



FCC- TEST REPORT

Report Number : **68.760.14.135.01** Date of Issue: 4 August 2014

Model : WAG M12

Product Type : Wireless audio gateway with wireless PTT for communication radios

Applicant : Titan Communications systems Aps

Address : Skovlytoften 26B, st. DK - 2840 Holte

Manufacturer : Vintech Corporation

Address : 12B,Jinshun Building ,No.287, Ruyi Road ,Longgang District,Shenzhen.

Test Result : **Positive** **Negative**

Total pages including
Appendices : 24

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2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
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FCC Registration No.: 934118

Telephone: 86 755 3366 3308
Fax: 86 755 3366 3309

3 Description of the Equipment under Test

Description of the Equipment Under Test

Product:	Wireless audio gateway with wireless PTT for communication radios
Model no.:	WAG M12
List Models:	UNI, M3, M4, M5, M10, M12, M15, H6, I3, N3
FCC ID:	2ACD5AIRCRIPT-WAG1
Options and accessories:	NIL
Rating:	DC5.0V supplied by Interphone
RF Transmission Frequency:	2402-2480MHz
No. of Operated Channel:	40
Modulation:	GFSK
Duty Cycle:	NIL
Antenna Type:	Integral Antenna
Antenna Gain:	2.12dBi
Description of the EUT:	The Equipment Under Test (EUT) is a Wireless audio gateway with wireless PTT for communication radios with Bluetooth 4.0 function operating at 2.4GHz



4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C 10-1-2013 Edition	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Meas Guidance v03r02 and ANSI C63.10 (2013).

5 Summary of Test Results

Technical Requirements					
FCC Part 15 Subpart C					
Test Condition	Pages	Test Site	Test Result		
			Pass	Fail	N/A
§15.207 Conducted emission AC power port	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247 (b) (1) Conducted peak output power	10	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(a)(1) 20dB bandwidth	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1) Carrier frequency separation	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii) Number of hopping frequencies	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii) Dwell Time	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(2) 6dB bandwidth	11	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(e) Power spectral density	13	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d) Spurious RF conducted emissions	14	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d) Band edge	19	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d) & §15.209 Spurious radiated emissions for transmitter	21	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203 Antenna requirement	See note 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a permanently ceramic antenna, which gain is 2.12dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ACD5AIRCRIPT-WAG1 complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

The model WAG126 &WAG127 and other models have the same PCB Layout, circuit theory and construction, so all the EMC requirements were applied on test model and other models are deemed to fulfill the relevant EMC requirements without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date: May 21, 2014

Testing Start Date: May 26, 2014

Testing End Date: August 4, 2014

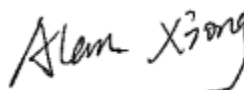
- TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch-

Reviewed by:

Prepared by:



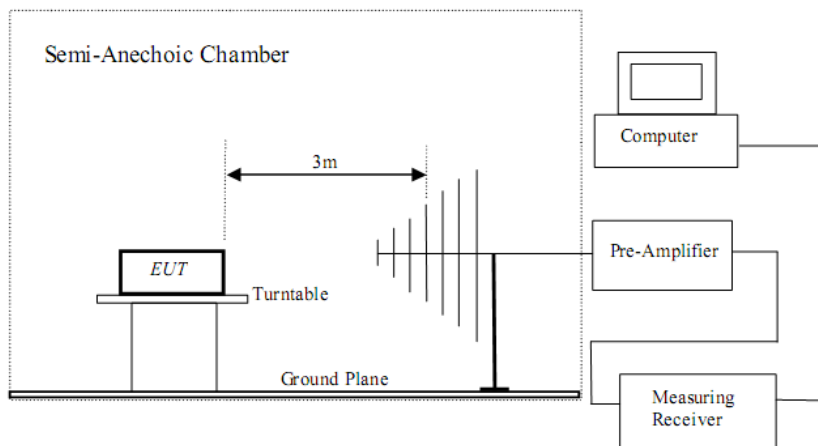
John Zhi
EMC Project Manager



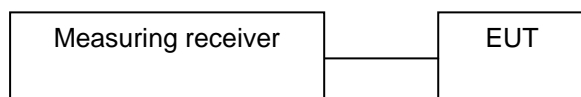
Alan Xiong
EMC Project Engineer

7 Test Setups

7.1 Radiated test setups



7.2 Conducted RF test setups



8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Notebook	Lenovo	X220	---

Test software: CSR_Blue Test3, which is used to control the EUT in continues transmitting mode.

