Radio Test Report

Report No.: STS2407030W01

Issued for

Good Sportsman Marketing, LLC

5250 Frye Rd, Irving, TX 75061, United States

Product Name:	Recon BT WalkieTalkie
Brand Name:	WALKER'S
Model Name:	GWP-RECM-BT-WT
Series Model(s):	GWP-RECM-BT-WT-XXX(X=A-Z)
FCC ID:	2AU3A-RECMBTWT
Test Standard:	FCC Part 95 Subpart B

TEST REPORT

Applicant's Name ..... :	Good Sportsman Marketing, LLC
Address..... :	5250 Frye Rd, Irving, TX 75061, United States
Manufacturer's Name ..... :	K-Mark Industrial Limited
Address..... :	FLAT A, 7/F., MAI ON IND. BLDG, 17-21 KUNG YIP STREET, KWAI CHUNG, HONG KONG
Product Description	
Product Name ..... :	Recon BT WalkieTalkie
Brand Name ..... :	WALKER'S
Model Name..... :	GWP-RECM-BT-WT
Series Model(s) ..... :	GWP-RECM-BT-WT-XXX(X=A-Z)
Test Standards..... :	FCC Part 95 Subpart B
Test Procedure ..... :	ANSI C63.26-2015

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC/IC requirements. And it is applicable only to the tested sample identified in the report.
The test results presented in this report relate only to the object tested. This report shall not be reproduced, except in full, without the written approval of the ShenZhen STS Test Services Co., Ltd.

Date of Test..... :	
Date of receipt of test item..... :	04 July 2024
Date of performance of tests ..... :	04 July 2024 ~ 24 July 2024
Date of Issue..... :	24 July 2024
Test Result ..... :	**Pass**

Testing Engineer : Lenon.Hou
(Lenon Hou)

Technical Manager : Chris Chen
(Chris Chen)

Authorized Signatory : Bovey Yang
(Bovey Yang)

SHENZHEN STS TEST SERVICES CO., LTD. TESTING APPROVAL

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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	24 July 2024	STS2407030W01	ALL	Initial Issue

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part 95 Subpart B			
Standard Section	Test Item	Judgment	Remark
FCC Part 95.567	Transmitter Output Power and Effective Radiated Power (e.r.p)	PASS	--
FCC Part 95.573	Authorized Bandwidth	PASS	--
FCC Part 95.579	Emission Mask	PASS	--
FCC Part 95.579	Transmitter Radiated Spurious Emission	PASS	--
FCC Part 95.579	Spurious Emission On Antenna Port	PASS	--
FCC Part 95.565	Frequency Stability	PASS	--
FCC Part 95.575	Audio Low Pass Filter Response	PASS	--
FCC Part 95.575	Audio Frequency Response	PASS	--
FCC Part 95.575	Modulation Requirements	PASS	--

NOTE: (1) “N/A” denotes test is not applicable in this Test Report.

(2) All tests are according to ANSI C63.26-2015.

1.1 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD
Add. :101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China
FCC test Firm Registration Number: 625569
IC test Firm Registration Number: 12108A
A2LA Certificate No.: 4338.01
IC CAB ID: CN0086

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **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** %.

No.	Item	Uncertainty
1	RF output power, conducted	±0.87dB
2	Unwanted Emissions, conducted	±2.895dB
3	All emissions, radiated 9K-30MHz	±3.80dB
4	All emissions, radiated 30M-1GHz	±4.09dB
5	All emissions, radiated 1G-6GHz	±4.92dB
6	All emissions, radiated>6G	±5.49dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF THE EUT

Product Name/PMN	Recon BT WalkieTalkie	
Brand Name	WALKER'S	
Model Name	GWP-RECM-BT-WT	
Series Model(s)/HVIN	GWP-RECM-BT-WT-XXX(X=A-Z)	
Model Difference	All models are identical except for the naming.	
Operation Frequency Range:	462.5625MHz-462.7125MHz, 467.5625MHz-467.7125MHz, 462.5500MHz-462.7250MHz	
Channel Separation	12.5KHz	
Modulation Type	FM	F3E
Emission types	FRS	6K50F3E
Rating	Input: DC 4.5V	
Hardware version	N/A	
Software version/FVIN	N/A	
Sample number	240704003-2	
Connecting I/O Port(s)	Please refer to the note 1	

Note:
1. For a more detailed features description, please refer to the manufacturer's specifications or the User Manual.
2. Table for filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	WALKER'S	GWP-RECM-BT-WT	Internal	N/A	-4.1	Antenna

3. Channel List

Channel	Frequency(MHz)	Channel	Frequency(MHz)	Channel	Frequency(MHz)
1	462.5625	9	467.5875	17	462.6000
2	462.5875	10	467.6125	18	462.6250
3	462.6125	11	467.6375	19	462.6500
4	462.6375	12	467.6625	20	462.6750
5	462.6625	13	467.6875	21	462.7000
6	462.6875	14	467.7125	22	462.7250
7	462.7125	15	462.5500		
8	467.5625	16	462.5750		

Test channel:

Channel	Frequency(MHz)
04	462.6375
11	467.6375
19	462.6500

2.2 DESCRIPTION OF THE TEST MODES

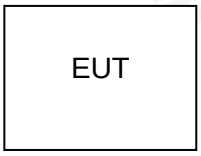
To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	FRS CH4 TX Mode
Mode 2	FRS CH11 TX Mode
Mode 3	FRS CH19 TX Mode

For Radiated Emission/Conducted Emission	
Final Test Mode	Description
Mode 1	FRS CH4 TX Mode
Mode 2	FRS CH11 TX Mode
Mode 3	FRS CH19 TX Mode

2.3 BLOCK DIAGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



2.4 DESCRIPTION OF NECESSARY ACCESSORIES AND SUPPORT UNITS

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

Necessary accessories

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Support units

Item	Equipment	Mfr/Brand	Model/Type No.	Length	Note
N/A	N/A	N/A	N/A	N/A	N/A

Note:

(1) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

2.5 EQUIPMENTS LIST

RF Radiation Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
Wireless Communications Test Set	R&S	CMW 500	117239	2023.09.26	2024.09.25
Pre-Amplifier(0.1M-3GHz)	EM	EM330	060665	2024.02.23	2025.02.22
Pre-Amplifier (1G-18GHz)	SKET	LNPA-01018G-45	SK2018080901	2023.09.28	2024.09.27
Positioning Controller	MF	MF-7802	MF-780208587	N/A	N/A
Signal Analyzer	R&S	FSV 40-N	101823	2023.09.26	2024.09.25
Switch Control Box	N/A	N/A	N/A	N/A	N/A
Filter Box	BALUN Technology	SU319E	BL-SZ1530051	N/A	N/A
Video Controller	SKET	FCS C-3	N/A	N/A	N/A
Bilog Antenna	TESEQ	CBL6111D	34678	2022.09.30	2024.09.29
Horn Antenna	SCHWARZBECK	BBHA 9120D	02014	2023.09.24	2025.09.23
Antenna Mast	MF	MFA-440H	N/A	N/A	N/A
Turn Table	MF	N/A	N/A	N/A	N/A
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A
DC Power Supply	Zhaoxin	RXN 605D	20R605D11010081	N/A	N/A
Test SW	EMC Test Software	15.2.0.339			
RF Connected Test Equipment					
Kind of Equipment	Manufacturer	Type No.	Serial No.	Last Calibration	Calibrated Until
Temperature & Humidity	SW-108	SuWei	N/A	2024.03.15	2025.03.14
Universal Radio communication tester	R&S	CMU200	111058	2023.09.26	2024.09.25
Signal Generator	Agilent	N5182A	MY46240556	2023.09.26	2024.09.25
Signal Analyzer	Agilent	N9020A	MY52440124	2024.02.23	2025.02.22
Intercom comprehensive tester	HP	8920A	348A05658	2024.02.23	2025.02.22
Temperature & Humidity Test Chamber	Safety test	AG80L	171200018	2024.02.23	2025.02.22
Programmable Power Supply	Agilent	E3642A	MY40002025	2023.09.26	2024.09.25
Attenuator	HP	8494B	DC-18G	2024.02.29	2025.02.28
AC Power Source	APC	KDF-11010G	F214050035	N/A	N/A

3. FIELD STRENGTHS AND RADIATED SPURIOUS EMISSION

3.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on 15.205 and RSS-Gen limit in the followed

In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:

(a) If the equipment operates below 10 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.

Particular attention should be paid to harmonics and sub-harmonics of the carrier frequency, as well as to those frequencies removed from the carrier by multiples of the oscillator frequency.

Radiation at the frequencies of multiplier stages should also be checked.

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value need not be reported.

43 + 10 log (Pwatts)

Calculation: Limit (dBm) =EL-43-10log10 (TP)

Notes: EL is the emission level of the Output Power expressed in dBm,

In this application, the EL is P(dBm).

Limit (dBm) = P(dBm)-43-10 log (Pwatts) = -13 dBm

LIMITS OF RESTRICTED FREQUENCY BANDS

FCC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	Above 38.6
13.36-13.41			

IC:

FREQUENCY (MHz)	FREQUENCY (MHz)	FREQUENCY (GHz)
0.090 - 0.110	149.9 - 150.05	9.0 - 9.2
0.495 - 0.505	156.52475 - 156.52525	9.3 - 9.5
2.1735 - 2.1905	156.7 - 156.9	10.6 - 12.7
3.020 - 3.026	162.0125 - 167.17	13.25 - 13.4
4.125 - 4.128	167.72 - 173.2	14.47 - 14.5
4.17725 - 4.17775	240 – 285	15.35 - 16.2
4.20725 - 4.20775	322 - 335.4	17.7 - 21.4
5.677 - 5.683	399.9 - 410	22.01 - 23.12
6.215 - 6.218	608 - 614	23.6 - 24.0
6.26775 - 6.26825	960 - 1427	31.2 - 31.8
6.31175 - 6.31225	1435 - 1626.5	36.43 - 36.5
8.291 - 8.294	1645.5 - 1646.5	Above 38.6
8.362 - 8.366	1660 - 1710	
8.37625 - 8.38675	1718.8 - 1722.2	
8.41425 - 8.41475	2200 - 2300	
12.29 - 12.293	2310 - 2390	
12.51975 - 12.52025	2483.5 - 2500	
12.57675 - 12.57725	2655 - 2900	
13.36 - 13.41	3260 – 3267	
16.42 - 16.423	3332 - 3339	
16.69475 - 16.69525	3345.8 - 3358	
16.80425 - 16.80475	3500 - 4400	
25.5 - 25.67	4500 - 5150	
37.5 - 38.25	5350 - 5460	
73 - 74.6	7250 - 7750	
74.8 - 75.2	8025 – 8500	
108 – 138		

Frequencies (MHz)	Field Strength (micorvolts/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

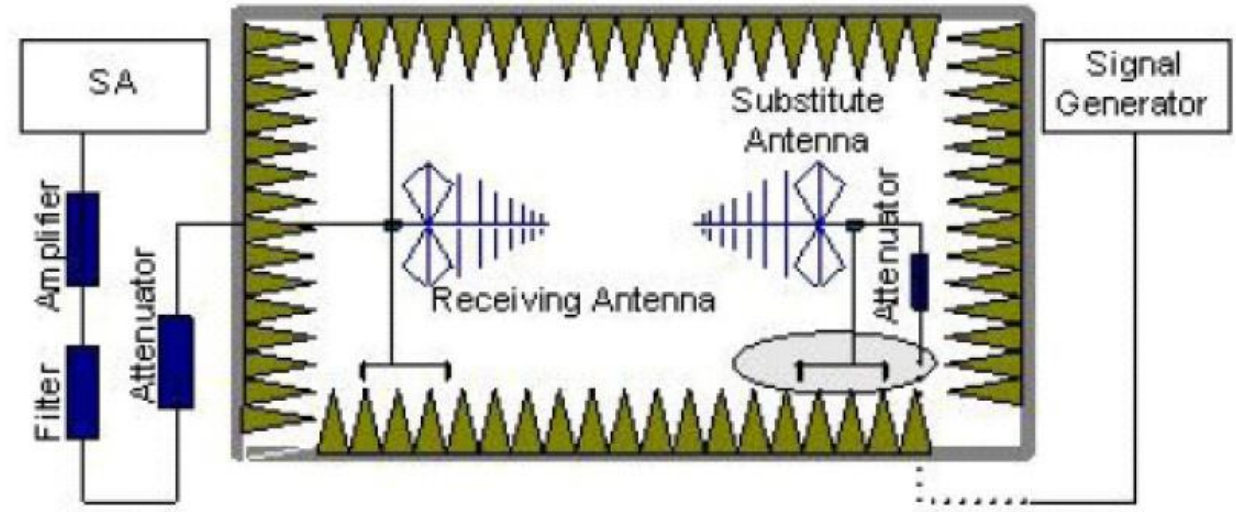
Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
Start Frequency	30 MHz
Stop Frequency	10th carrier harmonic

