TEST REPORT

Applicant	The House of Marley.LLC
Address	3000 Pontiac Trail, Commerce Township, Michigan 48390 United States

Manufacturer or Supplier	The House of Marley.LLC
Address	3000 Pontiac Trail, Commerce Township, Michigan 48390 United States
Product	GET TOGETHER MINI
Brand Name	
Model	EM-JA013A
Additional Model & Model Difference	N/A
Date of tests	Mar. 19, 2021 ~ Apr. 19, 2021

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 Aaron Liang Project Engineer / EMC Department	Approved by David Huang Supervisor / EMC Department
Aaron Liang	David Huang Date: Apr. 21, 2021

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF2103WSZ0060-2	Original release	Apr. 21, 2021

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	PASS	Meet the requirement of limit.
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: 1. Test Lab Information:

Lab A: 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

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

Test Lab Address: No. 96, Guantai Road (Houjie Section), Houjie Town, Dongguan City, Guangdong Province. 523942. People's Republic of China.

2. Except for Radiated Emission, which is tested in Lab B, the others are tested in Lab A.

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
Radiated emissions	9kHz~30MHz	2.16dB
	30MHz ~ 1GMHz	3.74dB
	1GHz ~ 18GHz	4.66dB
	18GHz ~ 40GHz	4.67dB

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	GET TOGETHER MINI
MODEL NO.	EM-JA013A
ADDITIONAL MODELS	N/A
FCC ID	PVB-GTMINIA
NOMINAL VOLTAGE	DC 7.4V from Li-ion Battery or DC 5V from USB
MODULATION TECHNOLOGY	DTS
MODULATION TYPE	BT-LE GFSK
OPERATING FREQUENCY	2402-2480MHz
PEAK OUTPUT POWER	1.384 mW (Max. Measured)
ANTENNA TYPE	FPC Antenna, 1.6dBi Gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Line: Unshielded Detachable 1.1m

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.: 2103WSZ0060) for detailed product photo.
4. Wireless function can not be used normally when the product charging.
5. The EUT was powered by the following adapter:

Adapter	
BRAND:	N/A
MODEL:	ASSA107w-050200
INPUT:	AC 100-240V, 50/60Hz 0.45A
OUTPUT:	DC 5.0V, 2.0A 10.0W
DC LINE:	Unshielded, Detachable 1.1m

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 X 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	√	√	√	√	DC 5V from Adapter

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

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	BT-LE	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	BT-LE	1

POWER LINE CONDUCTED EMISSION TEST:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channels 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	BT-LE	1

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates 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	BT-LE	1

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	24deg. C, 53%RH	DC 5V from Adapter	Aaron Liang
RE≥1G	25deg. C, 55%RH	DC 5V from Adapter	Aaron Liang
PLC	25deg. C, 60%RH	DC 5V from Adapter	Aaron Liang
APCM	22deg. C, 55%RH	DC 5V from Adapter	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 15.247 Meas Guidance v05r02

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	N/A	N/A	N/A	N/A	N/A

NO.	DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	N/A

4 TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 to 56	56 to 46
0.5 ~ 5	56	46
5 ~ 30	60	50

NOTE: 1.The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

3. All emanations 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

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESCS30	8471241027	Mar. 10, 22
Artificial Mains Network	SCHWARZBECK	8127	8127713	Mar. 10, 22
ISN	Com-Power	ISN T800	34373	Mar. 10, 22
Test software	EZ-EMC	ICP-03A1	N/A	N/A

NOTE:

1. The test was performed in shielded room 843.
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.

4.1.3 TEST PROCEDURES

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

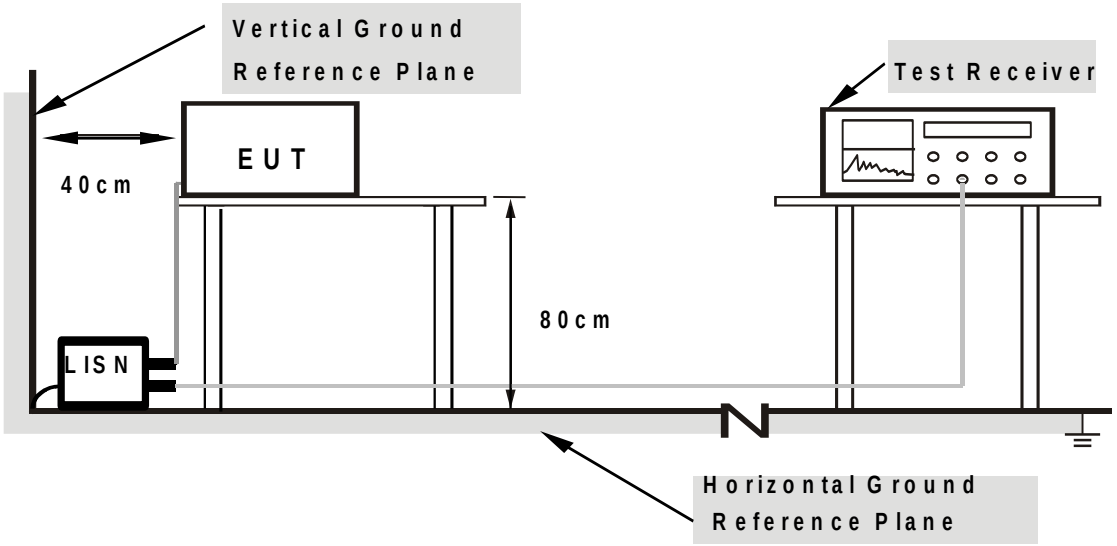
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

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

4.1.6 EUT OPERATING CONDITIONS

a. Turned on the power and connected of all equipment.
b. EUT was operated according to the type used was description in manufacturer's specifications or the User's Manual.