The system was configured to channel 0, 20, and 39 for the test.

9 Technical Requirement

9.1 Conducted peak output power

Test Method

1. Use the following spectrum analyzer settings:
 RBW > the 6 dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW
 Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Limits

According to §15.247 (b) (1), conducted peak output power limit as below:

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤1	≤30

Test result as below table

Frequency MHz	Conducted Peak Output Power dBm	Result
Low channel 2402MHz	-7.208	Pass
Middle channel 2442MHz	-5.770	Pass
High channel 2480MHz	-4.593	Pass

9.2 6dB bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold
2. Use the automatic bandwidth measurement capability of an instrument, may be employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

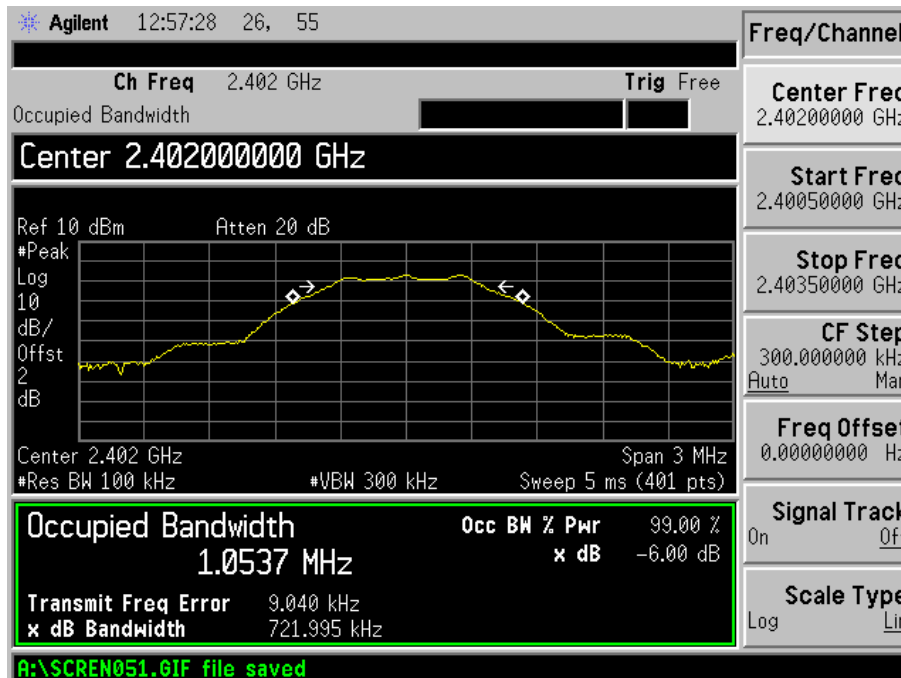
Limit [kHz]

