

Prüfbericht-Nr.: <i>Test report no.:</i>	CN21GYI4 001	Auftrags-Nr.: <i>Order no.:</i>	238513955	Seite 1 von 36 Page 1 of 36
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2021-04-21	
Auftraggeber: <i>Client:</i>	Microchip Technology Inc. 2355 West Chandler Blvd. Chandler, Arizona 85224-6199, United States			
Prüfgegenstand: <i>Test item:</i>	Bluetooth module			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	BM78abcdefg,RN4678			
Auftrags-Inhalt: <i>Order content:</i>	Test Report for CE compliance, R&TTE Directive (BR/EDR)			
Prüfgrundlage: <i>Test specification:</i>	EN 300 328 V 1.9.1 EN 62479:2010 Refer to section 1.1 Test Specifications for more details.			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2015-08-23			
Prüfmuster-Nr.: <i>Test sample no.:</i>	A000244783-005 A000244783-006			
Prüfzeitraum: <i>Testing period:</i>	2015-09-02 - 2015-09-08			
Ort der Prüfung: <i>Place of testing:</i>	EMC/RF Taipei Testing Site			
Prüflaboratorium: <i>Testing laboratory:</i>	Taipei Testing Laboratories			
Prüfergebnis*: <i>Test result*:</i>	Pass			
überprüft von: reviewed by:		genehmigt von: authorized by:		
Datum: 2021-05-05 Date: J a c k C h a n g Stellung / Position: Senior Project Manager		Datum: 2021-05-05 Date: R y a n C h e n Stellung / Position: 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: <i>Condition of the test item at delivery:</i>	Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>			
* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n)	1 = sehr gut 2 = gut 3 = befriedigend	Fail = entspricht nicht o.g. Prüfgrundlage(n)	4 = ausreichend N/A = nicht anwendbar	5 = mangelhaft N/T = nicht getestet
* Legend: P(ass) = passed a.m. test specification(s)	1 = very good 2 = good 3 = satisfactory	Fail = failed a.m. test specification(s)	4 = sufficient N/A = not applicable	5 = poor 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>				

Prüfbericht - Nr.: **CN21GYI4 001**
Test Report No.

Seite 2 von 36
Page 2 of 36

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

Prüfbericht - Nr.: CN21GYI4 001

Test Report No.

Seite 3 von 36
Page 3 of 36

Contents

HISTORY OF THIS TEST REPORT	5
1 GENERAL REMARKS.....	6
1.1 COMPLEMENTARY MATERIALS	6
2 TEST SITES.....	7
2.1 TEST LABORATORY	7
2.2 TEST FACILITY	7
2.3 LIST OF TEST AND MEASUREMENT INSTRUMENTS	8
2.4 MEASUREMENT UNCERTAINTY	9
3 GENERAL PRODUCT INFORMATION	10
3.1 PRODUCT FUNCTION AND INTENDED USE	10
3.2 SYSTEM DETAILS	10
3.3 INDEPENDENT OPERATION MODES	11
3.4 NOISE SUPPRESSING PARTS.....	11
4 TEST SET-UP AND OPERATION MODES	12
4.1 PRINCIPLE OF CONFIGURATION SELECTION	12
4.2 TEST OPERATION AND TEST SOFTWARE	12
4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	12
5 TEST RESULTS RADIO	13
5.1 TRANSMITTER PARAMETERS	13
5.1.1 <i>RF output power</i>	13
5.1.2 <i>Duty Cycle, Tx-sequence, Tx-gap</i>	15
5.1.3 <i>Dwell Time</i>	15
5.1.4 <i>Minimum Frequency Occupation.....</i>	18
5.1.5 <i>Hopping Frequency Separation</i>	21
5.1.6 <i>Medium Utilisation Factor</i>	24
5.1.7 <i>Adaptivity (Adaptive Frequency Hopping)</i>	24
5.1.8 <i>Occupied Channel Bandwidth</i>	25
5.1.9 <i>Transmitter unwanted emissions in the OOB domain</i>	28
5.1.10 <i>Transmitter unwanted emissions in the spurious domain</i>	30
5.2 RECEIVER PARAMETERS.....	31
5.2.1 <i>Receiver Radiated Spurious Emissions</i>	31
5.2.2 <i>Receiver Blocking</i>	31
6 SAFETY HUMAN EXPOSURE.....	32
6.1 RADIO FREQUENCY EXPOSURE COMPLIANCE.....	32
6.1.1 <i>Electromagnetic Fields</i>	32

Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 4 von 36
Page 4 of 36

7	PHOTOGRAPHS OF THE TEST SETUP	33
8	LIST OF TABLES	36
9	LIST OF FIGURES.....	36
10	LIST OF PHOTOGRAPHS	36

Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 5 von 36
Page 5 of 36

HISTORY OF THIS TEST REPORT

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

Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 6 von 36
Page 6 of 36

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

Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 7 von 36
Page 7 of 36

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.)

Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 8 von 36
Page 8 of 36

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	±5 %
RF power, conducted	± 1.5 dB
RF power density, conducted	± 3 dB
unwanted emissions, conducted	± 3 dB
all emissions, radiated	± 6 dB
Temperature	± 1 °C
Humidity	± 5 %
DC and low frequency voltages	±3 %
Time	± 5 %
Duty Cycle	± 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, π/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.

Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 14 von 36
Page 14 of 36

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
	Read Power	-0.23	-0.20	-1.25
1DH5	e.i.r.p.	3.00	3.03	1.98
	Read Power	-4.26	-3.80	-2.78
2DH5	e.i.r.p.	-1.03	-0.57	0.45
	Read Power	-4.25	-3.82	-2.77
3DH5	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)
----	-------	-----------	------	-------

Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.*Seite 15 von 36
Page 15 of 36**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 $\geq 2 \cdot RBW$. The dwell time of a single packet was then measured using the Delta Marker function using a zero span centered on a hopping channel.

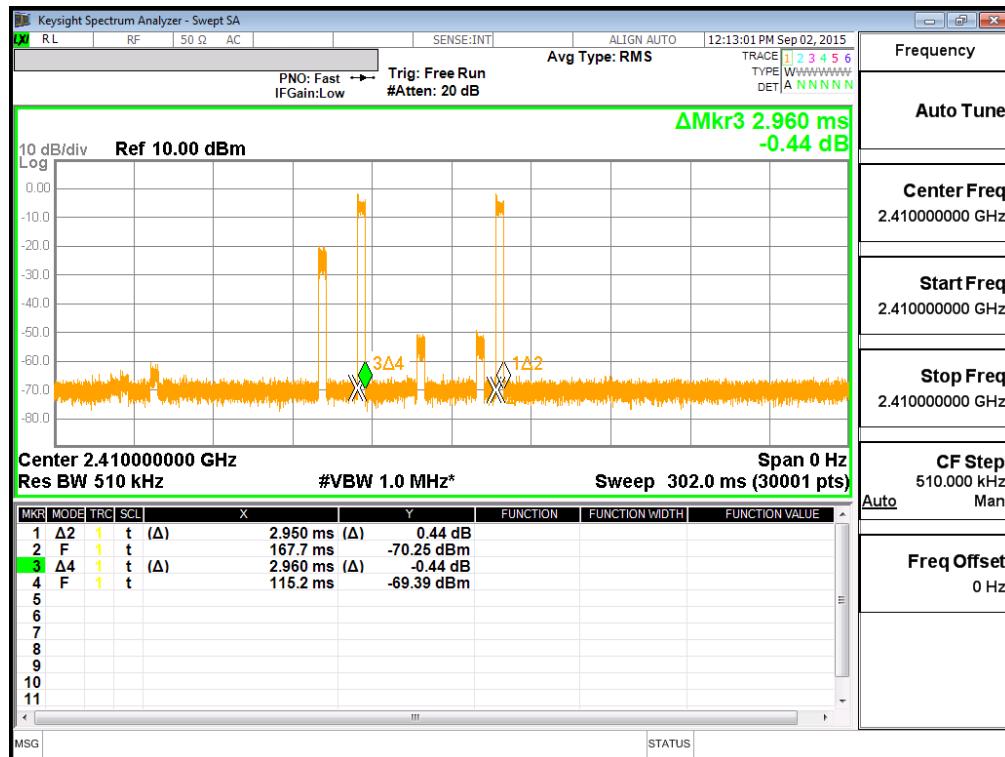
Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 16 von 36
Page 16 of 36

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

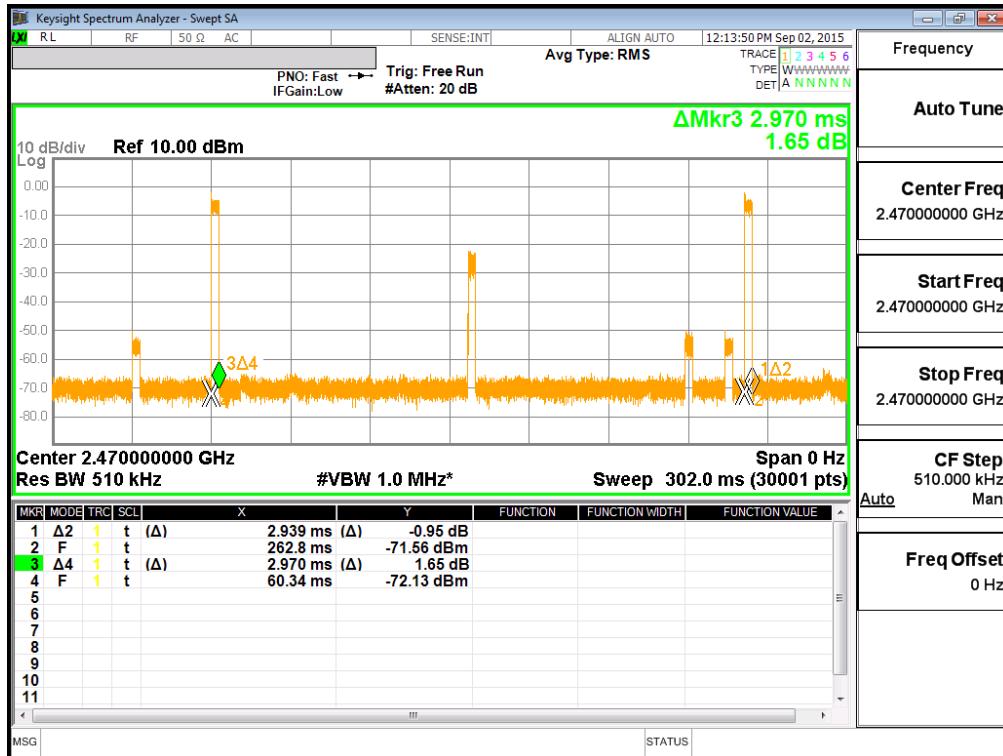


Prüfbericht - Nr.: CN21GYI4 001

Test Report No.

Seite 17 von 36
Page 17 of 36

Figure 2: Accumulated Dwell Time, 2470 MHz



Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.***Seite 18 von 36**
*Page 18 of 36***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 $\geq 2 \times RBW$. All the dwell times of packets within ($4 \times$ dwell time per hop \times 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

Prüfbericht - Nr.: CN21GYI4 001

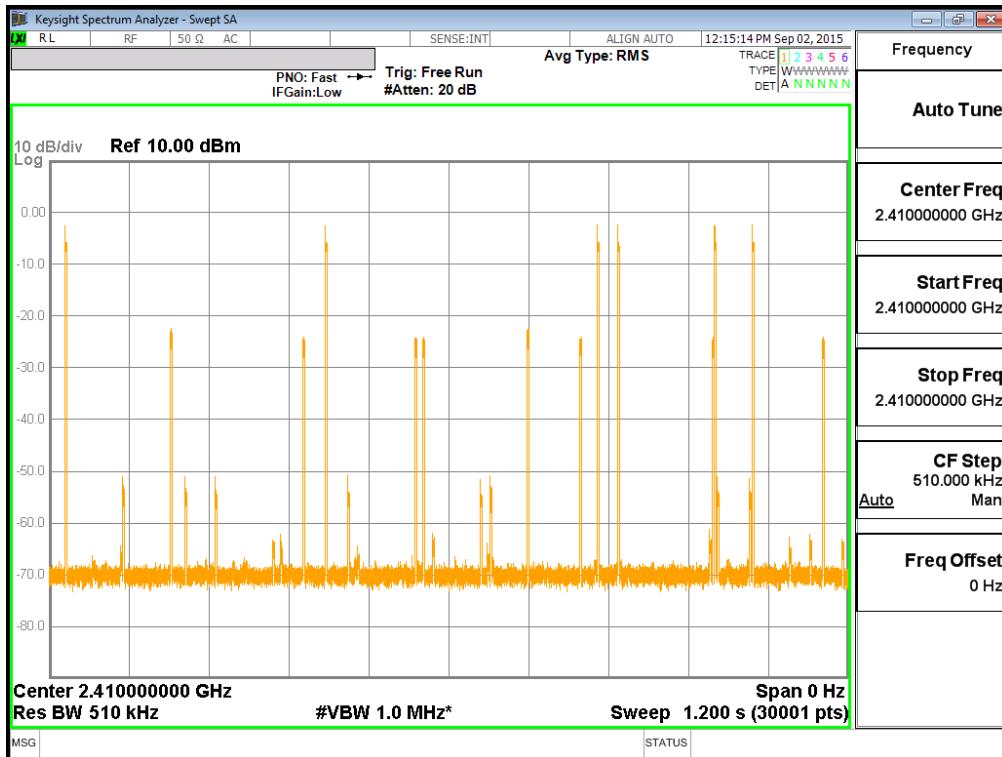
Test Report No.

