

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)
Report No.: RFBCKS-WTW-P26040080-2
FCC ID: NKR-LS06B
Product: Touchscreen
Brand: ADT
Model No.: ADTTOUCH502R0
Received Date: 2026/4/7
Test Date: 2026/5/11 ~ 2026/8/4
Issued Date: 2026/8/14
Applicant: WNC Corporation
Address: 20 Park Avenue II, Hsinchu Sciencer Park, Hsinchu 308, Taiwan, R.O.C
Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories
Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / 788550 / TW0003
Designation Number:

Approved by: _____

Jeremy Lin

Jeremy Lin / Project Engineer

, Date: _____

2026/8/14

This test report consists of 52 pages in total. It may be duplicated completely for legal use with the approval of the applicant. It should not be reproduced except in full, without the written approval of our laboratory. The test results in the report only apply to the tested sample. The test results in this report are traceable to the national or international standards.



Prepared by : Polly Chien / Specialist

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.

Table of Contents

Release Control Record	4
1 Certificate.....	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Supplementary Information	6
3 General Information	7
3.1 General Description	7
3.2 Antenna Description of EUT	8
3.3 Channel List	9
3.4 Test Mode Applicability and Tested Channel Detail	10
3.5 Duty Cycle of Test Signal	11
3.6 Test Program Used and Operation Descriptions	12
3.7 Connection Diagram of EUT and Peripheral Devices	12
3.8 Configuration of Peripheral Devices and Cable Connections	12
4 Test Instruments	13
4.1 RF Output Power	13
4.2 Number of Hopping Frequency Used	13
4.3 Dwell Time on Each Channel	14
4.4 Hopping Channel Separation	14
4.5 20 dB Bandwidth	14
4.6 Conducted Out of Band Emissions	14
4.7 AC Power Conducted Emissions	15
4.8 Unwanted Emissions below 1 GHz	16
4.9 Unwanted Emissions above 1 GHz	17
5 Limits of Test Items	18
5.1 RF Output Power	18
5.2 Number of Hopping Frequency Used	18
5.3 Dwell Time on Each Channel	18
5.4 Hopping Channel Separation	18
5.5 20 dB Bandwidth	18
5.6 Conducted Out of Band Emissions	18
5.7 AC Power Conducted Emissions	18
5.8 Unwanted Emissions below 1 GHz	19
5.9 Unwanted Emissions above 1 GHz	19
6 Test Arrangements	20
6.1 RF Output Power	20
6.1.1 Test Setup	20
6.1.2 Test Procedure	20
6.2 Number of Hopping Frequency Used	20
6.2.1 Test Setup	20
6.2.2 Test Procedure	20
6.3 Dwell Time on Each Channel	21
6.3.1 Test Setup	21
6.3.2 Test Procedure	21
6.4 Hopping Channel Separation	22
6.4.1 Test Setup	22
6.4.2 Test Procedure	22
6.5 20 dB Bandwidth	23
6.5.1 Test Setup	23
6.5.2 Test Procedure	23
6.6 Conducted Out of Band Emissions	24
6.6.1 Test Setup	24
6.6.2 Test Procedure	24
6.7 AC Power Conducted Emissions	25

6.7.1	Test Setup	25
6.7.2	Test Procedure	25
6.8	Unwanted Emissions below 1 GHz	26
6.8.1	Test Setup	26
6.8.2	Test Procedure	27
6.9	Unwanted Emissions above 1 GHz	28
6.9.1	Test Setup	28
6.9.2	Test Procedure	28
7	Test Results of Test Item	29
7.1	RF Output Power	29
7.2	Number of Hopping Frequency Used	30
7.3	Dwell Time on Each Channel	31
7.4	Hopping Channel Separation	33
7.5	20 dB Bandwidth	34
7.6	Conducted Out of Band Emissions	35
7.7	AC Power Conducted Emissions	37
7.8	Unwanted Emissions below 1 GHz	39
7.9	Unwanted Emissions above 1 GHz	41
8	Pictures of Test Arrangements	51
9	Information of the Testing Laboratories	52



Release Control Record

Issue No.	Description	Date Issued
RFBCKS-WTW-P26040080-2	Original release.	2026/8/14

1 Certificate

Product: Touchscreen
Brand: ADT
Test Model: ADTTOUCH502R0
Sample Status: Engineering sample
Applicant: WNC Corporation
Test Date: 2026/5/11 ~ 2026/8/4
Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)
Measurement procedure: ANSI C63.10-2020
KDB 558074 D01 15.247 Meas Guidance v05r02

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
Standard / Clause	Test Item	Result	Remark
15.247 (a)(1)	RF Output Power	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Number of Hopping Frequency Used	Pass	Meet the requirement of limit.
15.247(a)(1) (iii)	Dwell Time on Each Channel	Pass	Meet the requirement of limit.
15.247(a)(1)	Hopping Channel Separation	Pass	Meet the requirement of limit.
15.247(a)(1)	20 dB Bandwidth	-	Refer to Note 1
15.247(d)	Conducted Out of Band Emissions	Pass	Meet the requirement of limit.
15.207	AC Power Conducted Emissions	Pass	Minimum passing margin is -2.77 dB at 0.44178 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -5.2 dB at 552.83 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -5.6 dB at 2390.00 MHz
15.203	Antenna Requirement	Pass	Antenna connector is ipex(MHF) not a standard connector.

Notes:

1. If the Frequency Hopping System operating in 2400-2483.5 MHz band and the output power less than 125 mW. The hopping channel carrier frequencies separated by a minimum of 25 kHz or two-thirds of the 20 dB bandwidth of hopping channel whichever is greater.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Specification	Expanded Uncertainty (k=2) (±)
RF Output Power	-	1.371 dB
Dwell Time on Each Channel	-	0.0218
Hopping Channel Separation	-	390 Hz
20 dB Bandwidth	-	206.5 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.79 dB
AC Power Conducted Emissions	9 kHz ~ 30 MHz	2.90 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.59 dB
	30 MHz ~ 1 GHz	3.6 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	2.29 dB
	18 GHz ~ 40 GHz	2.29 dB

The other instruments specified are routine verified to remain within the calibrated levels, no measurement uncertainty is required to be calculated.

2.2 Supplementary Information

There is not any deviation from the test standards for the test method, and no modifications required for compliance.

3 General Information

3.1 General Description

Product	Touchscreen
Brand	ADT
Test Model	ADTTTOUCH502R0
Status of EUT	Engineering sample
Power Supply Rating	12Vdc from adapter
Modulation Type	GFSK, $\pi/4$ -DQPSK, 8DPSK
Modulation Technology	FHSS
Transfer Rate	Up to 3 Mbps
Operating Frequency	2.402 GHz ~ 2.48 GHz
Number of Channel	79
Output Power	35.645 mW (15.52 dBm)

Note:

1. The EUT uses following accessories.

Item	Brand	Model	Specification
AC Adapter 1	HOIOTO	ADS-26FSG-12 12018EPCU	AC Input: 100-240V, 50/60Hz, Max 0.7A DC Output: 12V, 1.5A, 18W DC Output Cable: 1.5m Plug: US
AC Adapter 2	ZBPOWER	ZB-H120015	AC Input: 100-240VAC, 50/60Hz, 0.45A Max DC Output: 12V, 1.5A DC Output Cable: 0.1m Plug: US
AC Adapter 3	ADT	1A102-1215	AC Input: 100-120V, 500mA, 50-60Hz DC Output: 12V, 1.5A DC Output Cable: 0.5m Plug: US

2. There are Bluetooth and WLAN (2.4 GHz & 5 GHz) technology used for the EUT.

3. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Antenna Description of EUT

1. The antenna information is listed as below.

Antenna NO.	RF Chain NO.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
WLAN1	ANT0	WNC	95XKAC15.GG7	2.07	2.4 GHz ~ 2.4835 GHz	PIFA	ipex(MHF)
				3.62	5.15 GHz ~ 5.25 GHz	PIFA	ipex(MHF)
				3.62	5.25 GHz ~ 5.35 GHz	PIFA	ipex(MHF)
				2.94	5.47 GHz ~ 5.725 GHz	PIFA	ipex(MHF)
				3.41	5.725 GHz ~ 5.85 GHz	PIFA	ipex(MHF)
WLAN2/BT	ANT1	WNC	95XKAC15.GG8	2.80	2.4 GHz ~ 2.4835 GHz	PIFA	ipex(MHF)
				3.95	5.15 GHz ~ 5.25 GHz	PIFA	ipex(MHF)
				3.95	5.25 GHz ~ 5.35 GHz	PIFA	ipex(MHF)
				2.92	5.47 GHz ~ 5.725 GHz	PIFA	ipex(MHF)
				3.42	5.725 GHz ~ 5.85 GHz	PIFA	ipex(MHF)

*Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

3.3 Channel List

79 channels are provided for BT-EDR:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.4 Test Mode Applicability and Tested Channel Detail

Pre-Scan:	1. EUT can be used in the following ways: X-axis/ Y-axis/ Z-axis. Pre-scan these ways and find the worst case as a representative test condition. 2. The AC Adapter has the following items: AC Adapter 1 / AC Adapter 2 / AC Adapter 3. Pre-scan these modes and find the worst case as a representative test condition.
Worst Case:	1. X-axis/ Y-axis/ Z-axis Worst Condition: Z-axis 2. AC Adapter Worst Condition: AC Adapter 3

