

Prüfbericht-Nr.: Test report no.:	CN21GYI4 001	Auftrags-Nr.: Order no.:	238513955	Seite 1 von 36 Page 1 of 36
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2021-04-21	
Auftraggeber: Client:	Microchip Technology Inc. 2355 West Chandler Blvd. Chandler, Arizona 85224-6199, United States			
Prüfgegenstand: Test item:	Bluetooth module			
Bezeichnung / Typ-Nr.: Identification / Type no.:	BM78abcdefgh, RN4678			
Auftrags-Inhalt: Order content:	Test Report for CE compliance, R&TTE Directive (BR/EDR)			
Prüfgrundlage: Test specification:	EN 300 328 V 1.9.1 EN 62479:2010 Refer to section 1.1 Test Specifications for more details.			
Wareneingangsdatum: Date of sample receipt:	2015-08-23			
Prüfmuster-Nr.: Test sample no.:	A000244783-005 A000244783-006			
Prüfzeitraum: Testing period:	2015-09-02 - 2015-09-08			
Ort der Prüfung: Place of testing:	EMC/RF Taipei Testing Site			
Prüflaboratorium: Testing laboratory:	Taipei Testing Laboratories			
Prüfergebnis*: Test result*:	Pass			
überprüft von: reviewed by:	genehmigt von: authorized by:			
Datum: 2021-05-05 Date:	 J a c k C h a n g		Datum: 2021-05-05 Date:	
Stellung / Position:	Senior Project Manager		 R y a n C h e n Senior Project Manager	
Sonstiges / Other:	This report is mainly added ilac-MRA and TAF logos. The test results remain the same as report no. 10052797 001.			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient N/T = not tested
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

V05

TEST SUMMARY

4.1.1 RF OUTPUT POWER

RESULT: PASS

4.1.2 DUTY CYCLE, TX-SEQUENCE, TX-GAP

RESULT: N/A

4.1.3 DWELL TIME

RESULT: PASS

4.1.4 MINIMUM FREQUENCY OCCUPATION

RESULT: PASS

4.1.5 HOPPING FREQUENCY SEPARATION

RESULT: PASS

4.1.6 MEDIUM UTILISATION FACTOR

RESULT: PASS

4.1.7 ADAPTIVITY (ADAPTIVE FREQUENCY HOPPING)

RESULT: N/A

4.1.8 OCCUPIED CHANNEL BANDWIDTH

RESULT: PASS

4.1.9 TRANSMITTER UNWANTED EMISSIONS IN THE OOB DOMAIN

RESULT: PASS

4.1.10 TRANSMITTER UNWANTED EMISSIONS IN THE SPURIOUS DOMAIN

RESULT: PASS

4.2.1 RECEIVER RADIATED SPURIOUS EMISSIONS

RESULT: PASS

4.2.2 RECEIVER BLOCKING

RESULT: N/A

5.1.1 ELECTROMAGNETIC FIELDS

RESULT: Passed

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HISTORY OF THIS TEST REPORT

Report No.	Description	Date Issued
CN21GYI4 001	Original Release	2021-05-05

1 General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: IUT Photos

Appendix 2: Test Result of Radiated Emissions

Table 1: Applied Standard and Test Levels

Radio
EN 300 328 V 1.9.1

2 Test Sites

2.1 Test Laboratory

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

Taipei Testing Laboratories

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Last Calibration	Next Calibration
EMI Test Receiver	R&S	ESR7	101062	31-Aug-14	15-Sep-15
Bilog Antenna	TESEQ	CBL6111D	29802	4-Jul-14	3-Jul-16
Spectrum Analyzer	R&S	FSV 40	100921	17-Dec-14	16-Dec-15
Spectrum Analyzer	Agilent	N9010A	MY53470241	1-Apr-15	30-Mar-16
Horn Antenna	ETS-Lindgren	3117	138160	12-Jan-15	11-Jan-17
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101031	30-Oct-13	29-Oct-15
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	24-Dec-14	24-Dec-15
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	26-Aug-14	26-Aug-16
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM30180	60558	4-Nov-14	3-Nov-15
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	22-Oct-14	21-Oct-15
EMI Test Receiver	R&S	ESCI7	100797	28-Dec-14	27-Dec-15
Spectrum Analyzer	R&S	FSL3	101943	7-Sep-15	7-Sep-16
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	13-Jul-15	12-Jul-16
LISN (1 phase)	R&S	ENV216	101243	1-Jun-15	31-May-16
LISN	R&S	ENV216	101262	16-Jun-15	15-Jun-16
Power sensor	Agilent	U2021XA	MY53480013	11-Mar-15	9-Mar-16
Signal Generator	R&S	SMU200	104260	6-Sep-15	5-Sep-16
EXG-B RF Analog Signal Generator	Agilent	N5171B	MY53050377	15-Mar-15	13-Mar-16
MXG-B RF Vector Signal Generator	Agilent	N5182B	MY53050524	18-Mar-15	16-Mar-16

2.4 Measurement Uncertainty

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Occupied Channel Bandwidth	$\pm 5 \%$
RF power, conducted	$\pm 1.5 \text{ dB}$
RF power density, conducted	$\pm 3 \text{ dB}$
unwanted emissions, conducted	$\pm 3 \text{ dB}$
all emissions, radiated	$\pm 6 \text{ dB}$
Temperature	$\pm 1 \text{ }^{\circ}\text{C}$
Humidity	$\pm 5 \%$
DC and low frequency voltages	$\pm 3 \%$
Time	$\pm 5 \%$
Duty Cycle	$\pm 5 \%$

3 General Product Information

3.1 Product Function and Intended Use

The EUT is a Bluetooth module. It contains a Bluetooth 4.2 BLE/BR/EDR compatible module enabling the user to communicate data through a Wireless interface. For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details

Table 4: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	Bluetooth module
Operating Frequency	2402~2480 MHz
Channel Spacing	1 MHz
Channel number	79
Extreme Temperature Range	-20~70 °C
Operation Voltage	3.3Vdc
Modulation	GFSK, $\pi/4$ DQPSK, 8 DPSK
Antenna gain	1.63 dBi

3.3 Independent Operation Modes

Testing was performed at the lowest operating frequency (2402MHz), at the operating frequency in the middle of the specified frequency band (2441MHz) and at the highest operating frequency (2480MHz).

The basic operation modes are:

- A. EUT transmits (TX mode), with full power, at lowest channel (2402MHz), a continuous modulated signal streaming with 100% duty cycle.
- B. EUT transmits (TX mode), with full power, at lowest channel (2441MHz), a continuous modulated signal streaming with 100% duty cycle.
- C. EUT transmits (TX mode), with full power, at highest channel (2480MHz), a continuous modulated signal streaming with 100% duty cycle.
- D. EUT receives (RX mode), at lowest channel (2402MHz), continuously.
- E. EUT receives (RX mode), at highest channel (2480MHz), continuously.
- F. Transmitter is in stand-by.
- G. EUT transmits on pseudo-random sequence on all channels (hopping mode).

3.4 Noise Suppressing Parts

Nothing mentioned explicitly. Please refer to photo documentation for details.

4 Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Software used for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate, the connection laptop was removed when performing the testing.

Test operation please refer to test setup in chapter 6.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Kind of Equipment	Manufacturer	Model Name	S/N
Notebook	HP	HSTNN-Q78C-3	CNF0339QBM

5 Test Results RADIO

5.1 Transmitter Parameters

5.1.1 RF output power

RESULT:**PASS**

Date of testing: 2-Sep-2015

Atmospheric pressure: 100-103 kPa

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.1

Test procedure: EN 300 328 V 1.8.1, clause 5.3.2

Test modes applied: A, B, C

Note:

The output power of this device is below 10 dBm.. Tx-Gap measurement is not required. Therefore the timing information of a Burst is not required and the testing can be done with the EUT set to a continuous signal, with a non-sampling power sensor.

The output power (conducted) was measured at the antenna port with a Power Meter. The final measurement takes into account the loss generated by all the involved cables.

EIRP was then determined at normal and extreme conditions at the above mentioned data rate.

Table 5: Equivalent Isotropically Radiated Power

Antenna Assembly Gain:				1.63
Cable Loss=				1.6
TEST CONDITIONS		TRANSMITTER POWER (dBm)		
		-20 °C	25 °C	70 °C
Data rate		3.3 V		
1DH5	Read Power	-0.23	-0.20	-1.25
	e.i.r.p.	3.00	3.03	1.98
2DH5	Read Power	-4.26	-3.80	-2.78
	e.i.r.p.	-1.03	-0.57	0.45
3DH5	Read Power	-4.25	-3.82	-2.77
	e.i.r.p.	-1.02	-0.59	0.46
Limit = 20 dBm				

AVG Conducted Power

25	3.3 V	Max Power	1.40	(dBm)
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5.1.2 Duty Cycle, Tx-sequence, Tx-gap

RESULT:**N/A**

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.2

Note:

The output power of this device is below 10 dBm. Tx-Gap measurement is not required.

5.1.3 Dwell Time

RESULT:**PASS**

Ambient temperature : 20-24 °C
Ambient Relative humidity : 50-65 %%
Atmospheric pressure : 100-103 kPa

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.3

Test procedure: EN 300 328 V 1.8.1, clause 5.3.4.2.1

Test mode applied: G

Measurement procedure:

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and were set to ~ 50 % of the Occupied Channel Bandwidth, with video bandwidth set to $\geq 2 \cdot \text{RBW}$. The dwell time of a single packet was then measured using the Delta Marker function using a zero span centered on a hopping channel.

Table 6: Dwell Time

Packet Type	Frequency [MHz]	Packet Duration [ms]	Maximum Dwell Time in one period	Limit [ms]
3-DH5	2410	2.96	5.92	15
3-DH5	2470	2.97	5.94	15

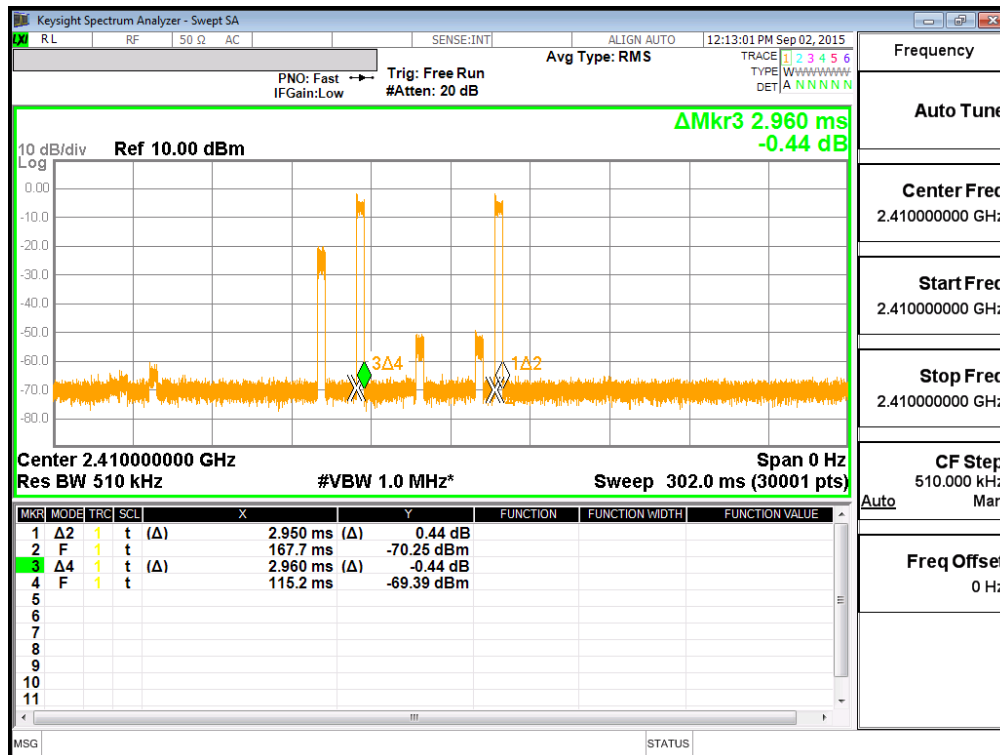
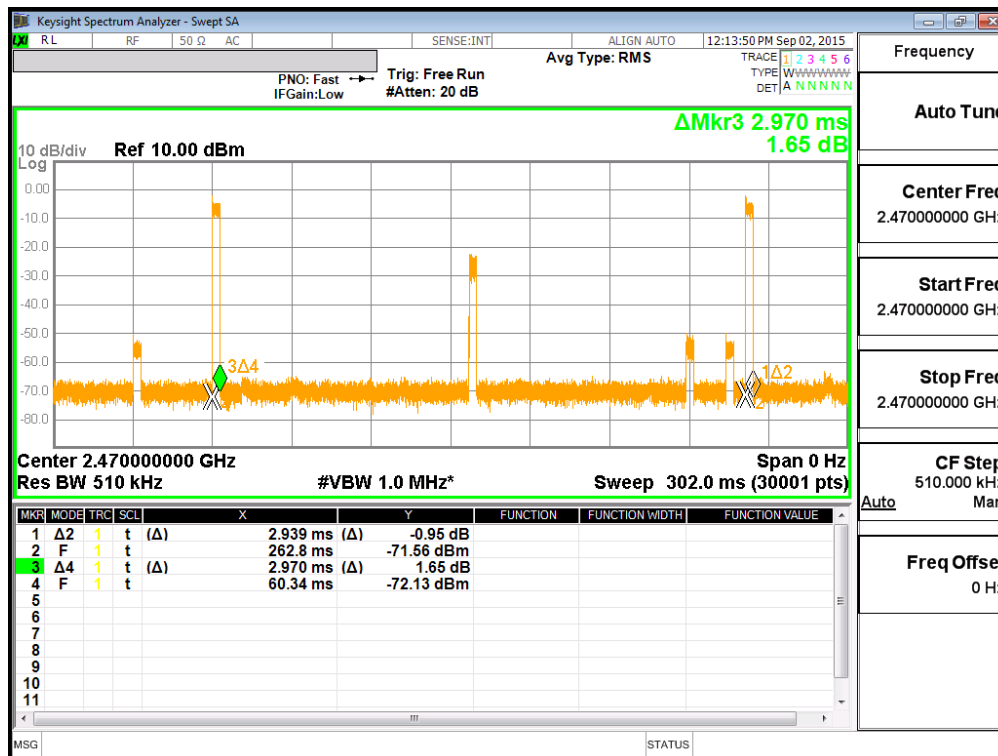
Figure 1: Accumulated Dwell Time, 2410 MHz


