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Testing of

Electromagnetic Emissions

per

USA: CFR Title 47, Part 15.247

are herein reported for

EQT Corporation
MDS-AMP

Test Report No.: 20111114-01r2

Applicant/Provider:
EQT Corporation
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Measured by:	Dr. Joseph Brunett, EMC-002790-NE	Report Approved by:	Dr. Joseph Brunett, EMC-002790-NE
Report by:	Dr. Joseph Brunett, EMC-002790-NE	Report Date of Issue:	January 19, 2012

Results of equipment under test (EUT) testing completed before January 19, 2012 are as follows.

Emissions The transmitter fundamental emission meets the regulatory limit(s) by no less than 0.1 dB. Transmit chain spurious harmonic emissions comply by no less than 1.3 dB. Radiated spurious emissions associated with the receive chain of this device meet the regulatory limit(s) by no less than 5.3 dB. Unintentional spurious emissions from digital circuitry comply with the radiated emission limit(s) by more than 1.3 dB. AC Power Line conducted emissions comply by more than 2.7 dB.

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1 Test Specifications, General Procedures, and Location

1.1 Test Specification and General Procedures

The ultimate goal of EQT Corporation is to demonstrate that the EUT complies with the Rules and/or Directives below. Detailed in this report are the results of testing the EQT Corporation MDS-AMP for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.247

In association with the rules and directives outlined above, the following specifications and procedures are followed herein.

ANSI C63.4-2003	"Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz"
FCC DA 00-705	"Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems"

1.2 Test Location and Equipment Used

Test Location The EUT was fully tested at **Willow Run Test Labs, LLC**, 8501 Beck Road, Building 2227, Belleville, Michigan 48111 USA. The **Open Area Test Site (OATS)** description and attenuation characteristics are on file with the FCC Laboratory, Columbia, Maryland (FCC Reg. No: 688478) and with Industry Canada, Ottawa, ON (File Ref. No: IC 8719A-1).

Test Equipment Pertinent test equipment used for measurements at this facility is listed in Table 1. The quality system employed at Willow Run Test Labs, LLC has been established to ensure all equipment has a clearly identifiable classification, calibration expiry date, and that all calibrations are traceable to the SI through NIST, other recognized national laboratories, accepted fundamental or natural physical constants, ratio type of calibration, or by comparison to consensus standards.

Table 1: Willow Run Test Labs, LLC Equipment List.

Description	Manufacturer/Model	SN	Quality Number	Last Cal By / Date Due
Antennas				
Shielded Loop (9 kHz - 50 MHz)	EMCO/6502	2855	UMLOOP1	UMRL / July-2012
Dipole Set (20 MHz - 1000 MHz)	EMCO/3121C	9504-1121	DIPEMC001	Liberty Labs / Sept-2012
Bicone (20 MHz - 250 MHz)	JEF	1	BICJEF001	UMRL / July-2012
Bicone (200 MHz - 1000 MHz)	JEF	1	SBICJEF001	UMRL / July-2012
Log-Periodic Array (200 MHz - 1000 MHz)	JEF/Isbell	1	LOGJEF001	UMRL / July-2012
Ridge-Horn Antenna	Univ. of Michigan	5	UMHORN005	UMRL / July-2012
L-Band	JEF		HRNL001	JEF / July-2012*
LS-Band Horns	JEF/NRL	001, 002	HRN15001, HRN15002	JEF / July-2012*
S-Band Horns	Scientific-Atlanta	1854	HRNSB001	JEF / July-2012*
C-Band	JEF/NRL	1	HRNC001	JEF / July-2012*
XN-Band Horns	JEF/NRL	001, 002	HRNXN001, HRNXN002	JEF / July-2012*
X-Band Horns	JEF/NRL	001, 002	HRNXB001, HRNXB002	JEF / July-2012*
Ku-Band Horns	JEF/NRL	001, 002	HRNKU001, HRNKU002	JEF / July-2012*
Ka-Band Horns	JEF/NRL	001, 002	HRNKA001, HRNKA002	JEF / July-2012*
Receiver's / Spectrum Analyzers				
Spectrum Analyzer	HP/8593E	3649A02722	HP8593E001	DTI / Sept-2012
Signal Generators				
Tracking Generator	HP/8593E	3649A02722	HP8593E001	DTI / Sept-2012
Line Impedance Stabilization Networks				
LISN	EMCO	9304-2081	LISNEM001	JEF / Jan-2012

* Verification Only - Standard Gain Horn Antennas

2 Configuration and Identification of the Equipment Under Test

2.1 Description and Declarations

The EUT is a amplified 900 MHz transceiver system employing a range of configurations, as described in this report. The equipment under test (EUT) is approximately 11 x 10 x 3 cm (radio only) in dimension, and is depicted in Figure 1. It is powered by a 6-30 VDC commercial system power bus (in typical use). This device is professionally installed for use in systems owned by electric power utilities, oil and gas exploration and transmission companies, railroad companies, federal, and or state agencies. Table 2 outlines provider declared EUT specifications.

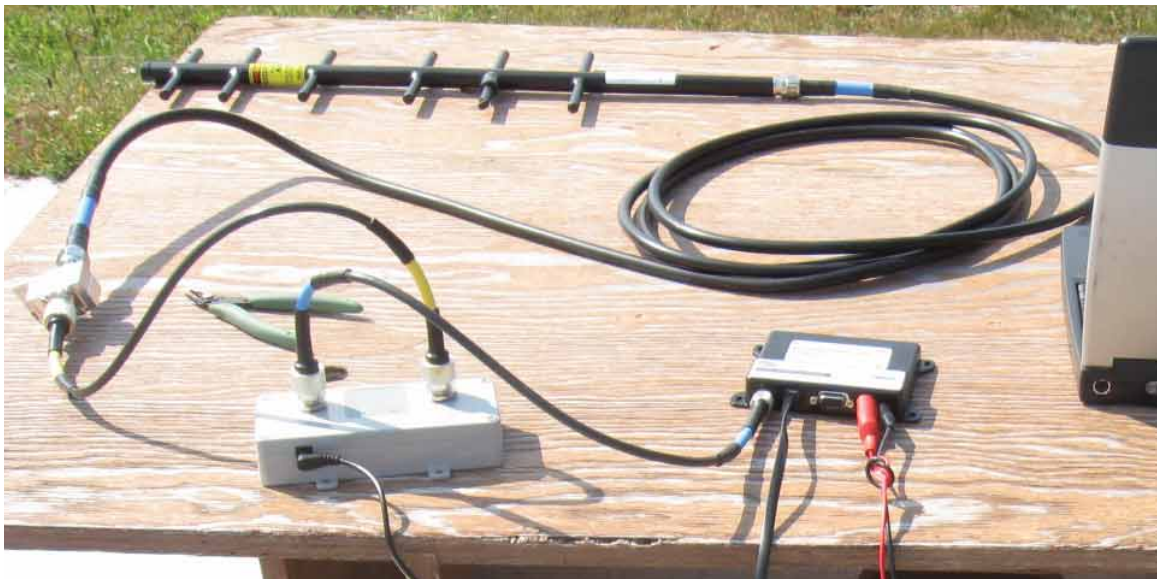

Figure 1: Photographs of the EUT.

Table 2: EUT Declarations.

General Declarations			
Equipment Type:	900 MHz Transceiver System	**Country of Origin:**	US
Nominal Supply:	6-30 VDC	**Oper. Temp Range:**	0^o C to $+35^o$ C
Frequency Range:	902.2-927.8 MHz	**Antenna Dimension:**	0.6 m (Yagi-Uda) 2.4 m (Monopole)
Antenna Type:	Monopole/Yagi-Uda	**Antenna Gain:**	Yagi-Uda: 12 dBi (declared), Monopole: 9 dBi (declared)
Number of Channels:	128	**Channel Spacing:**	0.2 MHz
Alignment Range:	N/A	**Type of Modulation:**	CPFSK
United States			
FCC ID Number:	Z3N-MDS-AMP	**Classification:**	DSS

2.1.1 EUT Configuration

The EUT is configured for testing as depicted in Figure 2.

2.1.2 Modes of Operation

Once programmed and installed by a professional installer, the EUT in all configurations is capable of only a single mode of operation, as a CPFSK frequency hopping communications transceiver.

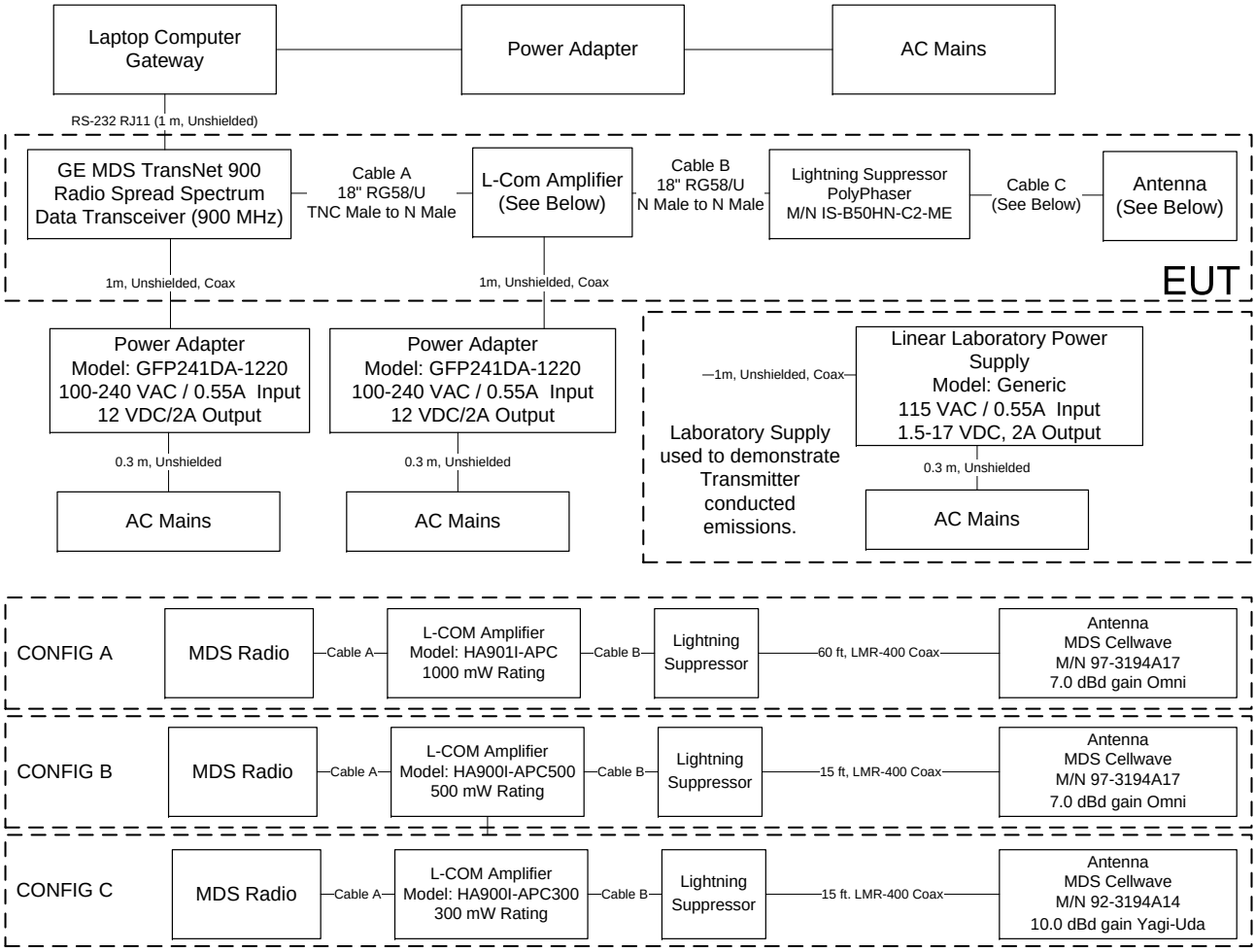

Figure 2: EUT Test Configuration Diagram.

