

APPLICATION CERTIFICATION
On Behalf of
Shenzhen Minde Electronics Technology LTD.

Barcode Scanner

Model No.: MS3390,CS3260,CS3290,CS3261,CS3291,MS3590,
MS3391,MS3591,CS3262,CS3292,CS3263,CS3293,MS3392,MS3393,
MS3592,MS3593,MS3396,MS3596,MS3395,MS3595,CS3266,CS3296,
CS3265,CS3295,MS3390A,MS3390B,MS3390C,CS3260A,CS3260B,
MS3590A,MS3590B,MS3590C,CS3260C,CS3290A,CS3290B,CS3290C

FCC ID: 2AASG-MS3390

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Date of Report : Jun 01,2015

TABLE OF CONTENTS

Description	Page
Test Report Certification	
1. GENERAL INFORMATION	5
1.1. Description of Device (EUT).....	5
1.2. Description of Test Facility	6
1.3. 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	11
5.6. Test Result	11
6. CARRIER FREQUENCY SEPARATION TEST.....	12
6.1. Block Diagram of Test Setup.....	17
6.2. The Requirement For Section 15.247(a)(1).....	17
6.3. EUT Configuration on Measurement	17
6.4. Operating Condition of EUT	17
6.5. Test Procedure	18
6.6. Test Result	18
7. NUMBER OF HOPPING FREQUENCY TEST	24
7.1. Block Diagram of Test Setup.....	24
7.2. The Requirement For Section 15.247(a)(1)(iii).....	24
7.3. EUT Configuration on Measurement	24
7.4. Operating Condition of EUT	24
7.5. Test Procedure	25
7.6. Test Result	25
8. DWELL TIME TEST	27
8.1. Block Diagram of Test Setup.....	27
8.2. The Requirement For Section 15.247(a)(1)(iii).....	27
8.3. EUT Configuration on Measurement	27
8.4. Operating Condition of EUT	27
8.5. Test Procedure	28
8.6. Test Result	28
9. MAXIMUM PEAK OUTPUT POWER TEST	44
9.1. Block Diagram of Test Setup.....	44
9.2. The Requirement For Section 15.247(b)(1).....	44
9.3. EUT Configuration on Measurement	44

9.4.	Operating Condition of EUT	44
9.5.	Test Procedure	45
9.6.	Test Result	45
10.	RADIATED EMISSION TEST	46
10.1.	Block Diagram of Test Setup.....	51
10.2.	The Limit For Section 15.247(d)	52
10.3.	Restricted bands of operation	52
10.4.	Configuration of EUT on Measurement	53
10.5.	Test Procedure	53
10.6.	The Field Strength of Radiation Emission Measurement Results	54
11.	BAND EDGE COMPLIANCE TEST	66
11.1.	Block Diagram of Test Setup.....	66
11.2.	The Requirement For Section 15.247(d)	66
11.3.	EUT Configuration on Measurement	66
11.4.	Operating Condition of EUT	66
11.5.	Test Procedure	67
11.6.	Test Result	67
12.	AC POWER LINE CONDUCTED EMISSION FOR FCC PART 15 SECTION 15.207(A) ..	89
12.1.	Block Diagram of Test Setup.....	89
12.2.	The Emission Limit	89
12.3.	Configuration of EUT on Measurement	90
12.4.	Operating Condition of EUT	90
12.5.	Test Procedure	90
12.6.	Power Line Conducted Emission Measurement Results	90
13.	ANTENNA REQUIREMENT.....	93
13.1.	The Requirement	93
13.2.	Antenna Construction	93

Test Report Certification

Applicant : Shenzhen Minde Electronics Technology LTD.

Manufacturer : Shenzhen Minde Electronics Technology LTD.

EUT Description : Barcode Scanner

(A) MODEL NO.: MS3390,CS3260,CS3290,CS3261,CS3291,MS3590, MS3391,MS3591,CS3262.CS3292,CS3263,CS3293,MS3392, MS3393, MS3592,MS3593,MS3396,MS3596,MS3395,MS3595, CS3266,CS3296, CS3265,CS3295,MS3390A,MS3390B, MS3390C,CS3260A,CS3260B, MS3590A,MS3590B,MS3590C, CS3260C,CS3290A,CS3290B,CS3290C

(B) POWER SUPPLY: DC 3.7V (Battery) or DC 5V(USB)

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 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 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 ACCURATE TECHNOLOGY CO. LTD.

Date of Test : May 25-30,2015

Date of Report : Jun 01,2015

Prepared by :



(Eric Zhang, Engineer)

Approved & Authorized Signer :



(Sean Liu, Manager)

1. GENERAL INFORMATION

1.1. Description of Device (EUT)

EUT	:	Barcode Scanner
Model Number	:	MS3390,CS3260,CS3290,CS3261,CS3291,MS3590,MS3391,MS3591,CS3262,CS3292,CS3263,CS3293,MS3392,MS3393,MS3592,MS3593,MS3396,MS3596,MS3395,MS3595,CS3266,CS3296,CS3265,CS3295,MS3390A,MS3390B,MS3390C,CS3260A,CS3260B,MS3590A,MS3590B,MS3590C,CS3260C,CS3290A,CS3290B,CS3290C (Note: These samples are same except for the model number and colors are different for the marketing requirement. So we prepare the MS3390 for test.)
Frequency Band	:	2402MHz-2480MHz
Number of Channels	:	79
Bluetooth Version	:	2.1+EDR
Modulation type	:	GFSK, $\Pi/4$ -DQPSK, 8DPSK
Antenna Gain	:	0dBi
Power Supply	:	DC 3.7V (Battery) or DC 5V(USB)
Applicant	:	Shenzhen Minde Electronics Technology LTD.
Address	:	5th Floor, Section 1,25th Block,No.5,Keji Xi Road, Keji Yuan, Nanshan District, Shenzhen, P.R. China
Manufacturer	:	Shenzhen Minde Electronics Technology LTD.
Address	:	5th Floor, Section 1,25th Block,No.5,Keji Xi Road, Keji Yuan, Nanshan District, Shenzhen, P.R. China
Date of sample received	:	May 25, 2015
Date of Test	:	May 25-30,2015

1.2. Description of Test Facility

EMC Lab	:	Accredited by TUV Rheinland Shenzhen
		Listed by FCC
		The Registration Number is 752051
		Listed by Industry Canada
		The Registration Number is 5077A-2
		Accredited by China National Accreditation Committee for Laboratories
		The Certificate Registration Number is L3193
Name of Firm	:	ACCURATE TECHNOLOGY CO. LTD
Site Location	:	F1, Bldg. A, Changyuan New Material Port, Keyuan Rd. Science & Industry Park, Nanshan, Shenzhen, Guangdong P.R. China

1.3. 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	Cal. Interval
EMI Test Receiver	Rohde&Schwarz	ESCS30	100307	Jan. 11, 2015	One Year
EMI Test Receiver	Rohde&Schwarz	ESPI3	101526/003	Jan. 11, 2015	One Year
Spectrum Analyzer	Agilent	E7405A	MY45115511	Jan. 11, 2015	One Year
Pre-Amplifier	Rohde&Schwarz	CBLU118354 0-01	3791	Jan. 11, 2015	One Year
Loop Antenna	Schwarzbeck	FMZB1516	1516131	Jan. 15, 2015	One Year
Bilog Antenna	Schwarzbeck	VULB9163	9163-323	Jan. 15, 2015	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-655	Jan. 15, 2015	One Year
Horn Antenna	Schwarzbeck	BBHA9120D	9120D-1067	Jan. 15, 2015	One Year
LISN	Rohde&Schwarz	ESH3-Z5	100305	Jan. 11, 2015	One Year
LISN	Schwarzbeck	NSLK8126	8126431	Jan. 11, 2015	One Year
Highpass Filter	Wainwright Instruments	WHKX3.6/18 G-10SS	N/A	Jan. 11, 2015	One Year
Band Reject Filter	Wainwright Instruments	WRCG2400/2 485-2375/2510 -60/11SS	N/A	Jan. 11, 2015	One Year

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

EUT

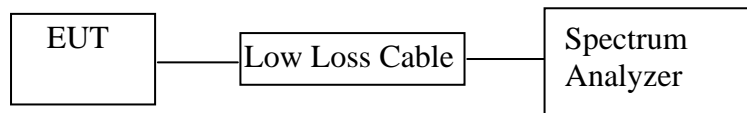
(EUT: Barcode Scanner)

4. TEST PROCEDURES AND RESULTS

FCC Rules	Description of Test	Result
Section 15.207	Conducted Emission Test	Compliant
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 15.203	Antenna Requirement	Compliant

5. 20DB BANDWIDTH TEST

5.1. Block Diagram of Test Setup



(EUT: Barcode Scanner)

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 30 kHz and VBW to 100 kHz.

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

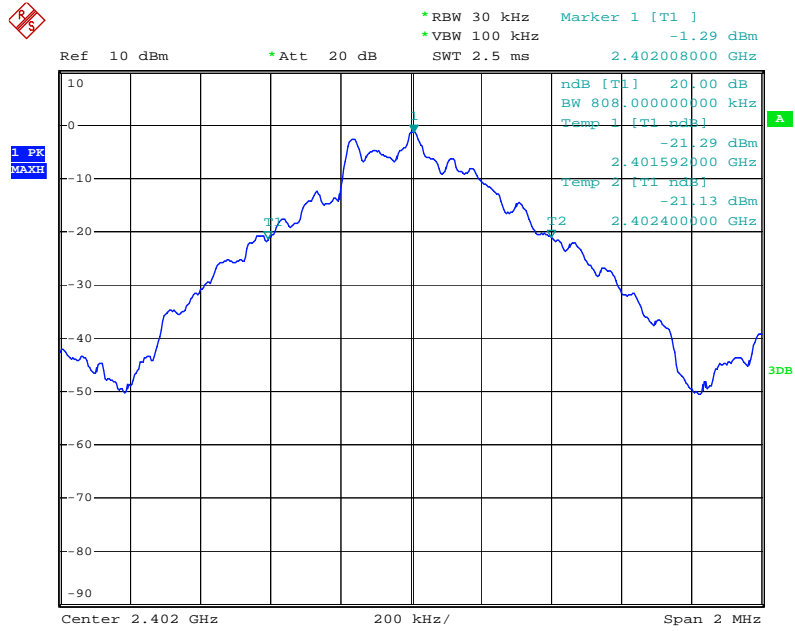
5.6. Test Result

Channel	Frequency (MHz)	GFSK 20dB Bandwidth (MHz)	$\Pi/4$ -DQPSK 20dB Bandwidth (MHz)	8DPSK 20dB Bandwidth (MHz)	Result
Low	2402	0.808	1.228	1.152	Pass
Middle	2441	0.808	1.224	1.152	Pass
High	2480	0.844	1.224	1.148	Pass

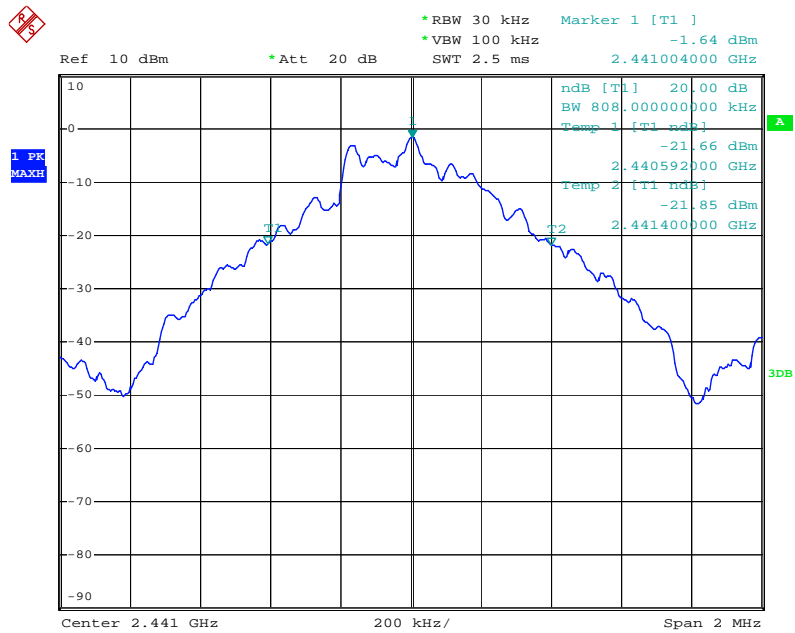
The spectrum analyzer plots are attached as below.

GFSK Mode

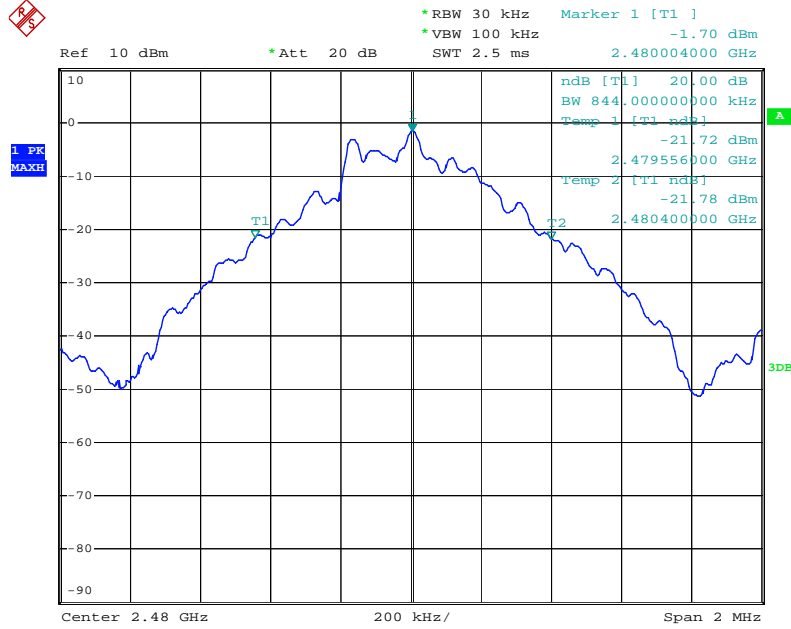
Low channel



Middle channel

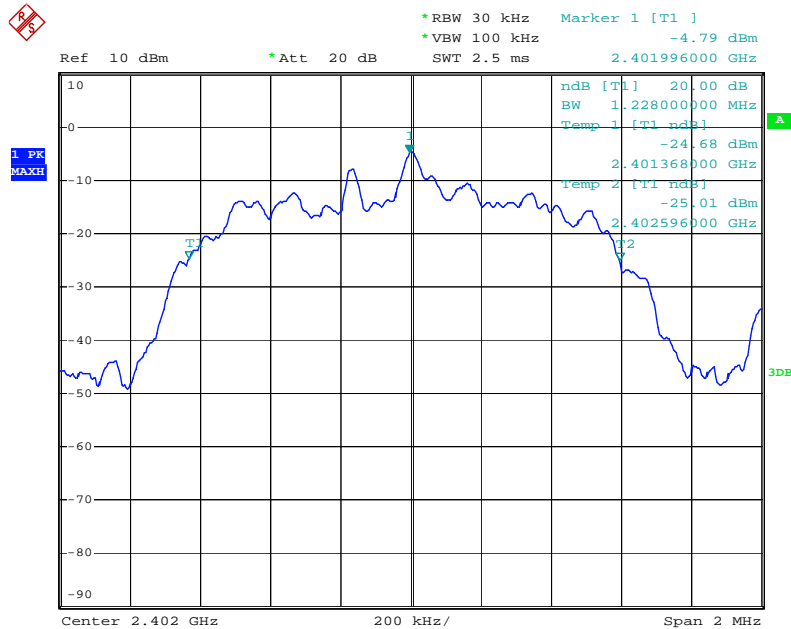


High channel

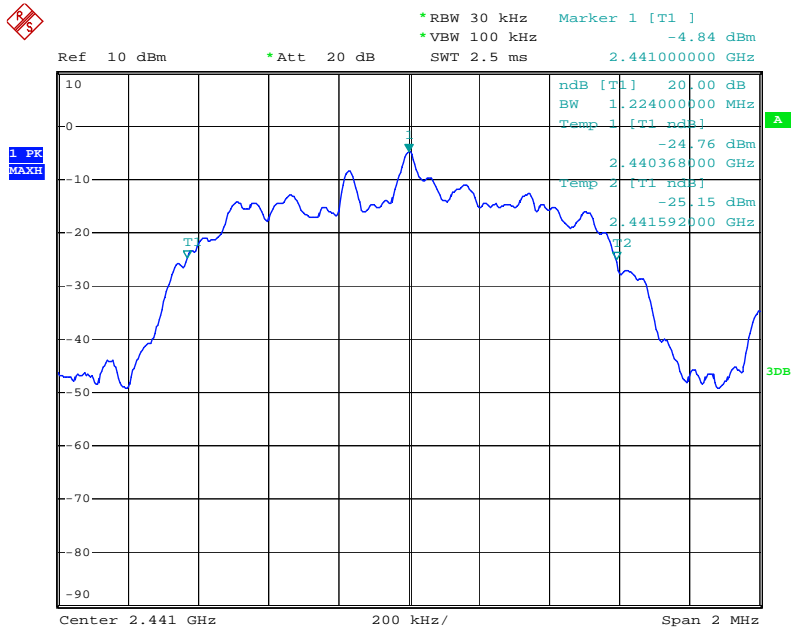


Π/4-DQPSK Mode

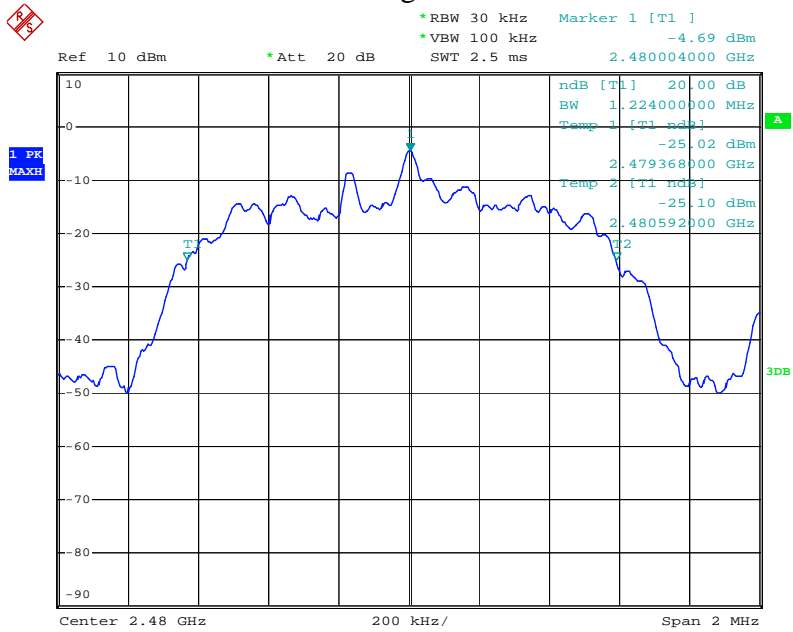
Low channel



Middle channel

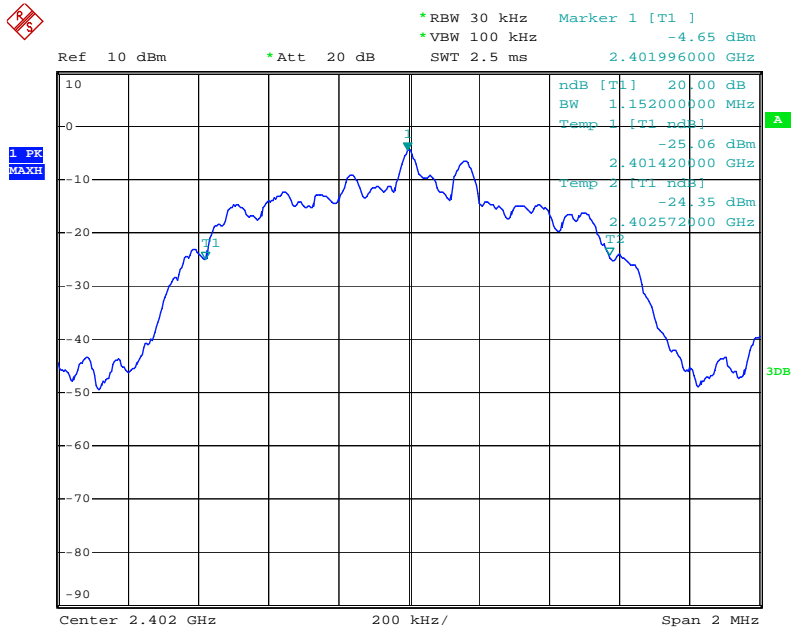


High channel

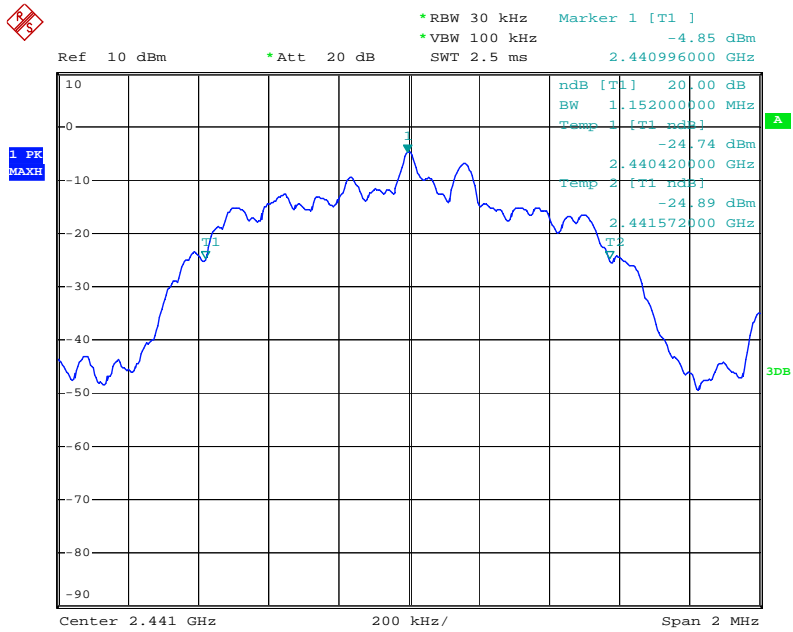


8DPSK Mode

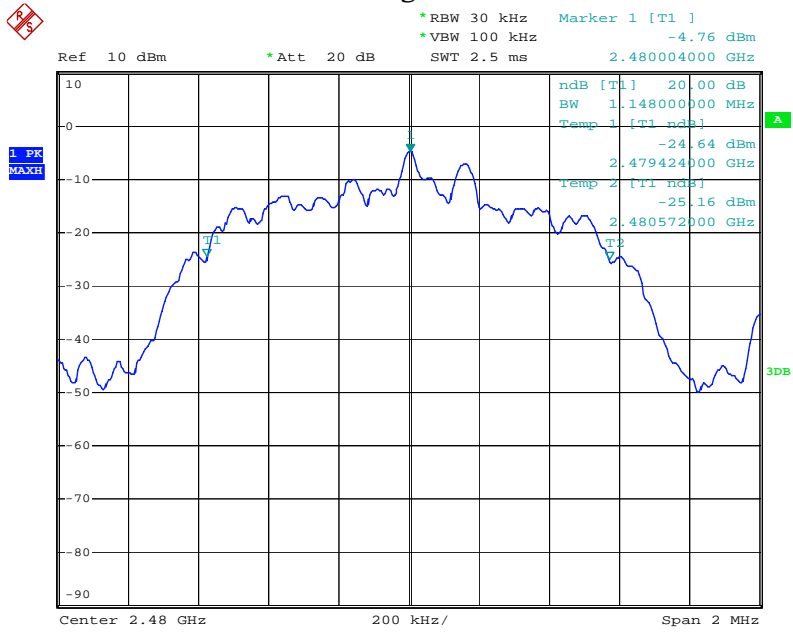
Low channel



Middle channel

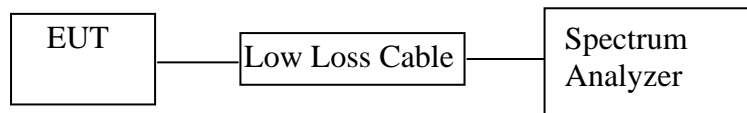


High channel



6. CARRIER FREQUENCY SEPARATION TEST

6.1. Block Diagram of Test Setup



(EUT: Barcode Scanner)

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 pseudorandomly 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

GFSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.000	25KHz or 20dB bandwidth	PASS
	2403			
Middle	2440	1.000	25KHz or 20dB bandwidth	PASS
	2441			
High	2479	1.000	25KHz or 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			

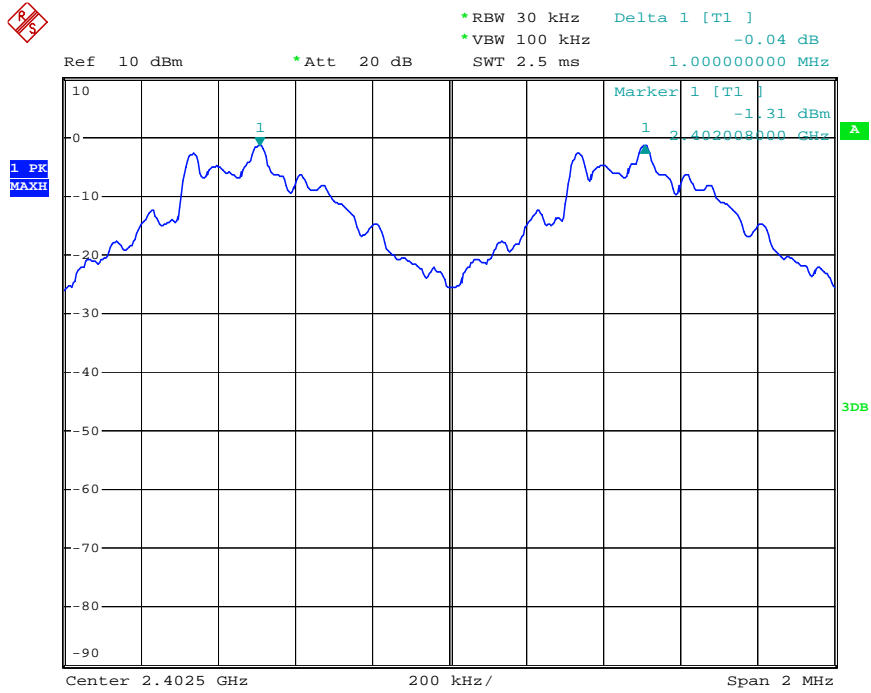
8DPSK

Channel	Frequency (MHz)	Channel Separation(MHz)	Limit (MHz)	Result
Low	2402	1.000	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			

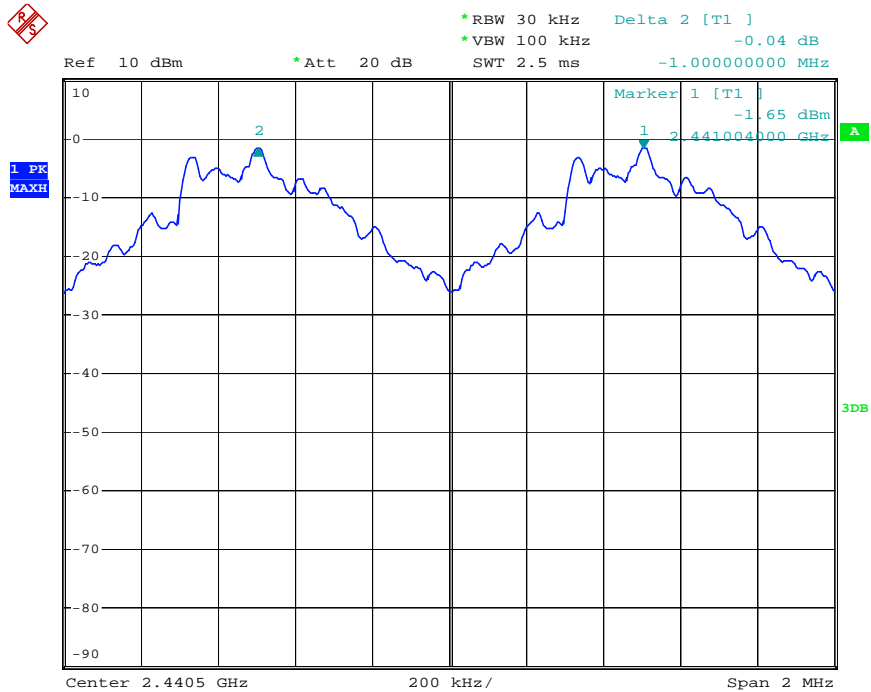
The spectrum analyzer plots are attached as below.

