REGULATORY COMPLIANCE REPORT

TITLE: FCC & IC Test Report for 15.247 & RSS-210 Digital Transmission Device
AUTHOR: Jeff Gilbert

REV	CCO	DESCRIPTION OF CHANGE	DATE	APPROVALS	
A		INITIAL RELEASE		Engineering	Jeff Gilbert
				Engineering	Dan Bomsta

REVISION HISTORY

				Engineering	
				Engineering	
				Engineering	

Test Data Summary

FCC 15.247 / IC RSS-210

Digital Transmission Device, 2.405 - 2.475 GHz

FCC ID: EO924GZ / **IC:** 864D-24GZ

Model Number: 2.4GZ

OATS Registration Number: FCC 90716, IC 5615

Rule	Description	Max. Reading	Pass/Fail
Part 15.207 / RSS-Gen 7.2.2	AC Powerline Conducted Emissions	N/A (battery device)	N/A
Part 15.247(b)(3) / RSS-210 A8.4(4)	Peak RF Power Output – Conducted	20.94 mW	Pass
Part 15.247(a)(2) / RSS-210 A8.2(a)	6 dB Bandwidth - Conducted	1.621 MHz	Pass
Part 15.247(e) / RSS-210 A8.2(b)	Peak Power Spectral Density – Conducted	-0.843 dBm/3 kHz	Pass
Part 15.247(d) / RSS-210 A8.5	Spurious Emissions – Conducted	-43.4 dBc	Pass
Parts 15.205 & 15.209 / RSS-210 2.2, 2.6 Tables 1 & 2	Restricted Bands / Spurious Emissions – Radiated	51.83 dBµV/m @ 3m (4960 MHz)	Pass
RSS-Gen 7.2.3	Receiver Spurious Emissions – Conducted	47.4 dBuV/m @ 3m (4876 MHz)	Pass

Rule versions: FCC Part 1 (10-2006), FCC Part 2 (10-2006), FCC Part 15 (05-04-2007), RSS-Gen Issue 2 (06-2007), RSS-210 Issue 7 (06-2007).
Reference docs: ANSI C63.4-2003, FCC KDB Publication, 558074, March 23, 2005, New Guidance on Measurement for Digital Transmission Systems in Section 15.247.

Cognizant Personnel	
Name Mark Kvamme	Title Test Technician
Name Jeff Gilbert	Title Regulatory Engineer

15.31 (e)

This is a battery powered device. Nominal battery voltage is 3.0 Vdc. In order to perform conducted testing of the device, the battery was removed and a DC supply was used in its place. The DC supply was varied between 2.55 Vdc and 3.45 Vdc. The maximum peak RF power was found with the DC supply at 3.45 Vdc. All conducted testing was performed at 3.45 Vdc. All radiated testing was performed using a new battery.

15.247(b) (3) / RSS-210 A8.4 (4)

RF Power Output

The maximum peak conducted output power of the intentional radiator shall not exceed the following: For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.

This is an RF conducted test. Use a direct connection between the antenna port of the transmitter and the spectrum analyzer, through suitable attenuation.

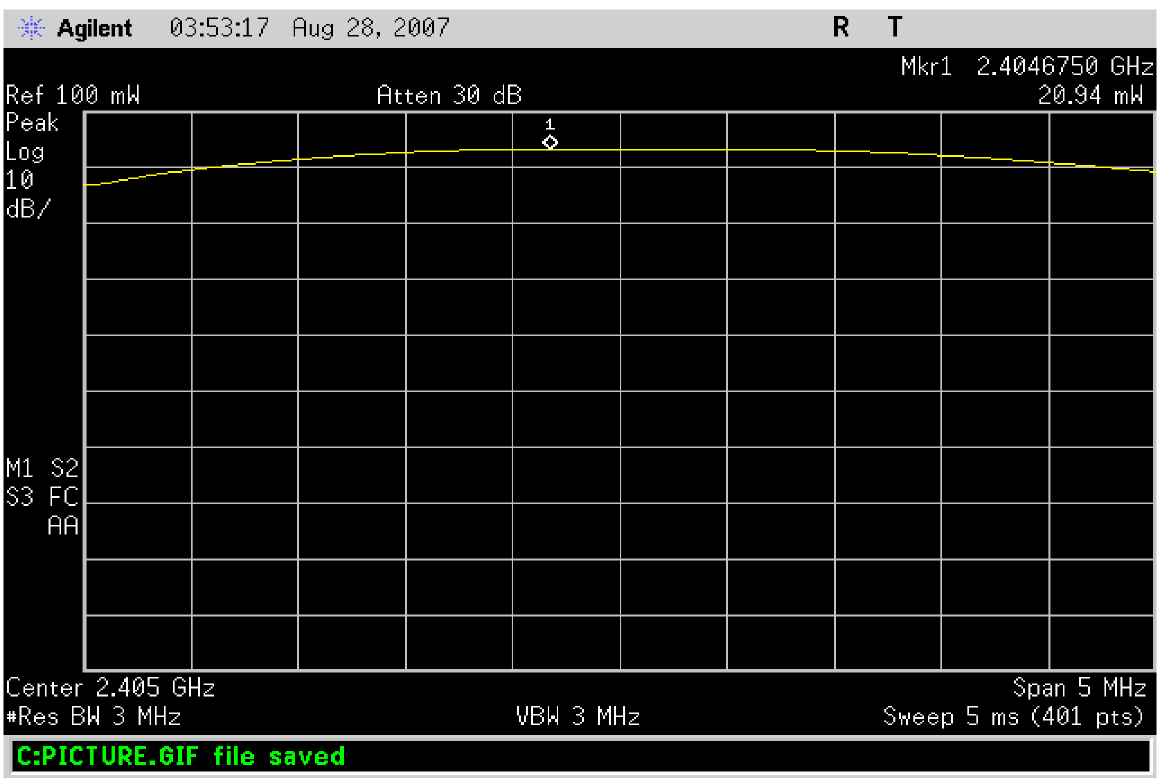
RBW > 6 dB bandwidth of the emission
VBW ≥ RBW
Span = > 6 dB bandwidth of the emission
Sweep = auto
Detector function = peak
Trace = max hold

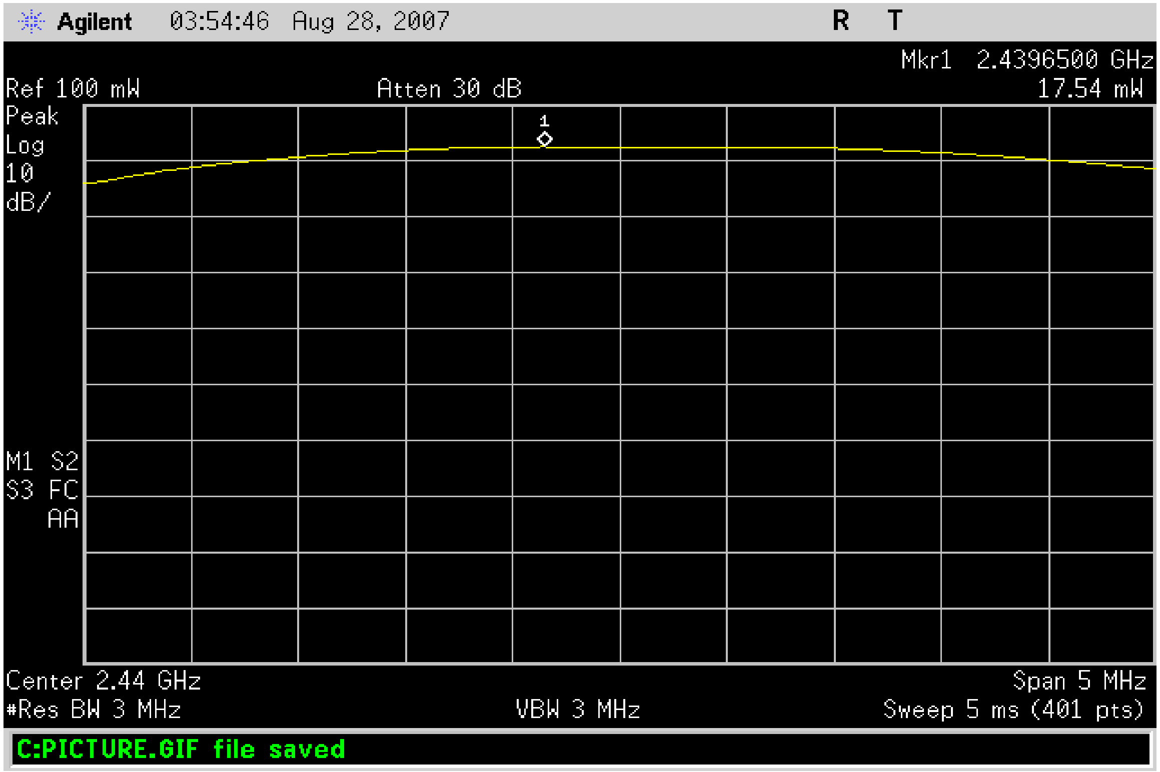
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

