

TEST REPORT

CERTIFICATE OF CONFORMITY

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)
Report No.: RFBBUI-WTW-P26020159-8
FCC ID: TX2-RTL8922D
Product: 11be RTL8922D M.2 1216 Combo module
Brand: REALTEK
Model No.: RTL8922D
Received Date: 2026/2/9
Test Date: 2026/4/16 ~ 2026/6/25
Issued Date: 2026/7/21

Applicant: Realtek Semiconductor Corp.
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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory
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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / 723255 / TW2022
Designation Number:

Approved by: _____, **Date:** 2026/7/21
May Chen / Manager

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Prepared by : Claire Kuan / Specialist



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Release Control Record

Issue No.	Description	Date Issued
RFBBUI-WTW-P26020159-8	Original release.	2026/7/21

1 Certificate

Product: 11be RTL8922D M.2 1216 Combo module

Brand: REALTEK

Test Model: RTL8922D

Sample Status: Engineering sample

Applicant: Realtek Semiconductor Corp.

Test Date: 2026/4/16 ~ 2026/6/25

Standard: 47 CFR FCC Part 15, Subpart C (Section 15.247)

Measurement ANSI C63.10-2020

procedure: 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 -12.00 dB at 2.52344 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions below 1 GHz	Pass	Minimum passing margin is -3.1 dB at 99.74 MHz
15.205 / 15.209 / 15.247(d)	Unwanted Emissions above 1 GHz	Pass	Minimum passing margin is -7.5 dB at 2390.00 MHz
15.203	Antenna Requirement	Pass	Antenna connector is IPEX, MHF4, MHF4L, Quick couple RP PLUG 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	-	1.1 dB
Number of Hopping Frequency Used	-	1050.00 Hz
Dwell Time on Each Channel	-	2.2 ms
Hopping Channel Separation	-	1050.00 Hz
20 dB Bandwidth	-	1050.00 Hz
Conducted Out of Band Emissions	9 kHz ~ 40 GHz	2.6 dB
AC Power Conducted Emissions	150 kHz ~ 30 MHz	1.9 dB
Unwanted Emissions below 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.4 dB
Unwanted Emissions above 1 GHz	1 GHz ~ 18 GHz	5.0 dB
	18 GHz ~ 40 GHz	5.3 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	11be RTL8922D M.2 1216 Combo module
Brand	REALTEK
Test Model	RTL8922D
Status of EUT	Engineering sample
Power Supply Rating	3.3 Vdc from host equipment
Modulation Type	BT LE-Channel Sounding: ASK
Modulation Technology	FHSS
Operating Frequency	2.404 GHz ~ 2.478 GHz
Number of Channel	72
Output Power	19.543 mW (12.91 dBm)

Note:

1. There are Bluetooth and WLAN (2.4 GHz & 5 GHz & 6 GHz) technology used for the EUT.
2. This Bluetooth device supports Channel Sounding technology, which is a precise ranging feature introduced by Bluetooth that enables secure and accurate distance measurement between two Bluetooth devices.
3. Simultaneously transmission combination.

1Tx		
Combination	Technology	
	S0 (Chain 1)	S1 (Chain 0)
1	WLAN (5 GHz)_H	Bluetooth + WLAN (5 GHz)_L
2	WLAN (6 GHz)	Bluetooth + WLAN (5 GHz)_H
3	WLAN (5 GHz)_H	Bluetooth + WLAN (6 GHz)
4	WLAN (2.4 GHz)	WLAN (5 GHz) Full
5	WLAN (2.4 GHz)	WLAN (6 GHz)
6	WLAN (5 GHz) Full	Bluetooth
7	WLAN (6 GHz)	Bluetooth
2Tx		
1	WLAN (5 GHz)_H + Bluetooth	WLAN (5 GHz)_H + Bluetooth
2	WLAN (5 GHz)_H	WLAN (5 GHz)_H + Bluetooth
3	WLAN (6 GHz) + Bluetooth	WLAN (6 GHz) + Bluetooth

Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.

4. 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 Set	EUT Port No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	1/2	Chain0/1	REALTEK	RTK-ANT-0022	3.4	2.4~2.4835	PIFA	IPEX, MHF4	300
					5	5.15~5.85			
					5	5.925~7.125			
2	1/2	Chain0/1	HongBo	260-25096	3.11	2.4~2.4835	Monopole	MHF4L	300
					4.91	5.15~5.85			
					4.73	5.925~7.125			

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

3.3 Channel List

72 channels are provided to this EUT:

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

3.4 Test Mode Applicability and Tested Channel Detail

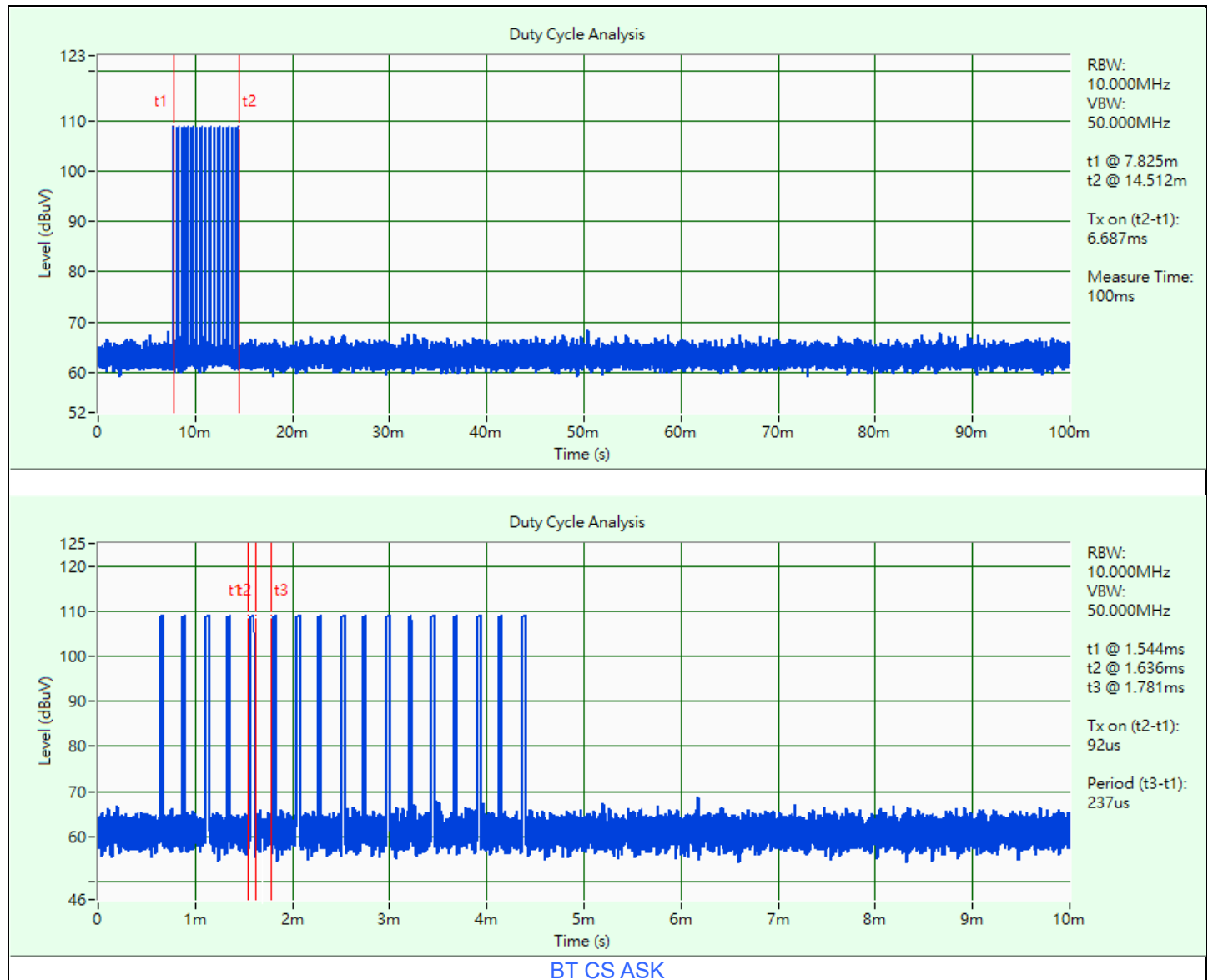
Pre-Scan:	1. The PIFA/ Monopole antenna can be used in the following ways: X / Y / Z axis. Pre-scan in these ways and find the worst case as a representative test condition. 2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates.
Worst Case:	1. The antenna sets of the worst case was found when positioned on (X / Y / Z axis) ➤ PIFA antenna: Y axis ➤ Monopole antenna: X axis 2. For 1Tx diversity configuration the worst chain is: Chain0 (S1)

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

Test Item	EUT Configure Mode	Tested Channel	Modulation
RF Output Power	-	0, 33, 71	CS ASK
Number of Hopping Frequency Used	-	0, 33, 71	CS ASK
Dwell Time on Each Channel	-	0, 33, 71	CS ASK
Hopping Channel Separation	-	0, 33, 71	CS ASK
20 dB Bandwidth	-	0, 33, 71	CS ASK
Conducted Out of Band Emissions	-	0, 33, 71	CS ASK
AC Power Conducted Emissions	A	71	CS ASK
Unwanted Emissions below 1 GHz	A, B	71	CS ASK
Unwanted Emissions above 1 GHz	A, B	0, 33, 71	CS ASK
EUT Configure Mode:	A	PIFA antenna (Model: RTK-ANT-0022)	
	B	Monopole antenna (Model: 260-25096)	

