

EMC

TEST REPORT

Report No. : TW14070261
Model No. : BT Dongle
Issued Date : Oct. 09, 2014

Applicant: Strength Master Fitness Tech Co. Ltd
No. 398, Sec. 1, Yaofeng Rd., Puxin Township, Changhua
County, Taiwan

Test Method/ Standard: 47 CFR FCC Part 15.249 & ANSI C63.4 2009

Test By: Intertek Testing Services Taiwan Ltd.
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**FCC Laboratory
Registration Number:**

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Summary of Tests

Test	Reference	Results
Radiated Emission test	15.249(c), 15.209	Pass
Emission on the Band Edge	15.249(d)	Pass
Conducted Emission of AC Power	15.207	Pass
20dB Bandwidth	15.215(c)	Pass



1. General information

1.1 Identification of the EUT

Product: BT Dongle
Model No.: BT Dongle
FCC ID: 2AB9OBTDONGLE
Frequency Range: 2402MHz ~ 2480MHz
Channel Number: 79 Channels
Frequency of Each Channel: 2402MHz+1k, k=1~78
Type of Modulation: GFSK, $\pi/4$ -DQPSK, 8DPSK
Rated Power: DC 3.3V
Power Cord: N/A
Sample Received: Jul. 14, 2014
Test Date(s): Sep. 09, 2014 ~ Sep. 10, 2014

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Note 2: When determining the test conclusion, the Measurement Uncertainty of test has been considered.

1.2 Additional information about the EUT

The EUT was Console for sporting goods, and was defined as fixed installation.

For more detail features, please refer to User's manual.

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0 dBi

Antenna Type : PCB Antenna

Connector Type : Fixed

2. Test specifications

2.1 Test standard

The EUT was performed according to the procedures in FCC Part 15 Subpart C Paragraph 15.249 for non-spread spectrum devices.

The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of this frequency band was all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT was supplied with DC 3.3V.

TX mode was based on "ISRT_V2.1.9.3409" to execute, and selected the different frequency and modulation.

2.3 Test equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2013/12/03	2014/12/02
Spectrum Analyzer	Rohde & Schwarz	FSP30	100137	2014/06/16	2015/06/15
Spectrum Analyzer	Rohde & Schwarz	FSEK30	100186	2014/01/20	2015/01/19
Horn Antenna (1-18G)	Schwarzbeck	BBHA 9120 D	9120D-456	2014/08/29	2017/08/27
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2014/09/16	2017/09/14
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-172	2013/08/08	2015/08/07
Pre-Amplifier	AML	AML0120L3401	0419-114	2014/05/30	2015/05/29
Pre-Amplifier	MITEQ	JS4-26004000--2 7-8A	828825	2014/09/15	2015/09/14
Power Meter	Anritsu	ML2495A	0844001	2013/10/10	2014/10/09
Power Sensor	Anritsu	MA2411B	0738452	2013/10/10	2014/10/09
Temperature & Humidity Test Chamber	TERCHY	MHU-225LRU (SA)	950838	2014/06/12	2015/06/11
Two-Line V-Network	Rohde & Schwarz	ESH3-Z5	838979/014	2013/10/12	2014/10/11
Singal Analyzer	Agilent	N9030A	MY51380492	2014/09/19	2015/09/18
Loop Antenna	RolfHeine	LA-285	02/10033	2014/03/18	2016/03/16
966-2(A) Cable	SUHNER	SMA / EX 100	N/A	2014/05/06	2015/05/05
966-2(B) Cable	JUNFLON	SMA / J12J100880-00	AUG-26-08-00 2	2014/05/06	2015/05/05
RF Cable	SUHNER	SUCOFLEX 102	CB0006	2014/05/06	2015/05/05
Bore Sight Antenna mast	Max-Full Antenna Corp.	MFA-520BS	N/A	N/A	N/A

Note: The above equipments are within the valid calibration period.

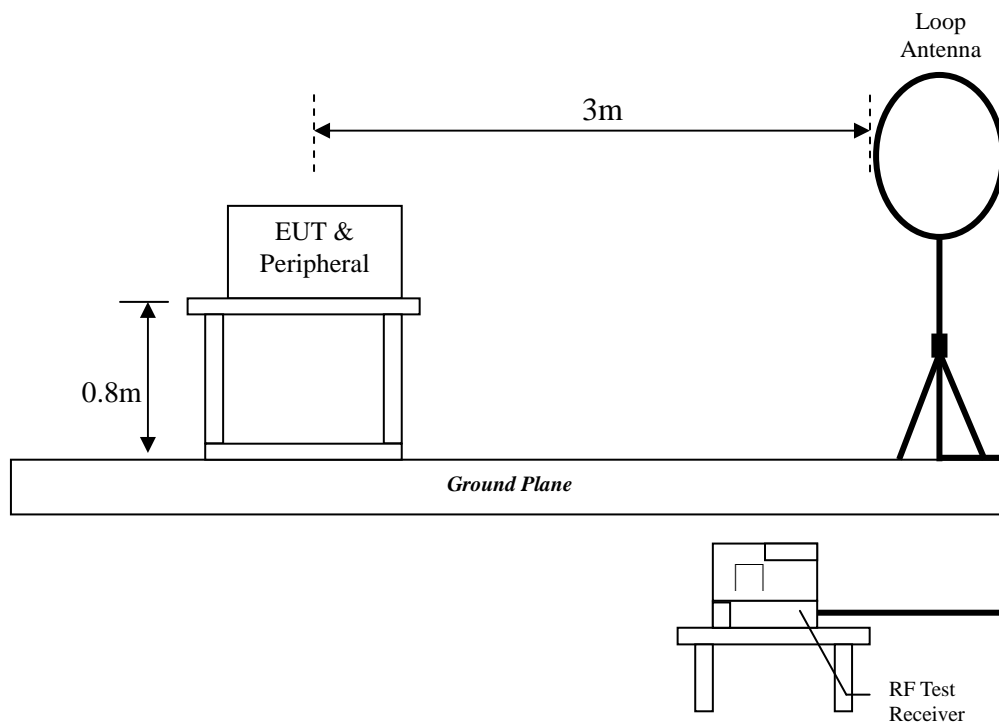
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

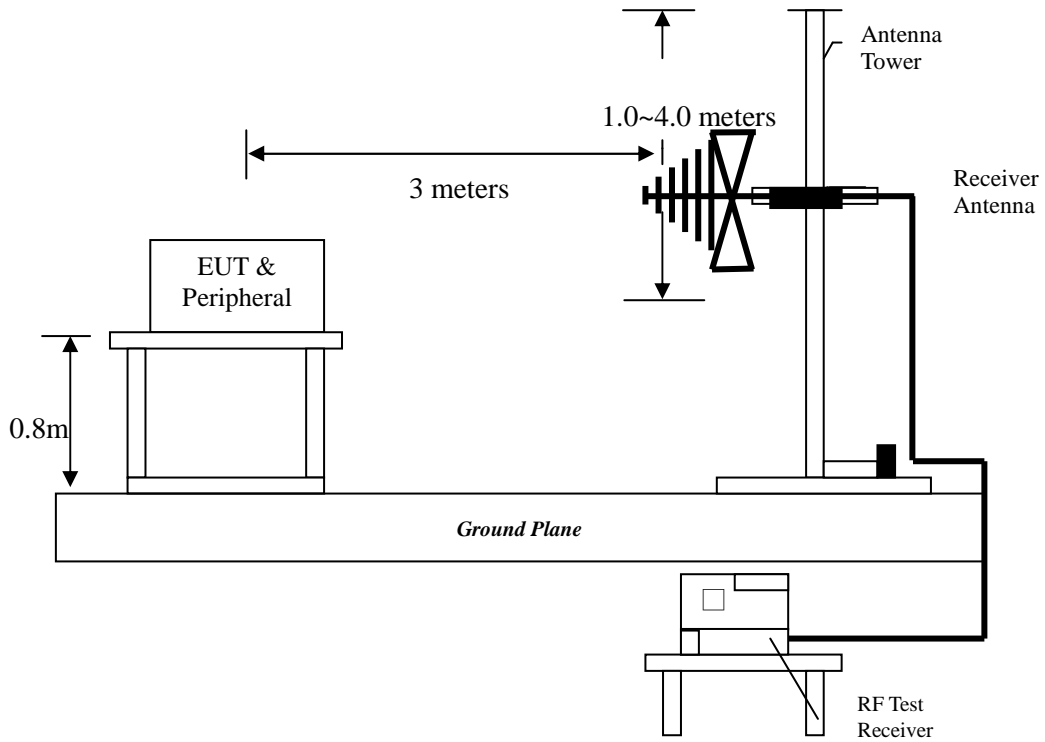
Temperature: 25 °C
Relative Humidity: 55 %
Atmospheric Pressure 1008 hPa