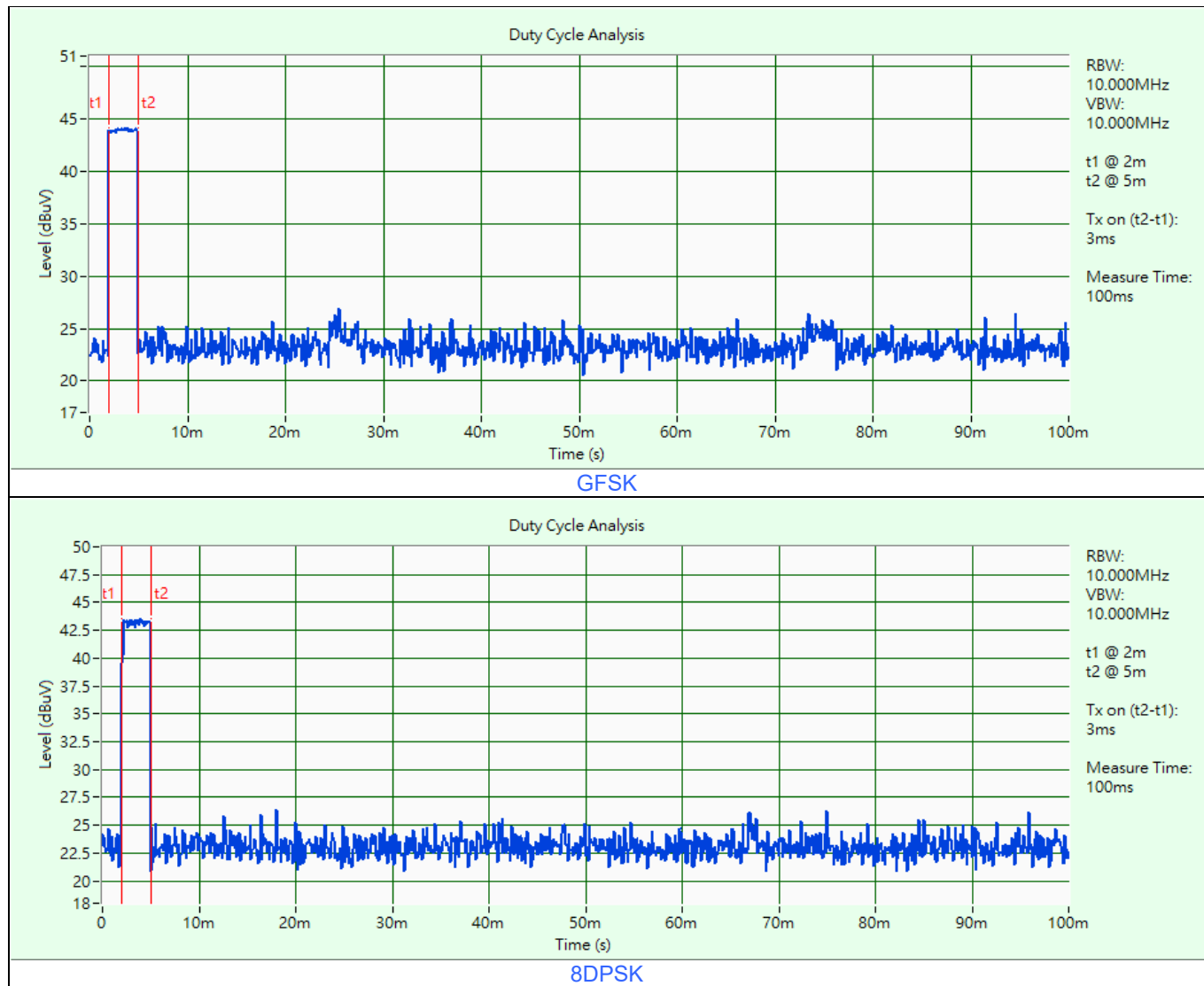
Following channel(s) was (were) selected for the final test as listed below:

Test Item	Tested Channel	Modulation	Data Rate Parameter
RF Output Power	0, 39, 78	GFSK	DH5
		8DPSK	3DH5
Number of Hopping Frequency Used	Hopping	GFSK	DH5
		8DPSK	3DH5
Dwell Time on Each Channel	Hopping	GFSK	DH1/DH3/DH5
		8DPSK	3DH1/3DH3/3DH5
Hopping Channel Separation / 20 dB Bandwidth	0, 39, 78	GFSK	DH5
		8DPSK	3DH5
Conducted Out of Band Emissions	Hopping 0, 78	GFSK	DH5
		8DPSK	3DH5
AC Power Conducted Emissions	39	GFSK	DH5
Unwanted Emissions below 1 GHz	39	GFSK	DH5
Unwanted Emissions above 1 GHz	0, 39, 78	GFSK	DH5
		8DPSK	3DH5

3.5 Duty Cycle of Test Signal

GFSK: Duty cycle = 3 ms / 100 ms x 100% = 3.0%

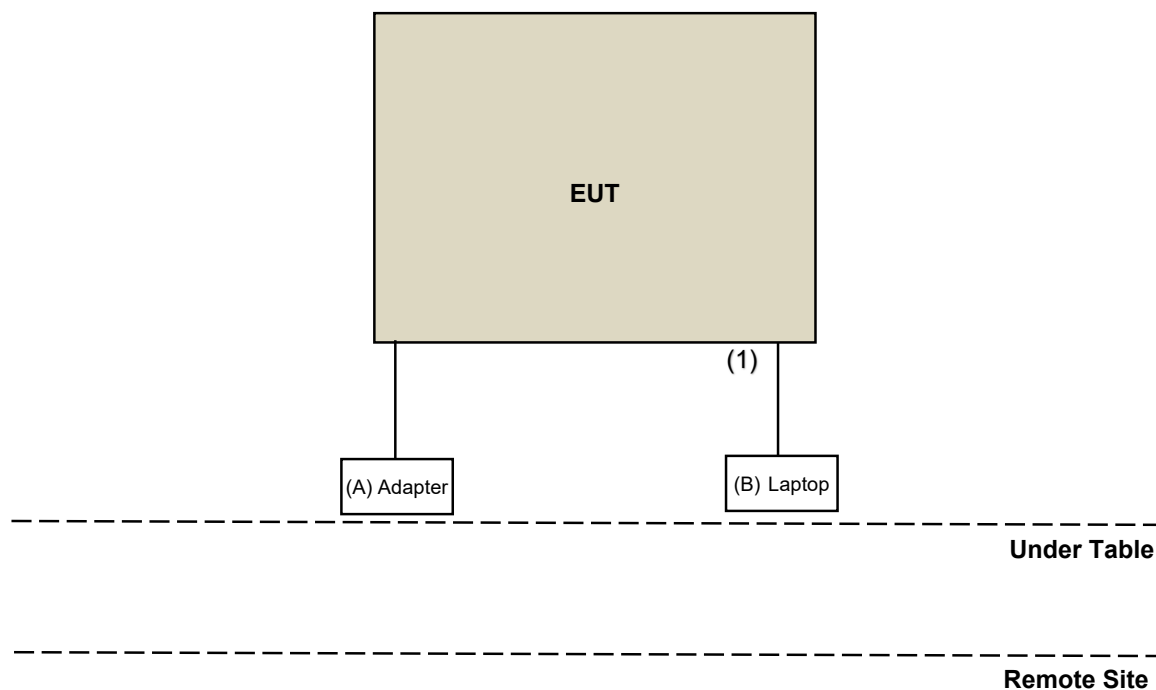
8DPSK: Duty cycle = 3 ms / 100 ms x 100% = 3.0%



3.6 Test Program Used and Operation Descriptions

Controlling software ADB has been activated to set the EUT under transmission condition continuously at specific channel frequency.

3.7 Connection Diagram of EUT and Peripheral Devices



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Laptop	Lenovo	X250	PC04UZN1	N/A	Provided by Lab
B	Adapter	ZBPOWER	ZB-H120015	N/A	N/A	Accessory of the EUT

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	USB Cable	1	1.5	No	0	Provided by Lab

4 Test Instruments

The calibration interval of the all test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.1 RF Output Power

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Woken	00800A1K01A-10	00800A1K01A-10-01	2025/5/23	2026/5/22
Peak Power Analyzer Keysight	8990B	MY51000538	2025/5/23	2026/5/22
USB Power Sensor Anritsu	MA24408A	12994	2025/12/5	2026/12/4
Wideband Power Sensor Keysight	N1923A	MY58200003	2025/5/29	2026/5/28

Notes:

1. The test was performed in HY - Oven room(Hwaya).
2. Tested Date: 2026/5/14

4.2 Number of Hopping Frequency Used

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Woken	00800A1K01A-10	00800A1K01A-10-01	2025/5/23	2026/5/22
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSU43	101261	2026/5/4	2027/5/3

Notes:

1. The test was performed in HY - Oven room(Hwaya).
2. Tested Date: 2026/5/14

4.3 Dwell Time on Each Channel

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Fixed Attenuator Woken	00800A1K01A-10	00800A1K01A-10-01	2025/5/23	2026/5/22
MXA Signal Analyzer Keysight	N9020B	MY60110462	2026/5/5	2027/5/4
Signal & Spectrum Analyzer R&S	FSV3044	101504	2025/6/18	2026/6/17
	FSW26	102023	2025/11/14	2026/11/13
	FSW43	101582	2026/5/2	2027/5/1
Signal Analyzer R&S	FSV40	100980	2026/5/14	2027/5/13
Software BV	ADT_RF Test Software V7.6.5.4	N/A	N/A	N/A
Spectrum Analyzer R&S	FSU26	101645	2025/7/28	2026/7/27
	FSU43	101261	2026/5/4	2027/5/3

Notes:

1. The test was performed in HY - Oven room(Hwaya).
2. Tested Date: 2026/5/14

4.4 Hopping Channel Separation

Refer to section 4.2 to get the tested date and information of the instruments.

4.5 20 dB Bandwidth

Refer to section 4.2 to get the tested date and information of the instruments.

4.6 Conducted Out of Band Emissions

Refer to section 4.2 to get the tested date and information of the instruments.

4.7 AC Power Conducted Emissions

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
50 ohm terminal resistance	E1-011279	04	2025/12/4	2026/12/3
	E1-011280	05	2025/12/4	2026/12/3
	E1-011311	09	2025/12/4	2026/12/3
DC LISN Schwarzbeck	NNBM 8126G	8126G-069	2025/11/3	2026/11/2
Diode Pulse Limiter Schwarzbeck	VTSD 9561 F-N	01617	2025/8/23	2026/8/22
EMI Test Receiver R&S	ESR3	102783	2025/12/15	2026/12/14
LISN R&S	ESH2-Z5	100100	2026/3/4	2027/3/3
	ESH3-Z5	100312	2025/8/29	2026/8/28
RF Coaxial Cable Woken	5D-FB	Cable-cond2-01	2025/8/23	2026/8/22
Software BVADT	BVADT_Cond_ V7.4.1.0	N/A	N/A	N/A
V-LISN Schwarzbeck	NNBL 8226-2	8226-142	2025/8/27	2026/8/26

Notes:

1. The test was performed in HY - Conduction 2.
2. Tested Date: 2026/8/4

4.8 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn BV ADT	AT100	AT93021705	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-160	2025/9/16	2026/9/15
Loop Antenna TESEQ	HLA 6121	45745	2025/9/1	2026/8/31
MXE EMI Receiver Agilent	N9038A	MY51210203	2025/8/27	2026/8/26
Preamplifier Agilent	8447D	2944A10638	2026/4/18	2027/4/17
Preamplifier EMCI	EMC001340	980201	2025/9/21	2026/9/20
RF Coaxial Cable Woken	8D-FB	Cable-CH9-01	2026/4/18	2027/4/17
Signal & Spectrum Analyzer R&S	FSW43	101582	2026/5/2	2027/5/1
Software BV ADT	ADT_Radiated_ V7.7.1.1.1	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 4(Hwaya).
2. Tested Date: 2026/8/4

4.9 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn BV ADT	AT100	AT93021705	N/A	N/A
Boresight antenna tower fixture BV	BAF-02	5	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-1169	2025/11/9	2026/11/8
	BBHA 9170	9170-480	2025/11/9	2026/11/8
		BBHA9170243	2025/11/9	2026/11/8
MXE EMI Receiver Agilent	N9038A	MY51210203	2025/8/27	2026/8/26
Preamplifier Agilent	8449B	3008A02367	2026/1/3	2027/1/2
Preamplifier EMCI	EMC 184045	980116	2025/9/21	2026/9/20
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	2025/6/30	2026/6/29
	EMC102-KM-KM-3000	150929	2025/6/30	2026/6/29
RF Coaxial Cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	2026/1/3	2027/1/2
RF Coaxial Cable HUBER+SUHNER&EMCI	SUCOFLEX 104& EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	2026/1/3	2027/1/2
Signal & Spectrum Analyzer R&S	FSW43	101582	2026/5/2	2027/5/1
Software BV ADT	ADT_Radiated_ V7.7.1.1.1	N/A	N/A	N/A
Turn Table BV ADT	TT100	TT93021705	N/A	N/A
Turn Table Controller BV ADT	SC100	SC93021705	N/A	N/A

Notes:

1. The test was performed in HY - 966 chamber 4(Hwaya).
2. Tested Date: 2026/5/11

5 Limits of Test Items

5.1 RF Output Power

The Maximum Output Power Measurement is 125 mW (21 dBm).

