TEST REPORT

Applicant	SB C&S Corp.
Address	19F, Shiodome-Sumitomo Bldg.,1-9-2 Higashi Shimbashi, Minato-ku, Tokyo, JAPAN

Manufacturer or Supplier	SB C&S Corp.
Address	19F, Shiodome-Sumitomo Bldg.,1-9-2 Higashi Shimbashi, Minato-ku, Tokyo, JAPAN
Product	GLIDiC Sound Air SPT-7000
Brand Name	GLIDiC
Model	SB-WS73-MRTW(R)
Additional Model & Model Difference	N/A
Date of tests	Oct. 22, 2019 ~ Oct. 29, 2019

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

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

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

Tested by Breeze Jiang Project Engineer / EMC Department	Approved by Glyn He Assistant Manager / EMC Department
Breeze	Date: Nov. 28, 2019

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF191108N031-2R	Original release	Nov. 28, 2019

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**	**REMARK**
15.207	AC Power Conducted Emission	N/A	Power by Battery
15.247(a)(1)(iii)	Number of Hopping Frequency Used	PASS	Meet the requirement of limit.
15.247(a)(1)(iii)	Dwell Time on Each Channel	PASS	Meet the requirement of limit.
15.247(a)(1)	1. Hopping Channel Separation 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System	PASS	Meet the requirement of limit.
15.247(b)	Maximum Peak Output Power	PASS	Meet the requirement of limit.
15.247(d)& 15.209	Transmitter Radiated Emission	PASS	Meet the requirement of limit.
15.247(d)	Out of band Emission Measurement	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	No antenna connector is used.

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	150kHz ~ 30MHz	2.66 dB
	9KHz ~ 30MHz	2.90dB
	30MHz ~ 1000MHz	3.47 dB
	1GHz ~ 18GHz	4.84 dB
	18GHz ~ 40GHz	4.62 dB

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	GLIDiC Sound Air SPT-7000
BRAND	GLIDiC
MODEL NO.	SB-WS73-MRTW(R)
ADDITIONAL MODEL	N/A
FCC ID	2AO2PSPT-7000-R
POWER SUPPLY	DC 3.7V from Li-ion Battery, Battery Charging: DC5V from Charger Box
MODULATION TECHNOLOGY	FHSS
MODULATION TYPE	GFSK, π/4 DQPSK, 8DPSK
OPERATING FREQUENCY	2402MHz~2480MHz
NUMBER OF CHANNEL	79
AVERAGE OUTPUT POWER	1.795mW (Max. Measured)
ANTENNA TYPE	Integral Antenna, -1.01dBi Gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Line: unshielded detachable 0.3m

NOTES:

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.: 191108N031) for detailed product photo.
4. When the EUT charging that wireless function cann't working, the charging mode was tested in the FCC Part 15B (sDoC) report.(report no.: FS191108N031).

3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461		

3.2.1. CONFIGURATION OF SYSTEM UNDER TEST

Please see section 5 photograph 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 channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
A	√	√	-	√	Powered by Fully Battery with Bluetooth link

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 1 GHz):

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	39	FHSS	GFSK	DH5

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

RADIATED EMISSION TEST (ABOVE 1 GHz):

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

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

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, antenna ports (if EUT with antenna diversity architecture), and packet types.

☒ Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	PACKET TYPE
0 to 78	0, 39, 78	FHSS	GFSK	DH5
0 to 78	0, 39, 78	FHSS	8DPSK	3DH5

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE (SYSTEM)	TESTED BY
RE<1G	25deg. C, 55%RH	DC 3.7V from Fully Battery	Tank Tan
RE≥1G	25deg. C, 55%RH	DC 3.7V from Fully Battery	Tank Tan
PLC	-	-	-
APCM	25deg. C, 60%RH	DC 3.7V from Fully Battery	Rex yang

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
KDB 558074 D01 15.247 Meas Guidance v05r02
ANSI C63.10-2013

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 dependent 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	Notebook	LENOVO	Think pad	KKA9196S	N/A

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

4 TEST TYPES AND RESULTS

4.1. RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION AND BANDEDGE 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). Other emissions shall be at least 20dB below the highest level of the desired power.

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

NOTES:

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.

4.1.2 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
EMI Test Receiver Rohde&Schwarz	ESCI 7	100962	2019-7-16	2020-7-15
Broadband antenna Schwarzbeck	VULB 9168	00937	2019-10-18	2020-10-17
3m Semi-anechoic Chamber MAORUI	9m*6m*6m	NSEMC003	2018-10-20	2020-10-19
Signal Amplifier Com-power	PAM-103	18020051	2019-10-18	2020-10-17
Attenuator Rohde&Schwarz	TS2GA-6dB	18101101	N/A	N/A
Test software FARAD	FARAD	EZ_EMCV1.1.4.2	N/A	N/A
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	2019-10-18	2020-10-17
Loop Antenna	HLA 6121	45745	2019-10-18	2020-10-17
Preamplifier EMCI	EMC001340	980201	2019-10-18	2020-10-17
Digital Multimete FLUKE	15B+	43512617WS	2019-10-18	2020-10-17
Horn Antenna Schwarzbeck	BBHA 9170	01959	2019-10-18	2020-10-17
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2019-10-18	2020-10-17
Broadband Coaxial Preamplifier Schwarzbeck	BBV 9718	00025	2019-10-18	2020-10-17
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170242	2019-05-05	2020-05-04
Pre-Amplifier EMCI	EMC 184045	980102	2019-10-18	2020-10-17
Spectrum Keysight	N9020A	MY51240612	2019-10-18	2020-10-17
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower&Turn Table Controller MF	MF-7802	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA.

2. The test was performed in Hwa-Hsing (Dongguan) Testing Co., Ltd.

4.1.3 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.

NOTES:

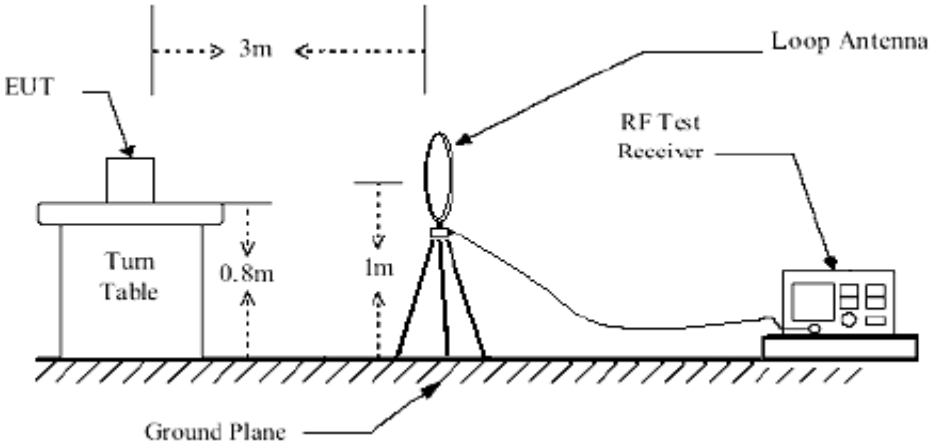
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution 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.

4.1.4 DEVIATION FROM TEST STANDARD

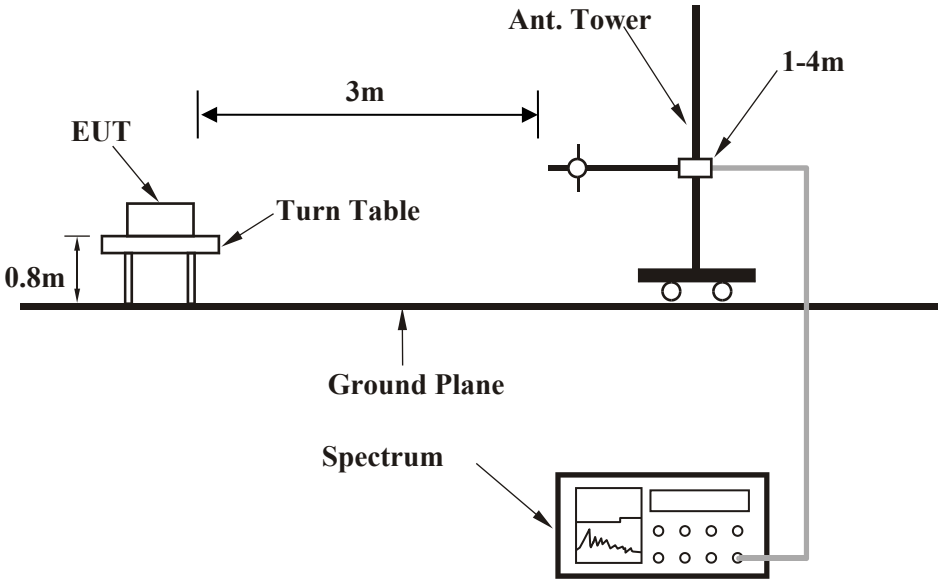
No deviation.

4.1.5 TEST SETUP

Below 30MHz test setup

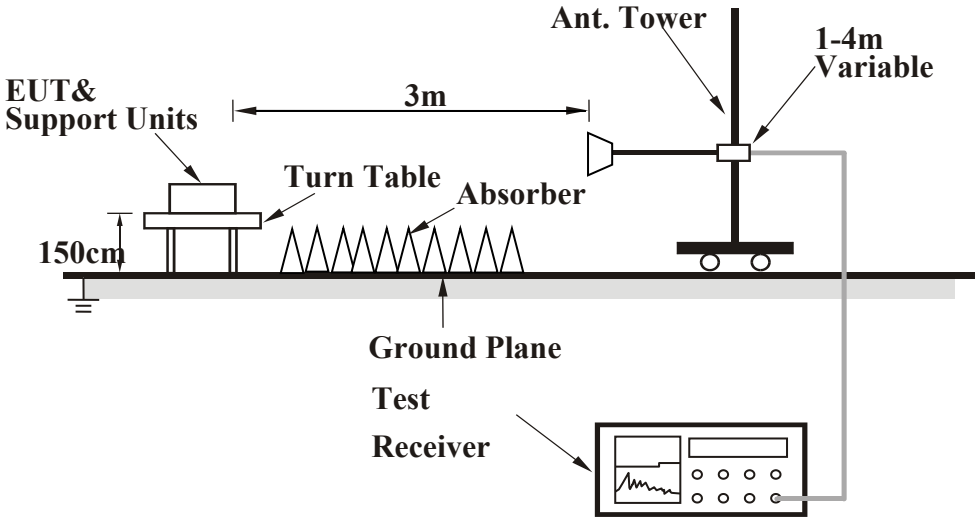


Below 1GHz test setup



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

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.

4.1.7 TEST RESULTS

9kHz ~ 30MHz Data:

The amplitude of spurious emissions attenuated more than 20dB below the permissible value is not required to be report.