Seite 19 von 36
Page 19 of 36

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

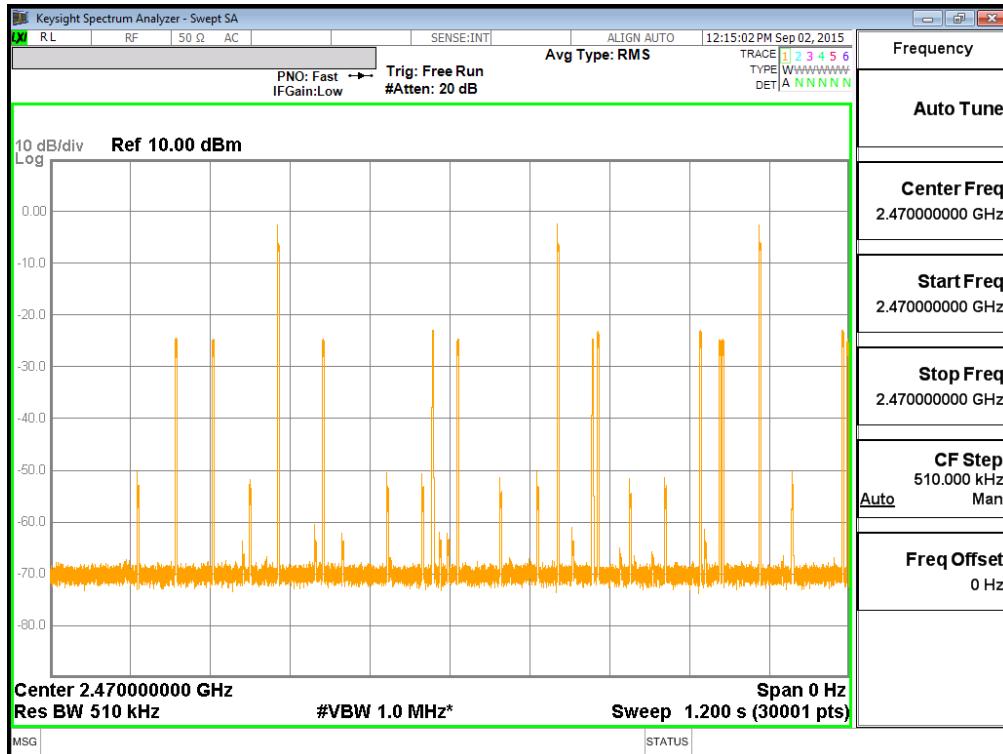
Figure 3: Dwell Time in four periods, 2410 MHz



Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 20 von 36
Page 20 of 36

Figure 4: Dwell Time in four periods, 2470 MHz



Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.***Seite 21 von 36**
*Page 21 of 36***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.

Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.*Seite 22 von 36
Page 22 of 36**Table 8: Hopping Channel Separation**

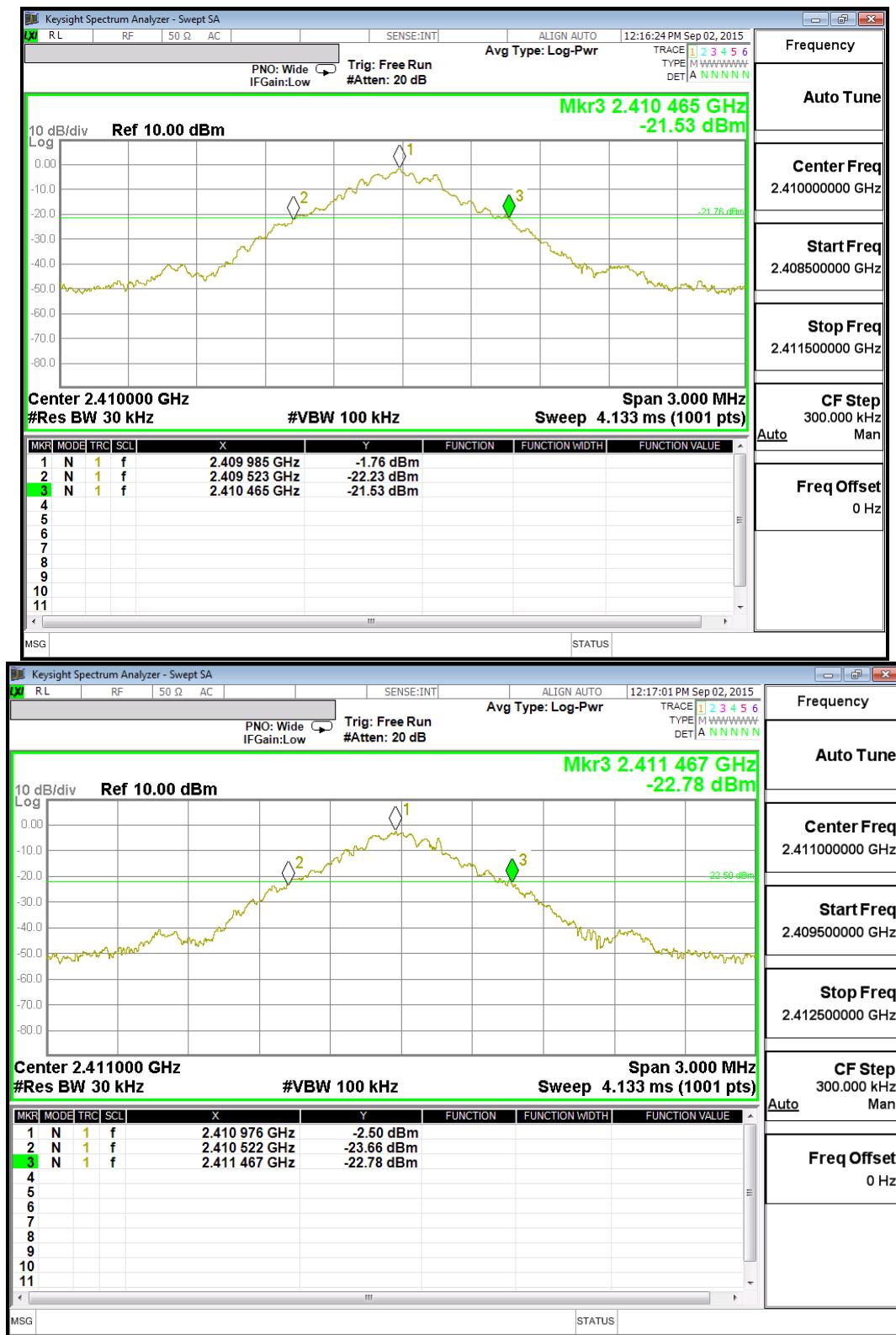
Frequency [MHz]	F _L [MHz]	F _H [MHz]	F _c =(F _L +F _H)/2 [MHz]	Channel Separation [MHz]	Limit [MHz]
2410	2409.523	2410.465	2409.9940	1.0005	≥ 0.1
2411	2410.522	2411.467	2410.9945		

Prüfbericht - Nr.: CN21GYI4 001

Test Report No.

Seite 23 von 36
Page 23 of 36

Figure 5: Hopping Channel Separation



Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.***Seite 24 von 36**
*Page 24 of 36***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.

Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.*Seite 25 von 36
Page 25 of 36**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

Prüfbericht - Nr.: CN21GYI4 001

Test Report No.

Seite 26 von 36
Page 26 of 36

Figure 6: 99% Bandwidth Low Channel GFSK

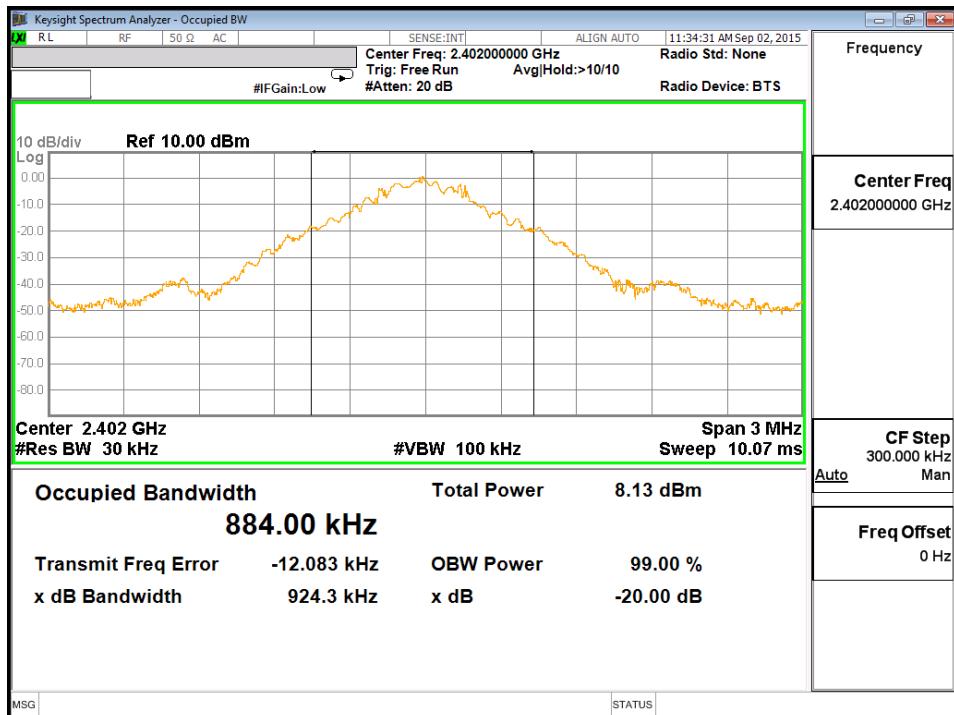
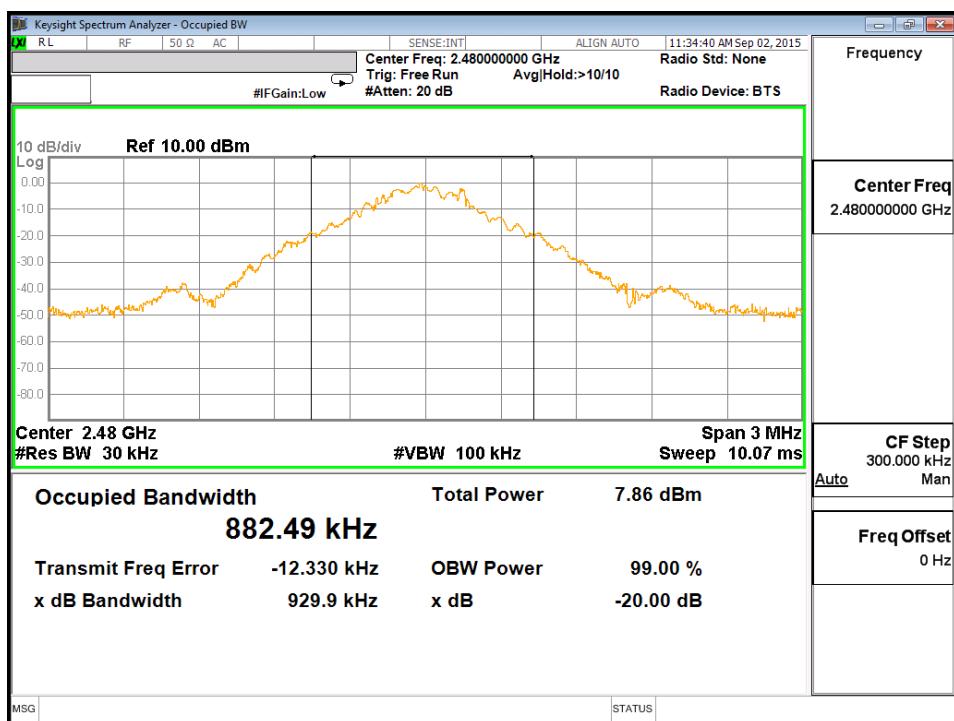


Figure 7: 99% Bandwidth High Channel GFSK



Prüfbericht - Nr.: CN21GYI4 001

Test Report No.

