Panasonic Avionics Corp.

TEST REPORT FOR

Bluetooth Radio
Model: Laird BT-850

Tested to The Following Standards:

FCC Part 15 Subpart C Section 15.247
(FHSS 2400-2483.5 MHz)

Report No.: 103959-9

Date of issue: January 14, 2021

This test report bears the accreditation symbol indicating that the testing performed herein meets the test and reporting requirements of ISO/IEC 17025 under the applicable scope of testing for CKC Laboratories, Inc.

We strive to create long-term, trust based relationships by providing sound, adaptive, customer first testing services. We embrace each of our customers' unique EMC challenges, not as an interruption to set processes, but rather as the reason we are in business.

Test Certificate # 803.01

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Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:	REPORT PREPARED BY:
Panasonic Avionics Corp. 26200 Enterprise Way Lake Forrest, CA 92630	Samantha Mossman CKC Laboratories, Inc. 5046 Sierra Pines Drive Mariposa, CA 95338
Representative: Steve Dang	Project Number: 103959
DATE OF EQUIPMENT RECEIPT:	December 16, 2020
DATE(S) OF TESTING:	December 16-17, 2020

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, tested in the agreed upon operational mode(s) and configuration(s) as identified herein. Compliance assessment remains the client's responsibility. This report may not be used to claim product endorsement by A2LA or any government agencies. This test report has been authorized for release under quality control from CKC Laboratories, Inc.

Steve Behm
Director of Quality Assurance & Engineering Services
CKC Laboratories, Inc.

Test Facility Information

Our laboratories are configured to effectively test a wide variety of product types. CKC utilizes first class test equipment, anechoic chambers, data acquisition and information services to create accurate, repeatable and affordable test results.

TEST LOCATION(S):
CKC Laboratories, Inc.
110 Olinda Place
Brea, CA 92823

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.19

Site Registration & Accreditation Information

Location	*NIST CB #	FCC	Canada	Japan
Canyon Park, Bothell, WA	US0103	US1024	3082C	A-0136
Brea, CA	US0103	US1024	3082D	A-0136
Fremont, CA	US0103	US1024	3082B	A-0136
Mariposa, CA	US0103	US1024	3082A	A-0136

*CKC's list of NIST designated countries can be found at: https://standards.gov/cabs/designations.html

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 2.4GHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)	Occupied Bandwidth	NA	NP
15.247(a)(1)	Carrier Separation	NA	NP
15.247(a)(1)(iii)	Number of Hopping Channels	NA	NP
15.247(a)(1)(iii)	Average Time of Occupancy	NA	NP
15.247(b)(1)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	NP
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	NP

NA = Not Applicable
NP = CKC laboratories was not contracted to perform test.

ISO/IEC 17025 Decision Rule
The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

This list is a summary of the modifications made to the equipment during testing.

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
Note PCII of a single modular approved radio, Original FCCID: U6YBT850 with new antennas and cable. Power setting: Specific Power Table index 0

EQUIPMENT UNDER TEST (EUT)

During testing, numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Bluetooth Radio	Panasonic Avionics Corp.	Laird BT-850	NA

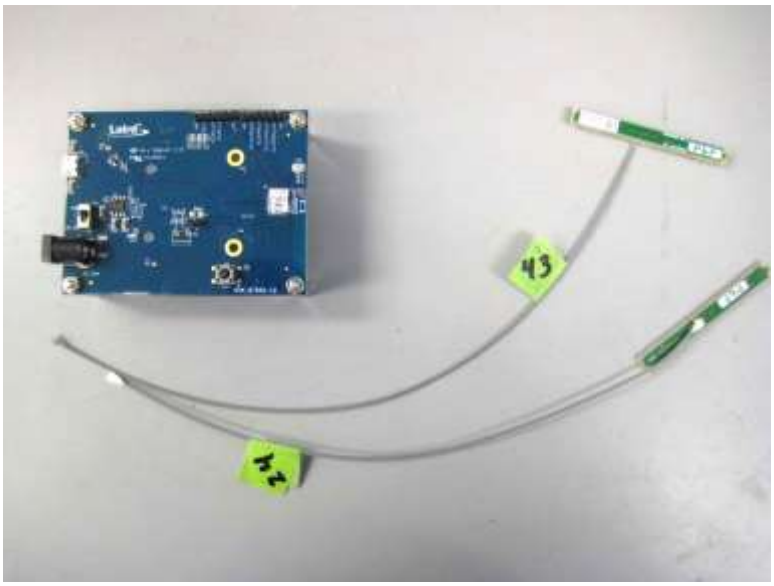
Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Inspiron 15	PA004933
Development board	Laird	DVK-BT850-1.0	PA004933

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Radio Module
Type of Wideband System:	FHSS
Operating Frequency Range:	2402-2480MHz
Number of Hopping Channels:	78
Receiver Bandwidth and Synchronization:	The manufacturer declares the receiver input bandwidth matches the transmit channel bandwidth and shifts frequencies in synchronization with the transmitter.
Modulation Type(s):	GFSK, π/4 DQPSK, 8DPSK
Maximum Duty Cycle:	98%
Number of TX Chains:	1
Antenna Type(s) and Gain:	Ant: PCB trace, R8U2FJ8436Z, ant gain +3.0dBi, paired with Cable 43 Ant: PCB trace, R8U5FJ8946Z, ant gain -1.2dBi, paired with Cable 24
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	3.3 V DC
Firmware / Software used for Test:	Firmware PN: BT850-ST-PA-01-CT

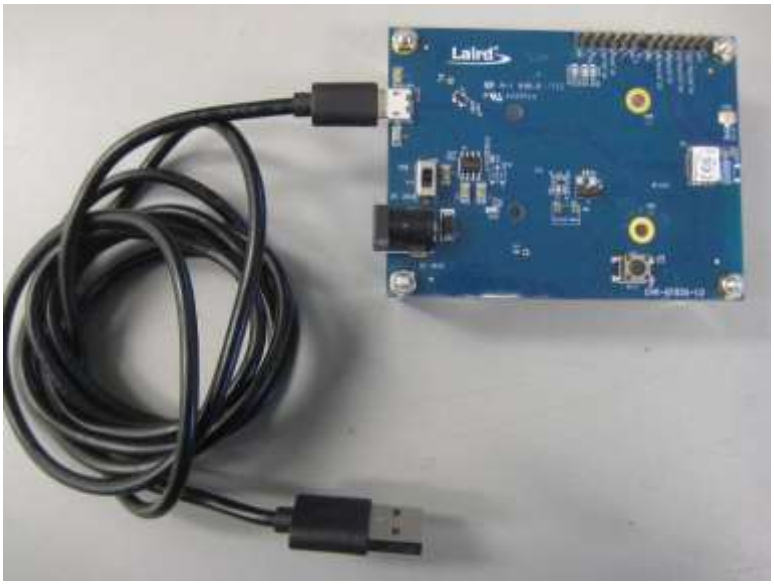
EUT and Accessory Photo(s)



Antenna

Support Equipment Photo(s)

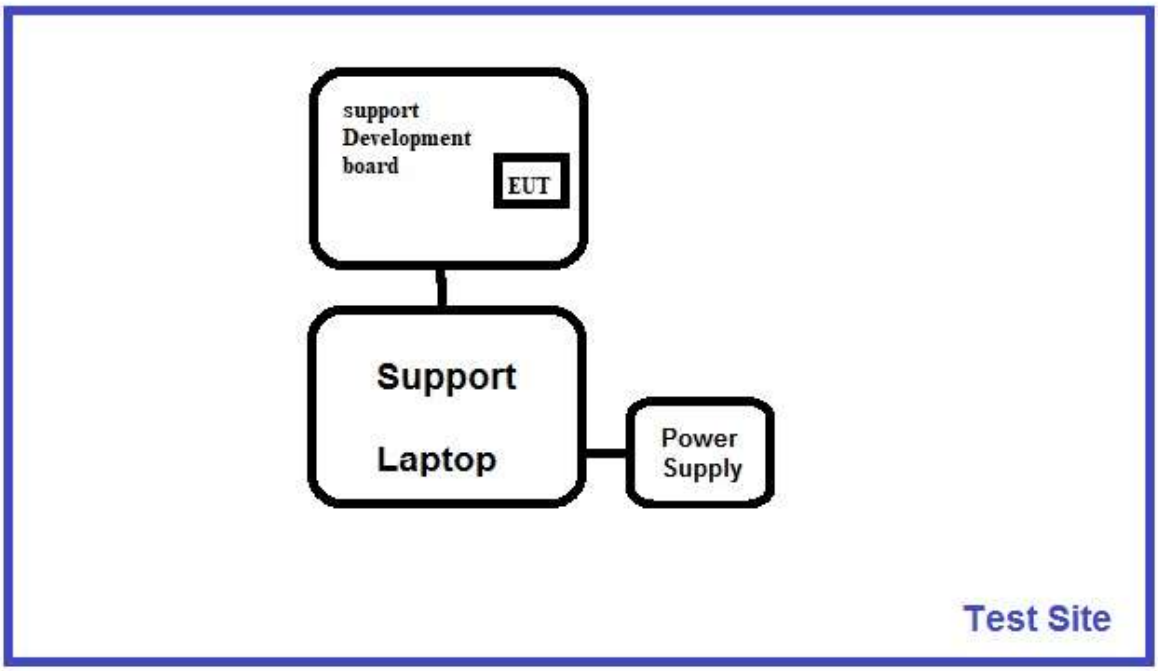
Laptop



Development Board

Block Diagram of Test Setup(s)

Test Setup Block Diagram



FCC Part 15 Subpart C

15.247(b)(1) Output Power

Test Setup/Conditions			
Test Location:	Brea Lab D	Test Engineer:	E. Wong
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/16/2020
Configuration:	1		
Test Setup:	The single modulator approved radio is placed on the test bench conducted measurement measured at antenna port. 2402Mhz, 2441MHz, 2480MHz. Power setting: Specific Power Table index 0		

Environmental Conditions			
Temperature (ºC)	20	Relative Humidity (%):	23

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02869	Spectrum Analyzer	Agilent	E4440A	8/3/2020	8/3/2021
03430	Attenuator	Aeroflex/Weinschel	75A-10-12	12/20/2019	12/20/2021
07243	Cable	H&S	32022-29094K-29094K-24TC	5/29/2020	5/29/2022

Test Data Summary - RF Conducted Measurement

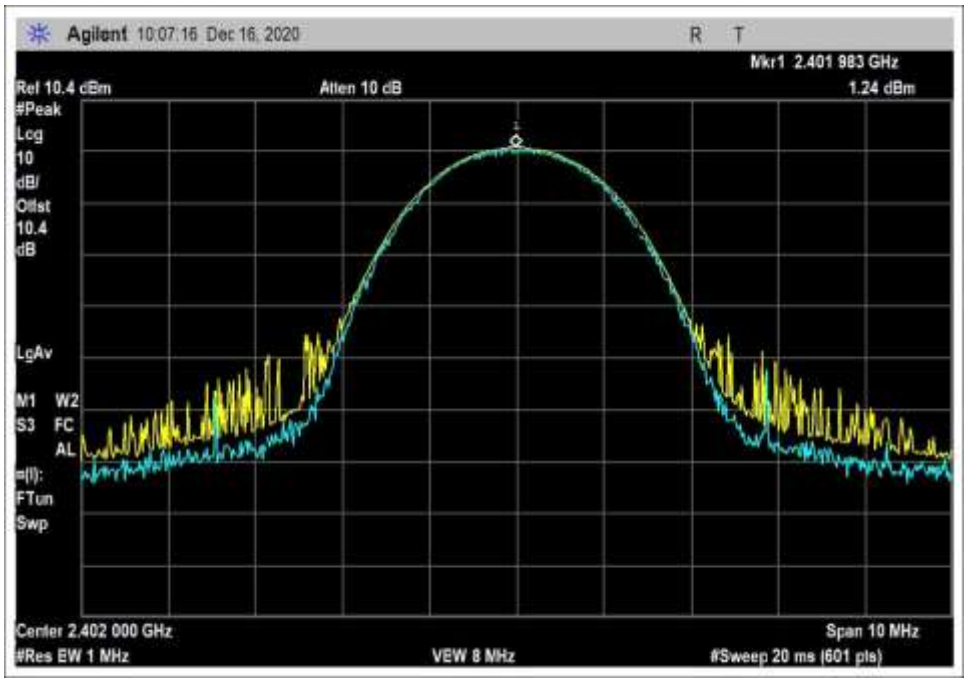
$$Limit = \begin{cases} 30dBm\ Conducted/36dBm\ EIRP \mid \geq 75\ Channels \\ 21dBm\ Conducted/27dBm\ EIRP \mid < 75\ Channels\ (\min 15) \end{cases}$$