3.5 Duty Cycle of Test Signal

BT CS ASK: Duty cycle = 1.564 ms / 100 ms x 100% = 1.6%



Note: Total Tx on = 0.092 ms x 17 = 1.564 ms

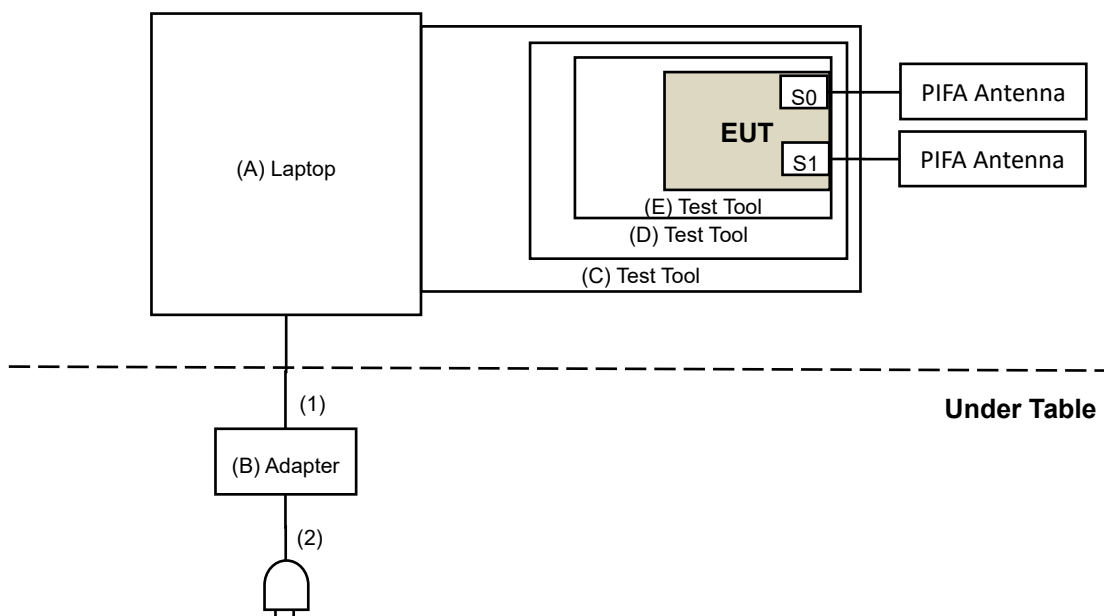
3.6 Test Program Used and Operation Descriptions

Controlling software (20260619_Realtek Bluetooth MP Kit Setup Package_1210101010_Fix_CS_Txpower) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

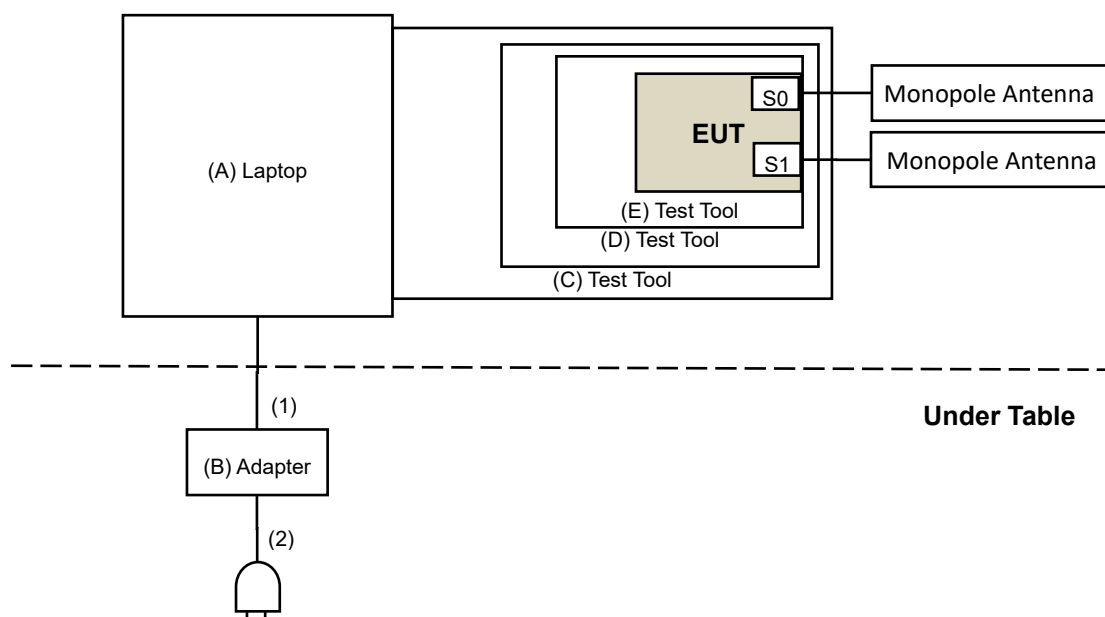
3.7 Connection Diagram of EUT and Peripheral Devices

For Unwanted Emissions test:

Mode A

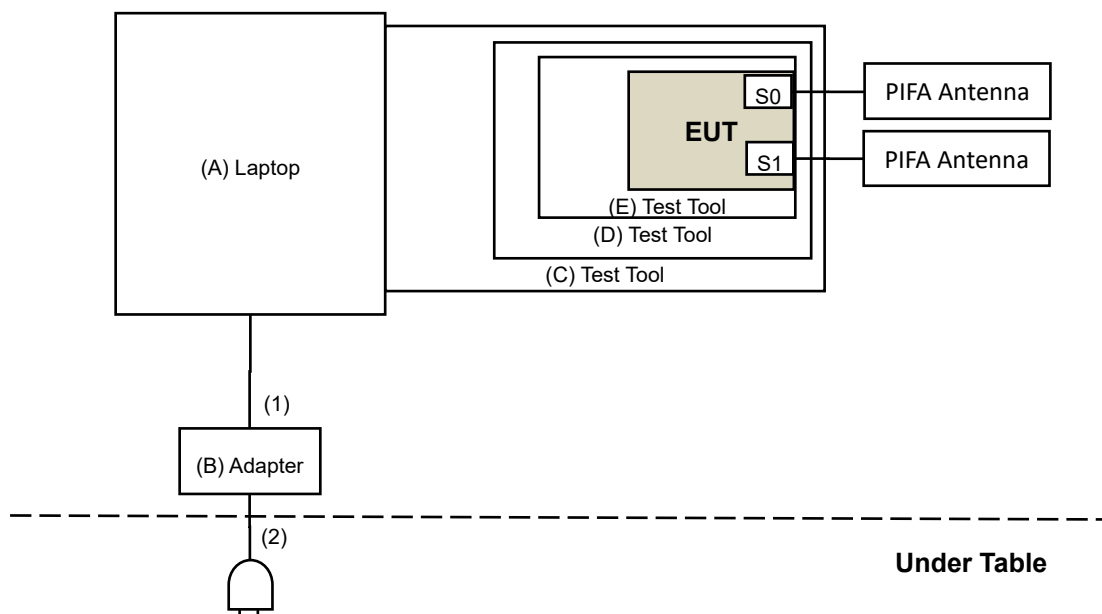


Mode B



For AC Power Conducted Emission test:

Mode A



3.8 Configuration of Peripheral Devices and Cable Connections

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Notebook	DELL	E6230	G94PSY1	N/A	Provided by Lab
B	Adapter	DELL	LA65NM130	N/A	N/A	Provided by Lab
C	Test Tool	Realtek	MTE	N/A	N/A	Supplied by applicant
D	Test Tool	NFHK	N-9437 Ver2.0	N/A	N/A	Supplied by applicant
E	Test Tool	Realtek	N/A	N/A	N/A	Supplied by applicant

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1	DC Cable	1	1.8	0	0	Provided by Lab
2	AC Cable	1	1	0	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-20	00800A1K01A-20-02	2025/5/23	2026/5/22
Pulse Power Sensor Anritsu	MA2411B	1726434	2025/6/3	2026/6/2
RF Power Meter Anritsu	ML2495A	1529002	2025/6/3	2026/6/2

Notes:

1. The test was performed in HC - Oven room 2(Hsinchu).
2. Tested Date: 2026/5/19

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	2026/5/21	2027/5/20
MXA Signal Analyzer Keysight	N9020B	MY60112408	2026/2/12	2027/2/11
Software	ADT_RF Test Software v8.5.6.4	N/A	N/A	N/A

Notes:

1. The test was performed in HC - Oven room 2(Hsinchu).
2. Tested Date: 2026/6/12

4.3 Dwell Time on Each Channel

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

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 Telegartner	50 ohm	3	2025/10/29	2026/10/28
EMI Test Receiver R&S	ESCS 30	100375	2026/5/20	2027/5/19
Fixed Attenuator STI	STI02-2200-10	005	2026/2/9	2027/2/8
LISN R&S	ESH3-Z5	835239/001	2026/3/30	2027/3/29
		848773/004	2025/10/3	2026/10/2
RF Coaxial Cable JYEBAO	5D-FB	COCCAB-001	2026/2/9	2027/2/8
Software BVADT	BVADT_Conc_V7.4.1.0	N/A	N/A	N/A

Notes:

1. The test was performed in HC - Conduction 1(Hsinchu).
2. Tested Date: 2026/6/25

4.8 Unwanted Emissions below 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	N/A	N/A
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-361	2025/9/16	2026/9/15
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	N/A	N/A
Fixed Attenuator Woken	00800N1G01A-05	00800N1G01A-05-003	2026/1/31	2027/1/30
Loop Antenna TESEQ	HLA 6121	63620	2025/10/20	2026/10/19
MXE EMI Receiver Agilent	N9038A	MY50010156	2026/6/22	2027/6/21
Preamplifier EMCI	EMC330N	980852	2026/1/31	2027/1/30
RF Coaxial Cable PEWC	8D	001	2026/1/31	2027/1/30
		966-3-2	2026/1/31	2027/1/30
		966-3-3	2026/1/31	2027/1/30
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in HC - 966 Chamber No. 3(Hsinchu).
2. Tested Date: 2026/6/24

4.9 Unwanted Emissions above 1 GHz

Description Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	N/A	N/A
Fix tool for Boresight antenna tower BV	FBA-01	FBA_SIP01	N/A	N/A
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-406	2025/11/9	2026/11/8
	BBHA 9170	9170-739	2025/11/9	2026/11/8
MXE EMI Receiver Agilent	N9038A	MY51210202	2025/7/30	2026/7/29
Preamplifier EMCI	EMC12630SE	980384	2026/1/10	2027/1/9
	EMC184045SE	980387	2025/8/7	2026/8/6
PXA Signal Analyzer Keysight	N9030B	MY57141948	2026/5/25	2027/5/24
RF Coaxial Cable EMCI	EMC102-KM-KM-1200	160924	2026/1/15	2027/1/14
	EMC102-KM-KM-4000	200214	2026/1/15	2027/1/14
	EMC104-SM-SM-1500	180504	2026/1/17	2027/1/16
	EMC104-SM-SM-2000	180601	2026/1/17	2027/1/16
	EMC104-SM-SM-6000	210201	2026/1/17	2027/1/16
Software	ADT_Radiated_V8.7.08	N/A	N/A	N/A

Notes:

1. The test was performed in HC - 966 Chamber No. 3(Hsinchu).
2. Tested Date: 2026/4/16 ~ 2026/6/25

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

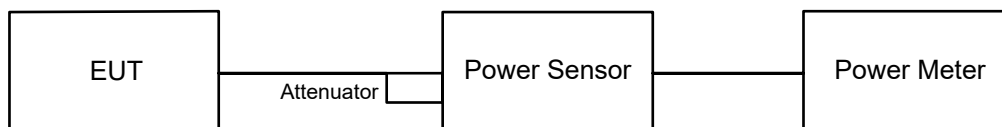
Notes:

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



Note: The correction factor has already been compensated by the instrument.

