Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	Air Pressure: 1011 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

7.4 Radiated spurious emission measurements

7.4.1 General

This test was performed to measure radiated spurious emissions from the EUT. Specification test limits are given in Table 7.4.1, Table 7.4.2.

Table 7.4.1 Radiated spurious emission test limits

Frequency, MHz	Attenuation below carrier dBc	ERP of spurious, dBm	Equivalent field strength limit @ 3m, dB(μV/m)***
0.009 – 10th harmonic*	43+10logP**	-13	84.4

* - Excluding the in band emission within ± 250 % of the authorized bandwidth from the carrier
** - P is transmitter output power in Watts
*** - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows: E=sqrt(30×P×1.64)/r, where P is ERP in Watts, 1.64 is numeric gain of ideal dipole and r is antenna to EUT distance in meters

Table 7.4.2 Radiated spurious emissions limits for in 9 kHz – 30 MHz range

Frequency, MHz	Field strength at 3 m within restricted bands, dB(μV/m)*		
	Peak	Quasi Peak	Average
0.009 – 0.090	148.5 – 128.5	NA	128.5 – 108.5**
0.090 – 0.110	NA	108.5 – 106.8**	NA
0.110 – 0.490	126.8 – 113.8	NA	106.8 – 93.8**
0.490 – 1.705	NA	73.8 – 63.0**	NA
1.705 – 30.0*		69.5	

*- The limit for 3 m test distance was calculated using the inverse square distance extrapolation factor as follows:

$$Lim_{S2} = Lim_{S1} + 40 \log (S_1/S_2),$$

where S_1 and S_2 – standard defined and test distance respectively in meters.
**- The limit decreases linearly with the logarithm of frequency.
*** - The field strength limits applied from the lowest radio frequency generated in the device, without going below 9 kHz up to the tenth harmonic of the highest fundamental frequency.

7.4.2 Test procedure for spurious emission field strength measurements in 9 kHz to 30 MHz band

7.4.2.1 The EUT was set up as shown in Figure 7.4.1, energized and the performance check was conducted.
7.4.2.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna was rotated around its vertical axis.
7.4.2.3 The worst test results (the lowest margins) were recorded in Table 7.4.3 and shown in the associated plots.

7.4.3 Test procedure for spurious emission field strength measurements above 30 MHz

7.4.3.1 The EUT was set up as shown in Figure 7.4.2, energized and the performance check was conducted.
7.4.3.2 The specified frequency range was investigated with antenna connected to spectrum analyzer. To find maximum radiation the turntable was rotated 360^0 and the measuring antenna height was swept from 1 to 4 m in both, vertical and horizontal, polarizations.
7.4.3.3 The worst test results (the lowest margins) were recorded in Table 7.4.3 and shown in the associated plots.

Test specification:	Section 27.53(m)(2), Radiated spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	Air Pressure: 1011 hPa	Relative Humidity: 38 %	Power Supply: 48 VDC
Remarks:			

Figure 7.4.1 Setup for spurious emission field strength measurements in 9 kHz to 30 MHz band

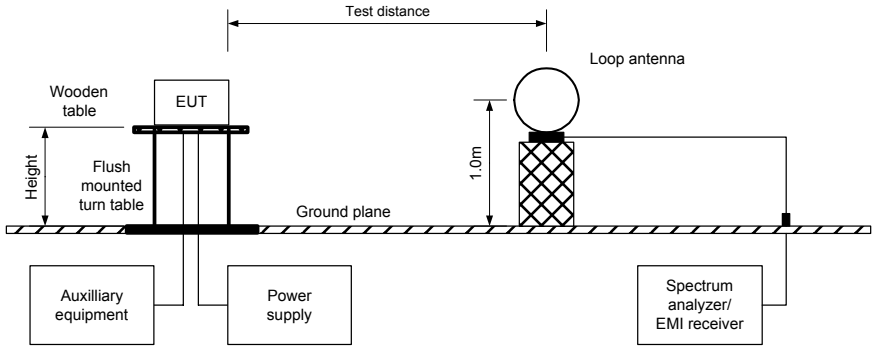
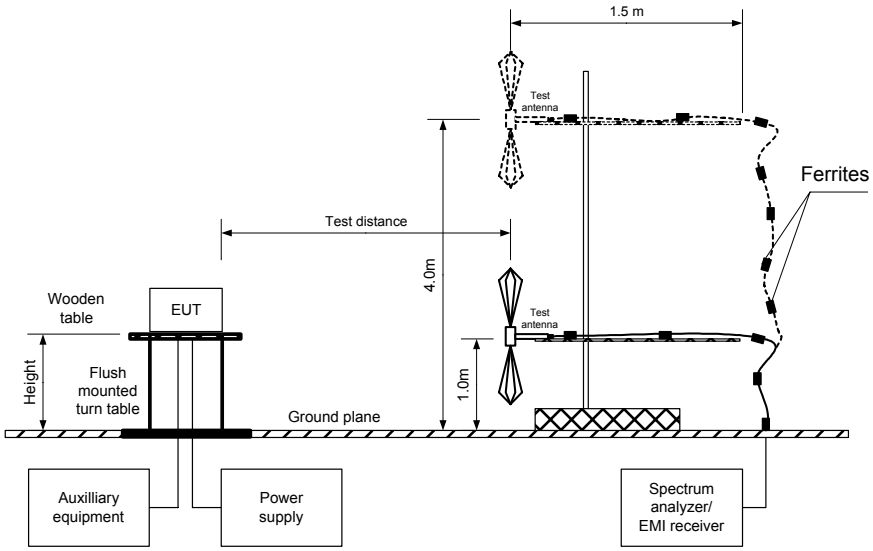


Figure 7.4.2 Setup for spurious emission field strength measurements above 30 MHz



Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.4.3 Spurious emission field strength test results

ASSIGNED FREQUENCY RANGE:	2496.0 – 2690.0 MHz
TEST DISTANCE:	3 m
TEST SITE:	Semi anechoic chamber / OATS
EUT HEIGHT:	0.8 m
INVESTIGATED FREQUENCY RANGE:	0.009 – 27000 MHz
DETECTOR USED:	Peak
VIDEO BANDWIDTH:	> Resolution bandwidth
TEST ANTENNA TYPE:	Active loop (9 kHz – 30 MHz) Biconilog (30 MHz – 1000 MHz) Double ridged guide (above 1000 MHz)
MODULATION:	QPSK
MODULATING SIGNAL:	PRBS

Frequency, MHz	Field strength, dB(μV/m)	Limit, dB(μV/m)	Margin, dB*	RBW, kHz	Antenna polarization	Antenna height, m	Turn-table position**, degrees
All emissions are at least 20 dB below the specified limit							

*- Margin = Field strength of spurious – calculated field strength limit.
**- EUT front panel refers to 0 degrees position of turntable.

Reference numbers of test equipment used

HL 0446	HL 0521	HL 0604	HL 0768	HL 0769	HL 1984	HL 2870	HL 2871
HL 2909	HL 3122	HL 3355	HL 3356	HL 3534	HL 3616	HL 3818	HL 3884

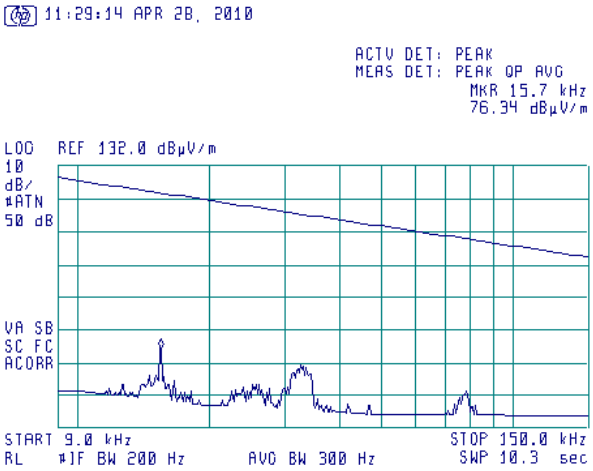
Full description is given in Appendix A.

Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

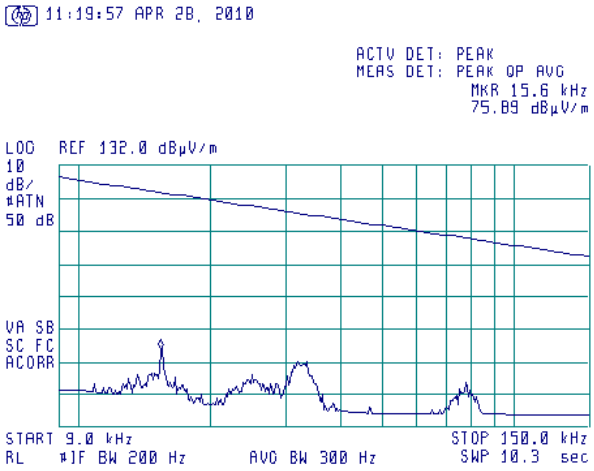
Plot 7.4.1 Radiated emission measurements in 9 - 150 kHz range

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

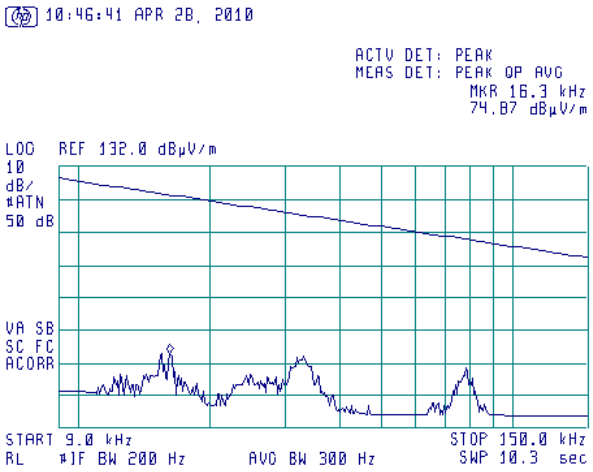
Low channel



Mid channel



High channel

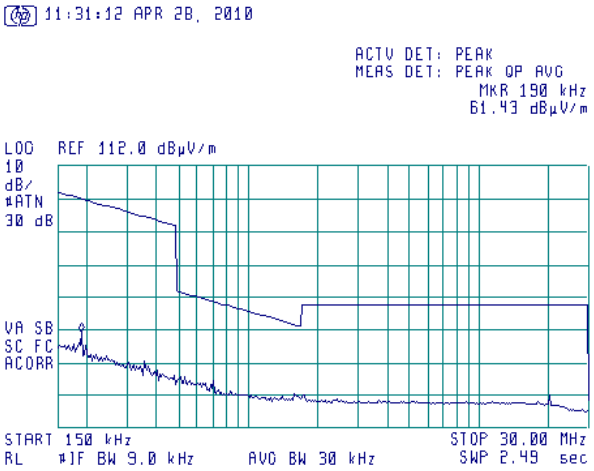


Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

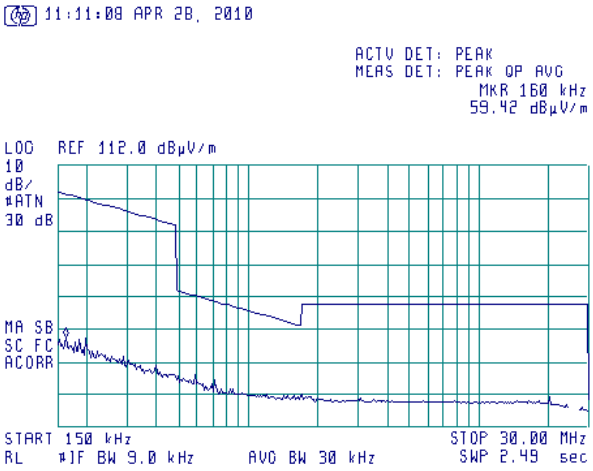
Plot 7.4.2 Radiated emission measurements in 0.15 - 30 MHz range

TEST SITE: Semi anechoic chamber
TEST DISTANCE: 3 m

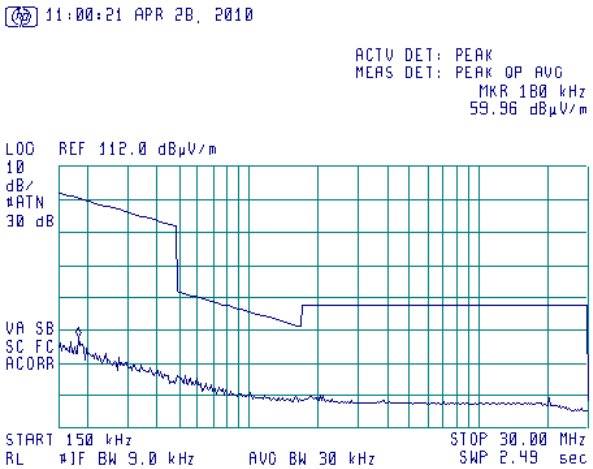
Low channel



Mid channel



High channel

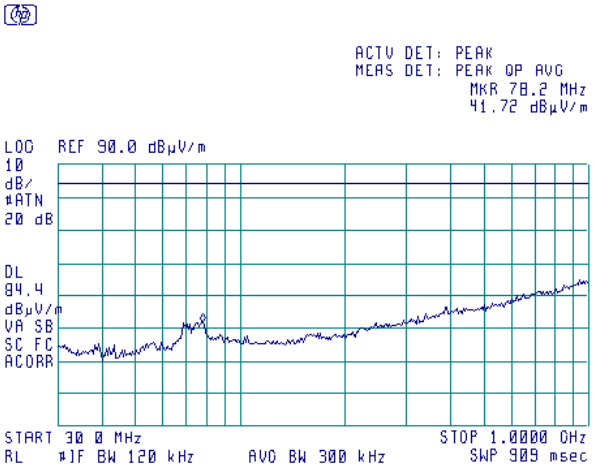


Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

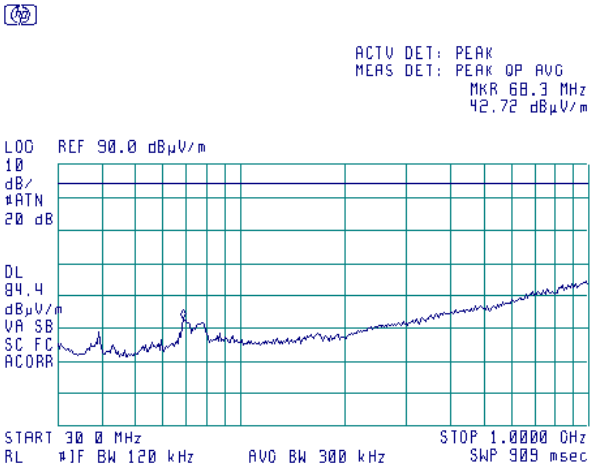
Plot 7.4.3 Radiated emission measurements in 30 - 1000 MHz range

TEST SITE: Semi anechoic chamber
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

