Advanced
Compliance Laboratory

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Electromagnetic Emission Compliance Test Report

Equipment Under Test (EUT)	**Very Small Transmitter 25VST-AMP**
Applicant	Integrated Microwave Technologies, LLC.
In Accordance With	FCC Part 90 (/Part 2)
Test by	Advanced Compliance Laboratory, Inc. 6 Randolph Way Hillsborough, New Jersey 08844
Authorized by	Wei Li Lab Manager Signature
Date	August 14, 2015
AC Lab Report Number	0048-150807-01

Lab Code:200101-0

The test result in this report is supported and covered by the NVLAP accreditation.

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Section 1. Summary of Test Results

Manufacturer:	Integrated Microwave Technologies, LLC.
Product Name &	
Model No.:	Very Small Transmitter
	25VST-AMP
Sample No.:	ENGUNIT002

General: **All measurements are traceable to national standards**

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 2& Part 90.

☒New Submission ☐Production Unit

☐Class II Permissive Change ☒Pre-Production Unit

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

"See Summary of Test Data"

NVLAP LAB CODE: 200101-0

Summary of Test Data

The measurement methodology shall compliance with the requirements in FCC KDB 971168 D01 Power Meas License Digital Systems v02r02 published on Oct. 17, 2014.

FCC Requirements	FCC Rule Part	Limit	Result
RF Power Output	90.205/2.1046	5W (37dBm) (2450-2483.5MHz Band) EIRP	Complies
Occupied Bandwidth	90.209/2.1049	8MHz (2G Band)	Complies
Spurious Emissions at Antenna Terminals	90.210/2.1051	-13 dBm	Complies
Field Strength of Spurious Emissions	90.210/2.1053	-13 dBm E.I.R.P.	Complies
Emission Limitation Mask	90.210	Mask B	Complies
Frequency Stability vs. Voltage &Temperature	90.213/2.1055	10ppm	Complies

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	±2.36	±2.99	±1.83

Wei Li
Lab Manager
Advanced Compliance Lab

Date: August 14, 2015

Section 2. General Equipment Specification

Supply Voltage	Nominal +12Vdc Extended +10.2 to +13.8Vdc					
Frequency Range		**2450.0 – 2483.5 MHz**				
Modulations	All Modes	Digital QPSK (D7W) ☒	Digital 16QAM (D7W) ☒	Digital 64QAM (D7W) ☐		
Emission Designators / Max. Rated Power	**1M3D7W/2M5D7W/6M0D7W/7M0D7W/8M5D7W** **Max. Rate Power: 5W (37dBm)** See Page 7 for details					
Output Impedance	50ohm					
Frequency Translation	All Bands	F1-F1 ☒	F1-F2 ☐	N/A ☐		
		Software ☐	Duplexer Change ☐	Full Band Coverage ☒		

DC voltages and DC currents per 2.1033(c)(8)

The input supply to the RF Circuitry was set as followings:
2.4GHz Band: 12Vdc/4.8Amax
The RF power output was measured with the indicated voltage and current applied into the final RF amplifying device(s).
Measured Maximum RF output : 36.84dBm (4.83W)
Measured Minimum RF output: 0 dBm (1mW)

Tune-up procedure per 2.1033(c) (9)

There are no user accessible adjustments or tuning in this portable Transmitter. All necessary adjustments and tuning are performed during manufacture of the product. Any adjustments or tuning after service or repair are done as part of that process as special equipment is required to perform such adjustments.

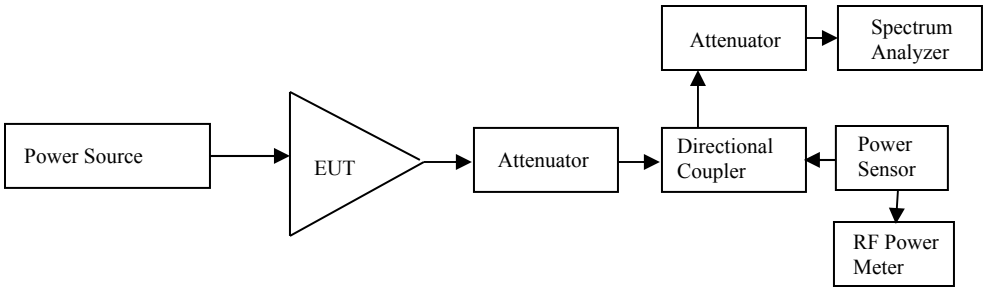
Description of Operation

The Equipment Under Test (EUT) is comprised of an assembly of a 25VST-10 nano-transmitter coupled to an SM2325-41L Power Amplifier (PA). SMA attenuators are used between the nano-transmitter and the PA to provide the proper amplifier drive level. An interface board is used to adapt between external audio and video inputs and the ribbon cable connection to the nano-transmitter. Equipment cooling is provided by mounting the nano-transmitter on brackets that conduct the heat into the base plate, and a fan is mounted over the PA heatsink.

System Diagram

See Attachment.

General EUT Setup



Internal color-bar signal was used for testing.

Testing Frequency/Modulation BW/Mask BW/Modulation/Power Selection:

CH	Frequency MHz	Mod BW MHz	Mask BW MHz	Modulation	PWR SET dBm	Emission Designator
L	2450.75	1.25	1.25	QPSK	36.5	1M25D7W
M	2466					
H	2482.75					
L	2451.25	2.5	2.5	QPSK	36.5	2M50D7W
M	2466					
H	2482.25					
L	2453	6	6	QPSK/16QAM	36.5	6M00D7W
M	2466					
H	2480.5					
L	2453.5	7	7	QPSK/16QAM	36.5	7M00D7W
M	2466					
H	2480					
L	2454	8	8	QPSK/16QAM	36.5	8M00D7W
M	2466					
H	2479.5					

Section 3. RF Output Power

Name of Test:	*RF Output Power*	Test Standard:	*90.205/2.1046*
Tested By:	WEI LI	Test Date:	08/07/2015-08/14/2015

Minimum Standard:

Refer to FCC Part 90.205/2.1046:
2.1046 Measurements Required: RF power output
(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in § 2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.
2.1033 Application for certification
(c) Applications for equipment other than that operating under parts 15 and 18 of the rules shall be accompanied by a technical report containing the following information:
(8) The dc voltages applied to and dc currents into the several elements of the final radio frequency amplifying device for normal operation over the power range.

Power Limit
2450–2483.5 MHz. The maximum transmitter power is 5 watts (37dBm)

Method of Measurement:

Per FCC KDB 971168 Sec. 5

Detachable Antenna:
The average/peak power at antenna terminals is measured using power meter. The broadband power meter has a video bandwidth that is greater than or equal to the emission bandwidth and utilizes a fast-responding diode detector.

Integral Antenna:
If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the plane wave relation

$$\frac{GP}{4\pi R^2} = \frac{E^2}{120\pi}$$

and proceeding as follows:

$$P = \frac{E^2 R^2}{30G} = \frac{E^2 3^2}{30G}$$

where,
P = the equivalent isotropic radiated power in watts
E = the maximum measured field strength in V/m
R = the measurement range (3 meters)
G = the numeric gain of the transmit antenna in relation to an isotropic radiator

Test Result: **Complies**

Test Data:

* Based on pretest data, there is no significant difference in this measurement between QPSK and 16QAM modulations.

Channel BW / Signal BW (MHz)	Freq Channel	**Transmitter Power (dBm) @ V=12VDC**				**FCC Limit (dBm)**	**UNDER LIMIT**
		QPSK	16QAM				
1.25 /1.25	L	36.80	X	X		37.0	Y
	M	36.16	X	X		37.0	Y
	H	36.30	X	X		37.0	Y
2.5/2.5	L	36.19	X	X		37.0	Y
	M	36.12	X	X		37.0	Y
	H	36.28	X	X		37.0	Y
6 /6	L	36.25	36.15	X		37.0	Y
	M	36.24	36.16	X		37.0	Y
	H	36.32	36.20	X		37.0	Y
7/7	L	36.26	36.16	X		37.0	Y
	M	36.19	36.23	X		37.0	Y
	H	36.34	36.29	X		37.0	Y
8 /8	L	36.25	36.18	X		37.0	Y
	M	36.22	36.15	X		37.0	Y
	H	36.32	36.21	X		37.0	Y

Channel BW / Signal BW (MHz)	Freq Channel	**Transmitter Power (dBm) @ V=10.2VDC**				**FCC Limit (dBm)**	**UNDER LIMIT**
		QPSK	16QAM				
1.25 /1.25	L	36.12	X	X		37.0	Y
	M	36.51	X	X		37.0	Y
	H	36.66	X	X		37.0	Y
2.5/2.5	L	X	X	X		37.0	Y
	M	X	X	X		37.0	Y
	H	X	X	X		37.0	Y
6/6	L	X	X	X		37.0	Y
	M	X	X	X		37.0	Y
	H	X	X	X		37.0	Y
7/7	L	X	X	X		37.0	Y
	M	X	X	X		37.0	Y
	H	X	X	X		37.0	Y
8 /8	L	36.46	X	X		37.0	Y
	M	36.43	X	X		37.0	Y
	H	36.61	X	X		37.0	Y

Channel BW / Signal BW (MHz)	Freq Channel	**Transmitter Power (dBm) @ V=13.8VDC**				**FCC Limit (dBm)**	**UNDER LIMIT**
		QPSK	16QAM				
1.25 /1.25	L	36.30	X	X		37.0	Y
	M	35.56	X	X		37.0	Y
	H	35.70	X	X		37.0	Y
2.5/2.5	L	X	X	X		37.0	Y
	M	X	X	X		37.0	Y
	H	X	X	X		37.0	Y
6 /6	L	X	X	X		37.0	Y
	M	X	X	X		37.0	Y
	H	X	X	X		37.0	Y
7/7	L	X	X	X		37.0	Y
	M	X	X	X		37.0	Y
	H	X	X	X		37.0	Y
8 /8	L	X	35.53	X		37.0	Y
	M	X	35.44	X		37.0	Y
	H	X	35.58	X		37.0	Y

Section 4. Occupied Bandwidth

Name of Test:	*Occupied Bandwidth*	Test Standard:	*90.209/2.1049*
Tested By:	WEI LI	Test Date:	08/07/2015-08/14/2015

Minimum Standard:

§2.1049 Measurements required: Occupied bandwidth.
The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:
(h) Transmitters employing digital modulation techniques—when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudo-random generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at the discretion of the user.
Following is the test setup used for the Occupied Bandwidth (OBW) testing:

Method of Measurement:

Per FCC KDB 971168 Sec. 4.

Spectrum Analyzer Settings:
RBW: 1~3% of Signal Channel BW
VBW: ≥RBW
Span: As required
Sweep: Auto
Input Signal Characteristics:
RF level: Maximum Gain recommended by manufacturer

Test Result: **Complies**

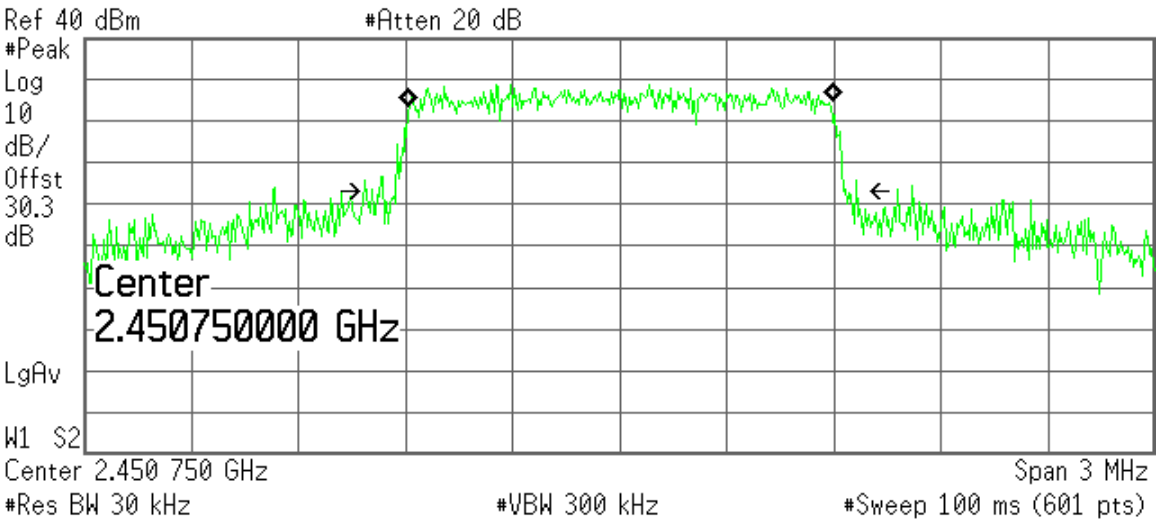
Test Data: Attached Plots

* Based on pretest data, there is no significant difference in OCBW measurement between QPSK and 16QAM modulations.

Channel BW / Signal BW (MHz)	Freq Channel	**OC BW (MHz)**				**FCC Limit (MHz)**	**UNDER LIMIT**
		QPSK	16QAM				
1.25 /1.25	L	1.1864	X			1.25	Y
	M	1.1843	X			1.25	Y
	H	1.1858	X			1.25	Y
2.5/2.5	L	2.3532	X			2.5	Y
	M	2.3497	X			2.5	Y
	H	2.3582	X			2.5	Y
6 /6	L	X	5.6672			6	Y
	M	5.6694	5.6636			6	Y
	H	X	5.6964			6	Y
7/7	L	X	6.6164			7	Y
	M	6.6047	6.6012			7	Y
	H	X	6.6375			7	Y
8 /8	L	X	7.5471			8	Y
	M	7.5258	7.5439			8	Y
	H	X	7.5346			8	Y