2.1.3 Variants

In total, three unique configurations were assembled for testing to demonstrate compliance for a wide range of professionally installed configurations, as listed in the product user's manual and this report. The three configurations tests are depicted in the system block diagram.

2.1.4 Test Samples

The testing laboratory was supplied with one GE MDS TransNet 900 FCC certified radio (FCC ID: E5MDS-EL805), three L-COM amplifiers (models HA901I-APC, HA900I-APC500, and HA900I-APC300), 60 feet of LMR-400 coaxial cable, 15 feet of LMR-400, a lightning suppressor, one MDS Cellwave 10 dBd Yagi-Uda antenna, and one MDS Cellwave 7 dBd OMNI antenna.

2.1.5 Functional Exerciser

Not Applicable.

2.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory, other than assembly of the test configurations.

2.1.7 Production Intent

The EUT appears to be assembled from production ready samples.

2.1.8 Declared Exemptions and Additional Product Notes

The three configurations tested in this report are intended to demonstrate compliance for this system not only with the two antennas tested, but with antennas of the same type but lower gain in the same general configurations. Alternative antennas intended to be included in this system are listed in the professional user's manual. Also, as this product is sold for private use in commercial, professionally installed, configurations, it is considered a Class A digital device.

In order to demonstrate compliance with FCC 15.107 AC mains emissions limits for a transmitter product (Class B level), the AC power supplies provided by the manufacturer were exchanged for a laboratory linear power supply (see block diagram). The resulting test data for AC main conducted emissions demonstrates that the transmitter product meets the Class B conducted emissions levels, despite the fact that the manufacturer intends this product to be installed only for Class A commercial use in non-residential settings.

3 Emissions

3.1 General Test Procedures

3.1.1 Radiated Test Setup and Procedures

Radiated electromagnetic emissions from the EUT are first evaluated in our shielded fully anechoic chamber. Spectrum and modulation characteristics of all emissions are recorded, and emissions above 1 GHz are fully characterized. The anechoic chamber contains a set-up similar to that of our outdoor 3-meter site, with a turntable and antenna mast. Instrumentation, including spectrum analyzers and other test equipment as detailed in Section 1.2 are employed. After indoor pre-scans, emission measurements up to 1 GHz are made on our outdoor 3-meter Open Area Test Site (OATS). If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.4 / CISPR 22 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 3.

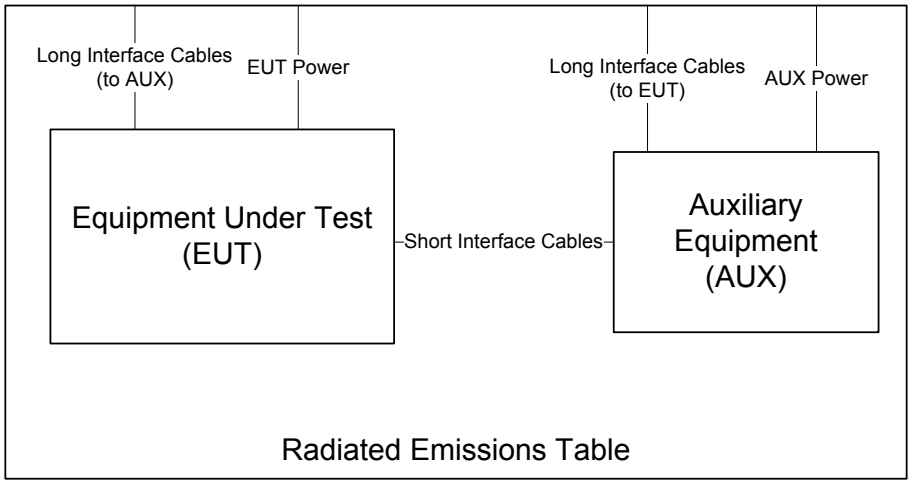

Figure 3: Radiated Emissions Diagram of the EUT.

All intentionally radiating elements are placed on the test table lying flat, on their side, and on their end (3-axes) and the resulting worst case emissions are recorded. For both horizontal and vertical polarizations, the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected. The EUT is then rotated through 360^o in azimuth until the highest emission is detected. The test antenna is then raised and lowered one last time from 1 to 4 m and the worst case value is recorded. Photographs of the test setup employed are depicted in Figure 4.

If the EUT exhibits spurious emissions due to internal receiver circuitry, such emissions are measured with an appropriate carrier signal applied. For devices with intentional emissions below 30 MHz, a shielded loop antenna is used as the test antenna. It is placed at a 1 meter receive height and appropriate low frequency magnetic field extrapolation to the regulatory limit distance is employed. Emissions between 30 MHz and 1 GHz are measured using tuned dipoles and/or calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Care is taken to ensure that test receiver resolution and video bandwidths meet the regulatory requirements, and that the emission bandwidth of the EUT is not reduced.

Figure 4: Radiated Emissions Test Setup Photograph(s).

3.1.2 Conducted Test Setup and Procedures

Transmit Antenna Port Conducted Emissions At least one sample EUT supplied for testing employed a removable antenna with 50Ω port. Thus, conducted RF emissions measurements (when applicable) are made by connecting the EUT antenna port directly to the test receiver port.

AC Port Conducted Spurious For this device, AC power line conducted emissions are measured in our screen room. If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.4 / CISPR 22 are employed. Alternatively, an on-table layout more representative of actual use may be employed if the resulting emissions appear to be worst-case in such a configuration. See Figure 5. Conducted

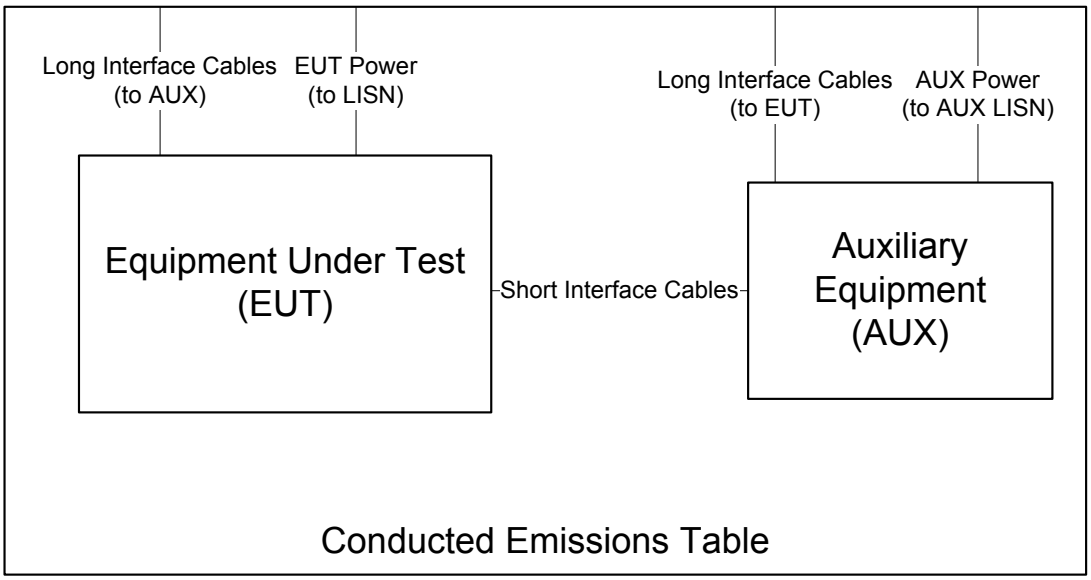

Figure 5: Conducted Emissions Setup Diagram of the EUT.

emissions are measured and recorded for each AC mains power source over the spectrum 0.15 MHz to 30 MHz for both the ungrounded (HI/PHASE) and grounded (LO/GRND) conductors with the EUT placed in its highest current draw operating mode(s). The test receiver is set to peak-hold mode in order to record the peak emissions throughout the course of functional operation. Only if an emission exceeds or is near the limit are quasi-peak and average detection applied. Photographs of the test setup employed are depicted in Figure 6.

3.1.3 Power Supply Variation

Tests at extreme supply voltages are made if required by the the procedures specified in the test standard, and results of this testing are detailed in this report.

In the case of this EUT, measurements of the worst-case radiated emissions are performed with the supply voltage varied by no less than 85% and 115% of the nominal rated value for devices connecting to AC power mains.

3.1.4 Thermal Variation

Tests at extreme temperatures are made if required by the procedures specified in the test standard, and results of this testing are detailed in this report. The provider has declared that the EUT is designed for operation over the temperature range 0^o C to $+35^o$ C. Before any temperature measurements are made, the equipment is allowed to reach a thermal balance in the test chamber, temperature and humidity are recorded, and thermal balance is verified via a thermocouple based probe.

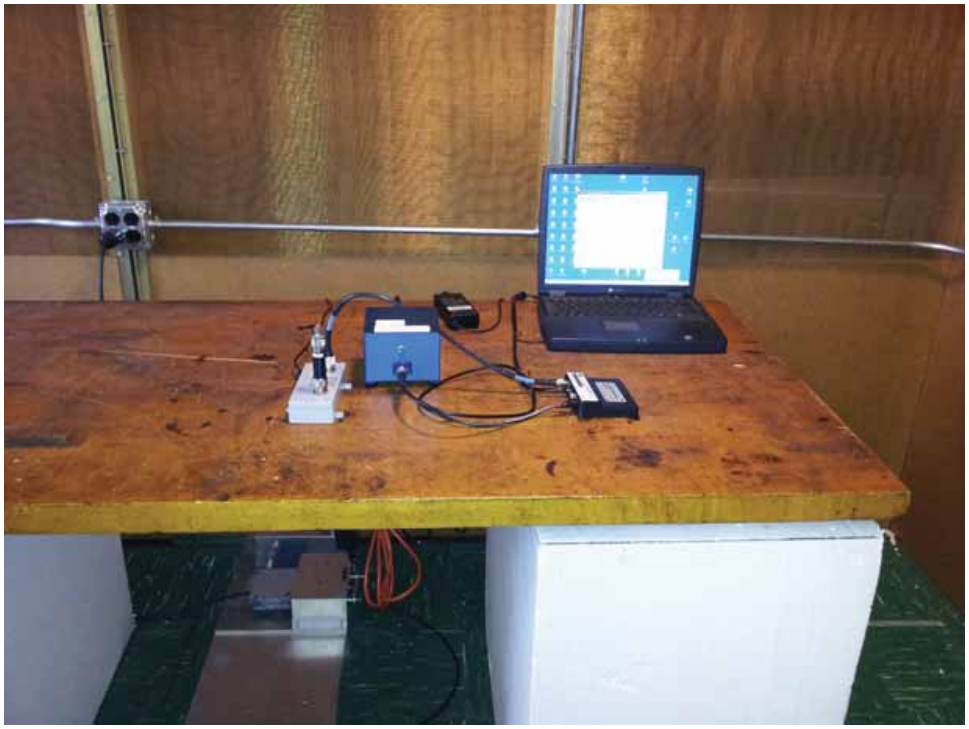

Figure 6: Conducted Emissions Test Setup Photograph(s).

3.2 Intentional Emissions

3.2.1 Hopping Channel Dwell Time

The average time of occupancy on any hopping channel must not be greater than 0.4 seconds within a 20 second period. For this test, the EUT was set for data transmission with hopping enabled. The dwell time was measured in the lowest, middle, and highest channels when a link was established. Results of this testing are depicted in Table 3. Plots showing example measurements made to obtain these values are provided in Figure 7.