3.2 Test setup & procedure

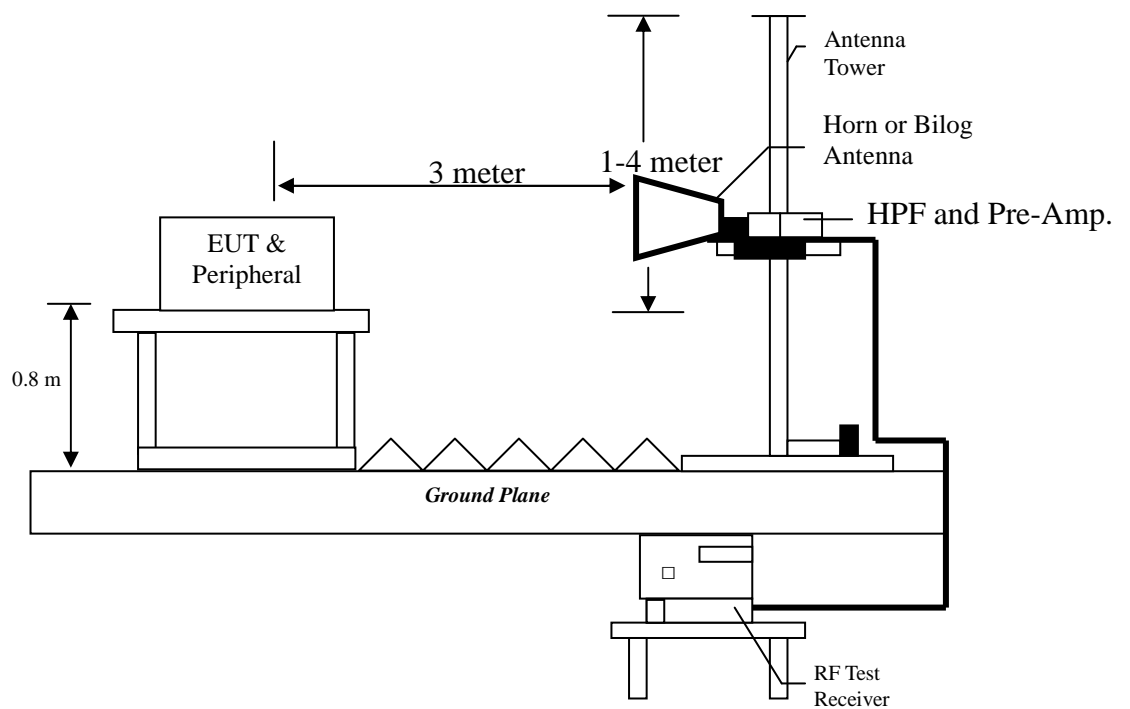
Radiated emission from 9 kHz to 30 MHz uses Loop Antenna:



Radiated emission from 30 MHz to 1 GHz uses Bilog Antenna:



Radiated emission above 1 GHz uses Horn Antenna:



Radiated emissions were investigated cover the frequency range from 30MHz to 1000MHz using a receiver RBW of 120kHz record QP reading, and the frequency over 1GHz using a spectrum analyzer RBW of 1MHz and 10Hz VBW record Average reading. (15.209 paragraph), the Peak reading (1 MHz RBW/ 3 MHz VBW) recorded also on the report. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and the whole system. During the test, all cables were arranged to produce worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meters and down to 1 meter.

The measurement for radiated emission will be done at the distance of three meters unless the signal level is too low to measure at that distance. In the case of the reading under noise floor, a pre-amplifier is used and/or the test is conducted at a closer distance. And then all readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance.

The EUT configurations please refer to the “Spurious set-up photo.pdf”.

3.3 Emission limit

3.3.1 Fundamental and harmonics emission limits

Frequency (MHz)	Field Strength of Fundamental		Field Strength of Harmonics	
	(mV/m@3m)	(dBuV/m@3m)	(uV/m@3m)	(dBuV/m@3m)
2400-2483.5	50	94	500	54

3.3.2 General radiated emission limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

Frequency MHz	15.209 Limits (dB μ V/m@3m)
30-88	40
88-216	43.5
216-960	46
Above 960	54

Remark:

1. In the above table, the tighter limit applies at the band edges.
2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system

Measurement uncertainty was calculated in accordance with TR 100 028-1.

Parameter	Uncertainty
Radiated Emission	Vertical: 4.13 dB Horizontal:3.85 dB
Conducted Emission	2.08 dB.

This uncertainty represents an expanded uncertainty expressed at approximately the 95 % confidence level using a coverage factor of k=2.

3.4 Radiated spurious emission test data

3.4.1 Measurement results: frequencies equal to or less than 1 GHz

The test was performed on EUT under GFSK & 8-DPSK continuously transmitting mode. Channel 0, 39, 78 were verified. The worst case occurred at GFSK TX Channel 39

EUT : BT Dongle

Test Condition : Tx at 8-DPSK Channel 39

Antenna Polariz. (V/H)	Freq. (MHz)	Receiver Detector	Corr. Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
Vertical	33.02	QP	15.77	20.13	35.90	40.00	-4.10
Vertical	36.00	QP	15.90	23.00	37.80	40.00	-2.20
Vertical	48.00	QP	17.00	23.00	38.50	40.00	-1.50
Vertical	59.10	QP	16.28	23.00	38.10	40.00	-1.90
Vertical	95.96	QP	11.05	23.00	34.97	43.50	-8.53
Vertical	214.30	QP	14.64	23.00	37.14	43.50	-6.36
Vertical	322.94	QP	18.02	23.00	37.80	46.00	-8.20
Vertical	383.08	QP	19.51	23.00	39.03	46.00	-6.97
Horizontal	95.99	QP	14.33	23.00	41.30	43.50	-2.20
Horizontal	119.24	QP	14.74	23.00	40.01	43.50	-3.49
Horizontal	175.50	QP	15.73	23.00	38.61	43.50	-4.89
Horizontal	191.96	QP	16.01	23.00	43.00	43.50	-0.50
Horizontal	324.88	QP	18.35	23.00	38.15	46.00	-7.85
Horizontal	383.08	QP	19.37	21.00	43.03	46.00	-2.97

Remark:

1. Corr. Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Corr. Factor

3.4.2 Measurement results: frequency above 1GHz

EUT : BT Dongle

Test Condition : Tx at GFSK channel 0

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
4804	PK	V	40.13	-0.10	52.07	51.97	74.00	-22.03
4804	PK	H	40.13	-0.10	48.56	48.46	74.00	-25.54

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at GFSK channel 39

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
4882	PK	V	39.99	0.16	58.26	58.42	74.00	-15.58
4882	AV	V	39.99	0.16	37.77	37.93	54.00	-16.07
4882	PK	H	39.99	0.16	51.41	51.57	74.00	-22.43

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at GFSK channel 78

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
4960	PK	V	39.84	0.41	49.03	49.44	74.00	-24.56
4960	PK	H	39.84	0.41	46.53	46.94	74.00	-27.06

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at $\pi/4$ -DQPSK channel 0

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
4804	PK	V	40.13	-0.10	57.00	56.90	74.00	-17.10
4804	AV	V	40.13	-0.10	37.76	37.66	54.00	-16.34
4804	PK	H	40.13	-0.10	46.26	46.16	74.00	-27.84

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle
 Test Condition : Tx at $\pi/4$ -DQPSK channel 39

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
4882	PK	V	39.99	0.16	50.02	50.18	74.00	-23.82
4882	PK	H	39.99	0.16	47.13	47.29	74.00	-26.71

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle
 Test Condition : Tx at $\pi/4$ -DQPSK channel 78

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
4960	PK	V	39.84	0.41	47.95	48.36	74.00	-25.64
4960	PK	H	39.84	0.41	47.66	48.07	74.00	-25.93

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle
 Test Condition : Tx at 8-DPSK channel 0

