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Testing of

Electromagnetic Emissions

per

USA: CFR Title 47, Part 15.249
Canada: IC RSS-210/GENe

are herein reported for

FortrezZ, LLC
FM5202-US

Test Report No.: 20140504-01

Applicant/Provider:
FortrezZ, LLC
520 Aarons Way, Ortonville Michigan 48462 USA
Phone: +1 (248) 481-7092, Fax: +1 (248) 481-7092
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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:	May 4, 2014

Results of testing completed on (or before) May 4, 2014 are as follows.

Emissions: The transmitter intentional emissions **COMPLY** with the regulatory limit(s) by no less than 2.8 dB. Transmit chain spurious harmonic emissions **COMPLY** by no less than 4.7 dB. Radiated spurious emissions associated with the receive chain of this device **COMPLY** the regulatory limit(s) by no less than 20 dB. Unintentional spurious emissions from digital circuitry **COMPLY** with radiated emission limit(s) by more than 14.5 dB. AC Power Line conducted emissions **COMPLY** by more than 14.6 dB.

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1 Test Specifications, General Procedures, and Location

1.1 Test Specification and General Procedures

The ultimate goal of FortrezZ, LLC is to demonstrate that the Equipment Under Test (EUT) complies with the Rules and/or Directives below. Detailed in this report are the results of testing the FortrezZ, LLC FM5202-US for compliance to:

Country/Region	Rules or Directive	Referenced Section(s)
United States	Code of Federal Regulations	CFR Title 47, Part 15.249
Canada	Industry Canada	IC RSS-210/GENe

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"
ICES-003; Issue 5 (2012)	"Information Technology Equipment (ITE) Limits and methods of measurement"
Industry Canada	"The Measurement of Occupied Bandwidth"

1.2 Test Location and Equipment Used

Test Location The EUT was fully tested by **Willow Run Test Labs, LLC**, 8501 Beck Road, Building 2227, Belleville, Michigan 48111 USA. The Test Facility 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-2014
Dipole Set (20 MHz - 1000 MHz)	EMCO/3121C	9504-1121	DIPEMC001	Liberty Labs / Sept-2016
Bicone (20 MHz - 250 MHz)	JEF	1	BICJEF001	UMRL / July-2014
Bicone (200 MHz - 1000 MHz)	JEF	1	SBICJEF001	UMRL / July-2014
Log-Periodic Array (200 MHz - 1000 MHz)	JEF/Isbell	1	LOGJEF001	UMRL / July-2014
Ridge-Horn Antenna	Univ. of Michigan	5	UMHORN005	UMRL / July-2014
L-Band	JEF		HRNL001	JEF / July-2014*
LS-Band Horns	JEF/NRL	001, 002	HRN15001, HRN15002	JEF / July-2014*
S-Band Horns	Scientific-Atlanta	1854	HRNSB001	JEF / July-2014*
C-Band	JEF/NRL	1	HRNC001	JEF / July-2014*
XN-Band Horns	JEF/NRL	001, 002	HRNXN001, HRNXN002	JEF / July-2014*
X-Band Horns	JEF/NRL	001, 002	HRNXB001, HRNXB002	JEF / July-2014*
Ku-Band Horns	JEF/NRL	001, 002	HRNKU001, HRNKU002	JEF / July-2014*
Ka-Band Horns	JEF/NRL	001, 002	HRNKA001, HRNKA002	JEF / July-2014*
Quad-Ridge Horns	Condor AS-48461	C35200	QRH218001	WRTL / July-2014
Analyzers & Generators				
Spectrum Analyzer	HP/8593E	3649A02722	HP8593E001	DTI / Nov-2014
Spectrum Analyzer	R&S/FSV30	101660	RSFSV30001	R&S / Mar-2015
Radio Test Set	R&S/CMU200	100104	RSCMU20001	Not Necessary
Line Impedance Stabilization Networks				
LISN	EMCO	9304-2081	LISNEM001	JEF / Jan-2015

* Verification Only - Standard Gain Horn Antennas

2 Configuration and Identification of the Equipment Under Test

2.1 Description and Declarations

The equipment under test is a modular Z-Wave Transceiver. The EUT is approximately 20 x 31 x 5 mm in dimension, and is depicted in Figure 1. It is powered by a 3-16 VDC any DC power supply. This modular transceiver is used by various manufacturers to add Z-Wave functionality to their product. Table 2 outlines provider declared EUT specifications.