≥500

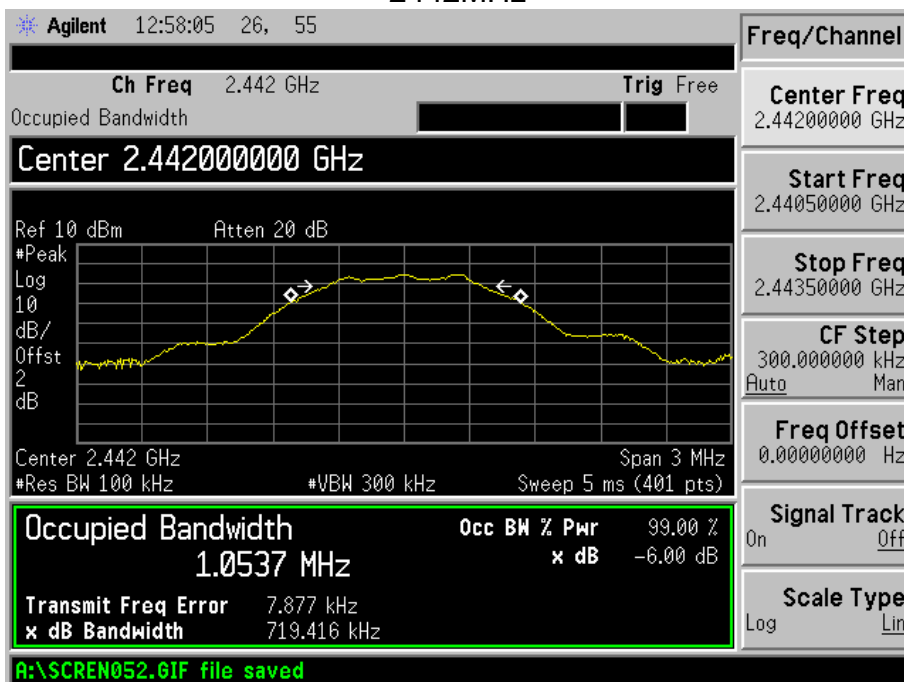
Test result

Frequency MHz	6dB bandwidth kHz	Result
Low channel 2402MHz	721.995	Pass
Middle channel 2442MHz	719.416	Pass
High channel 2480MHz	727.484	Pass

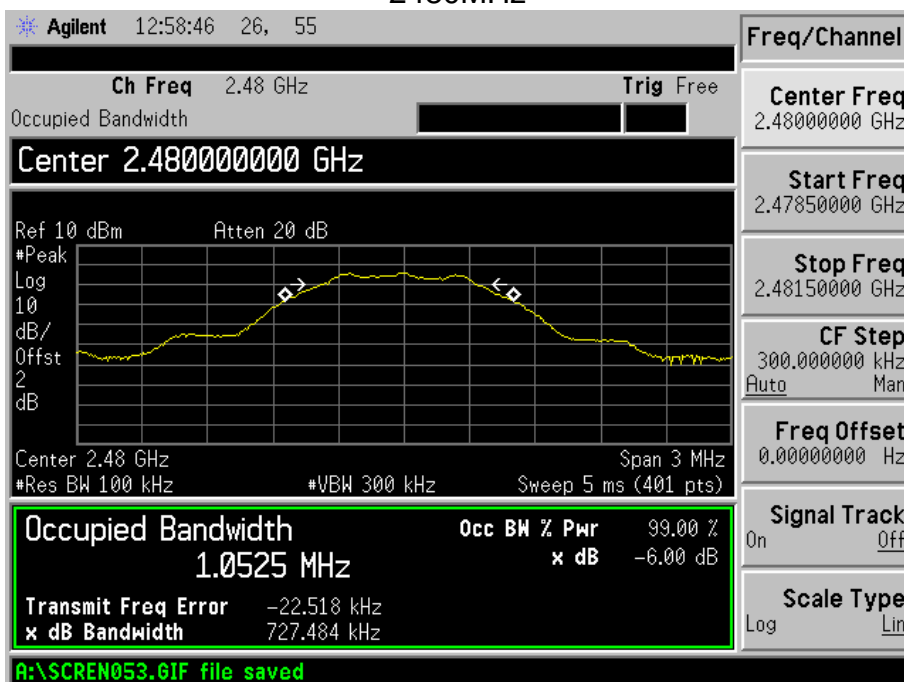
2402MHz



2442MHz



2480MHz



9.3 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

1. Set analyzer center frequency to DTS channel center frequency.
RBW=3kHz, VBW \geq 3RBW, Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
3. Repeat above procedures until other frequencies measured were completed.

