

Report on the Radio Testing

For

MysteryVibe Limited

on

Tenuto

Report no. TRA-041977-45-00B

22 August 2019

RF915 6.0







TRA-041977-45-00B Report Number:

Issue:

REPORT ON THE RADIO TESTING OF A MysteryVibe Limited Tenuto WITH RESPECT TO SPECIFICATION FCC 47CFR 15.247

TEST DATE: 2019-05-13 to 2019-05-17

Tested by: A Tosif & D Garvey

A Tosif

Written by: Radio Test Engineer

J Charters

Approved by: Department Manager - Radio

Date: 22 August 2019

Disclaimers:

[1] THIS DOCUMENT MAY BE REPRODUCED ONLY IN ITS ENTIRETY AND WITHOUT CHANGE [2] THE RESULTS CONTAINED IN THIS DOCUMENT RELATE ONLY TO THE ITEM(S) TESTED

1 Revision Record

Issue Number	Issue Date	Revision History		
Α	31 July 2019	Original		
В	22 August 2019	Address in section 2 updated		

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2 Summary

TEST REPORT NUMBER: TRA-041977-45-00B

WORKS ORDER NUMBER TRA-041977-01

PURPOSE OF TEST: Certification

TEST SPECIFICATION: 47CFR15.247

EQUIPMENT UNDER TEST (EUT): Tenuto

FCC IDENTIFIER: 2AHVA-6901

EUT SERIAL NUMBERS: 002 & 004

MANUFACTURER/AGENT: MysteryVibe Limited

ADDRESS: Flat 7

1 Murphy Street

London SE1 7FP

United Kingdom

CLIENT CONTACT: Rob Weekly

***** +44 (0) 1252 444474

 ${\ \ }{\ \ }{\ \ }$ robw@mysteryvibe.com

ORDER NUMBER: 1005

TEST DATE: 2019-05-13 to 2019-05-17

TESTED BY: A Tosif & D Garvey

Element

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2.1 Test Summary

Test Method and Descript	Requirement Clause 47CFR15	Applicable to this equipment	Result / Note		
Radiated spurious emissions (restri	15.205	\boxtimes	Pass		
AC power line conducted emissions	15.207		Note 1		
Occupied bandwidth	15.247(a)(2)	\boxtimes	Pass		
Conducted corrier power	Peak	15 247/b)/2)	\boxtimes	- Pass	
Conducted carrier power	Max.	15.247(b)(3)			
Out of band emissions		15.247(d)	\boxtimes	Pass	
Power spectral density		15.247(e)	\boxtimes	Pass	

Specific Note:

1. The EUT has got a rechargeable battery, but as per client's declaration, the radio is not functional during charging.

General Notes:

The results contained in this report relate only to the items tested, in the condition at time of test, and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. Any modifications made are identified in Section 8 of this report.

Particular operating modes, apparatus monitoring methods and performance criteria required by the standards tested to have been performed except where identified in Section 5.2 of this test report (Deviations from Test Standards).

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4 Introduction

This report TRA-041977-45-00B presents the results of the Radio testing on a MysteryVibe Limited, Tenuto to specification 47CFR15 Radio Frequency Devices.

The testing was carried out for MysteryVibe Limited by Element, at the address detailed below.

 \boxtimes Element Hull Element Skelmersdale Unit E Unit 1 South Orbital Trading Park Pendle Place **Hedon Road** Skemersdale West Lancashire Hull HU9 1NJ WN8 9PN UK UK

This report details the configuration of the equipment, the test methods used and any relevant modifications where appropriate.

All test and measurement equipment under the control of the laboratory and requiring calibration is subject to an established programme and procedures to control and maintain measurement standards. The quality management system meets the principles of ISO 9001, and has quality control procedures for monitoring the validity of tests undertaken. Records and sufficient detail are retained to establish an audit trail of calibration records relating to its test results for a defined period. Under control of the established calibration programme, key quantities or values of the test & measurement instrumentation are within specification and comply with the relevant traceable internationally recognised and appropriate standard specifications, which are UKAS calibrated as such where these properties have a significant effect on results. Participation in inter-laboratory comparisons and proficiency testing ensures satisfactory correlation of results conform to Elements own procedures, as well as statistical techniques for analysis of test data providing the appropriate confidence in measurements.

Throughout this report EUT denotes equipment under test.

FCC Site Listing:

Element is accredited for the above sites under the US-EU MRA, Designation number UK0009.

The test site requirements of ANSI C63.4-2014 are met up to 1GHz.

The test site SVSWR requirements of CISPR 16-1-4:2010 are met over the frequency range 1 GHz to 18 GHz.

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5 Test Specifications

5.1 Normative References

- FCC 47 CFR Ch. I Part 15 Radio Frequency Devices.
- ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
- ANSI C63.4-2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

5.2 Deviations from Test Standards

There were no deviations from the test standard.