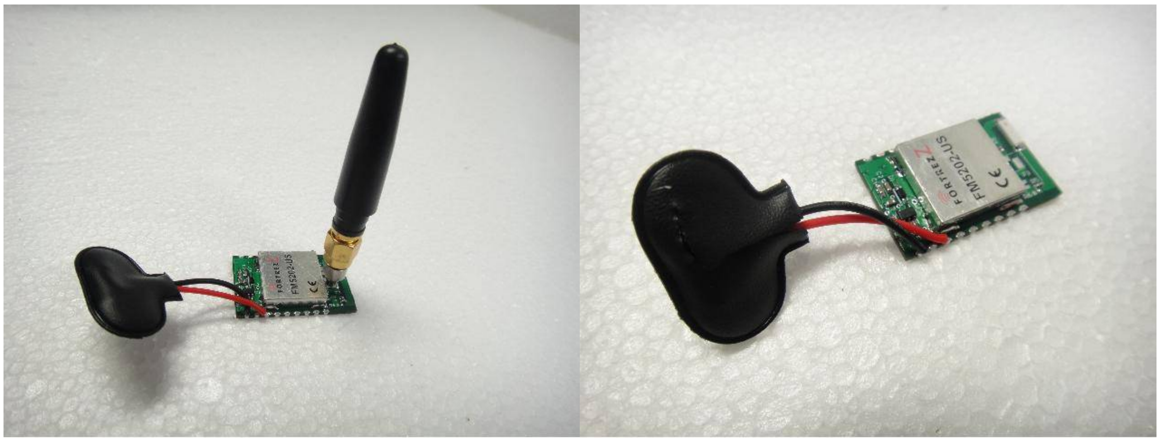

Figure 1: Photos of EUT.

Table 2: EUT Declarations.

General Declarations			
Equipment Type:	Z-Wave Transceiver	**Country of Origin:**	USA
Nominal Supply:	3-16 VDC	**Oper. Temp Range:**	0^o C to $+40^o$ C
Frequency Range:	908.4 MHz	**Antenna Dimension:**	1 cm chip, 3 cm monopole
Antenna Type:	Chip Antenna or Monopole	**Antenna Gain:**	0 dBi (chip), 2.14 dBi (monopole)
Number of Channels:	1	**Channel Spacing:**	Not Applicable
Alignment Range:	Not Declared	**Type of Modulation:**	FSK
United States			
FCC ID Number:	XCT-FM5202	**Classification:**	DSC
Canada			
IC Number:	8156A-FM5202	**Classification:**	Low Power Device (902 to 928 MHz)

2.1.1 EUT Configuration

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

2.1.2 Modes of Operation

This device is capable of only a single mode of operation, as a Z-wave transceiver.

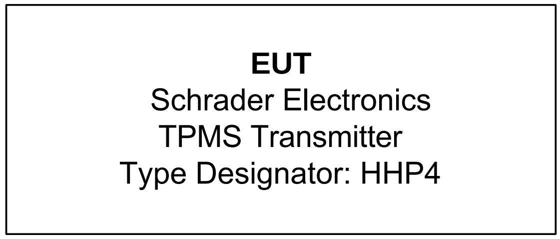

Figure 2: EUT Test Configuration Diagram.

2.1.3 Variants

There is only a single variant (model) of the EUT that may be populated with one of two antennas.

2.1.4 Test Samples

Two continuously modulated samples were provided for testing. One sample populated with the onboard chip antenna, and a second sample populated with a U.fL. connector, along with a sample of the monopole antenna.

2.1.5 Functional Exerciser

Normal operating EUT functionality was verified by observation of transmitted signal.

2.1.6 Modifications Made

There were no modifications made to the EUT by this laboratory.

2.1.7 Production Intent

The EUT appears to be a production ready sample.

2.1.8 Declared Exemptions and Additional Product Notes

None.

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 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. All

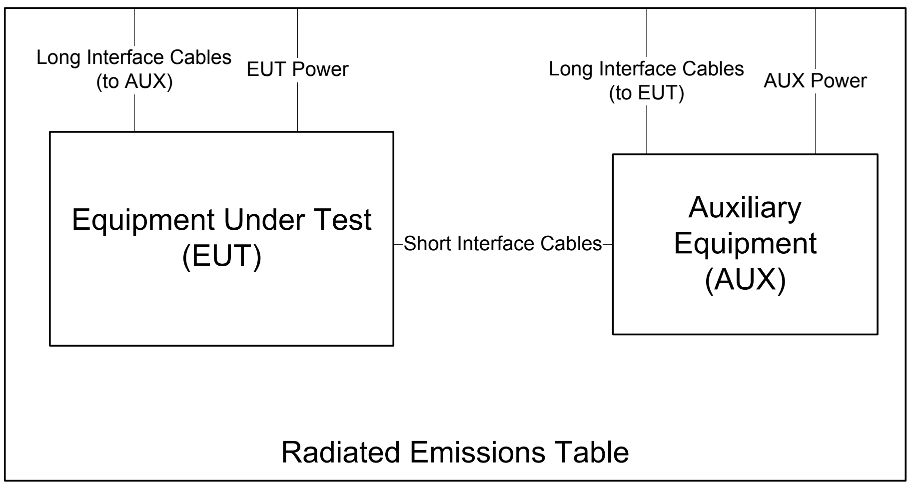

Figure 3: Radiated Emissions Diagram of the EUT.

intentionally radiating elements that are not fixed-mounted in use 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. If the EUT is fixed-mounted in use, measurements are made with the device oriented in the manner consistent with installation and then emissions are recorded.

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. 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. Emissions above 1 GHz are characterized using standard gain horn antennas or calibrated broadband ridge-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. Photographs of the test setup employed are depicted in Figure 4.

Where regulations allow for direct measurement of field strength, power values (dBm) measured on the test receiver / analyzer are converted to dBμV/m at the regulatory distance, using

$$E_{dist} = 107 + P_R + K_A - K_G + K_E - C_F$$

where P_R is the power recorded on spectrum analyzer, in dBm, K_A is the test antenna factor in dB/m, K_G is the combined pre-amplifier gain and cable loss in dB, K_E is duty correction factor (when applicable) in dB, and C_F is a distance conversion (employed only if limits are specified at alternate distance) in dB. This field strength value is then compared with the regulatory limit. If effective isotropic radiated power (EIRP) is compute, it is computed as

$$EIRP(dBm) = E_{3m}(dB\mu V/m) - 95.2.$$

When presenting data at each frequency, the highest measured emission under all possible EUT orientations (3-axes) is reported.

