FCC Test Report

Report No.:	RFBCFP-WTW-P21050668A
FCC ID:	Q3V-DIAL01
Test Model:	DIAL01
Received Date:	2023/7/4
Test Date:	2023/7/21 ~ 2023/8/2
Issued Date:	2023/8/21
Applicant:	Nien Made Enterprise Co., Ltd.
Address:	23F.-1, No. 98, Shizheng N. 7th Rd., Xitun Dist.,Taichung City 407,Taiwan
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan
FCC Registration / Designation Number:	723255 / TW2022

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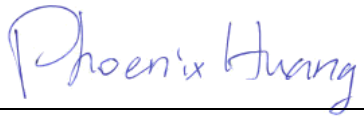
Release Control Record

Issue No.	Description	Date Issued
RFBCFP-WTW-P21050668A	Original release.	2023/8/21

1 Certificate of Conformity

Product:	SmartDial™ Remote Control
Brand:	NORMAN、ShadeAuto
Test Model:	DIAL01
Sample Status:	Engineering sample
Applicant:	Nien Made Enterprise Co., Ltd.
Test Date:	2023/7/21 ~ 2023/8/2
Standards:	47 CFR FCC Part 15, Subpart C (Section 15.249) ANSI C63.10: 2013

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 EMC characteristics under the conditions specified in this report.

Prepared by :  , **Date:** 2023/8/21

Phoenix Huang / Specialist

Approved by :  , **Date:** 2023/8/21

Wen Yu / Assistant Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (SECTION 15.249)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	NA	No need to concern of Conducted Emission due to the EUT is powered by battery.
15.209 15.249 15.249 (d)	Radiated Emission Test Band Edge Measurement Limit: 50dB less than the peak value of fundamental frequency or meet radiated emission limit in section 15.209	PASS	Meet the requirement of limit. Minimum passing margin is -8.3 dB at 33.49 MHz
15.215 (c)	20dB Bandwidth	PASS	Meet the requirement of limit
15.203	Antenna Requirement	PASS	No antenna connector is used.

Note: 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	Frequency	Expanded Uncertainty (k=2) (±)
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.1 dB
	30 MHz ~ 1 GHz	5.1 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	5.0 dB
	18 GHz ~ 40 GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	SmartDial™ Remote Control
Brand	NORMAN、ShadeAuto
Test Model	DIAL01
Status of EUT	Engineering sample
Power Supply Rating	3 Vdc from lithium battery
Modulation Type	DTS
Modulation Technology	GFSK
Transfer Rate	1 Mbps
Operating Frequency	2.415 GHz ~ 2.459 GHz
Number of Channel	3
Output Power (Field Strength)	93.2 dBuV/m (Peak) at 3m
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The antenna information is listed as below.

Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connector
1.8	2.4~2.5	Chip	None
Due to radiated measurements are made and the antenna gain is already accounted for this device, so provide an antenna datasheet and/or antenna measurement report is not required. The antenna dimensions and pictures (include antenna wire length if have) are stated in EUT photo exhibit.			

2. 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 Description of Test Modes

3 channels are provided to this EUT:

Channel	Frequency	Channel	Frequency
15	2415	39	2439
59	2459		

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	-	√	-

Where **RE≥1G:** Radiated Emission above 1GHz & Bandedge Measurement **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

Note:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane (below 1GHz)** & **Y-plane (above 1GHz)**.
2. No need to concern of Conducted Emission due to the EUT is powered by battery.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type
15 to 59	15, 39, 59	GFSK