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=1.25/1.25MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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Temperature:	70°F
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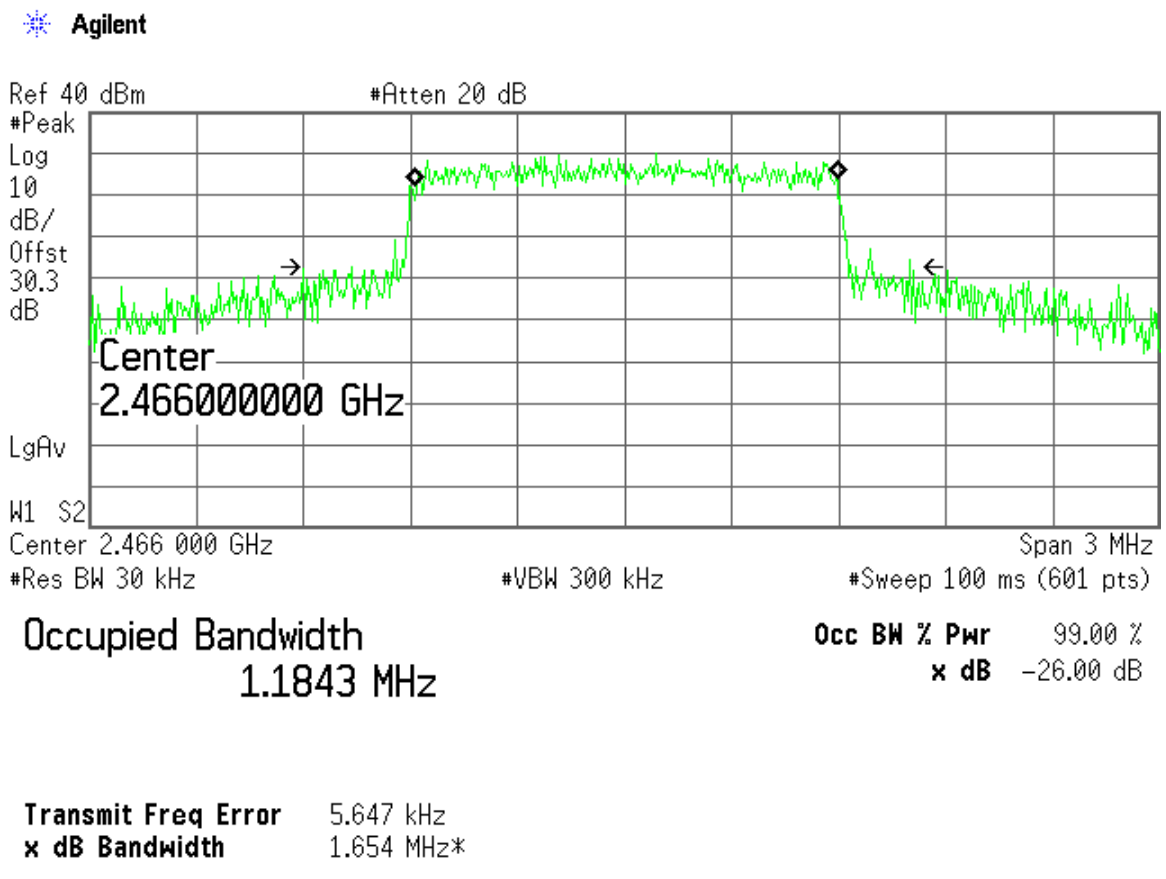
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=1.25/1.25MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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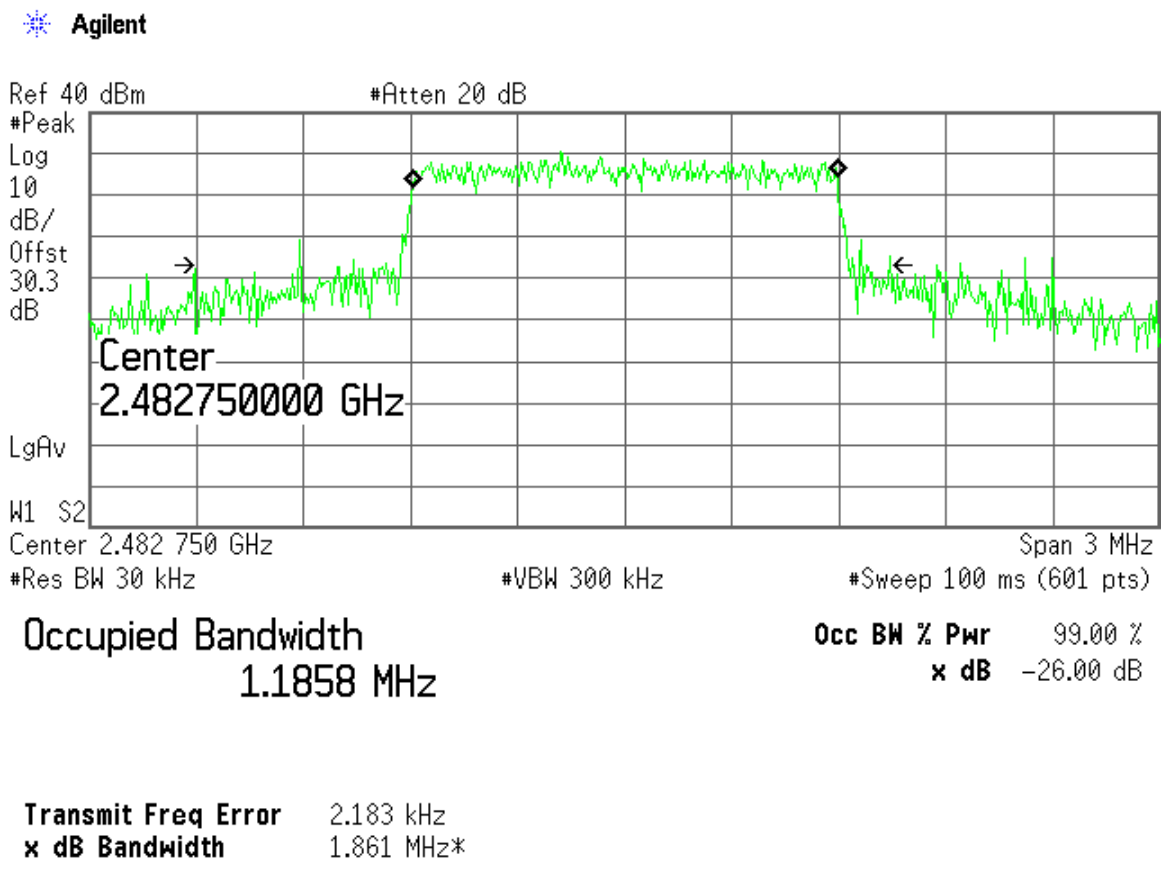
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=1.25/1.25MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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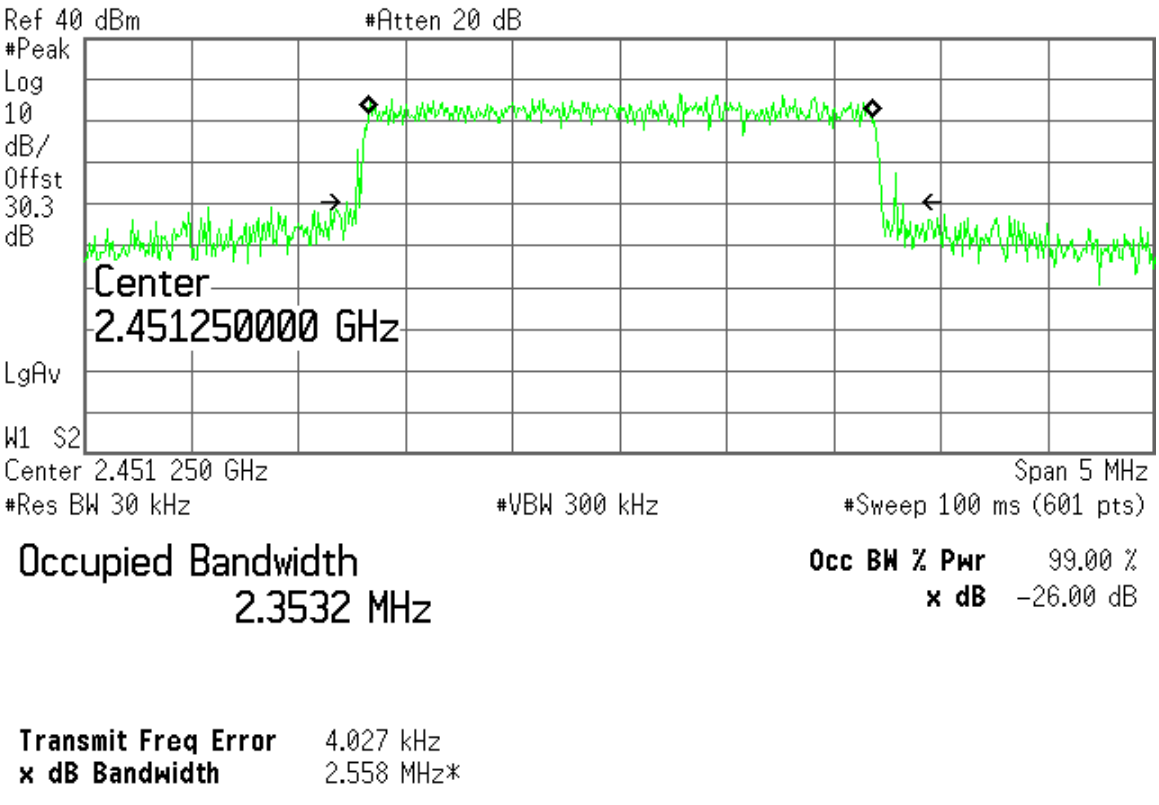
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=2.5 /2.5MHz**
Plot Name:	**OC BW:Low Power, QPSK Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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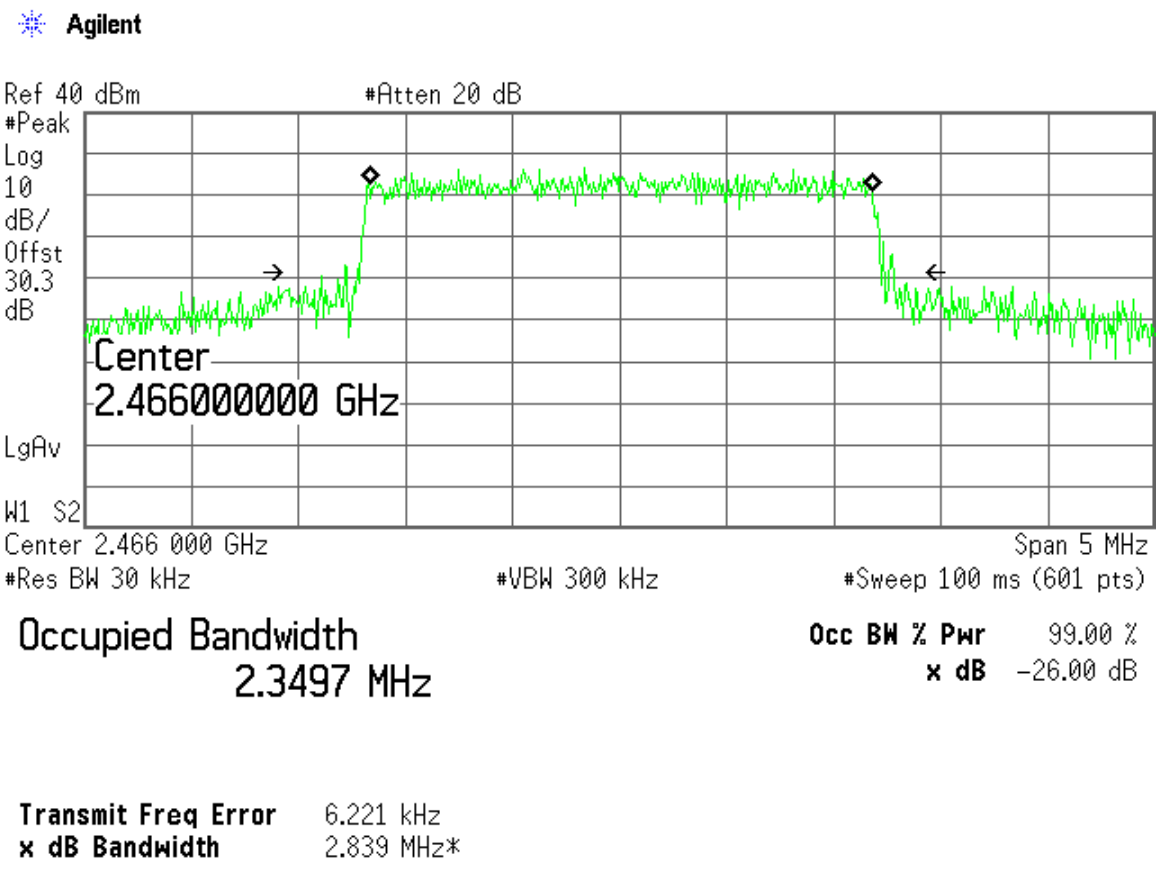
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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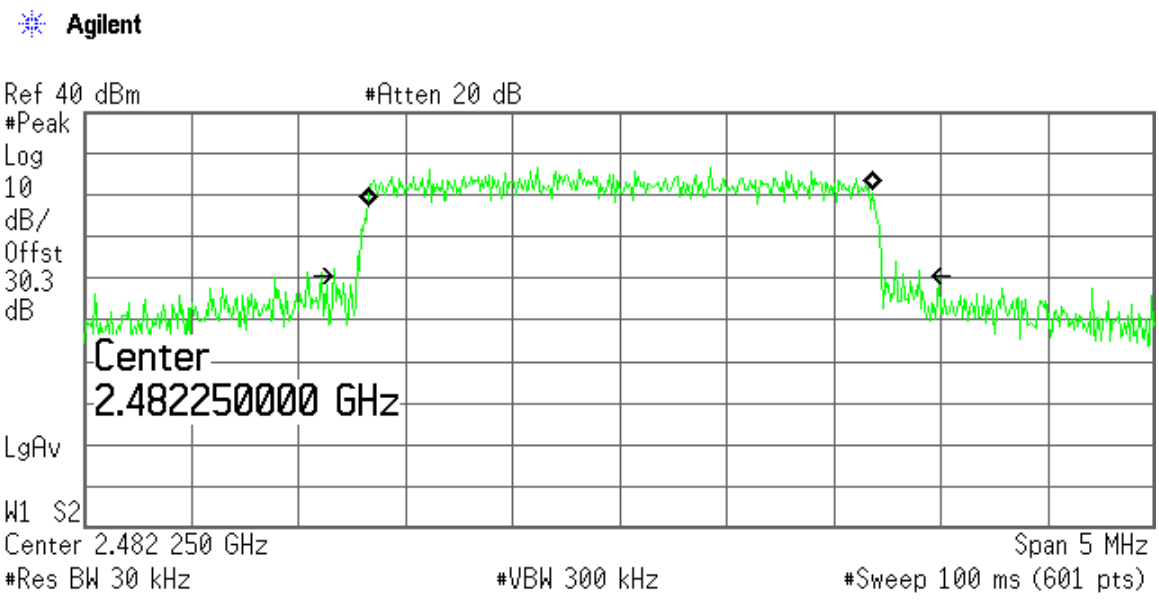
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=2.5/2.5M MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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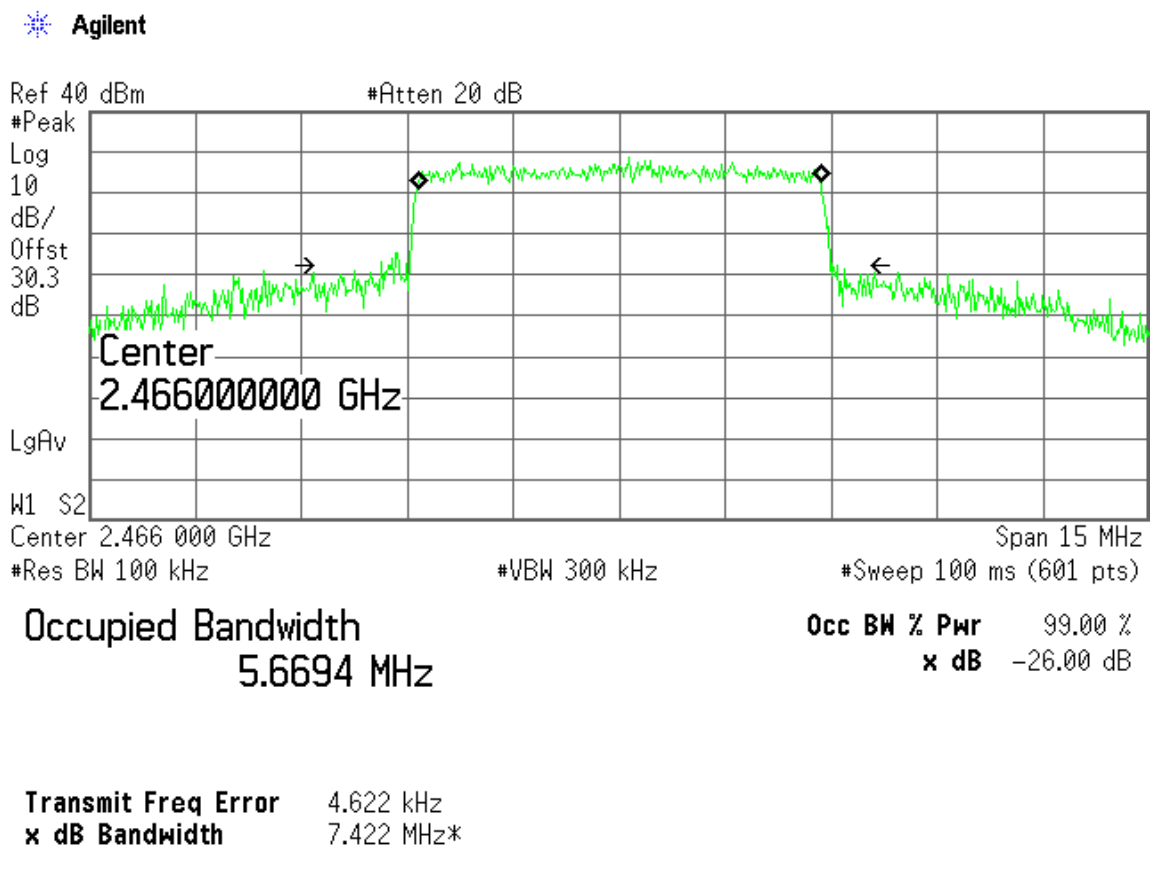
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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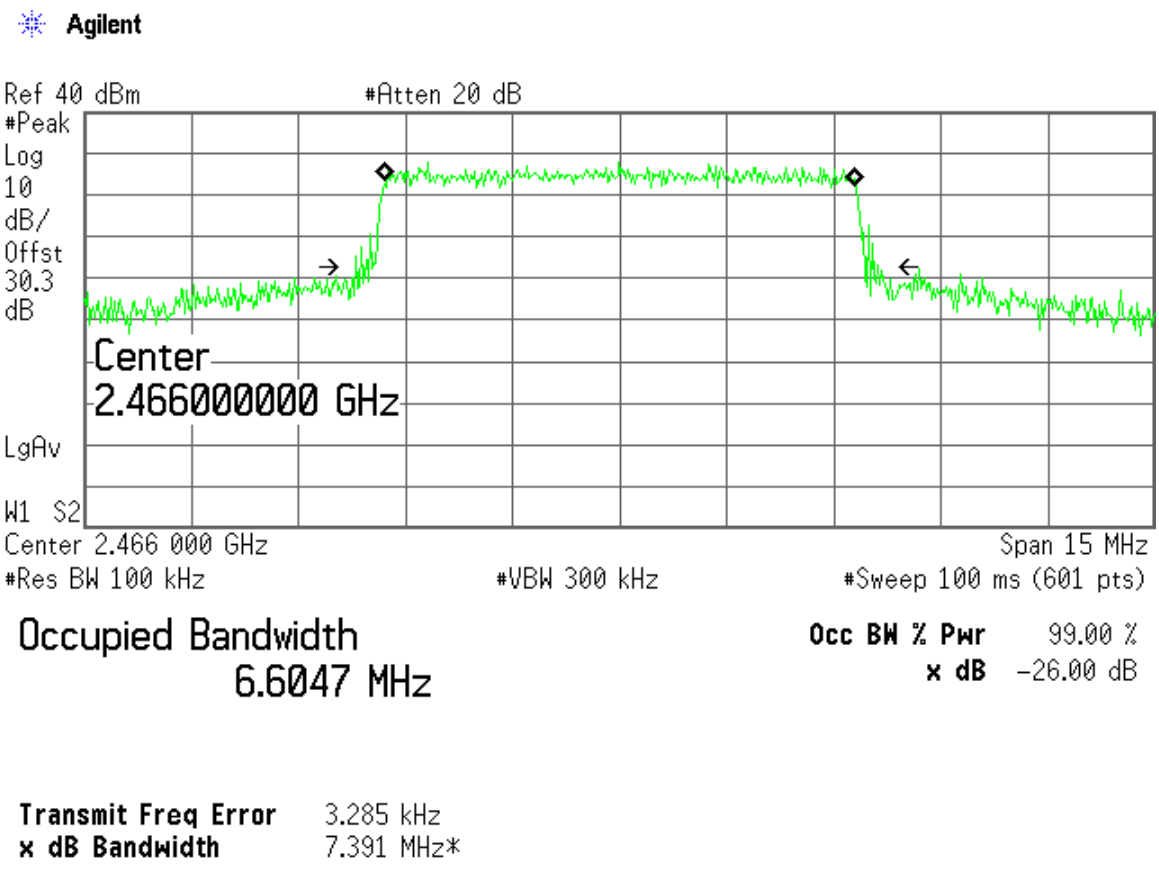
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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Temperature:	70°F
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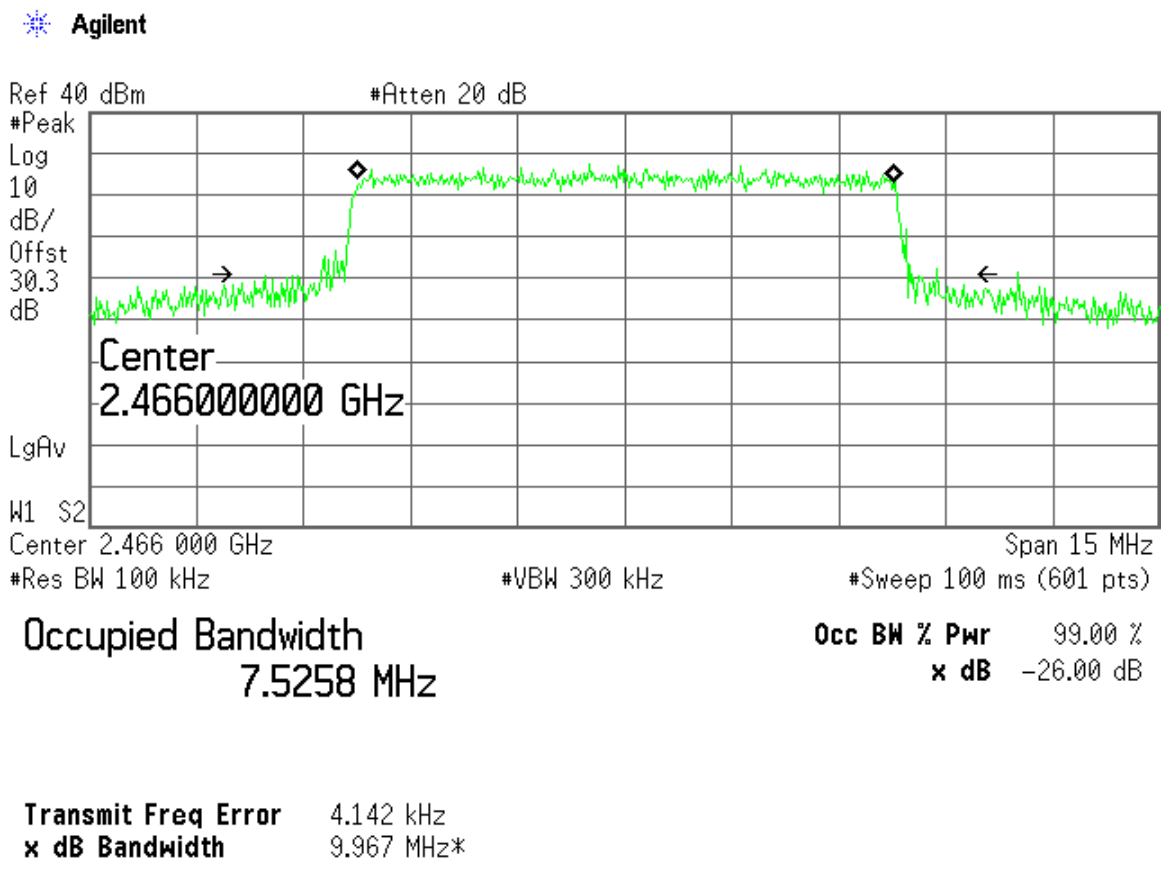
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**OC BW: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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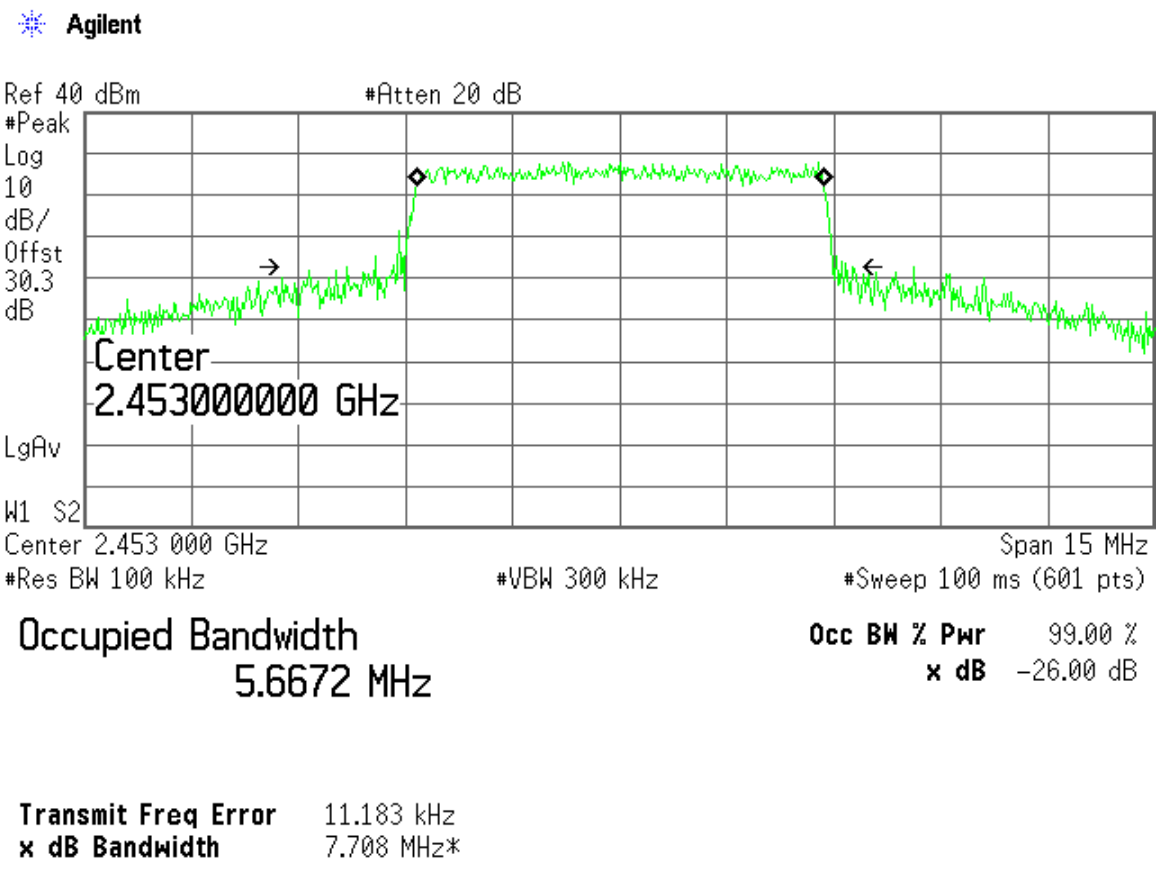
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**OC BW:Low Power,16QAM Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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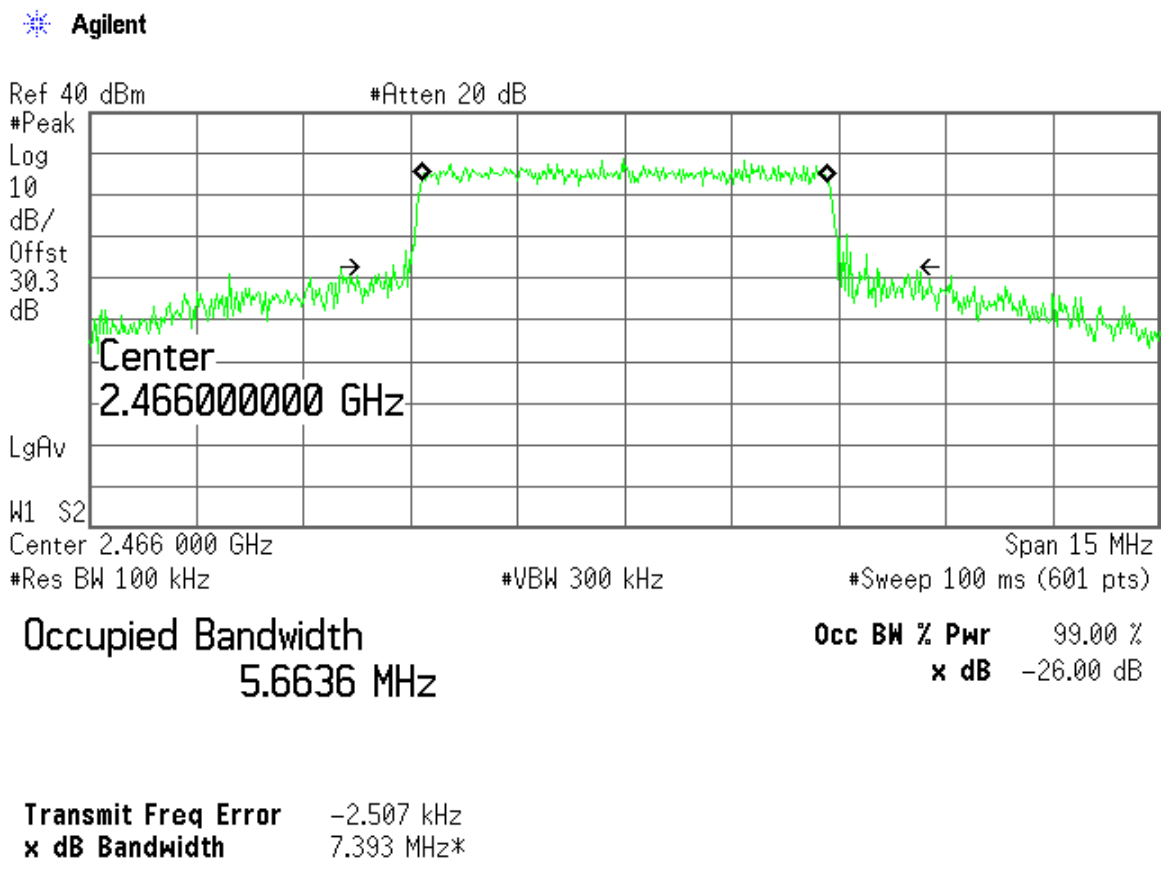
Plot Name:	**OC BW:Low Power, 16QAM Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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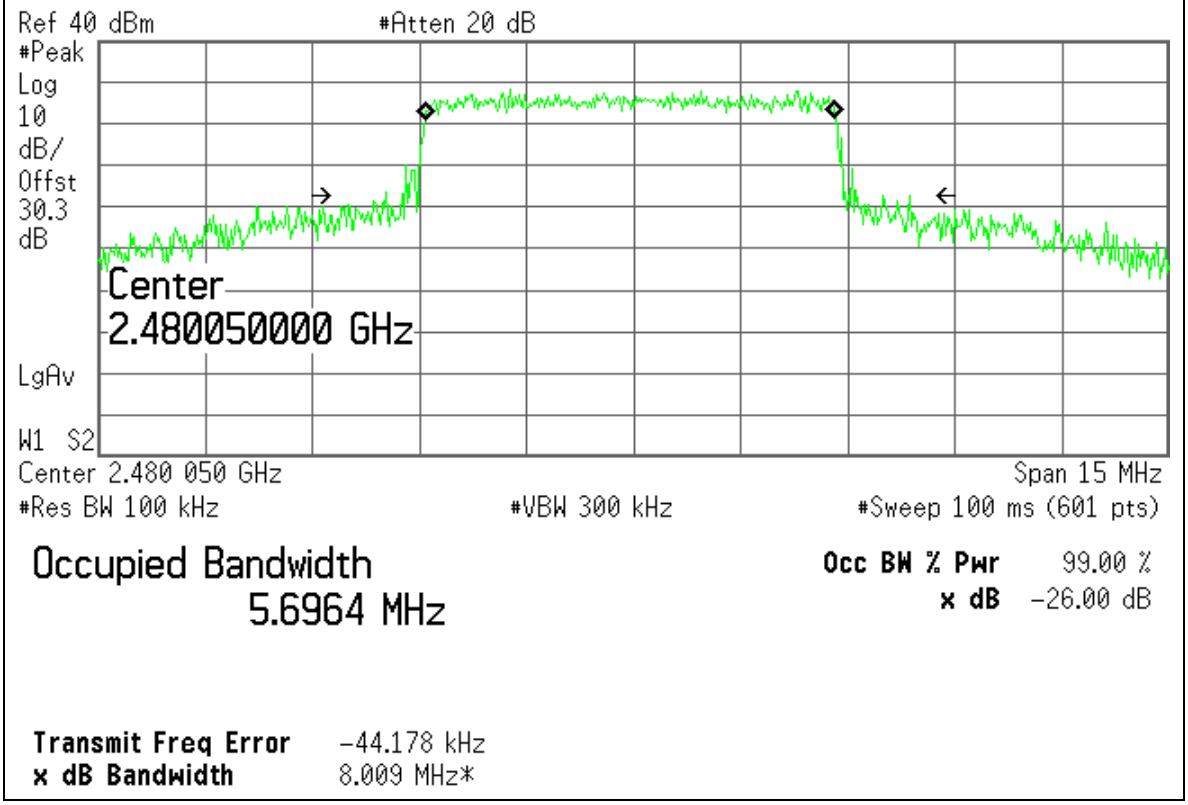
Configuration:	SG Input: Color Bar. Output Port: EUT



