Itron, Inc.

TEST REPORT FOR

Gas Endpoint
Model: 500GC

Tested to The Following Standards:

FCC Part 15 Subpart C Section(s)

15.247
(FHSS AND HYBRID 902-928 MHz)

Report No.: 99318-18

Date of issue: December 24, 2018

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 # 803.02

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Liberty Lake, WA 99019

Representative: Jay Holcomb
Customer Reference Number: 163061

REPORT PREPARED BY:

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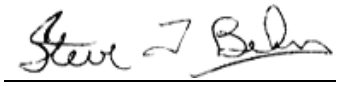
Mariposa, CA 95338

Project Number: 99318

DATE OF EQUIPMENT RECEIPT: October 25, 2018
DATE(S) OF TESTING: October 25-31, 2018 and December 4-7, 2018

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	5.03.11

Site Registration & Accreditation Information

Location	NIST CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147
Brea D, CA	US0060	SL2-IN-E-1146R	3082D-2	US1025	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 15 Subpart C - 15.247 (FHSS 902-928MHz)

Test Procedure	Description	Modifications	Results
15.247(a)(1)(i)	Occupied Bandwidth	NA	Pass
15.247(a)(1)	Carrier Separation	NA	Pass
15.247(a)(1)(i)	Number of Hopping Channels	NA	Pass
15.247(a)(1)(i)/15.247(f)	Average Time of Occupancy	NA	NP
15.247 (f)	Hybrid Systems	NA	Pass
15.247(f)	Power Spectral Density	NA	Pass
15.247(b)(2)	Output Power	NA	Pass
15.247(d)	RF Conducted Emissions & Band Edge	NA	Pass
15.247(d)	Radiated Emissions & Band Edge	NA	Pass
15.207	AC Conducted Emissions	NA	NA1

NA = Not Applicable
NA1 = Not applicable because the EUT is battery powered
NP = CKC Laboratories was not contracted to perform test. See Manufacturer Declaration in Average Time of Occupancy section.

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
None

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
Gas Endpoint	Itron, Inc.	500GC	99318-cond4

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Latitude E6410	NA
Laptop AC/DC Adapter	Dell	LA65NS0-00	NA
USB to Serial Adapter	Itron, Inc.	PCB-TEMP-0007	NA

Configuration 2

Equipment Tested:

Device	Manufacturer	Model #	S/N
Gas Endpoint	Itron, Inc.	500GC	28 0100696353

Support Equipment:

Device	Manufacturer	Model #	S/N
Laptop	Dell	Latitude E6410	NA
Laptop AC/DC Adapter	Dell	LA65NS0-00	NA
USB to Serial Adapter	Itron, Inc.	PCB-TEMP-0007	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Wideband System:	Proprietary FHSS
Operating Frequency Range:	902.3 to 926.9MHz (100kbps FSK power level 3) 902.4 to 927.6 MHz (300kbps power level 2-Hybrid) 902.4 to 927.6 MHz (300kbps power level 3)
Number of Hopping Channels:	83 (100kbps FSK power level 3) 64 (300kbps power level 2-Hybrid) 64 (300kbps power level 3)
Modulation Type(s):	100kbps FSK 300kbps GFSK 300kbsp GFSK Hybrid
Maximum Duty Cycle:	100%
Number of TX Chains:	1
Antenna Type(s) and Gain:	2.8dBi integral omni power level 2 5.7 dBi integral omni power level 3
Beamforming Type:	NA
Antenna Connection Type:	Integral (External connector provided to facilitate testing)
Nominal Input Voltage:	6.0Vdc
Firmware / Software used for Test:	4.1.6.0 / Command Line Interface (CLI) Tool 2.0.0.11

FCC Part 15 Subpart C

15.247(a) Transmitter Characteristics

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/5/2018
Configuration:	1		
Test Setup:	The EUT is placed on test bench. The serial port is connected to a support laptop via serial to USB adapter. The laptop is running software Command Line Interface Tool to turn on TX at 100% duty cycle. The EUT is powered from fresh battery 6.0Vdc. Frequency of measurement: 902.3 to 927.6MHz RBW=2kHz and 3.9kHz, VBW=6.2kHz and 12kHz		

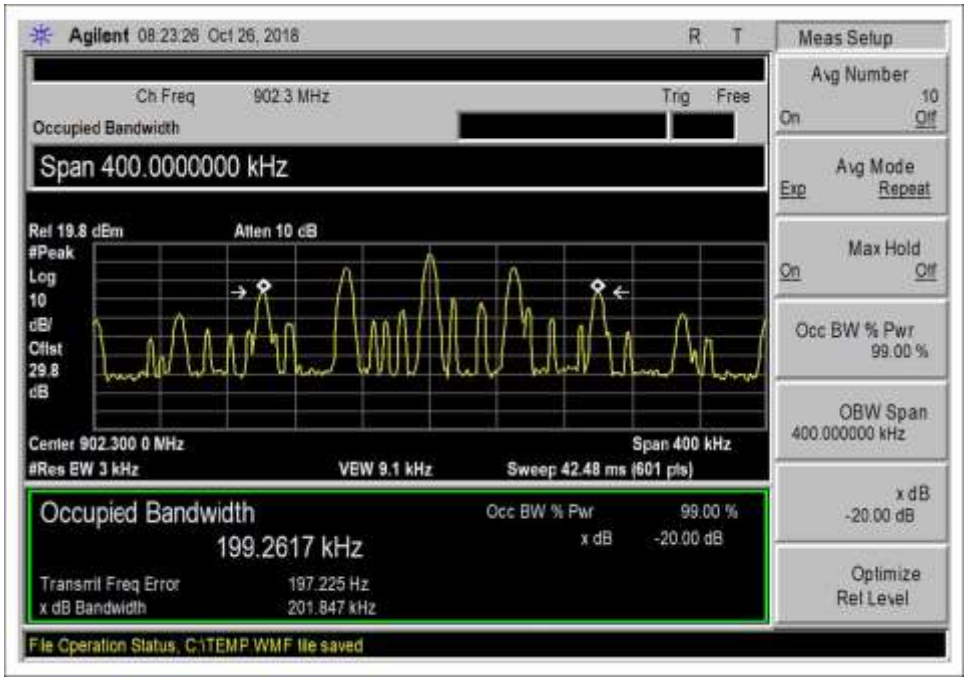
Environmental Conditions			
Temperature (ºC)	21.5	Relative Humidity (%):	35.0

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/27/2017	10/27/2019
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020

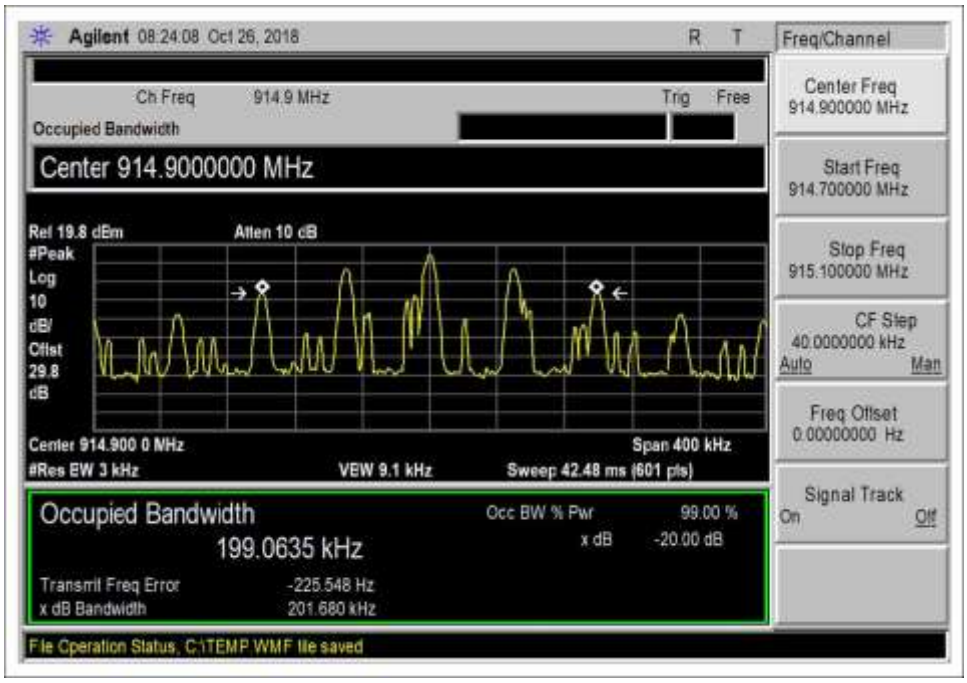
15.247(a)(1) 20 dB Bandwidth

Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
902.3	1	100kbps FSK lv3	201.847	≤500	Pass
914.9	1	100kbps FSK lv3	201.680	≤500	Pass
926.9	1	100kbps FSK lv3	201.701	≤500	Pass
902.4	1	300kbps GFSK lv2	363.298	≤500	Pass
914.8	1	300kbps GFSK lv2	362.436	≤500	Pass
927.6	1	300kbps GFSK lv2	358.512	≤500	Pass
902.4	1	300kbps GFSK lv3	363.532	≤500	Pass
914.8	1	300kbps GFSK lv3	355.226	≤500	Pass
927.6	1	300kbps GFSK lv3	355.094	≤500	Pass

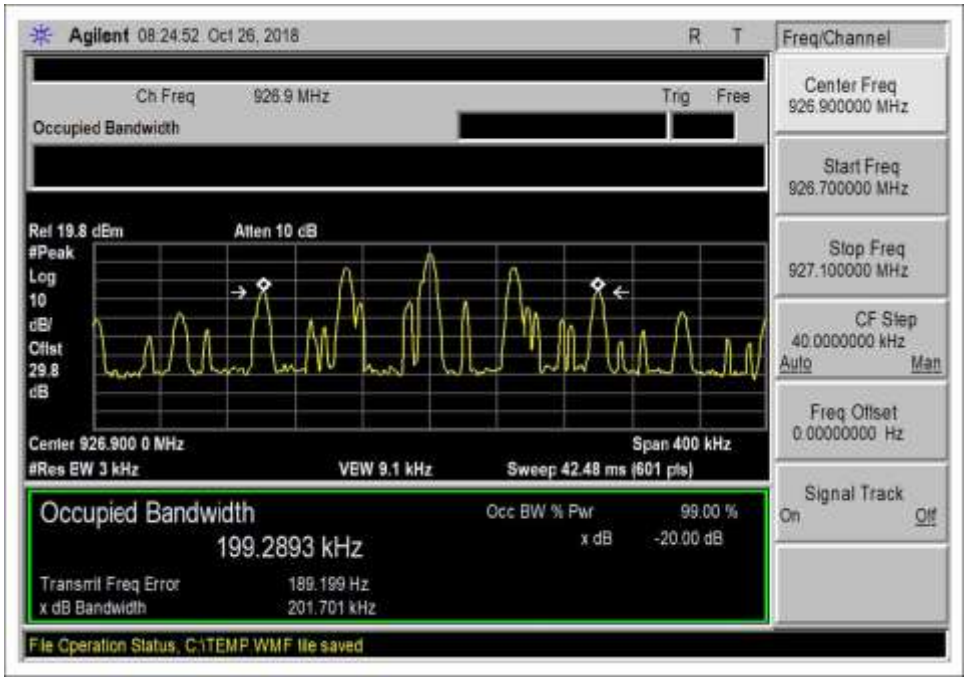
Plots



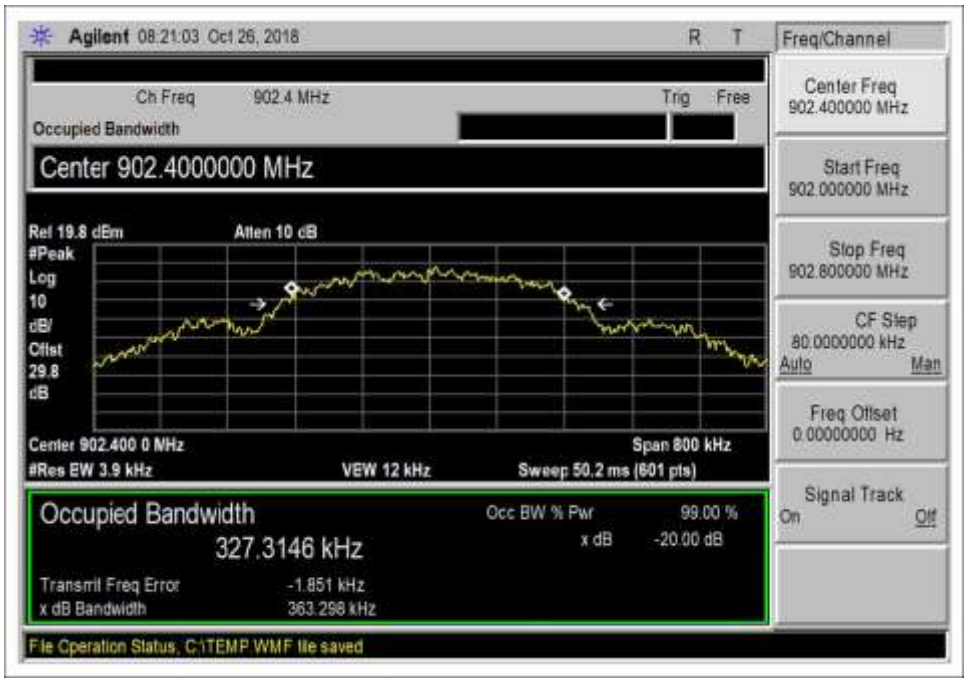
Low Channel, 100kbps, Power level 3



Middle Channel, 100kbps, Power level 3

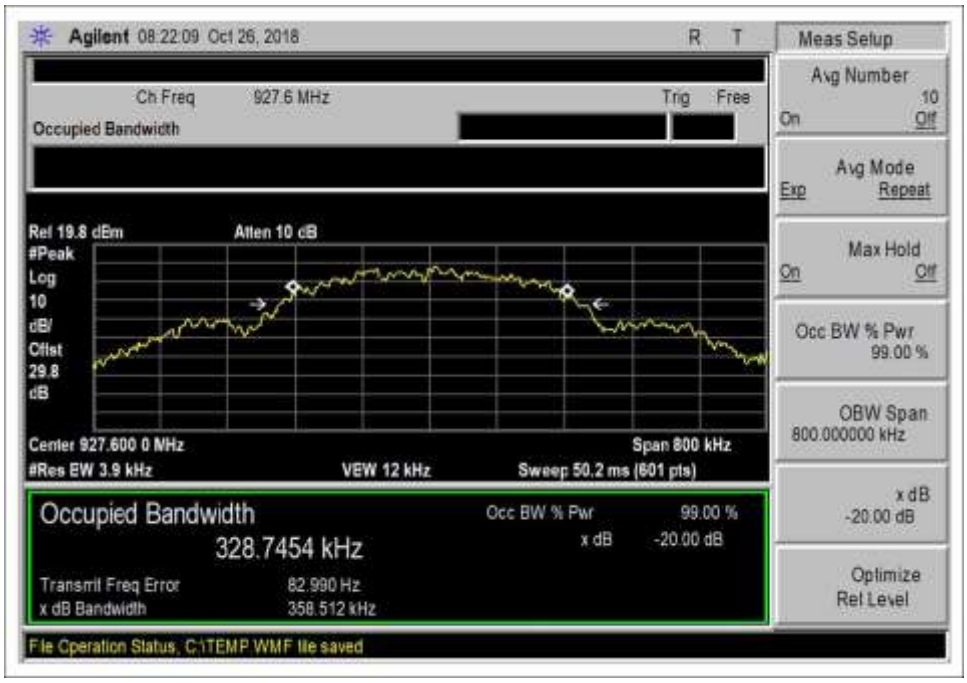


High Channel, 100kbps, Power level 3

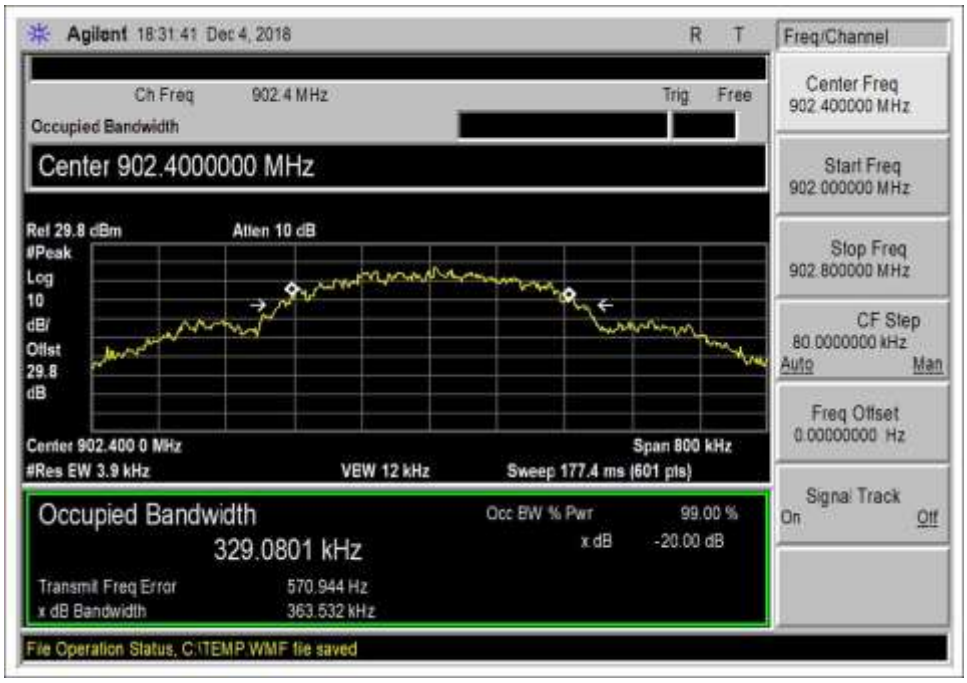


Low Channel, 300kbps, Power level 2

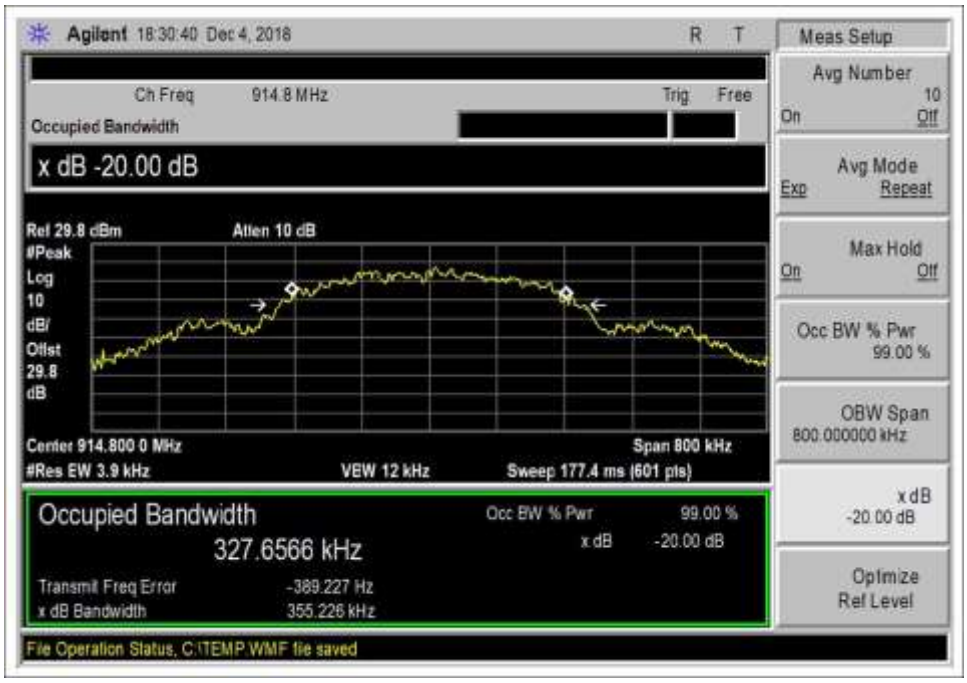
Middle Channel, 300kbps, Power level 2



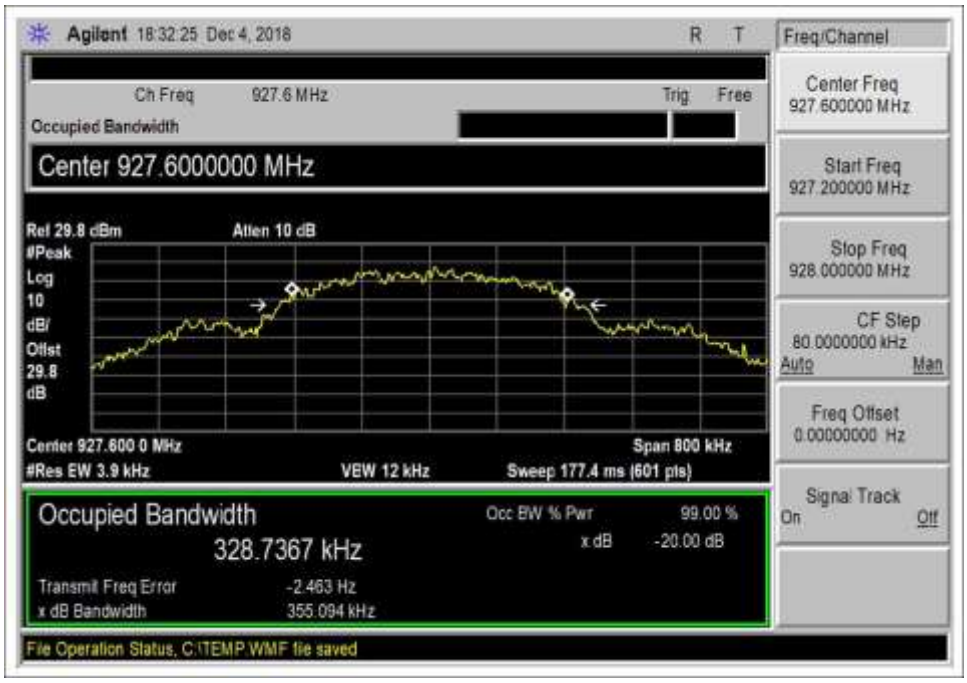
High Channel, 300kbps, Power level 2



Low Channel, 300kbps, Power level 3



Middle Channel, 300kbps, Power level 3

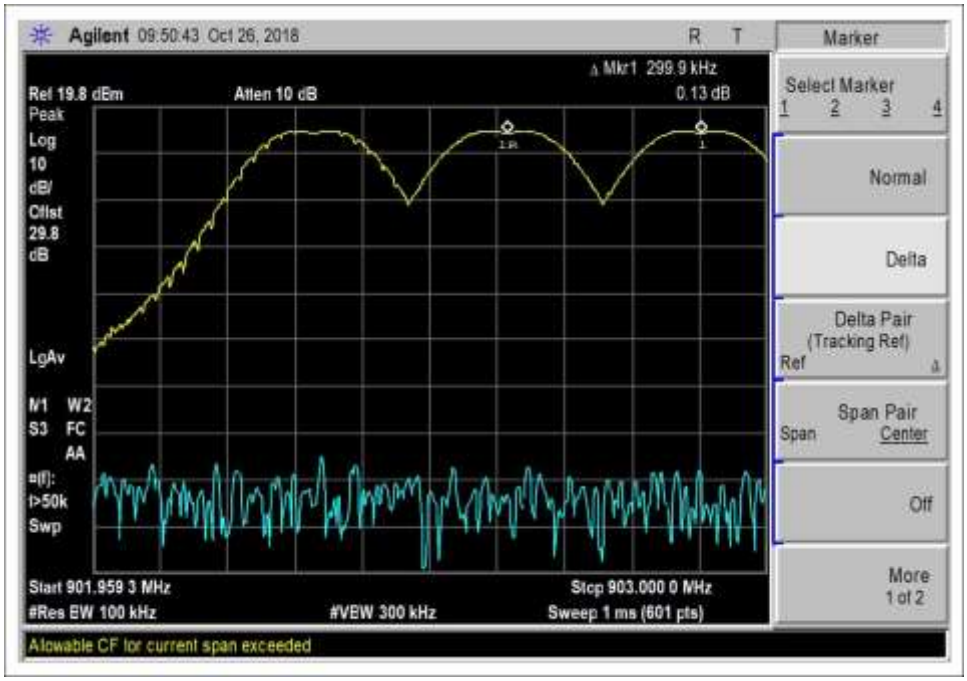


High Channel, 300kbps, Power level 3

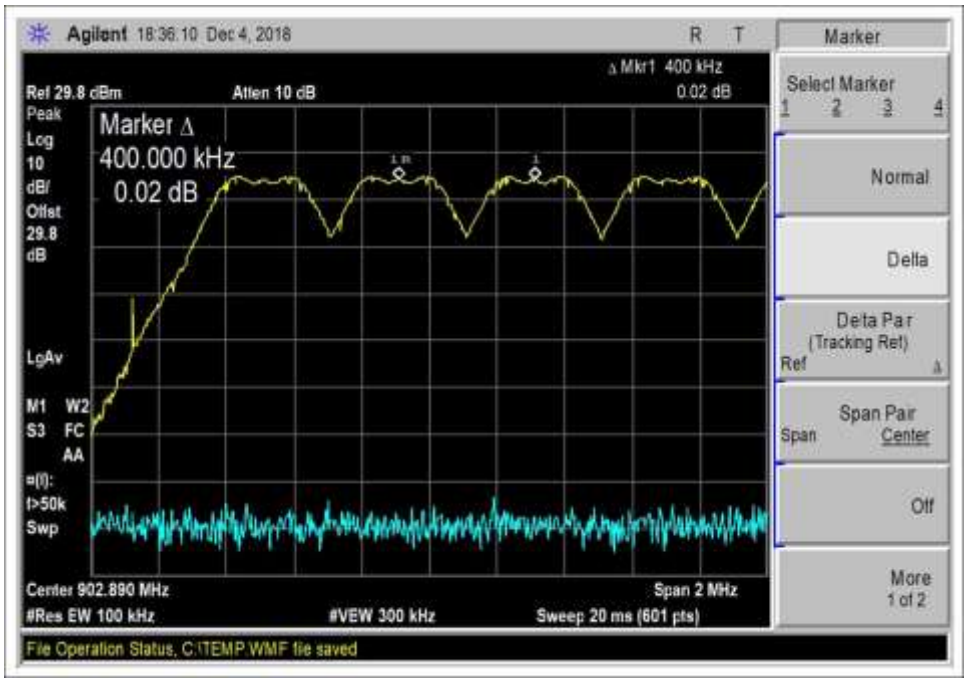
15.247(a)(1) Carrier Separation

Test Data Summary				
Limit applied: 20dB bandwidth of the hopping channel.				
Antenna Port	**Operational Mode**	**Measured (kHz)**	**Limit (kHz)**	**Results**
1	100kbps FSK lv3	300	> 201.847	Pass
1	300kbps GFSK lv2	400	> 363.298	Pass
1	300kbps GFSK lv3	400	> 363.532	Pass