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6 Glossary of Terms

§ denotes a section reference from the standard, not this document

AC Alternating Current

ANSI American National Standards Institute

BW bandwidth C Celsius

CFR Code of Federal Regulations

CW Continuous Wave

dB decibel

dBm dB relative to 1 milliwatt

DC Direct Current

DSSS Direct Sequence Spread Spectrum
Equivalent Isotropically Radiated Power

ERP Effective Radiated Power EUT Equipment under Test

FCC Federal Communications Commission FHSS Frequency Hopping Spread Spectrum

Hz hertz

ITU International Telecommunication Union

LBT Listen before Talk

m metremax maximum

MIMO Multiple Input and Multiple Output

min minimum

MRA Mutual Recognition Agreement

N/A Not Applicable
PCB Printed Circuit Board
PDF Portable Document Format

Pt-mpt Point-to-multipoint
Pt-pt Point-to-point
RF Radio Frequency
RH Relative Humidity
RMS Root Mean Square

Rx receiver second

SVSWR Site Voltage Standing Wave Ratio

Tx transmitter

UKAS United Kingdom Accreditation Service

 $\begin{array}{ll} \textbf{V} & \text{volt} \\ \textbf{W} & \text{watt} \\ \textbf{\Omega} & \text{ohm} \end{array}$

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7 Equipment under Test

7.1 EUT Identification

Name: Tenuto

Serial Numbers: 002 & 004Model Number: 6901

Software Revision: V1.0 C (EMC Build)

• Build Level / Revision Number: 6901-1801-002 Issue 1.1

7.2 System Equipment

Equipment listed below forms part of the overall test setup and is required for equipment functionality and/or monitoring during testing. The compliance levels achieved in this report relate only to the EUT and not items given in the following list.

Not Applicable – No support/monitoring equipment required.

7.3 EUT Mode of Operation

The EUT was transmitting modulated carrier on required channels.

7.4 EUT Radio Parameters

Frequency of operation:	2402 MHz – 2480 MHz
Modulation type:	GFSK
Channel spacing:	2 MHz
Nominal Supply Voltage:	3.7 Vdc
Antenna Type:	Integral PCB
Antenna Gain:	4.33 dBi

7.5 EUT Description

The EUT is a vibrating sex toy with Bluetooth Low Energy radio.

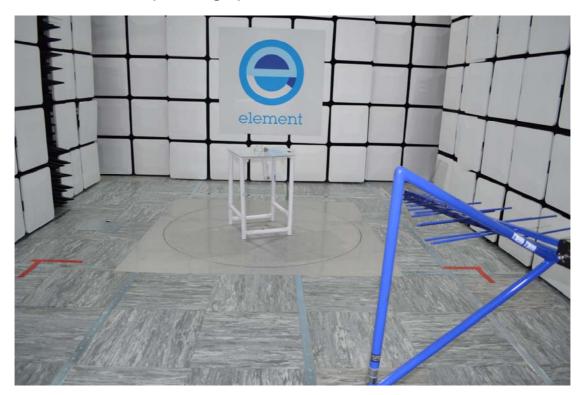
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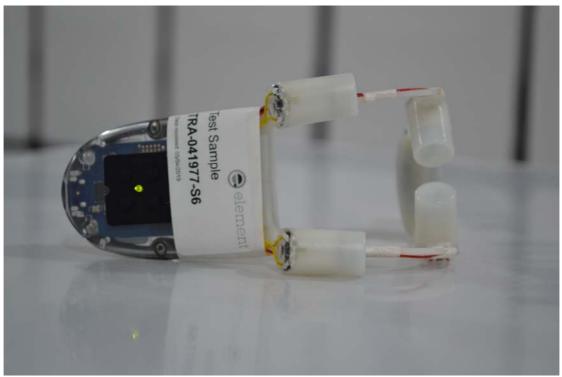
8 Modifications

No modifications were performed during this assessment.

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9 EUT Test Setup Photographs





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10 General Technical Parameters

10.1 Normal Conditions

The EUT was tested under the normal environmental conditions of the test laboratory, except where otherwise stated. The normal power source applied was 3.7 Vdc from internal lithium-ion polymer battery.

10.2 Varying Test Conditions

There are no specific frequency stability requirements for the type of device. The results contained in this report demonstrate that the occupied bandwidth is contained within the authorised band and the manufacturer has declared sufficient frequency stability (refer to section 7.4).

Variation of supply voltage is required to ensure stability of the declared output power. During carrier power testing the following variations were made:

	Category	Nominal	Variation
	Mains	110 V ac +/-2 %	85 % and 115 %
\boxtimes	Battery	New battery	N/A

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11 Radiated emissions

11.1 Definitions

Spurious emissions

Emissions on a frequency or frequencies, which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

Restricted bands

A frequency band in which intentional radiators are permitted to radiate only spurious emissions but not fundamental signals.

11.2 Test Parameters

Test Location: Element Hull
Test Chamber: Wireless Lab 3

Test Standard and Clause: ANSI C63.10-2013, Clause 6.5 and 6.6

Frequencies Measured: 2402 MHz, 2440 MHz 2480 MHz

Deviations From Standard: None

Measurement BW: 30 MHz to 1 GHz: 120 kHz; Above 1 GHz: 1 MHz

Measurement Detector: Up to 1 GHz: quasi-peak; Above 1 GHz: RMS average

and Peak

Environmental Conditions (Normal Environment)

Temperature: 21 °C +15 °C to +35 °C (as declared)

Humidity: 38 % RH 20 % RH to 75 % RH (as declared)

Supply: 3.7 V dc As declared

11.3 Test Limit

Unwanted emissions that fall within the restricted frequency bands shall comply with the limits specified:

General Field Strength Limits for License-Exempt Transmitters at Frequencies above 30 MHz

Frequency (MHz)	Field Strength (µV/m at 3 m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

11.4 Test Method

With the EUT setup as per section 9 of this report and connected as per Figure i, the emissions from the EUT were measured on a spectrum analyzer / EMI receiver.