Limit

Limit [dBm]

≤ 8

Test result

Frequency MHz	Power spectral density dBm	Result
Low channel 2402MHz	-21.38	Pass
Middle channel 2442MHz	-20.13	Pass
High channel 2480MHz	-19.25	Pass

9.4 Spurious RF conducted emissions

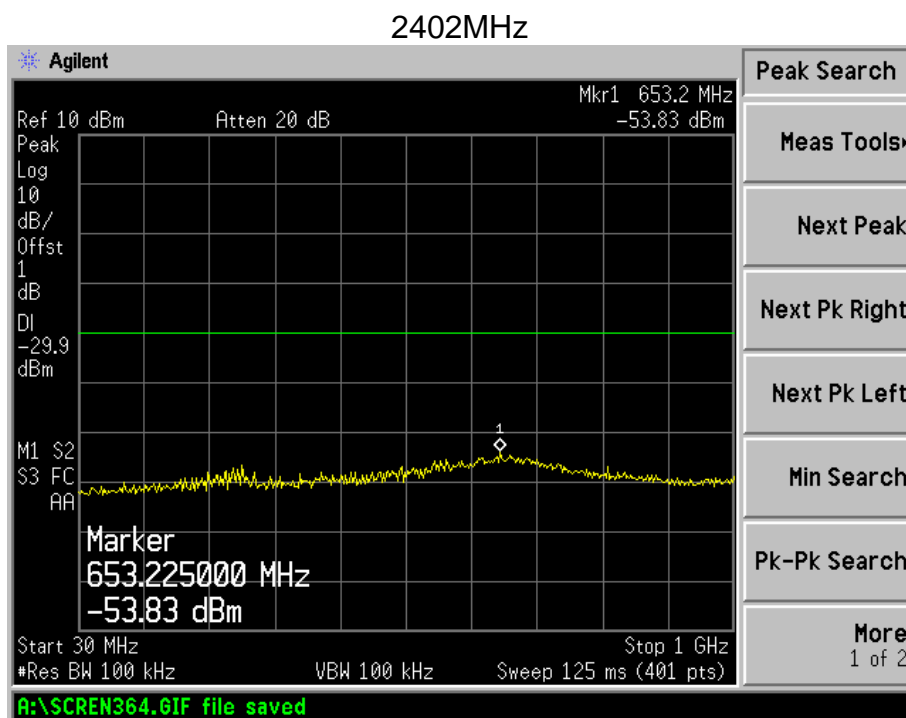
Test Method

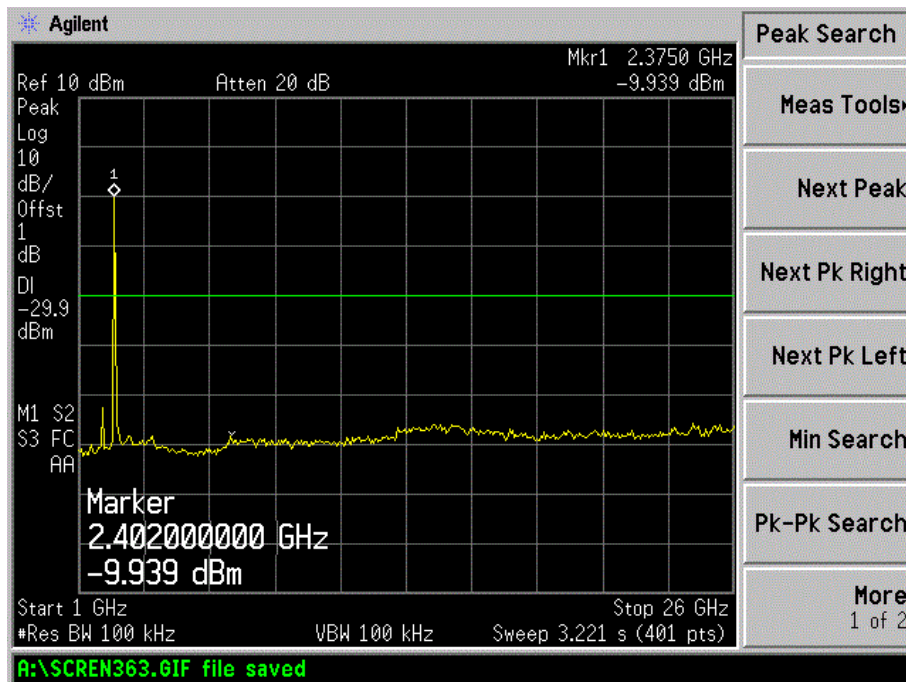
1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW \geq 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
3. Repeat above procedures until other frequencies measured were completed.