Figure 2: Accumulated Dwell Time, 2470 MHz


5.1.4 Minimum Frequency Occupation

RESULT:**PASS**

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.3
Test procedure: EN 300 328 V 1.8.1, clause 5.3.4.2.1

Test mode applied: G

Measurement procedure:

A spectrum analyzer was connected to the antenna port of the EUT. The analyzer resolution bandwidth and were set to ~ 50 % of the Occupied Channel Bandwidth, with video bandwidth set to $\geq 2 \times \text{RBW}$. All the dwell times of packets within (4 x dwell time per hop x number of hopping frequencies in use) was then measured using the Time Delta Marker function using a zero span centered on a hopping channel and then summed up

Table 7: Minimum Frequency Occupation

Packet Type	Frequency [MHz]	Number of Packets in four periods	Sum of all Packet Duration [ms]	Minimum Dwell Time in four periods [ms]
3-DH5	2410	6	17.76	>2.96
3-DH5	2470	3	8.91	>2.97

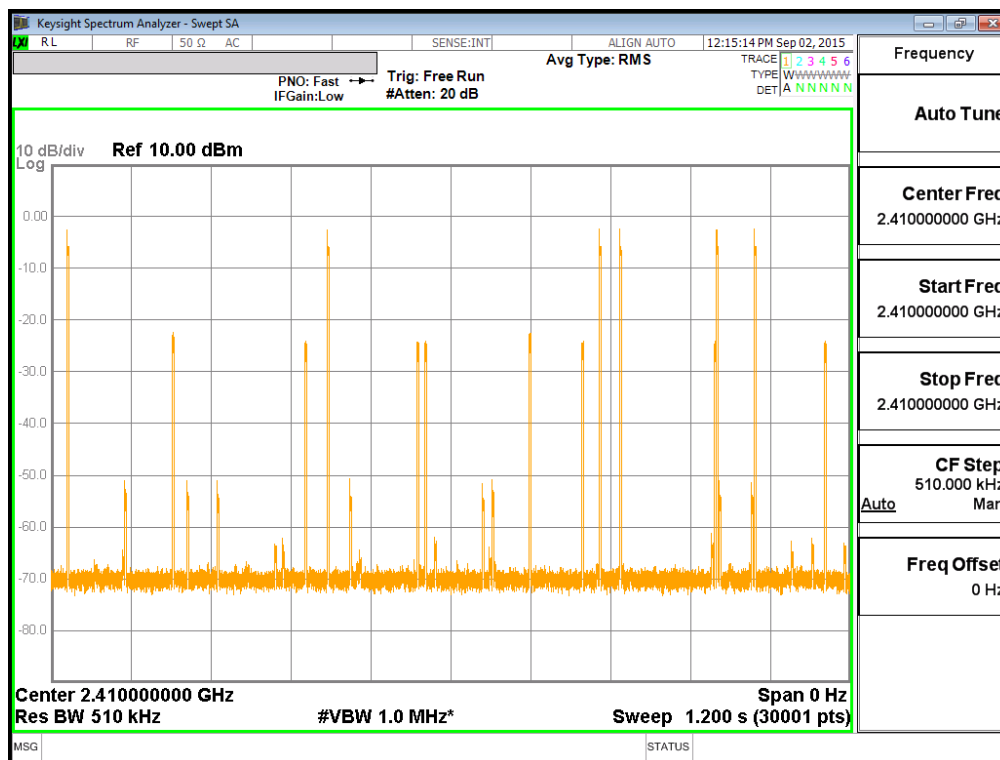
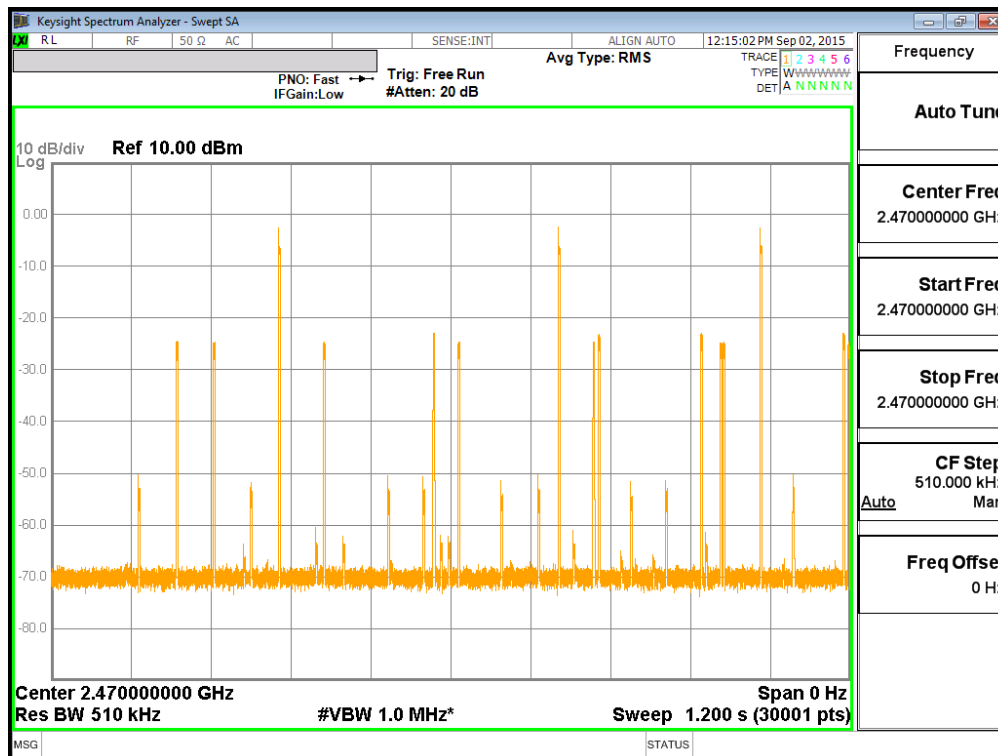
Figure 3: Dwell Time in four periods, 2410 MHz


Figure 4: Dwell Time in four periods, 2470 MHz


5.1.5 Hopping Frequency Separation

RESULT:**PASS**

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.3
Test procedure: EN 300 328 V 1.8.1, clause 5.3.4.2.1

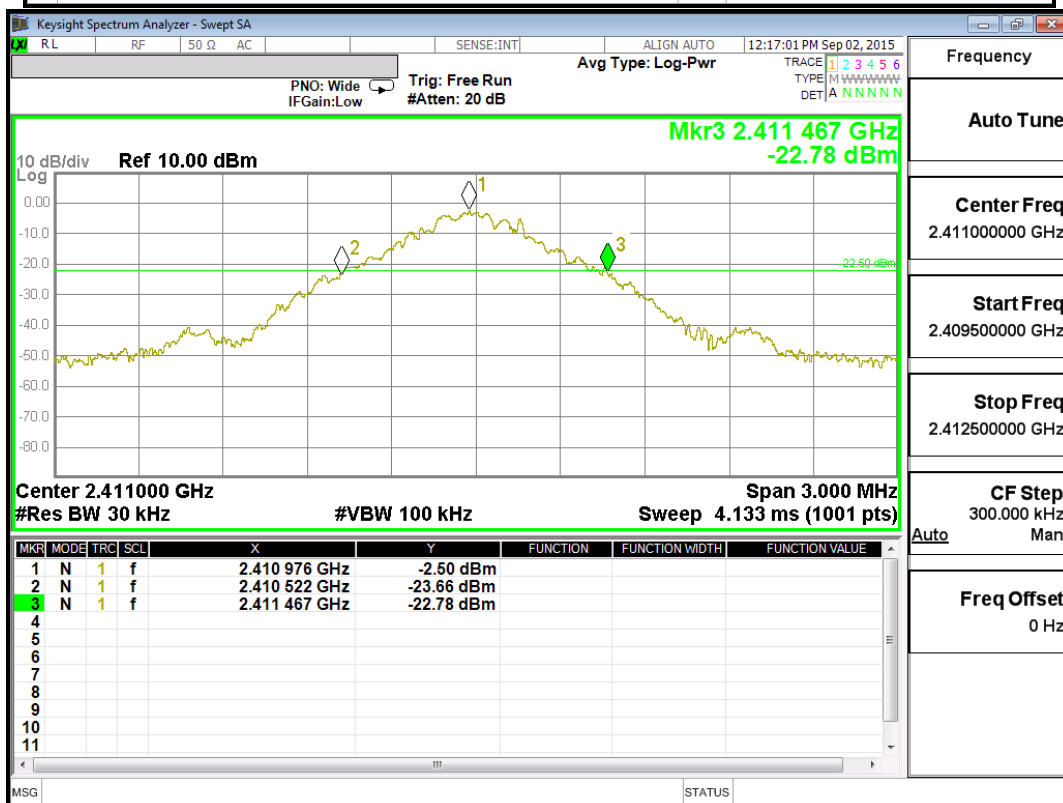
Test mode applied: G

Measurement procedure:

A spectrum analyzer was connected to the antenna port of the EUT. The was set as prescribed in item 5.3.4.2. of EN 300 328. The Delta Marker function was used to determine the separation between the peaks of two adjacent channels.

Table 8: Hopping Channel Separation

Frequency [MHz]	F_L [MHz]	F_H [MHz]	$F_C=(F_L+F_H)/2$ [MHz]	Channel Separation [MHz]	Limit [MHz]
2410	2409.523	2410.465	2409.9940	1.0005	≥ 0.1
2411	2410.522	2411.467	2410.9945		

Figure 5: Hopping Channel Separation


5.1.6 Medium Utilisation Factor

RESULT:**PASS**

Test requirement: EN 300 328 V1.8.1, clause 4.3.1.5

The output power is less than 10 dBm. Therefore, assessment of the Medium Utilisation Factor is not required. This device may transmit continuously.

5.1.7 Adaptivity (Adaptive Frequency Hopping)

RESULT:**N/A**

Requirement: EN 300 328 V1.8.1, clause 4.3.1.6

The output power is less than 10 dBm. Therefore, a testing of the adaptive hopping implementation is not required. May use the full available band.

5.1.8 Occupied Channel Bandwidth

RESULT:**PASS**

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.7
Test procedure: EN 300 328 V 1.8.1, clause 5.3.8

Test modes applied: A, C

Table 9: Test result of 99% Bandwidth, GFSK modulation

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit
Low Channel	2402	0.884	4 MHz (Ch2402)
High Channel	2480	0.882	5 MHz

Table 10: Test result of 99% Bandwidth, 8DPSK modulation

Channel	Channel Frequency (MHz)	99% Bandwidth (MHz)	Limit
Low Channel	2402	1.1646	4 MHz (Ch2402)
High Channel	2480	1.1598	5 MHz