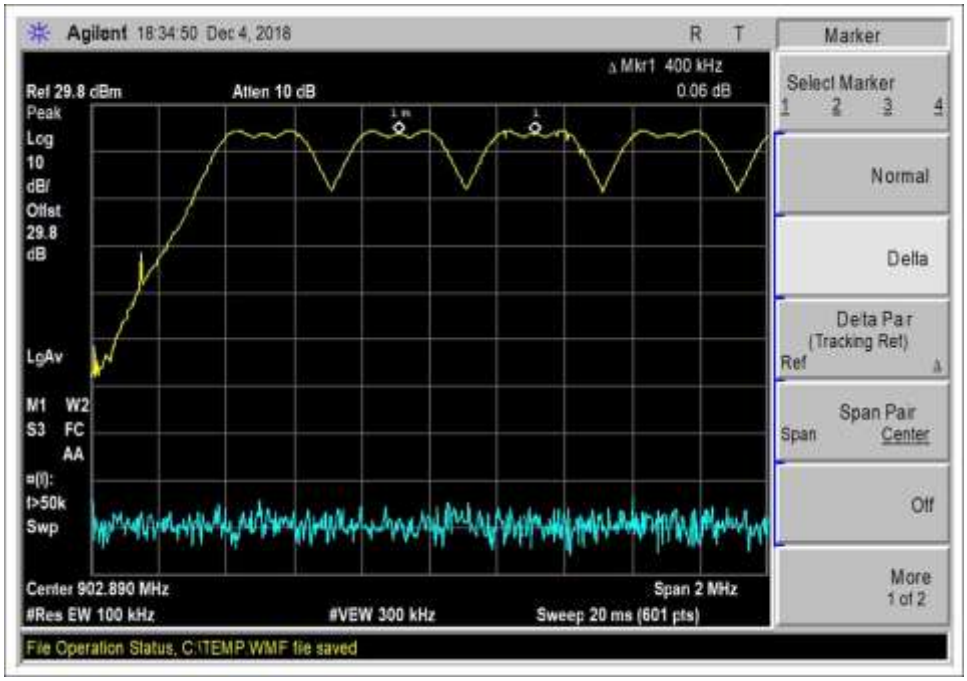
Plots



100kbps, Power level 3



300kbps, Power level 2

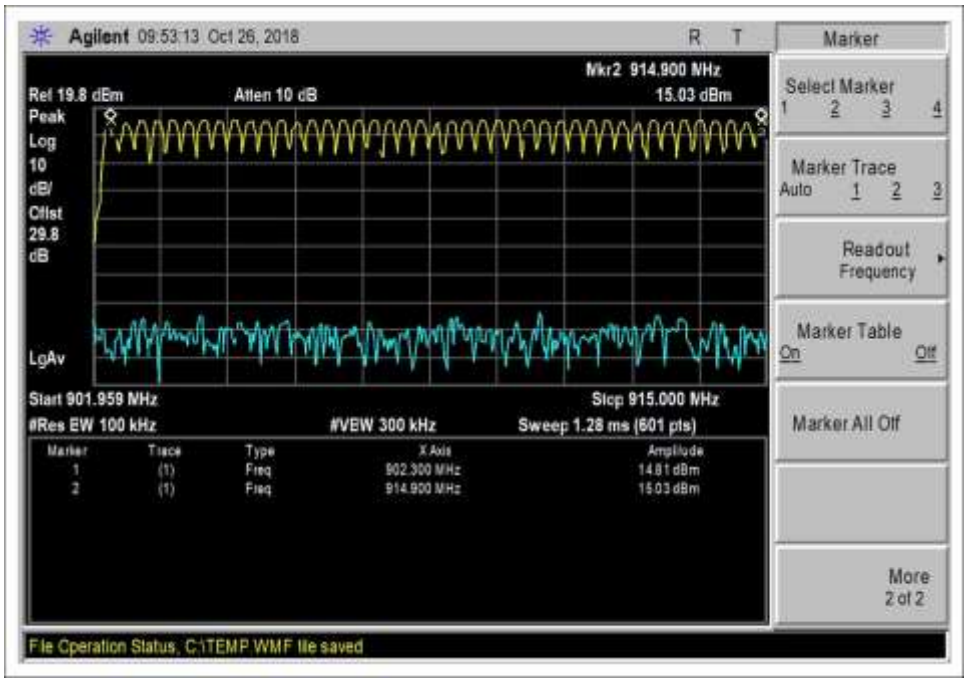


300kbps, Power level 3

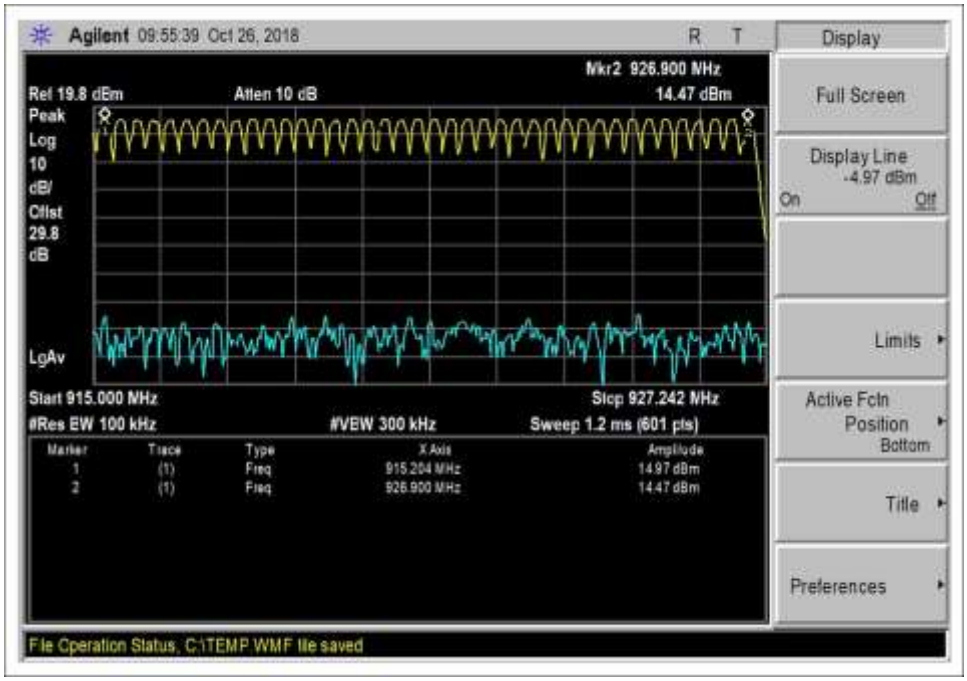
15.247(a)(1)(iii) Number of Hopping Channels

Test Data Summary				
$Limit = \begin{cases} 50\ Channels \mid 20\ dB\ BW < 250kHz \\ 25\ Channels \mid 20\ dB\ BW \geq 250kHz \end{cases}$				
Antenna Port	**Operational Mode**	**Measured (Channels)**	**Limit (Channels)**	**Results**
1	100kbps FSK lv3	83	≥ 50	Pass
1	300kbps GFSK lv2	64	≥ 25	Pass
1	300kbps GFSK lv3	64	≥ 25	Pass

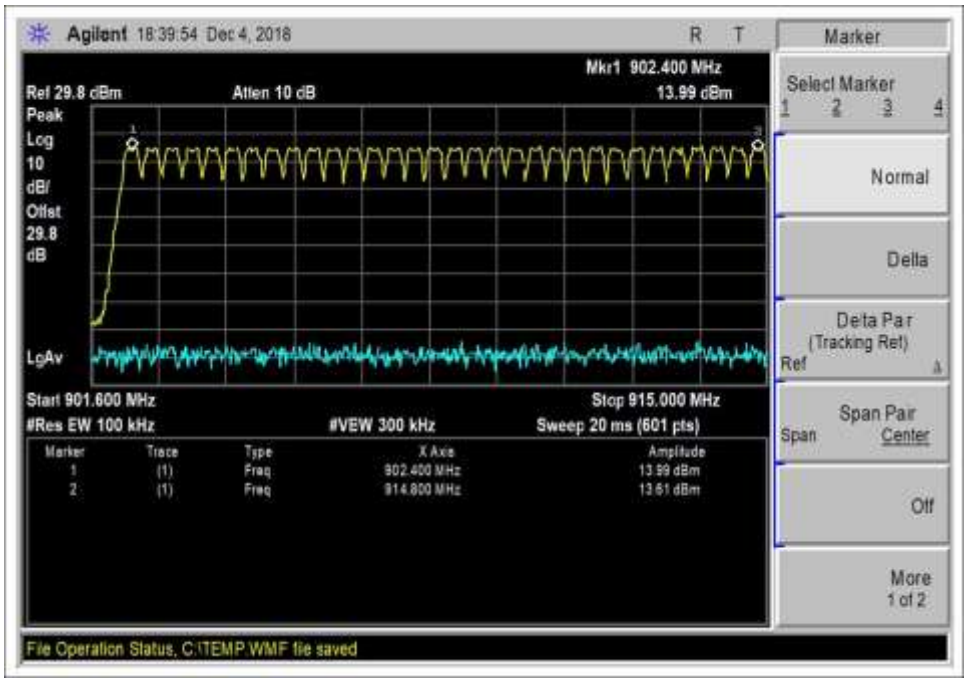
Plots



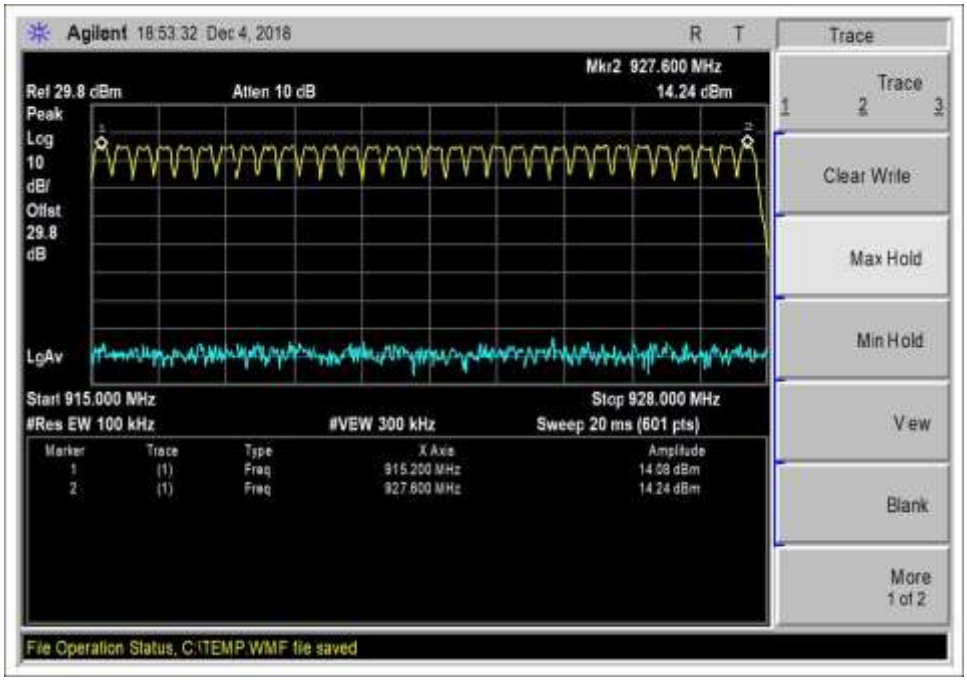
100kbps, Power level 3, #1



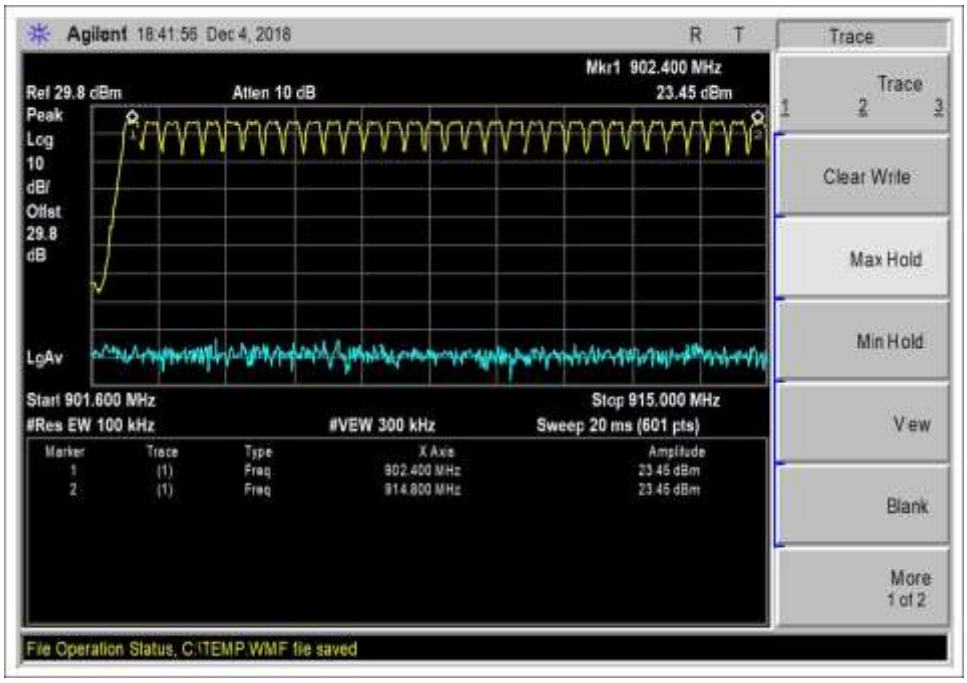
100kbps, Power level 3, #2



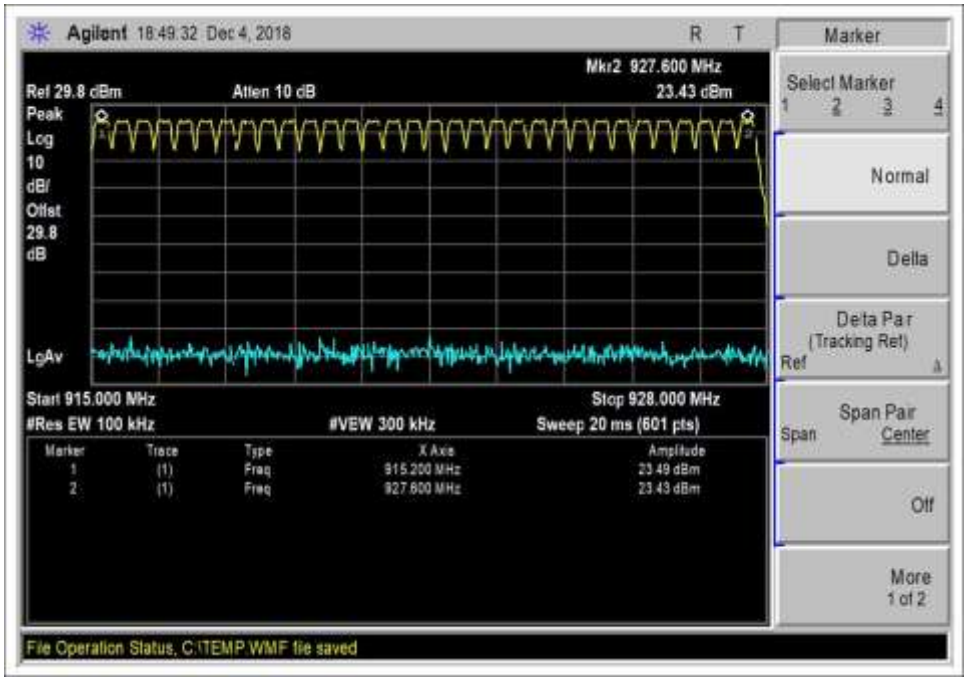
300kbps, Power level 2, #1



300kbps, Power level 2, #2



300kbps, Power level 3, #1



300kbps, Power level 3, #2

15.247(a)(1)(i)/15.247(f) Average Time of Occupancy

CKC laboratories was not contracted to perform the testing due to the required equipment and firmware to exercise the EUT's multiple pseudo-random hopping sequences was not available and that the complexity of the different modulations and modes depend on the device to be in a fully operating network environment.

Therefore, the manufacturer declares the following:

With the multiple modulations, modes and hop tables, the mode with the worst-case Time of Occupancy to demonstrate 400mS compliance is 399.9 mS in 20 seconds, since this modulation is less than 250kHz Occupied Band Width. Each session of multiple short transmissions takes place on channels out of a minimum of 50 channels in a pseudorandom sequence. The algorithm that determines the pseudo-random hop sequence ensures all active channels are used equally on the average.

Itron employs hopping patterns based on pseudo-random sequence generators or pseudo-random hop tables.

The firmware uses the channels in the prescribed pseudo random order, therefore it maintains equal channel usage.

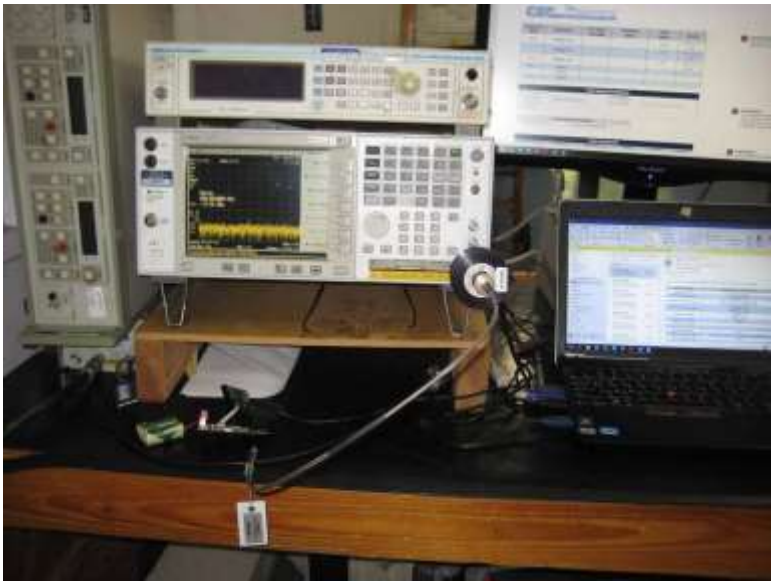
The system has receiver channel bandwidths that match the transmitter's modulation bandwidth that is enabled.

With the transmitter and receiver in synchronization within the network, transmitters switch frequencies in synchronization with the receiver.

When the transmitter needs to send a continuous or long data stream, total time of the packet transmissions is monitored to comply with dwell time requirement of 400ms in the appropriate 10s or 20s window depending on the modulation/mode enabled.

This device does not employ any hopping avoidance techniques.

Test Setup Photo



15.247(f) Hybrid Systems

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	10/25/2018
Configuration:	1		
Test Setup:	The EUT is placed on test bench. The serial port is connected to a support laptop via serial to USB adapter. The laptop is running software Command Line Interface Tool to turn on TX at 100% duty cycle. The EUT is powered from 6.0Vdc power supply. Frequency of measurement: 902.4 to 927.6MHz RBW=3kHz, VBW=9kHz		

Environmental Conditions			
Temperature (ºC)	22.9	Relative Humidity (%):	54.4

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/27/2017	10/27/2019
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020

15.247(f) Power Spectral Density

Power Spectral Density

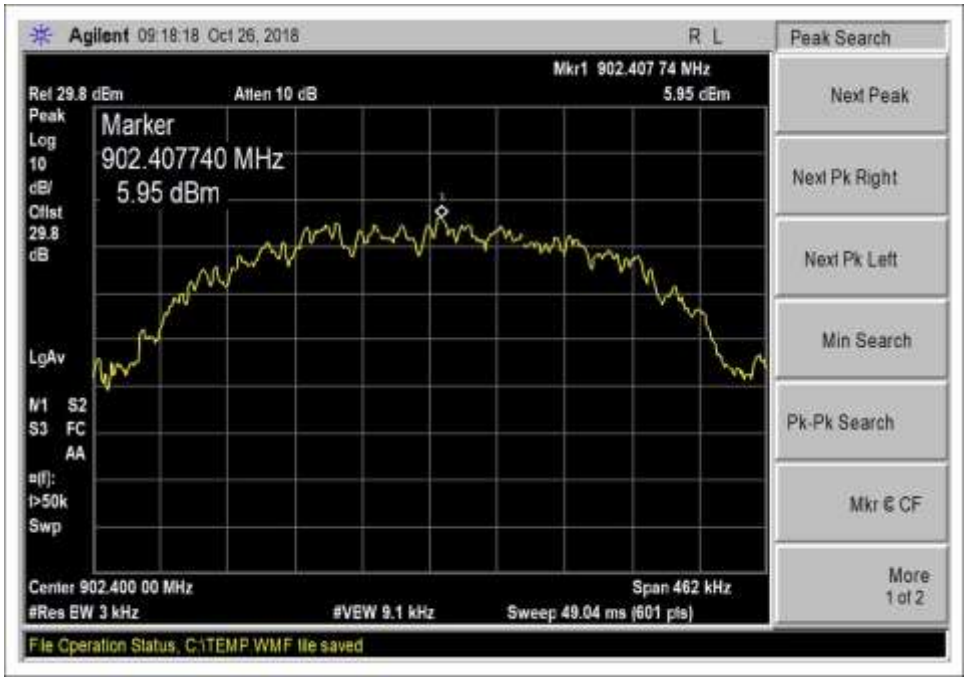
Test Data Summary - RF Conducted Measurement				
Measurement Method: PKPSD				
Frequency (MHz)	**Modulation**	**Measured (dBm/3kHz)**	**Limit (dBm/3kHz)**	**Results**
902.4	300kbps GFSK lv2 Hybrid	5.95	≤8	Pass
914.8	300kbps GFSK lv2 Hybrid	6.20	≤8	Pass
927.6	300kbps GFSK lv2 Hybrid	6.26	≤8	Pass

6dB Occupied Bandwidth (required for PSD measurement)

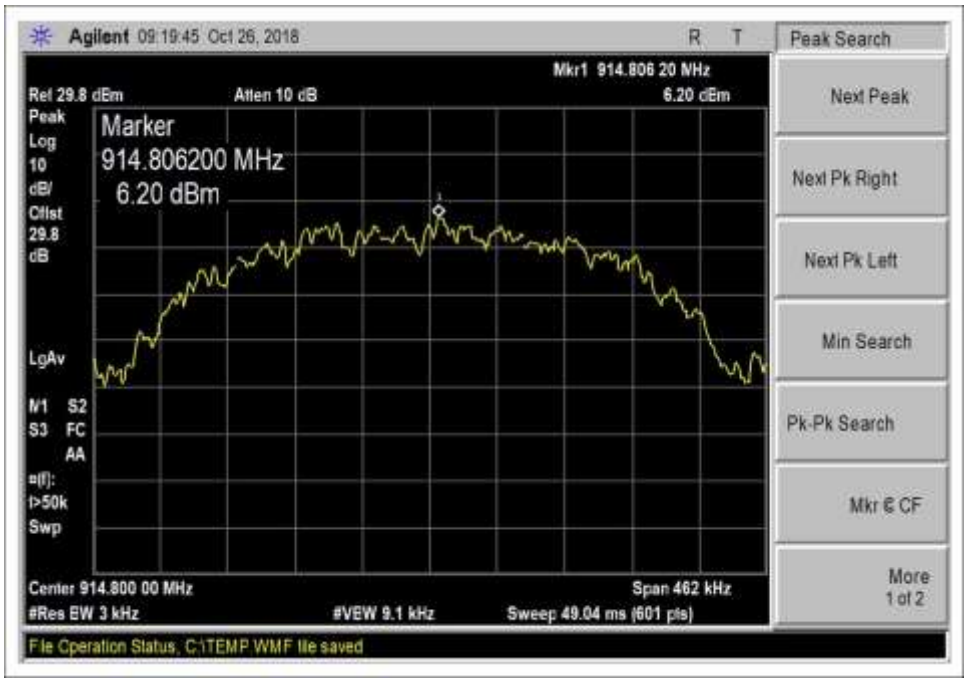
Test Data Summary					
Frequency (MHz)	**Antenna Port**	**Modulation**	**Measured (kHz)**	**Limit (kHz)**	**Results**
902.4	1	300kbps GFSK lv2 Hybrid	307.545	None	Pass
914.8	1	300kbps GFSK lv2 Hybrid	307.819		
927.6	1	300kbps GFSK lv2 Hybrid	310.093		

