

Test Report No. 7191121268-EEC15/01
dated 11 Dec 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.

**Choose certainty.
Add value.**

TEST REPORT COVER PAGE

Product Information			
Product Name / Description:	HANDHELD RADIO	Applicant Company Number:	109U
Model Number(s):	AAH02RDH9VA1AN	UPN Number:	92FT7068
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	0.0030							
Field Strength Units @ distance	100.0 dB μ V/m @ 3m							
Measured BW (kHz) (99%, 26dB, 6dB, etc.)	1033 (99%)							
Calculated BW (kHz) As per TRC-43	1200							
Emission Classification (FID, GID, DID, etc.)	1M20G1 D							
Transmitter Spurious Units @ distance	14.5GHz Peak: 59.5 dB μ V/m Average: 48.8 dB μ V/m @ 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:	11 Dec 2015

Test Report No. 7191121268-EEC15/01
dated 11 Dec 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.

**Choose certainty.
Add value.**

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
HANDHELD RADIO (BLUETOOTH LOW ENERGY)
[Model : AAH02RDH9VA1AN]
[FCC ID : AZ489FT7068]
[IC : 109U-92FT7068]

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 2191024797

JOB NUMBER 7191121268

TEST PERIOD 31 Aug 2015 – 20 Oct 2015

PREPARED BY

Quek Keng Huat
Higher Associate Engineer

APPROVED BY

Lim Cher Hwee
Assistant Vice President



TÜV SÜD PSB

Laboratory:
TÜV SÜD PSB Pte. Ltd.
No.1 Science Park Drive
Singapore 118221

Phone : +65-6885 1333
Fax : +65-6776 8670
E-mail: testing@tuv-sud-psb.sg
www.tuv-sud-psb.sg
Co. Reg : 199002667R

Regional Head Office:
TÜV SÜD Asia Pacific Pte. Ltd.
3 Science Park Drive, #04-01/05
The Franklin, Singapore 118223
TUV®



TABLE OF CONTENTS

TEST SUMMARY	4
PRODUCT DESCRIPTION	6
SUPPORTING EQUIPMENT DESCRIPTION.....	8
EUT OPERATING CONDITIONS.....	9
RADIATED EMISSION TEST.....	10
SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST	14
MAXIMUM PEAK POWER TEST	20
RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST.....	22
RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST.....	27
BAND EDGE COMPLIANCE (CONDUCTED) TEST.....	39
BAND EDGE COMPLIANCE (RADIATED) TEST.....	42
PEAK POWER SPECTRAL DENSITY TEST.....	47
ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS	52
ANNEX B USER MANUAL TECHNICAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS.....	60
ANNEX C FCC, IC LABEL & POSITION	61
ANNEX D TEST SITE DESCRIPTION	63



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	Not Applicable *See Note 4
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



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.
4. The Equipment Under Test (EUT) is a battery operated device / DC operated device and contains no provision for public utility connections. The EUT will be powered off and not operational during the charging mode.
5. The EUT was tested using fully charged batteries with DC voltage of 7.45V.
6. 99% Bandwidth Measurement is applicable to RSS-247 only.
7. The unit was also investigated for inter-modulation products between the co-located Bluetooth and the land mobile radios. All inter-modulation products between the co-located radios were found to be compliant to the FCC limits of 15.209 and Industry Canada RSS-GEN.
8. The EUT uses a 0.0 dBi internal PIFA which connects to the RF port via a spring contact. The EUT meets the requirement of FCC 15.203.
9. The maximum measured RF power of the Equipment Under Test is 4.77dBm.
10. All tests except Maximum Peak Power and Band Edge Compliance (Radiated) were tested at the maximum power of the RF module which is higher than the supported maximum EUT RF power. The Maximum Peak Power and Band Edge Compliance (Radiated) tests were tested at the maximum RF power of the EUT.

Modifications

No modifications were made.



PRODUCT DESCRIPTION

Description : The Equipment Under Test (EUT) is a **HANDHELD 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 : AAH02RDH9VA1AN

FCC ID : AZ489FT7068

IC : 109U-92FT7068

Serial Number : 867TRM0645 (RF Radiated Radio)
867TRM0674 (RF Conducted Radio)

Microprocessor : Ti OMAPL138BZCEA3R

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: 19.2MHz , LO: 329.65MHz - 396.65MHz

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 : 0.0 dBi (PIFA Antenna)



PRODUCT DESCRIPTION

(Continued)

Port / Connectors : Refer to manufacturer's user manual / operating manual
Rated Input Power : 7.4Vdc 20.7Wh 2800mAh Lithium ION battery
Accessories : Refer to manufacturer's user manual / operating manual





SUPPORTING EQUIPMENT DESCRIPTION

Equipment Description (Including Brand Name)	Model, Serial & FCC ID Number	Cable Description (List Length, Type & Purpose)
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



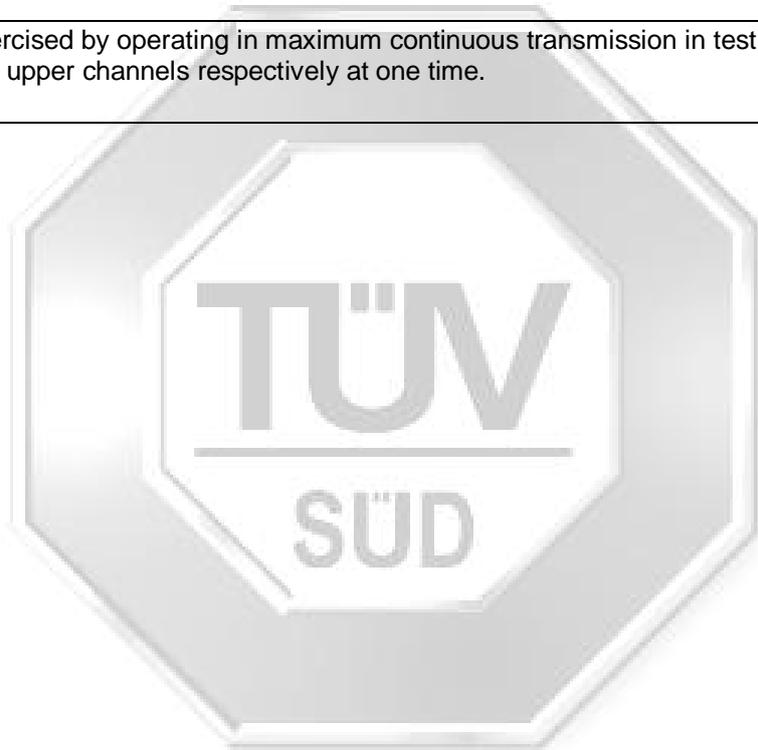


EUT OPERATING CONDITIONS

47 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 & 99% 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**

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.



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 2016	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 10th 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 μ 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 μ 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	7.4Vdc	Temperature	22°C
Test Distance	3m (≥30MHz – 25GHz)	Relative Humidity	55%
		Atmospheric Pressure	1030mbar
		Tested By	Lim Kay Tak

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
256.9350	29.8	46.0	16.2	198	345	V	19
260.8980	21.3	46.0	24.7	100	262	H	19
321.3710	31.9	46.0	14.1	100	279	H	19
325.1940	32.7	46.0	13.3	198	331	V	19
449.3810	37.5	46.0	8.5	100	184	V	19
457.2930	16.2	46.0	29.8	122	184	V	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
3.6009	43.5	74.0	30.5	39.2	54.0	14.8	300	349	V	0
7.1901	47.3	74.0	26.7	41.6	54.0	12.4	100	323	H	0
12.6065	52.8	74.0	21.2	36.6	54.0	17.4	200	335	H	0
14.4281	52.8	74.0	21.2	44.2	54.0	9.8	100	318	H	0
14.8653	52.8	74.0	21.2	41.1	54.0	12.9	200	146	V	0
17.8528	56.0	74.0	18.0	46.2	54.0	7.8	100	60	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
1.6781	48.3	74.0	25.7	25.4	54.0	28.6	200	334	V	19
1.8602	45.4	74.0	28.6	27.6	54.0	26.4	300	297	V	19
2.1335	43.1	74.0	30.9	29.6	54.0	24.4	300	297	V	19
3.6009	43.4	74.0	30.6	37.8	54.0	16.2	300	286	V	19
4.8862	48.6	74.0	25.4	35.6	54.0	18.4	400	166	V	19
5.4833	48.3	74.0	25.7	35.8	54.0	18.2	200	290	H	19

Spurious Emissions above 1GHz - 25GHz

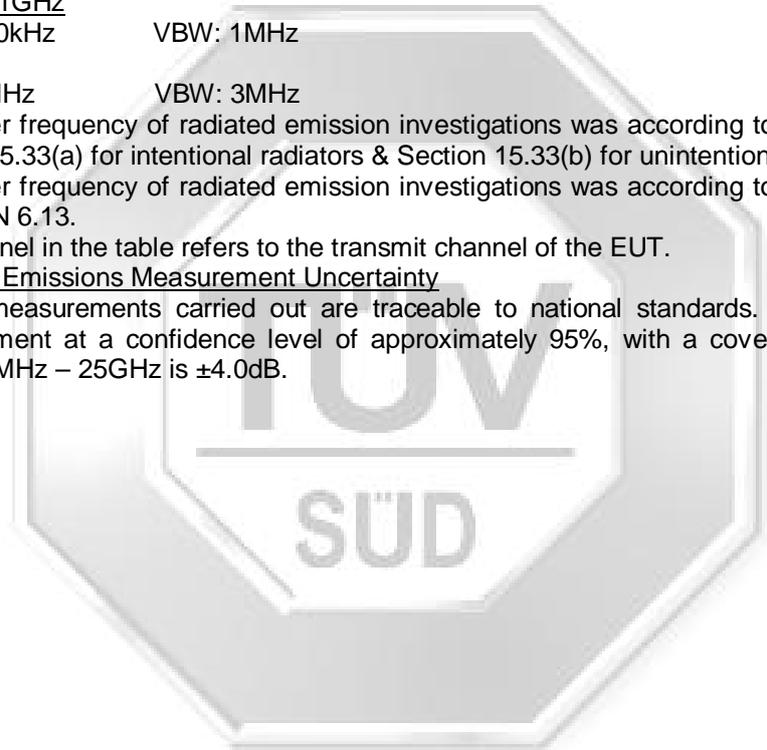
Freq (GHz)	Peak Value (dBμV/m)	Peak Limit (dBμV/m)	Peak Margin (dB)	AV Value (dBμV/m)	AV Limit (dBμV/m)	AV Margin (dB)	Height (cm)	Azimuth (Degrees)	Pol (H/V)	Ch
2.0525	44.4	74.0	29.6	37.5	54.0	16.5	100	295	H	39
3.6009	44.2	74.0	29.8	37.9	54.0	16.1	300	73	V	39
5.4731	43.1	74.0	30.9	35.1	54.0	18.9	100	9	H	39
6.0486	47.8	74.0	26.2	36.5	54.0	17.5	300	158	H	39
6.9473	49.1	74.0	24.9	38.1	54.0	15.9	100	202	H	39
14.4767	59.5	74.0	14.5	48.8	54.0	5.2	100	276	H	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: 3MHz
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 ± 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.

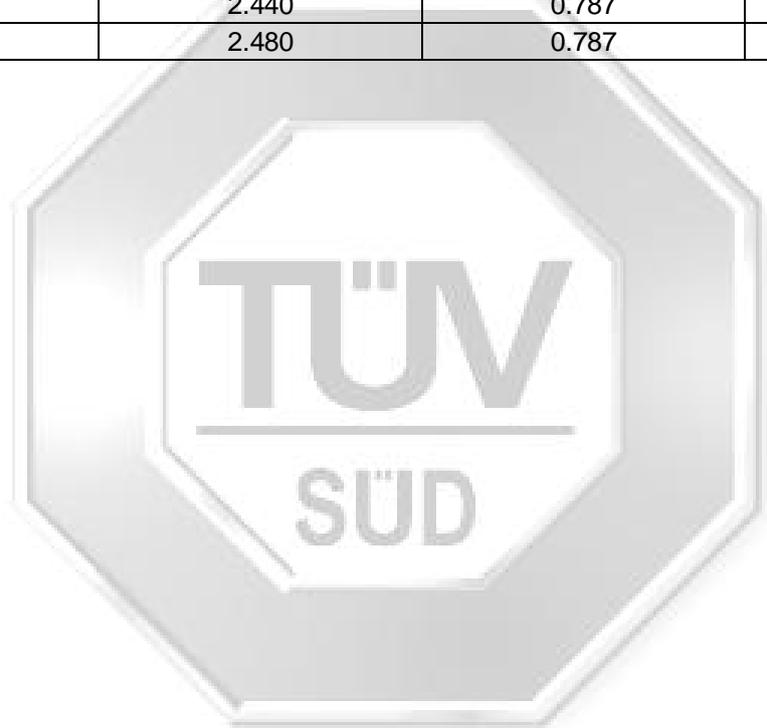


SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST

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	7.4Vdc	Temperature	24°C
Attached Plots	1 – 3 (20dB Bandwidth)	Relative Humidity	56%
	4 – 6 (99% Bandwidth)	Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

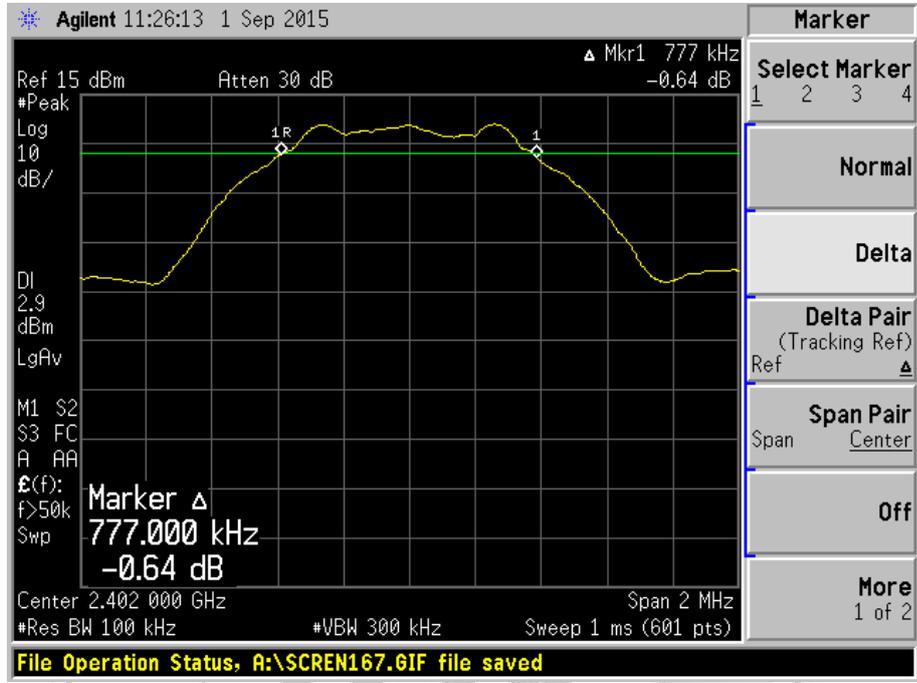
Channel	Channel Frequency (GHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)
0	2.402	0.777	1.032
19	2.440	0.787	1.030
39	2.480	0.787	1.033



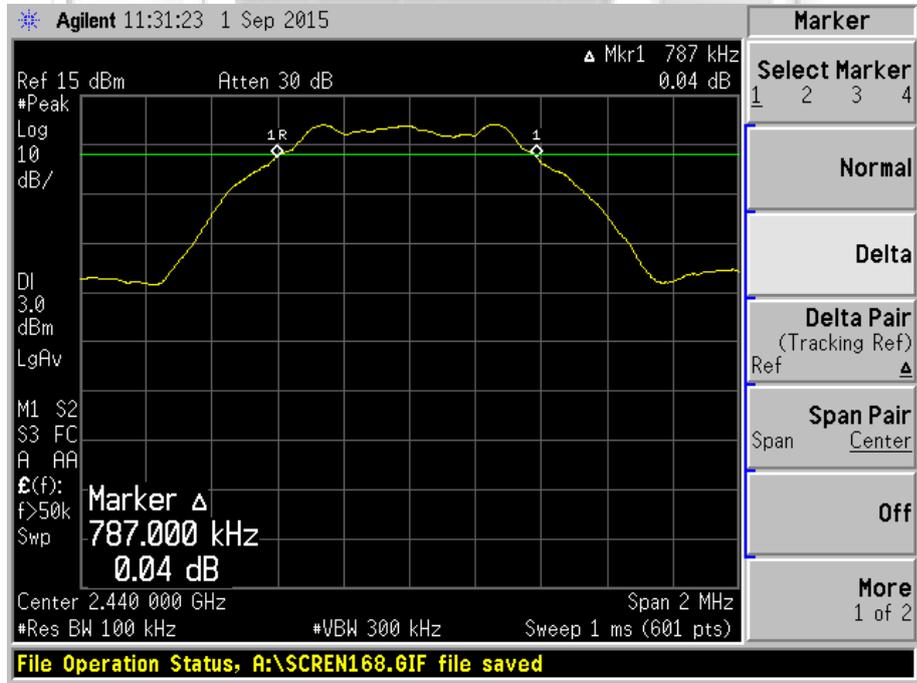


SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (6dB Bandwidth Measurement) Plots



