

TEST REPORT

of

FCC Part 15 Subpart C AND CANADA RSS-247

New Application; Class I PC; Class II PC

Product : Sensor AID DUO TPMS TOOL
Brand: Cub
Model: FCC: Please see page 7
IC:VS-60U029
Model Difference: FCC: Please see page 7
IC: N/A
FCC ID: ZPNVS60U029
IC: 9959A-VS60U029
FCC Rule Part: §15.247, Cat: DSS
IC Rule Part: RSS-247 issue 2
RSS-Gen issue 5
Applicant: CUB ELECPARTS INC.
Address: No.6, Lane 546, Sec.6, Changlu Road, Fuhsin Township, Changhua County, Taiwan 506

Test Performed by:



International Standards Laboratory Corp. LT Lab.

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No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan

Report No.: ISL-18LR335FCDTs-R2
Issue Date :2021/09/24



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

The uncertainty of the measurement does not include in consideration of the test result unless the customer required the determination of uncertainty via the agreement, regulation or standard document specification.

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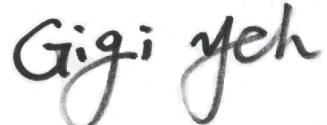
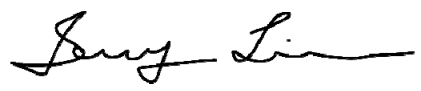
VERIFICATION OF COMPLIANCE

Applicant: CUB ELECPARTS INC.
Product Description: Sensor AID DUO TPMS TOOL
Brand Name: Cub
Model No.: FCC: Please see page 7
IC:VS-60U029
Model Difference: FCC: Please see page 7
IC: N/A
FCC ID: ZPNVS60U029
IC: 9959A-VS60U029
Date of test: 2021/08/12 ~ 2021/09/23
Date of EUT Received: 2021/08/12

We hereby certify that:

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory Corp.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Test By:		Date:	2021/09/24
	<hr/> <i>Barry Lee / Senior Engineer</i>		<hr/>
Prepared By:		Date:	2021/09/24
	<hr/> <i>Gigi Yeh / Senior Engineer</i>		<hr/>
Approved By:		Date:	2021/09/24
	<hr/> <i>Jerry Liu / Assistant Manager</i>		<hr/>

Version

Version No.	Date	Description
00	2021/09/24	Initial creation of document

Measurement Uncertainty (K=2)

Description Of Test	Uncertainty
Conducted Emission (AC power line)	2.586 dB
Field Strength of Spurious Radiation	<=30MHz: 2.96dB 30-1GHz: 4.22 dB 1-40 GHz: 4.08 dB
Conducted Power	2.412 GHz: 1.30 dB 5.805 GHz: 1.55 dB
Power Density	2.412 GHz: 1.30 dB 5.805 GHz: 1.67 dB
Frequency	0.0032%

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1. General Information

1.1. Product Description

General:

Product Name	Sensor AID DUO TPMS TOOL	
Brand Name	Cub	
FCC: Model Name	VS-60U029; VS-60U029XX; VS-60U029XX-XX; VS-60U029XX-XX-X; VS-60U024; VS-60U024XX; VS-60U024XX-XX; VS-60U024XX-XX-X; VS-60U029XXXXXXXX; VS-60U024XXXXXXXX; CT4; Sensor AID TOOL Gen4; Sensor AID DUO TPMS TOOL; SENSOR AID TOOL GEN4; SENSOR AID DUO TPMS TOOL	
IC: Model Name	VS-60U029	
FCC Model Difference	1. For the marketing purpose 2. Where X may be any alpha character "a"-"z", "A"-"Z", or numeric character "0"-"9", or -, (,), or blank or combination of alpha and numeric characters	
IC Model Difference	N/A	
Power Supply	5 Vdc from AC/DC adapter or 3.7V from battery	
	Adapter:	Model: SK22G3-0500250U
	Battery:	Model : MLP625094

IC RSS-Gen:

PMN (Product Marketing Name)	VS-60U029
HVIN (Hardware Version Identification Number)	VS-60U029
Product SW version	1.0
Product HW version	1.0
Radio SW version	RS1.0
Radio HW version	1.0

2.4GHz WLAN: 1TX/1RX

Wi-Fi	Frequency Range (MHz)	Channels	Peak / Average Power	Modulation Technology
802.11b	2412 – 2462(DTS)	11	17.8 dBm (PK)	DSSS
802.11g	2412 – 2462(DTS)	11	22.35 dBm (PK)	OFDM
802.11n	HT20 2412 – 2462(DTS)	11	21.51 dBm (PK)	
802.11n	HT40 2422 – 2452(DTS)	7	20.55 dBm (PK)	
Modulation type		CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM		
Antenna Designation		Type: FPC, 2.80dBi		
Tune up power (Average)		16 dBm +/- 0.5 dBm		

Bluetooth:

Frequency Range:	2402 – 2480MHz	
Bluetooth Version:	V2.1 + EDR	V4.0
Channel number:	79 channels	40 channels, 2MHz step
Modulation type	GFSK + π / 4DQPSK + 8DPSK	Wide band Modulation (GFSK)
Transmit Power:	8.96 dBm Peak	-0.3 dBm Peak
Dwell Time:	\leq 0.4s	N/A
Antenna Designation:	Type: FPC, 2.80dBi	

This report applies for BT V2.1 + EDR

Remark: The above DUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: ZPNVS60U029 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules and IC: 9959A-VS60U029 filing to comply with Industry Canada RSS-247 issue 2.

1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 558074 D01 15.247 Meas Guidance v05r02

1.4. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of **International Standards Laboratory Corp.** <LT Lab.> No. 120, Lane 180, Hsin Ho Rd., Lung-Tan Dist., Tao Yuan City 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.10: 2013. FCC Registration Number is: 487532; Designation Number is: TW0997, Canada Registration Number: 4067B-4.

1.5. Special Accessories

Not available for this EUT intended for grant.

1.6. Equipment Modifications

Not available for this EUT intended for grant.

2. System Test Configuration

2.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT Exercise

The EUT (Transmitter) was tested with a test program to fix the TX/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

2.3 Test Procedure

2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 6 of ANSI C63.10: 2013 and RSS-Gen issue 5. Con-ducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR 16-1-1 Quasi-Peak and Average detector mode.

2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8/1.5 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” Is still within the 3dB illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Sub-clause 8.3.1.2 of ANSI C63.10: 2013.

2.4 Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed channel)

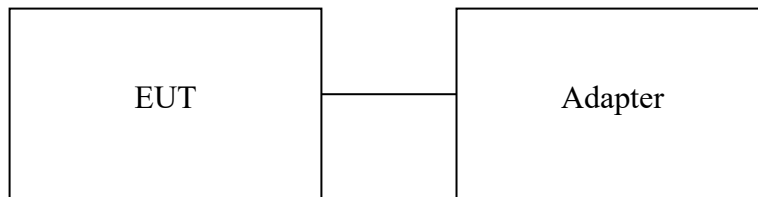


Table 1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	N/A					

3. Summary of Test Results

FCC Rules	Description Of Test	Result
§15.247(b)(1)/ RSS-247 issue 2, §A5.4(b)	Peak Output Power	Compliant
§15.247(d) RSS-247 issue 2, §5.5	100 kHz Bandwidth of Frequency Band Edges	Compliant
§15.247(c) RSS-247 issue 2, §5.5	Spurious Emission	Compliant
§15.203, §15.247(c) RSS-GEN 8.3	Antenna Requirement	Compliant

4. Description of Test Modes

Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low (2402MHz) 、 mid (2441MHz) and high (2480MHz) with each modulation were chosen for full testing.

All mode has been pre-scanned, and only the cast of the worst is presented in the report.

The worst case EDR 2M mode was reported for Radiated Emission.

Note: Test item list below has been re-verify:

1. RF Output power
2. Transmitter spurious emissions below 1GHz
3. Transmitter spurious emissions above 1GHz
4. 100 kHz Bandwidth of Frequency Band Edges

5. Peak Output Power Measurement

5.1 Standard Applicable:

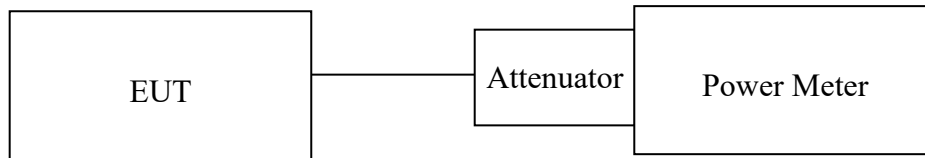
According to §15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

According to RSS-247 issue 2, §A5.4(b), For FHSs operating in the band 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1.0 W if the hopset uses 75 or more hopping channels; the maximum peak conducted output power shall not exceed 0.125 W if the hopset uses less than 75 hopping channels. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

5.2 Measurement Equipment Used:

Location Conducted	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conducted	Power Meter	Anritsu	ML2495A	1116010	09/25/2020	09/25/2021
Conducted	Power Sensor	Anritsu	MA2411B	34NKF50	09/25/2020	09/25/2021
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO33	01/04/2021	01/04/2022
Conducted	Power Sensor	DARE	RPR3006W	13I00030SNO34	01/04/2021	01/04/2022
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO35	06/23/2021	06/23/2022
Conducted	Power Sensor	DARE	RPR3006W	14I00889SNO36	06/23/2021	06/23/2022
Conducted	Temperature Chamber	KSON	THS-B4H100	2287	04/26/2021	04/26/2022
Conducted	DC Power supply	ABM	8185D	N/A	01/05/2021	01/05/2022
Conducted	AC Power supply	EXTECH	CFC105W	NA	N/A	N/A
Conducted	Spectrum analyzer	Keysight	N9010A	MY56070257	09/23/2020	09/23/2021
Conducted	Test Software	DARE	Radiation Ver:2013.1.23	NA	NA	NA
Conducted	Test Software	R&S	CMUGO Ver:2.0.0	N/A	N/A	N/A
Conducted	Universal Digital Radio Communication Tester	R&S	CMU200	111968	11/29/2020	11/29/2021
Conducted	Wideband Radio Communication Tester	R&S	CMW500	1201.002K50108 793-JG	10/28/2020	10/28/2021
Conducted	BT Simulator	Agilent	N4010A	MY48100200	NA	NA
Conducted	GPS Simulator	Welnavigate	GS-50	701523	NA	NA
Conducted (TS8997)	Wideband Radio Communication Tester	R&S	CMW500	168811	07/19/2021	07/19/2022
Conducted (TS8997)	Signal Generator	R&S	SMB100B	101085	10/28/2020	10/28/2021
Conducted (TS8997)	Vector Signal Generator	R&S	SMBV100A	263246	10/28/2020	10/28/2021
Conducted (TS8997)	Signal analyzer 40GHz	R&S	FSV40	101884	10/20/2020	10/20/2021
Conducted (TS8997)	OSP150 extension unit CAM-BUS	R&S	OSP150	101107	04/06/2021	04/06/2022
Conducted (TS8997)	Test Software	R&S	EMC32 Ver:11.10.00	NA	NA	NA

5.3 Test Set-up:



5.4 Measurement Procedure:

1. Place the EUT on the table and set it in transmitting mode.
2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
3. Record the max. reading.
4. Repeat above procedures until all frequency measured were complete.