Limit

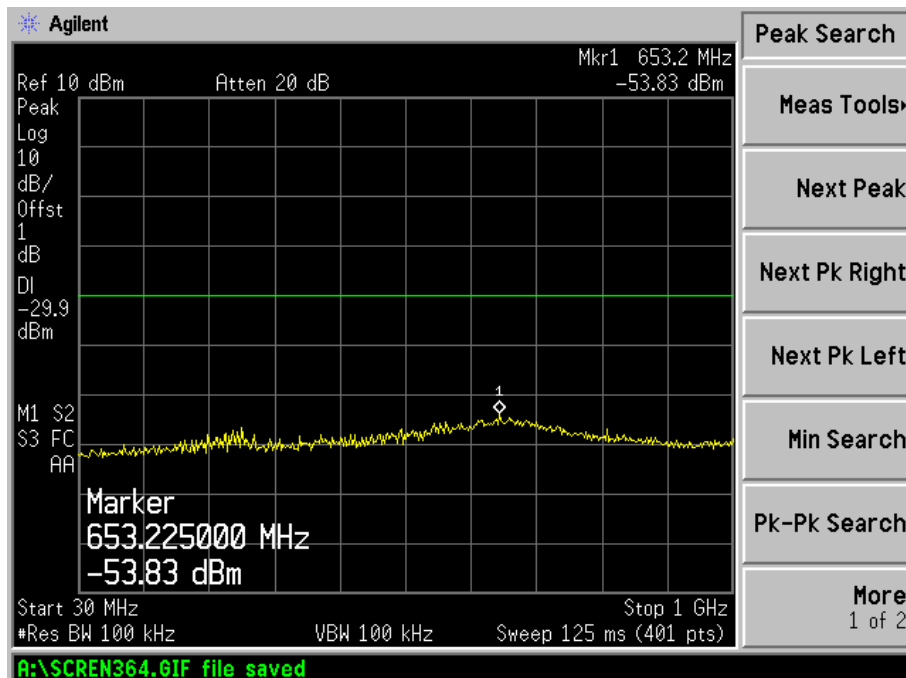
Frequency Range MHz	Limit (dBc)
30-25000	-20

