

# FCC / ISED Test Report

For: Hendrickson USA, L.L.C., DBA Hendrickson Brake and Wheel-End Group

> Model Name: B-40699

**Product Description:** Wheel End Sensor with Tire Pressure Monitoring and Bluetooth Radio

> FCC ID: 2BMOAWES ISED: 33452-WES

Applied Rules and Standards: 47 CFR Part 15.247 (DTS) RSS-247 Issue 3 (DTS) & RSS-Gen Issue 5

**REPORT:** EMC\_HENDR\_002\_24001\_FCC\_15\_247\_BLE\_Rev1

DATE: 2025-03-26



A2LA Accredited

IC recognized # 3462B

#### **CETECOM** Inc.

411 Dixon Landing Road • Milpitas, CA 95035 • U.S.A.

Phone: + 1 (408) 586 6200 • Fax: + 1 (408) 586 6299 • E-mail: contact@cetecom.com • <u>http://www.cetecom.com</u> *CETECOM* Inc. is a Delaware Corporation with Corporation number: 2905571

© Copyright by CETECOM



#### TABLE OF CONTENTS

1	1	ASSESSMENT	3
2		ADMINISTRATIVE DATA	4
	2.1 2.2 2.3	IDENTIFICATION OF THE CLIENT	4
3	I	EQUIPMENT UNDER TEST (EUT)	5
	3.1 3.2 3.3 3.4 3.5 3.6	EUT SAMPLE DETAILS ACCESSORY EQUIPMENT (AE) DETAILS TEST SAMPLE CONFIGURATION MODE OF OPERATION	6 6 6 6
4	;	SUBJECT OF INVESTIGATION	7
5	I	MEASUREMENT RESULTS SUMMARY	7
6	I	MEASUREMENT UNCERTAINTY	8
	6.1 6.2 6.3	DATES OF TESTING:	8
7	I	MEASUREMENT PROCEDURES	9
	7.1 7.2 7.3	Power Line Conducted Measurement Procedure	. 11
8		TEST RESULT DATA	. 12
	8.1 8.2 8.3 8.4 8.5 8.6	MAXIMUM PEAK CONDUCTED OUTPUT POWER POWER SPECTRAL DENSITY DUTY CYCLE NON-RESTRICTED BAND EDGE COMPLIANCE	. 20 . 24 . 28 . 29
9		TEST SETUP PHOTOS	
10	) .	TEST EQUIPMENT AND ANCILLARIES USED FOR TESTING	. 52
11		HISTORY	. 53



#### 1 Assessment

The following device was evaluated against the applicable criteria specified in FCC rules Parts 15.247 of Title 47 of the Code of Federal Regulations and the relevant ISED Canada standard RSS-247.

No deviations were ascertained.

Company Name	Product Description	Model No.
Hendrickson USA, L.L.C., DBA Hendrickson Brake and Wheel-End Group	Wheel End Sensor with Tire Pressure Monitoring and Bluetooth Radio	B-40699

#### **Report Reviewer:**

	Alvin, Ilarina			
2025-03-26 Compliance (Senior Manager Regulatory Services)				
	Date Section Na		Name	Signature
	2410			e ignatai e

## **Responsible for the Report:**

	Art Thammanavarat		
2025-03-26	Compliance	(Senior EMC Engineer)	
Date	Section	Name	Signature
Date	Dection	Name	Olgilature

The test results of this test report relate exclusively to the test item specified in Section3.

CETECOM Inc. USA does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples of the type of the equipment represented by the test item. The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written approval of CETECOM Inc. USA.



# 2 Administrative Data

# 2.1 Identification of the Testing Laboratory Issuing the EMC Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
Street Address:	411 Dixon Landing Road
City/Zip Code	Milpitas, CA 95035
Country	USA
Telephone:	+1 (408) 586 6200
Fax:	+1 (408) 586 6299
EMC Engineer:	Art Thammanavarat
Responsible Project Leader:	Hao Shane

# 2.2 Identification of the Client

Applicant's Name:	Hendrickson USA, L.L.C., DBA Hendrickson Brake and Wheel-End Group
Street Address:	9260 Pleasantwood Ave NW
City/Zip Code	North Canton Ohio 44720
Country	USA

# 2.3 Identification of the Manufacturer

Manufacturer's Name:	
Manufacturers Address:	Same as client
City/Zip Code	
Country	



# 3 Equipment Under Test (EUT)

# 3.1 EUT Specifications

Product Description:	Wheel End sensor with tire pressure monitoring and Bluetooth radio			
Model Name:	B-40699			
Marketing Name:	WATCHMAN™ or TIREMAAX®			
HW Version:	V4.2E			
SW Version:	V1.0.1			
FCC-ID:	2BMOAWES			
ISED:	33452-WES			
Frequency Range /	Nominal band: 2400 MHz – 2483.5 MHz			
number of channels:	Center to center: 2402 MHz (ch 0) – 2480 MHz (ch 39), 40 channels			
Radio Information as declared:       Bluetooth Modules         Brandl Name: Texas Instruments Incorporated         Model Number: CC2650MODA         FCC: ZAT26M1         ISED: 451H-26M1         Wireless Technologies         Bluetooth				
Antenna Information as declared: Type: PCB Trace Location: Internal Peak Gain: +5 dBi gain				
Power Supply/ Rated Operating Voltage Range				
Operating Temperature Range	Low: -40°C Norm: 25°C High: 85°C			
Sample Revision				
EUT Dimensions         113mm x 113mm x 31mm				
Weight	129 grams			
EUT Diameter	⊠< 60 cm □ Other			
Note: The information of the EUT	Note: The information of the EUT specifications in the table above is provided by the client.			



#### 3.2 EUT Sample details

EUT #	Serial Number	HW Version	SW Version	Notes/Comments
1	N/A	V4.2E	V1.0.1	Radiated Emissions / Conducted Emissions

#### 3.3 Accessory Equipment (AE) details

AE #	Туре	Model	Manufacturer	Serial Number	Comments
1	Laptop	P135G	Dell	12243628947	Support laptop provided by Cetecom to exercise device.

# 3.4 Test Sample Configuration

EUT Set-up #	Combination of AE used for test set up	Comments
1	EUT#1+AE#1	<ul> <li>The client provides a USB cable to communicate with the device and sends commands for configuring the BLE radios into a specific test mode. This test mode configuration, designed for worst-case scenarios, is not intended for end-user application and is outlined as follows: <ul> <li>EUT powered by 3Vdc</li> <li>Radiated RF measurements were performed with EUT configured via customer provided using BTool and instructions</li> <li>The EUT connected to support laptop to exercise device.</li> </ul> </li> </ul>

## 3.5 Mode of Operation

Mode of Operation	Description of Operating modes	Additional Information
Op. 1	BLE	BLE was tested on Low, Mid, and High channels at the maximum allowed power setting.

## 3.6 Justification for Mode of Operation

During the testing process, the EUT was tested with transmitter sets on low, mid and high channels, and highest possible duty cycle. For radiated measurements, all data in this report shows the worst case between horizontal and vertical antenna polarizations and for all orientations of the EUT.



#### 4 Subject of Investigation

The objective of the measurements done by CETECOM Inc. was to evaluate the compliance of the EUT against the relevant requirements specified in section 1.

# 5 Measurement Results Summary

Test Specification	Test Case	Temperature and Voltage Conditions	Mode	Pass	NA	NP	Result
§15.247(a)(1) RSS-247 5.2(a)	Emission Bandwidth	Nominal	Op. 1				Complies
§15.247(e) RSS-247 5.2(b)	Power Spectral Density	Nominal	Op. 1				Complies
§15.247(b)(1) RSS-247 5.4(d)	Maximum Conducted Output Power and EIRP	Nominal	Op. 1				Complies
§15.247(d) RSS-247 5.5	Band edge compliance Unrestricted Band Edges	Nominal	Op. 1				Complies
§15.247; 15.209; 15.205 RSS-Gen 8.9; 8.10	Band edge compliance Restricted Band Edges	Nominal	Op. 1				Complies
§15.247(d); §15.209 RSS-Gen 6.13	TX Radiated Spurious Emissions	Nominal	Op. 1				Complies
§15.207(a) RSS Gen 8.8	AC Conducted Emissions	Nominal	-				Note 1 Note 2

Note 1: NA= Not Applicable; NP= Not Performed.

Note 2: The EUT does not utilize power from public mains, hence testing for AC line conducted emissions is not applicable in this case.



#### 6 **Measurement Uncertainty**

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus, with 95% confidence interval (in dB delta to result), based on a coverage factor k=2.

Radiated measurement

		EMC Lab 2
150 kHz – 30 MHz	2.47 dB	N/A
9 kHz – 30 MHz	2.68 dB	2.53 dB
30 – 100 MHz	4.39 dB	3.85 dB
100 MHz – 1 GHz	5.65 dB	5.24 dB
1 – 6 GHz	5.0 dB	4.88 dB
6 – 18 GHz	4.76 dB	4.58 dB
18 – 40 GHz	4.65 dB	4.61 dB
	9 kHz – 30 MHz 30 – 100 MHz 100 MHz – 1 GHz 1 – 6 GHz 6 – 18 GHz 18 – 40 GHz	9 kHz - 30 MHz         2.68 dB           30 - 100 MHz         4.39 dB           100 MHz - 1 GHz         5.65 dB           1 - 6 GHz         5.0 dB           6 - 18 GHz         4.76 dB

RF conducted measurement

According to TR 102 273 a multiplicative propagation of error is assumed for RF measurement systems. For this reason the RMS method is applied to dB values and not to linear values as appropriate for additive propagation of error. Also used: http://physics.nist.gov/cuu/Uncertainty/typeb.html. The above calculated uncertainties apply to direct application of the Substitution method. The Substitution method is always used when the EUT comes closer than 3dB to the limit.

#### 6.1 **Environmental Conditions During Testing:**

The following environmental conditions were maintained during the course of testing:

- Ambient Temperature: 20-25°C ٠
- Relative humidity: 40-60%

#### 6.2 Dates of Testing:

#### 2024-10-23 - 2024-10-24

#### 6.3 **Decision Rule:**

Cetecom advanced follows ILAC G8:2019 chapter 4.2.1 (Simple Acceptance Rule).

Only the measured values related to their corresponding limits will be used to decide whether the equipment under test meets the requirements of the test standards listed in chapter 3. The measurement uncertainty is mentioned in this test report, See chapter 9, but is not taken into account - neither to the limits nor to the measurement results. Measurement results with a smaller margin to the corresponding limits than the measurement uncertainty have a potential risk of more than 5% that the decision might be wrong.

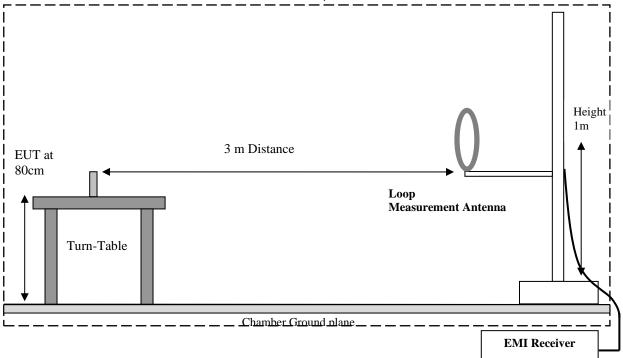


#### 7 Measurement Procedures

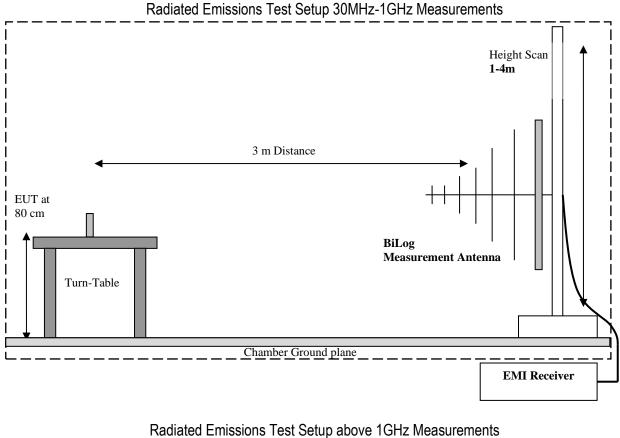
#### 7.1 Radiated Measurement

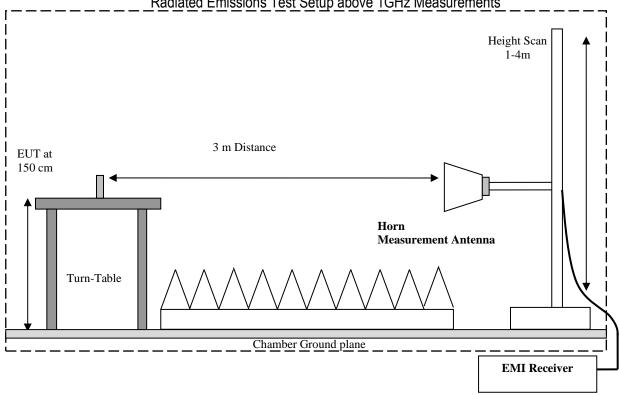
The radiated measurement is performed according to ANSI C63.10 (2013)

- The exploratory measurement is accomplished by running a matrix of 16 sweeps over the required frequency
  range with R&S Test-SW EMC32 for 4 positions of the turntable, two orthogonal positions of the EUT and
  both antenna polarizations. This procedure exceeds the requirement of the above standards to cover the 3
  orthogonal axis of the EUT. A max peak detector is utilized during the exploratory measurement. The TestSW creates an overall maximum trace for all 12 sweeps and saves the settings for each point of this trace.
  The maximum trace is part of the test report.
- The 10 highest emissions are selected with an automatic algorithm of EMC32 searching for peaks in the noise floor and ensuring that broadband signals are not selected multiple times.
- The maxima are then put through the final measurement and again maximized in a 90deg range of the turntable, fine search in frequency domain and height scan between 1m and 4m.
- The above procedure is repeated for all possible ways of power supply to EUT and for all supported modulations.
- In case there are no emissions above noise floor level only the maximum trace is reported as described above.
- The results are split up into up to 4 frequency ranges due to antenna bandwidth restrictions. A magnetic loop
  is used from 9 kHz to 30 MHz, a Biconilog antenna is used from 30 MHz to 1 GHz, and two different horn
  antennas are used to cover frequencies up to 40 GHz.