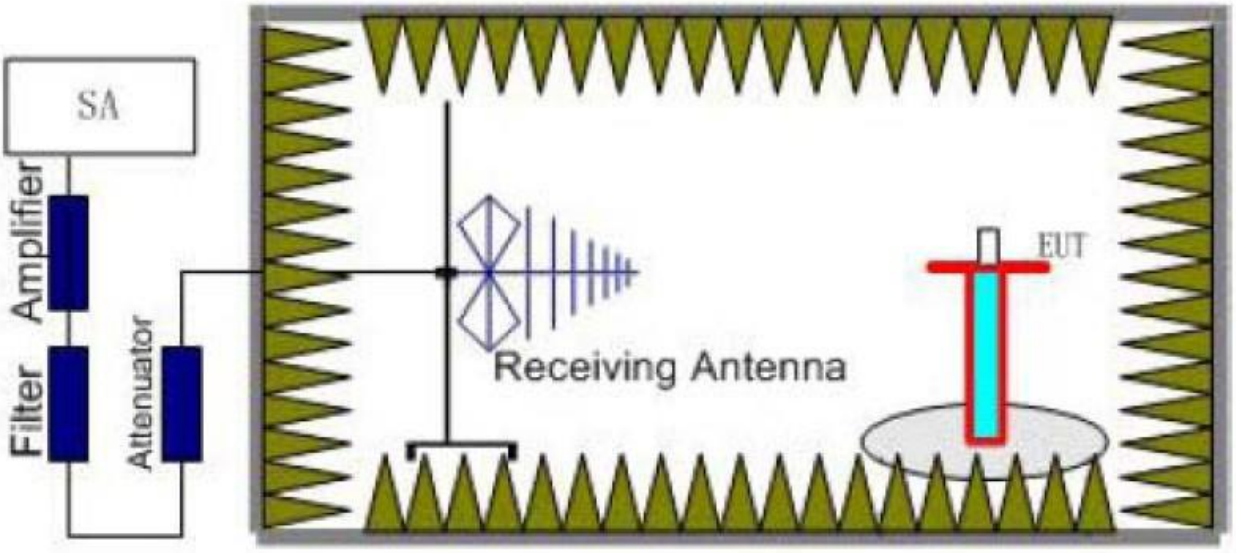
3.2 TEST PROCEDURE

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1. 0 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and BW=100kHz,VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of thesubstitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test. The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}- P_{Ag} - P_{cl} + G_a
   We used signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below:
   Power(EIRP)=P_{Mea}- P_{cl} +G_a
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi

3.3 TEST SETUP





3.4 EUT OPERATING CONDITIONS

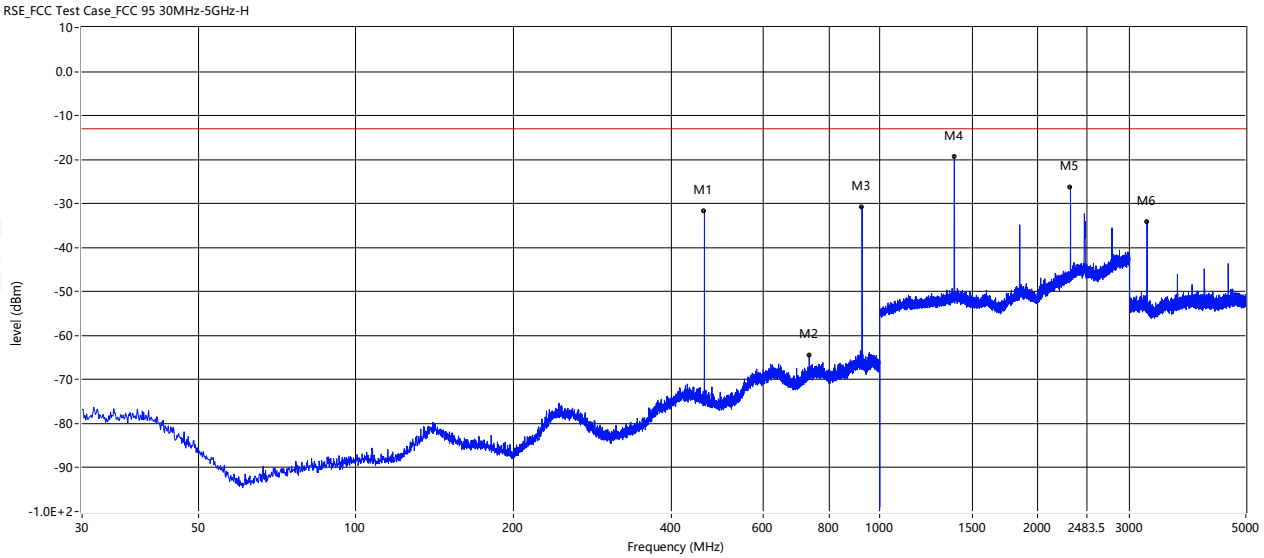
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.5 TEST RESULT

Note: 1. The unwanted emissions falling into the restricted frequency band limit is 82.2dBuV/m, whichever is less stringent. The spurious emission and restricted frequency band data are shown on the same graph.

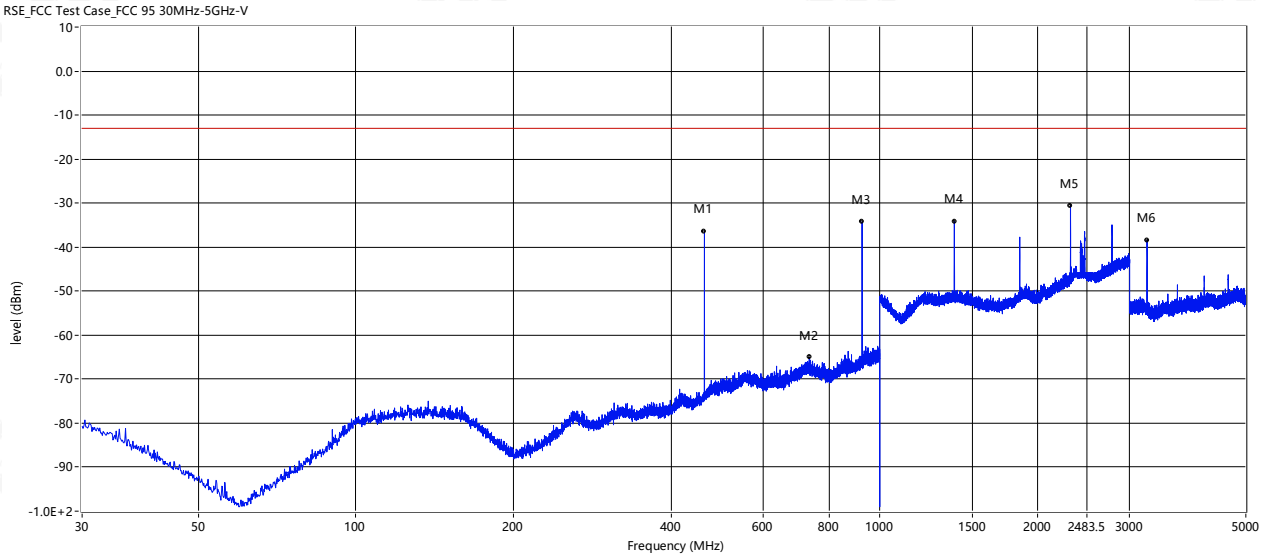
2. E(dBuV/m)=E(dBm)+95.2 = -13dBm+95.2=82.2dBuV/m.

Temperature:	23.4 ℃	Relative Humidity:	60%
Test Mode:	Mode 1	Phase :	Horizontal



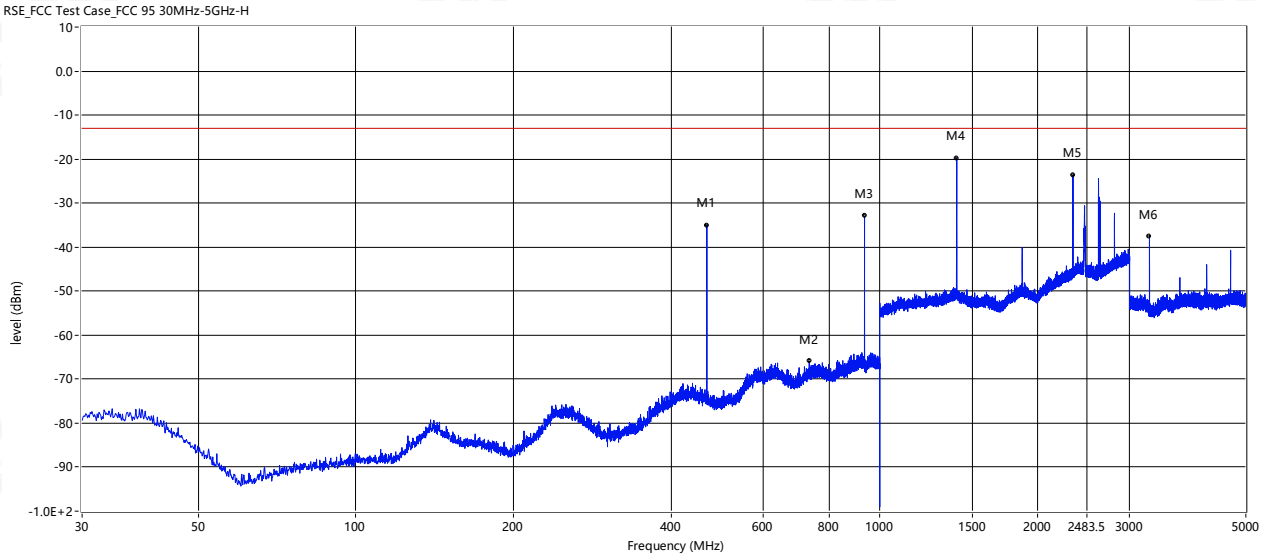
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
462.620	-31.74	1.99	-13.0	-18.74	156.50	Horizontal	Vertical	Pass
733.371	-64.59	6.79	-13.0	-51.59	272.10	Horizontal	Vertical	Pass
925.310	-30.75	9.23	-13.0	-17.75	236.70	Horizontal	Vertical	Pass
1388.000	-19.44	14.00	-13.0	-6.44	283.30	Horizontal	Vertical	Pass
2313.250	-26.32	18.07	-13.0	-13.32	14.60	Horizontal	Vertical	Pass
3238.500	-34.16	2.93	-13.0	-21.16	265.50	Horizontal	Vertical	Pass

Temperature:	23.4 ℃	Relative Humidity:	60%
Test Mode:	Mode 1	Phase:	Vertical



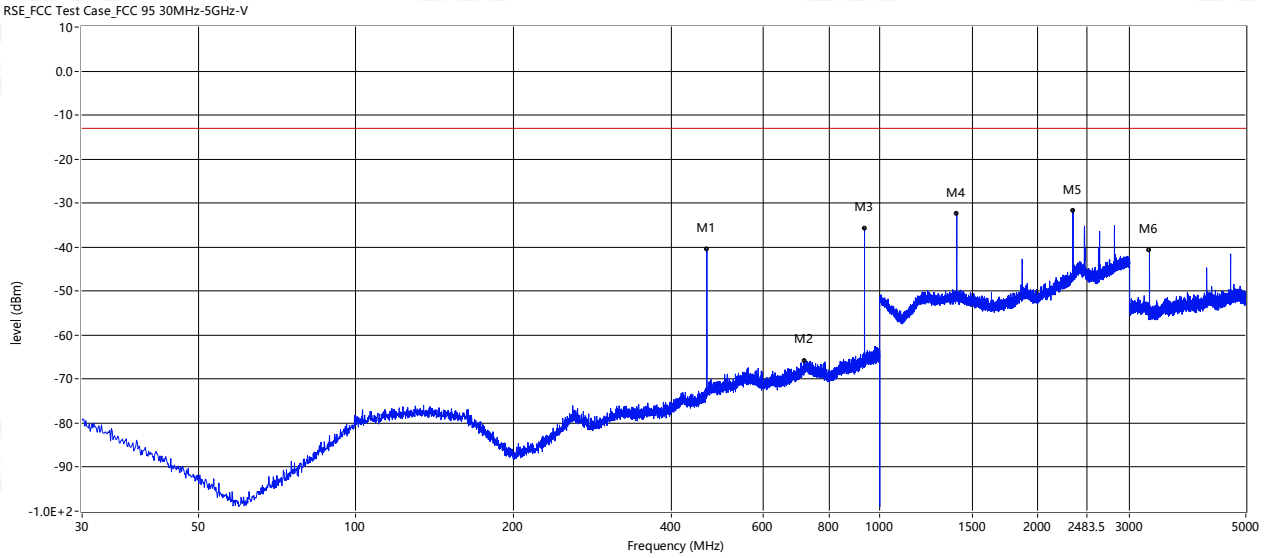
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
462.620	-36.36	2.66	-13.0	-23.36	130.70	Vertical	Vertical	Pass
733.492	-64.97	7.88	-13.0	-51.97	359.70	Vertical	Vertical	Pass
925.310	-34.27	9.27	-13.0	-21.27	33.10	Vertical	Vertical	Pass
1388.000	-34.18	13.73	-13.0	-21.18	56.80	Vertical	Vertical	Pass
2313.250	-30.55	17.10	-13.0	-17.55	92.60	Vertical	Vertical	Pass
3238.500	-38.42	2.13	-13.0	-25.42	123.60	Vertical	Vertical	Pass

Temperature:	23.4 ℃	Relative Humidity:	60%
Test Mode:	Mode 2	Phase :	Horizontal



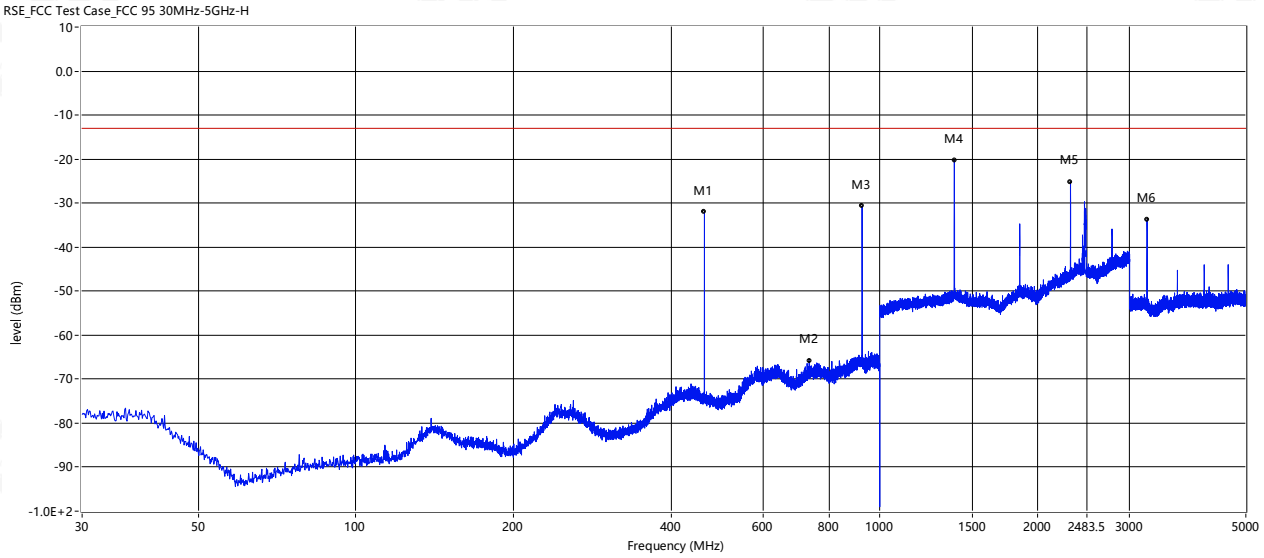
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
467.712	-35.04	1.87	-13.0	-22.04	165.60	Horizontal	Vertical	Pass
733.371	-65.99	6.79	-13.0	-52.99	245.30	Horizontal	Vertical	Pass
935.374	-32.99	8.52	-13.0	-19.99	207.30	Horizontal	Vertical	Pass
1403.000	-19.76	14.12	-13.0	-6.76	290.70	Horizontal	Vertical	Pass
2338.500	-23.59	18.63	-13.0	-10.59	30.00	Horizontal	Vertical	Pass
3273.500	-37.62	2.41	-13.0	-24.62	128.60	Horizontal	Vertical	Pass

