

EMC

TEST REPORT

Report No. : TS14010011-EME
Model No. : TTD-65RG
Issued Date : Feb. 06, 2014

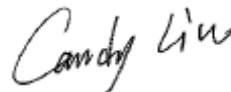
Applicant: **Tranwo Technology Corp.**
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Test Method/ Standard: **47 CFR FCC Part 15.249 & ANSI C63.4 2003**

Test By: **Intertek Testing Services Taiwan Ltd.**
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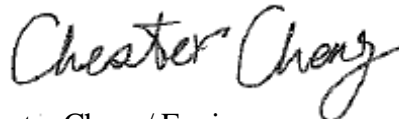
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Summary of Tests

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: 2.4GHz Digital Wireless Video Baby Monitor

Model No.: TTD-65RG

FCC ID.: O6LTTD-65RG

Frequency Range: 2414MHz ~ 2470MHz

Channel Number: 15 Channels

Frequency of Each Channel: 2410MHz+4k, k=1~15

Type of Modulation: GFSK

Rated Power: 1. DC 6 V from adapter
2. DC 3.7 V from battery

Power Cord: N/A

Sample Received: Jan. 03, 2014

Test Date(s): Jan. 07, 2014 ~ Jan. 27, 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 is 2.4GHz Digital Wireless Video Baby Monitor, and was defined as information technology equipment.

For more detail features, please refer to User's manual as file name “Installation guide.pdf”

1.3 Antenna description

The EUT uses a permanently connected antenna.

Antenna Gain : 0 dBi
Antenna Type : Monopole Antenna
Connector Type : N/A

1.4 Adapter information

The EUT will be supplied with a power supply from below list:

No.	Brand	Model no.	Specification
Adapter 1	SALOM ELECTRIC (XIAMEN) CO., LTD.	SSW-2256US	I/P: 100-240V~, 50-60Hz, 0.2A O/P: 6.0V, 800mA
Adapter 2	Csec	CS5B060080FU	I/P: 100-240V~, 50/60Hz, 200mA O/P: 6.0V, 800mA
Adapter 3	Csec	CS5D060080F	I/P: 100-240V~, 50/60Hz, 200mA O/P: 6.0V, 800mA

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 were all meet limit requirement, thus we evaluate the EUT pass the specified test.

2.2 Operation mode

The EUT is supplied with DC 6 V from adapter (Test voltage: 120Vac, 60Hz).

TX mode: EUT transmits continuously as power on and press button to change different channel.

2.3 Test equipment

Equipment	Brand	Model No.	Serial No.	Calibration Date	Next Calibration Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100018	2013/12/3	2014/12/2
Spectrum Analyzer	Rohde&schwarz	FSP30	100137	2013/6/21	2014/6/20
Spectrum Analyzer	Rohde&schwarz	FSEK30	100186	2014/1/20	2015/1/19
Horn Antenna (1-18G)	Schwarzbeck	BBHA 9120 D	9120D-456	2012/9/3	2014/9/3
Horn Antenna (14-42G)	SHWARZBECK	BBHA 9170	BBHA9170159	2012/9/5	2014/9/5
Broadband Antenna	SCHWARZBECK	VULB 9168	9168-172	2013/8/8	2015/8/7
Pre-Amplifier	MITEQ	AFS44-00102650 --42-10P-44	1495287	2013/10/27	2015/10/26
Pre-Amplifier	MITEQ	JS4-26004000--2 7-8A	828825	2012/9/18	2014/9/17
Power Meter	Anritsu	ML2495A	0844001	2013/10/10	2014/10/9
Power Sensor	Anritsu	MA2411B	0738452	2013/10/10	2014/10/9
Temperature&Humidity Test Chamber	TERCHY	MHU-225LRU (SA)	950838	2013/6/14	2014/6/13
Two-Line V-Network	Rohde&schwarz	ESH3-Z5	838979/014	2013/10/12	2014/10/11
Singal Analyzer	Agilent	N9030A	MY51380492	2013/9/19	2014/9/18