GFSK Mode

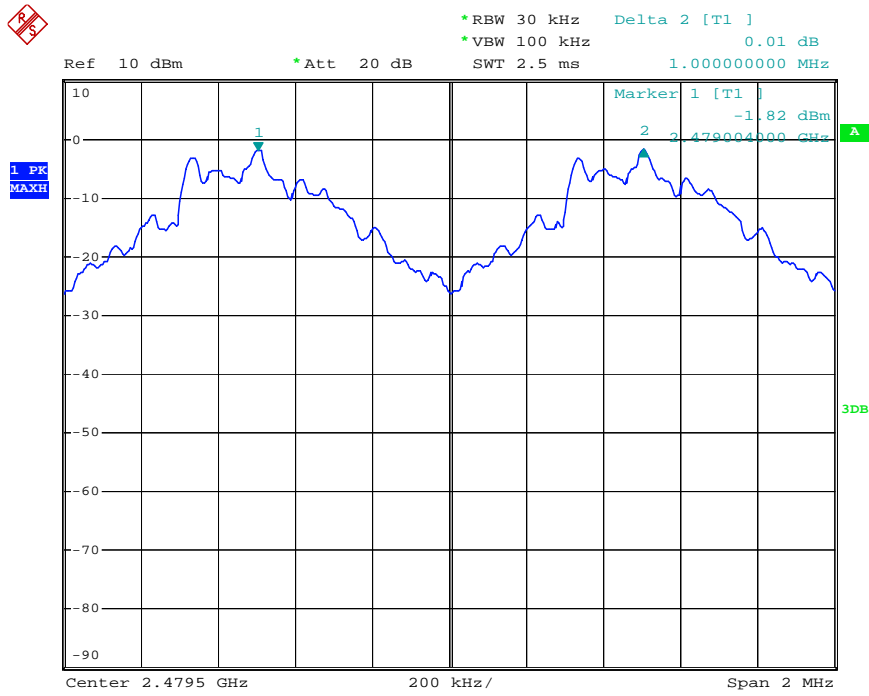
Low channel



Middle channel

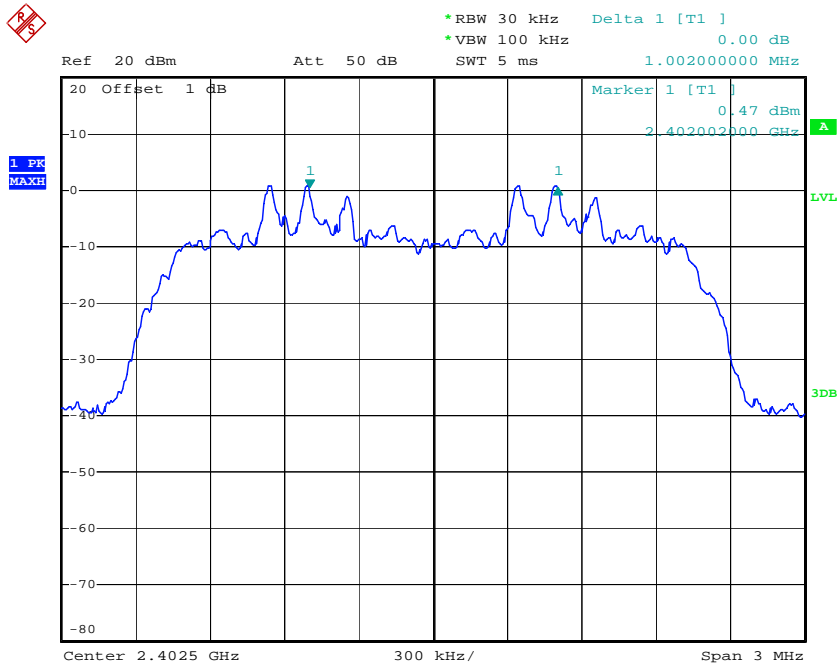


High channel

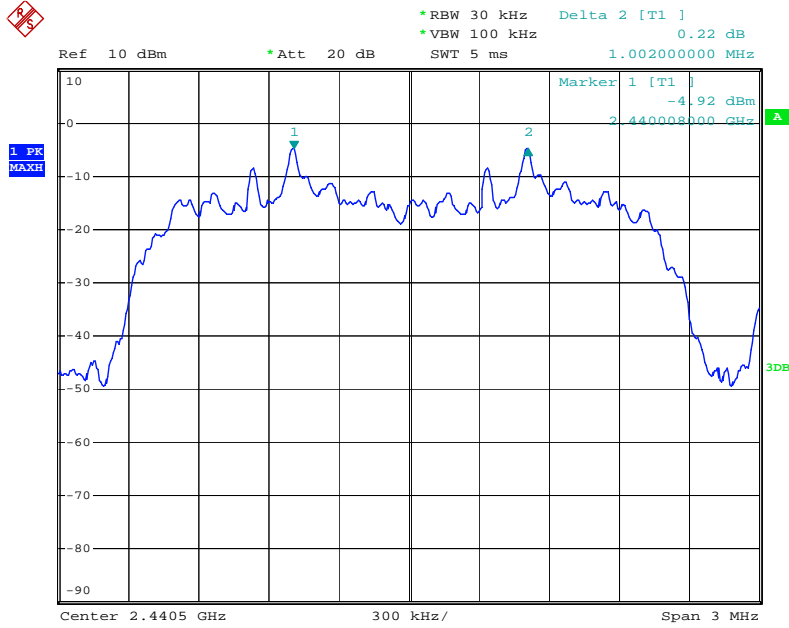


Π/4-DQPSK Mode

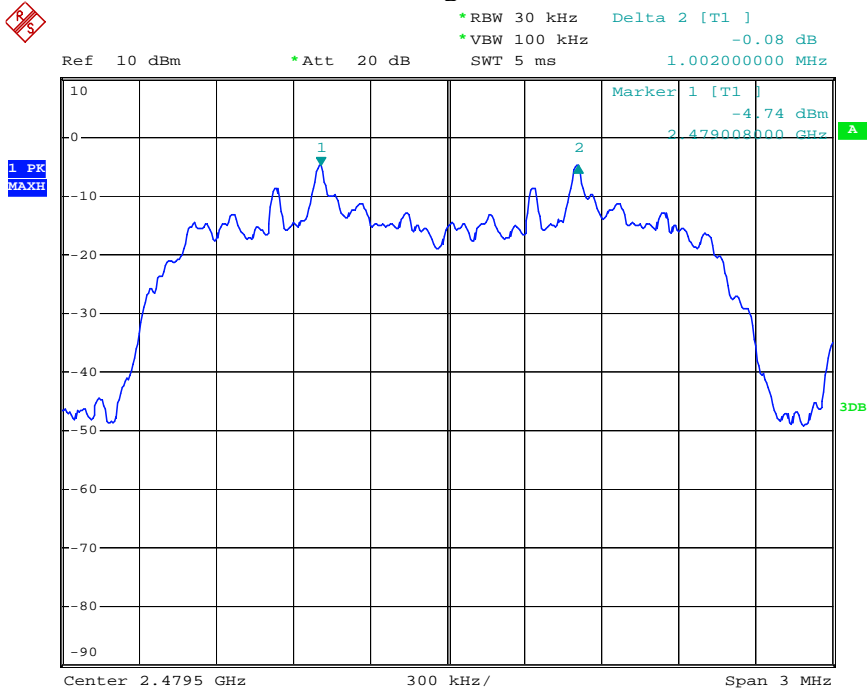
Low channel



Middle channel

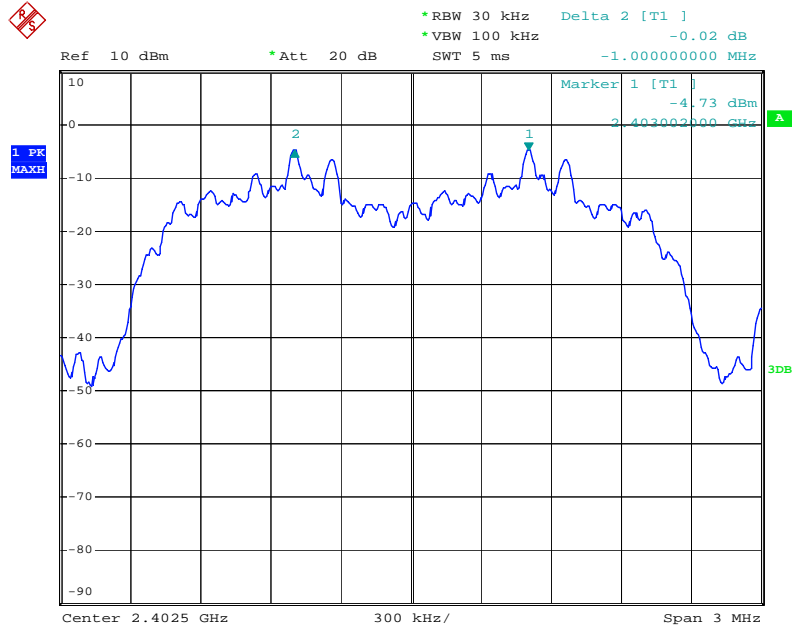


High channel

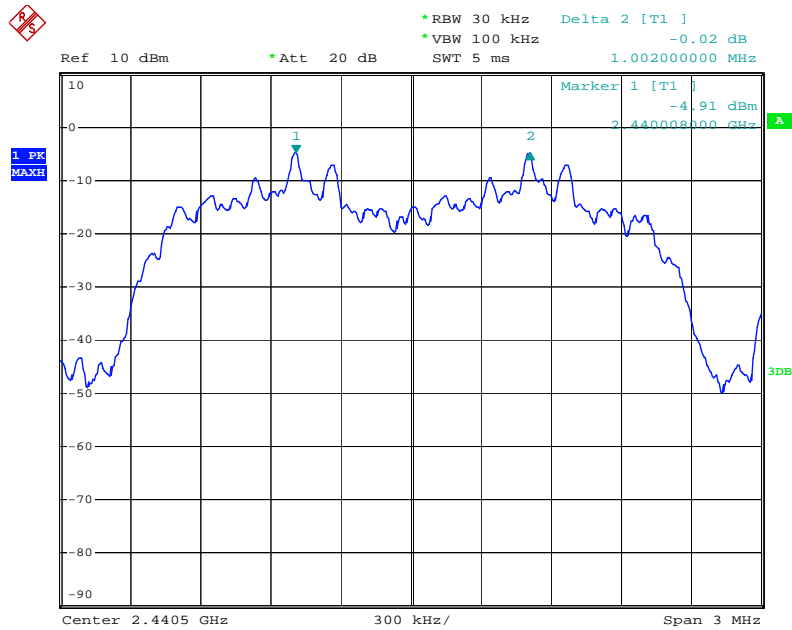


8DPSK Mode

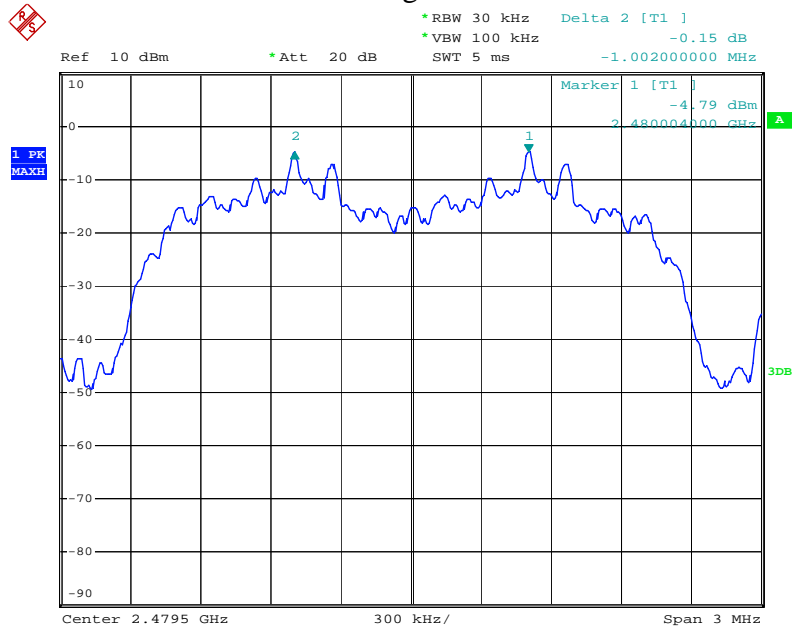
Low channel



Middle channel

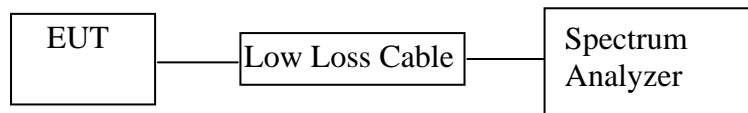


High channel



7. NUMBER OF HOPPING FREQUENCY TEST

7.1. Block Diagram of Test Setup



(EUT: Barcode Scanner)

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.

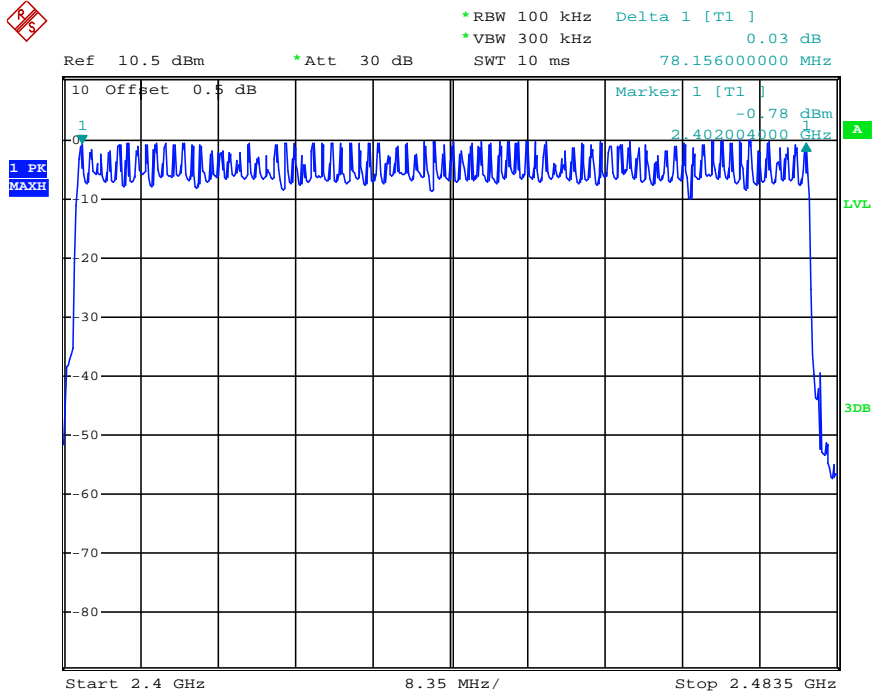
7.4. Operating Condition of EUT

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

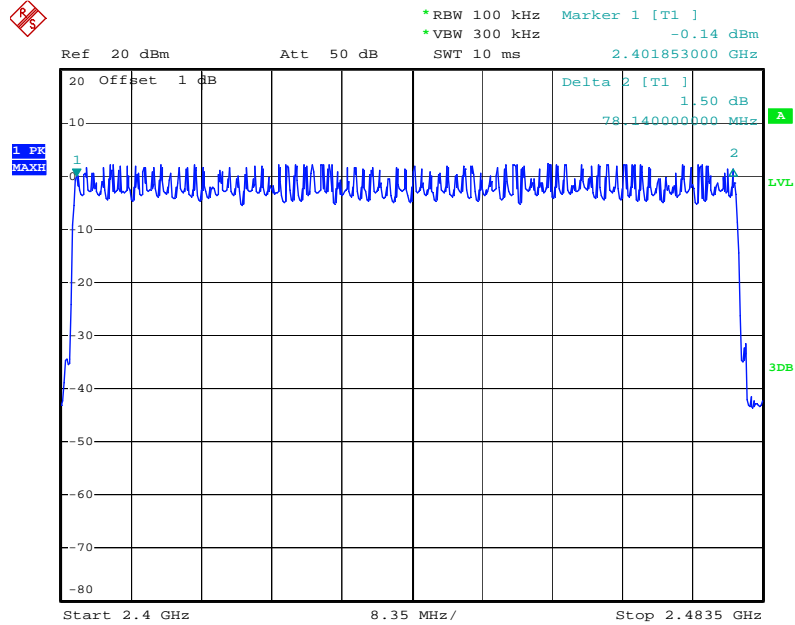
7.4.2. Turn on the power of all equipment.

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

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

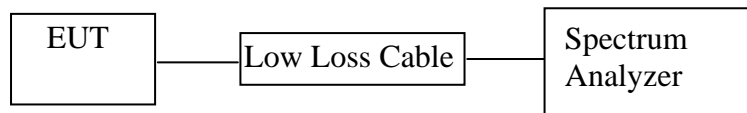


Number of hopping channels(8DPSK)



8. DWELL TIME TEST

8.1. Block Diagram of Test Setup



(EUT: Barcode Scanner)

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

8.6. Test Result

GFSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.530	169.60	400
	2441	0.530	169.60	400
	2480	0.530	169.60	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
DH3	2402	1.790	286.40	400
	2441	1.800	288.00	400
	2480	1.790	286.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
DH5	2402	3.070	327.47	400
	2441	3.070	327.47	400
	2480	3.070	327.47	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				

Π/4-DQPSK

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.545	174.40	400
	2441	0.545	174.40	400
	2480	0.545	174.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
DH3	2402	1.315	210.40	400
	2441	1.325	212.00	400
	2480	1.325	212.00	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
DH5	2402	3.495	372.80	400
	2441	3.075	328.00	400
	2480	3.075	328.00	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				

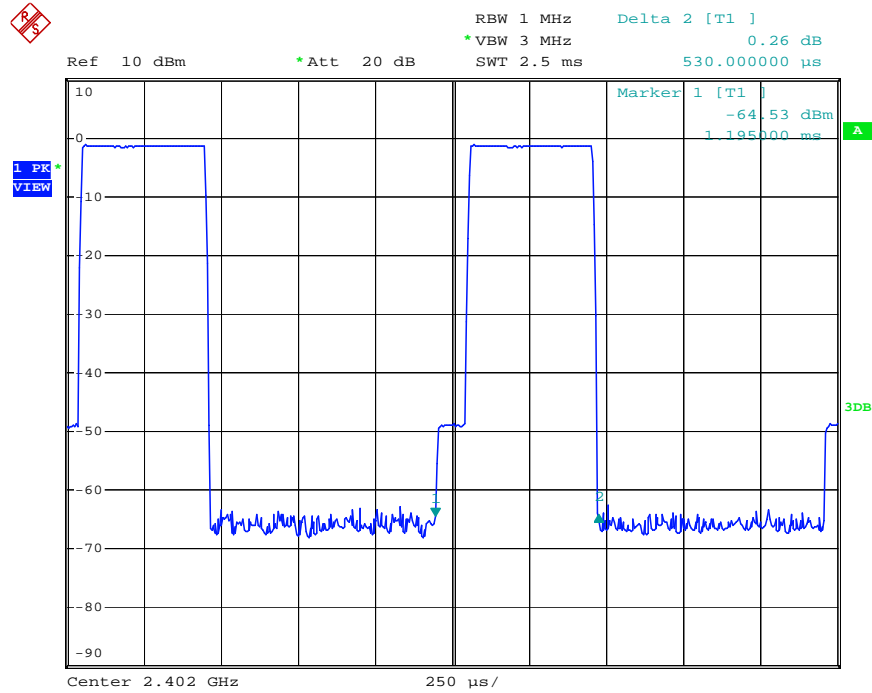
8DPSK Mode

Mode	Channel Frequency (MHz)	Pulse Time (ms)	Dwell Time (ms)	Limit (ms)
DH1	2402	0.540	172.80	400
	2441	0.540	172.80	400
	2480	0.545	174.40	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(2*79)) \times 31.6$				
DH3	2402	1.890	302.40	400
	2441	1.815	290.40	400
	2480	1.805	288.80	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(4*79)) \times 31.6$				
DH5	2402	3.075	328.00	400
	2441	3.095	330.13	400
	2480	3.080	328.53	400
A period transmit time = $0.4 \times 79 = 31.6$ Dwell time = pulse time $\times (1600/(6*79)) \times 31.6$				

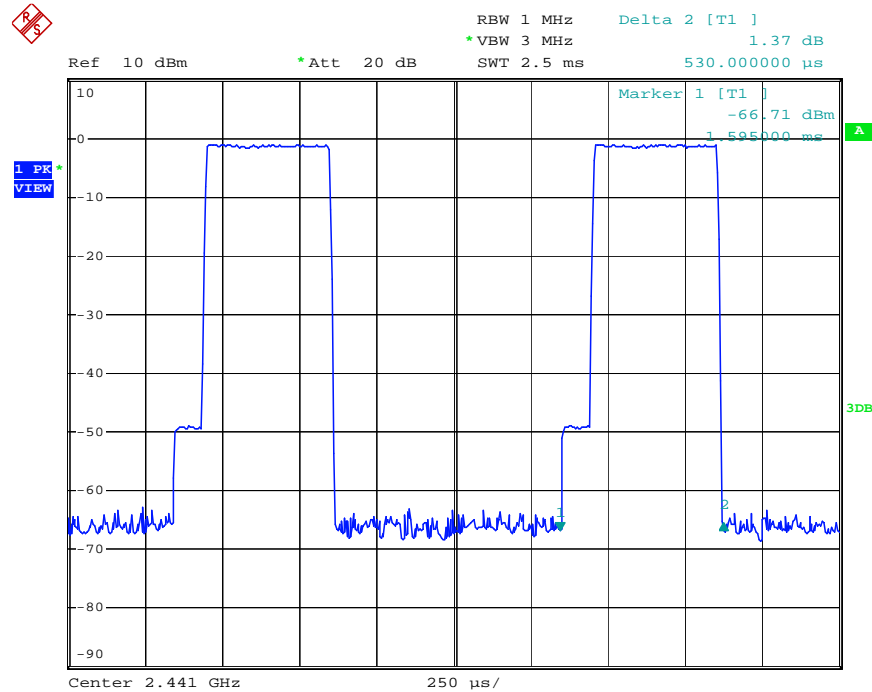
The spectrum analyzer plots are attached as below.

