

Test Report

Product: TWS Monitor Earphone

Trade Mark:  **HOLLYLAND**

Model Number: M21E

FCC ID: 2ADZC-M21E

Prepared for

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's Name..... : Shenzhen Hollyland Technology Co., Ltd.
Address : 8F, Building 5D, Skyworth Innovation Valley, Tangtou Road,
Shiyan Street, Baoan District, Shenzhen, 518055 China
Manufacturer's Name : Shenzhen Hollyland Technology Co., Ltd.
Address : 8F, Building 5D, Skyworth Innovation Valley, Tangtou Road,
Shiyan Street, Baoan District, Shenzhen, 518055 China

Product description

Product name : TWS Monitor Earphone
Model Number : M21E
Standards : FCC Part 15.247
Test procedure..... : IEEE/ANSI C63.10-2020
KDB 558074 D01 15.247 Meas Guidance v05r02

This device described above has been tested by Shenzhen HongBiao Certification& Testing Co., Ltd and the test results show that the equipment under test (EUT) is in compliance with the EMC requirements. And it is applicable only to the tested sample identified in the report.

Date of Test

Date (s) of performance of tests..... : Oct. 29, 2025~Dec. 21, 2025

Test Result..... : **Pass**

Testing Engineer :

Zoe Su

(Z o e S u)

Technical Manager :

Gary Lu

(G a r y L u)

Authorized Signatory :

Leo Su

(L e o S u)

[illegible]

1 General Description

1.1 Description of EUT

Product name:	TWS Monitor Earphone
Model name:	M21E
Series Model:	N/A
Different of series model:	N/A
Operation frequency:	2402-2480MHz
Modulation type:	GFSK
Bit Rate of transmitter:	1 Mbps, 2 Mbps
Antenna type:	FPCB Antenna
Antenna gain:	L: -6.6dBi R: -6dBi
Max. output power:	L: 4.77dBm R: 5.17dBm
Hardware version:	V28
Software version:	V2.0.0.13
Battery:	DC 3.85V, 60mAh, 0.231Wh
Power supply:	Battery: DC 3.85V, 60mAh, 0.231Wh Input: 5V=60mA
Adapter information:	N/A

1.2 Test Mode

Test Mode	Channel	Frequency (MHz)
GFSK 1M	00	2402
GFSK 1M	19	2440
GFSK 1M	39	2480
GFSK 2M	00	2402
GFSK 2M	19	2440
GFSK 2M	39	2480

1.3 Operation Channel List

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (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

1.4 Test Setup

See photographs of the test setup in the report for the actual setup and connections between EUT and support equipment.

1.5 Power setting configuration parameters

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters.

Test software Version		ATS303X FCC Tool V3.00	
Frequency	2402 MHz	2440 MHz	2480 MHz
Parameters	Default	Default	Default
RF cable			
Description	Connector	Length	Supplied by
Antenna Cable	SMA	10cm	Applicant

Note: Disclaimer: the loss of RF cable is too small and can be ignored.

1.6 Ancillary Equipment

Equipment	Model	S/N	Manufacturer
Laptop	BDR-WDH	A3RQPM242 0004454	Honor Device Co., Ltd.
HUB	/	/	/

2 Summary of Test Result

No.	Standard Section	Test Item	Result	Remark
1	15.203	Antenna requirement	Pass	
2	15.207	Conducted emission	N/A	
3	15.247(d)	Band edge	Pass	
4	15.205/15.209	Spurious emission	Pass	
5	15.247(b)(1)	Peak output power	Pass	
6	15.247(a)(1)	20dB occupied bandwidth	Pass	
7	15.247(a)(1)	Carrier Frequencies Separation	Pass	
8	15.247(a)(1)	Hopping channel number	Pass	
9	15.247(a)(1)	Dwell time	Pass	
10	15.247(d)	Spurious RF Conducted Emissions	Pass	

Note: "N/A" means the test item not applicable.

3 Test Facilities and Accreditations

3.1 Test Laboratory

Test Site:	Shenzhen HongBiao Certification& Testing Co., Ltd
Test Site Location:	Room 102, 201, Building 2, Yuanwanggu RFID Industrial Park, Tongguan Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen, China
Telephone:	(86-755) 2998 9321
Fax:	(86-755) 2998 5110
FCC Registration No.:	CN1341
A2LA Certificate No.:	6765.01

3.2 Environmental Conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15°C~35°C
Relative Humidity:	20%~75%
Air Pressure:	98kPa~101kPa

3.3 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

The data and results quoted in this document are true and accurate values, and uncertainties are not involved in the calculations.

In addition, components and mass production processes that are similar to testing equipment may introduce additional deviations, and the manufacturer is solely responsible for the continued compliance of the equipment.

Measurement Frequency Range	U, (dB)	Note
RF frequency	2×10^{-5}	
RF power, conducted	± 0.57 dB	
Conducted emission(150kHz~30MHz)	± 2.5 dB	
Radiated emission(9kHz-30MHz)	± 2.5 dB	
Radiated emission(30MHz~1GHz)	± 4.2 dB	
Radiated emission (above 1GHz)	± 4.7 dB	
Occupied Bandwidth	$\pm 3\%$	
Temperature	± 1 degree	
Humidity	$\pm 5 \%$	

3.4 Test Software

Software name	Manufacturer	Model	Version
Conducted Emission test Software	Farad	EZ-EMC	EMC-CON 3A1.1+
Radiated Emission test Software	Farad	EZ-EMC	FA-03A2
RF Test System	MWRF	MTS 8310	2.0.0.0

4 List of Test Equipment

Radiation emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E001	Horn Antenna	Schwarzbeck	BBHA 9120D	02592	2024-05-18	2026-05-17
2	HB-E002	Biconical log-periodic composite antenna	Schwarzbeck	VULB 9168	01340	2024-05-18	2026-05-17
3	HB-E003	SHF-EHF Horn	Schwarzbeck	BBHA 91270	01193	2024-05-18	2026-05-17
4	HB-E005	Preamplifier	Noyetec	LAN-0118	NYCM1420102	2025-05-07	2026-05-06
5	HB-E006	Preamplifier	Noyetec	LAN-1840	NYCM1420103	2025-05-07	2026-05-06
6	HB-E007	EMI TEST RECEIVER	R&S	ESR7	102520	2025-05-07	2026-05-06
7	HB-E009	POSITINAL COTROLLE R	Noyetec	N/A	N/A	/	/
8	HB-E013	RF switch	Noyetec	NY-RF4	NY0CM1420204	/	/
9	HB-E066	Illuminance Tester	TASI	TA8121	N/A	2025-05-13	2026-05-12
10	HB-E075	Active loop antenna	Schwarzbeck	FMZB 1519B	1519B-245	2024-05-18	2026-05-17
11	HB-E076	Preamplifier	Hewlett Packard	8447D	1937A02278	2025-05-07	2026-05-06
Conduction emission							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E014	4 Path V-LISN	Schwarzbeck	NNLK 8121	00770	2025-05-07	2026-05-06
2	HB-E015	Pulse Limiter	Schwarzbeck	VTSD 9561-F	00949	2025-05-07	2026-05-06
3	HB-E016	ZN23201	Noyetec	ZN23201	N/A	2025-05-10	2026-05-09
4	HB-E059	Attenuator	Xianghua	TS2-6-1	220215166	2025-05-10	2026-05-09
5	HB-E069	EMI TEST RECEIVER	R&S	ESCI	N/A	2025-05-07	2026-05-06
RF							
Item	Equipment No.	Equipment name	Manufacturer	Model	Serial No.	Calibration date	Due date
1	HB-E041	MXG Anaio Signal Generator	Agilent	N5181A	MY47070421	2025-05-07	2026-05-06
2	HB-E042	WIDEBAND RADIO COMMUNICATION TESTER	R&S	CMW500	132108	2025-05-08	2026-05-07

3	HB-E043	MXG Anaio Signal Generator	Agilent	N5182A	US46240335	2025-05-08	2026-05-07
4	HB-E044	Signal& spectrum Analyzer	R&S	FSV3044	101264	2025-05-07	2026-05-06
5	HB-E045	RF Control Box	Noyetec	NY100-R FCB	N/A	2025-05-08	2026-05-07
6	HB-E058	Thermometer Clock Humidity Monitor	N/A	HTC-1S	N/A	2025-05-09	2026-05-08

Note: the calibration interval of the above test instruments is 12&24 months and the calibrations are traceable to international system unit (SI).

5 Test Item And Results

5.1 Antenna Requirement

5.1.1 Standard Requirement

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device

5.1.2 Test Result

The EUT antenna is FPCB Antenna. It comply with the standard requirement. In case of replacement of broken antenna the same antenna type must be used.

5.2 Conducted Emission

5.2.1 Limits

Limits – Class B		
Frequency (MHz)	Limit (dBμV)	
	Quasi-Peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50
Note: 1. the tighter limit applies at the band edges. 2. the limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.		

5.2.2 Test Procedures

a) EUT Operating Conditions

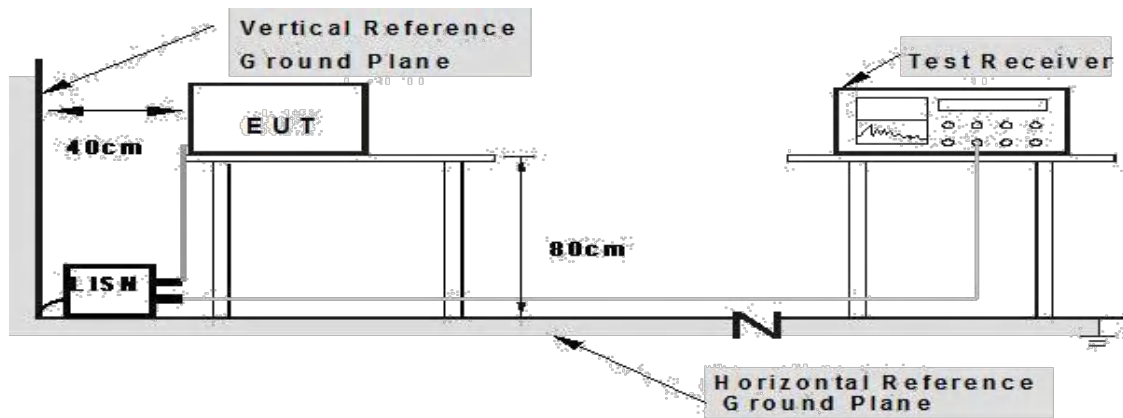
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

b) The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

- The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipment powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN is at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item – photographs of the test setup.

5.2.3 Test Setup



5.2.4 Test Result

Note: The device is a battery power supply and does not apply to conducted emissions.

5.3 Radiated Emission

5.3.1 Limits

Frequencies (MHz)	Field Strength (microvolt/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

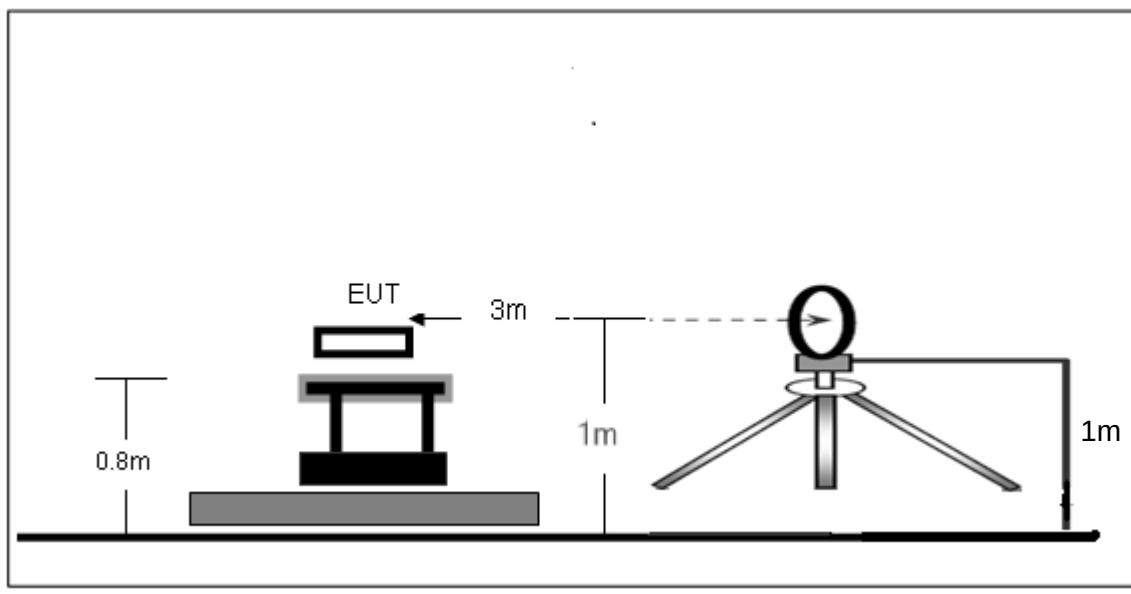
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

5.3.2 Test Procedures

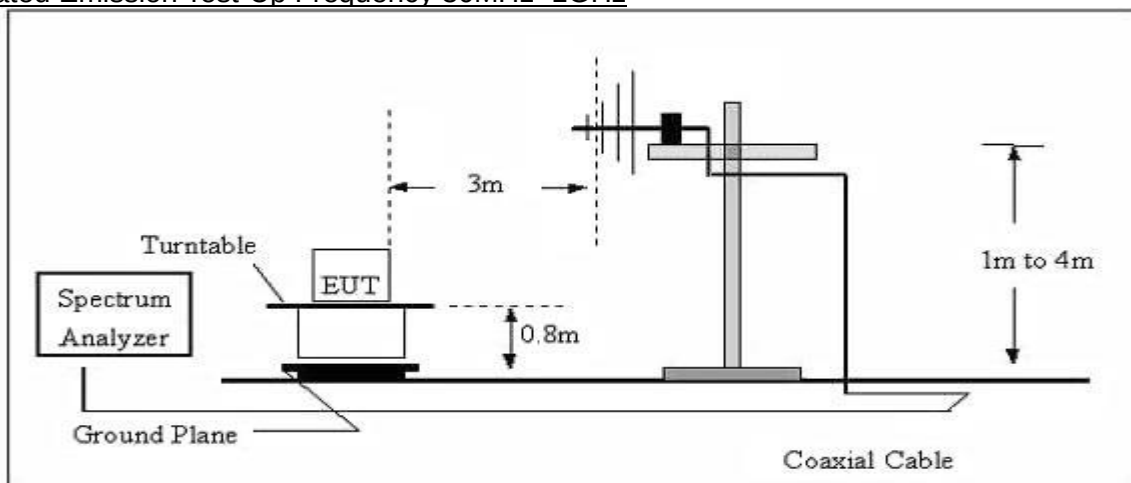
- The radiated emission tests were performed in the 3 meters.
- The EUT was placed on the top of a rotating table 0.8 meters above the ground. The table was rotated 360 degrees to determine the position of the highest radiation.
- The height of the test antenna shall vary between 1m to 4m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- If the peak mode measured value compliance with and lower than quasi peak mode limit, the EUT shall be deemed to meet QP limits and then no additional QP mode measurement performed.
- If the peak mode measured value compliance with and lower than average mode limit, the EUT shall be deemed to meet average limits and then no additional average mode measurement performed.
- For the actual test configuration, please refer to the related item – EUT test photos.

5.3.3 Test Setup

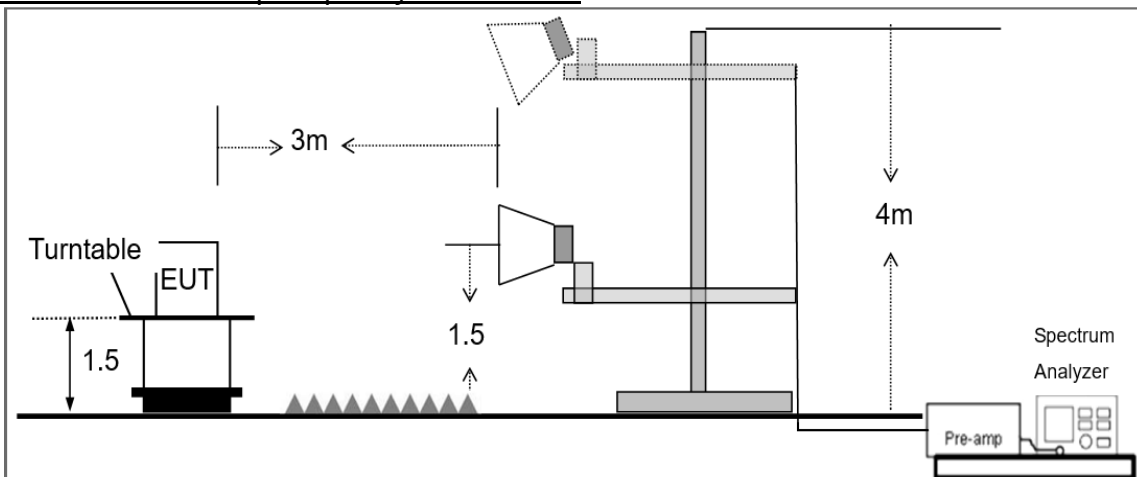
Radiated Emission Test-Up Frequency Below 30MHz



Radiated Emission Test-Up Frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz



5.3.4 Test Result

Below 30MHz

EUT:	TWS Monitor Earphone	Model Name:	M21E
Pressure:	1010 hPa	Test Voltage:	DC 3.85V from battery
Test Mode:	TX	Polarization:	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	Pass
--	--	--	--	Pass

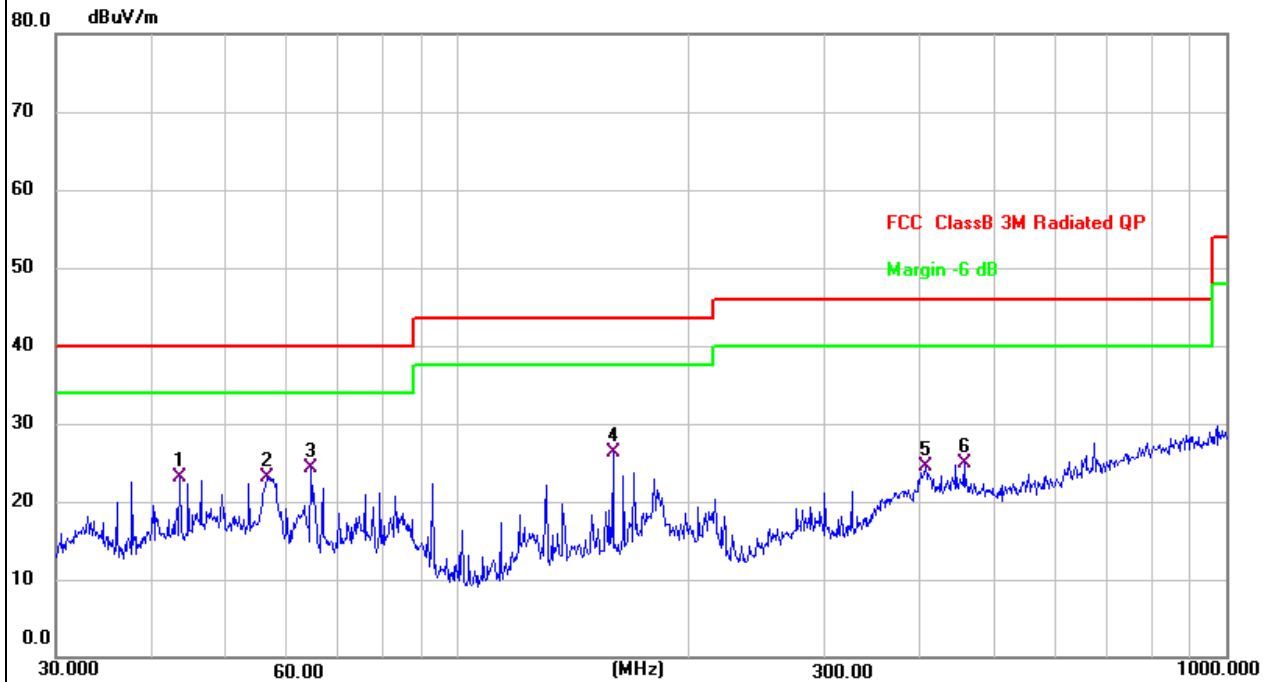
Note:

1. For 9kHz-30MHz, 18G-25G the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
2. Distance extrapolation factor = $40 \log (\text{specific distance}/\text{test distance})$ (dB);
3. Limit line = specific limits (dBuV) + distance extrapolation factor.