Seite 27 von 36
Page 27 of 36

Figure 8: 99% Bandwidth Low Channel 8DPSK

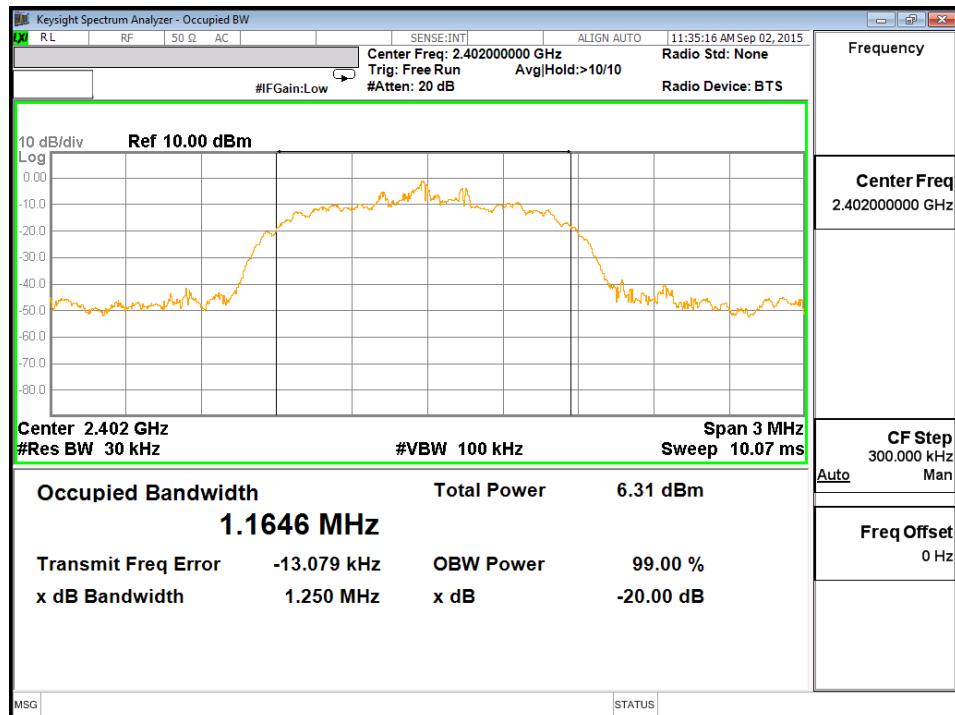
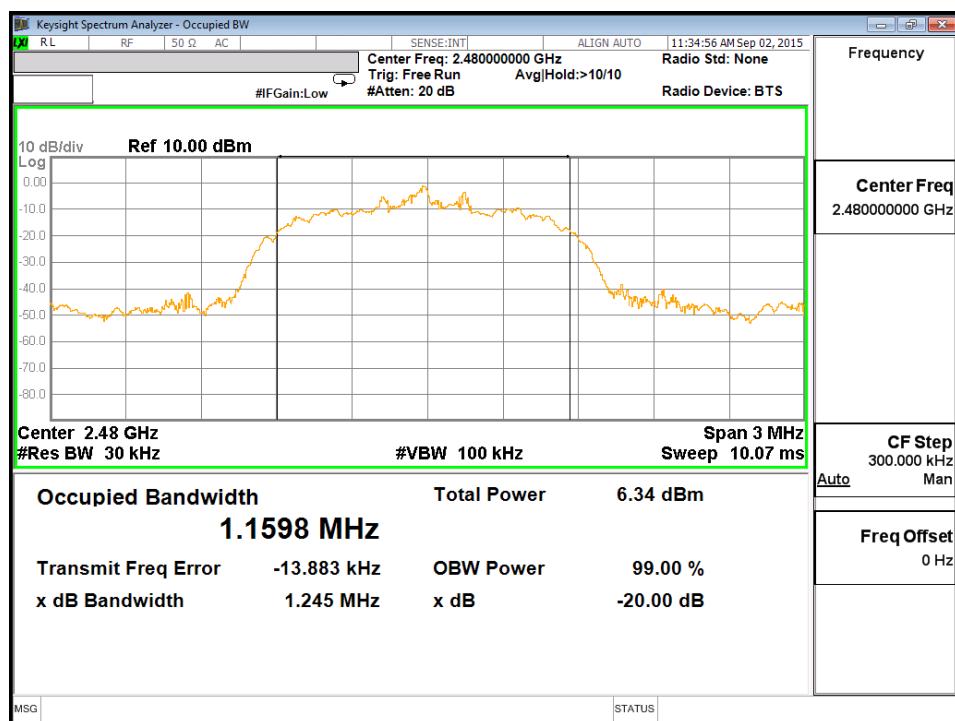


Figure 9: 99% Bandwidth High Channel 8DPSK



Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.***Seite 28 von 36**
*Page 28 of 36***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

Prüfbericht - Nr.: CN21GYI4 001

Test Report No.

Seite 29 von 36
Page 29 of 36

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

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

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

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

Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.***Seite 30 von 36**
*Page 30 of 36***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

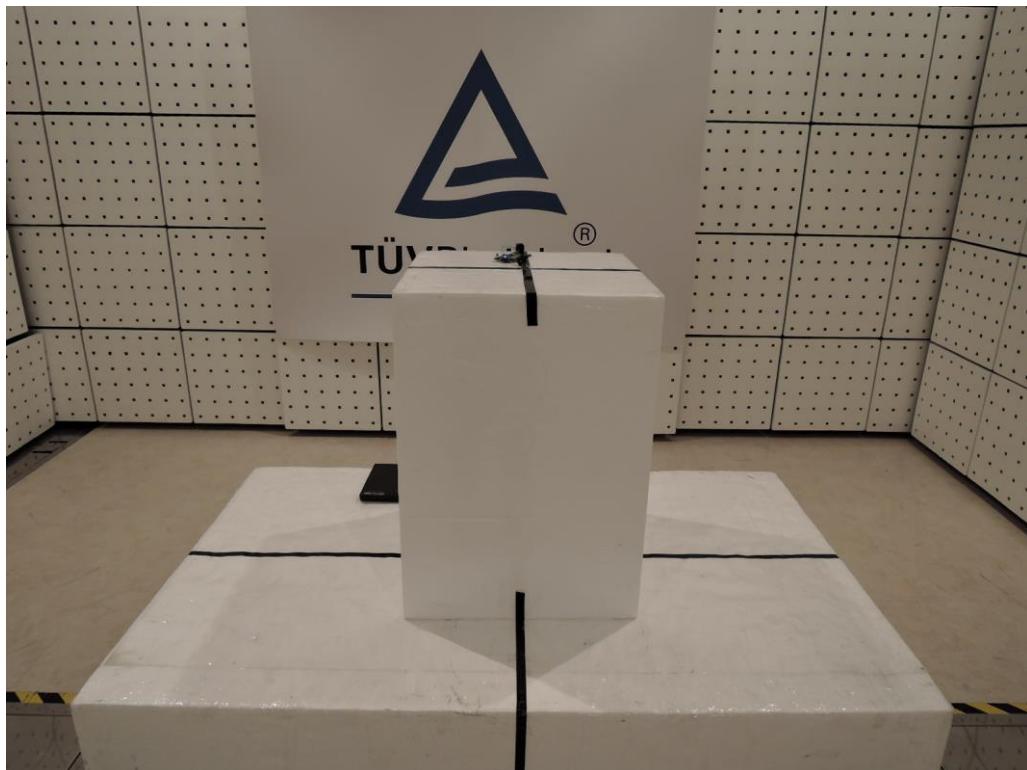
Test standard : EN 62479:2010, A.3.

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

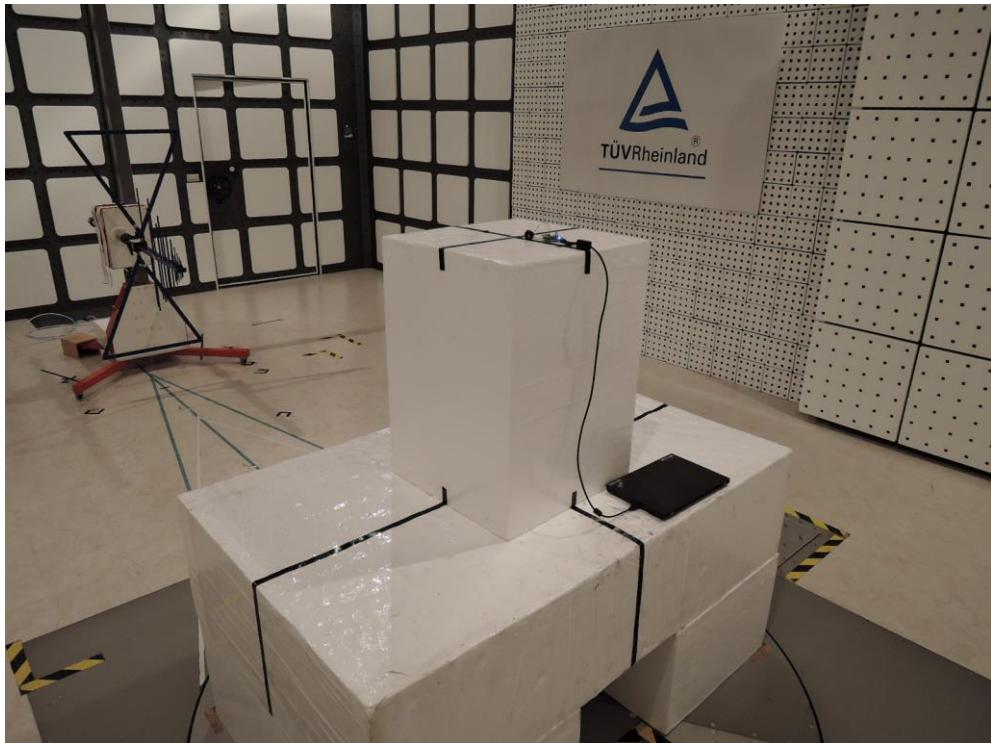
Photograph 1: Set-up for Radiated Emission (front)



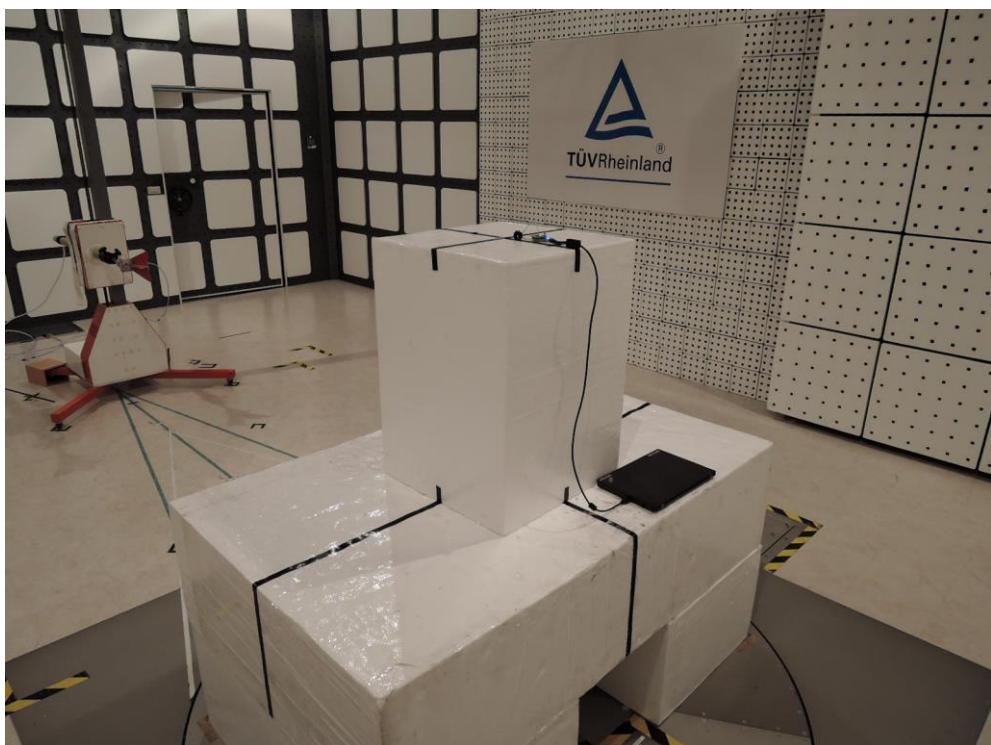
Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 34 von 36
Page 34 of 36