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

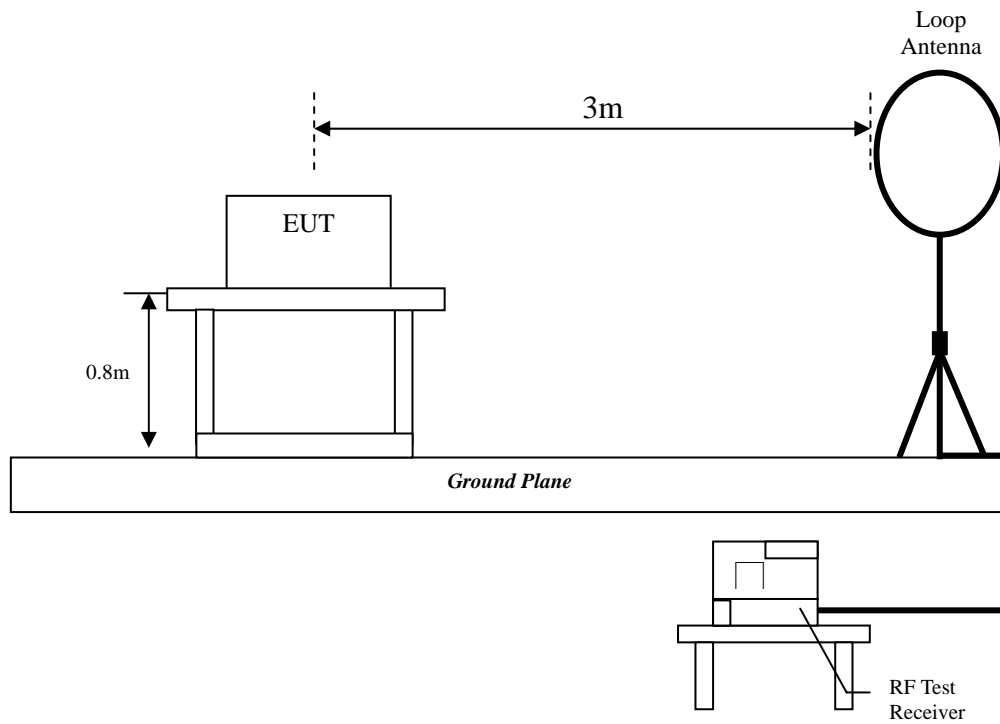
3. Radiated emission test FCC 15.249 (C)

3.1 Operating environment

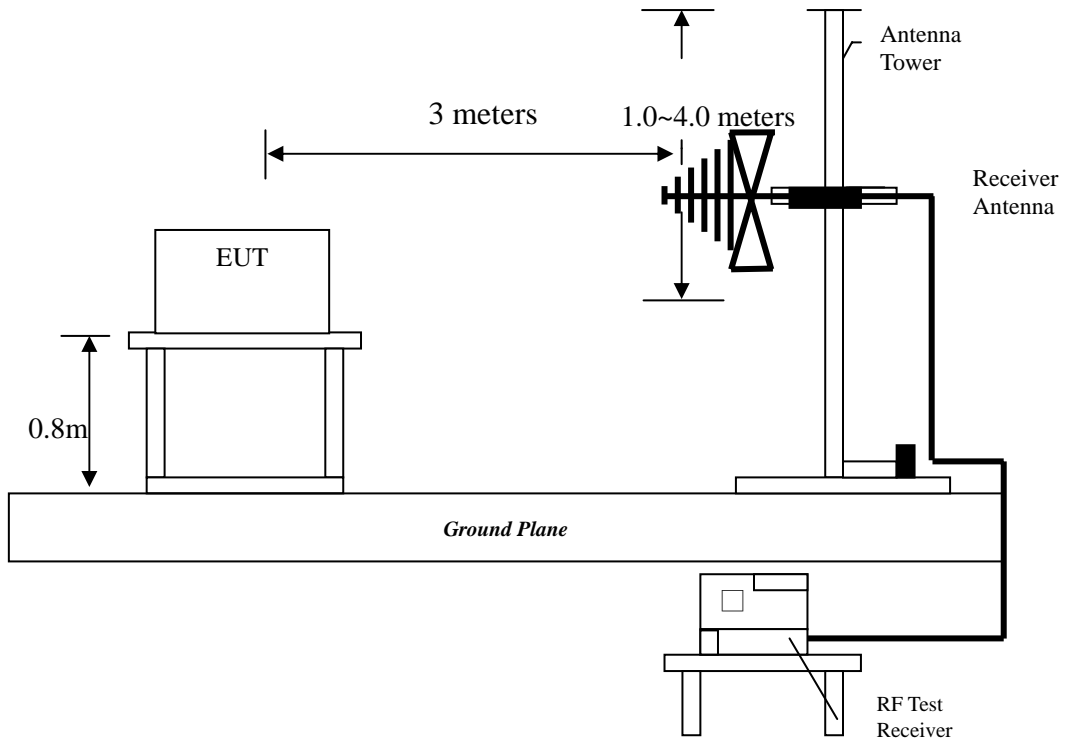
Temperature: 25 °C
Relative Humidity: 55 %
Atmospheric Pressure 1008 hPa