30MHz ~ 1GHz Worst-Case Data:

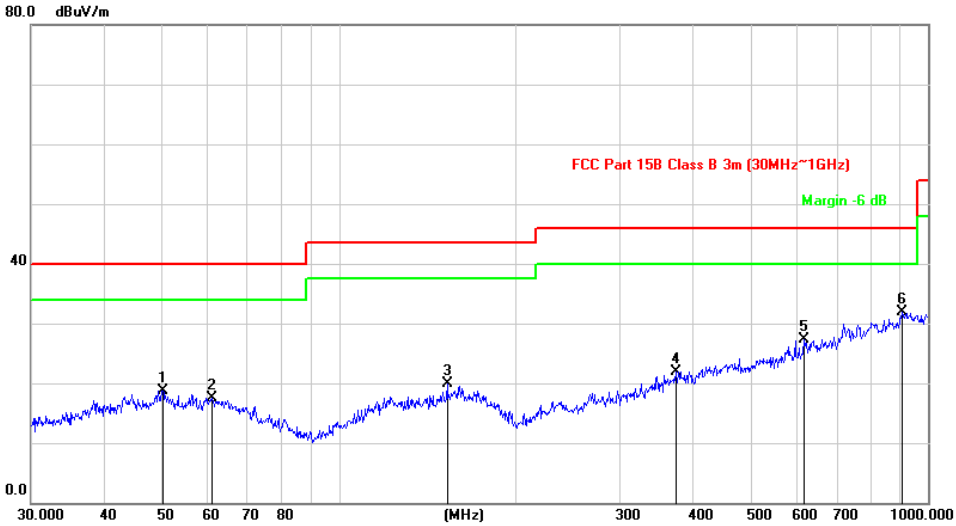
GFSK DH5

CHANNEL	Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1	50.2324	32.90	-14.12	18.78	40.00	-21.22	251	130
2	60.9176	32.08	-14.50	17.58	40.00	-22.42	176	235
3	152.6641	33.05	-13.09	19.96	43.50	-23.54	203	118
4	373.3112	31.89	-9.95	21.94	46.00	-24.06	216	228
5	616.3718	32.17	-4.78	27.39	46.00	-18.61	195	182
6	903.3094	30.57	1.32	31.89	46.00	-14.11	243	294

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.

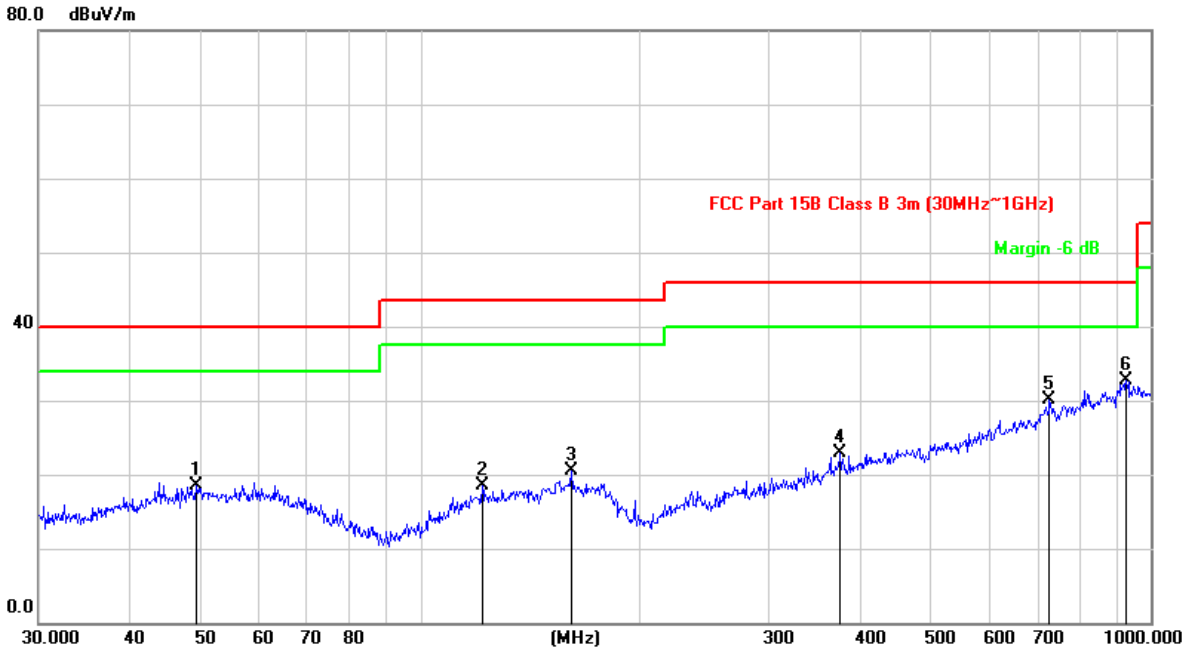


CHANNEL	Channel 39	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1	49.3594	32.70	-14.21	18.49	40.00	-21.51	100	172
2	121.5486	33.19	-14.68	18.51	43.50	-24.99	100	266
3	160.9089	32.95	-12.44	20.51	43.50	-22.99	100	102
4	375.9385	32.79	-9.88	22.91	46.00	-23.09	140	152
5	726.8052	31.61	-1.51	30.10	46.00	-15.90	133	199
6	925.7563	30.85	1.87	32.72	46.00	-13.28	117	213

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.



ABOVE 1GHz DATA

BT_GFSK

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1	2390.00	44.09	peak	-0.85	43.24	74.00	-30.76	178	299
2	2390.00	13.99	AVG	-0.85	13.14	54.00	-40.86	178	299
3*	2402.16	96.85	peak	-0.75	96.10			178	299
4*	2402.16	66.75	AVG	-0.75	66.00			178	299
5	4804.40	53.41	peak	5.36	58.77	74.00	-15.23	173	298
6	4804.40	23.31	AVG	5.36	28.67	54.00	-25.33	173	298
7	7205.57	46.28	peak	11.74	58.02	74.00	-15.98	268	266
8	7205.57	16.18	AVG	11.74	27.92	54.00	-26.08	268	266
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1	2390.00	48.84	peak	-0.85	47.99	74.00	-26.01	141	232
2	2390.00	18.74	AVG	-0.85	17.89	54.00	-36.11	141	232
3*	2401.77	88.61	peak	-0.73	87.88			141	232
4*	2401.77	58.51	AVG	-0.73	57.78			141	232
5	4804.16	55.01	peak	5.36	60.37	74.00	-13.63	314	124
6	4804.16	24.91	AVG	5.36	30.27	54.00	-23.73	314	124
7	7206.51	45.91	peak	11.75	57.66	74.00	-16.34	217	302
8	7206.51	14.92	AVG	11.75	26.67	54.00	-27.33	217	302

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.
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.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2440.000	95.23	peak	-0.64	94.59			100	320
2*	2440.000	65.13	AVG	-0.64	64.49			100	320
3	4880.000	53.18	peak	6.24	59.42	74.00	-14.58	105	312
4	4880.000	23.08	AVG	6.24	29.32	54.00	-24.68	105	312
5	7320.000	46.19	peak	12.13	58.32	74.00	-15.68	100	298
6	7320.000	16.09	AVG	12.13	28.22	54.00	-25.78	100	298
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2439.820	97.49	peak	-0.64	96.85			169	191
2*	2439.820	67.39	AVG	-0.64	66.75			169	191
3	4879.680	51.85	peak	6.23	58.08	74.00	-15.92	258	186
4	4879.680	21.75	AVG	6.23	27.98	54.00	-26.02	258	186
5	7319.600	45.07	peak	12.13	57.20	74.00	-16.80	223	287
6	7319.600	14.97	AVG	12.13	27.10	54.00	-26.90	223	287

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2480.000	97.89	peak	-0.52	97.37			103	318
2*	2480.000	67.79	AVG	-0.52	67.27			103	318
3	2483.500	46.80	peak	-0.51	46.29	74.00	-27.71	103	318
4	2483.500	16.70	AVG	-0.51	16.19	54.00	-37.81	103	318
5	4960.000	52.59	peak	6.09	58.68	74.00	-15.32	100	221
6	4960.000	22.49	AVG	6.09	28.58	54.00	-25.42	100	221
7	7440.000	44.58	peak	12.53	57.11	74.00	-16.89	136	254
8	7440.000	14.48	AVG	12.53	27.01	54.00	-26.99	136	254
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2480.000	95.62	peak	-0.52	95.10			100	292
2*	2480.000	65.52	AVG	-0.52	65.00			100	292
3	2483.500	49.51	peak	-0.50	49.01	74.00	-24.99	100	292
4	2483.500	19.41	AVG	-0.50	18.91	54.00	-35.09	100	292
5	4960.000	52.87	peak	6.09	58.96	74.00	-15.04	114	276
6	4960.000	22.77	AVG	6.09	28.86	54.00	-25.14	114	276
7	7440.000	46.10	peak	12.53	58.63	74.00	-15.37	100	298
8	7440.000	16.00	AVG	12.53	28.53	54.00	-25.47	100	298

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.
5. " * ": Fundamental frequency.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1	2387.790	46.06	peak	-0.83	45.23	74.00	-28.77	207	274
2	2387.790	15.96	AVG	-0.83	15.13	54.00	-38.87	207	274
3*	2402.000	95.67	peak	-0.75	94.92			207	274
4*	2402.000	65.57	AVG	-0.75	64.82			207	274
5	4804.000	53.53	peak	5.36	58.89	74.00	-15.11	146	265
6	4804.000	23.43	AVG	5.36	28.79	54.00	-25.21	146	265
7	7206.000	47.65	peak	11.75	59.40	74.00	-14.60	114	287
8	7206.000	17.55	AVG	11.75	29.30	54.00	-24.70	114	287
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1	2387.000	50.79	peak	-0.80	49.99	74.00	-24.01	142	296
2	2387.000	20.69	AVG	-0.80	19.89	54.00	-34.11	142	296
3*	2402.000	94.13	peak	-0.75	93.38			142	296
4*	2402.000	64.03	AVG	-0.75	63.28			142	296
5	4804.000	52.73	peak	5.36	58.09	74.00	-15.91	128	274
6	4804.000	22.63	AVG	5.36	27.99	54.00	-26.01	128	274
7	7206.000	44.97	peak	11.75	56.72	74.00	-17.28	100	292
8	7206.000	14.87	AVG	11.75	26.62	54.00	-27.38	100	292

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.
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.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2441.000	94.40	peak	-0.64	93.76			100	165
2*	2441.000	64.30	AVG	-0.64	63.66			100	165
3	4882.000	53.04	peak	6.27	59.31	74.00	-14.69	124	293
4	4882.000	22.94	AVG	6.27	29.21	54.00	-24.79	124	293
5	7323.000	45.04	peak	12.14	57.18	74.00	-16.82	107	310
6	7323.000	14.94	AVG	12.14	27.08	54.00	-26.92	107	310
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2441.000	93.69	peak	-0.64	93.05			156	289
2*	2441.000	63.59	AVG	-0.64	62.95			156	289
3	4882.000	52.38	peak	6.27	58.65	74.00	-15.35	100	283
4	4882.000	22.28	AVG	6.27	28.55	54.00	-25.45	100	283
5	7323.000	45.04	peak	12.14	57.18	74.00	-16.82	100	274
6	7323.000	14.94	AVG	12.14	27.08	54.00	-26.92	100	274

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.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 78	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2480.000	98.30	peak	-0.52	97.78	74.00	23.78	234	274
2*	2480.000	68.20	AVG	-0.52	67.68	54.00	13.68	234	274
3	2483.500	58.74	peak	-0.51	58.23	74.00	-15.77	234	274
4	2483.500	28.64	AVG	-0.51	28.13	54.00	-25.87	234	274
5	4960.000	53.27	peak	6.09	59.36	74.00	-14.64	168	243
6	4960.000	23.17	AVG	6.09	29.26	54.00	-24.74	168	243
7	7440.000	46.58	peak	12.53	59.11	74.00	-14.89	100	241
8	7440.000	16.48	AVG	12.53	29.01	54.00	-24.99	100	241
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M									
NO.	FREQ. (MHz)	RAW VALUE (dBuV)	Det.	CORRECTION FACTOR (dB/m)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)
1*	2480.000	98.33	peak	-0.52	97.81			100	245
2*	2480.000	68.23	AVG	-0.52	67.71			100	245
3	2483.500	58.74	peak	-0.51	58.23	74.00	-15.77	234	274
4	2483.500	28.64	AVG	-0.51	28.13	54.00	-25.87	234	274
5	4960.000	54.05	peak	6.09	60.14	74.00	-13.86	143	268
6	4960.000	23.95	AVG	6.09	30.04	54.00	-23.96	1443	268
7	7440.000	44.71	peak	12.53	57.24	74.00	-16.76	112	267
8	7440.000	14.61	AVG	12.53	27.14	54.00	-26.86	112	267

REMARKS:

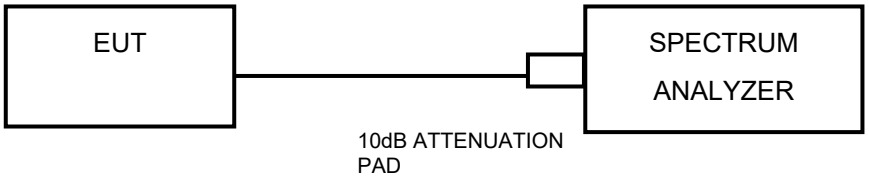
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The emission levels of other frequencies were less than 20dB margin against the limit.
4. Margin value = Emission level – Limit value.
5. " * ": Fundamental frequency.