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



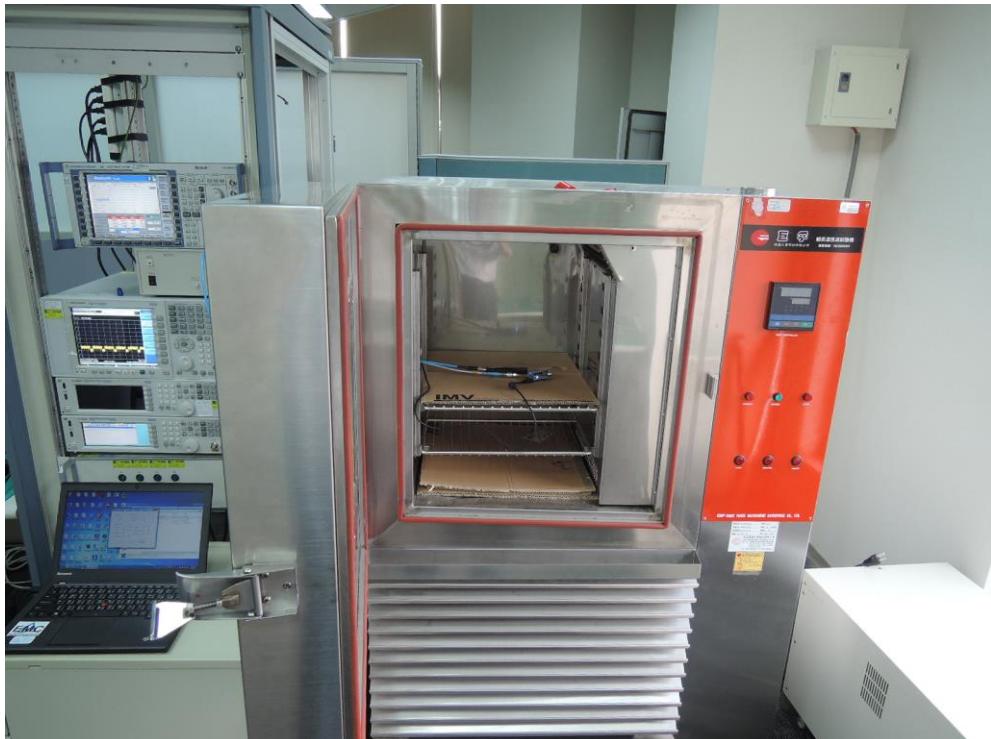
Photograph 3: Set-up for Radiated Emission (Rear View 2)



Prüfbericht - Nr.: CN21GYI4 001
Test Report No.

Seite 35 von 36
Page 35 of 36

Photograph 4: Setup for Radio Frequency Conducted Tests



Prüfbericht - Nr.: CN21GYI4 001
*Test Report No.*Seite 36 von 36
Page 36 of 36

8 List of Tables

Table 1: Applied Standard and Test Levels	6
Table 2: List of Test and Measurement Equipment	8
Table 3: Emission Measurement Uncertainty	9
Table 4: Technical Specification of EUT	10
Table 5: Equivalent Isotropically Radiated Power	14
Table 6: Dwell Time	16
Table 7: Minimum Frequency Occupation	19
Table 8: Hopping Channel Separation.....	22
Table 9: Test result of 99% Bandwidth, GFSK modulation.....	25
Table 10: Test result of 99% Bandwidth, 8DPSK modulation.....	25

9 List of Figures

Figure 1: Accumulated Dwell Time, 2410 MHz.....	16
Figure 2: Accumulated Dwell Time, 2470 MHz.....	17
Figure 3: Dwell Time in four periods, 2410 MHz.....	19
Figure 4: Dwell Time in four periods, 2470 MHz.....	20
Figure 5: Hopping Channel Separation.....	23
Figure 6: 99% Bandwidth Low Channel GFSK.....	26
Figure 7: 99% Bandwidth High Channel GFSK	26
Figure 8: 99% Bandwidth Low Channel 8DPSK.....	27
Figure 9: 99% Bandwidth High Channel 8DPSK	27

10 List of Photographs

Photograph 1: Set-up for Radiated Emission (front).....	33
Photograph 2: Set-up for Radiated Emission (30 MHz-1GHz)	34
Photograph 3: Set-up for Radiated Emission (Rear View 2)	34
Photograph 4: Setup for Radio Frequency Conducted Tests	35

Test Report No.CN21GYI4 001

Appendix D: Radiated Spurious Emission Data

(File: CN21GYI4 001Appendix D)

Contents

Spurious Emissions, Receiving Mode, 1-12.75G.....	2
Spurious Emissions, Receiving Mode, 30M-1G	6
Spurious Emissions, TX Mode, 1-12.75G.....	10
Spurious Emissions, TX Mode, 30M-1G	14

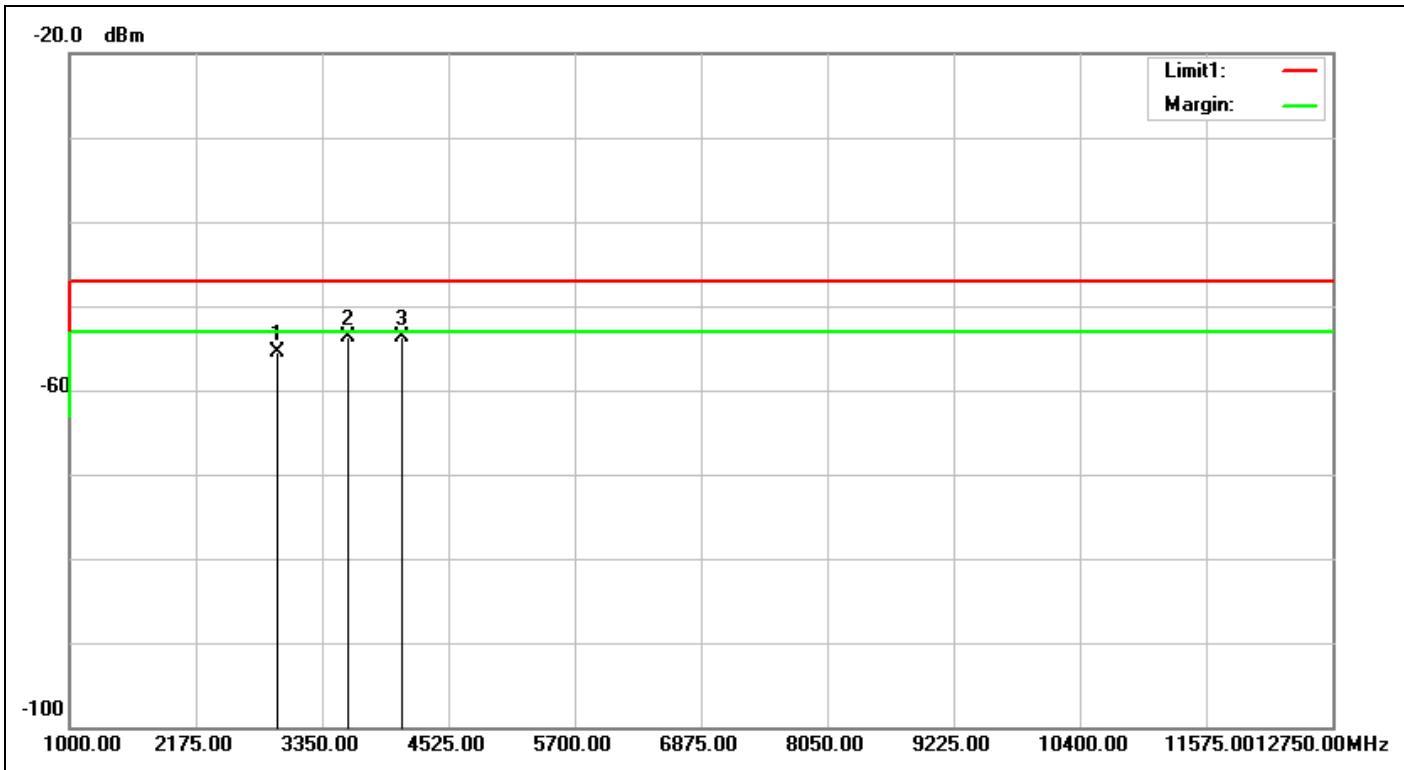
Spurious Emissions, Receiving Mode, 1-12.75G



TUV Taiwan

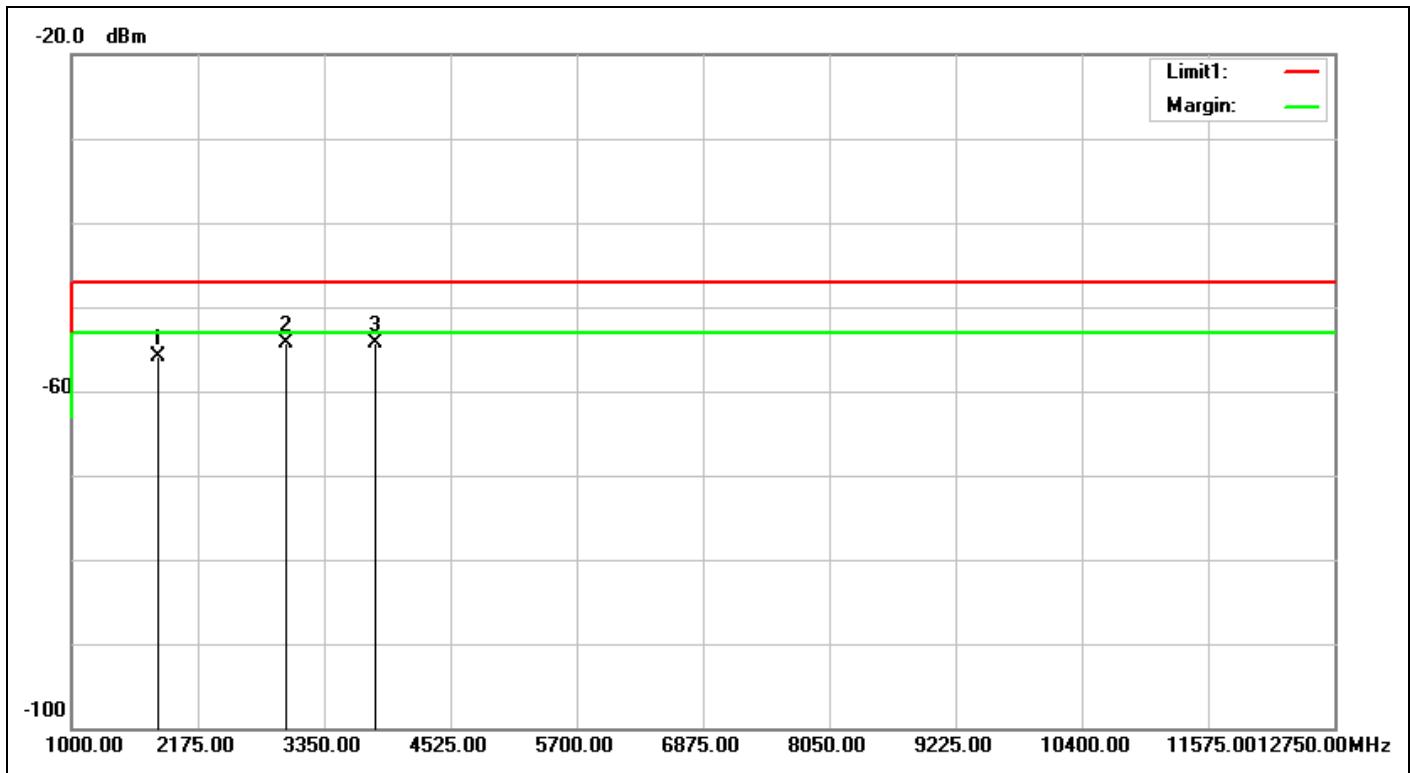
11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105

