

**Test Report No. 7191120730-EEC15/01**  
dated 05 Oct 2015



PSB Singapore

**Note:** This report is issued subject to the Testing and Certification Regulations of the TÜV SÜD Group and the General Terms and Conditions of Business of TÜV SÜD PSB Pte Ltd. In addition, this report is governed by the terms set out within this report.

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**TEST REPORT COVER PAGE**

Product Information			
Product Name / Description:	MOTOTRBO MOBILE RADIO (BLUETOOTH LOW ENERGY)	Applicant Company Number:	109U
Model Number(s):	AAM28QPN9RA1AN	UPN Number:	92FT7079
All Used IC Test Site(s) Reg. #:	29321-1	SAR Test Lab Company Number:	--

Emissions Information								
	Band 1	Band 2	Band 3	Band 4	Band 5	Band 6	Band 7	Band 8
RSS # & Issue #	RSS-247 & Issue 1							
Frequency Min (MHz)	2402							
Frequency Max (MHz)	2480							
RF Power Min (W) Conducted / EIRP / ERP	--							
RF Power Max (W) Conducted	0.0026							
Field Strength Units @ distance	103.4 dB $\mu$ V/m @ 3m							
Measured BW (kHz) (99%, 26dB, 6dB, etc.)	1044 (99%)							
Calculated BW (kHz) As per TRC-43	1200							
Emission Classification (FID, GID, DID, etc.)	1M20G1 D							
Transmitter Spurious Units @ distance	14.4GHz 50.5 dB $\mu$ V/m (Peak) @ 3m							
	B	B	B	B	B	B	B	B
RSS # & Issue #								
Frequency Min (MHz)								
Frequency Max (MHz)								
RF Power Min (W) Conducted / EIRP / ERP								
RF Power Max (W) Conducted / EIRP / ERP								
Field Strength Units @ distance								
Measured BW (kHz) (99%, 26dB, 6dB, etc.)								
Calculated BW (kHz) As per TRC-43								
Emission Classification (FID, GID, DID, etc.)								
Transmitter Spurious Units @ distance								

**Agreement Signature**

ATTESTATION: The test measurements were made in accordance with the above-mentioned departmental standard(s), and that the radio equipment identified in this application has been subject to all the applicable test conditions specified in the departmental standards and all of the requirements of the standards have been met.

Applicant / Agent Name:	Lim Cher Hwee	Applicant / Agent Title:	Assistant Vice President
Applicant / Agent Signature:		Signature Date:	05 Oct 2015

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FORMAL REPORT ON TESTING IN ACCORDANCE WITH  
47 CFR FCC Parts 15B & C  
RSS-GEN Issue 4: 2014  
RSS-247 Issue 1: 2015  
OF A  
**MOTOTRBO MOBILE RADIO (BLUETOOTH LOW ENERGY)**  
[ Model : AAM28QPN9RA1AN ]  
[ FCC ID : AZ492FT7079 & IC : 109U-92FT7079 ]

**TEST FACILITY** TÜV SÜD PSB Pte Ltd  
Electrical & Electronics Centre (EEC), Product Services,  
No. 1 Science Park Drive, Singapore 118221

**FCC REG. NO.** 99142 (3m and 10m Semi-Anechoic Chamber, Science Park)

**IND. CANADA REG. NO.** 2932I-1 (3m and 10m Semi-Anechoic Chamber, Science Park)

**PREPARED FOR** Motorola Solutions Malaysia Sdn Bhd  
Plot 2, Technoplex Industrial Park Mukim 12 Swd,  
Medan Bayan Lepas, Bayan Lepas Industrial Park, 11900 Bayan Lepas,  
Pulau Penang,  
Malaysia

Tel : +604 2528543 Fax : +604 8503099

**QUOTATION NUMBER** 2191024729

**JOB NUMBER** 7191120730

**TEST PERIOD** 14 Sep 2015 – 28 Sep 2015

**PREPARED BY**

Quek Keng Huat  
Higher Associate Engineer

**APPROVED BY**

Lim Cher Hwee  
Assistant Vice President



LA-2007-0380-A  
LA-2007-0381-F  
LA-2007-0382-B  
LA-2007-0383-G

LA-2007-0384-G  
LA-2007-0385-E  
LA-2007-0386-C  
LA-2010-0464-D

The results reported herein have been performed in accordance with the laboratory's terms of accreditation under the Singapore Accreditation Council - Singapore Laboratory Accreditation Scheme. Tests/Calibrations marked "Not SAC-SINGLAS Accredited" in this Report are not included in the SAC-SINGLAS Accreditation Schedule for our laboratory.



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**TEST SUMMARY**

The product was tested in accordance with the customer's specifications.

**Test Results Summary**

Test Standard	Description	Pass / Fail
47 CFR FCC Part 15 and RSS-GEN Issue 4: 2014 and RSS-247 Issue 1: 2015		
15.207 RSS-GEN 8.8	Conducted Emissions	Pass
15.205, 15.209 RSS-GEN 8.9, 8.10	Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)	Pass
15.247(a)(2) RSS-247 5.2(1)	Spectrum Bandwidth (6dB & 99% Bandwidth Measurement)	Pass
15.247(b)(3) RSS-247 5.4(4)	Maximum Peak Power	Pass
15.247(d) RSS-247 5.5	RF Conducted Spurious Emissions (Non-Restricted Bands)	Pass
15.247(d) RSS-247 5.5	RF Conducted Spurious Emissions (Restricted Bands)	Pass
15.247(d) RSS-247 5.5	Band Edge Compliance (Conducted)	Pass
15.247(d) RSS-247 5.5	Band Edge Compliance (Radiated)	Pass
15.247(e) RSS-247 5.2(2)	Peak Power Spectral Density	Pass
1.1310 RSS-102 4.0, RSS-GEN 3.2	Maximum Permissible Exposure	Pass



**TEST SUMMARY**

**Notes**

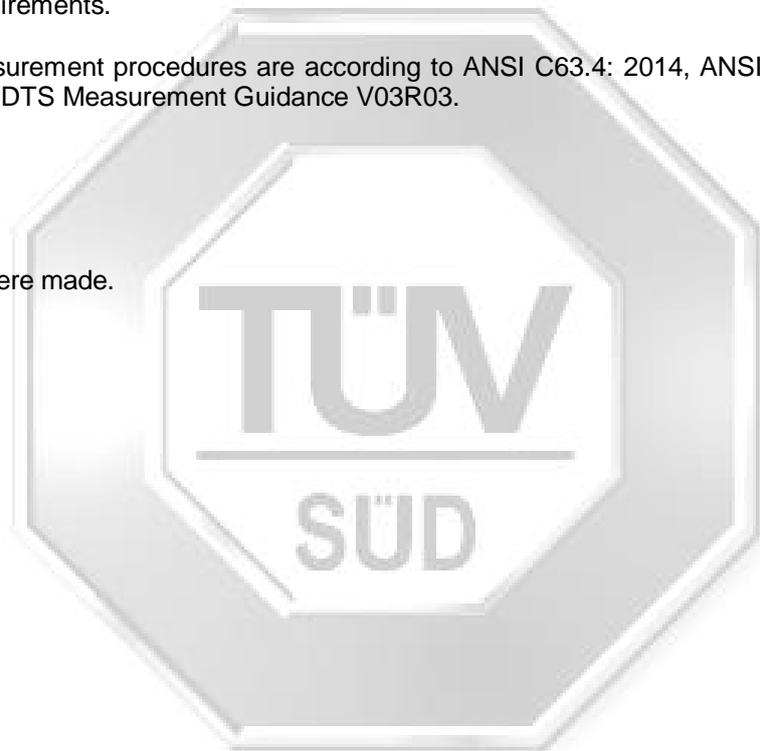
1. Three channels as listed below, which respectively represent the lower, middle and upper channels of the Equipment Under Test (EUT) were chosen and tested. For each channel, the EUT was configured to operate in the test mode.

<u>Transmit Channel</u>	<u>Frequency (MHz)</u>
Channel 0 (Lower Channel)	2402
Channel 19 (Middle Channel)	2440
Channel 39 (Upper Channel)	2480

2. The EUT is a Class B device when in non-transmitting state and meets the 47 CFR FCC Part15B Class B requirements.
3. All test measurement procedures are according to ANSI C63.4: 2014, ANSI C63.10: 2013 and KDB 558074 D01 DTS Measurement Guidance V03R03.

**Modifications**

No modifications were made.





**PRODUCT DESCRIPTION**

Description : The Equipment Under Test (EUT) is a **MOTOTRBO MOBILE RADIO**.

Manufacturer : Motorola Solutions Malaysia Sdn Bhd  
Plot 2, Technoplex Industrial Park Mukim 12 Swd,  
Medan Bayan Lepas, Bayan Lepas Industrial Park, 11900 Bayan Lepas,  
Pulau Penang,  
Malaysia

Model Number : AAM28QPN9RA1AN

FCC ID : AZ492FT7079

IC : 109U-92FT7079

Serial Number : 511TRMB983

Microprocessor : Ti OMAPL138BZWTA3R

Operating / Transmitting Frequency : Bluetooth / Bluetooth LE  
2.402GHz (lower channel) to 2.480GHz (upper channel)  
79 channels (Bluetooth), 40 channels (Bluetooth LE)

WiFi  
2.412GHz (lower channel) to 2.462GHz (upper channel)  
11 channels

Land Mobile  
403MHz to 470MHz /Channel Spacing 12.5kHz/25kHz

Clock / Oscillator Frequency : Reference Clock: 19.2 MHz , LO: 329.65 MHz - 396.65 MHz

Modulation : Bluetooth  
Gaussian Frequency Shift Keying (GFSK)  
( $\pi/4$ ) DQPSK  
8DPSK

WiFi  
Differential Binary Phase Shift Keying (DBPSK)  
Differential Quadrature Phase Shift Keying (DQPSK)  
Complementary Code Keying (CCK )  
Binary Phase Shift Keying (BPSK)  
Quadrature Phase Shift Keying (QPSK)  
16-Quadrature Amplitude Modulation (16QAM)  
64-Quadrature Amplitude Modulation (64QAM)

Land Mobile  
Frequency Modulation (FM)

Antenna Gain : 4.0 dBi (PIFA Antenna)



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**PRODUCT DESCRIPTION**

(Continued)

Port / Connectors : Refer to manufacturer's user manual / operating manual  
Rated Input Power : 120V 60Hz  
Accessories : Refer to manufacturer's user manual / operating manual





**SUPPORTING EQUIPMENT DESCRIPTION**

<b>Equipment Description (Including Brand Name)</b>	<b>Model, Serial &amp; FCC ID Number</b>	<b>Cable Description (List Length, Type &amp; Purpose)</b>
Fujitsu Laptop	M/N: S6310 S/N: R7100269 FCC ID: DoC	Nil
Fujitsu AC Adapter	M/N: CP293662-01 S/N: O6X00399B FCC ID: DoC	1.80m unshielded power cable
Microsoft Wheel Mouse	M/N: X08-71118 S/N: Nil FCC ID: DoC	Nil
Alfatronix Limited Desktop Power Supply	M/N: AD MT 3100/DM S/N: Nil FCC ID: DoC	Nil
Motorola IMPRES Keypad Microphone	M/N: RMN5127C S/N: Nil FCC ID: DoC	Nil





**EUT OPERATING CONDITIONS**

**CFR FCC Part 15 and RSS-GEN Issue 4 and RSS-247 Issue 1**

1. **Conducted Emissions**
2. **Radiated Emissions (Spurious Emissions inclusive Restricted Bands Requirement)**
3. **Spectrum Bandwidth (6dB Bandwidth Measurement)**
4. **Maximum Peak Power**
5. **RF Conducted Spurious Emissions (Non-Restricted Bands)**
6. **RF Conducted Spurious Emissions (Restricted Bands)**
7. **Band Edge Compliance (Conducted)**
8. **Band Edge Compliance (Radiated)**
9. **Peak Power Spectral Density**
10. **Maximum Permissible Exposure**

The EUT was exercised by operating in maximum continuous transmission in test mode, i.e transmitting at lower, middle and upper channels respectively at one time.





**CONDUCTED EMISSION TEST**

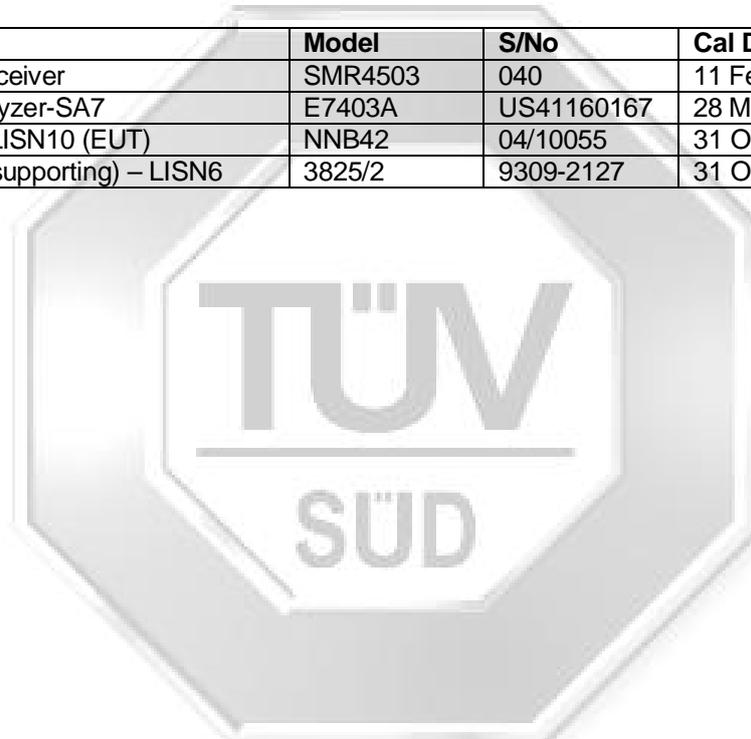
**47 CFR FCC Part 15.207 and RSS-GEN 8.8 Conducted Emission Limits**

Frequency Range (MHz)	Limit Values (dBµV)	
	Quasi-peak (Q-P)	Average (AV)
0.15 - 0.5	66 – 56 *	56 – 46 *
0.5 - 5.0	56	46
5.0 - 30.0	60	50

\* Decreasing linearly with the logarithm of the frequency

**47 CFR FCC Part 15.207 and RSS-GEN 8.8 Conducted Emission Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Schaffner EMI Receiver	SMR4503	040	11 Feb 2016	1 year
Agilent EMC Analyzer-SA7	E7403A	US41160167	28 May 2016	1 year
Schaffner LISN –LISN10 (EUT)	NNB42	04/10055	31 Oct 2015	1 year
EMCO LISN (for supporting) – LISN6	3825/2	9309-2127	31 Oct 2015	1 year





**CONDUCTED EMISSION TEST**

**47 CFR FCC Part 15.207 and RSS-GEN 8.8 Conducted Emission Test Setup**

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment were powered separately from another LISN.

**47 CFR FCC Part 15.207 and RSS-GEN 8.8 Conducted Emission Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A scan was made on the NEUTRAL line over the required frequency range using an EMI test receiver.
3. High peaks, relative to the limit line, were then selected.
4. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 9kHz. Both Quasi-peak and Average measurements were made.
5. Steps 2 to 4 were then repeated for the LIVE line.

**Sample Calculation Example**

At 20 MHz	Q-P limit = 60.0 dBμV
Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dBμV (Calibrated for system losses)	
Therefore, Q-P margin = 60.0 - 40.0 = 20.0	i.e. 20.0 dB below Q-P limit



**CONDUCTED EMISSION TEST**

**47 CFR FCC Part 15.207 and and RSS-GEN 8.8 Conducted Emission Results**

Test Input Power	120V 60Hz	Temperature	22°C
Line Under Test	AC Mains	Relative Humidity	55%
		Atmospheric Pressure	1030mbar
		Tested By	Li Chaoming

Frequency (MHz)	Peak Value (dBµV)	Q-P Limit (dBµV)	Q-P Margin (dB)	AV Value (dBµV)	AV Limit (dBµV)	AV Margin (dB)	Line	Channel
0.4929	33.3	56.1	22.8	-- *See Note 3	46.1	12.8	Live	39
0.8113	33.5	56.0	22.5	-- *See Note 3	46.0	12.5	Live	39
1.2644	33.2	56.0	22.8	-- *See Note 3	46.0	12.8	Neutral	39
1.4359	34.0	56.0	22.0	-- *See Note 3	46.0	12.0	Neutral	39
1.7175	32.4	56.0	23.6	-- *See Note 3	46.0	13.6	Live	39
2.5380	34.1	56.0	21.9	-- *See Note 3	46.0	11.9	Live	39

Notes

- All possible modes of operation were investigated from 150kHz to 30MHz. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
- A "positive" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative" margin indicates a FAIL.
- As the measured peak shows compliance to the Q-P & Average limits, as such no Q-P & Average measurements was carried out. The EUT is deemed to meet both requirements.
- EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:  
9kHz - 30MHz  
RBW: 9kHz                      VBW: 30kHz
- Conducted Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 9kHz – 30MHz is  $\pm 2.2$ dB.



**RADIATED EMISSION TEST**

**47 CFR FCC Part 15.205 and RSS-GEN 8.10 Restricted Bands**

MHz		MHz		MHz		GHz	
0.090	- 0.110	16.42	- 16.423	399.9	- 410	4.5	- 5.15
0.495	- 0.505	16.69475	- 16.69525	608	- 614	5.35	- 5.46
2.1735	- 2.1905	16.80425	- 16.80475	960	- 1240	7.25	- 7.75
4.125	- 4.128	25.5	- 25.67	1300	- 1427	8.025	- 8.5
4.17725	- 4.17775	37.5	- 38.25	1435	- 1626.5	9.0	- 9.2
4.20725	- 4.20775	73	- 74.6	1645.5	- 1646.5	9.3	- 9.5
6.215	- 6.218	74.8	- 75.2	1660	- 1710	10.6	- 12.7
6.26775	- 6.26825	108	- 121.94	1718.8	- 1722.2	13.25	- 13.4
6.31175	- 6.31225	123	- 138	2200	- 2300	14.47	- 14.5
8.291	- 8.294	149.9	- 150.05	2310	- 2390	15.35	- 16.2
8.362	- 8.366	156.52475	- 156.52525	2483.5	- 2500	17.7	- 21.4
8.37625	- 8.38675	156.7	- 156.9	2690	- 2900	22.01	- 23.12
8.41425	- 8.41475	162.0125	- 167.17	3260	- 3267	23.6	- 24.0
12.29	- 12.293	167.72	- 173.2	3332	- 3339	31.2	- 31.8
12.51975	- 12.52025	240	- 285	3345.8	- 3358	36.43	- 36.5
12.57675	- 12.57725	322	- 335.4	3600	- 4400	Above 38.6	
13.36	- 13.41						

**47 CFR FCC Part 15.209 and RSS-GEN 8.9 Radiated Emission Limits**

Frequency Range (MHz)	Quasi-Peak Limit Values (dBµV/m)
0.009 - 0.490	20 log [2400 / F (kHz)] @ 300m
0.490 - 1.705	20 log [24000 / F (kHz)] @ 30m
1.705 - 30.0	30.0 @ 30m
30 - 88	40.0 @ 3m
88 - 216	43.5 @ 3m
216 - 960	46.0 @ 3m
Above 960	54.0* @ 3m

\* For frequency bands 9kHz – 90kHz, 110kHz – 490kHz and above 1GHz, average detector was used. A peak limit of 20dB above the average limit does apply.

