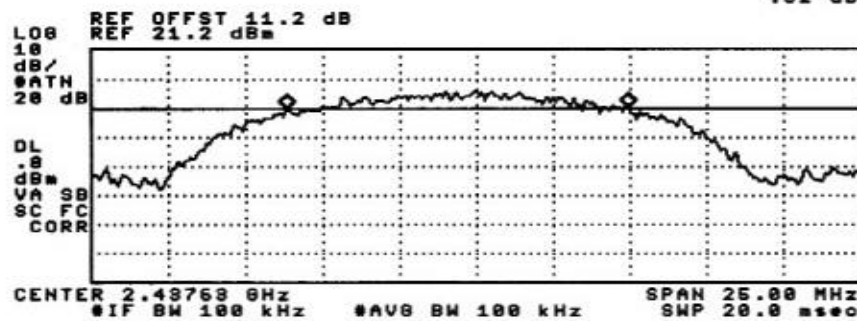
17:13:36 DEC 13, 2001
6dB Bandwidth Ch. 1

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRA 11.25 MHz
.49 dB



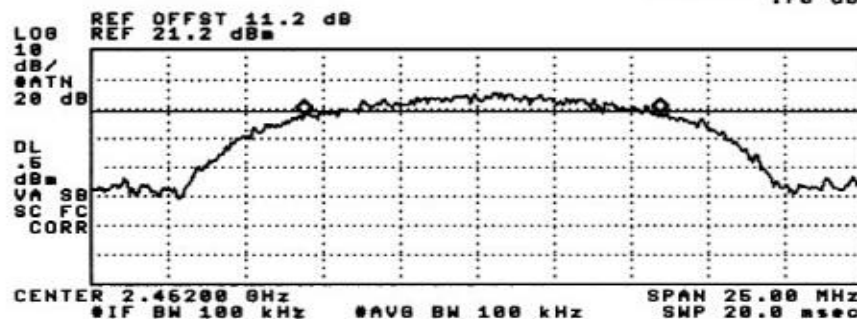
17:19:28 DEC 13, 2001
6dB Bandwidth Ch. 6

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRA 11.13 MHz
.62 dB



17:21:58 DEC 13, 2001
6dB Bandwidth Ch. 11

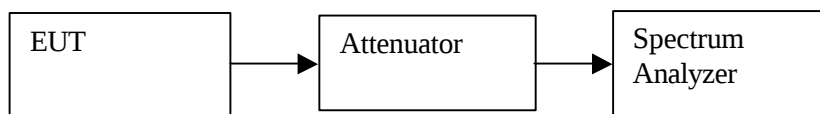
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRA 11.56 MHz
.76 dB



9.3. CONDUCTED SPURIOUS EMISSION

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Below 1000	☒ Peak ☐ Average	☒ 100 kHz ☐ 1 MHz	☒ 100 kHz ☐ 10 Hz
Above 1000	☒ Peak ☐ Average	☒ 100 kHz ☐ 1 MHz	☒ 100 kHz ☐ 10 Hz

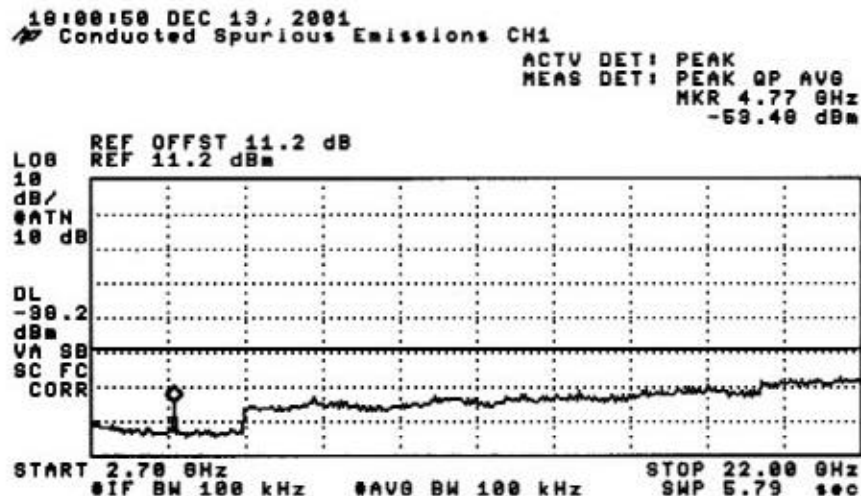
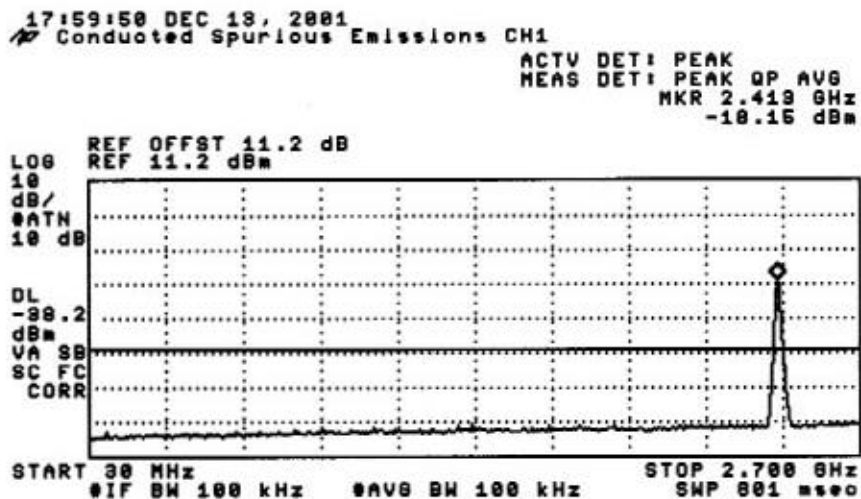
TEST SETUP**TEST PROCEDURE**