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



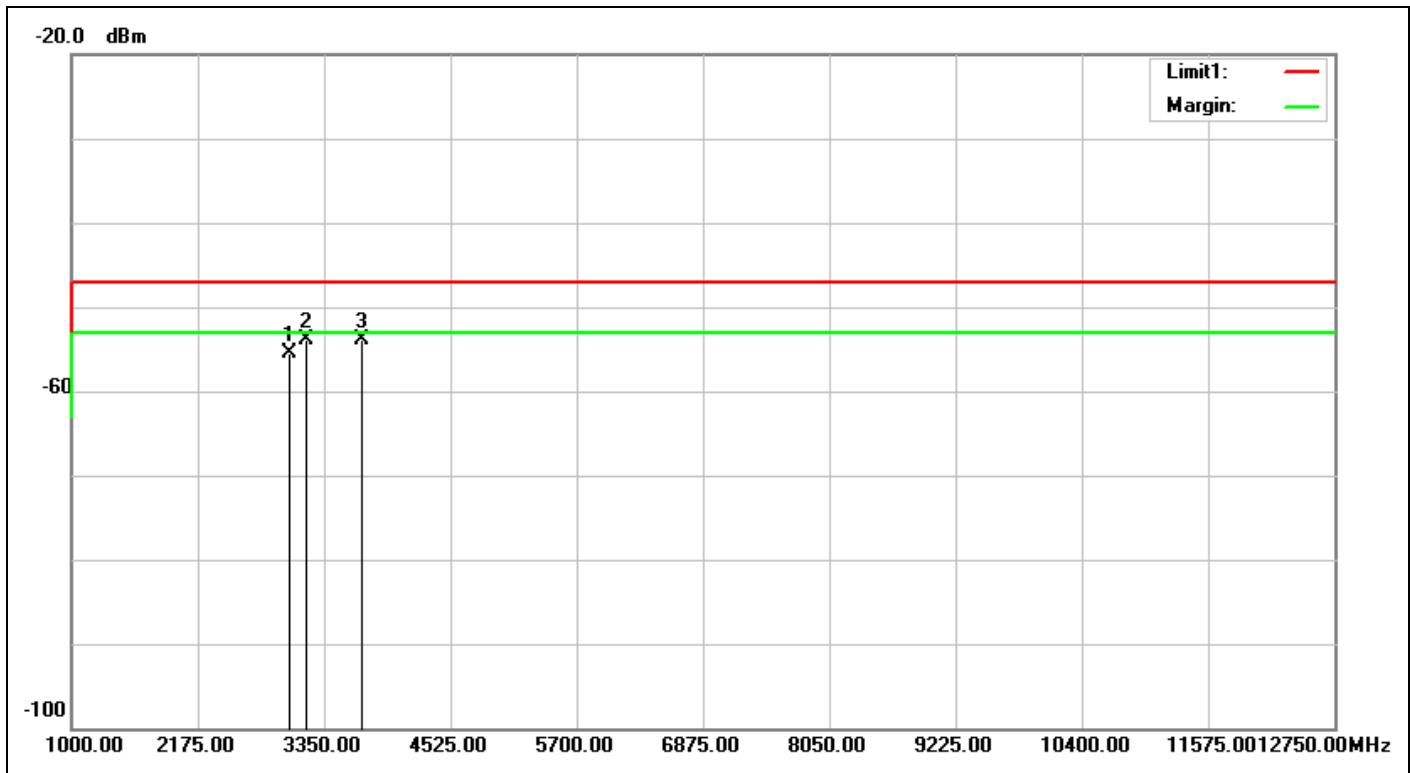
Service No.:	114039665-CE	Test Distance:	1.2m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/4 22:17:41
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George 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	



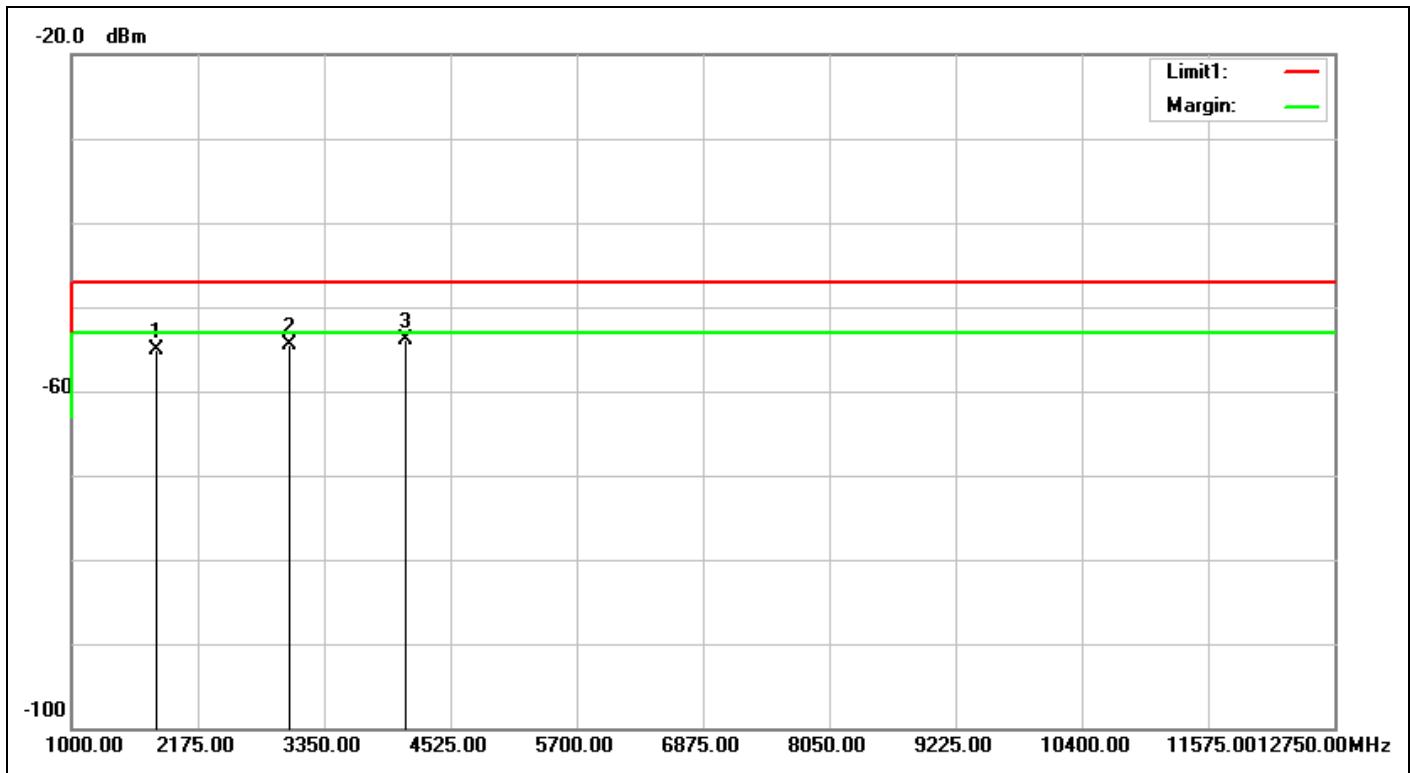
Service No.:	114039665-CE	Test Distance:	1.2m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/4 22:18:43
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George 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 Distance:	1.2m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/4 22:21:11
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-RX		
Remark:			

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	

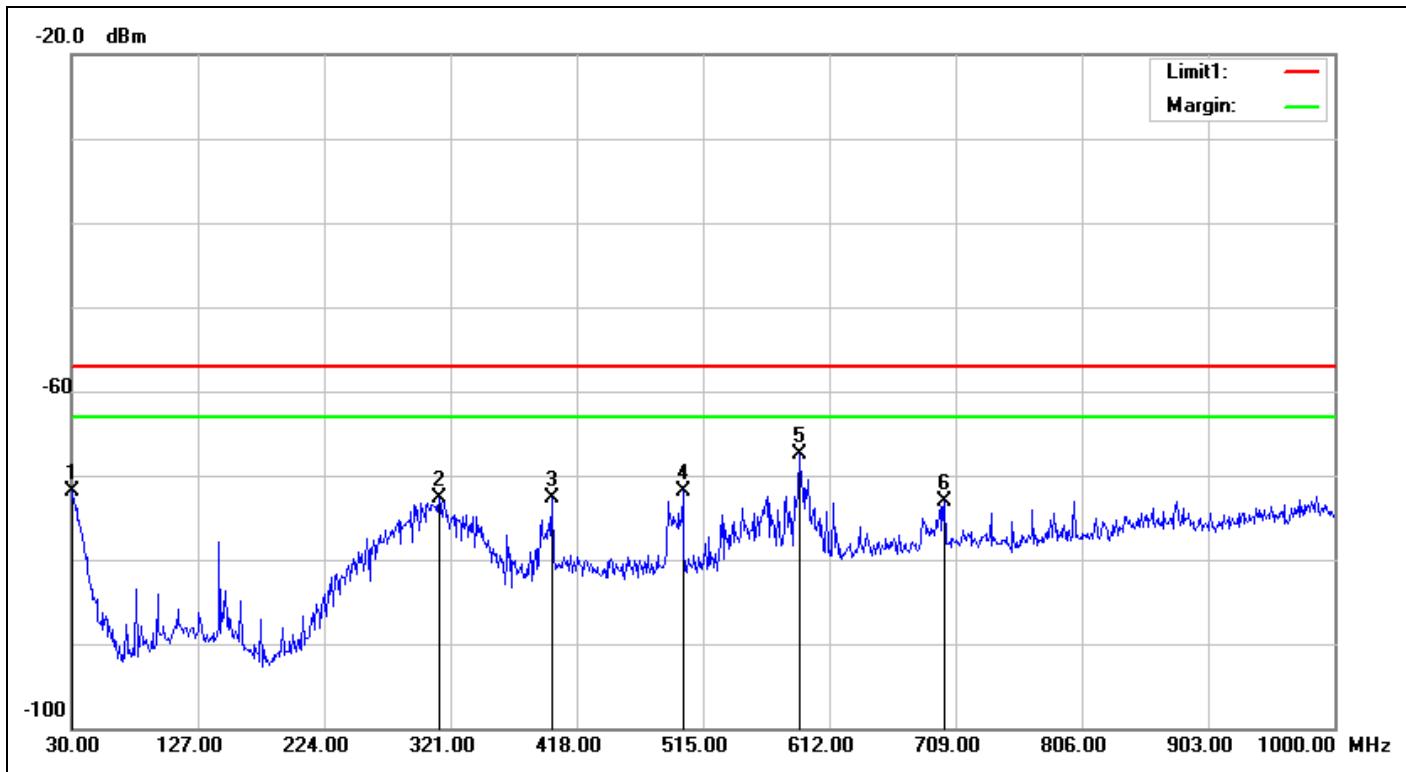
Spurious Emissions, Receiving Mode, 30M-1G



TUV Taiwan

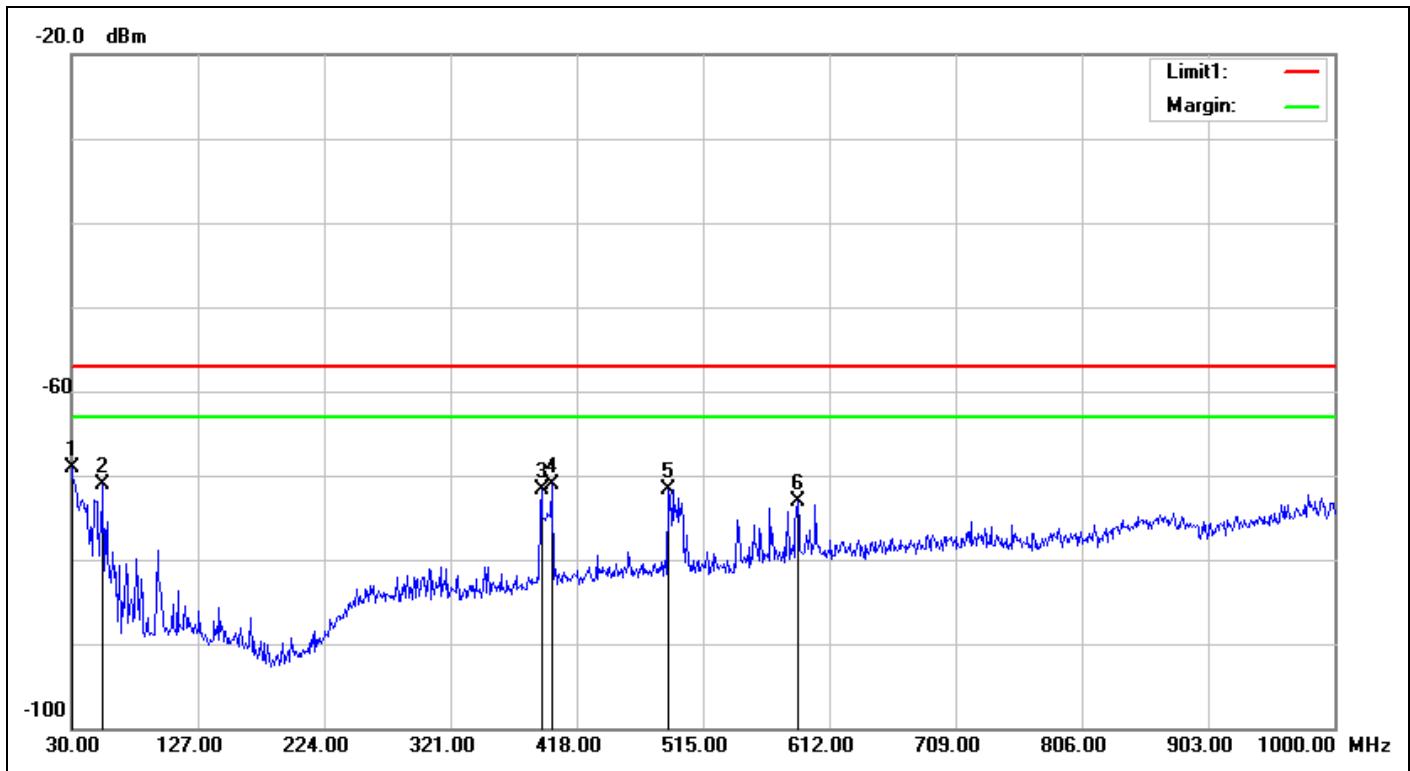
11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105

