

Produkte
Products

Prüfbericht - Nr.: 19660223 001		Seite 1 von 27	
<i>Test Report No.:</i>		<i>Page 1 of 27</i>	
Auftraggeber: <i>Client:</i>		Remidio Innovative Solutions Pvt. Ltd. #108/E-3, VIth Main Road, III Phase Peenya Industrial Area, Bangalore-560058	
Gegenstand der Prüfung: <i>Test item:</i>		Fundus on Phone Non Mydriatic	
Bezeichnung: <i>Identification:</i>	FOPNM-10	Serien-Nr.: <i>Serial No.</i>	FOP NM 10-16-03-001-0018
Wareneingangs-Nr.: <i>Receipt No.:</i>	1803132234	Eingangsdatum: <i>Date of receipt:</i>	02.05.2016
Prüfört: <i>Testing location:</i>		Refer Page 4 of 27 for test facilities	
Prüfgrundlage: <i>Test specification:</i>		FCC Part 15, Subpart C ANSI C63.10-2013	
Prüfergebnis: <i>Test Result:</i>		Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n). <i>The test items passed the test specification(s).</i>	
Prüflaboratorium: <i>Testing Laboratory:</i>		TÜV Rheinland (India) Pvt. Ltd. 82/A, 3rd Main, West Wing, Electronic City Phase 1 Hosur Road, Bangalore – 560 100, India FCC Registration No.: 176555; IC Assigned Code: 3466E	
geprüft / tested by:		kontrolliert / reviewed by:	
19.05.2016	Shrikanth S Naik Engineer	24.05.2016	Raghavendra Kulkarni Sr.Manager
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>
Sonstiges / Other Aspects: FCC ID : 2AIHH-FOPNM-10			
Abkürzungen:		Abbreviations:	
P(ass) = entspricht Prüfgrundlage		P(ass) = passed	
F(ail) = entspricht nicht Prüfgrundlage		F(ail) = failed	
N/A = nicht anwendbar		N/A = not applicable	
N/T = nicht getestet		N/T = not tested	
<p>Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.</p> <p><i>This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.</i></p>			

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Test Result Summary

Clause	Test Item	Result
FCC 15.247(b) (3)	Maximum Conducted Peak Output Power	Pass
FCC 15.247(a) (2)	DTS (6dB) Bandwidth	Pass
FCC 15.247(e)	Power Spectral Density	Pass
FCC 15.247(d)	Emission in the non-restricted frequency bands (Band-edge compliance)	Pass
FCC 15.209 / FCC 15.205	Spurious Radiated Emissions and Restricted Bands of Operation	Pass
FCC 15.207	Conducted Emissions on A.C Power lines	Pass

Note: Conducted measurements are done according to the procedure given in KDB No. **558074**
D01 DTS Meas Guidance v03r05

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Appendix 1: Test Setup Photo

Appendix 2: EUT External Photo

Appendix 3: EUT Internal Photo

Appendix 4: FCC Label and Label Location

Appendix 5: Block Diagram

Appendix 6: Specification of EUT

Appendix 7: Schematic Diagram

Appendix 8: Bill of Material

Appendix 9: User Manual

Appendix 10: Maximum Permissible Exposure Calculation

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List of Test and Measurement Instruments

Equipment	Manufacturer	Model Name	Serial Number	Calibration Due Date	Periodicity	Used for Test Items
EMI Test Receiver	Rohde & Schwarz	ESU 40	100288	23.11.2016	Yearly	Spurious Radiated Emissions
Broadband Antenna	Frankonia	ALX-4000	ALX-4000-806	20.01.2017	Yearly	
Active Loop Antenna	Frankonia	LAX-10	LAX-10-800	22.12.2016	Yearly	
Horn Antenna	Frankonia	HAX-18	HAX18-802	14.03.2017	Yearly	
Double-Ridged Waveguide Horn Antenna	ETS	116706	00107323	02.11.2016	Yearly	
Anechoic Chamber	Frankonia	-	-	-	-	
Spectrum Analyser	Agilent Technologies	E4407B	US4119277 2	23.04.2017	Yearly	Antenna port conducted measurements
LISN	Rohde & Schwarz	ENV216	100022	12.09.2016	Yearly	Conducted Emission on AC power lines
EMI Receiver	Rohde & Schwarz	ESR7	101133	19.11.2016	Yearly	

Testing Facilities

- 1) TÜV Rheinland (India) Private Limited
108 , Beside ISBR Business School,
Electronic city Phase I
Bangalore - 560 100.

General Product Information**Product Function and Intended Use**

FOP NM-10 is intended for screening of the eye for variety of ocular conditions like diabetic retinopathy; macular edema; cataract; glaucoma, corneal ulcers, vitreous hemorrhages etc. Light from the device is shown into the patient eye & the user will use an accessory like the smart phone to capture images of the eye & device does not come in contact with any part of the patient body including the eye. The device can be used at any time & over & over again by a trainer user.

Ratings and System Details

Operating Frequency	2400 – 2483.5MHz
No. of channel	40
Channel Spacing	2 MHz
Modulation	GFSK
Conducted Power	-1.92 dBm / 0.6427mW
Data Rate	1 Mbps
Antenna Type	Inbuilt PCB Antenna
Number of antenna	One
Antenna Gain	3dBi
Supply Voltage	AC to DC adaptor: 9V, 2A Battery: 7.4 V , 1500mAH
Dimension	68 x 248 x 234mm
Environmental	Operating: 0 °C to +45 °C Storage: -10 °C to 70 °C

Test Conditions:

Voltage: 9VDC from AC to DC adaptor

7.4VDC from battery

Environmental conditions:

Temperature: +24 °C **RH:** 62%

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Operational Description

FOPNM 10 designed to be used to screen for diseases of the human eye. The device has two modes of operation.

1. Non Mydriatic Mode:

In this mode, IR LED is used for focusing the retina & cool white LED as flash to capture the image of the retina

2. Mydriatic Mode:

In this mode, cool white LED is used for focusing & to capture the image of the retina

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Test Set-up and Operation Mode

Principle of Configuration Selection

Transmission was enabled with highest possible duty cycle on low, mid and high channel.

Test Operation and Test Software

A test tool “CSR µEnergy Tools 2.3.0” in laptop is used to enable the transmission at maximum defined power level and to select channels low, mid and high in 2.4 GHz band on the EUT for the tests in this report. Power level value ‘4’ was set in the test tool during testing.

An application in the iPhone (FCC ID: BCG-E2643A) is used to configure the EUT in normal operating condition.

Special Accessories and Auxiliary Equipment

- None

Countermeasures to achieve EMC Compliance

- None

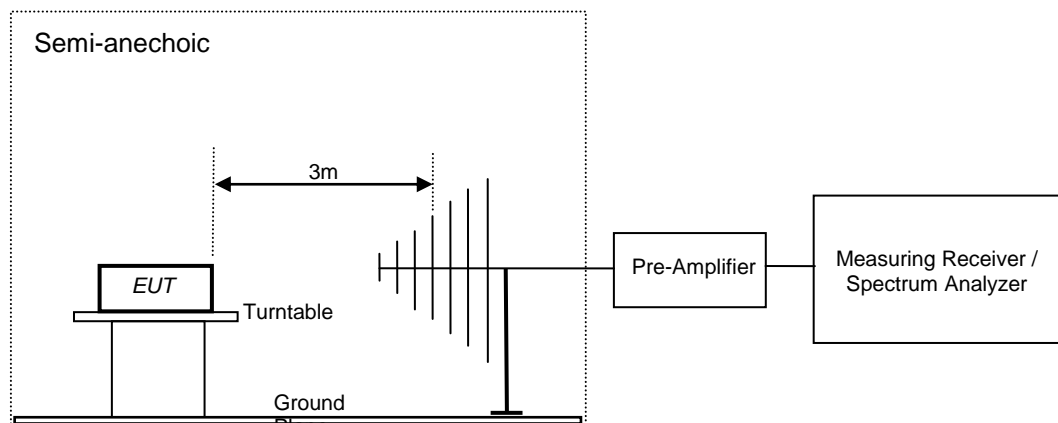
Table of frequencies

Frequency Band (MHz)	Frequency (MHz)
2400 – 2483.5	2402
	2404
	2406
	;
	:
	:
	2440
	2442
	2444
	;
	:
	:
	2478
	2480