30MHz – 1GHz

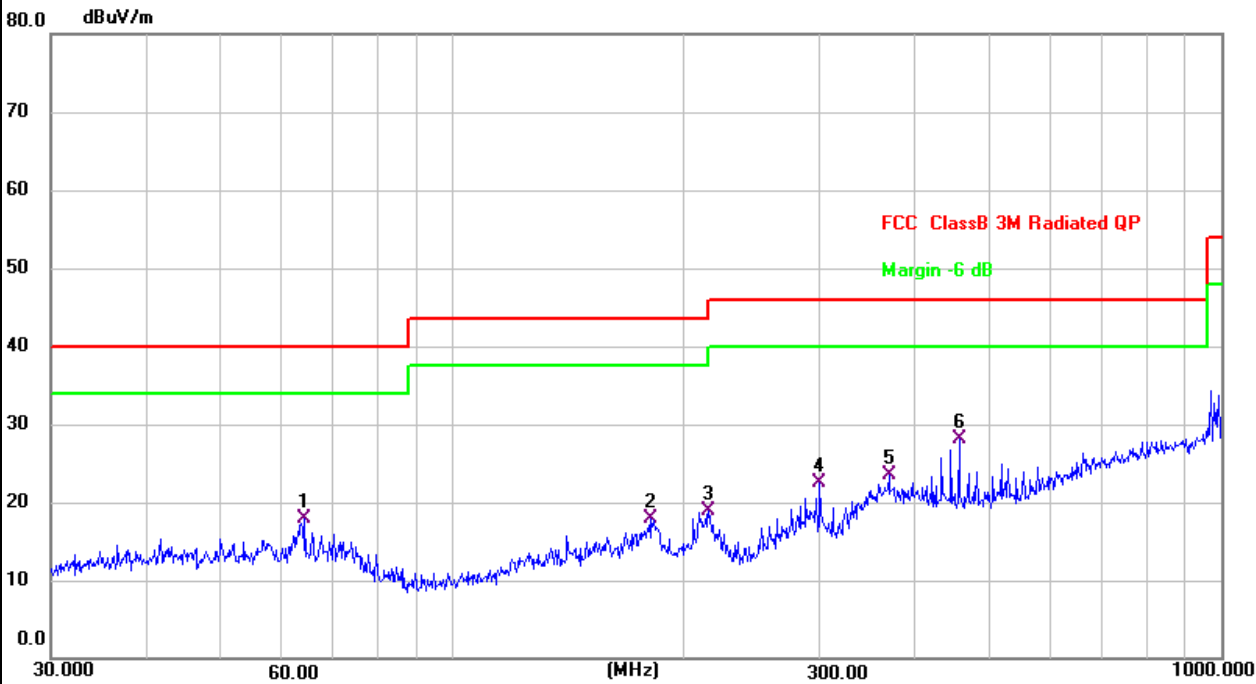
L:

EUT:	TWS Monitor Earphone	Model Name:	M21E
Test Mode:	TX	Phase:	Vertical
Test Voltage:	DC 3.85V from battery		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	43.5057	37.12	-13.95	23.17	40.00	-16.83	QP
2	56.3948	37.56	-14.40	23.16	40.00	-16.84	QP
3 *	64.4331	39.40	-15.18	24.22	40.00	-15.78	QP
4	159.2251	39.62	-13.28	26.34	43.50	-17.16	QP
5	406.0880	33.65	-9.17	24.48	46.00	-21.52	QP
6	455.9058	32.92	-8.05	24.87	46.00	-21.13	QP

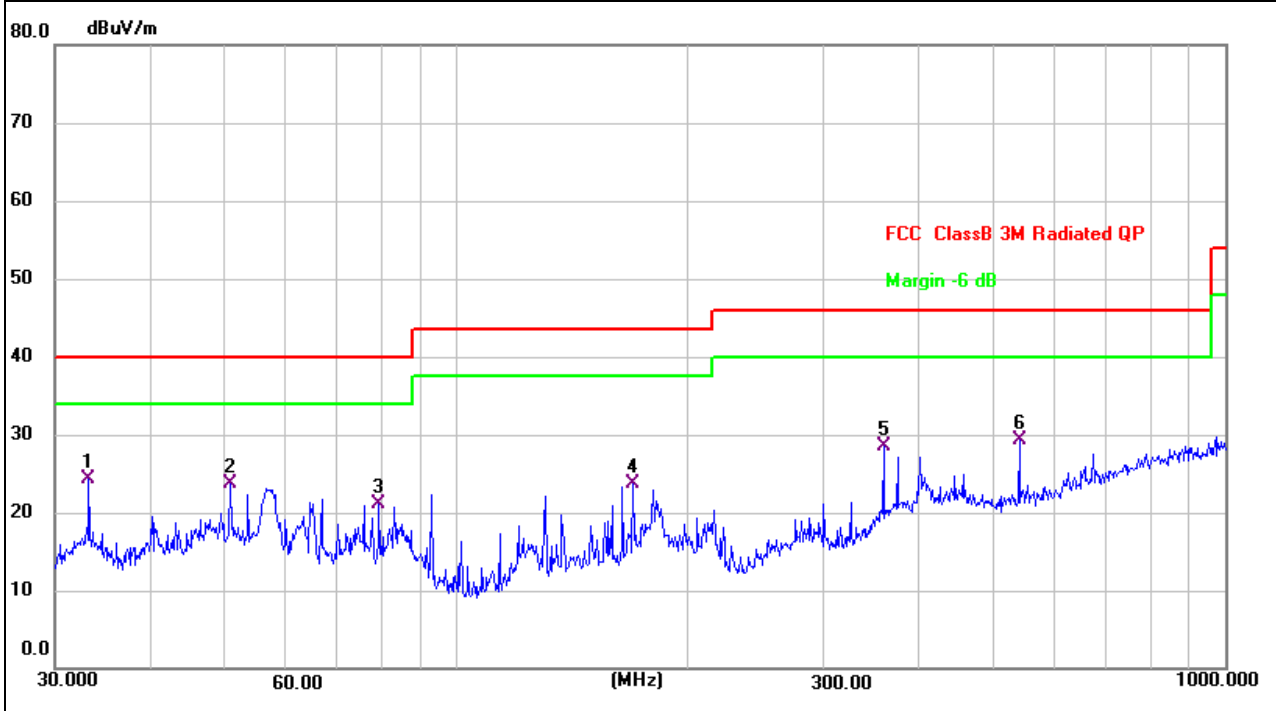
EUT:	TWS Monitor Earphone	Model Name:	M21E
Test Mode:	TX	Phase:	Horizontal
Test Voltage:	DC 3.85V from battery		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	64.2074	32.98	-15.13	17.85	40.00	-22.15	QP
2	181.2834	33.12	-15.21	17.91	43.50	-25.59	QP
3	215.2678	35.61	-16.65	18.96	43.50	-24.54	QP
4	300.3672	34.91	-12.46	22.45	46.00	-23.55	QP
5	369.4047	33.84	-10.39	23.45	46.00	-22.55	QP
6 *	455.9058	36.21	-8.05	28.16	46.00	-17.84	QP

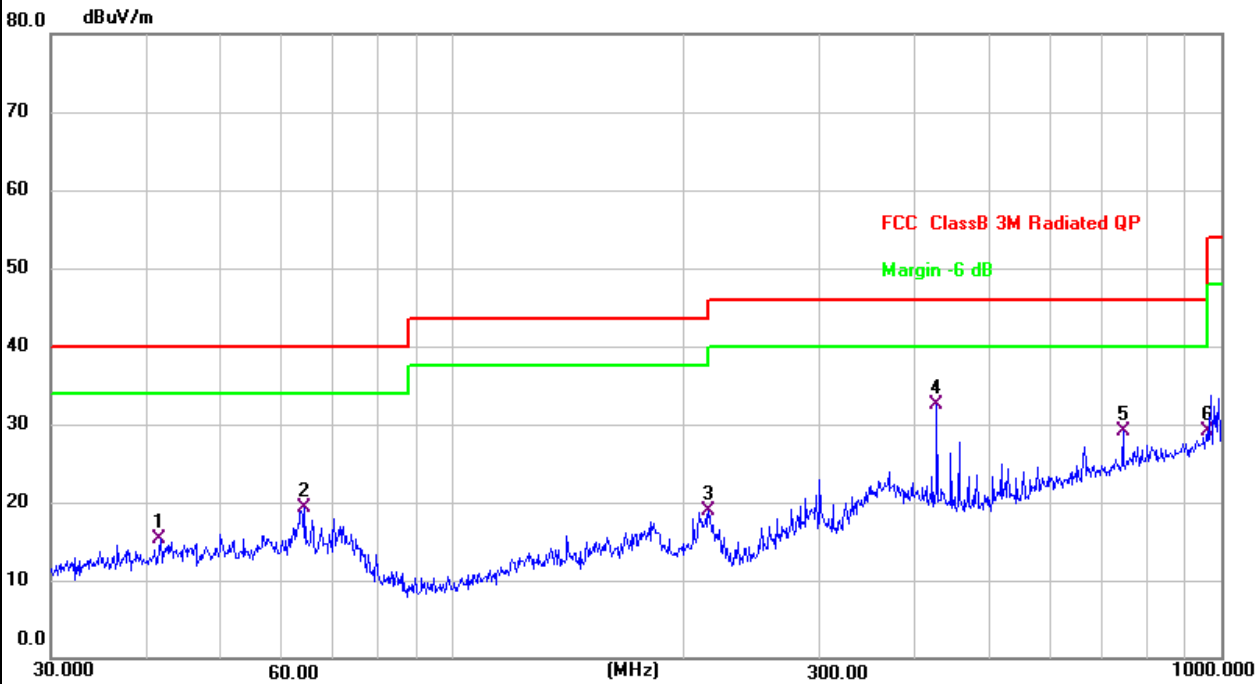
R:

EUT:	TWS Monitor Earphone	Model Name:	M21E
Test Mode:	TX	Phase:	Vertical
Test Voltage:	DC 3.85V from battery		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1 *	33.2111	39.32	-14.95	24.37	40.00	-15.63	QP
2	50.7635	37.80	-14.04	23.76	40.00	-16.24	QP
3	79.2425	38.97	-17.77	21.20	40.00	-18.80	QP
4	169.5988	37.27	-13.62	23.65	43.50	-19.85	QP
5	359.1859	39.12	-10.58	28.54	46.00	-17.46	QP
6	539.4773	35.75	-6.35	29.40	46.00	-16.60	QP

EUT:	TWS Monitor Earphone	Model Name:	M21E
Test Mode:	TX	Phase:	Horizontal
Test Voltage:	DC 3.85V from battery		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector
1	41.7129	29.22	-13.86	15.36	40.00	-24.64	QP
2	64.2074	34.48	-15.13	19.35	40.00	-20.65	QP
3	215.2675	35.61	-16.65	18.96	43.50	-24.54	QP
4 *	426.5210	41.13	-8.58	32.55	46.00	-13.45	QP
5	744.8659	29.67	-0.64	29.03	46.00	-16.97	QP
6	958.7943	27.16	1.87	29.03	46.00	-16.97	QP

5.3.5 Band Edge - Radiated

L:

Frequency (MHz)	Meter Reading (dBμV)	Cable Loss (dB)	Antenna Factor dB/m	Preamplifier Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
GFSK(1M)									
2310.00	45.99	3.40	27.80	32.41	44.78	74	-29.22	Pk	Horizontal
2310.00	33.55	3.40	27.80	32.41	32.34	54	-21.66	AV	Horizontal
2310.00	44.89	3.40	27.80	32.41	43.68	74	-30.32	Pk	Vertical
2310.00	33.63	3.40	27.80	32.41	32.42	54	-21.58	AV	Vertical
2390.00	45.66	3.45	27.70	32.49	44.32	74	-29.68	Pk	Vertical
2390.00	34.64	3.45	27.70	32.49	33.30	54	-20.70	AV	Vertical
2390.00	46.20	3.45	27.70	32.49	44.86	74	-29.14	Pk	Horizontal
2390.00	34.41	3.45	27.70	32.49	33.07	54	-20.93	AV	Horizontal
2400.00	46.76	3.46	27.80	32.54	45.48	74	-28.52	Pk	Vertical
2400.00	34.45	3.46	27.80	32.54	33.17	54	-20.83	AV	Vertical
2400.00	45.81	3.46	27.80	32.54	44.53	74	-29.47	Pk	Horizontal
2400.00	34.44	3.46	27.80	32.54	33.16	54	-20.84	AV	Horizontal
2483.50	47.19	3.48	28.53	32.55	46.65	74	-27.35	Pk	Vertical
2483.50	34.09	3.48	28.53	32.55	33.55	54	-20.45	AV	Vertical
2483.50	46.30	3.48	28.53	32.55	45.76	74	-28.24	Pk	Horizontal
2483.50	33.73	3.48	28.53	32.55	33.19	54	-20.81	AV	Horizontal
2500.00	45.27	3.49	29.20	32.66	45.30	74	-28.70	Pk	Vertical
2500.00	33.93	3.49	29.20	32.66	33.96	54	-20.04	AV	Vertical
2500.00	45.28	3.49	29.20	32.66	45.31	74	-28.69	Pk	Horizontal
2500.00	33.66	3.49	29.20	32.66	33.69	54	-20.31	AV	Horizontal

Remark:

- Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin = Emission Level – Limit
- All the modulation modes have been tested, and only the worst results are reflected in the report.

R:

Frequency (MHz)	Meter Reading (dBμV)	Cable Loss (dB)	Antenna Factor dB/m	Preamplifier Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
GFSK(1M)									
2310.00	46.20	3.40	27.80	32.41	44.99	74	-29.01	Pk	Horizontal
2310.00	33.34	3.40	27.80	32.41	32.13	54	-21.87	AV	Horizontal
2310.00	44.80	3.40	27.80	32.41	43.59	74	-30.41	Pk	Vertical
2310.00	33.67	3.40	27.80	32.41	32.46	54	-21.54	AV	Vertical
2390.00	45.55	3.45	27.70	32.49	44.21	74	-29.79	Pk	Vertical
2390.00	34.54	3.45	27.70	32.49	33.20	54	-20.80	AV	Vertical
2390.00	46.37	3.45	27.70	32.49	45.03	74	-28.97	Pk	Horizontal
2390.00	34.45	3.45	27.70	32.49	33.11	54	-20.89	AV	Horizontal
2400.00	46.53	3.46	27.80	32.54	45.25	74	-28.75	Pk	Vertical
2400.00	34.43	3.46	27.80	32.54	33.15	54	-20.85	AV	Vertical
2400.00	46.06	3.46	27.80	32.54	44.78	74	-29.22	Pk	Horizontal
2400.00	34.33	3.46	27.80	32.54	33.05	54	-20.95	AV	Horizontal
2483.50	47.28	3.48	28.53	32.55	46.74	74	-27.26	Pk	Vertical
2483.50	34.00	3.48	28.53	32.55	33.46	54	-20.54	AV	Vertical
2483.50	46.13	3.48	28.53	32.55	45.59	74	-28.41	Pk	Horizontal
2483.50	33.85	3.48	28.53	32.55	33.31	54	-20.69	AV	Horizontal
2500.00	45.54	3.49	29.20	32.66	45.57	74	-28.43	Pk	Vertical
2500.00	33.88	3.49	29.20	32.66	33.91	54	-20.09	AV	Vertical
2500.00	45.28	3.49	29.20	32.66	45.31	74	-28.69	Pk	Horizontal
2500.00	33.91	3.49	29.20	32.66	33.94	54	-20.06	AV	Horizontal

Remark:

- Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin = Emission Level – Limit
- All the modulation modes have been tested, and only the worst results are reflected in the report.

5.3.6 Spurious emission in restricted band 1000MHz-25000MHz

L:

Frequency (MHz)	Reading Level (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)(GFSK 1M)--Above 1G									
4804.338	42.96	4.83	33.5	30.80	50.49	74.00	-23.51	Pk	Vertical
4804.338	31.86	4.83	33.5	30.80	39.39	54.00	-14.61	AV	Vertical
7206.107	42.88	5.83	37.79	31.40	55.10	74.00	-18.90	Pk	Horizontal
7206.107	31.98	5.83	37.79	31.40	44.20	54.00	-9.80	AV	Horizontal
4804.169	42.94	4.83	33.5	30.80	50.47	74.00	-23.53	Pk	Vertical
4804.169	31.81	4.83	33.5	30.80	39.34	54.00	-14.66	AV	Vertical
7206.214	42.66	5.83	37.79	31.40	54.88	74.00	-19.12	Pk	Horizontal
7206.214	32.16	5.83	37.79	31.40	44.38	54.00	-9.62	AV	Horizontal
Mid Channel (2440 MHz)(GFSK 1M)--Above 1G									
4880.473	44.13	4.89	33.76	30.80	51.98	74.00	-22.02	Pk	Vertical
4880.473	32.01	4.89	33.76	30.80	39.86	54.00	-14.14	AV	Vertical
7320.265	44.49	5.95	38.25	31.70	56.99	74.00	-17.01	Pk	Horizontal
7320.265	32.95	5.95	38.25	31.70	45.45	54.00	-8.55	AV	Horizontal
4880.366	43.88	4.89	33.76	30.80	51.73	74.00	-22.27	Pk	Vertical
4880.366	31.99	4.89	33.76	30.80	39.84	54.00	-14.16	AV	Vertical
7320.234	43.87	5.95	38.25	31.70	56.37	74.00	-17.63	Pk	Horizontal
7320.234	32.95	5.95	38.25	31.70	45.45	54.00	-8.55	AV	Horizontal
High Channel (2480 MHz)(GFSK 1M)-- Above 1G									
4960.482	42.88	4.95	34.33	30.80	51.36	74.00	-22.64	Pk	Vertical
4960.482	32.17	4.95	34.33	30.80	40.65	54.00	-13.35	AV	Vertical
7440.131	43.38	6.11	37.60	31.74	55.35	74.00	-18.65	Pk	Horizontal
7440.131	32.15	6.11	37.60	31.74	44.12	54.00	-9.88	AV	Horizontal
4960.326	42.89	4.95	34.33	30.80	51.37	74.00	-22.63	Pk	Vertical
4960.326	32.00	4.95	34.33	30.80	40.48	54.00	-13.52	AV	Vertical
7440.199	43.26	6.11	37.60	31.74	55.23	74.00	-18.77	Pk	Horizontal
7440.199	32.27	6.11	37.60	31.74	44.24	54.00	-9.76	AV	Horizontal

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. All the modulation modes have been tested, and only the worst results are reflected in the report.

R:

Frequency (MHz)	Reading Level (dBμV)	Cable Loss (dB)	Antenna Factor (dB/m)	Preamplifier Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)(GFSK 1M)--Above 1G									
4804.338	42.78	4.83	33.5	30.80	50.31	74.00	-23.69	Pk	Vertical
4804.338	31.73	4.83	33.5	30.80	39.26	54.00	-14.74	AV	Vertical
7206.107	42.92	5.83	37.79	31.40	55.14	74.00	-18.86	Pk	Horizontal
7206.107	31.89	5.83	37.79	31.40	44.11	54.00	-9.89	AV	Horizontal
4804.169	42.95	4.83	33.5	30.80	50.48	74.00	-23.52	Pk	Vertical
4804.169	31.75	4.83	33.5	30.80	39.28	54.00	-14.72	AV	Vertical
7206.214	42.76	5.83	37.79	31.40	54.98	74.00	-19.02	Pk	Horizontal
7206.214	32.15	5.83	37.79	31.40	44.37	54.00	-9.63	AV	Horizontal
Mid Channel (2440 MHz)(GFSK 1M)--Above 1G									
4880.473	44.18	4.89	33.76	30.80	52.03	74.00	-21.97	Pk	Vertical
4880.473	31.84	4.89	33.76	30.80	39.69	54.00	-14.31	AV	Vertical
7320.265	44.32	5.95	38.25	31.70	56.82	74.00	-17.18	Pk	Horizontal
7320.265	32.83	5.95	38.25	31.70	45.33	54.00	-8.67	AV	Horizontal
4880.366	43.72	4.89	33.76	30.80	51.57	74.00	-22.43	Pk	Vertical
4880.366	32.00	4.89	33.76	30.80	39.85	54.00	-14.15	AV	Vertical
7320.234	43.82	5.95	38.25	31.70	56.32	74.00	-17.68	Pk	Horizontal
7320.234	33.04	5.95	38.25	31.70	45.54	54.00	-8.46	AV	Horizontal
High Channel (2480 MHz)(GFSK 1M)-- Above 1G									
4960.482	42.75	4.95	34.33	30.80	51.23	74.00	-22.77	Pk	Vertical
4960.482	32.03	4.95	34.33	30.80	40.51	54.00	-13.49	AV	Vertical
7440.131	43.54	6.11	37.60	31.74	55.51	74.00	-18.49	Pk	Horizontal
7440.131	32.17	6.11	37.60	31.74	44.14	54.00	-9.86	AV	Horizontal
4960.326	42.70	4.95	34.33	30.80	51.18	74.00	-22.82	Pk	Vertical
4960.326	32.17	4.95	34.33	30.80	40.65	54.00	-13.35	AV	Vertical
7440.199	43.09	6.11	37.60	31.74	55.06	74.00	-18.94	Pk	Horizontal
7440.199	32.19	6.11	37.60	31.74	44.16	54.00	-9.84	AV	Horizontal

Remark:

1. Emission Level = Meter Reading + Antenna Factor + Cable Loss – Pre-amplifier, Margin= Emission Level - Limit
2. If peak below the average limit, the average emission was no test.
3. The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
4. All the modulation modes have been tested, and only the worst results are reflected in the report.