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

Available Channel	Tested Channel	Modulation Type
15 to 59	15	GFSK

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

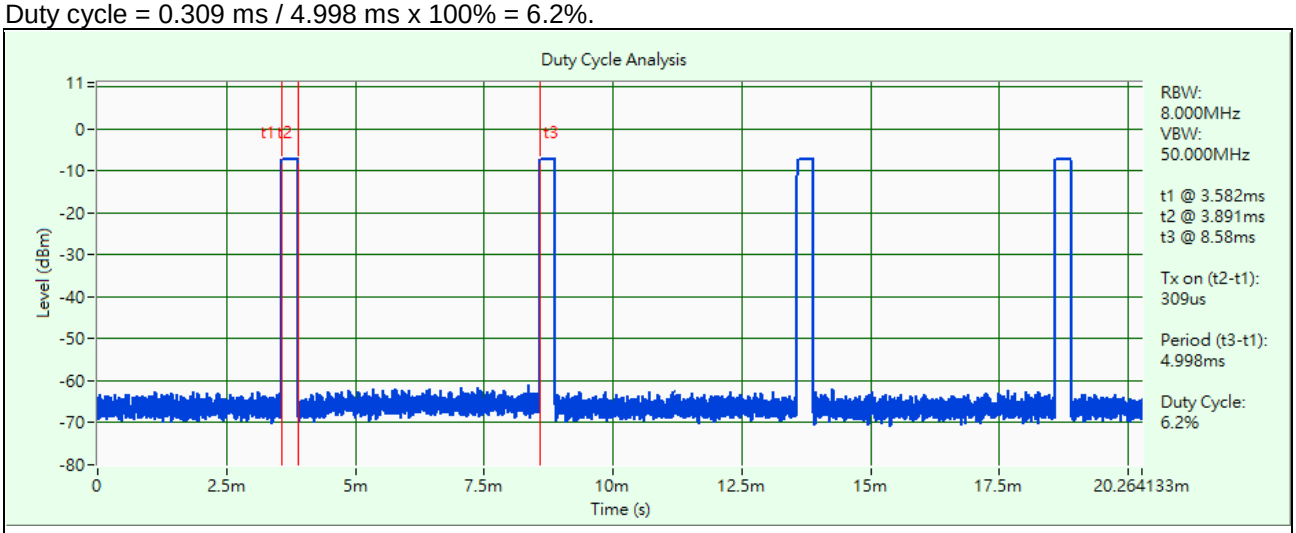
Available Channel	Tested Channel	Modulation Type
15 to 59	15, 39, 59	GFSK

Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	25deg. C, 75%RH	3 Vdc	Sampson Chen
RE<1G	25deg. C, 76%RH	3 Vdc	William Su
APCM	25deg. C, 76%RH	3 Vdc	Waydi Tuan

3.3 Duty Cycle of Test Signal

Duty cycle = 0.309 ms / 4.998 ms x 100% = 6.2%.



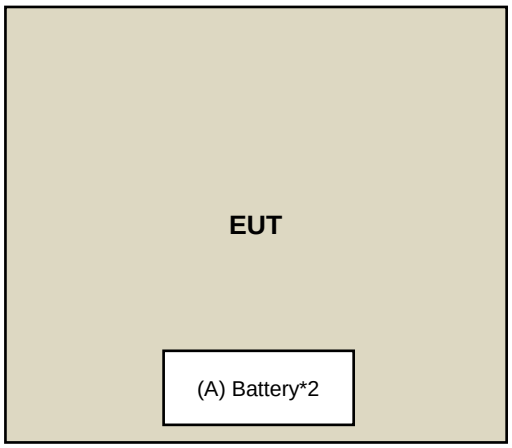
GFSK

3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Battery	Lithium	CR 2032	NA	NA	Supplied by applicant

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C (15.249)

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following

Fundamental Frequency	Field Strength of Fundamental (millivolts/meter)	Field Strength of Harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2400 ~ 2483.5 MHz	50	500
5725 ~ 5875 MHz	50	500
24 ~ 24.25 GHz	250	2500

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits as below table, whichever is the lesser attenuation

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

Note:

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 1000MHz, 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 20dB under any condition of modulation.

4.1.2 Test Instruments

For Radiated Emission:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
MXA Signal Analyzer Keysight	N9020B	MY60112410	2023/3/6	2024/3/5
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
MXE EMI Receiver Keysight	N9038A	MY59050100	2023/6/13	2024/6/12
Preamplifier EMCI	EMC001340	980142	2023/5/8	2024/5/7
Loop Antenna Electro-Metrics	EM-6879	264	2023/2/21	2024/2/20
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2022/12/19	2023/12/18
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2022/12/19	2023/12/18
Preamplifier EMCI	EMC330N	980852	2023/2/20	2024/2/19
Bi_Log Antenna Schwarzbeck	VULB 9168	9168-0942	2022/10/20	2023/10/19
RF Coaxial Cable COMMATE/PEWC	8D	966-6-1	2023/4/6	2024/4/5
RF Coaxial Cable COMMATE/PEWC	8D	966-6-2	2023/4/6	2024/4/5
RF Coaxial Cable COMMATE/PEWC	8D	966-6-3	2023/4/6	2024/4/5
Fixed Attenuator Mini-Circuits	UNAT-5+	PAD-ATT5-01	2022/12/28	2023/12/27
Horn Antenna Schwarzbeck	BBHA 9120D	9120D-2035	2022/11/13	2023/11/12
Preamplifier EMCI	EMC12630SE	980385	2022/8/15	2023/8/14
RF Coaxial Cable EMCI	EMC101G-KM-KM-10000	210708	2022/11/4	2023/11/3
RF Coaxial Cable EMCI	EMC104-SM-SM-1300	210205	2023/5/8	2024/5/7
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Preamplifier EMCI	EMC184045SE	980387	2022/12/28	2023/12/27
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170519	2022/11/13	2023/11/12
RF Coaxial Cable EMCI	EMC102-KM-KM-1200	160924	2022/12/28	2023/12/27
RF Coaxial Cable EMCI	EMC-KM-KM-4000	200214	2023/2/20	2024/2/19