Frequency (MHz)	Modulation	Ant. Type / Gain (dBi)	Measured (dBm)	Limit (dBm)	Results
2402	GFSK	PCB Trace *	-0.95	≤ 30	Pass
2441	GFSK	PCB Trace *	-0.51	≤ 30	Pass
2480	GFSK	PCB Trace *	-0.93	≤ 30	Pass
2402	π/4 DQPSK	PCB Trace *	0.87	≤ 30	Pass
2441	π/4 DQPSK	PCB Trace *	1.24	≤ 30	Pass
2480	π/4 DQPSK	PCB Trace *	0.63	≤ 30	Pass
2402	8DPSK	PCB Trace *	1.24	≤ 30	Pass
2441	8DPSK	PCB Trace *	1.58	≤ 30	Pass
2480	8DPSK	PCB Trace *	0.98	≤ 30	Pass

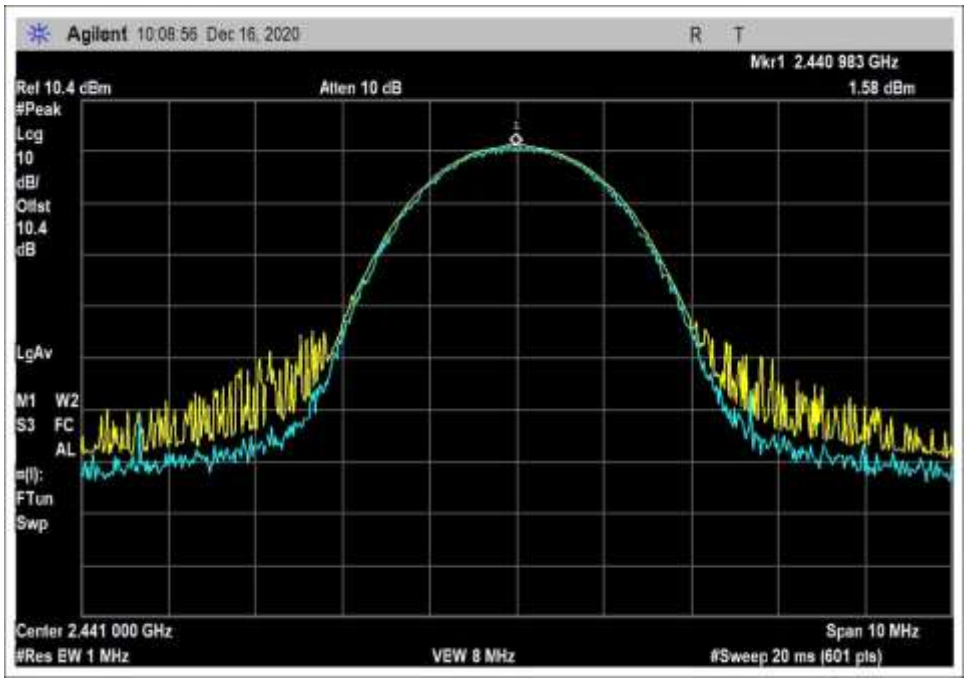
Modulation Equivalent to DH5, 2DH5, 3DH5. Original grant FHSS 78 channels

* antennas listed in equipment general product information

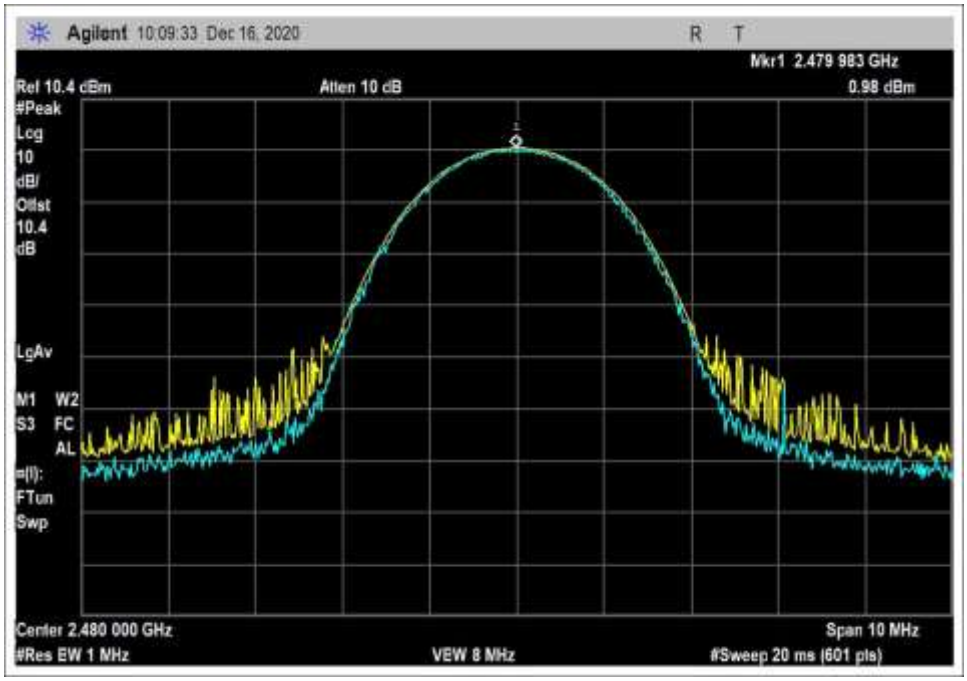
Plot(s)



