TEST REPORT

Applicant:	Hi-Target Survey Instruments Company Ltd
Address of Applicant:	10th Floor,Chuangxin Building, Tian'an Technology Zone, No.555, the North Panyu Road, Panyu District, Guangzhou City
Manufacturer:	Hi-Target Survey Instruments Company Ltd
Address of Manufacturer:	10th Floor,Chuangxin Building, Tian'an Technology Zone, No.555, the North Panyu Road, Panyu District, Guangzhou City
Product name:	Industry-Level GIS Data Collector
Model:	Qmini
Rating(s):	DC 12-24V, 1.5A (Charging Voltage) DC 7.4V, 2000mA (Battery Voltage)
Trademark:	HI-TARGET
FCC register number：	935596
Standards:	FCC Part 15.247 ANSI C63.4 : 2003
FCC ID:	XXHQMINI
Data of Receipt:	2011-11-01
Date of Test:	2011-11-02~2011-11-11
Date of Issue:	2011-11-14
Test Result	**Pass***

* In the configuration tested, the test item complied with the standards specified above.

Authorized for issue by:

Test by:			***Reviewed by:***		
Nov.14.2011	Jumy Qiu	Jumy qiu	Nov.14.2011	Pauler Li	Pauler Li
	Project Engineer			Project Engineer	
Date	*Name/Position*	*Signature*	*Date*	*Name/Position*	*Signature*

Possible test case verdicts:	
- test case does not apply to the test object ..... :	N/A
- test object does meet the requirement . :	P (Pass)
- test object does not meet the requirement ..... :	F (Fail)
Testing ..... :	
Date of receipt of test item ..... :	01 Nov 2011
Date (s) of performance of tests ..... :	02 Nov 2011 ~ 11 Nov. 2011

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report would be invalid test report without all the signatures of testing technician and approver.

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (c)	Antenna conducted Spurious Emission	PASS	
15.247 (a)(1)	Hopping Channel Separation	PASS	
15.247 (b)(1)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (b)(1)	Number of Hopping Frequency	PASS	
15.247 (a)(1)	Dwell Time	PASS	
15.205	Restricted Bands	PASS	
15.203	Antenna Requirement	PASS	
1.1307 1.1310 2.1091 2.1093	RF Exposure Compliance	PASS	

NOTE:

(1)” N/A” denotes test is not applicable in this Test Report

1.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U，(dB)	NOTE
CE01	ANSI	150 KHz ~ 30MHz	2.3	

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U，(dB)	NOTE
3m chamber	ANSI	30MHz ~ 1000MHz	V	3.35	

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Industry-Level GIS Data Collector
Trade Name	HI TARGET
Model Name	Qmini
OEM Brand/Model Name	N/A
Model Difference	N/A
Product Description	The EUT is a Mobile printer Operation Frequency: 2402~2480 MHz Modulation Type: FHSS Bit Rate of Transmitter GFSK(1Mbps) Number Of Channel 79 CH Antenna Designation: Please see Note 3. Antenna Gain(Peak) Please see Note 3. Output Power: -4 dBm (Max.) Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.
Channel List	Please refer to the Note 2.
Power Source	DC Voltage supplied from 1* lithium size Battery
Power Rating	DC 7.4V
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	N/A

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	Printed Antenna	NA	1.82	BT Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78

For Conducted Emission	
Final Test Mode	Description
-	“N/A” denotes test is not applicable in this Test Report

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78

Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

(2) The EUT use new battery.

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: Broadcom		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1Mbps)	DEF	DEF	DEF

2.4 DESCRIPTION OF SUPPORT UNITS

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

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.	Note

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2012.04.16
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2012.04.06
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2012.09.06
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2012.04.07
5	Biconilog Antenna	ETS•Lindgren	3142D	00108096	2012.01.28
6	Horn Antenna	EMCO	3115	6124	2012.06.08
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2012.09.06
8	EMI Test Receiver	R&S	ESCI	100124	2011.12.27
9	LISN	R&S	ENV216	8-837-4	2012.05.04
10	LISN	Kyoritsu	KNW-407	8-1789-3	2012.04.06
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2012.09.06

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

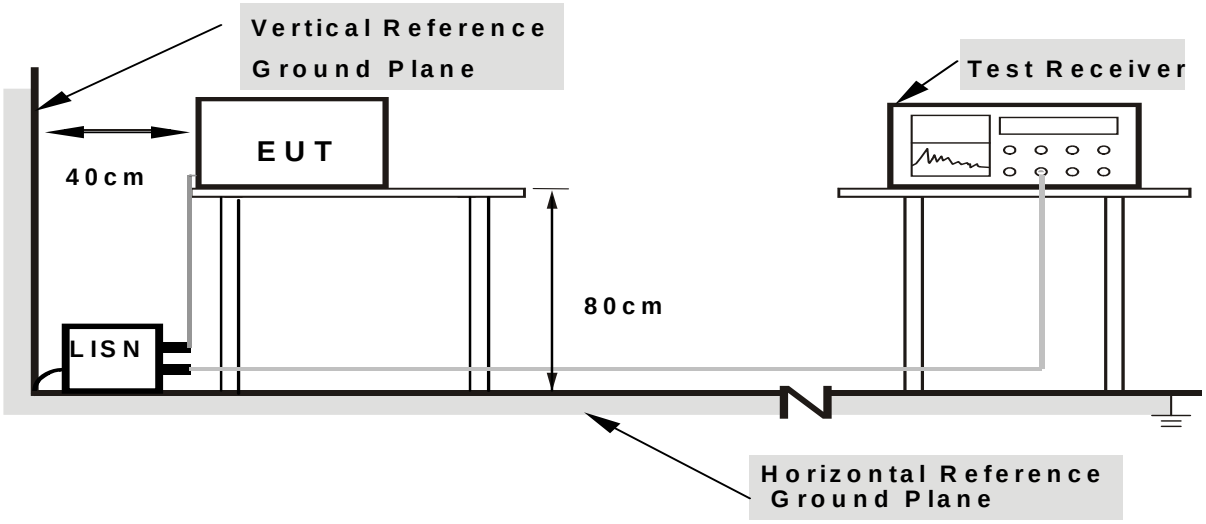
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



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

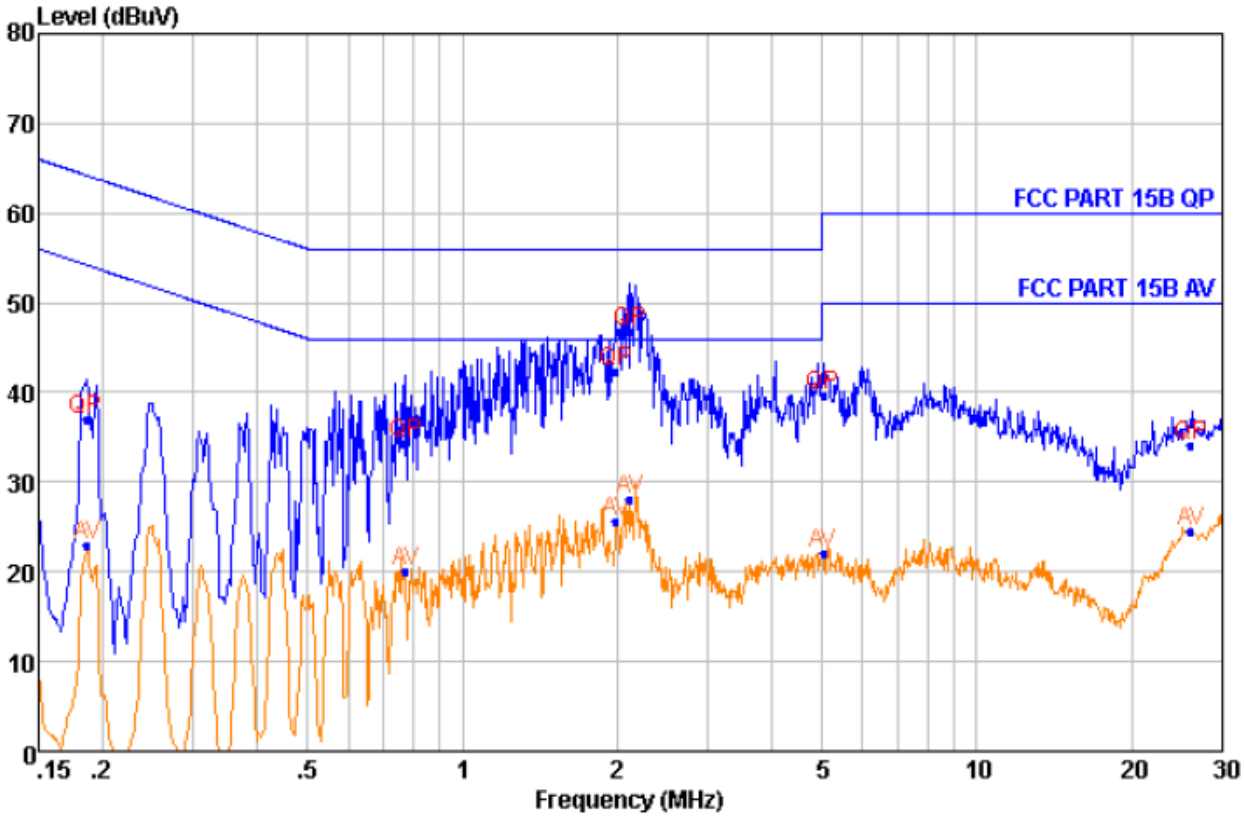
3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test.

3.1.6 TEST RESULTS

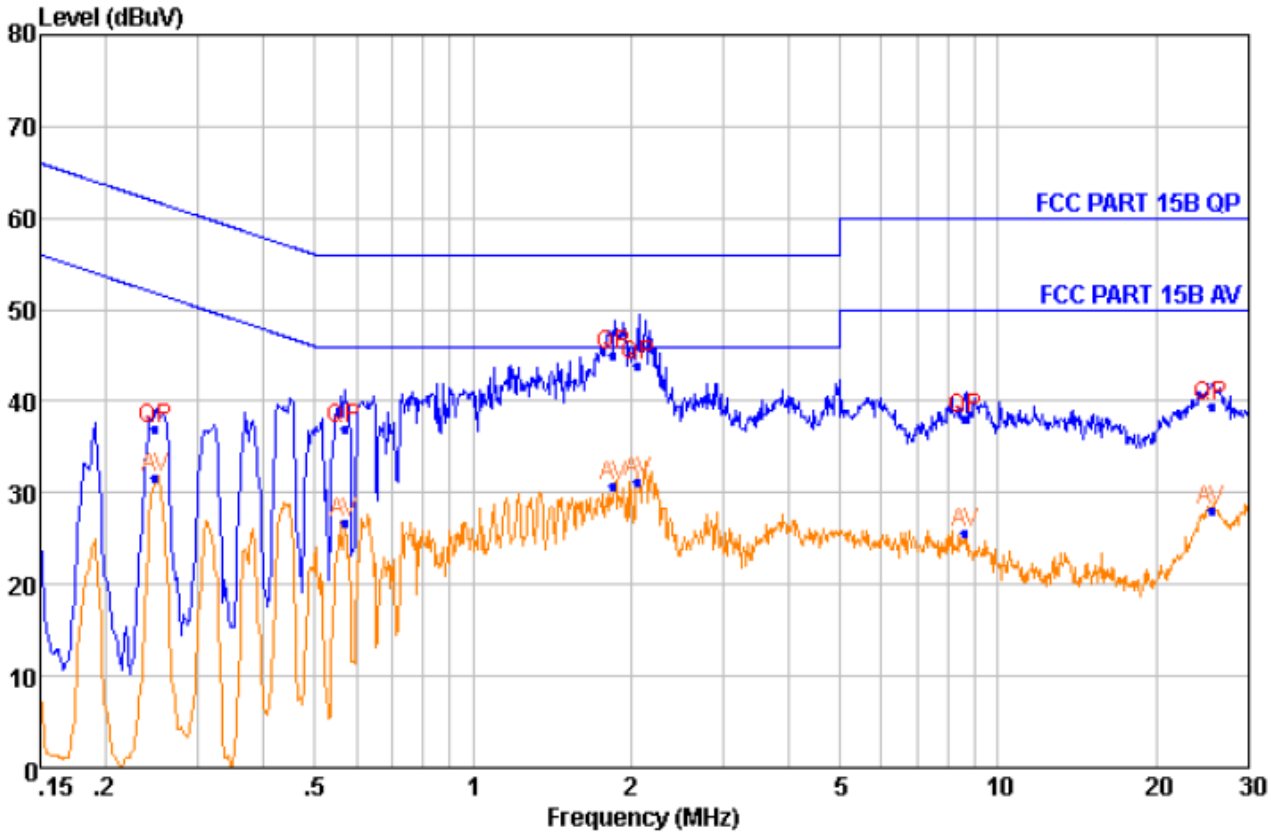
EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2480MHz-1Mbps		

L line



NO.	Freq MHz	Level dBuV	Remark	LISN Factor dB	Cable Loss dB	Limit Line dBuV	Margin dB
1	0.186	37.06	QP	9.69	0.21	64.22	-27.16
2	0.186	22.88	Average	9.68	0.21	54.20	-31.32
3	0.774	34.22	QP	9.70	0.29	56.00	-21.78
4	0.774	19.95	Average	9.70	0.29	46.00	-26.05
5	1.985	42.42	QP	9.65	0.35	56.00	-13.58
6	1.985	25.68	Average	9.65	0.35	46.00	-20.32
7	2.117	46.84	QP	9.65	0.35	56.00	-9.16
8	2.117	28.04	Average	9.65	0.35	46.00	-17.96
9	5.022	39.61	QP	9.60	0.40	60.00	-20.39
10	5.022	22.06	Average	9.60	0.40	50.00	-27.94
11	26.080	34.12	QP	9.67	0.49	60.00	-25.88
12	26.080	24.50	Average	9.67	0.49	50.00	-25.50

N line



NO.	Freq MHz	Level dBuV	Remark	LISN Factor dB	Cable Loss dB	Limit Line dBuV	Margin dB
1	0.249	37.03	QP	9.64	0.23	61.80	-24.77
2	0.249	31.75	Average	9.64	0.23	51.80	-20.05
3	0.569	36.97	QP	9.65	0.28	56.00	-19.03
4	0.569	26.84	Average	9.65	0.28	46.00	-19.16
5	1.854	45.03	QP	9.62	0.34	56.00	-10.97
6	1.854	30.64	Average	9.62	0.34	46.00	-15.36
7	2.061	43.99	QP	9.62	0.35	56.00	-12.01
8	2.061	31.29	Average	9.62	0.35	46.00	-14.71
9	8.660	38.16	QP	9.62	0.43	60.00	-21.84
10	8.660	25.58	Average	9.62	0.43	50.00	-24.42
11	25.526	39.34	QP	9.63	0.49	60.00	-20.66
12	25.526	27.97	Average	9.63	0.49	50.00	-22.03

3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5^{th} harmonic of the highest frequency or 40 GHz, whichever is lower

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

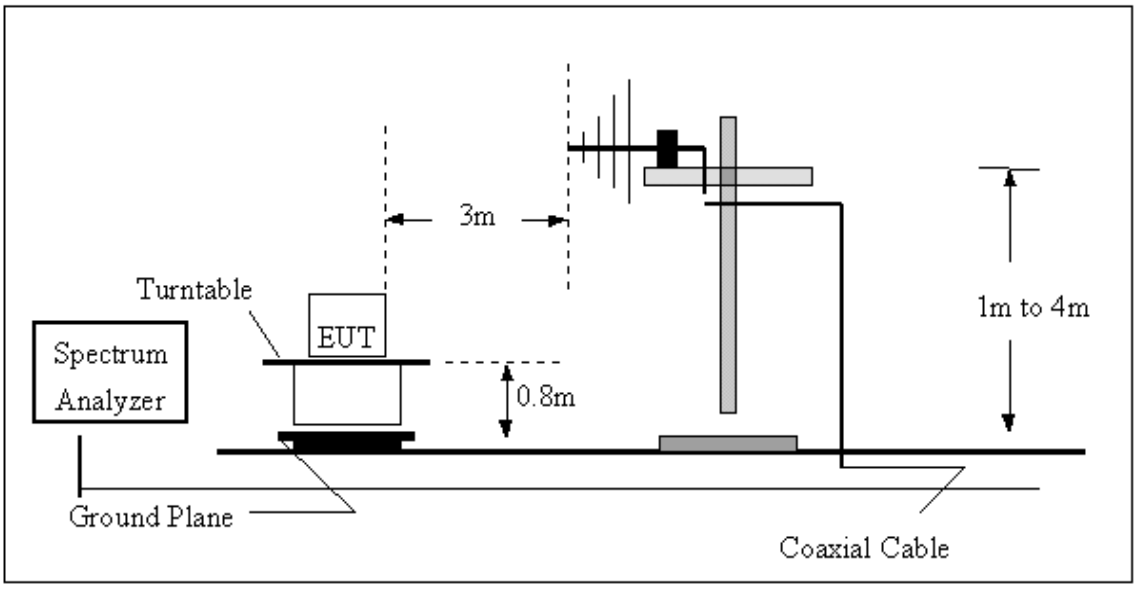
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.2.3 DEVIATION FROM TEST STANDARD