5.5 Measurement Result:

BDR Mode

Frequency (MHz)	Peak Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
Low	8.751	8.75	0.00750	1
Mid	8.188	8.19	0.00659	1
High	7.567	7.57	0.00571	1

EDR 2M Mode

Frequency (MHz)	Peak Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
Low	8.964	8.96	0.00788	0.125
Mid	7.643	7.64	0.00581	0.125
High	7.802	7.80	0.00603	0.125

EDR 3M Mode

Frequency (MHz)	Peak Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
Low	9.294	9.29	0.00850	0.125
Mid	7.818	7.82	0.00605	0.125
High	7.943	7.94	0.00623	0.125

6. Spurious Emission Test

6.1 Standard Applicable:

According to §15.247(d), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

According to RSS-247 issue 2, §5.5

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, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

6.2 Measurement Equipment Used:

6.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

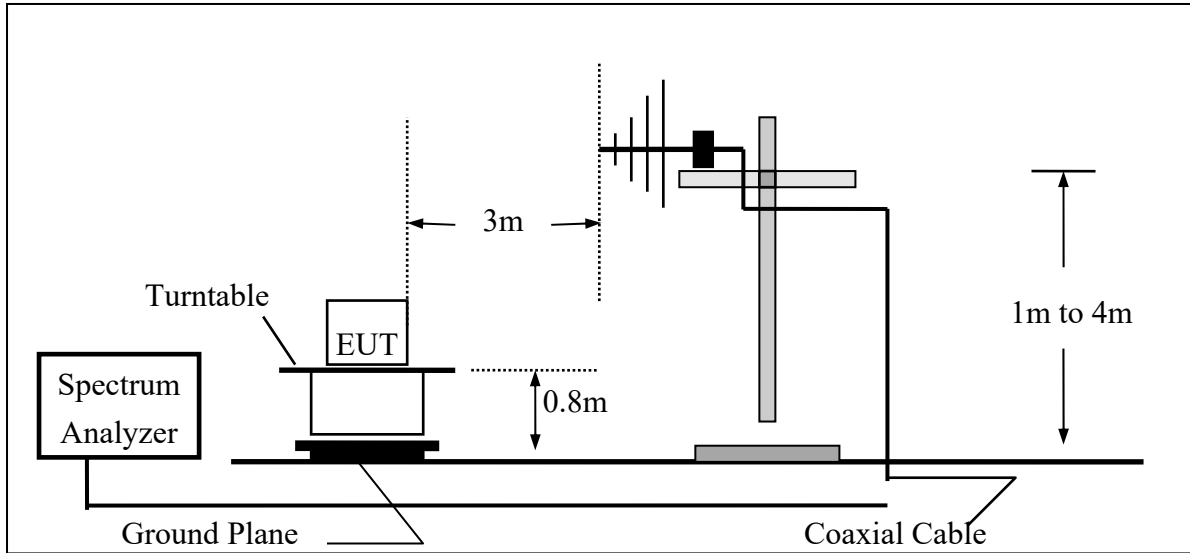
6.2.2. Radiated emission:

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Chamber 19	SIGNAL ANALYZER	R&S	FSV40	101919	8/18/2021	8/18/2022
Chamber 19	EMI Receiver	R&S	ESR3	102461	5/05/2021	5/05/2022
Chamber 19	Loop Antenna	EM	EM-6879	271	05/21/2020	05/21/2022
Chamber 19	Bilog Antenna (30MHz-1GHz)	Schwarzbeck	VULB9168 w 6dB Att.	9168-736	2/22/2021	2/22/2022
Chamber 19	Horn antenna (1GHz-18GHz)	ETS LINDGREN	3117	00218718	09/25/2021	09/25/2022
Chamber 19	Horn antenna (18GHz-26GHz)	Com-power	AH-826	081001	11/23/2020	11/23/2021
Chamber 19	Horn antenna (26GHz-40GHz)	Com-power	AH-640	100A	03/11/2021	03/11/2022
Chamber 19	Preamplifier (9kHz-1GHz)	HP	8447F	3113A04621	06/22/2021	06/22/2022
Chamber 19	Preamplifier (1GHz - 26GHz)	EM	EM01M26G	060681	05/07/2021	05/07/2022
Chamber 19	Preamplifier (26GHz-40GHz)	MITEQ	JS4-26004000- 27-5A	818471	05/07/2021	05/07/2022
Chamber 19	RF Cable (9kHz-18GHz)	Huber Suhner & Woken	Sucoflex 104A & 18GHz SMA(M)-SM A(M)-10M	MY817/4A & 20200525	12/25/2020	12/25/2021
Chamber 19	RF Cable (18GHz-40GHz)	HUBER SU- HNER	Sucoflex 102	27963/2&374 21/2	11/19/2020	11/19/2021
Chamber 19	Signal Generator	Anritsu	MG3692A	20311	01/03/2021	01/03/2022
Chamber 19	Test Software	Audix	E3 Ver:6.12023	N/A	N/A	N/A

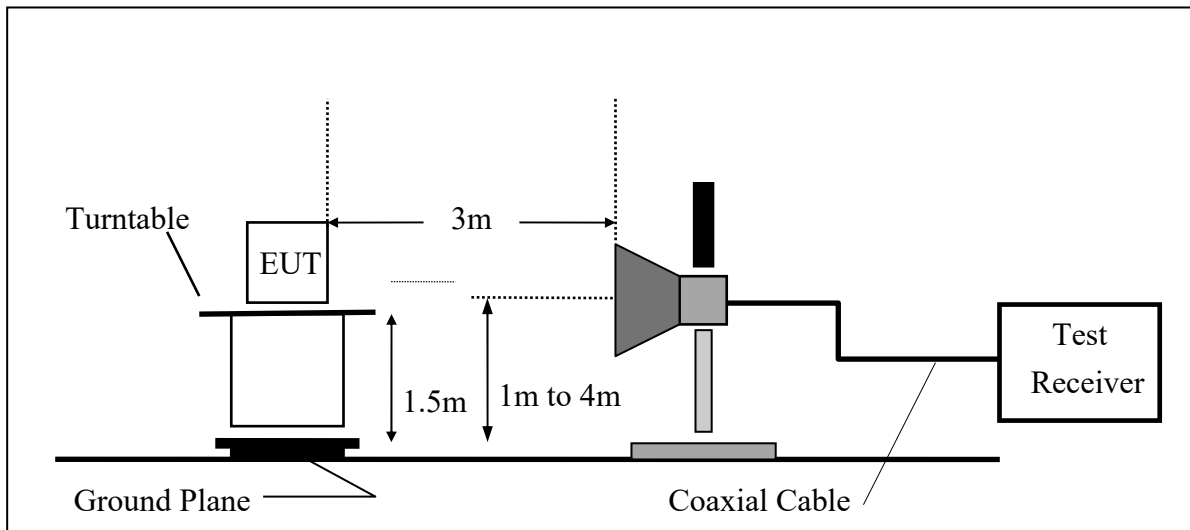
6.3 Test SET-UP:

The test item only performed radiated mode

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz



6.4 Measurement Procedure:

1. According 414788 section 2, Either OATS or chamber for radiated emission below 30MHz, the test was done at 966 chamber, the test site was evaluated with OATS and the Chamber has test signals level greater than OATS's .
2. The EUT was placed on a turn table which is 0.8m/1.5m above ground plane in 966 chamber.
3. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
4. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
5. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. Repeat above procedures until all frequency measured were complete.

6.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

6.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Radiated Spurious Emission Measurement Result: (below 1GHz) (Worst case: EDR 3M)

Operation Mode	TX CH Low	Test Date	2021/09/09
Fundamental Frequency	2402MHz	Test By	Barry
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	453.89	40.62	-1.39	39.23	46.00	-6.77	Peak	VERTICAL
2	512.09	38.62	-0.65	37.97	46.00	-8.03	Peak	VERTICAL
3	528.58	39.84	-0.41	39.43	46.00	-6.57	Peak	VERTICAL
4	751.68	35.34	4.19	39.53	46.00	-6.47	Peak	VERTICAL
5	762.35	35.37	4.30	39.67	46.00	-6.33	Peak	VERTICAL
6	775.93	34.57	4.49	39.06	46.00	-6.94	Peak	VERTICAL
1	122.15	42.53	-7.63	34.90	43.50	-8.60	Peak	HORIZONTAL
2	141.55	42.42	-5.87	36.55	43.50	-6.95	Peak	HORIZONTAL
3	506.27	39.01	-0.76	38.25	46.00	-7.75	Peak	HORIZONTAL
4	517.91	40.61	-0.52	40.09	46.00	-5.91	Peak	HORIZONTAL
5	528.58	40.73	-0.41	40.32	46.00	-5.68	Peak	HORIZONTAL
6	540.22	41.33	-0.16	41.17	46.00	-4.83	Peak	HORIZONTAL

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH Mid	Test Date	2021/09/09
Fundamental Frequency	2441MHz	Test By	Barry
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	453.89	40.83	-1.39	39.44	46.00	-6.56	Peak	VERTICAL
2	517.91	39.51	-0.52	38.99	46.00	-7.01	Peak	VERTICAL
3	534.40	38.00	-0.27	37.73	46.00	-8.27	Peak	VERTICAL
4	719.67	35.20	3.02	38.22	46.00	-7.78	Peak	VERTICAL
5	752.65	34.98	4.21	39.19	46.00	-6.81	Peak	VERTICAL
6	786.60	34.11	4.51	38.62	46.00	-7.38	Peak	VERTICAL
1	127.97	41.82	-7.07	34.75	43.50	-8.75	Peak	HORIZONTAL
2	141.55	42.15	-5.87	36.28	43.50	-7.22	Peak	HORIZONTAL
3	478.14	37.63	-1.16	36.47	46.00	-9.53	Peak	HORIZONTAL
4	515.97	39.40	-0.57	38.83	46.00	-7.17	Peak	HORIZONTAL
5	555.74	39.59	-0.04	39.55	46.00	-6.45	Peak	HORIZONTAL
6	623.64	35.01	1.68	36.69	46.00	-9.31	Peak	HORIZONTAL

