

9. RADIATED SPURIOUS EMISSION

9.1 Applicable Standard

Requirements: CFR 47, §2.1053 (a) Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of §2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required, with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

9.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Schwarzbeck	BBHA 9120D /Double Ridged Horn Antenna	296	09/23/2010
Schwarzbeck	BBHA 9120D /Double Ridged Horn Antenna	147	04/13/2011
Schwarzbeck	VULB 9168/ TRILOG Antenna	9168-200	01/06/2011
HD	MA240/ Antenna Position Tower	556	N/A
EMCO	1050/ Turn Table	114	N/A
HD GmbH	HD 100/ Controller	13	N/A
HD GmbH	KMS 560/ SlideBar	12	N/A
MITEQ	AFS44-00102650-42-10P44-PS	1532439	04/05/2011
EMCO	6502/Loop Antenna	9009-2536	01/13/2012
R&S	ESI40 / EMI TEST Receiver	831564/003	10/30/2010

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9.3 Test Procedure

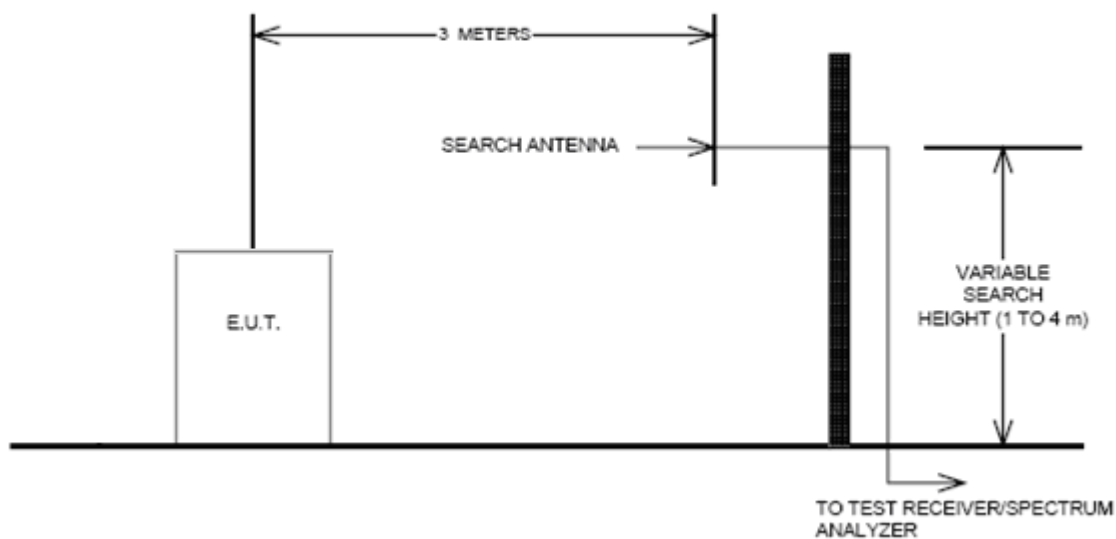
Radiated emission measurements were performed at an open Site.

The EUT was set at a distance of 3m from the receiving antenna. The EUT's RF ports were terminated to 50ohm load. The EUT was set to transmit at the low, mid and high channels of the transmitter frequency range at its maximum power level. The EUT was rotated about 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission.

A calibrated antenna source was positioned in place of the EUT and the previously recorded signal was duplicated.

The maximum EIRP of the emission was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. Harmonic emissions up to the 10th or 40GHz, whichever was the lesser, were investigated.

9.3.1 Radiated Spurious Emissions Test Setup



9.3.2 Environmental Conditions:

Temperature:	26 °C
Relative Humidity:	60 %

9.4 Test Result

: PASS (There were no emissions detected above the noise floor which was at least 20 dB below the limit.)

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10. FREQUENCY STABILITY

10.1 Applicable Standard

Requirements: FCC § 2.1055 (a), Part 27.54 following: The frequency stability shall be sufficient to ensure that the fundamental emissions stay

10.2 Test Equipment List and Details

Manufacturer	Model / Equipment	Serial No.	Calibration Due
Agilent	6674A / DC Power Supply	3501A00901	05/14/2011
WEINSCHEL	67-30-33 / Attenuator	BR0530	01/14/2011
Agilent	N9020A / MXA Signal Analyzer	US46220219	03/03/2011

10.3 Test Procedure

Frequency Stability over Temperature variation:

The equipment under test was connected to an external AC-DC power supply and the RF output was connected to a Spectrum Analyzer via feed-through attenuators. The EUT was placed inside the temperature chamber. RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 30 minutes, the frequency output was recorded from the VSA8960 S/W via MXA Signal Analyzer.