3.2 Test setup & procedure

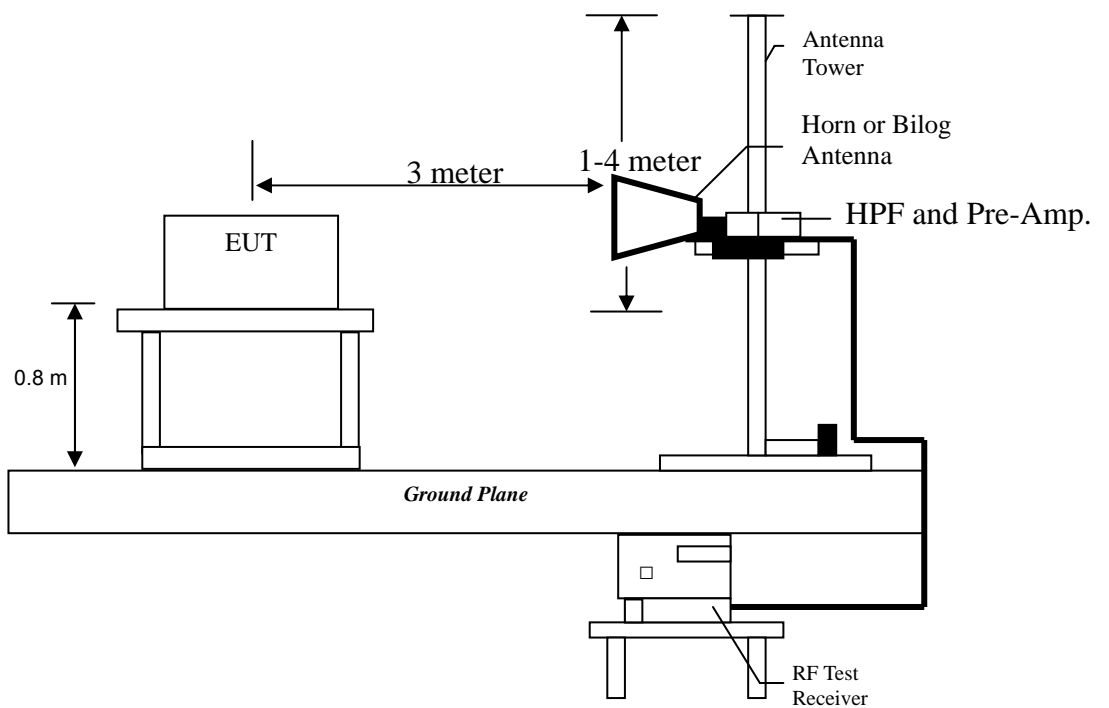
Radiated emission from 9 kHz to 30 MHz uses Loop Antenna:



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.

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 configuration 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: frequency range from 9kHz to 30MHz

Frequency (kHz)	Detector	Corrected Factor (dB/m)	Reading (dBuV)	Emission (dBuV)	Limit (dBuV)	Margin (dB)
30	QP	-28.52	51.36	22.84	38.1	-15.26
350	QP	-62.15	33.40	-28.75	16.71	-45.46
710	QP	-22.85	30.47	7.62	30.8	-23.18
16300	QP	-29.35	45.67	16.32	28.32	-12.00

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

The test was performed on EUT under GFSK continuously transmitting mode. Low, Middle, High Channel were verified. The worst case occurred at GFSK TX Low Channel

EUT : TTD-65RG
 Test Condition : Tx at Low Channel

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)
V	47.46	QP	15.24	10.66	25.90	40.00	-14.10
V	59.10	QP	14.81	13.58	28.39	40.00	-11.61
V	191.02	QP	12.13	9.52	21.65	43.50	-21.85
V	251.16	QP	14.46	9.70	24.16	46.00	-21.84
V	352.04	QP	17.38	9.75	27.13	46.00	-18.87
V	557.68	QP	21.97	9.52	31.49	46.00	-14.51
H	49.40	QP	15.42	9.59	25.01	40.00	-14.99
H	191.02	QP	12.13	11.64	23.77	43.50	-19.73
H	218.18	QP	12.92	9.53	22.45	46.00	-23.55
H	456.80	QP	20.02	10.19	30.21	46.00	-15.79
H	534.40	QP	21.47	10.00	31.47	46.00	-14.53
H	697.36	QP	24.23	9.54	33.77	46.00	-12.23

Remark:

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

3.4.3 Measurement results: frequency above 1GHz

EUT : TTD-65RG
 Test Condition : Tx at Low channel

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)
4828	PK	V	-0.36	40.66	40.3	74	-33.70
4828	PK	H	-0.36	40.53	40.17	74	-33.83

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 : TTD-65RG
 Test Condition : Tx at Middle channel

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)
4884	PK	V	-0.22	40.1	39.88	74	-34.12
4884	PK	H	-0.22	40.42	40.2	74	-33.8

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 : TTD-65RG
 Test Condition : Tx at High channel

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)
4940	PK	V	-0.12	38.99	38.87	74	-35.13
4940	PK	H	-0.12	39.34	39.22	74	-34.78

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 : TTD-65RG
 Test Condition : Tx at Low channel

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)
2414	PK	V	32.59	68.14	100.73	114	-13.27
2414	AV	V	33.59	14.08	47.67	94	-46.33
2414	PK	H	32.59	50.58	110.67	114	-3.33
2414	AV	H	32.59	50.58	48.02	94	-45.98

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 : TTD-65RG
 Test Condition : Tx at Middle channel

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)
2442	PK	V	32.63	67.53	100.16	114	-13.84
2442	AV	V	33.63	13.57	47.20	94	-46.80
2442	PK	H	32.63	77.51	110.14	114	-3.86
2442	AV	H	32.63	25.03	57.66	94	-36.34

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 : TTD-65RG
Test Condition : Tx at High channel