4.2 NUMBER OF HOPPING FREQUENCY USED

4.2.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

4.2.2 TEST SETUP



4.2.3 TEST INSTRUMENTS

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Spectrum Keysight	N9020A	MY51240612	2019/10/18	2020/10/17
Spectrum Analyzer Rohde&Schwarz	FSV-40N	101783	2019/10/18	2020/10/17
Power Meter10Hz~18GHz Tonscend	JS0806-2	188060126	2019/10/18	2020/10/17
Signal generator Keysight	N5182A	GB40051020	2019/10/18	2020/10/17
Signal generator Keysight	N5182A	MY47420944	2019/10/18	2020/10/17
Test Software Tonscend	JS0806-2	NA	NA	NA
Hygrothermograph Yuhuaze	HTC-1	NA	2019/10/18	2020/10/17

NOTES:

1. The test was performed in RF Oven room in Hwa-Hsing (Dongguan) Testing Co., Ltd..
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.

4.2.4 TEST PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Set the SA on Max Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.

d. Set the SA on View mode and then plot the result on SA screen.

e. Repeat above procedures until all frequencies measured were completed.

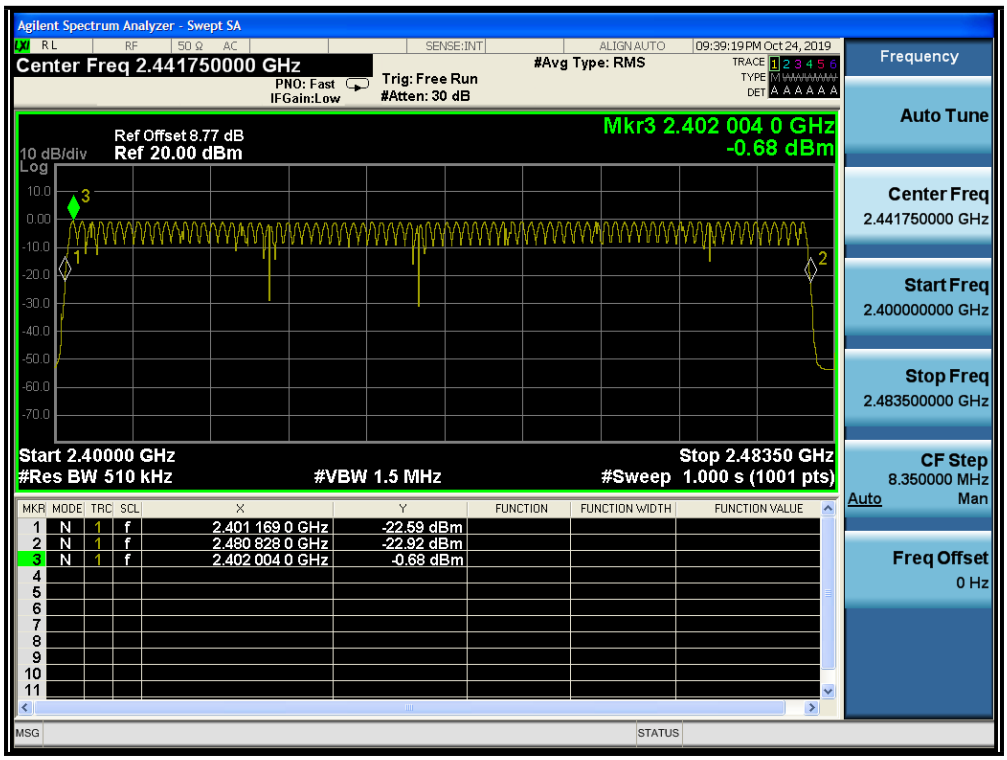
4.2.5 DEVIATION FROM TEST STANDARD

No deviation.

4.2.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.

GFSK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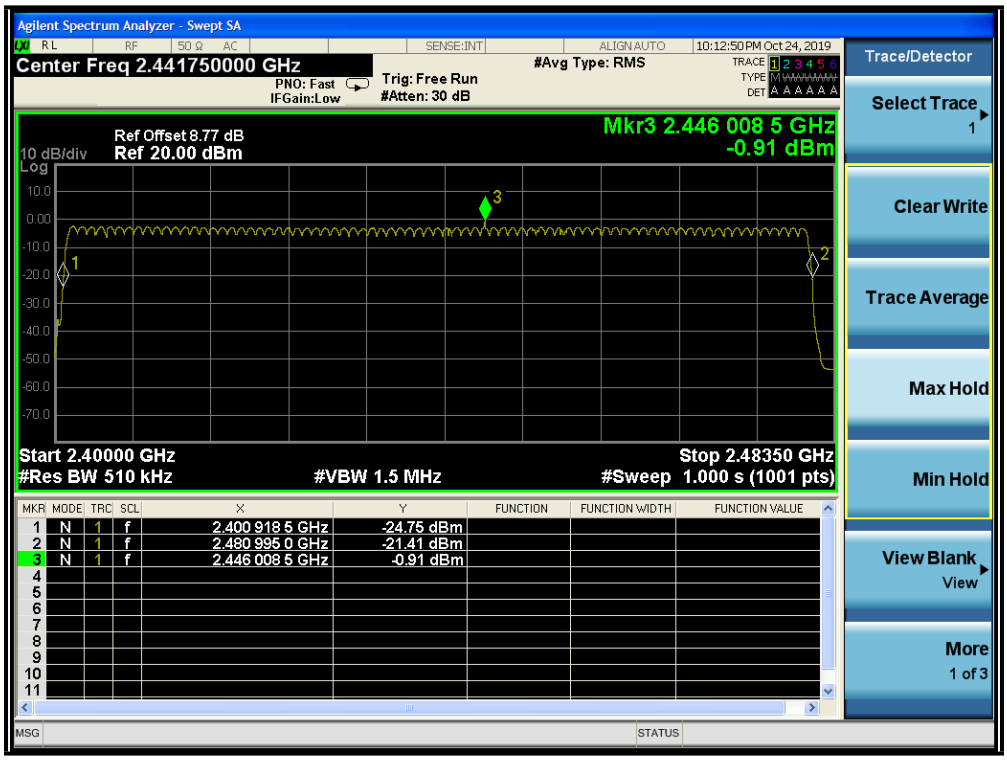
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
09:39:19 PM Oct 24, 2019
Ref Offset 8.77 dB
10 dB/div
Ref 20.00 dBm
Mkr3 2.402 004 0 GHz
-0.68 dBm
Start 2.40000 GHz
#Res BW 510 kHz
#VBW 1.5 MHz
Stop 2.48350 GHz
#Sweep 1.000 s (1001 pts)
1 N 1 f 2.401 169 0 GHz -22.59 dBm
2 N 1 f 2.480 828 0 GHz -22.92 dBm
3 N 1 f 2.402 004 0 GHz -0.68 dBm
Frequency
Auto Tune
Center Freq
2.441750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.483500000 GHz
CF Step
8.350000 MHz
Auto
Man
Freq Offset
0 Hz

8DPSK

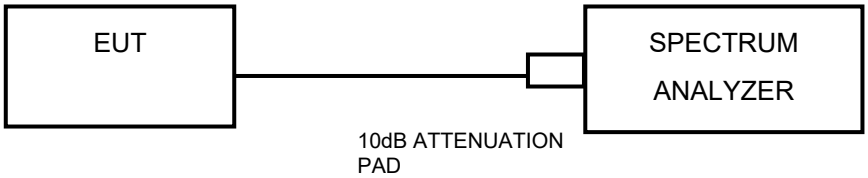

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441750000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
10:12:50 PM Oct 24, 2019
Ref Offset 8.77 dB
10 dB/div
Ref 20.00 dBm
Mkr3 2.446 008 5 GHz
-0.91 dBm
Start 2.40000 GHz
#Res BW 510 kHz
#VBW 1.5 MHz
Stop 2.48350 GHz
#Sweep 1.000 s (1001 pts)
1 N 1 f 2.400 918 5 GHz -24.75 dBm
2 N 1 f 2.480 995 0 GHz -21.41 dBm
3 N 1 f 2.446 008 5 GHz -0.91 dBm
Trace/Detector
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
View
More
1 of 3

4.3 DWELL TIME ON EACH CHANNEL

4.3.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

4.3.2 TEST SETUP



4.3.3 TEST INSTRUMENTS

Refer to section 4.2.3 to get information of above instrument.

4.3.4 TEST PROCEDURES

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.

c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.

d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.

e. Repeat above procedures until all different time-slot modes have been completed.

4.3.5 DEVIATION FROM TEST STANDARD

No deviation.

4.3.6 TEST RESULTS

GFSK

Mode	Number of Hopping Channel	Number of transmission in a period(channel number*0.4 sec)				Length of transmission time (msec)	Result (msec)	Limit (msec)	PASS / FAIL
		period (sec)	sweep time (sec)	times in a sweep	times in a period				
DH1	79	31.6	3.16	33	330	0.385	127.05	400	PASS
DH3	79	31.6	3.16	17	170	1.642	279.14	400	PASS
DH5	79	31.6	3.16	11	110	2.888	317.68	400	PASS

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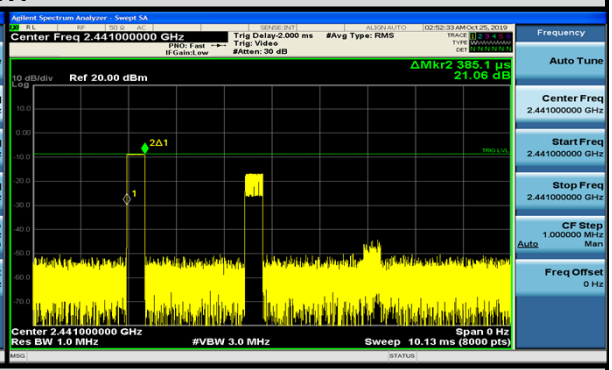
Mode	Number of Hopping Channel	Number of transmission in a period(channel number*0.4 sec)				Length of transmission time (msec)	Result (msec)	Limit (msec)	PASS / FAIL
		period (sec)	sweep time (sec)	times in a sweep	times in a period				
3DH1	79	31.6	3.16	33	330	0.395	130.35	400	PASS
3DH3	79	31.6	3.16	17	170	1.644	279.48	400	PASS
3DH5	79	31.6	3.16	11	110	2.896	318.56	400	PASS

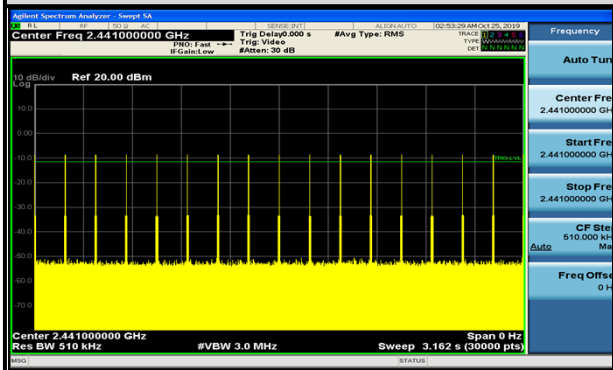
NOTE: Test plots of the transmitting time slot are shown on next page.

