TEST REPORT

Test Report No. : UL-RPT-RP-12741851-316-FCC

Applicant	:	Workaround GmbH
Model No.	:	MARK 2 MR
FCC ID	:	2AOJL-MARK-2
Technology	:	Bluetooth – Low Energy
Test Standard(s)	:	FCC Parts 15.209(a) & 15.247
		For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. Test Report Version 1.0
5. Result of the tested sample: **PASS**

Prepared by: Krume, Ivanov
Title: Laboratory Engineer
Date: 28 May 2019

Approved by: Ajit, Phadtare
Title: Lead Test Engineer
Date: 28 May 2019

DAkkS Deutsche Akkreditierungsstelle D-PL-19381-02-00

This laboratory is accredited by DAkkS.
The tests reported herein have been performed in accordance with its' terms of accreditation.

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1. Customer Information

1.1. Applicant Information

Company Name:	Workaround GmbH
Company Address:	Rupert-Mayer-Str. 44, 81379 Munich, GERMANY
Contact Person:	Daniel Castillo
Contact E-Mail Address:	daniel.castillo@proglove.de

1.2. Manufacturer Information

Company Name:	Workaround GmbH
Company Address:	Rupert-Mayer-Str. 44, 81379 Munich, GERMANY
Contact Person:	Daniel Castillo
Contact E-Mail Address:	daniel.castillo@proglove.de

2. Summary of Testing

2.1. General Information

Applied Standards

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) – Section 15.209
Test Firm Registration:	399704

Location

Location of Testing:	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany

Date information

Order Date:	21 February 2019
EUT arrived:	12 March 2019
Test Dates:	12 March 2019 to 18 March 2019
EUT returned:	-/-

2.2. Summary of Test Results

Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions(1)	☐	☐	☐	☒
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth	☒	☐	☐	☐
Part 15.35(c)	Transmitter Duty Cycle	☒	☐	☐	☐
Part 15.247(e)	Transmitter Power Spectral Density(2)	☐	☐	☒	☐
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power	☒	☐	☐	☐
Part 15.247(d)/15.209(a)	Transmitter Radiated Emissions	☒	☐	☐	☐
Part 15.247(d)/15.209(a)	Transmitter Band Edge Radiated Emissions	☒	☐	☐	☐

Note:

1. Not applicable as EUT does not support BT-LE transmit or receive modes whilst charging.
2. In accordance with KDB 558074 D01 section 8.4 referencing ANSI C63.10:2013, subclause 11.10.1, PSD is not required if the maximum conducted output power is less than the PSD limit of 8 dBm / 3 kHz. The PSD level is therefore deemed to be equal to the measured total output power

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	KDB 558074 D01 DTS Meas Guidance v05r01 Februar 11, 2019
Title:	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

2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

3. Equipment Under Test (EUT)

3.1. Identification of Equipment Under Test (EUT)

Brand Name:	ProGlove
Model Name or Number:	MARK 2 MR
Test Sample Serial Number:	M2MR101000236 / M2MR101000237*(Radiated sample)*
Hardware Version Number:	1010
Firmware Version Number:	1.0.1, FCC branch
FCC ID:	2AOJL-MARK-2

Brand Name:	ProGlove
Model Name or Number:	MARK 2 MR
Test Sample Serial Number:	M2MR101000250 *(Conducted sample with RF port)*
Hardware Version Number:	1010
Firmware Version Number:	1.0.1, FCC branch
FCC ID:	2AOJL-MARK-2

3.2. Description of EUT

The equipment under test was a wireless wearable bar-code reader supporting Bluetooth Low Energy.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	*Bluetooth* Low Energy (Digital Transmission System)	
Type of Unit:	Transceiver	
Channel Spacing:	2 MHz	
Modulation:	GFSK	
Data Rate:	1 Mbps	
Power Supply Requirement(s):	Nominal	5 V DC
Power Supply Type:	Internal Rechargeable Battery	
Power Supply Detail(s):	Sunny Electronics Corp | Model: SYS 1561-1105-W2E	
Maximum measured Conducted Output Power:	+6.2 dBm	
Maximum Antenna Gain:	0 dBi	
Antenna Type:	Custom Flex PCB Antenna	
Antenna Details:	TQ Systems | Model No.: 3.087.250.100 | Version: 2.4.1	
Transmit Frequency Range:	2402 MHz to 2480 MHz	
Transmit Channels Tested:	**Channel ID**	**RF Channel** / **Channel Frequency (MHz)**
	Bottom	0 / 2402
	Middle	21 / 2444
	Top	39 / 2480

3.5. Support Equipment

The following support equipment was used to exercise the EUT during testing:

A. Support Equipment (In-house)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Laptop PC	HP	HP ProBook 650 G1	5CG6143YWB

B. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Power Supply, AC/DC ADAPTER	Shenzhen Yingyuan electronics Co.	SAW06D-050-1200GB	Not stated
2	USB Type-A to Type-C cable	Not stated	Not stated	Not stated
3	Mark 2 Charger Station S	ProGlove	Not stated	Not stated
4	Glove with button to trigger Mark	ProGlove	Long Life	Not stated
5	Glove with button to trigger Mark	ProGlove	Glove	Not stated
6	Glove with button to trigger Mark	ProGlove	Index Trigger	Not stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

The EUT was tested in the following operating mode(s):
☒ Transmitting at maximum power in Bluetooth LE mode with modulation, maximum possible data length available and Pseudorandom Bit Sequence 9.

4.2. Configuration and Peripherals

The EUT was tested in the following configuration(s):

- The EUT was powered via internal rechargeable battery.
- The test modes were activated using “Mark 2 Certification Helper.pdf” supplied by customer.
- The test modes were selected by scanning the QR codes in the document “Mark 2 Certification Helper.pdf”.
- The EUT conducted sample was used for transmitter duty cycle, 6 dB bandwidth and maximum peak output power measurements.
- The EUT radiated samples were used for radiated emissions and radiated band edge measurements.
- Before starting final radiated measurements “worst case verification” with EUT in Standing & EUT in Laying position was perfomed by Lab.
- EUT in Standing position found to be the worst case therefore this report includes relevant results.

5. Measurements, Examinations and Derived Results

5.1. General Comments

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

5.2. Test Results

5.2.1. Transmitter Minimum 6 dB Bandwidth

Test Summary:

Test Engineer:	Abdoufataou Salifou	**Test Date:**	13 & 14 March 2019
Test Sample Serial Number:	M2MR101000250		
Test Site Identification	SR 9		

FCC Reference:	Part 15.247(a)(2)
Test Method Used:	FCC KDB 558074 Section 8.2 referring ANSI C63.10:2013 Section 11.8.1 Option 1