Mode 1: GFSK Link Mode

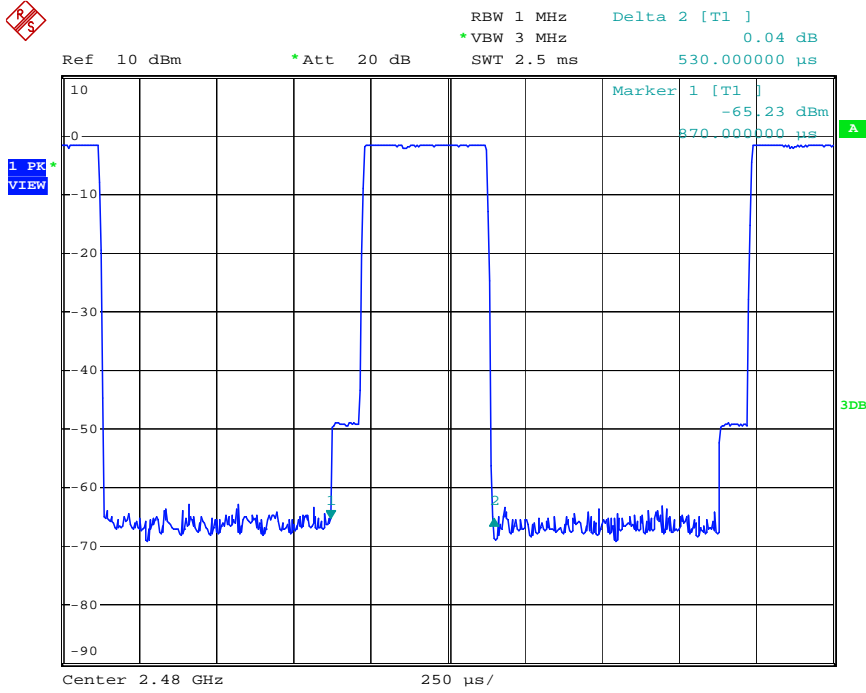
DH1 Low channel



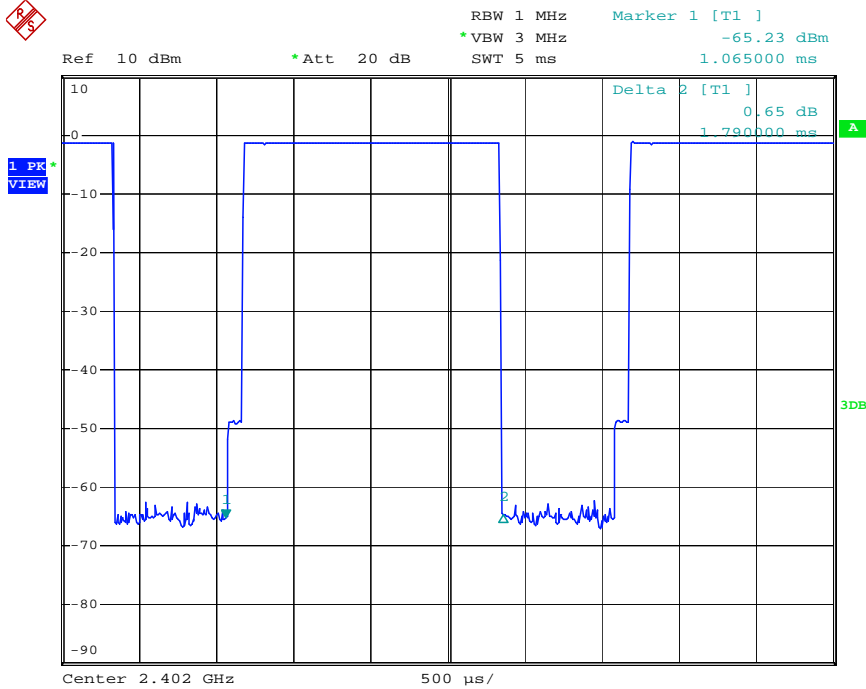
DH1 Middle channel



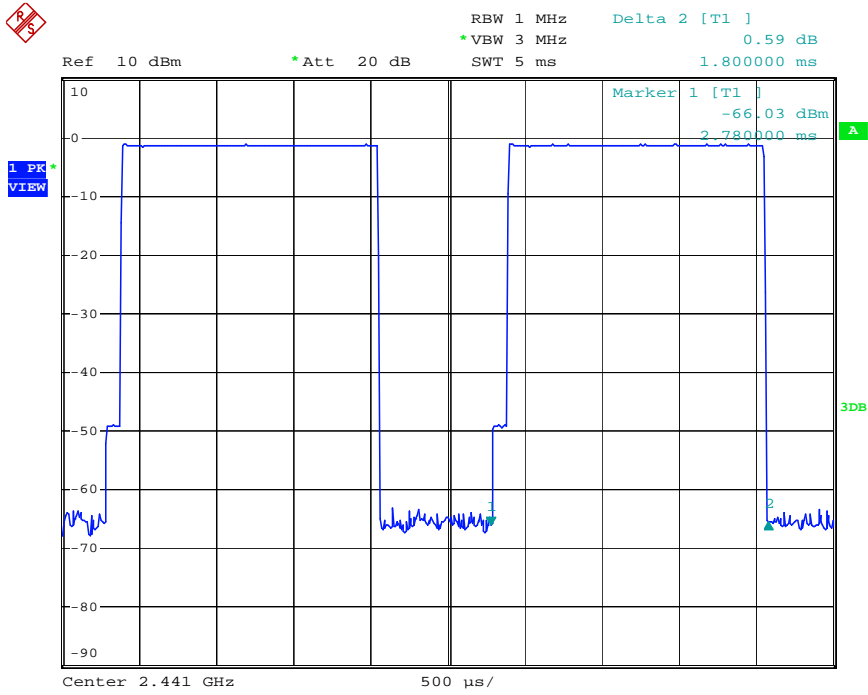
DH1 High channel



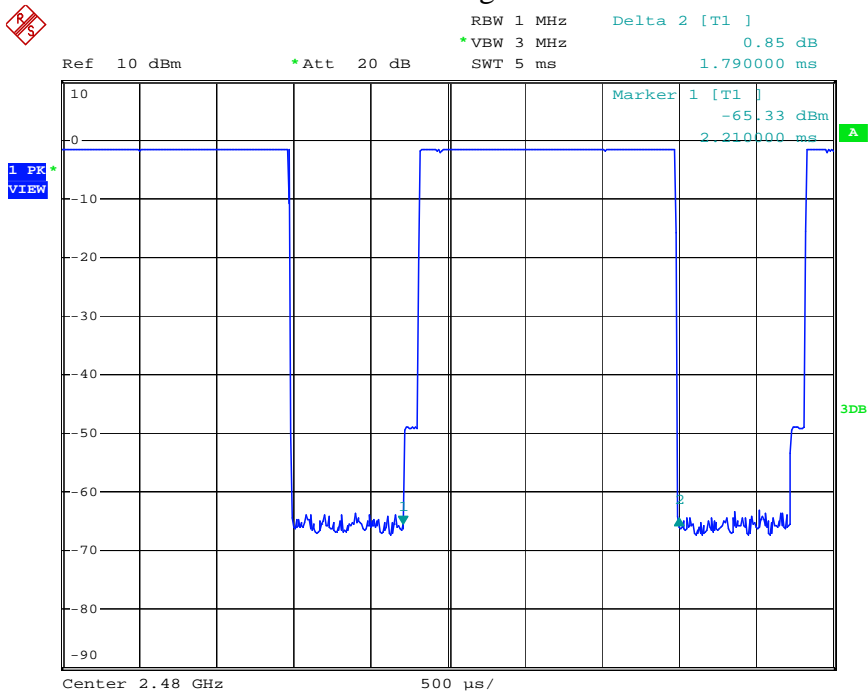
DH3 Low channel



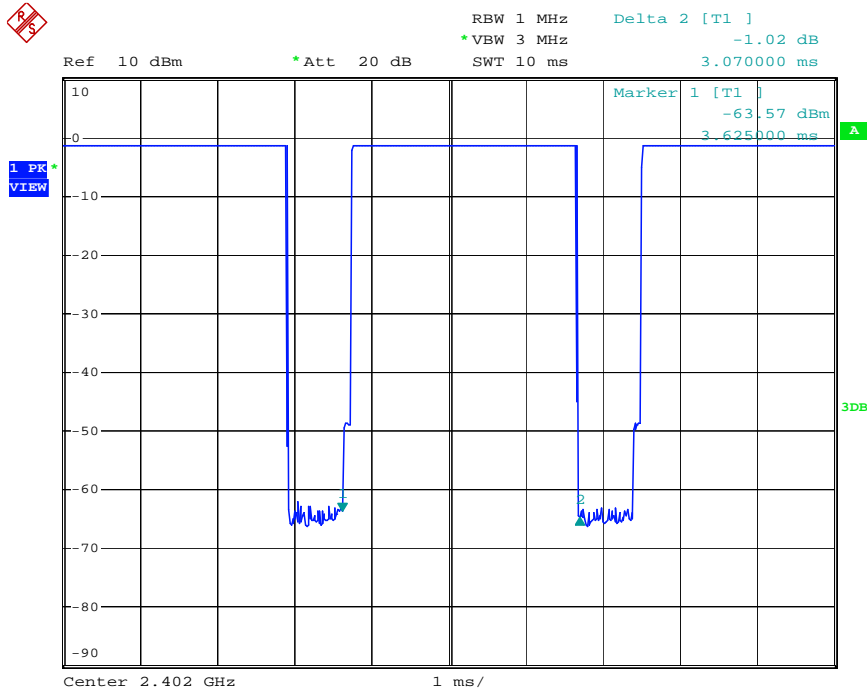
DH3 Middle channel



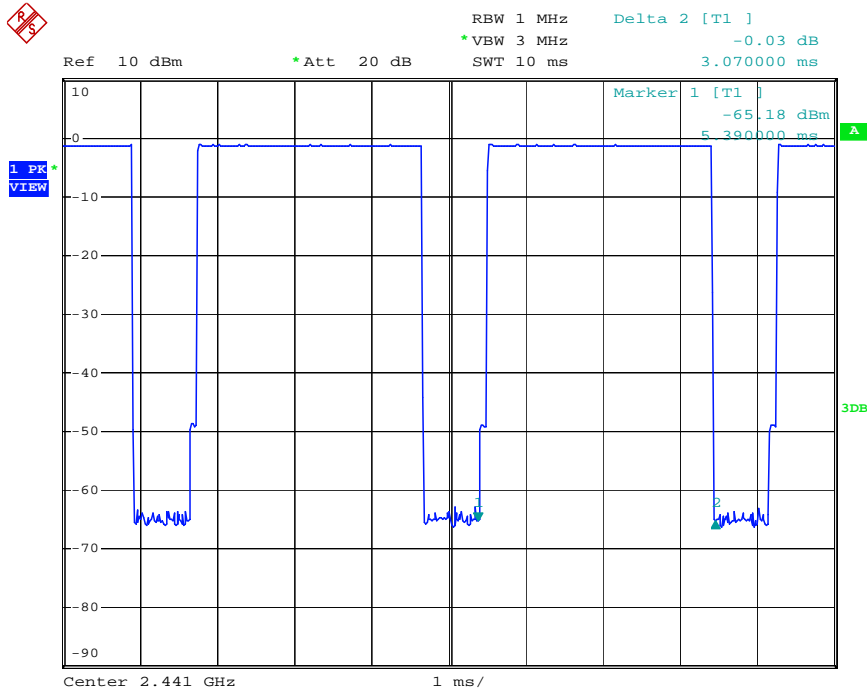
DH3 High channel



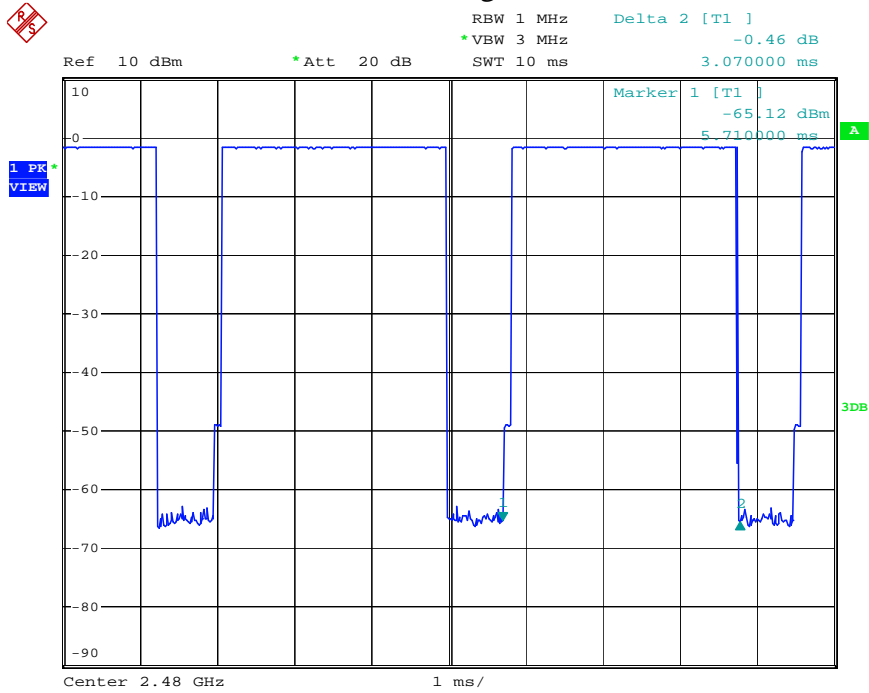
DH5 Low channel



DH5 Middle channel

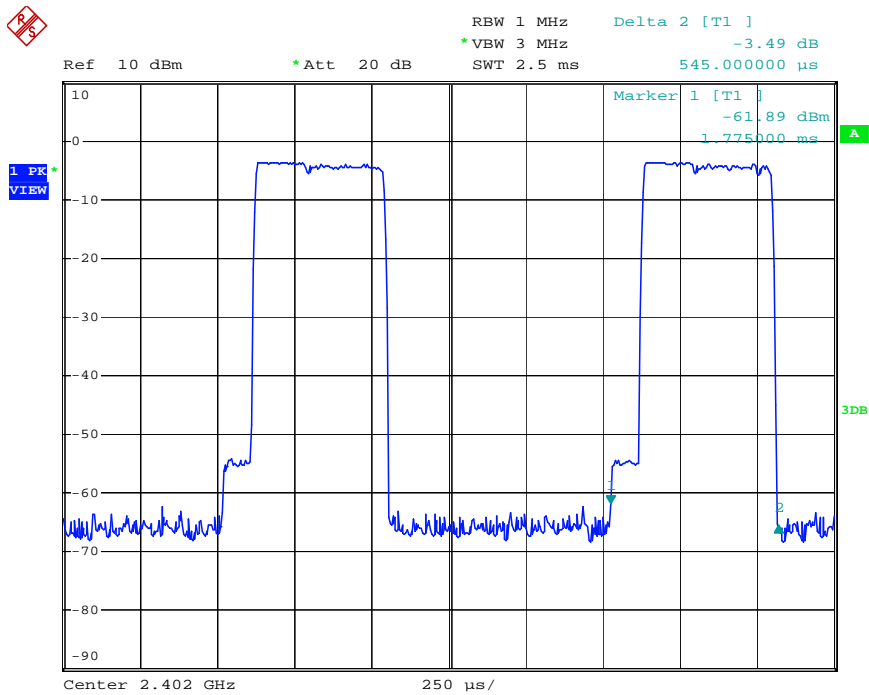


DH5 High channel

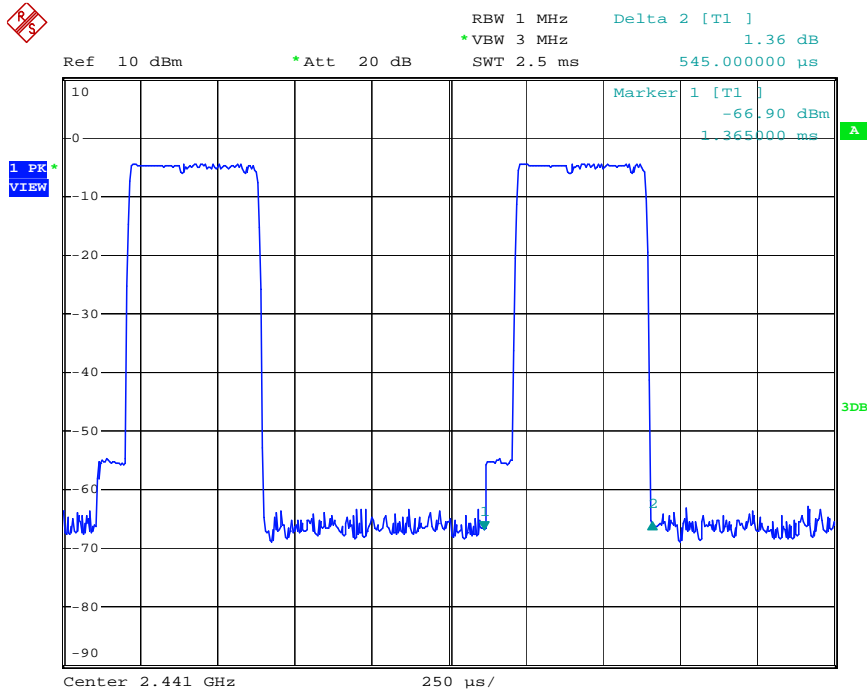


Mode 2: $\pi/4$ DQPSK Link Mode

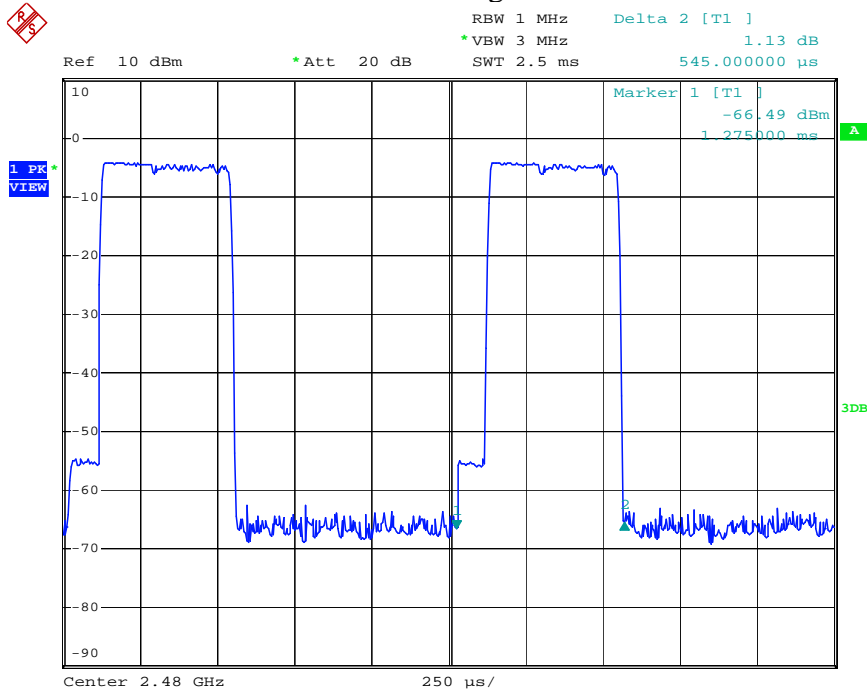
2DH1 Low channel



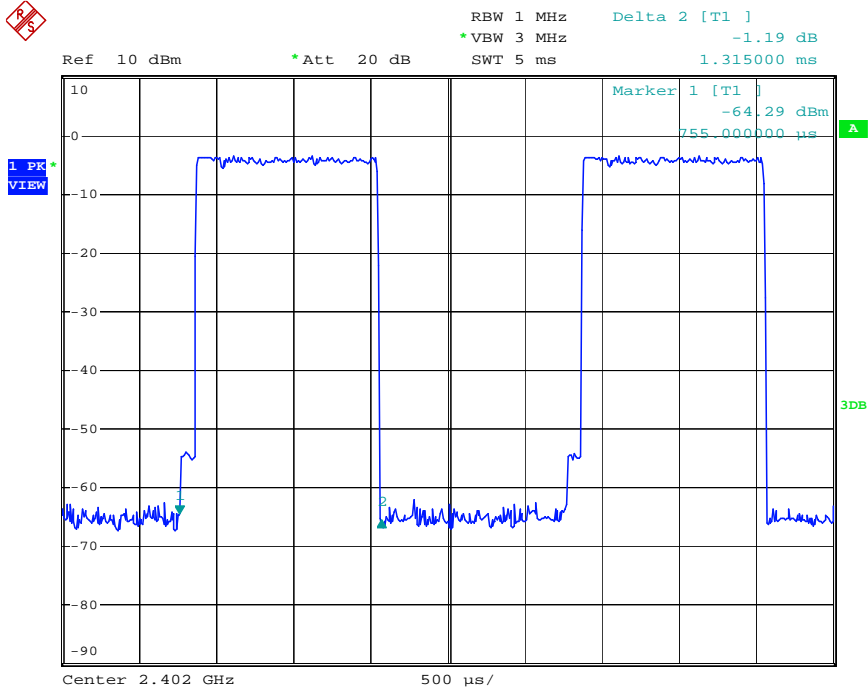
2DH1 Middle channel



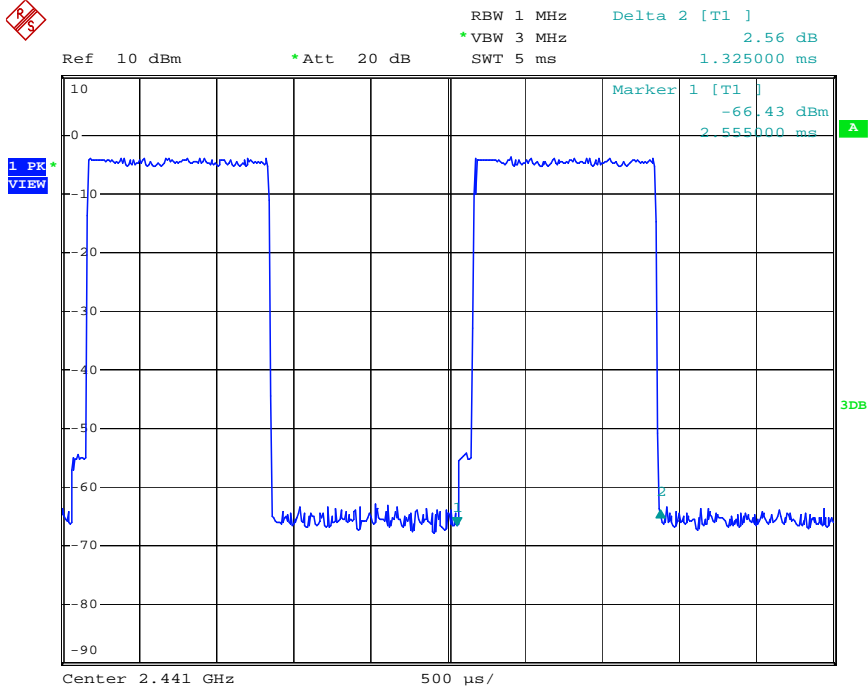
2DH1 High channel



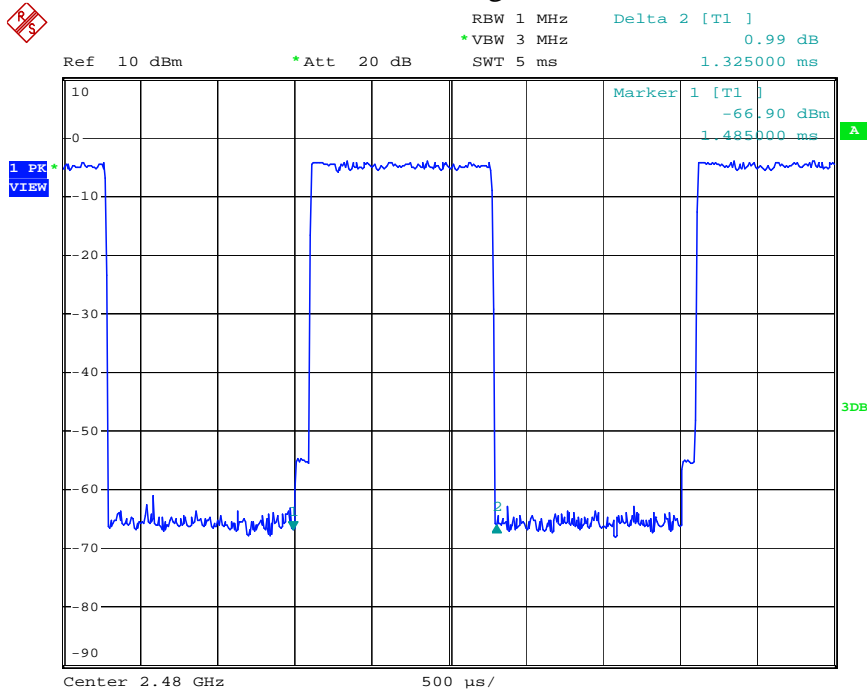
2DH3 Low channel



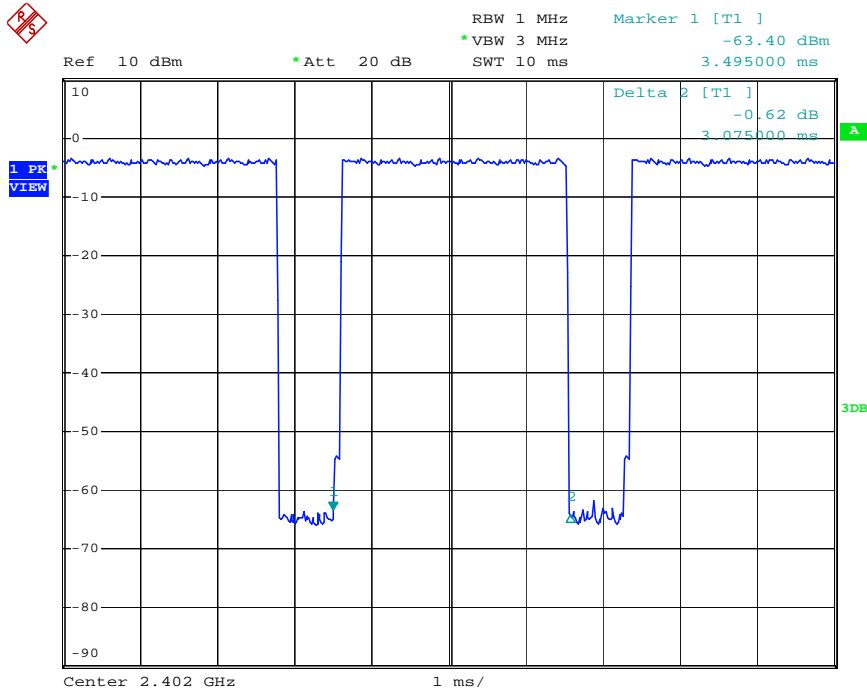
2DH3 Middle channel



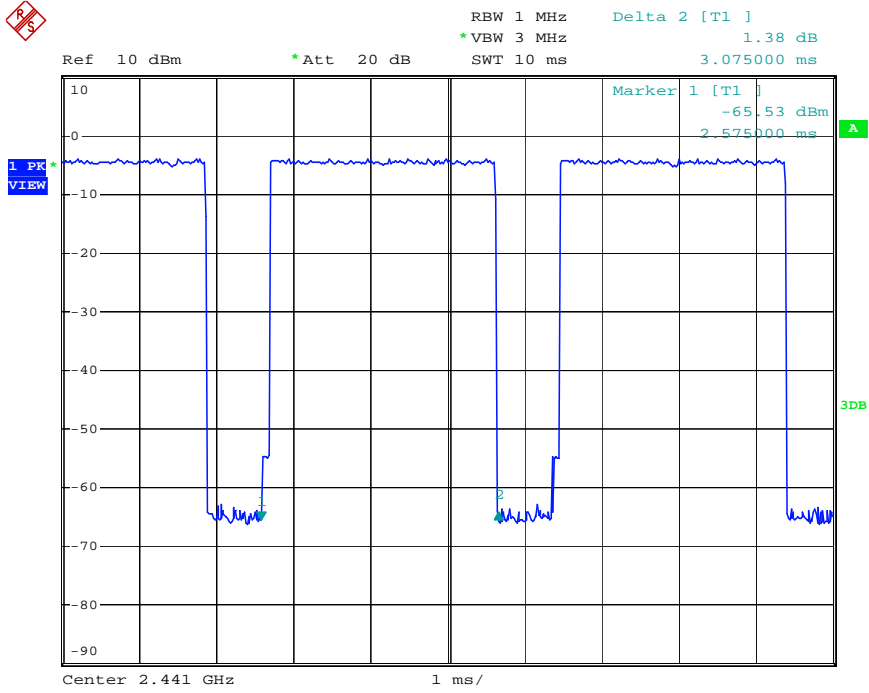
2DH3 High channel



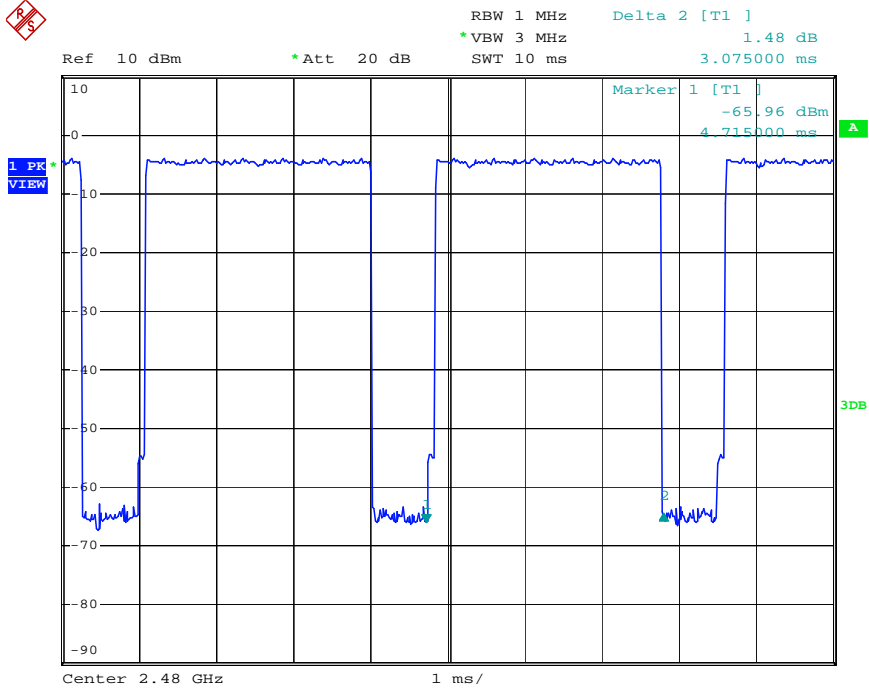
2DH5 Low channel



2DH5 Middle channel

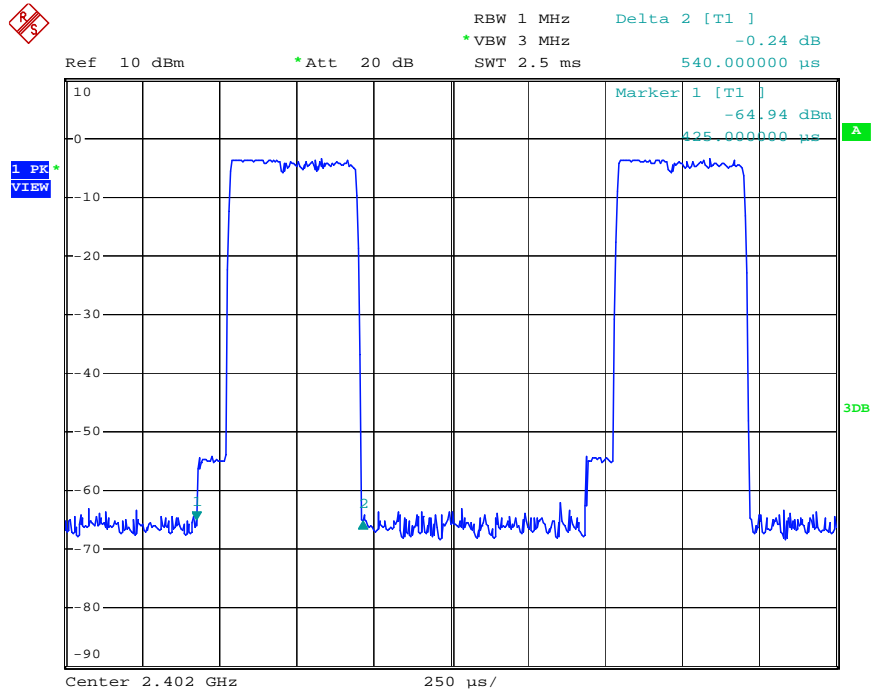


2DH5 High channel

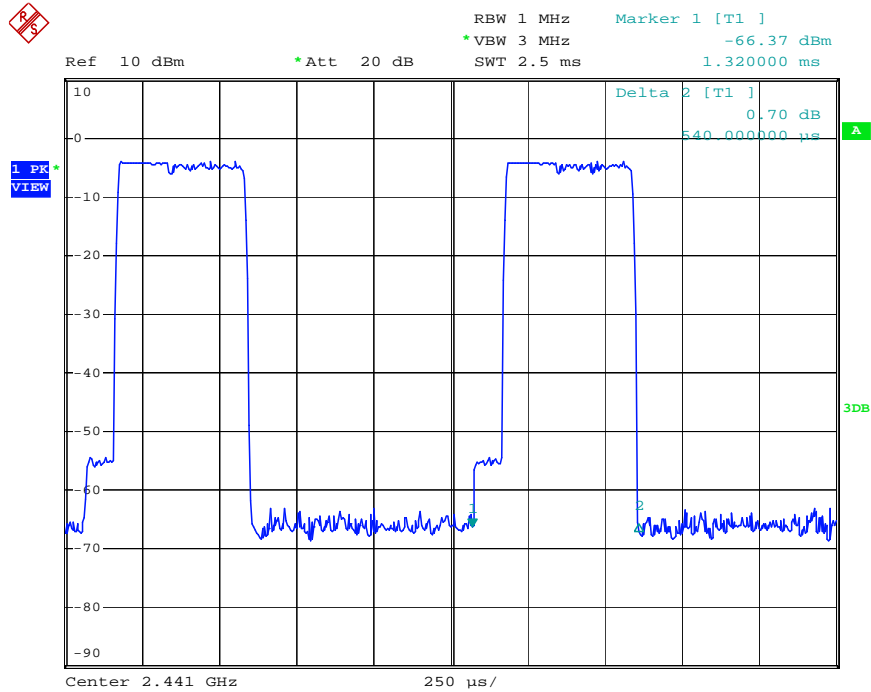


Mode 3: 8DPSK Link Mode

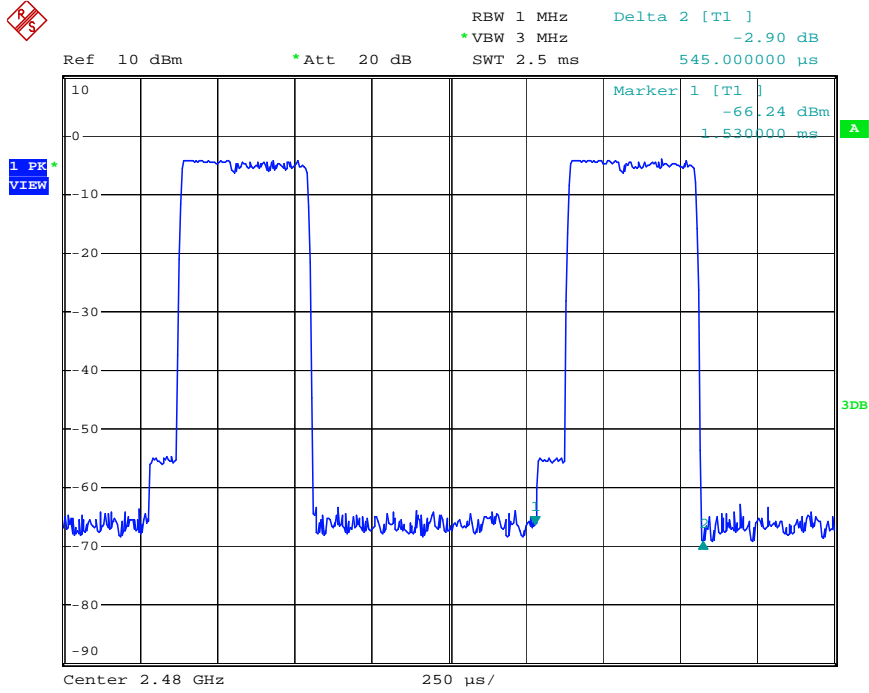
3DH1 Low channel



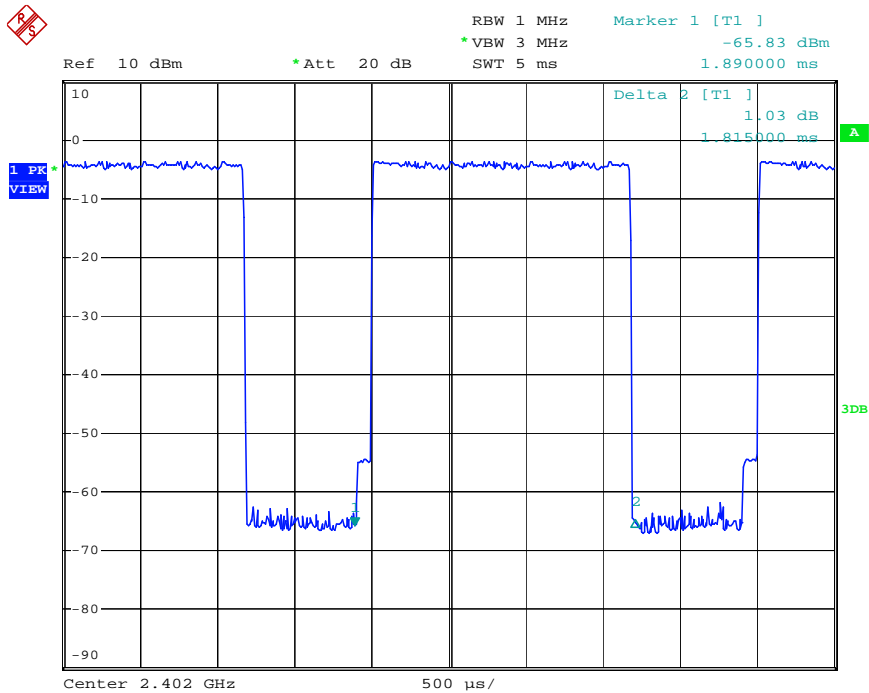
3DH1 Middle channel



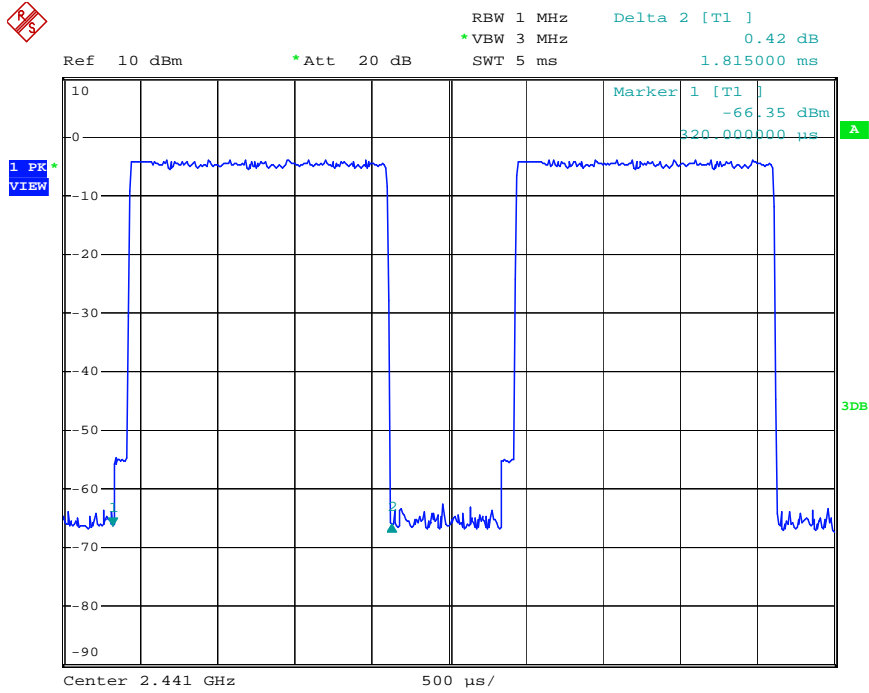
3DH1 High channel



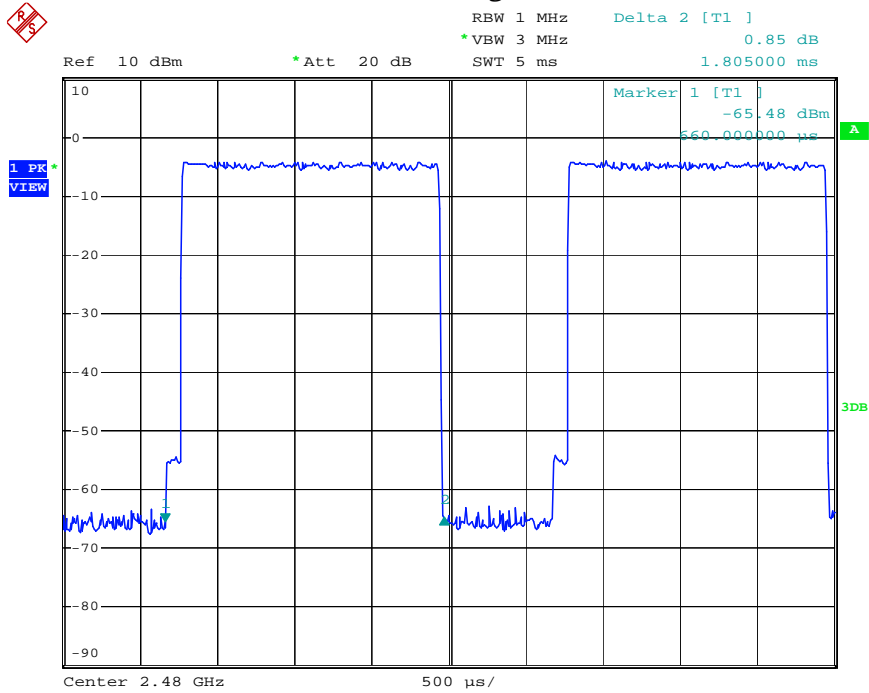
3DH3 Low channel



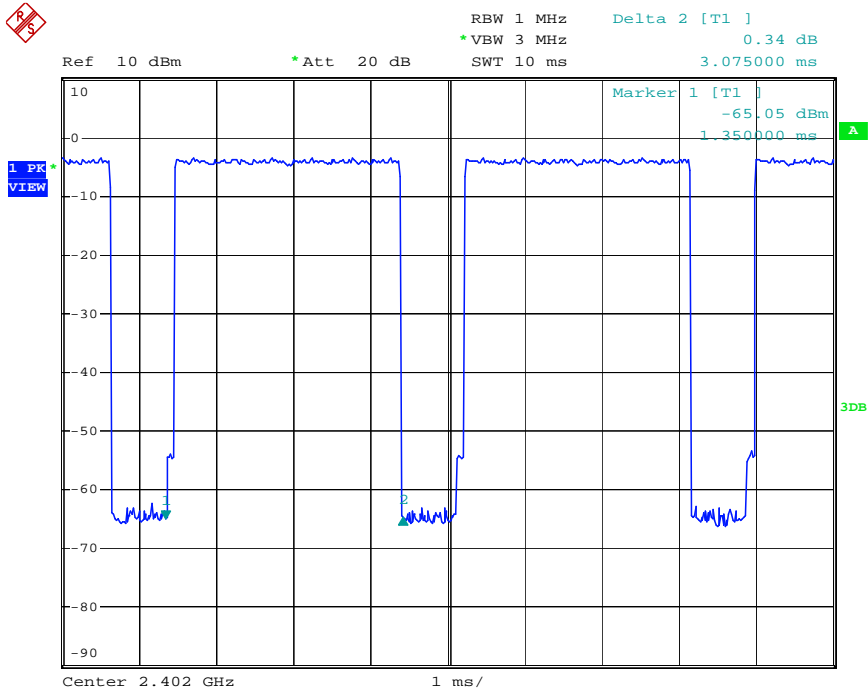
3DH3 Middle channel



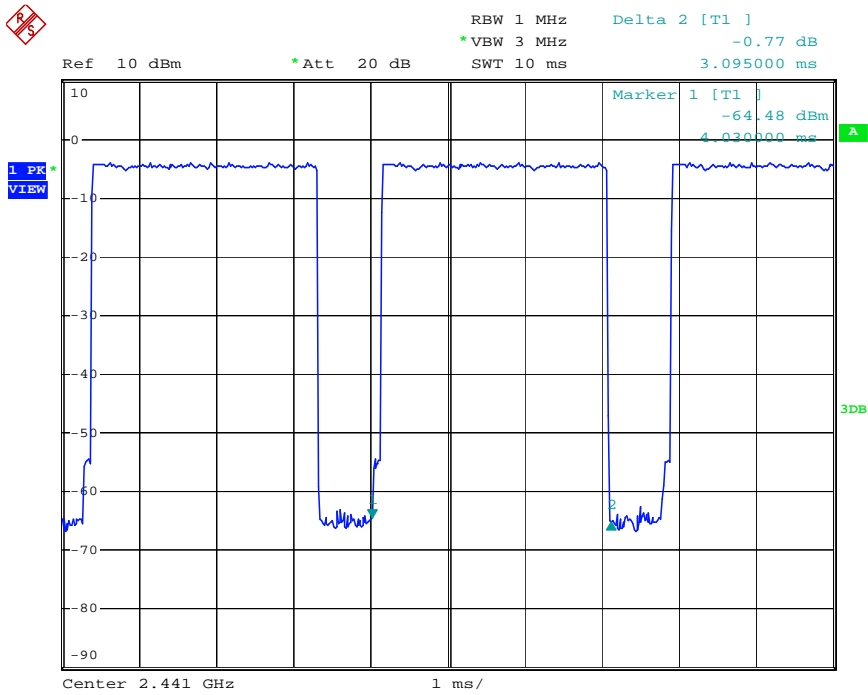
3DH3 High channel



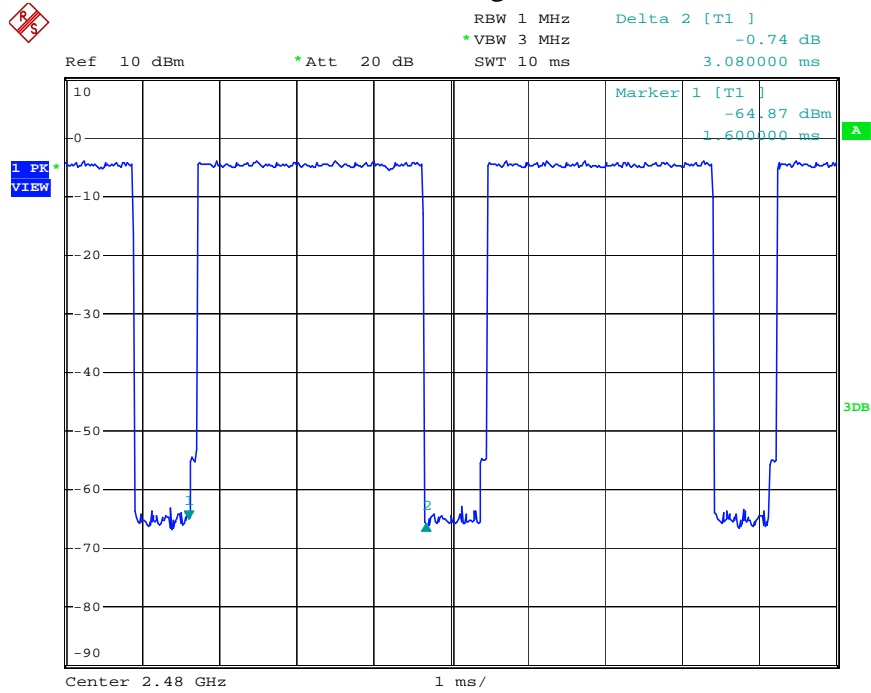
3DH5 Low channel



3DH5 Middle channel

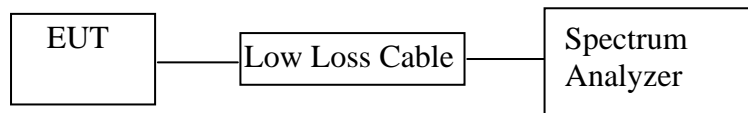


3DH5 High channel



9. MAXIMUM PEAK OUTPUT POWER TEST

9.1. Block Diagram of Test Setup



(EUT: Barcode Scanner)

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 1MHz and VBW to 3MHz for GFSK mode

9.5.3. Set RBW of spectrum analyzer to 3MHz and VBW to 3MHz for other mode