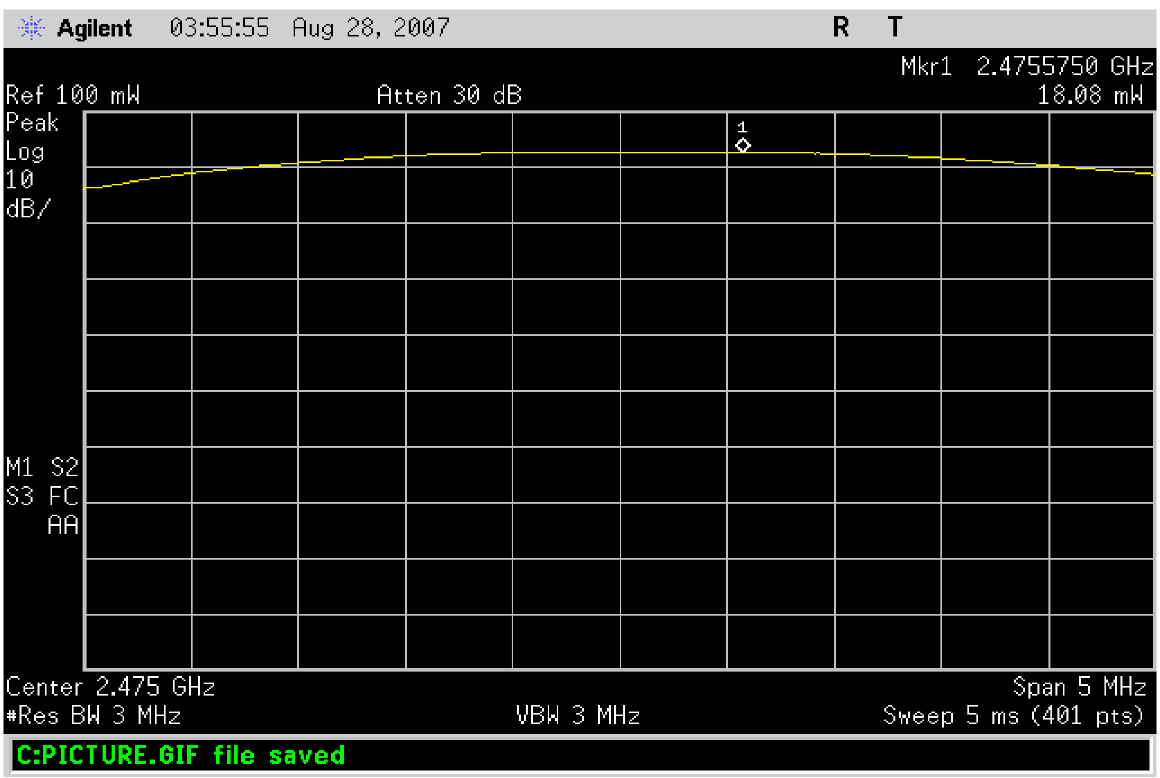
Equipment Used	Model Number	Serial Number	Cal Date	Due
Spectrum Analyzer	Agilent E7405A	MY45113415	Aug/07	Aug/08
RF Test Cable	SUCOFLEX 104	220057 002	03/07	03/08

Date	Tested by
8-27-07	Mark Kvamme

Cable loss of 0.21 dB was added to the spectrum analyzer as a correction. The marker value in the plots is the true corrected value.




Agilent 03:54:46 Aug 28, 2007
R T
Mkr1 2.4396500 GHz
Ref 100 mW
Atten 30 dB
17.54 mW
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Center 2.44 GHz
Span 5 MHz
#Res BW 3 MHz
VBW 3 MHz
Sweep 5 ms (401 pts)
C:PICTURE.GIF file saved


Agilent 03:55:55 Aug 28, 2007
R T
Mkr1 2.4755750 GHz
Ref 100 mW
Atten 30 dB
18.08 mW
Peak
Log
10
dB/
M1 S2
S3 FC
AA
Center 2.475 GHz
Span 5 MHz
#Res BW 3 MHz
VBW 3 MHz
Sweep 5 ms (401 pts)
C:PICTURE.GIF file saved

Part 15.247(a) (2) / RSS-210 A8.2 (a)

6 dB Bandwidth

Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

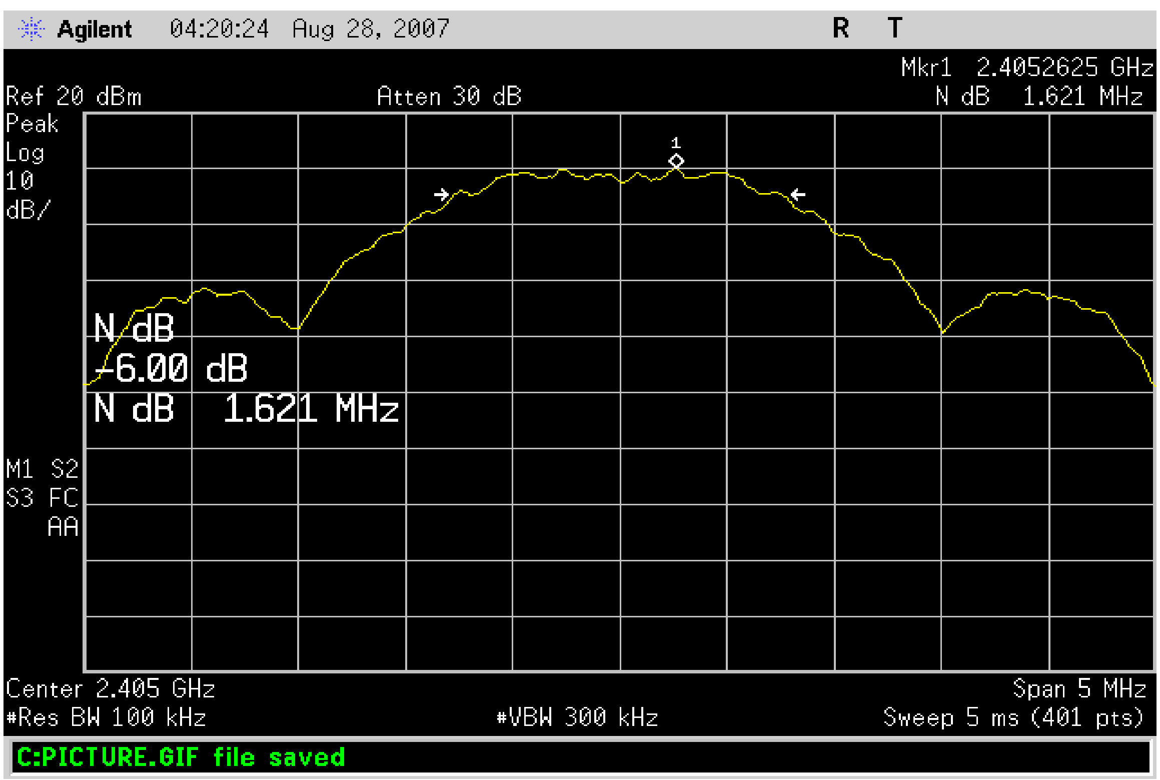
Use the following spectrum analyzer settings:

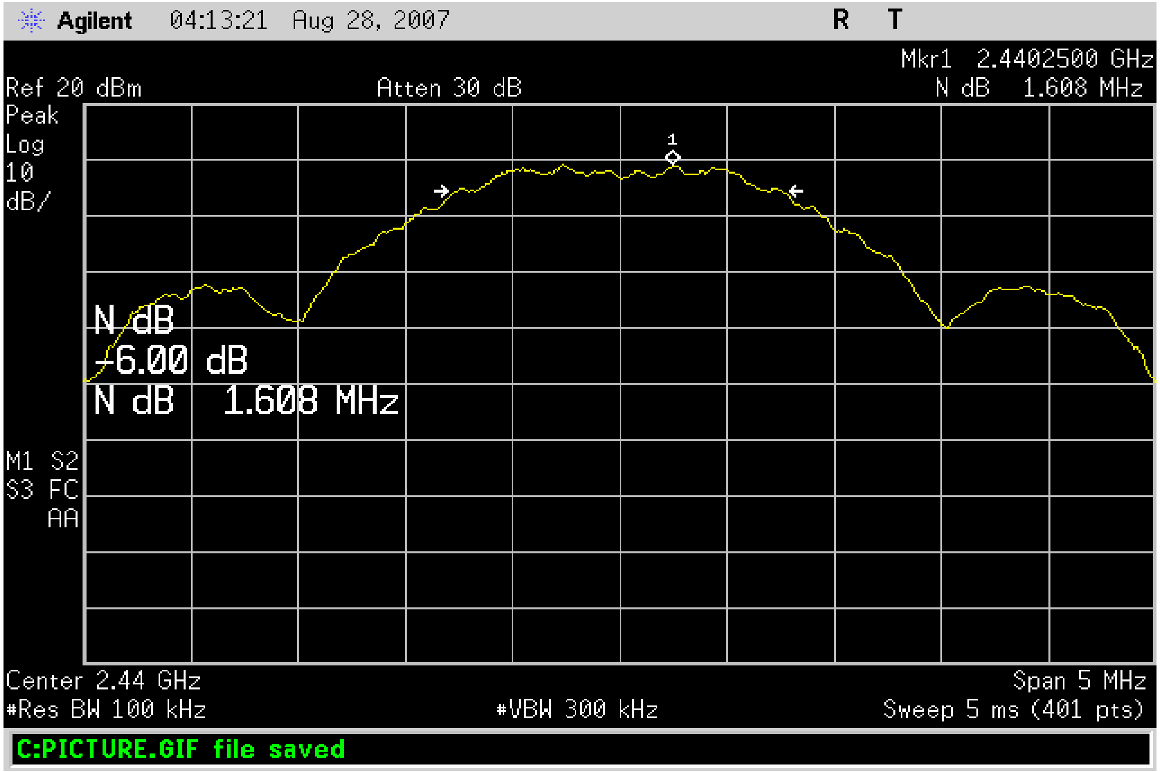
RBW = 100 kHz
VBW ≥ RBW
Span = 5 MHz
Sweep = auto
Detector function = Peak
Trace = max hold