Radiated Emissions Test Setup below 30MHz Measurements







# 7.1.1 Sample Calculations for Field Strength Measurements

Field Strength is calculated from the Spectrum Analyzer/ Receiver readings, taking into account the following parameters:

- 1. Measured reading in  $dB\mu V$
- 2. Cable Loss between the receiving antenna and SA in dB and
- 3. Antenna Factor in dB/m

All radiated measurement plots in this report are taken from a test SW that calculates the Field Strength based on the following equation:

FS (dB $\mu$ V/m) = Measured Value on SA (dB $\mu$ V) + Cable Loss (dB) + Antenna Factor (dB/m)

Example:

Frequency (MHz)	Measured SA (dBµV)	Cable Loss (dB)	Antenna Factor Correction (dB)	Field Strength Result (dBµV/m)
1000	80.5	3.5	14	98.0

## 7.2 Power Line Conducted Measurement Procedure

AC Power Line conducted emissions measurements performed according to: ANSI C63.4 (2014)

## 7.3 RF Conducted Measurement Procedure

Testing procedures are based on 558074 D01 15.247 Meas Guidance v05r02 – "GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES" - April 2, 2019, by the Federal Communications Commission, Office of Engineering and Technology, Laboratory Division.



- Connect the equipment as shown in the above diagram.
- Adjust the settings of the SA (Rohde-Schwarz Spectrum Analyzer) to connect the EUT at the required mode of test.
- Measurements are to be performed with the EUT set to the low, middle and high channels and for worst case modulation schemes.



#### 8 Test Result Data

#### 8.1 Emission Bandwidth 6dB and 99% Occupied Bandwidth

8.1.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

#### Spectrum Analyzer settings:

99% Occupied Bandwidth:

- Set frequency = nominal EUT channel center frequency
- Set Span = 1.5 x to 5.0 x OBW
- Set RBW = 1% to 5% of OBW
- Set the video bandwidth (VBW) ≈ 3 x RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth
- If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

#### 6dB (DTS) Bandwidth:

- Set RBW = 100 kHz
- Set the video bandwidth (VBW)  $\geq$  3 x RBW
- Detector = Peak
- Trace mode = Max hold
- Sweep = Auto couple
- Allow the trace to stabilize
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two
  outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the
  maximum level measured in the fundamental emission.

## 8.1.2 Limits:

FCC §15.247(a)(2) and RSS-247 5.2(a)

• Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.



## 8.1.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22 °C	1	Op. 1	nominal

#### 8.1.4 Measurement result:

Plot #	Channel	РНҮ	99% Occupied Bandwidth (MHz)	Limit (MHz)	Result
1	0	LE 1M	1.095000	-	For info only
2	19	LE 1M	1.080000	-	For info only
3	39	LE 1M	1.095000	-	For info only
4	0	LE 2M	2.090000	-	For info only
5	19	LE 2M	2.050000	-	For info only
6	39	LE 2M	2.080000	-	For info only

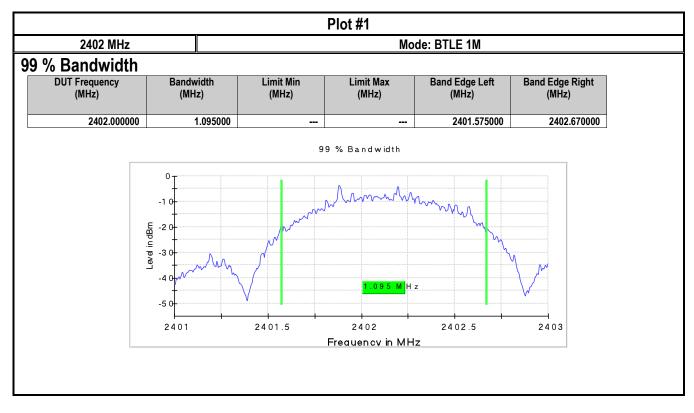
Note 1: The test results and plots are generated by the R&S WMS32 software, which automatically performs the measurements.

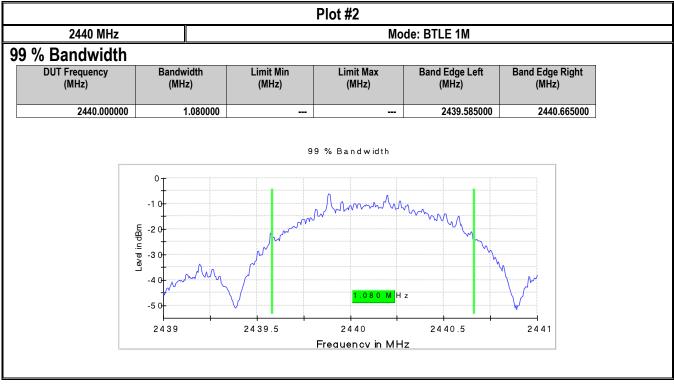
Plot #	Channel	РНҮ	6dB Emissions Bandwidth (MHz)	Limit (MHz)	Result
7	0	LE 1M	0.740260	> 0.5	Pass
8	19	LE 1M	0.727273	> 0.5	Pass
9	39	LE 1M	0.727273	> 0.5	Pass
10	0	LE 2M	1.506494	> 0.5	Pass
11	19	LE 2M	1.454546	> 0.5	Pass
12	39	LE 2M	1.428572	> 0.5	Pass

Note 1: The test results and plots are generated by the R&S WMS32 software, which automatically performs the measurements.

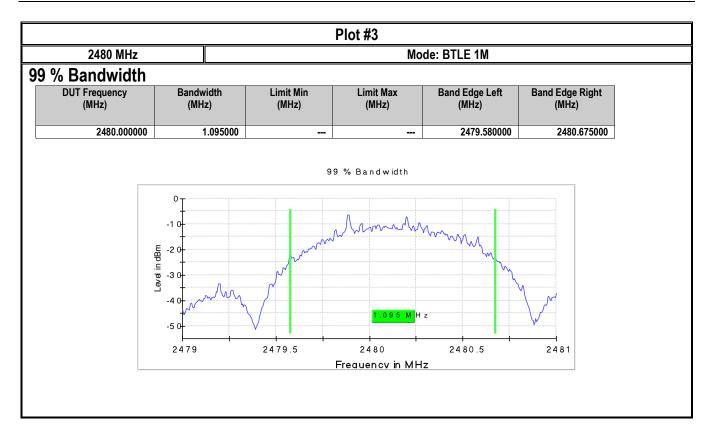


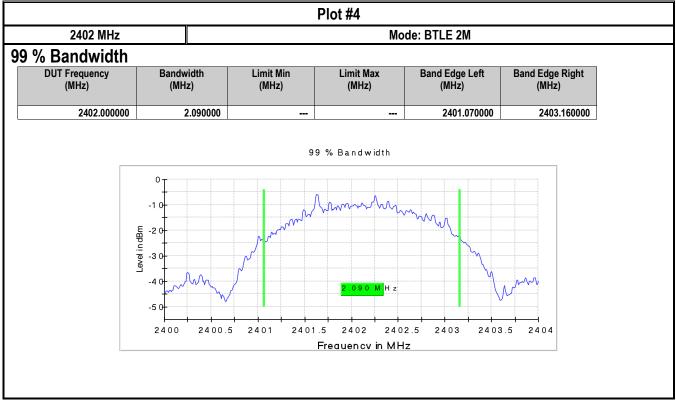
#### 8.1.5 Measurement Plots: 99% OBW



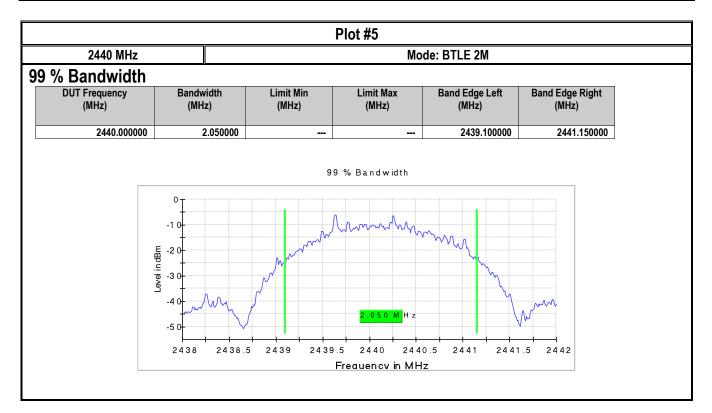


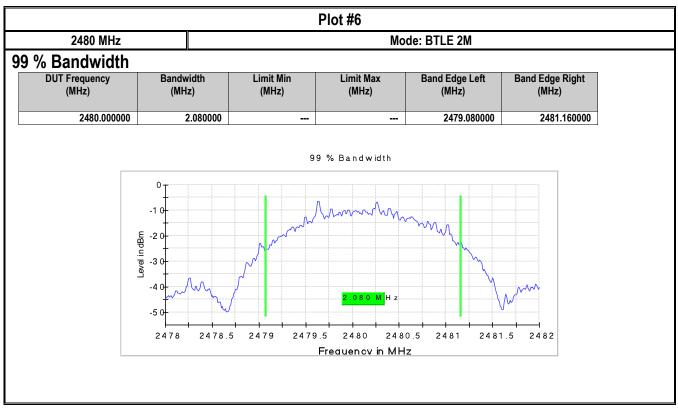






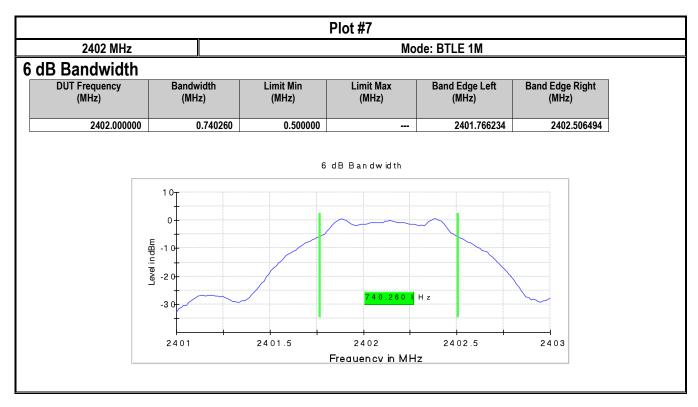


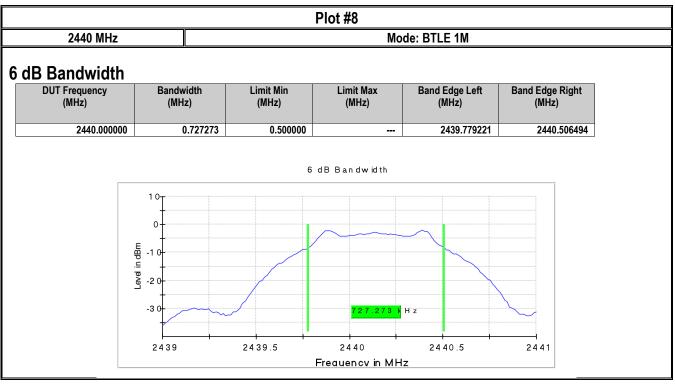




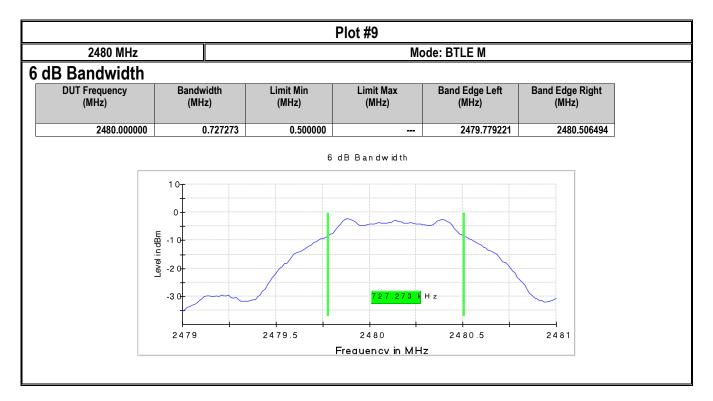


#### 8.1.6 Measurement Plots: 6dB BW



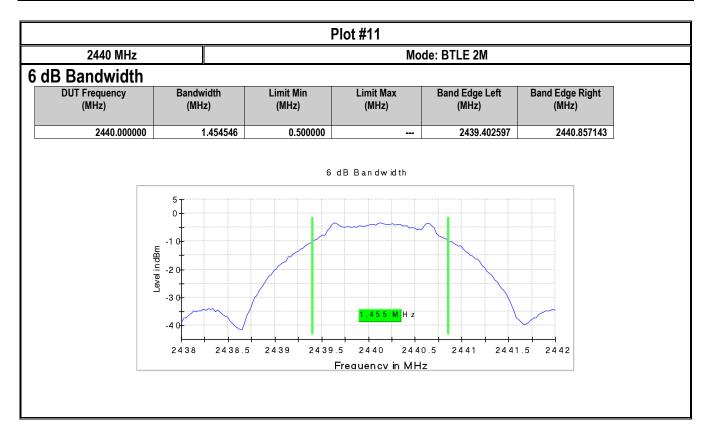


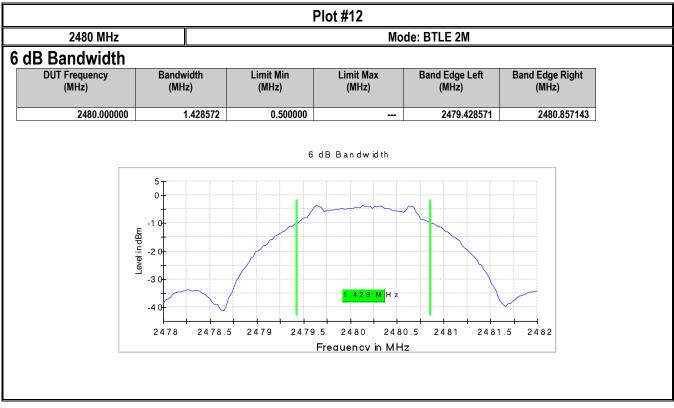




				PI	ot #10					
2402 MHz						Mode:	BTLE 2N	Λ		
andwidth										
Frequency (MHz)	Bandw (MH		Limit Mi (MHz)		Limit Ma (MHz)	x B	and Edge (MHz)		Band Edge (MHz)	
2402.000000		1.506494	0.5	00000			2401.3	376623	2402	.883117
	-10- -10- -10- -10- 					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
	-3 0 -4 0	~~			<mark>1 . 5 0 6</mark>	M H z				
	2400	2400.5	2401	i 2401.5 Fi	2402 2402	2402.5 in MHz	2403	2403.5	2404	









#### 8.2 Maximum Peak Conducted Output Power

# 8.2.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

Spectrum Analyzer settings according to mentioned ANSI, sec.11.9.1.1:

- RBW ≥ DTS bandwidth
- VBW  $\geq$  3 x RBW
- Span ≥ 3 x RBW
- Sweep = Auto couple
- Detector function = Peak
- Trace = Max hold
- Allow trace to fully stabilize
- Use peak marker function to determine the peak amplitude level

#### 8.2.2 Limits:

#### Maximum Peak Output Power:

- FCC §15.247 (b)(3): 1 W (30 dBm)
- IC RSS-247 5.4(d): 1 W (30 dBm)

#### 8.2.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input	Antenna Gain
22 °C	1	Op. 1	nominal	5 dBi *

Note \*: Details regarding the antenna gain are provided by the applicant.