9.5.4. Measurement the maximum peak output power.

9.6. Test Result

GFSK Mode

Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)	Limits dBm / W
Low	2402	-0.66	0.86	30/1.0
Middle	2441	-0.19	0.96	30/1.0
High	2480	0.03	1.01	30/1.0

Π/4-DQPSK Mode

Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)	Limits dBm / W
Low	2402	-2.24	0.60	21 / 0.125
Middle	2441	-1.59	0.69	21 / 0.125
High	2480	-1.66	0.68	21 / 0.125

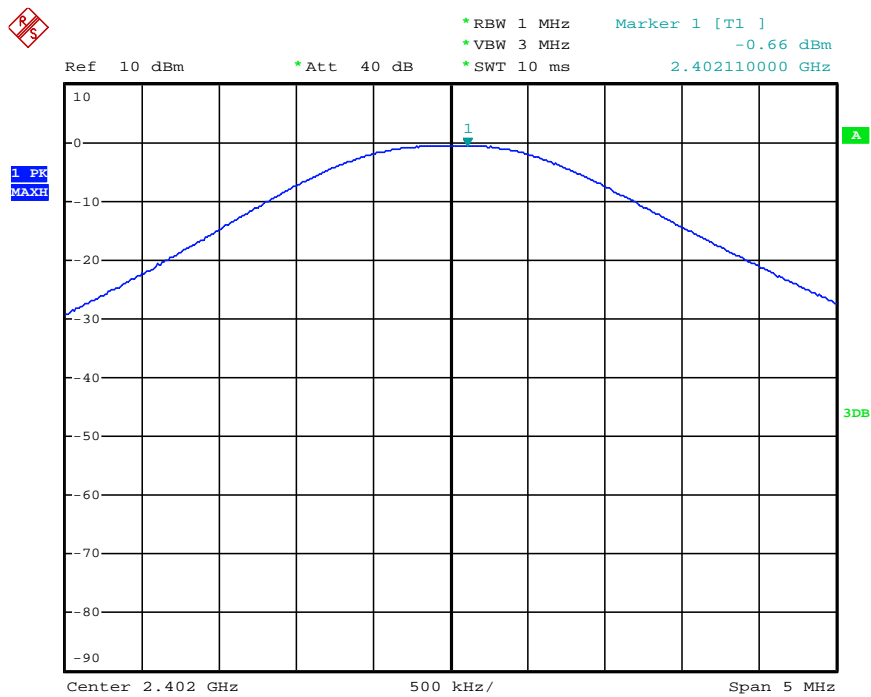
8DPSK Mode

Channel	Frequency (MHz)	Peak Output Power(dBm)	Peak Output Power(mW)	Limits dBm / W
Low	2402	-1.93	0.64	21 / 0.125
Middle	2441	-1.75	0.67	21 / 0.125
High	2480	-1.44	0.72	21 / 0.125

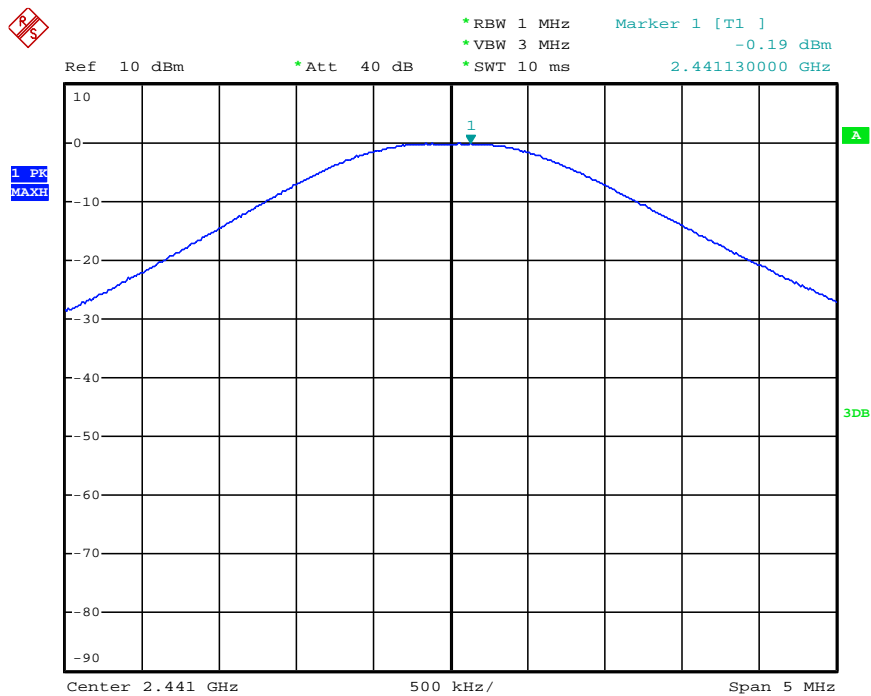
The spectrum analyzer plots are attached as below.

GFSK Mode

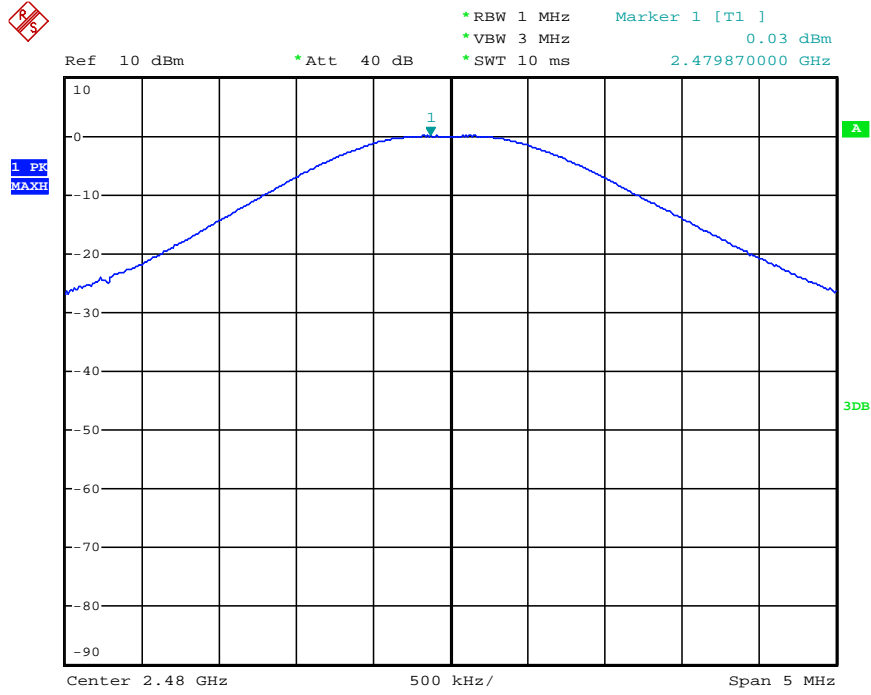
Low channel



Middle channel

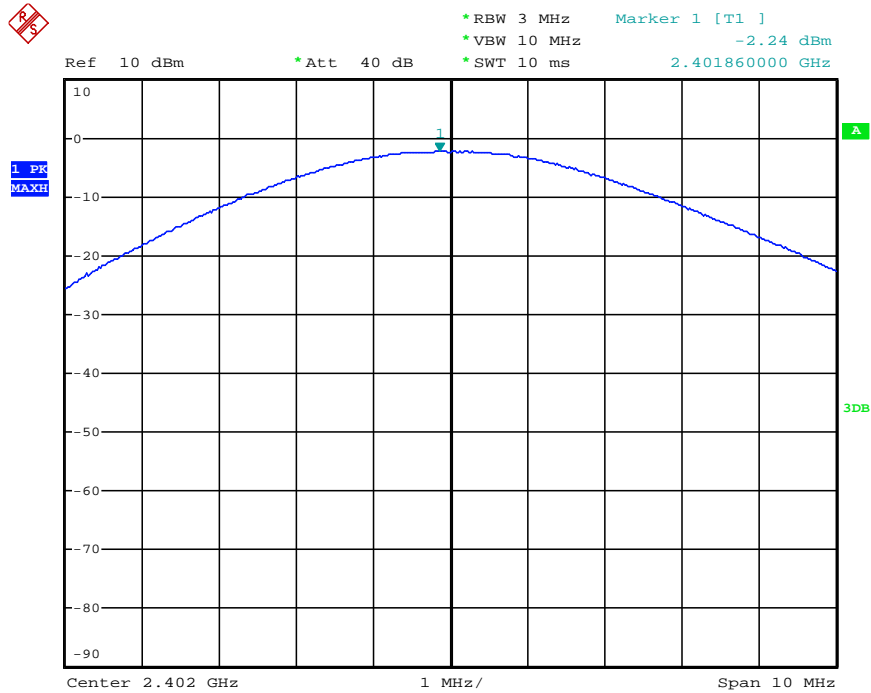


High channel

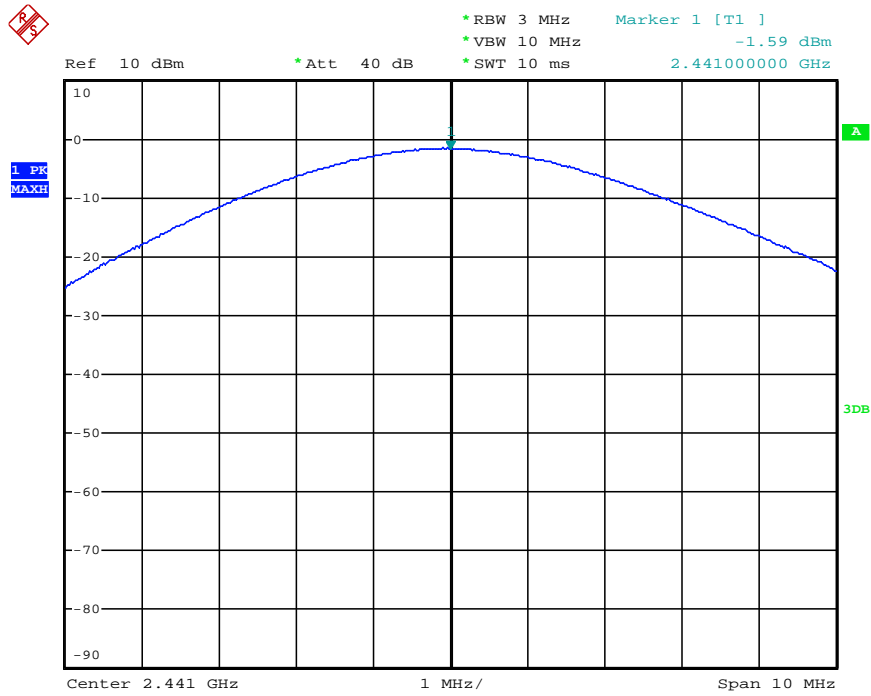


Π/4-DQPSK Mode

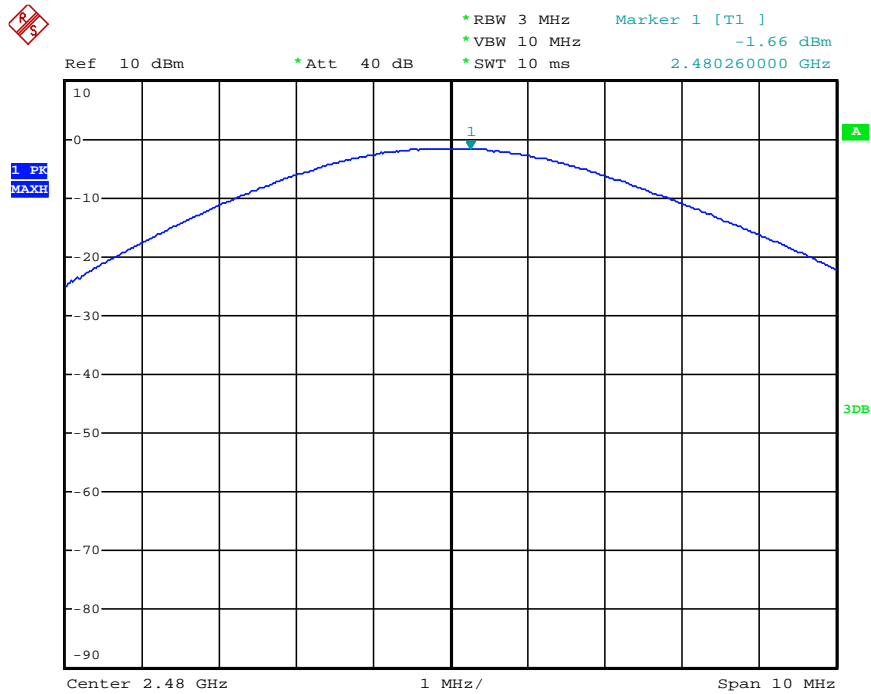
Low channel



Middle channel

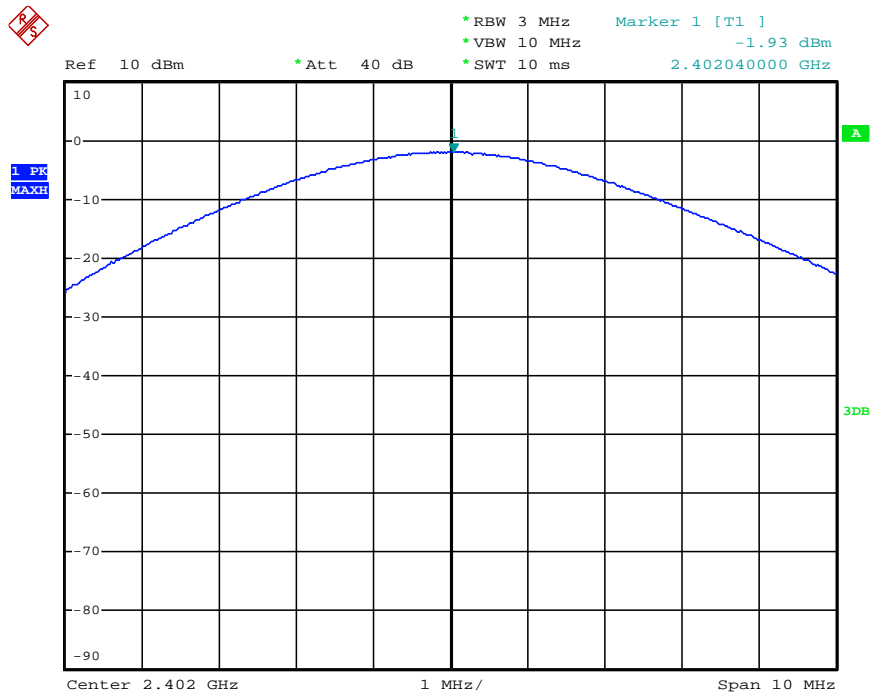


High channel

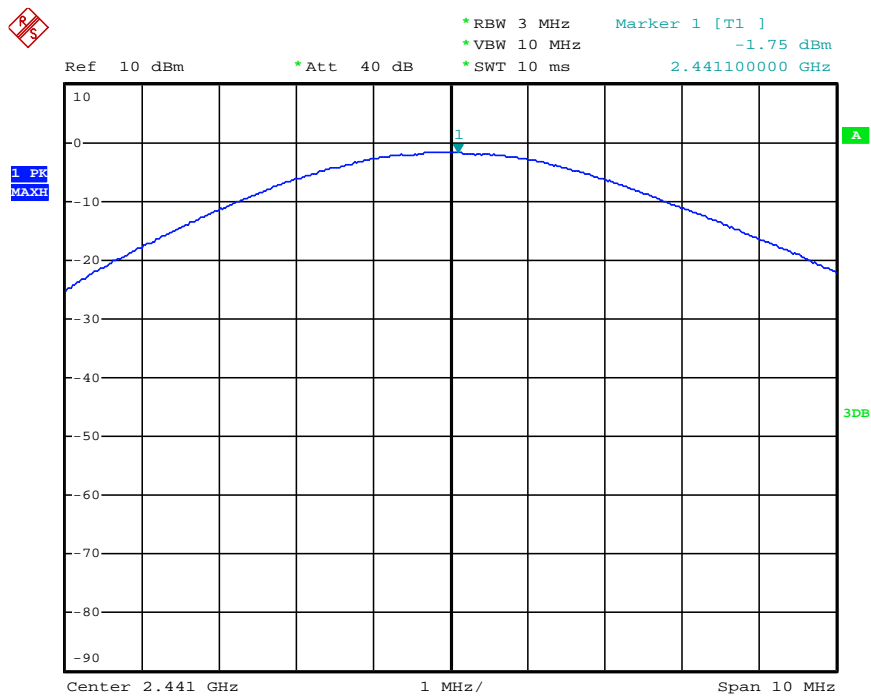


8DPSK Mode

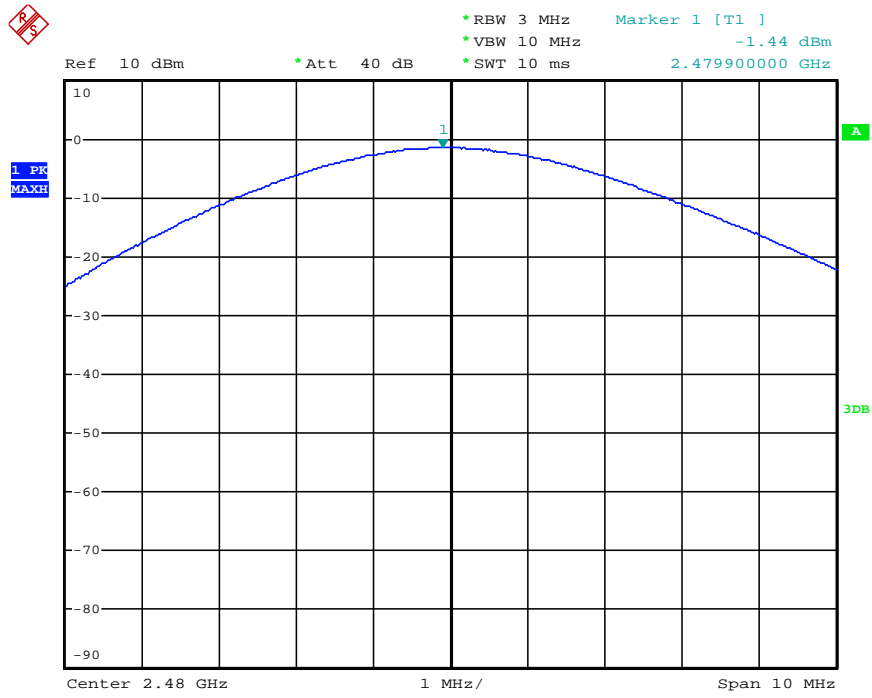
Low channel



Middle channel



High channel



10. RADIATED EMISSION TEST

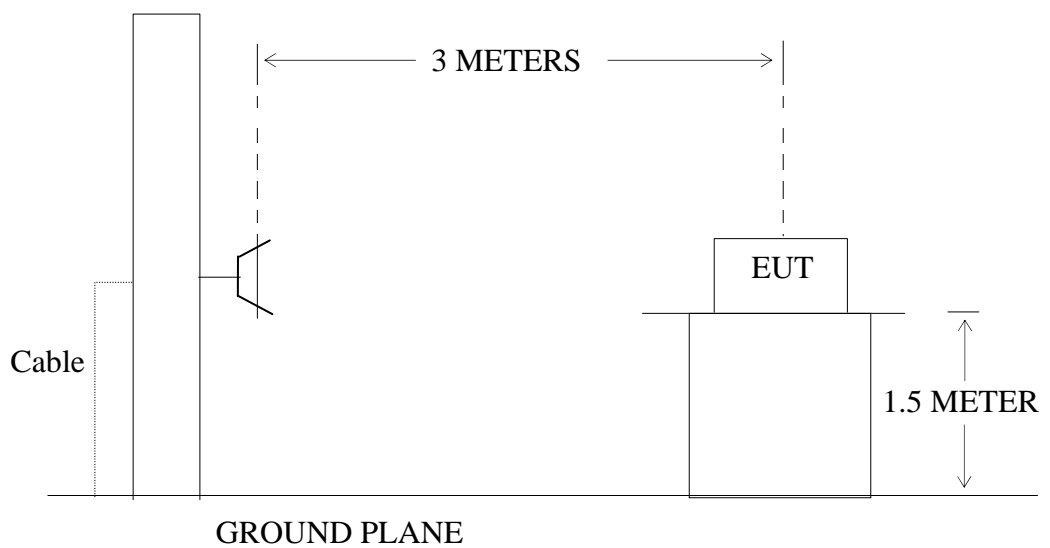
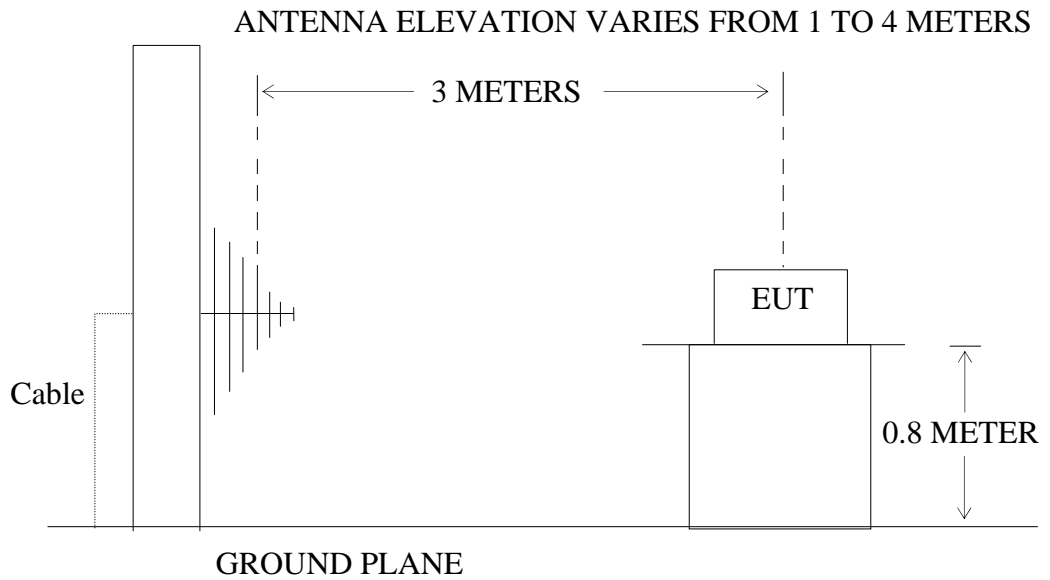
10.1. Block Diagram of Test Setup

10.1.1. Block diagram of connection between the EUT and simulators



(EUT: Barcode Scanner)

10.1.2. Anechoic Chamber Test Setup Diagram



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 are 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. Test Procedure

The EUT and its simulators are placed on a turntable, which is 0.8 meter (below 1G) or 1.5 meter (above 1G) high above ground. 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 bilog 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 interface cables must be manipulated according to ANSI C63.10-2013 on radiated emission measurement.