**47 CFR FCC Part 15.209, RSS-GEN 8.9 and 8.10 Radiated Emission Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
R&S Test Receiver – ESI1	ESI40	100010	14 Jul 2016	1 year
Schaffner Bilog Antenna –(30MHz-2GHz) BL3 (Ref)	CBL6112D	2549	29 Jan 2016	1 year
ETS Horn Antenna(18GHz-40GHz)(Ref)	3116	0004-2474	02 Oct 2016	1 year
EMCO Horn Antenna(1GHz-18GHz)	3115	0003-6088	20 Apr 2016	1 year
R&S Preamplifier (1GHz -18GHz)	SCU18	102191	13 Mar 2016	1 year
Agilent Preamplifier(1GHz-26.5GHz) (PA18)	8449D	3008A02305	06 Oct 2016	1 year
Com-Power Preamplifier (1MHz-1GHz)	PAM-103	441096	13 Oct 2015	1 year
Micro-Tronics Bandstop Filter (2.4-2.5 GHz)	BRM50701	017	13 Aug 2016	1 year



**RADIATED EMISSION TEST**

**47 CFR FCC Part 15.209, RSS-GEN 8.9 and 8.10 Radiated Emission Test Setup**

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m X 1.0m X 0.8m high, non-metallic table.
2. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the turntable.
3. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

**47 CFR FCC Part 15.209, RSS-GEN 8.9 and 8.10 Radiated Emission Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A prescan was carried out to pick the worst emission frequencies from the EUT. For EUT which is a portable device, the prescan was carried out by rotating the EUT through three orthogonal axes to determine which altitude and equipment arrangement produces such emissions.
3. The test was carried out at the selected frequency points obtained from the prescan in step 2. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
  - a. Vertical or horizontal polarisation (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
  - b. The EUT was then rotated to the direction that gave the maximum emission.
  - c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
4. A Quasi-peak measurement was made for that frequency point if it was less than or equal to 1GHz. For frequency point in the range of 9kHz – 90kHz, 110kHz – 490kHz and above 1GHz, both Peak and Average measurements were carried out.
5. Steps 3 and 4 were repeated for the next frequency point, until all selected frequency points were measured.
6. The frequency range covered was from the lowest radio frequency signal generated from the EUT, without going below 9kHz to 10<sup>th</sup> harmonics of the EUT fundamental frequency, using the loop antenna for frequency below 30MHz, Bi-log antenna for frequencies from 30MHz up to 1GHz, and the Horn antenna above 1GHz.

**Sample Calculation Example**

At 300 MHz	Q-P limit = 46.0 dB $\mu$ V/m
Log-periodic antenna factor & cable loss at 300 MHz = 18.5 dB	
Q-P reading obtained directly from EMI Receiver = 40.0 dB $\mu$ V/m (Calibrated level including antenna factors & cable losses)	
Therefore, Q-P margin = 46.0 - 40.0 = 6.0	i.e. 6.0 dB below Q-P limit



**RADIATED EMISSION TEST**

**47 CFR FCC Part 15.205, 15.209, RSS-GEN 8.9 and 8.10 Radiated Emission Results**

Test Input Power	120V 60Hz	Temperature	22°C
Test Distance	3m (≥30MHz – 25GHz)	Relative Humidity	55%
		Atmospheric Pressure	1030mbar
		Tested By	Chang Wai Kit

Spurious Emissions ranging from 30MHz – 1GHz

Frequency (MHz)	Q-P Value (dBµV/m)	Q-P Limit (dBµV/m)	Q-P Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Channel
31.3790	9.0	40.0	31.0	136	217	V	39
46.1510	1.5	40.0	38.5	100	148	V	39
257.9860	5.9	46.0	40.1	115	83	H	39
326.6580	6.3	46.0	39.7	100	244	H	39
449.6230	8.7	46.0	37.3	218	201	H	39
457.0450	8.7	46.0	37.3	400	9	V	39

Spurious Emissions above 1GHz - 25GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
2.1335	40.3	74.0	33.7	28.6	54.0	25.4	100	9	V	0
2.9633	44.3	74.0	29.7	28.8	54.0	25.2	400	194	V	0
3.6009	44.6	74.0	29.4	41.2	54.0	12.8	300	190	V	0
4.8052	42.6	74.0	31.4	37.8	54.0	16.2	100	254	H	0
9.5947	48.3	74.0	25.7	39.8	54.0	14.2	300	177	V	0
14.4281	50.5	74.0	23.5	40.9	54.0	13.1	100	202	V	0

Spurious Emissions above 1GHz - 25GHz

Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
1.3238	41.0	74.0	33.0	31.0	54.0	23.0	300	10	V	19
2.9633	41.3	74.0	32.7	29.2	54.0	24.8	400	194	V	19
3.6009	44.2	74.0	29.8	40.9	54.0	13.1	300	331	V	19
4.8862	42.7	74.0	31.3	36.6	54.0	17.4	100	262	H	19
9.7647	46.1	74.0	27.9	37.9	54.0	16.1	400	233	H	19
14.6467	49.3	74.0	24.7	41.4	54.0	12.6	300	77	H	19

Spurious Emissions above 1GHz - 25GHz

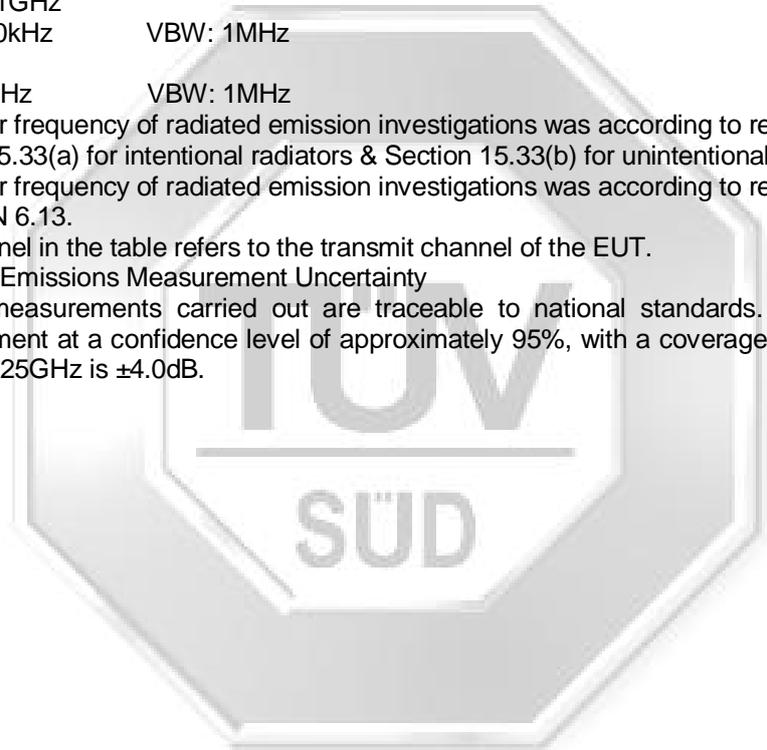
Freq (GHz)	Peak Value (dBµV/m)	Peak Limit (dBµV/m)	Peak Margin (dB)	AV Value (dBµV/m)	AV Limit (dBµV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
1.9918	43.1	74.0	30.9	28.8	54.0	25.2	300	92	V	39
2.9633	40.1	74.0	33.9	29.1	54.0	24.9	300	180	V	39
3.6009	43.7	74.0	30.3	41.2	54.0	12.8	300	192	V	39
4.9671	46.0	74.0	28.0	41.7	54.0	12.3	300	180	V	39
9.9105	46.1	74.0	27.9	36.9	54.0	17.1	100	210	V	39
14.7925	49.8	74.0	24.2	39.2	54.0	14.8	100	1	V	39



**RADIATED EMISSION TEST**

Notes

1. All possible modes of operation were investigated. Only the worst case emissions measured, using the correct CISPR detectors, are reported. All other emissions were relatively insignificant.
2. Quasi-peak measurement was used for frequency measurement up to 1GHz. Average and peak measurements were used for emissions above 1GHz. The average measurement was done by averaging over a complete cycle of the pulse train, including the blanking interval as the pulse train duration does not exceed 0.1 second.
3. A "positive" margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency. Conversely, a "negative" margin indicates a FAIL.
4. EMI receiver Resolution Bandwidth (RBW) and Video Bandwidth (VBW) settings:  
30MHz - 1GHz  
RBW: 100kHz            VBW: 1MHz  
>1GHz  
RBW: 1MHz            VBW: 1MHz
5. The upper frequency of radiated emission investigations was according to requirements stated in Section 15.33(a) for intentional radiators & Section 15.33(b) for unintentional radiators.
6. The upper frequency of radiated emission investigations was according to requirements stated in RSS-GEN 6.13.
7. The channel in the table refers to the transmit channel of the EUT.
8. Radiated Emissions Measurement Uncertainty  
All test measurements carried out are traceable to national standards. The uncertainty of the measurement at a confidence level of approximately 95%, with a coverage factor of 2, in the range 30MHz – 25GHz is  $\pm 4.0$ dB.



**SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST**

**47 CFR FCC Part 15.247(a)(2) and RSS-247 5.2(1) Spectrum Bandwidth (6dB and 99% Bandwidth Measurement) Limits**

The EUT shows compliance to the requirements of this section, which states that the minimum bandwidth of the EUT employing digital modulation techniques shall be at least 500kHz.

**47 CFR FCC Part 15.247(a)(2) and RSS-247 5.2(1) Spectrum Bandwidth (6dB and 99% Bandwidth Measurement) Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4440A	MY45304764	12 Dec 2015	1 year

**47 CFR FCC Part 15.247(a)(2) and RSS-247 5.2(1) Spectrum Bandwidth (6dB and 99% Bandwidth Measurement) Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to the following:  
RBW = 100kHz  
VBW = 3 times RBW
5. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(a)(2) and RSS-247 5.2(1) Spectrum Bandwidth (6dB and 99% Bandwidth Measurement) Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at lower channel.
2. The center frequency of the spectrum analyser was set to the transmitting frequency with the frequency span wide enough to capture the 6dB and 99% bandwidth of the transmitting frequency.
3. The spectrum analyser was set to max hold to capture the transmitting frequency. The signal capturing was continuous until no further changes were observed.
4. The peak of the transmitting frequency was detected with the marker peak function of the spectrum analyser. For 6dB bandwidth measurement, the frequencies below the 6dB peak frequency at lower ( $f_L$ ) and upper ( $f_H$ ) sides of the transmitting frequency were marked and measured by using the marker-delta function of the spectrum analyser. For 99% bandwidth measurement, the spectrum analyser power measurement was activated with bandwidth measurement as 99%.
5. For 6dB bandwidth measurement, the 6dB bandwidth of the transmitting frequency is the frequency difference between the marked lower and upper frequencies,  $|f_H - f_L|$ . For 99% bandwidth measurement, the measured 99% bandwidth shown on the spectrum analyser was recorded.
6. The steps 2 to 5 were repeated with the transmitting frequency was set to middle and upper channel respectively.



**SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST**

**47 CFR FCC Part 15.247(a)(2) and RSS-247 5.2(1) Spectrum Bandwidth (6dB and 99% Bandwidth Measurement) Results**

Test Input Power	120V 60Hz	Temperature	24°C
Attached Plots	1 – 3 (20dB Bandwidth)	Relative Humidity	56%
	4 – 6 (99% Bandwidth)	Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

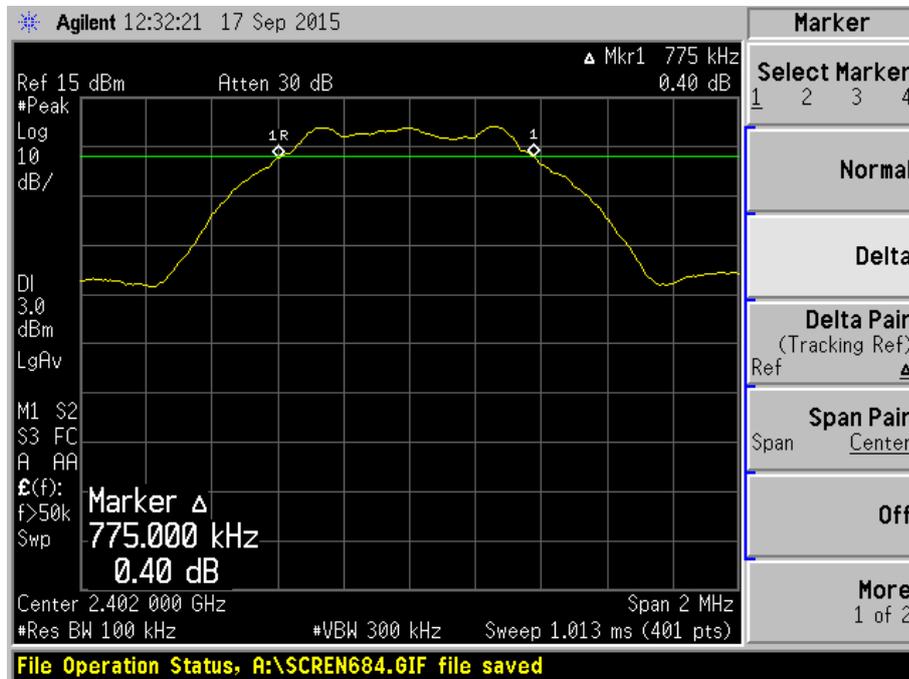
Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
0	2.402	0.7750	1.041
19	2.440	0.7750	1.044
39	2.480	0.7750	1.031