Radiated electromagnetic emissions from the EUT are checked first by preview scans. Preview scans for all spectrum and modulation characteristics are checked, using a peak detector and where applicable worst-case determined for function, operation, orientation, etc.

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for both vertical and horizontal polarisations. Pre-scan plots are shown with a peak detector and 100 kHz RBW.

If the EUT connects to auxiliary equipment and is table or floor standing, the configurations prescribed in ANSI C63.10 are followed. Alternatively, a layout closest to normal use (as declared by the provider) is employed, (see EUT setup photographs for more detail).

Emissions between 30 MHz and 1 GHz are measured using calibrated broadband antennas. Emissions above 1 GHz are characterized using standard gain horn antennas. Pre-amplifiers and filters are used where required. Care is taken to ensure that test receiver resolution bandwidth, video bandwidth and detector type(s) meet the regulatory requirements.

For both horizontal and vertical polarizations, the EUT is then rotated through 360 degrees in azimuth until the highest emission is detected. At the previously determined azimuth the test antenna is raised and lowered from 1 to 4 m in height until a maximum emission level is detected, this maximum value is recorded.

Power values measured on the test receiver / analyzer are converted to field strength, FS, in $dB\mu V/m$ at the regulatory distance, using:

Where,

PR is the power recorded on the receiver / spectrum analyzer in dBµV;

CL is the cable loss in dB;

AF is the test antenna factor in dB/m;

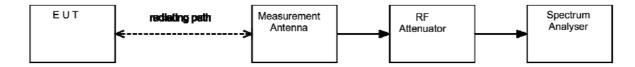
PA is the pre-amplifier gain in dB (where used):

DC is the duty correction factor in dB (where used, e.g. harmonics of pulsed fundamental);

CF is the distance factor in dB (where measurement distance different to limit distance);

This field strength value is then compared with the regulatory limit.

Figure i Test Setup



11.5 Test Equipment

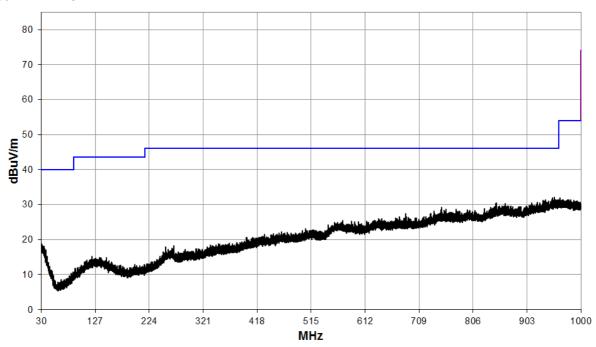
Equipment Type	Manufacturer	Equipment Description	Element No	Due For Calibration
Ferrite Lined Chamber	Rainford	Chamber	REF2259	2020-08-03
EMI Test Receiver	R&S	ESW26	REF2235	2019-07-23
Bilog Antenna	Chase	CBL6111B	REF2218	2019-11-06
Horn Antenna	A Info Inc	LB-10180-NF	REF2241	2020-07-13
Horn Antenna	A Info Inc	LB-90-25-C2-SF	REF2243	2020-07-16
Pre-Amp (9kHz – 1GHz)	Sonoma	310	REF927	2019-05-22
Pre-Amp (1 – 26.5GHz)	Agilent	8449B	REF913	2020-02-06
3115	EMCO	1-18GHz Horn	TRL138	2020-04-13
LB-62-25-C-SF	A Info Inc	Horn Antenna	REF2244	2020-07-16

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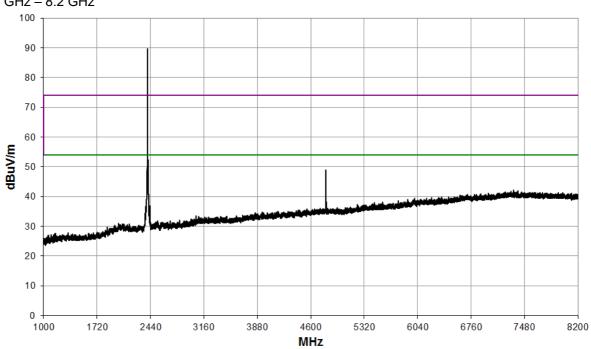
11.6 Test Results

	Frequency: 2402 MHz								
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Factor (dB)	Duty Cycle Corr'n (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBµV/m)	Field Strength (µV/m)	Limit (µV/m)	
Average	4804.0	46.7	2.6	0.0	0.0	49.3	291.7	500	
Peak	4804.6	52.8	2.6	0.0	0.0	55.4	588.8	5000	