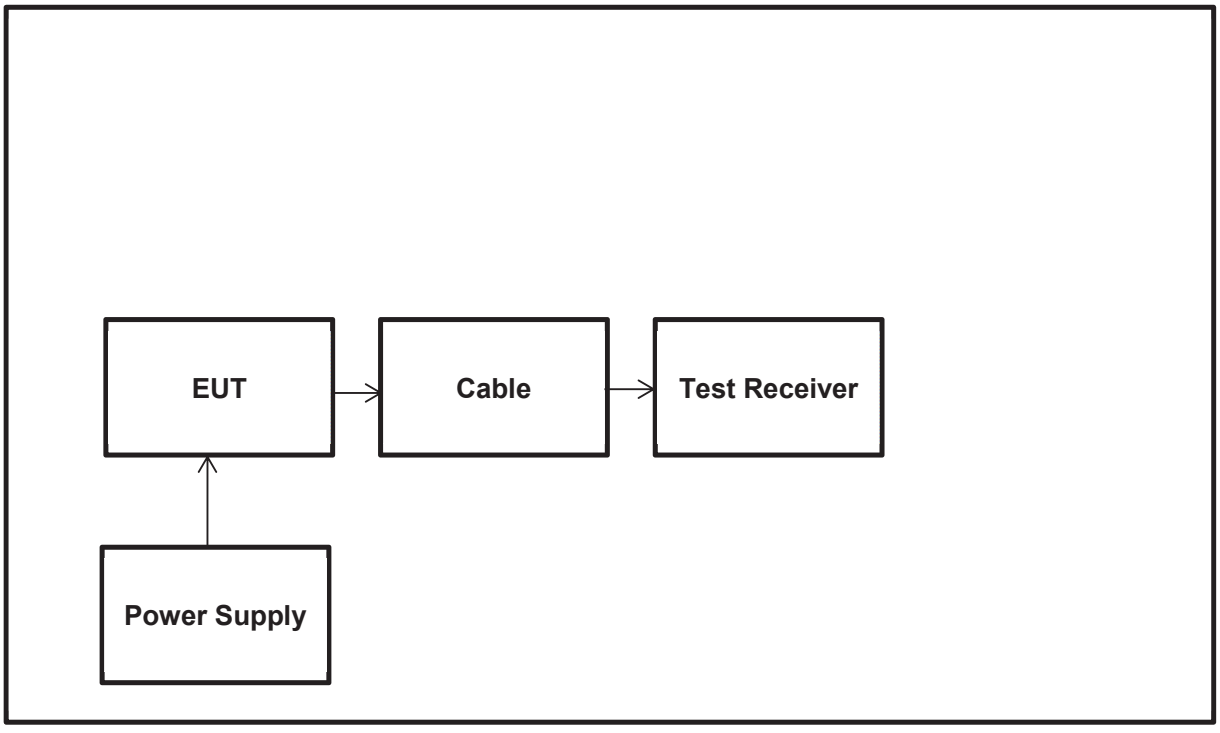
Environmental Conditions:

Temperature (°C):	22.3 & 22.1
Relative Humidity (%):	27 & 28

Notes:

1. 6 dB DTS bandwidth tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 8.2 referring ANSI C63.10:2013 Section 11.8.1 Option 1 measurement procedure. The spectrum analyser resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and the trace mode was Max Hold. The DTS bandwidth was measured at 6 dB down from the peak of the signal.
2. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors. The RF cable attenuation (0.4 dB@2.4GHz) from the EUT to Analyzer including the 10 dB attenuation at the Spectrum Analyzer input was added as a reference level offset (10.4 dB) to each of the conducted plots.

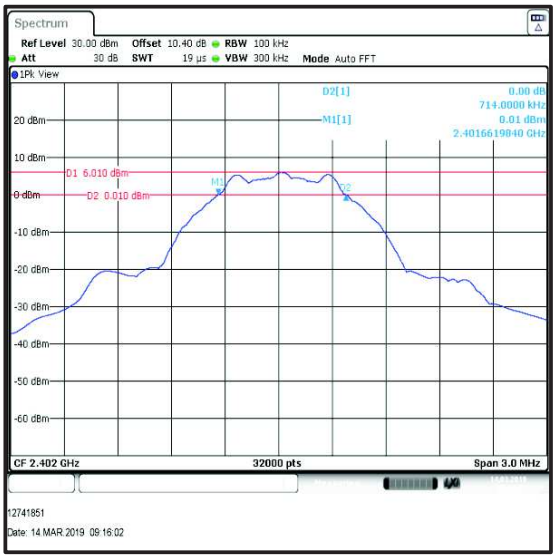
Test Setup:



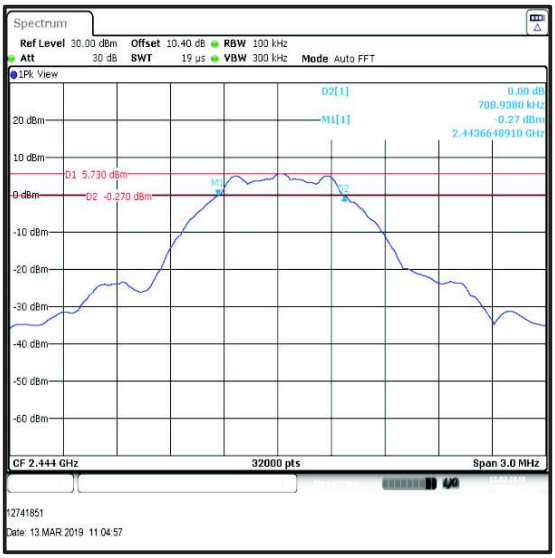
Transmitter Minimum 6 dB Bandwidth (continued)

Results:

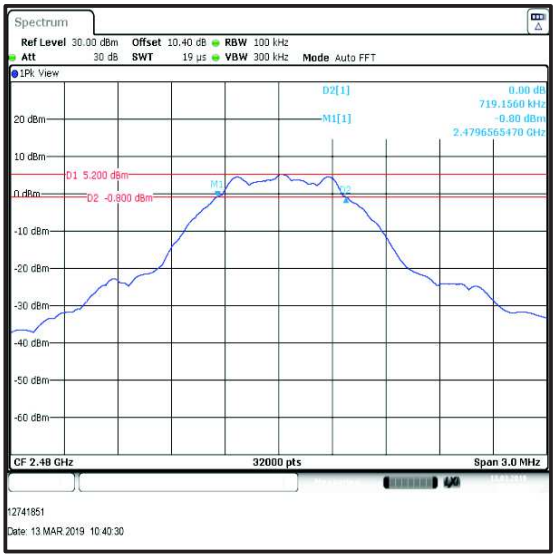
Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Margin (kHz)	Result
Bottom	714.000	≥500	214.000	Complied
Middle	708.938	≥500	208.938	Complied
Top	719.156	≥500	219.156	Complied



Bottom Channel



Middle Channel



Top Channel

Result: Pass

5.2.2.Transmitter Duty Cycle

Test Summary:

Test Engineer:	Abdoufataou Salifou	**Test Date:**	13 March 2019
Test Sample Serial Number:	M2MR101000250		
Test Site Identification	SR 9		

FCC Reference:	Part 15.35(c)
Test Method Used:	FCC KDB 558074 Section 6.0

Environmental Conditions:

Temperature (°C):	22.8
Relative Humidity (%):	26

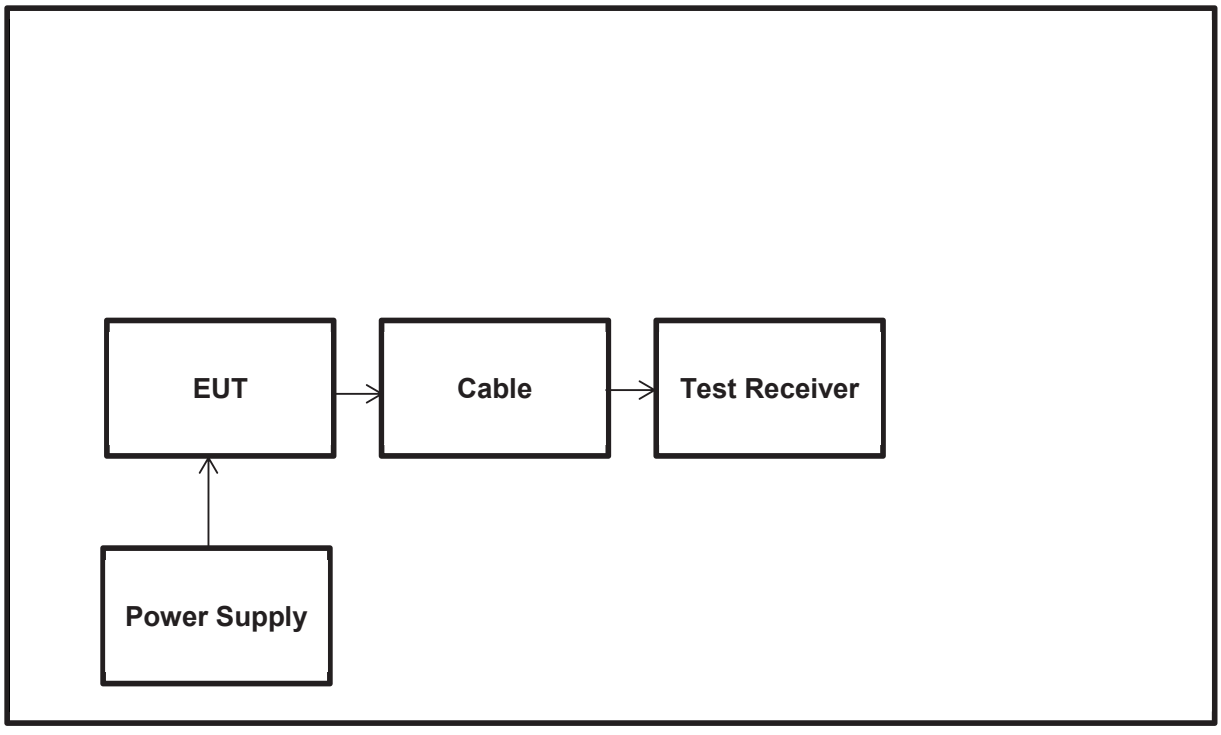
Note:

The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

10 log (1 / (On Time / [Period or 100 ms whichever is the lesser])).

BLE duty cycle: 10 log (1 / (550.783 µs/ 1153.145 µs)) = 3.2 dB

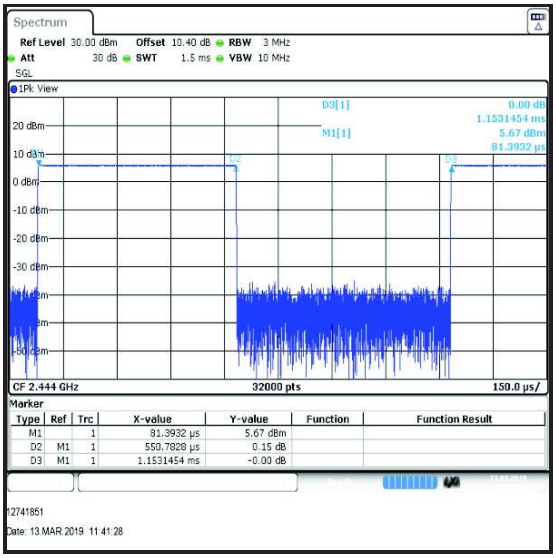
Test Setup:



Transmitter Duty Cycle (continued)

Results:

Pulse Duration (µs)	Period (µs)	Duty Cycle Correction (dB)
1153.145	550.783	3.2



5.2.3. Transmitter Maximum Peak Output Power

Test Summary:

Test Engineer:	Abdoufataou Salifou	**Test Date:**	13 & 14 March 2019
Test Sample Serial Number:	M2MR101000250		
Test Site Identification	SR 9		

FCC Reference:	Part 15.247(b)(3)
Test Method Used:	FCC KDB 558074 Section 8.3.1.1 referring ANSI C63.10 Section 11.9.1.1

Environmental Conditions:

Temperature (°C):	22.4 & 22.2
Relative Humidity (%):	27 & 28

Notes:

1. Conducted power tests were performed using a spectrum analyser in accordance with FCC KDB 558074 Section 8.3.1.1 referring ANSI C63.10 Section 11.9.1.1 with the RBW ≥ *DTS bandwidth* procedure.

1. The signal analyser resolution bandwidth was set to 3 MHz and video bandwidth of 10 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The span was set to 10 MHz. A marker was placed at the peak of the signal and the results recorded in the table below.

2. The spectrum analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset was entered on the spectrum analyser to compensate for the loss of the attenuator and RF cable.

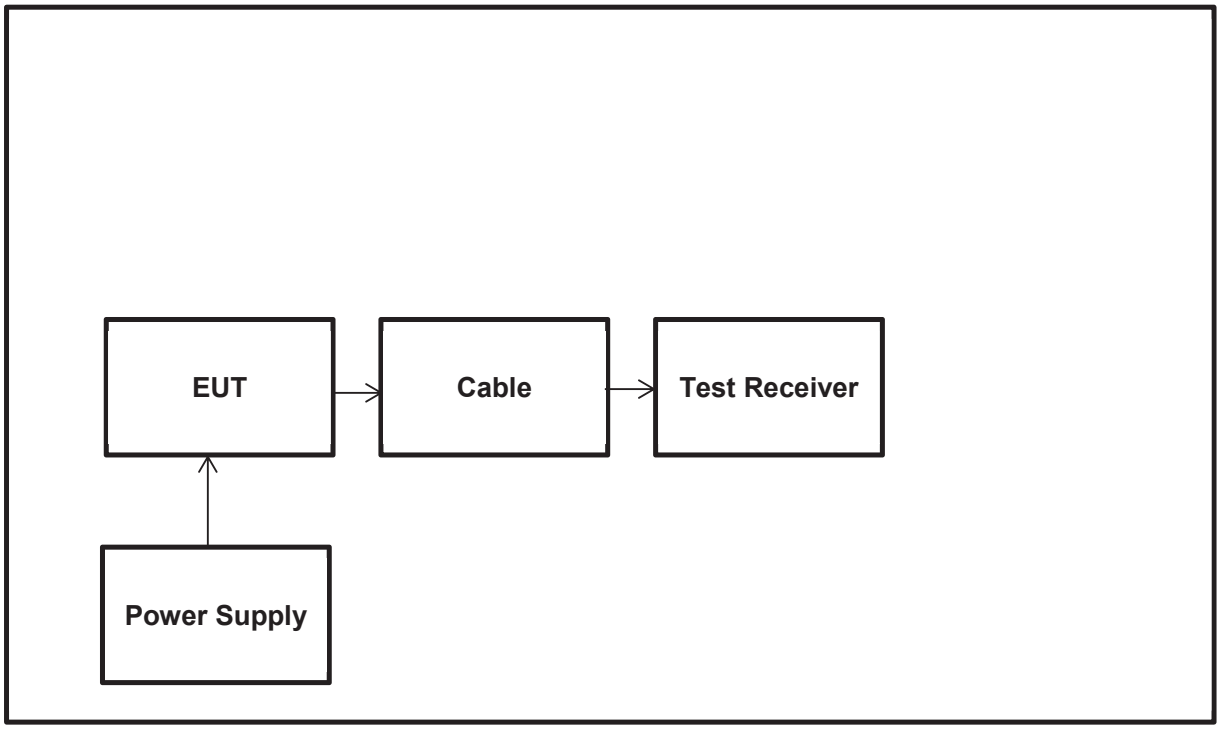
3. The RF port on the EUT was connected to the spectrum analyser using suitable attenuation and RF cable. The measured values takes into consideration the external attenuation correction factors. The RF cable attenuation (0.4 dB@2.4GHz) from the EUT to Analyzer including the 10 dB attenuation at the Spectrum Analyzer input was added as a reference level offset (10.4 dB) to each of the conducted plots.