Frequency stability over Voltage variation:

An external variable AC-DC power supply Source. The voltage was set to 85% and 115% of the nominal value. The output frequency was recorded for each voltage.

10.3.1. Environmental conditions

Temperature:	24 ° C
Relative Humidity:	58 %

10.4. Test Result

: Pass

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10.4.1. Frequency Stability over Temperature and Voltage variation

Modulation: QPSK**Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz**

Temperature (Celsius)	Measured Freq (MHz)	Drift (ppm)
50	2,607,999,935	0.02056
40	2,607,999,936	0.02017
30	2,607,999,937	0.01979
20	Reference	
10	2,607,999,936	0.02017
0	2,607,999,938	0.0194
-10	2,607,999,937	0.01979
-20	2,607,999,938	0.0194
-30	2,607,999,935	0.02056

Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz

Voltage(dc) +/-15% Ref	Measured Freq (MHz)	Drift (ppm)
40.8	2,607,999,937	0.01979
55.2	2,607,999,936	0.02017

(Output Port0 Middle CH)**Modulation: 16QAM****Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz**

Temperature (Celsius)	Measured Freq (MHz)	Drift (ppm)
50	2,607,999,937	0.01979
40	2,607,999,936	0.02017
30	2,607,999,935	0.02056
20	Reference	
10	2,607,999,937	0.01979
0	2,607,999,938	0.0194
-10	2,607,999,935	0.02056
-20	2,607,999,938	0.0194
-30	2,607,999,936	0.02017

Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz

Voltage(dc) +/-15% Ref	Measured Freq (MHz)	Drift (ppm)
40.8	2,607,999,938	0.0194
55.2	2,607,999,937	0.01979

(Output Port1 Middle CH)

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Modulation: 64QAM
Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz

Temperature (Celsius)	Measured Freq (MHz)	Drift (ppm)
50	2,607,999,935	0.02056
40	2,607,999,936	0.02017
30	2,607,999,938	0.0194
20	Reference	
10	2,607,999,936	0.02017
0	2,607,999,938	0.0194
-10	2,607,999,935	0.02056
-20	2,607,999,938	0.0194
-30	2,607,999,936	0.02017

Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz

Voltage(dc) +/-15% Ref	Measured Freq (MHz)	Drift (ppm)
40.8	2,607,999,936	0.02017
55.2	2,607,999,938	0.0194

(Output Port2 Middle CH)
Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz

Temperature (Celsius)	Measured Freq (MHz)	Drift (ppm)
50	2,607,999,936	0.02017
40	2,607,999,938	0.0194
30	2,607,999,937	0.01979
20	Reference	
10	2,607,999,936	0.02017
0	2,607,999,938	0.0194
-10	2,607,999,935	0.02056
-20	2,607,999,938	0.0194
-30	2,607,999,936	0.02017

Reference: - 48 Vdc at 20°C Freq. = 2608,000,000 MHz

Voltage(dc) +/-15% Ref	Measured Freq (MHz)	Drift (ppm)
40.8	2,607,999,938	0.0194
55.2	2,607,999,936	0.02017

(Output Port3 Middle CH)

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11. RF EXPOSURE STATEMENT

1. LIMITS

According to §1.1310 and §2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f ²)	30
30 - 300.....	27.5	0.073	0.2	30
300 - 1500.....			f/1500	30
1500 - 100.000.....			1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. MAXIMUM PERMISSIBLE EXPOSURE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

S = Power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

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Max Peak output Power at antenna input terminal	25.89	dBm
Max Peak output Power at antenna input terminal	388.15037	mW
Prediction distance	25.00000	cm
Prediction frequency	2602.00	MHz
Antenna Gain(typical)	12.02000	dBi
Antenna Gain(numeric)	15.92209	–
Power density at prediction frequency (S)	0.78688	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.00000	mW/cm ²

3. RESULTS

The power density level at 25 cm is 0.78688 mW/cm², which is below the uncontrolled exposure limit of 1.0 mW/cm² at 2602 MHz.

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