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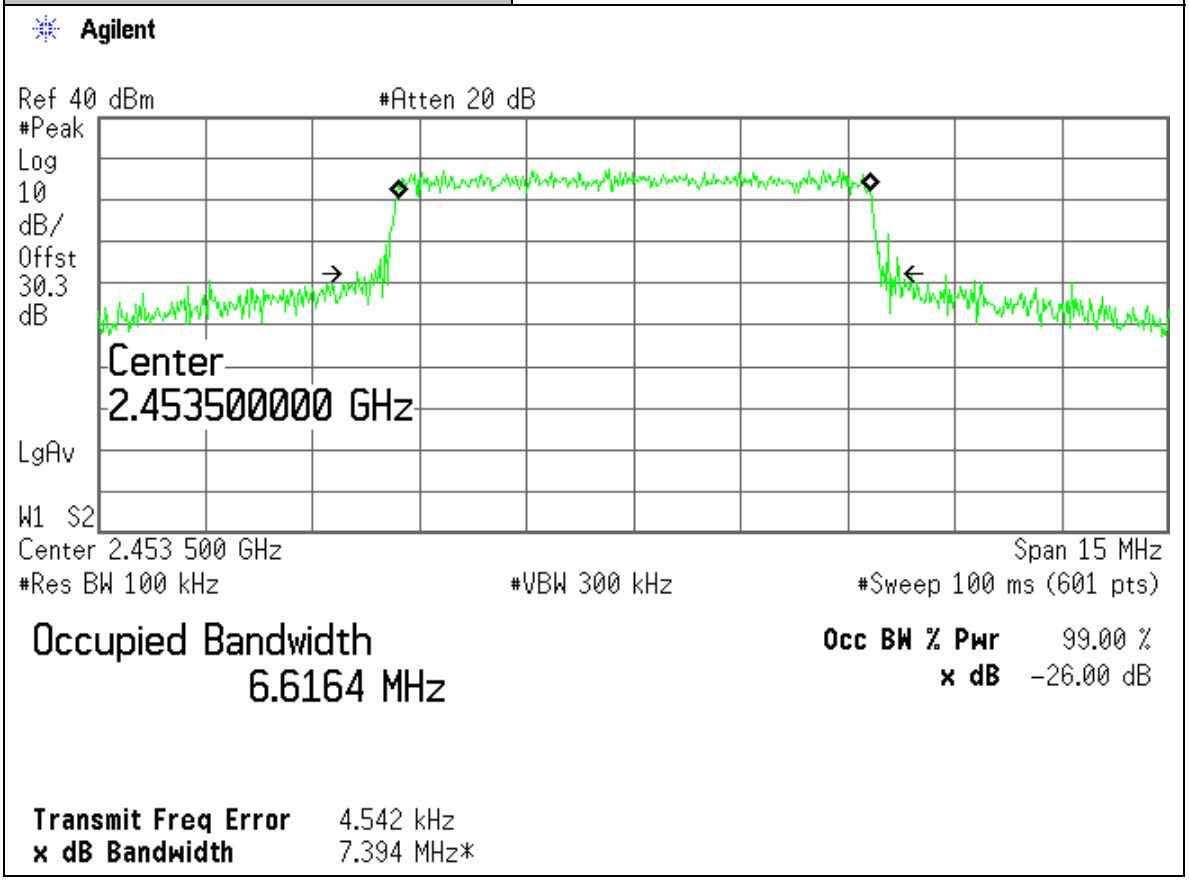
Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**OC BW: Low Power,16QAM Modulation,Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



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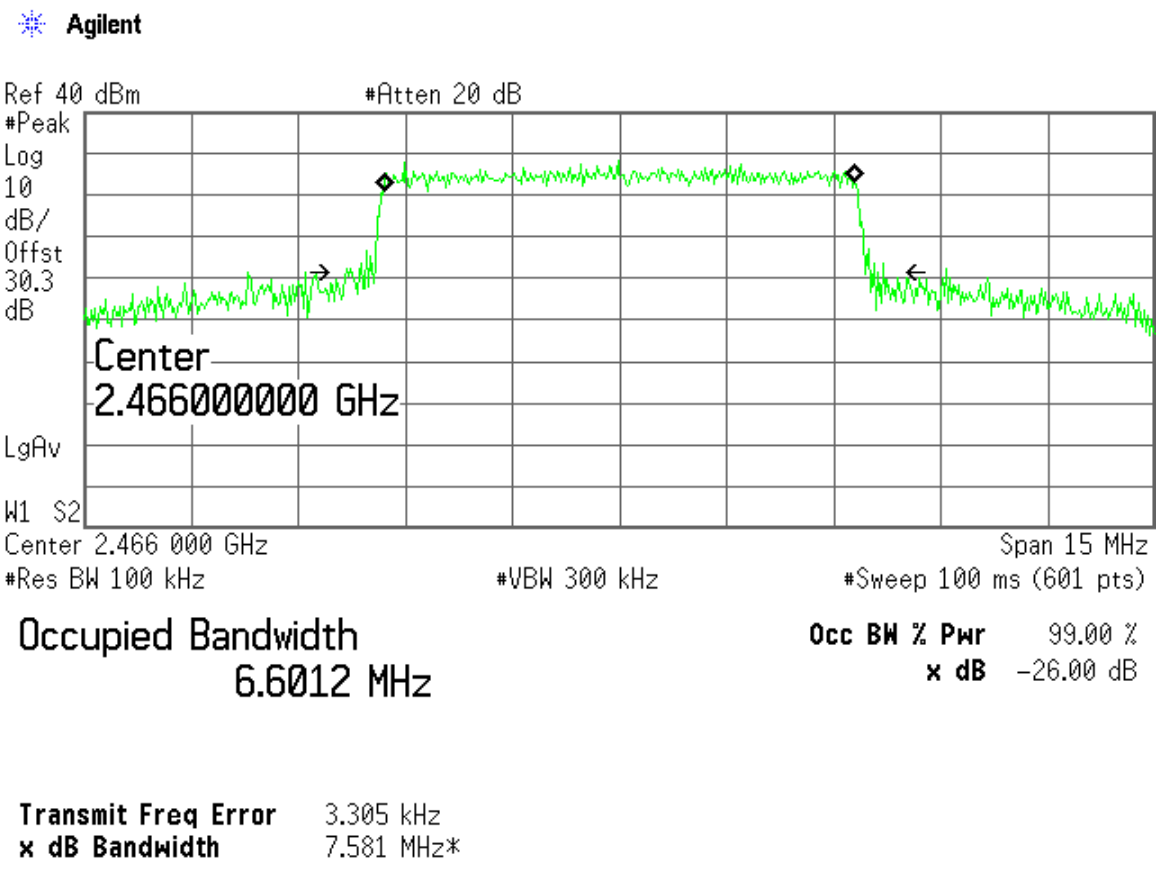

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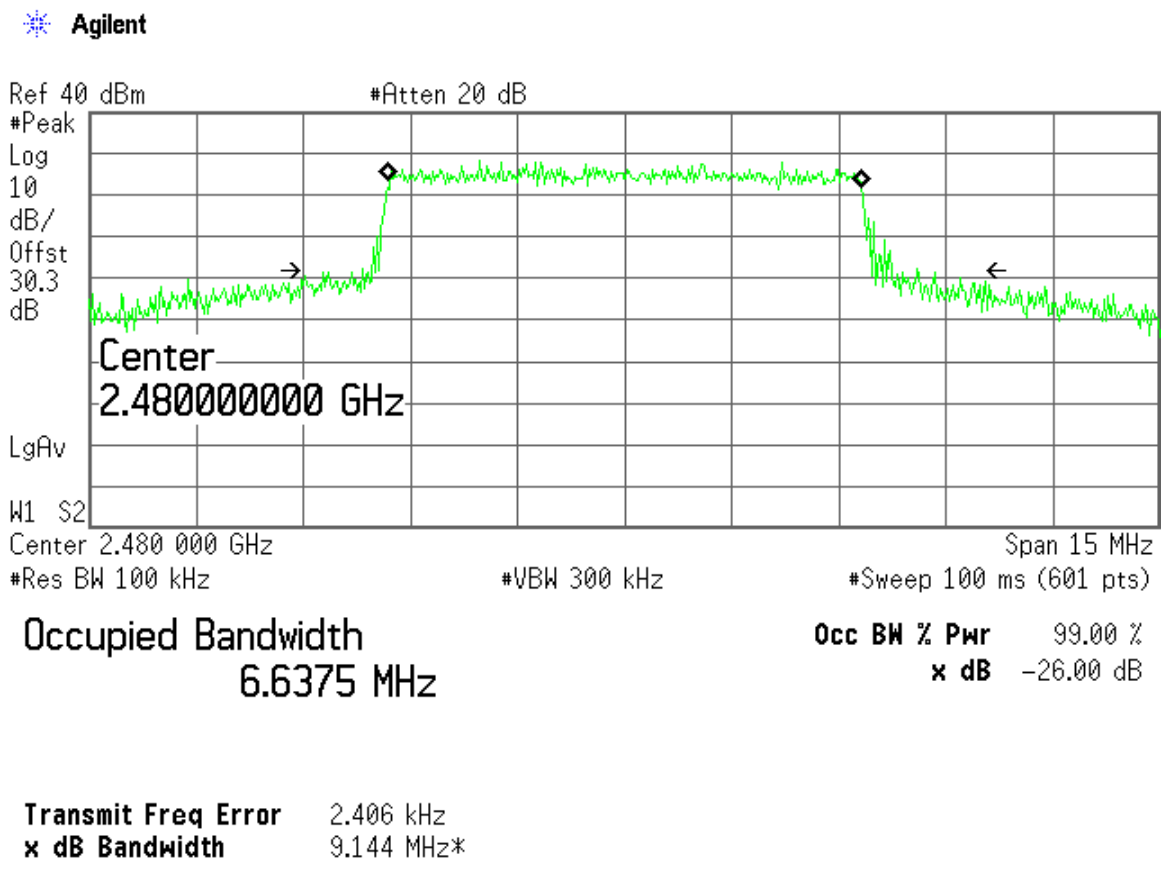
Configuration:	SG Input: Color Bar. Output Port: EUT



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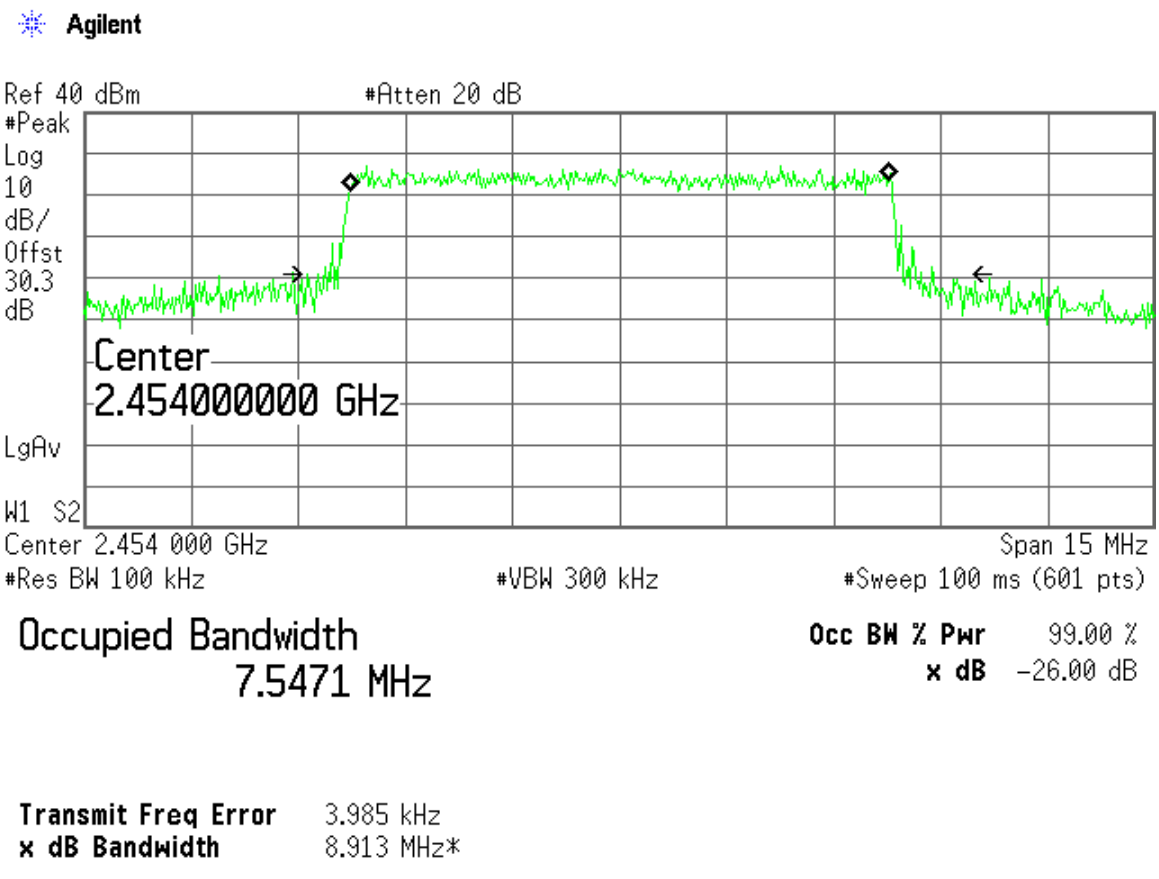
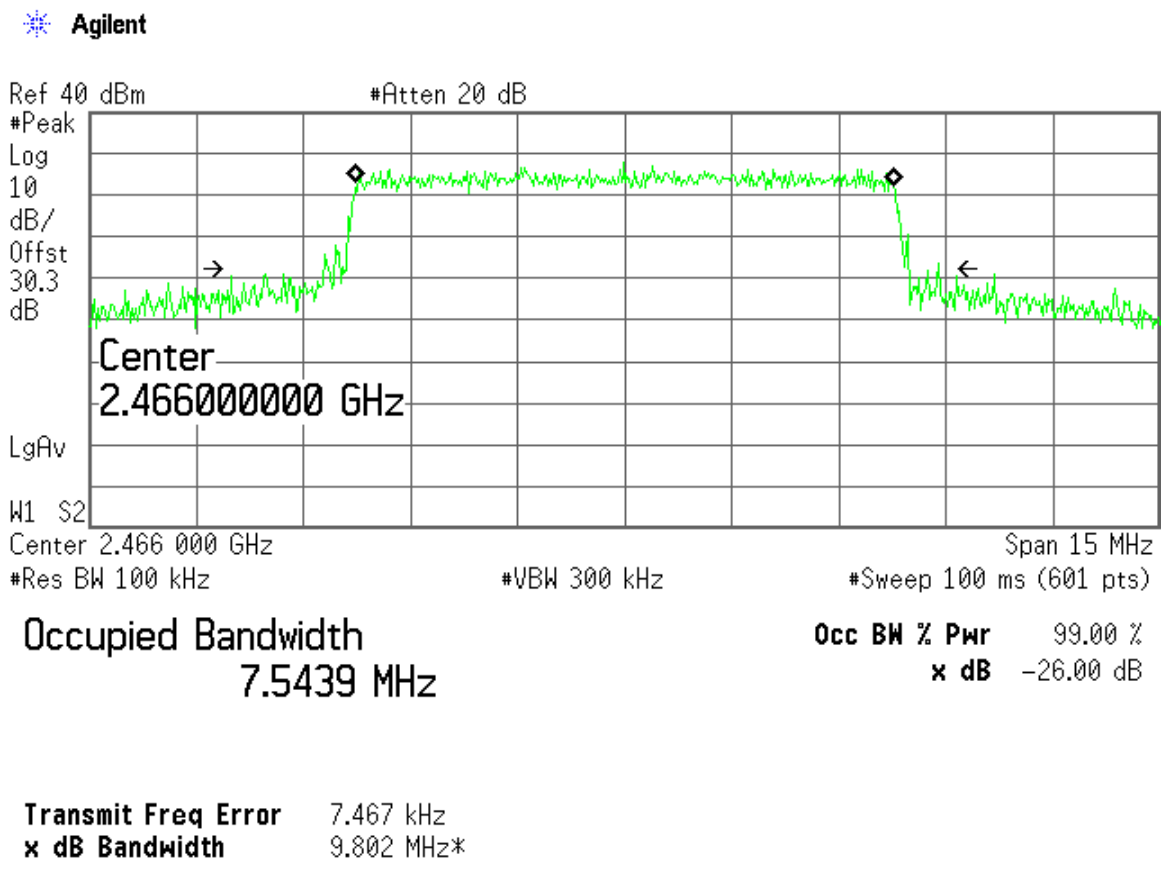
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**OC BW: Low Power,16QAM Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



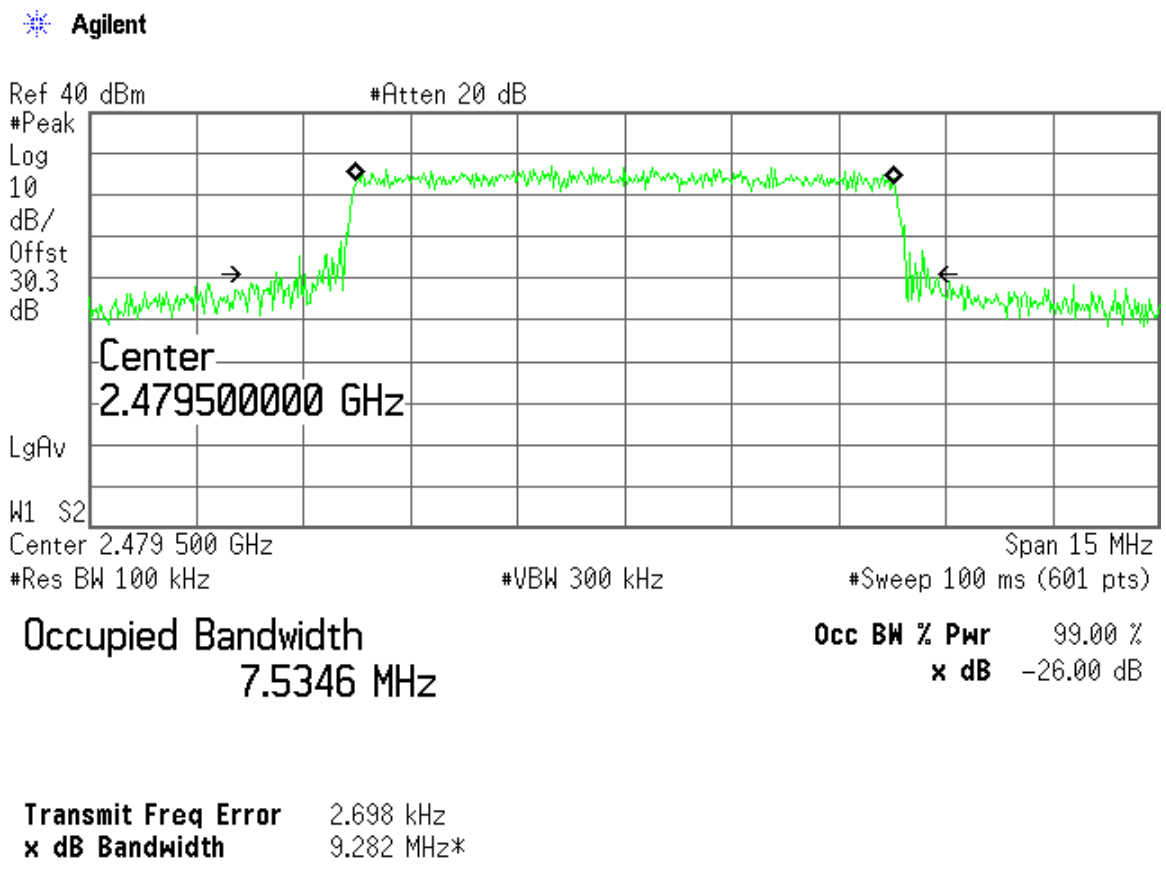
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**OC BW: Hi Power, 16QAM Modulation, Mid CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Occupied Bandwidth: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**OC BW: Low Power,16QAM Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



Section 5. Spurious Emissions at Antenna Terminals

Name of Test:	*Spurious Emissions at Antenna Terminals*	Test Standard:	*90.210/2.1051*
Tested By:	WEI LI DAVID TU	Test Date:	08/07/2015-08/14/2015

Minimum Standard:

Refer to Part 90.210 *Emission masks.*
Under section 90.210, the form of digital modulation used by the EUT is not explicitly included, consequently, Mask B would be appropriate.
(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

§2.1051 Measurements required: Spurious emissions at antenna terminals.