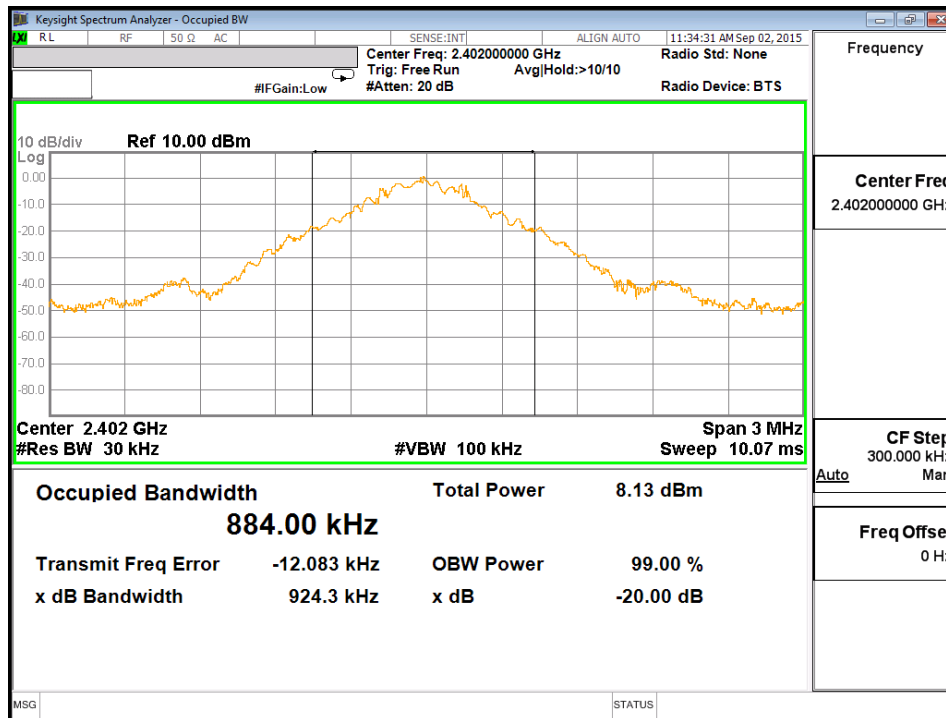
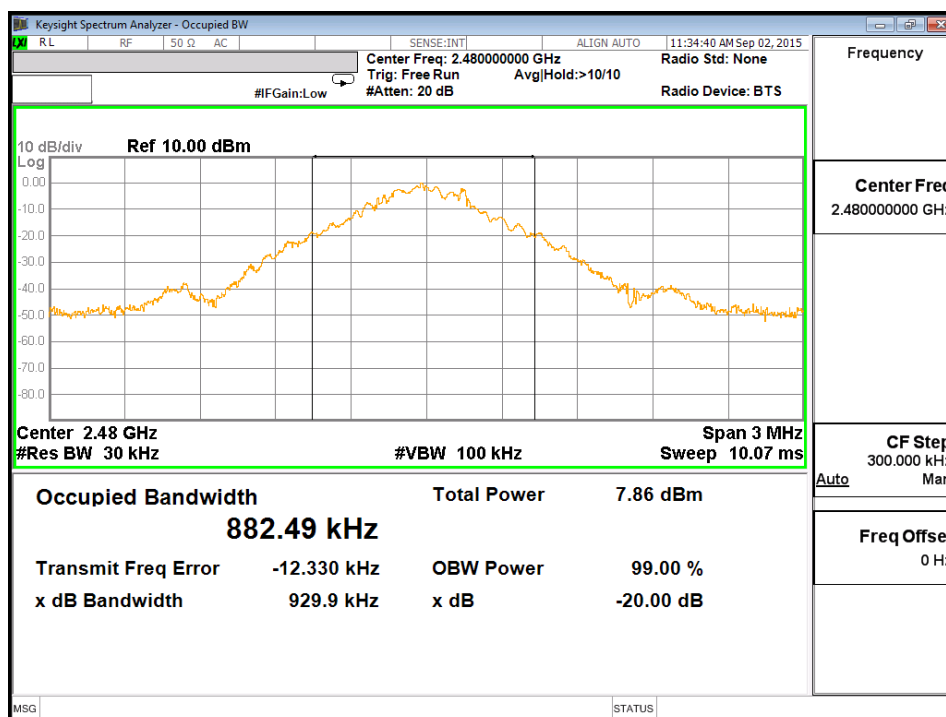
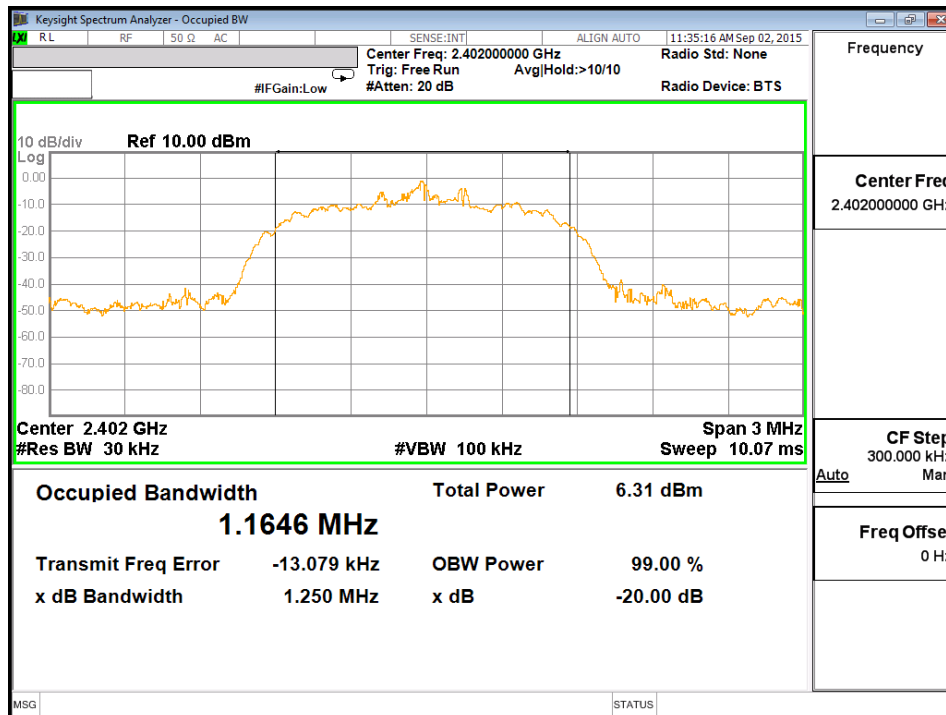
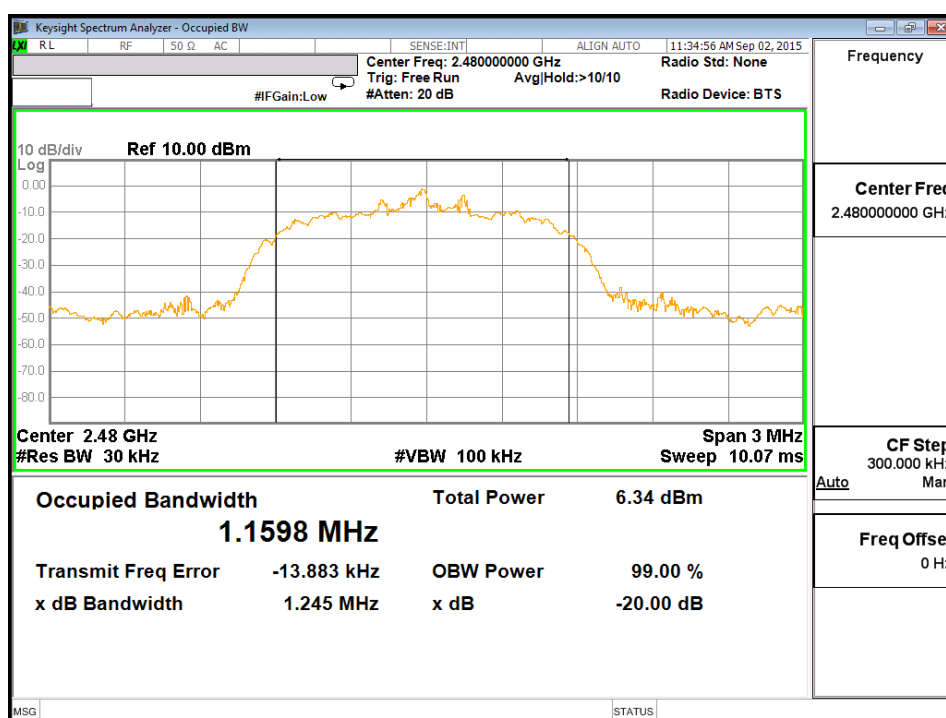
Figure 6: 99% Bandwidth Low Channel GFSK

Figure 7: 99% Bandwidth High Channel GFSK


Figure 8: 99% Bandwidth Low Channel 8DPSK

Figure 9: 99% Bandwidth High Channel 8DPSK


5.1.9 Transmitter unwanted emissions in the OOB domain

RESULT:**PASS**

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.8

Test procedure: EN 300 328 V 1.8.1, clause 5.3.9

Frequency range: 30MHz - 12.75GHz

Measurement distance: 3m

Kind of test site: Semi Anechoic Chamber

Test mode applied: A, C, F

Note:

Outside the 2400 – 2483.5 MHz band all unwanted emissions are below -30 dBm

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Temperature Low:	-20	°C
Temperature Normal:	25	°C
Temperature High:	70	°C
1DH5		
Ton of Duty Cycle:	2.94	
Tall of Duty Cycle:	3.76	
Duty factor: (dB)	1.07	

Antenna Assembly Gain: (dBi)	1.63
Cable Loss: (dB)	1.6

3DH5	
Ton of Duty Cycle:	2.94
Tall of Duty Cycle:	3.75
Duty factor: (dB)	1.06

Temperature Low

Freq.(MHz)	Read(dBm)	e.i.r.p.(dBm)	Limit(dBm)
2398.5	-60.50	-56.20	-20
2399.5	-51.13	-46.83	-10
2484	-64.85	-60.55	-10
2485	-69.95	-65.65	-20

Freq.(MHz)	Read(dBm)	e.i.r.p.(dBm)	Limit(dBm)
2398.14	-68.06	-63.77	-20
2398.32	-67.10	-62.81	-20
2399.32	-57.33	-53.04	-10
2399.5	-55.43	-51.14	-10
2484	-69.60	-65.31	-10
2484.18	-70.47	-66.18	-10
2485.18	-74.43	-70.14	-20
2485.36	-74.61	-70.32	-20

Temperature Normal

Freq.(MHz)	Read(dBm)	e.i.r.p.(dBm)	Limit(dBm)
2398.5	-61.82	-57.52	-20
2399.5	-52.38	-48.08	-10
2484	-66.13	-61.83	-10
2485	-71.25	-66.95	-20

Freq.(MHz)	Read(dBm)	e.i.r.p.(dBm)	Limit(dBm)
2398.14	-67.88	-63.59	-20
2398.32	-66.96	-62.67	-20
2399.32	-58.66	-54.37	-10
2399.5	-56.91	-52.62	-10
2484	-69.65	-65.36	-10
2484.18	-70.11	-65.82	-10
2485.18	-72.13	-67.84	-20
2485.36	-73.63	-69.34	-20

Temperature High

Freq.(MHz)	Read(dBm)	e.i.r.p.(dBm)	Limit(dBm)
2398.5	-59.45	-55.15	-20
2399.5	-50.45	-46.15	-10
2484	-66.73	-62.43	-10
2485	-71.31	-67.01	-20

Freq.(MHz)	Read(dBm)	e.i.r.p.(dBm)	Limit(dBm)
2398.14	-64.72	-60.43	-20
2398.32	-63.83	-59.54	-20
2399.32	-55.53	-51.24	-10
2399.5	-53.88	-49.59	-10
2484	-67.34	-63.05	-10
2484.18	-67.98	-63.69	-10
2485.18	-70.09	-65.80	-20
2485.36	-71.13	-66.84	-20

5.1.10 Transmitter unwanted emissions in the spurious domain**RESULT:****PASS**

Test requirement: EN 300 328 V 1.8.1, clause 4.3.1.9
Test procedure: EN 300 328 V 1.8.1, clause 5.3.10

Frequency range: 30MHz - 12.75GHz
Measurement distance: 3m
Kind of test site: Semi Anechoic Chamber

Test mode applied: A, C, F

Please refer to Appendix D: Test result of Radiated Emissions

5.2 Receiver Parameters

5.2.1 Receiver Radiated Spurious Emissions

RESULT: **PASS**

Test requirement:	EN 300 328 V 1.8.1, clause 4.3.1.10
Test procedure:	EN 300 328 V 1.8.1, clause 5.3.11
Frequency range:	30MHz - 12.75GHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber
Test mode applied:	D, E

Please refer to Appendix D: Test result of Radiated Emissions

5.2.2 Receiver Blocking

RESULT: **N/A**

Test requirement:	EN 300 328 V 1.8.1, clause 4.3.1.11
Test procedure:	EN 300 328 V 1.8.1, clause 5.3.7

The output power is less than 10 dBm. Therefore, test items related to adaptivity are not required for this device.

6 Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT:**Passed**

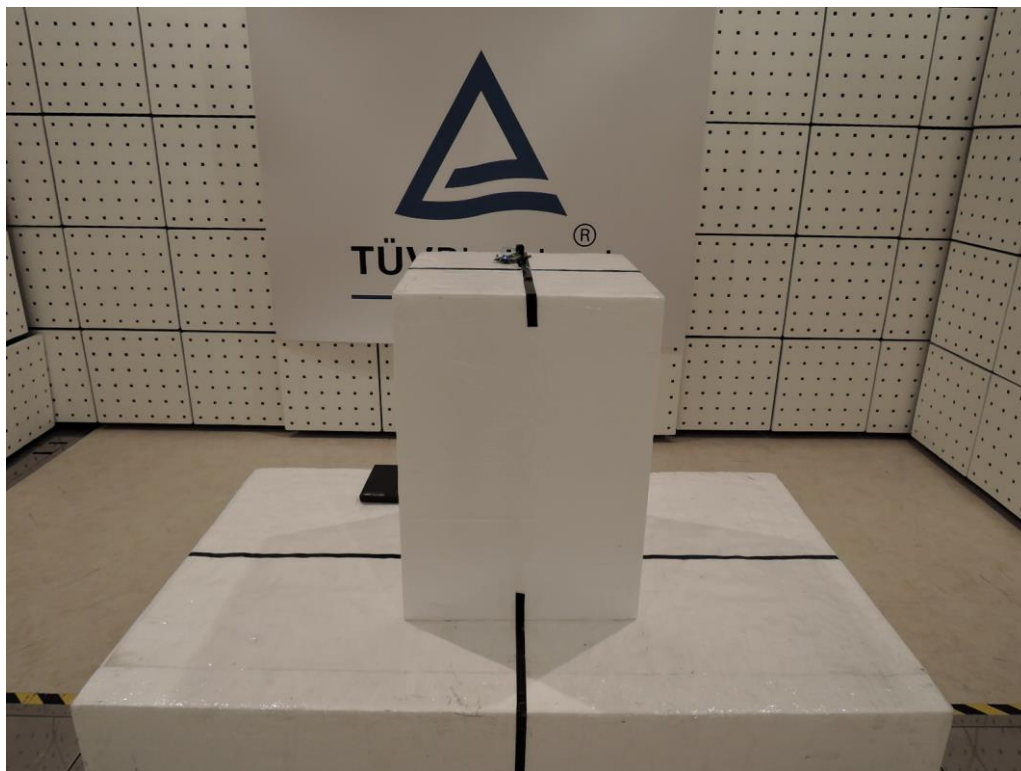
Test standard : EN 62479:2010, A.3.