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
4804	PK	V	40.13	-0.10	57.05	56.95	74.00	-17.05
4804	AV	V	40.13	-0.10	37.66	37.56	54.00	-16.44
4804	PK	H	40.13	-0.10	45.48	45.38	74.00	-28.62

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle
 Test Condition : Tx at 8-DPSK channel 39

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)
4882	PK	V	39.99	0.16	48.05	48.21	74.00	-25.79
4882	PK	H	39.99	0.16	50.07	50.23	74.00	-23.77

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at 8-DPSK channel 78

Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dB μ V)	Corrected Reading (dB μ V/m)	Limit @ 3 m (dB μ V/m)	Margin (dB)
4960	PK	V	39.84	0.41	47.80	48.21	74.00	-25.79
4960	PK	H	39.84	0.41	47.17	47.58	74.00	-26.42

Remark:

1. Correction Factor = Antenna Factor + Cable Loss + Power Amplifier
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

3.4.4 Measurement results: Fundamental and harmonics emission

EUT : BT Dongle

Test Condition : Tx at GFSK Channel 0

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402	PK	V	33.91	59.35	93.26	114.00	-20.74
2402	AV	V	33.91	27.65	61.56	94.00	-32.44
2402	PK	H	33.91	58.69	92.60	114.00	-21.40
2402	AV	H	33.91	27.45	61.36	94.00	-32.64

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at GFSK Channel 39

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2441	PK	V	34.10	60.24	94.34	114.00	-19.66
2441	AV	V	34.10	27.83	61.93	94.00	-32.07
2441	PK	H	34.10	60.41	94.51	114.00	-19.49
2441	AV	H	34.10	27.97	62.07	94.00	-31.93

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle
 Test Condition : Tx at GFSK Channel 78

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2480	PK	V	34.28	59.91	94.19	114.00	-19.81
2480	AV	V	34.28	27.72	62.00	94.00	-32.00
2480	PK	H	34.28	59.69	93.97	114.00	-20.03
2480	AV	H	34.28	27.75	62.03	94.00	-31.97

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle
 Test Condition : Tx at $\pi/4$ -DQPSK Channel 0

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402	PK	V	33.91	58.13	92.04	114.00	-21.96
2402	AV	V	33.91	26.80	60.71	94.00	-33.29
2402	PK	H	33.91	58.35	92.26	114.00	-21.74
2402	AV	H	33.91	26.94	60.85	94.00	-33.15

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at $\pi/4$ -DQPSK Channel 39

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2441	PK	V	34.10	59.33	93.43	114.00	-20.57
2441	AV	V	34.10	27.36	61.46	94.00	-32.54
2441	PK	H	34.10	58.48	92.58	114.00	-21.42
2441	AV	H	34.10	27.05	61.15	94.00	-32.85

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at $\pi/4$ -DQPSK Channel 78

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2480	PK	V	34.28	59.19	93.47	114.00	-20.53
2480	AV	V	34.28	27.16	61.44	94.00	-32.56
2480	PK	H	34.28	57.89	92.17	114.00	-21.83
2480	AV	H	34.28	26.73	61.01	94.00	-32.99

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at 8-DPSK Channel 0

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2402	PK	V	33.91	57.96	91.87	114.00	-22.13
2402	AV	V	33.91	26.89	60.80	94.00	-33.20
2402	PK	H	33.91	57.91	91.82	114.00	-22.18
2402	AV	H	33.91	26.90	60.81	94.00	-33.19

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at 8-DPSK Channel 39

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2441	PK	V	34.10	57.91	92.01	114.00	-21.99
2441	AV	V	34.10	26.63	60.73	94.00	-33.27
2441	PK	H	34.10	58.54	92.64	114.00	-21.36
2441	AV	H	34.10	27.11	61.21	94.00	-32.79

Remark:

1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

EUT : BT Dongle

Test Condition : Tx at 8-DPSK Channel 78

Frequency (MHz)	Spectrum Analyzer Detector	Antenna Polariz. (H/V)	Correction Factor (dB/m)	Reading (dBuV)	Corrected Level (dBuV/m)	Limit @ 3 m (dBuV/m)	Margin (dB)
2480	PK	V	34.28	58.99	93.27	114.00	-20.73
2480	AV	V	34.28	27.33	61.61	94.00	-32.39
2480	PK	H	34.28	57.71	91.99	114.00	-22.01
2480	AV	H	34.28	26.69	60.97	94.00	-33.03

Remark:

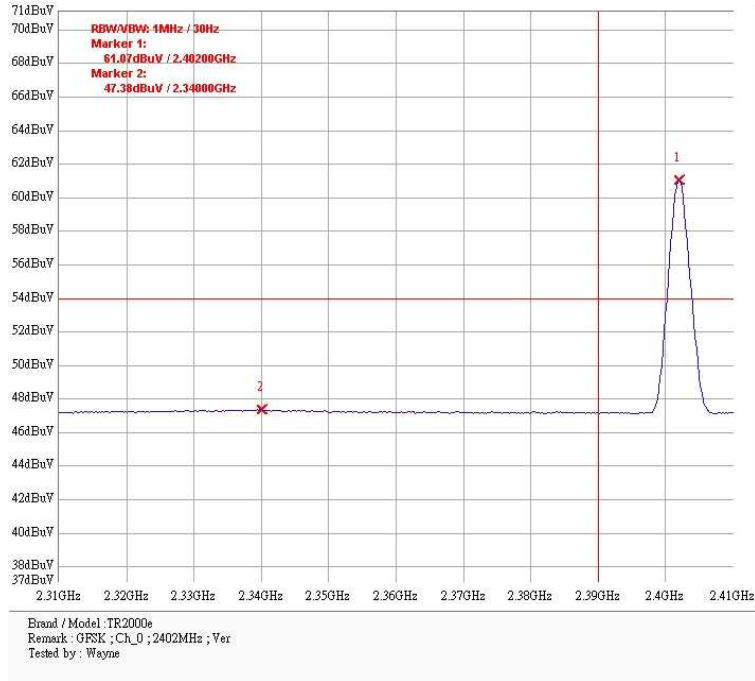
1. Correction Factor = Antenna Factor + Cable Loss
2. Corrected Level = Reading + Correction Factor
3. The frequency measured ranges from 1 GHz to 25 GHz. The data value listed above which is higher than the system noise floor.

4. Radiated emission on the band edge FCC 15.249(d)

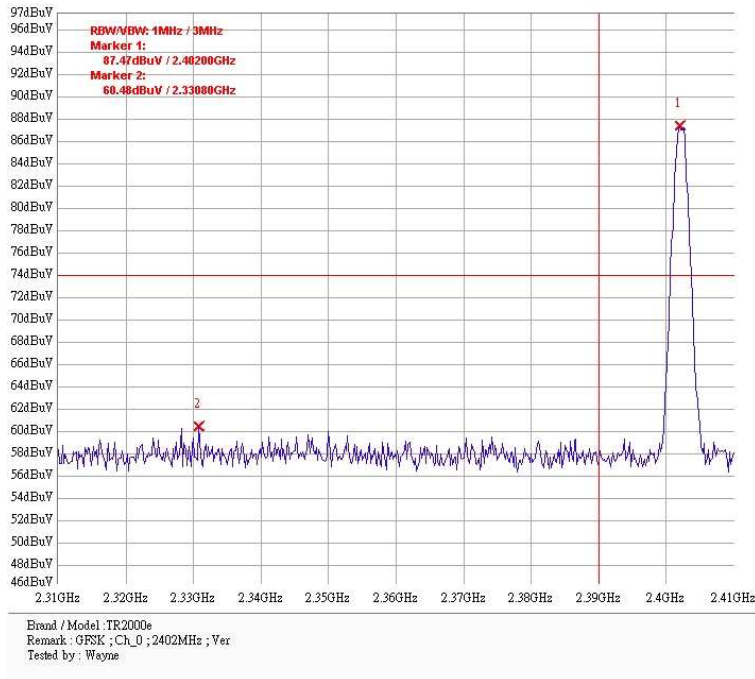
Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental (2402~2480MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