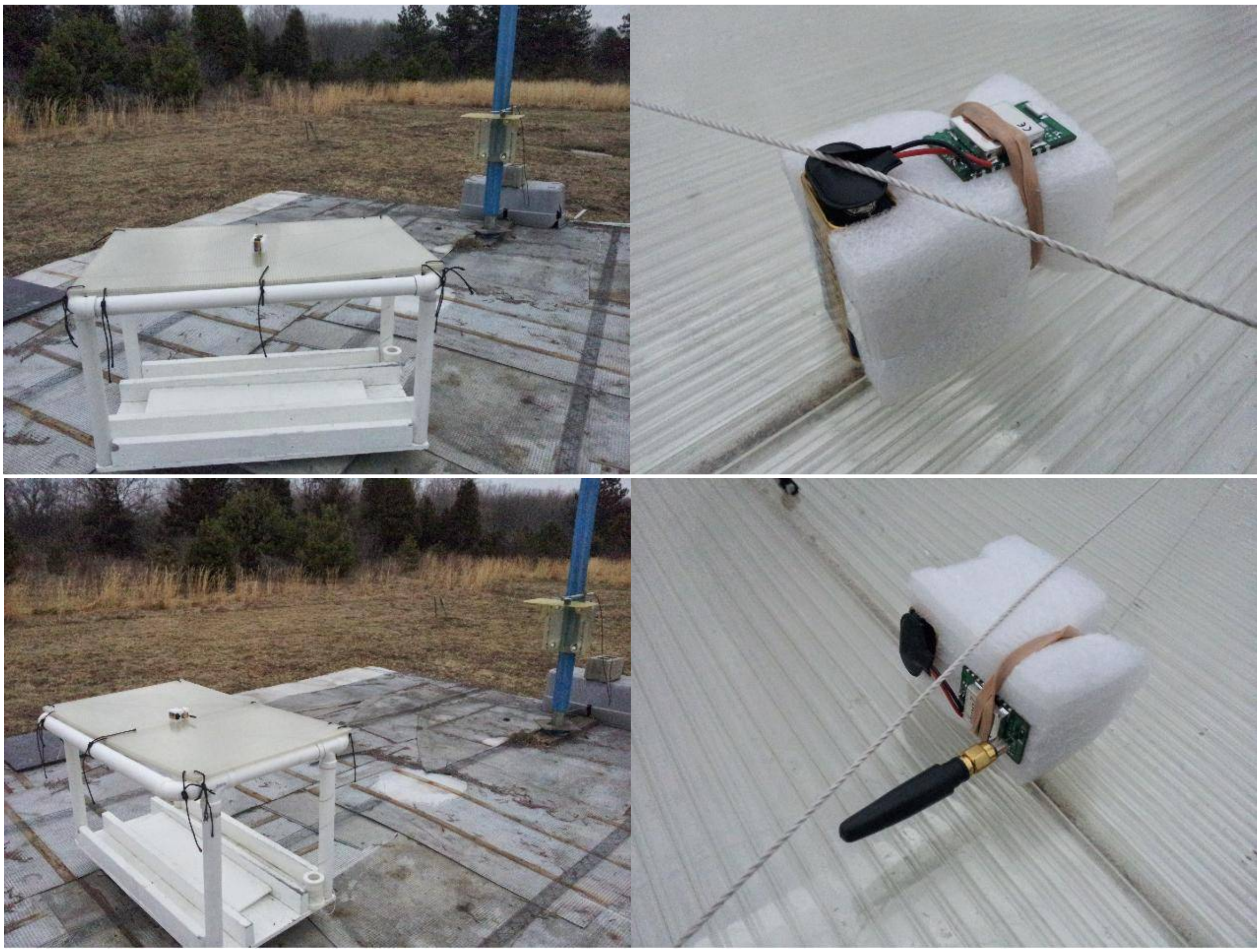

Figure 4: Radiated Emissions Test Setup Photograph(s).