Temperature:	23.4 ℃	Relative Humidity:	60%
Test Mode:	Mode 2	Phase:	Vertical



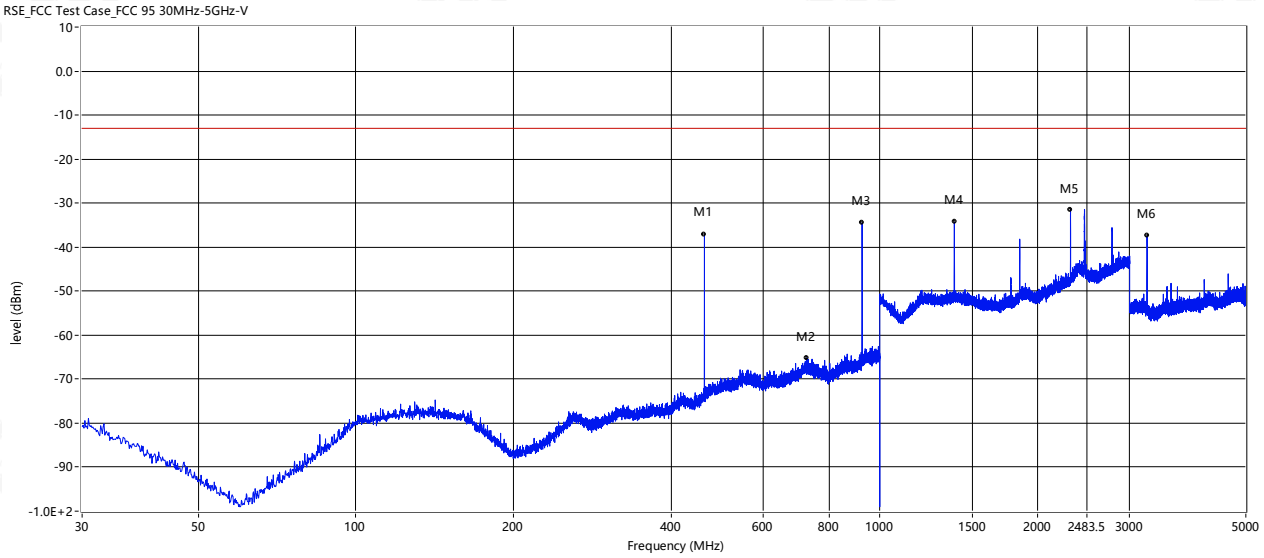
Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
467.712	-40.56	3.20	-13.0	-27.56	130.20	Vertical	Vertical	Pass
719.306	-65.78	8.21	-13.0	-52.78	289.40	Vertical	Vertical	Pass
935.374	-35.79	9.89	-13.0	-22.79	41.10	Vertical	Vertical	Pass
1402.750	-32.40	13.81	-13.0	-19.40	85.60	Vertical	Vertical	Pass
2338.250	-31.80	17.97	-13.0	-18.80	106.90	Vertical	Vertical	Pass
3273.500	-40.83	1.63	-13.0	-27.83	138.70	Vertical	Vertical	Pass

Temperature:	23.4 ℃	Relative Humidity:	60%
Test Mode:	Mode 3	Phase :	Horizontal



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
462.620	-31.97	1.99	-13.0	-18.97	163.00	Horizontal	Vertical	Pass
733.371	-65.82	6.79	-13.0	-52.82	106.50	Horizontal	Vertical	Pass
925.431	-30.70	9.22	-13.0	-17.70	230.90	Horizontal	Vertical	Pass
1388.000	-20.34	14.00	-13.0	-7.34	280.20	Horizontal	Vertical	Pass
2313.250	-25.29	18.07	-13.0	-12.29	8.50	Horizontal	Vertical	Pass
3238.500	-33.86	2.93	-13.0	-20.86	266.50	Horizontal	Vertical	Pass

Temperature:	23.4 ℃	Relative Humidity:	60%
Test Mode:	Mode 3	Phase:	Vertical



Frequency (MHz)	Result (dBm)	Factor (dB)	PK Limit (dBm)	Over Limit (dB)	Table (o)	ANT	EUT	Verdict
462.620	-37.03	2.66	-13.0	-24.03	129.80	Vertical	Vertical	Pass
725.975	-65.17	8.09	-13.0	-52.17	94.30	Vertical	Vertical	Pass
925.431	-34.48	9.28	-13.0	-21.48	32.60	Vertical	Vertical	Pass
1388.000	-34.30	13.73	-13.0	-21.30	110.60	Vertical	Vertical	Pass
2313.500	-31.54	17.10	-13.0	-18.54	83.70	Vertical	Vertical	Pass
3238.750	-37.47	2.12	-13.0	-24.47	127.60	Vertical	Vertical	Pass

4. SPURIOUS EMISSION ON ANTENNA PORT

4.1 LIMIT
43 + 10 log (Pwatts)
Calculation: Limit (dBm) =EL-43-10log10 (TP)
Notes: EL is the emission level of the Output Power expressed in dBm,
In this application, the EL is P(dBm).
Limit (dBm) = P(dBm)-43-10 log (Pwatts) = -13 dBm

4.2 TEST PROCEDURE

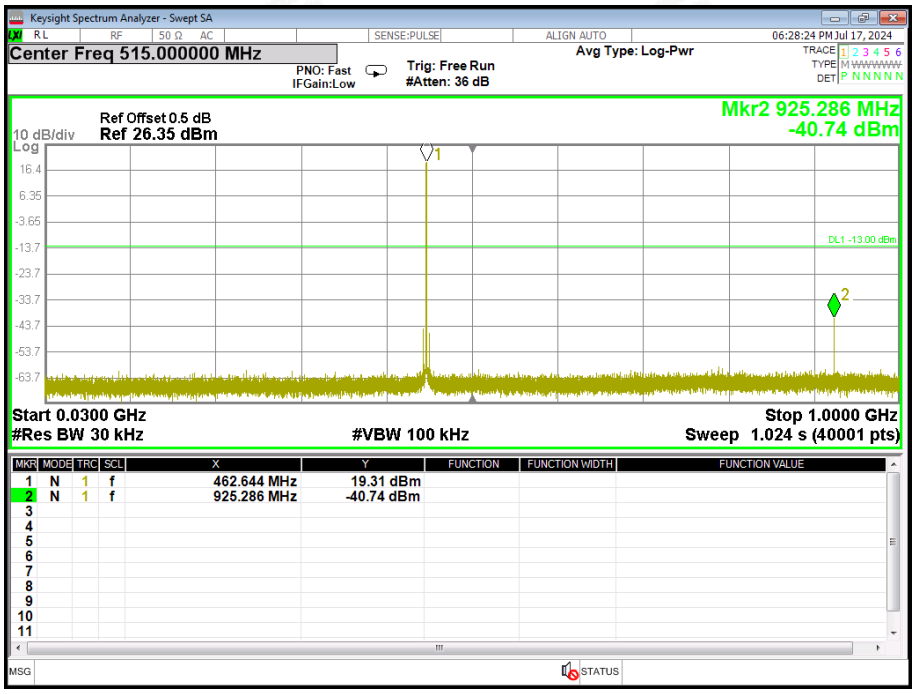
1. The EUT was connected to the spectrum analyzer through sufficent attenuation.
2. Sufficient scans were taken to show any out of band emission up to 10th. Harmonic for the lower and the highest frequency range.
3. Set EUT as digital data mode.
4. Set RBW 30kHz, VBW 100 kHz in the frequency band 30MHz to 1GHz,while set RBW=1MHz. VBW=3MHz from the 1GHz to 10th Harmonic.

4.3 TEST SETUP

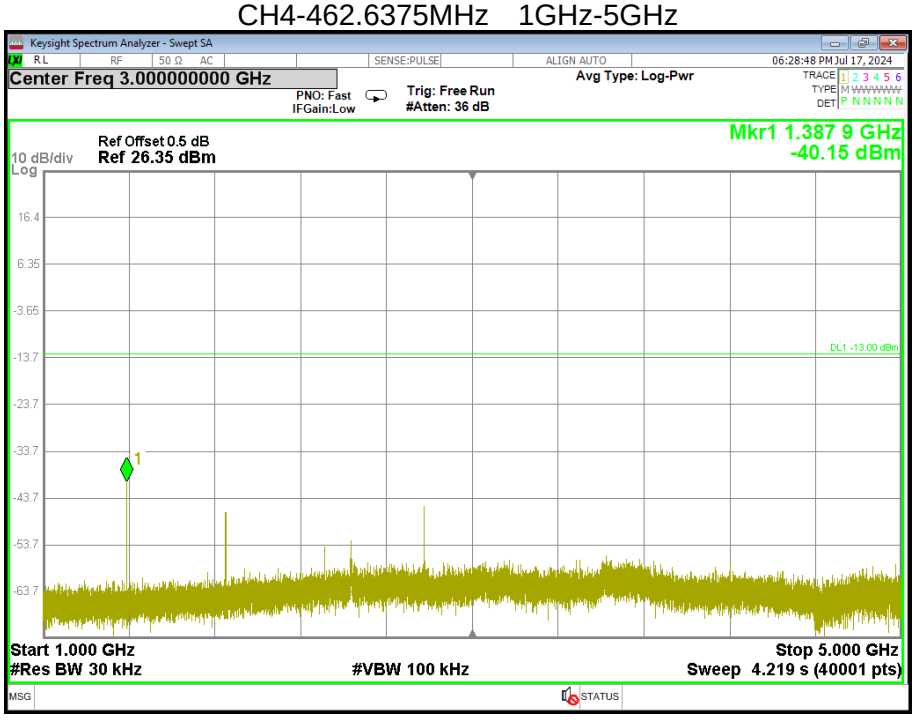
4.4 EUT OPERATION CONDITIONS
TX mode.