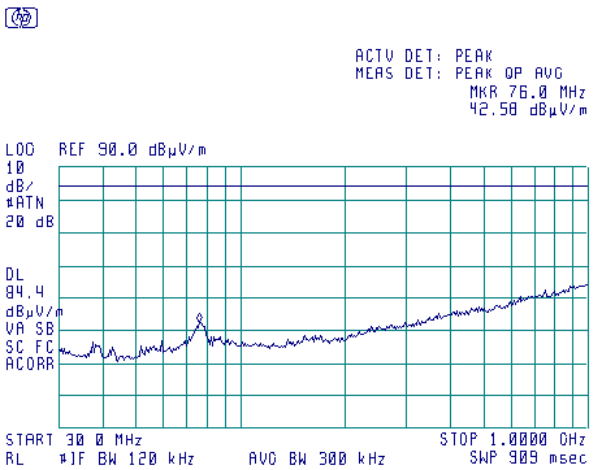
Low channel



Mid channel



High channel

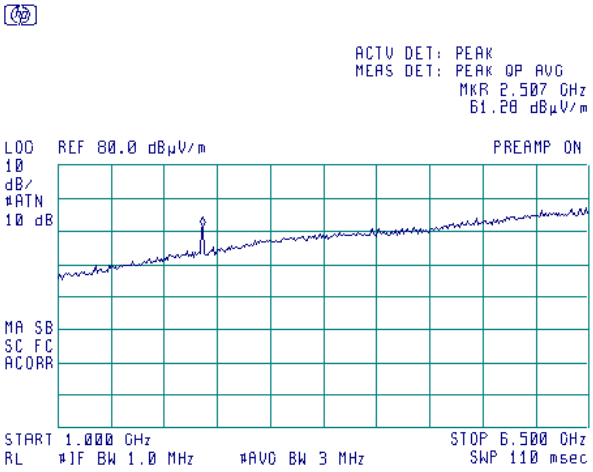


Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

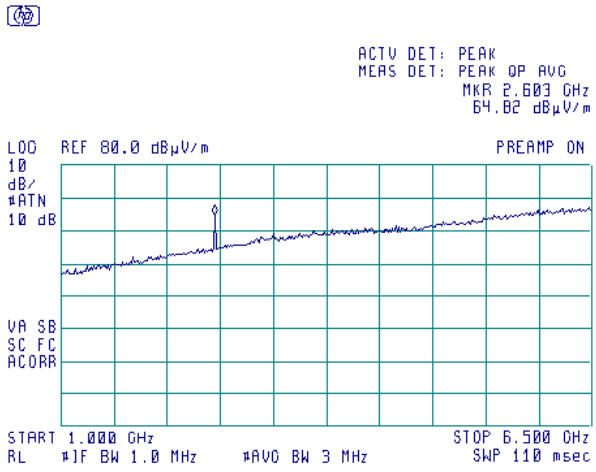
Plot 7.4.4 Radiated emission measurements in 1000 – 6500 MHz range

TEST SITE: Semi anechoic chamber
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

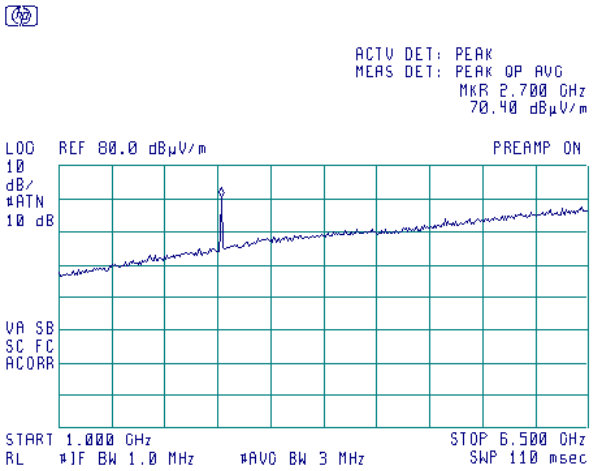
Low channel



Mid channel



High channel

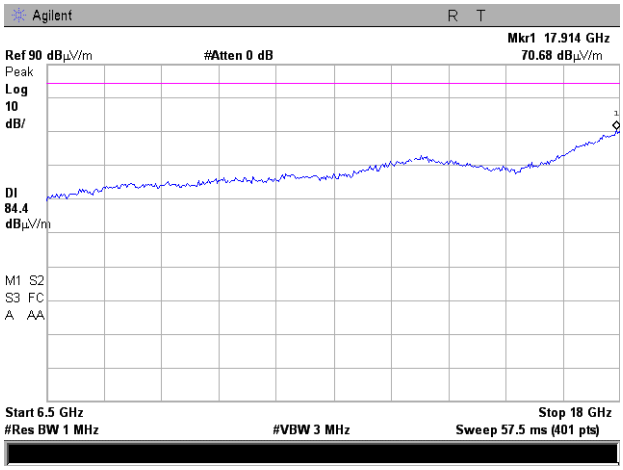


Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

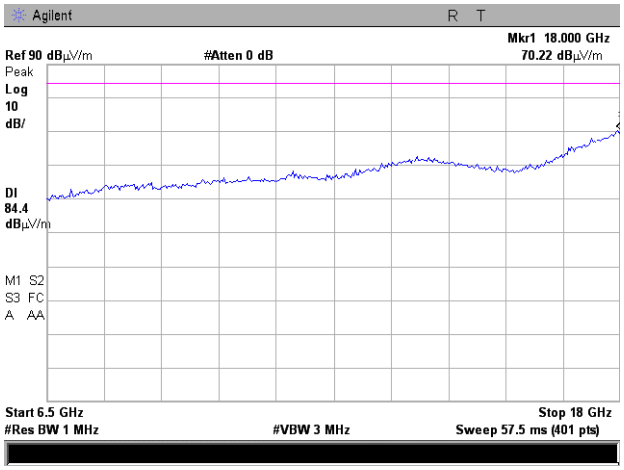
Plot 7.4.5 Radiated emission measurements in 6500 – 18000 MHz range

TEST SITE: Semi anechoic chamber
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

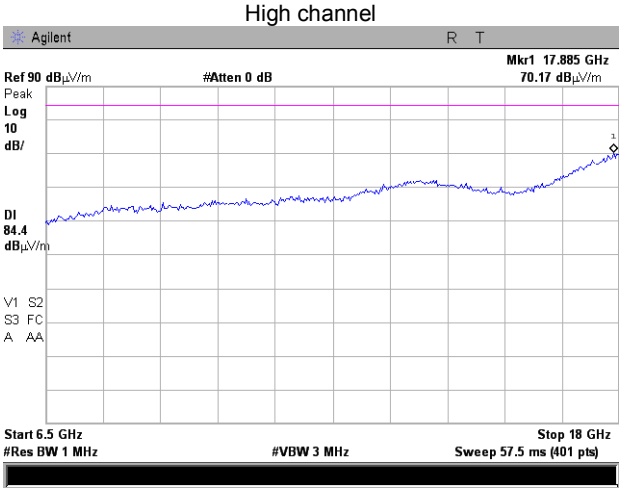
Low channel



Mid channel



High channel

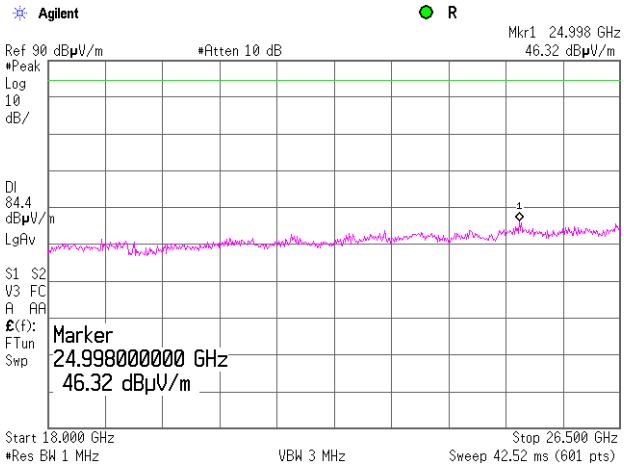


Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

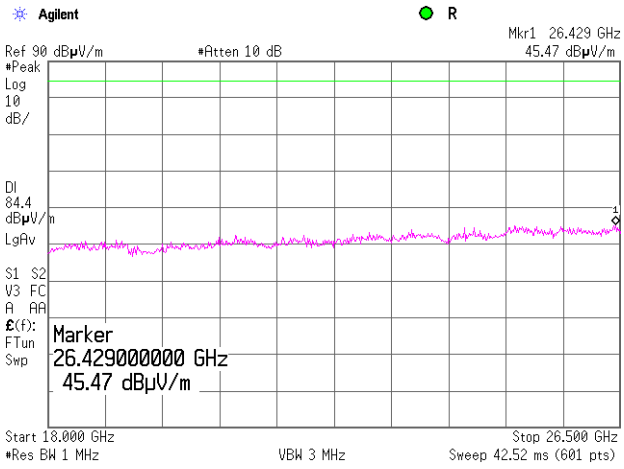
Plot 7.4.6 Radiated emission measurements in 18000 – 26500 MHz range

TEST SITE: OATS
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m

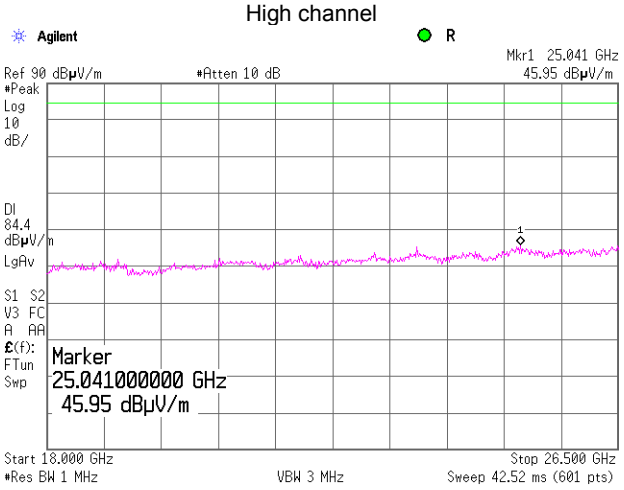
Low channel



Mid channel



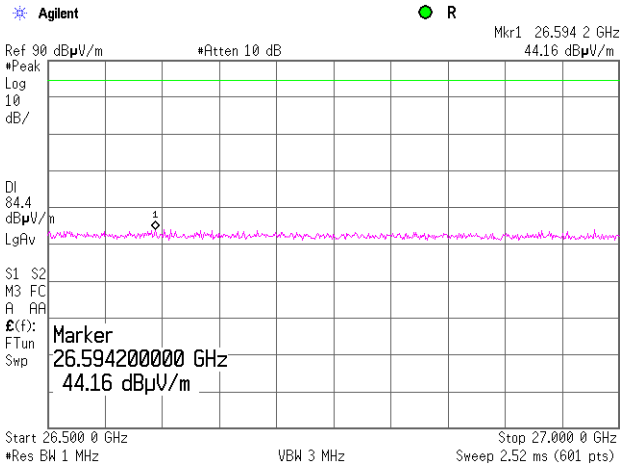
High channel



Test specification:	**Section 27.53(m)(2), Radiated spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/2/2010		
Temperature: 24.1 ºC	**Air Pressure:** 1011 hPa	**Relative Humidity:** 38 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.4.7 Radiated emission measurements in 26500 – 27000 MHz range high carrier frequency

TEST SITE: OATS
ANTENNA POLARIZATION: Vertical and Horizontal
TEST DISTANCE: 3 m



Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

7.5 Spurious emissions at RF antenna connector test

7.5.1 General

This test was performed to measure spurious emissions at RF antenna connector. Specification test limits are given in Table 7.5.1.

Table 7.5.1 Spurious emission limits

Frequency, MHz	Attenuation below carrier, dBc	ERP of spurious, dBm
0.009 – 10th harmonic*	43+10logP*	-13.0

* - P is transmitter output power in Watts

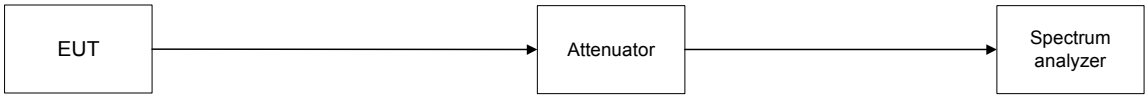
7.5.2 Test procedure

7.5.2.1 The EUT was set up as shown in Figure 7.5.1, energized and its proper operation was checked.

7.5.2.2 The EUT was adjusted to produce maximum available for end user RF output power.

7.5.2.3 The spurious emission was measured with spectrum analyzer as provided in Table 7.5.2, Table 7.5.3 and the associated plots.

Figure 7.5.1 Spurious emission test setup



Test specification:	**Section 27.53(m)(2), Conducted spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.5.2 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: QPSK
MODULATING SIGNAL: PRBS
CHANNEL BW: 5 MHz
TRANSMITTER OUTPUT POWER: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
536.00	-36.90	Included	Included	100	-36.90	-13.00	-23.9	Pass
2489.70	-19.99	Included	Included	1000	-19.99	-13.00	-6.99	Pass
2507.00	-20.81	Included	Included	1000	-20.81	-13.00	-7.81	Pass
Mid carrier frequency								
633.00	-40.99	Included	Included	100	-40.99	-13.00	-27.99	Pass
2584.50	-21.12	Included	Included	1000	-21.12	-13.00	-8.12	Pass
2601.50	-25.36	Included	Included	1000	-25.36	-13.00	-12.36	Pass
High carrier frequency								
72.00	-42.06	Included	Included	100	-42.06	-13.00	-29.06	Pass
726.80	-37.28	Included	Included	100	-37.28	-13.00	-24.28	Pass
2679.00	-21.13	Included	Included	1000	-21.13	-13.00	-8.13	Pass
2696.61	-24.12	Included	Included	1000	-24.12	-13.00	-11.12	Pass

*- Margin = Spurious emission – specification limit.

Test specification:	**Section 27.53(m)(2), Conducted spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.5.3 Spurious emission test results

ASSIGNED FREQUENCY RANGE: 2496.0 – 2690.0 MHz
INVESTIGATED FREQUENCY RANGE: 0.009 – 27000 MHz
DETECTOR USED: Peak
VIDEO BANDWIDTH: ≥ Resolution bandwidth
MODULATION: QPSK
MODULATING SIGNAL: PRBS
CHANNEL BW: 10 MHz
TRANSMITTER OUTPUT POWER: Maximum

Frequency, MHz	SA reading, dBm	Attenuator, dB	Cable loss, dB	RBW, kHz	Spurious emission, dBm	Limit, dBm	Margin, dB*	Verdict
Low carrier frequency								
2488.604	-20.31	Included	Included	1000	-20.31	-13.00	-7.31	Pass
2513.000	-20.56	Included	Included	1000	-20.56	-13.00	-7.56	Pass
Mid carrier frequency								
2580.809	-20.28	Included	Included	1000	-20.28	-13.00	-7.28	Pass
2605.395	-21.58	Included	Included	1000	-21.58	-13.00	-8.58	Pass
High carrier frequency								
2673.000	-20.88	Included	Included	1000	-20.88	-13.00	-7.88	Pass
2697.303	-23.03	Included	Included	1000	-23.03	-13.00	-10.03	Pass

*- Margin = Spurious emission – specification limit.