#### 8.2.4 Measurement result:

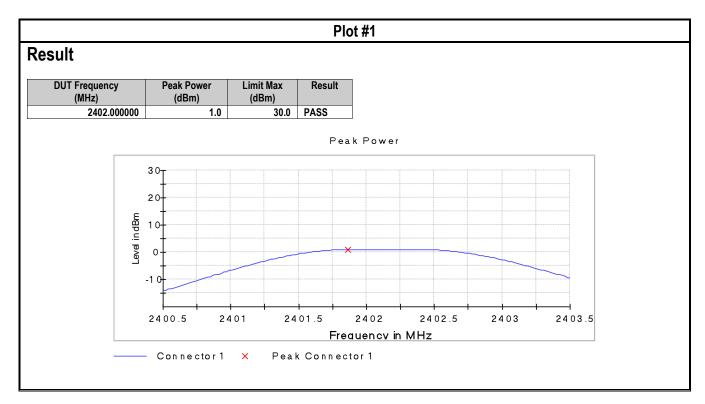
Plot #	Channel	РНҮ	Maximum Peak Conducted Output Power (dBm)	EIRP (dBm)	Limit (dBm)	Result
1	0	LE 1M	1	6	30 (PK) / 36 (EIRP)	Pass
2	19	LE 1M	-1.6	3.4	30 (PK) / 36 (EIRP)	Pass
3	39	LE 1M	-1.8	3.2	30 (PK) / 36 (EIRP)	Pass
4	0	LE 2M	-1.2	3.8	30 (PK) / 36 (EIRP)	Pass
5	19	LE 2M	-1.5	3.5	30 (PK) / 36 (EIRP)	Pass
6	39	LE 2M	-1.6	3.4	30 (PK) / 36 (EIRP)	Pass

Note \*: Results based on calculation utilizing antenna gain information provided by applicant.

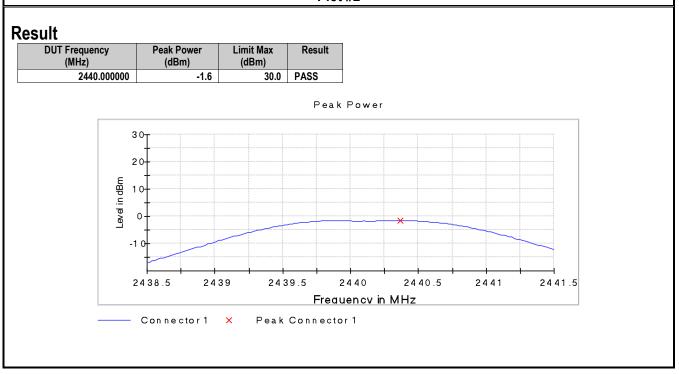
Note 2: The test results and plots are generated by the R&S WMS32 software, which automatically performs the measurements.

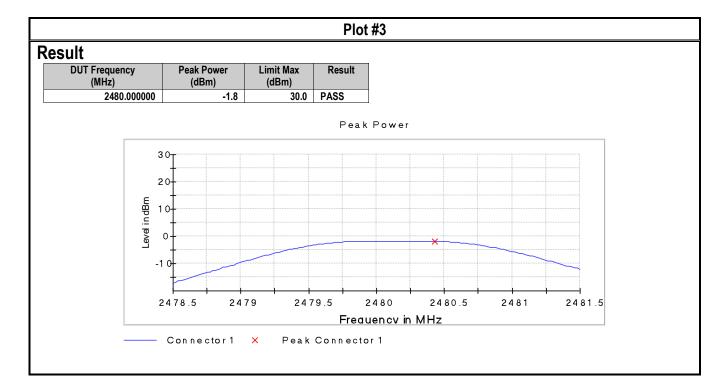


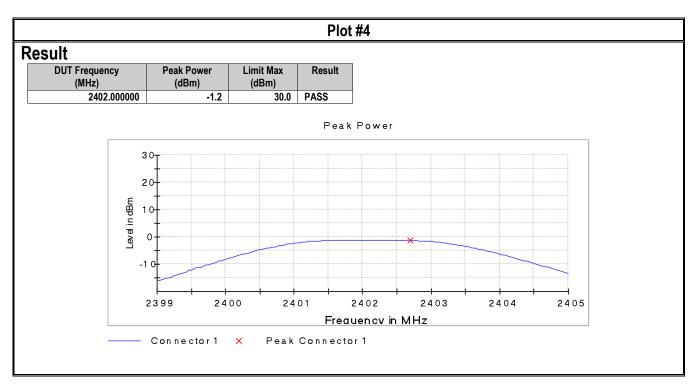
#### 8.2.5 Measurement Plots:



Plot #2

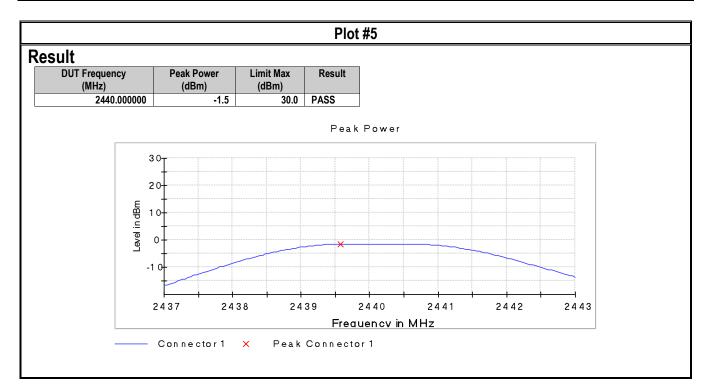


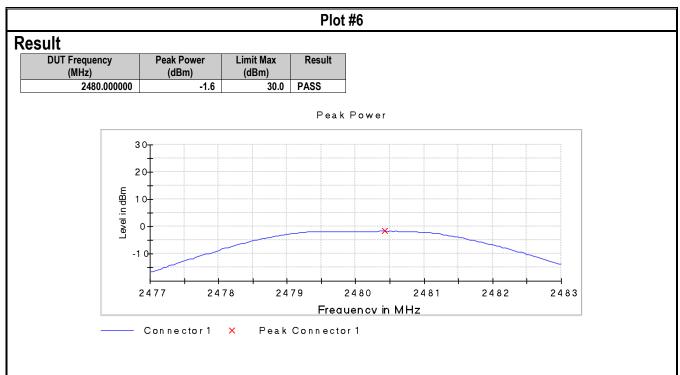














#### 8.3 Power Spectral Density

8.3.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

#### Spectrum Analyzer settings for Peak PSD method:

- Set analyzer center frequency to DTS channel center frequency
- Set the span to 1.5 x DTS bandwidth
- Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$
- Set the VBW  $\geq$  3 x RBW
- Detector = Peak
- Sweep time = Auto couple
- Trace mode = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level within the RBW
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat

#### 8.3.2 Limits:

FCC§15.247(e) & RSS-247 5.2(b)

• For digitally modulated systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

#### 8.3.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22 °C	1	Op. 1	nominal

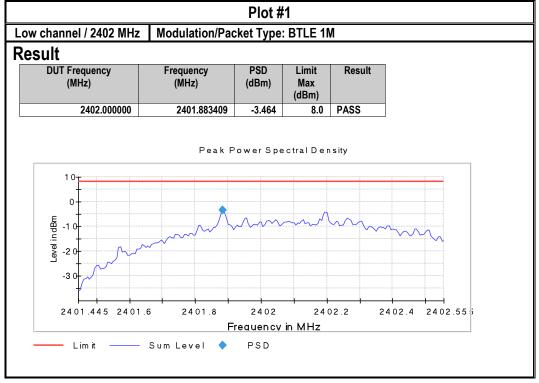
#### 8.3.4 Measurement result:

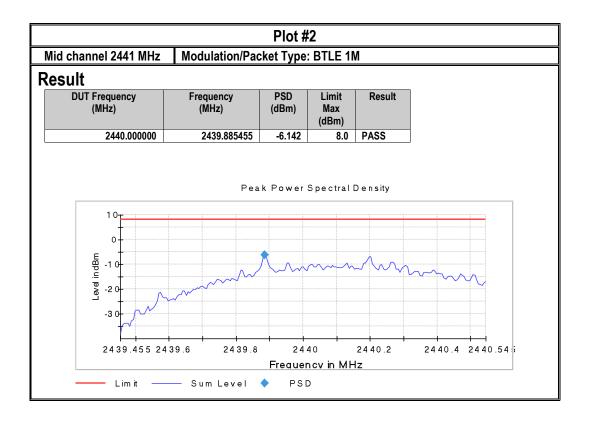
Plot #	Channel	РНҮ	Maximum Power Spectral Density (dBm/3 kHz)	Limit (dBm / 3 kHz)	Result
1	0	LE 1M	-3.464	8	Pass
2	19	LE 1M	-6.142	8	Pass
3	39	LE 1M	-6.384	8	Pass
4	0	LE 2M	-8.404	8	Pass
5	19	LE 2M	-8.765	8	Pass
6	39	LE 2M	-9.002	8	Pass

**Note 1**: The test results and plots are generated by the R&S WMS32 software, which automatically performs the measurements. **Note 2**: The plots presented below represent the worst-case test results measured.

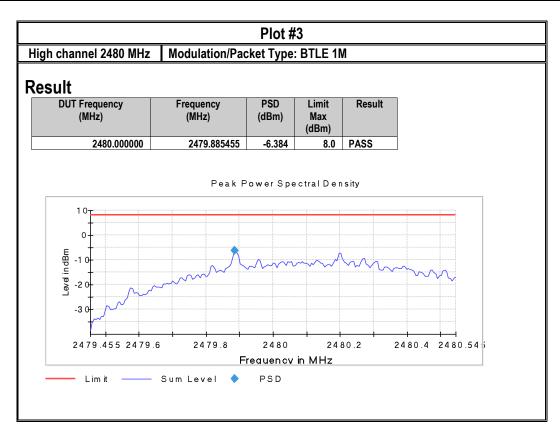


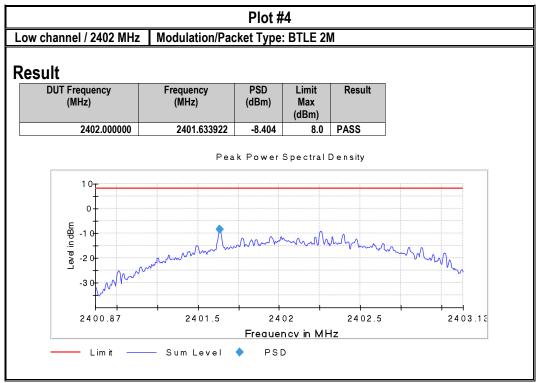
#### 8.3.5 Measurement Plots:



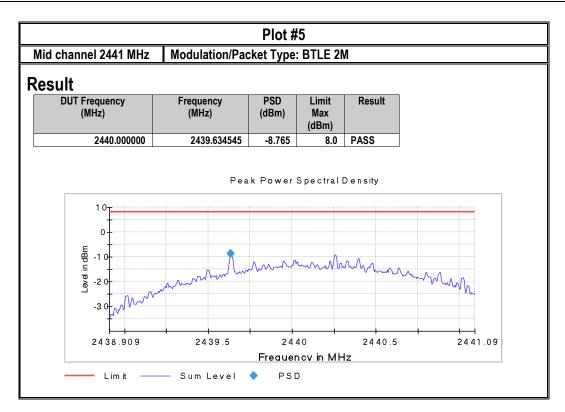


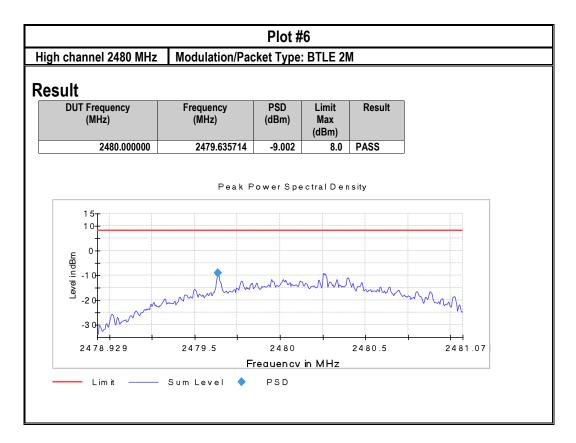














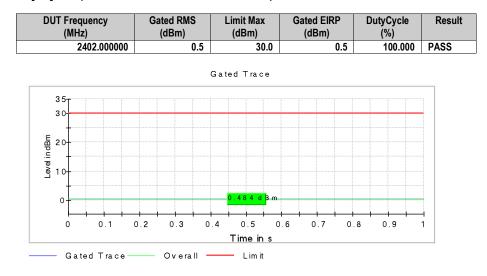
#### 8.4 Duty cycle

# 8.4.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

#### 8.4.2 Measurement result

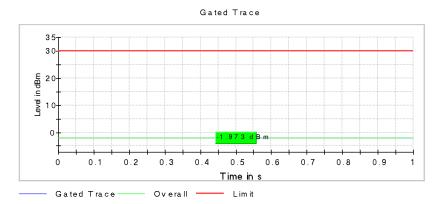
Test according to FCC title 47 part 15 §15.247(b), KDB 558074 D01 DTS Meas Guidance v05r02 and ANSI C63.10-2013, section 11.6.