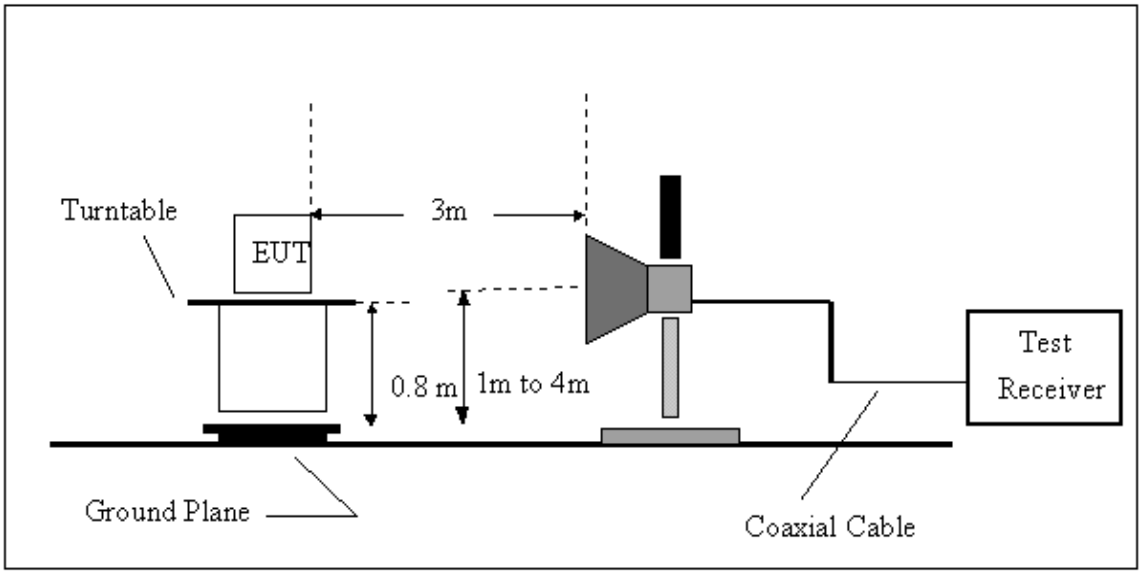
No deviation

3.2.4 TEST SETUP

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-Up Frequency Above 1 GHz



3.2.5 EUT OPERATING CONDITIONS

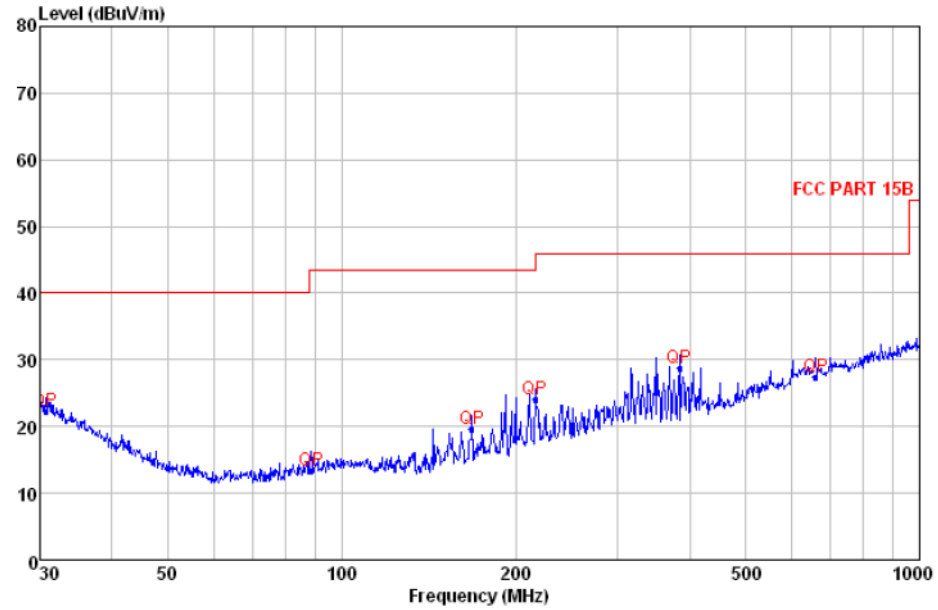
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.2.6 TEST RESULTS (BETWEEN30 – 1000 MHZ)

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2480MHz-1Mbps		

Horizontal:

No.	Freq	Level	Remark	Antenna Factor	Cable Loss	Limit Line	Margin	A/pos	T/pos
	MHz	dBuV/m		dB/m	dB	dBuV/m	dB	cm	deg
1	30.638	22.20	QP	17.54	1.61	40.00	-17.80	200	256
2	88.342	13.27	QP	8.13	2.09	43.50	-30.23	200	236
3	167.824	19.61	QP	8.77	2.39	43.50	-23.89	100	245
4	216.024	23.97	QP	10.87	2.50	46.00	-22.03	200	255
5	383.932	28.64	QP	15.11	2.76	46.00	-17.36	150	249
6	661.151	27.31	QP	20.56	3.01	46.00	-18.69	200	253



Remark：

(1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz；SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz。

(2) All readings are Peak unless otherwise stated QP in column of『Remark』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

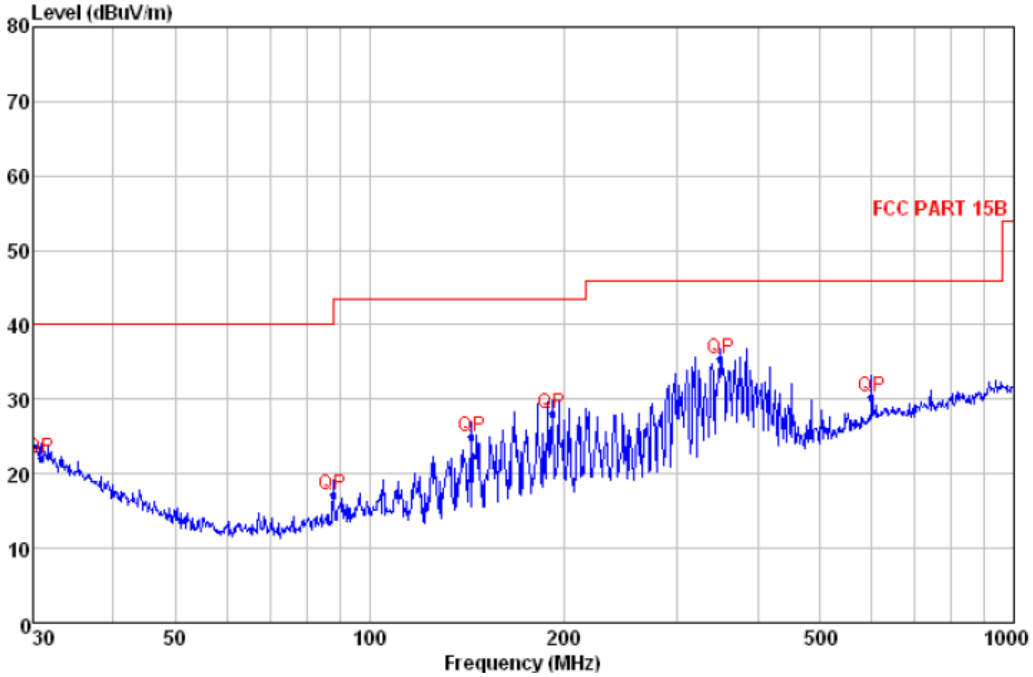
(3) Measuring frequency range from 30MHz to 1000MHz。

(4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table。

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2480MHz-1Mbps		

Vertical:

No.	Freq	Level	Remark	Antenna Factor	Cable Loss	Limit Line	Margin	A/pos	T/pos
	MHz	dBuV/m		dB/m	dB	dBuV/m	dB	cm	deg
1	30.853	22.17	QP	17.34	1.61	40.00	-17.83	100	136
2	87.725	17.18	QP	8.08	2.09	40.00	-22.82	100	145
3	143.830	24.89	QP	7.73	2.32	43.50	-18.61	150	142
4	191.745	27.97	QP	9.44	2.45	43.50	-15.53	200	145
5	350.477	35.33	QP	14.41	2.72	46.00	-10.67	100	162
6	601.427	30.27	QP	19.93	2.97	46.00	-15.73	100	135



Remark：

(1) Reading in which marked as QP or Peak means measurements by using are Quasi-Peak Mode or Peak Mode with Detector BW=120KHz；SPA setting in RBW=120KHz, VBW =120KHz, Swp. Time = 0.3 sec./MHz。

(2) All readings are Peak unless otherwise stated QP in column of『Remark』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(3) Measuring frequency range from 30MHz to 1000MHz。

(4) If the peak scan value lower limit more than 20dB, then this signal data does not show in table。

3.2.7 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2402MHz – CH 00(1Mbps)		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	V	16.49	6.28	34.77	51.26	41.05	74.00	54.00	X/E
2402.00	**V**	**46.33**	**45.86**	**34.80**	**81.13**	**80.66**			**X/F**
4804.00	V	33.72	32.98	7.71	41.43	40.69	74.00	54.00	X/H
7206.00	V	26.68	25.16	10.81	37.49	35.97	74	54	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency。"F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

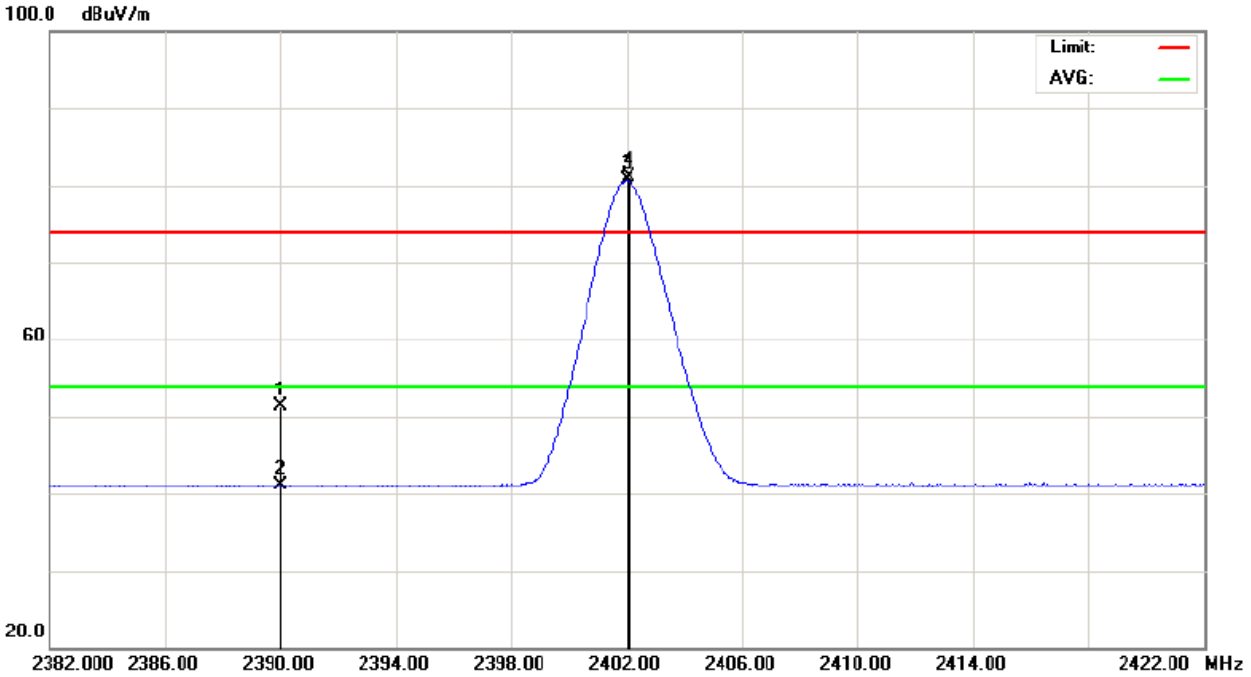
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

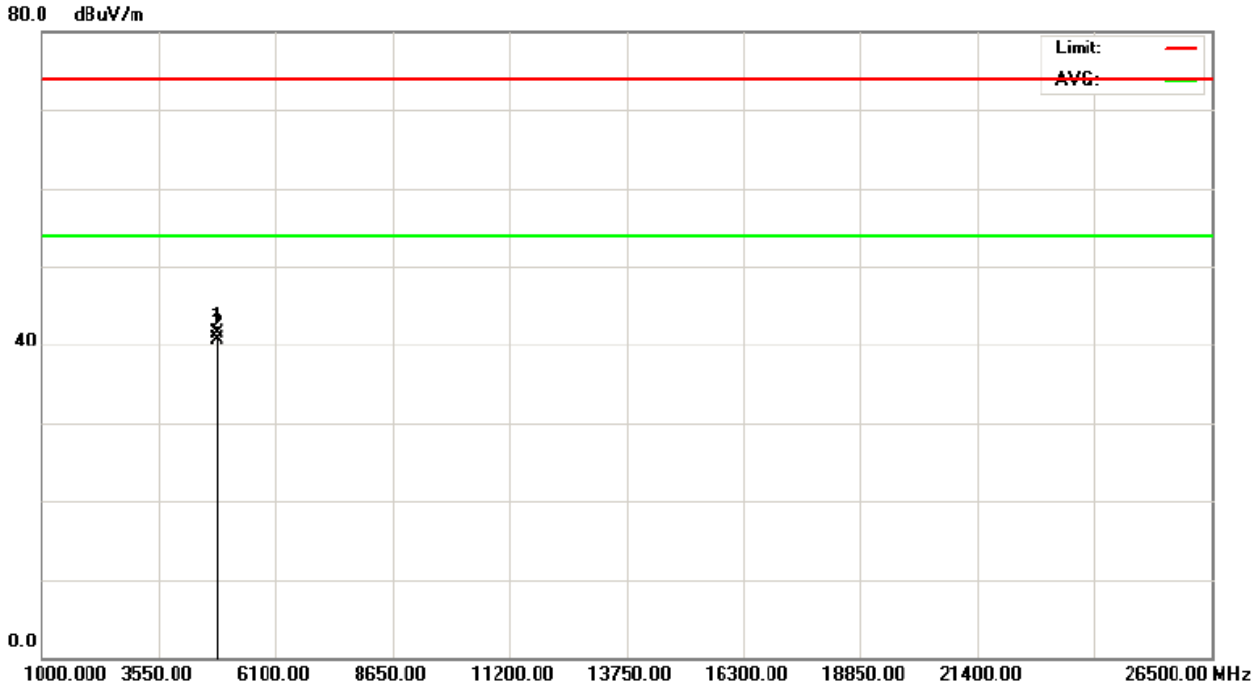
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.
For example: Frequency 4804MHz
Anttenna:33.6dB;Cable Loss:9.21dB, Pre-amplifier:35.1dB
Corr.Factor=33.6+9.21-35.1=7.71dB

TX CH00(Above 1000 MHz, Vertical)





EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2402MHz – CH 00(1Mbps)		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	H	16.13	6.14	34.77	50.90	40.91	74.00	54.00	X/E
2402.00	**H**	**47.79**	**47.43**	**34.80**	**82.59**	**82.23**			**X/F**
4803.98	H	39.29	36.38	7.71	47.00	44.09	74.00	54.00	X/H
7206.00	H	29.86	28.62	10.81	40.67	39.43	74	54	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency。"F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

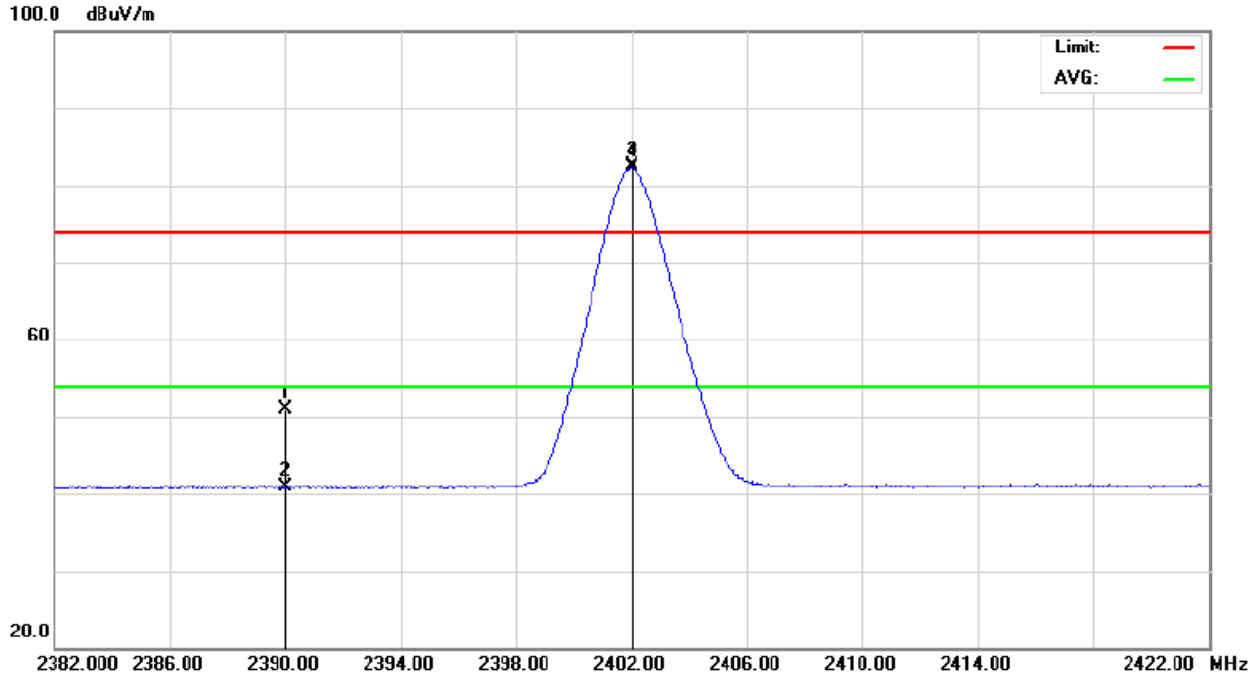
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