5.4 Peak Output Power

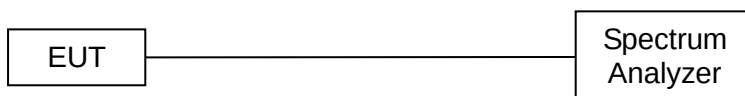
5.4.1 Limit

FCC Part15 Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247(b)(1)	Peak output power	Power<0.125W (21dBm)	2400-2483.5

5.4.2 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:
RBW=2MHz, VBW=10MHz, Detector=Peak
- (3) The EUT was set to continuously transmitting in the max power during the test.

5.4.3 Test Setup



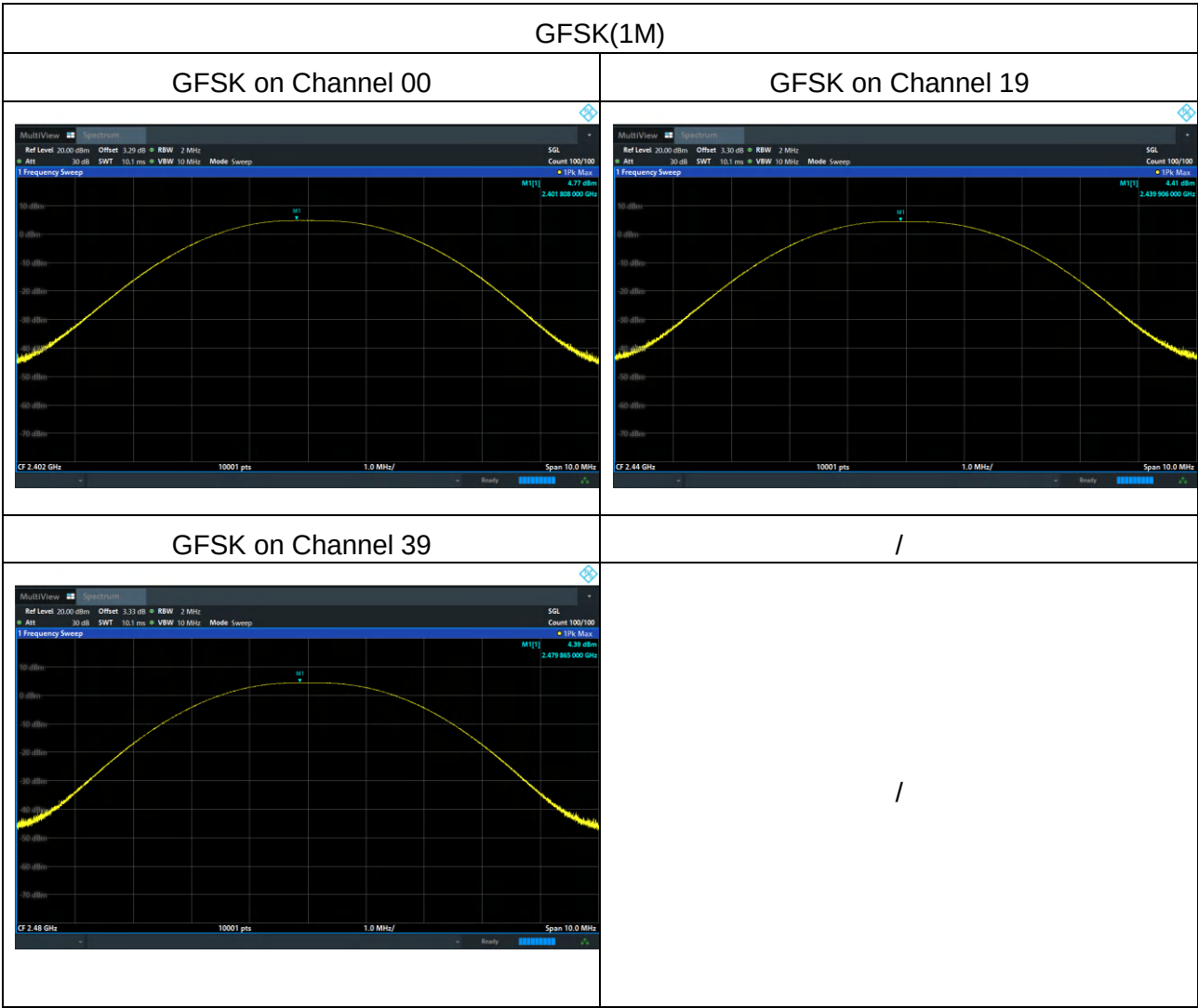
5.4.4 Test Results

EUT:	TWS Monitor Earphone	Model Name:	M21E
Test Mode:	GFSK/CH00, CH19, CH39	Test Voltage:	DC 3.85V from battery

L:

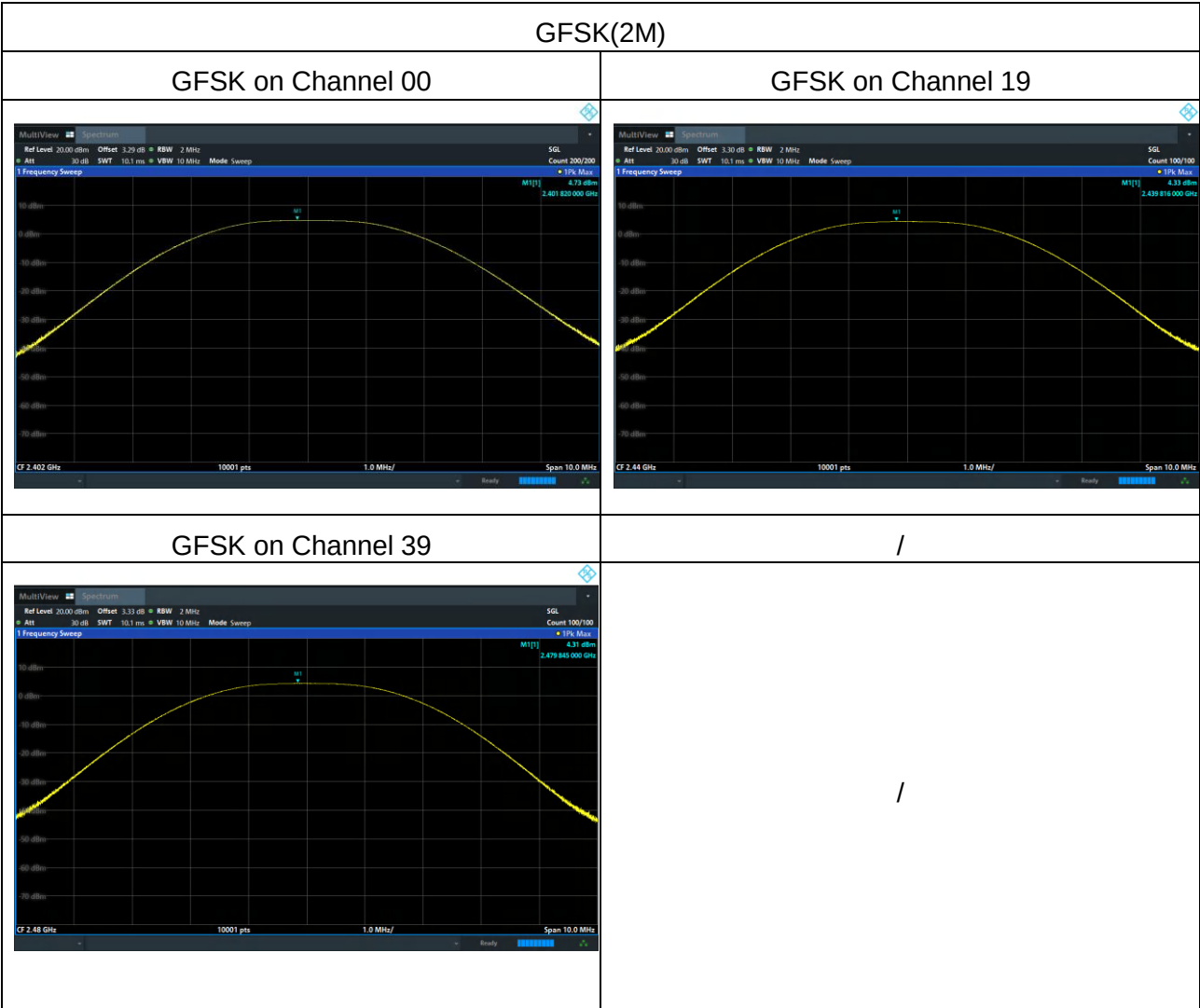
GFSK(1M)			
Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	4.77	21
CH19	2440	4.41	21
CH39	2480	4.39	21

Test plots:



GFSK(2M)			
Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	4.73	21
CH19	2440	4.33	21
CH39	2480	4.31	21

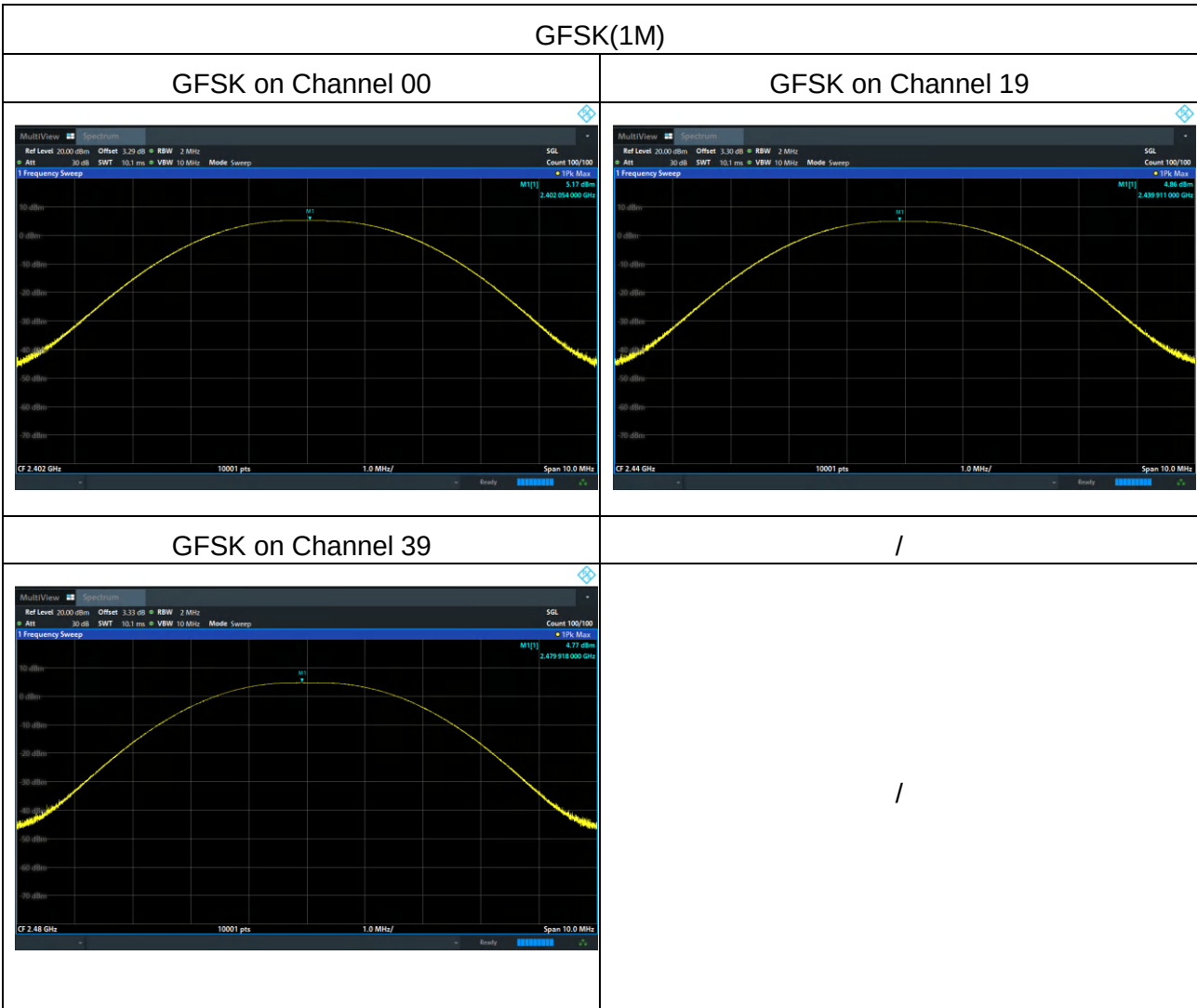
Test plots:



R:

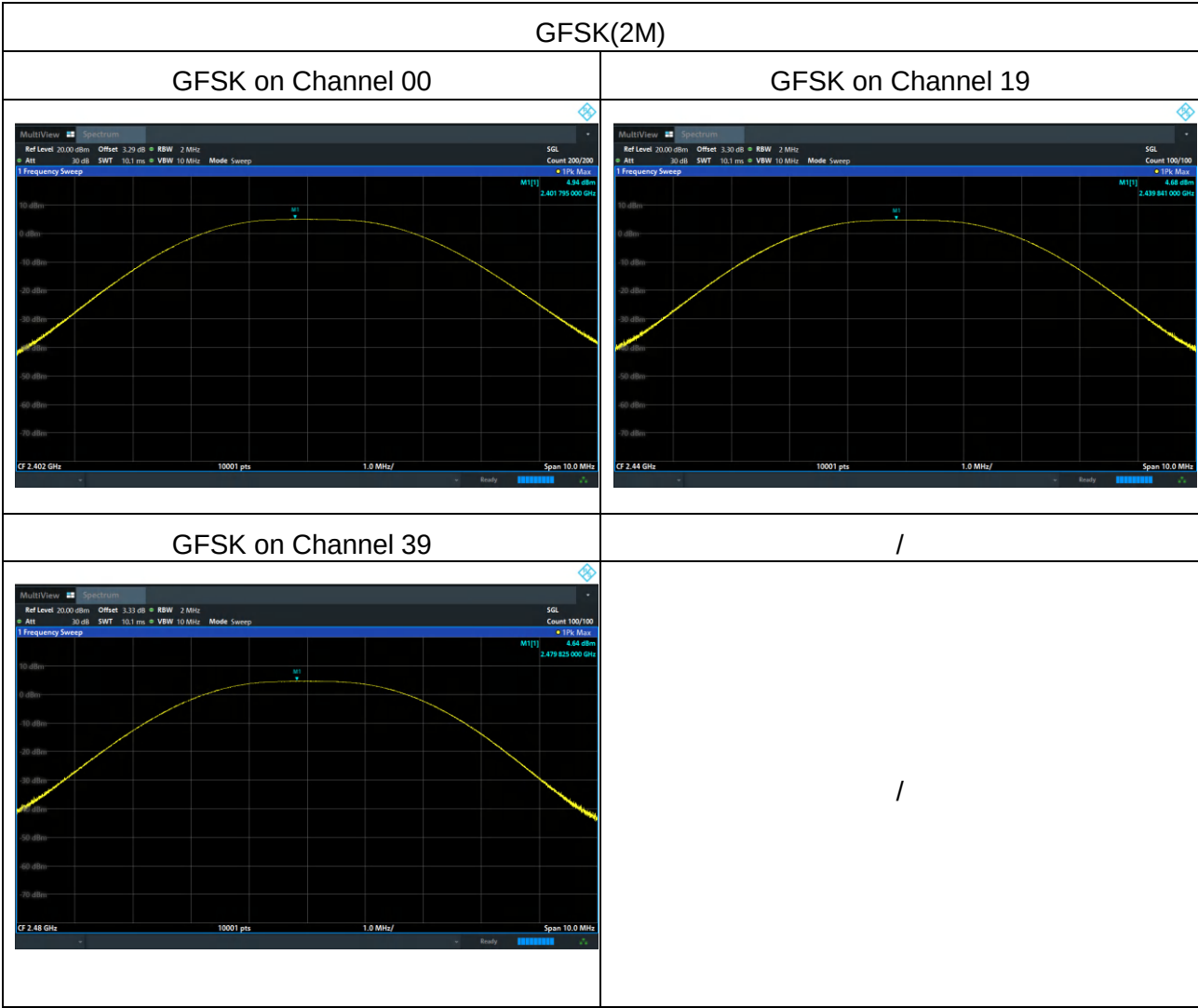
GFSK(1M)			
Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	5.17	21
CH19	2440	4.86	21
CH39	2480	4.77	21

Test plots:



GFSK(2M)			
Test Channel	Frequency (MHz)	Maximum Peak Output Power(dBm)	Limit (dBm)
CH00	2402	4.94	21
CH19	2440	4.68	21
CH39	2480	4.64	21

Test plots:



5.5 20dB Occupied Channel Bandwidth

5.5.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247a(1)	20dB bandwidth	N/A	2400-2483.5

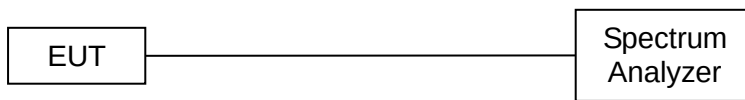
5.5.2 Test Procedure

(1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.

