

APPLICATION CERTIFICATION FCC Part 15C
On Behalf of
Modern Marketing Concepts, Inc.

MOMENTO

Model No.: CR8018A-DD, CR8018X-XX
("X" can be replaced by letter from "A" to "Z" or blank)

FCC ID: AUSCR8018A

Prepared for : Modern Marketing Concepts, Inc.
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Date of Test : April 23, 2019
Date of Report : April 25, 2019

TABLE OF CONTENTS

Description	Page
Test Report Certification	
TABLE OF CONTENTS	2
1. GENERAL INFORMATION	5
1.1. Description of Device (EUT).....	5
1.2. Accessory and Auxiliary Equipment	5
1.3. Description of Test Facility	6
1.4. Measurement Uncertainty	6
2. MEASURING DEVICE AND TEST EQUIPMENT	7
3. OPERATION OF EUT DURING TESTING	8
3.1. Operating Mode	8
3.2. Configuration and peripherals	8
4. TEST PROCEDURES AND RESULTS	9
5. 20DB BANDWIDTH TEST	10
5.1. Block Diagram of Test Setup.....	10
5.2. The Requirement For Section 15.247(a)(1).....	10
5.3. EUT Configuration on Measurement	10
5.4. Operating Condition of EUT	10
5.5. Test Procedure	10
5.6. Test Result	11
6. CARRIER FREQUENCY SEPARATION TEST	16
6.1. Block Diagram of Test Setup.....	16
6.2. The Requirement For Section 15.247(a)(1).....	16
6.3. EUT Configuration on Measurement	16
6.4. Operating Condition of EUT	16
6.5. Test Procedure	17
6.6. Test Result	17
7. NUMBER OF HOPPING FREQUENCY TEST	23
7.1. Block Diagram of Test Setup.....	23
7.2. The Requirement For Section 15.247(a)(1)(iii).....	23
7.3. EUT Configuration on Measurement	23
7.4. Operating Condition of EUT	23
7.5. Test Procedure	23
7.6. Test Result	24
8. DWELL TIME TEST	26
8.1. Block Diagram of Test Setup.....	26
8.2. The Requirement For Section 15.247(a)(1)(iii).....	26
8.3. EUT Configuration on Measurement	26
8.4. Operating Condition of EUT	26
8.5. Test Procedure	26
8.6. Test Result	27
9. MAXIMUM PEAK OUTPUT POWER TEST	33
9.1. Block Diagram of Test Setup.....	33

9.2.	The Requirement For Section 15.247(b)(1).....	33
9.3.	EUT Configuration on Measurement	33
9.4.	Operating Condition of EUT	33
9.5.	Test Procedure	33
9.6.	Test Result	34
10.	RADIATED EMISSION TEST	40
10.1.	Block Diagram of Test Setup.....	40
10.2.	The Limit For Section 15.247(d)	41
10.3.	Restricted bands of operation	43
10.4.	Configuration of EUT on Measurement	43
10.5.	Operating Condition of EUT	44
10.6.	Test Procedure	44
10.7.	Data Sample.....	45
10.8.	Test Results.....	45
11.	BAND EDGE COMPLIANCE TEST	58
11.1.	Block Diagram of Test Setup.....	58
11.2.	The Requirement For Section 15.247(d)	58
11.3.	EUT Configuration on Measurement	58
11.4.	Operating Condition of EUT	58
11.5.	Test Procedure	59
11.6.	Test Result	59
12.	AC POWER LINE CONDUCTED EMISSION TEST	70
12.1.	Block Diagram of Test Setup.....	70
12.2.	Power Line Conducted Emission Measurement Limits.....	71
12.3.	Configuration of EUT on Measurement	71
12.4.	Operating Condition of EUT	71
12.5.	Test Procedure	71
12.6.	Data Sample.....	72
12.7.	Test Results.....	72
13.	ANTENNA REQUIREMENT.....	77
13.1.	The Requirement	77
13.2.	Antenna Construction	77

Test Report Certification

Applicant : Modern Marketing Concepts, Inc.
Manufacturer : TIMSEN DEVELOPMENT LIMITED
EUT : MOMENTO
Model No. : CR8018A-DD, CR8018X-XX

("X" can be replaced by letter from "A" to "Z" or blank)

Measurement Procedure Used:

FCC Rules and Regulations Part 15 Subpart C Section 15.247
ANSI C63.10: 2013

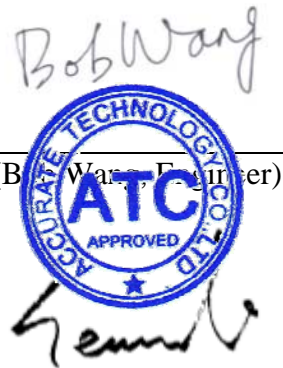
The device described above is tested by Shenzhen Accurate Technology Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C Section 15.247 limits. The measurement results are contained in this test report and Shenzhen Accurate Technology Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. Also, this report shows that the Equipment Under Test (EUT) is to be technically compliant with the FCC requirements.

This report applies to above tested sample only. This report shall not be reproduced in part without written approval of Shenzhen Accurate Technology Co., Ltd.

Date of Test : April 23, 2019
Date of Report : April 25, 2019

Prepared by : _____
(Bob Wang, Engineer)

Approved & Authorized Signer : _____
(Sean Liu, Manager)



1. GENERAL INFORMATION

1.1. Description of Device (EUT)

Model Number	:	CR8018A-DD, CR8018X-XX ("X" can be replaced by letter from "A" to "Z" or blank) (Note: We hereby state that these models are identical in interior structure, electrical circuits and components, Just model name is different, Therefore, only model CR8018A-DD is tested for EMC test.)
Bluetooth version	:	V5.0
Frequency Range	:	2402MHz-2480MHz
Number of Channels	:	79
Antenna Gain(Max)	:	1.2dBi
Antenna type	:	PCB Antenna
Modulation mode	:	GFSK, $\pi/4$ DQPSK, 8DPSK
Power Supply	:	DC 12V (Power by Adapter)
Adapter	:	Model: SW1200500-F04 Input: AC 100-240V; 50/60Hz Output: DC 12V; 500mA
Applicant	:	Modern Marketing Concepts, Inc.
Address	:	1220 E Oak, St. Louisville, Kentucky, United States 40204
Manufacturer	:	TIMSEN DEVELOPMENT LIMITED
Address	:	5F, 447# Tianhebei Road, Guangzhou, China

1.2. Accessory and Auxiliary Equipment

n.a.

1.3. Description of Test Facility

EMC Lab	:	Recognition of accreditation by Federal Communications Commission (FCC) The Designation Number is CN1189 The Registration Number is 708358
		Listed by Innovation, Science and Economic Development Canada (ISED) The Registration Number is 5077A-2
		Accredited by China National Accreditation Service for Conformity Assessment (CNAS) The Registration Number is CNAS L3193
		Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 4297.01
Name of Firm	:	Shenzhen Accurate Technology Co., Ltd.
Site Location	:	1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China

1.4. Measurement Uncertainty

Conducted Emission Expanded Uncertainty	=	2.23dB, k=2
Radiated emission expanded uncertainty (9kHz-30MHz)	=	3.08dB, k=2
Radiated emission expanded uncertainty (30MHz-1000MHz)	=	4.42dB, k=2
Radiated emission expanded uncertainty (Above 1GHz)	=	4.06dB, k=2

2. MEASURING DEVICE AND TEST EQUIPMENT

Table 1: List of Test and Measurement Equipment

Kind of equipment	Manufacturer	Type	S/N	Calibrated dates	Calibrated until
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 05, 2019	1 Year
EMI Test Receiver	Rohde& Schwarz	ESR	101817	Jan. 05, 2019	1 Year
Spectrum Analyzer	Rohde&Schwarz	FSV40	101495	Jan. 05, 2019	1 Year
Pre-Amplifier	Rohde&Schwarz	CBLU1183540-01	3791	Jan. 05, 2019	1 Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 05, 2019	1 Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 05, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 05, 2019	1 Year
Horn Antenna	Schwarzbeck	BBHA9170	9170-359	Jan. 05, 2019	1 Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 05, 2019	1 Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18G-10S S	N/A	Jan. 05, 2019	1 Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2485-2 375/2510-60/11SS	N/A	Jan. 05, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-5m(Frequency range:9KHz-26.5GHz)	NO.3	Jan. 05, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-5m(Frequency range:9KHz-26.5GHz)	NO.4	Jan. 05, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-1m(Frequency range:9KHz-26.5GHz)	NO.5	Jan. 05, 2019	1 Year
RF COAXIAL CABLE	SUHNER	N-1m(Frequency range:9KHz-26.5GHz)	NO.6	Jan. 05, 2019	1 Year
Temporary antenna connector	NTGS	14AE	N/A	Jan. 21, 2019	N/A

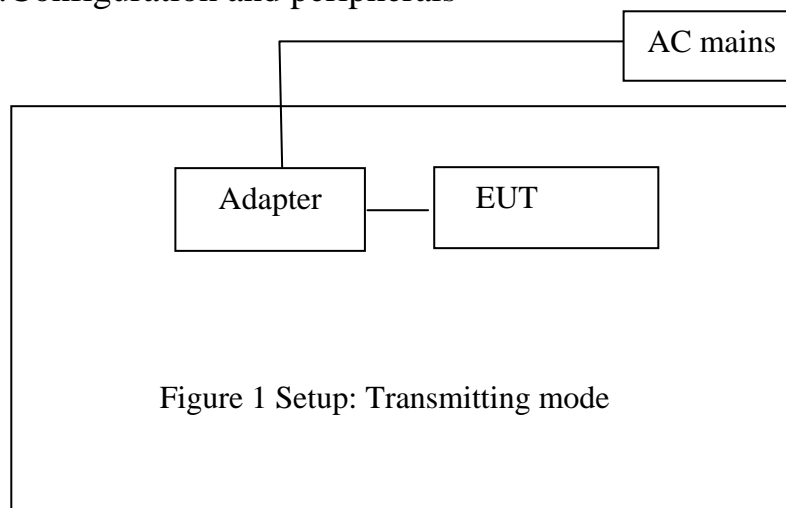
Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

3. OPERATION OF EUT DURING TESTING

3.1. Operating Mode

The mode is used: Transmitting mode
Low Channel: 2402MHz
Middle Channel: 2441MHz
High Channel: 2480MHz
Hopping

3.2. Configuration and peripherals

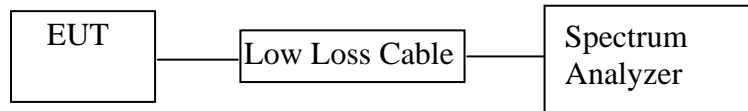


4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.247(a)(1)	20dB Bandwidth Test	Compliant
Section 15.247(a)(1)	Carrier Frequency Separation Test	Compliant
Section 15.247(a)(1)(iii)	Number Of Hopping Frequency Test	Compliant
Section 15.247(a)(1)(iii)	Dwell Time Test	Compliant
Section 15.247(b)(1)	Maximum Peak Output Power Test	Compliant
Section 15.247(d) Section 15.209	Radiated Emission Test	Compliant
Section 15.247(d)	Band Edge Compliance Test	Compliant
Section 15.207	AC Power Line Conducted Emissions Test	Compliant
Section 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



5.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

5.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

5.4. Operating Condition of EUT

5.4.1. Setup the EUT and simulator as shown as Section 5.1.

5.4.2. Turn on the power of all equipment.

5.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

5.5. Test Procedure

5.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

5.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz.

5.5.3. The 20dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20dB.

5.6. Test Result

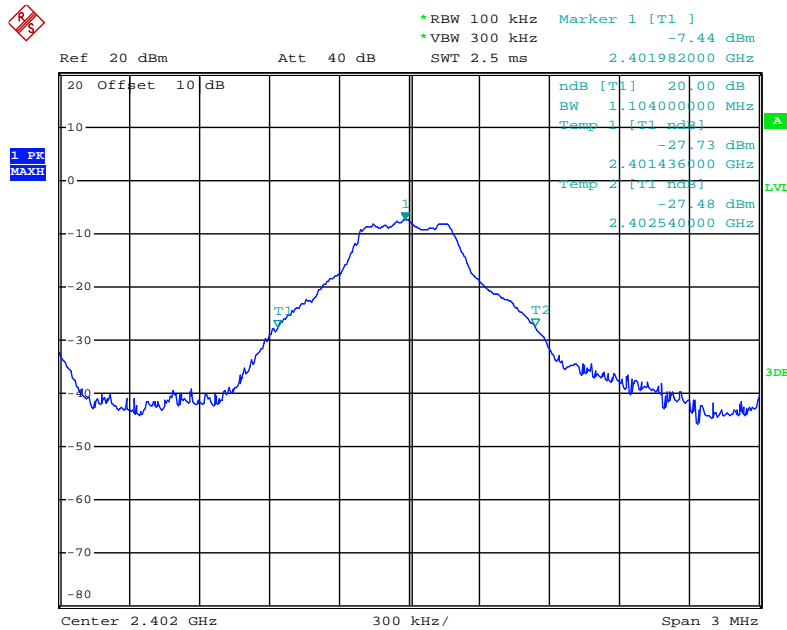
Test Lab: Shielding room

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	Π/4-DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	1.104	1.464	1.458	Pass
Middle	2441	1.110	1.458	1.434	Pass
High	2480	1.122	1.446	1.410	Pass

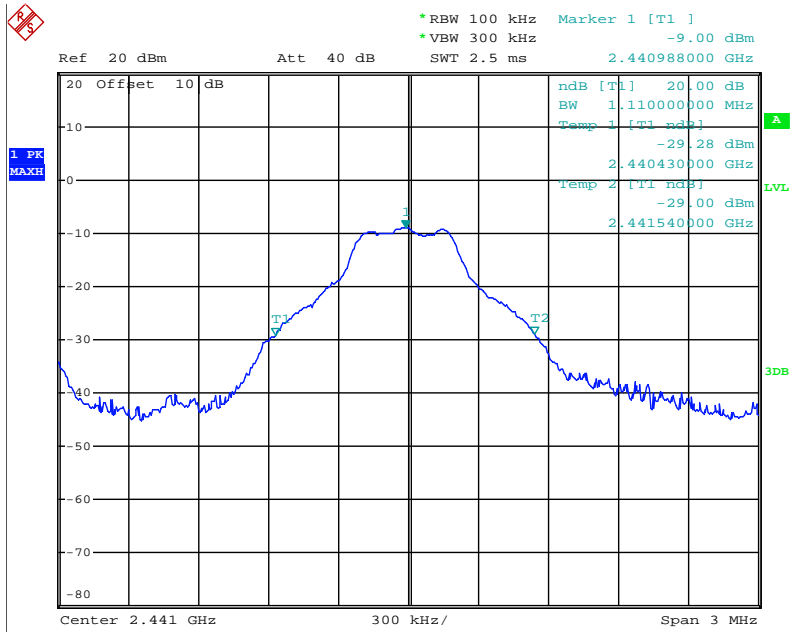
The spectrum analyzer plots are attached as below.