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode	TX CH High	Test Date	2021/09/09
Fundamental Frequency	2480MHz	Test By	Barry
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	452.92	39.82	-1.39	38.43	46.00	-7.57	Peak	VERTICAL
2	482.02	39.59	-1.16	38.43	46.00	-7.57	Peak	VERTICAL
3	521.79	39.05	-0.48	38.57	46.00	-7.43	Peak	VERTICAL
4	534.40	38.47	-0.27	38.20	46.00	-7.80	Peak	VERTICAL
5	708.03	34.96	3.02	37.98	46.00	-8.02	Peak	VERTICAL
6	762.35	35.49	4.30	39.79	46.00	-6.21	Peak	VERTICAL
1	142.52	41.97	-5.77	36.20	43.50	-7.30	Peak	HORIZONTAL
2	274.44	38.86	-5.20	33.66	46.00	-12.34	Peak	HORIZONTAL
3	288.02	39.03	-4.75	34.28	46.00	-11.72	Peak	HORIZONTAL
4	478.14	38.65	-1.16	37.49	46.00	-8.51	Peak	HORIZONTAL
5	507.24	39.17	-0.75	38.42	46.00	-7.58	Peak	HORIZONTAL
6	557.68	38.62	0.00	38.62	46.00	-7.38	Peak	HORIZONTAL

Remark:

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90kHz/110-490kHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100kHz, VBW=300kHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Low	Test Date	2021/09/09
Fundamental Frequency	2402 MHz	Test By	Barry
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4804.00	46.15	-6.02	40.13	74.00	-33.87	Peak	VERTICAL
2	7206.00	45.83	-2.16	43.67	74.00	-30.33	Peak	VERTICAL
1	4804.00	47.09	-6.02	41.07	74.00	-32.93	Peak	HORIZONTAL
2	7206.00	46.45	-2.16	44.29	74.00	-29.71	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH Mid	Test Date	2021/09/09
Fundamental Frequency	2441 MHz	Test By	Barry
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4882.00	46.11	-5.88	40.23	74.00	-33.77	Peak	VERTICAL
2	7323.00	45.91	-2.15	43.76	74.00	-30.24	Peak	VERTICAL
1	4882.00	46.41	-5.88	40.53	74.00	-33.47	Peak	HORIZONTAL
2	7323.00	45.62	-2.15	43.47	74.00	-30.53	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode	TX CH High	Test Date	2021/09/09
Fundamental Frequency	2480 MHz	Test By	Barry
Temperature	25 °C	Humidity	60 %

No	Freq MHz	Reading dBuV	Factor dB	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	4960.00	45.80	-5.71	40.09	74.00	-33.91	Peak	VERTICAL
2	7440.00	45.53	-2.13	43.40	74.00	-30.60	Peak	VERTICAL
1	4960.00	46.93	-5.71	41.22	74.00	-32.78	Peak	HORIZONTAL
2	7440.00	45.45	-2.13	43.32	74.00	-30.68	Peak	HORIZONTAL

Remark:

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

7. 100kHz Bandwidth of Band Edges Measurement

7.1 Standard Applicable:

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

According to RSS-247 issue 2, §5.5

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, as permitted under Section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

7.2 Measurement Equipment Used:

7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

7.2.2. Radiated emission:

Refer to section 6.2 for details.

7.3 Test SET-UP:

Refer to section 6.3 for details.

7.4 Measurement Procedure:

1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
4. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made “while keeping the antenna in the ‘cone of radiation’ from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response.” is still within the 3dB illumination BW of the measurement antenna.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. Repeat above procedures until all frequency measured were complete.

7.5 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

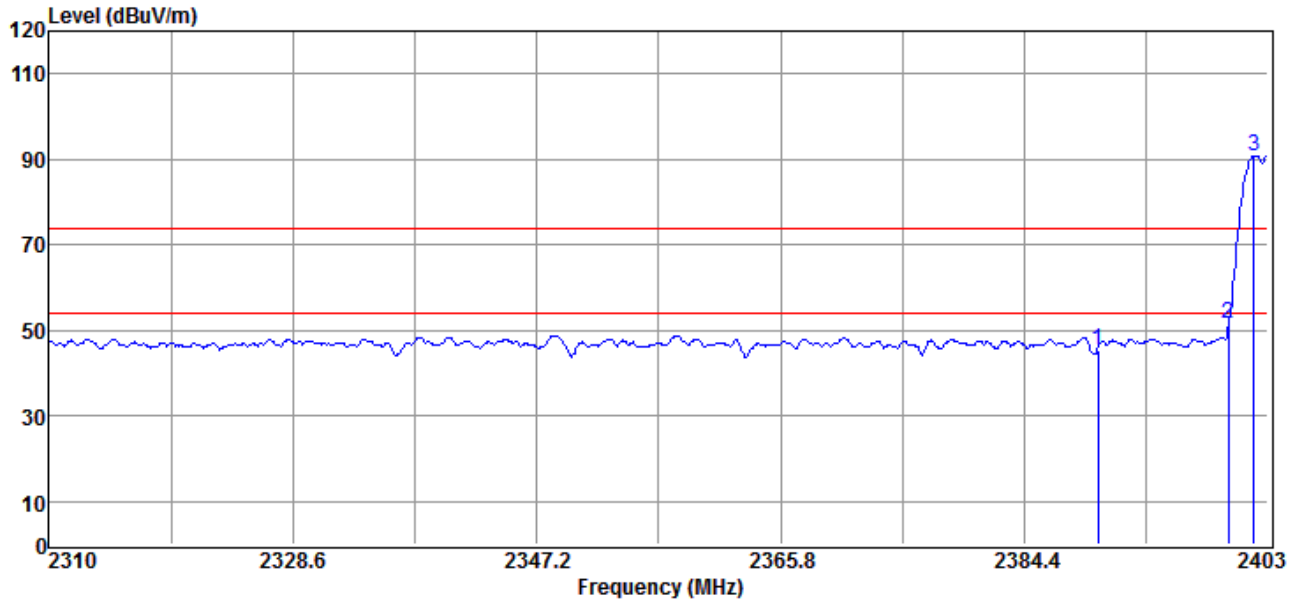
7.6 Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

Radiated Emission: (BDR Hopping mode)

Operation Mode TX CH Low
 Fundamental Frequency 2402 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

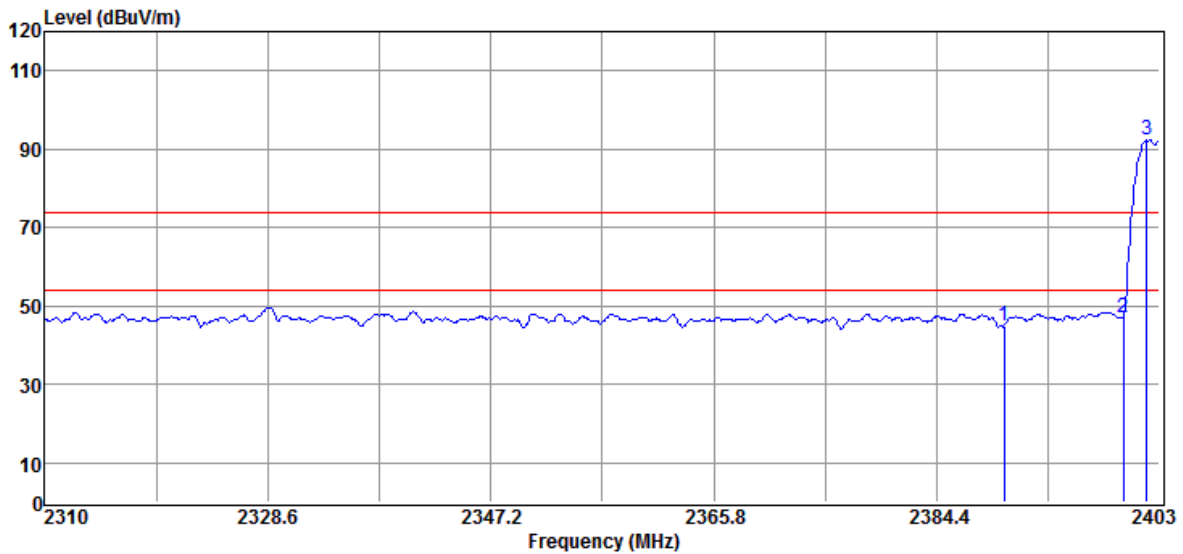


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	56.25	-10.88	45.37	74.00	-28.63	Peak	VERTICAL
2	2400.00	62.50	-10.87	51.63	74.00	-22.37	Peak	VERTICAL
3	2401.88	101.80	-10.87	90.93	F	--	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	55.76	-10.88	44.88	74.00	-29.12	Peak	HORIZONTAL
2	2400.00	57.94	-10.87	47.07	74.00	-26.93	Peak	HORIZONTAL
3	2401.88	103.04	-10.87	92.17	F	--	Peak	HORIZONTAL

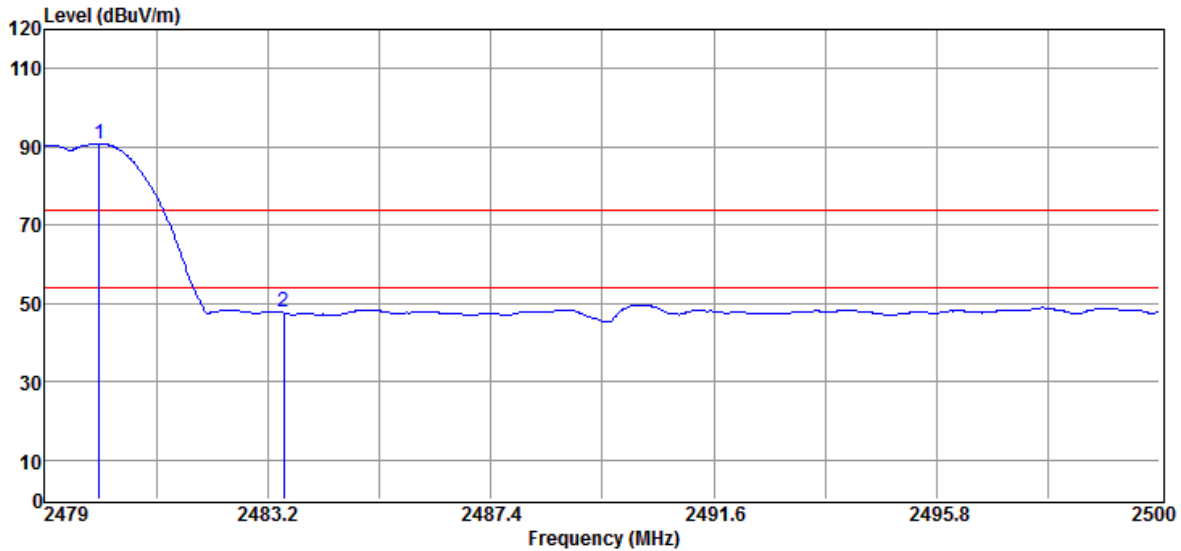
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Operation Mode TX CH High
 Fundamental Frequency 2480 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