4.5 TEST RESULT

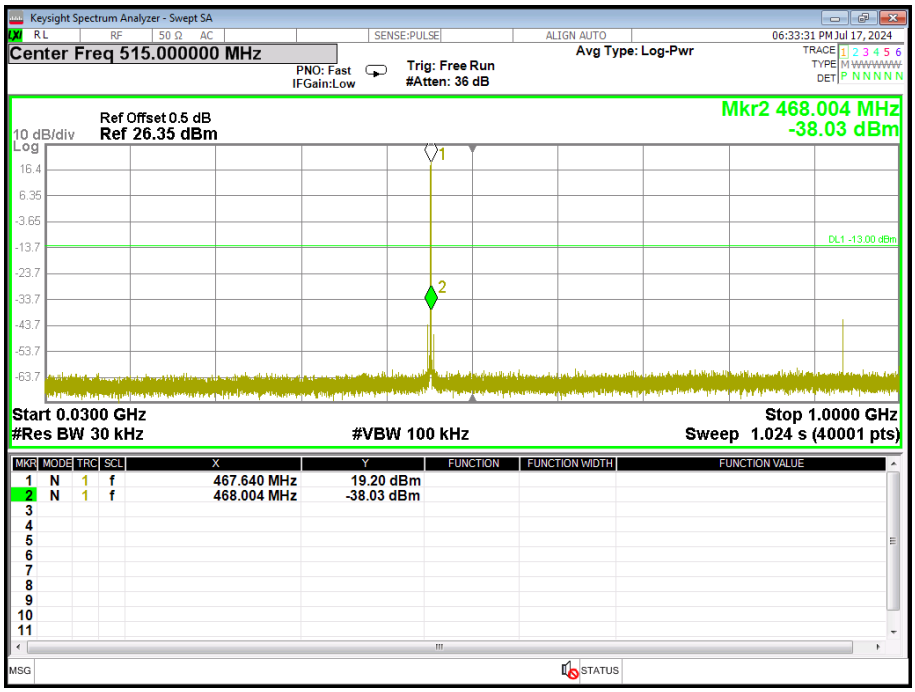
CH4-462.6375MHz 30MHz-1GHz



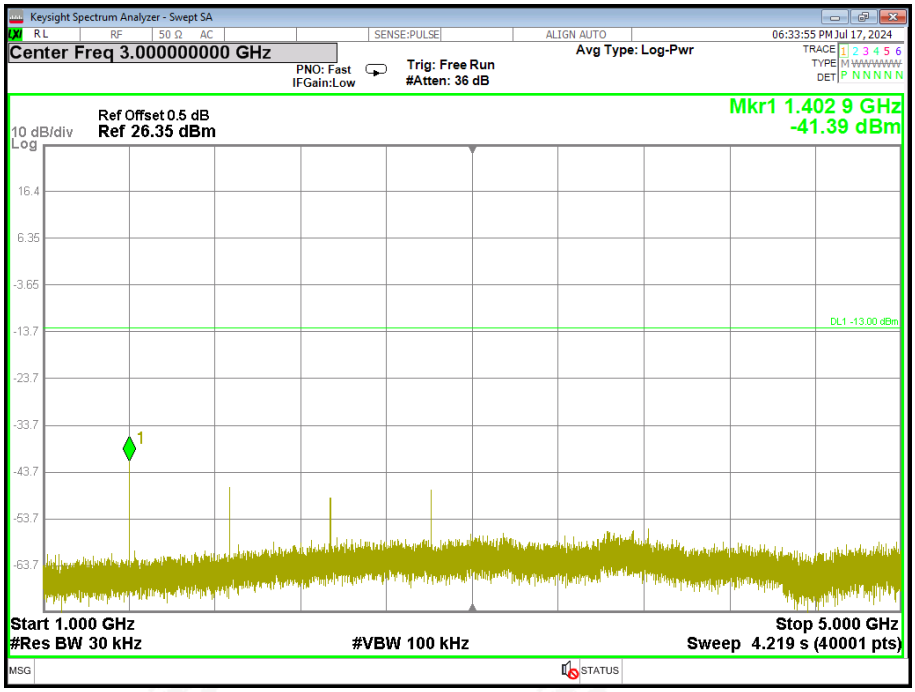
CH4-462.6375MHz 1GHz-5GHz



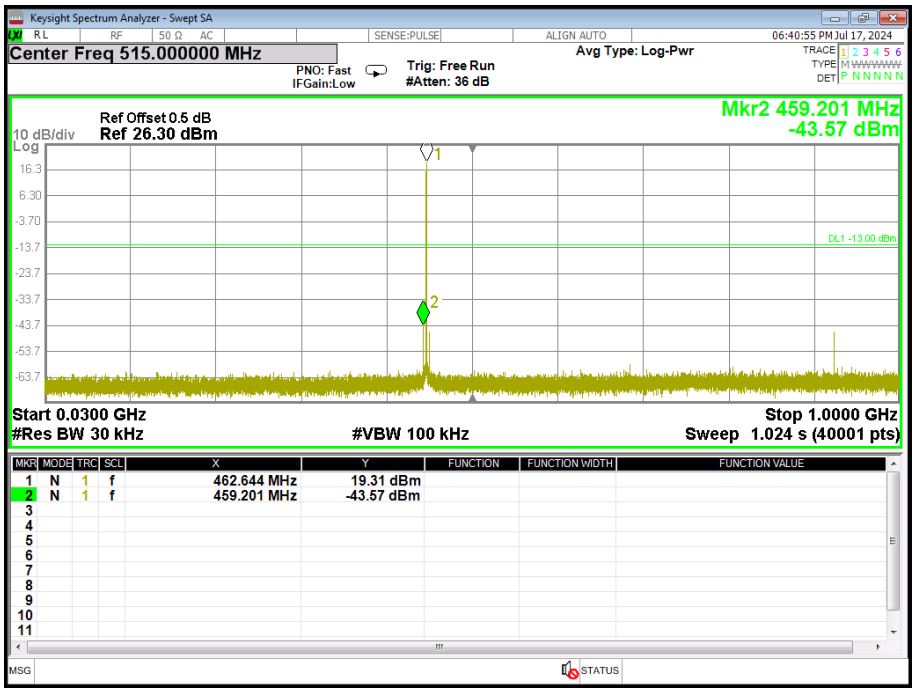
CH11-467.6375MHz 30MHz-1GHz



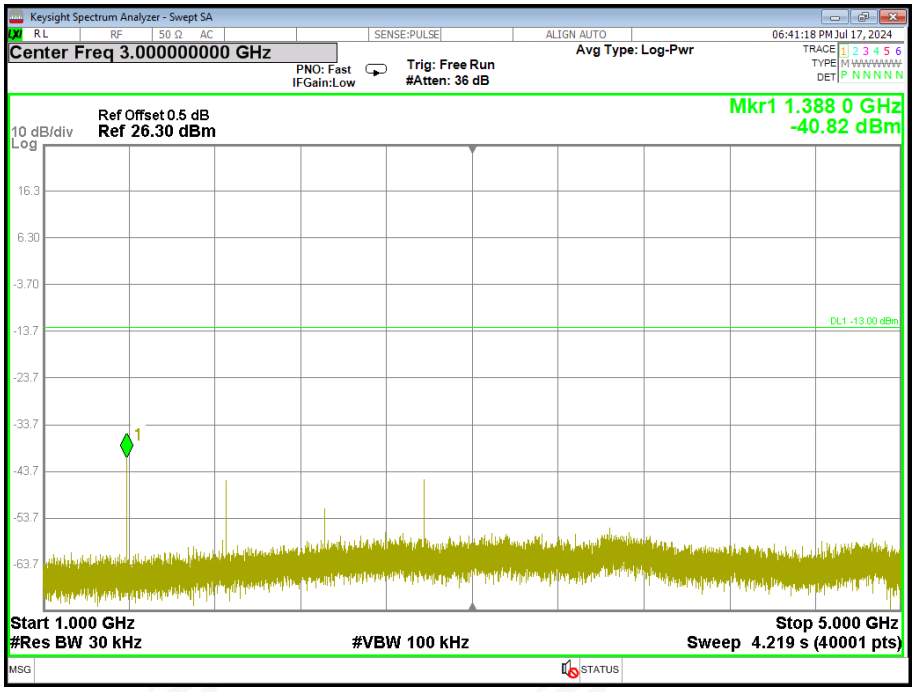
CH11-467.6375MHz 1GHz-5GHz



CH19-462.65MHz 30MHz-1GHz



CH19-462.65MHz 1GHz-5GHz



5. BANDWIDTH TEST

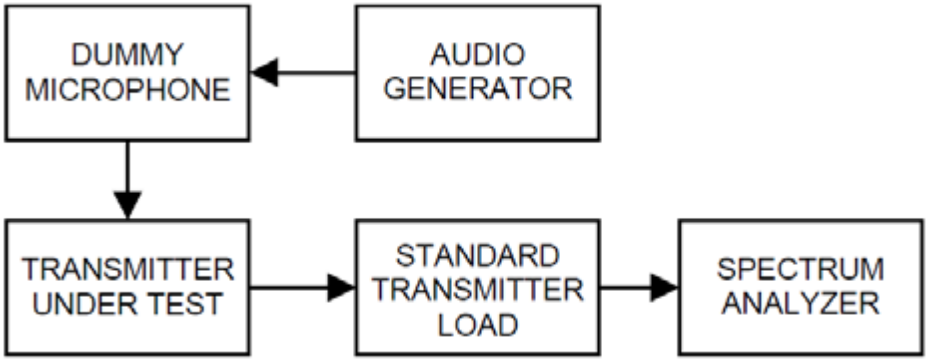
5.1 LIMIT

FRS:
FCC: The authorized bandwidth for an FRS unit is 12.5 kHz.
IC: The authorized bandwidth is 12.5 kHz for channels 8-14 and 20 kHz for other channels.

5.2 TEST PROCEDURE

1. The EUT was connected to the spectrum analyzer through sufficent attenuation.
2. Set EUT as digital data mode.
3. Set SPA Center Frequency=fundamental frequency, RBW=100Hz, VBW=1KHz, span =15KHz.
4. Set SPA Max hold. Mark peak, Set 99% Occupied Bandwidth.

5.3 TEST SETUP



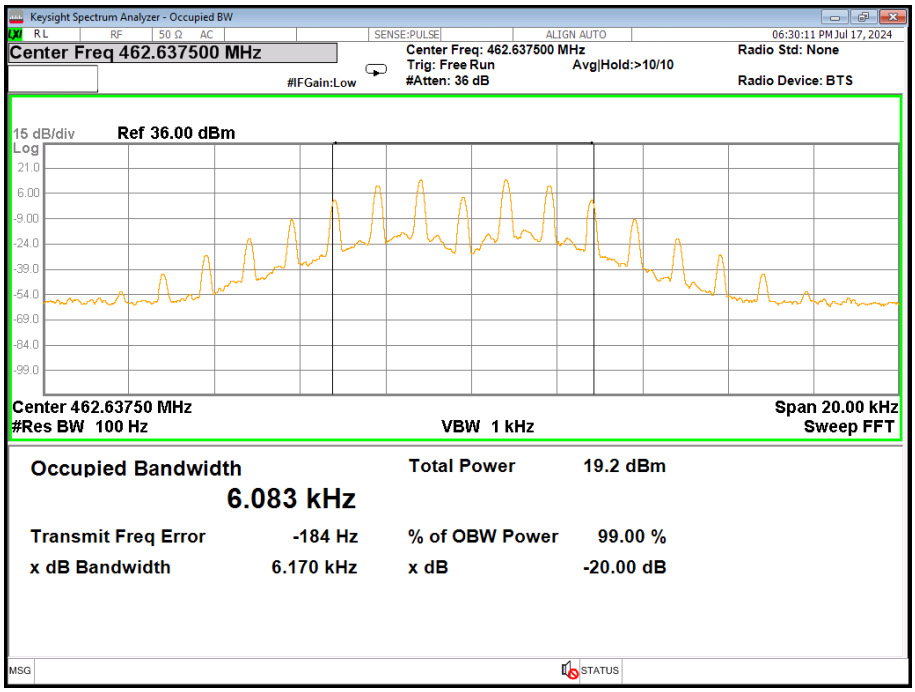
5.4 EUT OPERATION CONDITIONS

TX mode.

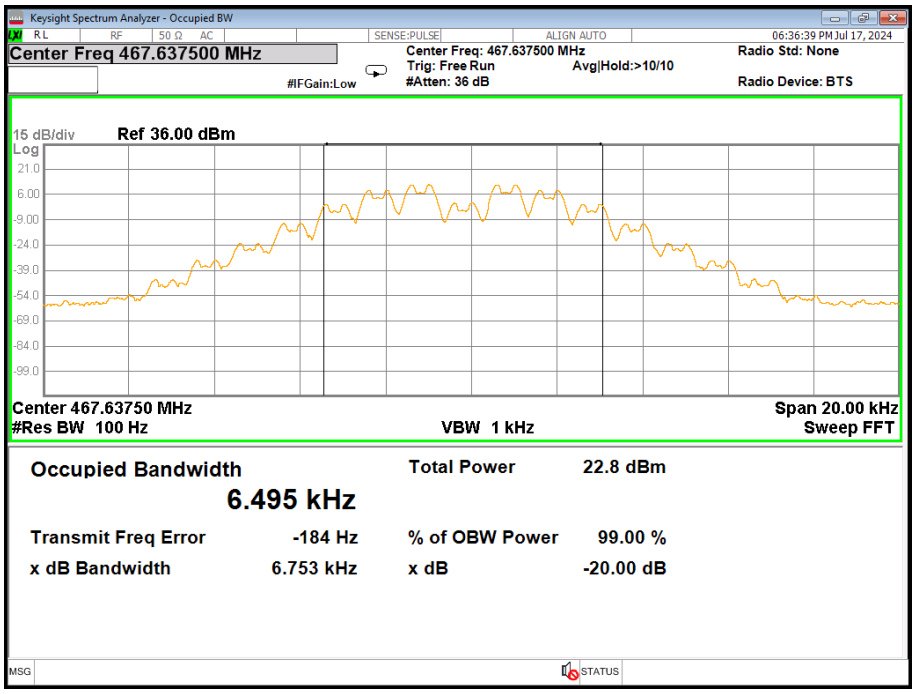
5.5 TEST RESULTS

Operation Mode	Test Channel	Test Frequency(MHz)	99% Occupied Bandwidth(KHz)	20dB Bandwidth (KHz)	FCC Limits (KHz)	IC Limits (KHz)	Result
FRS	4	462.6375	6.083	6.17	12.5	20	Pass
	11	467.6375	6.495	6.753	12.5	12.5	Pass
	19	462.6500	6.184	6.247	12.5	20	Pass

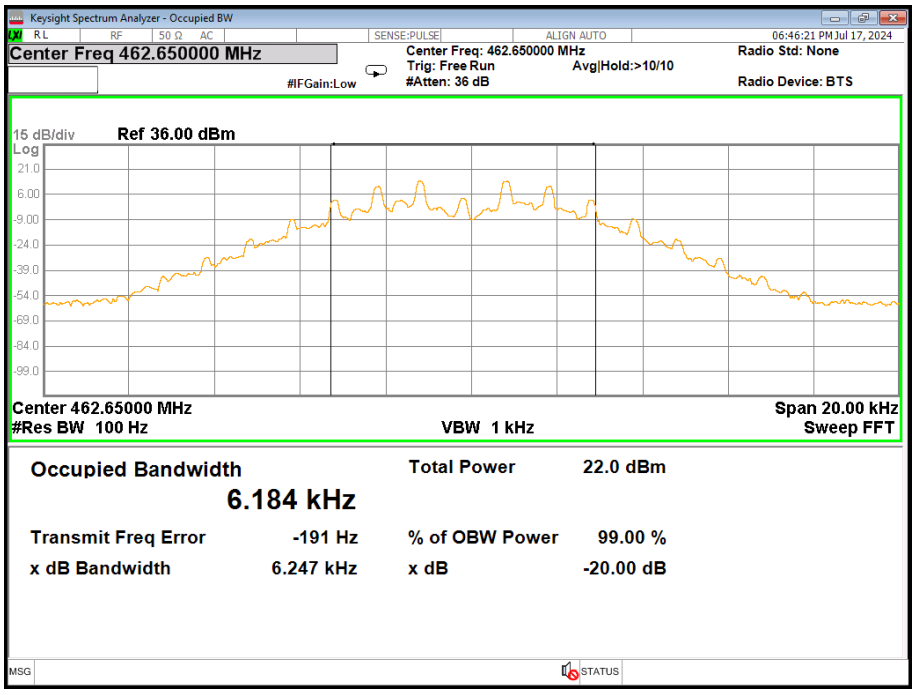
CH4



CH11


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
06:36:39 PM Jul 17, 2024
Center Freq 467.637500 MHz
Center Freq: 467.637500 MHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 36 dB
Radio Std: None
Radio Device: BTS
15 dB/div
Ref 36.00 dBm
Log
21.0
6.00
-9.00
-24.0
-39.0
-54.0
-69.0
-84.0
-99.0
Center 467.63750 MHz
#Res BW 100 Hz
VBW 1 kHz
Span 20.00 kHz
Sweep FFT
Occupied Bandwidth
6.495 kHz
Total Power 22.8 dBm
Transmit Freq Error -184 Hz
% of OBW Power 99.00 %
x dB Bandwidth 6.753 kHz
x dB -20.00 dB
MSG
STATUS