30 MHz - 1 GHz

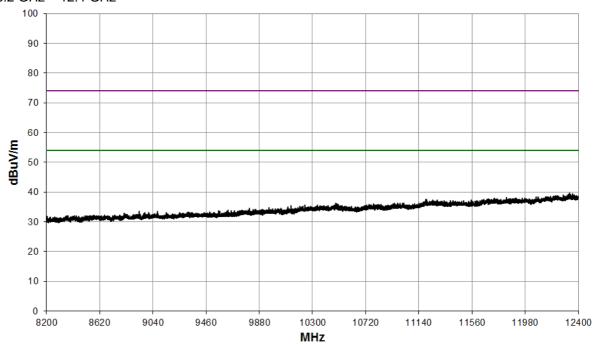


1 GHz – 8.2 GHz

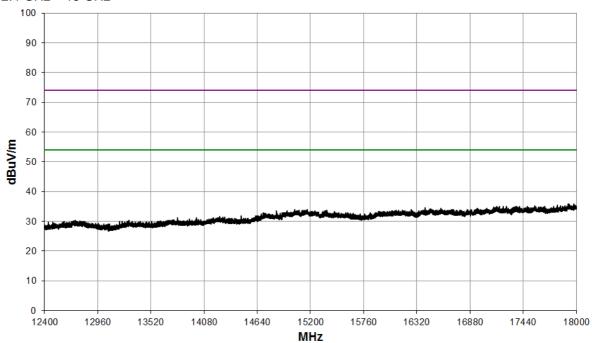


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8.2 GHz - 12.4 GHz

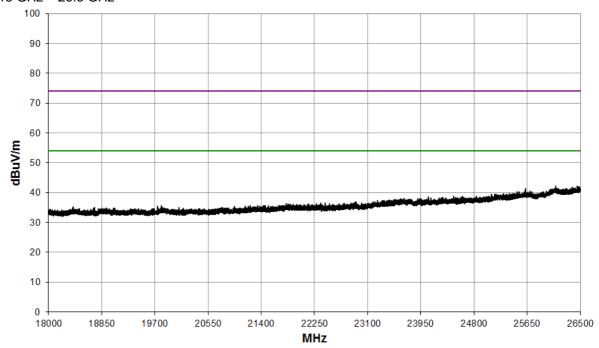


12.4 GHz - 18 GHz



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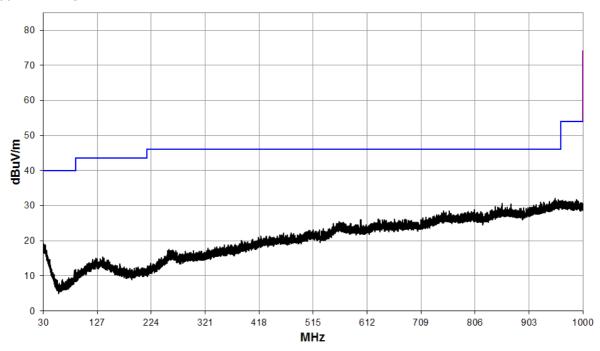
18 GHz - 26.5 GHz



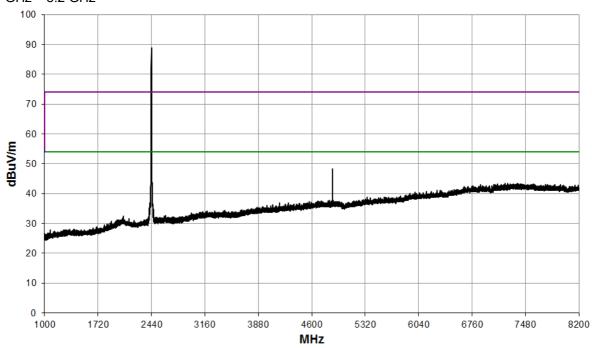
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	Frequency: 2440 MHz								
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Factor (dB)	Duty Cycle Corr'n (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBµV/m)	Field Strength (µV/m)	Limit (μV/m)	
Average	4880.0	44.9	3.2	0.0	0.0	48.1	254.1	500	
Peak	4880.4	52.1	3.2	0.0	0.0	55.3	582.1	5000	