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)
2470	PK	V	32.64	68.28	100.92	114	-13.08
2470	AV	V	33.64	14.22	47.86	94	-46.14
2470	PK	H	34.64	75.48	110.12	114	-3.88
2470	AV	H	32.64	15.47	48.11	94	-45.89

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 (2414~2470MHz) or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

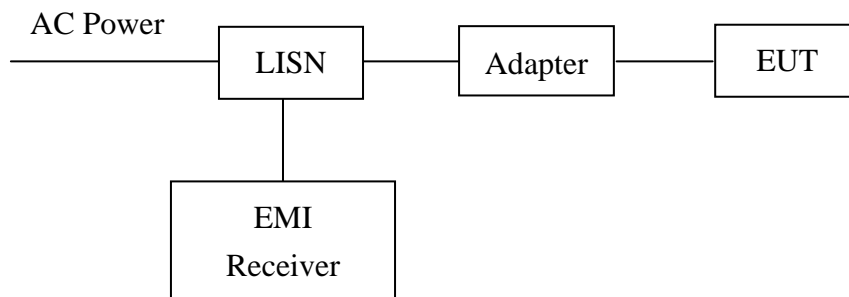
Frequency (MHz)	Spectrum Analyzer Detector	Ant. Pol. (H/V)	Preamp. Gain (dB)	Correction Factor (dB/m)	Reading (dBUV)	Corrected Reading (dBUV/m)	Limit @ 3 m (dBUV/m)	Margin (dB)	Restricted band (MHz)
2390.00	PK	H	38.02	31.85	62.72	56.55	74	-17.45	2310~2390
2390.00	AV	H	38.02	31.85	50.86	44.69	54	-9.31	
2414.00	PK	H	38.03	31.96	116.73	110.67	-	110.67	-
2414.00	AV	H	38.03	31.96	54.08	48.02	-	48.02	-
2470.00	PK	H	38.04	32.23	115.93	110.12	-	110.12	-
2470.00	AV	H	38.04	32.23	53.92	48.11	-	48.11	-
2483.50	PK	H	38.05	32.29	65.49	59.74	74	-14.26	2483.5~2500
2483.50	AV	H	38.05	32.29	50.81	45.06	54	-8.94	

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 C63.4/2003 on conducted measurement.

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

The EUT configuration 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.

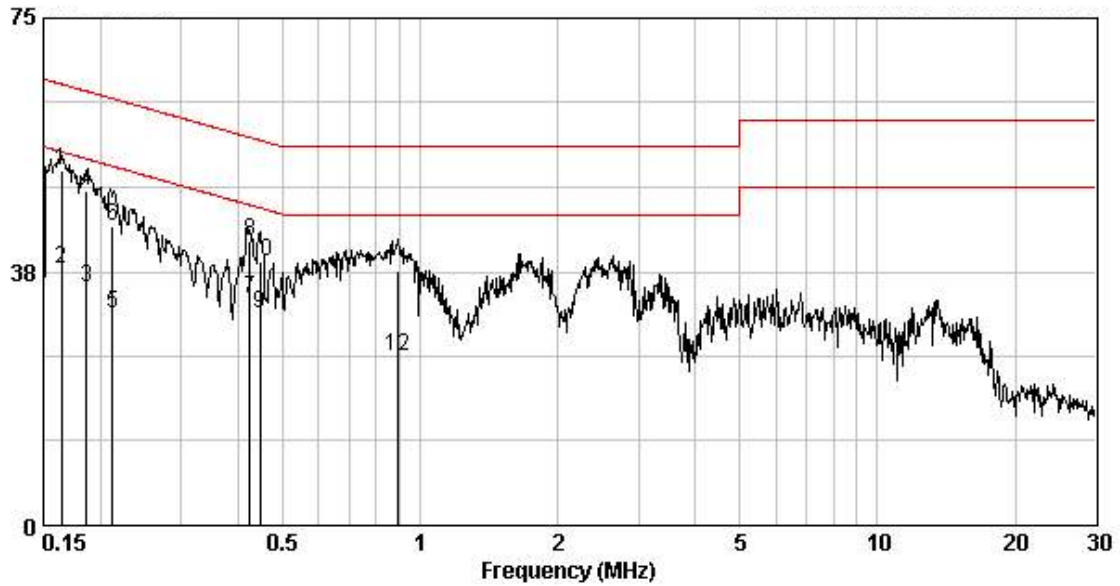
5.4 Conducted emission data FCC 15.207

Phase: Live Line
 Model No.: TTD-65RG
 Test Condition: Normal mode (Adapter: SSW-2256US)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.164	9.56	52.56	65.25	37.90	55.25	-12.69	-17.35
0.186	9.56	49.43	64.20	35.08	54.20	-14.76	-19.12
0.213	9.57	44.34	63.10	31.27	53.10	-18.75	-21.82
0.424	9.59	41.91	57.37	33.47	47.37	-15.46	-13.90
0.447	9.59	39.01	56.93	31.42	46.93	-17.93	-15.51
0.894	9.62	37.60	56.00	24.97	46.00	-18.40	-21.03