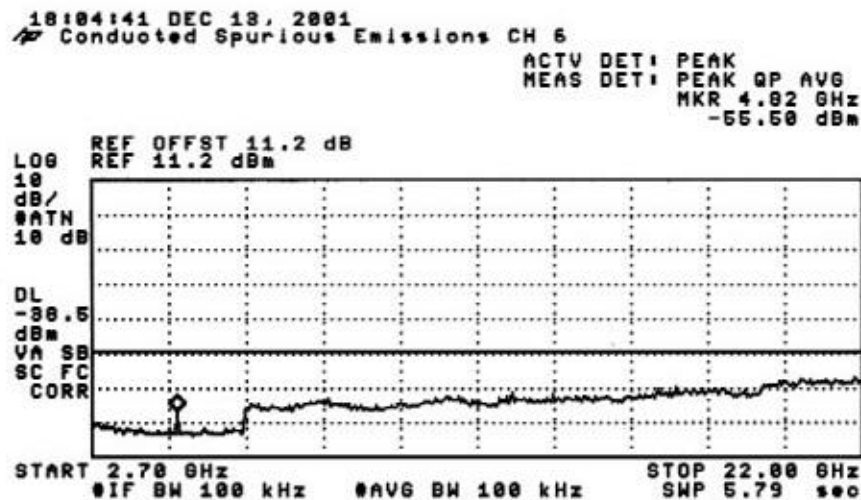
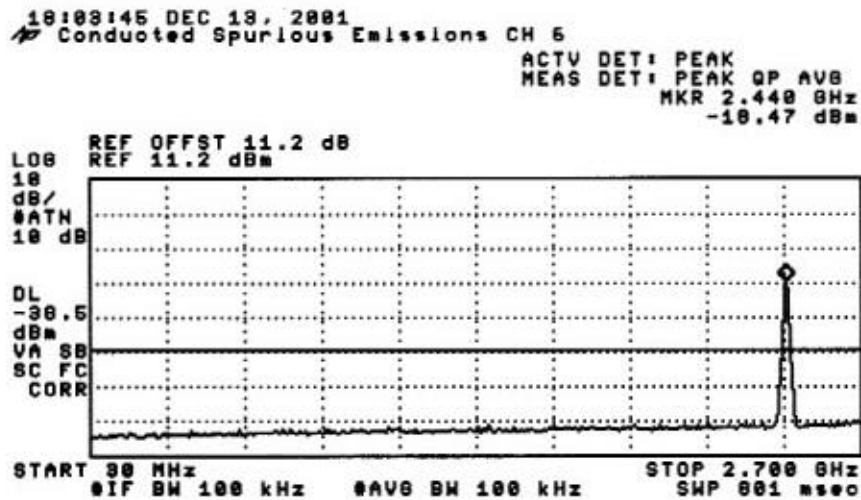
Connect the Eut's antenna port to the Spectrum Analyzer's input put.

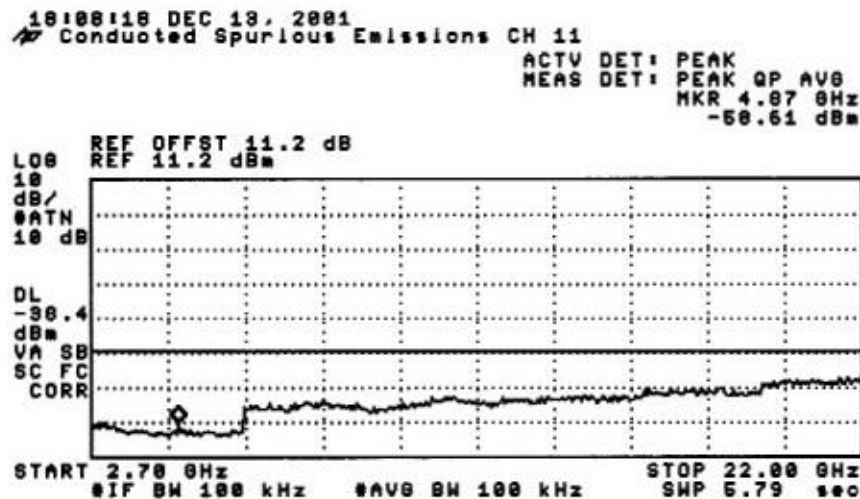
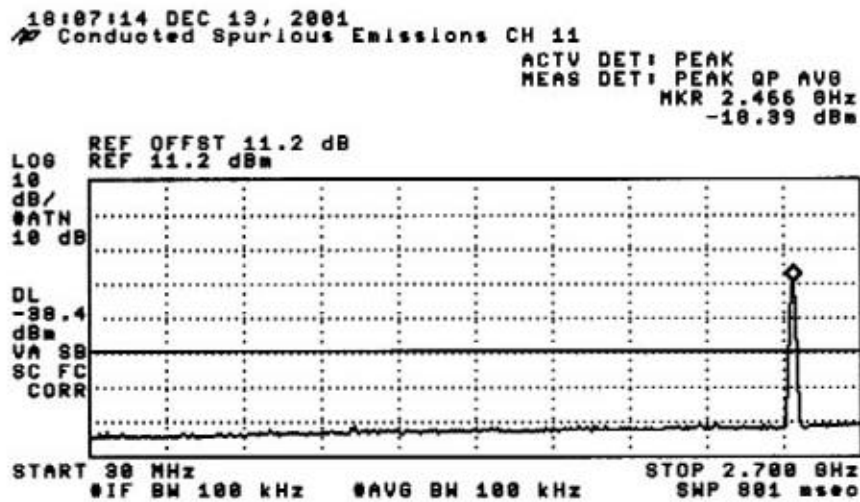
Investigate the entire frequency of the carrier frequency, up to the tenth harmonic.