Notes:

1. The test was performed in 966 Chamber No. 6.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2023/7/21 ~ 2023/8/2

For other test items:

Description & Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
MXA Signal Analyzer Keysight	N9020B	MY60112409	2023/2/18	2024/2/17
Fixed Attenuator Woken	MDCS18N-10	MDCS18N-10-01	2023/3/27	2024/3/26
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

Notes:

1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2023/7/21

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) 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 detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect 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.

Note:

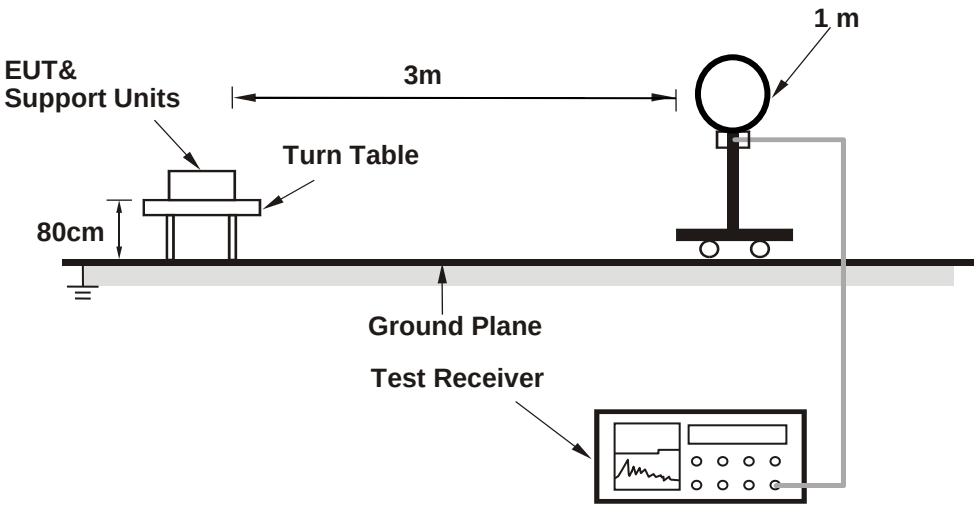
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. According to ANSI C63.10 section 7.5. For fundamental and harmonic signal measurement, the average value = peak value + duty cycle correction factor. The duty cycle measurement refer to FCC 47 CFR Part 15C section 15.35 (c). For duty cycle correction factor values, see the Test Signal Duty Cycle section in this report.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

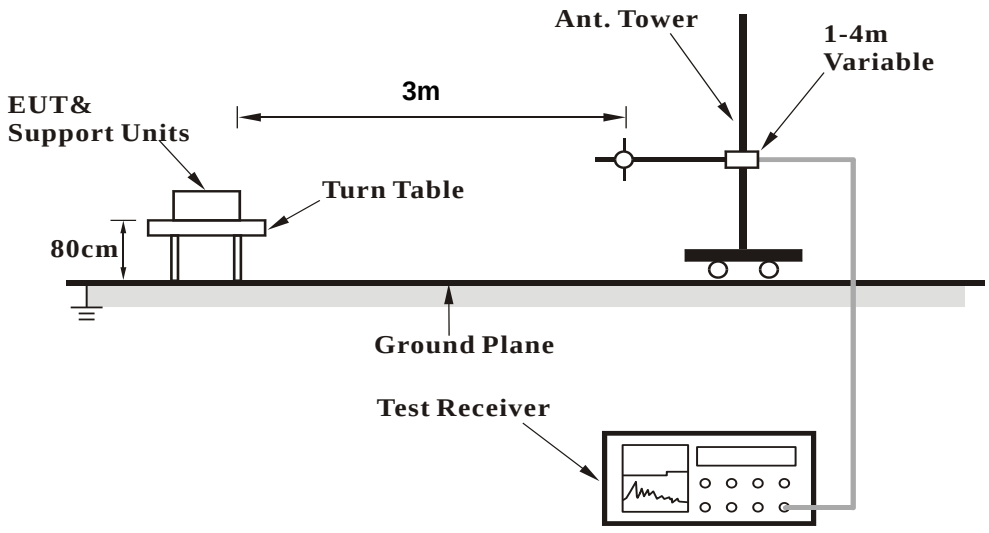
No deviation.