3.1.2 Conducted Emissions Test Setup and Procedures

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

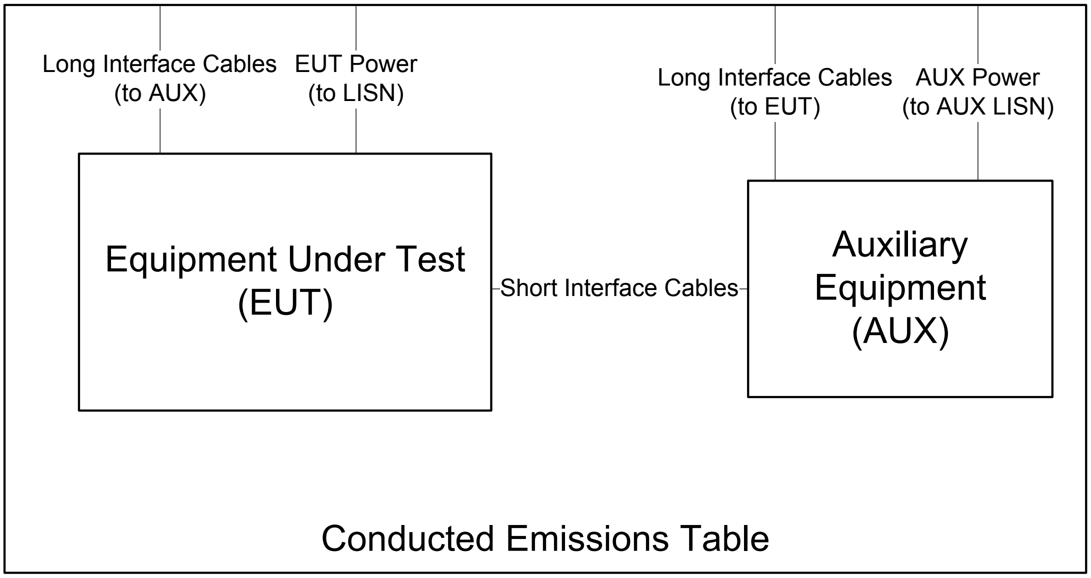

Figure 5: Conducted Emissions Setup Diagram of the EUT.

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 $+40^o$ 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.

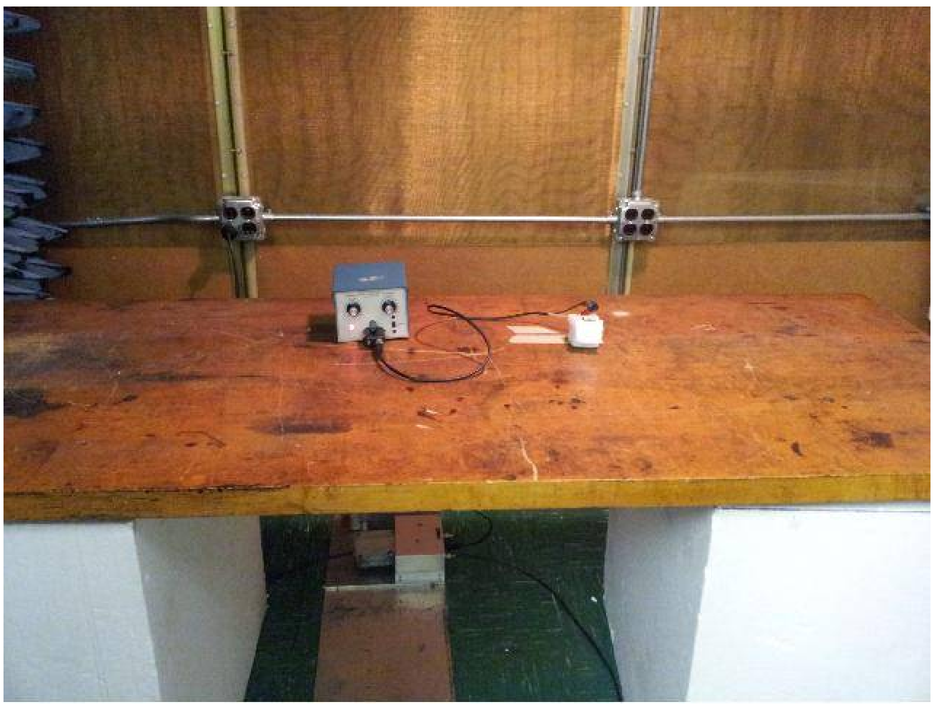

Figure 6: Conducted Emissions Test Setup Photograph(s).

3.2 Intentional Emissions

3.2.1 Fundamental Emission Pulsed Operation

The details and results of testing the EUT for pulsed operation are summarized in Table 3. Plots showing the measurements made to obtain these values are provided in Figure 7.

Table 3: Pulsed Emission Characteristics (Duty Cycle).

Detector	Span	IF Bandwidth	Video Bandwidth
Pk	0	1 MHz	3 MHz

Test Date:	2-May-14
Test Engineer:	Joseph Brunett
EUT:	FortrezZ
EUT Mode:	Modulated
Meas. Distance:	10 cm

FCC/IC

		Overall Transmission			Internal Frame Characteristics			Computed Duty Cycle	
#	EUT Test Mode	Min. Repetition Rate (sec)	Max. No. of Frames	Total Transmission Length (sec)	Max. Frame Length (ms)	Min. Frame Period (ms)	Frame Encoding	(%)	(dB)
1	Cont. Modulation	Cont.	1	Inf.	Inf.	N/A	Worst case continuous on-time employed. Not duty cycle applied.	100.0	0.0