5.2 Number of Hopping Frequency Used

At least 15 channels frequencies, and should be equally spaced.

5.3 Dwell Time on Each Channel

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

5.4 Hopping Channel Separation

At least 25 kHz or two-third of 20 dB hopping channel bandwidth (whichever is greater).

5.5 20 dB Bandwidth

Maximum bandwidth is not specified.

5.6 Conducted Out of Band Emissions

Below 20 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

5.7 AC Power Conducted Emissions

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Notes:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.

5.8 Unwanted Emissions below 1 GHz

Radiated emissions up to 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).

5.9 Unwanted Emissions above 1 GHz

Radiated emissions above 1 GHz which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
Above 960	500	3

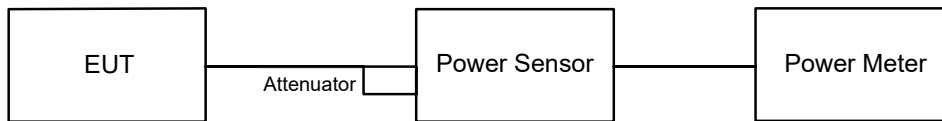
Notes:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

6 Test Arrangements

6.1 RF Output Power

6.1.1 Test Setup



6.1.2 Test Procedure

Peak Power:

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

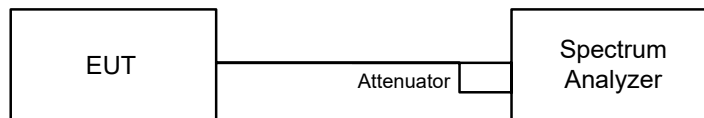
The power meter video bandwidth is greater than or equal to the DTS bandwidth and use a fast responding diode detector.

Average Power:

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

6.2 Number of Hopping Frequency Used

6.2.1 Test Setup



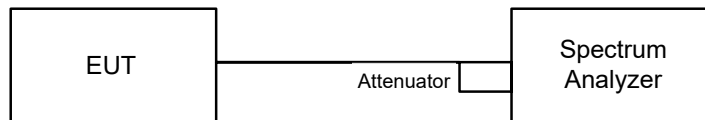
6.2.2 Test Procedure

- Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- Span: The frequency band of operation. Depending on the number of channels the device supports, it could be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.
- RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.
- Video (or average) bandwidth (VBW) $\geq$ RBW.
- Sweep: No faster than coupled (auto) time.
- Detector function: Peak.
- Trace: Max-hold.
- Allow the trace to stabilize

Note: Where the device shares the same channel plan (carrier frequencies and number of channels) across multiple data rates or modulation schemes then the number of channels need only be measured for one of those modulation schemes or data rates.

6.3 Dwell Time on Each Channel

6.3.1 Test Setup



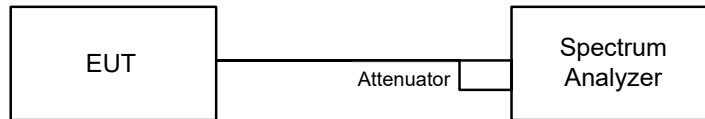
6.3.2 Test Procedure

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Span: Zero span, centered on a hopping channel.
- d. RBW shall be $\leq$ channel spacing and where possible RBW should be set $\gg 1 / T$, where T is the expected transmission time per hop.
- e. Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = $1/\text{hopping rate}$) should achieve this.
- f. Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel.
- g. Detector function: Peak.
- h. Trace: Clear-write, single sweep.
- i. Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers.

Note: Where the device shares the same hopping algorithms (dwell time, channel selection) across multiple data rates or modulation schemes then the time of occupancy need only be measured for one of those modulation schemes or data rates. If the dwell time value varies with different modes of operation (data rate, modulation format, number of hopping channels, etc.), then repeat this test for each variation in dwell time.

6.4 Hopping Channel Separation

6.4.1 Test Setup



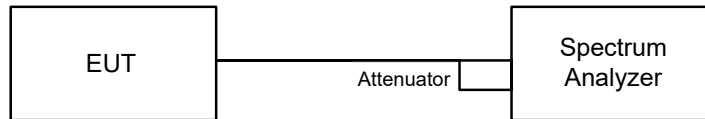
6.4.2 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- c. Span: Wide enough to capture the peaks of two adjacent channels.
- d. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.
- e. Video (or average) bandwidth (VBW) $\geq$ RBW.
- f. Sweep: No faster than coupled (auto) time.
- g. Detector function: Peak.
- h. Trace: Max-hold.
- i. Allow the trace to stabilize.

Note: Where the device shares the same channel plan (carrier frequencies and number of channels) across multiple data rates or modulation schemes then the carrier separation need only be measured for one of those modulation schemes or data rates.

6.5 20 dB Bandwidth

6.5.1 Test Setup

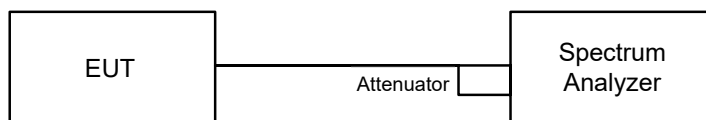


6.5.2 Test Procedure

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
- c. The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be at least three times RBW, unless otherwise specified by the applicable requirement.
- d. Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level.
- e. Steps a) through c) might require iteration to adjust within the specified tolerances.
- f. The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target “-xx dB down” requirement; that is, if the requirement calls for measuring the -20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value.
- g. Set detection mode to peak and trace mode to max-hold.
- h. Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- i. Determine the “-xx dB down amplitude” using $[(\text{reference value}) - xx]$. Alternatively, this calculation may be made by using the marker-delta function of the instrument.

6.6 Conducted Out of Band Emissions

6.6.1 Test Setup



6.6.2 Test Procedure

MEASUREMENT PROCEDURE REF

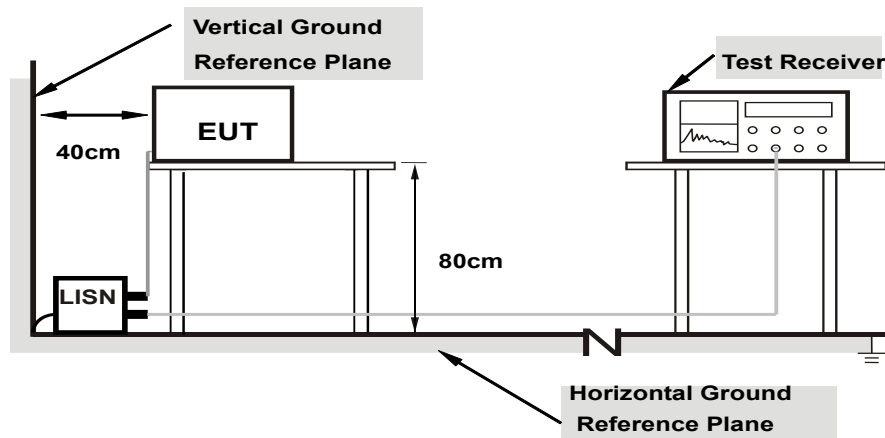
- Set instrument center frequency to DTS channel center frequency.
- Set the span to ≥ 1.5 times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW ≥ 300 kHz.
- Detector = peak.
- Sweep time = No faster than coupled (auto) time.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum PSD level.

MEASUREMENT PROCEDURE OOB

- Set the center frequency and span to encompass frequency range to be measured. Note that the frequency range might need to be divided into multiple frequency ranges to retain frequency resolution.
- Set RBW = 100 kHz.
- Set VBW ≥ 300 kHz.
- Detector = peak.
- Sweep = No faster than coupled (auto) time.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

6.7 AC Power Conducted Emissions

6.7.1 Test Setup



Note: 1. Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.7.2 Test Procedure

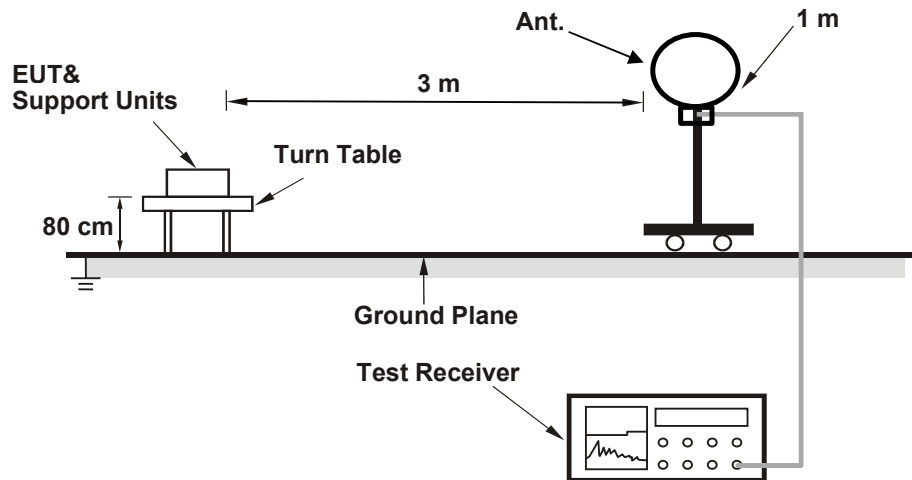
- Exploratory ac power-line conducted emission measurements: The EUT shall be operated on the mid channel and in the mode with highest output power unless the fundamental operates in the AC power-line emission test range then the EUT shall be operated in the range of typical modes of operation.
- The EUT was placed on a 0.8 meter to the top of table and placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50 uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels under (Limit – 20 dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz-30 MHz.