Plot 1 - Channel 0

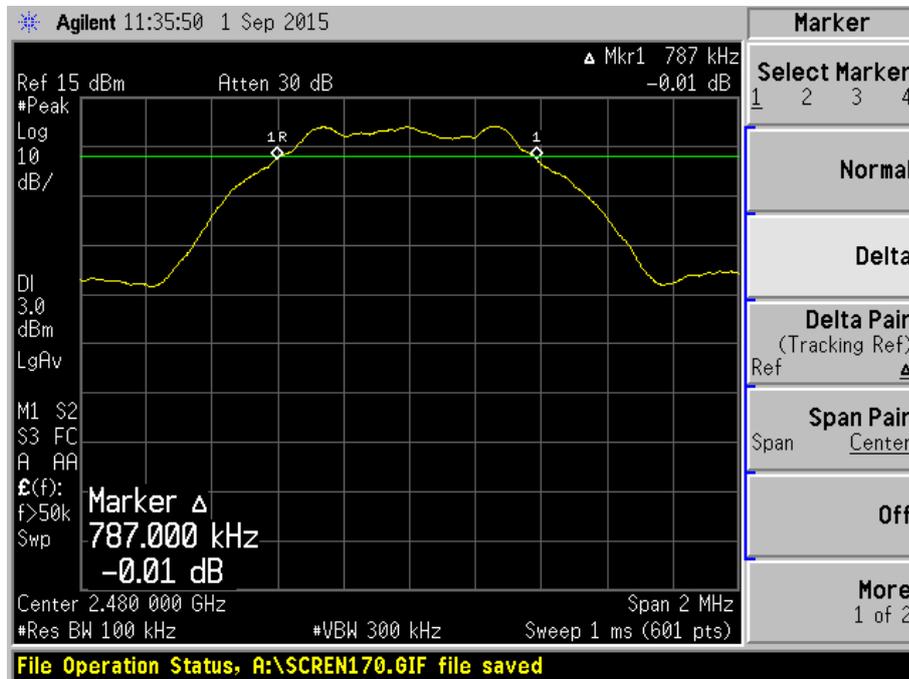


Plot 2 - Channel 19

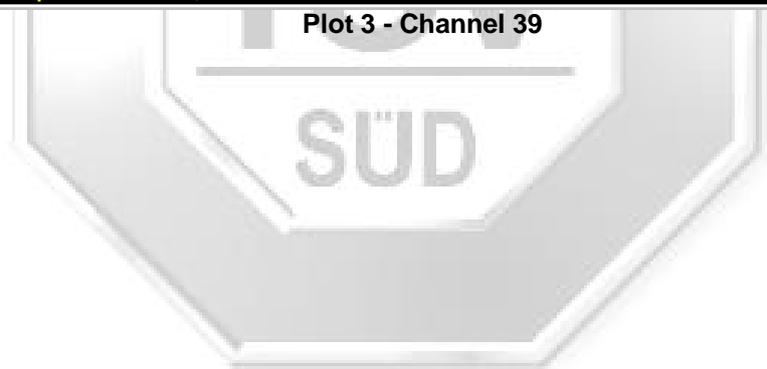


SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (6dB Bandwidth Measurement) Plots



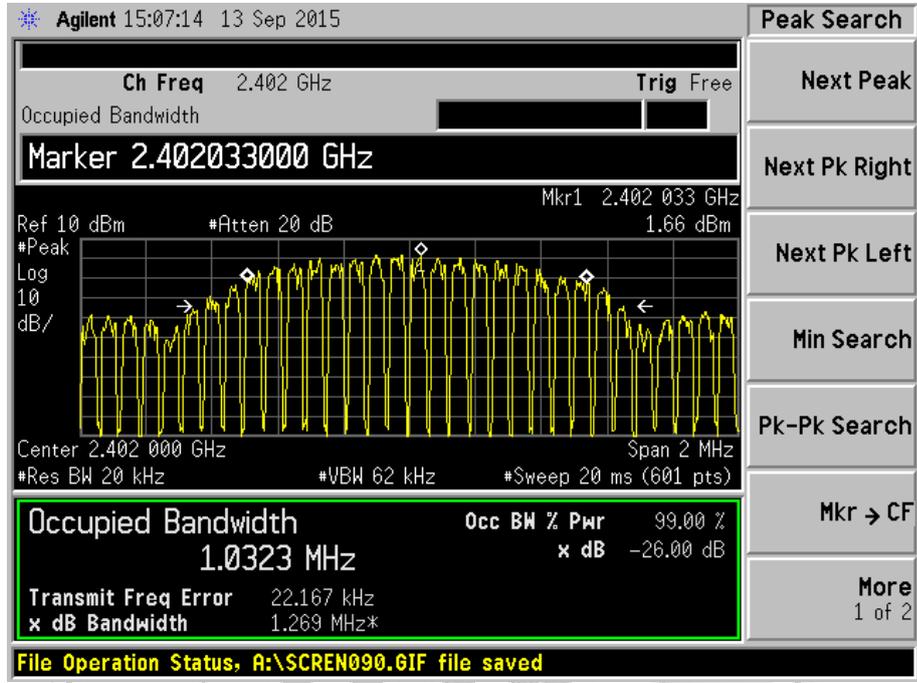
Plot 3 - Channel 39



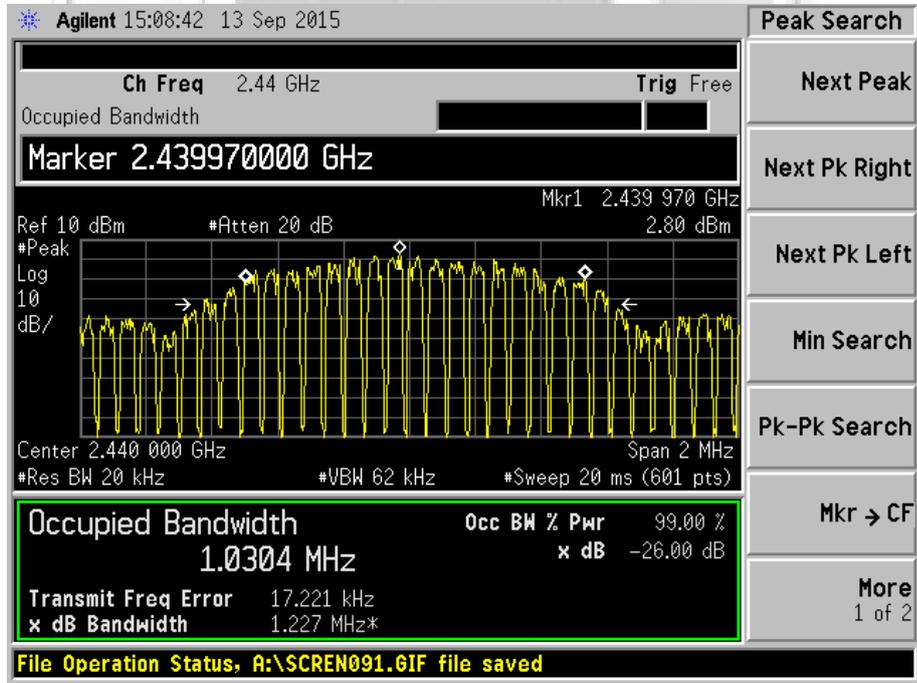


SPECTRUM BANDWIDTH (6dB and 99% BANDWIDTH MEASUREMENT) TEST

Spectrum Bandwidth (99% Bandwidth Measurement) Plots



Plot 4 - Channel 0

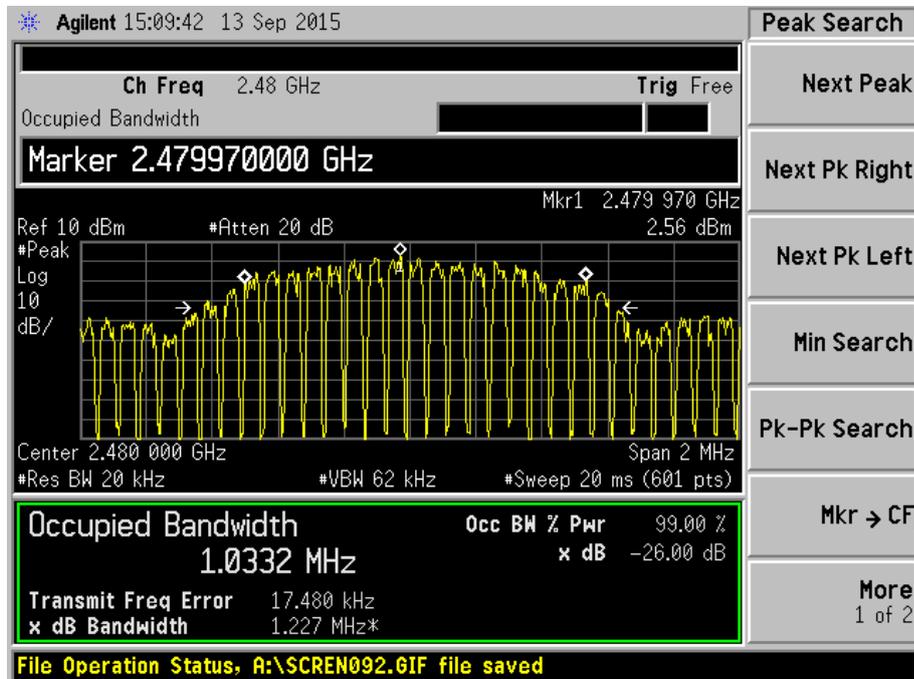


Plot 5 - Channel 19



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

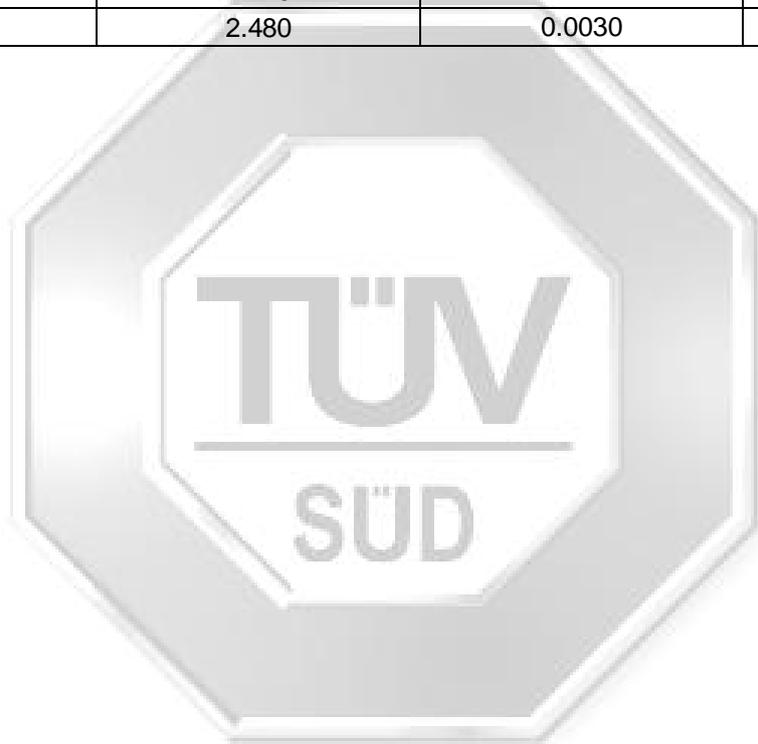
47 CFR FCC Part 15.247(b)(3) and RSS-247 5.4(4) Maximum Peak Power Results

Test Input Power	7.4Vdc	Temperature	24°C
Antenna Gain	0.0 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	0.0030	1.0
19	2.440	0.0030	1.0
39	2.480	0.0030	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	7.4Vdc	Temperature	24°C
Attached Plots	7 – 12	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

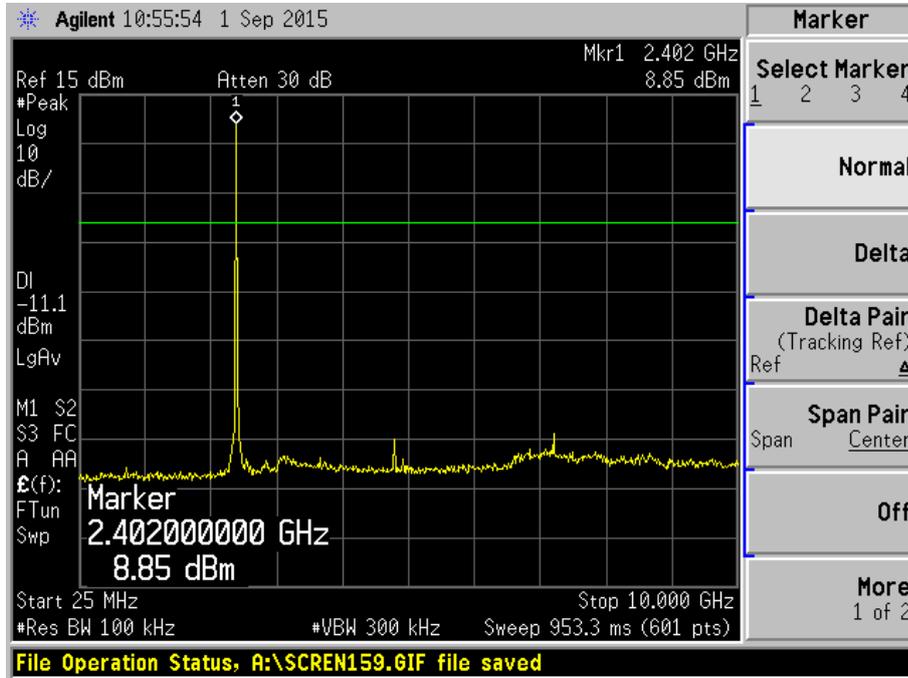
All spurious signals found were below the specified limit. Please refer to the attached plots.



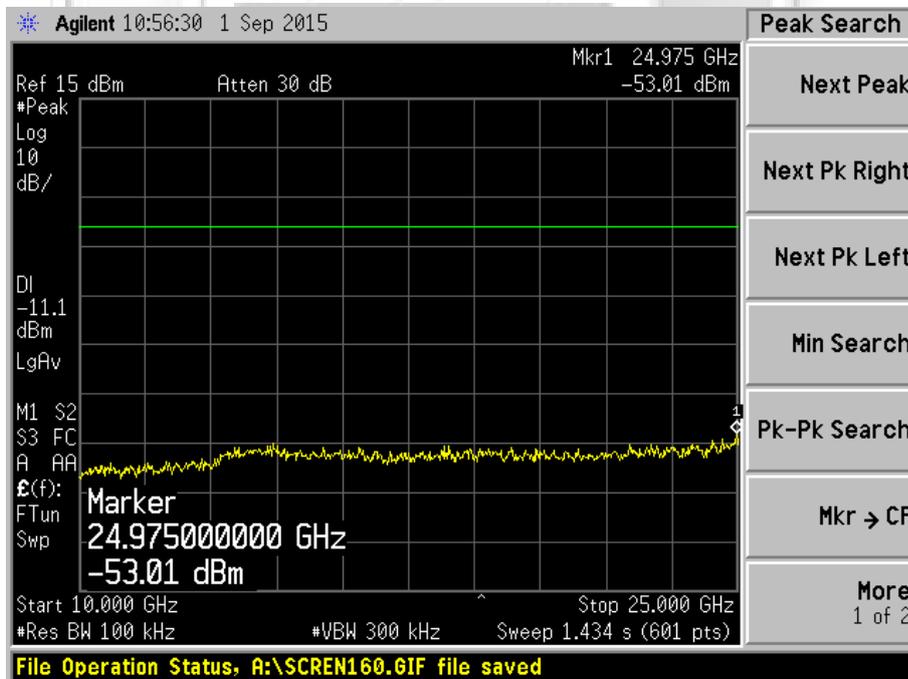


RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Non-Restricted Bands) Plots



Plot 7 – Channel 0

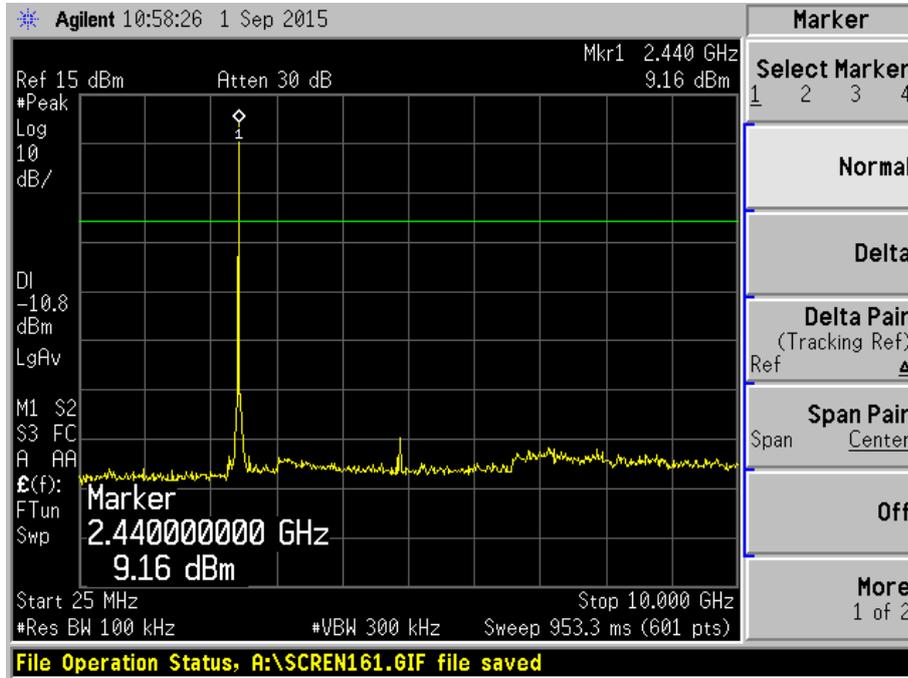


Plot 8 – Channel 0

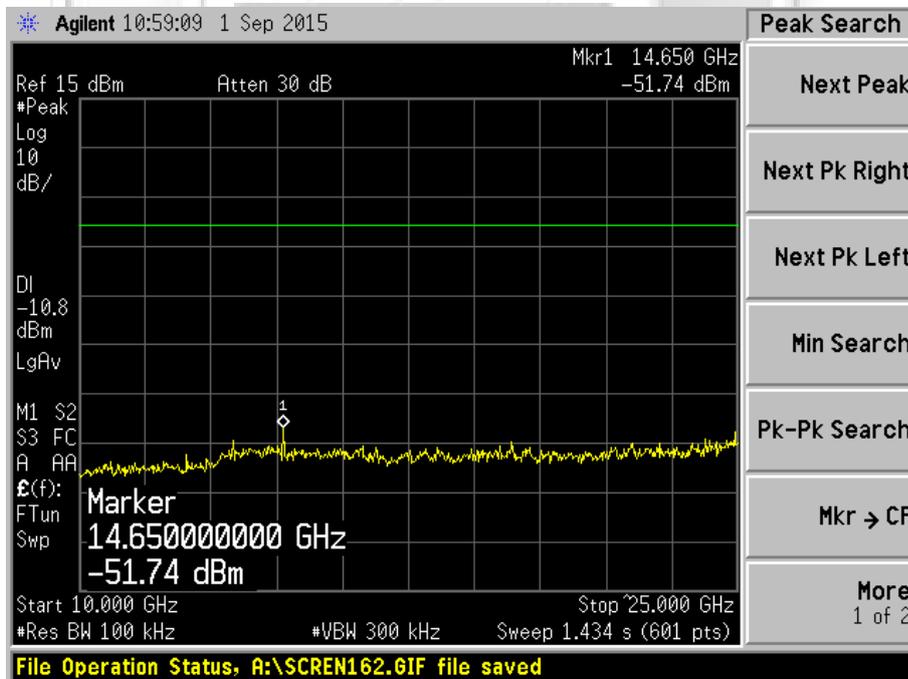


RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Non-Restricted Bands) Plots



Plot 9 – Channel 19

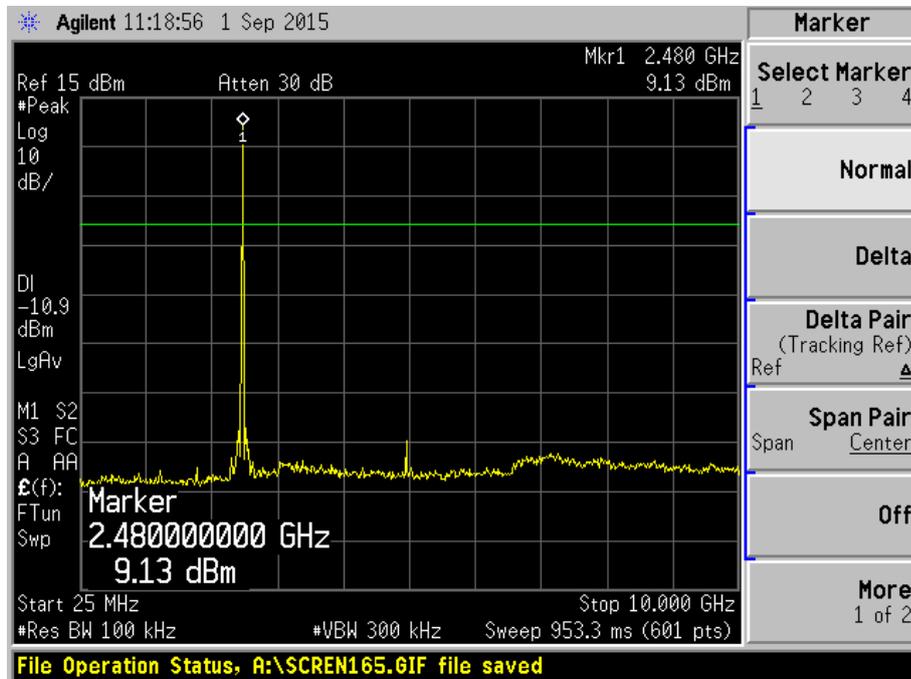


Plot 10 – Channel 19

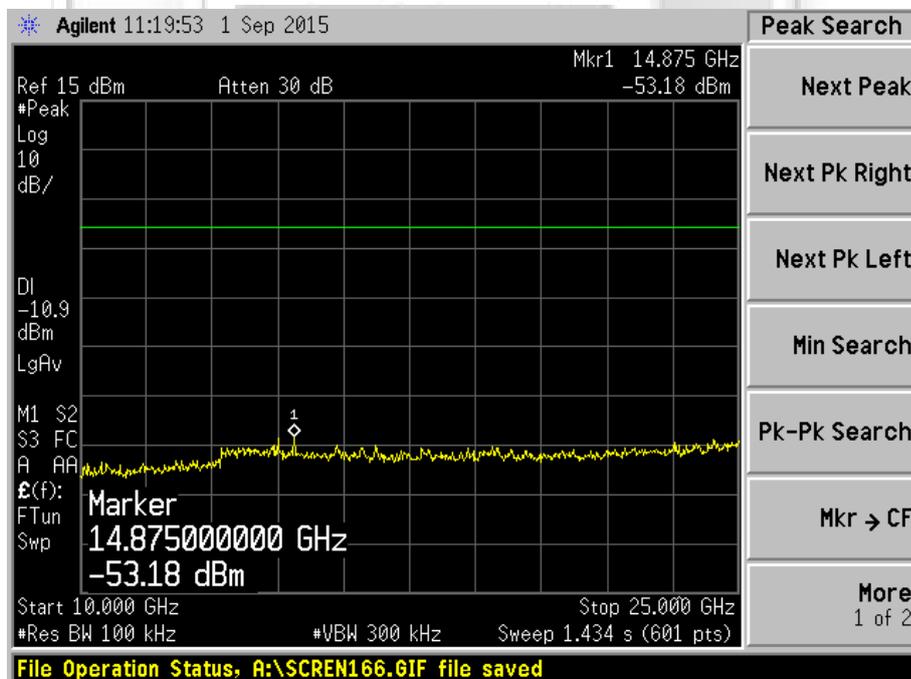


RF CONDUCTED SPURIOUS EMISSIONS (NON-RESTRICTED BANDS) TEST

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	7.4Vdc	Temperature	24°C
Attached Plots	13 – 30	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

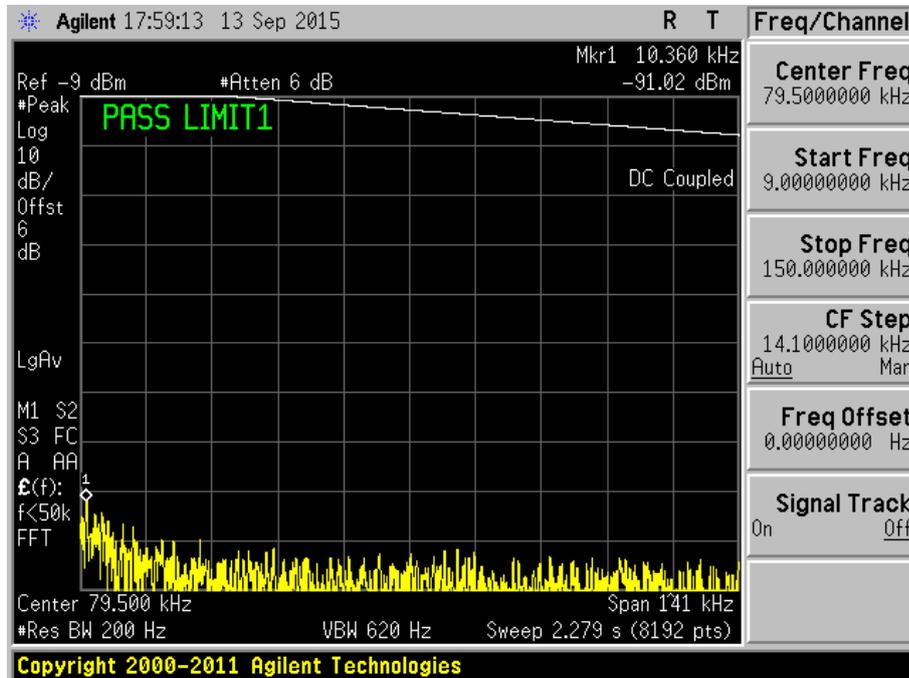
All spurious signals found were below the specified limit. Please refer to the attached plots.



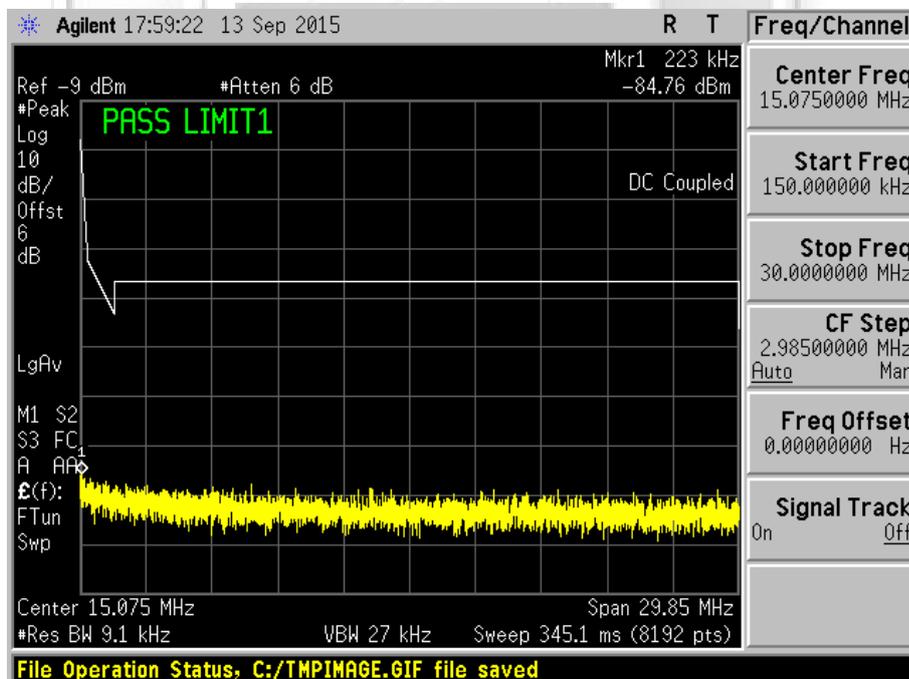


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 13 - Channel 0 (lower ch)

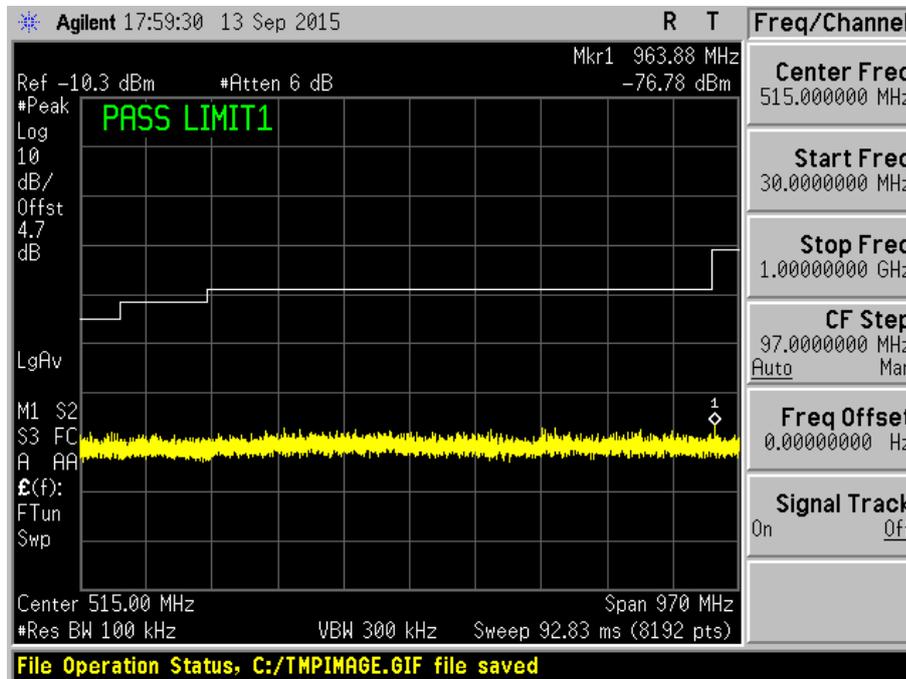


Plot 14 - Channel 0 (lower ch)

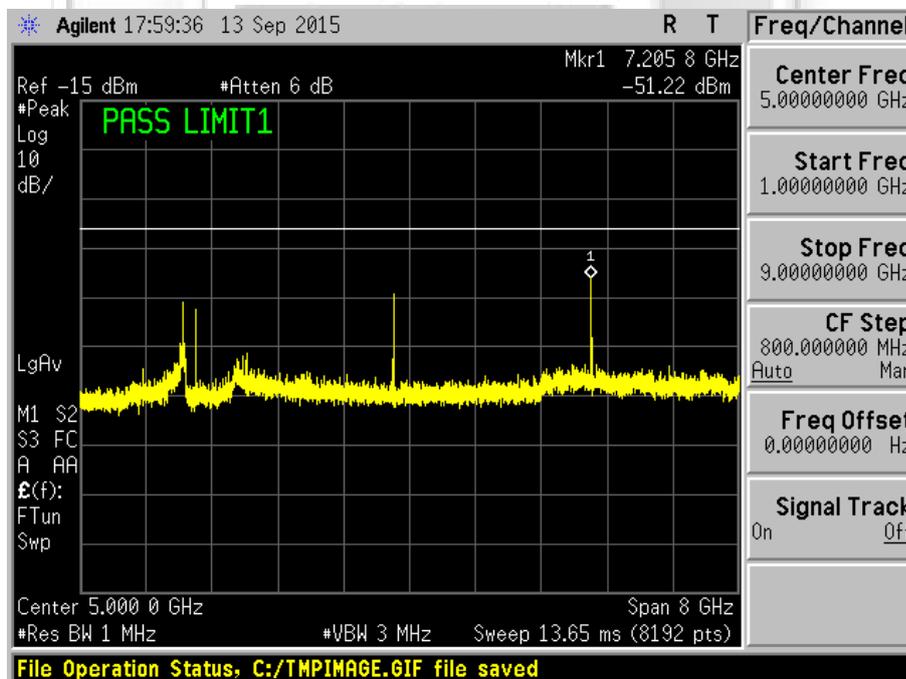


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 15 – Channel 0 (lower ch)

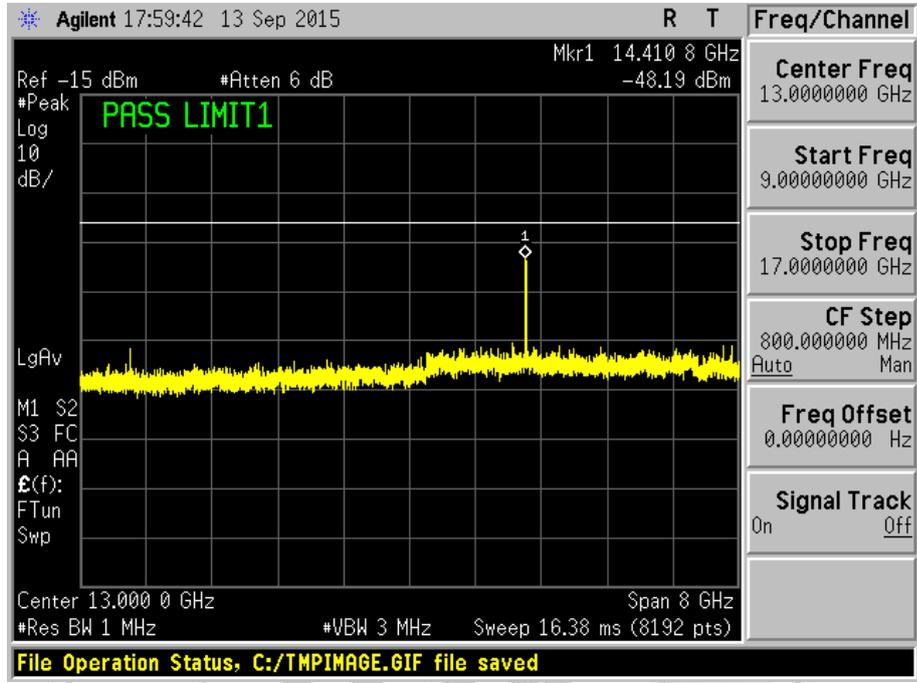


Plot 16 – Channel 0 (lower ch)

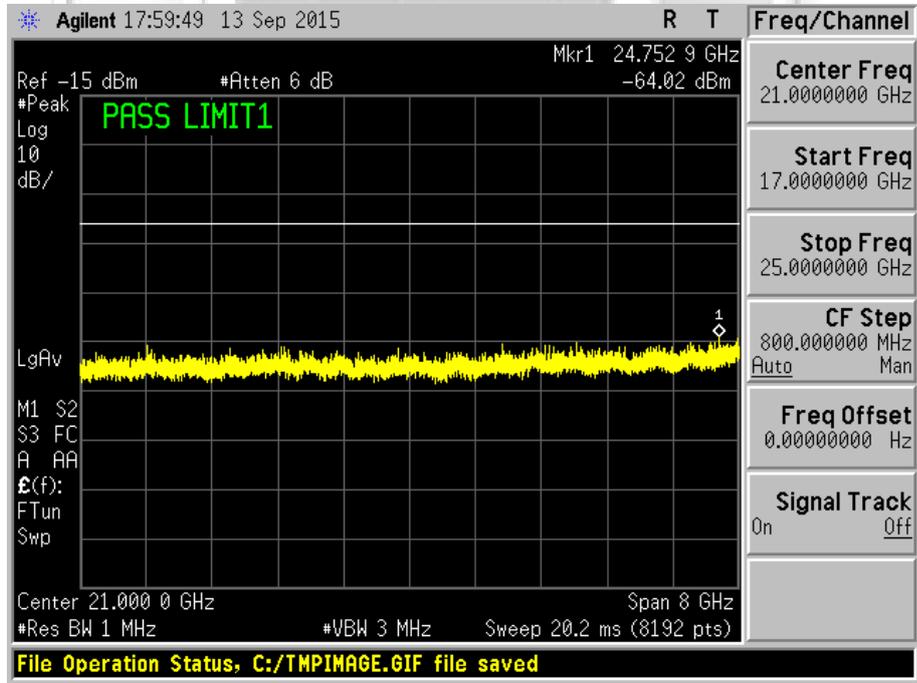


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 17 – Channel 0 (lower ch)

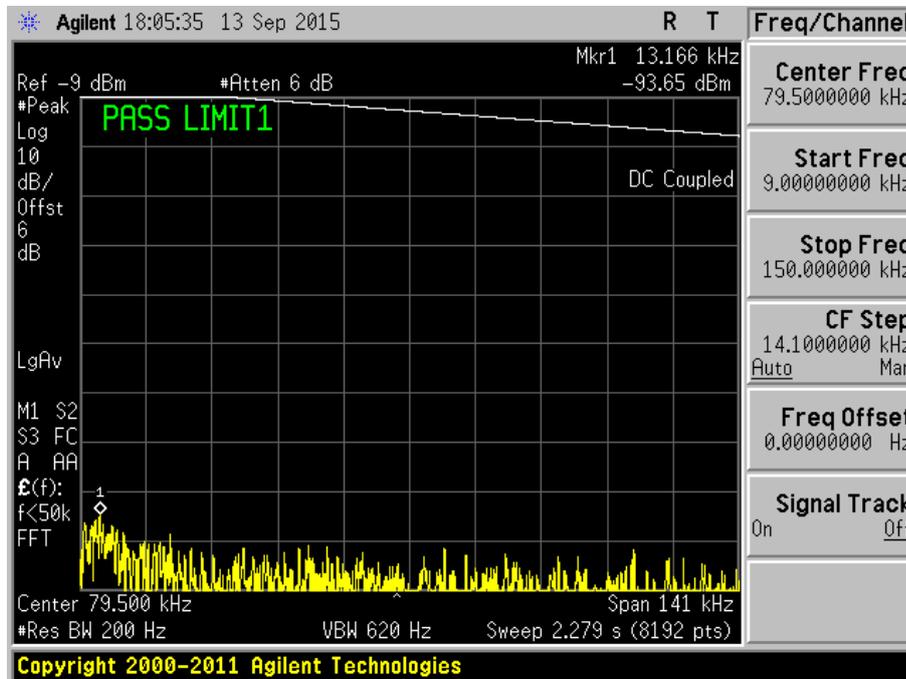


Plot 18 – Channel 0 (lower ch)

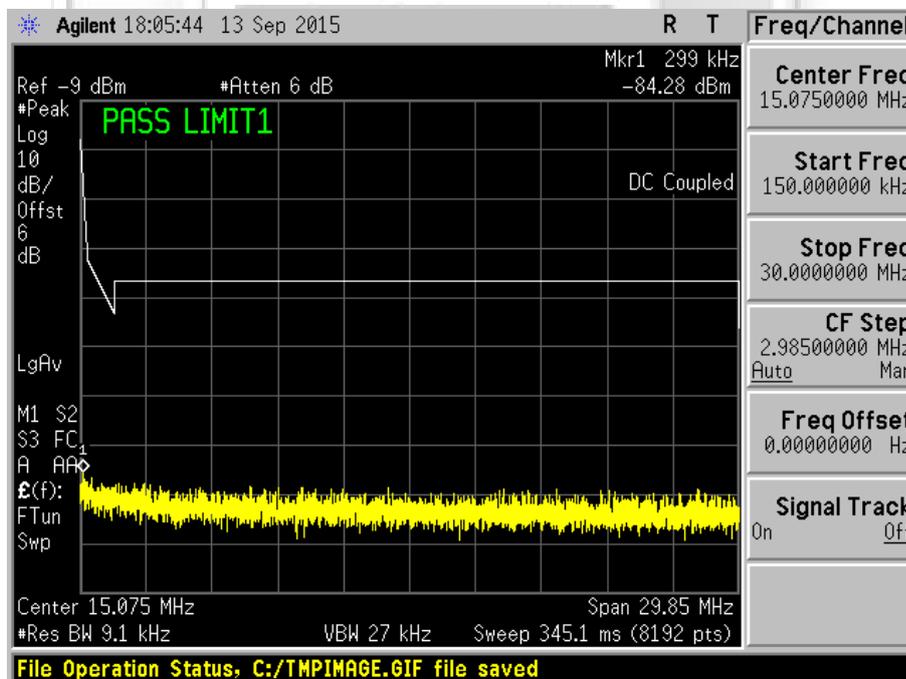


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 19 - Channel 19 (middle ch)

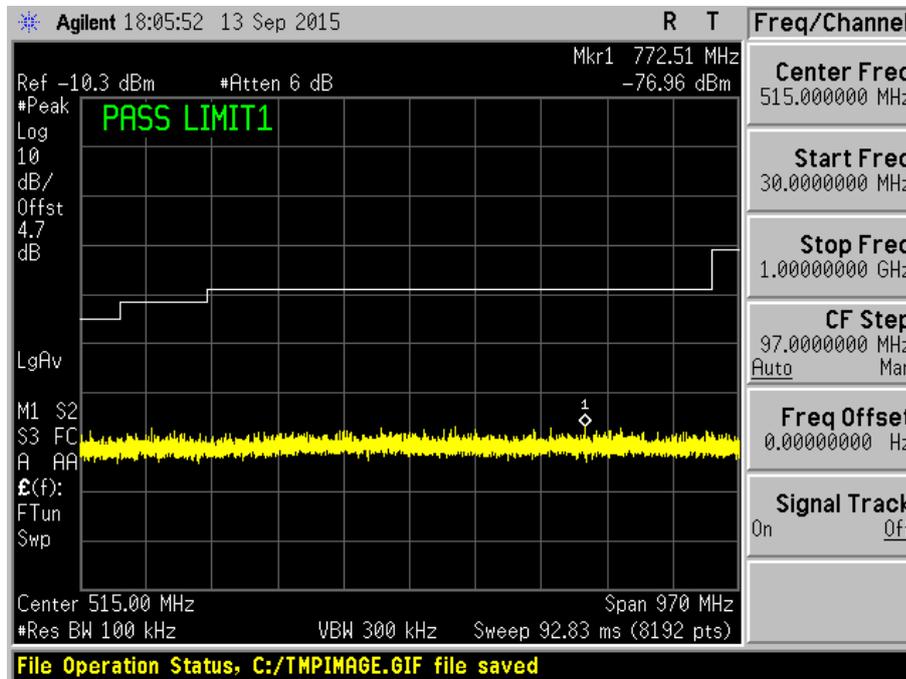


Plot 20 - Channel 19 (middle ch)

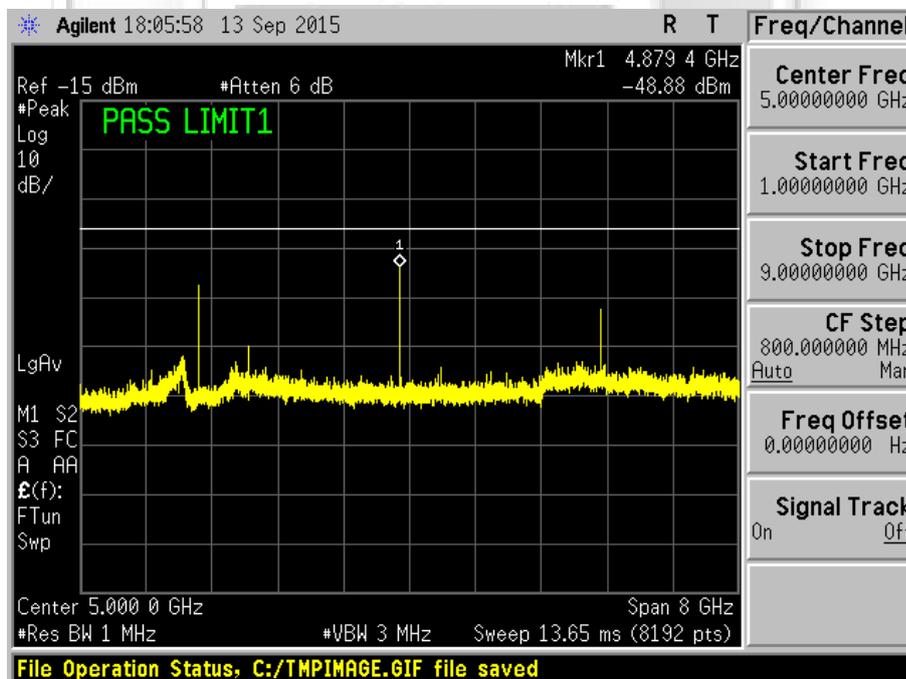


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 21 – Channel 19 (middle ch)

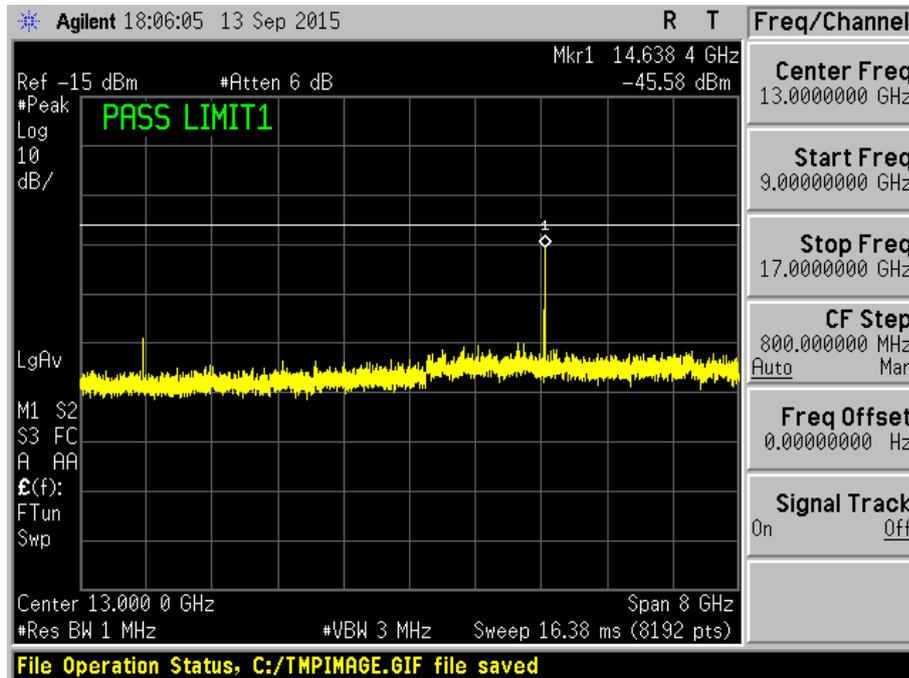


Plot 22 – Channel 19 (middle ch)

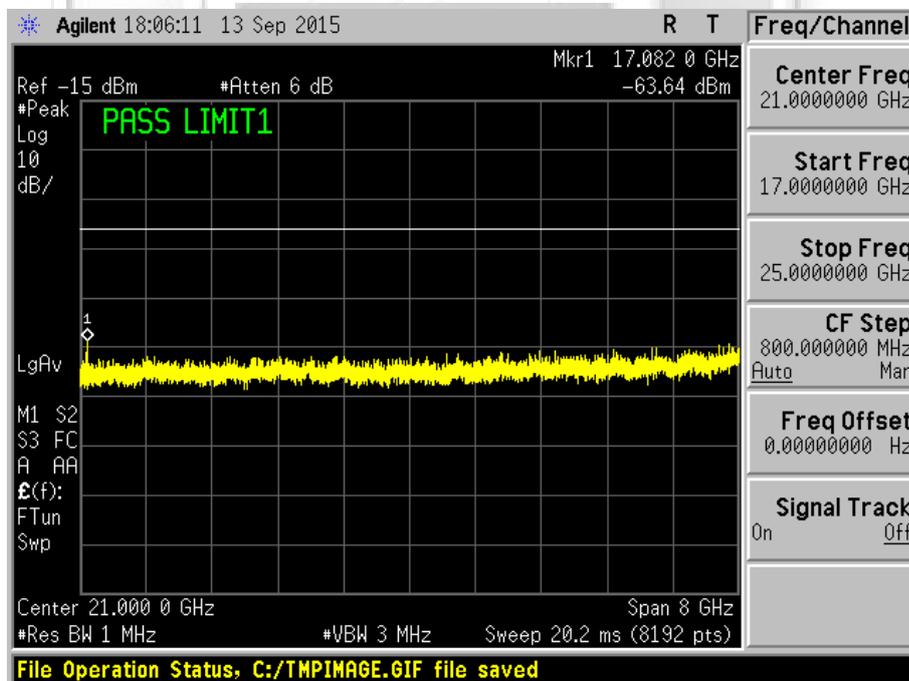


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 23 – Channel 19 (middle ch)

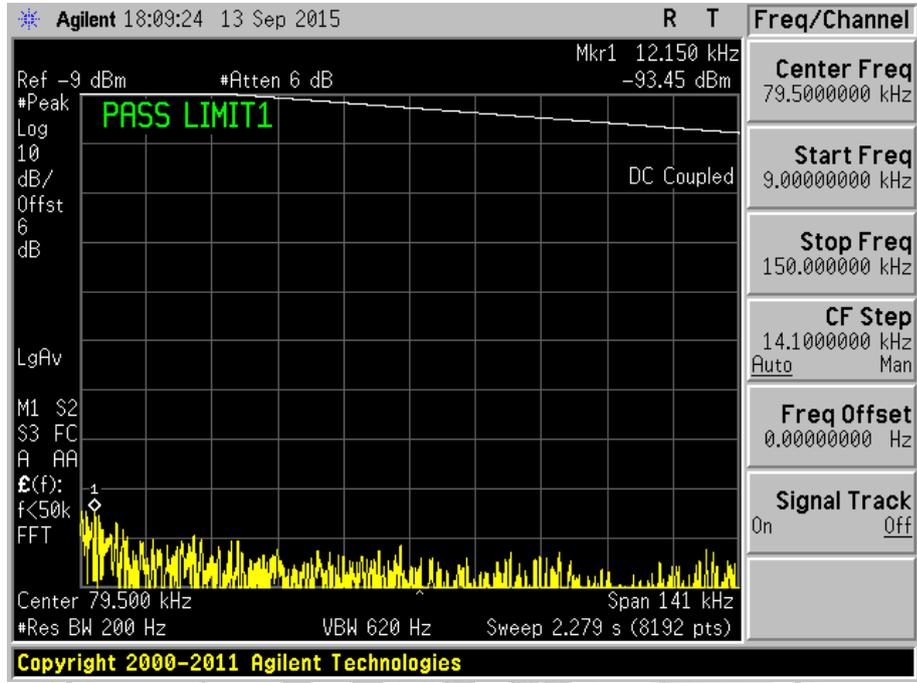


Plot 24 – Channel 19 (middle ch)

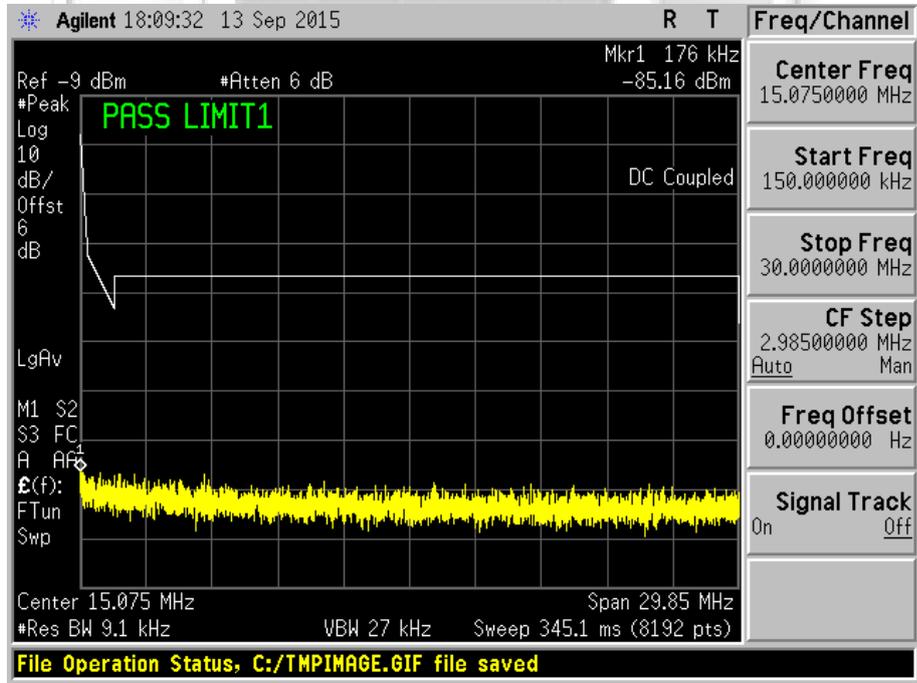


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 25 - Channel 39 (upper ch)

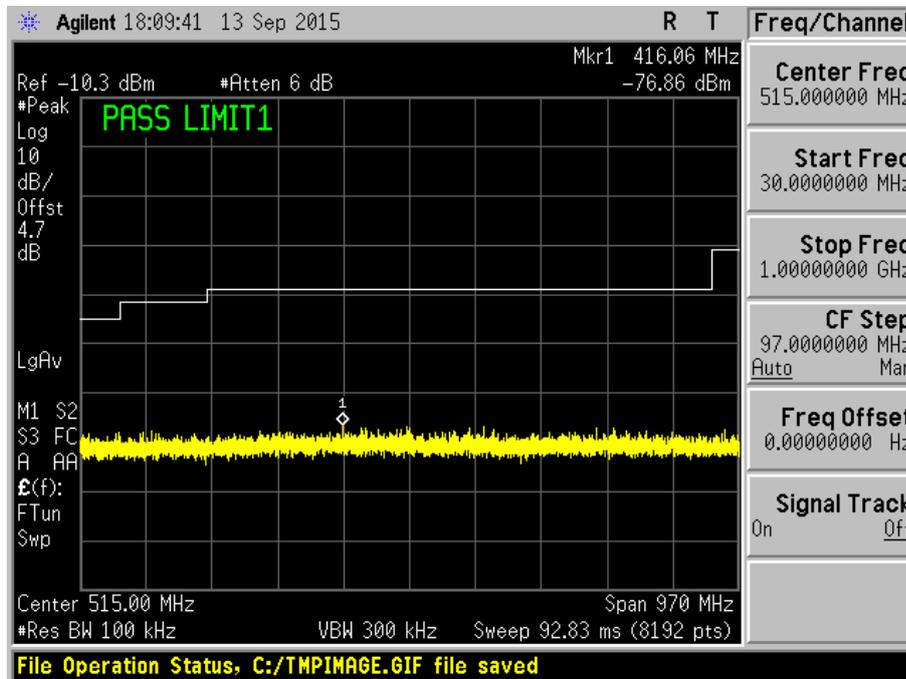


Plot 26 - Channel 39 (upper ch)

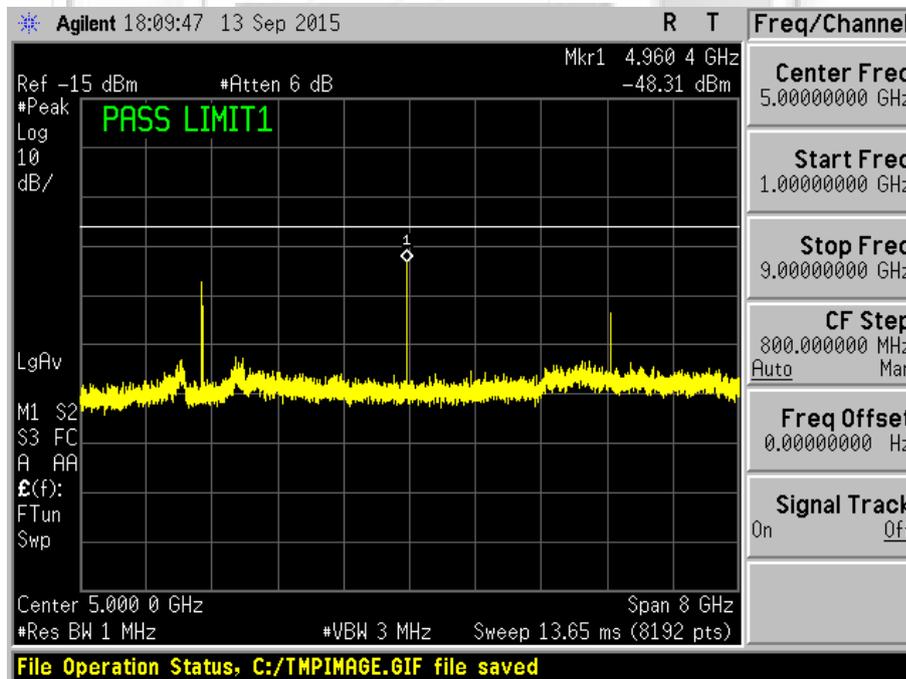


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 27 – Channel 39 (upper ch)

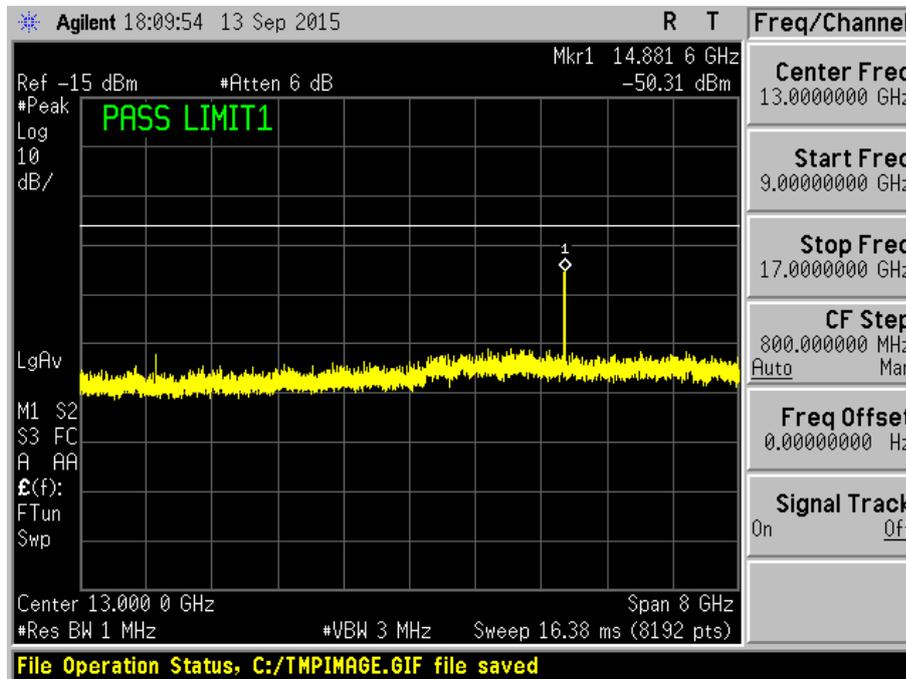


Plot 28 – Channel 39 (upper ch)

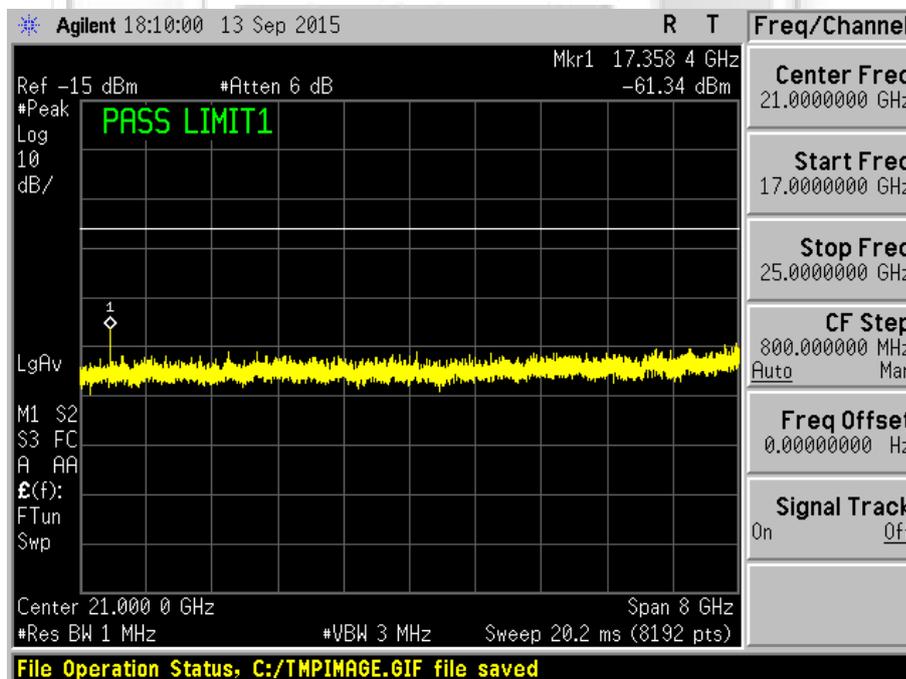


RF CONDUCTED SPURIOUS EMISSIONS (RESTRICTED BANDS) TEST

RF Conducted Spurious Emissions (Restricted) Plots



Plot 29 – Channel 39 (upper ch)



Plot 30 – 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) and RSS-247 5.5 Band Edge Compliance (Conducted) Results

Test Input Power	7.4Vdc	Temperature	24°C
Attached Plots	31 – 32	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

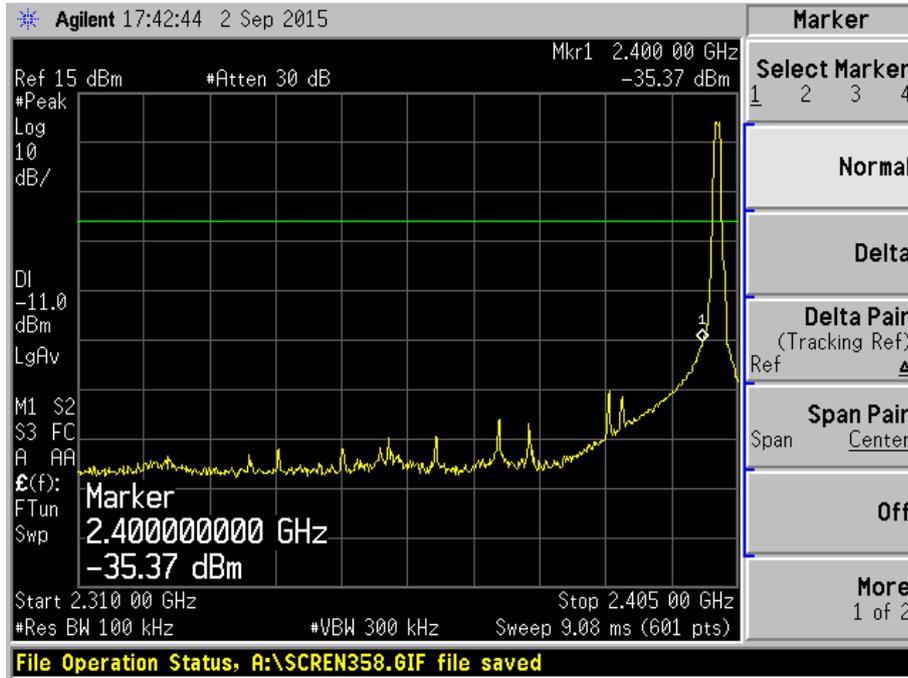
No significant signal was found and they were below the specified limit.



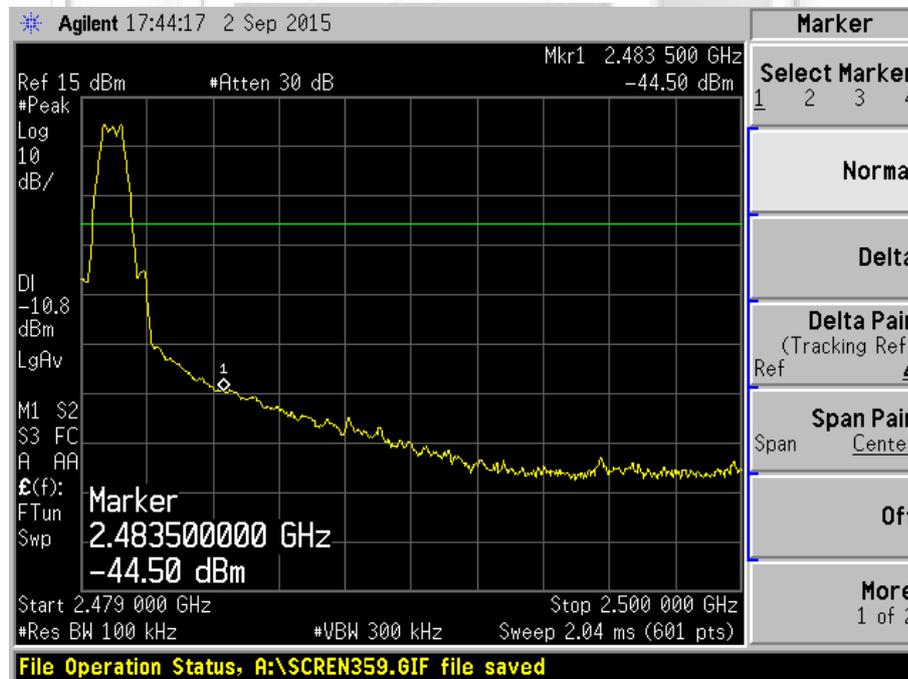


BAND EDGE COMPLIANCE (CONDUCTED) TEST

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 = 1MHz, VBW = 3MHz
 - 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. For the average measurement, it was done via a video average mode with a reduced VBW.
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	7.4Vdc	Temperature	24°C
Attached Plots	33 – 38	Relative Humidity	60%
		Atmospheric Pressure	1030mbar
		Tested By	Dylan Lin

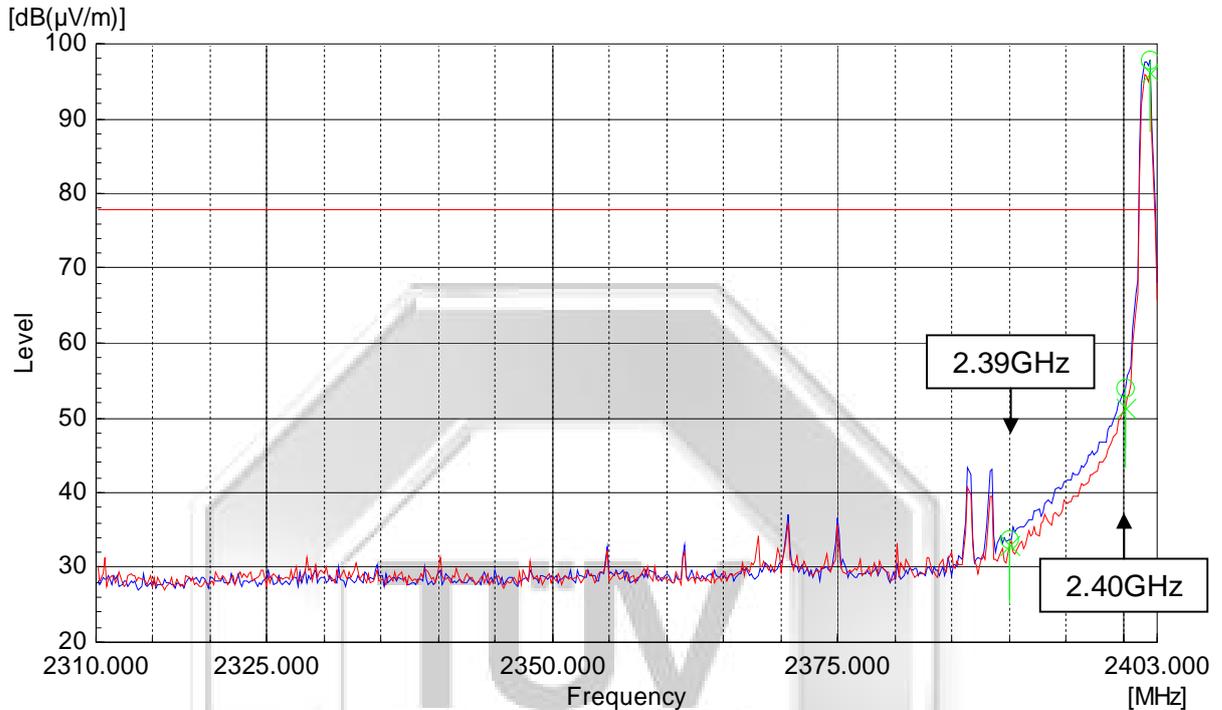
No significant signal was found and they were below the specified limit.



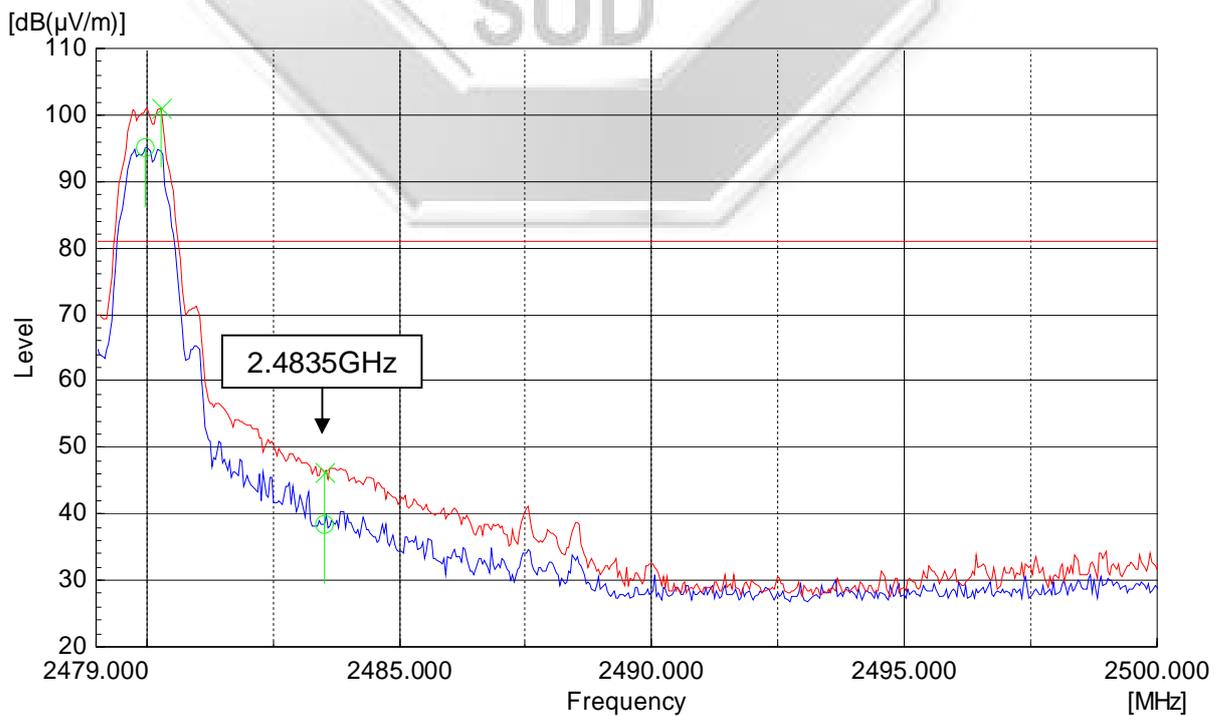


BAND EDGE COMPLIANCE (RADIATED) TEST

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



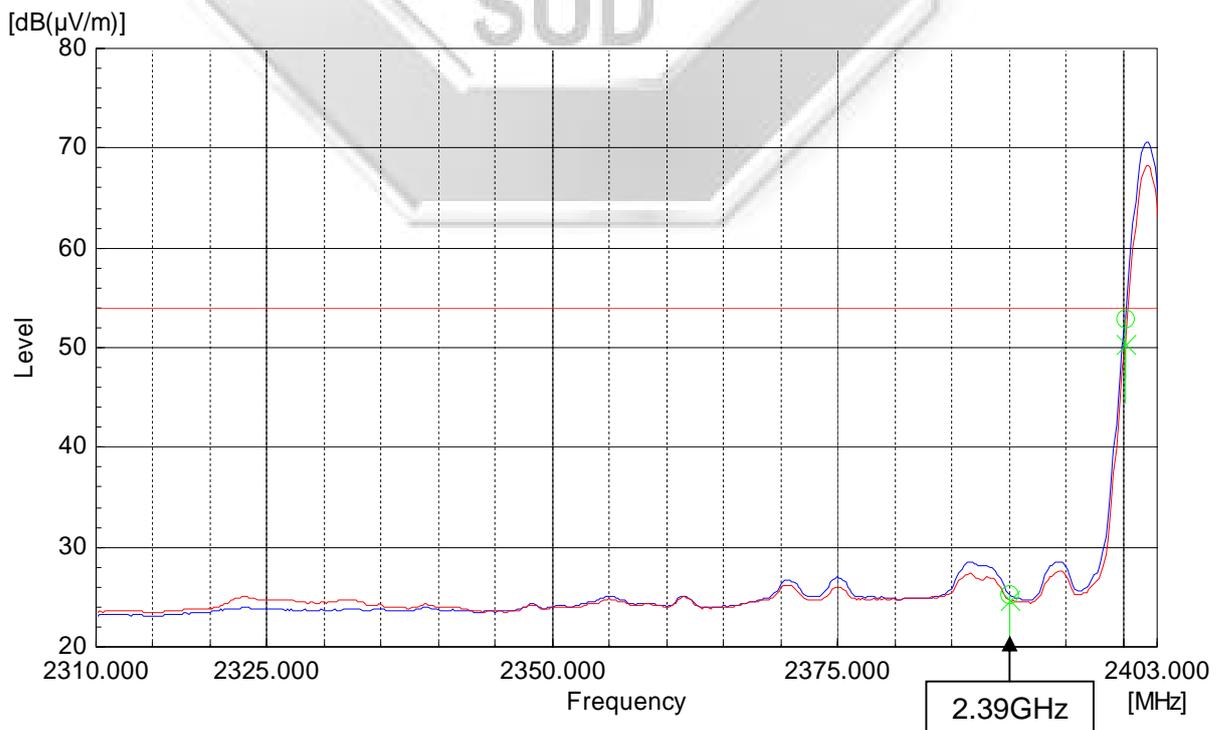
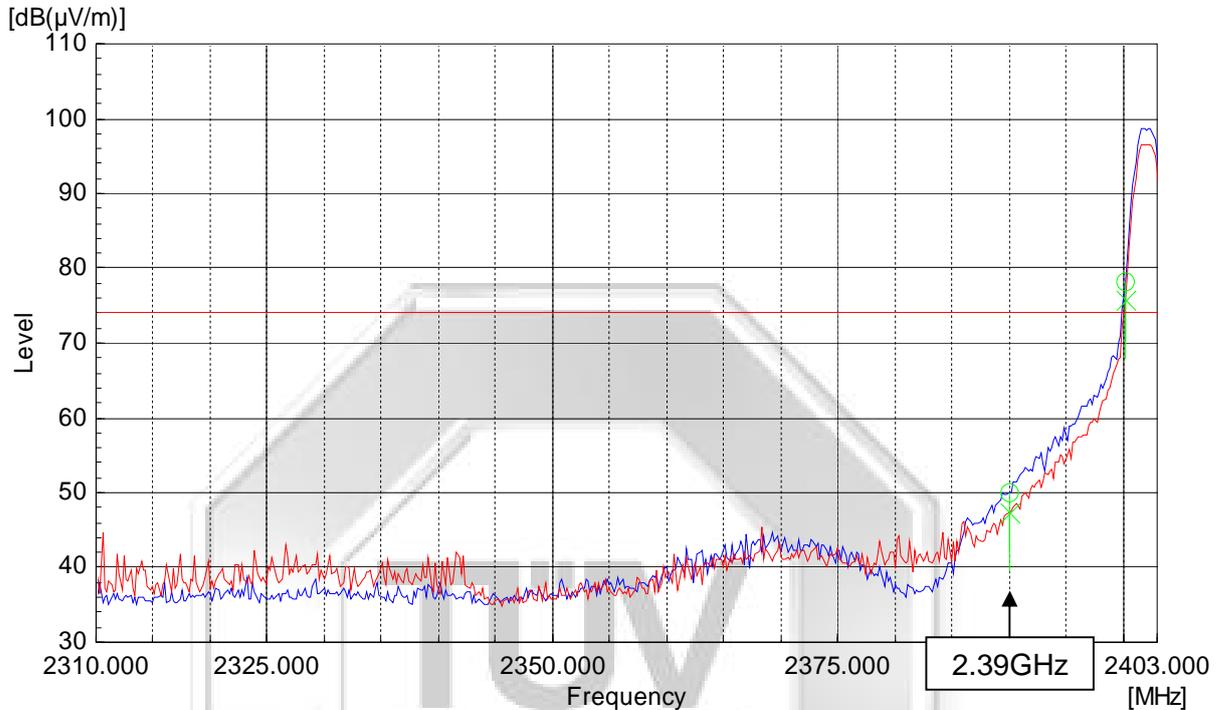
Plot 33 – Lower Band Edge at 2.4000GHz



Plot 34 – Upper Band Edge at 2.4835GHz

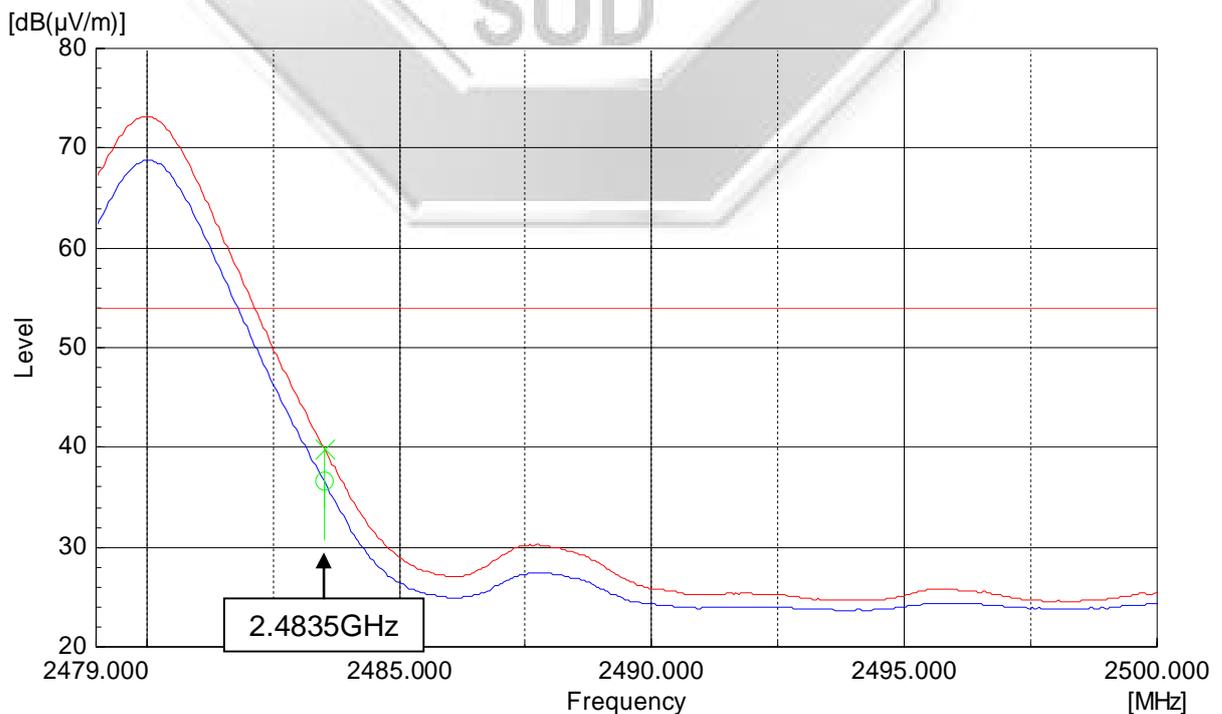
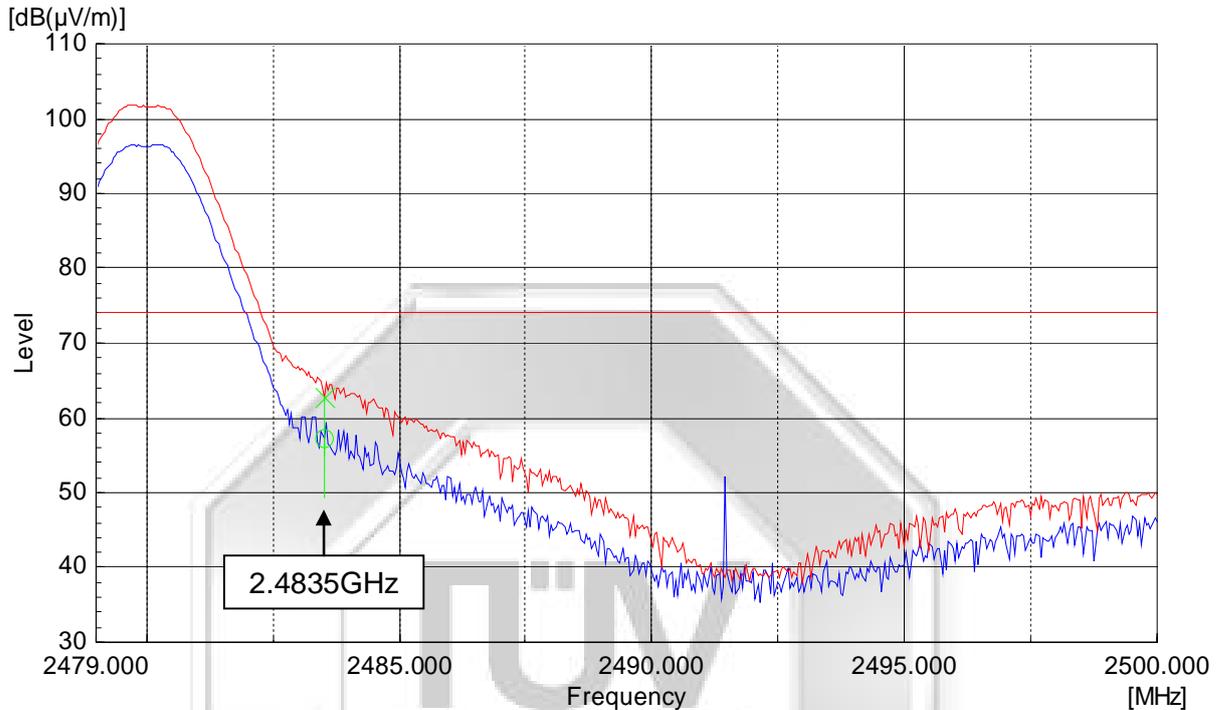
BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band)



BAND EDGE COMPLIANCE (RADIATED) TEST

Band Edge Compliance (Radiated) Plots (Restricted Band)





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.

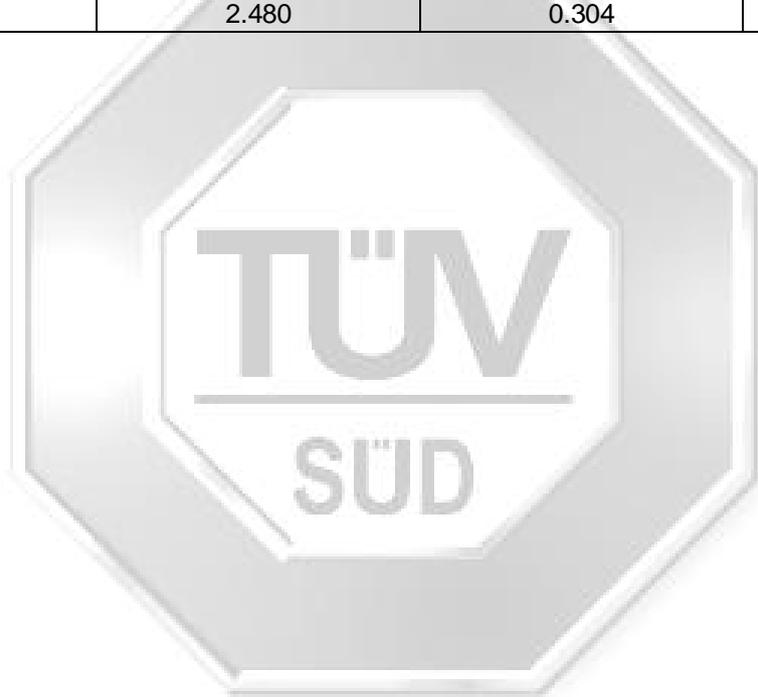


PEAK POWER SPECTRAL DENSITY TEST

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

Test Input Power	7.4Vdc	Temperature	24°C
Attached Plots	39 – 41	Relative Humidity	56%
		Atmospheric Pressure	1030mbar
		Tested By	Liau Lee Yin

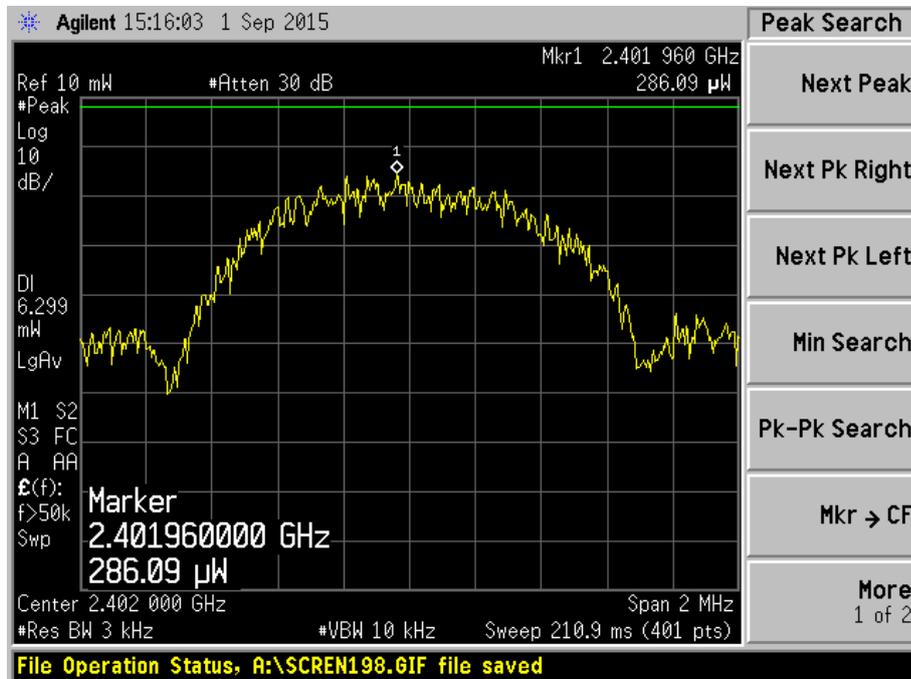
Channel	Channel Frequency (GHz)	Peak Power Spectral Density (mW)	Limit (mW)
0	2.402	0.286	6.3
19	2.440	0.304	6.3
39	2.480	0.304	6.3





PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots



Plot 39 – Channel 0

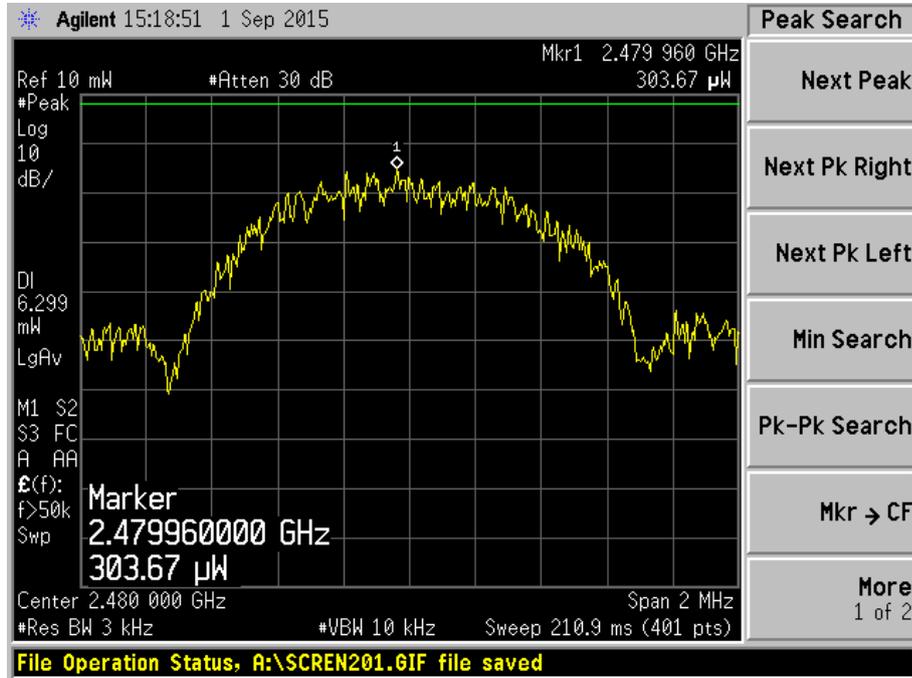


Plot 40 – Channel 19



PEAK POWER SPECTRAL DENSITY TEST

Peak Power Spectral Density Plots





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.
2. The sample/s mentioned in this report is/are submitted/supplied/manufactured by the Client. TÜV SÜD PSB therefore assumes no responsibility for the accuracy of information on the brand name, model number, origin of manufacture, consignment or any information supplied.
3. Nothing in this report shall be interpreted to mean that TÜV SÜD PSB has verified or ascertained any endorsement or marks from any other testing authority or bodies that may be found on that sample.
4. This report shall not be reproduced wholly or in parts and no reference shall be made by the Client to TÜV SÜD PSB or to the report or results furnished by TÜV SÜD PSB in any advertisements or sales promotion.
5. Unless otherwise stated, the tests were carried out in TÜV SÜD PSB Pte Ltd, No.1 Science Park Drive Singapore 118221.

July 2011



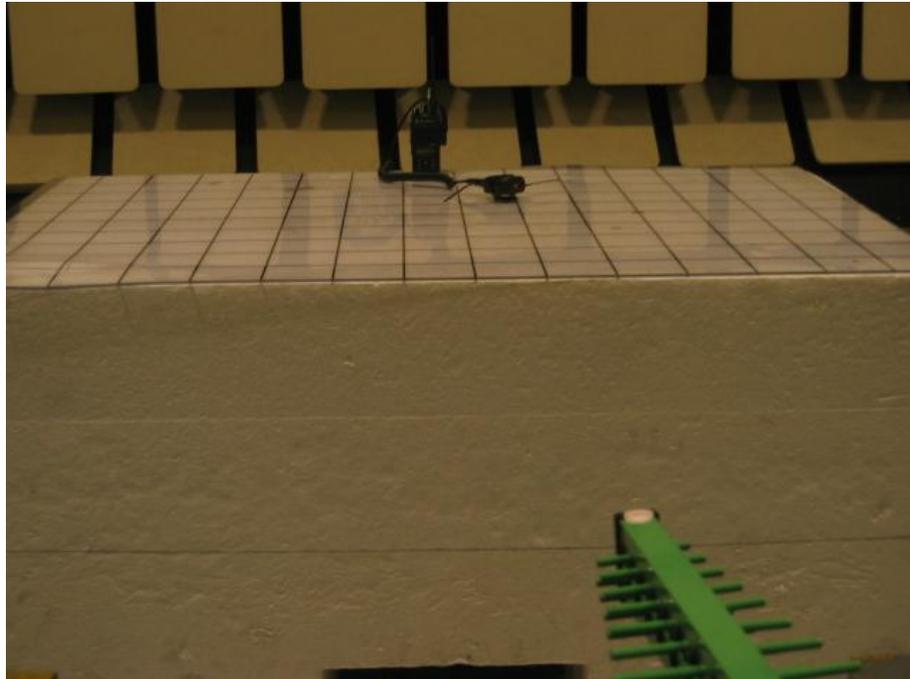


ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

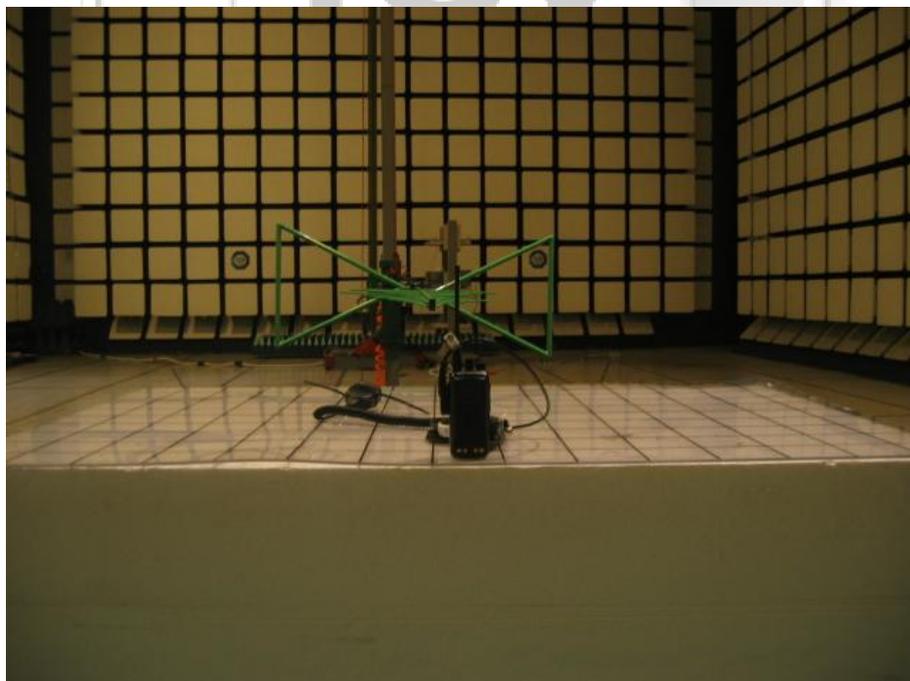


ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP (30MHz to 1GHz)



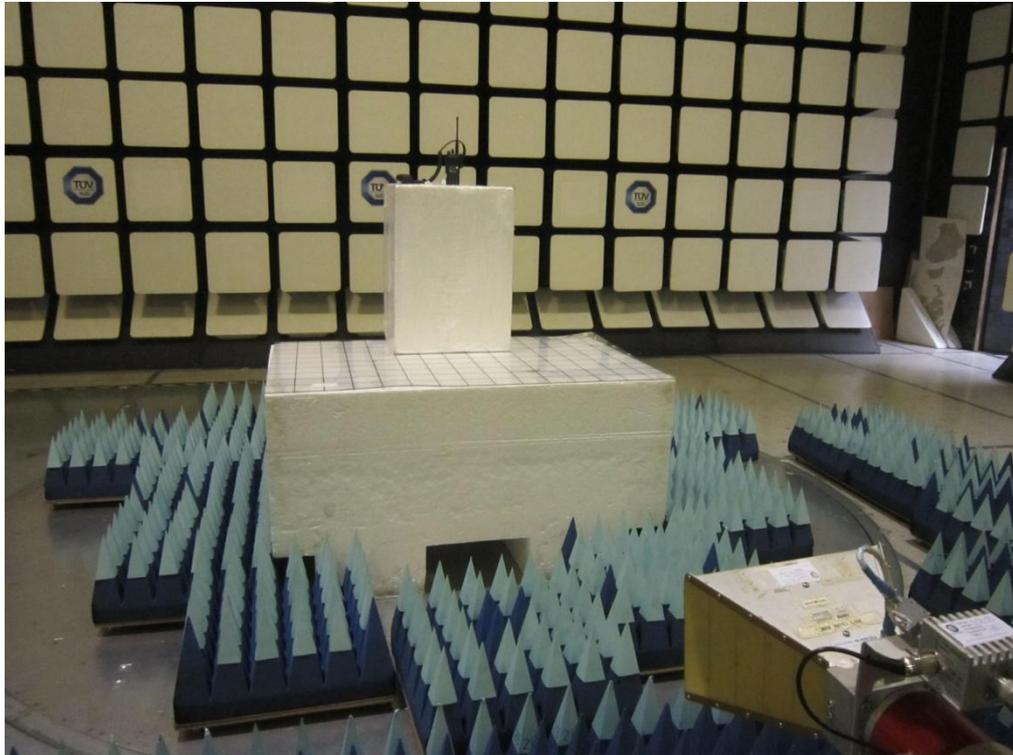
Radiated Emissions Test Setup (Front View)



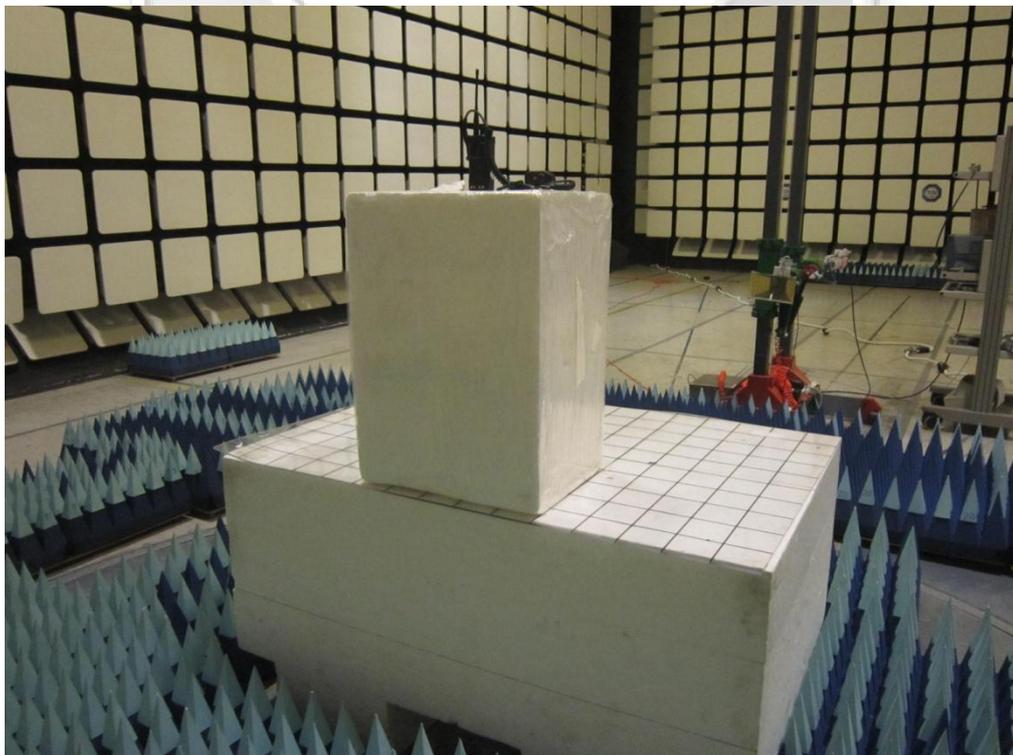
Radiated Emissions Test Setup (Rear View)

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP (Above 1GHz)



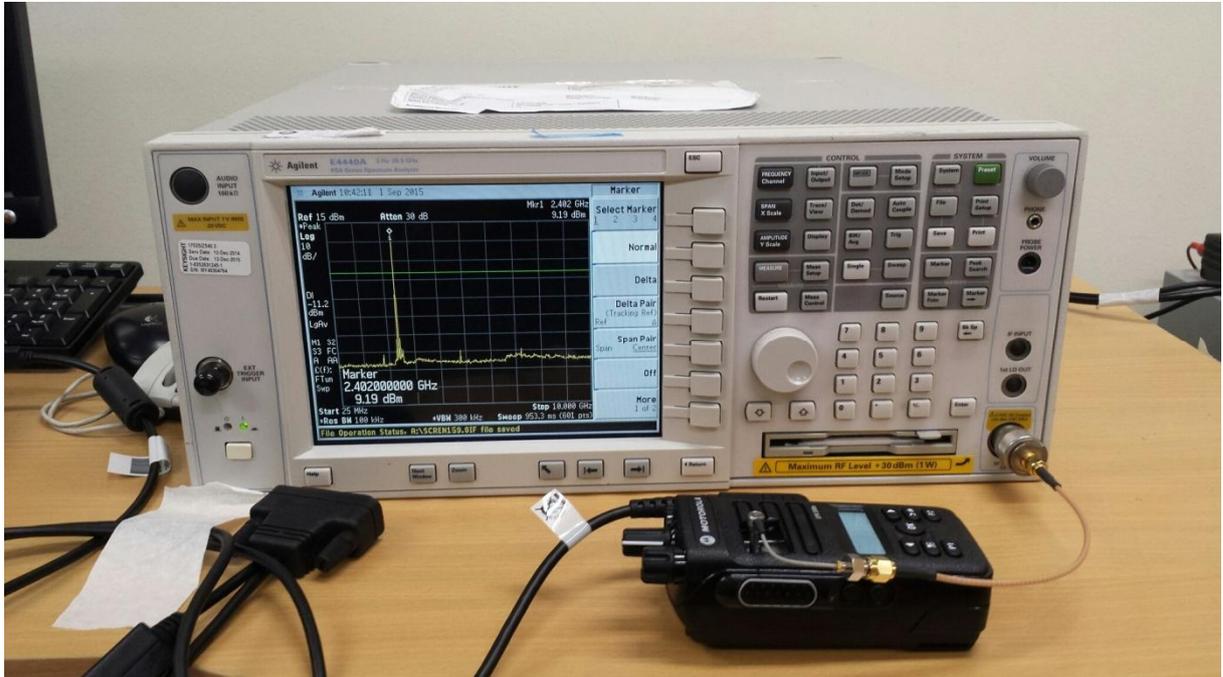
Radiated Emissions Test Setup (Front View)



Radiated Emissions Test Setup (Rear View)

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



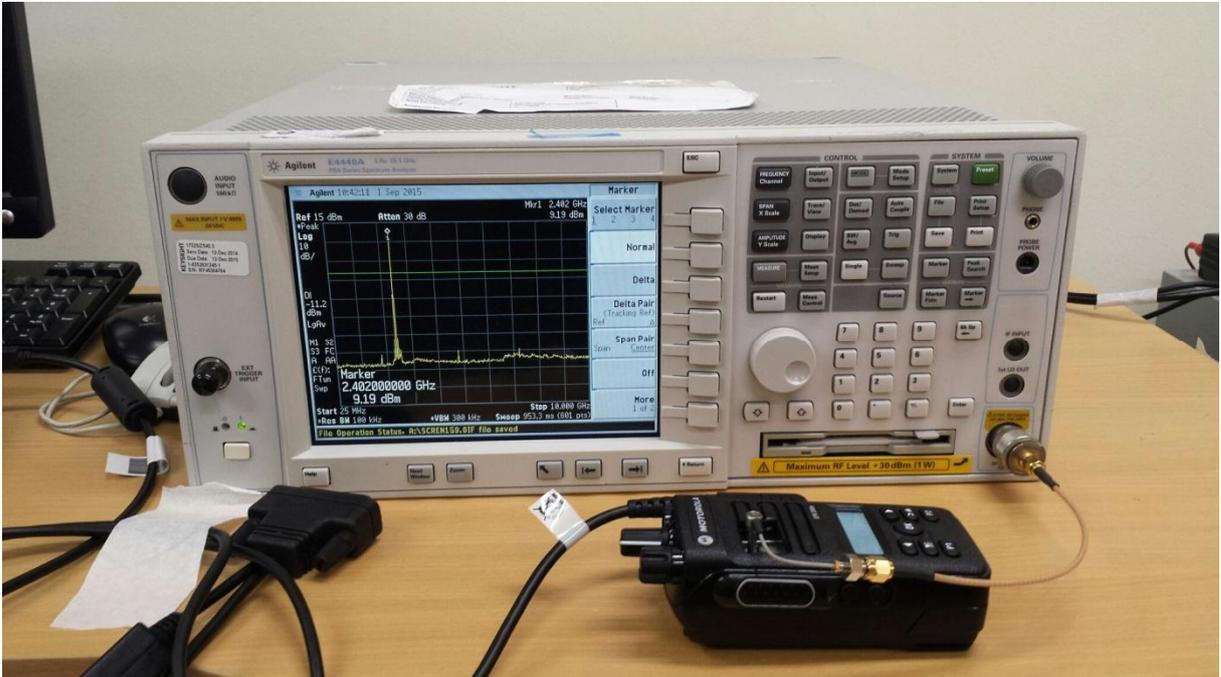
Spectrum Bandwidth (6dB & 99% Bandwidth Measurement) Test Setup