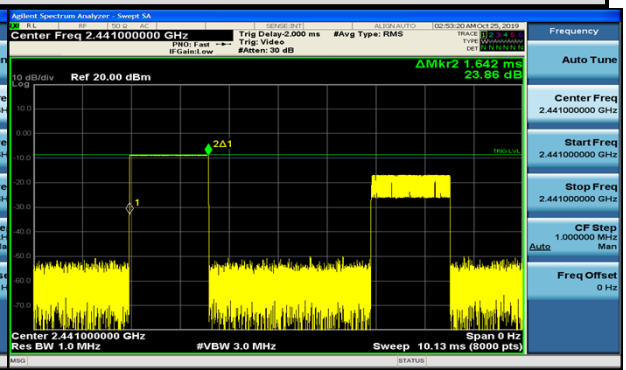
GFSK

DH1

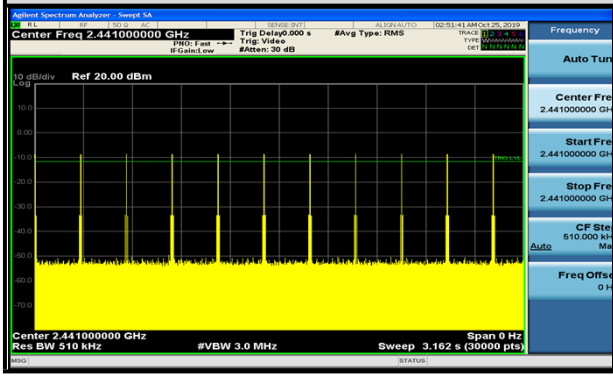


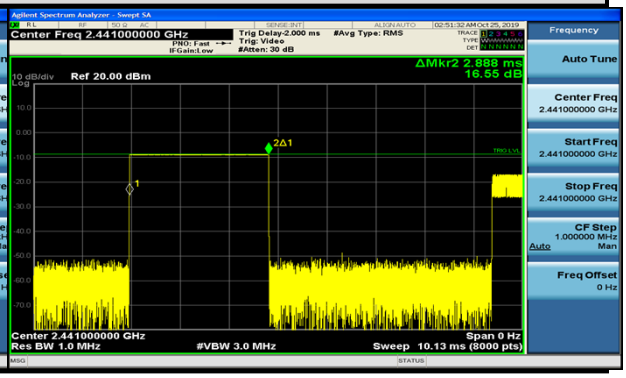
DH3





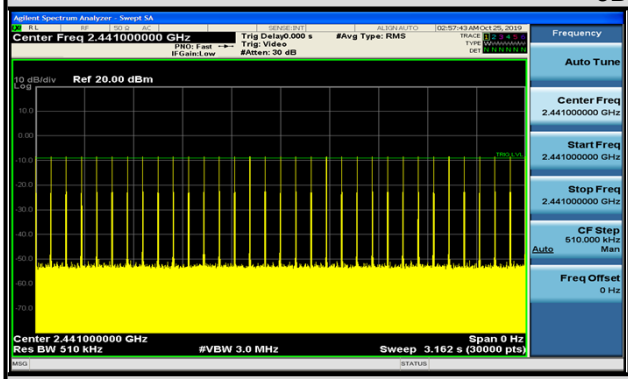
DH5

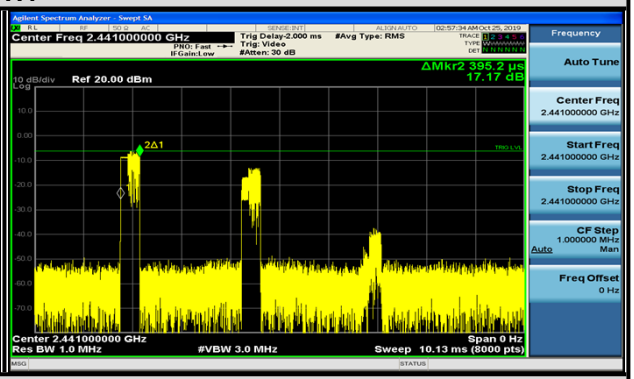




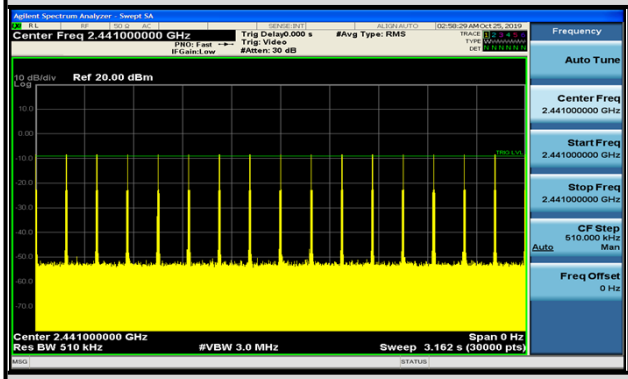
8DPSK

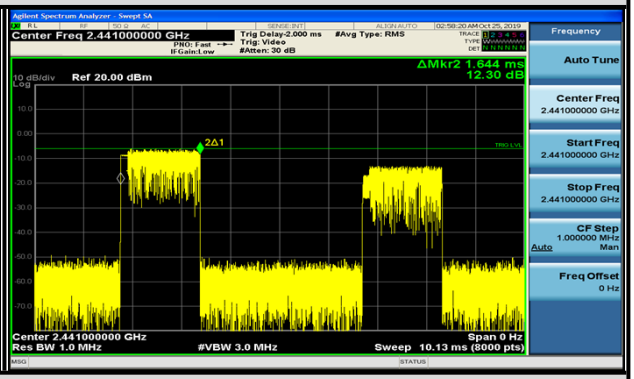
3DH1



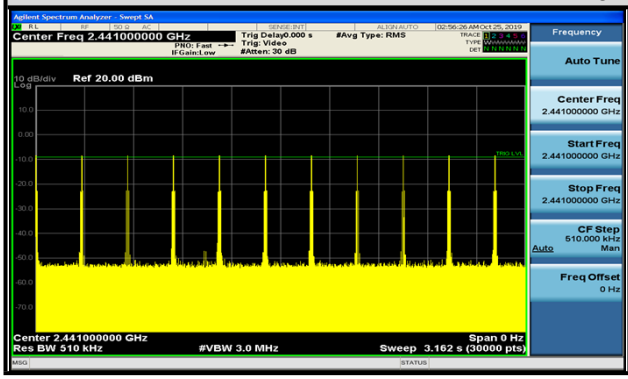


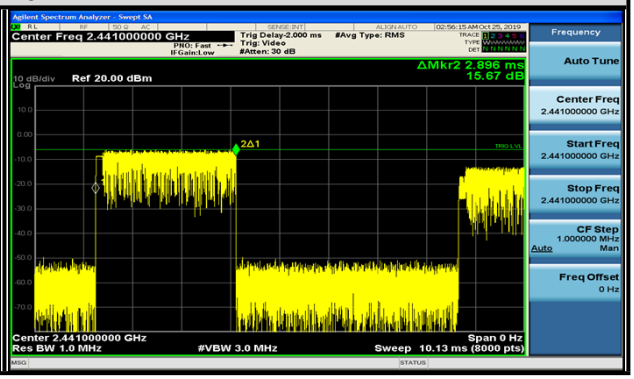
3DH3





3DH5



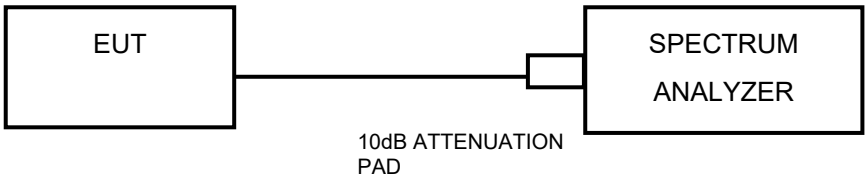


4.4 CHANNEL BANDWIDTH

4.4.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dBbandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

4.4.2 TEST SETUP



4.4.3 TEST INSTRUMENTS

Refer to section 4.2.3 to get information of above instrument.

4.4.4 TEST PROCEDURE

a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.

d. Repeat above procedures until all frequencies measured were complete.

4.4.5 DEVIATION FROM TEST STANDARD

No deviation.

4.4.6 EUT OPERATING CONDITION

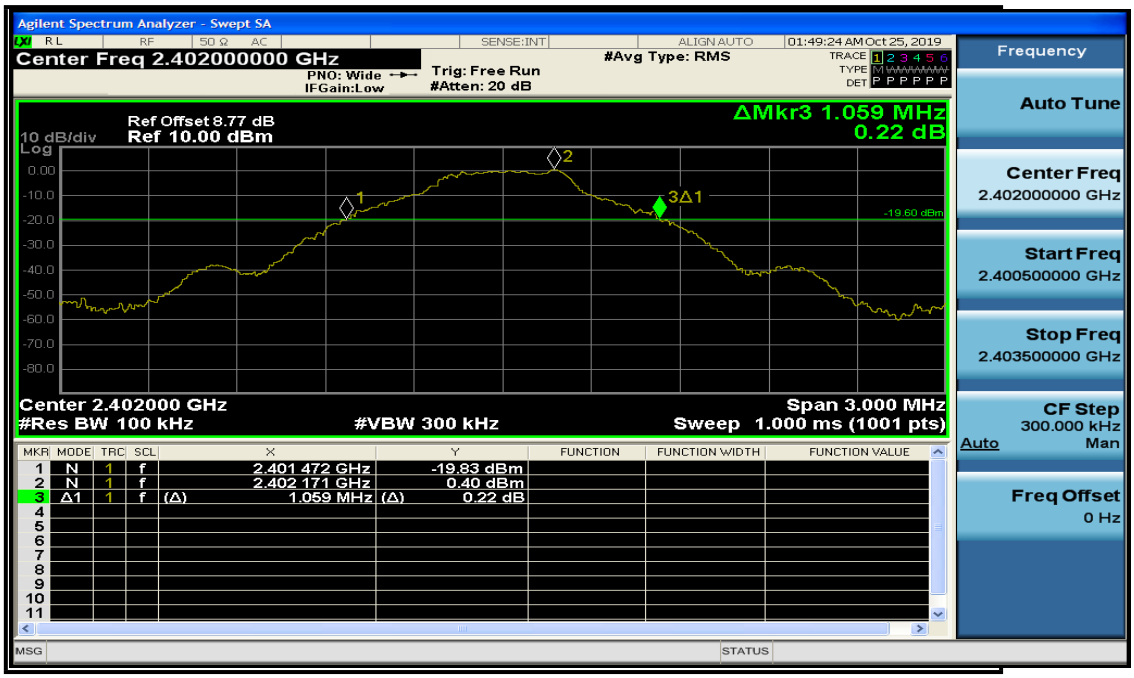
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.4.7 TEST RESULTS