CH19


Keysight Spectrum Analyzer - Occupied BW
RL
RF
50 Ω AC
SENSE:PULSE
ALIGN AUTO
06:46:21 PM Jul 17, 2024
Center Freq 462.650000 MHz
Center Freq: 462.650000 MHz
Trig: Free Run
Avg|Hold:>10/10
#IFGain:Low
#Atten: 36 dB
Radio Std: None
Radio Device: BTS
15 dB/div
Ref 36.00 dBm
Log
21.0
6.00
-9.00
-24.0
-39.0
-54.0
-69.0
-84.0
-99.0
Center 462.65000 MHz
#Res BW 100 Hz
VBW 1 kHz
Span 20.00 kHz
Sweep FFT
Occupied Bandwidth
6.184 kHz
Total Power 22.0 dBm
Transmit Freq Error -191 Hz
% of OBW Power 99.00 %
x dB Bandwidth 6.247 kHz
x dB -20.00 dB
MSG
STATUS

6. TRANSMITTER OUTPUT POWER AND EFFECTIVE RADIATED POWER (E.R.P)

6.1 LIMIT

FRS:
FCC:
Each FRS transmitter type must be designed such that the effective radiated power (ERP) on channels 8 through 14 does not exceed 0.5 Watts and the ERP on channels 1 through 7 and 15 through 22 does not exceed 2.0 Watts.
IC:
Transmitter output power shall be measured as average carrier power during one unmodulated cycle when transmitting emission type A1D, A3E, F1D, F2D, F3E, G1D, G2D or G3E and as peak envelope power when transmitting emission type H1D, H3E, J1D, J3E, R1D or R3E.

The maximum permissible transmitted e.r.p. of the equipment under any operating conditions shall not exceed 0.5 W for channels 8-14 and 2 W for other channels.

6.2 TEST PROCEDURE

The procedure of conducted power is as follows:
Measurements shall be made to establish the radio frequency power delivered by the transmitter the standard output termination. The power output shall be monitored and recorded and no adjustment shall be made to the transmitter after the test has begun, except as noted bellow:
If the power output is adjustable, measurements shall be made for the highest and lowest power levels. The EUT connect to the Spectrum Analyzer through 30 dB attenuator.

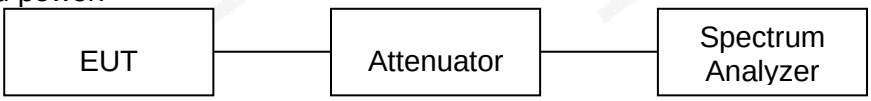
The procedure of effective radiated power is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1. 0 m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz for above 1GHz and BW=100kHz,VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of thesubstitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test. The measurement results are obtained as described below:
   Power(EIRP)=P_{Mea}- P_{Ag} - P_{cl} + G_a
   We used signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below:
   Power(EIRP)=P_{Mea}- P_{cl} +G_a

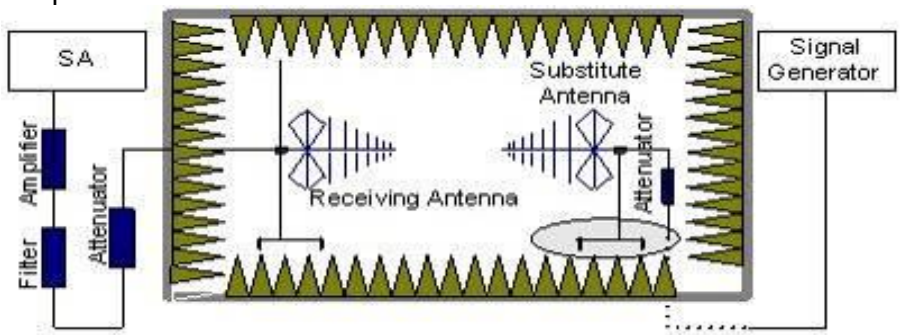
6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power
7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP=Reading - Cable loss + Antenna Gain - 2.15

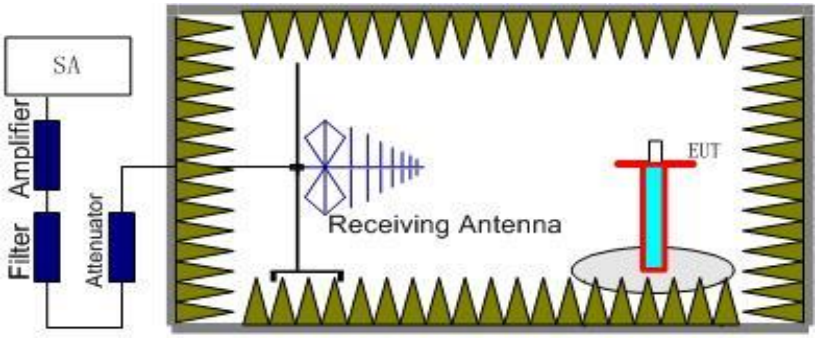
6.3 TEST SETUP

Conducted power:



Effective radiated power:





6.4 TEST RESULTS

Conducted Power:

Operation Mode	Test Channel	Test Frequency(MHz)	Test Results (dBm)	Test Results (W)	Limit (W)	Result
FRS	4	462.6375	19.34	0.09	2	Pass
	11	467.6375	19.22	0.08	0.5	Pass
	19	462.6500	19.34	0.09	2	Pass

Effective radiated power:

Operation Mode	Test Channel	Test Frequency(MHz)	Reading (dBm)	Cable Loss(dB)	Antenna Gain(dBi)	ERP (dBm)	ERP (W)	Limit (W)	Polarization	Result
FRS	4	462.6375	13.79	1.49	6.00	16.15	0.04	2	V	Pass
			13.31	1.49	6.00	15.67	0.04	2	H	Pass
	11	467.6375	13.36	1.49	6.00	15.72	0.04	0.5	V	Pass
			13.25	1.49	6.00	15.61	0.04	0.5	H	Pass
	19	462.6500	13.65	1.49	6.00	16.01	0.04	2	V	Pass
			13.56	1.49	6.00	15.92	0.04	2	H	Pass
Note:ERP=Reading - Cable loss + Antenna Gain - 2.15										

7. EMISSION MASK

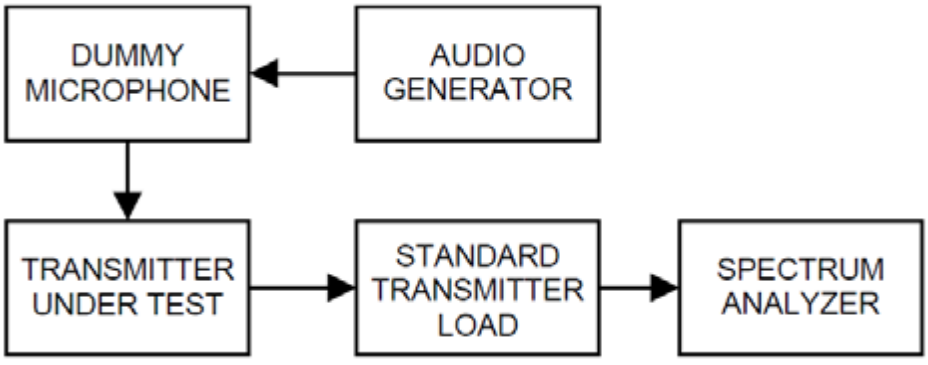
7.1 LIMIT

FRS:
FCC:
a. 25 dB, measured with a bandwidth of 300 Hz, in the band 6.25 kHz to 12.5 kHz removed from the channel centre frequency;
b. 35 dB, measured with a bandwidth of 300 Hz, in the band 12.5 kHz to 31.25 kHz removed from the channel centre frequency; and
c. 43 dB + 10 $\log_{10}$ (transmitter power in watts) dB, measured with a bandwidth of 30 kHz for frequencies beyond 31.25 kHz removed from the channel centre frequency.
IC:
a. 25 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 50%, up to and including 100% of the authorized bandwidth.
b. 35 dB, measured with a bandwidth of 300 Hz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 100%, up to and including 250% of the authorized bandwidth
c. 43 dB + 10 log10 p dB, measured with a bandwidth of at least 30 kHz, on any frequency removed from the centre frequency of the authorized bandwidth by more than 250% of the authorized bandwidth.

7.2 TEST PROCEDURE

1. The EUT was connected to the spectrum analyzer through sufficent attenuation.
2. Set EUT as digital data mode.
3. Set SPA Center Frequency=fundamental frequency, RBW=300Hz, VBW=3KHz, span =100KHz.

7.3 TEST SETUP



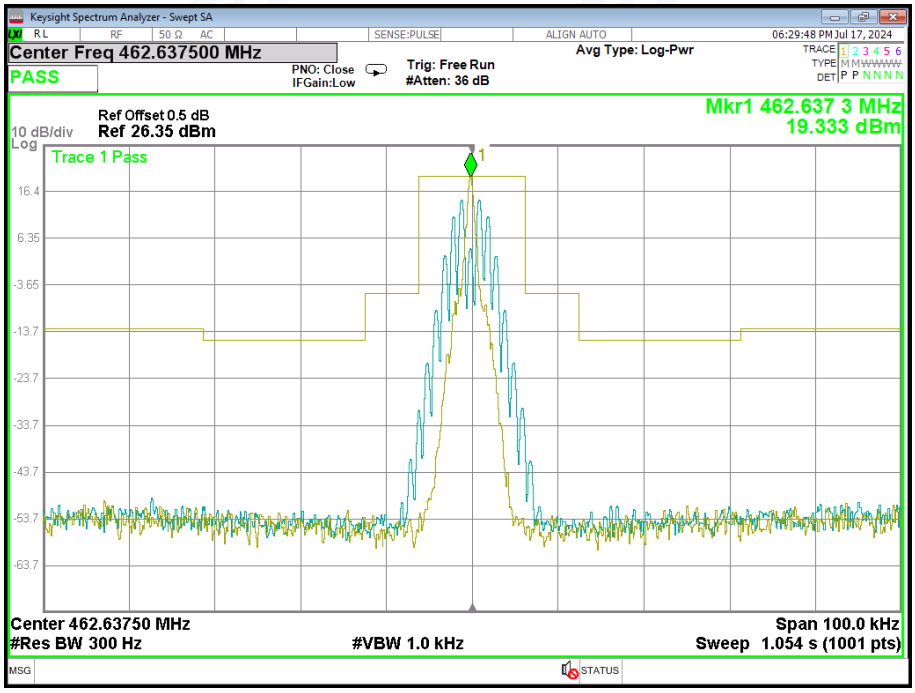
7.4 EUT OPERATION CONDITIONS

TX mode.

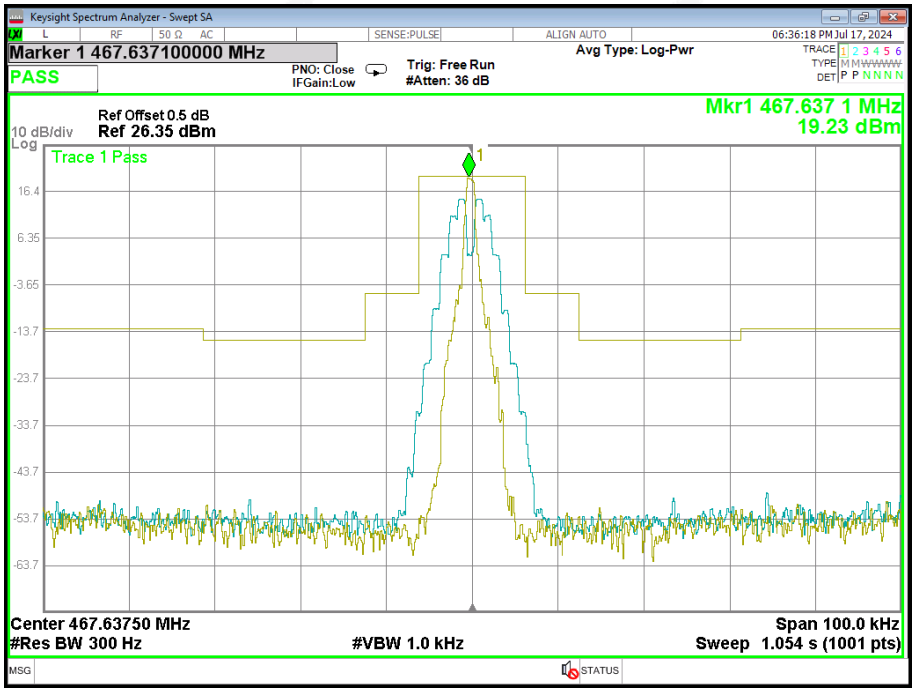
7.5 TEST RESULT

FCC:

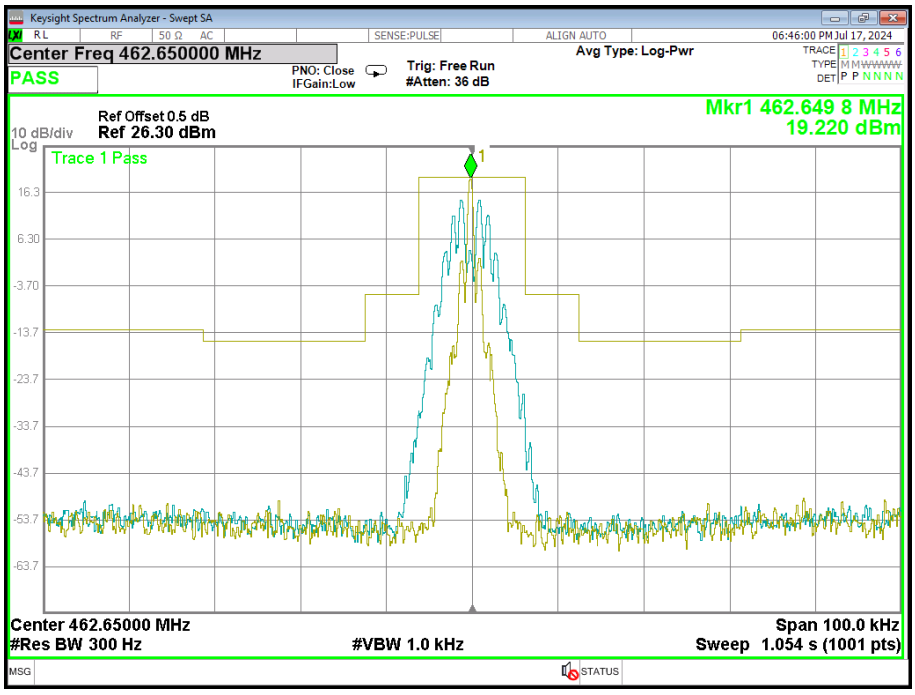
CH4-462.6375MHz



CH11-467.6375MHz



CH19-462.65MHz



8. FREQUENCY STABILITY

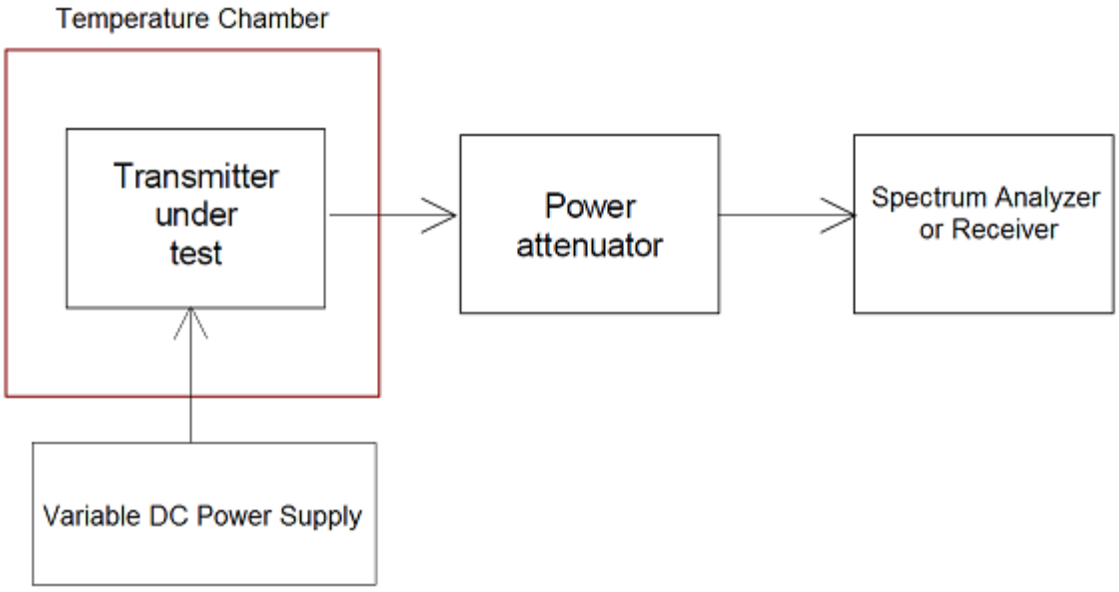
8.1 LIMIT

The carrier frequency stability shall not exceed ±2.5 ppm.

8.2 TEST PROCEDURE

1. The frequency stability shall be measured with variation of ambient temperature from -30℃ to +50℃
2. For battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point, which is specified by the manufacture.
3. Vary primary supply voltage from 4.05V to 4.95V.
4. The EUT was set in the climate chamber and connected to an external DC power supply. The RF output was directly connected to Spectrum Analyzer The coupling loss of the additional cables was recorded and taken in account for all the measurements. After temperature stabilization (approx. 20 min for each stage), the frequency for the lower, the middle and the highest frequency range was recorded. For Frequency stability Vs. Voltage the EUT was connected to a DC power supply and the voltage was adjusted in the required ranges. The result was recorded

8.3 TEST SETUP



8.4 EUT OPERATION CONDITIONS

TX mode.

8.5 TEST RESULT

FRS_Channl 4(462.6375MHz)						
Voltage	Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency error (ppm)	Limit	Result
4.5V	-30	462.6375	462.6370	-1.0808	±2.5ppm	Pass
	-20	462.6375	462.6373	-0.4323		
	-10	462.6375	462.6373	-0.4323		
	0	462.6375	462.6373	-0.4323		
	10	462.6375	462.6372	-0.6485		
	20	462.6375	462.6373	-0.4323		
	30	462.6375	462.6371	-0.8646		
	40	462.6375	462.6371	-0.8646		
	50	462.6375	462.6374	-0.2162		
4.95V	20	462.6375	462.6370	-1.0808		
4.05	20	462.6375	462.6374	-0.2162		

FRS_Channl 11(467.6375MHz)						
Voltage	Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency error (ppm)	Limit	Result
4.5V	-30	467.6375	467.6370	-1.0692	±2.5ppm	Pass
	-20	467.6375	467.6371	-0.8554		
	-10	467.6375	467.6374	-0.2138		
	0	467.6375	467.6372	-0.6415		
	10	467.6375	467.6372	-0.6415		
	20	467.6375	467.6375	0.0000		
	30	467.6375	467.6372	-0.6415		
	40	467.6375	467.6375	0.0000		
	50	467.6375	467.6374	-0.2138		
4.95V	20	467.6375	467.6372	-0.6415		
4.05	20	467.6375	467.6375	0.0000		

FRS_Channl 19(462.6500MHz)						
Voltage	Temperature (°C)	Nominal Frequency (MHz)	Measured Frequency (MHz)	Frequency error (ppm)	Limit	Result
4.5V	-30	462.6500	462.6497	-0.6484	±2.5ppm	Pass
	-20	462.6500	462.6499	-0.2161		
	-10	462.6500	462.6499	-0.2161		
	0	462.6500	462.6497	-0.6484		
	10	462.6500	462.6497	-0.6484		
	20	462.6500	462.6498	-0.4323		
	30	462.6500	462.6499	-0.2161		
	40	462.6500	462.6498	-0.4323		
	50	462.6500	462.6495	-1.0807		
4.95V	20	462.6500	462.6496	-0.8646		
4.05	20	462.6500	462.6498	-0.4323		

9. MODULATION LIMIT

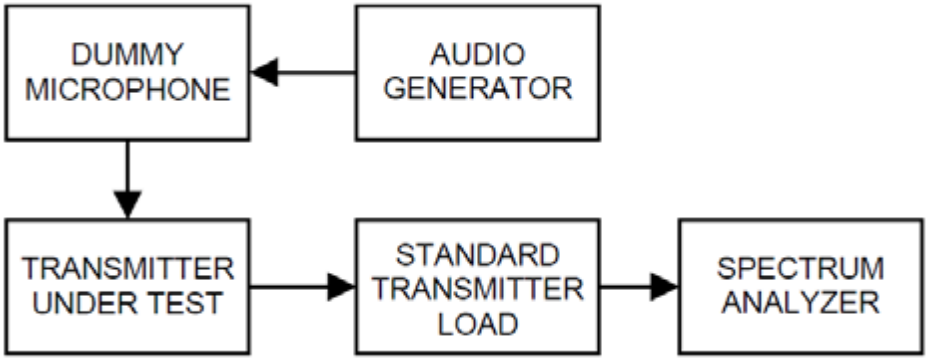
9.1 LIMIT

FRS:
FCC:
Each FRS transmitter type must be designed such that the peak frequency deviation does not exceed 2.5 kHz, and the highest audio frequency contributing substantially to modulation must not exceed 3.125 kHz.
IC:
For frequency modulation and phase modulation, the peak frequency deviation shall not exceed ±2.5 kHz for channels 8-14 and ±5 kHz for other channels.

9.2 TEST PROCEDURE

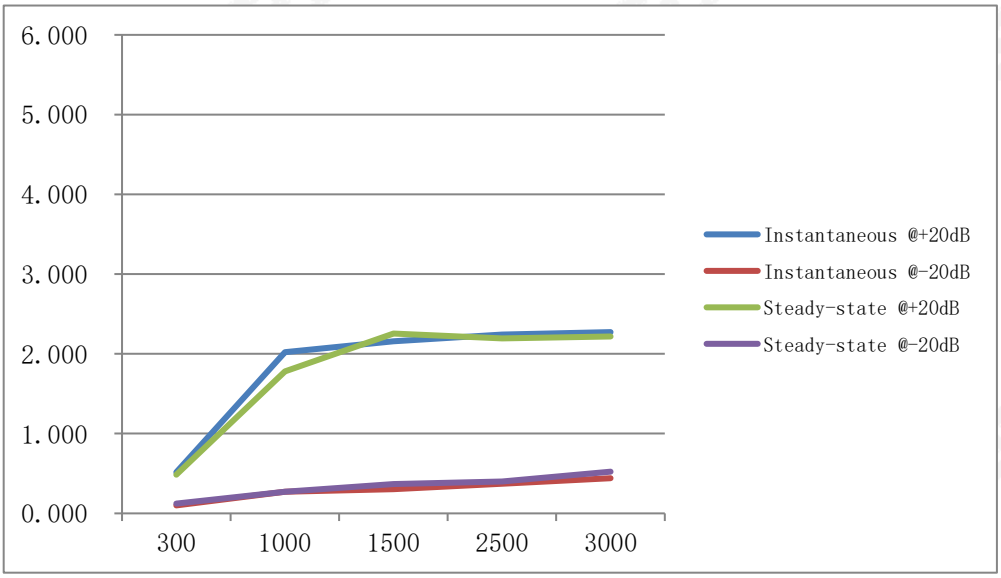
1. Connect the equipment as illustrated.
2. Adjust the transmitter per the manufacturer's procedure for full rated system deviation
3. Set the test receiver to measure peak positive deviation. Set the audio bandwidth for ≤0.25 Hz to ≥15,000 Hz. Turn the de-emphasis function off
4. Apply a 1000 Hz modulating signal to the transmitter from the audio frequency generator, and adjust the level to obtain 60% of full rated system deviation, this level is as a reference (0dB) and vary the input lev el from -20 to +20dB.
5. Measure both the instantaneous and steady-state deviation at and after the time of increasing the audio input level
6. Repeat step 4-5 with input frequency changing to 300Hz, 1004Hz, 1500Hz and 2500Hz in sequence.

9.3 TEST SETUP

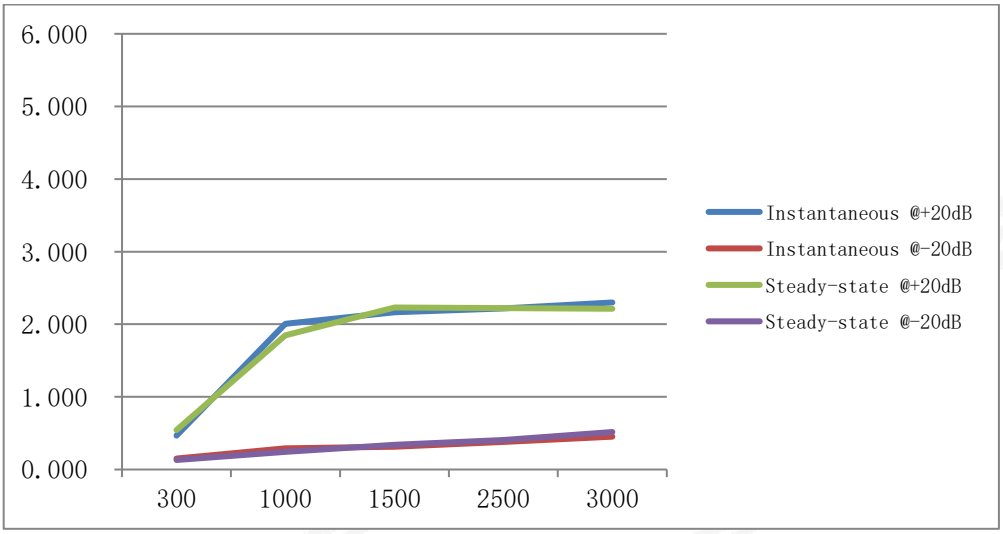


9.4 TEST RESULT

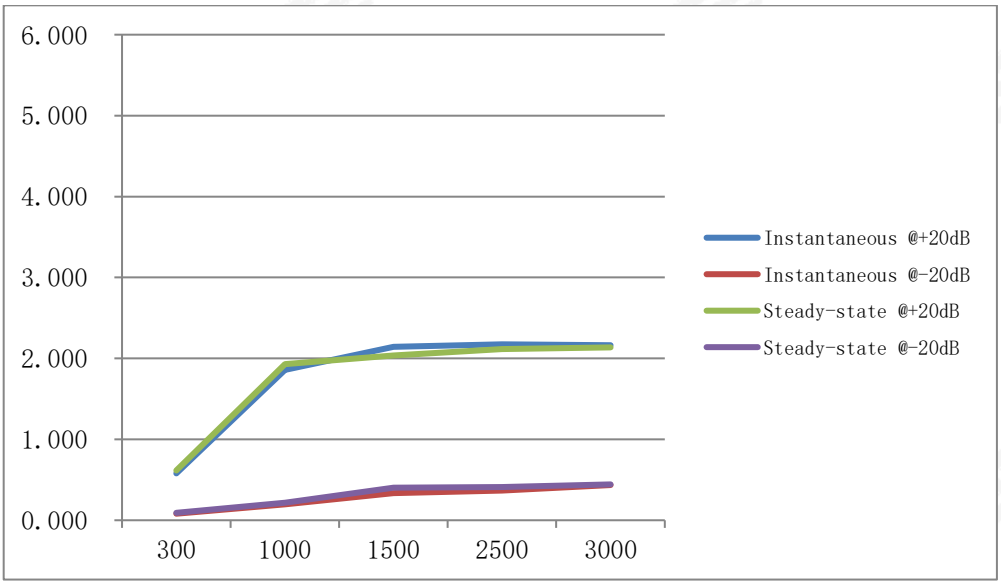
FRS_Channl 4(462.6375MHz)							
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit (kHz)	IC Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)			
300	0.516	0.100	0.485	±2.5	±2.5	±5	Pass
1000	2.021	0.272	1.781	0.271			
1500	2.160	0.303	2.255	0.368			
2500	2.242	0.373	2.195	0.399			
3000	2.273	0.441	2.218	0.523			