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.

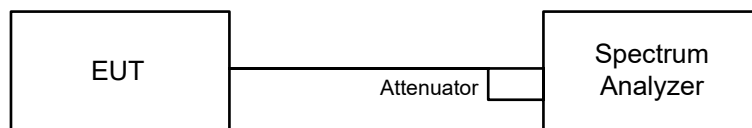
The power meter video bandwidth is greater than or equal to the DTS bandwidth and use a fast responding diode detector.

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



Note: The correction factor has already been compensated by the instrument.

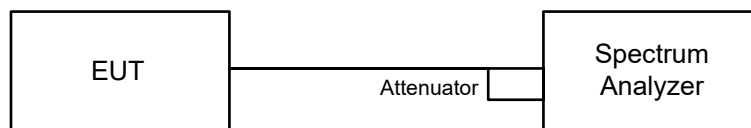
6.2.2 Test Procedure

- 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: 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.
- d. 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.
- 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 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



Note: The correction factor has already been compensated by the instrument.

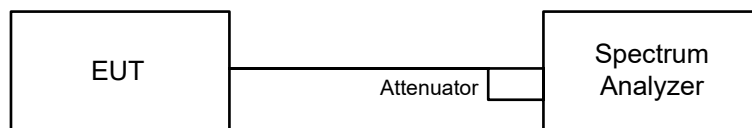
6.3.2 Test Procedure

- 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



Note: The correction factor has already been compensated by the instrument.

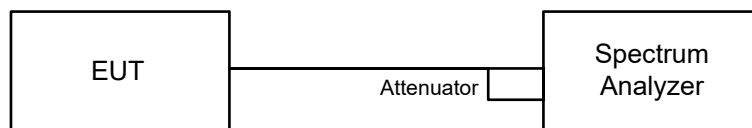
6.4.2 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
- Span: Wide enough to capture the peaks of two adjacent channels.
- 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.
- 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 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



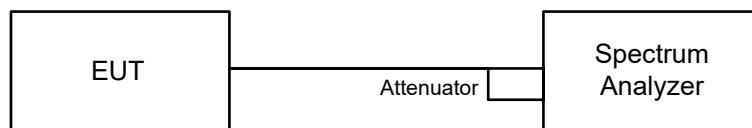
Note: The correction factor has already been compensated by the instrument.

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



Note: The correction factor has already been compensated by the instrument.

6.6.2 Test Procedure

MEASUREMENT PROCEDURE REF

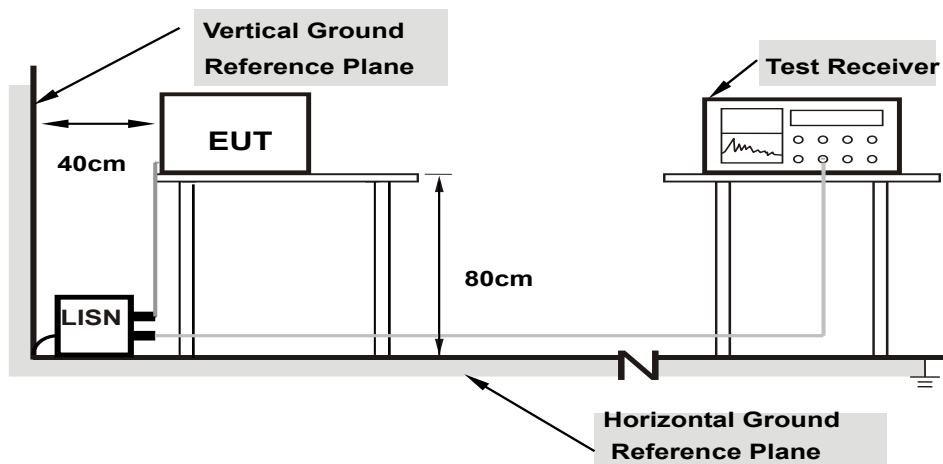
- Set instrument center frequency to DTS channel center frequency.
- Set the span to ≥ 1.5 times the DTS bandwidth.
- Set the RBW = 100 kHz.
- Set the VBW ≥ 300 kHz.
- Detector = peak.
- Sweep time = No faster than coupled (auto) time.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use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

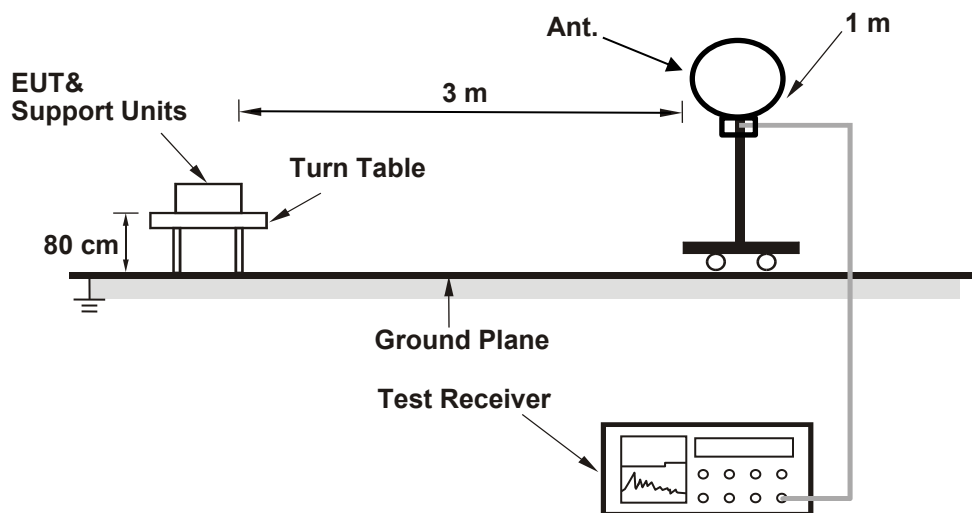
- Exploratory ac power-line conducted emission measurements: The EUT shall be operated on the mid channel and in the mode with highest output power unless the fundamental operates in the AC power-line emission test range then the EUT shall be operated in the range of typical modes of operation.
- The 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.

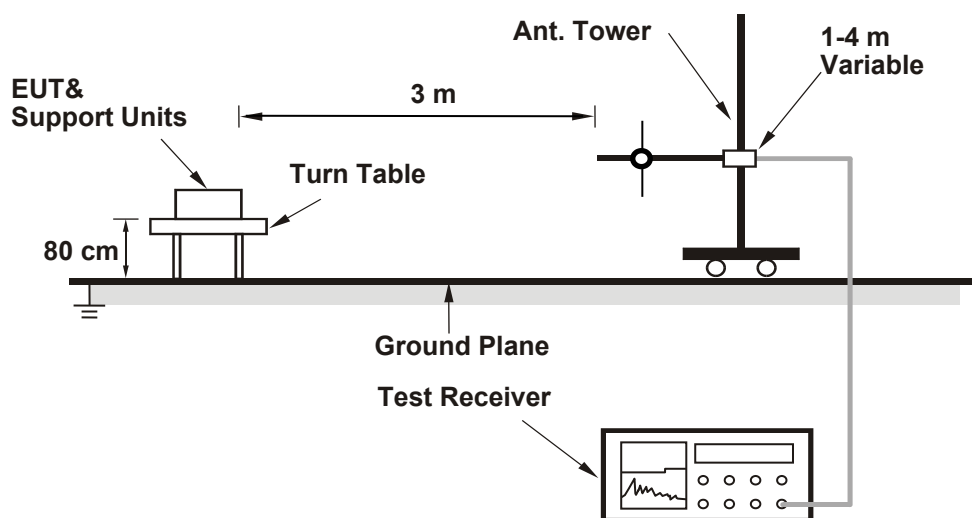
6.8 Unwanted Emissions below 1 GHz

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

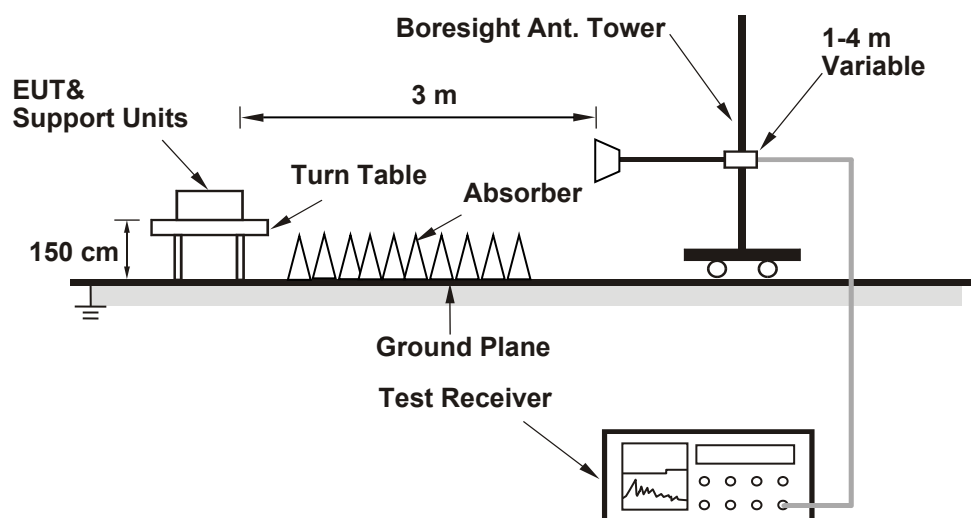
- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the 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.
- All modes of operation were investigated and the worst-case emissions are reported.
 - 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 ANSI C63.10 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

