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TEST REPORT

Report Number: 22060748HKG-001

Application for Original Grant of 47 CFR Part 15 Certification

New Family of RSS-247 Issue 2 Equipment

(Parent Unit)

FCC ID: EW780-1320-01A

IC: 1135B-80132001A

Prepared and Checked by:	Approved by:
Signed On File Leung Chun Ning, Peter Assistant Engineer	Digitally signed by Herbert Wong Location: Intertek Testing Services Hong Kong Limited Wong Cheuk Ho, Herbert Assistant Supervisor Date: March 06, 2023

TEST REPORT

GENERAL INFORMATION

Applicant Name:	VTech Telecommunications Ltd.
Applicant Address:	23/F., Tai Ping Industrial Centre, Block 1, 57 Ting Kok Road, Tai Po, Hong Kong.
FCC Specification Standard:	FCC Part 15, October 1, 2021 Edition
FCC ID:	EW780-1320-01A
FCC Model(s):	VM3252 PU, VM3252-2 PU
IC Specification Standard:	RSS-247 Issue 2, February 2017 RSS-Gen Issue 5 Amendment 2, February 2021
IC:	1135B-80132001A
HVIN:	35-201977PU
PMN:	VM3252 PU, VM3252-2 PU
VTech Model(s):	VM3252 PU, VM3252-2 PU
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	Video Monitor - Parent Unit
Serial Number:	N/A
Sample Receipt Date:	June 14, 2022
Date of Test:	June 14, 2022 to March 02, 2023
Report Date:	March 06, 2023
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 / RSS-247 Issue 2 Certification.

TEST REPORT

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TEST REPORT

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-247/ RSS-Gen# Section	Results	Details See Section
Antenna Requirement	15.203	8.3#	Pass	2.1
Max. Conducted Output Power	15.247(b)(1) & (4)	5.4(2)	Pass	4.1
Max. 20dB RF Bandwidth	N/A	5.1(1)	Pass	4.2
Min. No. of Hopping Frequencies	15.247(a)(1)(iii)	5.1(4)	Pass	4.3
Min. Hopping Channel Carrier Frequency Separation	15.247(a)(1)	5.1(2)	Pass	4.4
Average Time of Occupancy	15.247(a)(1)(iii)	5.1(4)	Pass	4.5
Out of Band Antenna Conducted Emission	15.247(d)	5.5	Pass	4.6
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d)	8.10#	Pass	4.8
AC Power Line Conducted Emission	15.207 & 15.107	8.8#	Pass	4.9

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, October 1, 2021 Edition
RSS-247 Issue 2, February 2017
RSS-Gen Issue 5 Amendment 2, February 2021

TEST REPORT

2.0 GENERAL DESCRIPTION

2.1 Product Description

The VM3252 PU (35-201977PU) is a Video Monitor - Parent Unit.

The Equipment Under Test (EUT) operates at frequency range of 2405MHz to 2475MHz. There are totally 32 non-overlapping channels with 2MHz channel separation and 16 active channels out of the 32 channels.

The EUT is powered by an AC/DC Adaptor.

The antenna used in the EUT is integral, and the test sample is a prototype.

For FCC, the Model(s): VM3252-2 PU is the same as the Model: VM3252 PU in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure as declared by client. The only differences between these models are color and model number to be sold for marketing purpose as declared by client.

The circuit description and frequency hopping algorithm are attached in the Appendix and saved with filename: descri.pdf.

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2014). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The radiated emission test site, AC power line conducted measurement facility and antenna port conducted measurement facility used to collect the radiated data, AC Power Line conducted data, and conductive data are at Intertek Testing Services Hong Kong Ltd., which is located at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong SAR, China. This test facility and site measurement data have been fully placed on file with FCC and Industry Canada No. 2042H, CABID is “HKAP01”.

TEST REPORT

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by 120VAC during test.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable at 0.8m height from the ground plane for emission testing at or below 1GHz and 1.5m for emission measurements above 1GHz. If the baby unit attached to peripherals, they were connected and operational (as typical as possible). The parent unit was remotely located as far from the antenna and the baby as possible to ensure full power transmission from the parent unit. Else, the base was wired to transmit full power with modulation.

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

For transmitter radiated measurement, the spectrum analyzer resolution bandwidth was 100 kHz for frequencies below 1000 MHz. The resolution bandwidth was 3 MHz for frequencies above 1000 MHz.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Receiver was performed from 30MHz to the fifth harmonic of the highest frequency or 40GHz, whichever is lower.

TEST REPORT

3.1 Justification - Cont'd

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitry used to control additional functions other than the operation of the transmitter is subject to FCC Part Section 15.109 Limits.

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.3.4.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.3.4. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes have been tested, and the worst-case data is included in this report.

3.2 EUT Exercising Software

The EUT exercise program used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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3.3 Details of EUT and Description of Accessories

Details of EUT:

An AC adaptor (provided with the unit) was used to power the device. Their description are listed below.

(1) An AC adaptor (Model: VT05EUS06050; Input: 100-240VAC 50/60Hz; Output: 6VDC 500mA) (Provided by Applicant)

Description of Accessories:

(1) Baby Unit, Model: VM3252 BU (Provided by Applicant)

There are no accessories for compliance of this product.

3.4 Measurement Uncertainty

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, Cl 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level (k=2). In case, the measured value is within guard band region, undetermined decision will be used. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are ± 5.3dB and ±0.99dB respectively. The value of the Measurement uncertainty for conducted emission test is ±4.2dB.

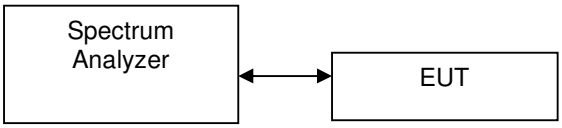
Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

TEST REPORT

4.0 TEST RESULTS

RF Conducted measurement Test Setup by a Spectrum Analyzer.

The figure below shows the test setup, which is utilized to make these measurements.



4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

☐ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to obtain power at the EUT antenna terminals.

☒ The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW>20dB bandwidth and power was read directly in dBm. External attenuation and cable loss were compensated for using the OFFSET function of the analyzer.

(Parent Unit) Antenna Gain = 0 dBi

Frequency (MHz)	Output in dBm	Output in mWatt
Low Channel: 2405	13.38	21.8
Middle Channel: 2439	13.10	20.4
High Channel: 2475	12.40	17.4

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

dBm max. output level = 13.38 dBm

Limits:
☒ 0.125W (21dBm) for antennas with gains of 6dBi or less

☐ 0.25W (24dBm) for antennas with gains of 6dBi or less

☐ 1W (30dBm) for antennas with gains of 6dBi or less

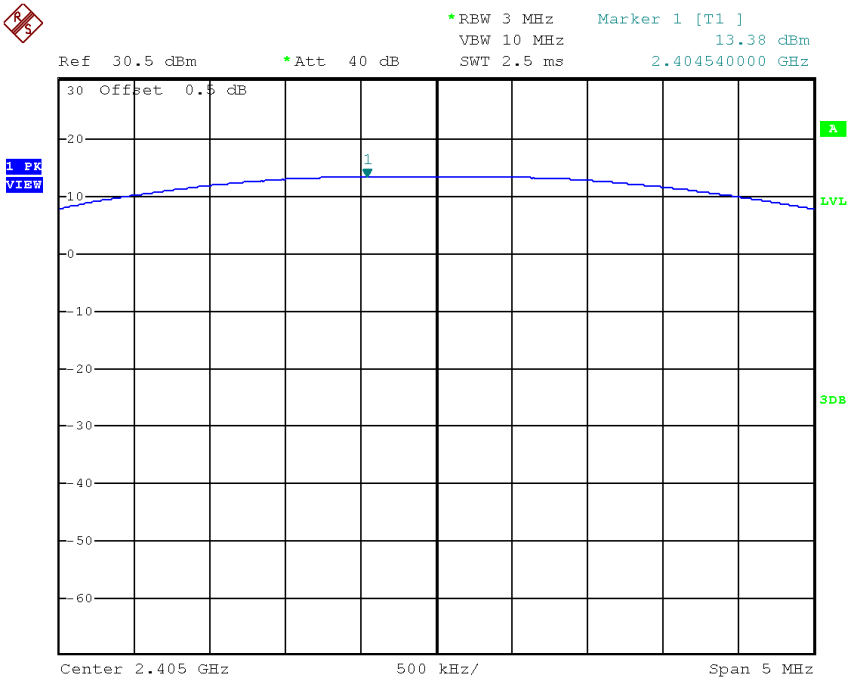
☐ ___W (___dBm) for antennas with gains more than 6dBi

The plots of conducted output power are saved as below.