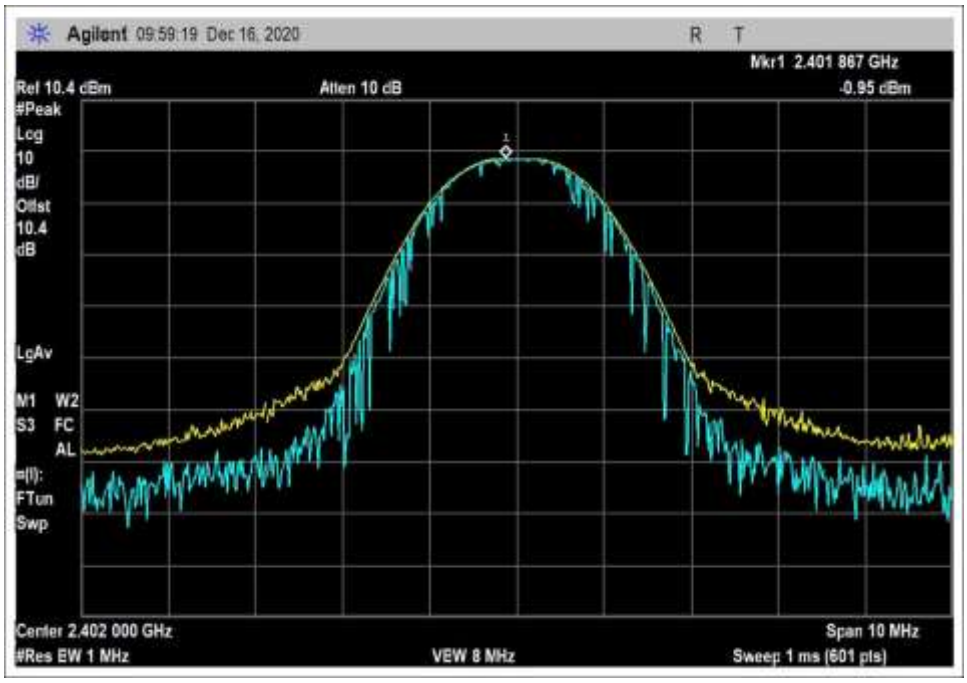
DPSK_2402MHz, Low Channel



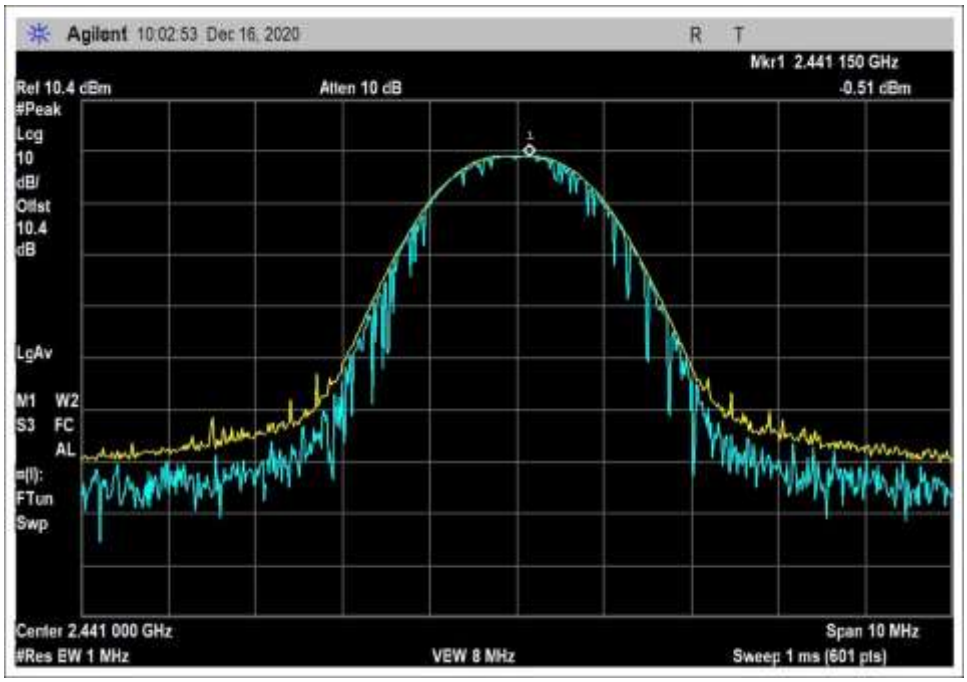
DPSK_2441MHz, Middle Channel



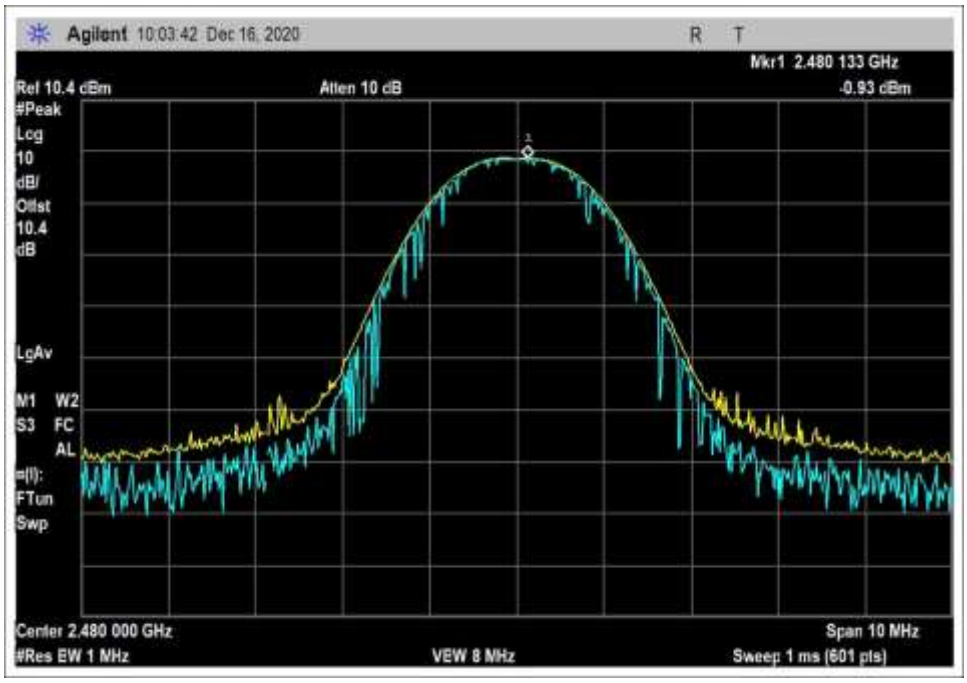
DPSK_2480MHz, High Channel



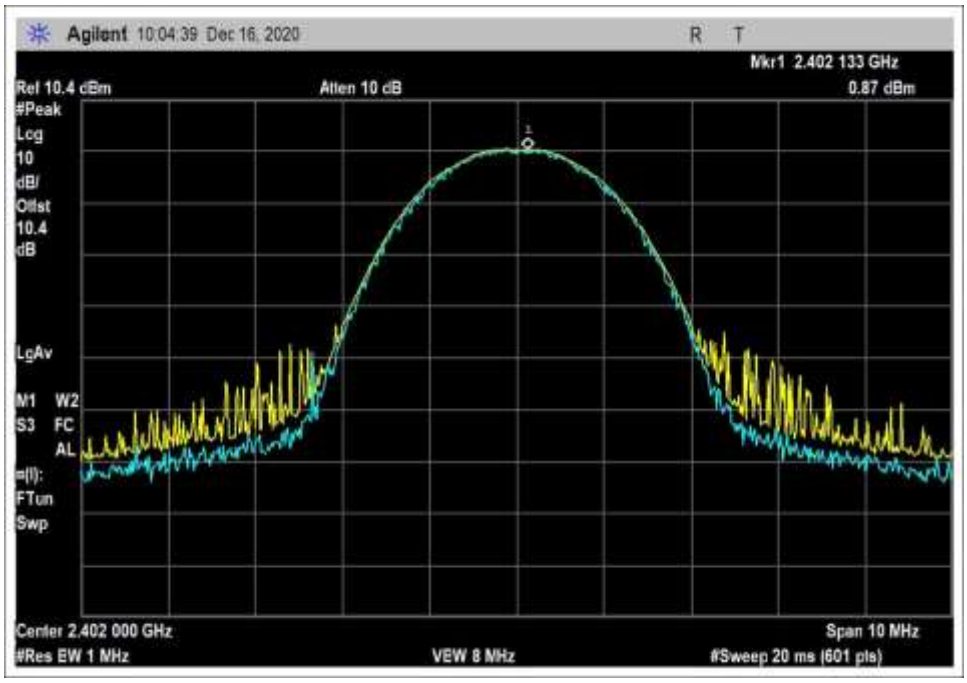
GFSK_2402MHz, Low Channel



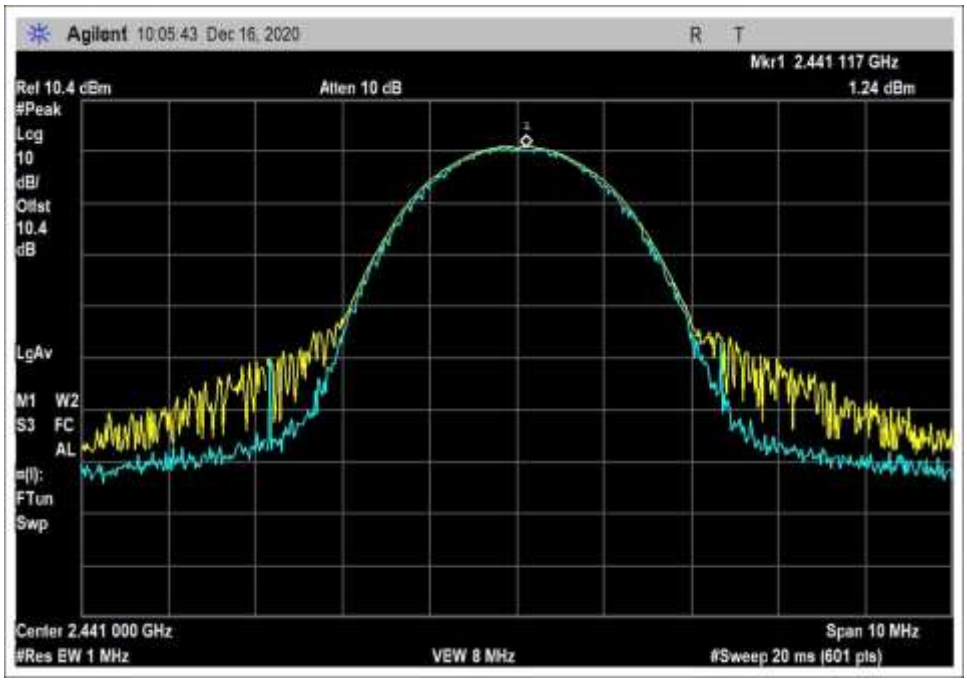
GFSK_2441MHz, Middle Channel



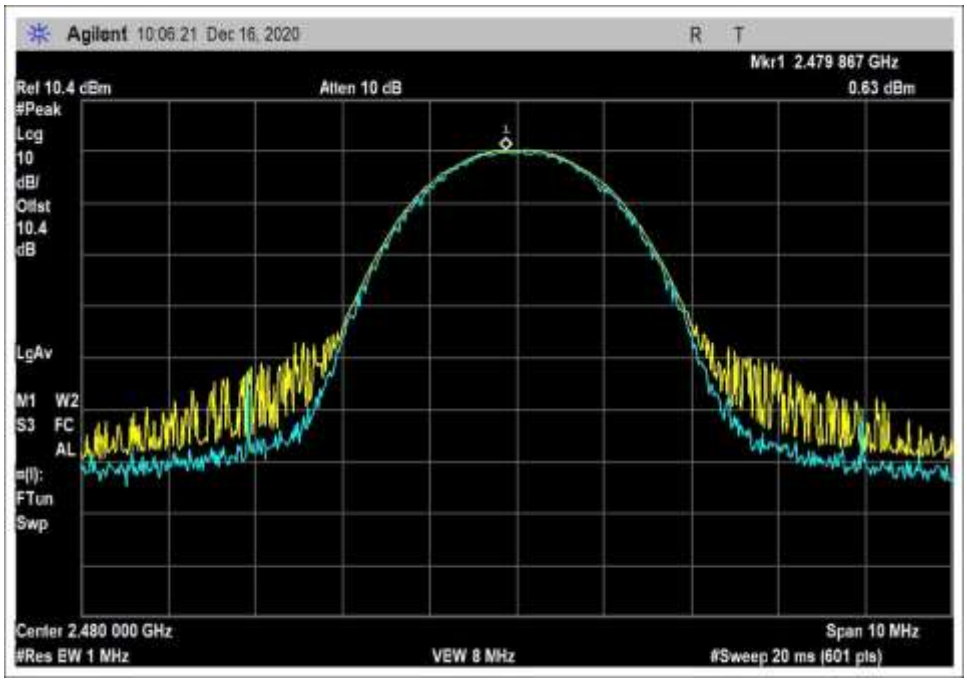
GFSK_2480MHz, High Channel



QPSK_2402MHz, Low Channel



QPSK_2441MHz, Middle Channel



QPSK_2480MHz, High Channel

Test Setup / Conditions / Data

15.247(d) Radiated Emissions & Band Edge

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Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA • 714 993 6112		
Customer:	**Panasonic Avionics Corp.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**103959**	Date:	12/16/2020
Test Type:	**Radiated Scan**	Time:	18:26:49
Tested By:	E. Wong	Sequence#:	2
Software:	EMITest 5.03.19		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is installed on support development board and placed on Styrofoam block, connected to a support laptop for configuration purposes.

Evaluation of PCII with new antenna. Worst case emission evaluation based on original certification.

2402MHz, 2441MHz, 2480MHz

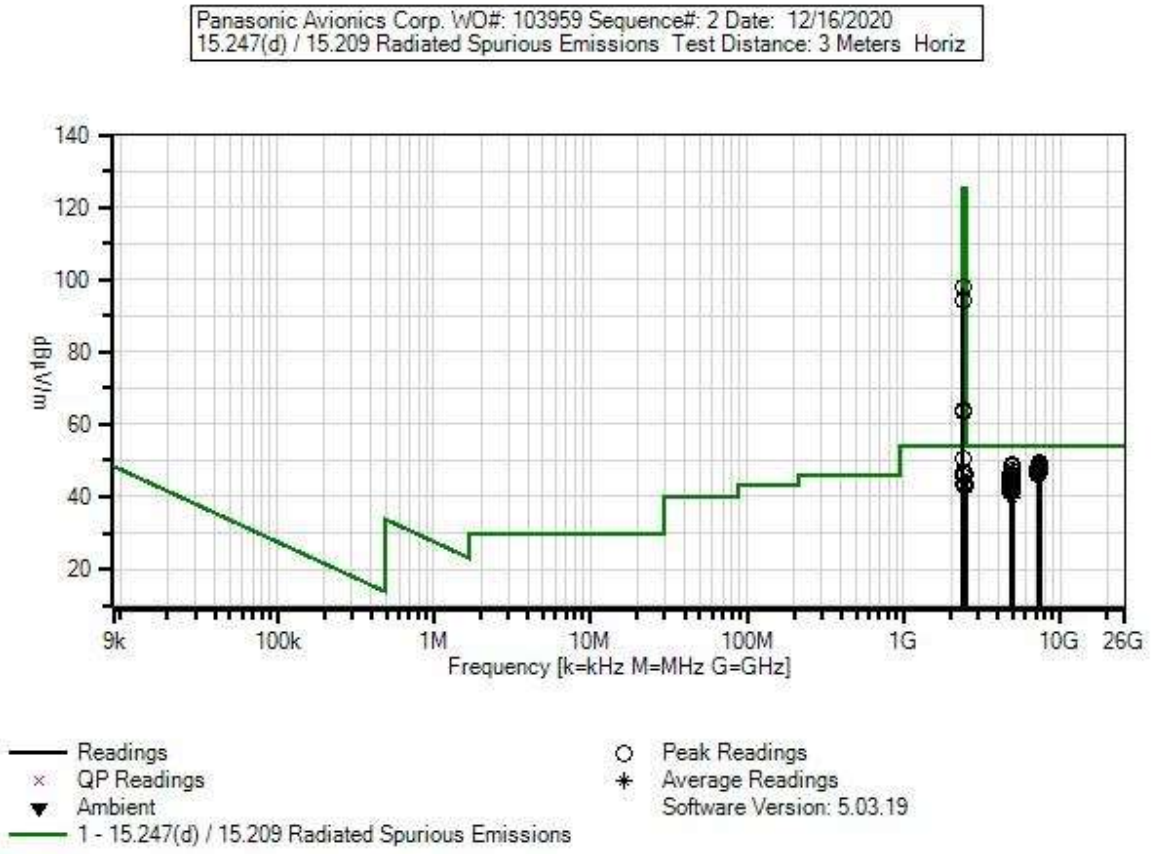
Bluetooth: GFSK, Pi /4 DQPSK, 8DPSK

Ant 1: R8U2FJ8436Z, ant gain: +3.0dBi, paired with Cable 43

Frequency range of measurement = 1 - 12 GHz.
1000 MHz-12000 MHz; RBW=1MHz,VBW=3 MHz

Test environment conditions:
Temperature:22.3°C
Relative Humidity:21%
Atmospheric Pressure: 100kPa

Site D
ANSI ANSI C63.10-2013



Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/3/2020	8/3/2021
T2	AN01646	Horn Antenna	3115	3/17/2020	3/17/2022
T3	ANP07656	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00787	Preamp	83017A	5/31/2019	5/31/2021
T5	ANP07138	Cable	ANDL1-PNMNM-60	3/4/2019	3/4/2021
T6	ANP04382	Cable	LDF-50	5/15/2020	5/15/2022

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist.	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	7439.567M	32.8	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	49.3	54.0 Ant1_2480MHz_G FSK_X	-4.7	Horiz
2	7440.430M	32.7	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	49.2	54.0 Ant1_2480MHz_Q PSK_X	-4.8	Horiz
3	7440.100M	32.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	49.1	54.0 Ant1_2480MHz_8 DPSK_Z	-4.9	Horiz
4	4959.750M	40.0	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	49.1	54.0 Ant1_2480MHz_G FSK_X	-4.9	Horiz
5	7439.830M	32.4	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.9	54.0 Ant1_2480MHz_G FSK_Y	-5.1	Vert
6	7440.100M	32.3	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.8	54.0 Ant1_2480MHz_8 DPSK_Y	-5.2	Horiz
7	7440.400M	32.3	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.8	54.0 Ant1_2480MHz_Q PSK_Z	-5.2	Horiz
8	7439.830M	32.3	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.8	54.0 Ant1_2480MHz_G FSK_Y	-5.2	Horiz
9	7440.100M	32.2	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.7	54.0 Ant1_2480MHz_8 DPSK_Y	-5.3	Vert
10	7323.000M	32.6	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.6	54.0 Ant1_2441MHz_Q PSK_Z	-5.4	Vert
11	7440.400M	32.0	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.5	54.0 Ant1_2480MHz_8 DPSK_X	-5.5	Vert
12	7440.430M	32.0	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.5	54.0 Ant1_2480MHz_Q PSK_X	-5.5	Vert
13	7323.000M	32.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.4	54.0 Ant1_2441MHz_8 DPSK_X	-5.6	Vert
14	7440.430M	31.9	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.4	54.0 Ant1_2480MHz_G FSK_Z	-5.6	Horiz
15	4960.230M	39.3	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	48.4	54.0 Ant1_2480MHz_8 DPSK_X	-5.6	Horiz
16	7323.000M	32.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.4	54.0 Ant1_2441MHz_8 DPSK_Y	-5.6	Vert