(2) Spectrum Setting:

Bandwidth: RBW=30 kHz, VBW=100 kHz, detector= Peak

5.5.3 Test Setup



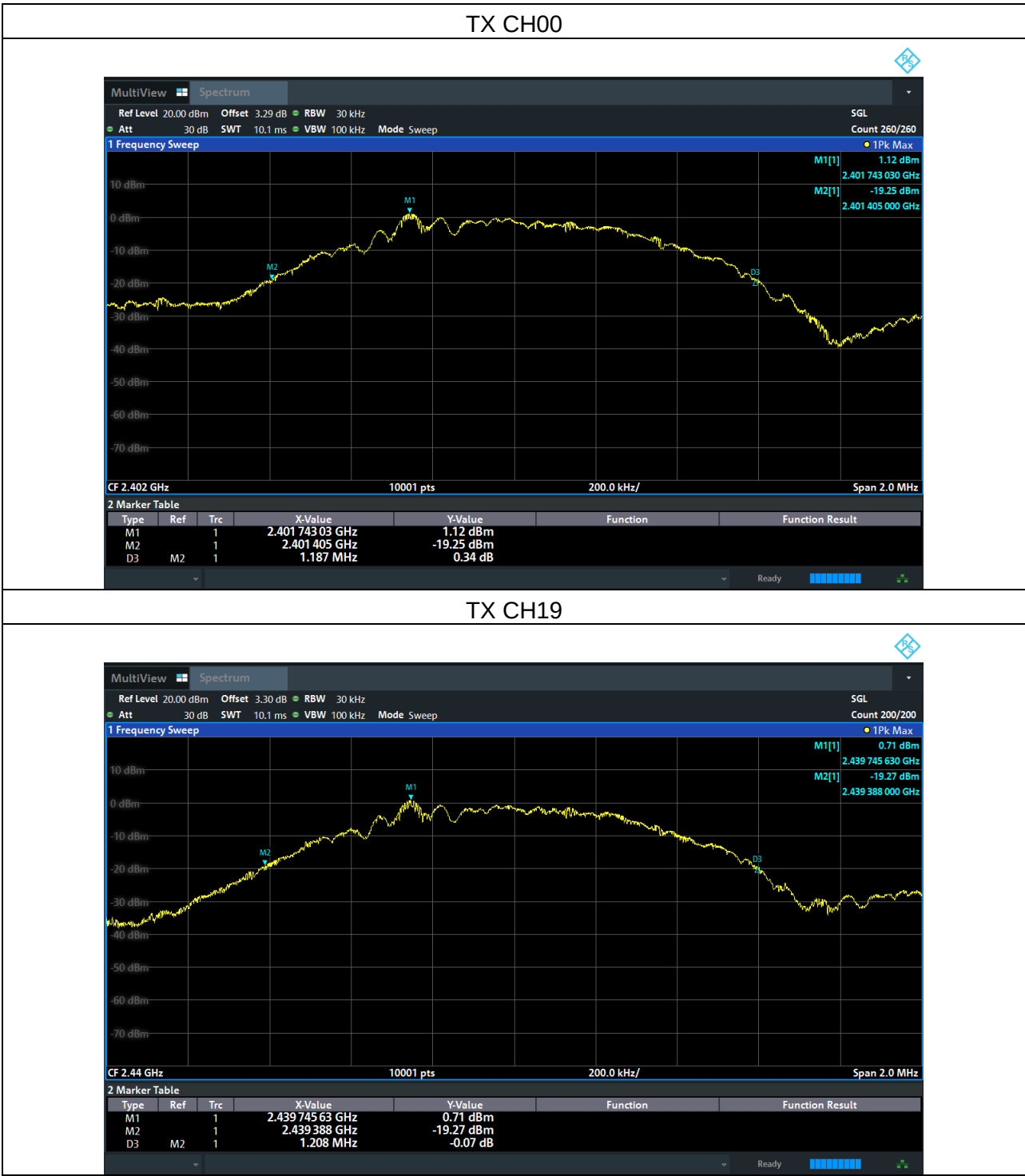
5.5.4 Test results

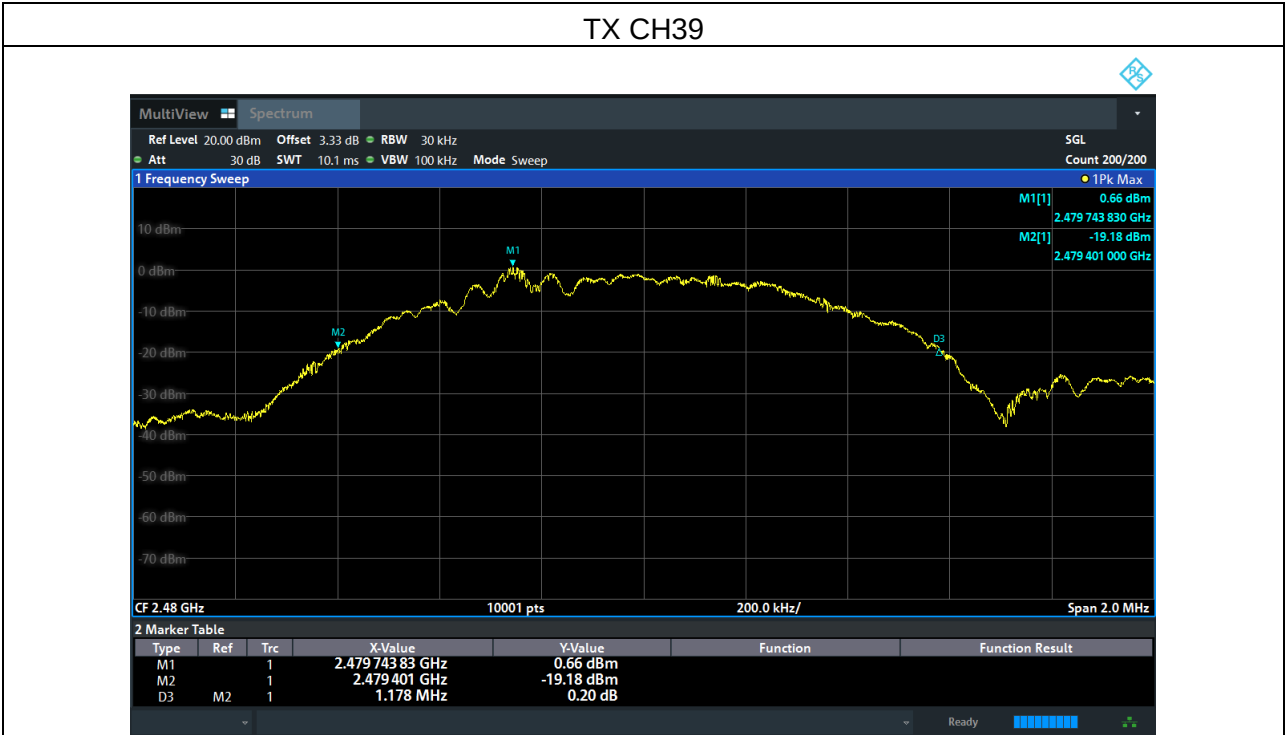
EUT:	TWS Monitor Earphone	Model Name:	M21E
Test Mode:	GFSK/CH00, CH19, CH39	Test Voltage:	DC 3.85V from battery

L:

Mode	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Result
GFSK(1M)	2402	1.187	N/A	Pass
	2440	1.208	N/A	Pass
	2480	1.178	N/A	Pass

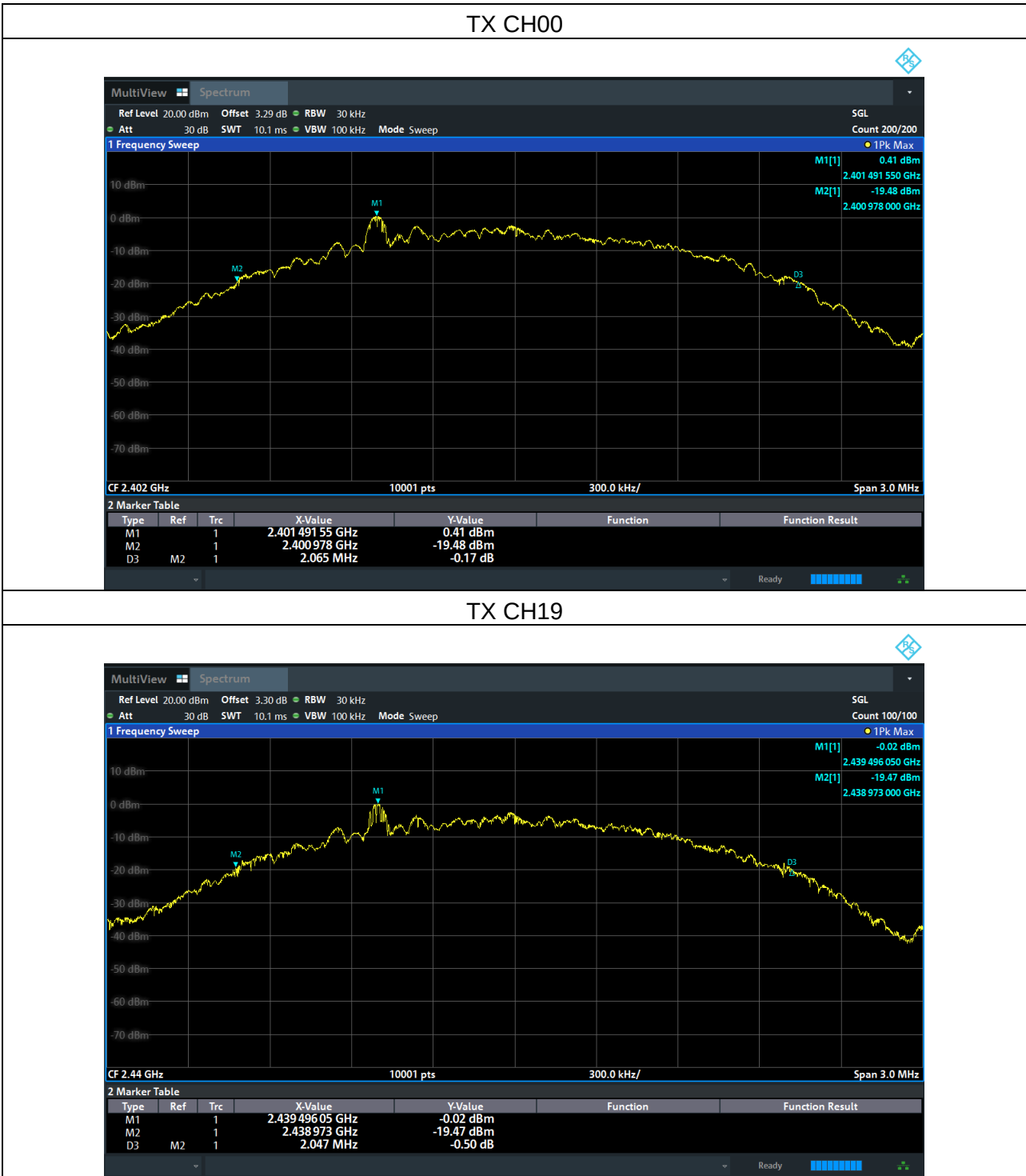
Test plots:

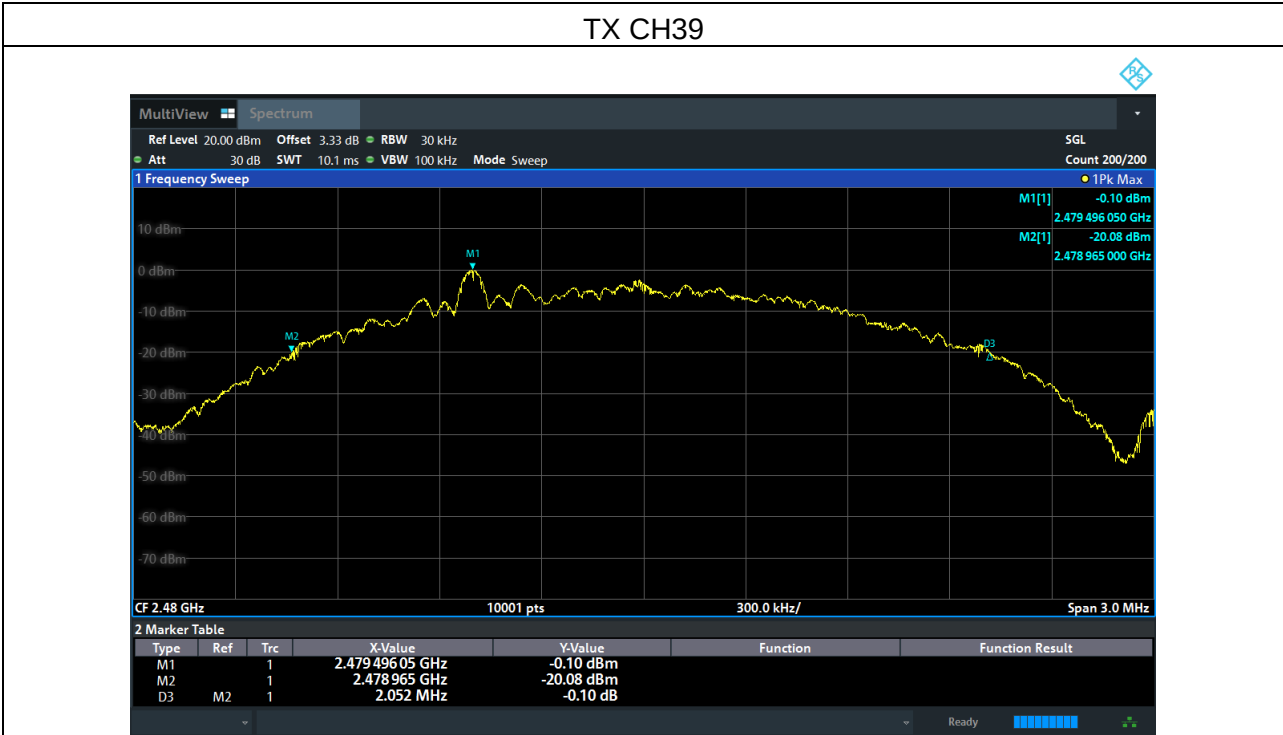




Mode	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Result
GFSK(2M)	2402	2.065	N/A	Pass
	2440	2.047	N/A	Pass
	2480	2.052	N/A	Pass

Test plots:

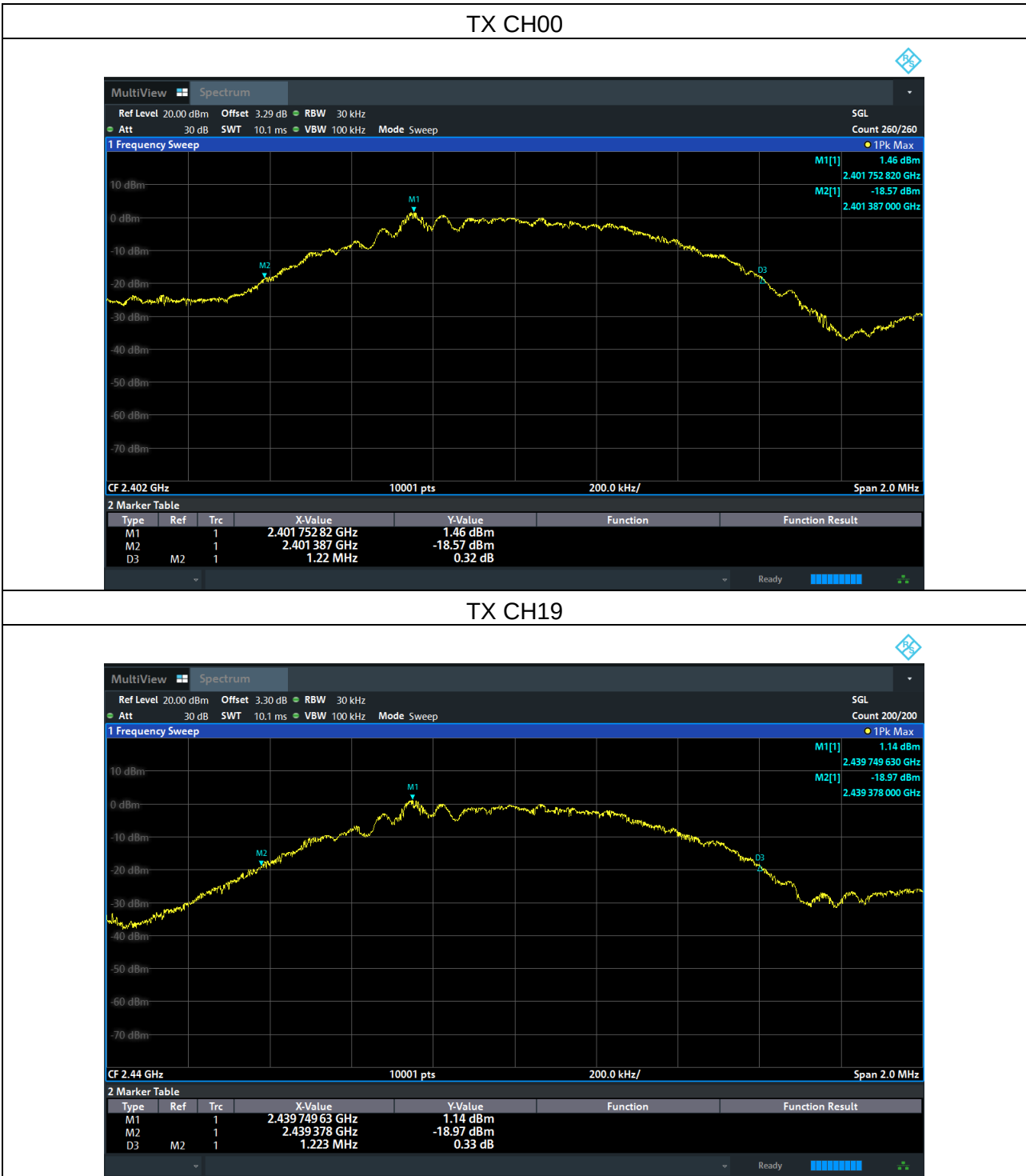


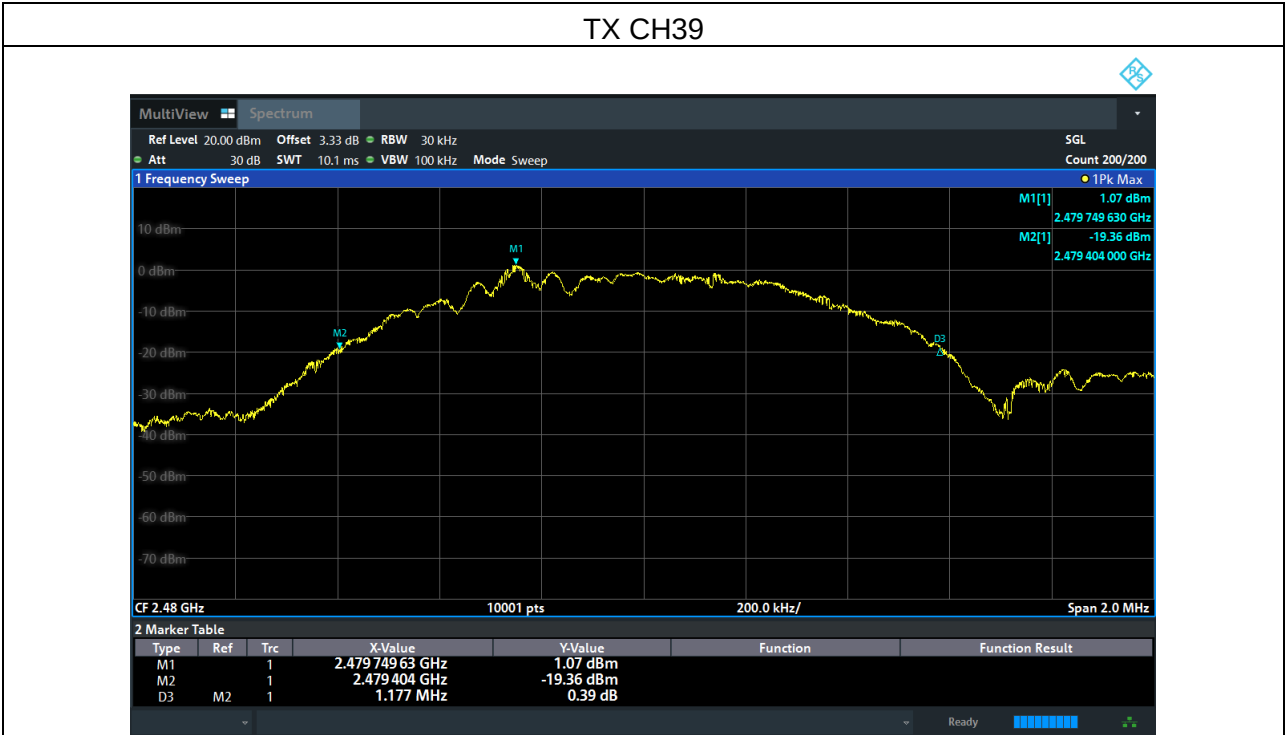


R:

Mode	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Result
GFSK(1M)	2402	1.22	N/A	Pass
	2440	1.223	N/A	Pass
	2480	1.177	N/A	Pass

