



FCC / IC Test Report

For

SIX COMBO

Accolade #: 34449-A

FCC ID: CFS8DLCOMR6

IC ID: 573F-COMR6

Report Completion Date: 2017-08-22

Prepared by and for:
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NVLAP Lab Code: 600110-0

Document Introduction

Honeywell tested the above equipment in accordance with the requirements set forth in the listed standards. All indications of Pass/Fail in the report are opinions expressed by Honeywell based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

This document is a record of the FCC/IC Test Report for Honeywell products. It demonstrates the data required to be analyzed to certify a product according to the requirements of the FCC & IC.

The results in the report reflect only the model of the items under test unless noted otherwise. This document may not be altered or revised in any way unless done so by Honeywell and all revisions are duly noted in the revisions section. Any alterations of this document not carried out by Honeywell will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Test Report Revision History				
Revision	Prepared By	Reviewed By	Revision Detail	Release Date
---	M. Antola	A. Roussin	Original Release	2017-07-14
A	M. Antola	A. Roussin	Updated 6dB Bandwidth section	2018-08-22

Report Authorization

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Applicable Test Standards

Test Standard	Result	Dates Tested
ANSI C63.10: 2013	Compliant	5/4/17 – 5/5/17
RSS-247, Issue 2	Compliant	5/4/17 – 5/5/17
RSS-GEN, Issue 4	Compliant	5/4/17 – 5/5/17
CFR 47 Part 15 Subpart C, Section 15.247	Compliant	5/4/17 – 5/5/17

Deviations from Test Methods

#	Deviation Description
1	None

Facilities and Accreditation

The test site and measurement facility used to collect data are located at 2 Corporate Center Dr., Melville, NY 11747, USA. Honeywell International is accredited by NVLAP, Laboratory Code 600110-0. The full scope of accreditation can be viewed at the NVLAP website.

Test Item Description

The EUT is a Wireless Smoke and CO Detector, which contains an RF6 radio. RF6 uses 802.15.4-compliant message protocol which is similar to Zigbee on the physical level, O-QPSK modulation. It contains two (2) inverted F-type antennas, printed on the PCB, each of which have a gain of -1.5dBi. The EUT is powered from four (4) 3V Lithium CR123A cell batteries. The device has a duty cycle of 6.96%.

IC Model (HVIN): COMR6
HW Version: 1.0
FW Version: 1.00

NOTE: Radiated emissions testing was performed at an external lab. Refer to Rhein Tech Laboratories report RTL Work Order #: 2016197

Worse-Case Configuration & Mode

The EUT was configured to transmit a continuously modulated signal at its highest power on each antenna, individually. The device is programmable to be able to transmit at its low (2405MHz), mid (2445MHz) and high (2475MHz) channels.

Test Sample Identification

Sample ID Number	Sample Serial Number	Date Received
MEL-130	Non-serialized production unit	2016-05-01

Calibration & Measurement Uncertainty

- Measuring Instrument Calibration – The measuring equipment utilized to perform the tests documented in this report have been calibrated in accordance with the manufacturer’s recommendations and is traceable to recognized national standards.
- Sample Calculation – Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

[i.e.] 37 dBuV/m = 30 dBuV + 18.5 dB/m + 0.5 dB – 12 dB

- Uncertainty - Figures are valid to a confidence level of 95%.

Test	Standard Uncertainty
Radiated Emissions (30-200MHz Horizontal)	+/- 5.05 dB
Radiated Emissions (30-200MHz Vertical)	+/- 5.28 dB
Radiated Emissions (200-1000MHz Horizontal)	+/- 10.21 dB
Radiated Emissions (200-1000MHz Vertical)	+/- 10.36 dB
Radiated Emissions (Above 1GHz)	+/- 9.70 dB
Conducted Emissions (150KHz-30MHz)	+/- 4.36 dB

Opinions / Interpretations

None

Test Summary

All tests described below are required, unless otherwise noted. Notes should be described in detail in the "Additional notes" section.

#	Test Description	Status
1	99% Bandwidth	PASS
2	6 dB Occupied Bandwidth	PASS
3	Conducted Spurious Emissions	PASS
4	Maximum Conducted Output Power (Average)	PASS
5	Maximum Power Spectral Density (Average)	PASS

6dB Occupied Bandwidth (DTS Bandwidth)

Test Description

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (a)(2) RSS-247 Section 5.2 (1)	$\geq 500\text{kHz}$

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
MA	RF Lab	2017-08-22	23	50	1005	P

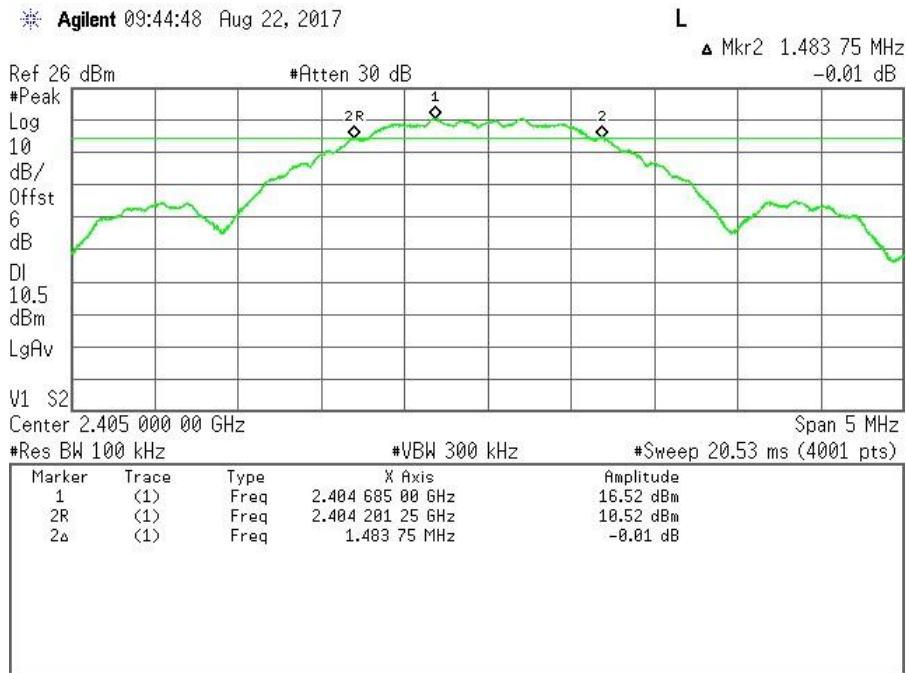
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11549	MY46187211	Agilent	E4440A	2017-06-06	2019-06-06

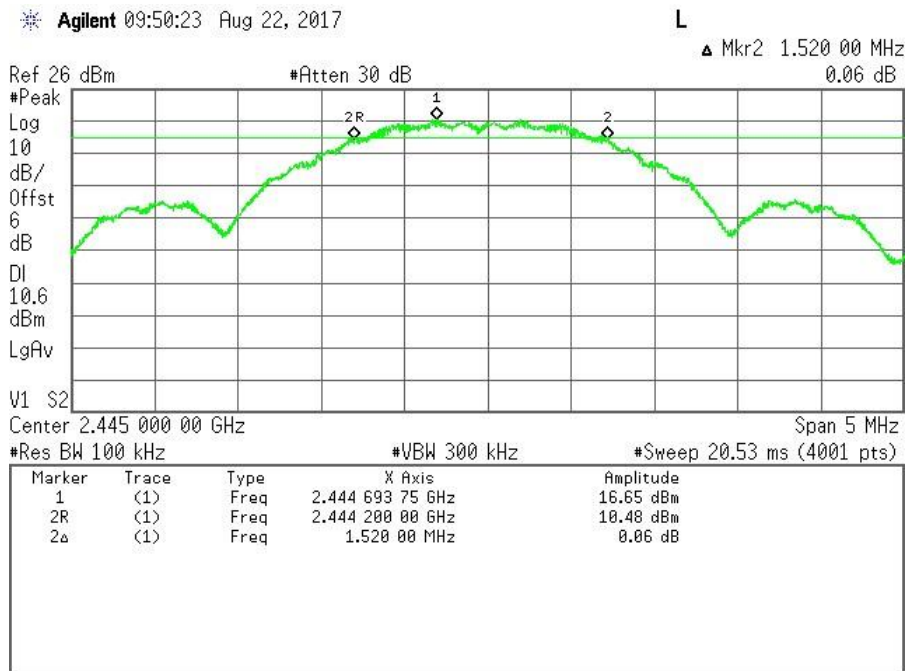
Test Results

Channel	Frequency (GHz)	6dB Bandwidth (in MHz)	
		Antenna 1	Antenna 2
Low	2.405	1.484	1.514
Mid	2.445	1.520	1.534
High	2.475	1.572	1.558