Radiated Emission Test

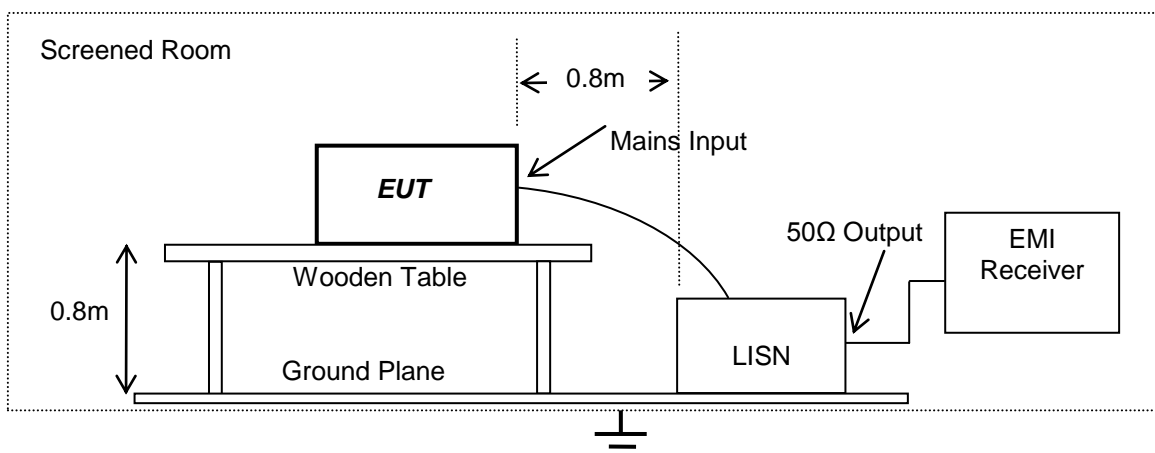
The radiated emission measurement was performed according to the procedures in ANSI C63.10-2013. The equipment under test (EUT) was placed at the middle of the 80 cm high turntable, and the EUT is 3 meters far from the measuring antenna for below 1GHz. The equipment under test (EUT) was placed at the middle of the 1.5m high turntable, and the EUT is 3 meters far from the measuring antenna for above 1GHz. The turntable was rotated 360° for obtaining the maximum emission. The height of the measuring antennas was scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained. The measurement above 1000MHz was performed by horn antenna. The measurement below 30MHz was performed by loop antenna.

The EUT was rotated around the X-, Y-, and Z-Axis and the results from worst case axis are recorded.



Conducted Emission Test on A.C. mains line

The equipment under test (EUT) was placed on a wooden table 80cm above the ground plane, the LISN was placed 80cm away from the EUT. The test was performed in accordance with ANSI C63.10: 2013, with the following: an initial measurement was performed in peak and average detection mode on the live and neutral lines. The pre-scan was performed by peak detection on both live and neutral conductors. Any emissions recorded within 20dB of the relevant limit line were re-measured using quasi-peak and average detections, the 6 worst cases were recorded in the table of results.



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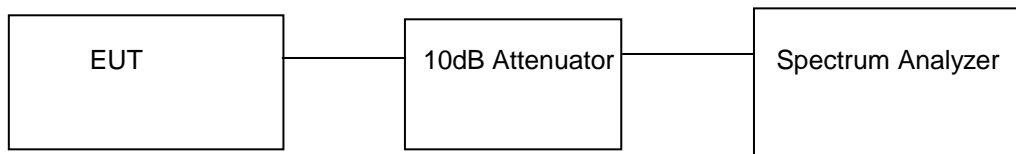
Test Results

Maximum Conducted Peak Output Power Result

Section 15.247(b) (3)
Pass

Test Specification	FCC Part 15 Subpart C
Measurement Bandwidth (RBW)	1 MHz
Detector	Peak
Requirement	≤1 watt (30dBm).

Test Method:

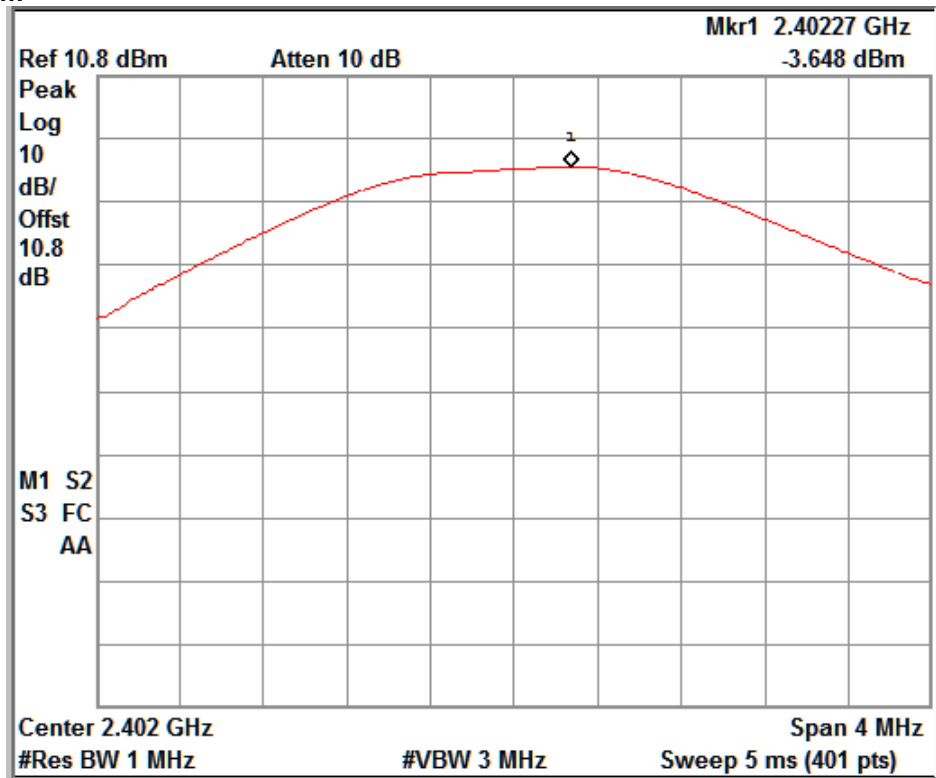


Cable Loss+ Attenuation: 10.8dB (Included in the test results)