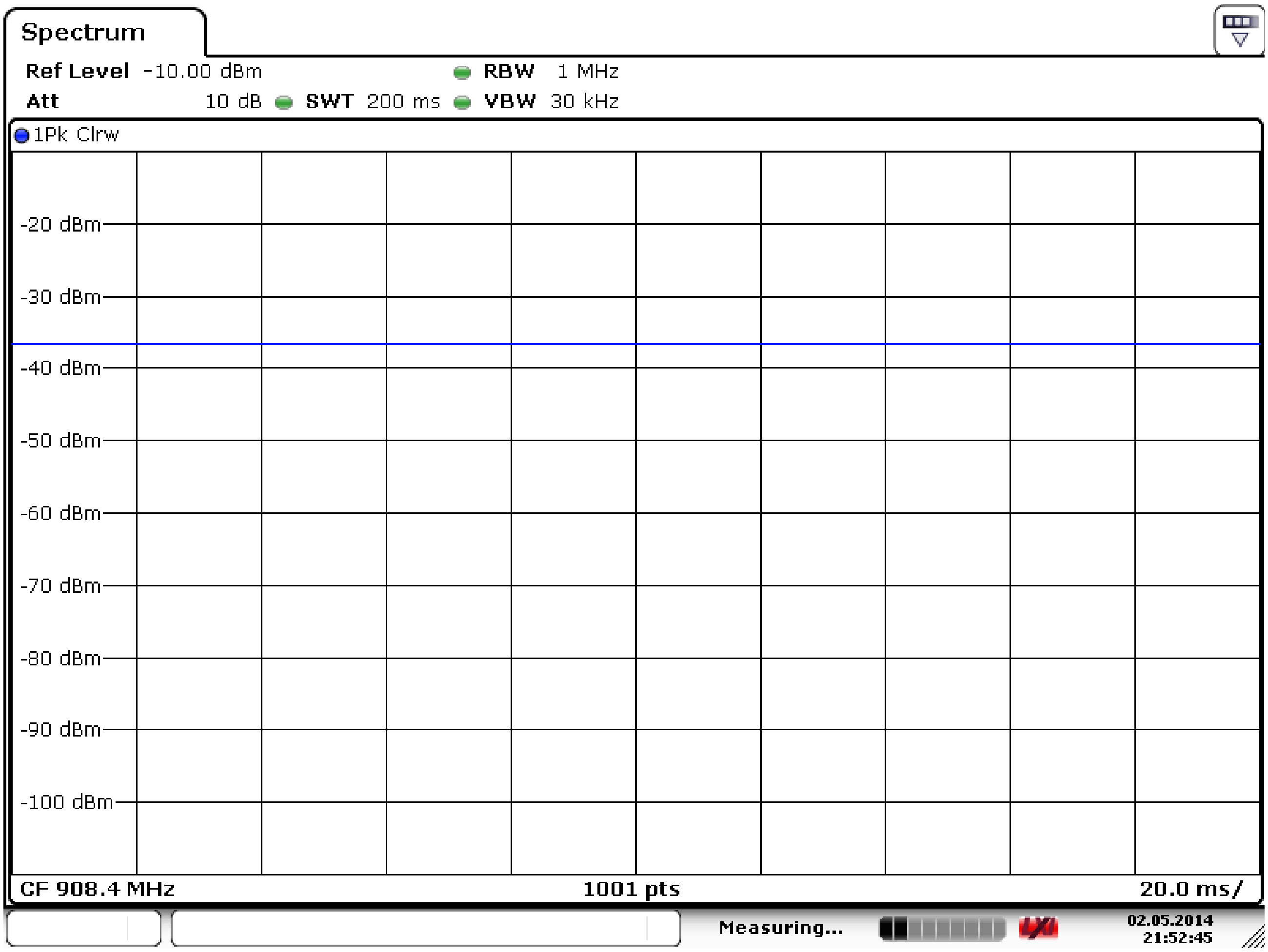

Figure 7: Pulsed Emission Characteristics (Duty Cycle).

3.2.2 Fundamental Emission Bandwidth

Emission bandwidth (EBW) of the EUT is measured with the device placed in the test mode(s) with the shortest available frame length and minimum frame spacing. Radiated emissions are recorded following the test procedures listed in Section 1.1. The 20 dB EBW is measured as the max-held peak-detected signal when the IF bandwidth is greater than or equal to 1% of the receiver span. For complex modulations other than ASK and FSK, the 99% emission bandwidth per IC test procedures has a different result, and is also separately reported.The results of EBW testing are summarized in Table 4. Plots showing measurements employed to obtain the emission bandwidth reported are provided in Figure 8.

Table 4: Intentional Emission Bandwidth.

Detector	IF Bandwidth	Video Bandwidth
Pk	10 kHz	30 kHz

Test Date:	2-May-14
Test Engineer:	Joseph Brunett
EUT:	FortrezZ
EUT Mode:	Modulated
Meas. Distance:	10 cm

							FCC/IC
#	Modulation	Center Frequency (MHz)	20 dB EBW (kHz)				
1	FSK	908.4	79.9000				
2							