17	7322.950M	32.3	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.3	54.0	-5.7	Horiz Ant1_2441MHz_8 DPSK_Z
18	7323.000M	32.3	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.3	54.0	-5.7	Horiz Ant1_2441MHz_G FSK_X
19	7440.500M	31.8	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.3	54.0	-5.7	Vert Ant1_2480MHz_Q PSK_Z
20	7323.000M	32.2	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.2	54.0	-5.8	Horiz Ant1_2441MHz_Q PSK_Y
21	7439.830M	31.7	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.2	54.0	-5.8	Vert Ant1_2480MHz_G FSK_Z
22	4960.330M	39.1	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	48.2	54.0	-5.8	Vert Ant1_2480MHz_Q PSK_Y
23	7322.950M	32.2	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.2	54.0	-5.8	Horiz Ant1_2441MHz_8 DPSK_Y
24	7440.400M	31.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.1	54.0	-5.9	Horiz Ant1_2480MHz_8 DPSK_X
25	7440.500M	31.5	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.0	54.0	-6.0	Horiz Ant1_2480MHz_Q PSK_Y
26	7439.450M	31.5	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.0	54.0	-6.0	Vert Ant1_2480MHz_G FSK_X
27	7322.800M	32.0	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.0	54.0	-6.0	Vert Ant1_2441MHz_G FSK_Z
28	7323.000M	32.0	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.0	54.0	-6.0	Vert Ant1_2441MHz_G FSK_X
29	7323.000M	31.9	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.9	54.0	-6.1	Horiz Ant1_2441MHz_Q PSK_Z
30	7323.000M	31.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Horiz Ant1_2441MHz_8 DPSK_X
31	7322.950M	31.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Vert Ant1_2441MHz_8 DPSK_Z
32	7205.730M	32.1	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Vert Ant1_2402MHz_Q PSK_Z
33	7205.000M	32.1	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Vert Ant1_2402MHz_G FSK_X

34	7323.000M	31.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Vert Ant1_2441MHz_Q PSK_Y
35	7323.000M	31.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Horiz Ant1_2441MHz_Q PSK_X
36	7322.800M	31.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Horiz Ant1_2441MHz_G FSK_Z
37	7323.000M	31.6	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.6	54.0	-6.4	Vert Ant1_2441MHz_G FSK_Y
38	7205.630M	32.0	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.6	54.0	-6.4	Horiz Ant1_2402MHz_G FSK_Z
39	7205.600M	31.9	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.5	54.0	-6.5	Horiz Ant1_2402MHz_G FSK_X
40	7206.300M	31.9	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.5	54.0	-6.5	Horiz Ant1_2402MHz_8 DPSK_Z
41	4959.670M	38.3	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	47.4	54.0	-6.6	Vert Ant1_2480MHz_G FSK_Y
42	7205.770M	31.8	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.4	54.0	-6.6	Horiz Ant1_2402MHz_Q PSK_X
43	7206.300M	31.7	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.3	54.0	-6.7	Vert Ant1_2402MHz_8 DPSK_Y
44	7205.730M	31.7	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.3	54.0	-6.7	Vert Ant1_2402MHz_8 DPSK_X
45	7205.730M	31.7	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.3	54.0	-6.7	Horiz Ant1_2402MHz_Q PSK_Z
46	7205.730M	31.6	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.2	54.0	-6.8	Horiz Ant1_2402MHz_G FSK_Y
47	7440.500M	30.7	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.2	54.0	-6.8	Vert Ant1_2480MHz_Q PSK_Y
48	7205.730M	31.6	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.2	54.0	-6.8	Vert Ant1_2402MHz_G FSK_Y
49	7440.100M	30.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.1	54.0	-6.9	Vert Ant1_2480MHz_8 DPSK_Z
50	7205.730M	31.5	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.1	54.0	-6.9	Horiz Ant1_2402MHz_Q PSK_Y

51	7323.000M	31.0	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.0	54.0	-7.0	Vert Ant1_2441MHz_QPSK_X
52	7206.300M	31.4	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.0	54.0	-7.0	Horiz Ant1_2402MHz_8DPSK_Y
53	7205.770M	31.3	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.9	54.0	-7.1	Vert Ant1_2402MHz_QPSK_X
54	7206.300M	31.3	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.9	54.0	-7.1	Vert Ant1_2402MHz_8DPSK_Z
55	7205.730M	31.3	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.9	54.0	-7.1	Vert Ant1_2402MHz_QPSK_Y
56	7323.000M	30.9	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	46.9	54.0	-7.1	Horiz Ant1_2441MHz_GFSK_Y
57	7205.730M	31.2	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.8	54.0	-7.2	Horiz Ant1_2402MHz_8DPSK_X
58	2390.000M	48.2	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	46.8	54.0	-7.2	Vert Ant1_2402MHz_GFSK_Y_Bandedge_L
59	2483.500M	47.8	+0.0 +4.1	+28.2 +5.7	+0.5	-39.9	+0.0	46.4	54.0	-7.6	Vert Ant1_2480MHz_8DPSK_Y_Bandedge_H
60	4804.200M	37.9	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	46.4	54.0	-7.6	Vert Ant1_2402MHz_8DPSK_Y
61	4960.070M	37.1	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	46.2	54.0	-7.8	Horiz Ant1_2480MHz_8DPSK_Z
62	7205.520M	30.6	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.2	54.0	-7.8	Vert Ant1_2402MHz_GFSK_Z
63	4882.000M	36.8	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	45.8	54.0	-8.2	Vert Ant1_2441MHz_8DPSK_Y
64	4960.070M	36.4	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	45.5	54.0	-8.5	Vert Ant1_2480MHz_8DPSK_Y
65	2390.000M	46.8	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	45.4	54.0	-8.6	Vert Ant1_2402MHz_8DPSK_Y_Bandedge_L
66	4882.000M	36.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	45.2	54.0	-8.8	Vert Ant1_2441MHz_GFSK_Y

67	4960.230M	36.1	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	45.2	54.0	-8.8	Horiz Ant1_2480MHz_QPSK_Z
68	4803.930M	36.4	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	44.9	54.0	-9.1	Horiz Ant1_2402MHz_QPSK_Z
69	4803.930M	36.4	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	44.9	54.0	-9.1	Horiz Ant1_2402MHz_8DPSK_X
70	4960.270M	35.7	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.8	54.0	-9.2	Horiz Ant1_2480MHz_QPSK_X
71	4882.000M	35.6	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	44.6	54.0	-9.4	Vert Ant1_2441MHz_QPSK_Y
72	4803.930M	35.8	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	44.3	54.0	-9.7	Vert Ant1_2402MHz_QPSK_Y
73	4959.670M	35.2	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.3	54.0	-9.7	Vert Ant1_2480MHz_GFSK_Z
74	4960.070M	35.0	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.1	54.0	-9.9	Horiz Ant1_2480MHz_8DPSK_Y
75	4881.800M	35.0	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	44.0	54.0	-10.0	Horiz Ant1_2441MHz_GFSK_Z
76	4803.670M	35.5	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	44.0	54.0	-10.0	Vert Ant1_2402MHz_QPSK_X
77	4959.633M	34.8	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.9	54.0	-10.1	Vert Ant1_2480MHz_GFSK_X
78	4804.200M	35.3	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.8	54.0	-10.2	Horiz Ant1_2402MHz_8DPSK_Z
79	4960.330M	34.7	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.8	54.0	-10.2	Horiz Ant1_2480MHz_QPSK_Y
80	4803.870M	35.2	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.7	54.0	-10.3	Vert Ant1_2402MHz_GFSK_Y
81	4881.800M	34.6	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.6	54.0	-10.4	Vert Ant1_2441MHz_GFSK_Z
82	4960.230M	34.5	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.6	54.0	-10.4	Vert Ant1_2480MHz_8DPSK_X
83	2390.000M	44.9	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	43.5	54.0	-10.5	Vert Ant1_2402MHz_QPSK_Y_Bandedge_L

84	4803.930M	34.8	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.3	54.0	-10.7	Vert Ant1_2402MHz_QPSK_Z
85	4960.270M	34.2	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.3	54.0	-10.7	Vert Ant1_2480MHz_QPSK_X
86	2483.500M	44.7	+0.0 +4.1	+28.2 +5.7	+0.5	-39.9	+0.0	43.3	54.0	-10.7	Vert Ant1_2480MHz_GFSK_Y_Bandedge_H
87	4882.000M	34.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.2	54.0	-10.8	Vert Ant1_2441MHz_QPSK_X
88	4803.730M	34.7	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.2	54.0	-10.8	Horiz Ant1_2402MHz_GFSK_X
89	2483.500M	44.5	+0.0 +4.1	+28.2 +5.7	+0.5	-39.9	+0.0	43.1	54.0	-10.9	Horiz Ant1_2480MHz_QPSK_Y_Bandedge_H
90	4803.830M	34.6	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.1	54.0	-10.9	Horiz Ant1_2402MHz_GFSK_Z
91	4960.330M	33.8	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	42.9	54.0	-11.1	Vert Ant1_2480MHz_QPSK_Z
92	4882.000M	33.9	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.9	54.0	-11.1	Vert Ant1_2441MHz_QPSK_Z
93	4803.930M	34.4	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.9	54.0	-11.1	Vert Ant1_2402MHz_8DPSK_X
94	4882.000M	33.8	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.8	54.0	-11.2	Vert Ant1_2441MHz_8DPSK_X
95	4881.950M	33.7	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.7	54.0	-11.3	Vert Ant1_2441MHz_8DPSK_Z
96	4803.930M	34.1	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.6	54.0	-11.4	Horiz Ant1_2402MHz_QPSK_Y
97	4803.650M	34.0	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.5	54.0	-11.5	Vert Ant1_2402MHz_GFSK_Z
98	4803.970M	33.8	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.3	54.0	-11.7	Horiz Ant1_2402MHz_QPSK_X
99	4803.333M	33.6	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.1	54.0	-11.9	Vert Ant1_2402MHz_GFSK_X

100	4960.070M	32.9	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	42.0	54.0	-12.0	Vert Ant1_2480MHz_8DPSK_Z
101	4804.200M	33.5	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.0	54.0	-12.0	Horiz Ant1_2402MHz_8DPSK_Y
102	4882.000M	33.0	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.0	54.0	-12.0	Vert Ant1_2441MHz_GFSK_X
103	4803.870M	33.1	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	41.6	54.0	-12.4	Horiz Ant1_2402MHz_GFSK_Y
104	4804.200M	32.9	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	41.4	54.0	-12.6	Vert Ant1_2402MHz_8DPSK_Z
105	2399.970M	65.0	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	63.6	76.3	-12.7	Vert Ant1_2402MHz_QPSK_Y_Bandedge_L -20dBc
106	4882.000M Ave	32.1	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	41.1	54.0	-12.9	Horiz Ant1_2441MHz_8DPSK_X
107	4881.950M Ave	31.7	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	40.7	54.0	-13.3	Horiz Ant1_2441MHz_8DPSK_Z
^	4881.950M	40.8	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	49.8	54.0	-4.2	Horiz Ant1_2441MHz_8DPSK_Z
^	4882.000M	40.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	49.2	54.0	-4.8	Horiz Ant1_2441MHz_8DPSK_X
^	4882.000M	39.3	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	48.3	54.0	-5.7	Horiz Ant1_2441MHz_QPSK_X
^	4882.000M	39.1	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	48.1	54.0	-5.9	Horiz Ant1_2441MHz_QPSK_Z
^	4882.000M	34.0	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.0	54.0	-11.0	Horiz Ant1_2441MHz_GFSK_X
^	4881.950M	33.9	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.9	54.0	-11.1	Horiz Ant1_2441MHz_8DPSK_Y
^	4882.000M	33.8	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.8	54.0	-11.2	Horiz Ant1_2441MHz_GFSK_Y
^	4882.000M	33.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.2	54.0	-11.8	Horiz Ant1_2441MHz_QPSK_Y

116	2400.000M	65.2	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	63.8	77.9	-14.1	Vert Ant1_2402MHz_8DPSK_Y_Bandedge_L -20dBc
117	4959.633M Ave	30.4	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	39.5	54.0	-14.5	Horiz Ant1_2480MHz_GFSK_X
^	4959.600M	37.0	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	46.1	54.0	-7.9	Horiz Ant1_2480MHz_GFSK_Z
^	4959.670M	34.6	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.7	54.0	-10.3	Horiz Ant1_2480MHz_GFSK_Y
120	2400.000M	52.1	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	50.7	76.3	-25.6	Vert Ant1_2402MHz_GFSK_Y_Bandedge_L -20dBc
121	2402.000M	99.3	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	97.9	125.2	-27.3	Vert Ant1_2402MHz_8DPSK_Y_Bandedge_Fundamental
122	2401.970M	95.6	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	94.2	125.2	-31.0	Vert Ant1_2402MHz_QPSK_Y_Bandedge_Fundameltal

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA • 714 993 6112		
Customer:	**Panasonic Avionics Corp.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**103959**	Date:	12/17/2020
Test Type:	**Radiated Scan**	Time:	11:44:13
Tested By:	E. Wong	Sequence#:	3
Software:	EMITest 5.03.19		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The EUT is installed on support development board and placed on Styrofoam block, connected to a support laptop for configuration purposes.

Evaluation of PCII with new antenna. Worst case emission evaluation based on original certification and pre-scan.