FRS_Channl 11(467.6375MHz)							
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit (kHz)	IC Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)			
300	0.467	0.151	0.543	0.131	±2.5	±2.5	Pass
1000	2.005	0.292	1.846	0.245			
1500	2.167	0.315	2.231	0.341			
2500	2.220	0.379	2.224	0.408			
3000	2.300	0.452	2.214	0.516			



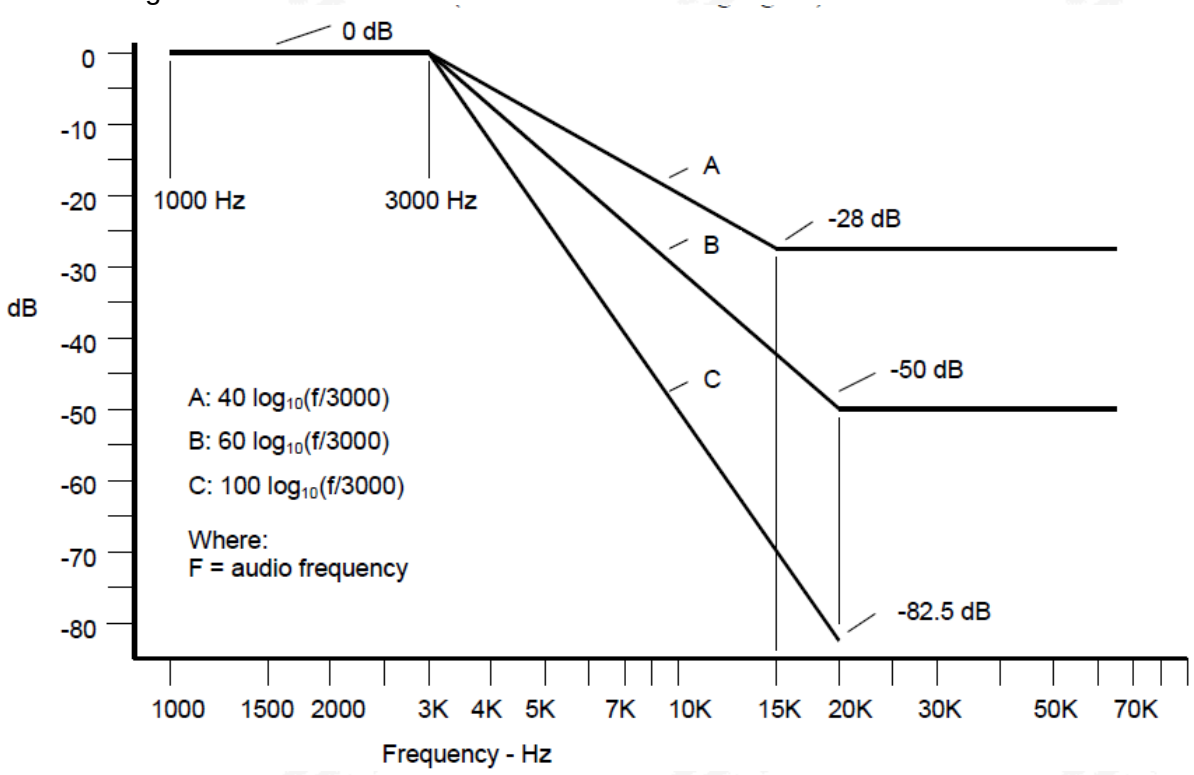
FRS_Channl 19(462.6500MHz)							
Audio Frequency (Hz)	Instantaneous		Steady-state		FCC Limit (kHz)	IC Limit (kHz)	Result
	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)	Deviation (@+20dB) (kHz)	Deviation (@-20dB) (kHz)			
300	0.579	0.081	0.615	0.092	±2.5	±5	Pass
1000	1.860	0.198	1.931	0.218			
1500	2.141	0.337	2.038	0.403			
2500	2.174	0.368	2.117	0.410			
3000	2.164	0.435	2.136	0.443			



10. AUDIO LOW PASS FILTER RESPONSE

10.1 LIMIT

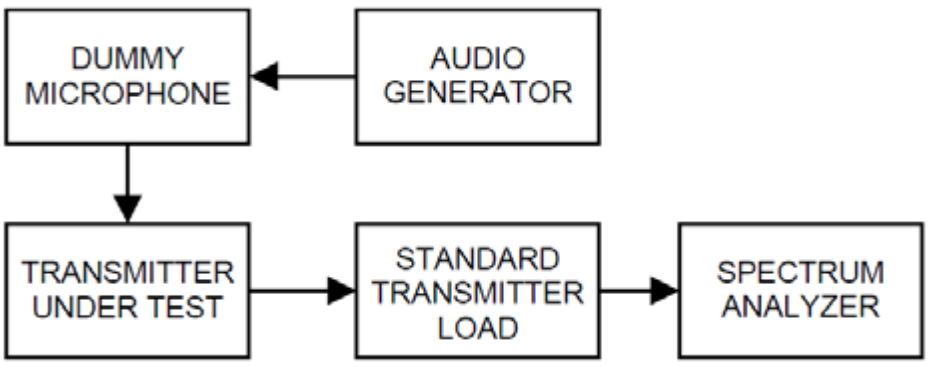
The filter must be between the modulation limiter and the modulated stage of the transmitter. At any frequency (f in kHz) between 3 and 20 kHz, the filter must have an attenuation of at least 60 log10 (f/3) dB greater than the attenuation at 1 kHz. Above 20 kHz, it must have an attenuation of at least 50 dB greater than the attenuation at 1 kHz



10.2 TEST PROCEDURE

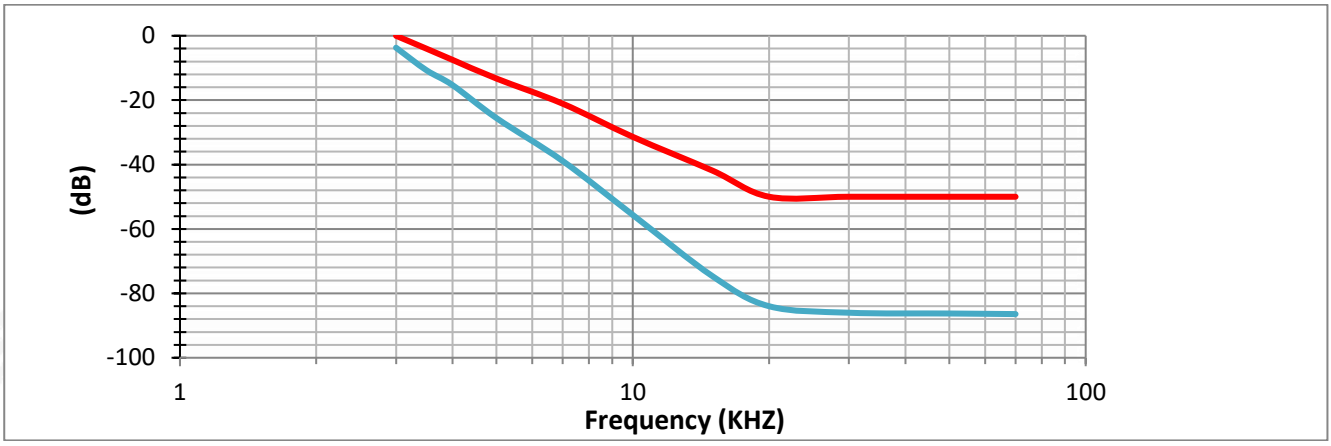
1. Configure the EUT as shown in figure
2. Apply a 1000 Hz tone from the audio signal generator and adjust the level per manufacturer's specifications. Record the dB level of the 1000 Hz tone as LEV_{REF}.
3. Set the audio signal generator to the desired test frequency between 3000 Hz and the upper low pass filter limit. Record the dB level at the test frequency as LEV_{FREQ}
4. Calculate the audio frequency response at the test frequency as:
low pass filter response = LEV_{FREQ} - LEV_{REF}

10.3 TEST SETUP

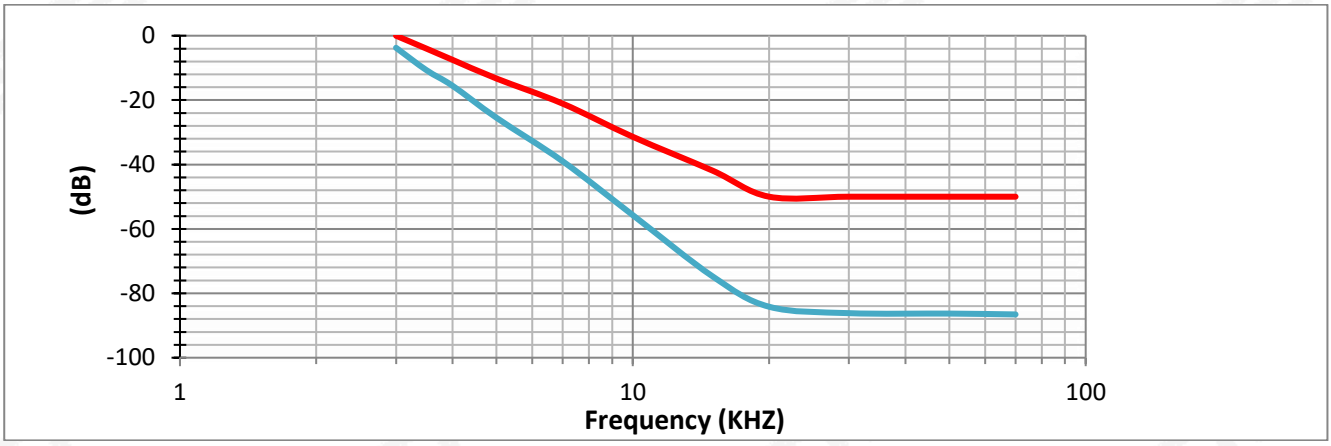


10.4 TEST RESULT

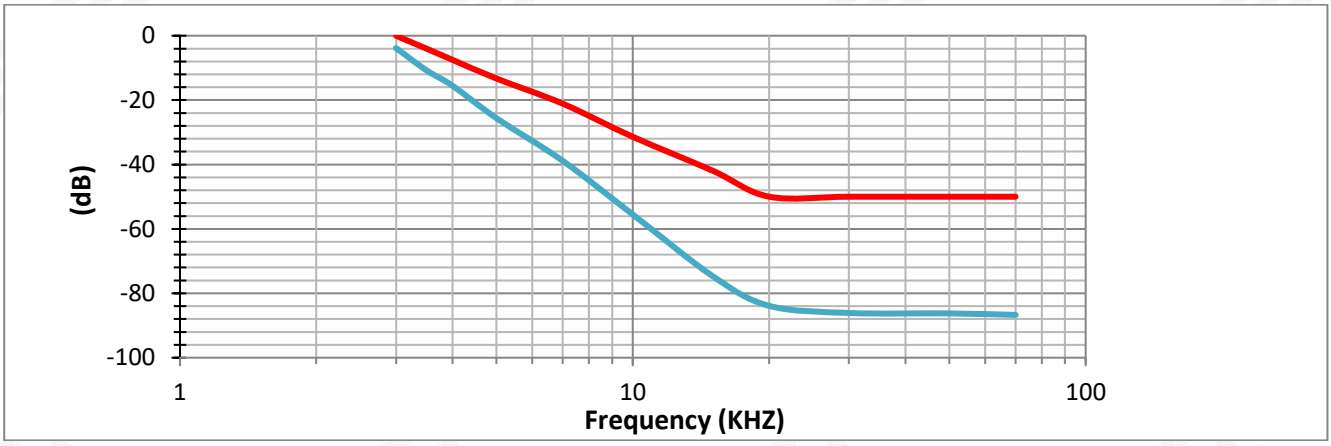
FRS_Channl 4(462.6375MHz)			
Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-3.71	PASS
3.5	-4	-10.69	
4	-7.5	-15.34	
5	-13.3	-25.58	
7	-21.1	-38.90	
10	-31.4	-55.65	
15	-41.9	-74.69	
20	-50	-84.00	
30	-50	-86.01	
50	-50	-86.25	
70	-50	-86.44	



FRS_Channl 11(467.6375MHz)			
Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-3.75	PASS
3.5	-4	-10.68	
4	-7.5	-15.56	
5	-13.3	-25.49	
7	-21.1	-39.00	
10	-31.4	-55.72	
15	-41.9	-74.74	
20	-50	-84.17	
30	-50	-86.16	
50	-50	-86.29	
70	-50	-86.56	



