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Test Report

Prepared for: Icom Incorporated

Model: MR1010-RII

Description: Marine Radar

Serial Number: 00000120

FCC ID: AFJ271410

To

FCC Part 80

Date of Issue: July 5, 2018

On the behalf of the applicant:	**Icom Incorporated** **1-1-32 Kamiminami Hirano-ku** **Osaka 547-0003** **Japan**
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Greg Corbin
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	June 24, 2018	Greg Corbin	Original Document
2.0	July 3, 2018	Greg Corbin	Added sub-paragraph reference to output power on test summary table on page 6. Added reference to ANSI C63.26-2015 to page 5. Added type of emission to page 5 Revised the units for PEP in the output power table from watts to kwatts on page 8

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ILAC / A2LA

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The tests results contained within this test report all fall within our scope of accreditation, unless noted in the table below

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: **2152.01**

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

Standard Test Conditions Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing:

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts: FCC Part 80, ANSI C63.26-2015.

Measurement results, unless otherwise noted, are worst-case measurements.

Environmental Conditions		
Temperature (ºC)	**Humidity (%)**	**Pressure (mbar)**
26.1 – 31.1	18.4 – 25.5	960.9 – 967.4

EUT Description
Model: MR1010-RII
Description: Marine Radar
Serial Number: 00000120
Additional Information: The EUT is a 4kW Radome Scanner Marine Radar operating at 9.4 GHz.
The radar operates from 10.2 – 42 volts DC. There is a 10 inch color TFT display that is used to control the radar and display the radar images. The RF output going to the antenna port is WR90 waveguide.
Type of emission = PON
Refer to Table 1 for pulse width and repetition rates for different distances.

Table 1 – Pulse Width/repetition rate vs distance

Instruction Manual Specifications				Measured PW and PRR		
Nautical Miles	**Pulse Width (ns)**	**Pulse Repetition Rate**		**Pulse Width (ns)**	**Pulse Repetition Rate**	
		(Hz)	**(u)s**		**(us)**	**(Hz)**
1/8	80	2160	462.96	90	465	2150.54
1/4	80	2160	462.96	90	463.75	2156.33
1/2	80	2160	462.96	90	467.5	2139.04
3/4	80	1440	694.44	90	700	1428.57
1	80	1440	694.44	90	703.75	1420.96
1 1/2	80	1440	694.44	90	703.75	1420.96
2	250	1440	694.44	225	700	1428.57
3	350	1440	694.44	330	697.5	1433.69
4	900	720	1388.89	900	1400	714.29
6	900	720	1388.89	900	1408	710.23
8	900	720	1388.89	900	1405	711.74
12	900	720	1388.89	900	1405	711.74
16	900	720	1388.89	900	1397	715.82
24	900	720	1388.89	900	1400	714.29
32	900	720	1388.89	900	1402	713.27
36	900	720	1388.89	900	1405	711.74

EUT Operation during Tests
The EUT was tested at 12 vdc under normal operation.
There was a waveguide coupler and 30 dB attenuator connected to the output for all tests unless otherwise noted for individual tests.

Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1047 80.213(g)	Modulation Requirements	Pass	
2.1046 80.215 (a)	Output Power (Conducted)	Pass	
2.1051 80.211(f)	Conducted Spurious Emissions	Pass	
2.1053 80.211(f)	Radiated Spurious Emissions	Pass	
2.1049 80.205	Emission Masks	Pass	
2.1049 80.205	Occupied Bandwidth	Pass	
2.1055 80.209(b)	Frequency Stability (Temperature Variation)	Pass	
2.1055, 80.209(b)	Frequency Stability (Voltage Variation)	Pass	

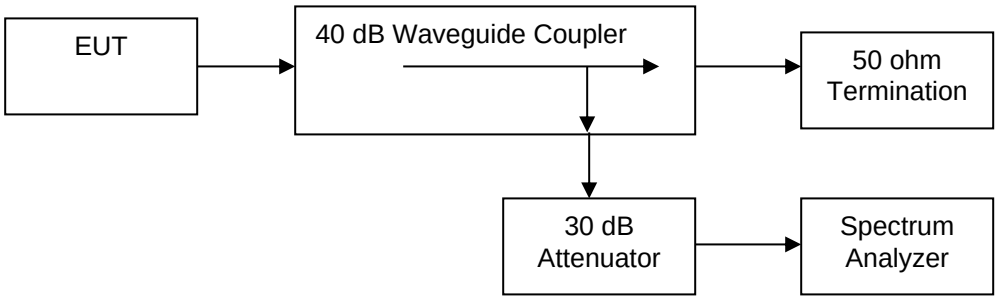
Modulation Requirements
Engineer: Greg Corbin
Test Date: 6/23/2018

Test Procedure

The EUT was setup as shown.
The Pulse Width and Pulse Repetition Rate was measured for each nautical mile setting using a Real Time Spectrum Analyzer set to the zero-span mode.