Plots

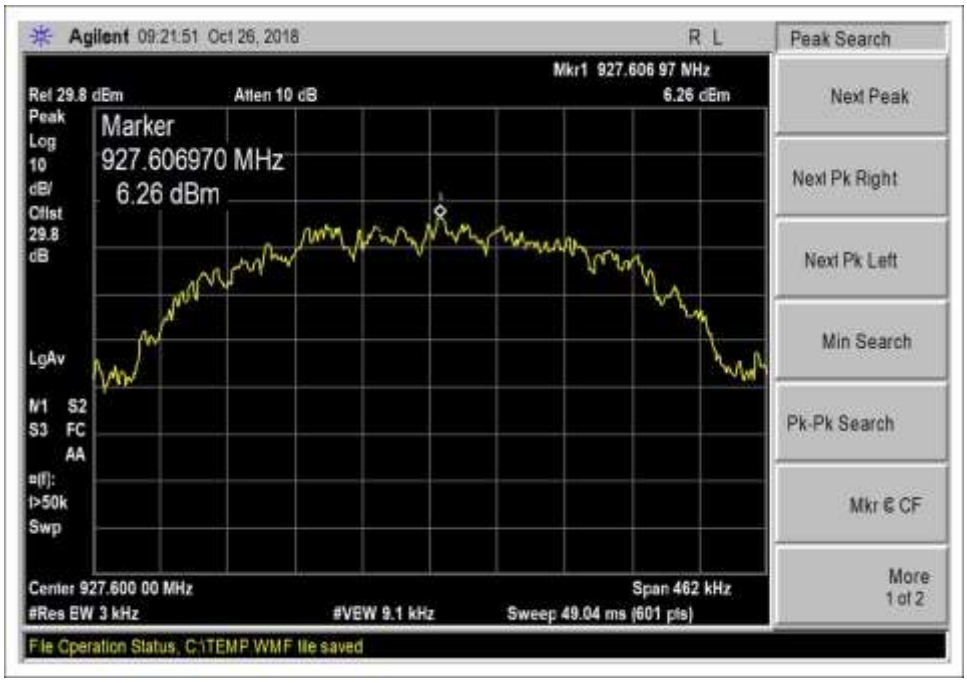
Power Spectral Density



Low Channel

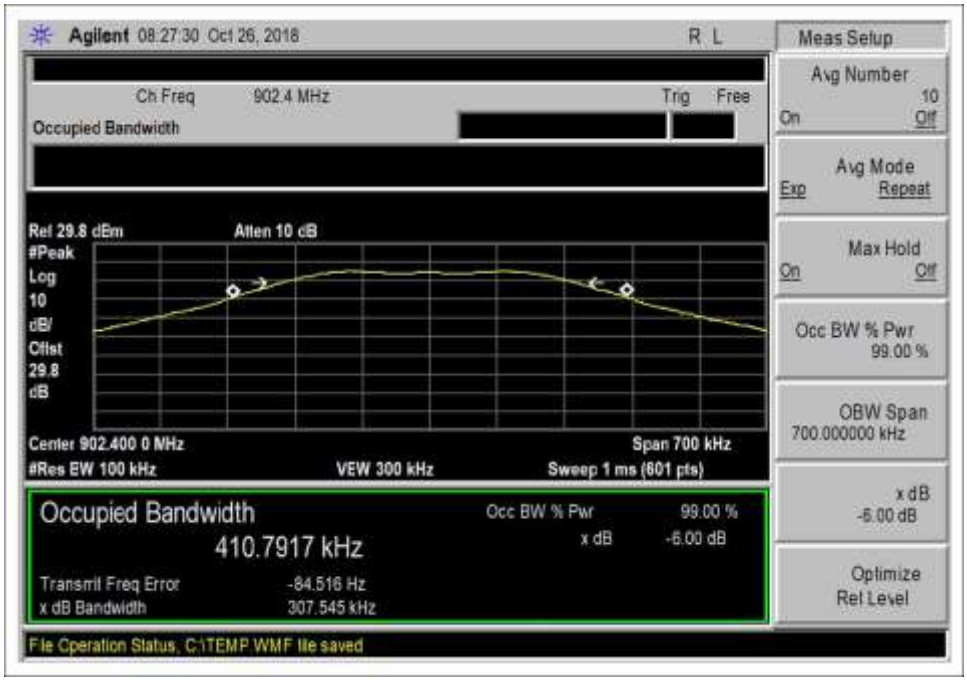


Middle Channel

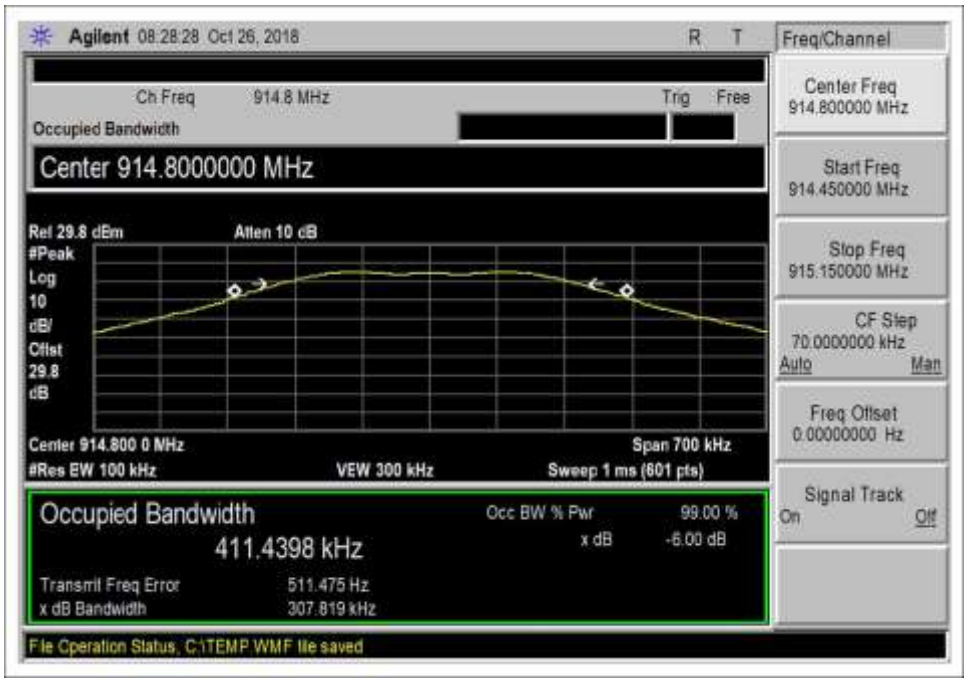


High Channel

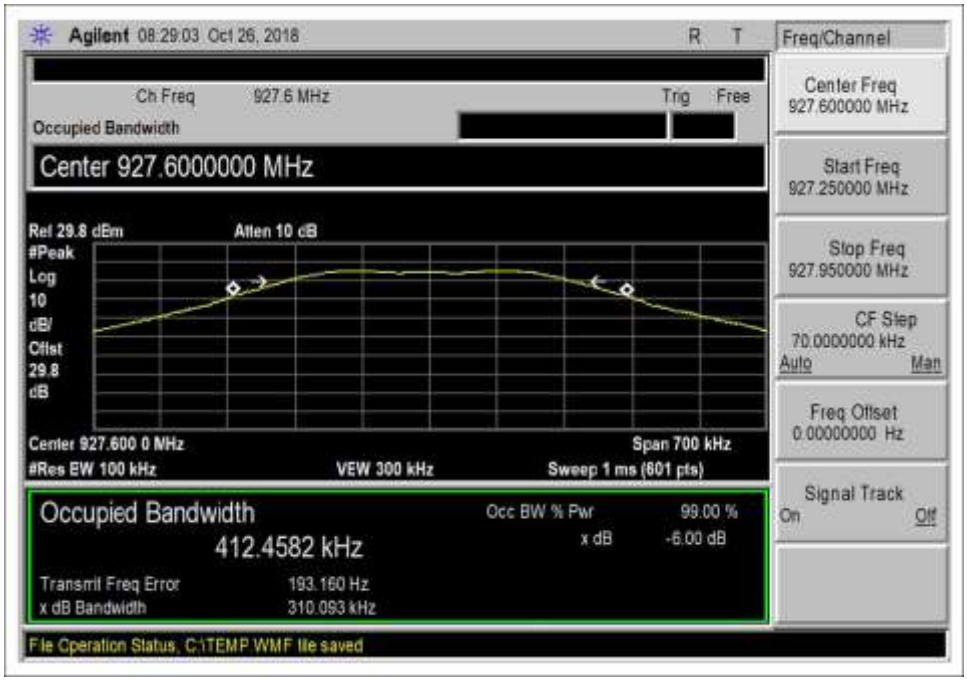
6dB Occupied Bandwidth



Low Channel

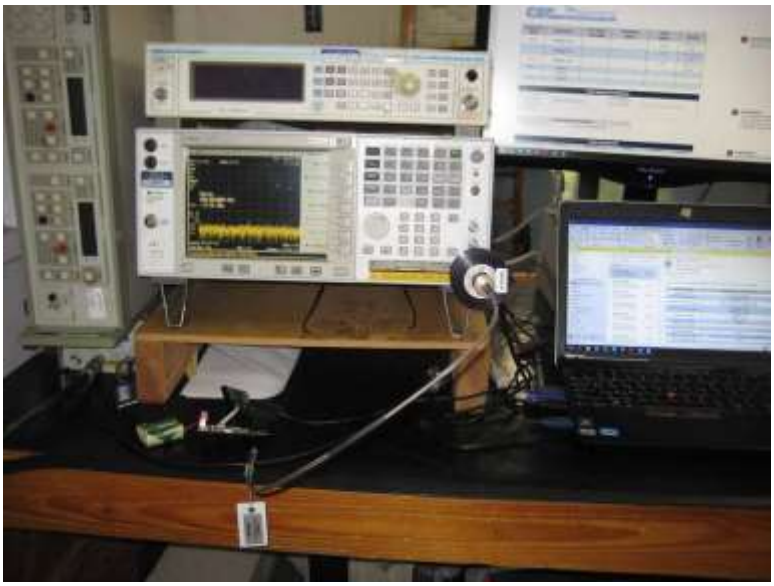


Middle Channel



High Channel

Test Setup Photo



15.247(b)(1) Output Power

Test Setup/Conditions			
Test Location:	Brea Lab A	Test Engineer:	Don Nguyen
Test Method:	ANSI C63.10 (2013)	Test Date(s):	12/5/2018
Configuration:	1		
Test Setup:	The EUT is placed on test bench. The serial port is connected to a support laptop via serial to USB adapter. The laptop is running software Command Line Interface Tool to turn on TX at 100% duty cycle. The EUT is powered from fresh battery 6.0Vdc. Frequency of measurement: 902.3 to 927.6MHz RBW=2MHz, VBW=6MHz		

Environmental Conditions			
Temperature (ºC)	21.5	Relative Humidity (%):	35.0

Test Equipment					
Asset#	**Description**	**Manufacturer**	**Model**	**Cal Date**	**Cal Due**
02672	Spectrum Analyzer	Agilent	E4446A	3/2/2017	3/2/2019
03432	Attenuator	Aeroflex/Weinschel	90-30-34	10/27/2017	10/27/2019
P07244	Cable	H&S	32022-29094K-29094K-24TC	7/5/2018	7/5/2020

Test Data Summary - Voltage Variations

This equipment is battery powered. Power output tests were performed using a fresh battery.

Parameter Definitions:

Measurements performed at input voltage according to manufacturer specification.

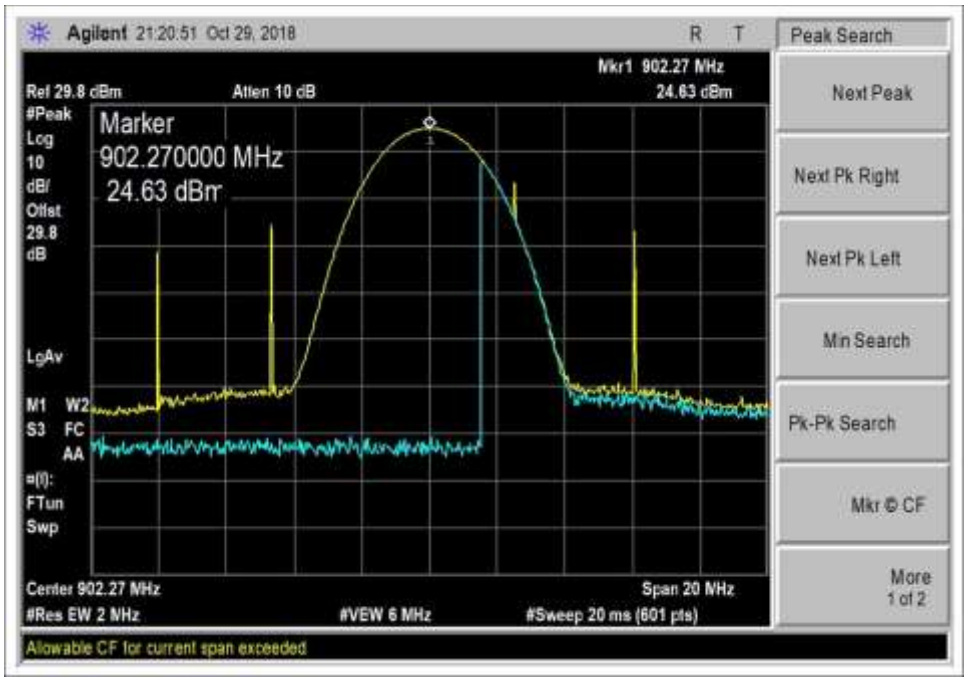
Parameter	Value
$V_{Nominal}$:	6.0Vdc
$V_{Minimum}$:	6.0Vdc
$V_{Maximum}$:	6.0Vdc

Test Data Summary - Voltage Variations

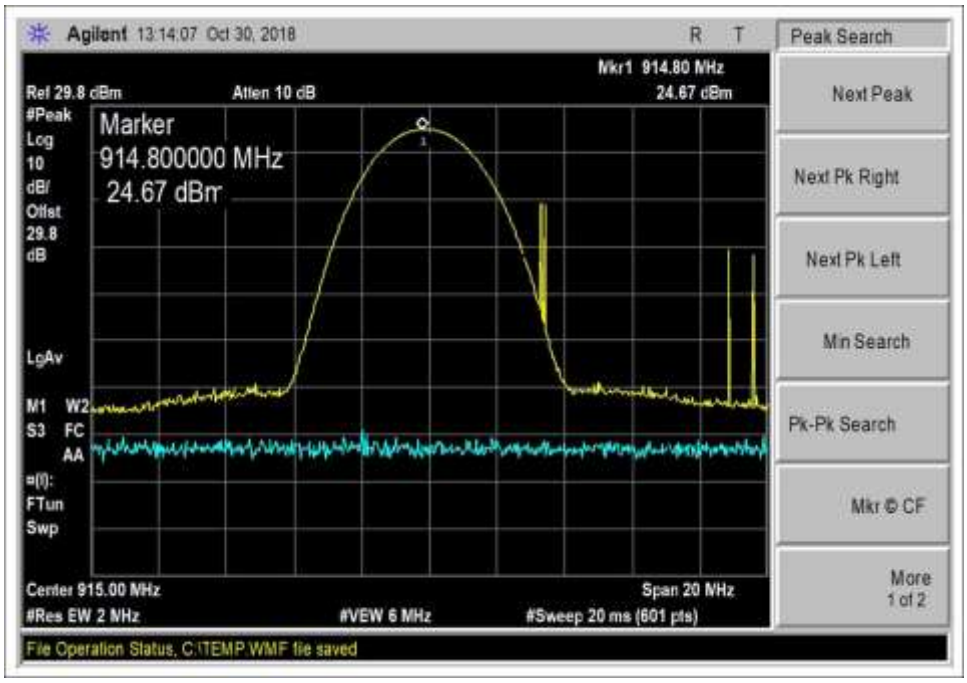
This equipment is battery powered. Power output tests were performed using a fresh battery.

Test Data Summary - RF Conducted Measurement					
$Limit = \begin{cases} 30dBm\ Conducted/36dBm\ EIRP \mid \geq 50\ Channels \\ 24dBm\ Conducted/30dBm\ EIRP \mid < 50\ Channels\ (\min 25) \end{cases}$					
Frequency (MHz)	**Modulation**	**Ant. Type / Gain (dBi)**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902.3	100kbps FSK lv3	integral omni /5.7	24.63	≤ 30	Pass
914.9	100kbps FSK lv3	integral omni /5.7	24.67	≤ 30	Pass
926.9	100kbps FSK lv3	integral omni /5.7	24.69	≤ 30	Pass
902.4	300kbps GFSK lv2	integral omni / 2.8	15.16	≤ 30	Pass
914.8	300kbps GFSK lv2	integral omni / 2.8	15.29	≤ 30	Pass
927.6	300kbps GFSK lv2	integral omni / 2.8	15.46	≤ 30	Pass
902.4	300kbps GFSK lv3	integral omni /5.7	24.10	≤ 30	Pass
914.8	300kbps GFSK lv3	integral omni /5.7	24.16	≤ 30	Pass
927.6	300kbps GFSK lv3	integral omni /5.7	24.12	≤ 30	Pass