Table 3: Pulsed Emission Characteristics (Duty Cycle).

Frequency Range	Detector	IF Bandwidth	Video Bandwidth
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz
f > 1 000 MHz	Pk	3 MHz	3 MHz
f > 1 000 MHz	Avg	3 MHz	10 kHz

Test Date: 14-Nov-11
Test Engineer: Joseph Brunett
EUT Mode: Hopping + Data Transmission

FCC/IC

Config	Radio "Hop Time" (ms)	Channel	Frequency (MHz)	Single Hop Dwell (ms)	Minim Period (s)	Dwell / 20 sec (s)	Pk/QPk/Avg Ratio (dB) Pk/QPk**	Pk/Avg***
Radio Alone	7	0	902.2	5.1	0.9	0.11	0	<-20
	7	64	915.0	5.1	0.9	0.11	0	<-20
	7	127	927.6	5.1	0.9	0.11	0	<-20
Radio Alone	28	0	902.2	17.8	3.6	0.10	0	-15.0
	28	64	915.0	17.8	3.6	0.10	0	-15.0
	28	127	927.6	17.8	3.6	0.10	0	-15.0

* Radio employs two "Hop Time" settings, both of which were tested here.

** Measured with EUT in continuous Tx mode on a single channel (non-hopping).

*** Computed based on worst case duty cycle in 100 ms window. Applicable for Tx Harmonic Spurious emissions > 1 GHz.

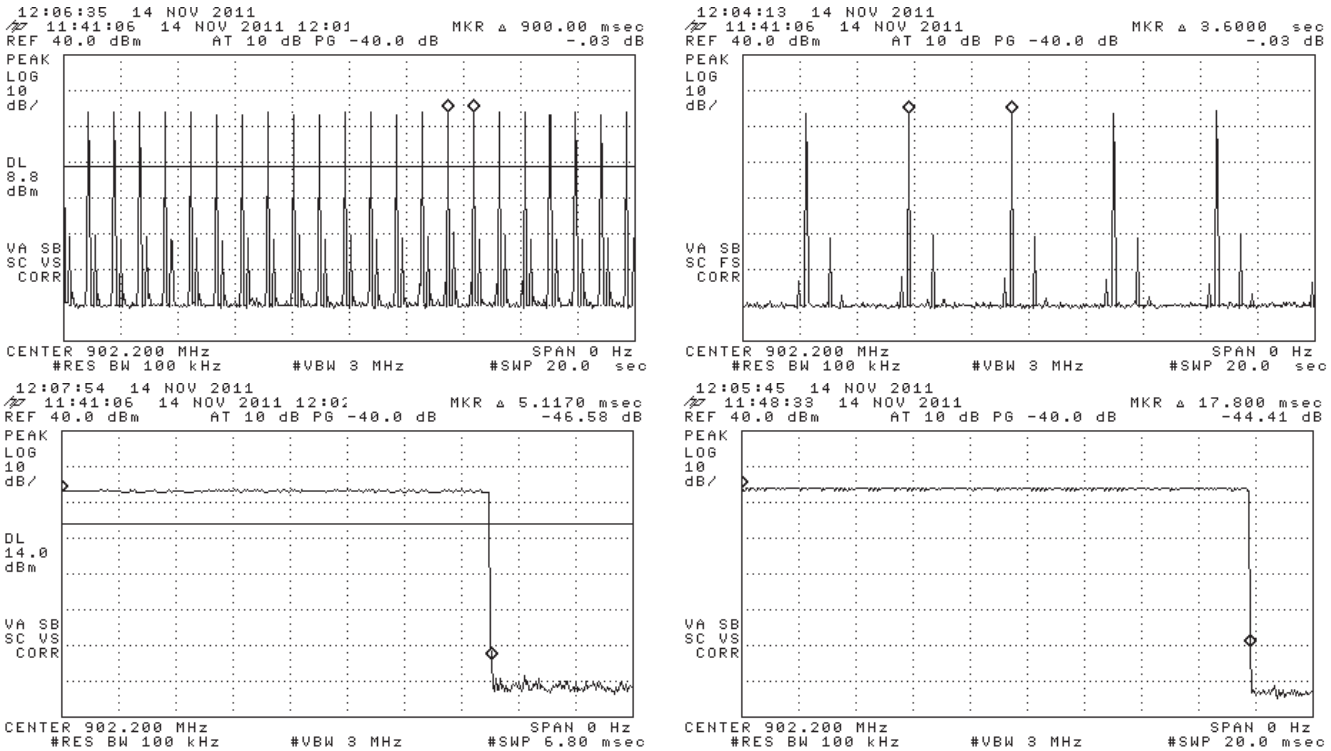

Figure 7(a): Pulsed Emission Characteristics (Duty Cycle).

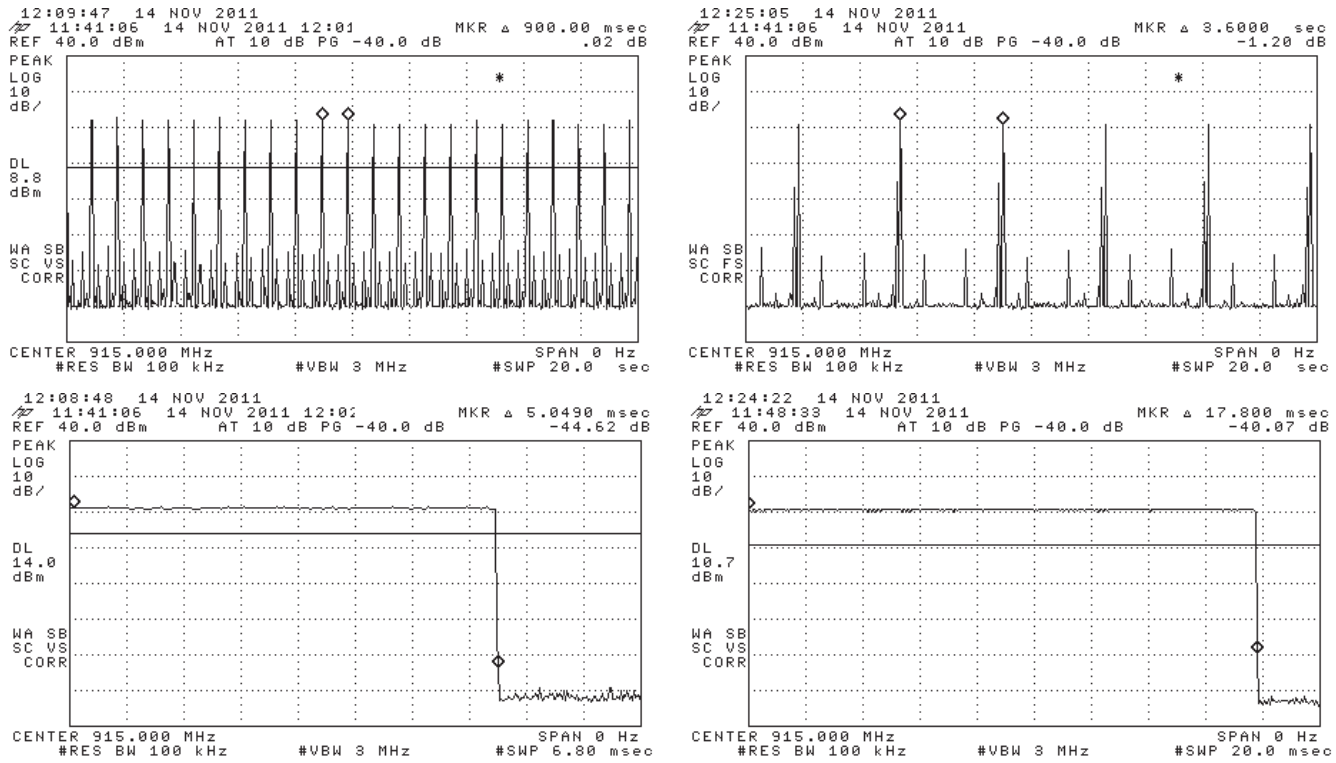

Figure 7(b): Pulsed Emission Characteristics (Duty Cycle).

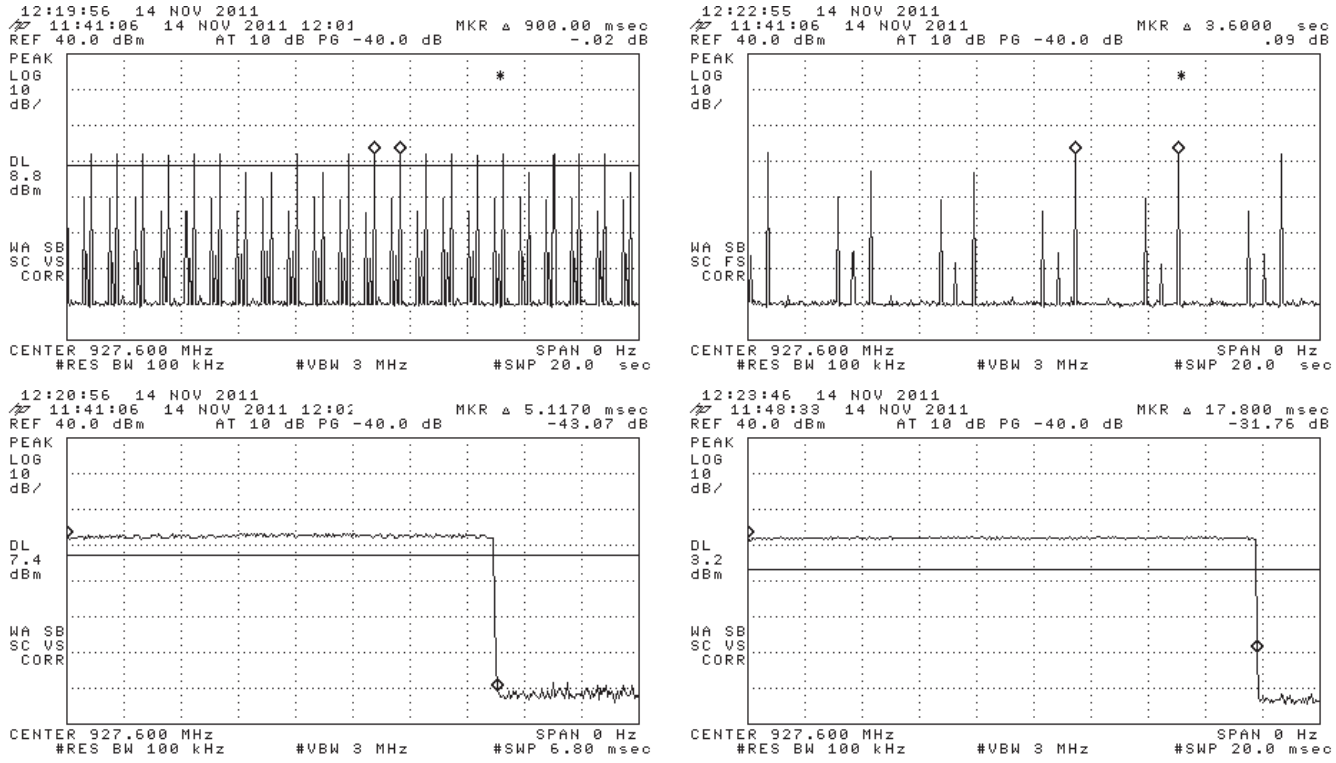

Figure 7(c): Pulsed Emission Characteristics (Duty Cycle).

3.2.2 Hopping Sequence

It is required that the EUT hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average. In addition, system receivers are required to have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and that shift frequencies in synchronization with the transmitted signals. Figure 8 details how the EUT meets these criteria.