Reference numbers of test equipment used

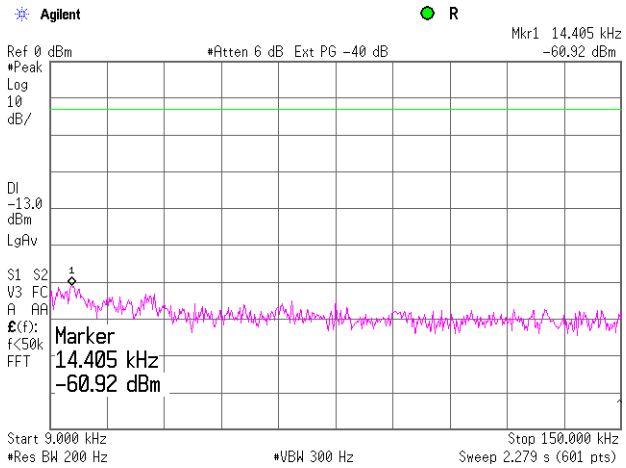
HL 1424	HL 2254	HL 2909	HL 2953	HL 3321	HL 3386	HL 3455	

Full description is given in Appendix A.

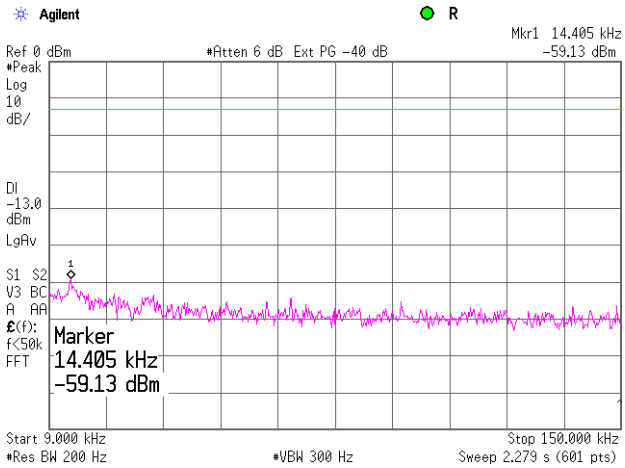
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.1 Spurious emission measurements in 9 - 150 kHz range, 5 MHz BW

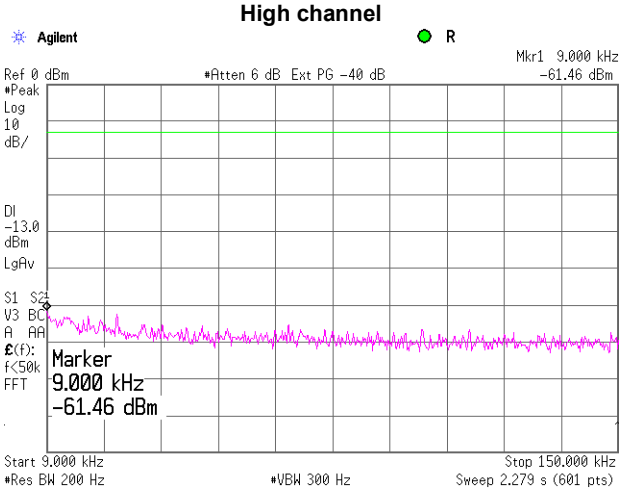
Low channel



Mid channel



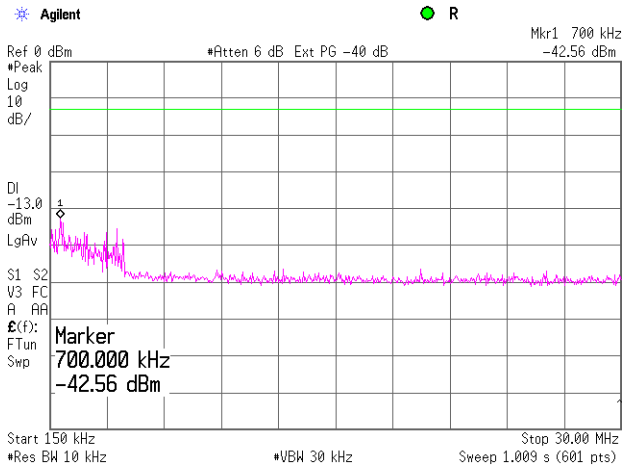
High channel



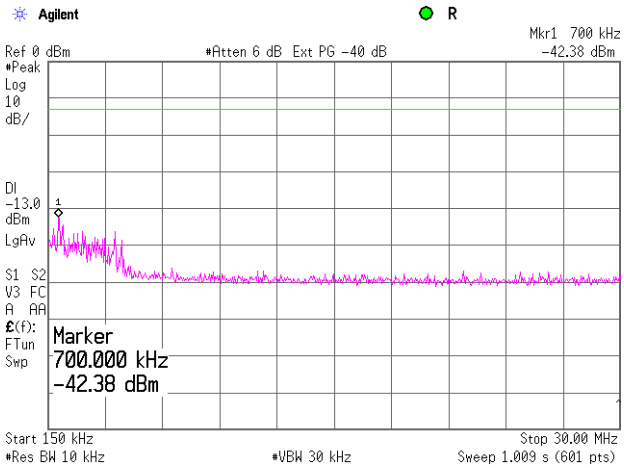
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.2 Spurious emission measurements in 0.15 - 30.0 MHz range, 5 MHz BW

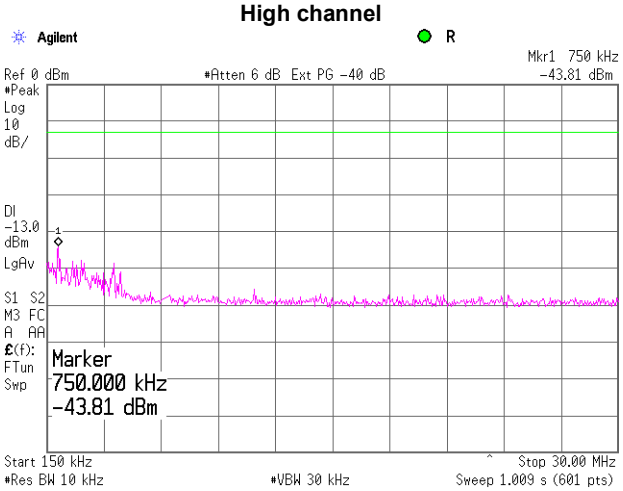
Low channel



Mid channel



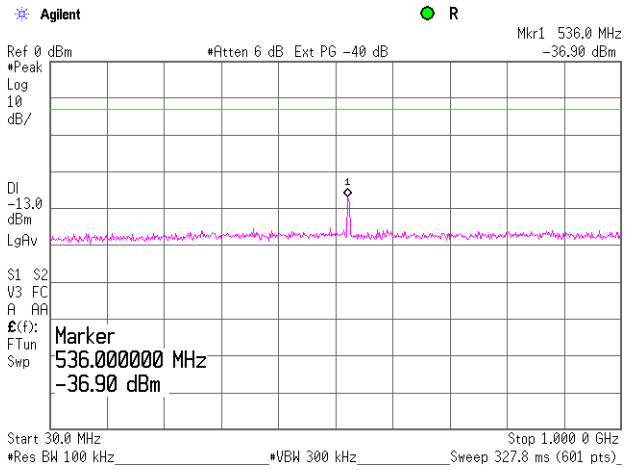
High channel



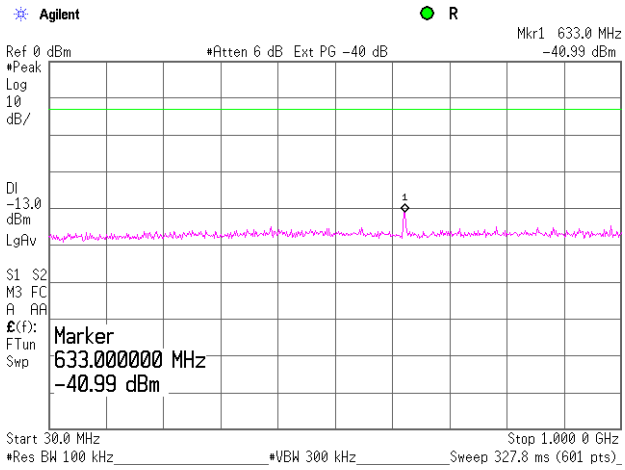
Test specification:	**Section 27.53(m)(2), Conducted spurious emissions**		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	**Verdict:**	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	**Air Pressure:** 1013 hPa	**Relative Humidity:** 45 %	**Power Supply:** 48 VDC
Remarks:			

Plot 7.5.3 Spurious emission measurements in 30.0 - 1000 MHz range, 5 MHz BW

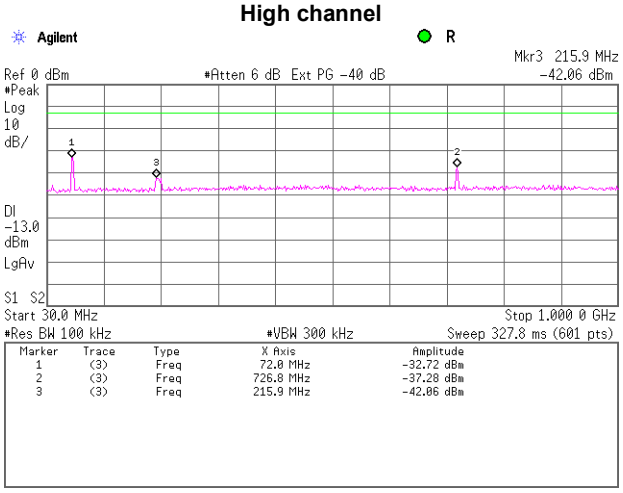
Low channel



Mid channel



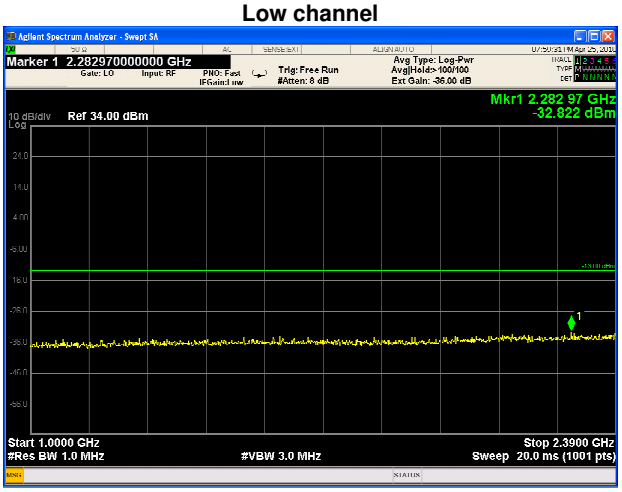
High channel



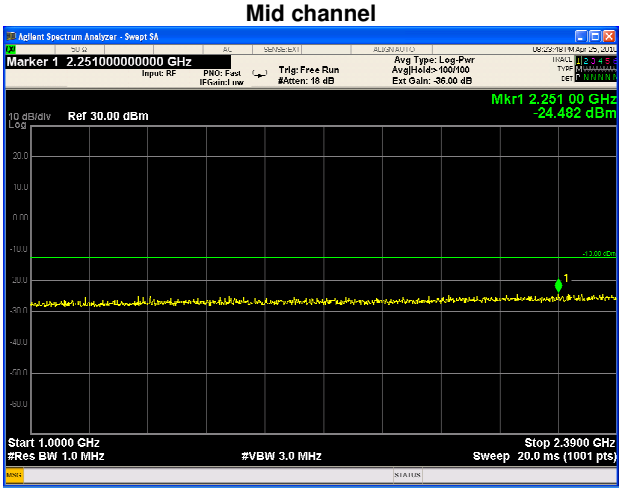
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.4 Spurious emission measurements in 1000 - 2390 MHz range for 5 MHz BW

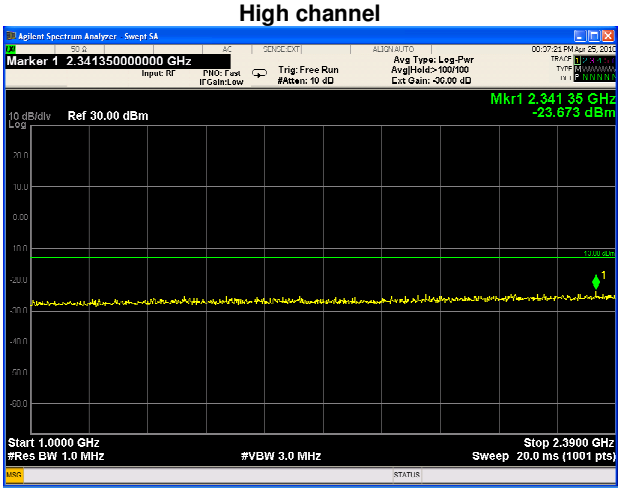
Low channel



Mid channel

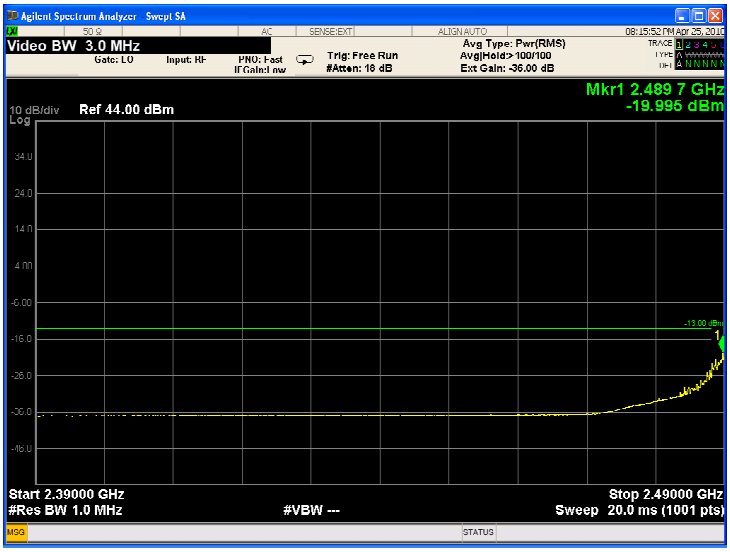


High channel

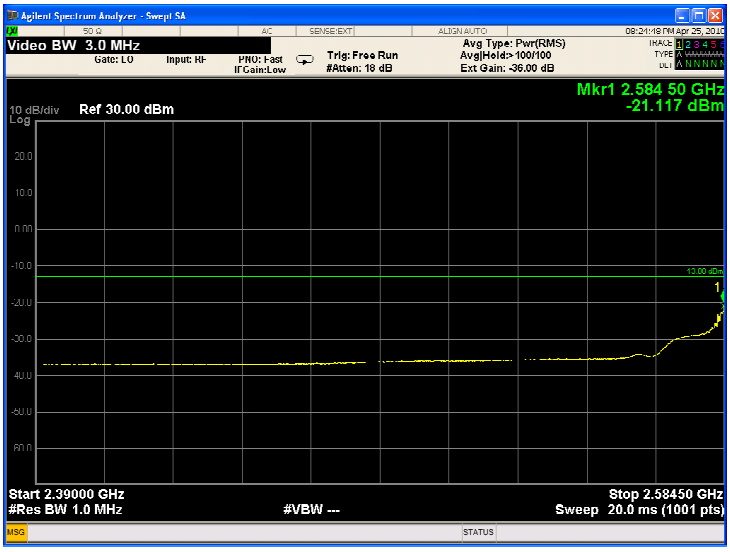


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.5 Spurious emission measurements in 2390 – 2490 MHz range at low carrier frequency, 5 MHz BW