Mode	Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Correction Factor (dB/m)	Reading (dBμV)	Corrected Reading (dBμV/m)	Limit @ 3 m (dBμV/m)	Margin (dB)	Restricted band (MHz)
GFSK	2330.80	PK	H	32.30	28.18	60.48	74	-13.52	2310~2390
	2340.00	AV	H	32.33	15.05	47.38	54	-6.62	
	2402.00	PK	H	32.55	54.92	87.47	-	87.47	-
	2402.00	AV	H	32.55	28.52	61.07	-	61.07	
	2479.93	PK	H	32.83	59.55	92.38	-	92.38	-
	2479.85	AV	H	32.83	29.04	61.87	-	61.87	
	2484.09	PK	H	32.84	27.34	60.18	74	-13.82	2483.5~2500
	2483.50	AV	H	32.84	15.68	48.52	54	-5.48	
π/4-DQPSK	2337.60	PK	H	32.32	28.05	60.37	74	-13.63	2310~2390
	2342.60	AV	H	32.34	15.04	47.38	54	-6.62	
	2402.20	PK	H	32.55	59.19	91.74	-	91.74	-
	2402.20	AV	H	32.55	29.20	61.75	-	61.75	
	2479.88	PK	H	32.83	60.20	93.03	-	93.03	-
	2479.93	AV	H	32.83	29.04	61.87	-	61.87	
	2492.10	PK	H	32.87	27.85	60.72	74	-13.28	2483.5~2500
	2483.52	AV	H	32.84	15.99	48.83	54	-5.17	
8-DPSK	2334.60	PK	H	32.31	27.76	60.07	74	-13.93	2310~2390
	2335.60	AV	H	32.31	15.05	47.36	54	-6.64	
	2402.20	PK	H	32.55	60.59	93.14	-	93.14	-
	2402.20	AV	H	32.55	29.19	61.74	-	61.74	
	2480.19	PK	H	32.83	59.80	92.63	-	92.63	-
	2479.98	AV	H	32.83	29.05	61.88	-	61.88	
	2487.31	PK	H	32.85	27.57	60.42	74	-13.58	2483.5~2500
	2483.52	AV	H	32.84	15.87	48.71	54	-5.29	

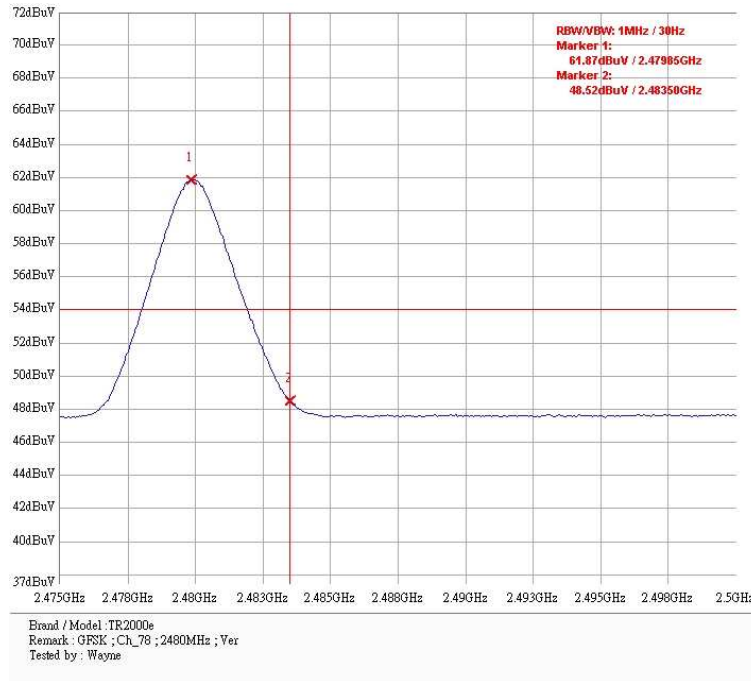
Band edge @ GFSK mode Channel_0 2402MHz Vertical AV



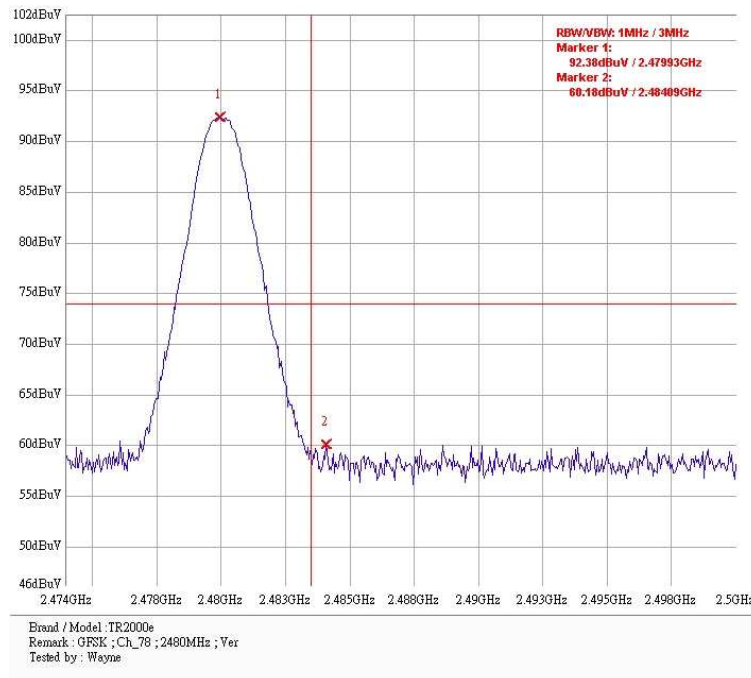
Band edge @ GFSK mode Channel_0 2402MHz Vertical PK



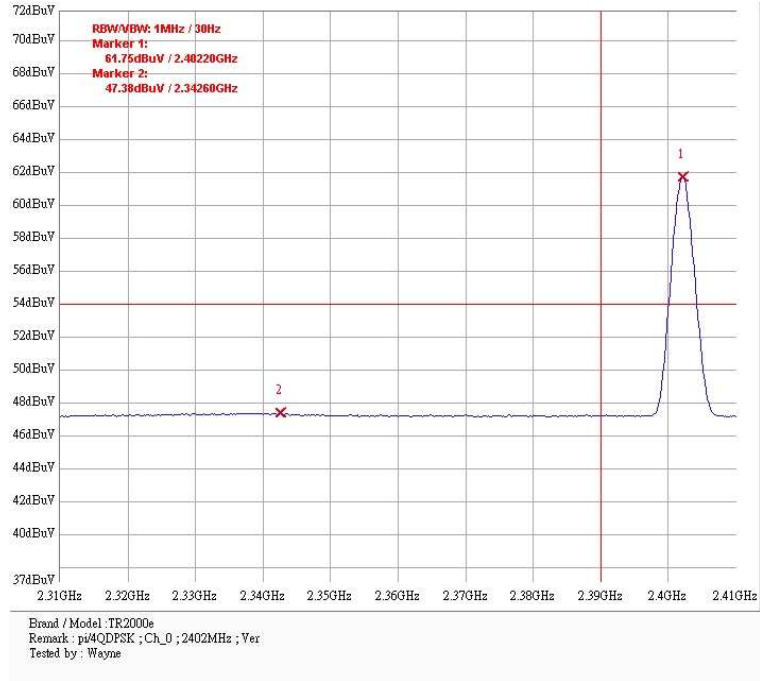
Band edge @ GFSK mode Channel_78 2480MHz Vertical AV



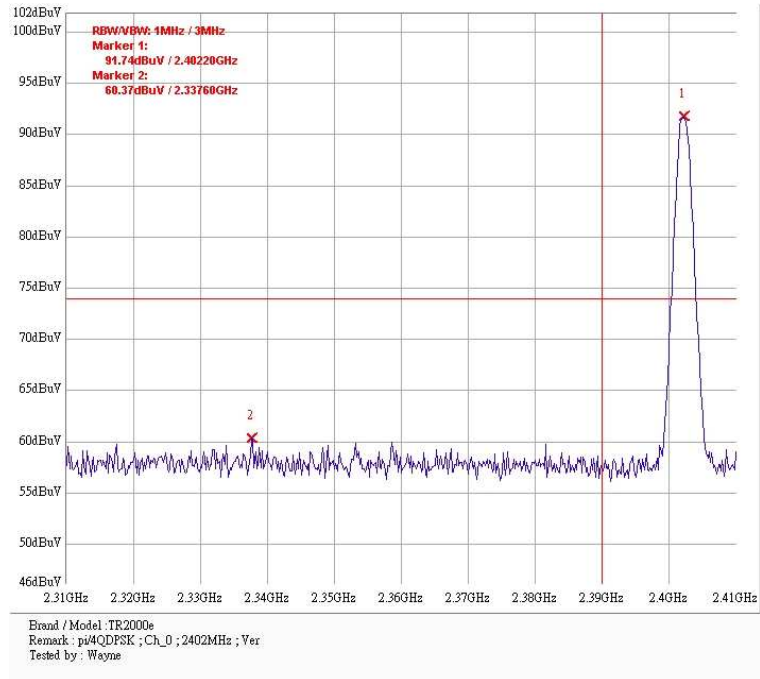
Band edge @ GFSK mode Channel_78 2480MHz Vertical PK