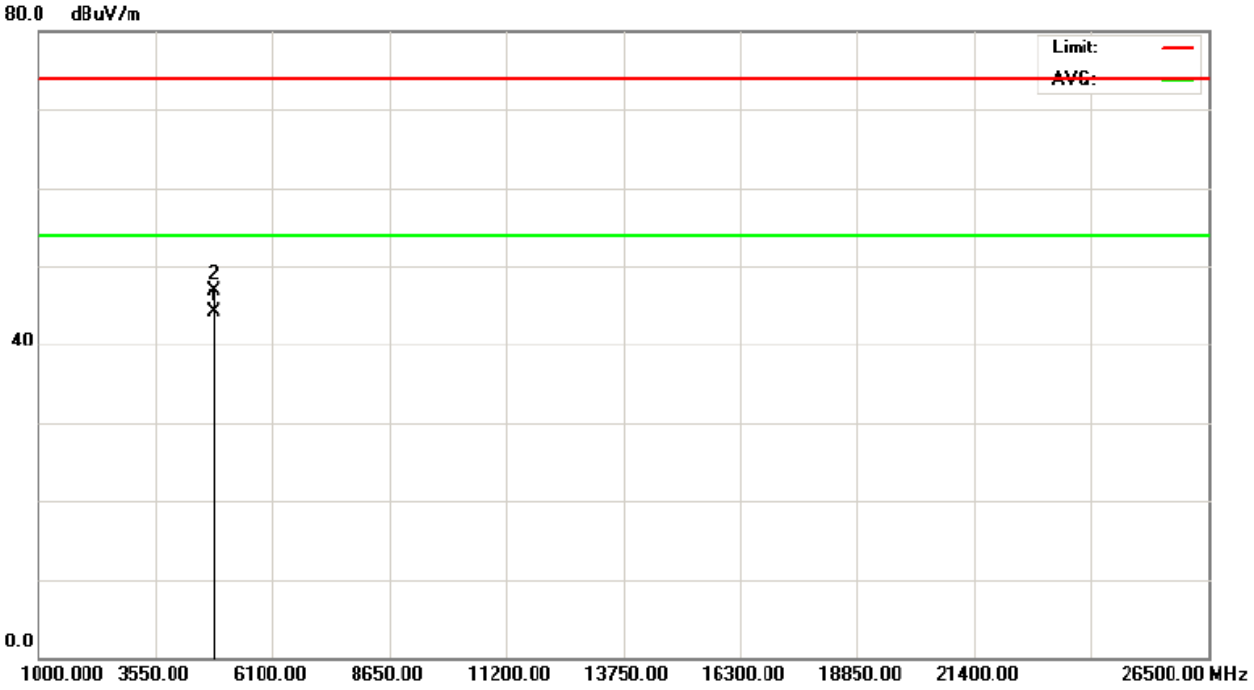
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

TX CH00(Above 1000 MHz, Horizontal)





EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2441MHz –CH39(1Mbps)		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2440.96	**V**	**44.63**	**44.03**	**32.21**	**76.84**	**76.24**			**X/F**
4882.18	V	30.05	29.69	8.19	38.24	37.88	74.00	54.00	X/H
5235.92	V	29.36	27.55	8.95	38.31	36.50	74.00	54.00	X/E
7322.88	V	26.88	25.37	10.96	37.84	36.33	74	74	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency。"F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

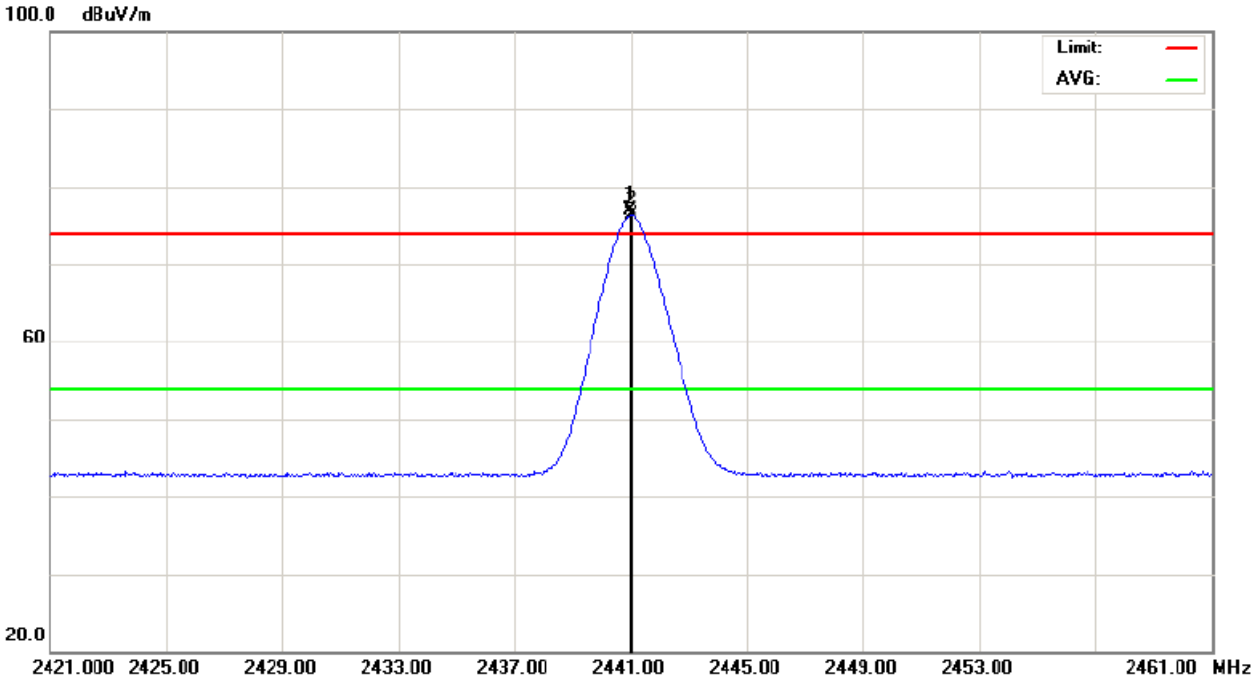
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

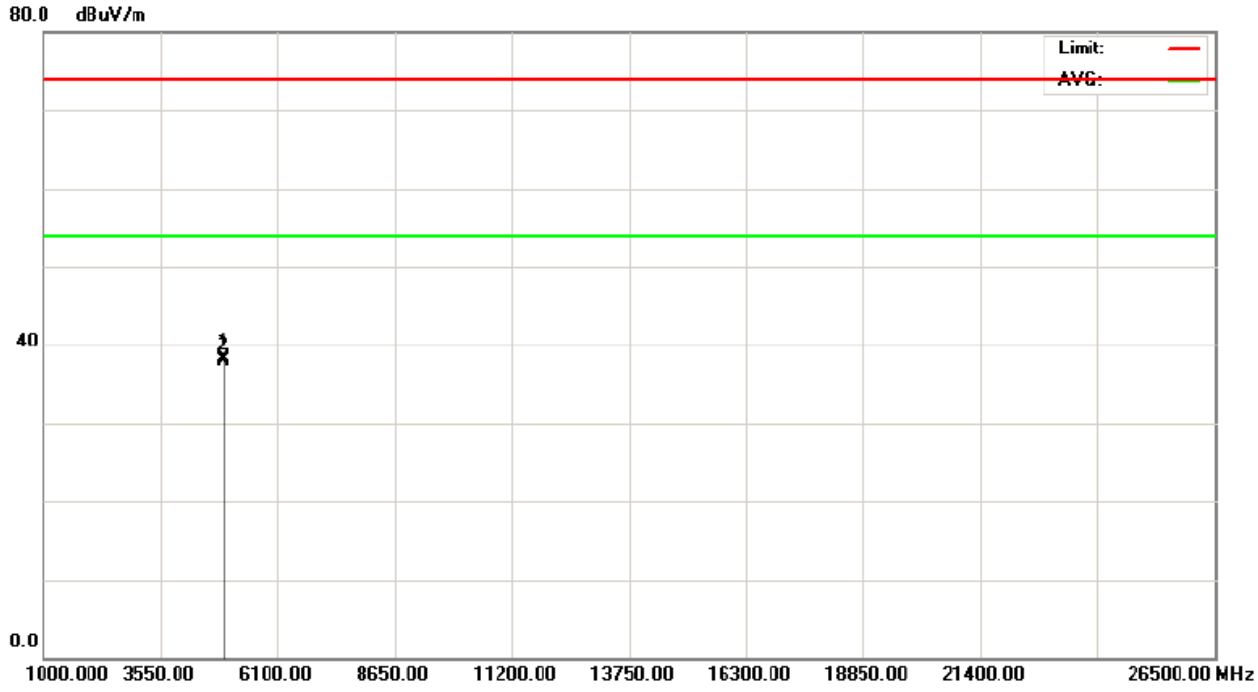
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

TX CH39 (Above 1000 MHz, Vertical)





EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2441MHz –CH39(1Mbps)		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2441.00	**H**	**48.14**	**47.73**	**32.21**	**80.35**	**79.94**			**X/F**
4882.03	H	31.82	31.03	8.19	40.01	39.22	74.00	54.00	X/H
5236.02	H	31.35	29.29	8.95	40.30	38.24	74.00	54.00	X/E
7323.00	H	25.66	24.32	10.96	36.62	35.28	74	54	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency。"F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

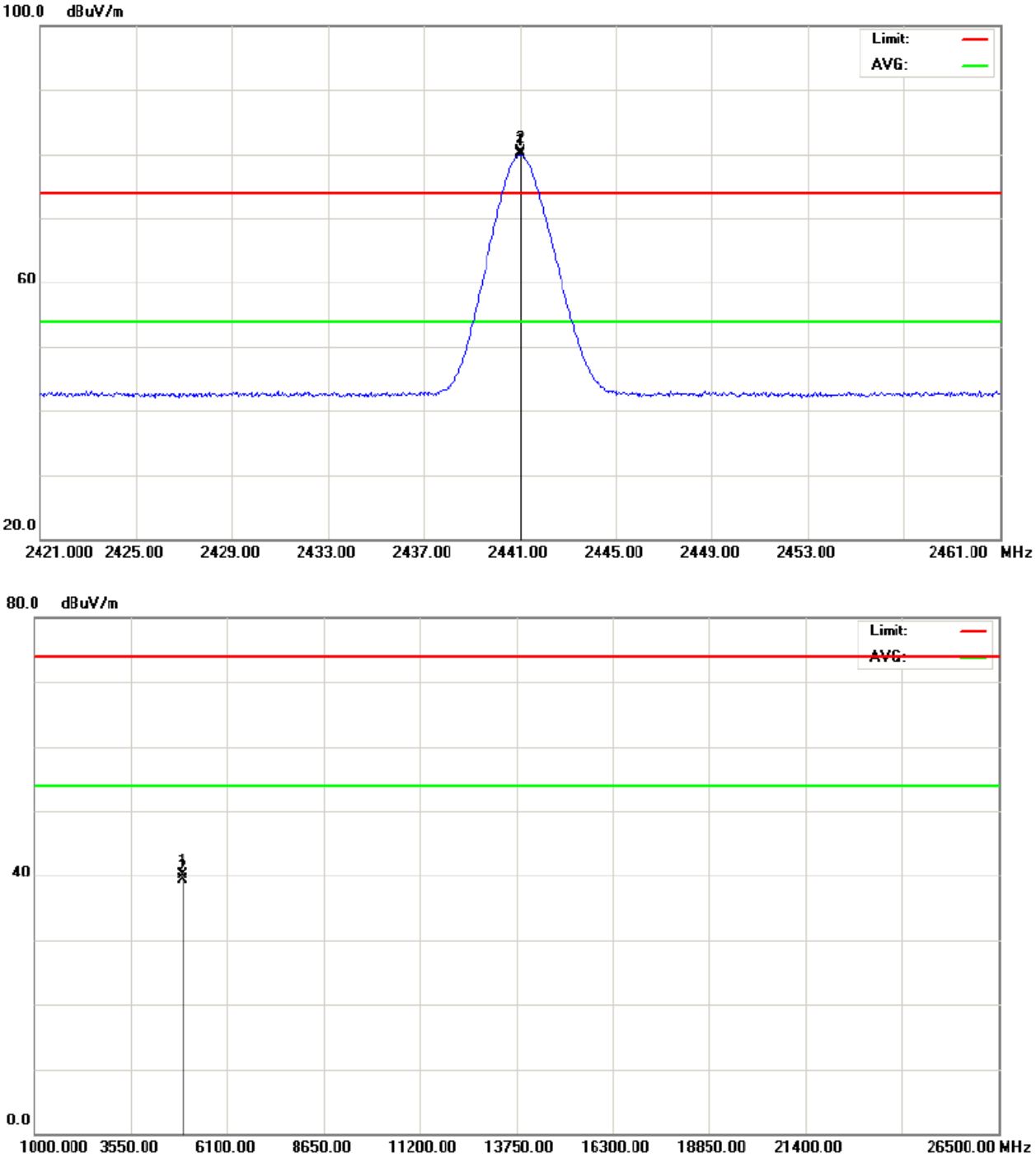
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

TX CH39 (Above 1000 MHz, Horizontal)



EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2480MHz –CH78(1Mbps)		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2480.00	**V**	**44.44**	**44.07**	**35.04**	**79.48**	**79.11**			**X/F**
2483.50	V	17.49	6.98	35.04	52.53	42.02	74.00	54.00	X/E
4960.00	V	36.26	35.61	8.67	44.93	44.28	74.00	54.00	X/H
7440.00	V	28.01	26.88	11.21	39.22	38.09	74	54	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency。"F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

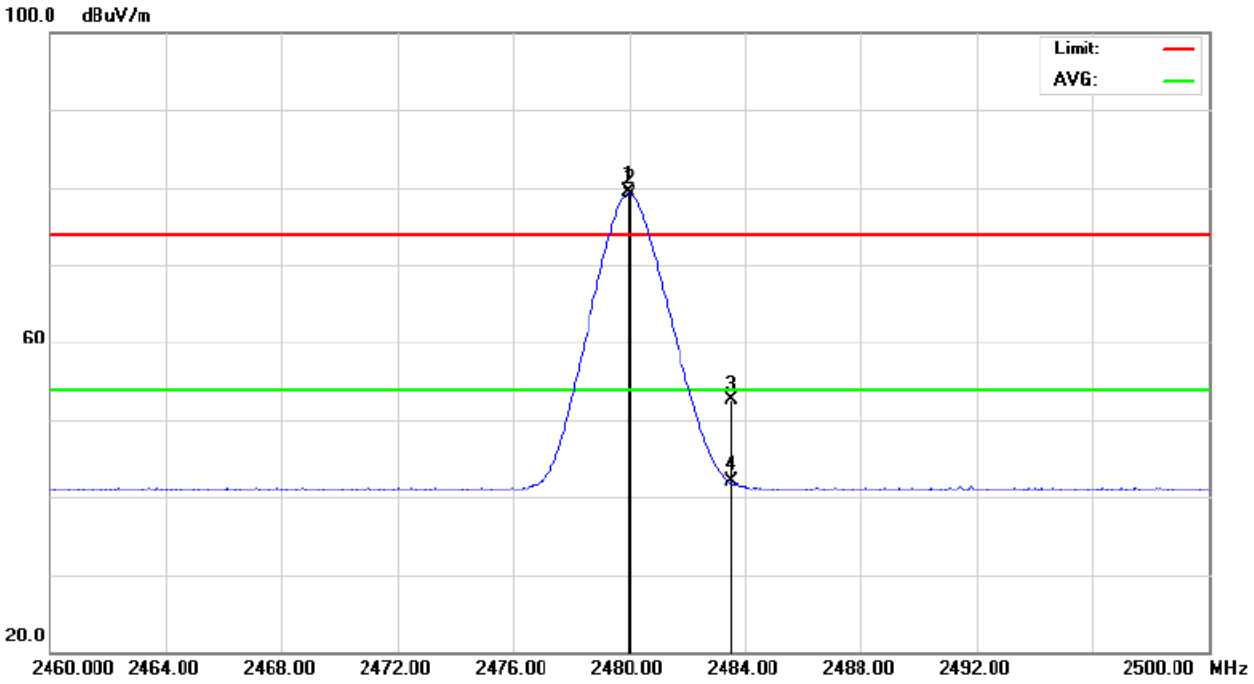
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

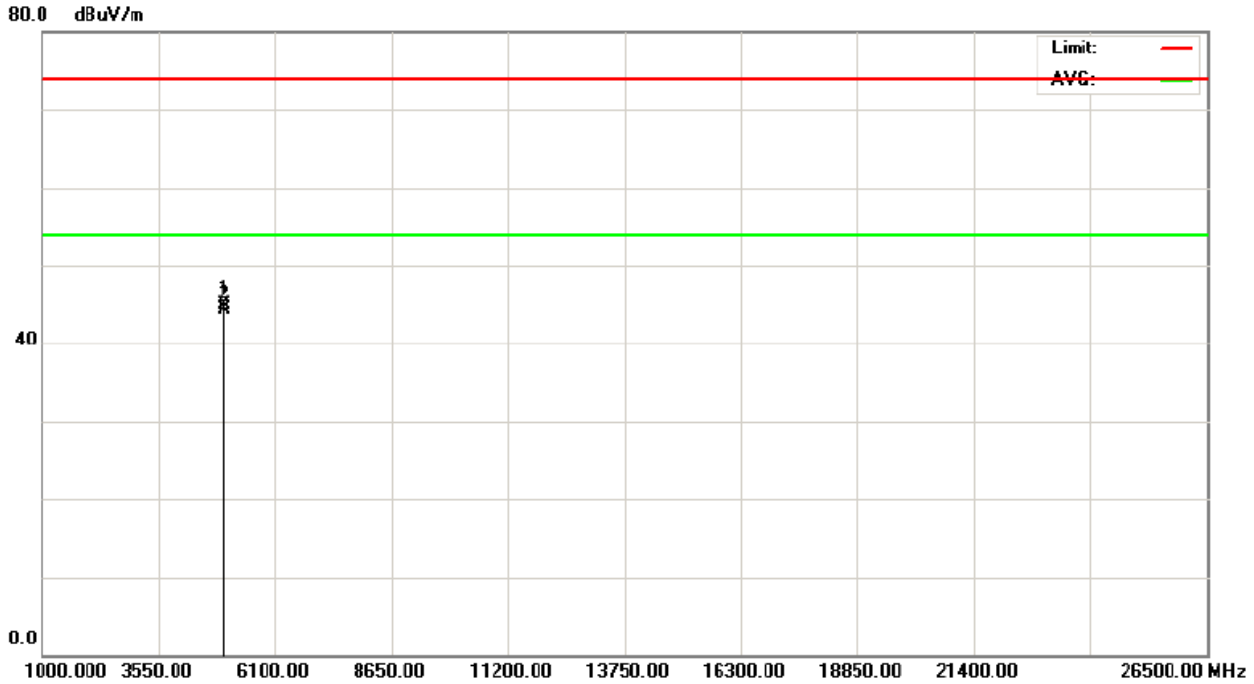
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

TX CH78 (Above 1000 MHz, Vertical)





EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2480MHz –CH78(1Mbps)		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2480.00	**H**	**44.92**	**44.37**	**35.04**	**79.96**	**79.41**			**X/F**
2483.50	H	16.58	7.04	35.04	51.62	42.08	74.00	54.00	X/E
4960.00	H	33.97	33.33	8.67	42.64	42.00	74.00	54.00	X/H
7440.00	H	26.54	25.12	11.21	37.75	36.33	74	54	X/H

Remark：

(1) All readings are Peak unless otherwise stated QP in column of『Note』. Peak denotes that the Peak reading compliance with the QP Limits and then QP Mode measurement didn't perform。

(2) Measuring frequency range from 30MHz to 1000MHz or the 10th harmonic of highest fundamental frequency。"F" denotes fundamental frequency; "H" denotes spurious frequency. "E" denotes band edge frequency. (This judgment method includes the Band Edge Requirement.)