4. The measurement was made with highest possible duty cycle.

5. The declared antenna gain was added to conducted power to obtain the EIRP.

Transmitter Maximum Peak Output Power (continued)

Test setup:



Transmitter Maximum Peak Output Power (continued)

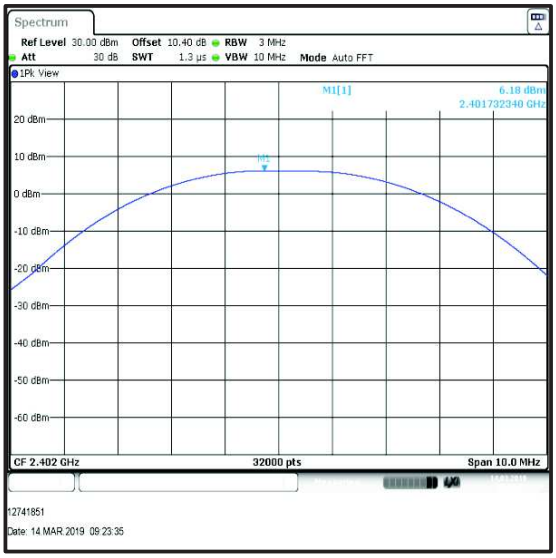
Results:

Channel	Conducted Peak Power (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	6.2	30.0	23.8	Complied
Middle	5.9	30.0	24.1	Complied
Top	5.4	30.0	24.6	Complied

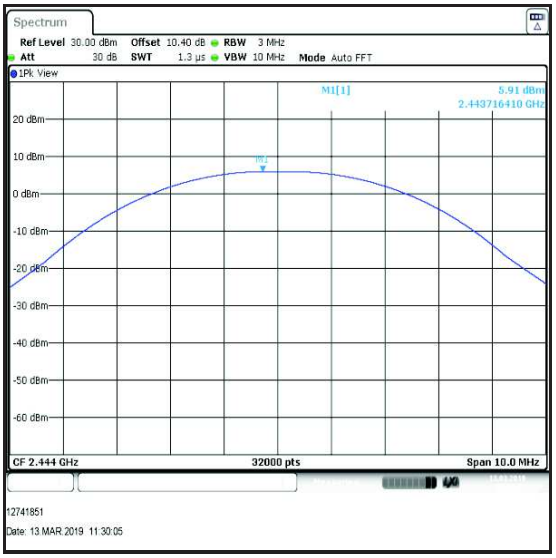
Channel	Conducted Peak Power (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	6.2	0	6.2	36.0	29.8	Complied
Middle	5.9	0	5.9	36.0	30.1	Complied
Top	5.4	0	5.4	36.0	30.6	Complied

Result: Pass

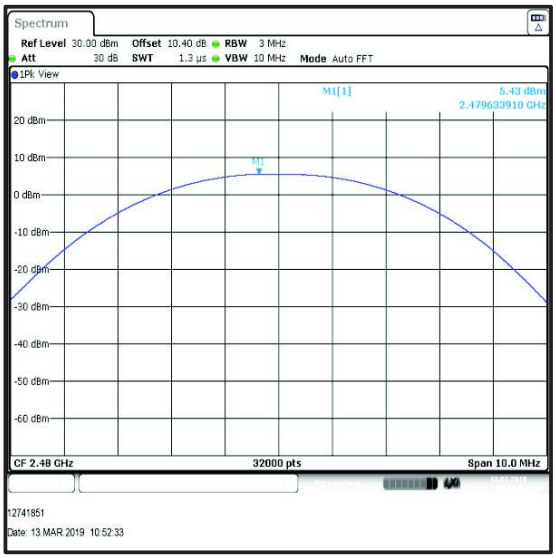
Transmitter Maximum Peak Output Power (continued)



Bottom Channel



Middle Channel



Top Channel

5.2.4. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Krume Ivanov	**Test Date:**	15 March 2019
Test Sample Serial Number:	M2MR101000236 / M2MR101000237		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referring ANSI C63.10 Sections 11.10 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

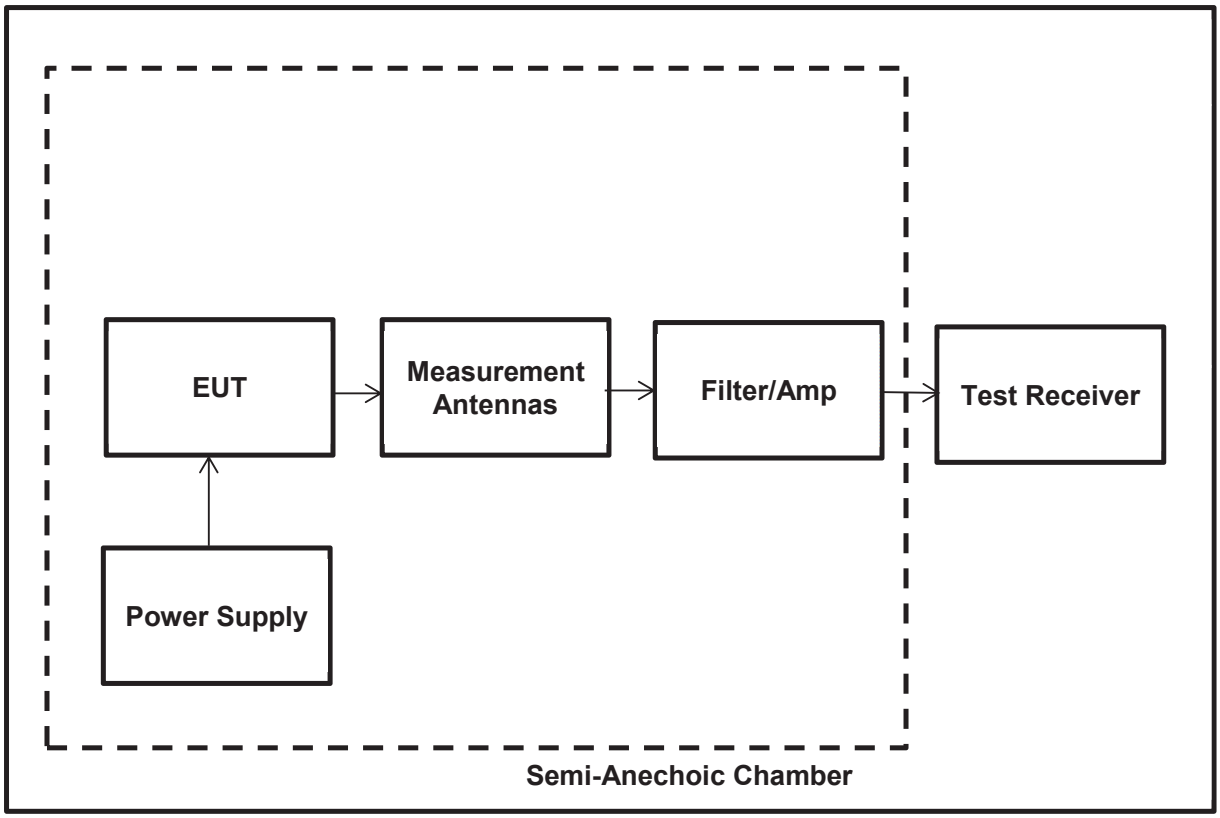
Temperature (°C):	21
Relative Humidity (%):	21

Notes:

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The preliminary scans showed similar emission levels below 1 GHz, for each channel of operation. Therefore final radiated emissions measurements were performed with the EUT set to the bottom channel only.
3. All emissions shown on the pre-scans were investigated and found to be ambient, or > 20 dB below the appropriate limit or below the noise floor of the measurement system. Therefore the highest peak noise floor reading of the measuring receiver was recorded in the table below.
4. All other emissions shown on the pre-scan plots were investigated and found to be ambient, or >20 dB below the applicable limit or below the measurement system noise floor and therefore not recorded.
5. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table below.
6. Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
7. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
8. Final measurements were performed on the marker frequencies and the results entered into the table below. The test receiver resolution bandwidth was set to 120 kHz, using a CISPR quasi-peak detector and span big enough to see the whole emission.

