

Project No: TM-2403000503P  
Report No.: TMWK2403000949KR

FCC ID: 2AEFTAW111T

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# RADIO TEST REPORT

## FCC 47 CFR PART 15 SUBPART E

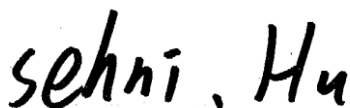
Test Standard	FCC Part 15.407
Brand name	AVerMedia
Applicant	AVerMedia Technologies, Inc.
Product name	Wireless Expansion Microphone
Model No.	AW111, AW111T, AW111uvwxyz (The "u"~"z" in the models could be defined as A~Z, 0~9, -, + or blank)
Test Result	Pass
Statements of Conformity	Determination of compliance is based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

The test Result was tested by Compliance Certification Services Inc. The test data, data evaluation, test procedures, and equipment configurations shown in this report were given in ANSI C63.10: 2013 and compliance standards.

The test results of this report relate only to the tested sample (EUT) identified in this report.

The test Report of full or partial shall not copy. Without written approval of Compliance Certification Services Inc.(Wugu Laboratory)

Approved by:



---

Sehni Hu  
Supervisor

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.  
除非另有說明，此報告結果僅對測試之樣品負責，同時此樣品僅保留90天。本報告未經本公司書面許可，不可部份複製。

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## Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	June 6, 2024	Initial Issue	ALL	Peggy Tsai
01	June 13, 2024	See the following Note Rev.(01)	P.4, 8, 10, 29, 32-45, A-1,A-3-A-5	Peggy Tsai
02	June 26, 2024	See the following Note Rev.(02)	P.4, 5, 10,11, 15, 20, 21, 23, 26,31-44	Peggy Tsai

**Note:**

**Rev.(01)**

1. Modify power supply in section 1.1.
2. Modify instrument calibration in section 1.6.
3. Modify test set up diagram in section 1.8.
4. Modify test procedure in section 4.5.2.
5. Modify operation band in section 4.5.4.
6. Modify test photo in appendix 1.

**Rev.(02)**

1. Modify HW Version to AW111.
2. Modify modulation type to FSK.
3. Modify support and EUT accessories equipment in section 1.7.
4. Modify test set up diagram in section 1.8.



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## 1. GENERAL INFORMATION

### 1.1 EUT INFORMATION

<b>Applicant</b>	AVerMedia Technologies, Inc. No.135, Jian 1st Rd., Zhonghe Dist., New Taipei City 23585, Taiwan
<b>Manufacturer</b>	AVerMedia Technologies, Inc. No.135, Jian 1st Rd., Zhonghe Dist., New Taipei City 23585, Taiwan
<b>Equipment</b>	Wireless Expansion Microphone
<b>Model Name</b>	AW111, AW111T, AW111uvwxyz (The “u”~”z” in the models could be defined as A~Z, 0~9, -, + or blank)
<b>Model Discrepancy</b>	All the above models are identical except for the designation of model numbers. The “u”~”z” in the models could be defined as A~Z, 0~9, -, + or blank on model number is just for marketing purpose only.
<b>Brand Name</b>	AVerMedia
<b>Received Date</b>	April 3, 2024
<b>Date of Test</b>	May 6 ~17, 2024
<b>Power Supply</b>	1. Power by Host System (DC 5V) 2. Power by Battery (DC 3.7V, 2800mAh) CYBER-POWER / SDL-753650-2P
<b>HW Version</b>	AW111
<b>FW Version</b>	1.2.2.19

**Remark:**

1. For more details, please refer to the User’s manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. Disclaimer: Variant information between/among model numbers / trademarks are provided by the applicant, test results of this report are applicable to the sample EUT received of main test model name.)



## 1.2 EUT CHANNEL INFORMATION

Frequency Range	5732~5848 MHz							
Modulation Type	FSK							
Channel List	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	1	5732	17	5763	33	5795	49	5827
	2	5733	18	5765	34	5797	50	5829
	3	5735	19	5767	35	5799	51	5831
	4	5737	20	5769	36	5801	52	5833
	5	5739	21	5771	37	5803	53	5835
	6	5741	22	5773	38	5805	54	5837
	7	5743	23	5775	39	5807	55	5839
	8	5745	24	5777	40	5809	56	5841
	9	5747	25	5780	41	5811	57	5843
	10	5749	26	5781	42	5813	58	5845
	11	5751	27	5783	43	5815	59	5847
	12	5753	28	5785	44	5817	60	5848
	13	5755	29	5787	45	5819		
	14	5757	30	5789	46	5821		
	15	5759	31	5791	47	5823		
	16	5761	32	5793	48	5825		

**Remark:**

Refer as ANSI C63.10: 2013 clause 5.6.1 Table 4 for test channels

Number of frequencies to be tested		
Frequency range in which device operates	Number of frequencies	Location in frequency range of operation
<input type="checkbox"/> 1 MHz or less	1	Middle
<input type="checkbox"/> 1 MHz to 10 MHz	2	1 near top and 1 near bottom
<input checked="" type="checkbox"/> More than 10 MHz	3	1 near top, 1 near middle, and 1 near bottom

### 1.3 ANTENNA INFORMATION

Antenna Type	<input type="checkbox"/> PIFA <input checked="" type="checkbox"/> PCB <input type="checkbox"/> Dipole <input type="checkbox"/> Coils
Antenna Specification	Everestek / ETK52 Gain: 3.49 dBi
Antenna connector	N/A

**Notes:**

1. Antenna must use a unique type of connector to attach to the EUT. So the EUT complies with the requirements of §15.203.
2. Power Directional Gain =  $10 \cdot \log \{ [ 10^{(\text{Ant1}/20)} + 10^{(\text{Ant2}/20)} + \dots + 10^{(\text{Ant N}/20)} ]^2 / N \text{ ANT} \}$  dBi

### 1.4 MEASUREMENT UNCERTAINTY

PARAMETER	UNCERTAINTY
AC Powerline Conducted Emission	± 2.213 dB
Channel Bandwidth	± 2.7 %
RF output power (Spectrum)	± 2.440 dB
Power Spectral density	± 2.739 dB
Radiated Emission_9kHz-30MHz	± 3.115 dB
Radiated Emission_30MHz-200MHz	± 4.071 dB
Radiated Emission_200MHz-1GHz	± 4.419 dB
Radiated Emission_1GHz-6GHz	± 5.023 dB
Radiated Emission_6GHz-18GHz	± 5.068 dB
Radiated Emission_18GHz-26GHz	± 3.349 dB
Radiated Emission_26GHz-40GHz	± 3.229 dB

**Remark:**

1. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2
2. ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report.



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## 1.5 FACILITIES AND TEST LOCATION

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

CAB identifier: TW1309

Test site	Test Engineer	Remark
AC Conduction Room	Tony Chao	-
Radiation	Ray Li	-
RF Conducted	Marco Chan	-

**Remark:** The lab has been recognized as the FCC accredited lab. under the KDB 974614 D01 and is listed in the FCC public Access Link (PAL) database, FCC Registration No. :444940, the FCC Designation No.:TW1309



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## 1.6 INSTRUMENT CALIBRATION

Conducted_FCC/IC/NCC (All)					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Power Sensor	Anritsu	MA2411B	1911387	2023-07-25	2024-07-24
Power Meter	Anritsu	ML2496A	2136002	2023-11-16	2024-11-15
Signal Analyzer	KEYSIGHT	N9030B	MY62291089	2023-10-13	2024-10-12
Attenuator	Marvelous Microwave Inc	MVE2213-10	08	2023-11-07	2024-11-06
Software	Radio Test Software Ver. 21				

966A_Radiated					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
Signal Analyzer	KEYSIGHT	N9010A	MY54200716	2023-10-13	2024-10-12
Thermo-Hygro Meter	WISEWIND	1206	D07	2023-12-08	2024-12-07
Bi-Log Antenna	Sunol Sciences	JB3	A030105	2023-08-08	2024-08-07
Active Loop Antenna	SCHWARZBECK	FMZB 1513-60	1513-60-028	2023-12-13	2024-12-12
Preamplifier	EMEC	EM330	060609	2024-02-21	2025-02-20
Cable	Huber+Suhner	104PEA	20995+21000+182330	2024-02-21	2025-02-20
Horn Antenna	ETC	MCTD 1209	DRH13M02003	2023-12-28	2024-12-27
Preamplifier	HP	8449B	3008A00965	2023-12-22	2024-12-21
Cable	EMCI	EMC101G	221213+221011+221012	2023-10-17	2024-10-16
Attenuator	Mini-Circuits	BW-S9W5	BWS9W5-09-966A-01	2024-02-07	2025-02-06
Horn Antenna	SCHWARZBECK	BBHA9170	1047	2023-12-13	2024-12-12
Pre-Amplifier	EMCI	EMC184045SE	980860	2023-12-12	2024-12-11
Turn Table	CCS	CC-T-1F	N/A	N.C.R	N.C.R
Controller	CCS	CC-C-1F	N/A	N.C.R	N.C.R
Antenna Tower	CCS	CC-A-1F	N/A	N.C.R	N.C.R
Site Validation	CCS	966A	N/A	2023-07-10	2024-07-09
Software	e3 V9-210616c				

### Remark:

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.





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AC Mains Conduction					
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due
EMI Test Receiver	R&S	ESCI	100064	2023-06-07	2024-06-06
LISN	TESEQ	LN2-16N	22012	2024-02-29	2025-02-27
Cable	EMCI	CFD300-NL	CERF	2023-06-27	2024-06-26
Software	e3 V6-110812				

**Remark:**

1. Each piece of equipment is scheduled for calibration once a year.
2. N.C.R. = No Calibration Required.



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## 1.7 SUPPORT AND EUT ACCESSORIES EQUIPMENT

EUT Accessories Equipment					
No.	Equipment	Brand	Model	Series No.	FCC ID
	N/A				

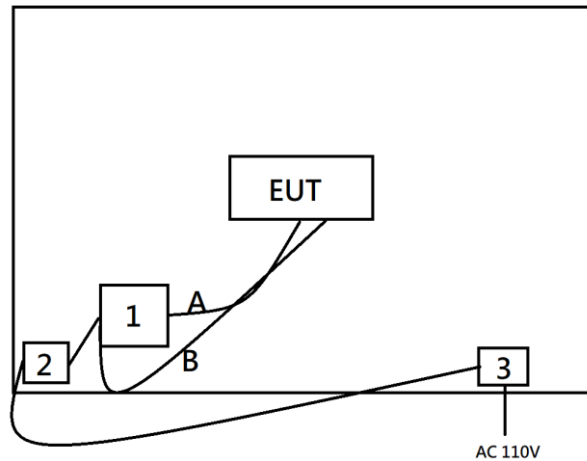
Support Equipment (Conducted)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(B)	Lenovo	T470	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
A	Test Kit	Dark Voice	EVK_MA_I2C_Programming_Board_V1.0	N/A	N/A
B	TypeC to USB	GREATLAND	064AUSB00BX5	N/A	N/A

Support Equipment (Conduction)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
A	Test Kit	Dark Voice	EVK_MA_I2C_Programming_Board_V1.0	N/A	N/A
B	TypeC to USB	GREATLAND	064AUSB00BX5	N/A	N/A

Support Equipment (RSE)					
No.	Equipment	Brand	Model	Series No.	FCC ID
1	NB(D)	Lenovo	ThinkPad X260	N/A	N/A
2	Adapter	Lenovo	ADLX45DLC3A	N/A	N/A
3	Power Box	N/A	N/A	N/A	N/A
A	Test Kit	Dark Voice	EVK_MA_I2C_Programming_Board_V1.0	N/A	N/A
B	TypeC to USB	GREATLAND	064AUSB00BX5	N/A	N/A

## 1.8 TEST SET UP DIAGRAM

RSE:



## 1.9 TEST PROGRAM

The EUT connection corresponds to the surrounding fixture control board.  
This EUT uses "EMI\_Tool\_V27\_EverestekInc\_v.2023\_0203" software to set the frequency, modulation, and power to allow the sample to continuously transmit.