4.1.5 Test Setup

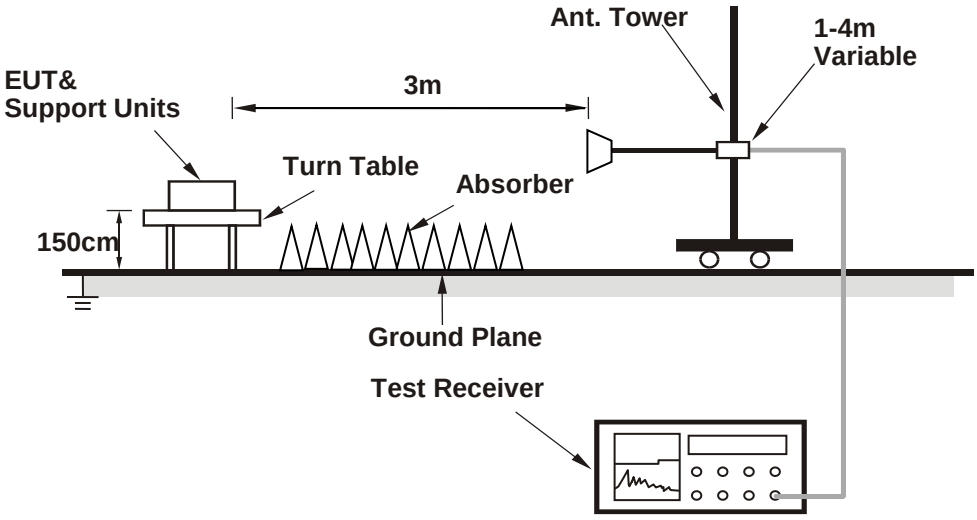
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Controlling software (RF Sample push the button) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

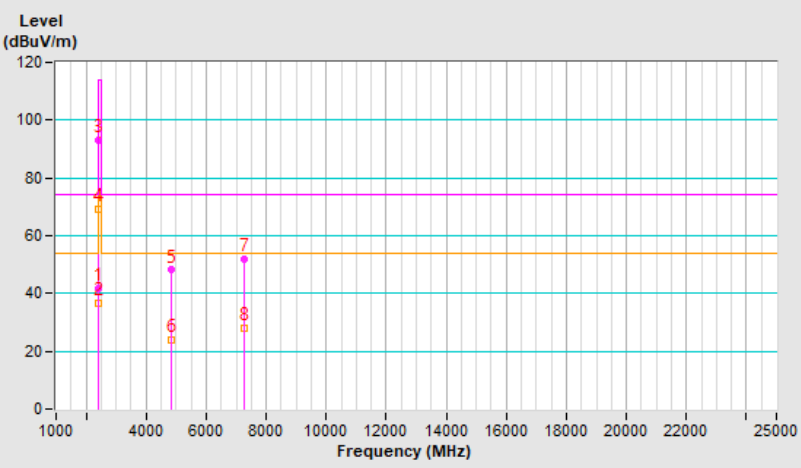
Above 1GHz Data:

RF Mode	GFSK	Channel	CH 15：2415 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

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	2400.00	41.8 PK	74.0	-32.2	1.20 H	134	43.5	-1.7
2	2400.00	36.6 AV	54.0	-17.4	1.20 H	134	38.3	-1.7
3	*2415.00	93.2 PK	114.0	-20.8	1.20 H	134	94.9	-1.7
4	*2415.00	69.0 AV	94.0	-25.0	1.20 H	134	70.7	-1.7
5	4830.00	48.1 PK	74.0	-25.9	1.07 H	132	45.0	3.1
6	4830.00	23.9 AV	54.0	-30.1	1.07 H	132	20.8	3.1
7	7245.00	52.1 PK	74.0	-21.9	2.09 H	238	43.2	8.9
8	7245.00	27.9 AV	54.0	-26.1	2.09 H	238	19.0	8.9

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.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.309 ms / 4.998 ms) = -24.2 dB