GFSK Mode

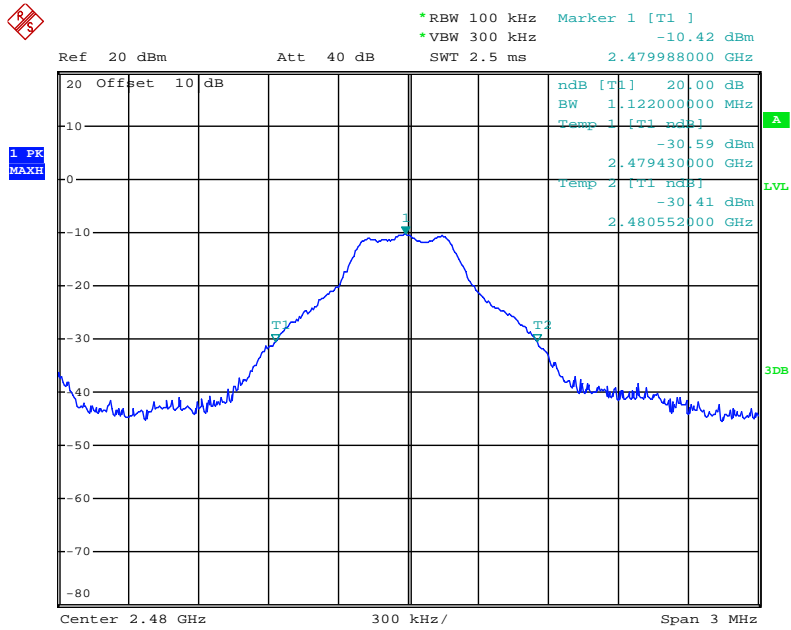
Low channel



Middle channel

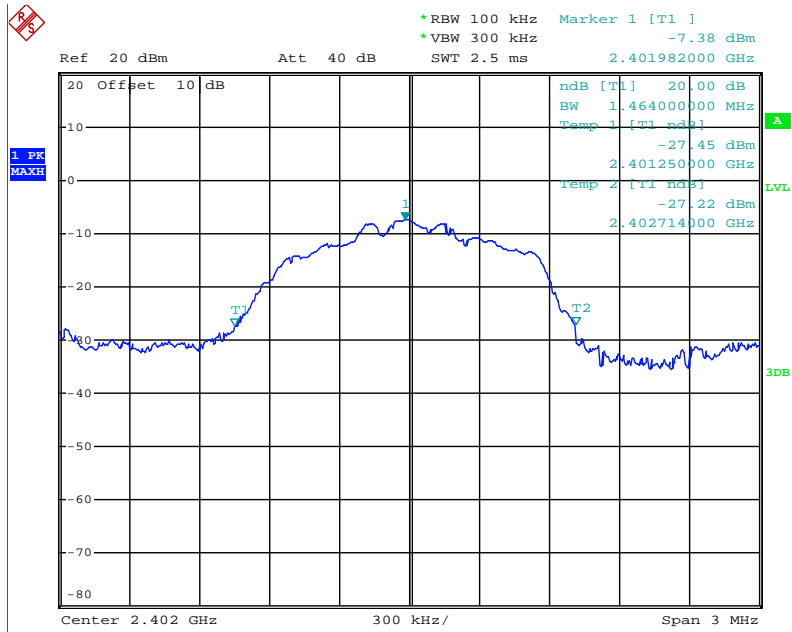


High channel

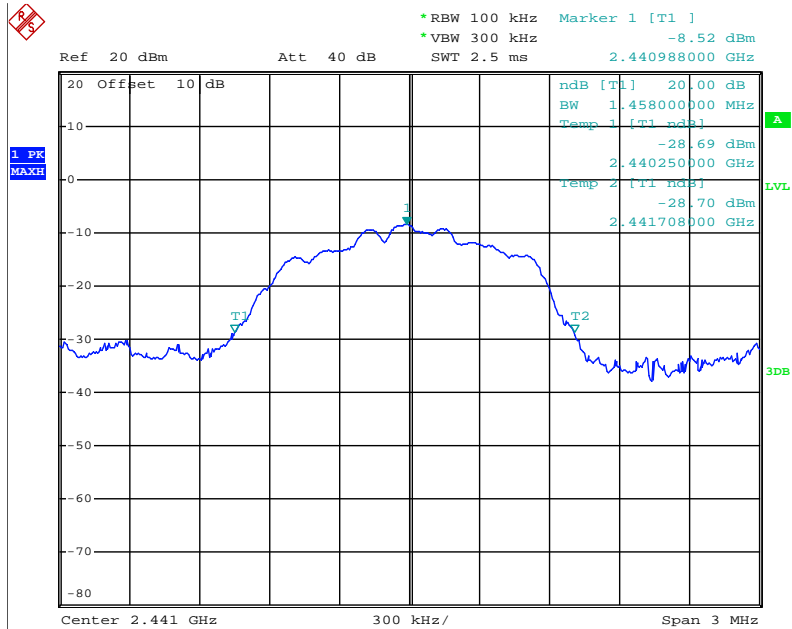


Π/4-DQPSK Mode

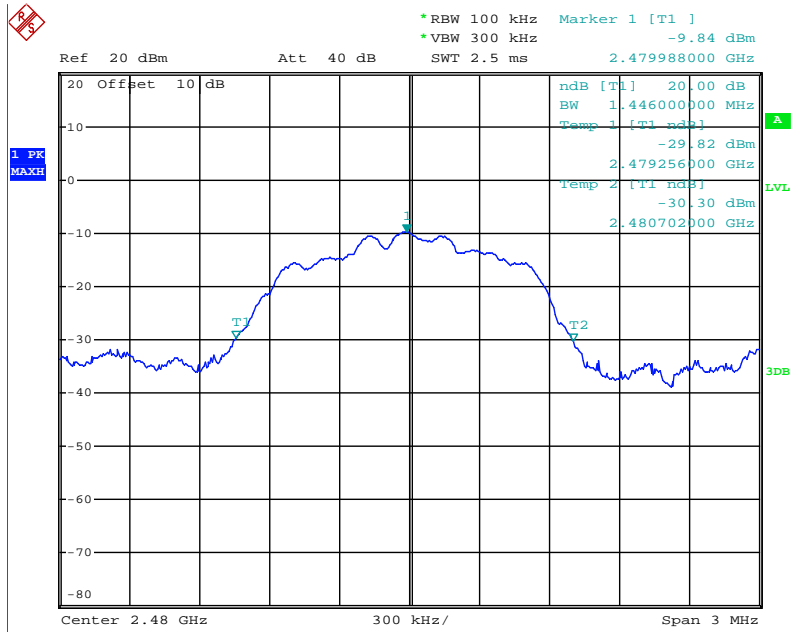
Low channel



Middle channel

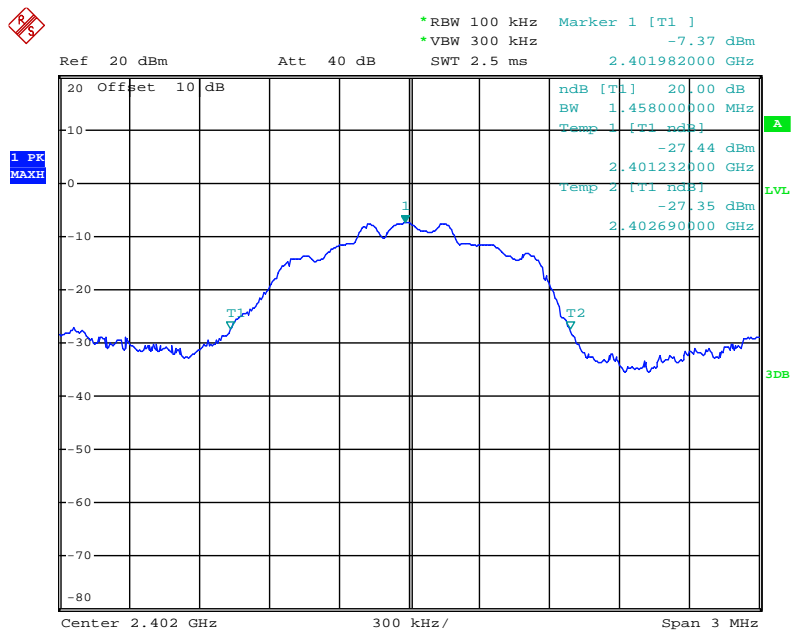


High channel

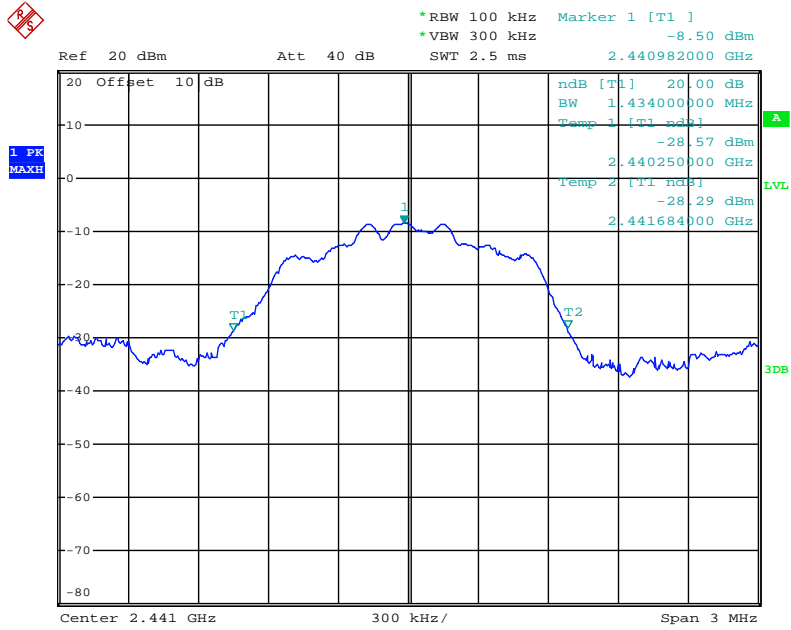


8DPSK Mode

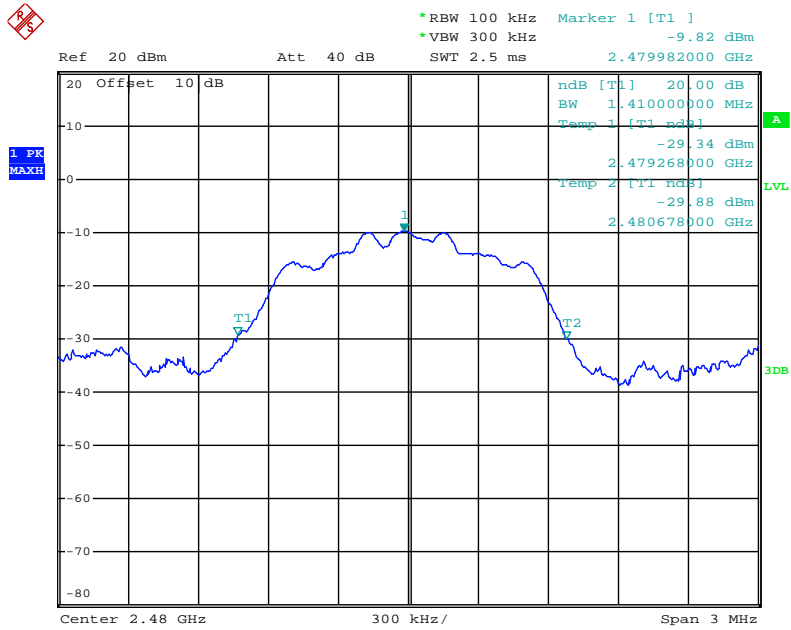
Low channel



Middle channel

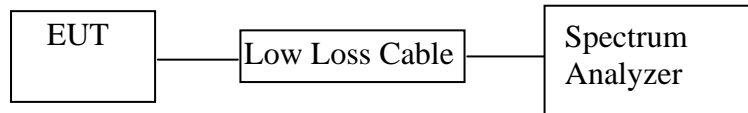


High channel



6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



6.2. The Requirement For Section 15.247(a)(1)

Section 15.247(a)(1): Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

6.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

6.4. Operating Condition of EUT

6.4.1. Setup the EUT and simulator as shown as Section 6.1.

6.4.2. Turn on the power of all equipment.

6.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

6.5. Test Procedure

6.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

6.5.2. Set RBW of spectrum analyzer to 30 kHz and VBW to 100 kHz. Adjust Span to 3 MHz.

6.5.3. Set the adjacent channel of the EUT Maxhold another trace.

6.5.4. Measurement the channel separation

6.6. Test Result

Test Lab: Shielding room

GFSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	0.996	25KHz or 2/3*20dB bandwidth	Pass
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2480			

Π/4-DQPSK

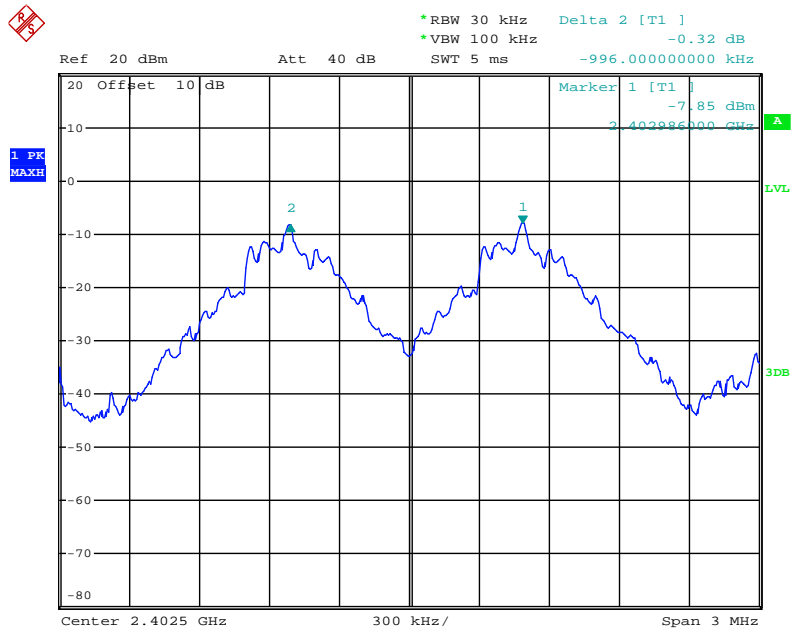
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2480			

8DPSK

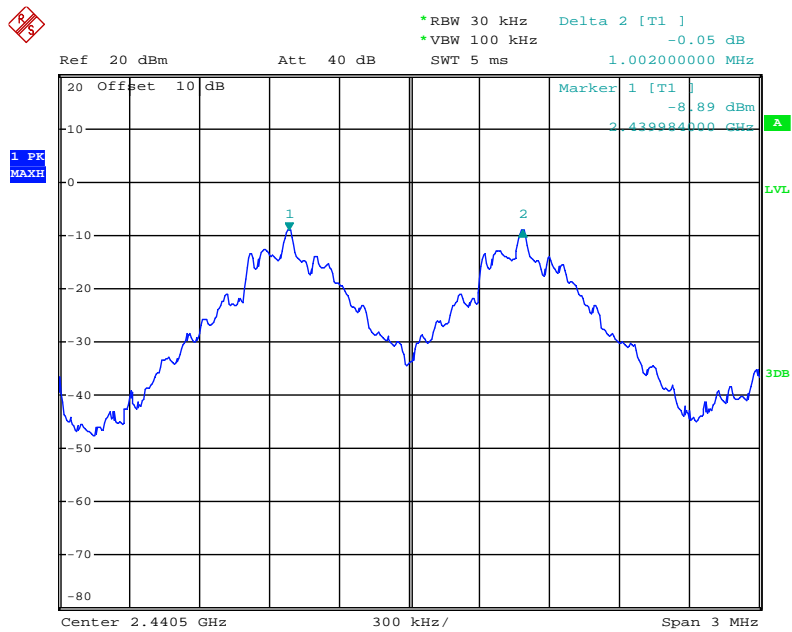
Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2403			
Middle	2440	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2441			
High	2479	1.002	25KHz or 2/3*20dB bandwidth	Pass
	2480			

GFSK Mode

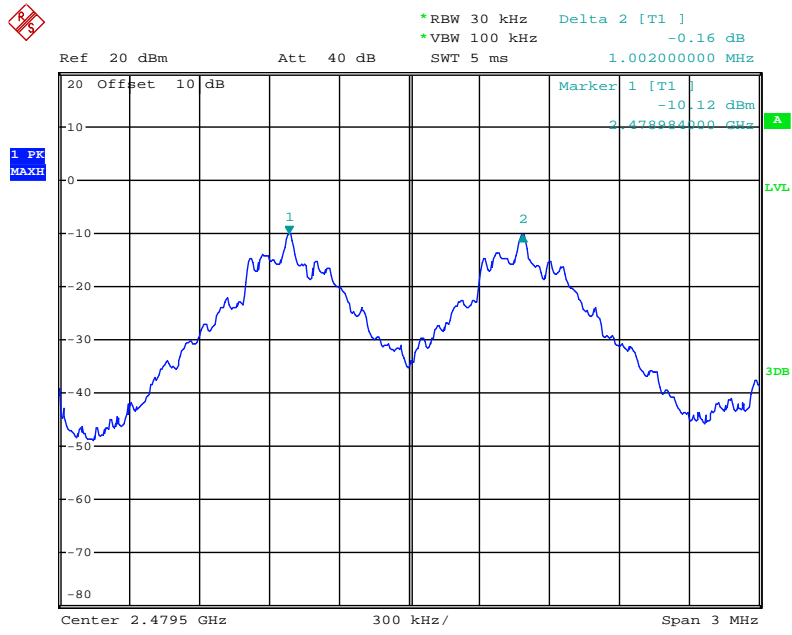
Low channel



Middle channel

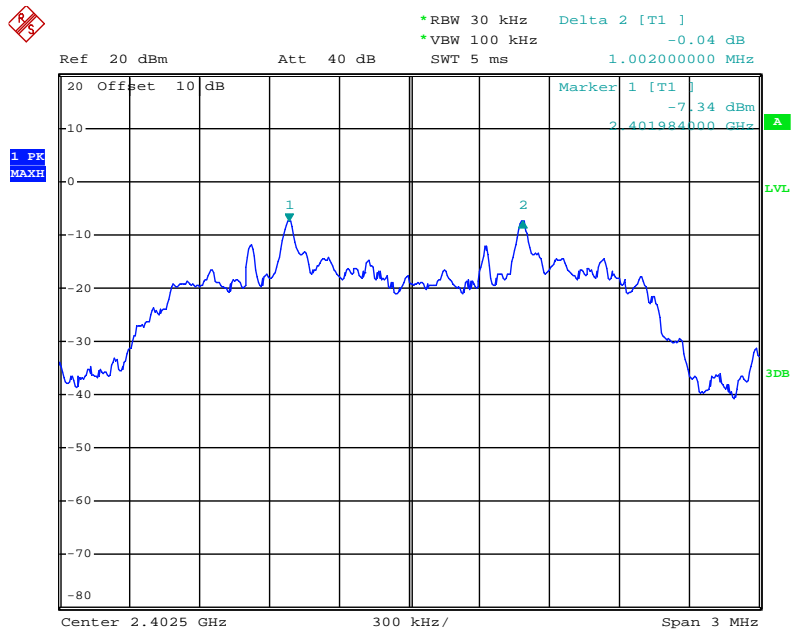


High channel

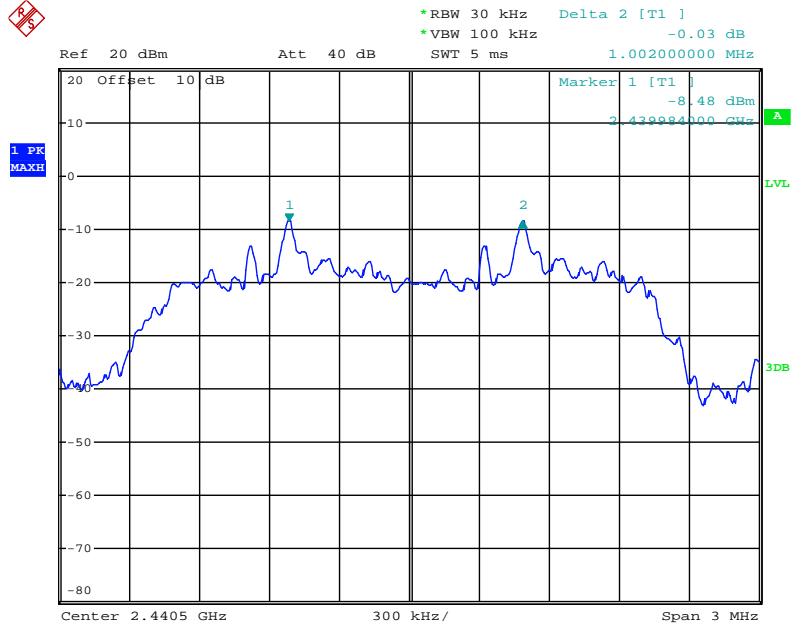


Π/4-DQPSK Mode

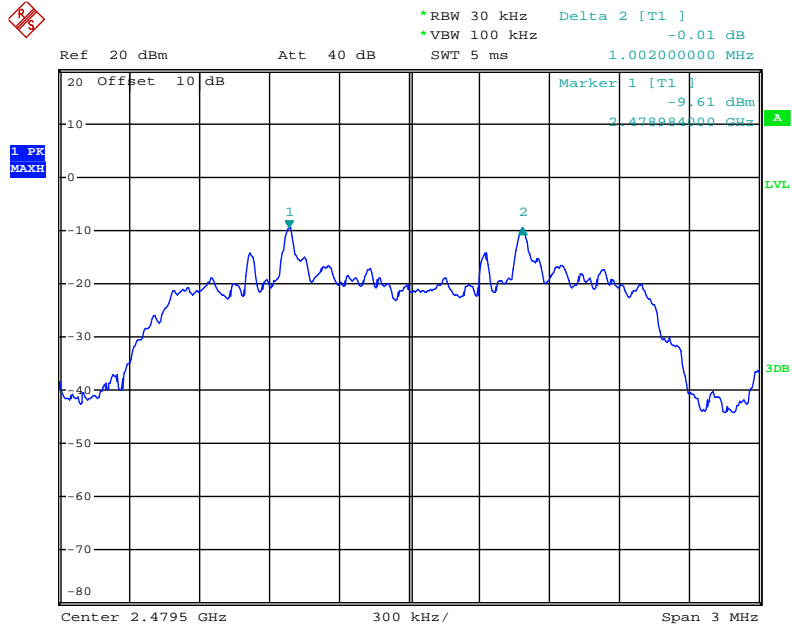
Low channel



Middle channel

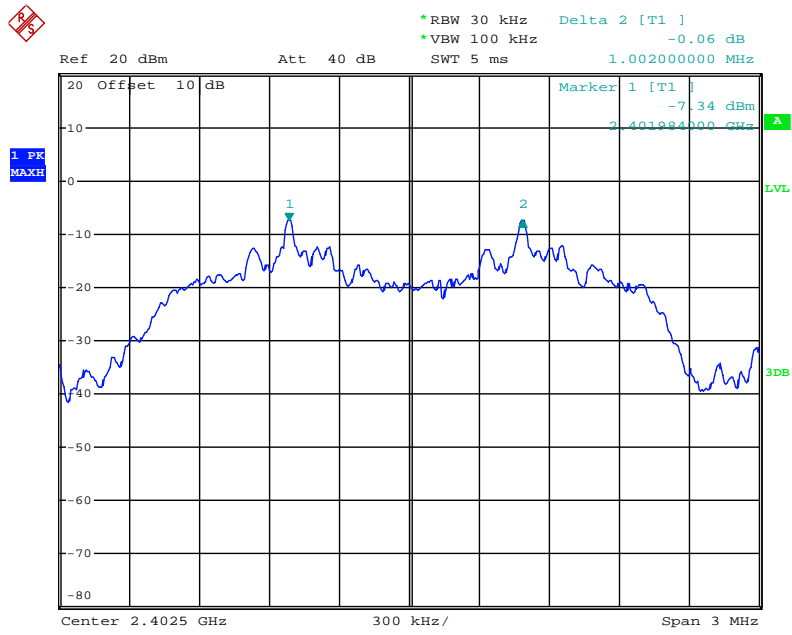


High channel

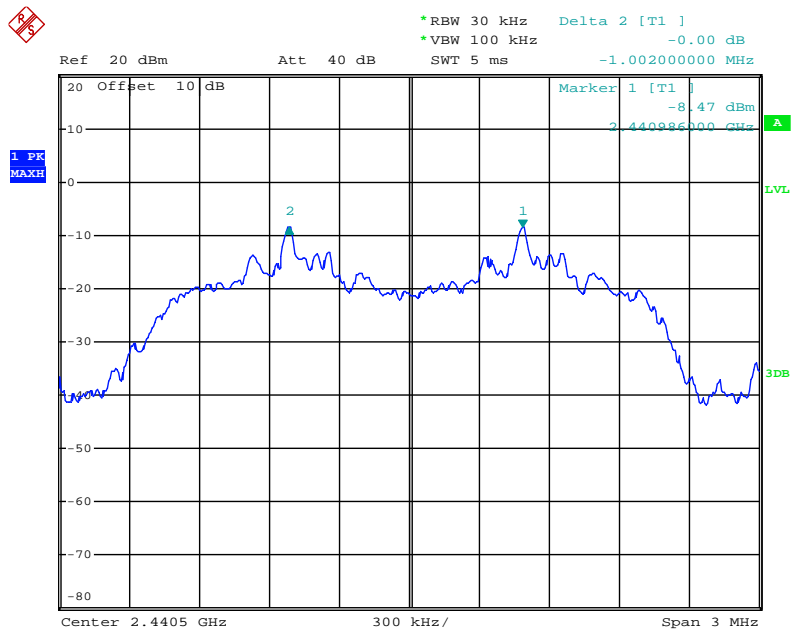


8DPSK Mode

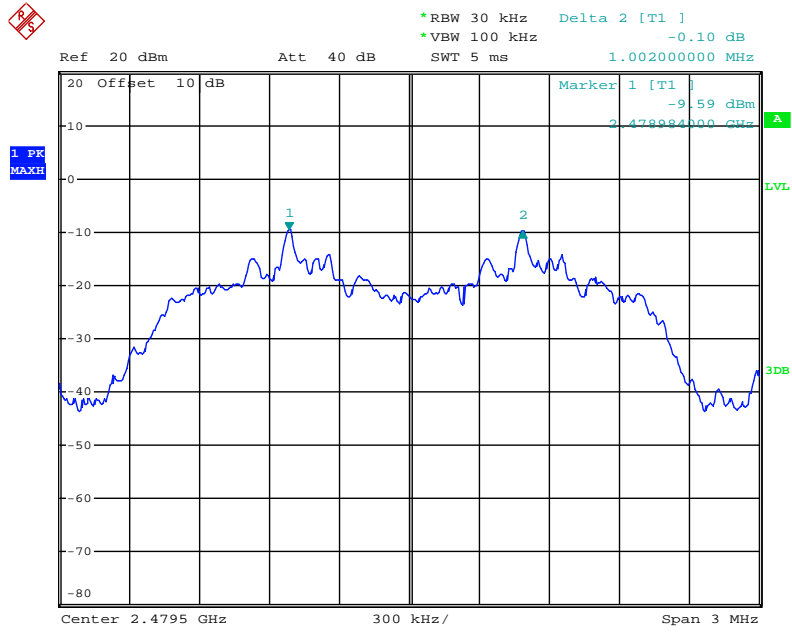
Low channel



Middle channel

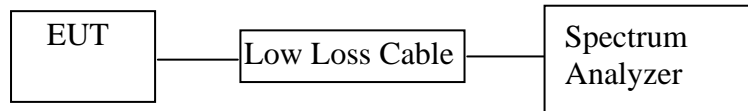


High channel



7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



7.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

7.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

7.4. Operating Condition of EUT

7.4.1. Setup the EUT and simulator as shown as Section 7.1.

7.4.2. Turn on the power of all equipment.

7.4.3. Let the EUT work in TX (Hopping on) modes measure it.

7.5. Test Procedure

7.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

7.5.2. Set the spectrum analyzer as RBW=100 kHz, VBW=300 kHz.

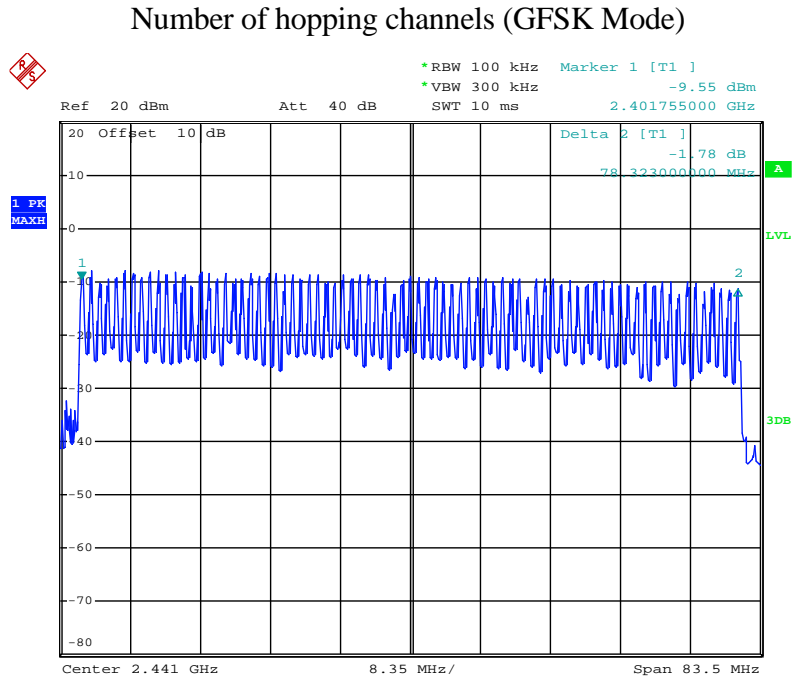
7.5.3. Max hold, view and count how many channel in the band.