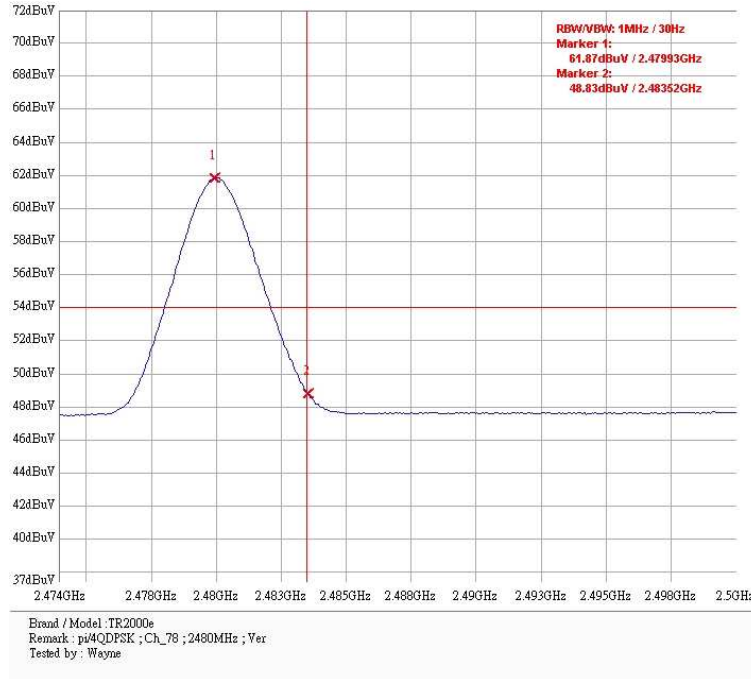
Band edge @ $\pi/4$ -DQPSK mode Channel_0 2402MHz Vertical AV



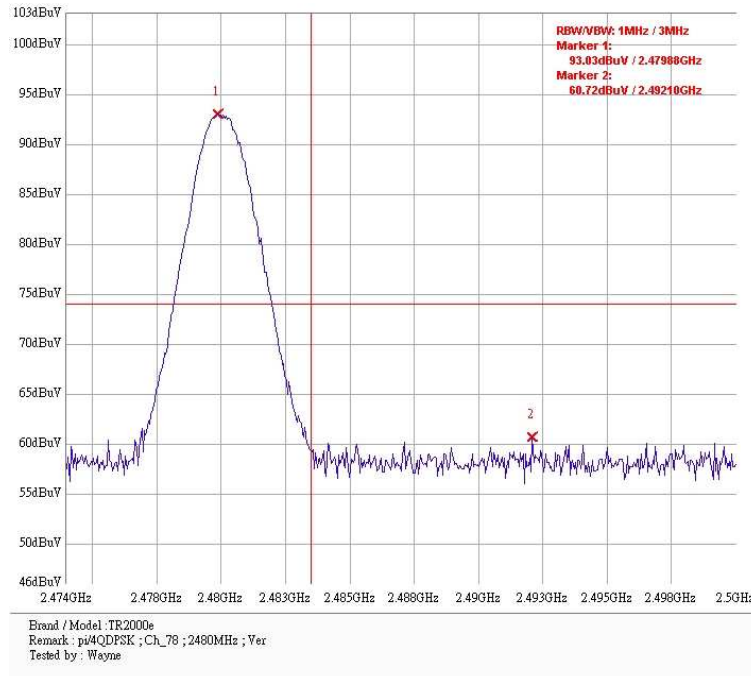
Band edge @ $\pi/4$ -DQPSK mode Channel_0 2402MHz Vertical PK



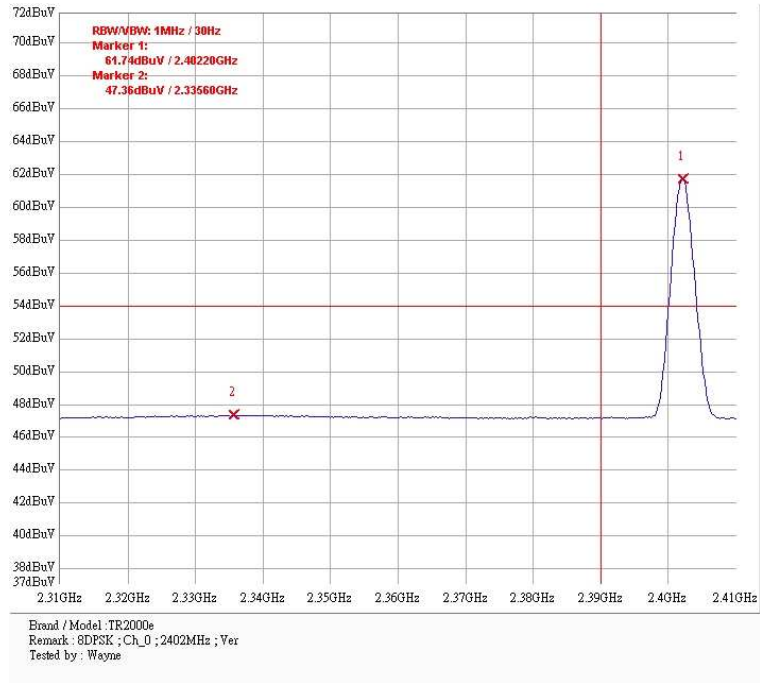
Band edge @ $\pi/4$ -DQPSK mode Channel_78 2480MHz Vertical AV



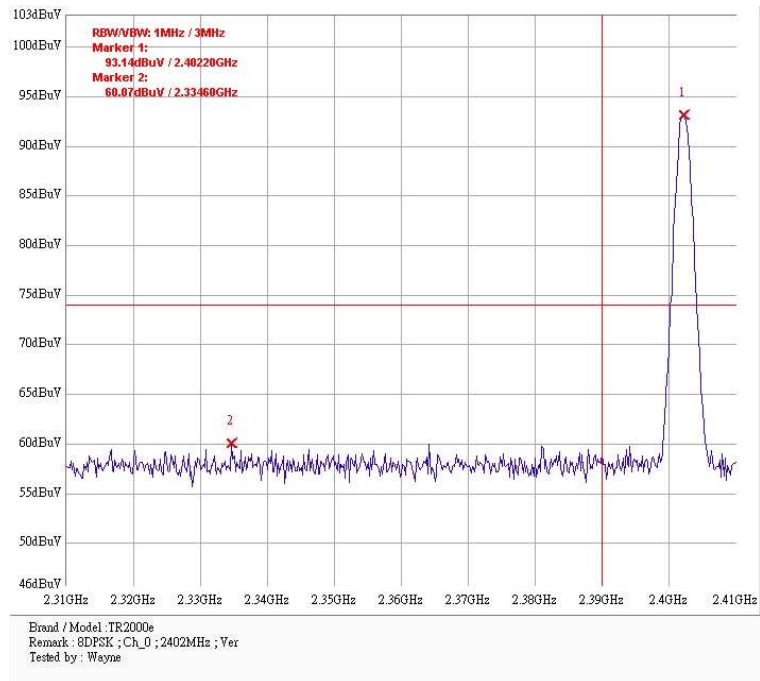
Band edge @ $\pi/4$ -DQPSK mode Channel_78 2480MHz Vertical PK