Input Power:	3.3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Stars Liu
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For Peak Power

Chan.	Chan. Freq. (MHz)	Peak Power (mW)	Peak Power (dBm)	Power Limit (dBm)	Test Result
0	2404	17.338	12.39	21	Pass
33	2440	18.323	12.63	21	Pass
71	2478	19.543	12.91	21	Pass

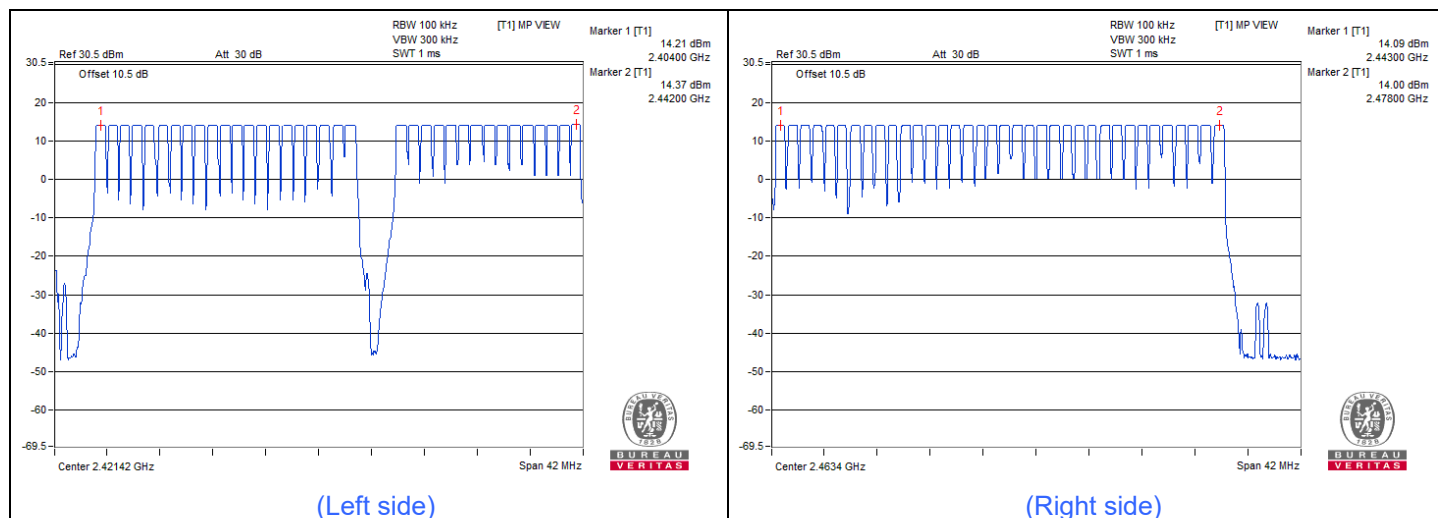
Note: The antenna gain is 3.4 dBi <= 6 dBi, so the output power limit shall not be reduced.

For Average Power

Chan.	Chan. Freq. (MHz)	Average Power (mW)	Average Power (dBm)
0	2404	16.634	12.21
33	2440	17.947	12.54
71	2478	18.621	12.70

7.2 Number of Hopping Frequency Used

Input Power:	3.3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Stars Liu
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Note: There are 72 hopping frequencies in the hopping mode. On the plots, it shows that the hopping frequencies are equally spaced.

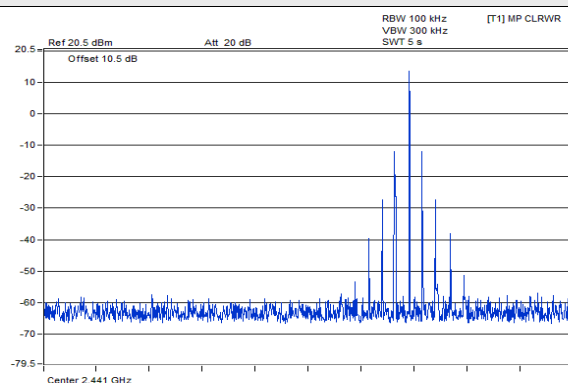
7.3 Dwell Time on Each Channel

Input Power:	3.3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Stars Liu
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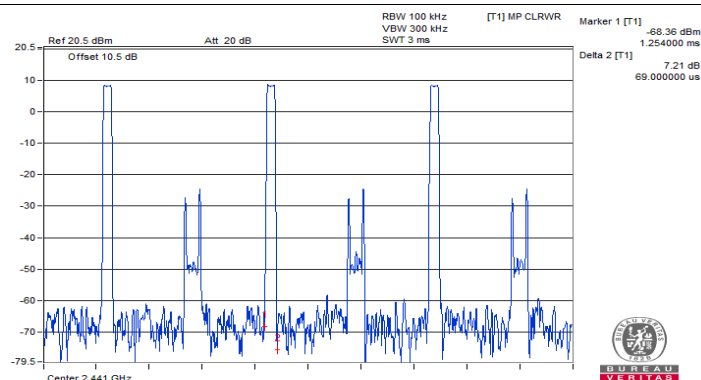
Mode	Number of transmission in 28.8 sec	Length of transmission time (msec)	Dwell Time (msec)	Limit (msec)	Test Result
DH1	1 (times / 5 sec) * 5.76 = 6 times	1.173	7.038	400	Pass

Note: Transmission time = 0.069 ms x 17 = 1.173 ms

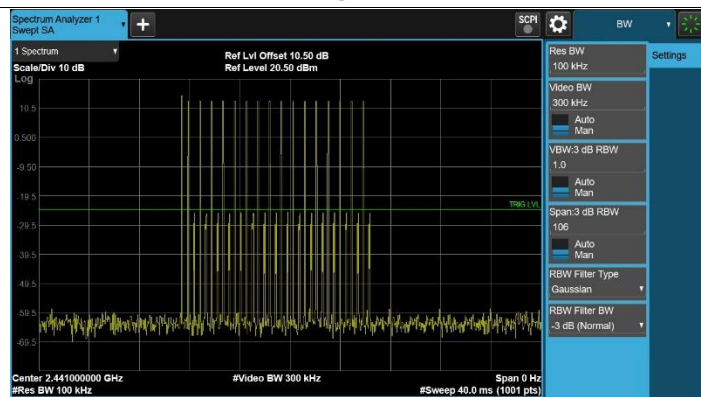
Spectrum plots of Dwell Time



BT CS ASK



BT CS ASK



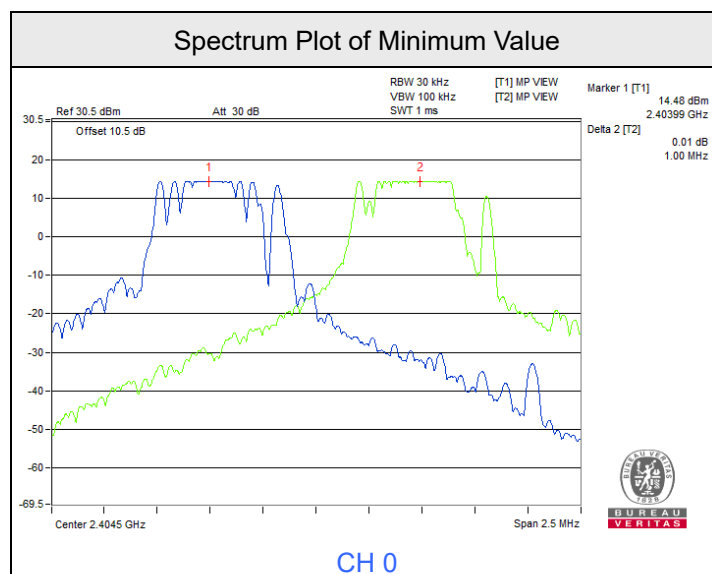
BT CS ASK

7.4 Hopping Channel Separation

Input Power:	3.3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Stars Liu
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Channel	Frequency (MHz)	Hopping Channel Separation (MHz)	Minimum Limit (MHz)	Test Result
0	2404	1.00	0.48	Pass
33	2440	1.01	0.48	Pass
71	2478	1.01	0.47	Pass

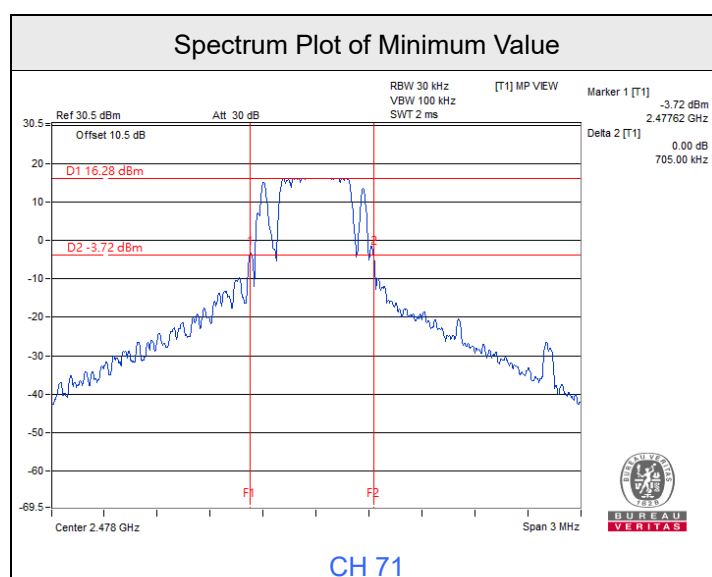
Note: The minimum limit is two-third 20dB bandwidth.