Maximum available Power:

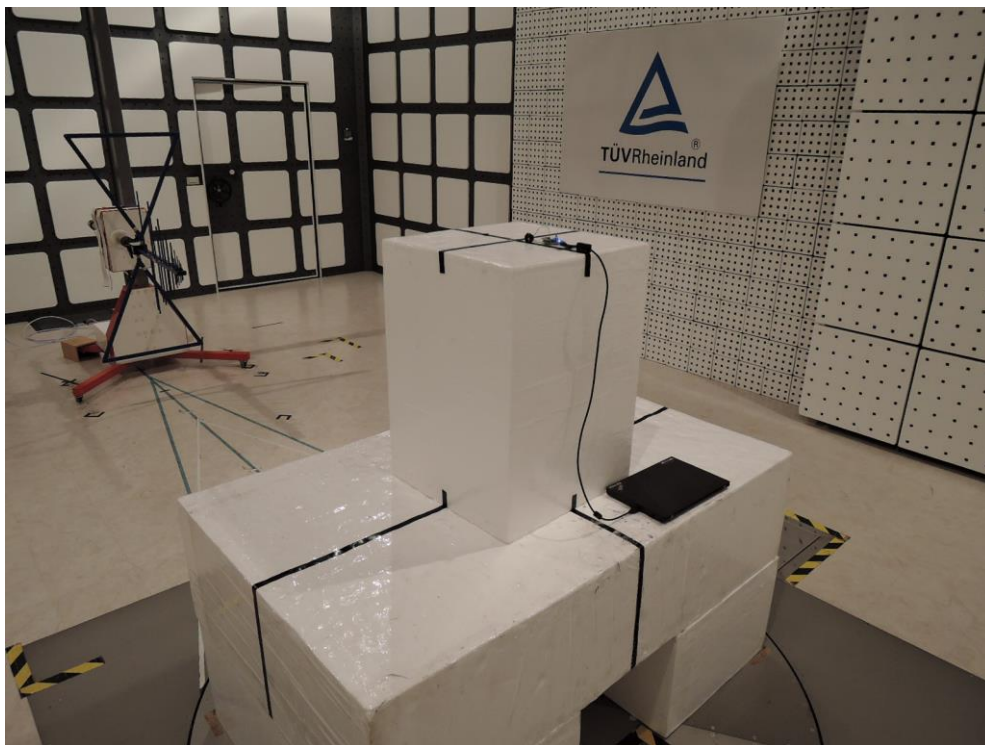
Max Power (dBm)	Power (mW)	Head and Body Power Limit in (mW)	Pass/Fail
1.4	1.38	20	PASS

7 Photographs of the Test Setup

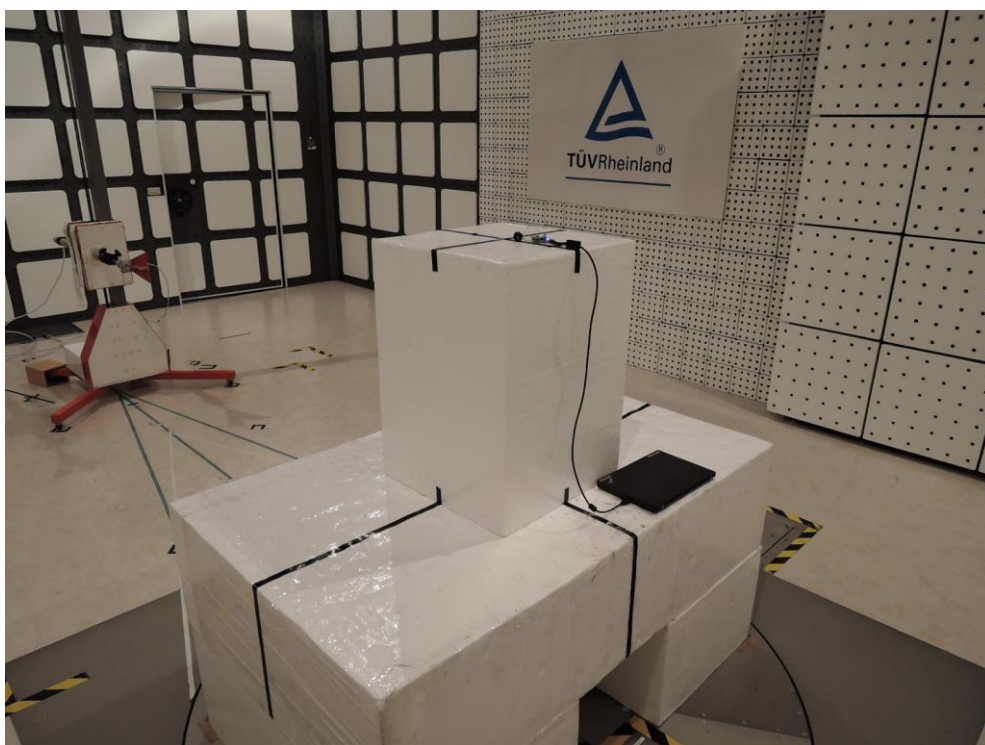
Photograph 1: Set-up for Radiated Emission (front)



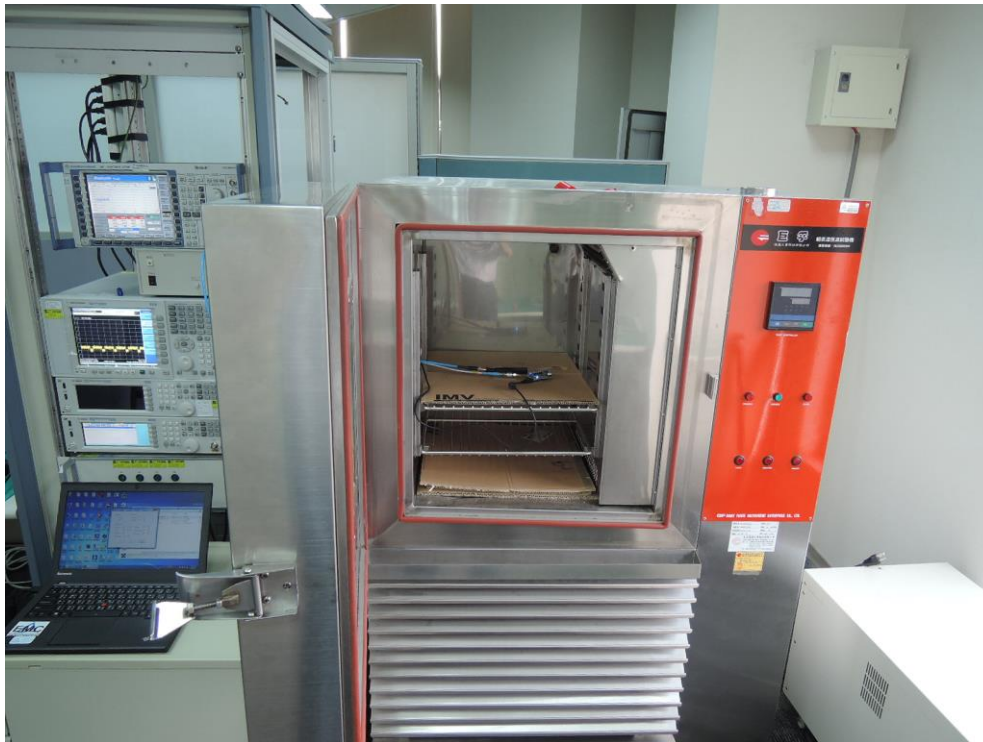
Photograph 2: Set-up for Radiated Emission (30 MHz-1GHz)



Photograph 3: Set-up for Radiated Emission (Rear View 2)



Photograph 4: Setup for Radio Frequency Conducted Tests



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Test Report No.CN21GYI4 001

Appendix D: Radiated Spurious Emission Data

(File: CN21GYI4 001Appendix D)

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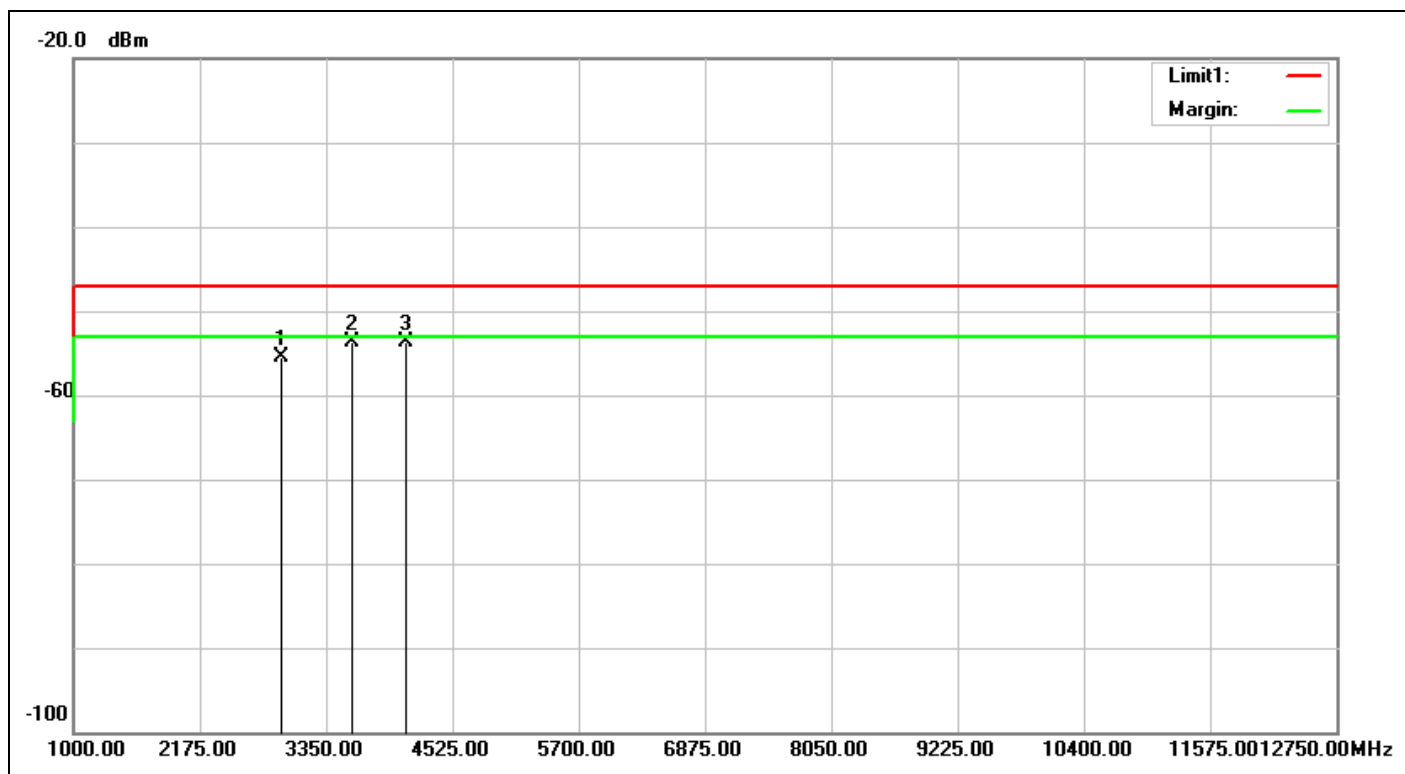
Spurious Emissions, Receiving Mode, 1-12.75G