(3) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(4) Data of measurement within this frequency range shown " * " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

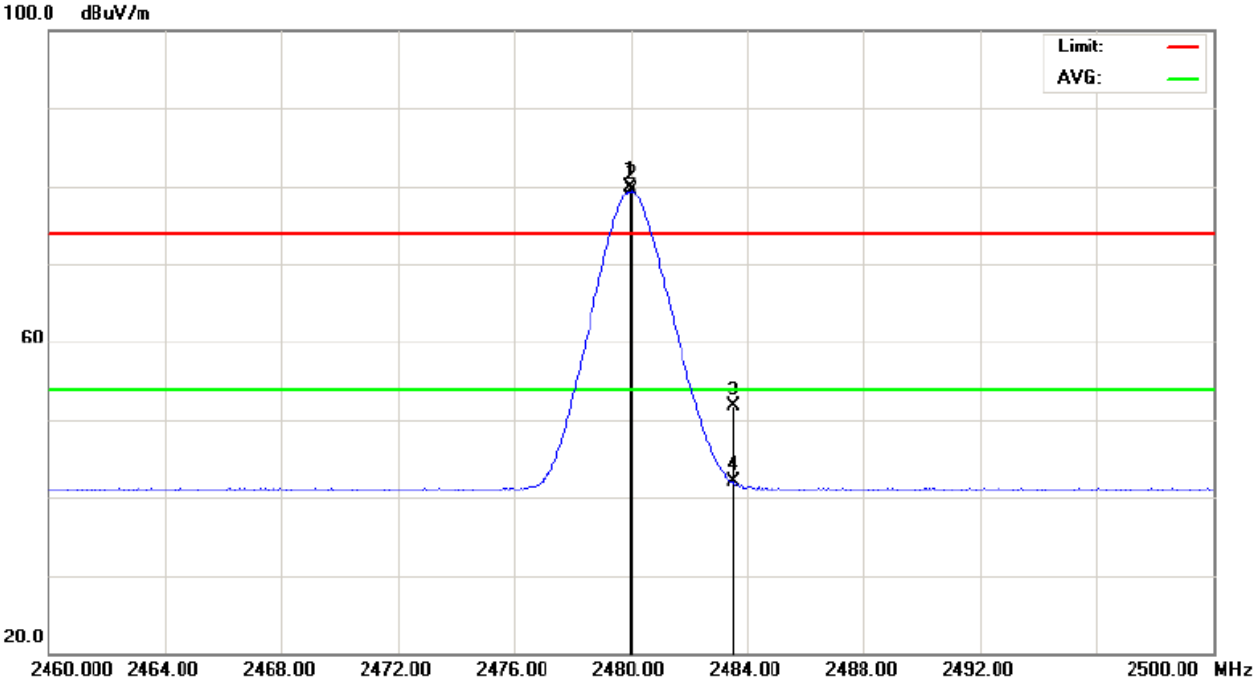
(5) A preamp and high pass filter were used for this test in order to provide sufficient measurement sensitivity.

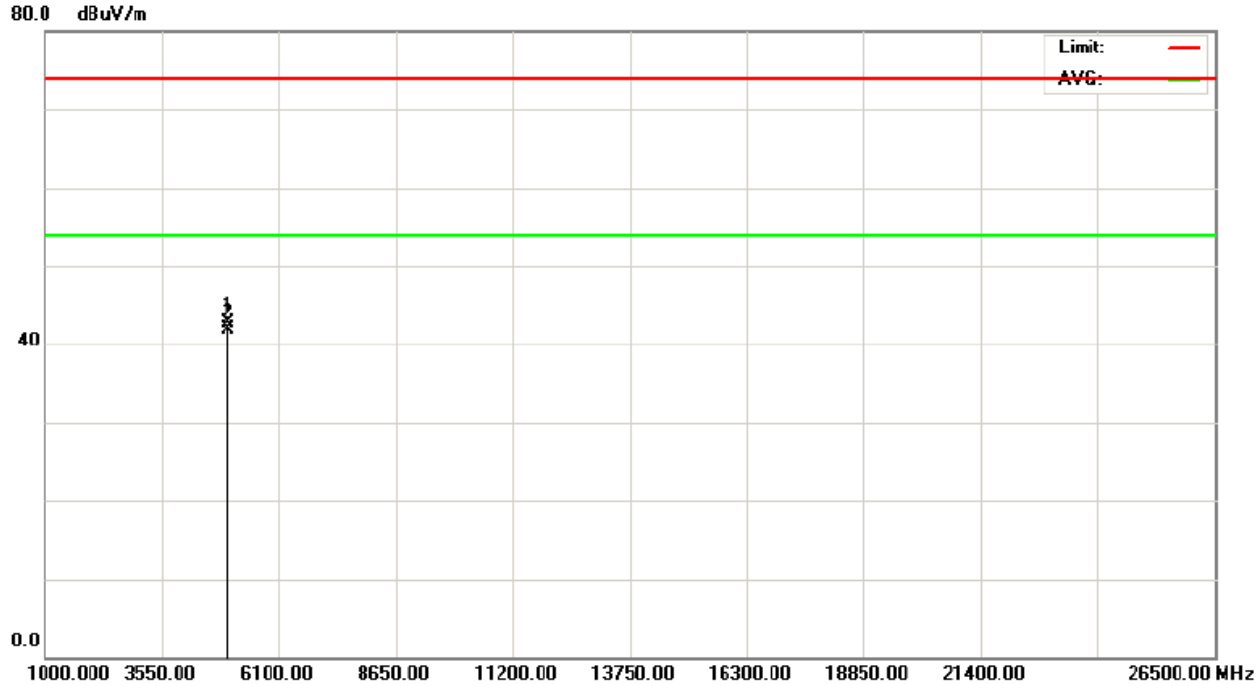
(6) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

(7) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(8) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

TX CH78 (Above 1000 MHz, Horizontal)





3.2.8 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2402MHz/2480MHz (1Mbps)		
Note：	1. The transmitter was setup to transmit at the lowest channel (CH00). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel (CH78). Then the field strength was measured at 2483.5-2500 MHz.		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	V	16.49	6.28	34.77	51.26	41.05	74.00	54.00	CH00
2483.50	V	17.49	6.98	35.04	52.53	42.02	74.00	54.00	CH78

Remark：

(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

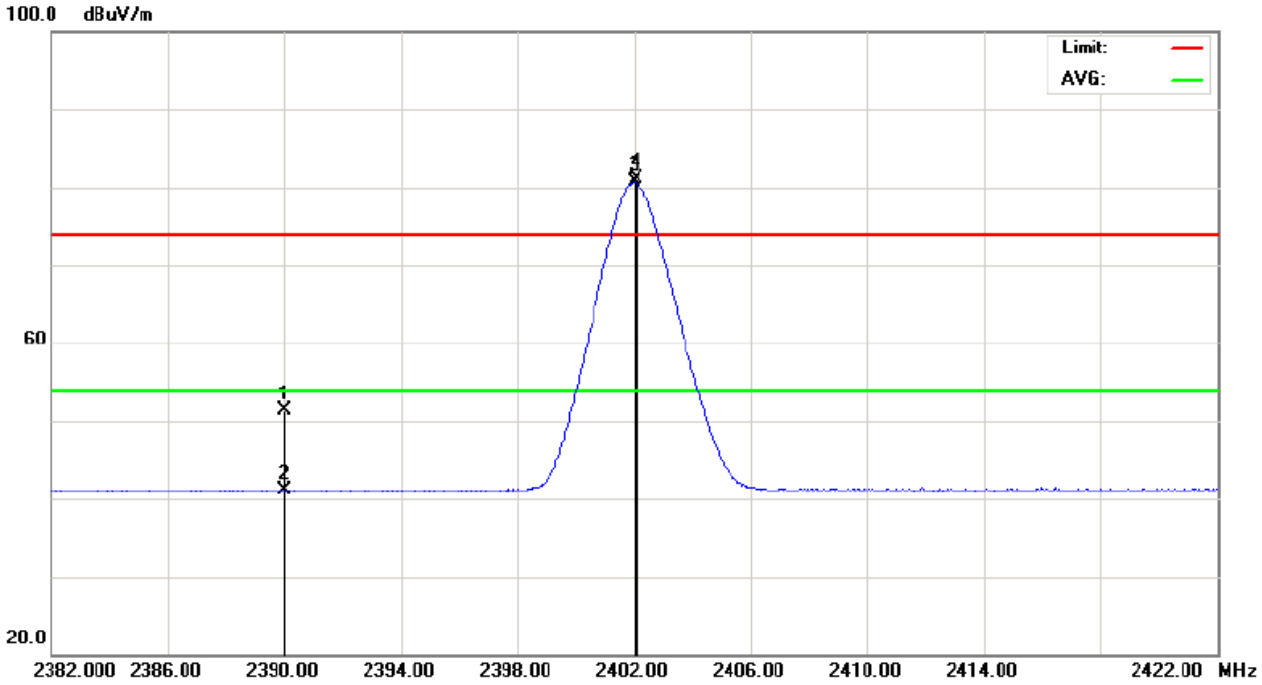
(2) EUT Orthogonal Axis：

"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

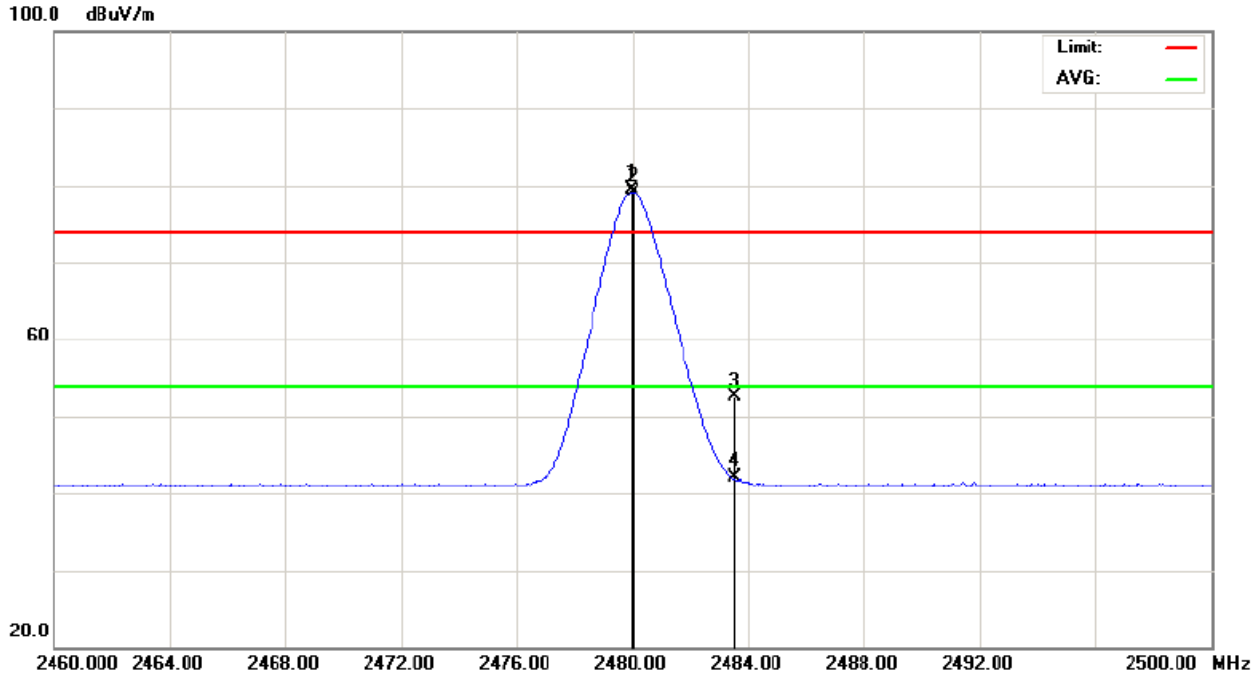
(3) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(4) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Restricted Bands Requirements, Vertical
CH00



CH78



EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	TX 2402MHz/2480MHz (1Mbps)		
Note：	1. The transmitter was setup to transmit at the lowest channel (CH00). Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel (CH78). Then the field strength was measured at 2483.5-2500 MHz.		

Freq.	Ant.Pol.	Reading		Ant./CF	Act.		Limit		Note
		Peak	AV		Peak	AV	Peak	AV	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	
2390.00	H	16.13	6.14	34.77	50.90	40.91	74.00	54.00	CH00
2483.50	H	16.58	7.04	35.04	51.62	42.08	74.00	54.00	CH78

Remark：

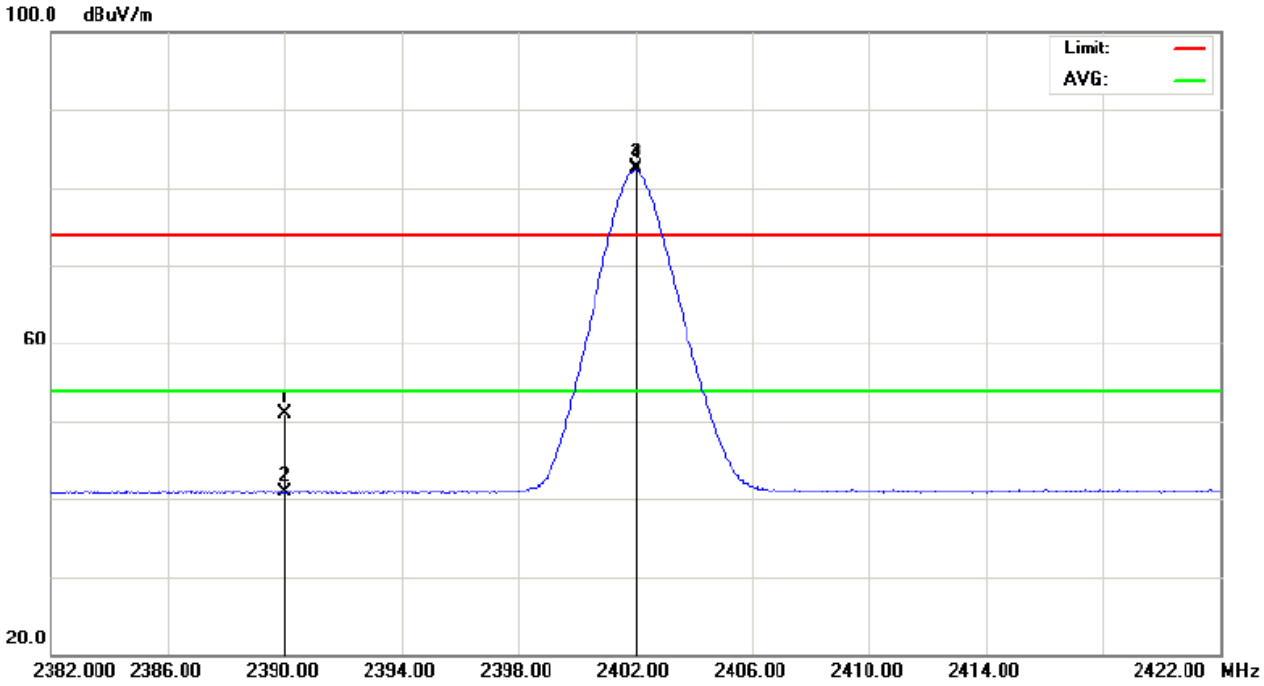
(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(2) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

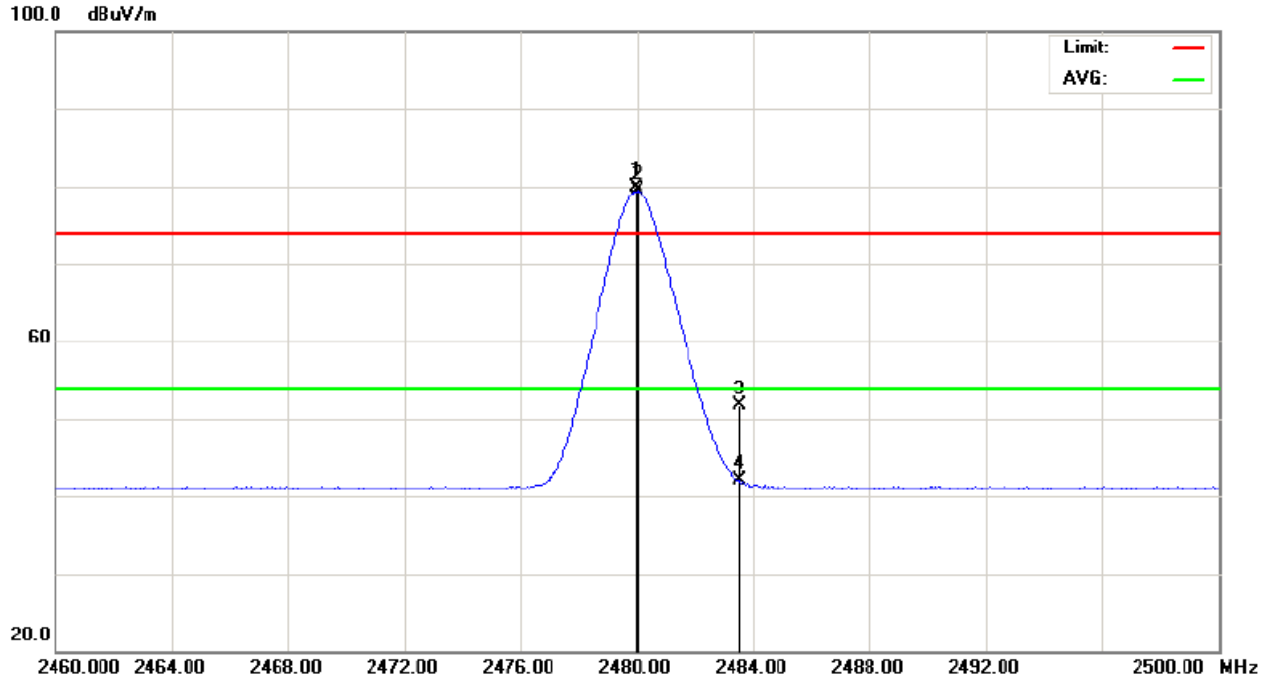
(3) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(4) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Restricted Bands Requirements, Horizontal
CH00