RESULT

No non-compliance noted.





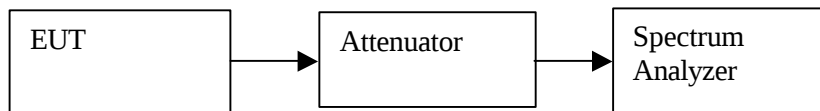


9.4. PEAK POWER SPECTRAL DENSITY

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak	☒ 3 kHz	☒ 3 kHz

TEST SETUP



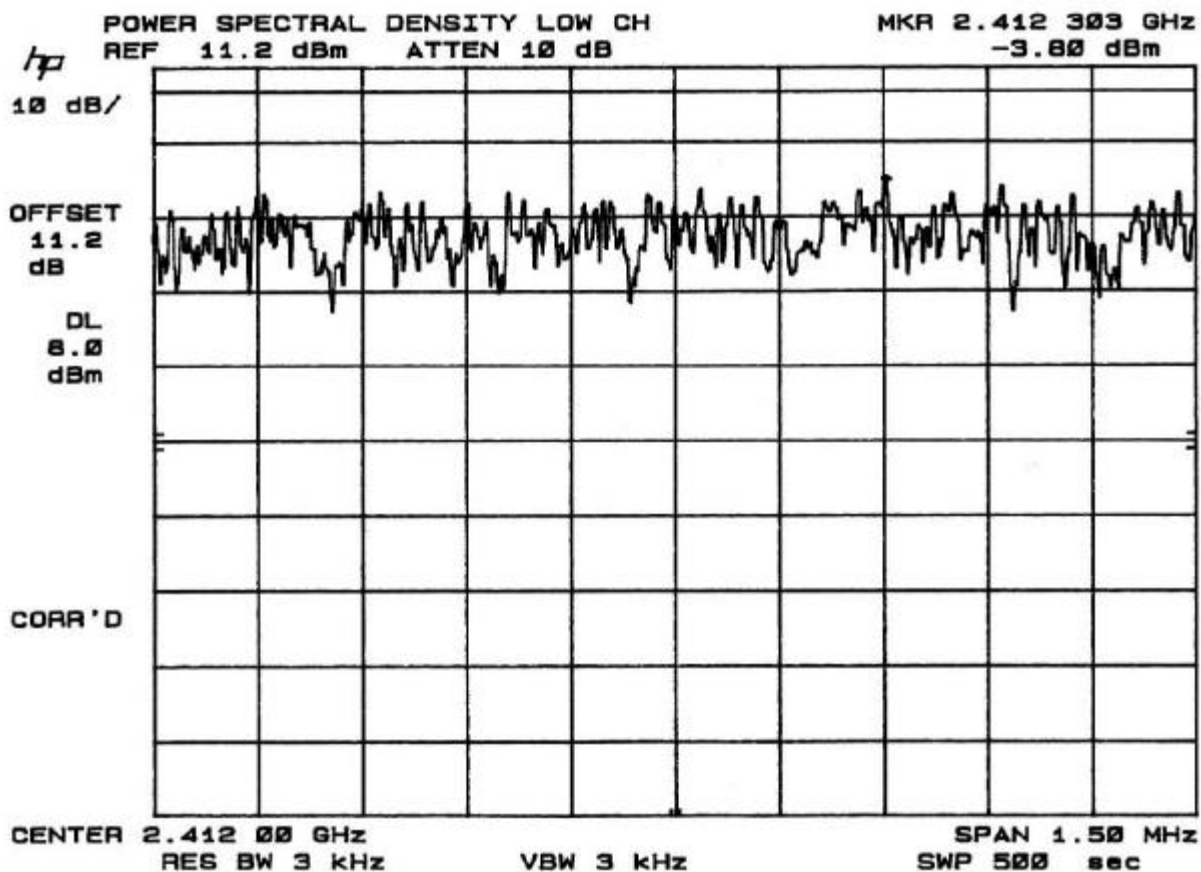
TEST PROCEDURE

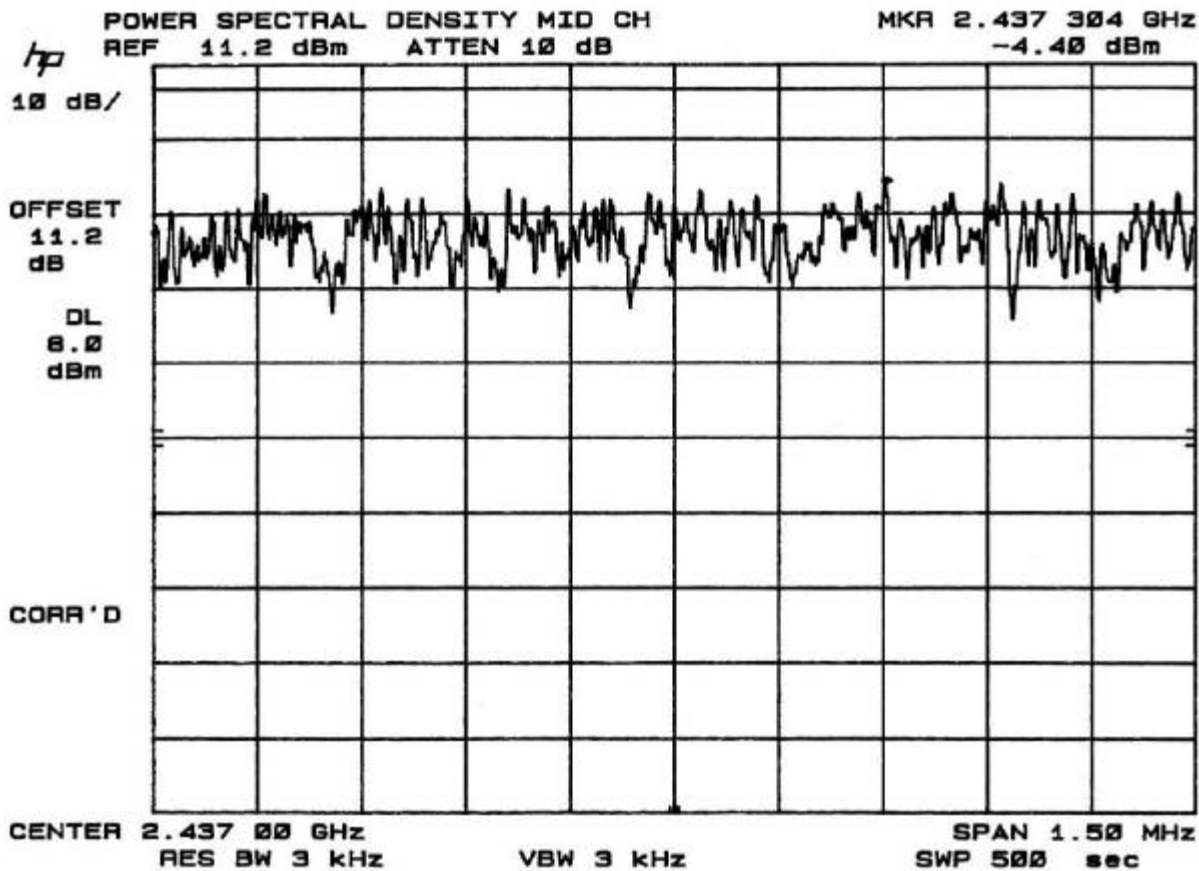