TUV Taiwan

11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105

Tel:+886-2172-7000 fax:+886-2528-0018



Service No.: 114039665-CE

Test Distance: 1.2m

Test Standard: EN 300 328 1.8.1_Rx

Ant. Polarization: Horizontal

Test item: Radiation Emission

Test Time: 2015/9/4 22:17:41

Applicant: Microchip

Test Rating: DC 5V

Product: Bluetooth Module

Temp.(°C)/Hum.(%): 22.6(°C)/59%

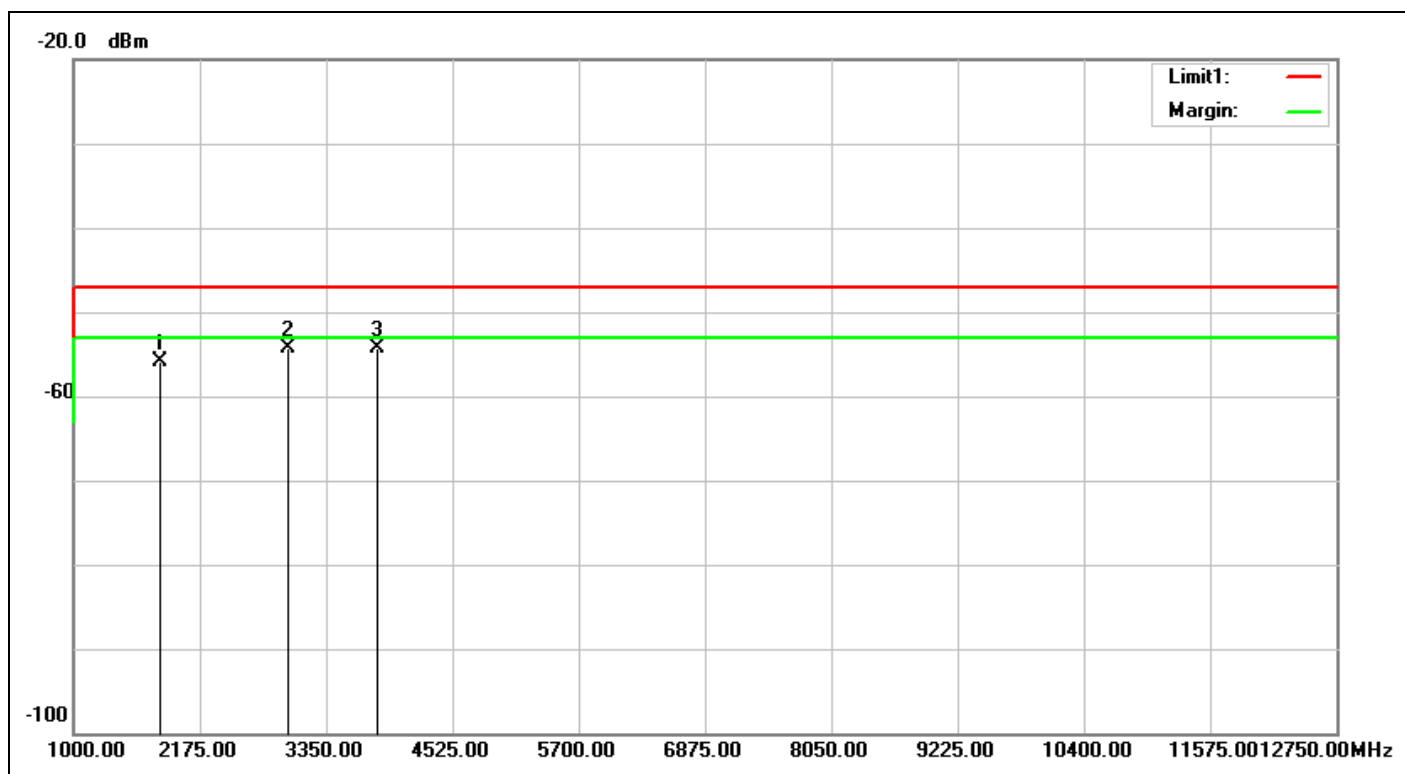
Model No.: BM78

Test Engineer: George Yang

Test Mode: LE-2402-RX

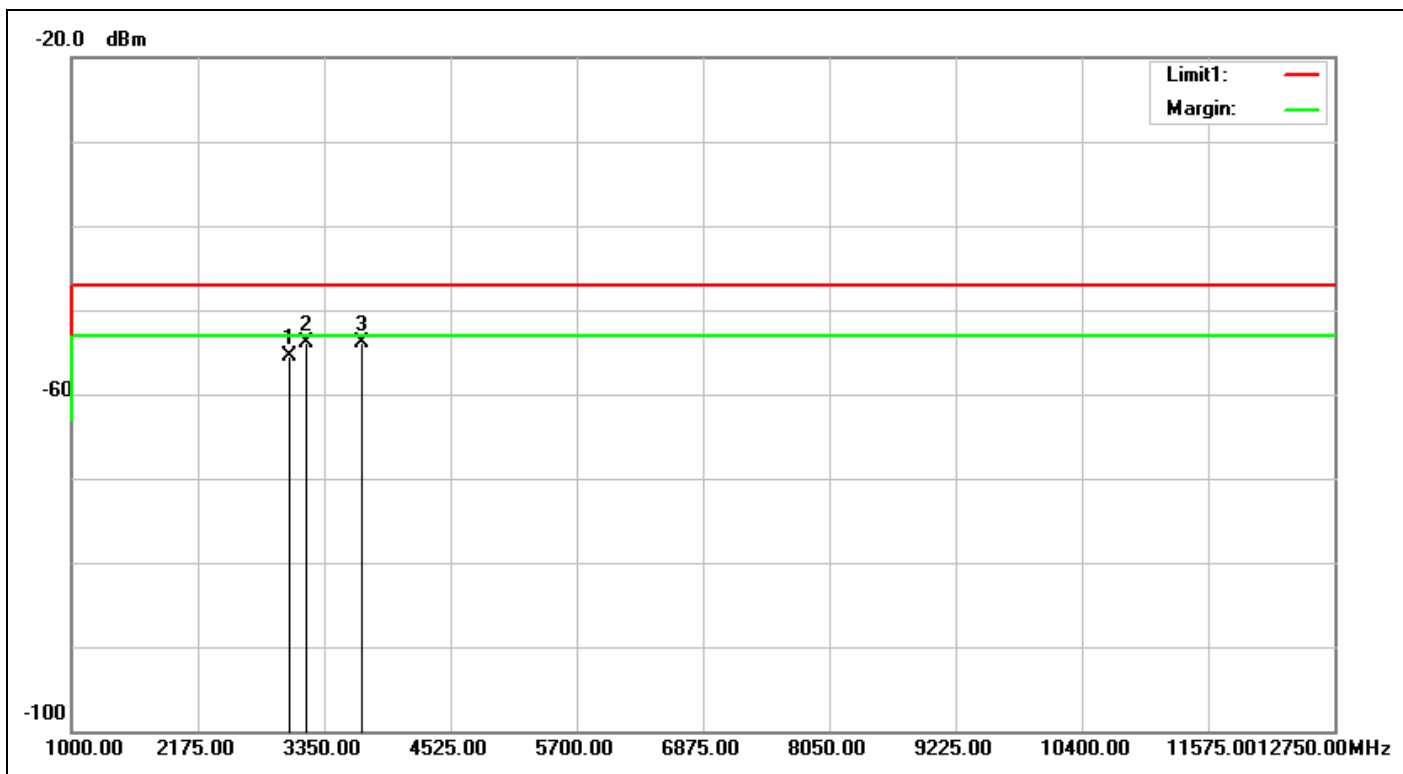
Remark:

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	2927.000	-0.51	-55.07	-55.58	-47.00	-8.58	peak	100	148	
2	3585.000	1.58	-55.30	-53.72	-47.00	-6.72	peak	100	337	
3	4090.250	2.70	-56.36	-53.66	-47.00	-6.66	peak	100	1	



Service No.:	114039665-CE	Test Distance:	1.2m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/4 22:18:43
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2402-RX		
Remark:			

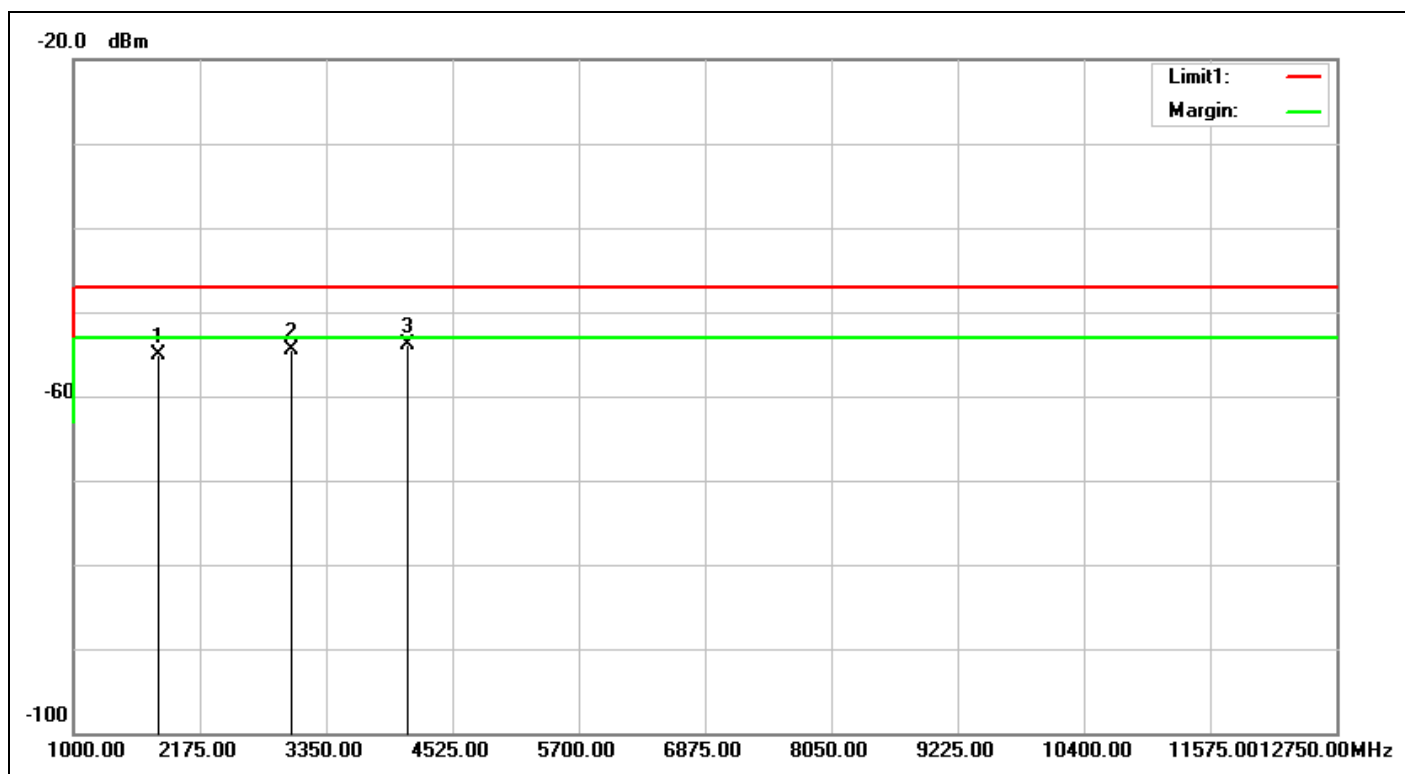
No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	1799.000	-2.46	-53.36	-55.82	-47.00	-8.82	peak	100	257	
2	2997.500	0.06	-54.29	-54.23	-47.00	-7.23	peak	100	188	
3	3831.750	2.26	-56.59	-54.33	-47.00	-7.33	peak	100	324	



Service No.: 114039665-CE
Test Standard: EN 300 328 1.8.1_Rx
Test item: Radiation Emission
Applicant: Microchip
Product: Bluetooth Module
Model No.: BM78
Test Mode: LE-2480-RX
Remark:

Test Distance: 1.2m
Ant. Polarization: Horizontal
Test Time: 2015/9/4 22:21:11
Test Rating: DC 5V
Temp.(°C)/Hum.(%): 22.6(°C)/59%
Test Engineer: George Yang

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	3021.000	-0.11	-55.38	-55.49	-47.00	-8.49	peak	100	75	
2	3185.500	0.41	-54.32	-53.91	-47.00	-6.91	peak	100	212	
3	3702.500	1.79	-55.75	-53.96	-47.00	-6.96	peak	100	64	



Service No.:	114039665-CE	Test Distance:	1.2m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/4 22:22:13
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-RX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	1787.250	-2.47	-52.70	-55.17	-47.00	-8.17	peak	100	148	
2	3021.000	0.17	-54.66	-54.49	-47.00	-7.49	peak	100	110	
3	4102.000	2.63	-56.56	-53.93	-47.00	-6.93	peak	100	271	

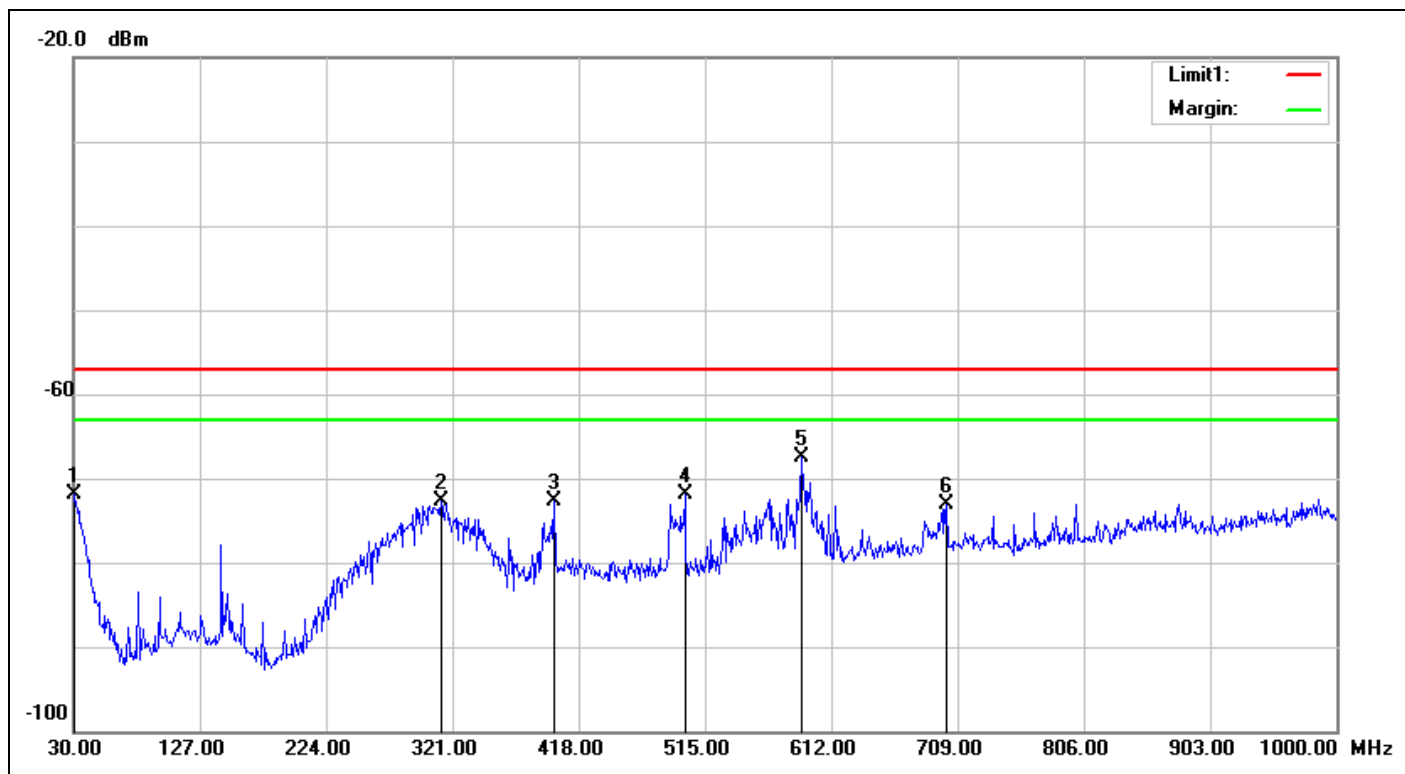
Spurious Emissions, Receiving Mode, 30M-1G



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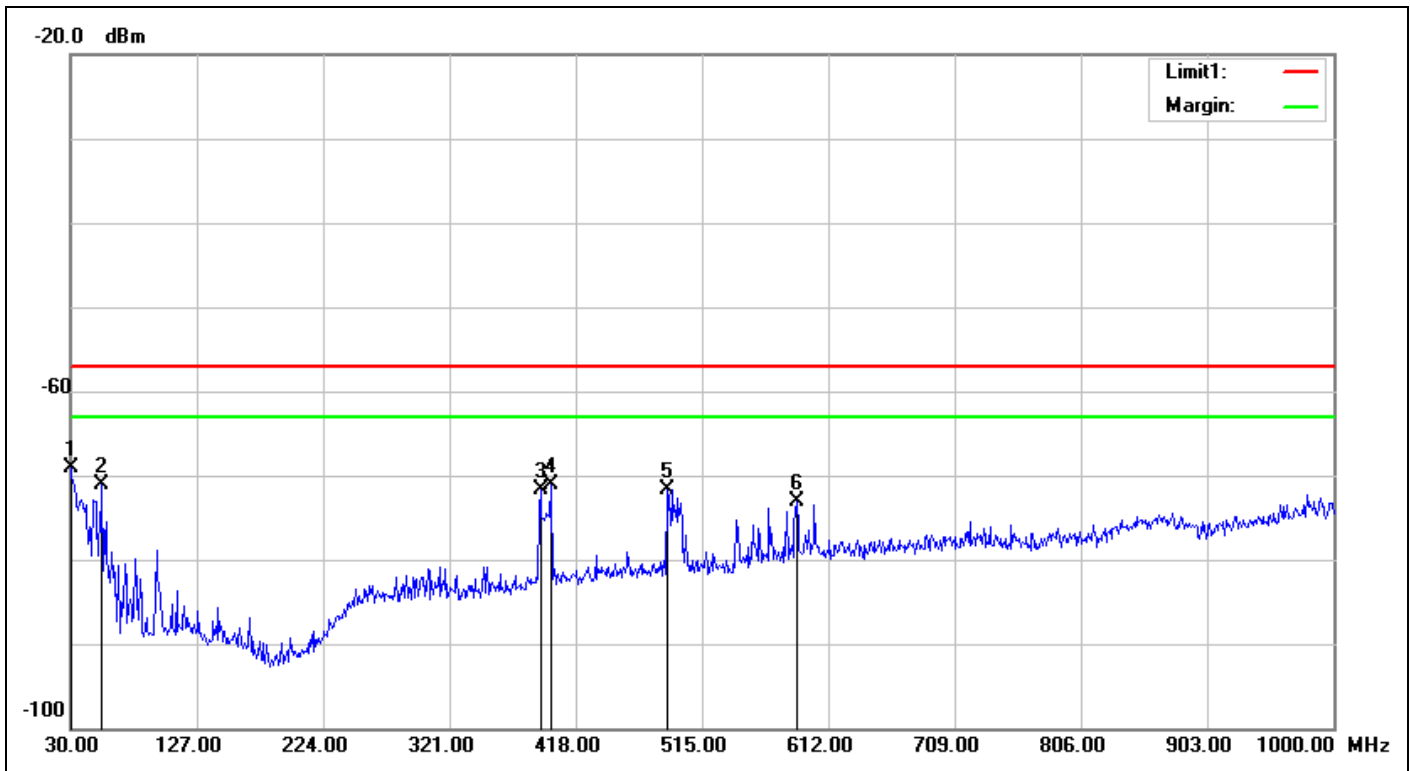
Tel:+886-2172-7000 fax:+886-2528-0018