#### Duty cycle (2402 MHz; 10.000 dBm; 1 MHz)



## Duty cycle (2402 MHz; 10.000 dBm; 2 MHz)

DUT Frequency (MHz)	Gated RMS (dBm)	Limit Max (dBm)	Gated EIRP (dBm)	DutyCycle (%)	Result
2402.000000	-2.0	30.0	-2.0	100.000	PASS





#### 8.5 Non-restricted Band Edge Compliance

8.5.1 Measurement according to FCC 558074 D01 15.247 Meas Guidance v05r02, and ANSI C63.10 Clause 11.

#### Spectrum Analyzer settings for band edge:

- Set the center frequency and span to encompass frequency range to be measured
- RBW = 100 kHz
- VBW  $\geq$  3 x RBW
- Sweep Time: Auto couple
- Detector = Peak
- Trace = Max hold
- Allow trace to fully stabilize
- Use the peak marker function to determine the maximum amplitude level
- Set the marker on the emission at the band edge, or on the highest modulation product outside of the band, if this level is greater than that at the band edge

#### 8.5.2 Limits non restricted band:

FCC§15.247 (d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### RSS-247 5.5

 In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30dB instead of 20dB.

#### Spectrum Analyzer settings for restricted band:

• Peak measurements are made using a peak detector and RBW=100 kHz



# 8.5.3 Test conditions and setup:

Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22 °C	1	Op. 1	nominal

# 8.5.4 Measurement result: band edge (conducted)

Test #	EUT operating mode	РНҮ	Band Edge	Level (dBm)	Band Edge Delta (dBm)	Limit (dBm)	Result
1	Op. 1	LE 1M	Lower, Non-restricted (conducted)	-2.2	-54.8	-22.2	Pass
2	Op. 1	LE 2M	Lower, Non-restricted (conducted)	-3.4	-38.0	-23.4	Pass

Note 1: The test results and plots are generated by the R&S WMS32 software, which automatically performs the measurements.



#### 8.5.5 Measurement Plots (Non-restricted Band Edge)

2484.399038

2484.663462

-56.3

-56.3

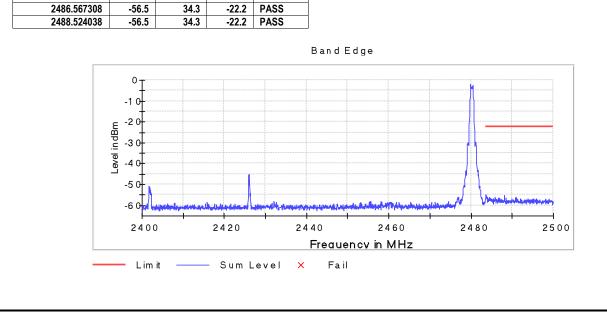
34.1

34.1

-22.2 PASS

-22.2 PASS

Low channel / 2	402 MHz	Mod	lulation/P	acket Type
sult		·		
DUT Frequency	Re	sult		
(MHz)		Juit		
2480.000	000 PAS	s		
2-100.000		•		
and Deak				
and Peak				
Frequency	Level			
(MHz)	(dBm)			
	(abiii)			
2479.914412	-2.2			
2479.914412	-2.2			
2479.914412 asurements	-2.2	Margin	Limit	Result
2479.914412	-2.2	Margin (dB)	Limit (dBm)	Result
2479.914412 asurements Frequency	-2.2	Margin (dB) 32.6		Result
2479.914412 asurements Frequency (MHz)	-2.2 Level (dBm)	(dB)	(dBm)	
2479.914412 asurements Frequency (MHz) 2483.658654	-2.2 Level (dBm) -54.8	(dB) 32.6	(dBm) -22.2	PASS
2479.914412 asurements Frequency (MHz) 2483.658654 2483.605769 2488.100962	-2.2 Level (dBm) -54.8 -55.1 -55.2	(dB) 32.6 32.9 33.0	(dBm) -22.2 -22.2 -22.2	PASS PASS PASS
2479.914412 asurements Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5	(dB) 32.6 32.9 33.0 33.3	(dBm) -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS
2479.914412 asurements Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423 2483.552885	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5 -55.6	(dB) 32.6 32.9 33.0 33.3 33.3	(dBm) -22.2 -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS PASS
2479.914412 <b>asurements</b> Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423 2483.552885 2483.711538	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5 -55.6 -55.8	(dB) 32.6 32.9 33.0 33.3 33.3 33.3 33.6	(dBm) -22.2 -22.2 -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS PASS PASS PASS
2479.914412 <b>asurements</b> Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423 2483.552885 2483.711538 2485.826923	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5 -55.6 -55.8 -55.8 -56.0	(dB) 32.6 32.9 33.0 33.3 33.3 33.3 33.6 33.8	(dBm) -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS PASS PASS PASS
2479.914412 <b>asurements</b> Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423 2483.552885 2483.711538 2485.826923 2483.817308	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5 -55.6 -55.8 -55.8 -55.0 -56.0 -56.0	(dB) 32.6 33.0 33.3 33.3 33.6 33.6 33.8 33.8	(dBm) -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS PASS PASS PASS PASS
2479.914412 <b>asurements</b> Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423 2483.752885 2483.711538 2485.826923 2483.817308 2491.009615	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5 -55.6 -55.8 -55.8 -55.0 -56.0 -56.0 -56.0	(dB) 32.6 32.9 33.0 33.3 33.3 33.6 33.8 33.8 33.8 33.8 33.8	(dBm) -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS PASS PASS PASS PASS
2479.914412 <b>asurements</b> Frequency (MHz) 2483.658654 2483.605769 2488.100962 2483.764423 2483.552885 2483.711538 2485.826923 2483.817308	-2.2 Level (dBm) -54.8 -55.1 -55.2 -55.5 -55.6 -55.8 -55.8 -55.0 -56.0 -56.0	(dB) 32.6 33.0 33.3 33.3 33.6 33.6 33.8 33.8	(dBm) -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2 -22.2	PASS PASS PASS PASS PASS PASS PASS PASS