2402MHz, 2441MHz, 2480MHz

Bluetooth: GFSK, Pi /4 DQPSK, 8DPSK

Ant 2: R8U5FJ8946Z, ant gain: -1.2dBi, paired with Cable 24

Frequency range of measurement = 1 - 12 GHz.
1000 MHz-12000 MHz; RBW=1MHz, VBW=3 MHz

Test environment conditions:
Temperature:22.3°C
Relative Humidity: 21%
Atmospheric Pressure:100kPa

Site D
ANSI ANSI C63.10-2013

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/3/2020	8/3/2021
T2	AN01646	Horn Antenna	3115	3/17/2020	3/17/2022
T3	ANP07656	Cable	32022-29094K-29094K-24TC	7/30/2020	7/30/2022
T4	AN00787	Preamp	83017A	5/31/2019	5/31/2021
T5	ANP07138	Cable	ANDL1-PNMNM-60	3/4/2019	3/4/2021
T6	ANP04382	Cable	LDF-50	5/15/2020	5/15/2022

Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist.	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	7323.000M	33.0	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	49.0	54.0 Ant2_2441MHz_QPSK_Y	-5.0	Vert
2	7323.000M	32.9	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.9	54.0 Ant2_2441MHz_GFSK_Z	-5.1	Horiz
3	7440.000M	32.3	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.8	54.0 Ant2_2480MHz_8DPSK_Y	-5.2	Horiz
4	7323.000M	32.8	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.8	54.0 Ant2_2441MHz_8DPSK_X	-5.2	Vert
5	7323.000M	32.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.7	54.0 Ant2_2441MHz_8DPSK_Y	-5.3	Horiz
6	7439.600M	32.1	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.6	54.0 Ant2_2480MHz_QPSK_Y	-5.4	Vert
7	7439.600M	32.0	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.5	54.0 Ant2_2480MHz_8DPSK_X	-5.5	Vert
8	7323.000M	32.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.4	54.0 Ant2_2441MHz_GFSK_Y	-5.6	Horiz
9	7323.000M	32.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.4	54.0 Ant2_2441MHz_GFSK_X	-5.6	Vert
10	7323.000M	32.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.4	54.0 Ant2_2441MHz_GFSK_Y	-5.6	Vert
11	7440.000M	31.8	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.3	54.0 Ant2_2480MHz_8DPSK_Z	-5.7	Vert
12	7205.600M	32.7	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	48.3	54.0 Ant2_2402MHz_QPSK_Z	-5.7	Horiz
13	7440.000M	31.8	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.3	54.0 Ant2_2480MHz_8DPSK_Y	-5.7	Vert
14	7206.230M	32.6	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	48.2	54.0 Ant2_2402MHz_GFSK_Z	-5.8	Vert
15	7439.700M	31.7	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.2	54.0 Ant2_2480MHz_QPSK_X	-5.8	Horiz
16	7439.600M	31.7	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.2	54.0 Ant2_2480MHz_QPSK_Z	-5.8	Horiz

17	7205.900M	32.5	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	48.1	54.0	-5.9	Ant2_2402MHz_8DPSK_Z	Horiz
18	7440.100M	31.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.1	54.0	-5.9	Ant2_2480MHz_GFSK_X	Horiz
19	7439.700M	31.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.1	54.0	-5.9	Ant2_2480MHz_QPSK_X	Vert
20	7323.000M	32.1	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.1	54.0	-5.9	Ant2_2441MHz_QPSK_X	Vert
21	7439.600M	31.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.1	54.0	-5.9	Ant2_2480MHz_QPSK_Z	Vert
22	7440.000M	31.5	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	48.0	54.0	-6.0	Ant2_2480MHz_8DPSK_Z	Horiz
23	7323.000M	32.0	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	48.0	54.0	-6.0	Ant2_2441MHz_QPSK_Z	Horiz
24	7205.900M	32.4	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	48.0	54.0	-6.0	Ant2_2402MHz_8DPSK_Y	Vert
25	7439.600M	31.4	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.9	54.0	-6.1	Ant2_2480MHz_QPSK_Y	Horiz
26	7439.600M	31.4	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.9	54.0	-6.1	Ant2_2480MHz_8DPSK_X	Horiz
27	7205.600M	32.3	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.9	54.0	-6.1	Ant2_2402MHz_8DPSK_X	Horiz
28	7439.600M	31.3	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.8	54.0	-6.2	Ant2_2480MHz_GFSK_Y	Vert
29	7323.000M	31.8	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.8	54.0	-6.2	Ant2_2441MHz_QPSK_X	Horiz
30	7439.600M	31.3	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.8	54.0	-6.2	Ant2_2480MHz_GFSK_Z	Vert
31	7440.100M	31.2	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.7	54.0	-6.3	Ant2_2480MHz_GFSK_X	Vert
32	7323.000M	31.7	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.7	54.0	-6.3	Ant2_2441MHz_QPSK_Y	Horiz
33	7323.000M	31.6	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.6	54.0	-6.4	Ant2_2441MHz_QPSK_Z	Vert

34	7205.600M	32.0	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.6	54.0	-6.4	Horiz Ant2_2402MHz_QPSK_Y
35	7206.200M	31.9	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.5	54.0	-6.5	Horiz Ant2_2402MHz_GFSK_Y
36	7206.400M	31.9	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.5	54.0	-6.5	Vert Ant2_2402MHz_GFSK_Y
37	7205.900M	31.9	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.5	54.0	-6.5	Horiz Ant2_2402MHz_8DPSK_Y
38	7205.600M	31.9	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.5	54.0	-6.5	Vert Ant2_2402MHz_QPSK_Y
39	7323.000M	31.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.4	54.0	-6.6	Vert Ant2_2441MHz_8DPSK_Y
40	7323.000M	31.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.4	54.0	-6.6	Vert Ant2_2441MHz_8DPSK_Z
41	7323.000M	31.4	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.4	54.0	-6.6	Vert Ant2_2441MHz_GFSK_Z
42	7205.600M	31.8	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.4	54.0	-6.6	Vert Ant2_2402MHz_QPSK_Z
43	7439.600M	30.8	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.3	54.0	-6.7	Horiz Ant2_2480MHz_GFSK_Y
44	7323.000M	31.2	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.2	54.0	-6.8	Horiz Ant2_2441MHz_8DPSK_X
45	7206.400M	31.6	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.2	54.0	-6.8	Horiz Ant2_2402MHz_QPSK_X
46	7206.600M	31.6	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.2	54.0	-6.8	Vert Ant2_2402MHz_GFSK_X
47	7323.000M	31.1	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.1	54.0	-6.9	Horiz Ant2_2441MHz_GFSK_X
48	7205.600M	31.5	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.1	54.0	-6.9	Vert Ant2_2402MHz_8DPSK_X
49	7439.600M	30.6	+0.0 +7.6	+37.3 +11.2	+0.8	-40.4	+0.0	47.1	54.0	-6.9	Horiz Ant2_2480MHz_GFSK_Z
50	7323.000M	31.0	+0.0 +7.5	+36.9 +11.1	+0.8	-40.3	+0.0	47.0	54.0	-7.0	Horiz Ant2_2441MHz_8DPSK_Z

51	7205.500M	31.4	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	47.0	54.0	-7.0	Vert Ant2_2402MHz_QPSK_X
52	7205.900M	31.3	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.9	54.0	-7.1	Vert Ant2_2402MHz_8DPSK_Z
53	7206.230M	31.3	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.9	54.0	-7.1	Horiz Ant2_2402MHz_GFSK_Z
54	7206.600M	30.8	+0.0 +7.5	+36.6 +11.0	+0.8	-40.3	+0.0	46.4	54.0	-7.6	Horiz Ant2_2402MHz_GFSK_X
55	2400.000M	47.7	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	46.3	54.0	-7.7	Vert Ant2_2402MHz_GFSK_Y_Bandedge_L -20dBc
56	2483.500M	46.8	+0.0 +4.1	+28.2 +5.7	+0.5	-39.9	+0.0	45.4	54.0	-8.6	Vert Ant2_2480MHz_8DPSK_Y_Bandedge_H
57	2483.500M	46.2	+0.0 +4.1	+28.2 +5.7	+0.5	-39.9	+0.0	44.8	54.0	-9.2	Vert Ant2_2480MHz_QPSK_Y_bandedge_H
58	4959.730M	35.6	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.7	54.0	-9.3	Vert Ant2_2480MHz_GFSK_Y
59	4960.000M	35.4	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.5	54.0	-9.5	Vert Ant2_2480MHz_8DPSK_Y
60	4960.070M	35.2	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.3	54.0	-9.7	Horiz Ant2_2480MHz_GFSK_X
61	4804.130M	35.6	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	44.1	54.0	-9.9	Horiz Ant2_2402MHz_GFSK_Y
62	4959.730M	34.9	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	44.0	54.0	-10.0	Horiz Ant2_2480MHz_QPSK_Y
63	4803.730M	35.5	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	44.0	54.0	-10.0	Vert Ant2_2402MHz_QPSK_Y
64	4959.730M	34.8	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.9	54.0	-10.1	Vert Ant2_2480MHz_QPSK_Y
65	4960.070M	34.7	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.8	54.0	-10.2	Vert Ant2_2480MHz_GFSK_X
66	4959.730M	34.7	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.8	54.0	-10.2	Vert Ant2_2480MHz_GFSK_Z

67	4803.730M	35.3	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.8	54.0	-10.2	Vert Ant2_2402MHz_8 DPSK_X
68	4804.270M	35.3	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.8	54.0	-10.2	Vert Ant2_2402MHz_G FSK_Y
69	4960.000M	34.6	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.7	54.0	-10.3	Horiz Ant2_2480MHz_8 DPSK_Z
70	4959.730M	34.6	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.7	54.0	-10.3	Vert Ant2_2480MHz_8 DPSK_X
71	4960.000M	34.6	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.7	54.0	-10.3	Horiz Ant2_2480MHz_8 DPSK_Y
72	4882.000M	34.6	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.6	54.0	-10.4	Horiz Ant2_2441MHz_Q PSK_Z
73	4803.670M	35.1	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.6	54.0	-10.4	Vert Ant2_2402MHz_Q PSK_X
74	4959.730M	34.5	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.6	54.0	-10.4	Vert Ant2_2480MHz_Q PSK_Z
75	4959.730M	34.4	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.5	54.0	-10.5	Horiz Ant2_2480MHz_Q PSK_Z
76	4803.930M	35.0	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.5	54.0	-10.5	Horiz Ant2_2402MHz_8 DPSK_Y
77	4882.000M	34.5	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.5	54.0	-10.5	Vert Ant2_2441MHz_G FSK_Y
78	4804.170M	34.9	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.4	54.0	-10.6	Horiz Ant2_2402MHz_G FSK_Z
79	4959.730M	34.3	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.4	54.0	-10.6	Horiz Ant2_2480MHz_8 DPSK_X
80	4803.730M	34.9	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.4	54.0	-10.6	Horiz Ant2_2402MHz_Q PSK_Z
81	4804.400M	34.9	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.4	54.0	-10.6	Horiz Ant2_2402MHz_G FSK_X
82	4803.730M	34.8	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.3	54.0	-10.7	Vert Ant2_2402MHz_Q PSK_Z
83	4803.730M	34.8	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.3	54.0	-10.7	Horiz Ant2_2402MHz_8 DPSK_X

84	4959.830M	34.2	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.3	54.0	-10.7	Horiz Ant2_2480MHz_Q PSK_X
85	4882.000M	34.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.2	54.0	-10.8	Vert Ant2_2441MHz_8 DPSK_Z
86	4804.400M	34.7	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.2	54.0	-10.8	Vert Ant2_2402MHz_G FSK_X
87	4882.000M	34.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.2	54.0	-10.8	Vert Ant2_2441MHz_Q PSK_Y
88	4882.000M	34.1	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.1	54.0	-10.9	Horiz Ant2_2441MHz_Q PSK_Y
89	4803.930M	34.6	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.1	54.0	-10.9	Vert Ant2_2402MHz_8 DPSK_Z
90	4959.830M	34.0	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.1	54.0	-10.9	Vert Ant2_2480MHz_Q PSK_X
91	4959.730M	34.0	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.1	54.0	-10.9	Horiz Ant2_2480MHz_G FSK_Z
92	4882.000M	34.0	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.0	54.0	-11.0	Vert Ant2_2441MHz_Q PSK_X
93	4804.170M	34.5	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	43.0	54.0	-11.0	Vert Ant2_2402MHz_G FSK_Z
94	4960.000M	33.9	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	43.0	54.0	-11.0	Vert Ant2_2480MHz_8 DPSK_Z
95	4882.000M	34.0	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	43.0	54.0	-11.0	Vert Ant2_2441MHz_8 DPSK_Y
96	4959.730M	33.8	+0.0 +5.9	+33.8 +8.6	+0.7	-39.9	+0.0	42.9	54.0	-11.1	Horiz Ant2_2480MHz_G FSK_Y
97	4882.000M	33.9	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.9	54.0	-11.1	Horiz Ant2_2441MHz_Q PSK_X
98	4803.930M	34.4	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.9	54.0	-11.1	Vert Ant2_2402MHz_8 DPSK_Y
99	4882.000M	33.9	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.9	54.0	-11.1	Vert Ant2_2441MHz_G FSK_Z
100	4882.000M	33.8	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.8	54.0	-11.2	Horiz Ant2_2441MHz_G FSK_Z