Remark:

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

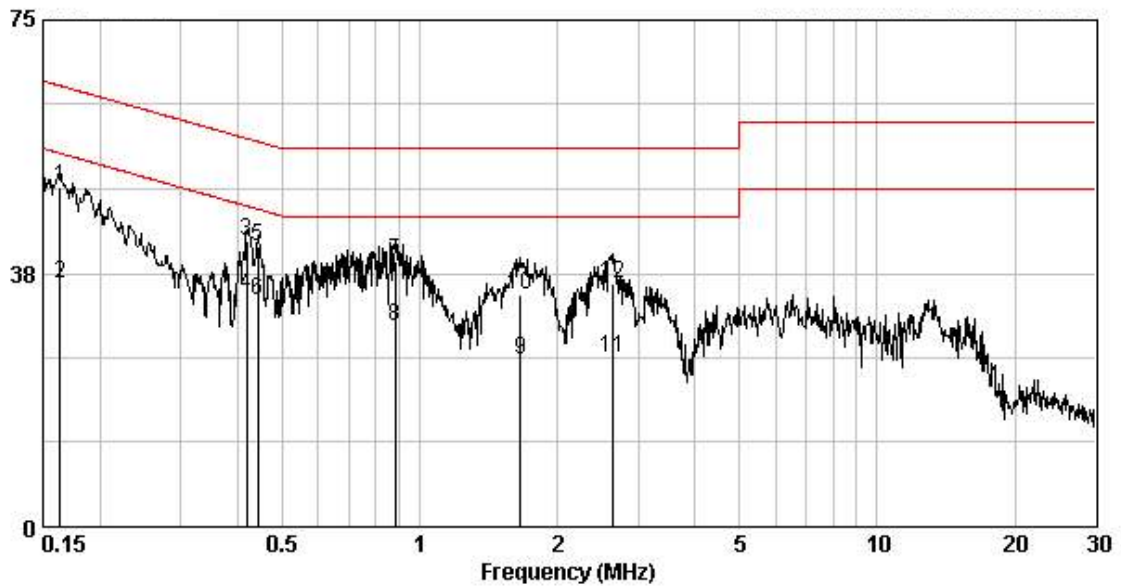


Phase: Neutral Line
 Model No.: TTD-65RG
 Test Condition: Normal mode(Adapter: SSW-2256US)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.163	9.55	50.21	65.30	36.05	55.30	-15.09	-19.24
0.419	9.59	42.43	57.46	34.38	47.46	-15.03	-13.09
0.442	9.59	41.49	57.02	33.64	47.02	-15.54	-13.39
0.885	9.62	39.26	56.00	29.65	46.00	-16.74	-16.35
1.662	9.66	34.44	56.00	24.85	46.00	-21.56	-21.15
2.636	9.69	35.87	56.00	25.09	46.00	-20.13	-20.91

Remark:

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

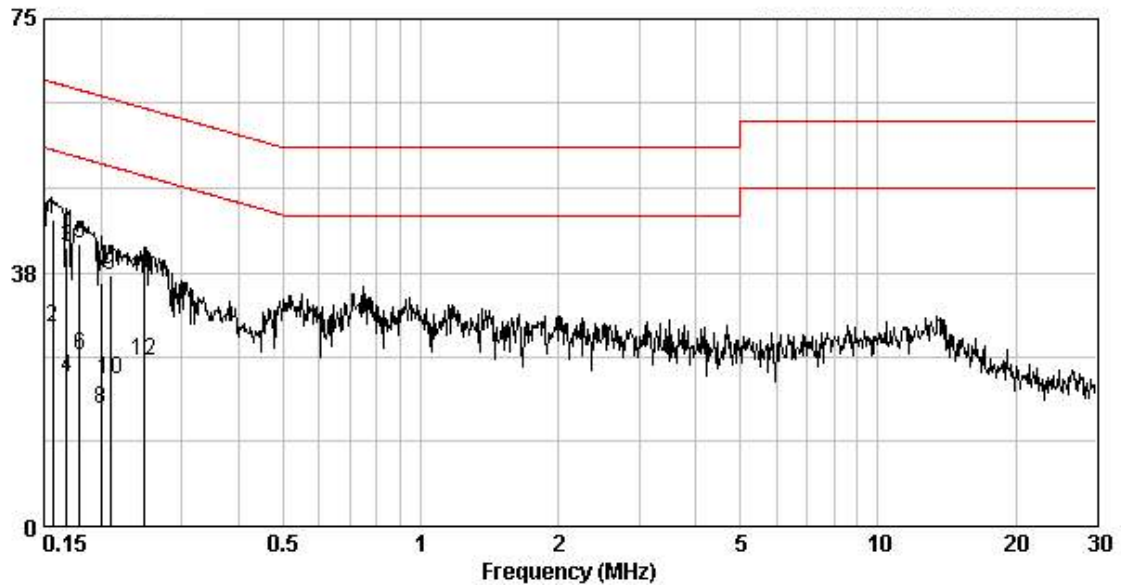


Phase: Live Line
 Model No.: TTD-65RG
 Test Condition: Normal mode(Adapter: CS5B060080FU)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.156	9.55	45.36	65.65	29.48	55.65	-20.29	-26.17
0.169	9.56	41.10	65.03	21.85	55.03	-23.94	-33.18
0.180	9.56	41.87	64.50	25.21	54.50	-22.63	-29.29
0.200	9.57	35.88	63.62	17.32	53.62	-27.74	-36.30
0.209	9.57	37.13	63.23	21.60	53.23	-26.10	-31.63
0.248	9.57	36.78	61.82	24.54	51.82	-25.04	-27.28