CH78



4. NUMBER OF HOPPING CHANNEL

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Frequency Range (MHz)	Result
15.247 (a)(1)(ii)	Number of Hopping Channel	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> Operating Frequency Range
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

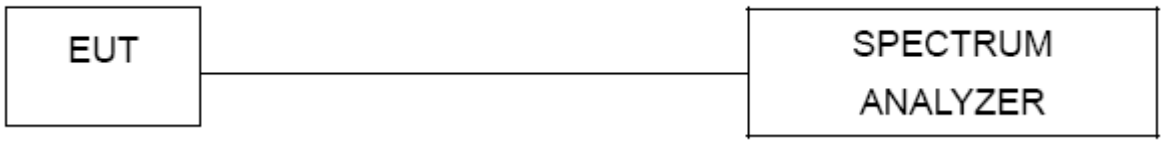
4.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



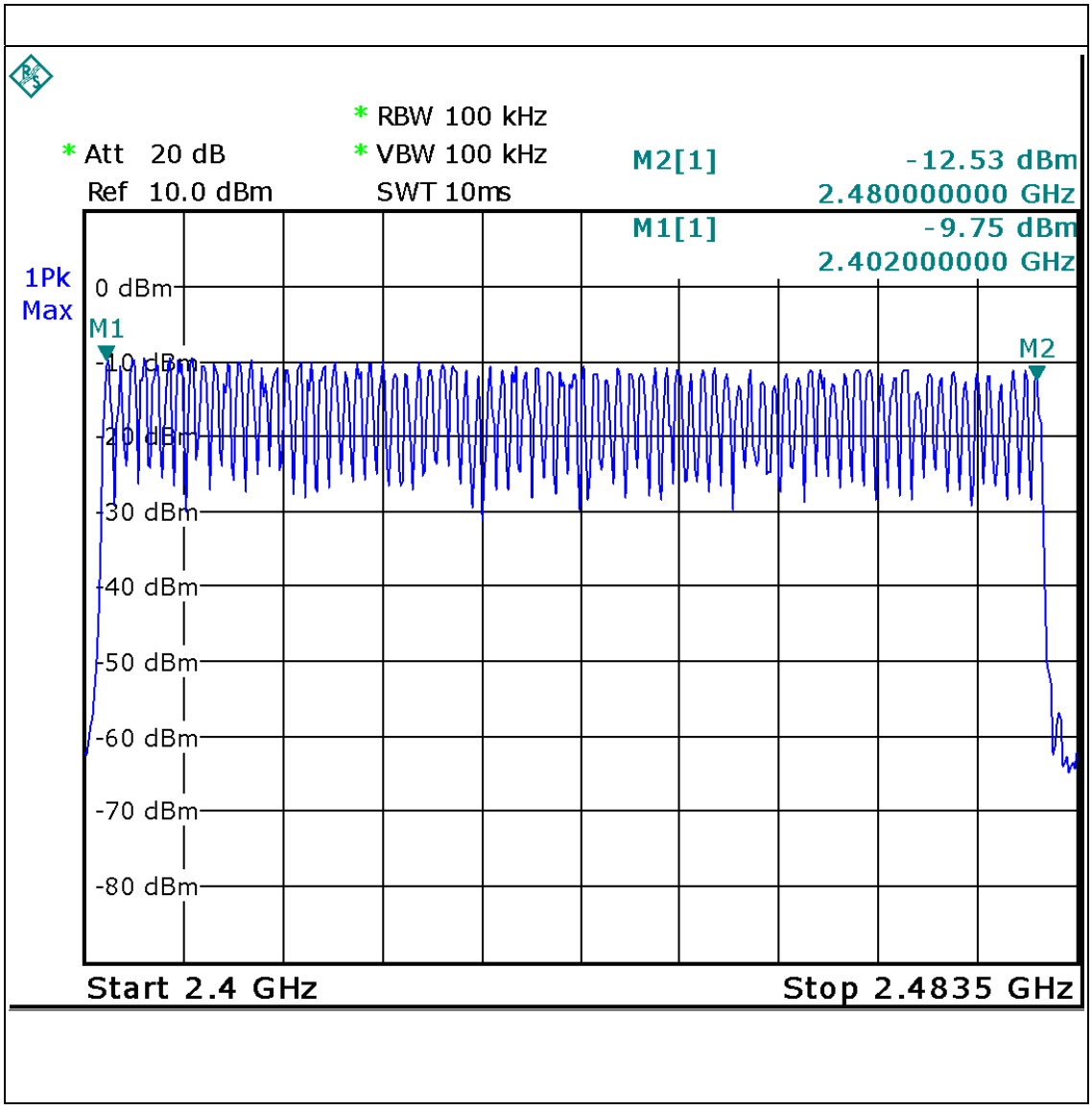
4.1.4 EUT OPERATION CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

4.1.5 TEST RESULTS

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	Hopping Mode –1Mbps mode		

Number of Hopping Channel	79



5. AVERAGE TIME OF OCCUPANCY

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(ii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

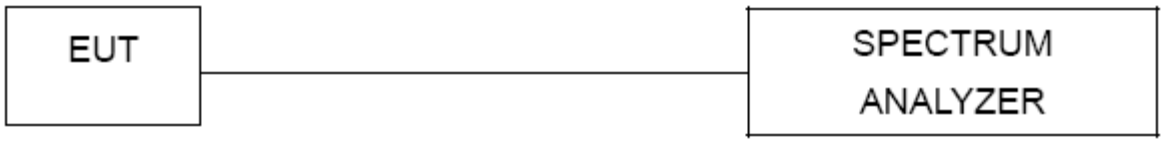
5.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyzer
b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 3.37 x 31.6 = 106.6 within 31.6 seconds.
j. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.
k. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



5.1.4 EUT OPERATION CONDITIONS

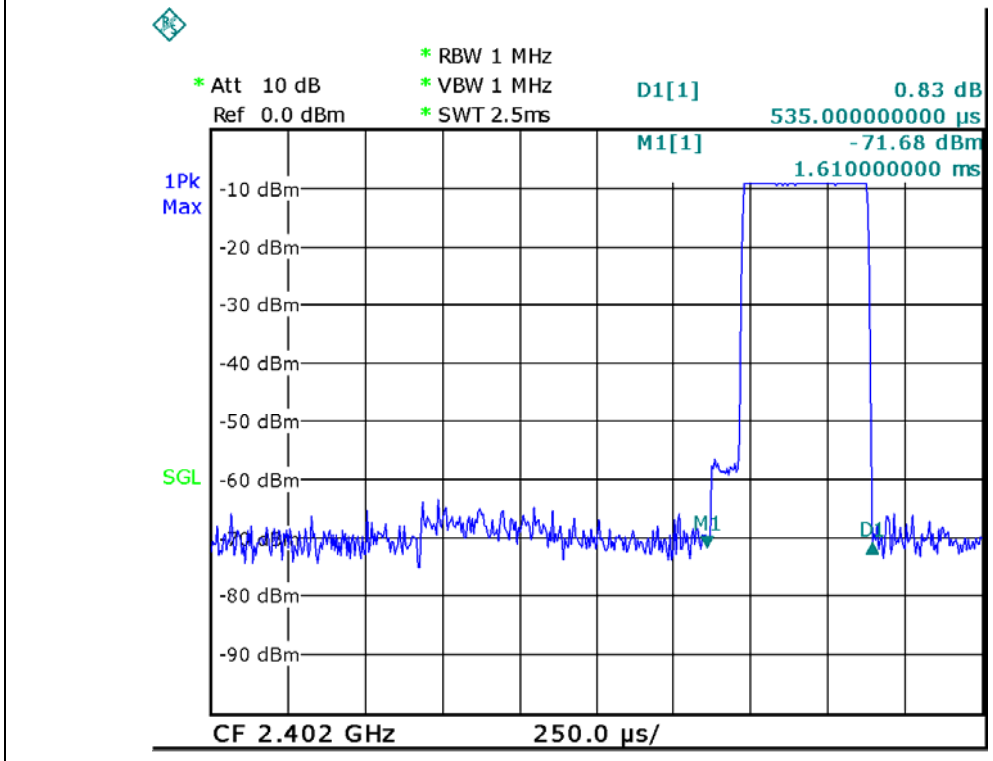
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

5.1.5 TEST RESULTS

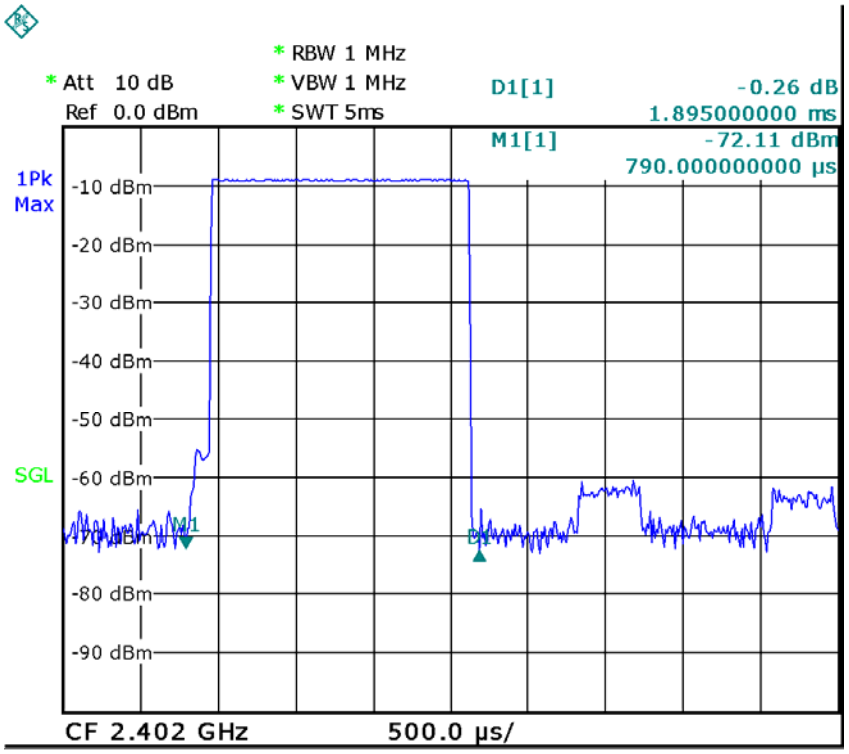
EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH00-DH1/DH3/DH5 (1Mbps Mode)		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH5	2402 MHz	3.1150	0.3323	0.4000
DH3	2402 MHz	1.8950	0.3032	0.4000
DH1	2402 MHz	0.5350	0.1712	0.4000

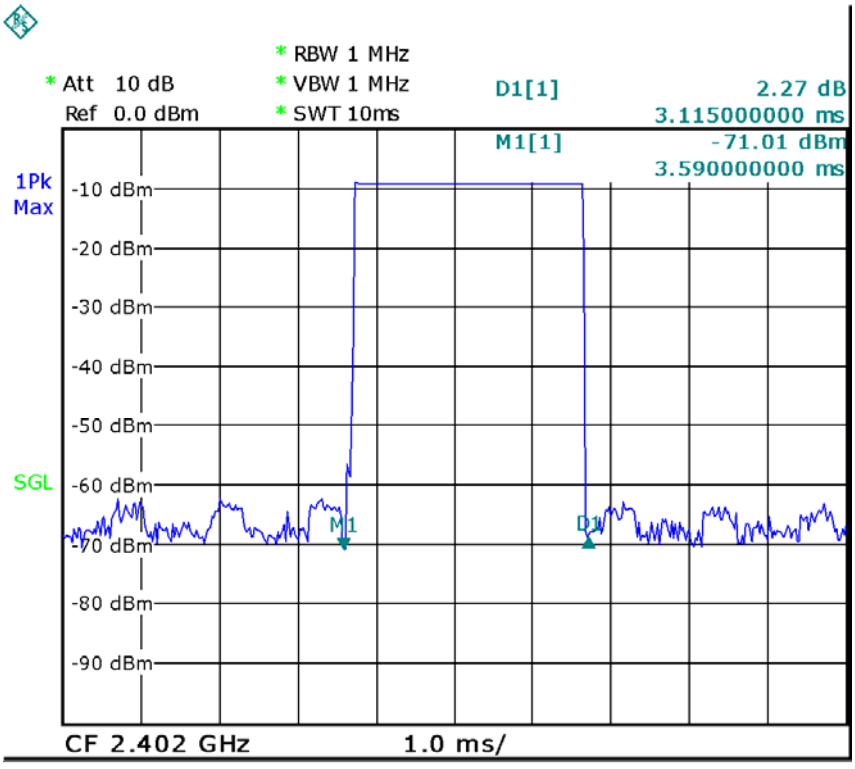
CH00-DH1



CH00-DH3



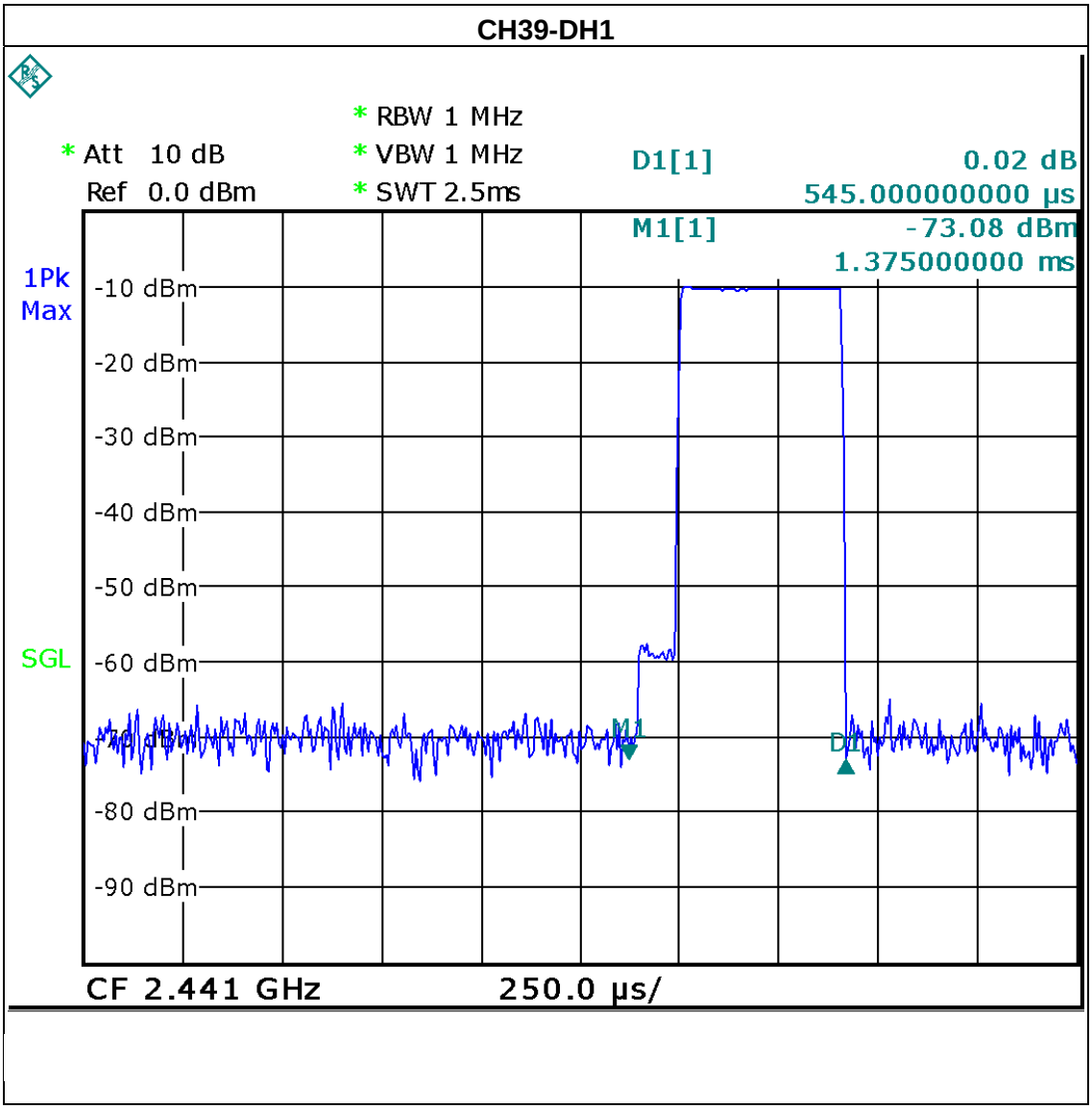
CH00-DH5



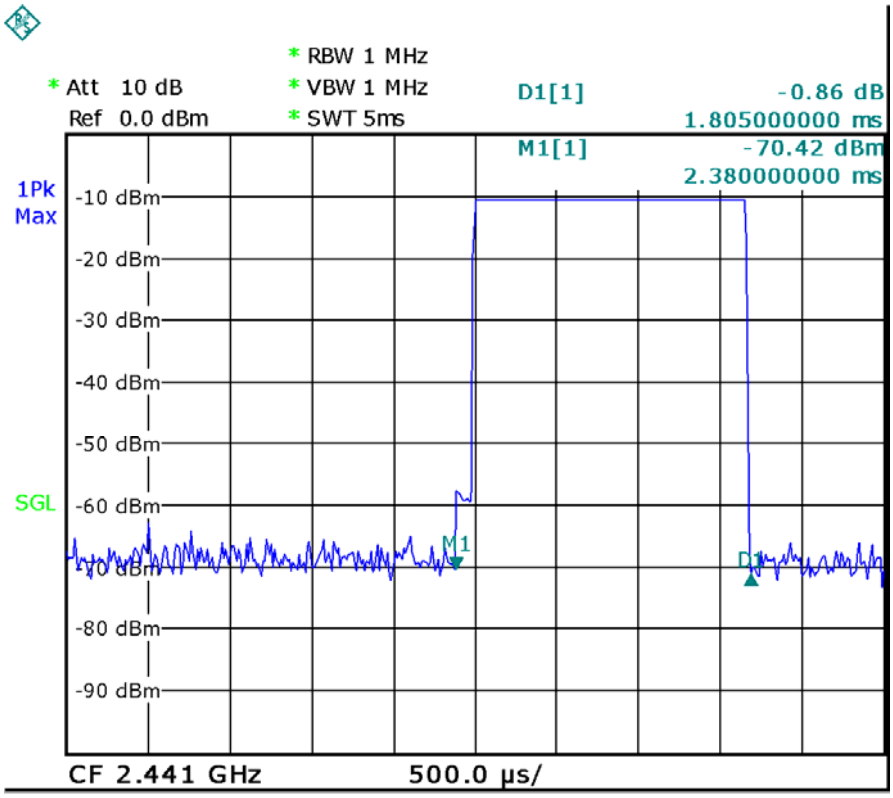
EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH39 -DH1/DH3/DH5 (1Mbps Mode)		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH5	2441 MHz	3.1750	0.3387	0.4000
DH3	2441 MHz	1.8050	0.2888	0.4000
DH1	2441 MHz	0.5450	0.1744	0.4000