The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate. The magnitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be specified.

Method of Measurement:

Per FCC KDB 971168 Sec. 6 & 8
Spectrum Analyzer Settings:
RBW: 100 kHz&1MHz. As required for digital modulations.
VBW:>=RBW

Start Frequency: 9kHz or lowest EUT clock frequency.
Stop Frequency: up to 10th Harmonics or 40GHz highest.
Sweep: Auto

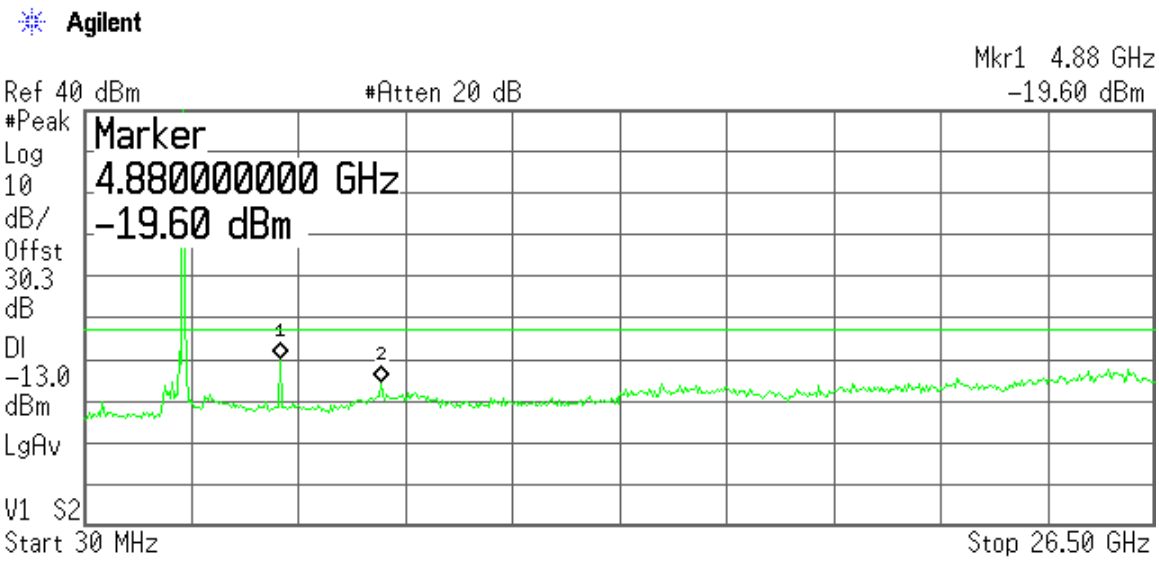
Test Result: **Complies**

Test Data: Attached Plots

* Based on pretest data, there is no significant difference in this measurement between QPSK and 16QAM modulations

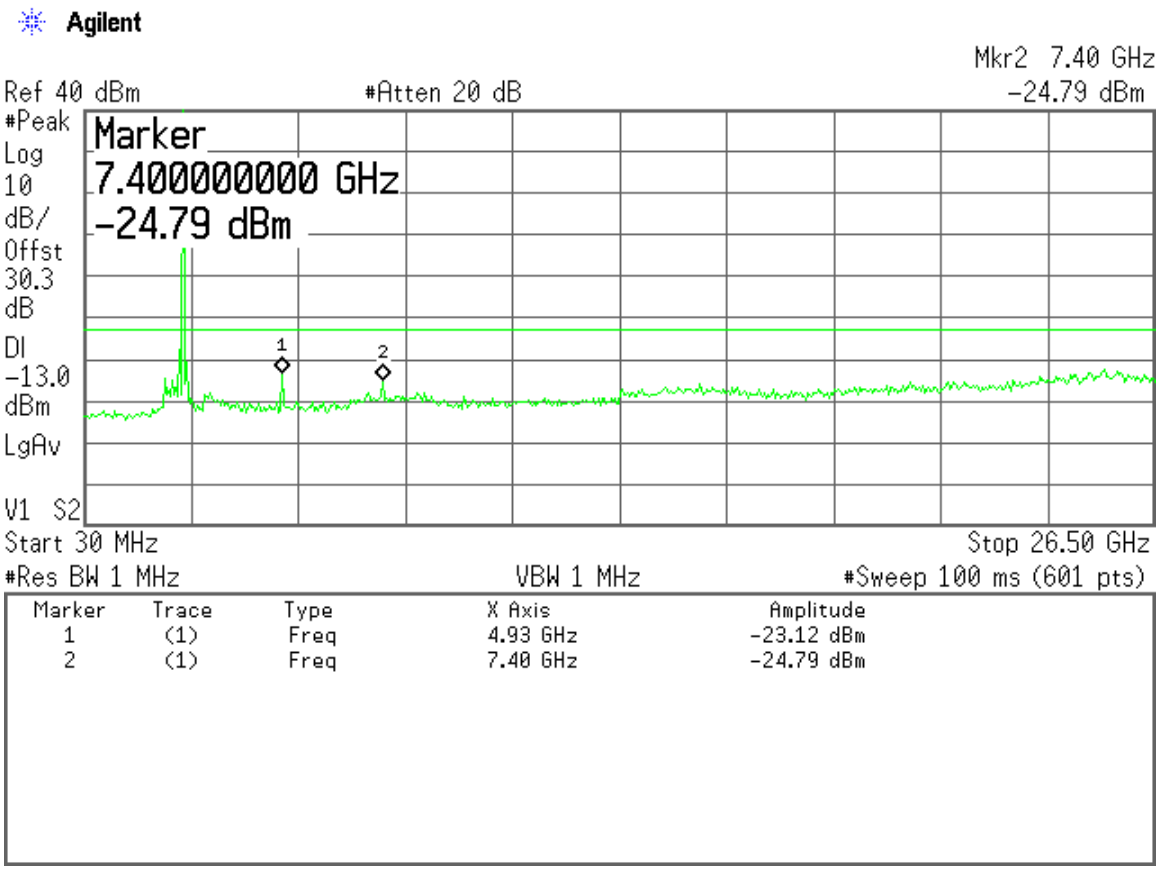
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=1.25/1.25 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



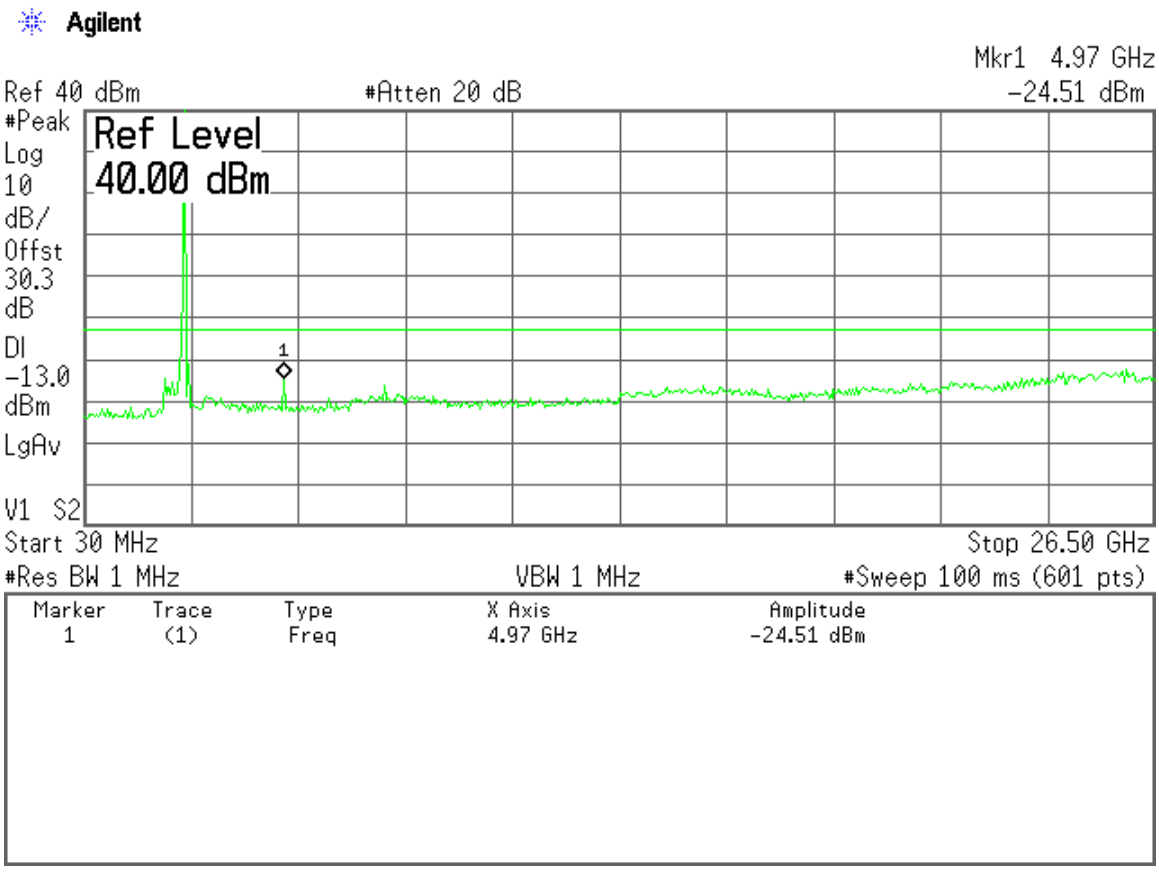
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=1.25/1.25 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



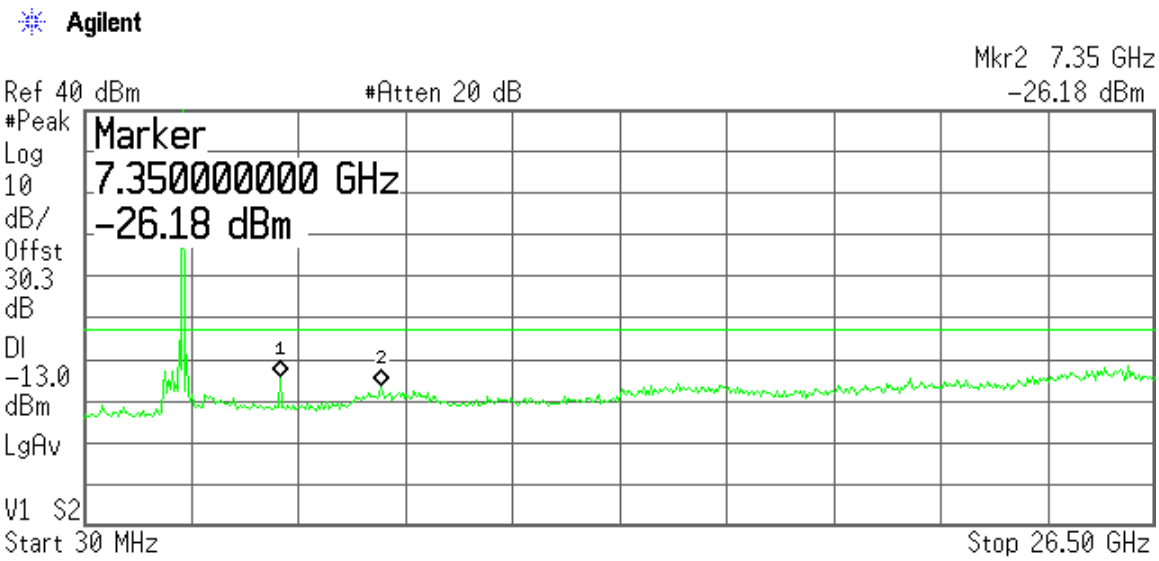
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=1.25/1.25 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



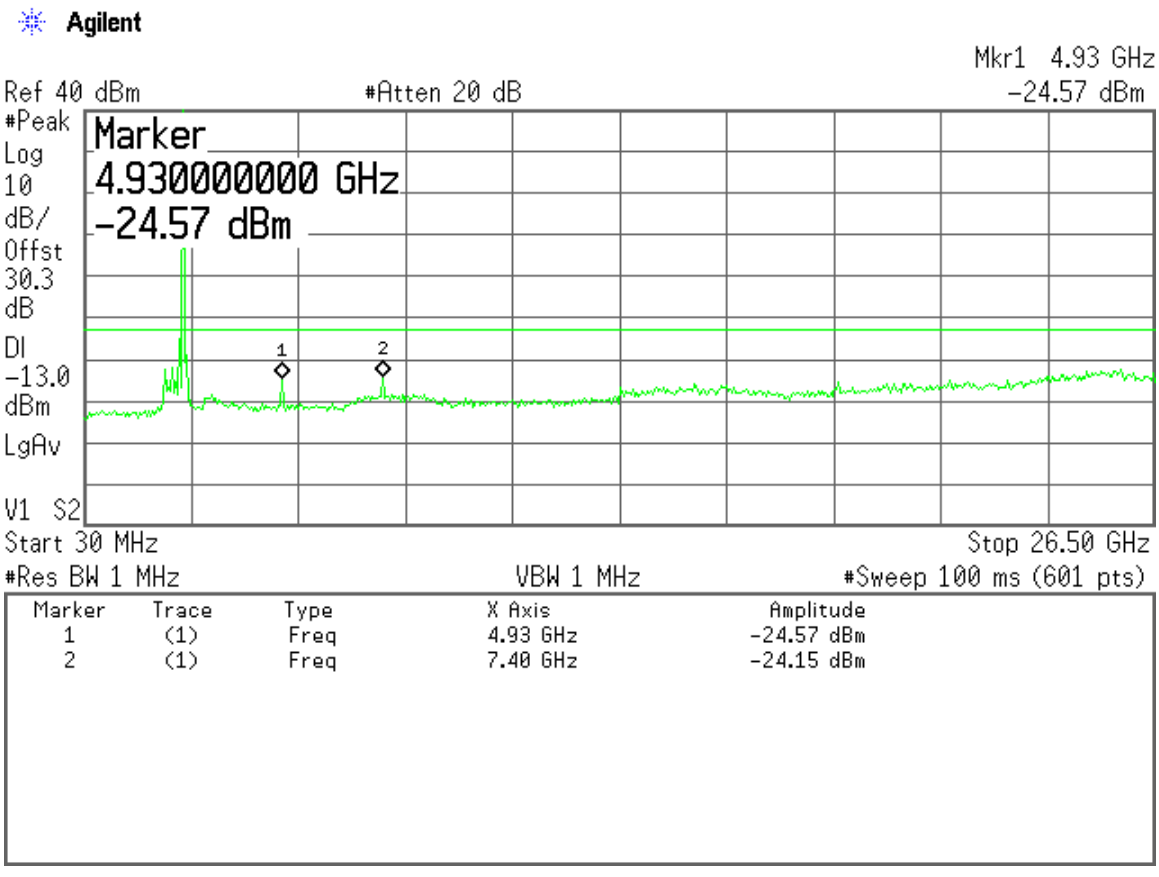
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



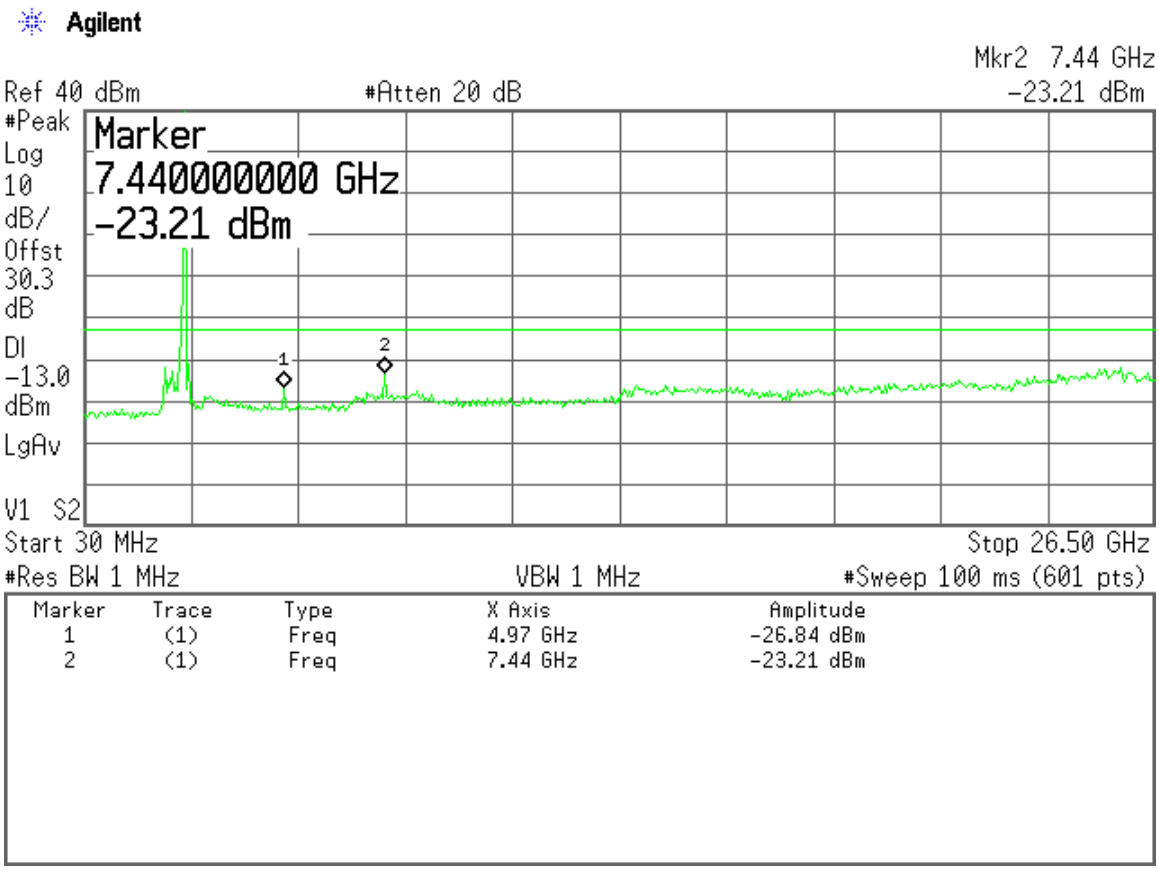
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Mid CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



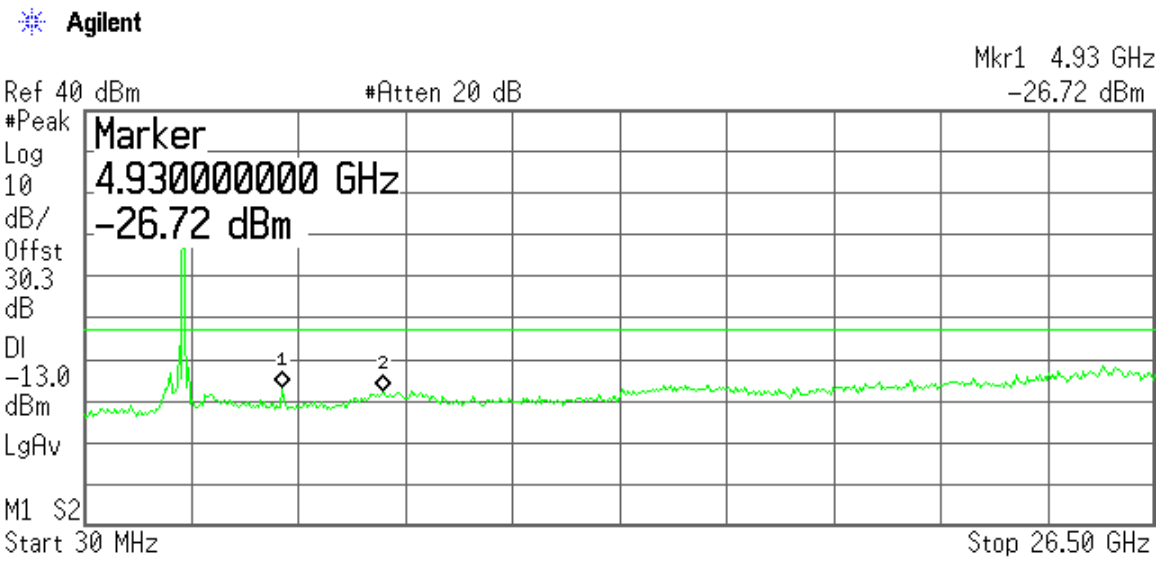
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