101	4882.000M	33.6	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.6	54.0	-11.4	Horiz Ant2_2441MHz_8DPSK_Y
102	4882.000M	33.6	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.6	54.0	-11.4	Vert Ant2_2441MHz_GFSK_X
103	4803.730M	34.0	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.5	54.0	-11.5	Horiz Ant2_2402MHz_QPSK_Y
104	4882.000M	33.4	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.4	54.0	-11.6	Horiz Ant2_2441MHz_8DPSK_X
105	4882.000M	33.4	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.4	54.0	-11.6	Horiz Ant2_2441MHz_GFSK_Y
106	4882.000M	33.3	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.3	54.0	-11.7	Horiz Ant2_2441MHz_GFSK_X
107	4882.000M	33.2	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.2	54.0	-11.8	Vert Ant2_2441MHz_QPSK_Z
108	4803.930M	33.6	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.1	54.0	-11.9	Horiz Ant2_2402MHz_8DPSK_Z
109	4804.270M	33.5	+0.0 +5.8	+33.5 +8.5	+0.7	-40.0	+0.0	42.0	54.0	-12.0	Horiz Ant2_2402MHz_QPSK_X
110	4882.000M	33.0	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	42.0	54.0	-12.0	Vert Ant2_2441MHz_8DPSK_X
111	4882.000M	32.9	+0.0 +5.9	+33.7 +8.6	+0.7	-39.9	+0.0	41.9	54.0	-12.1	Horiz Ant2_2441MHz_8DPSK_Z
112	2483.500M	41.4	+0.0 +4.1	+28.2 +5.7	+0.5	-39.9	+0.0	40.0	54.0	-14.0	Vert Ant2_2480MHz_GFSK_Y_bandedge_H
113	2400.000M	56.7	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	55.3	70.4	-15.1	Vert Ant2_2402MHz_QPSK_Y_Bandedge_L_-20dBc
114	2400.000M	57.1	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	55.7	70.8	-15.1	Vert Ant2_2402MHz_8DPSK_Y_Bandedge_L -20dBc

115	2390.000M Ave	28.0	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	26.6	54.0	-27.4	Vert Ant2_2402MHz_8DPSK_Y_Bandedge_L
^	2390.000M	52.9	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	51.5	54.0	-2.5	Vert Ant2_2402MHz_8DPSK_Y_Bandedge_L
^	2390.000M	51.1	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	49.7	54.0	-4.3	Vert Ant2_2402MHz_QPSK_Y_Bandedge_L
^	2390.000M	47.0	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	45.6	54.0	-8.4	Vert Ant2_2402MHz_GFSK_Y_Bandedge_L
119	2402.000M	92.2	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	90.8	125.2	-34.4	Vert Ant2_2402MHz_8DPSK_Y_fundamental
120	2401.930M	91.8	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	90.4	125.2	-34.8	Vert Ant2_2402MHz_QPSK_Y_Fundamental
121	2402.200M	90.8	+0.0 +4.0	+28.3 +5.6	+0.5	-39.8	+0.0	89.4	125.2	-35.8	Vert Ant2_2402MHz_GFSK_Y _fundamental

Band Edge Summary					
Antenna 1 Operating Mode: Single Channel (Low and High)					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	GFSK	PCB Trace *	46.8	<54	Pass
2400.0	GFSK	PCB Trace *	50.7	<76.3	Pass
2483.5	GFSK	PCB Trace *	43.3	<54	Pass
2390.0	π/4 QPSK	PCB Trace *	43.5	<54	Pass
2400.0	π4 QPSK	PCB Trace *	63.6	<74.2	Pass
2483.5	π/4 QPSK	PCB Trace *	43.1	<54	Pass
2390.0	8DPSK	PCB Trace *	45.4	<54	Pass
2400.0	8DPSK	PCB Trace *	63.8	<77.9	Pass
2483.5	8DPSK	PCB Trace *	46.4	<54	Pass

* antennas listed in equipment general product information.

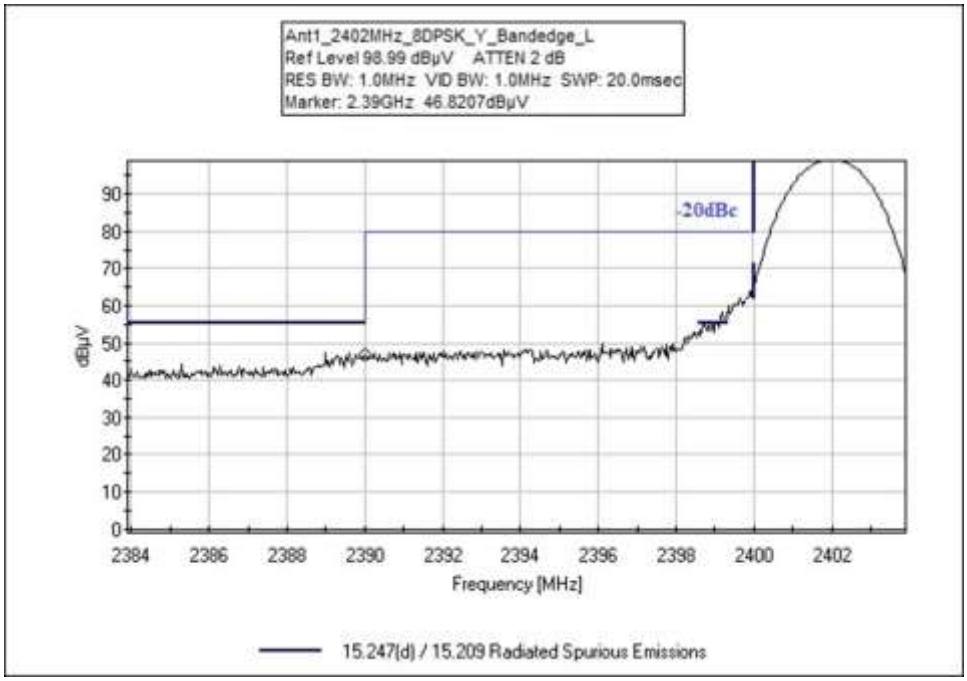
Antenna 2					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	GFSK	PCB Trace *	45.6	<54	Pass
2400.0	GFSK	PCB Trace *	46.3	< 69.4	Pass
2483.5	GFSK	PCB Trace *	40.0	<54	Pass
2390.0	π4 QPSK	PCB Trace *	49.7	<54	Pass
2400.0	π4 QPSK	PCB Trace *	55.3	<70.4	Pass
2483.5	π4 QPSK	PCB Trace *	44.8	<54	Pass
2390.0	8DPSK	PCB Trace *	51.5	<54	Pass
2400.0	8DPSK	PCB Trace *	55.7	<70.8	Pass
2483.5	8DPSK	PCB Trace *	54.5	<54	Pass

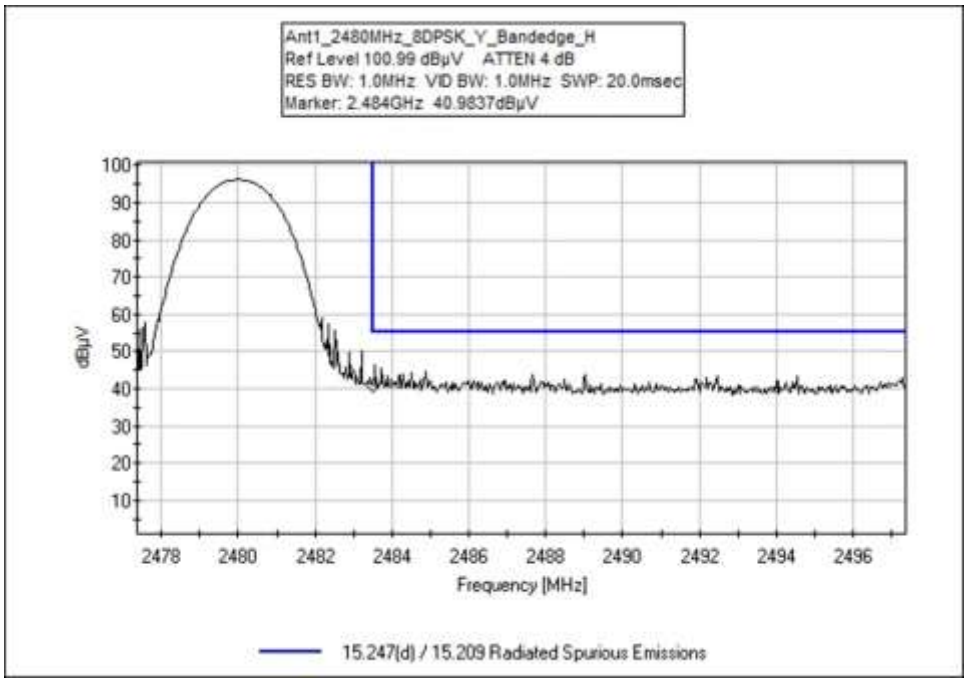
* antennas listed in equipment general product information.

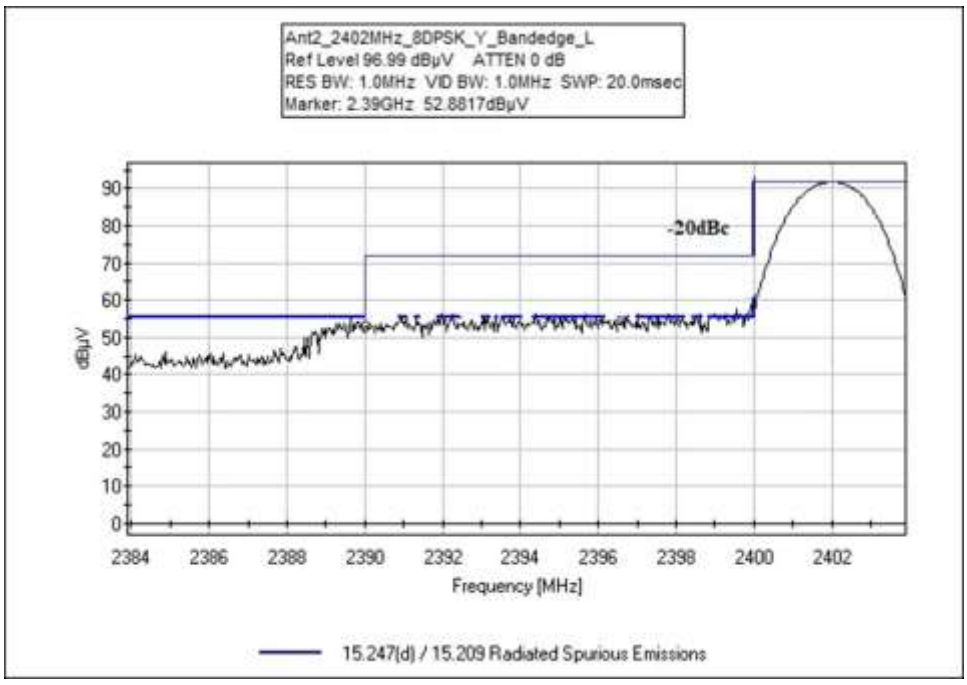
Band Edge Summary					
Operating Mode: Hopping					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
2390.0	NA	NA	NA	<54	NA*
2400.0	NA	NA	NA	<	NA*
2483.5	NA	NA	NA	<54	NA*

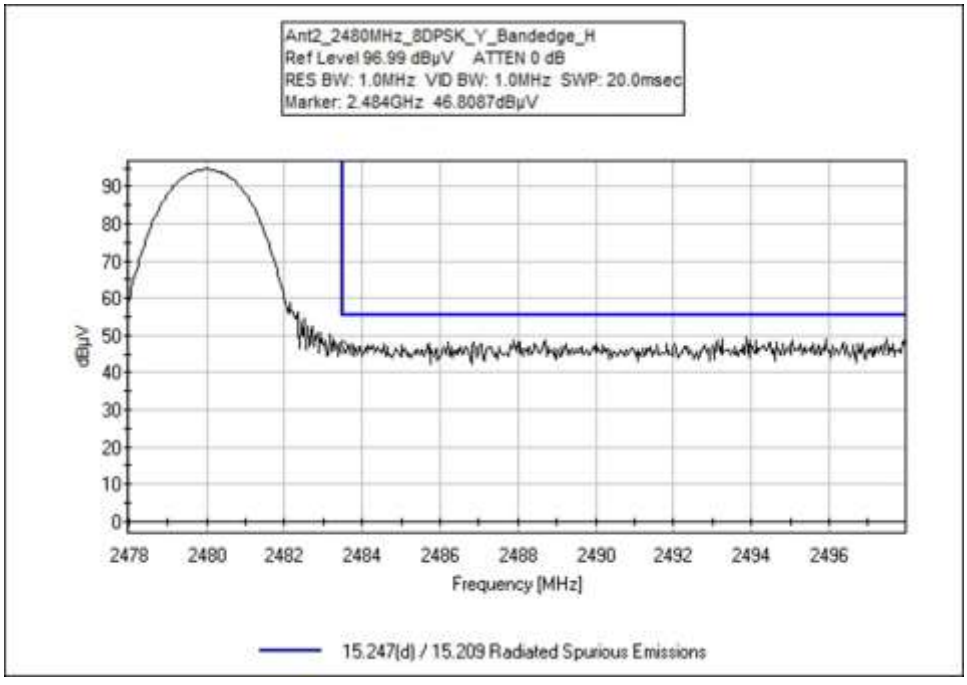
*Not Applicable, original grant tested at higher power level, passed with good margin in Hopping mode.