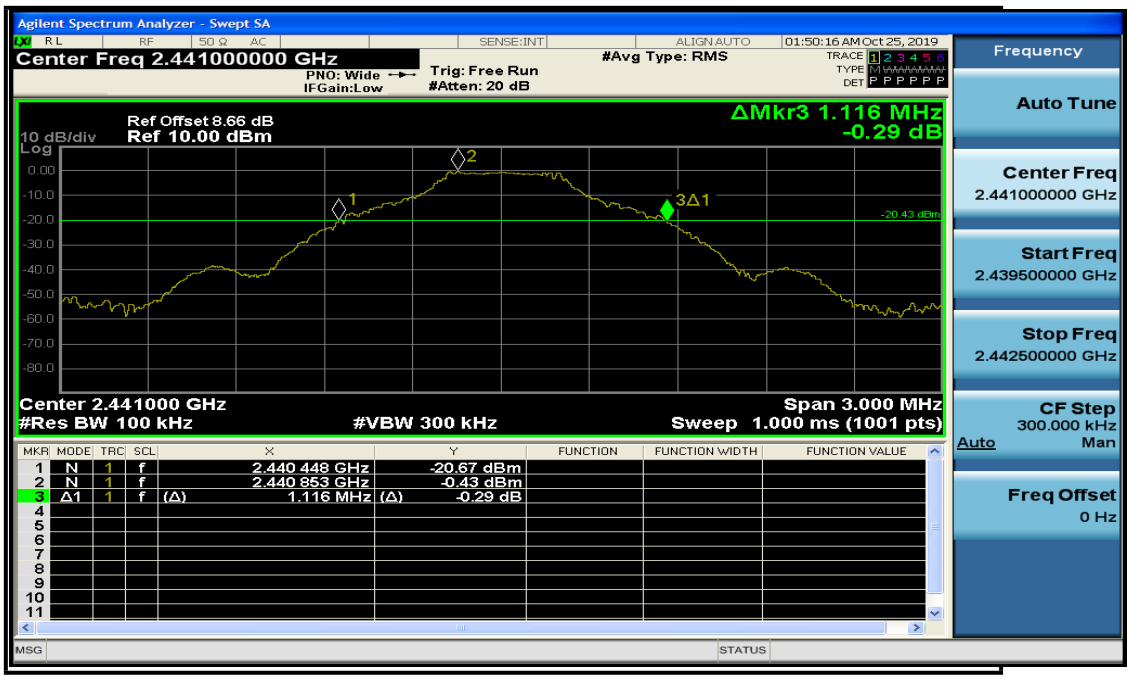
GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.059
39	2441	1.116
78	2480	1.119

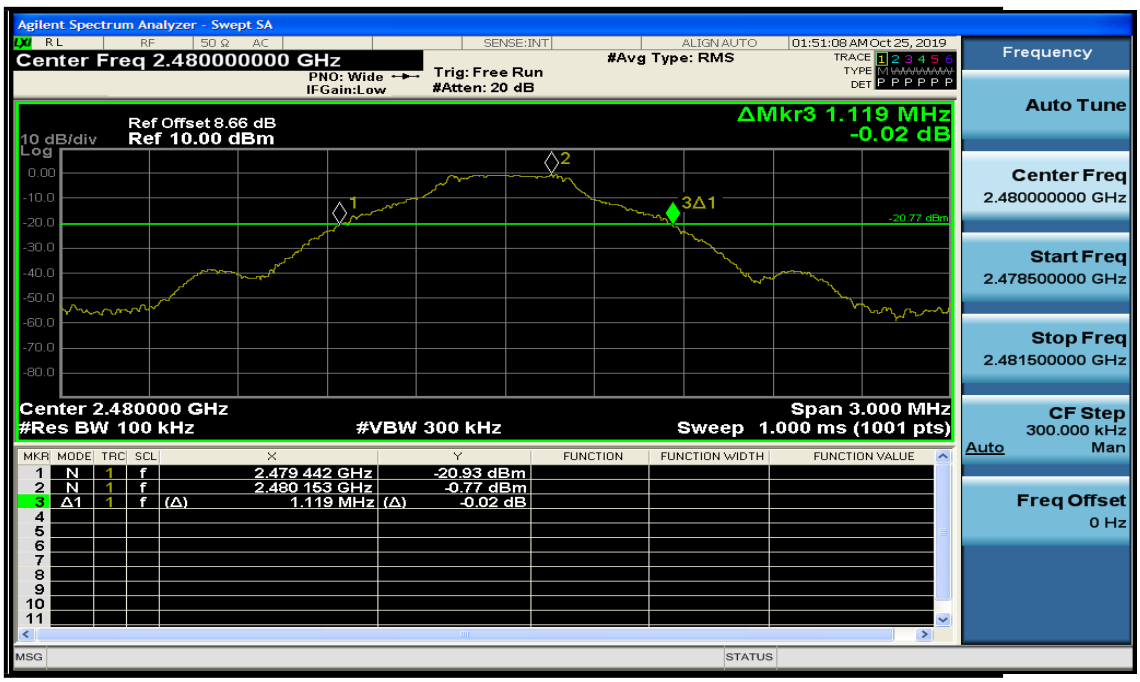
CH 0



CH 39


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
01:50:16 AM Oct 25, 2019
Ref Offset 8.66 dB
10 dB/div
Ref 10.00 dBm
ΔMkr3 1.116 MHz
-0.29 dB
-20.43 dBm
Center 2.441000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.440 448 GHz -20.67 dBm
2 N 1 f 2.440 853 GHz -0.43 dBm
3 Δ1 1 f (Δ) 1.116 MHz (Δ) -0.29 dB
Frequency
Auto Tune
Center Freq 2.441000000 GHz
Start Freq 2.439500000 GHz
Stop Freq 2.442500000 GHz
CF Step 300.000 kHz
Auto Man
Freq Offset 0 Hz

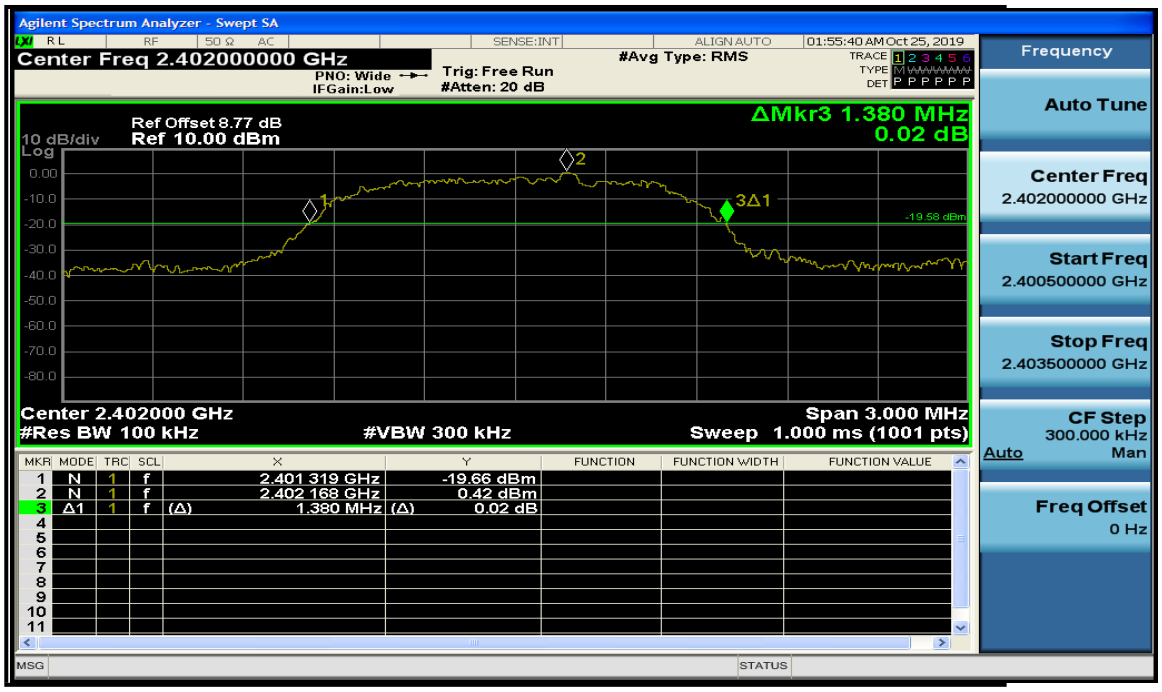
CH 78


Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
01:51:08 AM Oct 25, 2019
Ref Offset 8.66 dB
10 dB/div
Ref 10.00 dBm
ΔMkr3 1.119 MHz
-0.02 dB
-20.77 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.479 442 GHz -20.93 dBm
2 N 1 f 2.480 153 GHz -0.77 dBm
3 Δ1 1 f (Δ) 1.119 MHz (Δ) -0.02 dB
Frequency
Auto Tune
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

8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	20dB BANDWIDTH (MHz)
0	2402	1.380
39	2441	1.398
78	2480	1.392

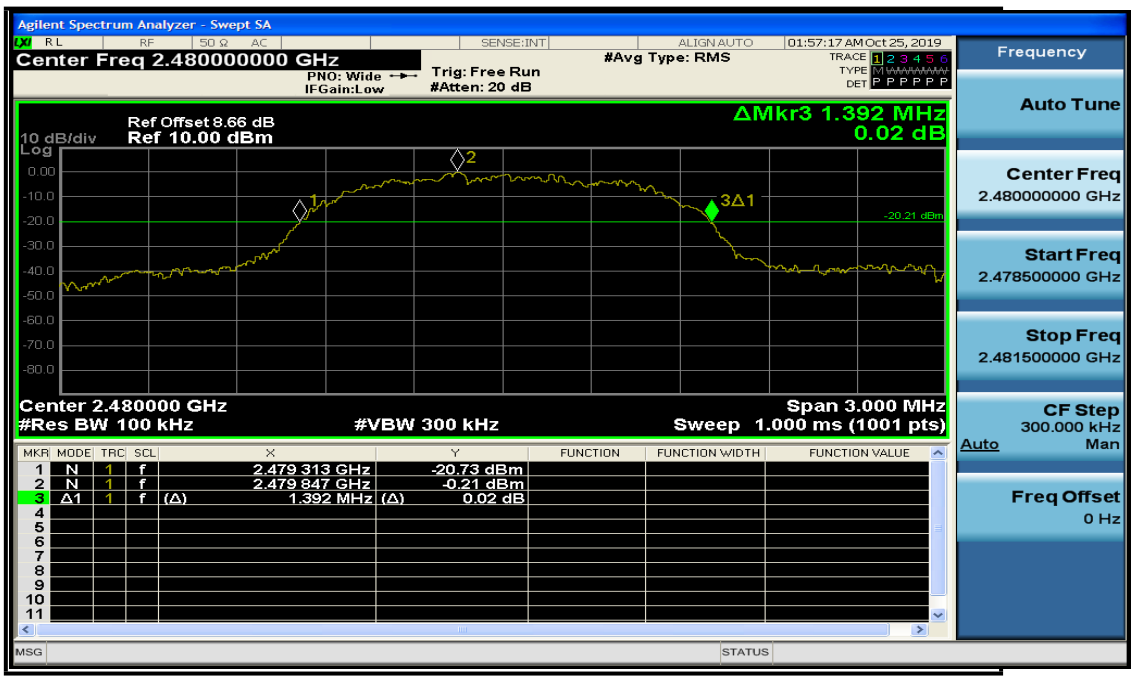
CH 0



CH 39

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.441000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
01:56:30 AM Oct 25, 2019
Ref Offset 8.66 dB
10 dB/div
Ref 10.00 dBm
ΔMkr3 1.398 MHz
0.16 dB
-20.05 dBm
Center 2.441000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.440 310 GHz -20.60 dBm
2 N 1 f 2.441 171 GHz -0.05 dBm
3 Δ1 1 f (Δ) 1.398 MHz (Δ) 0.16 dB
Frequency
Auto Tune
Center Freq 2.441000000 GHz
Start Freq 2.439500000 GHz
Stop Freq 2.442500000 GHz
CF Step 300.000 kHz
Auto Man
Freq Offset 0 Hz

CH 78

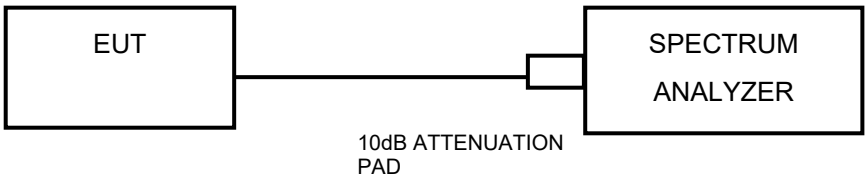

Agilent Spectrum Analyzer - Swept SA
Center Freq 2.480000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
01:57:17 AM Oct 25, 2019
Ref Offset 8.66 dB
10 dB/div
Ref 10.00 dBm
ΔMkr3 1.392 MHz
0.02 dB
-20.21 dBm
Center 2.480000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.479 313 GHz -20.73 dBm
2 N 1 f 2.479 847 GHz -0.21 dBm
3 Δ1 1 f (Δ) 1.392 MHz (Δ) 0.02 dB
Frequency
Auto Tune
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

4.5 HOPPING CHANNEL SEPARATION

4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

4.5.2 TEST SETUP



4.5.3 TEST INSTRUMENTS

Refer to section 4.2.3 to get information of above instrument.