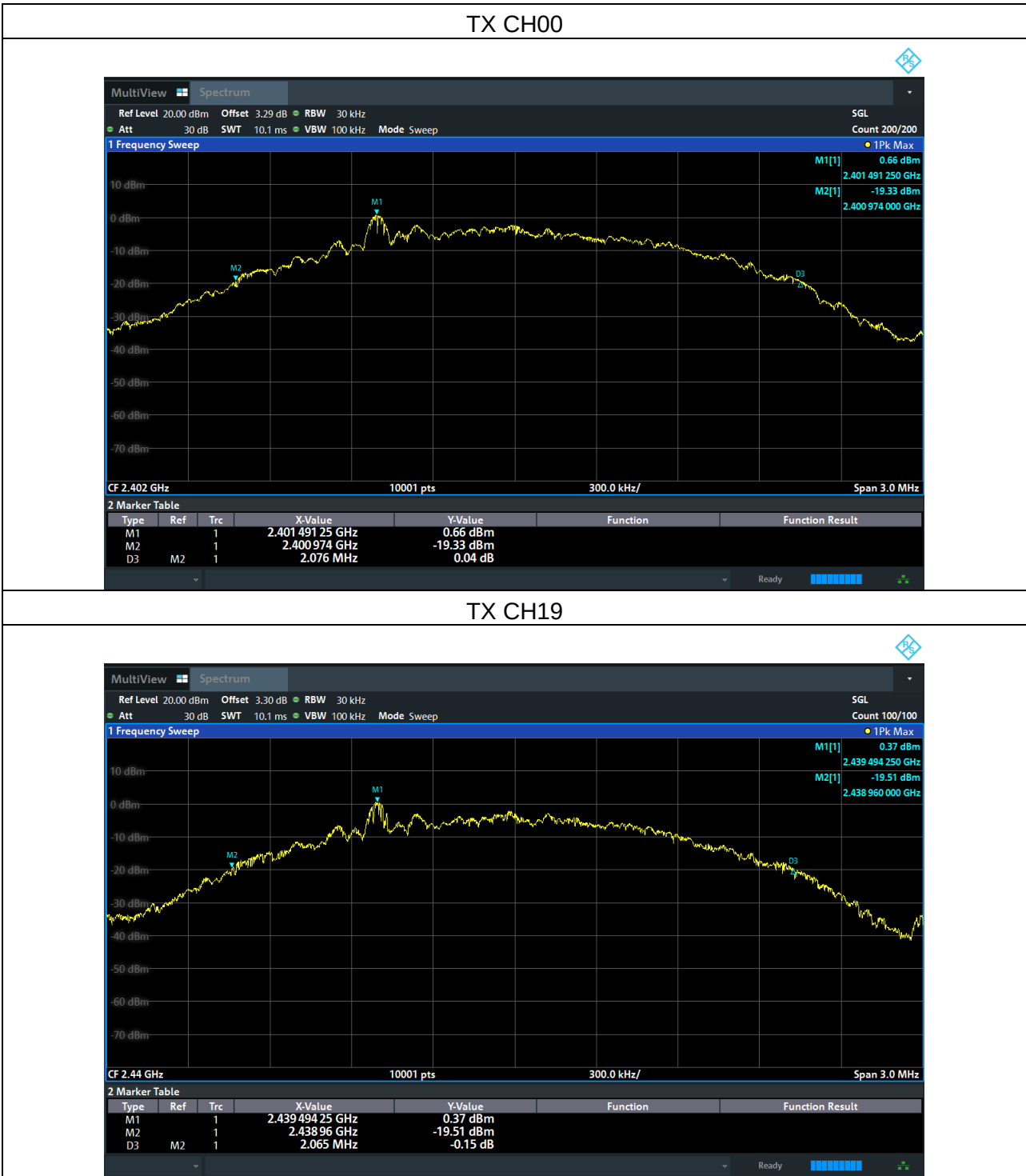
Test plots:

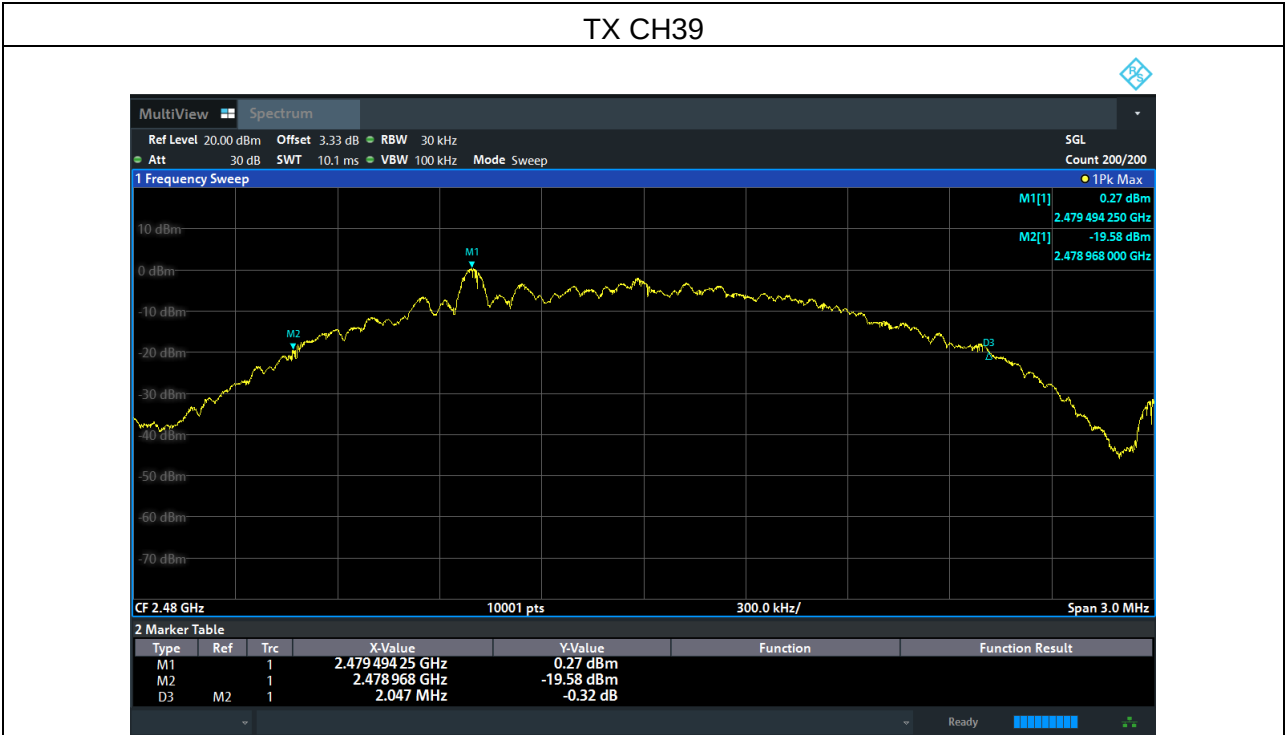




Mode	Frequency (MHz)	20dB Bandwidth (MHz)	Limit (kHz)	Result
GFSK(2M)	2402	2.076	N/A	Pass
	2440	2.065	N/A	Pass
	2480	2.047	N/A	Pass

Test plots:





5.6 Carrier Frequency Separation

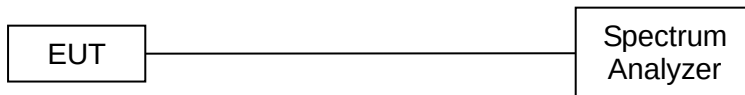
5.6.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247(a)(1)	Channel Separation	>25kHz or >two-thirds of the 20 dB bandwidth (Which is greater)	2400-2483.5

5.6.2 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:
RBW=30 kHz, VBW=100 kHz, detector= Peak, Sweep Time =auto.
- (3) The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Test.

5.6.3 Test Setup

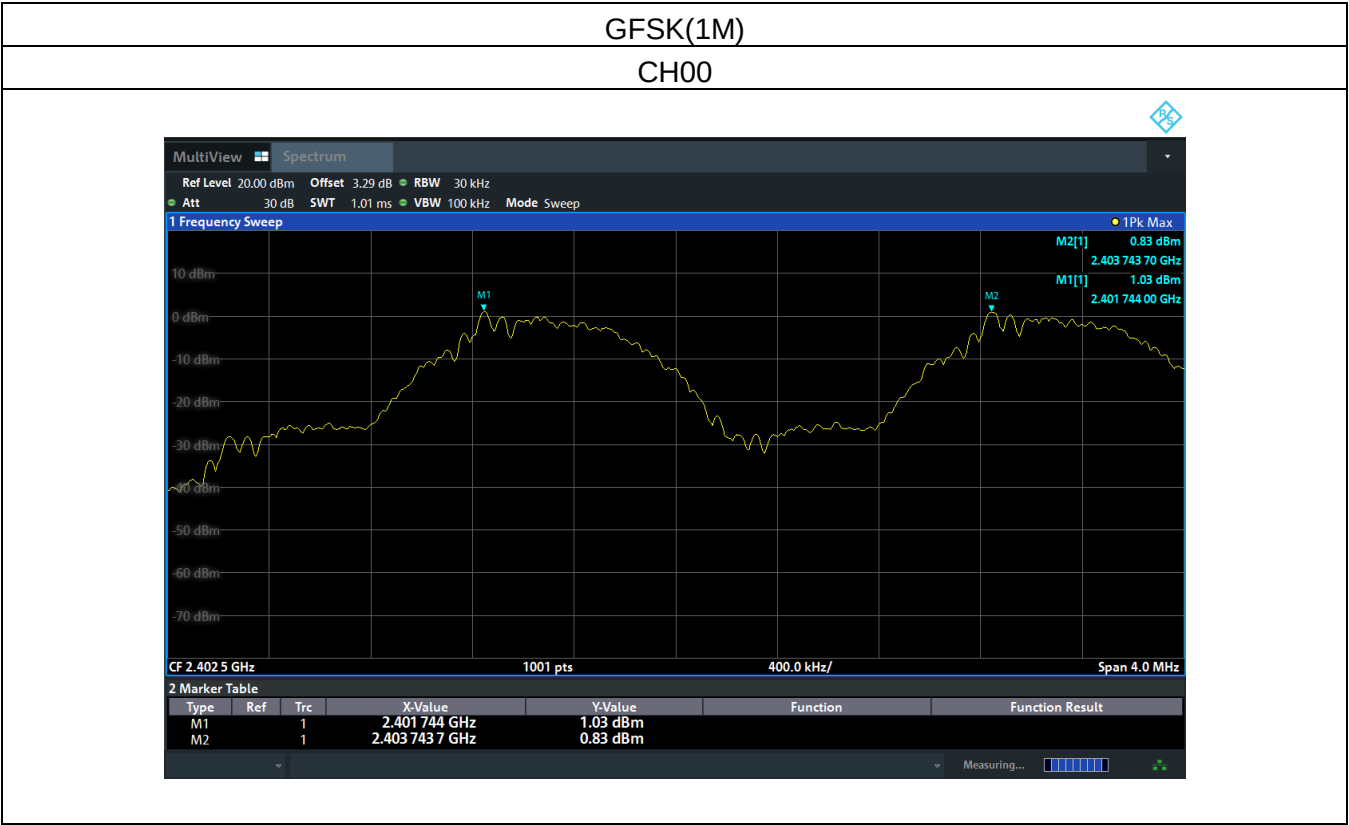


5.6.4 Test Results

EUT:	TWS Monitor Earphone	Model Name:	M21E
Pressure:	1012 hPa	Test Voltage:	DC 3.85V from battery
Test Mode:	GFSK/CH00, CH19, CH39		

L:

Mode	Channel	Frequency (MHz)	Test Result (MHz)	Limit (MHz)		Result
GFSK(1M)	Low	2402	1.999	0.791	2/3 of 20dB BW	Pass
	Middle	2440	2.007	0.805	2/3 of 20dB BW	Pass
	High	2480	1.999	0.785	2/3 of 20dB BW	Pass



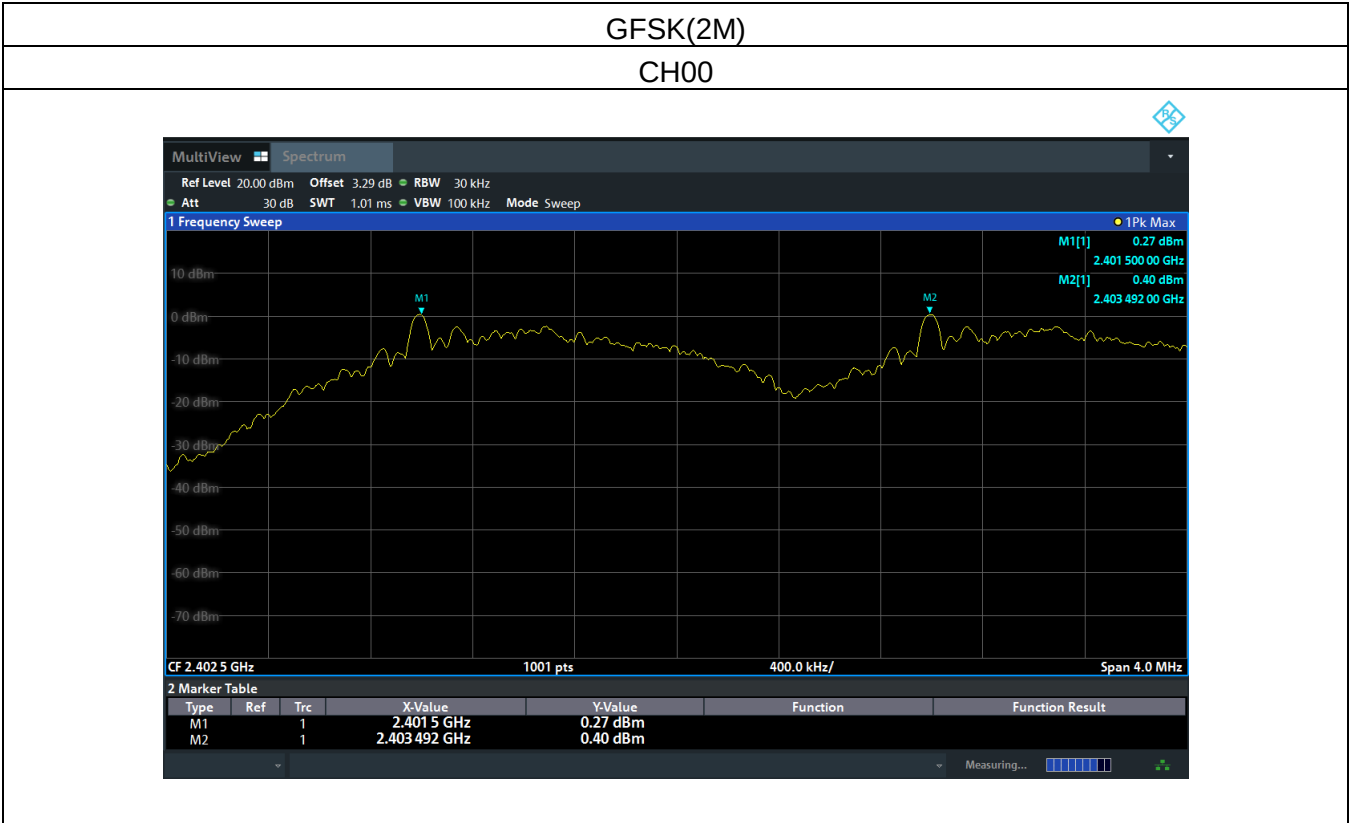
CH19



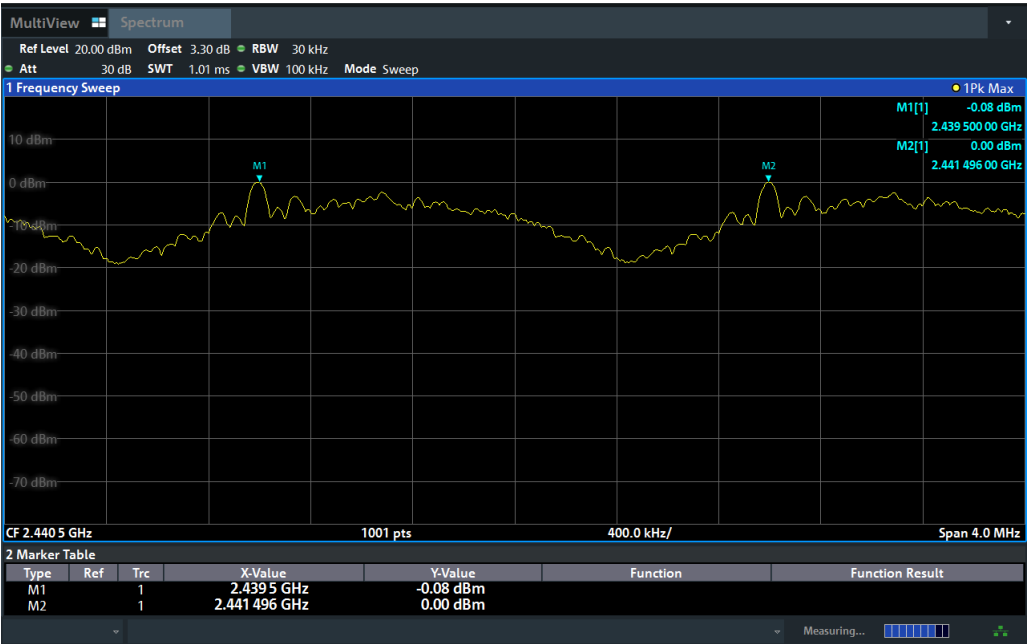
CH39



Mode	Channel	Frequency (MHz)	Test Result (MHz)	Limit (MHz)		Result
GFSK(2M)	Low	2402	1.992	1.377	2/3 of 20dB BW	Pass
	Middle	2440	1.996	1.365	2/3 of 20dB BW	Pass
	High	2480	2.003	1.368	2/3 of 20dB BW	Pass



CH19

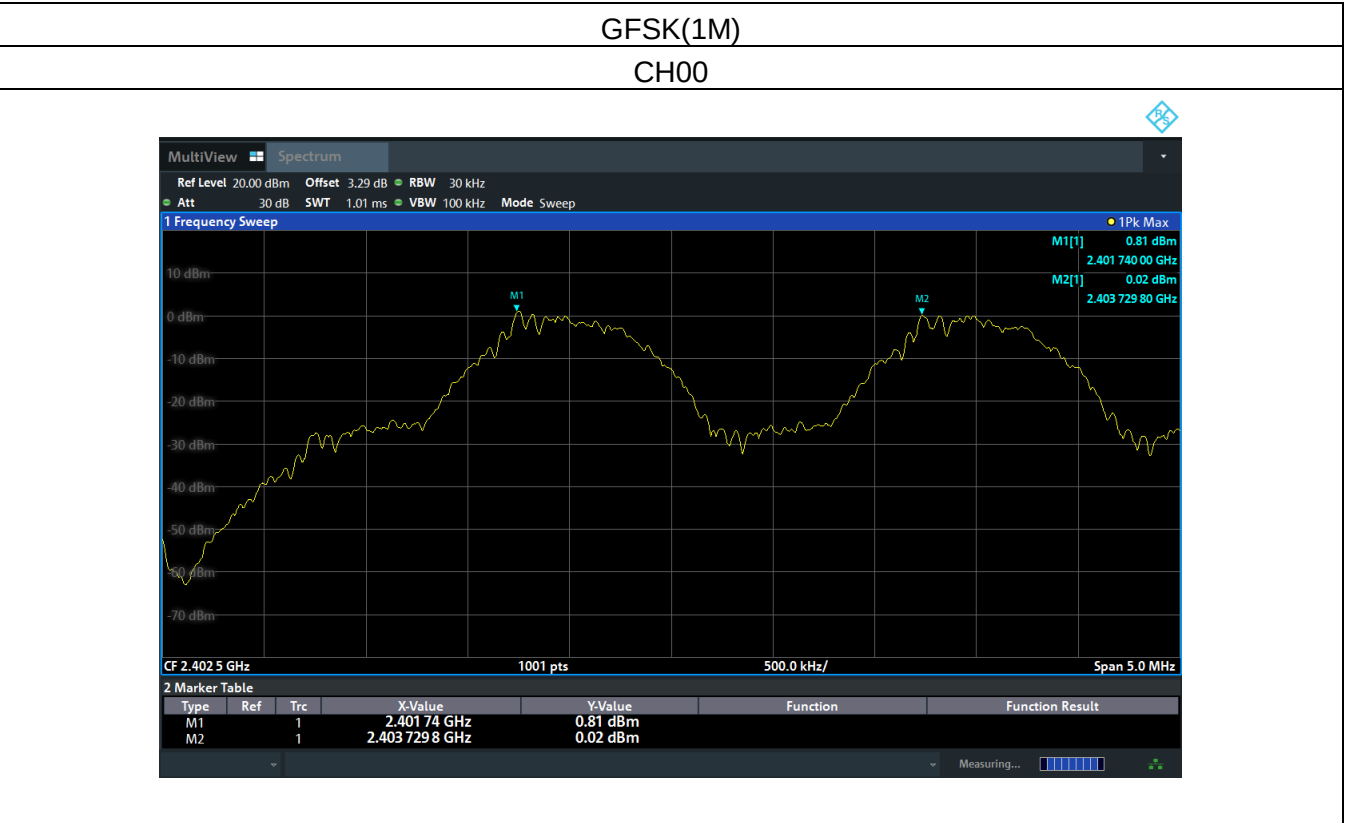


CH39

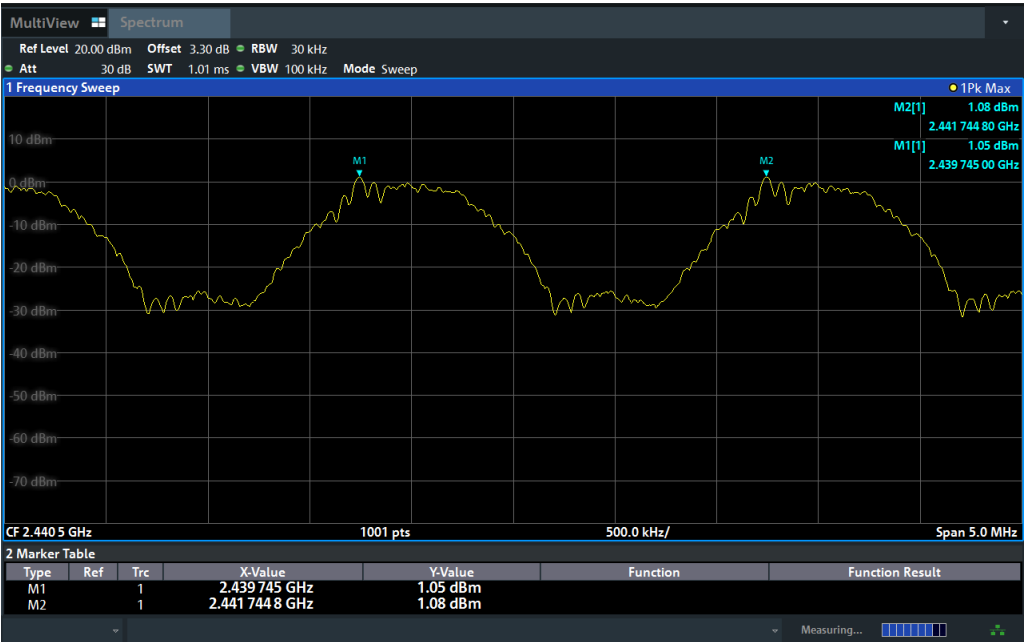


R:

Mode	Channel	Frequency (MHz)	Test Result (MHz)	Limit (MHz)		Result
GFSK(1M)	Low	2402	1.984	1.22	2/3 of 20dB BW	Pass
	Middle	2440	1.999	1.223	2/3 of 20dB BW	Pass
	High	2480	2.004	1.177	2/3 of 20dB BW	Pass



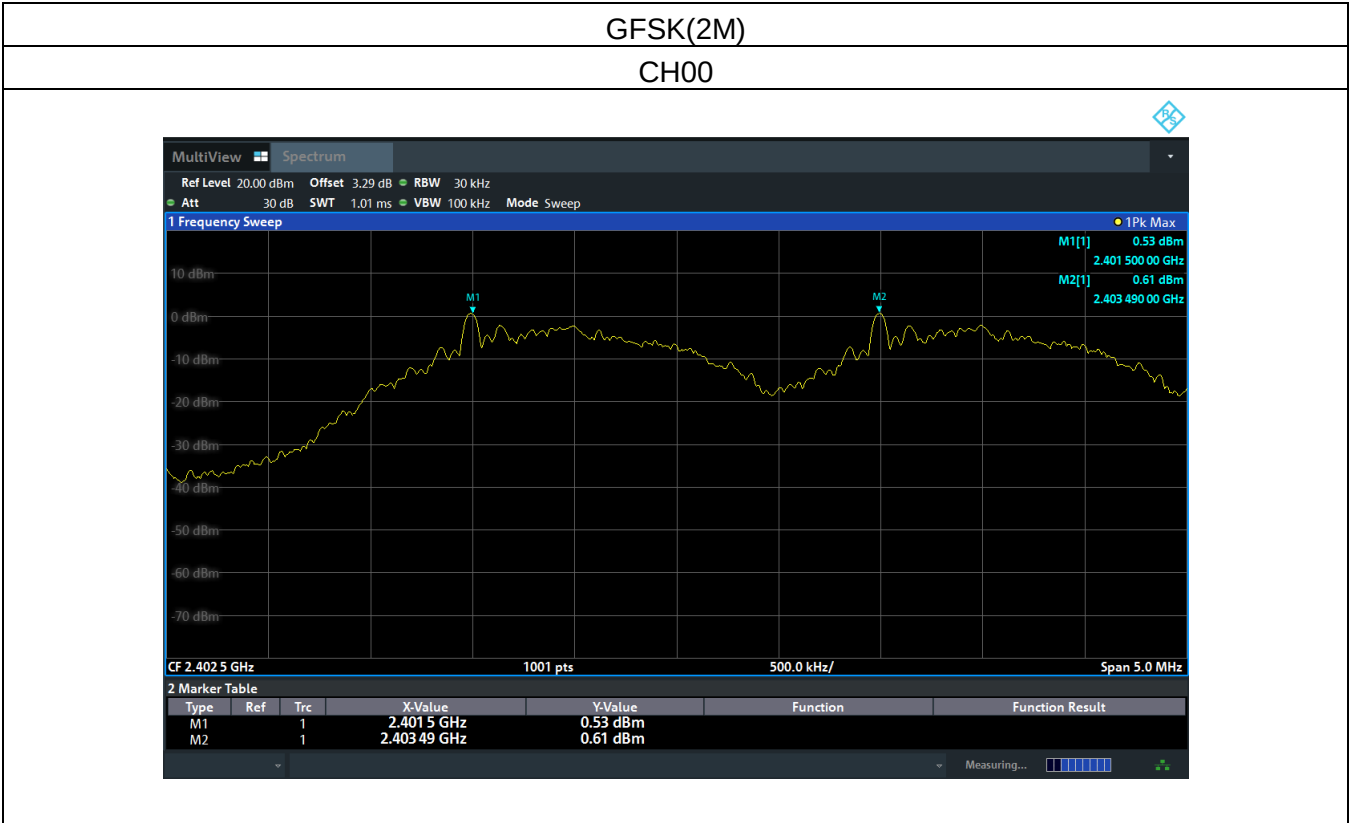
CH19



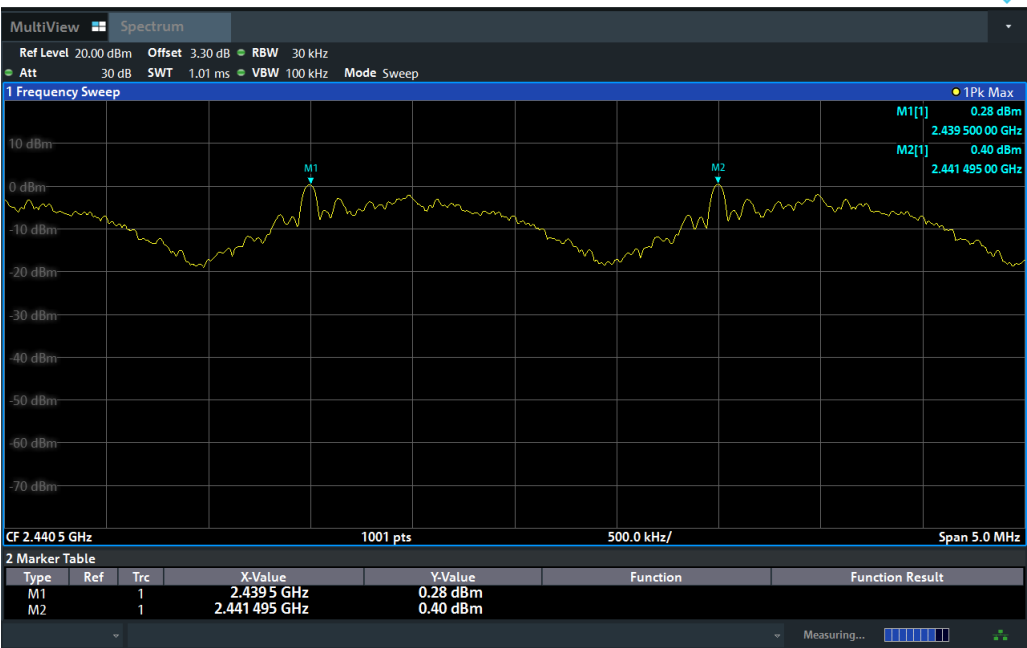
CH39



Mode	Channel	Frequency (MHz)	Test Result (MHz)	Limit (MHz)		Result
GFSK(2M)	Low	2402	1.99	1.384	2/3 of 20dB BW	Pass
	Middle	2440	1.995	1.377	2/3 of 20dB BW	Pass
	High	2480	2.003	1.365	2/3 of 20dB BW	Pass



CH19



CH39



5.7 Hopping Channel Number

5.7.1 Limit

Frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

5.7.2 Test Procedure

The testing follows IEEE / ANSI C63.10-2020 clause 7.8.3

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.

The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously.

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW : To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

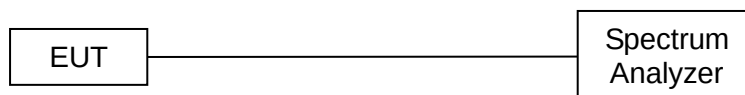
VBW $\geq$ RBW

Sweep = auto

Detector function = peak

Trace = max hold

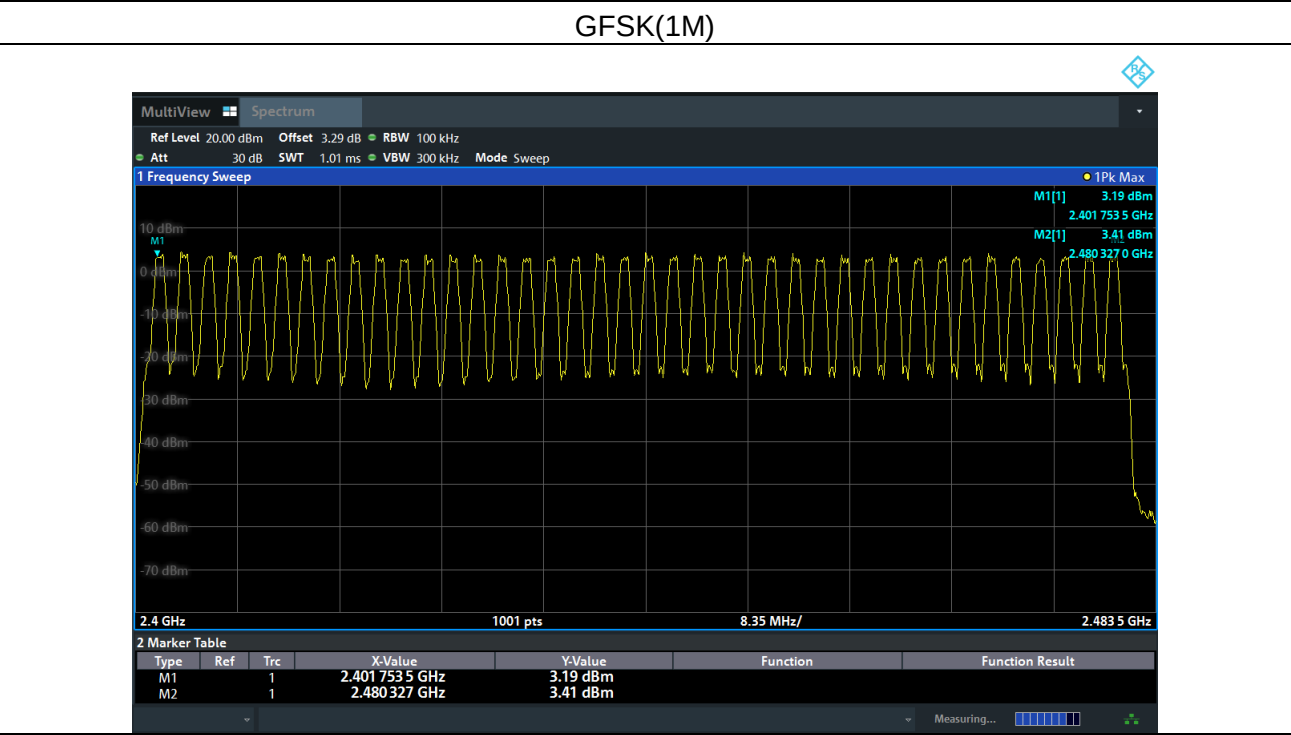
5.7.3 Test Setup



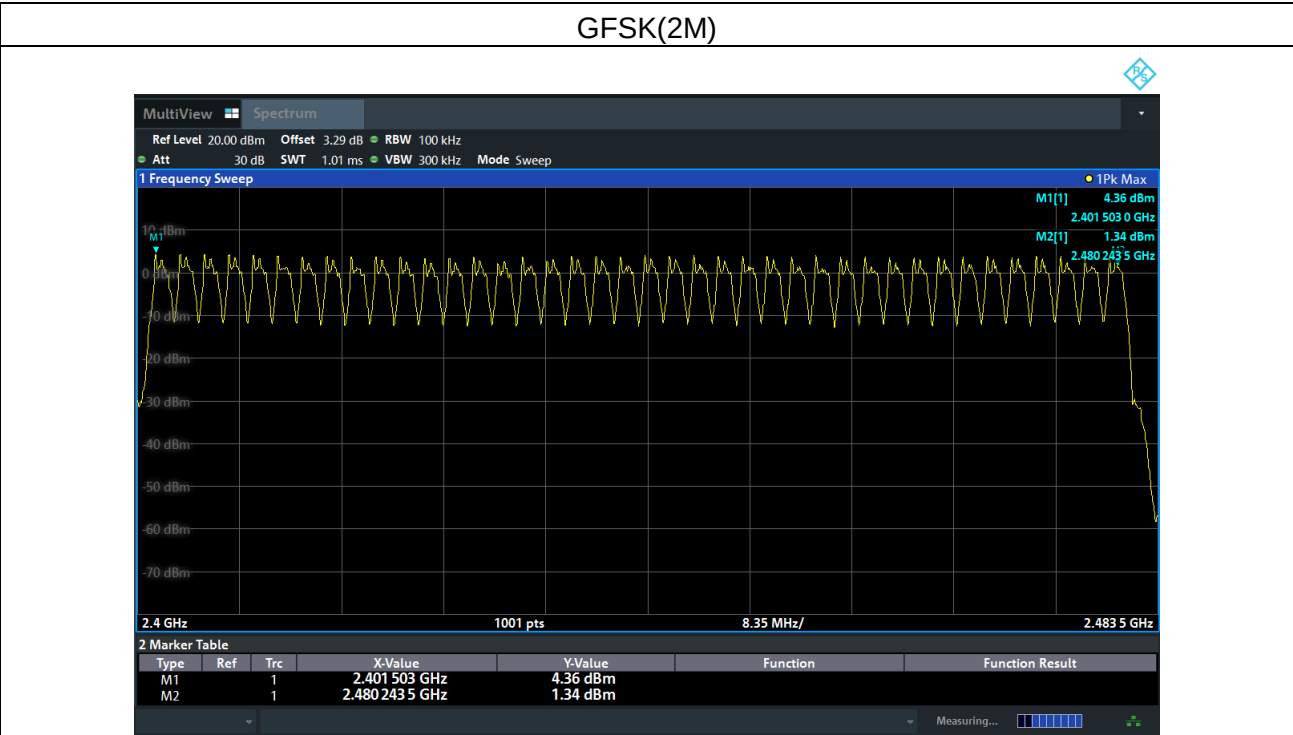
5.7.4 Test Results

L:

Mode	Quantity of Hopping Channel	Limit	Results
GFSK(1M)	40	>15	Pass

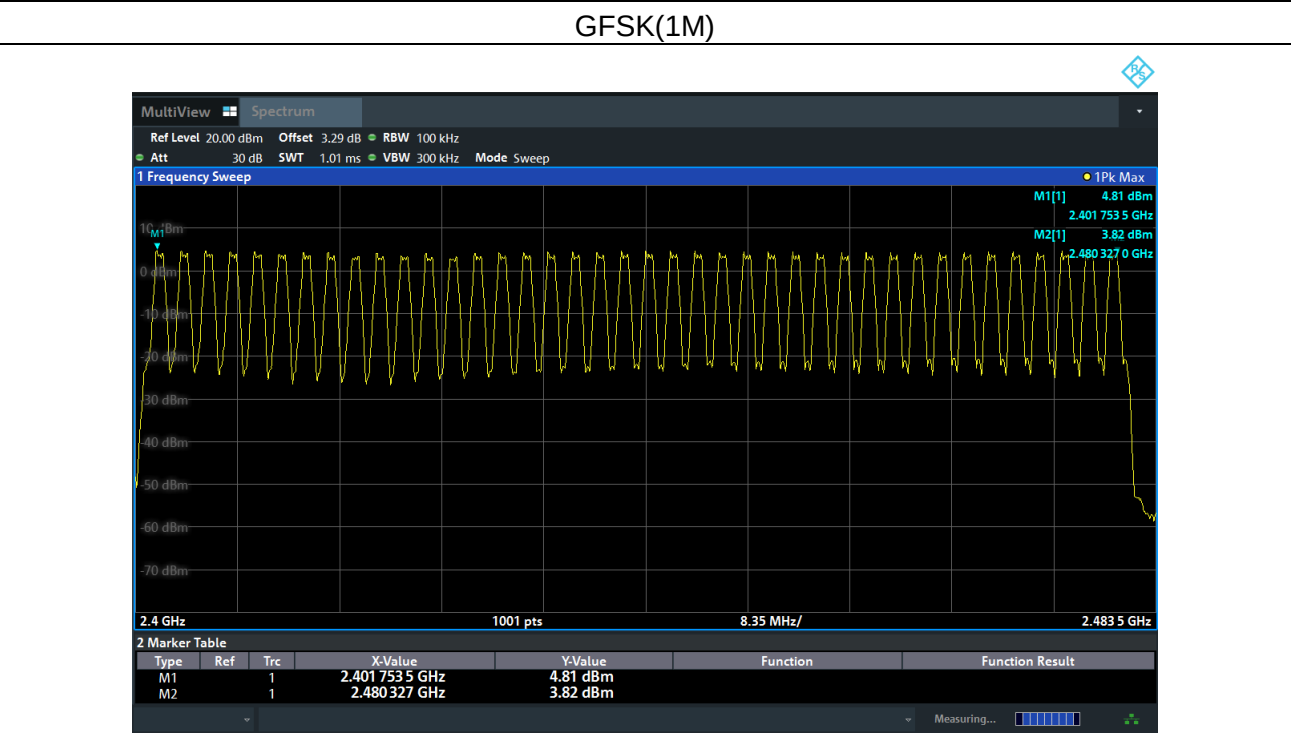


Mode	Quantity of Hopping Channel	Limit	Results
GFSK(2M)	40	>15	Pass

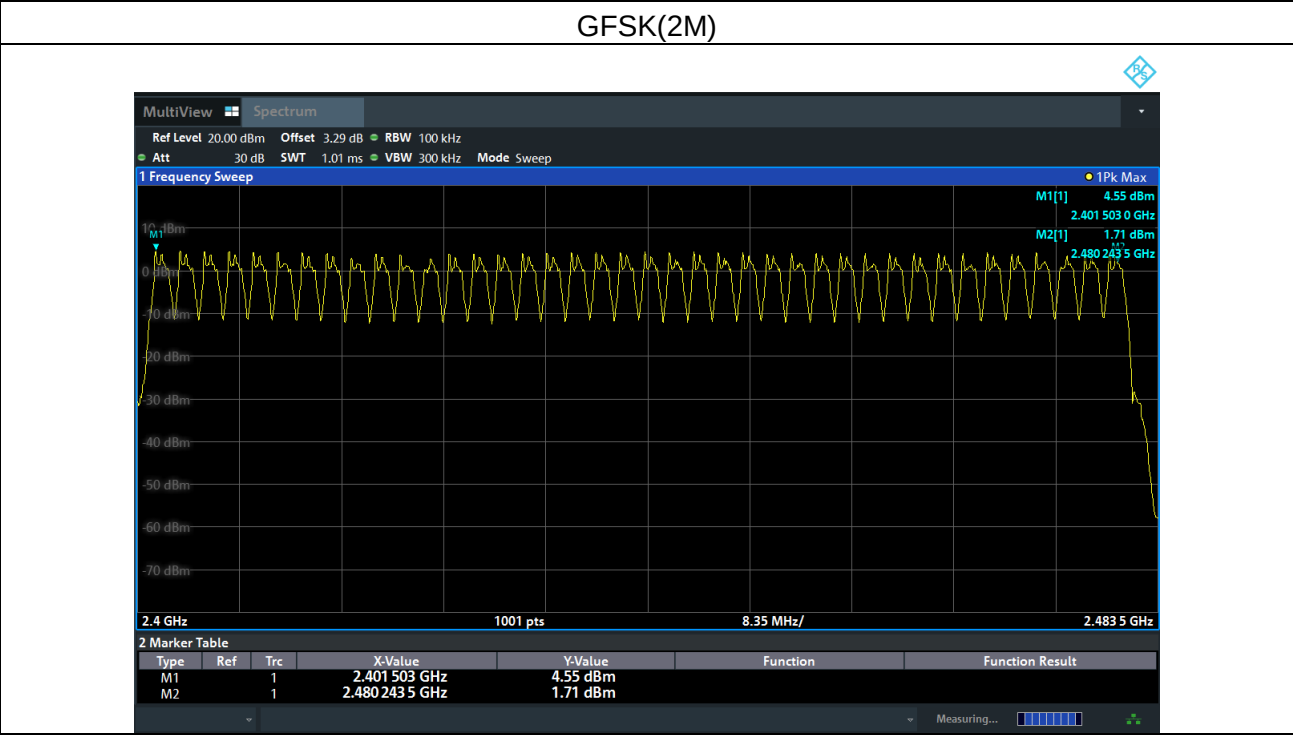


R:

Mode	Quantity of Hopping Channel	Limit	Results
GFSK(1M)	40	>15	Pass



Mode	Quantity of Hopping Channel	Limit	Results
GFSK(2M)	40	>15	Pass



5.8 Dwell Time

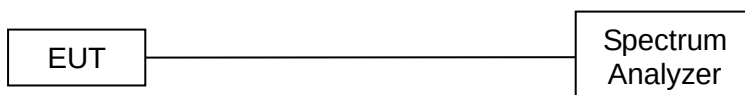
5.8.1 Limit

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
15.247(a)(1)	Dwell time	0.4 sec	2400-2483.5

5.8.2 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=1MHz, VBW=3MHz, Span=0Hz, Detector=Peak
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.
- (9) The EUT was set to the Hopping Mode for Dwell Time Test.