The final measurement in band 9-90 kHz, 110-490 kHz and above 1000MHz is performed with Average detector. Except those frequency bands mention above, the final measurement for frequencies below 1000MHz is performed with Quasi Peak detector.

RBW (120 kHz), VBW (300 kHz) for QP detector below 1GHz

Peak detector above 1GHz

RBW (1 MHz), VBW (3MHz) for Peak measurement

RBW (1 MHz), VBW (10Hz) for AV measurement

If the peak-detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

10.6.The Field Strength of Radiation Emission Measurement Results

- Note: 1.**We tested GFSK mode, $\Pi/4$ -DQPSK Mode & 8DPSK mode and recorded the worst case data (8DPSK mode) for all test mode.
- 2.** The fundamental radiated emissions were reduced by 2.4G Band Reject Filter in the attached plots.
- 3.** The 18-25GHz emissions are not reported, because the levels are too low against the limit.
- 4.** The EUT is tested radiation emission in three axes. The worst emissions are reported in all channels.



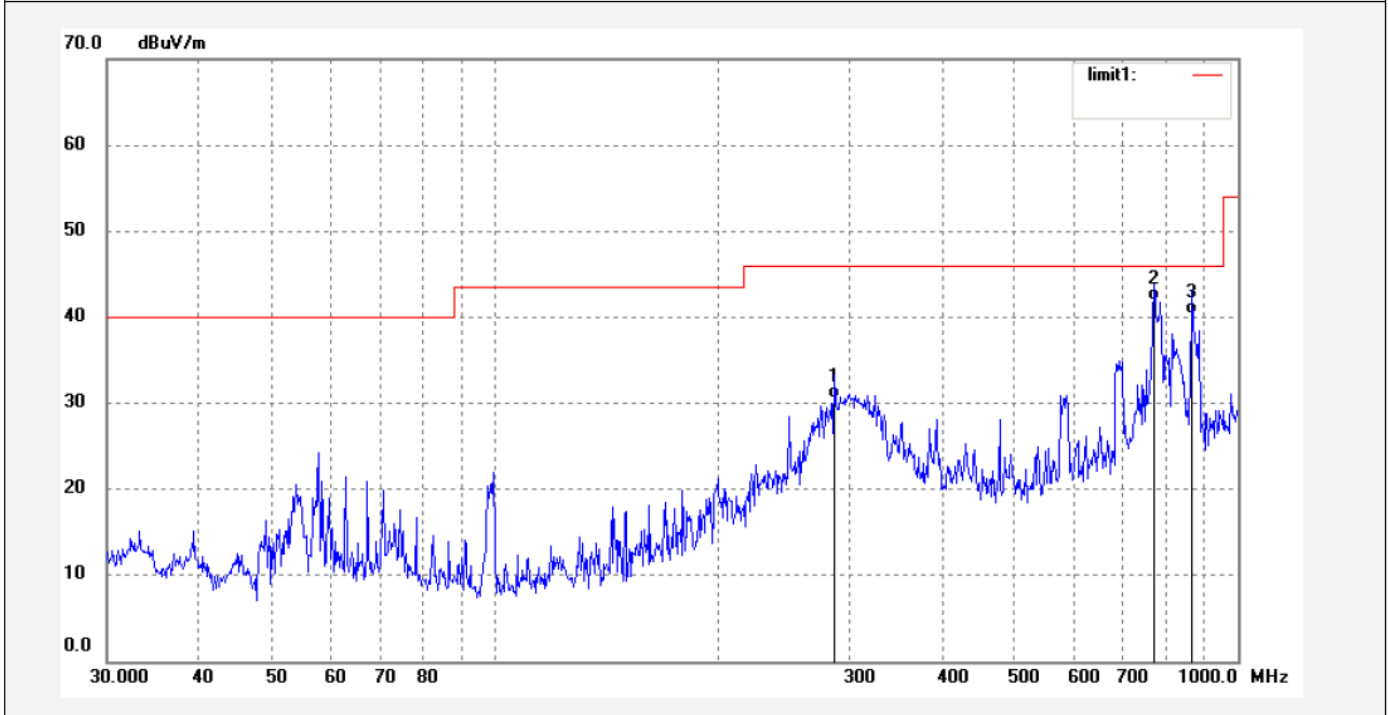
ACCURATE TECHNOLOGY CO., LTD.

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.: star2015 #711	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/39/08
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	286.2653	48.60	-18.14	30.46	46.00	-15.54	QP			
2	771.0475	50.10	-8.26	41.84	46.00	-4.16	QP			
3	868.8859	46.97	-6.64	40.33	46.00	-5.67	QP			



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Site: 1# Chamber

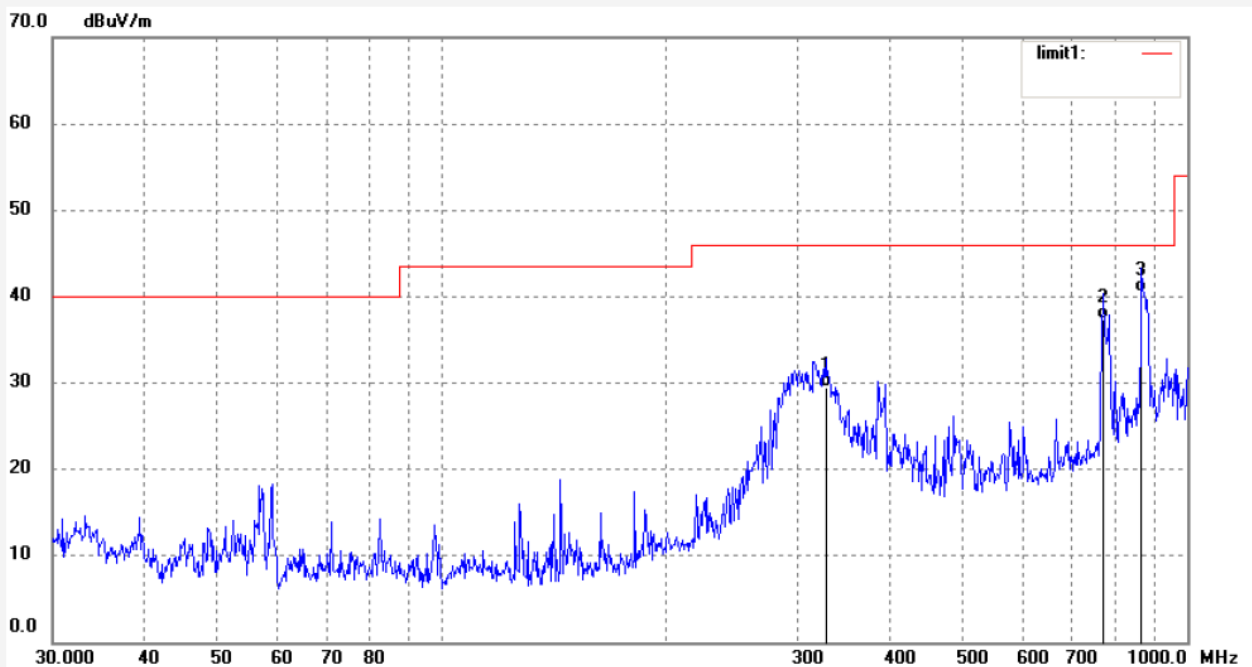
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #712
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C/Hum (%)) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2402MHz
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/28/
Time: 8/39/55
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107

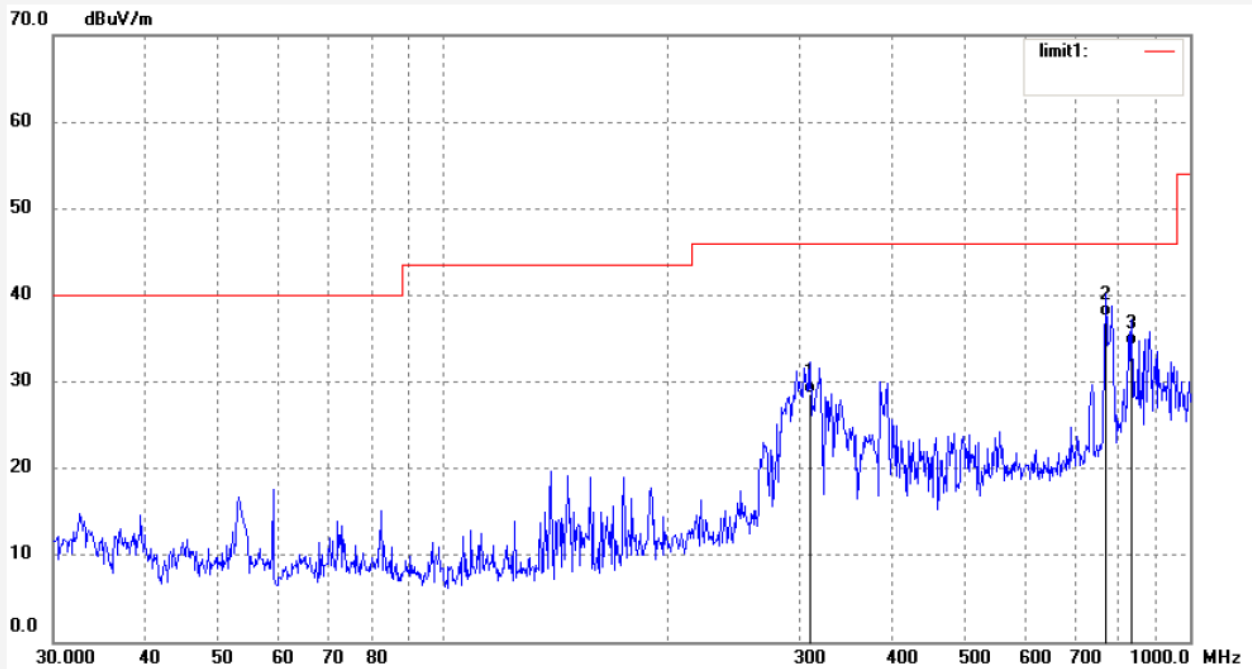


No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	327.1553	46.55	-17.11	29.44	46.00	-16.56	QP			
2	771.0475	45.67	-8.26	37.41	46.00	-8.59	QP			
3	868.8859	47.10	-6.64	40.46	46.00	-5.54	QP			

Job No.: star2015 #713
 Standard: FCC Class B 3M Radiated
 Test item: Radiation Test
 Temp.(C)/Hum.(%) 25 C / 55 %
 EUT: Barcode Scanner
 Mode: TX 2441MHz
 Model: MS3390
 Manufacturer: MinDe

Polarization: Vertical
 Power Source: DC 5V
 Date: 15/05/28/
 Time: 8/41/10
 Engineer Signature:
 Distance: 3m

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	310.3594	46.24	-17.66	28.58	46.00	-17.42	QP			
2	771.0475	45.72	-8.26	37.46	46.00	-8.54	QP			
3	835.9447	41.39	-7.18	34.21	46.00	-11.79	QP			



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Site: 1# Chamber

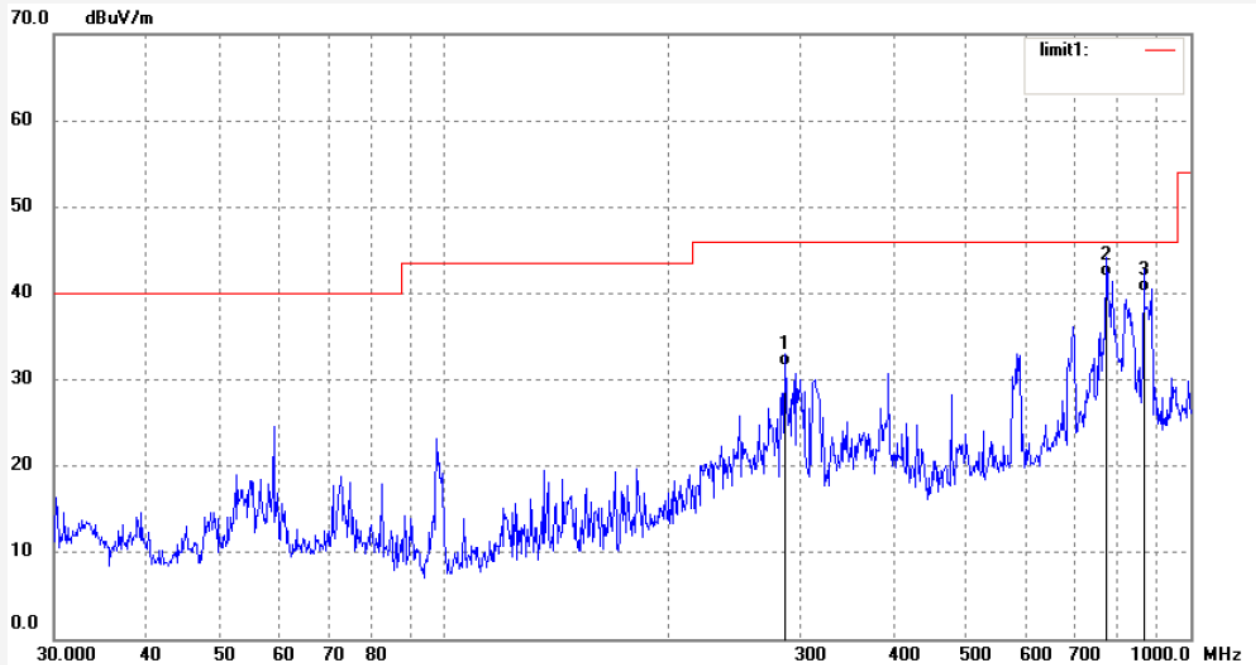
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #714
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2441MHz
Model: MS3390
Manufacturer: MinDe

Polarization: Horizontal
Power Source: DC 5V
Date: 15/05/28/
Time: 8/42/46
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	286.2653	49.66	-18.14	31.52	46.00	-14.48	QP			
2	771.0475	50.10	-8.26	41.84	46.00	-4.16	QP			
3	865.8383	46.87	-6.69	40.18	46.00	-5.82	QP			



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

Site: 1# Chamber

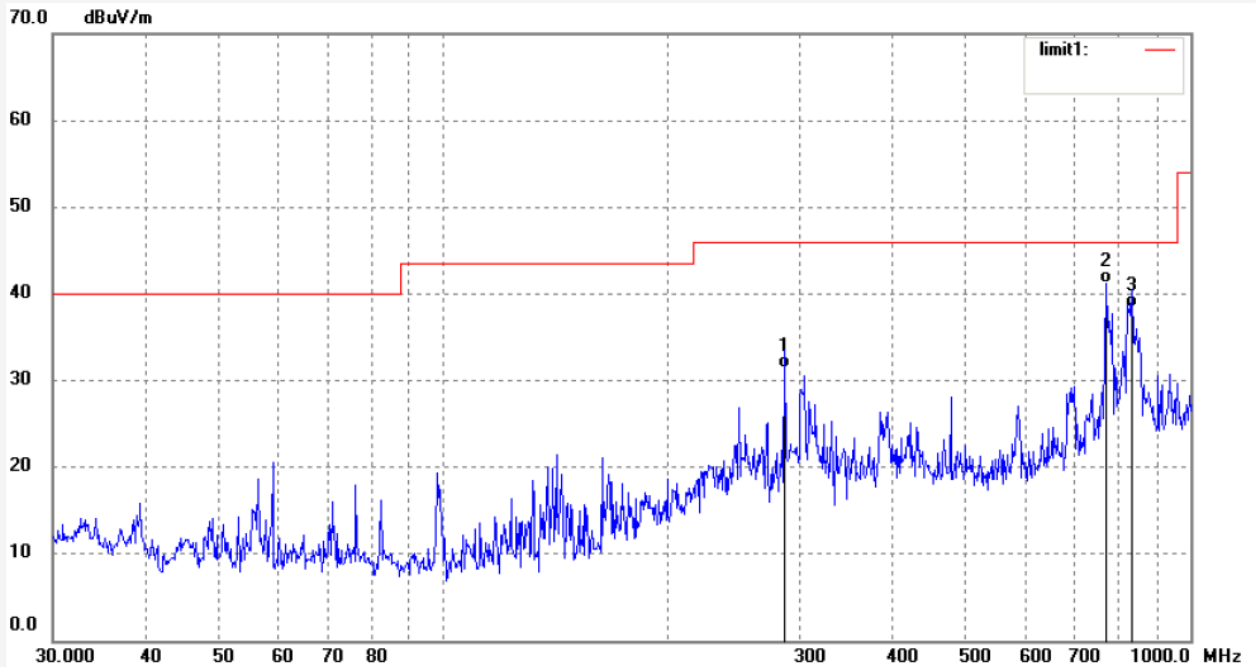
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #715
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2480MHz
Model: MS3390
Manufacturer: MinDe

Polarization: Horizontal
Power Source: DC 5V
Date: 15/05/28/
Time: 8/44/43
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	286.2653	49.55	-18.14	31.41	46.00	-14.59	QP			
2	771.0475	49.42	-8.26	41.16	46.00	-4.84	QP			
3	835.9447	45.63	-7.18	38.45	46.00	-7.55	QP			



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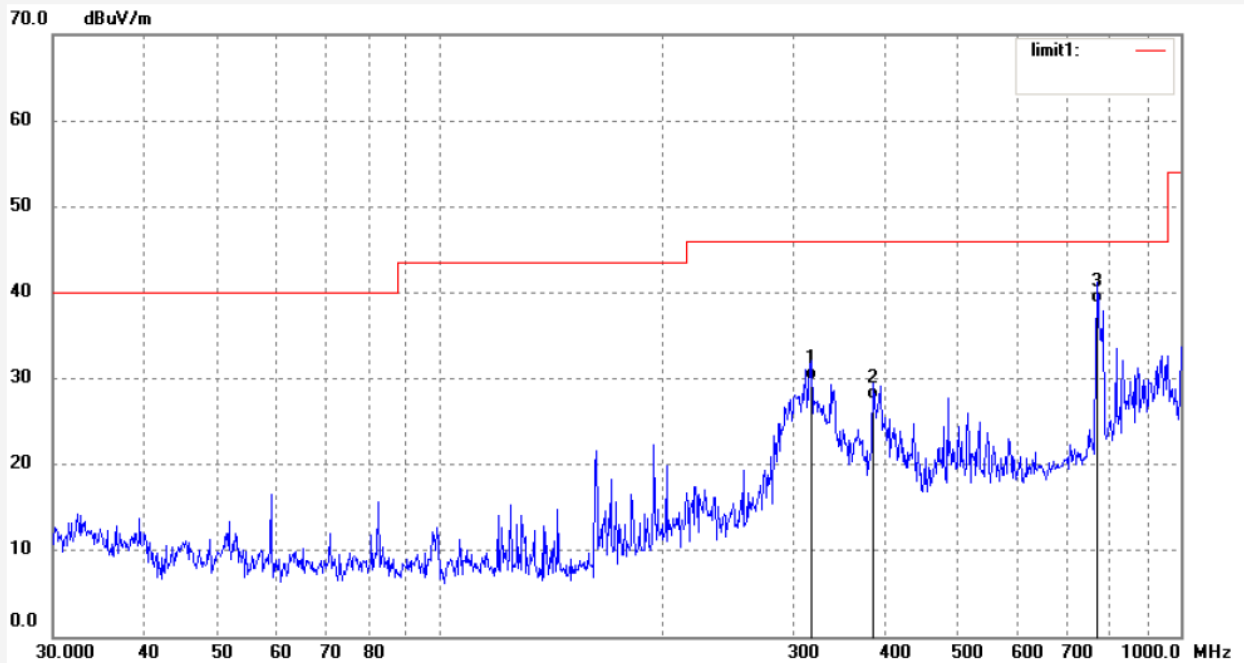
F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: star2015 #716
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2480MHz
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/28/
Time: 8/46/27
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	316.9717	47.26	-17.48	29.78	46.00	-16.22	QP			
2	384.5446	43.29	-15.77	27.52	46.00	-18.48	QP			
3	771.0475	47.11	-8.26	38.85	46.00	-7.15	QP			



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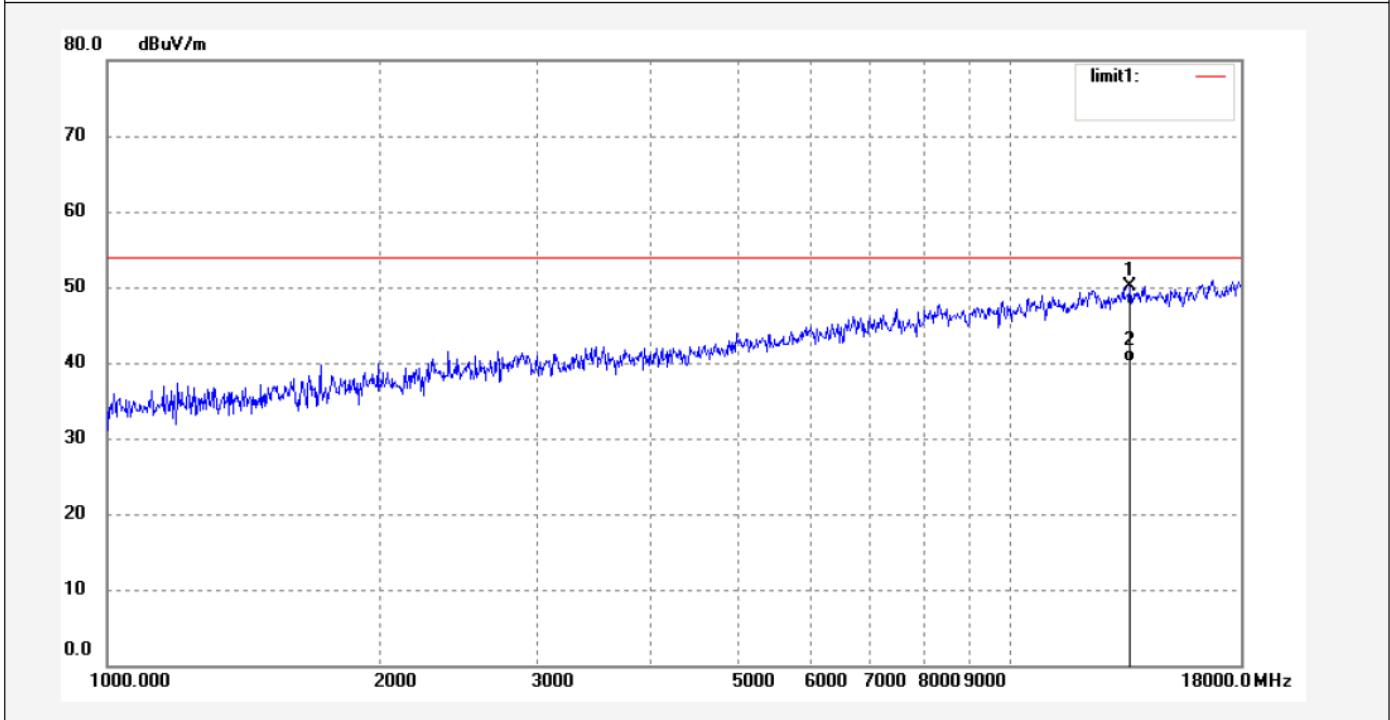
Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #717	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/49/34
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	13572.278	39.38	10.75	50.13	54.00	-3.87	peak			
2	13572.278	29.34	10.75	40.09	54.00	-13.91	AVG			



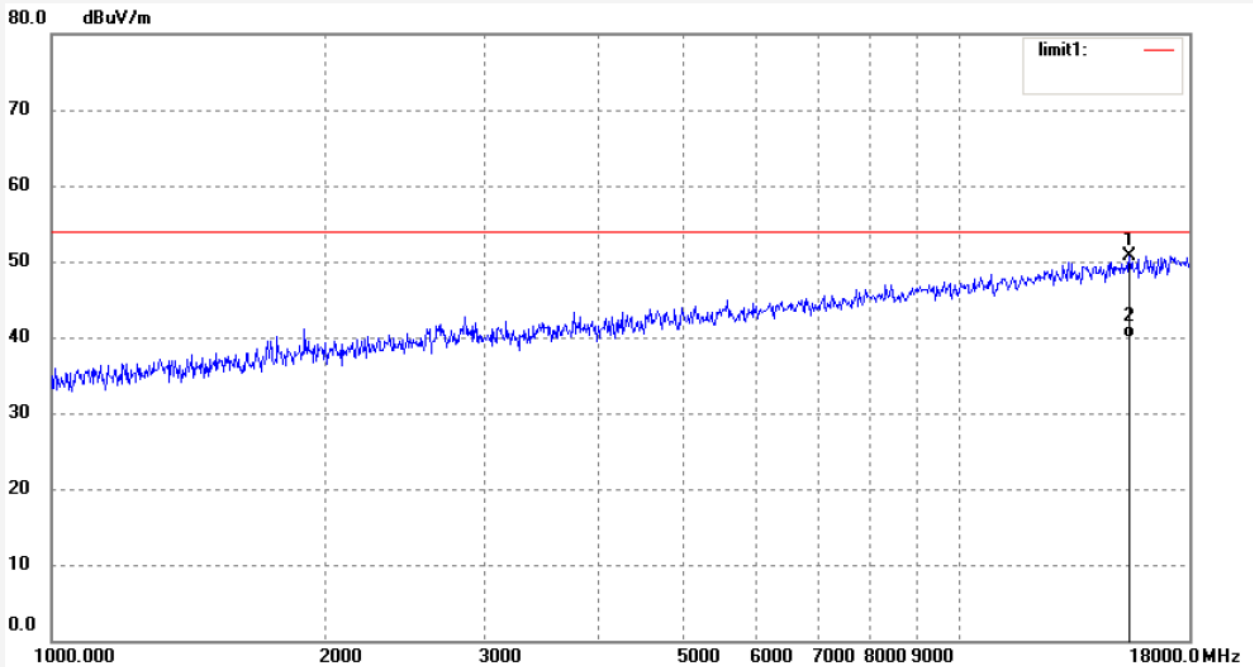
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Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: star2015 #718	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/50/31
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2402MHz	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	15471.706	37.49	13.15	50.64	54.00	-3.36	peak			
2	15471.706	26.76	13.15	39.91	54.00	-14.09	AVG			



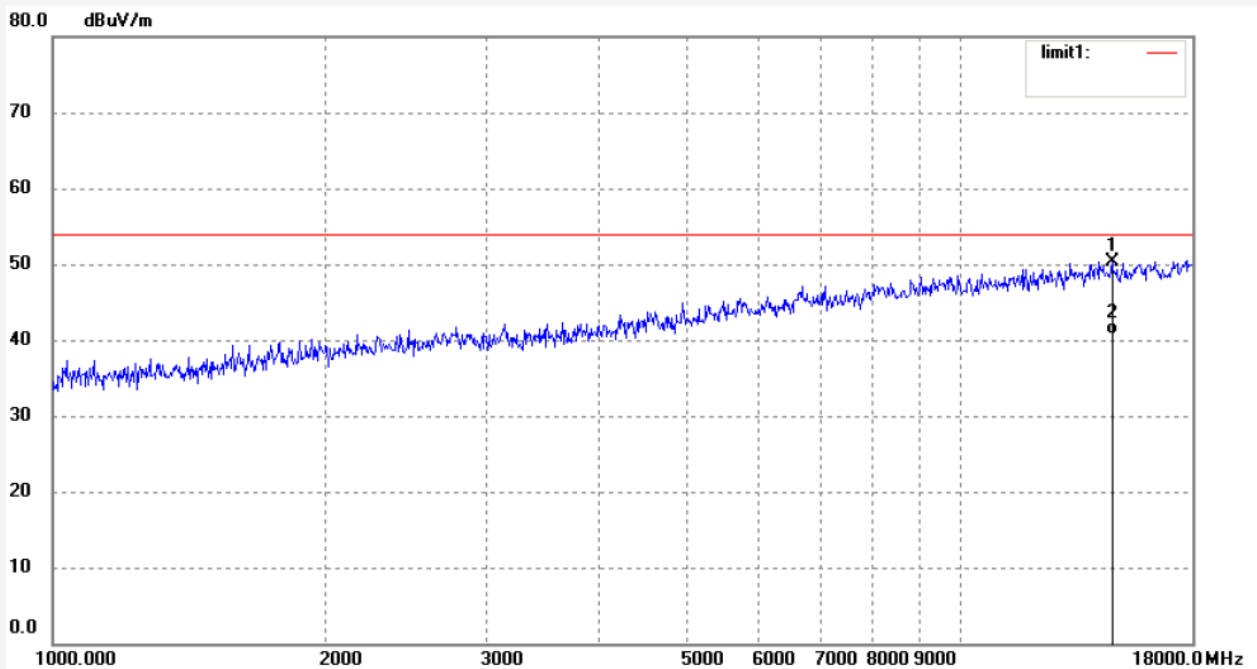
ACCURATE TECHNOLOGY CO., LTD.