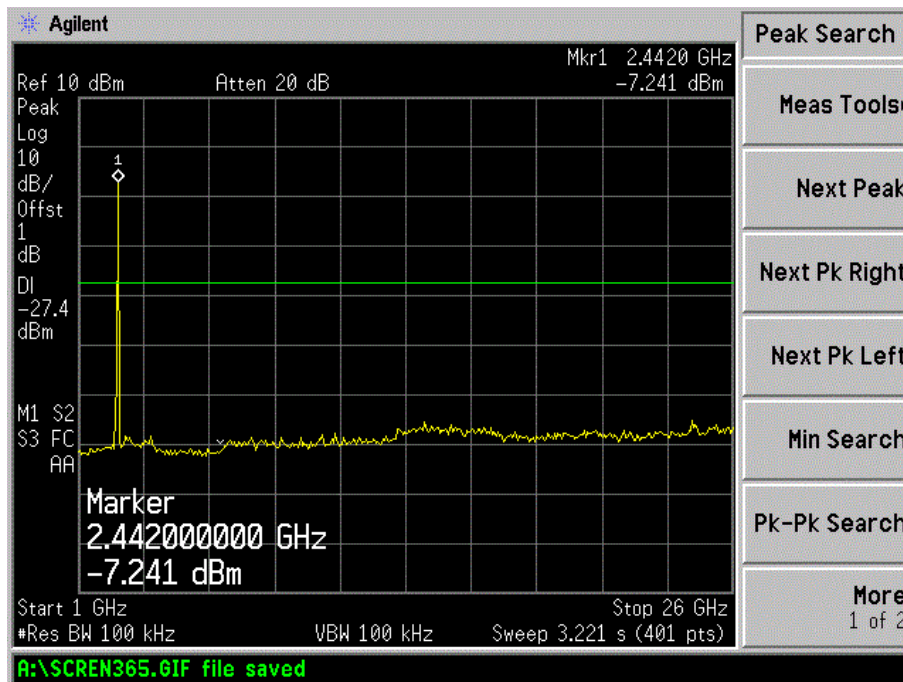
Spurious RF conducted emissions



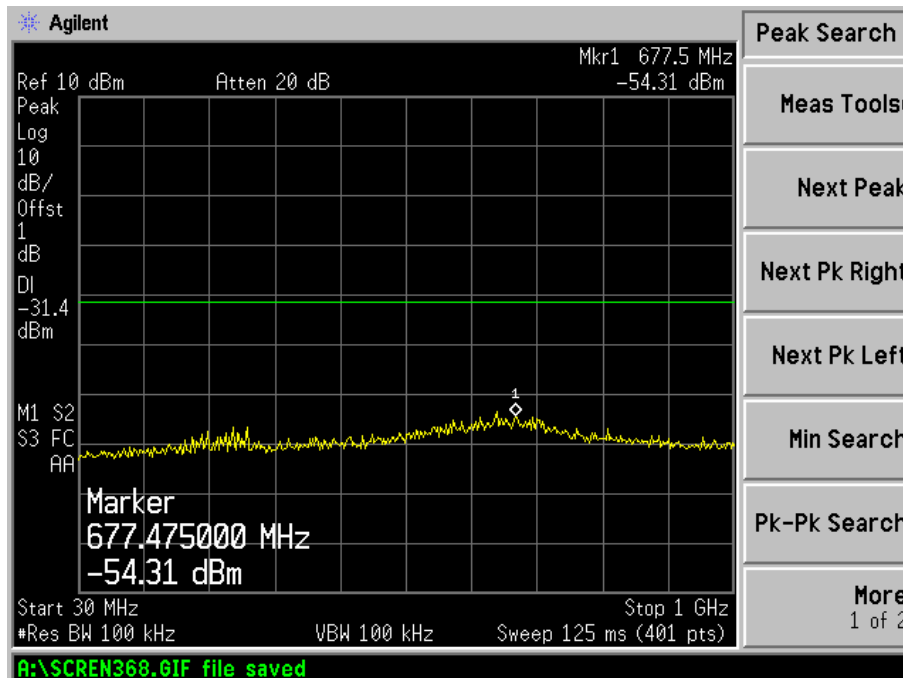


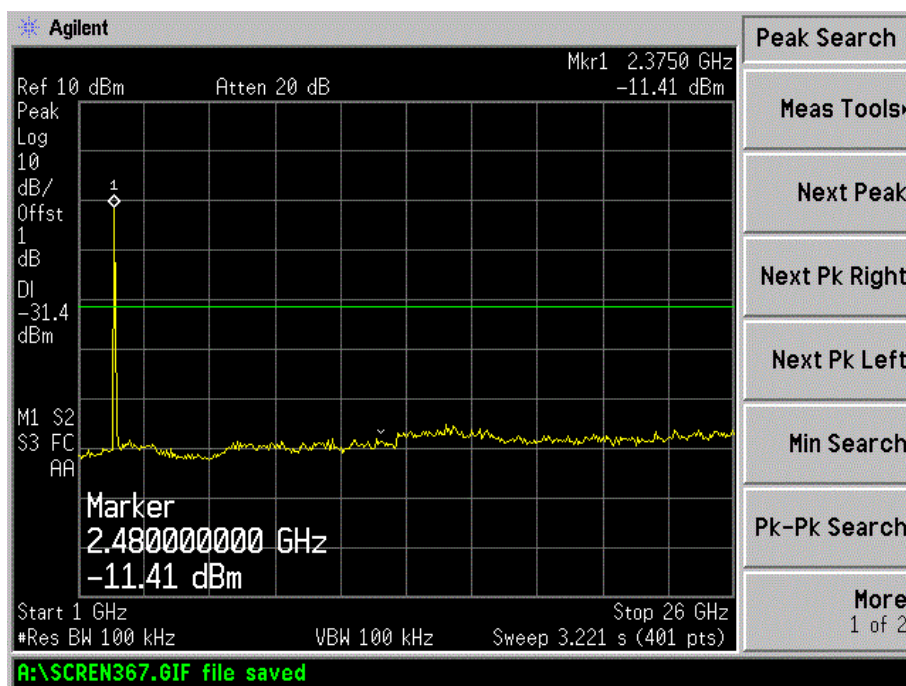
2442MHz





2480MHz





9.5 Band edge

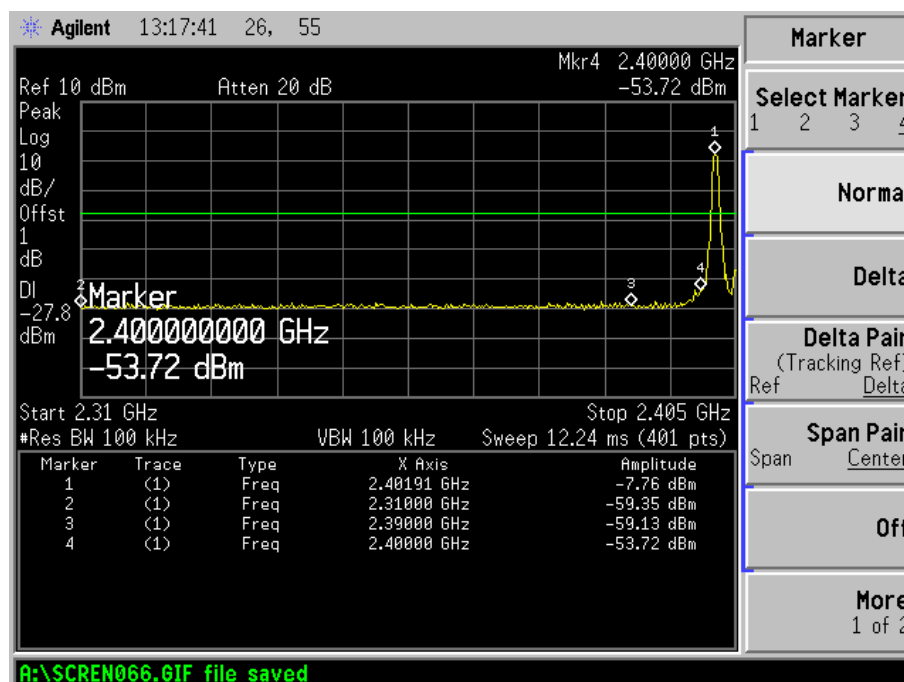