FCC Section	FCC Rules	Manufacturer's Clarification
15.247(a)	Pseudo Frequency Hopping Sequence: Describe how the hopping sequence is generated. Provide an example of the hopping sequence channels, in order to demonstrate that the sequence meets the requirements specified in the definition of a frequency hopping spread spectrum system, found in Section 2.1	The pseudo-random sequence is derived from a Linear Congruential Generator (LCG). rnd(i+1) = (rnd(i)*b + a) mod 128 "a" and "b" are chosen based on system address (ADDR) and are qualified to guarantee a sequence of length 128. Skipped channels are removed from the sequence. Mapping of sequence index to frequency is based on 902.2MHz + index*200KHz, where index is a value between 0 and 127. A sample sequence is provided listed as ATTACHMENT #1.
15.247(a)	Equal Hopping Frequency Use: Describe how each individual EUT meets the requirement that each of its hopping channels is used equally on average (e.g. that each new transmission event begins on the next channel in the hopping sequence after final channel used in the previous transmission events).	Dwell time is an equal fixed duration on each channel. Hopping is asynchronous to serial data input. Randomly presented data will be randomly distributed across all channels in the sequence.
15.247(g)	Describe how the EUT complies with the requirement that it be designed to be capable of operating as a true frequency hopping system	The radio will always hop on a minimum of 64 channels. Dwell time is an equal fixed duration on each channel. In the presence of continuous data all channels in the hop sequence will be used equally. This applies to a radio configured as either a master or a remote.
15.247(h)	Describe how the EUT complies with the requirement that it not have the ability to coordinated with other FHSS is an effort to avoid the simultaneous occupancy of individual hopping frequencies by multiple transmitters	Hopping is statically determined based on system address and other configurable parameters. The radio does NOT alter this pattern based on channel occupancy or any other dynamic factors.
Public Notice DA 00-705	System Receiver Input Bandwidth: Describe how the associated receiver(s) complies with the requirement that its input bandwidth (either RF or IF) matches the bandwidth of the transmitted signal.	The receiver has an IF bandwidth of 150 KHz, matching the bandwidth of the transmitted signal
Public Notice DA 00-705	System Receiver Hopping Capability: Describe how the associated receiver(s) has the ability to shift frequencies in synchronization with the transmitted signals	Once synchronization is achieved, all radios hop in lock step together with the master. Timing adjustments to cover clock drift are made based on the measured arrival time of dedicated SYNC messages.

Figure 8(a): Hopping Sequence Description.

ATTACHMENT #1

Sample Psuedo-Random Sequence (values 0-127)

seq_next: 0031 (001f)
seq_next: 0034 (0022)
seq_next: 0121 (0079)
seq_next: 0084 (0054)
seq_next: 0035 (0023)
seq_next: 0022 (0016)
seq_next: 0029 (001d)
seq_next: 0104 (0068)
seq_next: 0103 (0067)
seq_next: 0074 (004a)
seq_next: 0001 (0001)
seq_next: 0060 (003c)
seq_next: 0107 (006b)
seq_next: 0062 (003e)
seq_next: 0037 (0025)
seq_next: 0080 (0050)
seq_next: 0047 (002f)
seq_next: 0114 (0072)
seq_next: 0009 (0009)
seq_next: 0036 (0024)
seq_next: 0051 (0033)
seq_next: 0102 (0066)
seq_next: 0045 (002d)
seq_next: 0056 (0038)
seq_next: 0119 (0077)
seq_next: 0026 (001a)
seq_next: 0017 (0011)
seq_next: 0012 (000c)
seq_next: 0123 (007b)
seq_next: 0014 (000e)
seq_next: 0053 (0035)
seq_next: 0032 (0020)
seq_next: 0063 (003f)
seq_next: 0066 (0042)
seq_next: 0025 (0019)
seq_next: 0116 (0074)
seq_next: 0067 (0043)
seq_next: 0054 (0036)
seq_next: 0061 (003d)
seq_next: 0008 (0008)
seq_next: 0007 (0007)
seq_next: 0106 (006a)
seq_next: 0033 (0021)
seq_next: 0092 (005c)
seq_next: 0011 (000b)
seq_next: 0094 (005e)
seq_next: 0069 (0045)
seq_next: 0112 (0070)
seq_next: 0079 (004f)
seq_next: 0018 (0012)
seq_next: 0041 (0029)
seq_next: 0068 (0044)
seq_next: 0083 (0053)
seq_next: 0006 (0006)
seq_next: 0077 (004d)
seq_next: 0088 (0058)
seq_next: 0023 (0017)
seq_next: 0058 (003a)
seq_next: 0049 (0031)
seq_next: 0044 (002c)
seq_next: 0027 (001b)
seq_next: 0046 (002e)
seq_next: 0085 (0055)
seq_next: 0064 (0040)
seq_next: 0095 (005f)
seq_next: 0098 (0062)
seq_next: 0057 (0039)
seq_next: 0020 (0014)
seq_next: 0099 (0063)
seq_next: 0086 (0056)
seq_next: 0093 (005d)
seq_next: 0040 (0028)
seq_next: 0039 (0027)
seq_next: 0010 (000a)
seq_next: 0065 (0041)
seq_next: 0124 (007c)
seq_next: 0043 (002b)
seq_next: 0126 (007e)
seq_next: 0101 (0065)
seq_next: 0016 (0010)
seq_next: 0111 (006f)
seq_next: 0050 (0032)
seq_next: 0073 (0049)
seq_next: 0100 (0064)
seq_next: 0115 (0073)
seq_next: 0038 (0026)
seq_next: 0109 (006d)
seq_next: 0120 (0078)
seq_next: 0055 (0037)
seq_next: 0090 (005a)
seq_next: 0081 (0051)
seq_next: 0076 (004c)
seq_next: 0059 (003b)
seq_next: 0078 (004e)
seq_next: 0117 (0075)
seq_next: 0096 (0060)
seq_next: 0127 (007f)
seq_next: 0002 (0002)
seq_next: 0089 (0059)
seq_next: 0052 (0034)
seq_next: 0003 (0003)
seq_next: 0118 (0076)
seq_next: 0125 (007d)
seq_next: 0072 (0048)
seq_next: 0071 (0047)
seq_next: 0042 (002a)
seq_next: 0097 (0061)
seq_next: 0028 (001c)
seq_next: 0075 (004b)
seq_next: 0030 (001e)
seq_next: 0005 (0005)
seq_next: 0048 (0030)
seq_next: 0015 (000f)
seq_next: 0082 (0052)
seq_next: 0105 (0069)
seq_next: 0004 (0004)
seq_next: 0019 (0013)
seq_next: 0070 (0046)
seq_next: 0013 (000d)
seq_next: 0024 (0018)
seq_next: 0087 (0057)
seq_next: 0122 (007a)
seq_next: 0113 (0071)
seq_next: 0108 (006c)
seq_next: 0091 (005b)
seq_next: 0110 (006e)
seq_next: 0021 (0015)
seq_next: 0000 (0000)

Figure 8(b): Hopping Sequence Description.

3.2.3 Channel Bandwidth

Maximum permissable 20 dB channel bandwidth is 500 kHz. For this test, the EUT was set continuous data transmission (hopping disabled). The 20-dB bandwidth as well as 99% emission bandwidth was measured for the low, middle, and high channels. Results of these measurements are shown in Table 4. Plots showing example measurements employed to obtain this data are provided in Figure 9.

Table 4: Intentional Emission Bandwidth.

Frequency Range **Detector** **IF Bandwidth** **Video Bandwidth** **Test Date:** 22-Oct-11
Test Engineer: Joseph Brunett
EUT Mode: Cont. Mod. Tx.

						FCC/IC
Config	Data Rate	Channel	Frequency (MHz)	20 dB BW (kHz)	26 dB EBW (kHz)	IC 99% PWR BW (kHz)
A (1000 mW)	Continuous	1	902.2	155.00	247.50	159.00
		64	915.0	187.50	252.50	157.50
		128	927.8	157.50	245.00	154.50
B (500 mW)	Continuous	1	902.2	157.50	250.00	159.00
		64	915.0	185.00	247.50	154.50
		128	927.8	152.00	242.50	151.50
C (300 mW)	Continuous	1	902.2	182.50	250.00	154.50
		64	915.0	155.00	250.00	154.50
		128	927.8	155.00	247.50	151.50

* Measured conducted at antenna port.

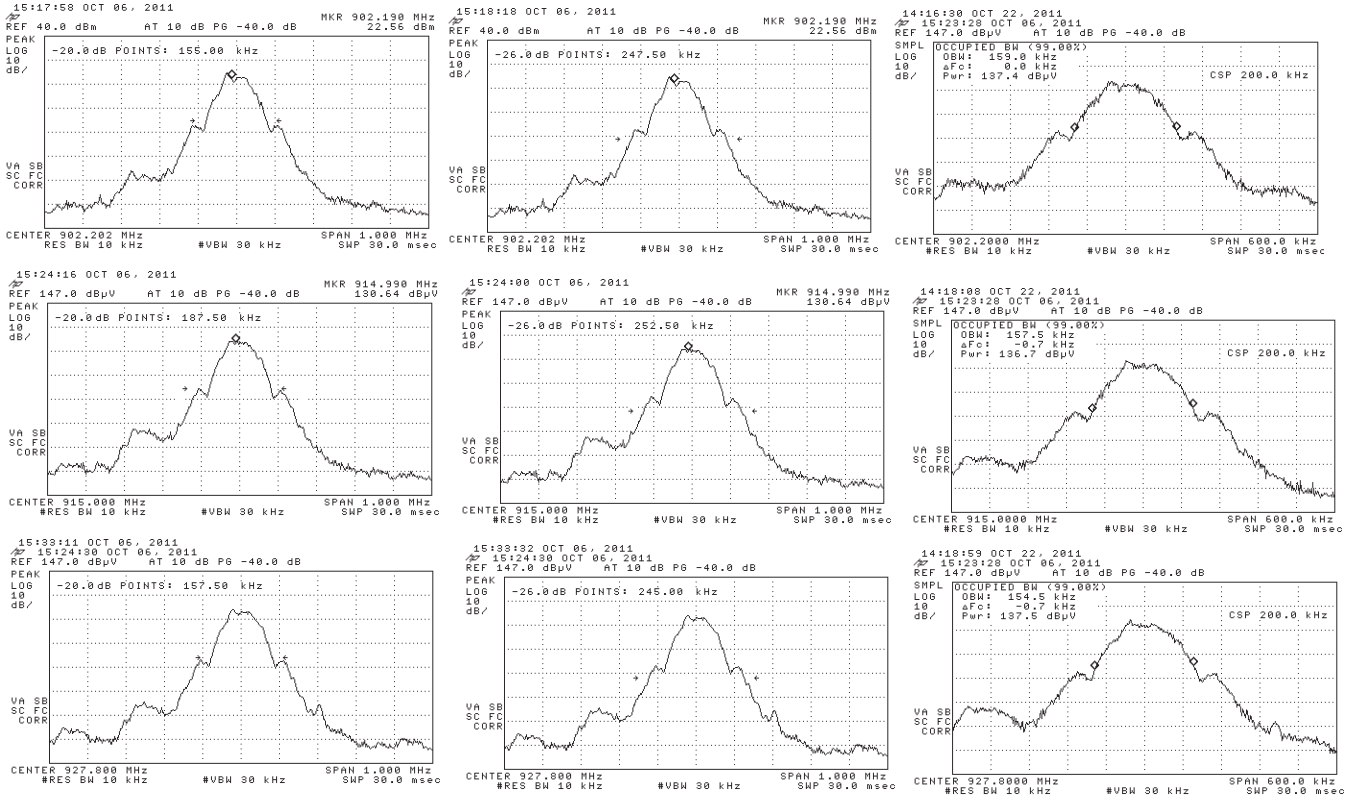

Figure 9: Intentional Emission Bandwidth.