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



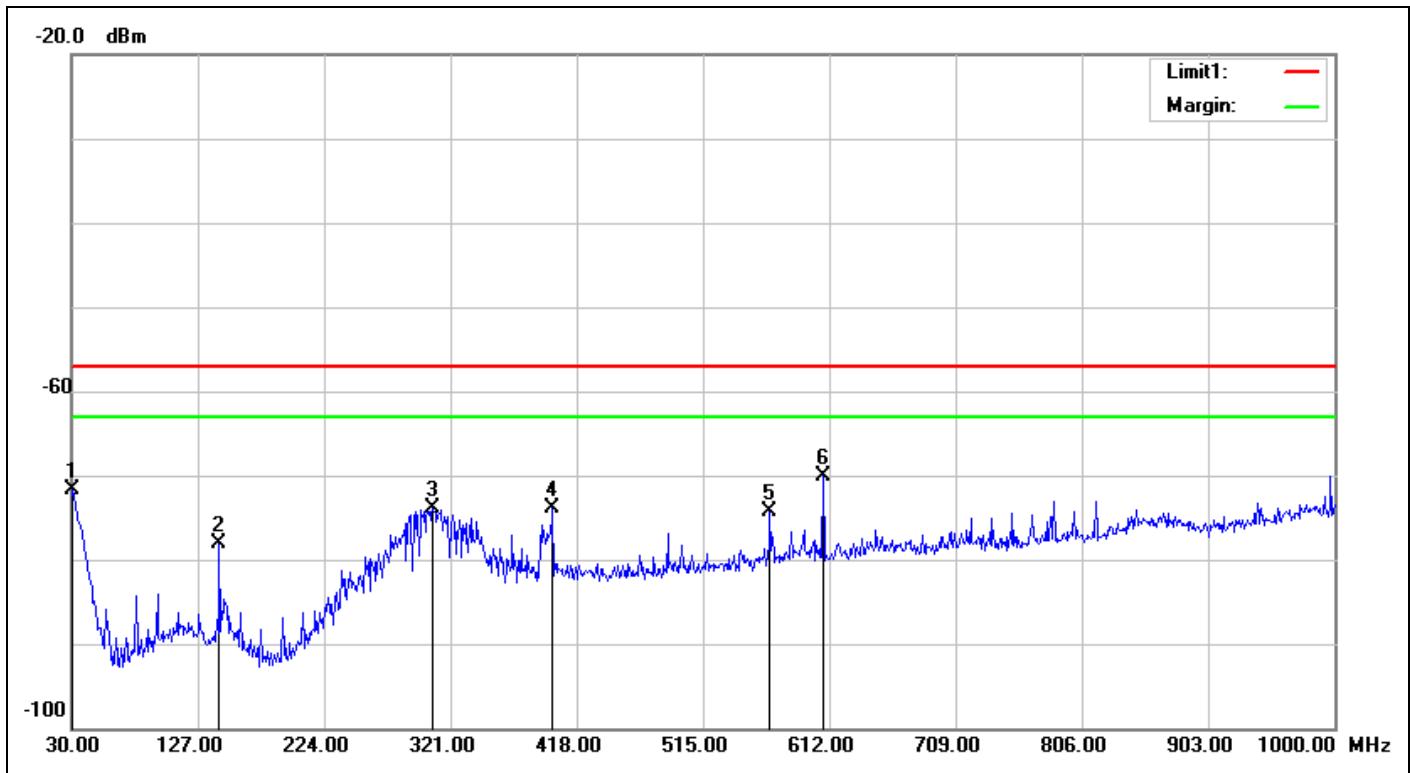
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/5 08:58:00
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George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



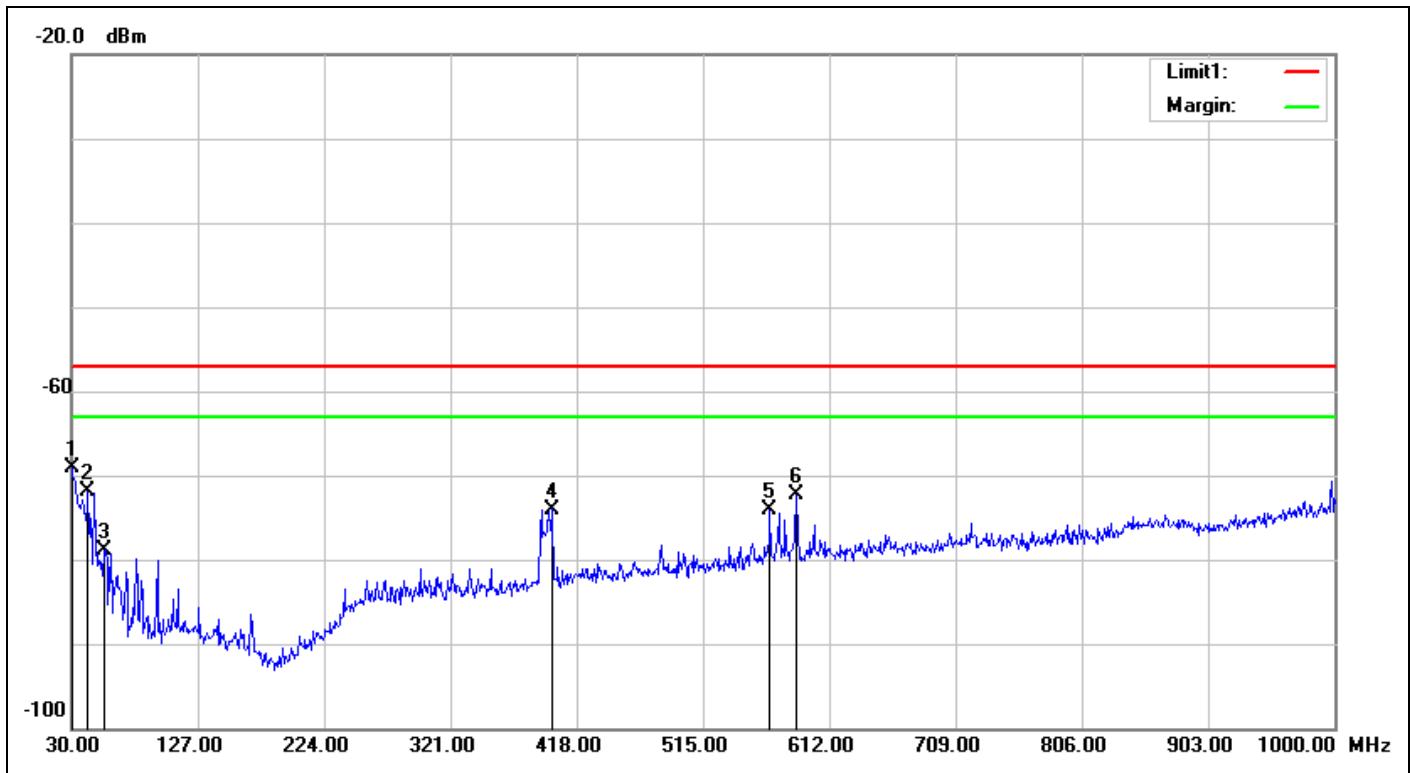
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 08:59:03
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George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



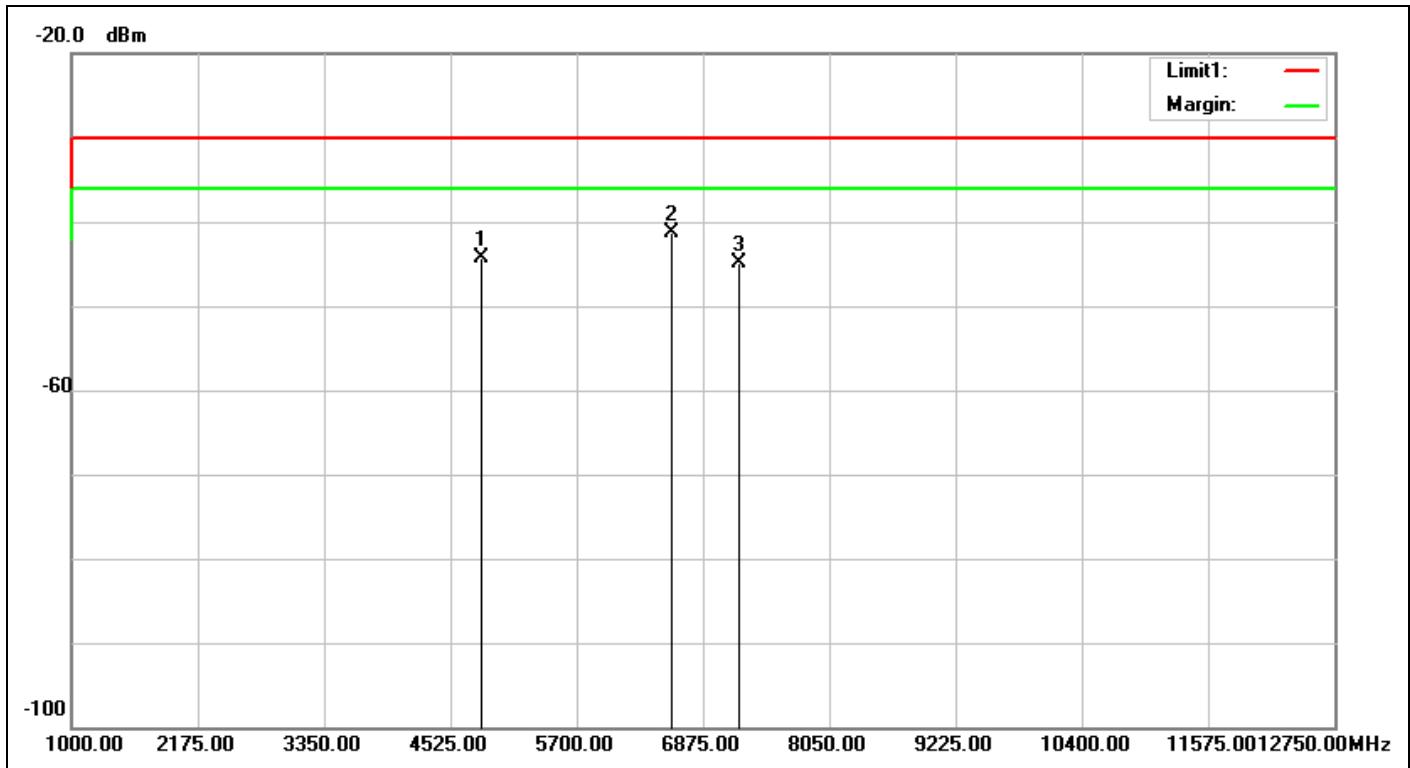
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Rx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 09:01:55
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George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