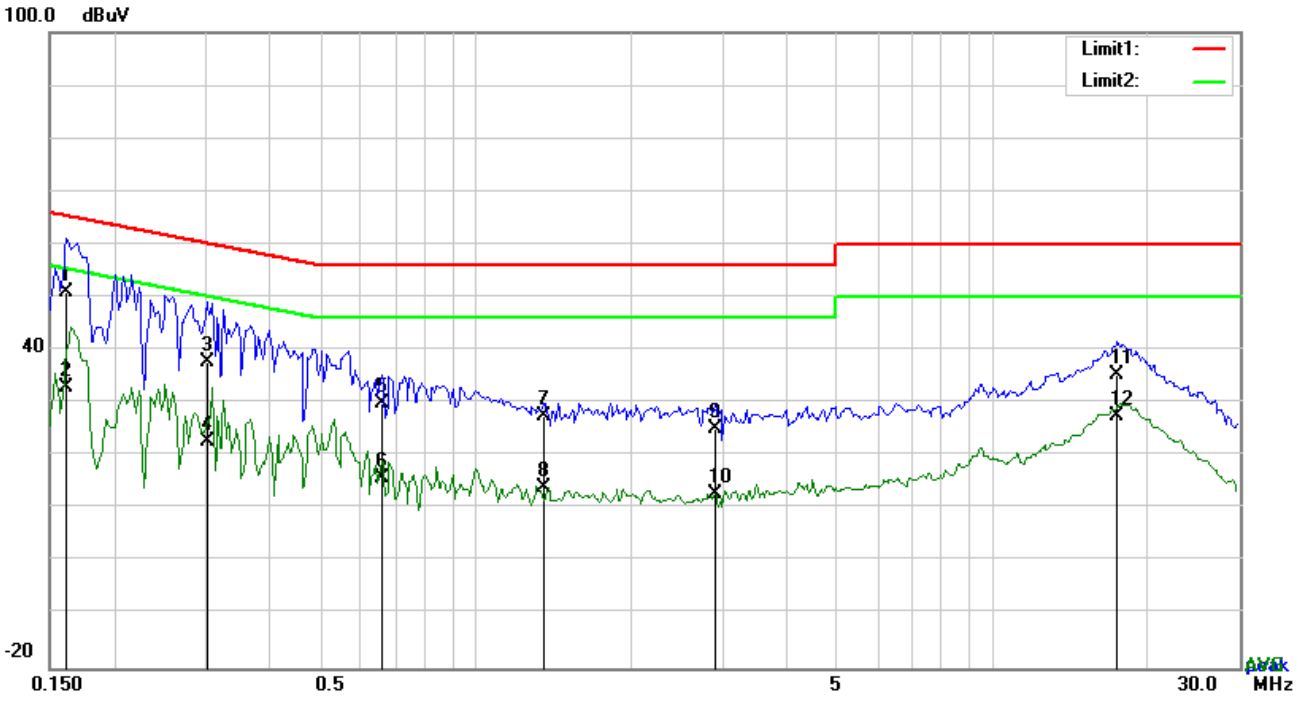
4.1.7 TEST RESULTS

CONDUCTED WORST-CASE DATA:

PHASE	Line	6dB BANDWIDTH	9kHz

NO.	P/L	FREQUENCY (MHZ)	READING (DBUV)	DETECTOR	CORRECTED (DB}	RESULT (DBUV)	LIMIT (DBUV)	MARGIN (DB)
1	L1	0.1617	40.82	QP	10.17	50.99	65.38	-14.39
2	L1	0.1617	22.84	AVG	10.17	33.01	55.38	-22.37
3	L1	0.3021	27.70	QP	10.17	37.87	60.18	-22.31
4	L1	0.3021	12.73	AVG	10.17	22.90	50.18	-27.28
5	L1	0.6609	19.78	QP	10.18	29.96	56.00	-26.04
6	L1	0.6609	5.81	AVG	10.18	15.99	46.00	-30.01
7	L1	1.3590	17.40	QP	10.21	27.61	56.00	-28.39
8	L1	1.3590	3.83	AVG	10.21	14.04	46.00	-31.96
9	L1	2.9112	14.99	QP	10.25	25.24	56.00	-30.76
10	L1	2.9112	2.51	AVG	10.25	12.76	46.00	-33.24
11	L1	17.4105	24.75	QP	10.67	35.42	60.00	-24.58
12	L1	17.4105	16.92	AVG	10.67	27.59	50.00	-22.41

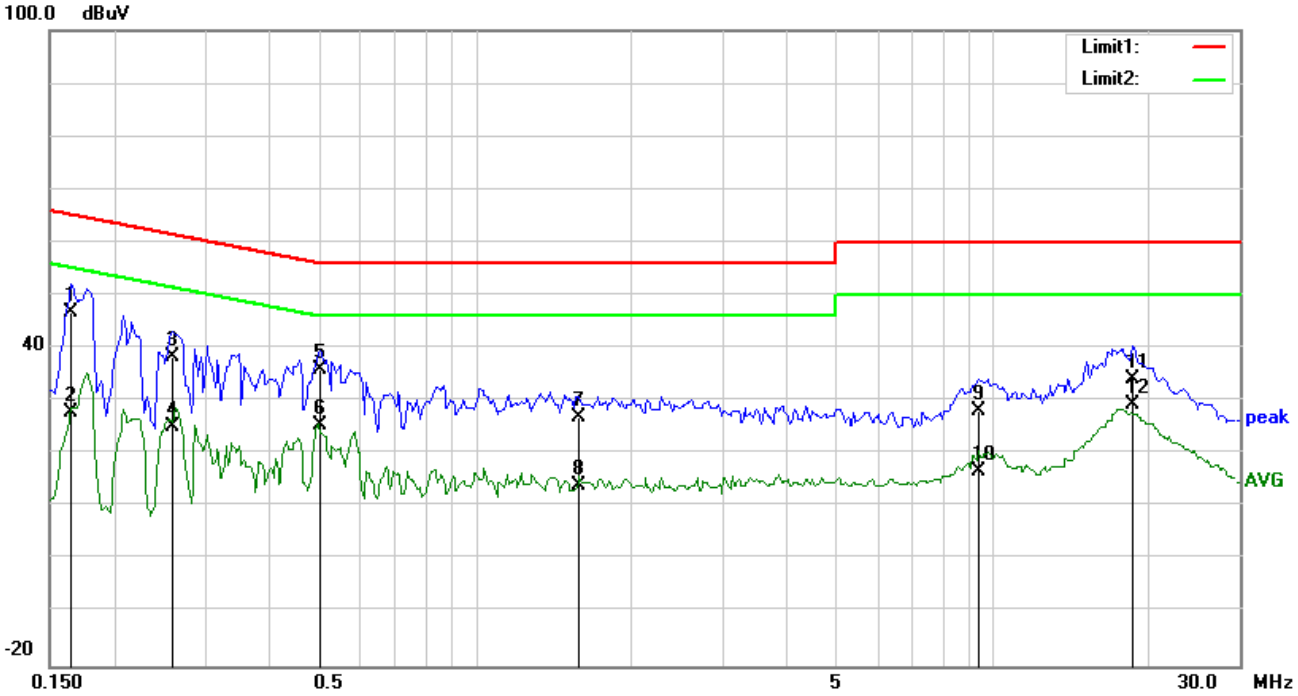
REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



PHASE	Neutral	6dB BANDWIDTH	9kHz

NO.	P/L	FREQUENCY (MHZ)	READING (DBUV)	DETECTOR	CORRECTED (DB}	RESULT (DBUV)	LIMIT (DBUV)	MARGIN (DB)
1	N	0.1656	36.52	QP	10.14	46.66	65.18	-18.52
2	N	0.1656	17.79	AVG	10.14	27.93	55.18	-27.25
3	N	0.2592	28.25	QP	10.15	38.40	61.46	-23.06
4	N	0.2592	15.00	AVG	10.15	25.15	51.46	-26.31
5	N	0.5010	25.74	QP	10.17	35.91	56.00	-20.09
6	N	0.5010	15.37	AVG	10.17	25.54	46.00	-20.46
7	N	1.5852	16.70	QP	10.26	26.96	56.00	-29.04
8	N	1.5852	3.71	AVG	10.26	13.97	46.00	-32.03
9	N	9.3804	17.62	QP	10.63	28.25	60.00	-31.75
10	N	9.3804	6.25	AVG	10.63	16.88	50.00	-33.12
11	N	18.6702	23.32	QP	10.83	34.15	60.00	-25.85
12	N	18.6702	18.49	AVG	10.83	29.32	50.00	-20.68

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 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).

FREQUENCIES (MHz)	FIELD STRENGTH (microvolts/meter)	MEASUREMENT DISTANCE (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

4.2.2 TEST INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESL6	1300.5001K06 -100262-eQ	Mar. 10, 22
Bilog Antenna	Sunol Sciences	JB6	A110712	Jul. 21, 21
Active Antenna	CMO-POWER	AL-130	121031	Jun. 30, 21
Signal Amplifier	HP	8447E	443008	Mar. 10, 22
Signal and Spectrum Analyzer	R&S	FSV40	101094	Mar. 19, 22
MXA signal analyzer	Agilent	N9020A	MY49100060	Mar. 24, 22
Horn Antenna	COM-POWER	AH-118	71259	Apr. 17, 21
Horn Antenna	COM-POWER	AH-118	71283	Jul. 21, 21
SHF-EHF Horn	Schwarzbeck	BBHA9170	BBHA9170147	May 10, 21
SHF-EHF Horn	Schwarzbeck	BBHA9170	BBHA9170242	May 10, 21
SHF-EHF Horn	Schwarzbeck	BBHA 9170	01023	Dec. 26, 21
SHF-EHF Horn	Schwarzbeck	BBHA 9170	01024	Dec. 26, 21
AMPLIFIER	EM Electornic Corporation	EM01G26G	60613	Mar. 10, 22
Pre-amplifier	Rohde&Schwarz	SCU40	100437	Nov. 17, 21
3m Semi-anechoic Chamber	SAEMC	9m*6m*6m	N/A	Oct. 17, 21
Frequency Analyzer	Keysight	N9010B	MY60240432	Dec. 22, 21
Test Software	EZ-EMC	ICP-03A1	N/A	N/A

NOTE:

1. The test was performed in 966 Chamber.
2. The calibration interval of the above test instruments is 12 months (Except 3m Semi-anechoic Chamber). And the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above1GHz if tested.
4. The FCC Site Registration No. is 535293.

4.2.3 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 1.5 meters (above 1GHz) and 0.8 meters (below 1GHz) above the ground at a 3 meters semi-anechoic chamber. 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. For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

f. For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.

g. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

4.All modes of operation were investigated and the worst-case emissions are reported.

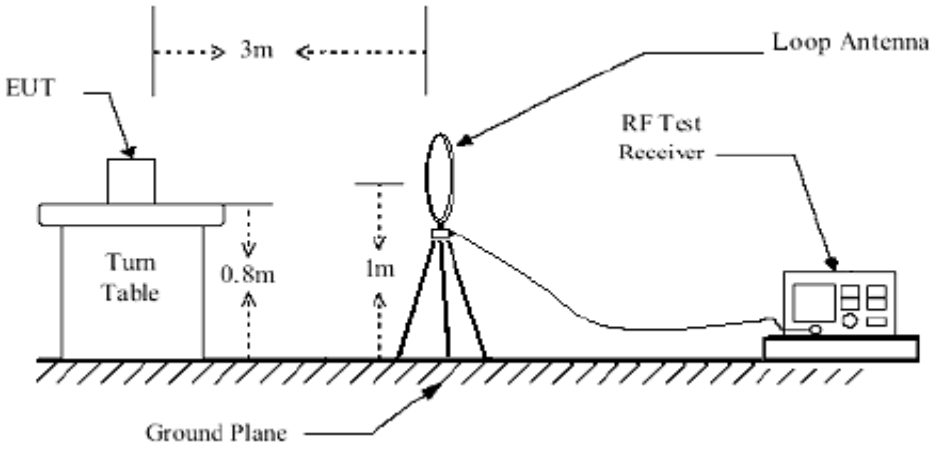
5.The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

4.2.4 DEVIATION FROM TEST STANDARD

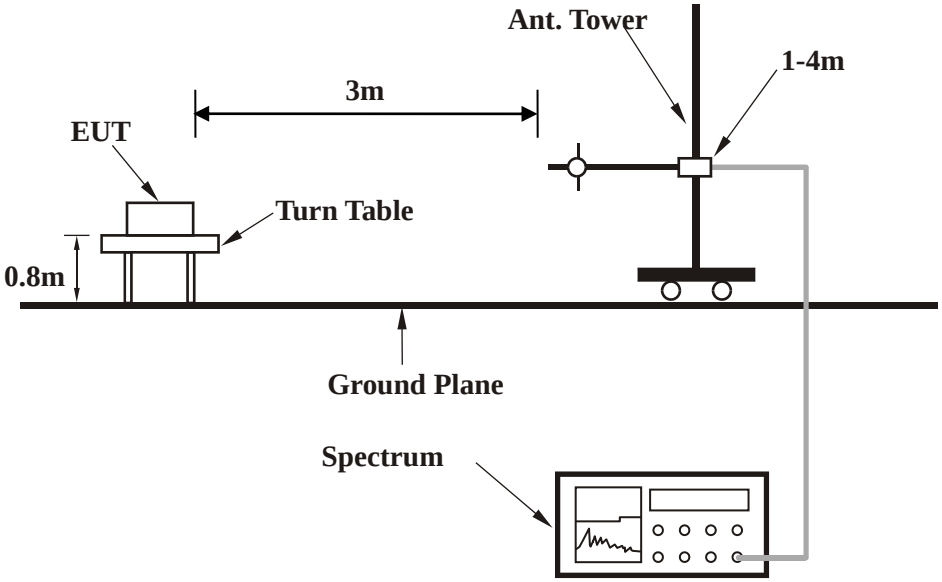
No deviation.

4.2.5 TEST SETUP

Below 30MHz test setup

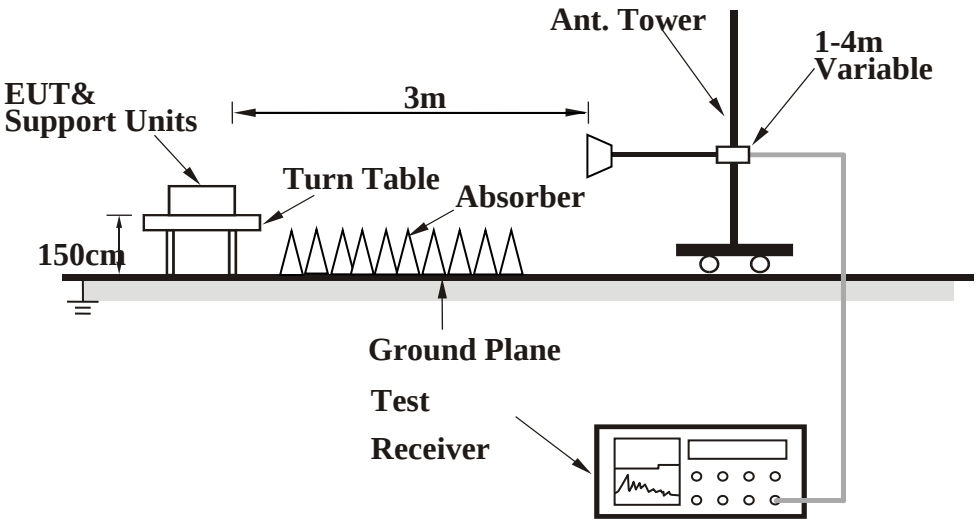


Below 1GHz test setup



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).

4.2.6 EUT OPERATING CONDITIONS

a. Set the EUT under full load condition and placed them on a testing table.

b. Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

c. The necessary accessories enable the EUT in full functions.

4.2.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA:

BT-LE GFSK (1 Mbps)

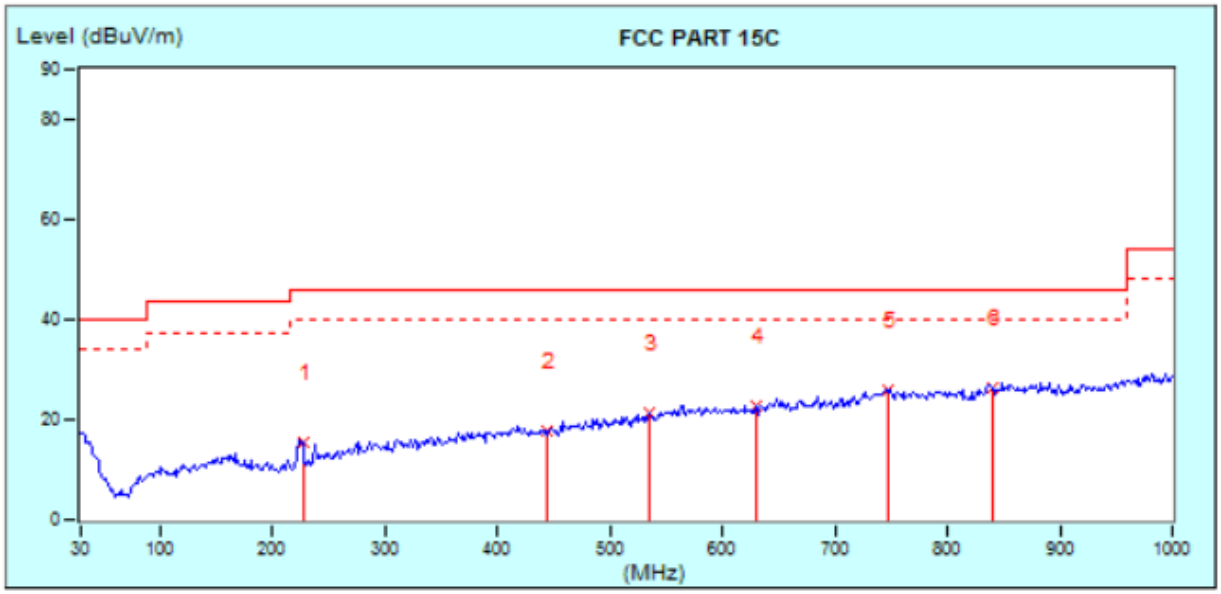
CHANNEL	TX Channel 39	**DETECTOR FUNCTION**	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 m

	No.	Frequency	Factor	Reading	Emission	Limit	Margin	Tower	Table
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
	1	227.42	-18.88	34.45	15.57	46.00	-30.43	100	0
	2	445.05	-10.62	28.45	17.83	46.00	-28.17	100	0
	3	535.21	-8.22	29.74	21.52	46.00	-24.48	100	0
	4	630.03	-6.15	29.10	22.95	46.00	-23.05	100	0
	5	748.17	-3.42	29.42	26.00	46.00	-20.00	100	9
*	6	839.89	-2.28	28.58	26.30	46.00	-19.70	100	21

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.



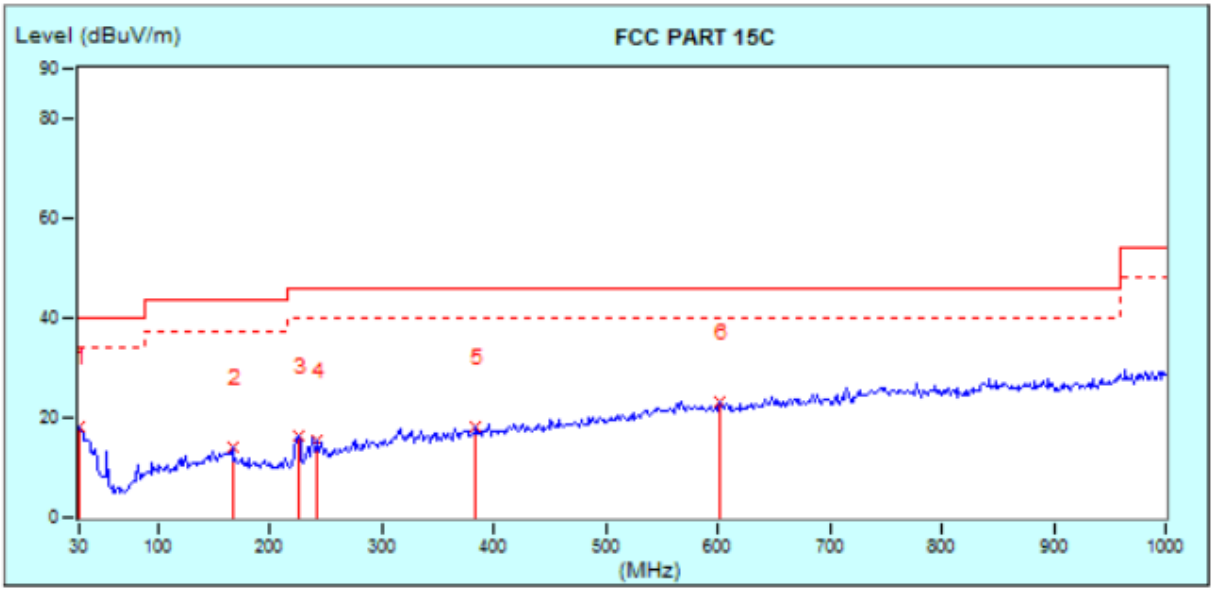
CHANNEL	TX Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9KHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 m

No.		Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
*	1	30.00	-12.06	30.05	17.99	40.00	-22.01	100	0
	2	166.79	-17.60	31.62	14.02	43.50	-29.48	100	0
	3	225.87	-19.06	35.31	16.25	46.00	-29.75	100	0
	4	242.96	-17.14	32.54	15.40	46.00	-30.60	100	0
	5	384.42	-11.77	29.75	17.98	46.00	-28.02	100	0
	6	602.05	-8.59	29.62	23.03	46.00	-22.97	100	0

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. 9KHz~30MHz have been test and test data more than 20dB margin.
5. Margin value = Emission level – Limit value.



ABOVE 1GHz TEST DATA:

BT-LE GFSK (1 Mbps)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

	No.	Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
	1	2390.00 (PK)	5.06	41.52	46.58	74.00	-27.42	100	177
	2	2390.00 (AV)	5.06	32.52	37.58	54.00	-16.42	100	177
i	3	2402.00 (PK)	5.13	95.28	100.41	74.00	26.41	100	177
*i	4	2402.00 (AV)	5.13	94.25	99.38	54.00	45.38	100	177
	5	4804.00 (PK)	10.61	44.08	54.69	74.00	-19.31	100	0
	6	4804.00 (AV)	10.61	30.67	41.28	54.00	-12.72	100	0
	7	7206.00 (PK)	16.87	40.92	57.79	74.00	-16.21	100	0
	8	7206.00 (AV)	16.87	26.49	43.36	54.00	-10.64	100	0

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

	No.	Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
	1	2390.00 (PK)	5.06	40.19	45.25	74.00	-28.75	100	144
	2	2390.00 (AV)	5.06	31.25	36.31	54.00	-17.69	100	144
i	3	2402.00 (PK)	5.13	92.63	97.76	74.00	23.76	100	144
*i	4	2402.00 (AV)	5.13	91.08	96.21	54.00	42.21	100	144
	5	4804.00 (PK)	10.61	41.68	52.29	74.00	-21.71	100	0
	6	4804.00 (AV)	10.61	29.49	40.10	54.00	-13.90	100	0
	7	7206.00 (PK)	16.87	38.80	55.67	74.00	-18.33	100	0
	8	7206.00 (AV)	16.87	25.81	42.68	54.00	-11.32	100	0

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.		Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
i	1	2440.00 (PK)	5.33	90.30	95.63	74.00	21.63	100	76
*i	2	2440.00 (AV)	5.33	88.77	94.10	54.00	40.10	100	76
	3	4880.00 (PK)	10.92	46.56	57.48	74.00	-16.52	100	0
	4	4880.00 (AV)	10.92	30.10	41.02	54.00	-12.98	100	0
	5	7320.00 (PK)	17.19	43.03	60.22	74.00	-13.78	100	0
	6	7320.00 (AV)	17.19	26.50	43.69	54.00	-10.31	100	0

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.		Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
i	1	2440.00 (PK)	5.33	88.02	93.35	74.00	19.35	100	227
*i	2	2440.00 (AV)	5.33	87.05	92.38	54.00	38.38	100	227
	3	4880.00 (PK)	10.92	45.46	56.38	74.00	-17.62	100	0
	4	4880.00 (AV)	10.92	25.52	36.44	54.00	-17.56	100	0
	5	7320.00 (PK)	17.19	39.95	57.14	74.00	-16.86	100	0
	6	7320.00 (AV)	17.19	25.09	42.28	54.00	-11.72	100	0

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

No.		Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
i	1	2480.00 (PK)	5.55	90.92	96.47	74.00	22.47	100	208
*i	2	2480.00 (AV)	5.55	90.37	95.92	54.00	41.92	100	208
	3	2483.50 (PK)	5.57	44.08	49.65	74.00	-24.35	100	208
	4	2483.50 (AV)	5.57	33.82	39.39	54.00	-14.61	100	208
	5	4960.00 (PK)	11.24	39.79	51.03	74.00	-22.97	100	0
	6	4960.00 (AV)	11.24	27.51	38.75	54.00	-15.25	100	0
	7	7440.00 (PK)	17.52	36.63	54.15	74.00	-19.85	100	0
	8	7440.00 (AV)	17.52	23.76	41.28	54.00	-12.72	100	0

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

No.		Frequency	Factor	Reading	Emission	Limit	Margin	Tower / Table	
		MHz	dB/m	dBuV	dBuV/m	dBuV/m	dB	cm	deg
i	1	2480.00 (PK)	5.55	90.13	95.68	74.00	21.68	100	306
*i	2	2480.00 (AV)	5.55	88.76	94.31	54.00	40.31	100	306
	3	2483.50 (PK)	5.57	42.96	48.53	74.00	-25.47	100	306
	4	2483.50 (AV)	5.57	33.03	38.60	54.00	-15.40	100	306
	5	4960.00 (PK)	11.24	37.51	48.75	74.00	-25.25	100	0
	6	4960.00 (AV)	11.24	24.03	35.27	54.00	-18.73	100	0
	7	7440.00 (PK)	17.52	35.25	52.77	74.00	-21.23	100	0
	8	7440.00 (AV)	17.52	22.66	40.18	54.00	-13.82	100	0

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 Gain (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

4.3 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

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 22, 21
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 07, 22
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 24, 22
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 07, 22
Signal Generation	Agilent	E4421B	US40051152	Dec. 22, 21
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 14, 22
Programmable Temperature & Humidity Chamber	Hongjin	HYC-TH-225 DH	DG-180746	Mar. 10, 22
Test System	Tonscend	JS 1120-3	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 27, 22

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.

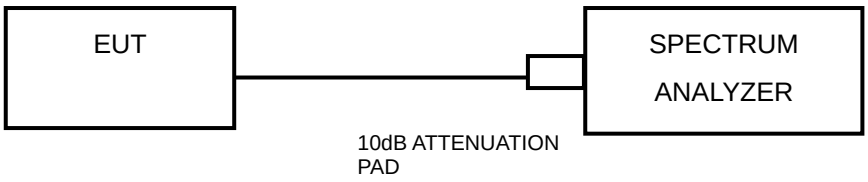
4.2.3 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 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 (1 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	6dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	0.668	0.5	PASS
19	2440	0.672	0.5	PASS
39	2480	0.676	0.5	PASS

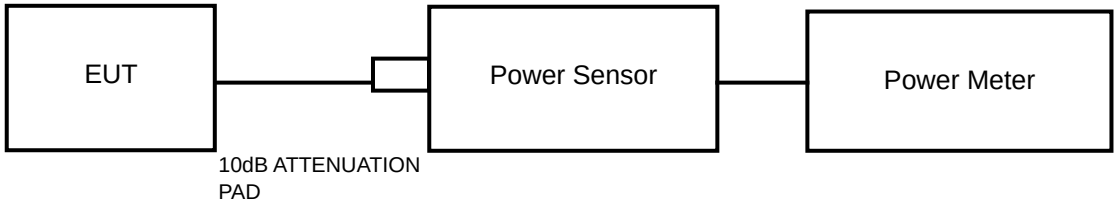
WORSE PLOT

4.4 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

Equipment	Manufacturer	Model No.	Serial No.	Next Cal.
Wireless Connectivity Tester	R&S	CMW270	1201.0002K75	Dec. 22, 21
MXA VEXTOR SIGNAL	Agilent	n5182a	MY50140530	Mar. 07, 22
MXA signal analyzer	Agilent	n9020a	MY49100060	Mar. 24, 22
RF Control Unit	Tonscend	JS0806-2	188060112	Mar. 07, 22
Signal Generation	Agilent	E4421B	US40051152	Dec. 22, 21
DC Power Supply	Agilent	E3640A	MY40004013	Mar. 14, 22
Programmable Temperature & Humidity Chamber	Hongjin	HYC-TH-225 DH	DG-180746	Mar. 10, 22
Test System	Tonscend	JS 1120-3	N/A	N/A
Power Splitter	Weinschel	1580-1	TL177	Mar. 27, 22

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.

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

4.3.7.1 MAXIMUM PEAK OUTPUT POWER

BT-LE GFSK (1 Mbps)

CHANNEL	CHANNEL FREQUENCY (MHz)	PEAK POWER (dBm)	PEAK POWER (mW)	PEAK POWER LIMIT (W)	PASS/FAIL
0	2402	1.23	1.327	1	PASS
19	2440	1.34	1.361	1	PASS
39	2480	1.41	1.384	1	PASS

4.3.7.2 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 (1 Mbps)

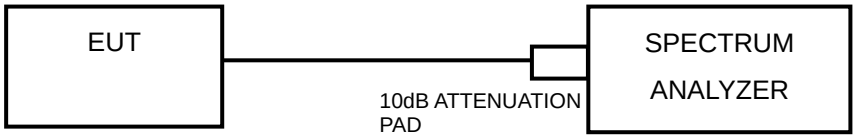
CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)
0	2402	1.02
19	2440	1.11
39	2480	1.06

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

1. Set the span to 1.5 times the DTS bandwidth
2. Set the RBW = 3 kHz, VBW ≥ 3 x RBW, Detector = peak.
3. Sweep time = auto couple, Trace mode = max hold, allow trace to fully stabilize.
4. 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

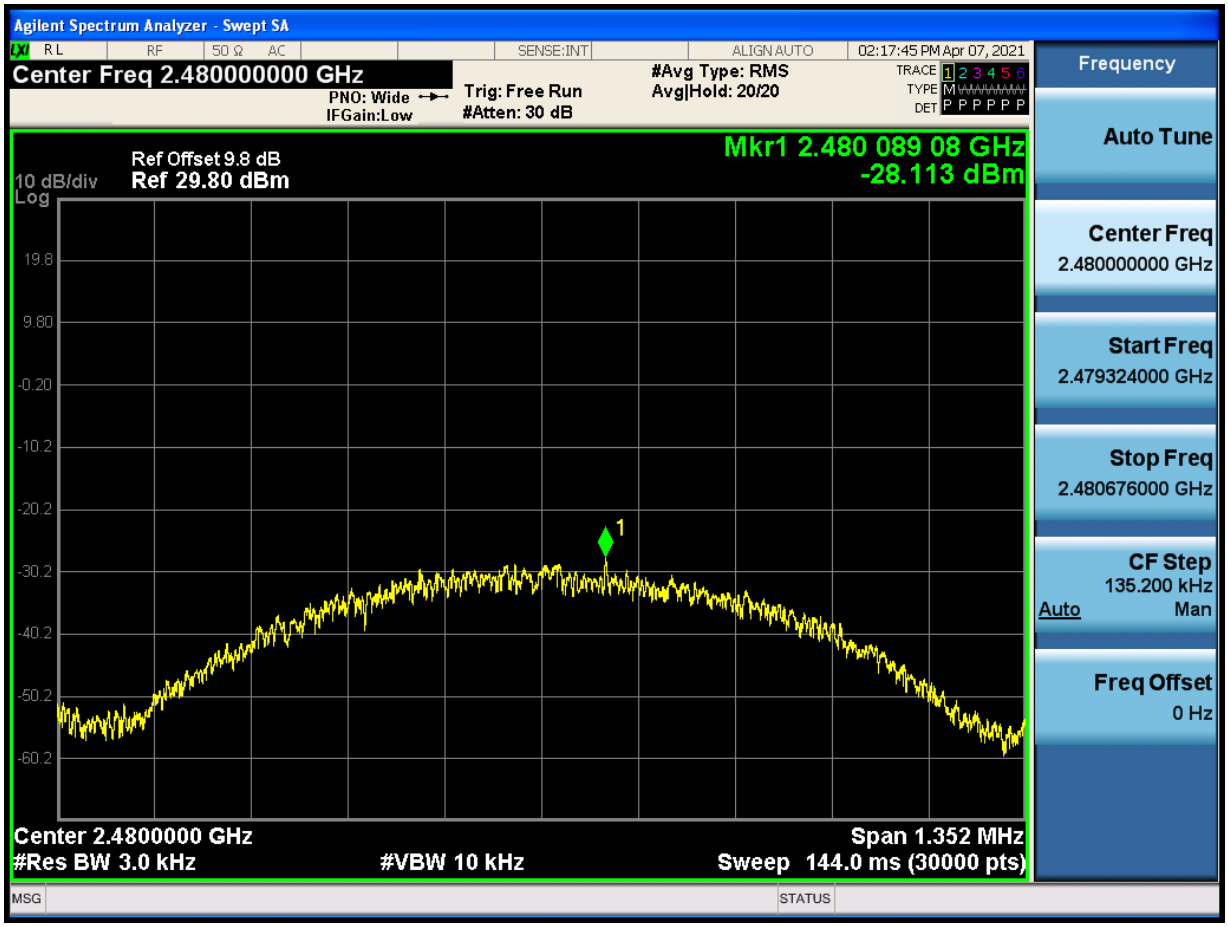
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.7 TEST RESULTS

BT-LE GFSK (1 Mbps)

Channel	FREQ. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	PASS /FAIL
0	2402	-28.19	8	PASS
19	2440	-28.69	8	PASS
39	2480	-28.11	8	PASS

WORSE PLOT

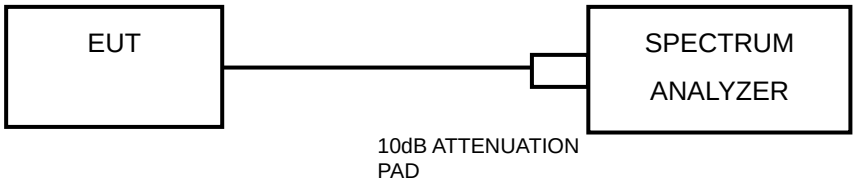


4.5 OUT OF BAND EMISSION MEASUREMENT

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 ≥ 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 OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 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.

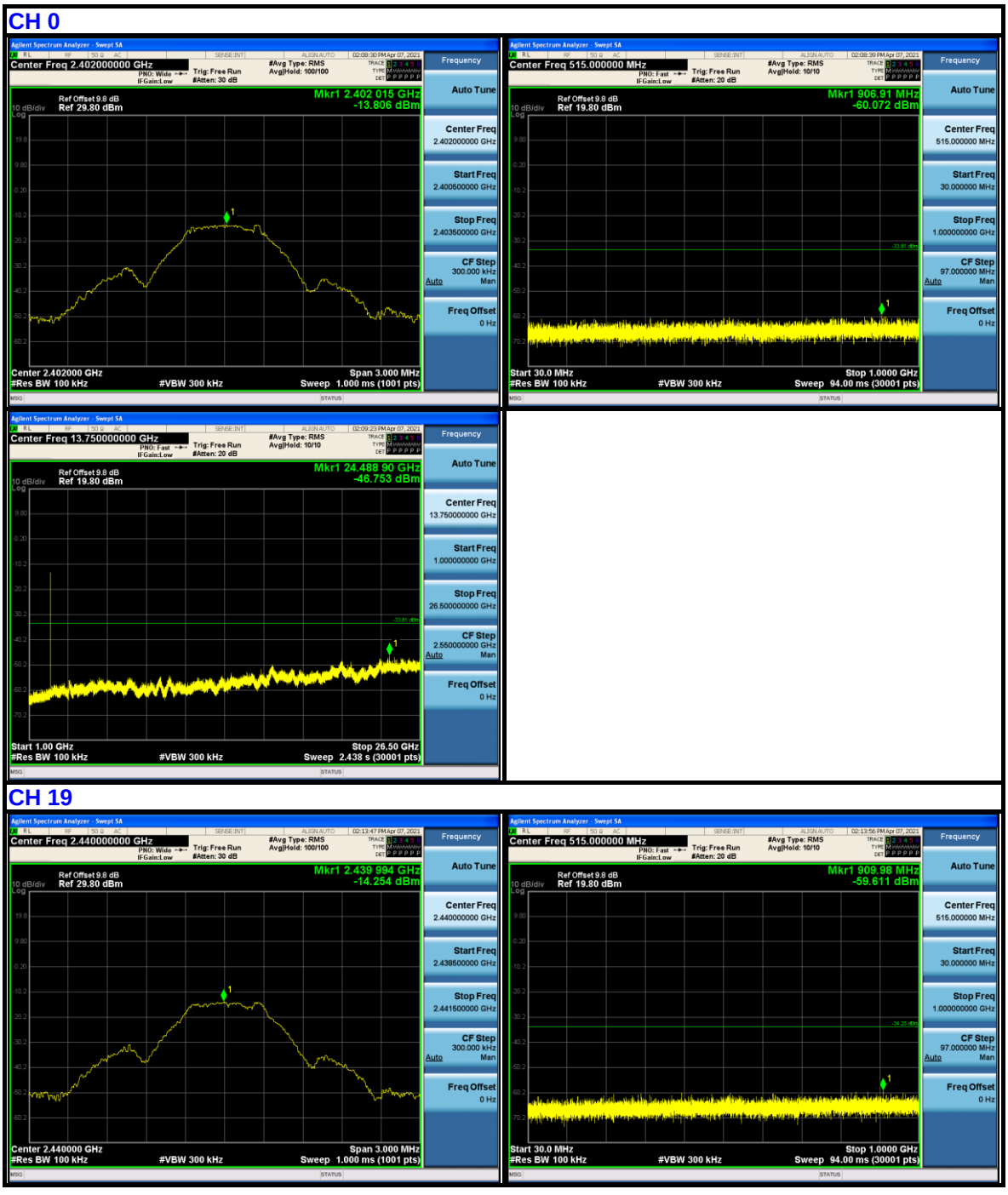
4.5.6 EUT OPERATING CONDITION

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

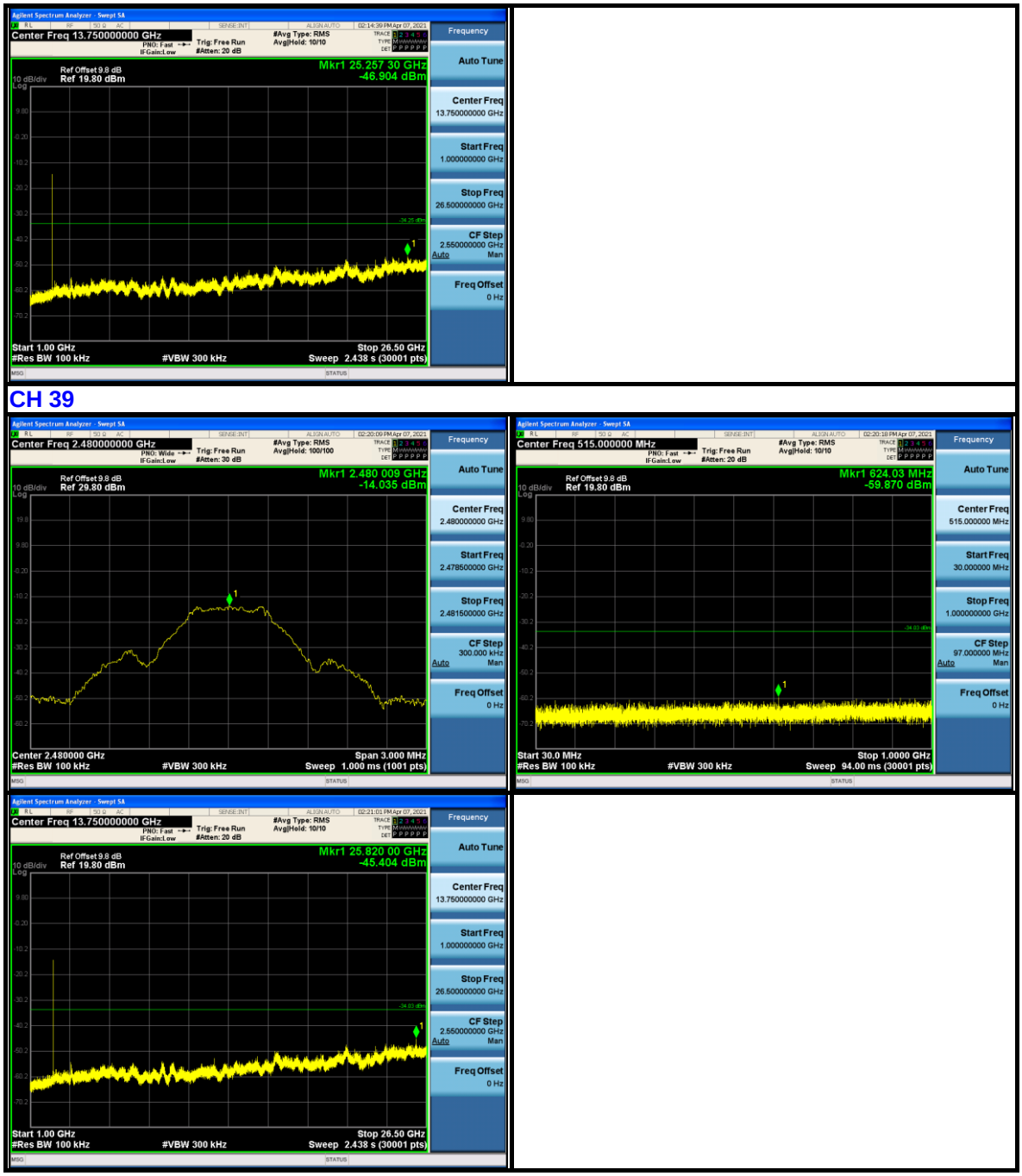
4.5.7 TEST RESULTS

BT-LE GFSK (1 Mbps)

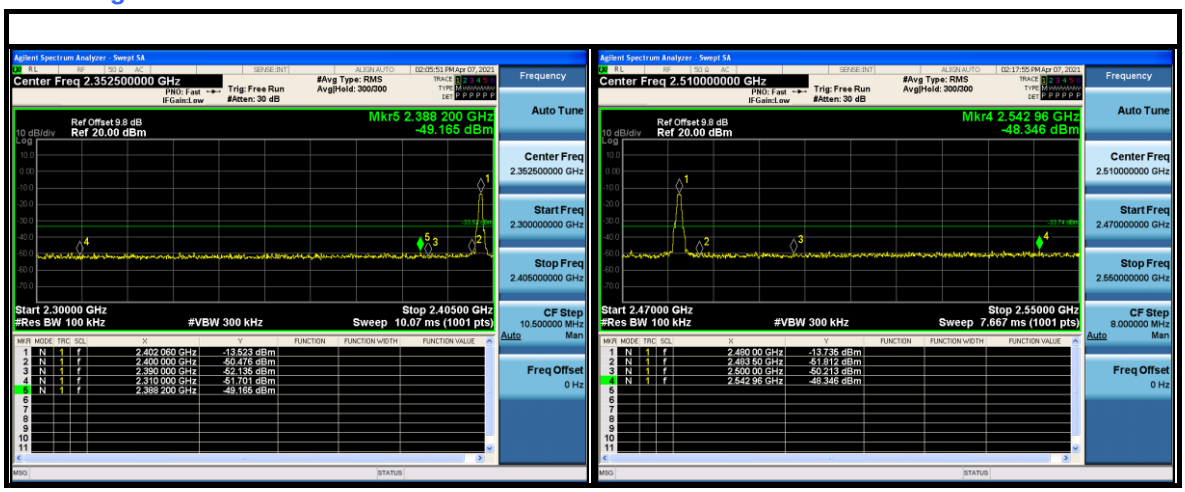
CH 0



CH 19


Agilent Spectrum Analyzer - Swept SA
Center Freq 13.750000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
Mkr1 25.257 30 GHz
-46.904 dBm
Ref Offset 9.8 dB
10 dB/div
Ref 19.80 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.438 s (30001 pts)
Frequency
Auto Tune
Center Freq
13.750000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
CF Step
2.550000000 GHz
Auto
Man
Freq Offset
0 Hz
CH 39
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
#Atten: 30 dB
Avg|Hold: 100/100
Mkr1 2.480 009 GHz
-14.035 dBm
Ref Offset 9.8 dB
10 dB/div
Ref 29.80 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
Center Freq
2.480000000 GHz
Start Freq
2.478500000 GHz
Stop Freq
2.481500000 GHz
CF Step
300.000 kHz
Auto
Man
Freq Offset
0 Hz
Center Freq 515.000000 MHz
#Atten: 20 dB
Avg|Hold: 10/10
Mkr1 624.03 MHz
-59.870 dBm
Ref Offset 9.8 dB
10 dB/div
Ref 19.80 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30001 pts)
Center Freq
515.000000 MHz
Start Freq
30.000000 MHz
Stop Freq
1.000000000 GHz
CF Step
97.000000 MHz
Auto
Man
Freq Offset
0 Hz
Center Freq 13.750000000 GHz
PNO: Fast
IFGain:Low
#Atten: 20 dB
Avg|Hold: 10/10
Mkr1 25.820 00 GHz
-45.404 dBm
Ref Offset 9.8 dB
10 dB/div
Ref 19.80 dBm
Start 1.00 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.438 s (30001 pts)
Center Freq
13.750000000 GHz
Start Freq
1.000000000 GHz
Stop Freq
26.500000000 GHz
CF Step
2.550000000 GHz
Auto
Man
Freq Offset
0 Hz

Band Edge:


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.352500000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 300/300
02:05:51 PM Apr 07, 2021
Frequency
Auto Tune
Ref Offset 9.8 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr5 2.388 200 GHz
-49.165 dBm
Center Freq
2.352500000 GHz
Start Freq
2.300000000 GHz
Stop Freq
2.405000000 GHz
CF Step
10.500000 MHz
Auto
Man
Freq Offset
0 Hz
Start 2.30000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.40500 GHz
Sweep 10.07 ms (1001 pts)
1 N 1 f 2.402 060 GHz -13.523 dBm
2 N 1 f 2.400 000 GHz -50.476 dBm
3 N 1 f 2.390 000 GHz -52.135 dBm
4 N 1 f 2.310 000 GHz -51.701 dBm
5 N 1 f 2.388 200 GHz -49.165 dBm
MSG
STATUS
Agilent Spectrum Analyzer - Swept SA
Center Freq 2.510000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold: 300/300
02:17:55 PM Apr 07, 2021
Frequency
Auto Tune
Ref Offset 9.8 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr4 2.542 96 GHz
-48.346 dBm
Center Freq
2.510000000 GHz
Start Freq
2.470000000 GHz
Stop Freq
2.550000000 GHz
CF Step
8.000000 MHz
Auto
Man
Freq Offset
0 Hz
Start 2.47000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.55000 GHz
Sweep 7.667 ms (1001 pts)
1 N 1 f 2.480 00 GHz -13.736 dBm
2 N 1 f 2.483 50 GHz -51.812 dBm
3 N 1 f 2.500 00 GHz -50.213 dBm
4 N 1 f 2.542 96 GHz -48.346 dBm
MSG
STATUS

5 PHOTOGRAPHS OF THE TEST CONFIGURATION

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

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---