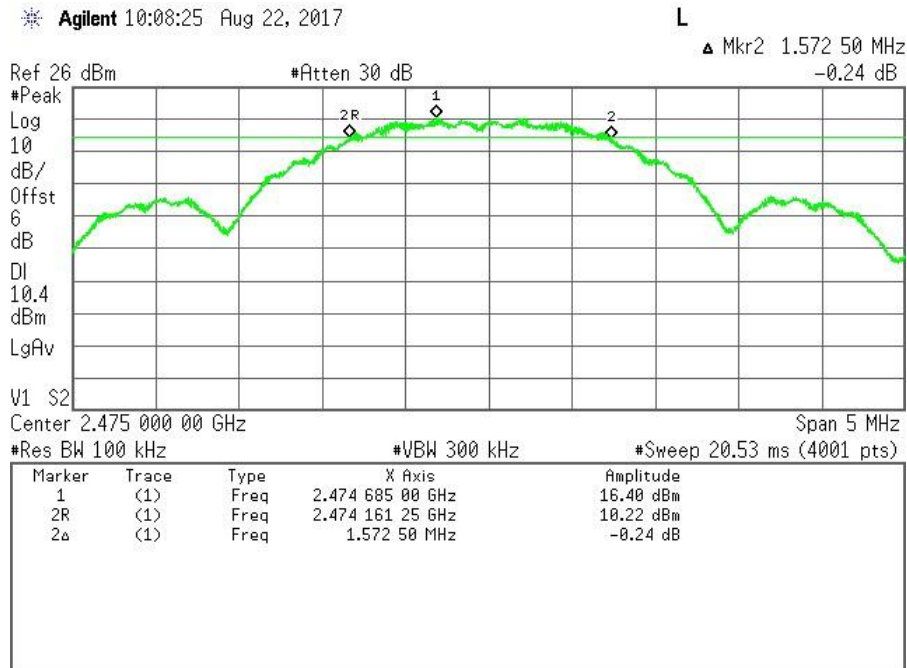
Plots



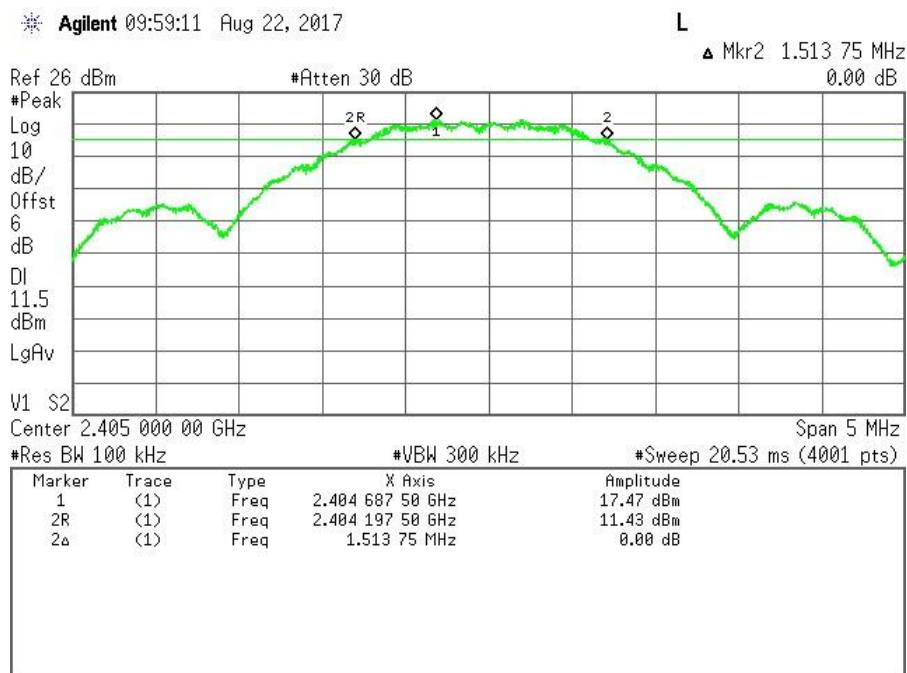
Antenna 1 – Low Channel



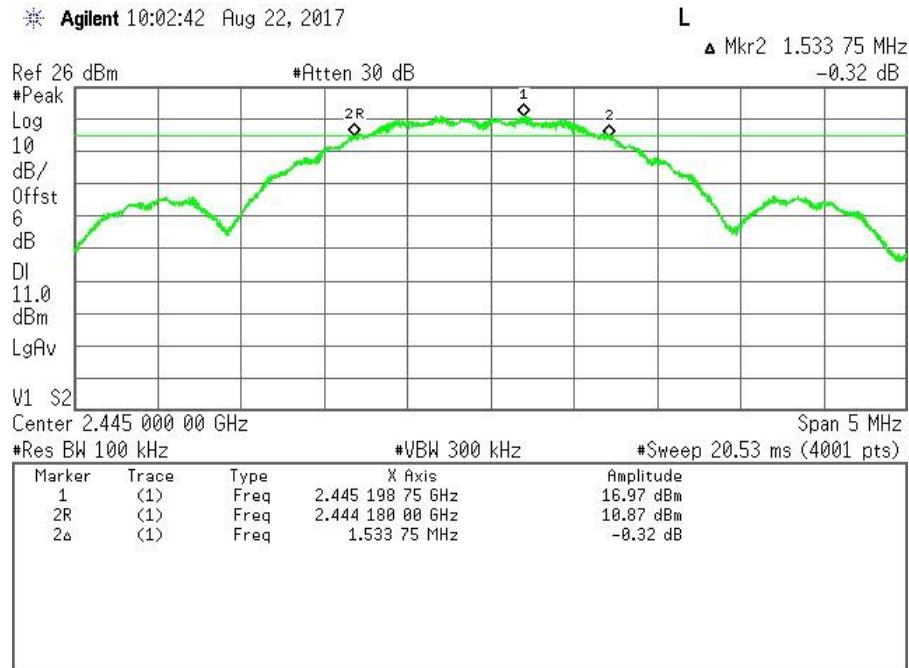
Antenna 1 – Mid Channel



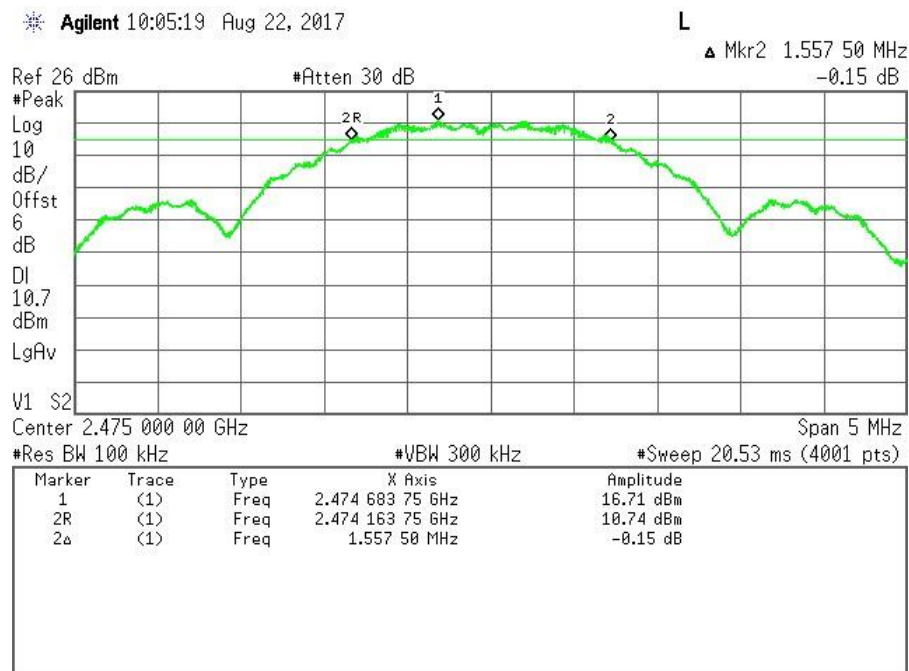
Antenna 1 – High Channel



Antenna 2 – Low Channel



Antenna 2 – Mid Channel



Antenna 2 – High Channel

99% Bandwidth

Test Description

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

Test Criteria