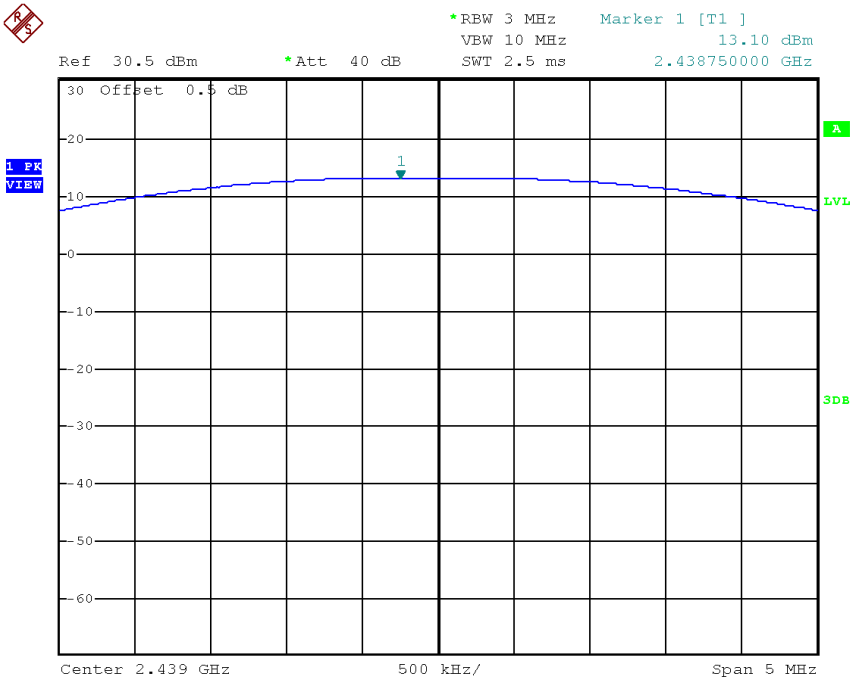
TEST REPORT

PLOTS OF CONDUCTED OUTPUT POWER

Lowest Channel



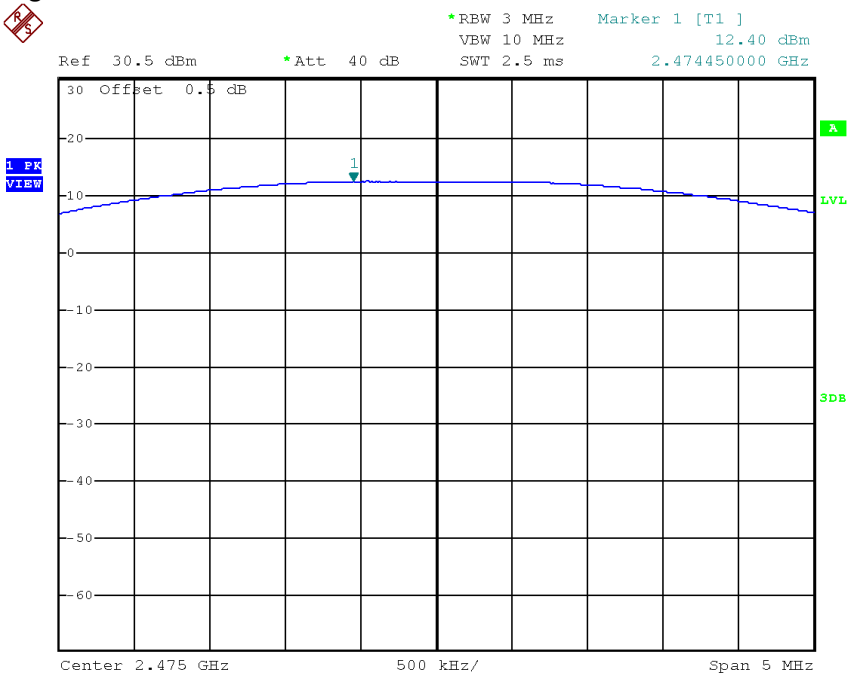
Middle Channel



TEST REPORT

PLOTS OF CONDUCTED OUTPUT POWER

Highest Channel



TEST REPORT

4.2 Maximum 20 dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was chosen so that the display was a result of the hopping channel modulation. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 20 dB lower than PEAK level. The 20 dB bandwidth was determined from where the channel output spectrum intersected the display line.

Parent Unit

Frequency (MHz)	20 dB Bandwidth (kHz)
Low Channel: 2405	2200
Middle Channel: 2439	2200
High Channel: 2475	2200

Limits

☐ ≤500kHz for 902-928MHz

☒ N/A for 2400-2483.5MHz

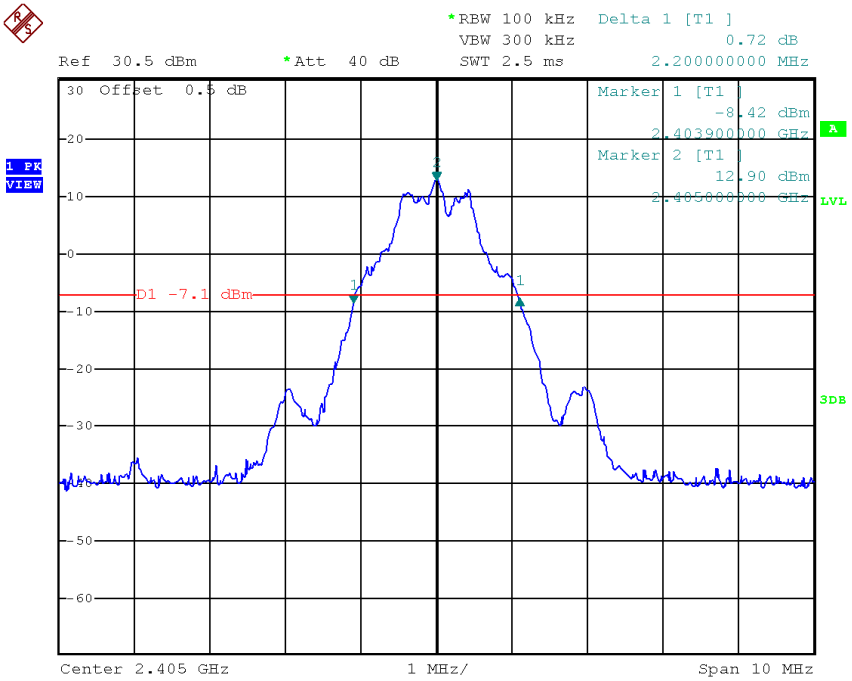
☐ ≤1MHz for 5725-5850MHz

The plots of 20dB RF bandwidth are saved as below.