30 MHz - 1 GHz

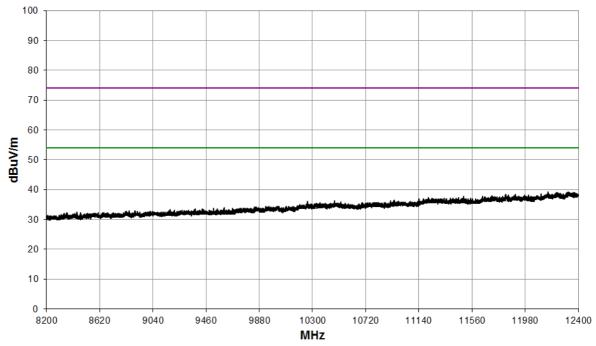


1 GHz – 8.2 GHz

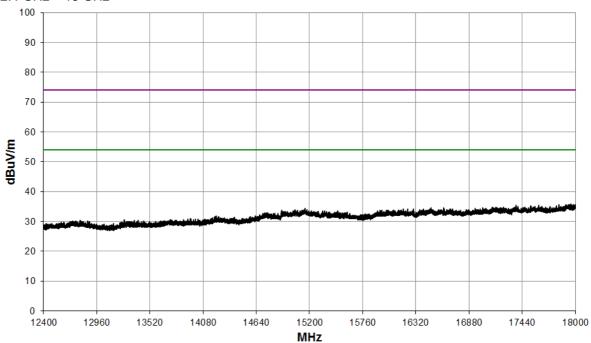


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8.2 GHz - 12.4 GHz

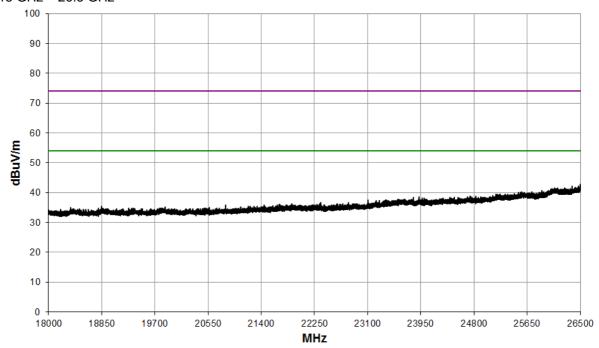


12.4 GHz - 18 GHz



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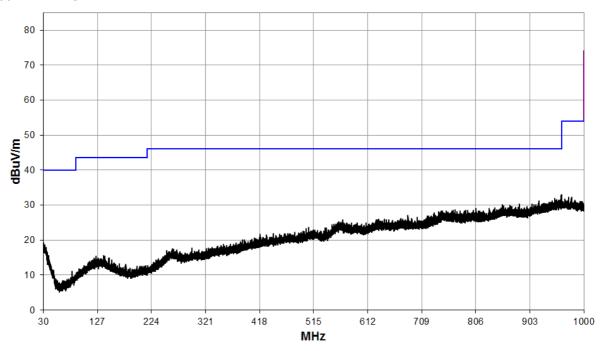
18 GHz - 26.5 GHz



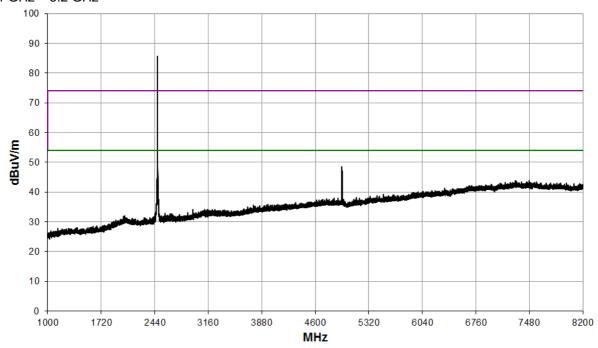
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	Frequency: 2480 MHz								
Detector	Freq. (MHz)	Meas'd Emission (dBµV)	Factor (dB)	Duty Cycle Corr'n (dB)	Distance Extrap'n Factor (dB)	Field Strength (dBµV/m)	Field Strength (µV/m)	Limit (μV/m)	
Average	4958.0	44.6	3.2	0.0	0.0	47.8	245.5	500	
Peak	4959.5	50.4	3.2	0.0	0.0	53.6	478.6	5000	