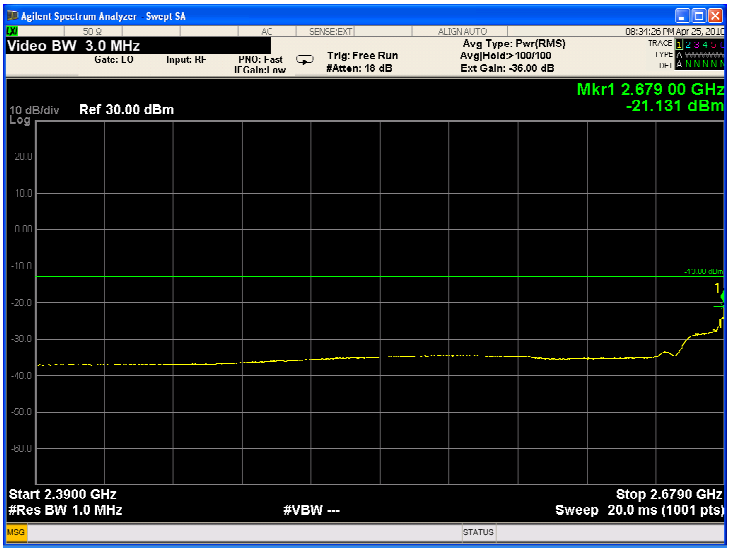


Plot 7.5.6 Spurious emission measurements in 2390 – 2584.5 MHz at mid carrier frequency, 5 MHz BW



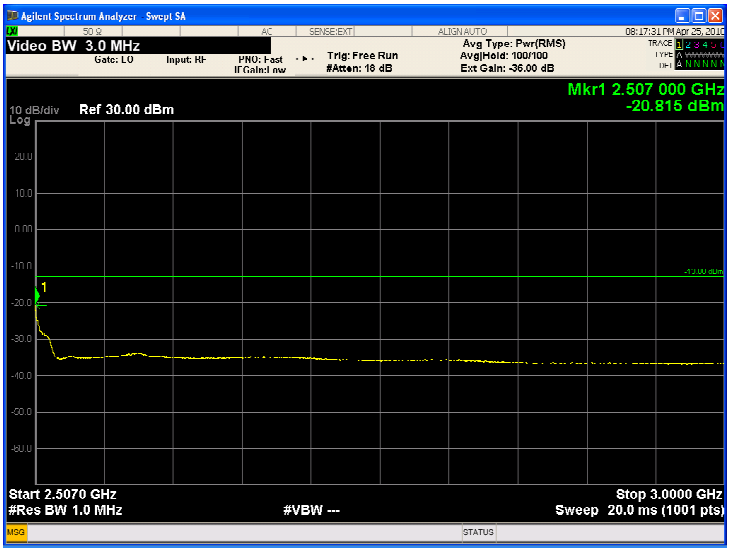
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.7 Spurious emission measurements in 2390 - 2679 MHz at high carrier frequency, 5 MHz BW

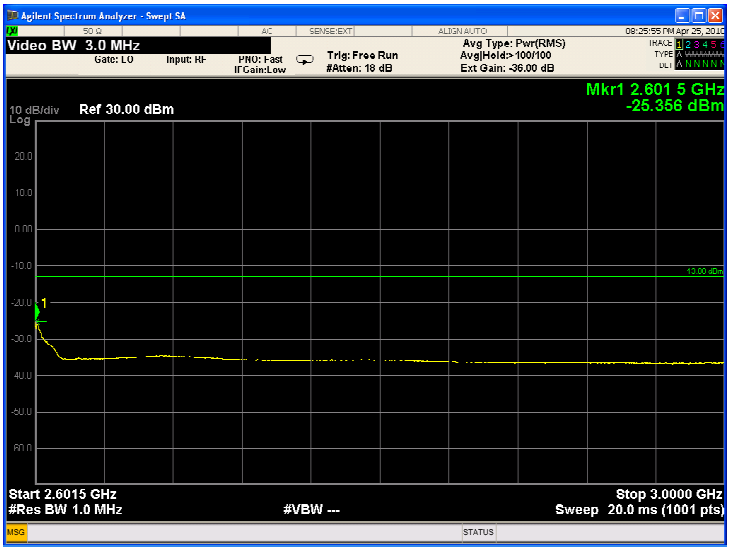


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.8 Spurious emission measurements in 2507 - 3000 MHz range at low carrier frequency, 5 MHz BW

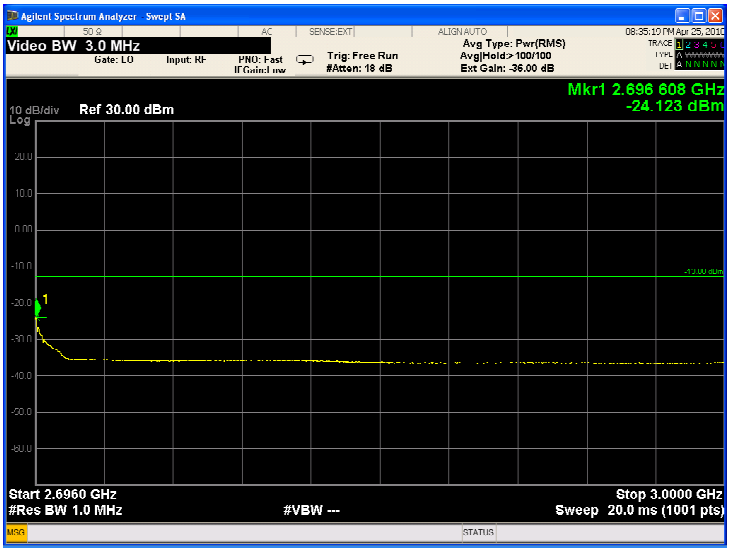


Plot 7.5.9 Spurious emission measurements in 2601.5 - 3000 MHz at mid carrier frequency, 5 MHz BW



Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

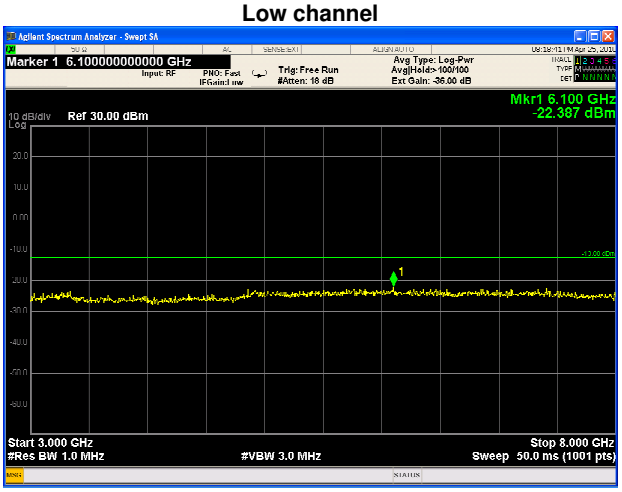
Plot 7.5.10 Spurious emission measurements in 2696 - 3000 MHz at high carrier frequency, 5 MHz BW



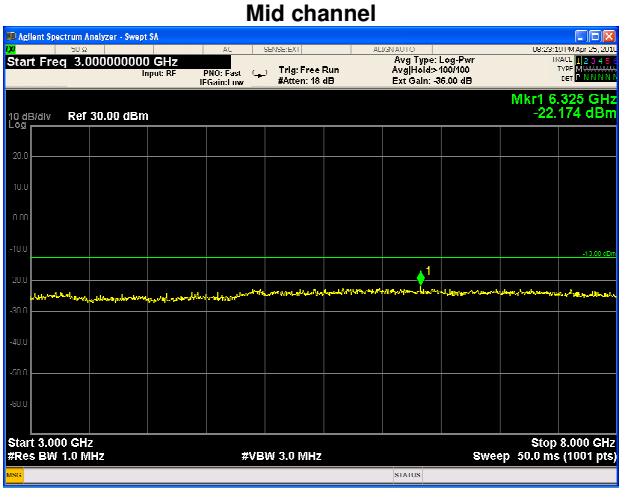
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.11 Spurious emission measurements in 3000 - 8000 MHz range, 5 MHz BW

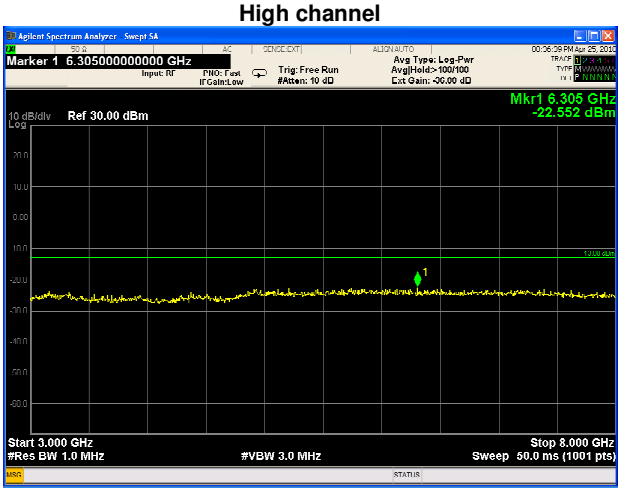
Low channel



Mid channel



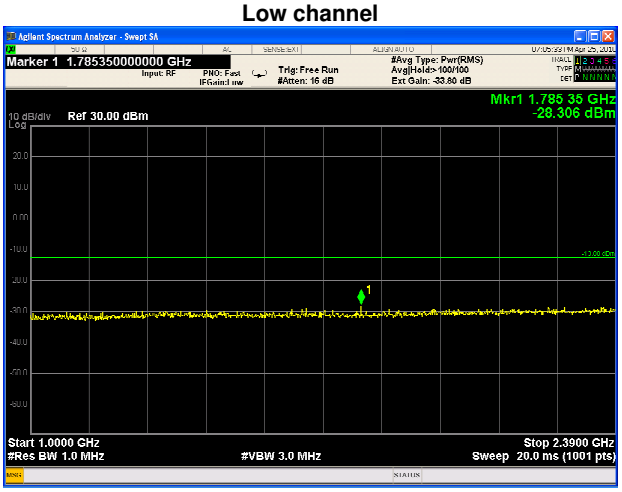
High channel



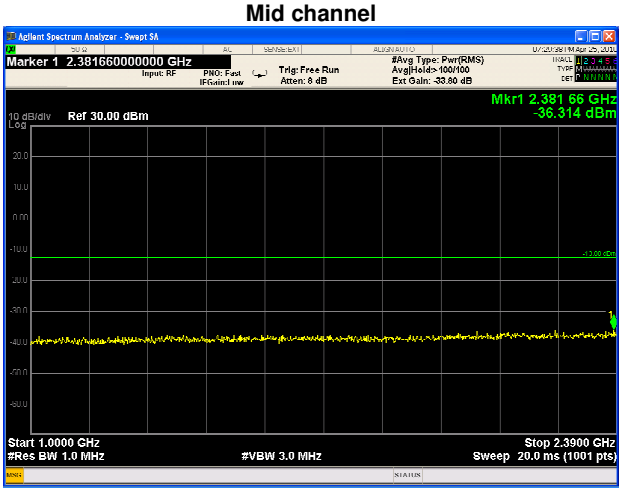
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.12 Spurious emission measurements in 1000 - 2390 MHz range, 10 MHz BW

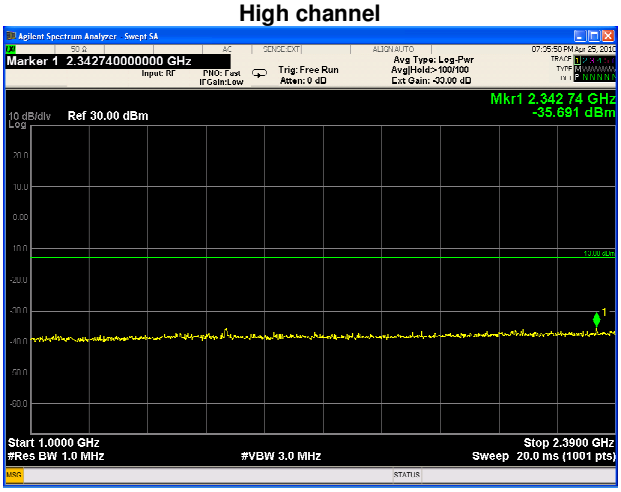
Low channel



Mid channel

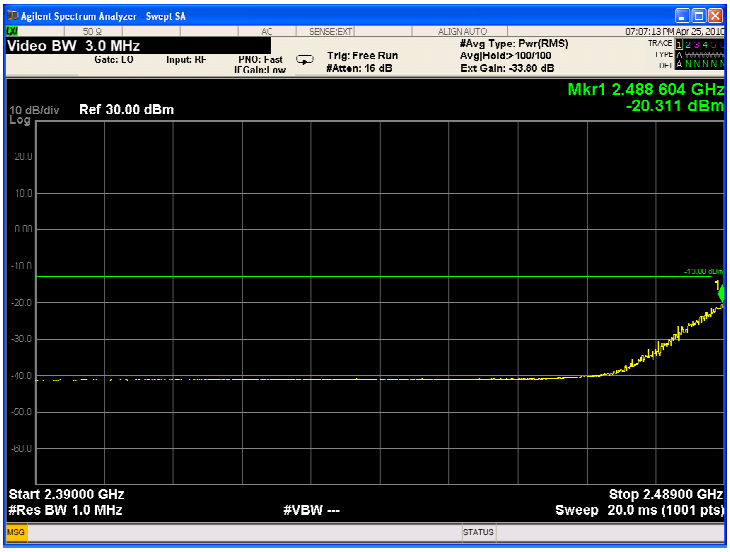


High channel

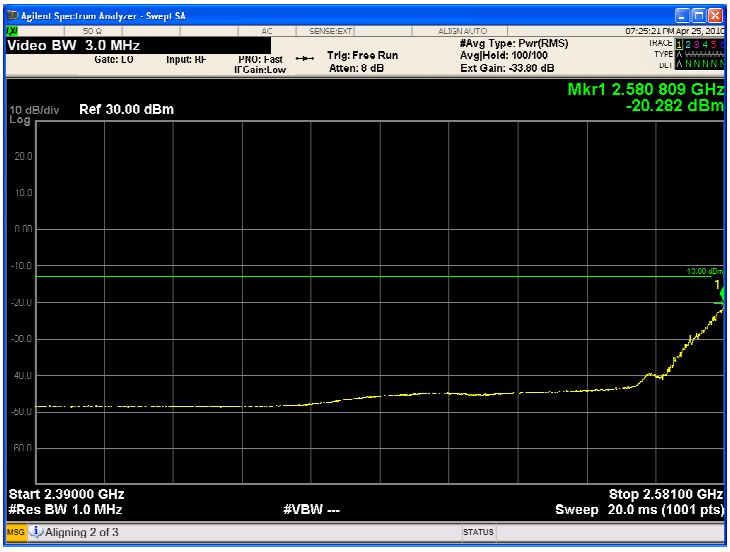


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.13 Spurious emission measurements in 2390 – 2489 MHz range at low carrier frequency, 10 MHz BW