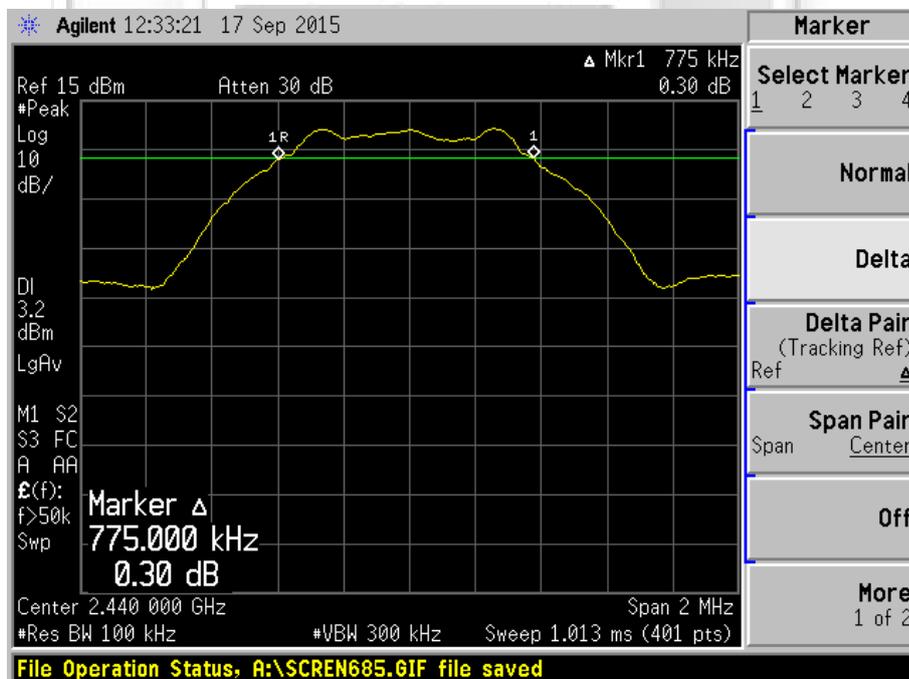


**SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST**

**Spectrum Bandwidth (6dB Bandwidth Measurement) Plots**



Plot 1 - Channel 0

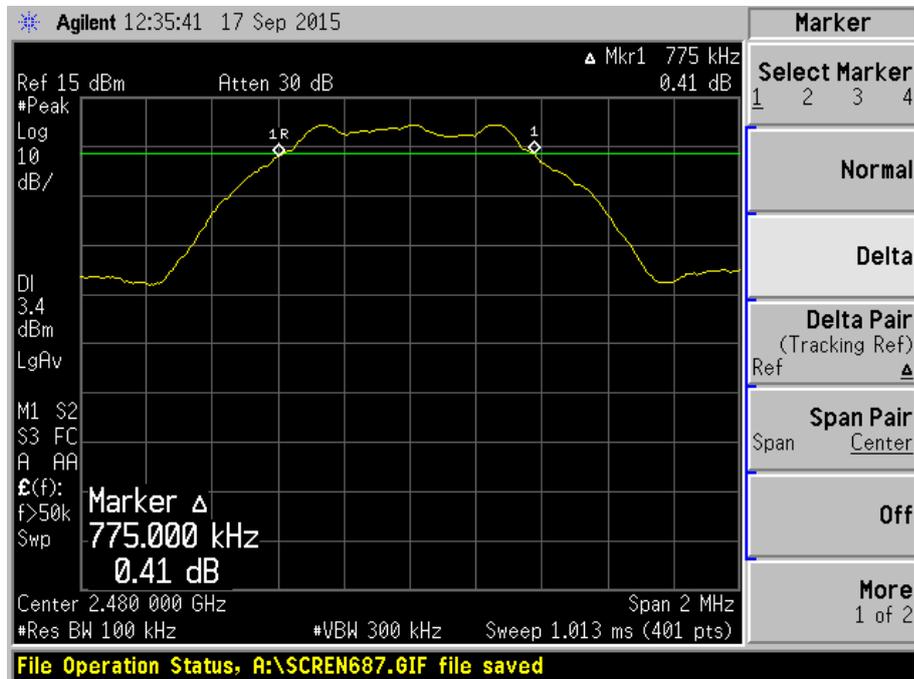


Plot 2 - Channel 19



**SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST**

**Spectrum Bandwidth (6dB Bandwidth Measurement) Plots**



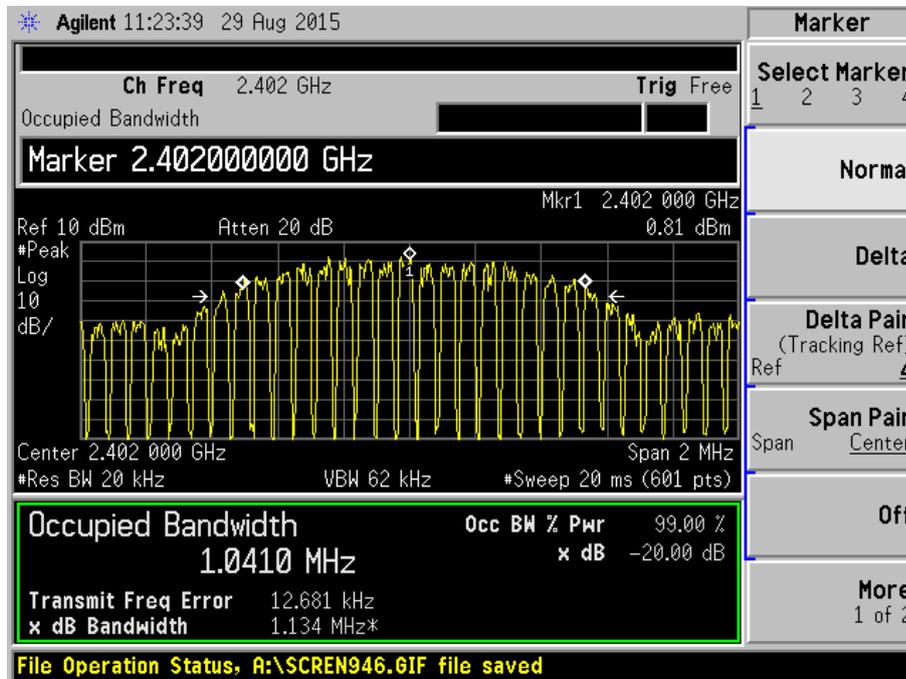
Plot 3 - Channel 39



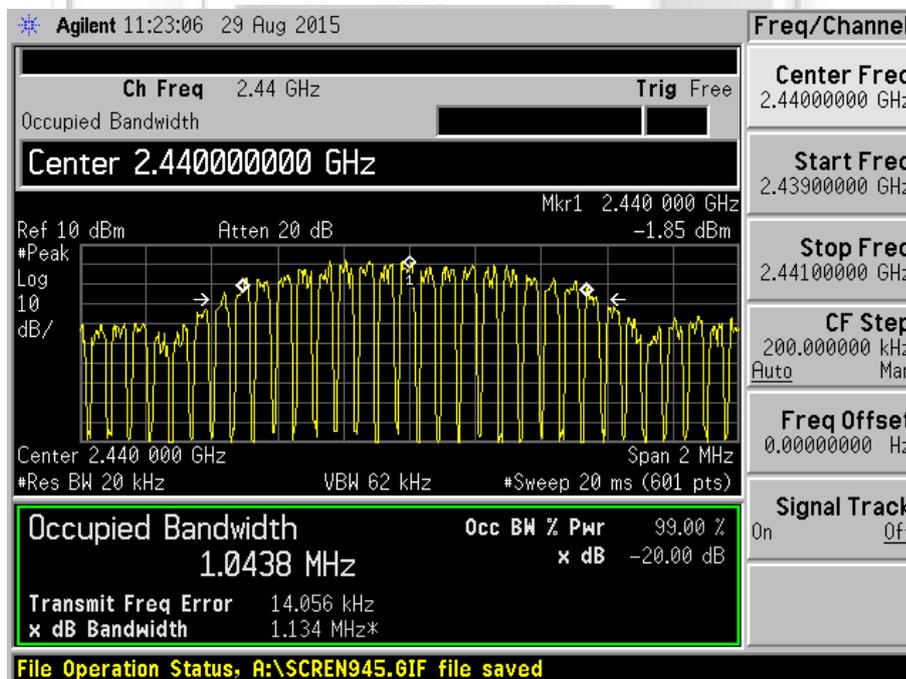


**SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST**

**Spectrum Bandwidth (99% Bandwidth Measurement) Plots**



Plot 4 - Channel 0

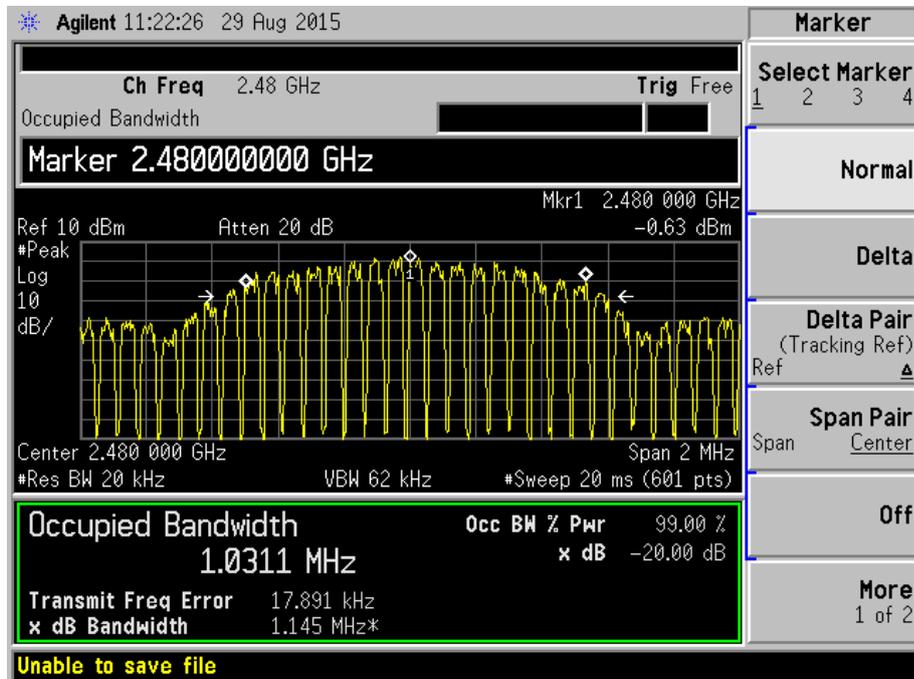


Plot 5 - Channel 19



**SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST**

**Spectrum Bandwidth (99% Bandwidth Measurement) Plots**



Plot 6 - Channel 39





**MAXIMUM PEAK POWER TEST**

**47 CFR FCC Part 15.247(b)(3) and RSS-247 5.4(4) Maximum Peak Power Limits**

The EUT shows compliance to the requirements of this section, which states the maximum peak power of the EUT employing digital modulation shall not exceed 1W (30dBm).

**47 CFR FCC Part 15.247(b)(3) and RSS-247 5.4(4) Maximum Peak Power Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Boonton Electronics RF Power Meter	4532	72901	27 Aug 2016	1 year
Boonton Electronics Peak Power Sensor	56218-S/1	1417	27 Aug 2016	1 year

**47 CFR FCC Part 15.247(b)(3) and RSS-247 5.4(4) Maximum Peak Power Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the power meter.
4. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(b)(3) and RSS-247 5.4(4) Maximum Peak Power Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at lower channel.
2. The maximum peak power of the transmitting frequency was detected and recorded.
3. The step 2 was repeated with the transmitting frequency was set to middle and upper channel respectively.



**MAXIMUM PEAK POWER TEST**

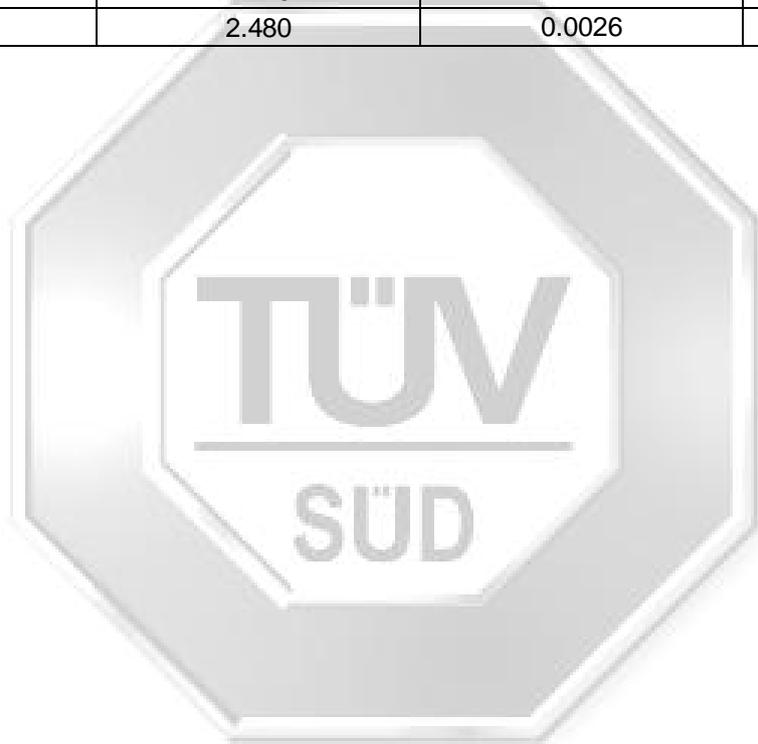
**47 CFR FCC Part 15.247(b)(3) and RSS-247 5.4(4) Maximum Peak Power Results**

Test Input Power	120V 60Hz	Temperature	24°C
Antenna Gain	4.0 dBi	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

Channel	Channel Frequency (GHz)	Maximum Peak Power (W)	Limit (W)
0	2.402	0.0022	1.0
19	2.440	0.0026	1.0
39	2.480	0.0026	1.0

Notes

1. Nil.





**RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Non-Restricted Bands) Limits**

The EUT shows compliance to the requirements of this section, which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Non-Restricted Bands) Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4440A	MY45304764	12 Dec 2015	1 year

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Non-Restricted Bands) Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Non-Restricted Bands) Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, with the transmitting frequency was set to lower channel.
2. The start and stop frequencies of the spectrum analyser were set to 30MHz and 10GHz.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with frequency span was set from 10GHz to 25GHz.
5. The steps 2 to 4 were repeated with the transmitting frequency was set to middle and upper channel respectively.



**RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Non-Restricted Bands) Results**

Test Input Power	120V 60Hz	Temperature	24°C
Attached Plots	7 – 12	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

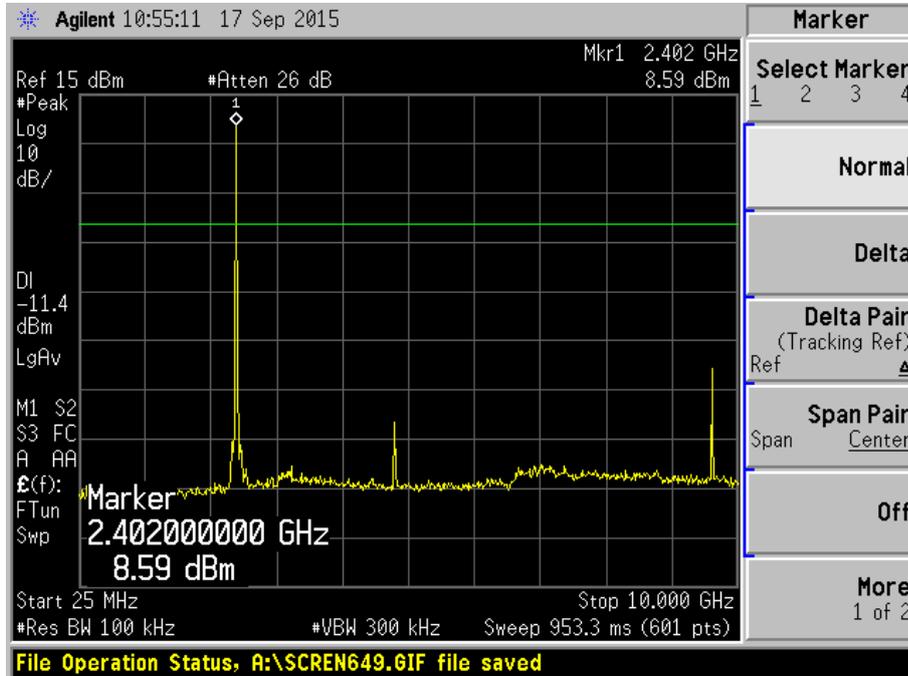
All spurious signals found were below the specified limit. Please refer to the attached plots.



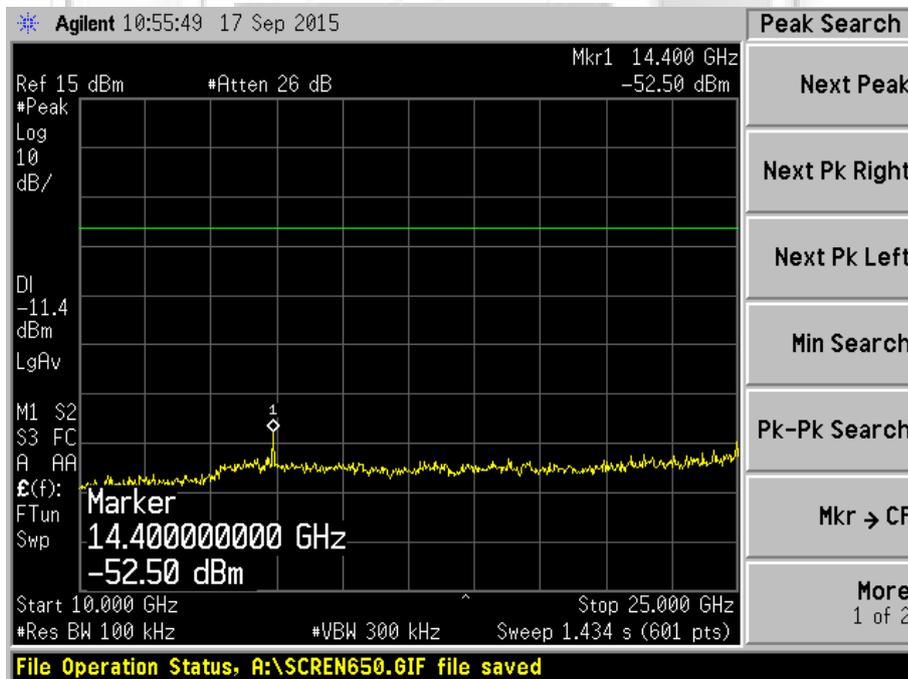


**RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST**

**RF Conducted Spurious Emissions (Non-Restricted Bands) Plots**



Plot 7 – Channel 0

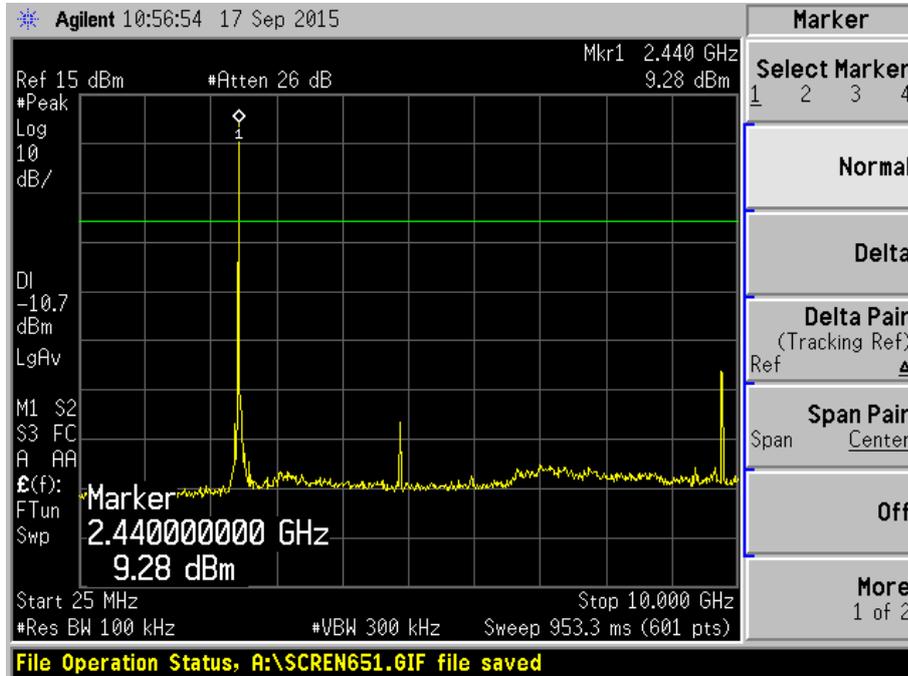


Plot 8 – Channel 0

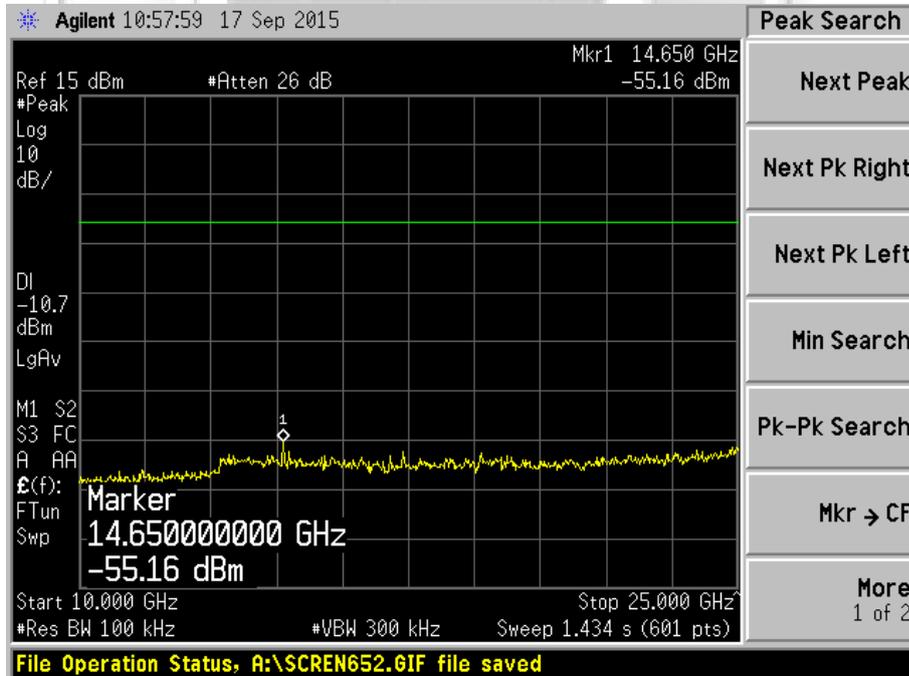


**RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST**

**RF Conducted Spurious Emissions (Non-Restricted Bands) Plots**



Plot 9 – Channel 19

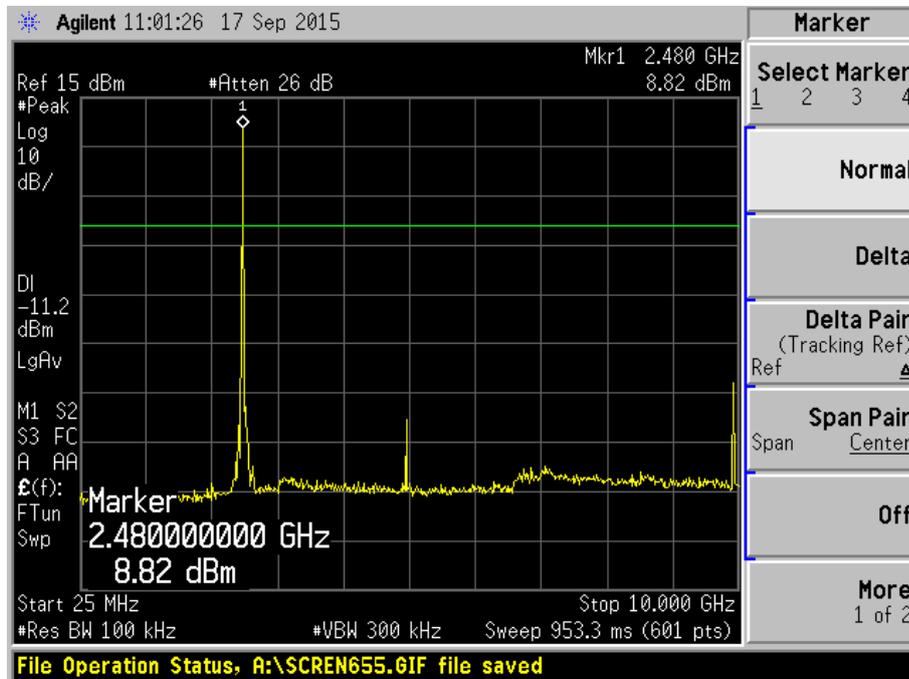


Plot 10 – Channel 19

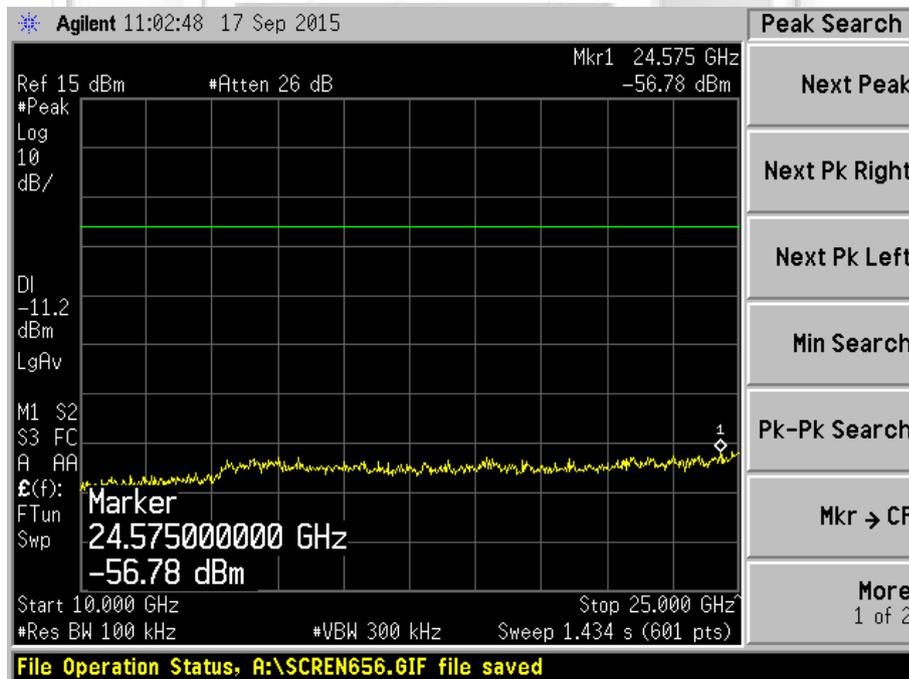


RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Non-Restricted Bands) Plots



Plot 11 – Channel 39



Plot 12 – Channel 39



**RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST**

**47 CFR FCC Part 15.205 and RSS-GEN 8.10 Restricted Bands**

MHz		MHz		MHz		GHz	
0.090	- 0.110	16.42	- 16.423	399.9	- 410	4.5	- 5.15
0.495	- 0.505	16.69475	- 16.69525	608	- 614	5.35	- 5.46
2.1735	- 2.1905	16.80425	- 16.80475	960	- 1240	7.25	- 7.75
4.125	- 4.128	25.5	- 25.67	1300	- 1427	8.025	- 8.5
4.17725	- 4.17775	37.5	- 38.25	1435	- 1626.5	9.0	- 9.2
4.20725	- 4.20775	73	- 74.6	1645.5	- 1646.5	9.3	- 9.5
6.215	- 6.218	74.8	- 75.2	1660	- 1710	10.6	- 12.7
6.26775	- 6.26825	108	- 121.94	1718.8	- 1722.2	13.25	- 13.4
6.31175	- 6.31225	123	- 138	2200	- 2300	14.47	- 14.5
8.291	- 8.294	149.9	- 150.05	2310	- 2390	15.35	- 16.2
8.362	- 8.366	156.52475	- 156.52525	2483.5	- 2500	17.7	- 21.4
8.37625	- 8.38675	156.7	- 156.9	2690	- 2900	22.01	- 23.12
8.41425	- 8.41475	162.0125	- 167.17	3260	- 3267	23.6	- 24.0
12.29	- 12.293	167.72	- 173.2	3332	- 3339	31.2	- 31.8
12.51975	- 12.52025	240	- 285	3345.8	- 3358	36.43	- 36.5
12.57675	- 12.57725	322	- 335.4	3600	- 4400	Above 38.6	
13.36	- 13.41						

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Restricted Bands) Limits**

The EUT shows compliance to the requirements of this section, which states that emissions which fall in the restricted bands must comply with the radiated emission limits specified in the table below:

Frequency Range (MHz)	EIRP (dBm)	Radiated Emissions (dBµV/m)
0.009 – 0.490	-6.7 – (-41.4) **	67.6 – 20logF* @ 300m **
0.490 – 1.705	-41.4 – (-52.3) **	87.6 – 20logF* @ 30m **
1.705 – 30	-45.7	29.5 @ 30m
30 - 88	-55.2	40.0 @ 3m
88 - 216	-51.7	43.5 @ 3m
216 - 960	-49.2	46.0 @ 3m
>960	-41.2 ***	54.0 @ 3m ***
* F is frequency in kHz.		
** Decreasing linearly with the logarithm of the frequency.		
*** Above 1GHz, a peak limit of 20dB above the average limit does apply.		