7.6. Test Result

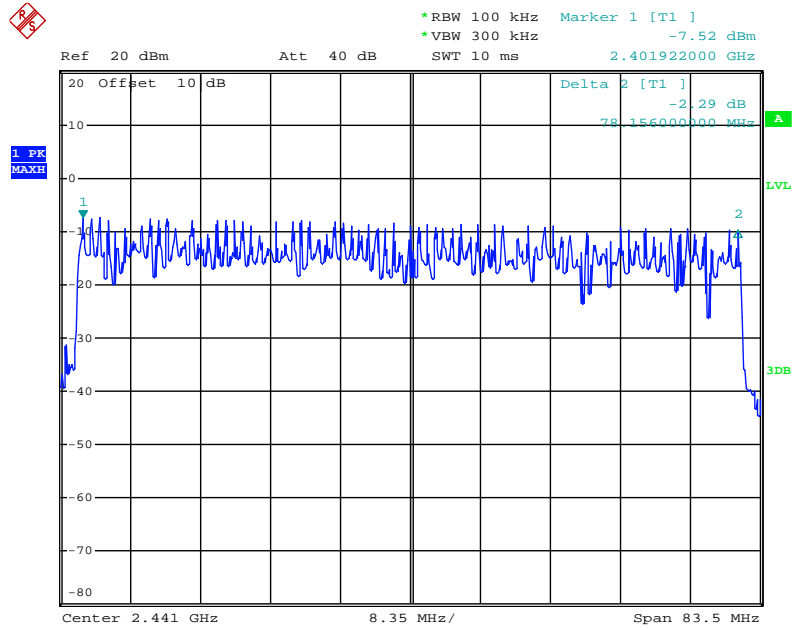
Test Lab: Shielding room

Total number of hopping channel	Measurement result(CH)	Limit(CH)	Result
	79	≥ 15	Pass

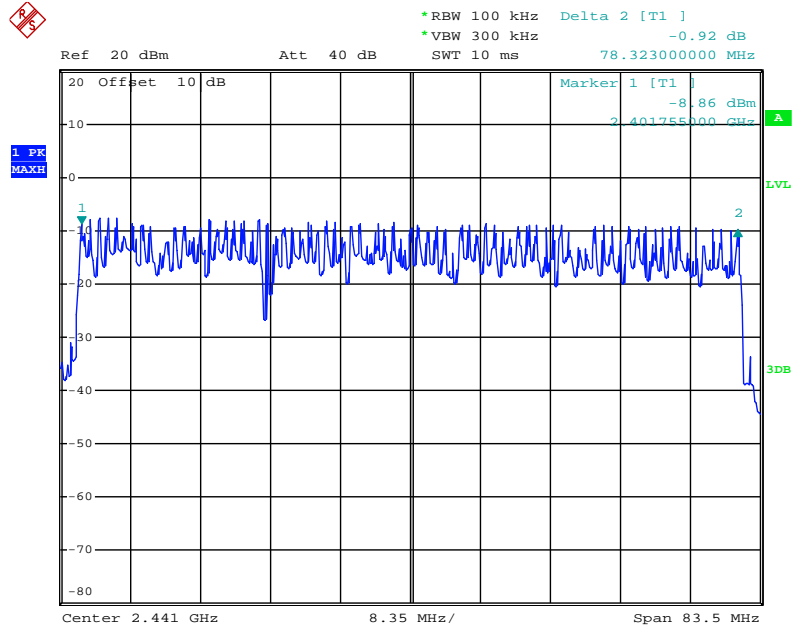
The spectrum analyzer plots are attached as below.



Number of hopping channels ($\Pi/4$ -DQPSK Mode)

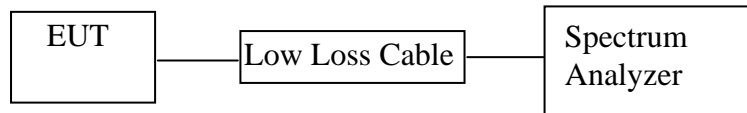


Number of hopping channels (8DPSK Mode)



8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



8.2. The Requirement For Section 15.247(a)(1)(iii)

Section 15.247(a)(1)(iii): Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. 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. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

8.3. EUT Configuration on Measurement

The equipment are installed on the emission measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

8.4. Operating Condition of EUT

8.4.1. Setup the EUT and simulator as shown as Section 8.1.

8.4.2. Turn on the power of all equipment.

8.4.3. Let the EUT work in TX (Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

8.5. Test Procedure

8.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

8.5.2. Set center frequency of spectrum analyzer = operating frequency.

8.5.3. Set the spectrum analyzer as RBW=1MHz, VBW=3MHz, Span=0Hz, Adjust Sweep=5ms, 10ms, 15ms. Get the pulse time.

8.5.4. Repeat above procedures until all frequency measured were complete.

8.6. Test Result

Test Lab: Shielding room

GFSK Mode (Worse case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.440	140.8	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
DH3	2441	1.720	275.2	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
DH5	2441	3.010	321.1	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				

$\Pi/4$ -DQPSK (Worse case)

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.450	144.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
DH3	2441	1.740	278.4	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
DH5	2441	3.020	322.1	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				

8DPSK Mode (Worse case)

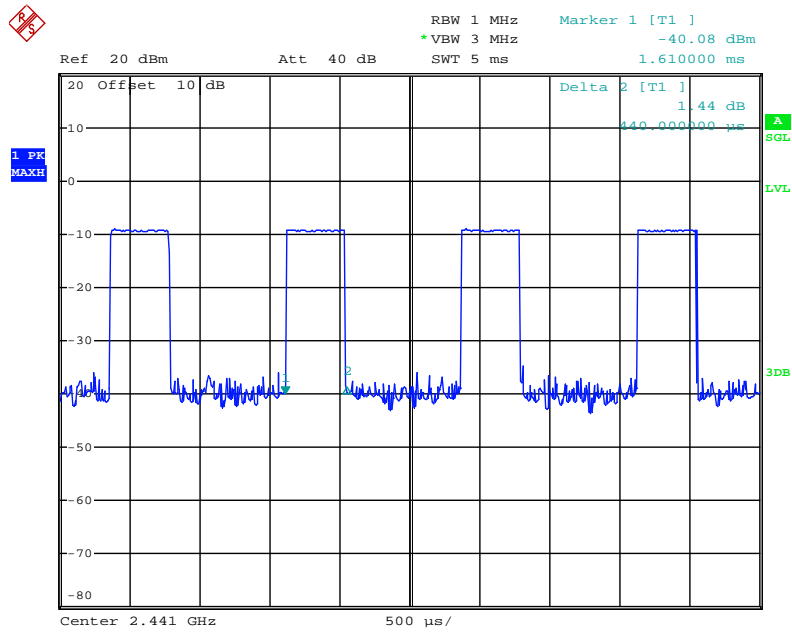
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2441	0.450	144.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
DH3	2441	1.750	280.0	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
DH5	2441	2.970	316.8	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				

Note: We tested GFSK mode and $\Pi/4$ -DQPSK & 8DPSK mode the low, middle and high channel and recorded the Worse case data for all test mode.

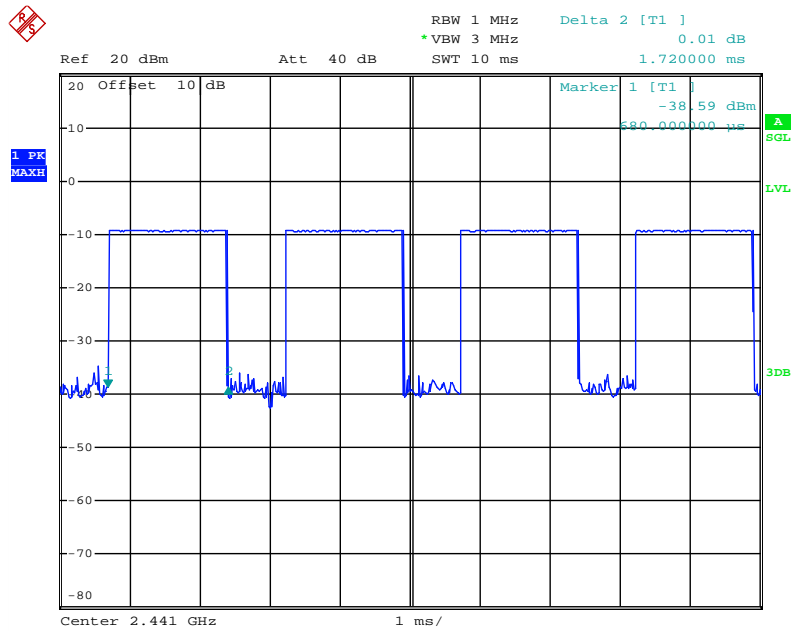
The spectrum analyzer plots are attached as below.

GFSK Mode

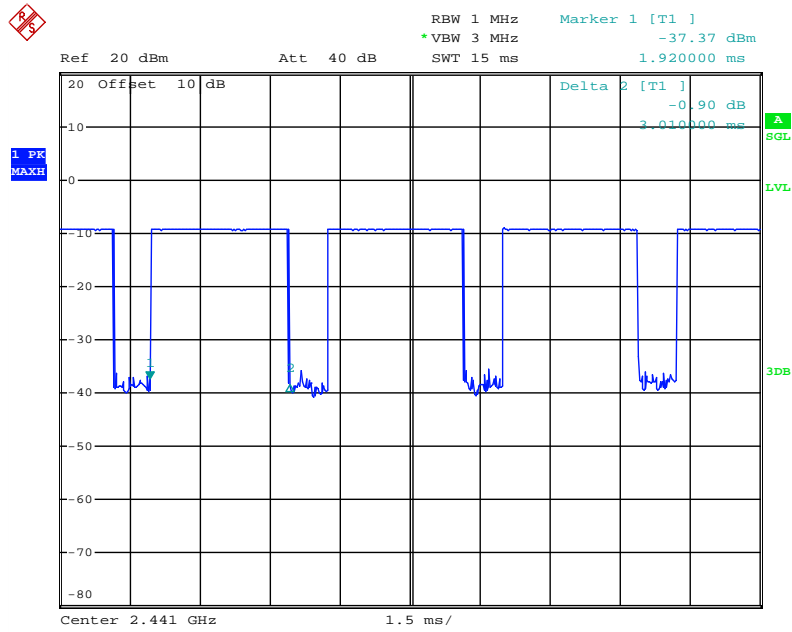
DH1 Middle channel



DH3 Middle channel

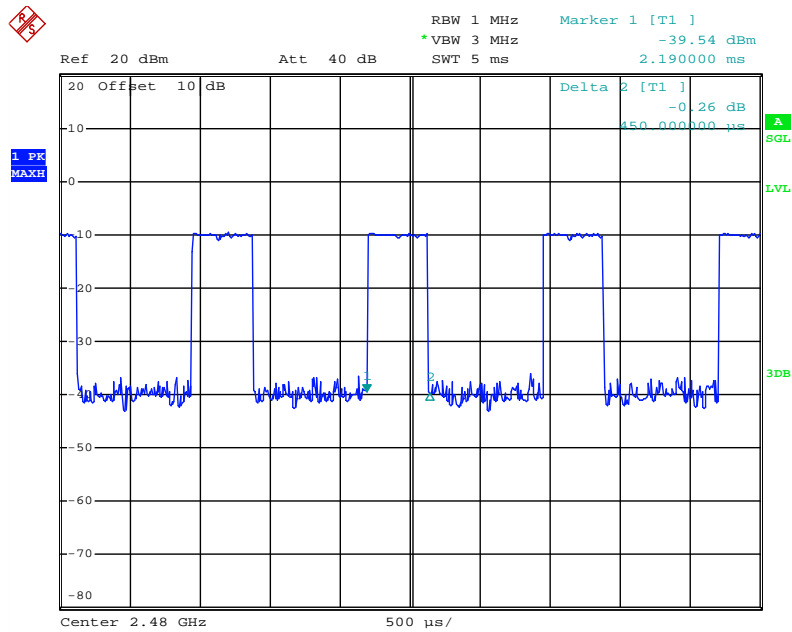


DH5 Middle channel

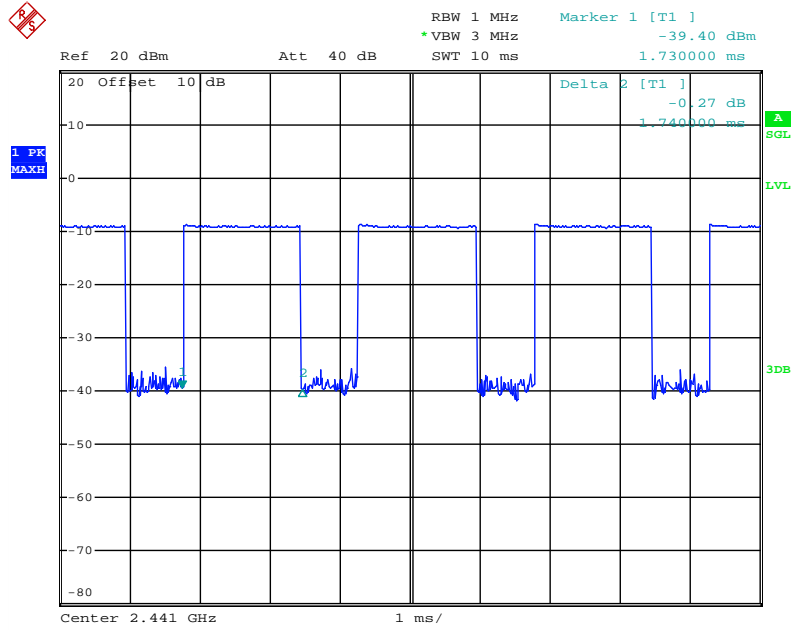


Π/4-DQPSK Mode

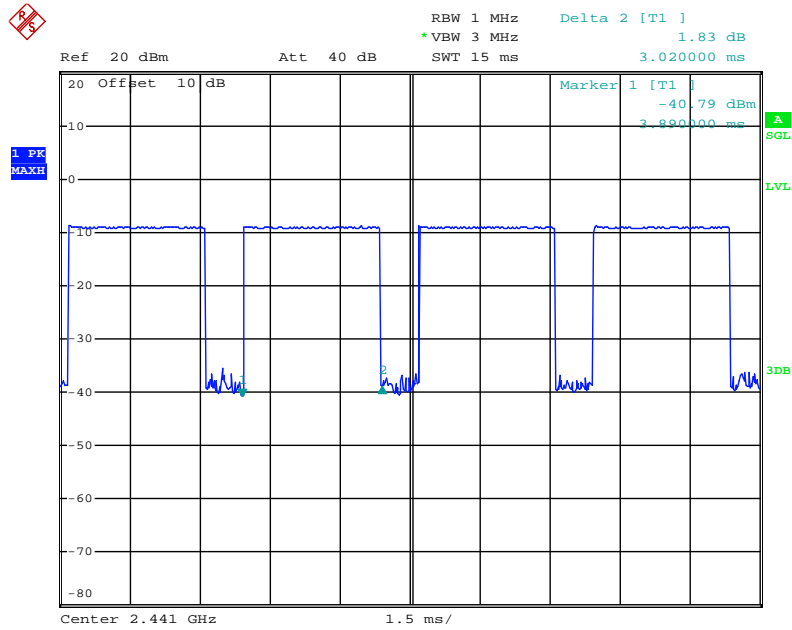
2DH1 Middle channel



2DH3 Middle channel

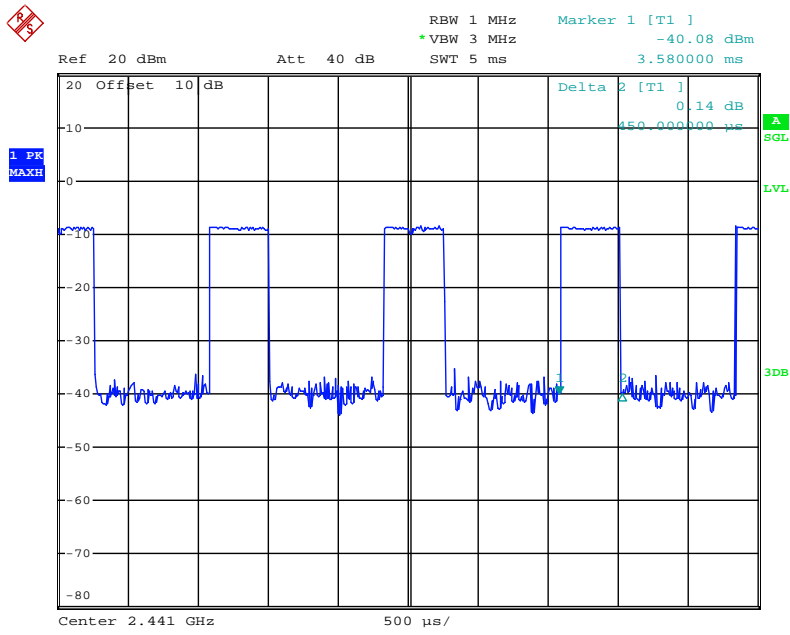


2DH5 Middle channel

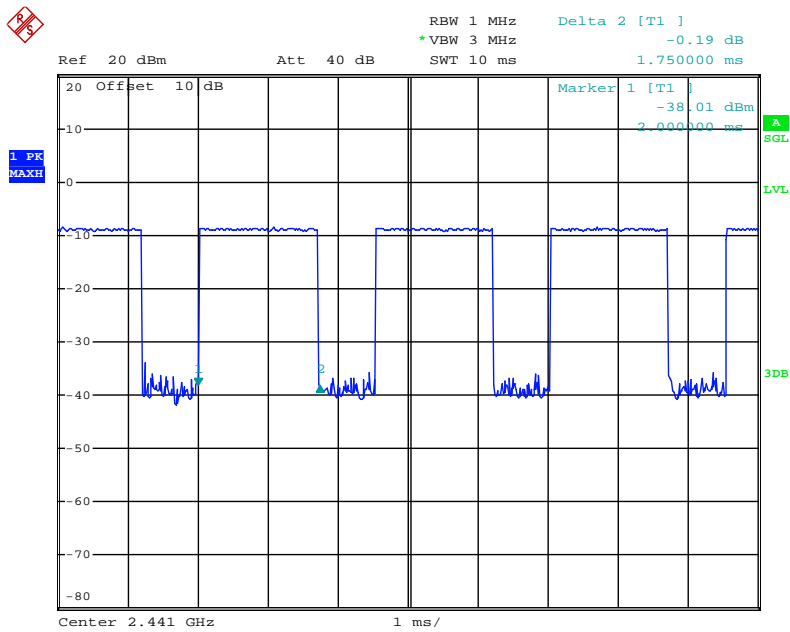


8DPSK Mode

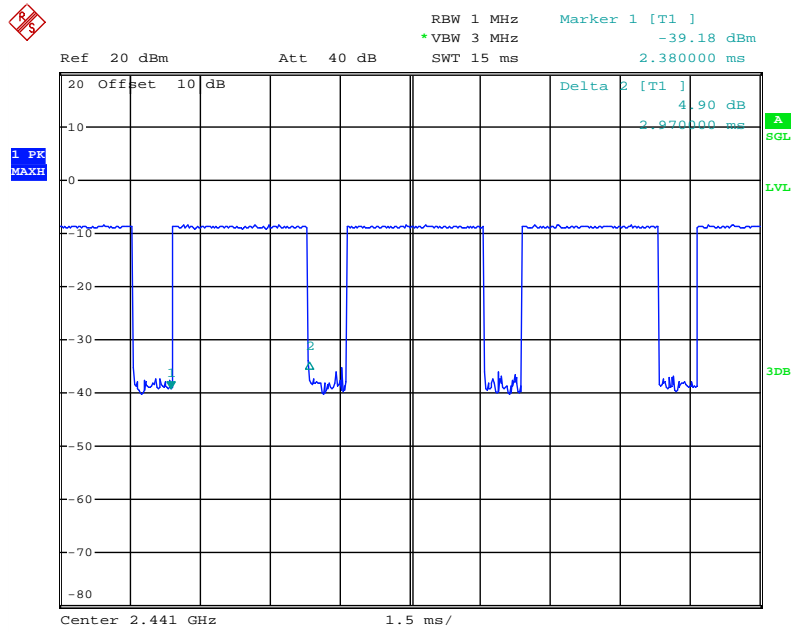
3DH1 Middle channel



3DH3 Middle channel

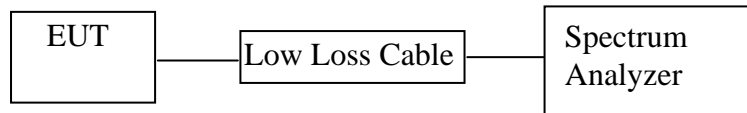


3DH5 Middle channel



9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



9.2. The Requirement For Section 15.247(b)(1)

Section 15.247(b)(1): For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

9.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

9.4. Operating Condition of EUT

9.4.1. Setup the EUT and simulator as shown as Section 9.1.

9.4.2. Turn on the power of all equipment.

9.4.3. Let the EUT work in TX (Hopping off) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

9.5. Test Procedure

9.5.1. The transmitter output was connected to the spectrum analyzer through a low loss cable.

9.5.2. Set RBW of spectrum analyzer to 3MHz and VBW to 10MHz.

9.5.3. Measurement the maximum peak output power.

9.6. Test Result

Test Lab: Shielding room

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-5.79/0.0003	21 / 0.125
Middle	2441	-6.86/0.0002	21 / 0.125
High	2480	-7.93/0.0002	21 / 0.125

Π/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-5.31/0.0003	21 / 0.125
Middle	2441	-6.43/0.0002	21 / 0.125
High	2480	-7.14/0.0002	21 / 0.125

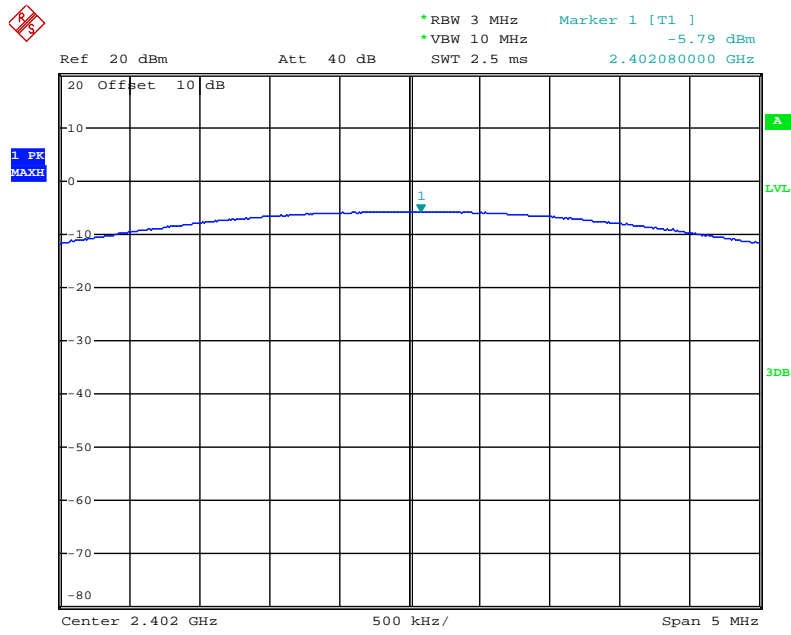
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power (dBm/W)	Limits dBm / W
Low	2402	-5.06/0.0003	21 / 0.125
Middle	2441	-6.53/0.0002	21 / 0.125
High	2480	-7.41/0.0002	21 / 0.125

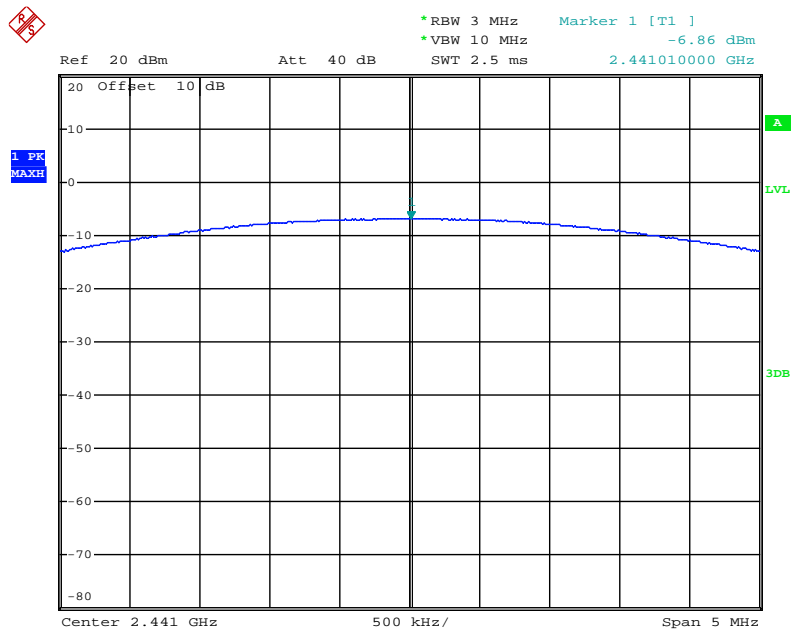
The spectrum analyzer plots are attached as below.