## 1.10 TEST METHODOLOGY AND APPLIED STANDARDS

The test methodology, setups and results comply with all requirements in accordance with ANSI C63.10:2013, FCC Part 2, FCC Part 15.407, KDB 662911 D01 v02r01, KDB 789033 D02 v02r01, KDB 905462 D02 v02.



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## 2. TEST SUMMERY

FCC Standard Sec.	Chapter	Test Item	Result
15.203	1.3	Antenna Requirement	Pass
15.207	4.1	AC Conducted Emission	Pass
15.407(e)	4.2	6dB Bandwidth	Pass
2.1049	4.2	Occupied Bandwidth (99%)	Pass
15.407(a)	4.3	Output Power Measurement	Pass
15.407(a)	4.4	Power Spectral Density	Pass
15.407(b) 15.205	4.5	Radiation Band Edge	Pass
15.407(b) 15.209 15.205	4.5	Radiation Spurious Emission	Pass



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### 3. DESCRIPTION OF TEST MODES

#### 3.1 THE WORST MODE OF OPERATING CONDITION

Operation mode	2Mbps
Operating Frequency Range & Number of Channels	Frequency Range (MHz): 5732~5848 Number of Channels: 60 Channels

**Remark:**

1. EUT pre-scanned data rate of output power for each mode, the worst data rate were recorded in this report.

### 3.2 THE WORST MODE OF MEASUREMENT

AC Power Line Conducted Emission	
Test Condition	AC Power line conducted emission for line and neutral
Power supply Mode	Mode 1: EUT Power by Host System
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

Radiated Emission Measurement Above 1G	
Test Condition	Radiated Emission Above 1G
Power supply Mode	Mode 1: EUT power by Host System
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4
Worst Position	<input type="checkbox"/> Placed in fixed position. <input checked="" type="checkbox"/> Placed in fixed position at X-Plane (E2-Plane) <input type="checkbox"/> Placed in fixed position at Y-Plane (E1-Plane) <input type="checkbox"/> Placed in fixed position at Z-Plane (H-Plane)

Radiated Emission Measurement Below 1G	
Test Condition	Radiated Emission Below 1G
Power supply Mode	Mode 1: EUT power by Host System
Worst Mode	<input checked="" type="checkbox"/> Mode 1 <input type="checkbox"/> Mode 2 <input type="checkbox"/> Mode 3 <input type="checkbox"/> Mode 4

#### Remark:

1. The worst mode was record in this test report.
2. AC power line conducted emission were performed the EUT transmit at the highest output power channel as worse case.
3. EUT pre-scanned in three axis ,X,Y, Z and two polarity, for radiated measurement. The worst case(X-Plane) were recorded in this report



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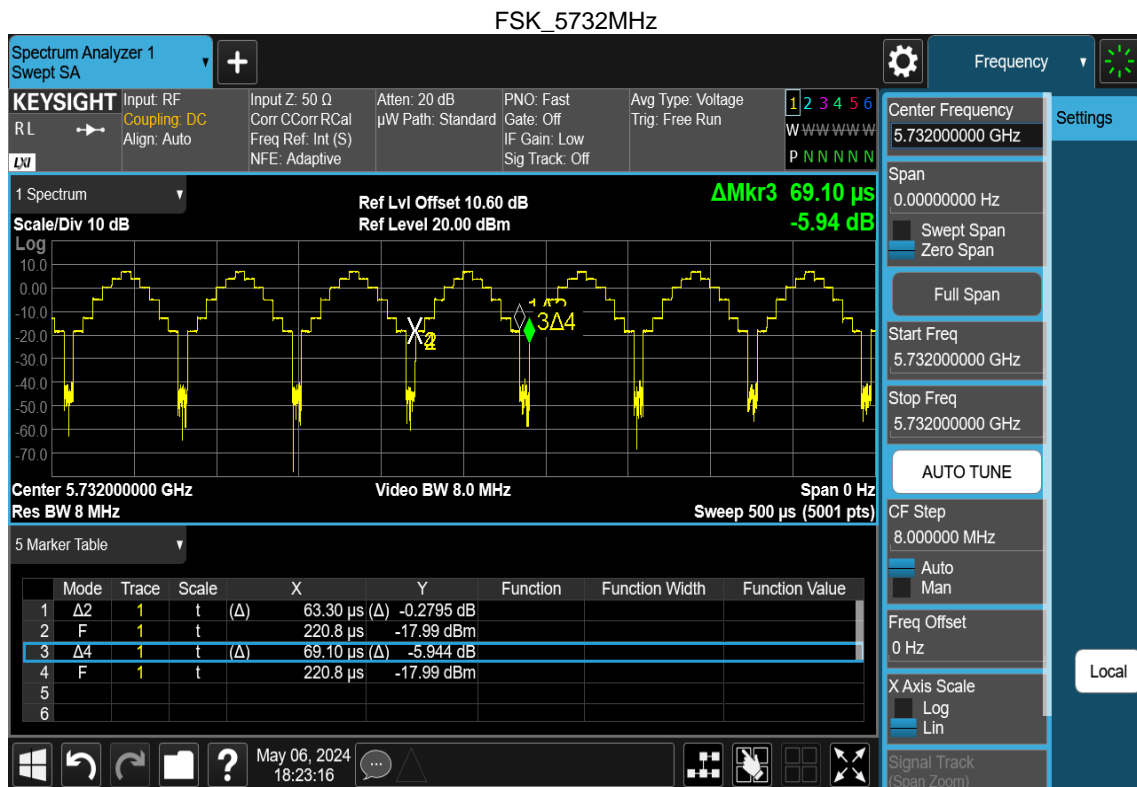
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### 3.3 EUT DUTY CYCLE

Temperature: 20.5 ~ 24.9°C  
Humidity: 52 ~ 59% RH

Test date: May 6 ~17, 2024  
Tested by: Marco Chan

Mode	Duty Cycle (%) =Ton / (Ton+Toff)	Duty Factor (dB) =10*log ( 1/Duty Cycle )	1/T (kHz)	VBW setting (kHz)
FSK	91.61	0.38	15.80	16.00



## 4. TEST RESULT

### 4.1 AC POWER LINE CONDUCTED EMISSION

#### 4.1.1 Test Limit

According to §15.207(a),

Frequency Range (MHz)	Limits(dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

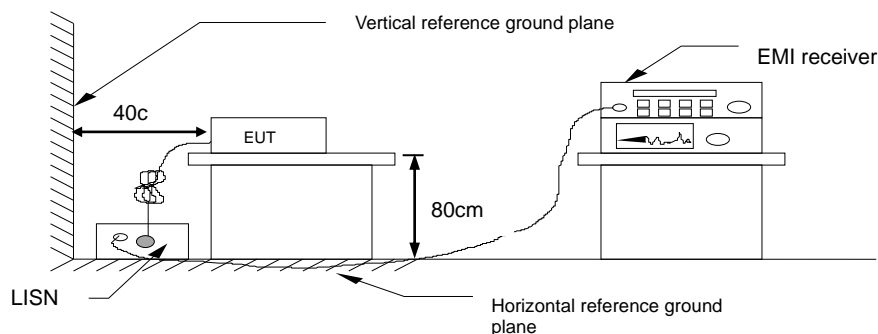
\* Decreases with the logarithm of the frequency.

#### 4.1.2 Test Procedure

Test method Refer as ANSI C63.10: 2013 clause 6.2,

1. The EUT was placed on a non-conducted table, which is 0.8m above horizontal ground plane and 0.4m above vertical ground plane.
2. EUT connected to the line impedance stabilization network (LISN)
3. Receiver set RBW of 9kHz and Detector Peak, and note as quasi-peak and average.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. Recorded Line for Neutral and Line.

#### 4.1.3 Test Setup



#### 4.1.4 Test Result

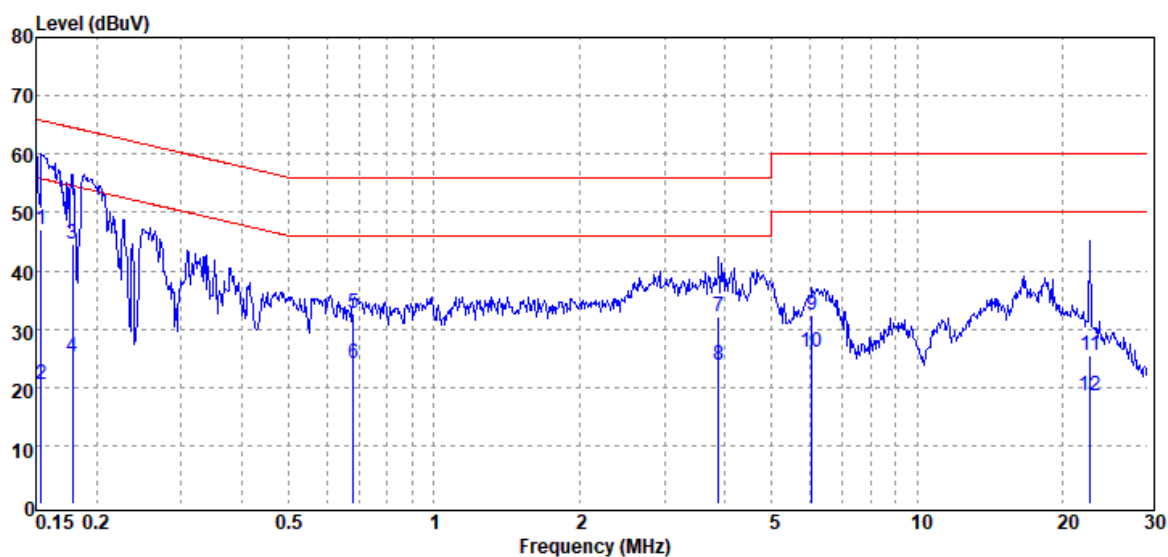
Pass.



## Test Data

Project No : TM-2403000503P  
Operation Mode : TX  
Test Chamber : Conduction  
Probe : LINE  
Note :

Test Date : 2024-05-14  
Temp./Humi. : 24.3°C / 54%  
Engineer : Tony Chao  
Test Voltage : AC 120V/60Hz



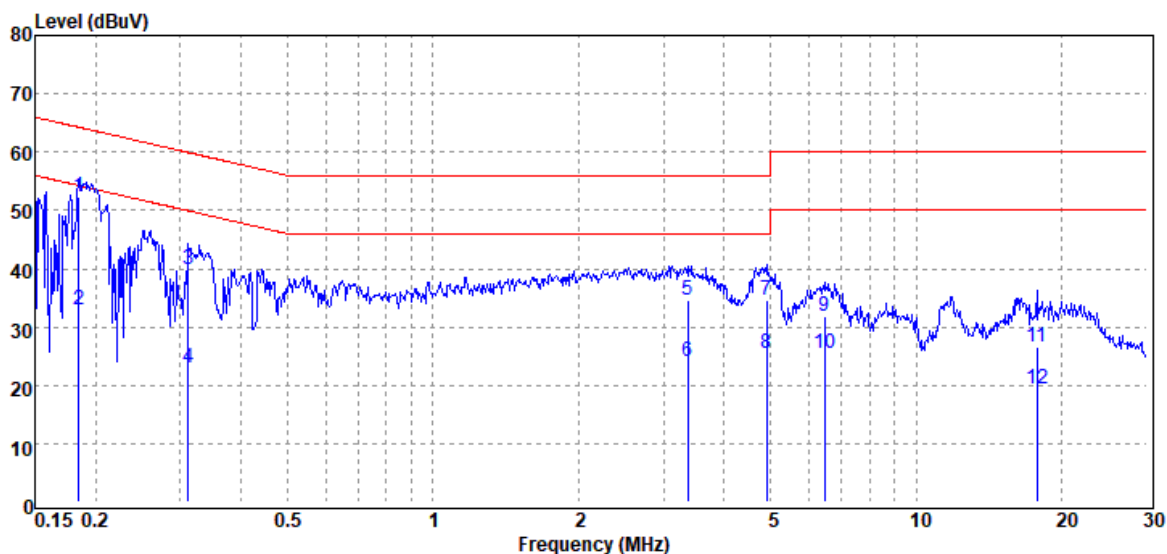
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.154	QP	46.81	0.15	46.96	65.79	-18.83
0.154	Average	20.47	0.15	20.62	55.79	-35.17
0.179	QP	44.32	0.15	44.47	64.54	-20.07
0.179	Average	25.15	0.15	25.30	54.54	-29.24
0.682	QP	32.64	0.16	32.80	56.00	-23.20
0.682	Average	24.01	0.16	24.17	46.00	-21.83
3.874	QP	31.82	0.26	32.08	56.00	-23.92
3.874	Average	23.46	0.26	23.72	46.00	-22.28
6.064	QP	32.02	0.30	32.32	60.00	-27.68
6.064	Average	25.64	0.30	25.94	50.00	-24.06
22.775	QP	25.03	0.55	25.58	60.00	-34.42
22.775	Average	17.95	0.55	18.50	50.00	-31.50

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS – Limit

Project No : TM-2403000503P  
Operation Mode : TX  
Test Chamber : Conduction  
Probe : NEUTRAL  
Note :

Test Date : 2024-05-14  
Temp./Humi. : 24.3°C / 54%  
Engineer : Tony Chao  
Test Voltage : AC 120V/60Hz



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV	Limit dBμV	Margin dB
0.185	QP	51.99	0.20	52.19	64.25	-12.06
0.185	Average	32.65	0.20	32.85	54.25	-21.40
0.311	QP	39.80	0.19	39.99	59.94	-19.95
0.311	Average	22.68	0.19	22.87	49.94	-27.07
3.368	QP	34.40	0.29	34.69	56.00	-21.31
3.368	Average	23.70	0.29	23.99	46.00	-22.01
4.895	QP	34.31	0.33	34.64	56.00	-21.36
4.895	Average	25.15	0.33	25.48	46.00	-20.52
6.453	QP	31.52	0.36	31.88	60.00	-28.12
6.453	Average	25.16	0.36	25.52	50.00	-24.48
17.776	QP	26.01	0.50	26.51	60.00	-33.49
17.776	Average	18.81	0.50	19.31	50.00	-30.69

Note: 1. Actual FS= Spectrum Read Level + Factor

Note: 2. Margin= Actual FS - Limit

## 4.2 6dB BANDWIDTH AND OCCUPIED BANDWIDTH(99%)

### 4.2.1 Test Limit

**6 dB Bandwidth** : Least 500kHz.

**Occupied Bandwidth(99%)** : For reporting purposes only.

### 4.2.2 Test Procedure

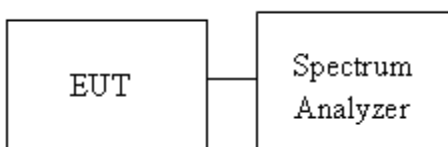
#### 6dB

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set RBW = 100 kHz.
3. Set the video bandwidth (VBW)  $\geq 3 \times$  RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 99%

1. This measurement setting are specified in section D of KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
2. Set center frequency to the nominal EUT channel center frequency.
3. Set span = 1.5 times to 5.0 times the OBW.
4. Set RBW = 1 % to 5% of the OBW.
5. Set VBW  $\geq 3 \times$  RBW

### 4.2.3 Test Setup





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#### 4.2.4 Test Result

Temperature: 20.5 ~ 24.9°C

Test date: May 6 ~17, 2024

Humidity: 52 ~ 59% RH

Tested by: Marco Chan

##### Occupied Bandwidth(99%)

FSK

Frequency (MHz)	99% BW (MHz)	6dB BW (MHz)
5732	3.4225	1.418
5789	3.5255	1.590
5848	3.4215	1.438

##### 6 dB Bandwidth

FSK

Freq. (MHz)	6dB BW (MHz)	Limit (MHz)
5732	1.304	>0.5
5789	1.562	>0.5
5848	1.516	>0.5



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## Test Data

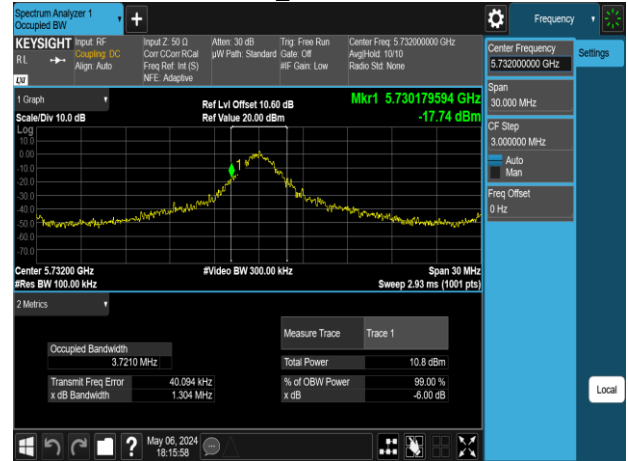
### Occupied Bandwidth(99%)

FSK\_5732MHz

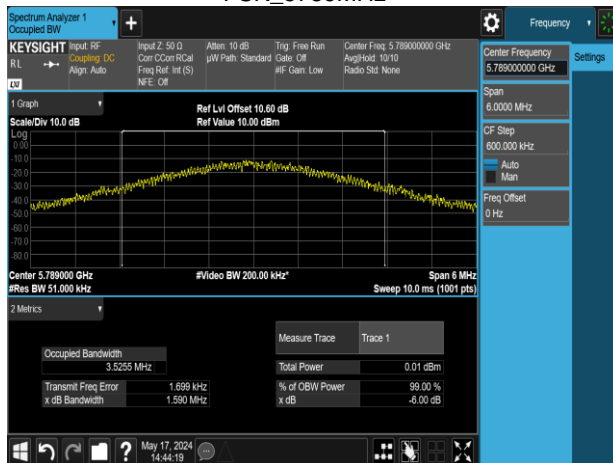


### 6 dB Bandwidth

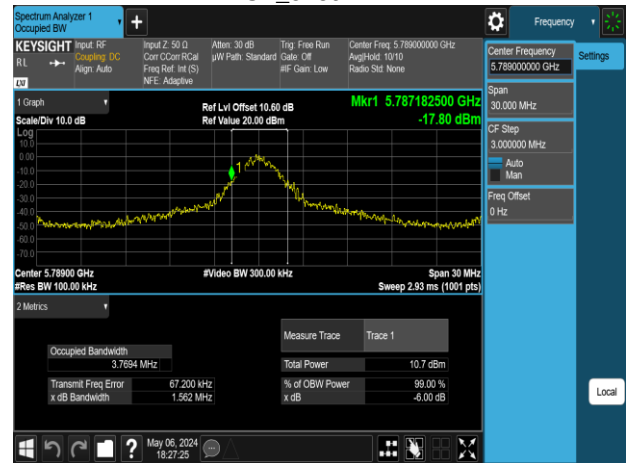
FSK\_5732MHz



FSK\_5789MHz



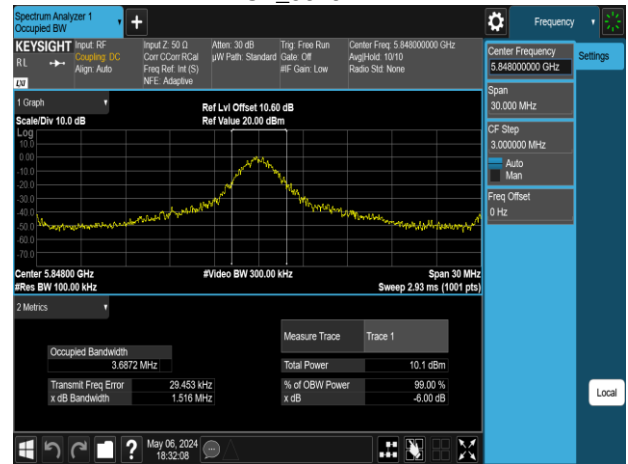
FSK\_5789MHz



FSK\_5848MHz



FSK\_5848MHz



## 4.3 OUTPUT POWER MEASUREMENT

### 4.3.1 Test Limit

According to 15.407(a)(3).

#### UNII-3:

##### FCC

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

##### FCC

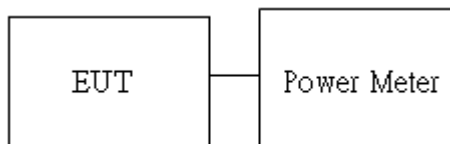
UNII-3 Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)]
--------------	--

### 4.3.2 Test Procedure

Test method Refer as KDB 789033 D02, Section E.3.b.

1. The EUT RF output connected to the power meter or spectrum by RF cable.
2. Setting maximum power transmit of EUT.
3. The path loss and Duty Factor were compensated to the results for each measurement.
4. Measure and record the result of Average output power. in the test report.

### 4.3.3 Test Setup





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#### 4.3.4 Test Result

Temperature: 20.5 ~ 24.9°C

Test date: May 6 ~17, 2024

Humidity: 52 ~ 59% RH

Tested by: Marco Chan

##### Conducted output power :

FSK

CH	Frequency (MHz)	Power Setting	TOTAL POWER (mW)	TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
1	5732	5	1.442	1.59	30	PASS
30	5789	5	1.328	1.23	30	PASS
60	5848	5	1.162	0.65	30	PASS

## 4.4 POWER SPECTRAL DENSITY

### 4.4.1 Test Limit

According to 15.407(a)(3).

#### UNII-3:

For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### FCC

UNII-3 Limit	<input checked="" type="checkbox"/> Antenna not exceed 6 dBi : 30 dBm <input type="checkbox"/> Antenna with DG greater than 6 dBi : [Limit = 30 – (DG – 6)]
--------------	---

### 4.4.2 Test Procedure

Test method Refer as KDB 789033 D02 v02r01, Section F

1. The EUT RF output connected to the spectrum analyzer by RF cable.
2. Setting maximum power transmit of EUT
3. UNII-3, SA set RBW = 300kHz, VBW = 1MHz and Detector = RMS, to measurement Power Density
4. The path loss was compensated to the results for each measurement by SA.
5. Mark the maximum level.
6. Measure and record the result of power spectral density (Include duty factor+ RBW factor) in the test report.

### 4.4.3 Test Setup







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#### 4.4.4 Test Result

Temperature: 20.5 ~ 24.9°C

Test date: May 6 ~17, 2024

Humidity: 52 ~ 59% RH

Tested by: Marco Chan

POWER DENSITY GFSK						
Frequency (MHz)	Ch0 meas PSD (dBm/300kHz)	Duty Factor (dB)	10log (500kHz/RBW) Factor(dB)	Maximum Corr'd PSD (dBm/500kHz)	Limit	Margin (dB)
5732	-5.739	0.38	2.22	-3.14	30.00 dBm/500kHz	-33.14
5789	-5.873	0.38	2.22	-3.27	30.00 dBm/500kHz	-33.27
5848	-5.338	0.38	2.22	-2.74	30.00 dBm/500kHz	-32.74



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## Test Data

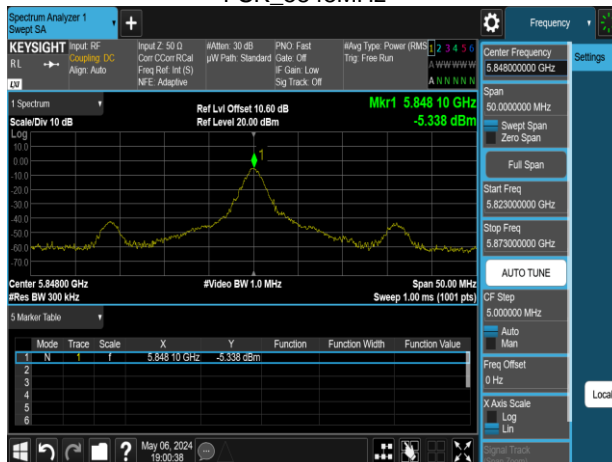
FSK\_5732MHz



FSK\_5789MHz



FSK\_5848MHz



## 4.5 RADIATION BANDEDGE AND SPURIOUS EMISSION

### 4.5.1 Test Limit

FCC according to §15.407, §15.209 and §15.205,

#### Below 30 MHz

Frequency	Field Strength (microvolts/m)	Magnetic H-Field (microamperes/m)	Measurement Distance (metres)
9-490 kHz	2,400/F (F in kHz)	2,400/F (F in kHz)	300
490-1,705 kHz	24,000/F (F in kHz)	24,000/F (F in kHz)	30
1.705-30 MHz	30	N/A	30

#### Above 30 MHz

Frequency (MHz)	Field Strength microvolts/m at 3 metres (watts, e.i.r.p.)	
	Transmitters	Receivers
30-88	100 (3 nW)	100 (3 nW)
88-216	150 (6.8 nW)	150 (6.8 nW)
216-960	200 (12 nW)	200 (12 nW)
Above 960	500 (75 nW)	500 (75 nW)

#### UNII-3:

All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

## 4.5.2 Test Procedure

Test method Refer as KDB 789033 D02.

1. The EUT is placed on a turntable, Above 1 GHz is 1.5m and below 1 GHz is 0.8m above ground plane. The EUT Configured un accordance with ANSI C63.10: 2013, and the EUT set in a continuous mode.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. And EUT is set 3m away from the receiving antenna, which is scanned from 1m to 4m above the ground plane to find out the highest emissions. Measurement are made polarized in both the vertical and the horizontal positions with antenna.
3. Span shall wide enough to full capture the emission measured. The SA from 9kHz to 40GHz set to the low, Mid and High channels with the EUT transmit.
4. No emission found between lowest internal used/generated frequency to 30MHz (9KHz~30MHz).

Radiated emission below 30MHz is measured in a 9m\*6m\*6m semi-ane choic chamber, the measurements correspond to those obtained at an open-field test site. There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

5. The SA setting following :

- (1) Below 30MHz :

- (1.1) 9KHz-490KHz : RBW=200Hz / VBW=1kHz / Sweep=AUTO

- (1.2) 490KHz-30MHz : RBW=10kHz / VBW=30kHz / Sweep=AUTO

- (2) 30MHz to 1GHz : RBW = 100kHz, VBW  $\geq$  3\*RBW, Sweep = Auto,

Detector = Peak, Trace = Max hold.

- (3) Above 1GHz :

- (3.1) For Peak measurement : RBW = 1MHz, VBW  $\geq$  3 RBW, Sweep = Auto, Detector = Peak, Trace = Max hold.

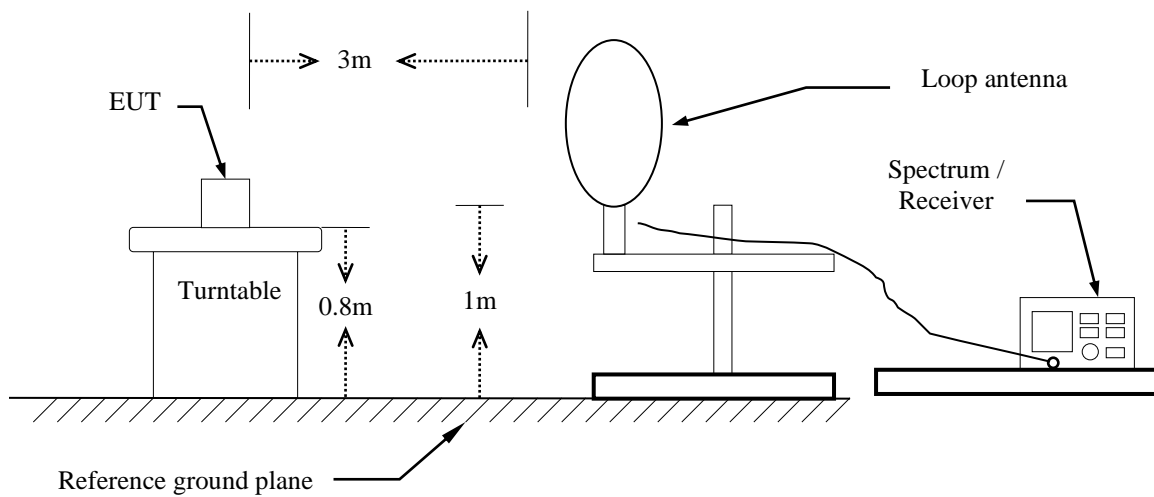
- (3.2) For Average measurement : RBW = 1MHz, VBW

·If Duty Cycle  $\geq$  98%, VBW=10Hz.

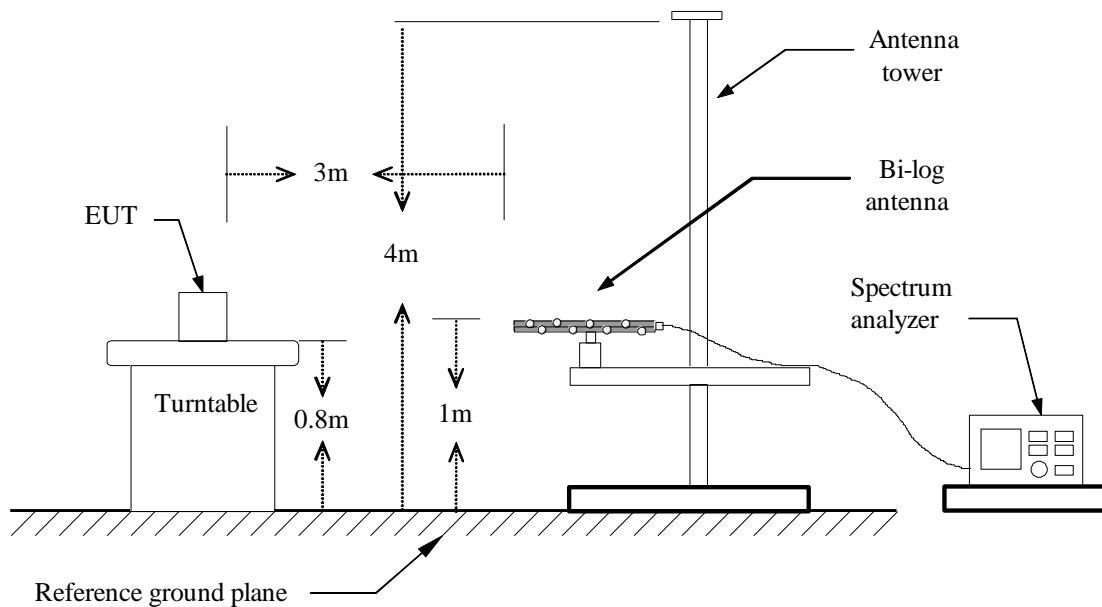
·If Duty Cycle < 98%, VBW=1/T.

### 4.5.3 Test Setup

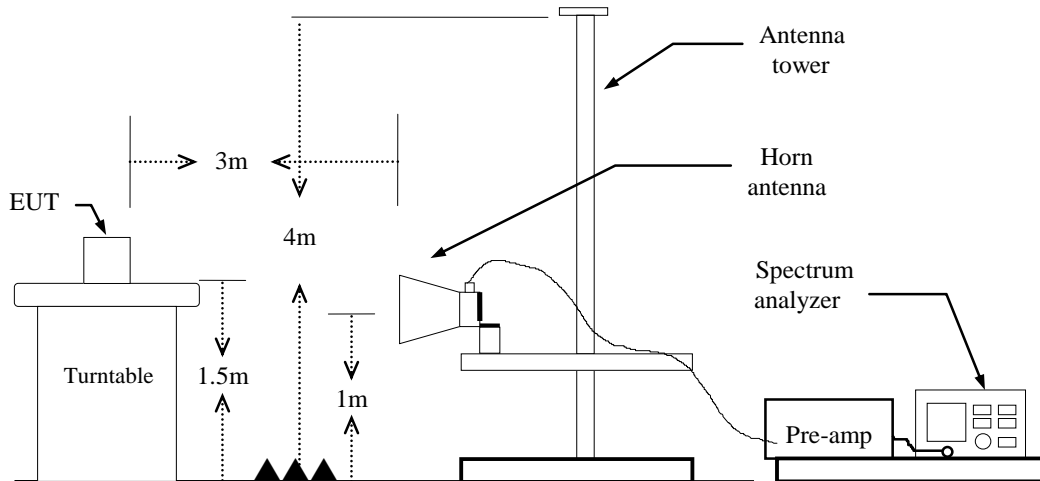
#### 9kHz ~ 30MHz



#### 30MHz ~ 1GHz



## Above 1 GHz

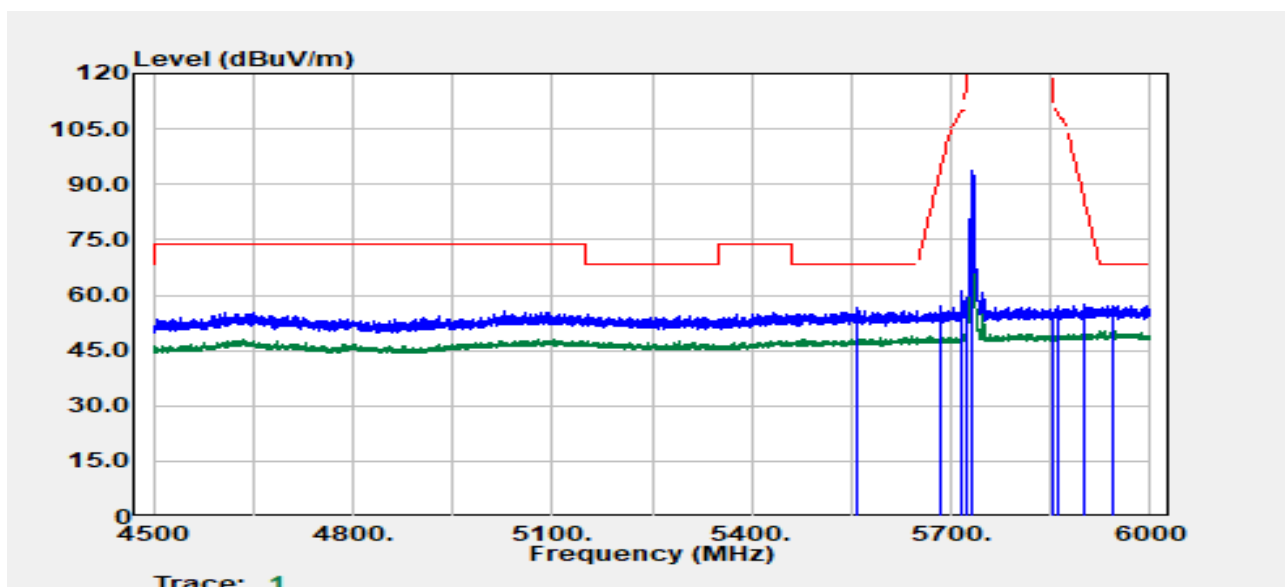


## 4.5.4 Test Result

### Test Data

#### Band Edge

Project No	:TM-2403000503P	Test Date	:2024-05-07
Operation Band	:FSK/Band4	Temp./Humi.	:24.6/57
Frequency	:5732 MHz	Antenna Pol.	:VERTICAL
Operation Mode	:Bandedge	Engineer	:Ray Li
EUT Pol	:E2	Test Chamber	: 966A
Setting	:5		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5558.22	Peak	41.94	14.49	56.42	68.20	-11.78
5683.66	Peak	41.49	15.48	56.97	93.14	-36.17
5715.64	Peak	45.31	15.73	61.04	109.58	-48.54
5724.89	Peak	42.50	15.78	58.29	121.95	-63.66
5732.00	Peak	78.03	15.83	93.86	--	--
5732.00	Average	75.44	15.83	91.27	--	--
5853.32	Peak	39.43	15.94	55.37	114.62	-59.25
5862.32	Peak	40.90	15.94	56.84	108.75	-51.91
5901.05	Peak	41.53	15.93	57.46	85.88	-28.43
5942.28	Peak	41.07	16.13	57.19	68.20	-11.01

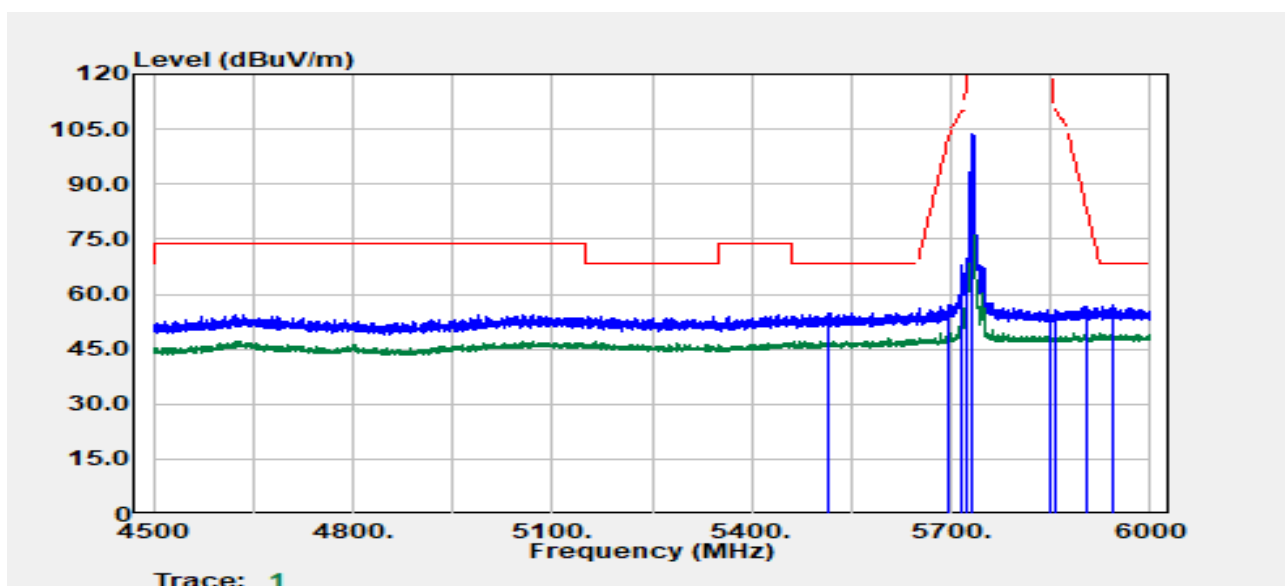


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5732 MHz  
Operation Mode :Bandedge  
EUT Pol :E2  
Setting :5

Test Date :2024-05-07  
Temp./Humi. :24.6/57  
Antenna Pol. :HORIZONTAL  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5513.49	Peak	41.41	13.44	54.84	68.20	-13.36
5696.15	Peak	42.33	14.74	57.07	102.36	-45.30
5715.64	Peak	53.05	14.89	67.94	109.58	-41.65
5724.89	Peak	52.11	14.95	67.07	121.94	-54.88
5732.00	Peak	88.67	15.00	103.67	--	--
5732.00	Average	85.98	15.00	100.98	--	--
5850.58	Peak	39.43	15.12	54.56	120.89	-66.33
5858.57	Peak	40.36	15.12	55.49	109.80	-54.31
5903.80	Peak	41.60	15.14	56.74	83.85	-27.11
5941.78	Peak	41.62	15.32	56.94	68.20	-11.26



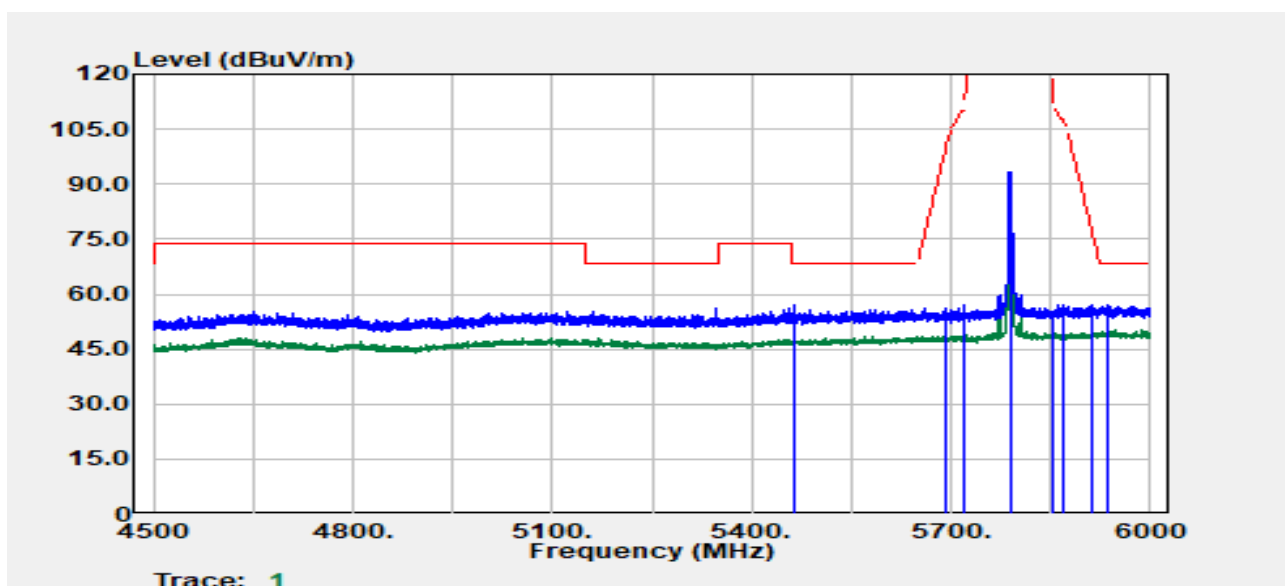


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5789 MHz  
Operation Mode :Bandedge  
EUT Pol :E2  
Setting :5

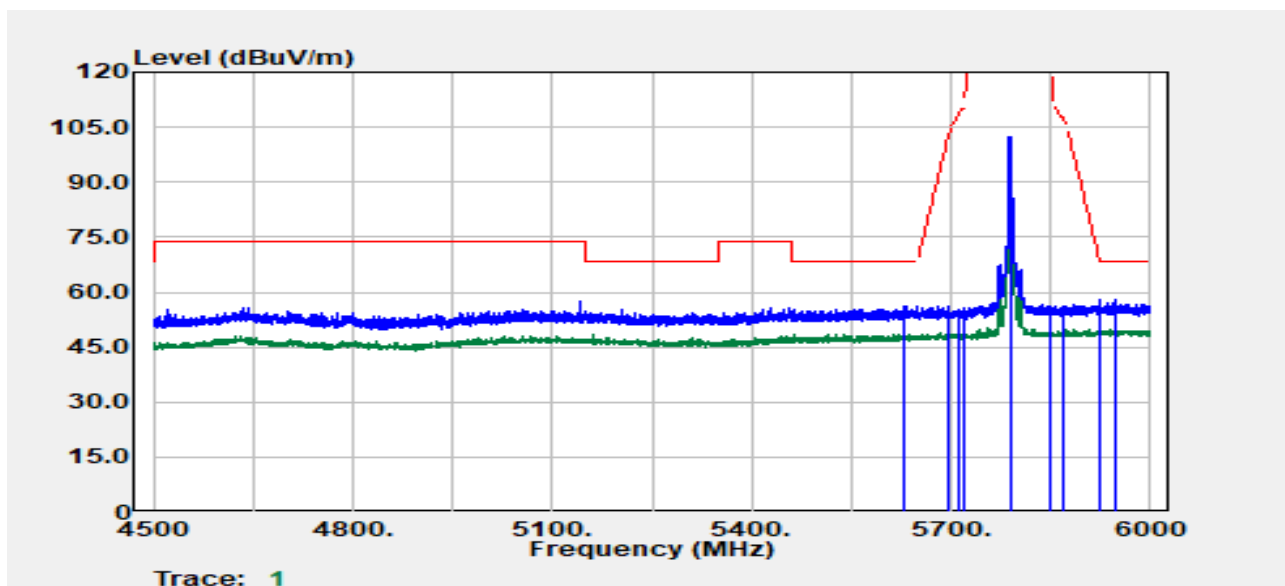
Test Date :2024-05-07  
Temp./Humi. :24.6/57  
Antenna Pol. :VERTICAL  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5463.02	Peak	42.73	14.38	57.10	68.20	-11.10
5693.40	Peak	40.72	15.57	56.29	100.34	-44.05
5718.64	Peak	41.51	15.75	57.25	110.42	-53.17
5720.89	Peak	39.35	15.76	55.11	112.83	-57.72
5789.00	Peak	77.34	16.08	93.42	--	--
5789.00	Average	74.68	16.08	90.76	--	--
5852.57	Peak	39.41	15.94	55.35	116.33	-60.98
5869.32	Peak	41.10	15.94	57.04	106.79	-49.75
5913.79	Peak	41.11	15.99	57.10	76.47	-19.37
5933.78	Peak	41.10	16.09	57.19	68.20	-11.01

Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5789 MHz  
Operation Mode :Bandedge  
EUT Pol :E2  
Setting :5

Test Date :2024-05-07  
Temp./Humi. :24.6/57  
Antenna Pol. :HORIZONTAL  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5629.94	Peak	41.06	14.97	56.03	68.20	-12.17
5697.40	Peak	40.62	15.61	56.22	103.28	-47.06
5710.40	Peak	39.61	15.69	55.30	108.11	-52.81
5720.14	Peak	39.82	15.76	55.57	111.12	-55.55
5789.00	Peak	86.40	16.08	102.48	--	--
5789.00	Average	84.05	16.08	100.13	--	--
5850.83	Peak	40.20	15.94	56.15	120.32	-64.17
5869.07	Peak	40.42	15.94	56.36	106.86	-50.50
5922.29	Peak	41.98	16.03	58.01	70.20	-12.19
5946.28	Peak	42.04	16.15	58.19	68.20	-10.01

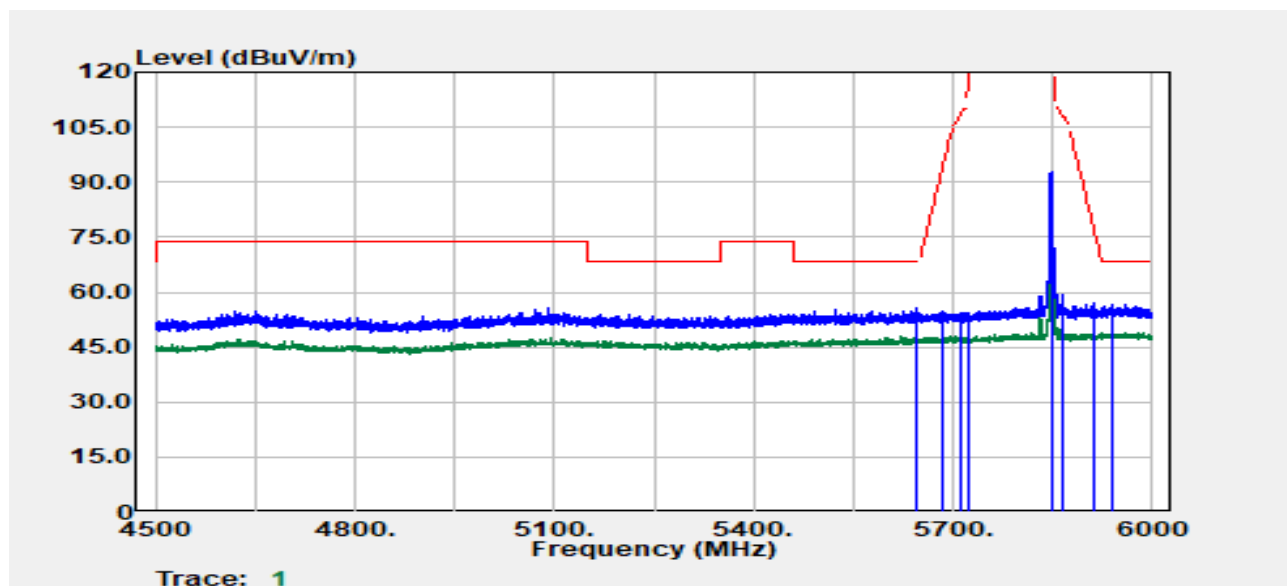


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5848 MHz  
Operation Mode :Bandedge  
EUT Pol :E2  
Setting :5

Test Date :2024-05-07  
Temp./Humi. :24.6/57  
Antenna Pol. :VERTICAL  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5644.18	Peak	41.50	14.21	55.71	68.20	-12.49
5685.91	Peak	40.01	14.63	54.64	94.80	-40.16
5711.40	Peak	39.63	14.86	54.49	108.39	-53.90
5722.64	Peak	39.51	14.94	54.44	116.82	-62.37
5848.00	Peak	77.49	15.13	92.62	--	--
5848.00	Average	75.10	15.13	90.24	--	--
5850.08	Peak	71.94	15.13	87.06	122.03	-34.97
5863.82	Peak	44.11	15.12	59.24	108.33	-49.09
5910.30	Peak	41.86	15.17	57.03	79.05	-22.02
5938.28	Peak	41.48	15.31	56.79	68.20	-11.41

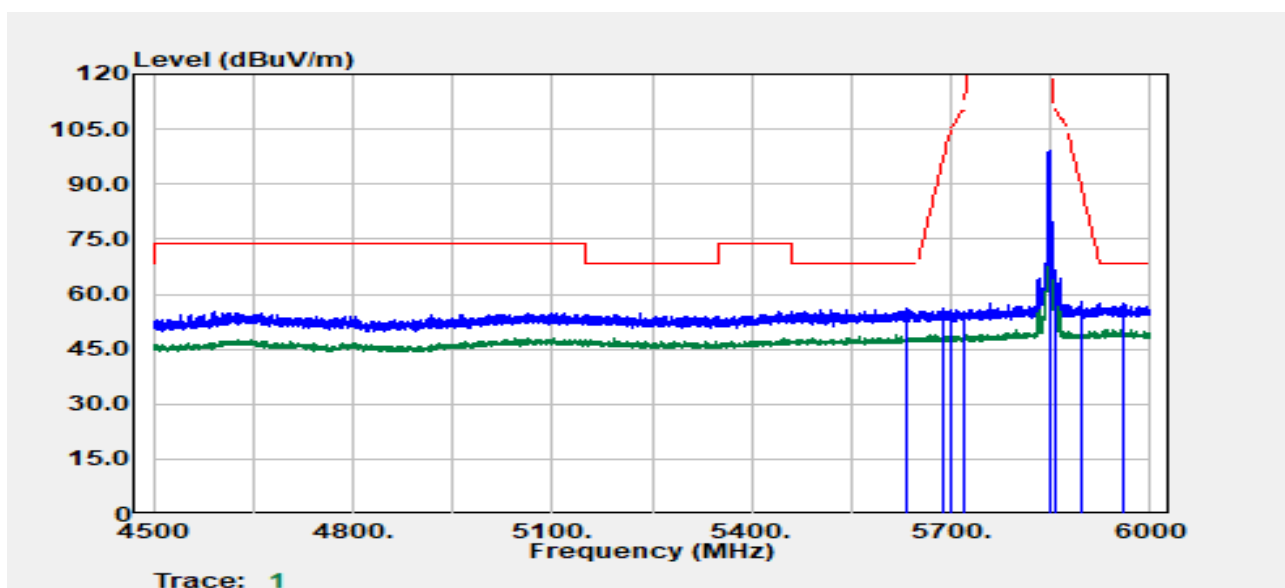


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5848 MHz  
Operation Mode :Bandedge  
EUT Pol :E2  
Setting :5

Test Date :2024-05-07  
Temp./Humi. :24.6/57  
Antenna Pol. :HORIZONTAL  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
5631.43	Peak	41.26	14.98	56.24	68.20	-11.96
5686.41	Peak	40.55	15.50	56.05	95.17	-39.12
5701.15	Peak	39.93	15.64	55.57	105.52	-49.95
5719.89	Peak	39.43	15.75	55.18	110.77	-55.59
5848.00	Peak	83.23	15.95	99.18	--	--
5848.00	Average	80.41	15.95	96.36	--	--
5850.08	Peak	76.08	15.95	92.03	122.03	-30.00
5855.32	Peak	50.49	15.94	66.43	110.71	-44.28
5896.55	Peak	42.01	15.92	57.93	89.21	-31.28
5959.77	Peak	41.26	16.15	57.41	68.20	-10.79



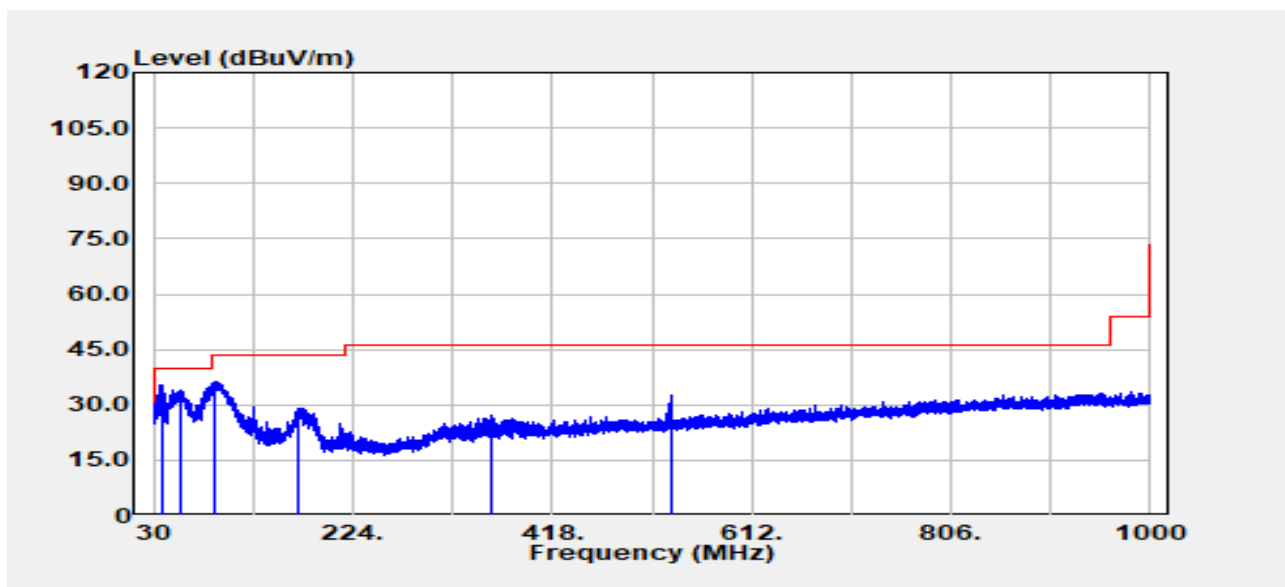
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### TX Test Data

Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5732 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Vertical  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBuV	Factor dB	Actual FS dBuV/m	Limit dBuV/m	Margin dB
39.22	Peak	44.50	-9.13	35.37	40.00	-4.63
55.22	Peak	49.95	-16.14	33.81	40.00	-6.19
90.14	Peak	51.64	-15.21	36.42	43.50	-7.08
171.86	Peak	40.28	-11.16	29.12	43.50	-14.38
359.92	Peak	34.37	-7.09	27.28	46.00	-18.72
533.19	Peak	35.43	-2.95	32.47	46.00	-13.53

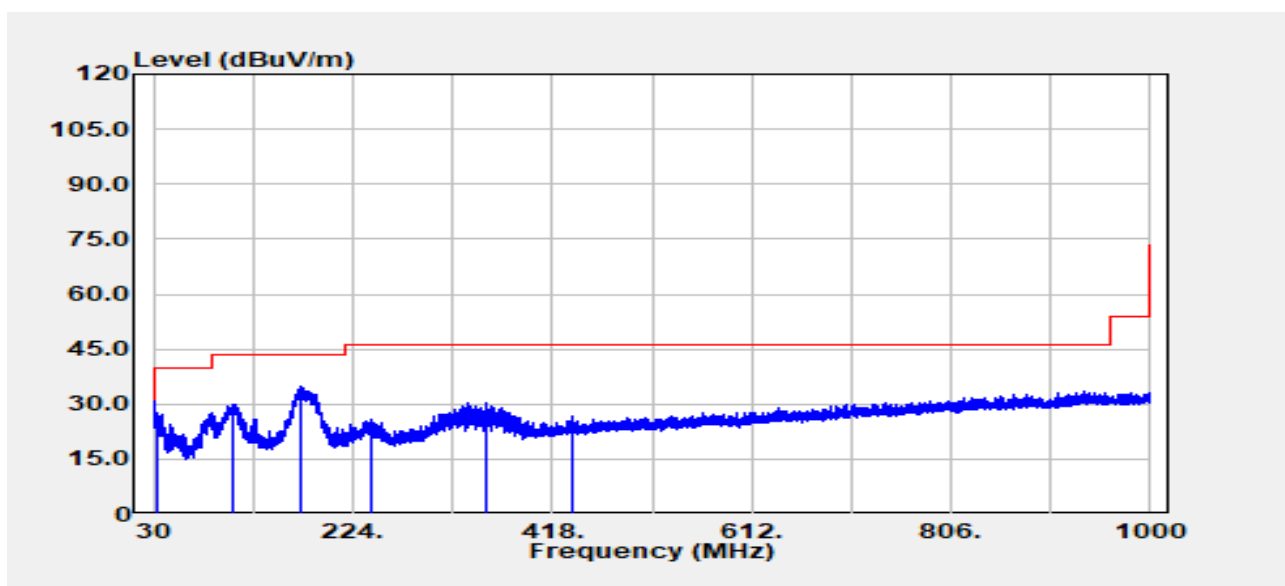


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5732 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Horizontal  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
34.37	Peak	32.92	-5.26	27.66	40.00	-12.34
107.84	Peak	40.97	-10.86	30.11	43.50	-13.39
173.44	Peak	46.19	-11.29	34.91	43.50	-8.59
242.79	Peak	36.46	-10.62	25.84	46.00	-20.16
354.47	Peak	37.54	-7.17	30.37	46.00	-15.63
437.64	Peak	31.34	-4.66	26.69	46.00	-19.31

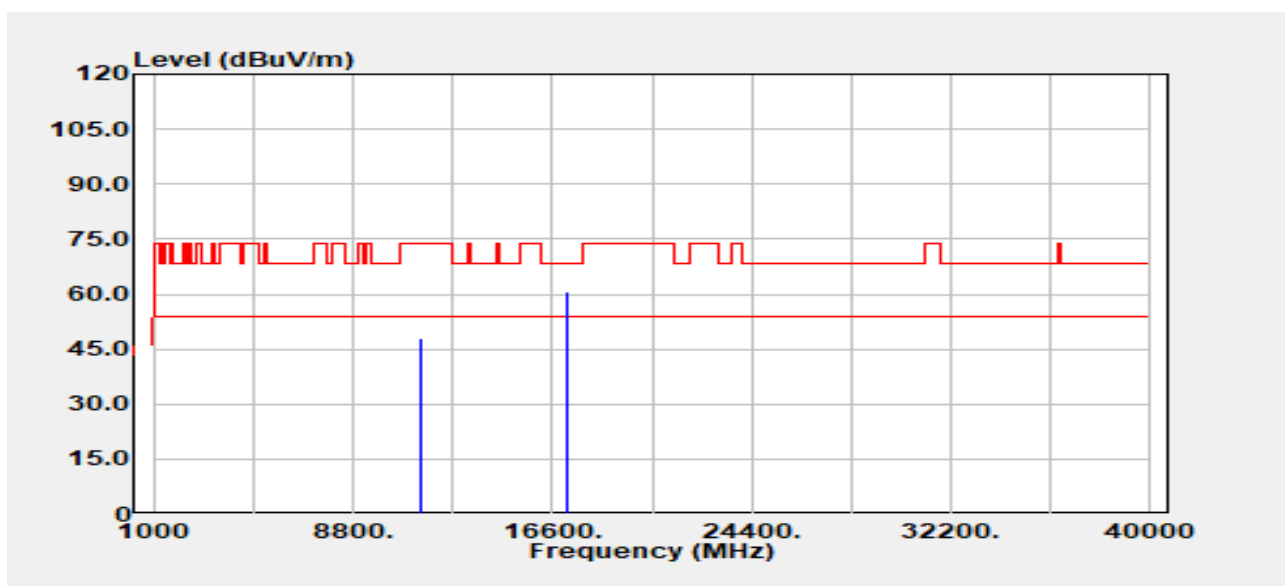


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5732 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :5

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Vertical  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
11464.00	Peak	34.35	13.54	47.89	74.00	-26.11
11464.00	Average	29.95	13.54	43.49	54.00	-10.51
17196.00	Peak	32.63	28.07	60.70	68.20	-7.50

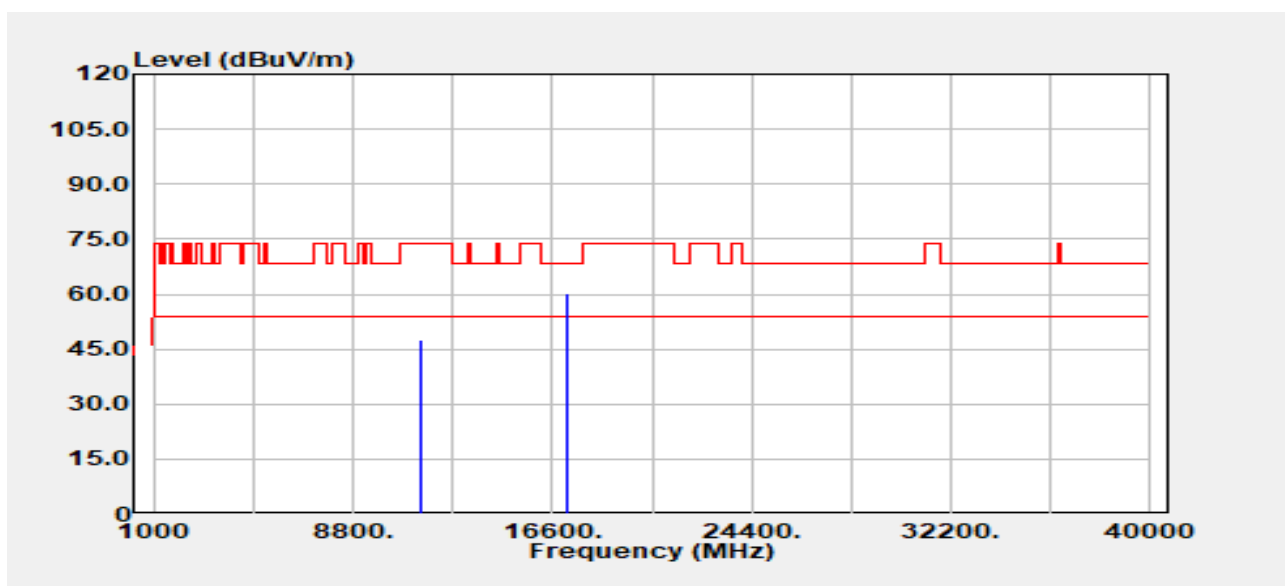


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Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5732 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :5

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Horizontal  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
11464.00	Peak	34.03	13.54	47.57	74.00	-26.43
11464.00	Average	29.31	13.54	42.85	54.00	-11.15
17196.00	Peak	32.02	28.07	60.09	68.20	-8.11



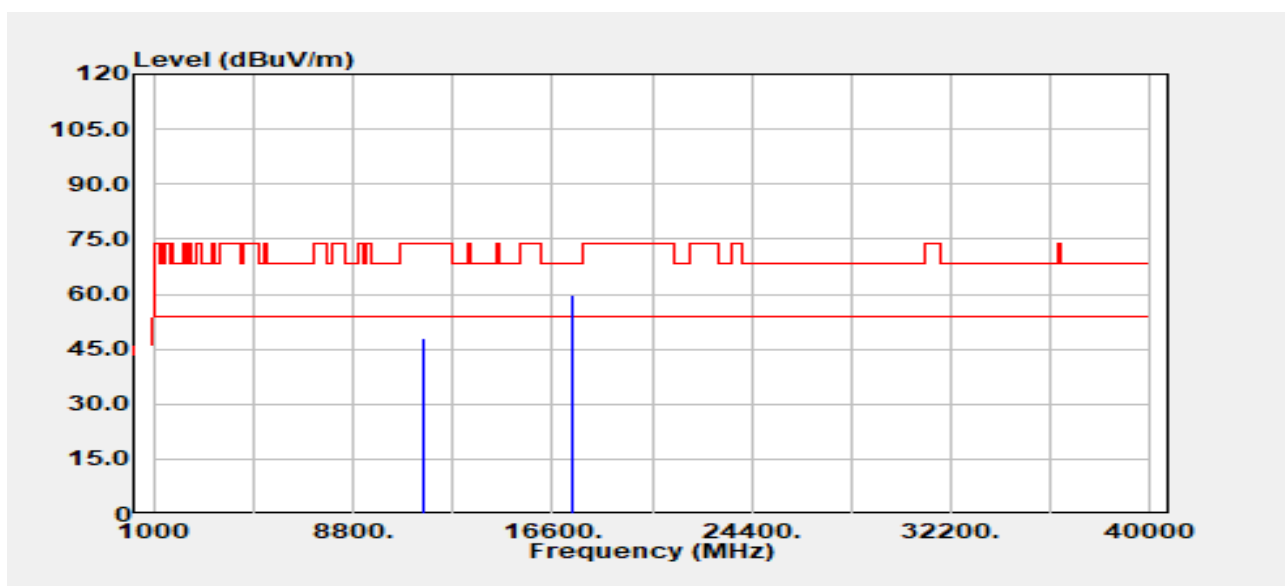


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Rev.: 02

Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5789 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :5

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Vertical  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
11578.00	Peak	34.19	13.86	48.05	74.00	-25.95
11578.00	Average	29.94	13.86	43.80	54.00	-10.20
17367.00	Peak	32.51	27.31	59.82	68.20	-8.38

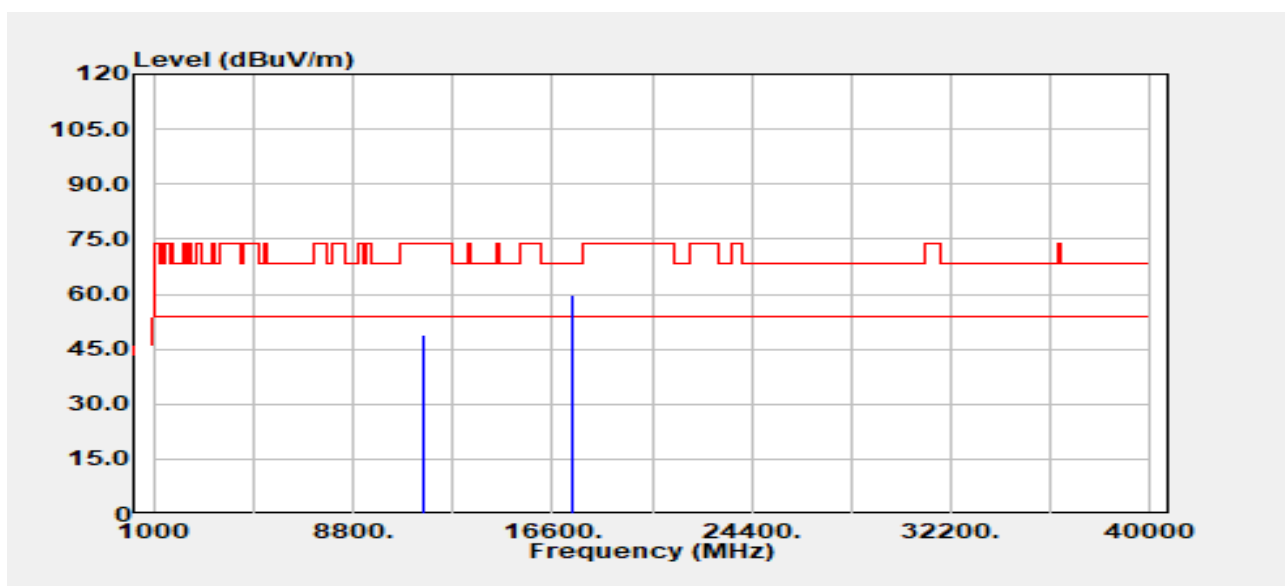


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Rev.: 02

Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5789 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :5

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Horizontal  
Engineer :Ray Li  
Test Chamber : 966A



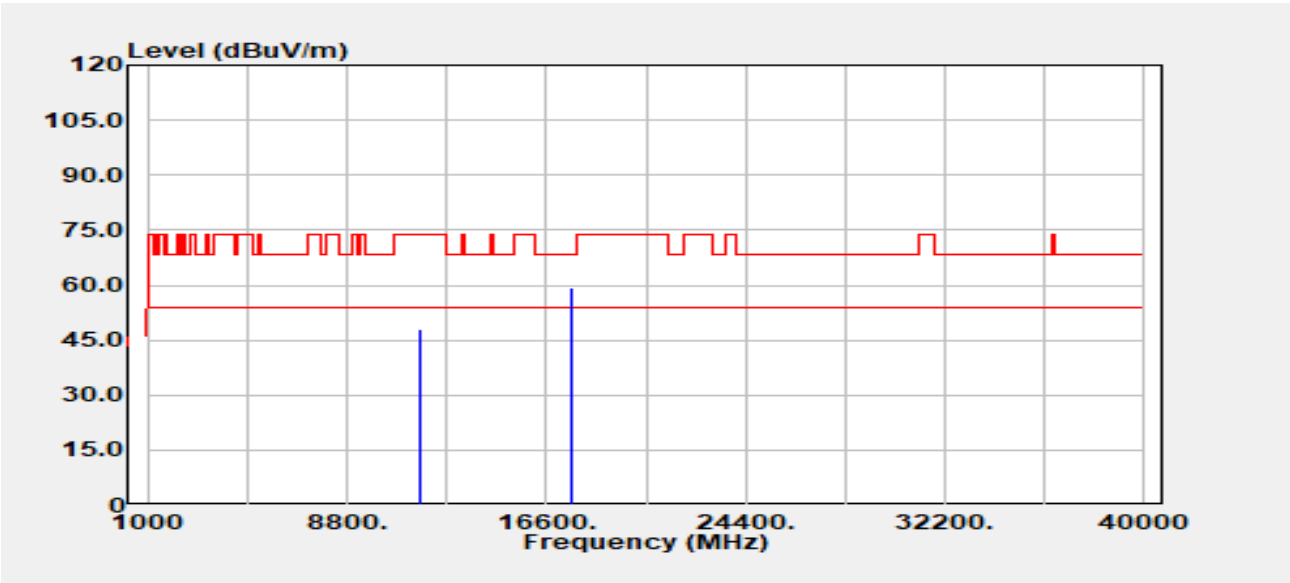
Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
11578.00	Peak	34.87	13.86	48.74	74.00	-25.26
11578.00	Average	29.67	13.86	43.53	54.00	-10.47
17367.00	Peak	32.48	27.31	59.78	68.20	-8.42



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Rev.: 02

Project No	:TM-2403000503P	Test Date	:2024-05-08
Operation Band	:FSK/Band4	Temp./Humi.	:24.6/57
Frequency	:5848 MHz	Antenna Pol.	:Vertical
Operation Mode	:TX	Engineer	:Ray Li
EUT Pol	:E2	Test Chamber	: 966A
Setting	:5		



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dBμV	Factor dB	Actual FS dBμV/m	Limit dBμV/m	Margin dB
11696.00	Peak	34.12	13.85	47.97	74.00	-26.03
11696.00	Average	29.57	13.85	43.43	54.00	-10.57
17544.00	Peak	31.89	27.65	59.54	68.20	-8.66

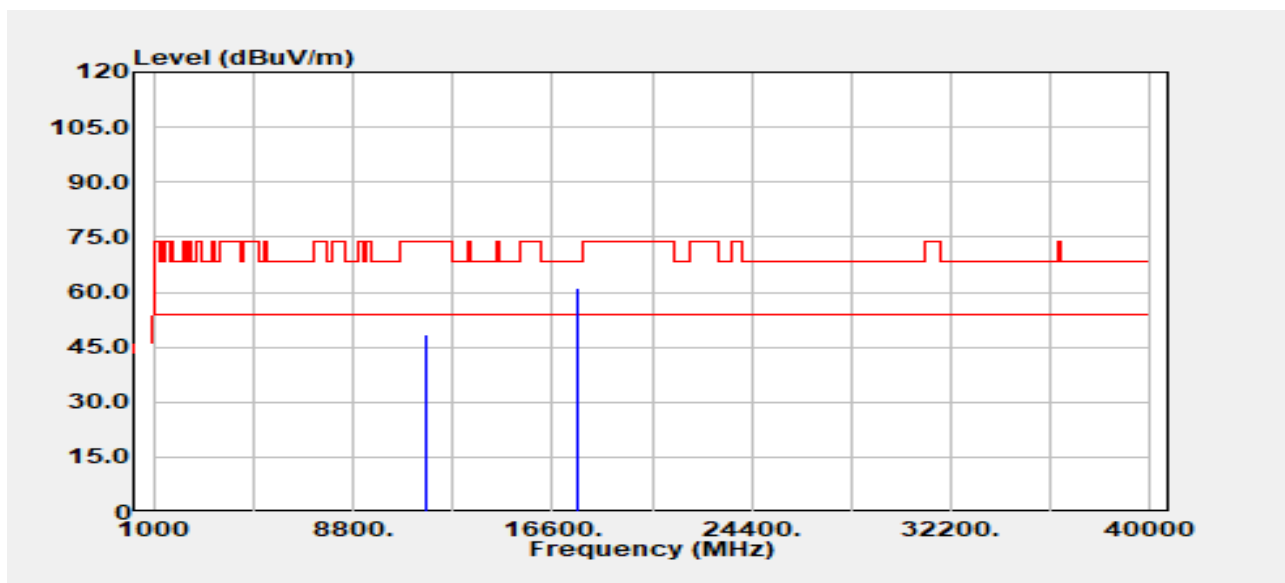


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Rev.: 02

Project No :TM-2403000503P  
Operation Band :FSK/Band4  
Frequency :5848 MHz  
Operation Mode :TX  
EUT Pol :E2  
Setting :5

Test Date :2024-05-08  
Temp./Humi. :24.6/57  
Antenna Pol. :Horizontal  
Engineer :Ray Li  
Test Chamber : 966A



Freq. MHz	Detector Mode PK/QP/AV	Spectrum Read Level dB $\mu$ V	Factor dB	Actual FS dB $\mu$ V/m	Limit dB $\mu$ V/m	Margin dB
11696.00	Peak	34.69	13.85	48.55	74.00	-25.45
11696.00	Average	29.19	13.85	43.05	54.00	-10.95
17544.00	Peak	33.36	27.65	61.01	68.20	-7.19

--End of Test Report--