Test Method

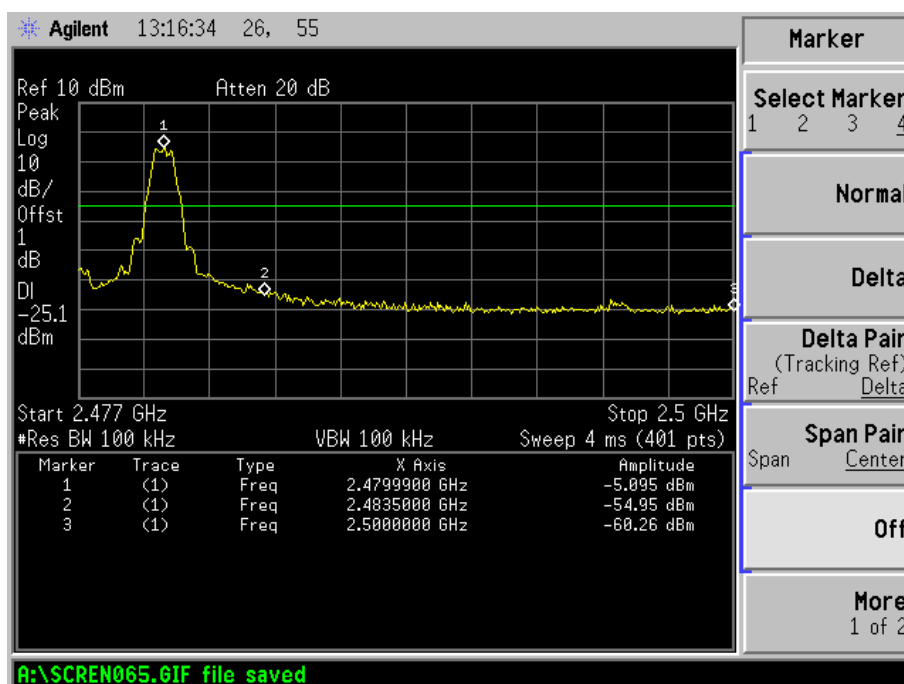
- 1 Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious
RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold.
- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