4.5.4 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the Max Hold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.5.5 DEVIATION FROM TEST STANDARD

No deviation.

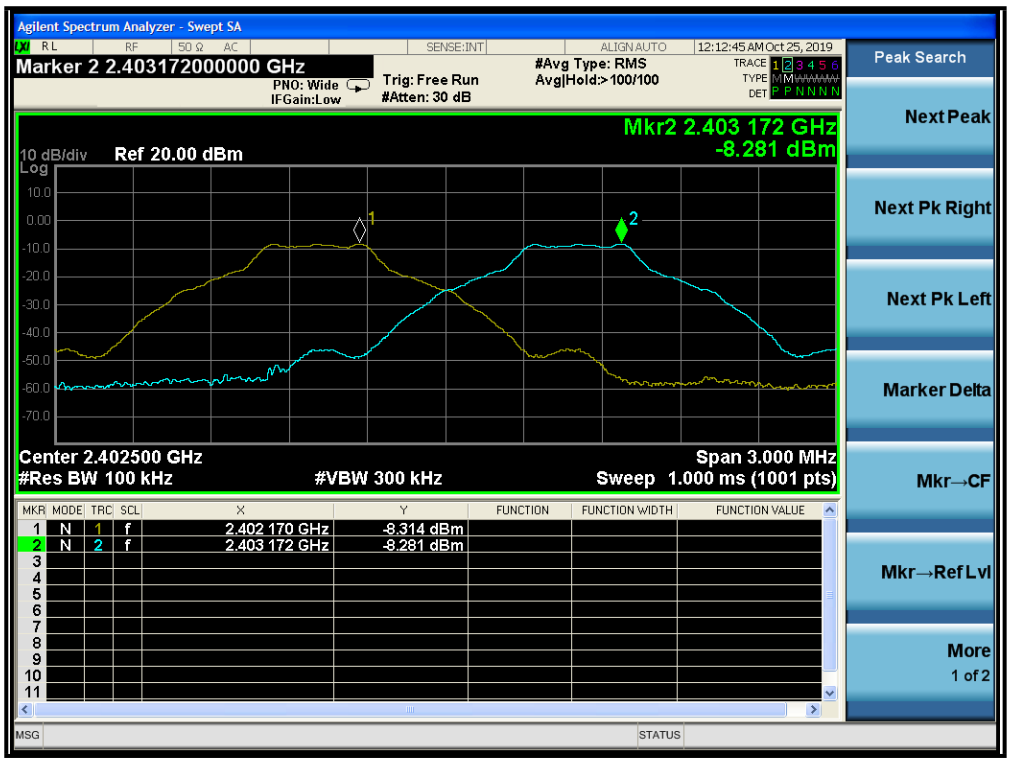
4.5.6 TEST RESULTS

GFSK

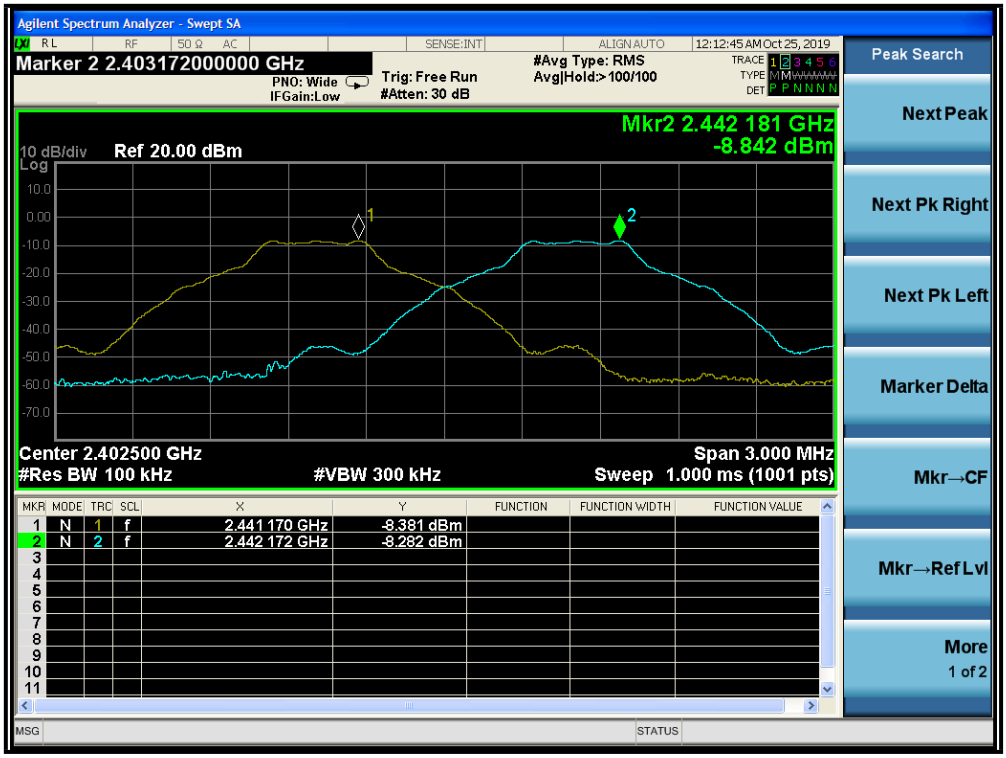
CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.005	1.059	0.706	PASS
39	2441	1.002	1.116	0.744	PASS
78	2480	1.002	1.119	0.746	PASS

NOTE: The minimum limit is two-third 20dB bandwidth.

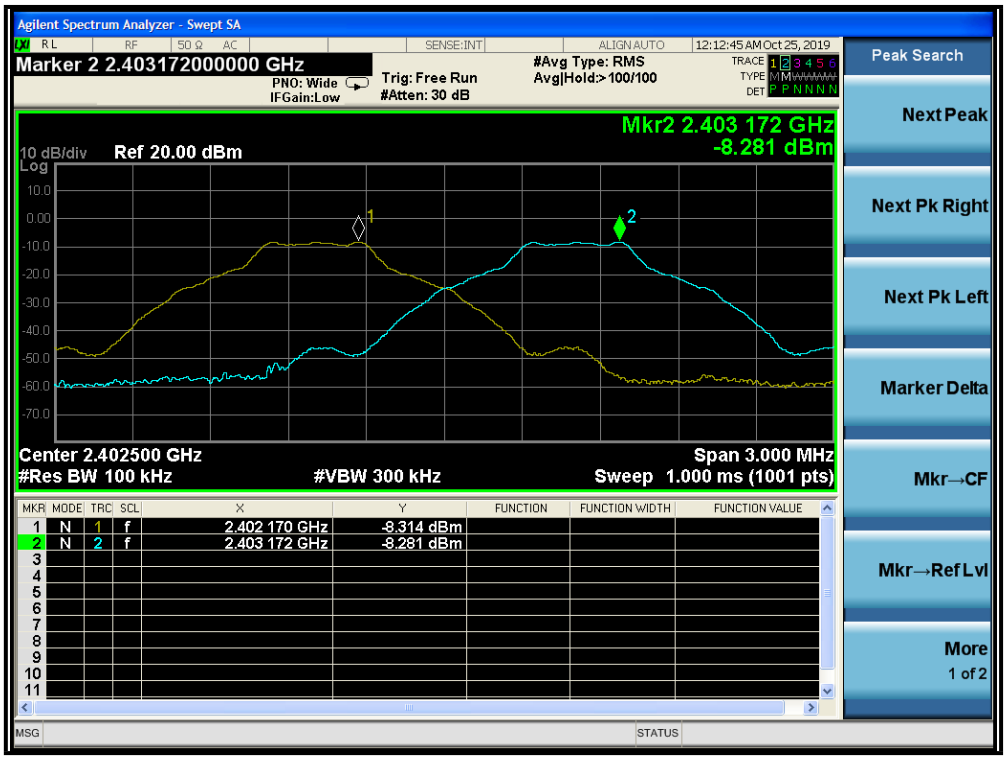
CH 0



CH 39


Agilent Spectrum Analyzer - Swept SA
Marker 2 2.403172000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
12:12:45 AM Oct 25, 2019
Mkr2 2.442 181 GHz
-8.842 dBm
10 dB/div
Ref 20.00 dBm
Center 2.402500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.441 170 GHz -8.381 dBm
2 N 2 f 2.442 172 GHz -8.282 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH 78


Agilent Spectrum Analyzer - Swept SA
Marker 2 2.403172000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
12:12:45 AM Oct 25, 2019
Mkr2 2.403 172 GHz
-8.281 dBm
10 dB/div
Ref 20.00 dBm
Center 2.402500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.402 170 GHz -8.314 dBm
2 N 2 f 2.403 172 GHz -8.281 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

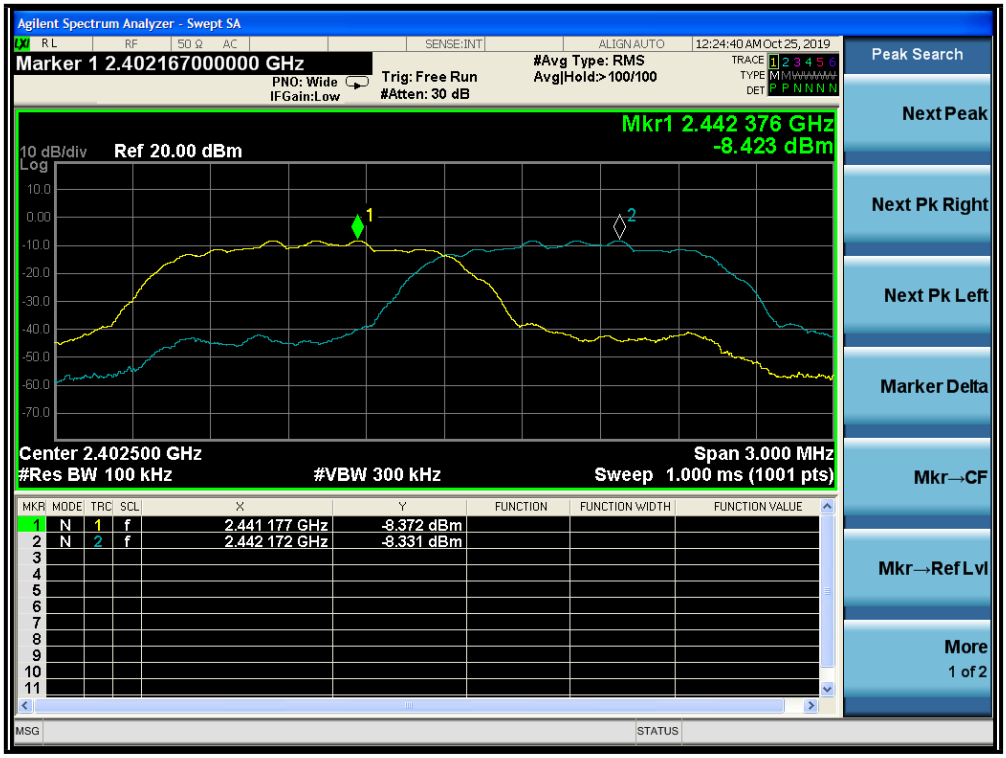
DPSK

CHANNEL	FREQUENCY (MHz)	ADJACENT CHANNEL SEPARATION (MHz)	20dB BANDWIDTH (MHz)	MINIMUM LIMIT (MHz)	PASS / FAIL
0	2402	1.005	1.380	0.920	PASS
39	2441	1.005	1.398	0.932	PASS
78	2480	1.002	1.392	0.928	PASS