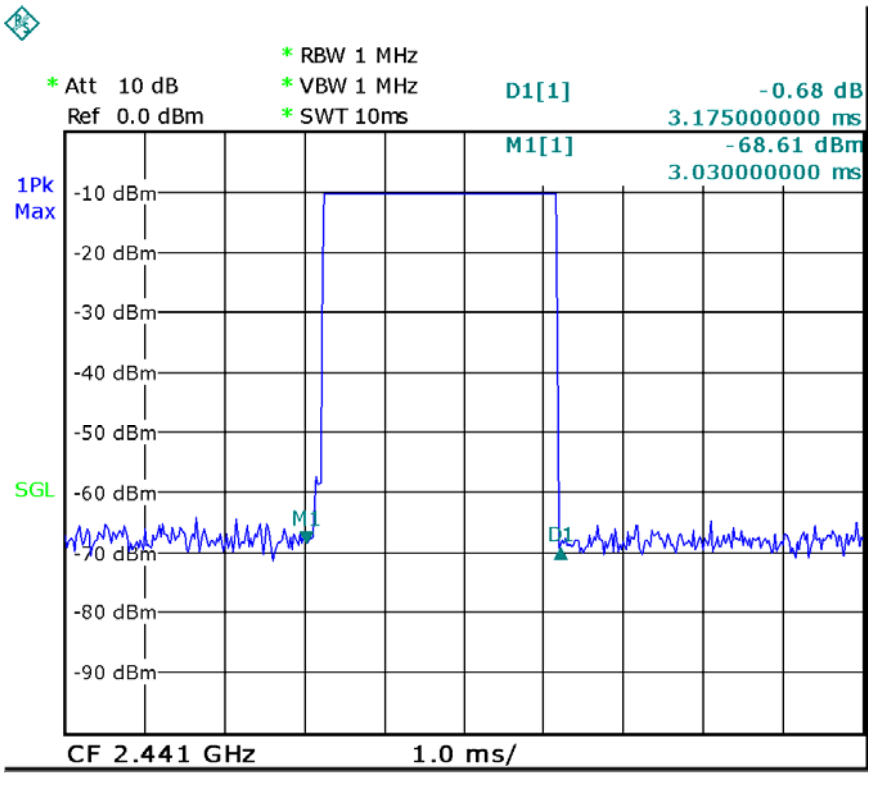
CH39-DH1



CH39-DH3



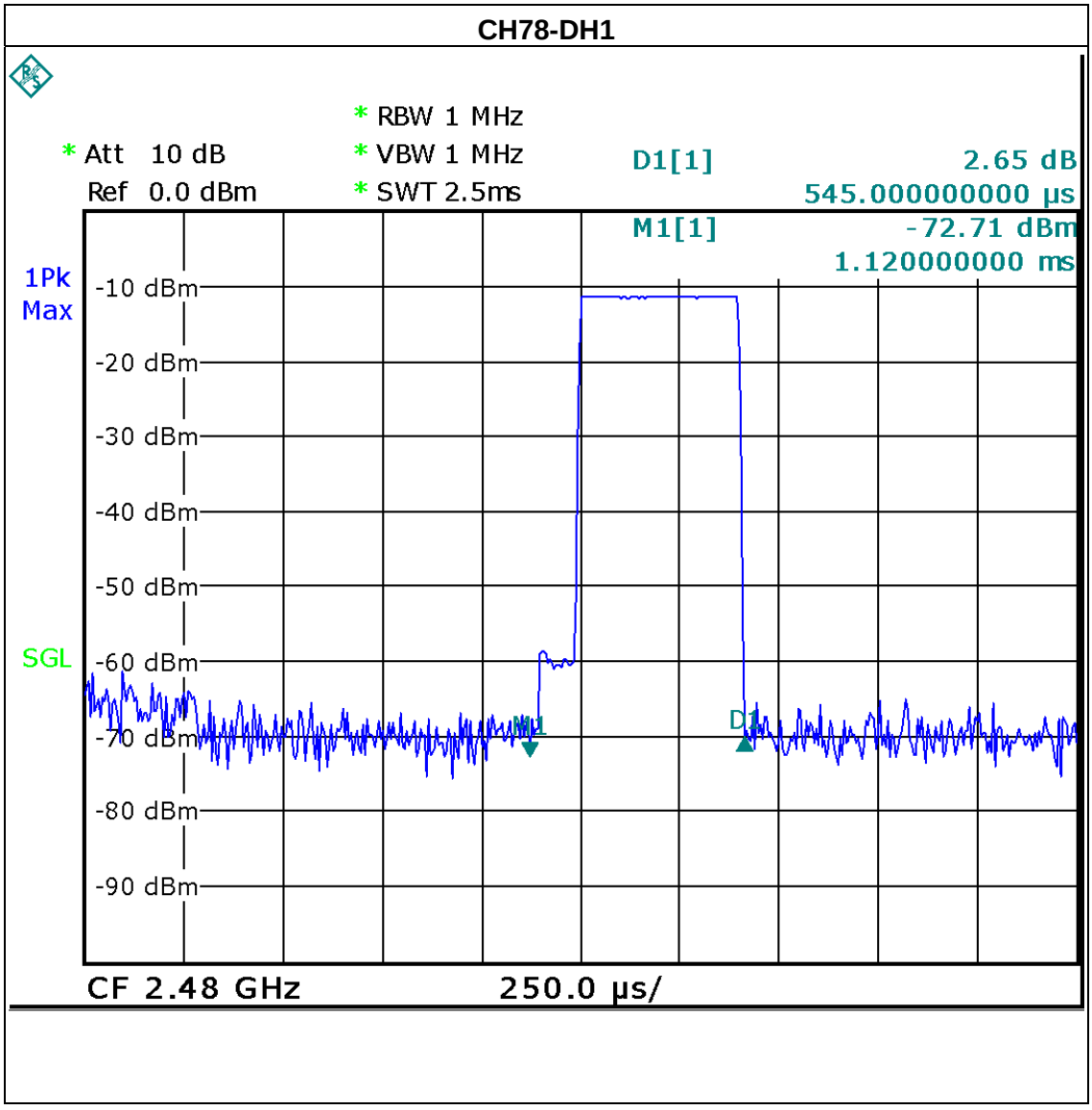
CH39-DH5



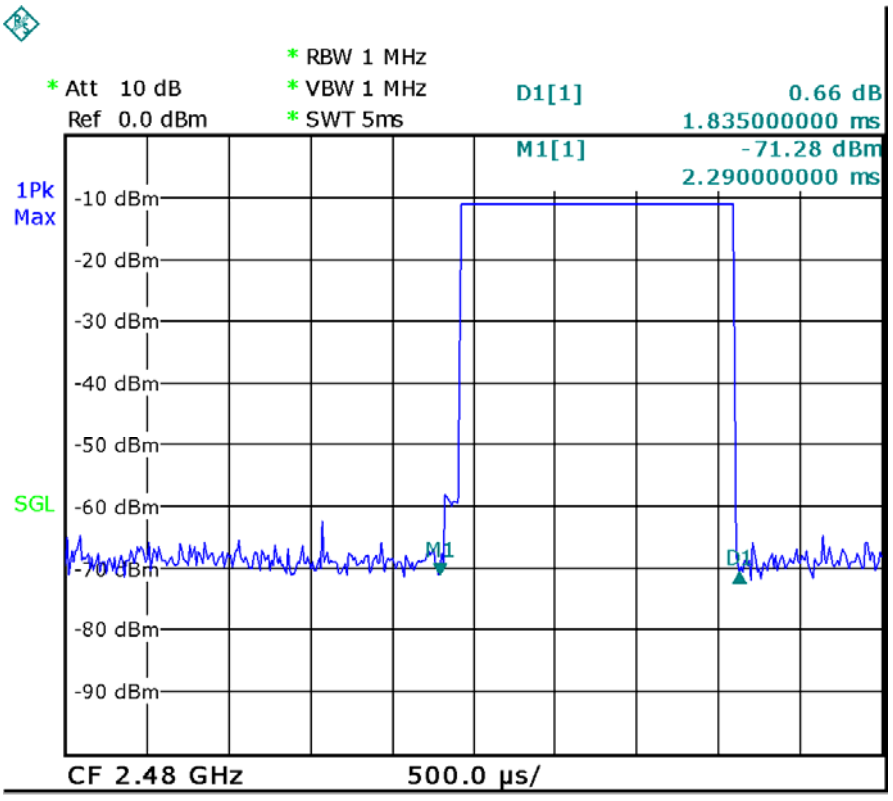
EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH78 -DH1/DH3/DH5 (1Mbps Mode)		

Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH5	2480 MHz	3.2150	0.3429	0.4000
DH3	2480 MHz	1.8350	0.2936	0.4000
DH1	2480 MHz	0.5450	0.1744	0.4000

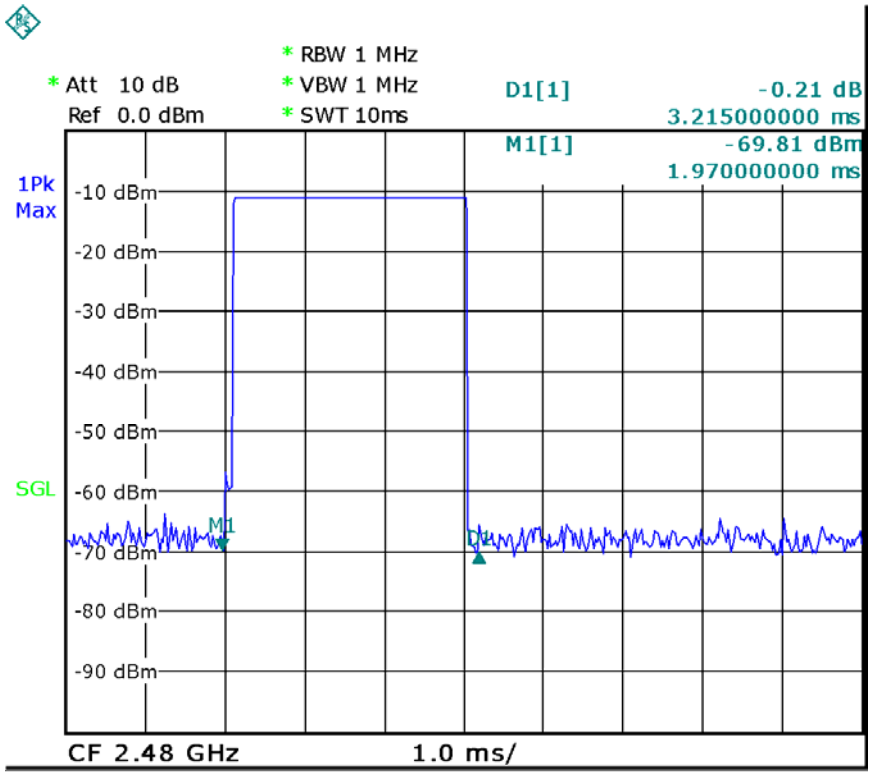
CH78-DH1



CH78-DH3



CH78-DH5



6. HOPPING CHANNEL SEPARATION MEASUREMENT

6.1 APPLIED PROCEDURES / LIMIT

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.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

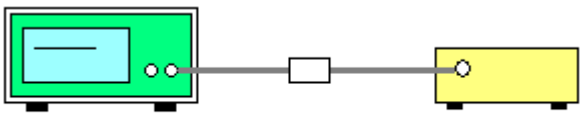
6.1.1 TEST PROCEDURE

a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 kHz were utilised for 20 dB bandwidth measurement.
c. The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

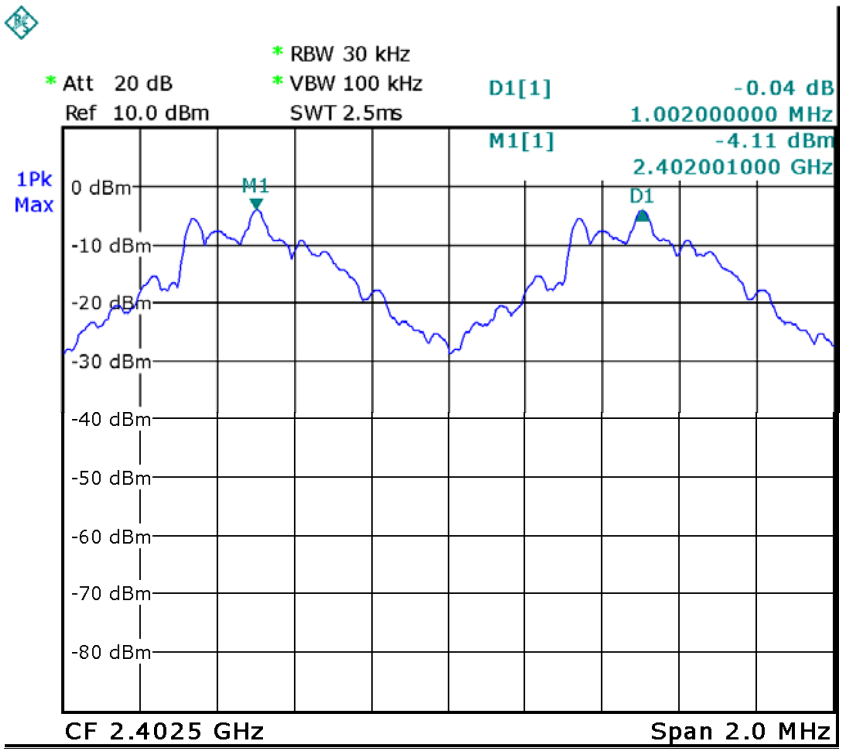
6.1.5 TEST RESULTS

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH00 / CH39 /CH78 (1Mbps Mode)		

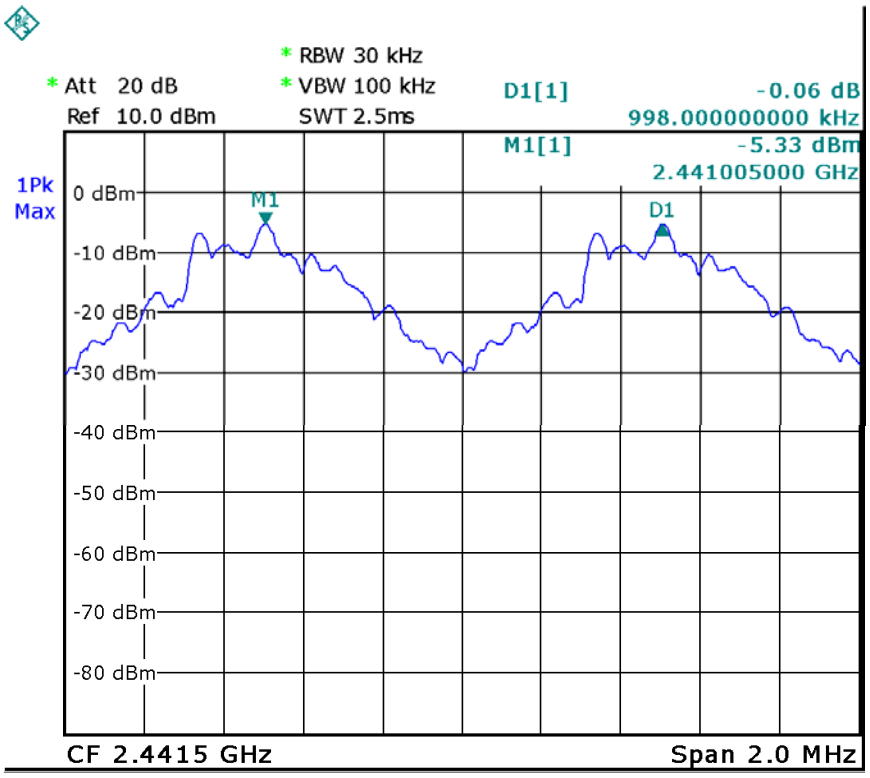
Frequency	Ch. Separation (MHz)	20d Bandwidth B (kHz)	99% Occupied Bandwidth (kHz)	Result
2402 MHz	1	846.30	842.32	**Complies**
2441 MHz	1	838.30	838.32	**Complies**
2480 MHz	1	846.30	842.32	**Complies**