3.2.4 Separation and Number of Hopping Channels

Frequency hopping systems are required to employ hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. For this test, the EUT was enabled for data transmission with hopping. The Carrier Separation was measured for low, mid, and high channels. Results of these measurements are shown in Table 5.Plots showing example measurements employed to obtain this data are provided in Figure 10.

Table 5: Hopping Channel Separation.

Frequency Range	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	15-Nov-11
902.2-927.8 MHz	30kHz	300 kHz	**Test Engineer:**	Joseph Brunett
			EUT Mode:	Hopping

					FCC/IC
Config	Channels	Separation* (kHz)	Min Sep. Limit (kHz)	Total Hopping Channels (Computed)	Pass/Fail
Radio Alone	3-4	200.0	187.50	128	Pass
	64-65	200.0	187.50		
	125-126	200.0	187.50		

* Measured conducted at antenna port.

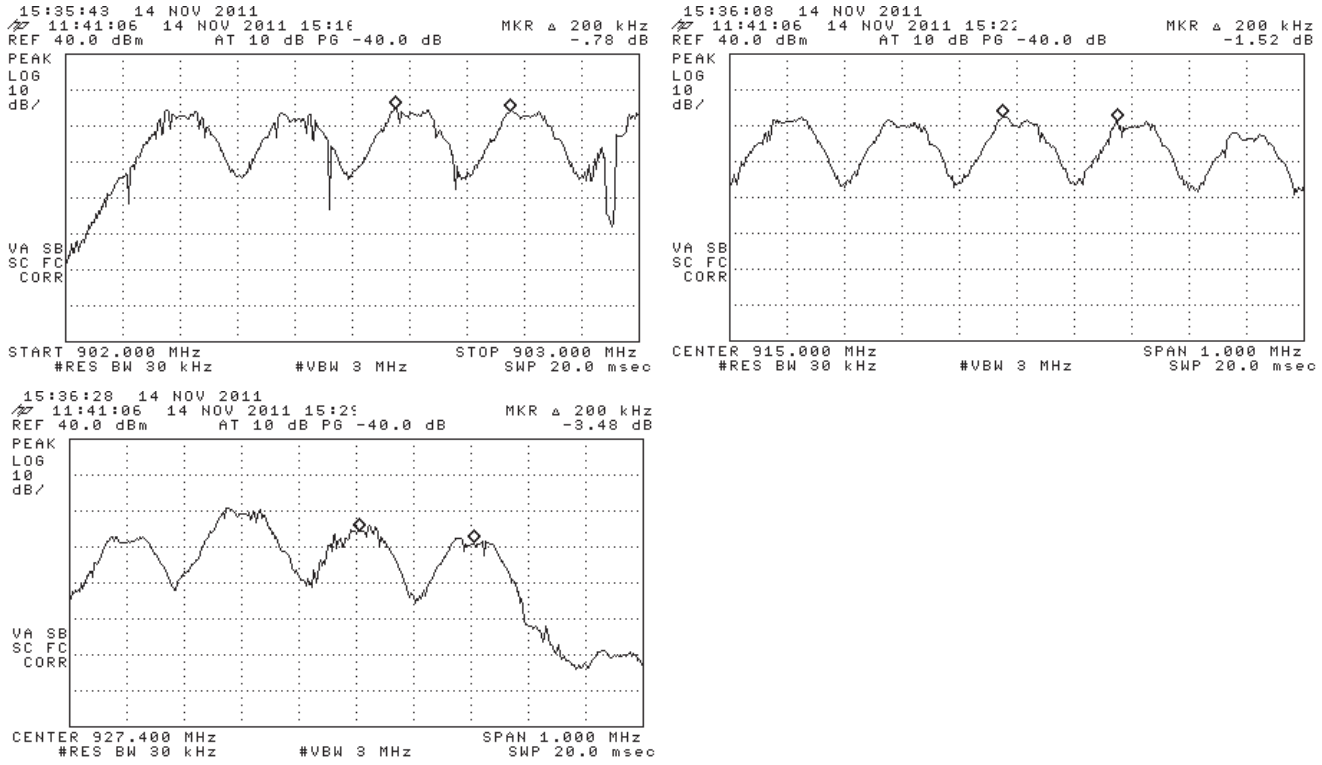

Figure 10: Hopping Channel Separation.

3.2.5 Effective Isotropic Radiated Power

The EUT's radiated power is computed from antenna port conducted power measurements and the gain of the EUT antenna(s). Where the EUT is not sold with an antenna connector, a modified product has been provided including such. Peak conducted output power was measured directly from the EUT at the port where the antenna attaches. The test receiver bandwidth was set to be greater than the measured emission bandwidth of the EUT to capture the true peak. Antenna gain is either provided directly by the antenna manufacturer or measured by comparison between substitution based EIRP and conducted output power. Table 6 details the results of these measurements.

Table 6: Radiated Power Results.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	22-Oct-10
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Pk	3 MHz	10kHz	**EUT Mode:**	Cont. Mod. Tx single Channel
f > 1 000 MHz	Avg	3 MHz	10kHz		

									FCC/IC
Config.	Channel	Freq. MHz	EUT Radio Pwr dBm	EUT Amp Pwr* dBm	EUT Cable + Lght. Sup. Loss (dB)	Pout (Pk)** dBm	Ant Gain dBi	EIRP Limit dBm	Pass By dB
A	1	902.2	20.0	29.9	3.2	26.7	9.2	36.0	**0.1**
	64	915.0	20.0	29.7	4.1	25.6	9.2	36.0	1.2
	128	927.8	20.0	29.5	3.0	26.5	9.2	36.0	0.4
B	1	902.2	20.0	26.8	0.8	26.0	9.2	36.0	0.8
	64	915.0	20.0	25.6	0.5	25.1	9.2	36.0	1.7
	128	927.8	20.0	25.5	0.8	24.7	9.2	36.0	2.1
C	1	902.2	20.0	24.7	2.1	22.7	12.2	36.0	1.1
	64	915.0	20.0	24.4	0.7	23.7	12.2	36.0	**0.1**
	128	927.8	20.0	24.1	1.0	23.2	12.2	36.0	0.6
Config.	Channel	Freq. MHz	Radio AC Supply Voltage	Pout (Pk)* dBm	Amplifier AC Supply Voltage	Pout (Pk)* dBm			
A	8	915.0	90.0	29.9	90.0	29.9			
		915.0	105.0	29.9	105.0	29.8			
		915.0	115.0	29.9	115.0	29.8			
		915.0	125.0	29.8	125.0	29.7			
		915.0	140.0	29.9	140.0	29.7			

* Measured conducted at Amplifier output port with test receiver bandwidth greater than signal emission bandwidth (true peak).

* Measured conducted at antenna connection port with test receiver bandwidth greater than signal emission bandwidth (true peak).

3.3 Unintentional Emissions

3.3.1 Out of Band Conducted Spurious Emissions

Out of band spurious emissions were recorded at the antenna port up to (and beyond) 10 times the highest fundamental operating frequency for each applicable operating mode or configuration. Table 7 details the results of these measurements. Plots showing the measurements made to obtain these values are provided in Figure 11.

Table 7(a): Out-of-Band Conducted Spurious Emissions.

Frequency Range	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	23-Oct-11
25 MHz ≤ f ≤ 1 000 MHz	100 kHz	300 kHz	**Test Engineer:**	Joseph Brunett
			EUT Mode/Config:	1000 mW + 60ft Cable + Omni (CONFIG A)

Tx Band Edge Spurious Emissions							FCC/IC
#	Freq. MHz	Po (Pk)* dBm	dB Down (Mkr-Delta)** (dBc)	Po (Mkr-Delta)*** dBm	Band Edge Limit**** (dBc)	Pass dB	Comments
1	Maximum Fundamental Emission - (Max of Hopping & Non-Hopping)						
2	902.2	26.6					Low Channel
3	915.0	26.2					Middle Channel
4	927.8	25.8					High Channel
5	Band Edge Emission - Non-Hopping						
6	902.0		38.8	-12.2	6.6	18.8	Channel 1
7	902.0	-12.3			6.6	18.9	902.4 MHz (Ch 2)
8	928.0	- 9.3			6.6	15.9	927.6 MHz (Ch 127)
9	928.0		36.2	-9.6	6.6	16.2	Channel 128
10	Band Edge Emission - Hopping						
11	902.0		37.8	-11.2	6.6	17.8	All Channels
12	928.0		39.5	-12.9	6.6	19.5	All Channels

* Po measured conducted with peak measured in 100kHz RBW / 300 kHz VBW.

** Marker-Delta meas. conducted at Antenna Prt (30 kHz RBW < VBW, Span < 3 MHz), < 2 bandwidths from band edge.

** Po (Mkr-Delta) = Max(Pr (Pk) across L,M,H Channels) - dB Down (Mkr-Delta)

**** Band Edge Limit = 20 dB below maximum peak emission measured in band.

Table 7(b): Out-of-Band Conducted Spurious Emissions.

Frequency Range	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	23-Oct-11
25 MHz ≤ f ≤ 1 000 MHz	100 kHz	300 kHz	**Test Engineer:**	Joseph Brunett
			EUT Mode/Config:	500 mW + 15ft Cable + Omni (CONFIG B)

Tx Band Edge Spurious Emissions							FCC/IC
#	Freq. MHz	Po (Pk)* dBm	dB Down (Mkr-Delta)** (dBc)	Po (Mkr-Delta)*** dBm	Band Edge Limit**** (dBc)	Pass dB	Comments
1	Maximum Fundamental Emission - (Max of Hopping & Non-Hopping)						
2	902.2	25.6					Low Channel
3	915.0	26.0					Middle Channel
4	927.8	26.1					High Channel
5	Band Edge Emission - Non-Hopping						
6	902.0		35.5	-9.4	6.1	15.5	Channel 1
7	902.0	- 9.2			6.1	15.3	902.4 MHz (Ch 2)
8	928.0	- 9.3			6.1	15.4	927.6 MHz (Ch 127)
9	928.0		32.0	-5.9	6.1	12.0	Channel 128
10	Band Edge Emission - Hopping						
11	902.0		37.2	-11.1	6.1	17.2	All Channels
12	928.0		32.3	-6.2	6.1	12.3	All Channels

* Po measured conducted with peak measured in 100kHz RBW / 300 kHz VBW.

** Marker-Delta meas. conducted at Antenna Prt (30 kHz RBW < VBW, Span < 3 MHz), < 2 bandwidths from band edge.

** Po (Mkr-Delta) = Max(Pr (Pk) across L,M,H Channels) - dB Down (Mkr-Delta)

**** Band Edge Limit = 20 dB below maximum peak emission measured in band.

Table 7(c): Out-of-Band Conducted Spurious Emissions.

Frequency Range	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	23-Oct-11
25 MHz ≤ f ≤ 1 000 MHz	100 kHz	300 kHz	**Test Engineer:**	Joseph Brunett
			EUT Mode/Config:	300 mW + 15ft Cable + Yagi (CONFIG C)

Tx Band Edge Spurious Emissions							FCC/IC
#	Freq. MHz	Po (Pk)* dBm	dB Down (Mkr-Delta)** (dBc)	Po (Mkr-Delta)*** dBm	Band Edge Limit**** (dBc)	Pass dB	Comments
1	Maximum Fundamental Emission - (Max of Hopping & Non-Hopping)						
2	902.2	23.1					Low Channel
3	915.0	23.3					Middle Channel
4	927.8	23.5					High Channel
5	Band Edge Emission - Non-Hopping						
6	902.0		37.6	-14.1	3.5	17.6	Channel 1
7	902.0	-14.9			3.5	18.4	902.4 MHz (Ch 2)
8	928.0	-13.2			3.5	16.6	927.6 MHz (Ch 127)
9	928.0		31.6	-8.1	3.5	11.6	Channel 128
10	Band Edge Emission - Hopping						
11	902.0		38.3	-14.8	3.5	18.3	All Channels
12	928.0		31.8	-8.3	3.5	11.8	All Channels

* Po measured conducted with peak measured in 100kHz RBW / 300 kHz VBW.