30 MHz - 1 GHz

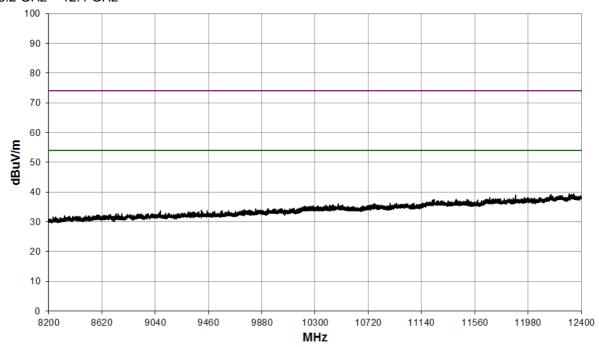


1 GHz - 8.2 GHz

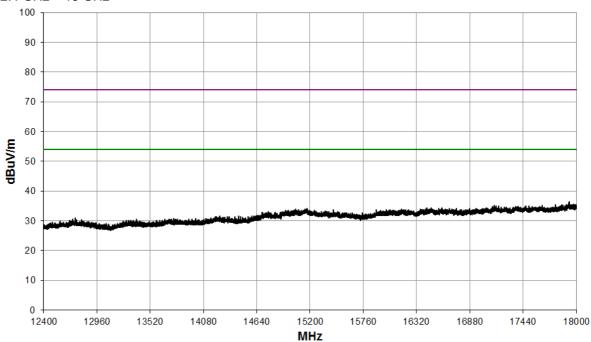


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8.2 GHz - 12.4 GHz

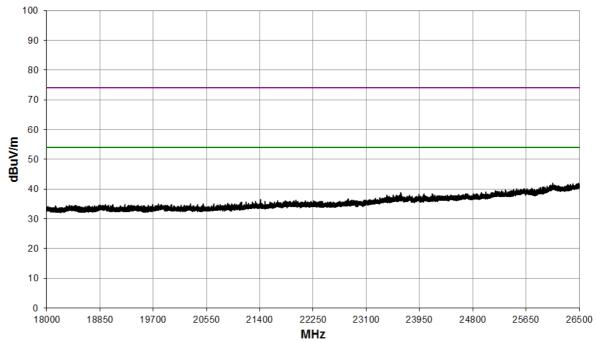


12.4 GHz - 18 GHz



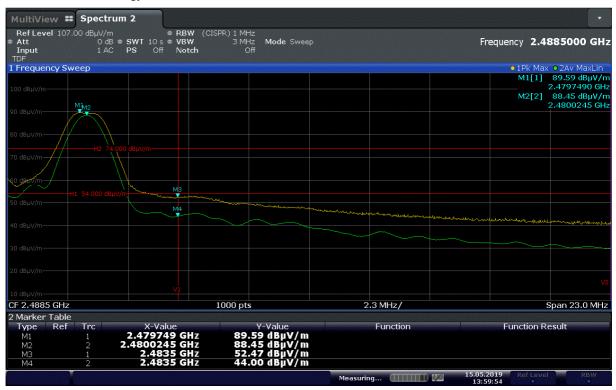
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18 GHz - 26.5 GHz



Band Edge

Element Materials Technology



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12 Occupied Bandwidth

12.1 Definition

The emission bandwidth (x dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated x dB below the maximum in-band spectral density of the modulated signal.

12.2 Test Parameters

Test Location: Element Hull
Test Chamber: Wireless Lab 1

Test Standard and Clauses: ANSI C63.10-2013, Clause 11.8 EUT Frequencies Measured: 2402 MHz, 2440 MHz & 2480 MHz

Deviations From Standard: None
Measurement Detector: Peak

Environmental Conditions (Normal Environment)

Temperature: 22 °C +15 °C to +35 °C (as declared)

Humidity: 45 % RH 20 % RH to 75 % RH (as declared)

12.3 Test Limit

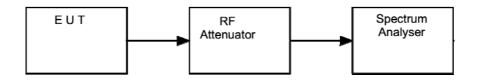
The minimum -6 dB bandwidth shall be at least 500 kHz.

12.4 Test Method

With the EUT connected as per Figure iii, the bandwidth of the EUT was measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty.

Figure iii Test Setup

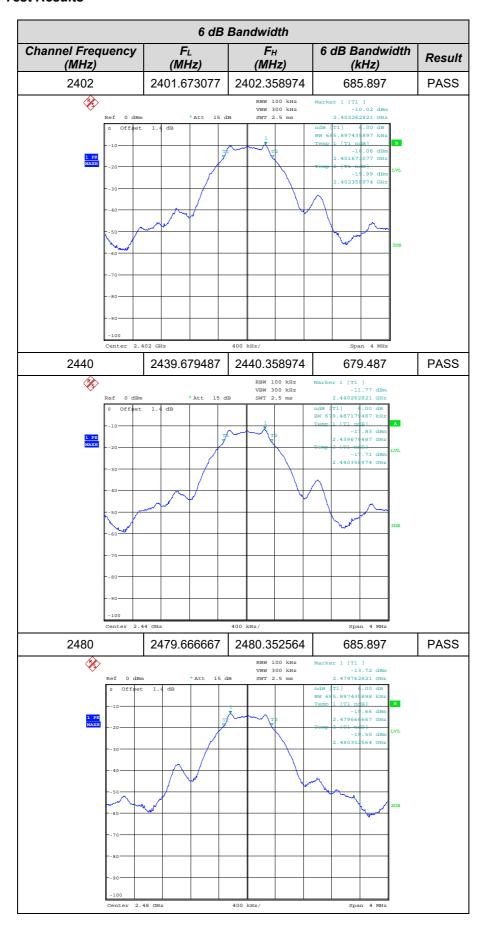


12.5 Test Equipment

Equipment		Equipment	Element	Due For
Description	Manufacturer	Туре	No	Calibration
Spectrum Analyser	R&S	FSU26	REF909	2019-06-15

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12.6 Test Results



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13 Maximum peak conducted output power

13.1 Definition

The maximum peak conducted output power is defined as the maximum power level measured with a peak detector using a filter with width and shape of which is sufficient to accept the signal bandwidth.

The maximum conducted output power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

13.2 Test Parameters

Test Location: Element Hull
Test Chamber: Wireless Lab 1

Test Standard and Clause: ANSI C63.10-2013, Clause 11.9
EUT Frequencies Measured: 2402 MHz, 2440 MHz & 2480 MHz

Deviations From Standard: None

Environmental Conditions (Normal Environment)

Temperature: 22 °C +15 °C to +35 °C (as declared)

Humidity: 45 % RH 20 % RH to 75 % RH (as declared)

13.3 Test Limit

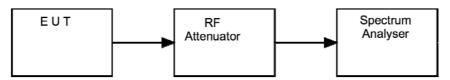
For systems employing digital modulation techniques operating in the bands 902 to 928 MHz, 2400 to 2483.5 MHz and 5725 to 5850 MHz, the maximum peak conducted output power shall not exceed 1 W.

13.4 Test Method

With the EUT connected as per Figure iv, the resolution bandwidth of the spectrum analyser was increased above the EUT occupied bandwidth and the peak emission data noted.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst-case configuration in each bandwidth.