7.5 20 dB Bandwidth

Input Power:	3.3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Stars Liu
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Channel	Frequency (MHz)	20dB Bandwidth (MHz)
0	2404	0.72
33	2440	0.72
71	2478	0.7



7.6 Conducted Out of Band Emissions

Input Power:	3.3 Vdc	Environmental Conditions:	25°C, 60% RH	Tested By:	Stars Liu
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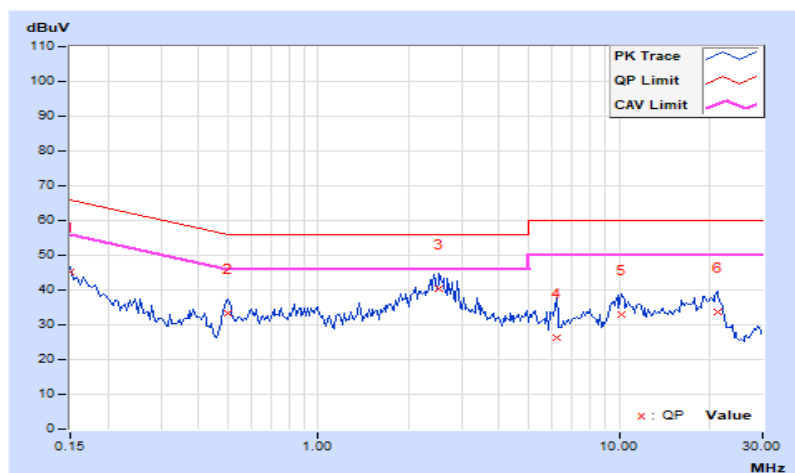
7.7 AC Power Conducted Emissions

RF Mode	CS ASK	Channel	CH 71 : 2478 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	0.15000	9.97	35.08	16.81	45.05	26.78	66.00	56.00	-20.95	-29.22
2	0.50156	10.01	23.48	18.18	33.49	28.19	56.00	46.00	-22.51	-17.81
3	2.52344	10.13	30.08	23.87	40.21	34.00	56.00	46.00	-15.79	-12.00
4	6.17188	10.38	15.76	7.72	26.14	18.10	60.00	50.00	-33.86	-31.90
5	10.19922	10.65	22.19	16.28	32.84	26.93	60.00	50.00	-27.16	-23.07
6	21.21484	11.31	22.26	16.39	33.57	27.70	60.00	50.00	-26.43	-22.30

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

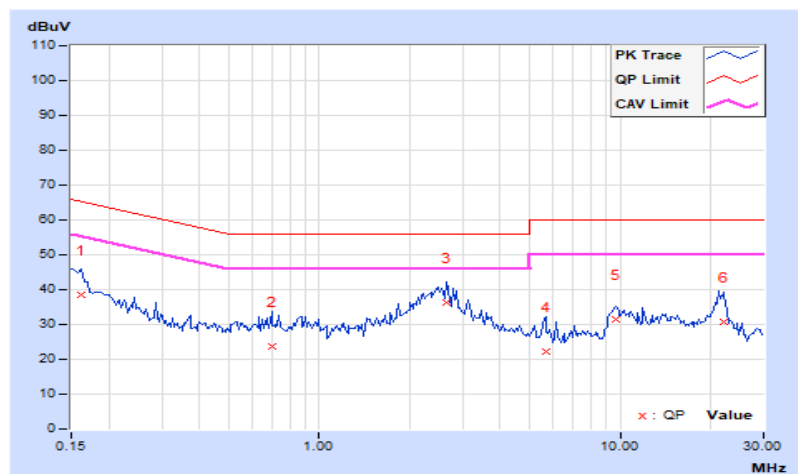


RF Mode	CS ASK	Channel	CH 71 : 2478 MHz
Frequency Range	150 kHz ~ 30 MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9 kHz
Input Power (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	0.16172	9.99	28.42	14.45	38.41	24.44	65.38	55.38	-26.97	-30.94
2	0.69688	9.97	13.67	7.47	23.64	17.44	56.00	46.00	-32.36	-28.56
3	2.64453	10.10	26.02	19.72	36.12	29.82	56.00	46.00	-19.88	-16.18
4	5.64844	10.24	11.89	2.44	22.13	12.68	60.00	50.00	-37.87	-37.32
5	9.63672	10.44	20.93	13.98	31.37	24.42	60.00	50.00	-28.63	-25.58
6	22.08984	10.99	19.71	13.29	30.70	24.28	60.00	50.00	-29.30	-25.72

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

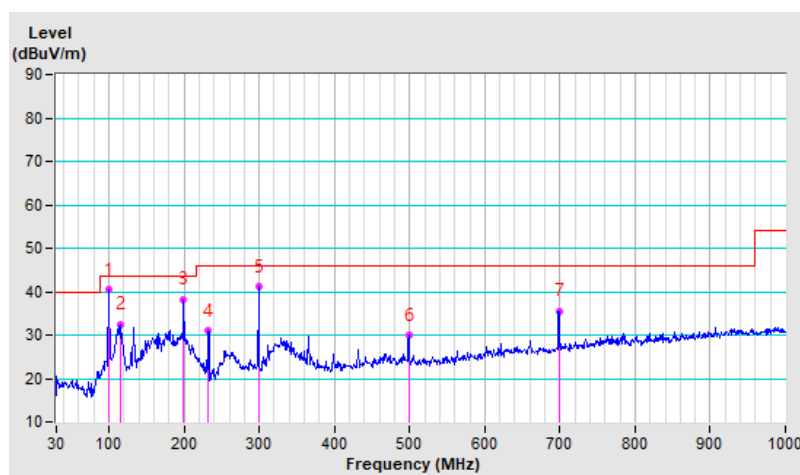
Mode A

RF Mode	GFSK	Channel	CH 71 : 2478 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	PK: RB=120 kHz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Owen Lee		

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	99.74	40.4 PK	43.5	-3.1	2.00 H	44	57.5	-17.1
2	114.49	32.3 PK	43.5	-11.2	3.00 H	75	47.5	-15.2
3	199.14	38.2 PK	43.5	-5.3	2.00 H	360	54.0	-15.8
4	232.37	30.9 PK	46.0	-15.1	2.00 H	360	45.7	-14.8
5	299.34	41.1 PK	46.0	-4.9	1.00 H	246	53.0	-11.9
6	498.87	29.9 PK	46.0	-16.1	2.00 H	211	37.2	-7.3
7	698.43	35.5 PK	46.0	-10.5	1.00 H	147	39.0	-3.5

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 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.

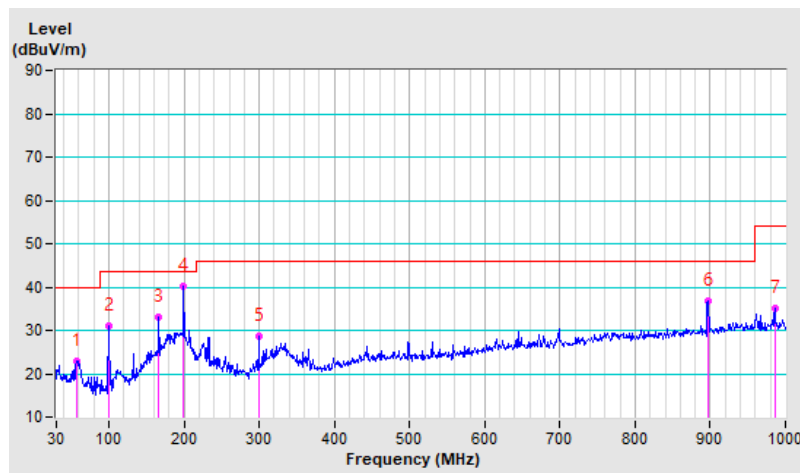


RF Mode	GFSK	Channel	CH 71 : 2478 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	PK: RB=120 kHz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Owen Lee		

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	57.50	23.0 PK	40.0	-17.0	2.00 V	360	36.4	-13.4
2	99.77	31.0 PK	43.5	-12.5	1.00 V	58	48.1	-17.1
3	166.31	33.0 PK	43.5	-10.5	3.00 V	132	46.0	-13.0
4	199.19	40.3 PK	43.5	-3.2	1.00 V	360	56.1	-15.8
5	298.74	28.8 PK	46.0	-17.2	2.00 V	344	40.7	-11.9
6	898.00	36.8 PK	46.0	-9.2	1.00 V	114	37.2	-0.4
7	985.74	35.2 PK	54.0	-18.8	1.00 V	70	34.5	0.7

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.



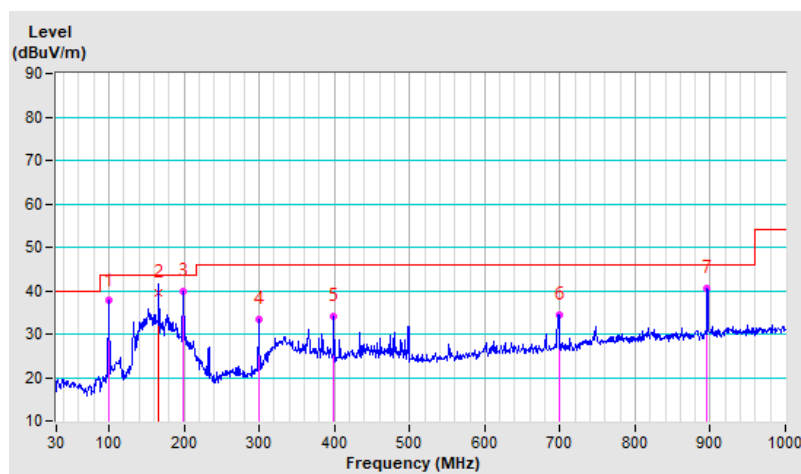
Mode B

RF Mode	GFSK	Channel	CH 71 : 2478 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	PK: RB=120 kHz, DET=Peak QP: RB=120 kHz, DET=Quasi-Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Owen Lee		

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	99.60	37.7 PK	43.5	-5.8	2.00 H	64	54.8	-17.1
2	166.24	39.6 QP	43.5	-3.9	1.91 H	218	52.6	-13.0
3	199.53	40.0 PK	43.5	-3.5	1.00 H	53	55.8	-15.8
4	298.74	33.5 PK	46.0	-12.5	1.00 H	360	45.4	-11.9
5	399.11	34.1 PK	46.0	-11.9	1.00 H	88	43.5	-9.4
6	698.40	34.5 PK	46.0	-11.5	1.00 H	360	38.0	-3.5
7	896.16	40.6 PK	46.0	-5.4	1.00 H	298	41.1	-0.5

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 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.