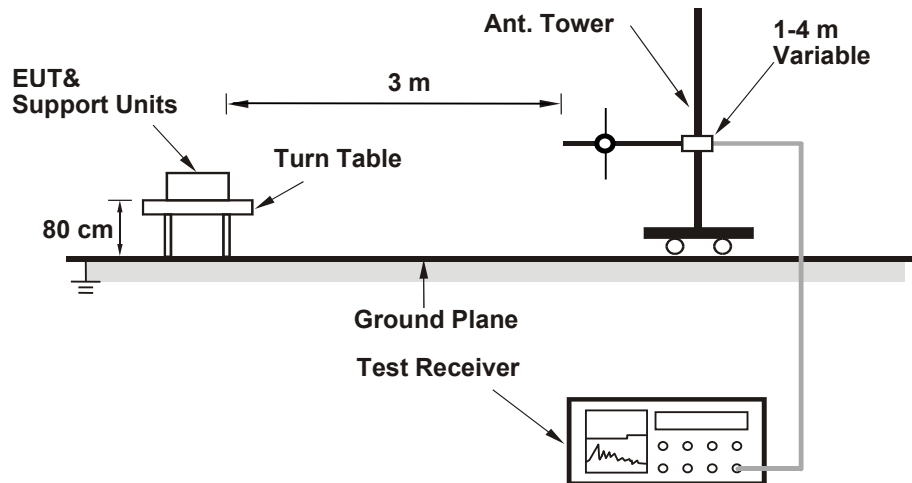
6.8 Unwanted Emissions below 1 GHz

6.8.1 Test Setup

For Radiated emission below 30 MHz



For Radiated emission above 30 MHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.8.2 Test Procedure

For Radiated emission below 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode (however, peak detector measurements may be used to determine compliance with QP requirements), except for the frequency band (9 kHz to 90 kHz and 110 kHz to 490 kHz) set to average detect function and peak detect function.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz at frequency below 150 kHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz or 10 kHz at frequency (150 kHz to 30 MHz).
3. All modes of operation were investigated and the worst-case emissions are reported.

For Radiated emission above 30 MHz

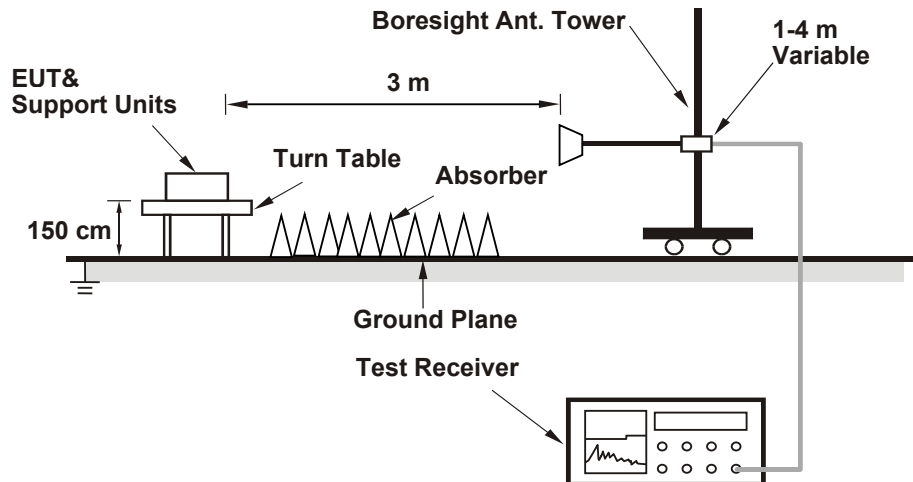
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-peak(QP) detect function, Average(AV) detect function, Peak(PK) detect function and specified bandwidth with maximum hold mode when the test frequencies less than or equal to 1 GHz.

Notes:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz (however, peak detector measurements may be used to determine compliance with QP requirements).
2. All modes of operation were investigated and the worst-case emissions are reported.

6.9 Unwanted Emissions above 1 GHz

6.9.1 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

6.9.2 Test Procedure

- The EUT was placed on the top of a rotating table 1.5 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Notes:

- The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) and Average detection (AV) at frequency above 1 GHz.
- The maximum dwell time per 1 MHz is determined as follows:
Maximum dwell time per 1 MHz = dwell time per 100 ms per channel × (channel separation correction + overlapping channel correction) where:
 - Channel separation correction = $[1 / \text{channel separation (MHz)}]$ for channel separation < 1 MHz, and = 1 for channel separation ≥ 1 MHz, as determined using the procedures of 7.8.2. If the average measurements are performed on the Nth harmonic, the channel separation value is N times the separation at the fundamental frequency.
 - Overlapping channel correction = 0 when the 20 dB channel bandwidth < channel separation and = 1 for when the 20 dB channel bandwidth > channel separation.
- The average value may be determined as follows:
From the peak value of the emission: The measured peak value in dBuV/m is corrected by $20\log(\text{maximum dwell time in 100 ms} / 100)$.
- All modes of operation were investigated and the worst-case emissions are reported.

7 Test Results of Test Item

7.1 RF Output Power

Environmental Conditions:	25°C, 60% RH	Tested By:	Match Tsui
---------------------------	--------------	------------	------------

For Peak Power

GFSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	31.915	15.04	21	Pass
39	2441	35.645	15.52	21	Pass
78	2480	34.914	15.43	21	Pass

Note: The antenna gain is 2.08 dBi $\leq$ 6 dBi, so the output power limit shall not be reduced.

8DPSK

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2402	17.701	12.48	21	Pass
39	2441	16.749	12.24	21	Pass
78	2480	16.181	12.09	21	Pass

Note: The antenna gain is 2.08 dBi $\leq$ 6 dBi, so the output power limit shall not be reduced.

For Average Power

GFSK

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	29.242	14.66
39	2441	31.55	14.99
78	2480	31.989	15.05

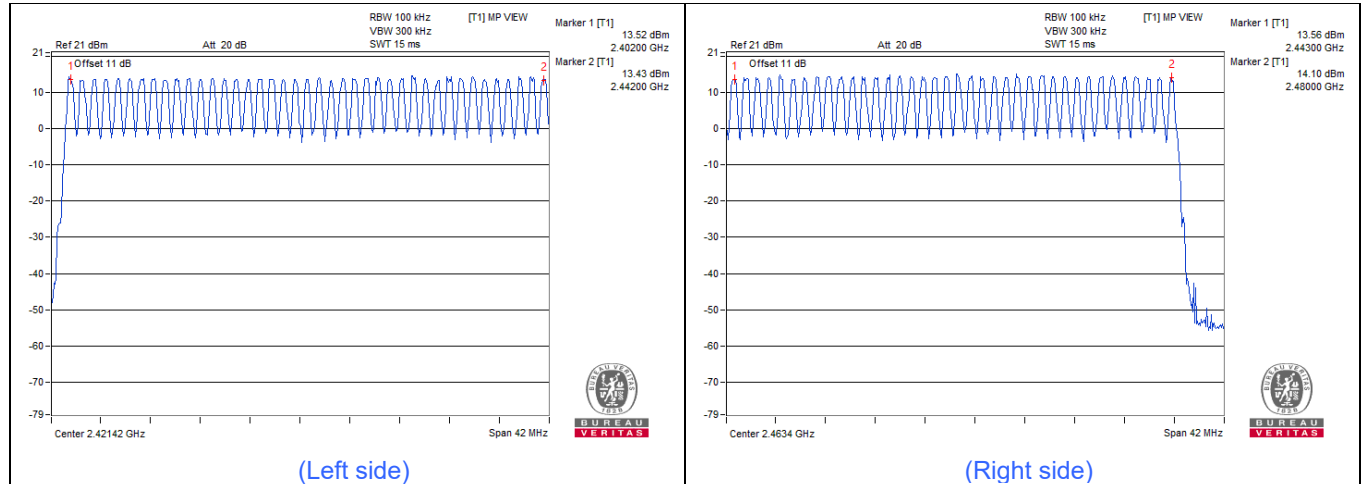
8DPSK

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2402	9.226	9.65
39	2441	8.337	9.21
78	2480	8.299	9.19

7.2 Number of Hopping Frequency Used

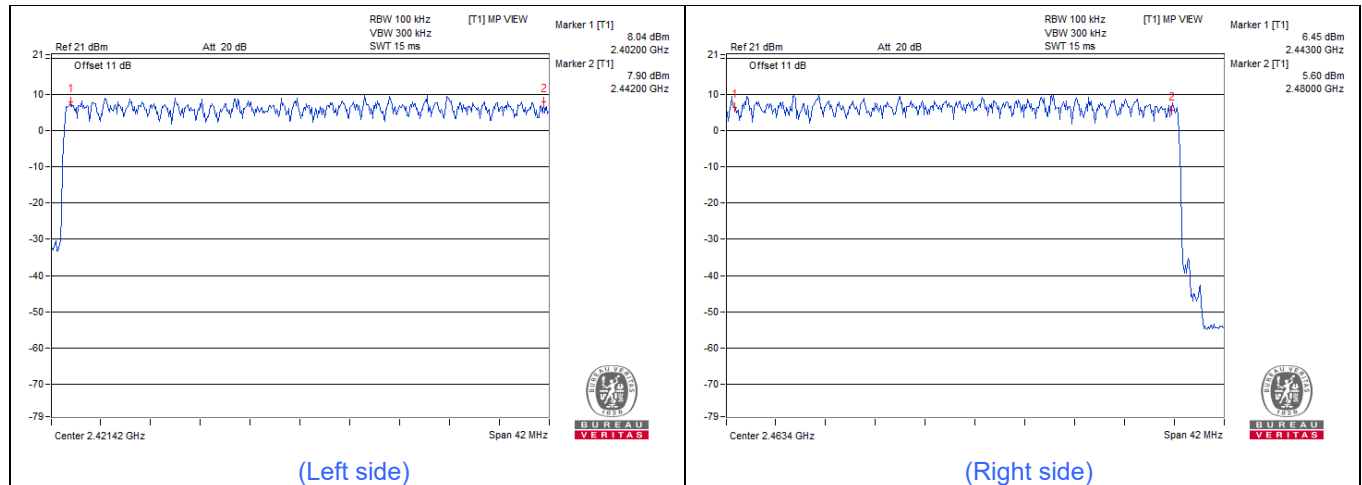
Environmental Conditions:	25°C, 60% RH	Tested By:	Match Tsui
---------------------------	--------------	------------	------------