The waveguide coupler, 30 dB attenuator and RF cable insertion loss correction factors was input to the spectrum analyzer as correction factors or reference level offsets before recording the emission mask data.

Test Setup



Nautical Mile	Pulse Width (usec)	Pulse Repetition Rate (usec)	Pulse Repetition Frequency (Hz)
1/8	90	465	2150.54
1/4	90	463.75	2156.33
1/2	90	467.5	2139.04
3/4	90	700	1428.57
1	90	703.75	1420.96
1 1/2	90	703.75	1420.96
2	225	700	1428.57
3	330	697.5	1433.69
4	900	1400	714.29
6	900	1408	710.23
8	900	1405	711.74
12	900	1405	711.74
16	900	1397	715.82
24	900	1400	714.29
32	900	1402	713.27
36	900	1405	711.74

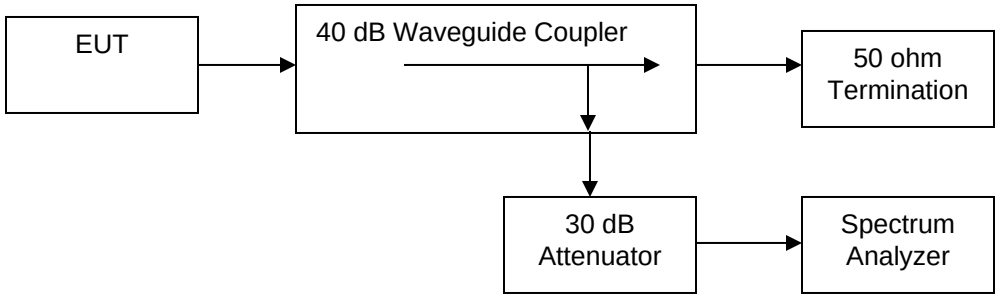
Output Power (Conducted)
Engineer: Greg Corbin
Test Date: 6/23/2018

Test Procedure

The channel power was measured for each distance listed in the table below.
The channel power was measured using the channel power tool on the spectrum analyzer with the integration bandwidth set to the measured occupied bandwidth.
The following formulas were utilized.

Duty Cycle Correction Factor (DCCR) =10*LOG10(1/(PW/((PRR*1000)+PW)))
PEP (peak envelope power) = Channel Power + DCCR

Test Setup



Nautical Mile (nm)	Pulse width (ns)	Pulse Rep. Rate (Hz)	Occupied BW (MHz)	Measured Channel Power		DCCR (dB)	Calculated PEP	
				dBm	watt		dBm	kwatt
1/8	90	465	27.225	27.8	0.6026	37.1329	64.9329	3.1138
1/4	90	463.75	27.325	27.79	0.6012	37.1213	64.9113	3.0983
1/2	90	467.5	27.775	27.81	0.6039	37.1562	64.9662	3.1378
3/4	90	700	27.125	26.12	0.4093	38.9091	65.0291	3.1835
1	90	703.75	27.175	26.11	0.4083	38.9323	65.0423	3.1932
1 1/2	90	703.75	26.975	26.14	0.4111	38.9323	65.0723	3.2154
2	225	700	17.6	31.11	1.2912	34.9306	66.0406	4.0184
3	330	697.5	13.375	32.64	1.8365	33.2524	65.8924	3.8836
4	900	1400	10.35	33.98	2.5003	31.9216	65.9016	3.8919
6	900	1408	11.2	33.99	2.5061	31.9464	65.9364	3.9232
8	900	1405	10.5	34	2.5119	31.9371	65.9371	3.9238
12	900	1405	10.45	34.02	2.5235	31.9371	65.9571	3.9420
16	900	1397	10.15	34.08	2.5586	31.9123	65.9923	3.9741
24	900	1400	10.4	34.05	2.5410	31.9216	65.9716	3.9552
32	900	1402	9.95	34.02	2.5235	31.9278	65.9478	3.9335
36	900	1405	10.375	34.07	2.5527	31.9371	66.0071	3.9876