** Marker-Delta meas. conducted at Antenna Prt (30 kHz RBW < VBW, Span < 3 MHz), < 2 bandwidths from band edge.

** Po (Mkr-Delta) = Max(Pr (Pk) across L,M,H Channels) - dB Down (Mkr-Delta)

**** Band Edge Limit = 20 dB below maximum peak emission measured in band.

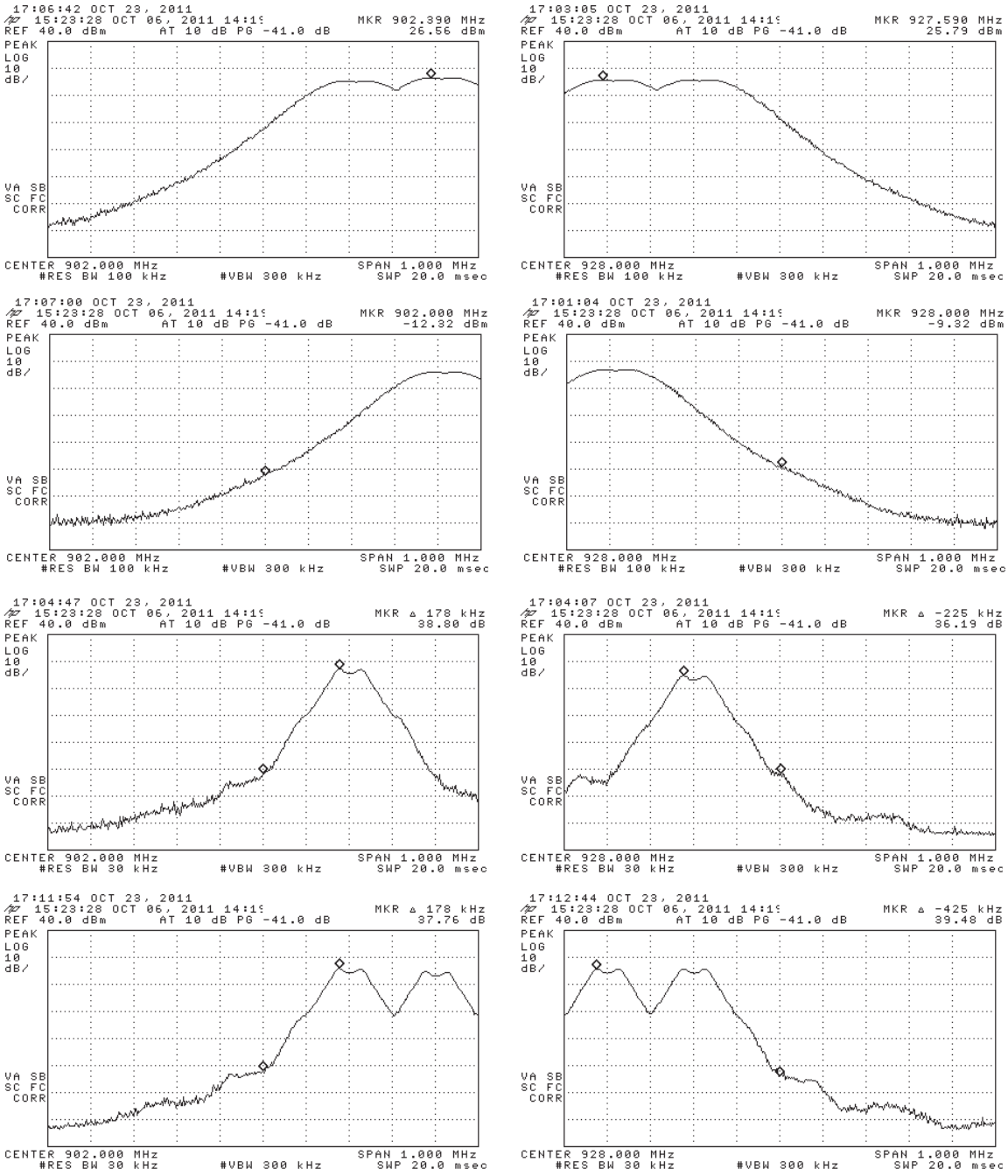

Figure 11(a): Out-of-Band Conducted Spurious Emissions Measurement Examples.

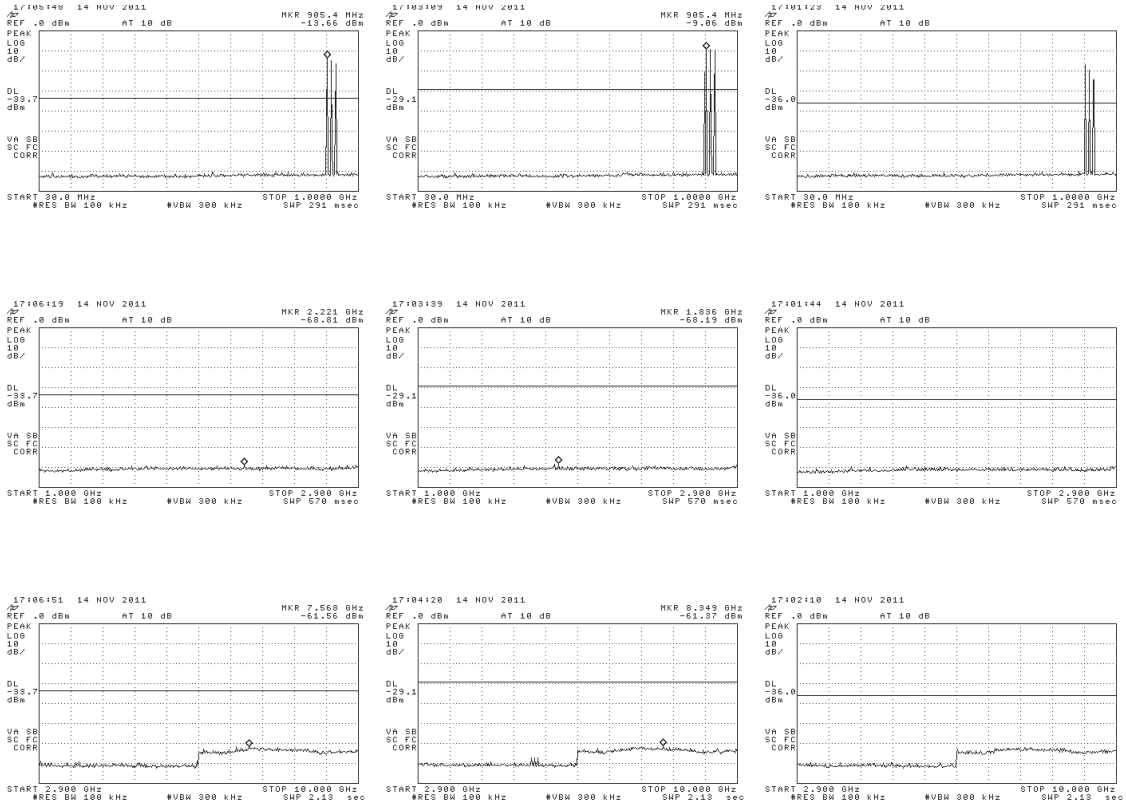

Figure 11(b): Out-of-Band Conducted Spurious Emissions Measurement Examples.

3.3.2 Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 8. Measurements are performed to 10 times the highest fundamental operating frequency.

Table 8(a): Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	23-Sep-11
f > 1 000 MHz	Pk	1 MHz	3 MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT Mode/Config:**	1000 mW + 60ft Cable + Omni (CONFIG A)

Tx Spurious Harmonic Emissions FCC/IC

#	Freq. MHz	Ant. Used	Ant. Pol.**	Pr (Pk) dBm	Pr (Avg)* dBm	Ka dB/m	Kg dB	E3(Pk) dBµV/m	E3(Avg) dBµV/m	E3 Avg Lim dBµV/m	Pass dB	Comments
1	1806.0	Horn LS	V	-47.1	-62.1	20.9	28.1	52.7	37.7	54.0	16.3	Low; max all
2	1830.0	Horn LS	V	-47.7	-47.7	20.8	28.1	52.0	52.0	54.0	**2.0**	Mid; max all
3	1854.0	Horn LS	V	-53.7	-53.7	20.8	28.1	45.9	45.9	54.0	8.1	High; max all
4	2709.0	Horn S	V	-66.6	-66.6	21.6	25.3	36.7	36.7	54.0	17.3	Low; max all
5	2745.0	Horn S	V	-67.5	-67.5	21.6	25.1	36.0	36.0	54.0	18.0	Mid; max all
6	2781.0	Horn S	V	-67.4	-67.4	21.6	25.0	36.3	36.3	54.0	17.7	High; max all
7	3612.0	Horn S	V	-65.4	-65.4	22.3	23.1	40.7	40.7	54.0	13.3	Low; max all
8	3660.0	Horn S	V	-69.4	-69.4	22.3	23.1	36.8	36.8	54.0	17.2	Mid; max all
9	3708.0	Horn S	V	-68.2	-68.2	22.3	23.1	38.1	38.1	54.0	15.9	High; max all
10	4515.0	Horn C	V	-58.4	-58.4	24.5	33.0	40.1	40.1	54.0	13.9	Low; max all
11	4575.0	Horn C	V	-61.2	-61.2	24.5	34.1	36.3	36.3	54.0	17.7	Mid; max all
12	4635.0	Horn C	V	-58.8	-58.8	24.6	35.1	37.6	37.6	54.0	16.4	High; max all
13	5418.0	Horn C	V	-53.9	-53.9	24.7	38.0	39.8	39.8	54.0	14.2	Low; max all
14	5490.0	Horn C	V	-51.7	-51.7	24.8	38.0	42.1	42.1	54.0	11.9	Mid; max all
15	5562.0	Horn C	V	-52.4	-52.4	24.8	38.0	41.4	41.4	54.0	12.6	High; max all
16	6321.0	Horn XN	V	-51.1	-51.1	24.4	38.0	42.3	42.3	54.0	11.7	Low, noise; max all
17	6405.0	Horn XN	V	-53.6	-53.6	24.5	38.0	39.9	39.9	54.0	14.1	Mid, noise; max all
18	6489.0	Horn XN	V	-57.6	-57.6	24.5	38.0	35.9	35.9	54.0	18.1	High, noise; max all
19	7224.0	Horn XN	V	-53.2	-53.2	25.1	36.8	42.1	42.1	54.0	11.9	Low, noise; max all
20	7320.0	Horn XN	V	-59.5	-59.5	25.2	36.8	35.9	35.9	54.0	18.1	Mid, noise; max all
21	7416.0	Horn XN	V	-58.7	-58.7	25.3	36.8	36.8	36.8	54.0	17.2	High, noise; max all
22	8127.0	Horn X	V	-57.6	-57.6	27.0	36.8	39.6	39.6	54.0	14.4	Low, noise; max all
23	8235.0	Horn X	V	-55.5	-55.5	27.0	36.8	41.7	41.7	54.0	12.3	Mid, noise; max all
24	8343.0	Horn X	V	-54.0	-54.0	27.1	36.8	43.3	43.3	54.0	10.7	High, noise; max all
25	9030.0	Horn X	V	-59.0	-59.0	27.5	36.8	38.7	38.7	54.0	15.3	Low, noise; max all
26	9150.0	Horn X	V	-58.4	-58.4	27.5	36.8	39.3	39.3	54.0	14.7	Mid, noise; max all
27	9270.0	Horn X	V	-59.2	-59.2	27.6	36.8	38.6	38.6	54.0	15.4	High, noise; max all
28												
29												
30												

*QPk detection below 1 GHz, Avg computed from Peak + Duty at or above 1 GHz.