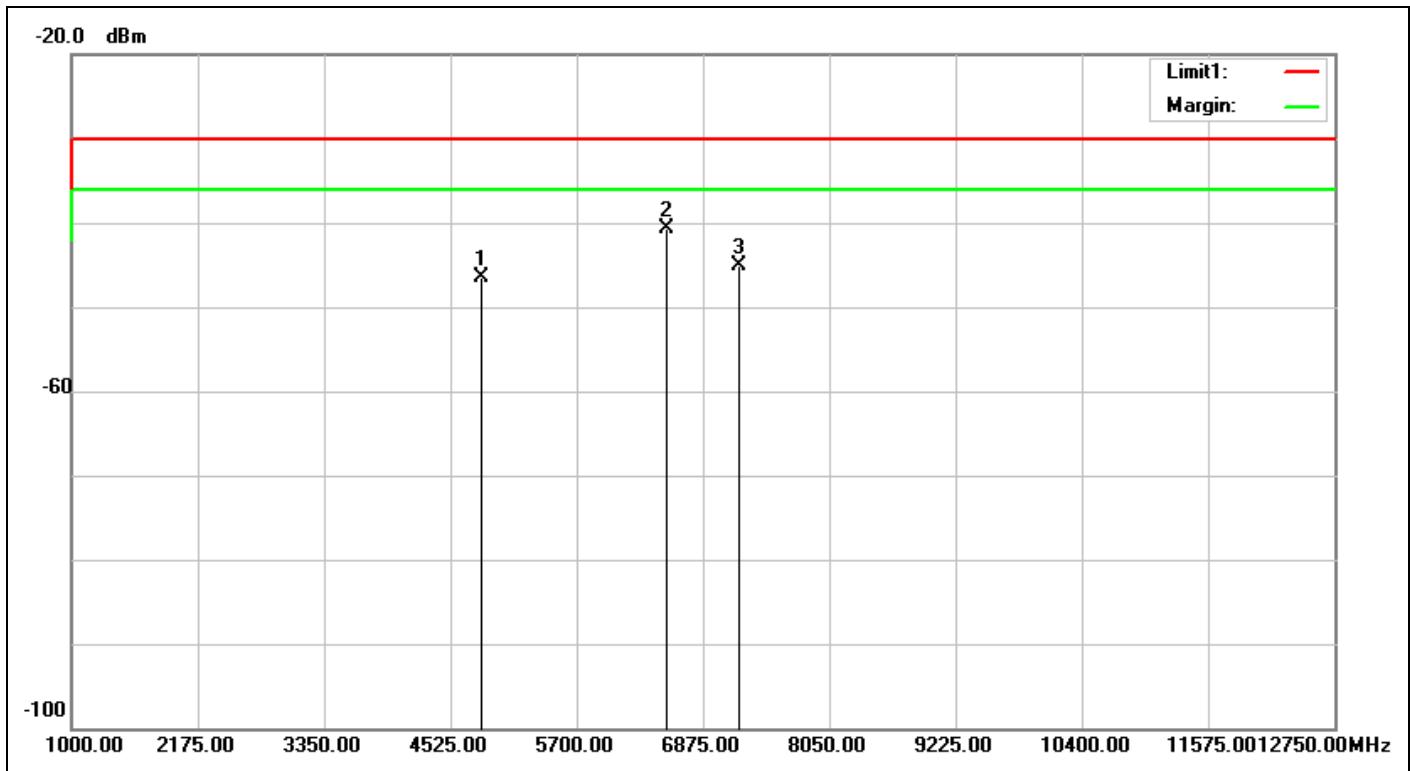


TUV Taiwan
11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105
Tel:+886-2172-7000 fax:+886-2528-0018



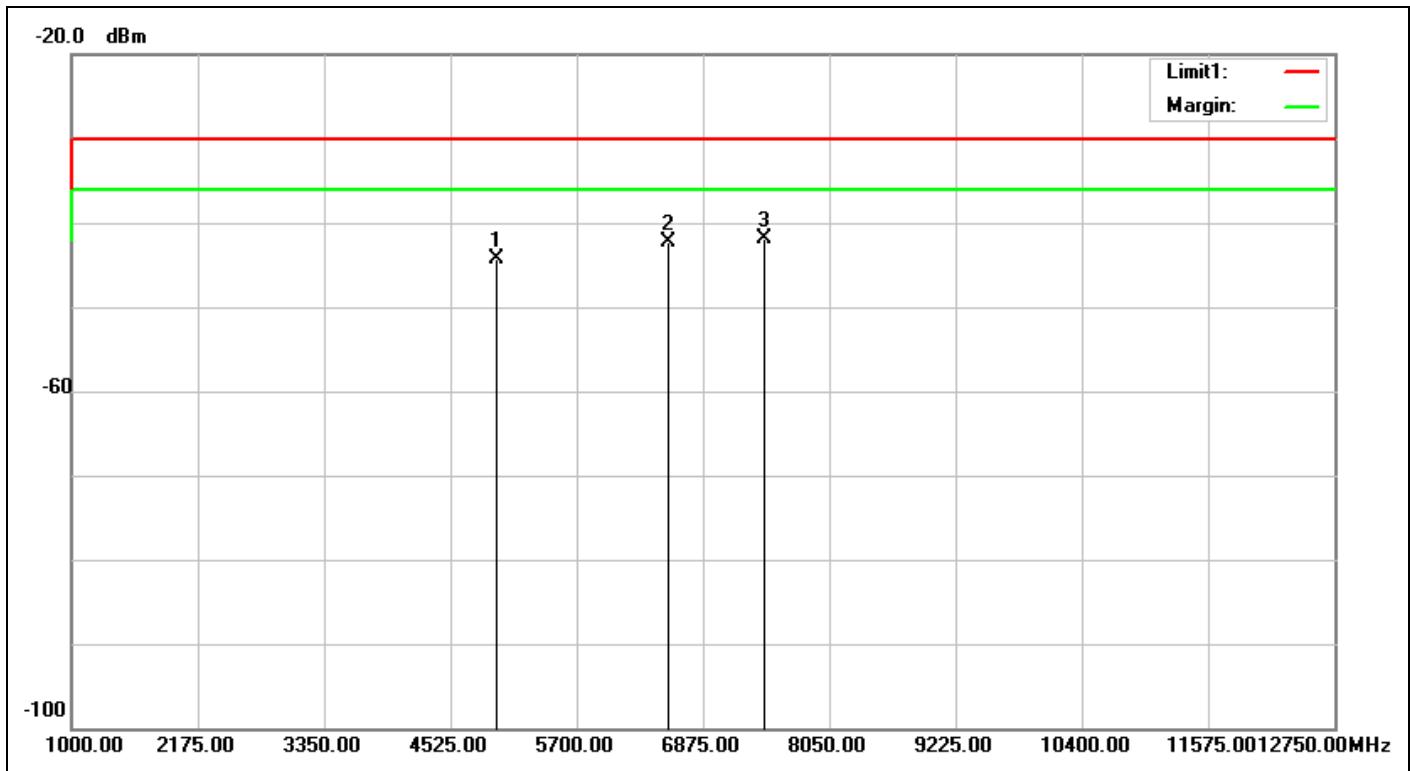
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/4 22:05:12
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George 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	



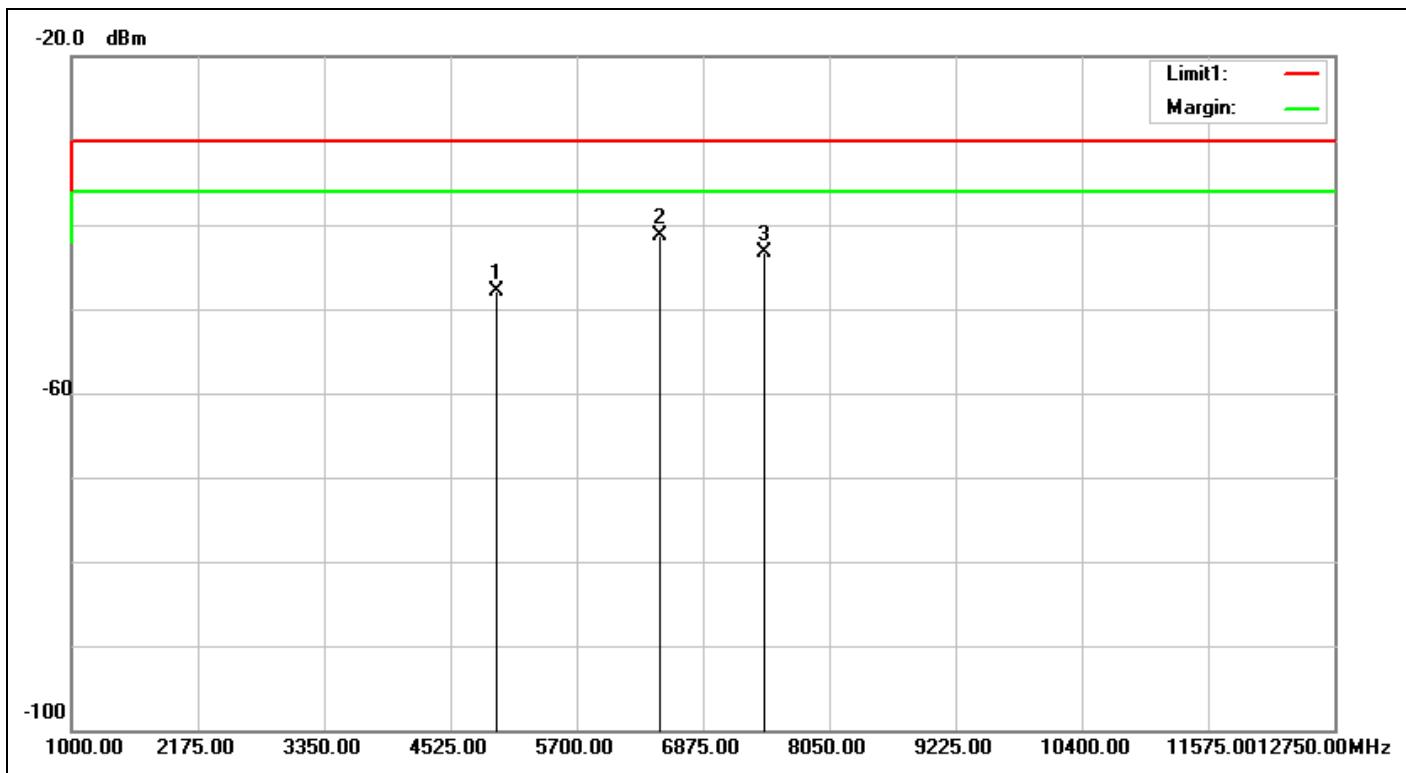
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/4 22:06:14
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George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