Conducted Spurious Emissions
Engineer: Greg Corbin
Test Date: 6/19/2018

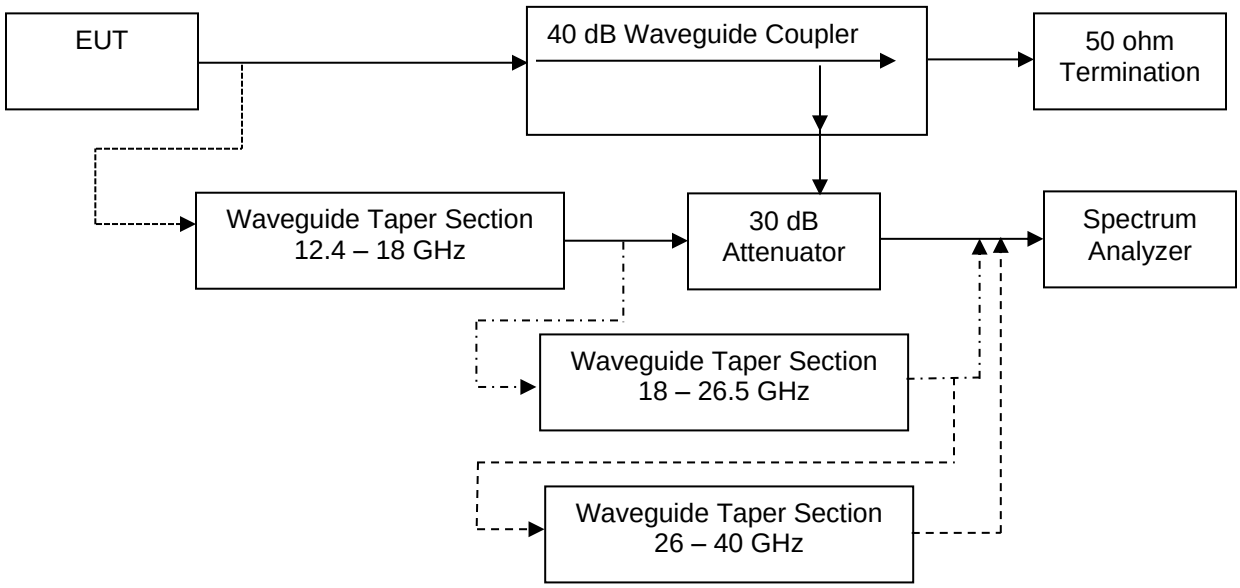
Test Procedure

Conducted spurious emissions were measured at the waveguide RF output as follows.
Spurious emissions were measured for each combination of PW/PRR and are referenced by the distance; 0.125, 1, 2, 3, 36 nautical miles.
RBW below 1 GHz = 100 kHz
RBW above 1 GHz = 1 MHz
When used, the waveguide coupler, 30 dB attenuator and RF cable insertion loss correction factors was input to the spectrum analyzer as correction factors or reference level offsets before recording the spurious emissions data.
From 30 MHz to 12.4 GHz the waveguide coupler and 30 dB attenuator were installed and the spurious was measured at the 30 dB attenuator output.
From 12.4 – 40 GHz, waveguide taper sections were installed at the EUT WR90 output.
From 12.4 – 18 GHz the waveguide coupler was removed and the 30 dB attenuator was moved to the waveguide taper output.
From 18 – 40 GHz, the 30 dB attenuator was removed and the spurious emissions were measured at the output of each taper section.
The following waveguide taper sections were used.

Waveguide Taper sections

Measured Frequency (GHz)	Waveguide Flange	Frequency Range (GHz)	Waveguide Flange	Frequency Range (GHz)
12.4 – 18	WR90	8.2 – 12.4	WR62	12.4 – 18
18 – 26.5	WR62	12.4 – 18	WR42	18 – 26.5
26.5 – 40	WR42	18 – 26.5	WR28	26.5 - 40