Ch. Separation Limits: >20dB bandwidth or >2/3 of 20dB bandwidth

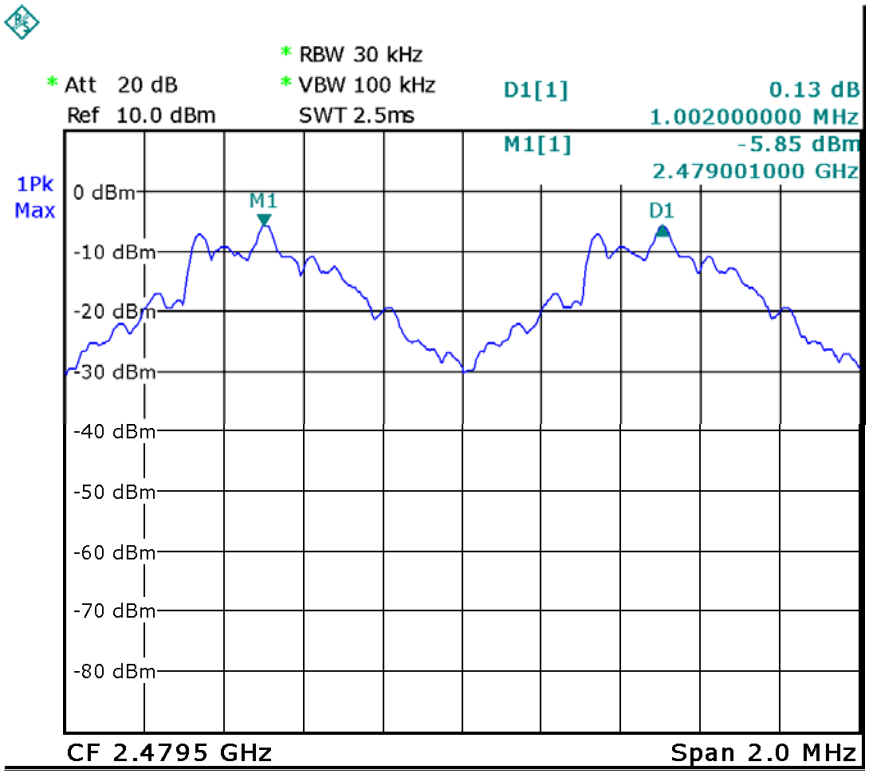
CH00 -1Mbps



CH39 -1Mbps



CH78 -1Mbps



7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(2)	Bandwidth	<= 1 MHz (20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	30 kHz (20dB Bandwidth) / 100 kHz (Channel Separation)
VB	100 kHz (20dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

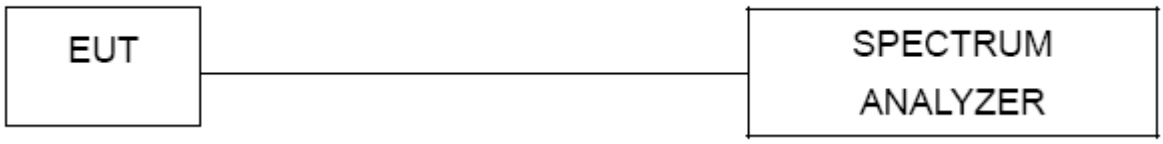
7.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



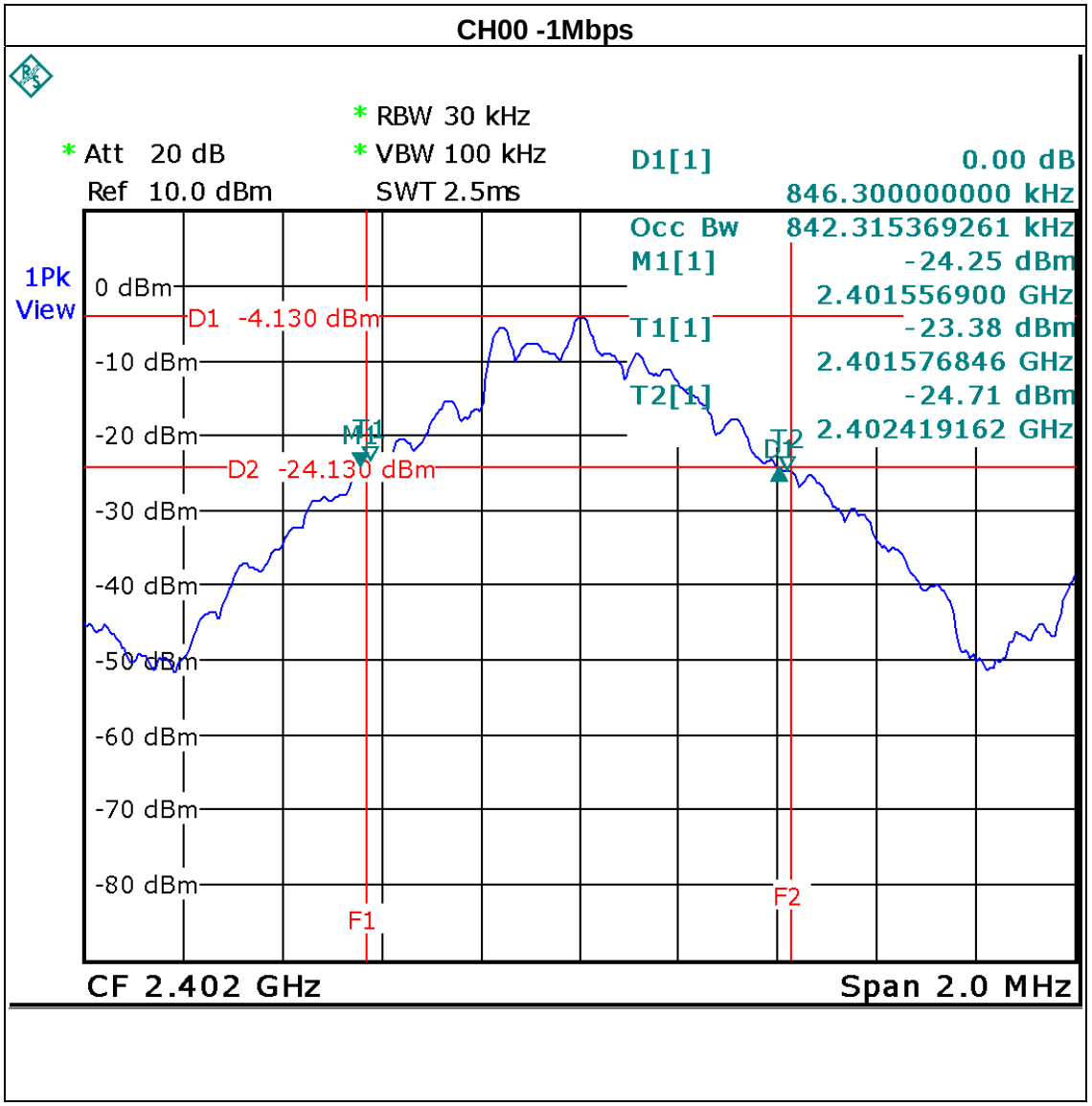
7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

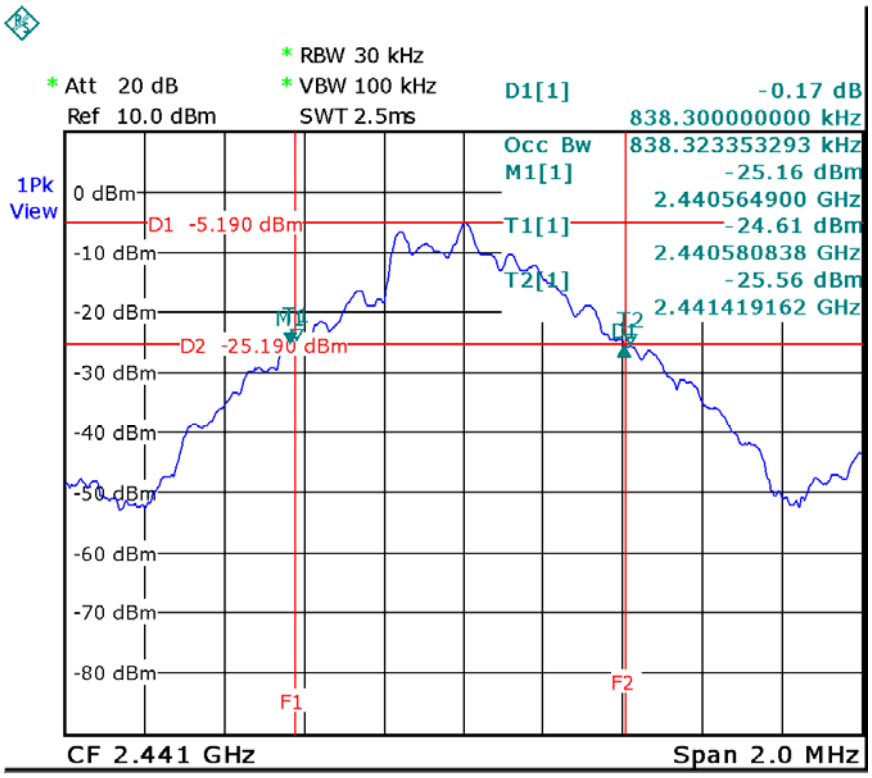
7.1.5 TEST RESULTS

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH00 / CH39 /CH78 (1Mbps Mode)		

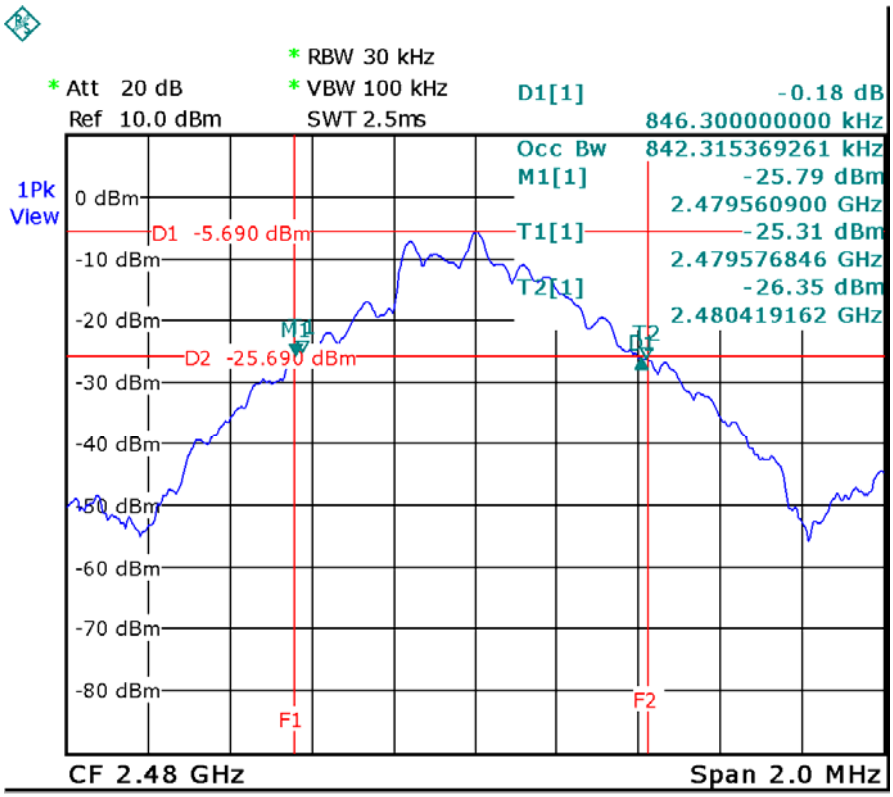
Frequency	20dB Bandwidth (kHz)	Channel Separation (MHz)	Result
2402 MHz	846.30	<= 1MHz	**PASS**
2441 MHz	838.30	<= 1MHz	**PASS**
2480 MHz	846.30	<= 1MHz	**PASS**



CH39 -1Mbps



CH78 -1Mbps



8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(1)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

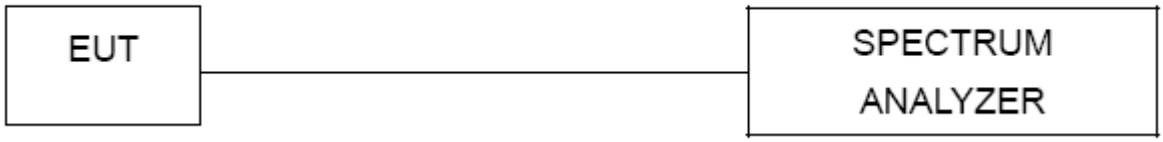
8.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 1MHz, VBW= 1MHz, Sweep time = Auto.

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



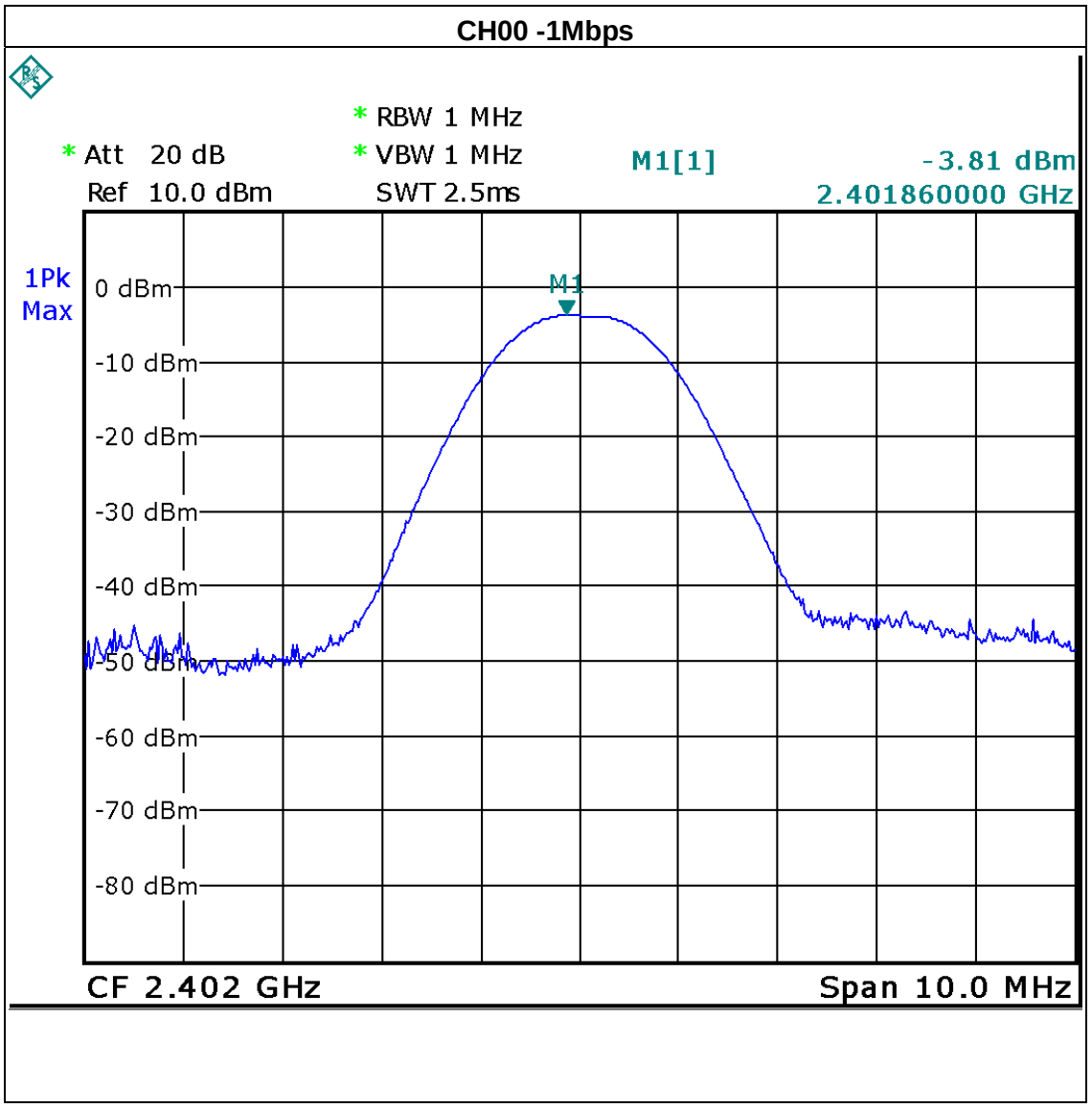
8.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

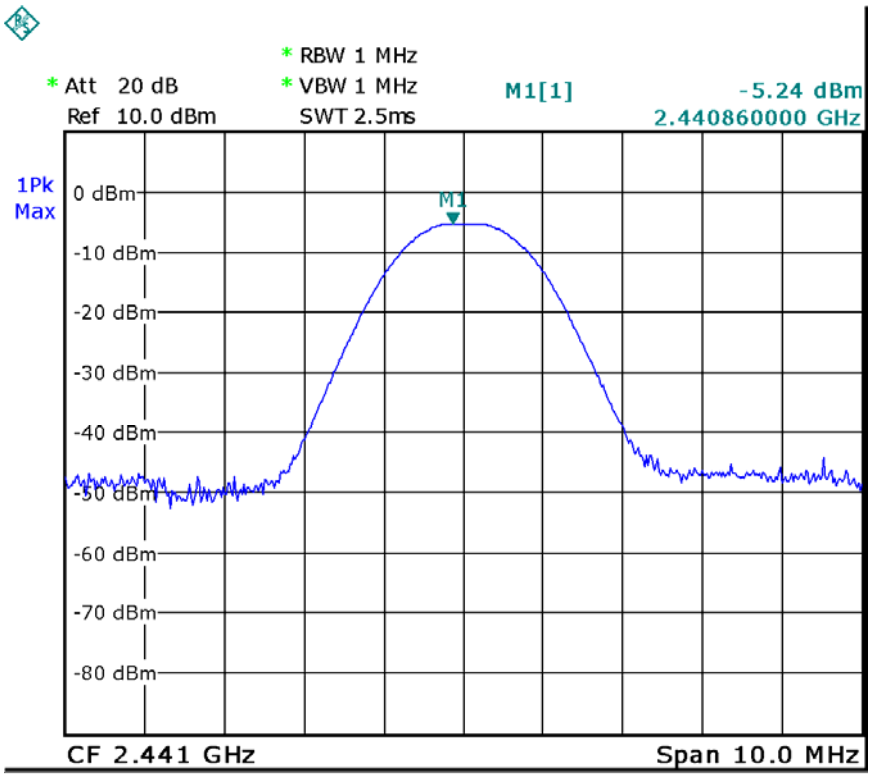
8.1.5 TEST RESULTS

EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH00/ CH39 /CH78 (1Mbps Mode)		

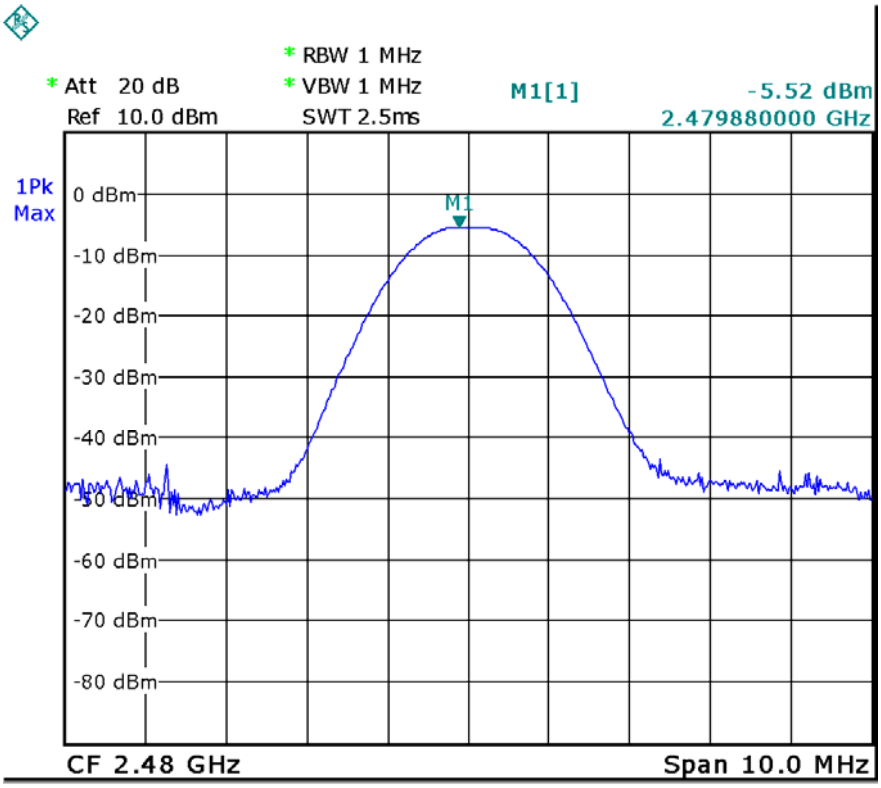
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)	LIMIT (W)
CH00	2402	-3.81	30	1
CH39	2441	-5.24	30	1
CH78	2480	-5.52	30	1



CH39 -1Mbps



CH78 -1Mbps



9. ANTENNA CONDUCTED SPURIOUS EMISSION

9.1 APPLIED PROCEDURES / LIMIT

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (other emission)	100 KHz /100 KHz for Peak

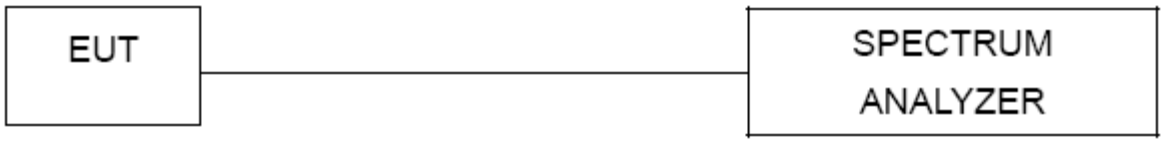
9.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100KHz, VBW=100KHz, Sweep time = Auto.

9.1.2 DEVIATION FROM STANDARD

No deviation.

9.1.3 TEST SETUP



9.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

9.1.5 TEST RESULTS

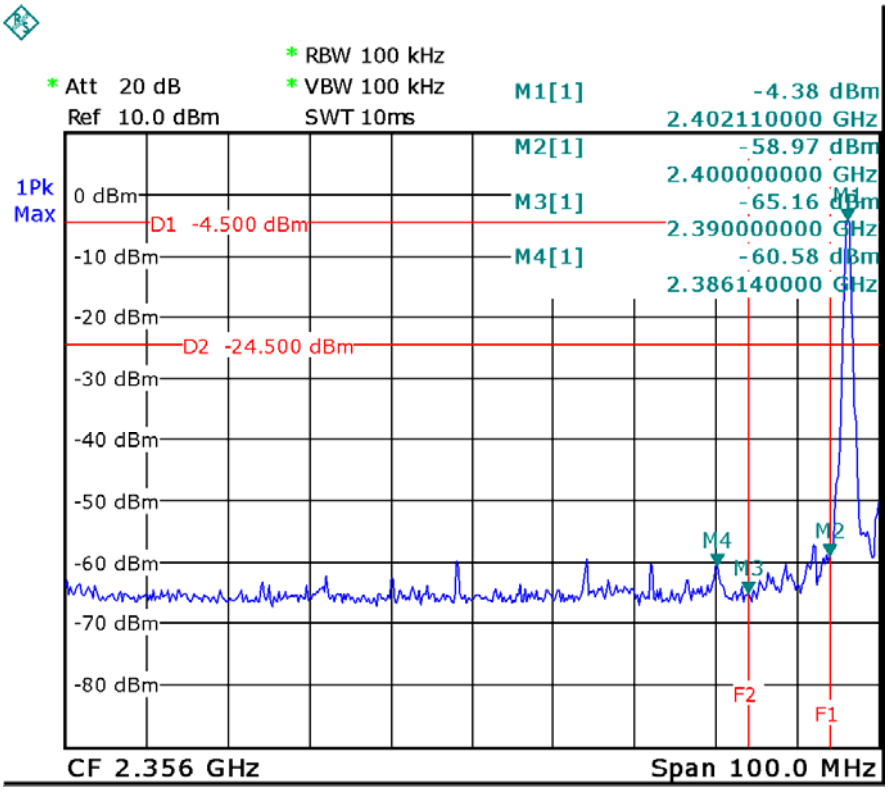
EUT：	Industry-Level GIS Data Collector	Model Name ：	Qmini
Temperature：	23 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V battery
Test Mode ：	CH00 / CH78 (1Mbps)		

The max. radio frequency power in any 100kHz bandwidth outside the frequency band		The max. radio frequency power in any 100 kHz bandwidth within the frequency band.	
FREQUENCY(MHz)	POWER(dBm)	FREQUENCY(MHz)	POWER(dBm)
2386.14	-60.58	2484.58	-54.01
Result			
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.			

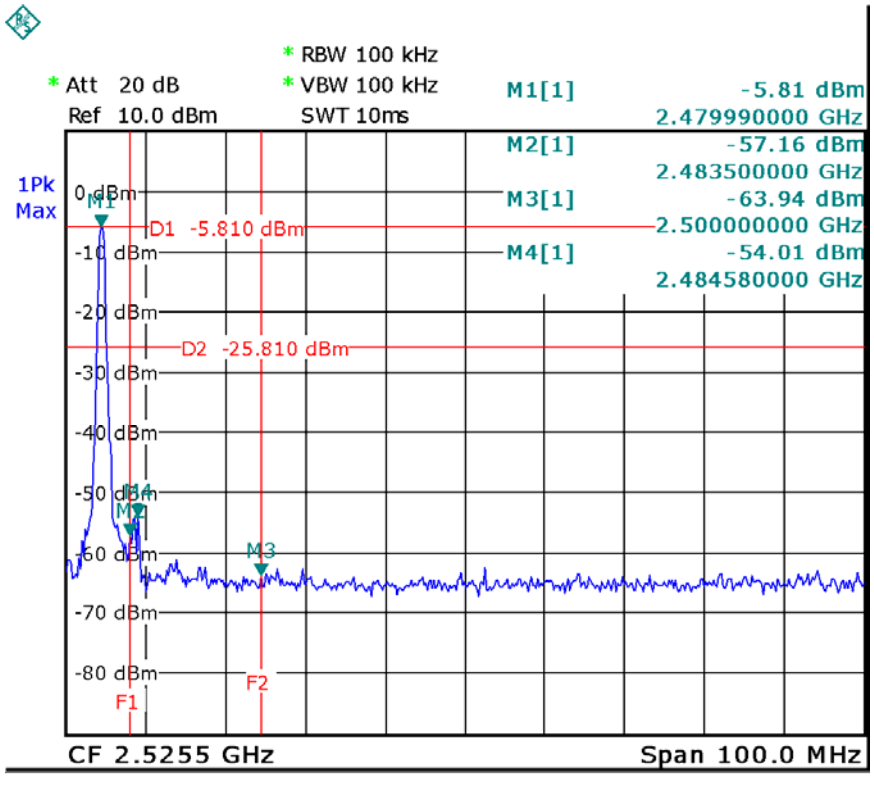
Remark：

(1) Hopping enabled and disabled have evaluated,and the worrest data was reported

CH00 (Lower) -1Mbps



CH 78 (Upper) -1Mbps



10. RF EXPOSURE TEST

10.1 APPLIED PROCEDURES / LIMIT

These devices are not exempted from compliance does not exceed the Commission's RF exposure guidelines.Unless a device operates at substantially low power levels,with a low gain antenna(s),supporting information is generally needed to establish the various potential operating configurations and exposure conditions of a transmitter and its antenna(s) in order to determine compliance with the RF exposure guidelines.
In order to demonstrate compliance with MPE requirement(see Section 2.1091),the following information is typically needed:
Calculation that estimates the minimum separation distance(20 cm or more)between an antenna and persons required to satisfy power density limits defined for free space.
Antenna installation and device operating instructions for installers(professional/unskilled users), and the parties responsible for ensuring compliance with the RF exposure requirement Any caution statements and/or warming labels that are necessary in order to comply with the exposure limits Any other RF exposure related issues that may affect MPE compliance.

FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency(RF) radiation as specified in 1.1307(b).

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Averaging Time $\|E\|^2$,$\|H\|^2$ or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

10.1.1 MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

P :power input to the antenna in Mw
EIRP :Equivalent(effective) isotropic radiated power.
S :power density mW/ cm^2
G ;numeric gain of antenna relative to isotropic radiator
R :distance to centre of radiation in cm

FCC radio frequency exposure limits may be exceeded at distances closer than r cm from the antenna of this device

$$r = \sqrt{\frac{PG}{4\pi S}} = \sqrt{\frac{EIRP}{4\pi S}}$$

$EIRP=10^{(Antenna\ Gain+Peak\ Output\ Power/10)}$

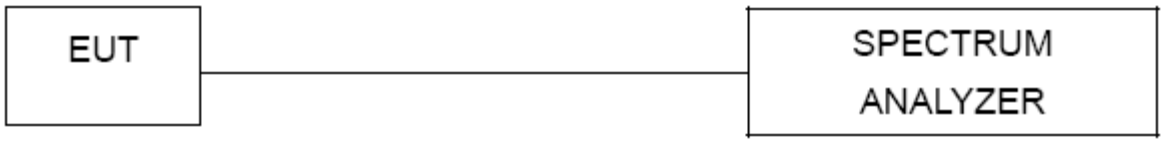
Note:
1. s=1.0 mW /cm^2 for limits for General Population/Uncontrolled Exposures.
2. The time averaged power over 30 minutes will be equaled Output Power.
3. Minimum calculated separation distance betweet antenna and persons required:0.53 cm
4. The Power Density at a distance of 20cm calculated from the formula is far below the limit of 1MW/ cm^2
5. For portable device,the power limit is 60/f(in GHz) mW
6. For limit 60/f is equal:
   60/2.402=24.98mW
   60/2.441=24.58 mW
   60/2.480=24.19mW
7. The max.output power E.I.R.P is 0.6324 mW

So it is complied with the limit,SAR report is not requied.

10.1.2 DEVIATION FROM STANDARD

No deviation.

10.1.3 TEST SETUP



10.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

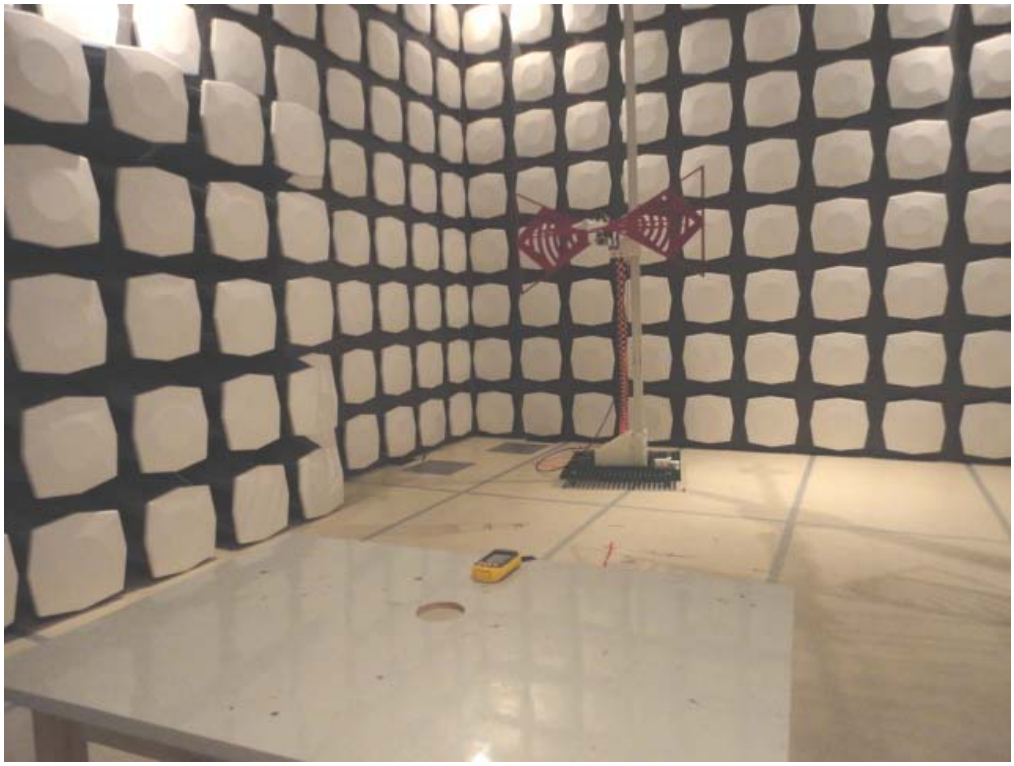
10.1.5 TEST RESULTS

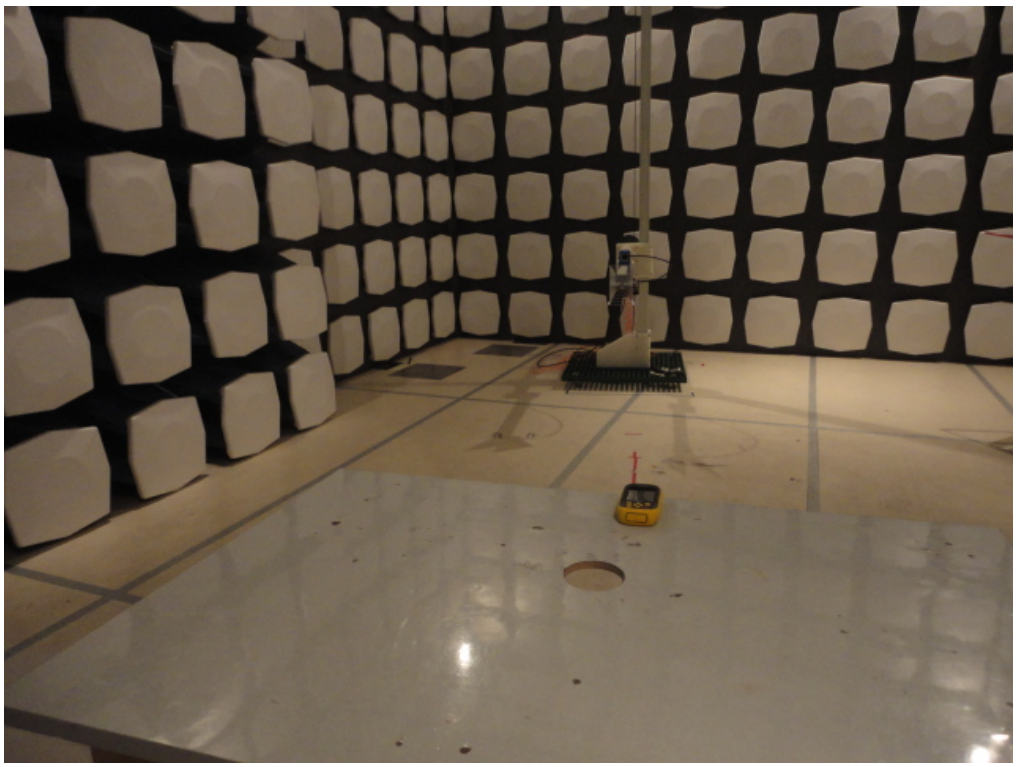
EUT：	Mobile printer	Model Name ：	AB-320M
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 9.0V
Test Mode ：	**CH00 (2402 MHz)**, CH39(2441 MHz), CH78 (2480 MHz) -1Mbps		

Frequency (MHz)	Antenna Gain (dBi)	Peak Output Power (dBm)	Calculated EIRP (mW)	Power Density (S) (mW/cm²)	FCC Threshold (mW)	Test Result
2402	**1.82**	**-3.81**	**0.6324**	**0.00012588**	**24.98**	**Complies**
2441	1.82	-5.24	0.4550	0.00009056	24.58	Complies
2480	1.82	-5.52	0.4266	0.00008491	24.19	Complies

11. EUT TEST PHOTO

Radiated Measurement Photos





Conducted Measurement Photos