** Both test antenna polarizations are tested. Only worst case polarization is reported.

Table 8(b): Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	27-Oct-11
f > 1 000 MHz	Pk	1 MHz	3 MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT Mode/Config:**	500 mW + 15ft Cable + Omni (CONFIG B)

Tx Spurious Emissions FCC/IC

#	Freq. MHz	Ant. Used	Ant. Pol.**	Pr (Pk) dBm	Pr (Avg)* dBm	Ka dB/m	Kg dB	E3(Pk) dBµV/m	E3(Avg) dBµV/m	E3 Avg Lim dBµV/m	Pass dB	Comments
1	1806.0	Horn LS	V	-49.0	-64.0	20.9	28.1	50.8	35.8	54.0	18.2	Low; max all
2	1830.0	Horn LS	V	-51.0	-51.0	20.8	28.1	48.7	48.7	54.0	**5.3**	Mid; max all
3	1854.0	Horn LS	V	-55.0	-55.0	20.8	28.1	44.6	44.6	54.0	9.4	High; max all
4	2709.0	Horn S	V	-66.7	-66.7	21.6	25.3	36.6	36.6	54.0	17.4	Low; max all
5	2745.0	Horn S	V	-67.3	-67.3	21.6	25.1	36.2	36.2	54.0	17.8	Mid; max all
6	2781.0	Horn S	V	-67.4	-67.4	21.6	25.0	36.3	36.3	54.0	17.7	High; max all
7	3612.0	Horn S	V	-65.3	-65.3	22.3	23.1	40.8	40.8	54.0	13.2	Low; max all
8	3660.0	Horn S	V	-69.3	-69.3	22.3	23.1	36.9	36.9	54.0	17.1	Mid; max all
9	3708.0	Horn S	V	-68.0	-68.0	22.3	23.1	38.3	38.3	54.0	15.7	High; max all
10	4515.0	Horn C	V	-58.1	-58.1	24.5	33.0	40.4	40.4	54.0	13.6	Low; max all
11	4575.0	Horn C	V	-61.2	-61.2	24.5	34.1	36.3	36.3	54.0	17.7	Mid; max all
12	4635.0	Horn C	V	-58.6	-58.6	24.6	35.1	37.8	37.8	54.0	16.2	High; max all
13	5418.0	Horn C	V	-53.7	-53.7	24.7	38.0	40.0	40.0	54.0	14.0	Low; max all
14	5490.0	Horn C	V	-51.6	-51.6	24.8	38.0	42.1	42.1	54.0	11.9	Mid; max all
15	5562.0	Horn C	V	-52.3	-52.3	24.8	38.0	41.4	41.4	54.0	12.6	High; max all
16	6321.0	Horn XN	V	-50.9	-50.9	24.4	38.0	42.5	42.5	54.0	11.5	Low, noise; max all
17	6405.0	Horn XN	V	-53.3	-53.3	24.5	38.0	40.1	40.1	54.0	13.9	Mid, noise; max all
18	6489.0	Horn XN	V	-57.4	-57.4	24.5	38.0	36.1	36.1	54.0	17.9	High, noise; max all
19	7224.0	Horn XN	V	-53.2	-53.2	25.1	36.8	42.2	42.2	54.0	11.8	Low, noise; max all
20	7320.0	Horn XN	V	-59.4	-59.4	25.2	36.8	36.0	36.0	54.0	18.0	Mid, noise; max all
21	7416.0	Horn XN	V	-58.6	-58.6	25.3	36.8	36.8	36.8	54.0	17.2	High, noise; max all
22	8127.0	Horn X	V	-57.4	-57.4	27.0	36.8	39.8	39.8	54.0	14.2	Low, noise; max all
23	8235.0	Horn X	V	-55.5	-55.5	27.0	36.8	41.7	41.7	54.0	12.3	Mid, noise; max all
24	8343.0	Horn X	V	-53.7	-53.7	27.1	36.8	43.6	43.6	54.0	10.4	High, noise; max all
25	9030.0	Horn X	V	-58.8	-58.8	27.5	36.8	38.8	38.8	54.0	15.2	Low, noise; max all
26	9150.0	Horn X	V	-58.2	-58.2	27.5	36.8	39.5	39.5	54.0	14.5	Mid, noise; max all
27	9270.0	Horn X	V	-59.0	-59.0	27.6	36.8	38.8	38.8	54.0	15.2	High, noise; max all
28												
29												
30												

*QPk detection below 1 GHz, Avg computed from Peak + Duty at or above 1 GHz.

** Both test antenna polarizations are tested. Only worst case polarization is reported.

Table 8(c): Transmit Chain Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	27-Oct-11
f > 1 000 MHz	Pk	1 MHz	3 MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT Mode/Config:**	300 mW + 15ft Cable + Yagi (CONFIG C)

Tx Spurious Emissions FCC/IC

#	Freq. MHz	Ant. Used	Ant. Pol.**	Pr (Pk) dBm	Pr (Avg)* dBm	Ka dB/m	Kg dB	E3(Pk) dBµV/m	E3(Avg) dBµV/m	E3 Avg Lim dBµV/m	Pass dB	Comments
1	1806.0	Horn LS	V	-44.0	-59.0	20.9	28.1	55.8	40.8	54.0	13.2	Low; max all
2	1830.0	Horn LS	V	-47.0	-47.0	20.8	28.1	52.7	52.7	54.0	**1.3**	Mid; max all
3	1854.0	Horn LS	V	-49.0	-49.0	20.8	28.1	50.6	50.6	54.0	3.4	High; max all
4	2709.0	Horn S	V	-62.3	-62.3	21.6	25.3	41.0	41.0	54.0	13.0	Low; max all
5	2745.0	Horn S	V	-59.6	-59.6	21.6	25.1	43.9	43.9	54.0	10.1	Mid; max all
6	2781.0	Horn S	V	-57.4	-57.4	21.6	25.0	46.3	46.3	54.0	7.7	High; max all
7	3612.0	Horn S	V	-64.7	-64.7	22.3	23.1	41.4	41.4	54.0	12.6	Low; max all
8	3660.0	Horn S	V	-65.7	-65.7	22.3	23.1	40.5	40.5	54.0	13.5	Mid; max all
9	3708.0	Horn S	V	-68.0	-68.0	22.3	23.1	38.3	38.3	54.0	15.7	High; max all
10	4515.0	Horn C	V	-61.6	-61.6	24.5	33.0	37.0	37.0	54.0	17.0	Low; max all
11	4575.0	Horn C	V	-59.1	-59.1	24.5	34.1	38.4	38.4	54.0	15.6	Mid; max all
12	4635.0	Horn C	V	-59.6	-59.6	24.6	35.1	36.8	36.8	54.0	17.2	High; max all
13	5418.0	Horn C	V	-52.4	-52.4	24.7	38.0	41.3	41.3	54.0	12.7	Low; max all
14	5490.0	Horn C	V	-52.7	-52.7	24.8	38.0	41.1	41.1	54.0	12.9	Mid; max all
15	5562.0	Horn C	V	-53.0	-53.0	24.8	38.0	40.8	40.8	54.0	13.2	High; max all
16	6321.0	Horn XN	V	-49.1	-49.1	24.4	38.0	44.3	44.3	54.0	9.7	Low, noise; max all
17	6405.0	Horn XN	V	-55.1	-55.1	24.5	38.0	38.4	38.4	54.0	15.6	Mid, noise; max all
18	6489.0	Horn XN	V	-58.7	-58.7	24.5	38.0	34.8	34.8	54.0	19.2	High, noise; max all
19	7224.0	Horn XN	V	-58.8	-58.8	25.1	36.8	36.5	36.5	54.0	17.5	Low, noise; max all
20	7320.0	Horn XN	V	-59.1	-59.1	25.2	36.8	36.3	36.3	54.0	17.7	Mid, noise; max all
21	7416.0	Horn XN	V	-59.3	-59.3	25.3	36.8	36.2	36.2	54.0	17.8	High, noise; max all
22	8127.0	Horn X	V	-51.4	-51.4	27.0	36.8	45.8	45.8	54.0	8.2	Low, noise; max all
23	8235.0	Horn X	V	-52.7	-52.7	27.0	36.8	44.5	44.5	54.0	9.5	Mid, noise; max all
24	8343.0	Horn X	V	-56.5	-56.5	27.1	36.8	40.8	40.8	54.0	13.2	High, noise; max all
25	9030.0	Horn X	V	-57.1	-57.1	27.5	36.8	40.6	40.6	54.0	13.4	Low, noise; max all
26	9150.0	Horn X	V	-56.8	-56.8	27.5	36.8	40.9	40.9	54.0	13.1	Mid, noise; max all
27	9270.0	Horn X	V	-57.9	-57.9	27.6	36.8	39.9	39.9	54.0	14.1	High, noise; max all
28												
29												
30												

*QPk detection below 1 GHz, Avg computed from Peak + Duty at or above 1 GHz.

** Both test antenna polarizations are tested. Only worst case polarization is reported.

3.3.3 Radiated Receiver Spurious

The results for the measurement of radiated receiver spurious emissions (emissions from the receiver chain, e.g. LO or VCO) at the nominal voltage and temperature are reported in Table 9. Receive chain emissions are measured to 5 times the highest receive chain frequency employed or 4 GHz, whichever is higher. If no emissions are detected, only those noise floor emissions at the LO/VCO frequency are reported.

Table 9: Receiver Chain Spurious Emissions $\geq$ 30 MHz.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	25-Oct-11
25 MHz $\leq$ f $\leq$ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Pk	1 MHz	3 MHz	**EUT Mode:**	Standby (Rx), Config. C
f > 1 000 MHz	Avg	1 MHz	10kHz		

Receive Chain Spurious Emissions FCC/IC/CISPR

#	Freq. MHz	Ant. Used	Ant. Pol.***	Pr (Pk) dBm	Pr (QPk/Avg) dBm*	Ka dB/m	Kg dB	E3(Pk) dBµV/m	E3(Avg) dBµV/m	FCC/IC E3lim dBµV/m	CE E3lim dBµV/m	Pass dB	Comments
1	791.3	SBic	H	-76.2	-76.2	27.3	17.4	40.7	40.7	46.0	47.5	**5.3**	max all, noise, Low
2	804.3	SBic	H	-77.9	-77.9	27.5	17.3	39.3	39.3	46.0	47.5	6.7	max all, noise, Middle
3	817.3	SBic	H	-80.5	-80.5	27.7	17.2	37.0	37.0	46.0	47.5	9.0	max all, noise, High
4													
5	NOTE: VCO/LO is between 791.3-817.3 MHz per Radio Description. Low, Middle and High Channels tested.												
6													
7													

*QPk detection below 1 GHz, Avg detection at or above 1 GHz with receiver bandwidth as specified at top of table.

*** Both test antenna polarizations are tested. Only worst case polarization is reported.

3.3.4 Radiated Digital Spurious

The results for the measurement of digital spurious emissions (emissions arising from digital circuitry) at the nominal voltage and temperature are provided in Table 10. Radiation from digital components has been measured to 4 GHz, or to five times the maximum digital component operating frequency, whichever is greater.

