For 1GHz to 25GHz

Note: All models *have been tested, only the worse model case was reported.*

GFSK (above 1GHz)

Frequency(MHz):			2402		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4804.00	62.15	PK	74	11.85	66.42	32.33	5.12	41.72	-4.27
4804.00	44.57	AV	54	9.43	48.84	32.33	5.12	41.72	-4.27
7206.00	54.11	PK	74	19.89	54.63	36.6	6.49	43.61	-0.52
7206.00	43.24	AV	54	10.76	43.76	36.6	6.49	43.61	-0.52

Frequency(MHz):			2402		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4804.00	60.01	PK	74	13.99	64.28	32.33	5.12	41.72	-4.27
4804.00	42.53	AV	54	11.47	46.80	32.33	5.12	41.72	-4.27
7206.00	52.30	PK	74	21.70	52.82	36.6	6.49	43.61	-0.52
7206.00	41.41	AV	54	12.59	41.93	36.6	6.49	43.61	-0.52

Frequency(MHz):			2440		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4880.00	61.54	PK	74	12.46	65.42	32.6	5.34	41.82	-3.88
4880.00	43.77	AV	54	10.23	47.65	32.6	5.34	41.82	-3.88
7320.00	53.58	PK	74	20.42	53.69	36.8	6.81	43.72	-0.11
7320.00	42.72	AV	54	11.28	42.83	36.8	6.81	43.72	-0.11

Frequency(MHz):			2440		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4880.00	59.69	PK	74	14.31	63.57	32.6	5.34	41.82	-3.88
4880.00	42.12	AV	54	11.88	46.00	32.6	5.34	41.82	-3.88
7320.00	51.49	PK	74	22.51	51.60	36.8	6.81	43.72	-0.11
7320.00	40.72	AV	54	13.28	40.83	36.8	6.81	43.72	-0.11

Frequency(MHz):			2480		Polarity:		HORIZONTAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4960.00	61.04	PK	74	12.96	64.12	32.73	5.66	41.47	-3.08
4960.00	43.25	AV	54	10.75	46.33	32.73	5.66	41.47	-3.08
7440.00	53.08	PK	74	20.92	52.63	37.04	7.25	43.84	0.45
7440.00	42.09	AV	54	11.91	41.64	37.04	7.25	43.84	0.45

Frequency(MHz):			2480		Polarity:		VERTICAL		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4960.00	59.00	PK	74	15.00	62.08	32.73	5.66	41.47	-3.08
4960.00	41.02	AV	54	12.98	44.10	32.73	5.66	41.47	-3.08
7440.00	51.22	PK	74	22.78	50.77	37.04	7.25	43.84	0.45
7440.00	40.06	AV	54	13.94	39.61	37.04	7.25	43.84	0.45

REMARKS:
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)- Pre-amplifier
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

Results of Band Edges Test (Radiated)

GFSK

Frequency(MHz):			**2402**		**Polarity:**		**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	61.99	PK	74	12.01	72.41	27.42	4.31	42.15	-10.42
2390.00	43.96	AV	54	10.04	54.38	27.42	4.31	42.15	-10.42
Frequency(MHz):			**2402**		**Polarity:**		**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2390.00	59.68	PK	74	14.32	70.10	27.42	4.31	42.15	-10.42
2390.00	41.89	AV	54	12.11	52.31	27.42	4.31	42.15	-10.42
Frequency(MHz):			**2480**		**Polarity:**		**HORIZONTAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	61.28	PK	74	12.72	71.39	27.7	4.47	42.28	-10.11
2483.50	43.16	AV	54	10.84	53.27	27.7	4.47	42.28	-10.11
Frequency(MHz):			**2480**		**Polarity:**		**VERTICAL**		
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2483.50	59.17	PK	74	14.83	69.28	27.7	4.47	42.28	-10.11
2483.50	41.09	AV	54	12.91	51.20	27.7	4.47	42.28	-10.11

REMARKS:
1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)- Pre-amplifier
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.

4.3 Maximum Peak Output Power

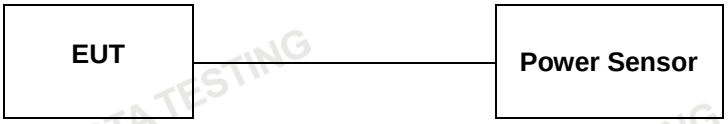
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power sensor.

Test Configuration



Test Results

Please refer to Appendix RF Test Data for BLE

Note: 1.The test results including the cable loss.

4.4 Power Spectral Density

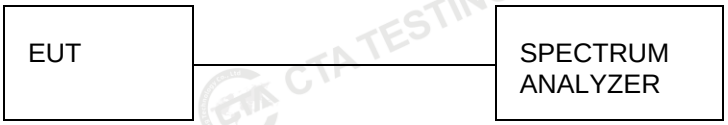
Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration



Test Results

Please refer to Appendix RF Test Data for BLE

4.5 6dB Bandwidth

Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

Test Results

Please refer to Appendix RF Test Data for BLE

4.6 Out-of-band Emissions

Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

Test Configuration

Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

Please refer to Appendix RF Test Data for BLE

4.7 Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited

FCC CFR Title 47 Part 15 Subpart C Section 15.247(c) (1) (I):

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

Antenna Connected Construction

The gain of antenna was 2.86 dBi.

Remark:The antenna gain is provided by the customer , if the data provided by the customer is not accurate, Shenzhen CTA Testing Technology Co., Ltd. does not assume any responsibility.

4.8 On Time and Duty Cycle

Standard Applicable

None; for reporting purpose only.

TEST CONFIGURATION

Test Procedures

1). Set the Centre frequency of the spectrum analyzer to the transmitting frequency;
2). Set the span=0MHz, RBW=1MHz, VBW=1MHz, Sweep time=5ms;
3). Detector = peak;
4). Trace mode = Single hold.

Please refer to Appendix RF Test Data for BLE

5 Test Setup Photos of the EUT

Please refer to separated files for Test Setup Photos of the EUT.

6 Photos of the EUT

Please refer to separated files for External Photos & Internal Photos of the EUT.

********** End of Reprt **********