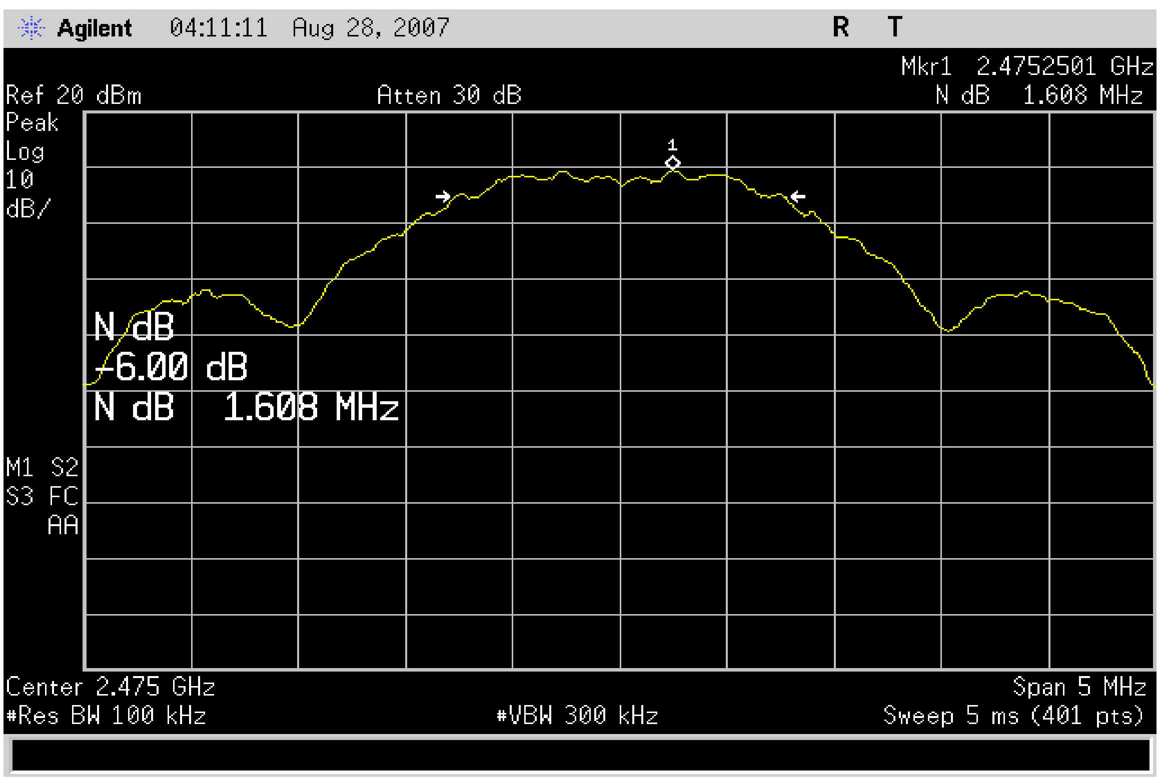
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the mission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 6 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Equipment Used	Model Number	Serial Number	Cal Date	Due
Spectrum Analyzer	Agilent E7405A	MY45113415	Aug/07	Aug/08
RF Test Cable	SUCOFLEX 104	220057 002	03/07	03/08

Date	Tested by
8/27/2007	Mark Kvamme




Agilent 04:13:21 Aug 28, 2007 R T
Mkr1 2.4402500 GHz
Ref 20 dBm Atten 30 dB
N dB 1.608 MHz
Peak
Log
10
dB/
N dB
-6.00 dB
N dB 1.608 MHz
M1 S2
S3 FC
AA
Center 2.44 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 5 ms (401 pts)
C:PICTURE.GIF file saved


Agilent 04:11:11 Aug 28, 2007 R T
Mkr1 2.4752501 GHz
Ref 20 dBm Atten 30 dB
N dB 1.608 MHz
Peak
Log
10
dB/
N dB
-6.00 dB
N dB 1.608 MHz
M1 S2
S3 FC
AA
Center 2.475 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 5 MHz
Sweep 5 ms (401 pts)

Part 15.247(e) / RSS-210 A8.2 (b)

Power Spectral Density

For digitally modulated systems, the 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.

Use the following spectrum analyzer settings:

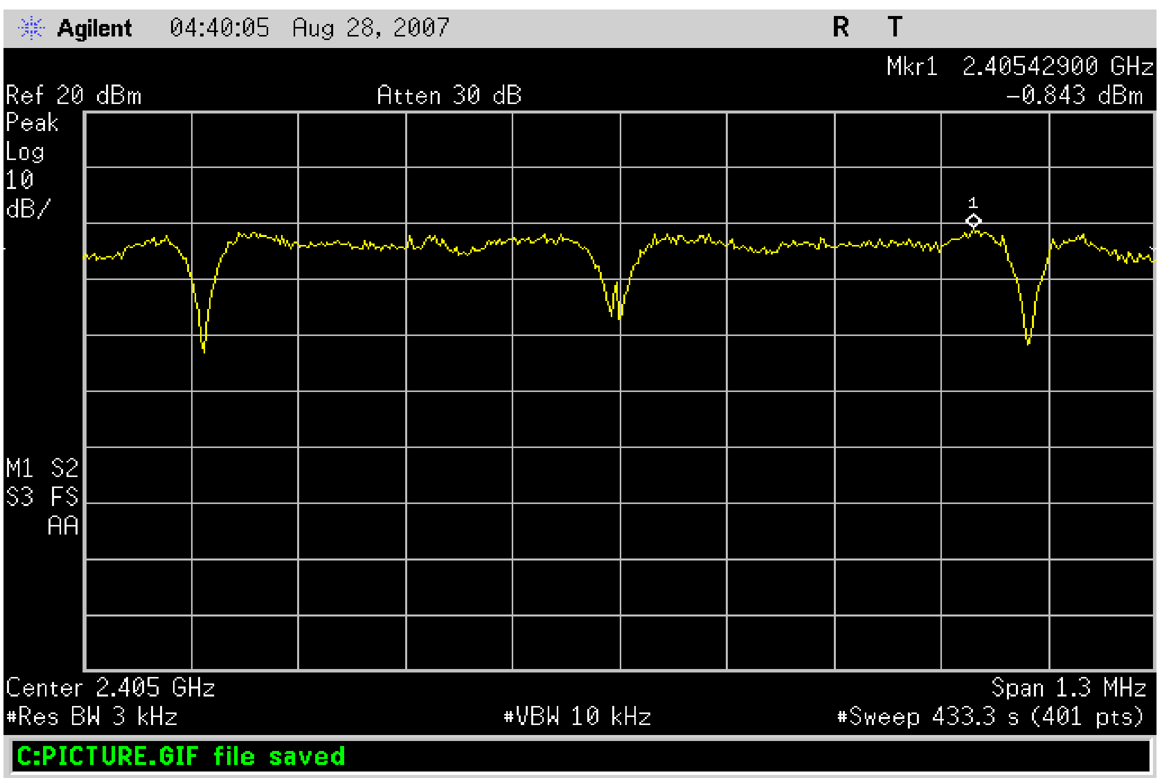
RBW = 3 kHz
VBW ≥ RBW
Span = > 3 dB bandwidth
Sweep = SPAN/3 kHz (*e.g., for a span of 1.5 MHz, the sweep would be 1.5 x* 10^6 ÷ *3 x*10^3 *= 500 seconds.*)
Detector function = peak
Trace = max hold

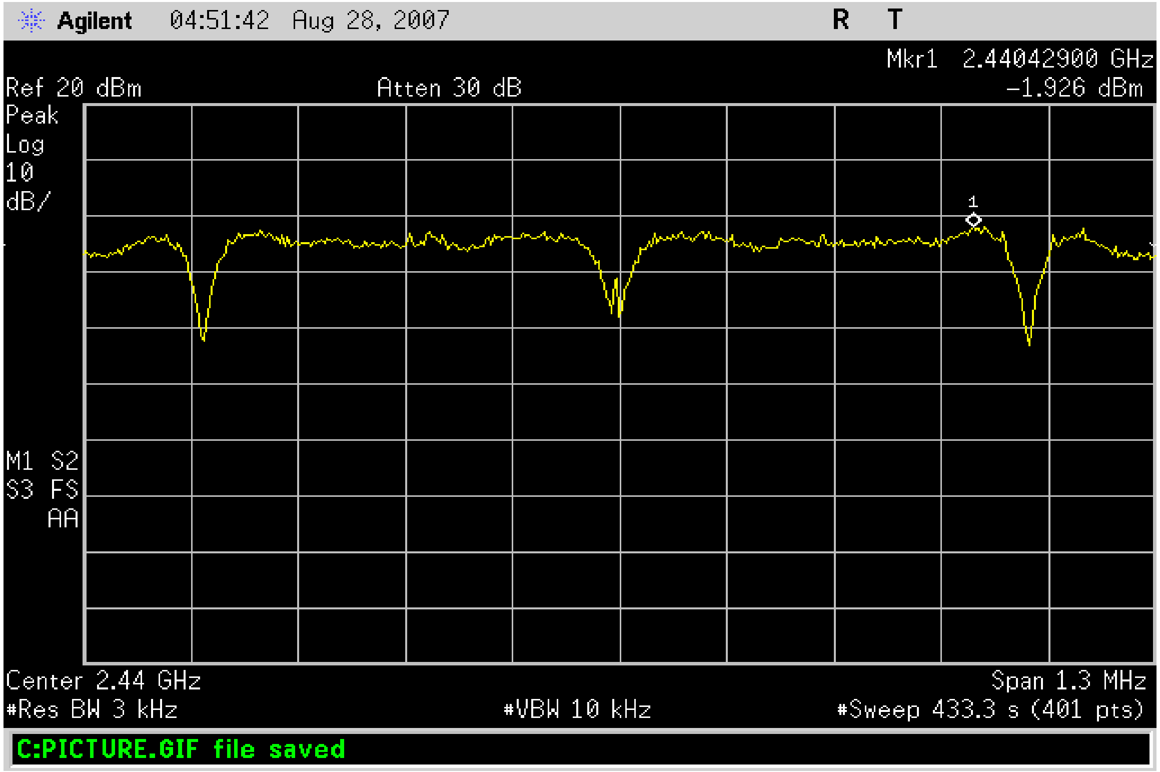
Locate and zoom in on the emission peak within the passband. The peak level measured must be no greater than + 8 dBm.