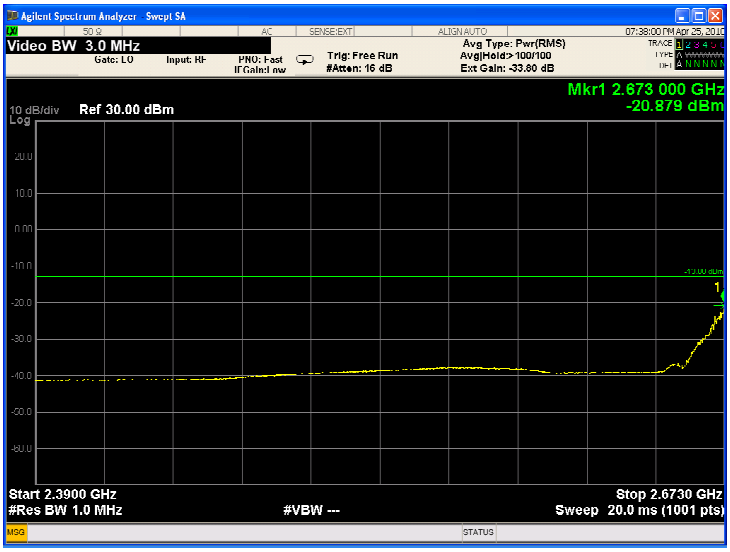


Plot 7.5.14 Spurious emission measurements in 2390 - 2581 MHz at mid carrier frequency, 10 MHz BW



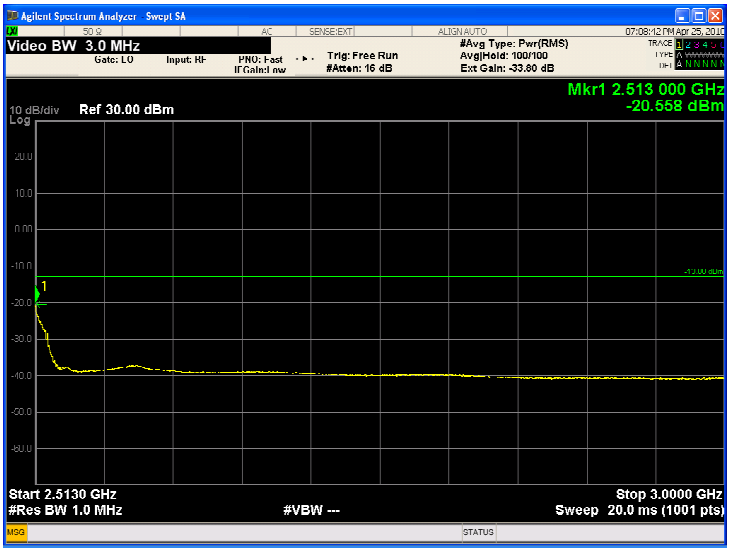
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.15 Spurious emission measurements in 2390 - 2673 MHz at high carrier frequency, 10 MHz BW

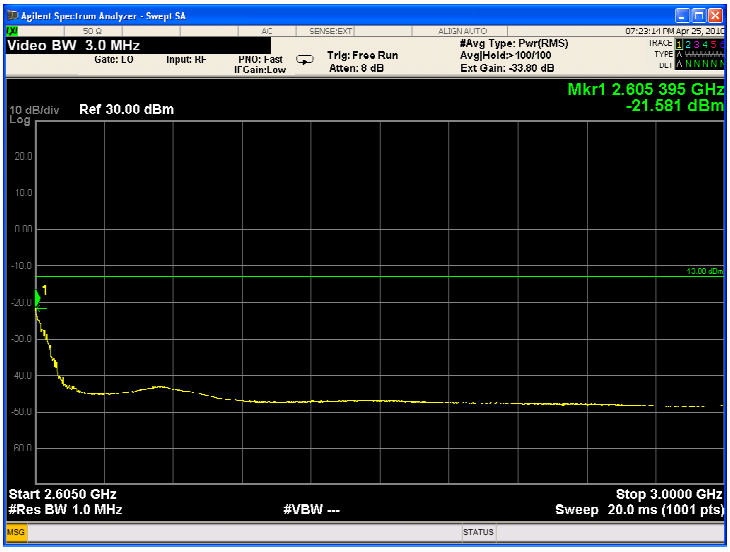


Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.16 Spurious emission measurements in 2513 - 3000 MHz range at low carrier frequency, 10 MHz BW

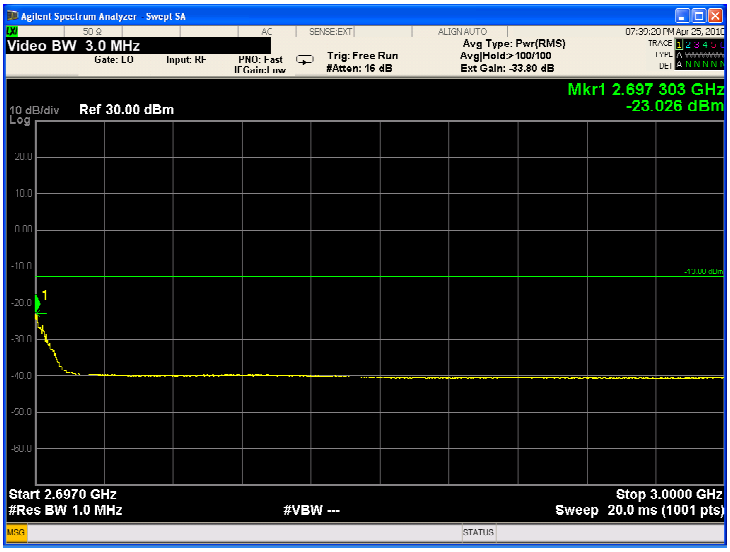


Plot 7.5.17 Spurious emission measurements in 2605 - 3000 MHz at mid carrier frequency, 10 MHz BW



Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

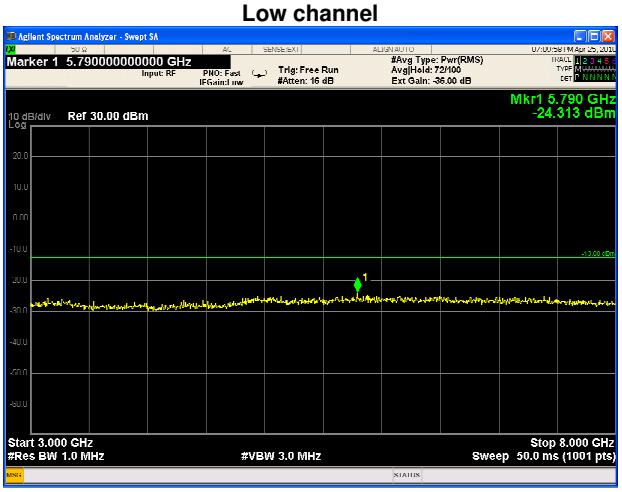
Plot 7.5.18 Spurious emission measurements in 2697 - 3000 MHz at high carrier frequency, 10 MHz BW



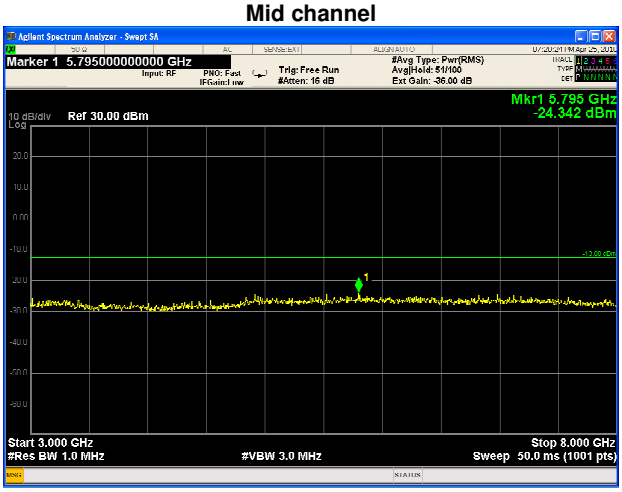
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.19 Spurious emission measurements in 3000 - 8000 MHz range at low carrier frequency, 10MHz BW

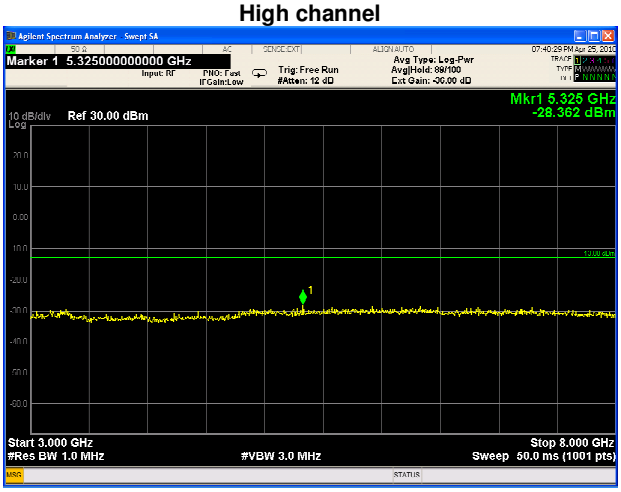
Low channel



Mid channel



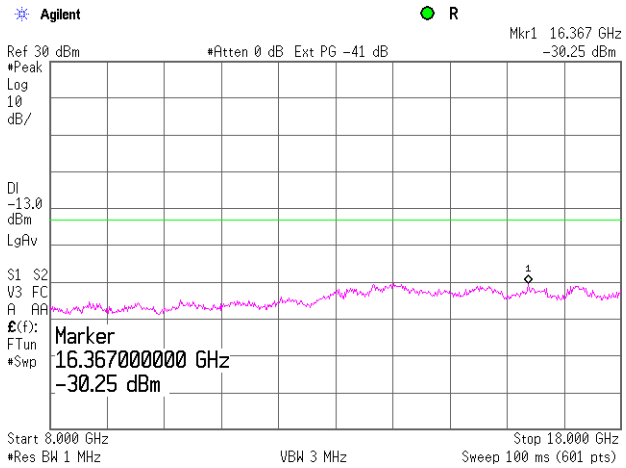
High channel



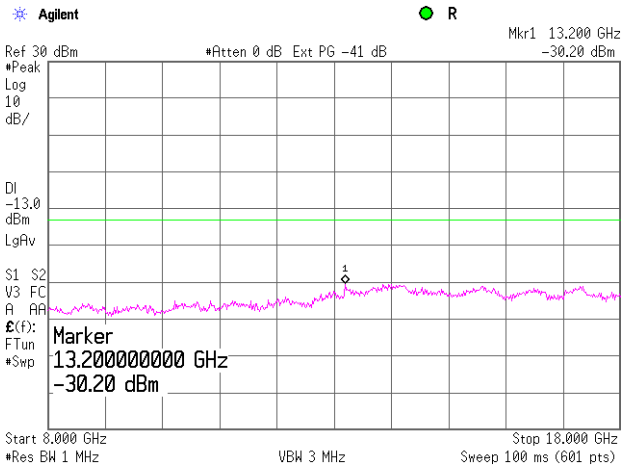
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.20 Spurious emission measurements in 8000 - 18000 MHz range, 5 MHz BW worst case

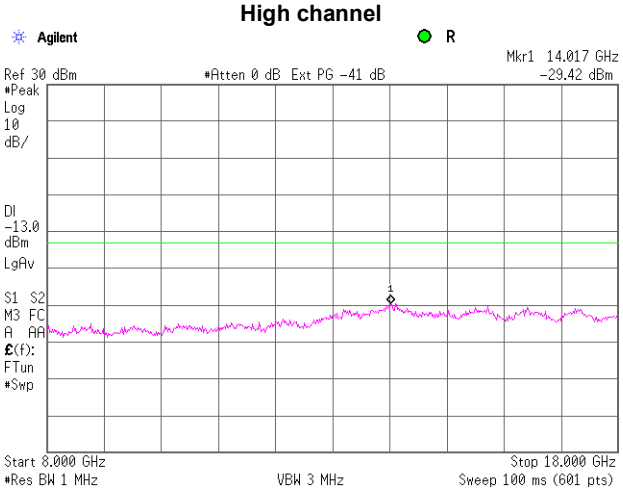
Low channel



Mid channel



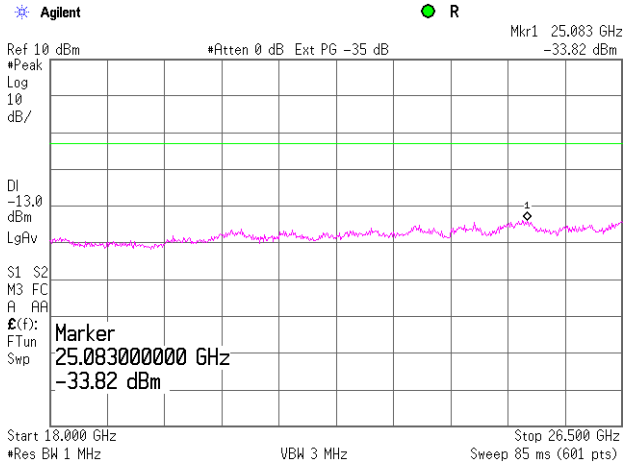
High channel



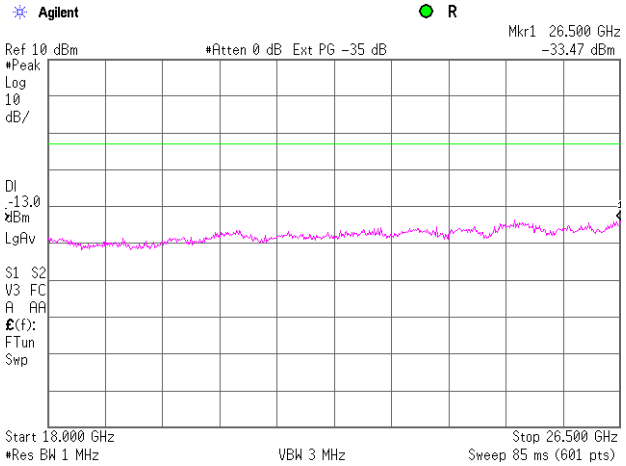
Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.21 Spurious emission measurements in 18000 - 26500 MHz, 5 MHz BW