Table 10: Radiated Digital Spurious Emissions.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	25-Sep-10
f > 1 000 MHz	Pk	1 MHz	3 MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT Mode:**	Tx

Digital Spurious Emissions FCC/IC/CISPR

#	Freq. MHz	Ant. Used	Ant. Pol.	Pr (Pk) dBm	Pr (QPk/Avg) dBm*	Ka dB/m	Kg dB	E3(Pk) dBµV/m	E3(QPk/Avg) dBµV/m	FCC/IC E3lim dBµV/m	CE E3lim dBµV/m	Pass dB	Comments
1	41.2	Bic	H	-62.1	-66.4	10.5	25.2	30.3	26.0	40.0	47.5	14.0	
2	63.7	Bic	H	-64.3	-64.0	7.8	24.8	25.7	26.0	40.0	47.5	14.0	
3	70.3	Bic	H	-61.0	-63.6	7.6	24.8	28.9	26.3	40.0	47.5	13.7	
4	72.0	Bic	H	-56.8	-62.1	7.6	24.7	33.0	27.7	40.0	47.5	12.3	
5	72.0	Bic	V	-56.1	-56.4	7.6	24.7	33.7	33.4	40.0	47.5	6.6	
6	160.6	Bic	H	-70.2	-73.5	13.2	23.5	26.5	23.2	43.5	47.5	20.3	
7	160.6	Bic	V	-67.5		13.2	23.5	29.2		43.5	47.5	14.3	
8	172.1	Bic	H	-67.9	-72.4	13.8	23.4	29.6	25.1	43.5	47.5	18.4	
9	172.1	Bic	V	-66.8		13.8	23.4	30.7		43.5	47.5	12.8	
10	195.2	Bic	H	-69.1	-72.5	14.6	23.1	29.4	26.0	43.5	47.5	17.5	
11	195.2	Bic	V	-66.7	-73.1	14.6	23.1	31.8	25.4	43.5	47.5	18.1	
12	233.6	Bic	H	-63.5	-69.2	14.7	22.6	35.6	29.9	46.0	47.5	16.1	
13	233.6	Bic	V	-75.9		14.7	22.6	23.2		46.0	47.5	22.8	
14	239.9	Bic	H	-64.4		14.7	22.5	34.7		46.0	47.5	11.3	
15	239.9	Bic	V	-73.1		14.7	22.5	26.0		46.0	47.5	20.0	
16	288.0	SBic	H	-68.2	-70.8	17.4	21.9	34.2	31.6	46.0	47.5	14.4	
17	300.4	SBic	H	-63.7	-67.0	17.9	21.8	39.4	36.1	46.0	47.5	9.9	
18	300.4	SBic	V	-69.5		17.9	21.8	33.6		46.0	47.5	12.4	
19	336.0	SBic	H	-59.3	-60.1	19.2	21.4	45.5	44.7	46.0	47.5	**1.3**	
20	336.0	SBic	V	-70.0		19.2	21.4	34.8		46.0	47.5	11.2	
21													
22													
23													
24													
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*QPk detection below 1 GHz, Avg detection at or above 1 GHz with receiver bandwidth as specified at top of table.

3.3.5 Conducted Emissions Test Results - AC Power Port(s)

The results of emissions from the EUT's AC mains power port(s) are reported in Table 11.

Table 11(a): AC Mains Power Conducted Emissions Results.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	12-Jan-12
150kHz ≤ f ≤ 30 MHz	Pk/QPk/Avg	9 kHz	30 kHz	**Test Engineer:**	Joseph Brunett
				UT Mode/Config:	Config A: Amp w/ Lab Linear Supp.

FCC/IC/CISPR

#	Freq. MHz	Line Side	Peak Det., dBµV Vtest	Peak Det., dBµV Vlim*	Pass dB*	QP Det., dBµV Vtest	QP Det., dBµV Vlim	Pass dB	Ave. Det., dBµV Vtest	Ave. Det., dBµV Vlim	Pass dB	Comments
1	0.17	Lo	52.1	55.0	2.9	42.8	65.1	22.3	18.8	55.0	36.2	
2	0.18	Lo	51.4	54.4	3.0	42.5	64.5	22.0	18.4	54.4	36.0	
3	0.25	Lo	48.8	51.6	2.8	39.4	61.6	22.2	16.6	51.6	35.0	
4	0.35	Lo	46.9	48.9	2.0	38.2	59.0	20.8	15.7	48.9	33.2	
5	0.44	Lo	46.2	47.1	0.9	37.3	57.2	19.9	15.8	47.1	31.3	
6	0.46	Lo	46.6	46.7	0.1	37.5	56.8	19.3	15.8	46.7	30.9	
7	0.48	Lo	46.6	46.2	- 0.4	37.4	56.3	18.9	15.7	46.2	30.5	
8	0.52	Lo	45.7	46.0	0.3	36.7	56.0	**19.3**	15.6	46.0	**30.4**	
9	0.53	Lo	45.7	46.0	0.3	36.5	56.0	19.5	15.6	46.0	30.4	
10	0.56	Lo	44.9	46.0	1.1	35.8	56.0	20.2	15.5	46.0	30.5	
11	0.57	Lo	44.2	46.0	1.8	35.0	56.0	21.0	15.3	46.0	30.7	
12	0.61	Lo	42.9	46.0	3.1	33.4	56.0	22.6	15.3	46.0	30.7	
13	0.68	Lo	40.7	46.0	5.3	30.7	56.0	25.3	15.2	46.0	30.8	
14	0.72	Lo	39.8	46.0	6.2	30.1	56.0	25.9	15.2	46.0	30.8	
15	0.75	Lo	39.3	46.0	6.7	29.8	56.0	26.2	15.3	46.0	30.7	
16	0.75	Lo	39.6	46.0	6.4	29.6	56.0	26.4	15.3	46.0	30.7	
17	0.79	Lo	38.9	46.0	7.1	29.5	56.0	26.5	15.4	46.0	30.6	
18	0.84	Lo	39.0	46.0	7.0	29.0	56.0	27.0	15.3	46.0	30.7	
19	0.87	Lo	38.4	46.0	7.6	28.3	56.0	27.7	15.2	46.0	30.8	
20	0.88	Lo	38.1	46.0	7.9	28.2	56.0	27.8	15.2	46.0	30.8	
21												
22	0.14	Hi	52.5	56.4	3.9	43.8	66.5	22.7	19.1	56.4	37.3	
23	0.19	Hi	50.1	53.8	3.7	40.9	63.9	23.0	16.8	53.8	37.0	
24	0.21	Hi	49.9	53.4	3.5	40.8	63.4	22.6	16.9	53.4	36.5	
25	0.23	Hi	49.0	52.6	3.6	39.8	62.6	22.8	16.3	52.6	36.3	
26	0.23	Hi	48.4	52.3	3.9	39.3	62.4	23.1	16.2	52.3	36.1	
27	0.25	Hi	48.3	51.8	3.5	39.0	61.9	22.9	15.9	51.8	35.9	
28	0.27	Hi	47.2	51.2	4.0	38.2	61.3	23.1	15.5	51.2	35.7	
29	0.27	Hi	47.2	51.0	3.8	38.2	61.1	22.9	15.4	51.0	35.6	
30	0.28	Hi	47.6	50.7	3.1	38.0	60.7	22.7	15.3	50.7	35.4	
31	0.33	Hi	46.1	49.3	3.2	36.8	59.4	22.6	15.1	49.3	34.2	
32	0.34	Hi	45.6	49.1	3.5	36.6	59.1	22.5	14.9	49.1	34.2	
33	0.43	Hi	44.4	47.3	2.9	35.4	57.4	22.0	14.6	47.3	32.7	
34	0.45	Hi	44.5	46.8	2.3	35.2	56.8	21.6	14.7	46.8	32.1	
35	0.47	Hi	44.4	46.5	2.1	35.2	56.5	21.3	14.6	46.5	31.9	
36	0.47	Hi	44.5	46.4	1.9	35.3	56.4	**21.1**	14.6	46.4	31.8	
37	0.51	Hi	43.8	46.0	2.2	34.4	56.0	21.6	14.5	46.0	31.5	
38	0.52	Hi	43.3	46.0	2.7	34.0	56.0	22.0	14.7	46.0	**31.3**	
39	0.58	Hi	41.2	46.0	4.8	31.8	56.0	24.2	14.5	46.0	31.5	
40	0.61	Hi	40.3	46.0	5.7	30.3	56.0	25.7	14.4	46.0	31.6	
41	0.70	Hi	36.2	46.0	9.8	26.3	56.0	29.7	14.5	46.0	31.5	
42												
43												

Table 11(b): AC Mains Power Conducted Emissions Results.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**	**Test Date:**	13-Jan-12
150kHz ≤ f ≤ 30 MHz	Pk/QPk/Avg	9 kHz	30 kHz	**Test Engineer:**	Joseph Brunett
				UT Mode/Config:	Config A: Radio w/ Lab Linear Supp

													FCC/IC/CISPR
	Freq.	Line	Peak Det., dBµV		Pass	QP Det., dBµV		Pass	Ave. Det., dBµV		Pass	
#	MHz	Side	Vtest	Vlim*	dB*	Vtest	Vlim	dB	Vtest	Vlim	dB	Comments
1	0.18	Lo	49.48	54.3	4.9		64.4			54.3		
2	0.23	Lo	47.62	52.3	4.7		62.4			52.3		
3	0.27	Lo	46.34	51.2	4.9		61.3			51.2		
4	0.34	Lo	45.44	49.3	3.8		59.3			49.3		
5	0.35	Lo	44.78	48.8	4.1		58.9			48.8		
6	0.37	Lo	44.49	48.5	4.0		58.6			48.5		
7	0.44	Lo	44.37	47.1	2.7		57.1			47.1		
8	0.50	Lo	43.26	46.0	2.7		56.1			46.0		
9	0.56	Lo	42.20	46.0	3.8		56.0			46.0		
10	0.58	Lo	41.73	46.0	4.3		56.0			46.0		
11	2.63	Lo	24.02	46.0	129.0		56.0			46.0		
12	3.96	Lo	21.07	46.0	131.9		56.0			46.0		
13	5.29	Lo	19.08	50.0	137.9		60.0			50.0		
14	7.11	Lo	19.92	50.0	137.1		60.0			50.0		
15	9.56	Lo	18.92	50.0	138.1		60.0			50.0		
16	13.69	Lo	18.70	50.0	138.3		60.0			50.0		
17	14.04	Lo	18.27	50.0	138.7		60.0			50.0		
18	27.27	Lo	18.02	50.0	139.0		60.0			50.0		
19												
20	0.17	Hi	49.79	54.8	5.0		64.8			54.8		
21	0.19	Hi	48.72	53.9	5.2		64.0			53.9		
22	0.24	Hi	47.32	52.1	4.8		62.2			52.1		
23	0.27	Hi	46.04	51.2	5.2		61.3			51.2		
24	0.37	Hi	44.92	48.5	3.6		58.6			48.5		
25	0.38	Hi	44.90	48.2	3.3		58.3			48.2		
26	0.40	Hi	44.81	47.8	3.0		57.9			47.8		
27	0.42	Hi	44.69	47.3	2.7		57.4			47.3		
28	0.55	Hi	43.30	46.0	2.7		56.0			46.0		
29	0.59	Hi	42.32	46.0	3.7		56.0			46.0		
30	5.36	Hi	25.41	50.0	24.6		60.0			50.0		
31	9.56	Hi	23.51	50.0	26.5		60.0			50.0		
32	19.92	Hi	22.88	50.0	27.1		60.0			50.0		
33	21.25	Hi	22.29	50.0	27.7		60.0			50.0		
34	21.74	Hi	21.33	50.0	28.7		60.0			50.0		
35	23.07	Hi	20.50	50.0	29.5		60.0			50.0		
36	24.12	Hi	20.24	50.0	29.8		60.0			50.0		
37	24.82	Hi	20.09	50.0	29.9		60.0			50.0		
38	27.90	Hi	20.00	50.0	30.0		60.0			50.0		
39	29.65	Hi	20.00	50.0	30.0		60.0			50.0		
40												
41												
42												
43												