Frequency in MHz	$\frac{1}{2402.00000} \frac{1}{PASS}$ Peak $\frac{1}{1422} \frac{1}{2402.00000} \frac{1}{PASS}$ Peak $\frac{1}{1422} \frac{1}{3.4}$ rements $\frac{1}{142} \frac{1}{3.4} \frac{1}{1.58} \frac{1}{2.34} \frac{1}{PASS}$ $\frac{1}{393.95000} \frac{1}{4.5} \frac{1}{2.34} \frac{1}{PASS}$ $\frac{1}{393.95000} \frac{1}{50.1} \frac{1}{2.67} \frac{1}{2.34} \frac{1}{PASS}$ $\frac{1}{393.95000} \frac{1}{50.1} \frac{1}{2.67} \frac{1}{2.34} \frac{1}{PASS}$ $\frac{1}{393.950000} \frac{1}{50.1} \frac{1}{2.7} \frac{1}{2.34} \frac{1}{PASS}$ $\frac{1}{393.95000} \frac{1}{50.1} \frac{1}{2.7} \frac{1}{2.34} \frac{1}{PASS}$ $\frac{1}{393.95000} \frac{1}{2.5} \frac{1}{2.5} \frac{1}{2.34} \frac{1}{$	Level (dBm)         Limit         Result           3.4         S           Level (dBm)         Limit         Result           -3.4         -3.4
DUT Frequency (MHz) 2402.00000         Result PASS           and Peak           Frequency (MHz) 2402.161176         -3.4           surements           Frequency (MHz) 2399.950000         -3.4           78000         -46.7           239.950000         -32.1           2399.950000         -32.4           2399.950000         -32.2           -15.8         -23.4           2399.950000         -46.7           23.3         -23.4           2399.950000         -46.7           23.3         -23.4           2399.950000         -46.7           23.4         PASS           2399.950000         -46.7           23.3         -23.4           2399.950000         -50.1           26.7         -23.4           2399.950000         -50.1           26.7         -23.4           2399.950000         -50.6           239.950000         -50.6           239.950000         -50.6           239.950000         -50.6           239.950000         -50.6           239.950000         -50.6           239.950000         -50.6           239.950000	$\frac{(MHz)}{2402.00000} PASS$ Peak $\frac{WHz}{201.0000} \frac{Level}{dBm}$ $\frac{WHz}{40.16176} \frac{Level}{3.4}$ Prements $\frac{WHZ}{1000} \frac{V}{100} V$	Level (dBm)         Limit         Result           3.4         Image: Constraint of the second
(MHz)         PASS           and Peak           frequency         Level           (MHz)         2402.161176           2399.50000         33.6           Source of the second of the	$\frac{(MHz)}{2402.00000} PASS$ Peak $\frac{WHz}{201.0000} \frac{Level}{dBm}$ $\frac{WHz}{40.16176} \frac{Level}{3.4}$ Prements $\frac{WHZ}{1000} \frac{V}{100} V$	Level (dBm)         Limit         Result           3.4         -3.4           S         Level (dBm) (dB) (dBm)         Result           -38.0         14.6         -23.4           -39.2         15.8         -23.4           -39.2         15.8         -23.4
And Peak <u>Yequency</u> <u>Level</u> <u>2402.161176</u> <u>3.4</u> <b>Surements</b> <u>Frequency</u> <u>Level</u> <u>Margin</u> <u>Limit</u> <u>Result</u> <u>2399.30000</u> <u>392.15.8</u> <u>23.4</u> PASS <u>2399.30000</u> <u>42.9</u> <u>19.5</u> <u>23.4</u> PASS <u>2399.30000</u> <u>44.7</u> <u>23.3</u> <u>23.4</u> PASS <u>2399.30000</u> <u>46.7</u> <u>23.3</u> <u>23.4</u> PASS <u>2399.30000</u> <u>46.7</u> <u>23.3</u> <u>23.4</u> PASS <u>2399.20000</u> <u>46.7</u> <u>23.3</u> <u>23.4</u> PASS <u>2399.20000</u> <u>50.1</u> <u>26.7</u> <u>23.4</u> PASS <u>2399.20000</u> <u>50.1</u> <u>26.7</u> <u>23.4</u> PASS <u>2399.20000</u> <u>50.6</u> <u>27.3</u> <u>23.4</u> PASS <u>2399.20000</u> <u>50.6</u> <u>27.3</u> <u>23.4</u> PASS <u>2399.30000</u> <u>50.6</u> <u>27.3</u> <u>23.4</u> PASS <u>2399.40000</u> <u>50.6</u> <u>27.6</u> <u>23.4</u> PASS <u>2399.40000</u> <u>40.0</u> <u>40.0</u> <u>40.000</u>	Peak           Hziz         Level           Hziz         16415           102.161176         -3.4   rements           Immery         Level         Margin         Limit         Result           139.950000         -39.2         15.8         -23.4         PASS           139.950000         -43.6         20.2         23.4         PASS           139.950000         -45.7         23.3         PASS           139.950000         -46.7         23.3         PASS           139.950000         -46.7         23.4         PASS           139.950000         -46.7         23.4         PASS           139.950000         -50.1         26.7         23.4         PASS           139.950000         -50.6         27.3         23.4         PASS           139.950000         -50.9         27.6         23.4	Level (dBm)       Margin (dB)       Limit (dBm)       Result (dBm)         -38.0       14.6       -23.4       PASS         -39.2       15.8       -23.4       PASS         -42.9       19.5       -23.4       PASS
Frequency (MHz)         Level (BBm)           2402.161176         -3.4           asurements           Frequency (MHz)         Level (BBm)         Margin (BB)         Limit (BBm)         Result (BBm)           2399.50000         -38.0         14.6         23.4         PASS           2399.50000         -38.0         14.6         23.4         PASS           2399.50000         -42.9         19.5         -23.4         PASS           2399.50000         -46.7         23.3         -23.4         PASS           2399.50000         -46.7         23.3         -23.4         PASS           2399.50000         -46.7         23.4         PASS           2399.50000         -50.1         26.7         -23.4         PASS           2399.20000         -50.3         26.9         -23.4         PASS           2399.30000         -50.4         27.0         -23.4         PASS           2399.50000         -50.9         27.5         -23.4         PASS           2399.50000         -50.9         27.5         -23.4         PASS           2399.50000         -50.9         27.5         -23.4         PASS           239.9         23	uppercy       Level (dBm)         402.161176       -3.4         rements         399.90000       -38.0       14.6       -23.4       PASS         399.90000       -39.2       15.8       -23.4       PASS         399.90000       -43.6       20.2       -23.4       PASS         399.90000       -46.7       23.3       -23.4       PASS         399.750000       -46.7       23.3       -23.4       PASS         399.750000       -46.7       23.3       -23.4       PASS         399.750000       -46.7       23.3       -23.4       PASS         399.50000       -50.1       26.7       -23.4       PASS         399.50000       -50.1       26.7       -23.4       PASS         399.50000       -50.3       26.9       -23.4       PASS         399.50000       -50.4       27.7       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         391.150000       -50.9       27.5       -23.	(dBm)       -3.4         S       Level (dBm)       Margin (dB)       Limit (dBm)         -38.0       14.6       -23.4       PASS         -39.2       15.8       -23.4       PASS         -42.9       19.5       -23.4       PASS
Frequency (MHz)         Level (BBm)           2402.161176         -3.4           asurements           Frequency (MHz)         Level (BBm)         Margin (BB)         Limit (BBm)         Result (BBm)           2399.50000         -38.0         14.6         23.4         PASS           2399.50000         -38.0         14.6         23.4         PASS           2399.50000         -42.9         19.5         -23.4         PASS           2399.50000         -46.7         23.3         -23.4         PASS           2399.50000         -46.7         23.3         -23.4         PASS           2399.50000         -46.7         23.4         PASS           2399.50000         -50.1         26.7         -23.4         PASS           2399.20000         -50.3         26.9         -23.4         PASS           2399.30000         -50.4         27.0         -23.4         PASS           2399.50000         -50.9         27.5         -23.4         PASS           2399.50000         -50.9         27.5         -23.4         PASS           2399.50000         -50.9         27.5         -23.4         PASS           239.9         23	uppercy       Level (dBm)         402.161176       -3.4         rements         399.90000       -38.0       14.6       -23.4       PASS         399.90000       -39.2       15.8       -23.4       PASS         399.90000       -43.6       20.2       -23.4       PASS         399.90000       -46.7       23.3       -23.4       PASS         399.750000       -46.7       23.3       -23.4       PASS         399.750000       -46.7       23.3       -23.4       PASS         399.750000       -46.7       23.3       -23.4       PASS         399.50000       -50.1       26.7       -23.4       PASS         399.50000       -50.1       26.7       -23.4       PASS         399.50000       -50.3       26.9       -23.4       PASS         399.50000       -50.4       27.7       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         391.150000       -50.9       27.5       -23.	(dBm)       -3.4         S       Level (dBm)       Margin (dB)       Limit (dBm)         -38.0       14.6       -23.4       PASS         -39.2       15.8       -23.4       PASS         -42.9       19.5       -23.4       PASS
(MHz)       (dBm)         2402.161176       -3.4         scurements         Frequency       (dBm)       Margin       Limit       Result         2399.950000       -38.0       14.6       -23.4       PASS         2399.80000       -42.9       19.5       -23.4       PASS         2399.80000       -43.6       0.2       -23.4       PASS         2399.80000       -43.6       0.2       -23.4       PASS         2399.80000       -43.6       0.2       -23.4       PASS         2399.80000       -40.0       24.7       -23.4       PASS         2399.60000       -50.1       26.7       -23.4       PASS         2399.200000       -50.1       26.7       -23.4       PASS         2399.200000       -50.3       26.9       -23.4       PASS         2399.400000       -50.9       27.6       -23.4       PASS         2399.50000       -50.9       27.6       -23.4       PASS         2399.300000       -50.9       27.6       -23.4       PASS         2399.100000       -50.9       27.6       -23.4       PASS         2399.100000       -50.9       27.6	Interp       (dBm)         402.161176       -3.4         rements         uency       Level Margin Limit (dB)       Result         399.950000       -38.0       14.6       -23.4       PASS         399.950000       -39.2       15.8       -23.4       PASS         399.950000       -46.7       23.3       -23.4       PASS         399.70000       -46.7       23.3       -23.4       PASS         399.70000       -46.7       23.3       -23.4       PASS         399.70000       -50.1       26.7       -23.4       PASS         399.70000       -50.1       26.7       -23.4       PASS         399.70000       -50.3       26.9       -23.4       PASS         399.40000       -50.3       26.9       -23.4       PASS         399.40000       -50.9       27.5       -23.4       PASS         391.50000       -50.9       27.5       -23.4       PASS<	(dBm)       -3.4         S       Level (dBm)       Margin (dB)       Limit (dBm)         -38.0       14.6       -23.4       PASS         -39.2       15.8       -23.4       PASS         -42.9       19.5       -23.4       PASS
$\frac{2402.161176 - 3.4}{3399.250000 - 33.2}$ $\frac{Frequency}{(MHz)} \frac{Level}{(MHz)} \frac{Margin}{14.6} \frac{Limit}{23.4} \frac{Result}{PASS} \frac{1}{2399.950000 - 33.2} \frac{14.6}{15.8} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{1}{2399.550000 - 42.9} \frac{1}{19.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{1}{2399.550000 - 46.7} \frac{23.3}{23.3} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{1}{2399.550000 - 46.7} \frac{23.3}{23.4} \frac{PASS}{PASS} \frac{1}{2399.550000 - 46.7} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{1}{2399.550000 - 50.1} \frac{26.7}{23.4} \frac{23.4}{PASS} \frac{PASS}{2399.50000 - 50.1} \frac{26.7}{23.4} \frac{23.4}{PASS} \frac{PASS}{2399.50000 - 50.3} \frac{26.9}{23.4} \frac{23.4}{PASS} \frac{PASS}{2399.50000 - 50.1} \frac{26.7}{23.4} \frac{23.4}{PASS} \frac{PASS}{2399.50000 - 50.6} \frac{27.3}{27.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.50000 - 50.6} \frac{27.3}{27.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.50000 - 50.6} \frac{27.7}{27.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.50000 - 50.9} \frac{27.5}{27.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.250000 - 50.9} \frac{27.5}{27.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{239.5}{23.4} \frac{PASS}{PASS} \frac{PASS}{$	402.161176 3.4         rements         Hz       Colspan="2">Result         399.95000       38.0       14.6       -23.4       PASS         399.80000       -39.2       15.8       -23.4       PASS         399.70000       -42.9       19.5       -23.4       PASS         399.70000       -43.6       20.2       -23.4       PASS         399.70000       -47.5       24.1       -23.4       PASS         399.70000       -46.7       23.3       -23.4       PASS         399.70000       -50.1       26.7       -23.4       PASS         399.50000       -50.1       26.7       -23.4       PASS         399.50000       -50.3       26.9       -23.4       PASS         399.400000       -50.4       27.7       -23.4       PASS         399.50000       -50.9       27.5       -23.4       PASS         391.50000       -50.9       27.6 <td< td=""><td>-3.4 S Level Margin Limit Result (dBm) (dB) (dBm) -38.0 14.6 -23.4 PASS -39.2 15.8 -23.4 PASS -42.9 19.5 -23.4 PASS</td></td<>	-3.4 S Level Margin Limit Result (dBm) (dB) (dBm) -38.0 14.6 -23.4 PASS -39.2 15.8 -23.4 PASS -42.9 19.5 -23.4 PASS
Frequency   Freq	rements <u>Htt2</u> kolono <u>180</u> <u>1600</u> <u>130</u> <u>146</u> <u>234</u> <u>PASS</u> <u>399.50000</u> <u>130</u> <u>146</u> <u>234</u> <u>PASS</u> <u>399.50000</u> <u>4219</u> <u>19.5</u> <u>234</u> <u>PASS</u> <u>399.50000</u> <u>447.5</u> <u>24.1</u> <u>233</u> <u>234</u> <u>PASS</u> <u>399.50000</u> <u>457.5</u> <u>24.1</u> <u>233</u> <u>234</u> <u>PASS</u> <u>399.50000</u> <u>450.1</u> <u>26.7</u> <u>234</u> <u>PASS</u> <u>399.250000</u> <u>50.1</u> <u>26.7</u> <u>234</u> <u>PASS</u> <u>399.250000</u> <u>50.3</u> <u>26.9</u> <u>234</u> <u>PASS</u> <u>399.350000</u> <u>50.3</u> <u>26.9</u> <u>234</u> <u>PASS</u> <u>399.350000</u> <u>50.6</u> <u>27.3</u> <u>234</u> <u>PASS</u> <u>399.350000</u> <u>50.6</u> <u>27.3</u> <u>234</u> <u>PASS</u> <u>399.350000</u> <u>50.6</u> <u>27.3</u> <u>234</u> <u>PASS</u> <u>399.350000</u> <u>50.6</u> <u>27.3</u> <u>234</u> <u>PASS</u> <u>399.150000</u> <u>50.9</u> <u>27.5</u> <u>234</u> <u>PASS</u> <u>391.15000</u> <u>50.9</u> <u>27.5</u> <u>234</u> <u>PASS</u> <u>392.15000</u> <u>50.9</u> <u>27.5</u> <u>234</u> <u>PASS</u> <u>393.15000</u> <u>50.9</u> <u>27.6</u> <u>2340</u> <u>2340</u> <u>2340</u> <u>2340</u> <u>2400</u> <u></u>	Level         Margin (dBm)         Limit (dBm)         Result (dBm)           -38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
Frequency (MHz)         Level (dBm)         Margin (dB)         Limit (dBm)         Result (dBm)           2399.950000         -38.0         14.6         -23.4         PASS           2399.850000         -42.9         19.5         -23.4         PASS           2399.750000         -43.6         20.2         -23.4         PASS           2399.750000         -46.7         23.3         -23.4         PASS           2399.750000         -46.7         23.3         -23.4         PASS           2399.550000         -48.0         24.7         -23.4         PASS           2399.550000         -50.1         26.7         -23.4         PASS           2399.600000         -50.3         26.9         -23.4         PASS           2399.050000         -50.3         26.9         -23.4         PASS           2399.100000         -50.4         27.7         -23.4         PASS           2399.100000         -50.9         27.6         -23.4         PASS           2399.10000         -50.9         27.6         -23.4         PASS           2399.300000         -50.9         27.6         -23.4         PASS           2399.300000         -50.9         27.6	nuency         Level         Margin (dB)         Limit (dBm)         Result (dBm)           399.950000         -38.0         14.6         -23.4         PASS           399.90000         -38.2         15.8         -23.4         PASS           399.90000         -42.9         19.5         -23.4         PASS           399.70000         -46.7         23.3         23.4         PASS           399.70000         -47.5         24.1         -23.4         PASS           399.50000         -50.1         26.7         -23.4         PASS           399.50000         -50.1         26.7         -23.4         PASS           399.400000         -50.3         26.9         -23.4         PASS           399.400000         -50.3         26.9         -23.4         PASS           399.400000         -50.6         27.3         -23.4         PASS           399.400000         -50.9         27.5         -23.4         PASS           399.300000         -50.9         27.6         -23.4         PASS           399.300000         -50.9         27.6         -23.4         PASS           399.300000         -50.9         27.6         -23.4 <t< td=""><td>Level (dBm)         Margin (dB)         Limit (dBm)         Result           -38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS</td></t<>	Level (dBm)         Margin (dB)         Limit (dBm)         Result           -38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