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.: star2015 #719	Polarization: Horizontal
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/51/41
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2441MHz	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	14681.959	36.11	14.28	50.39	54.00	-3.61	peak			
2	14681.959	26.43	14.28	40.71	54.00	-13.29	AVG			



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

Site: 1# Chamber

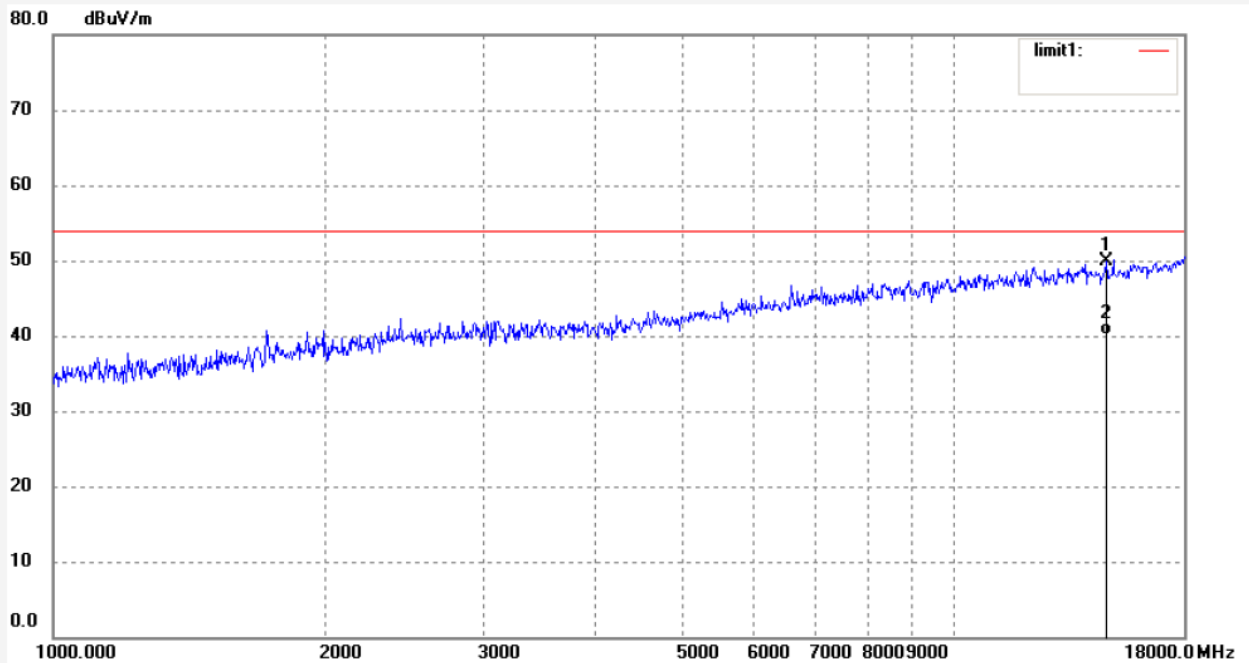
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #720
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2441MHz
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/28/
Time: 8/53/08
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	14767.679	35.65	14.16	49.81	54.00	-4.19	peak			
2	14767.679	25.97	14.16	40.13	54.00	-13.87	AVG			



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

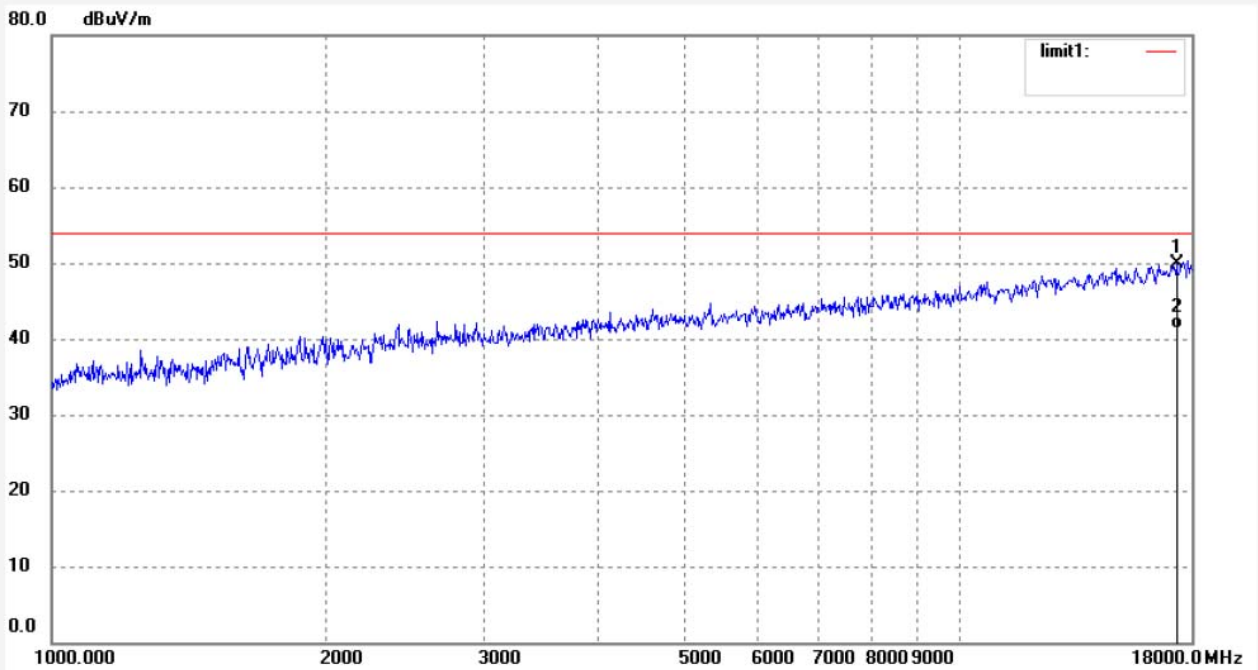
Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #721	Polarization: Vertical
Standard: FCC Class B 3M Radiated	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/28/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/54/24
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2480MHz	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	17331.611	33.09	16.72	49.81	54.00	-4.19	peak			
2	17331.611	24.55	16.72	41.27	54.00	-12.73	AVG			



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Site: 1# Chamber

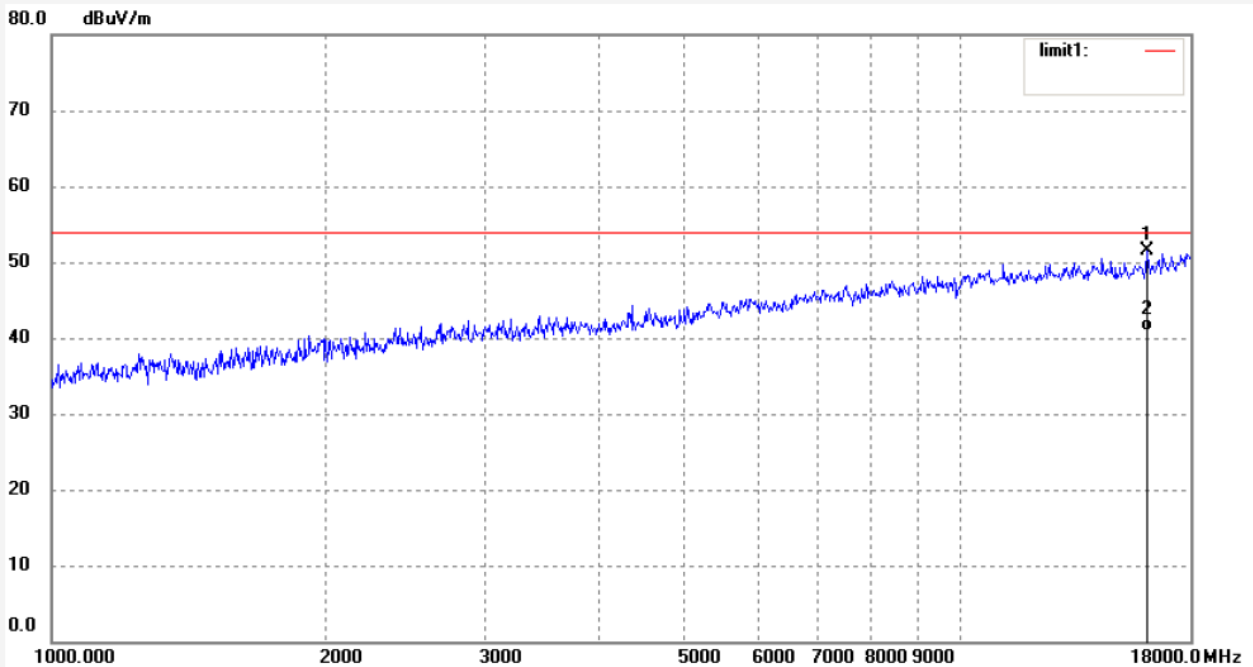
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: star2015 #722
Standard: FCC Class B 3M Radiated
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2480MHz
Model: MS3390
Manufacturer: MinDe

Polarization: Horizontal
Power Source: DC 5V
Date: 15/05/28/
Time: 8/56/02
Engineer Signature:
Distance: 3m

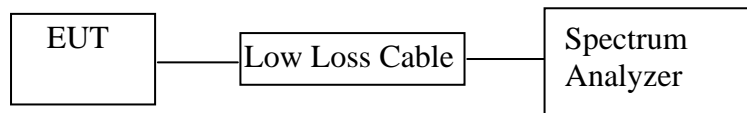
Note: Report No.:ATE20151107



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Height (cm)	Degree (deg.)	Remark
1	16115.207	38.18	13.32	51.50	54.00	-2.50	peak			
2	16115.207	27.64	13.32	40.96	54.00	-13.04	AVG			

11. BAND EDGE COMPLIANCE TEST

11.1. Block Diagram of Test Setup



(EUT: Barcode Scanner)

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.

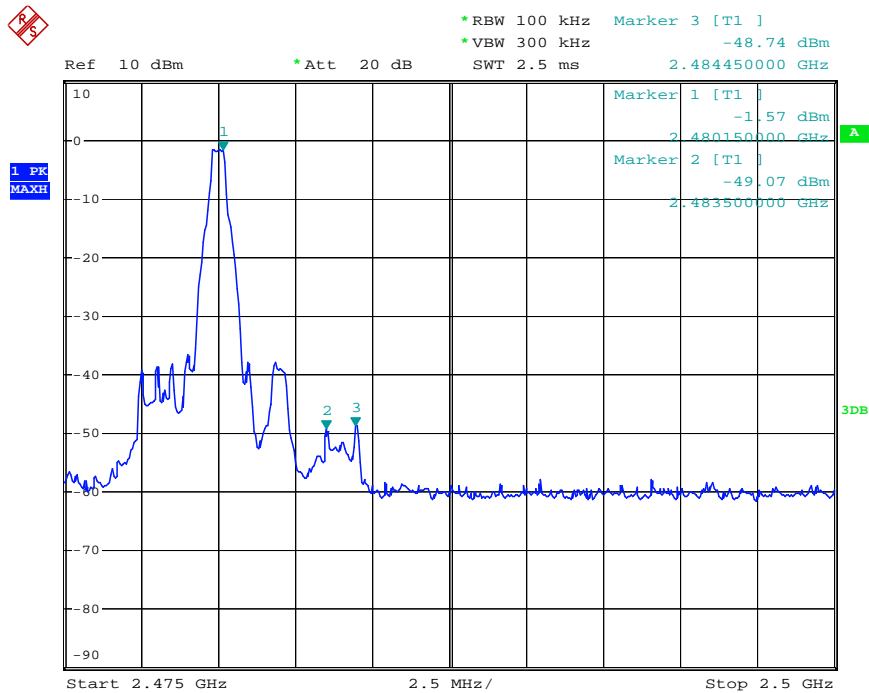
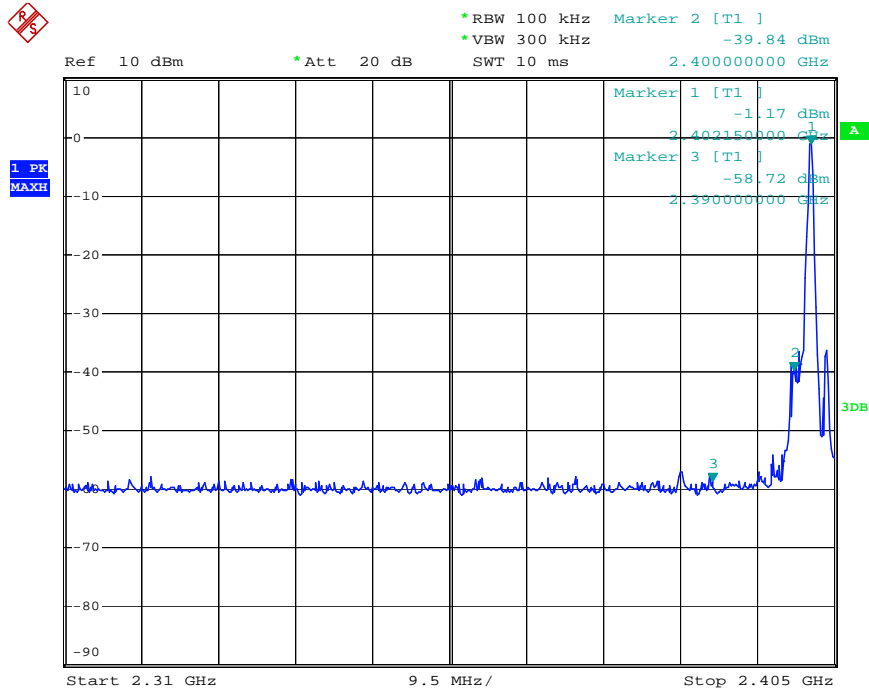
11.5.2. Set RBW of spectrum analyzer to 100 kHz and VBW to 300 kHz with convenient frequency span including 100 kHz bandwidth from band edge.

11.5.3. The band edges were measured and recorded.

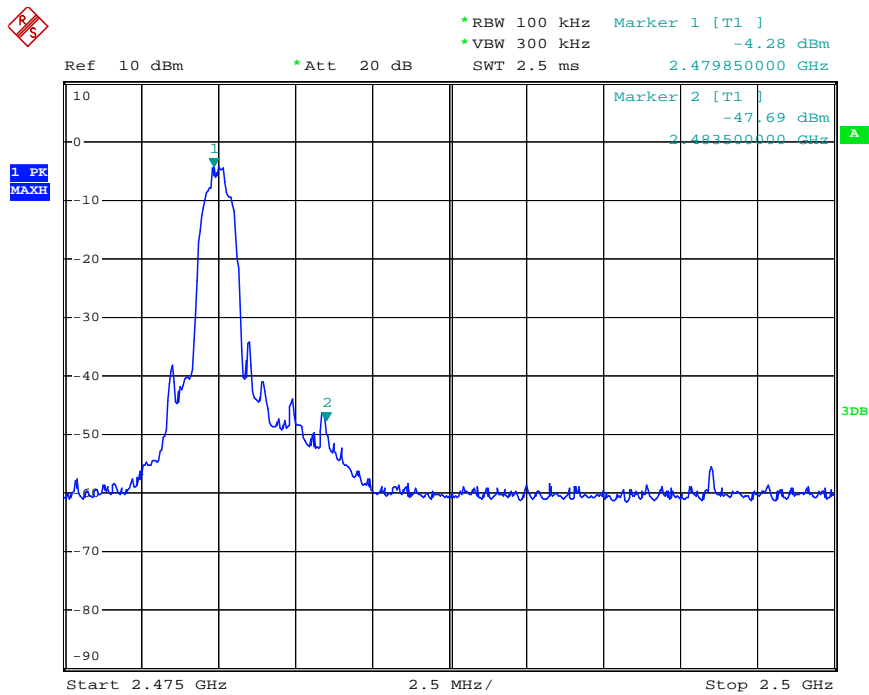
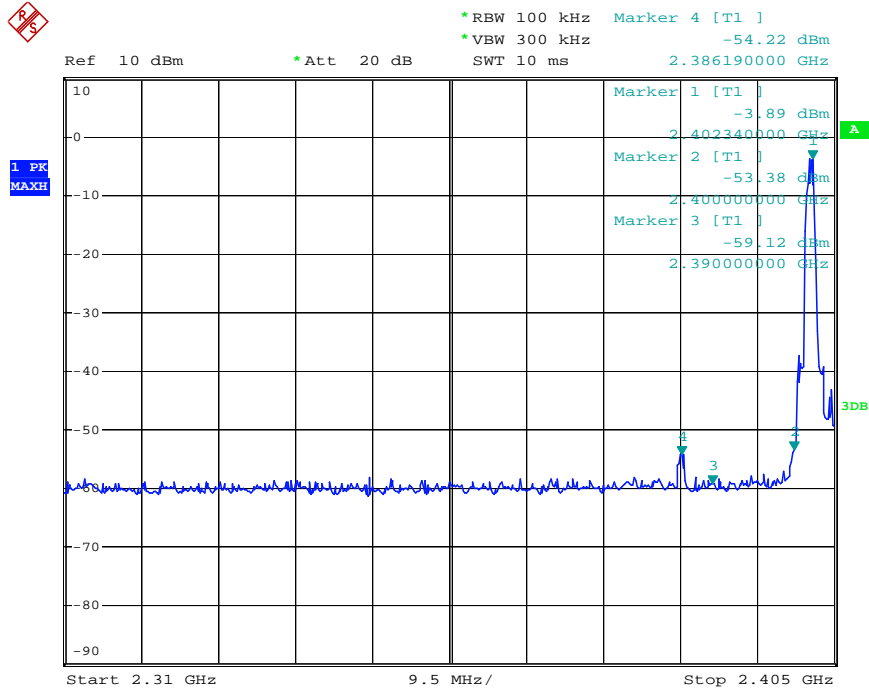
11.6. Test Result

Frequency (MHz)	Result of Band Edge (dBc)	Limit of Band Edge (dBc)
GFSK		
2400.00	38.67	> 20dBc
2484.45	47.17	> 20dBc
Π/4-DQPSK Mode		
2400.00	49.49	> 20dBc
2483.50	43.41	> 20dBc
8QPSK		
2400.00	49.25	> 20dBc
2483.50	43.41	> 20dBc

GFSK



Π/4-DQPSK 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.

Non-hopping mode



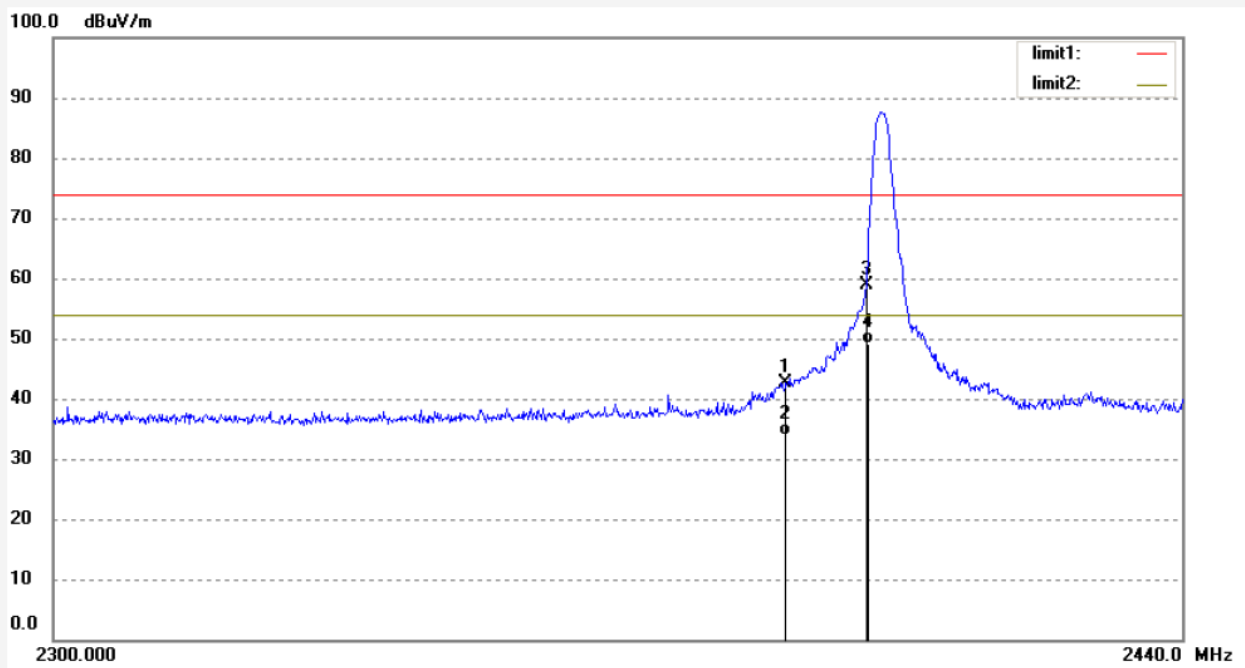
ACCURATE TECHNOLOGY CO., LTD.

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.: STAR #3958	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/44/05
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2402MHz(GFSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



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	49.39	-6.78	42.61	74.00	-31.39	peak			
2	2390.000	40.64	-6.78	33.86	54.00	-20.14	AVG			
3	2400.000	65.67	-6.76	58.91	74.00	-15.09	peak			
4	2400.000	55.97	-6.76	49.21	54.00	-4.79	AVG			



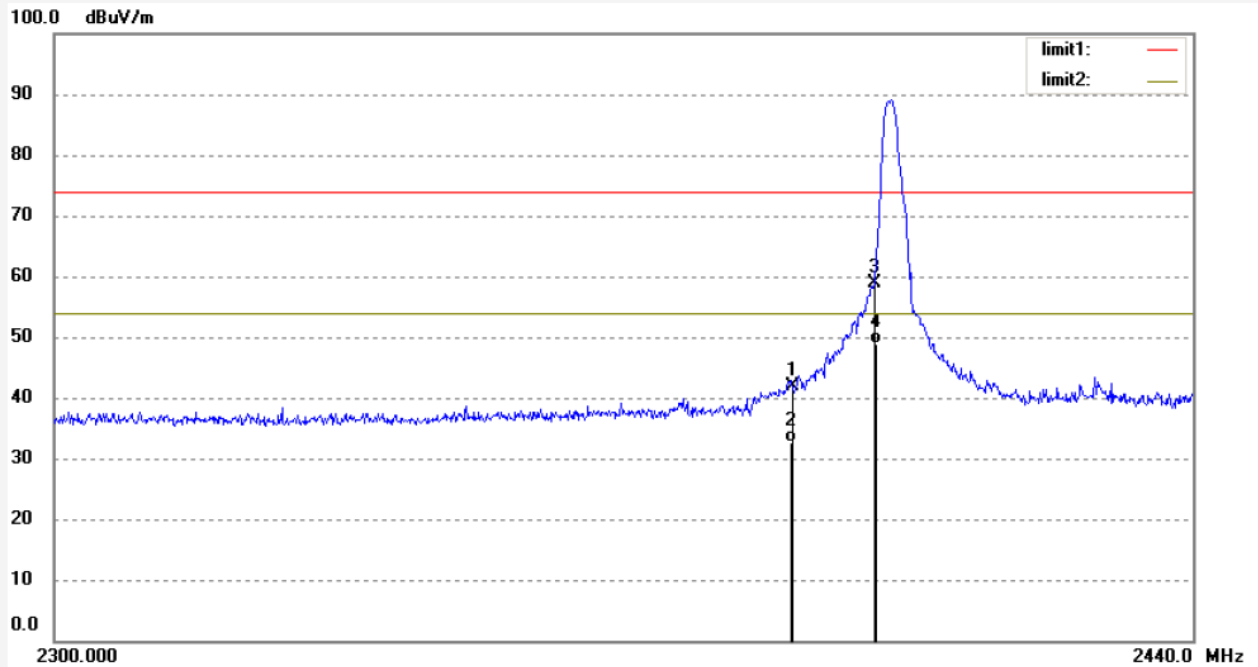
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F1,Bldg,A,Changyuan New Material Port Keyuan Rd,
Science & Industry Park,Nanshan Shenzhen,P.R.China

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

Job No.: STAR #3959	Polarization: Vertical
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 8/48/19
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2402MHz(GFSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

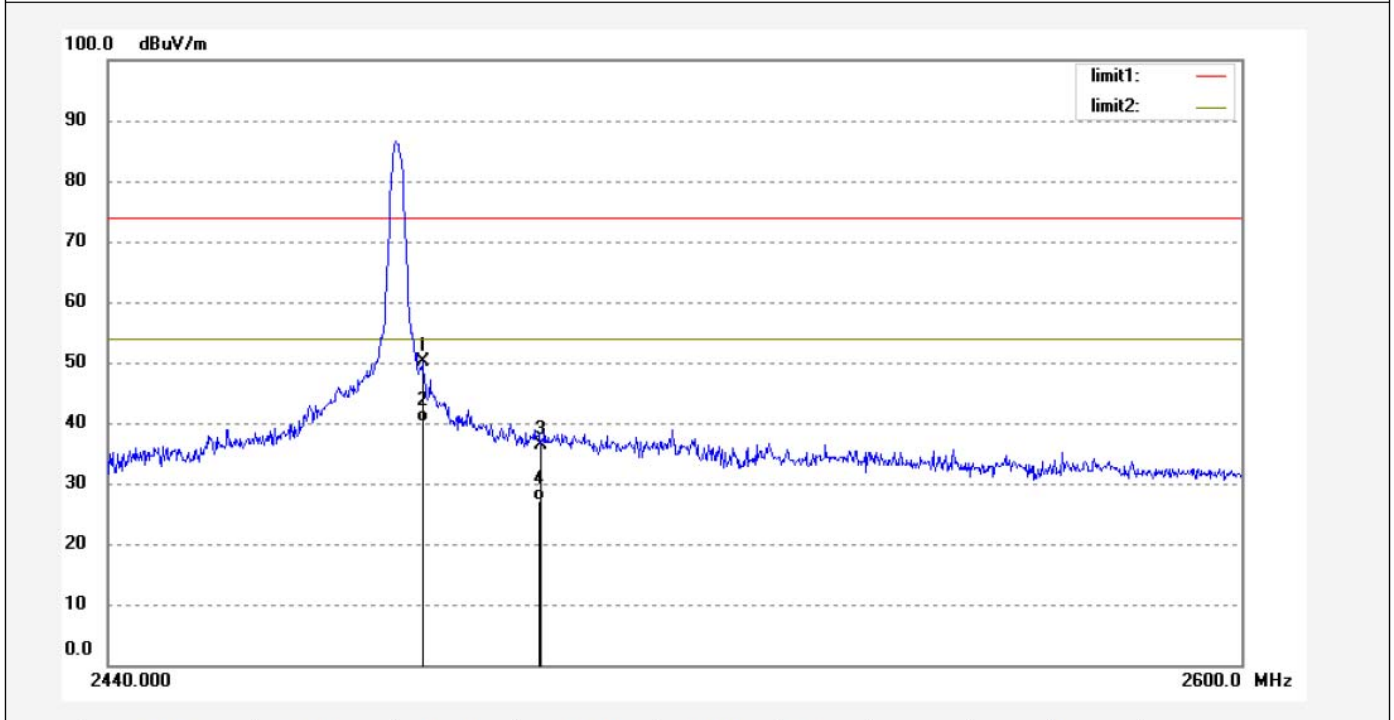
Note: Report No.:ATE20151107



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	48.75	-6.78	41.97	74.00	-32.03	peak			
2	2390.000	39.50	-6.78	32.72	54.00	-21.28	AVG			
3	2400.000	65.59	-6.76	58.83	74.00	-15.17	peak			
4	2400.000	55.64	-6.76	48.88	54.00	-5.12	AVG			

Job No.: STAR #3964	Polarization: Vertical
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/07/04
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2480MHz(GFSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



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	56.79	-6.54	50.25	74.00	-23.75	peak			
2	2483.500	46.79	-6.54	40.25	54.00	-13.75	AVG			
3	2500.000	42.79	-6.50	36.29	74.00	-37.71	peak			
4	2500.000	33.62	-6.50	27.12	54.00	-26.88	AVG			



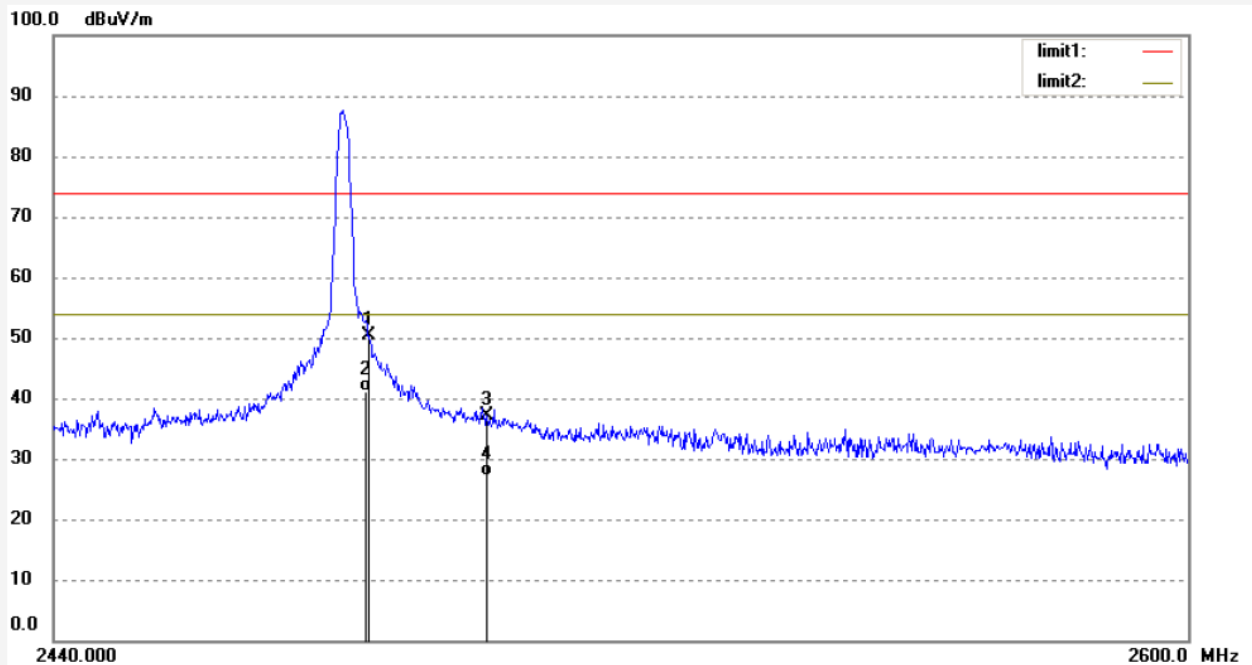
ACCURATE TECHNOLOGY CO., LTD.