The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 3 kHz VBW, set sweep time=span/3kHz. The power spectral density was measured and recorded.

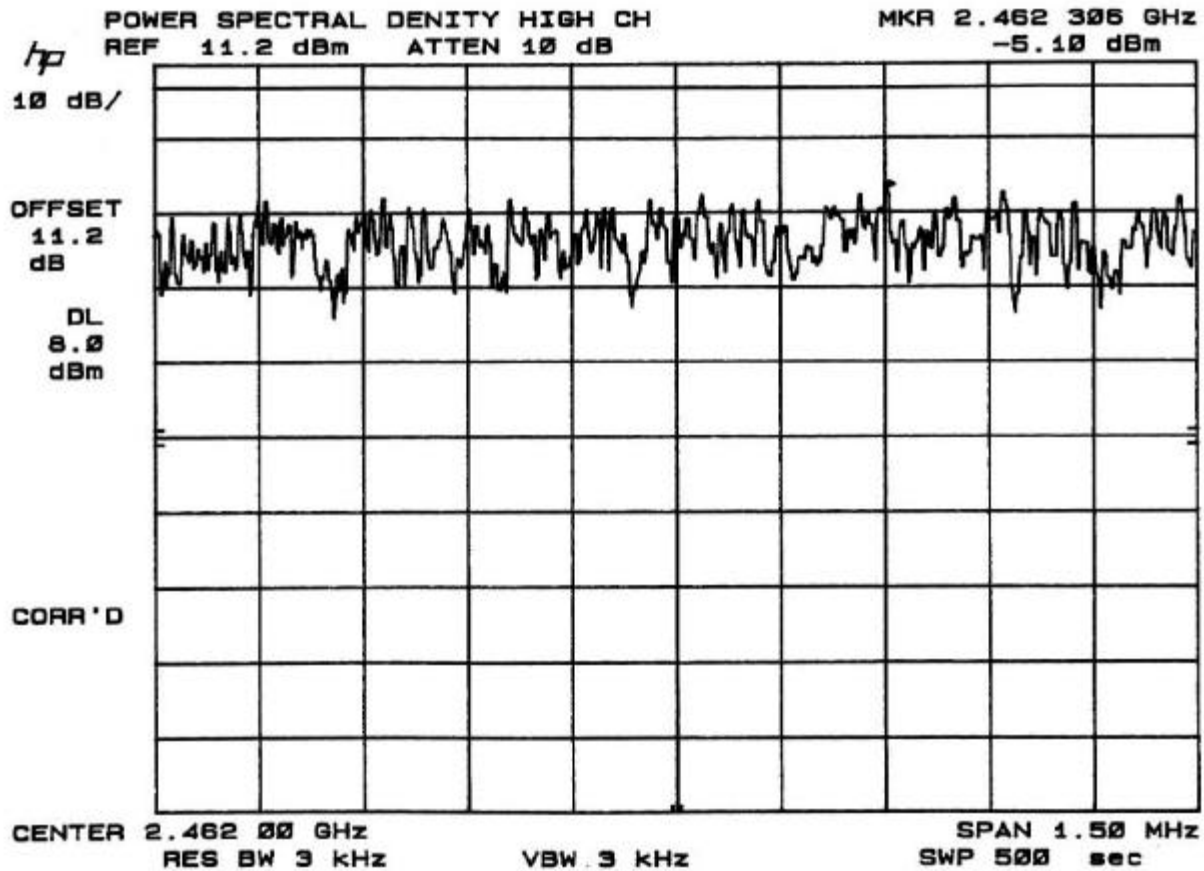
The sweep time is allowed to be longer than span/3KHz for a full response of the mixer in the spectrum analyzer.