Remark:

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

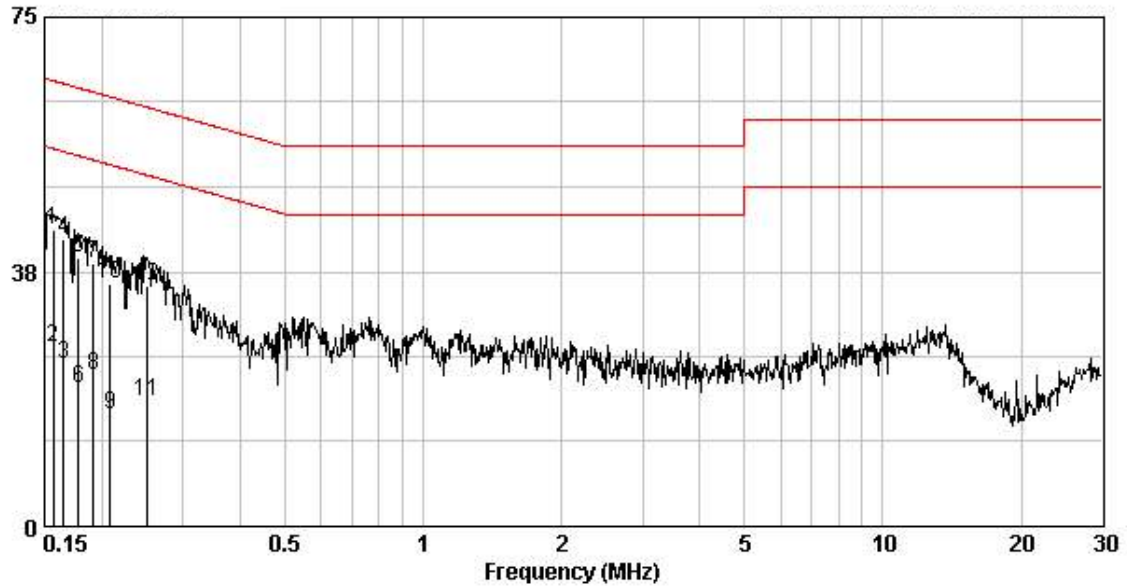


Phase: Neutral Line
 Model No.: TTD-65RG
 Test Condition: Normal mode(Adapter: CS5B060080FU)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.156	9.55	43.71	65.65	26.41	55.65	-21.94	-29.24
0.165	9.55	42.28	65.21	23.93	55.21	-22.93	-31.28
0.178	9.55	39.65	64.59	20.45	54.59	-24.95	-34.14
0.191	9.56	38.78	63.98	22.15	53.98	-25.20	-31.82
0.208	9.56	35.70	63.27	16.39	53.27	-27.57	-36.88
0.251	9.57	35.38	61.73	18.44	51.73	-26.35	-33.29

Remark:

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

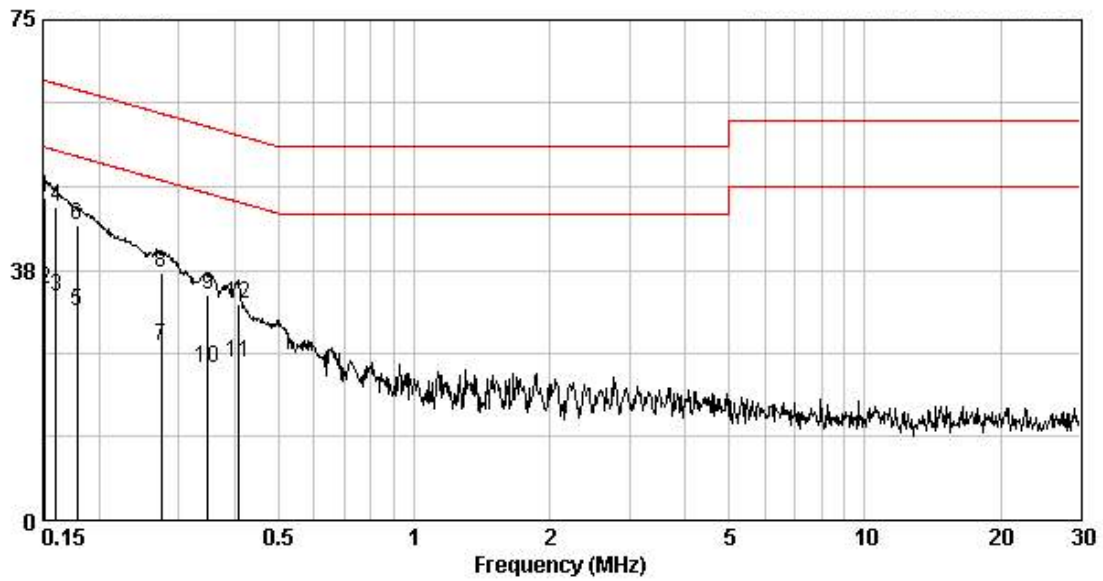


Phase: Live Line
 Model No.: TTD-65RG
 Test Condition: Normal mode(Adapter: CS5D060080F)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.152	9.55	48.40	65.91	34.68	55.91	-17.51	-21.23
0.161	9.55	46.88	65.43	33.58	55.43	-18.55	-21.85
0.179	9.56	44.20	64.55	31.20	54.55	-20.35	-23.35
0.274	9.58	37.22	60.98	26.22	50.98	-23.76	-24.76
0.348	9.58	33.79	59.00	22.87	49.00	-25.21	-26.13
0.406	9.59	32.42	57.73	23.58	47.73	-25.31	-24.15

Remark:

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

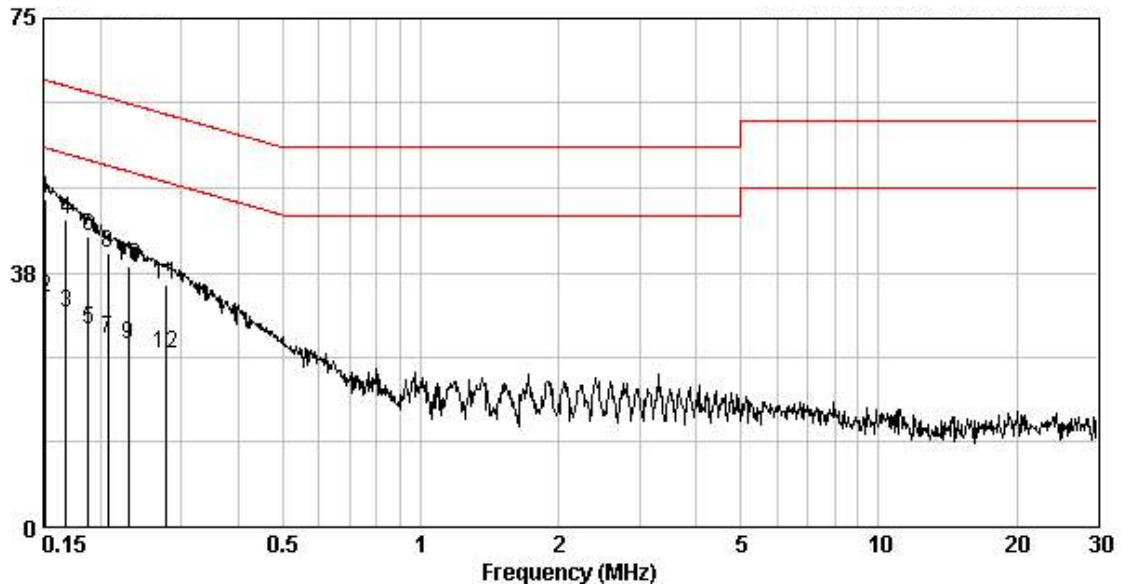


Phase: Neutral Line
 Model No.: TTD-65RG
 Test Condition: Normal mode(Adapter: CS5D060080F)

Frequency (MHz)	Corr. Factor (dB)	Level Qp (dBuV)	Limit Qp (dBuV)	Level Av (dBuV)	Limit Av (dBuV)	Margin (dB)	
						Qp	Av
0.152	9.55	48.27	65.91	33.90	55.91	-17.64	-22.01
0.169	9.55	45.45	65.03	31.60	55.03	-19.59	-23.43
0.188	9.55	42.82	64.11	29.22	54.11	-21.29	-24.89
0.207	9.56	40.28	63.32	27.83	53.32	-23.03	-25.49
0.230	9.56	38.55	62.44	26.89	52.44	-23.89	-25.54
0.279	9.57	35.81	60.85	25.66	50.85	-25.04	-25.19

Remark:

1. Correction Factor (dB) = LISN Factor (dB) + Cable Loss (dB)
2. Margin (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