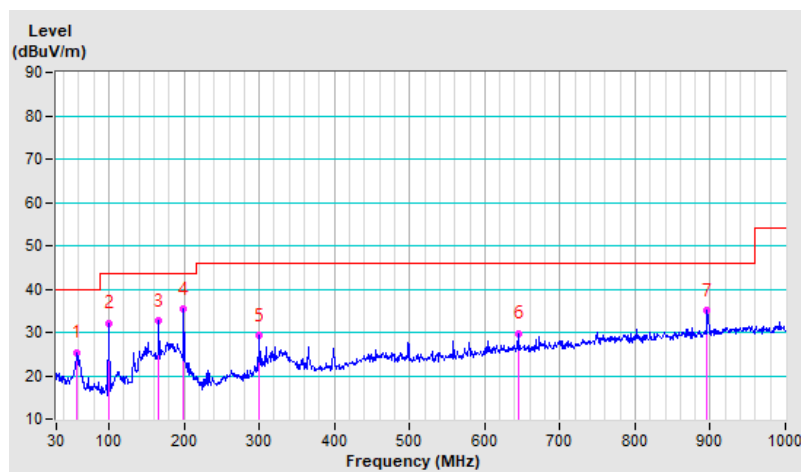


RF Mode	GFSK	Channel	CH 71 : 2478 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	PK: RB=120 kHz, DET=Peak
Input Power	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Owen Lee		

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	57.40	25.3 PK	40.0	-14.7	2.00 V	0	38.8	-13.5
2	99.69	32.1 PK	43.5	-11.4	1.00 V	49	49.2	-17.1
3	165.99	32.6 PK	43.5	-10.9	1.00 V	242	45.6	-13.0
4	199.53	35.3 PK	43.5	-8.2	1.00 V	296	51.1	-15.8
5	298.76	29.2 PK	46.0	-16.8	2.00 V	279	41.1	-11.9
6	644.35	29.7 PK	46.0	-16.3	2.00 V	29	33.7	-4.0
7	896.16	34.9 PK	46.0	-11.1	2.00 V	259	35.4	-0.5

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 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

Mode A

RF Mode	CS ASK	Channel	CH 0 : 2404 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 (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	58.1 PK	74.0	-15.9	1.10 H	280	60.1	-2.0
2	2390.00	46.4 AV	54.0	-7.6	1.10 H	280	48.4	-2.0
3	*2404.00	111.2 PK			1.10 H	280	113.3	-2.1
4	*2404.00	75.1 AV			1.10 H	280	77.2	-2.1
5	4808.00	40.2 PK	74.0	-33.8	2.53 H	172	38.1	2.1
6	4808.00	4.1 AV	54.0	-49.9	2.53 H	172	2.0	2.1
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	57.9 PK	74.0	-16.1	3.16 V	158	59.9	-2.0
2	2390.00	46.2 AV	54.0	-7.8	3.16 V	158	48.2	-2.0
3	*2404.00	109.2 PK			3.16 V	158	111.3	-2.1
4	*2404.00	73.1 AV			3.16 V	158	75.2	-2.1
5	4808.00	37.2 PK	74.0	-36.8	2.11 V	352	35.1	2.1
6	4808.00	1.1 AV	54.0	-52.9	2.11 V	352	-1.0	2.1

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.
- For fundamental and related emissions signals (e.g., harmonic frequencies), the average value of 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(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction))
 = 20 log(1.564 ms * (1 + 0) / 100 ms) = -36.1 dB

RF Mode	CS ASK	Channel	CH 33 : 2440 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 (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	*2440.00	110.8 PK			1.27 H	212	112.9	-2.1
2	*2440.00	74.7 AV			1.27 H	212	76.8	-2.1
3	4880.00	39.6 PK	74.0	-34.4	2.53 H	180	37.2	2.4
4	4880.00	3.5 AV	54.0	-50.5	2.53 H	180	1.1	2.4
5	7320.00	47.2 PK	74.0	-26.8	3.82 H	111	39.8	7.4
6	7320.00	11.1 AV	54.0	-42.9	3.82 H	111	3.7	7.4
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	*2440.00	109.1 PK			3.15 V	147	111.2	-2.1
2	*2440.00	73.0 AV			3.15 V	147	75.1	-2.1
3	4880.00	38.5 PK	74.0	-35.5	2.16 V	337	36.1	2.4
4	4880.00	2.4 AV	54.0	-51.6	2.16 V	337	0.0	2.4
5	7320.00	45.5 PK	74.0	-28.5	1.72 V	196	38.1	7.4
6	7320.00	9.4 AV	54.0	-44.6	1.72 V	196	2.0	7.4

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. For fundamental and related emissions signals (e.g., harmonic frequencies), the average value of 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(dwell time per 100 ms per channel × (channel separation correction + overlapping channel correction))
= 20 log(1.564 ms * (1 + 0) / 100 ms) = -36.1 dB

RF Mode	CS ASK	Channel	CH 71 : 2478 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 (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	*2478.00	112.7 PK			1.31 H	211	115.1	-2.4
2	*2478.00	76.6 AV			1.31 H	211	79.0	-2.4
3	2483.50	58.2 PK	74.0	-15.8	1.31 H	211	60.6	-2.4
4	2483.50	46.3 AV	54.0	-7.7	1.31 H	211	48.7	-2.4
5	4956.00	41.1 PK	74.0	-32.9	2.59 H	188	38.8	2.3
6	4956.00	5.0 AV	54.0	-49.0	2.59 H	188	2.7	2.3
7	7434.00	48.1 PK	74.0	-25.9	3.83 H	99	40.1	8.0
8	7434.00	12.0 AV	54.0	-42.0	3.83 H	99	4.0	8.0
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	*2478.00	110.5 PK			3.16 V	161	112.9	-2.4
2	*2478.00	74.4 AV			3.16 V	161	76.8	-2.4
3	2483.50	57.8 PK	74.0	-16.2	3.16 V	161	60.2	-2.4
4	2483.50	46.0 AV	54.0	-8.0	3.16 V	161	48.4	-2.4
5	4956.00	40.1 PK	74.0	-33.9	2.11 V	341	37.8	2.3
6	4956.00	4.0 AV	54.0	-50.0	2.11 V	341	1.7	2.3
7	7434.00	46.2 PK	74.0	-27.8	1.68 V	212	38.2	8.0
8	7434.00	10.1 AV	54.0	-43.9	1.68 V	212	2.1	8.0

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. For fundamental and related emissions signals (e.g., harmonic frequencies), the average value of 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(dwell time per 100 ms per channel × (channel separation correction + overlapping channel correction))
= 20 log(1.564 ms * (1 + 0) / 100 ms) = -36.1 dB

Mode B

RF Mode	CS ASK	Channel	CH 0 : 2404 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 (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	58.0 PK	74.0	-16.0	1.02 H	159	60.0	-2.0
2	2390.00	46.5 AV	54.0	-7.5	1.02 H	159	48.5	-2.0
3	*2404.00	110.1 PK			1.02 H	159	112.2	-2.1
4	*2404.00	74.0 AV			1.02 H	159	76.1	-2.1
5	4808.00	39.8 PK	74.0	-34.2	3.02 H	106	37.7	2.1
6	4808.00	3.7 AV	54.0	-50.3	3.02 H	106	1.6	2.1
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	57.9 PK	74.0	-16.1	1.02 V	262	59.9	-2.0
2	2390.00	46.1 AV	54.0	-7.9	1.02 V	262	48.1	-2.0
3	*2404.00	104.4 PK			1.02 V	262	106.5	-2.1
4	*2404.00	68.3 AV			1.02 V	262	70.4	-2.1
5	4808.00	37.8 PK	74.0	-36.2	3.82 V	66	35.7	2.1
6	4808.00	1.7 AV	54.0	-52.3	3.82 V	66	-0.4	2.1

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. For fundamental and related emissions signals (e.g., harmonic frequencies), the average value of 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(dwell time per 100 ms per channel * (channel separation correction + overlapping channel correction))
= 20 log(1.564 ms * (1 + 0) / 100 ms) = -36.1 dB

RF Mode	CS ASK	Channel	CH 33 : 2440 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 (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	*2440.00	109.3 PK			1.25 H	258	111.4	-2.1
2	*2440.00	73.2 AV			1.25 H	258	75.3	-2.1
3	4880.00	40.2 PK	74.0	-33.8	3.07 H	106	37.8	2.4
4	4880.00	4.1 AV	54.0	-49.9	3.07 H	106	1.7	2.4
5	7320.00	48.2 PK	74.0	-25.8	1.12 H	33	40.8	7.4
6	7320.00	12.1 AV	54.0	-41.9	1.12 H	33	4.7	7.4
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	*2440.00	104.6 PK			1.59 V	186	106.7	-2.1
2	*2440.00	68.5 AV			1.59 V	186	70.6	-2.1
3	4880.00	39.1 PK	74.0	-34.9	3.86 V	61	36.7	2.4
4	4880.00	3.0 AV	54.0	-51.0	3.86 V	61	0.6	2.4
5	7320.00	46.5 PK	74.0	-27.5	3.82 V	278	39.1	7.4
6	7320.00	10.4 AV	54.0	-43.6	3.82 V	278	3.0	7.4

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. For fundamental and related emissions signals (e.g., harmonic frequencies), the average value of 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(dwell time per 100 ms per channel × (channel separation correction + overlapping channel correction))
= 20 log(1.564 ms * (1 + 0) / 100 ms) = -36.1 dB

RF Mode	CS ASK	Channel	CH 71 : 2478 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 (System)	120 Vac, 60 Hz	Environmental Conditions	25 °C, 75% RH
Tested By	Stars Liu		