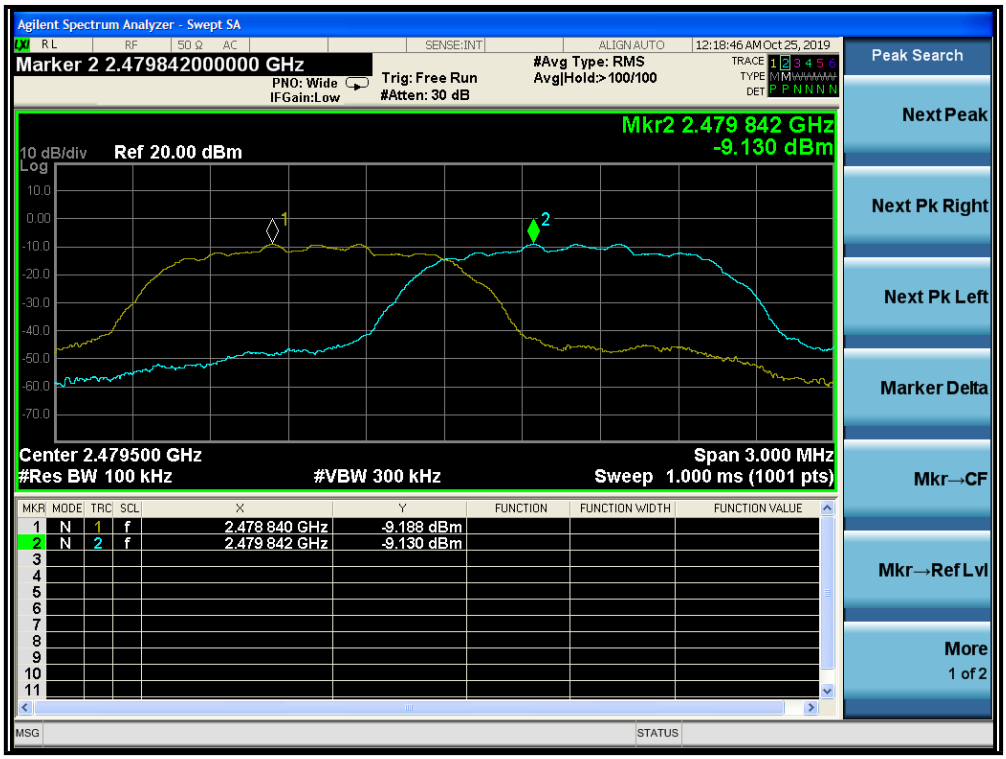
NOTE: The minimum limit is two-third 20dB bandwidth.

CH 0

CH 39


Agilent Spectrum Analyzer - Swept SA
Marker 1 2.402167000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
12:24:40 AM Oct 25, 2019
Mkr1 2.442 376 GHz
-8.423 dBm
10 dB/div
Ref 20.00 dBm
Center 2.402500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.441 177 GHz -8.372 dBm
2 N 2 f 2.442 172 GHz -8.331 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

CH 78

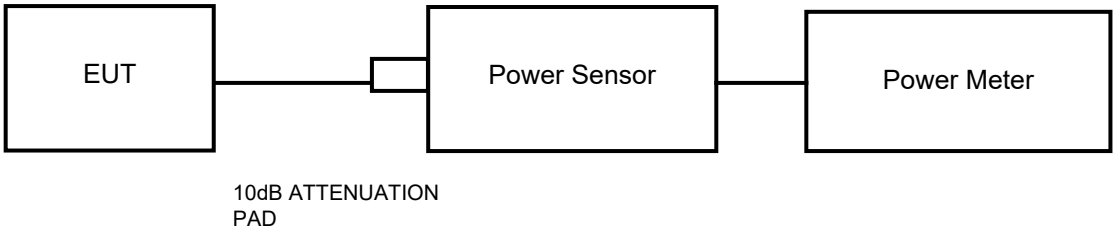

Agilent Spectrum Analyzer - Swept SA
Marker 2 2.479842000000 GHz
PNO: Wide
IFGain:Low
Trig: Free Run
#Atten: 30 dB
#Avg Type: RMS
Avg|Hold:>100/100
12:18:46 AM Oct 25, 2019
Mkr2 2.479 842 GHz
-9.130 dBm
10 dB/div
Ref 20.00 dBm
Center 2.479500 GHz
#Res BW 100 kHz
#VBW 300 kHz
Span 3.000 MHz
Sweep 1.000 ms (1001 pts)
1 N 1 f 2.478 840 GHz -9.188 dBm
2 N 2 f 2.479 842 GHz -9.130 dBm
Peak Search
Next Peak
Next Pk Right
Next Pk Left
Marker Delta
Mkr→CF
Mkr→Ref Lvl
More
1 of 2

4.6 CONDUCTED OUTPUT POWER

4.6.1 LIMITS OF CONDUCTED OUTPUT POWER MEASUREMENT

The Maximum Output Power Measurement is 125mW.

4.6.2 TEST SETUP



4.6.3 TEST INSTRUMENTS

Refer to section 4.2.3 to get information of above instrument.

4.6.4 TEST PROCEDURES

A peak power 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.

4.6.5 DEVIATION FROM TEST STANDARD

No deviation.

4.6.6 EUT OPERATING CONDITION

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

4.6.7 TEST RESULTS

MAXIMUM AVERAGE OUTPUT POWER

GFSK

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)
0	2402	0.21	1.050
39	2441	-0.05	0.989
78	2480	0.27	1.064

8DPSK

CHANNEL	CHANNEL FREQUENCY (MHz)	AVERAGE POWER (dBm)	AVERAGE POWER (mW)
0	2402	**2.54**	**1.795**
39	2441	2.25	1.679
78	2480	2.39	1.734

4.7 OUT OF BAND EMISSION MEASUREMENT

4.7.1 LIMITS OF OUT OF BAND EMISSION MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

4.7.2 TEST INSTRUMENTS

Refer to section 4.2.3 to get information of above instrument.

4.7.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. of Spectrum Analyzer was set RBW to 100 kHz and VBW to 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. Detector = PEAK and Trace mode = Max Hold. The band edges was measured and recorded.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation.

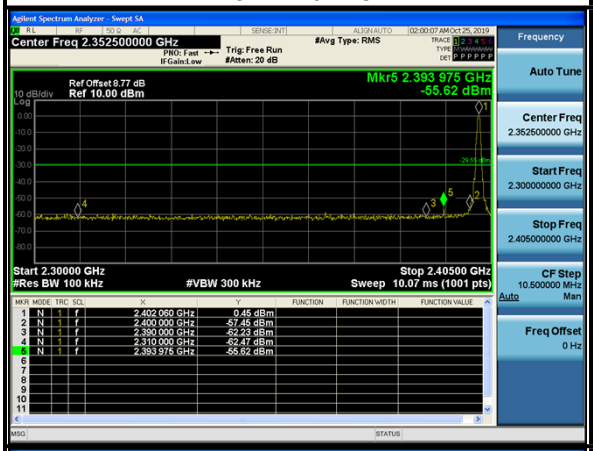
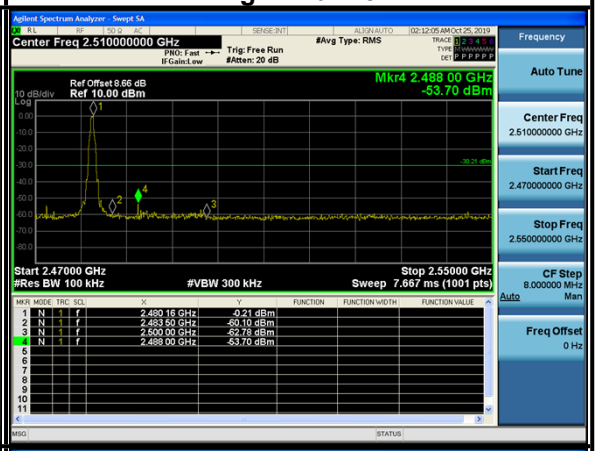
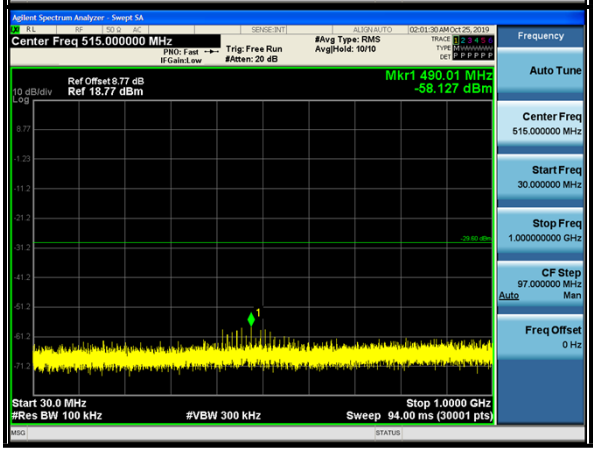
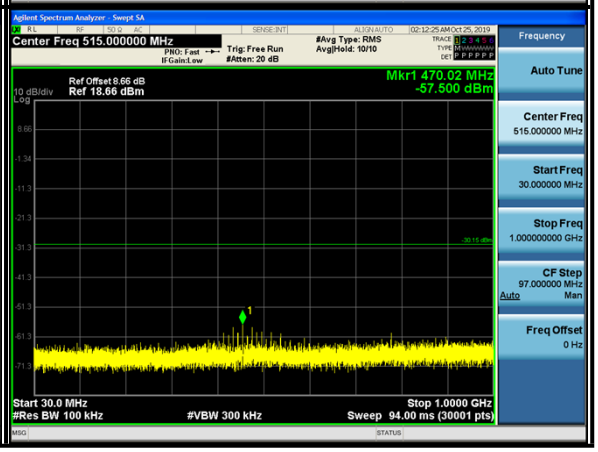
4.7.5 EUT OPERATING CONDITION

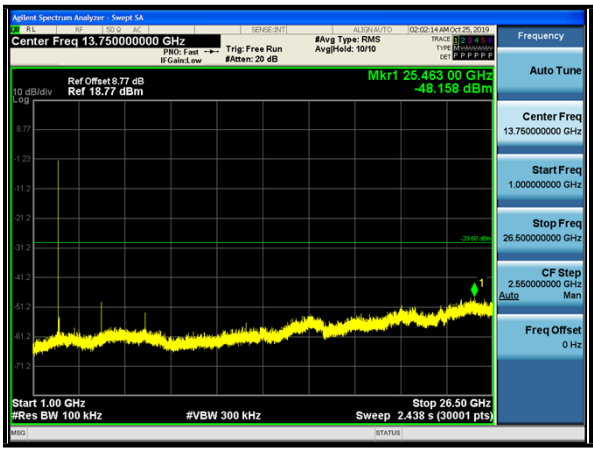
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.7.6 TEST RESULTS

The spectrum plots are attached on the following images. D1 line indicates the highest level. D2 line indicates the 20dB offset below D1. It shows compliance to the requirement.