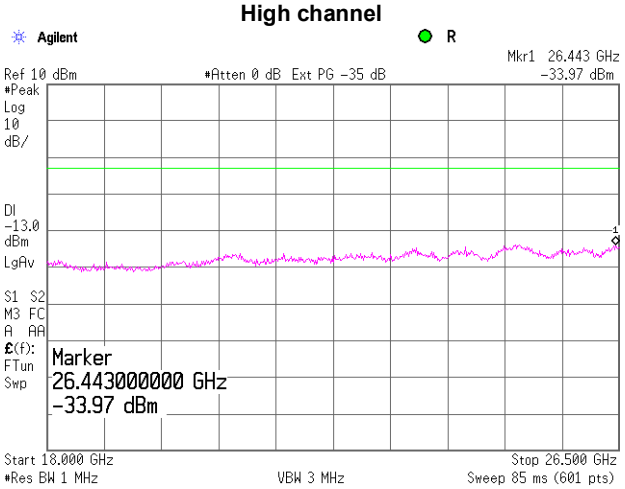
Low channel



Mid channel

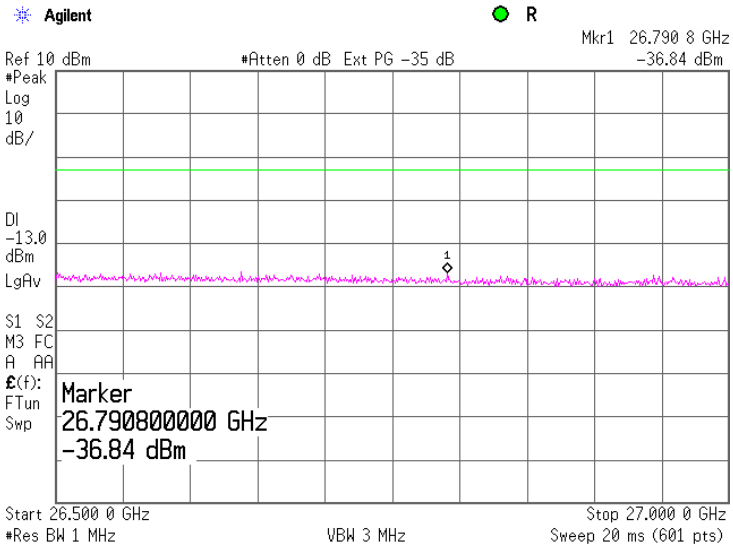


High channel



Test specification:	Section 27.53(m)(2), Conducted spurious emissions		
Test procedure:	Section 27.53(m)(2)		
Test mode:	Compliance	Verdict:	PASS
Date:	5/3/2010		
Temperature: 23.4 ºC	Air Pressure: 1013 hPa	Relative Humidity: 45 %	Power Supply: 48 VDC
Remarks:			

Plot 7.5.22 Spurious emission measurements in 26500 – 27000 MHz at high carrier frequency, 5 MHz BW



Test specification:	Section 27.54, Frequency stability		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	Verdict:	PASS
Date:	7/19/2010		
Temperature: 22.4 ºC	Air Pressure: 1007 hPa	Relative Humidity: 36 %	Power Supply: 48 VDC
Remarks:			

7.6 Frequency stability test

7.6.1 General

This test was performed to measure frequency stability of transmitter RF carrier. Specification test limits are given in Table 7.6.1.

Table 7.6.1 Frequency stability limits

Assigned frequency, MHz	Maximum allowed frequency displacement	
	ppm	Hz
2496.0 – 2690.0	NA	NA

7.6.2 Test procedure

7.6.2.1 The EUT was set up as shown in Figure 7.6.1, energized and its proper operation was checked.

7.6.2.2 The EUT power was turned off. Temperature within test chamber was set to +30˚C and a period of time sufficient to stabilize all of the oscillator circuit components was allowed.

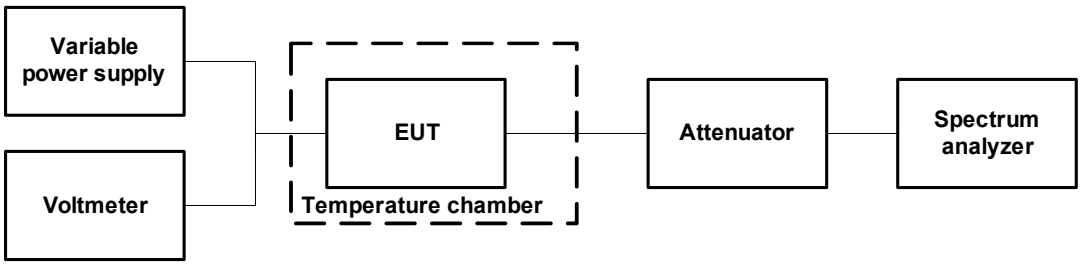
7.6.2.3 The EUT was powered on and carrier frequency was measured at start up moment and then every minute until frequency had been stabilized or 10 minutes elapsed whichever reached the last. The EUT was powered off.

7.6.2.4 The above procedure was repeated at 0˚C and at the lowest test temperature.

7.6.2.5 The EUT was powered on and carrier frequency was measured at start up moment and at the end of stabilization period at the rest of test temperatures and voltages. The EUT was powered off.

7.6.2.6 Frequency displacement was calculated and compared with the limit as provided in Table 7.6.2.

Figure 7.6.1 Frequency stability test setup



Test specification:	**Section 27.54, Frequency stability**		
Test procedure:	47 CFR, Section 2.1055; TIA/EIA-603-C Section 2.2.2		
Test mode:	Compliance	**Verdict:**	PASS
Date:	7/19/2010		
Temperature: 22.4 ºC	**Air Pressure:** 1007 hPa	**Relative Humidity:** 36 %	**Power Supply:** 48 VDC
Remarks:			

Table 7.6.2 Frequency stability test results

OPERATING FREQUENCY: 2496.0 – 2690.0MHz
NOMINAL POWER VOLTAGE: 48 VDC
TEMPERATURE STABILIZATION PERIOD: 20 min
POWER DURING TEMPERATURE TRANSITION: Off
SPECTRUM ANALYZER MODE: Counter
RESOLUTION BANDWIDTH: 30 Hz
VIDEO BANDWIDTH: 100 Hz
MODULATION: Unmodulated

T, ºC	Voltage,	Frequency, MHz							Max frequency drift, Hz		Max frequency drift,ppm	
	V	Start up	1st min	2nd min	3rd min	4th min	5th min	10th min	Positive	Negative	Positive	Negative
Low frequency												
-30	nominal	2498.499969	2498.499971	2498.499996	2498.499997	2498.499997	2498.499971	2498.499968	0.00	-30.00	0.00	-0.01
-20	nominal	2498.499981	NA	NA	NA	NA	NA	2498.499978	0.00	-20.00	0.00	-0.01
-10	nominal	2498.499999	NA	NA	NA	NA	NA	2498.499998	1.00	0.00	0.00	0.00
0	nominal	2498.499999	2498.499999	2498.499999	2498.499999	2498.499999	2498.499999	2498.499999	1.00	0.00	0.00	0.00
10	nominal	2498.499980	NA	NA	NA	NA	NA	2498.499999	1.00	-18.00	0.00	-0.01
20	15%	2498.499963	NA	NA	NA	NA	NA	2498.499965	0.00	-35.00	0.00	-0.01
20	nominal	2498.500000	NA	NA	NA	NA	NA	2498.499998	2.00	0.00	0.00	0.00
20	-15%	2498.499966	NA	NA	NA	NA	NA	2498.499964	0.00	-34.00	0.00	-0.01
30	nominal	2498.499963	2498.499965	2498.499963	2498.499959	2498.499964	2498.499960	2498.499962	0.00	-39.00	0.00	-0.02
40	nominal	2498.499962	NA	NA	NA	NA	NA	2498.499962	0.00	-36.00	0.00	-0.01
50	nominal	2498.499960	2498.499960	2498.499957	2498.499960	2498.499961	2498.499960	2498.499958	0.00	-41.00	0.00	-0.02
Mid frequency												
-30	nominal	2592.999969	2592.999970	2592.999972	2592.999971	2592.999970	2592.999969	2592.999968	0.00	-22.00	0.00	-0.01
-20	nominal	2592.999977	NA	NA	NA	NA	NA	2592.999974	0.00	-16.00	0.00	-0.01
-10	nominal	2592.999990	NA	NA	NA	NA	NA	2592.999982	0.00	-8.00	0.00	0.00
0	nominal	2592.999990	2592.999990	2592.999990	2592.999990	2592.999990	2592.999990	2592.999990	0.00	0.00	0.00	0.00
10	nominal	2592.999980	NA	NA	NA	NA	NA	2592.999990	0.00	-10.00	0.00	0.00
20	15%	2592.999958	NA	NA	NA	NA	NA	2592.999960	0.00	-32.00	0.00	-0.01
20	nominal	2592.999980	NA	NA	NA	NA	NA	2592.999990	0.00	-10.00	0.00	0.00
20	-15%	2592.999962	NA	NA	NA	NA	NA	2592.999961	0.00	-29.00	0.00	-0.01
30	nominal	2592.999963	2592.999961	2592.999959	2592.999962	2592.999960	2592.999962	2592.999961	0.00	-31.00	0.00	-0.01
40	nominal	2592.999961	NA	NA	NA	NA	NA	2592.999962	0.00	-29.00	0.00	-0.01
50	nominal	2592.999956	2592.999957	2592.999960	2592.999956	2592.999959	2592.999958	2592.999959	0.00	-34.00	0.00	-0.01
High frequency												
-30	nominal	2687.499969	2687.499971	2687.499996	2687.499997	2687.499997	2687.499971	2687.499968	0.00	-30.00	0.00	-0.01
-20	nominal	2687.499975	NA	NA	NA	NA	NA	2687.499974	0.00	-24.00	0.00	-0.01
-10	nominal	2687.499985	NA	NA	NA	NA	NA	2687.499983	0.00	-15.00	0.00	-0.01
0	nominal	2687.499990	2687.499999	2687.499999	2687.499999	2687.499998	2687.499999	2687.499999	1.00	-8.00	0.00	0.00
10	nominal	2687.499990	NA	NA	NA	NA	NA	2687.499990	0.00	-8.00	0.00	0.00
20	15%	2687.499957	NA	NA	NA	NA	NA	2687.499959	0.00	-41.00	0.00	-0.02
20	nominal	2687.499990	NA	NA	NA	NA	NA	2687.499998	0.00	-8.00	0.00	0.00
20	-15%	2687.499962	NA	NA	NA	NA	NA	2687.499961	0.00	-37.00	0.00	-0.01
30	nominal	2687.499963	2687.499961	2687.499959	2687.499962	2687.499960	2687.499962	2687.499961	0.00	-39.00	0.00	-0.01
40	nominal	2687.499961	NA	NA	NA	NA	NA	2687.499960	0.00	-38.00	0.00	-0.01
50	nominal	2687.499956	2687.499957	2687.499960	2687.499956	2687.499959	2687.499958	2687.499959	0.00	-42.00	0.00	-0.02

* - Reference frequency

Reference numbers of test equipment used

HL 1424	HL 3286						

Full description is given in Appendix A.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
0446	Antenna, Loop, Active, 10 kHz - 30 MHz	EMCO	6502	2857	29-Jun-10	29-Jun-11
0521	EMI Receiver (Spectrum Analyzer) with RF filter section 9 kHz-6.5 GHz	Hewlett Packard	8546A	3617A 00319, 3448A002 53	27-Aug-09	27-Aug-10
0554	Amplifier, 2-18 GHz RF	Miteq	AFD4	104300	28-Feb-09	28-Feb-10
0557	Generator Signal, 9 KHz - 1.2 GHz	Marconi Instruments	2023	112225/08 0	16-Feb-10	16-Feb-11
0604	Antenna BiconiLog Log-Periodic/T Bow-TIE, 26 - 2000 MHz	EMCO	3141	9611-1011	11-Jan-10	11-Jan-11
0768	Antenna Standard Gain Horn,18-26.5 GHz, WR-42, 25 dB gain	Quinstar Technology	QWH-4200-BA	110	23-Dec-08	23-Dec-11
0769	Antenna Standard Gain Horn, 26.5-40 GHz, WR28, 25 dB gain	Quinstar Technology	QWH-2800-BA	112	23-Dec-08	23-Dec-11
1424	Spectrum Analyzer, 30 Hz- 40 GHz	Agilent Technologies	8564EC	3946A002 19	28-Aug-09	28-Aug-10
1430	EMI Receiver, 9 kHz - 2.9 GHz, System: HL1431, HL1432	Agilent Technologies	8542E	3807A002 62,3705A0 0217	31-Aug-09	31-Aug-10
1984	Antenna, Double-Ridged Waveguide Horn, 1-18 GHz, 300 W	EMC Test Systems	3115	9911-5964	11-Jun-10	11-Jun-11
2254	Cable 40 GHz, 0.8 m, blue	Rhophase Microwave Limited	KPS-1503A-800-KPS	W4907	13-Jun-10	13-Jun-11
2667	Signal generator, 9 kHz - 3.3 GHz	Rohde & Schwarz	SML03	101909	30-Dec-09	30-Dec-10
2870	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	2870	17-Sep-09	17-Sep-10
2871	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-8155-00	2871	15-Sep-09	15-Sep-10
2909	Spectrum analyzer, ESA-E, 100 Hz to 26.5 GHz	Agilent Technologies	E4407B	MY414447 62	07-May-10	07-May-11
2910	Cable 18 GHz, 3 m, SMA-SMA	Gore	NA	989370	30-Dec-09	30-Dec-10
2953	Cable, RF, 18 GHz, 1.2 m, SMA-SMA	Gore	10020014	NA	05-Oct-09	05-Oct-10
3121	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3121	30-Dec-09	30-Dec-10
3122	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3122	30-Dec-09	30-Dec-10
3123	Microwave Cable Assembly, 18 GHz, 6.4 m, SMA - SMA	Huber-Suhner	198-9155-00	3123	30-Dec-09	30-Dec-10
3206	Cable 40 GHz, 0.6 m	Gore	GOR245	05118336	13-Jun-10	13-Jun-11
3286	Temperature Chamber, (-40 to +170) °C	Thermotron	EL-8-CH-1-1-CO2	21-9048	09-Sep-09	09-Sep-10
3321	Attenuator DC to 22 GHz, 30 dB, 50 W	Aeroflex / Weinschel	86-30-12	380	30-Dec-09	30-Dec-10