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	*2478.00	108.2 PK			1.50 H	152	110.6	-2.4
2	*2478.00	72.1 AV			1.50 H	152	74.5	-2.4
3	2483.50	58.2 PK	74.0	-15.8	1.50 H	152	60.6	-2.4
4	2483.50	46.4 AV	54.0	-7.6	1.50 H	152	48.8	-2.4
5	4956.00	39.5 PK	74.0	-34.5	3.10 H	117	37.2	2.3
6	4956.00	3.4 AV	54.0	-50.6	3.10 H	117	1.1	2.3
7	7434.00	47.1 PK	74.0	-26.9	1.07 H	24	39.1	8.0
8	7434.00	11.0 AV	54.0	-43.0	1.07 H	24	3.0	8.0
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	*2478.00	103.2 PK			1.18 V	296	105.6	-2.4
2	*2478.00	67.1 AV			1.18 V	296	69.5	-2.4
3	2483.50	57.9 PK	74.0	-16.1	3.81 V	75	60.3	-2.4
4	2483.50	46.2 AV	54.0	-7.8	3.81 V	75	48.6	-2.4
5	4956.00	38.3 PK	74.0	-35.7	3.80 V	287	36.0	2.3
6	4956.00	2.2 AV	54.0	-51.8	3.80 V	287	-0.1	2.3
7	7434.00	45.2 PK	74.0	-28.8	3.62 V	252	37.2	8.0
8	7434.00	9.1 AV	54.0	-44.9	3.62 V	252	1.1	8.0

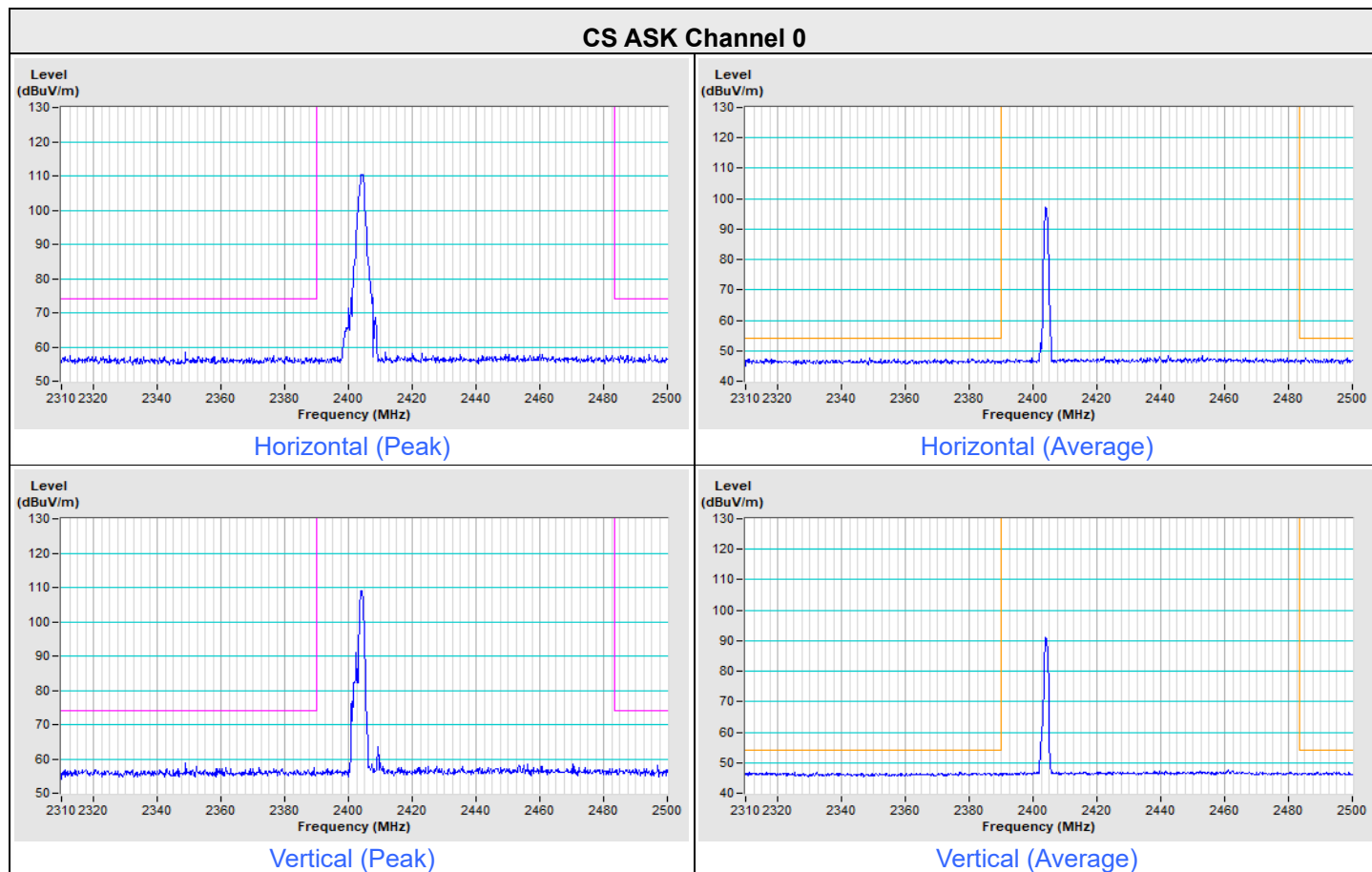
Remarks:

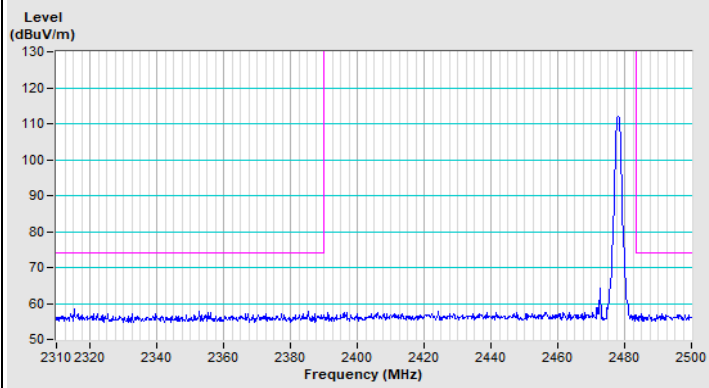
1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency, the limit was restricted at the RF Output Power.
6. For fundamental and related emissions signals (e.g., harmonic frequencies), the average value of 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(dwell time per 100 ms per channel × (channel separation correction + overlapping channel correction))
= 20 log(1.564 ms * (1 + 0) / 100 ms) = -36.1 dB

Plot of Band Edge

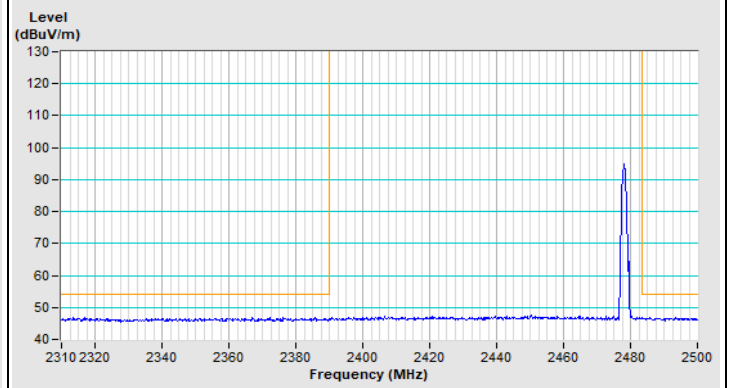
Mode A

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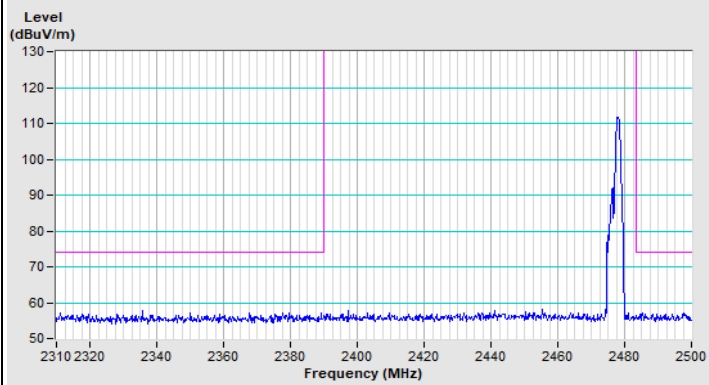


CS ASK Channel 71

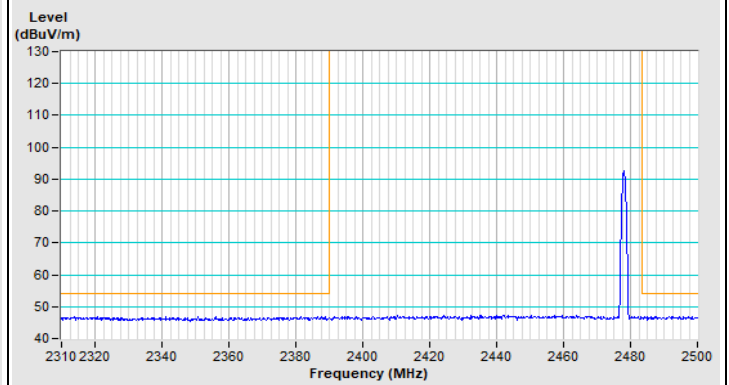
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)