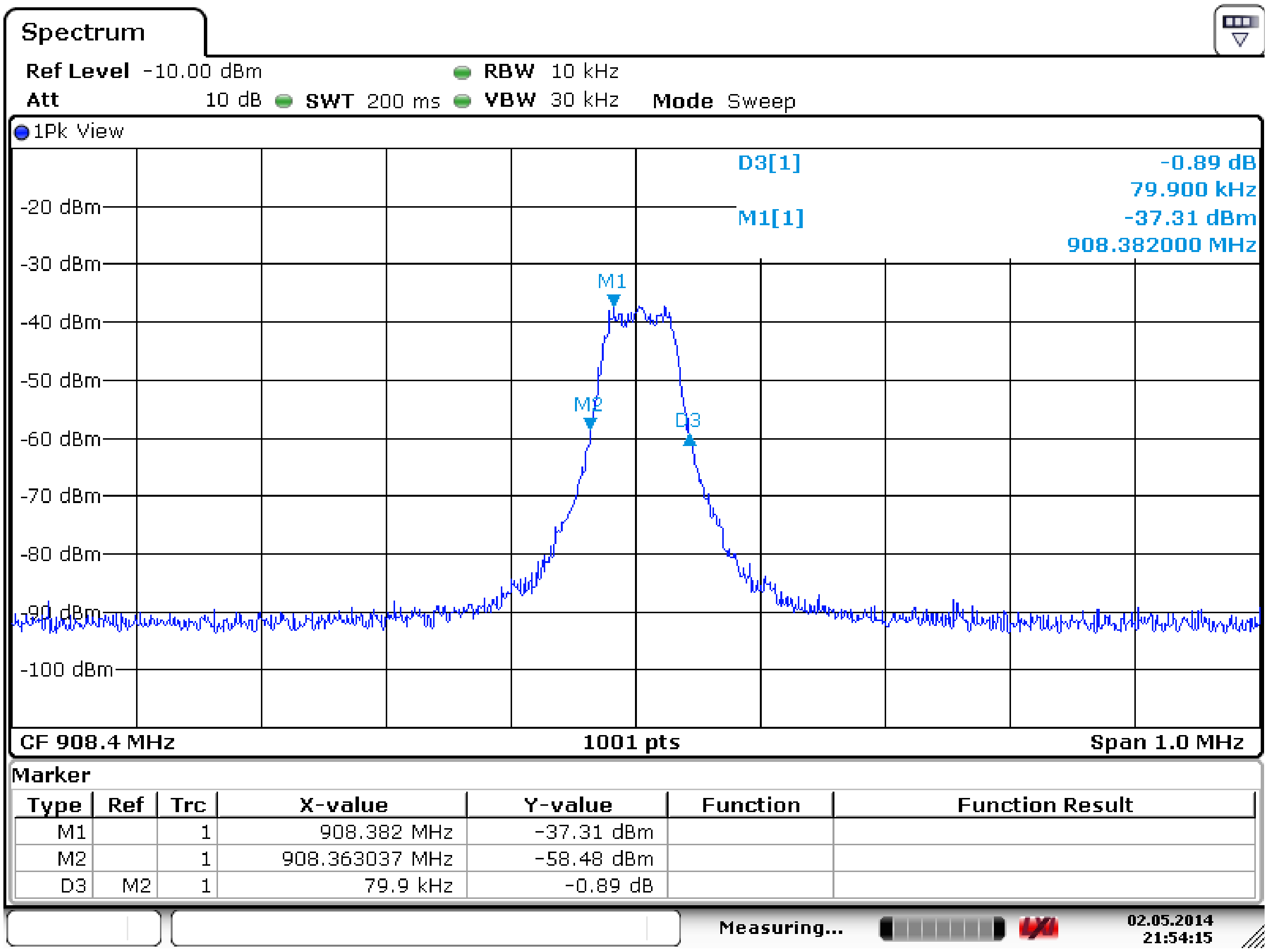

Figure 8: Intentional Emission Bandwidth.

3.2.3 Fundamental Emission

Following the test procedures listed in Section 1.1, radiated emissions measurements are made on the EUT for both Horizontal and Vertical polarized fields. Table 5 details the results of these measurements.

Table 5: Fundamental Radiated Emissions.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	28-Apr-14
f > 1 000 MHz	Pk	1 MHz	3MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT:**	Fortrez
				EUT Mode:	Cont. Mod.
				Meas. Distance:	3 meters

#	Freq. MHz	Ant. Used	Ant. Pol.	Pr (Pk) dBm	Pr (Qpk)* dBm	Ka dB/m	Kg dB	E3(Pk) dBμV/m	E3(Avg) dBμV/m	FCC/IC E3(Avg) Lim. dBμV/m	Pass dB	Comments
												FCC/IC
1	**Chip Antenna**											
2	908.4	Dip	H	-18.2	-19.4	28.4	27.8	89.4	88.2	94.0	5.8	side
3	908.4	Dip	V	-17.1	-18.3	28.4	27.8	90.5	89.3	94.0	4.7	end
4	**Monopole Antenna**											
5	908.4	Dip	H	-15.8	-17.0	28.4	27.8	91.8	90.6	94.0	3.4	side
6	908.4	Dip	V	-15.2	-16.4	28.4	27.8	92.4	91.2	94.0	**2.8**	end
#	Freq. MHz	DC Supply Voltage		Relative Pr (Pk) dBm**								
7	908.4	3.00		-7.0								
8	908.4	6.00		-7.0								
9	908.4	9.00		-7.0								
10	908.4	12.00		-7.0								
11	908.4	16.00		-7.0								

*QPk data measured on Continously Modulated device.

** Conducted Power (Pk), Continously Modulated mode.

3.3 Unintentional Emissions

3.3.1 Transmit Chain Spurious Emissions

The results for the measurement of transmit chain spurious emissions at the nominal voltage and temperature are provided in Table 6. Measurements are performed to 10 times the highest fundamental operating frequency.

Table 6: Transmit Chain Spurious Emissions.