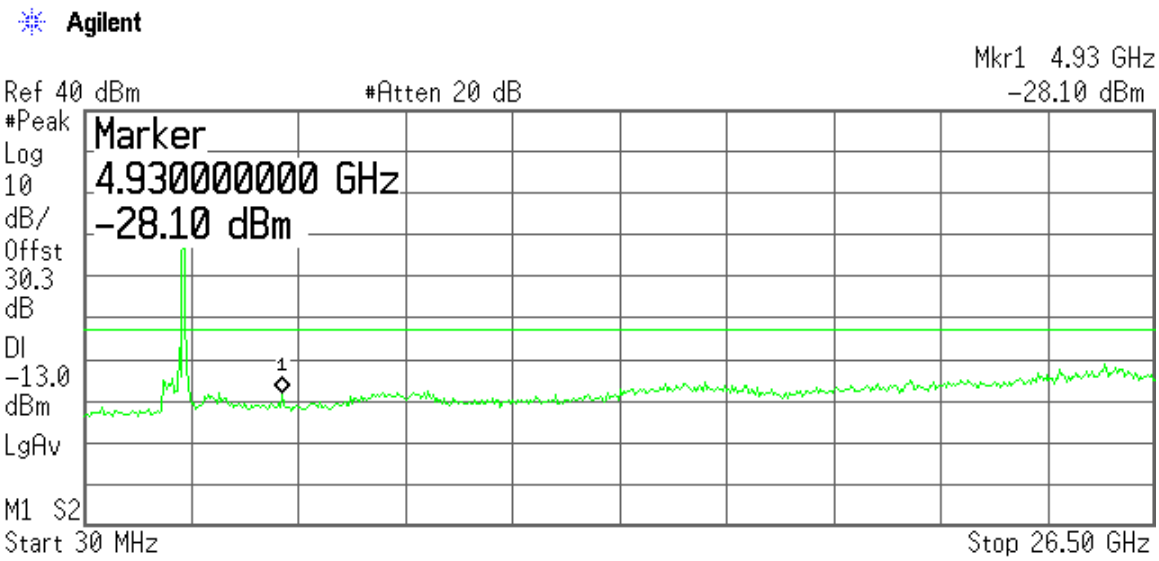
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



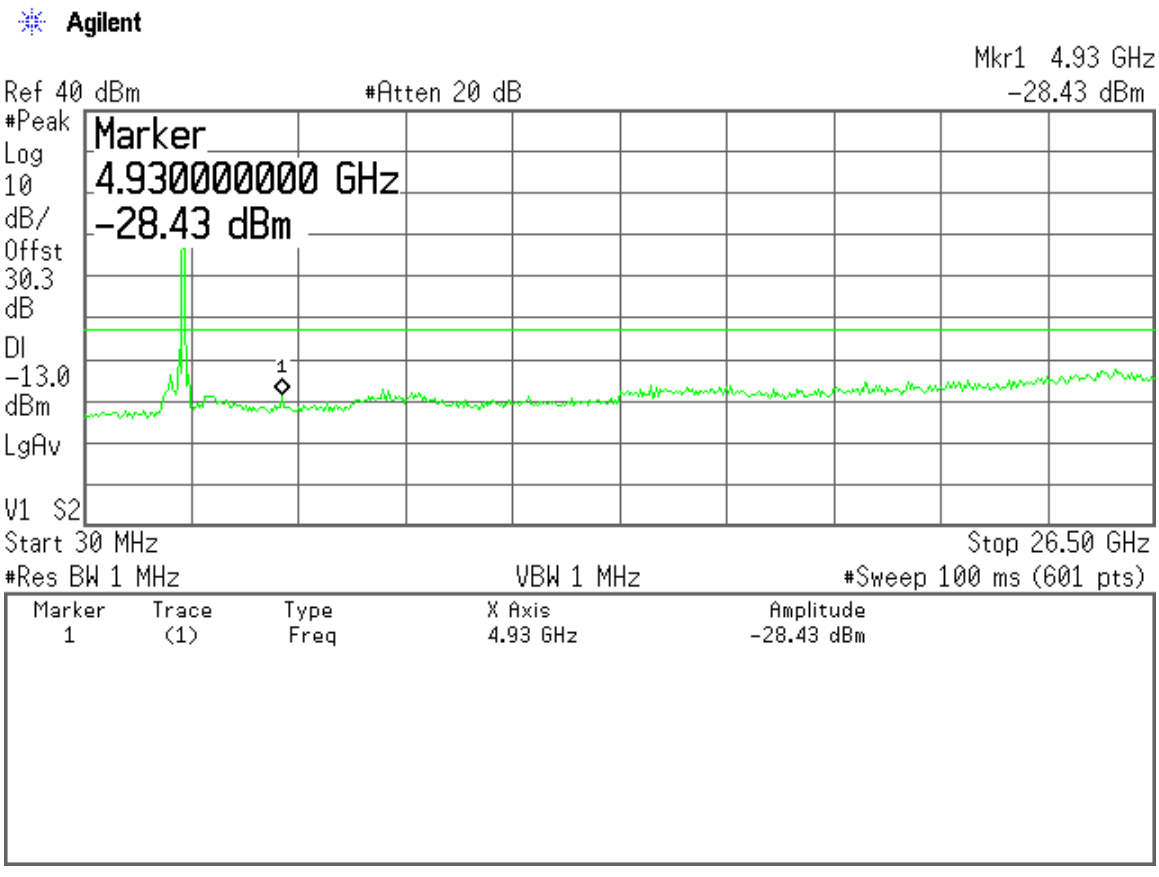
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



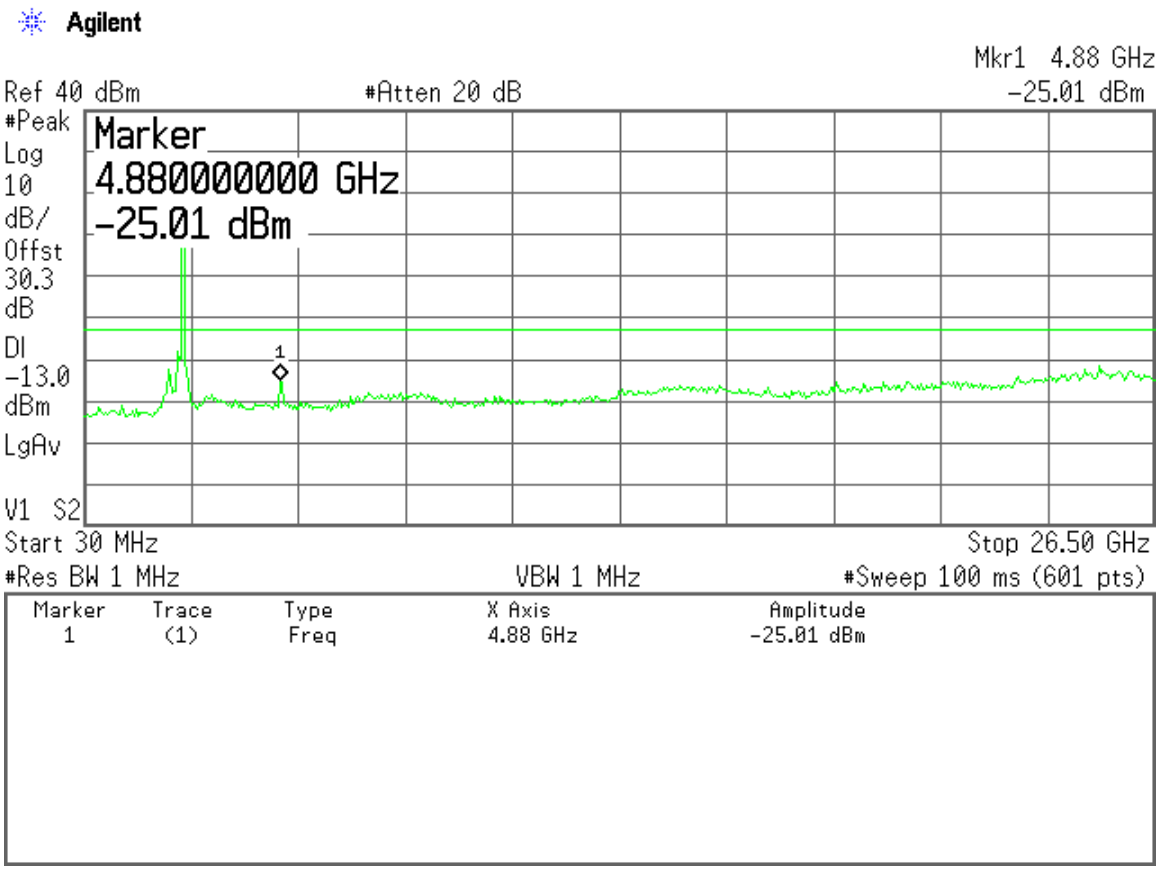
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**SPURIOUS: Low Power, QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



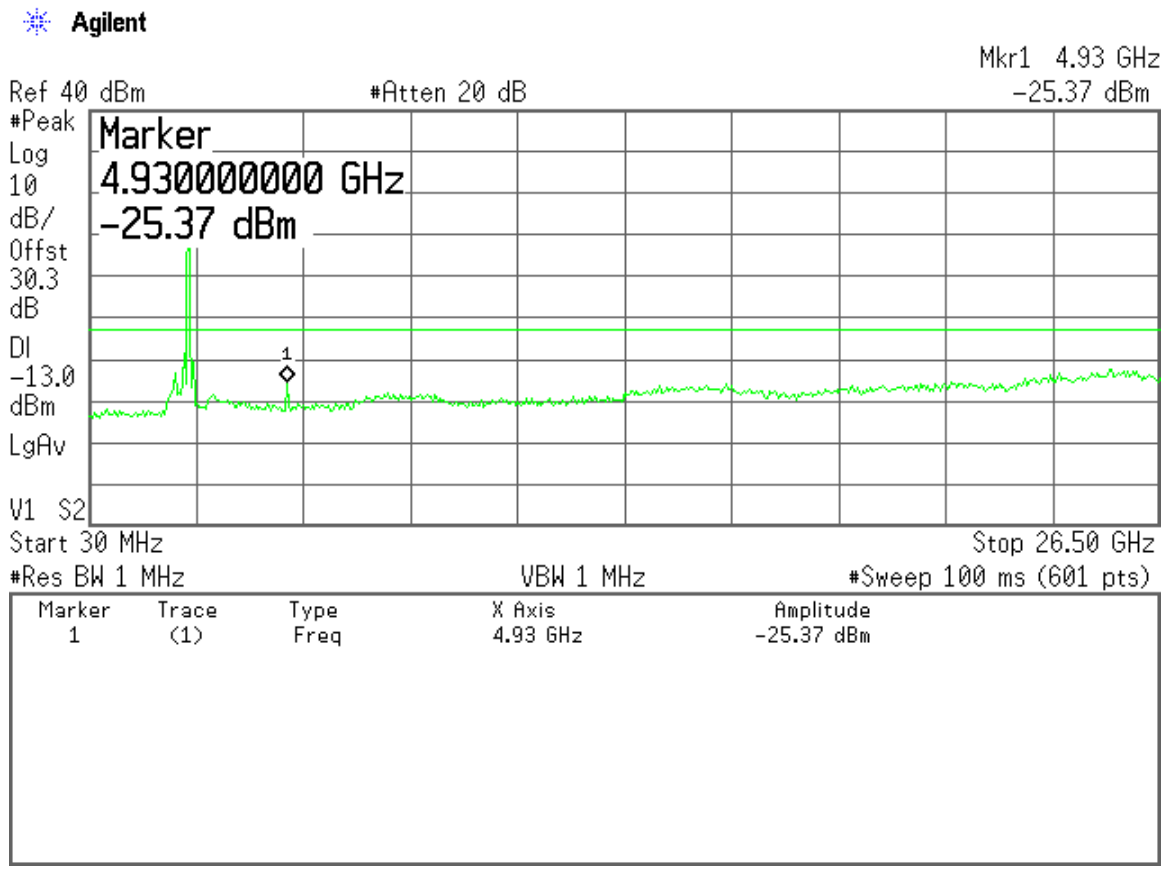
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**SPURIOUS: Low Power,16QAM Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



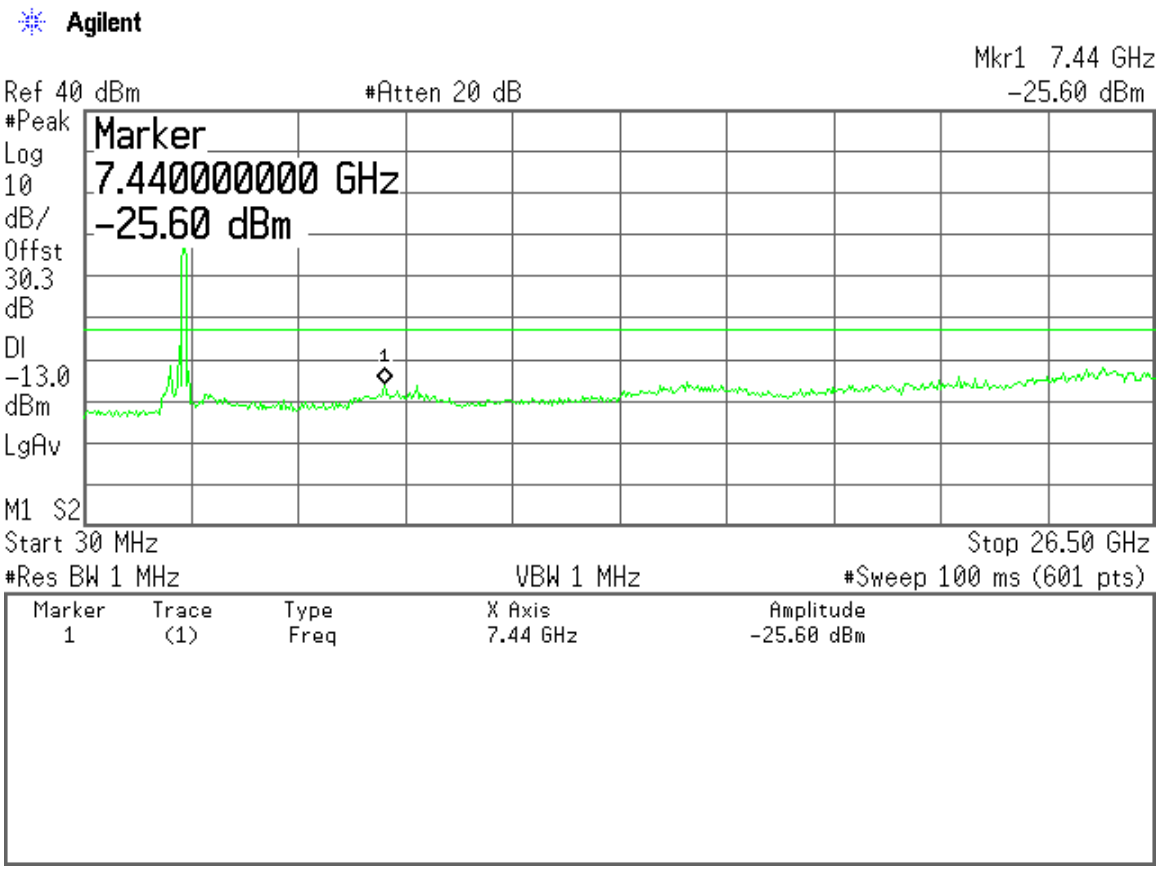
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**SPURIOUS: Low Power,16QAM Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



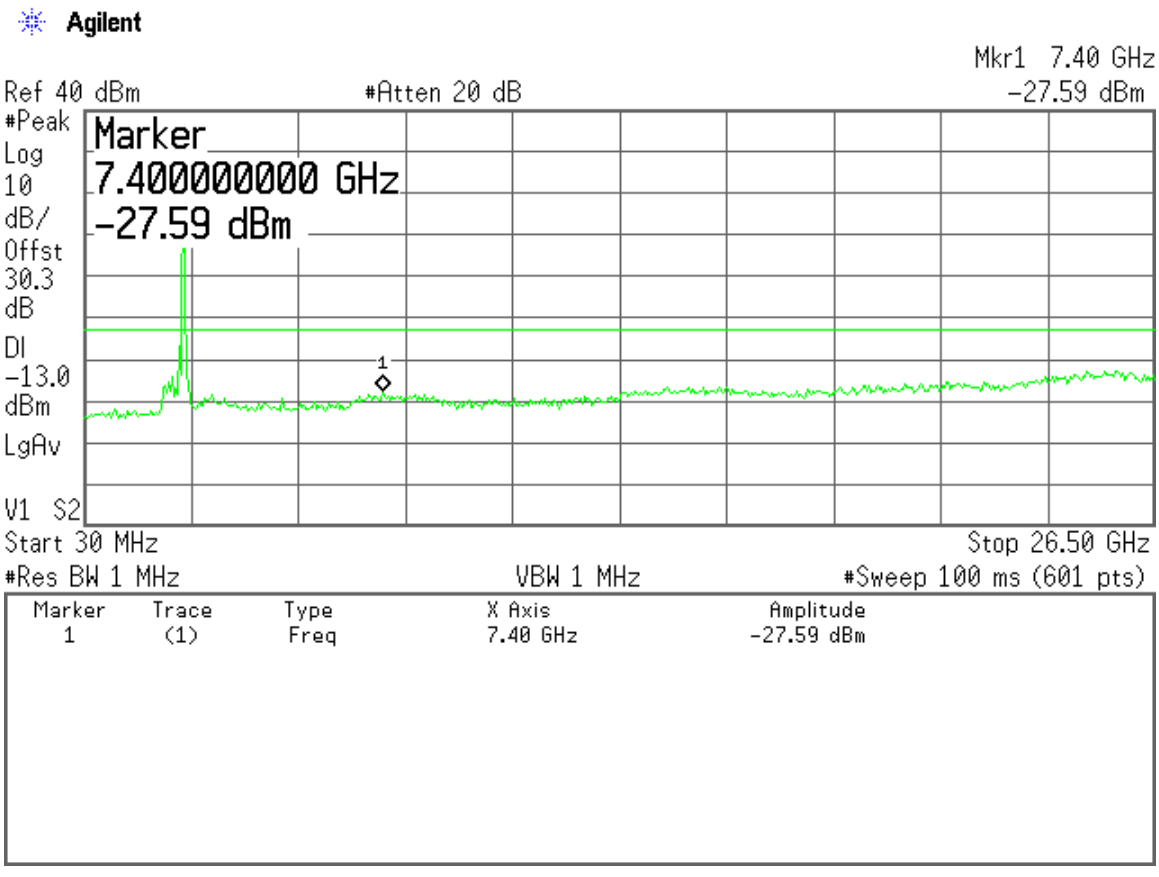
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**SPURIOUS: low Power, 16QAM Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



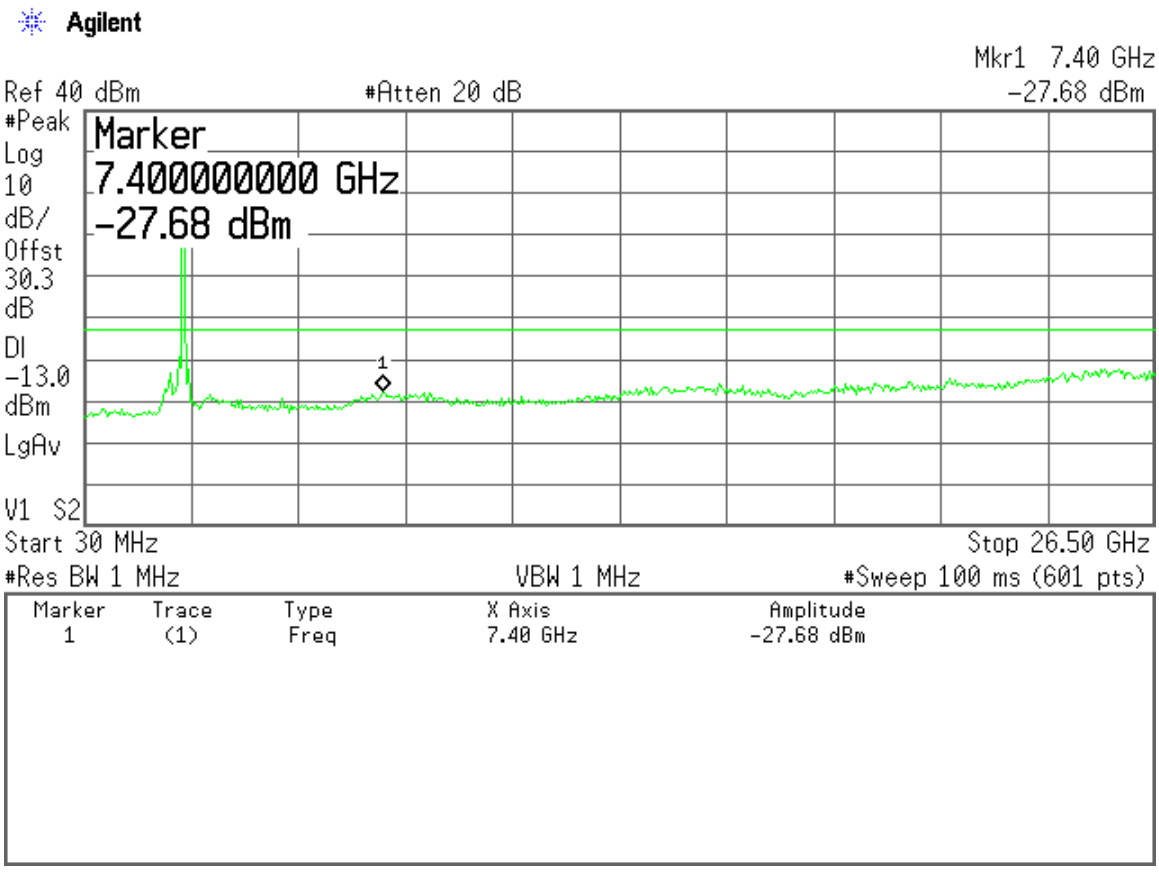
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**SPURIOUS: Low Power,16QAM Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Conducted Spurious: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**SPURIOUS: Low Power,16QAM Modulation, Mid CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



Section 6. Field Strength of Spurious

Name of Test:	*Field Strength of Spurious*	Test Standard:	*90.210/2.1053*
Tested By:	DAVID TU	Test Date:	08/07/2015-08/14/2015

Minimum Standard: Refer to Part 90.210:
Under section 90.210, the form of digital modulation used by the EUT is not explicitly included, consequently, Mask B would be appropriate.
(b) Emission Mask B. For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:
(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.
(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Method of Measurement: Per FCC KDB 971168 Sec. 7 &8

TIA/EIA-603-C-2004, Section 2.2.12
The antenna substitution method was used to determine the equivalent radiated power at spurious frequencies. The spurious emissions were measured at a distance of 3 meters. The EUT was then replaced with a reference substitution antenna with a known gain referenced to a dipole. This antenna was fed with a signal at the spurious frequency. The level of the signal was adjusted to repeat the previously measured level. The resulting ERP is the signal level fed to the reference antenna corrected for gain referenced to a dipole. The spectrum was investigated up to the 10 harmonics per 2.1057.