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal.	Due Cal.
3341	High Pass Filter, 50 Ohm, 1400 to 5000 MHz	Mini-Circuits	VHF-1300+	NA	05-Oct-09	05-Oct-10
3355	Low Pass Filter, 50 Ohm, DC to 1450 MHz	Mini-Circuits	VLF-1450+	NA	05-Oct-09	05-Oct-10
3356	Low Pass Filter, 50 Ohm, DC to 1800 MHz	Mini-Circuits	VLF-1800+	NA	05-Oct-09	05-Oct-10
3386	Microwave Cable Assembly, 26.5 GHz, 1.0 m, N type/N type	Suhner Sucoflex	104EA	3386	25-Feb-10	25-Feb-11
3455	Medium Power Fixed Coaxial Attenuator DC to 40 GHz, 20 dB, 5 W	Aeroflex / Weinschel	75A-20-12	1182	25-Mar-10	25-Mar-11
3533	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001001	06-Dec-09	06-Dec-10
3534	Amplifier, low noise, 6 to 18 GHz	Quinstar Technology	QLJ-06184040-J0	11159001002	06-Dec-09	06-Dec-10
3616	Cable RF, 6.5 m, N type-N type, DC-6.5 GHz	Suhner Switzerland	Rg 214/U	NA	27-May-10	27-May-11
3818	PSA Series Spectrum Analyzer, 3 Hz- 44 GHz	Agilent Technologies	E4446A	MY48250288	25-Sep-09	25-Sep-10
3884	Preamplifier, 0.1 to 18 GHz, Gain 25 dB, N-type(f) in, N-type(m) out.	Agilent Technologies	87405C	MY47010418	13-Jan-10	13-Jan-11

8.1 Alvarion's test equipment and ancillaries used for tests

No.	Description	Manufacturer	Model No.	Serial No.	Due Calibr
1	Signal analyzer, 20 Hz-8.4 GHz	Agilent	MXA N9020A	US46470609	31-July-10
2	Attenuator, DC-8.5GHz, 20 dB	Aeroflex/Weinschel	24-20-34 SN: BV4048	NA	NA
3	Microwave 1.5m cable	Suhner	Sucoflex 104PE	27314/4PE	NA

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
Transmitter tests	
Carrier power conducted at antenna connector	± 1.7 dB
Carrier power radiated (substitution method)	± 4.5 dB
Occupied bandwidth	±8%
Conducted emissions at RF antenna connector	9 kHz to 2.9 GHz: ± 2.6 dB 2.9 GHz to 6.46 GHz: ± 3.5 dB 6.46 GHz to 13.2 GHz: ± 4.3 dB 13.2 GHz to 22.0 GHz: ± 5.0 dB 22.0 GHz to 26.8 GHz: ± 5.5 dB 26.8 GHz to 40.0 GHz: ± 4.8 dB
Spurious emissions radiated 30 MHz – 40 GHz (substitution method)	± 4.5 dB
Frequency error	30 – 300 MHz: ± 50.5 Hz (1.68 ppm) 300 – 1000 MHz: ± 168 Hz (0.56 ppm)
Transient frequency behaviour	187 Hz ± 13.9 %
Duty cycle, timing (Tx ON / OFF) and average factor measurements	± 1.0 %

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.

Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.

In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.
Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, IC 2186A-2 for anechoic chamber, IC 2186A-3 for full-anechoic chamber for RE measurements above 1 GHz), certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01).

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11 APPENDIX D Specification references

FCC 47CFR part 27: 2009	Miscellaneous wireless communications services
FCC 47CFR part 1: 2009	Practice and procedure
FCC 47CFR part 2: 2009	Frequency allocations and radio treaty matters; general rules and regulations
ANSI C63.2: 1996	American National Standard for Instrumentation-Electromagnetic Noise and Field Strength, 10 kHz to 40 GHz-Specifications.
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
ANSI/TIA/EIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

12 APPENDIX E Test equipment correction factors

Antenna Factor
Active Loop Antenna
EMC Test Systems, model 6502, S/N 2857, HL 0446

Frequency, MHz	Magnetic Antenna Factor, dB(S/m)	Electric Antenna Factor, dB(1/m)
0.009	-32.8	18.7
0.010	-33.8	17.7
0.020	-38.3	13.2
0.050	-41.1	10.4
0.075	-41.3	10.2
0.100	-41.6	9.9
0.150	-41.7	9.8
0.250	-41.6	9.9
0.500	-41.8	9.7
0.750	-41.9	9.6
1.000	-41.4	10.1
2.000	-41.5	10.0
3.000	-41.4	10.1
4.000	-41.4	10.1
5.000	-41.5	10.0
10.000	-41.9	9.6
15.000	-41.9	9.6
20.000	-42.2	9.3
25.000	-42.8	8.7
30.000	-44.0	7.5

Antenna factor in dB(S/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μA/m).
Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Antenna factor
Standard gain horn antenna
Quinstar Technology
Model QWH, Ser.No.112, HL 0768, 0769

Frequency min, GHz	Frequency max, GHz	Antenna factor, dB(1/m)
18.000	26.500	32.01
26.500	40.000	35.48
40.000	60.000	39.03
60.000	90.000	42.55
90.000	140.000	46.23
140.000	220.000	50.11

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Antenna factor
Biconilog antenna EMCO Model 3141
Ser.No.1011, HL 0604

Frequency, MHz	Antenna Factor, dB(1/m)	Frequency, MHz	Antenna Factor, dB(1/m)
26	7.8	940	24.0
28	7.8	960	24.1
30	7.8	980	24.5
40	7.2	1000	24.9
60	7.1	1020	25.0
70	8.5	1040	25.2
80	9.4	1060	25.4
90	9.8	1080	25.6
100	9.7	1100	25.7
110	9.3	1120	26.0
120	8.8	1140	26.4
130	8.7	1160	27.0
140	9.2	1180	27.0
150	9.8	1200	26.7
160	10.2	1220	26.5
170	10.4	1240	26.5
180	10.4	1260	26.5
190	10.3	1280	26.6
200	10.6	1300	27.0
220	11.6	1320	27.8
240	12.4	1340	28.3
260	12.8	1360	28.2
280	13.7	1380	27.9
300	14.7	1400	27.9
320	15.2	1420	27.9
340	15.4	1440	27.8
360	16.1	1460	27.8
380	16.4	1480	28.0
400	16.6	1500	28.5
420	16.7	1520	28.9
440	17.0	1540	29.6
460	17.7	1560	29.8
480	18.1	1580	29.6
500	18.5	1600	29.5
520	19.1	1620	29.3
540	19.5	1640	29.2
560	19.8	1660	29.4
580	20.6	1680	29.6
600	21.3	1700	29.8
620	21.5	1720	30.3
640	21.2	1740	30.8
660	21.4	1760	31.1
680	21.9	1780	31.0
700	22.2	1800	30.9
720	22.2	1820	30.7
740	22.1	1840	30.6
760	22.3	1860	30.6
780	22.6	1880	30.6
800	22.7	1900	30.6
820	22.9	1920	30.7
840	23.1	1940	30.9
860	23.4	1960	31.2
880	23.8	1980	31.6
900	24.1	2000	32.0
920	24.1		

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Antenna factor
Double-ridged wave guide horn antenna
Model 3115, S/N 9911-5964, HL 1984

Frequency, MHz	Antenna factor, dB(1/m)
1000.0	24.7
1500.0	25.7
2000.0	27.6
2500.0	28.9
3000.0	31.2
3500.0	32.0
4000.0	32.5
4500.0	32.7
5000.0	33.6
5500.0	35.1
6000.0	35.4
6500.0	34.9
7000.0	36.1
7500.0	37.8
8000.0	38.0
8500.0	38.1
9000.0	39.1
9500.0	38.3
10000.0	38.6
10500.0	38.2
11000.0	38.7
11500.0	39.5
12000.0	40.0
12500.0	40.4
13000.0	40.5
13500.0	41.1
14000.0	41.6
14500.0	41.7
15000.0	38.7
15500.0	38.2
16000.0	38.8
16500.0	40.5
17000.0	42.5
17500.0	45.9
18000.0	49.4

Antenna factor in dB(1/m) is to be added to receiver meter reading in dB(μV) to convert it into field intensity in dB(μV/m).

Cable loss
Cable 40 GHz, 0.8 m, blue, model: KPS-1503A-800-KPS, S/N W4907, HL 2254

Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB	Frequency, GHz	Cable loss, dB
0.03	0.04	5.10	0.80	15.00	1.49
0.05	0.07	5.30	0.83	15.50	1.49
0.10	0.09	5.50	0.83	16.00	1.46
0.20	0.15	5.70	0.84	16.50	1.47
0.30	0.19	5.90	0.87	17.00	1.50
0.40	0.25	6.10	0.86	17.50	1.57
0.50	0.29	6.30	0.89	18.00	1.63
0.60	0.33	6.50	0.90	18.50	1.57
0.70	0.37	6.70	0.89	19.00	1.63
0.80	0.41	6.90	0.93	19.50	1.65
0.90	0.44	7.10	0.92	20.00	1.64
1.00	0.45	7.30	0.95	20.50	1.75
1.10	0.48	7.50	0.96	21.00	1.72
1.20	0.51	7.70	0.97	21.50	1.78
1.30	0.53	7.90	1.01	22.00	1.76
1.40	0.54	8.10	1.00	22.50	1.72
1.50	0.57	8.30	1.05	23.00	1.83
1.60	0.59	8.50	1.04	23.50	1.80
1.70	0.04	8.70	1.07	24.00	1.90
1.80	0.07	8.90	1.11	24.50	1.81
1.90	0.09	9.10	1.09	25.00	1.98
2.00	0.15	9.30	1.14	25.50	1.91
2.10	0.19	9.50	1.12	26.00	2.02
2.20	0.25	9.70	1.15	26.50	1.92
2.30	0.29	9.90	1.16	27.00	1.97
2.40	0.33	10.10	1.16	28.00	2.02
2.50	0.37	10.30	1.19	29.00	1.95
2.60	0.41	10.50	1.14	30.00	1.94
2.70	0.44	10.70	1.19	31.00	2.11
2.80	0.45	10.90	1.17	32.00	2.17
2.90	0.48	11.10	1.13	33.00	2.27
3.10	0.61	11.30	1.20	34.00	2.27
3.30	0.64	11.50	1.13	35.00	2.29
3.50	0.65	11.70	1.20	36.00	2.35
3.70	0.68	11.90	1.18	37.00	2.37
3.90	0.69	12.10	1.14	38.00	2.40
4.10	0.71	12.40	1.19	39.00	2.57
4.30	0.73	13.00	1.34	40.00	2.36
4.50	0.75	13.50	1.33		
4.70	0.77	14.00	1.48		
4.90	0.79	14.50	1.45		

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-9155-00, HL 2870

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.09	5750	2.49	12000	3.71
30	0.17	6000	2.53	12250	3.81
100	0.32	6250	2.58	12500	3.84
250	0.49	6500	2.64	12750	3.88
500	0.70	6750	2.69	13000	3.92
750	0.86	7000	2.75	13250	3.96
1000	1.00	7250	2.80	13500	3.98
1250	1.11	7500	2.87	13750	4.01
1500	1.23	7750	2.93	14000	4.03
1750	1.34	8000	2.94	14250	4.09
2000	1.41	8250	3.00	14500	4.08
2250	1.51	8500	3.04	14750	4.10
2500	1.59	8750	3.08	15000	4.15
2750	1.68	9000	3.14	15250	4.22
3000	1.76	9250	3.16	15500	4.31
3250	1.83	9500	3.22	15750	4.42
3500	1.91	9750	3.26	16000	4.48
3750	1.97	10000	3.36	16250	4.54
4000	2.05	10250	3.41	16500	4.56
4250	2.11	10500	3.46	16750	4.57
4500	2.18	10750	3.50	17000	4.59
4750	2.24	11000	3.54	17250	4.66
5000	2.30	11250	3.58	17500	4.70
5250	2.36	11500	3.63	17750	4.76
5500	2.43	11750	3.66	18000	4.72

Cable loss
Cable coaxial, Huber-Suhner, 18 GHz, 6.4 m, SMA - SMA, model 198-8155-00, HL 2871

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.12	5750	2.34	12000	3.55
30	0.14	6000	2.39	12250	3.61
100	0.27	6250	2.46	12500	3.67
250	0.45	6500	2.52	12750	3.74
500	0.63	6750	2.58	13000	3.79
750	0.76	7000	2.64	13250	3.82
1000	0.89	7250	2.68	13500	3.83
1250	1.01	7500	2.73	13750	3.83
1500	1.12	7750	2.78	14000	3.88
1750	1.23	8000	2.83	14250	3.93
2000	1.32	8250	2.88	14500	3.96
2250	1.41	8500	2.94	14750	4.01
2500	1.49	8750	2.97	15000	4.00
2750	1.58	9000	3.02	15250	4.01
3000	1.66	9250	3.07	15500	4.00
3250	1.73	9500	3.13	15750	4.13
3500	1.80	9750	3.18	16000	4.22
3750	1.87	10000	3.21	16250	4.29
4000	1.93	10250	3.26	16500	4.29
4250	2.01	10500	3.30	16750	4.32
4500	2.06	10750	3.36	17000	4.37
4750	2.12	11000	3.39	17250	4.45
5000	2.17	11250	3.44	17500	4.49
5250	2.24	11500	3.48	17750	4.53
5500	2.29	11750	3.52	18000	4.55

Cable loss
Cable coaxial, Gore, 18 GHz, 3m, SMA-SMA, S/N 989370
HL 2910

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.07	5750	2.97	12000	5.05
30	0.19	6000	2.91	12250	4.44
100	0.36	6250	3.23	12500	4.82
250	0.53	6500	3.42	12750	5.22
500	0.77	6750	3.17	13000	5.02
750	0.94	7000	3.56	13250	5.00
1000	1.10	7250	3.77	13500	5.09
1250	1.19	7500	3.48	13750	4.70
1500	1.35	7750	3.81	14000	5.03
1750	1.51	8000	3.82	14250	5.17
2000	1.57	8250	3.62	14500	4.92
2250	1.69	8500	3.95	14750	4.91
2500	1.76	8750	4.00	15000	5.03
2750	1.83	9000	3.80	15250	4.93
3000	2.02	9250	4.09	15500	5.28
3250	2.17	9500	4.12	15750	5.60
3500	2.13	9750	4.11	16000	5.16
3750	2.23	10000	4.36	16250	5.45
4000	2.40	10250	4.75	16500	5.78
4250	2.31	10500	4.61	16750	5.47
4500	2.52	10750	4.26	17000	5.21
4750	2.77	11000	4.62	17250	5.53
5000	2.82	11250	4.55	17500	5.53
5250	2.77	11500	4.59	17750	5.71
5500	3.04	11750	5.20	18000	5.77