Frequency (MHz)         Level (dBm)         Margin (dB)         Limit (dBm)         Result (dBm)           2399.950000         -38.0         14.6         -23.4         PASS           2399.850000         -42.9         19.5         -23.4         PASS           2399.750000         -43.6         20.2         -23.4         PASS           2399.750000         -46.7         23.3         -23.4         PASS           2399.750000         -46.7         23.3         -23.4         PASS           2399.550000         -48.0         24.7         -23.4         PASS           2399.550000         -50.1         26.7         -23.4         PASS           2399.600000         -50.3         26.9         -23.4         PASS           2399.050000         -50.3         26.9         -23.4         PASS           2399.100000         -50.4         27.7         -23.4         PASS           2399.100000         -50.9         27.6         -23.4         PASS           2399.10000         -50.9         27.6         -23.4         PASS           2399.300000         -50.9         27.6         -23.4         PASS           2399.300000         -50.9         27.6	nuency         Level         Margin (dB)         Limit (dBm)         Result (dBm)           399.950000         -38.0         14.6         -23.4         PASS           399.950000         -38.2         15.8         -23.4         PASS           399.950000         -43.6         20.2         -23.4         PASS           399.750000         -46.7         23.3         -23.4         PASS           399.750000         -46.0         24.7         -23.4         PASS           399.550000         -46.0         24.7         -23.4         PASS           399.50000         -50.1         26.7         -23.4         PASS           399.50000         -50.3         26.9         -23.4         PASS           399.400000         -50.3         26.9         -23.4         PASS           399.150000         -50.6         27.3         -23.4         PASS           399.150000         -50.9         27.5         -23.4         PASS           399.300000         -50.9         27.6         -23.4         PASS           399.300000         -50.9         27.6         -23.4         PASS           399.300000         -50.9         27.6         -23.4	Level (dBm)         Margin (dB)         Limit (dBm)         Result           -38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
Frequency (MHz)         Level (dBm)         Margin (dB)         Limit (dBm)         Result (dBm)           2399.950000         -38.0         14.6         -23.4         PASS           2399.850000         -42.9         19.5         -23.4         PASS           2399.750000         -43.6         20.2         -23.4         PASS           2399.750000         -46.7         23.3         -23.4         PASS           2399.750000         -46.7         23.3         -23.4         PASS           2399.550000         -48.0         24.7         -23.4         PASS           2399.550000         -50.1         26.7         -23.4         PASS           2399.600000         -50.3         26.9         -23.4         PASS           2399.050000         -50.3         26.9         -23.4         PASS           2399.100000         -50.4         27.7         -23.4         PASS           2399.100000         -50.9         27.6         -23.4         PASS           2399.10000         -50.9         27.6         -23.4         PASS           2399.300000         -50.9         27.6         -23.4         PASS           2399.300000         -50.9         27.6	nuency         Level         Margin (dB)         Limit (dBm)         Result (dBm)           399.950000         -38.0         14.6         -23.4         PASS           399.950000         -38.2         15.8         -23.4         PASS           399.950000         -43.6         20.2         -23.4         PASS           399.750000         -46.7         23.3         -23.4         PASS           399.750000         -46.0         24.7         -23.4         PASS           399.550000         -46.0         24.7         -23.4         PASS           399.50000         -50.1         26.7         -23.4         PASS           399.50000         -50.3         26.9         -23.4         PASS           399.400000         -50.3         26.9         -23.4         PASS           399.150000         -50.6         27.3         -23.4         PASS           399.150000         -50.9         27.5         -23.4         PASS           399.300000         -50.9         27.6         -23.4         PASS           399.300000         -50.9         27.6         -23.4         PASS           399.300000         -50.9         27.6         -23.4	Level (dBm)         Margin (dB)         Limit (dBm)         Result           -38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
$\frac{(\hat{\mathbf{M}} \mathbf{H}_2)}{(\mathbf{M} \mathbf{H}_2)} (\mathbf{dBm}) (\mathbf$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	(dBm)         (dB)           -38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
2399.950000 -38.0 14.6 -23.4 PASS 2399.90000 -39.2 15.8 -23.4 PASS 2399.850000 -42.9 19.5 -23.4 PASS 2399.750000 -43.6 20.2 -23.4 PASS 2399.750000 -46.7 23.3 -23.4 PASS 2399.50000 -50.1 26.7 -23.4 PASS 2399.60000 -50.1 26.7 -23.4 PASS 2399.20000 -50.3 26.9 -23.4 PASS 2399.20000 -50.3 26.9 -23.4 PASS 2399.150000 -50.4 27.0 -23.4 PASS 2399.150000 -50.9 27.6 -23.4 PASS 2399.150000 -50.9 27.6 -23.4 PASS 2399.100000 -50.9 27.6 -23.4 PASS 2399.100000 -50.9 27.6 -23.4 PASS 2399.10000 -50.9 27.6 -23.4 PASS 2390.0 24.0 24.0 24.0 24.0 24.0 24.0 24.0 2	$\frac{399,950000}{399,2} \frac{-38.0}{19.5} \frac{14.6}{23.4} \frac{-23.4}{PASS} \frac{PASS}{399,850000} \frac{-39.2}{42.9} \frac{15.8}{19.5} \frac{-23.4}{23.4} \frac{PASS}{PASS} \frac{399,750000}{43.6} \frac{-46.7}{23.3} \frac{-23.4}{23.4} \frac{PASS}{PASS} \frac{399,50000}{399,650000} \frac{-46.7}{23.4} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{399,50000}{399,650000} \frac{-50.1}{26.7} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{399,50000}{399,50000} \frac{-50.1}{26.7} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{399,50000}{399,50000} \frac{-50.1}{26.7} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{399,50000}{399,50000} \frac{-50.1}{26.7} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{399,50000}{399,50000} \frac{-50.4}{-50.4} \frac{27.0}{-23.4} \frac{-23.4}{PASS} \frac{PASS}{399,50000} \frac{-50.6}{-50.9} \frac{27.5}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{PASS} \frac{PASS}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{PASS} \frac{PASS}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{23.4} \frac{PASS}{PAS} \frac{-23.4}{23.4} \frac{PASS}{PASS} \frac{-23.4}{23.4} \frac{PASS}{PAS} \frac{-23.4}{23.4} \frac{PASS}{PAS} \frac{-23.4}{23.4} \frac{PASS}{PAS$	-38.0         14.6         -23.4         PASS           -39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	-39.2         15.8         -23.4         PASS           -42.9         19.5         -23.4         PASS
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{rrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrrr$	-42.9 19.5 -23.4 PASS
$\frac{2399.80000}{2399.70000} \frac{43.6}{46.7} \frac{20.2}{23.3} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.70000}{47.5} \frac{44.7}{23.4} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.50000}{48.0} \frac{47.7}{23.4} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.50000}{50.1} \frac{50.1}{26.7} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.50000}{50.0} \frac{-50.4}{50.4} \frac{27.0}{27.0} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.30000}{50.0} \frac{-50.4}{50.4} \frac{27.0}{27.5} \frac{23.4}{23.4} \frac{PASS}{PASS} \frac{2399.30000}{50.0} \frac{-50.9}{27.5} \frac{27.3}{23.4} \frac{PASS}{PASS} \frac{2399.30000}{50.0} \frac{-50.9}{27.6} \frac{27.4}{23.4} \frac{PASS}{PASS} \frac{2399.30000}{50.0} \frac{-50.9}{27.6} \frac{27.4}{23.4} \frac{PASS}{PASS} \frac{2399.30000}{2399.30000} \frac{-50.9}{27.6} \frac{27.4}{23.4} \frac{PASS}{PASS} \frac{2399.30000}{23.4} \frac{-50.9}{27.6} \frac{27.4}{23.4} \frac{PASS}{PASS} \frac{10.0}{23.4} \frac{PASS}{PAS} \frac{10.0}{23.4} \frac{PASS}{PASS} \frac{10.0}{23.4} $	$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	-43.6 20.2 -23.4 PASS
$\frac{2399.70000}{2399.50000} \frac{47.5}{48.0} \frac{24.1}{24.7} \frac{-23.4}{23.4} PASS  2399.50000 -50.1 26.7 -23.4 PASS  2399.20000 -50.3 26.9 -23.4 PASS  2399.30000 -50.3 26.9 -23.4 PASS  2399.0000 -50.4 27.0 -23.4 PASS  2399.0000 -50.9 27.5 -23.4 PASS  2399.30000 -50.9 27.6 -23.4 PASS  -10 -10 -10 -10 -10 -10 -10 -10 -10 -10 $	$\frac{399,700000}{399,50000} \frac{47.5}{48.0} \frac{24.1}{24.7} \frac{-23.4}{23.4} \frac{PASS}{PASS} \frac{399,50000}{50.1} \frac{48.0}{26.7} \frac{223.4}{23.4} \frac{PASS}{PASS} \frac{399,50000}{50.3} \frac{-50.1}{26.9} \frac{223.4}{23.4} \frac{PASS}{PASS} \frac{399,30000}{50.0} \frac{-50.4}{27.0} \frac{27.3}{-23.4} \frac{PASS}{PASS} \frac{399,50000}{-50.6} \frac{-57.3}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{399,00000}{-50.9} \frac{-50.9}{27.5} \frac{27.5}{-23.4} \frac{PASS}{PASS} \frac{399,00000}{-50.9} \frac{-50.9}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{100000}{-50.9} \frac{-20.6}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{100000}{-50.9} \frac{-20.6}{-20.6} -20$	
$\frac{2399.650000}{2399.250000} \frac{-48.0}{-50.1} \frac{24.7}{26.7} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{2399.250000}{-50.1} \frac{-50.1}{26.7} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{2399.00000}{-50.3} \frac{-50.9}{26.9} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{2399.400000}{-50.4} \frac{-50.4}{27.0} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{2399.150000}{-50.9} \frac{-50.9}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{2399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-27.4}{-23.4} \frac{PASS}{PASS} \frac{2399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-27.4}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{2399.300000} \frac{-50.9}{-50.9} \frac{27.5}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{-239.4}{-2399.30000} \frac{-50.9}{-50.9} \frac{27.6}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{2399.30000} \frac{-50.9}{-50.9} \frac{27.6}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{-23.4} P$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$\frac{2399.250000}{2399.60000} \frac{-50.1}{26.7} \frac{26.7}{-23.4} \frac{-23.4}{PASS}$ $\frac{2399.20000}{2399.20000} \frac{-50.1}{-50.3} \frac{26.9}{-23.4} \frac{-23.4}{PASS}$ $\frac{2399.30000}{-50.4} \frac{-27.0}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{2399.050000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{2399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{PASS}{PASS}$ $\frac{2399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{PASS}{PASS}$ $\frac{2399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{PASS}{PASS}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	
$\frac{2399.60000}{2399.20000} \frac{-50.1}{50.3} \frac{26.7}{26.9} \frac{-23.4}{23.4} \frac{PASS}{PASS}$ $\frac{2399.30000}{2399.40000} \frac{-50.3}{20.4} \frac{27.0}{27.5} \frac{-23.4}{23.4} \frac{PASS}{PASS}$ $\frac{2399.150000}{2399.30000} \frac{-50.9}{27.5} \frac{27.3}{-23.4} \frac{PASS}{PASS}$ $\frac{2399.30000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $Band Edge$ $Band Edge$	$\frac{399.60000}{399.20000} \frac{-50.1}{-50.3} \frac{26.7}{26.9} \frac{-23.4}{-23.4} \frac{PASS}{PASS} \frac{399.20000}{-50.3} \frac{-50.9}{-23.4} \frac{PASS}{PASS} \frac{399.0000}{-50.6} \frac{-27.3}{-23.4} \frac{PASS}{PASS} \frac{399.0000}{-50.9} \frac{-27.5}{-23.4} \frac{-23.4}{PASS} \frac{PASS}{-239.30000} \frac{-50.9}{-50.9} \frac{27.5}{-23.4} \frac{-23.4}{PASS} \frac{PASS}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{PASS} \frac{PASS}{-23.4} \frac{PASS}{PASS} \frac{-23.4}{-2.5} \frac{PASS}{-2.3.4} \frac{PASS}{PASS} \frac{-23.4}{-2.5} \frac{PASS}{-2.3.4} \frac{PASS}{PASS} \frac{-23.4}{-2.5} \frac{PASS}{-2.3.4} \frac{PASS}{PASS} \frac{-2.5}{-2.3.4} \frac{PASS}{PASS} \frac{-2.5}{-2.5} \frac{-2.5}$	
$\frac{2399.20000}{2399.350000} \frac{-50.3}{50.3} \frac{26.9}{26.9} \frac{-23.4}{23.4} \frac{PASS}{PASS}$ $\frac{2399.350000}{2399.050000} \frac{-50.4}{50.4} \frac{27.0}{27.5} \frac{-23.4}{23.4} \frac{PASS}{PASS}$ $\frac{2399.050000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $Band Edge$ $Band Edge$	$\frac{399.20000}{399.350000} \frac{-50.3}{-50.4} \frac{26.9}{-23.4} \frac{-23.4}{PASS}$ $\frac{399.350000}{-50.4} \frac{-27.0}{27.0} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{399.150000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $Band Edge$ $Band Edge$ $I = \frac{0}{100} \frac{1}{-100} \frac{1}$	
$\frac{2399.350000}{2399.400000} \frac{-50.3}{-50.4} \frac{26.9}{27.0} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{2399.050000}{-50.9} \frac{-50.9}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{2399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $Band Edge$ $Band Edge$ $\frac{1}{100} \frac{1}{-100} \frac{1}{-500} $	$\frac{399.350000}{399.400000} \frac{-50.3}{-50.4} \frac{26.9}{27.0} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{399.050000}{-50.6} \frac{-27.3}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{399.300000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ Band Edge $\frac{1}{10000} \frac{1}{-1000} \frac{1}{-1000$	
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{399.400000}{399.050000} \frac{-50.4}{50.6} \frac{27.0}{27.3} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{399.050000}{-50.9} \frac{-50.9}{27.6} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $Band Edge$ $Band Edge$	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\frac{399.050000}{399.150000} \frac{-50.6}{-50.9} \frac{27.3}{27.5} \frac{-23.4}{-23.4} \frac{PASS}{PASS}$ $\frac{399.150000}{-50.9} \frac{-50.9}{27.6} \frac{27.3}{-23.4} \frac{PASS}{PASS}$ Band Edge $\int_{-1}^{0} \frac{1}{10} \frac{1}{$	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$\frac{399.150000}{399.300000} \frac{-50.9}{27.6} \frac{27.5}{-23.4} \frac{PASS}{PASS}$ Band Edge $\int \frac{1}{40} \frac{1}{-20} \frac$	
$\begin{array}{ c c c c c c c c c c c c c c c c c c c$	$399.300000  -50.9  27.6  -23.4  PASS$ Band Edge $\int_{-2}^{0} \int_{-30}^{0} $	
Band Edge	Band Edge	
0       -10       -20         -20       -30       -40         -30       -40       -60         -50       -60       -23102320       2340       2360       2380       2400       2420       2440       2460       2483.         Frequency in MHz	0         -10	-30.3 21.0 -23.4 FA00
-10 -20 -30 -30 -40 -50 -60 -20 -40 -50 -60 -20 -40 -50 -60 -20 -40 -50 -60 -20 -20 -40 -20 -40 -20 -20 -40 -20 -20 -20 -20 -20 -20 -20 -20 -20 -2	-10 -20 -30 -30 -40 -50 -60 -50 -60 -23102320 -2340 -2360 -2380 -2400 -2420 -2400 -2460 -2483.5 Frequency in MHz	Band Edge
-10 -20 -30 -30 -40 -50 -60 -20 -40 -50 -60 -20 -40 -50 -60 -20 -40 -50 -60 -20 -20 -40 -20 -40 -20 -20 -40 -20 -20 -20 -20 -20 -20 -20 -20 -20 -2	-10 -20 -30 -30 -40 -50 -60 -50 -60 -23102320 -2340 -2360 -2380 -2400 -2420 -2400 -2420 -2400 -2460 -2483.5 Frequency in MHz	٥
-20 -30 -30 -40 -50 -60 -23102320 2340 2360 2380 2400 2420 2440 2460 2483. Frequency in MHz	-2	
-5	-3 0 -4 0 -5 0 -6 0 -2 3 1 02 3 2 0 -2 3 4 0 -2 3 1 02 3 2 0 -2 3 4 0 -2 3 1 02 3 2 0 -2 3 4 0 -2 3 6 0 -2 3 6 0 -2 3 8 0 	-10
	-3 0 -4 0 -5 0 -6 0 -2 3 1 02 3 2 0 -2 3 4 0 -2 3 1 02 3 2 0 -2 3 4 0 -2 3 1 02 3 2 0 -2 3 4 0 -2 3 6 0 -2 3 6 0 -2 3 6 0 -2 3 8 0 	
-50 -60 23102320 2340 2360 2380 2400 2420 2440 2460 2483. Frequency in MHz	-5 0 -6 0 231 02320 2340 2360 2380 2400 2420 2440 2460 2483.5 Frequency in MHz	
-50 -60 23102320 2340 2360 2380 2400 2420 2440 2460 2483. Frequency in MHz	-5 0 -6 0 231 023 20 23 40 23 60 23 80 24 00 24 20 24 40 24 60 24 83 .5 Frequency in MHz	
-50 -60 23102320 2340 2360 2380 2400 2420 2440 2460 2483. Frequency in MHz	-5 0 -6 0 231 02320 2340 2360 2380 2400 2420 2440 2460 2483.5 Frequency in MHz	
-60 -60 -60 -60 -60 -60 -60 -60	-60 -60 -3102320 2340 2360 2380 2400 2420 2440 2460 2483.5 Frequency in MHz	
23102320 2340 2360 2380 2400 2420 2440 2460 2483. Frequency in MHz	23102320 2340 2360 2380 2400 2420 2440 2460 2483.5 Frequency in MHz	-5 0
23102320 2340 2360 2380 2400 2420 2440 2460 2483. Frequency in MHz	23102320 2340 2360 2380 2400 2420 2440 2460 2483.5 Frequency in MHz	
Frequency in MHz	Frequency in MHz	
		23102320 2340 2360 2380 2400 2420 2440 2460 2483.5
limit Sum lovel X	Limit — Sum Level X Fail	Frequency in MHz
		limit — Sum level X Fail