GFSK Mode

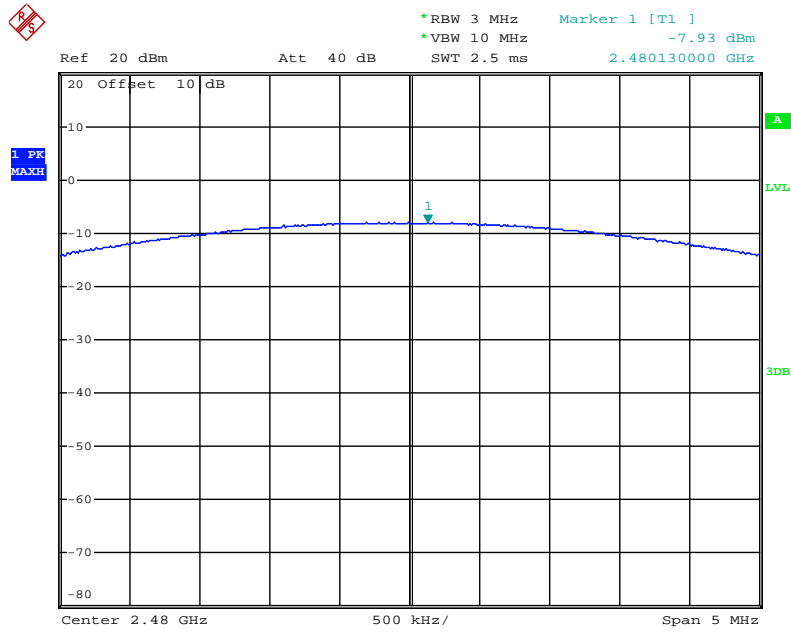
Low channel



Middle channel

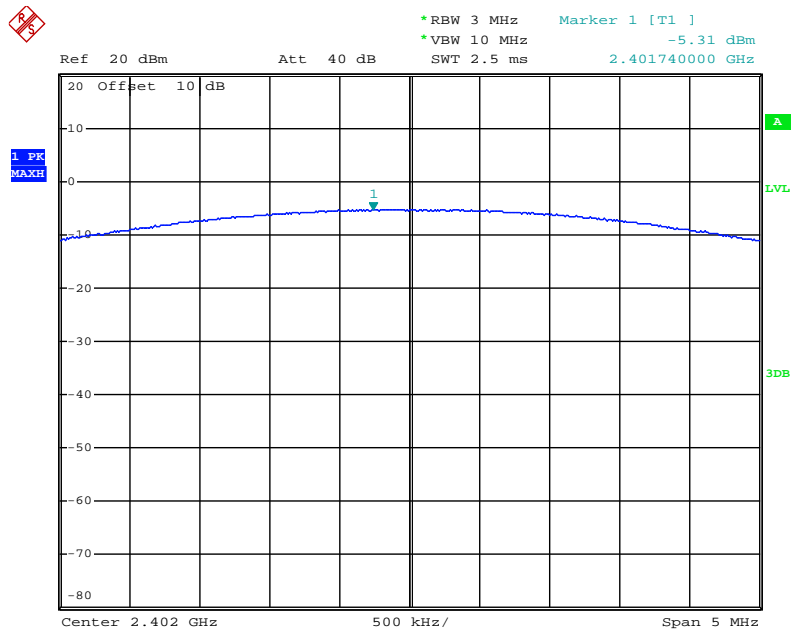


High channel

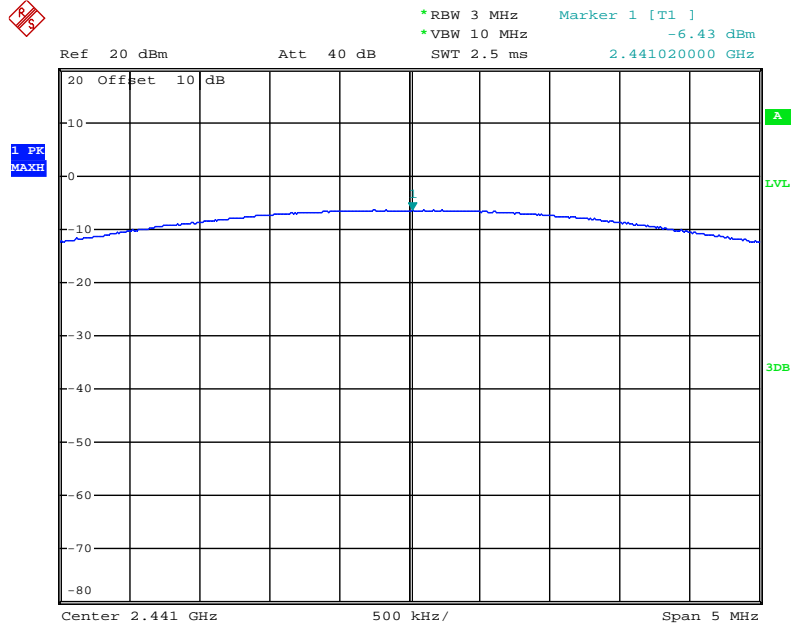


Π/4-DQPSK Mode

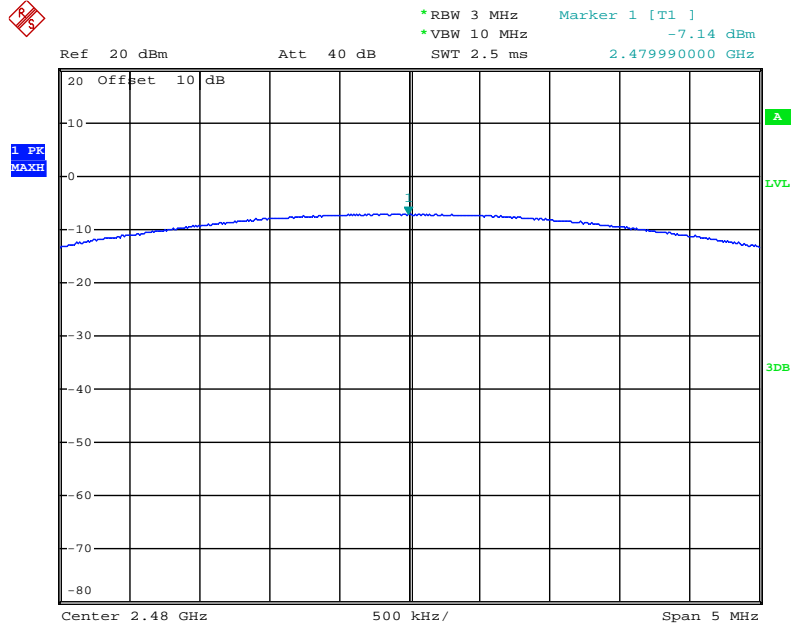
Low channel



Middle channel

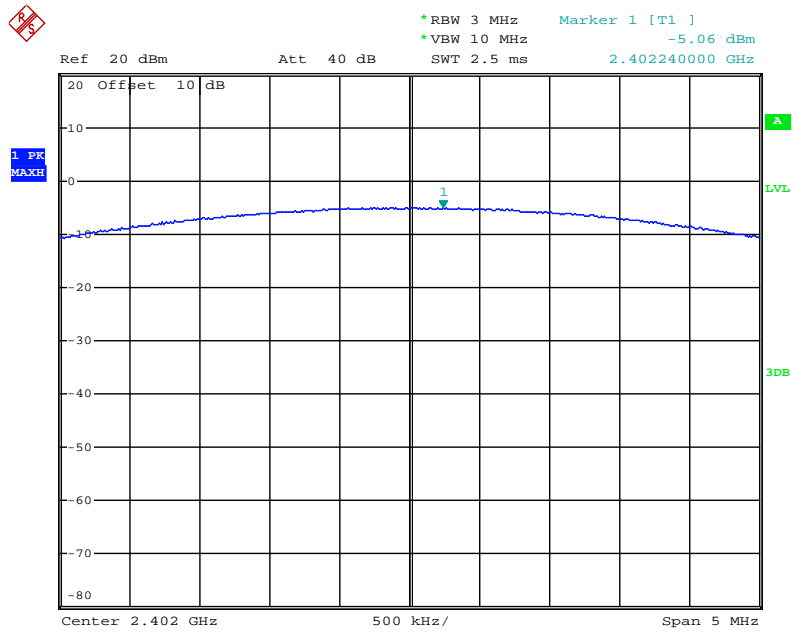


High channel

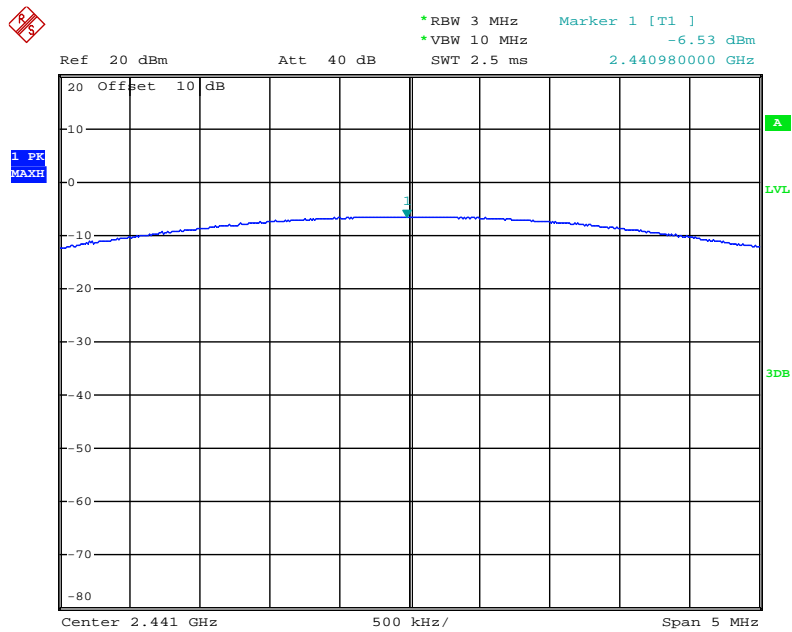


8DPSK Mode

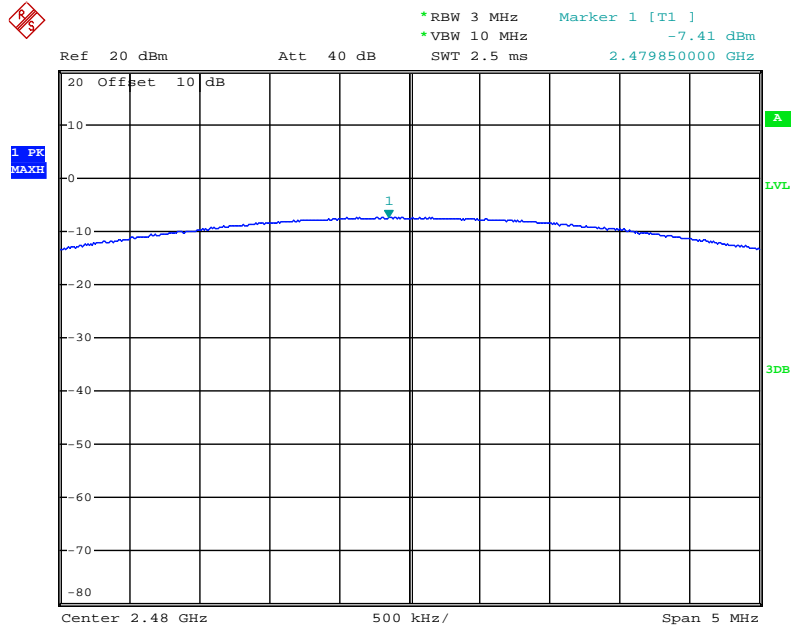
Low channel



Middle channel



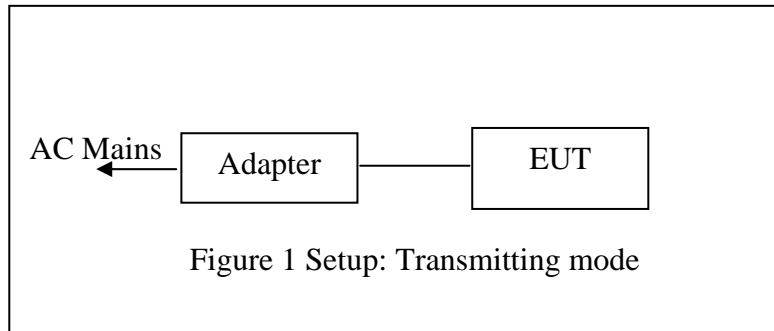
High channel



10. RADIATED EMISSION TEST

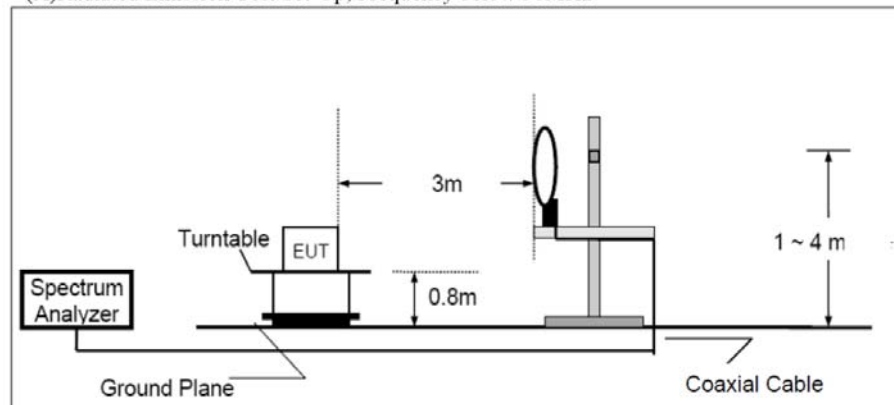
10.1. Block Diagram of Test Setup

10.1.1. Block diagram of connection between the EUT and peripherals

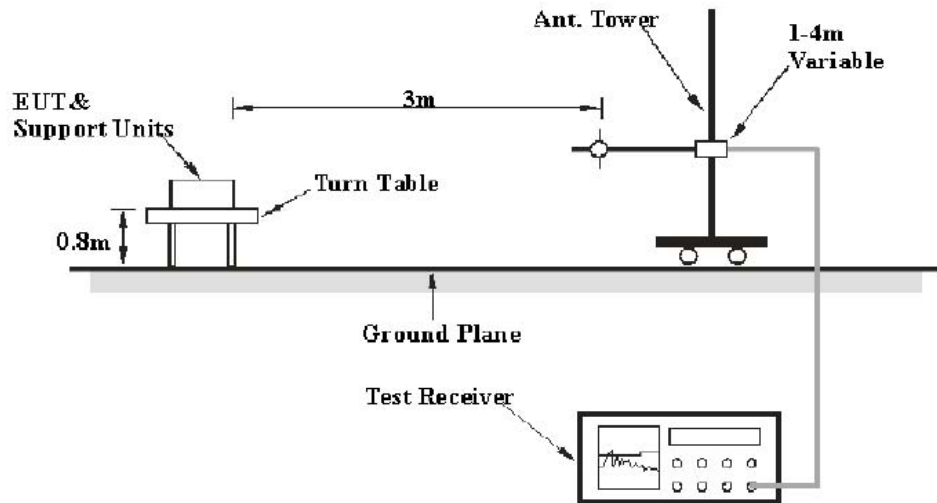


10.1.2. Semi-Anechoic Chamber Test Setup Diagram

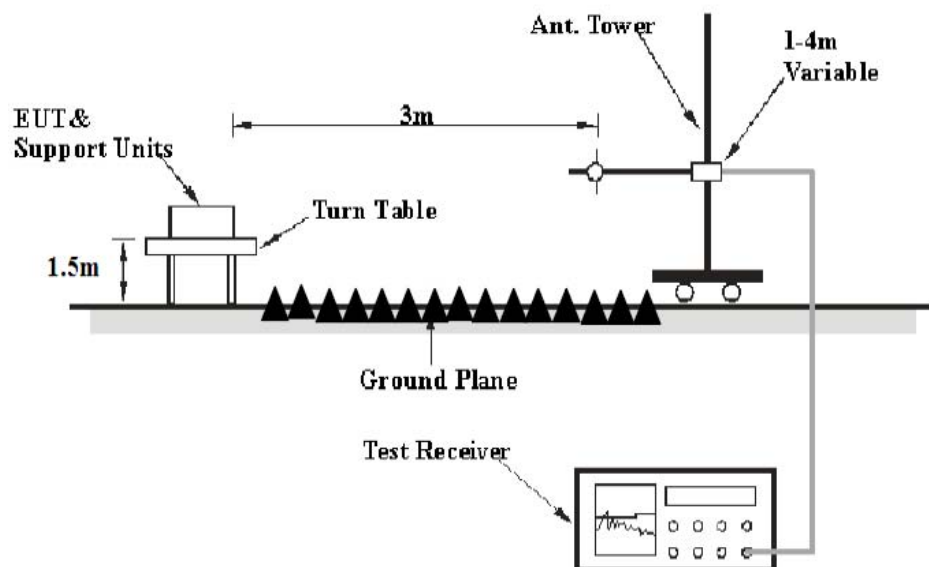
(A) Radiated Emission Test Set-Up, Frequency below 30MHz



(B) Radiated Emission Test Set-Up, Frequency 30MHz-1GHz



(C) Radiated Emission Test Set-Up, Frequency above 1GHz



10.2. The Limit For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the

general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

10.3.Restricted bands of operation

10.3.1.FCC Part 15.205 Restricted bands of operation

(a) Except as shown in paragraph (d) of this section, Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹Until February 1, 1999, this restricted band shall be 0.490-0.510

²Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emission appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000MHz, Compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

10.4.Configuration of EUT on Measurement

The equipment is installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

10.5. Operating Condition of EUT

10.5.1. Setup the EUT and simulator as shown as Section 10.1.

10.5.2. Turn on the power of all equipment.

10.5.3. Let the EUT work in TX modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2441MHz, and 2480MHz TX frequency to transmit.

10.6. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground (Below 1GHz). The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground (Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. This EUT was tested in 3 orthogonal positions and the Worst case position data was reported.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

10.7.Data Sample

Frequency (MHz)	Reading (dB μ v)	Factor (dB/m)	Result (dB μ v/m)	Limit (dB μ v/m)	Margin (dB)	Remark
X.XX	28.66	-15.19	13.47	40.0	-26.53	QP

Frequency(MHz) = Emission frequency in MHz

Reading(dB μ v) = Uncorrected Analyzer/Receiver reading

Factor (dB/m) = Antenna factor + Cable Loss – Amplifier gain

Result(dB μ v/m) = Reading(dB μ v) + Factor(dB/m)

Limit (dB μ v/m) = Limit stated in standard

Margin (dB) = Result(dB μ v/m) - Limit (dB μ v/m)

QP = Quasi-peak Reading

Calculation Formula:

Margin(dB) = Result (dB μ V/m)–Limit(dB μ V/m)

Result(dB μ V/m)= Reading(dB μ V)+ Factor(dB/m)

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the limit.

10.8.Tetst Results

Pass.

Test Lab: 3m Anechoic chamber

Note: 1.We tested GFSK mode, $\Pi/4$ -DQPSK Mode & 8DPSK mode and recorded the Worse case data (GFSK mode) for all test mode.

2. Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

The measurements greater than 20dB below the limit from 9kHz to 30MHz and 18 to 26.5GHz.

The spectrum analyzer plots are attached as below.