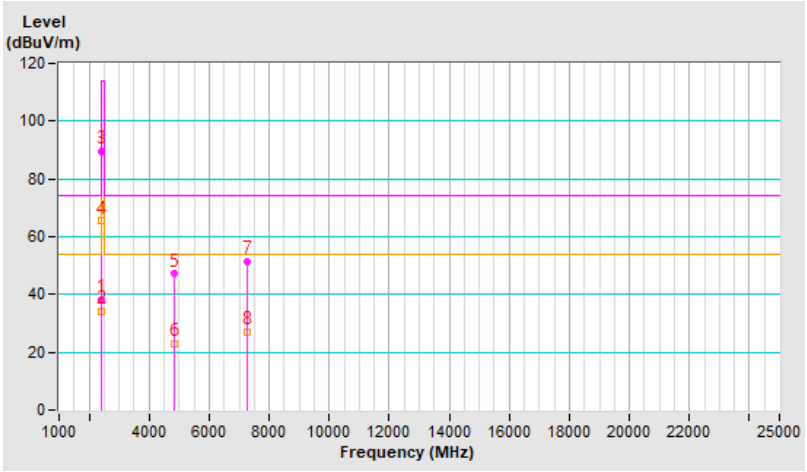


RF Mode	GFSK	Channel	CH 15：2415 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS

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	2400.00	38.2 PK	74.0	-35.8	2.29 V	355	39.9	-1.7
2	2400.00	34.1 AV	54.0	-19.9	2.29 V	355	35.8	-1.7
3	*2415.00	89.6 PK	114.0	-24.4	2.29 V	355	91.3	-1.7
4	*2415.00	65.4 AV	94.0	-28.6	2.29 V	355	67.1	-1.7
5	4830.00	47.1 PK	74.0	-26.9	1.16 V	232	44.0	3.1
6	4830.00	22.9 AV	54.0	-31.1	1.16 V	232	19.8	3.1
7	7245.00	51.3 PK	74.0	-22.7	1.49 V	175	42.4	8.9
8	7245.00	27.1 AV	54.0	-26.9	1.49 V	175	18.2	8.9

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.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.309 ms / 4.998 ms) = -24.2 dB

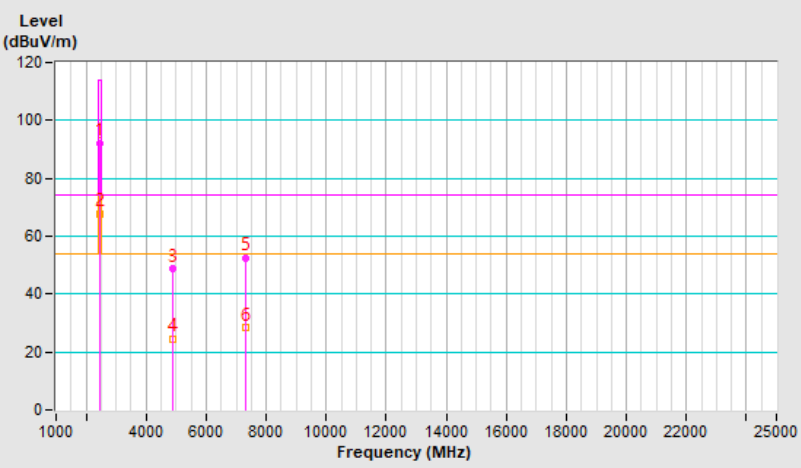


RF Mode	GFSK	Channel	CH 39：2439 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS

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	*2439.00	91.9 PK	114.0	-22.1	1.31 H	140	93.4	-1.5
2	*2439.00	67.7 AV	94.0	-26.3	1.31 H	140	69.2	-1.5
3	4878.00	48.6 PK	74.0	-25.4	1.05 H	131	45.5	3.1
4	4878.00	24.4 AV	54.0	-29.6	1.05 H	131	21.3	3.1
5	7317.00	52.5 PK	74.0	-21.5	2.03 H	243	43.7	8.8
6	7317.00	28.3 AV	54.0	-25.7	2.03 H	243	19.5	8.8

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.
5. " * ": Fundamental frequency.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.309 ms / 4.998 ms) = -24.2 dB

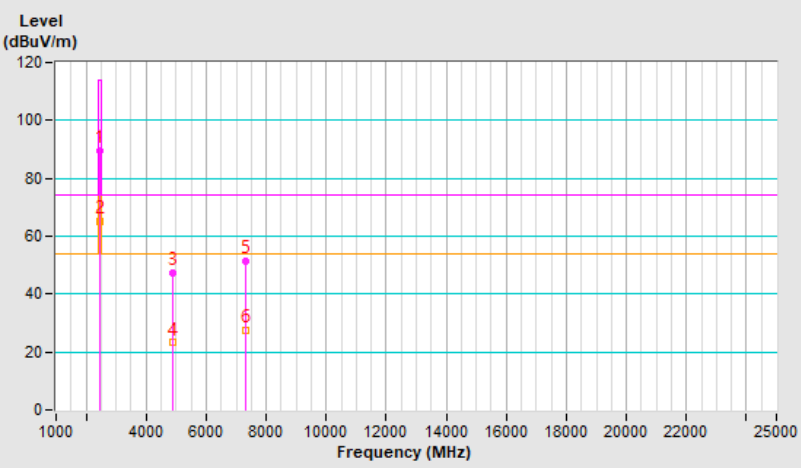


RF Mode	GFSK	Channel	CH 39：2439 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS

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	*2439.00	89.5 PK	114.0	-24.5	2.50 V	357	91.0	-1.5
2	*2439.00	65.3 AV	94.0	-28.7	2.50 V	357	66.8	-1.5
3	4878.00	47.4 PK	74.0	-26.6	1.24 V	209	44.3	3.1
4	4878.00	23.2 AV	54.0	-30.8	1.24 V	209	20.1	3.1
5	7317.00	51.5 PK	74.0	-22.5	1.51 V	205	42.7	8.8
6	7317.00	27.3 AV	54.0	-26.7	1.51 V	205	18.5	8.8

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.
5. " * ": Fundamental frequency.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.309 ms / 4.998 ms) = -24.2 dB

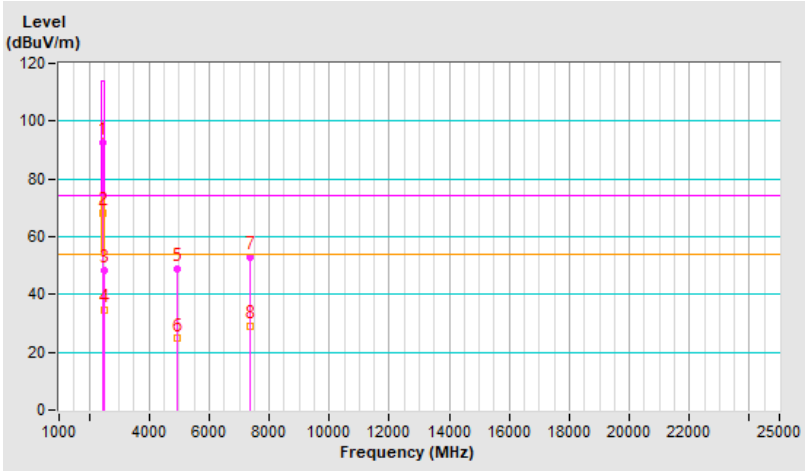


RF Mode	GFSK	Channel	CH 59：2459 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS

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	*2459.00	92.5 PK	114.0	-21.5	1.27 H	149	94.0	-1.5
2	*2459.00	68.3 AV	94.0	-25.7	1.27 H	149	69.8	-1.5
3	2483.50	48.4 PK	74.0	-25.6	1.27 H	149	50.0	-1.6
4	2483.50	34.6 AV	54.0	-19.4	1.27 H	149	36.2	-1.6
5	4918.00	48.9 PK	74.0	-25.1	1.01 H	138	45.8	3.1
6	4918.00	24.7 AV	54.0	-29.3	1.01 H	138	21.6	3.1
7	7377.00	53.1 PK	74.0	-20.9	2.06 H	241	44.2	8.9
8	7377.00	28.9 AV	54.0	-25.1	2.06 H	241	20.0	8.9

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.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.309 ms / 4.998 ms) = -24.2 dB

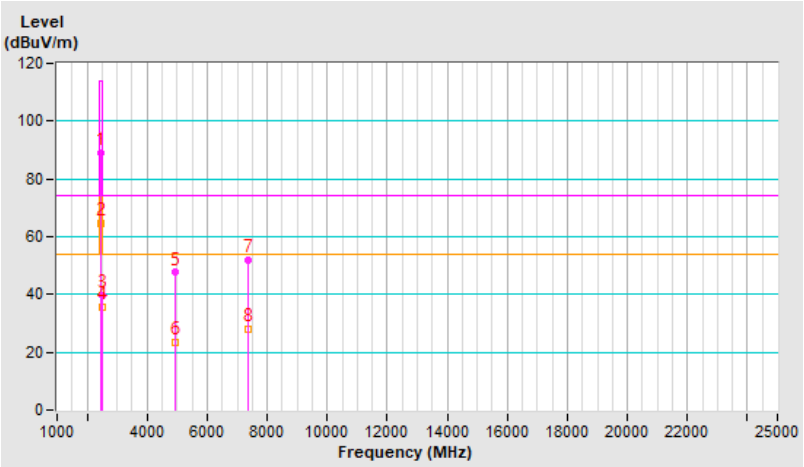


RF Mode	GFSK	Channel	CH 59：2459 MHz
Frequency Range	1 GHz ~ 25 GHz	Detector Function & Bandwidth	PK: RB=1 MHz, VB=3 MHz, DET=Peak AV: RB=1 MHz, VB=3 MHz, DET=RMS