Test Setup



Conducted Spurious Emissions Test Results

Nautical Miles	Frequency Range GHz	Measured Spurious Emission (Peak)		DCCF dB	Final Spurious Emissions (avg) dBm	Limit dBm	Pass / Fail
		MHz	dBm				
0.125	0.010 - 1000	714.2	-40.7	-37.1	-77.8	-13	Pass
1	0.010 - 1000	969.11	-41.1	-38.9	-80	-13	Pass
2	0.010 - 1000	640	-40.4	-34.9	-75.3	-13	Pass
3	0.010 - 1000	915.38	-40.5	-33.3	-73.8	-13	Pass
36	0.010 - 1000	910.99	-41.1	-31.9	-73	-13	Pass
0.125	1 - 12.4	11298	-13.5	-37.1	-50.6	-13	Pass
1	1 - 12.4	11282.7	-14.3	-38.9	-53.2	-13	Pass
2	1 - 12.4	11232.9	-14.5	-34.9	-49.4	-13	Pass
3	1 - 12.4	11062.3	-14.1	-33.3	-47.4	-13	Pass
36	1 - 12.4	11334.6	-14.1	-31.9	-46	-13	Pass
0.125	12.4 - 18	16382.4	-21.8	-37.1	-58.9	-13	Pass
1	12.4 - 18	13506.9	-21.1	-38.9	-60	-13	Pass
2	12.4 - 18	16250.5	-21.3	-34.9	-56.2	-13	Pass
3	12.4 - 18	17286.9	-21.1	-33.3	-54.4	-13	Pass
36	12.4 - 18	13887.4	-20.8	-31.9	-52.7	-13	Pass
0.125	18 - 26.5	25487.3	-47.7	-37.1	-84.8	-13	Pass
1	18 - 26.5	24835.5	-48.4	-38.9	-87.3	-13	Pass
2	18 - 26.5	25649.1	-48.1	-34.9	-83	-13	Pass
3	18 - 26.5	24770.1	-48	-33.3	-81.3	-13	Pass
36	18 - 26.5	24807.5	-47.8	-31.9	-79.7	-13	Pass
0.125	26.5 - 40, 3rd Harmonic	28253.2	-15	-37.1	-52.1	-13	Pass
0.125	26.5 - 40, 4th Harmonic	36375.7	-23.2	-38.9	-62.1	-13	Pass
1	26.5 - 40, 3rd Harmonic	28252.7	-15.2	-34.9	-50.1	-13	Pass
1	26.5 - 40, 4th Harmonic	37674.2	-23.4	-33.3	-56.7	-13	Pass
2	26.5 - 40, 3rd Harmonic	28250.5	-1.3	-31.9	-33.2	-13	Pass
2	26.5 - 40, 4th Harmonic	38661.5	-15.1	-37.1	-52.2	-13	Pass
3	26.5 - 40, 3rd Harmonic	28248.1	2.4	-38.9	-36.5	-13	Pass
3	26.5 - 40, 4th Harmonic	37658.6	-12.2	-34.9	-47.1	-13	Pass
36	26.5 - 40, 3rd Harmonic	28240.8	11.2	-33.3	-22.1	-13	Pass
36	26.5 - 40, 4th Harmonic	37651.2	-2.5	-31.9	-34.4	-13	Pass

All spurious emissions were below the -13 dBm limit.

No other spurious emissions were observed.

Radiated Spurious Emissions
Engineer: Greg Corbin
Test Date: 6/24/2018

Test Procedure

The EUT was tested in a semi-anechoic chamber with the turntable set 3m from the receiving antenna.
A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions.
The EUT was tested by rotating it 360 degrees with the antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure that the signal levels were maximized.

Spurious emissions were measured for each combination of PW/PRR and are referenced by the distance; 0.125, 1, 2, 3, 36 nautical miles.

Per 80.211(f), the spurious emissions are referenced to the mean (avg) power.

The peak emissions were measured and the average emission was calculated and compared to the limit.

The following formula was used for calculating the limits:

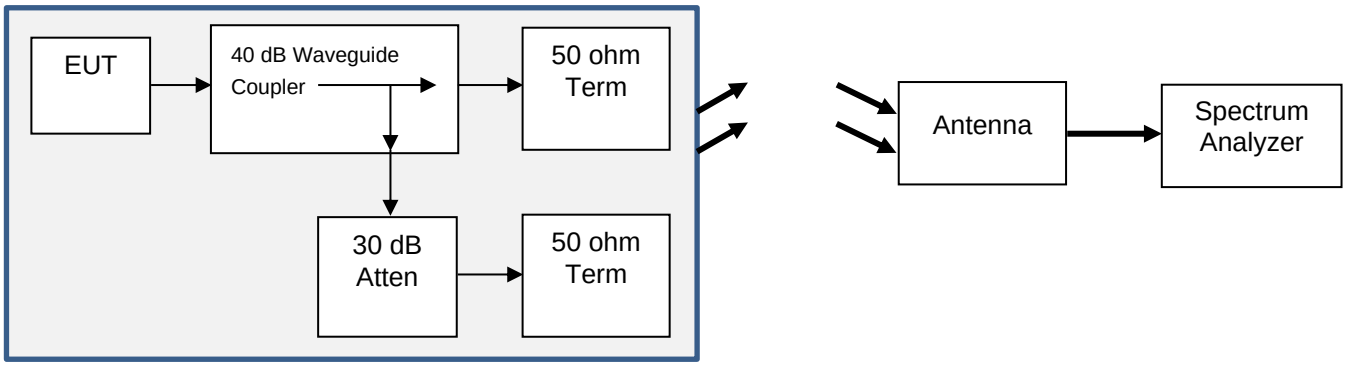
Duty Cycle Correction Factor (DCCR) =10*LOG10(1/(PW/((PRR*1000)+PW)))