5.8.3 Test Setup



5.8.4 Test Results

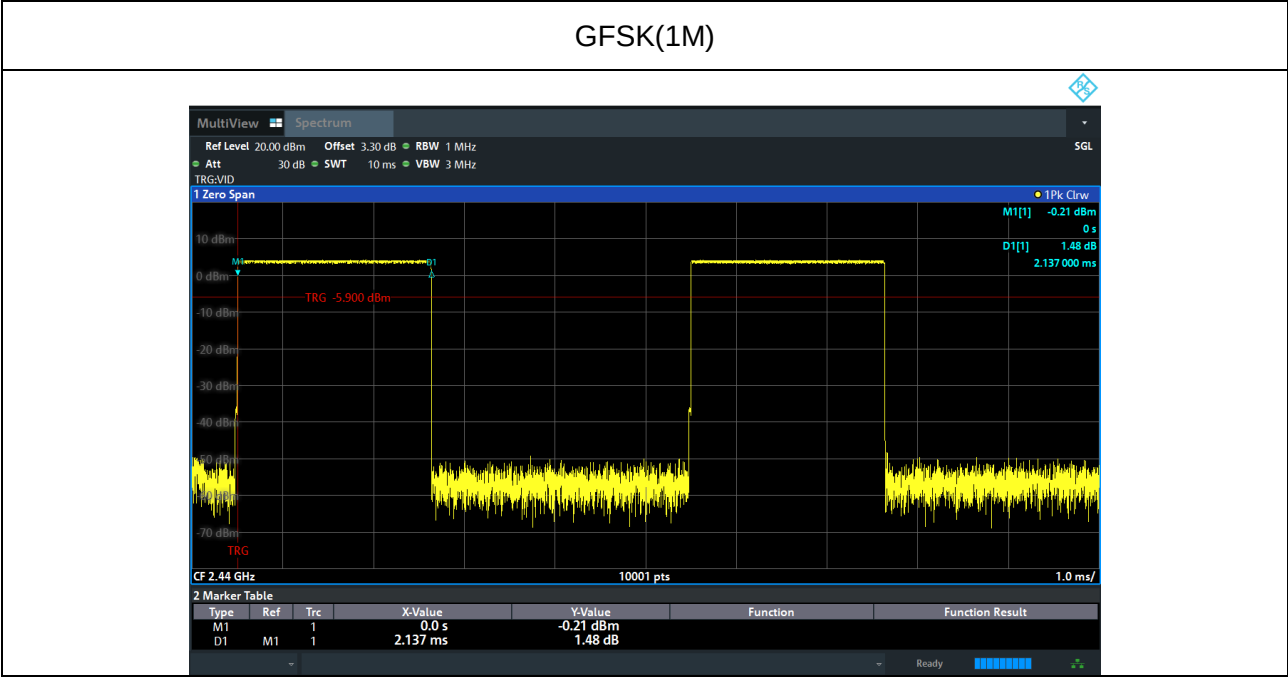
EUT:	TWS Monitor Earphone	Model Name:	M21E
Pressure:	1012 hPa	Test Voltage:	DC 3.85V from battery
Test Mode:	GFSK		

L:

Mode	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (ms)	Burst Count	Limit(s)	Conclusion
GFSK(1M)	2440	2.137	339.783	159	<0.4	Pass

Note:
1. A period time = 0.4 (s) * 40 = 16 (s)
2. Dwell Time = Pulse Duration * Burst Count

Test plots:

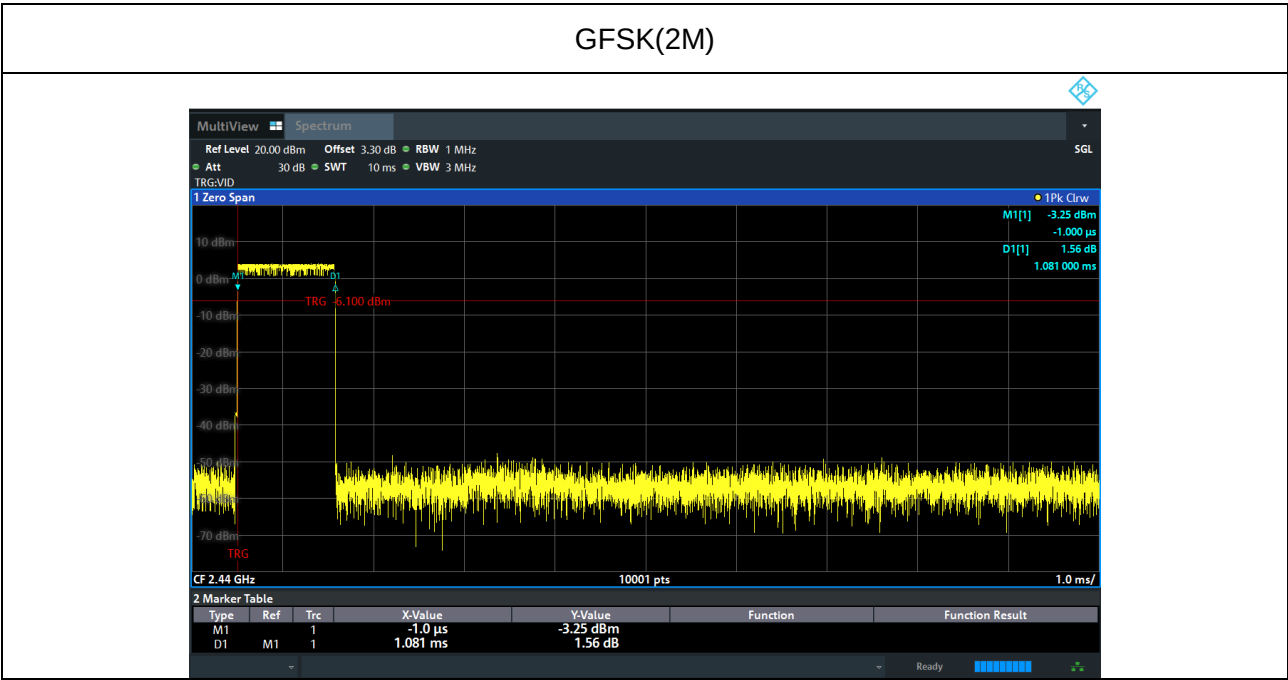


Mode	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (ms)	Burst Count	Limit(s)	Conclusion
GFSK(2M)	2440	1.081	316.733	293	<0.4	Pass

Note:

1. A period time = 0.4 (s) * 40 = 16 (s)
2. Dwell Time = Pulse Duration * Burst Count

Test plots:



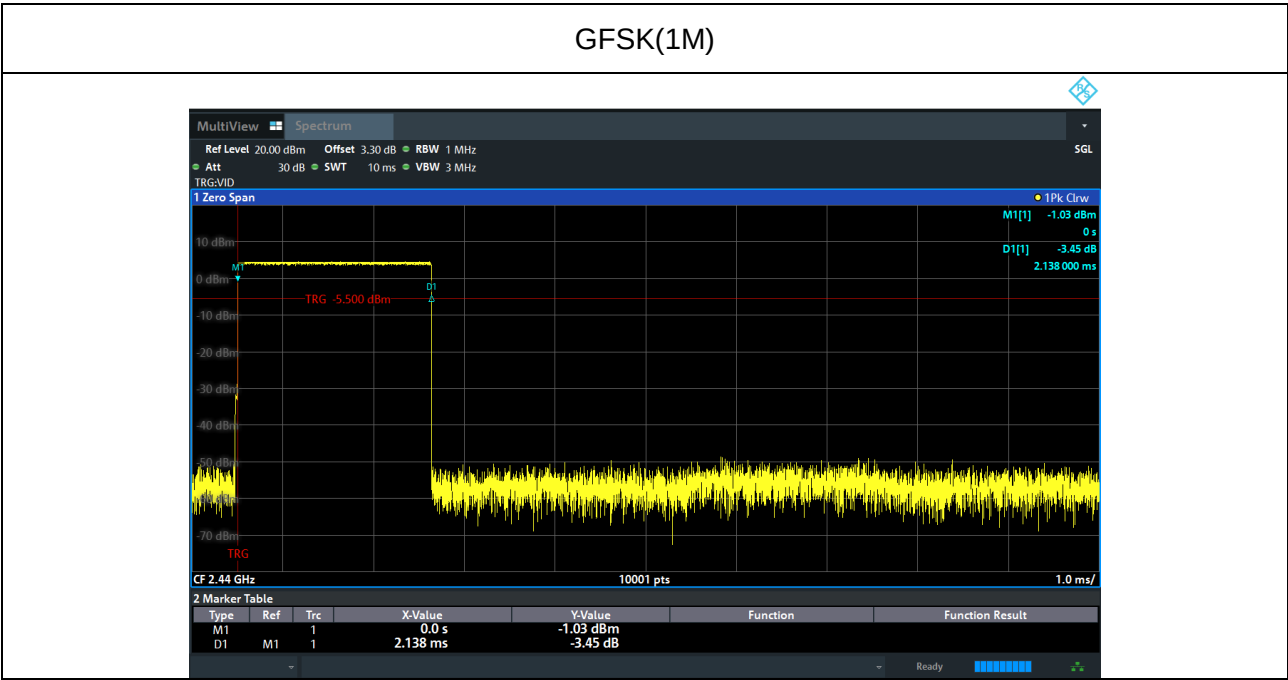
R:

Mode	Frequency (MHz)	Pulse Duration (ms)	Dwell Time (ms)	Burst Count	Limit(s)	Conclusion
GFSK(1M)	2440	2.138	337.804	158	<0.4	Pass

Note:

- A period time = 0.4 (s) * 40 = 16 (s)
- Dwell Time = Pulse Duration * Burst Count

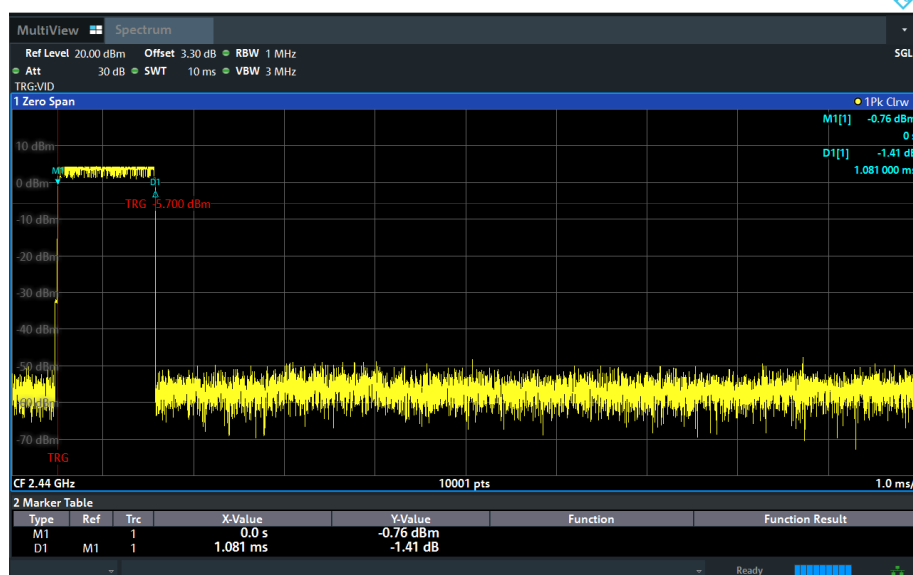
Test plots:



Note:

1. A period time = 0.4 (s) * 40 = 16 (s)
2. Dwell Time = Pulse Duration * Burst Count

GFSK(2M)



5.9 Conducted Band Edge

5.9.1 Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

5.9.2 Test Procedure

- Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument 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.
- Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- Repeat above procedures until all measured frequencies were complete.

5.9.3 Test Setup

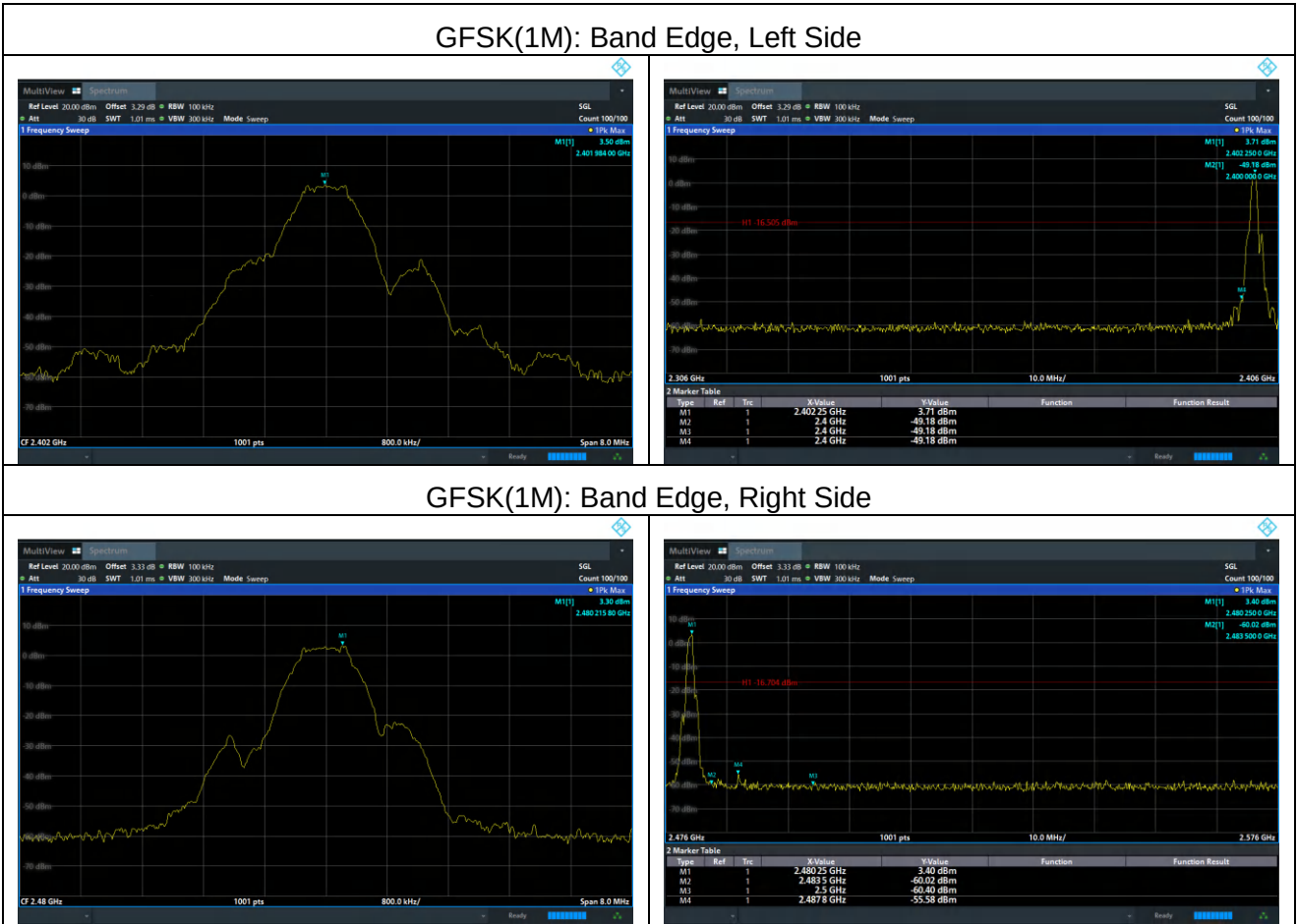


5.9.4 Test Results

EUT:	TWS Monitor Earphone	Model Name:	M21E
Pressure:	1012 hPa	Test Voltage:	DC 3.85V from battery

Test plots:

L:



Hopping Mode

Test plots:

GFSK(1M): Band Edge, Left Side



GFSK(1M): Band Edge, Right Side



Test plots:

GFSK(2M): Band Edge, Left Side



GFSK(2M): Band Edge, Right Side



Hopping Mode

Test plots:

GFSK(2M): Band Edge, Left Side



GFSK(2M): Band Edge, Right Side



R:

GFSK(1M): Band Edge, Left Side



GFSK(1M): Band Edge, Right Side



Hopping Mode

Test plots:

GFSK(1M): Band Edge, Left Side



GFSK(1M): Band Edge, Right Side



Test plots:

GFSK(2M): Band Edge, Left Side



GFSK(2M): Band Edge, Right Side



Hopping Mode

Test plots:

GFSK(2M): Band Edge, Left Side



GFSK(2M): Band Edge, Right Side



5.10 Spurious RF Conducted Emissions

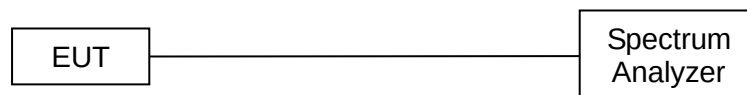
5.10.1 Limit

Below -20dB of the highest emission level in operating band.

5.10.2 Test Procedure

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2020 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW=300kHz to measure the peak field strength, and measure frequency range from 9kHz to 26.5GHz.