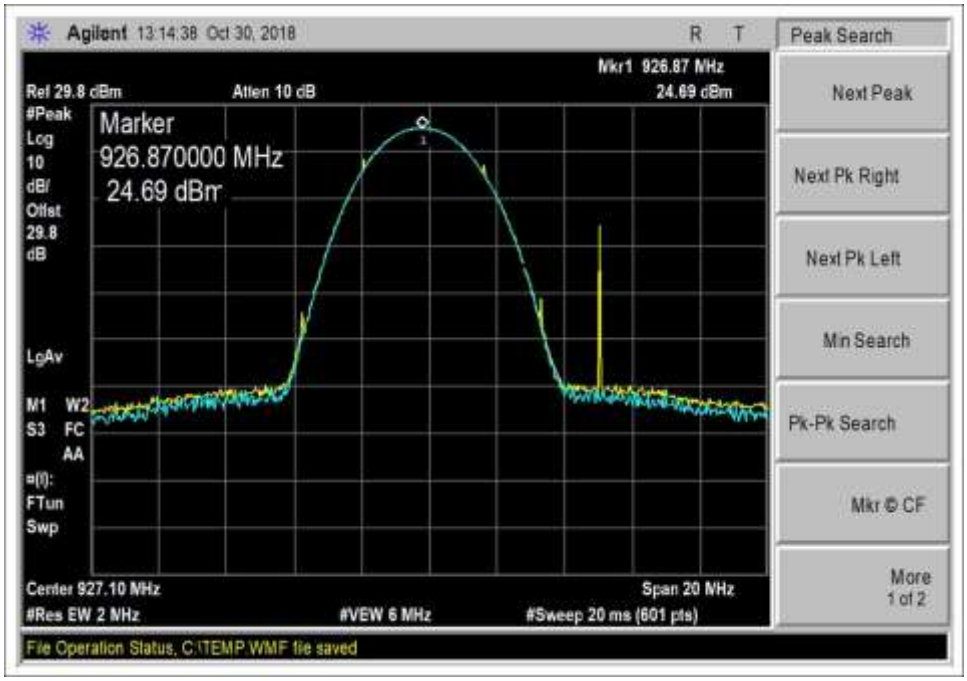
Plots



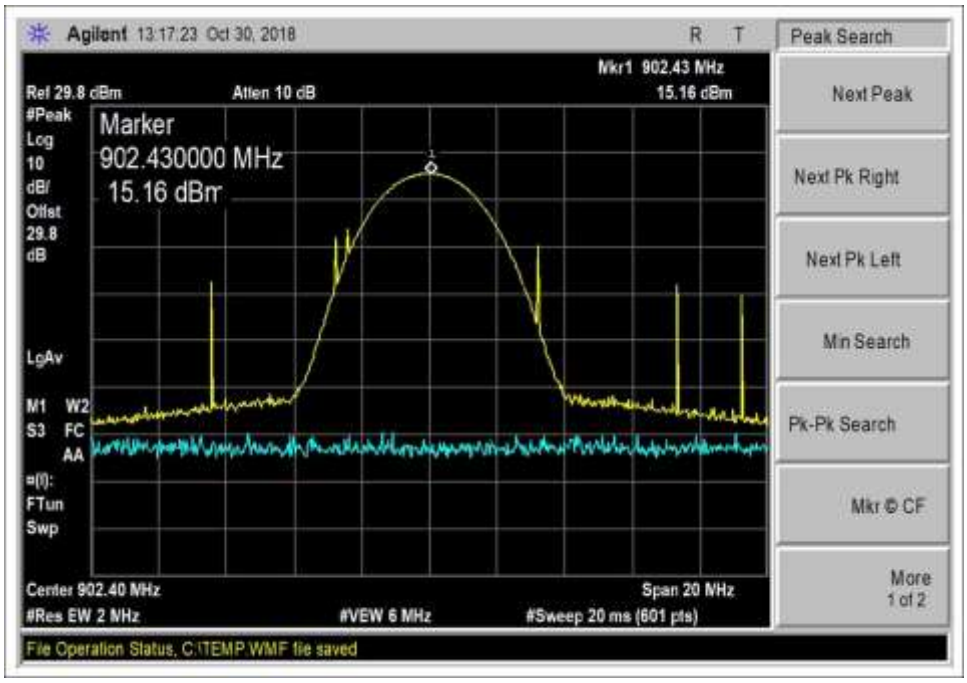
Low Channel, 100kbps, Power level 3



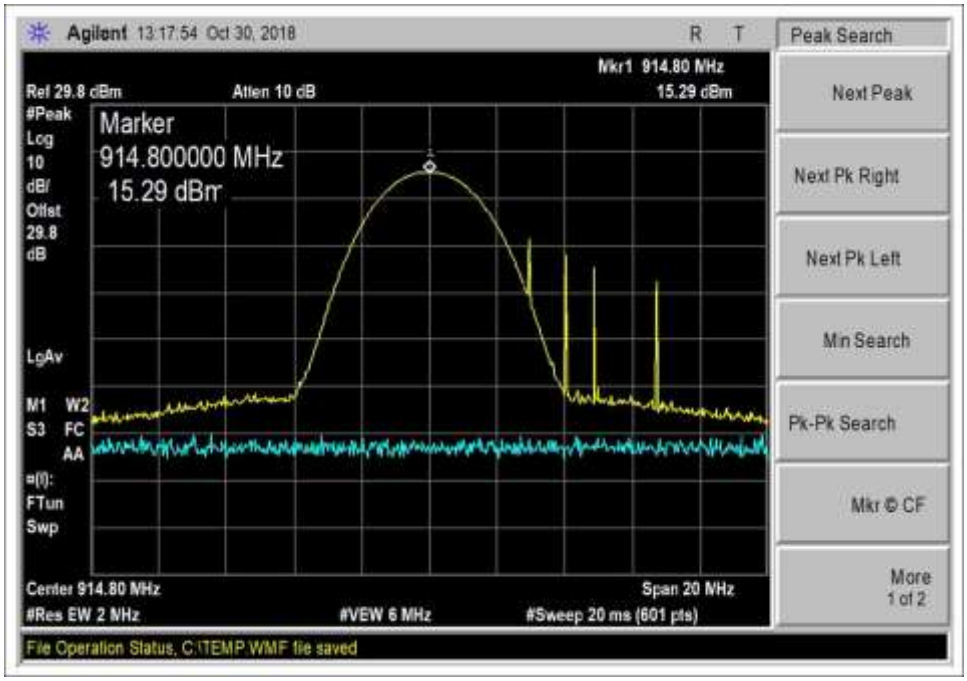
Middle Channel, 100kbps, Power level 3



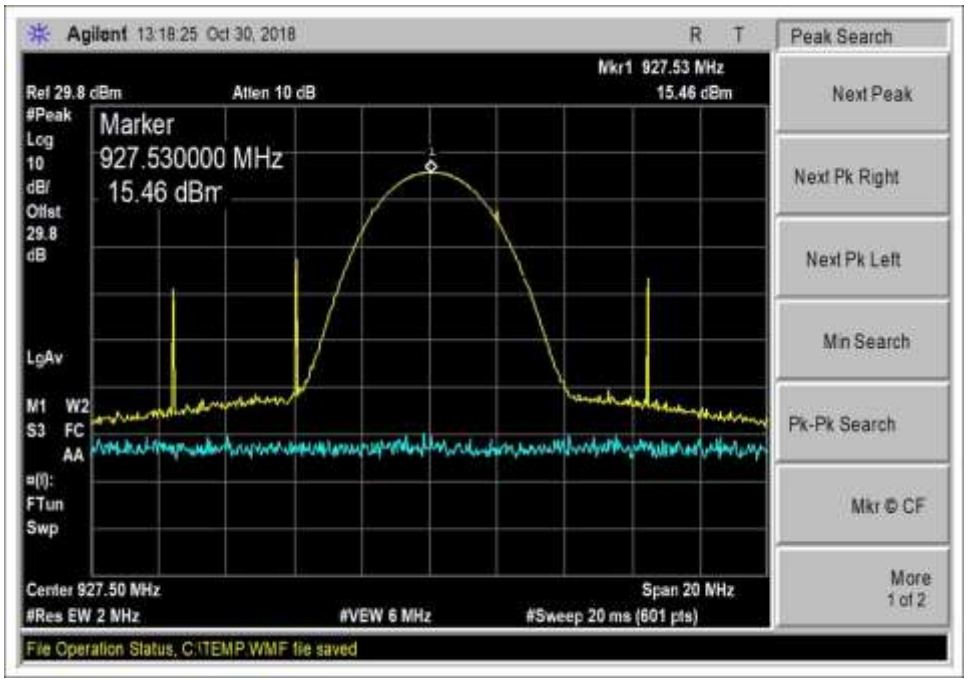
High Channel, 100kbps, Power level 3



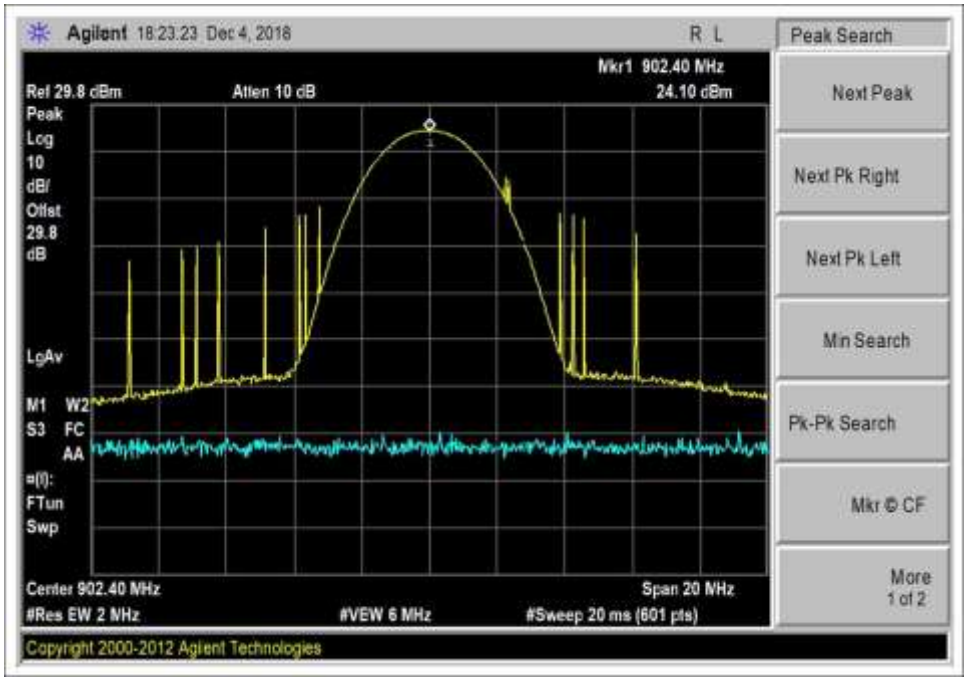
Low Channel, 300kbps, Power level 2



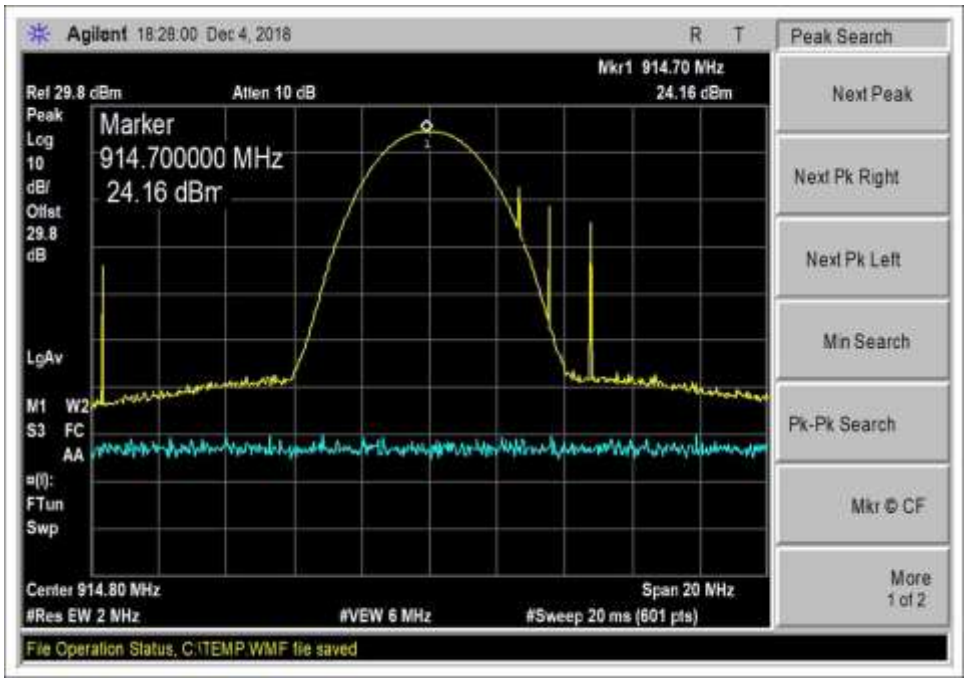
Middle Channel, 300kbps, Power level 2



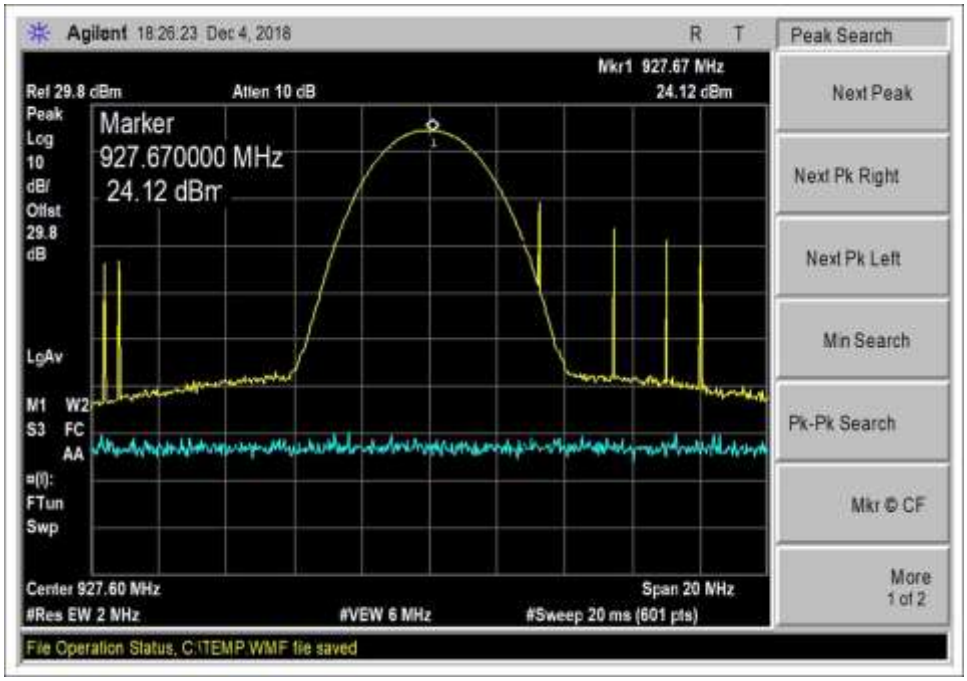
High Channel, 300kbps, Power level 2



Low Channel, 300kbps, Power level 3

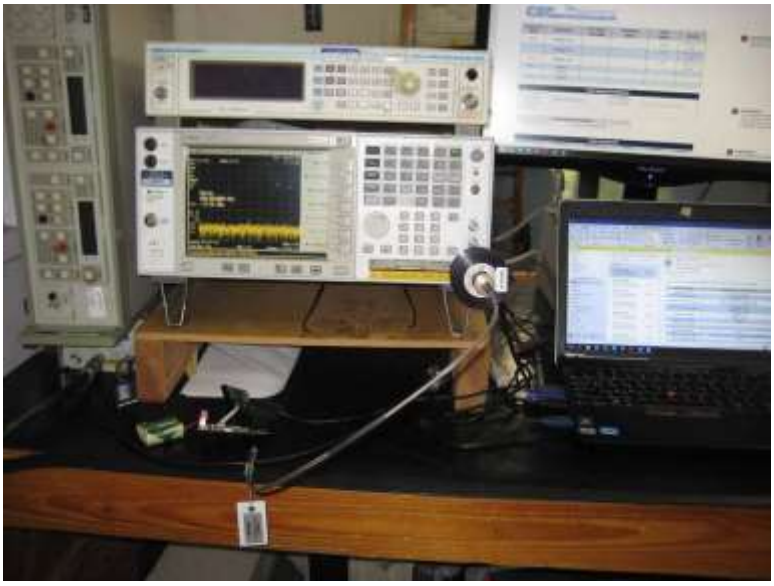


Middle Channel, 300kbps, Power level 3



High Channel, 300kbps, Power level 3

Test Setup Photo



15.247(d) RF Conducted Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) Conducted Spurious Emissions**		
Work Order #:	**99318**	Date:	12/5/2018
Test Type:	**Conducted Emissions**	Time:	09:31:51
Tested By:	Don Nguyen	Sequence#:	0
Software:	EMITest 5.03.11		6.0Vdc

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

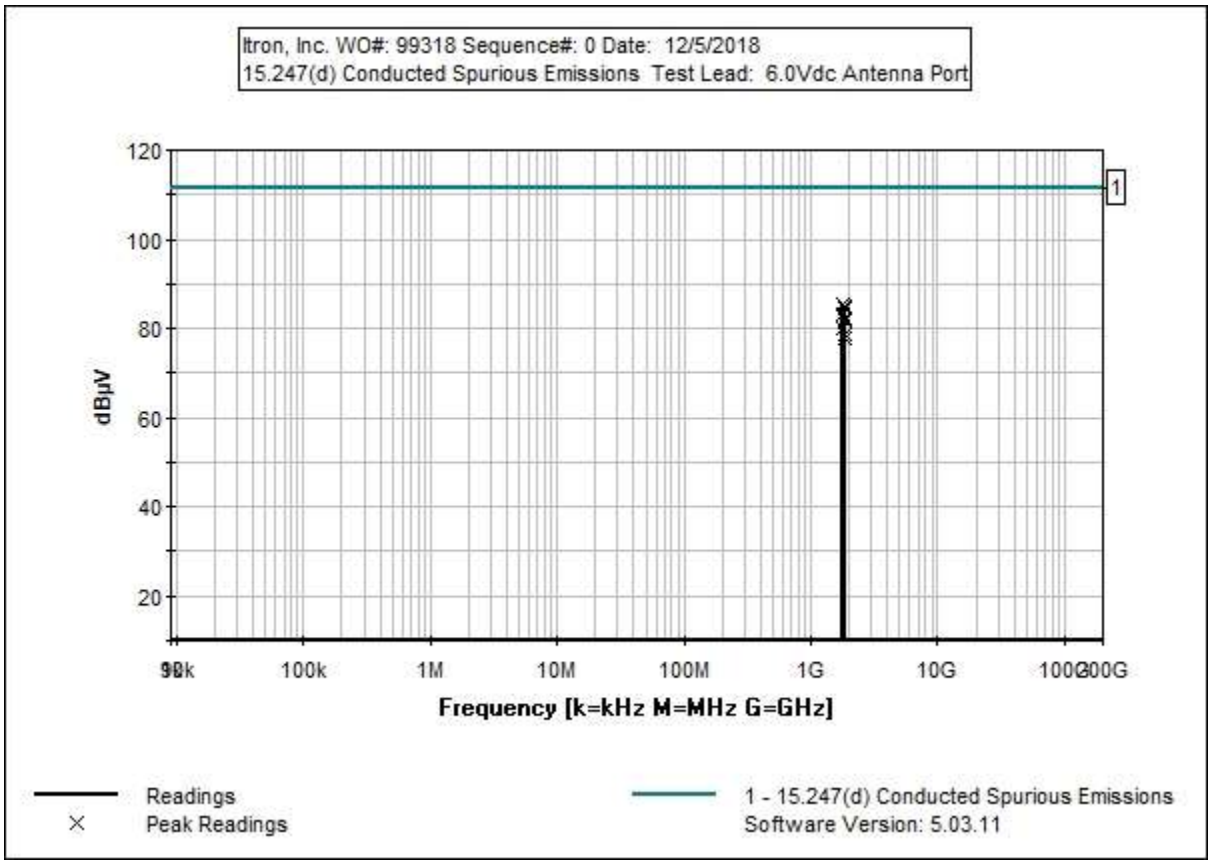
The EUT is placed on test bench. The serial port is connected to a support laptop via serial to USB adapter.
The laptop is running software Command Line Interface Tool to turn on TX at 100% duty cycle.
The EUT is powered from fresh battery 6.0Vdc.

Modulation: 100kbps FSK, 300kbps GFSK power level 2, 300kbps GFSK power level 3

Frequency of measurement: 9kHz-9280MHz
RBW=100kHz, VBW=300kHz

Test Method: ANSI C63.10 (2013)

Data represent worst case emissions.


Itron, Inc. WO#: 99318 Sequence#: 0 Date: 12/5/2018
15.247(d) Conducted Spurious Emissions Test Lead: 6.0Vdc Antenna Port
120
100
80
60
40
20
dBµV
1
100k
1M
10M
100M
1G
10G
Frequency [k=kHz M=MHz G=GHz]
Readings
Peak Readings
1 - 15.247(d) Conducted Spurious Emissions
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03432	Attenuator	90-30-34	10/27/2017	10/27/2019
	AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
T2	ANP07244	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020

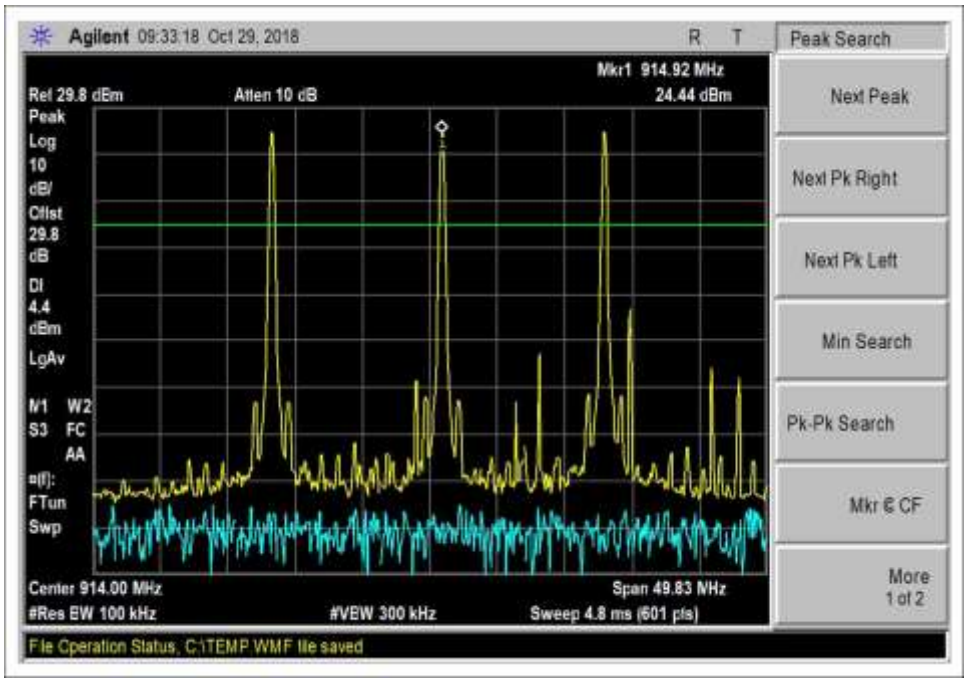
Measurement Data: Reading listed by margin. Test Lead: Antenna Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1804.647M	50.3	+29.7	+0.2			+0.0	80.2	102.0	-21.8	Anten
									GFSK 300k lv2		
2	1829.450M	49.0	+29.7	+0.2			+0.0	78.9	102.0	-23.1	Anten
									GFSK 300k lv2		
3	1855.050M	48.1	+29.7	+0.2			+0.0	78.0	102.0	-24.0	Anten
									GFSK 300k lv2		
4	1804.644M	55.7	+29.7	+0.2			+0.0	85.6	111.4	-25.8	Anten
									GFSK 300k lv3		
5	1829.453M	55.1	+29.7	+0.2			+0.0	85.0	111.4	-26.4	Anten
									GFSK 300k lv3		
6	1855.043M	54.7	+29.7	+0.2			+0.0	84.6	111.4	-26.8	Anten
									GFSK 300k lv3		
7	1804.805M	53.4	+29.7	+0.2			+0.0	83.3	111.4	-28.1	Anten
									FSK 100k lv3		
8	1829.600M	52.5	+29.7	+0.2			+0.0	82.4	111.4	-29.0	Anten
									FSK 100k lv3		
9	1855.200M	51.9	+29.7	+0.2			+0.0	81.8	111.4	-29.6	Anten
									FSK 100k lv3		

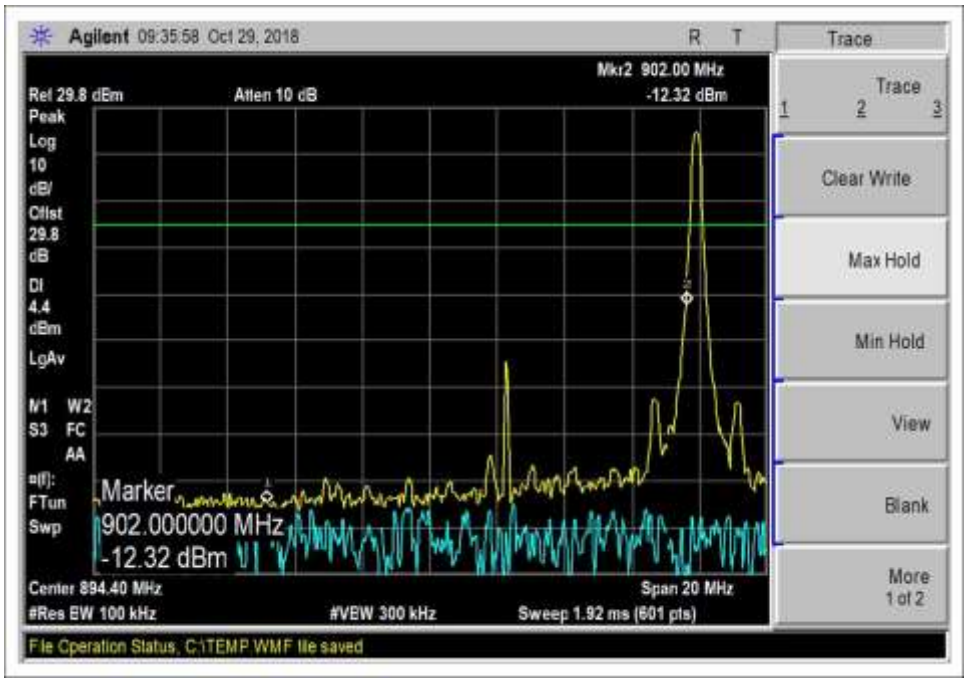
Band Edge

Band Edge Summary				
Limit applied: Max Power/100kHz - 20dB.				
Frequency (MHz)	**Modulation**	**Measured (dBm)**	**Limit (dBm)**	**Results**
902	100kbps FSK lv3	-12.32	<4.4	Pass
928	100kbps FSK lv3	-36.75	<4.4	Pass
902	100kbps FSK lv3 hopping	-11.29	<4.4	Pass
928	100kbps FSK lv3 hopping	-36.26	<4.4	Pass
902	300kbps GFSK lv2	-22.08	<-5.0	Pass
928	300kbps GFSK lv2	-21.57	<-5.0	Pass
902	300kbps GFSK lv2 hopping	-20.43	<-5.0	Pass
928	300kbps GFSK lv2 hopping	-26.81	<-5.0	Pass
902	300kbps GFSK lv3	-9.47	<4.2	Pass
928	300kbps GFSK lv3	-11.01	<4.2	Pass
902	300kbps GFSK lv3 hopping	-10.82	<4.2	Pass
928	300kbps GFSK lv3 hopping	-9.76	<4.2	Pass

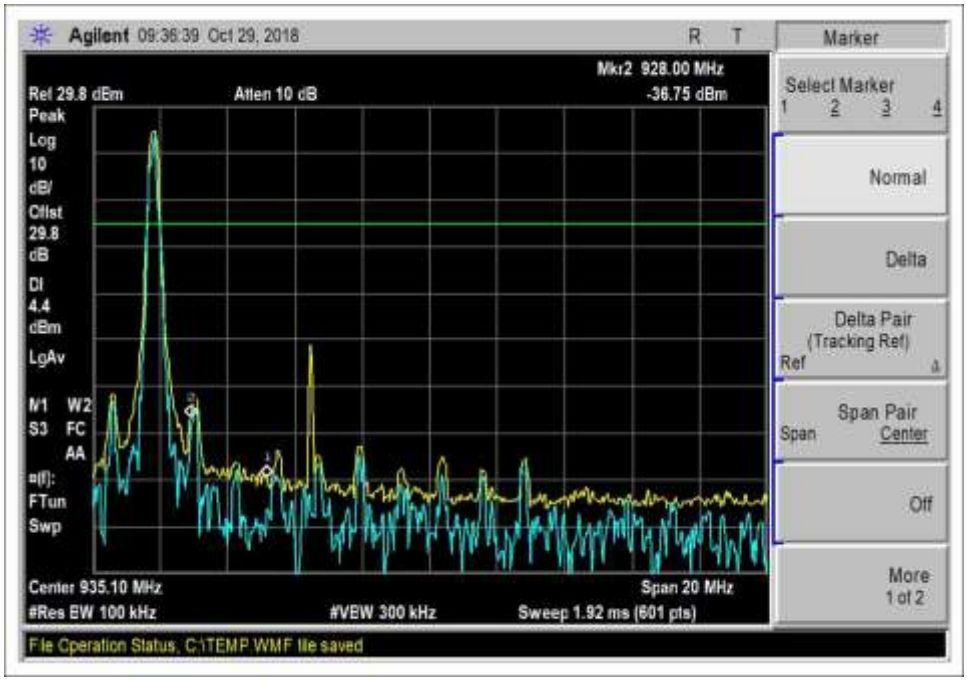
Band Edge Plots



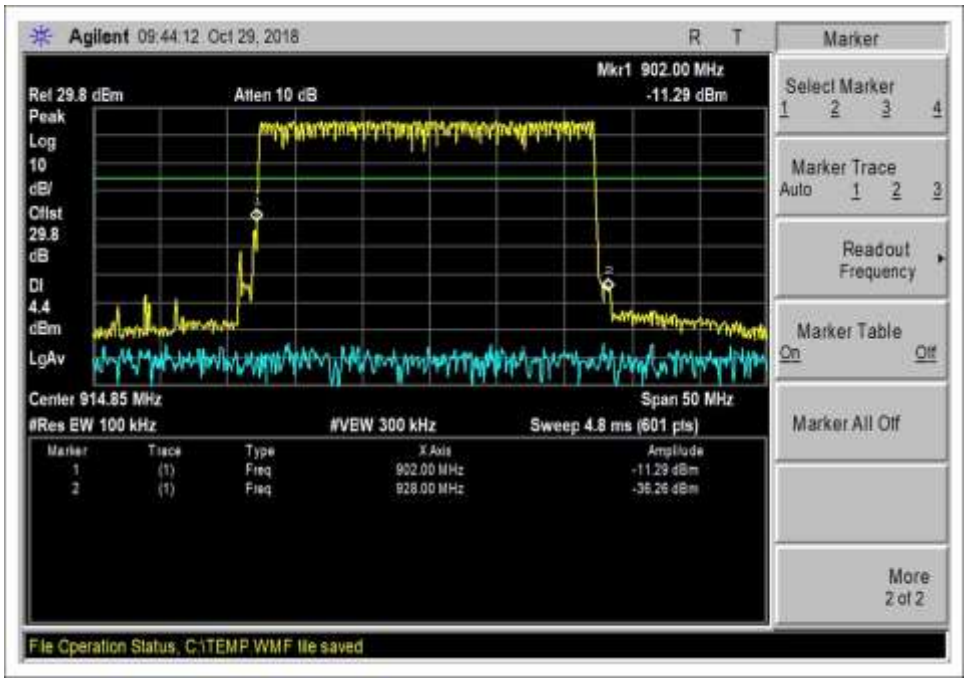
Peak, 100kbps, Power level 3



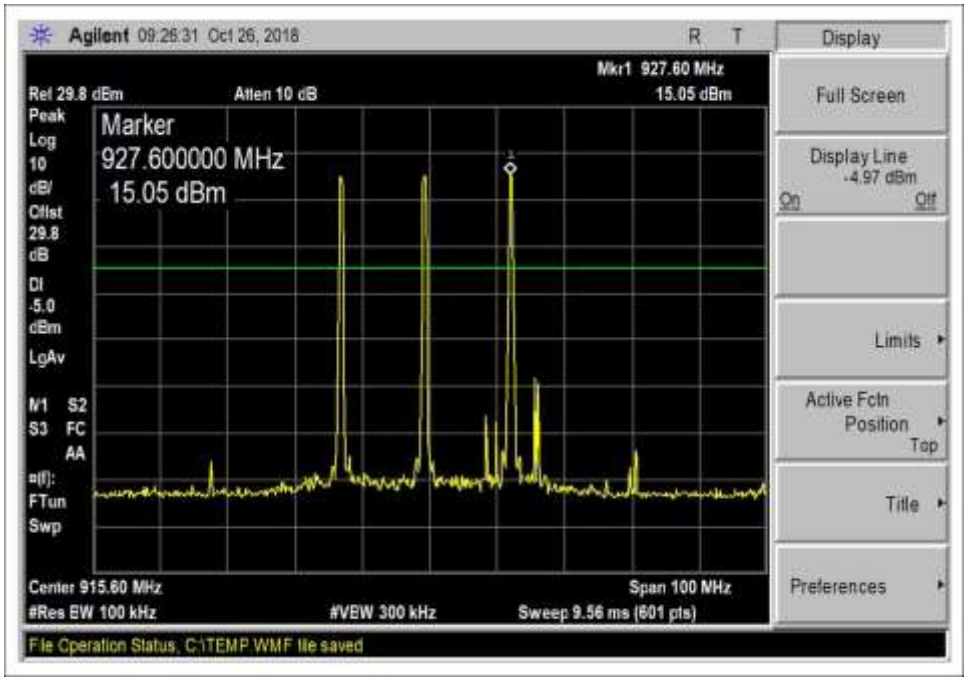
Low Channel, 100kbps, Power level 3



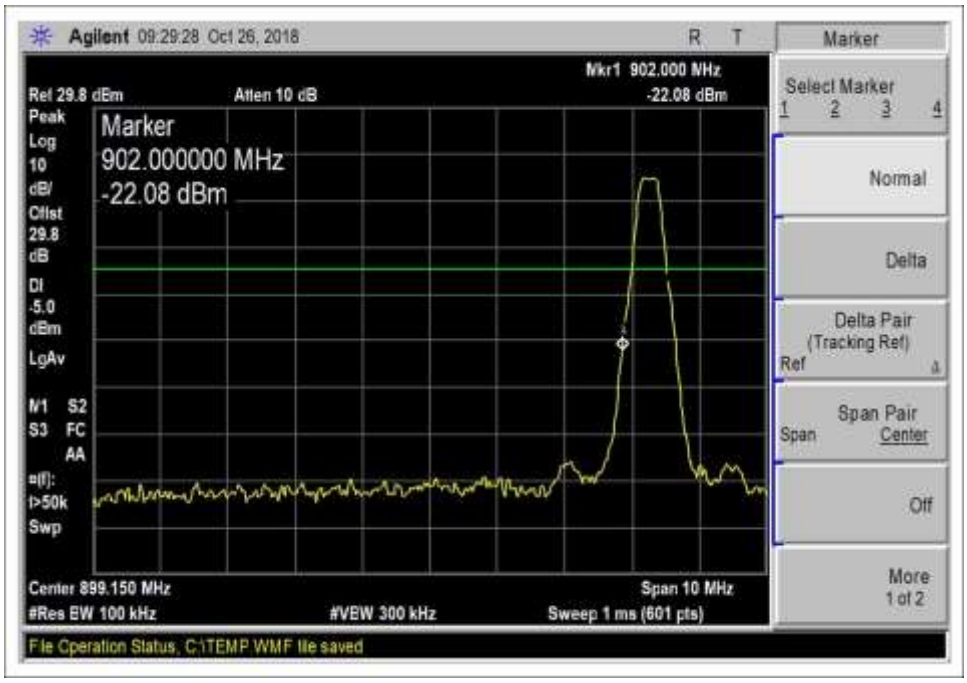
High Channel, 100kbps, Power level 3



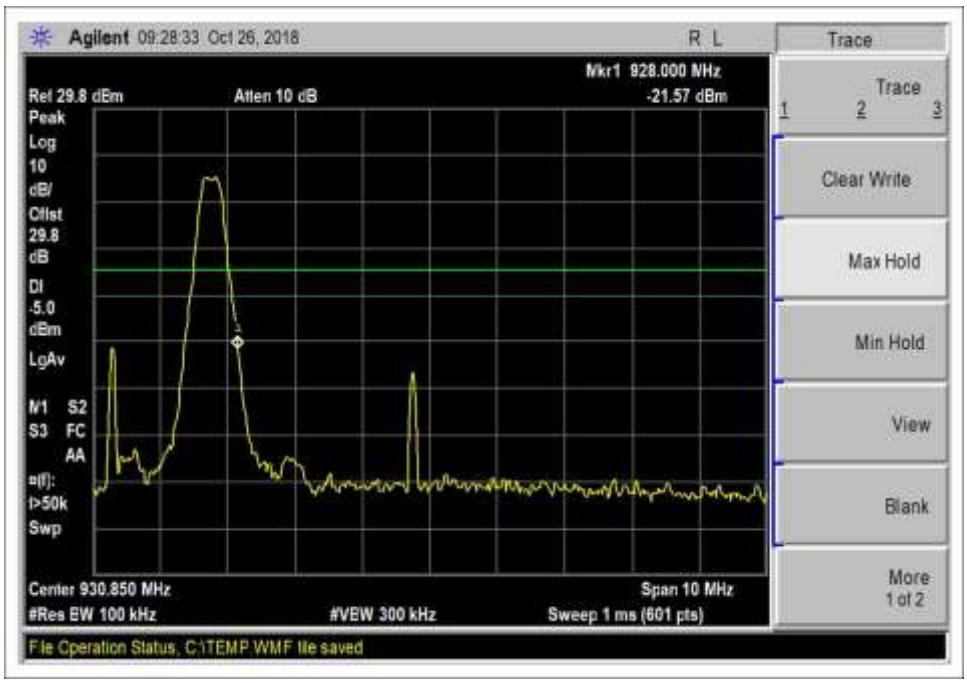
Hopping, 100kbps, Power level 3



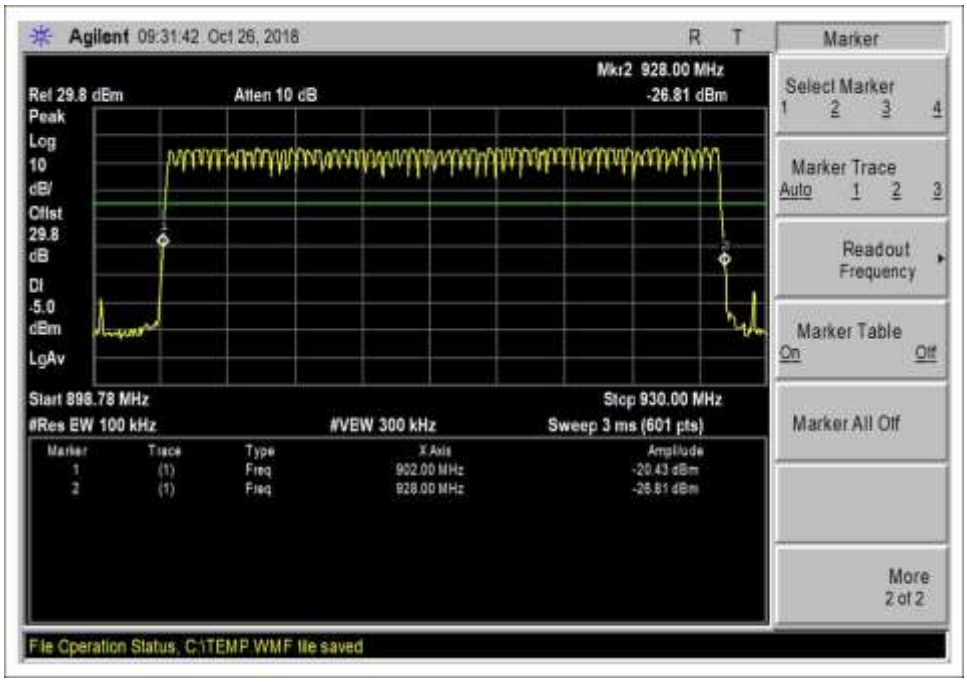
Peak, 300kbps, Power level 2



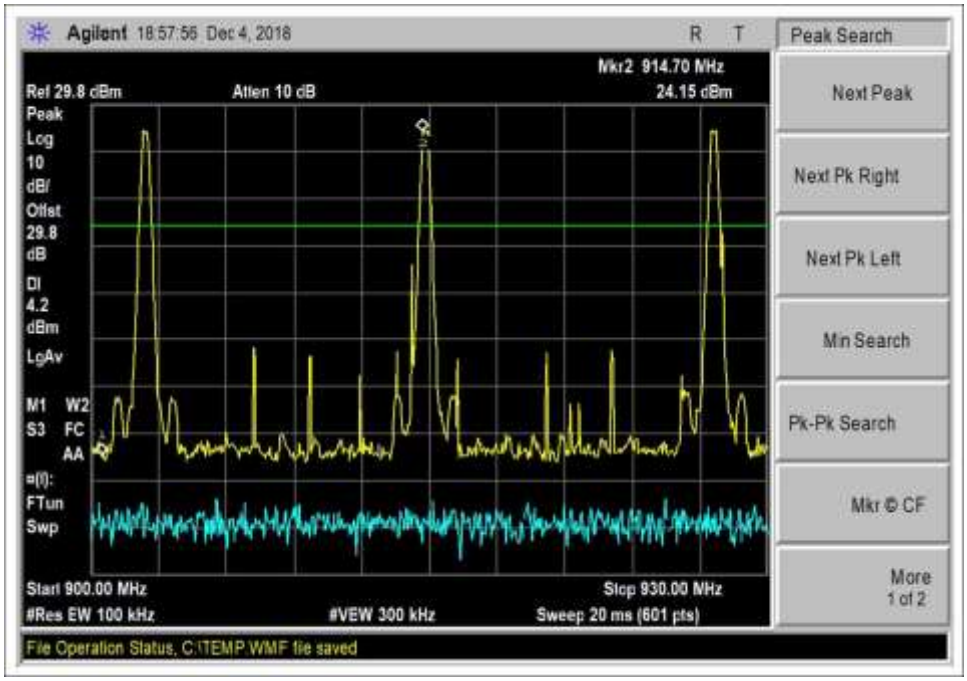
Low Channel, 300kbps, Power level 2



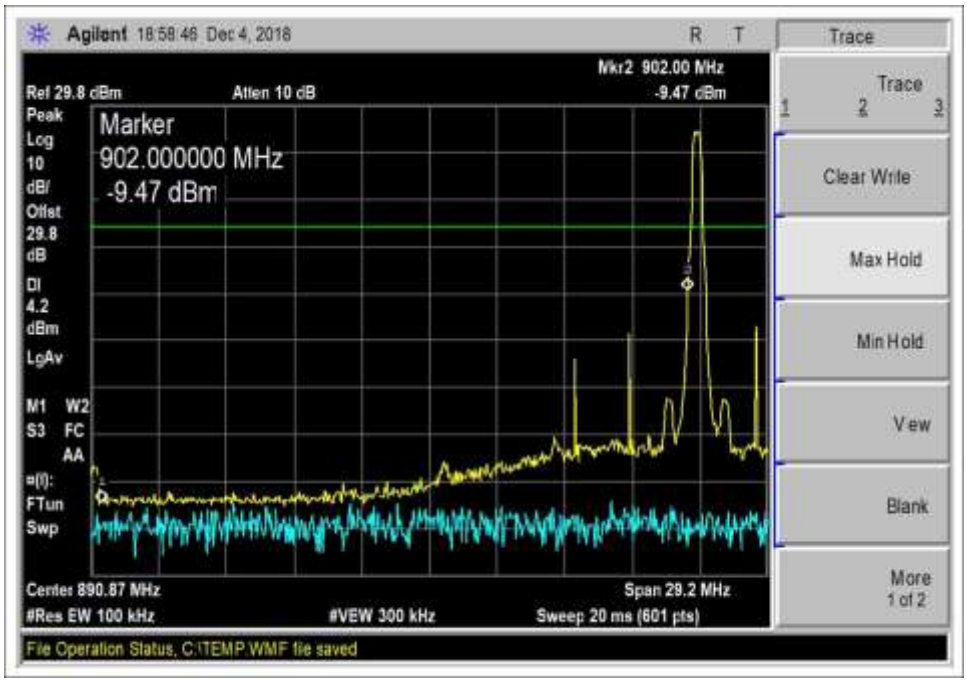
High Channel, 300kbps, Power level 2



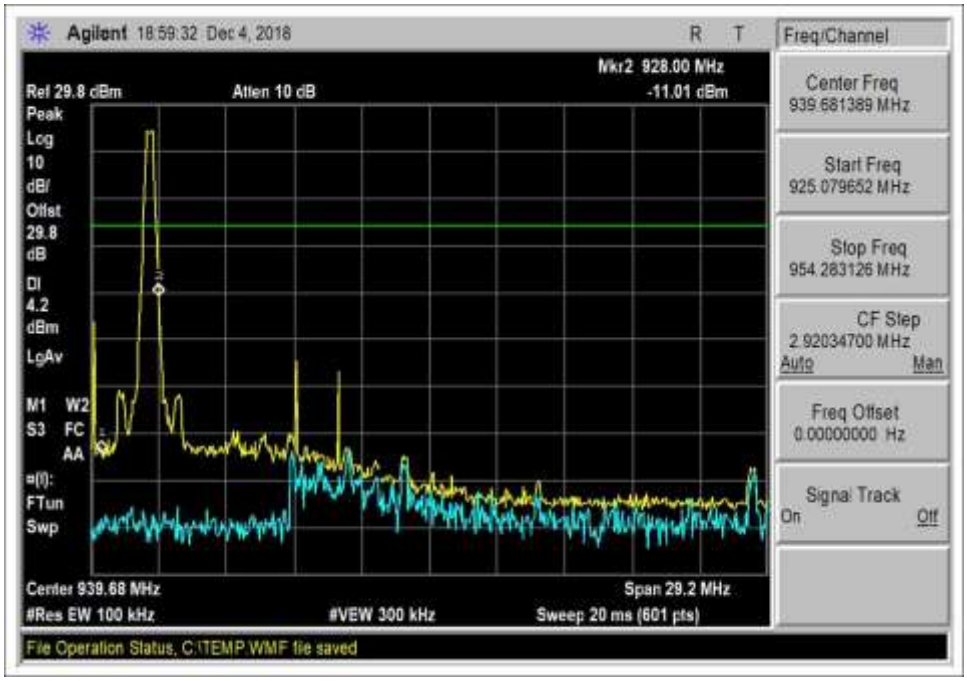
Hopping, 300kbps, Power level 2



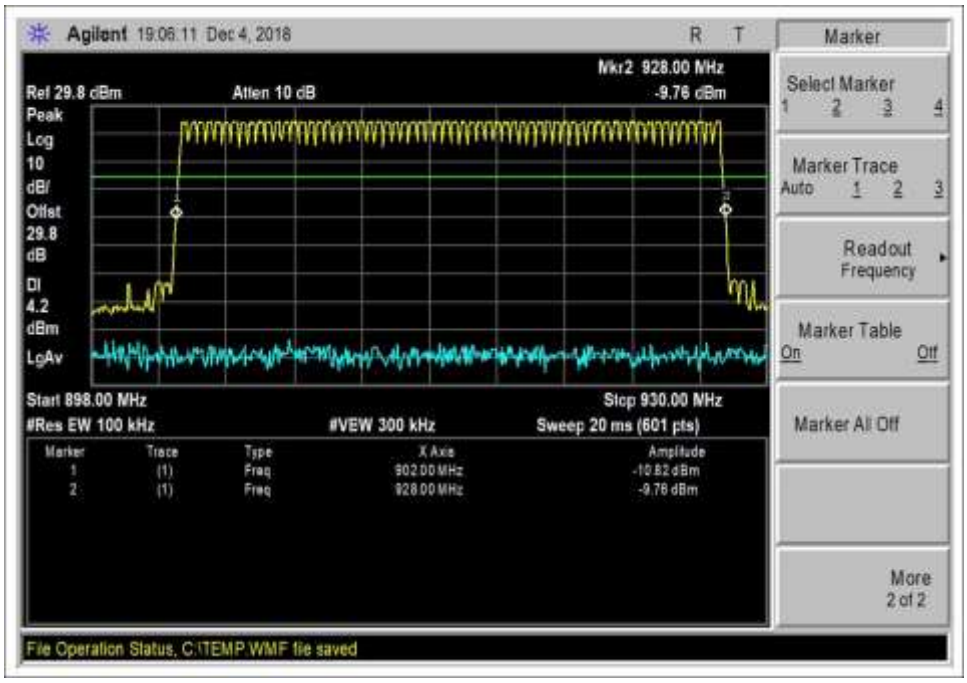
Peak, 300kbps, Power level 3



Low Channel, 300kbps, Power level 3

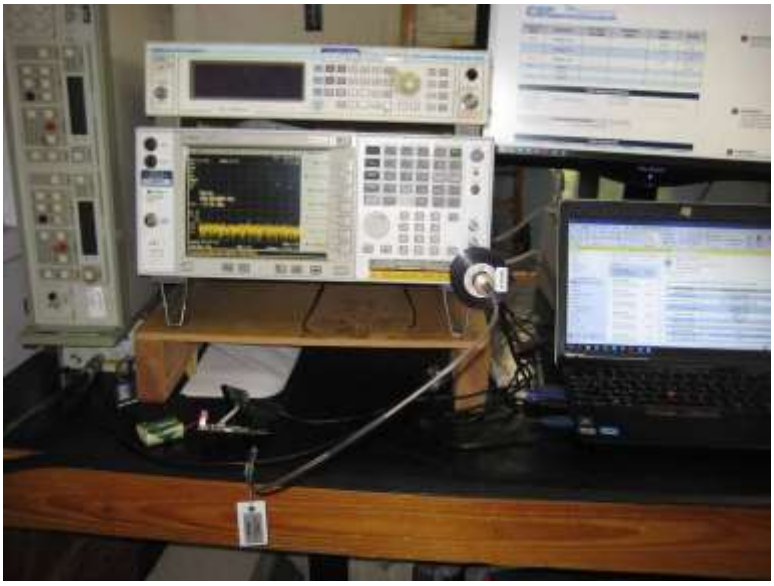


High Channel, 300kbps, Power level 3



Hopping, 300kbps, Power level 3

Test Setup Photo



15.247(d) Radiated Emissions & Band Edge

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	12/7/2018
Test Type:	**Maximized Emissions**	Time:	13:51:28
Tested By:	Don Nguyen	Sequence#:	3
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

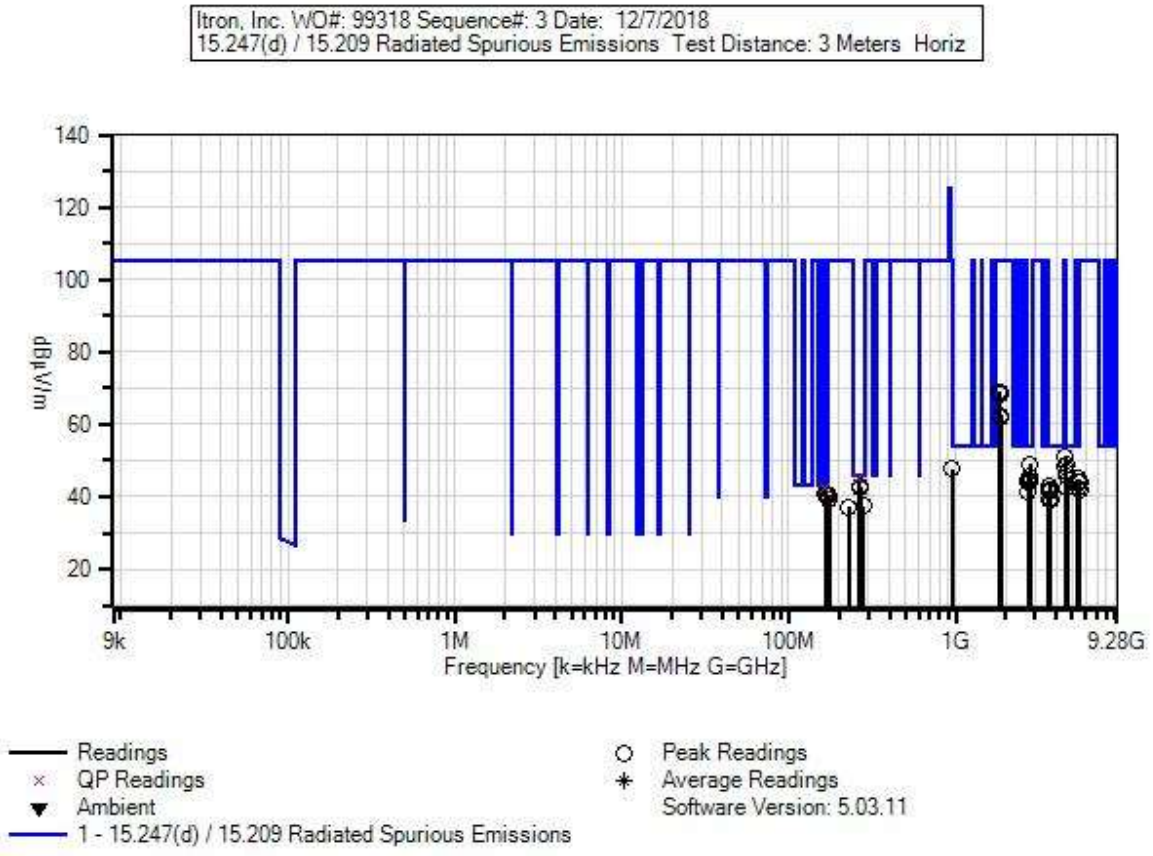
Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Modulation: GFSK 300kbps, power level 3.

Frequency of measurement: 9k-9280MHz
9 kH -150 kHz;RBW=200 Hz,VBW=600 Hz;
150 kHz-30 MHz;RBW=9 kHz,VBW=27 kHz;
30 MHz-1000 MHz;RBW=120 kHz,VBW=360 kHz,
1000 MHz-9280MHz;RBW=1 MHz,VBW=3 MHz.
RBW=100kHz, VBW=300kHz (-20dbc limit)

Temperature: 23.5°C, Humidity: 21.2%, Pressure: 100kPa.
Site A.
Test Method: ANSI C63.10 (2013)


Itron, Inc. WO#: 99318 Sequence#: 3 Date: 12/7/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz
140
120
100
80
60
40
20
dBµV/m
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00314	Loop Antenna	6502	5/13/2018	5/13/2020
T1	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
T2	ANP05569	Cable-Amplitude +15C to +45C (dB)	RG-214/U	12/7/2016	12/7/2018
T3	ANP05283	Attenuator	ATT-0218-06-NNN-02	4/5/2018	4/5/2020
T4	AN01994	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019
T5	AN00786	Preamp	83017A	5/12/2018	5/12/2020
T6	AN00849	Horn Antenna	3115	3/14/2018	3/14/2020
T7	ANP07139	Cable	ANDL1-PNMNM-48	3/1/2017	3/1/2019
T8	ANP07244	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
T9	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019

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

#	Freq	Rdng	T1 T5 T9	T2 T6	T3 T7	T4 T8	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	263.220M QP	23.2	+1.7 +0.0 +0.0	+1.7 +0.0	+5.8 +0.0	+12.5 +0.0	+0.0	44.9	46.0	-1.1	Horiz
^	263.250M	23.9	+1.7 +0.0 +0.0	+1.7 +0.0	+5.8 +0.0	+12.5 +0.0	+0.0	45.6	46.0	-0.4	Horiz
3	164.675M QP	23.7	+1.2 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+10.2 +0.0	+0.0	42.2	43.5	-1.3	Vert
^	164.675M	27.0	+1.2 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+10.2 +0.0	+0.0	45.5	43.5	+2.0	Vert
5	167.100M	22.4	+1.2 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+10.0 +0.0	+0.0	40.7	43.5	-2.8	Horiz
6	164.600M	22.1	+1.2 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+10.2 +0.0	+0.0	40.6	43.5	-2.9	Horiz
7	4512.000M	50.9	+0.0 -37.8 +0.1	+0.0 +32.9	+0.0 +4.1	+0.0 +0.7	+0.0	50.9	54.0	-3.1	Horiz
8	270.420M	21.0	+1.7 +0.0 +0.0	+1.7 +0.0	+5.8 +0.0	+12.7 +0.0	+0.0	42.9	46.0	-3.1	Horiz
9	169.500M	22.1	+1.3 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+9.8 +0.0	+0.0	40.3	43.5	-3.2	Horiz

10	270.420M	20.7	+1.7 +0.0 +0.0	+1.7 +0.0	+5.8 +0.0	+12.7 +0.0	+0.0	42.6	46.0	-3.4	Vert
11	171.900M	21.3	+1.3 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+9.6 +0.0	+0.0	39.3	43.5	-4.2	Horiz
12	2782.800M	54.1	+0.0 -38.6 +0.2	+0.0 +29.5	+0.0 +3.3	+0.0 +0.4	+0.0	48.9	54.0	-5.1	Horiz
13	4574.000M	48.8	+0.0 -37.8 +0.1	+0.0 +32.9	+0.0 +4.1	+0.0 +0.7	+0.0	48.8	54.0	-5.2	Vert
14	4512.000M	48.4	+0.0 -37.8 +0.1	+0.0 +32.9	+0.0 +4.1	+0.0 +0.7	+0.0	48.4	54.0	-5.6	Vert
15	4574.000M	47.0	+0.0 -37.8 +0.1	+0.0 +32.9	+0.0 +4.1	+0.0 +0.7	+0.0	47.0	54.0	-7.0	Horiz
16	2744.400M	51.3	+0.0 -38.6 +0.2	+0.0 +29.4	+0.0 +3.2	+0.0 +0.4	+0.0	45.9	54.0	-8.1	Horiz
17	4638.000M	45.5	+0.0 -37.7 +0.2	+0.0 +32.8	+0.0 +4.2	+0.0 +0.6	+0.0	45.6	54.0	-8.4	Horiz
18	278.920M	15.4	+1.7 +0.0 +0.0	+1.7 +0.0	+5.8 +0.0	+12.9 +0.0	+0.0	37.5	46.0	-8.5	Horiz
19	5414.400M	43.4	+0.0 -37.5 +0.1	+0.0 +33.9	+0.0 +4.6	+0.0 +0.4	+0.0	44.9	54.0	-9.1	Vert
20	2744.400M	50.1	+0.0 -38.6 +0.2	+0.0 +29.4	+0.0 +3.2	+0.0 +0.4	+0.0	44.7	54.0	-9.3	Vert
21	2707.200M	50.3	+0.0 -38.6 +0.2	+0.0 +29.1	+0.0 +3.2	+0.0 +0.4	+0.0	44.6	54.0	-9.4	Horiz
22	2707.200M	49.9	+0.0 -38.6 +0.2	+0.0 +29.1	+0.0 +3.2	+0.0 +0.4	+0.0	44.2	54.0	-9.8	Vert
23	5414.400M	42.5	+0.0 -37.5 +0.1	+0.0 +33.9	+0.0 +4.6	+0.0 +0.4	+0.0	44.0	54.0	-10.0	Horiz
24	2782.800M	49.1	+0.0 -38.6 +0.2	+0.0 +29.5	+0.0 +3.3	+0.0 +0.4	+0.0	43.9	54.0	-10.1	Vert
25	3659.200M	45.2	+0.0 -38.3 +0.2	+0.0 +31.6	+0.0 +3.8	+0.0 +0.5	+0.0	43.0	54.0	-11.0	Vert
26	4638.000M	42.5	+0.0 -37.7 +0.2	+0.0 +32.8	+0.0 +4.2	+0.0 +0.6	+0.0	42.6	54.0	-11.4	Vert

27	3710.400M	44.0	+0.0 -38.3 +0.2	+0.0 +31.9	+0.0 +3.8	+0.0 +0.5	+0.0	42.1	54.0	-11.9	Horiz
28	3659.200M	43.9	+0.0 -38.3 +0.2	+0.0 +31.6	+0.0 +3.8	+0.0 +0.5	+0.0	41.7	54.0	-12.3	Horiz
29	2707.200M	47.2	+0.0 -38.6 +0.2	+0.0 +29.1	+0.0 +3.2	+0.0 +0.4	+0.0	41.5	54.0	-12.5	Horiz
30	3609.600M	43.9	+0.0 -38.4 +0.2	+0.0 +31.1	+0.0 +3.8	+0.0 +0.6	+0.0	41.2	54.0	-12.8	Vert
31	3710.400M	41.1	+0.0 -38.3 +0.2	+0.0 +31.9	+0.0 +3.8	+0.0 +0.5	+0.0	39.2	54.0	-14.8	Vert
32	3609.600M	41.7	+0.0 -38.4 +0.2	+0.0 +31.1	+0.0 +3.8	+0.0 +0.6	+0.0	39.0	54.0	-15.0	Horiz
33	1829.600M	77.8	+0.0 -38.9 +0.3	+0.0 +27.1	+0.0 +2.5	+0.0 +0.2	+0.0	69.0	105.0	-36.0	Vert
34	1804.800M	77.9	+0.0 -38.9 +0.3	+0.0 +27.0	+0.0 +2.5	+0.0 +0.2	+0.0	69.0	105.0	-36.0	Vert
35	1804.800M	77.5	+0.0 -38.9 +0.3	+0.0 +27.0	+0.0 +2.5	+0.0 +0.2	+0.0	68.6	105.0	-36.4	Horiz
36	1829.600M	77.2	+0.0 -38.9 +0.3	+0.0 +27.1	+0.0 +2.5	+0.0 +0.2	+0.0	68.4	105.0	-36.6	Horiz
37	1855.200M	70.9	+0.0 -38.9 +0.3	+0.0 +27.3	+0.0 +2.6	+0.0 +0.2	+0.0	62.4	105.0	-42.6	Vert
38	1855.200M	70.4	+0.0 -38.9 +0.3	+0.0 +27.3	+0.0 +2.6	+0.0 +0.2	+0.0	61.9	105.0	-43.1	Horiz
39	954.470M	10.8	+3.4 +0.0 +0.0	+3.6 +0.0	+5.9 +0.0	+24.0 +0.0	+0.0	47.7	105.0	-57.3	Horiz
40	5488.800M	43.2	+0.0 -37.5 +0.1	+0.0 +34.1	+0.0 +4.6	+0.0 +0.4	+0.0	44.9	105.0	-60.1	Vert

41	5565.600M	42.7	+0.0 -37.4 +0.1	+0.0 +33.9	+0.0 +4.6	+0.0 +0.4	+0.0	44.3	105.0	-60.7	Vert
42	5488.800M	40.7	+0.0 -37.5 +0.1	+0.0 +34.1	+0.0 +4.6	+0.0 +0.4	+0.0	42.4	105.0	-62.6	Horiz
43	5565.600M	40.5	+0.0 -37.4 +0.1	+0.0 +33.9	+0.0 +4.6	+0.0 +0.4	+0.0	42.1	105.0	-62.9	Horiz
44	174.300M	22.7	+1.3 +0.0 +0.0	+1.3 +0.0	+5.8 +0.0	+9.4 +0.0	+0.0	40.5	105.0	-64.5	Horiz
45	227.180M	17.7	+1.5 +0.0 +0.0	+1.5 +0.0	+5.8 +0.0	+10.8 +0.0	+0.0	37.3	105.0	-67.7	Vert

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	10/31/2018
Test Type:	**Maximized Emissions**	Time:	15:01:19
Tested By:	S. Yamamoto	Sequence#:	3
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

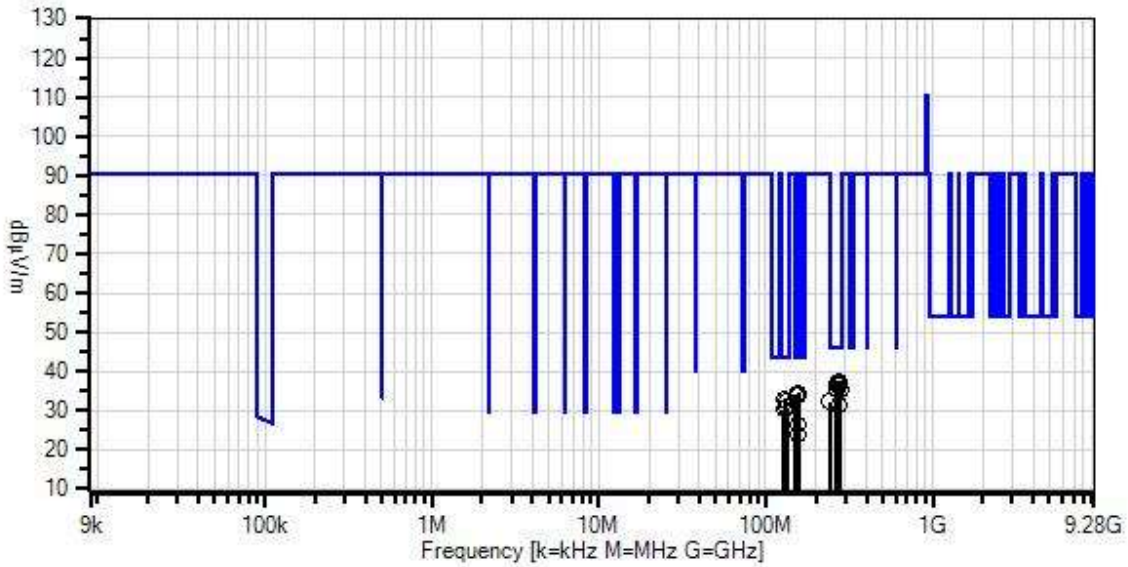
The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Operating frequency: 902.3MHz, 914.9MHz, and 926.9MHz,
FSK modulation firmware power level 3.
Operating frequency: 902.4MHz, 914.8MHz, and 927.6MHz,
Hybrid modulation firmware power level 2.

Frequency range of measurement = 9kHz to 1GHz. RBW=120kHz, VBW=300kHz for included data.

Temperature: 25°C, Humidity: 31%, Pressure: 100kPa.
Site D.
Test Method: ANSI C63.10 (2013)

Itron, Inc. WO#: 99318 Sequence#: 3 Date: 10/31/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00010	Preamp	8447D	2/19/2018	2/19/2020
T2	ANP05569	Cable-Amplitude +15C to +45C (dB)	RG-214/U	12/7/2016	12/7/2018
T3	ANP05283	Attenuator	ATT-0218-06-NNN-02	4/5/2018	4/5/2020
T4	AN01994	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020
T5	ANP06978	Cable	Sucoflex 104A	3/31/2018	3/31/2020
T6	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019

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	272.700M	41.7	-26.4 +0.1	+1.7 +1.7	+5.8	+12.8	+0.0	37.4	46.0	-8.6	Horiz
2	156.525M	42.2	-26.8 +0.1	+1.3 +1.2	+5.8	+10.8	+0.0	34.6	43.5	-8.9	Vert
3	265.200M	41.4	-26.4 +0.1	+1.7 +1.7	+5.8	+12.6	+0.0	36.9	46.0	-9.1	Horiz
4	275.025M	41.1	-26.4 +0.1	+1.7 +1.7	+5.8	+12.8	+0.0	36.8	46.0	-9.2	Horiz
5	149.924M	41.3	-26.8 +0.1	+1.3 +1.2	+5.8	+11.1	+0.0	34.0	43.5	-9.5	Vert
6	276.375M	40.5	-26.4 +0.1	+1.7 +1.7	+5.8	+12.9	+0.0	36.3	46.0	-9.7	Horiz
7	156.767M	41.4	-26.8 +0.1	+1.3 +1.2	+5.8	+10.8	+0.0	33.8	43.5	-9.7	Vert
8	271.500M	40.7	-26.4 +0.1	+1.7 +1.7	+5.8	+12.7	+0.0	36.3	46.0	-9.7	Horiz
9	273.900M	40.5	-26.4 +0.1	+1.7 +1.7	+5.8	+12.8	+0.0	36.2	46.0	-9.8	Horiz
10	278.625M	39.7	-26.4 +0.1	+1.7 +1.7	+5.8	+12.9	+0.0	35.5	46.0	-10.5	Horiz
11	129.150M	40.2	-26.9 +0.1	+1.1 +1.1	+5.8	+11.5	+0.0	32.9	43.5	-10.6	Horiz
12	270.375M	39.8	-26.4 +0.1	+1.7 +1.7	+5.8	+12.7	+0.0	35.4	46.0	-10.6	Horiz

13	131.575M	39.5	-26.9 +0.1	+1.2 +1.2	+5.8	+11.5	+0.0	32.4	43.5	-11.1	Horiz
14	133.975M	37.8	-26.9 +0.1	+1.2 +1.2	+5.8	+11.5	+0.0	30.7	43.5	-12.8	Horiz
15	128.375M	37.6	-26.9 +0.1	+1.1 +1.1	+5.8	+11.6	+0.0	30.4	43.5	-13.1	Horiz
16	240.300M	38.2	-26.5 +0.1	+1.6 +1.6	+5.8	+11.6	+0.0	32.4	46.0	-13.6	Vert
17	272.630M	35.5	-26.4 +0.1	+1.7 +1.7	+5.8	+12.8	+0.0	31.2	46.0	-14.8	Vert
18	156.749M	33.8	-26.8 +0.1	+1.3 +1.2	+5.8	+10.8	+0.0	26.2	43.5	-17.3	Horiz
19	156.525M	31.7	-26.8 +0.1	+1.3 +1.2	+5.8	+10.8	+0.0	24.1	43.5	-19.4	Horiz

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	10/31/2018
Test Type:	**Maximized Emissions**	Time:	16:19:00
Tested By:	S. Yamamoto	Sequence#:	2
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

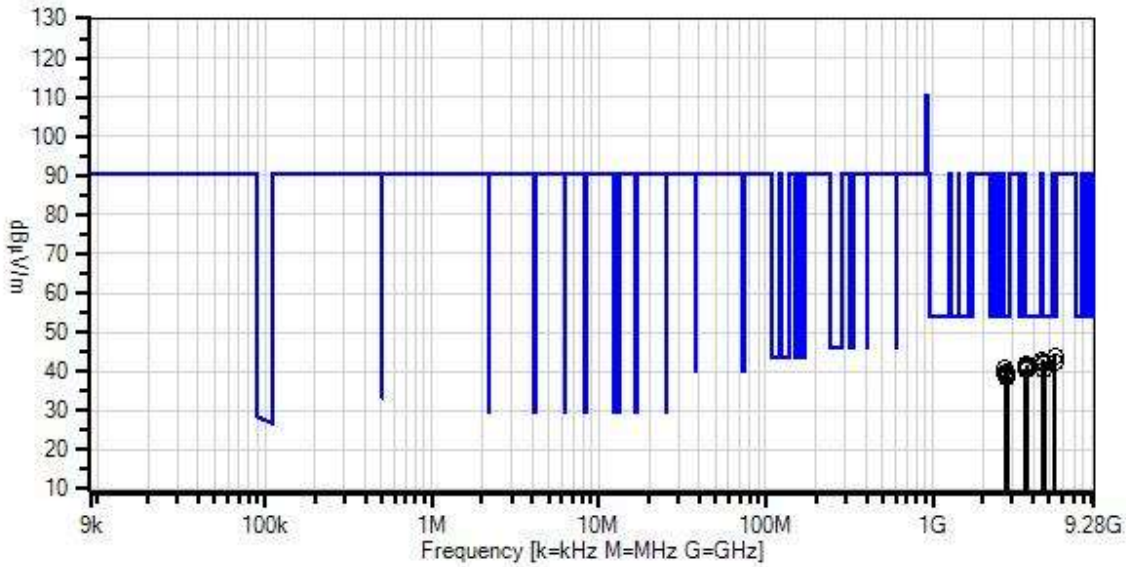
The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Operating frequency: 902.3MHz, 914.9MHz, and 926.9MHz.
FSK modulation. Firmware power: power level 3.

Frequency range of measurement = 1GHz to 9.3GHz. RBW=1MHz, VBW=3MHz for included data.

Temperature: 25°C, Humidity: 31%, Pressure: 100kPa.
Site D.
Test Method: ANSI C63.10 (2013).

Itron, Inc. WO#: 99318 Sequence#: 2 Date: 10/31/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Horiz



Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019
T2	AN01646	Horn Antenna	3115	3/14/2018	3/14/2020
T3	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019
T4	ANP07245	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
T5	ANP07138	Cable	ANDL1-PNMNM-60	3/1/2017	3/1/2019
T6	AN00787	Preamp	83017A	6/9/2017	6/9/2019

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

#	Freq	Rdng	T1 T5 T6	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	5413.997M	34.0	+8.9 +6.4	+33.8 -39.7	+0.1	+0.5	+0.0	44.0	54.0	-10.0	Vert
2	4511.522M	36.2	+7.7 +5.6	+32.8 -40.2	+0.1	+0.8	+0.0	43.0	54.0	-11.0	Horiz
3	4511.617M	36.2	+7.7 +5.6	+32.8 -40.2	+0.1	+0.8	+0.0	43.0	54.0	-11.0	Vert
4	5413.853M	32.5	+8.9 +6.4	+33.8 -39.7	+0.1	+0.5	+0.0	42.5	54.0	-11.5	Horiz
5	4574.753M	35.7	+7.7 +5.8	+32.8 -40.5	+0.1	+0.8	+0.0	42.4	54.0	-11.6	Horiz
6	4634.823M	35.3	+7.8 +5.9	+32.6 -40.7	+0.2	+0.8	+0.0	41.9	54.0	-12.1	Horiz
7	3659.907M	37.2	+7.1 +5.2	+31.8 -40.3	+0.2	+0.6	+0.0	41.8	54.0	-12.2	Horiz
8	4574.163M	35.0	+7.7 +5.8	+32.8 -40.5	+0.1	+0.8	+0.0	41.7	54.0	-12.3	Vert
9	3707.783M	36.4	+7.1 +5.2	+32.1 -40.2	+0.2	+0.6	+0.0	41.4	54.0	-12.6	Vert
10	3659.757M	36.8	+7.1 +5.2	+31.8 -40.3	+0.2	+0.6	+0.0	41.4	54.0	-12.6	Vert
11	3707.597M	36.1	+7.1 +5.2	+32.1 -40.2	+0.2	+0.6	+0.0	41.1	54.0	-12.9	Horiz
12	2706.977M	41.5	+5.7 +4.3	+28.9 -40.3	+0.2	+0.5	+0.0	40.8	54.0	-13.2	Vert
13	3609.100M	36.8	+7.0 +5.1	+31.3 -40.4	+0.2	+0.7	+0.0	40.7	54.0	-13.3	Vert

14	4634.410M	33.8	+7.8 +5.9	+32.6 -40.7	+0.2	+0.8	+0.0	40.4	54.0	-13.6	Vert
15	3609.098M	36.4	+7.0 +5.1	+31.3 -40.4	+0.2	+0.7	+0.0	40.3	54.0	-13.7	Horiz
16	2780.663M	40.3	+5.8 +4.4	+29.1 -40.3	+0.2	+0.5	+0.0	40.0	54.0	-14.0	Horiz
17	2706.897M	40.3	+5.7 +4.3	+28.9 -40.3	+0.2	+0.5	+0.0	39.6	54.0	-14.4	Horiz
18	2744.663M	40.0	+5.7 +4.3	+29.0 -40.3	+0.2	+0.5	+0.0	39.4	54.0	-14.6	Vert
19	2780.403M	39.3	+5.8 +4.4	+29.1 -40.3	+0.2	+0.5	+0.0	39.0	54.0	-15.0	Vert
20	2744.750M	39.2	+5.7 +4.3	+29.0 -40.3	+0.2	+0.5	+0.0	38.6	54.0	-15.4	Horiz

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	10/31/2018
Test Type:	**Maximized Emissions**	Time:	16:47:49
Tested By:	S. Yamamoto	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

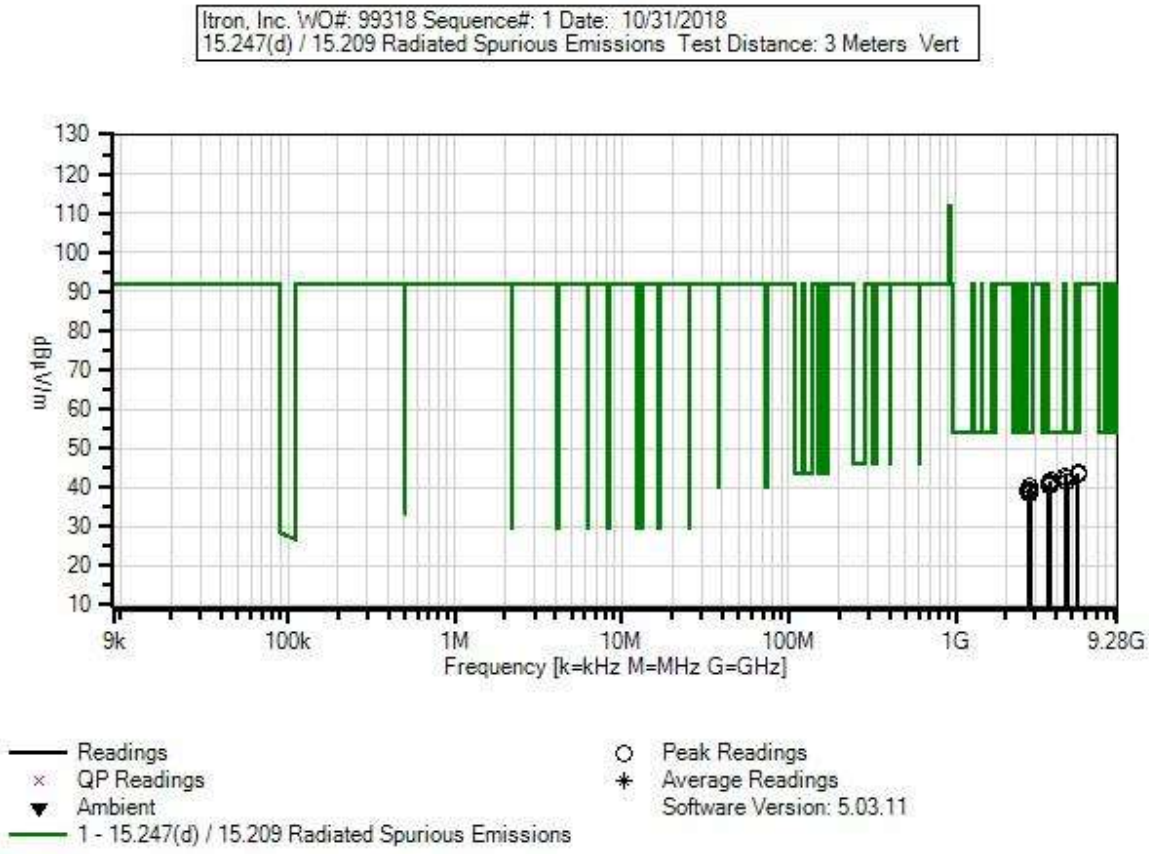
Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Operating frequency: 902.4MHz, 914.8MHz, and 927.6MHz.
Hybrid modulation. Firmware power: power level 2.

Frequency range of measurement = 1GHz to 9.3GHz. RBW=1MHz, VBW=3MHz for included data.

Temperature: 25°C, Humidity: 31%, Pressure: 100kPa.
Site D.
Test Method: ANSI C63.10 (2013)


Itron, Inc. WO#: 99318 Sequence#: 1 Date: 10/31/2018
15.247(d) / 15.209 Radiated Spurious Emissions Test Distance: 3 Meters Vert
dBµV/m
130
120
110
100
90
80
70
60
50
40
30
20
10
9k
100k
1M
10M
100M
1G
9.28G
Frequency [k=kHz M=MHz G=GHz]
Readings
QP Readings
Ambient
1 - 15.247(d) / 15.209 Radiated Spurious Emissions
Peak Readings
Average Readings
Software Version: 5.03.11

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019
T2	AN01646	Horn Antenna	3115	3/14/2018	3/14/2020
T3	AN03169	High Pass Filter	HM1155-11SS	6/15/2017	6/15/2019
T4	ANP07245	Cable	32022-29094K-29094K-24TC	7/5/2018	7/5/2020
T5	ANP07138	Cable	ANDL1-PNMNM-60	3/1/2017	3/1/2019
T6	AN00787	Preamp	83017A	6/9/2017	6/9/2019

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

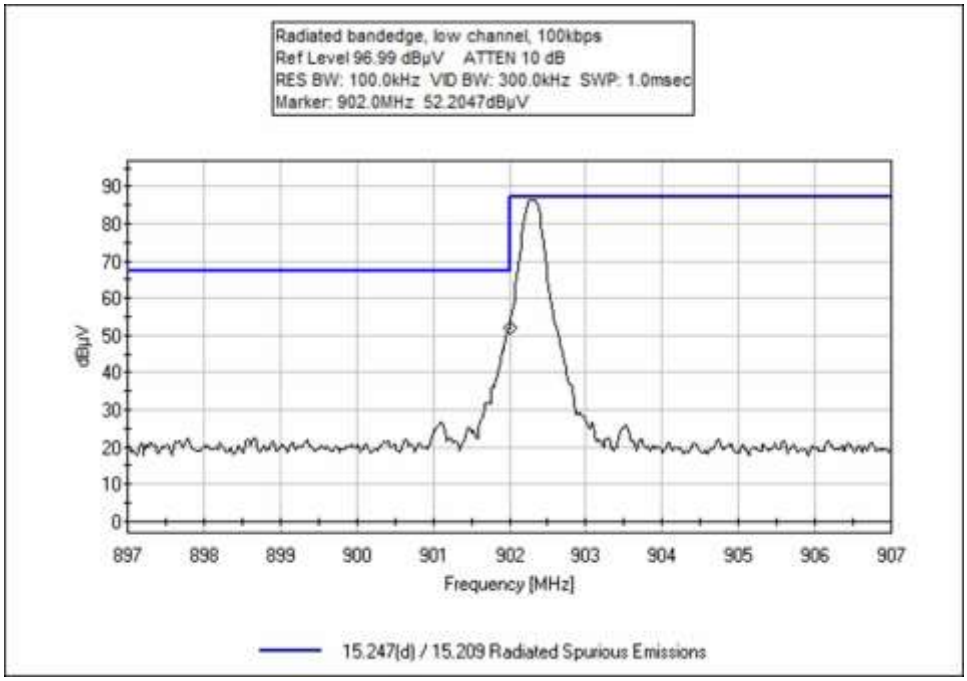
#	Freq	Rdng	T1 T5	T2 T6	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	5414.230M	33.7	+8.9 +6.4	+33.8 -39.7	+0.1	+0.5	+0.0	43.7	54.0	-10.3	Vert
2	5414.013M	33.6	+8.9 +6.4	+33.8 -39.7	+0.1	+0.5	+0.0	43.6	54.0	-10.4	Horiz
3	4512.150M	36.3	+7.7 +5.6	+32.8 -40.2	+0.1	+0.8	+0.0	43.1	54.0	-10.9	Horiz
4	4511.790M	36.0	+7.7 +5.6	+32.8 -40.2	+0.1	+0.8	+0.0	42.8	54.0	-11.2	Vert
5	4573.840M	35.5	+7.7 +5.8	+32.8 -40.5	+0.1	+0.8	+0.0	42.2	54.0	-11.8	Horiz
6	3710.810M	36.7	+7.1 +5.2	+32.1 -40.2	+0.2	+0.6	+0.0	41.7	54.0	-12.3	Vert
7	3658.940M	36.9	+7.1 +5.2	+31.8 -40.3	+0.2	+0.6	+0.0	41.5	54.0	-12.5	Vert
8	4638.120M	34.8	+7.8 +5.9	+32.6 -40.7	+0.2	+0.8	+0.0	41.4	54.0	-12.6	Vert
9	4638.400M	34.7	+7.8 +5.9	+32.6 -40.7	+0.2	+0.8	+0.0	41.3	54.0	-12.7	Horiz
10	4573.557M	34.6	+7.7 +5.7	+32.8 -40.5	+0.1	+0.8	+0.0	41.2	54.0	-12.8	Vert
11	3659.327M	36.5	+7.1 +5.2	+31.8 -40.3	+0.2	+0.6	+0.0	41.1	54.0	-12.9	Horiz
12	3710.653M	35.7	+7.1 +5.2	+32.1 -40.2	+0.2	+0.6	+0.0	40.7	54.0	-13.3	Horiz
13	3609.357M	36.6	+7.0 +5.1	+31.3 -40.4	+0.2	+0.7	+0.0	40.5	54.0	-13.5	Horiz

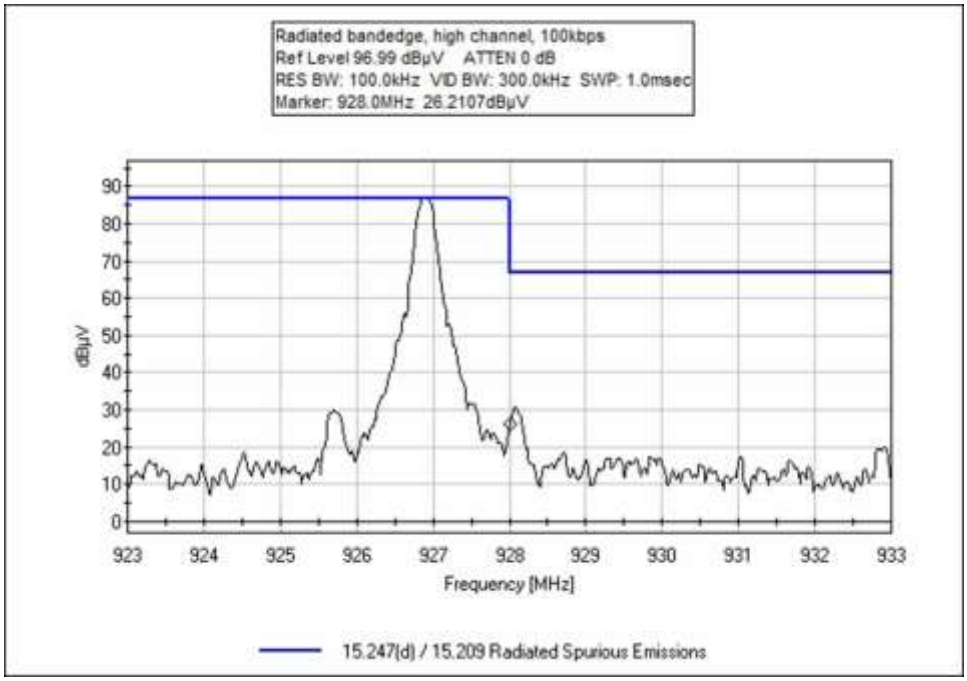
14	2782.977M	40.7	+5.8 +4.4	+29.1 -40.3	+0.2	+0.5	+0.0	40.4	54.0	-13.6	Horiz
15	3609.603M	36.3	+7.0 +5.1	+31.3 -40.4	+0.2	+0.7	+0.0	40.2	54.0	-13.8	Vert
16	2707.093M	40.3	+5.7 +4.3	+28.9 -40.3	+0.2	+0.5	+0.0	39.6	54.0	-14.4	Horiz
17	2744.683M	39.9	+5.7 +4.3	+29.0 -40.3	+0.2	+0.5	+0.0	39.3	54.0	-14.7	Horiz
18	2783.127M	39.3	+5.8 +4.4	+29.1 -40.3	+0.2	+0.5	+0.0	39.0	54.0	-15.0	Vert
19	2707.037M	39.5	+5.7 +4.3	+28.9 -40.3	+0.2	+0.5	+0.0	38.8	54.0	-15.2	Vert
20	2744.303M	38.9	+5.7 +4.3	+29.0 -40.3	+0.2	+0.5	+0.0	38.3	54.0	-15.7	Vert

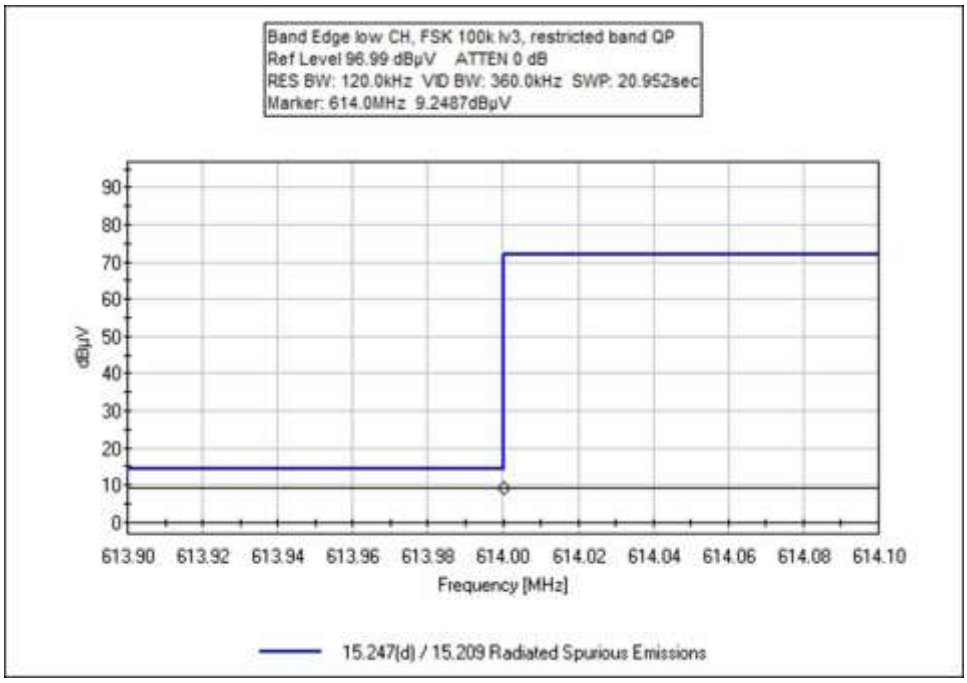
Band Edge

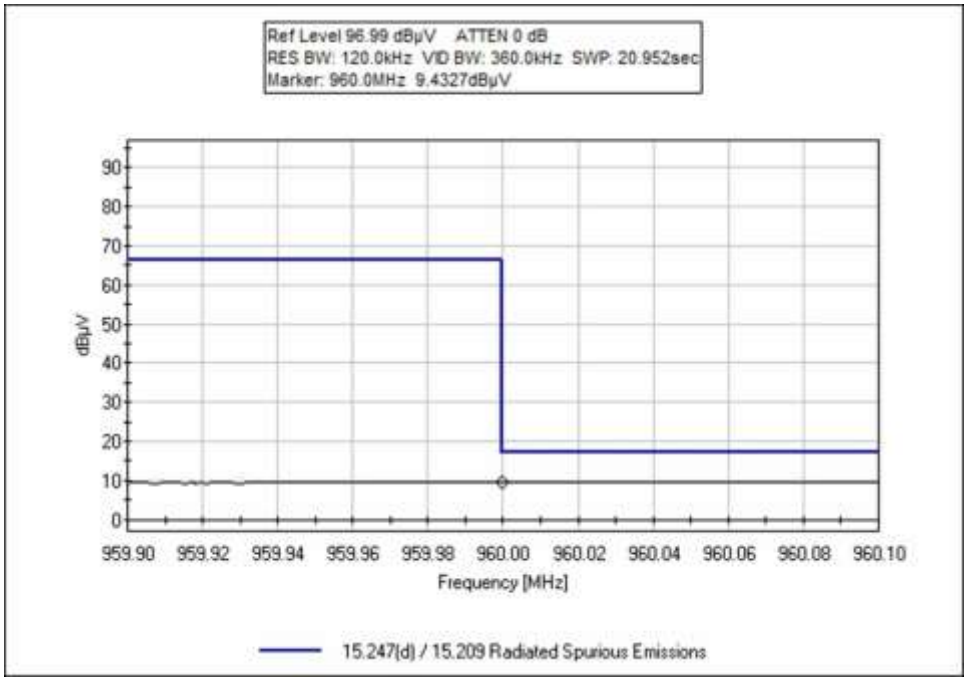
Band Edge Summary					
Frequency (MHz)	**Modulation**	**Ant. Type**	**Field Strength (dBuV/m @3m)**	**Limit (dBuV/m @3m)**	**Results**
614	100kbps FSK lv3	Integral	40.7	<46	Pass
902	100kbps FSK lv3	Integral	89.3	<103.4	Pass
928	100kbps FSK lv3	Integral	62.7	<103.4	Pass
960	100kbps FSK lv3	Integral	46.4	<54	Pass
902	100kbps FSK lv3 Hopping	Integral	88.2	<103.4	Pass
928	100kbps FSK lv3 Hopping	Integral	60.9	<103.4	Pass
614	300kbps GFSK lv2	Integral	40.7	<46	Pass
902	300kbps GFSK lv2	Integral	74.6	<93.2	Pass
928	300kbps GFSK lv2	Integral	76.2	<93.2	Pass
960	300kbps GFSK lv2	Integral	46.4	<54	Pass
902	300kbps GFSK lv2 Hopping	Integral	74.5	<93.2	Pass
928	300kbps GFSK lv2 Hopping	Integral	74.7	< 93.2	Pass
614	300kbps GFSK lv3	Integral	40.8	<46	Pass
902	300kbps GFSK lv3	Integral	88.6	<105	Pass
928	300kbps GFSK lv3	Integral	89.5	<105	Pass
960	300kbps GFSK lv3	Integral	46.5	<54	Pass
902	300kbps GFSK lv3 Hopping	Integral	87.0	<105	Pass
928	300kbps GFSK lv3 Hopping	Integral	89.5	<105	Pass

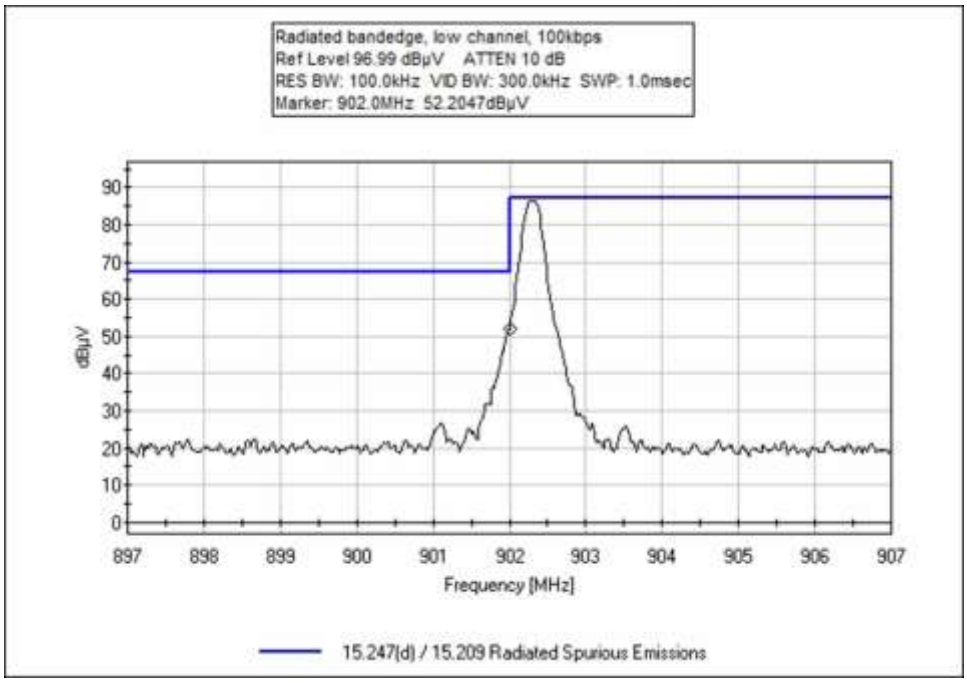
Band Edge Plots

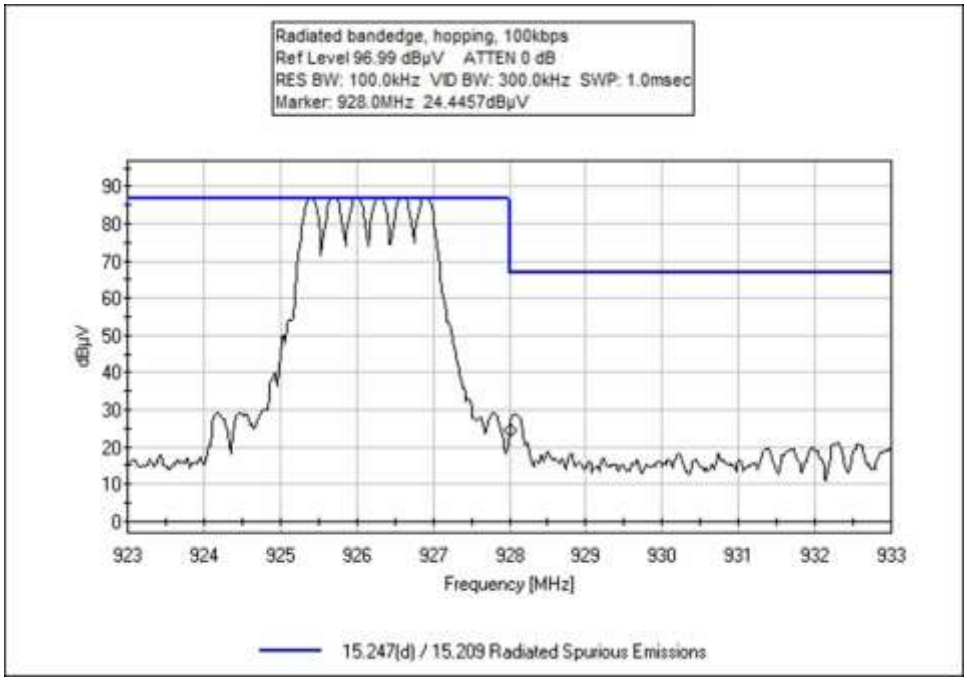


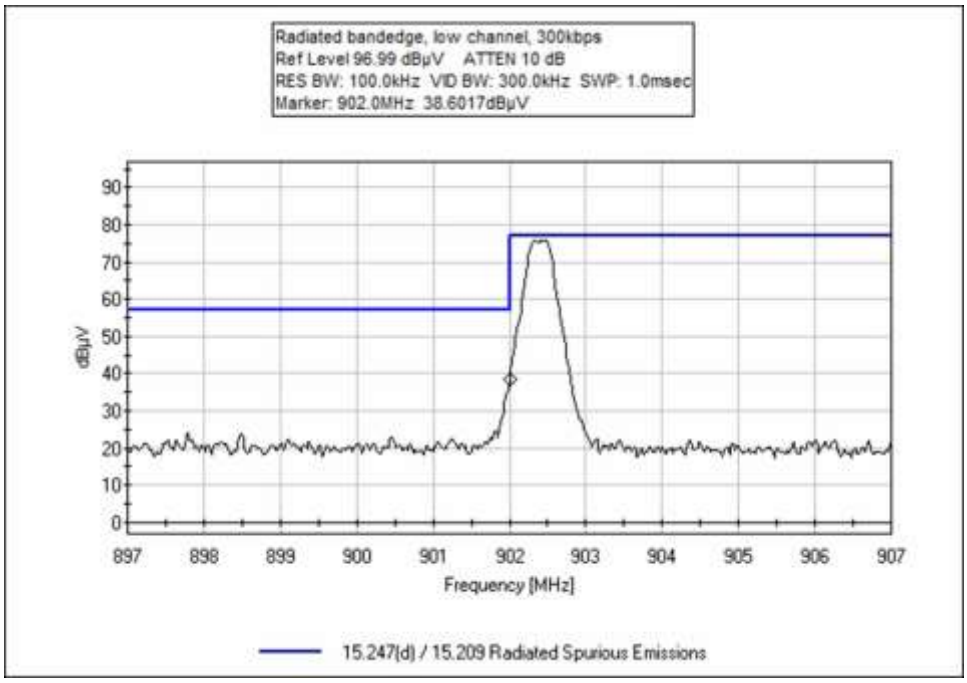


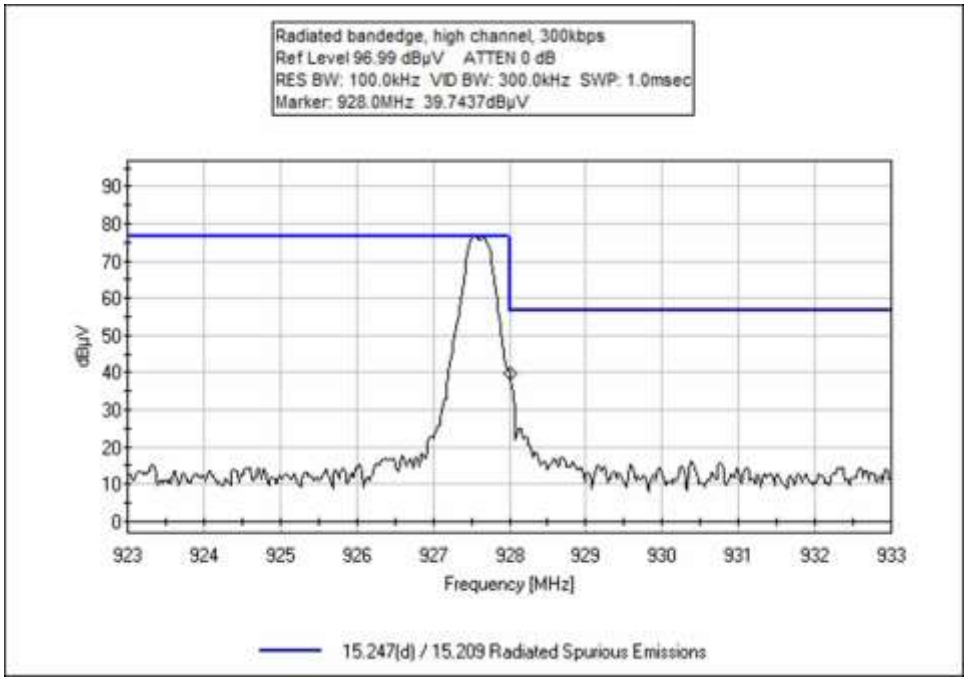

Band Edge low CH, FSK 100k lv3, restricted band QP
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.952sec
Marker: 614.0MHz 9.2487dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
613.90 613.92 613.94 613.96 613.98 614.00 614.02 614.04 614.06 614.08 614.10
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

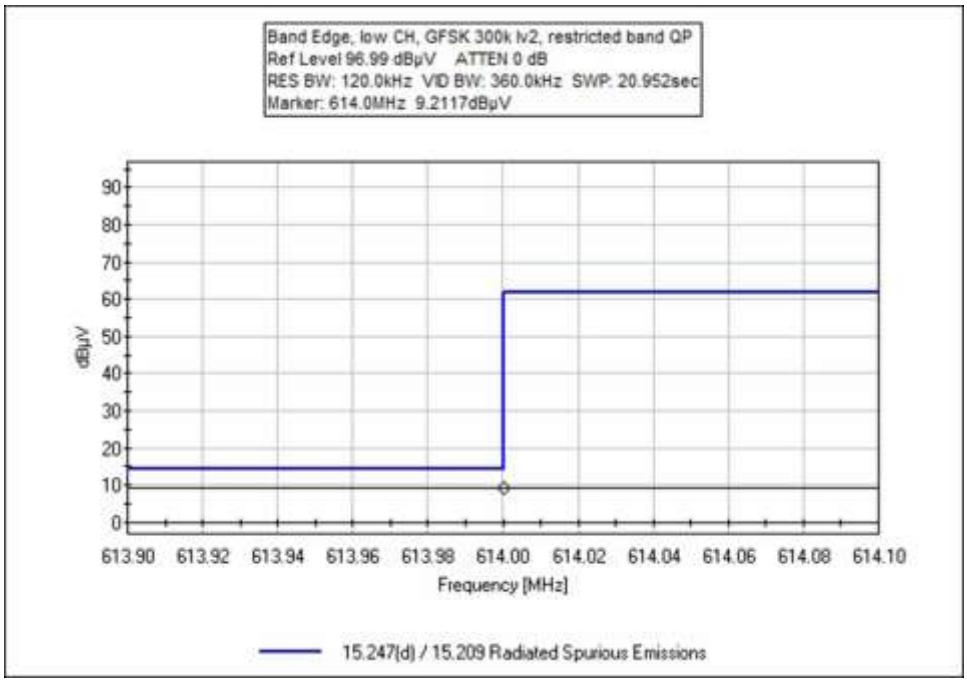

Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.952sec
Marker: 960.0MHz 9.4327dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
959.90 959.92 959.94 959.96 959.98 960.00 960.02 960.04 960.06 960.08 960.10
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

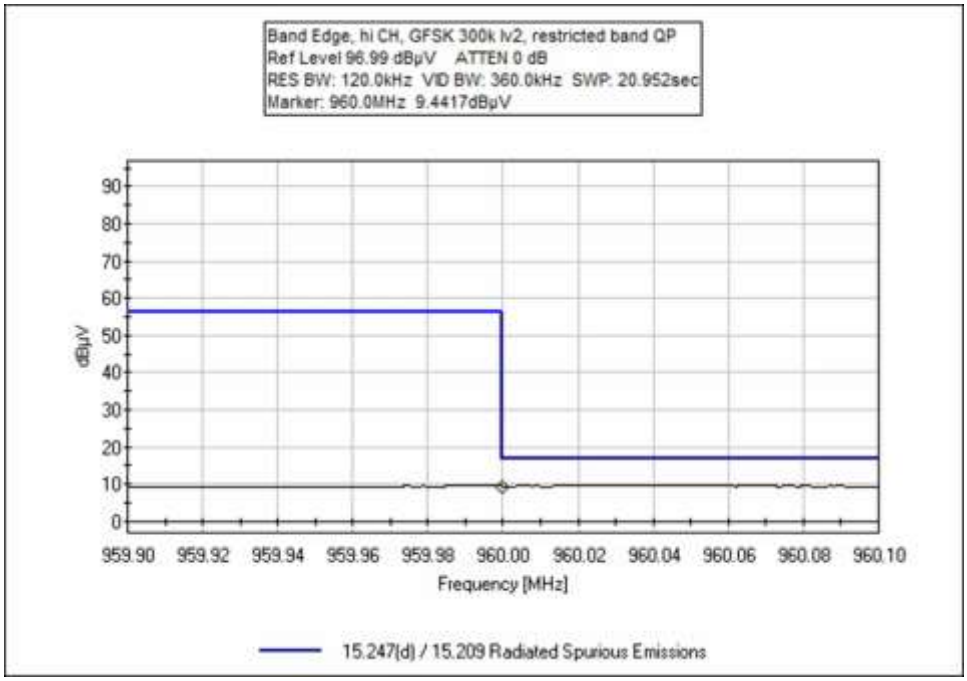

Radiated bandedge, low channel, 100kbps
Ref Level 96.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 902.0MHz 52.2047dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

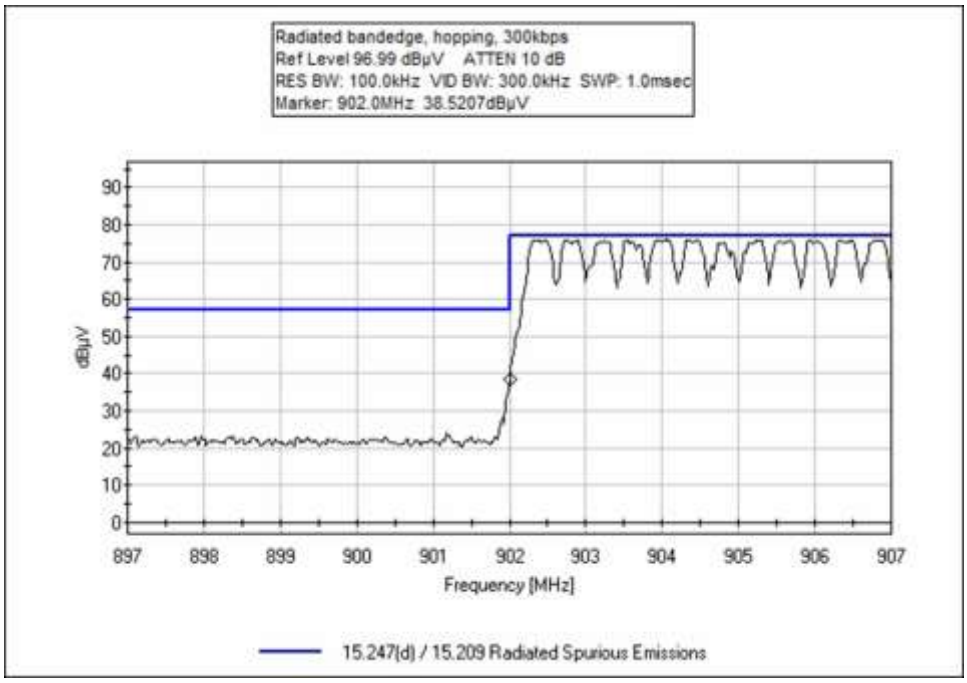

Radiated bandedge, hopping, 100kbps
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 928.0MHz 24.4457dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

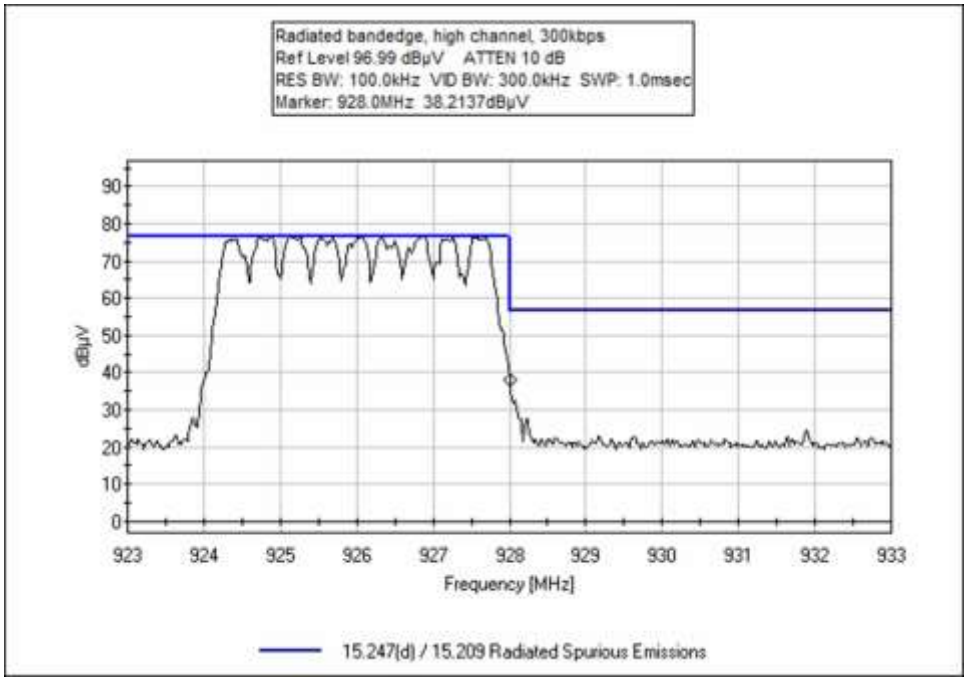

Radiated bandedge, low channel, 300kbps
Ref Level 96.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 902.0MHz 38.6017dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

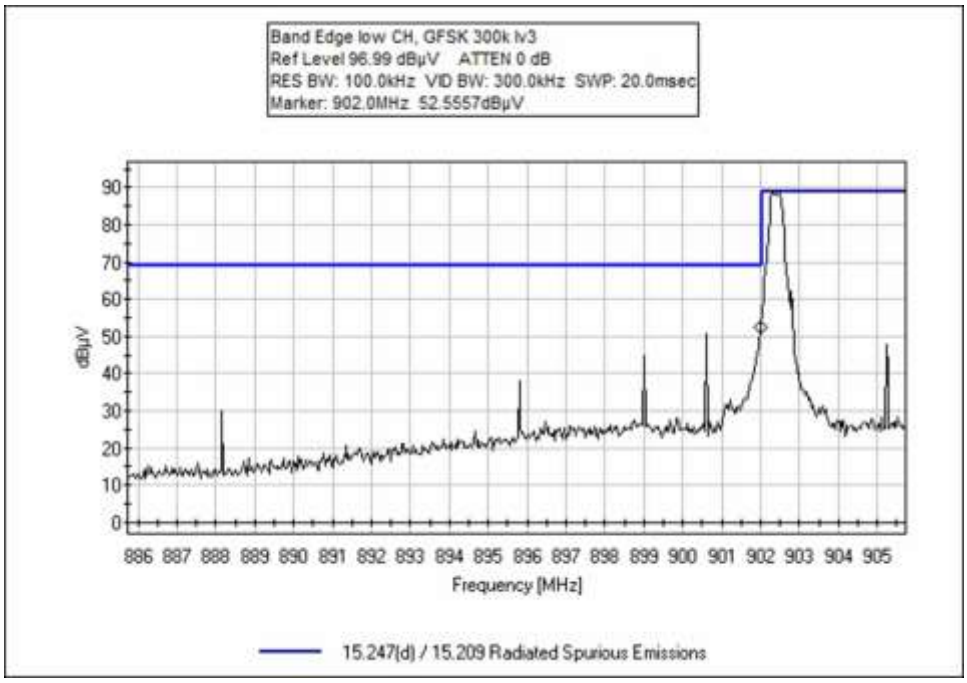

Radiated bandedge, high channel, 300kbps
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 928.0MHz 39.7437dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

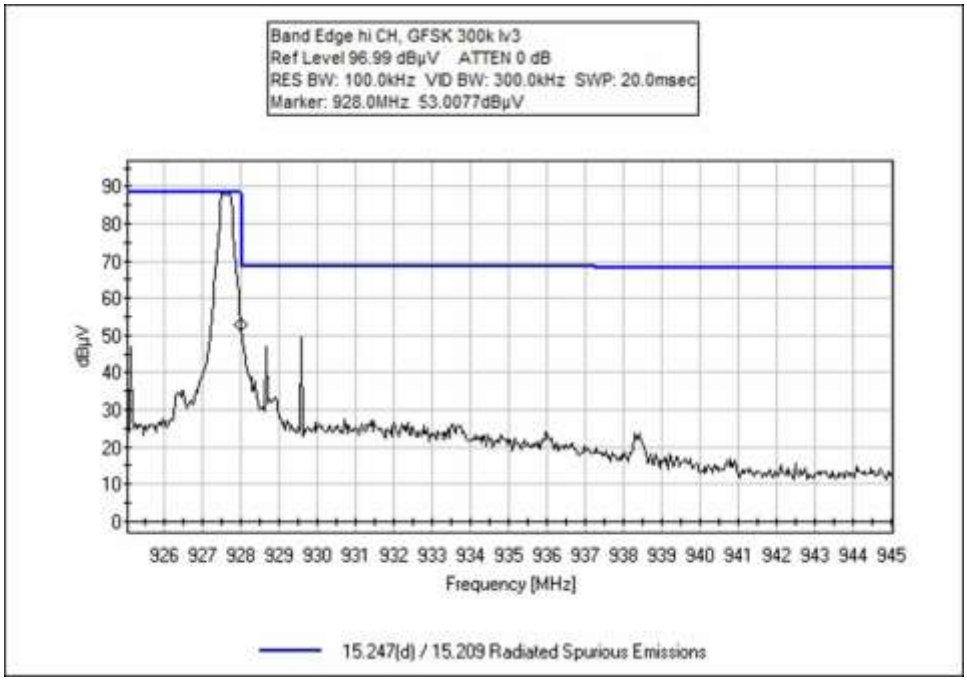

Band Edge, low CH, GFSK 300k lv2, restricted band QP
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.952sec
Marker: 614.0MHz 9.2117dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
613.90 613.92 613.94 613.96 613.98 614.00 614.02 614.04 614.06 614.08 614.10
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

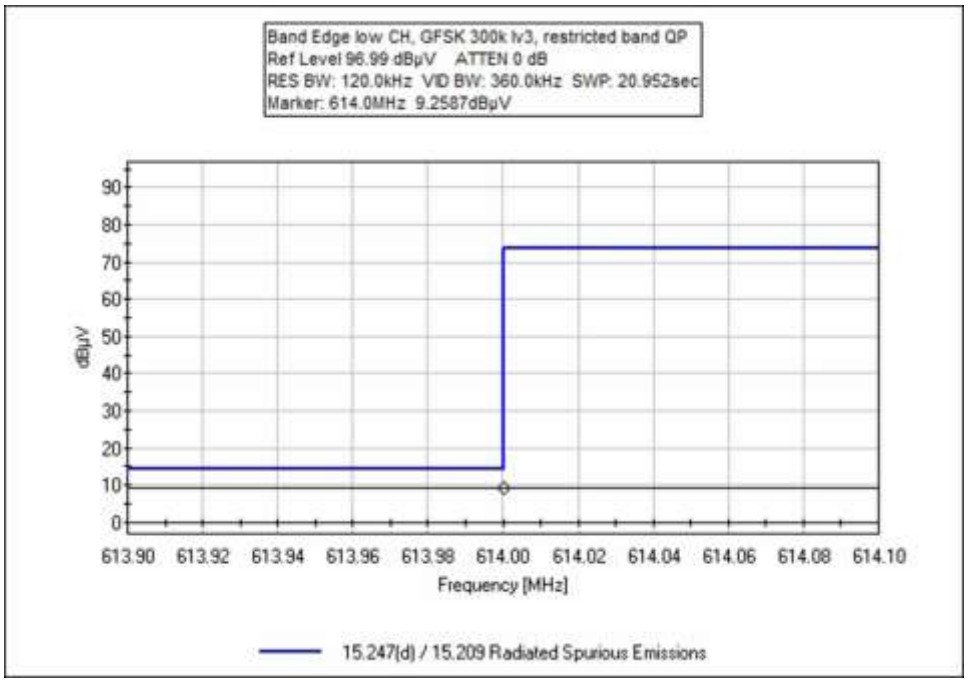

Band Edge, hi CH, GFSK 300k lv2, restricted band QP
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.952sec
Marker: 960.0MHz 9.4417dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
959.90 959.92 959.94 959.96 959.98 960.00 960.02 960.04 960.06 960.08 960.10
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

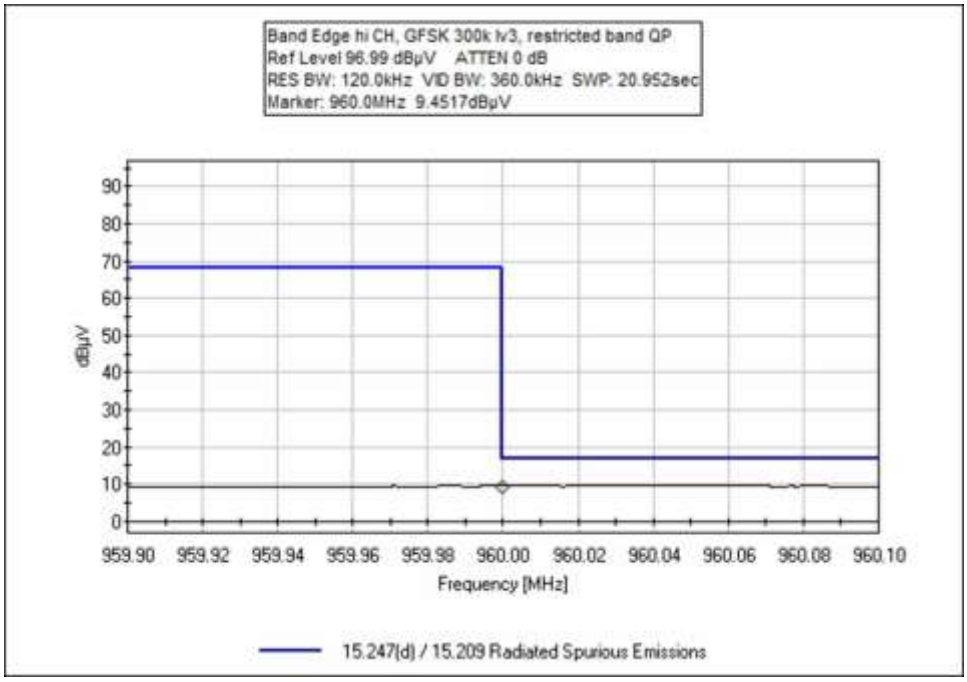

Radiated bandedge, hopping, 300kbps
Ref Level 96.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 902.0MHz 38.5207dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

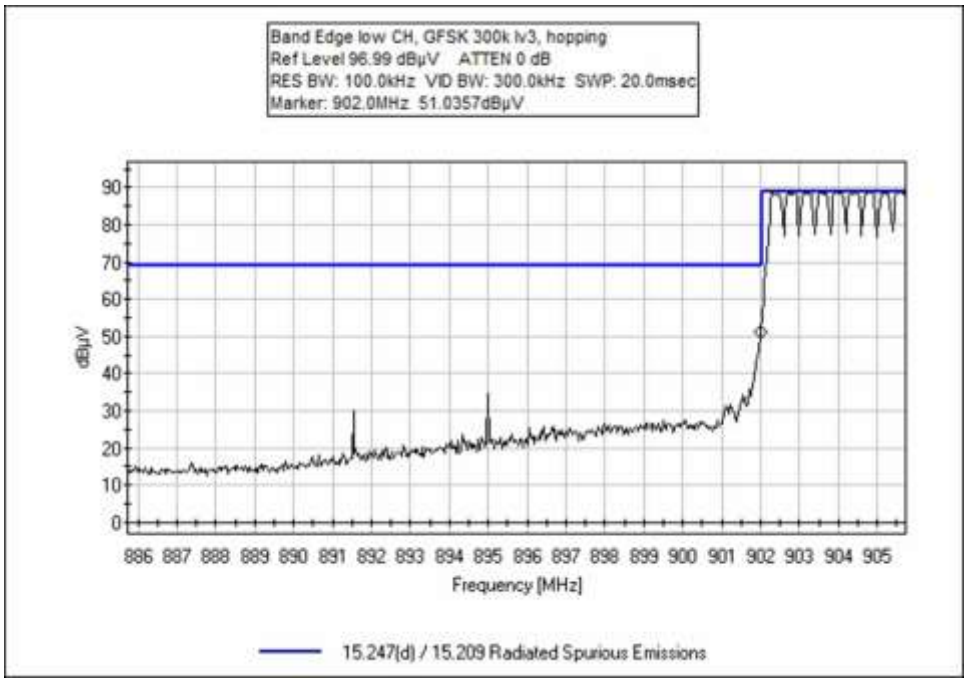

Radiated bandedge, high channel, 300kbps
Ref Level 96.99 dBµV ATTEN 10 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 1.0msec
Marker: 928.0MHz 38.2137dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

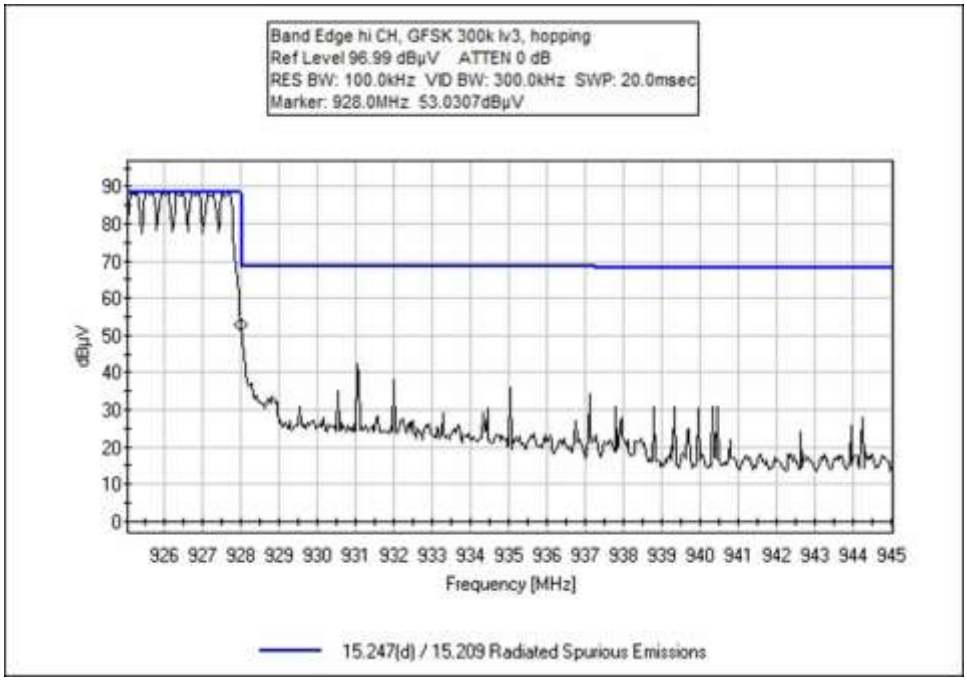

Band Edge low CH, GFSK 300k lv3
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 902.0MHz 52.5557dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Band Edge hi CH, GFSK 300k lv3
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 928.0MHz 53.0077dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Band Edge low CH, GFSK 300k lv3, restricted band QP
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.952sec
Marker: 614.0MHz 9.2587dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
613.90 613.92 613.94 613.96 613.98 614.00 614.02 614.04 614.06 614.08 614.10
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Band Edge hi CH, GFSK 300k lv3, restricted band QP
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 120.0kHz VID BW: 360.0kHz SWP: 20.952sec
Marker: 960.0MHz 9.4517dBµV
dBµV
90
80
70
60
50
40
30
20
10
0
959.90 959.92 959.94 959.96 959.98 960.00 960.02 960.04 960.06 960.08 960.10
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Band Edge low CH, GFSK 300k lv3, hopping
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 902.0MHz 51.0357dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions


Band Edge hi CH, GFSK 300k lv3, hopping
Ref Level 96.99 dBµV ATTEN 0 dB
RES BW: 100.0kHz VID BW: 300.0kHz SWP: 20.0msec
Marker: 928.0MHz 53.0307dBµV
dBµV
Frequency [MHz]
15.247(d) / 15.209 Radiated Spurious Emissions

Test Setup / Conditions / Data

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	12/4/2018
Test Type:	**Maximized Emissions**	Time:	14:07:31
Tested By:	S. Yamamoto	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Operating frequency: 902.3MHz, 914.9MHz, and 926.9MHz.
FSK modulation. Firmware power: power level 3.

Frequency range of measurement = 614-928MHz
RBW=100 kHz, VBW=300 kHz.

Temperature: 25°C, Humidity: 31%, Pressure: 100kPa.
Site D.
Test Method: ANSI C63.10 (2013)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019
T2	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
T3	ANP05569	Cable-Amplitude +15C to +45C (dB)	RG-214/U	12/7/2016	12/7/2018
T4	ANP05283	Attenuator	ATT-0218-06-NNN-02	4/5/2018	4/5/2020
T5	AN01994	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	614.000M QP	9.2	+0.0 +20.4	+2.6	+2.7	+5.8	+0.0	40.7	46.0	-5.3	Horiz
2	960.000M QP	9.4	+0.0 +24.1	+3.4	+3.6	+5.9	+0.0	46.4	54.0	-7.6	Horiz
3	902.000M	53.3	+0.0 +23.4	+3.2	+3.5	+5.9	+0.0	89.3	103.4	-14.1	Horiz
4	902.000M	52.2	+0.0 +23.4	+3.2	+3.5	+5.9	+0.0	88.2	103.4	-15.2	Horiz
5	928.000M	26.2	+0.0 +23.7	+3.3	+3.6	+5.9	+0.0	62.7	103.4	-40.7	Horiz
6	928.000M	24.4	+0.0 +23.7	+3.3	+3.6	+5.9	+0.0	60.9	103.4	-42.5	Horiz

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	12/4/2018
Test Type:	**Maximized Emissions**	Time:	14:08:10
Tested By:	S. Yamamoto	Sequence#:	1
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Operating frequency: 902.4MHz, 914.8MHz, and 927.6MHz.
Hybrid modulation. Firmware power: power level 2.

Frequency range of measurement = 614-928MHz
RBW=100 kHz, VBW=300 kHz.

Temperature: 25°C, Humidity: 31%, Pressure: 100kPa.
Site D.
Test Method: ANSI C63.10 (2013)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019
T2	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
T3	ANP05569	Cable-Amplitude +15C to +45C (dB)	RG-214/U	12/7/2016	12/7/2018
T4	ANP05283	Attenuator	ATT-0218-06-NNN-02	4/5/2018	4/5/2020
T5	AN01994	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020

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

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	614.000M QP	9.2	+0.0 +20.4	+2.6	+2.7	+5.8	+0.0	40.7	46.0	-5.3	Horiz
2	960.000M QP	9.4	+0.0 +24.1	+3.4	+3.6	+5.9	+0.0	46.4	54.0	-7.6	Horiz
3	928.000M	39.7	+0.0 +23.7	+3.3	+3.6	+5.9	+0.0	76.2	93.2	-17.0	Horiz
4	928.000M	38.2	+0.0 +23.7	+3.3	+3.6	+5.9	+0.0	74.7	93.2	-18.5	Horiz
5	902.000M	38.6	+0.0 +23.4	+3.2	+3.5	+5.9	+0.0	74.6	93.2	-18.6	Horiz
6	902.000M	38.5	+0.0 +23.4	+3.2	+3.5	+5.9	+0.0	74.5	93.2	-18.7	Horiz

Test Location:	CKC Laboratories Inc. • 110 N. Olinda Place • Brea, CA 92823 • 714-993-6112		
Customer:	**Itron, Inc.**		
Specification:	**15.247(d) / 15.209 Radiated Spurious Emissions**		
Work Order #:	**99318**	Date:	12/4/2018
Test Type:	**Maximized Emissions**	Time:	14:09:13
Tested By:	Don Nguyen	Sequence#:	2
Software:	EMITest 5.03.11		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 2			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 2			

Test Conditions / Notes:

The equipment under test (EUT) is placed stand alone on a Styrofoam table top. Connected to the EUT is a laptop computer via USB to serial interface board. The EUT is turned on and set in transmitting mode.
The EUT has fresh batteries installed. Nominal input voltage is 6.0Vdc.
The EUT is tested in preferred orientation declared by the manufacturer.

Modulation: GFSK 300kbps, power level 3.

Frequency range of measurement = 614-960MHz
RBW=100 kHz, VBW=300 kHz. (-20dBc limit)
RBW=120 kHz, VBW=360 kHz (restricted band)

Temperature: 25°C, Humidity: 31%, Pressure: 100kPa.
Site A.
Test Method: ANSI C63.10 (2013)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	8/10/2018	8/10/2019
T2	ANP04382	Cable	LDF-50	6/2/2018	6/2/2020
T3	ANP05569	Cable-Amplitude +15C to +45C (dB)	RG-214/U	12/7/2016	12/7/2018
T4	ANP05283	Attenuator	ATT-0218-06-NNN-02	4/5/2018	4/5/2020
T5	AN01994	Biconilog Antenna	CBL6111C	4/23/2018	4/23/2020

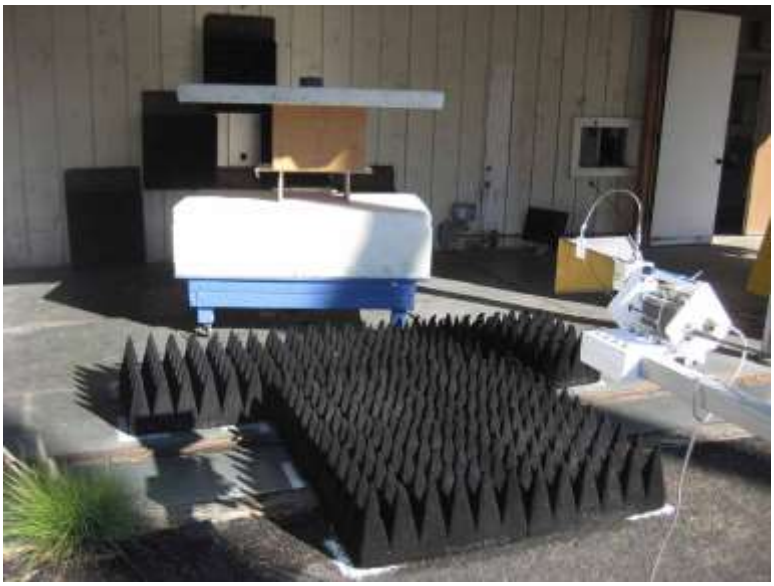
Measurement Data: Reading listed by margin. Test Distance: 3 Meters

#	Freq	Rdng	T1 T5	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBµV	dB	dB	dB	dB	Table	dBµV/m	dBµV/m	dB	Ant
1	614.000M QP	9.3	+0.0 +20.4	+2.6	+2.7	+5.8	+0.0	40.8	46.0	-5.2	Horiz
2	960.000M QP	9.5	+0.0 +24.1	+3.4	+3.6	+5.9	+0.0	46.5	54.0	-7.5	Horiz
3	928.000M	53.0	+0.0 +23.7	+3.3	+3.6	+5.9	+0.0	89.5	105.0 hopping	-15.5	Horiz
4	928.000M	53.0	+0.0 +23.7	+3.3	+3.6	+5.9	+0.0	89.5	105.0	-15.5	Horiz
5	902.000M	52.6	+0.0 +23.4	+3.2	+3.5	+5.9	+0.0	88.6	105.0	-16.4	Horiz
6	902.000M	51.0	+0.0 +23.4	+3.2	+3.5	+5.9	+0.0	87.0	105.0 hopping	-18.0	Horiz

Test Setup Photos

Below 1GHz, Site A

Below 1GHz, Site A



Above 1GHz, Site A, Cone placement

Above 1GHz, Site A, Cone placement

Below 1GHz, Site D

Below 1GHz, Site D

Above 1GHz, Site D, Cone placement

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.