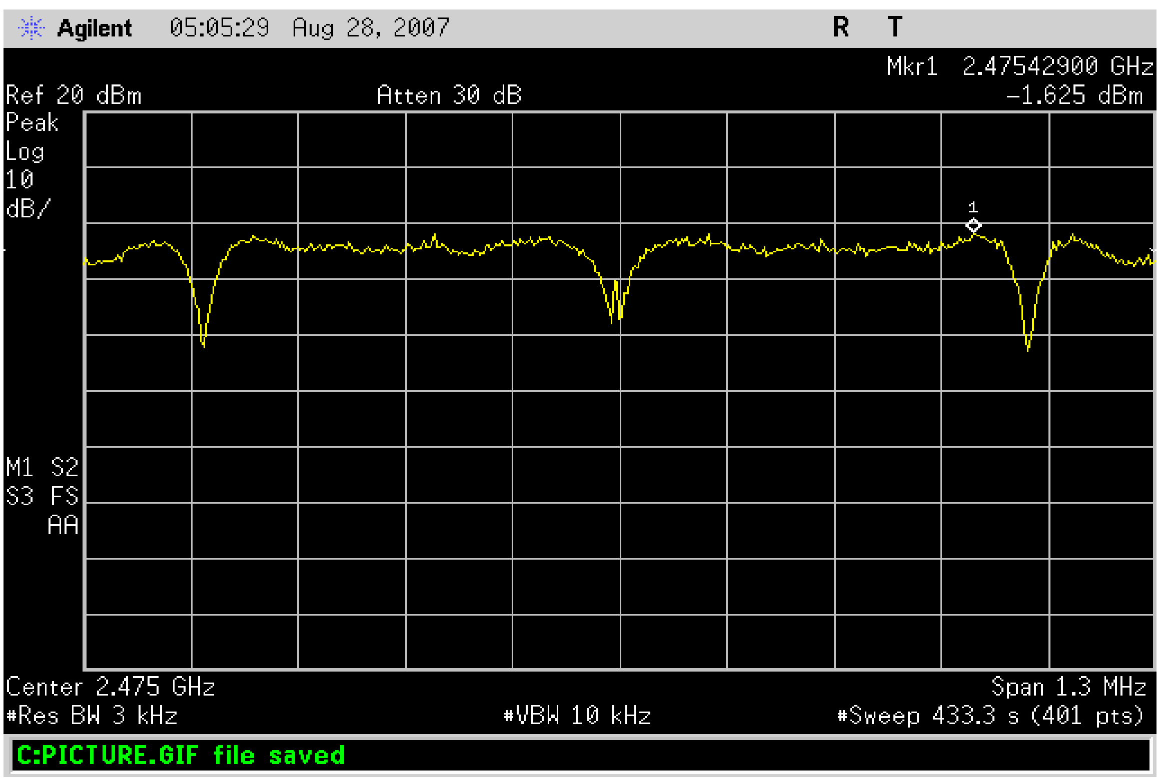
Equipment Used	Model Number	Serial Number	Cal Date	Due
Spectrum Analyzer	Agilent E7405A	MY45113415	Aug/07	Aug/08
RF Test Cable	SUCOFLEX 104	220057 002	03/07	03/08

Date	Tested by
8/27/2007	Mark Kvamme

Cable loss of 0.21 dB was added to the spectrum analyzer as a correction. The marker value in the plots is the true corrected value.




Agilent 04:51:42 Aug 28, 2007
R T
Mkr1 2.44042900 GHz
Ref 20 dBm
Atten 30 dB
-1.926 dBm
Peak
Log
10
dB/
1
M1 S2
S3 FS
AA
Center 2.44 GHz
Span 1.3 MHz
#Res BW 3 kHz
#VBW 10 kHz
#Sweep 433.3 s (401 pts)
C:PICTURE.GIF file saved


Agilent 05:05:29 Aug 28, 2007
R T
Mkr1 2.47542900 GHz
Ref 20 dBm
Atten 30 dB
-1.625 dBm
Peak
Log
10
dB/
1
M1 S2
S3 FS
AA
Center 2.475 GHz
Span 1.3 MHz
#Res BW 3 kHz
#VBW 10 kHz
#Sweep 433.3 s (401 pts)
C:PICTURE.GIF file saved

15.247 (d) / RSS-210 A8.5

Spurious RF Conducted Emissions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power,

Use the following spectrum analyzer settings:

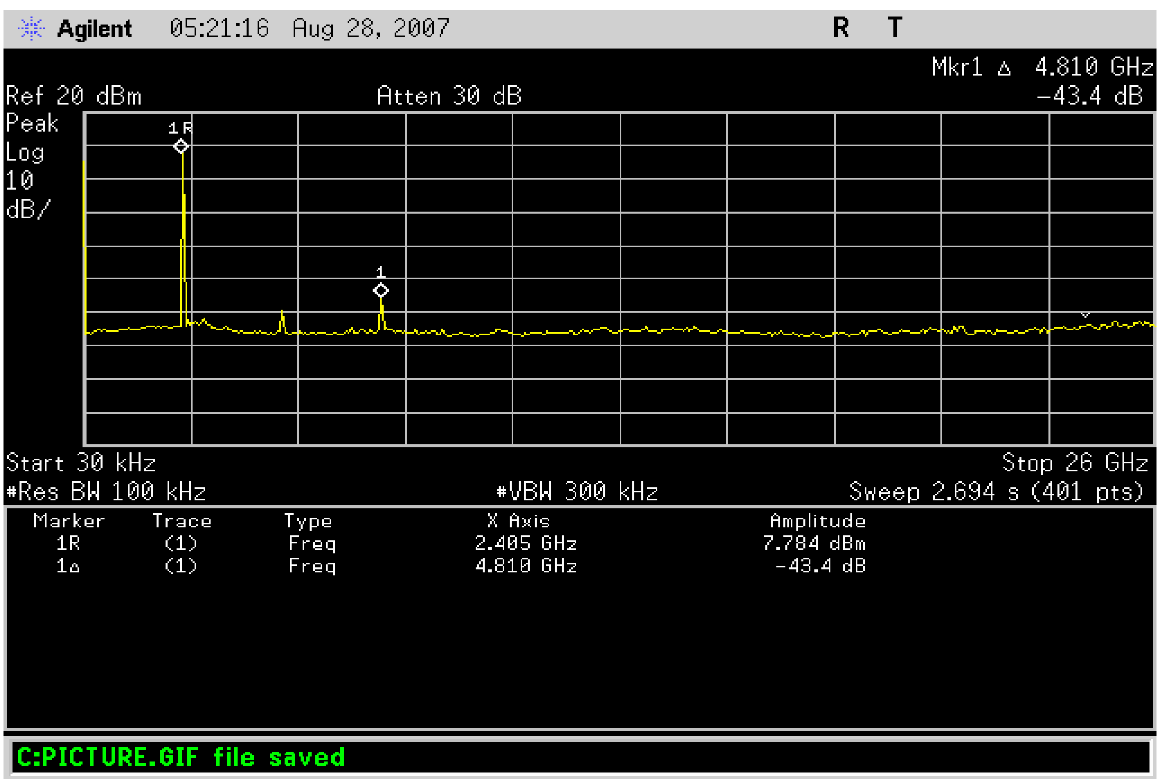
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10^{th} harmonic.
RBW = 100 kHz
VBW > RBW
Sweep = auto
Detector function = peak
Trace = max hold