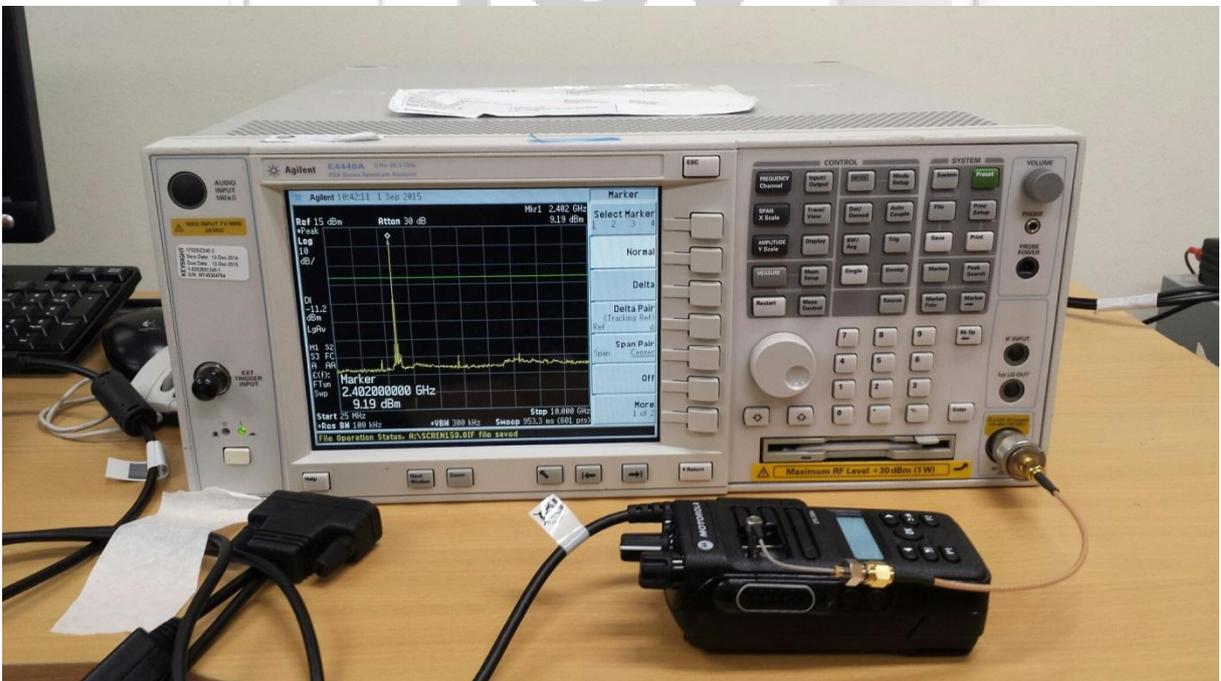
Maximum Peak Power Test Setup

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



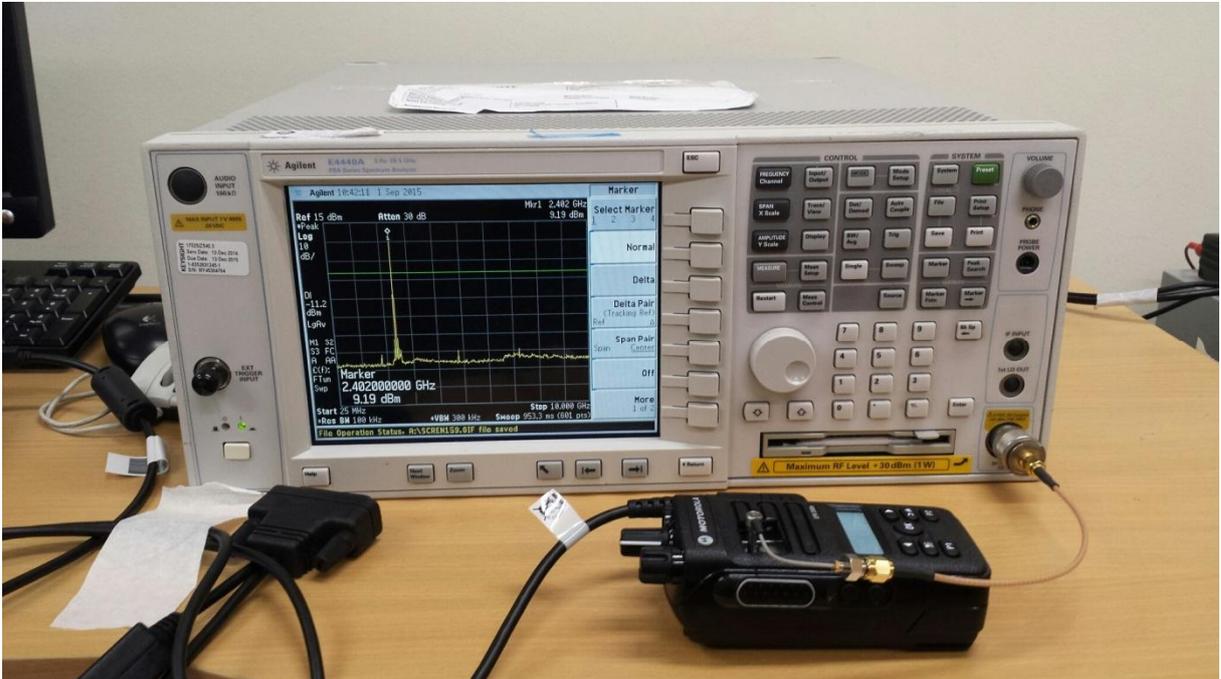
RF Conducted Spurious Emissions (Non-Restricted Bands) Test Setup



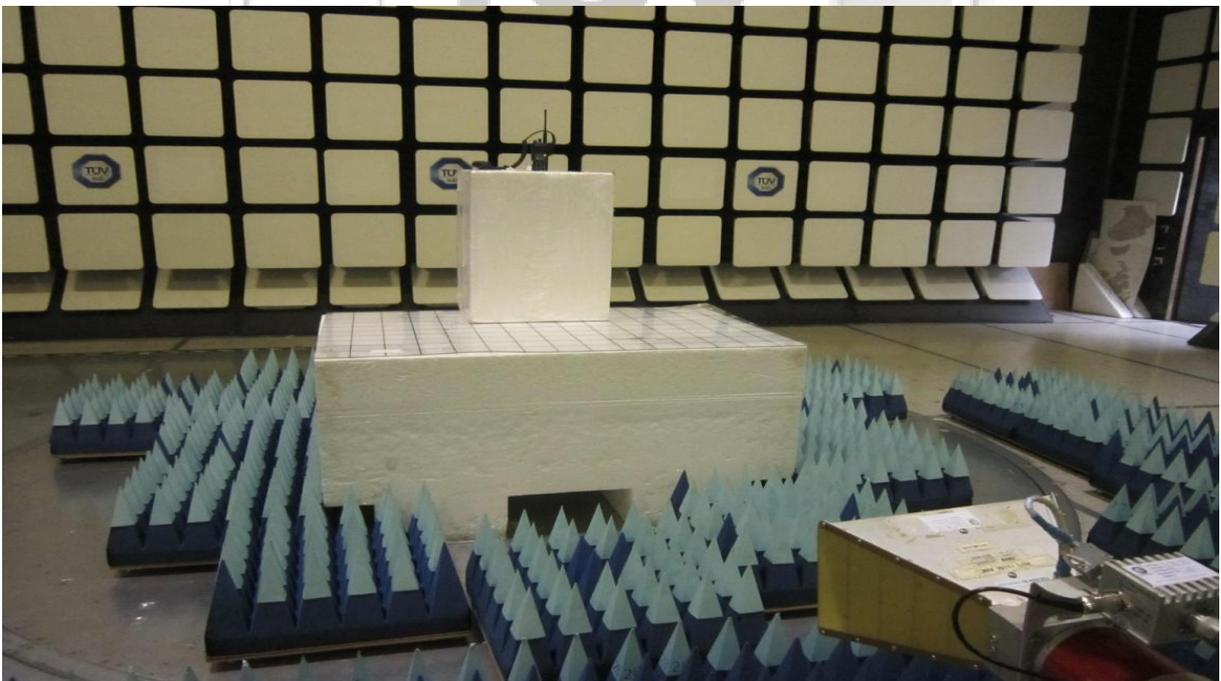
RF Conducted Spurious Emissions (Restricted Bands) Test Setup

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



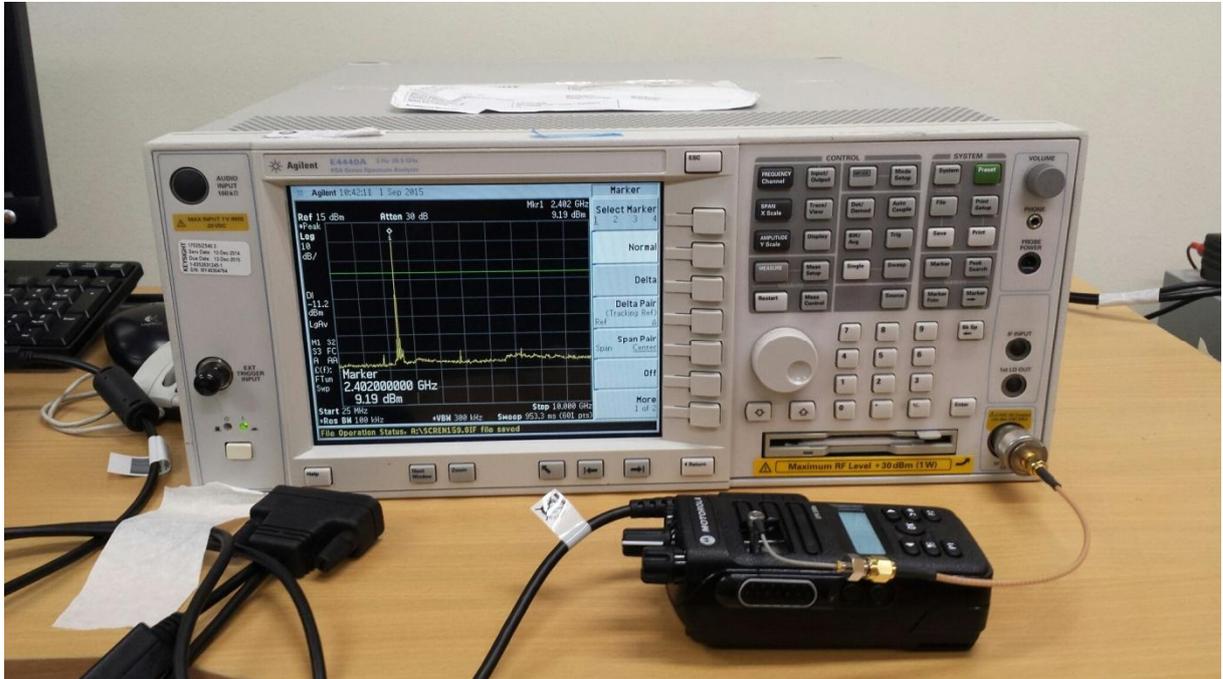
Band Edge Compliance (Conducted) Test Setup



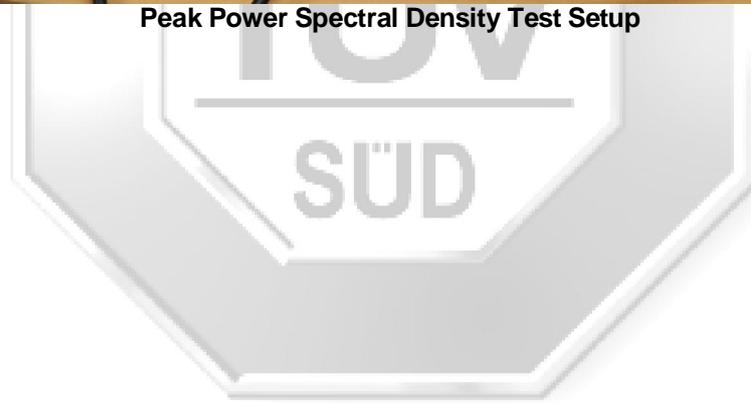
Band Edge Compliance (Radiated) Test Setup

ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

TEST SETUP



Peak Power Spectral Density Test Setup



ANNEX A TEST SETUP / EUT PHOTOGRAPHS / DIAGRAMS

EUT PHOTOGRAPHS



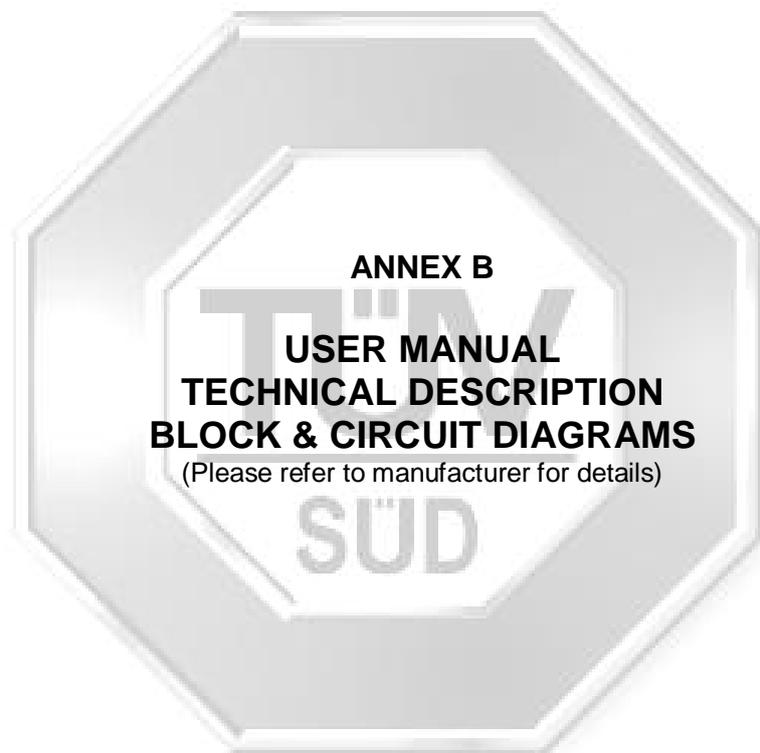
Front View



Rear View



ANNEX B USER MANUAL TECHNICAL DESCRIPTION BLOCK & CIRCUIT DIAGRAMS





ANNEX C FCC, IC LABEL & POSITION



ANNEX C FCC, 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 and IC Label on EUT



ANNEX D TEST SITE DESCRIPTION



ANNEX D TEST SITE DESCRIPTION

Radiated Emission Test Site Description

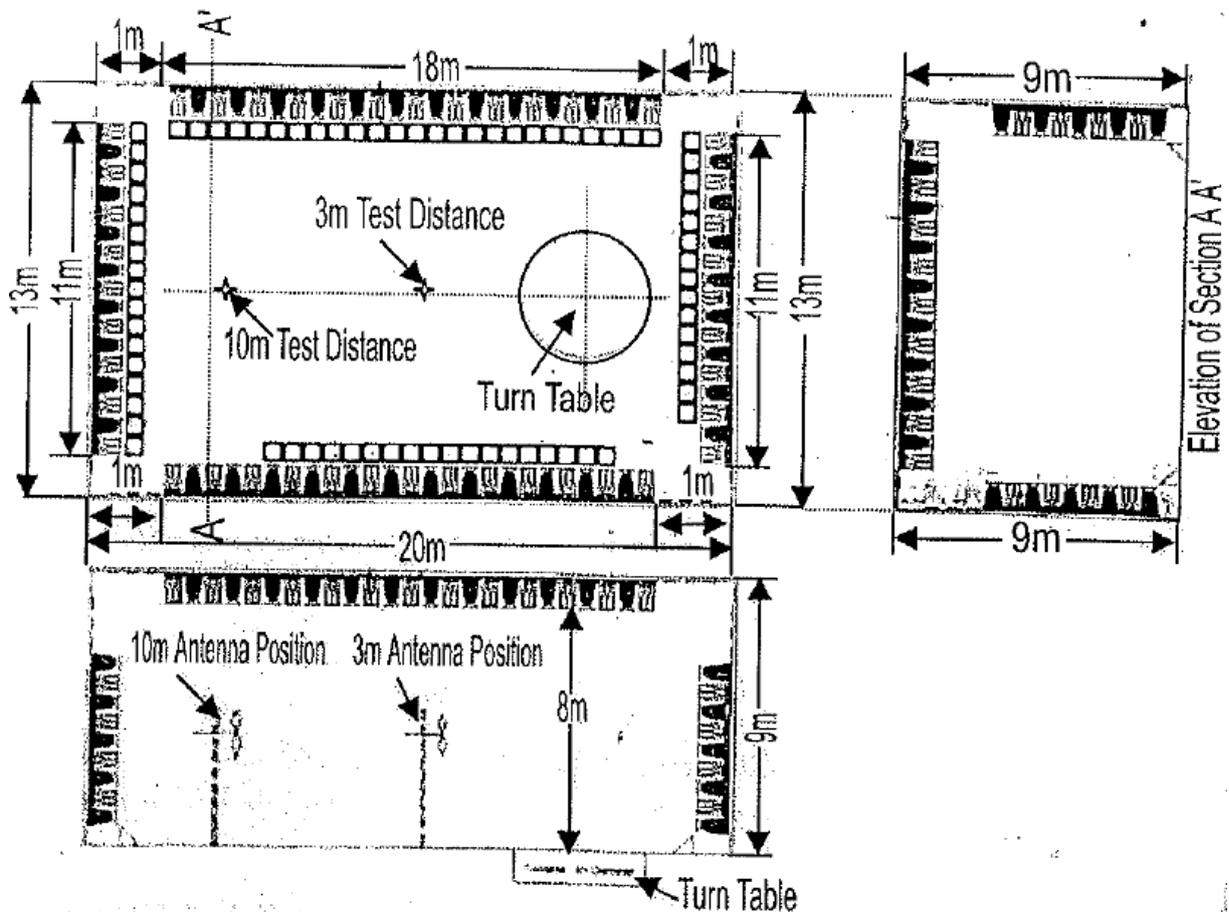
The Radiated Emission test facility consists of a RF-shielded enclosure (Model: 04" x 07") manufactured by Lindgren whose dimensions are shown below. The exterior of the chamber is made of rigid steel panels while the interior is covered with RF absorbing panels on the 4 walls and ceiling. The steel-clad ground plane is covered with vinyl flooring.

The turntable is mounted flush with the chamber floor and is driven by a pneumatic motor, which is capable of supporting 4,000 kg.

The boresight antenna mast is driven by a pneumatic motor with heights variation from 1m- 4m for both vertical and horizontal polarity and with tilt capability.

Both turntable and antenna mast in the chamber are controlled by system controller stationed outside the chamber.

The physical layout of the chamber is show below:



ANNEX D TEST SITE DESCRIPTION

Conducted Emission Test Site Description

The Conducted Emission facility consists of an RF-shielded enclosure measuring 4.3m x 3.7m x 2.45m manufactured by Universal Shielding Corporation. The Conducted Emission data were taken using two LISNs.

The physical layout of the test site is show below:

