

TEST REPORT

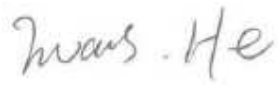
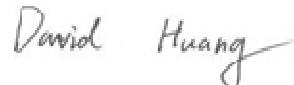
Applicant	SZ Telstar CO.,LTD
Address	Telstar Technology Park No.12~14,Gangbei Industrial Zone, Ailian, Longgang District, ShenZhen

Manufacturer or Supplier	SZ Telstar CO.,LTD
Address	Telstar Technology Park No.12~14,Gangbei Industrial Zone, Ailian, Longgang District, ShenZhen
Product	Remote
Brand Name	N/A
Model	RB01
Additional Model & Model Difference	N/A
Date of tests	Nov. 09 to Nov. 15, 2018

the tests have been carried out according to the requirements of the following standard:

☒ **FCC Part 15, Subpart C, Section 15.247**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Tested by Evans He Project Engineer / EMC Department	Approved by David Huang Supervisor / EMC Department
	
	Date: Nov. 16, 2018

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**BUREAU
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Test Report No.: RF181024N023-2

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF181024N023-2	Original release	Nov. 16, 2018



1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247)			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	N/A	Powered by Battery
15.205 15.209	Radiated Emission	PASS	Meet the requirement of limit.
15.247(d)	Out of band Emission Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used

NOTE: Test Lab Information:

Lab: Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

Test Lab Address: Zone A, Floor 1, Building 2 Wan Ye Long Technology
Park South Side of Zhoushi Road, Bao'an District Shenzhen, Guangdong,
518108, People's Republic of China

2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz~30MHz	3.11dB
Radiated emissions	9KHz ~ 30MHz	3.11dB
	30MHz ~ 1GMHz	5.12dB
	1GHz ~ 18GHz	5.34dB
	18GHz ~ 40GHz	5.20dB

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



3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	Remote
MODEL NO.	RB01
ADDITIONAL MODELS	N/A
FCC ID	2AFOW-RB01MIROIR
NOMINAL VOLTAGE	DC 3V(3V*CR2032*1) from Battery
MODULATION TYPE	BT-LE(GFSK)
MODULATION TECHNOLOGY	DTS
OPERATING FREQUENCY	2402-2480MHz
PEAK OUTPUT POWER	0.603 mW (Maximum)
ANTENNA TYPE	PCB Antenna, 0dBi Gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	TAPEC Line: Unshielded, Detachable 100cm HDMI Line: Unshielded, Detachable 70cm AC Line: Unshielded, Detachable 160cm

NOTE:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. Please refer to the EUT photo document (Reference No.: 181024N023-2) for detailed product photo.



3.2 DESCRIPTION OF TEST MODES

40 channels are provided for BT-LE(GFSK):

CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)	CHANNEL	FREQ. (MHZ)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

3.2.1. CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photographs of the test configuration for reference.

3.2.2. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports

The worst case was found when positioned on Y axis for radiated emission. Following test modes were selected for the final test, and the final worst case is marked in boldface and recorded in the report:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
A	√	√	-	√	Powered by New Battery

Where **RE<1G**: Radiated Emission below 1GHz **RE≥1G**: Radiated Emission above 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery.

**RADIATED EMISSION TEST (BELOW 1GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	39	DTS	GFSK	1

For the test results, only the worst case was shown in test report.

RADIATED EMISSION TEST (ABOVE 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
BT-LE	0 to 39	0,19, 39	DTS	GFSK	1

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	25deg. C, 55%RH	DC 3.0V From New Battery	Evans He
RE≥1G	25deg. C, 55%RH	DC 3.0V From New Battery	Evans He
PLC	N/A	N/A	N/A
APCM	20deg. C, 55%RH	DC 3.0V From New Battery	Aaron Liang



3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C, Section 15.247

558074 D01 DTS Meas Guidance v04

ANSI C63.10-2013

Note: All test items have been performed and recorded as per the above standards.

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	USB_SPI_Tools	CSR	N/A	N/A	N/A
2	Laptop	Lenovo	E40-30	MP05R4Z1	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	Signal Line: Unshielded, Detachable 1.0m
2	Signal Line: Unshielded, Detachable 0.2m



4 TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

Radiated Emissions Limits at 10 meters (dBμV/m)				
Frequencies (MHz)	FCC 15B/ ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	39	29.5	40	30
88-216	43.5	33.1		
216-230	46.4	35.6		
230-960			47	37
960-1000	49.5	43.5		
1000-3000	Avg: 49.5	Avg: 43.5	Not defined	Not defined
Above 3000	Peak: 69.5	Peak: 63.5	Not defined	Not defined

Radiated Emissions Limits at 3 meters (dBµV/m)				
Frequencies (MHz)	FCC 15B / ICES-003, Class A	FCC 15B / ICES-003, Class B	CISPR 22, Class A	CISPR 22, Class B
30-88	49.5	40	50.5	40.5
88-216	54	43.5		
216-230	56.9	46		
230-960			57.5	47.5
960-1000	60	54		
1000-3000	Avg: 60 Peak: 80	Avg: 54 Peak: 74	Avg: 56 Peak: 76	Avg: 50 Peak: 70
Above 3000			Avg: 60 Peak: 80	Avg: 54 Peak: 74



FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

- Note: (1) The lower limit shall apply at the transition frequencies.
(2) Emission level (dBuV/m) = 20 log Emission level (uV/m).
(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



4.1.2 TEST INSTRUMENTS

FREQUENCY RANGE BELOW 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06-1 00262-eQ	Jan. 05, 18	Jan. 04, 19
Bilog Antenna	Sunol Sciences	JB6	A110712	Feb. 08, 18	Feb. 07, 19
Signal Amplifier	HP	8447E	443008	Jan. 25,18	Jan. 24,19
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 19,18	Oct. 18,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

FREQUENCY RANGE ABOVE 1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06-10 0262-eQ	Jan. 05, 18	Jan. 04, 19
MXA signal analyzer	Agilent	N9020A	MY49100060	Jan. 05, 18	Jan. 04, 19
Horn Antenna	COM-POWER	HAH-118	71259	Jan. 26,18	Jan. 25,19
Horn Antenna	COM-POWER	HAH-118	71283	Feb. 02, 18	Feb. 01, 19
AMPLIFIER	EM Electornic Corporation	EM01G26G	60613	Jan. 25,18	Jan. 24,19
AMPLIFIER	Emc Instruments Corporation	Emc012645	980077	Jan. 05, 18	Jan. 04, 19
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 19,18	Oct. 18,21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A	N/A

- NOTES:**
1. The test was performed at 966 Chamber (a 3m Semi-anechoic chamber).
 2. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
 3. FCC Test Firm Registration Number: 749762.



4.1.3 TEST PROCEDURE

<Frequency Range below 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from 1 meter to 4 meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1GHz.
- f. For below 30MHz, a loop antenna with its vertical plane is placed 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the center of the loop shall be 1m above the ground.

NOTE:

1. The resolution bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
3. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) (if the raw value not contains the amplifier)
4. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB) – Amplifier Gain(dB) (if the raw value contains the amplifier)
5. Margin value = Emission level – Limit value



<Frequency Range above 1GHz>

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna can be varied from one meter-to four meters, the height of adjustment depends on the EUT height and the antenna 3dB beamwidth both, to detect the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement. The bore sight should be used during the test above 1GHz.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test receiver/spectrum was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

NOTE:

1. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz for Average detection (AV) at frequency above 1GHz.
2. For measurement of frequency above 1000 MHz, the EUT was set 3 meters away from the receiver antenna.
3. $\text{Emission level(dBuV/m)} = \text{Raw Value(dBuV)} + \text{Correction Factor(dB/m)}$
4. $\text{Correction Factor(dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)}$ (if the raw value not contains the amplifier)
5. $\text{Correction Factor (dB/m)} = \text{Antenna Factor (dB/m)} + \text{Cable Factor (dB)} - \text{Amplifier Gain(dB)}$ (if the raw value contains the amplifier).
6. $\text{Margin value} = \text{Emission level} - \text{Limit value}$

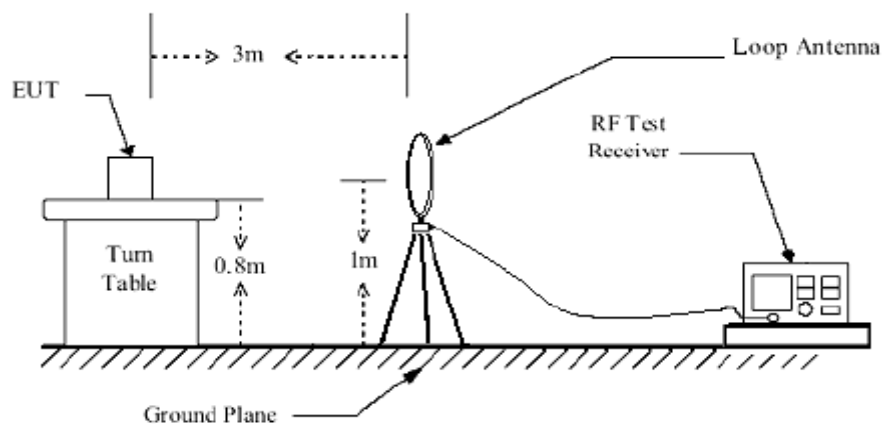
4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

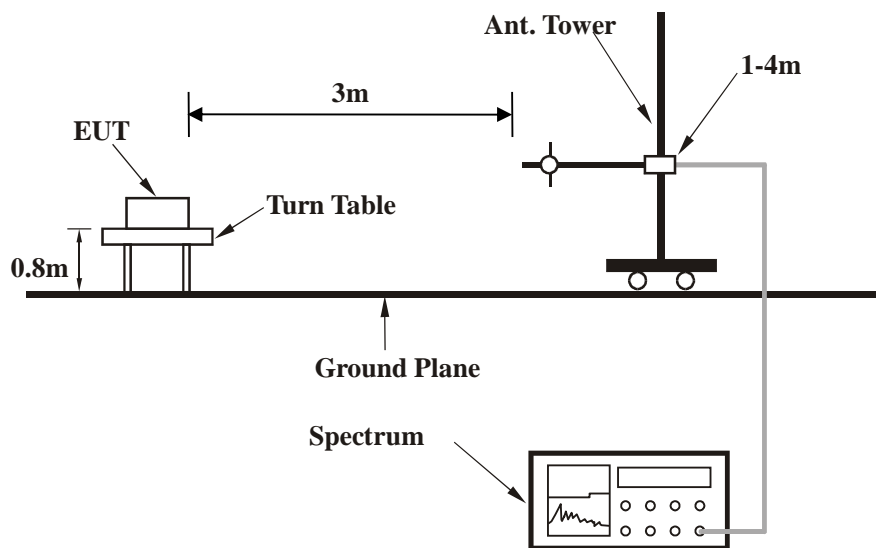


4.1.5 TEST SETUP

Below 30MHz test setup

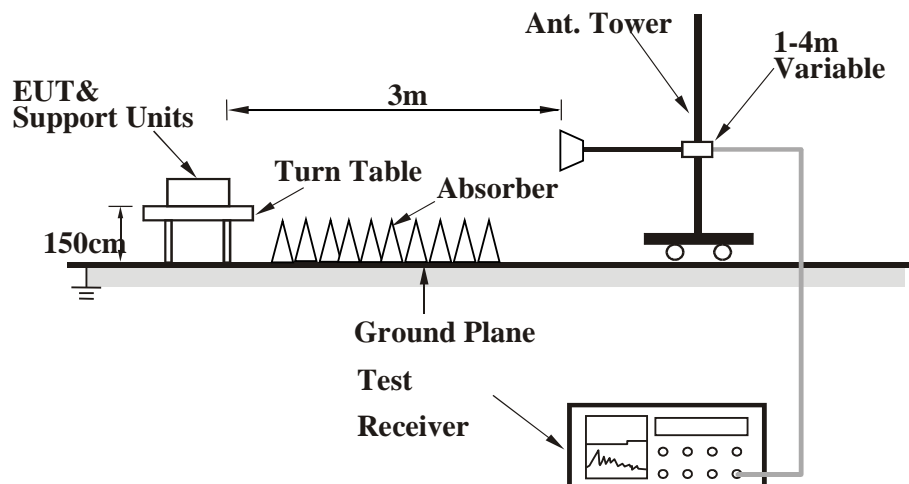


Below 1GHz test setup



Note: For the actual test configuration, please refer to the attached file (Test Setup Photo).

Above 1GHz test setup



Note: For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT OPERATING CONDITIONS

- Set the EUT under full load condition and placed them on a testing table.
- Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the EUT in full functions.



4.1.7 TEST RESULTS

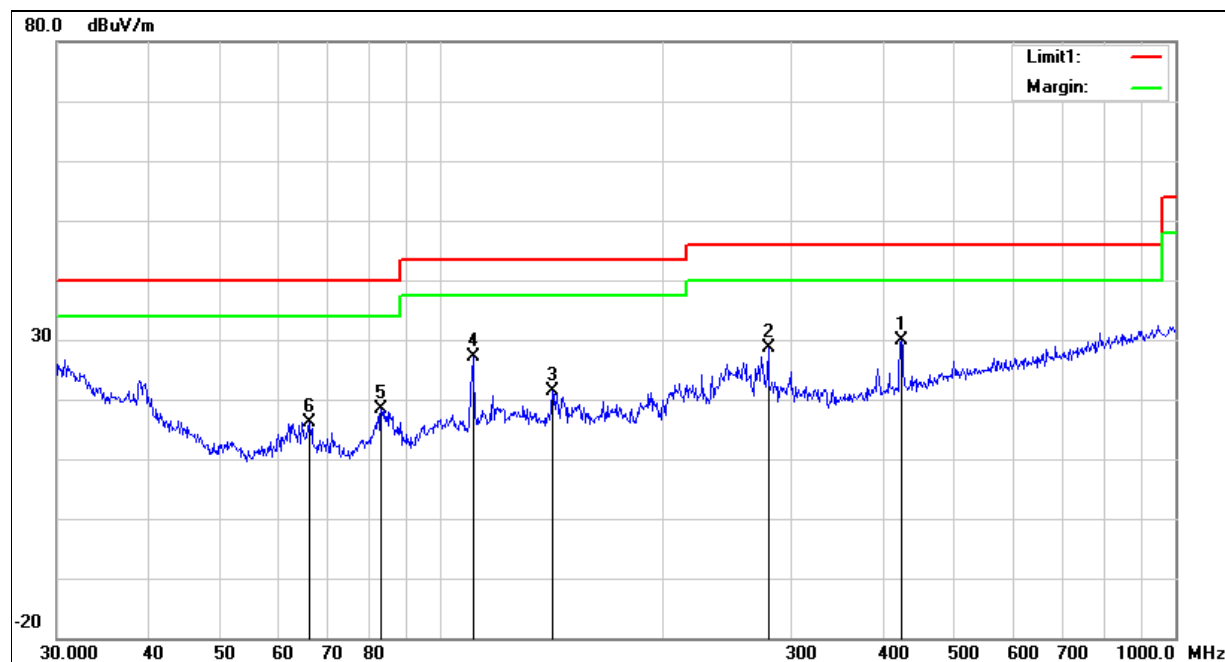
BELOW 1GHz WORST-CASE DATA:

BT-LE (GFSK)

CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	423.5403	33.50	16.17	21.96	2.07	29.78	46.00	-16.22	100	121
2	279.0436	36.51	12.68	22.29	1.75	28.65	46.00	-17.35	100	70
3	141.8262	29.84	12.60	22.40	1.28	21.32	43.50	-22.18	100	4
4	110.5687	36.08	12.25	22.34	1.17	27.16	43.50	-16.34	100	352
5	82.9385	32.06	7.72	22.39	1.06	18.45	40.00	-21.55	100	213
6	66.2662	30.09	7.61	22.39	0.91	16.22	40.00	-23.78	100	303

- REMARKS:** 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. The emission levels of other frequencies were less than 20dB margin against the limit.

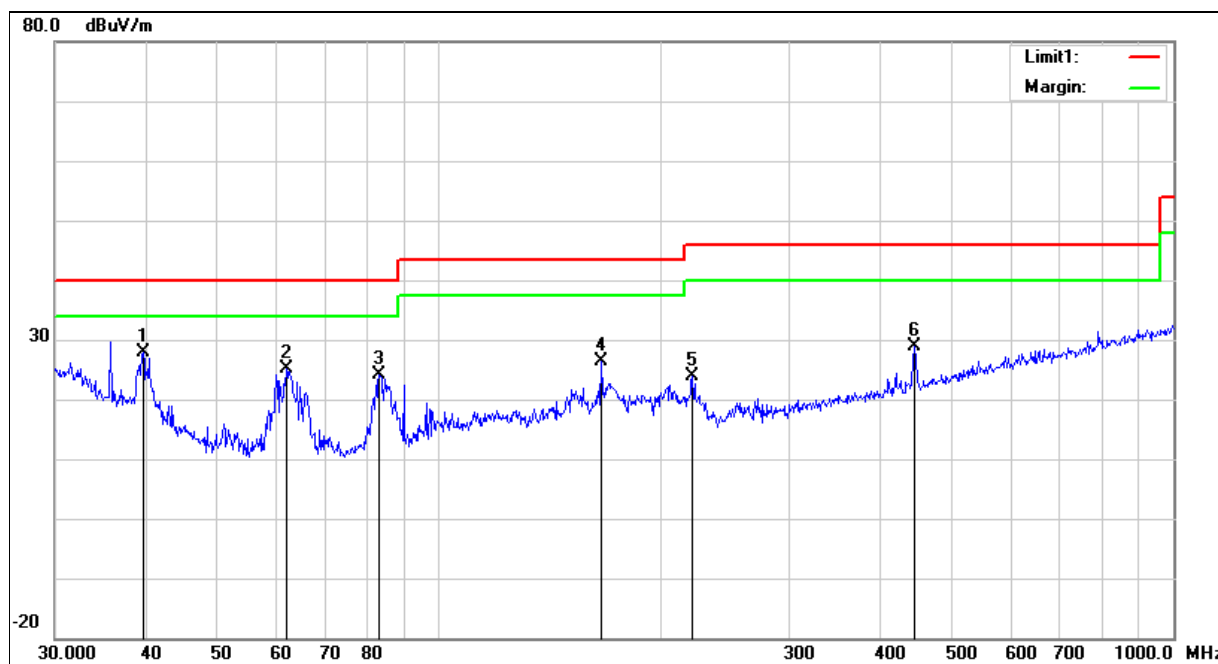




CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL at 3 m										
No.	Frequency (MHz)	Reading (dBuV/m)	Ant_F (dB/m)	PA_G (dB)	Cab_L (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Height (cm)	Degree (°)
1	39.5757	35.07	14.21	22.28	0.79	27.79	40.00	-12.21	100	248
2	61.9951	39.24	7.40	22.40	0.80	25.04	40.00	-14.96	200	220
3	82.9385	37.74	7.72	22.39	1.06	24.13	40.00	-15.87	100	172
4	166.6514	35.14	12.07	22.26	1.37	26.32	43.50	-17.18	100	95
5	221.3921	32.87	11.80	22.34	1.61	23.94	46.00	-22.06	100	310
6	443.2943	32.10	16.57	21.92	2.11	28.86	46.00	-17.14	100	273

- REMARKS:** 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. The emission levels of other frequencies were less than 20dB margin against the limit.





ABOVE 1GHz TEST DATA:

BT-LE (GFSK)

CHANNEL	TX Channel 0	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

Frequency (MHz)	Read_level (dBμV/m)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dBμV/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4804	44.8	AV	V	33.39	7.22	48.46	36.95	54	-17.05
4804	46.43	AV	H	33.39	7.22	48.46	38.58	54	-15.42
4804	57.75	PK	V	33.39	7.22	48.46	49.9	74	-24.1
4804	54.94	PK	H	33.39	7.22	48.46	47.09	74	-26.91
7865	34.13	AV	V	38.17	8.72	47.86	33.16	54	-20.84
7865	31.53	AV	H	38.17	8.72	47.86	30.56	54	-23.44
7865	49.06	PK	V	38.17	8.72	47.86	48.09	74	-25.91
7865	48.21	PK	H	38.17	8.72	47.86	47.24	74	-26.76
2390	48.6	AV	V	30	4.94	47.09	36.45	54	-17.55
2390	46.6	AV	H	30	4.94	47.09	34.45	54	-19.55
2390	49.3	PK	V	30	4.94	47.09	37.15	74	-36.85
2390	51.6	PK	H	30	4.94	47.09	39.45	74	-34.55

- REMARKS:** 1. Peak detector quick scan is showed on the graph and final quasi-peak detector data is measured corresponding to relevant limit and recorded in the data table.
2. Negative sign (-) in the margin column signify levels below the limit.
3. Only emissions significantly above equipment noise floor are reported.
4. Margin value = Cord.Amp. – Limit value.



CHANNEL	TX Channel 19	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

Frequency (MHz)	Read_level (dBμV/m)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dBμV/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4880	42.6	AV	V	33.62	7.53	48.36	35.39	54	-18.61
4880	46.02	AV	H	33.62	7.53	48.36	38.81	54	-15.19
4880	59.02	PK	V	33.62	7.53	48.36	51.81	74	-22.19
4880	56.39	PK	H	33.62	7.53	48.36	49.18	74	-24.82
8777	37.94	AV	V	38.81	9.6	49.15	37.2	54	-16.8
8777	31.57	AV	H	38.81	9.6	49.15	30.83	54	-23.17
8777	46.57	PK	V	38.81	9.6	49.15	45.83	74	-28.17
8777	49.36	PK	H	38.81	9.6	49.15	48.62	74	-25.38

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).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.



CHANNEL	TX Channel 39	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

Frequency (MHz)	Read_level (dBμV/m)	Detector (PK/AV)	Polarity (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dBμV/m)	Cord. Amp. (dBμV/m)	Limit (dBμV/m)	Margin (dB)
4960	45.86	AV	V	33.89	7.86	48.31	39.3	54	-14.7
4960	43.88	AV	H	33.89	7.86	48.31	37.32	54	-16.68
4960	52.94	PK	V	33.89	7.86	48.31	46.38	74	-27.62
4960	55.14	PK	H	33.89	7.86	48.31	48.58	74	-25.42
17856	14.04	AV	V	42.34	19.63	44.9	31.11	54	-22.89
17856	14.13	AV	H	42.34	19.63	44.9	31.2	54	-22.8
17856	33.28	PK	V	42.34	19.63	44.9	50.35	74	-23.65
17856	38.91	PK	H	42.34	19.63	44.9	55.98	74	-18.02
2483.5	45.7	AV	V	29.98	5.83	47.51	34	54	-20
2483.5	39.5	AV	H	29.98	5.83	47.51	27.8	54	-26.2
2483.5	50.6	PK	V	29.98	5.83	47.51	38.9	74	-35.1
2483.5	49.7	PK	H	29.98	5.83	47.51	38	74	-36

REMARKS:

1. Emission level (dBμV/m) = Raw Value (dBμV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Cord. Amp. – Limit value.



4.2 6dB BANDWIDTH MEASUREMENT

4.2.1 LIMITS OF 6dB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

4.2.2 TEST INSTRUMENTS

Instrument	Model	Serial #	Cal Date	Cal Due
DC Power Supply	E3640A	MY40004013	01/05/2018	01/04/2019
MXA Signal Analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
MXG Vector Signal Generator	N5182A	MY50140530	01/05/2018	01/04/2019
Series Signal Generator	E4421B	US40051152	05/12/2018	05/11/2019
RF control unit	JS0806-0806-2	188060112	04/25/2018	04/24/2019
Wireless Connectivity Tester	CMW270	1201.0002K75-101601-PE	04/25/2018	04/24/2019
Weinschel	1580-1	TL177	01/05/2018	01/04/2019
Universal Radio Communica	CMU200	121393	02/11/2018	02/10/2019

NOTE:

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

4.2.3 TEST PROCEDURE

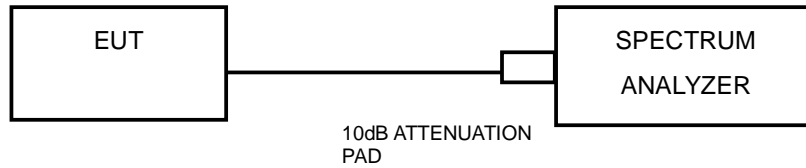
1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) \geq 3 RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation.



4.2.5 TEST SETUP



4.2.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

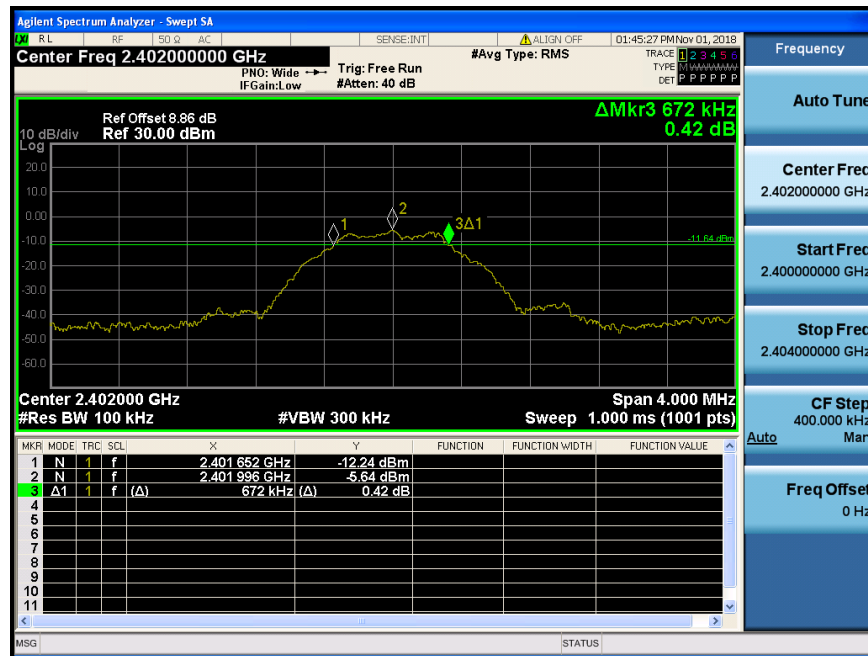


4.2.7 TEST RESULTS

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.672	0.5	PASS
19	2440	0.672	0.5	PASS
39	2480	0.684	0.5	PASS

WORST PLOT



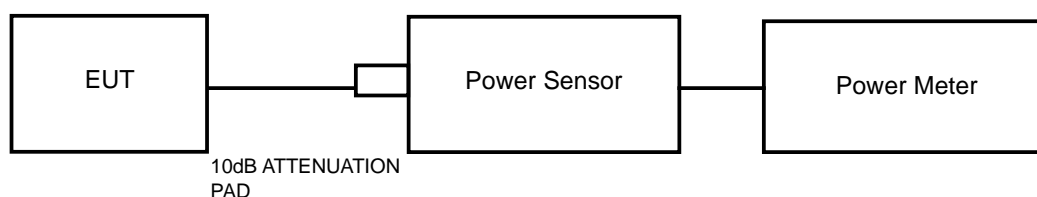


4.3 CONDUCTED OUTPUT POWER

4.3.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

For systems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm)

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Instrument	Model	Serial #	Cal Date	Cal Due
DC Power Supply	E3640A	MY40004013	01/05/2018	01/04/2019
MXA Signal Analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
MXG Vector Signal Generator	N5182A	MY50140530	01/05/2018	01/04/2019
Series Signal Generator	E4421B	US40051152	05/12/2018	05/11/2019
RF control unit	JS0806-0806-2	188060112	04/25/2018	04/24/2019
Wireless Connectivity Tester	CMW270	1201.0002K75-101601-PE	04/25/2018	04/24/2019
Weinschel	1580-1	TL177	01/05/2018	01/04/2019
Universal Radio Communica	CMU200	121393	02/11/2018	02/10/2019

NOTE:

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.

4.3.4 TEST PROCEDURES

A peak sensor was used on the output port of the EUT. A peak power meter was used to read the response of the peak power sensor. Record the peak power level.



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4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.



4.3.7 TEST RESULTS

MAXIMUM OUTPUT POWER

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
0	2402	-3.85	0.41	1	PASS
19	2440	-2.40	0.575	1	PASS
39	2480	-2.20	0.603	1	PASS

AVERAGE OUTPUT POWER (FOR REFERENCE)

The average power sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

BT-LE (GFSK)

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)
0	2402	-6.48	0.225
19	2440	-6.86	0.206
39	2480	-7.13	0.194

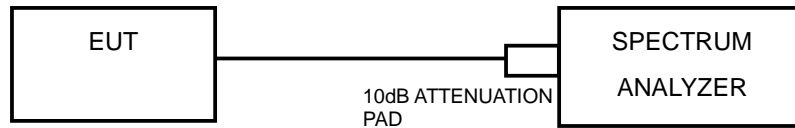


4.4 POWER SPECTRAL DENSITY MEASUREMENT

4.4.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

4.4.4 TEST PROCEDURE

- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 times the DTS Bandwidth.
- Set RBW to: 3KHz
- Set VBW $\geq 3 \times$ RBW.
- Detector = peak
- Ensure that the number of measurement points in the sweep $\geq 2 \times$ span/RBW.
- Sweep time = auto couple.
- Use the peak marker function to determine the maximum amplitude level.

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

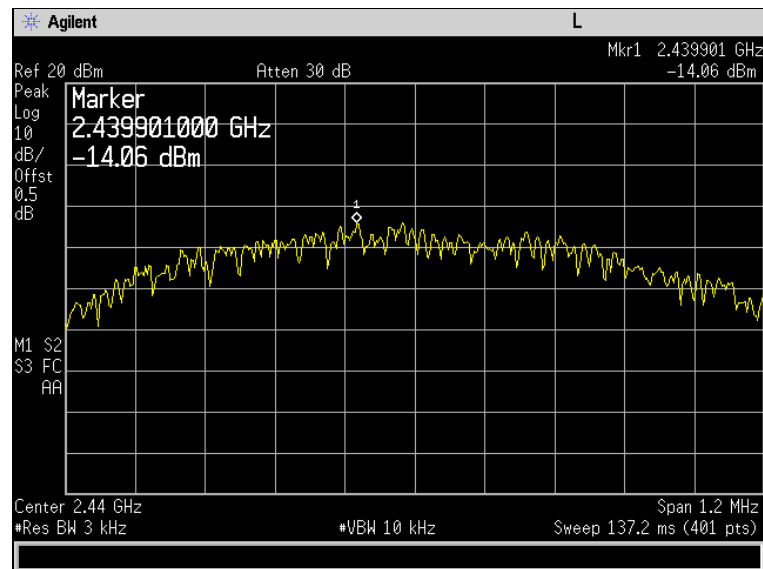


4.4.7 TEST RESULTS

BT-LE (GFSK)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-17.36	8	PASS
19	2440	-14.06	8	PASS
39	2480	-15.19	8	PASS

WORSE PLOT



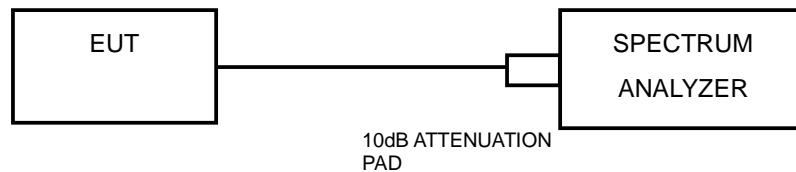


4.5 OUT OF BAND EMISSION MEASUREMENT

4.5.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.3.3 to get information of above instrument.

4.5.4 TEST PROCEDURE

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW \geq 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.



MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW \geq 300 kHz.
3. Set span to encompass the spectrum to be examined
4. Detector = peak.
5. Trace Mode = max hold.
6. Sweep = auto couple.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

4.5.6 EUT OPERATING CONDITION

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

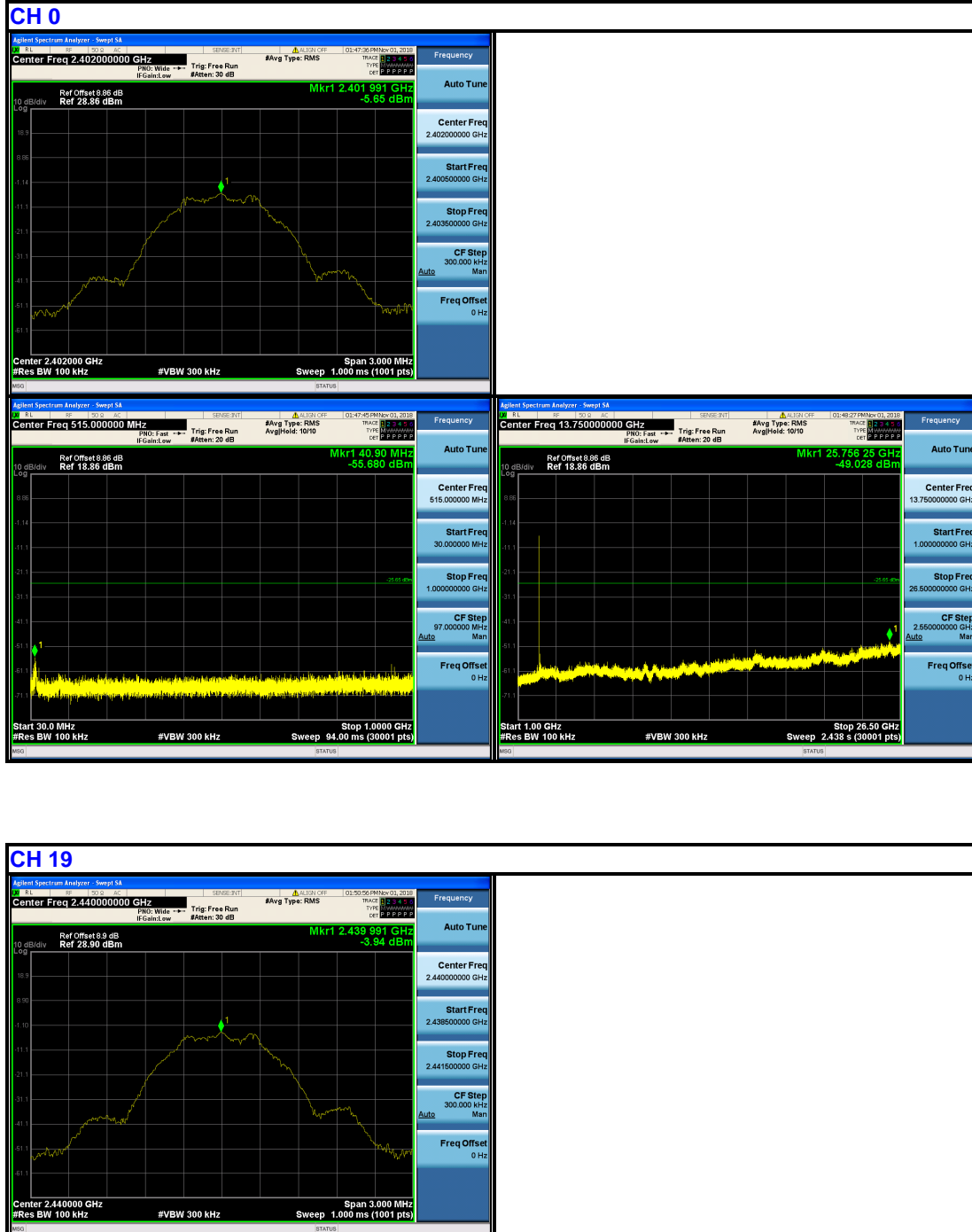


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4.5.7 TEST RESULTS

BT-LE (GFSK)