Reference	Limit
RSS-GEN	N/A

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
JB	RF Lab	2017-05-04	23	50	1005	P

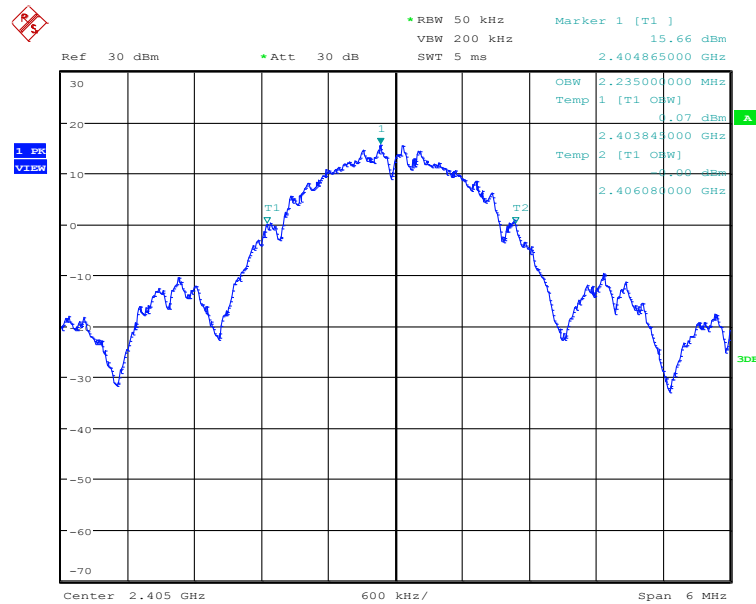
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	2016-03-31	2017-03-31

Test Results

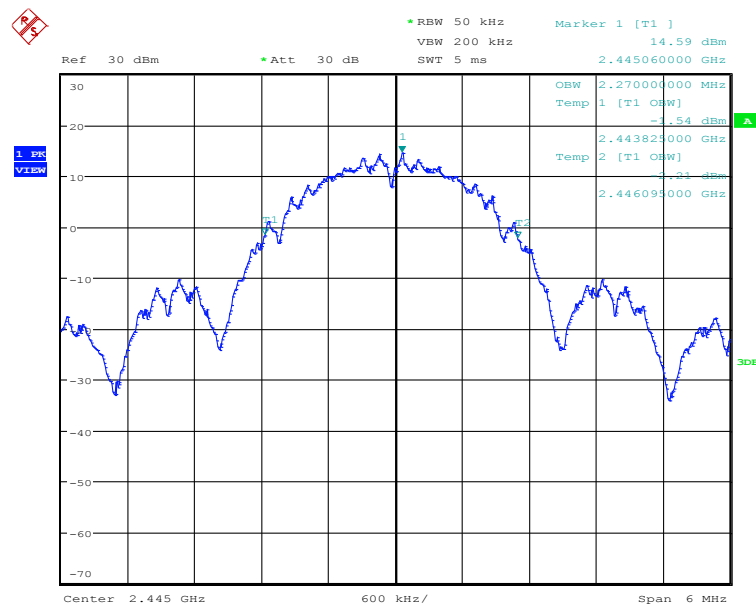
Channel	Frequency (GHz)	99% Bandwidth (in MHz)	
		Antenna 1	Antenna 2
Low	2.405	2.235	2.230
Mid	2.445	2.270	2.270
High	2.475	2.290	2.295