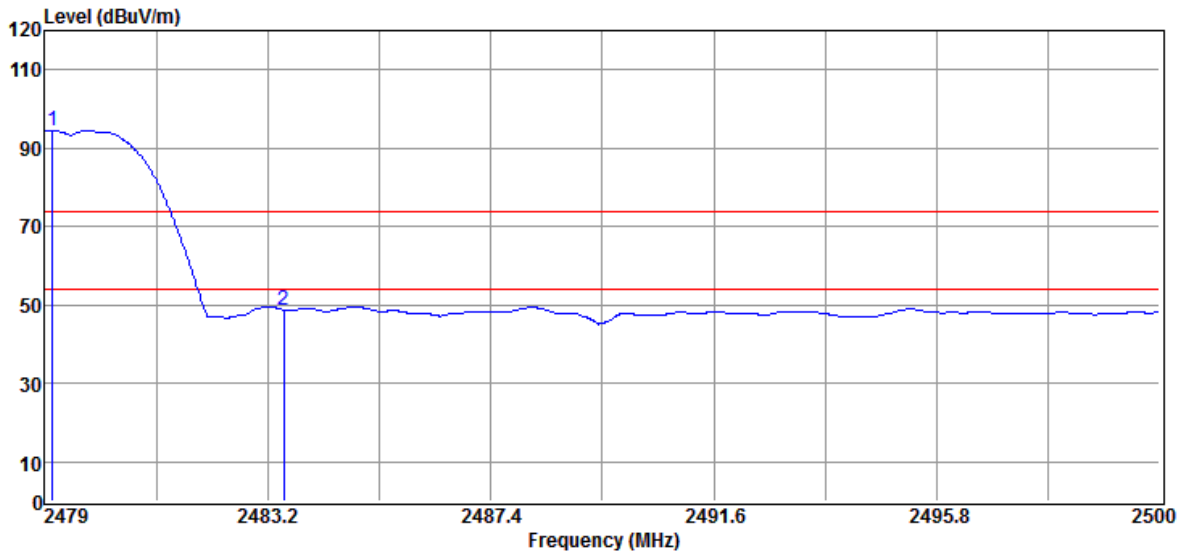


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2480.03	101.63	-10.74	90.89	F	---	Peak	VERTICAL
2	2483.50	58.36	-10.72	47.64	74.00	-26.36	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.15	105.18	-10.74	94.44	F	--	Peak	HORIZONTAL
2	2483.50	59.54	-10.72	48.82	74.00	-25.18	Peak	HORIZONTAL

Remark:

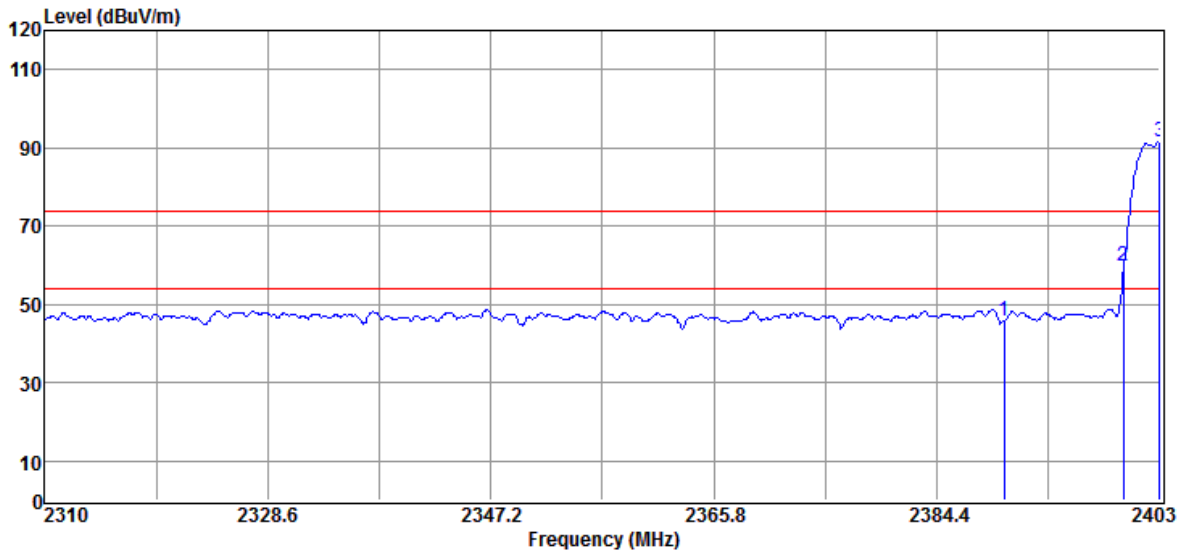
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Radiated Emission (EDR 2M Hopping mode):

Operation Mode TX CH Low
 Fundamental Frequency 2402 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

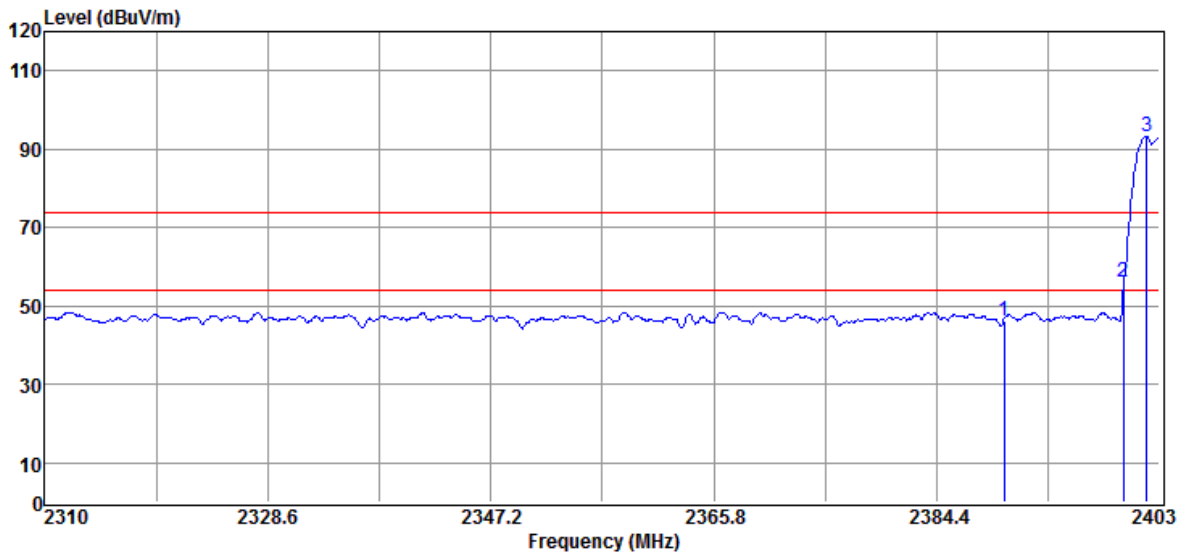


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	56.82	-10.88	45.94	74.00	-28.06	Peak	VERTICAL
2	2400.00	70.59	-10.87	59.72	74.00	-14.28	Peak	VERTICAL
3	2403.00	102.46	-10.86	91.60	F	--	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	56.99	-10.88	46.11	74.00	-27.89	Peak	HORIZONTAL
2	2400.00	66.91	-10.87	56.04	74.00	-17.96	Peak	HORIZONTAL
3	2401.88	104.19	-10.87	93.32	F	--	Peak	HORIZONTAL

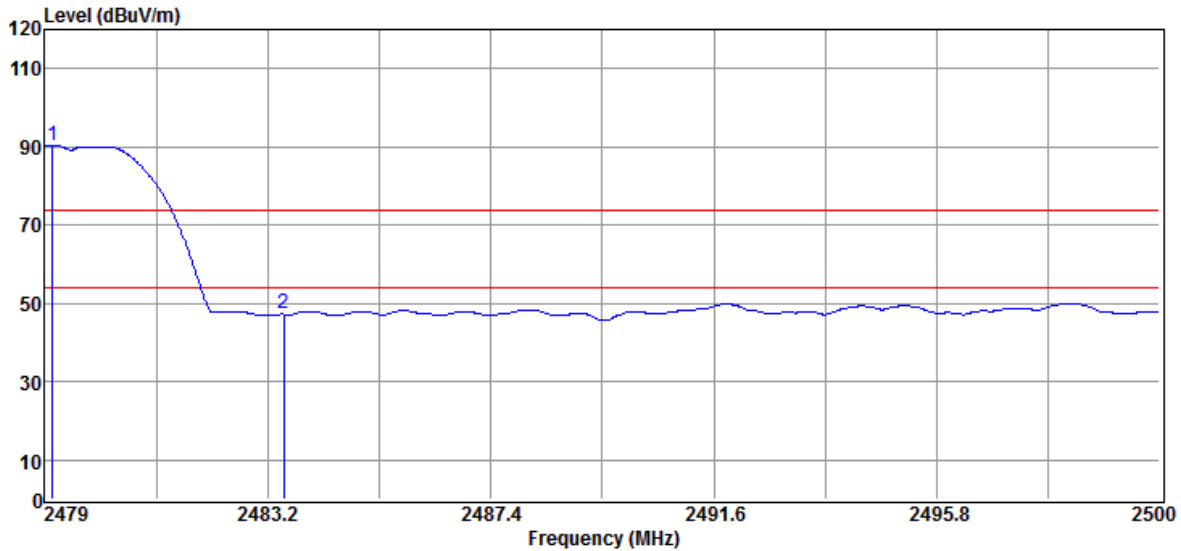
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Operation Mode TX CH High
 Fundamental Frequency 2480 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