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.: STAR #3965	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9/11/34
EUT: Barcode Scanner	Engineer Signature:
Mode: TX 2480MHz(GFSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



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	57.02	-6.54	50.48	74.00	-23.52	peak			
2	2483.500	47.58	-6.54	41.04	54.00	-12.96	AVG			
3	2500.000	43.62	-6.50	37.12	74.00	-36.88	peak			
4	2500.000	33.67	-6.50	27.17	54.00	-26.83	AVG			



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Site: 1# Chamber

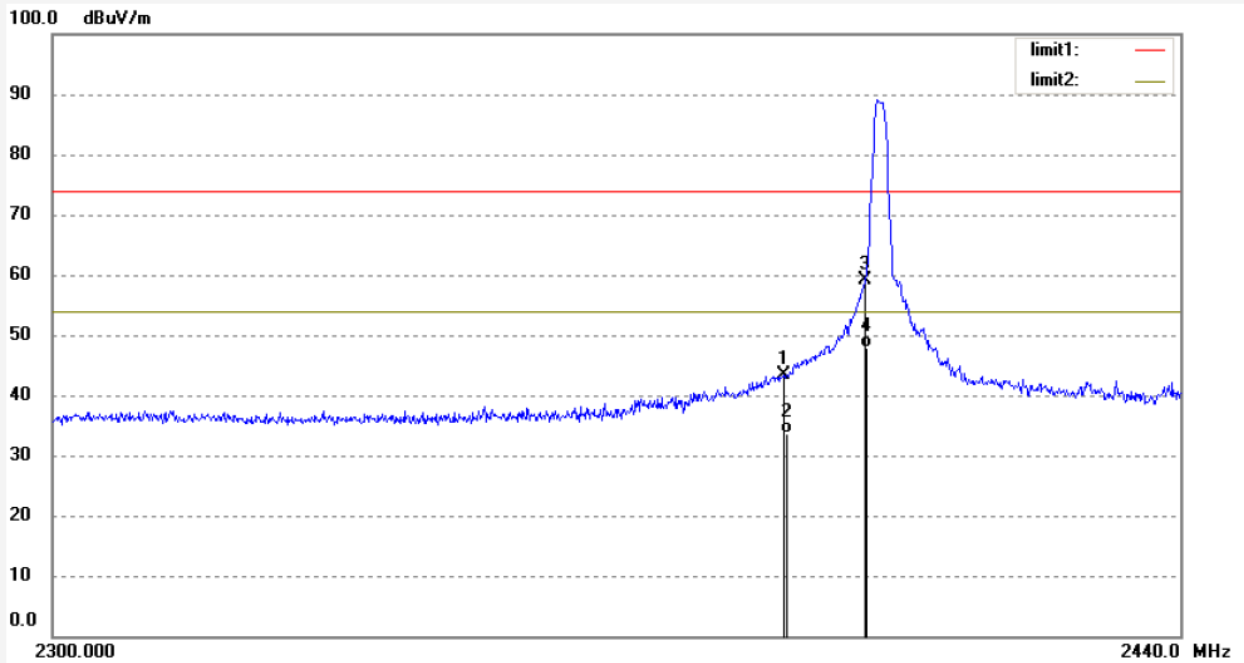
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR #3960
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2402MHz(PI/4DQPSK)
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/29/
Time: 8/52/46
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



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	50.04	-6.78	43.26	74.00	-30.74	peak			
2	2390.000	40.31	-6.78	33.53	54.00	-20.47	AVG			
3	2400.000	65.91	-6.76	59.15	74.00	-14.85	peak			
4	2400.000	54.67	-6.76	47.91	54.00	-6.09	AVG			



ACCURATE TECHNOLOGY CO., LTD.

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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.: STAR #3961

Standard: FCC PK

Test item: Radiation Test

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

EUT: Barcode Scanner

Mode: TX 2402MHz(PI/4DQPSK)

Model: MS3390

Manufacturer: MinDe

Polarization: Horizontal

Power Source: DC 5V

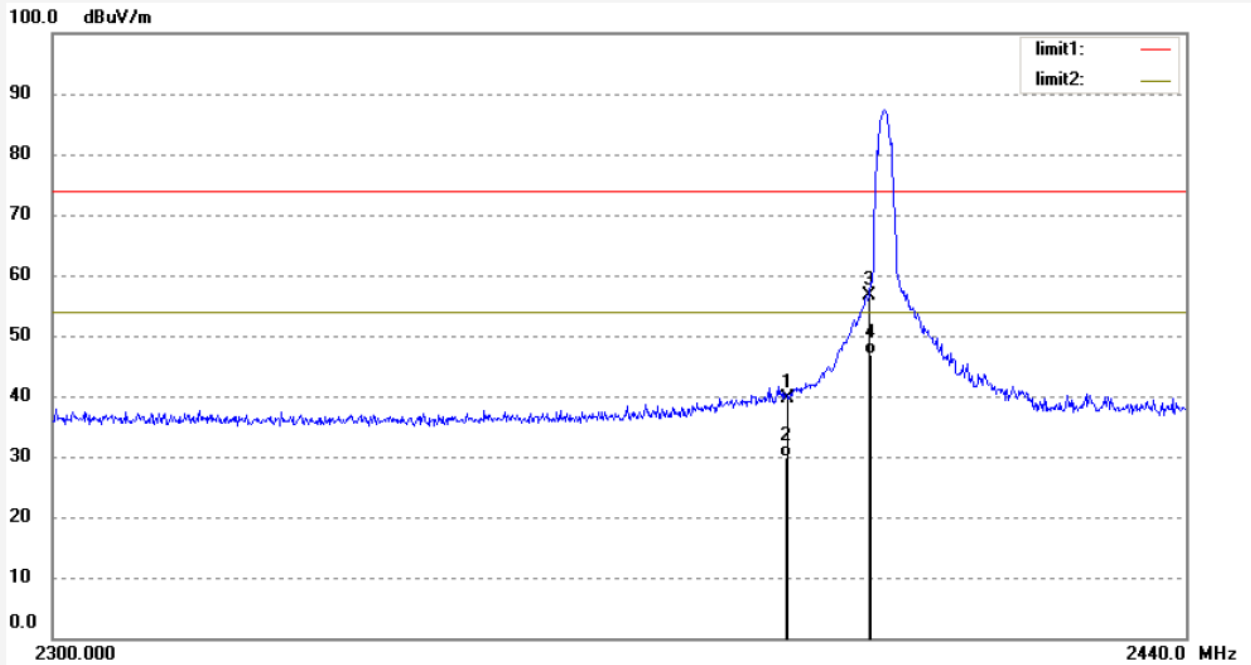
Date: 15/05/29/

Time: 8/55/45

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20151107



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	46.51	-6.78	39.73	74.00	-34.27	peak			
2	2390.000	36.70	-6.78	29.92	54.00	-24.08	AVG			
3	2400.000	63.47	-6.76	56.71	74.00	-17.29	peak			
4	2400.000	53.67	-6.76	46.91	54.00	-7.09	AVG			



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

Site: 1# Chamber

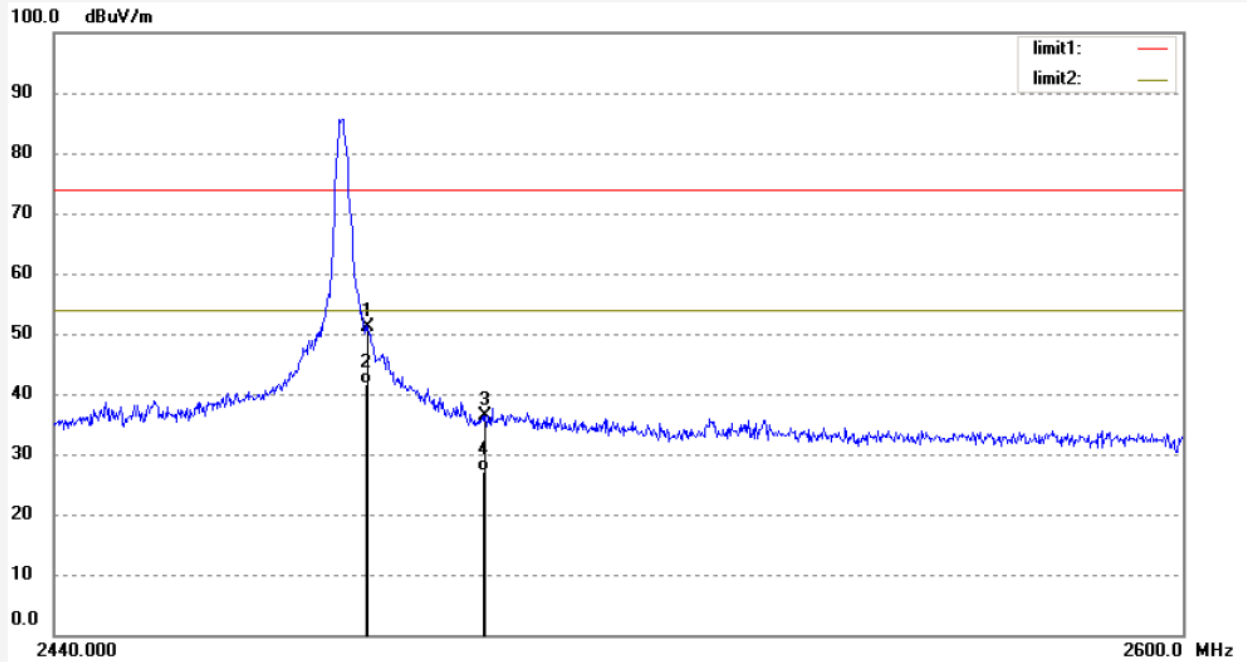
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR #3968
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2480MHz(PI/4DQPSK)
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/29/
Time: 9/23/20
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



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	57.77	-6.54	51.23	74.00	-22.77	peak			
2	2483.500	48.16	-6.54	41.62	54.00	-12.38	AVG			
3	2500.000	42.90	-6.50	36.40	74.00	-37.60	peak			
4	2500.000	33.55	-6.50	27.05	54.00	-26.95	AVG			



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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.: STAR #3969

Standard: FCC PK

Test item: Radiation Test

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

EUT: Barcode Scanner

Mode: TX 2480MHz(PI/4DQPSK)

Model: MS3390

Manufacturer: MinDe

Polarization: Horizontal

Power Source: DC 5V

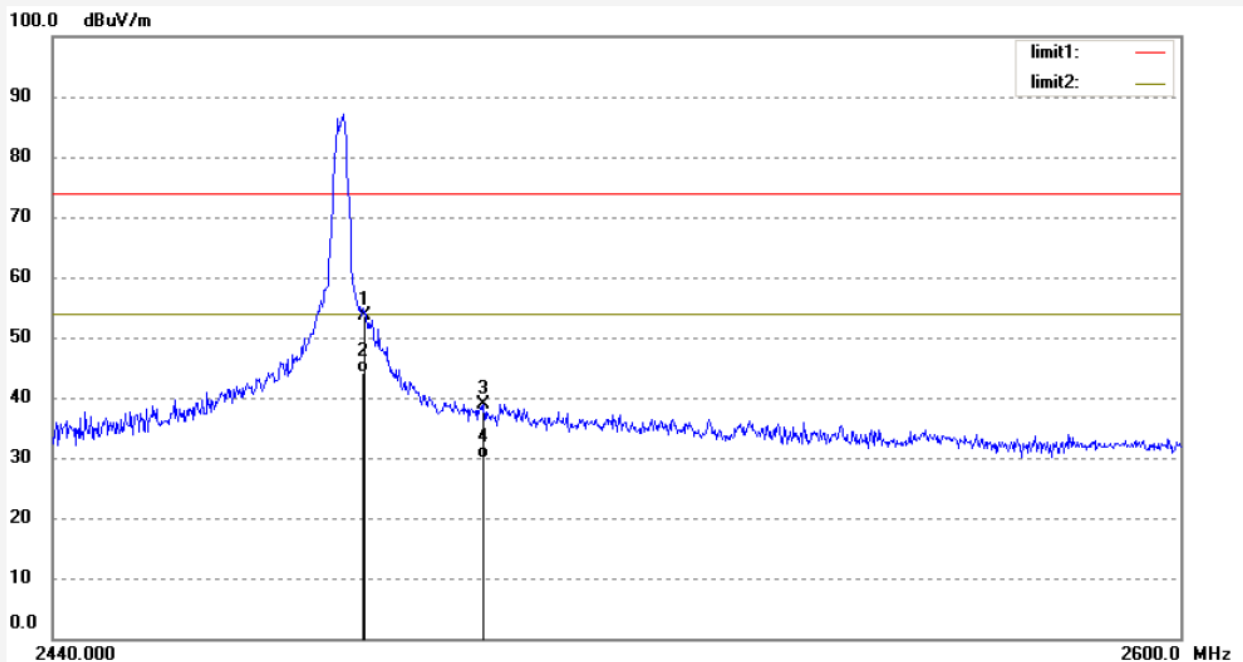
Date: 15/05/29/

Time: 9/28/07

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20151107



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	60.16	-6.54	53.62	74.00	-20.38	peak			
2	2483.500	50.67	-6.54	44.13	54.00	-9.87	AVG			
3	2500.000	45.34	-6.50	38.84	74.00	-35.16	peak			
4	2500.000	36.44	-6.50	29.94	54.00	-24.06	AVG			



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Site: 1# Chamber

Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR #3962

Standard: FCC PK

Test item: Radiation Test

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

EUT: Barcode Scanner

Mode: TX 2402MHz(8DPSK)

Model: MS3390

Manufacturer: MinDe

Polarization: Horizontal

Power Source: DC 5V

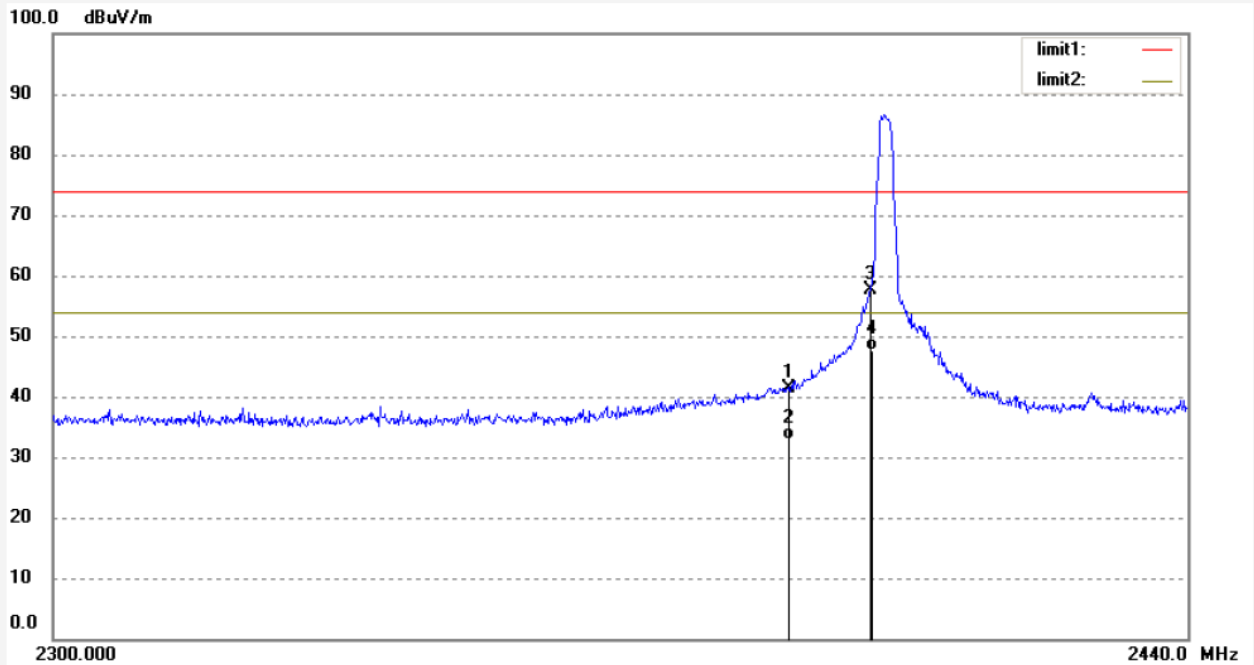
Date: 15/05/29/

Time: 8/58/50

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20151107



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	48.27	-6.78	41.49	74.00	-32.51	peak			
2	2390.000	39.62	-6.78	32.84	54.00	-21.16	AVG			
3	2400.000	64.44	-6.76	57.68	74.00	-16.32	peak			
4	2400.000	54.39	-6.76	47.63	54.00	-6.37	AVG			



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Site: 1# Chamber

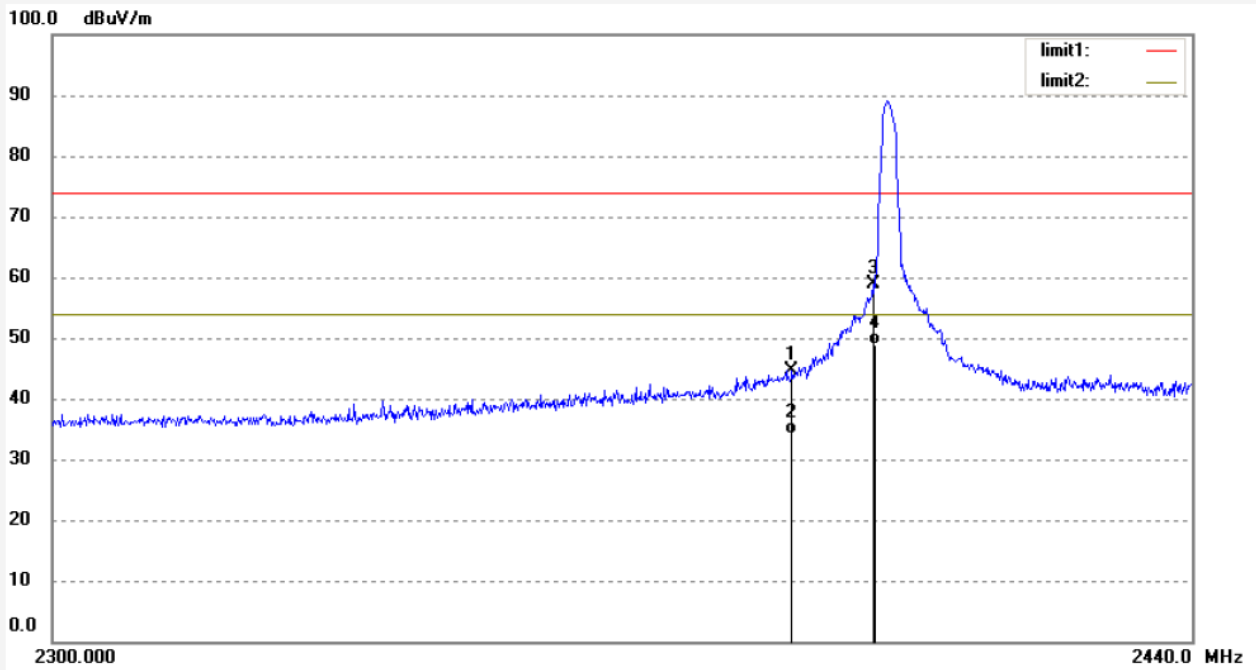
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR #3963
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2402MHz(8DPSK)
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/29/
Time: 9/03/58
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



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	51.36	-6.78	44.58	74.00	-29.42	peak			
2	2390.000	40.86	-6.78	34.08	54.00	-19.92	AVG			
3	2400.000	65.65	-6.76	58.89	74.00	-15.11	peak			
4	2400.000	55.67	-6.76	48.91	54.00	-5.09	AVG			



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Site: 1# Chamber

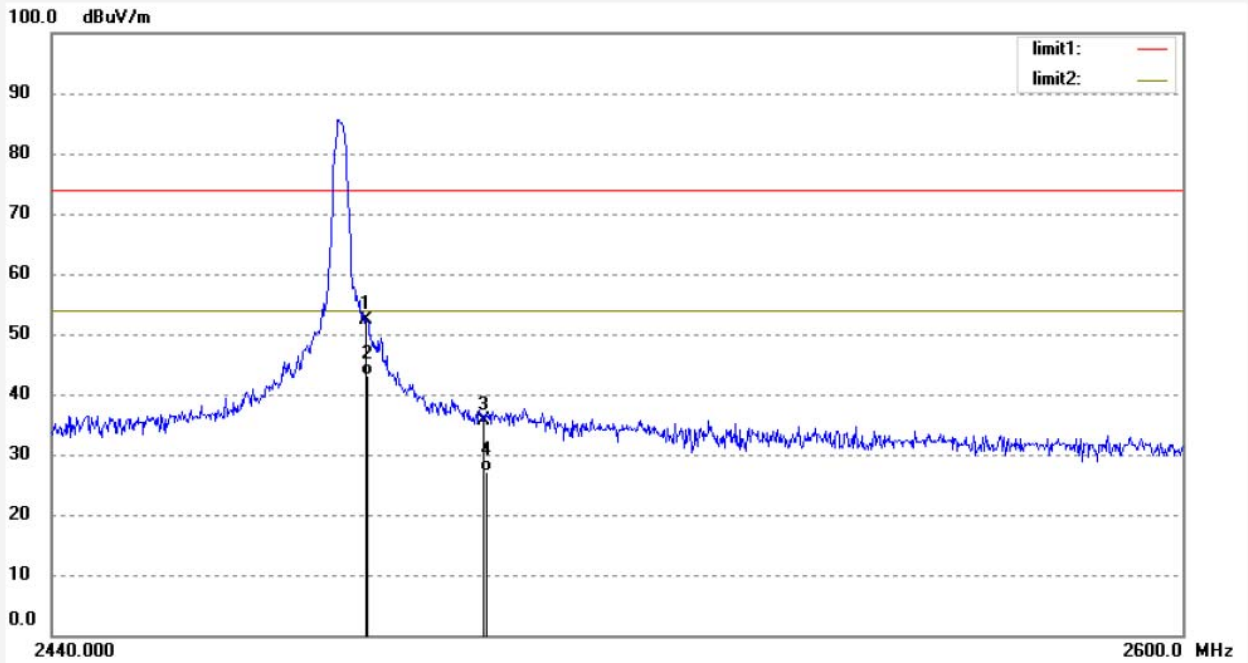
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR #3966
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2480MHz(8DPSK)
Model: MS3390
Manufacturer: MinDe

Polarization: Horizontal
Power Source: DC 5V
Date: 15/05/29/
Time: 9/15/59
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



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	58.81	-6.54	52.27	74.00	-21.73	peak			
2	2483.500	49.66	-6.54	43.12	54.00	-10.88	AVG			
3	2500.000	42.02	-6.50	35.52	74.00	-38.48	peak			
4	2500.000	33.51	-6.50	27.01	54.00	-26.99	AVG			



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Site: 1# Chamber

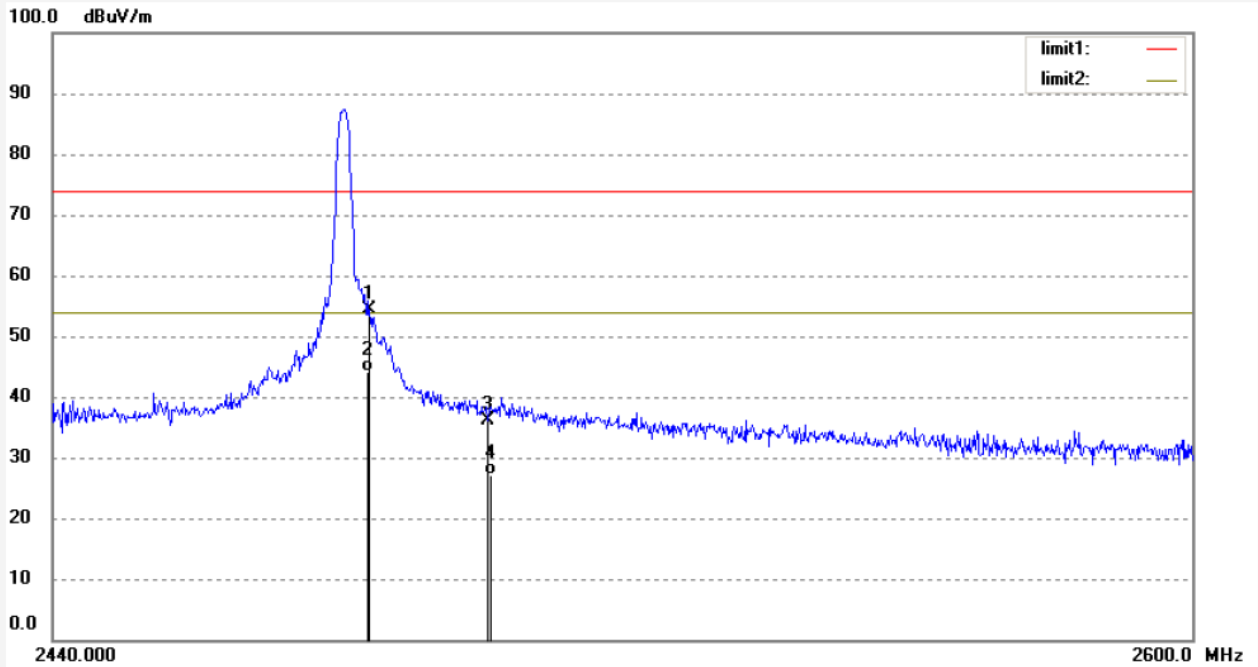
Tel:+86-0755-26503290

Fax:+86-0755-26503396

Job No.: STAR #3967
Standard: FCC PK
Test item: Radiation Test
Temp.(C)/Hum.(%) 25 C / 55 %
EUT: Barcode Scanner
Mode: TX 2480MHz(8DPSK)
Model: MS3390
Manufacturer: MinDe

Polarization: Vertical
Power Source: DC 5V
Date: 15/05/29/
Time: 9/19/53
Engineer Signature:
Distance: 3m

Note: Report No.:ATE20151107



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	60.87	-6.54	54.33	74.00	-19.67	peak			
2	2483.500	50.67	-6.54	44.13	54.00	-9.87	AVG			
3	2500.000	42.60	-6.50	36.10	74.00	-37.90	peak			
4	2500.000	33.67	-6.50	27.17	54.00	-26.83	AVG			

Hopping mode



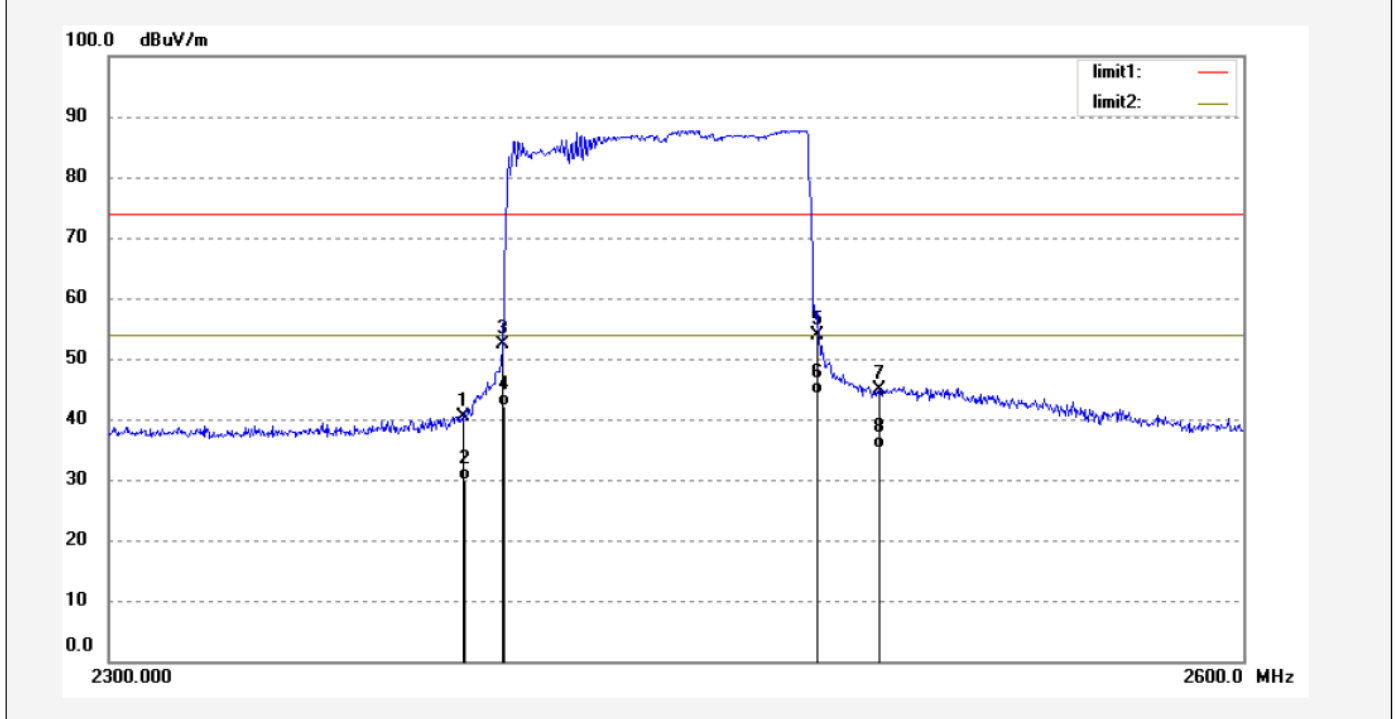
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Site: 1# Chamber
Tel:+86-0755-26503290
Fax:+86-0755-26503396