Transmitter Radiated Emissions (continued)

Test Setup:

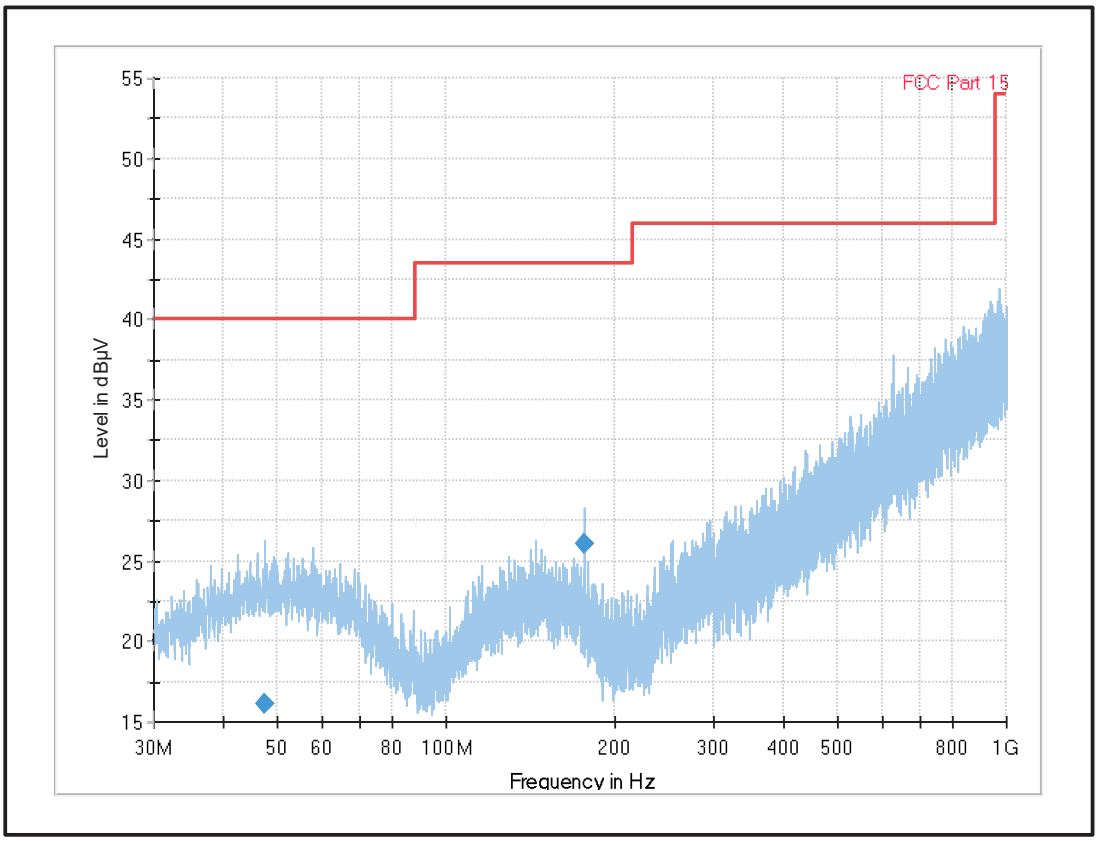


Transmitter Radiated Emissions (continued)

Results: Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Result
47.370	Vertical	16.12	40.00	23.88	Complied
175.890	Vertical	26.08	43.50	17.42	Complied

Plot: 30 MHz – 1GHz (bottom channel)



Note: This plot is a pre-scan and for indication purposes only. For final measurements, see accompanying table.

Result: Pass

Transmitter Radiated Emissions (continued)

Test Summary:

Test Engineer:	Krume Ivanov	**Test Date:**	13 & 15 March 2019
Test Sample Serial Number:	M2MR101000236 / M2MR101000237		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referring ANSI C63.10 Sections 11.10 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.6
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	21

Notes:

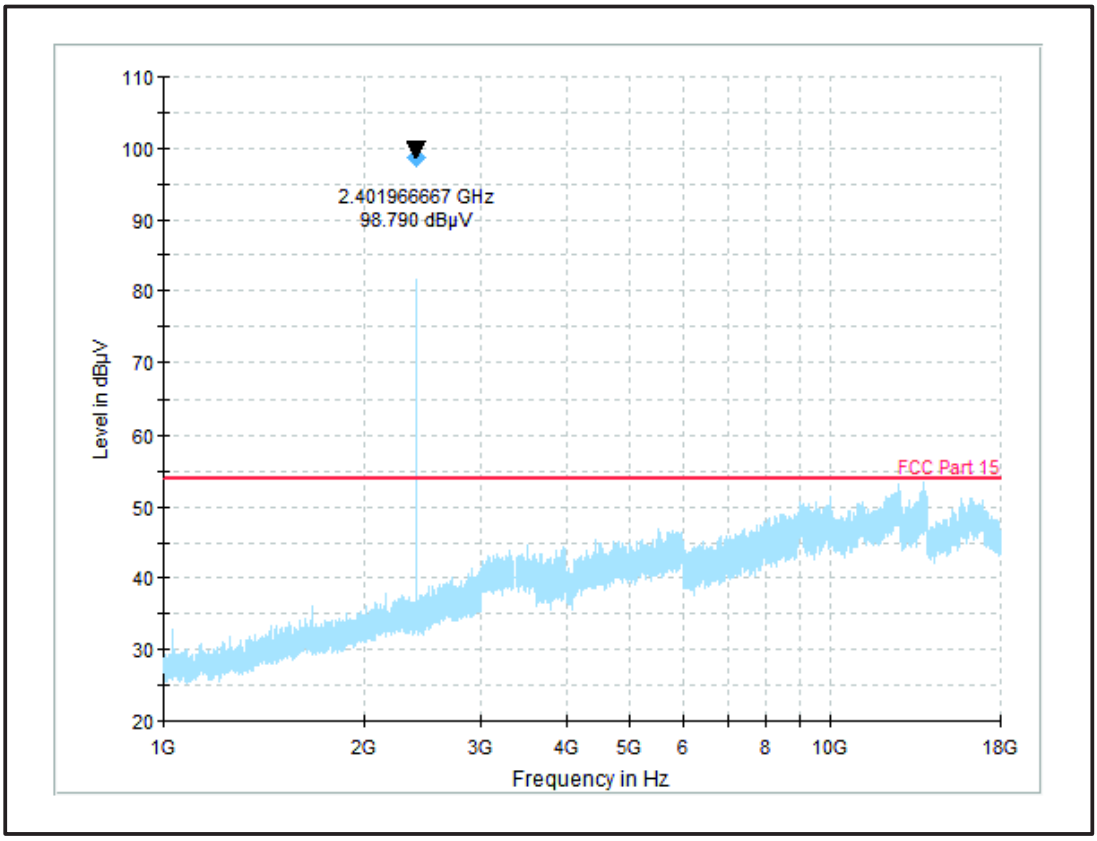
1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. All other emissions shown on the pre-scan plot were investigated and found to be ambient or >20 dB below the applicable limit or below the measurement system noise floor.
3. No spurious emissions were detected above the noise floor of the measuring receiver therefore the highest peak noise floor reading of the measuring receiver was recorded as shown in the table above. The peak level was compared to the average limit as opposed to being compared to the peak limit because this is the more onerous limit.
4. The emission shown on the 1 GHz to 4 GHz plot is the EUT fundamental.
5. Pre-scans above 1 GHz were performed in a fully anechoic chamber (Asset Number K0002) at a distance of 3 metres. The EUT was placed at a height of 1.5 metres above the test chamber floor in the centre of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 metres above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 metres. The EUT was placed at a height of 1.5 m above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
6. Pre-scans were performed and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.
7. *In accordance with ANSI C63.10 Section 6.6.4.3, Note 1, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.
8. The reference level for the emission in the non-restricted band was established by following KDB 558074 Section 8.5 referring Section 11.11 of ANSI C63.10 procedure.
9. **-20 dBc limit applies in non-restricted band as the conducted output power measurements were performed using a peak detector.