Test Result: **Complies**

Test Data: See Attached Table(s)

* The pre-scan investigation shows that different digital modulation mode has no evident effect on spurious measurements and the worst case is the QPSK modulation mode with 1.25MHz signal BW, which is chosen for final data collection.

Configuration	Spurious: QPSK Modulation
Band	2G Band: Channel BW=1.25MHz, Signal BW=1.25MHz
Channel	Low

Freq. (MHz)	H,V	SA Reading (dBuV)	SG Reading (dBm)	CL (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)	Margin (dB)
9808.30	H	47.5	-52.4	3.0	9.5	-48.05	-13	-35.05
12257.75	V	48.0	-53.3	4.2	12.3	-47.35	-13	-34.35

NO significant spurious which are under FCC limit by less than 20dB margin were founded.

NOTE:
*** Measured noise floor**
SA: Spectrum Analyzer
SG: Signal Generator
CL: SMA cable loss (6ft)

Worse case selected
H=horizontal and V=vertical
ERP = SG reading - CL + Gain (dBi)-2.15
Margin = ERP - Limit

Configuration	Spurious: QPSK Modulation
Band	2G Band: Channel BW=1.25MHz, Signal BW=1.25MHz
Channel	Middle

Freq. (MHz)	H,V	SA Reading (dBuV)	SG Reading (dBm)	CL (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)	Margin (dB)
9873.30	H	47.2	-52.0	3.1	9.1	-48.15	-13	-35.15
12330.00	V	48.3	-53.2	4.4	12.6	-47.15	-13	-34.15

NO other significant spurious which are under FCC limit by less than 20dB margin were founded.

NOTE:
*** Measured noise floor**
SA: Spectrum Analyzer
SG: Signal Generator
CL: SMA cable loss (6ft)

Worse case selected
H=horizontal and V=vertical
ERP = SG reading - CL + Gain (dBi)-2.15
Margin = ERP - Limit

Configuration	Spurious: QPSK Modulation
Band	2G Band: Channel BW=1.25MHz, Signal BW=1.25MHz
Channel	High

Freq. (MHz)	H,V	SA Reading (dBuV)	SG Reading (dBm)	CL (dB)	Gain (dBi)	ERP (dBm)	Limit (dBm)	Margin (dB)
9931.0	H	49.8	-50.0	3.2	9.1	-46.25	-13	-33.25
9939.3	V	48.4	-51.2	3.2	9.1	-47.45	-13	-34.45

NO Significant spurious which are under FCC limit by less than 20dB margin were founded.

NOTE:
*** Measured noise floor**
SA: Spectrum Analyzer
SG: Signal Generator
CL: SMA cable loss (6ft)

Worse case selected
H=horizontal and V=vertical
ERP = SG reading - CL + Gain (dBi)-2.15
Margin = ERP - Limit

Section 7. Emission Limitation Mask

Name of Test:	*Emission Mask*	Test Standard:	*90.210*
Tested By:	David Tu	Test Date:	08/07/2015-08/14/2015

Minimum Standard: *Refer to Part 90.210* Emission Masks

Under section 90.210, the form of digital modulation used by the EUT is not explicitly included, consequently, Mask B would be appropriate.

(b) *Emission Mask B.* For transmitters that are equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power (P) as follows:

(1) On any frequency removed from the assigned frequency by more than 50 percent, but not more than 100 percent of the authorized bandwidth: At least 25 dB.

(2) On any frequency removed from the assigned frequency by more than 100 percent, but not more than 250 percent of the authorized bandwidth: At least 35 dB.

(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 + 10 log (P) dB.

Method of Measurement: Per FCC KDB 971168 Sec. 6
Different Emission Masks were applied for
Channel BW / Signal Modulation BW
at power settings stated on Page 7.

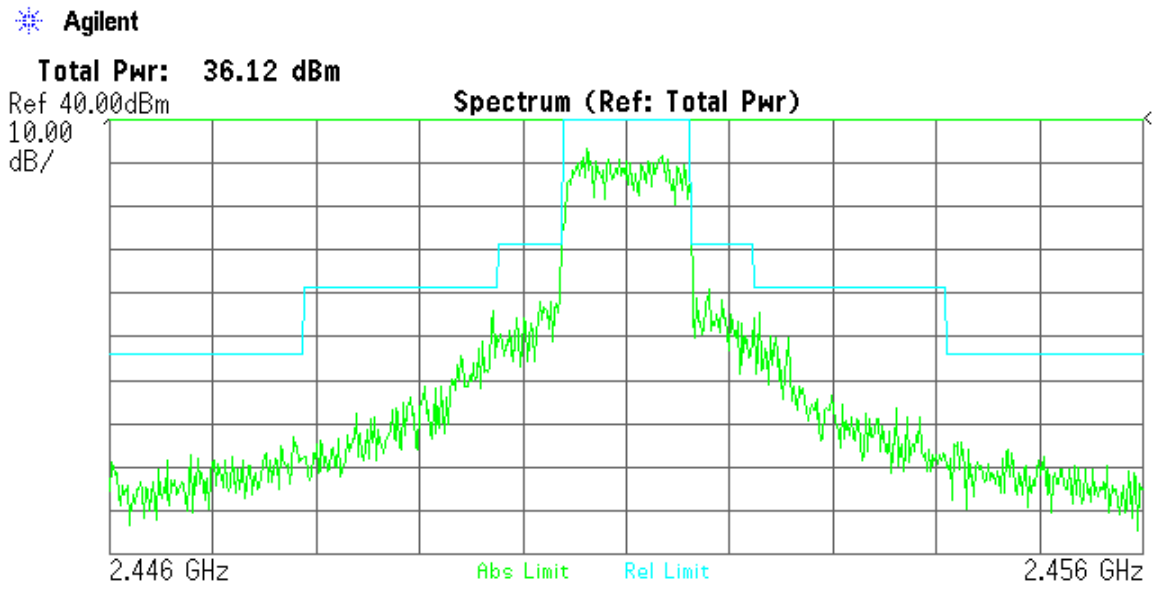
Test Result: **Complies**

Test Data: See Attached Table(s)

* Based on pretest data, there is no significant difference in this measurement between QPSK and 16QAM modulations

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=1.25/1.25 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

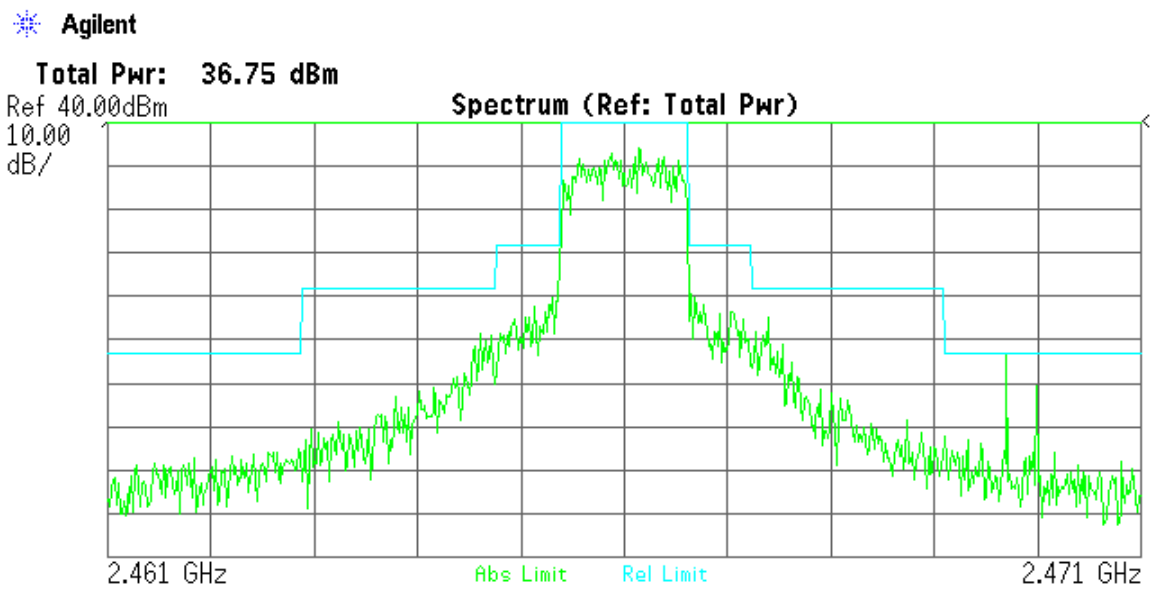


Total Pwr Ref: 36.12 dBm / 1.25000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
625.00 k	1.2500 M	30.000 k	9.20	2.4501 G	0.86	2.4516 G
1.2500 M	3.1250 M	30.000 k	-4.13	2.4495 G	-4.53	2.4520 G
3.1250 M	5.0000 M	30.000 k	-33.17	2.4475 G	-34.44	2.4540 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=1.25/1.25 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

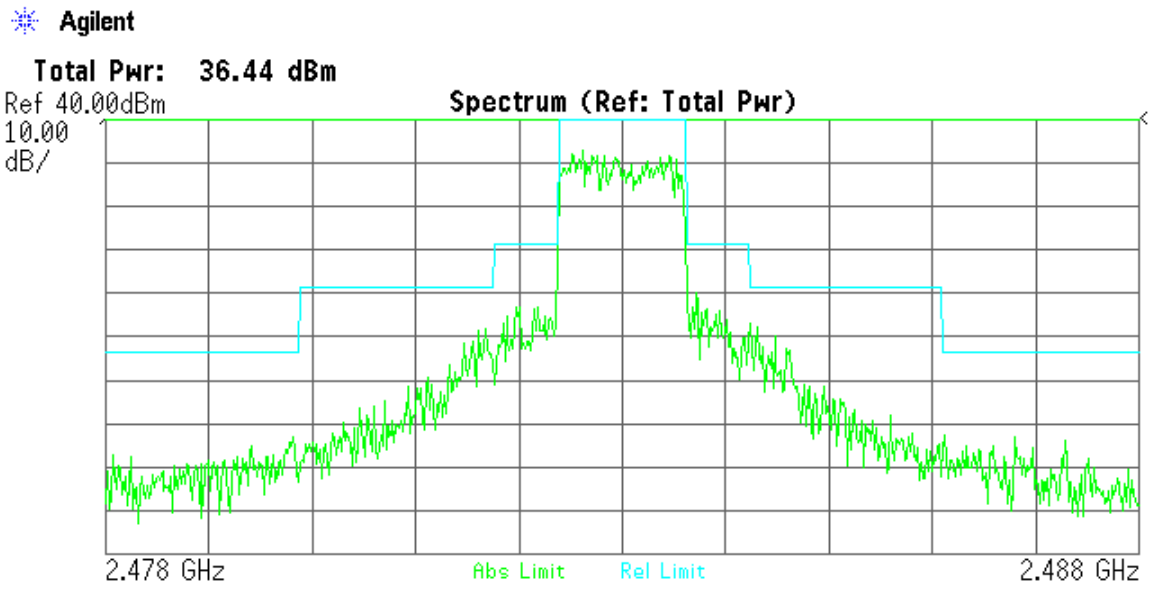


Total Pwr Ref: 36.75 dBm / 1.25000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
625.00 k	1.2500 M	30.000 k	8.57	2.4654 G	0.54	2.4666 G
1.2500 M	3.1250 M	30.000 k	-8.71	2.4646 G	-4.70	2.4674 G
3.1250 M	5.0000 M	30.000 k	-35.31	2.4628 G	-13.39	2.4697 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=1.25/1.25 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

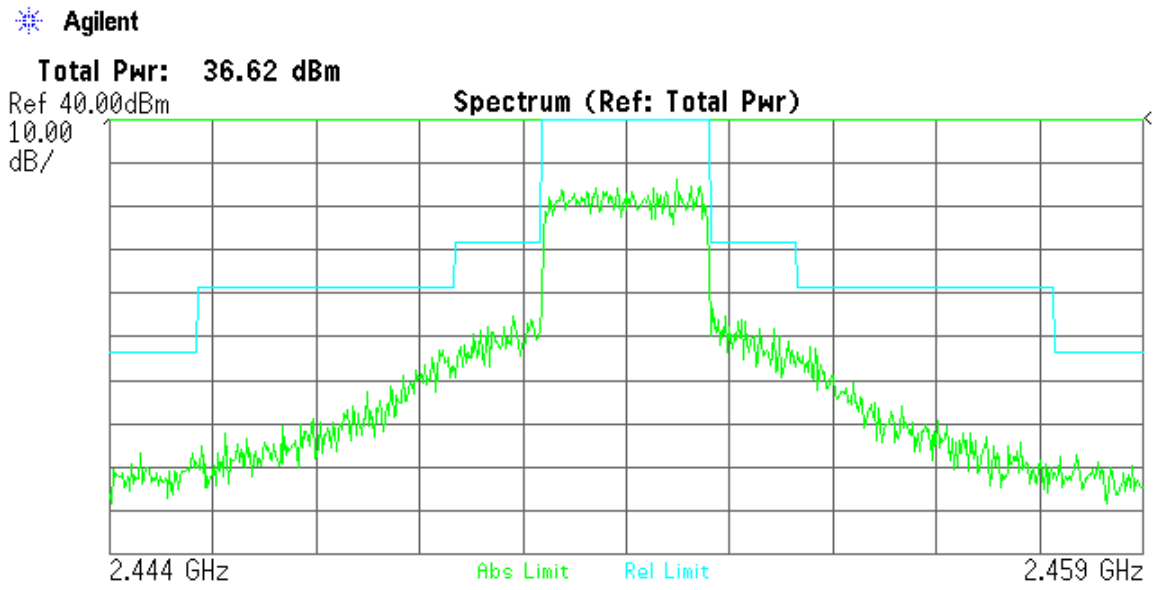


Total Pwr Ref: 36.44 dBm / 1.25000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
625.00 k	1.2500 M	30.000 k	8.47	2.4821 G	0.35	2.4835 G
1.2500 M	3.1250 M	30.000 k	-8.23	2.4814 G	-7.59	2.4841 G
3.1250 M	5.0000 M	30.000 k	-32.99	2.4796 G	-32.78	2.4859 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

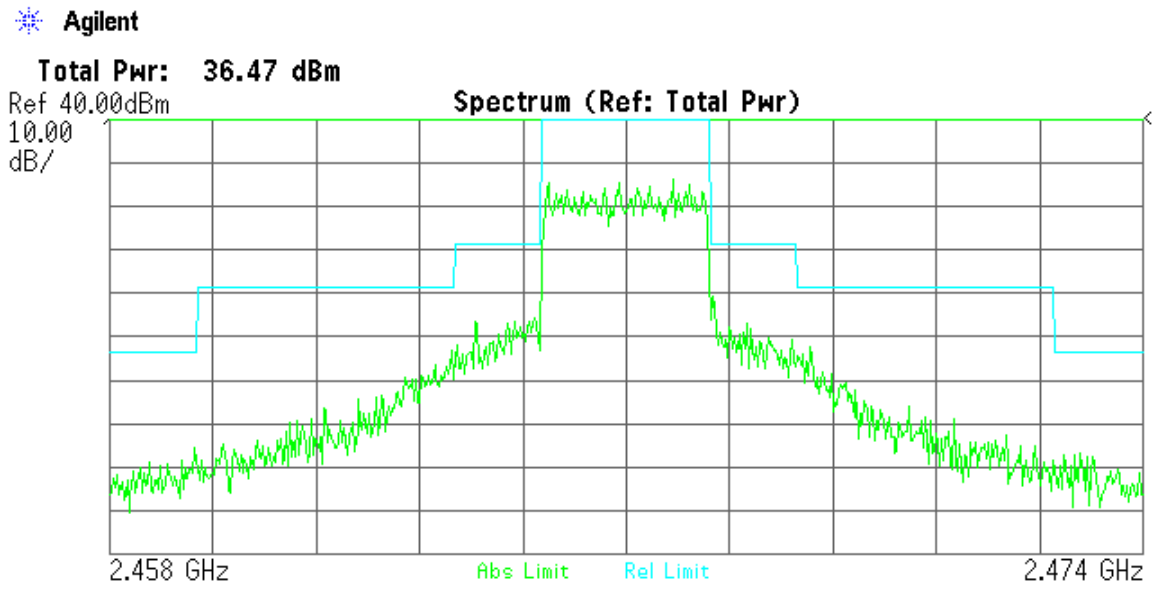


Total Pwr Ref: 36.62 dBm / 2.50000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
1.2500 M	2.5000 M	30.000 k	-5.38	2.4496 G	-3.40	2.4525 G
2.5000 M	6.2500 M	30.000 k	-13.10	2.4485 G	-12.45	2.4539 G
6.2500 M	7.5000 M	30.000 k	-36.57	2.4449 G	-37.21	2.4578 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

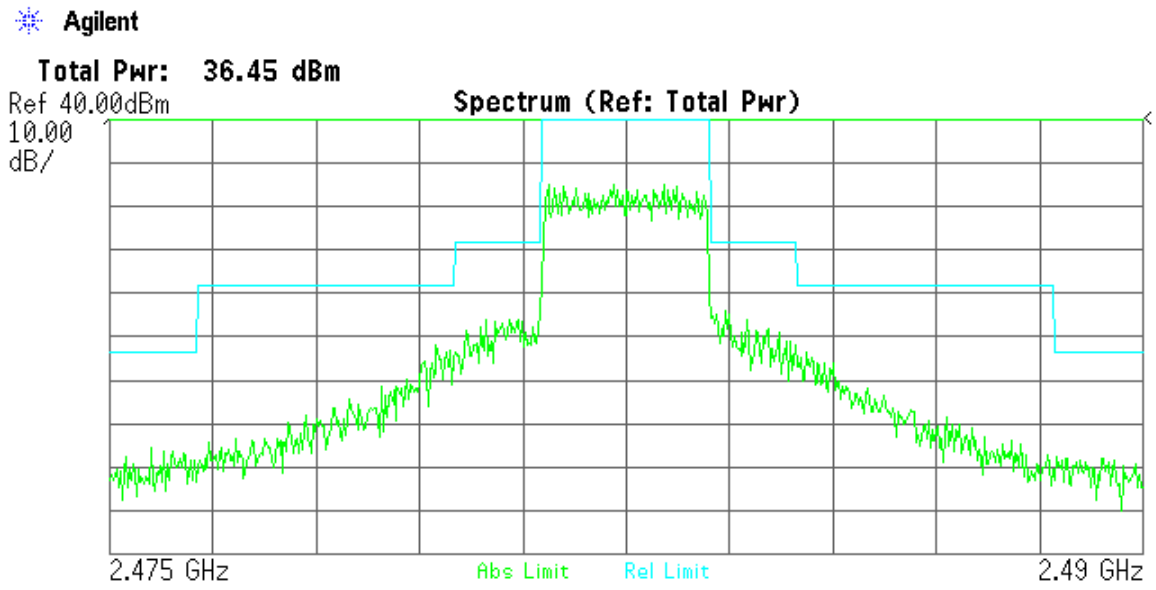


Total Pwr Ref: 36.47 dBm / 2.50000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
1.2500 M	2.5000 M	30.000 k	-5.63	2.4647 G	-0.80	2.4673 G
2.5000 M	6.2500 M	30.000 k	-13.11	2.4635 G	-12.48	2.4687 G
6.2500 M	7.5000 M	30.000 k	-35.49	2.4597 G	-36.85	2.4726 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=2.5/2.5 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

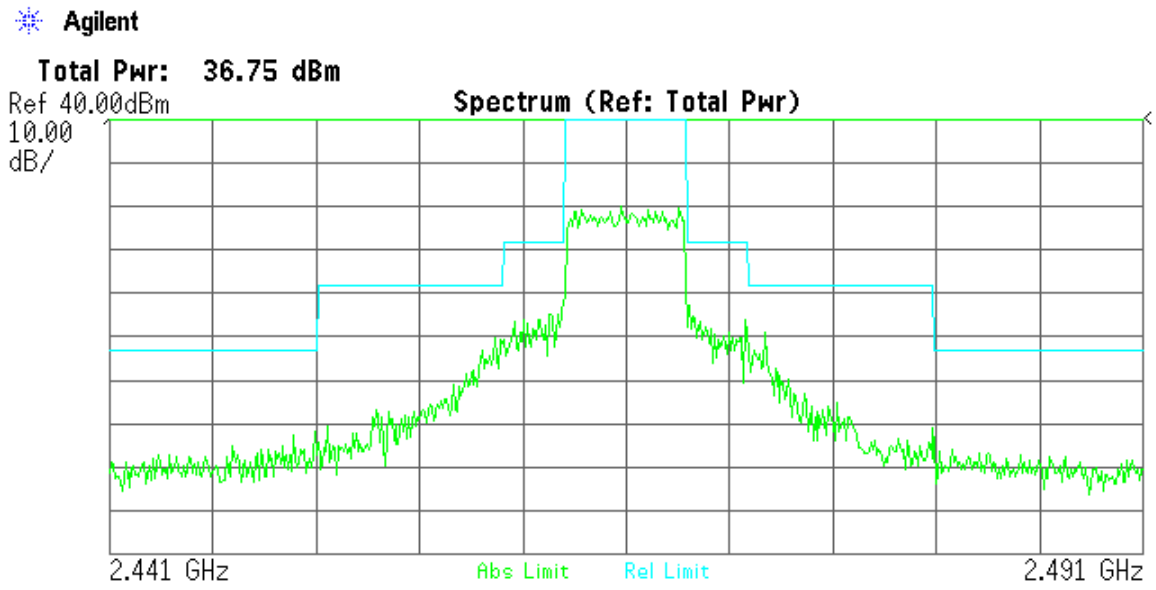


Total Pwr Ref: 36.45 dBm / 2.50000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
1.2500 M	2.5000 M	30.000 k	-6.14	2.4805 G	-4.09	2.4837 G
2.5000 M	6.2500 M	30.000 k	-11.78	2.4795 G	-13.67	2.4849 G
6.2500 M	7.5000 M	30.000 k	-35.33	2.4753 G	-37.72	2.4885 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