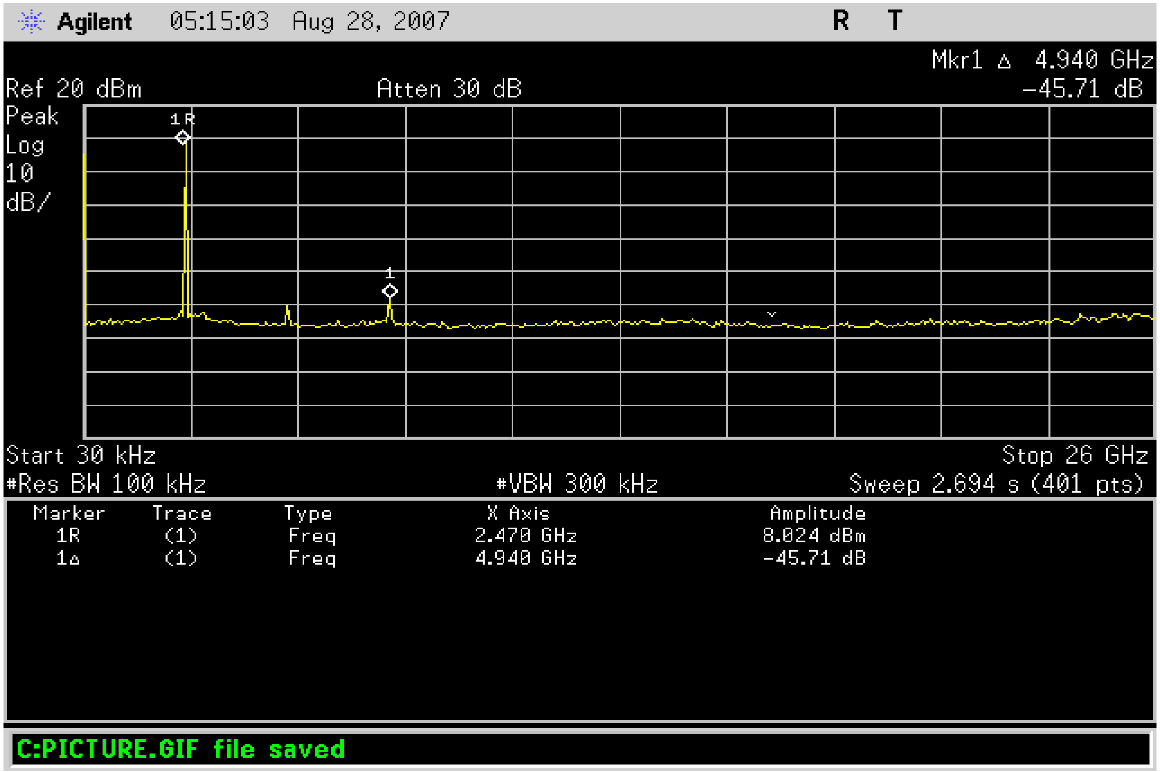
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified.

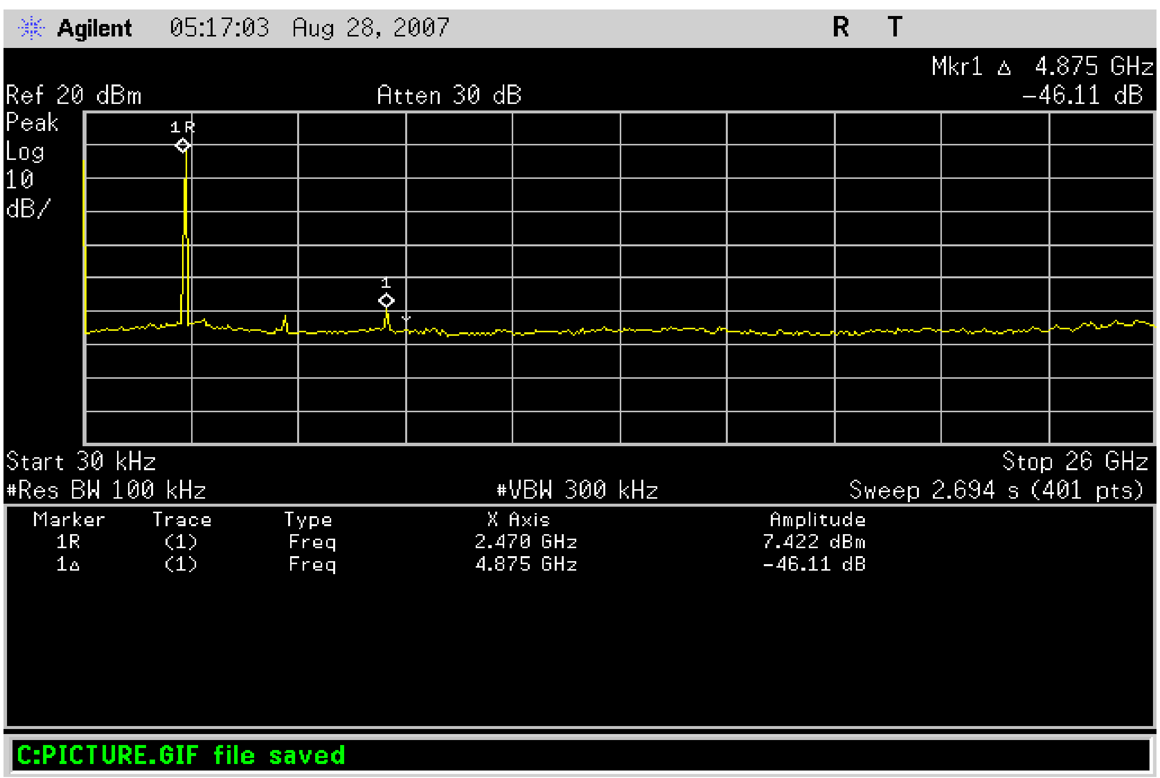
Equipment Used	Model Number	Serial Number	Cal Date	Due
Spectrum Analyzer	Agilent E7405A	MY45113415	Aug/07	Aug/08
RF Test Cable	SUCOFLEX 104	220057 002	03/07	03/08

Date	Tested by
8-27-07	Mark Kvamme

Frequency range investigated was 30 kHz to 26 GHz. TX @ 2.405, 2.440, & 2.475 GHz.




Agilent 05:15:03 Aug 28, 2007
R T
Mkr1 Δ 4.940 GHz
Ref 20 dBm
Atten 30 dB
-45.71 dB
Peak
Log
10
dB/
1R
1
Start 30 kHz
Stop 26 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.694 s (401 pts)
Marker Trace Type X Axis Amplitude
1R (1) Freq 2.470 GHz 8.024 dBm
1Δ (1) Freq 4.940 GHz -45.71 dB
C:PICTURE.GIF file saved


Agilent 05:17:03 Aug 28, 2007
R T
Mkr1 Δ 4.875 GHz
Ref 20 dBm
Atten 30 dB
-46.11 dB
Peak
Log
10
dB/
1R
1
Start 30 kHz
Stop 26 GHz
#Res BW 100 kHz
#VBW 300 kHz
Sweep 2.694 s (401 pts)
Marker Trace Type X Axis Amplitude
1R (1) Freq 2.470 GHz 7.422 dBm
1Δ (1) Freq 4.875 GHz -46.11 dB
C:PICTURE.GIF file saved

15.205, 15.209 / RSS-210 2.2, 2.6

Restricted Bands & Spurious Emissions

Only spurious emissions are permitted in any of the frequency bands listed below. The limits stated in 15.209 shall apply. Spurious emissions outside these bands shall also comply with the 15.209 limits.
This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz (120 kHz if QP detector is used)
VBW = peak measurements: 1 MHz for f ≥ 1 GHz. Average measurements: 10 Hz for f ≥ 1 GHz. Auto for f < 1 GHz
Sweep = auto
Detector function = peak for f ≥ 1 GHz, peak or QP as required for f < 1 GHz
Trace = max hold

Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505 1	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	Above 38.6
13.36-13.41			

Frequency range investigated was 30 kHz to 25 GHz. Worst case results are reported.

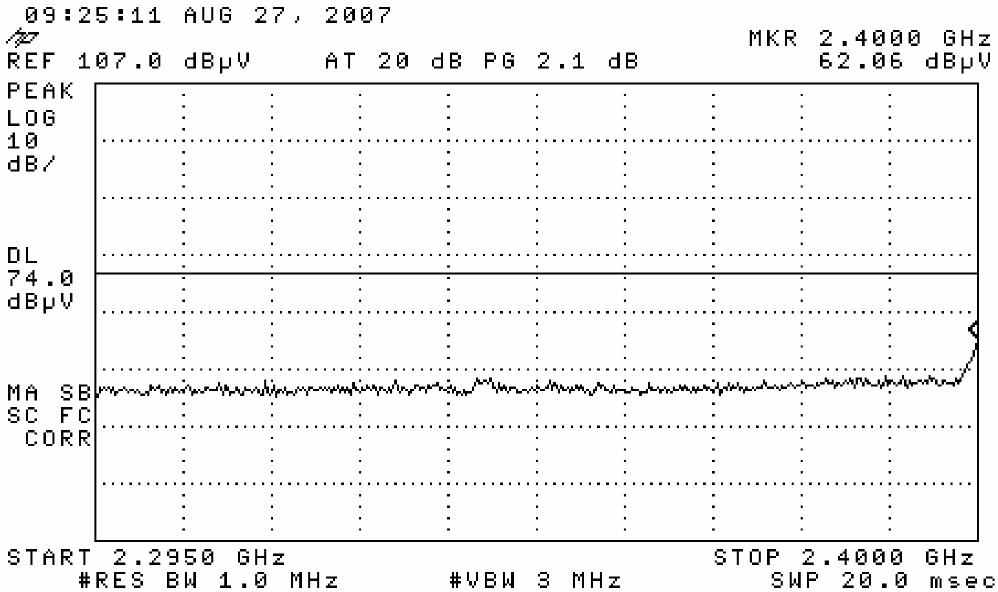
	Model Number	Serial Number	Cal Date	Due
Spectrum Analyzer	HP8593E	3543A02032	Oct/06	Oct/07
JCA technology JCA010-415 (0.1 to 10Ghz)	JCA010-415	103	May/07	May/08
JCA technology JCA618-80 (8 to 18 GHz)	JCA618-801	106	May/07	May/08
Huber&Suhner 40 foot cable	Sucoflex 100	220297 001	Apr/07	May/08
Double ridge wave guide	EMCO 3115	9508-4550	Mar/06	Mar/08
Dipole antenna	3121	78573	9/16/2006	9/16/2007
Loop antenna	EMCO 6502	2129	10/24/06	10/24/08