Result:

No non-compliance noted. See plots:







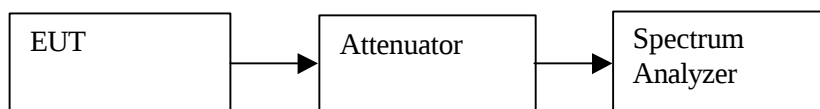
9.5. PROCESSING GAIN

Please refer to “CUSTOMER PROVIDED PROCESSING GAIN file”.

9.6. RESTRICTED BAND EDGE MEASUREMENT

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
Above 1000	☒ Peak ☐ Average	☒ 100 KHz ☐ 1 MHz	☒ 100 KHz ☐ 10 Hz

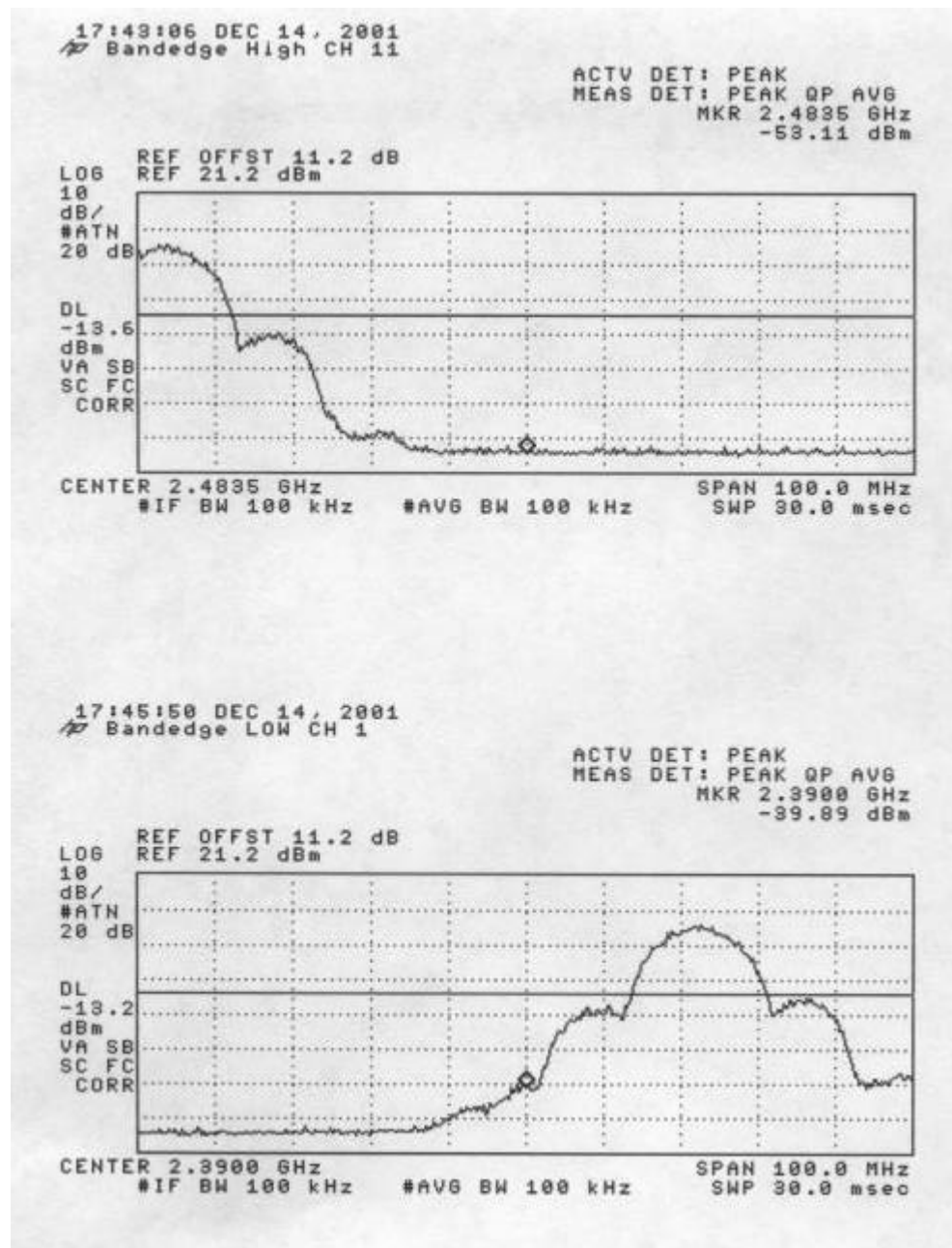
TEST SETUP**TEST PROCEDURE**

The transmitter output was connected to the spectrum analyzer through an attenuator; the lower and upper band edge of the EUT is investigated.

The resolutions and video bandwidth were set to 100kHz.