Plots



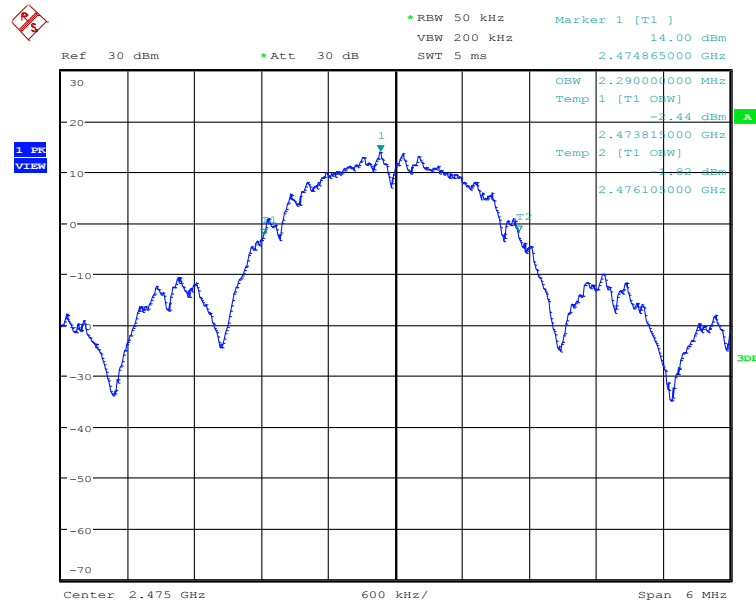
Date: 4.MAY.2016 13:45:45

Antenna 1 – Low Channel



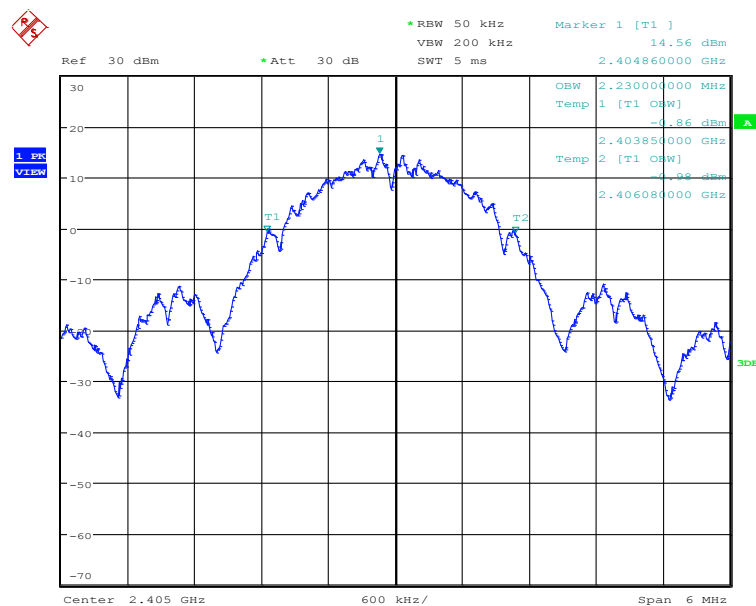
Date: 4.MAY.2016 13:46:38

Antenna 1 – Mid Channel



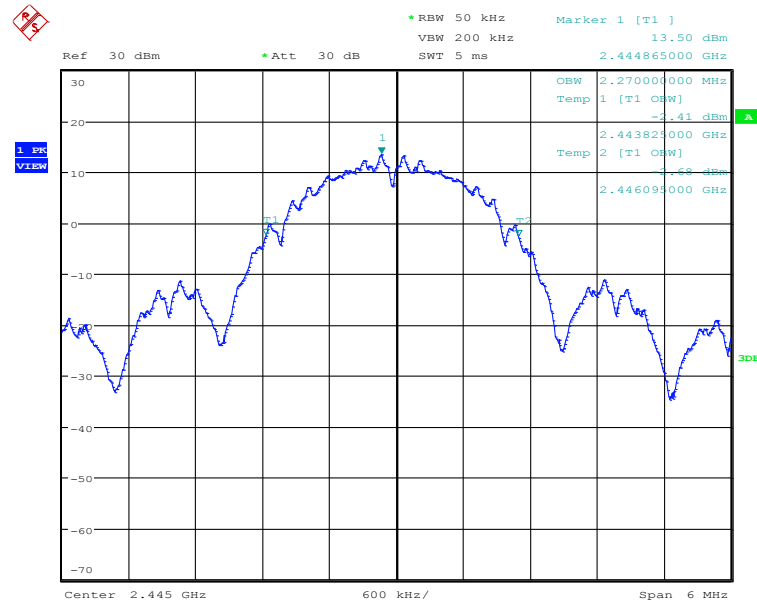
Date: 4.MAY.2016 13:47:44

Antenna 1 – High Channel



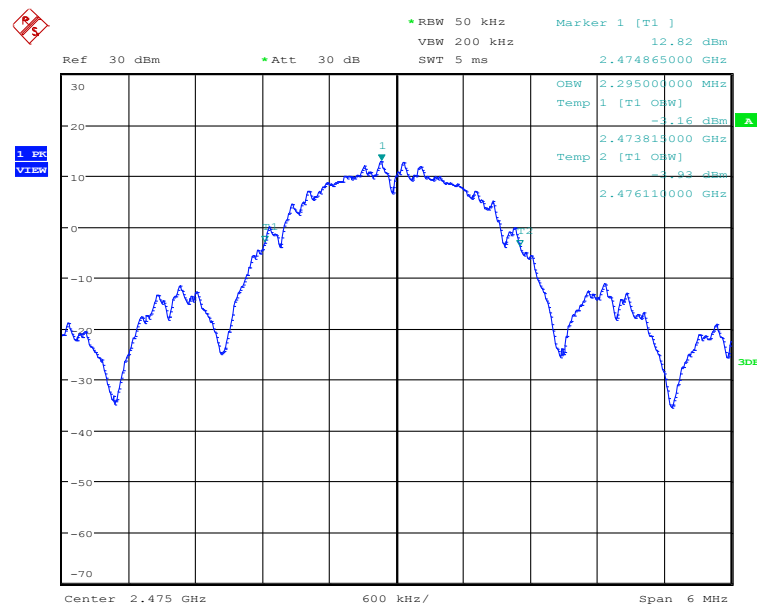
Date: 4.MAY.2016 13:49:50

Antenna 2 – Low Channel



Date: 4.MAY.2016 13:52:25

Antenna 2 – Mid Channel



Date: 4.MAY.2016 13:55:21

Antenna 2 – High Channel

Conducted Spurious Emissions (Transmit)

Test Description

Conducted spurious emissions measures all emissions from the antenna port between 30 MHz and 26GHz, while the transmitter is in transmit mode. The UUT is to be tested on all three channels on each antenna port. The fundamental and the next highest emissions need to be marked on the analyzer.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (d) RSS-247 Section 5.5	20dB Below the Fundamental

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
JB	RF Lab	2017-05-05	23	50	1005	P

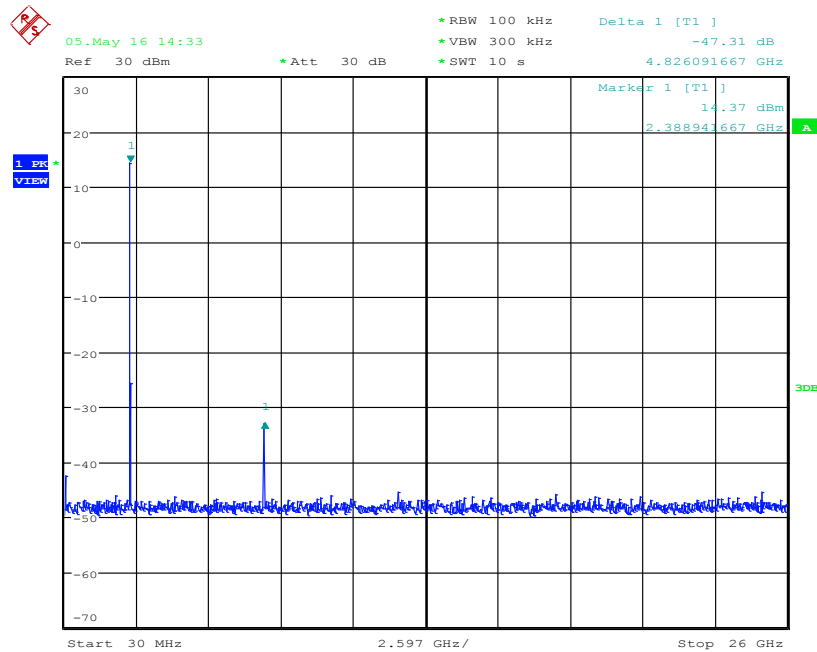
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	2016-03-31	2017-03-31

Test Results

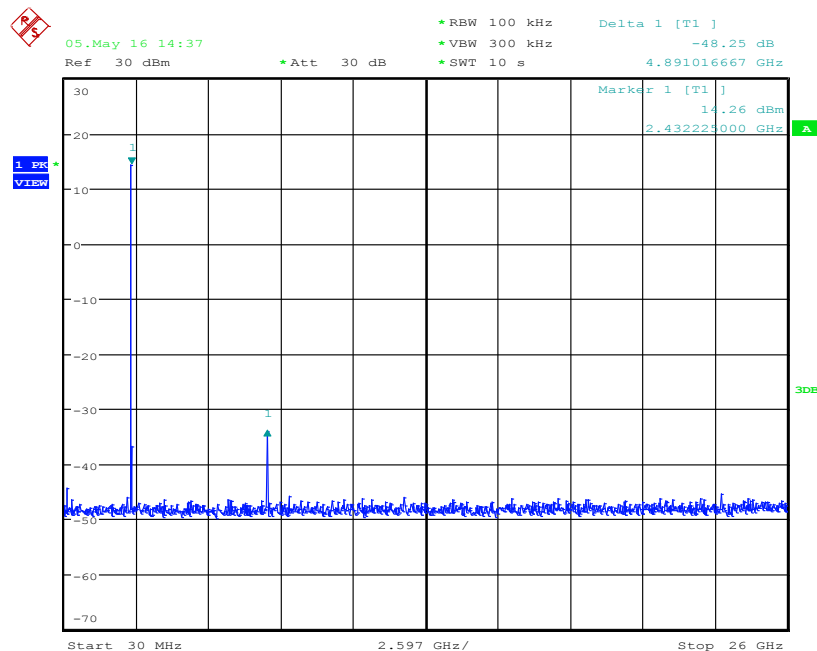
Channel	Frequency (GHz)	Highest Spurious Emission (Delta dBc)	
		Antenna 1	Antenna 2
Low	2.405	-47.31	-56.52
Mid	2.445	-48.25	-58.13
High	2.475	-49.78	-57.64

Plots



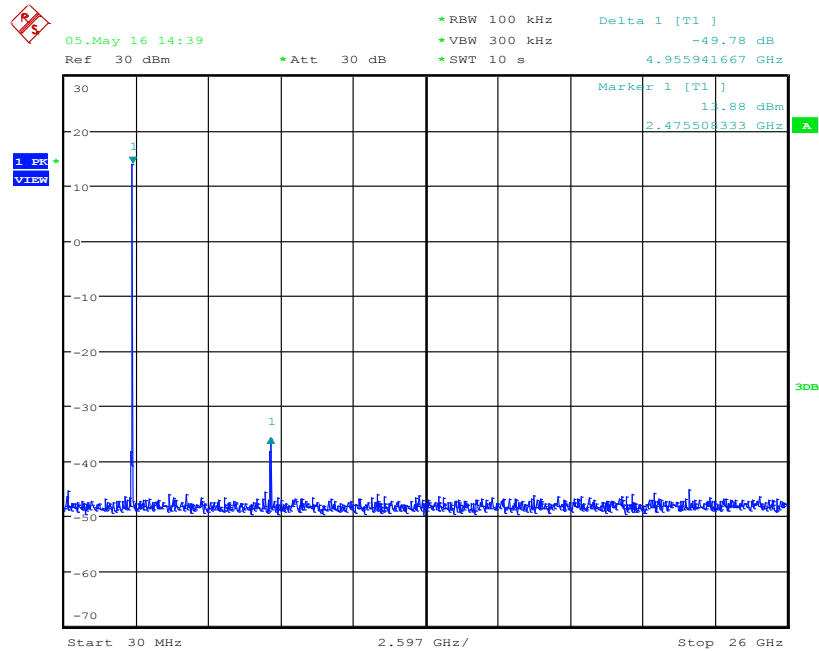
Date: 5.MAY.2016 14:33:37

Antenna 1 – Low Channel



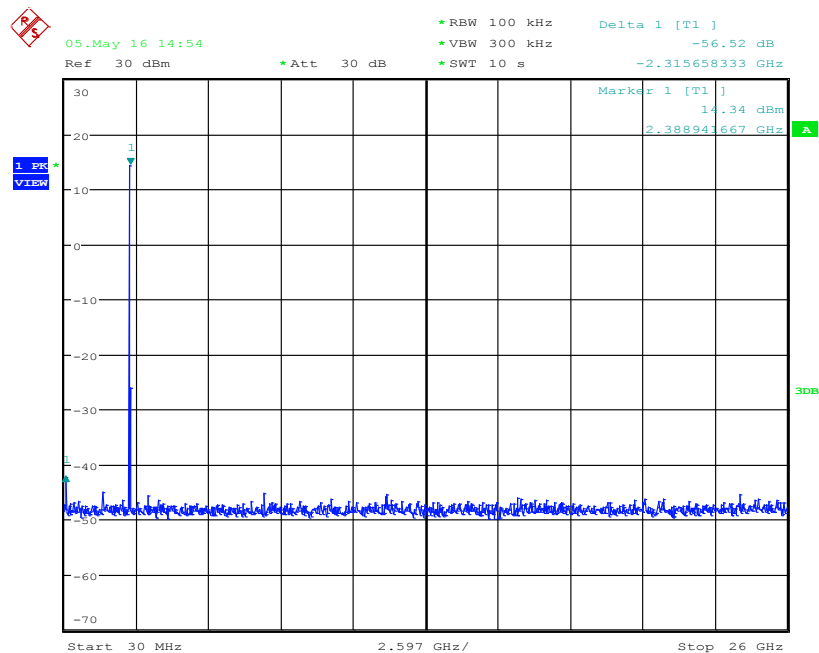
Date: 5.MAY.2016 14:37:29

Antenna 1 – Mid Channel



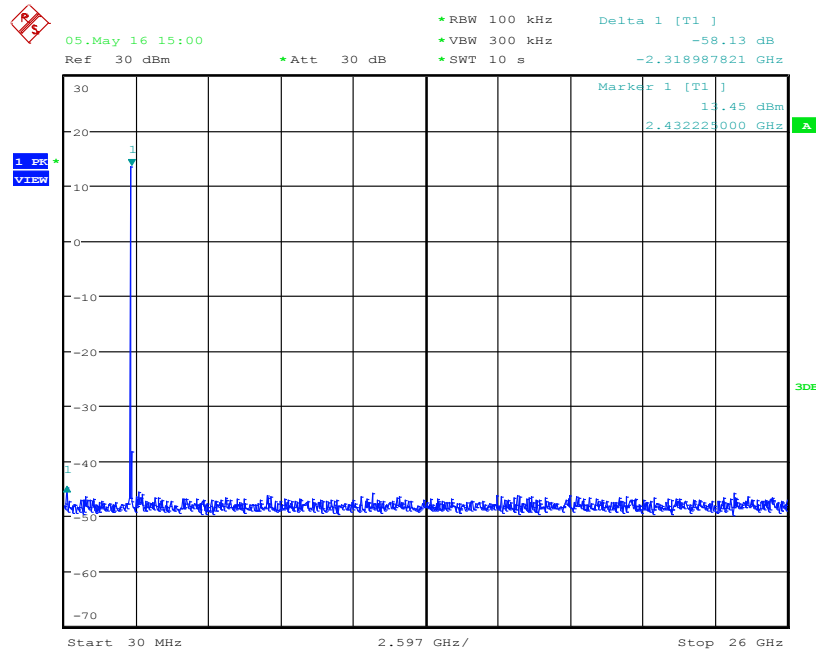
Date: 5.MAY.2016 14:39:53

Antenna 1 – High Channel



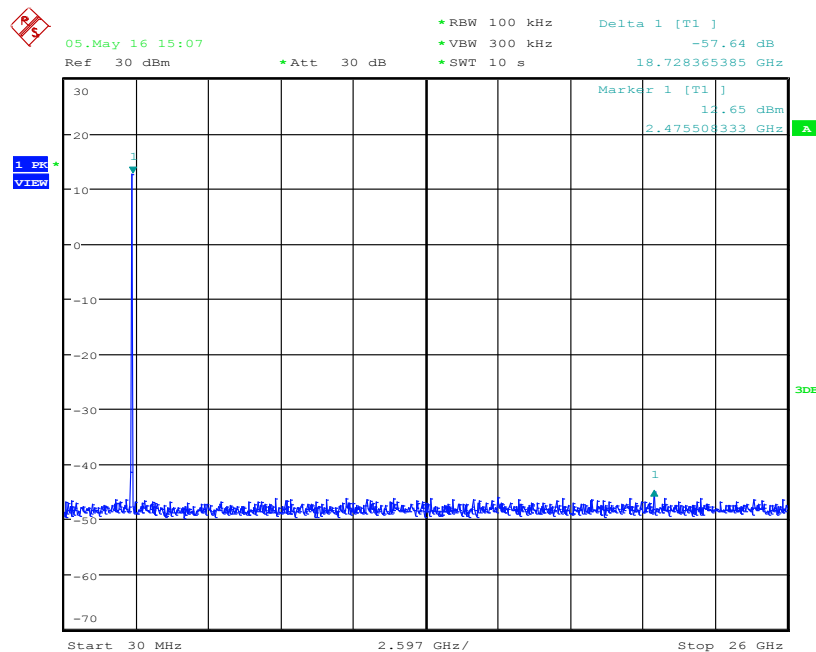
Date: 5.MAY.2016 14:54:19

Antenna 2 – Low Channel



Date: 5.MAY.2016 15:00:52

Antenna 2 – Mid Channel



Date: 5.MAY.2016 15:07:51

Antenna 2 – High Channel

Maximum Conducted Output Power (Average)

Test Description

Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum. Method AVGSA-1 per C63.10 and KDB 558074 was utilized for this test program.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (b)(3) RSS-247 Section 5.4 (4)	1W (30dBm)

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
JB	RF Lab	2017-05-05	23	50	1005	P

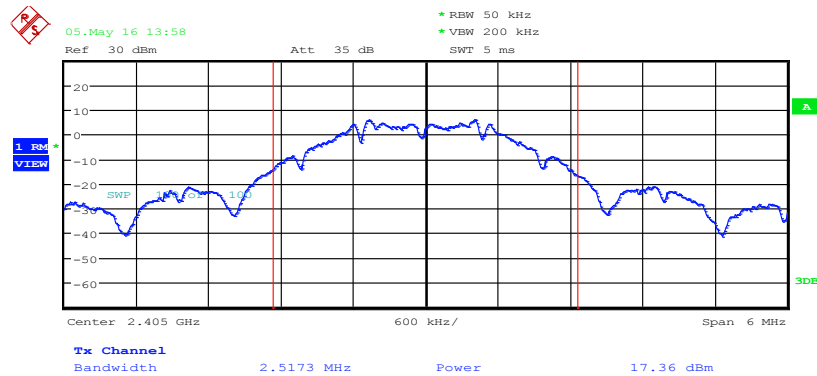
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	2016-03-31	2017-03-31

Test Results

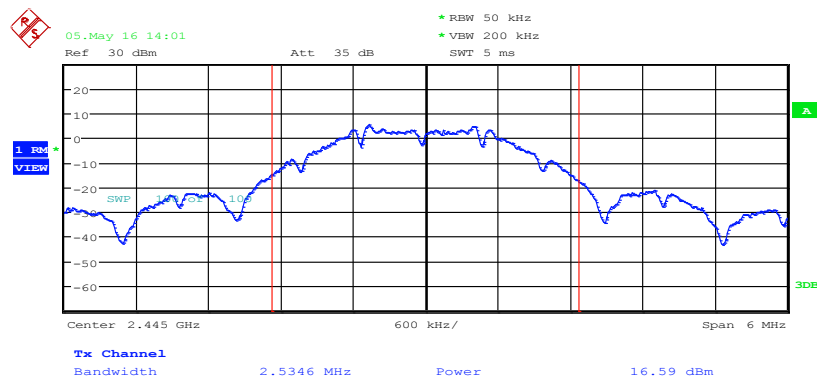
Channel	Frequency (GHz)	Tx Channel BW Power (dBm)	
		Antenna 1	Antenna 2
Low	2.405	17.36	16.89
Mid	2.445	16.59	16.33
High	2.475	16.38	15.94

Plots



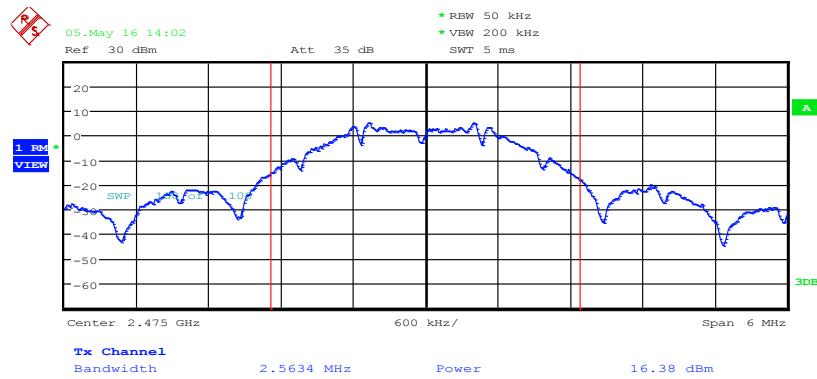
Date: 5.MAY.2016 13:58:47

Antenna 1 – Low Channel



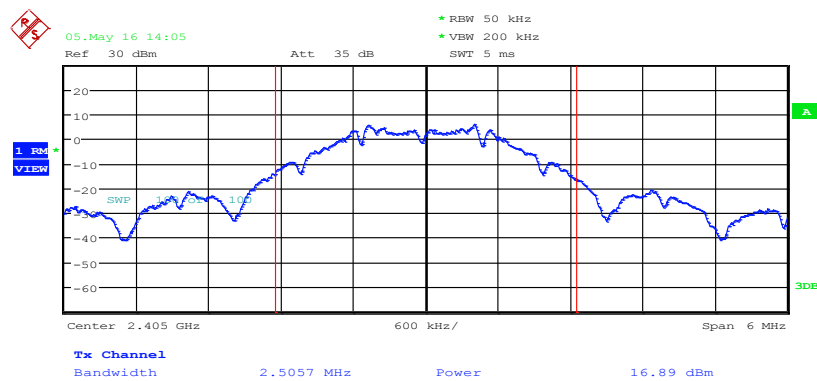
Date: 5.MAY.2016 14:01:24

Antenna 1 – Mid Channel



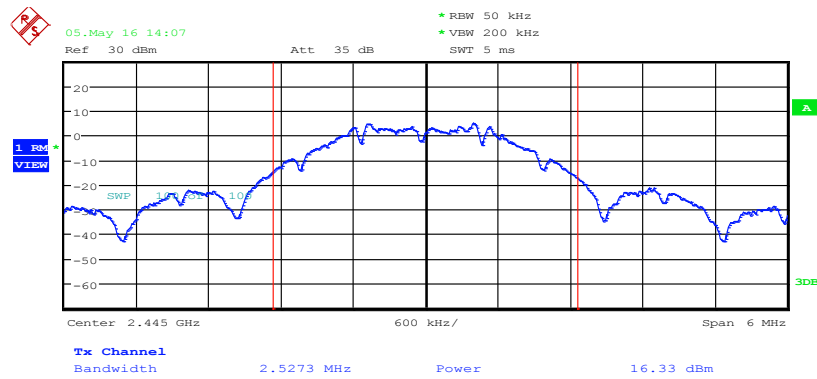
Date: 5.MAY.2016 14:02:59

Antenna 1 – High Channel



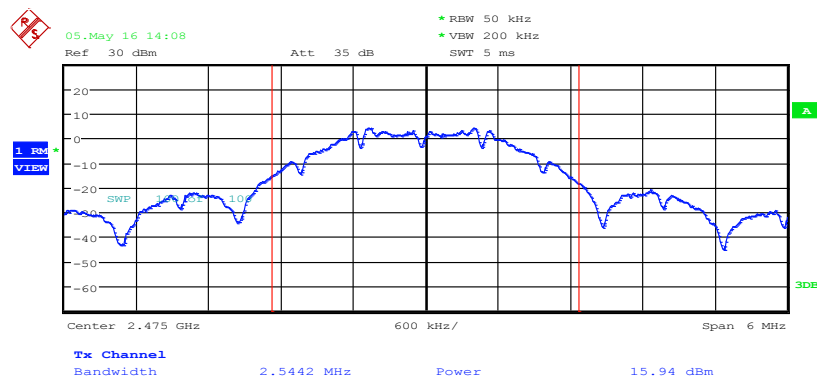
Date: 5.MAY.2016 14:05:40

Antenna 2 – Low Channel



Date: 5.MAY.2016 14:07:24

Antenna 2 – Mid Channel



Date: 5.MAY.2016 14:08:55

Antenna 2 – High Channel

Maximum Power Spectral Density (Average)

Test Description

This is the baseline method for determining the maximum (average) conducted PSD level. If the instrument has a power averaging (rms) detector, then it must be used; otherwise, use the sample detector. The EUT must be configured to transmit continuously ($D \geq 98\%$), or else sweep triggering/signal gating must be implemented to ensure that measurements are made only when the EUT is transmitting at its maximum power control level (no transmitter OFF time to be considered). Method AVGPS-1 per C63.10 and KDB 558074 was utilized for this test program.