Frequency (MHz)	Antenna polarity	Antenna height (cm.) for 54dbuV/m reading	Table angle (Degrees) for 54dbuV/m reading	reading RBW @1Mhz, VBW @10hz (dBm)	Temp. (F)	Relative Humidity %	coaxial loss (db)	amplifier gain (dB)	antenna correction factor (/m)	field strength (dBuV/m)	field strength limit (dBuV/m)	margin (db)
4810	Vertical	122	150	-52.6	79	49	6.52	45	33.1	49.02	54	4.98
4880	Vertical	102	120	-54.85	68	81	6.52	45	33.1	46.77	54	7.23
4960	Vertical	120	150	-52.78	79	49	6.52	45	33.1	48.84	54	5.16
4810	Horizontal	100	125	-54.94	79	49	6.52	45	33.2	46.78	54	7.22
4880	Horizontal	101	295	-50.29	68	81	6.52	45	33.2	51.43	54	2.57
4960	Horizontal	101	35	-49.89	79	49	6.52	45	33.2	51.83	54	2.17
4810	Vertical	122	155	-45.16	79	49	6.52	45	33.1	56.46	74	17.54
4880	Vertical	142	270	-47.13	68	81	6.52	45	33.1	54.49	74	19.51
4960	Vertical	100	295	-41.31	79	49	6.52	45	33.1	60.31	74	13.69
4810	Horizontal	101	115	-46.95	79	49	6.52	45	33.2	54.77	74	19.23
4880	Horizontal	101	130	-46.71	68	81	6.52	45	33.2	55.01	74	18.99
4960	Horizontal	101	40	-40.65	79	49	6.52	45	33.2	61.07	74	12.93
7215	Vertical	134	95	-61.28	79	49	8.5	43.8	36.1	46.52	54	7.48
7320	Vertical	106	15	-60.39	68	81	8.5	43.8	36.1	47.41	54	6.59
7440	Vertical	101	150	-61.23	80	47	8.5	43.8	36.1	46.57	54	7.43
7215	Horizontal	128	65	-62.65	79	49	8.5	43.8	36.1	45.15	54	8.85
7320	Horizontal	116	150	-60.01	68	81	8.5	43.8	36.1	47.79	54	6.21
7440	Horizontal	126	60	-60.49	80	47	8.5	43.8	36.1	47.31	54	6.69
7215	Vertical	100	160	-50.09	79	49	8.5	43.8	36.1	57.71	74	16.29
7320	Vertical	100	155	-49.94	68	81	8.5	43.8	36.1	57.86	74	16.14
7440	Vertical	130	95	-50.05	80	47	8.5	43.8	36.1	57.75	74	16.25
7215	Horizontal	101	10	-49.48	79	49	8.5	43.8	36.1	58.32	74	15.68
7320	Horizontal	101	45	-51.01	68	81	8.5	43.8	36.1	56.79	74	17.21
7440	Horizontal	101	70	-49.12	80	47	8.5	43.8	36.1	58.68	74	15.32
9620	Vertical	110	30	-64.7	70	79	9.6	45	38.1	45	54	9
9760	Vertical	110	30	-64.7	70	79	9.6	45	38.1	45	54	9
9920	Vertical	110	30	-64.7	70	79	9.6	45	38.1	45	54	9
9620	Horizontal	106	75	-64.95	70	79	9.6	45	38.1	44.75	54	9.25
9760	Horizontal	106	75	-64.95	70	79	9.6	45	38.1	44.75	54	9.25

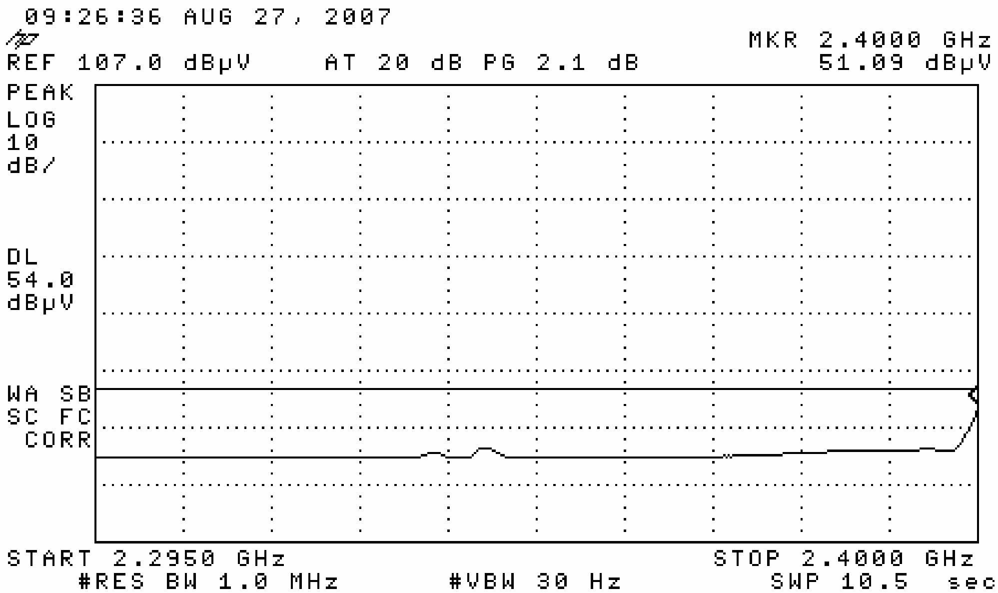
9920	Horizontal	106	75	-64.95	70	79	9.6	45	38.1	44.75	54	9.25
9620	Vertical	100	255	-52.28	70	79	9.6	45	38.1	57.42	74	16.58
9760	Vertical	100	255	-52.28	70	79	9.6	45	38.1	57.42	74	16.58
9920	Vertical	100	255	-52.28	70	79	9.6	45	38.1	57.42	74	16.58
9620	Horizontal	101	165	-52.32	70	79	9.6	45	38.1	57.38	74	16.62
9760	Horizontal	101	165	-52.32	70	79	9.6	45	38.1	57.38	74	16.62
9920	Horizontal	101	165	-52.32	70	79	9.6	45	38.1	57.38	74	16.62
12025	Vertical	241	55	-67.42	73	75	10.6	43.9	38.6	44.88	54	9.12
12200	Vertical	241	55	-67.42	73	75	10.6	43.9	38.6	44.88	54	9.12
12400	Vertical	241	55	-67.42	73	75	10.6	43.9	38.6	44.88	54	9.12
12025	Horizontal	147	255	-67.4	75	73	10.6	43.9	38.6	44.9	54	9.1
12200	Horizontal	147	255	-67.4	75	73	10.6	43.9	38.6	44.9	54	9.1
12400	Horizontal	147	255	-67.4	75	73	10.6	43.9	38.6	44.9	54	9.1
12025	Vertical	138	305	-54.58	73	75	10.6	43.9	38.6	57.72	74	16.28
12200	Vertical	138	305	-54.58	73	75	10.6	43.9	38.6	57.72	74	16.28
12400	Vertical	138	305	-54.58	73	75	10.6	43.9	38.6	57.72	74	16.28
12025	Horizontal	132	5	-54.79	75	73	10.6	43.9	38.6	57.51	74	16.49
12200	Horizontal	132	5	-54.79	75	73	10.6	43.9	38.6	57.51	74	16.49
12400	Horizontal	132	5	-54.79	75	73	10.6	43.9	38.6	57.51	74	16.49
14430	Vertical	100	245	-65.9	76	71	11.7	44.8	40.9	48.9	54	5.1
14640	Vertical	100	245	-65.9	76	71	11.7	44.8	40.9	48.9	54	5.1
14880	Vertical	100	245	-65.9	76	71	11.7	44.8	40.9	48.9	54	5.1
14430	Horizontal	101	315	-65.95	77	69	11.7	44.8	40.9	48.85	54	5.15
14640	Horizontal	101	315	-65.95	77	69	11.7	44.8	40.9	48.85	54	5.15
14880	Horizontal	101	315	-65.95	77	69	11.7	44.8	40.9	48.85	54	5.15
14430	Vertical	101	45	-53.31	76	71	11.7	44.8	40.9	61.49	74	12.51
14640	Vertical	101	45	-53.31	76	71	11.7	44.8	40.9	61.49	74	12.51
14880	Vertical	101	45	-53.31	76	71	11.7	44.8	40.9	61.49	74	12.51
14430	Horizontal	101	145	-52.98	77	69	11.7	44.8	40.9	61.82	74	12.18
14640	Horizontal	101	145	-52.98	77	69	11.7	44.8	40.9	61.82	74	12.18