Transmitter Radiated Emissions (continued)

Results: Peak / Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

Plot: 1 GHz – 18GHz (bottom channel) with Peak detector



Note: The above plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

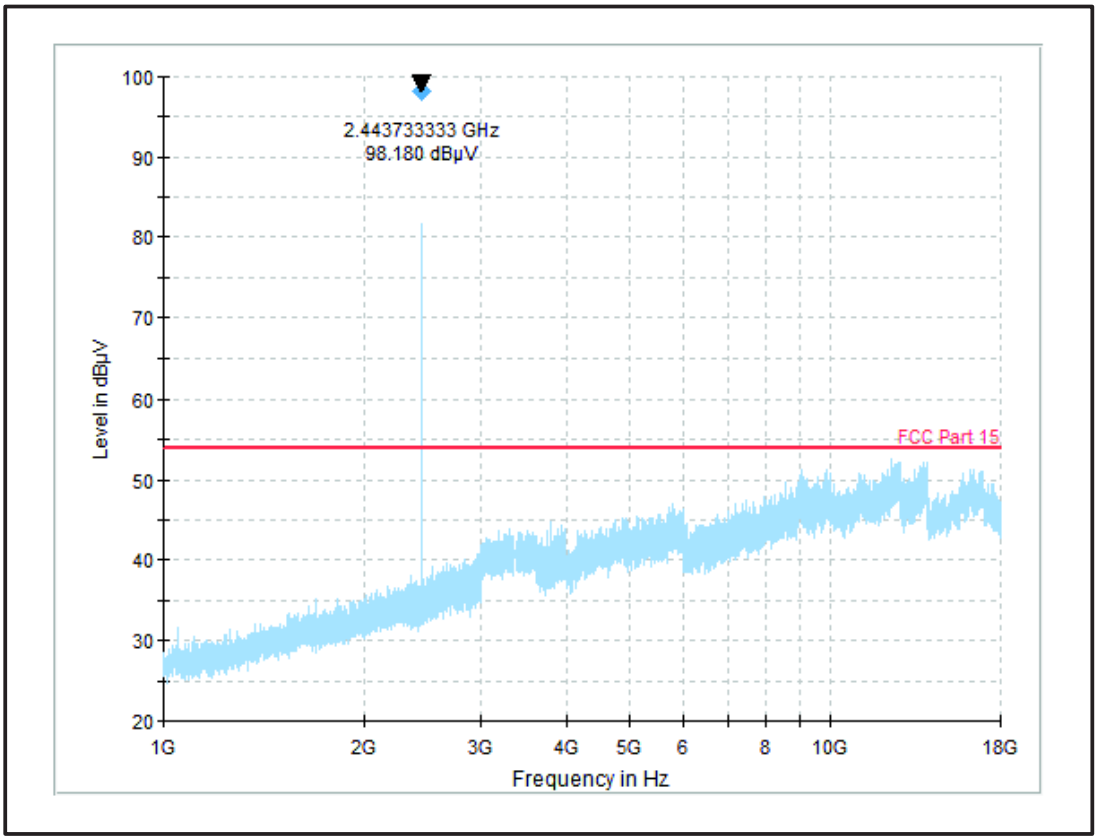
Result: Pass

Transmitter Radiated Emissions (continued)

Results: Peak / Middle Channel

Frequency (MHz)	Antenna Polarity	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

Plot: 1 GHz – 18GHz (middle channel) with Peak detector



Note: The above plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

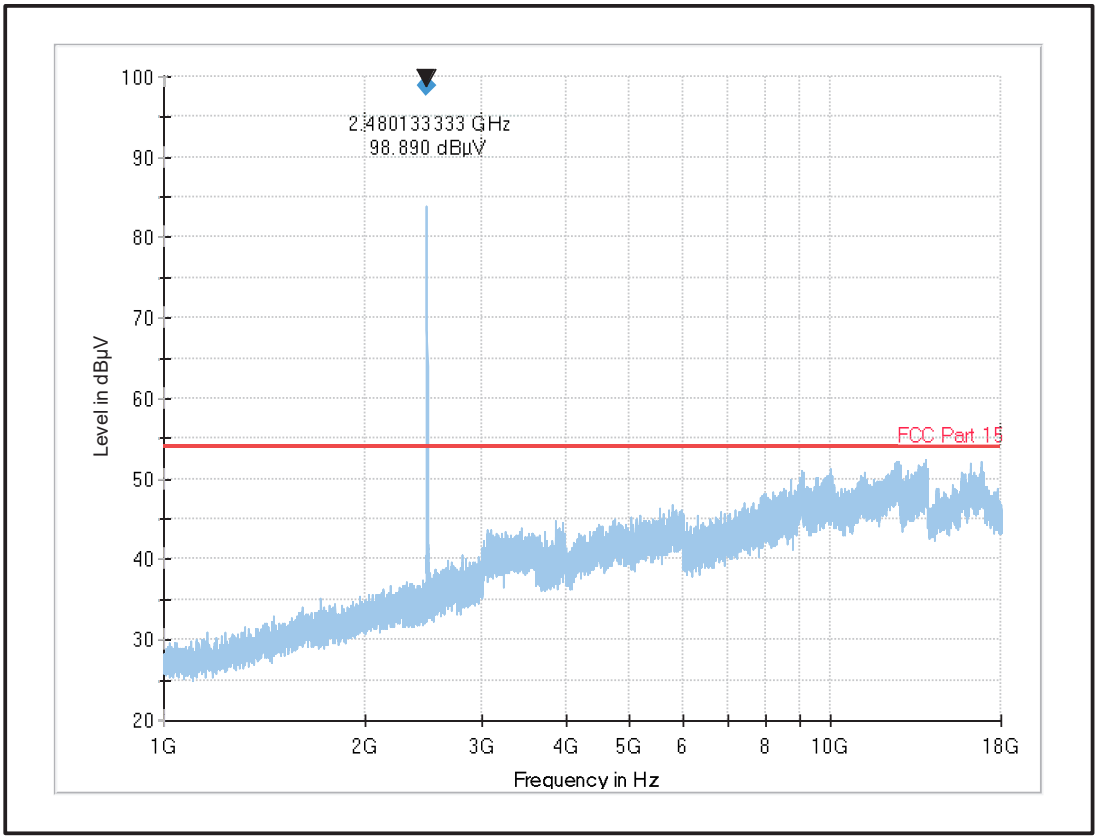
Result: Pass

Transmitter Radiated Emissions (continued)

Results: Peak / Top Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

Plot: 1 GHz – 18GHz (top channel) with Peak detector



Note: The above plot is a pre-scan and for indication purposes only. For final measurements, see accompanying tables.