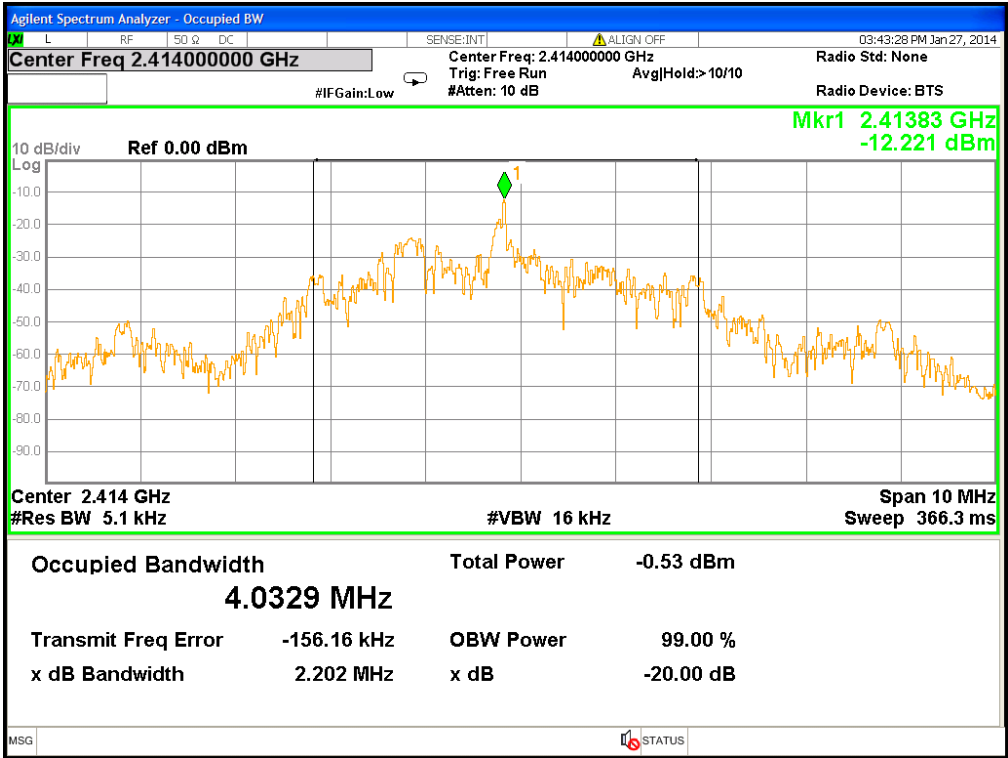
- Step 1: The 20dB bandwidth was measured using a 50 ohm spectrum analyzer
- Step 2: The span range for the SA display shall be between two times and five times the OBW.
- Step 3: The nominal IF filter bandwidth (3 dB RBW) should be approximately 1 % to 5 % of the OBW, unless otherwise specified, depending 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

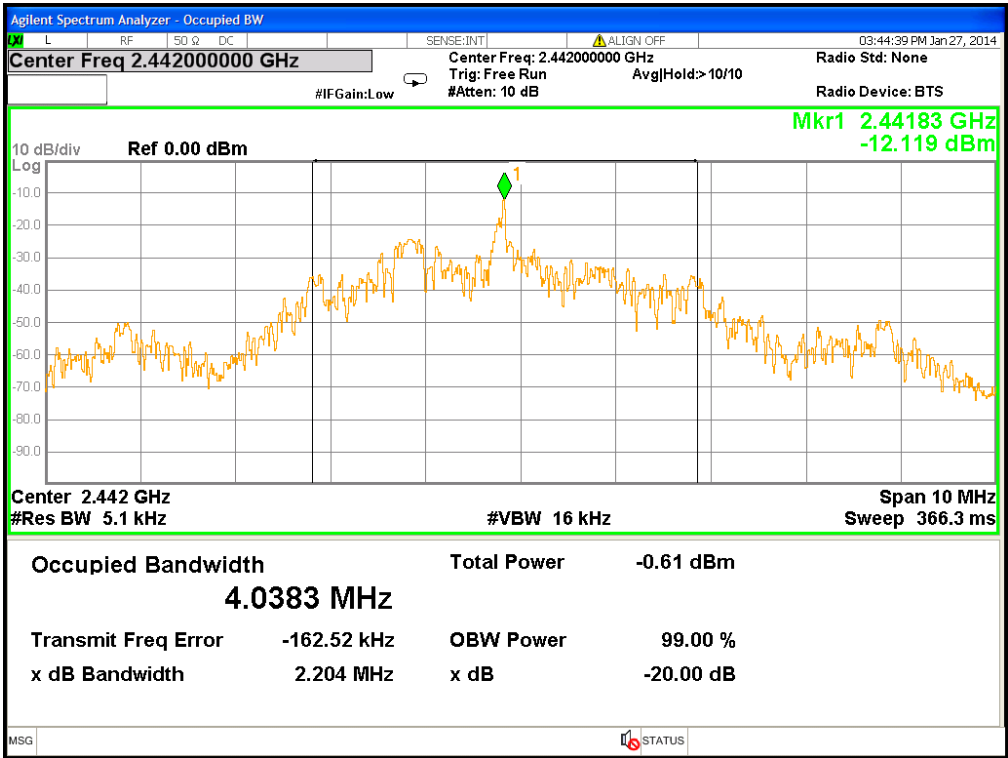
Mode	Channel	Frequency (MHz)	20dB Bandwidth(MHz)
GFSK	Low	2414	2.202
	Middle	2442	2.204
	High	2470	2.203

Please see the plot below.

20 dB Bandwidth @ Low channel



20 dB Bandwidth @ Middle channel





20 dB Bandwidth @ High channel