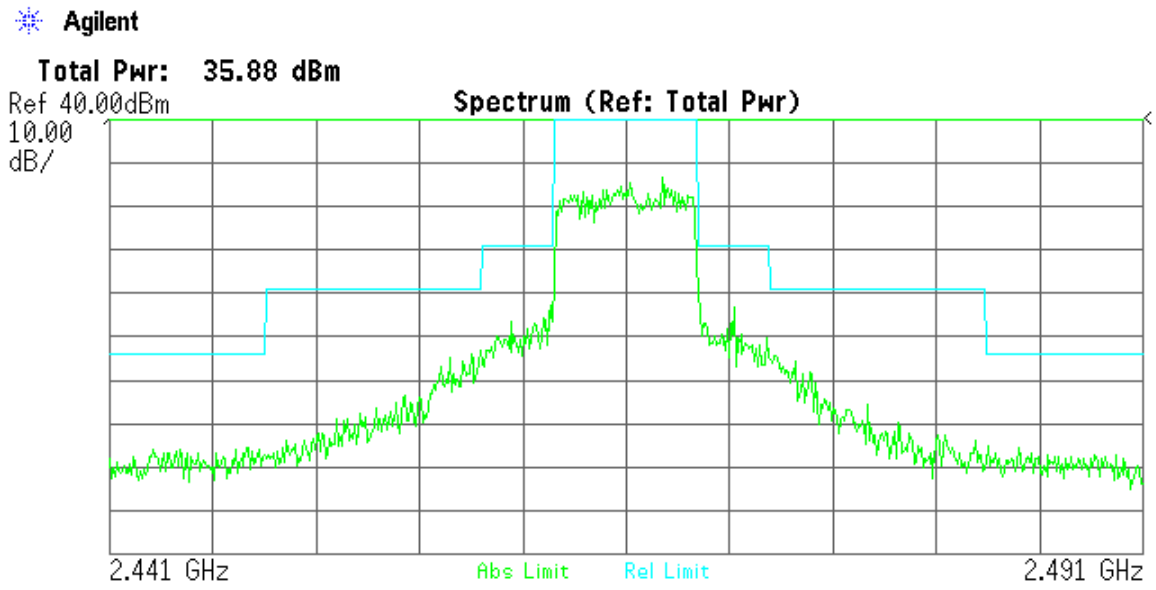


Total Pwr Ref: 36.75 dBm / 6.00000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
3.0000 M	6.0000 M	100.00 k	-1.56	2.4630 G	-2.72	2.4690 G
6.0000 M	15.000 M	100.00 k	-10.28	2.4596 G	-8.87	2.4727 G
15.000 M	25.000 M	100.00 k	-31.71	2.4509 G	-35.85	2.4818 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

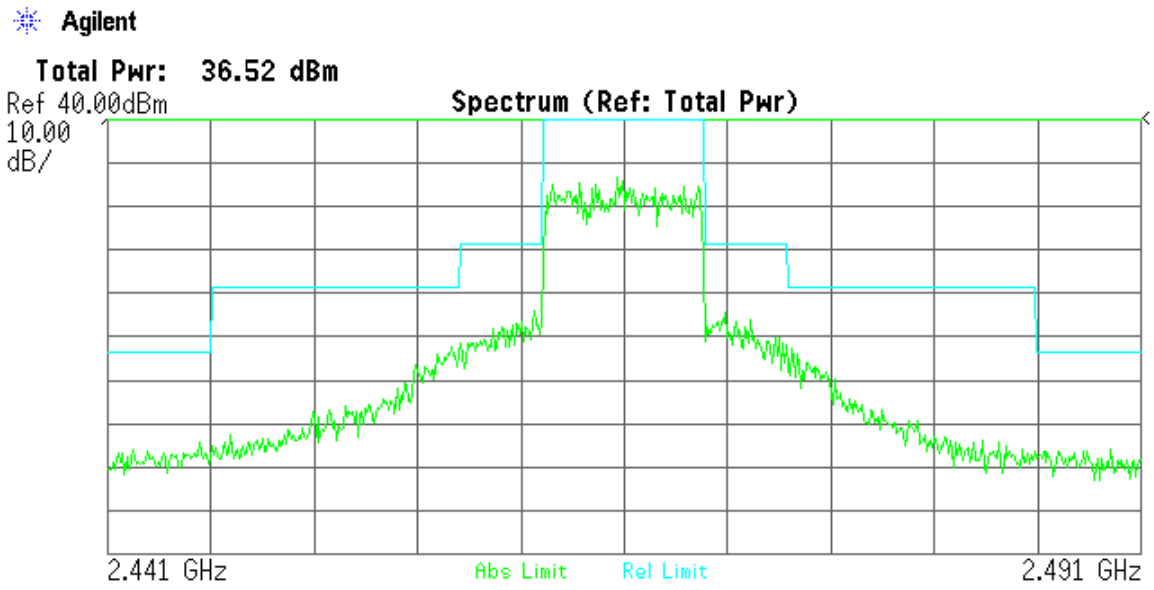


Total Pwr Ref: 35.88 dBm / 7.00000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
3.5000 M	7.0000 M	100.00 k	-2.79	2.4624 G	-3.26	2.4712 G
7.0000 M	17.500 M	100.00 k	-13.14	2.4590 G	-14.17	2.4731 G
17.500 M	25.000 M	100.00 k	-35.35	2.4477 G	-35.06	2.4835 G

Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**EM-MASK: QPSK Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT

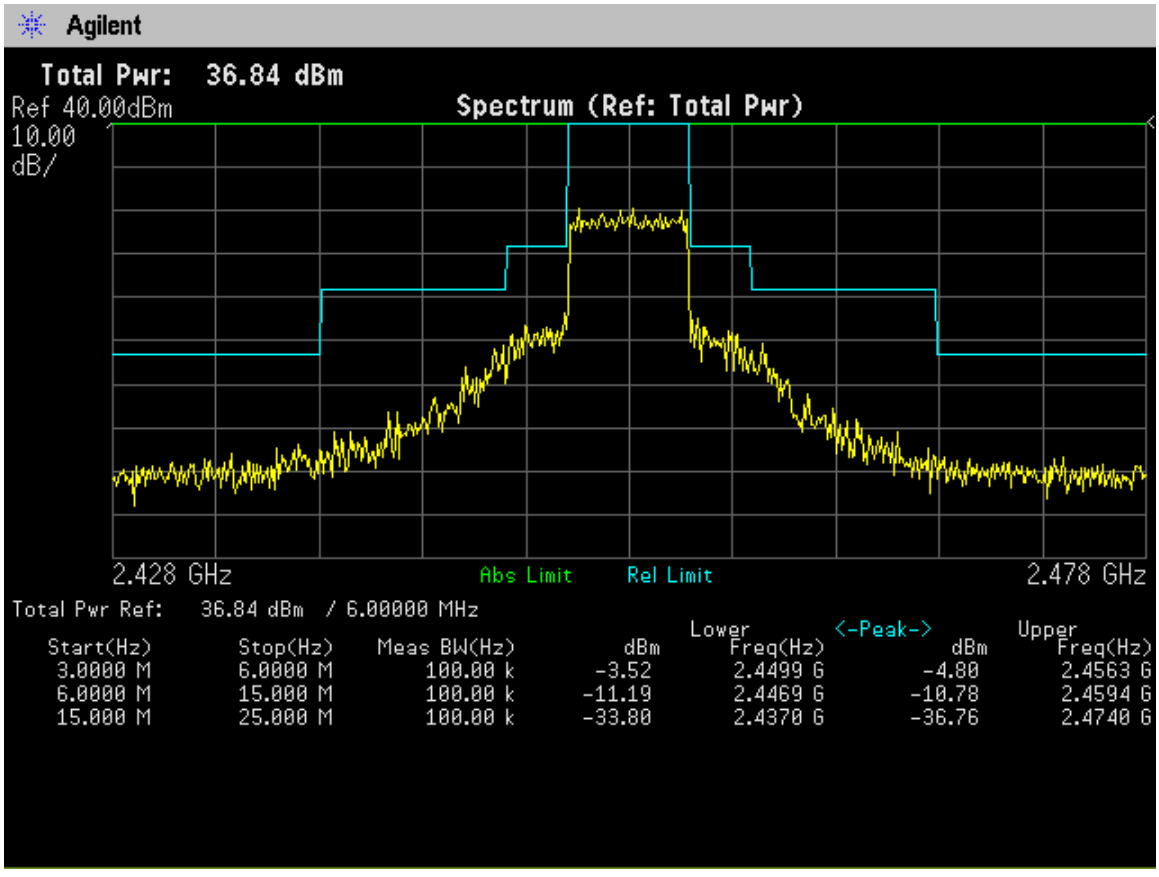


Total Pwr Ref: 36.52 dBm / 8.00000 MHz

Start(Hz)	Stop(Hz)	Meas BW(Hz)	Lower dBm	Lower Freq(Hz)	<-Peak-> dBm	Upper Freq(Hz)
4.0000 M	8.0000 M	100.00 k	-4.02	2.4616 G	-4.39	2.4709 G
8.0000 M	20.000 M	100.00 k	-12.36	2.4576 G	-12.86	2.4741 G
20.000 M	25.000 M	100.00 k	-34.47	2.4454 G	-36.06	2.4895 G

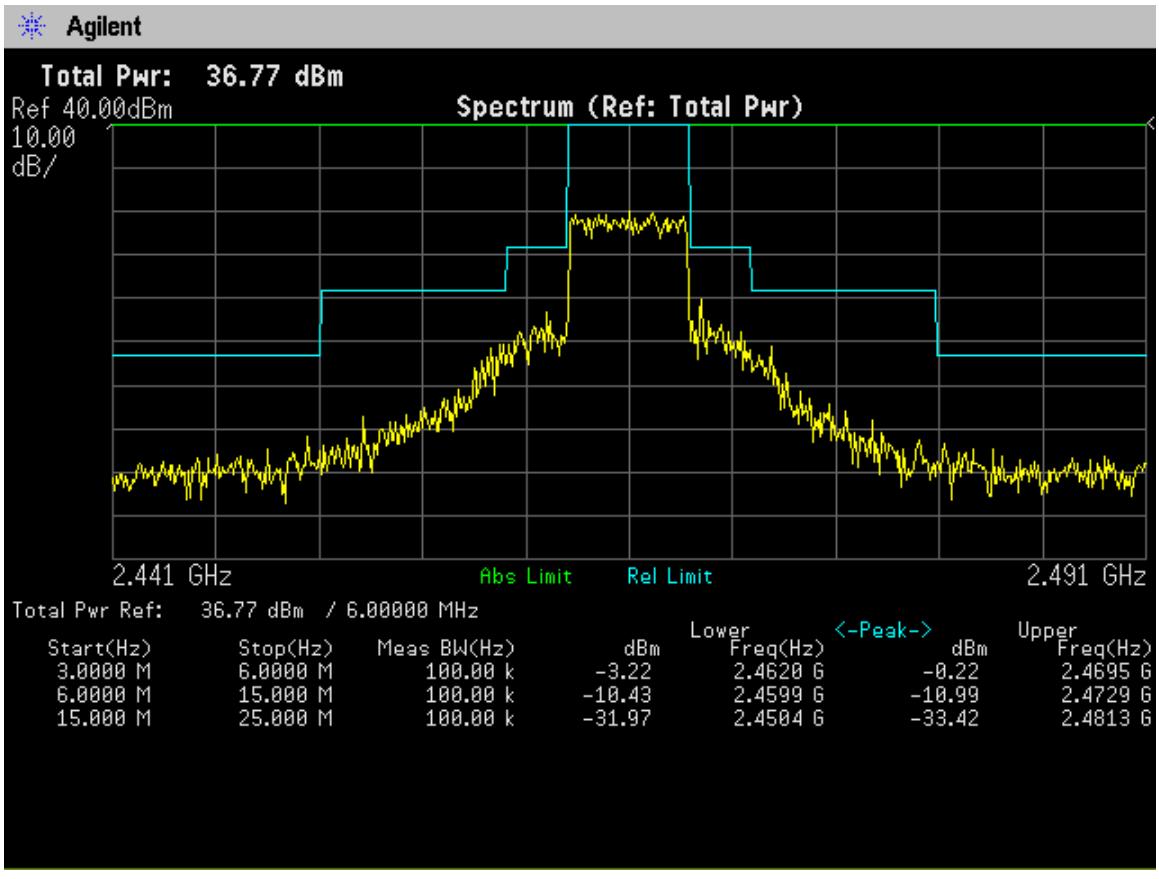
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



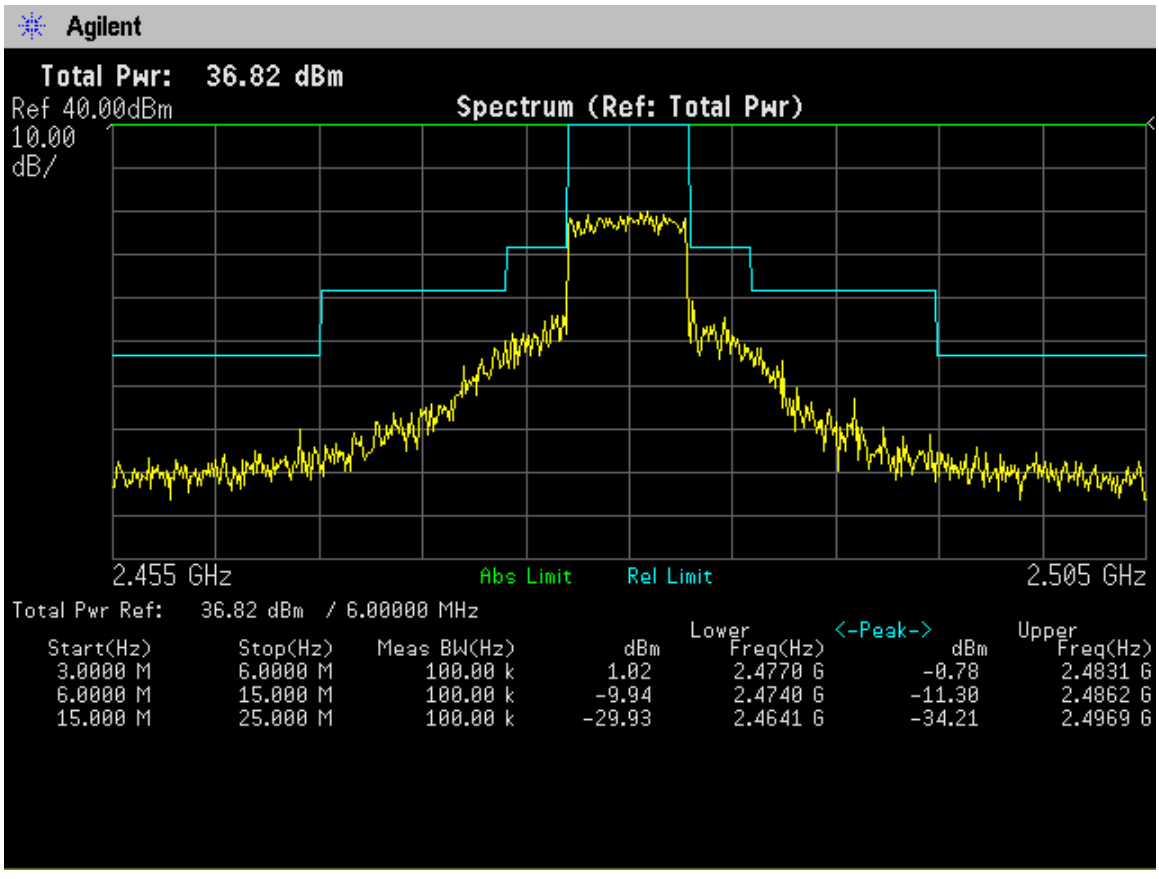
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



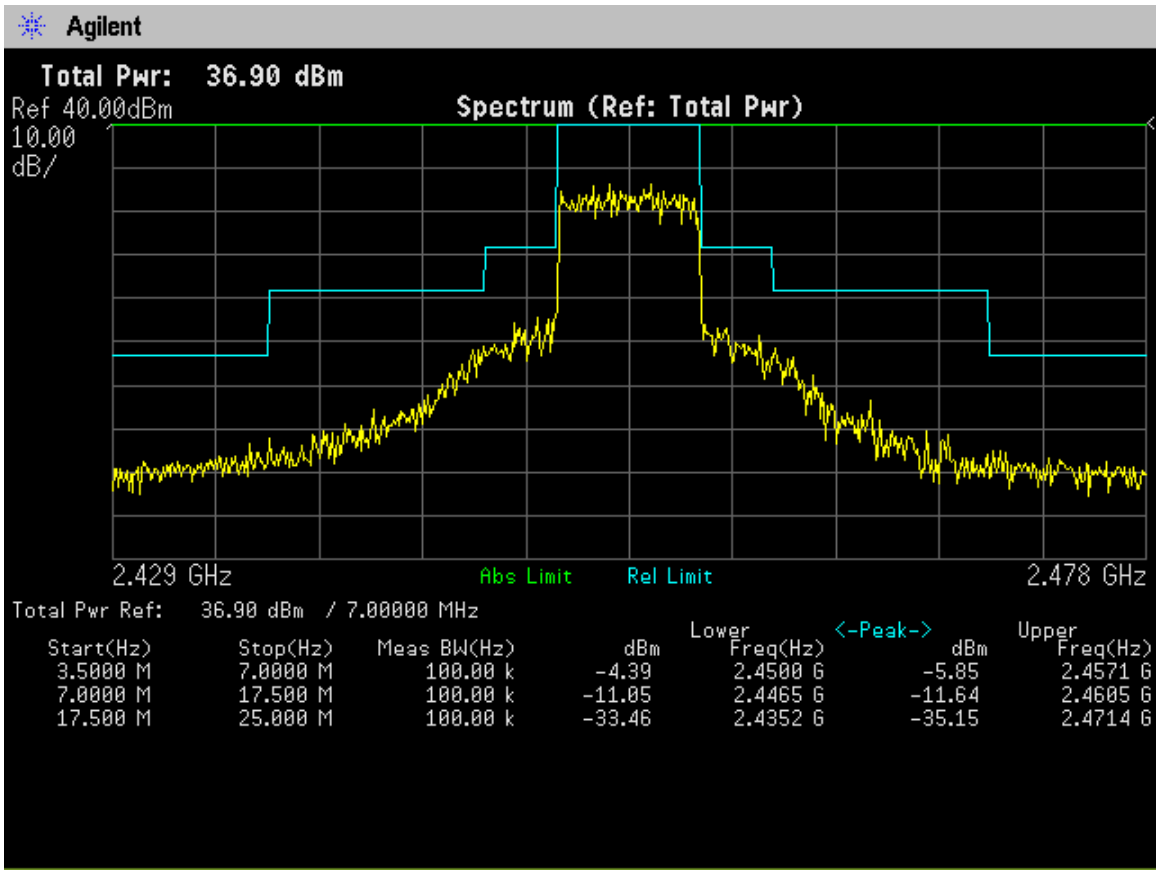
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=6.0/6.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



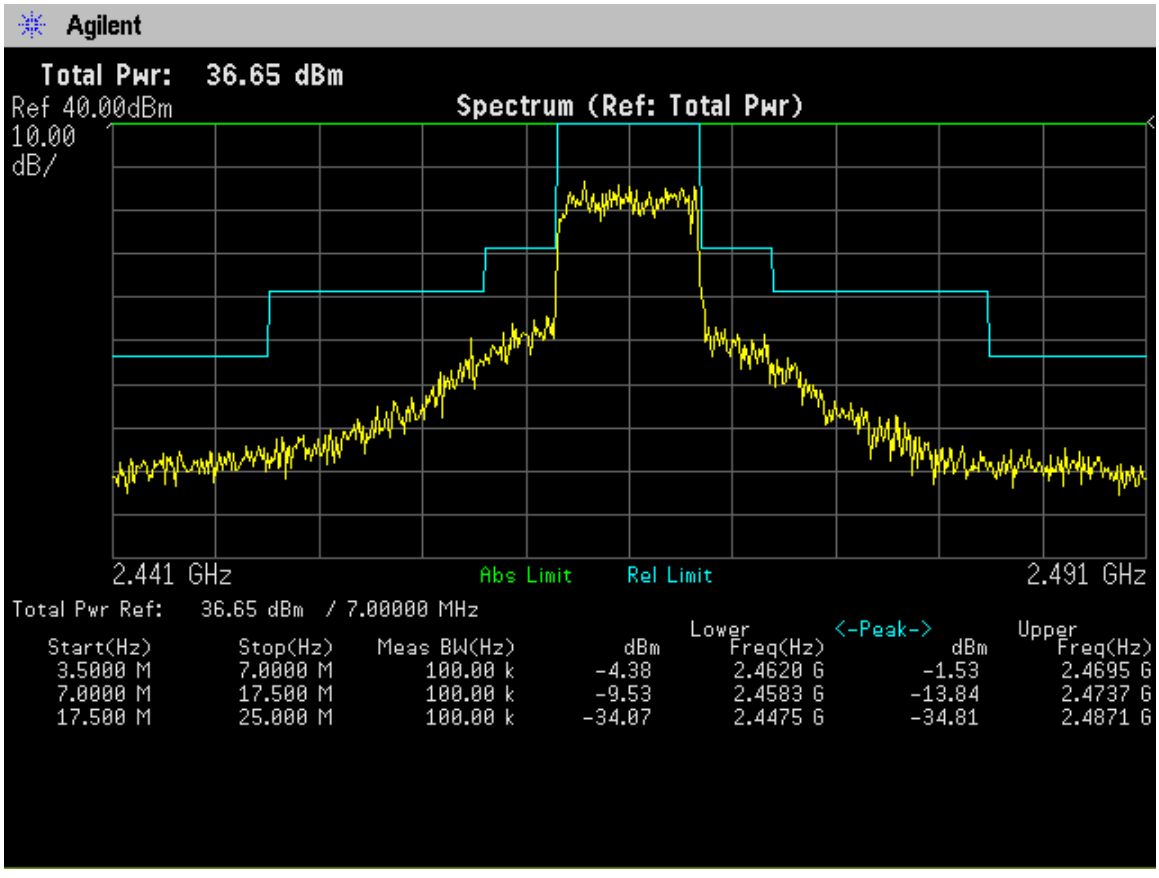
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