5.10.3 Test Setup



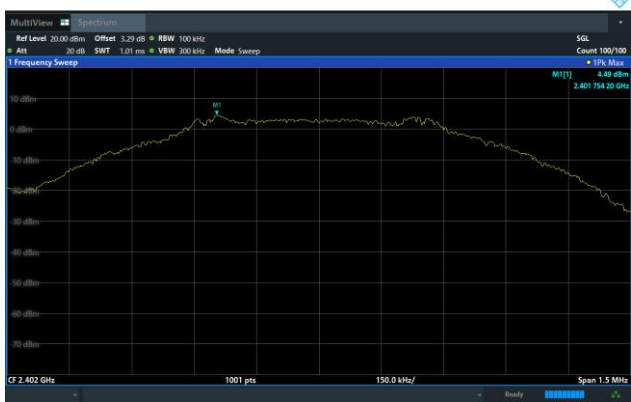
5.10.4 Test Results

Note:

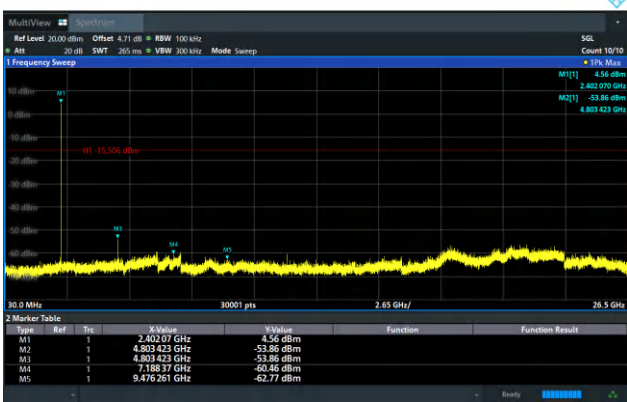
1: The measurement frequency range is from 9kHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

L:

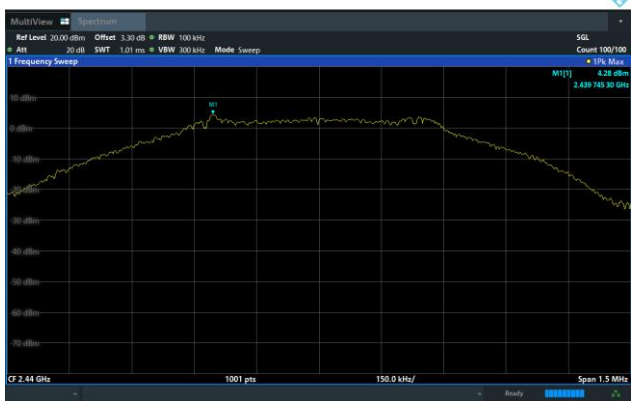
GFSK(1M) on Channel 00



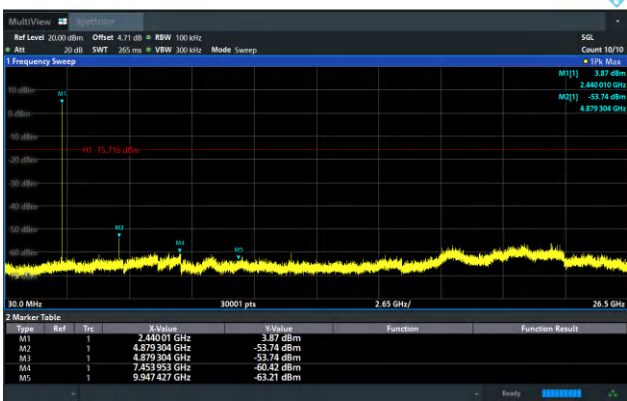
GFSK(1M) on Channel 00



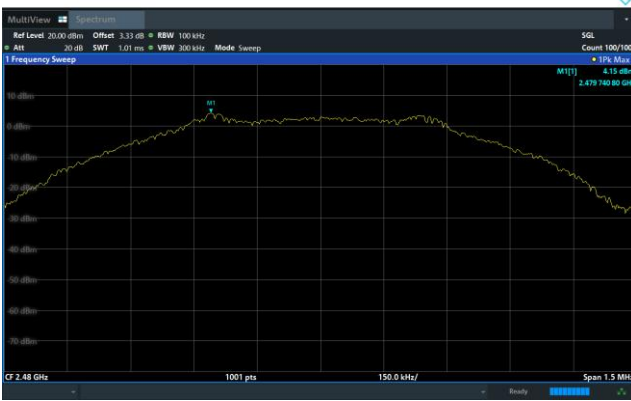
GFSK(1M) on Channel 19



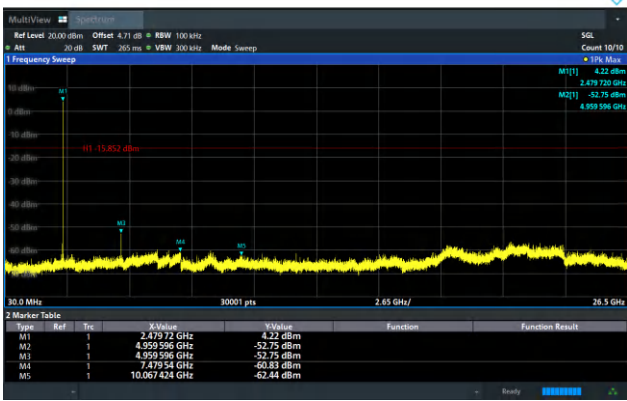
GFSK(1M) on Channel 19



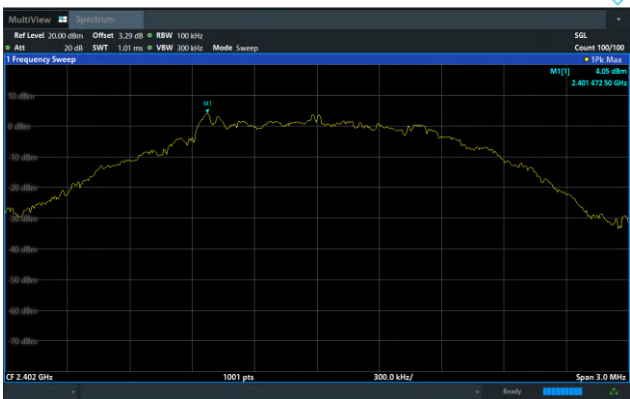
GFSK(1M) on Channel 39



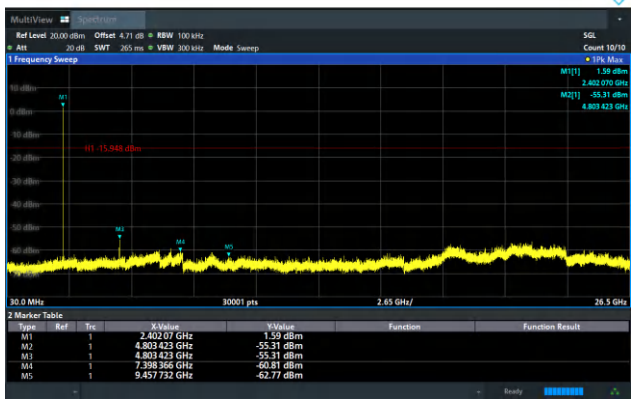
GFSK(1M) on Channel 39



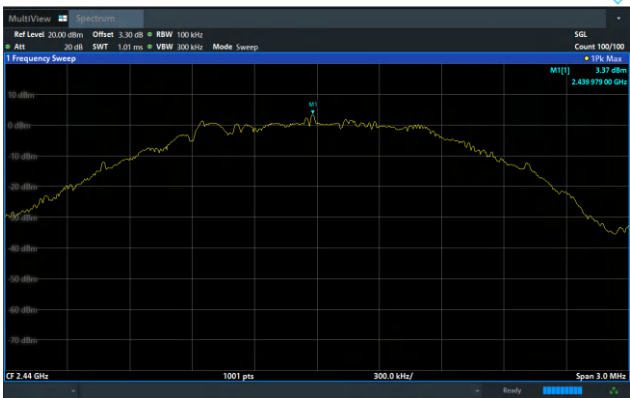
GFSK(2M) on Channel 00



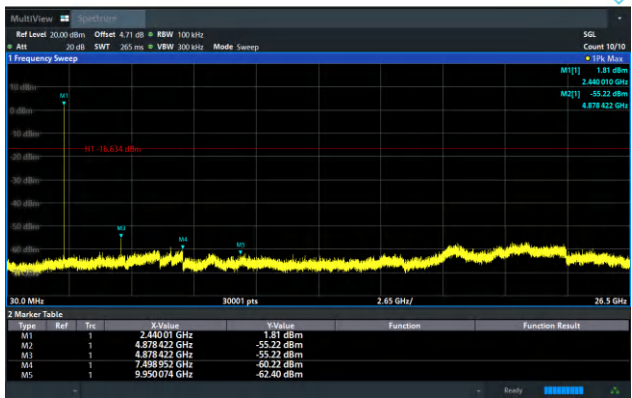
GFSK(2M) on Channel 00



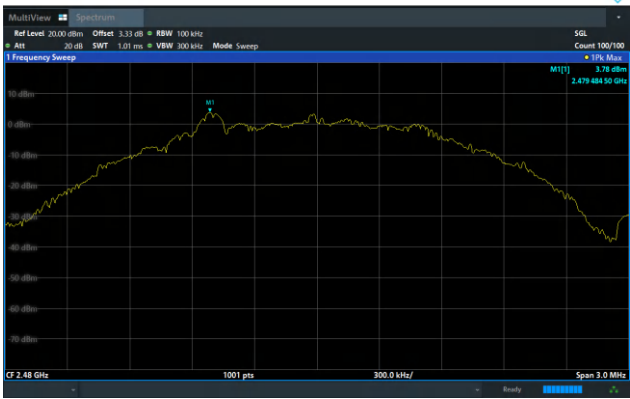
GFSK(2M) on Channel 19



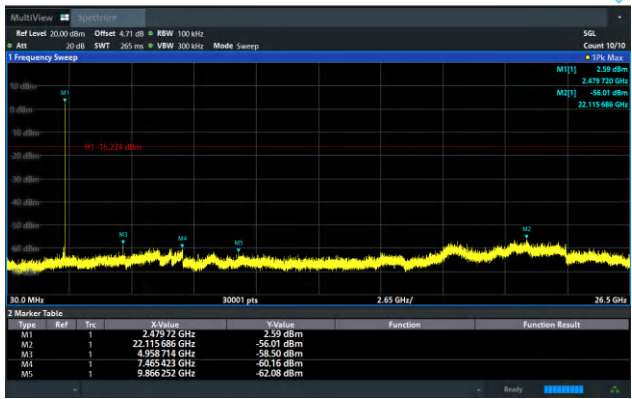
GFSK(2M) on Channel 19



GFSK(2M) on Channel 39

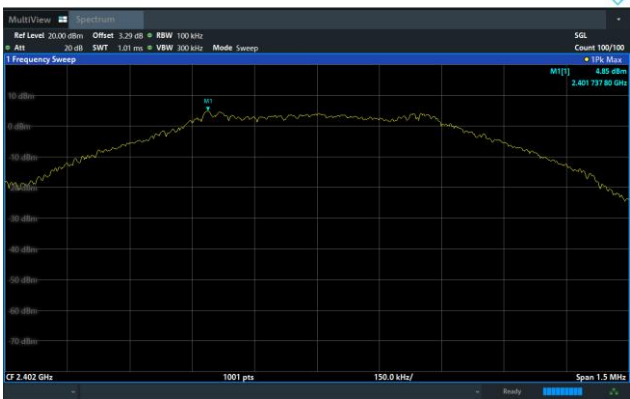


GFSK(2M) on Channel 39

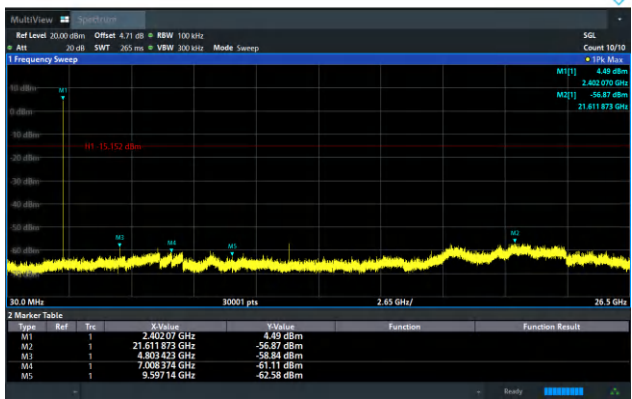


R:

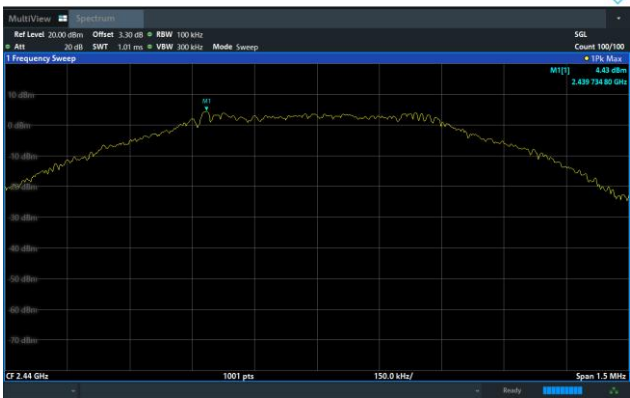
GFSK(1M) on Channel 00



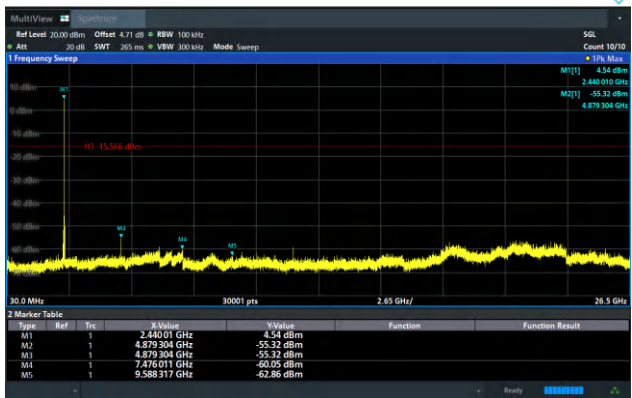
GFSK(1M) on Channel 00



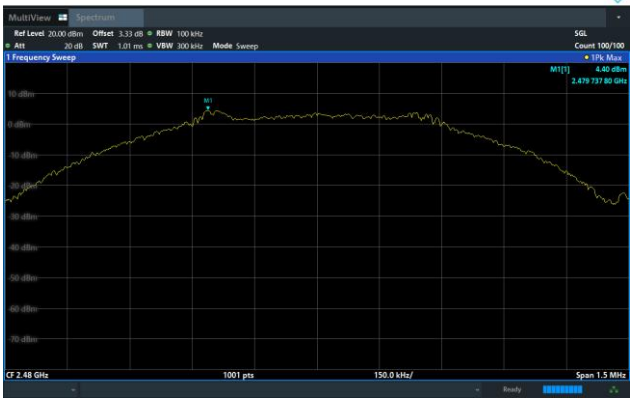
GFSK(1M) on Channel 19



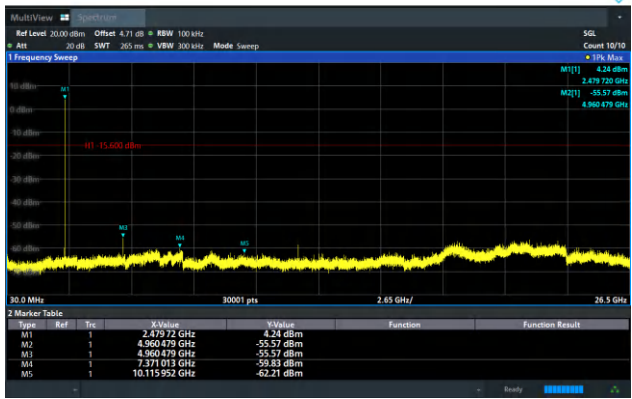
GFSK(1M) on Channel 19



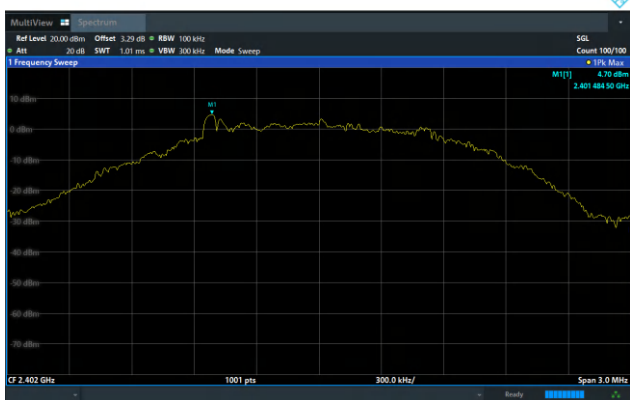
GFSK(1M) on Channel 39



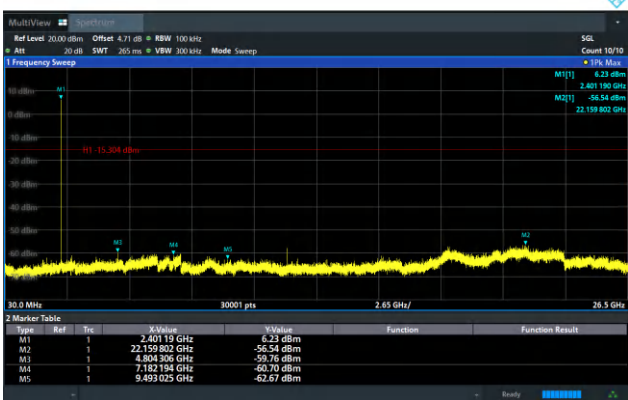
GFSK(1M) on Channel 39



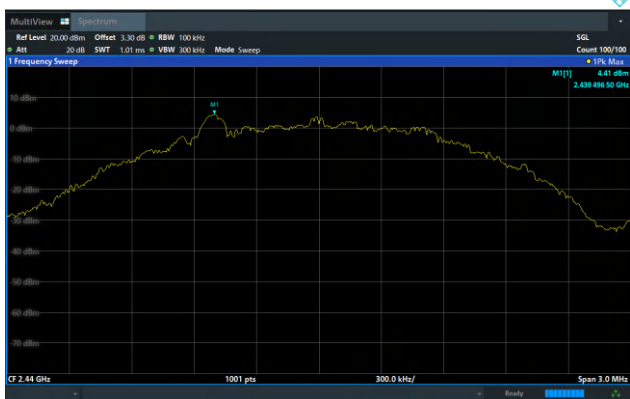
GFSK(2M) on Channel 00



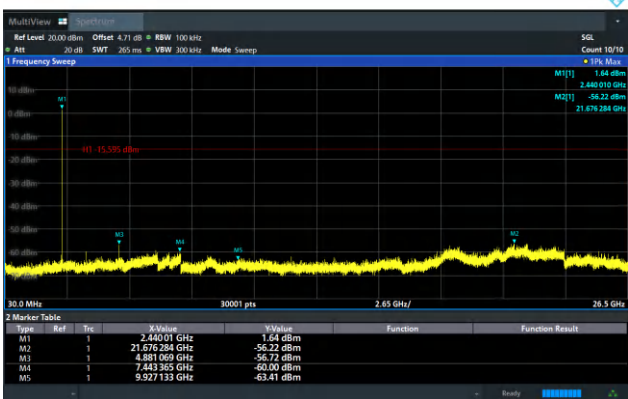
GFSK(2M) on Channel 00



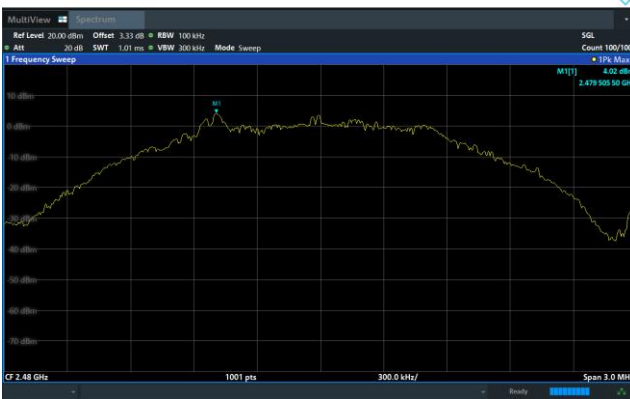
GFSK(2M) on Channel 19



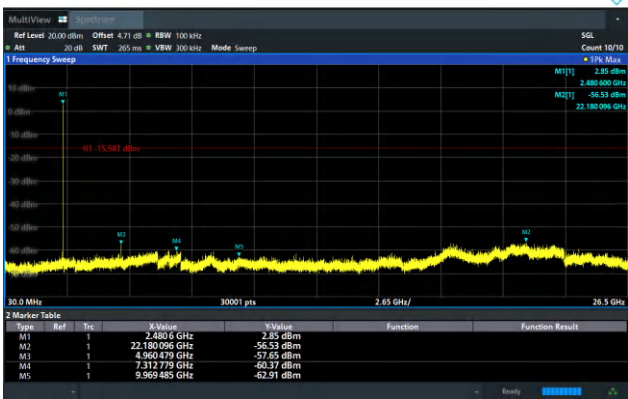
GFSK(2M) on Channel 19



GFSK(2M) on Channel 39



GFSK(2M) on Channel 39



6 Photographs of the Test Setup

Please refer to report HB20251027079E-01 for product photos.

7 Photographs of the EUT

Please refer to report HB20251027079E-01 for product photos.

******* END OF REPORT *******