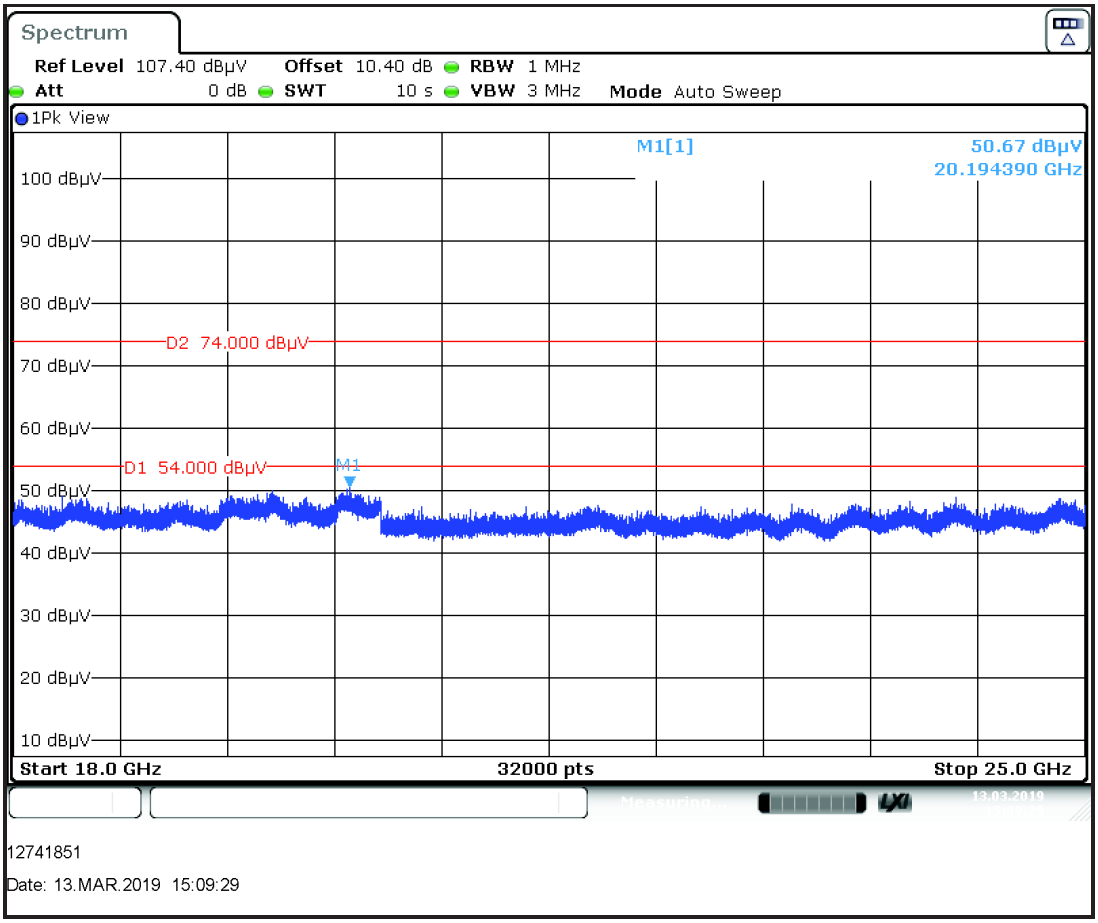
Result: Pass

Transmitter Radiated Emissions (continued)

Results: Peak / Bottom Channel

Frequency (MHz)	Antenna Polarization	Peak Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
No critical spurious was found					

Plot: 18 GHz – 25GHz (bottom channel)



Note: The above plots are pre-scans and for indication purposes only. For final measurements, see accompanying tables.

Result: Pass

5.2.5. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Krume Ivanov	**Test Date:**	12 & 15 March 2019
Test Sample Serial Number:	M2MR101000236 / M2MR101000237		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.7 referring ANSI C63.10:2013 Section 6.10.4, 6.10.5 & Section 11.11

Environmental Conditions:

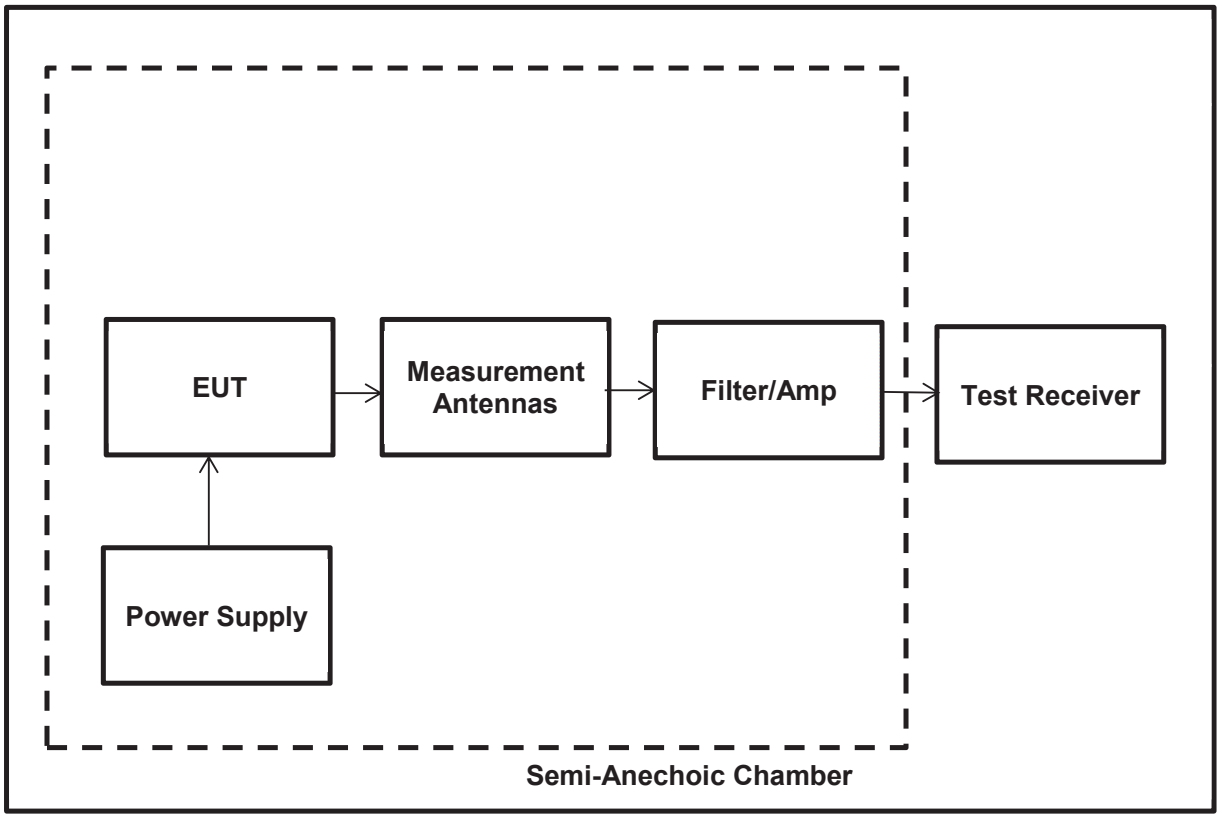
Temperature (°C):	21
Relative Humidity (%):	21