Figure iv Test Setup



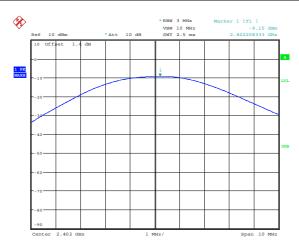
13.5 Test Equipment

Equipment		Equipment	Element	Due For
Description	Manufacturer	Туре	No	Calibration
Spectrum Analyser	R&S	FSU26	REF909	2019-06-15

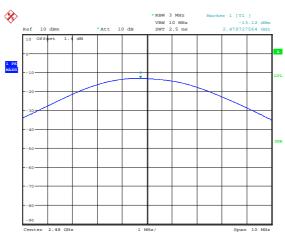
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13.6 Test Results

Channel Maximum peak conducted output power			Antenna gain	E.I.R.P.		Result
(MHz)	(dBm)	(W)	(dBi)	(dBm)	(W)	nooun
2402.0	-9.15	0.00012	4.33	-4.82	0.00033	PASS
2440.0	-11.30	0.00007	4.33	-6.97	0.00020	PASS
2480.0	-13.12	0.00005	4.33	-8.79	0.00013	PASS







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14 Out-of-band and conducted spurious emissions

14.1 Definition

Out-of-band emission

Emission on a frequency or frequencies immediately outside the necessary bandwidth that results from the modulation process but excluding spurious emissions.

Spurious emission

Emission on a frequency or frequencies that are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products, and frequency conversion products, but exclude out-of-band emissions.

14.2 Test Parameters

Test Location: Element Hull
Test Chamber: Wireless Lab 1

Test Standard and Clause: ANSI C63.10-2013, Clause 11.11 EUT Frequencies Measured: 2402 MHz, 2440 MHz & 2480 MHz

Deviations From Standard:

Measurement Bandwidth:

Video Bandwidth:

Measurement Detector:

Peak

Measurement Range: 9 kHz to 25 GHz

Environmental Conditions (Normal Environment)

Temperature: 22 °C +15 °C to +35 °C (as declared)

Humidity: 45 % RH 20 % RH to 75 % RH (as declared)

14.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits.

If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

Attenuation below the general field strength limits specified in FCC 47CFR15.209 (a) is not required.

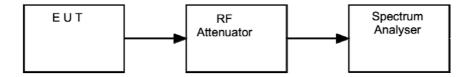
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14.4 Test Method

With the EUT connected as per Figure v, the emissions from the EUT were measured on a spectrum analyser.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

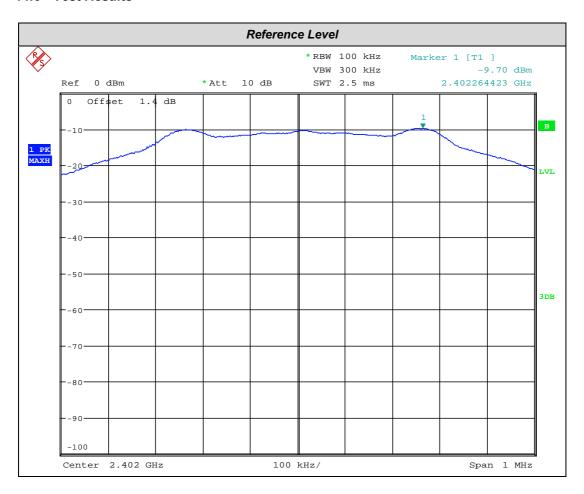
Figure v Test Setup



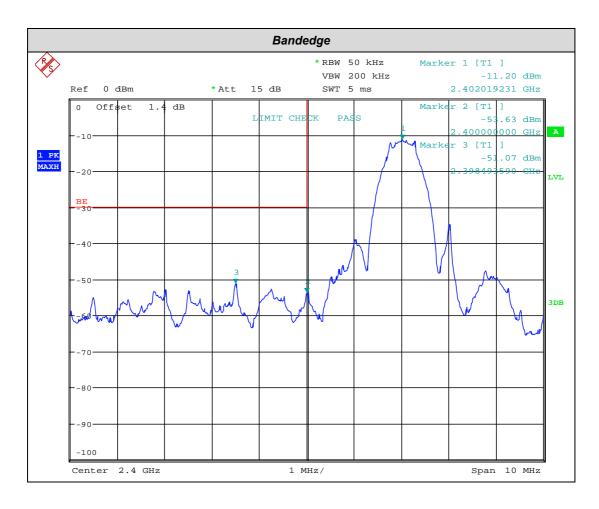
14.5 Test Equipment

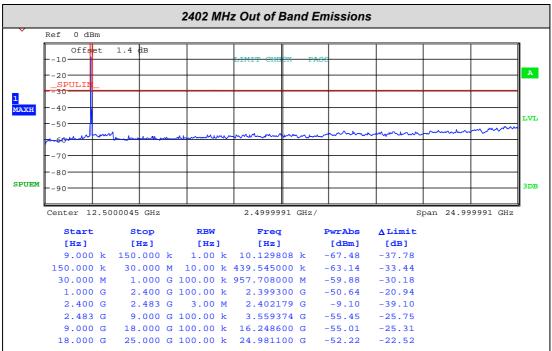
Equipment		Equipment	Element	Due For
Description	Manufacturer	Туре	No	Calibration
Spectrum Analyser	R&S	FSU26	REF909	2019-06-15