Cable loss
Cable coaxial, Gore, 25.5 GHz, 1.2 m, SMA-SMA, S/N 10020014
HL 2953

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.06	8750	1.28	18000	1.84
30	0.06	9000	1.30	18250	1.91
100	0.12	9250	1.35	18500	1.94
250	0.19	9500	1.34	18750	1.92
500	0.27	9750	1.36	19000	1.95
750	0.34	10000	1.33	19250	2.00
1000	0.40	10250	1.38	19500	1.96
1250	0.45	10500	1.39	19750	2.02
1500	0.50	10750	1.39	20000	1.92
1750	0.54	11000	1.43	20250	2.04
2000	0.57	11250	1.42	20500	2.00
2250	0.60	11500	1.48	20750	2.09
2500	0.64	11750	1.49	21000	2.01
2750	0.67	12000	1.59	21250	2.07
3000	0.70	12250	1.50	21500	2.20
3250	0.74	12500	1.55	21750	2.10
3500	0.76	12750	1.55	22000	2.24
3750	0.80	13000	1.61	22250	2.25
4000	0.83	13250	1.62	22500	2.12
4250	0.85	13500	1.56	22750	2.05
4500	0.87	13750	1.61	23000	2.10
4750	0.91	14000	1.57	23250	2.03
5000	0.92	14250	1.66	23500	2.08
5250	0.96	14500	1.58	23750	2.14
5500	0.99	14750	1.69	24000	2.16
5750	0.99	15000	1.71	24250	2.25
6000	1.03	15250	1.74	24500	2.17
6250	1.05	15500	1.75	24750	2.32
6500	1.07	15750	1.72	25000	2.32
6750	1.08	16000	1.89	25250	2.32
7000	1.12	16250	1.79	25500	2.41
7250	1.13	16500	1.84	25750	2.31
7500	1.15	16750	1.82	26000	2.28
7750	1.20	17000	1.79	26250	2.32
8000	1.20	17250	1.78	26500	2.29
8250	1.23	17500	1.85		
8500	1.27	17750	1.83		

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3121

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.08	3600	2.10	7400	3.08	11200	3.85	15100	4.58
30	0.18	3700	2.14	7500	3.11	11300	3.85	15200	4.60
50	0.26	3800	2.18	7600	3.14	11400	3.86	15300	4.63
100	0.34	3900	2.19	7700	3.16	11500	3.86	15400	4.65
200	0.47	4000	2.25	7800	3.18	11600	3.87	15500	4.71
300	0.59	4100	2.25	7900	3.20	11700	3.85	15600	4.70
400	0.66	4200	2.28	8000	3.22	11800	3.96	15700	4.69
500	0.75	4300	2.35	8100	3.26	11900	3.92	15800	4.71
600	0.83	4400	2.35	8200	3.27	12000	3.92	15900	4.74
700	0.90	4500	2.38	8300	3.29	12100	3.94	16000	4.69
800	0.96	4600	2.43	8400	3.30	12200	3.94	16100	4.72
900	1.02	4700	2.43	8500	3.31	12300	3.99	16200	4.71
1000	1.07	4800	2.45	8600	3.33	12400	4.02	16300	4.74
1100	1.12	4900	2.48	8700	3.35	12500	4.10	16400	4.74
1200	1.15	5000	2.55	8800	3.36	12600	4.09	16500	4.75
1300	1.22	5100	2.54	8900	3.38	12700	4.15	16600	4.78
1400	1.28	5200	2.56	9000	3.40	12800	4.15	16700	4.86
1500	1.29	5300	2.58	9100	3.41	12900	4.08	16800	4.84
1600	1.36	5400	2.61	9200	3.45	13000	4.21	16900	4.83
1700	1.40	5500	2.64	9300	3.48	13100	4.19	17000	4.86
1800	1.45	5600	2.69	9400	3.52	13200	4.29	17100	4.83
1900	1.51	5700	2.67	9500	3.54	13300	4.24	17200	4.90
2000	1.50	5800	2.71	9600	3.59	13400	4.26	17300	4.91
2100	1.56	5900	2.73	9700	3.59	13500	4.26	17400	4.94
2200	1.59	6000	2.75	9800	3.62	13600	4.29	17500	4.93
2300	1.63	6100	2.81	9900	3.70	13700	4.35	17600	4.93
2400	1.73	6200	2.80	10000	3.70	13800	4.31	17700	5.00
2500	1.73	6300	2.82	10100	3.72	13900	4.29	17800	5.01
2600	1.78	6400	2.85	10200	3.73	14000	4.32	17900	5.00
2700	1.84	6500	2.87	10300	3.75	14100	4.33	18000	5.00
2800	1.84	6600	2.90	10400	3.76	14200	4.34		
2900	1.91	6700	2.91	10500	3.77	14300	4.36		
3000	1.91	6800	2.94	10600	3.79	14400	4.38		
3100	1.97	6900	2.96	10700	3.80	14600	4.42		
3200	1.98	7000	2.98	10800	3.81	14700	4.42		
3300	2.04	7100	3.01	10900	3.81	14800	4.55		
3400	2.04	7200	3.02	11000	3.83	14900	4.55		
3500	2.10	7300	3.04	11100	3.84	15000	4.55		

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3122

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	3600	2.08	7400	3.07	11200	3.92	15100	4.61
30	0.17	3700	2.12	7500	3.09	11300	3.95	15200	4.58
50	0.23	3800	2.15	7600	3.14	11400	3.93	15300	4.62
100	0.32	3900	2.18	7700	3.15	11500	3.93	15400	4.62
200	0.47	4000	2.21	7800	3.19	11600	3.94	15500	4.65
300	0.58	4100	2.24	7900	3.22	11700	3.97	15600	4.66
400	0.66	4200	2.27	8000	3.20	11800	3.98	15700	4.66
500	0.74	4300	2.31	8100	3.21	11900	4.08	15800	4.72
600	0.81	4400	2.31	8200	3.24	12000	4.03	15900	4.78
700	0.88	4500	2.36	8300	3.27	12100	4.06	16000	4.89
800	0.95	4600	2.37	8400	3.32	12200	4.05	16100	4.95
900	1.00	4700	2.40	8500	3.35	12300	4.16	16200	4.92
1000	1.06	4800	2.43	8600	3.35	12400	4.18	16300	4.95
1100	1.11	4900	2.45	8700	3.33	12500	4.20	16400	5.02
1200	1.16	5000	2.50	8800	3.37	12600	4.22	16500	5.04
1300	1.21	5100	2.51	8900	3.39	12700	4.23	16600	5.06
1400	1.26	5200	2.55	9000	3.45	12800	4.28	16700	5.17
1500	1.31	5300	2.56	9100	3.46	12900	4.26	16800	5.16
1600	1.35	5400	2.59	9200	3.47	13000	4.28	16900	5.19
1700	1.39	5500	2.62	9300	3.46	13100	4.28	17000	5.23
1800	1.44	5600	2.65	9400	3.50	13200	4.28	17100	5.30
1900	1.47	5700	2.67	9500	3.50	13300	4.29	17200	5.26
2000	1.52	5800	2.71	9600	3.53	13400	4.34	17300	5.30
2100	1.55	5900	2.72	9700	3.52	13500	4.31	17400	5.30
2200	1.60	6000	2.73	9800	3.54	13600	4.35	17500	5.36
2300	1.63	6100	2.76	9900	3.56	13700	4.36	17600	5.40
2400	1.67	6200	2.78	10000	3.57	13800	4.37	17700	5.47
2500	1.70	6300	2.81	10100	3.60	13900	4.41	17800	5.56
2600	1.74	6400	2.85	10200	3.69	14000	4.42	17900	5.45
2700	1.78	6500	2.87	10300	3.69	14100	4.45	18000	5.47
2800	1.83	6600	2.87	10400	3.67	14200	4.49		
2900	1.85	6700	2.90	10500	3.70	14300	4.55		
3000	1.89	6800	2.91	10600	3.70	14400	4.62		
3100	1.92	6900	2.96	10700	3.76	14600	4.54		
3200	1.96	7000	2.99	10800	3.88	14700	4.58		
3300	1.99	7100	3.01	10900	3.88	14800	4.57		
3400	2.03	7200	3.04	11000	3.85	14900	4.65		
3500	2.06	7300	3.08	11100	3.85	15000	4.64		

Cable loss
Microwave Cable Assembly, 18 GHz, 6.4 m, SMA – SMA, Huber-Suhner, model 198-9155-00
HL 3123

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.11	3600	1.97	7400	3.12	11200	3.90	15100	4.74
30	0.17	3700	1.97	7500	3.13	11300	3.93	15200	4.70
50	0.25	3800	2.03	7600	3.16	11400	3.88	15300	4.73
100	0.32	3900	2.04	7700	3.18	11500	3.87	15400	4.78
200	0.46	4000	2.10	7800	3.20	11600	3.90	15500	4.75
300	0.58	4100	1.97	7900	3.23	11700	3.86	15600	4.76
400	0.65	4200	1.97	8000	3.25	11800	3.88	15700	4.75
500	0.74	4300	2.03	8100	3.26	11900	3.86	15800	4.78
600	0.82	4400	2.04	8200	3.28	12000	3.89	15900	4.79
700	0.89	4500	2.10	8300	3.31	12100	3.94	16000	4.73
800	0.95	4600	1.97	8400	3.31	12200	3.92	16100	4.78
900	1.01	4700	1.97	8500	3.32	12300	3.96	16200	4.84
1000	1.07	4800	2.03	8600	3.34	12400	4.01	16300	4.90
1100	1.11	4900	2.04	8700	3.35	12500	4.07	16400	4.87
1200	1.17	5000	2.10	8800	3.37	12600	4.08	16500	4.90
1300	1.22	5100	2.53	8900	3.39	12700	4.17	16600	4.98
1400	1.27	5200	2.55	9000	3.42	12800	4.26	16700	5.05
1500	1.29	5300	2.60	9100	3.43	12900	4.16	16800	5.04
1600	1.35	5400	2.61	9200	3.51	13000	4.21	16900	5.02
1700	1.40	5500	2.64	9300	3.52	13100	4.24	17000	5.09
1800	1.44	5600	2.70	9400	3.54	13200	4.27	17100	5.07
1900	1.51	5700	2.67	9500	3.63	13300	4.31	17200	5.10
2000	1.49	5800	2.71	9600	3.61	13400	4.33	17300	5.13
2100	1.55	5900	2.74	9700	3.71	13500	4.25	17400	5.23
2200	1.58	6000	2.80	9800	3.66	13600	4.27	17500	5.21
2300	1.62	6100	2.79	9900	3.77	13700	4.33	17600	5.22
2400	1.72	6200	2.81	10000	3.75	13800	4.33	17700	5.36
2500	1.76	6300	2.83	10100	3.77	13900	4.31	17800	5.35
2600	1.78	6400	2.86	10200	3.80	14000	4.30	17900	5.45
2700	1.80	6500	2.88	10300	3.79	14100	4.30	18000	5.43
2800	1.86	6600	2.90	10400	3.87	14200	4.31		
2900	1.90	6700	2.92	10500	3.83	14300	4.37		
3000	1.90	6800	2.98	10600	3.88	14400	4.35		
3100	1.97	6900	2.98	10700	3.86	14600	4.53		
3200	1.97	7000	3.00	10800	3.87	14700	4.50		
3300	2.03	7100	3.02	10900	3.90	14800	4.62		
3400	2.04	7200	3.04	11000	3.84	14900	4.65		
3500	2.10	7300	3.06	11100	3.88	15000	4.79		

Cable loss
Cable coaxial, Microwave Cable Assembly, 104EA, 18 GHz, 1.0 m
Suhner Sucoflex, HL 3386

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.05	5750	1.01	12000	1.29
30	0.07	6000	1.02	12250	1.33
100	0.12	6250	1.02	12500	1.36
250	0.18	6500	0.95	12750	1.35
500	0.26	6750	0.96	13000	1.36
750	0.32	7000	1.01	13250	1.39
1000	0.35	7250	1.04	13500	1.37
1250	0.41	7500	1.09	13750	1.43
1500	0.45	7750	1.12	14000	1.46
1750	0.50	8000	1.13	14250	1.39
2000	0.54	8250	1.15	14500	1.36
2250	0.57	8500	1.15	14750	1.47
2500	0.61	8750	1.15	15000	1.47
2750	0.64	9000	1.16	15250	1.41
3000	0.67	9250	1.14	15500	1.52
3250	0.70	9500	1.14	15750	1.54
3500	0.71	9750	1.19	16000	1.49
3750	0.74	10000	1.20	16250	1.48
4000	0.77	10250	1.22	16500	1.52
4250	0.80	10500	1.23	16750	1.56
4500	0.84	10750	1.22	17000	1.57
4750	0.85	11000	1.21	17250	1.53
5000	0.84	11250	1.24	17500	1.55
5250	0.85	11500	1.26	17750	1.55
5500	0.92	11750	1.28	18000	1.54

Cable loss
Cable coaxial, RG-214/U, N type-N type, 6.5 m
Suhner Switzerland, HL 3616

Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB	Frequency, MHz	Cable loss, dB
10	0.13	1750	2.66	3550	4.44	5350	6.08
30	0.25	1800	2.72	3600	4.46	5400	6.12
50	0.32	1850	2.78	3650	4.59	5450	6.17
100	0.48	1900	2.81	3700	4.60	5500	6.25
150	0.60	1950	2.86	3750	4.72	5550	6.31
200	0.71	2000	2.94	3800	4.72	5600	6.35
250	0.81	2050	2.97	3850	4.86	5650	6.41
300	0.91	2100	3.01	3900	4.85	5700	6.50
350	1.00	2150	3.06	3950	4.99	5750	6.52
400	1.07	2200	3.11	4000	4.90	5800	6.57
450	1.14	2250	3.16	4050	5.04	5850	6.61
500	1.23	2300	3.21	4100	5.01	5900	6.71
550	1.30	2350	3.26	4150	5.10	5950	6.70
600	1.37	2400	3.31	4200	5.08	6000	6.75
650	1.44	2450	3.35	4250	5.18	6050	6.74
700	1.50	2500	3.39	4300	5.14	6100	6.84
750	1.58	2550	3.46	4350	5.22	6150	6.87
800	1.64	2600	3.48	4400	5.21	6200	6.93
850	1.69	2650	3.55	4450	5.29	6250	6.96
900	1.77	2700	3.59	4500	5.31	6300	7.02
950	1.79	2750	3.66	4550	5.39	6350	7.04
1000	1.87	2800	3.68	4600	5.41	6400	7.10
1050	1.92	2850	3.75	4650	5.49	6450	7.11
1100	1.98	2900	3.79	4700	5.52	6500	7.19
1150	2.05	2950	3.86	4750	5.60		
1200	2.09	3000	3.89	4800	5.64		
1250	2.15	3050	3.94	4850	5.73		
1300	2.21	3100	3.98	4900	5.70		
1350	2.27	3150	4.03	4950	5.73		
1400	2.33	3200	4.06	5000	5.75		
1450	2.38	3250	4.12	5050	5.83		
1500	2.44	3300	4.14	5100	5.82		
1550	2.48	3350	4.22	5150	5.91		
1600	2.52	3400	4.24	5200	5.92		
1650	2.56	3450	4.31	5250	5.98		
1700	2.62	3500	4.35	5300	6.01		

13 APPENDIX F Abbreviations and acronyms

A	ampere
AC	alternating current
A/m	ampere per meter
AM	amplitude modulation
AVRG	average (detector)
CBW	channel bandwidth
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
DC	direct current
EBW	emission bandwidth
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
NB	narrow band
OATS	open area test site
Ω	Ohm
QP	quasi-peak
PM	pulse modulation
PS	power supply
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt
VA	volt-ampere

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