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

Test Date:	28-Apr-14
Test Engineer:	Joseph Brunett
EUT:	Fortrez
EUT Mode:	Cont. Mod.
Meas. Distance:	3 meters

Transmitter Unintentional 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	FCC/IC E3lim (Avg) dBμV/m	Pass dB	Comments
1	**Chip Antenna**											
2	1816.8	HFLog	H	-62.3	-62.3	33.6	29.0	49.3	49.3	54.0	**4.7**	flat
3	2725.2	HFLog	H	-63.4	-63.4	32.6	32.8	43.4	43.4	54.0	10.6	side
4	3633.6	HFLog	H	-64.8	-64.8	31.7	35.3	38.6	38.6	54.0	15.4	max all, noise
5	4542.0	HFLog	H	-66.6	-66.6	29.6	37.1	32.9	32.9	54.0	21.1	max all, noise
6	5450.4	HFLog	H	-74.3	-74.3	25.1	38.3	19.5	19.5	54.0	34.5	max all, noise
7	6358.8	HFLog	H	-61.0	-61.0	33.9	39.3	40.5	40.5	54.0	13.5	max all, noise
8	7267.2	HFLog	H	-62.6	-62.6	33.6	40.2	37.8	37.8	54.0	16.2	max all, noise
9	8175.6	HFLog	H	-59.8	-59.8	32.8	41.1	38.9	38.9	54.0	15.1	max all, noise
10	9084.0	HFLog	H	-66.5	-66.5	31.7	42.1	30.2	30.2	54.0	23.8	max all, noise
11	**Monopole Antenna**											
12	1816.8	HFLog	H	-65.8	-65.8	33.6	29.0	45.8	45.8	54.0	8.2	flat
13	2725.2	HFLog	H	-66.1	-66.1	32.6	32.8	40.7	40.7	54.0	13.3	max all, noise
14	3633.6	HFLog	H	-64.3	-64.3	31.7	35.3	39.1	39.1	54.0	14.9	max all, noise
15	4542.0	HFLog	H	-65.6	-65.6	29.6	37.1	33.9	33.9	54.0	20.1	max all, noise
16	5450.4	HFLog	H	-76.5	-76.5	25.1	38.3	17.3	17.3	54.0	36.7	max all, noise
17	6358.8	HFLog	H	-61.6	-61.6	33.9	39.3	39.9	39.9	54.0	14.1	max all, noise
18	7267.2	HFLog	H	-60.2	-60.2	33.6	40.2	40.2	40.2	54.0	13.8	max all, noise
19	8175.6	HFLog	H	-61.6	-61.6	32.8	41.1	37.1	37.1	54.0	16.9	max all, noise
20	9084.0	HFLog	H	-65.3	-65.3	31.7	42.1	31.4	31.4	54.0	22.6	max all, noise
21												
22												
23												
24												
25												
26												

*Avg data computed from Peak Measured Data and EUT Duty Cycle. EUT in CW mode.

3.3.2 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 7. 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 7: Receiver Chain Spurious Emissions ≥ 30 MHz.

Frequency Range	Det	IF Bandwidth	Video Bandwidth		
25 MHz ≤ f ≤ 1 000 MHz	Pk/QPk	120 kHz	300 kHz	**Test Date:**	12-Apr-14
f > 1 000 MHz	Pk/Avg	1 MHz	3 MHz/10kHz	**Test Engineer:**	Joseph Brunett
				EUT:	FortrezZ
				EUT Mode:	Cont. Mod.
				Meas. Distance:	3 meters

	Receive Chain Spurious Emissions												FCC/IC
#	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													
2													
3	NOTE: No emissions within 20 dB of the Class B (54 dBuV/m) limit were observed with EUT placed in Rx Only mode by manufacturer												
4													
5													
6													

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

3.3.3 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 8. Radiation from digital components has been measured to 4 GHz, or to five times the maximum digital component operating frequency, whichever is greater.

Table 8: 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:**	12-Apr-14
f > 1 000 MHz	Pk	1 MHz	3 MHz	**Test Engineer:**	Joseph Brunett
f > 1 000 MHz	Avg	1 MHz	10kHz	**EUT:**	FortrezZ
				EUT Mode:	Cont. Mod.
				Meas. Distance:	3 meters

	Digital Spurious Emissions																	FCC/IC + CE(CISPR)
	Test	Antenna		Pr (Pwr Rx.)				E-Field @ 3m		FCC/IC Class B		CE Class B		FCC/IC Class A		CE Class A		
#	Freq. MHz	Type Used	Test Pol.	Pk dBm	QPk/Avg dBm*	Ka dB/m	Kg dB	Pk dBμV/m	QPk/Avg dBμV/m	E3lim dBμV/m	Pass dB	E3lim dBμV/m	Pass dB	E3lim dBμV/m	Pass dB	E3lim dBμV/m	Pass dB	Comments
1	32.1	Bic	H	-56.7		12.7	40.1	22.8		40.0	17.2	40.5	17.7	49.5	26.7	50.5	27.7	noise
2	44.9	Bic	H	-49.9		9.9	39.8	27.2		40.0	12.8	40.5	13.3	49.5	22.3	50.5	23.3	noise
3	45.2	Bic	H	-48.1		9.8	39.8	28.9		40.0	11.1	40.5	11.6	49.5	20.6	50.5	21.6	noise
4	70.2	Bic	H	-46.3		7.6	39.2	29.1		40.0	10.9	40.5	11.4	49.5	20.4	50.5	21.4	noise
5	148.1	Bic	H	-54.6		12.3	37.7	27.1		43.5	16.4	40.5	13.4	54.0	26.9	50.5	23.4	noise
6	250.0	Bic	H	-52.5		14.6	36.0	33.1		46.0	12.9	47.5	14.4	56.9	23.8	57.5	24.4	noise
7	500.0	Log	H	-54.4		18.1	33.0	37.6		46.0	8.4	47.5	9.9	56.9	19.3	57.5	19.9	noise
8	1000.0	Log	H	-58.3		22.6	28.2	43.0		54.0	11.0	47.5	4.5	60.0	17.0	57.5	14.5	noise
9																		
10																		
12																		

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

3.3.4 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 9.