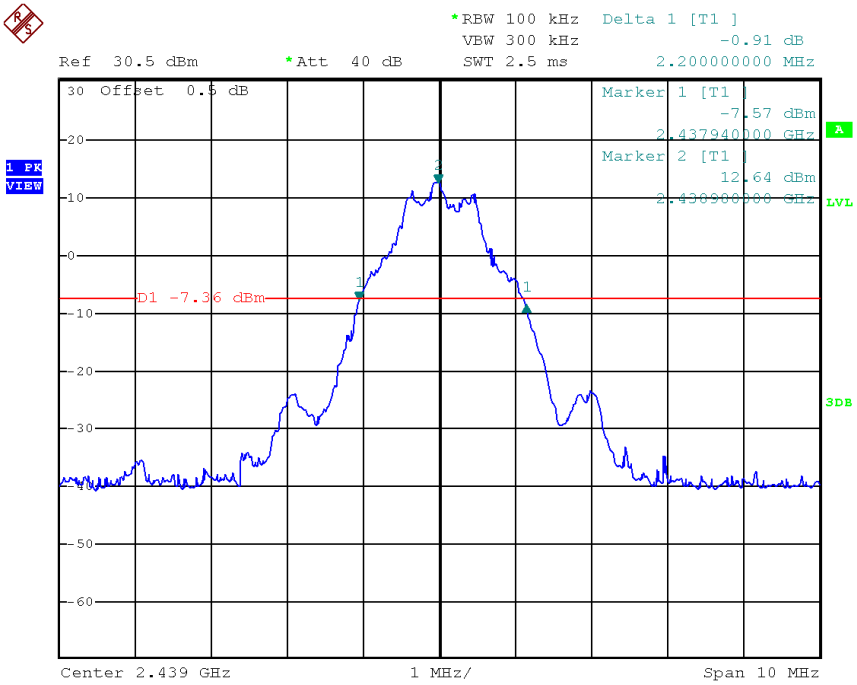
TEST REPORT

PLOTS OF 20dB RF BANDWIDTH

Lowest Channel



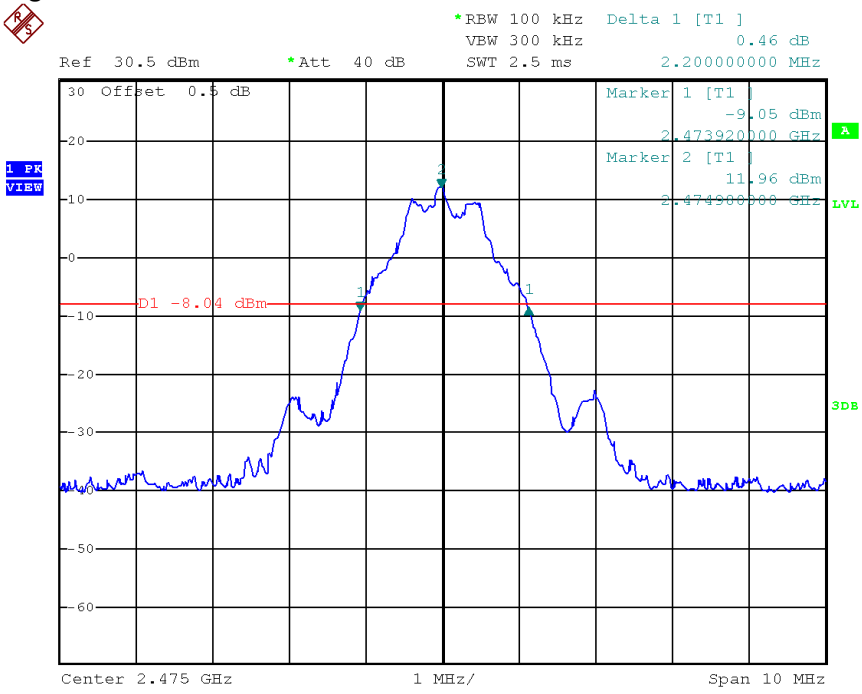
Middle Channel



TEST REPORT

PLOTS OF 20dB RF BANDWIDTH

Highest Channel



TEST REPORT

4.3 Minimum Number of Hopping Frequencies

With the analyzer set to MAX HOLD readings were taken for 2-3 minutes in each band. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

	Parent Unit
No. of Hopping Channels	16

Minimum Requirements:

☐ at least 50 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel < 250kHz)

☐ at least 25 hopping channels for 902MHz-928MHz (20 dB bandwidth of hopping channel ≥ 250kHz)

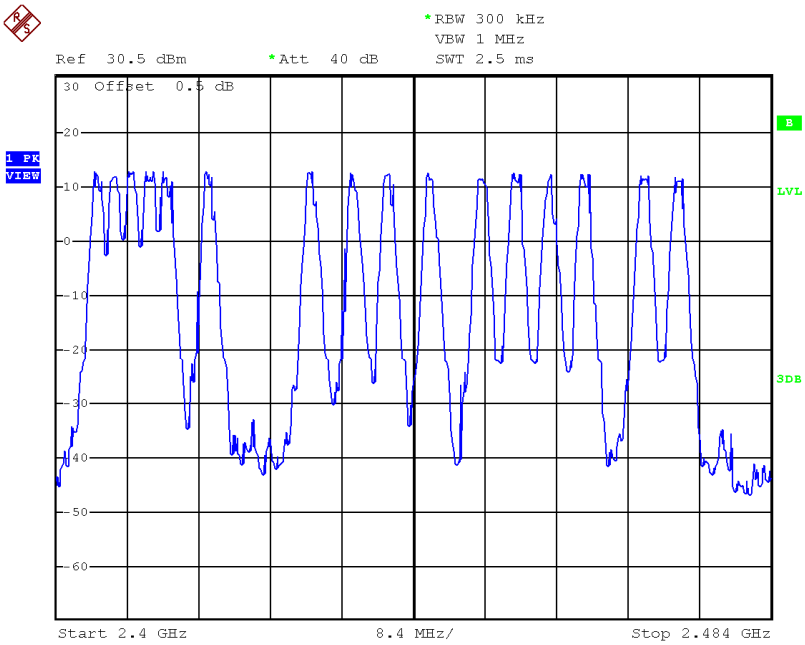
☒ at least 15 hopping channels for 2400MHz-2483.5MHz.

☐ at least 75 hopping channels for 5725MHz-5850MHz.

The plots of number of hopping frequencies are saved as below.

TEST REPORT

PLOTS OF NUMBER OF HOPPING FREQUENCIES



TEST REPORT

4.4 Minimum Hopping Channel Carrier Frequency Separation

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and met the requirement.

	Parent Unit
Channel Separation (Channel 1 and Channel 2)	2000kHz

Limits:
The channel separation must be larger than:

☐ 25 kHz

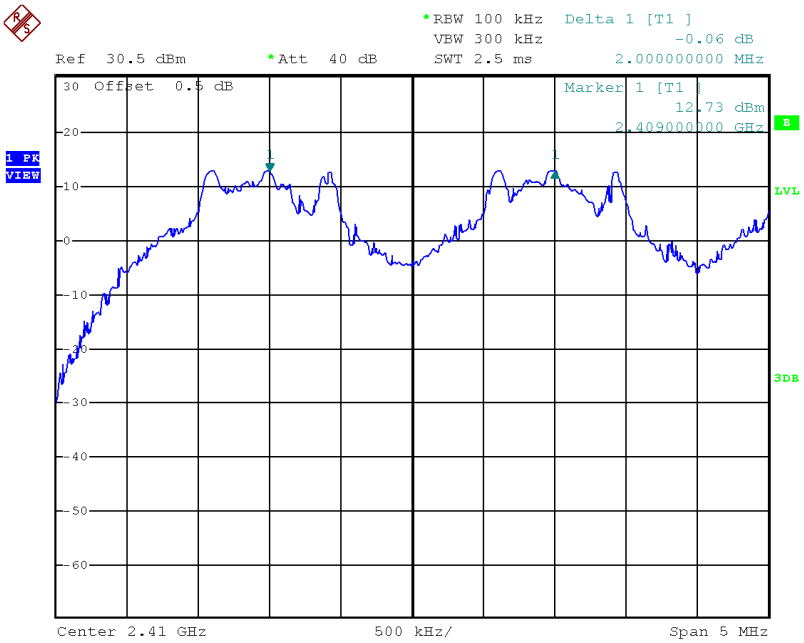
☐ 20 dB bandwidth of hopping channel: ___Hz

☒ 2/3 of 20dB bandwidth of hopping channel: 1467kHz

The plot(s) of hopping channel carrier frequency separation is saved as below.

TEST REPORT

PLOTS OF HOPPING CHANNEL CARRIER FREQUENCY SEPARATION



TEST REPORT

4.5 Average Channel Occupancy Time

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 1ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmission so captured was measured with the MARKER DELTA function.

The SWEEP was then set to the time required by the regulation (20 seconds for 902-928 MHz devices, if the 20dB bandwidth is less than 250kHz, 10 seconds for 902-928 MHz if the 20dB bandwidth is or greater than 250kHz, "0.4 seconds x Number of hopping channels employed" seconds for 2400-2483.5 MHz, 30 seconds for 5725-5850 MHz). The analyzer was set to SINGLE SWEEP, the total ON time was added and compared against the limit (0.4 seconds).