#### 8.6 Radiated Transmitter Spurious Emissions and Restricted Bands

#### 8.6.1 Measurement according to ANSI C63.10 (2013)

#### Spectrum Analyzer Settings:

- Frequency = 9 KHz 30 MHz
- RBW = 9 KHz
- Detector: Peak
- Frequency = 30 MHz 1 GHz
- Detector = Peak / Quasi-Peak
- RBW= 120 KHz (<1GHz)
- Frequency > 1 GHz
- Detector = Peak / Average
- RBW = 1 MHz
- Radiated spurious emissions shall be measured for the transmit frequencies, transmit power, and data rate for the lowest, middle and highest channel in each frequency band of operation and for the highest gain antenna for each antenna type, and using the appropriate parameters and test requirements.
- The highest (or worst-case) data rate shall be recorded for each measurement.
- For testing frequencies below 30 MHz at distance other than the specified in the standard, the limit conversion is calculated by using the FCC materials for the ANSI 63 committee issued on January, 27 1991.

#### 8.6.2 Limits:

#### FCC §15.247

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).



#### FCC §15.209 & RSS-Gen 8.9

• Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency of emission (MHz)	Field strength (µV/m)	Measurement Distance (m)	Field strength @ 3m (dBµV/m)
0.009–0.490	2400/F(kHz) /	300	-
0.490–1.705	24000/F(kHz) /	30	-
1.705–30.0	30 / (29.5)	30	-
30–88	100	3	40 dBµV/m
88–216	150	3	43.5 dBµV/m
216–960	200	3	46 dBµV/m
Above 960	500	3	54 dBµV/m

#### FCC §15.205 & RSS-Gen 8.10

• Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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			

• Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

\*PEAK LIMIT= 74 dBµV/m \*AVG. LIMIT= 54 dBµV/m



# 8.6.3 Test conditions and setup:

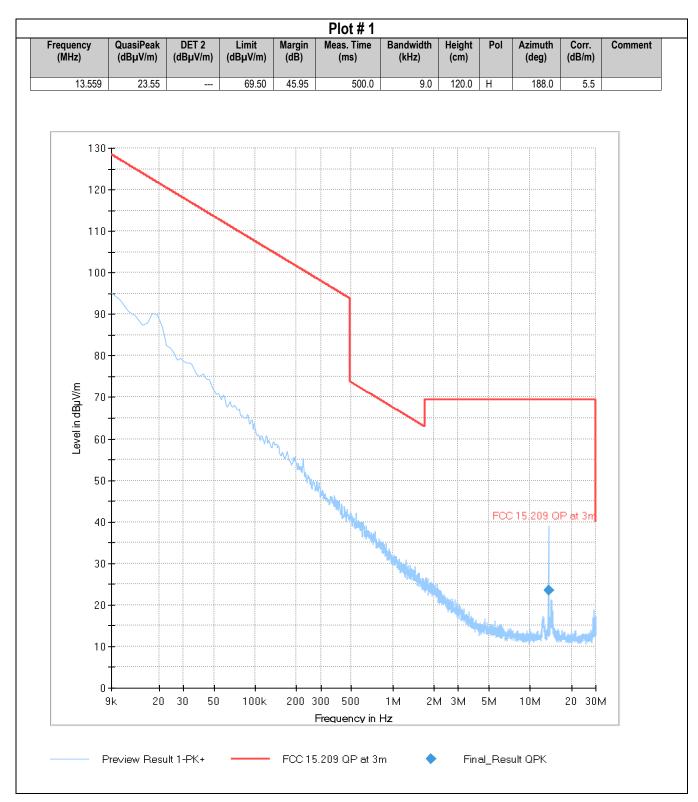
Ambient Temperature	EUT Set-Up #	EUT operating mode	Power Input
22° C	2	Op. 1	Battery

#### 8.6.4 Measurement result:

Plot #	Channel #	Scan Frequency	Limit	Result
1-5	Low	9 kHz – 26 GHz	See section 8.6.2	Pass
6-10	Mid	9 kHz – 26 GHz	See section 8.6.2	Pass
11-15	High	9 kHz – 26 GHz	See section 8.6.2	Pass
16	High	Upper Restricted Band Edge	See section 8.6.2	Pass



#### 8.6.5 Measurement Plots:



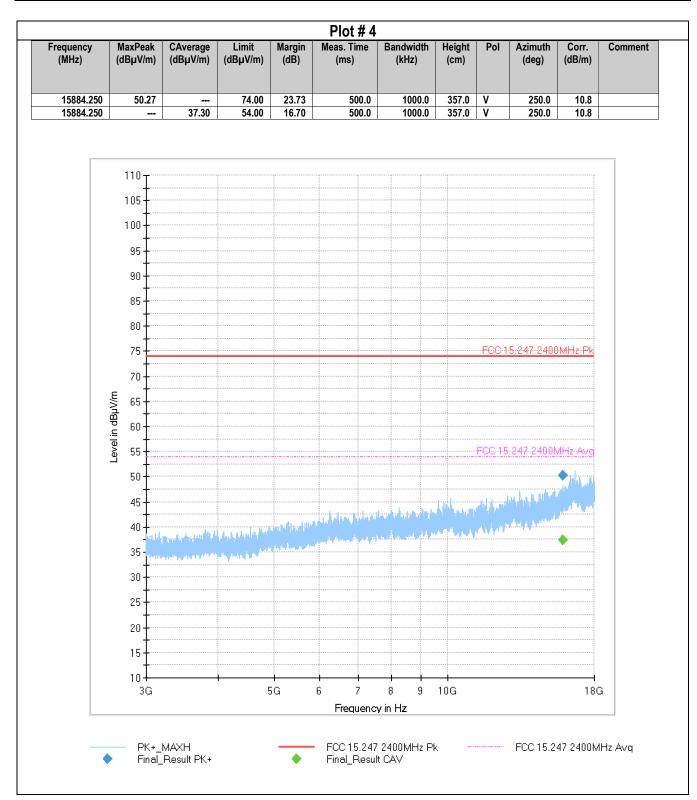


Frequenc		QuasiPeak	DET 2	Limit	Margin	Plot # 2 Meas. Time	Bandwidth	Height	Pol	Azimuth	Corr.	Commer
(MHz)	y	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(ms)	(kHz)	(cm)	POI	(deg)	(dB/m)	Commen
30.	128	17.12		40.00	22.88	500.0	120.0	184.0	V	6.0	-12.3	
59.	993	26.57		40.00	13.43	500.0	120.0	163.0	V	7.0	-21.6	
119.	980	25.64		43.50	17.86	500.0	120.0	264.0	Н	145.0	-20.4	
240.		31.57		46.02	14.46	500.0	120.0	172.0	Н	245.0	-15.3	
360.	004	34.55		46.02	11.47	500.0	120.0	137.0	Н	163.0	-11.0	
	70 -											
	· -											
	65											
	60											
	55 								FC	C 15.209 (	0Pat3m	
	50											
	45 											
m///h	40											
Level in dBµV/m	35							•				
Lev	30 -						•					
	25 -	<b>h</b>	•		•						, éda (b	
	20				1	-NK	d		n na star V			
	15					ų tų						
	10 + ·											
											_	
	30N	1	50 60	80 10	IOM	201 Frequency in		) 400	500		800 10	G
	Pr	eview Res	ult 1-PK+		FCC 14	5.209 QP at 3	m 🔺	Fin	al Res	ult QPK		



Frequence	;y	MaxPeak	CAverage	Limit	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth	Corr.	Commen
(MHz)		(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(ms)	(kHz)	(cm)		(deg)	(dB/m)	
1196	.500	52.36		74.00	21.64	500.0	1000.0	280.0	V	183.0	29.1	
1196 2941		 57.49	33.93	54.00 74.00	20.07 16.51	500.0 500.0	1000.0 1000.0	280.0 325.0	V V	183.0 92.0	29.1 35.9	
2941	500		42.84	54.00	11.16	500.0	1000.0	325.0	V	92.0	35.9	
	100-											
	95 ·											
	90·											
	85-											
	80·											
	75 ·								FCC 1	5 247 240	<u>0MHz Pk</u>	
	70·											
m//	65.											
Level in dBµV/m	60											
Level	55·		•						F <u>OC</u> 5	247-2400	MHz Avc	
	50		•									
	45·										•	
	40·							ولار بالبالرول				
						الملكر فيسارونهما		a second press				
	35.	المعلم والرار		A He He Ale			A					
	30·		يمي مطلحية برقانين 	hard for a second s								
	25·											
	20.											
	I	G				Frequency ir	2G h <b>Hz</b>				j	G
l												
	- P	review Res	sult 1-PK+		F	FCC 15.247 24	100MH7 Pk			FCC 15.2	47 2400M	viHz Ava
•		inal_Result				Final_Result C						·-··•

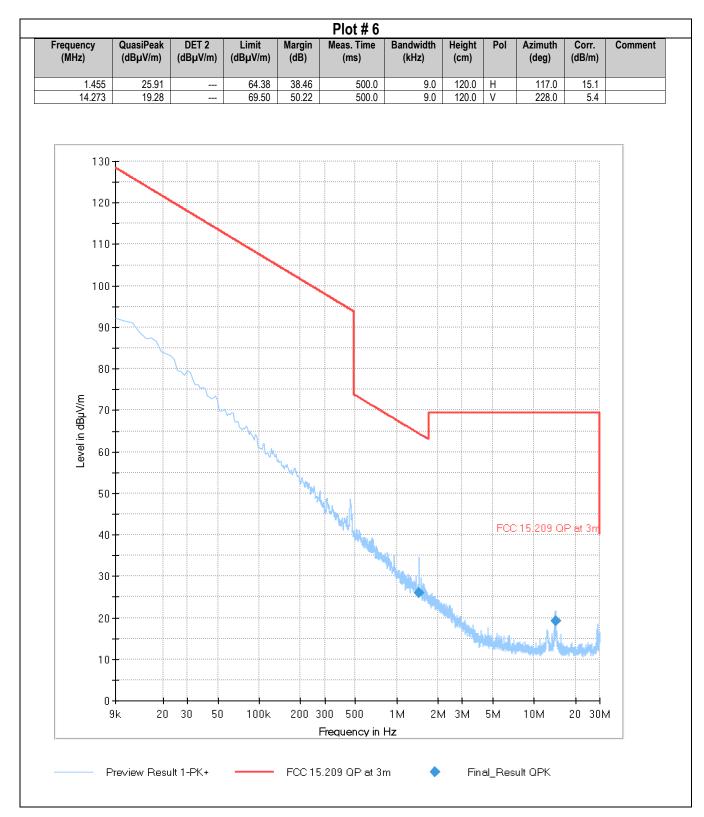




	<sup>100</sup> T															
	95															
	90 -															
	85 -												F	C 15.	209 PI	Kat 1 n
	80															
	75 +															
3.	70 +									ш Х						
Level in dBµV/m	65 +									22.732 GHz 58.021 dBµV/m			FO	15.2	09 AV	Sat In
Level ir	60+									22.7 58.02						
	55 +							اراله ال	المحال				<u>#</u> 1			
	50-	el, all	la anglill		in L <sub>illey</sub> prints	an baha Marina		, wette	enteta di pa <sup>la</sup>							
	45															
	40 +															
	35															
	30															
	18	·	19	2	20		21 Fi	2 requen	'2 cy in G	23 23	1	24	4	2	25	2









Frequenc	v	QuasiPeak	DET 2	Limit	Margin	Plot # 7 Meas. Time	Bandwidth	Height	Pol	Azimut	h Corr.	Commer
(MHz)	;y	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(ms)	(kHz)	(cm)	POI	(deg)	(dB/m)	Commer
30	.128	17.12		40.00	22.88	500.0	120.0	184.0	V	6.0	0 -12.3	
59	.993	26.57		40.00	13.43	500.0	120.0	163.0	V	7.0		
119	.980	25.64		43.50	17.86	500.0	120.0	264.0	Н	145.0	0 -20.4	
	.005	31.57		46.02	14.46	500.0	120.0	172.0	Н	245.0		
360	.004	34.55		46.02	11.47	500.0	120.0	137.0	Н	163.0	0 -11.0	
	70 -											
	+											
	65											
	60-											
	55 								FC	C 15:209	) OP at 3m	
	50											
	45 -											
m//	40											
Level in dBµV/m	35 -							•				
Level	30 +						•				al.	
	25-		•									
	+								yper l	a di karak		
	20					JAN.						
	15-		. A.				L	1				
	10					<b>,</b>						
	5-		η 1-									
	0 +		+ +		1					-		
	301	м	50 60	80 10	IOM I	200 Frequency in		) 400	500	l	800 10	<u> </u>
	_		1. a. <b>1</b> . (		<b>F</b> 00/-		•	_				
	- P	review Resi	uit 1-PK+		FCC 15	5.209 QP at 3	m 🔷	Fin	al_Res	sult QPK		



Frequenc	у	MaxPeak	CAverage	Limit	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth	Corr.	Commen
(MHz)	500	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(ms)	(kHz)	(cm)	N	(deg)	(dB/m)	
1194 1194	500	50.08	32.93	74.00 54.00	23.92 21.07	500.0 500.0	1000.0 1000.0	172.0 172.0	V V	176.0 176.0	29.1 29.1	
2859		59.05		74.00			1000.0	258.0	V	6.0	35.6	
2859	000	59.05	44.11	54.00	14.95 9.89	500.0 500.0	1000.0	258.0	V	6.0	35.6	
	100·	L										
	95 ·											
	90·											
	85.											
	80·											
	75 ·	-							FCG 1	5 247 240	<u>0MHz Pk</u>	
	70·	-										
m///u	65·	-										
Level in dBµV/m	60·										•	
Leve	55·								F <u>CC</u> /5	247-2400	MHz Avq	
	50·		•									
	45 ·											
	40 -							أنادر والداني				
	35-					اللهاجان.	A DUNCTION OF	per provinsi hi da la				
	30	Link de la de la	مسلك أسال			A DAY DO NOT THE PARTY OF						
	30·	n posterial e tr	(Arther House	( <sup>11</sup>								
	25 ·	-										
	-	+										
	20.											
		G					2G				31	a
						Frequency ir						
	- P	review Res	sult 1-PK+		— F	FCC 15.247-24	100MHz Pk			FCC 15.2	47.2400N	1Hz Ava