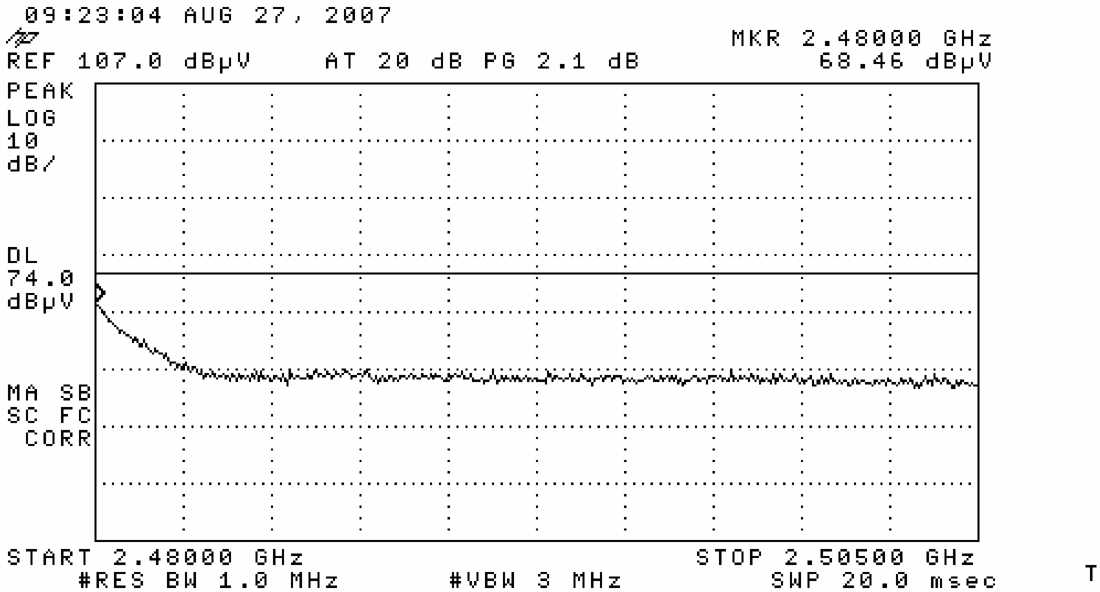
Band-Edge Measurement Plots

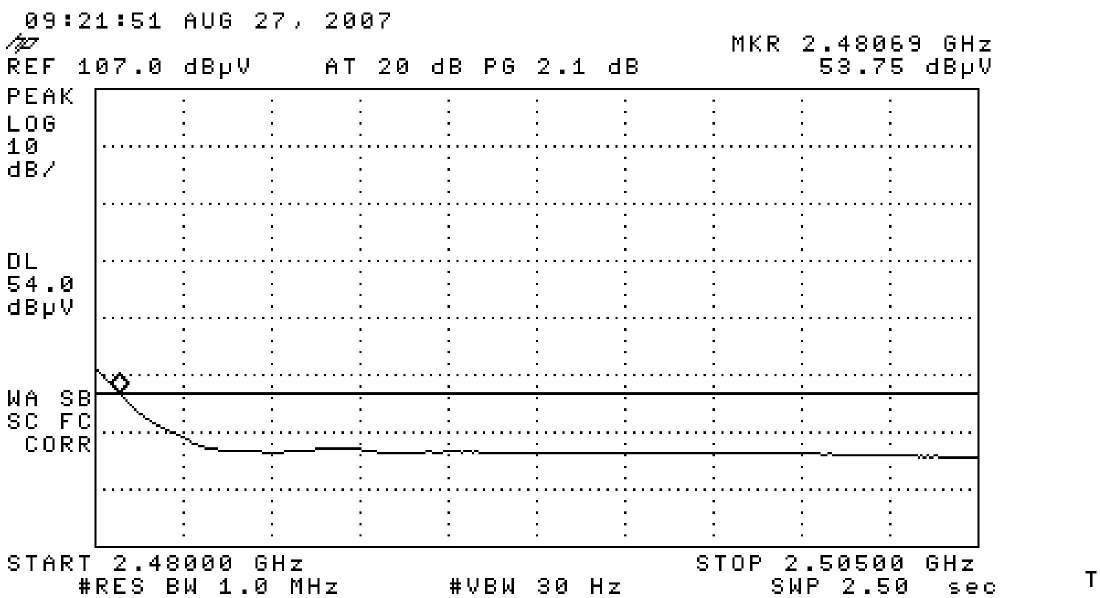
2310 - 2390 MHz & 2483.5 - 2500 MHz



T




09:23:04 AUG 27, 2007
MKR 2.48000 GHz
REF 107.0 dBµV AT 20 dB PG 2.1 dB
68.46 dBµV
PEAK
LOG
10
dB/
DL
74.0
dBµV
MA SB
SC FC
CORR
START 2.48000 GHz
STOP 2.50500 GHz
#RES BW 1.0 MHz
#VBW 3 MHz
SWP 20.0 msec
T


09:21:51 AUG 27, 2007
MKR 2.48069 GHz
REF 107.0 dBµV AT 20 dB PG 2.1 dB
53.75 dBµV
PEAK
LOG
10
dB/
DL
54.0
dBµV
WA SB
SC FC
CORR
START 2.48000 GHz
STOP 2.50500 GHz
#RES BW 1.0 MHz
#VBW 30 Hz
SWP 2.50 sec
T

RSS-Gen 7.2.3 Receiver Spurious Emission Limits

Receiver Spurious Emissions

The receiver shall be operated in the normal receive mode near the mid-point of the band over which the receiver is designed to operate. Unless otherwise specified in the applicable RSS, the radiated emission measurement is the standard measurement method (with the device's antenna in place) to measure receiver spurious emissions. Radiated emission measurements are to be performed using a calibrated open-area test site. As an alternative, the conducted measurement method may be used when the antenna is detachable. In such a case, the receiver spurious signal may be measured at the antenna port. If the receiver is super-regenerative, stabilize it by coupling to it an unmodulated carrier on the receiver frequency (antenna conducted measurement) or by transmitting an unmodulated carrier on the receiver frequency from an antenna in the proximity of the receiver (radiated measurement). Taking care not to overload the receiver, vary the amplitude and frequency of the stabilizing signal to obtain the highest level of the spurious emissions from the receiver. For either method, the search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is the higher, to at least 3 times the highest tunable or local oscillator frequency, whichever is the higher, without exceeding 40 GHz. For emissions below 1 GHz, measurements shall be performed using a CISPR quasi-peak detector and the related measurement bandwidth. As an alternative to CISPR quasi-peak measurement, compliance with the emission limit can be demonstrated using measuring equipment employing a peak detector with the same measurement bandwidth as that for CISPR quasi-peak measurements. Above 1 GHz, measurements shall be performed using an average detector and a resolution bandwidth of 300 kHz to 1 MHz.

Receiver Spurious Emission Standard

The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 1. The resolution bandwidth of the spectrum analyzer shall be 100 kHz for spurious emission measurements below 1.0 GHz, and 1.0 MHz for measurements above 1.0 GHz.

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

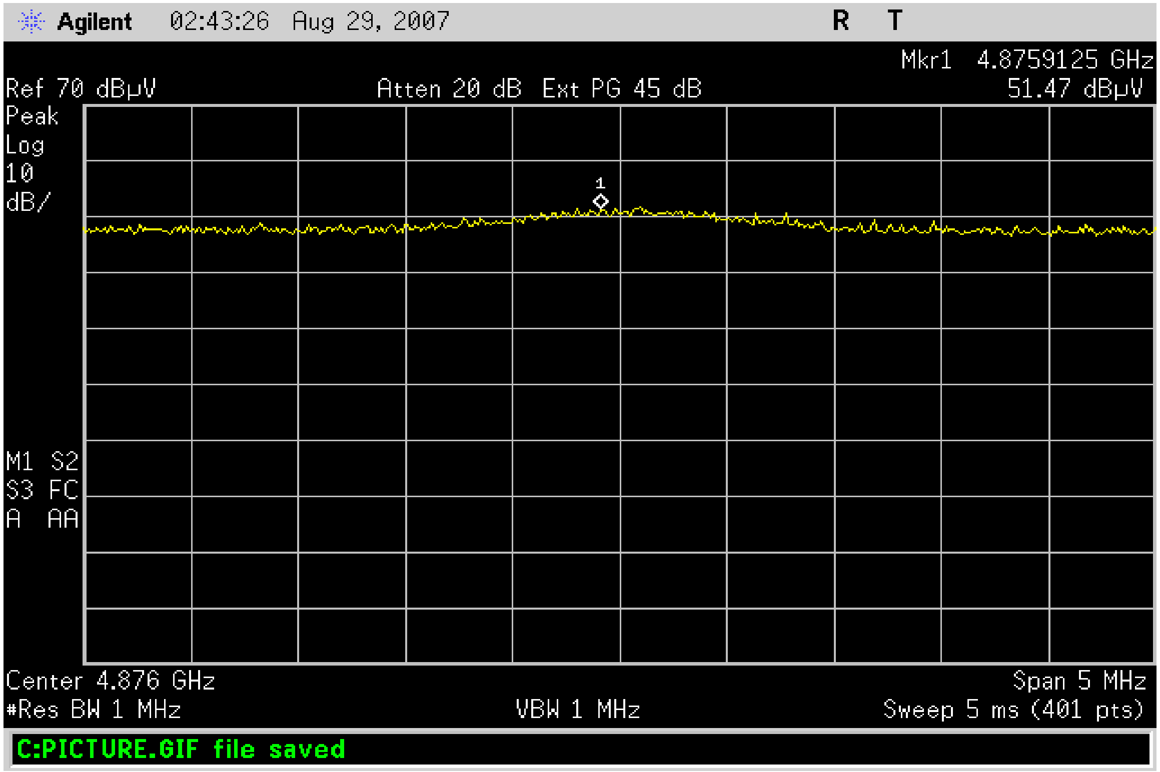
Table 1 – Radiated Spurious Emission Limits for Receivers