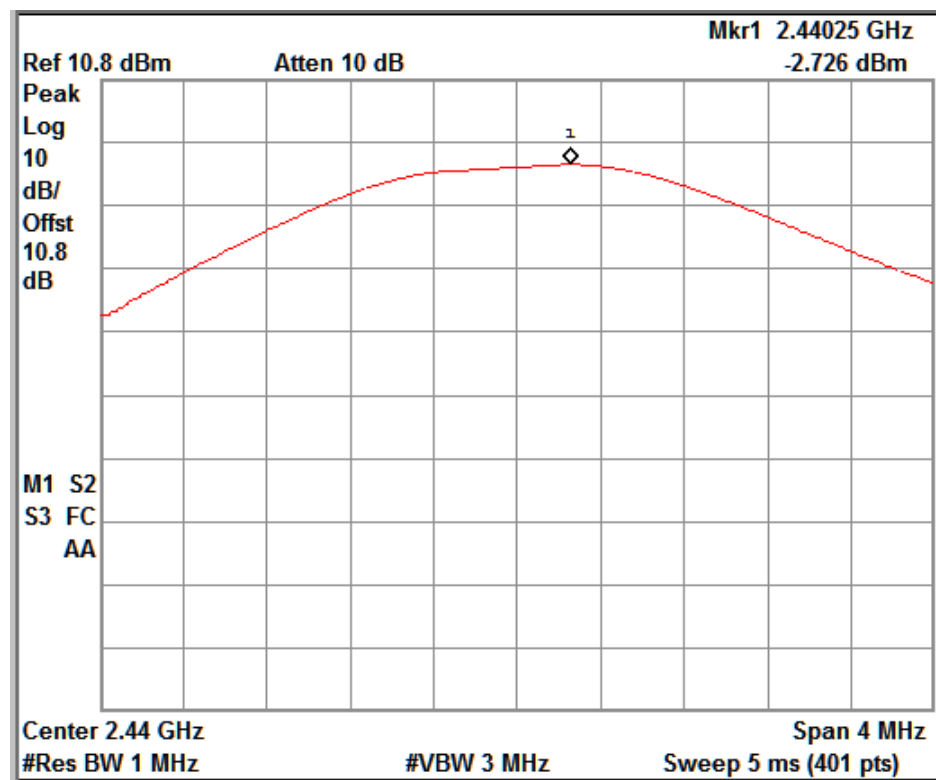
Test Result:

Frequency (MHz)	Total Output power (dBm)	Limit (dBm)
2402	-3.65	30.00
2440	-2.73	30.00
2480	-1.92	30.00

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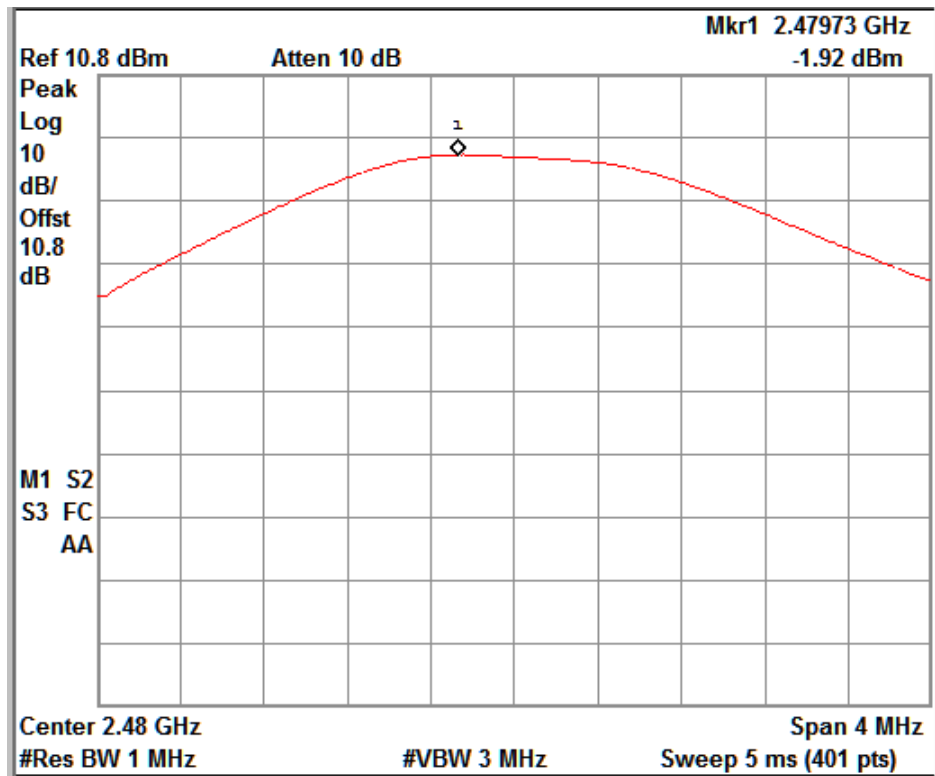


Channel Frequency: 2402 MHz



Channel Frequency: 2440 MHz

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Channel Frequency: 2480 MHz

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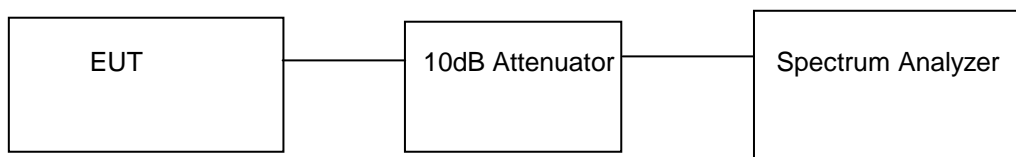
Power Spectral Density
Result

Section 15.247(e)
Pass

Test Specification
Detector Function
Requirement

FCC Part 15 Subpart C
Peak
For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm.

Test Method:

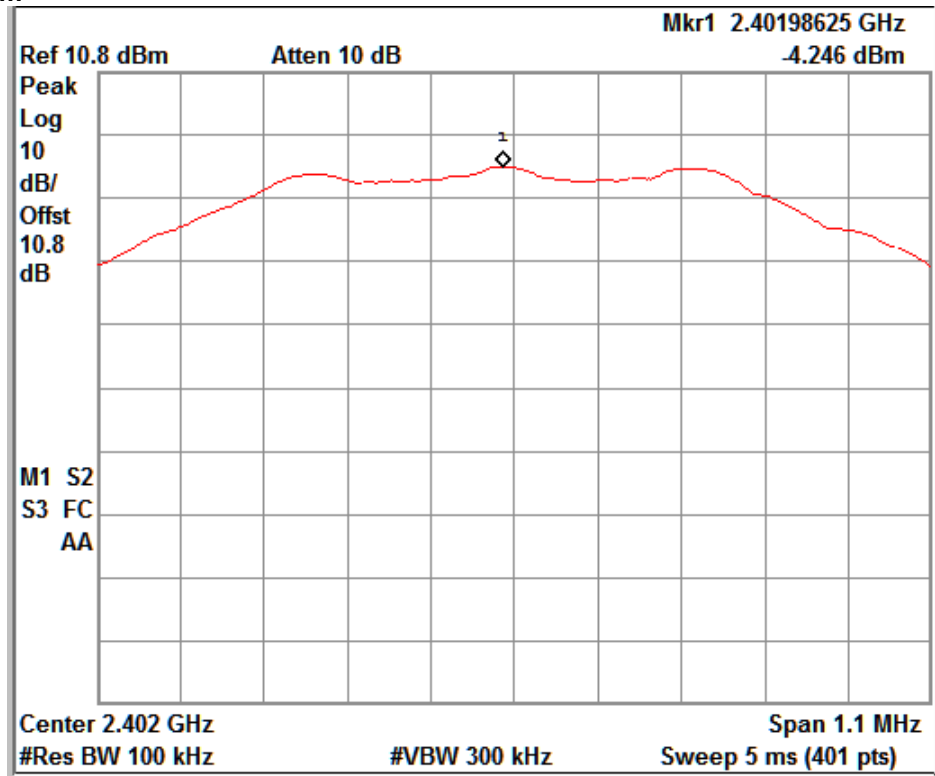


Cable Loss+ Attenuation: 10.8dB (Included in the test results).