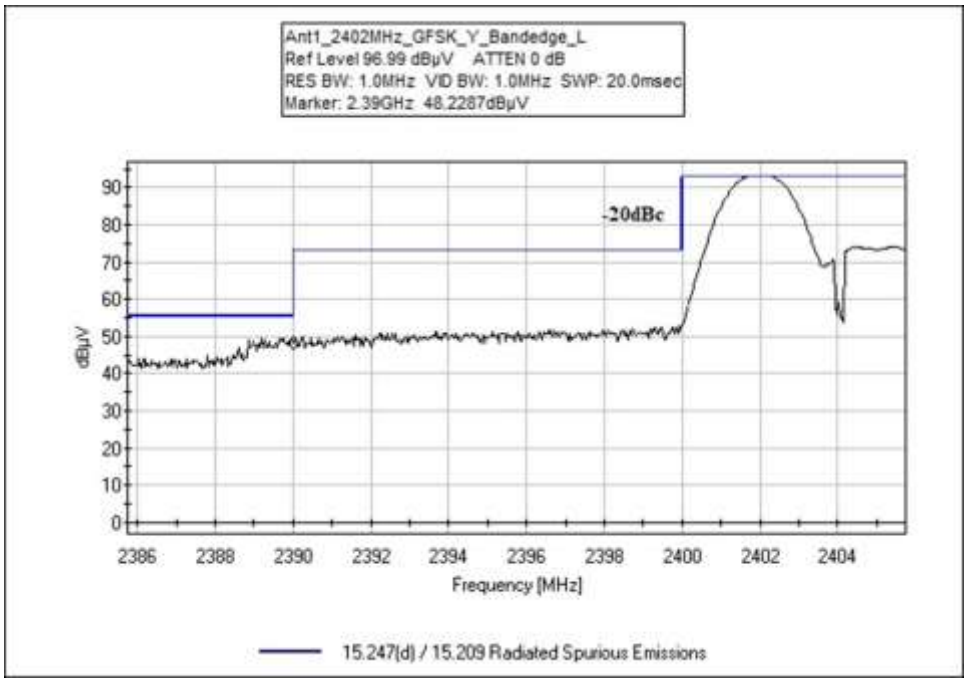
Band Edge Plots

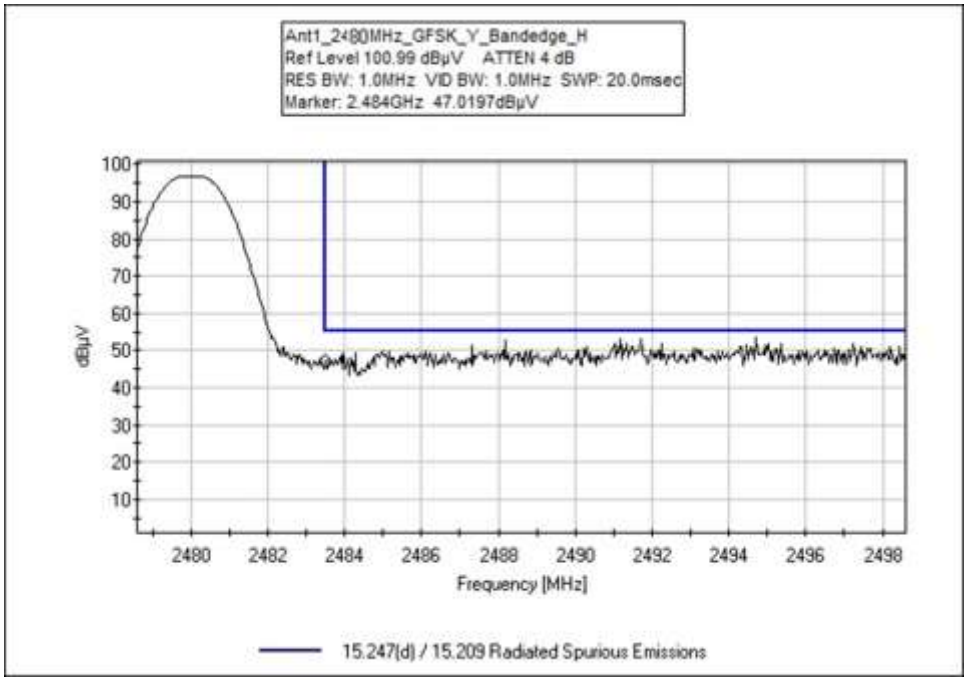


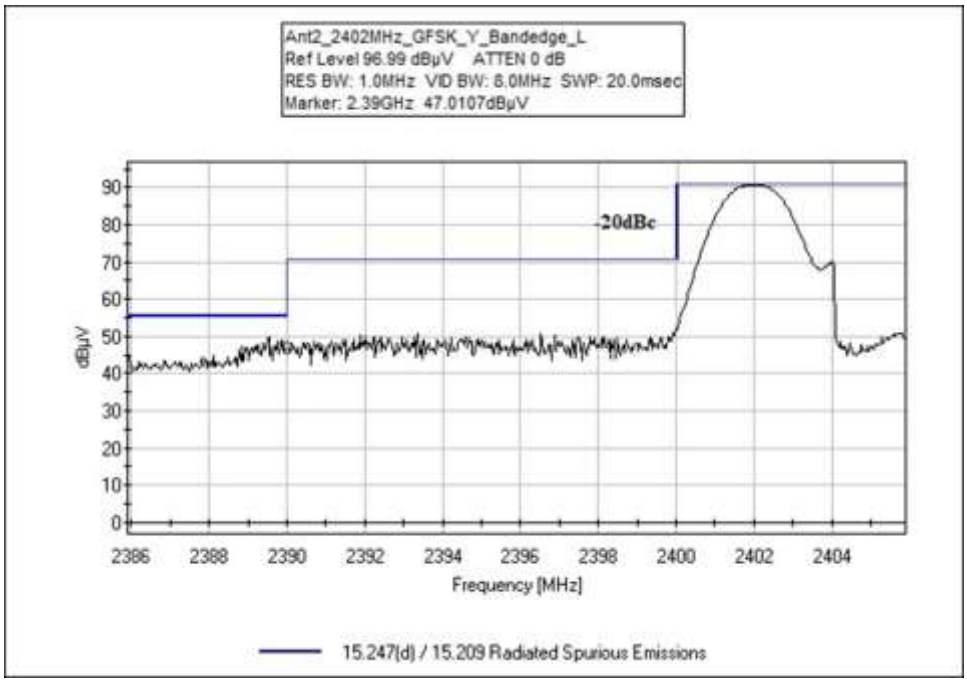


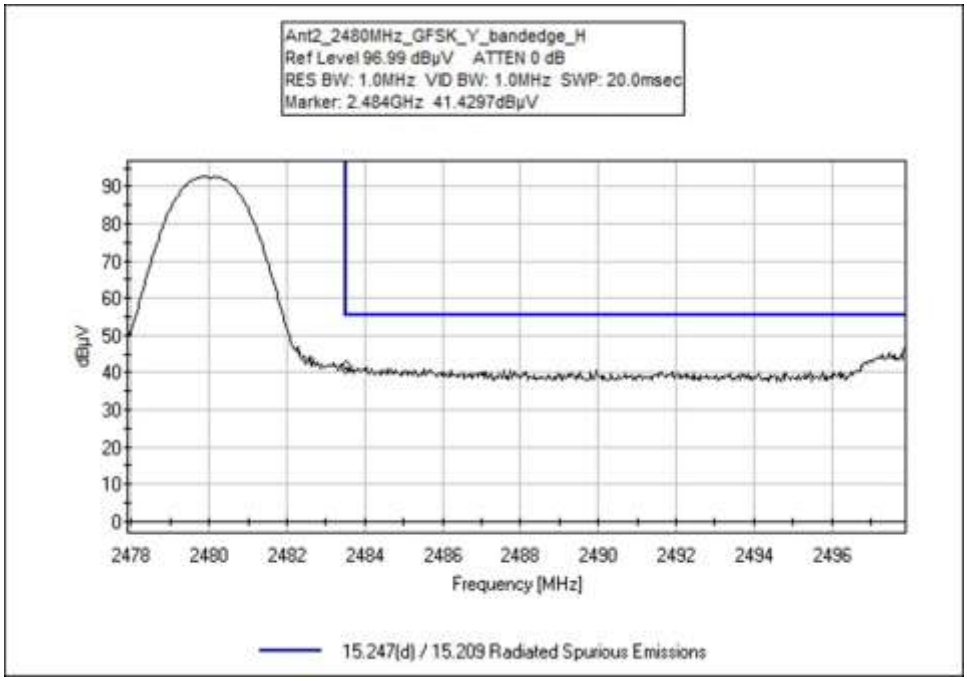

Ant2_2402MHz_8DPSK_Y_Bandedge_L
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.39GHz 52.8817dBµV
-20dBc
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

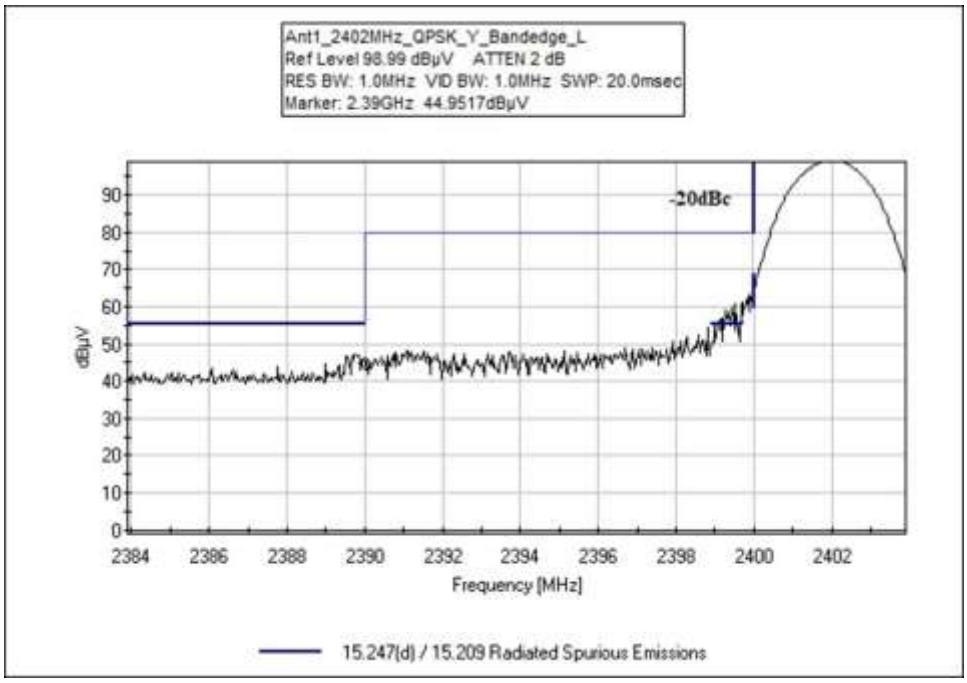

Ant2_2480MHz_8DPSK_Y_Bandedge_H
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 46.8087dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