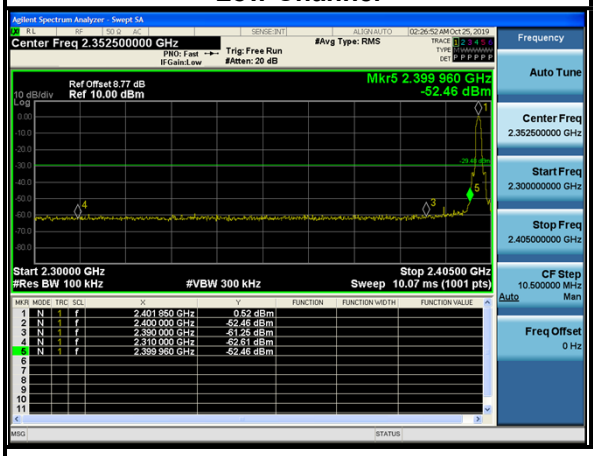
GFSK

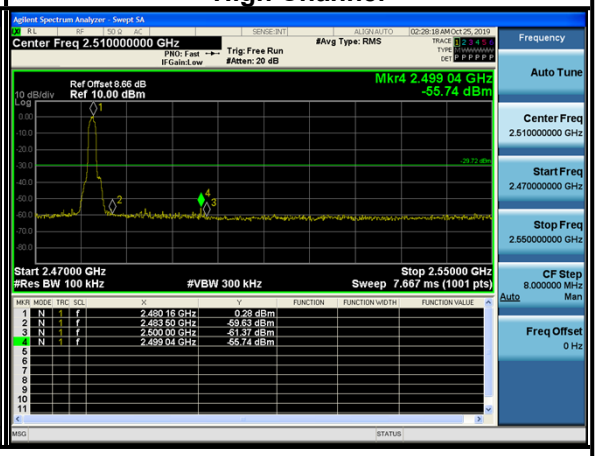
Low Channel	High Channel
	
	

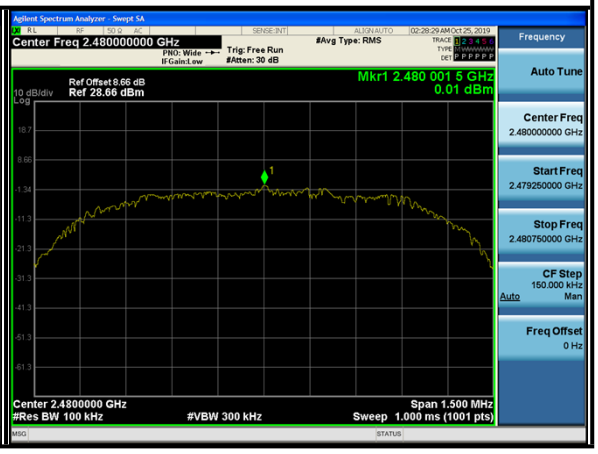


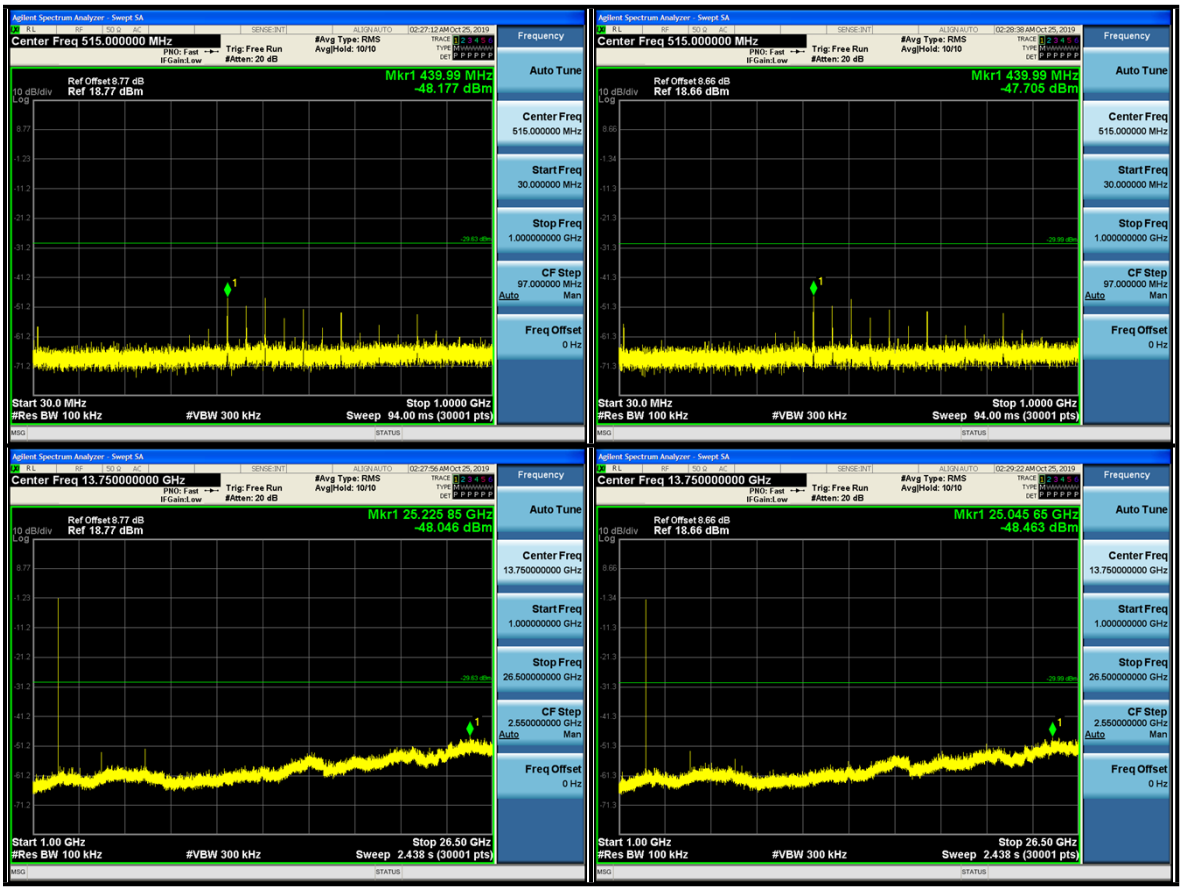
8DPSK

Low Channel	High Channel

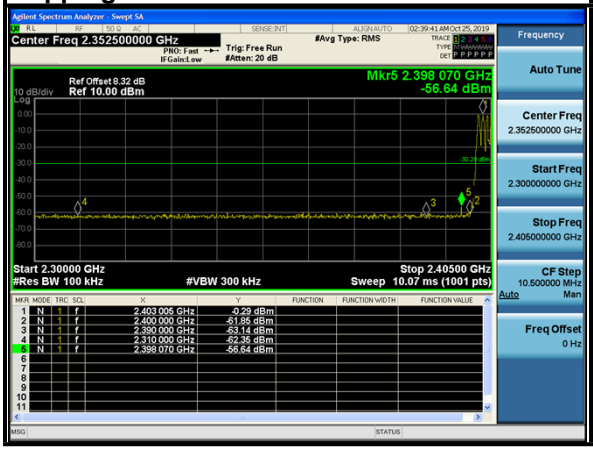
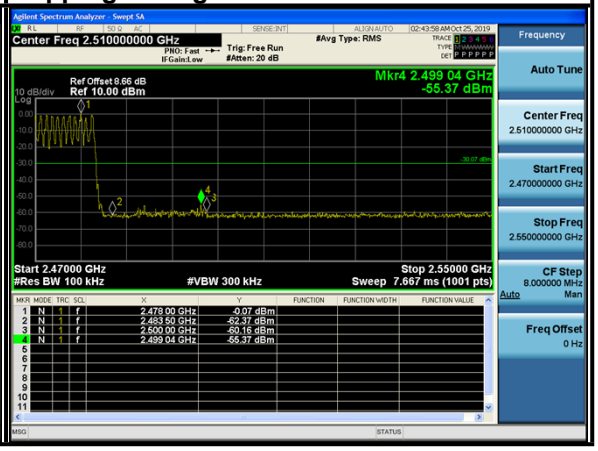




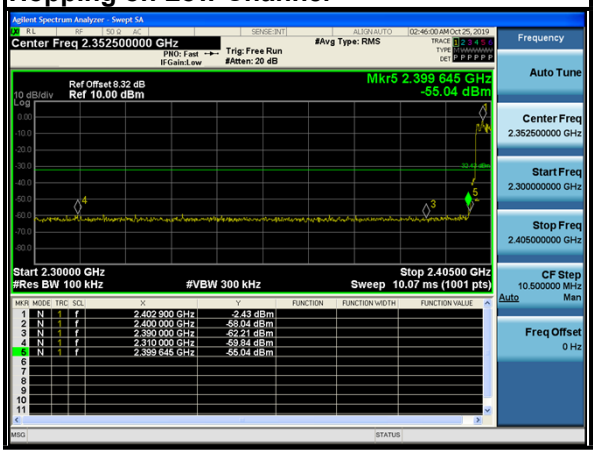
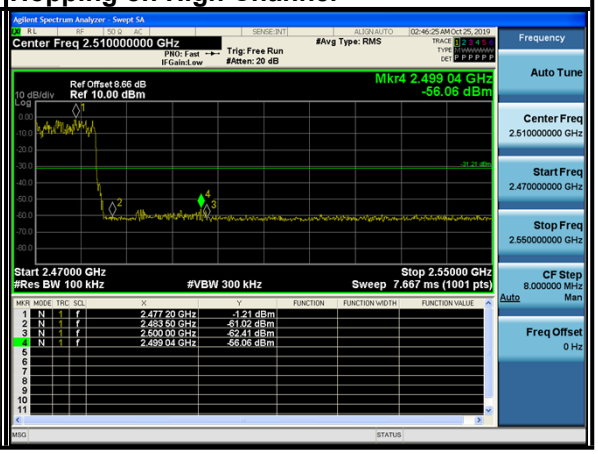



Agilent Spectrum Analyzer - Swept SA
Center Freq 515.000000 MHz
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
02:27:12 AM Oct 25, 2019
Ref Offset 8.77 dB
10 dB/div
Ref 18.77 dBm
Mkr1 439.99 MHz
-48.177 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30001 pts)
Frequency
Auto Tune
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
Agilent Spectrum Analyzer - Swept SA
Center Freq 515.000000 MHz
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
02:28:38 AM Oct 25, 2019
Ref Offset 8.66 dB
10 dB/div
Ref 18.66 dBm
Mkr1 439.99 MHz
-47.705 dBm
Start 30.0 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 1.0000 GHz
Sweep 94.00 ms (30001 pts)
Frequency
Auto Tune
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
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.750000000 GHz
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
02:27:56 AM Oct 25, 2019
Ref Offset 8.77 dB
10 dB/div
Ref 18.77 dBm
Mkr1 25.225 85 GHz
-48.046 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
Agilent Spectrum Analyzer - Swept SA
Center Freq 13.750000000 GHz
Trig: Free Run
#Atten: 20 dB
#Avg Type: RMS
Avg|Hold: 10/10
02:29:22 AM Oct 25, 2019
Ref Offset 8.66 dB
10 dB/div
Ref 18.66 dBm
Mkr1 25.045 65 GHz
-48.463 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

GFSK

Hopping on Low Channel	Hopping on High Channel
	

8DPSK

Hopping on Low Channel	Hopping on High Channel
	

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---