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Restricted Bands) Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4440A	MY45304764	12 Dec 2015	1 year
Micro-tronics Bandstop Filter (2.4GHz)	BRM50701-02	007	13 Aug 2016	1 year



**RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Restricted Bands) Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) of the spectrum analyser was set to the following settings. The video bandwidth (VBW) was set to at least three times of the RBW.

Frequency (MHz)	RBW (kHz)
0.009 – 0.150	0.2
0.150 – 30.0	9.0
30.0 - 1000	100.0
> 1000	1000.0

5. The detector of the spectrum analyser was set to peak detection mode.
6. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Restricted Bands) Test Method**

1. Measurement in the range 9kHz – 1000MHz
  - 1.1 The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, with the transmitting frequency was set to lower channel.
  - 1.2 The start and stop frequencies of the spectrum analyser were set according to the supported RBW.
  - 1.3 The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
  - 1.4 No further measurement was required if all the captured emissions complied to the limits. Else, the spectrum analyser was set to zoom to the captured emission with the detector of the spectrum analyser was set to quasi-peak. The emission level of the captured frequency was measured.
  - 1.5 The step 1.4 was repeated until all the captured emissions which exceeding the limits were measured.
  - 1.6 The steps 1.2 to 1.5 were repeated with the transmitting frequency was set to middle and upper channel respectively.
2. Measurement above 1000MHz
  - 2.1 The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode, with the transmitting frequency was set to lower channel.
  - 2.2 The start and stop frequencies of the spectrum analyser were set according to the supported frequency band of the set RBW with the number of points in a sweep was set to equal or greater than 2 times of the ratio of span over RBW.
  - 2.3 The detector of the spectrum analyser was set to power average (RMS) mode with the sweep time was set to equal or greater than 10 times of the product of number of measurement points in a sweep and transmission symbol time.
  - 2.4 The spectrum analyser was then allowed to capture any spurious emissions within a single sweep. The peak marker function of the spectrum analyser was used to locate the highest power level.
  - 2.5 The steps 2.2 to 2.4 were repeated until all the required frequency bands were measured.
  - 2.6 The steps 2.2 to 2.5 were repeated with the transmitting frequency was set to middle and upper channel respectively.
  - 2.7 The measurements were repeated with the detector of the spectrum analyser was set to peak detecting mode. The sweep time was set to auto coupler.



**RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 RF Conducted Spurious Emissions (Restricted Bands) Results**

Test Input Power	120V 60Hz	Temperature	24°C
Attached Plots	13 – 30	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

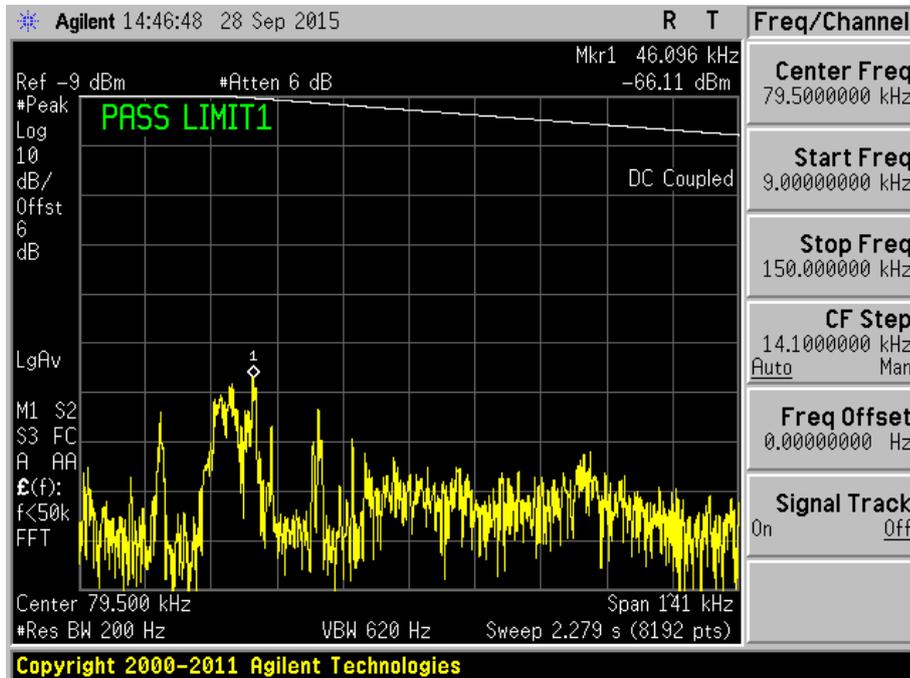
All spurious signals found were below the specified limit. Please refer to the attached plots.



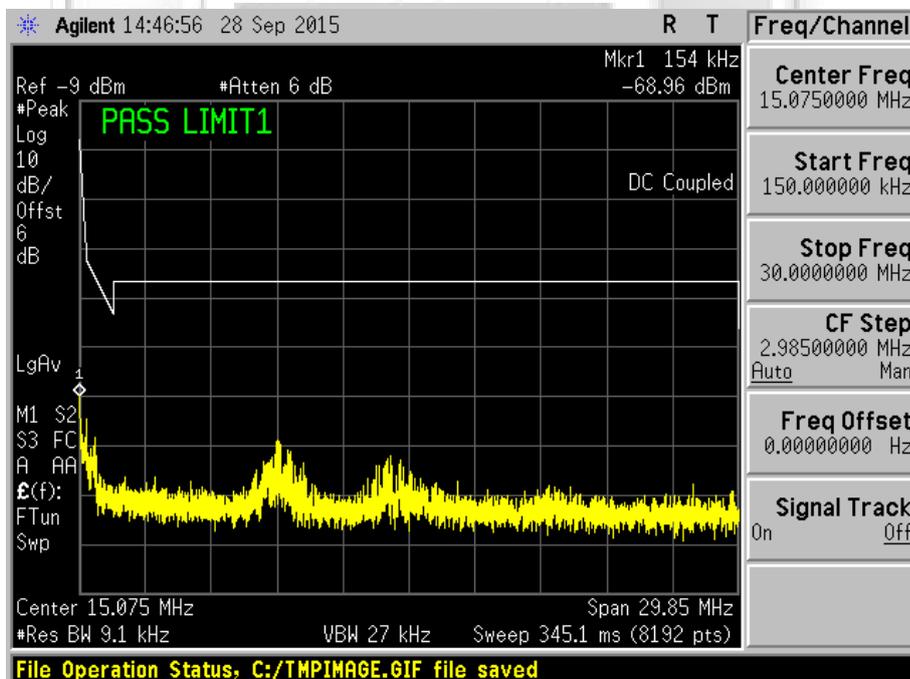


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 13 – Channel 0 (lower ch)

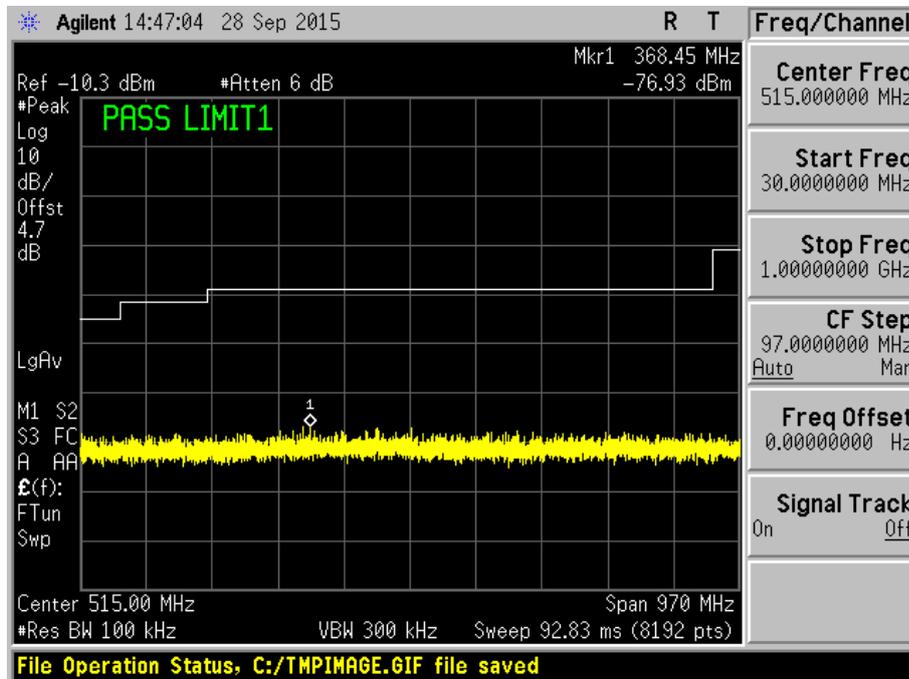


Plot 14 – Channel 0 (lower ch)

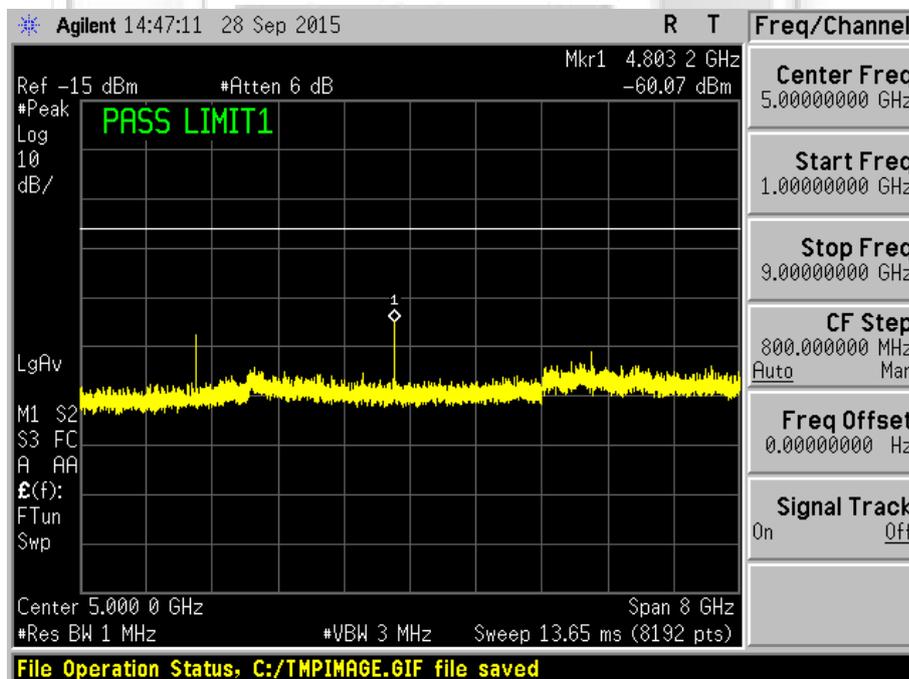


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 15 – Channel 0 (lower ch)

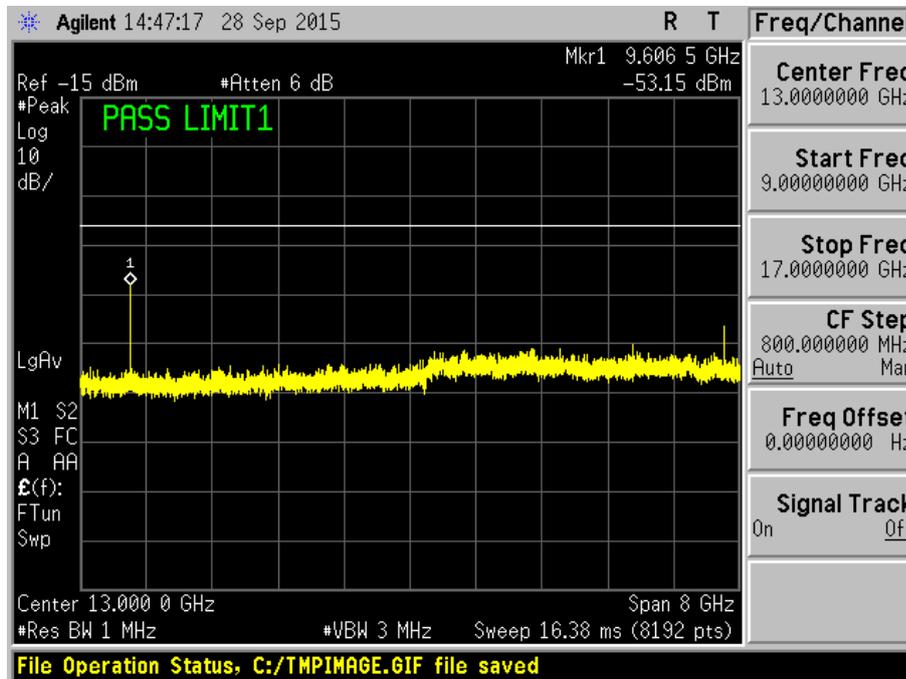


Plot 16 – Channel 0 (lower ch)

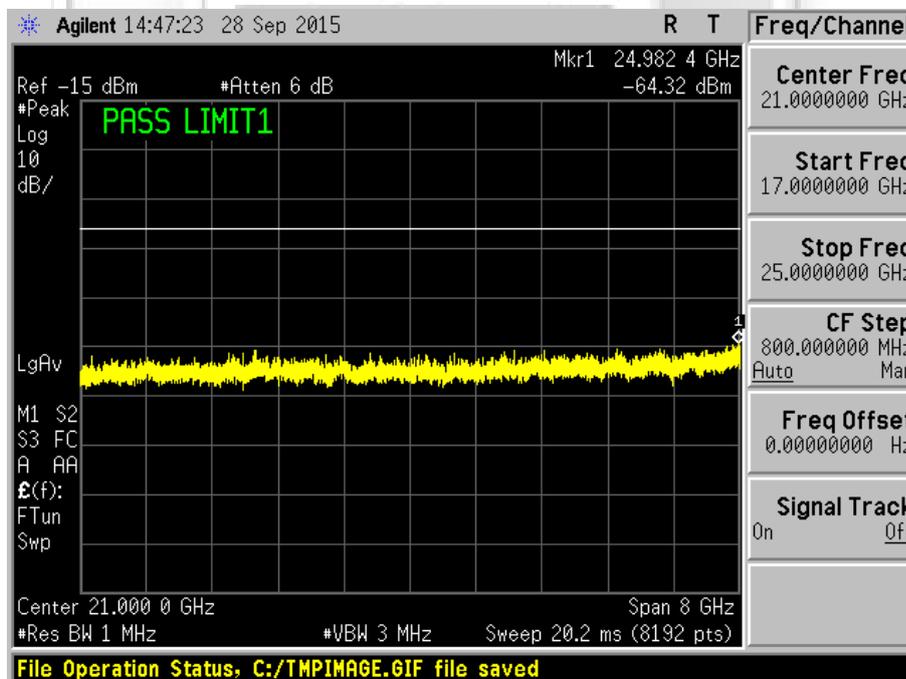


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 17 – Channel 0 (lower ch)

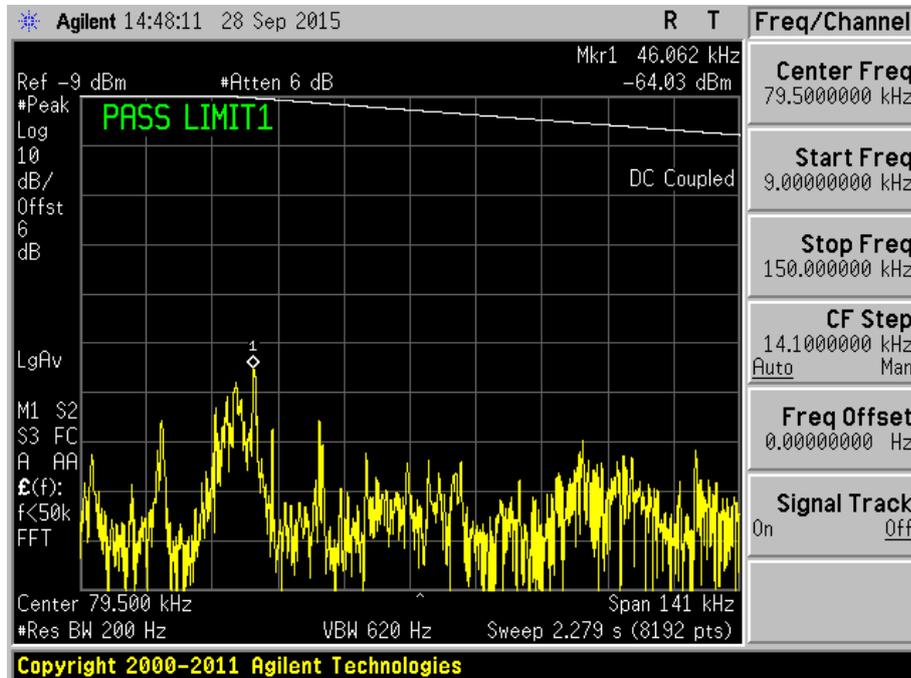


Plot 18 – Channel 0 (lower ch)