Notes:

1. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
2. The maximum peak conducted output power was previously measured. In accordance with FCC KDB 558074 Section 8.7 lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
3. As the lower band edge falls within a non-restricted band, only peak measurements are required. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. Marker frequencies and levels were recorded.
4. As the upper band edge falls within a restricted band both peak and average measurements were recorded by placing a marker at the edge of the band. For peak measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. For average measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 10 Hz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold. The test receiver was left to sweep for a sufficient length of time in order to maximise the carrier level and out-of-band emissions. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher level emission was present). Marker frequencies and levels were recorded.
5. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: the RBW set to 1 MHz, the VBW set to 3 MHz, with the sweep time set to auto couple. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.
6. The measured Average Level has been corrected by adding Duty Cycle Correction Factor (3.2 dB) into it.

Transmitter Band Edge Radiated Emissions (continued)

Test Setup:



Transmitter Band Edge Radiated Emissions (continued)

Results: Lower Band Edge/Peak

Frequency (MHz)	Peak Level (dBµV/m)	-20 dBc Limit (dBµV/m)	Margin (dB)	Result
2400.0	40.54	70.00	29.46	Complied
2384.4	36.83	70.00	33.17	Complied

Results: Upper Band Edge / Restricted Band/Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2483.83	51.94	74.0	22.06	Complied
2483.50	52.63	74.0	21.37	Complied

Results: Upper Band Edge / Restricted Band/Average

Frequency (MHz)	Measured Average Level (dBµV/m)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2483.83	40.70	43.9	54.0	10.1	Complied
2483.50	44.15	47.35	54.0	6.65	Complied

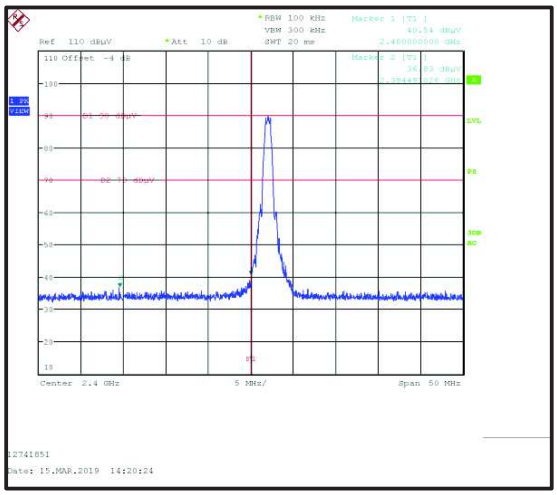
Results: 2310 to 2390 MHz Restricted Band/Peak

Frequency (MHz)	Peak Level (dBµV/m)	Peak Limit (dBµV/m)	Margin (dB)	Result
2343.58	57.38	74.0	16.62	Complied

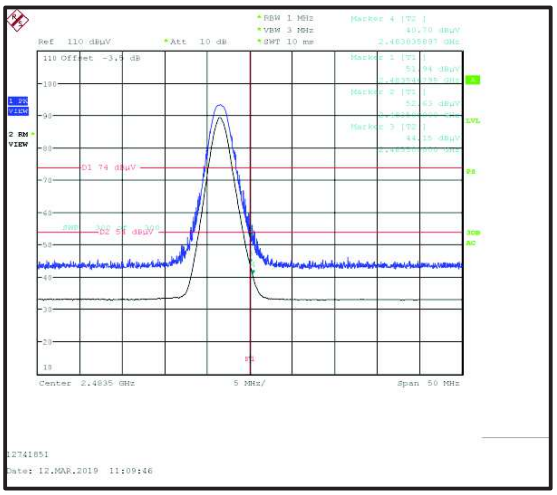
Results: 2310 to 2390 MHz Restricted Band/Average

Frequency (MHz)	Measured Average Level (dBµV/m)	Corrected Average Level (dBµV/m)	Average Limit (dBµV/m)	Margin (dB)	Result
2389.23	44.40	47.60	54.0	6.4	Complied

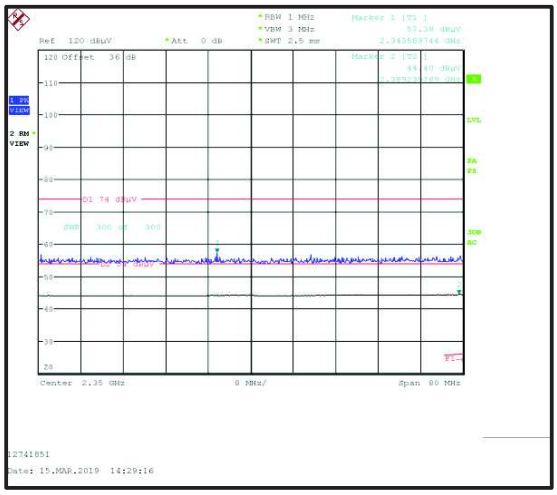
Transmitter Band Edge Radiated Emissions (continued)



Lower Band Edge Peak Measurement



Upper Band Edge Peak & Average Measurement



2310 MHz to 2390 MHz Restricted Band Plot

6. Measurement Uncertainty

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Confidence Level (%)	Calculated Uncertainty
Conducted Maximum Peak Output Power	95%	±0.59 dB
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated Emissions	95%	±3.10 dB
Minimum 6 dB Bandwidth	95%	±0.87 %
Spectral Power Density	95%	±0.59 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

7. Used equipment

Test site: SR 1/2

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	7/12/2018	12
383	Rohde & Schwarz	Antenna, Rod	HFH2-Z1	890151/11	7/14/2017	24
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	055929	7/12/2018	12
424	EMCO	Antenna, Horn	EMCO 3116	00046537	7/28/2016	24
460	Deisl	Turntable	DT 4250 S		n/a	n/a
465	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	8/8/2016	36
495	Rohde & Schwarz	Antenna, Log.- Periodical	HL050	100296	7/20/2016	36
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	7/12/2018	12
608	Rohde & Schwarz	Switch Matrix	OSP 120	101227	4/8/2014	60
615	Wainwright Instruments	Highpass Filter 1GHz	WHKX12-	3	Lab verification	n/a
620	Bonn Elektronik	pre-amplifier	BLNA 0110-01N	1510111	7/12/2017	24
628	Maturo	Antenna mast	CAM 4.0-P	224/19590716	n/a	n/a
629	Maturo	Kippeinrichtung	KE 2.5-R-M	MAT002	n/a	n/a

Test site: SR 9

ID	Manufacturer	Type	Model	Serial No.	Calibration Date	Cal. Cycle
636	Rohde & Schwarz	switching unit	OSP120	101698	7/12/2018	12
637	Rohde & Schwarz	Spectrum Analyzer	FSV40	101587	7/11/2018	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	55929	7/12/2018	24
195	SPS	Power Supply	TOE8842-24	51455	Verified by Multimeter	12
216	Agilent	Multimeter	34401A	US36017458	7/11/2017	24

8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	-	-	Initial Version