RESULT

No non-compliance noted. See plots:



9.7. RADIATED EMISSION

Detector Setting of Spectrum Analyzer

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
30 to 1000	☒ Peak	☒ 100 KHz	☒ 100 KHz
	☒ Quasi Peak	☒ 1 MHz	☒ 1 MHz
Above 1000	☒ Peak	☒ 1 MHz	☒ 1 MHz
	☒ Average	☒ 1 MHz	☒ 10 Hz

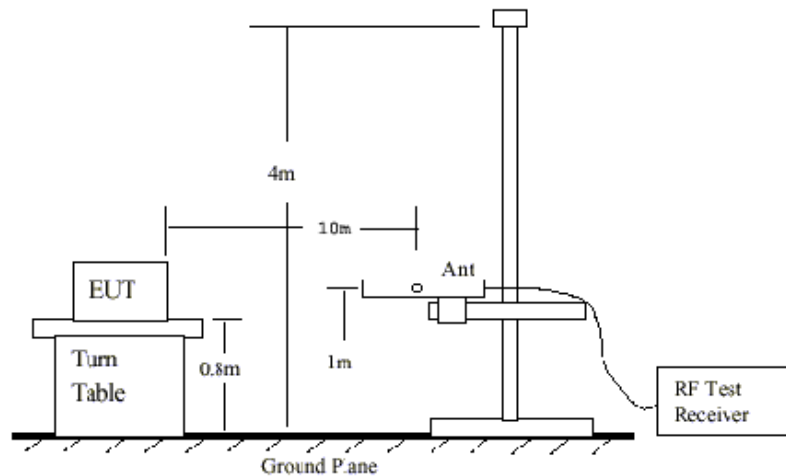


Fig 1: Radiated Emission Measurement 30 to 1000 MHz

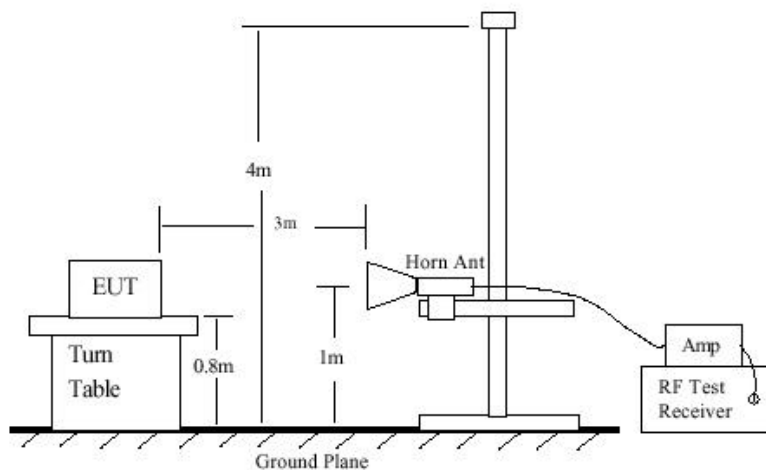


Fig 2: Radiated Emission Above 1000 MHz

TEST SETUP & PROCEDURE

1. The EUT was placed on the turn table 0.8 meter above ground in 3 meter open area test site.
2. Set the resolution bandwidth to 120KHz in the test receiver and select Peak function to scan the frequency below 1 GHz.
3. Shift the interference-receiving antenna located in antenna tower upwards and downwards between 1 and 4 meters above ground and find out the local peak emission on frequency domain.
4. Locate the interference-receiving antenna at the position where the local peak reach the maximum emission.
5. Rotate the turn table and stop at the angle where the measurement device has maximum reading
6. Shift the interference-receiving antenna again to detect the maximum emission of the local peak
7. If the reading of the local peak under Peak function is lower than limit by 6dB, then Quasi Peak detection is not needed and this reading should be recorded. And if it is higher than Peak limit, then the test is fail. Others, switch the receiver to Quasi Peak function, set the resolution bandwidth to 100kHz and repeat the procedures (3)~(6). If the reading is lower than limit, this reading should be recorded, otherwise, the test is fail.
8. Set the resolution and video bandwidth of the spectrum analyzer to 1MHz and repeat procedures (3)~(6) for frequency band from 1 GHz to 10 times carrier frequency.
9. If the reading for the local peak is lower than the Average limit, no further testing is needed in this local peak and this reading should be recorded. If it is higher than Average limit but lower than Peak limit, then set the resolution bandwidth to 1MHz and video bandwidth to 300Hz. Repeat procedures (3)~(6). If the maximum reading is lower than Average limit, then this reading should be recorded. If it is higher, then the test is fail.

RESULT

No non-compliance noted, as shown below.



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHIHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 01U1098-1

Report #: 011212c

Date & Time: 12/12/01 2:12 PM

Test Engr: HLV

Company: SYMBOL TECHNOLOGIES, INC
EUT Description: 2.4GHz DSSS TRANSCEIVER
Test Configuration : EUT/LAPTOP/PRINTER/MOUSE/MODEM
Type of Test: FCC CLASS B
Mode of Operation: TX

[<< Main Sheet](#)

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC_B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
421.00	52.00	16.31	3.09	27.48	43.92	46.00	-2.08	3mV	90.00	1.00	P
287.90	53.30	14.52	2.49	26.64	43.66	46.00	-2.34	3mH	90.00	1.00	P
267.25	52.80	13.99	2.33	26.65	42.47	46.00	-3.53	3mH	90.00	1.00	P
33.88	51.60	11.27	0.80	27.55	36.12	40.00	-3.88	3mV	90.00	1.00	P
120.00	49.00	11.51	1.39	27.26	34.64	43.50	-8.86	3mV	90.00	1.00	P
133.00	45.50	14.37	1.51	27.19	34.19	43.50	-9.31	3mV	90.00	1.00	P
6 Worst Data											

Low Channel

7-Nov-01 FCC Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz

HP8566B Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Antenna
Cable: 17.0 feet

Average Measurements:

1 MHz Resolution Bandwidth
10Hz Video Bandwidth

Peak Measurements:

1MHz Resolution Bandwidth
1MHz Video Bandwidth

Low Channel 2.412MHz

f GHz	Dist feet	Read Peak dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Peak Lim dBuV/m	Avg Lim dBuV/m	Peak Mar dB	Avg Mar dB	Notes
4.82	3.3	46.1	31.4	32.6	6.5	-41.8	-9.5	1.0	34.9	20.2	74.0	54.0	-39.1	-33.8	V
7.24	3.3	44.7	33.1	36.6	8.2	-41.2	-9.5	1.0	39.8	28.2	74.0	54.0	-34.2	-25.8	V
9.64	3.3	45.6	34.1	37.3	9.6	-39.3	-9.5	1.0	44.7	33.2	74.0	54.0	-29.3	-20.8	V
12.06	3.3	45.1	35.2	39.0	10.7	-40.1	-9.5	1.0	46.3	36.4	74.0	54.0	-27.7	-17.6	V
14.47	3.3	47.8	37.8	40.4	12.2	-43.6	-9.5	1.0	48.3	38.3	74.0	54.0	-25.7	-15.7	No Emissions Found
16.88	3.3	50.1	38.2	32.5	13.9	-44.1	-9.5	1.0	43.9	32.0	74.0	54.0	-30.1	-22.0	No Emissions Found
19.23	3.3	50.5	41.5	24.2	15.3	-44.3	-9.5	1.0	37.2	28.2	74.0	54.0	-36.8	-25.8	No Emissions Found

f Measurement Frequency
Dist Distance to Antenna
Read Analyzer Reading
AF Antenna Factor
CL Cable Loss

Amp Preamp Gain
D Corr Distance Correct to 3 meters
Avg Average Field Strength @ 3 m
Peak Calculated Peak Field Strength
HPF High Pass Filter

Avg Lim Average Field Strength Limit
Pk Lim Peak Field Strength Limit
Avg Mar Margin vs. Average Limit
Pk Mar Margin vs. Peak Limit

Low Channel

Mid Channel

7-Nov-01 FCC Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz

HP8566B Analyzer
Miteq NSP2600-44 Preamp
EMCO 3115 Antenna
Cable: 17.0 feet

Average Measurements:

1 MHz Resolution Bandwidth
10Hz Video Bandwidth

Peak Measurements:

1MHz Resolution Bandwidth
1MHz Video Bandwidth

Mid Channel 2.437MHz

f GHz	Dist feet	Read Peak dBuV	Read Avg dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Peak Lim dBuV/m	Avg Lim dBuV/m	Peak Mar dB	Avg Mar dB	Notes
4.87	3.3	40.8	29.5	32.7	6.5	-41.8	-9.5	1.0	29.7	18.4	74.0	54.0	-44.3	-35.6	V
7.31	3.3	44.5	39.0	36.7	8.3	-41.1	-9.5	1.0	39.8	34.4	74.0	54.0	-34.2	-19.6	V
9.74	3.3	43.1	33.6	37.5	9.7	-39.3	-9.5	1.0	42.4	33.0	74.0	54.0	-31.6	-21.0	V
12.13	3.3	46.1	34.2	39.1	10.8	-40.1	-9.5	1.0	47.4	35.5	74.0	54.0	-26.6	-18.5	V
14.62	3.3	49.4	36.4	40.2	12.3	-43.9	-9.5	1.0	49.5	36.5	74.0	54.0	-24.5	-17.5	No Emissions Found
16.88	3.3	50.1	38.2	32.5	13.9	-44.1	-9.5	1.0	43.9	32.0	74.0	54.0	-30.1	-22.0	No Emissions Found
19.23	3.3	50.5	41.5	24.2	15.3	-44.3	-9.5	1.0	37.2	28.2	74.0	54.0	-36.8	-25.8	No Emissions Found

f: Measurement Frequency
Dist: Distance to Antenna
Read: Analyzer Reading
AF: Antenna Factor
CL: Cable Loss

Amp: Preamp Gain
D Corr: Distance Correct to 3 meters
Avg: Average Field Strength @ 3 m
Peak: Calculated Peak Field Strength
HPF: High Pass Filter

Avg Lim: Average Field Strength Limit
Pk Lim: Peak Field Strength Limit
Avg Mar: Margin vs. Average Limit
Pk Mar: Margin vs. Peak Limit

High Channel

7-Nov-01 FCC Measurement
Compliance Certification Services, Morgan Hill Open Field Site

Equipment for 1-22 GHz

HP8566B Analyzer
Mileq NSP2600-44 Preamp
EMCO 3115 Antenna
Cable: 17.0 feet

Average Measurements:

1 MHz Resolution Bandwidth
10Hz Video Bandwidth

Peak Measurements:

1MHz Resolution Bandwidth
1MHz Video Bandwidth

High Channel 2.462MHz

f GHz	Dist feet	Read Peak dBuV	Read Avg. dBuV	AF dB/m	CL dB	Amp dB	D Corr dB	HPF	Peak dBuV/m	Avg dBuV/m	Peak Lim dBuV/m	Avg Lim dBuV/m	Peak Mar dB	Avg Mar dB	Notes
4.82	3.3	46.1	31.4	32.6	6.5	-41.8	-9.5	1.0	34.9	20.2	74.0	54.0	-39.1	-33.8	V
7.24	3.3	44.7	33.1	36.6	8.2	-41.2	-9.5	1.0	39.8	28.2	74.0	54.0	-34.2	-25.8	V
9.64	3.3	45.6	34.1	37.3	9.6	-39.3	-9.5	1.0	44.7	33.2	74.0	54.0	-29.3	-20.8	V
12.06	3.3	45.1	35.2	39.0	10.7	-40.1	-9.5	1.0	46.3	36.4	74.0	54.0	-27.7	-17.6	V
14.47	3.3	47.8	37.8	40.4	12.2	-43.6	-9.5	1.0	48.3	38.3	74.0	54.0	-25.7	-15.7	No Emissions Found
16.88	3.3	50.1	38.2	32.5	13.9	-44.1	-9.5	1.0	43.9	32.0	74.0	54.0	-30.1	-22.0	No Emissions Found
19.23	3.3	50.5	41.5	24.2	15.3	-44.3	-9.5	1.0	37.2	28.2	74.0	54.0	-36.8	-25.8	No Emissions Found

f Measurement Frequency
Dist Distance to Antenna
Read Analyzer Reading
AF Antenna Factor
CL Cable Loss

Amp Preamp Gain
D Corr Distance Correct to 3 meters
Avg Average Field Strength @ 3 m
Peak Calculated Peak Field Strength
HPF High Pass Filter

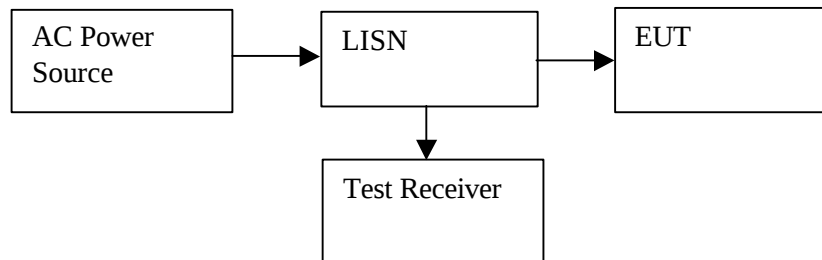
Avg Lim Average Field Strength Limit
Pk Lim Peak Field Strength Limit
Avg Mar Margin vs. Average Limit
Pk Mar Margin vs. Peak Limit

9.8. POWER LINE CONDUCTED EMISSION

Detector Function Setting of Test Receiver

Frequency Range (MHz)	Detector Function	Resolution Bandwidth	Video Bandwidth
450 KHz to 30 MHz	☒ Peak ☐ CISPR Quasi Peak	☒ 9 KHz	☒ 9 KHz

TEST SETUP



TEST PROCEDURE

1. The EUT was placed on a wooden table 40 cm from a vertical ground plane and approximately 80 cm above the horizontal ground plane on the floor. The EUT was set to transmit in a continuous mode.
2. Line conducted data was recorded for both NEUTRAL and HOT lines.

RESULT

No non-compliance noted. See Line Conduction plot

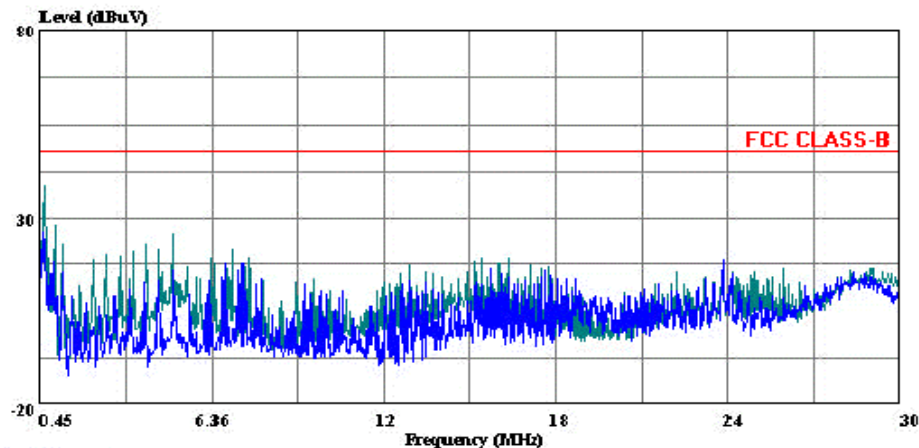
Delta ADP-10SB Power Supply									
CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
1.76	45.90	--	28.62	0.00	56.00	46.00	-10.10	-17.38	L1
20.27	47.83	--	45.11	0.00	60.00	50.00	-12.17	-4.89	L1
0.27	47.82	--	38.72	0.00	62.46	52.46	-14.64	-13.74	L1
1.73	45.62	--	29.89	0.00	56.00	46.00	-10.38	-16.11	L2
0.15	56.68	--	17.54	0.00	66.00	56.00	-9.32	-38.46	L2
0.27	47.10	--	35.20	0.00	62.49	52.49	-15.39	-17.29	L2
6 Worst Data									



561F Monterey Road,
Morgan Hill, CA 95037
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: 1c.EMI

Date: 12-12-2001 Time: 16:23:14

(Auxiliary ATC)
Trace: 3

Ref Trace:

Report : 01U1098-1
Project# : 0112121c
Tested By : Hue Ly Vang
Manufacture : Symbol Technologies, INC.
EUT Description : 2.4GHz DSSS Transceiver
Model : LA4137
Test Config. : EUT/Laptop/Mouse/Printer/Modem
Test Target : FCC Class B
Mode of Operation: TX
PEAK: L1 (Green), L2 (Blue)
115V(AC) ; 60Hz

9.9. SETUP PHOTOS

Radiated Emission photos



Conducted Emission Photos

FCC testing to antenna port

FCC testing above 1GIGHz

ATTACHMENTS

EUT PHOTOGRAPHS