Job No.: STAR #3996	Polarization: Vertical
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9:35:18
EUT: Barcode Scanner	Engineer Signature:
Mode: HOPPING (GFSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



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	47.19	-6.78	40.41	74.00	-33.59	peak			
2	2390.000	36.78	-6.78	30.00	54.00	-24.00	AVG			
3	2400.000	59.11	-6.76	52.35	74.00	-21.65	peak			
4	2400.000	49.00	-6.76	42.24	54.00	-11.76	AVG			
5	2483.500	60.54	-6.54	54.00	74.00	-20.00	peak			
6	2483.500	50.67	-6.54	44.13	54.00	-9.87	AVG			
7	2500.000	51.37	-6.50	44.87	74.00	-29.13	peak			
8	2500.000	41.69	-6.50	35.19	54.00	-18.81	AVG			

Job No.: STAR #3997

Standard: FCC PK

Test item: Radiation Test

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

EUT: Barcode Scanner

Mode: HOPPING (GFSK)

Model: MS3390

Manufacturer: MinDe

Polarization: Horizontal

Power Source: DC 5V

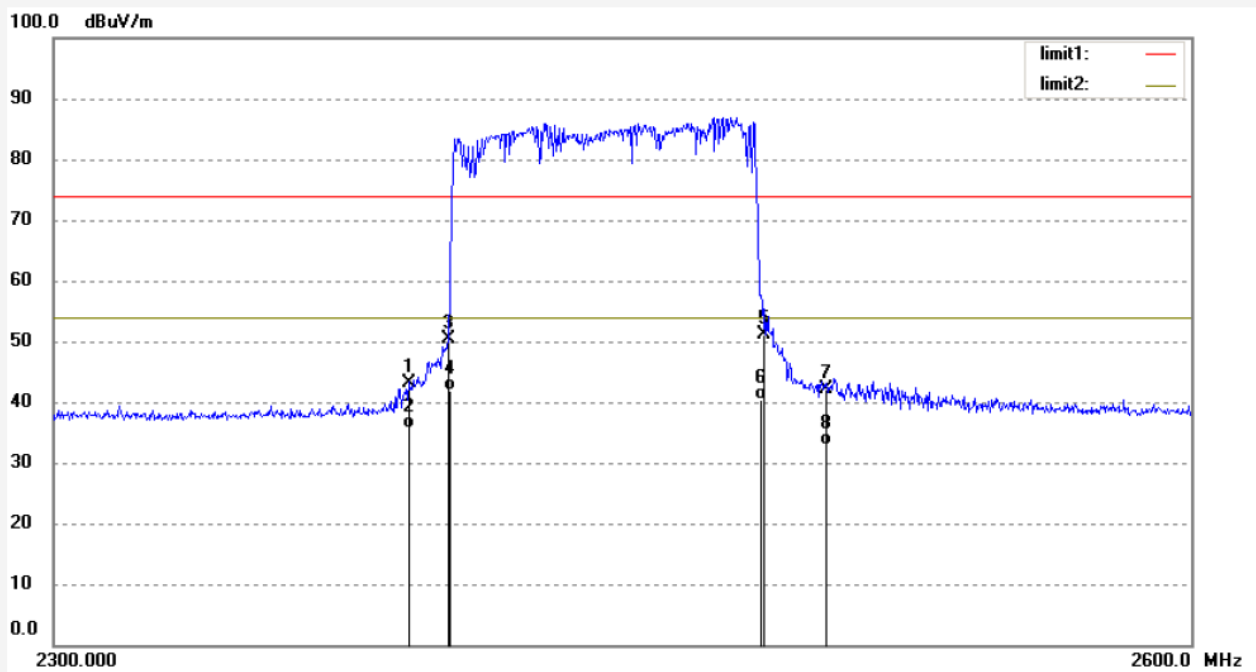
Date: 15/05/29/

Time: 9:39:45

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20151107



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	49.92	-6.78	43.14	74.00	-30.86	peak			
2	2390.000	42.40	-6.78	35.62	54.00	-18.38	AVG			
3	2400.000	57.04	-6.76	50.28	74.00	-23.72	peak			
4	2400.000	48.67	-6.76	41.91	54.00	-12.09	AVG			
5	2483.500	57.74	-6.54	51.20	74.00	-22.80	peak			
6	2483.500	46.97	-6.54	40.43	54.00	-13.57	AVG			
7	2500.000	48.73	-6.50	42.23	74.00	-31.77	peak			
8	2500.000	39.46	-6.50	32.96	54.00	-21.04	AVG			



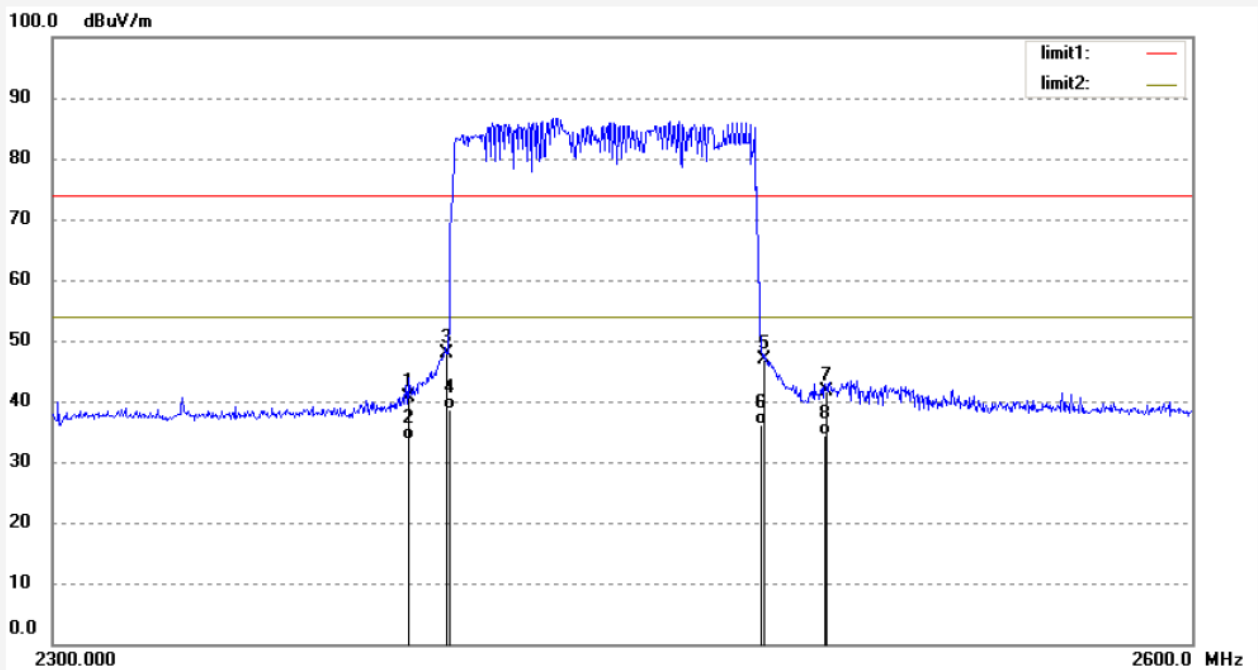
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Site: 1# Chamber
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Fax:+86-0755-26503396

Job No.: STAR #3998	Polarization: Horizontal
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9:46:41
EUT: Barcode Scanner	Engineer Signature:
Mode: HOPPING (PI/4DQPSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



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	47.44	-6.78	40.66	74.00	-33.34	peak			
2	2390.000	40.31	-6.78	33.53	54.00	-20.47	AVG			
3	2400.000	54.56	-6.76	47.80	74.00	-26.20	peak			
4	2400.000	45.31	-6.76	38.55	54.00	-15.45	AVG			
5	2483.500	53.47	-6.54	46.93	74.00	-27.07	peak			
6	2483.500	42.57	-6.54	36.03	54.00	-17.97	AVG			
7	2500.000	48.04	-6.50	41.54	74.00	-32.46	peak			
8	2500.000	40.82	-6.50	34.32	54.00	-19.68	AVG			



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Job No.: STAR #3999

Standard: FCC PK

Test item: Radiation Test

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

EUT: Barcode Scanner

Mode: HOPPING (PI/4QPSK)

Model: MS3390

Manufacturer: MinDe

Polarization: Vertical

Power Source: DC 5V

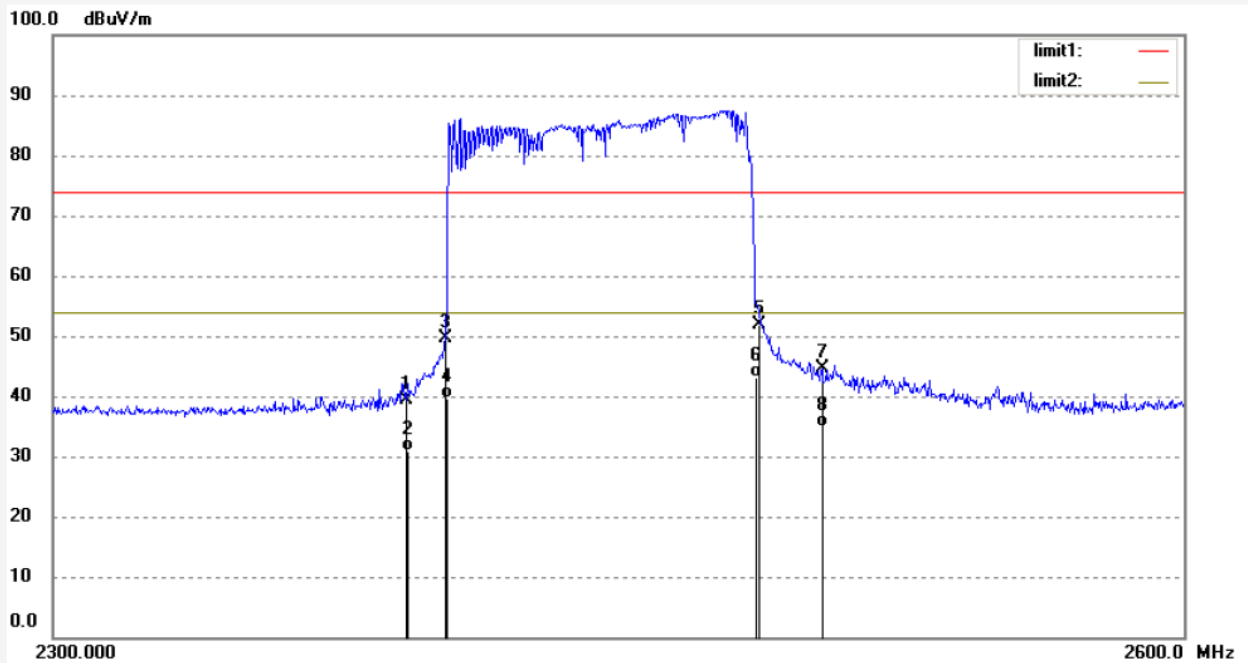
Date: 15/05/29/

Time: 9:51:16

Engineer Signature:

Distance: 3m

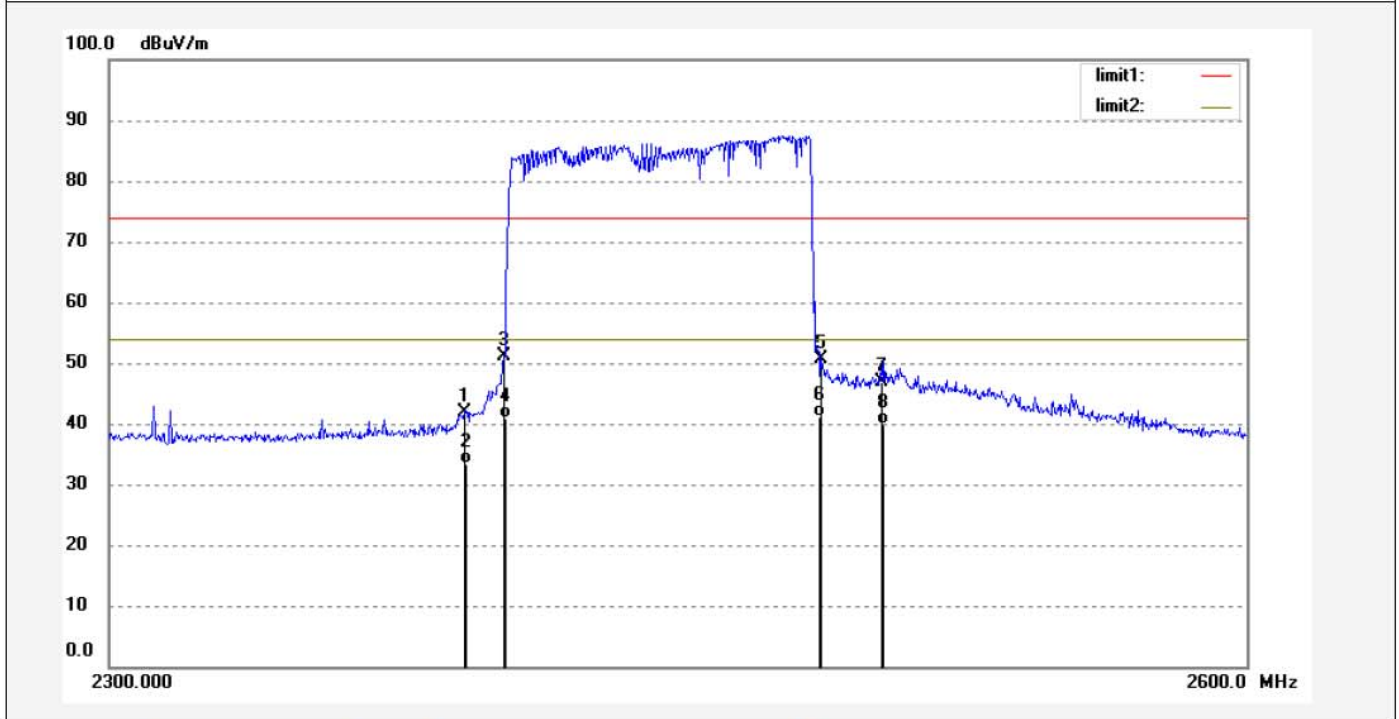
Note: Report No.:ATE20151107



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	46.09	-6.78	39.31	74.00	-34.69	peak			
2	2390.000	37.62	-6.78	30.84	54.00	-23.16	AVG			
3	2400.000	56.51	-6.76	49.75	74.00	-24.25	peak			
4	2400.000	46.34	-6.76	39.58	54.00	-14.42	AVG			
5	2483.500	58.34	-6.54	51.80	74.00	-22.20	peak			
6	2483.500	49.77	-6.54	43.23	54.00	-10.77	AVG			
7	2500.000	51.06	-6.50	44.56	74.00	-29.44	peak			
8	2500.000	41.36	-6.50	34.86	54.00	-19.14	AVG			

Job No.: STAR #4000	Polarization: Vertical
Standard: FCC PK	Power Source: DC 5V
Test item: Radiation Test	Date: 15/05/29/
Temp.(C)/Hum.(%) 25 C / 55 %	Time: 9:56:29
EUT: Barcode Scanner	Engineer Signature:
Mode: HOPPING (8DPSK)	Distance: 3m
Model: MS3390	
Manufacturer: MinDe	

Note: Report No.:ATE20151107



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	48.77	-6.78	41.99	74.00	-32.01	peak			
2	2390.000	40.20	-6.78	33.42	54.00	-20.58	AVG			
3	2400.000	57.88	-6.76	51.12	74.00	-22.88	peak			
4	2400.000	47.67	-6.76	40.91	54.00	-13.09	AVG			
5	2483.500	57.21	-6.54	50.67	74.00	-23.33	peak			
6	2483.500	47.67	-6.54	41.13	54.00	-12.87	AVG			
7	2500.000	53.50	-6.50	47.00	74.00	-27.00	peak			
8	2500.000	46.30	-6.50	39.80	54.00	-14.20	AVG			



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

Job No.: STAR #4001

Standard: FCC PK

Test item: Radiation Test

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

EUT: Barcode Scanner

Mode: HOPPING (8DPSK)

Model: MS3390

Manufacturer: MinDe

Polarization: Horizontal

Power Source: DC 5V

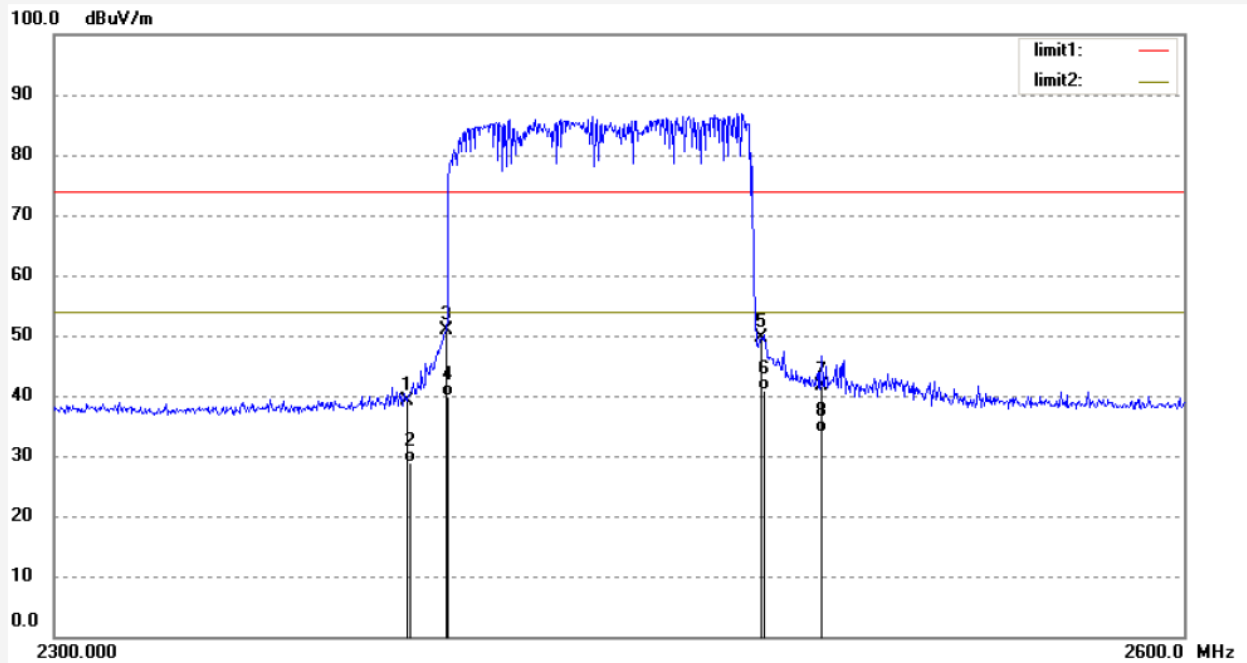
Date: 15/05/29/

Time: 10:02:30

Engineer Signature:

Distance: 3m

Note: Report No.:ATE20151107



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	45.95	-6.78	39.17	74.00	-34.83	peak			
2	2390.000	35.69	-6.78	28.91	54.00	-25.09	AVG			
3	2400.000	57.62	-6.76	50.86	74.00	-23.14	peak			
4	2400.000	46.67	-6.76	39.91	54.00	-14.09	AVG			
5	2483.500	56.20	-6.54	49.66	74.00	-24.34	peak			
6	2483.500	47.38	-6.54	40.84	54.00	-13.16	AVG			
7	2500.000	48.23	-6.50	41.73	74.00	-32.27	peak			
8	2500.000	40.36	-6.50	33.86	54.00	-20.14	AVG			

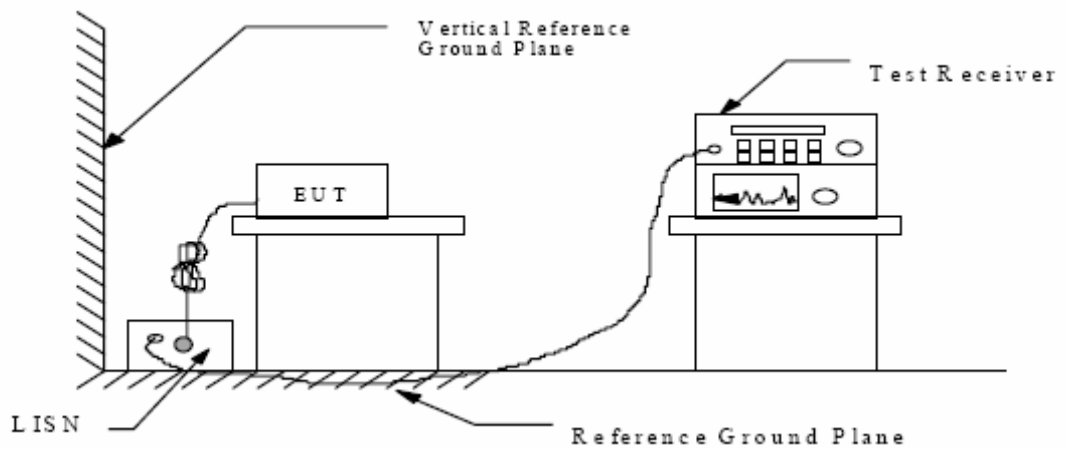
12.AC POWER LINE CONDUCTED EMISSION FOR FCC PART

15 SECTION 15.207(A)

12.1.Block Diagram of Test Setup

12.1.1.Block diagram of connection between the EUT and simulators

12.1.2.Shielding Room Test Setup Diagram



(EUT: Barcode Scanner)

12.2.The Emission Limit

12.2.1.Conducted Emission Measurement Limits According to Section 15.207(a)

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

* Decreases with the logarithm of the frequency.

12.3. Configuration of EUT on Measurement

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

12.4. Operating Condition of EUT

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

12.4.2. Turn on the power of all equipment.

12.4.3. Let the EUT work in TX (Operation) mode 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 (R & S ESCS30) is set at 9 kHz.

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

12.6. Power Line Conducted Emission Measurement Results



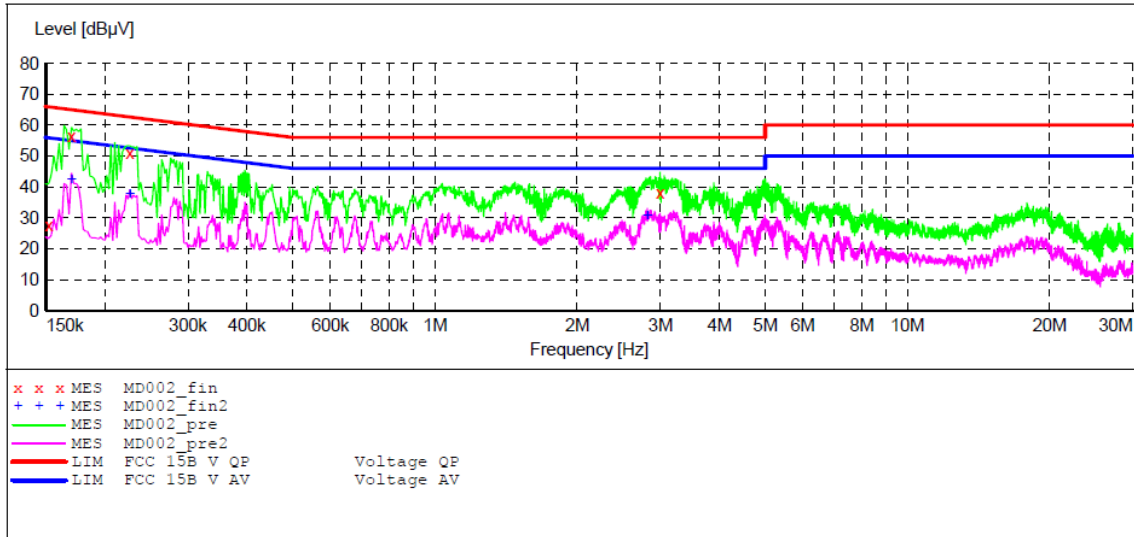
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART15B

EUT: Barcode Scanner M/N:MS3390
Manufacturer: MinDe
Operating Condition: ON
Test Site: 1#Shielding Room
Operator: star
Test Specification: L 120V/60Hz
Comment: Report No.:ATE20151107
Start of Test: 5/28/2015 / 9:13:30AM

SCAN TABLE: "V 9K-30MHz fin"

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak Average	1.0 s	200 Hz	NSLK8126 2008
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak Average	1.0 s	9 kHz	NSLK8126 2008



MEASUREMENT RESULT: "MD002_fin"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	56.50	10.5	65	8.5	QP	L1	GND
0.226000	50.80	10.6	63	11.8	QP	L1	GND
2.994000	37.90	11.1	56	18.1	QP	L1	GND

MEASUREMENT RESULT: "MD002_fin2"

Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.170000	42.30	10.5	55	12.7	AV	L1	GND
0.226000	37.70	10.6	53	14.9	AV	L1	GND
2.814000	30.50	11.0	46	15.5	AV	L1	GND



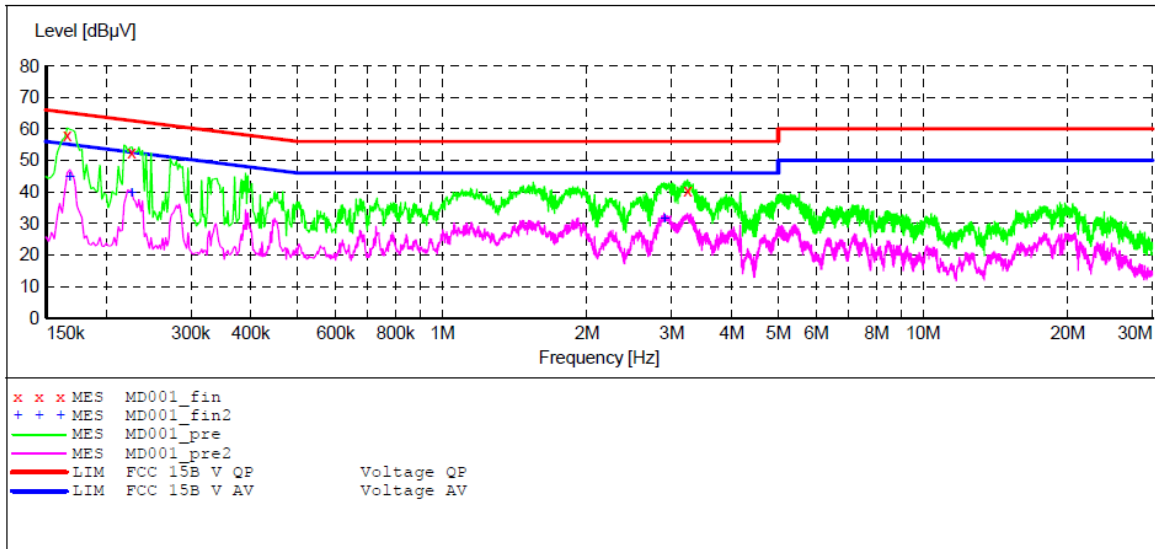
ACCURATE TECHNOLOGY CO., LTD

CONDUCTED EMISSION STANDARD FCC PART 15B

EUT: Barcode Scanner M/N:MS3390
 Manufacturer: MinDe
 Operating Condition: ON
 Test Site: 1#Shielding Room
 Operator: star
 Test Specification: N 120V/60Hz
 Comment: Report No.:ATE20151107
 Start of Test: 5/28/2015 / 9:06:08AM

SCAN TABLE: "V 9K-30MHz fin"

Short Description: _SUB_STD_VTERM2 1.70							
Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer	
9.0 kHz	150.0 kHz	100.0 Hz	QuasiPeak	1.0 s	200 Hz	NSLK8126 2008	
Average							
150.0 kHz	30.0 MHz	4.5 kHz	QuasiPeak	1.0 s	9 kHz	NSLK8126 2008	
Average							



MEASUREMENT RESULT: "MD001_fin"

5/28/2015 9:08AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.166000	58.10	10.5	65	7.1	QP	N	GND
0.226000	52.40	10.6	63	10.2	QP	N	GND
3.238000	40.30	11.1	56	15.7	QP	N	GND

MEASUREMENT RESULT: "MD001_fin2"

5/28/2015 9:08AM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line	PE
0.168000	44.50	10.5	55	10.6	AV	N	GND
0.226000	39.70	10.6	53	12.9	AV	N	GND
2.894000	31.60	11.0	46	14.4	AV	N	GND

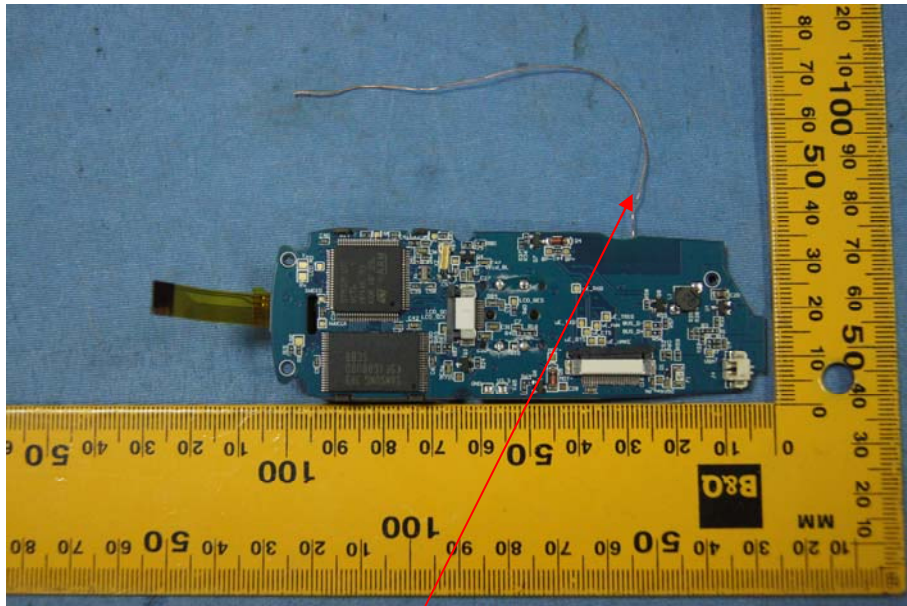
13.ANTENNA REQUIREMENT

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

The antenna is wire antenna, no consideration of replacement. Therefore, the equipment complies with the antenna requirement of Section 15.203.



Antenna