Parent Unit (worst-case: 1 parent unit operation)	
Average Occupancy Time (Traffic – in a clear RF environment) =	0.96ms x 40 = 38.4ms

Limits:
Average 0.4 seconds maximum occupancy in:

☒ 6.4 seconds (0.4 sec. x 16) for 2400MHz-2483.5MHz
(Traffic – in a clear RF environment)

☐ 20 seconds for 902MHz-928MHz ≥ 50 hopping channels

☐ 10 seconds for 902MHz-928MHz ≥ 25 hopping channels

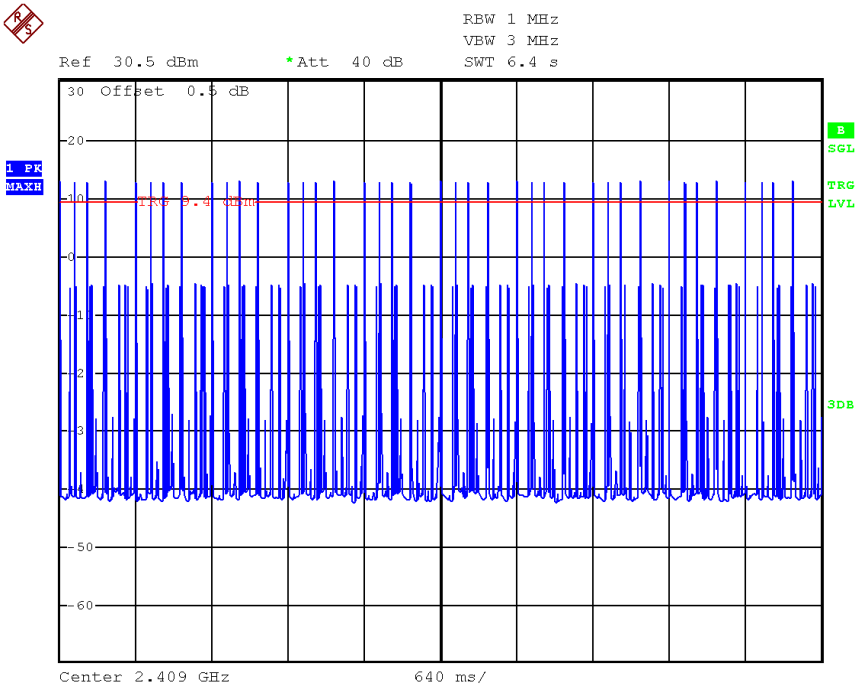
☐ 30 seconds for 5725-5850MHz

The plots of average channel occupancy time are saved as below.

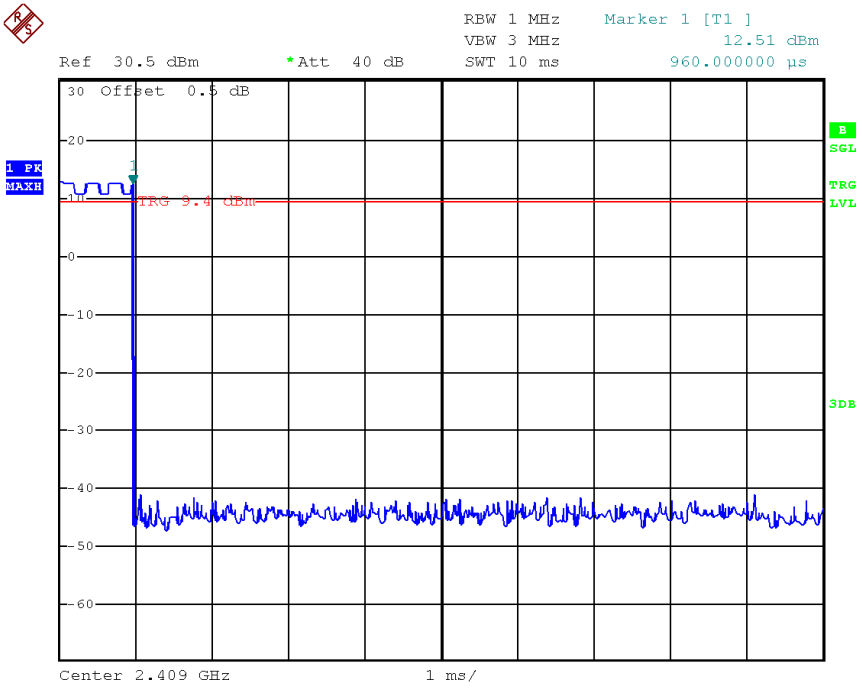
TEST REPORT

PLOTS AVERAGE CHANNEL OCCUPANCY TIME

Plot A



Plot B



TEST REPORT

4.6 Out of Band Conducted Emissions

In any 100 kHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission.

The plot(s) of bandedge compliance is shown the worst-case which has been already considered between enable and disable the hopping function of the EUT.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

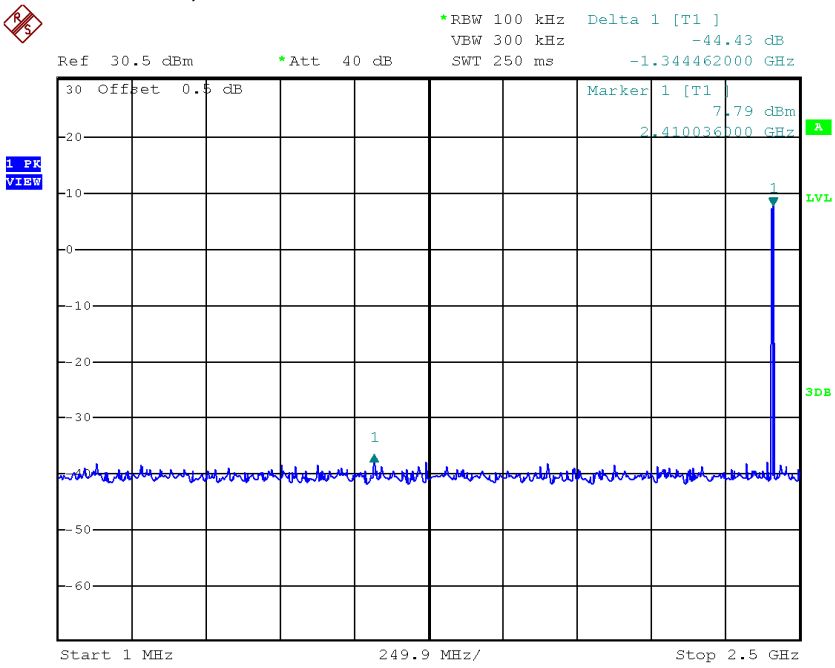
Limits:
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

The plots of out of band conducted emissions are saved as below.

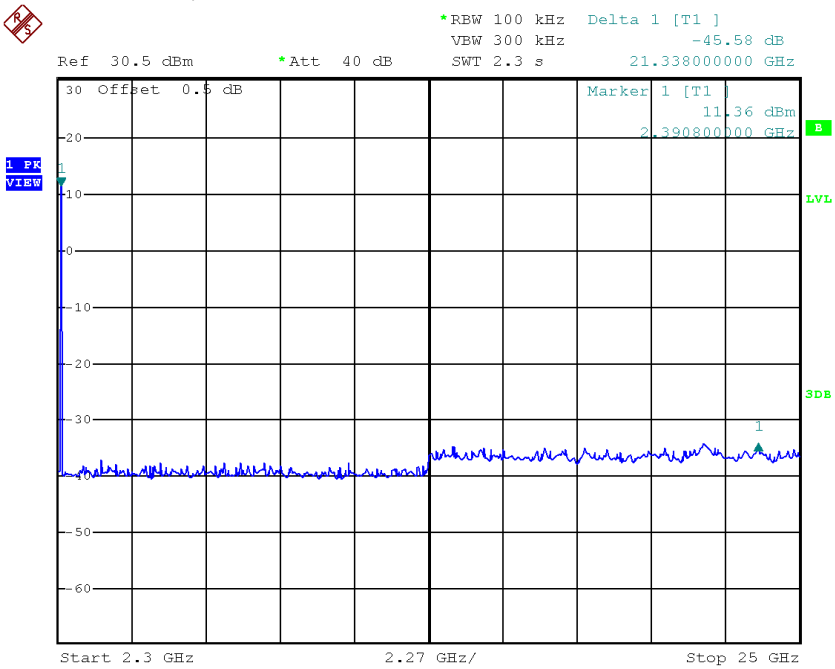
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Lowest Channel, Plot 1