Bureau Veritas Shenzhen Co., Ltd.
Dongguan Branch

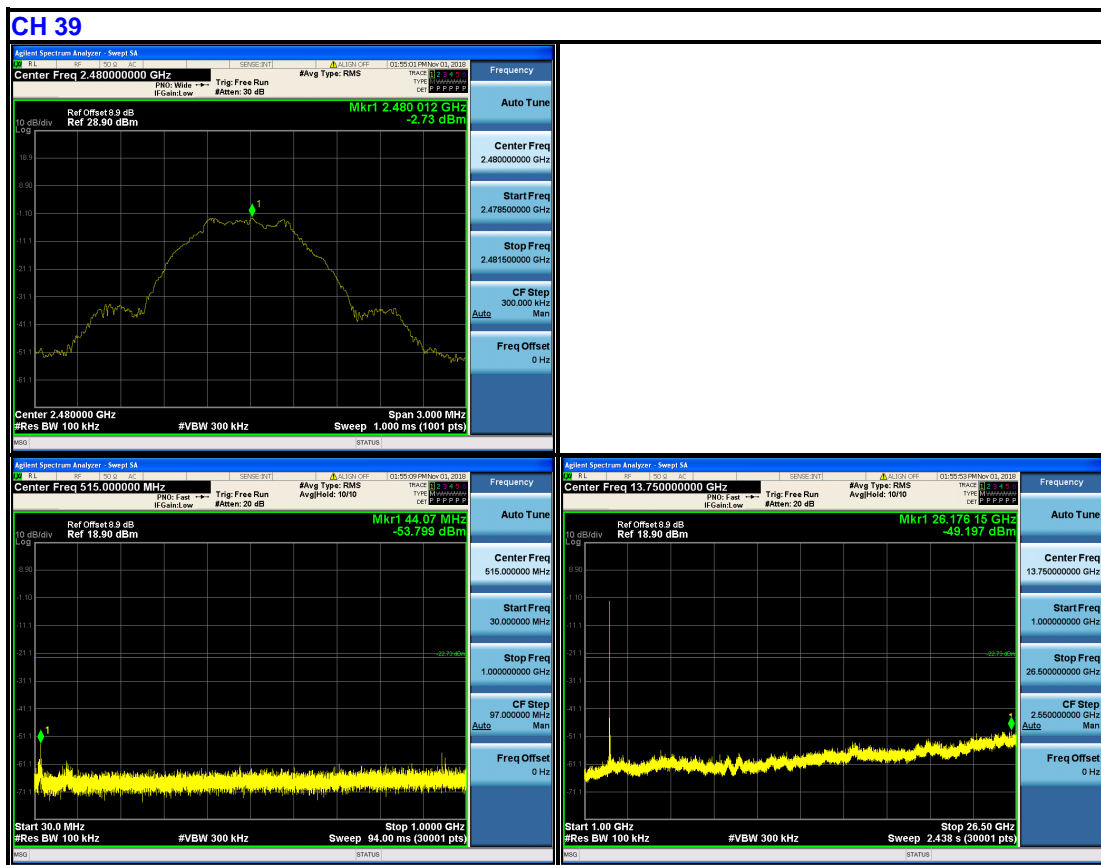
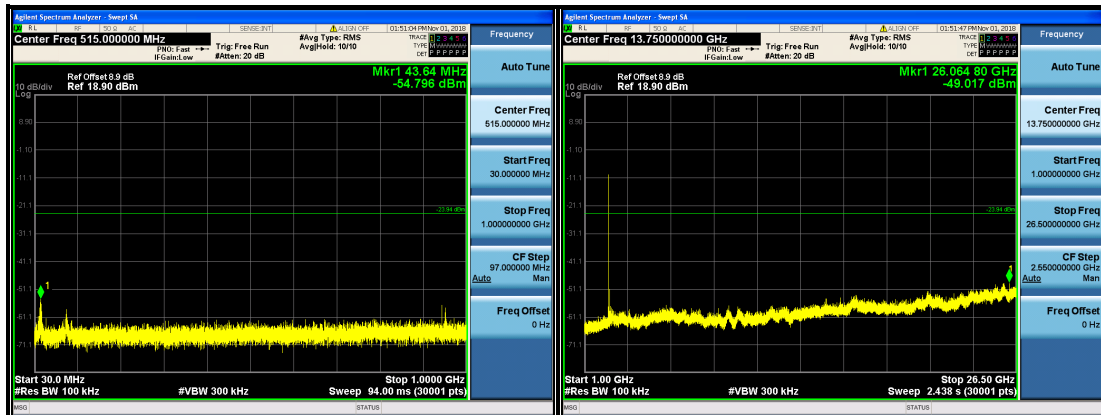
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Guangdong 523942, China

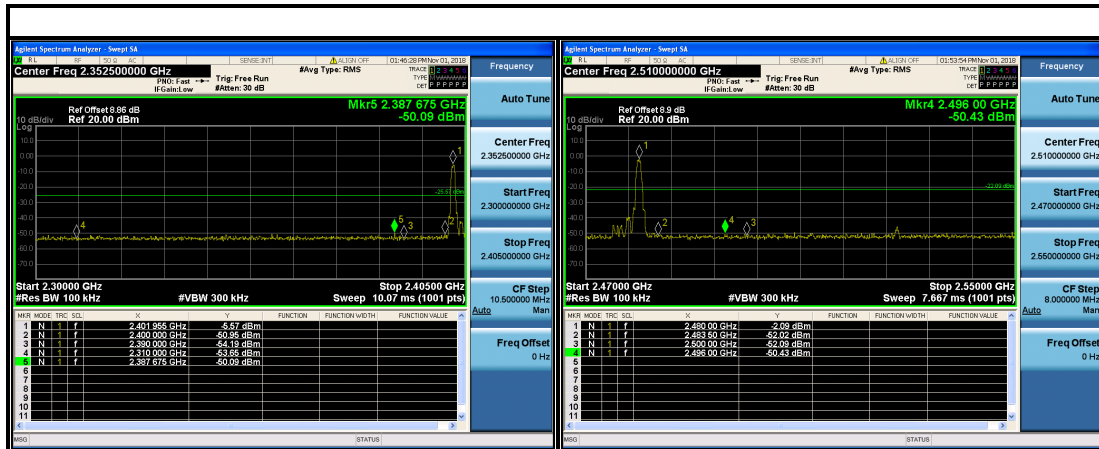
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Band Edge:



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5 PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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6 APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---