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/5 08:58:00
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2402-RX		
Remark:			

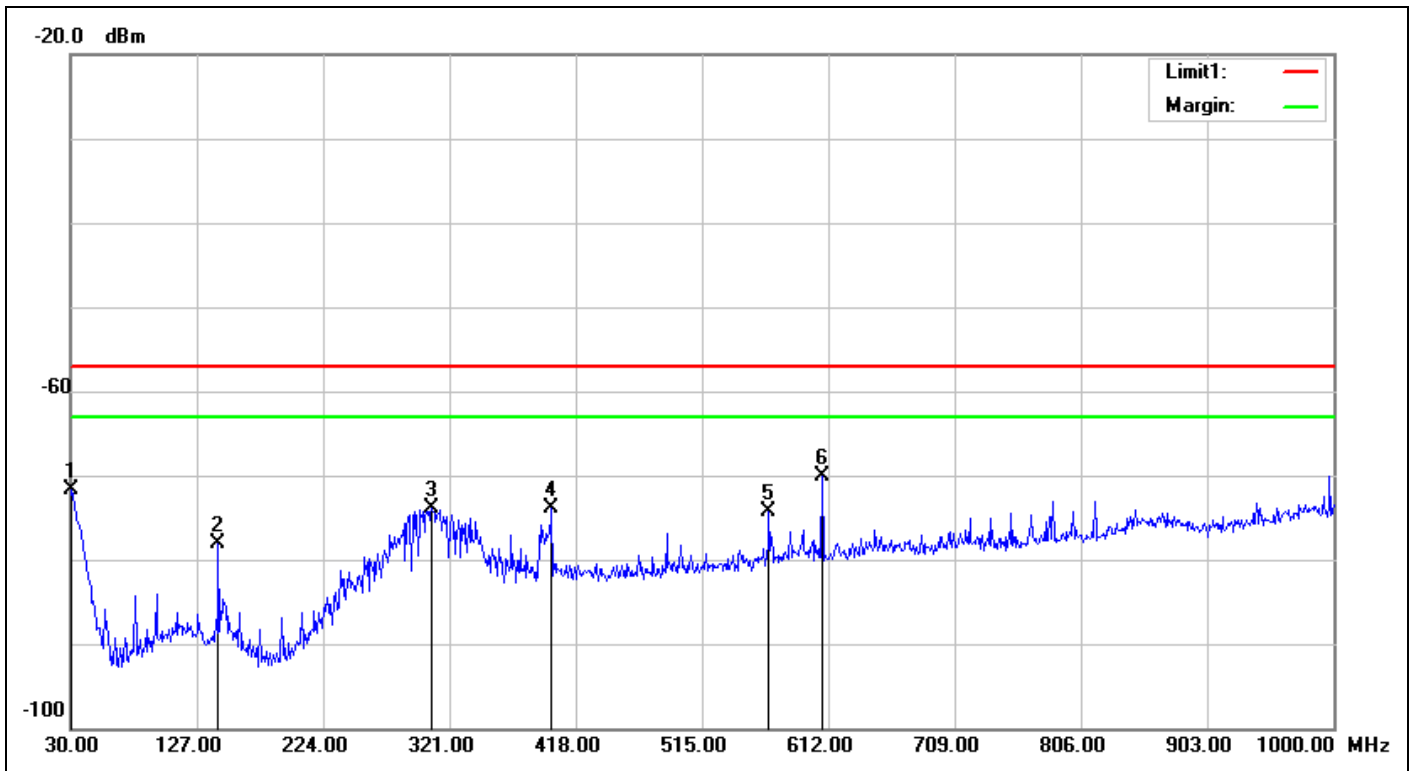
No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-78.81	-71.94	-57.00	-14.94	peak	100	316	
2	312.2700	-6.00	-66.71	-72.71	-57.00	-15.71	peak	100	110	
3	398.6000	-4.27	-68.52	-72.79	-57.00	-15.79	peak	100	249	
4	499.4800	-3.45	-68.39	-71.84	-57.00	-14.84	peak	100	59	
5	588.7200	-1.95	-65.53	-67.48	-57.00	-10.48	peak	100	212	
6	700.2700	-0.73	-72.34	-73.07	-57.00	-16.07	peak	100	305	

Spurious Emissions, Receiving Mode, 30M-1G



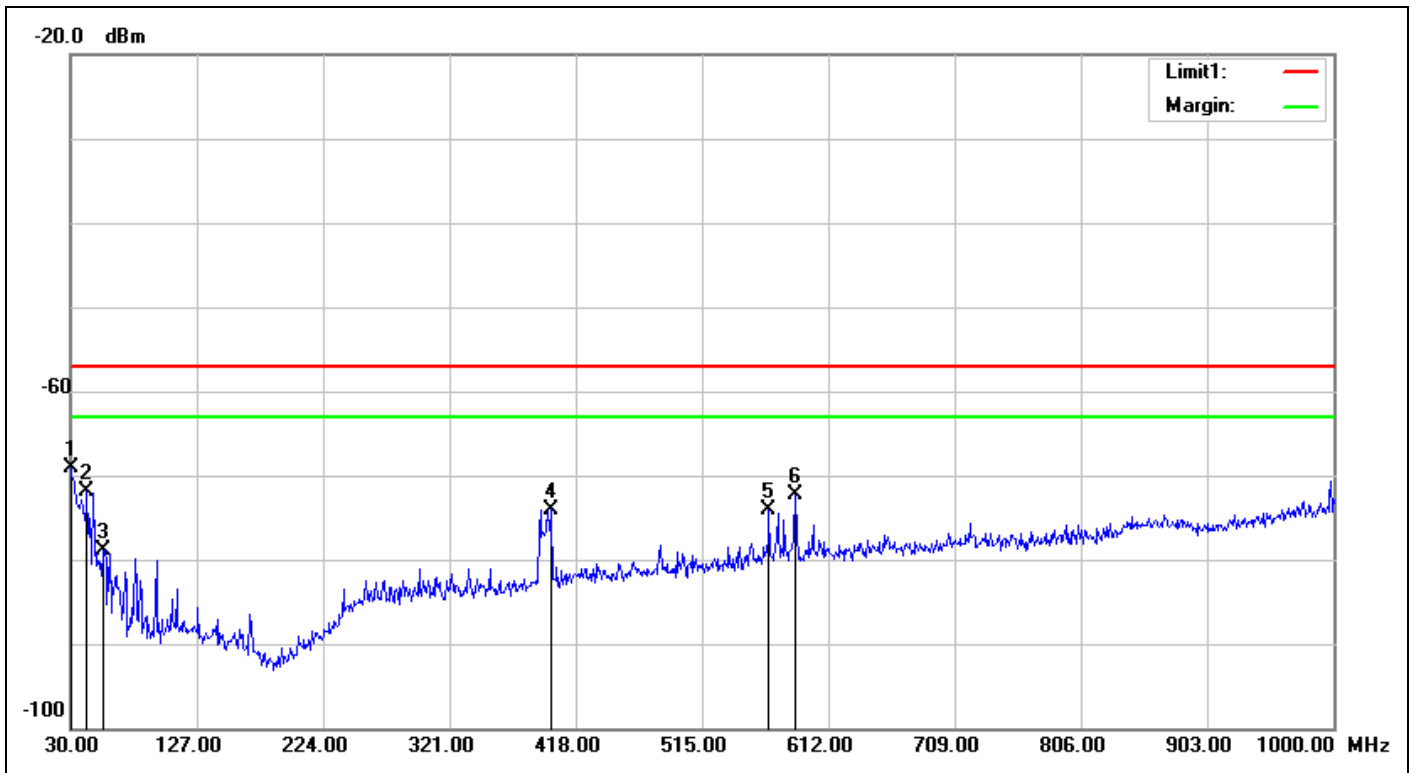
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 08:59:03
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2402-RX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-75.93	-69.06	-57.00	-12.06	peak	100	28	
2	54.2500	-11.11	-59.94	-71.05	-57.00	-14.05	peak	100	298	
3	390.8400	-4.54	-67.17	-71.71	-57.00	-14.71	peak	100	215	
4	399.5700	-4.24	-66.80	-71.04	-57.00	-14.04	peak	100	215	
5	487.8400	-3.44	-68.30	-71.74	-57.00	-14.74	peak	100	335	
6	587.7500	-1.97	-71.15	-73.12	-57.00	-16.12	peak	100	223	



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/5 09:00:53
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-RX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-78.64	-71.77	-57.00	-14.77	peak	100	0	
2	143.4900	-11.14	-66.95	-78.09	-57.00	-21.09	peak	100	243	
3	307.4200	-6.05	-67.81	-73.86	-57.00	-16.86	peak	100	199	
4	399.5700	-4.24	-69.67	-73.91	-57.00	-16.91	peak	100	246	
5	566.4100	-2.32	-71.89	-74.21	-57.00	-17.21	peak	100	212	
6	607.1500	-1.74	-68.41	-70.15	-57.00	-13.15	peak	100	193	



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 09:01:55
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-RX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-76.05	-69.18	-57.00	-12.18	peak	100	80	
2	42.6100	-2.19	-69.78	-71.97	-57.00	-14.97	peak	100	33	
3	55.2200	-11.54	-67.34	-78.88	-57.00	-21.88	peak	100	131	
4	398.6000	-4.27	-69.73	-74.00	-57.00	-17.00	peak	100	342	
5	566.4100	-2.32	-71.70	-74.02	-57.00	-17.02	peak	100	270	
6	586.7800	-1.99	-70.27	-72.26	-57.00	-15.26	peak	100	33	