Below 1GHz



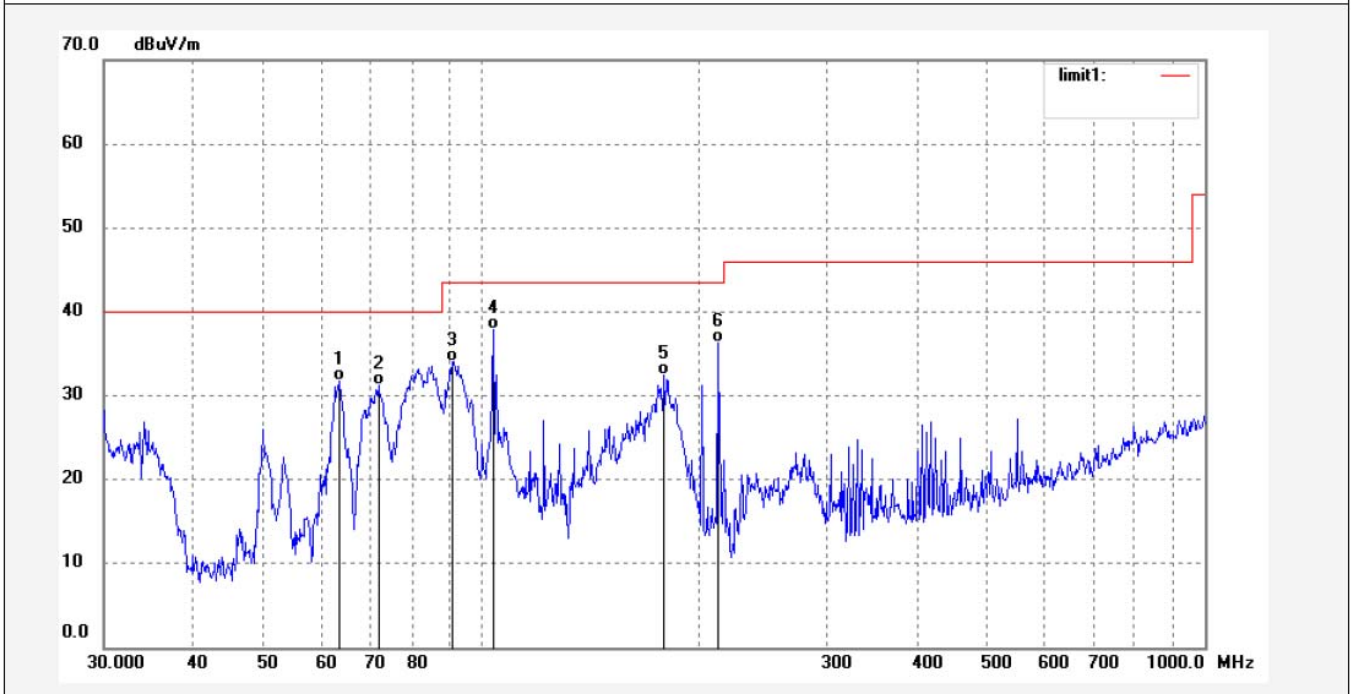
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019 #879	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 2019/04/23
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 14:35:05
EUT: MOMENTO	Engineer Signature:
Mode: TX2402MHz	Distance: 3m
Model: CR8018A-DD	
Manufacturer: TIMSEN DEVELOPMENT LIMITED	

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	63.6311	59.05	-27.27	31.78	40.00	-8.22	QP	100	101	
2	71.9578	58.75	-27.57	31.18	40.00	-8.82	QP	100	51	
3	91.0574	61.50	-27.41	34.09	43.50	-9.41	QP	100	33	
4	103.6989	66.03	-28.11	37.92	43.50	-5.58	QP	100	102	
5	178.7697	58.56	-26.15	32.41	43.50	-11.09	QP	100	119	
6	212.3559	60.38	-24.09	36.29	43.50	-7.21	QP	100	50	



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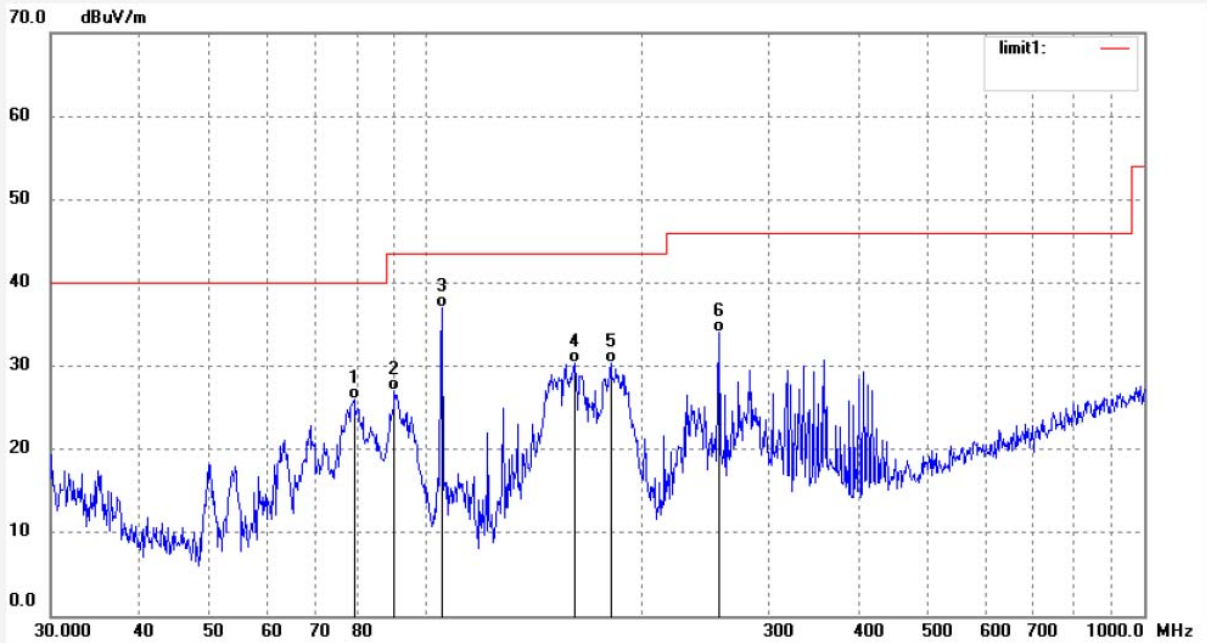
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019 #880
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: MOMENTO
Mode: TX2402MHz
Model: CR8018A-DD
Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 2019/04/23
Time: 14:38:57
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	79.3970	53.44	-27.43	26.01	40.00	-13.99	QP	200	103	
2	90.4196	54.44	-27.42	27.02	43.50	-16.48	QP	200	92	
3	105.1667	65.14	-28.12	37.02	43.50	-6.48	QP	200	116	
4	160.8851	57.31	-26.98	30.33	43.50	-13.17	QP	200	210	
5	180.6640	56.41	-25.97	30.44	43.50	-13.06	QP	200	331	
6	255.8225	57.36	-23.30	34.06	46.00	-11.94	QP	200	201	



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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019 #881

Polarization: Horizontal

Standard: FCC Class B 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 2019/04/23

Temp.(C)/Hum.(%) 25 C / 55 %

Time: 14:41:28

EUT: MOMENTO

Engineer Signature:

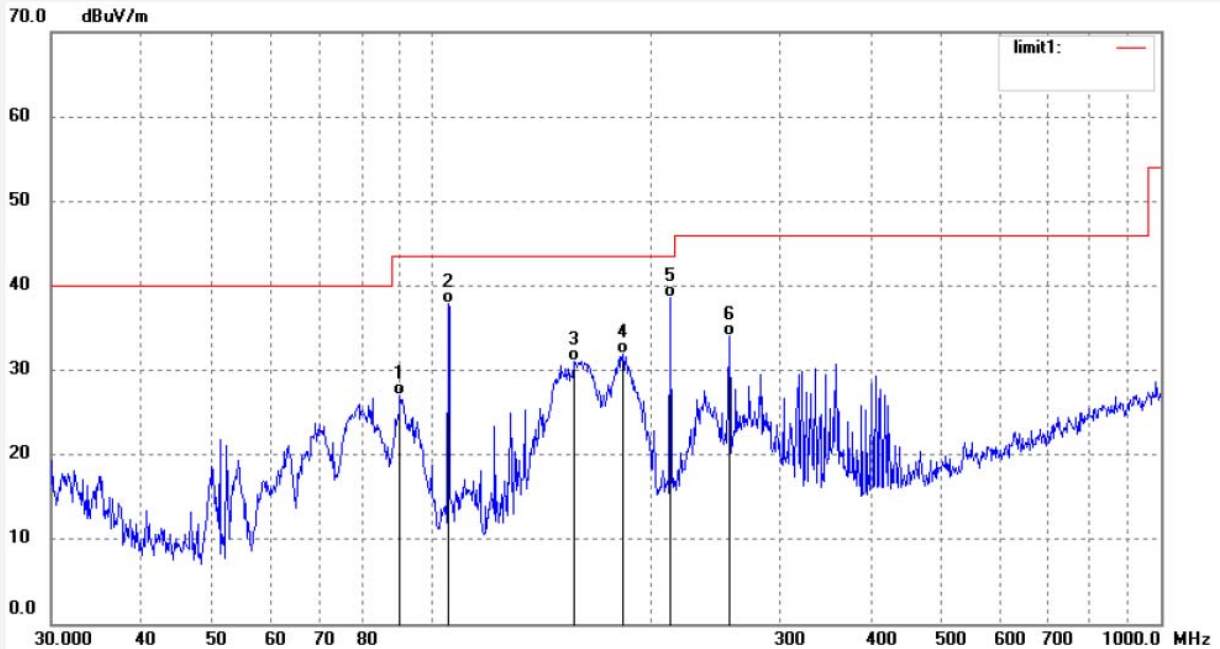
Mode: TX2441MHz

Distance: 3m

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	90.4196	54.44	-27.42	27.02	43.50	-16.48	QP	200	135	
2	105.1667	65.97	-28.12	37.85	43.50	-5.65	QP	200	110	
3	156.4259	58.61	-27.46	31.15	43.50	-12.35	QP	200	94	
4	182.5784	57.79	-25.78	32.01	43.50	-11.49	QP	200	215	
5	212.3559	62.67	-24.09	38.58	43.50	-4.92	QP	200	226	
6	255.8225	57.36	-23.30	34.06	46.00	-11.94	QP	200	103	



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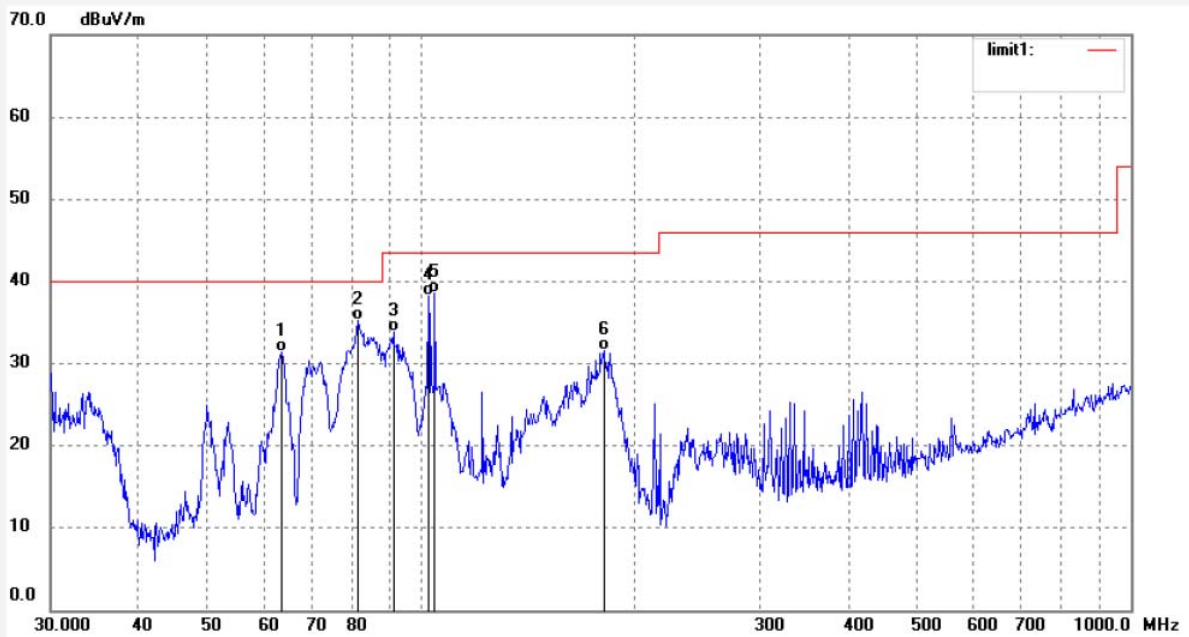
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: FRANK2019 #882
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: MOMENTO
Mode: TX2441MHz
Model: CR8018A-DD
Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 2019/04/23
Time: 14:44:25
Engineer Signature:
Distance: 3m

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	63.6311	58.66	-27.27	31.39	40.00	-8.61	QP	100	132	
2	81.3739	62.64	-27.41	35.23	40.00	-4.77	QP	100	201	
3	91.3777	61.21	-27.42	33.79	43.50	-9.71	QP	100	241	
4	102.2518	66.24	-28.08	38.16	43.50	-5.34	QP	100	113	
5	104.4303	66.79	-28.14	38.65	43.50	-4.85	QP	100	210	
6	180.6640	57.53	-25.97	31.56	43.50	-11.94	QP	100	33	



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Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019 #883

Polarization: Vertical

Standard: FCC Class B 3M Radiated

Power Source: AC 120V/60Hz

Test item: Radiation Test

Date: 2019/04/23

Temp.(C)/Hum.(%) 25 C / 55 %

Time: 14:47:56

EUT: MOMENTO

Engineer Signature:

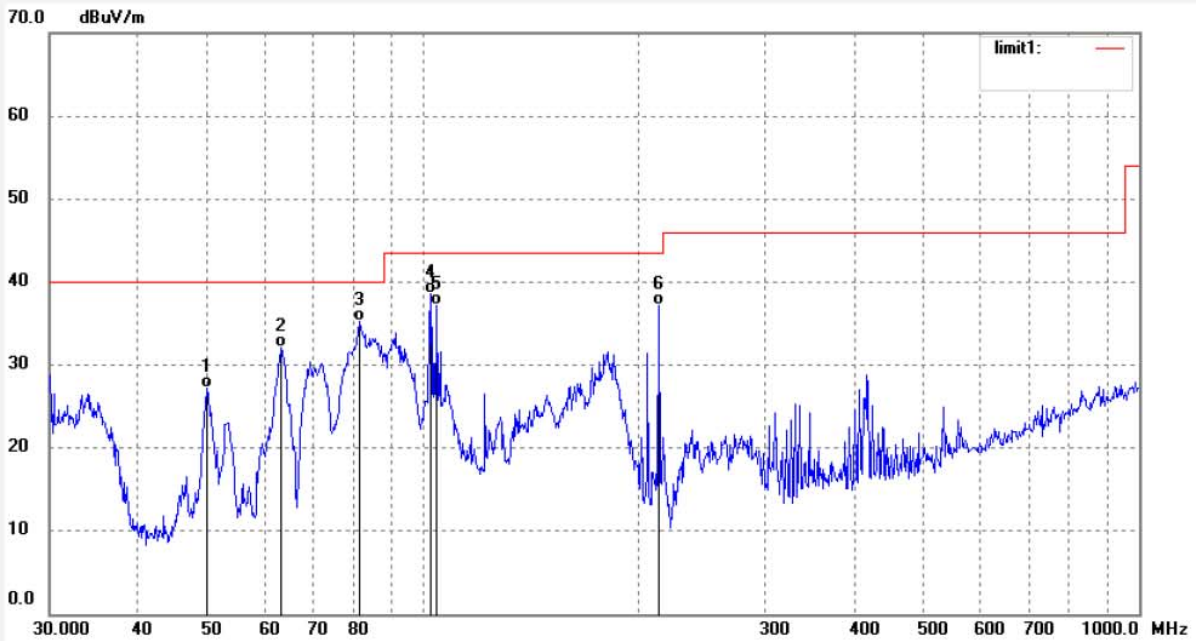
Mode: TX2480MHz

Distance: 3m

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	49.9322	53.38	-26.17	27.21	40.00	-12.79	QP	100	193	
2	63.1856	59.34	-27.27	32.07	40.00	-7.93	QP	100	136	
3	81.3739	62.64	-27.41	35.23	40.00	-4.77	QP	100	95	
4	102.2518	66.74	-28.08	38.66	43.50	-4.84	QP	100	215	
5	104.4303	65.29	-28.14	37.15	43.50	-6.35	QP	100	33	
6	213.1034	61.35	-24.08	37.27	43.50	-6.23	QP	100	102	



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Science & Industry Park,Nanshan Shenzhen,P.R.China

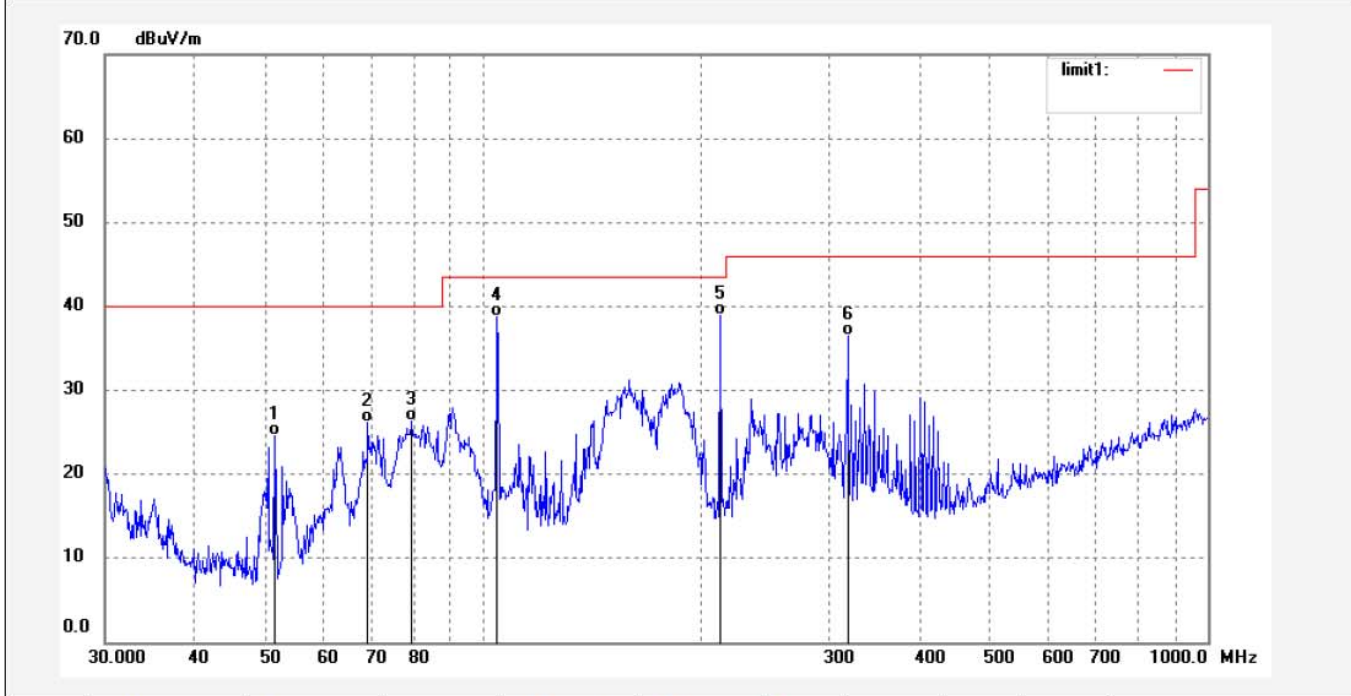
Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: FRANK2019 #884	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 2019/04/23
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 14:50:55
EUT: MOMENTO	Engineer Signature:
Mode: TX2480MHz	Distance: 3m
Model: CR8018A-DD	
Manufacturer: TIMSEN DEVELOPMENT LIMITED	

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	51.5363	51.07	-26.44	24.63	40.00	-15.37	QP	200	103	
2	69.2296	53.66	-27.45	26.21	40.00	-13.79	QP	200	221	
3	79.6764	53.77	-27.42	26.35	40.00	-13.65	QP	200	200	
4	104.4303	66.93	-28.14	38.79	43.50	-4.71	QP	200	92	
5	212.3559	63.05	-24.09	38.96	43.50	-4.54	QP	200	116	
6	318.0874	57.17	-20.68	36.49	46.00	-9.51	QP	200	66	

Above 1GHz



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Job No.: frank2019 #876

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: TX2402MHz

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Horizontal

Power Source: AC 120V/60Hz

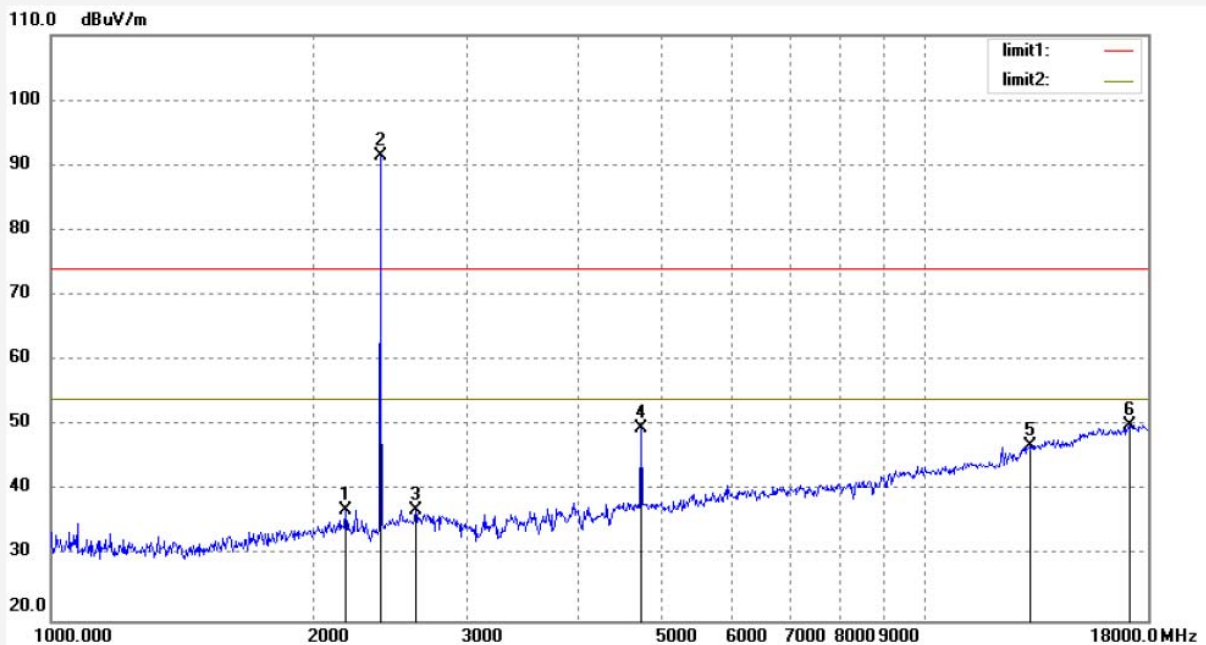
Date: 2019/04/23

Time: 14/48/42

Engineer Signature:

Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2175.306	45.48	-8.56	36.92	74.00	-37.08	peak	250	112	
2	2402.000	99.56	-8.03	91.53			peak	250	103	
3	2613.124	44.39	-7.37	37.02	74.00	-36.98	peak	250	32	
4	4804.000	52.08	-2.53	49.55	74.00	-24.45	peak	250	110	
5	13182.917	37.28	9.71	46.99	74.00	-27.01	peak	250	92	
6	17130.989	35.05	15.00	50.05	74.00	-23.95	peak	250	110	



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Fax:+86-0755-26503396

Job No.: frank2019 #877

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: TX2402MHz

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical

Power Source: AC 120V/60Hz

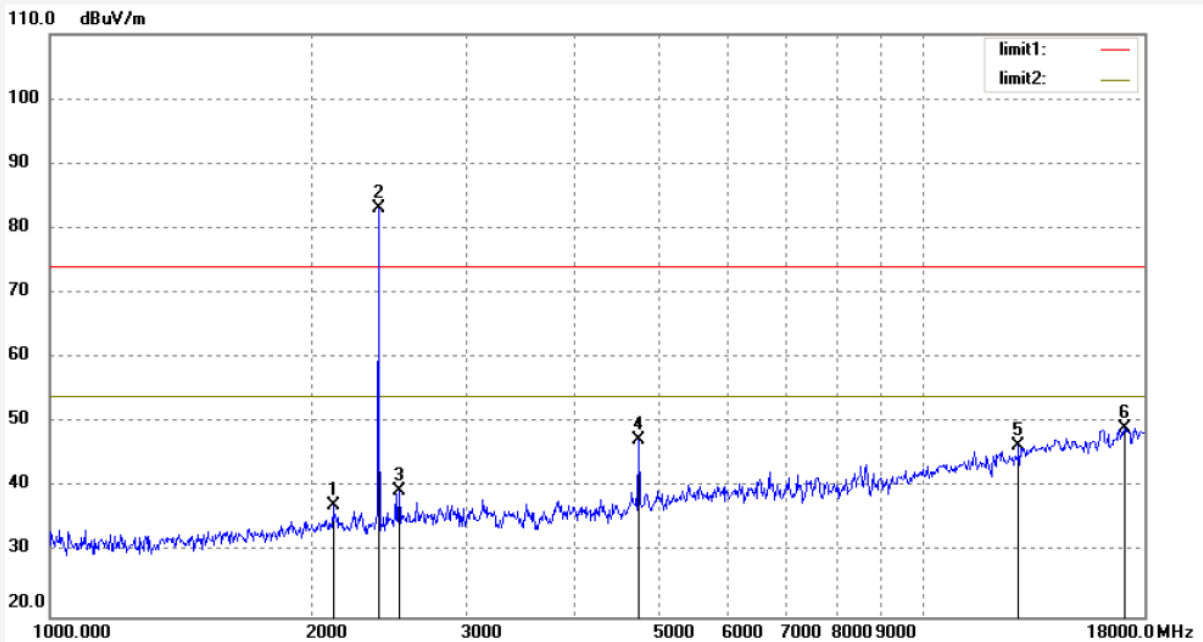
Date: 2019/04/23

Time: 15/50/03

Engineer Signature:

Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2112.901	45.88	-8.72	37.16	74.00	-36.84	peak	150	198	
2	2402.000	91.05	-8.03	83.02			peak	150	331	
3	2516.092	47.15	-7.66	39.49	74.00	-34.51	peak	150	110	
4	4804.000	49.88	-2.53	47.35	74.00	-26.65	peak	150	116	
5	12917.030	37.24	9.14	46.38	74.00	-27.62	peak	150	54	
6	17081.198	34.06	14.98	49.04	74.00	-24.96	peak	150	210	



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Job No.: frank2019 #878

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: TX2441MHz

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical

Power Source: AC 120V/60Hz

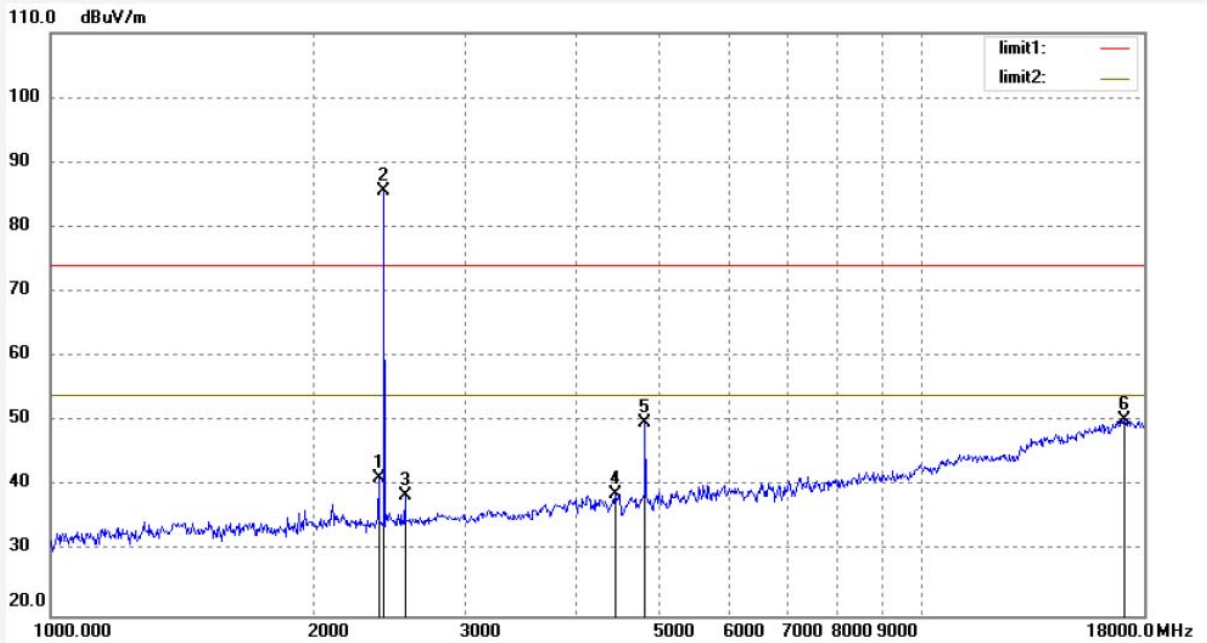
Date: 2019/04/23

Time: 15/53/31

Engineer Signature:

Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2380.719	49.20	-8.03	41.17	74.00	-32.83	peak	150	106	
2	2441.000	93.43	-7.93	85.50			peak	150	331	
3	2552.978	46.05	-7.55	38.50	74.00	-35.50	peak	150	201	
4	4451.376	42.02	-3.31	38.71	74.00	-35.29	peak	150	319	
5	4882.000	52.06	-2.25	49.81	74.00	-24.19	peak	150	331	
6	17081.198	35.19	14.98	50.17	74.00	-23.83	peak	150	210	



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Job No.: frank2019 #879

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: TX2441MHz

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Horizontal

Power Source: AC 120V/60Hz

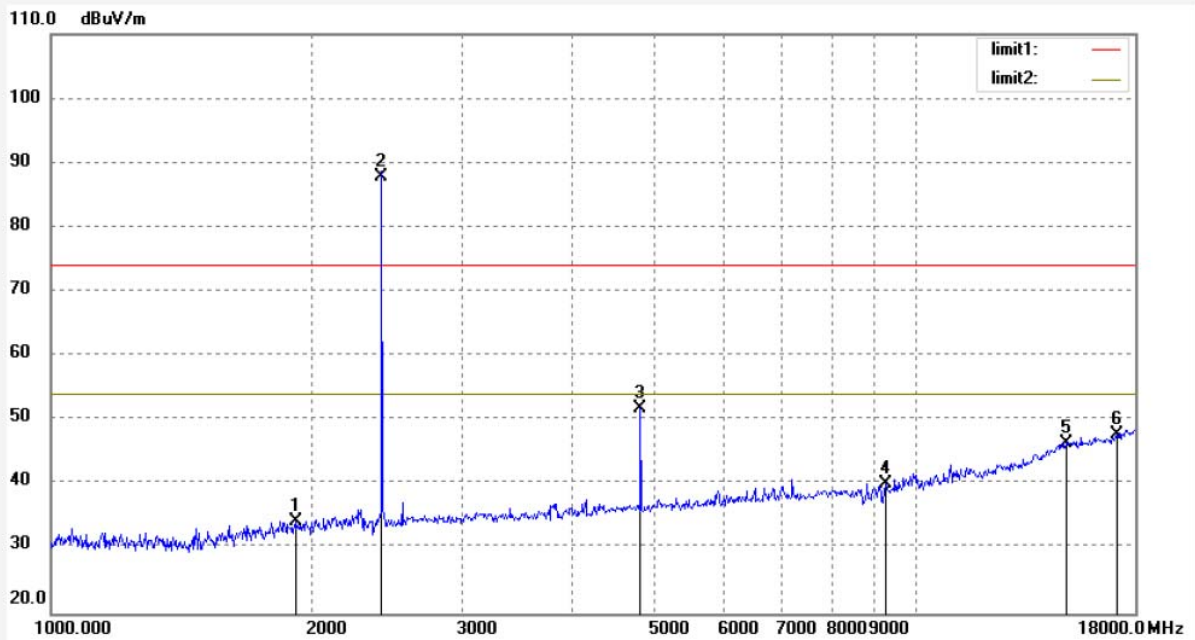
Date: 2019/04/23

Time: 15/55/39

Engineer Signature:

Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1924.985	43.77	-9.37	34.40	74.00	-39.60	peak	250	103	
2	2441.000	95.70	-7.93	87.77			peak	250	211	
3	4882.000	54.02	-2.25	51.77	74.00	-22.23	peak	250	92	
4	9242.484	34.97	5.14	40.11	74.00	-33.89	peak	250	110	
5	14984.176	33.14	13.33	46.47	74.00	-27.53	peak	250	332	
6	17180.926	32.72	15.02	47.74	74.00	-26.26	peak	250	210	



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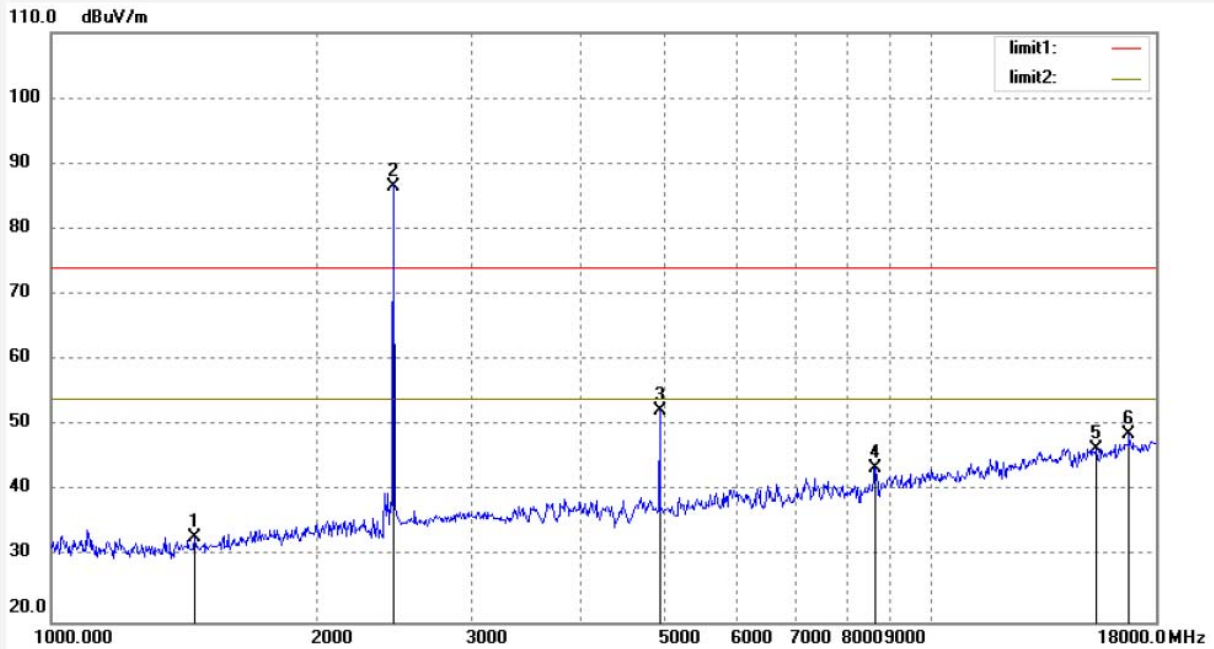
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2019 #880
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: MOMENTO
Mode: TX2480MHz
Model: CR8018A-DD
Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Horizontal
Power Source: AC 120V/60Hz
Date: 2019/04/23
Time: 15/58/07
Engineer Signature:
Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	1455.699	44.42	-11.42	33.00	74.00	-41.00	peak	250	52	
2	2480.000	94.24	-7.84	86.40			peak	250	164	
3	4960.000	54.23	-1.92	52.31	74.00	-21.69	peak	250	55	
4	8643.983	39.11	4.42	43.53	74.00	-30.47	peak	250	195	
5	15381.899	33.72	12.76	46.48	74.00	-27.52	peak	250	211	
6	16785.473	34.43	14.24	48.67	74.00	-25.33	peak	250	103	



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Job No.: frank2019 #881

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: TX2480MHz

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical

Power Source: AC 120V/60Hz

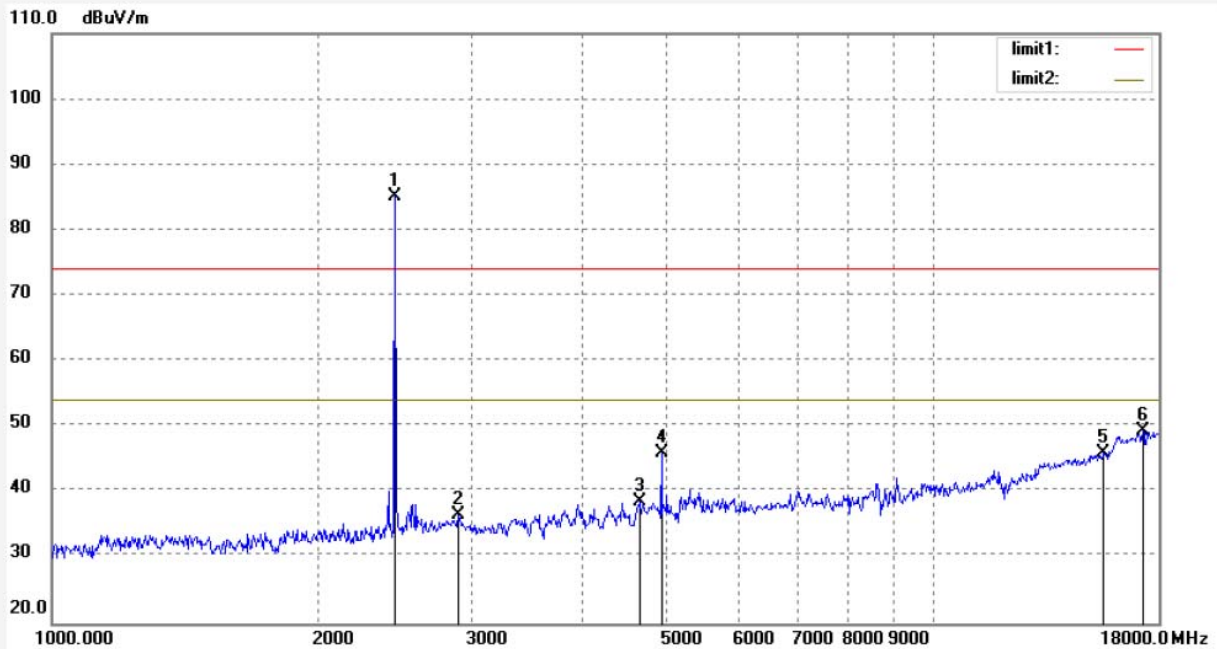
Date: 2019/04/23

Time: 16/01/02

Engineer Signature:

Distance:

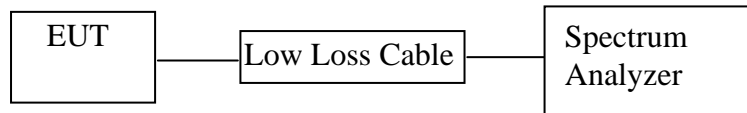
Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2480.000	93.01	-7.84	85.17			peak	150	354	
2	2893.372	43.00	-6.52	36.48	74.00	-37.52	peak	150	201	
3	4650.033	41.45	-2.81	38.64	74.00	-35.36	peak	150	223	
4	4960.000	47.94	-1.92	46.02	74.00	-27.98	peak	150	95	
5	15607.400	33.33	12.64	45.97	74.00	-28.03	peak	150	230	
6	17281.236	34.22	15.07	49.29	74.00	-24.71	peak	150	122	

11. BAND EDGE COMPLIANCE TEST

11.1. Block Diagram of Test Setup



11.2. The Requirement For Section 15.247(d)

Section 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

11.3. EUT Configuration on Measurement

The equipment are installed on the emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

11.4. Operating Condition of EUT

11.4.1. Setup the EUT and simulator as shown as Section 11.1.

11.4.2. Turn on the power of all equipment.

11.4.3. Let the EUT work in TX (Hopping off, Hopping on) modes measure it. The transmit frequency are 2402-2480MHz. We select 2402MHz, 2480MHz TX frequency to transmit.

11.5. Test Procedure

11.5.1. The transmitter output was connected to the spectrum analyzer via a low loss cable.

11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3. The band edges was measured and recorded.

11.6. Test Result

Test Lab: Shielding room

Note: Both hopping-on mode and hopping-off mode had been pre-tested, and only the Worse case was recorded in the test report.

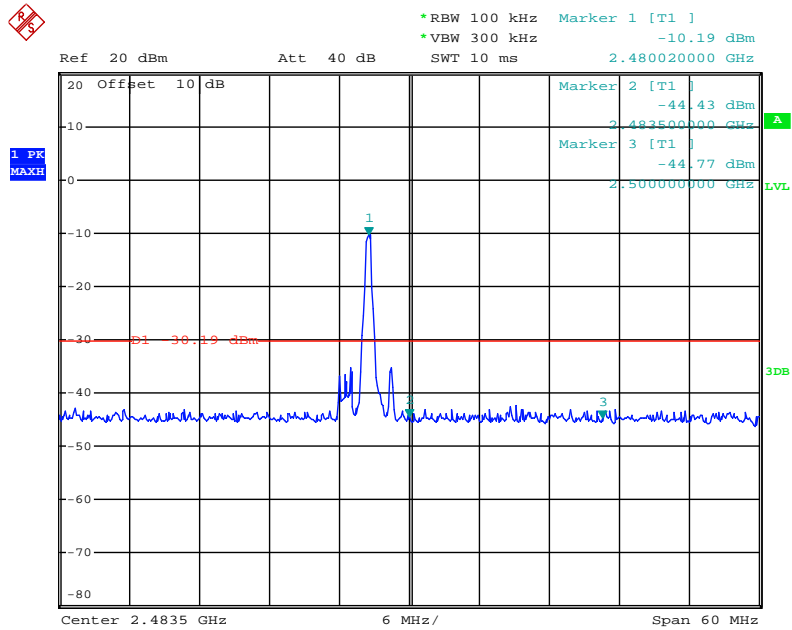
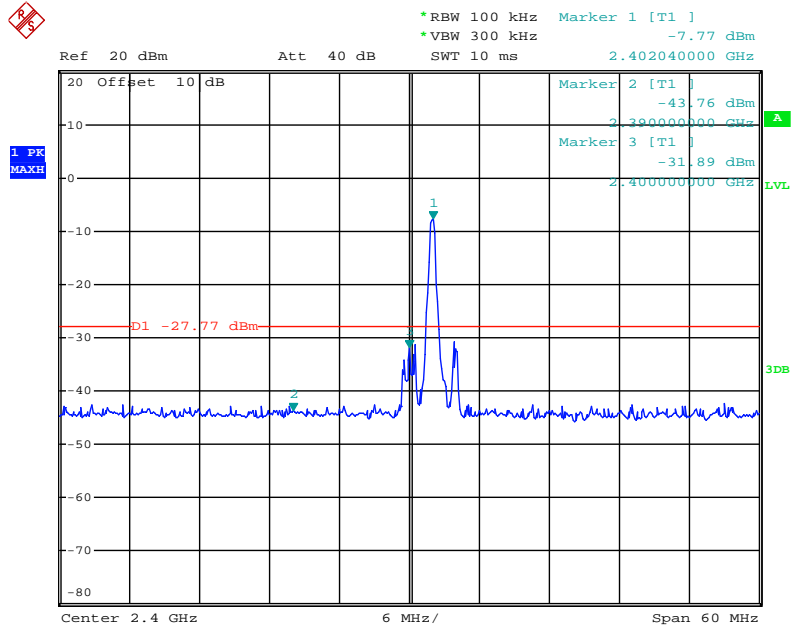
Conducted Band Edge Result

Non-hopping mode

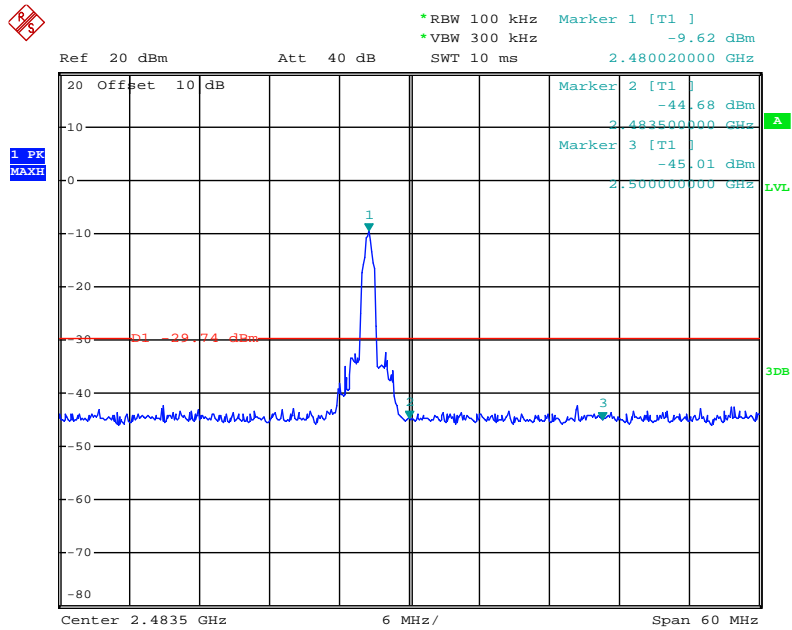
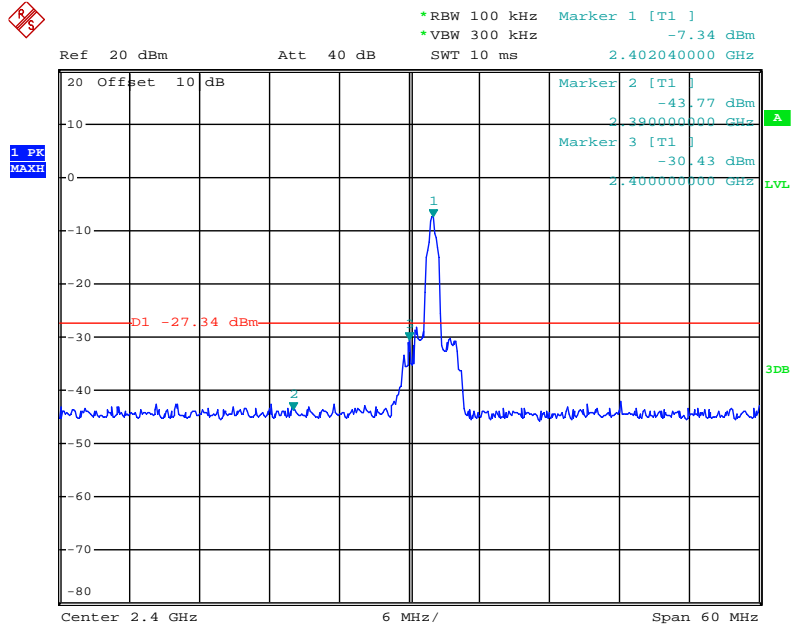
Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)	Result
GFSK Mode			
2400.00	24.12	> 20dBc	Pass
2483.50	34.24	> 20dBc	Pass
Π/4-DQPSK Mode			
2400.00	23.09	> 20dBc	Pass
2483.50	35.05	> 20dBc	Pass
8DPSK Mode			
2400.00	23.73	> 20dBc	Pass
2483.50	33.72	> 20dBc	Pass

The spectrum analyzer plots are attached as below.

