Compliance Testing, LLC
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http://www.ComplianceTesting.com
info@ComplianceTesting.com

Test Report

Prepared for: Time Keeping Systems Inc.

Model: Duress Device 10

Description: Wireless positioning and duress alarm for prison guards

Serial Number: N/A

FCC ID: MTD-0004
IC: 12375A-0004

To

FCC Part 15.247

Date of Issue: January 29, 2018

On the behalf of the applicant:	**Time Keeping Systems Inc.** **30700 Bainbridge Rd** **Cleveland, OH 44139**
Attention of:	**Dean Chriss, Hardware Engineer** **Ph: (216)595-1026** **E-Mail: dchriss@guard1.com**

Prepared By
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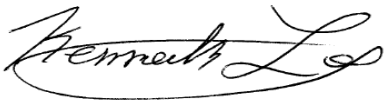
Project No: p1810006



Kenneth Lee
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	January 16, 2018	Kenneth Lee	Original Document
2.0	January 29, 2018	Kenneth Lee	Updated Test Setup Block Diagram on page 23.

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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

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

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

Testing Certificate Number: **2152.01**

ACCREDITED
TESTING CERT
#2152.01

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The applicant has been cautioned as to the following

15.21 - Information to User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) - Special Accessories

Equipment marked to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Standard Test Conditions Engineering Practices

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

In accordance with ANSI C63.10-2013 and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

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

Environmental Conditions		
Temperature (ºC)	**Humidity (%)**	**Pressure (mbar)**
17-24	29-39	962-979

EUT Description
Model: Duress Device 10
Description: Wirelss positioning and duress alarm for prison guards
Firmware: N/A
Software: N/A
Serial Number: N/A
Additional Information: The EUT implements a 3.3 dBi integral antenna. The EUT has 2 different power settings depending on the operator's needs, both modes were fully tested.

EUT Operation during Tests
The EUT was put into a test mode which enabled it to transmit at the lowest, middle and highest channel of operation at the maximum available output power. The EUT was fully tested in both the 0 dBm and +25 dBm modes.

Accessories:

Qty	Description	Manufacturer	Model	S/N
1	Charging Dock	Time Keeping Systems Inc.	N/A	N/A
1	Power Supply for Charging Dock	CONDOR	FJ-SW1903420	N/A

Cables: None

Modifications: None

15.203: Antenna Requirement:

X	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
	The EUT must be professionally installed
	The antenna requirement does not apply

Test Results Summary

FCC 15.247 Specification	RSS-247 Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Section 5.4(d)	Output Power	Pass	
15.247(d)	Section 5.5	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Section 5.5	Radiated Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Section 5.5	Emissions At Band Edges	Pass	
15.247(a)(2)	Sections 5.2(a)	Occupied Bandwidth	Pass	
15.247(e)	Section 5.2(b)	Transmitter Power Spectral Density	Pass	
15.207	RSS-GEN Section 8.8	A/C Powerline Conducted Emissions	Pass	

References	Description
CFR47, Part 15, Subpart B	Unintentional Radiators
CFR47, Part 15, Subpart C	Intentional Radiators
ANSI C63.10-2013	American National standard for testing Unlicensed Wireless Devices
ANSI C63.4-2014	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ISO/IEC 17025:2005	General requirements for the Competence of Testing and Calibrations Laboratories
KDB 558074 D01 v04	Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating under §15.247

Output Power
Engineer: Kenneth Lee
Test Date: 1/16/2018

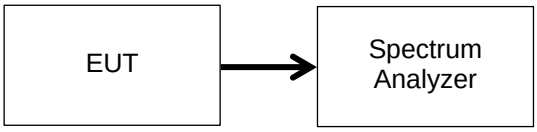
Test Procedure

The EUT was connected directly to a spectrum analyzer. The Spectrum Analyzer was set to the following:

RBW ≥ DTS Bandwidth
VBW ≥ 3 x RBW
Span ≥ 3 x RBW
Sweep time = auto couple
Detector = peak
Trace Mode = max hold

The EUT was set to transmit on the lowest, middle and highest frequencies at the maximum power level. The RF output power was measured using the spectrum analyzer's marker peak function

Test Setup



Transmitter Output Power Summary Tables

0 dBm

Tuned Frequency (MHz)	Measured Value (dBm)	Specification Limit	Result
2402	-0.4	1 W (30 dBm)	Pass
2426	-0.45	1 W (30 dBm)	Pass
2480	-0.7	1 W (30 dBm)	Pass

25 dBm

Tuned Frequency (MHz)	Measured Value (dBm)	Specification Limit	Result
2402	24.8	1 W (30 dBm)	Pass
2426	24.76	1 W (30 dBm)	Pass
2480	24.62	1 W (30 dBm)	Pass

Conducted Spurious Emissions
Engineer: Kenneth Lee
Test Date: 1/16/2018

Test Procedure

The EUT was connected to a spectrum analyzer through a notch filter. The Spectrum Analyzer was set to the following:

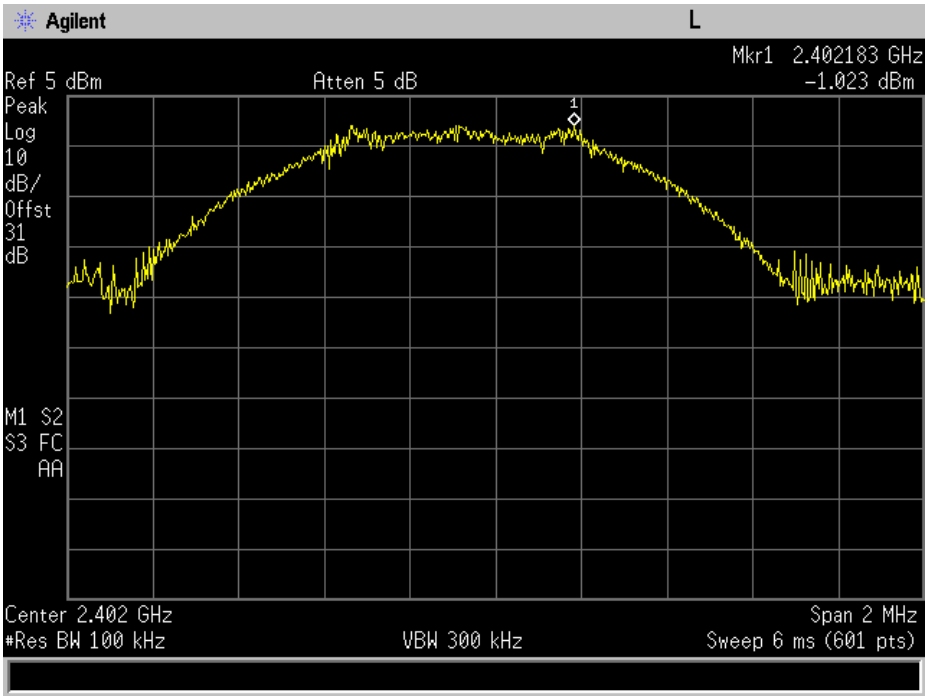
RBW = 100 kHz
VBW ≥ 3 x RBW
Peak Detector
Trace mode = max hold
Sweep = auto couple
Frequency Range = 30MHz – 10th Harmonic of the fundamental

The EUT was set to transmit on the lowest, middle and highest frequencies at the maximum power level. The trace was allowed to stabilize. All emission were investigated to insure they were attenuated from the reference level by at least 20dB. If the average power levels were measured then the out-of-band emissions needed to be attenuated by 30dB. In addition emissions were investigated at the band edges to insure all out-of-band emissions were attenuated 20 or 30dB as necessary.

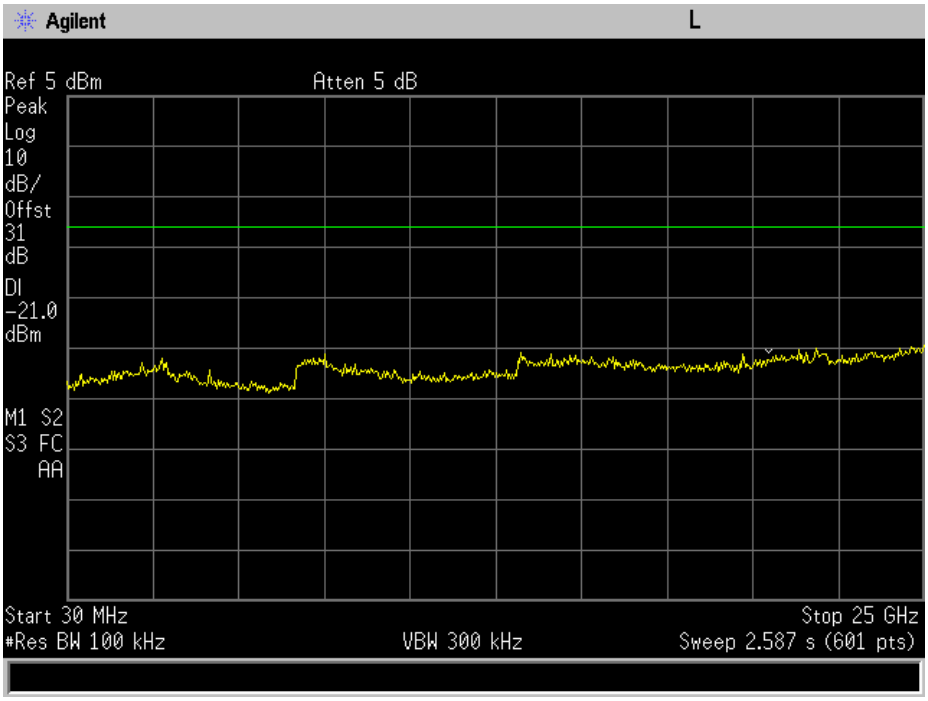
Test Setup

Conducted Spurious Emissions Plots 0 dBm

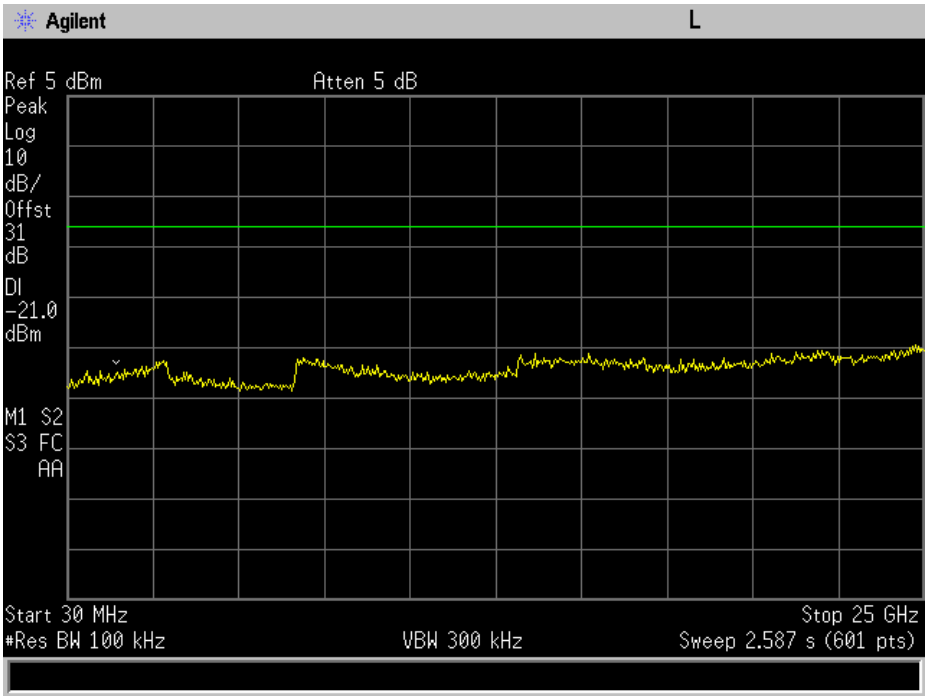
Reference Level



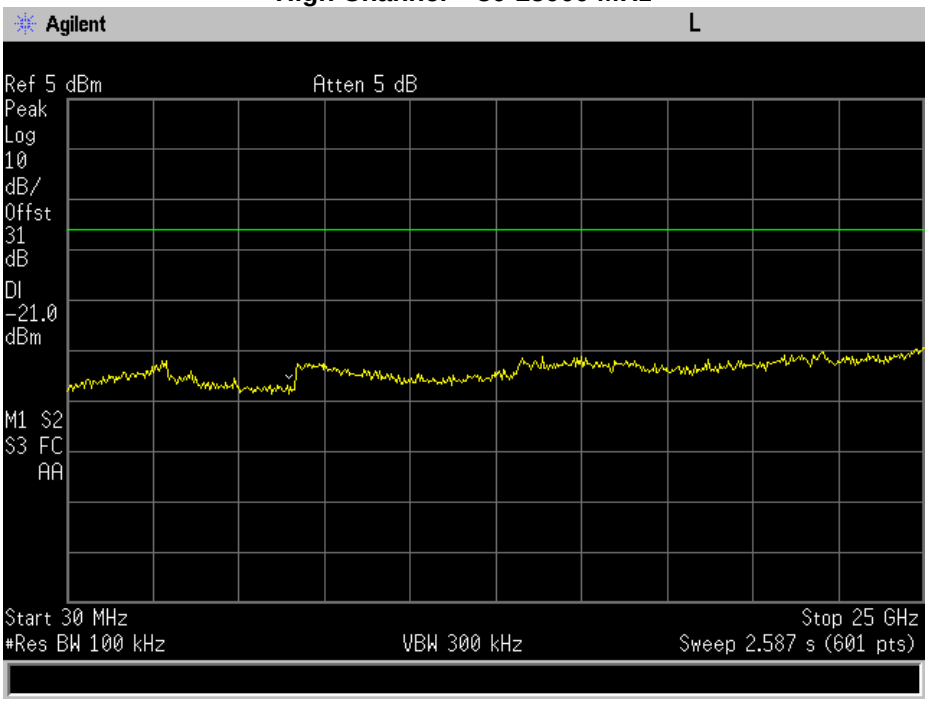
Low Channel – 30-25000 MHz



Mid Channel – 30-25000 MHz

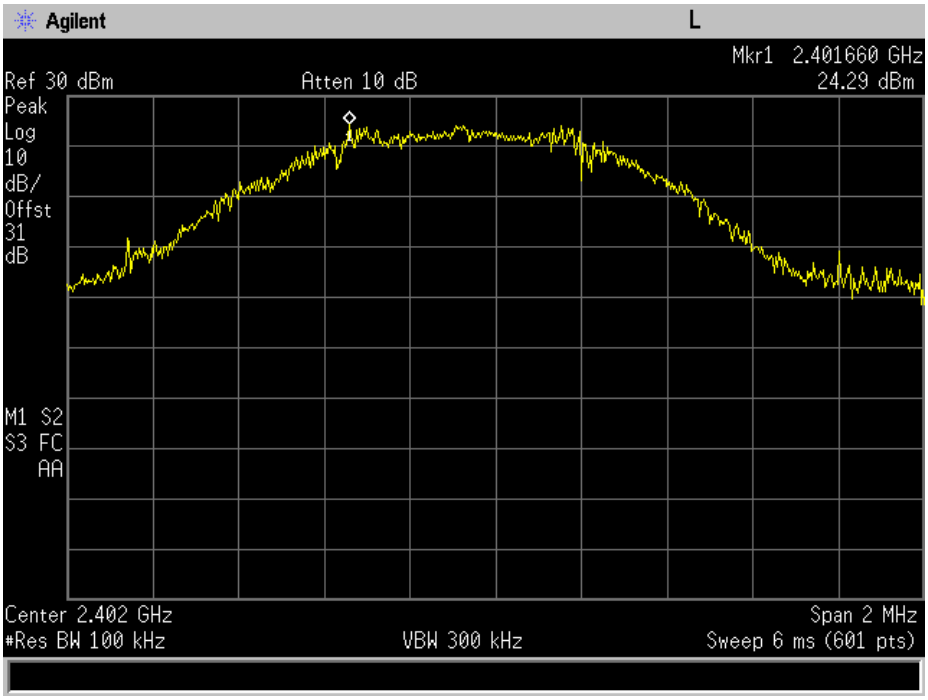


High Channel – 30-25000 MHz

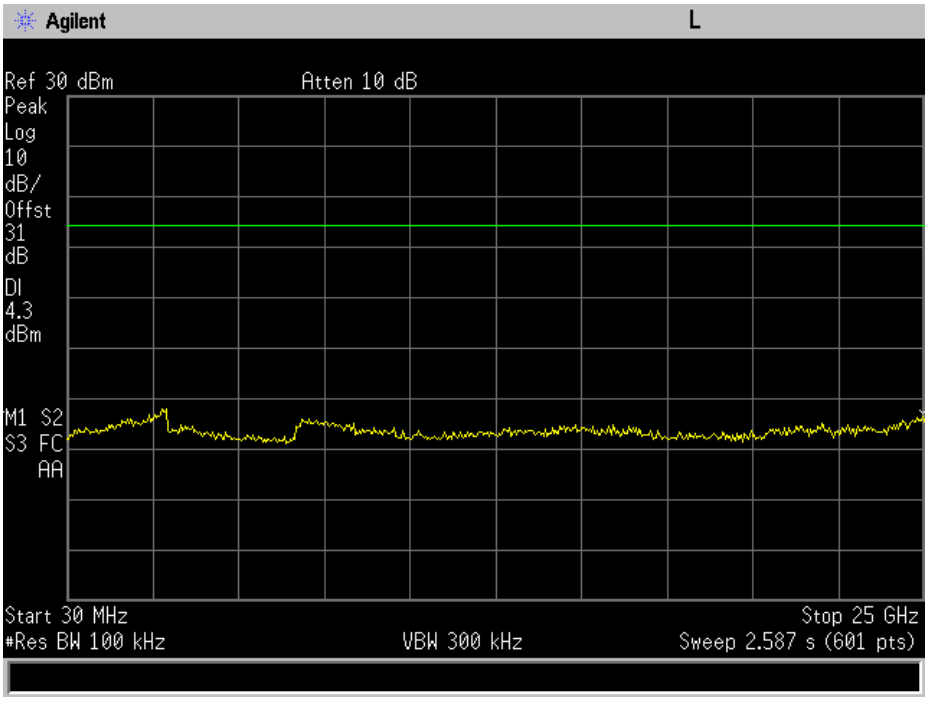


Conducted Spurious Emissions Plots 25 dBm

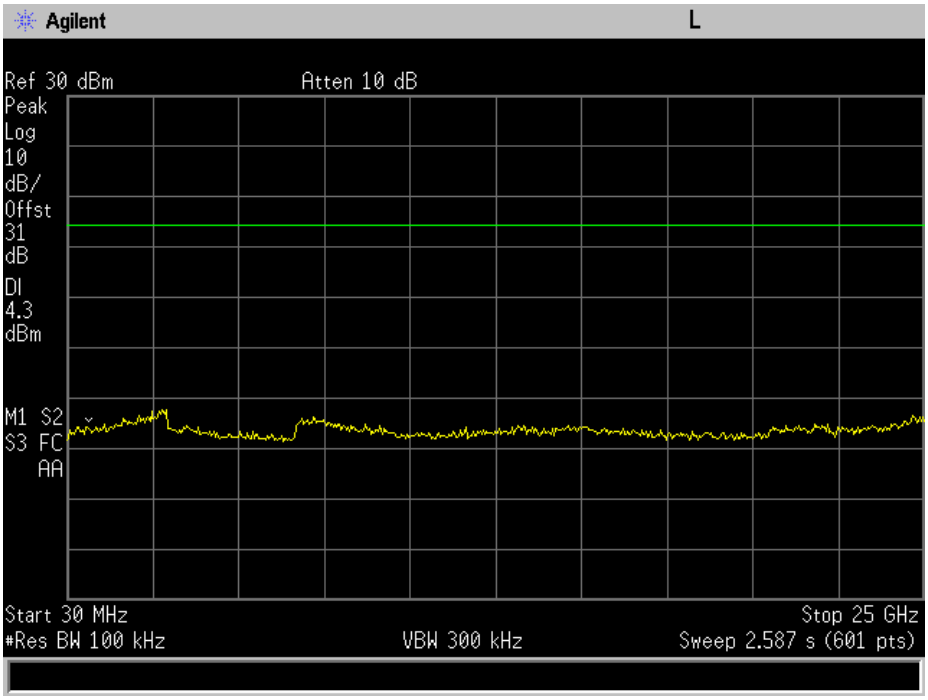
Reference Level



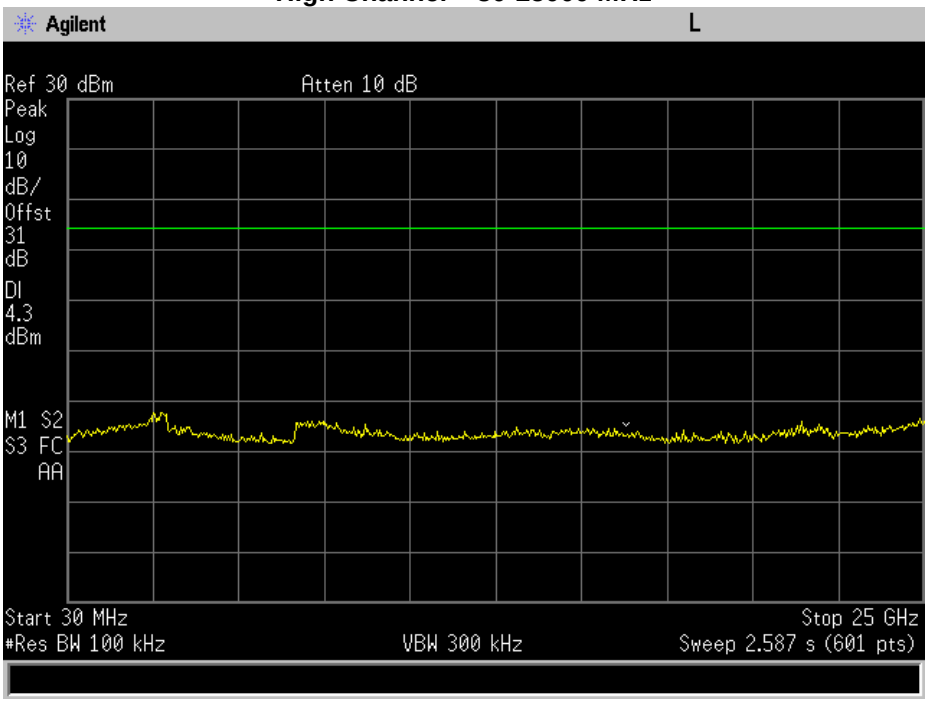
Low Channel – 30-25000 MHz



Mid Channel – 30-25000 MHz



High Channel – 30-25000 MHz



Radiated Spurious Emissions
Engineer: Kenneth Lee
Test Date: 1/16/2018

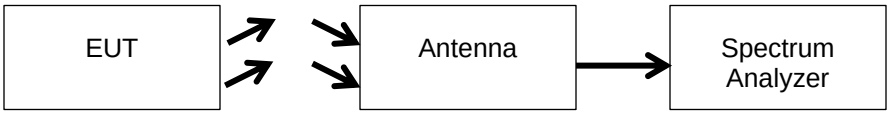
Test Procedure
Radiated Spurious Emissions: 30 – 1000 MHz

The EUT was setup in a semi-anechoic test chamber set 3m from the receiving antenna. The output of the transmitter was connected to a non-radiating balance load. The EUT was set to transmit on the lowest, middle and highest frequency of operation at the maximum power level. The EUT was tested, in 3 orthogonal axis, by rotating it 360° with the receive antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the TX signal levels were maximized. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Spurious Emissions.

All emissions from 30 MHz to 1 GHz were examined.
Measured Level includes antenna and receiver cable correction factors.
Correction factors were input into the spectrum analyzer before recording “Measured Level”.

RBW = 100 KHz
VBW = 300 KHz
Detector – Quasi Peak

Test Setup

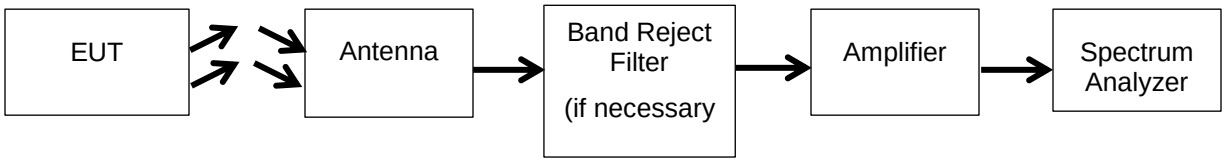


Test Procedure for
Radiated Spurious Emissions above 1 GHz

The EUT was setup in a semi-anechoic test chamber set 3m from the receiving antenna. The output of the transmitter was connected to a non-radiating balance load. The EUT was set to transmit on the lowest, middle and highest frequency of operation at the maximum power level. The EUT was tested, in 3 orthogonal axis, by rotating it 360° with the receive antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure the TX signal levels were maximized. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Spurious Emissions.

RBW = 1 MHz
VBW = 3 MHz
Detector – Peak

Test Setup



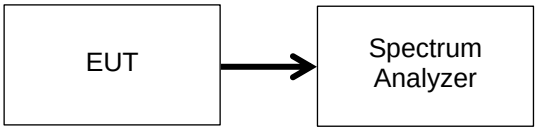
See Annex A for test data

Emissions at Band Edges
Engineer: Kenneth Lee
Test Date: 1/16/2018

Test Procedure

The EUT was connected directly to a spectrum analyzer. The spectrum analyzer was used to verify that the EUT met the requirements for band edges.

Test Setup



Band Edge Emissions Summary

0 dBm

Tuned Frequency (MHz)	Emission Frequency (MHz)	Monitored Level	Detector	Limit	Result
2402	2400	-38.58	Peak	-20 dBc	Pass
2480	2483.5	-46.85	Peak	-20 dBc	Pass

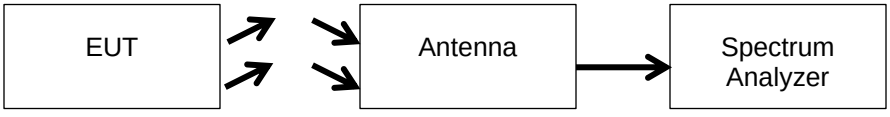
25 dBm

Tuned Frequency (MHz)	Emission Frequency (MHz)	Monitored Level	Detector	Limit	Result
2402	2400	-38.86	Peak	-20 dBc	Pass
2480	2483.5	-52.56	Peak	-20 dBc	Pass

Restricted Band Edge Test Procedure

The EUT was tested in a semi-anechoic test chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Restricted Band Edges. The EUT was tested in 3 orthogonal axis by rotating it 360° with the antenna in both the vertical and horizontal orientation and was raised from 1 to 4 meters to ensure the TX signal levels were maximized.

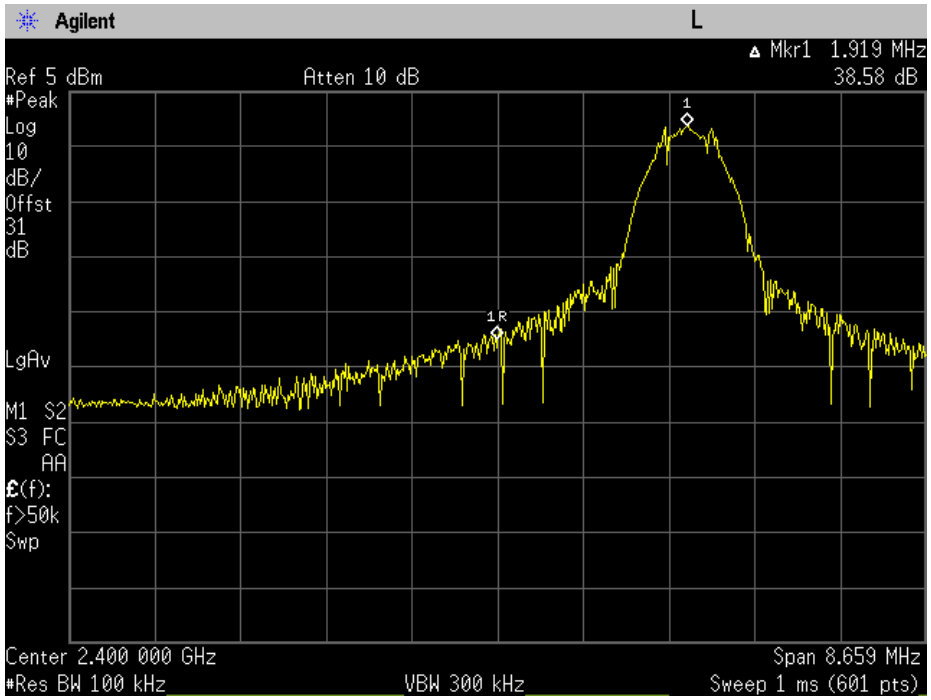
Test Setup



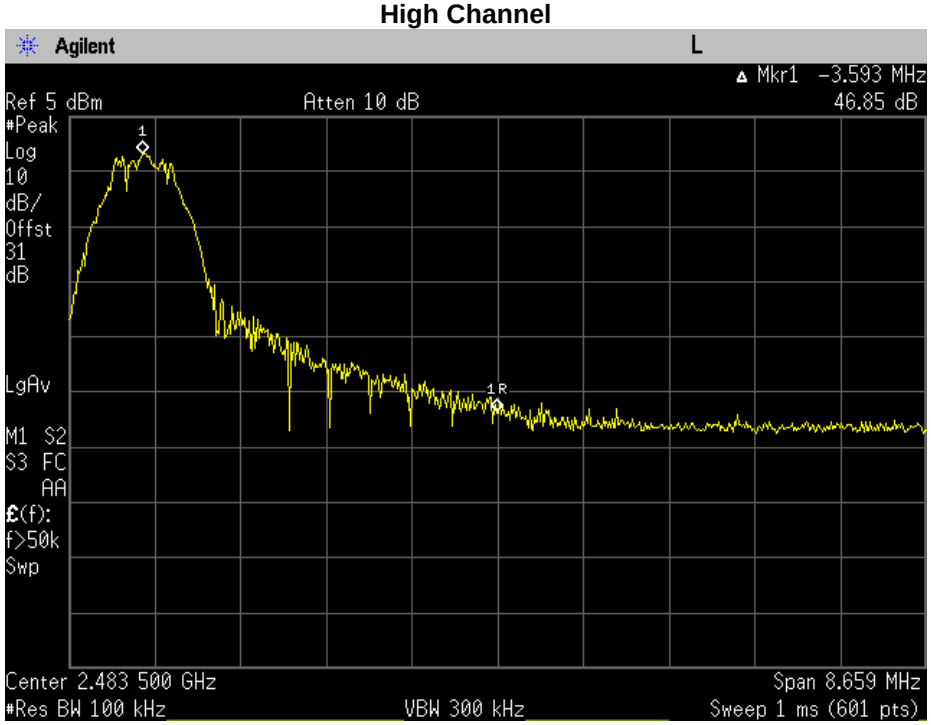
See Annex A for Test Data

Band Edge Plots 0 dBm

Low Channel

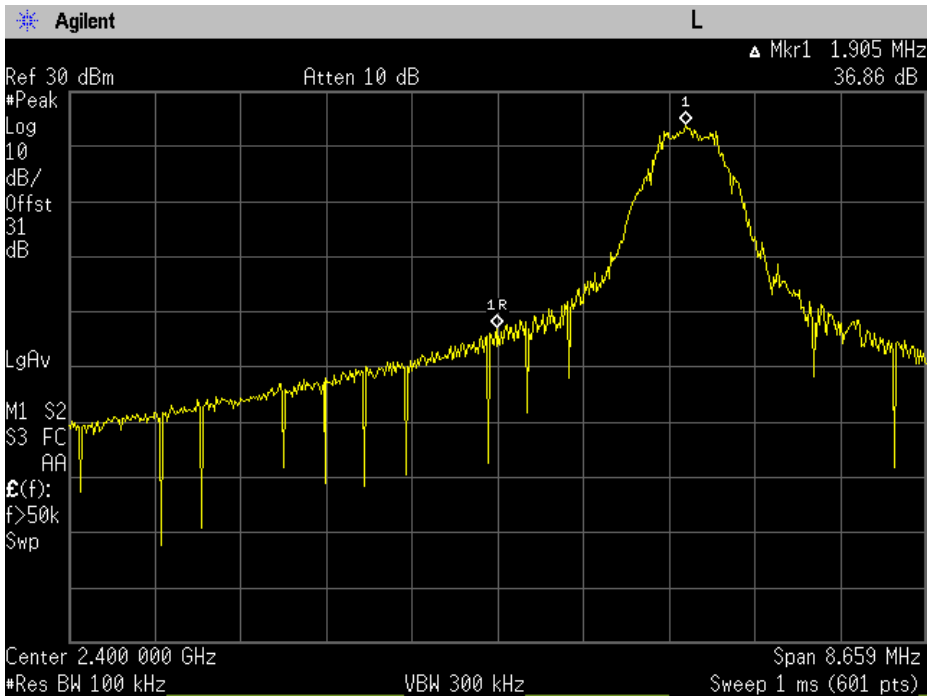


High Channel

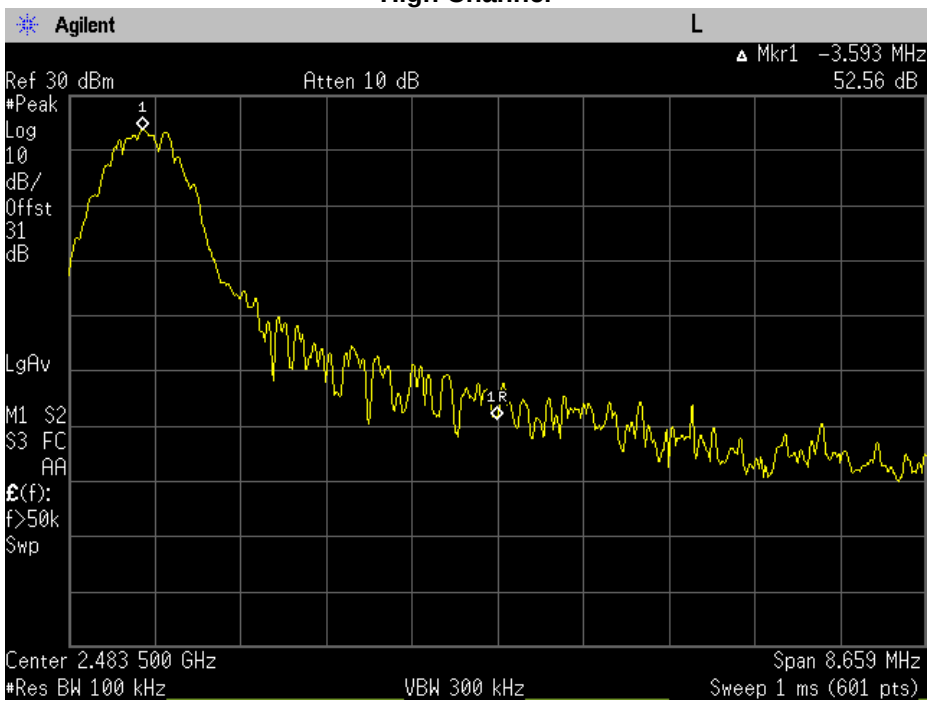


Band Edge Plots 25 dBm

Low Channel



High Channel



DTS Bandwidth
Engineer: Kenneth Lee
Test Date: 1/16/2018

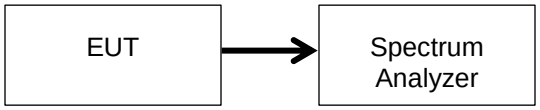
Test Procedure

The EUT was connected directly to a spectrum analyzer. The Spectrum Analyzer was set to the following:

RBW = 100 kHz
VBW ≥ 3 x RBW
Peak Detector
Trace mode = max hold
Sweep = auto couple
Span = 1.5 x EBW

The EUT was set to transmit at the lowest, middle and highest channels of the band at the maximum power levels. The maximum width of the emission that was determined by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that were attenuated by 6db and this value was used to determine the width of the carrier. Alternatively the spectrum analyzer's automatic bandwidth capability was used.

Test Setup



6 dB Occupied Bandwidth Summary 0 dBm

Frequency (MHz)	Measured Bandwidth (kHz)	Specification Limit (kHz)	Result
2402	665.64	≥ 500	Pass
2426	680.536	≥ 500	Pass
2480	681.663	≥ 500	Pass

99% Bandwidth Summary 0 dBm

Frequency (MHz)	Measured Bandwidth (kHz)	Result
2402	1096.8	Pass
2426	1091.4	Pass
2480	1096.7	Pass

6 dB Occupied Bandwidth Summary 25 dBm

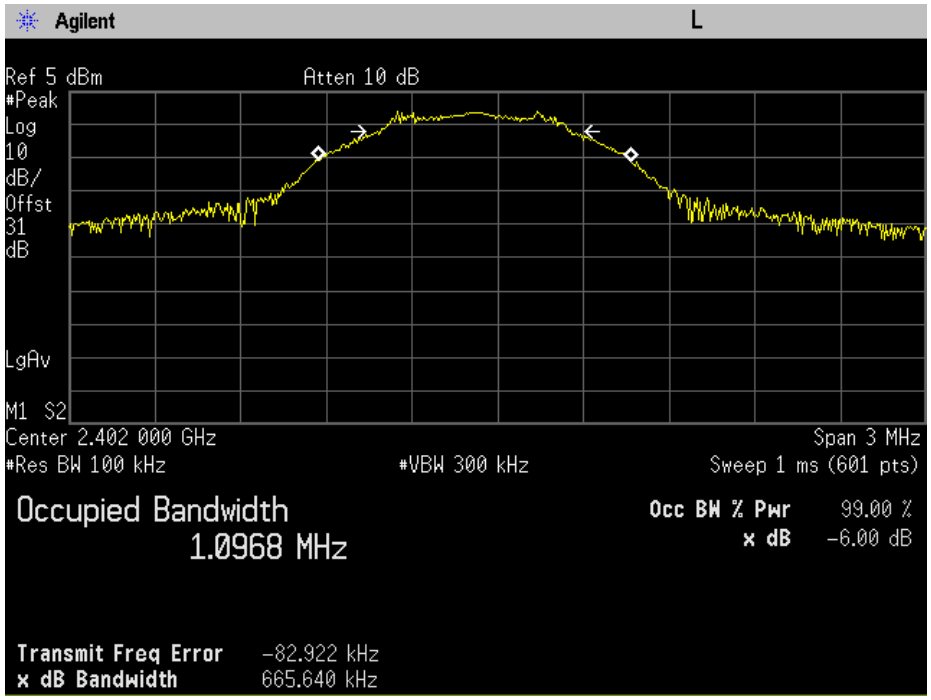
Frequency (MHz)	Measured Bandwidth (kHz)	Specification Limit (kHz)	Result
2402	718.953	≥ 500	Pass
2426	713.654	≥ 500	Pass
2480	725.523	≥ 500	Pass

99% Bandwidth Summary 25 dBm

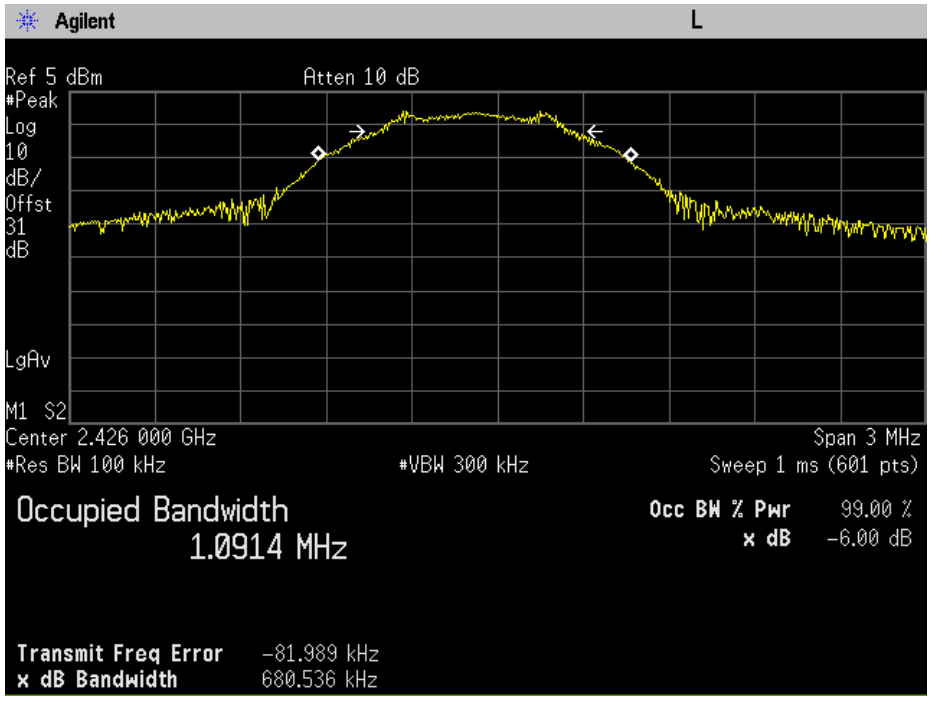
Frequency (MHz)	Measured Bandwidth (kHz)	Result
2402	1117.6	Pass
2426	1115.7	Pass
2480	1124.4	Pass

6 dB and 99% Bandwidth Plots 0 dBm

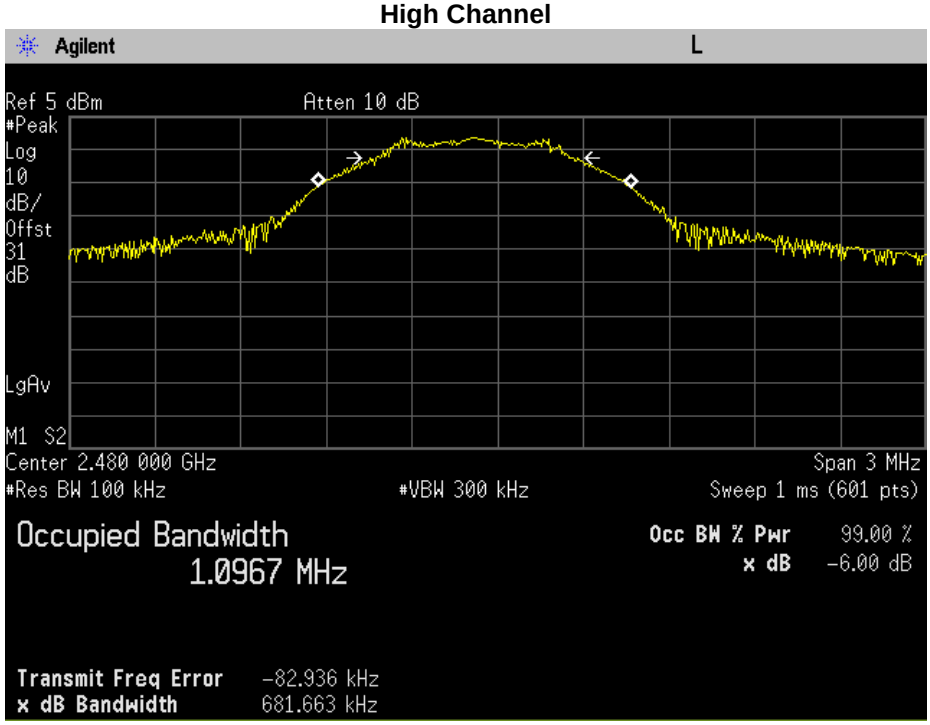
Low Channel



Mid Channel

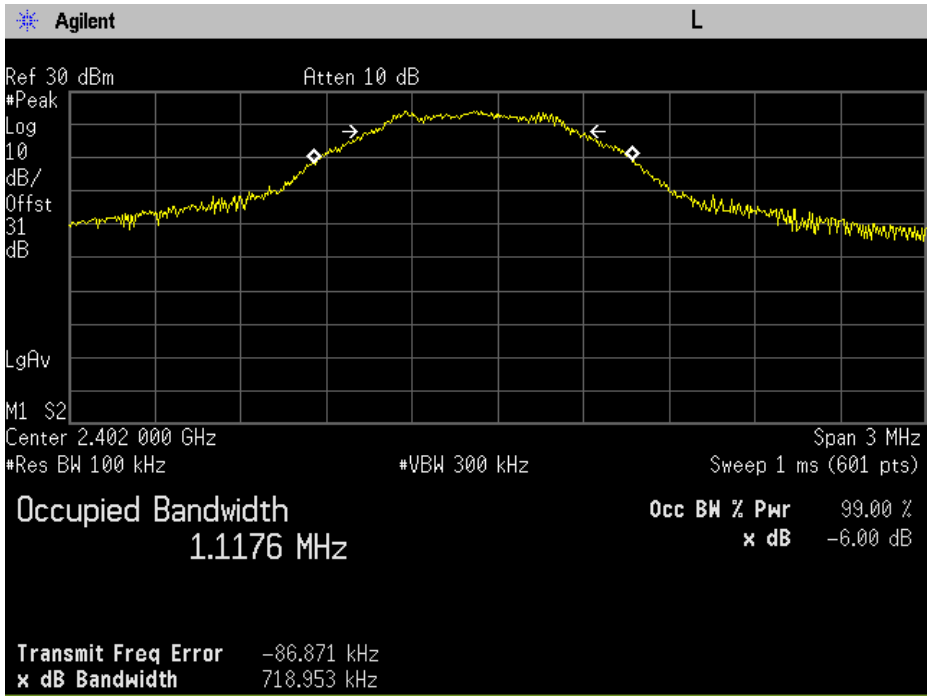


High Channel

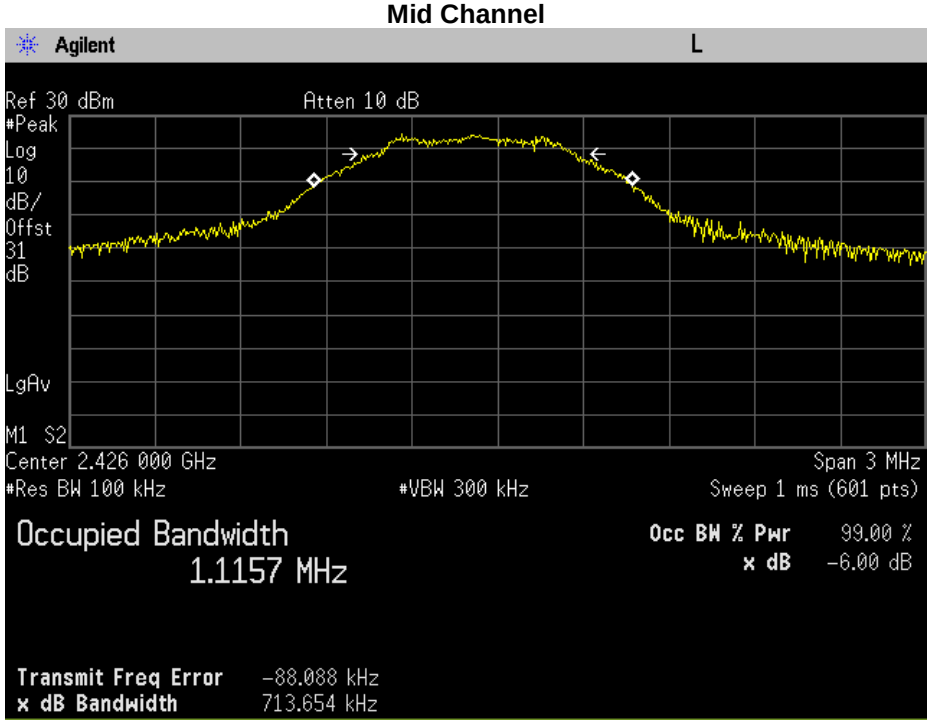


6 dB and 99% Bandwidth Plots 25 dBm

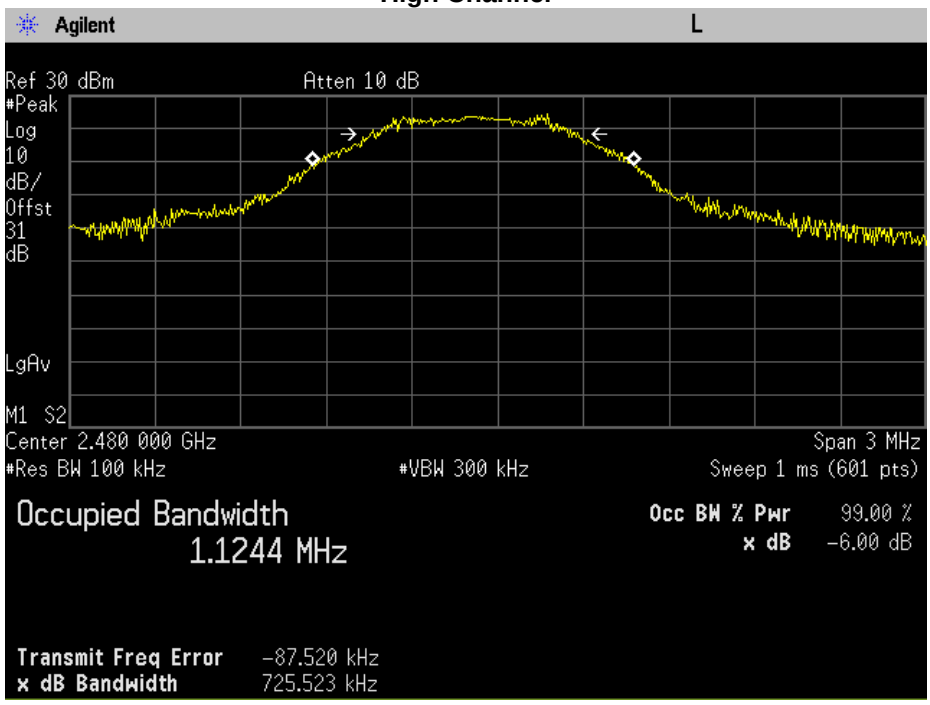
Low Channel



Mid Channel



High Channel



Transmitter Power Spectral Density (PSD)
Engineer: Kenneth Lee
Test Date: 1/16/2018

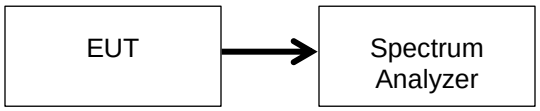
Test Procedure

The EUT was connected directly to a spectrum analyzer. The Spectrum Analyzer was set to the following:

DTS channel center frequency
Span 1.5 x DTS bandwidth
RBW =3 kHz ≤ RBW ≤ 100 kHz
VBW ≥ 3 x RBW
Peak Detector
Sweep time = auto couple
Trace mode = max hold

Once the trace has stabilized the peak marker was used to determine the power spectral density.

Test Setup



PSD Summary

0 dBm

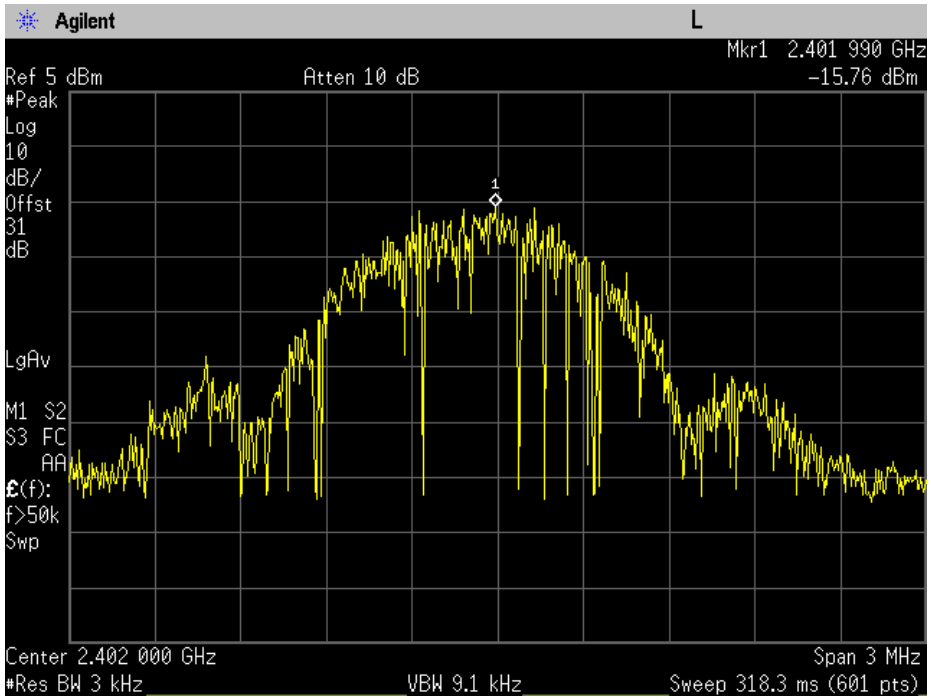
Frequency (MHz)	Measured Data (dBm)	Specification Limit (dBm)	Result
2402	-15.76	8	Pass
2426	-16.01	8	Pass
2480	-17.18	8	Pass

25 dBm

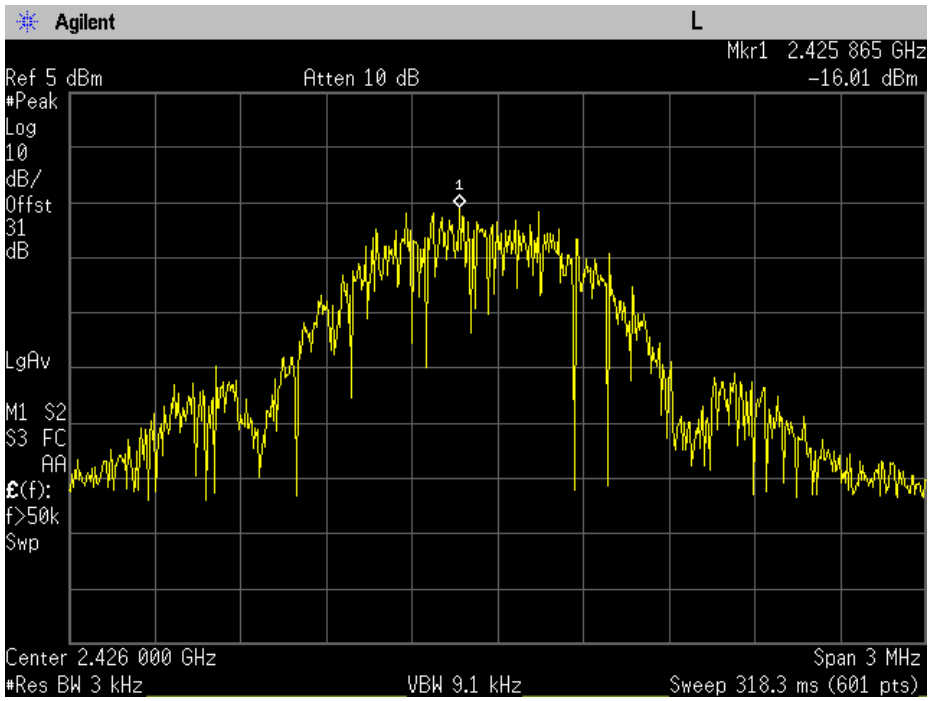
Frequency (MHz)	Measured Data (dBm)	Specification Limit (dBm)	Result
2402	7.48	8	Pass
2426	6.95	8	Pass
2480	6.98	8	Pass