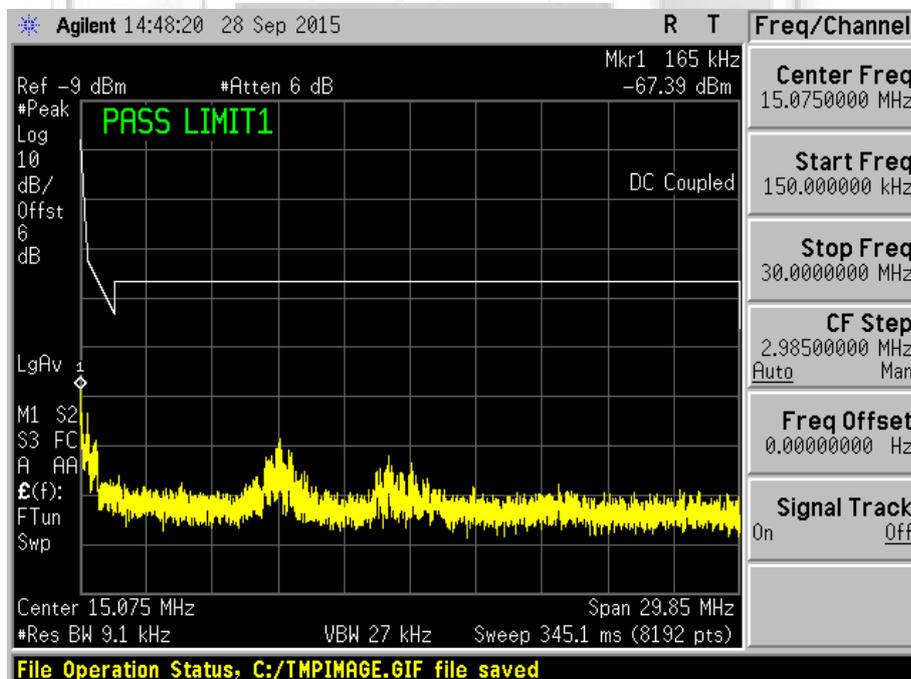


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 19 – Channel 19 (middle ch)

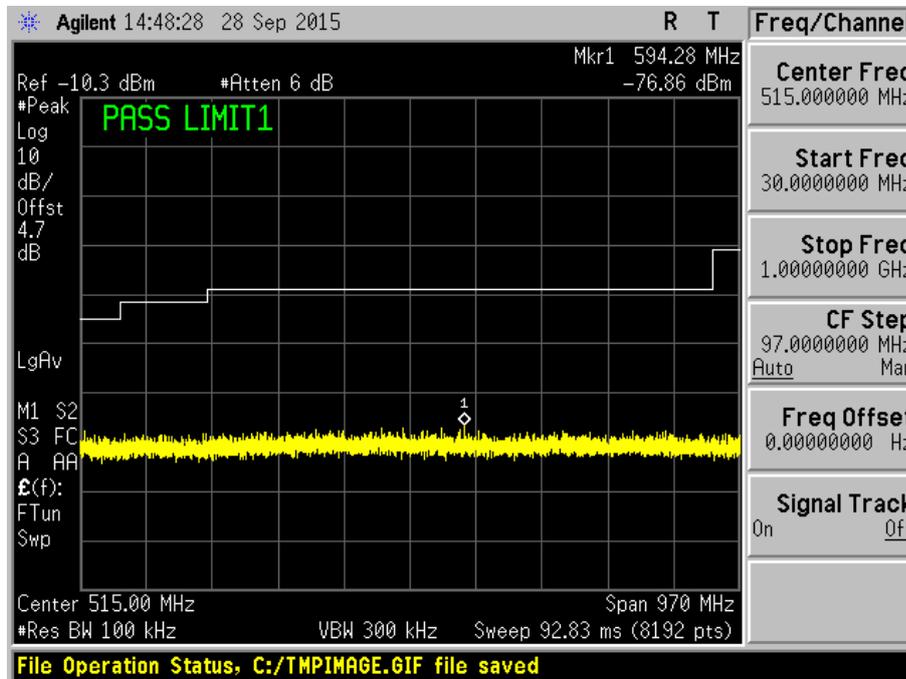


Plot 20 – Channel 19 (middle ch)

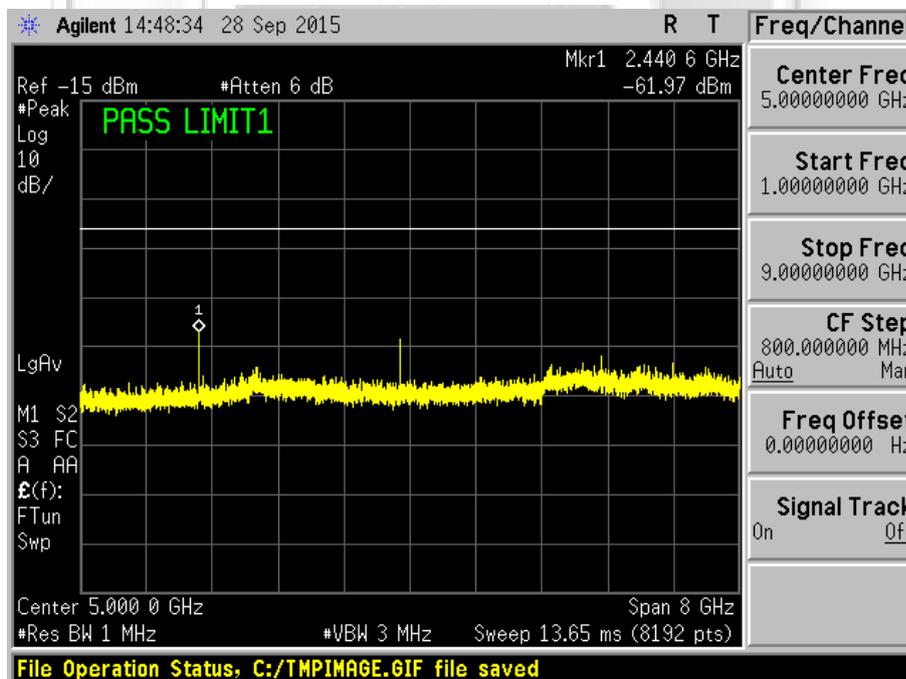


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 21 - Channel 19 (middle ch)

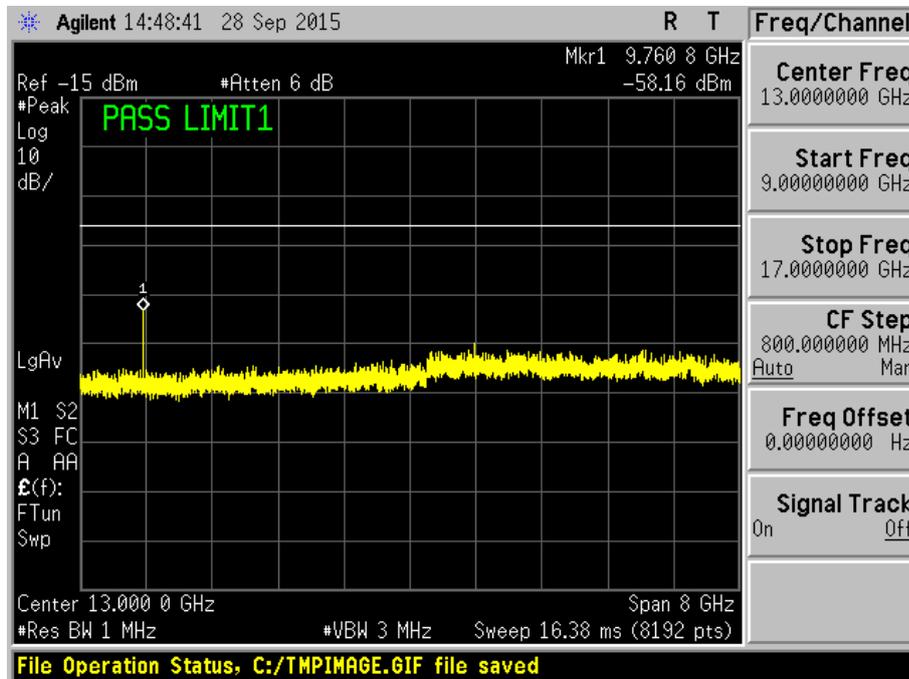


Plot 22 - Channel 19 (middle ch)

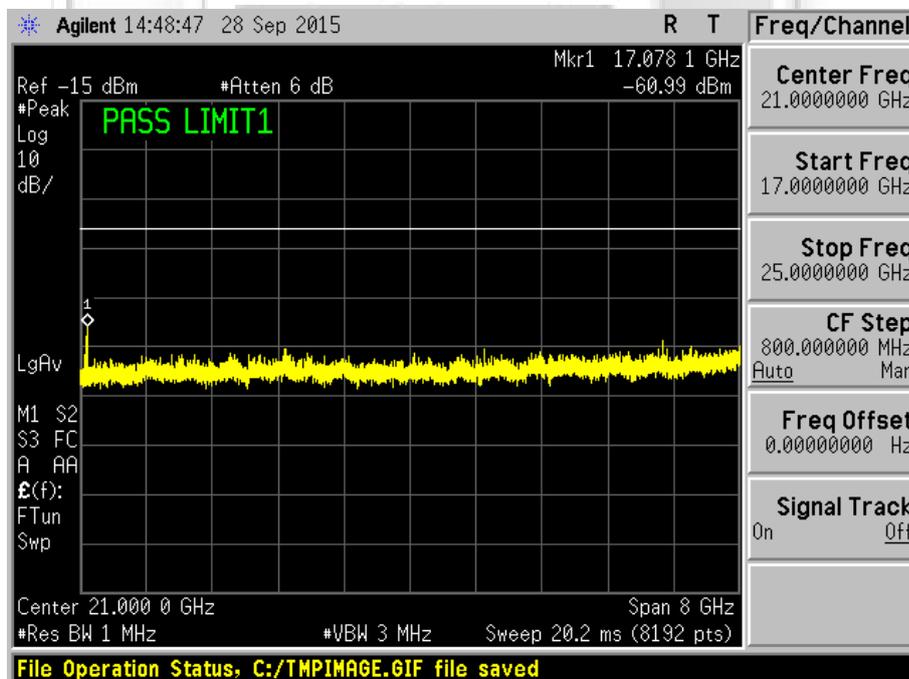


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 23 – Channel 19 (middle ch)

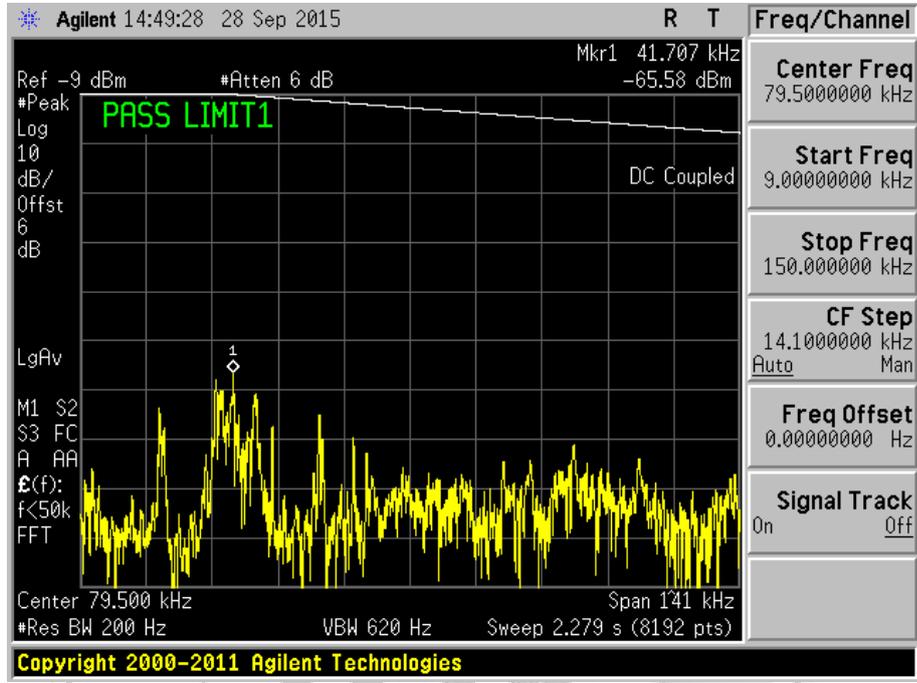


Plot 24 – Channel 19 (middle ch)

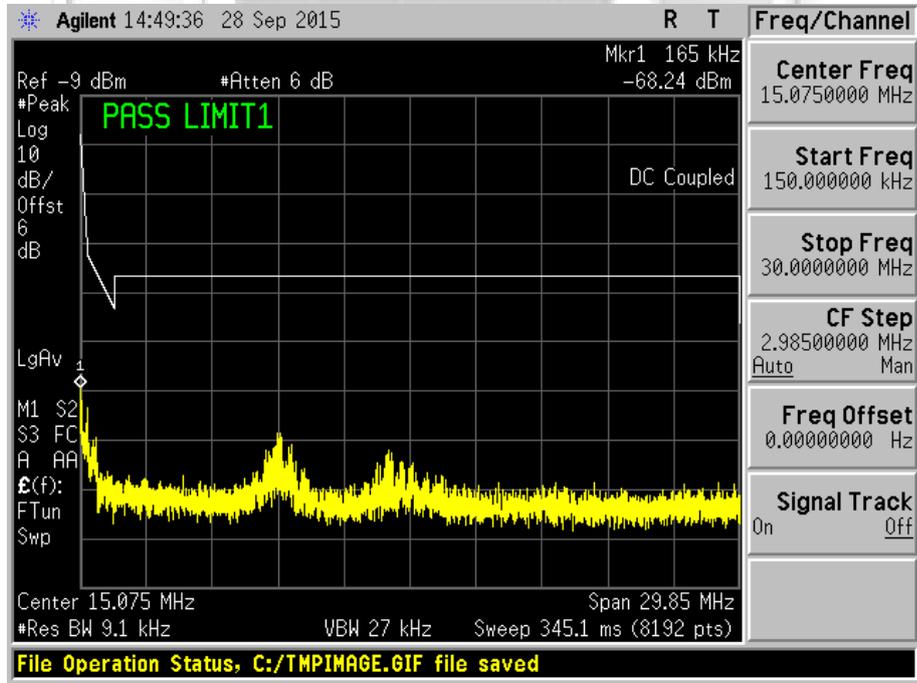


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 25 – Channel 39 (upper ch)

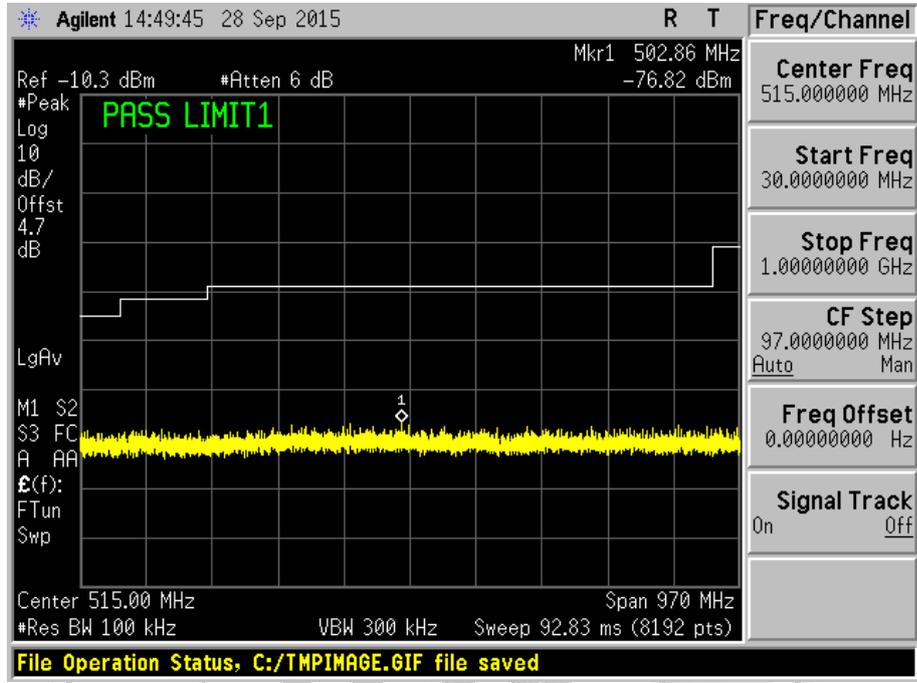


Plot 26 – Channel 39 (upper ch)

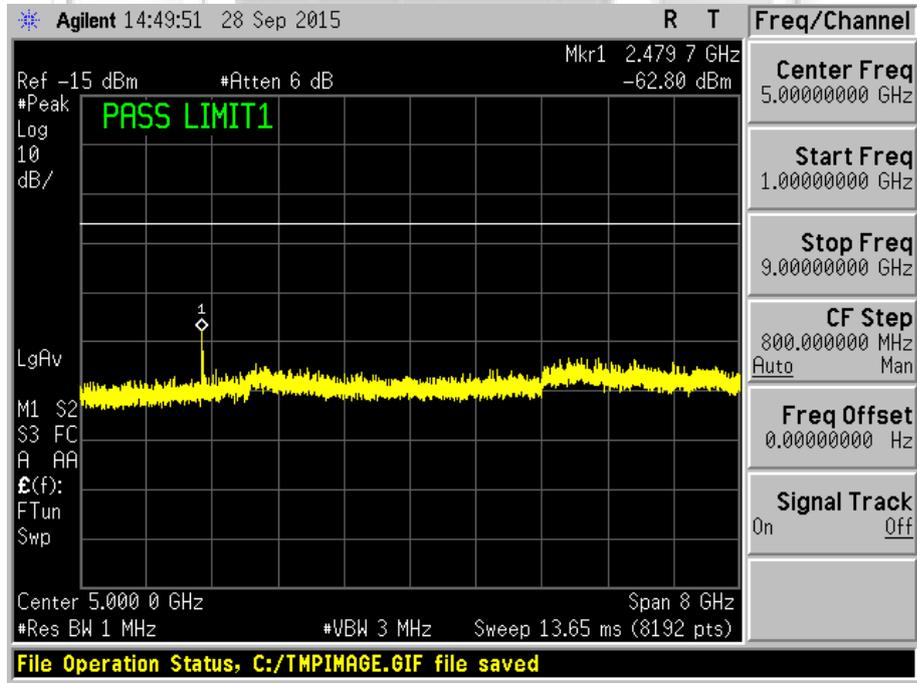


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 27 – Channel 39 (upper ch)



Plot 28 – Channel 39 (upper ch)





**BAND EDGE COMPLIANCE (CONDUCTED) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Conducted) Limits**

The EUT shows compliance to the requirements of this section, which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of desired power.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Conducted) Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4440A	MY45304764	12 Dec 2015	1 year

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Conducted) Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum analyser via a low-loss coaxial cable.
4. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz.
5. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Conducted) Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 2.400GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 2.4835GHz and the any spurious emissions at the band-edge.



**BAND EDGE COMPLIANCE (CONDUCTED) TEST**

**47 CFR FCC Part 15.247(d) Band Edge Compliance (Conducted) Results**

Test Input Power	120V 60Hz	Temperature	24°C
Attached Plots	31 – 32	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

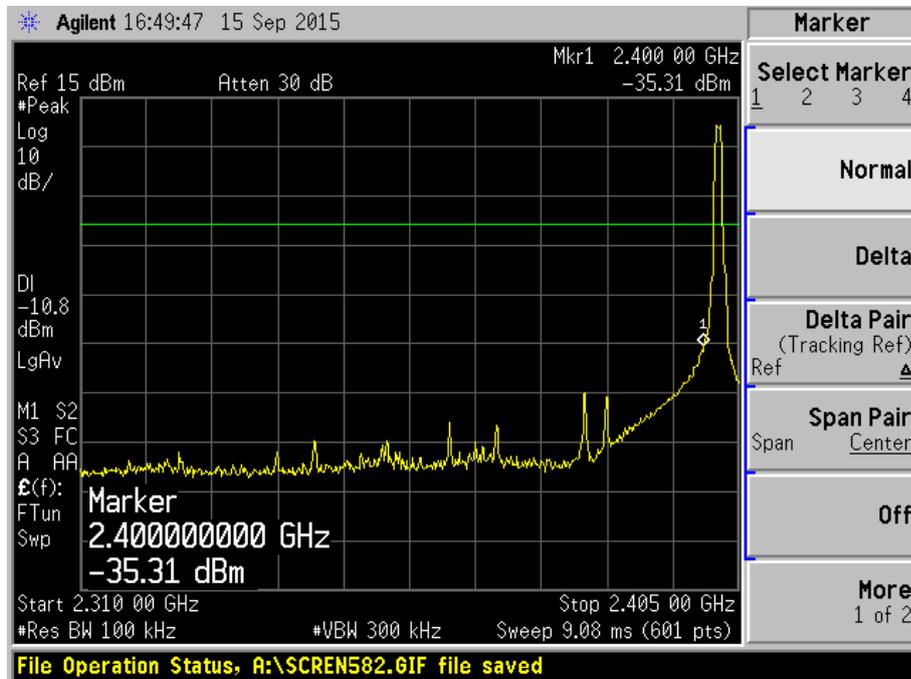
No significant signal was found and they were below the specified limit.