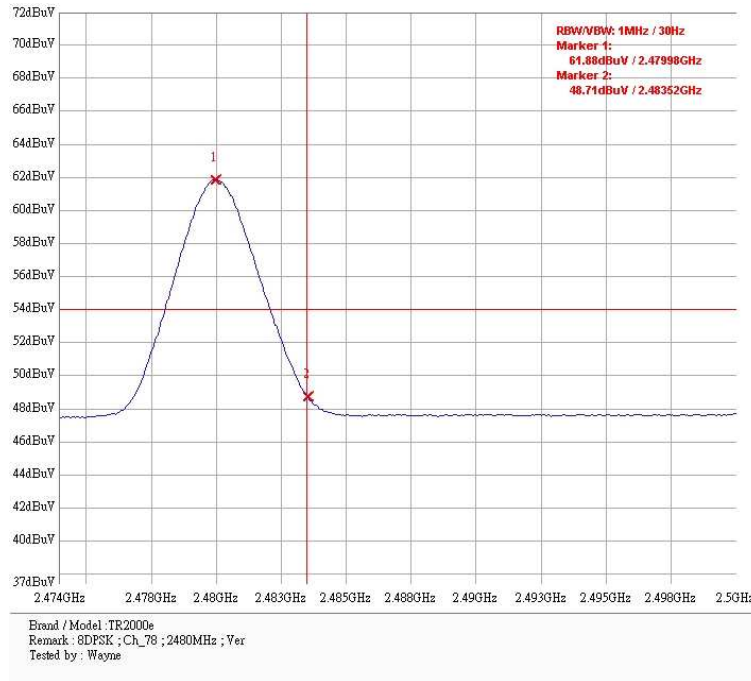
Band edge @ 8-DPSK mode Channel_0 2402MHz Vertical AV



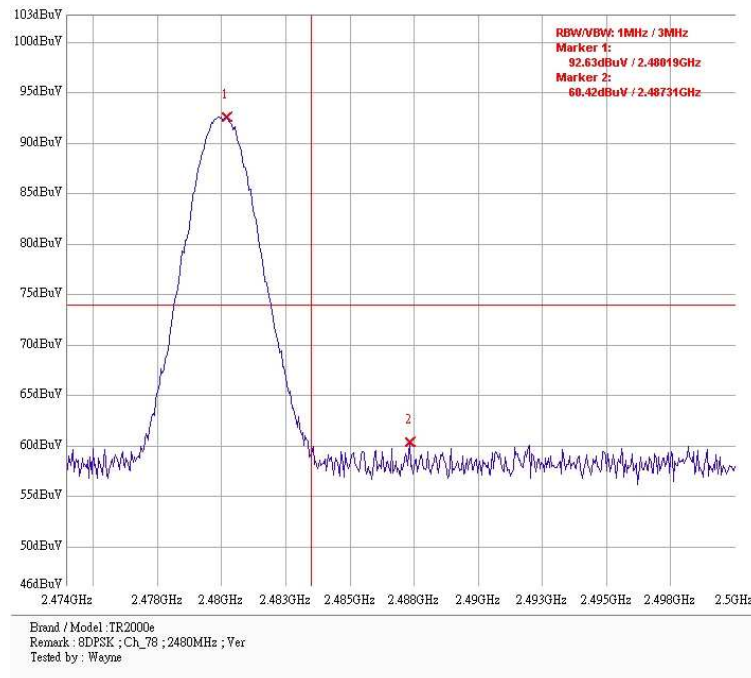
Band edge @ 8-DPSK mode Channel_0 2402MHz Vertical PK



Band edge @ 8-DPSK mode Channel_78 2480MHz Vertical AV



Band edge @ 8-DPSK mode Channel_78 2480MHz Vertical PK

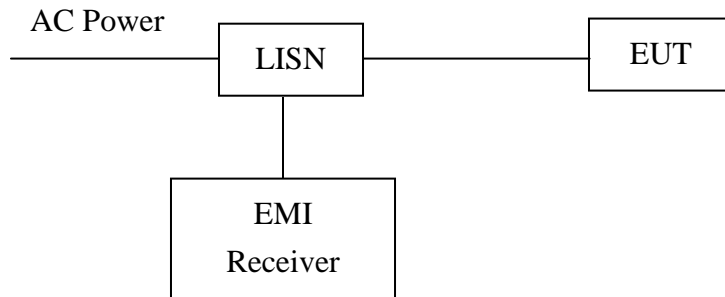


5. Conducted emission test FCC 15.207

5.1 Operating environment

Temperature:	25	°C
Relative Humidity:	50	%
Atmospheric Pressure	1008	hPa

5.2 Test setup & procedure



The EUT are connected to the main power through a line impedance stabilization network (LISN). This provides a 50 ohm/50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination.

Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2009 on conducted measurement.

The bandwidth of the field strength meter (R & S Test Receiver ESCI 30) is set at 9kHz.

The EUT configurations please refer to the “Conducted set-up photo.pdf”.

5.3 Emission limit

Freq. (MHz)	Conducted Limit (dBuV)	
	Q.P.	Ave.
0.15~0.50	66 – 56*	56 – 46*
0.50~5.00	56	46
5.00~30.0	60	50

*Decreases with the logarithm of the frequency.

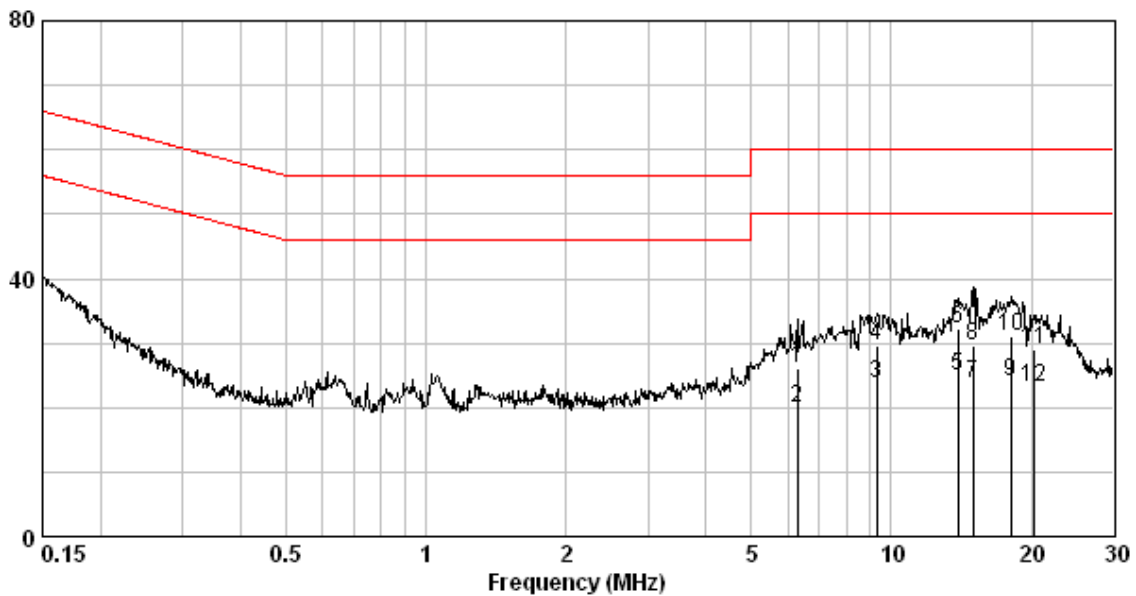
5.4 Conducted emission data FCC 15.207

Phase: Live Line
 Model No.: BT Dongle
 Test Condition: Normal mode
 Test Voltage: 120 Vac, 60 Hz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Over Limit (dB)	
						Qp	Av
6.285	0.93	26.09	60.00	19.79	50.00	-33.91	-30.21
9.302	1.12	29.50	60.00	23.85	50.00	-30.50	-26.15
13.915	1.58	32.26	60.00	24.86	50.00	-27.74	-25.14
14.986	1.68	29.51	60.00	23.62	50.00	-30.49	-26.38
18.039	1.84	31.18	60.00	24.07	50.00	-28.82	-25.93
20.270	1.96	29.03	60.00	23.09	50.00	-30.97	-26.91

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)