Test result





9.6 Spurious radiated emissions for transmitter

Test Method

1. The EUT is placed on a turntable, which is 0.8m above ground plane.
2. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
3. Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured, RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold
4. Follow the guidelines in ANSI C63.4-1992 with respect to maximizing the emission by rotating the EUT, adjusting the measurement antenna height and polarization, etc. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, submit this data. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the duty cycle per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{duty cycle}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

Limit

According to part 15.247(d), the radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

2402MHz

Frequency MHz	Reading dBuV	Correct dB/m	Emission Level dBuV/m	Polarization	Limit dBμV/m	Detector	Result
30-1000	-	-	-	Horizontal	-	-	Pass
30-1000	-	-	-	Vertical	-	-	Pass
*4804	43.08	0.53	43.61	Horizontal	74	PK	Pass
*4804	43.47	0.53	44.00	Vertical	74	PK	Pass

2442MHz

Frequency MHz	Reading dBuV	Correct dB/m	Emission Level dBuV/m	Polarization	Limit dBμV/m	Detector	Result
*4884	43.52	0.63	44.15	Horizontal	74	PK	Pass
*4884	44.21	0.63	44.84	Vertical	74	PK	Pass

2480MHz

Frequency MHz	Reading dBuV	Correct dB/m	Emission Level dBuV/m	Polarization	Limit dBμV/m	Detector	Result
*4960	43.29	0.77	44.06	Horizontal	74	PK	Pass
*4960	44.48	0.77	45.25	Vertical	74	PK	Pass

Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading
 PK Emission Level= Antenna Factor +Cable Loss - Amp. Factor + Reading
 AV Emission Level= PK Emission Level+20log (dutycycle)
- (2) Data of measurement within 30-1000MHz frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20db below the permissible limits or the field strength is too small to be measured.
- (3) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (4) Testing is carried out with frequency rang 9kHz to the 10th harmonics, which above 2th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 1GHz.

Receiving emission test result as below:

Frequency	Reading	Correct	Emission Level	Polarization	Limit	Detector	Result
MHz	dBuV	dB/m	dBuV/m		dBμV/m		
146.4000	40.26	-15.58	24.68	Horizontal	43.5	QP	Pass
356.8900	36.39	-9.12	27.26	Horizontal	46	QP	Pass
170.6500	39.57	-17.76	21.81	Vertical	43.5	QP	Pass
349.1298	34.91	-11.13	23.78	Vertical	46	QP	Pass

Remark:

- (1) QP Emission Level= Antenna Factor +Cable Loss + Reading
PK Emission Level= Antenna Factor +Cable Loss - Amp. factor + Reading
AV Emission Level= PK Emission Level+20log (duty cycle)
- (2) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section RSS-Gen.
- (3) Testing is carried out with frequency rang 9kHz to the 10th harmonics, which above 1GHz are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 30MHz.

10 Test Equipment List

List of Test Instruments

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Spectrum Analyzer	R&S	FSP	836079/035	May.06, 2015
EMI Test Receiver	R&S	ESVB	825471/005	May.06, 2015
Pre-amplifier	Agilent	8447F	3113A06717	May.06, 2015
Pre-amplifier	Compliance Direction	PAP-0118	24002	May.06, 2015
Trilog Broadband Antenna	SCHWARZBECK	VULB9163	9163-333	May.06, 2015
Horn Antenna	ETS	3117	00086197	May.06, 2015
Horn Antenna	ETS	3116B	00088203	May.06, 2015
Loop Antenna	SCHWARZECK	HFRA 5165	9365	May.06, 2015
Spectrum Analyzer	Agilent	E4402B	US41192821	May.06, 2015
Attenuator	ATTEN	ATS100-4-20	N/A	May.06, 2015

11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items	Extended Uncertainty
Radiation emission	U=5.10dB (30MHz-25GHz)
Output power test	0.94 dB
Power density test	2.10 dB
Bandwidth	1x10 ⁻⁹