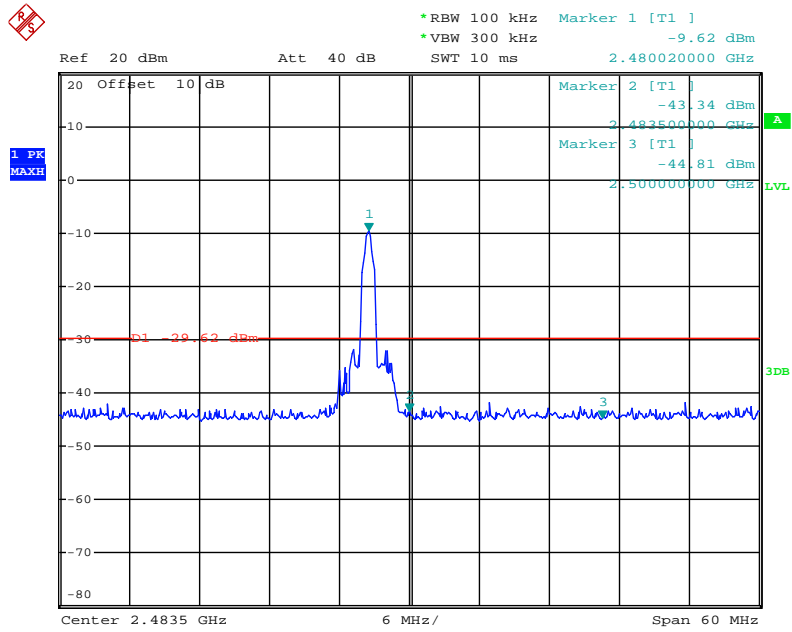
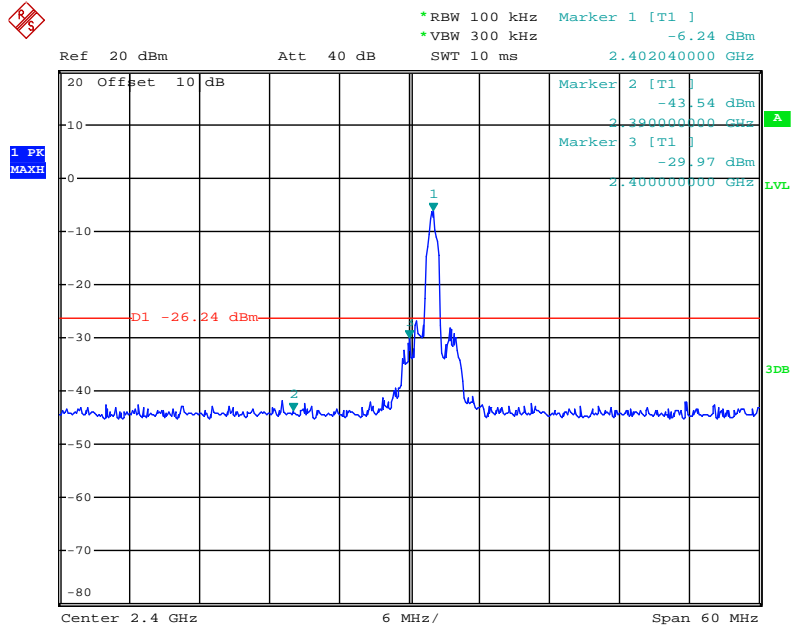
GFSK Mode



Π/4-DQPSK Mode



8DPSK Mode



Radiated Band Edge Result

Note:

1. Emissions attenuated more than 20 dB below the permissible value are not reported.
2. The field strength is calculated by adding the antenna factor, high pass filter loss(if used) and cable loss, and subtracting the amplifier gain(if any)from the measured reading. The basic equation calculation is as follows:

Result = Reading + Corrected Factor

3. Display the measurement of peak values.

Test Procedure:

The EUT and its simulators are placed on a turntable, which is 1.5 meter high above ground(Above 1GHz). The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated bi-log antenna) is used as receiving antenna. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find the maximum emission levels, all of the EUT location must be manipulated according to ANSI C63.10:2013 on radiated emission measurement. The EUT was tested in 3 orthogonal planes.

Let the EUT work in TX (Hopping off, Hopping on) modes measure it.
We select 2402MHz, 2480MHz TX frequency to transmit(Hopping off mode).
We select 2402-2480MHz TX frequency to transmit(Hopping on mode).

During the radiated emission test, the spectrum analyzer was set with the following configurations:

- 1.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for peak measurement with peak detector at frequency above 1GHz.
- 2.The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average measurement with peak detection at frequency above 1GHz.
- 3.All modes of operation were investigated and the worse case (GFSK Mode) emissions are reported.

Test Lab: 3m Anechoic chamber

The spectrum analyzer plots are attached as below.

Non-hopping mode



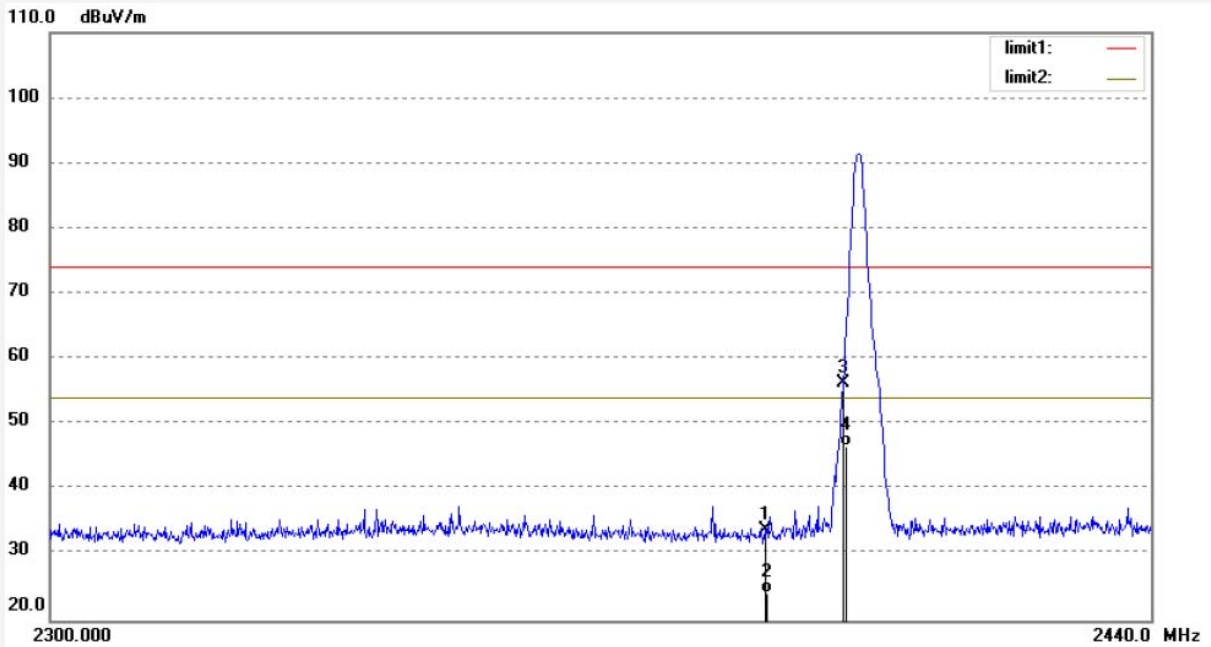
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2019 #888	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 2019/04/23
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 16/22/16
EUT: MOMENTO	Engineer Signature:
Mode: TX2402MHz(GFSK)	Distance:
Model: CR8018A-DD	
Manufacturer: TIMSEN DEVELOPMENT LIMITED	

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.81	-8.00	33.81	74.00	-40.19	peak	250	302	
2	2390.000	32.15	-8.00	24.15	54.00	-29.85	AVG	250	102	
3	2400.000	64.25	-7.97	56.28	74.00	-17.72	peak	250	119	
4	2400.000	54.66	-7.97	46.69	54.00	-7.31	AVG	200	96	

Note: Average measurement with peak detection at No.2&4



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Job No.: frank2019 #889

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: TX2402MHz(GFSK)

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical

Power Source: AC 120V/60Hz

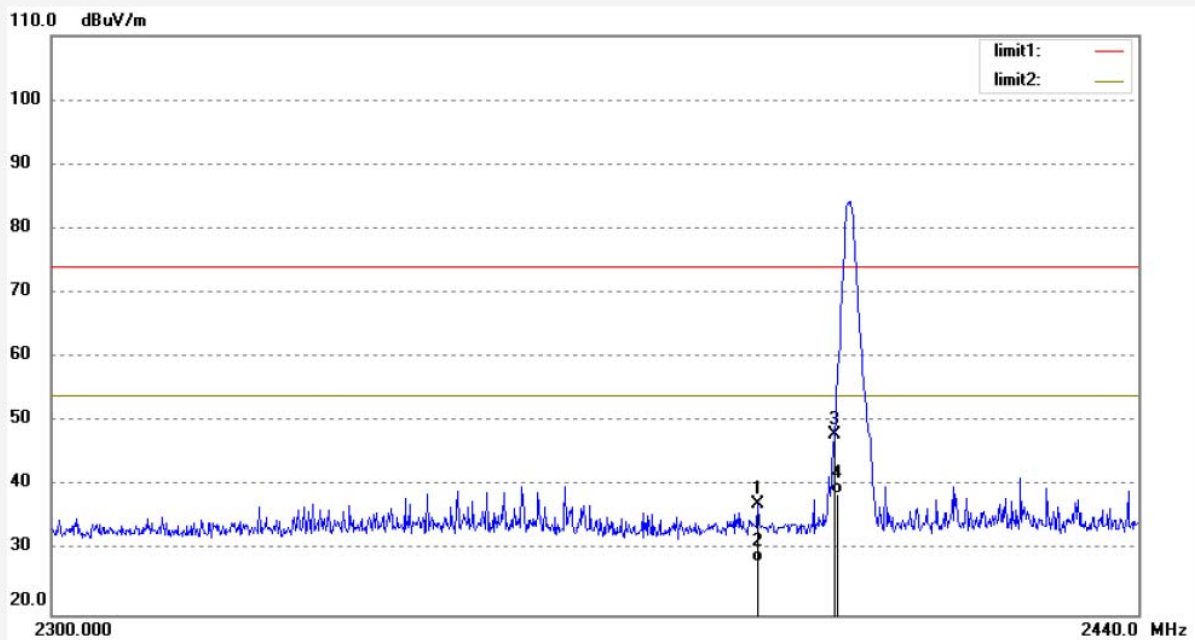
Date: 2019/04/23

Time: 16/25/34

Engineer Signature:

Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	45.10	-8.00	37.10	74.00	-36.90	peak	150	302	
2	2390.000	36.12	-8.00	28.12	54.00	-25.88	AVG	150	96	
3	2400.000	56.06	-7.97	48.09	74.00	-25.91	peak	150	55	
4	2400.000	46.78	-7.97	38.81	54.00	-15.19	AVG	150	164	

Note: Average measurement with peak detection at No.2&4



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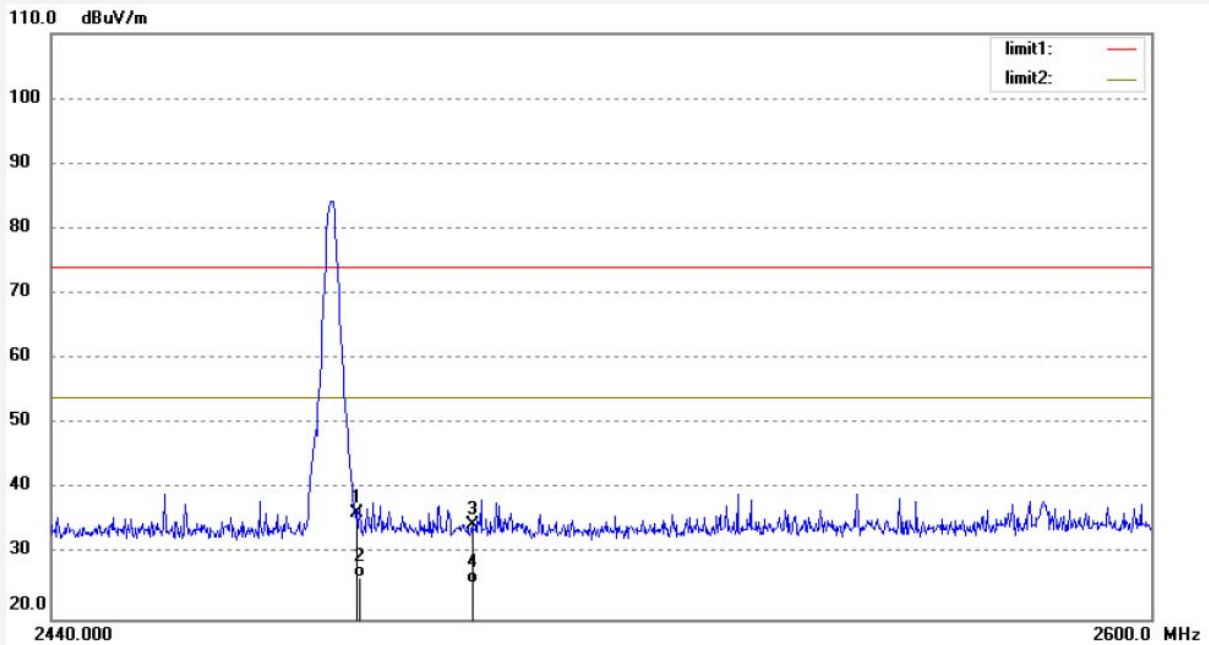
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2019 #898
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: MOMENTO
Mode: TX2480MHz(GFSK)
Model: CR8018A-DD
Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical
Power Source: AC 120V/60Hz
Date: 2019/04/23
Time: 16/56/04
Engineer Signature:
Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	44.10	-7.76	36.34	74.00	-37.66	peak	150	302	
2	2483.500	34.15	-7.76	26.39	54.00	-27.61	AVG	150	194	
3	2500.000	42.27	-7.71	34.56	74.00	-39.44	peak	150	55	
4	2500.000	33.15	-7.71	25.44	54.00	-28.56	AVG	150	164	

Note: Average measurement with peak detection at No.2&4



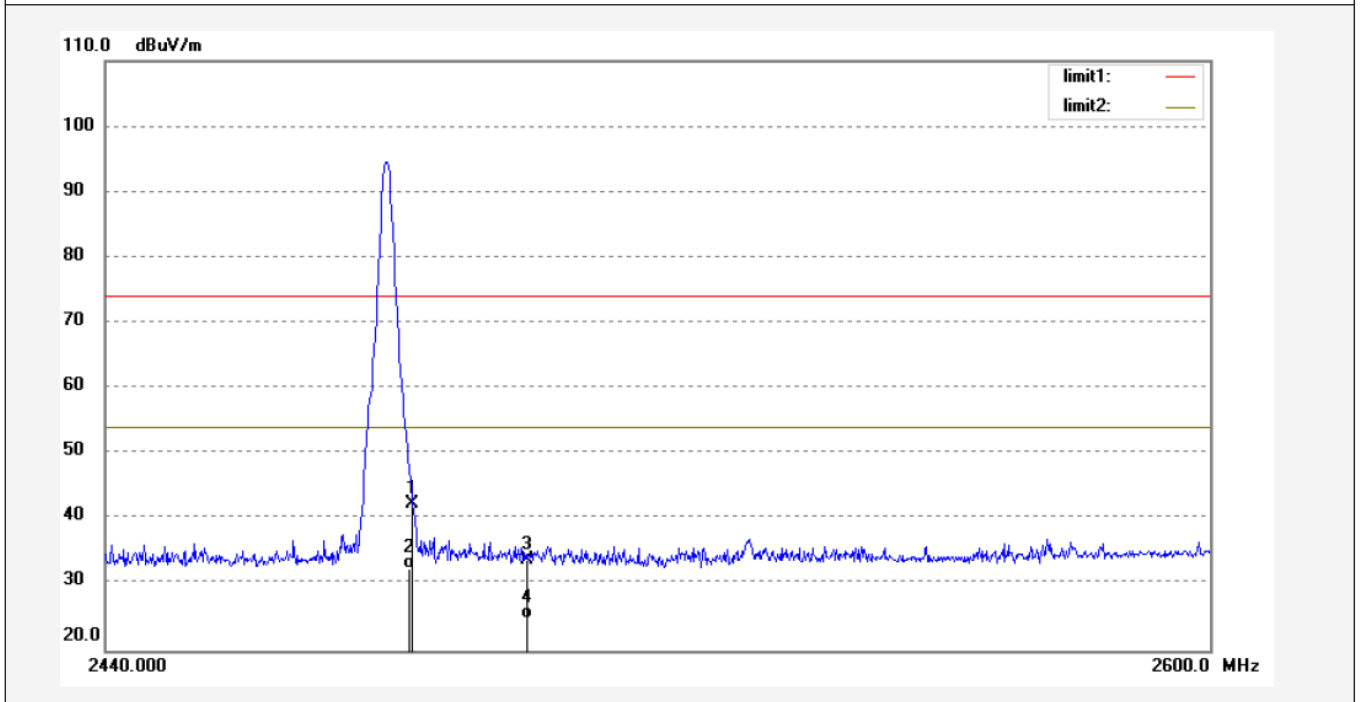
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2019 #899	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 2019/04/23
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 17/02/27
EUT: MOMENTO	Engineer Signature:
Mode: TX2480MHz(GFSK)	Distance:
Model: CR8018A-DD	
Manufacturer: TIMSEN DEVELOPMENT LIMITED	

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2483.500	50.17	-7.76	42.41	74.00	-31.59	peak	250	302	
2	2483.500	40.15	-7.76	32.39	54.00	-21.61	AVG	250	119	
3	2500.000	41.63	-7.71	33.92	74.00	-40.08	peak	250	95	
4	2500.000	32.45	-7.71	24.74	54.00	-29.26	AVG	250	177	

Note: Average measurement with peak detection at No.2&4

Hopping mode



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: frank2019 #882

Standard: FCC PK

Test item: Radiation Test

Temp.(C)/Hum.(%) 25 C / 55 %

EUT: MOMENTO

Mode: HOPPING(GFSK)

Model: CR8018A-DD

Manufacturer: TIMSEN DEVELOPMENT LIMITED

Polarization: Vertical

Power Source: AC 120V/60Hz

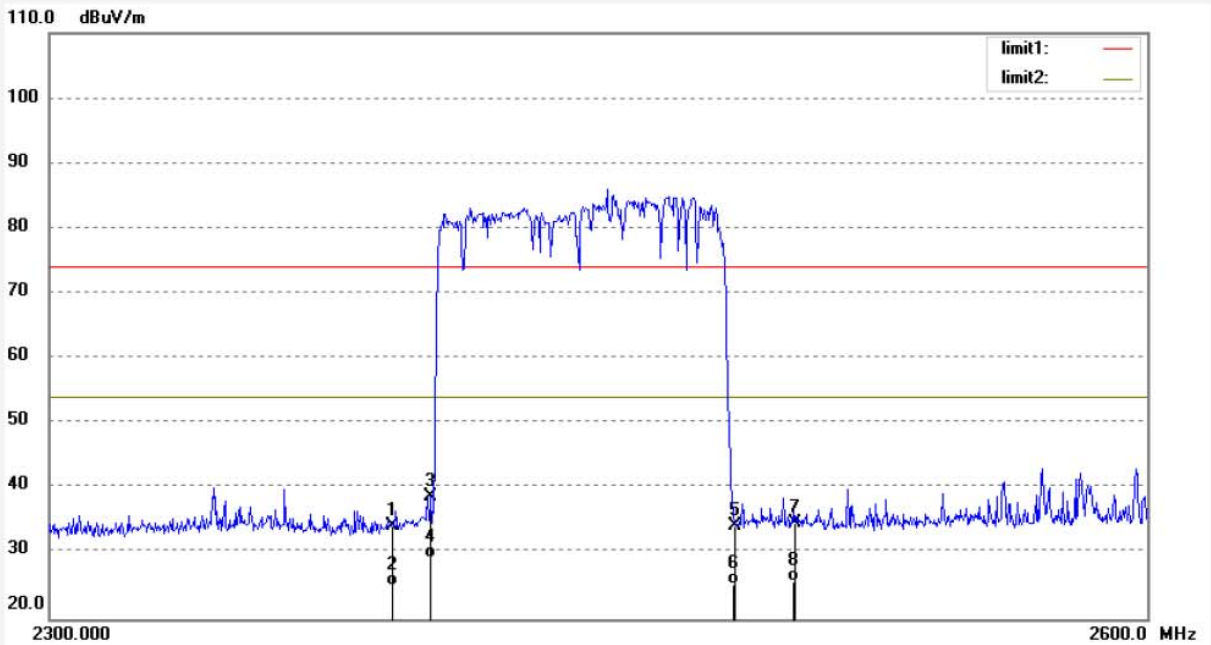
Date: 2019/04/23

Time: 16/06/43

Engineer Signature:

Distance:

Note: Report NO.:ATE20190552



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	42.27	-8.00	34.27	74.00	-39.73	peak	150	93	
2	2390.000	33.15	-8.00	25.15	54.00	-28.85	AVG	150	223	
3	2400.000	46.78	-7.97	38.81	74.00	-35.19	peak	150	302	
4	2400.000	37.21	-7.97	29.24	54.00	-24.76	AVG	150	212	
5	2483.500	42.03	-7.76	34.27	74.00	-39.73	peak	150	66	
6	2483.500	33.15	-7.76	25.39	54.00	-28.61	AVG	150	202	
7	2500.000	42.47	-7.71	34.76	74.00	-39.24	peak	150	123	
8	2500.000	33.48	-7.71	25.77	54.00	-28.23	AVG	150	102	

Note: Average measurement with peak detection at No.2&4&6&8



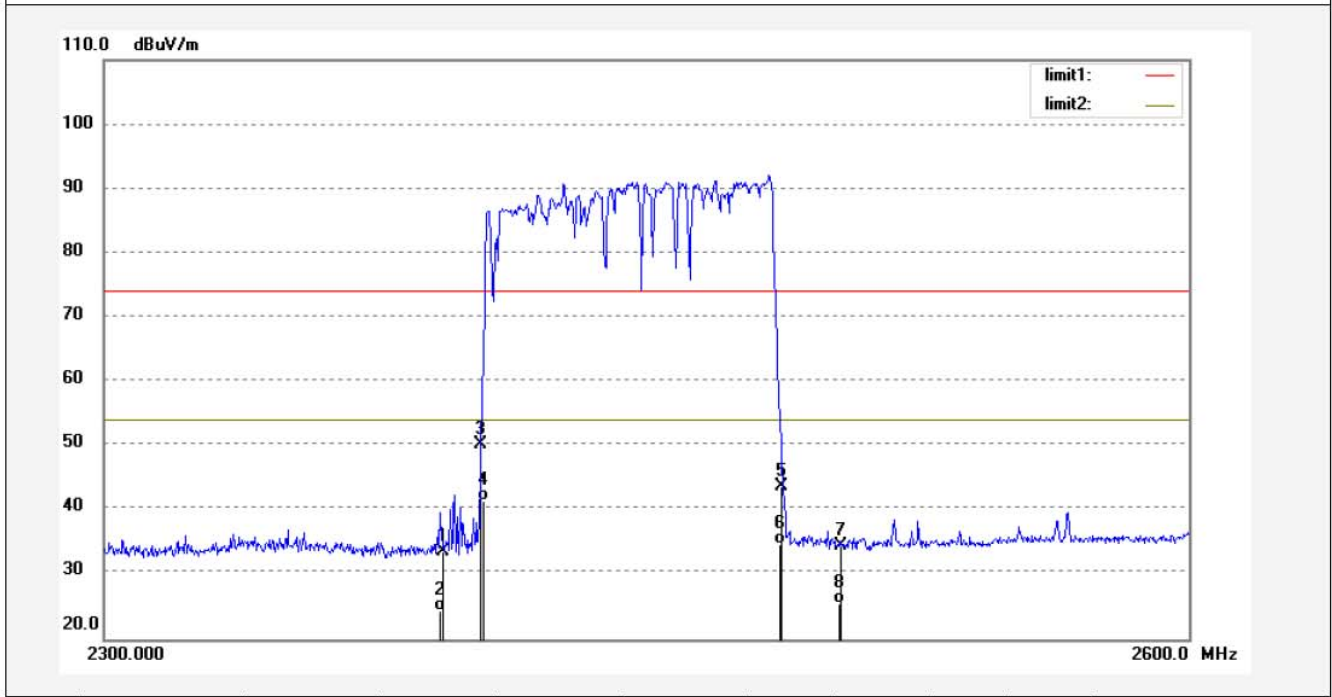
ACCURATE TECHNOLOGY CO., LTD.