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	*2459.00	88.9 PK	114.0	-25.1	3.16 V	360	90.4	-1.5
2	*2459.00	64.7 AV	94.0	-29.3	3.16 V	360	66.2	-1.5
3	2483.50	39.8 PK	74.0	-34.2	3.16 V	360	41.4	-1.6
4	2483.50	35.7 AV	54.0	-18.3	3.16 V	360	37.3	-1.6
5	4918.00	47.6 PK	74.0	-26.4	1.21 V	219	44.5	3.1
6	4918.00	23.4 AV	54.0	-30.6	1.21 V	219	20.3	3.1
7	7377.00	52.0 PK	74.0	-22.0	1.50 V	189	43.1	8.9
8	7377.00	27.8 AV	54.0	-26.2	1.50 V	189	18.9	8.9

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.
6. The average value of fundamental and harmonic frequency is: Average = Peak value + 20 log(Duty cycle) Where the duty cycle correction factor is calculated from following formula:
   20 log(Duty cycle) = 20 log(0.309 ms / 4.998 ms) = -24.2 dB



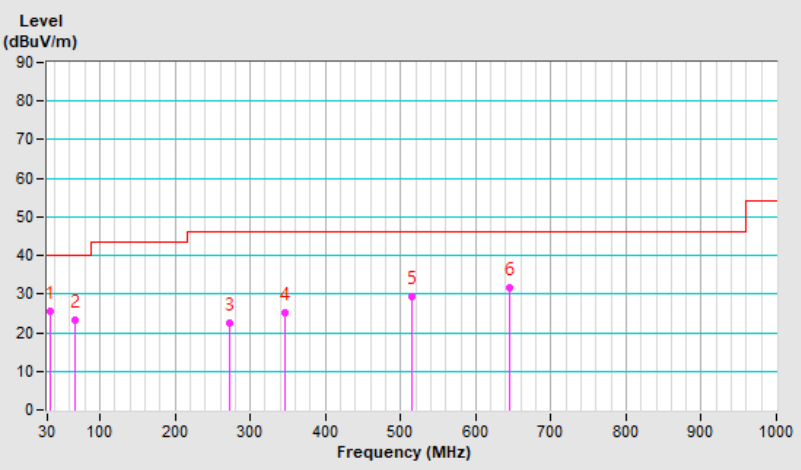
Below 1GHz Data:

RF Mode	GFSK	Channel	CH 15：2415 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

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	33.30	25.6 QP	40.0	-14.4	1.16 H	90	39.2	-13.6
2	66.37	23.3 QP	40.0	-16.7	1.05 H	76	37.3	-14.0
3	272.06	22.5 QP	46.0	-23.5	1.11 H	147	35.6	-13.1
4	346.95	25.0 QP	46.0	-21.0	1.04 H	360	36.1	-11.1
5	514.32	29.4 QP	46.0	-16.6	1.33 H	178	36.5	-7.1
6	644.50	31.7 QP	46.0	-14.3	1.00 H	18	36.0	-4.3

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.

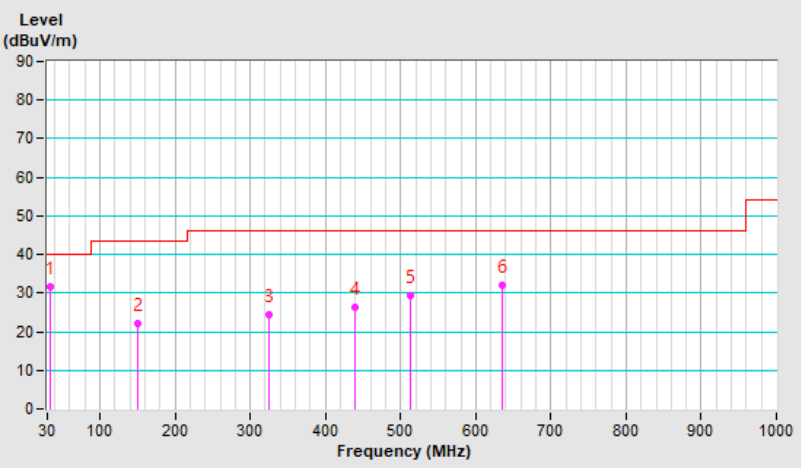


RF Mode	GFSK	Channel	CH 15：2415 MHz
Frequency Range	30 MHz ~ 1 GHz	Detector Function & Bandwidth	QP: RB=120kHz, DET=Quasi-Peak

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	**33.49**	**31.7 QP**	**40.0**	**-8.3**	**1.03 V**	**163**	**45.3**	**-13.6**
2	150.23	22.2 QP	43.5	-21.3	1.04 V	332	34.6	-12.4
3	324.30	24.3 QP	46.0	-21.7	1.10 V	254	35.7	-11.4
4	438.47	26.3 QP	46.0	-19.7	1.12 V	154	34.7	-8.4
5	513.45	29.2 QP	46.0	-16.8	1.05 V	268	36.3	-7.1
6	635.13	31.9 QP	46.0	-14.1	1.17 V	199	36.5	-4.6

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.