Final Spurious emissions (avg) = Measured Spurious (Peak) + Antenna Corr Factor + Cable Corr Factor - DCCF

Radiated Spurious Emissions Limit
Wideband = P1 – (43+ 10Log(P2)) = -13dBm
P1 = power in dBm
P2 = power in Watts

The RBW was set to 100 kHz for measurements below 1 GHz and 1 MHz for measurements above 1 GHz.
The VBW was set to 3 times the RBW.

Test Setup



Radiated Spurious Emissions Test Results

Nautical Miles	Frequency Range GHz	Measured Spurious Emission (Peak)		Antenna Correction Factor dB	Cable Correction Factor dB	DCCF dB	Final Spurious Emissions (avg) dBm	Limit dBm	Pass / Fail
		MHz	dBm						
0.125	30 - 1000	180.5	-33.7	0	0	-37.1	-70.8	-13	Pass
1	30 - 1000	179.5	-33	0	0	-38.9	-71.9	-13	Pass
2	30 - 1000	546.6	-38.2	0	0	-34.9	-73.1	-13	Pass
3	30 - 1000	188.3	-38.6	0	0	-33.3	-71.9	-13	Pass
36	30 - 1000	182.4	-37	0	0	-31.9	-68.9	-13	Pass
0.125	1 - 18	1387	-48.2	25.2	3.1	-37.1	-57	-13	Pass
1	1 - 18	1140	-48.3	24.9	2.9	-38.9	-59.4	-13	Pass
2	1 - 18	2968	-50.7	29.9	4.8	-34.9	-50.9	-13	Pass
3	1 - 18	2518	-49	28.7	4.3	-33.3	-49.3	-13	Pass
36	1 - 18	2479	-49.6	28.7	4.3	-31.9	-48.5	-13	Pass
0.125	18 - 40	18840	-51.5	44.8	4.9	-37.1	-38.9	-13	Pass
0.125	18 - 40	28270	-62.6	46.4	7.1	-38.9	-48	-13	Pass
1	18 - 40	18840	-50.5	44.8	4.9	-34.9	-35.7	-13	Pass
1	18 - 40	28270	-62.3	46.4	7.1	-33.3	-42.1	-13	Pass
2	18 - 40	18840	-45	44.8	4.9	-31.9	-27.2	-13	Pass
2	18 - 40	28270	-52.4	46.4	7.1	-37.1	-36	-13	Pass
3	18 - 40	18840	-42.2	44.8	4.9	-38.9	-31.4	-13	Pass
3	18 - 40	28270	-53.1	46.4	7.1	-34.9	-34.5	-13	Pass
36	18 - 40	18840	-37.9	44.8	4.9	-33.3	-21.5	-13	Pass
36	18 - 40	28270	-49.7	46.4	7.1	-31.9	-28.1	-13	Pass

Below 1 GHz, the antenna and cable correction factors were input to the spectrum analyzer before recording the peak measurement.
Above 1 GHz the antenna and cable correction factors were added to the peak measurement in the test results table.

All spurious emissions were below the -13 dBm limit.

No other spurious emissions were observed.

Emission Masks (Occupied Bandwidth)
Engineer: Greg Corbin
Test Date: 6/23/2018

Test Procedure

The EUT was setup as shown.
The spurious emissions is referenced to the mean power per 80.211(f)

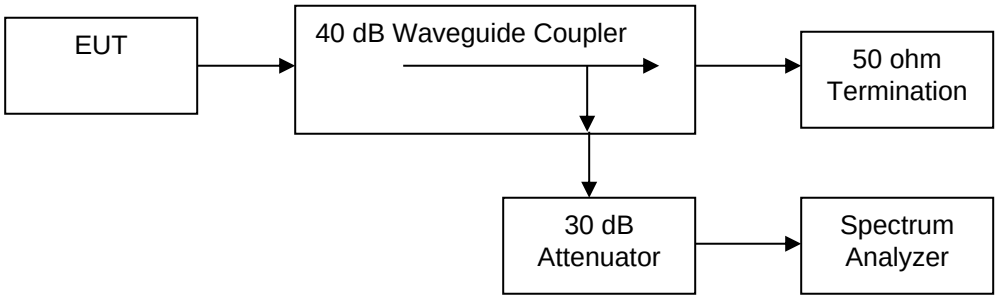
Emission masks were measured for each combination of PW/PRR and are referenced by the distance; 0.125, 1, 2, 3, 36 nautical miles.