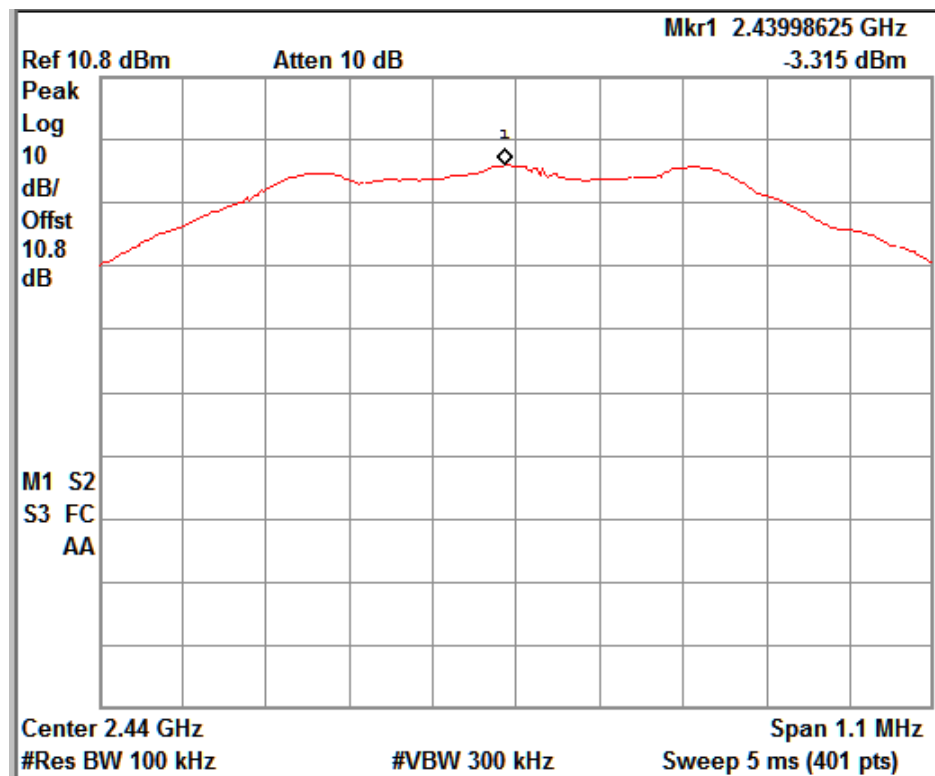
Test Result:

Frequency (MHz)	Total PSD (dBm)	Limit (dBm)
2402	-4.25	8
2440	-3.32	8
2480	-2.57	8

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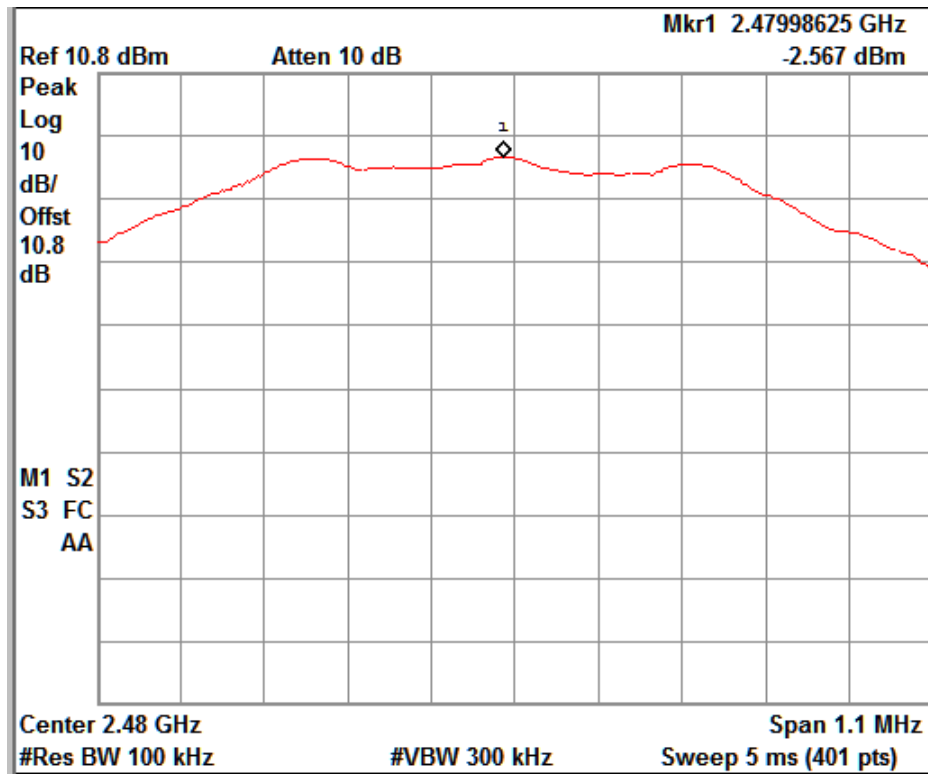


Channel Frequency: 2402 MHz



Channel Frequency: 2440 MHz

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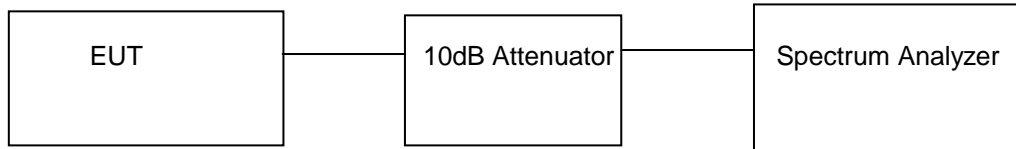
Channel Frequency: 2480 MHz

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6 dB Bandwidth
Result

Section 15.247(a) (2)
Pass

Test Specification FCC Part 15 Subpart C
Requirement The minimum 6 dB bandwidth shall be at least 500 kHz.

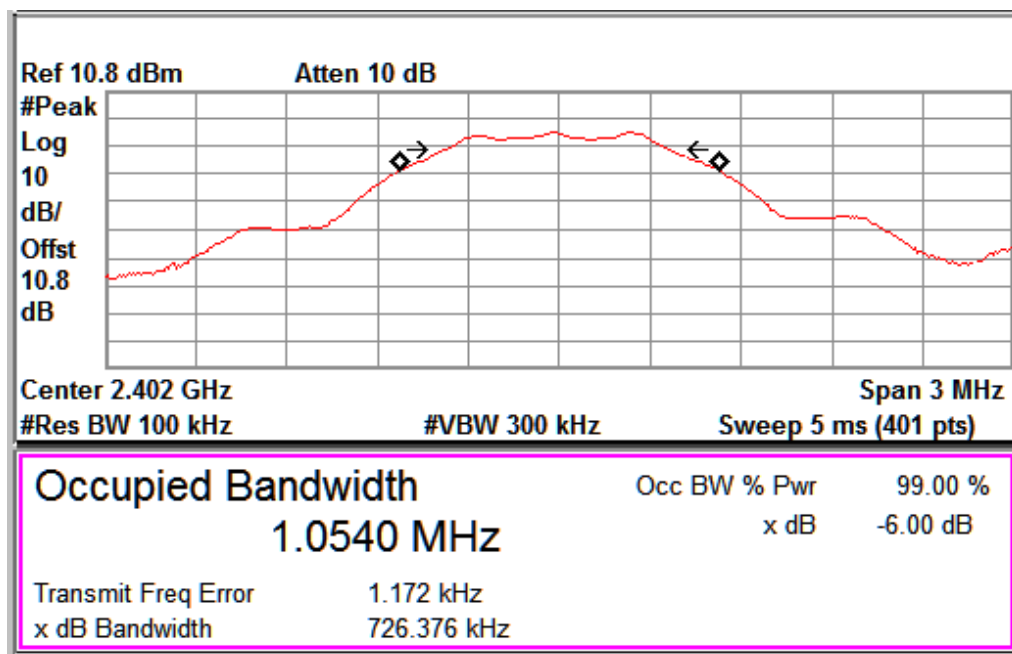
Test Method:



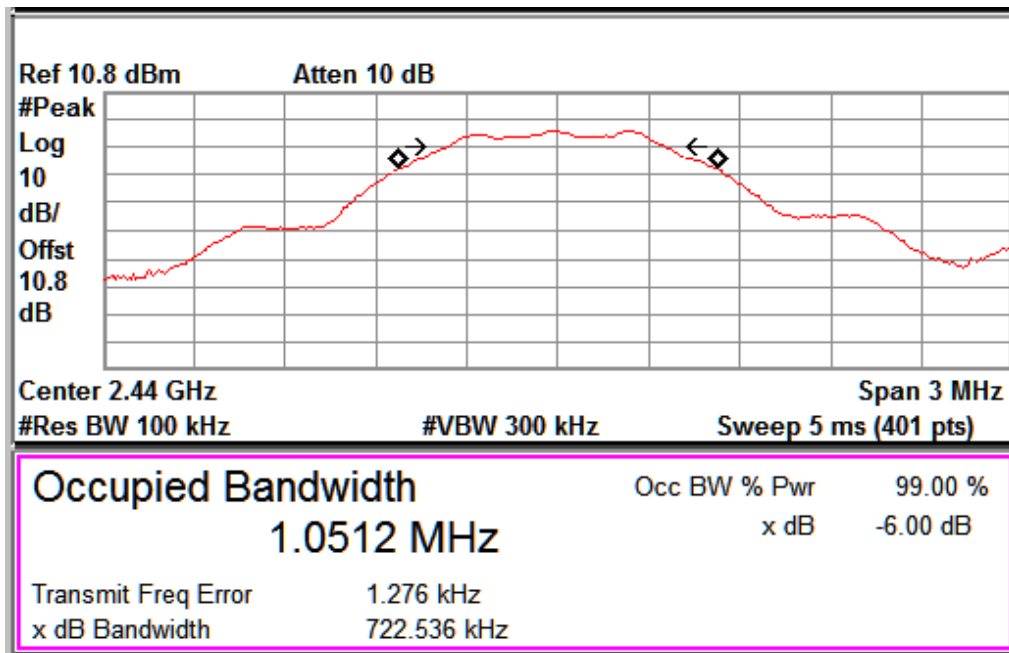
Cable Loss+ Attenuation: 10.8dB (Included in the test results).

Test Result:

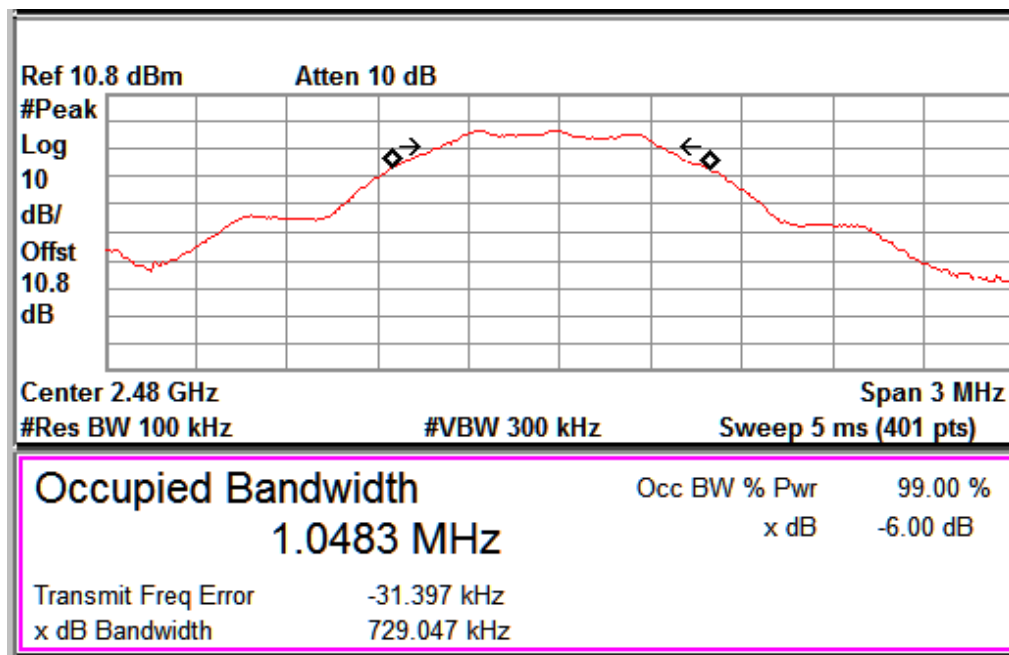
Frequency (MHz)	6 dB Bandwidth (kHz)	OBW (MHz)
2402	726.376	1.054
2440	722.536	1.051
2480	729.047	1.048



6dB BW and OBW: Channel frequency: 2402 MHz



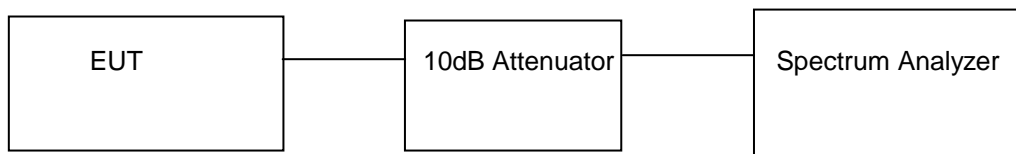
6dB BW and OBW: Channel frequency: 2440 MHz



6dB BW and OBW: Channel frequency: 2480 MHz

Emission in the non-restricted frequency bands
Result
Section 15.247(d)
Pass

Test Specification	FCC Part 15 Subpart C
Detector Function	Peak
Requirement	<p>If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.</p> <p>If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to 15.247(b)(3) requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.</p>

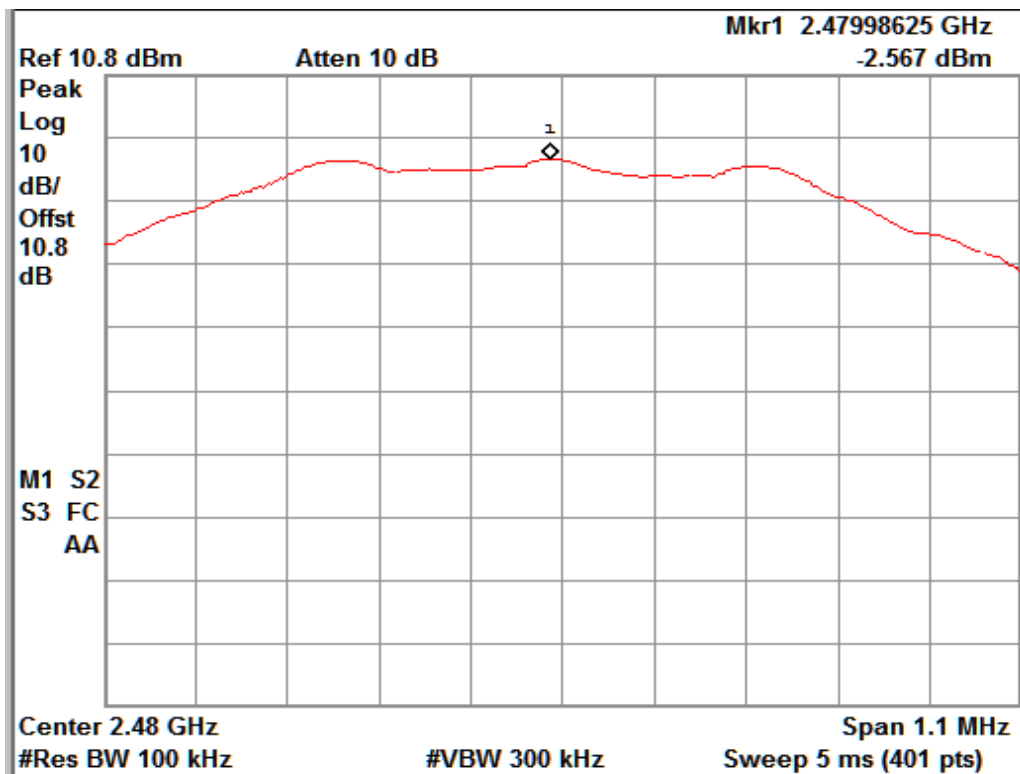
Test Method:


Cable Loss+ Attenuation: 10.8dB (Included in the test results).

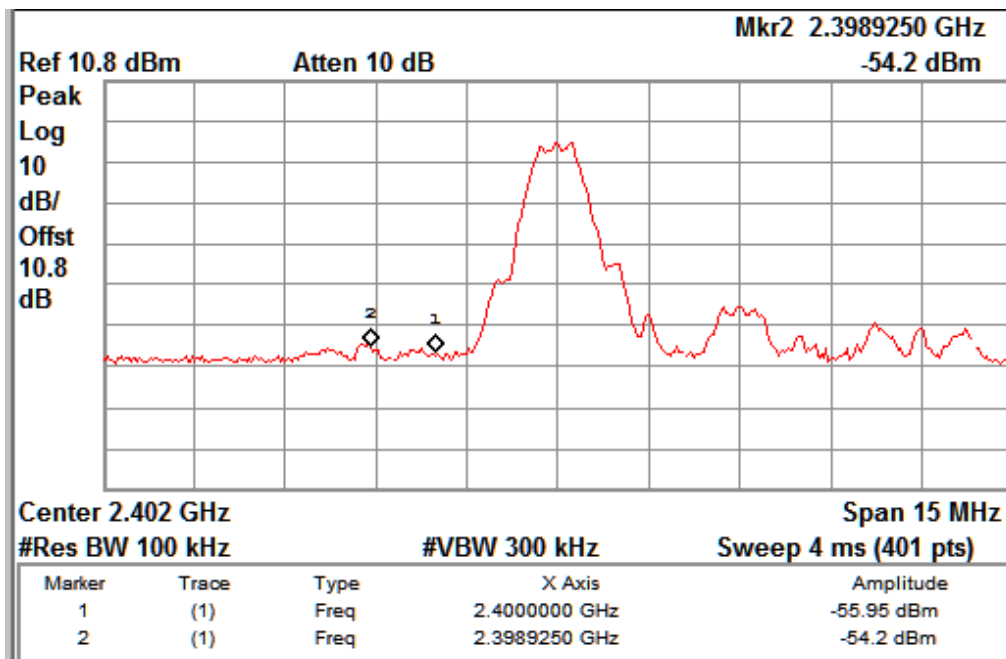
Test Result:

Channel Frequency (MHz)	Value at Band Edge				Limit (dBc)
	Band Edge Frequency (MHz)	Reference PSD Level 'A' in (dBm)	Band Edge Value 'B' in (dBm)	Difference A~B (dBc)	
2402	2400	-2.567	-55.95	53.28	20.00
2480	2483.5	-2.567	-54.83	52.26	20.00

Note: Channel frequency 2480MHz found to contain maximum PSD level and same is used to establish PSD reference level.

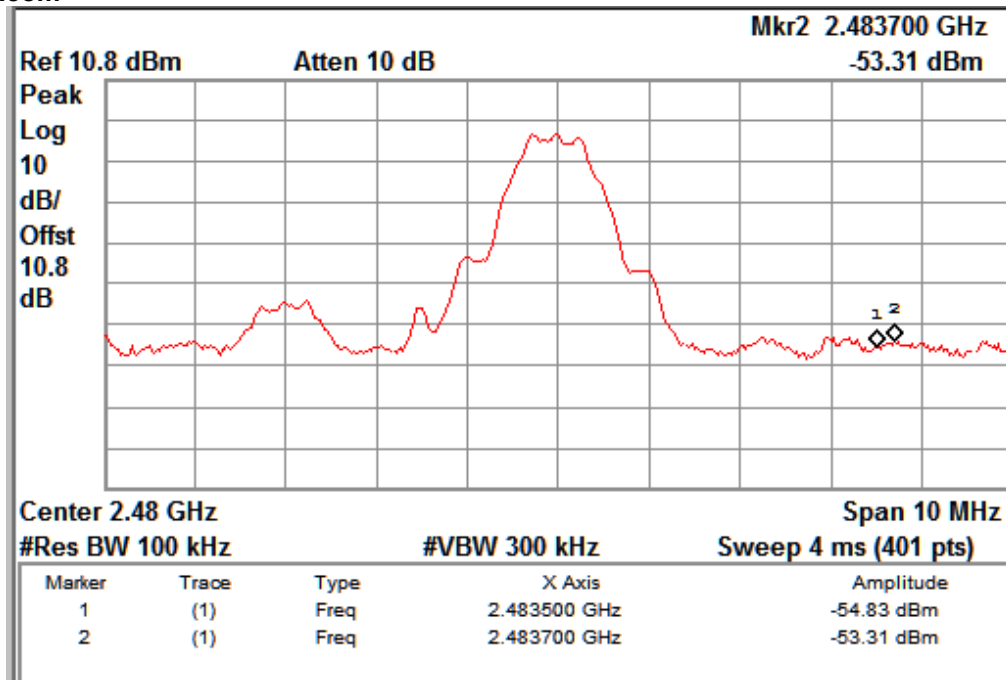


PSD Reference Level Plot



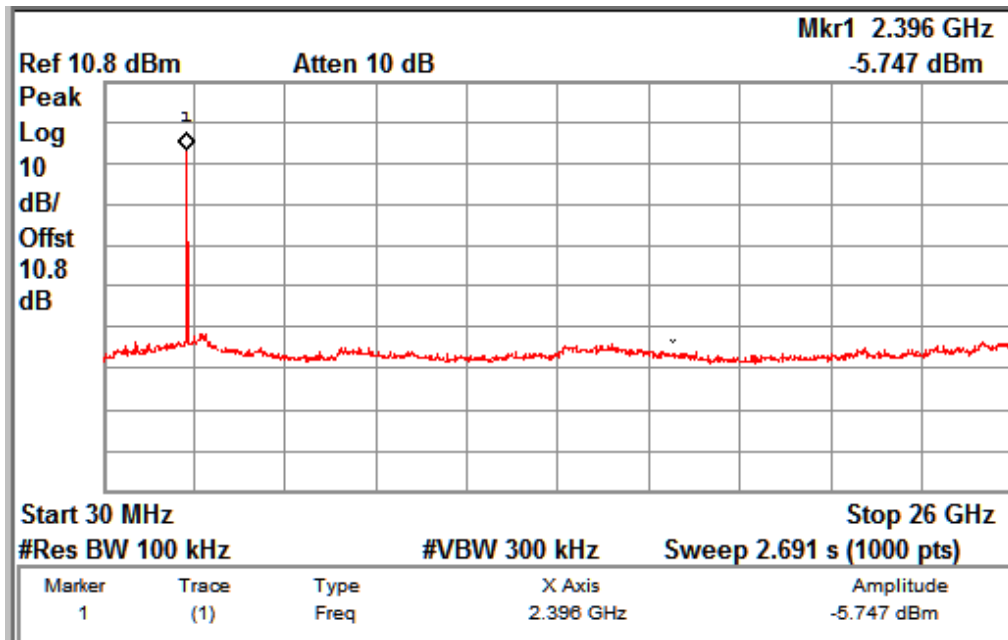
Channel frequency: 2402 MHz

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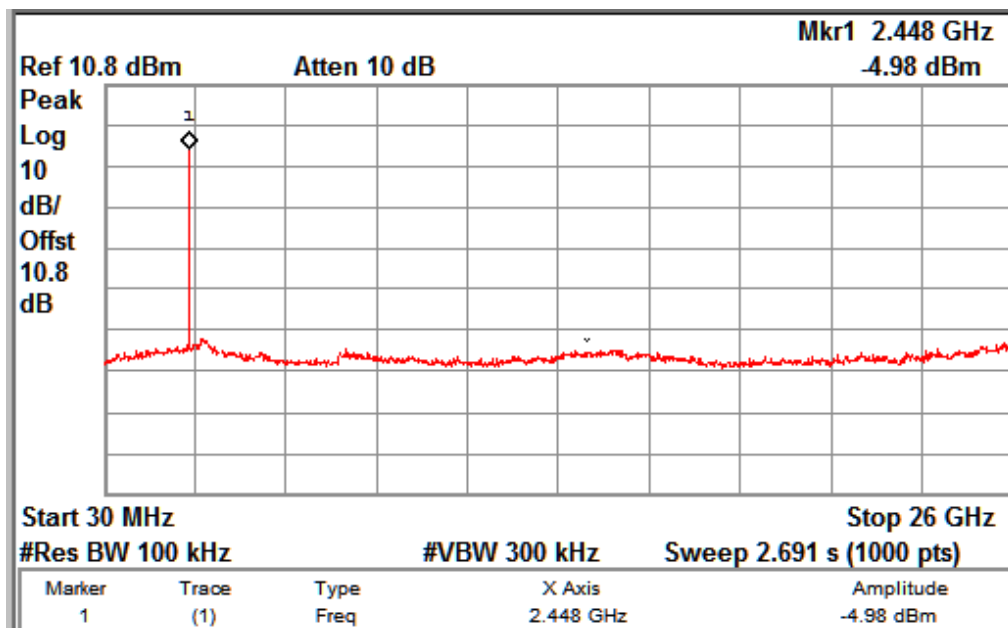


Channel frequency: 2480 MHz

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Conducted Spurious Emission

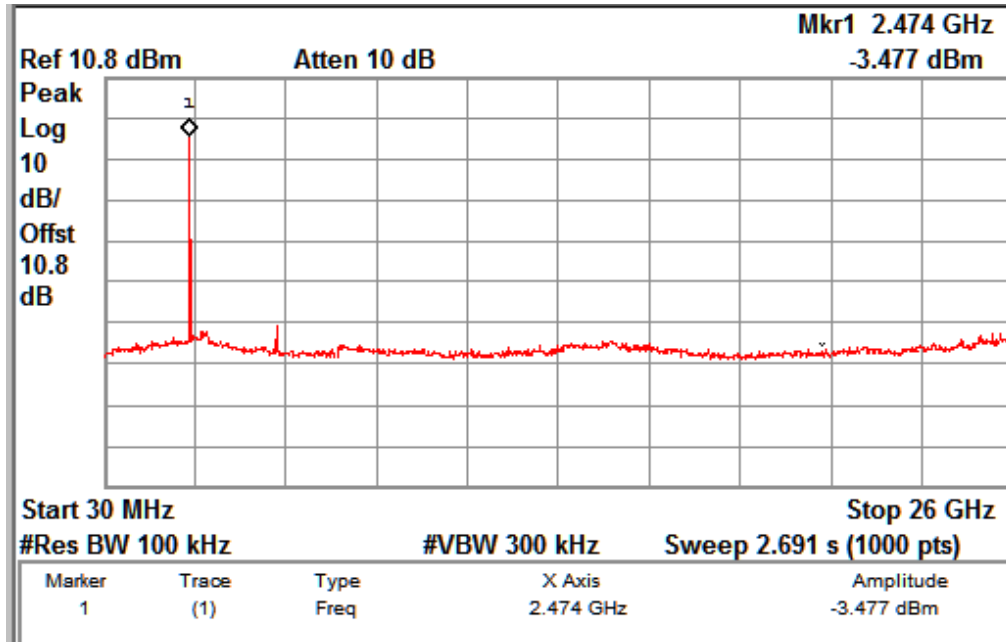


Channel frequency: 2402 MHz



Channel frequency: 2440 MHz

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Channel frequency: 2480 MHz

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**Spurious Radiated Emissions and
Restricted Bands of Operation**

Section 15.209 and 15.205

Result

Pass

Test Specification	FCC Part 15 Subpart C
Test Method	ANSI C63.10-2013
Measurement Location	Semi Anechoic Chamber
Measuring Distance	3m
Detection	QP for frequency below 1GHz, Peak and Average for frequency above 1GHz
Requirement	As per the limits mentioned in the below table

Limit for Radiated Emission of Section 15.209:

Frequency (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Distance of Measurement (m)
0.009 – 0.490	2400/F(kHz)	48.50 – 13.80	300*
0.490 – 1.705	24000/F(kHz)	33.80 – 23.00	30*
1.705 -30	30	29.54	30*
30-88	100	40.0	3
88-216	150	43.5	3
216-960	200	46.0	3
Above 960	500	54.0	3

Remark: * the limit shows in the table above of frequency range 0.009 – 0.490, 0.490 – 1.705 MHz and 1.705-30MHz is at 300 meter, 30 meter and 30 meter range respectively, which corresponds to 88, 50 – 53.80, 53.80 – 43.00 and 49.5dB $\mu\text{V/m}$ at 3m range by extrapolation calculation and the measurement of loop antenna.

The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz Radiated emission limits in these three bands are based on measurements employing an average detector.

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Test results:

For frequency range 9 KHz to 1 GHz

Note: EUT is tested in battery mode and charging mode. Charge mode test results are found to be worst and test results for same are listed below.

Antenna Polarization	Frequency (MHz)	Field Strength Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Vertical	70.35	22.40	40	-17.6
	117.39	23.91	43.5	-19.59
	140.92	22.51	43.5	-20.99
Horizontal	No emissions found			

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Frequencies above 1GHz

Fundamental Frequency (MHz)	Antenna Polarization	Frequency of Emission (MHz)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2402	Vertical	2390 (Pk)	45.38	74	-28.62
		2390 (Av)	33.03	54	-20.97
		2402 (Pk)	83.48	*	-
		2402 (Av)	79.47	*	-
		4804 (Pk)	50.74	74	-23.26
		4804 (Av)	40.53	54	-13.47
	Horizontal	2390 (Pk)	43.19	74	-30.81
		2390 (Av)	31.22	54	-22.78
		2402 (Pk)	93.2	*	-
		2402 (Av)	89.29	*	-
		4804 (Pk)	50.06	74	-23.94
		4804 (Av)	38.34	54	-15.66
2440	Vertical	2440 (Pk)	84.76	*	-
		2440 (Av)	80.12	*	-
		4880 (Pk)	53.69	74	-20.31
		4880 (Av)	44.42	54	-9.58
	Horizontal	2440 (Pk)	93.87	*	-
		2440 (Av)	89.21	*	-
		4880 (Pk)	50.57	74	-23.43
		4880 (Av)	38.5	54	-15.5
2480	Vertical	2480 (Pk)	86.52	*	-
		2480 (Av)	82.23	*	-
		2483.5 (Pk)	43.57	74	-30.43
		2483.5 (Av)	31.3	54	-22.7
		4960 (Pk)	53.87	74	-20.13
		4960 (Av)	43.02	54	-10.98
		7440 (Pk)	59.97	74	-14.03
		7440 (Av)	45.54	54	-8.46
	Horizontal	2480 (Pk)	94.17	*	-
		2480 (Av)	90.1	*	-
		2483.5 (Pk)	45.5	74	-28.5
		2483.5 (Av)	36.16	54	-17.84
		4960 (Pk)	53.26	74	-20.74
		4960 (Av)	42.04	54	-11.96
		7440 (Pk)	60.13	74	-13.87
		7440 (Av)	46.78	54	-7.22

Pk -> Peak Detector
Av -> Average Detector
*- -> Fundamental frequency

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**Conducted Emission Test on A.C. Power Line
Result**

**Section 15.207
Pass**

Test Specification : FCC Part 15 Section 15.207
Test Method : ANSI C63.10-2013
Testing Location : Screened room
Measurement Bandwidth : 9kHz
Frequency Range : 150kHz – 30MHz
Supply Voltage : 110VAC,60Hz

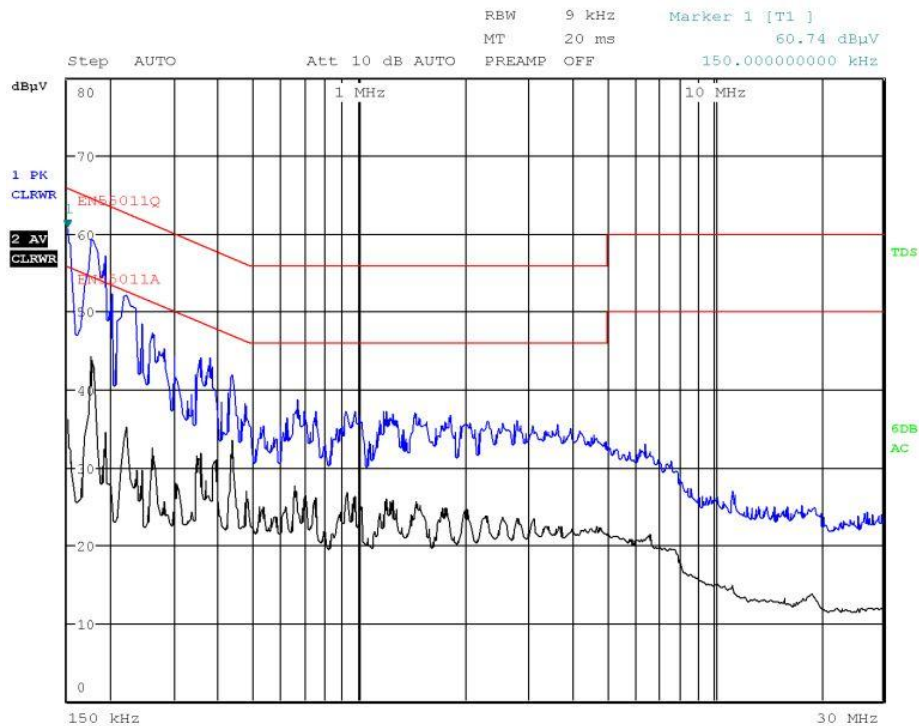
Limit of section 15.207

Frequency of Emission (MHz)	QP Limit (dB μ V)	AV Limit (dB μ V/m)
0.15 – 0.5	66 – 56*	56 – 46*
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency

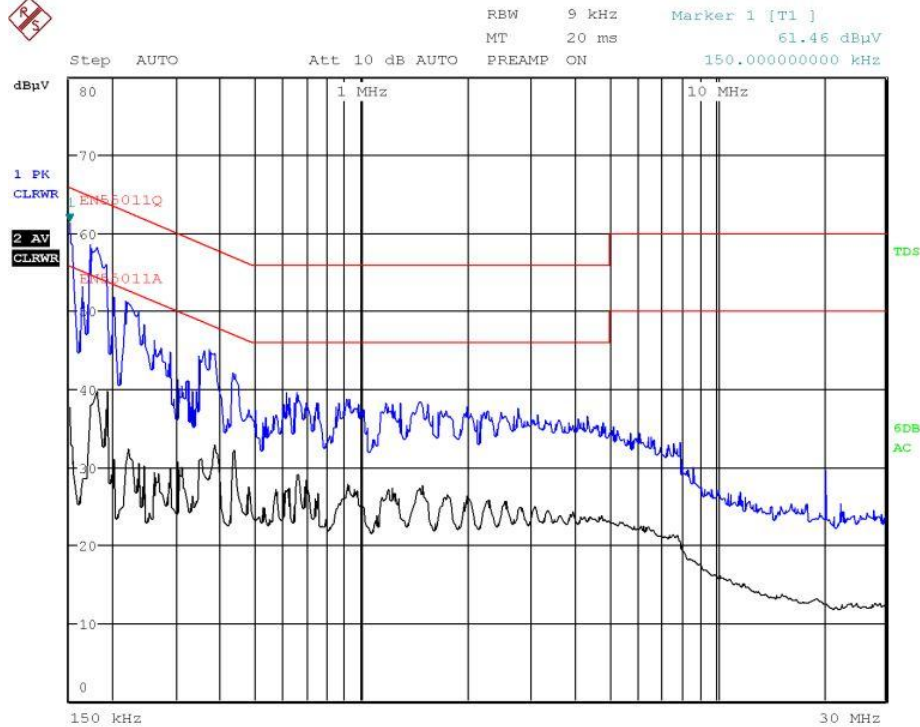
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Test Results:



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	EN55011Q			
Trace2:	EN55011A			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	174 kHz	57.66	L1	-7.09
1 Quasi Peak	150 kHz	55.43	L1	-10.56
1 Quasi Peak	218 kHz	50.05	L1	-12.83
2 Average	174 kHz	41.30	L1	-13.46
2 Average	434 kHz	32.51	L1	-14.66
1 Quasi Peak	242 kHz	45.43	L1	-16.59
1 Quasi Peak	258 kHz	44.16	L1	-17.32
1 Quasi Peak	434 kHz	39.65	L1	-17.52
1 Quasi Peak	374 kHz	40.50	L1	-17.90
2 Average	190 kHz	35.95	L1	-18.07
2 Average	218 kHz	34.59	L1	-18.29
2 Average	354 kHz	30.13	L1	-18.73
2 Average	654 kHz	26.87	L1	-19.12
2 Average	1.182 MHz	25.47	L1	-20.52
2 Average	922 kHz	25.32	L1	-20.67
2 Average	1.442 MHz	24.82	L1	-21.17
2 Average	1.746 MHz	24.52	L1	-21.47
1 Quasi Peak	666 kHz	34.38	L1	-21.61
2 Average	150 kHz	34.28	L1	-21.71
1 Quasi Peak	1.182 MHz	33.75	L1	-22.25

Mode: Line



EDIT PEAK LIST (Final Measurement Results)				
Trace1:	EN55011Q			
Trace2:	EN55011A			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV		DELTA LIMIT dB
1 Quasi Peak	170 kHz	55.30	N	-9.65
1 Quasi Peak	150 kHz	55.87	N	-10.12
1 Quasi Peak	214 kHz	48.83	N	-14.21
2 Average	434 kHz	32.57	N	-14.60
2 Average	382 kHz	32.96	N	-15.27
2 Average	178 kHz	38.89	N	-15.67
1 Quasi Peak	198 kHz	46.84	N	-16.84
1 Quasi Peak	430 kHz	40.22	N	-17.03
2 Average	190 kHz	36.90	N	-17.13
1 Quasi Peak	370 kHz	41.23	N	-17.26
2 Average	654 kHz	28.55	N	-17.44
2 Average	910 kHz	27.52	N	-18.47
2 Average	1.478 MHz	26.55	N	-19.44
1 Quasi Peak	906 kHz	36.15	N	-19.84
2 Average	218 kHz	32.87	N	-20.02
2 Average	1.734 MHz	25.92	N	-20.07
2 Average	2.278 MHz	25.25	N	-20.74
2 Average	150 kHz	35.11	N	-20.88
2 Average	302 kHz	29.18	N	-21.00
1 Quasi Peak	162 kHz	44.16	N	-21.19

Mode: Neutral

END OF TEST REPORT