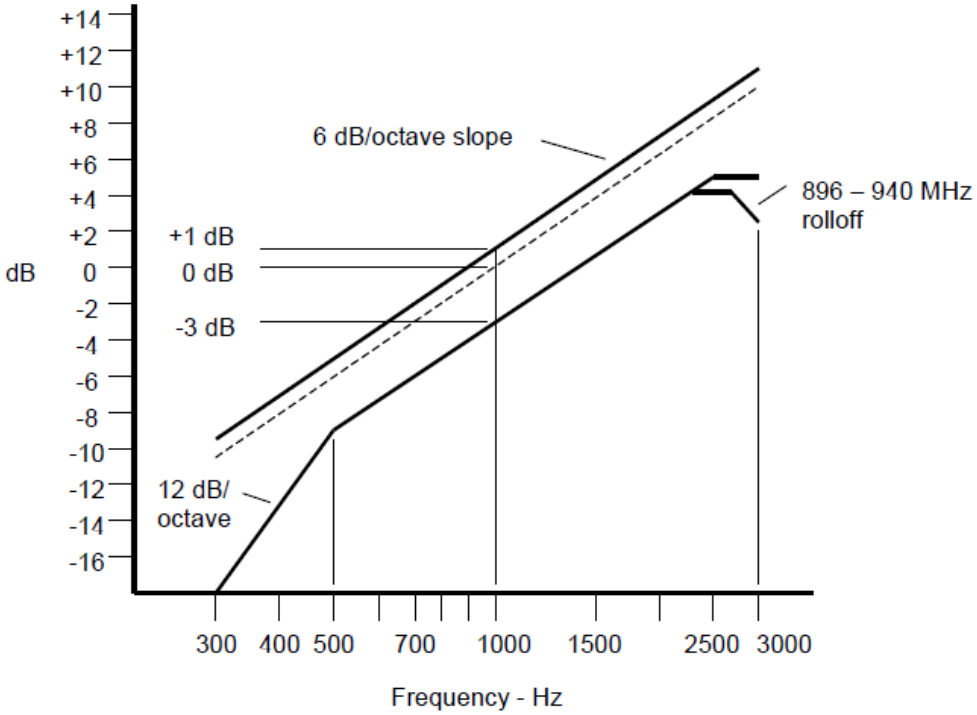
FRS_Channl 19(462.6500MHz)			
Audio Frequency(KHz)	Limit	Response Attenuation(dB)	Result
3	0	-3.83	PASS
3.5	-4	-10.73	
4	-7.5	-15.56	
5	-13.3	-25.62	
7	-21.1	-38.85	
10	-31.4	-55.54	
15	-41.9	-74.65	
20	-50	-83.89	
30	-50	-86.10	
50	-50	-86.24	
70	-50	-86.71	



11. AUDIO FREQUENCY RESPONSE

11.1 LIMIT

FCC Part 2.1047(a):
Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

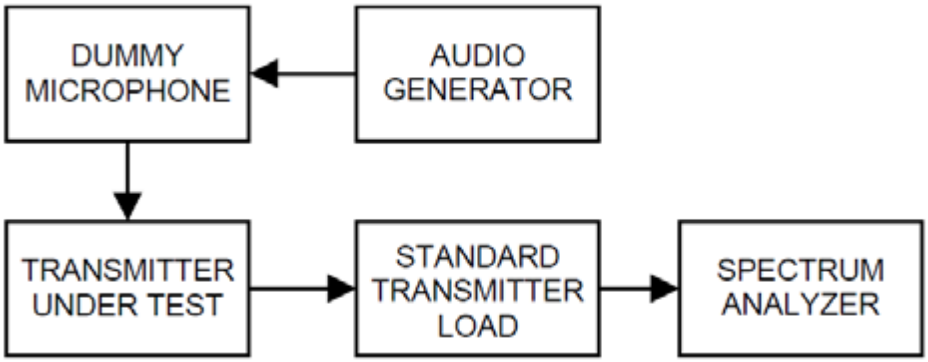


An additional 6 dB per octave attenuation is allowed from 2500 Hz to 3000 Hz in equipment operating in the 25 MHz to 869 MHz range

11.2 TEST PROCEDURE

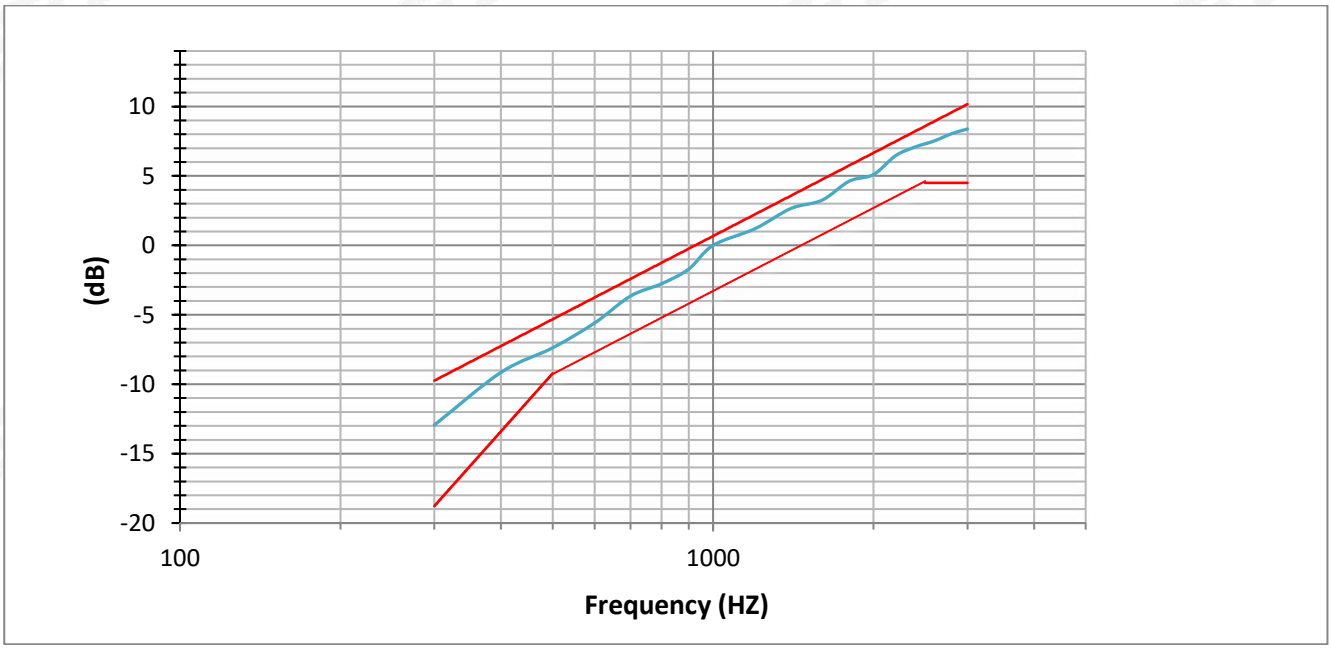
1. Configure the EUT as shown in figure
2. Adjust the audio input for 20% of rated system deviation at 1kHz using this level as a reference.
3. Vary the Audio frequency from 300Hz to 3 kHz and record the frequency deviation.
4. Audio Frequency Response =20log10 (VFREQ/VREF).

11.3 TEST SETUP

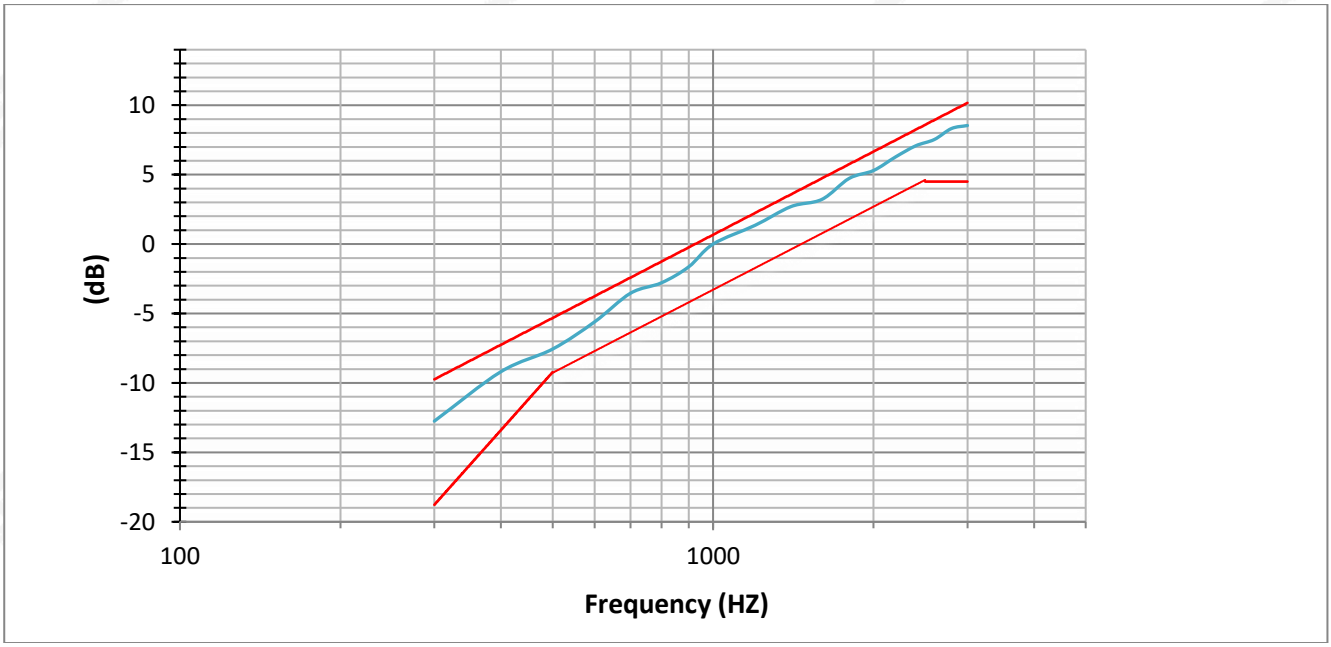


11.4 TEST RESULT

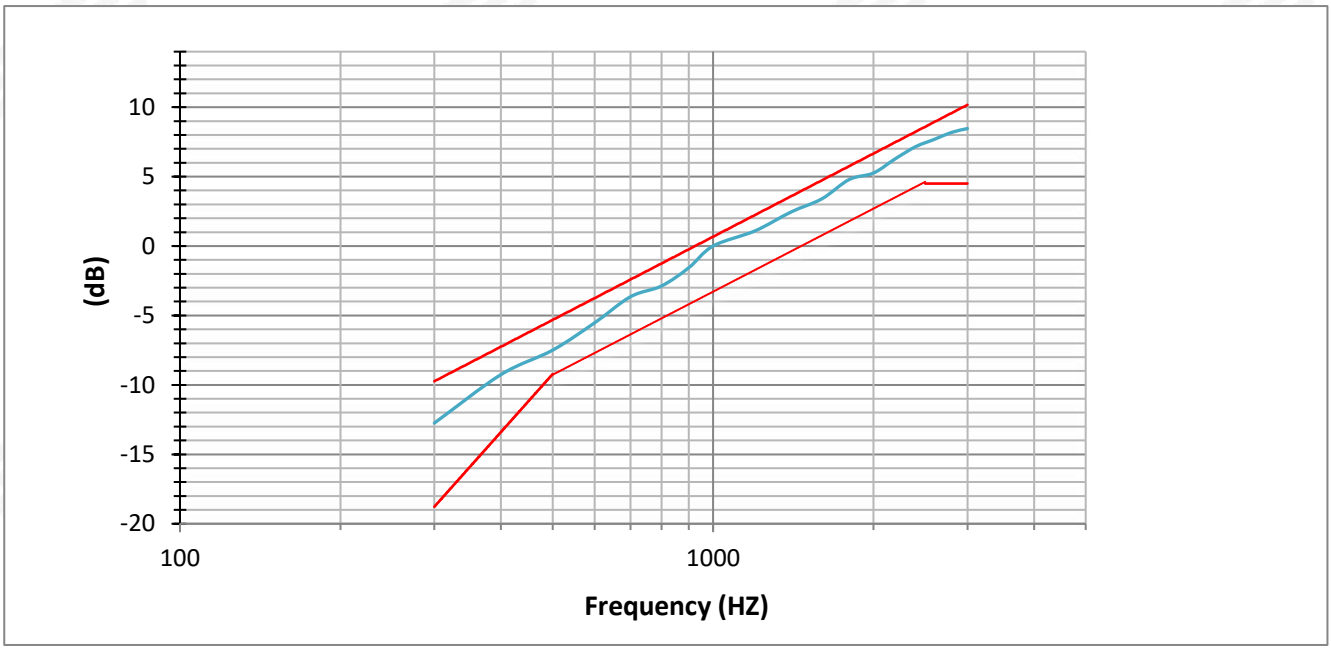
FRS_Channl 4(462.6375MHz)		
Audio Frequency(Hz)	Audio Frequency Response(dB)	Result
300	-13.03	PASS
400	-9.22	
500	-7.66	
600	-5.61	
700	-3.57	
800	-2.90	
900	-1.65	
1000	0.00	
1200	1.23	
1400	2.57	
1600	3.43	
1800	4.75	
2000	5.27	
2200	6.38	
2400	7.15	
2600	7.42	
2800	8.16	
3000	8.36	



FRS_Channl 11(467.6375MHz)		
Audio Frequency(Hz)	Audio Frequency Response(dB)	Result
300	-12.75	PASS
400	-9.19	
500	-7.56	
600	-5.59	
700	-3.54	
800	-2.79	
900	-1.64	
1000	0.00	
1200	1.36	
1400	2.70	
1600	3.22	
1800	4.73	
2000	5.30	
2200	6.28	
2400	7.08	
2600	7.53	
2800	8.32	
3000	8.54	



FRS_Channl 19(462.6500MHz)		
Audio Frequency(Hz)	Audio Frequency Response(dB)	Result
300	-12.75	PASS
400	-9.26	
500	-7.50	
600	-5.52	
700	-3.65	
800	-2.88	
900	-1.57	
1000	0.00	
1200	1.10	
1400	2.45	
1600	3.40	
1800	4.79	
2000	5.26	
2200	6.30	
2400	7.16	
2600	7.68	
2800	8.18	
3000	8.46	



APPENDIX 1- PHOTOS OF TEST SETUP

Note: See test photos in setup photo document for the actual connections between Product and support equipment.

※※※※※END OF THE REPORT※※※※※