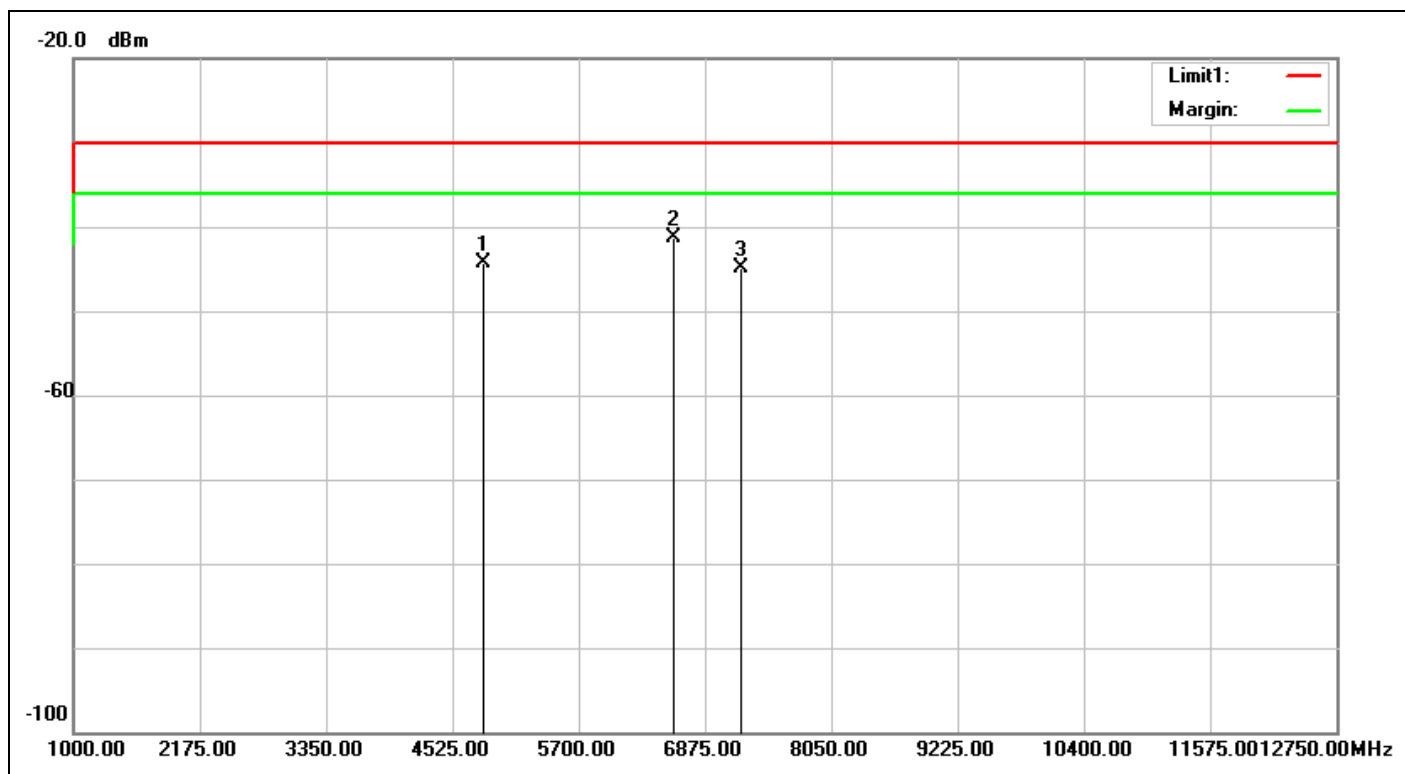
Spurious Emissions, TX Mode, 1-12.75G



TUV Taiwan

11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105

Tel:+886-2172-7000 fax:+886-2528-0018



Service No.: 114039665-CE

Test Distance: 3m

Test Standard: EN 300 328 1.8.1_Tx

Ant. Polarization: Horizontal

Test item: Radiation Emission

Test Time: 2015/9/4 22:05:12

Applicant: Microchip

Test Rating: DC 5V

Product: Bluetooth Module

Temp.(°C)/Hum.(%): 22.6(°C)/59%

Model No.: BM78

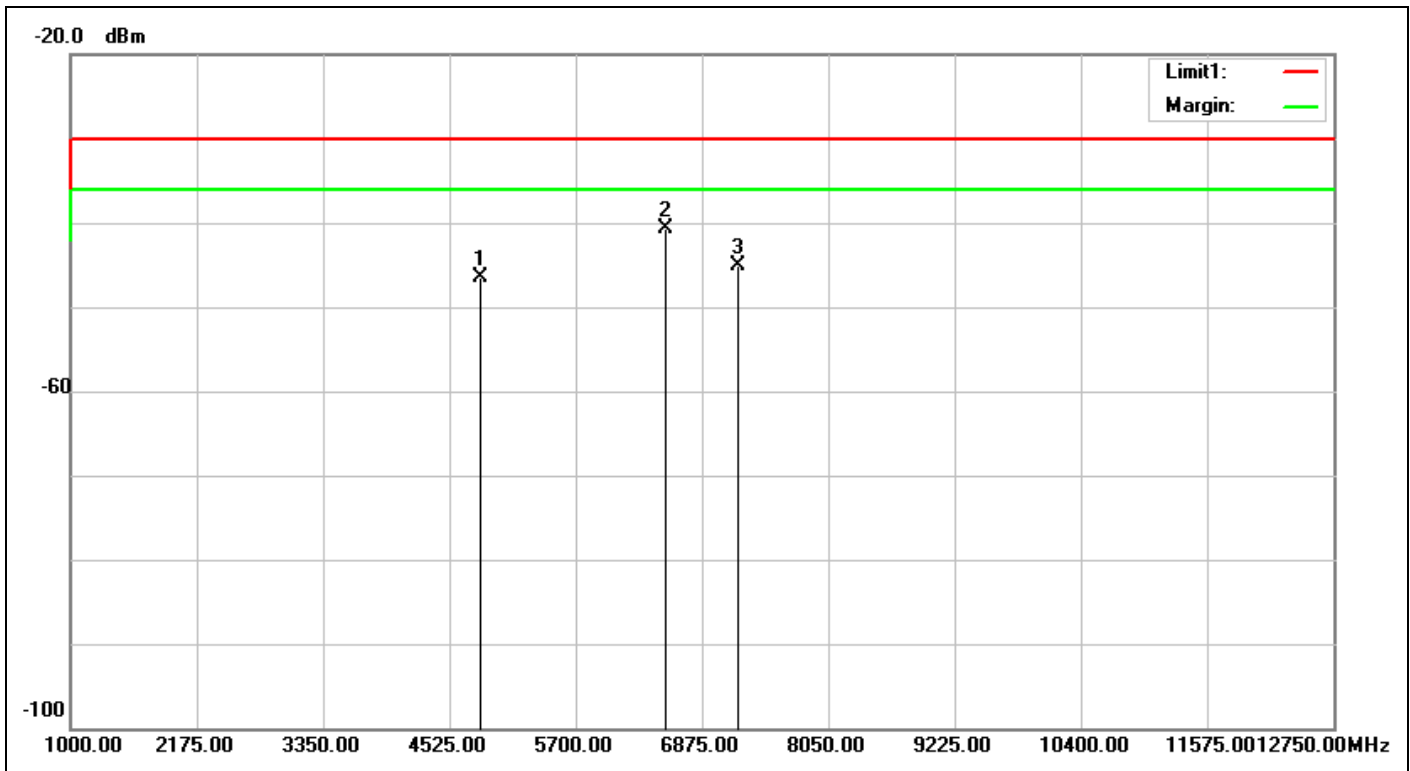
Test Engineer: George Yang

Test Mode: LE-2402-TX

Remark:

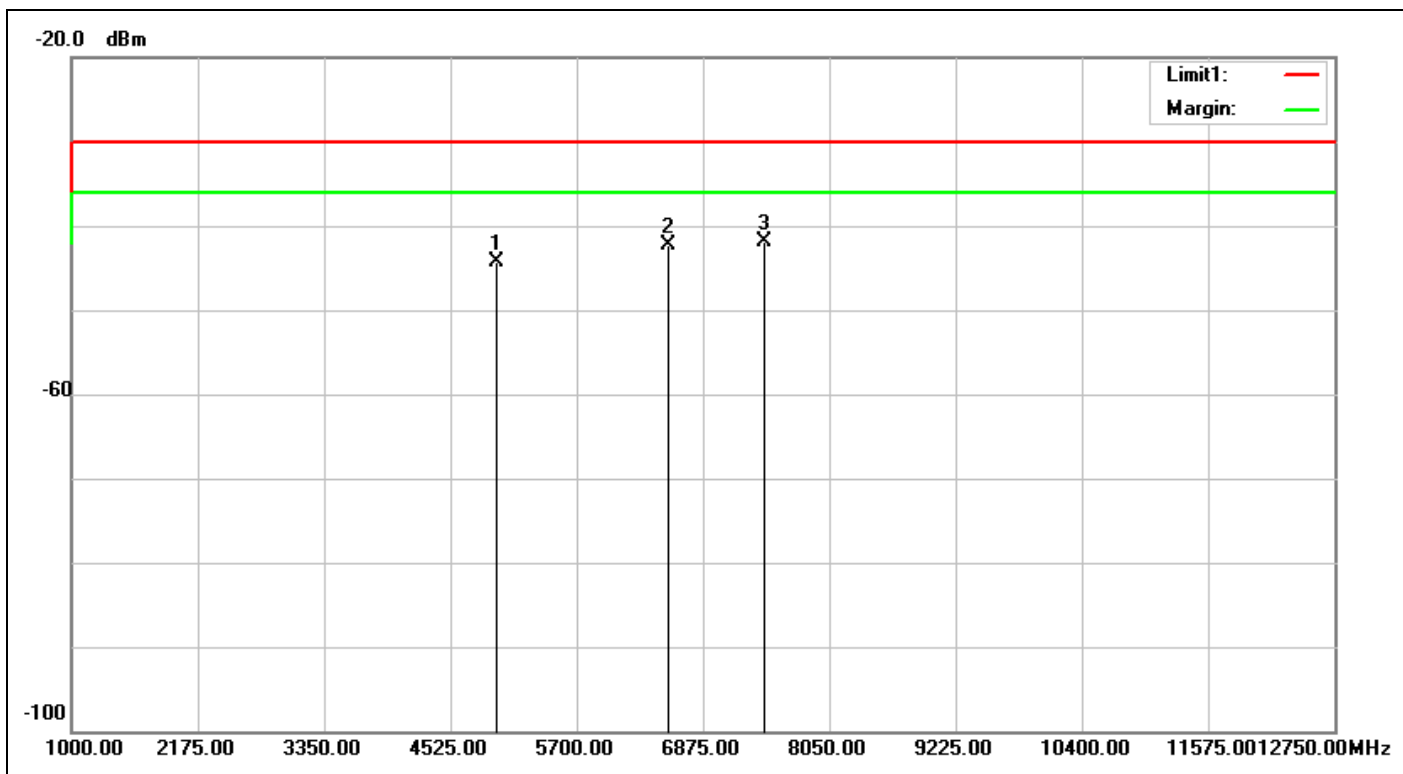
No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	4804.000	10.54	-54.84	-44.30	-30.00	-14.30	peak	100	240	
2	6581.250	19.97	-61.17	-41.20	-30.00	-11.20	peak	100	101	
3	7206.000	18.67	-63.49	-44.82	-30.00	-14.82	peak		0	

Spurious Emissions, TX Mode, 1-12.75G



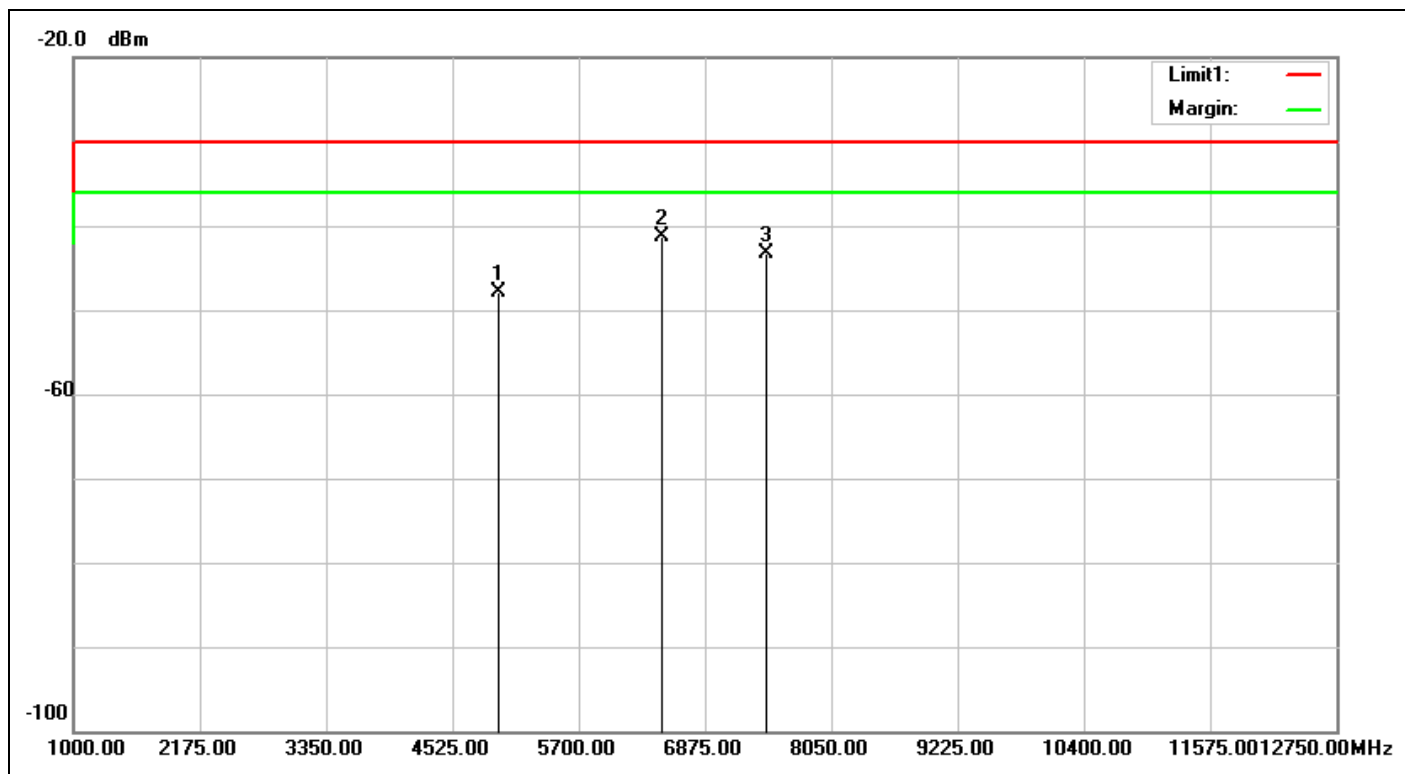
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/4 22:06:14
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2402-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	4804.000	10.63	-57.15	-46.52	-30.00	-16.52	peak			
2	6534.250	20.42	-61.09	-40.67	-30.00	-10.67	peak	100	212	
3	7206.000	18.66	-63.74	-45.08	-30.00	-15.08	peak			



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/4 22:10:16
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	4960.000	10.78	-55.08	-44.30	-30.00	-14.30	peak	100	123	
2	6546.000	20.14	-62.38	-42.24	-30.00	-12.24	peak	100	260	
3	7440.000	19.48	-61.34	-41.86	-30.00	-11.86	peak	100	45	



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/4 22:11:18
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	4960.000	10.82	-58.66	-47.84	-30.00	-17.84	peak			
2	6475.500	20.41	-61.72	-41.31	-30.00	-11.31	peak	100	186	
3	7440.000	19.34	-62.57	-43.23	-30.00	-13.23	peak			