PSD Plots 0 dBm

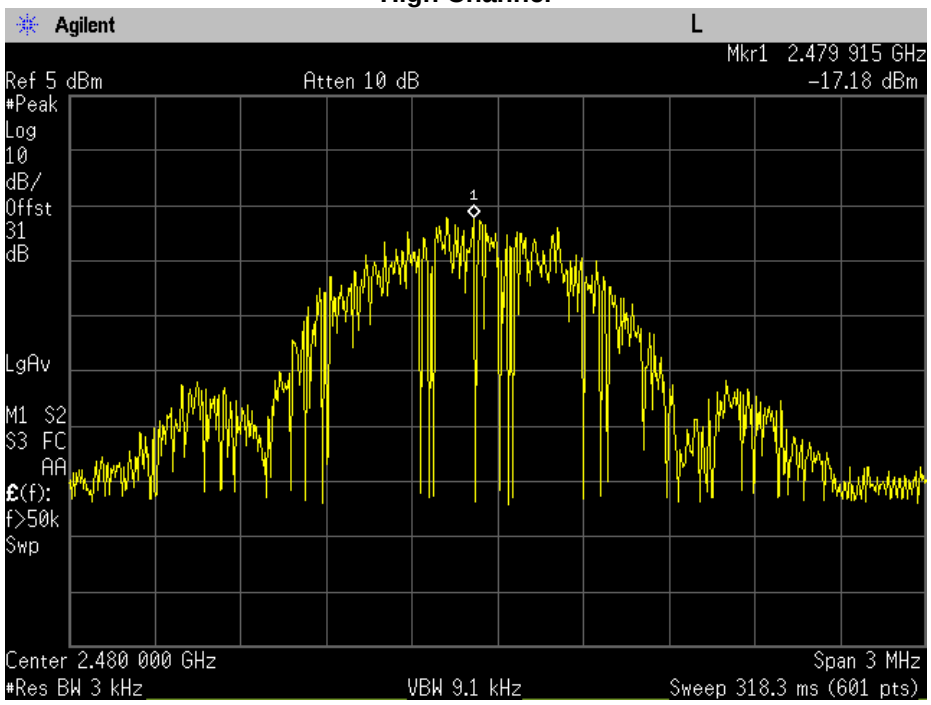
Low Channel



Mid Channel

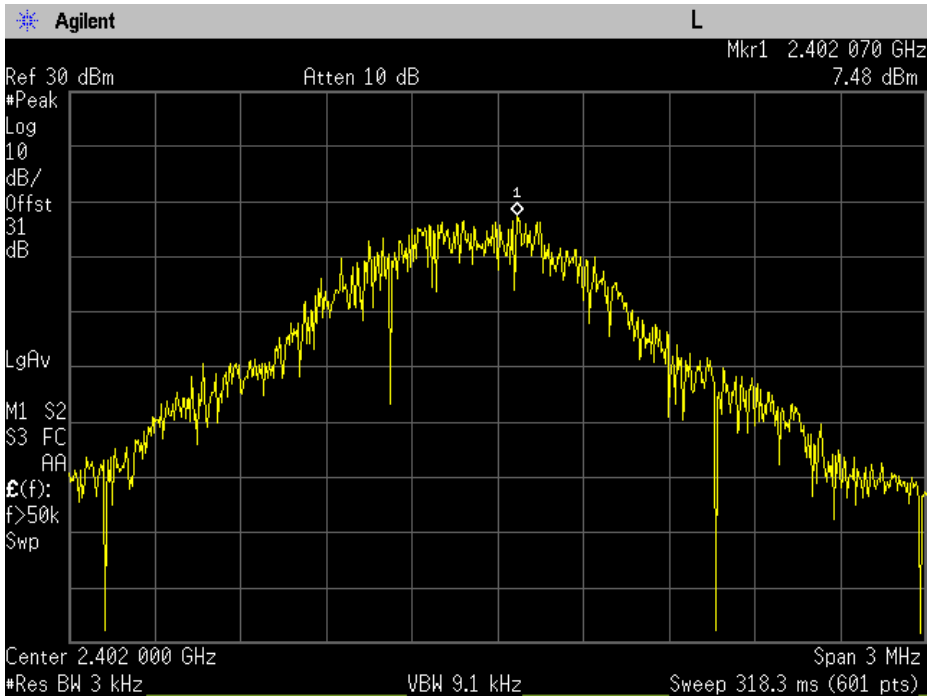


High Channel

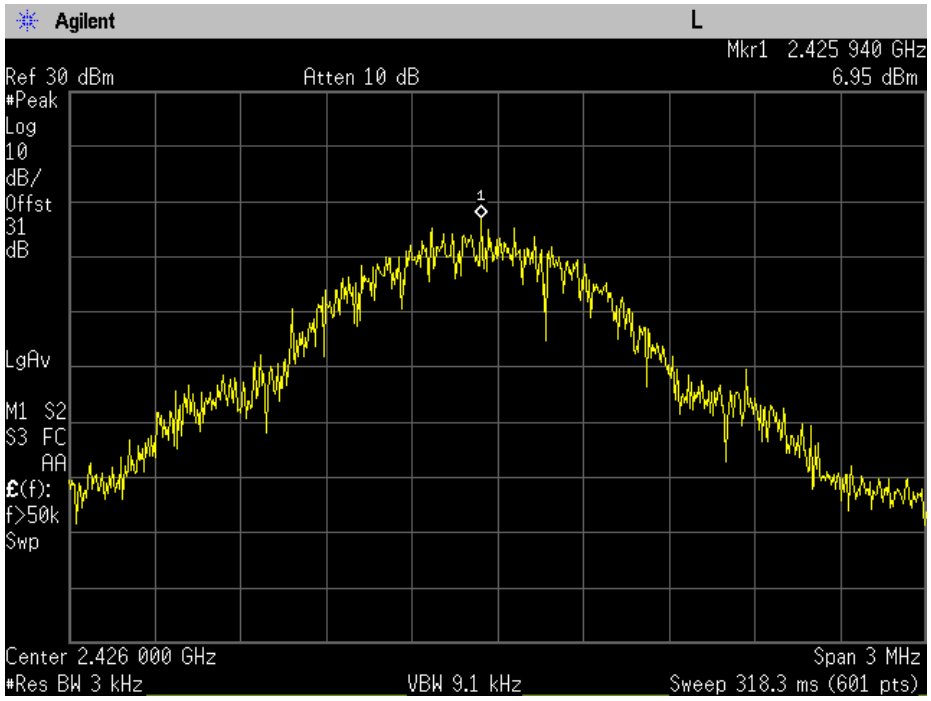


PSD Plots 25 dBm

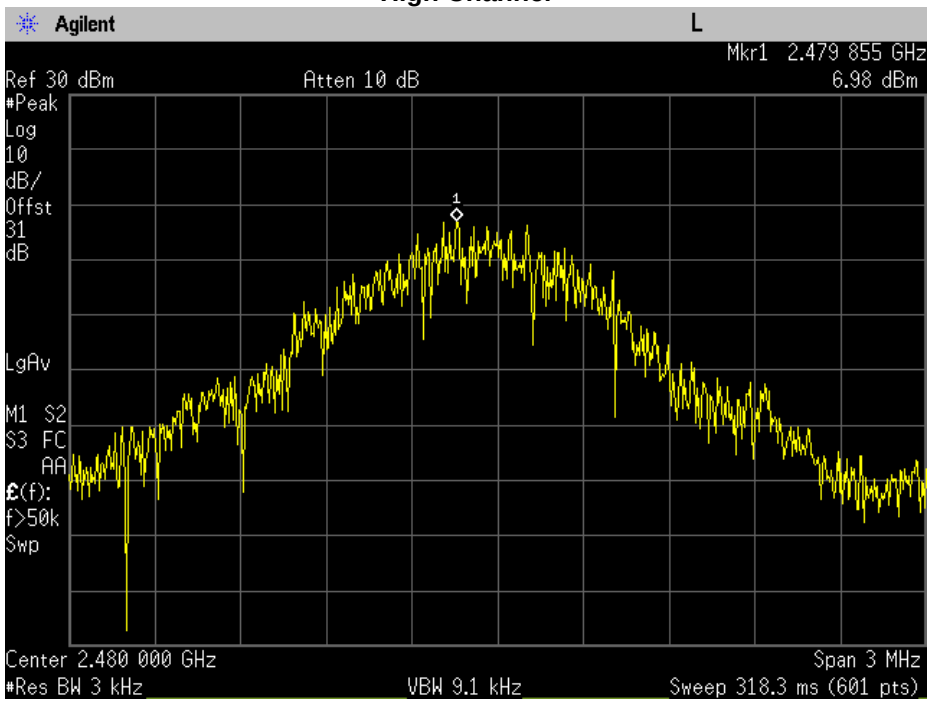
Low Channel



Mid Channel



High Channel



A/C Powerline Conducted Emission

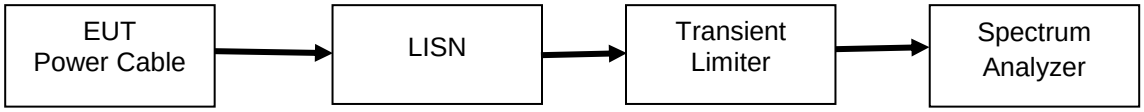
Engineer: Kenneth Lee

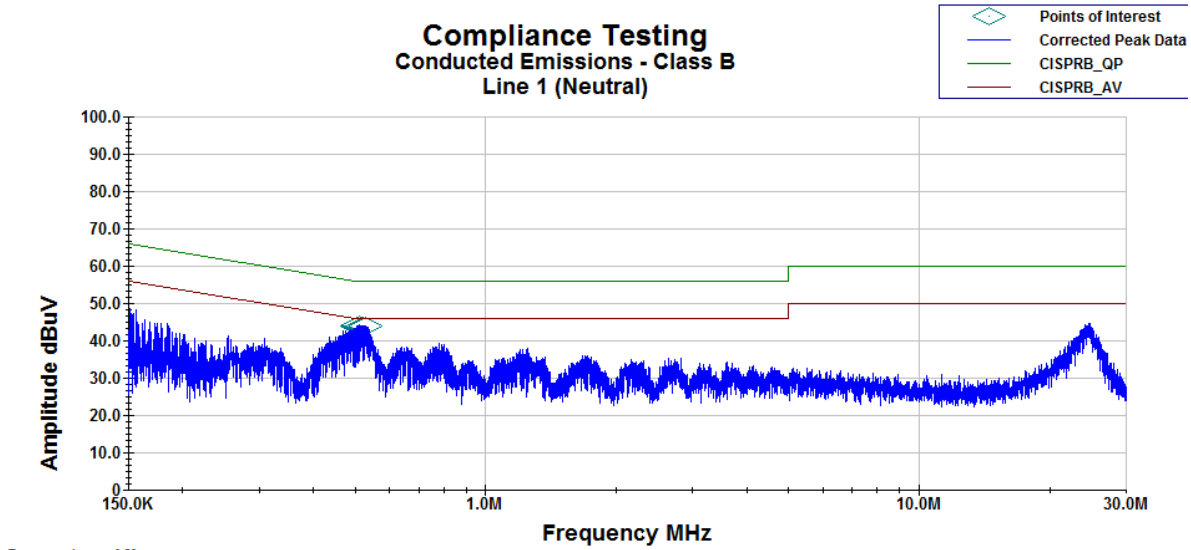
Test Date: 1/16/2018

Test Procedure

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

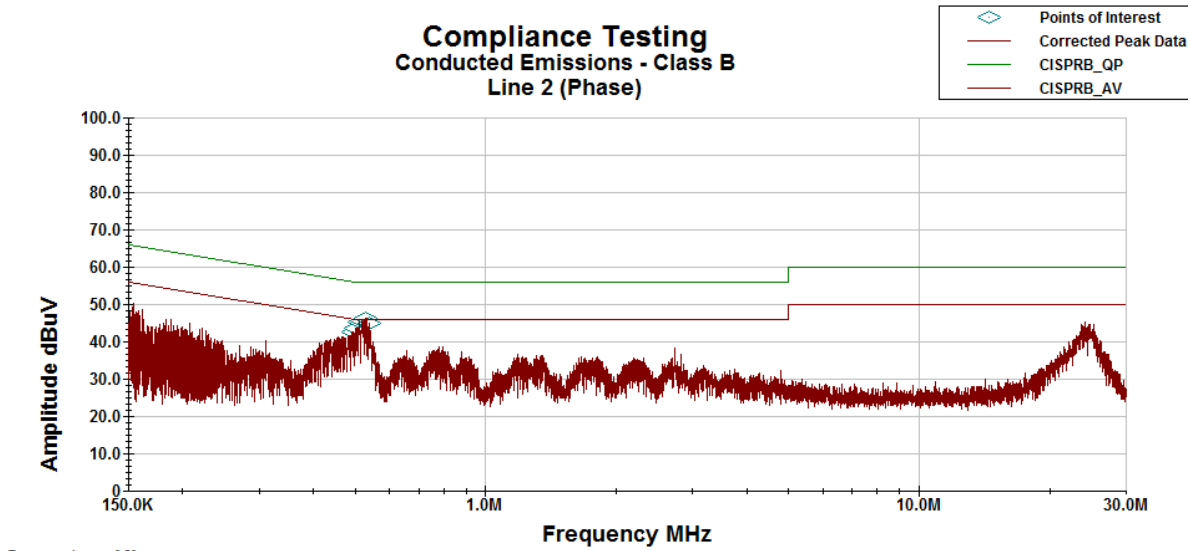
Test Setup





Operator: KL

Conducted Emissions.til **Job #: p1810006**



Operator: KL

Conducted Emissions.til **Job #: p1810006**

Line 1 Neutral Avg Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	Avg Margin (dB)
514.3 KHz	9.71	0.1	0.03	10.1	19.937	46	-26.063
516.3 KHz	9.77	0.1	0.03	10.1	19.997	46	-26.003
520.25 KHz	9.85	0.1	0.03	10.1	20.08	46	-25.92
520.36 KHz	10.11	0.1	0.03	10.1	20.337	46	-25.663
520.58 KHz	10.07	0.1	0.03	10.1	20.297	46	-25.703
521.7 KHz	10.14	0.1	0.03	10.1	20.37	46	-25.63

Line 2 Phase Avg Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	Avg Margin (dB)
512.13 KHz	11.27	0.1	0.03	10.1	21.497	46	-24.503
514.45 KHz	11.07	0.1	0.03	10.1	21.3	46	-24.7
518.15 KHz	11	0.1	0.03	10.1	21.233	46	-24.767
524.3 KHz	12.28	0.1	0.03	10.1	22.507	46	-23.493
524.99 KHz	12.53	0.1	0.03	10.1	22.763	46	-23.237
521.26 KHz	11.66	0.1	0.03	10.1	21.887	46	-24.113

Line 1 Neutral QP Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	QP Margin (dB)
514.3 KHz	29.33	0.1	0.03	10.1	39.56	56	-16.44
516.3 KHz	29.1	0.1	0.03	10.1	39.33	56	-16.67
520.25 KHz	29.3	0.1	0.03	10.1	39.53	56	-16.47
520.36 KHz	29.27	0.1	0.03	10.1	39.5	56	-16.5
520.58 KHz	29.3	0.1	0.03	10.1	39.53	56	-16.47
521.7 KHz	29.41	0.1	0.03	10.1	39.64	56	-16.36

Line 2 Phase QP Detector

Frequency	Measured Value (dBuV)	LISN Correction Factor (dB)	Cable Loss (dB)	Transient Limiter (dB)	Final Data (dBuV)	Limit (dBuV)	QP Margin (dB)
512.13 KHz	30.91	0.1	0.03	10.1	41.14	56	-14.86
514.45 KHz	30.84	0.1	0.03	10.1	41.07	56	-14.93
518.15 KHz	31.04	0.1	0.03	10.1	41.27	56	-14.73
524.3 KHz	31.81	0.1	0.03	10.1	42.04	56	-13.96
524.99 KHz	31.8	0.1	0.03	10.1	42.03	56	-13.97
521.26 KHz	31.38	0.1	0.03	10.1	41.61	56	-14.39

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
EMI Receiver	HP	8546A	i00033	3/28/17	3/28/18
Transient Limiter	Com-Power	LIT-153	i00123	Verified on: 1/16/2018	
Horn Antenna	ARA	DRG-118/A	i00271	6/16/16	6/16/18
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	6/9/17	6/9/18
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	8/3/16	8/3/18
AC Power Source	Behlman	BL 6000	i00362	Verified on: 1/16/2018	
EMI Analyzer	Agilent	E7405A	i00379	2/22/17	2/22/18
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	8/15/16	8/15/19
LISN	COM-Power	LI-125A	i00447	9/11/17	9/11/19
LISN	COM-Power	LI-125A	i00449	9/11/17	9/11/19
Preamplifier for 1-18GHz horn antenna	Miteq	AFS44 00101 400 23-10P-44	i00509	N/A	N/A

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

END OF TEST REPORT