14.6 Test Results

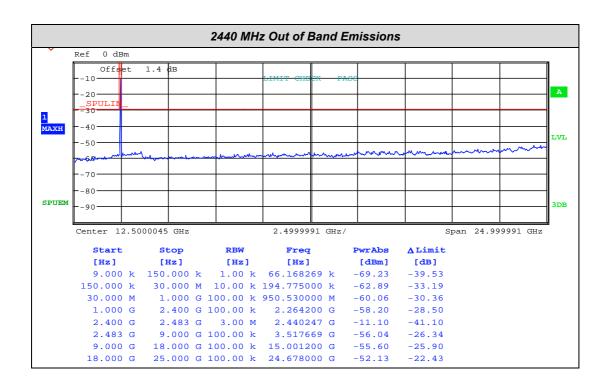


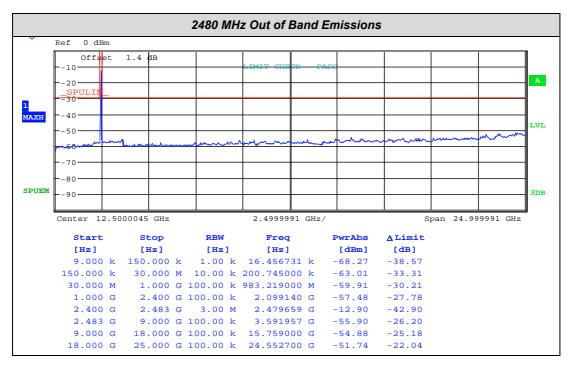
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15 Power spectral density

15.1 Definition

The power per unit bandwidth.

15.2 Test Parameters

Test Location: Element Hull
Test Chamber: Wireless Lab 1

Test Standard and Clause: ANSI C63.10-2013, Clause 11.10 EUT Frequencies Measured: 2402 MHz, 2440 MHz & 2480 MHz

Deviations From Standard:

Measurement Detector:

RMS

Environmental Conditions (Normal Environment)

Temperature: 22 °C +15 °C to +35 °C (as declared)

Humidity: 45 % RH 20 % RH to 75 % RH (as declared)

15.3 Test Limit

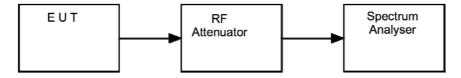
The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

15.4 Test Method

With the EUT connected as per Figure vi, the peak emission of the EUT was measured on a spectrum analyser, with path losses taken into account.

The measurements were performed with EUT set at its maximum duty. All modulation schemes, data rates and power settings were used to observe the worst case configuration in each bandwidth.

Figure vi Test Setup



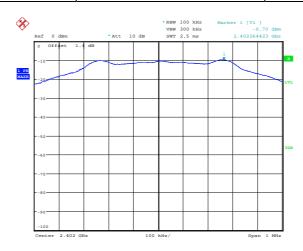
15.5 Test Equipment

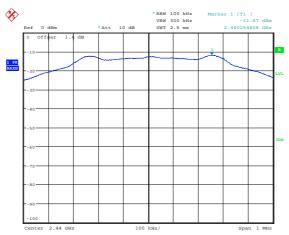
Equipment		Equipment	Element	Due For
Description	Manufacturer	Туре	No	Calibration
Spectrum Analyser	R&S	FSU26	REF909	2019-06-15

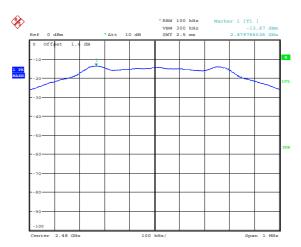
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15.6 Test Results

Channel Frequency (MHz)	Power Spectral Density (dBm)	Result
2402	-9.70	PASS
2440	-11.87	PASS
2480	-13.67	PASS







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16 Measurement Uncertainty

Calculated Measurement Uncertainties

All statements of uncertainty are expanded standard uncertainty using a coverage factor of 1.96 to give a 95 % confidence:

[1] Radiated spurious emissions

Uncertainty in test result (30 MHz to 1 GHz) = **4.75 dB** Uncertainty in test result (1 GHz to 18 GHz) = **4.46 dB**

[2] AC power line conducted emissions

Uncertainty in test result = 3.2 dB

[3] Occupied bandwidth

Uncertainty in test result = 15.58 %

[4] Conducted carrier power

Uncertainty in test result (Power Meter) = 0.93 dB

[5] Conducted RF power out-of-band

Uncertainty in test result – up to 8.1 GHz = **3.31 dB**Uncertainty in test result – 8.1 GHz to 15.3 GHz = **4.43 dB**

[6] Radiated RF power out-of-band

Uncertainty in test result (30 MHz to 1 GHz) = **4.75 dB** Uncertainty in test result (1 GHz to 18 GHz) = **4.46 dB**

[7] Power spectral density

Uncertainty in test result (Spectrum Analyser) = 3.11 dB

[8] ERP / EIRP

Uncertainty in test result (Laboratory) = **4.71 dB**Uncertainty in test result (Pershore OATS) = **4.26 dB**

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