Table 9: AC Mains Power Conducted Emissions Results.

Frequency Range	**Det**	**IF Bandwidth**	**Video Bandwidth**		
150kHz ≤ f ≤ 30 MHz	Pk/QPk/Avg	9 kHz	30 kHz	**Test Date:**	12-Apr-14
				Test Engineer:	Joseph Brunett
				EUT:	FortrezZ
				EUT Mode:	Cont. Mod.
				Meas. Distance:	3 meters

AC Mains Power Conducted Emissions														
	Freq.	Line	Vmeas			Class A Qpk		Class A Avg		Class B Qpk		Class B Avg		
			Pk	Qpk	Avg	**Vlim***	Margin	**Vlim***	Margin	**Vlim***	Margin	**Vlim***	Margin	
#	MHz	Side	dBuV	dBuV	dBuV	dBuV	dB	dBuV	dB	dBuV	dB	dBuV	dB	Comments
1	0.48	Lo	30.3			79.0	48.7	66.0	35.7	56.4	26.1	46.3	16.0	
2	0.50	Lo	28.7			79.0	50.3	66.0	37.3	56.1	27.3	46.0	17.3	
3	0.53	Lo	29.7			73.0	43.3	60.0	30.3	56.0	26.3	46.0	16.3	
4	0.64	Lo	28.7			73.0	44.3	60.0	31.3	56.0	27.3	46.0	17.3	
5	0.74	Lo	29.0			73.0	44.0	60.0	31.0	56.0	27.0	46.0	17.0	
6	0.80	Lo	27.8			73.0	45.2	60.0	32.2	56.0	28.2	46.0	18.2	
7	0.90	Lo	28.3			73.0	44.7	60.0	31.7	56.0	27.7	46.0	17.7	
8	0.98	Lo	28.2			73.0	44.8	60.0	31.8	56.0	27.8	46.0	17.8	
9	1.43	Lo	26.7			73.0	46.3	60.0	33.3	56.0	29.3	46.0	19.3	
10	1.76	Lo	26.9			73.0	46.1	60.0	33.1	56.0	29.1	46.0	19.1	
11	1.81	Lo	29.3			73.0	43.7	60.0	30.7	56.0	26.7	46.0	16.7	
12	3.50	Lo	29.0			73.0	44.0	60.0	31.0	56.0	27.0	46.0	17.0	
13	4.20	Lo	30.0			73.0	43.0	60.0	30.0	56.0	26.0	46.0	**16.0**	
14	7.31	Lo	27.1			73.0	45.9	60.0	32.9	60.0	32.9	50.0	22.9	
15	11.93	Lo	26.4			73.0	46.6	60.0	33.6	60.0	33.6	50.0	23.6	
16														
17	0.18	Hi	33.3			79.0	45.7	66.0	32.7	64.5	31.2	54.4	21.1	
18	0.29	Hi	30.9			79.0	48.1	66.0	35.1	60.5	29.6	50.5	19.6	
19	0.51	Hi	30.5			73.0	42.5	60.0	29.5	56.0	25.5	46.0	15.5	
20	0.77	Hi	30.1			73.0	42.9	60.0	29.9	56.0	25.9	46.0	15.9	
21	1.10	Hi	29.6			73.0	43.4	60.0	30.4	56.0	26.4	46.0	16.4	
22	1.38	Hi	29.4			73.0	43.6	60.0	30.6	56.0	26.6	46.0	16.6	
23	1.59	Hi	29.9			73.0	43.1	60.0	30.1	56.0	26.1	46.0	16.1	
24	1.63	Hi	29.0			73.0	44.0	60.0	31.0	56.0	27.0	46.0	17.0	
25	2.00	Hi	29.6			73.0	43.4	60.0	30.4	56.0	26.4	46.0	16.4	
26	2.12	Hi	28.9			73.0	44.1	60.0	31.1	56.0	27.1	46.0	17.1	
27	3.21	Hi	31.4			73.0	41.6	60.0	28.6	56.0	24.6	46.0	**14.6**	
28	3.98	Hi	30.2			73.0	42.8	60.0	29.8	56.0	25.8	46.0	15.8	
29	5.80	Hi	29.0			73.0	44.0	60.0	31.0	60.0	31.0	50.0	21.0	
30	7.20	Hi	29.5			73.0	43.5	60.0	30.5	60.0	30.5	50.0	20.5	
31	7.24	Hi	27.6			73.0	45.4	60.0	32.4	60.0	32.4	50.0	22.4	
32														

**In all cases, VPk ≥ VQpk ≥ VAve. If VPk < Vavg limit, then VQPk limit and Vavg limit are met.*