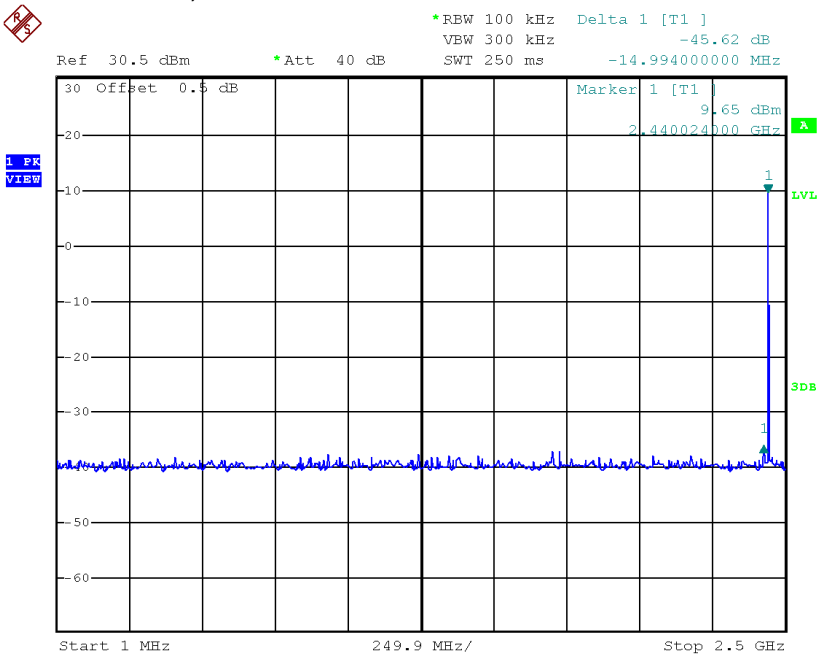
Lowest Channel, Plot 2



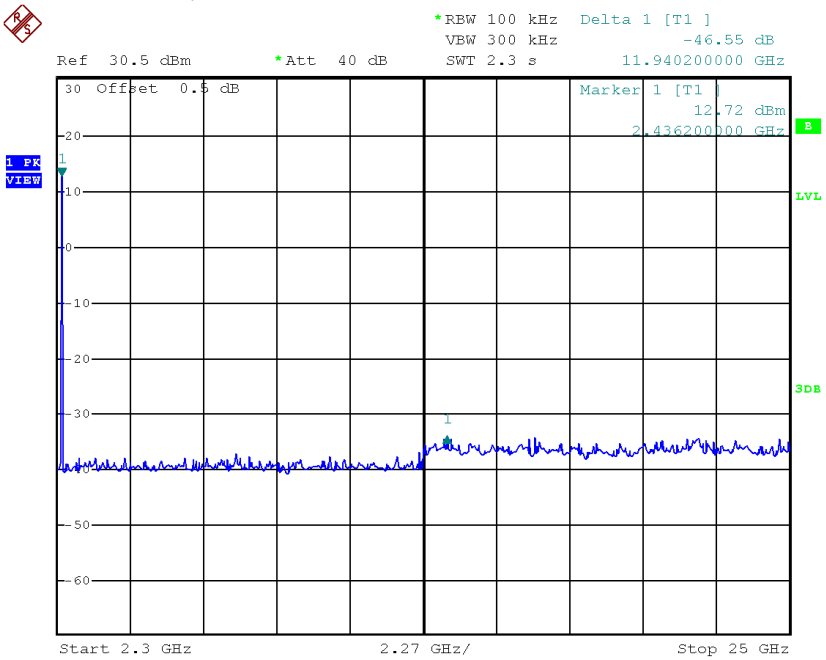
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Middle Channel, Plot 1



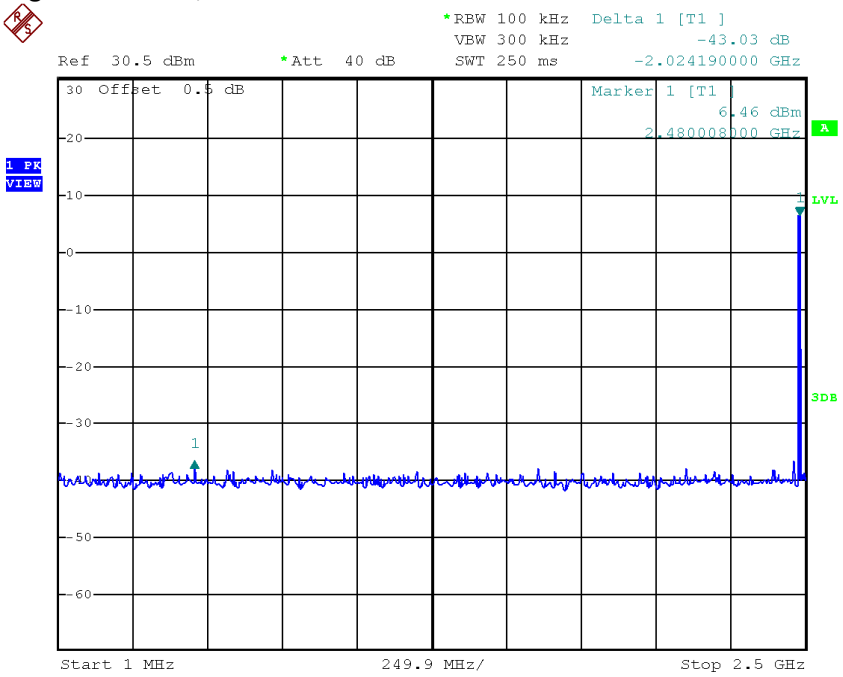
Middle Channel, Plot 2



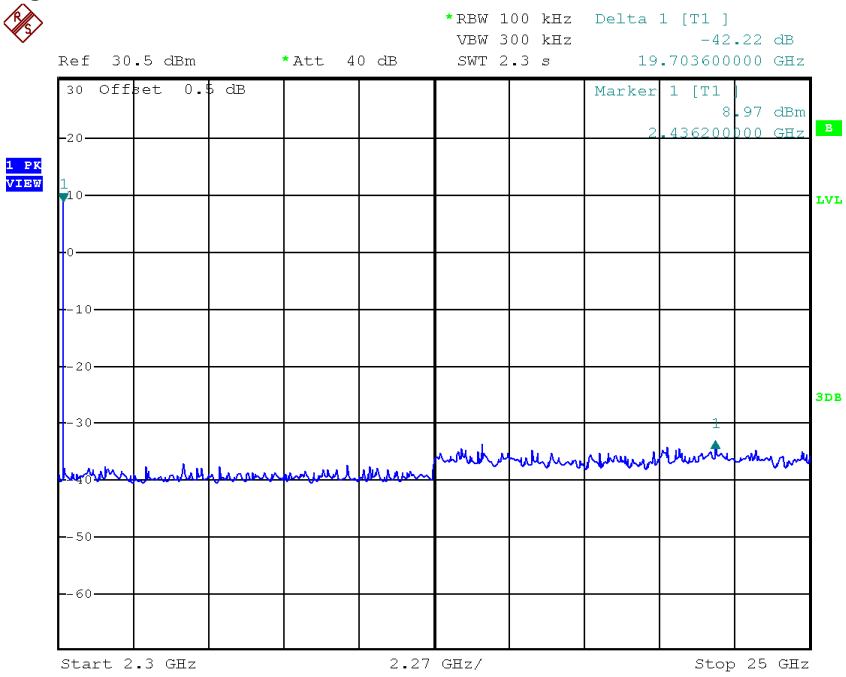
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Highest Channel, Plot 1