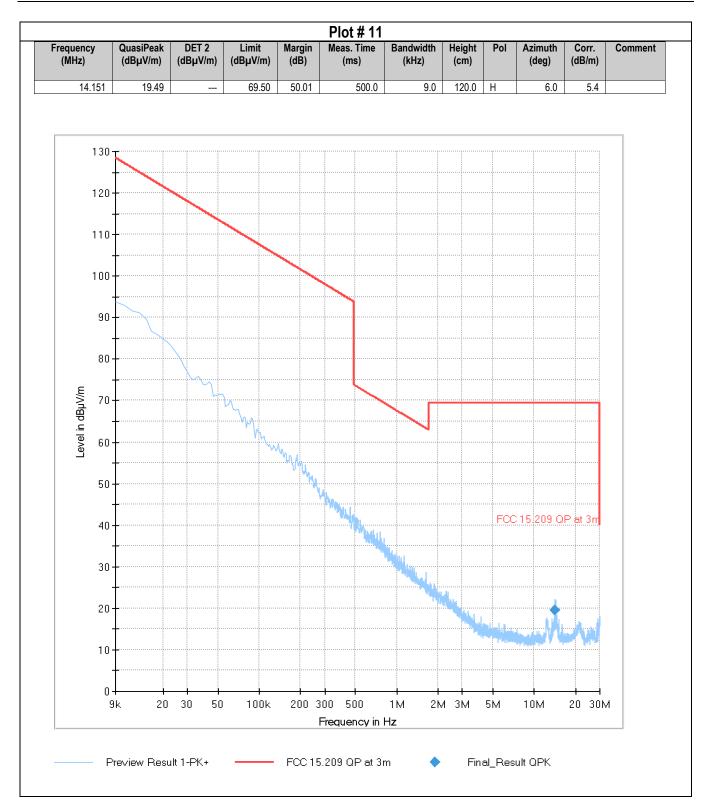


Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Comment
15934.750	49.94		74.00	24.06	500.0	1000.0	306.0	V	20.0	10.9	
15934.750		37.27	54.00	16.73	500.0		306.0	V	20.0	10.9	
	110 105 100 95 90 85 80 75 70 65 60 65 60 45 40 35 30							FGC-1-5	5.247-2400M	IHz-Ave	
	25										
	20										
	15										
	10		-	 							
	3G		i	5G	6 7 Frequen		10G			18G	
	PK+_	_MAXH _Result PK+				7 2400MHz Pi	<		FCC 15.24	17 2400MH	⊥ Hz Avq

	<sup>100</sup> T												
	95												
	90 -												
	85									F	CC 15.	209 P	Katir
	80												
	75												
Ę	70												
dBµ\//n	65							dBµV/m					
Level in dBµV/m	+						20200	57.243 dBµV/m		FC	<u>C 15.2</u>	<u>09 AV</u>	<u>Gat 1 n</u>
	60+							T T	1				
	55-	an I	1,44	dada ha		الليارورية. يتعمر معد	a na shadi Ana shadi					All All	ll.
	50-		اللوغية <mark>الدوسواطر</mark>								. ::::::::::::::::::::::::::::::::::::	<sup>a</sup> nn <sup>ah</sup> ity	, 11, 11, 11, 11, 11, 11, 11, 11, 11, 1
	45 +												
	40+												
	35												
	30 <b> </b> 18	19		20	21		22	23		24	+ 2	1 25	2
						Frequer							







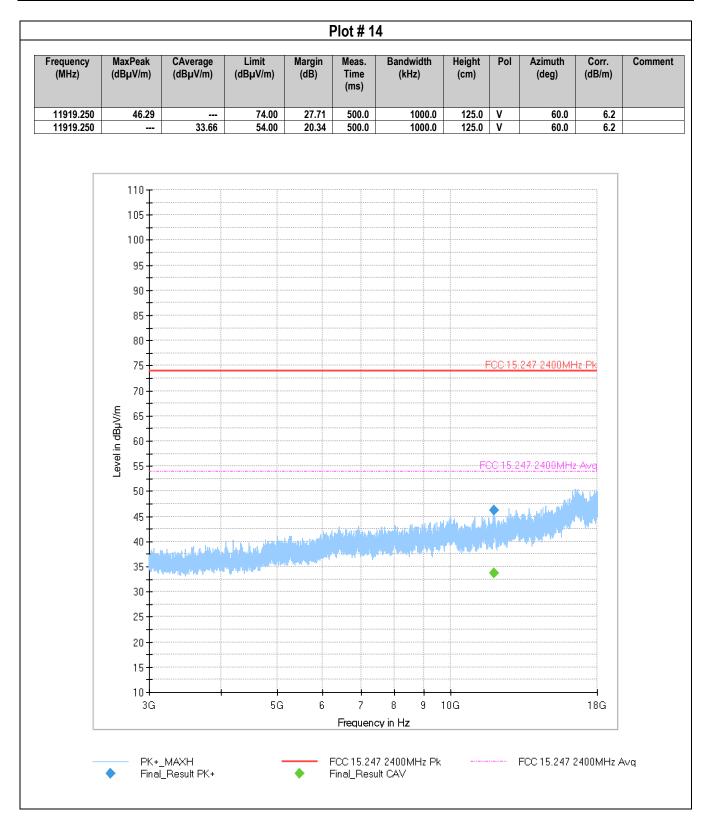


Frequence	у	QuasiP		DET			mit	Margin	Plot Meas. 1	Гime	Bandwid	th	Height	Pol		zimutl		Corr.	Commen
(MHz)		(dBµV/	m)	(dBµ\	//m)	(dBl	ıV/m)	(dB)	(ms	)	(kHz)		(cm)			(deg)		(dB/m)	
30	.357	24	.35				40.00	15.65	ť	500.0	120	.0	111.0	V		167.0	)	-12.3	
59	.993	26	.59				40.00	13.41	Ę	500.0	120	.0	105.0	V		38.0	)	-21.6	
119		26	.59				43.50	16.91		500.0	120		175.0	Н		91.0		-20.4	
240 360			.71 .69				46.02 46.02	14.31 11.33		500.0 500.0	120 120		129.0 199.0	H		257.0 171.0		-15.3 -11.0	
500	.004	31	.65				46.02	14.37	Ę	500.0	120	.0	141.0	V		293.0		-7.8	
	70 T																		
	+																		
	65 -																		
	60																		
	55													F	001	5.209	) QF	<sup>&gt;</sup> at3m	
	50																	0 0	
	1																		
	45																		
	†																		
m//	40																		
Bu	t																		
i.	35 +												•						
Level in dBµV/m	t										•			·····					
	30+															. 1		. 194	
					•			•									a qq	≗ પાણું તેલું. ઝોત	
	25							·····									Ϋ́ψ		
	Ī								 hi.					i ga i	jin, i	n			
	20+												TT T	a and					
	t							1		ויאי		βura.							
	15							ter myr m	h ji j	Jul	Here and the second s	峥节	ŀ						
	t						 11		. II <sup>III</sup>		<u>"</u>								
	10+		ար				L. III		- 1										
	╉		1		ĴĴ,	in the second	2000) 												
	5+				<u>г</u> , т		<b>T</b> I. (												
	+																		
	ο+			-	-	+ +		1				-				-		1	4
	301	м		50	60	81	) 10	0M	Frequen	200 cy in l		00	40	0 50	0		8(	)0 1	G
	- P	review P	Resu	lt 1-Pk	(+	_		FCC 1	5.209 QF	Pat 3i	m		Fir	nal_Re	esult⊫	QPK			



Frequenc	у	MaxPeak	CAverage	Limit (dBµV/m)	Margin	Meas. Time	Bandwidth	Height	Pol	Azimuth	Corr.	Commen
(MHz) 1707	500	(dBµV/m) 51.78	(dBµV/m)	(авµv/m) 74.00	(dB) 22.22	(ms) 500.0	(kHz) 1000.0	(cm) 107.0	V	(deg) 279.0	(dB/m) 30.9	
1707	500		34.73	54.00	19.27	500.0	1000.0	107.0	V	279.0	30.9	
2824	000	58.72		74.00	15.28	500.0	1000.0	223.0	V	131.0	35.5	
2824			43.70	54.00	10.30	500.0	1000.0	223.0	V	131.0	35.5	
	100-	Į										
	95 ·											
	90·	-										
	85 ·	-										
	80·											
	75 ·	-							FCC 1	5 <u>247 240</u>	<u>0MHz Pk</u>	
	70·	-										
BµV/m	65·	-										
Level in dBµV/m	60·										•	
Le	55·	-				•			F <u>CC</u> <b>1</b> 5	:2 <mark>47:2400</mark>	MHz Avo	
	50·											
	45 ·	-										
	40·	-					states a state	ر مراجع المراجع المراجع مرجع مرجع المراجع المرجع المراجع المرجع المراجع المراجع المراجع المراجع المراجع المراجع	n an	dup dis del	phile provident	
	35-			فالإ الماح وارين			an a					
	30•				this party of							
	25 ·	-										
	20·											1
	1	G				Frequency ir	2G • <b>Hz</b>				3	G
	P	review Res	ult 1-PK+		F	CC 15.247 24	NNMH7 Pk			FCC 15.2	47 24NNK	/Hz Ava

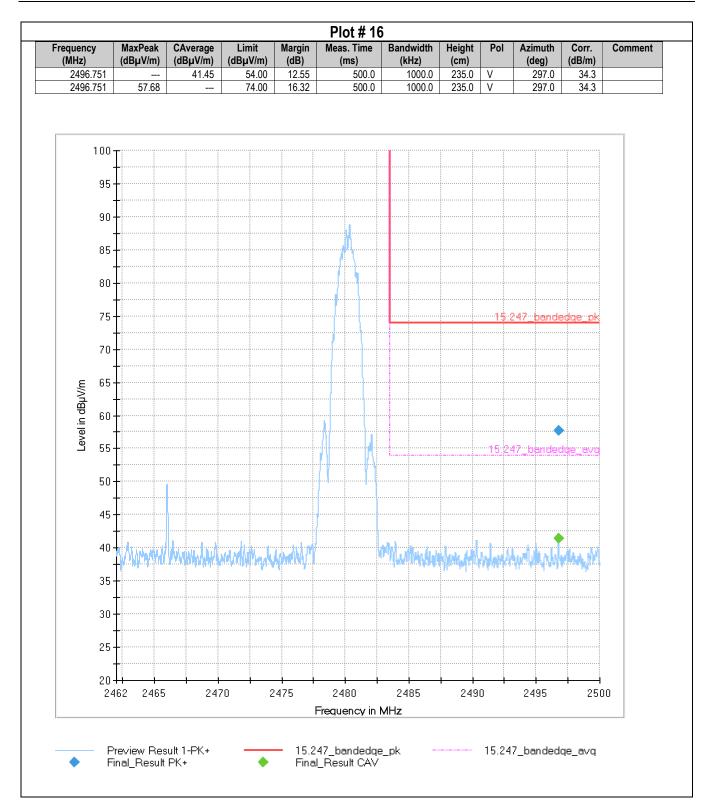




	<sup>100</sup> [								
	95 -								
	90								
	85						F	CC 15.209 P	<u>'Kat 1 n</u>
	80-								
	75								
//m	70					E			
Level in dBµV/m	65					22.651 GHz 57.535 dBμV/m	FC	<u>Ç 15.209 AV</u>	Gat1n
Level	60					57.53			
	55 -								
	50-		al for a start of the line of						
	45								
	40								
	35								
	30		1						-
	18	19	20	21 Fre	22 equency in	23 GHz	24	25	2









## 9 Test setup photos

Setup photos are included in supporting file name: "EMC\_HENDR\_002\_24001\_FCC\_15\_247\_BLE\_Photos"

## 10 Test Equipment And Ancillaries Used For Testing

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Active Monopole	Com-Power Corp.	AM-741R	10200112	3 Years	11/09/2023
PASSIVE LOOP ANTENNA	ETS LINDGREN	6512	000164698	3 Years	09/06/2023
BILOG ANTENNA	ETS.LINDGREN	3142E	00166067	3 Years	08/01/2024
HORN ANTENNA	EMCO	3115	00035114	3 Years	09/13/2023
HORN ANTENNA	ETS.LINDGREN	3117	00215984	3 Years	10/26/2023
HORN ANTENNA	ETS LINDGREN	3116C-PA	00166821	3 Years	10/26/2023
TEST RECEIVER	ROHDE & SCHWARZ	ESW44	103143	2 Years	09/12/2024
DIGITAL THERMOMETER	CONTROL COMPANY	4410,90080-03	230713059	3 Years	10/18/2023
Multimeter	Fluke	115	56090717MV	3 Years	09/26/2023
Software	EMC32	Version 11.40.00	-	-	-

Equipment Type	Manufacturer	Model	Serial #	Calibration Cycle	Last Calibration Date
Spectrum Analyzer	ROHDE & SCHWARZ	FSU	200302	3 Years	01/30/2026
Switch	ROHDE & SCHWARZ	OSP 120	100083	3 Years	12/31/2024
Temperature Chamber	TESTEQUITY	123H	230159	-	N/A
Software	WMS32	12.00.01			

Note: Equipment used meets the measurement uncertainty requirements as required per applicable standards for 95% confidence levels.

Calibration due dates, unless defined specifically, falls on the last day of the month. Items indicated "N/A" for cal status either do not specifically require calibration or is internally characterized before use.



## 11 <u>History</u>

Date	Report Name	Changes to report	Prepared by
2025-02-12	EMC_HENDR_002_24001_FCC_15_247_BLE	Initial Version	Art Thammanavarat
2025-03-26	EMC_HENDR_002_24001_FCC_15_247_BLE_Rev1	Report Revise1.Section 8.1.5 & 8.1.6: Added Plots.2.Section 8.2.1: Updated statement.3.Section 8.2.5: Added plots.4.Section 8.3.5: Added plots.5.Section 8.5.4: Updated Table.6.Section 8.5.5: Added plots.7.Section 10: Updated table.	Art Thammanavarat

<<< The End >>>