The reference level was set to the channel power + the Duty Cycle Correction Factor so the mask could be displayed using a peak detector.

The waveguide coupler, 30 dB attenuator and RF cable insertion loss correction factors was input to the spectrum analyzer as correction factors or reference level offsets before recording the emission mask data.

The RBW was set between 1 – 5% of the occupied bandwidth.

Test Setup



Refer to Annex A for Emission Mask test data

Occupied Bandwidth
Engineer: Greg Corbin
Test Date: 6/12/2018

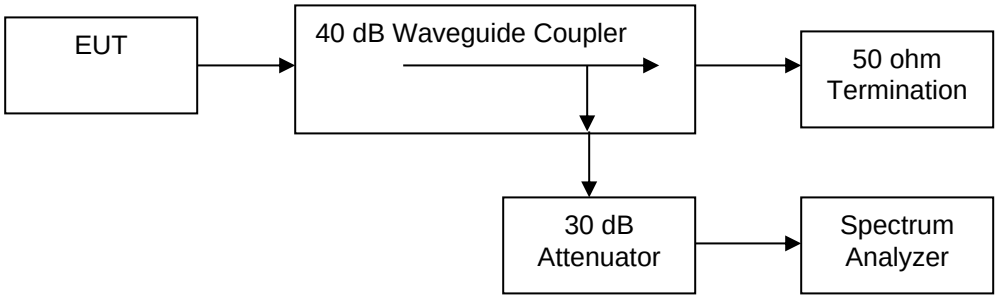
Test Procedure

The EUT was setup as shown.

Emission masks were measured for each combination of PW/PRR and are referenced by the distance in nautical miles.

The waveguide coupler, 30 dB attenuator and RF cable insertion loss correction factors was input to the spectrum analyzer as correction factors or reference level offsets before recording the occupied bandwidth data.

Test Setup



Refer to Annex B for Occupied Bandwidth test data.

Frequency Stability (Temperature Variation)
Engineer: Greg Corbin
Test Date: 6/19/2018

Test Procedure

The EUT was placed in an environmental test chamber and the RF output was connected directly to a spectrum analyzer
The temperature was varied from -20ºC to 50ºC in 10ºC increments.
After a sufficient time for temperature stabilization the RF output frequency was measured.

Per part 80.209(b) When pulse modulation is used in land and ship radar stations operating in the bands above 2.4 GHz the frequency at which maximum emission occurs must be within the authorized bandwidth and must not be closer than 1.5/T MHz to the upper and lower limits of the authorized bandwidth where “T” is the pulse duration in microseconds.

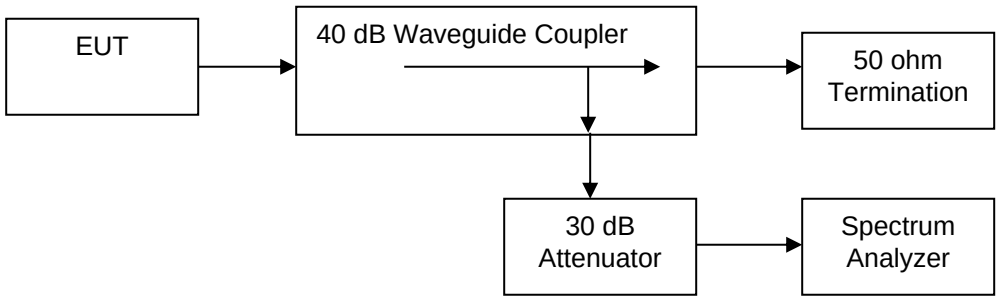
There is no authorized bandwidth for the PON class of emission in section 80.205 Bandwidth.

The frequency band in part 2.106 was used for the authorized Bandwidth

Per part 2.106 the authorized frequency band is 9.2 – 9.5 GHz.