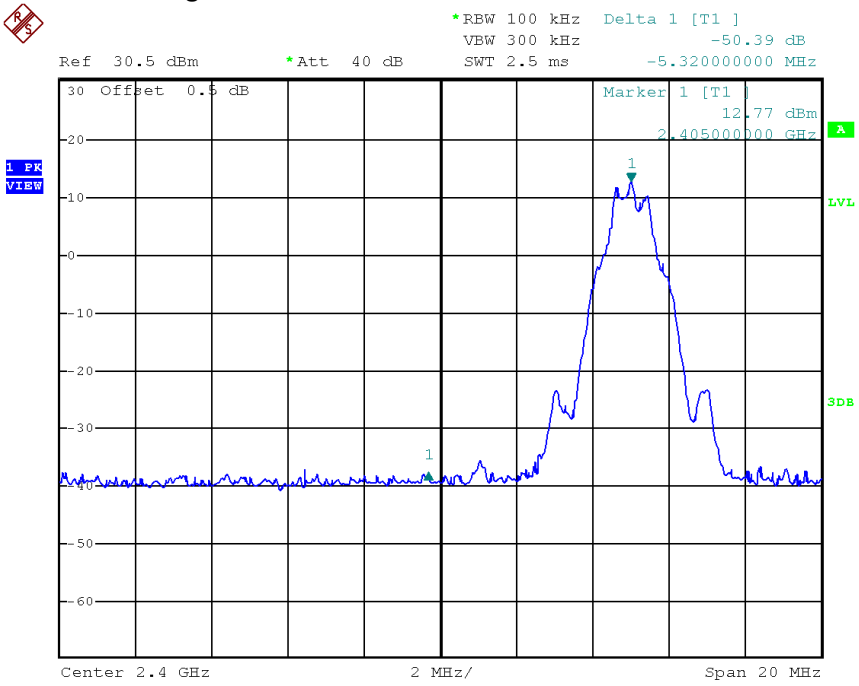
Highest Channel, Plot 2



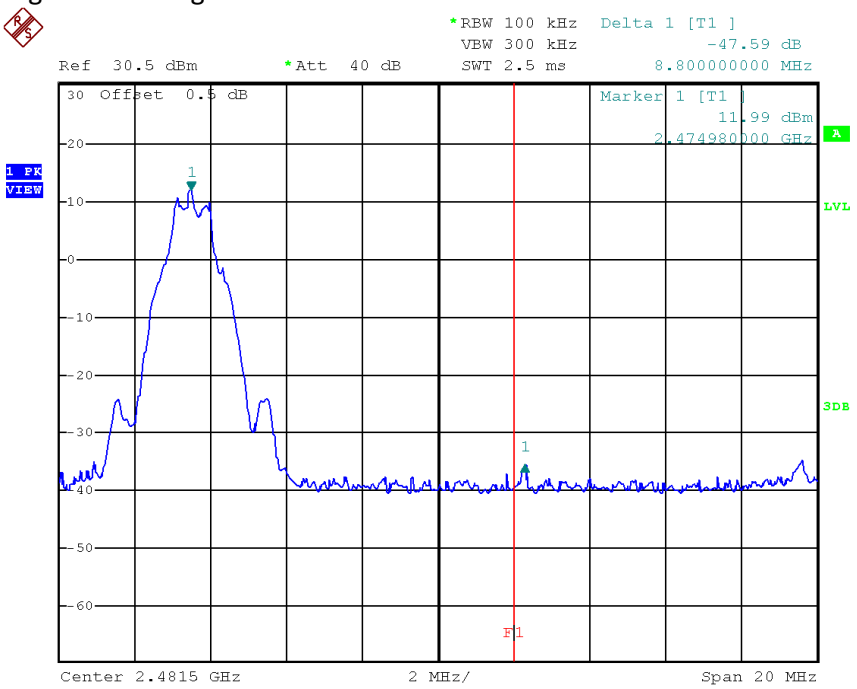
TEST REPORT

PLOTS OF BANDEDGE

Lowest Bandedge



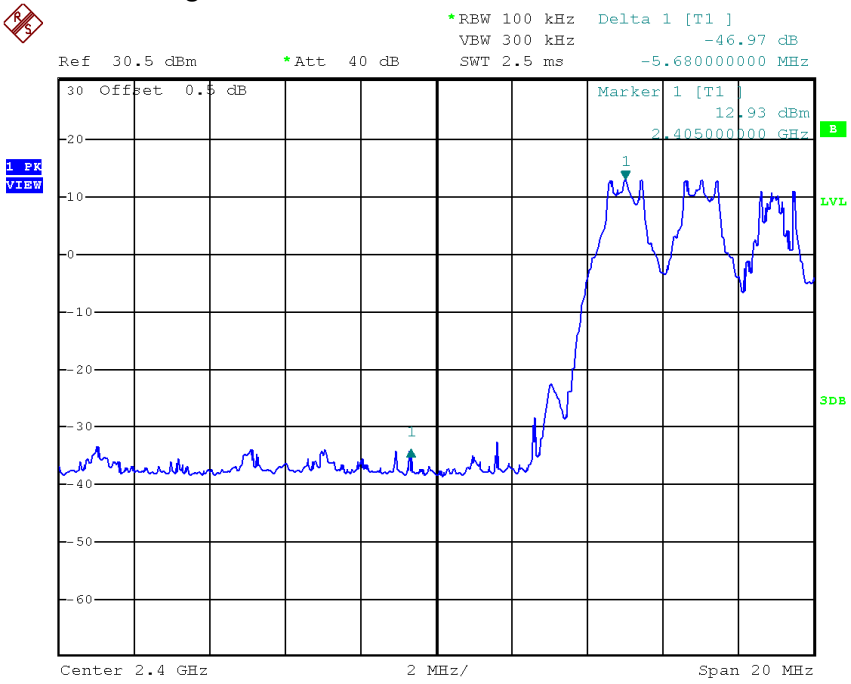
Highest Bandedge



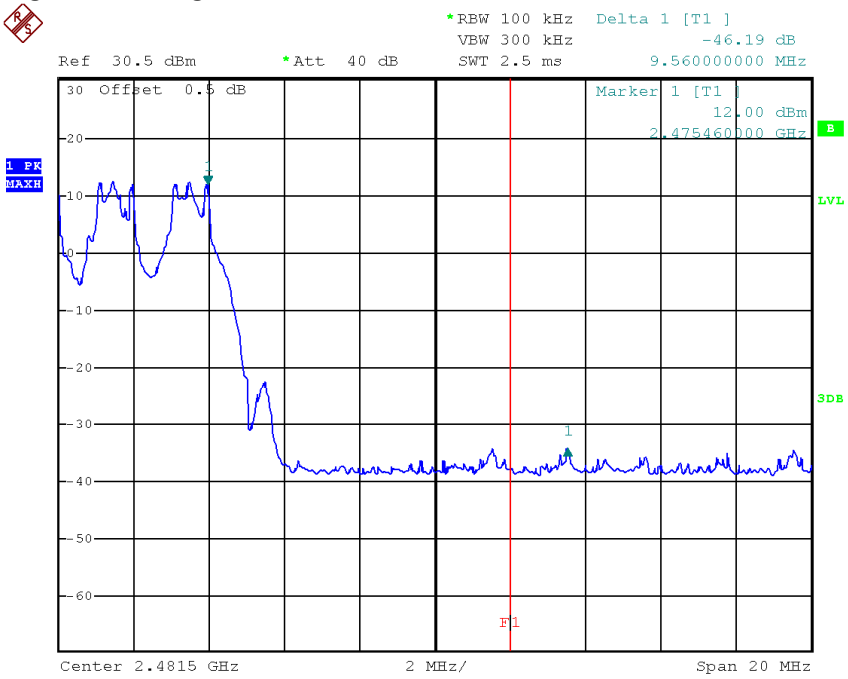
TEST REPORT

PLOTS OF BANDEDGE (HOPPING)

Lowest Bandedge



Highest Bandedge



TEST REPORT

4.7 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflects the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD +AV

Example
Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29 dB
PD = 0 dB
AV = -10 dB
FS = 62 + 7.4 +1.6 -29 +0 + (-10) = 32 dBµV/m

Level in µV/m = Common Antilogarithm [(32 dBµV/m)/20] = 39.8 µV/m

TEST REPORT

4.8 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

TEST REPORT

4.8.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

Parent Unit: 2390.000 MHz

The worst-case radiated emission configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.8.2 Radiated Emission Data

The data in tables 1-4 list the significant emission frequencies, the limit and the margin of compliance.