Test Criteria

Reference	Limit
CFR 47 Subpart C 15.247 (e) RSS-247 Section 5.2 (2)	< 8 dBm in any 3 kHz Band

Test Information

Tester	Test Location	Date	Temperature (°C)	Humidity (%RH)	Pressure (mbar)	Results (P/F)
JB	RF Lab	2017-05-04	23	50	1005	P

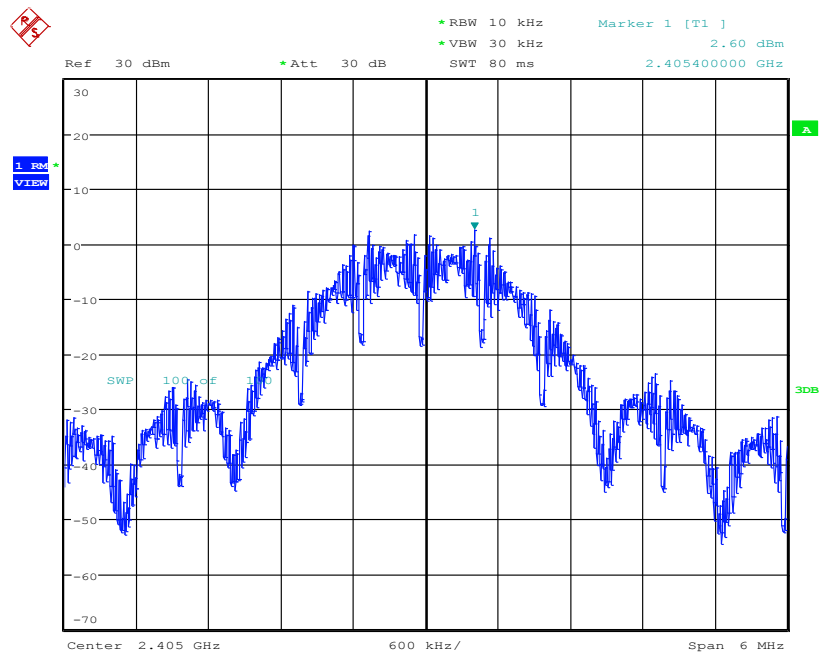
Equipment List

Instrument Type	ID #	Serial #	Manufacturer	Model	Cal Date	Cal Due Date
Spectrum Analyzer	11496	100303	Rohde & Schwarz	FSU26	2016-03-31	2017-03-31

Test Results

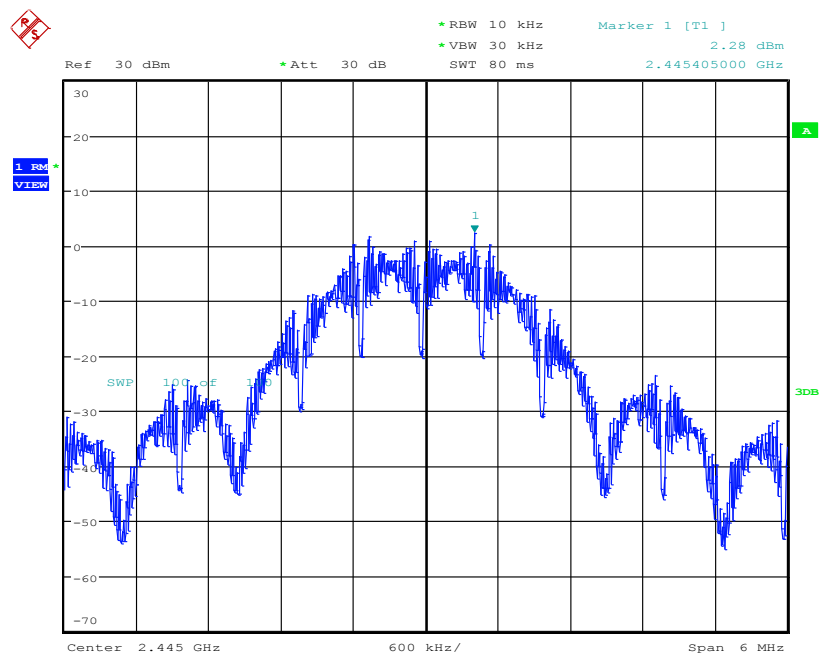
Channel	Frequency (GHz)	Max Power (dBm)	
		Antenna 1	Antenna 2
Low	2.405	2.60	1.77
Mid	2.445	2.28	1.18
High	2.475	1.74	0.62

Plots



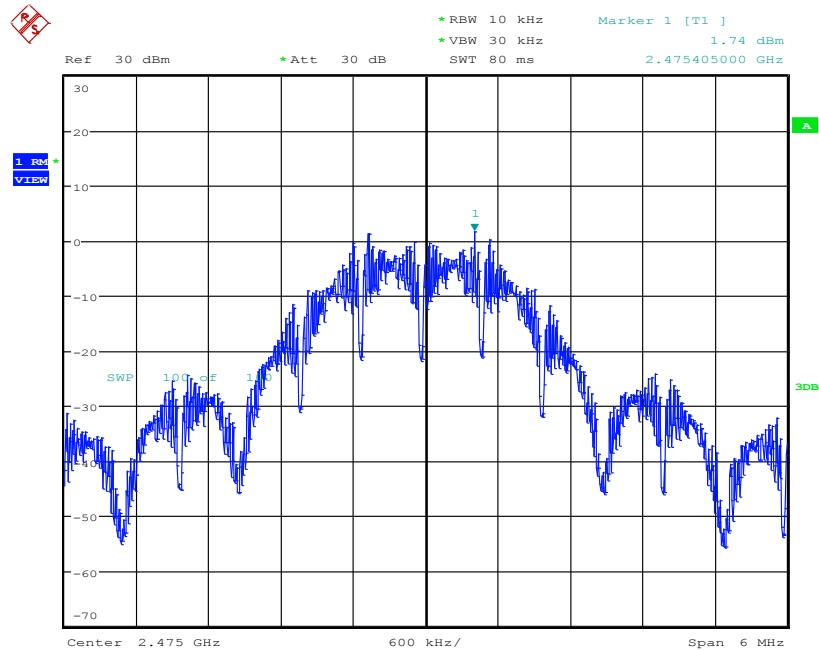
Date: 4.MAY.2016 14:40:42

Antenna 1 – Low Channel



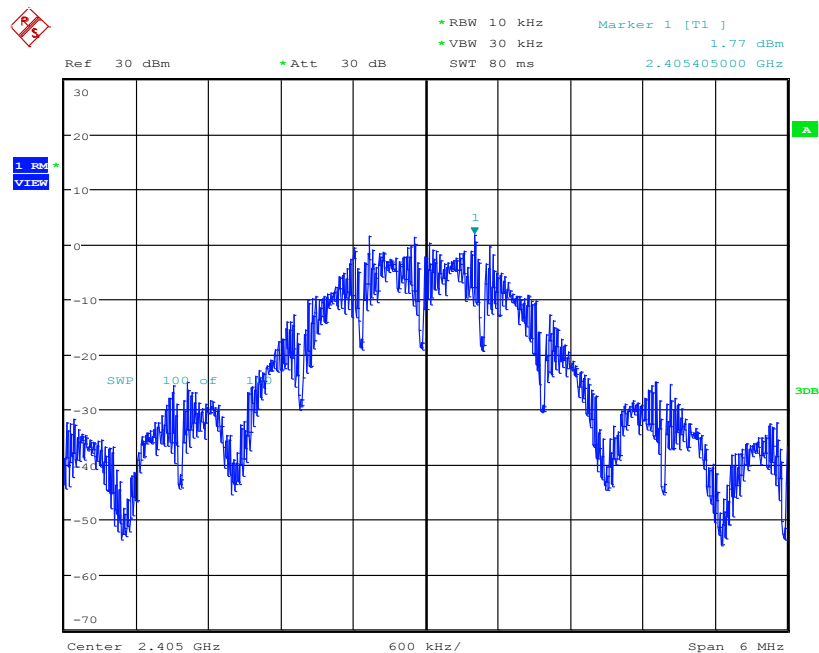
Date: 4.MAY.2016 14:42:22

Antenna 1 – Mid Channel



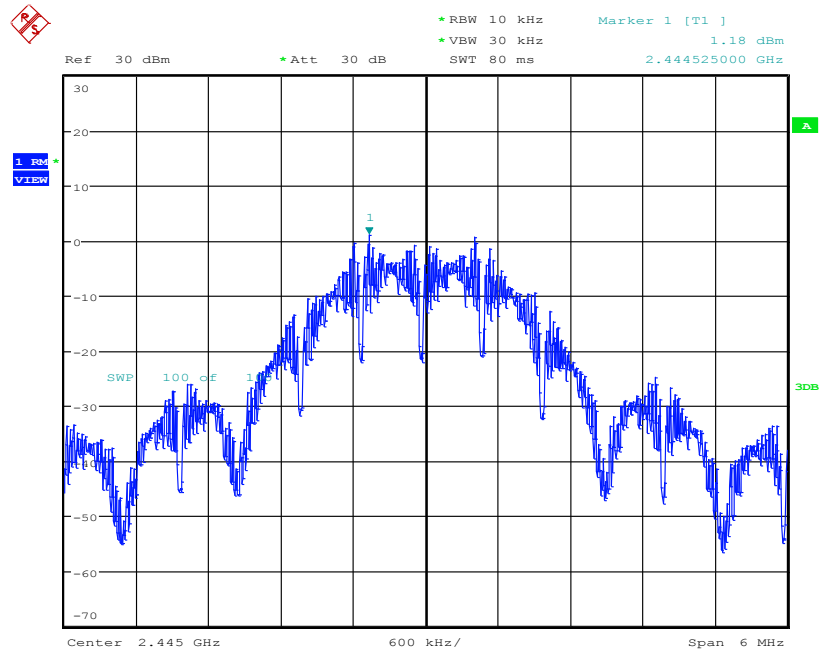
Date: 4.MAY.2016 14:43:20

Antenna 1 – High Channel



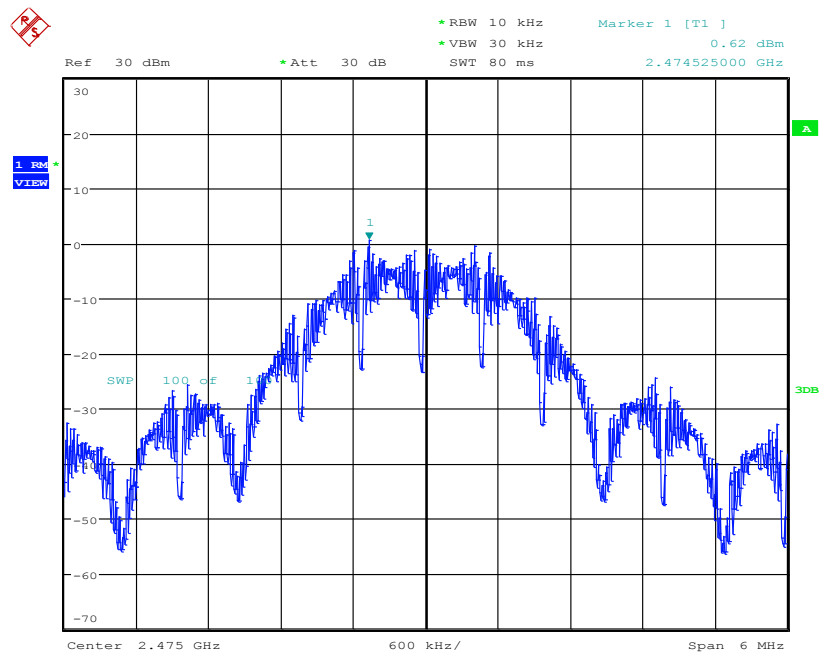
Date: 4.MAY.2016 14:47:32

Antenna 2 – Low Channel



Date: 4.MAY.2016 15:04:49

Antenna 2 – Mid Channel

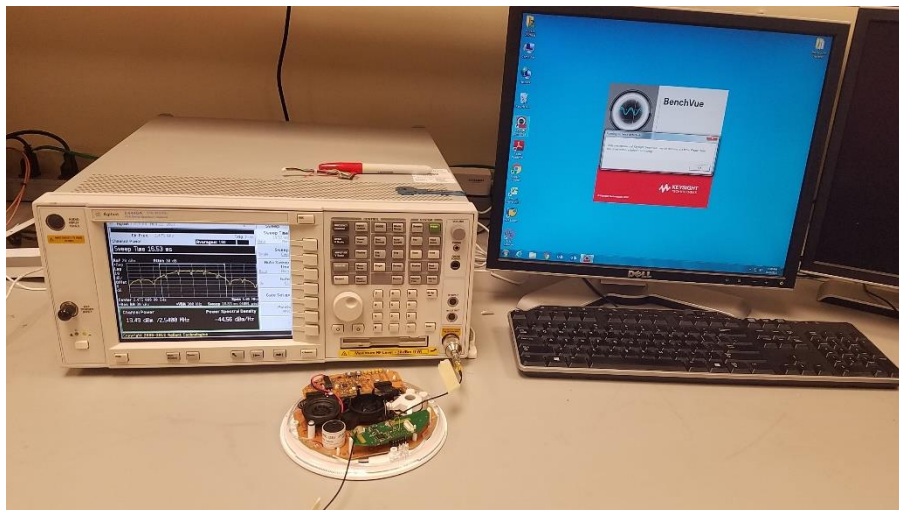
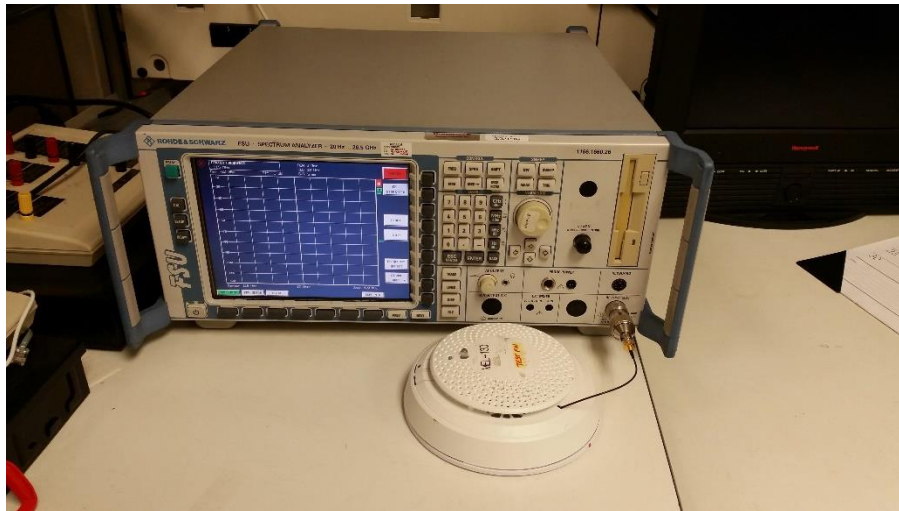


Date: 4.MAY.2016 15:06:33

Antenna 2 – High Channel

Setup Photos

Test Setup Photos – Antenna Port Tests



END OF REPORT