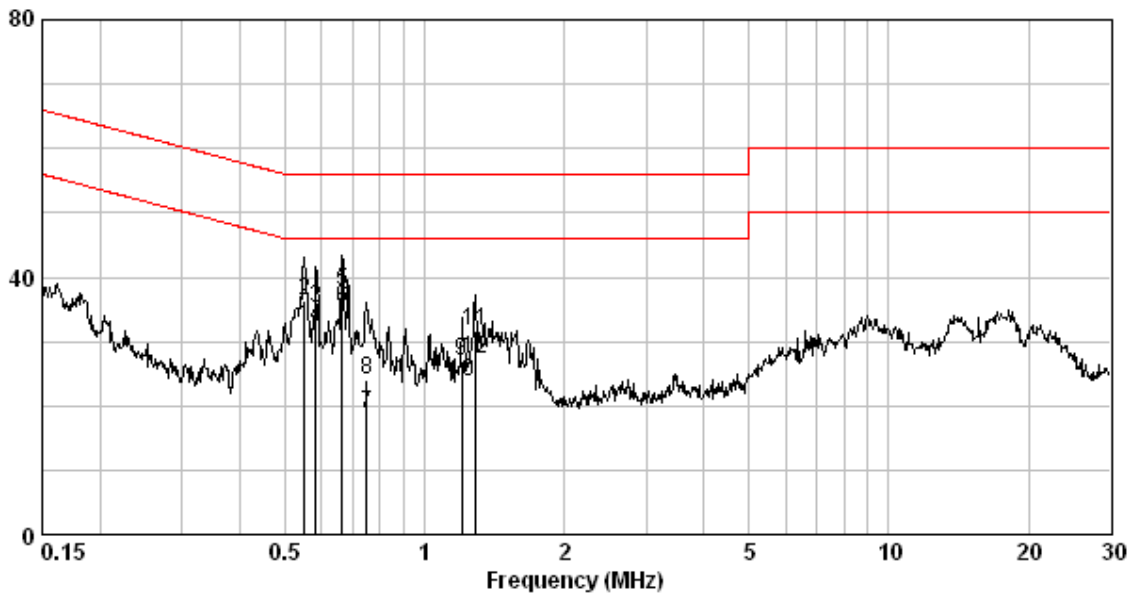


Phase: Neutral Line
 Model No.: BT Dongle
 Test Condition: Normal mode
 Test Voltage: 120 Vac, 60 Hz

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Over Limit (dB)	
						Qp	Av
0.552	0.29	36.42	56.00	32.35	46.00	-19.58	-13.65
0.582	0.30	35.16	56.00	32.21	46.00	-20.84	-13.79
0.665	0.33	37.87	56.00	35.03	46.00	-18.13	-10.97
0.751	0.35	24.14	56.00	18.68	46.00	-31.86	-27.32
1.203	0.42	26.84	56.00	23.66	46.00	-29.16	-22.34
1.282	0.42	31.52	56.00	27.39	46.00	-24.48	-18.61

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Over Limit (dB) = Level (dBuV) – Limit (dBuV)



6. 20dB Bandwidth test

6.1 Operating environment

Temperature: 25 °C
 Relative Humidity: 50 %
 Atmospheric Pressure: 1008 hPa

6.2 Test setup & procedure

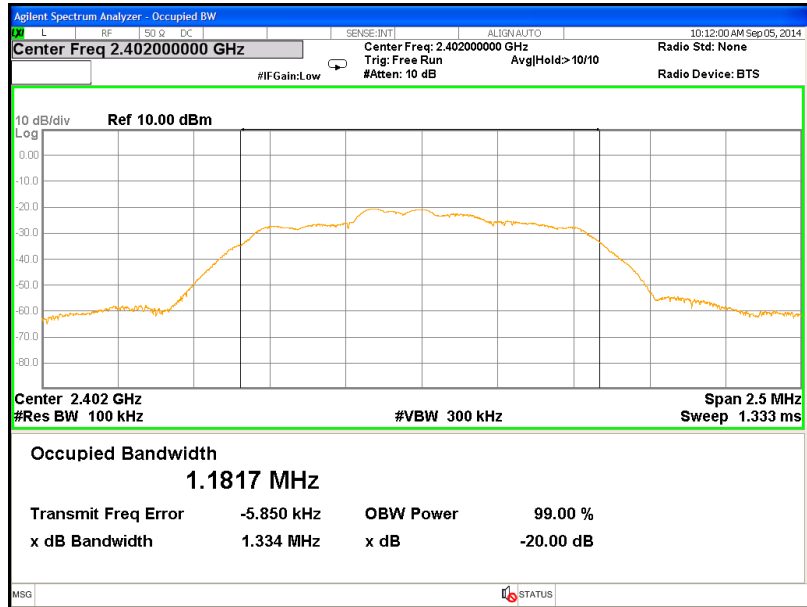
- Step 1: The 20dB bandwidth was measured using a 50 ohm spectrum analyzer
 Step 2: The span range for the SA display shall be between two times and five times the OBW.
 Step 3: The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending on the applicable requirement.
 Step 4: The test was performed at 3 channels (lowest, middle and highest channel). The maximum 20dB modulation bandwidth is in the following Table.

6.3 Measured data of modulated bandwidth test results

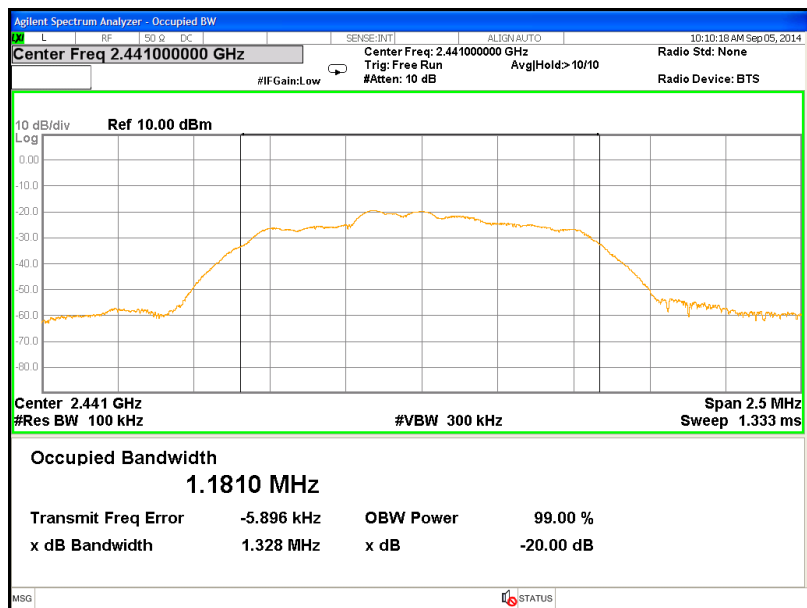
Modulation	Channel	Frequency (MHz)	Data Rate Mbps	20dB Bandwidth(MHz)
GFSK	0	2402	1	1.103
	39	2441		1.101
	78	2480		1.105
$\pi/4$ -DQPSK	0	2402	2	1.334
	39	2441		1.328
	78	2480		1.330
8-DPSK	0	2402	3	1.327
	39	2441		1.327
	78	2480		1.333

Please see the plots from Page 28 through Page 32.

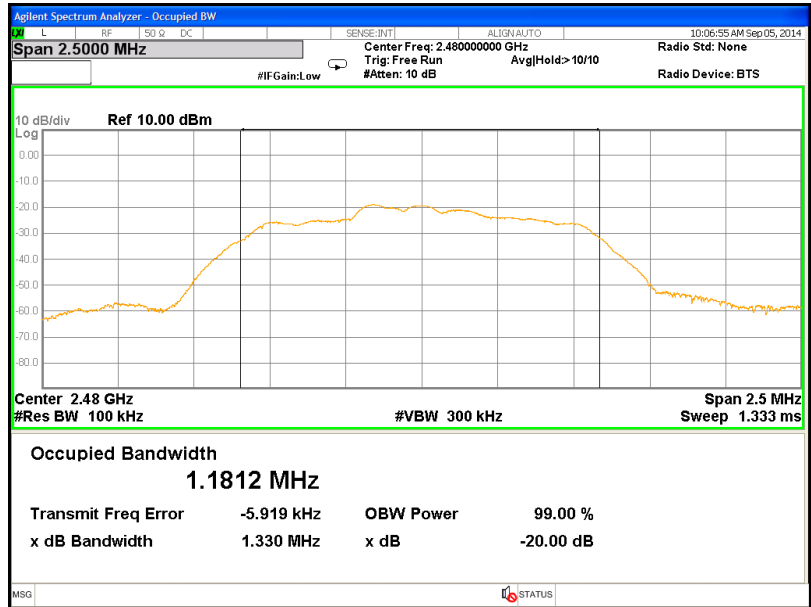
20dB Occupied Bandwidth @ 4QDPSK mode Channel_0 2402MHz