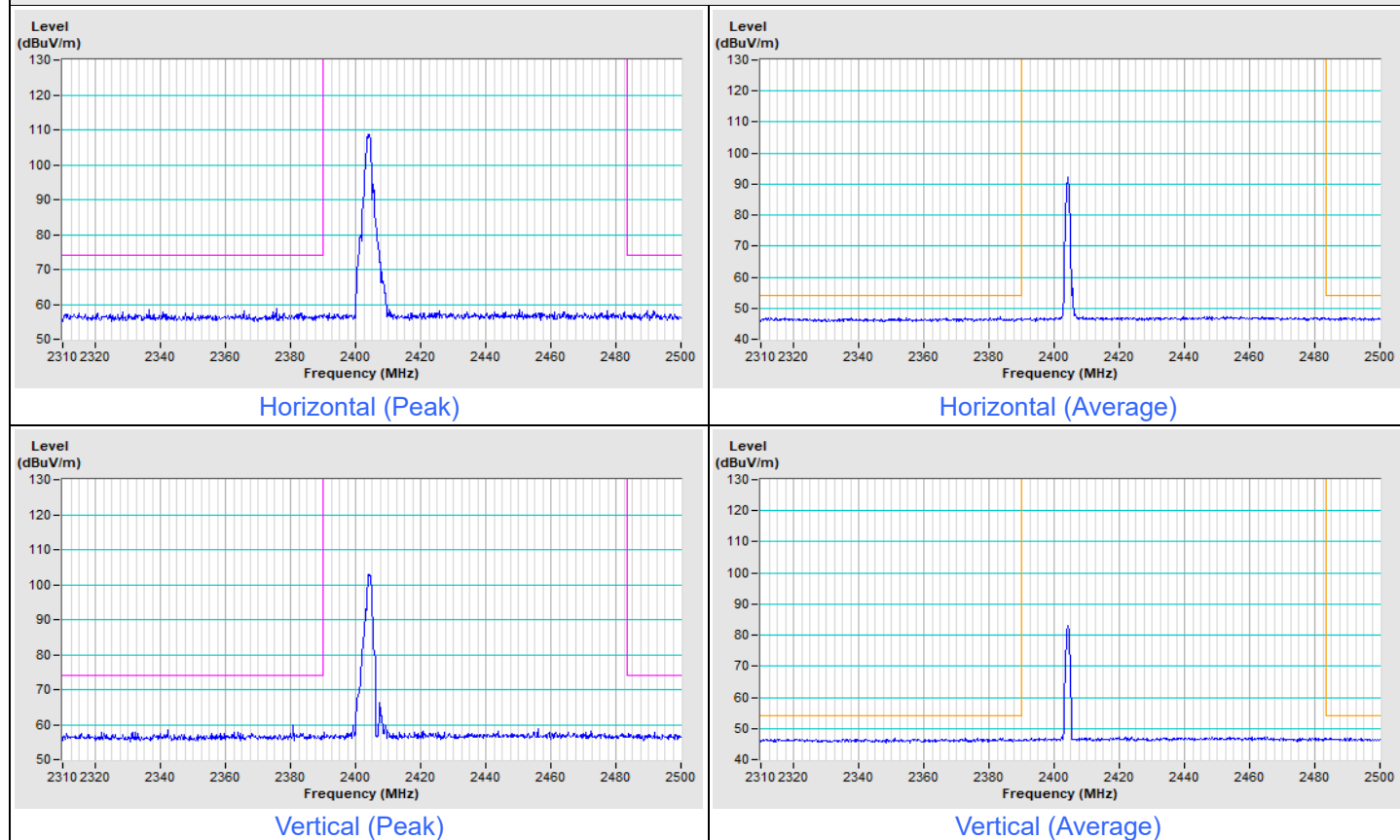


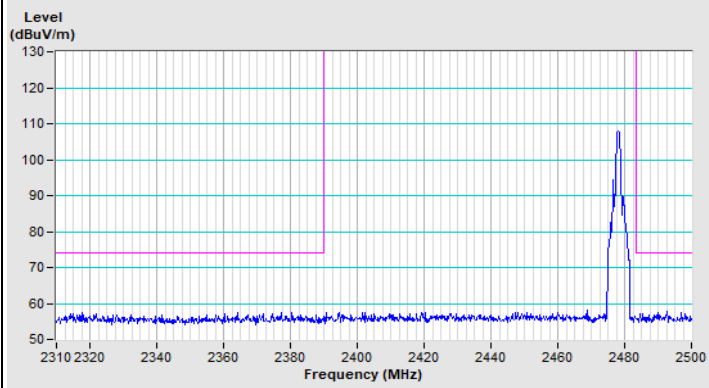
Vertical (Average)

Mode B

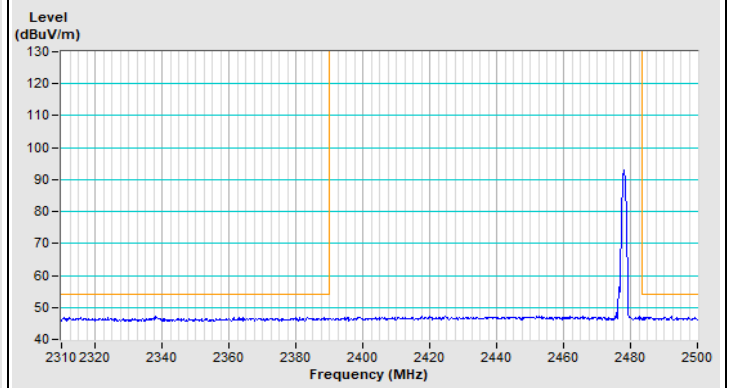
Frequency Range	2.31 GHz ~ 2.5 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
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CS ASK Channel 0

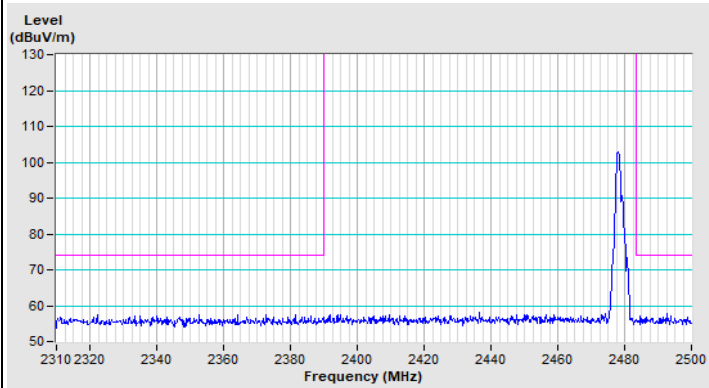


CS ASK Channel 71

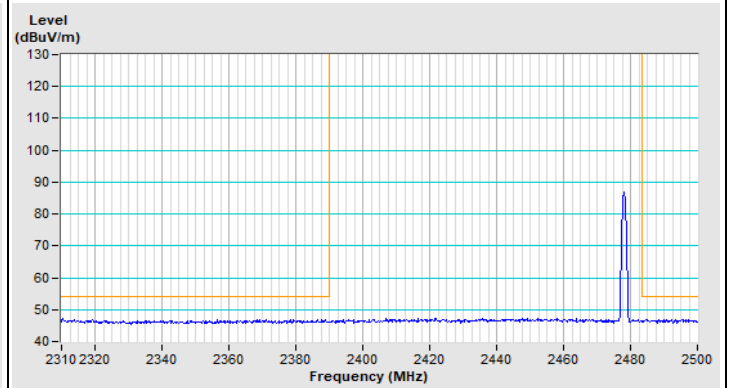
Horizontal (Peak)



Horizontal (Average)



Vertical (Peak)

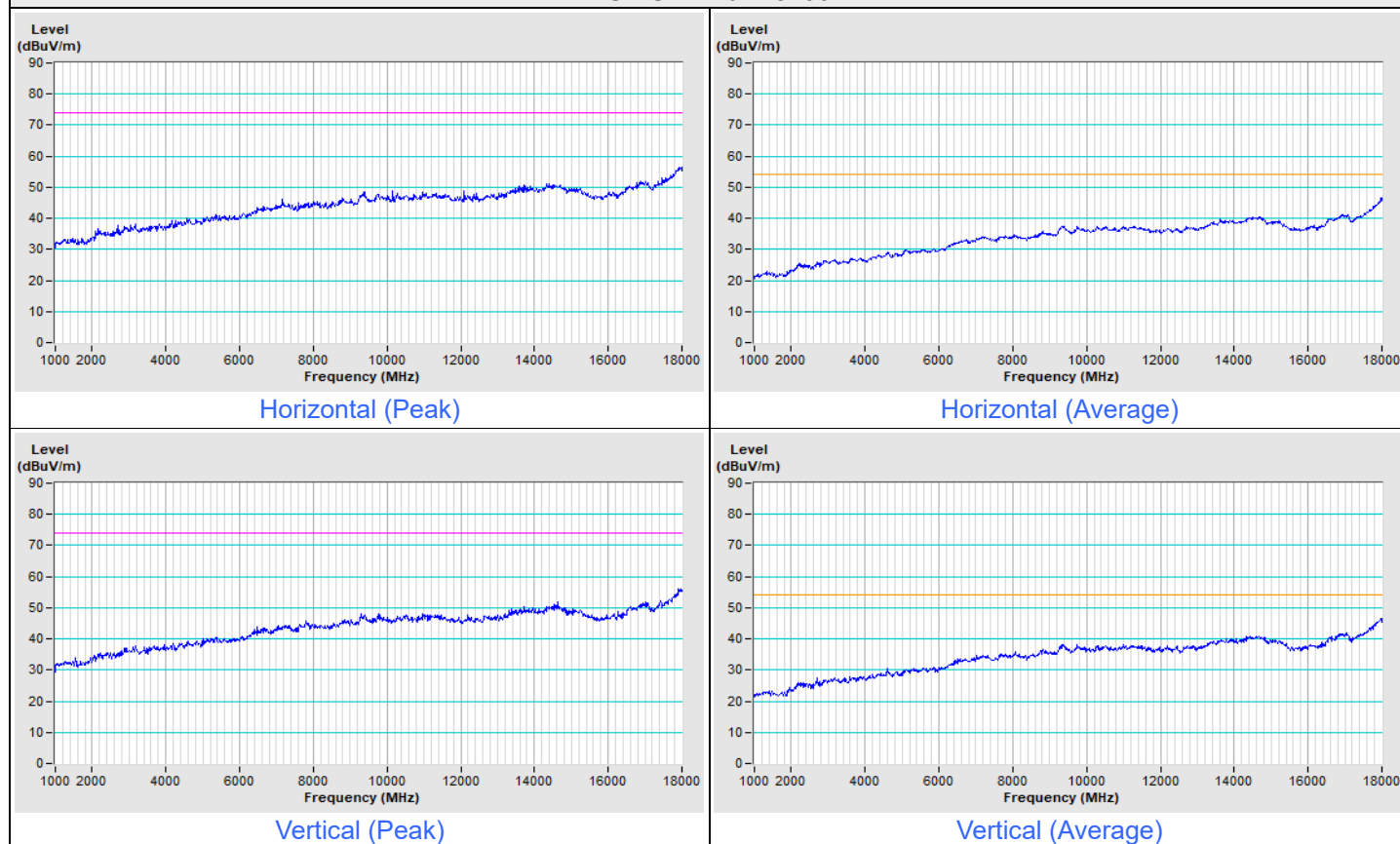


Vertical (Average)

Plot of Other Emission

Frequency Range	1 GHz ~ 18 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS
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CS ASK Channel 33



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:

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Fax: 886-3-3270892

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.

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