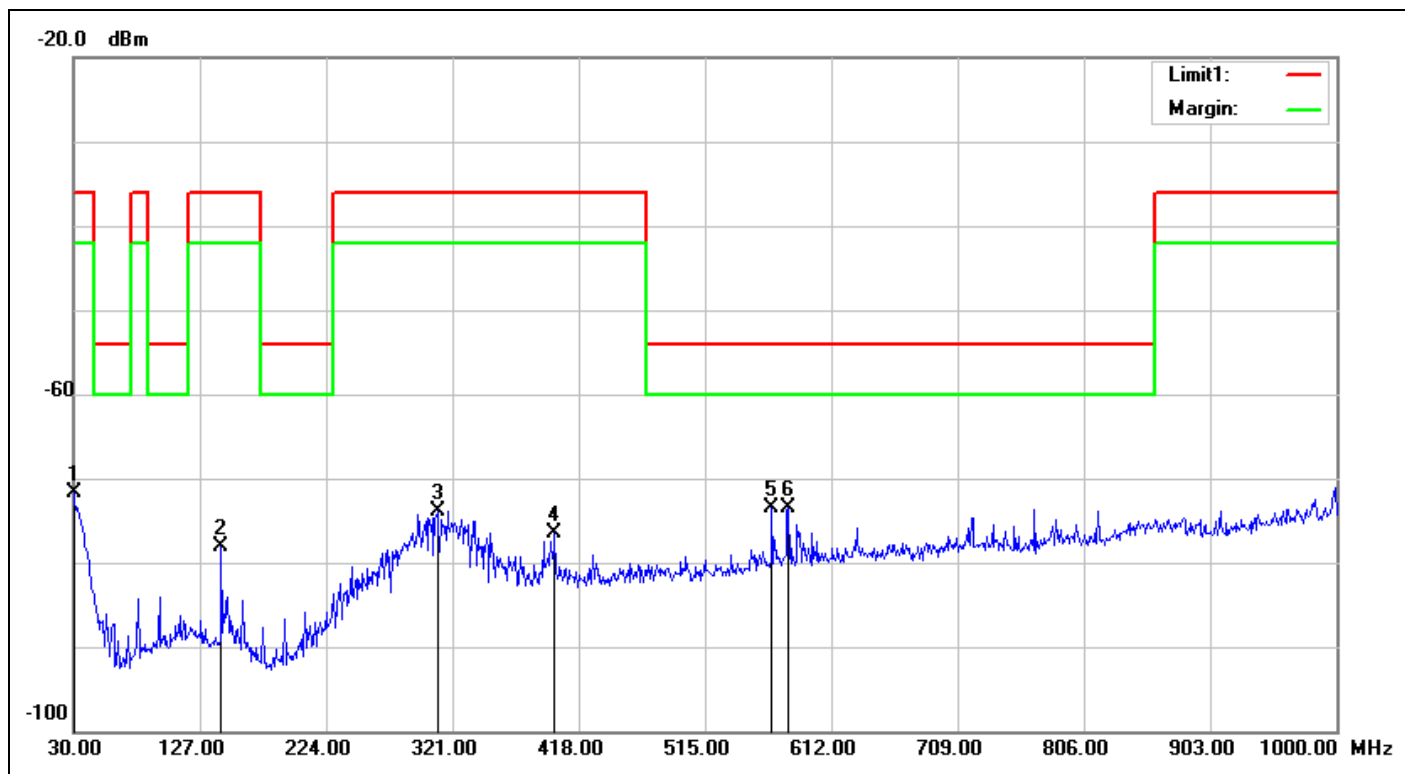
Spurious Emissions, TX Mode, 30M-1G



TUV Taiwan

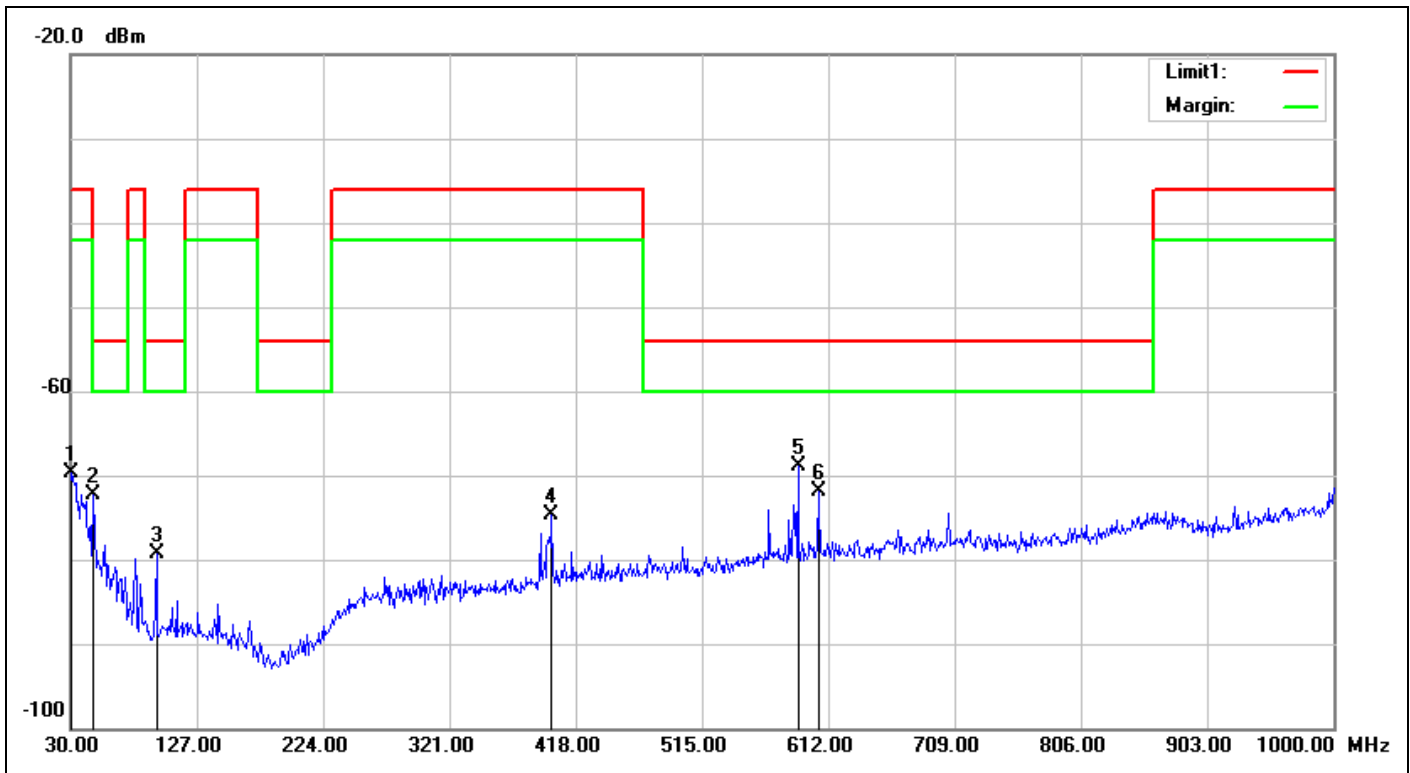
11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105

Tel:+886-2172-7000 fax:+886-2528-0018



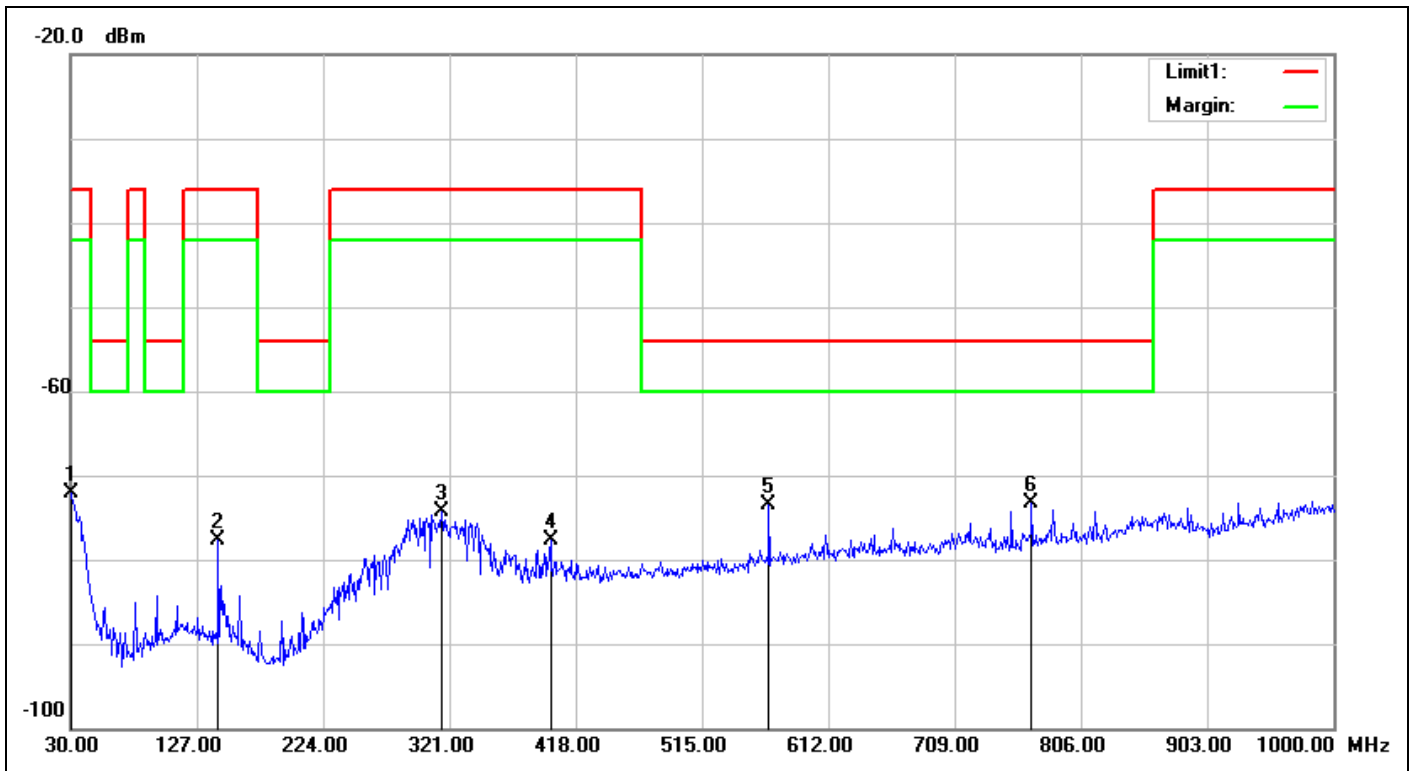
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/5 09:43:26
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2402-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-78.66	-71.79	-36.00	-35.79	peak	100	207	
2	143.4900	-11.14	-67.04	-78.18	-36.00	-42.18	peak	100	165	
3	309.3600	-6.03	-67.86	-73.89	-36.00	-37.89	peak	100	198	
4	399.5700	-4.24	-72.29	-76.53	-36.00	-40.53	peak	100	332	
5	566.4100	-2.32	-71.11	-73.43	-54.00	-19.43	peak	100	226	
6	579.0200	-2.09	-71.42	-73.51	-54.00	-19.51	peak	100	210	



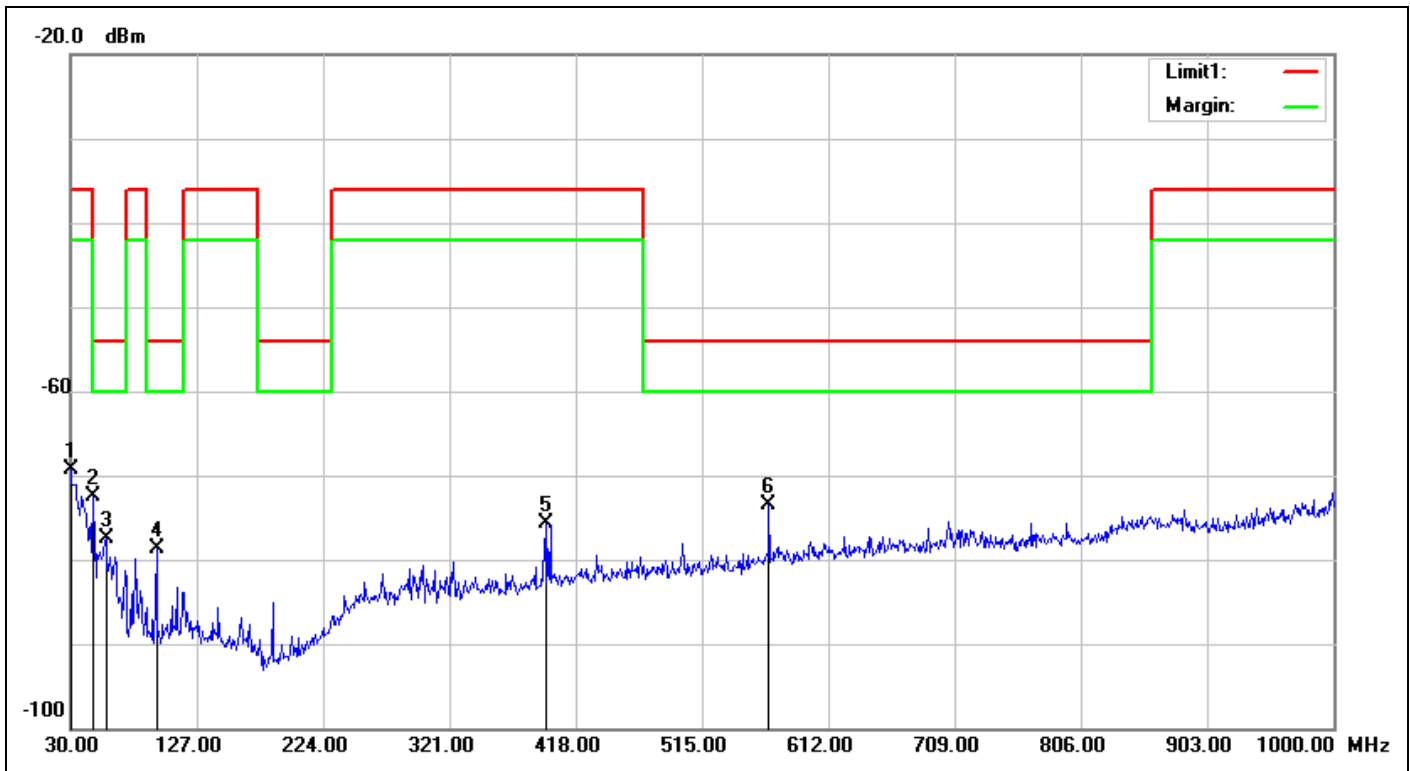
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 09:44:28
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2402-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.9700	6.25	-75.94	-69.69	-36.00	-33.69	peak	100	28	
2	47.4600	-6.91	-65.31	-72.22	-54.00	-18.22	peak	100	104	
3	95.9600	-11.51	-67.85	-79.36	-54.00	-25.36	peak	100	307	
4	399.5700	-4.24	-70.37	-74.61	-36.00	-38.61	peak	100	187	
5	588.7200	-1.95	-67.00	-68.95	-54.00	-14.95	peak	100	271	
6	604.2400	-1.78	-70.20	-71.98	-54.00	-17.98	peak	100	271	



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/5 09:46:08
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-78.99	-72.12	-36.00	-36.12	peak	100	221	
2	143.4900	-11.14	-66.49	-77.63	-36.00	-41.63	peak	100	213	
3	315.1800	-5.97	-68.29	-74.26	-36.00	-38.26	peak	100	115	
4	398.6000	-4.27	-73.43	-77.70	-36.00	-41.70	peak	100	246	
5	566.4100	-2.32	-71.08	-73.40	-54.00	-19.40	peak	100	190	
6	768.1700	-0.54	-72.67	-73.21	-54.00	-19.21	peak	100	307	



Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 09:47:11
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George Yang
Test Mode:	LE-2480-TX		
Remark:			

No.	Frequency (MHz)	Factor (dB)	Reading (dBm)	Level (dBm)	Limit (dBm)	Margin (dB)	Det.	Height (cm)	Azimuth (°)	Remark
1	30.0000	6.87	-76.07	-69.20	-36.00	-33.20	peak	100	318	
2	47.4600	-6.91	-65.64	-72.55	-54.00	-18.55	peak	100	2	
3	57.1600	-12.38	-65.21	-77.59	-54.00	-23.59	peak	100	360	
4	95.9600	-11.51	-67.22	-78.73	-54.00	-24.73	peak	100	240	
5	395.6900	-4.37	-71.28	-75.65	-36.00	-39.65	peak	100	190	
6	566.4100	-2.32	-71.27	-73.59	-54.00	-19.59	peak	100	50	