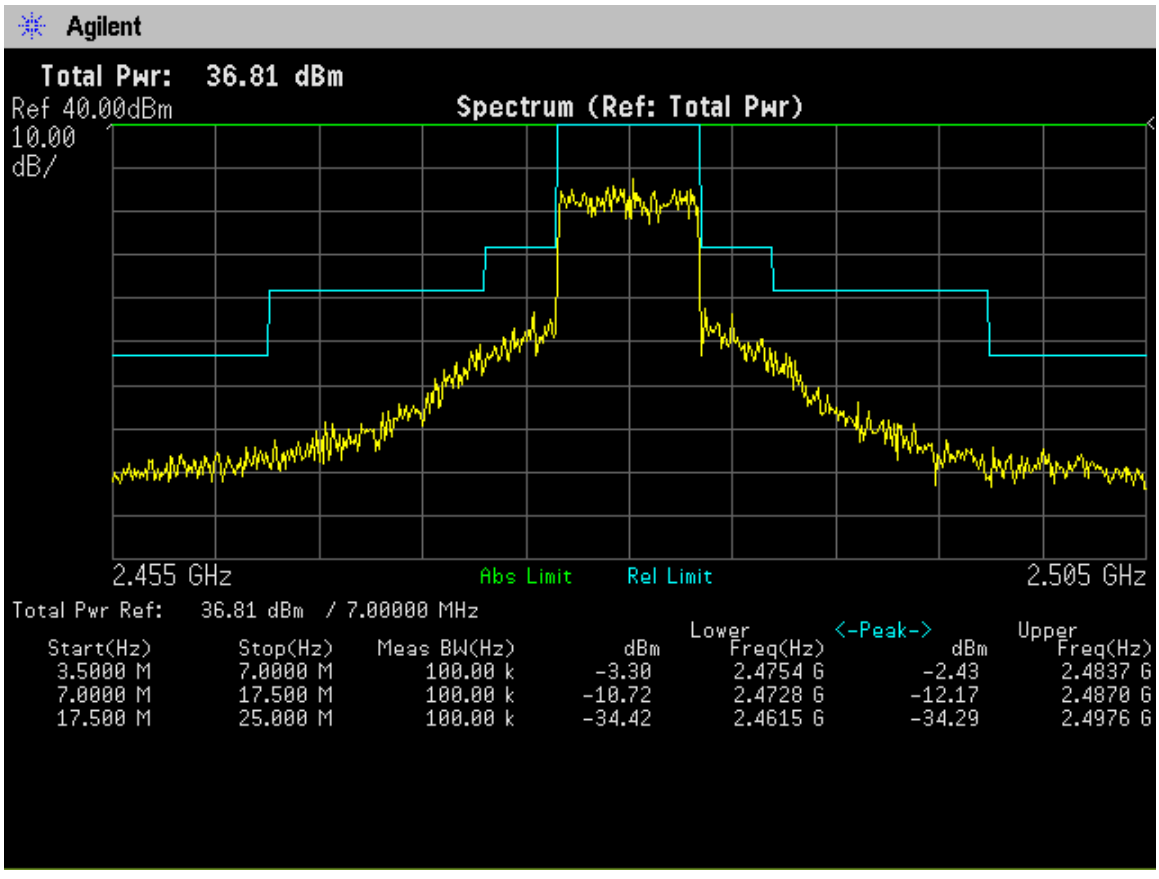
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



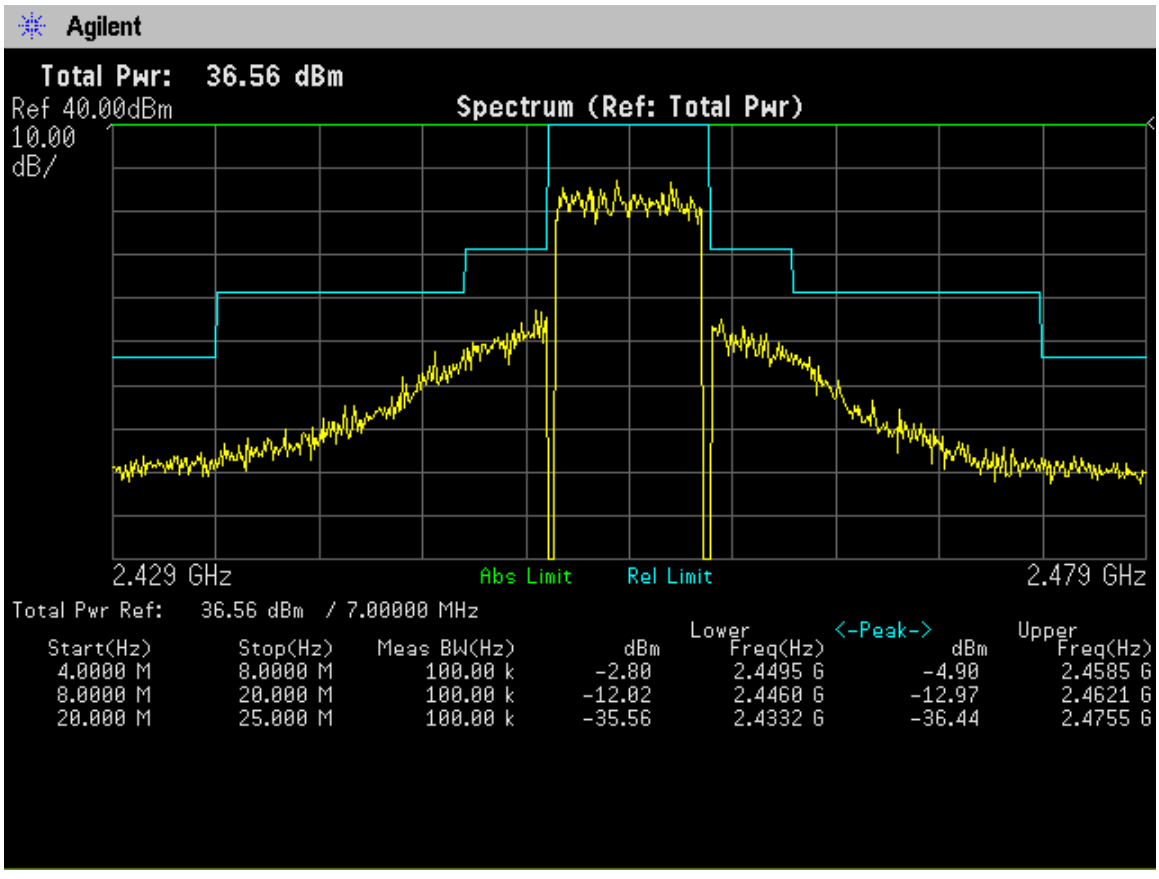
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=7.0/7.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



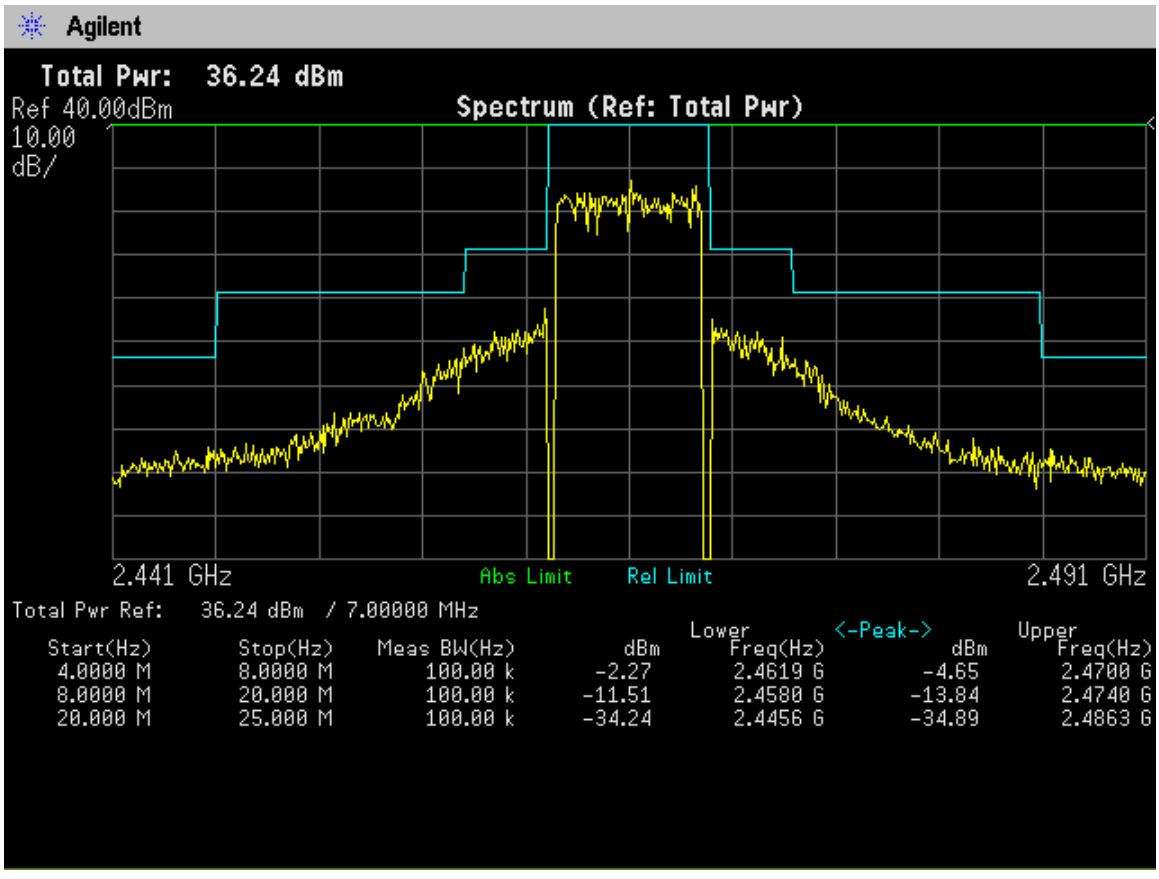
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Low CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



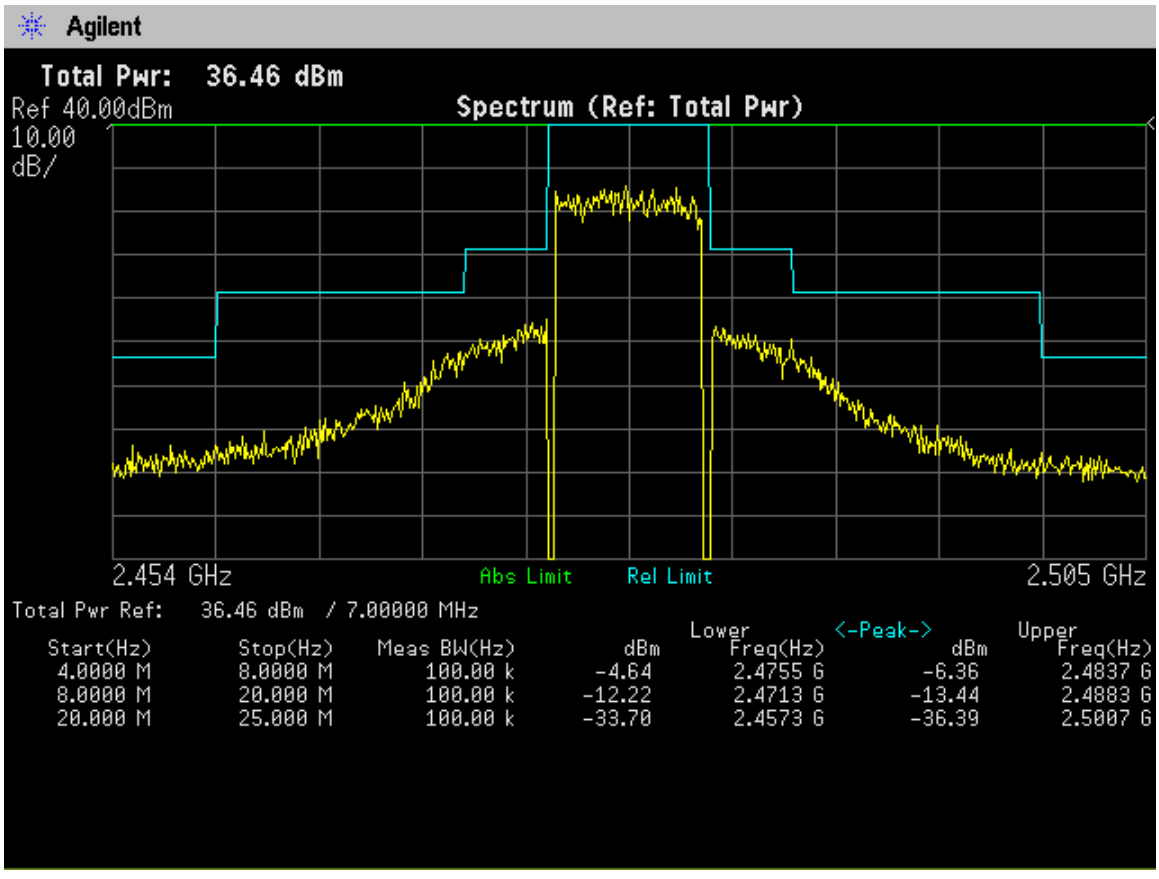
Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Mid-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



Project Number:	0048-150807-01
EUT:	IMT Very Small Transmitter 25VST-AMP
SN:	ENGUNIT002
Tested By:	Wei Li
Temperature:	70°F
Humidity:	30%

Section:	**Emission Mask: Channel BW / Signal Modulation BW=8.0/8.0 MHz**
Plot Name:	**EM-MASK: 16QAM Modulation, Hi-CH**
Configuration:	SG Input: Color Bar. Output Port: EUT



Section 8. Frequency Stability

Name of Test:	*Frequency Stability*	Test Standard:	*90.213/2.1055*
Tested By:	WEI LI	Test Date:	08/07/2015-08/14/2015

Minimum Standard: Refer to Part 90.213/2.1055
Frequency Stability vs Temperature Variation and Power Supply Voltage Variation.

Frequency Band (MHz)	Maximum Frequency Tolerance(%)
1,990 to 2,110	0.005 (50ppm)
2,450 to 2,483.5	0.001 (10ppm)
6,425 to 6,525	0.005 (50ppm)
6,875 to 7,125	0.005 (50ppm)
12,700 to 13,250	0.005 (50ppm)

Method of Measurement: Per FCC KDB 971168 Sec. 9
Frequency Stability With Voltage Variation:
The E.U.T. is placed in an environmental chamber and allowed to stabilize at +20 degrees Celsius for at least 15 minutes. Set SA resolution bandwidth low enough (30Hz) to obtain the desired frequency resolution. (Using frequency counter method: The frequency counter and signal generator are phase locked with the same 10 MHz reference frequency by connecting the 10 MHz ref. out of the counter to the 10MHz ref, in of the signal generator). With the voltage input to the E.U.T. set to 85% S.T.V., the frequency is measured in 30 second intervals for a period of 5 minutes. This procedure is repeated at 100% S.T.V. and 115% S.T.V.

Frequency Stability With Temperature Variation:
The input voltage to the E.U.T. is set to S.T.V. and the temperature of the environmental chamber is varied in 10 degree steps from -30 degrees C to +50 degrees C (+60 degree per manufacturer's spec.). The E.U.T. is allowed to stabilize at each temperature and the frequency is measured in 30 second intervals for a period of 5 minutes.

Test Result: **Complies**

Test Data: See Attached Table(s)

* The modulation modes have no evident effect on frequency stability measurements. EUT was set in CW mode for final data collection.

8.1. Frequency Stability vs . Voltage

Nominal voltage =12Vdc, 85% &115% of S.T.V. , T=25C, Nominal Middle channel frequency =2466.00MHz

	Voltage	Freq-Hz	Error-ppm	Limit(ppm)
85% Nominal	10.2	2466003238	1.313057583	10
Normal	12	2466003210	1.301703163	10
115% Nominal	13.8	2466003232	1.310624493	10

8.2. Frequency Stability vs. Temperature

Nominal voltage =12Vdc, Nominal Middle channel frequency =2466.000MHz

Temperature ©	Measured Frequency (Hz)	Frequency Error (Hz)	Error in ppm	Limit
-20	2466002973	2973	1.205596107	10
-10	2466003070	3070	1.244931062	10
0	2466003423	3423	1.388077859	10
10	2466003509	3509	1.422952149	10
20	2466003212	3212	1.302514193	10
30	2466002940	2940	1.192214112	10
40	2466002814	2814	1.141119221	10
50	2466002705	2705	1.096918086	10
60	2466002803	2803	1.136658556	10

Section 9. Maximum Permissible Exposure

MPE estimate is given per 2.1091 of FCC Rules:

Given

$E = \sqrt{(30 * P * G)} / d$

and

$S = E^2 / 3770$

where

E = Field Strength in Volts/meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power Density in milliwatts/square centimeter

Combining equations and rearranging the terms to express the distance as a function of the remaining variables yields:

$d = \sqrt{((30 * P * G) / (3770 * S))}$

Changing to units of Power to mW and Distance to cm, using:

P (mW) = P (W) / 1000 and
d (cm) =100 * d (m)

yields

$d = 100 * \sqrt{((30 * (P / 1000) * G) / (3770 * S))}$
$d = 0.282 * \sqrt{(P * G / S)}$

where

d = distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power Density in mW/cm^2

Substituting the logarithmic form of power and gain using:

P (mW) = 10 ^ (P (dBm) / 10) and
G (numeric) = 10 ^ (G (dBi) / 10)

yields

$d = 0.282 * 10^{((P + G) / 20)} / \sqrt{S}$ Equation (1)

$S = 0.0796 * 10^{((P + G)/10)} / d^2$ Equation (2)

where

d = MPE distance in cm
P = Power in dBm
G = Antenna Gain in dBi
S = Power Density Limit in mW/cm^2

Equation (1) and the measured peak power is used to calculate the MPE distance.
Equation (2) and the measured peak power is used to calculate the Power density.

Limit:

$S=1.0$ mW/cm^2 for public (un-controlled environment)*.
$S=5.0$ mW/cm^2 for professional (controlled environment)

*1mW/ cm^2 is the reference level for general public exposure according to the OET Bulletin 65, Edition 97-01 Table 1.

Results:

This EUT shall comply with RF exposure requirements stated in FCC KDB865664 section 2. and KDB447498 section 7.

For this product, typical max. gain of antenna G=2.6dBi, with P=37dBm, using formula (1) or (2),

Minimum MPE distance while S=1mW/ cm^2, d= 26.93 cm. S=5mW/ cm^2, d= 12cm.

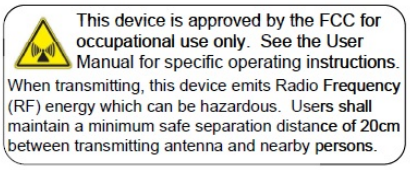
The intended and expected application for this product is for installation in an unmanned ground vehicle.

For mobile device, minimum d=20cm, per formula (2), S=1.825mW/ cm^2. This will meet the requirement for professional / controlled environment application.

The following information shall be included in user manual:

By FCC definition, a mobile transmitter installation requires a minimum safe separation distance of 20cm between a transmitting antenna and any person. The 25VST-AMP has been designed to comply with FCC RF exposure regulations for occupational/controlled-environment conditions at this separation distance when an antenna with gain not exceeding 2.5dBi is installed. This is the maximum antenna gain that can be used consistent with the approval granted to this device. Higher gain antennas shall not be used, and users shall verify that the proper antenna has been installed before commencing transmitter operation. The antenna used for this transmitter must be installed to provide a separation distance of 20cm from all persons, and must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures. In the event that the transmitter is not visible to the user when installed, a warning label requiring this separation distance shall be placed in a prominent and visible location adjacent to the transmitting antenna. Please contact IMT to procure additional labels if needed.
As noted above, this device is intended for use only by trained occupational/professional staff and only in a work-related use condition. Users of this device shall be made fully aware that the transmitter produces RF energy, and shall be able to exercise control over their exposure to RF energy from this device. RF Exposure allowable limits are higher in occupational/controlled-environment conditions as a result of the foregoing conditions. Consequently, the foregoing awareness and control conditions shall be strictly maintained.

The RF Exposure compliance label shall be affixed to EUT:



NOTE: For mobile or fixed location transmitters, the minimum separation distance is 20 cm, even if calculations indicate that the MPE distance would be less.

Section 10. Test Equipment List

Manufacturer	Model	Serial No.	Description	Last Cal mm/dd/yy	Cal Due mm/dd/yy
Agilent	E4440A	US40420700	3Hz-26.5GHz Spec. Analyzer	6/06/14	6/06/16
R &S	ESPI	100018	9KHz-7GHz EMI Receiver	8/25/14	8/25/16
HP	HP8546A	3448A00290	9kHz to 6.5GHz EMI Receiver	10/16/14	10/16/15
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	10/19/14	10/19/16
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	10/19/14	10/19/16
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	8/28/14	8/28/16
EMCO	3115	4945	Double Ridge Guide Horn Antenna	10/17/14	10/17/16
ARA	MWH-1826/B	1013	18-26GHZ Horn Antena	10/02/14	10/2/2016
R&S	SMH	8942280/010	Signal Generator	8/25/14	8/25/16
RES-NET	RFA500NFF30	0108	30dB in-line Power Attenuator	*	
Lorch Microwave	5NF-800/1000-S	AC3	Notch Filter	*	
Lorch Microwave	5NF-1800/2200-S	AE10	Notch Filter	*	
Narda	3022	80986	Directional Coupler	*	
Lorch Microwave	5NF-800/1000-S	AC3	Notch Filter	*	

All Test Equipment Used are Calibrated Traceable to NIST Standards. Calibration Interval: 2 Year.

* Functional Check and verified before each usage.