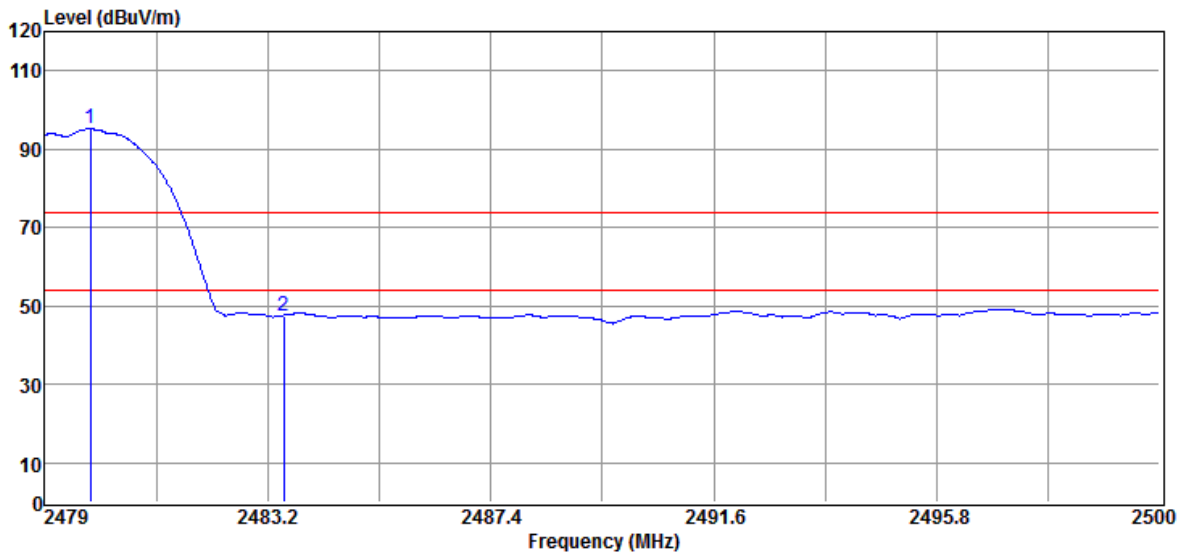


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.15	101.17	-10.74	90.43	F	--	Peak	VERTICAL
2	2483.50	57.94	-10.72	47.22	74.00	-26.78	Peak	VERTICAL

Remark:

- Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.86	105.86	-10.74	95.12	F	--	Peak	HORIZONTAL
2	2483.50	58.28	-10.72	47.56	74.00	-26.44	Peak	HORIZONTAL

Remark:

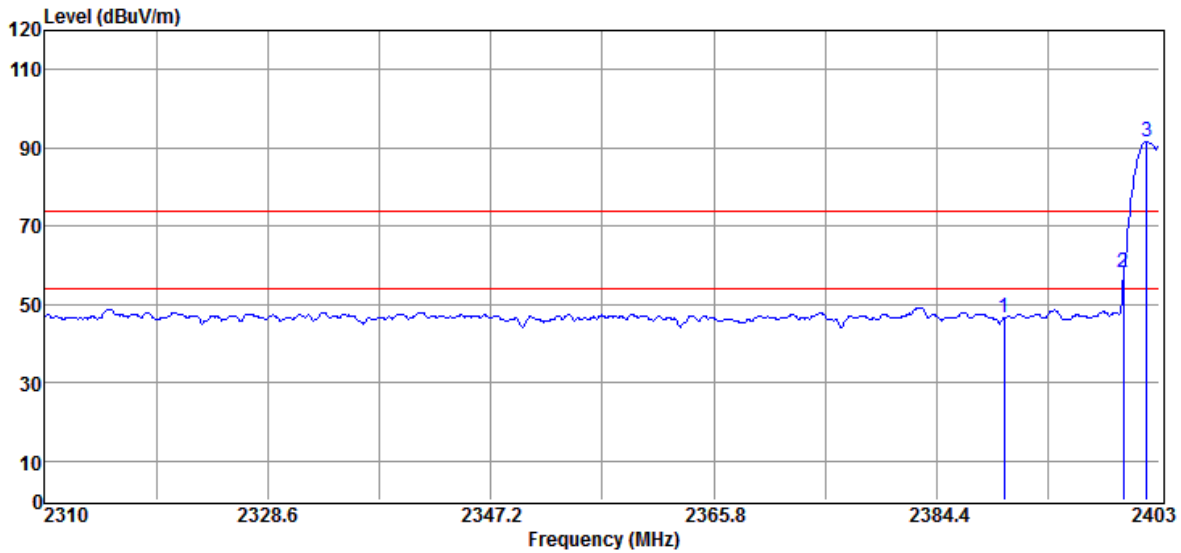
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Radiated Emission (EDR 3M Hopping mode):

Operation Mode TX CH Low
 Fundamental Frequency 2402 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

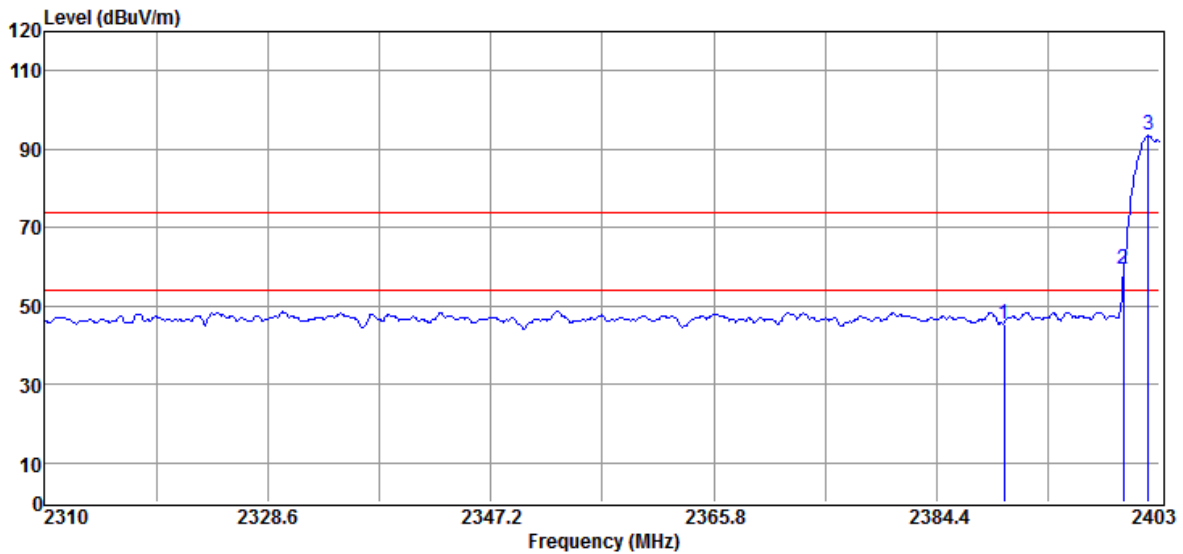


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	57.48	-10.88	46.60	74.00	-27.40	Peak	VERTICAL
2	2400.00	68.91	-10.87	58.04	74.00	-15.96	Peak	VERTICAL
3	2401.88	102.62	-10.87	91.75	F	--	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	56.22	-10.88	45.34	74.00	-28.66	Peak	HORIZONTAL
2	2400.00	70.19	-10.87	59.32	74.00	-14.68	Peak	HORIZONTAL
3	2402.07	104.36	-10.87	93.49	F	--	Peak	HORIZONTAL

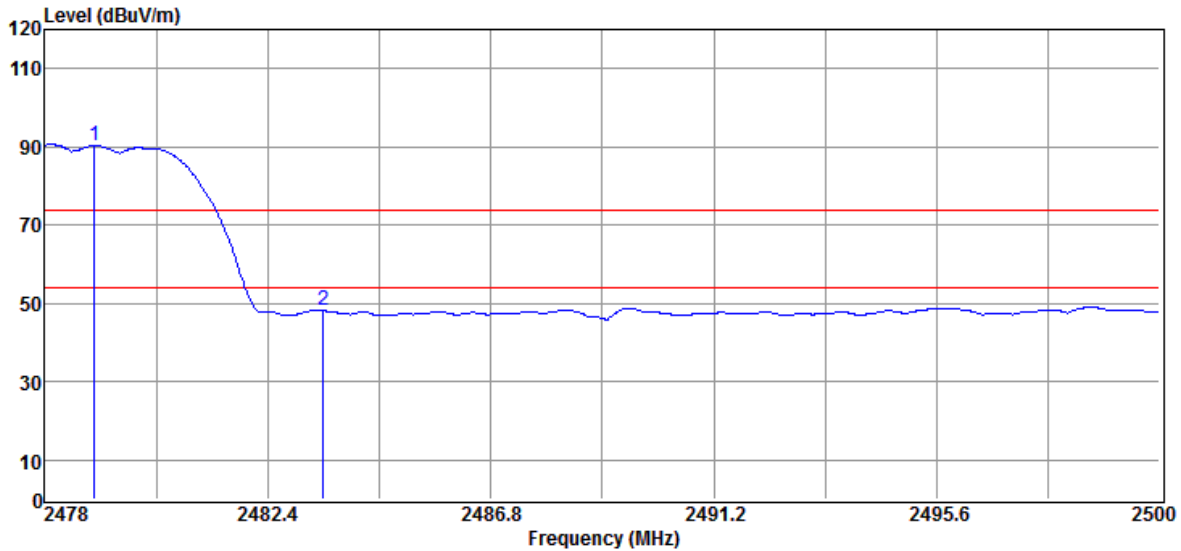
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Operation Mode TX CH High
 Fundamental Frequency 2480 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

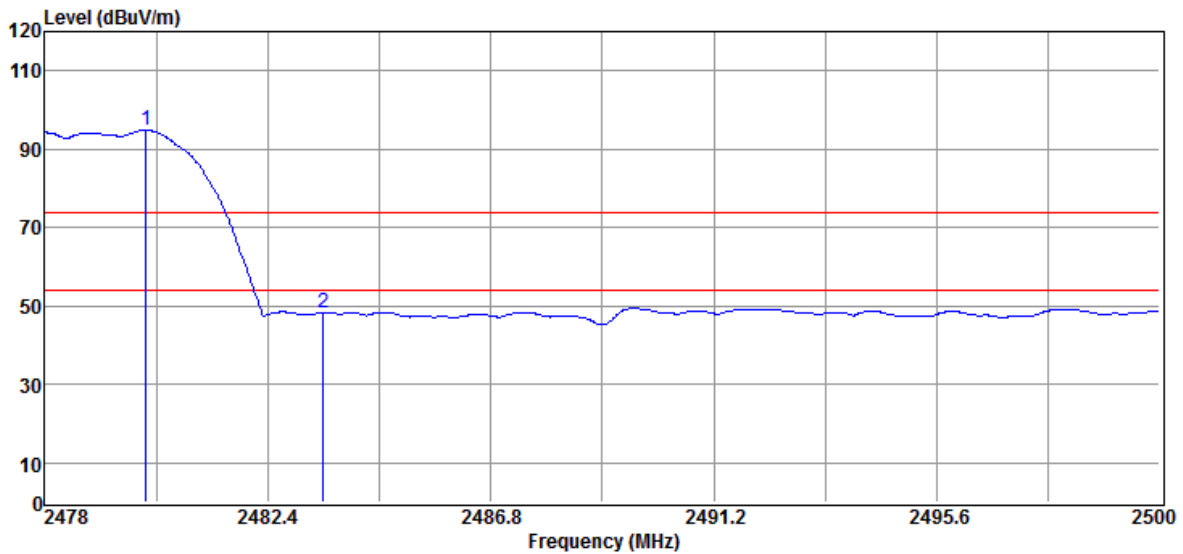


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2478.99	101.01	-10.74	90.27	F	--	Peak	VERTICAL
2	2483.50	58.84	-10.72	48.12	74.00	-25.88	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2480.00	105.56	-10.74	94.82	F	--	Peak	HORIZONTAL
2	2483.50	59.03	-10.72	48.31	74.00	-25.69	Peak	HORIZONTAL

Remark:

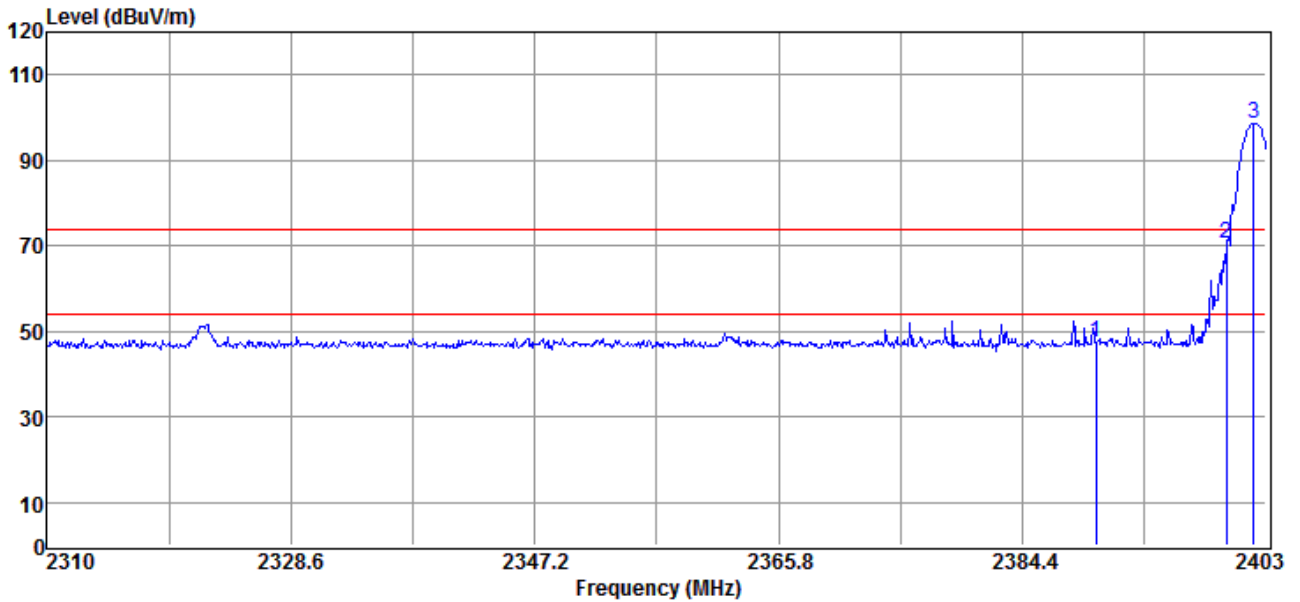
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Radiated Emission: (BDR Non-Hopping mode)

Operation Mode TX CH Low
 Fundamental Frequency 2402 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

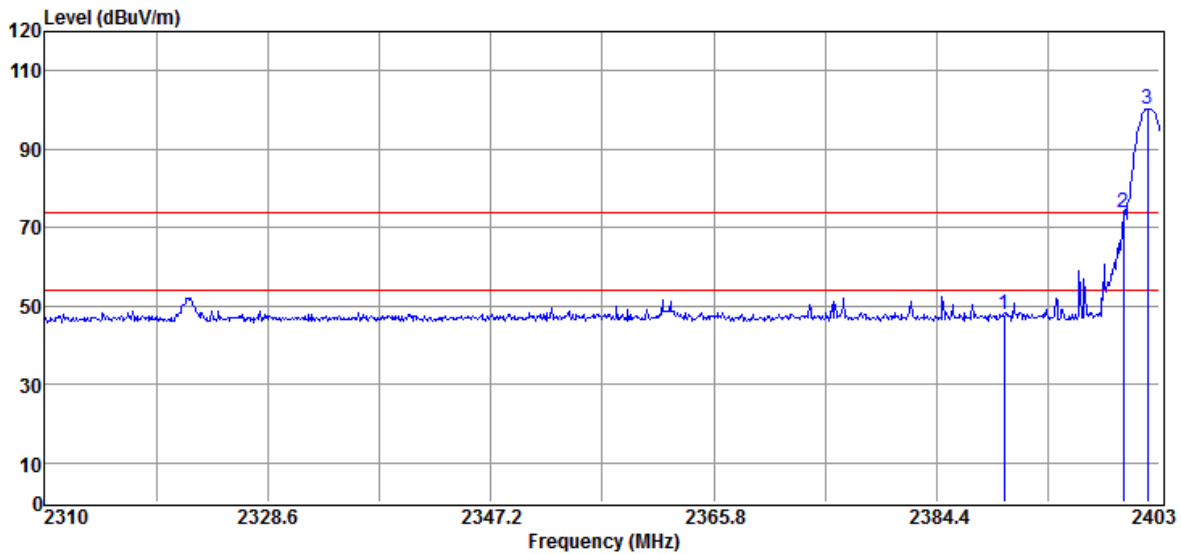


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	58.17	-10.88	47.29	74.00	-26.71	Peak	VERTICAL
2	2400.00	81.27	-10.87	70.40	78.59	-8.19	Peak	VERTICAL
3	2402.07	109.46	-10.87	98.59	F	--	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	58.52	-10.88	47.64	74.00	-26.36	Peak	HORIZONTAL
2	2400.00	84.71	-10.87	73.84	80.4	-6.56	Peak	HORIZONTAL
3	2401.98	111.27	-10.87	100.40	F	--	Peak	HORIZONTAL

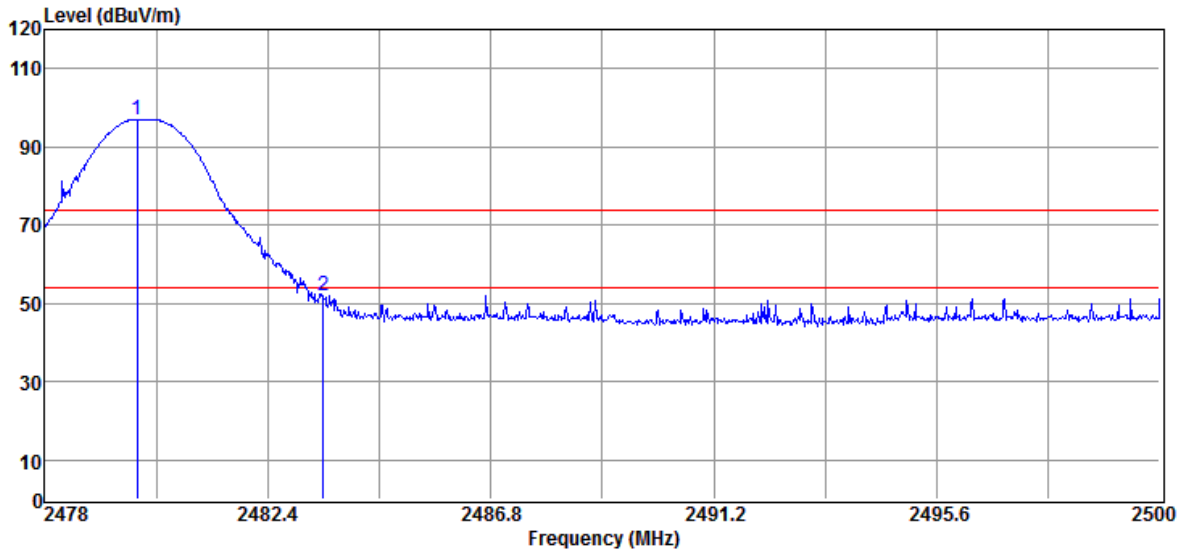
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Operation Mode TX CH High
 Fundamental Frequency 2480 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

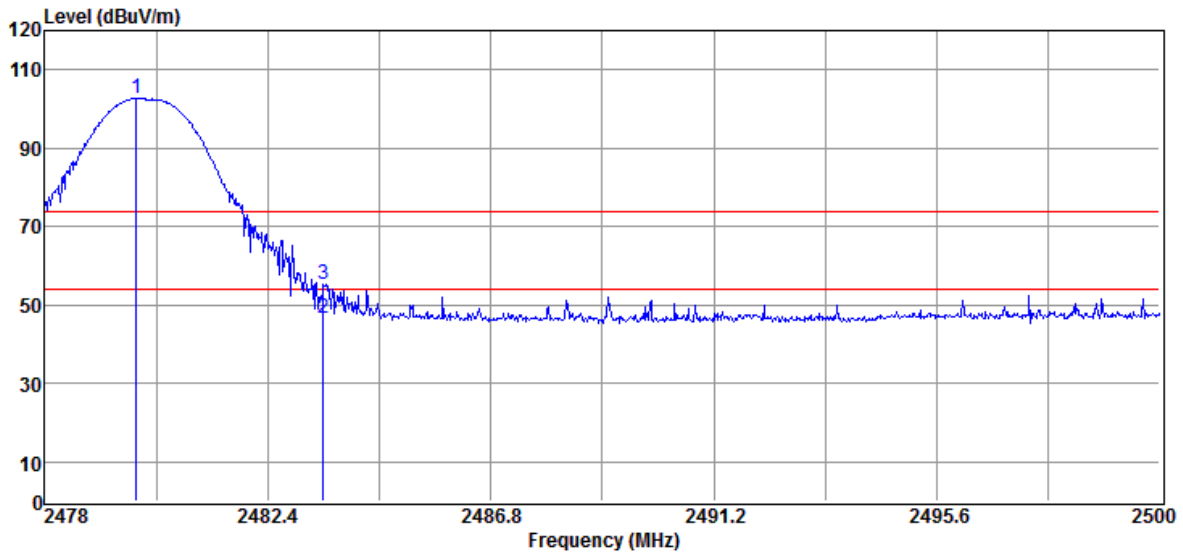


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.83	107.79	-10.74	97.05	F	--	Peak	VERTICAL
2	2483.50	62.49	-10.72	51.77	74.00	-22.23	Peak	VERTICAL

Remark:

- Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.80	113.48	-10.74	102.74	F	--	Peak	HORIZONTAL
2	2483.50	57.22	-10.72	46.50	54.00	-7.50	Average	HORIZONTAL
3	2483.50	66.14	-10.72	55.42	74.00	-18.58	Peak	HORIZONTAL

Remark:

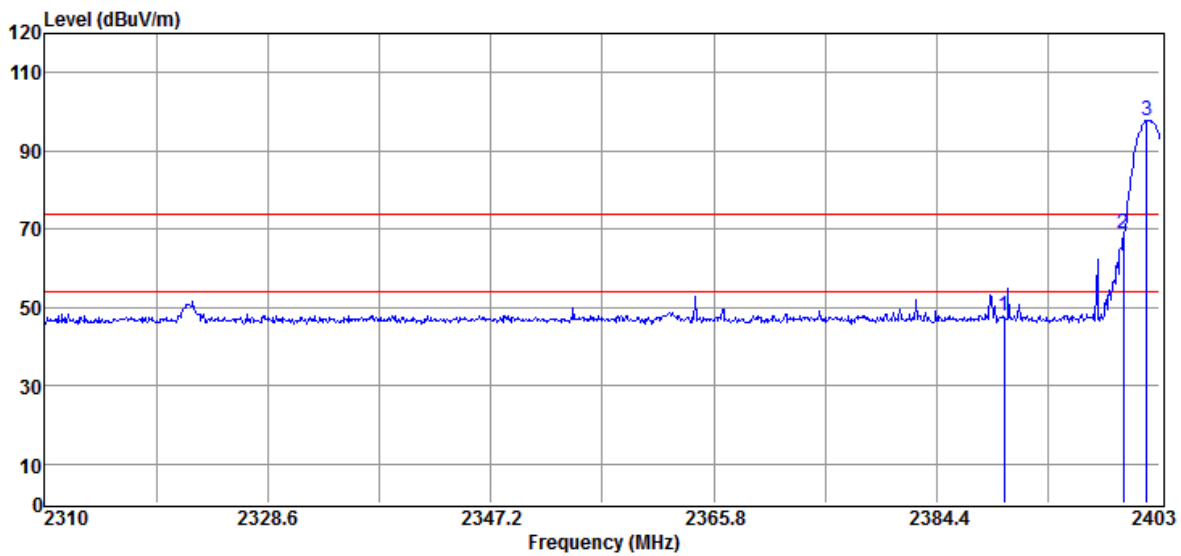
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Radiated Emission (EDR 2M Non-Hopping mode):

Operation Mode TX CH Low
Fundamental Frequency 2402 MHz
Temperature 25 °C

Test Date 2021/09/09
Test By Barry
Humidity 60 %

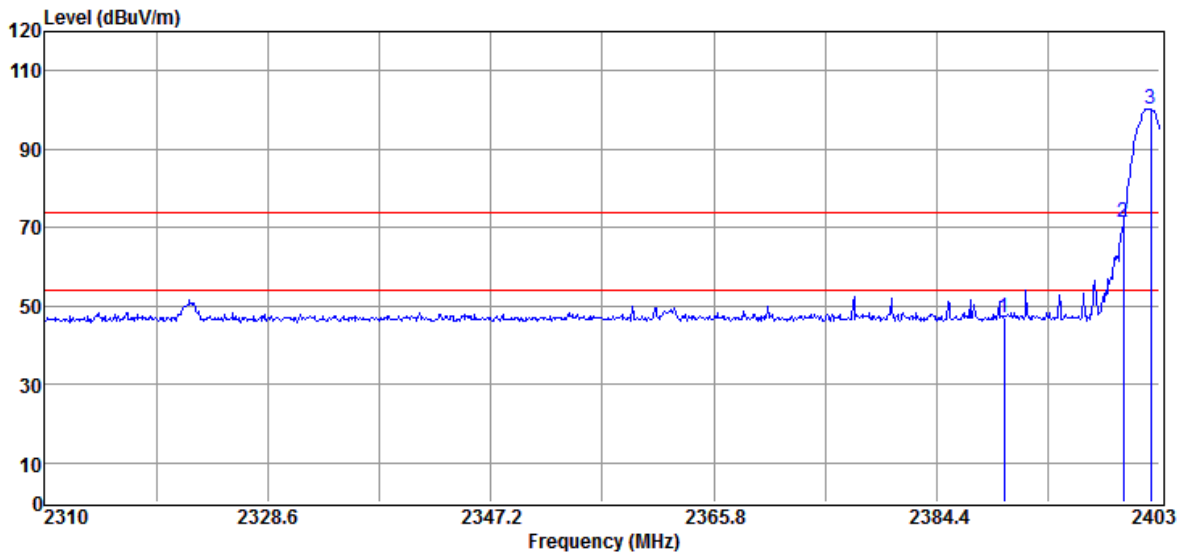


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	58.86	-10.88	47.98	74.00	-26.02	Peak	VERTICAL
2	2400.00	79.59	-10.87	68.72	77.85	-9.13	Peak	VERTICAL
3	2401.88	108.72	-10.87	97.85	F	--	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	57.93	-10.88	47.05	74.00	-26.95	2390.00	HORIZONTAL
2	2400.00	82.36	-10.87	71.49	80.33	-8.84	2400.00	HORIZONTAL
3	2402.26	111.20	-10.87	100.33	F	--	2402.26	HORIZONTAL

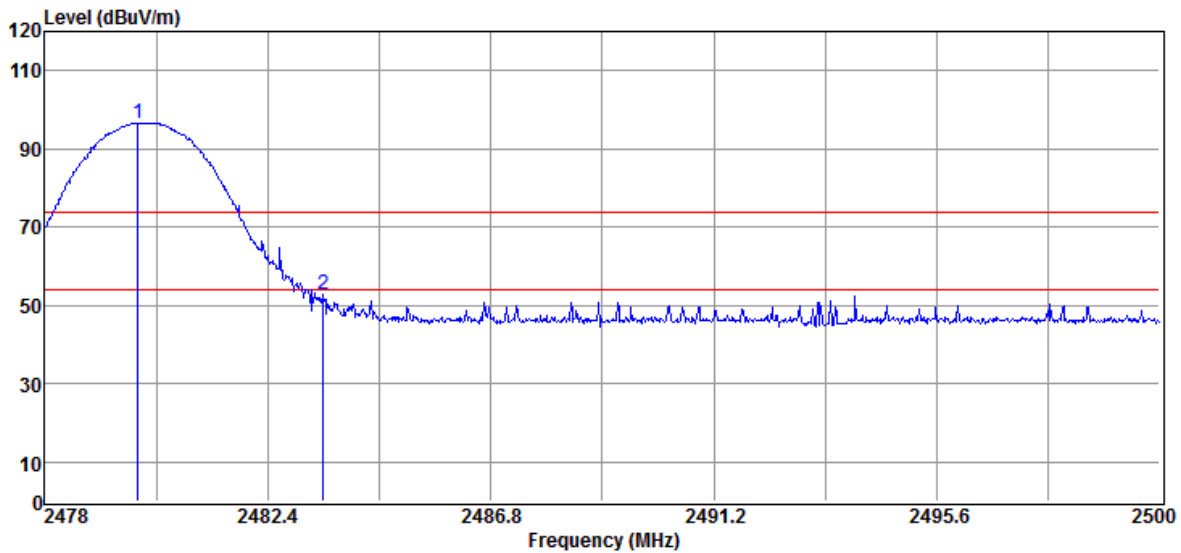
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Operation Mode TX CH High
 Fundamental Frequency 2480 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

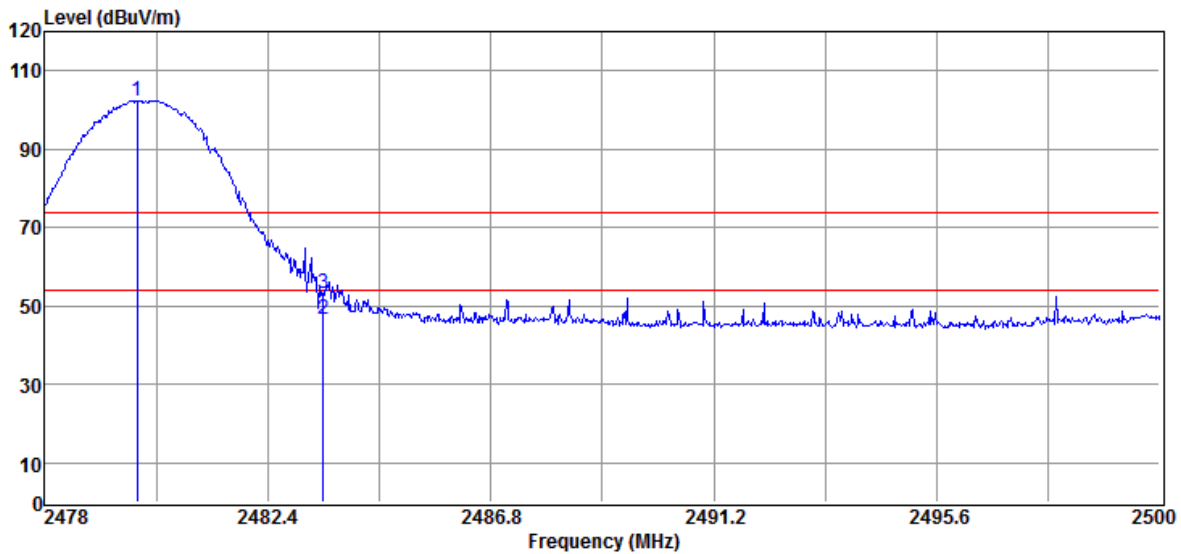


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.85	107.34	-10.74	96.60	F	--	Peak	VERTICAL
2	2483.50	63.57	-10.72	52.85	74.00	-21.15	Peak	VERTICAL

Remark:

- Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBUV	Factor dB/m	Level dBUV/m	Limit dBUV/m	Margin dB	Remark	Pol V/H
1	2479.83	113.11	-10.74	102.37	F	--	Peak	HORIZONTAL
2	2483.50	57.34	-10.72	46.62	54.00	-7.38	Average	HORIZONTAL
3	2483.50	63.78	-10.72	53.06	74.00	-20.94	Peak	HORIZONTAL

Remark:

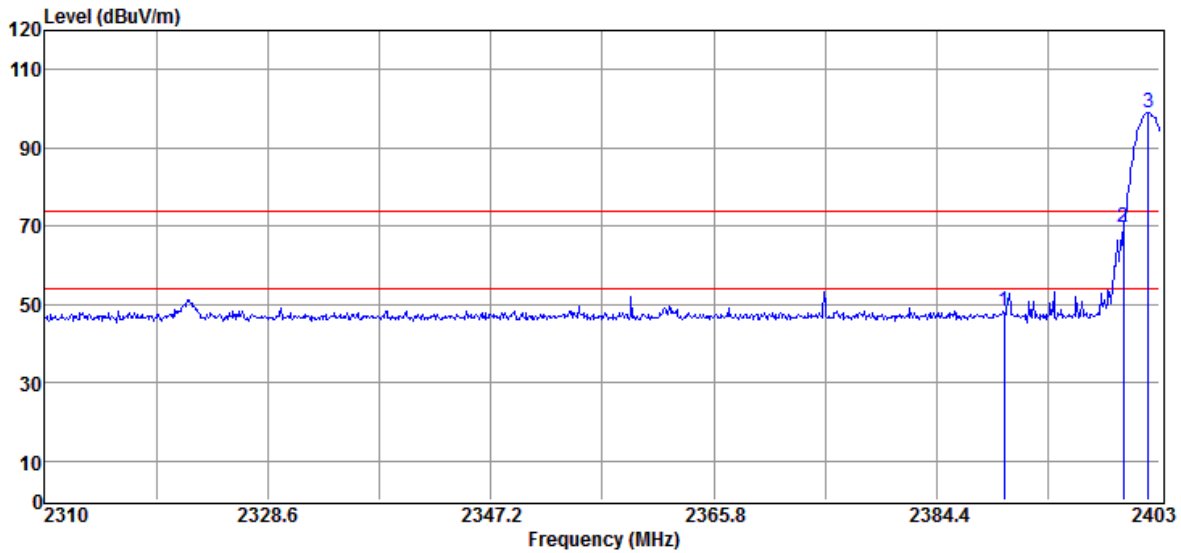
- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Radiated Emission (EDR 3M Non-Hopping mode):

Operation Mode TX CH Low
Fundamental Frequency 2402 MHz
Temperature 25 °C

Test Date 2021/09/09
Test By Barry
Humidity 60 %

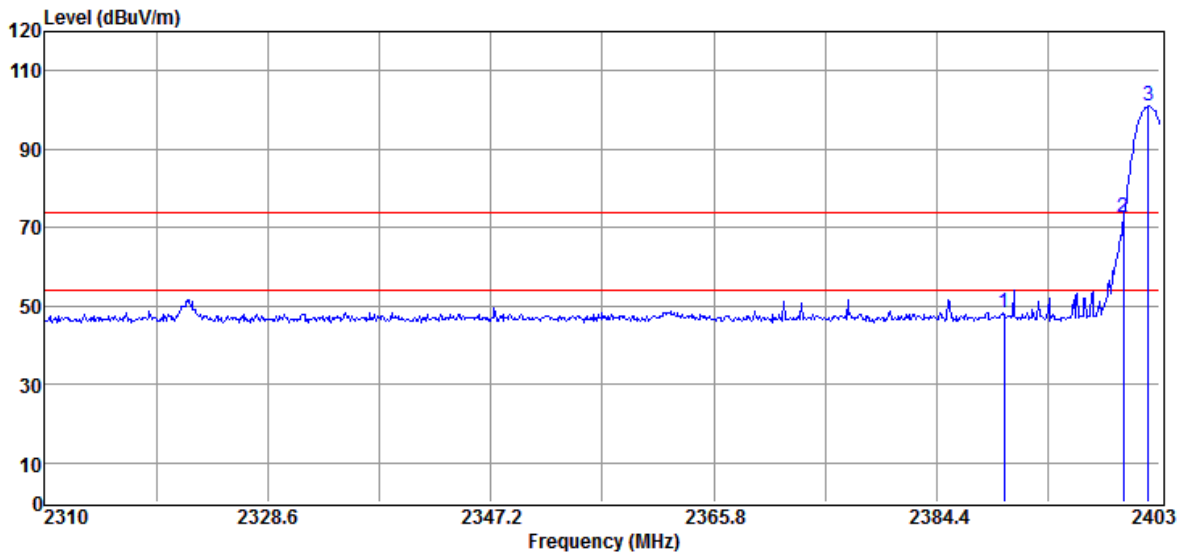


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	59.02	-10.88	48.14	74.00	-25.86	Peak	VERTICAL
2	2400.00	80.62	-10.87	69.75	78.92	-9.17	Peak	VERTICAL
3	2402.07	109.79	-10.87	98.92	F	--	Peak	VERTICAL

Remark:

- Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2390.00	58.95	-10.88	48.07	74.00	-25.93	Peak	HORIZONTAL
2	2400.00	83.27	-10.87	72.40	80.9	-8.5	Peak	HORIZONTAL
3	2402.07	111.77	-10.87	100.90	F	--	Peak	HORIZONTAL

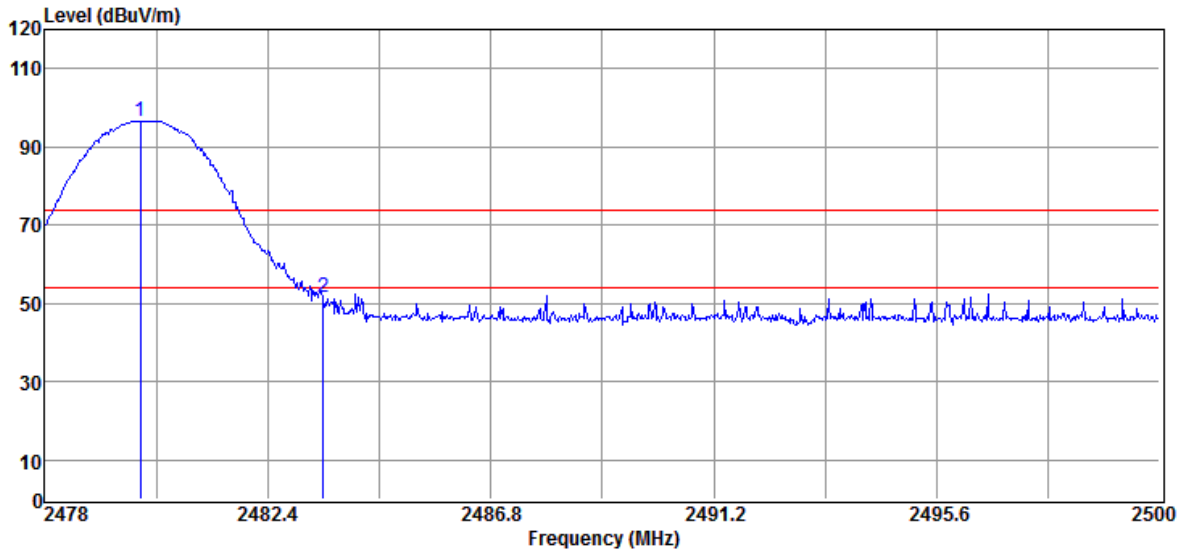
Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

Operation Mode TX CH High
 Fundamental Frequency 2480 MHz
 Temperature 25 °C

Test Date 2021/09/09
 Test By Barry
 Humidity 60 %

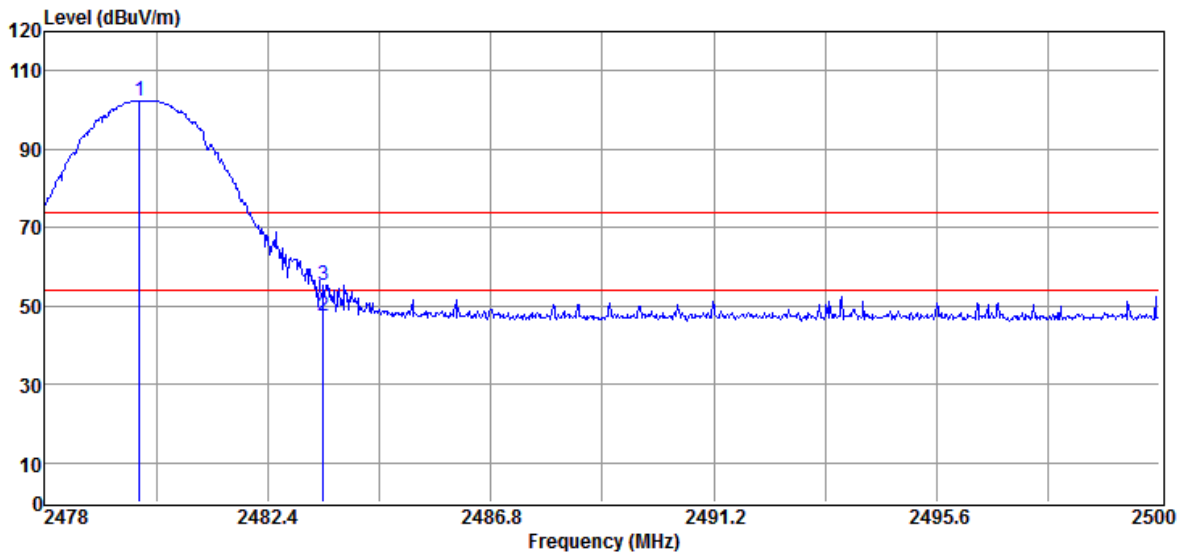


No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.89	107.36	-10.74	96.62	F	--	Peak	VERTICAL
2	2483.50	62.25	-10.72	51.53	74.00	-22.47	Peak	VERTICAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency



No	Freq MHz	Reading dBuV	Factor dB/m	Level dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol V/H
1	2479.87	113.14	-10.74	102.40	F	--	Peak	HORIZONTAL
2	2483.50	58.34	-10.72	47.62	54.00	-6.38	Average	HORIZONTAL
3	2483.50	66.13	-10.72	55.41	74.00	-18.59	Peak	HORIZONTAL

Remark:

- 1 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 2 Measurement of data within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 3 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 4 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Note: “F” denotes fundamental frequency

8. Antenna Requirement

8.1 Standard Applicable:

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.247(c), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-GEN 8.3, the applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for the licence-exempt apparatus.

Testing shall be performed using the highest gain antenna of each combination of licence-exempt transmitter and antenna type, with the transmitter output power set at the maximum level.⁹ When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna manufacturer.

User manuals for transmitters equipped with detachable antennas shall also contain the following notice in a conspicuous location:

This radio transmitter (identify the device by certification number or model number if Category II) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types approved for use with the transmitter, indicating the maximum permissible antenna gain (in dBi).

8.2 Antenna Connected Construction:

The directional gains of antenna used for transmitting is 2.80 dBi and the antenna type is FPC antenna which is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.