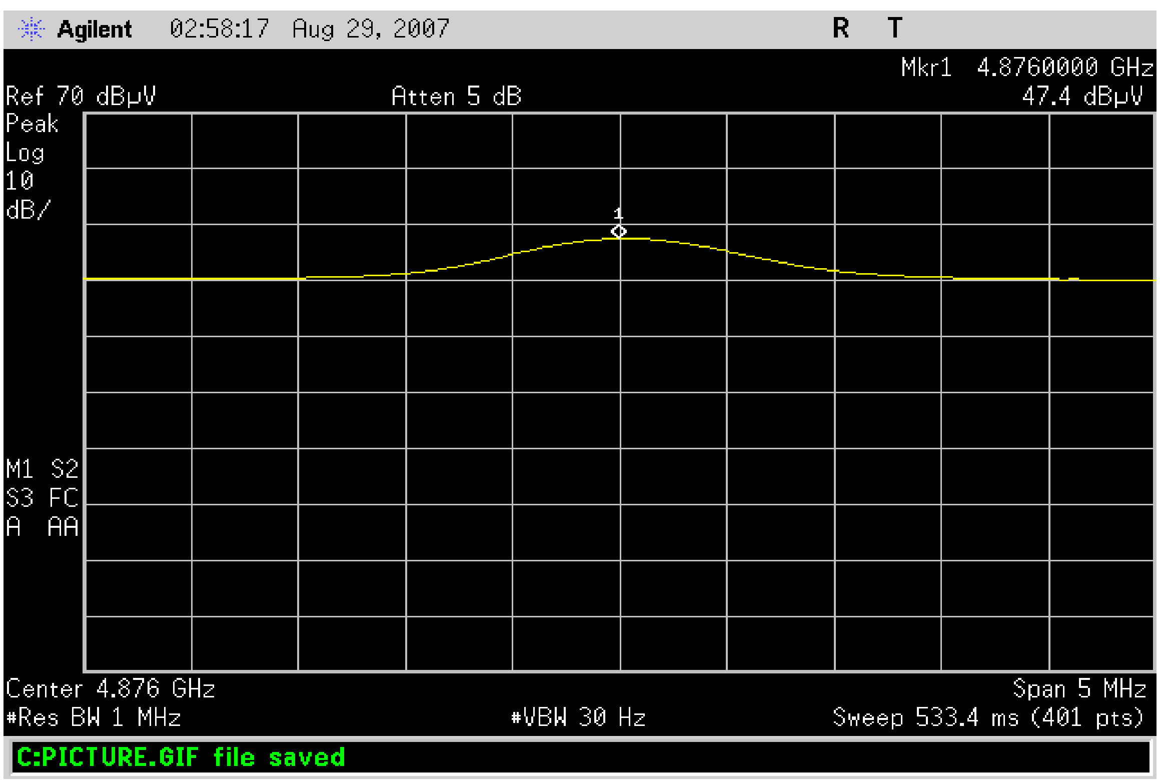
Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 meters)
30-88	100
88-216	150
216-960	200
Above 960	500

Date	Tested by
8/28/2007	Mark Kvamme

Frequency range investigated was 30 MHz to 15 GHz. Worst case results are shown.

Equipment Used	Model Number	Serial Number	Cal Date	Due
Spectrum Analyzer	Agilent E7405A	MY45113415	Aug/07	Aug/08
JCA technology JCA010-415 (0.1 to 10Ghz)	JCA010-415	103	May/07	May/08
JCA technology JCA618-80 (8 to 18 GHz)	JCA618-801	106	May/07	May/08
Huber&Suhner 40 foot cable	Sucoflex 100	220297 001	Apr/07	May/08
EMCO 3115 double ridge wave guide	EMCO 3115	9508-4550	Mar/06	Mar/08
Dipole antenna	3121	78573	9/16/2006	9/16/2007


Agilent 02:43:26 Aug 29, 2007
R T
Mkr1 4.8759125 GHz
Ref 70 dBµV
Atten 20 dB Ext PG 45 dB
51.47 dBµV
Peak
Log
10
dB/
1
M1 S2
S3 FC
A AA
Center 4.876 GHz
Span 5 MHz
#Res BW 1 MHz
VBW 1 MHz
Sweep 5 ms (401 pts)
C:PICTURE.GIF file saved

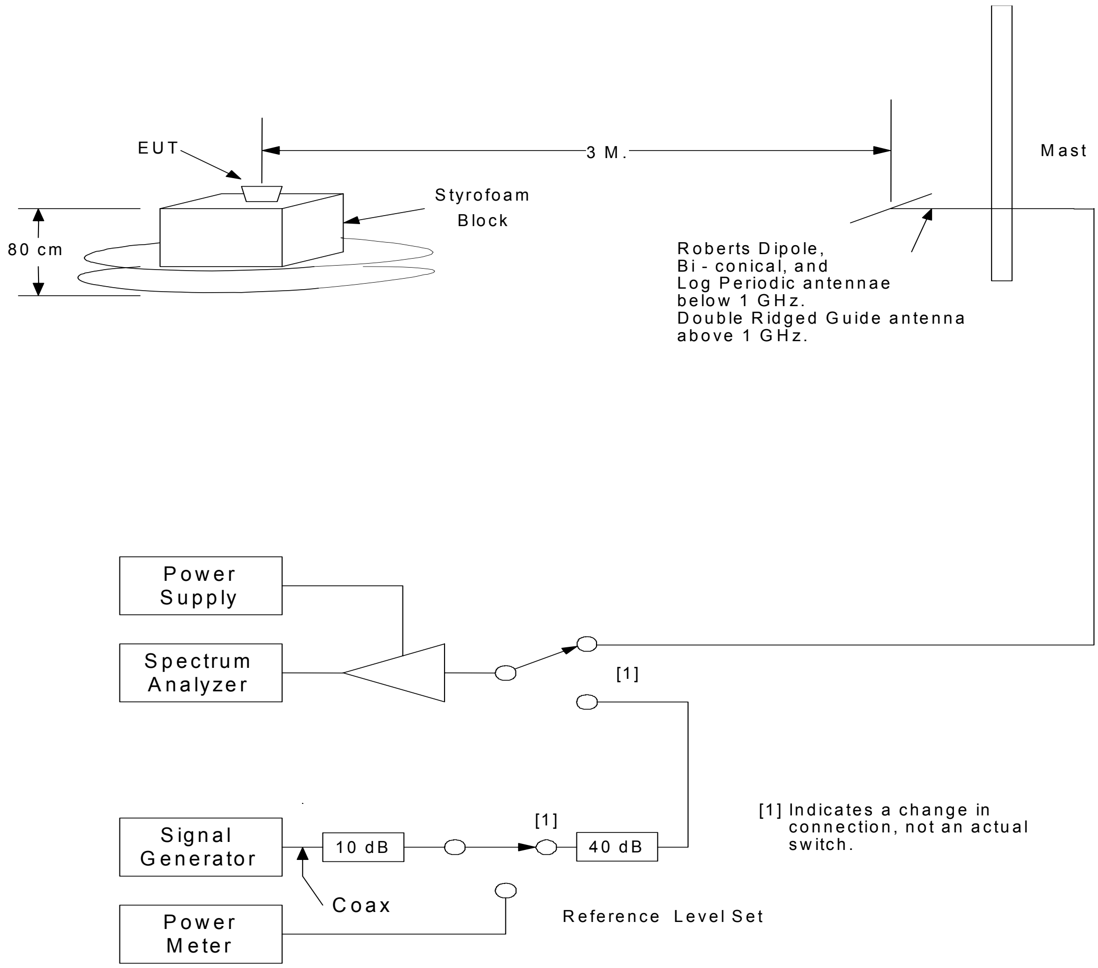

Agilent 02:58:17 Aug 29, 2007
R T
Mkr1 4.8760000 GHz
Ref 70 dBµV
Atten 5 dB
47.4 dBµV
Peak
Log
10
dB/
1
M1 S2
S3 FC
A AA
Center 4.876 GHz
Span 5 MHz
#Res BW 1 MHz
#VBW 30 Hz
Sweep 533.4 ms (401 pts)
C:PICTURE.GIF file saved

ANNEX A

Field Strength Measurement Procedure

This test measures the field strength of radiated emissions using a spectrum analyzer and a receiving antenna in accordance with ANSI C63.4-2003. During the test, the EUT is to be placed on a non-conducting support at 80 cm above the horizontal ground plane of the OATS. The horizontal distance between the antenna and the EUT is to be exactly 3 meters. Levels below 1 GHz are to be measured with the spectrum analyzer resolution bandwidth at 120 kHz and levels at or above 1 GHz are to be measured with the spectrum analyzer resolution bandwidth at 1 MHz.

1) Monitor the frequency range of interest at a fixed antenna height and EUT azimuth.
2) If appropriate, manipulate the system cables to produce the highest amplitude signal relative to the limit. Note the amplitude and frequency of the suspect signal.
3) Rotate the EUT 360° to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, go back to the azimuth and repeat step 2). Otherwise, orient the EUT azimuth to repeat the highest amplitude observation and proceed.
4) Move the antenna over its fully allowed range of travel to maximize the suspected highest amplitude signal. If the signal or another at a different frequency is observed to exceed the previously noted highest amplitude signal by 1 dB or more, return to step 2) with the antenna fixed at this height. Otherwise, move the antenna to the height that repeats the highest amplitude observation and proceed.
5) Change the polarity of the antenna and repeat step 2), step 3), and step 4). Compare the resulting suspected highest amplitude signal with that found for the other polarity. Select and note the higher of the two signals.
6) The transmitter shall be replaced by a substitution antenna.
The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter. The substitution antenna shall be connected to a calibrated signal generator. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
7) The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8) The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
9) The input level to the substitution antenna shall be recorded as power level, corrected for any change of input attenuator setting of the measuring receiver.
10) The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
11) The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary. This signal is termed the highest observed signal with respect to the limit for this EUT operational mode.


EUT
3 M.
Mast
Styrofoam Block
80 cm
Roberts Dipole,
Bi - conical, and
Log Periodic antennae
below 1 GHz.
Double Ridged Guide antenna
above 1 GHz.
Power Supply
Spectrum Analyzer
[1]
Signal Generator
10 dB
[1]
40 dB
[1] Indicates a change in connection, not an actual switch.
Coax
Power Meter
Reference Level Set