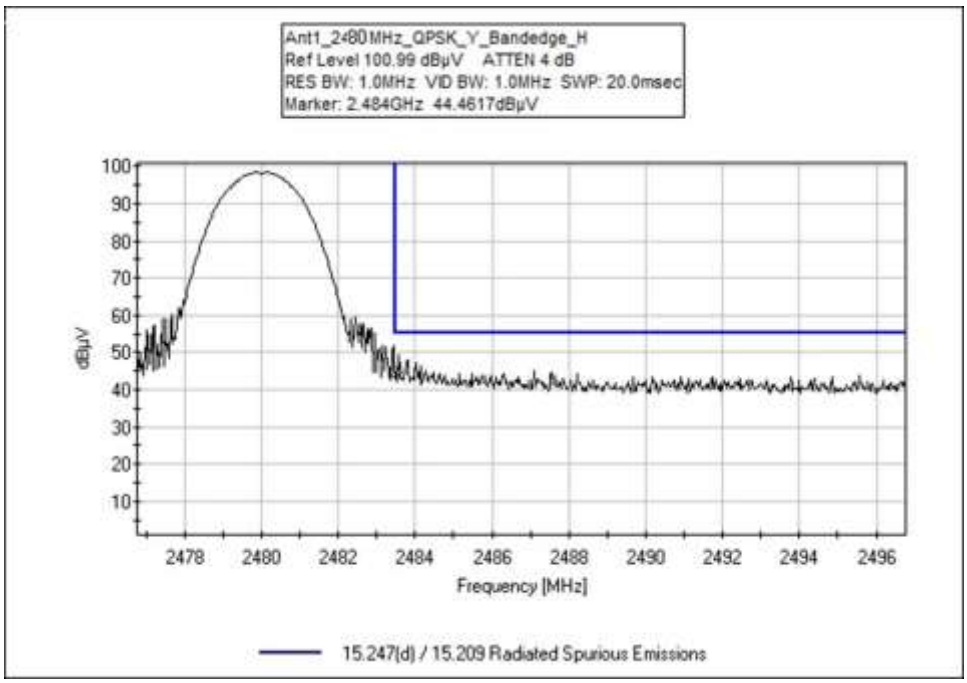

Ant1_2402MHz_GFSK_Y_Bandedge_L
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.39GHz 48.2287dBµV
-20dBc
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

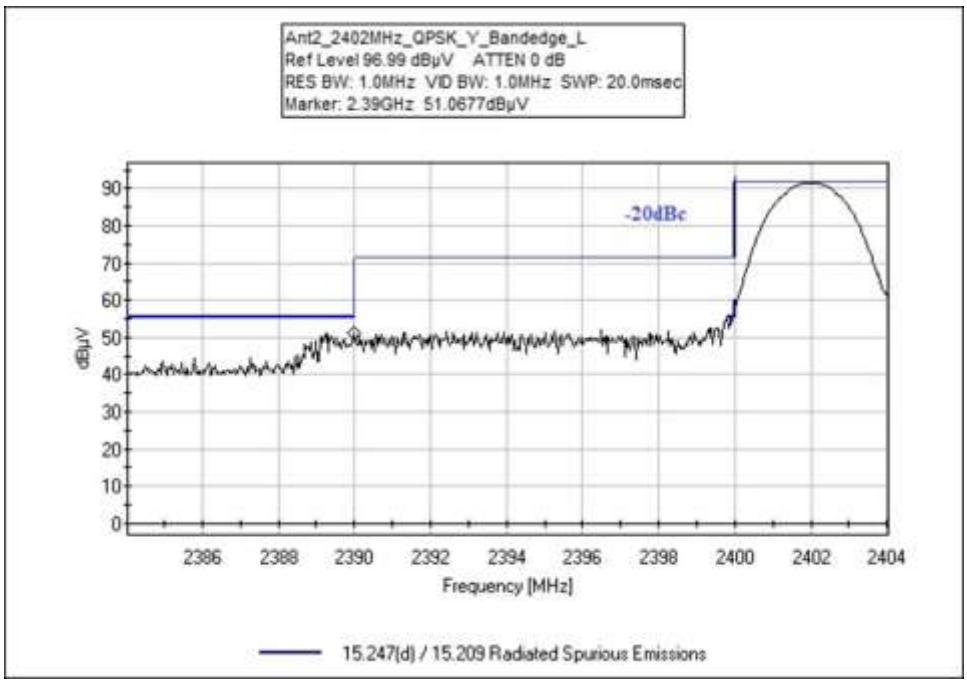

Ant1_2480MHz_GFSK_Y_Bandedge_H
Ref Level 100.99 dBµV ATTEN 4 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 47.0197dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

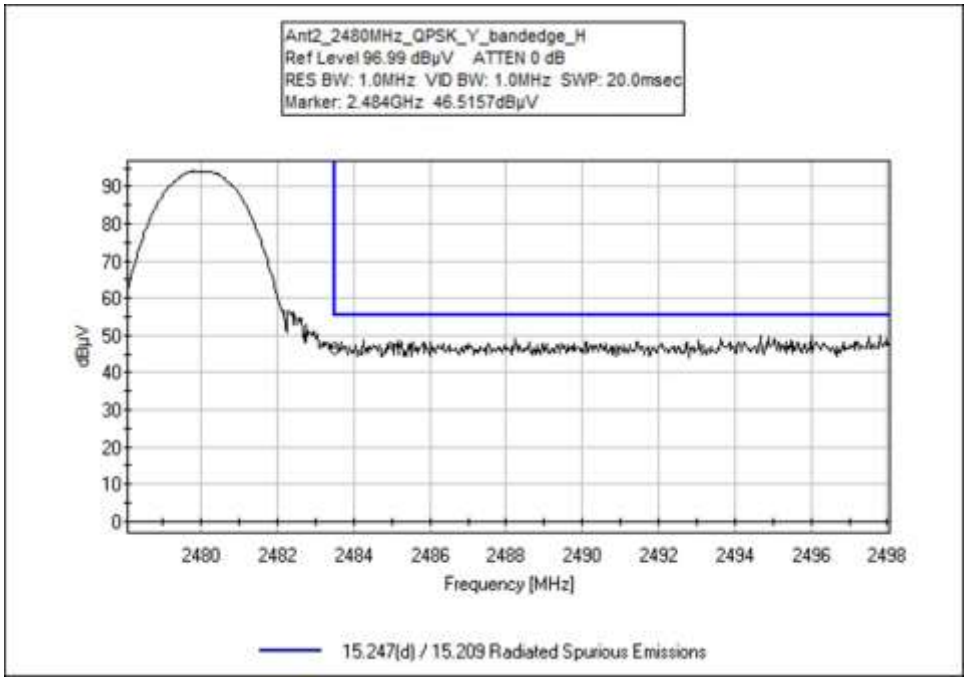

Ant2_2402MHz_GFSK_Y_Bandedge_L
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 8.0MHz SWP: 20.0msec
Marker: 2.39GHz 47.0107dBµV
-20dBc
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Ant2_2480MHz_GFSK_Y_bandedge_H
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 41.4297dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

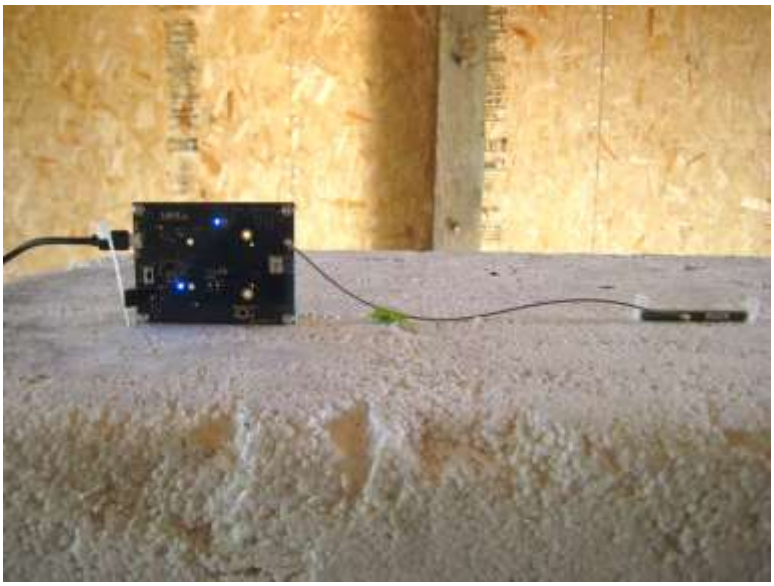

Ant1_2402MHz_QPSK_Y_Bandedge_L
Ref Level 98.99 dBµV ATTEN 2 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.39GHz 44.9517dBµV
-20dBc
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Ant1_2480MHz_QPSK_Y_Bandedge_H
Ref Level 100.99 dBµV ATTEN 4 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 44.4617dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Ant2_2402MHz_QPSK_Y_Bandedge_L
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.39GHz 51.0677dBµV
-20dBc
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Ant2_2480MHz_QPSK_Y_bandedge_H
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 1.0MHz VID BW: 1.0MHz SWP: 20.0msec
Marker: 2.484GHz 46.5157dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup Photo(s)



General Test Setup

Below 1GHz

Below 1GHz

Above 1GHz

Above 1GHz

X Axis

Y Axis

Z Axis

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

Uncertainty Value	Parameter
4.73 dB	Radiated Emissions
3.34 dB	Mains Conducted Emissions
3.30 dB	Disturbance Power

Uncertainties reported are worst case for all CKC Laboratories' sites and represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

Unless otherwise indicated, the following configuration parameters are used for equipment setup: The cables were routed consistent with the typical application by varying the configuration of the test sample. Interface cables were connected to the available ports of the test unit. The effect of varying the position of the cables was investigated to find the configuration that produced maximum emissions. Cables were of the type and length specified in the individual requirements. The length of cable that produced maximum emissions was selected.

The equipment under test (EUT) was set up in a manner that represented its normal use, as shown in the setup photographs. Any special conditions required for the EUT to operate normally are identified in the comments that accompany the emissions tables.

The emissions data was taken with a spectrum analyzer or receiver. Incorporating the applicable correction factors for distance, antenna, cable loss and amplifier gain, the data was reduced as shown in the table below. The corrected data was then compared to the applicable emission limits. Preliminary and final measurements were taken in order to ensure that all emissions from the EUT were found and maximized.

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dBµV/m, the spectrum analyzer reading in dBµV was corrected by using the following formula. This reading was then compared to the applicable specification limit. Individual measurements were compared with the displayed limit value in the margin column. The margin was calculated based on subtracting the limit value from the corrected measurement value; a positive margin represents a measurement exceeding the limit, while a negative margin represents a measurement less than the limit.

SAMPLE CALCULATIONS		
	Meter reading	(dBµV)
+	Antenna Factor	(dB/m)
+	Cable Loss	(dB)
-	Distance Correction	(dB)
-	Preamplifier Gain	(dB)
=	Corrected Reading	(dBµV/m)

TEST INSTRUMENTATION AND ANALYZER SETTINGS

The test instrumentation and equipment listed were used to collect the emissions data. A spectrum analyzer or receiver was used for all measurements. Unless otherwise specified, the following table shows the measuring equipment bandwidth settings that were used in designated frequency bands. For testing emissions, an appropriate reference level and a vertical scale size of 10 dB per division were used.

MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE			
TEST	BEGINNING FREQUENCY	ENDING FREQUENCY	BANDWIDTH SETTING
CONDUCTED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	9 kHz	150 kHz	200 Hz
RADIATED EMISSIONS	150 kHz	30 MHz	9 kHz
RADIATED EMISSIONS	30 MHz	1000 MHz	120 kHz
RADIATED EMISSIONS	1000 MHz	>1 GHz	1 MHz

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

The notes that accompany the measurements contained in the emissions tables indicate the type of detector function used to obtain the given readings. Unless otherwise noted, all readings were made in the "positive peak" detector mode. Whenever a "quasi-peak" or "average" reading was recorded, the measurement was annotated with a "QP" or an "Ave" on the appropriate rows of the data sheets. In cases where quasi-peak or average limits were employed and data exists for multiple measurement types for the same frequency then the peak measurement was retained in the report for reference, however the numbering for the affected row was removed and an arrow or caret ("^") was placed in the far left-hand column indicating that the row above takes precedence for comparison to the limit. The following paragraphs describe in more detail the detector functions and when they were used to obtain the emissions data.

Peak

In this mode, the spectrum analyzer or receiver recorded all emissions at their peak value as the frequency band selected was scanned. By combining this function with another feature called "peak hold," the measurement device had the ability to measure intermittent or low duty cycle transient emission peak levels. In this mode the measuring device made a slow scan across the frequency band selected and measured the peak emission value found at each frequency across the band.

Quasi-Peak

Quasi-peak measurements were taken using the quasi-peak detector when the true peak values exceeded or were within 2 dB of a quasi-peak specification limit. Additional QP measurements may have been taken at the discretion of the operator.

Average

Average measurements were taken using the average detector when the true peak values exceeded or were within 2 dB of an average specification limit. Additional average measurements may have been taken at the discretion of the operator. If the specification or test procedure requires trace averaging, then the averaging was performed using 100 samples or as required by the specification. All other average measurements are performed using video bandwidth averaging. To make these measurements, the test engineer reduces the video bandwidth on the measuring device until the modulation of the signal is filtered out. At this point the measuring device is set into the linear mode and the scan time is reduced.