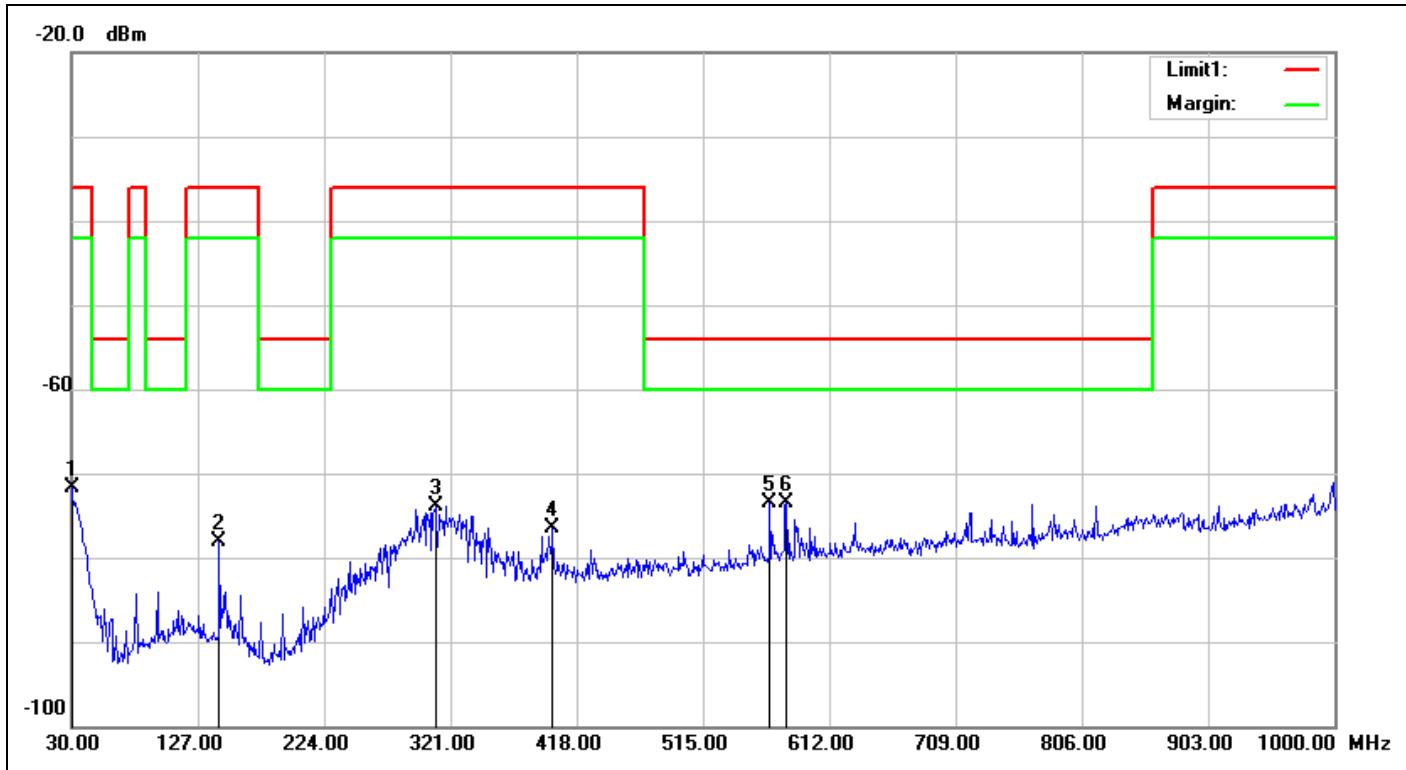
Spurious Emissions, TX Mode, 30M-1G



TUV Taiwan

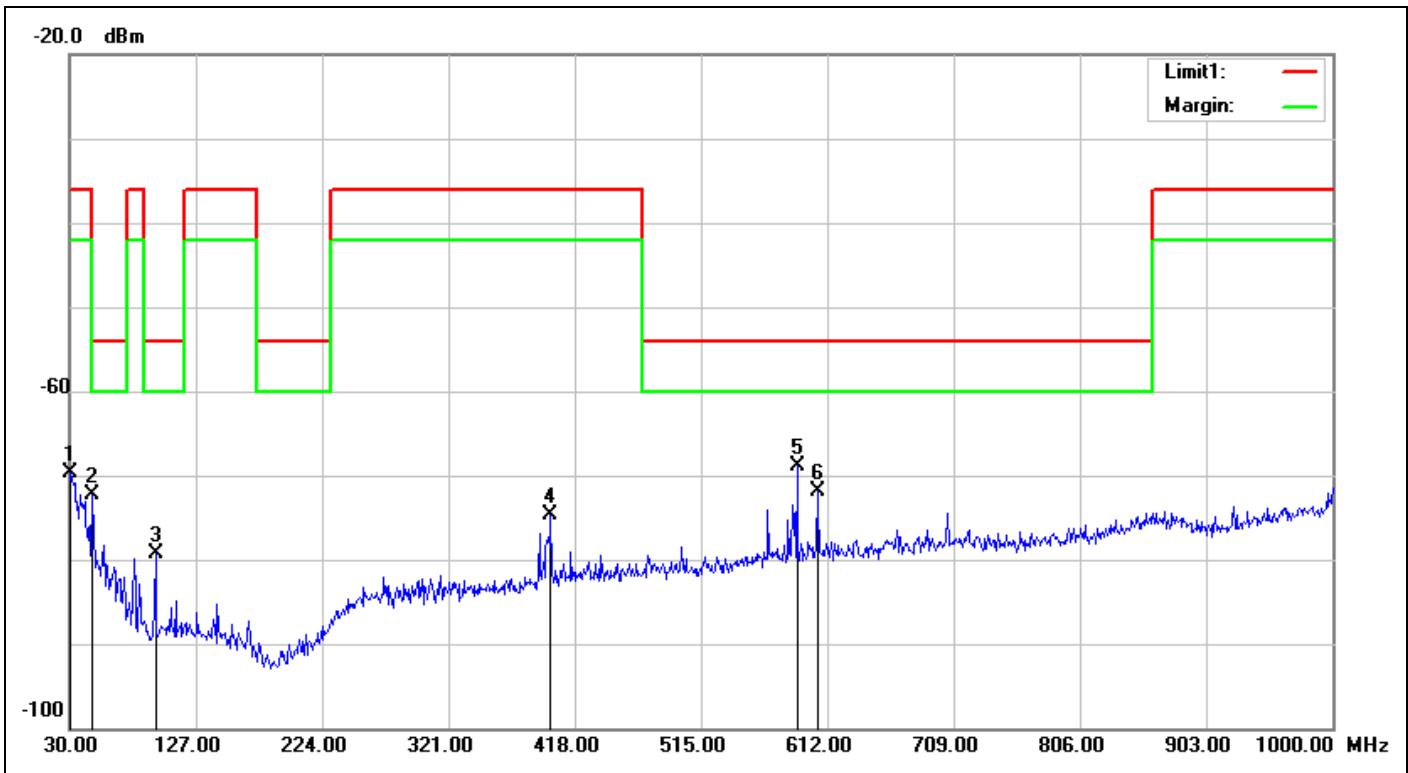
11F., No.758, Sec.4 Bade Road. Songshan Dist, Taipei City 105

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



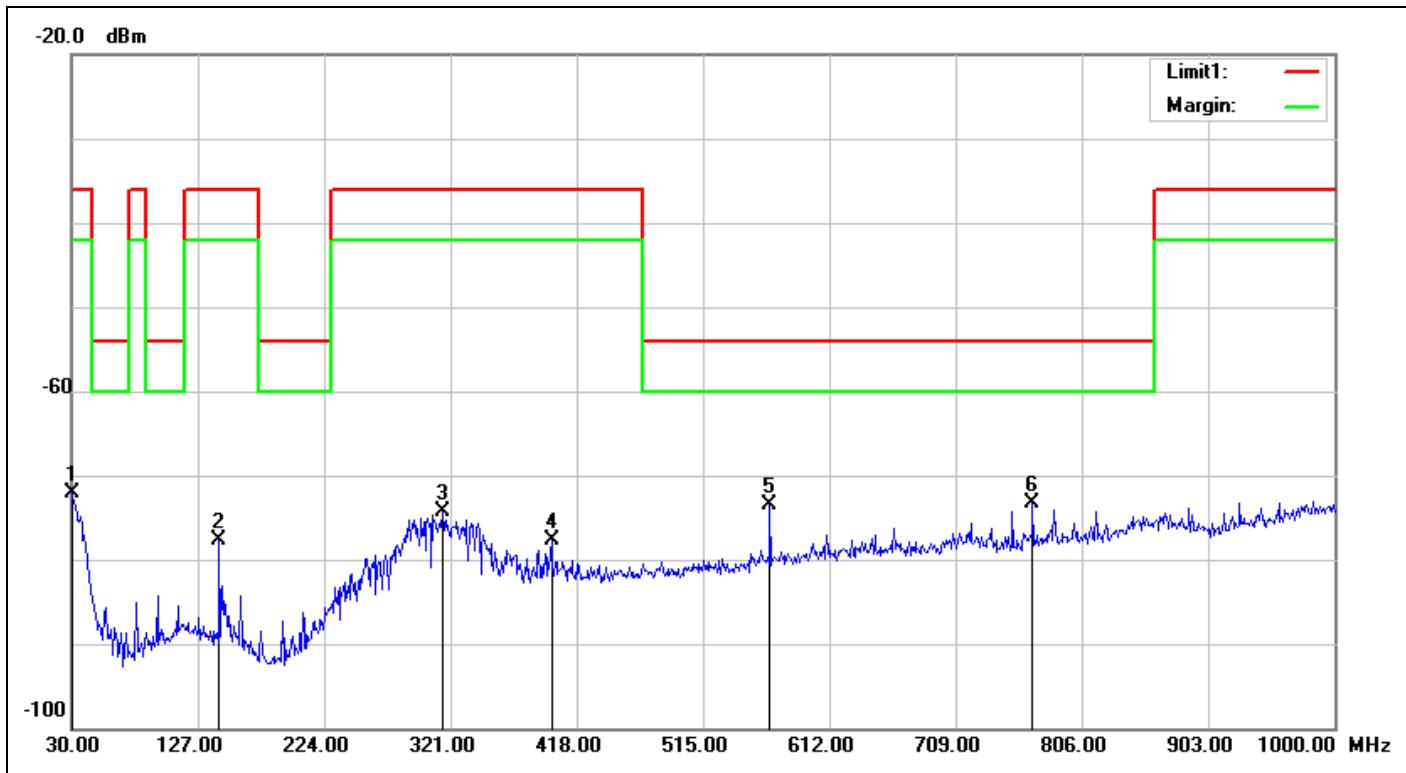
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Horizontal
Test item:	Radiation Emission	Test Time:	2015/9/5 09:43:26
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George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



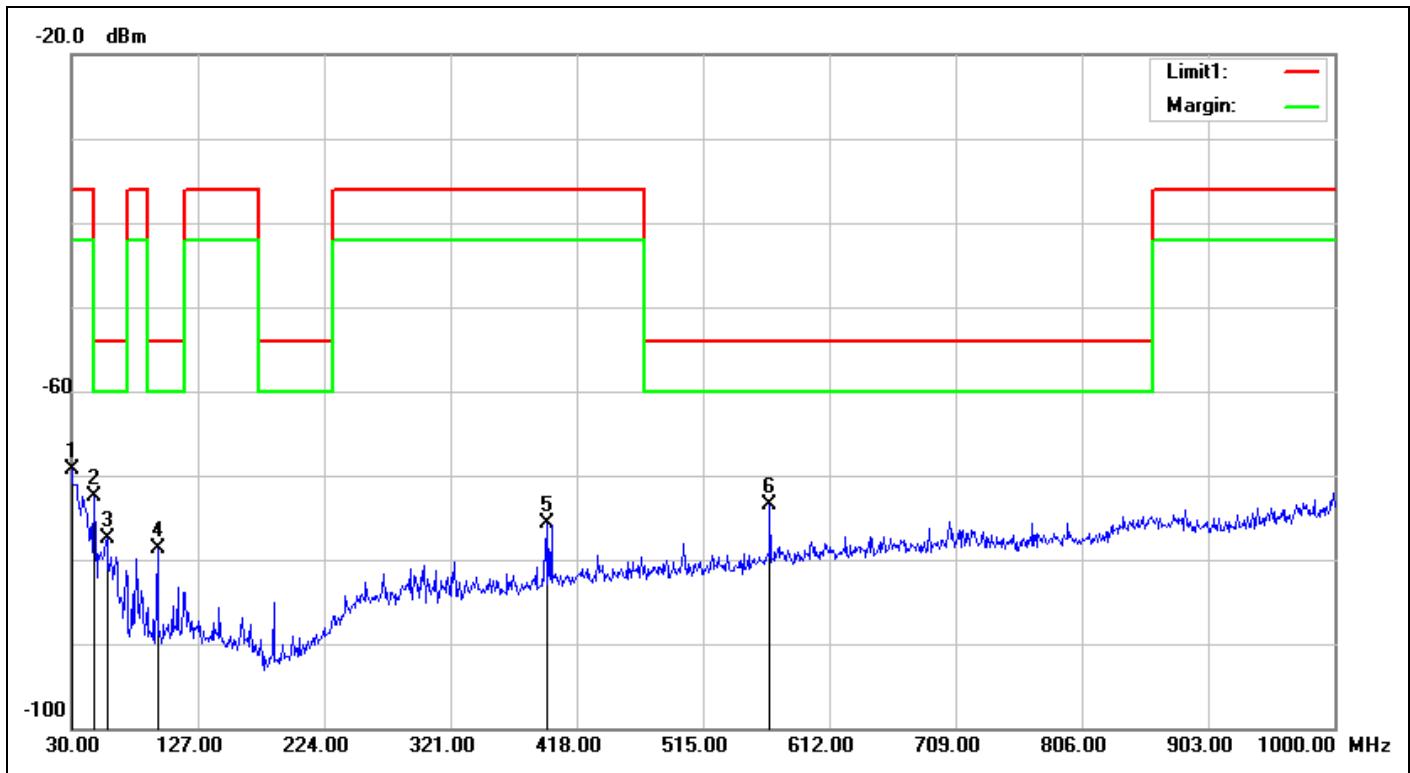
Service No.:	114039665-CE	Test Distance:	3m
Test Standard:	EN 300 328 1.8.1_Tx	Ant. Polarization:	Vertical
Test item:	Radiation Emission	Test Time:	2015/9/5 09:44:28
Applicant:	Microchip	Test Rating:	DC 5V
Product:	Bluetooth Module	Temp.(°C)/Hum.(%):	22.6(°C)/59%
Model No.:	BM78	Test Engineer:	George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