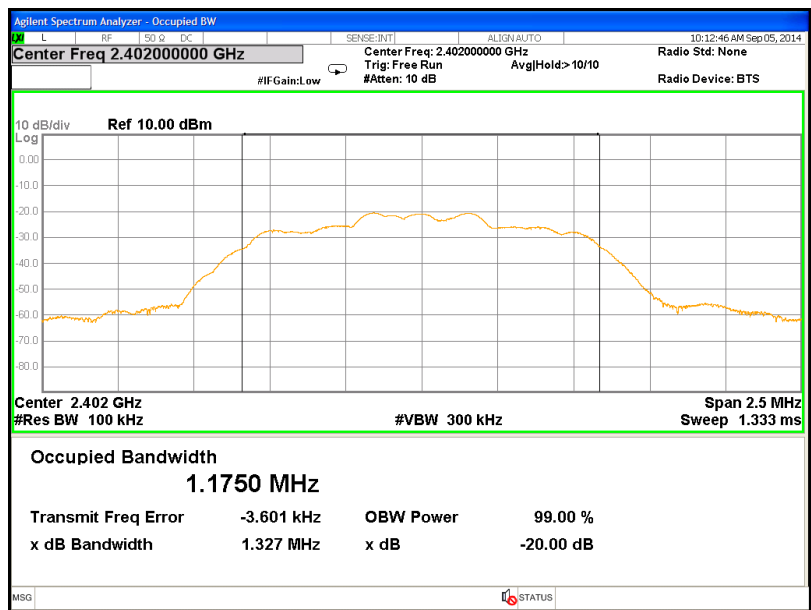
20dB Occupied Bandwidth @ 4QDPSK mode Channel_39 2441MHz



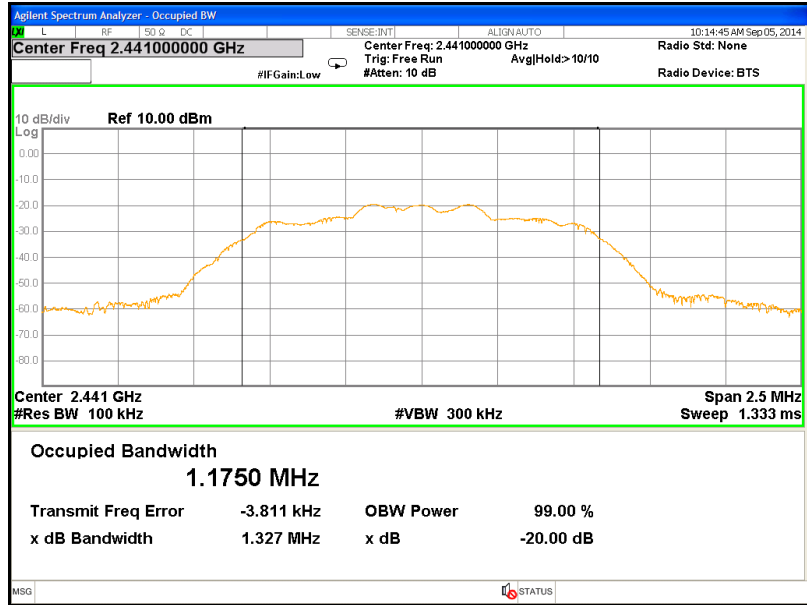
20dB Occupied Bandwidth @ 4QDPSK mode Channel_78 2480MHz



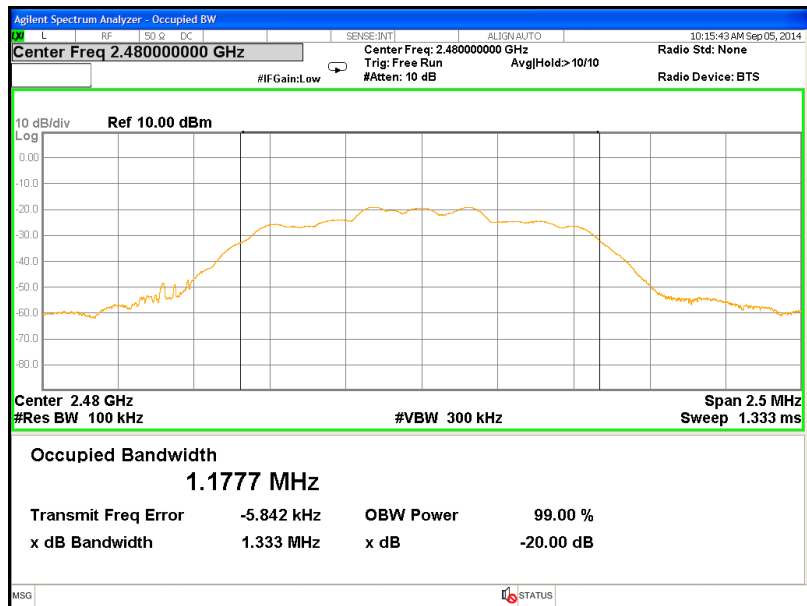
20dB Occupied Bandwidth @ 8DPSK mode Channel_0 2402MHz



20dB Occupied Bandwidth @ 8DPSK mode Channel_39 2441MHz

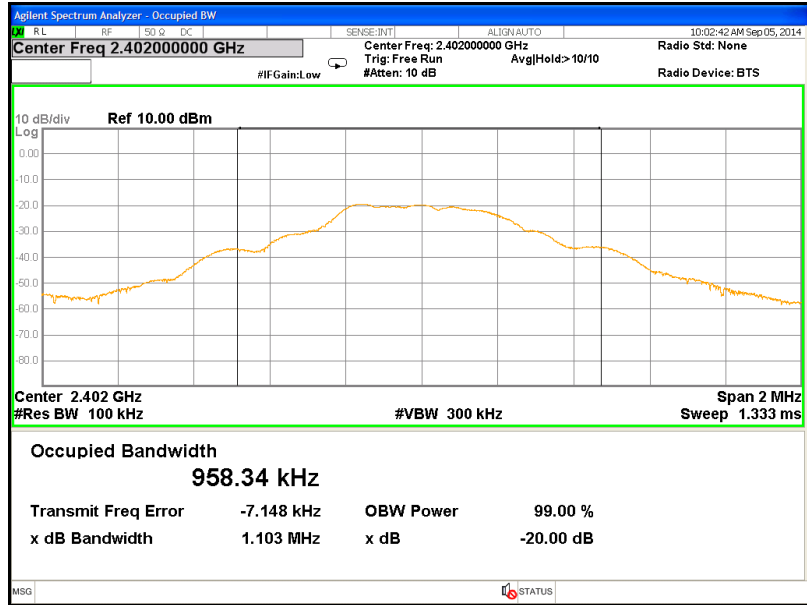


20dB Occupied Bandwidth @ 8DPSK mode Channel_78 2480MHz

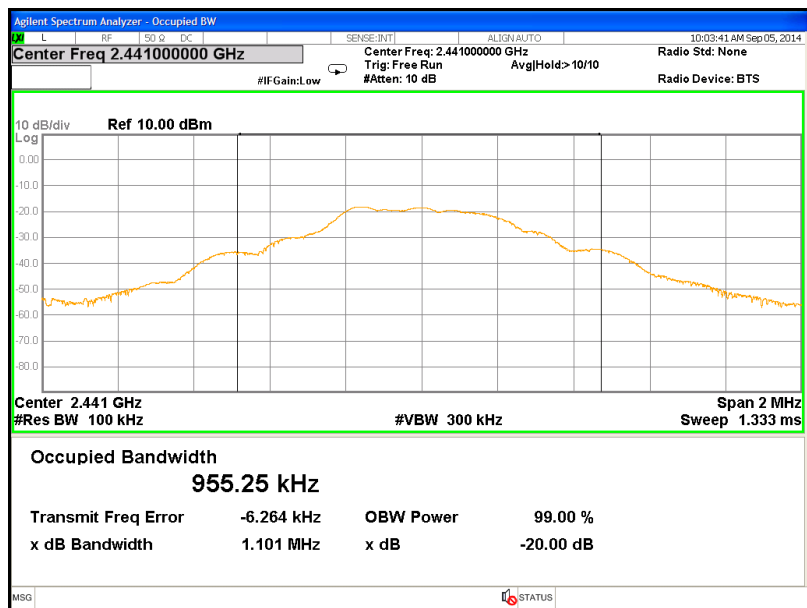




20dB Occupied Bandwidth @ GFSK mode Channel_0 2402MHz



20dB Occupied Bandwidth @ GFSK mode Channel_39 2441MHz





20dB Occupied Bandwidth @ GFSK mode Channel_78 2480MHz