4.2 20dB Bandwidth Measurement

4.2.1 Limits of 20dB Bandwidth Measurement

The 20dB bandwidth shall be specified in operating frequency band.

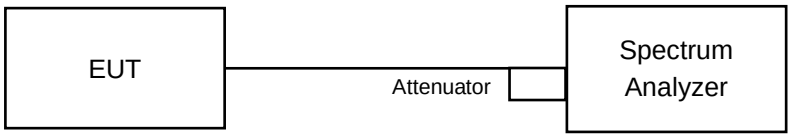
4.2.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.3 Test Procedure

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 30 kHz RBW and 100 kHz VBW. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

4.2.4 Test Setup



4.2.5 Deviation from Test Standard

No deviation.

4.2.6 EUT Operating Condition

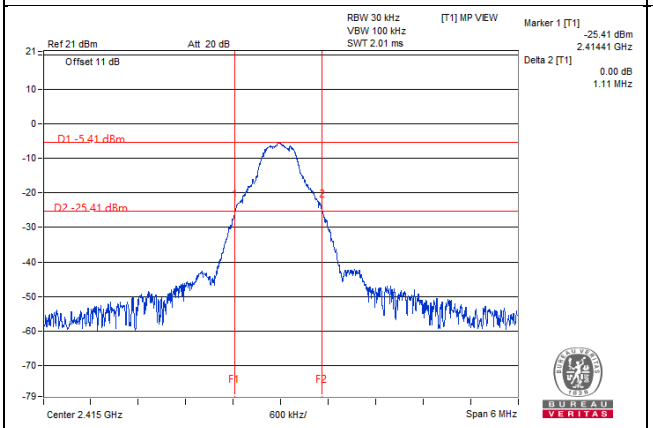
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.2.7 Test Results

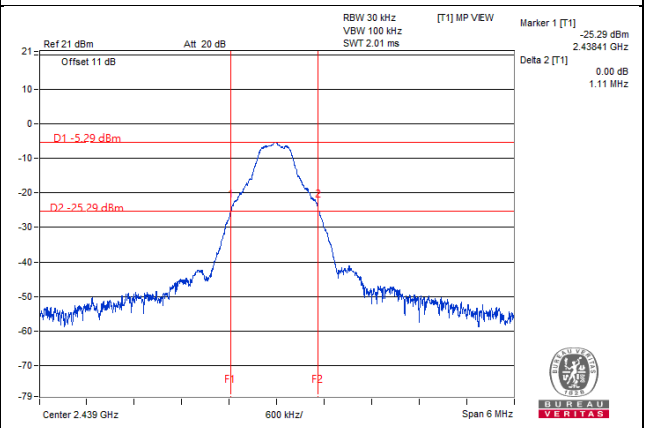
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
15	2415	1.11
39	2439	1.11
59	2459	1.12

Spectrum Plot

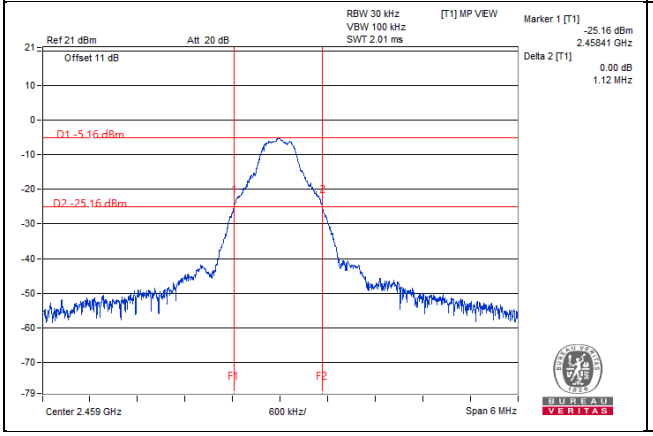
CH15



CH39



CH59



5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – 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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Tel: 886-3-6668565
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Tel: 886-3-3183232
Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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