The lower and upper limits were calculated as follows:
Lower limit (MHz)= 9200 + (1/T) MHz
Upper Limit(MHz) = 9500 – (1/T) MHz
T = PW in usec

Test Setup



Frequency Stability (Temperature Variation) Measurement Results

Temperature (°C)	Nautical Mile	Pulse Width (usec)	Measured Frequency (GHz)	Lower Limit (MHz)	Upper limit (GHz)	Pass / Fail
-20	0.250	90.00	9.430326923	9200.011111111	9499.988888889	Pass
-20	1.0	90.00	9.430961538	9200.011111111	9499.988888889	Pass
-20	2.0	225.00	9.429434615	9200.004444444	9499.995555556	Pass
-20	3.0	330.00	9.428935577	9200.003030303	9499.996969697	Pass
-20	12.0	900.00	9.428430769	9200.001111111	9499.998888889	Pass
-20	36.0	900.00	9.428584615	9200.001111111	9499.998888889	Pass
-10	0.250	90.00	9.432230769	9200.011111111	9499.988888889	Pass
-10	1.0	90.00	9.431903846	9200.011111111	9499.988888889	Pass
-10	2.0	225.00	9.430278846	9200.004444444	9499.995555556	Pass
-10	3.0	330.00	9.429649038	9200.003030303	9499.996969697	Pass
-10	12.0	900.00	9.428503846	9200.001111111	9499.998888889	Pass
-10	36.0	900.00	9.428245192	9200.001111111	9499.998888889	Pass
0	0.250	90.00	9.428354808	9200.011111111	9499.988888889	Pass
0	1.0	90.00	9.427705769	9200.011111111	9499.988888889	Pass
0	2.0	225.00	9.426458654	9200.004444444	9499.995555556	Pass
0	3.0	330.00	9.426378846	9200.003030303	9499.996969697	Pass
0	12.0	900.00	9.425790385	9200.001111111	9499.998888889	Pass
0	36.0	900.00	9.426172115	9200.001111111	9499.998888889	Pass
10	0.250	90.00	9.427013462	9200.011111111	9499.988888889	Pass
10	1.0	90.00	9.426503846	9200.011111111	9499.988888889	Pass
10	2.0	225.00	9.425306731	9200.004444444	9499.995555556	Pass
10	3.0	330.00	9.424686538	9200.003030303	9499.996969697	Pass
10	12.0	900.00	9.423532692	9200.001111111	9499.998888889	Pass
10	36.0	900.00	9.423184615	9200.001111111	9499.998888889	Pass
20	0.250	90.00	9.423511538	9200.011111111	9499.988888889	Pass
20	1.0	90.00	9.423578846	9200.011111111	9499.988888889	Pass
20	2.0	225.00	9.422155769	9200.004444444	9499.995555556	Pass
20	3.0	330.00	9.421857692	9200.003030303	9499.996969697	Pass
20	12.0	900.00	9.421355769	9200.001111111	9499.998888889	Pass
20	36.0	900.00	9.421567308	9200.001111111	9499.998888889	Pass
30	0.250	90.00	9.422619231	9200.011111111	9499.988888889	Pass
30	1.0	90.00	9.422686538	9200.011111111	9499.988888889	Pass
30	2.0	225.00	9.420585577	9200.004444444	9499.995555556	Pass
30	3.0	330.00	9.420042308	9200.003030303	9499.996969697	Pass
30	12.0	900.00	9.419198077	9200.001111111	9499.998888889	Pass
30	36.0	900.00	9.418883654	9200.001111111	9499.998888889	Pass
40	0.250	90.00	9.418438462	9200.011111111	9499.988888889	Pass
40	1.0	90.00	9.418726923	9200.011111111	9499.988888889	Pass
40	2.0	225.00	9.417234615	9200.004444444	9499.995555556	Pass
40	3.0	330.00	9.417048077	9200.003030303	9499.996969697	Pass
40	12.0	900.00	9.416627885	9200.001111111	9499.998888889	Pass
40	36.0	900.00	9.416901923	9200.001111111	9499.998888889	Pass
50	0.250	90.00	9.416726923	9200.011111111	9499.988888889	Pass
50	1.0	90.00	9.416486538	9200.011111111	9499.988888889	Pass
50	2.0	225.00	9.415101923	9200.004444444	9499.995555556	Pass
50	3.0	330.00	9.414738462	9200.003030303	9499.996969697	Pass
50	12.0	900.00	9.413905769	9200.001111111	9499.998888889	Pass
50	36.0	900.00	9.413777885	9200.001111111	9499.998888889	Pass

Frequency Stability (Voltage Variation)
Engineer: Greg Corbin
Test Date: 6/19/2018

Test Procedure

The EUT was placed in a temperature chamber at 20±5°C and connected directly to a spectrum analyzer. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value and the RF output was measured.