GFSK



Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

8DPSK



Note: There are 79 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

7.3 Dwell Time on Each Channel

Environmental Conditions:	25°C, 60% RH	Tested By:	Match Tsui
---------------------------	--------------	------------	------------

GFSK

Mode	Number of transmission in 31.6 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
DH1	51 (times / 5 sec) * 6.32 = 323 times	0.414	133.72	400	Pass
DH3	25 (times / 5 sec) * 6.32 = 158 times	1.69	267.02	400	Pass
DH5	16 (times / 5 sec) * 6.32 = 102 times	3.024	308.45	400	Pass



8DPSK

Mode	Number of transmission in 31.6 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
3DH1	51 (times / 5 sec) * 6.32 = 323 times	0.45	145.35	400	Pass
3DH3	25 (times / 5 sec) * 6.32 = 158 times	1.73	273.34	400	Pass
3DH5	18 (times / 5 sec) * 6.32 = 114 times	3.056	348.38	400	Pass

Spectrum plots of Dwell Time



7.4 Hopping Channel Separation

Environmental Conditions:	25°C, 60% RH	Tested By:	Match Tsui
---------------------------	--------------	------------	------------

GFSK

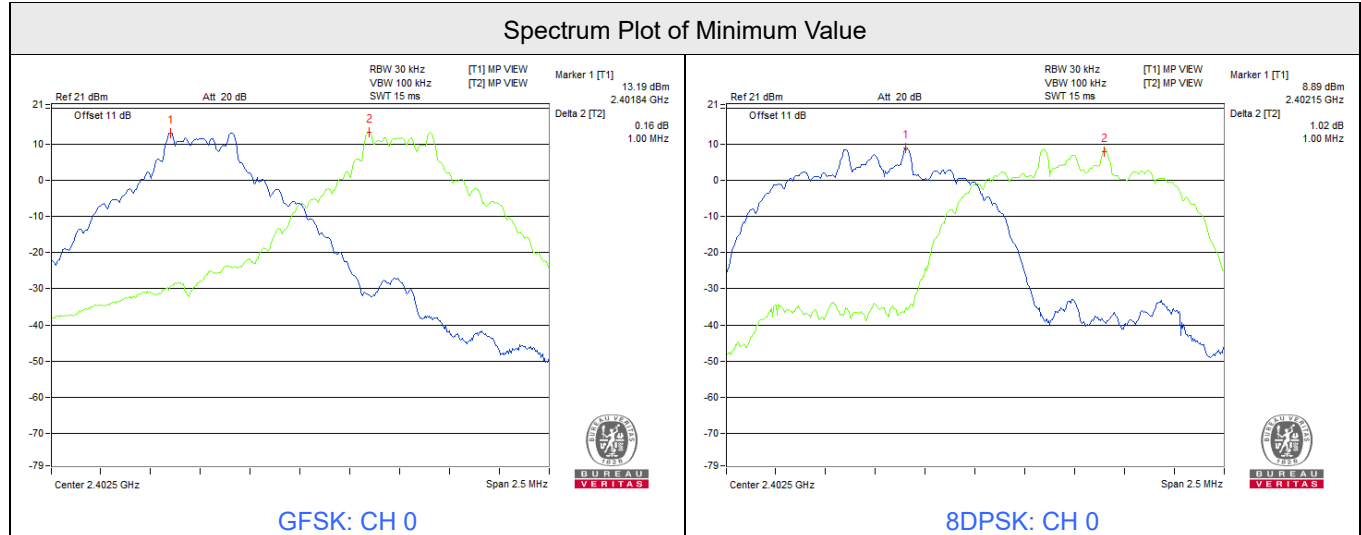
Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	1.00	0.68	Pass
39	2441	1.00	0.68	Pass
78	2480	1.01	0.67	Pass

Note: The minimum limit is two-third 20dB bandwidth.

8DPSK

Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2402	1.00	0.87	Pass
39	2441	1.00	0.88	Pass
78	2480	1.00	0.9	Pass

Note: The minimum limit is two-third 20dB bandwidth.



7.5 20 dB Bandwidth

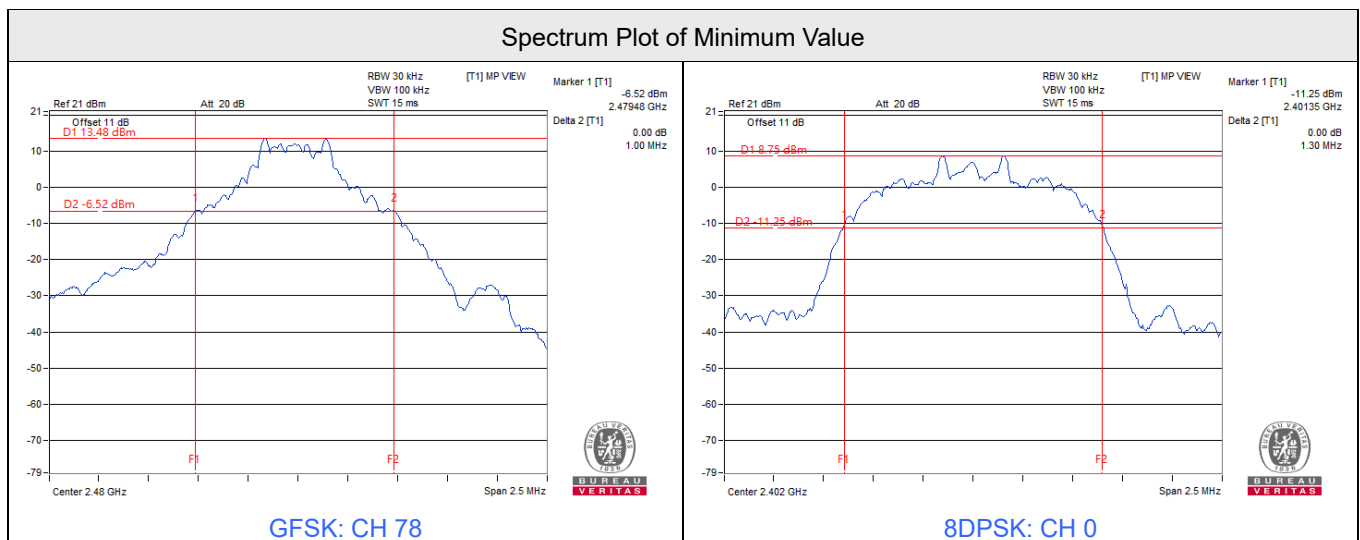
Environmental Conditions:	25°C, 60% RH	Tested By:	Match Tsui
---------------------------	--------------	------------	------------

GFSK

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.02
39	2441	1.01
78	2480	1

8DPSK

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2402	1.3
39	2441	1.31
78	2480	1.34



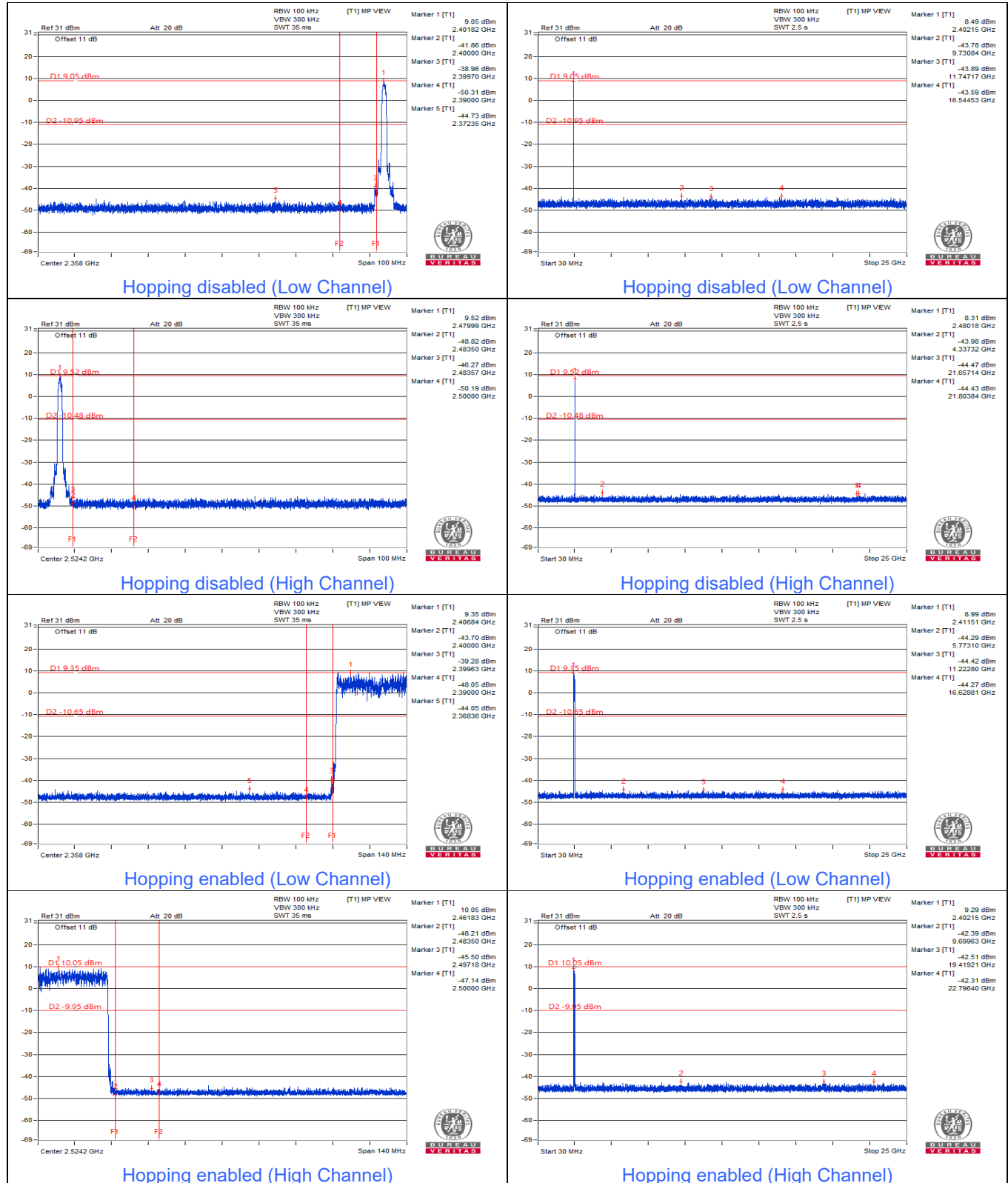
7.6 Conducted Out of Band Emissions

Environmental Conditions:	25°C, 60% RH	Tested By:	Match Tsui
---------------------------	--------------	------------	------------

GFSK



8DPSK



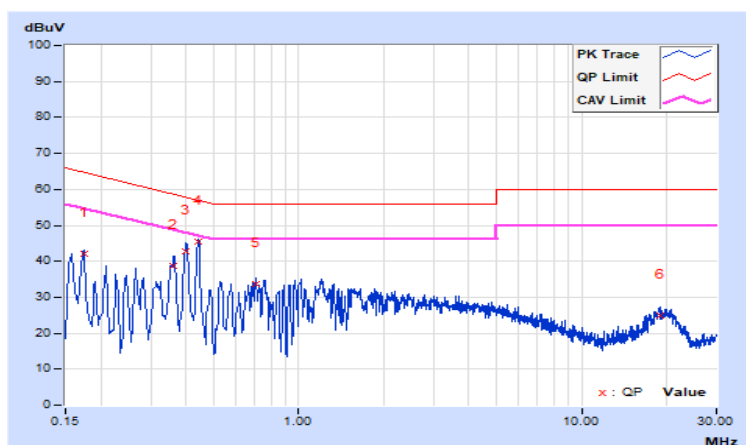
7.7 AC Power Conducted Emissions

RF Mode	GFSK	Channel	CH 39 : 2441 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 69% RH
Tested By	Thomas Cheng		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17384	10.28	31.88	18.94	42.16	29.22	64.77	54.77	-22.61	-25.55
2	0.36257	10.41	28.23	21.55	38.64	31.96	58.67	48.67	-20.03	-16.71
3	0.39800	10.44	32.42	28.76	42.86	39.20	57.90	47.90	-15.04	-8.70
4	0.44200	10.45	35.04	33.00	45.49	43.45	57.02	47.02	-11.53	-3.57
5	0.70612	10.50	23.17	17.38	33.67	27.88	56.00	46.00	-22.33	-18.12
6	18.92600	12.02	12.94	2.23	24.96	14.25	60.00	50.00	-35.04	-35.75

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

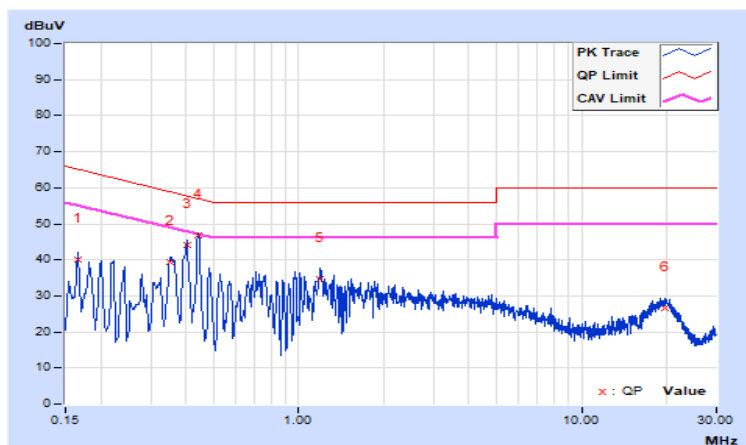


RF Mode	GFSK	Channel	CH 39 : 2441 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power	120 Vac, 60 Hz	Environmental Conditions	24 °C, 69% RH
Tested By	Thomas Cheng		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16600	10.23	29.83	16.09	40.06	26.32	65.16	55.16	-25.10	-28.84
2	0.35221	10.38	28.91	22.62	39.29	33.00	58.91	48.91	-19.62	-15.91
3	0.40200	10.42	33.65	30.13	44.07	40.55	57.81	47.81	-13.74	-7.26
4	0.44178	10.44	36.20	33.82	46.64	44.26	57.03	47.03	-10.39	-2.77
5	1.18968	10.67	24.01	16.75	34.68	27.42	56.00	46.00	-21.32	-18.58
6	19.81000	12.02	14.73	4.59	26.75	16.61	60.00	50.00	-33.25	-33.39

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



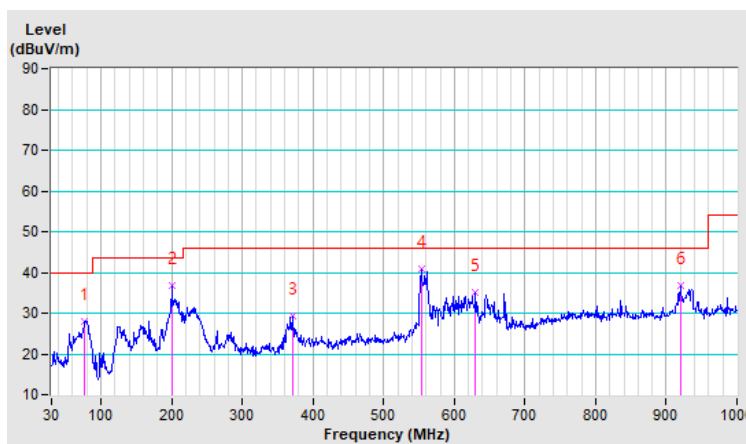
7.8 Unwanted Emissions below 1 GHz

RF Mode	GFSK	Channel	CH 39 : 2441 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120 kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	20 °C, 67% RH
Tested By	Thomas Cheng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	76.56	28.1 QP	40.0	-11.9	1.50 H	247	44.4	-16.3
2	199.75	36.8 QP	43.5	-6.7	1.00 H	192	52.3	-15.5
3	370.47	29.2 QP	46.0	-16.8	1.50 H	148	39.2	-10.0
4	552.83	40.8 QP	46.0	-5.2	1.00 H	100	46.4	-5.6
5	629.46	35.0 QP	46.0	-11.0	2.00 H	93	38.8	-3.8
6	919.49	36.7 QP	46.0	-9.3	2.00 H	15	36.1	0.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.

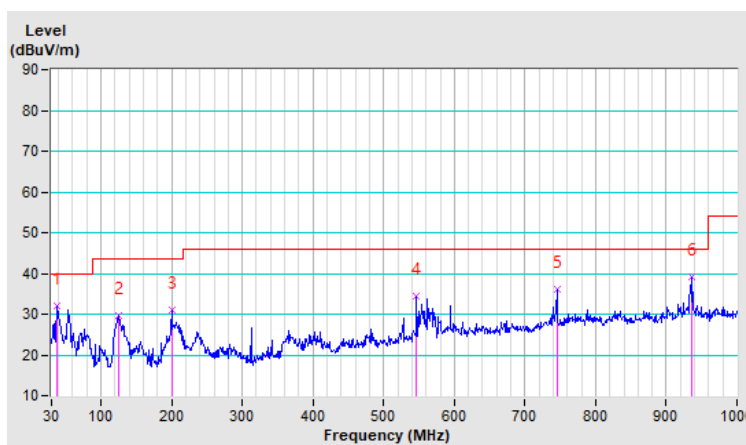


RF Mode	GFSK	Channel	CH 39 : 2441 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120 kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	20 °C, 67% RH
Tested By	Thomas Cheng		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	37.76	32.1 QP	40.0	-7.9	1.00 V	89	44.5	-12.4
2	124.09	29.8 QP	43.5	-13.7	1.00 V	133	43.9	-14.1
3	199.75	31.1 QP	43.5	-12.4	1.50 V	2	46.6	-15.5
4	547.01	34.4 QP	46.0	-11.6	2.00 V	67	40.0	-5.6
5	744.89	36.2 QP	46.0	-9.8	1.00 V	130	36.9	-0.7
6	935.01	39.2 QP	46.0	-6.8	2.00 V	2	38.4	0.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30 MHz ~ 1 GHz.
5. The frequency range 9 kHz ~ 30 MHz: all emissions are more than 20 dB below the limit, therefore do not be recorded in this report.



7.9 Unwanted Emissions above 1 GHz

RF Mode	GFSK	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	23 °C, 67% RH
Tested By	Adair Peng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	59.8 PK	74.0	-14.2	2.48 H	56	24.8	35.0
2	2390.00	48.2 AV	54.0	-5.8	2.48 H	56	13.2	35.0
3	*2402.00	112.5 PK			2.48 H	56	77.6	34.9
4	*2402.00	82.0 AV			2.48 H	56	47.1	34.9
5	4804.00	51.5 PK	74.0	-22.5	1.56 H	181	40.0	11.5
6	4804.00	21.0 AV	54.0	-33.0	1.56 H	181	9.5	11.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	59.9 PK	74.0	-14.1	3.70 V	100	24.9	35.0
2	2390.00	48.3 AV	54.0	-5.7	3.70 V	100	13.3	35.0
3	*2402.00	113.0 PK			3.70 V	100	78.1	34.9
4	*2402.00	82.5 AV			3.70 V	100	47.6	34.9
5	4804.00	51.6 PK	74.0	-22.4	2.43 V	145	40.1	11.5
6	4804.00	21.1 AV	54.0	-32.9	2.43 V	145	9.6	11.5

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(dwel time per 100 ms per channel * (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(dwel \text{ time per } 100 \text{ ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log((3 \text{ ms}) \times (1+0))/100 = -30.5 \text{ dB}$$

RF Mode	GFSK	Channel	CH 39 : 2441 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	23 °C, 67% RH
Tested By	Adair Peng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	113.8 PK			2.43 H	59	78.9	34.9
2	*2441.00	83.3 AV			2.43 H	59	48.4	34.9
3	4882.00	51.6 PK	74.0	-22.4	1.60 H	178	40.1	11.5
4	4882.00	21.1 AV	54.0	-32.9	1.60 H	178	9.6	11.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	114.1 PK			3.09 V	101	79.2	34.9
2	*2441.00	83.6 AV			3.09 V	101	48.7	34.9
3	4882.00	51.8 PK	74.0	-22.2	2.52 V	151	40.3	11.5
4	4882.00	21.3 AV	54.0	-32.7	2.52 V	151	9.8	11.5

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{dwell time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log((3 \text{ ms}) \times (1+0))/100 = -30.5 \text{ dB}$$

RF Mode	GFSK	Channel	CH 78 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	23 °C, 67% RH
Tested By	Adair Peng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	113.7 PK			2.45 H	55	78.8	34.9
2	*2480.00	83.2 AV			2.45 H	55	48.3	34.9
3	2483.50	58.9 PK	74.0	-15.1	2.45 H	55	45.7	13.2
4	2483.50	28.4 AV	54.0	-25.6	2.45 H	55	15.2	13.2
5	4960.00	51.3 PK	74.0	-22.7	1.61 H	175	39.8	11.5
6	4960.00	20.8 AV	54.0	-33.2	1.61 H	175	9.3	11.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	114.4 PK			3.45 V	104	79.5	34.9
2	*2480.00	83.9 AV			3.45 V	104	49.0	34.9
3	2483.50	60.2 PK	74.0	-13.8	3.45 V	104	47.0	13.2
4	2483.50	29.7 AV	54.0	-24.3	3.45 V	104	16.5	13.2
5	4960.00	51.4 PK	74.0	-22.6	2.58 V	154	39.9	11.5
6	4960.00	20.9 AV	54.0	-33.1	2.58 V	154	9.4	11.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{dwell time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log((3 \text{ ms}) \times (1+0))/100 = -30.5 \text{ dB}$$

RF Mode	8DPSK	Channel	CH 0 : 2402 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	23 °C, 67% RH
Tested By	Adair Peng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.2 PK	74.0	-13.8	2.43 H	57	25.2	35.0
2	2390.00	48.3 AV	54.0	-5.7	2.43 H	57	13.3	35.0
3	*2402.00	109.0 PK			2.43 H	57	74.1	34.9
4	*2402.00	84.6 AV			2.43 H	57	49.7	34.9
5	4804.00	51.1 PK	74.0	-22.9	1.61 H	185	39.6	11.5
6	4804.00	26.7 AV	54.0	-27.3	1.61 H	185	15.2	11.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.4 PK	74.0	-13.6	3.70 V	102	25.4	35.0
2	2390.00	48.4 AV	54.0	-5.6	3.70 V	102	13.4	35.0
3	*2402.00	109.6 PK			3.70 V	102	74.7	34.9
4	*2402.00	85.2 AV			3.70 V	102	50.3	34.9
5	4804.00	51.4 PK	74.0	-22.6	2.52 V	159	39.9	11.5
6	4804.00	27.0 AV	54.0	-27.0	2.52 V	159	15.5	11.5

Remarks:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- Margin value = Emission Level – Limit value
- The other emission levels were very low against the limit.
- " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
- The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{dwell time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log((3 \text{ ms}) * (1+1))/100 = -24.4 \text{ dB}$$

RF Mode	8DPSK	Channel	CH 39 : 2441 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	23 °C, 67% RH
Tested By	Adair Peng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	109.3 PK			2.53 H	57	74.4	34.9
2	*2441.00	84.9 AV			2.53 H	57	50.0	34.9
3	4882.00	51.5 PK	74.0	-22.5	1.52 H	183	40.0	11.5
4	4882.00	27.1 AV	54.0	-26.9	1.52 H	183	15.6	11.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2441.00	109.7 PK			3.56 V	103	74.8	34.9
2	*2441.00	85.3 AV			3.56 V	103	50.4	34.9
3	4882.00	51.7 PK	74.0	-22.3	2.46 V	166	40.2	11.5
4	4882.00	27.3 AV	54.0	-26.7	2.46 V	166	15.8	11.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{dwell time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

$$= 20 \log((3 \text{ ms}) * (1+1))/100 = -24.4 \text{ dB}$$

RF Mode	8DPSK	Channel	CH 78 : 2480 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
Input Power	120 Vac, 60 Hz	Environmental Conditions	23 °C, 67% RH
Tested By	Adair Peng		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	110.7 PK			2.43 H	55	75.8	34.9
2	*2480.00	86.3 AV			2.43 H	55	51.4	34.9
3	2483.50	56.9 PK	74.0	-17.1	2.43 H	55	43.7	13.2
4	2483.50	32.5 AV	54.0	-21.5	2.43 H	55	19.3	13.2
5	4960.00	51.5 PK	74.0	-22.5	1.64 H	188	40.0	11.5
6	4960.00	27.1 AV	54.0	-26.9	1.64 H	188	15.6	11.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	111.1 PK			3.29 V	104	76.2	34.9
2	*2480.00	86.7 AV			3.29 V	104	51.8	34.9
3	2483.50	57.8 PK	74.0	-16.2	3.29 V	104	44.6	13.2
4	2483.50	33.4 AV	54.0	-20.6	3.29 V	104	20.2	13.2
5	4960.00	51.8 PK	74.0	-22.2	2.56 V	163	40.3	11.5
6	4960.00	27.4 AV	54.0	-26.6	2.56 V	163	15.9	11.5

Remarks:

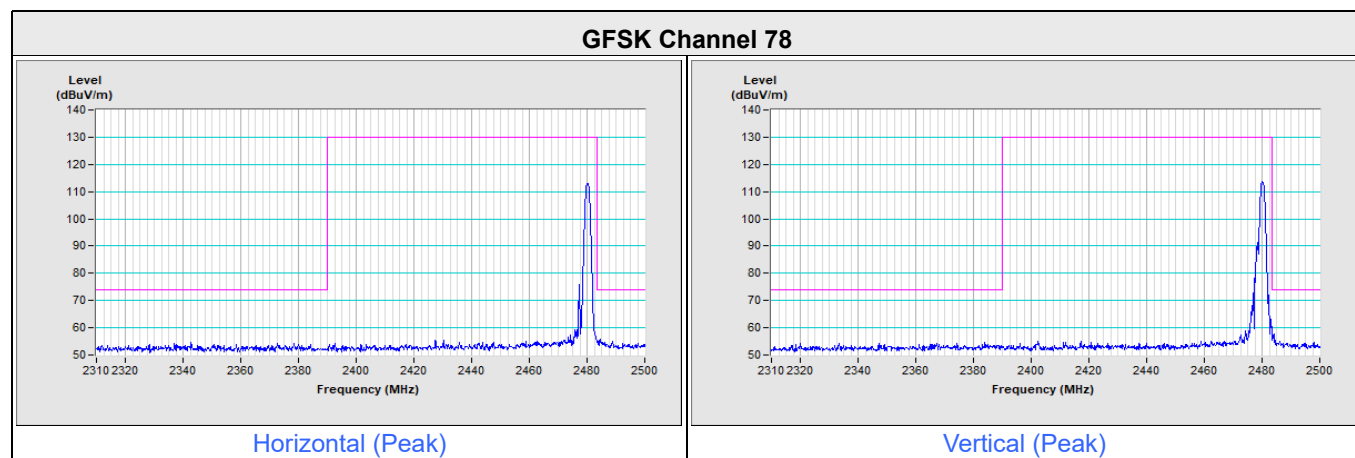
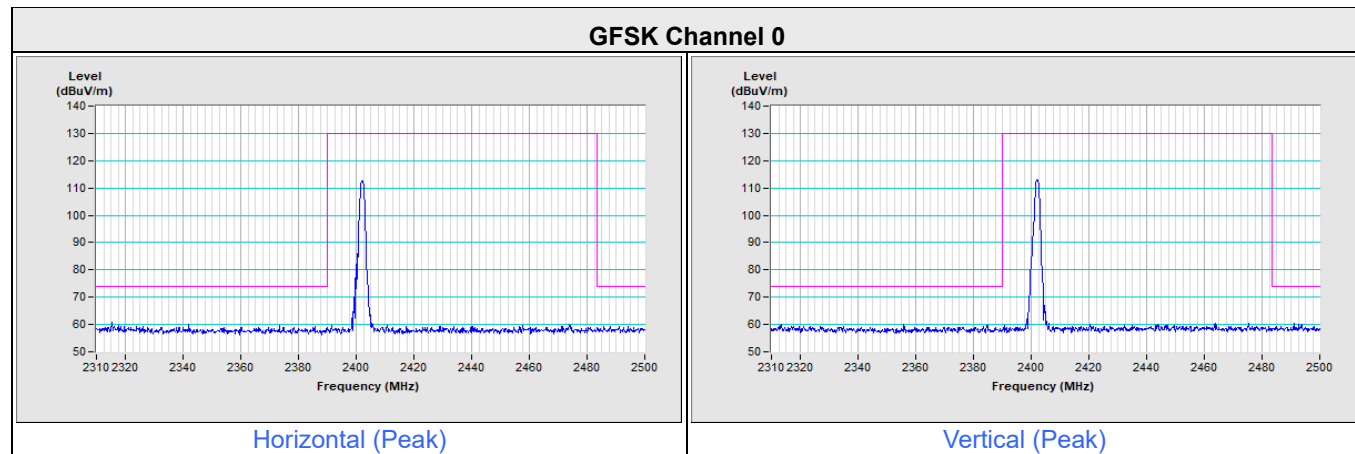
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * " : Fundamental frequency, the limit was restricted at the RF Output Power.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction)) Where the duty cycle correction factor is calculated from following formula:

$$20 \log(\text{dwell time per 100 ms per channel} \times (\text{channel separation correction} + \text{overlapping channel correction}))$$

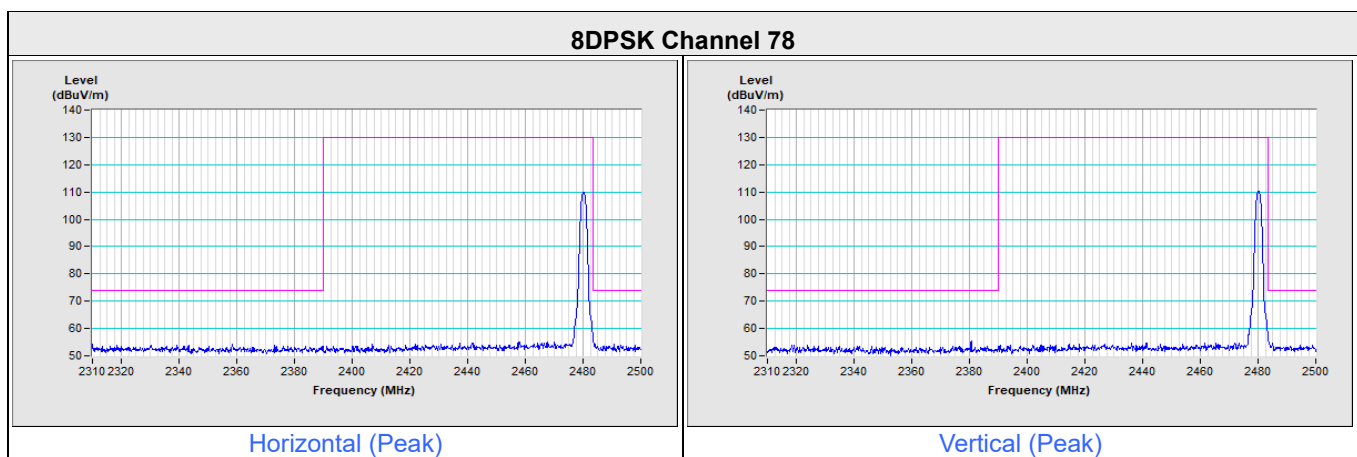
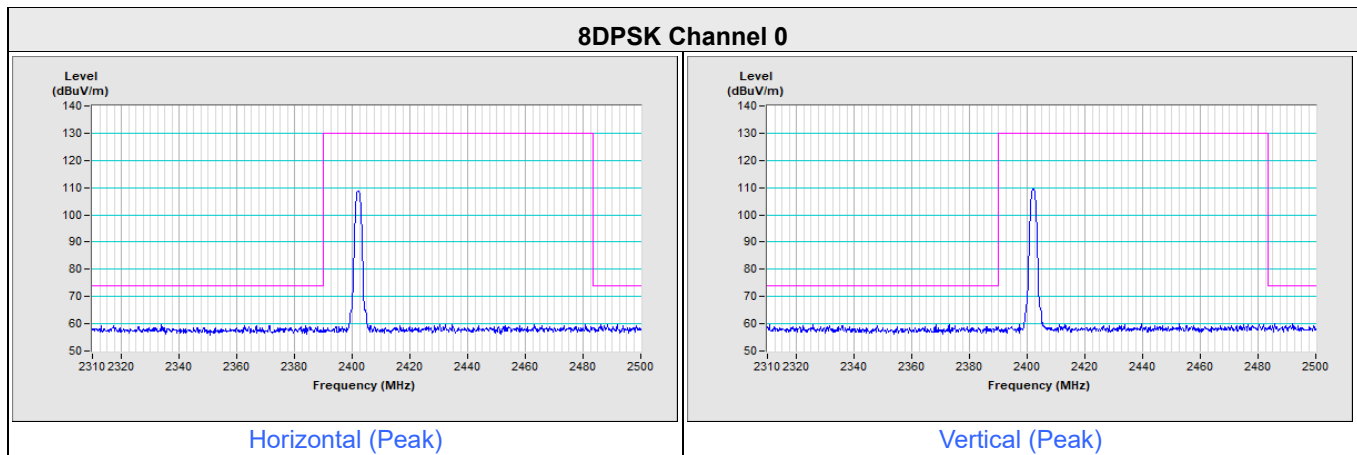
$$= 20 \log((3 \text{ ms}) * (1+1))/100 = -24.4 \text{ dB}$$

Plot of Band Edge

Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak
-----------------	--------------------	-------------------------------	----------------------------------

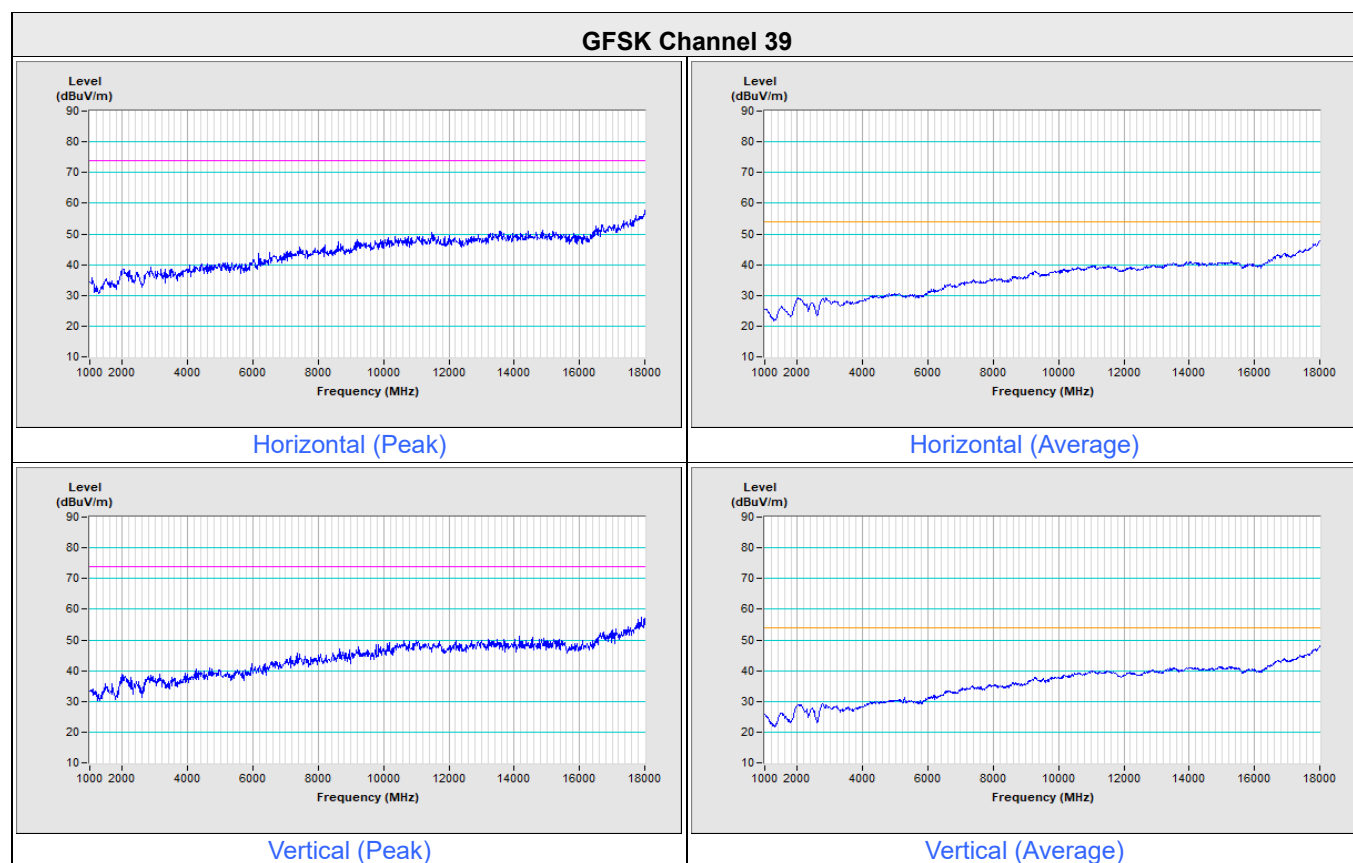


Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak
-----------------	--------------------	-------------------------------	----------------------------------



Plot of Other Emission

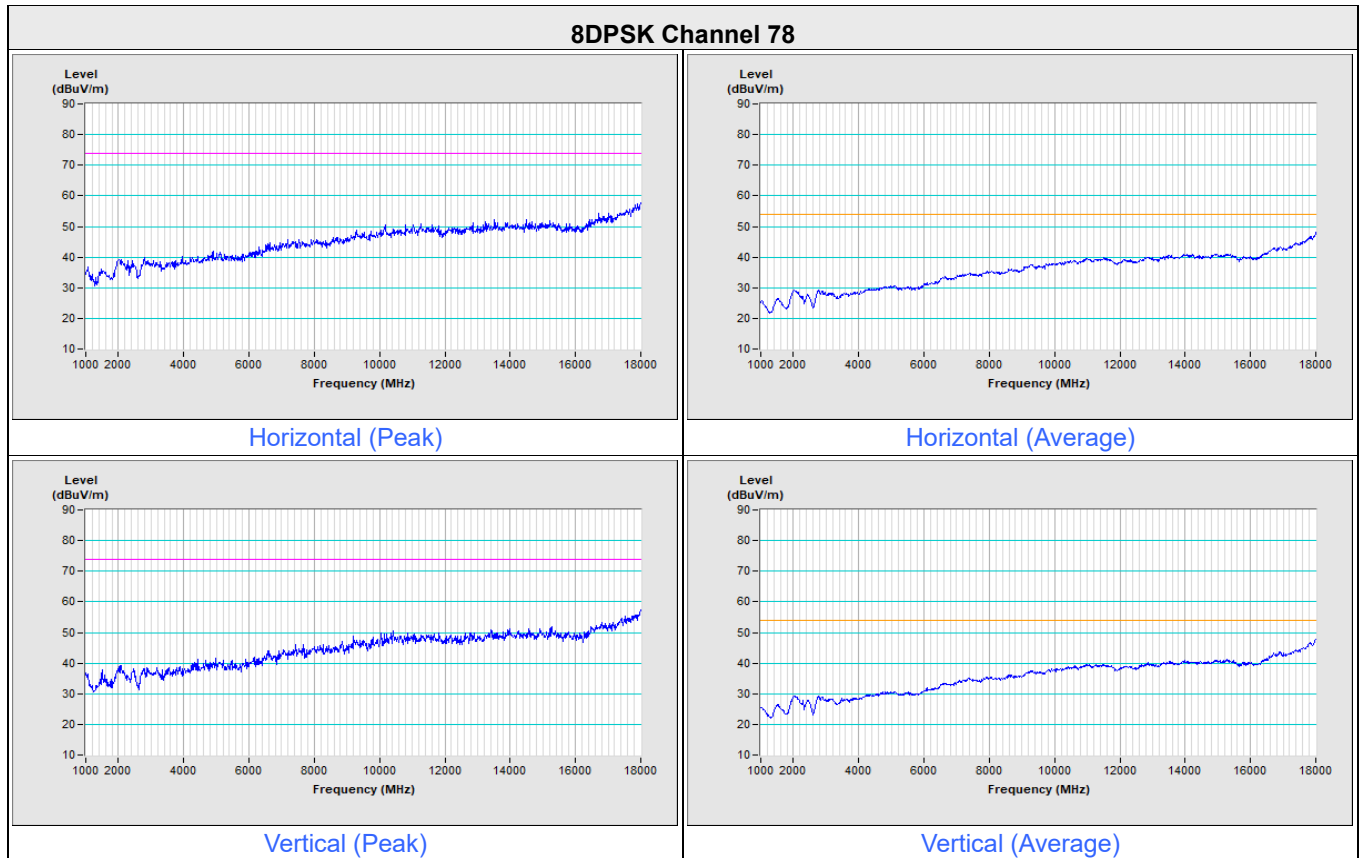
Frequency Range	1 GHz ~ 18 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak
-----------------	----------------	-------------------------------	----------------------------------



Notes:

1. For radiated emission test data, complete spectral plots shall be presented in the report only for the worst-case scenarios of each mode within each operating frequency band.
2. The frequency range 18 GHz ~ 25 GHz: After investigation, no any emissions were found to exist, therefore they are not recorded in this report.

Frequency Range	1 GHz ~ 18 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak
-----------------	----------------	-------------------------------	----------------------------------



Notes:

1. For radiated emission test data, complete spectral plots shall be presented in the report only for the worst-case scenarios of each mode within each operating frequency band.
2. The frequency range 18 GHz ~ 25 GHz: After investigation, no any emissions were found to exist, therefore they are not recorded in this report.

8 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo)

9 Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab

Tel: 886-(0)2-26052180

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-(0)3-6668565 (SIP)

Tel: 886-(0)3-5120595 (WD)

Hwa Ya EMC/RF/Safety/SAR Lab & Wenming EMC/RF Lab

Tel: 886-(0)3-3183232

Email: service.adt@bureauveritas.com

Web Site: <http://ee.bureauveritas.com.tw>

The address and road map of all our labs can be found in our web site also.

--- END ---