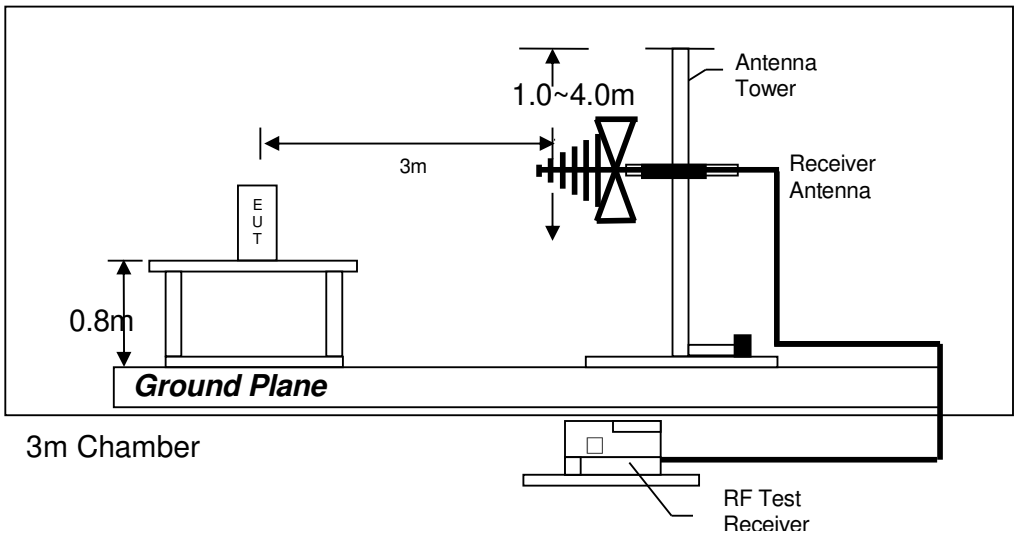
Judgement -

Parent Unit: Passed by 3.5 dB margin

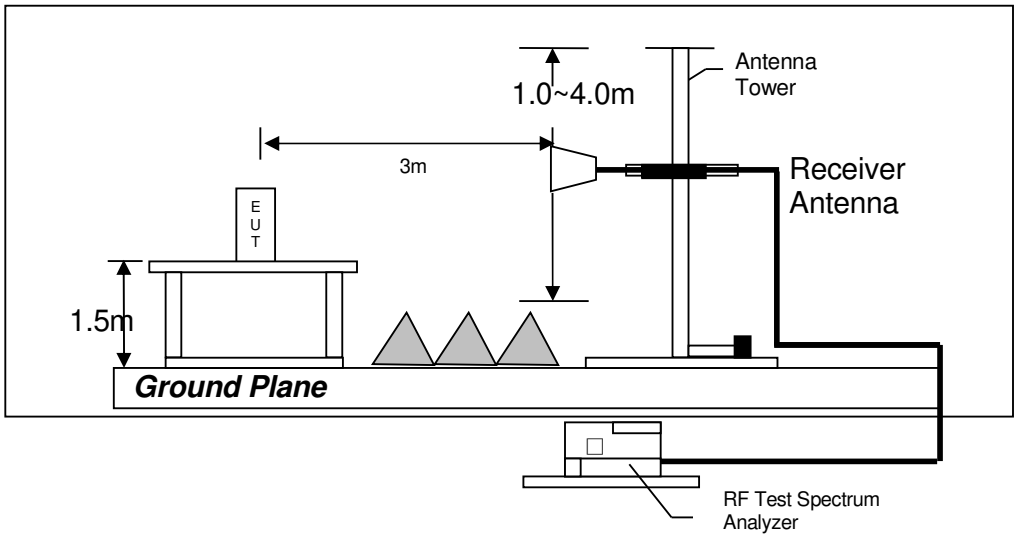
TEST REPORT

4.8.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

TEST REPORT

RADIATED EMISSION DATA

Mode: TX-Channel 1

Table 1, Parent Unit

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (Average) (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2390.000	54.1	33	29.4	50.5	54.0	-3.5
H	4810.000	39.8	33	34.9	41.7	54.0	-12.3
H	12025.000	26.9	33	40.5	34.4	54.0	-19.6

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	2390.000	72.1	33	29.4	68.5	74.0	-5.5
H	4810.000	53.4	33	34.9	55.3	74.0	-18.7
H	12025.000	40.4	33	40.5	47.9	74.0	-26.1

NOTES: 1. Peak detector is used for the emission measurement. Average detector is applied according to ANSI C63.10.

2. All measurements were made at 3 meters.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

Mode: TX-Channel 18

Table 2, Parent Unit

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (Average) (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	4878.000	39.7	33	34.9	41.6	54.0	-12.4
H	7317.000	32.3	33	37.9	37.2	54.0	-16.8
H	12195.000	26.7	33	40.5	34.2	54.0	-19.8

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	4878.000	53.7	33	34.9	55.6	74.0	-18.4
H	7317.000	48.5	33	37.9	53.4	74.0	-20.6
H	12195.000	40.3	33	40.5	47.8	74.0	-26.2

NOTES: 1. Peak detector is used for the emission measurement. Average detector is applied according to ANSI C63.10.

2. All measurements were made at 3 meters.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

Mode: TX-Channel 32

Table 3, Parent Unit

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (Average) (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	2483.500	53.8	33	29.4	50.2	54.0	-3.8
H	4950.000	39.3	33	34.9	41.2	54.0	-12.8
H	7425.000	32.2	33	37.9	37.1	54.0	-16.9
H	12375.000	26.8	33	40.5	34.3	54.0	-19.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	2483.500	67.0	33	29.4	63.4	74.0	-10.6
H	4950.000	53.5	33	34.9	55.4	74.0	-18.6
H	7425.000	48.3	33	37.9	53.2	74.0	-20.8
H	12375.000	39.9	33	40.5	47.4	74.0	-26.6

NOTES: 1. Peak detector is used for the emission measurement. Average detector is applied according to ANSI C63.10.

2. All measurements were made at 3 meters.

3. Negative value in the margin column shows emission below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

Mode: Transmit through Parent Unit

Table 4, Parent Unit

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
H	46.492	24.8	16	11.0	19.8	40.0	-20.2
V	73.407	25.2	16	6.0	15.2	40.0	-24.8
V	118.876	21.6	16	14.0	19.6	43.5	-23.9
V	143.975	28.6	16	14.0	26.6	43.5	-16.9
V	182.412	25.4	16	20.0	29.4	43.5	-14.1
V	199.992	29.5	16	16.0	29.5	43.5	-14.0
V	240.005	28.4	16	19.0	31.4	46.0	-14.6
V	278.322	24.4	16	22.0	30.4	46.0	-15.6
V	336.035	22.8	16	24.0	30.8	46.0	-15.2
H	479.958	20.4	16	26.0	30.4	46.0	-15.6

NOTES:
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative value in the margin column shows emission below limit.
4. Emissions within the restricted band meet the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

TEST REPORT

4.9 AC Power Line Conducted Emission

☐ Not applicable – EUT is only powered by battery for operation.

☒ EUT connects to AC power line. Emission Data is listed in following pages.

4.9.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

3.426 MHz

The worst-case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.9.2 AC Power Line Conducted Emission Data

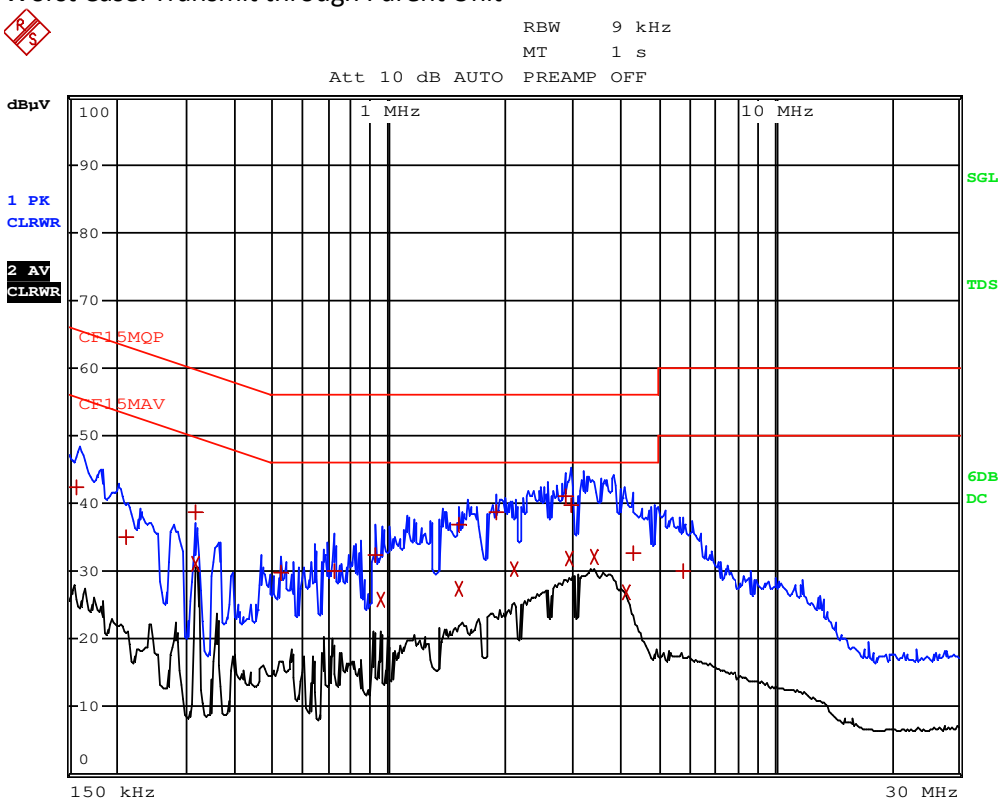
The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 13.8 dB margin

TEST REPORT

AC POWER LINE CONDUCTED EMISSION

Worst Case: Transmit through Parent Unit



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TEST REPORT

Worst Case: Transmit through Parent Unit

EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	159 kHz	42.38	N	-23.13
1	Quasi Peak	213 kHz	35.01	N	-28.06
1	Quasi Peak	316.5 kHz	38.62	N	-21.16
2	CISPR Average	321 kHz	30.97	L1	-18.70
1	Quasi Peak	523.5 kHz	29.68	N	-26.31
1	Quasi Peak	726 kHz	30.03	N	-25.96
1	Quasi Peak	928.5 kHz	32.50	N	-23.49
2	CISPR Average	955.5 kHz	25.74	N	-20.25
1	Quasi Peak	1.518 MHz	36.94	N	-19.05
2	CISPR Average	1.518 MHz	27.33	N	-18.66
1	Quasi Peak	1.905 MHz	38.82	N	-17.17
2	CISPR Average	2.121 MHz	30.33	N	-15.66
1	Quasi Peak	2.886 MHz	40.95	N	-15.04
2	CISPR Average	2.9265 MHz	31.84	N	-14.15
1	Quasi Peak	2.967 MHz	39.63	N	-16.36
2	CISPR Average	3.426 MHz	32.17	N	-13.83
2	CISPR Average	4.1415 MHz	26.78	N	-19.21
1	Quasi Peak	4.3305 MHz	32.71	N	-23.28
1	Quasi Peak	5.7705 MHz	29.99	N	-30.00

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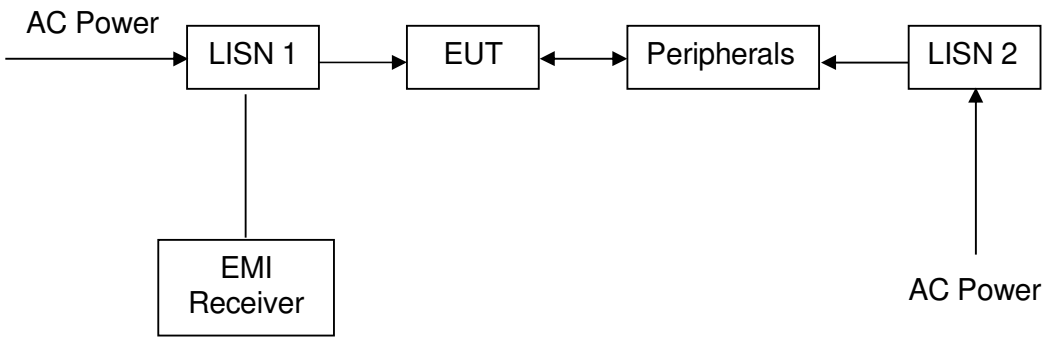
TEST REPORT

4.9.3 AC Line Conducted Emission Test Setup



The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission.

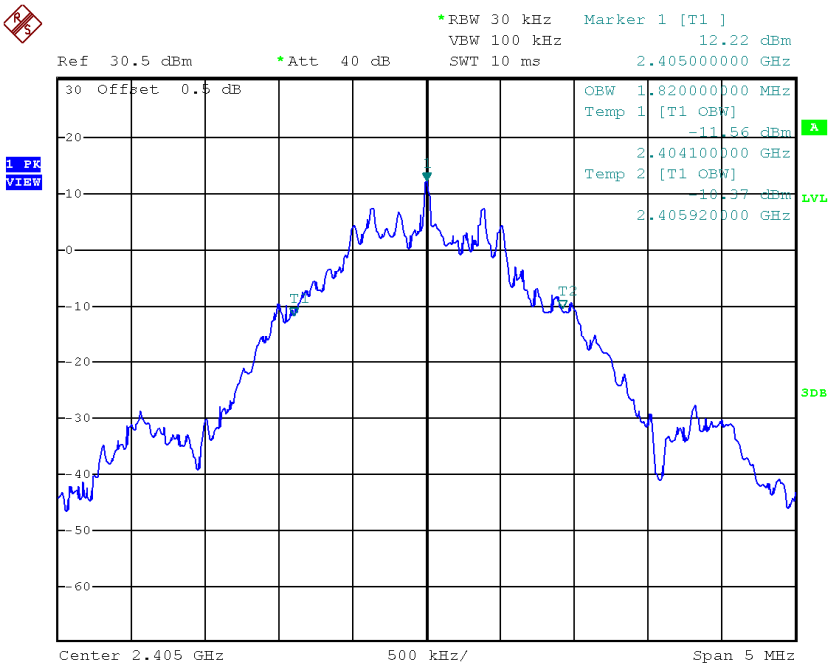
TEST REPORT

4.10 Occupied Bandwidth

Occupied Bandwidth Results:

	Occupied Bandwidth (kHz)
Low Channel: 2405	1820
Middle Channel: 2439	1780
High Channel: 2475	1800

The worst case is shown as below



TEST REPORT

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	Signal and Spectrum Analyzer (10Hz to 40GHz)	Biconical Antenna (30MHz to 300MHz)	EMI Test Receiver 7GHz
Registration No.	EW-3016	EW-3242	EW-3481
Manufacturer	ROHDESCHWARZ	EMCO	ROHDESCHWARZ
Model No.	FSV40	3110C	ESR7
Calibration Date	January 29, 2022	May 26, 2021	December 21, 2021
Calibration Due Date	July 29, 2023	August 26, 2023	June 21, 2023

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	Active Loop H-field (9kHz to 30MHz)
Registration No.	EW-3243	EW-1133	EW-3302
Manufacturer	EMCO	EMCO	EMCO
Model No.	3148B	3115	6502
Calibration Date	June 03, 2021	May 26, 2021	June 08, 2022
Calibration Due Date	June 30, 2023	August 26, 2023	September 08, 2023

Equipment	RF Preamplifier (9kHz to 6000MHz)	2.4GHz Notch Filter	14m Double Shield RF Cable (9kHz - 6GHz)
Registration No.	EW-3006b	EW-3435	EW-2376
Manufacturer	SCHWARZBECK	MICROWAVE	RADIALL
Model No.	BBV9718	N0324413	n m/br56/bnc m 14m
Calibration Date	February 15, 2022	June 16, 2022	January 26, 2022
Calibration Due Date	August 15, 2023	June 16, 2023	July 26, 2023

Equipment	RF Cable 14m (1GHz to 26.5GHz)	14m Double Shield RF Cable (20MHz to 6GHz)	Pyramidal Horn Antenna
Registration No.	EW-2781	EW-2074	EW-0905
Manufacturer	GREATBILLION	RADIALL	EMCO
Model No.	SMA m/SHF5MPU /SMA m ra14m,26G	N(m)-RG142-BNC(m) L=14M	3160-09
Calibration Date	November 24, 2021	December 10, 2021	July 20, 2021
Calibration Due Date	July 24, 2023	September 10, 2023	August 20, 2023

TEST REPORT

2) Conducted Emissions Test

Equipment	RF Cable 240cm (RG142) (9kHz to 30MHz)	Artificial Mains Network	EMI Test Receiver 7GHz
Registration No.	EW-2454	EW-2501	EW-3481
Manufacturer	RADIALL	ROHDESCHWARZ	ROHDESCHWARZ
Model No.	Bnc m st / 142 / bnc mra 240cm	ENV-216	ESR7
Calibration Date	January 26, 2022	September 11, 2021	December 21, 2021
Calibration Due Date	July 26, 2023	September 11, 2023	June 21, 2023

3) Conductive Measurement Test

Equipment	Signal and Spectrum Analyzer (10Hz to 40GHz)	5m RF Cable (40GHz)
Registration No.	EW-3016	EW-2701
Manufacturer	ROHDESCHWARZ	RADIALL
Model No.	FSV40	Sma m-m 5m 40G
Calibration Date	January 29, 2022	November 24, 2020
Calibration Due Date	April 29, 2023	May 24, 2023

TEST REPORT

4) Control Software for Radiated Emission

Software Information	
Software Name	EMC32
Manufacturer	ROHDESCHWARZ
Software version	10.50.40 & 10.40.10

END OF TEST REPORT