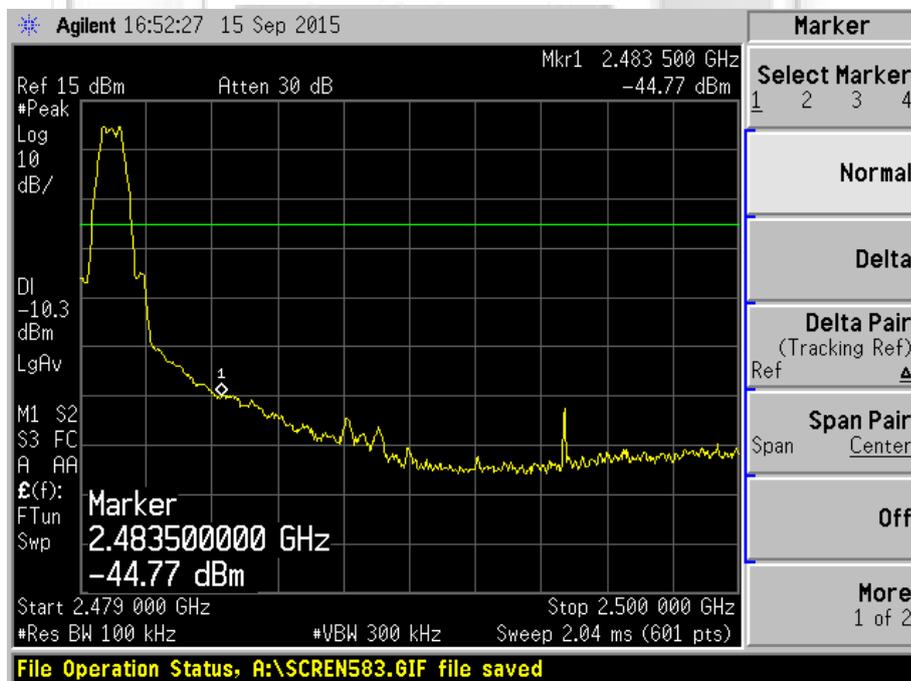


**BAND EDGE COMPLIANCE (CONDUCTED) TEST**

**Band Edge Compliance (Conducted) Plots**



**Plot 31 – Lower Band Edge at 2.4000GHz**



**Plot 32 – Upper Band Edge at 2.4835GHz**



**BAND EDGE COMPLIANCE (RADIATED) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Radiated) Limits**

The EUT shows compliance to the requirements of this section, which states in any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator (EUT) is operating, the radio frequency power that is produced by the EUT shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands shall comply to the radiated emission limits specified in 15.209.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Radiated) Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
R&S Test Receiver – ESI1	ESI40	100010	14 Jul 2016	1 year
EMCO Horn Antenna(1GHz-18GHz)	3115	0003-6088	20 Apr 2016	1 year
R&S Preamplifier (1GHz -18GHz)	SCU18	102191	13 Mar 2016	1 year

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Radiated) Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The resolution bandwidth (RBW) and the video bandwidth (VBW) of the spectrum analyser were respectively set to 100kHz and 300kHz to show compliance of spurious at band edges are at least 20dB below the carriers. For restricted band spurious at band edges, peak and average measurement plots were taken using the following setting:
  - a. Peak Plot:  
RBW = VBW = 1MHz
  - b. Average Plot  
RBW = 1MHz, VBW = 30Hz
4. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Radiated) Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode.
2. The frequency span of the spectrum analyser was set to wide enough to capture the lower band edge of the transmission band, 2.400GHz and any spurious emissions at the band edge.
3. The spectrum analyser was set to max hold to capture any spurious emissions within the span. The signal capturing was continuous until no further spurious emissions were detected.
4. The steps 2 to 3 were repeated with the frequency span of the spectrum analyser was set to wide enough to capture the upper band edge frequency of the transmission band, 2.4835GHz and the any spurious emissions at the band-edge.



**BAND EDGE COMPLIANCE (RADIATED) TEST**

**47 CFR FCC Part 15.247(d) and RSS-247 5.5 Band Edge Compliance (Radiated) Results**

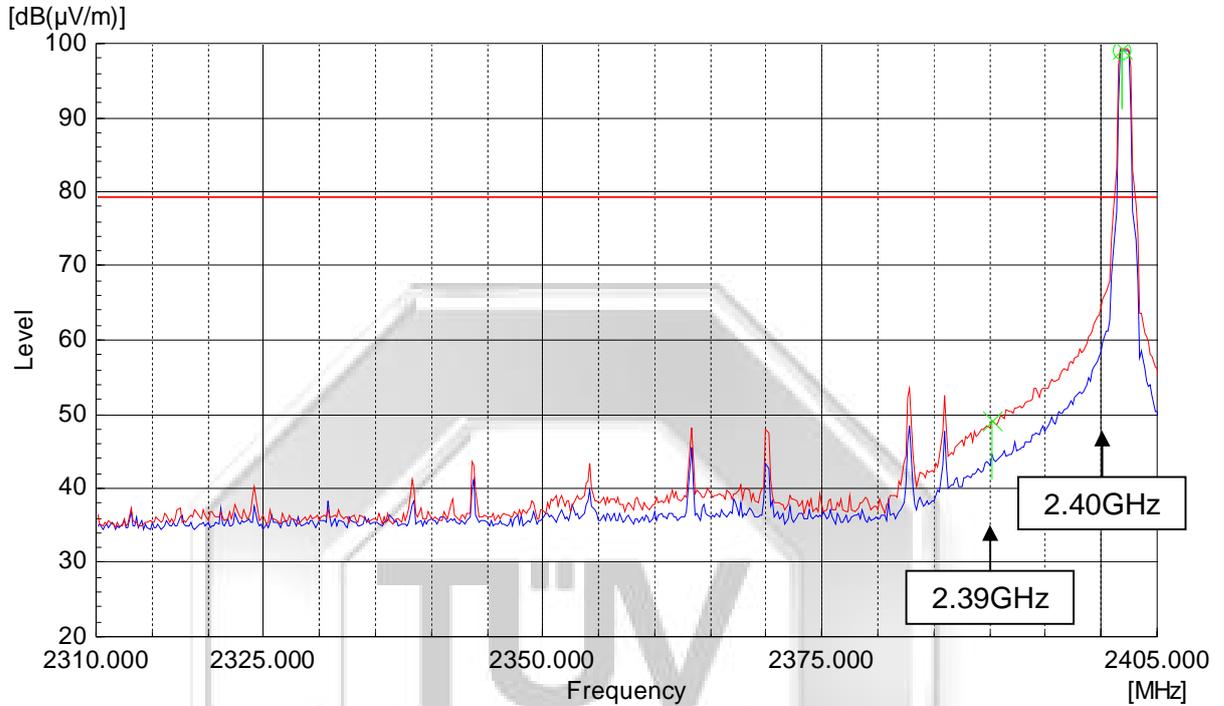
Test Input Power	120V 60Hz	Temperature	24°C
Attached Plots	33 – 38	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Dylan Lin

No significant signal was found and they were below the specified limit.

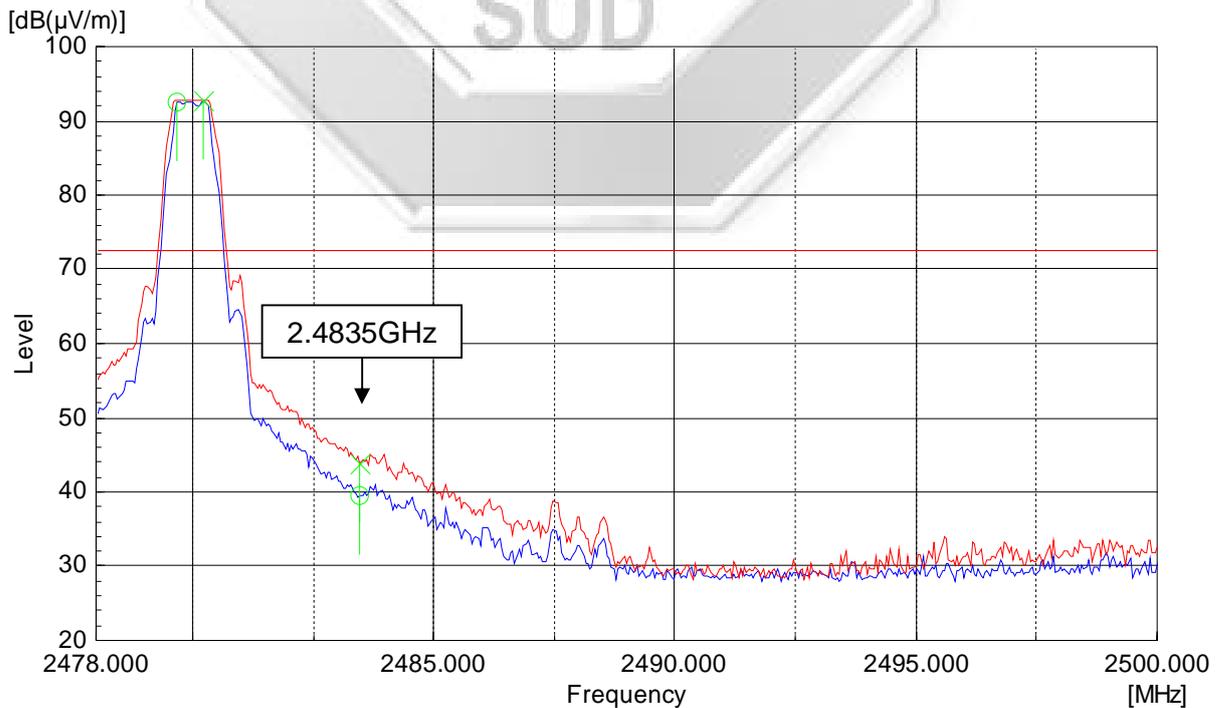


**BAND EDGE COMPLIANCE (RADIATED) TEST**

**Band Edge Compliance (Radiated) Plots (20dB Delta from Carrier at Band Edge)**



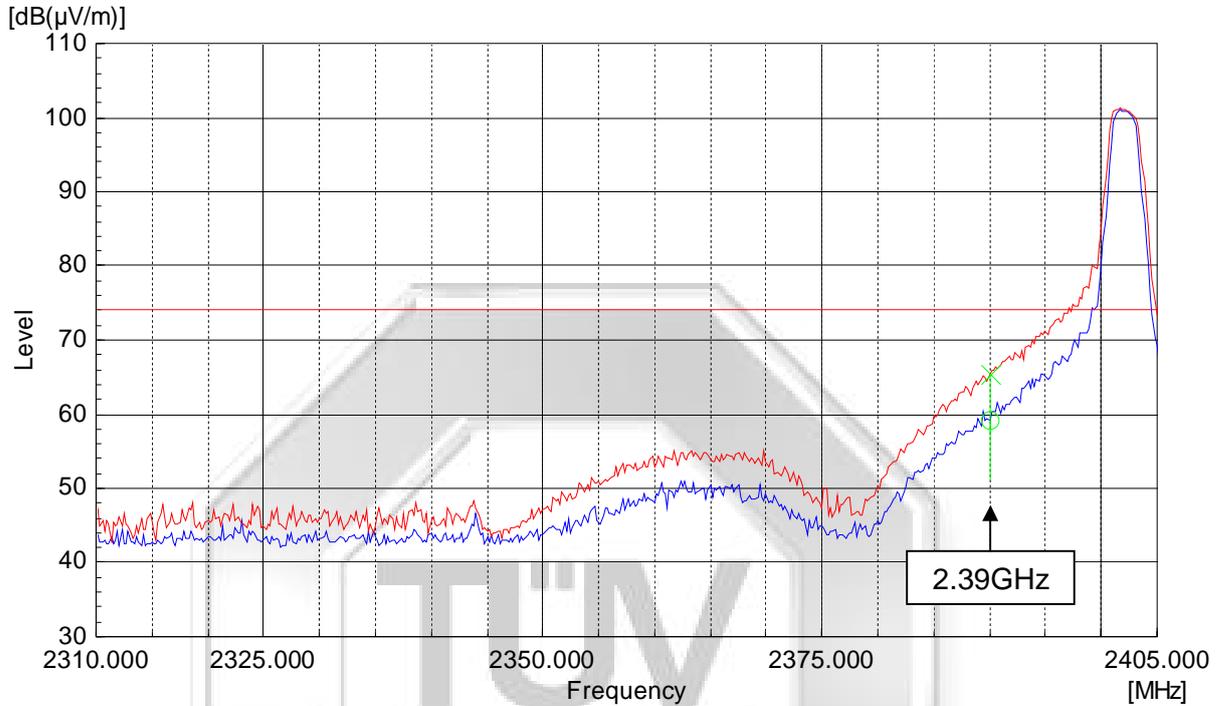
**Plot 33 – Lower Band Edge at 2.4000GHz**



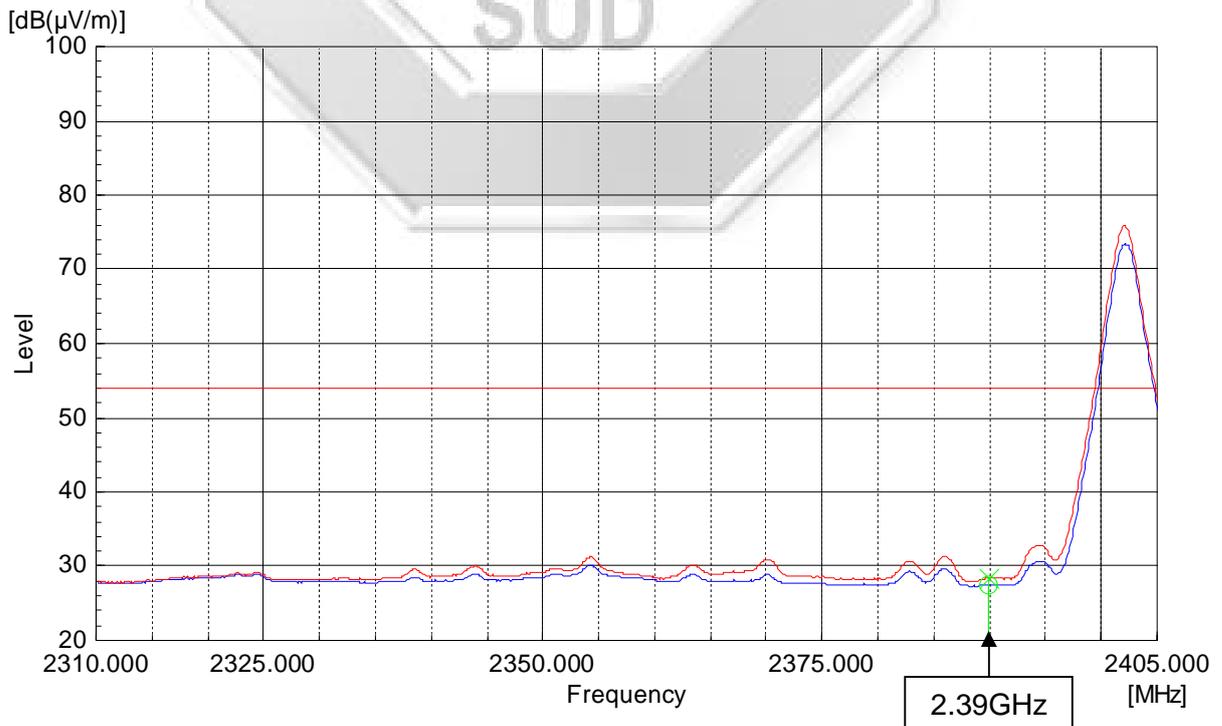
**Plot 34 – Upper Band Edge at 2.4835GHz**

**BAND EDGE COMPLIANCE (RADIATED) TEST**

**Band Edge Compliance (Radiated) Plots (Restricted Band)**



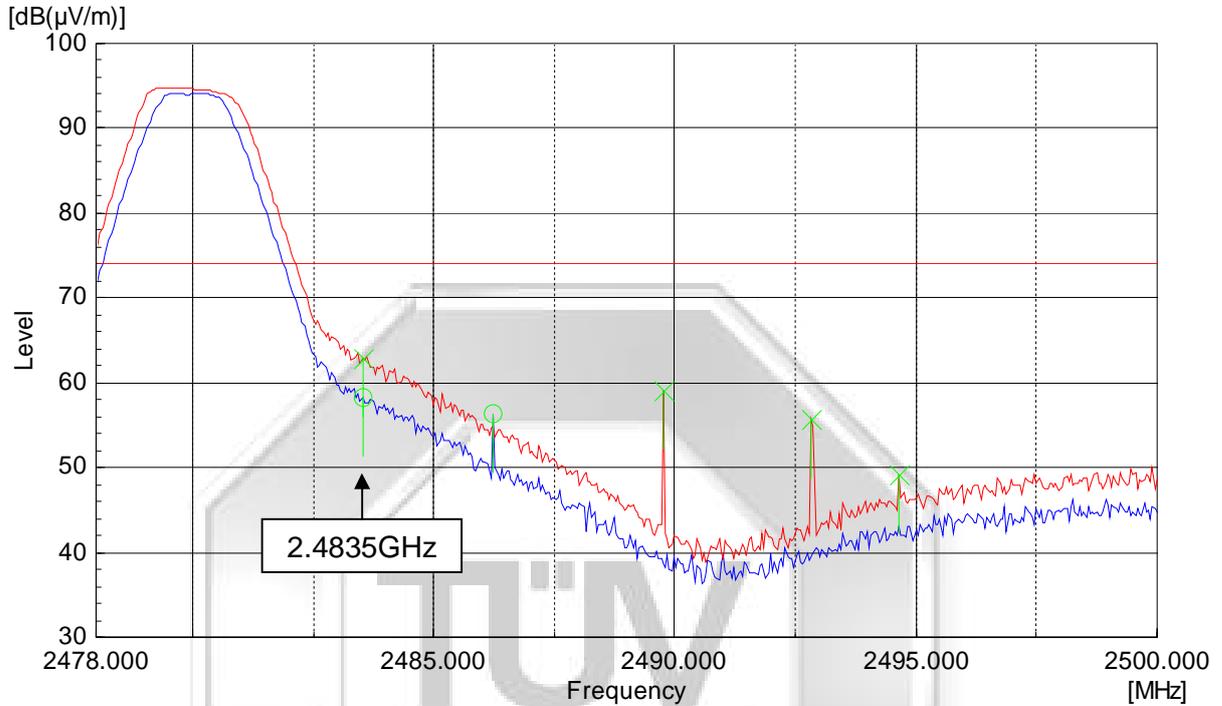
**Plot 35 – Peak Plot at Lower Band Edge at 2.400GHz**



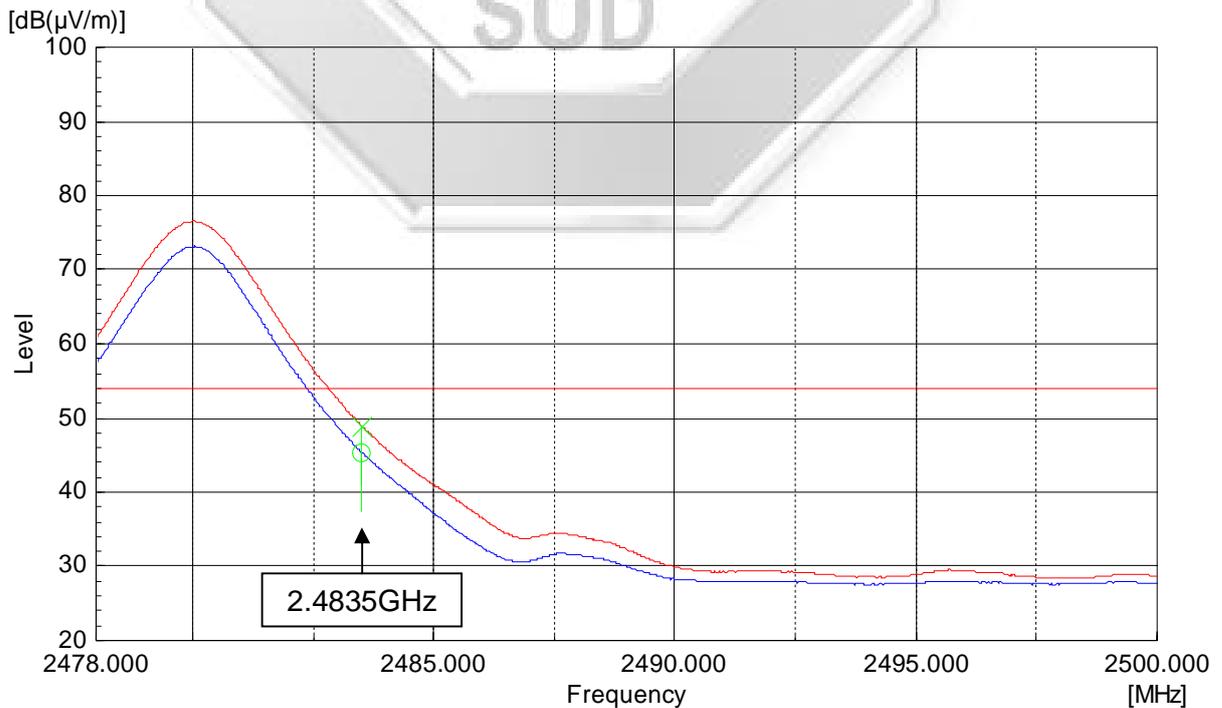
**Plot 36 – Average Plot at Lower Band Edge at 2.400GHz**

**BAND EDGE COMPLIANCE (RADIATED) TEST**

**Band Edge Compliance (Radiated) Plots (Restricted Band)**



**Plot 37 – Peak Plot at Upper Band Edge at 2.4835GHz**



**Plot 38 – Average Plot at Upper Band Edge at 2.4835GHz**



**PEAK POWER SPECTRAL DENSITY TEST**

**47 CFR FCC Part 15.247(e) and RSS-247 5.2(2) Peak Power Spectral Density Limits**

The EUT shows compliance to the requirements of this section, which states the peak power spectral density conducted from the intentional radiator (EUT) to the antenna shall not be greater than 8dBm (6.3mW) in any 3kHz band during any time interval of continuous transmission.

**47 CFR FCC Part 15.247(e) and RSS-247 5.2(2) Peak Power Spectral Density Test Instrumentation**

Instrument	Model	S/No	Cal Due Date	Cal Interval
Agilent Spectrum Analyzer	E4440A	MY45304764	12 Dec 2015	1 year

**47 CFR FCC Part 15.247(e) and RSS-247 5.2(2) Peak Power Spectral Density Test Setup**

1. The EUT and supporting equipment were set up as shown in the setup photo.
2. The power supply for the EUT was connected to a filtered mains.
3. The RF antenna connector was connected to the spectrum via a low-loss coaxial cable.
4. The resolution bandwidth (RBW), video bandwidth (VBW) and span of the spectrum analyser were set to the following:  
RBW = 3kHz  
VBW = 9kHz  
Span = 1.5 times the channel bandwidth  
Sweep time = auto couple
5. All other supporting equipment were powered separately from another filtered mains.

**47 CFR FCC Part 15.247(e) and RSS-247 5.2(2) Peak Power Spectral Density Test Method**

1. The EUT was switched on and allowed to warm up to its normal operating condition. The EUT was then configured to operate in the test mode at lower channel.
2. The peak of the transmitting frequency was detected with the marker peak function of the spectrum analyser.
3. The peak power density of the transmitting frequency was plotted and recorded.
4. The steps 2 to 3 were repeated with the transmitting frequency was set to middle and upper channel respectively.

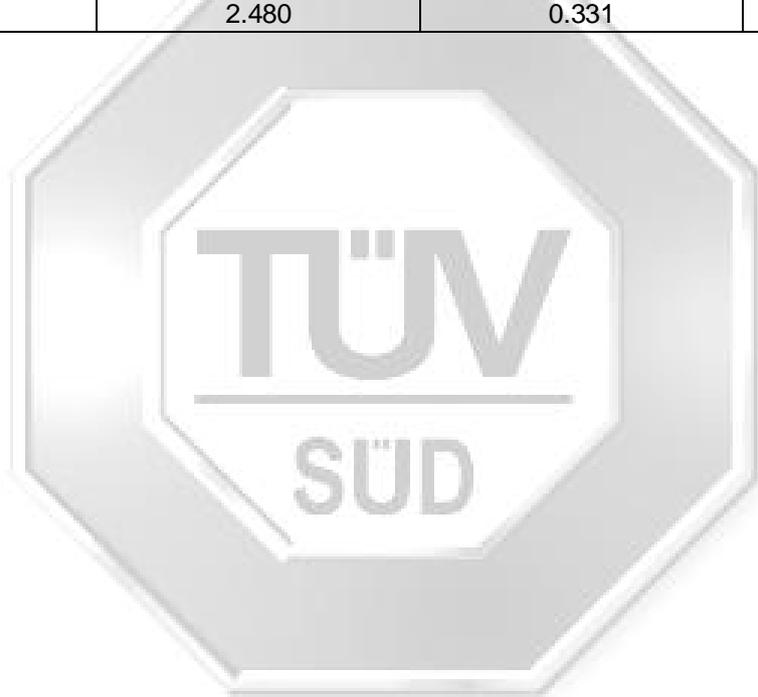


**PEAK POWER SPECTRAL DENSITY TEST**

**47 CFR FCC Part 15.247(e) and RSS-247 5.2(2) Peak Power Spectral Density Results**

Test Input Power	120V 60Hz	Temperature	24°C
Attached Plots	39 – 41	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

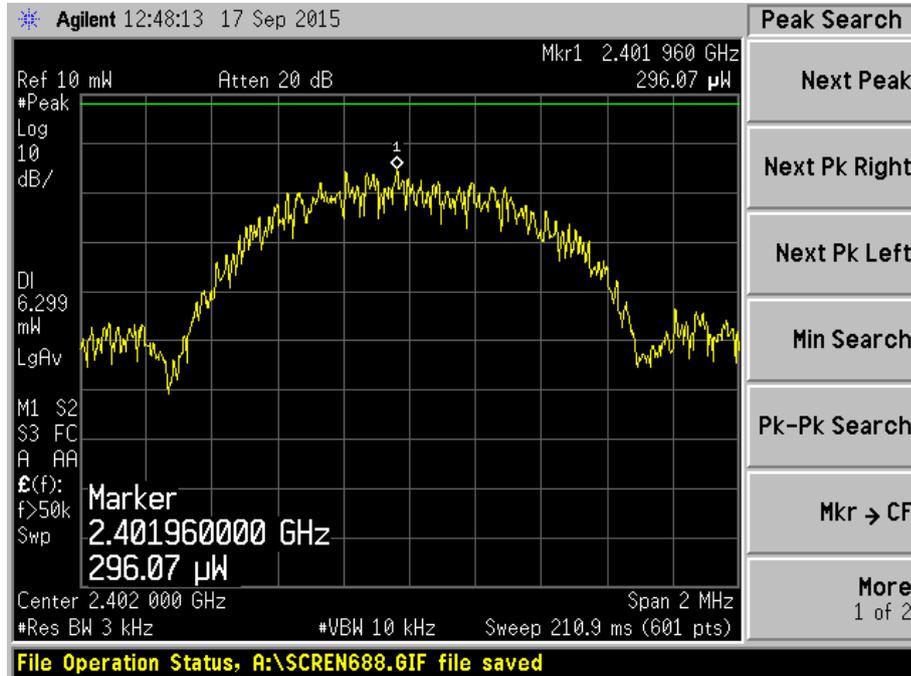
Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
0	2.402	0.296	6.3
19	2.440	0.307	6.3
39	2.480	0.331	6.3



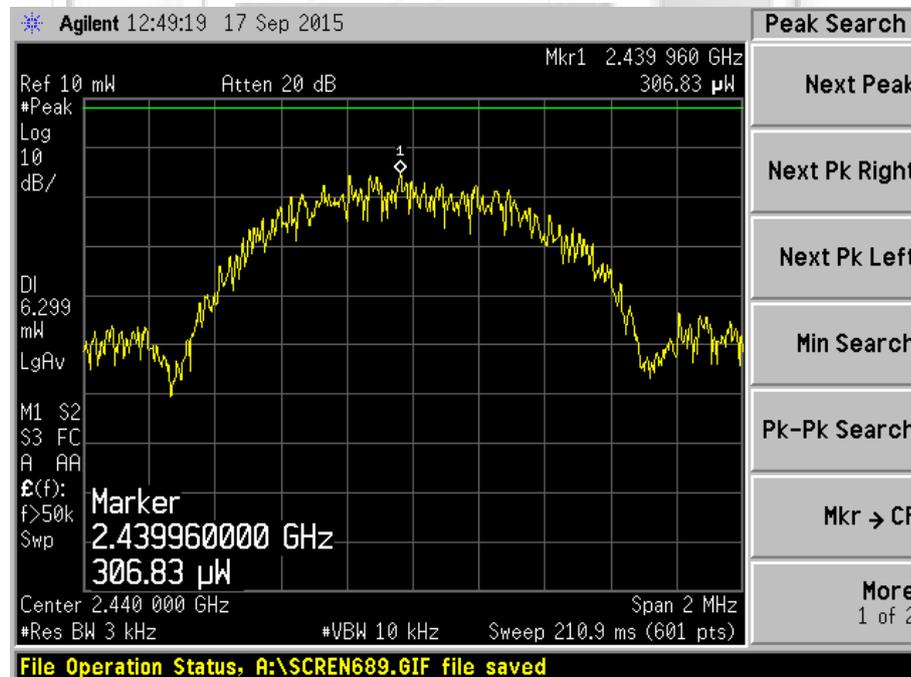


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots



Plot 39 – Channel 0

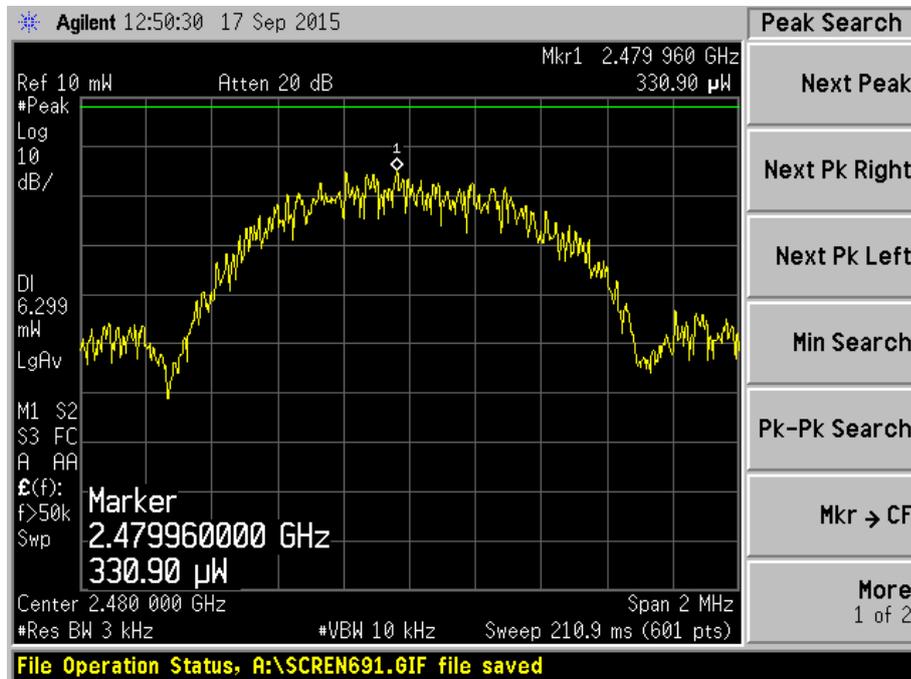


Plot 40 – Channel 19

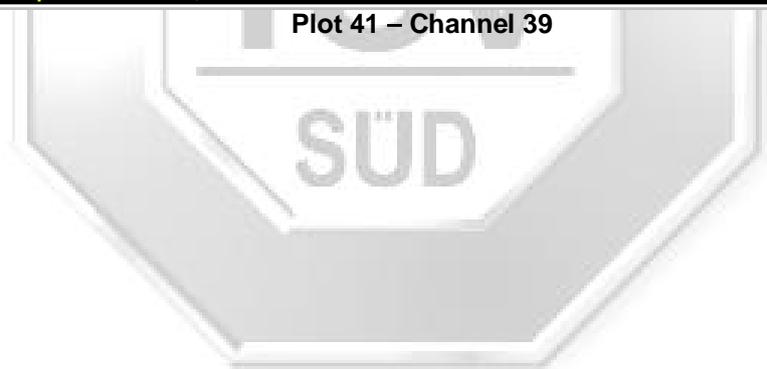


PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots



Plot 41 – Channel 39





**MAXIMUM PERMISSIBLE EXPOSURE (MPE) TEST**

**47 CFR FCC Part 1.1310, RSS-102 4.0 and RSS-GEN 3.2 Maximum Permissible Exposure (MPE) Limits**

The EUT shows compliance to the requirements of this section, which states the MPE limits for general population / uncontrolled exposure are as shown below:

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Average Time (min)
0.3 - 1.34	614	1.63	100 <sup>Note 2</sup>	30
1.34 - 30	824 / f	2.19 / f	180 / f <sup>2</sup> <sup>Note 2</sup>	30
30 - 300	27.5	0.073	0.2	30
300 - 1500	-	-	f / 1500	30
1500 - 100000	-	-	1.0	30

Notes

- f = frequency in MHz
- Plane wave equivalent power density

**47 CFR FCC Part 1.1310, RSS-102 4.0 and RSS-GEN 3.2 Maximum Permissible Exposure Computation**

The power density at 20cm distance was computed from the following formula:

$$S = \frac{(30GP)}{(377d^2)}$$

where

- S = Power density in W/m<sup>2</sup>
- P = 0.0026W
- d = Test distance at 0.2m
- G = Numerical isotropic gain, 2.51 (4.0dBi)

Substituting the relevant parameters into the formula:

$$S = \frac{[(30GP)}{377d^2]}$$

$$= 0.0130 \text{ W/m}^2$$

$$= 0.0013 \text{ mW/cm}^2$$

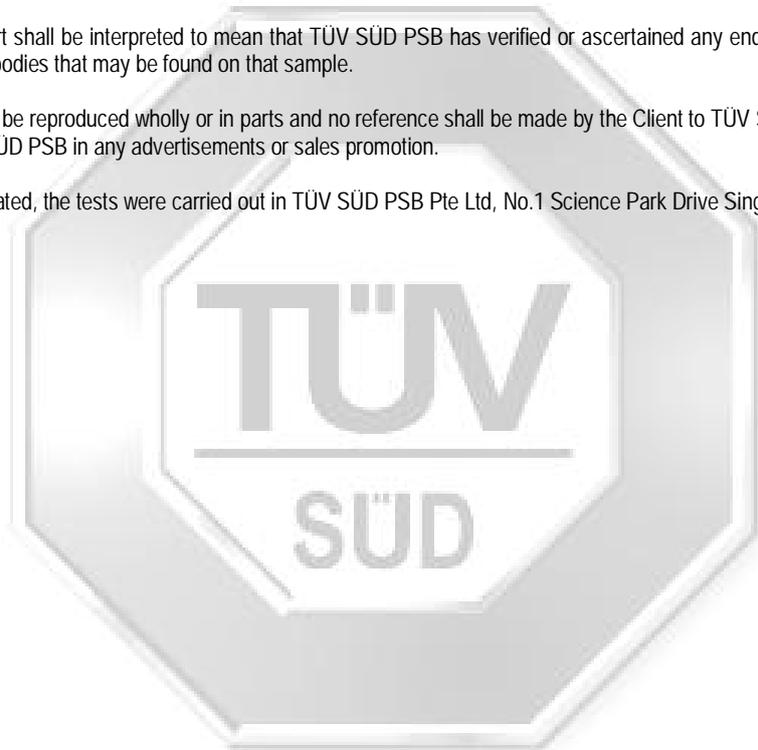
∴ The power density of the EUT at 20cm distance is 0.0013mW/cm<sup>2</sup> based on the above computation and found to be lower than the power density limit of 1.0mW/cm<sup>2</sup>.



Please note that this Report is issued under the following terms :

1. This report applies to the sample of the specific product/equipment given at the time of its testing/calibration. The results are not used to indicate or imply that they are applicable to other similar items. In addition, such results must not be used to indicate or imply that TÜV SÜD PSB approves, recommends or endorses the manufacturer, supplier or user of such product/equipment, or that TÜV SÜD PSB in any way "guarantees" the later performance of the product/equipment. Unless otherwise stated in this report, no tests were conducted to determine long term effects of using the specific product/equipment.
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July 2011





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**ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS**



**ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS**

**TEST SETUP**



**Conducted Emissions Test Setup (Front View)**



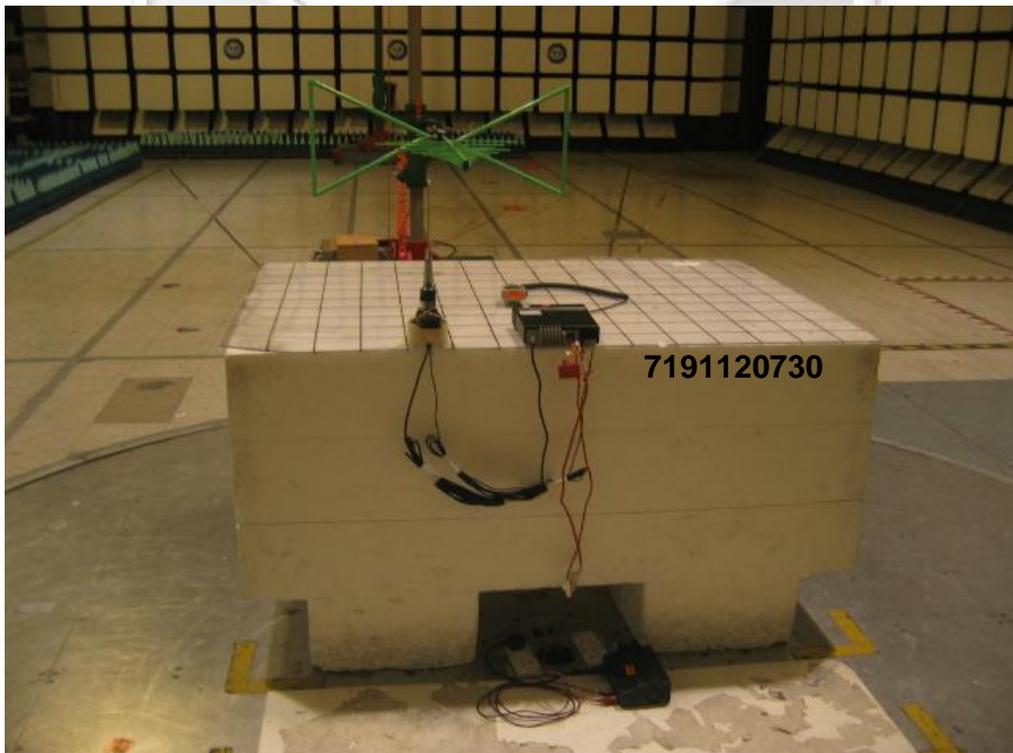
**Conducted Emissions Test Setup (Rear View)**

**ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS**

**TEST SETUP (30MHz to 1GHz)**



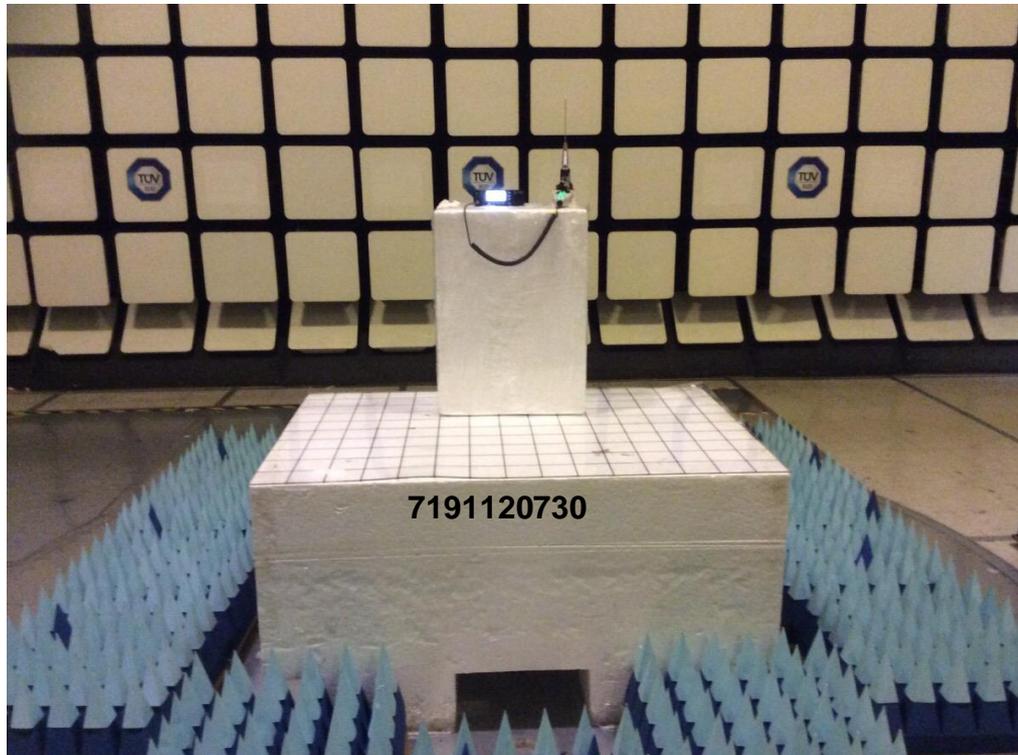
**Radiated Emissions Test Setup (Front View)**



**Radiated Emissions Test Setup (Rear View)**

**ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS**

**TEST SETUP (Above 1GHz)**



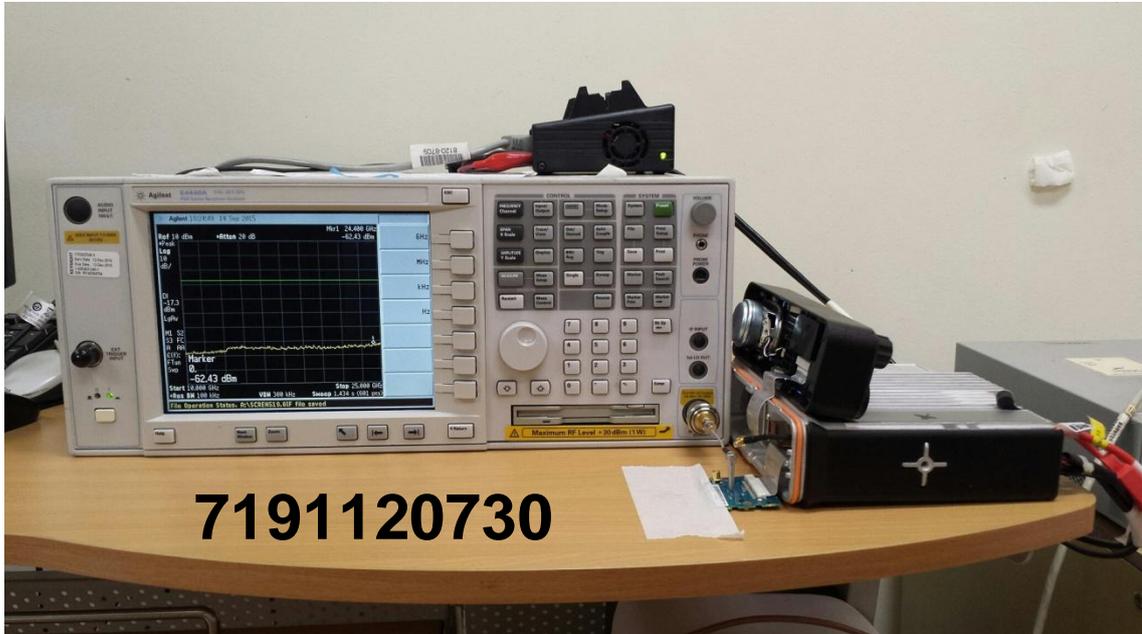
**Radiated Emissions Test Setup (Front View)**



**Radiated Emissions Test Setup (Rear View)**

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



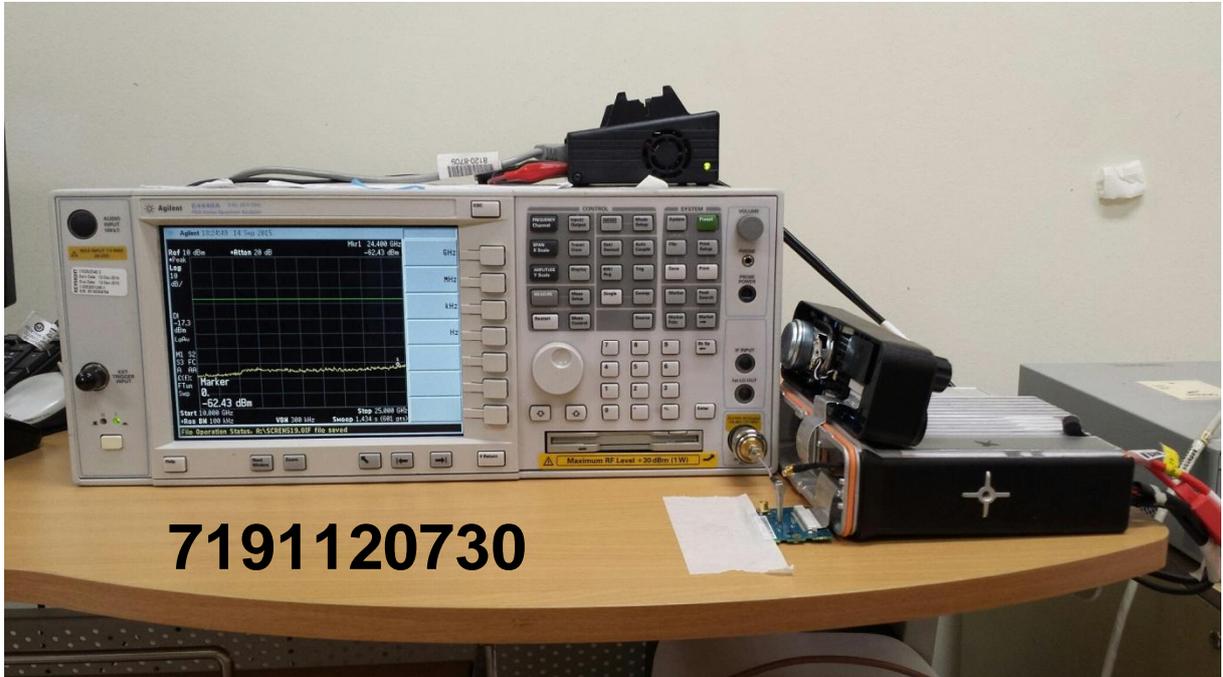
Spectrum Bandwidth (6dB Bandwidth Measurement) Test Setup



Maximum Peak Power Test Setup

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



7191120730

RF Conducted Spurious Emissions (Non-Restricted Bands) Test Setup

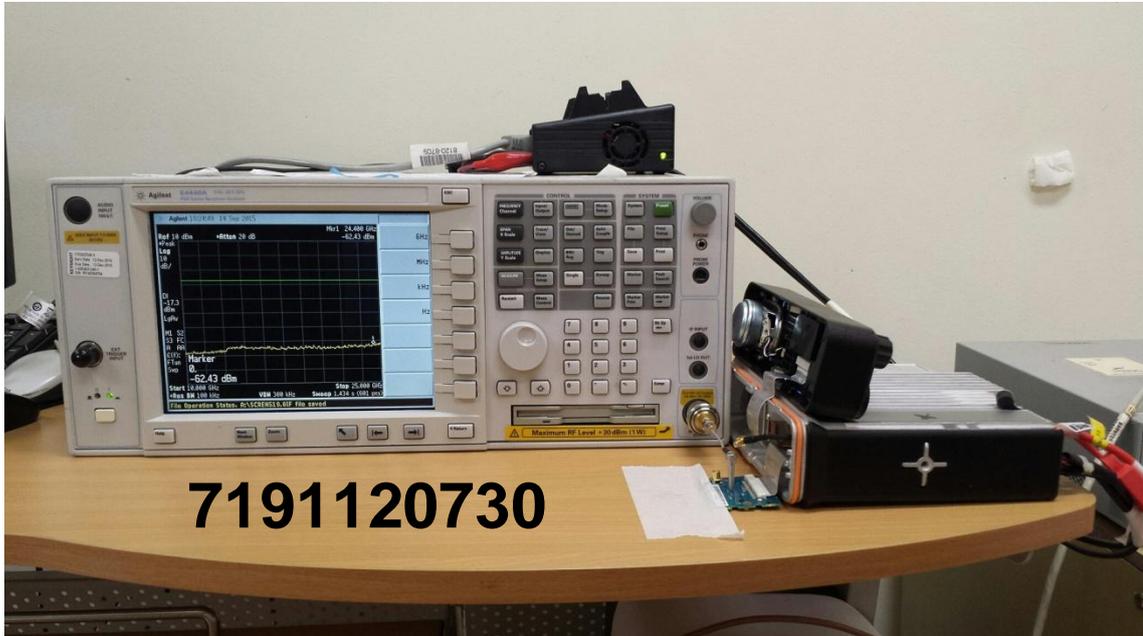


7191120730

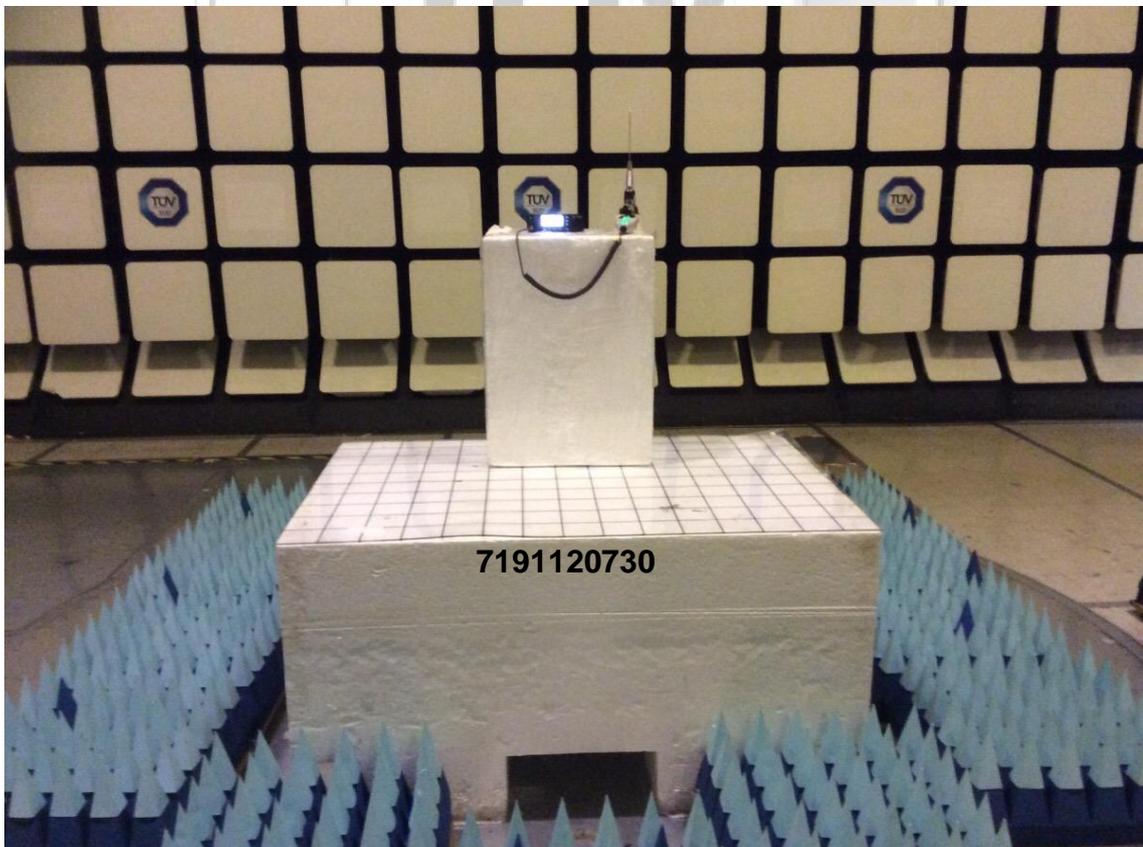
RF Conducted Spurious Emissions (Restricted Bands) Test Setup

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



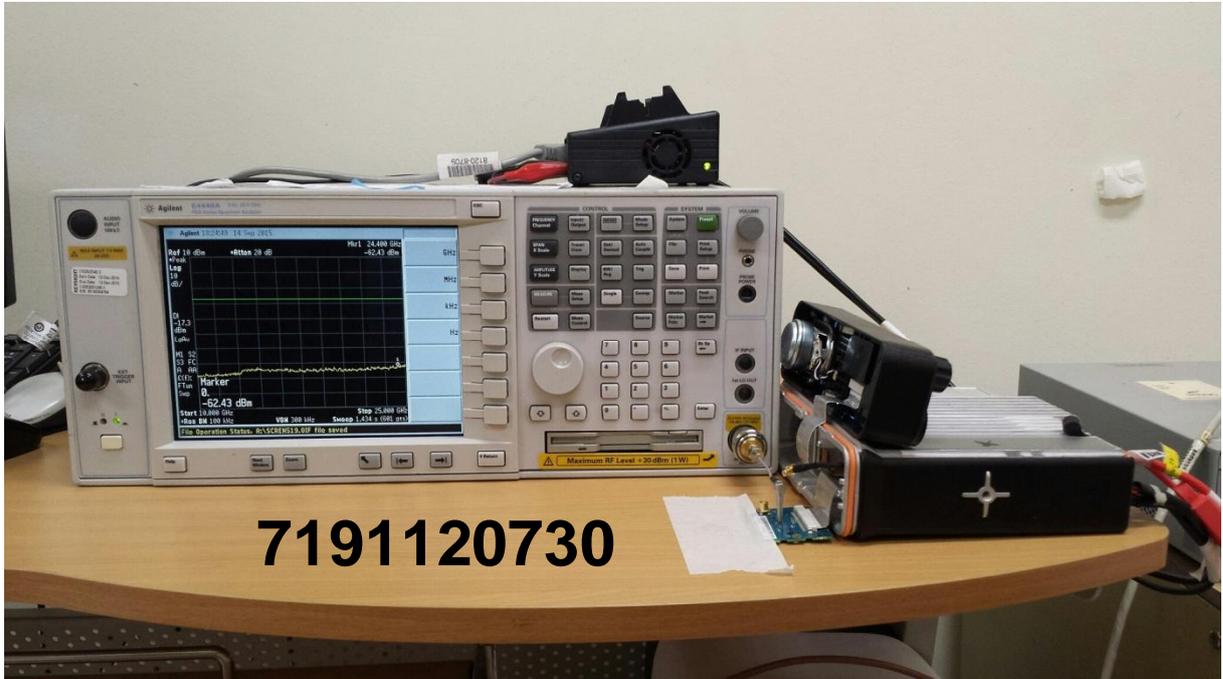
Band Edge Compliance (Conducted) Test Setup



Band Edge Compliance (Radiated) Test Setup

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



Peak Power Spectral Density Test Setup



ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS



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Front View



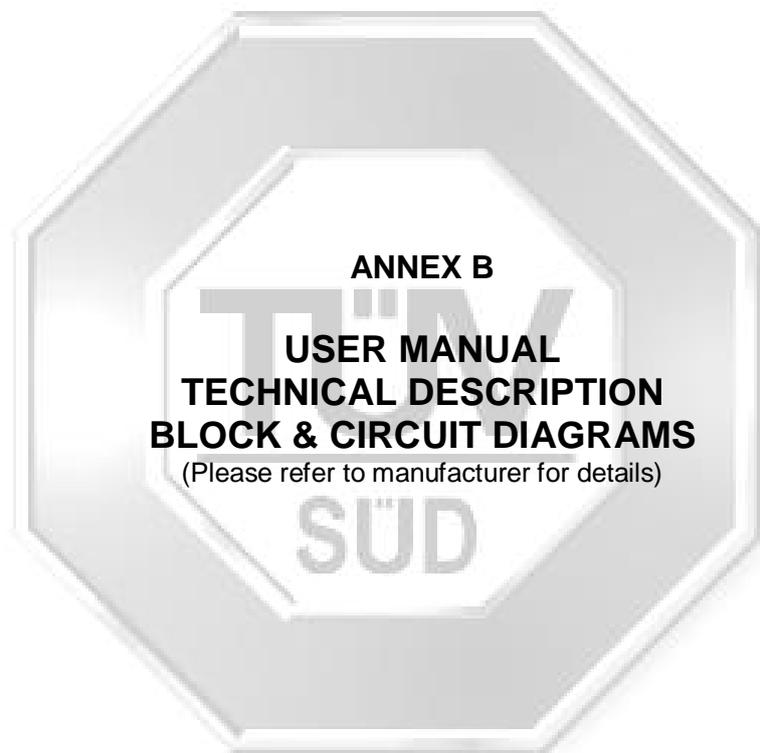
7191120730

Rear View



**ANNEX B USER MANUAL TECHNICAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS**

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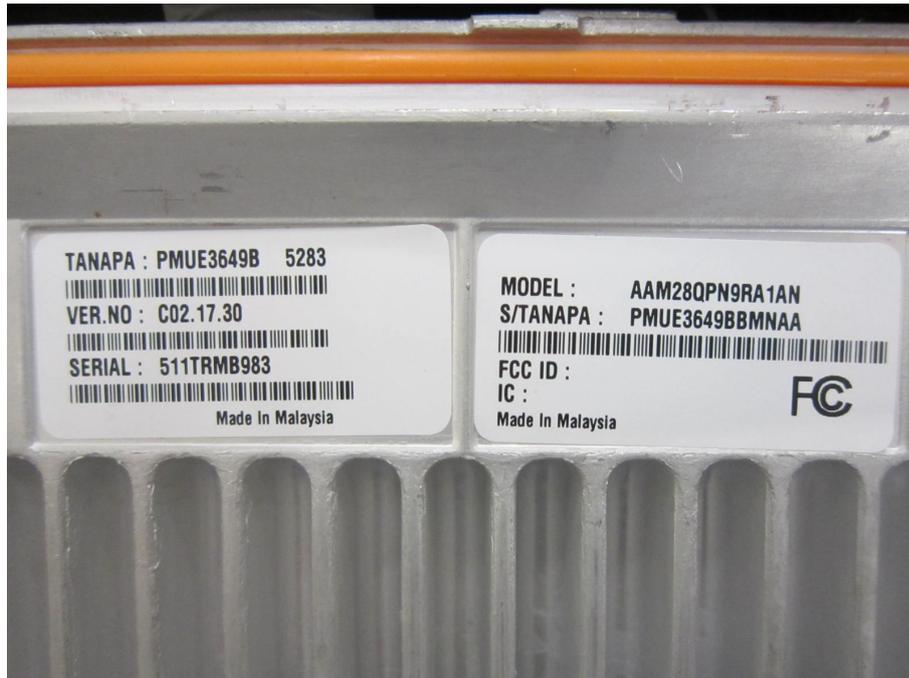
**ANNEX C FCC LABEL, IC LABEL & POSITION**



**ANNEX C FCC LABEL, IC LABEL & POSITION**

Labelling requirements per Section 2.925 & 15.19 and RSS-GEN 2.1

The label shown will be permanently affixed at a conspicuous location on the device and be readily visible to the user at the time of purchase.



**Sample Label**



**Physical Location of FCC, IC Label on EUT**