F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: frank2019 #883	Polarization: Horizontal
Standard: FCC PK	Power Source: AC 120V/60Hz
Test item: Radiation Test	Date: 2019/04/23
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 16/09/47
EUT: MOMENTO	Engineer Signature:
Mode: HOPPING(GFSK)	Distance:
Model: CR8018A-DD	
Manufacturer: TIMSEN DEVELOPMENT LIMITED	

Note: Report NO.:ATE20190552



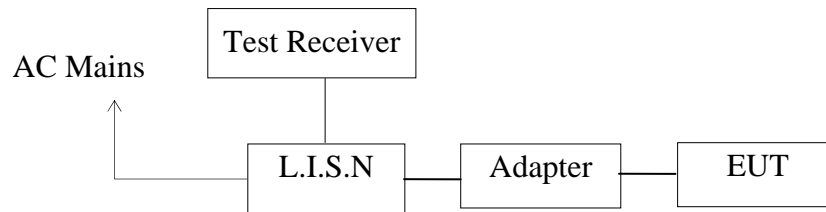
No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	2390.000	41.57	-8.00	33.57	74.00	-40.43	peak	250	92	
2	2390.000	32.48	-8.00	24.48	54.00	-29.52	AVG	250	110	
3	2400.000	58.17	-7.97	50.20	74.00	-23.80	peak	200	332	
4	2400.000	49.48	-7.97	41.51	54.00	-12.49	AVG	250	120	
5	2483.500	51.60	-7.76	43.84	74.00	-30.16	peak	250	299	
6	2483.500	42.48	-7.76	34.72	54.00	-19.28	AVG	250	66	
7	2500.000	42.28	-7.71	34.57	74.00	-39.43	peak	250	224	
8	2500.000	33.15	-7.71	25.44	54.00	-28.56	AVG	250	103	

Note: Average measurement with peak detection at No.2&4&6&8

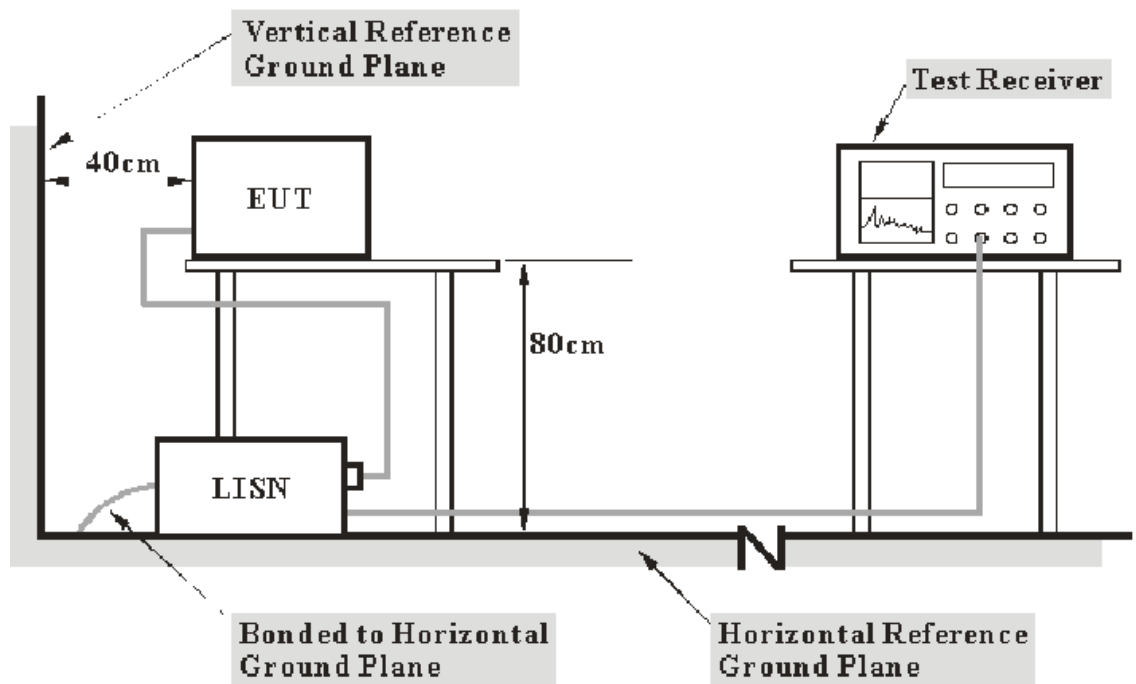
12.AC POWER LINE CONDUCTED EMISSION TEST

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators



12.1.2.Test System Setup



- Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

12.2. Power Line Conducted Emission Measurement Limits

Frequency (MHz)	Limit dB(μV)	
	Quasi-peak Level	Average Level
0.15 - 0.50	66.0 – 56.0 *	56.0 – 46.0 *
0.50 - 5.00	56.0	46.0
5.00 - 30.00	60.0	50.0

NOTE1: The lower limit shall apply at the transition frequencies.
 NOTE2: The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

12.3. Configuration of EUT on Measurement

The equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.

12.4. Operating Condition of EUT

12.4.1. Setup the EUT and simulator as shown as Section 12.1.

12.4.2. Turn on the power of all equipment.

12.4.3. Let the EUT work in test mode and measure it.

12.5. Test Procedure

The EUT is put on the plane 0.8m high above the ground by insulating support and is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC lines are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to ANSI C63.10: 2013 on Conducted Emission Measurement.

The bandwidth of test receiver is set at 9kHz.

The frequency range from 150kHz to 30MHz is checked.

12.6.Data Sample

Frequency (MHz)	Transducer value (dB)	QuasiPeak Level (dBμV)	Average Level (dBμV)	QuasiPeak Limit (dBμV)	Average Limit (dBμV)	QuasiPeak Margin (dB)	Average Margin (dB)	Remark (Pass/Fail)
X.XX	10.6	25.3	17.0	59.0	49.0	33.4	31.7	Pass

Frequency(MHz) = Emission frequency in MHz

Transducer value(dB) = Insertion loss of LISN + Cable Loss

Level(dBμV) = Quasi-peak Reading/Average Reading + Transducer value

Limit (dBμV) = Limit stated in standard

Margin = Limit (dBμV) - Level (dBμV)

Calculation Formula:

Margin = Limit (dBμV) - Level (dBμV)

12.7.Test Results

Pass.

Test Lab: 3m Anechoic chamber

The frequency range from 150kHz to 30MHz is checked.

Maximizing procedure was performed on the six (6) highest emissions of the EUT. Emissions attenuated more than 20 dB below the permissible value are not reported.

All data was recorded in the Quasi-peak and average detection mode.

The spectral diagrams are attached as below.

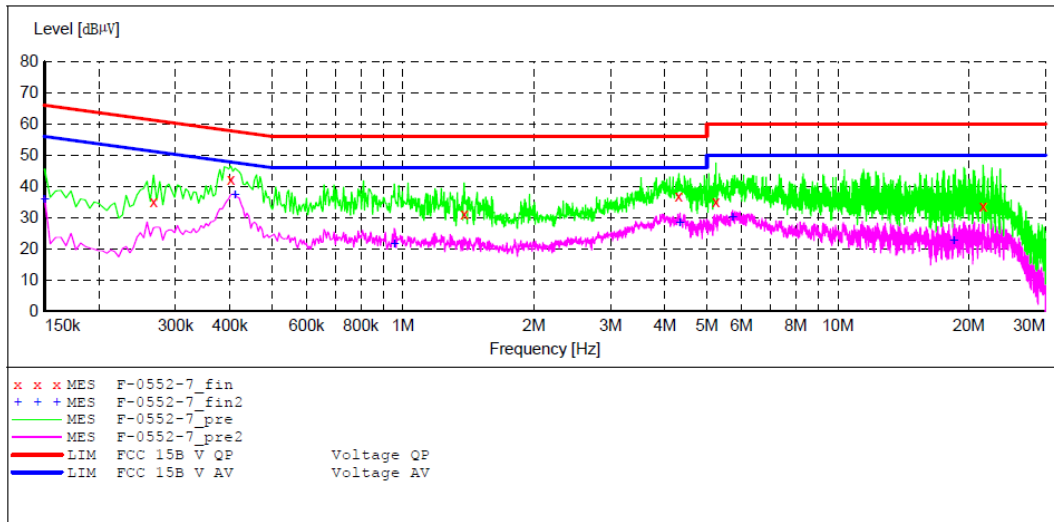
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: MOMENTO M/N:CR8018A-DD
 Manufacturer: TIMSEN DEVELOPMENT LIMITED
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: N 120V 60Hz
 Comment: Report NO.:ATE20190552
 Start of Test: 2019-4-23 / 9:13:17

SCAN TABLE: "V 150K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008
Average						



MEASUREMENT RESULT: "F-0552-7_fin"

2019-4-23 9:15

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.267000	35.00	10.9	61	26.2	QP	N	GND
0.402000	42.40	11.0	58	15.4	QP	N	GND
1.383000	31.40	11.2	56	24.6	QP	N	GND
4.308000	36.90	11.4	56	19.1	QP	N	GND
5.244000	35.30	11.4	60	24.7	QP	N	GND
21.570000	33.80	11.7	60	26.2	QP	N	GND

MEASUREMENT RESULT: "F-0552-7_fin2"

2019-4-23 9:15

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	35.80	10.8	56	20.2	AV	N	GND
0.411000	37.30	11.0	48	10.3	AV	N	GND
0.955500	21.60	11.1	46	24.4	AV	N	GND
4.335000	28.50	11.4	46	17.5	AV	N	GND
5.730000	30.30	11.5	50	19.7	AV	N	GND
18.447000	22.60	11.7	50	27.4	AV	N	GND

ACCURATE TECHNOLOGY CO., LTD

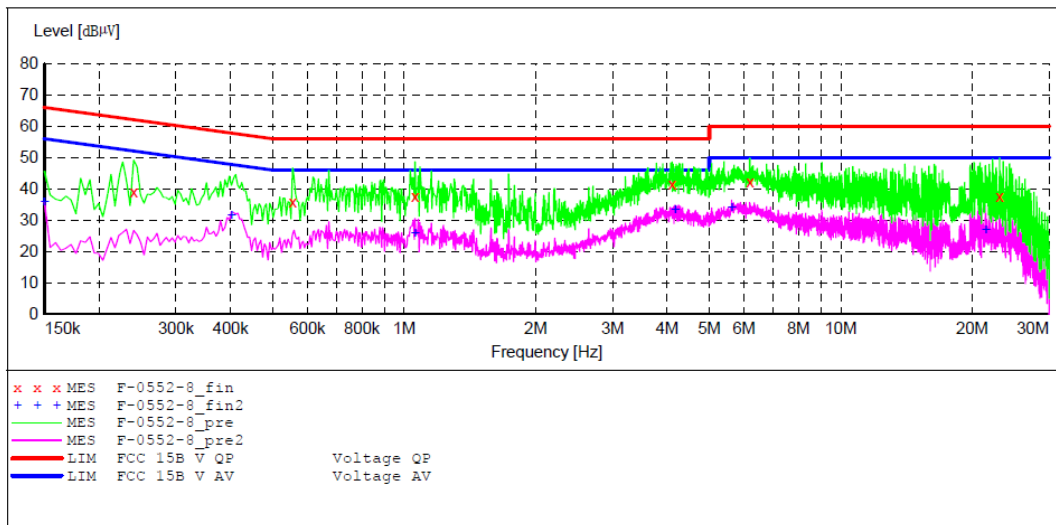
CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: MOMENTO M/N:CR8018A-DD
 Manufacturer: TIMSEN DEVELOPMENT LIMITED
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: L 120V 60Hz
 Comment: Report NO.:ATE20190552
 Start of Test: 2019-4-23 / 9:16:38

SCAN TABLE: "V 150K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008

Short Description: _SUB_STD_VTERM2 1.70
 Average



MEASUREMENT RESULT: "F-0552-8_fin"

2019-4-23 9:19

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.240000	39.20	10.9	62	22.9	QP	L1	GND
0.555000	36.00	11.0	56	20.0	QP	L1	GND
1.059000	37.60	11.1	56	18.4	QP	L1	GND
4.105500	41.60	11.4	56	14.4	QP	L1	GND
6.193500	42.30	11.5	60	17.7	QP	L1	GND
23.122500	37.80	11.7	60	22.2	QP	L1	GND

MEASUREMENT RESULT: "F-0552-8_fin2"

2019-4-23 9:19

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	35.80	10.8	56	20.2	AV	L1	GND
0.402000	31.50	11.0	48	16.3	AV	L1	GND
1.059000	25.80	11.1	46	20.2	AV	L1	GND
4.173000	33.30	11.4	46	12.7	AV	L1	GND
5.626500	34.20	11.5	50	15.8	AV	L1	GND
21.471000	27.10	11.7	50	22.9	AV	L1	GND

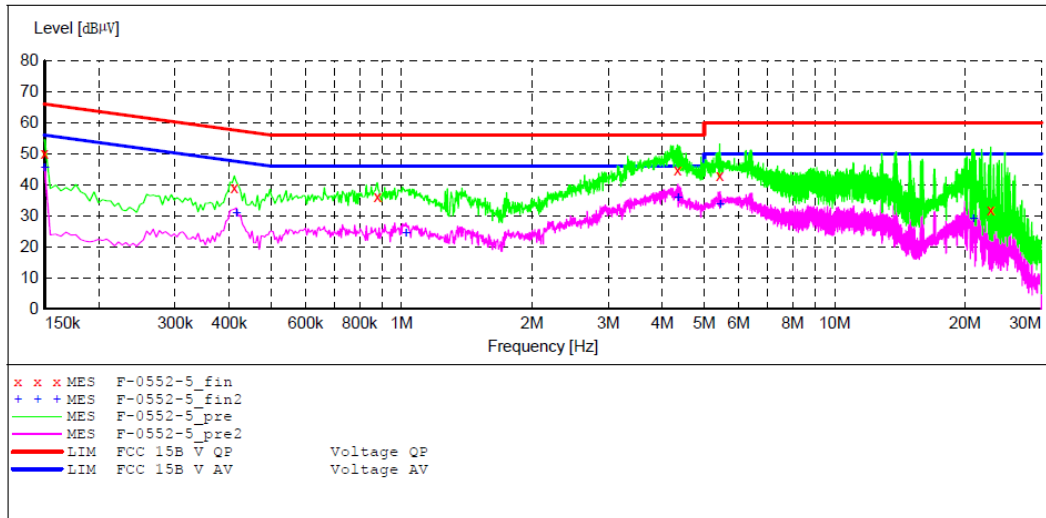
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: MOMENTO M/N:CR8018A-DD
 Manufacturer: TIMSEN DEVELOPMENT LIMITED
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: L 240V 60Hz
 Comment: Report NO.:ATE20190552
 Start of Test: 2019-4-23 / 9:06:50

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0552-5_fin"

2019-4-23 9:09

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	50.20	10.8	66	15.8	QP	L1	GND
0.411000	39.00	11.0	58	18.6	QP	L1	GND
0.879000	36.40	11.1	56	19.6	QP	L1	GND
4.335000	44.90	11.4	56	11.1	QP	L1	GND
5.428500	43.10	11.5	60	16.9	QP	L1	GND
22.929000	32.10	11.7	60	27.9	QP	L1	GND

MEASUREMENT RESULT: "F-0552-5_fin2"

2019-4-23 9:09

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	45.50	10.8	56	10.5	AV	L1	GND
0.415500	31.00	11.0	48	16.5	AV	L1	GND
1.023000	24.50	11.1	46	21.5	AV	L1	GND
4.348500	35.80	11.4	46	10.2	AV	L1	GND
5.437500	33.70	11.5	50	16.3	AV	L1	GND
20.940000	29.10	11.7	50	20.9	AV	L1	GND

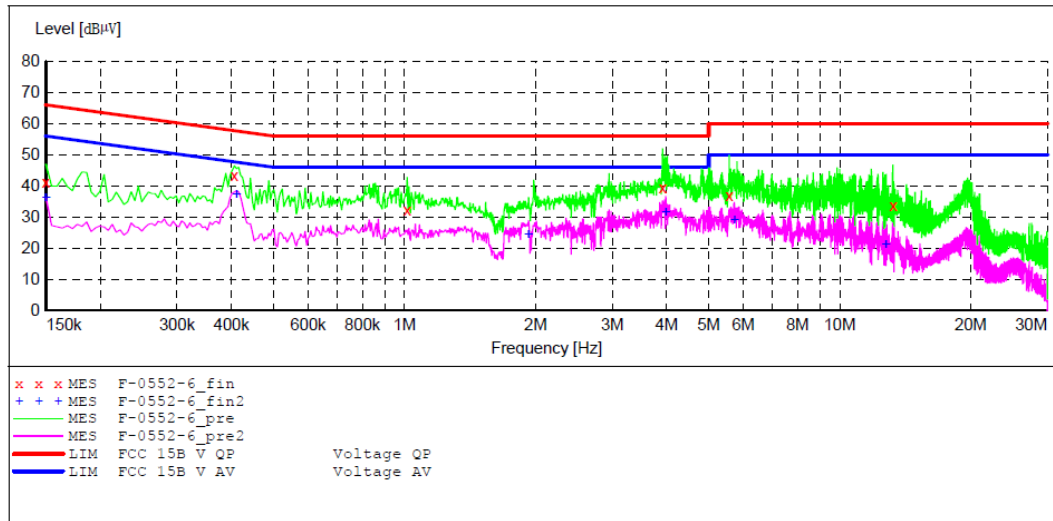
ACCURATE TECHNOLOGY CO.,LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: MOMENTO M/N:CR8018A-DD
 Manufacturer: TIMSEN DEVELOPMENT LIMITED
 Operating Condition: BT Communication
 Test Site: 1#Shielding Room
 Operator: Frank
 Test Specification: N 240V 60Hz
 Comment: Report NO.:ATE20190552
 Start of Test: 2019-4-23 / 9:10:10

SCAN TABLE: "V 150K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70
 Start Stop Step Detector Meas. IF Transducer
 Frequency Frequency Width Time Bandw.
 150.0 kHz 30.0 MHz 4.5 kHz QuasiPeak 1.0 s 9 kHz NSLK8126 2008
 Average



MEASUREMENT RESULT: "F-0552-6_fin"

2019-4-23 9:12

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	41.40	10.8	66	24.6	QP	N	GND
0.406500	43.30	11.0	58	14.4	QP	N	GND
1.014000	32.30	11.1	56	23.7	QP	N	GND
3.916500	39.40	11.4	56	16.6	QP	N	GND
5.572500	37.00	11.5	60	23.0	QP	N	GND
13.258500	33.70	11.6	60	26.3	QP	N	GND

MEASUREMENT RESULT: "F-0552-6_fin2"

2019-4-23 9:12

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.150000	36.10	10.8	56	19.9	AV	N	GND
0.411000	37.40	11.0	48	10.2	AV	N	GND
1.927500	24.50	11.3	46	21.5	AV	N	GND
3.984000	31.60	11.4	46	14.4	AV	N	GND
5.725500	29.10	11.5	50	20.9	AV	N	GND
12.745500	21.40	11.6	50	28.6	AV	N	GND

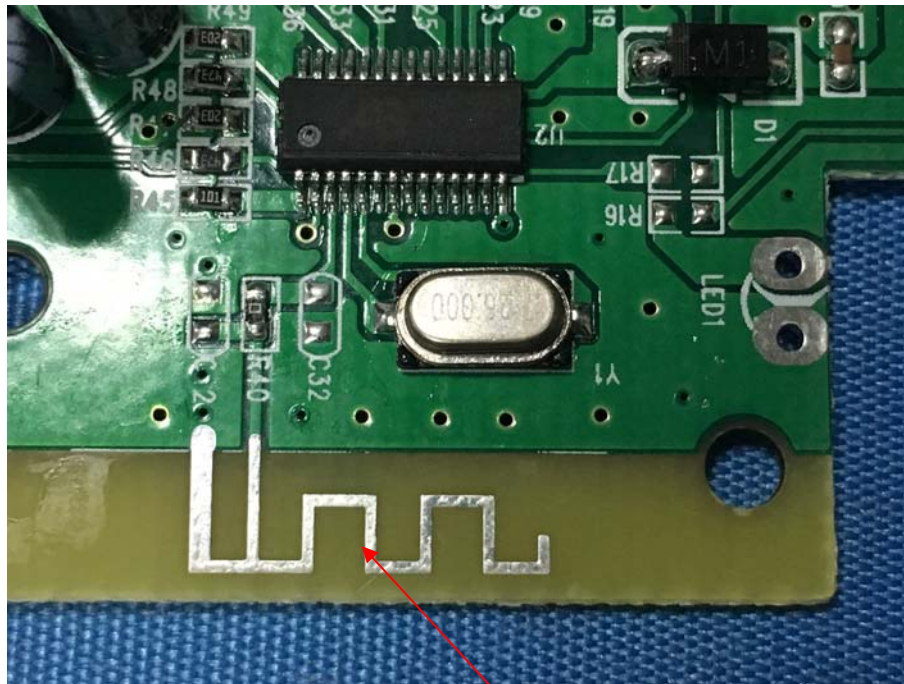
13.ANTENNA REQUIREMENT

13.1.The Requirement

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

13.2.Antenna Construction

Device is equipped with permanent attached antenna, which isn't displaced by other antenna. The Max Antenna gain of EUT is 1.2dBi. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna

***** End of Test Report *****