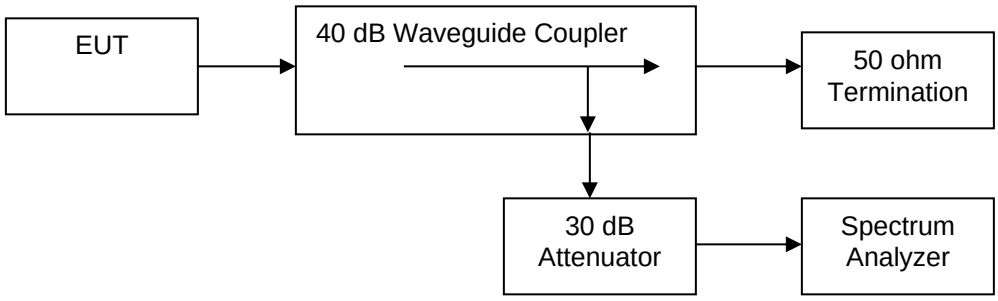
The rated voltage range for the EUT is 10.2 – 42 vdc.

The lower test input voltage = .85 x 10.2 = 8.67 vdc

The upper test input voltage = 1.15 x 42 = 48.3 vdc.

The system controller shutdown at 45 vdc, so 45 vdc was used as the upper limit.

Test Setup



Frequency Stability (Voltage Variation) Measurement Results

Supply Voltage (vdc)	Nautical Mile	Pulse Width (usec)	Measured Frequency (GHz)	Lower Limit (MHz)	Upper limit (GHz)	Pass / Fail
8.67	0.250	90.00	9.423569231	9200.011111111	9499.988888889	Pass
8.67	1.0	90.00	9.424122115	9200.011111111	9499.988888889	Pass
8.67	2.0	225.00	9.422247115	9200.004444444	9499.995555556	Pass
8.67	3.0	330.00	9.421819231	9200.003030303	9499.996969697	Pass
8.67	12.0	900.00	9.420767308	9200.001111111	9499.998888889	Pass
8.67	36.0	900.00	9.420629808	9200.001111111	9499.998888889	Pass
45	0.250	90.00	9.423292308	9200.011111111	9499.988888889	Pass
45	1.0	90.00	9.423513462	9200.011111111	9499.988888889	Pass
45	2.0	225.00	9.421217308	9200.004444444	9499.995555556	Pass
45	3.0	330.00	9.420955769	9200.003030303	9499.996969697	Pass
45	12.0	900.00	9.420481731	9200.001111111	9499.998888889	Pass
45	36.0	900.00	9.420964423	9200.001111111	9499.998888889	Pass

Test Equipment Utilized

Description	Manufacturer	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
Horn Antenna	EMCO	3116	i00085	2/6/17	2/6/19
Horn Antenna	EMCO	3115	i00103	2/3/17	2/3/19
Waveguide Coupler	Narda	1080	i00187	Verified on: 6/12/18	
Dummy Load	Narda	320B	i00189	Verified on: 6/12/18	
Data Logger	Fluke	Hydra Data Bucket	i00343	5/23/18	5/23/19
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	8/3/16	8/3/18
EMI Analyzer	Agilent	E7405A	i00379	2/13/18	2/13/19
Spectrum Analyzer	Textronix	RSA5126A	i00424	5/9/18	5/9/19
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	8/15/16	8/15/19
Spectrum Analyzer	Agilent	E4448A	S/N: US44020379 (rental)	12/1/17	12/1/18
Waveguide Taper	Demornay Bonardi	WR90 – WR62	i00538.2	Verified on: 6/12/18	
Waveguide Taper	N/A	WR62 – WR42	i00538.3	Verified on: 6/12/18	
Waveguide Taper	Demornay Bonardi	WR42 – WR28	i00538.4	Verified on: 6/12/18	
Waveguide adapter	Americon	WR62 - SMA	i00538.6	Verified on: 6/12/18	
Waveguide adapter	Wiltron	WR42 – 2.92 mm	i00538.7	Verified on: 6/12/18	
Waveguide adapter	HP	WR28 – 1.92 mm	S/N: 01806	Verified on: 6/12/18	
Waveguide adapter	HP	WR90 – type N	i00188	Verified on: 6/12/18	
Attenuator, 30 dB, 50w	Mini-Circuits	BW-N30W50+	i00474	Verified on: 6/12/18	

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT