

Test Report No.:  
**FCC2021-0025-RF2**

## **RF Test Report**

**EUT** : **AI Vision Sensor**  
**MODEL** : **VS121-915M**  
**BRAND NAME** : **Milesight**  
**APPLICANT** : **Xiamen Milesight IoT Co., Ltd.**  
**Classification Of Test** : **N/A**

**CVC Testing Technology Co., Ltd.**



# CVC Testing Technology Co., Ltd.

Test Report No.: FCC2021-0025-RF2		Page 2 of 34	
<b>Client</b>		Name : Xiamen Milesight IoT Co., Ltd. Address : Building C09, Software Park Phase III, Xiamen 361024, Fujian, China	
<b>Manufacturer</b>		Name : Xiamen Milesight IoT Co., Ltd. Address : Building C09, Software Park Phase III, Xiamen 361024, Fujian, China	
<b>Equipment Under Test</b>		Name : AI Vision Sensor Model/Type: VS121-915M Trade mark : Milesight Serial NO.:N/A Sample NO.:6-1	
Date of Receipt.	2021.09.08	Date of Testing	2021.09.08~2022.04.14
<b>Test Specification</b>		<b>Test Result</b>	
FCC Part 15, Subpart C, Section 15.247		PASS	
<b>Evaluation of Test Result</b>		The equipment under test was found to comply with the requirements of the standards applied.  <b>Issue Date: 2022.04.14</b>	
Tested by:  <b>Xu ZhenFei</b> Name                      Signature		Reviewed by:  <b>Liu YongHai</b> Name                      Signature	Approved by:  <b>Chen HuaWen</b> Name                      Signature
<b>Other Aspects: NONE.</b>			
Abbreviations:OK,    Pass= passed                      Fail = failed                      N/A= not applicable                      EUT= equipment, sample(s) under tested			
This test report relates only to the EUT, and shall not be reproduced except in full, without written approval of CVC.			



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## **RELEASE CONTROL RECORD**

<b>ISSUE NO.</b>	<b>REASON FOR CHANGE</b>	<b>DATE ISSUED</b>
FCC2021-0025-RF2	Original release	2022.04.14



## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

PPLIED STANDARD: FCC Part 15, Subpart C			
STANDARD SECTION	TEST TYPE AND LIMIT	RESULT	REMARK
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.247(d) 15.209	Radiated Emissions	PASS	Meet the requirement of limit.
15.247(d)	Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	6dB bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Meet the requirement of limit.



## 1.1 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Test Equipment	Type/Mode	SERIAL NO.	Equipment No.	Manufacturer	Cal. Due
WIFI & Bluetooth Test System 1					/
Communication Shielded Room 1	4m*3m*3m	CRTDSWKS44301	VGDS-0699	CRT	2024/04/24
Spectrum Analyzer	FSV30	104337	DZ-000235	R&S	2022/11/03
Comprehensive Test Instrument	CMW500	137779	DZ-000220	R&S	2022/06/30
Comprehensive Test Instrument	CMW500	169888	DZ-000342	R&S	2022/12/01
LTE Comprehensive Test Instrument	E7515A	MY58010639	DZ-000173	KEYSIGHT	2022/04/14
Analog Signal Generator	SMA100B	103663	DZ-000239-2	R&S	2022/06/30
Vector Signal Generator	SMBV100B	101757	DZ-000239-1	R&S	2022/06/30
Programmable DC Power Supply	E3642A	MY59108106	DZ-000242-2	KEYSIGHT	2022/08/05
Radiation Spurious Test System					/
3m Semi-Anechoic Chamber	FACT-4	ST08035	WKNA-0024	ETS	2024/12/12
Spectrum Analyzer	N9010B	MY57470323	DZ-000174	KEYSIGHT	2023/03/02
EMI Test Receiver	N9038A-508	MY532290079	EM-000397	Agilent	2023/03/02
Broadband Antenna	VULB 9163	9163-530	EM-000342	SCHWARZBECK	2022/06/26
Waveguide Horn Antenna	HF906	360306/008	WKNA-0024-8	R&S	2023/03/04
Waveguide Horn Antenna	BBHA9170	00949	DZ-000209-2	SCHWARZBECK	2022/08/27
Preamplifier	BBV 9721	9721-050	DZ-000209-1	SCHWARZBECK	2022/06/30
5G Bandstop Filters	WRCJV12-4 900-5100-5 900-6100-5 0EE	1	DZ-000186	WI	2022/12/20
Comprehensive tester	CMW500	159000	DZ-000240-2	R&S	2022/12/20

## 1.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

No.	ITEM	FREQUENCY	UNCERTAINTY
1	Conducted emissions	9kHz~30MHz	±2.66dB
2	Radiated emissions	9KHz ~ 30MHz	±0.769dB
		30MHz ~ 1GMHz	±0.877dB
		1GHz ~ 18GHz	±0.777dB
		18GHz ~ 40GHz	±1.315dB

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

## 1.3 TEST LOCATION

The tests and measurements refer to this report were performed by EMC testing Lab. of CVC Testing Technology Co., Ltd.

Address: No.3,TiantaiyiRoad,KaitaiAvenue,ScienceCity,Guangzhou,China

Post Code: 510663

Tel: 020-32293888

FAX: 020-32293889

E-mail: [office@cvc.org.cn](mailto:office@cvc.org.cn)



## 2 GENERAL INFORMATION

### 2.1 GENERAL PRODUCT INFORMATION

PRODUCT	AI Vision Sensor
BRAND	Milesight
MODEL	VS121-915M
ADDITIONAL MODEL	N/A
FCC ID	2AYHY-VS121
POWER SUPPLY	DC 5V From Adapter
MODULATION TYPE	Chirp Spread Spectrum
OPERATING FREQUENCY	DTS 500kHz,903MHz~914.2MHz DTS 500kHz,923.3MHz~927.5MHz
NUMBER OF CHANNEL	16
PEAK OUTPUT POWER	22.64dBm (Maximum)
ANTENNA TYPE	Spring Antenna , 1dBi Gain
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB Line: Unshielded Detachable 1.0m
Remark: 1. For more detailed features description, please refer to the manufacturer's specifications or the User's Manual. 2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report. 3. EUT photo refer to the report (Report NO.: FCC2021-0025-E). 4. The EUT have SISO function, provides 1 completed transmitter and 1 receiver.	

### 2.2 Description of Accessories

Adapter	
BRAND	CWT
Model No.:	2AEA010BC3D
Input:	100-240 V~50/60 Hz 0.35 A Max
Output:	5.0 V $\pm$ 2 A
AC Cable:	N/A
DC Cable:	N/A



## 2.3 OTHER INFORMATION

Operating frequency of each channel

LORA DR8					
CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
<b>1</b>	<b>903</b>	7	912.6	13	925.7
2	904.6	<b>8</b>	<b>914.2</b>	14	926.3
3	906.2	9	923.3	15	926.9
4	907.8	10	923.9	<b>16</b>	<b>927.5</b>
5	909.4	11	924.5		
6	911	12	925.1		

**Note:** The channels which were indicated in bold type of the above channel list were selected as representative test channel. Therefore only the data of the test channels were recorded in this report.





## 2.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, xyz axis and antenna ports

EUT CONFIGURE MODE	APPLICABLE TEST ITEMS				DESCRIPTION
	RE<1G	RE≥1G	PLC	APCM	
A	√	√	√	√	LORA link

Where **RE<1G**: Radiated Emission below 1GHz  
**PLC**: Power Line Conducted Emission

**RE≥1G**: Radiated Emission above 1GHz  
**APCM**: Antenna Port Conducted Measurement

### RADIATED EMISSION TEST (BELOW 1 GHz):

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE
A	1 to 16	1	Chirp Spread Spectrum	DR8

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

### RADIATED EMISSION TEST (ABOVE 1 GHz):

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

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE
A	1 to 16	1,8,16	Chirp Spread Spectrum	DR8

**ANTENNA PORT CONDUCTED MEASUREMENT:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, antenna ports (if EUT with antenna diversity architecture), and packet types.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE
A	1 to 16	1,8,16	Chirp Spread Spectrum	DR8

**POWER LINE CONDUCTED EMISSION TEST:**

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

EUT CONFIGURE MODE	TESTED CONDITION
-	LORA Link

**TEST CONDITION:**

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	TEST VOLTAGE	TESTED BY
RE<1G	24deg. C, 55%RH	AC 120V/60Hz	Liu ShiWei
RE≥1G	24deg. C, 55%RH	AC 120V/60Hz	Liu ShiWei
PLC	24deg. C, 55%RH	AC 120V/60Hz	Liu ShiWei
APCM	25deg. C, 58%RH	AC 120V/60Hz	Liu ShiWei



## 2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product, according to the specifications of the manufacturers. It must comply with the requirements of the following standards:

**FCC PART 15, Subpart C. Section 15.247**  
**KDB 558074 D01 15.247 Meas Guidance v05r02**  
**ANSI C63.10-2013**

All test items have been performed and recorded as per the above standards

## 2.6 DESCRIPTION OF SUPPORT UNITS

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

During the tests:

Support Equipment							
NO	Description	Brand	Model No.	Serial Number	Supplied by		
1	Laptop	Lenovo	V14	PFNXB1628023	Lab		
Support Cable							
NO	Description	Quantity (Number)	Length (cm)	Detachable (Yes/ No)	Shielded (Yes/ No)	Cores (Number)	Supplied by
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

## 3 TEST TYPES AND RESULTS

### 3.1 CONDUCTED EMISSION MEASUREMENT

#### 3.1.1 Limit

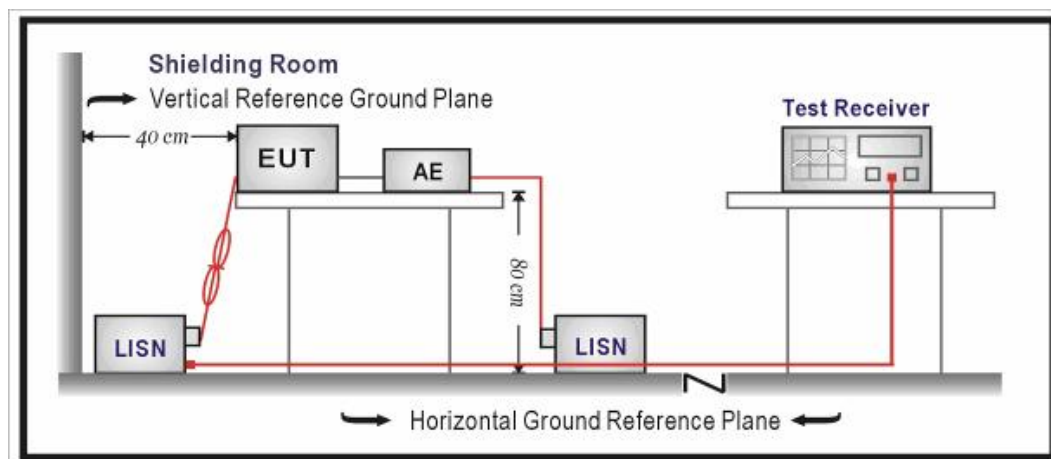
Frequency (MHz)	Conducted Limits(dBμV)	
	Quasi-peak	Average
0.15 - 0.5	66 to 56 *	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

NOTE: 1. The lower limit shall apply at the transition frequencies.  
NOTE: 2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

#### 3.1.2 Measurement procedure

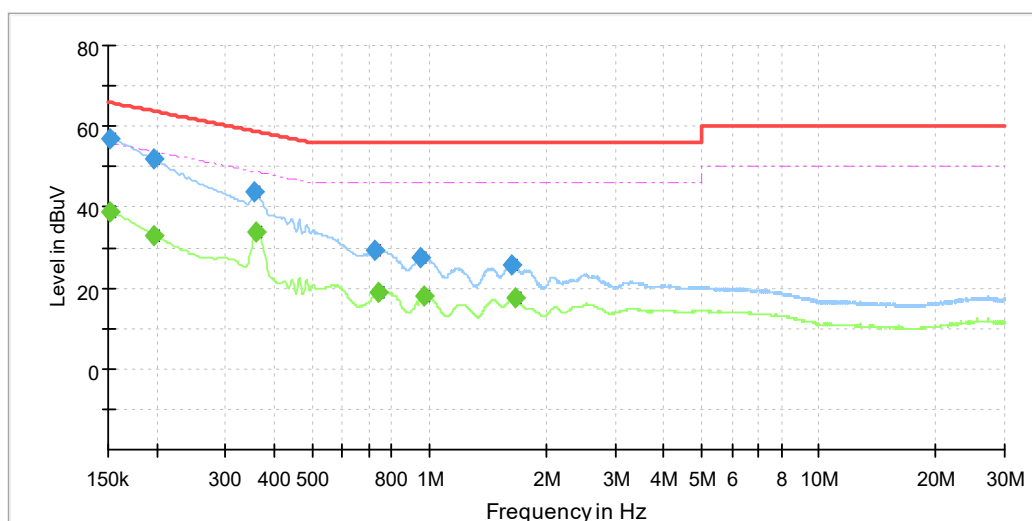
- The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the Test photographs) Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source. The equipment under test shall be placed on a support of non-metallic material, the height of which shall be 1.5m above the ground,
- The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.
- Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

#### 3.1.3 Test setup



## 3.1.4 Test results

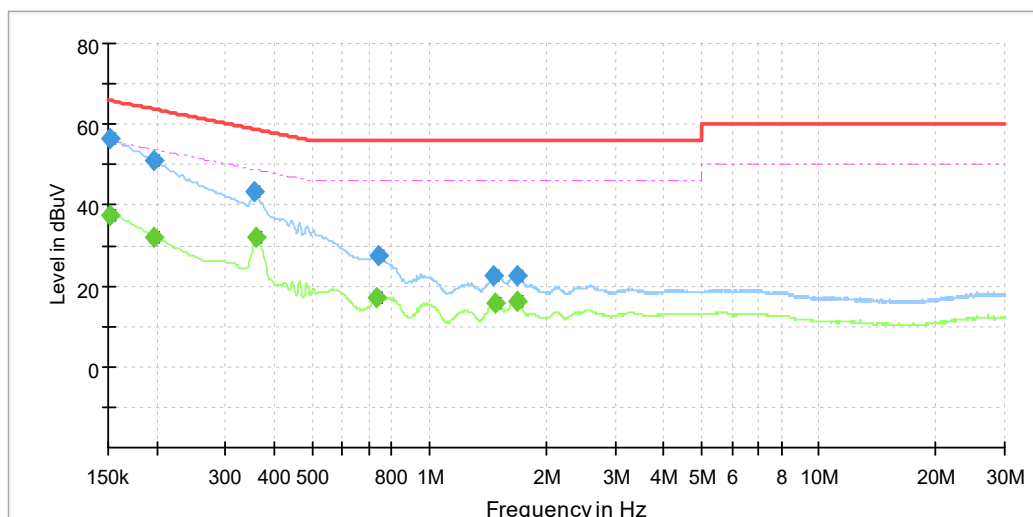
Test Mode	LORA Link	Frequency Range	150KHz ~ 30MHz
PHASE	Line (L)		



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.152	57.1	---	65.9	8.8	L1	19.5
2	0.152	---	38.6	55.9	17.2	L1	19.5
3	0.197	51.8	---	63.7	11.9	L1	19.5
4	0.197	---	33.2	53.7	20.6	L1	19.5
5	0.357	43.6	---	58.8	15.2	L1	19.5
6	0.359	---	33.9	48.7	14.8	L1	19.5
7	0.728	29.5	---	56.0	26.5	L1	19.6
8	0.737	---	18.7	46.0	27.3	L1	19.6
9	0.949	27.6	---	56.0	28.4	L1	19.6
10	0.969	---	17.9	46.0	28.1	L1	19.6
11	1.624	25.8	---	56.0	30.2	L1	19.6
12	1.662	---	17.7	46.0	28.3	L1	19.6

Remark: The emission levels of other frequencies were very low against the limit.

Test Mode	LORA Link	Frequency Range	150KHz ~ 30MHz
PHASE	Line (N)		



NO	Frequency (MHz)	QuasiPeak (dBuV)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line	Corr.Factor (dB)
1	0.152	56.3	---	65.9	9.6	N	19.5
2	0.152	---	37.7	55.9	18.2	N	19.5
3	0.197	50.9	---	63.7	12.8	N	19.5
4	0.197	---	32.3	53.7	21.5	N	19.5
5	0.357	43.5	---	58.8	15.3	N	19.6
6	0.359	---	32.0	48.7	16.7	N	19.6
7	0.733	---	16.9	46.0	29.1	N	19.6
8	0.737	27.5	---	56.0	28.5	N	19.6
9	1.464	22.4	---	56.0	33.6	N	19.6
10	1.482	---	15.6	46.0	30.4	N	19.6
11	1.680	---	16.0	46.0	30.0	N	19.6
12	1.687	22.4	---	56.0	33.6	N	19.6

Remark: The emission levels of other frequencies were very low against the limit.

## 3.2 RADIATED EMISSION AND BANDEDGE MEASUREMENT

### 3.2.1 Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

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

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

### 3.2.2 Measurement procedure

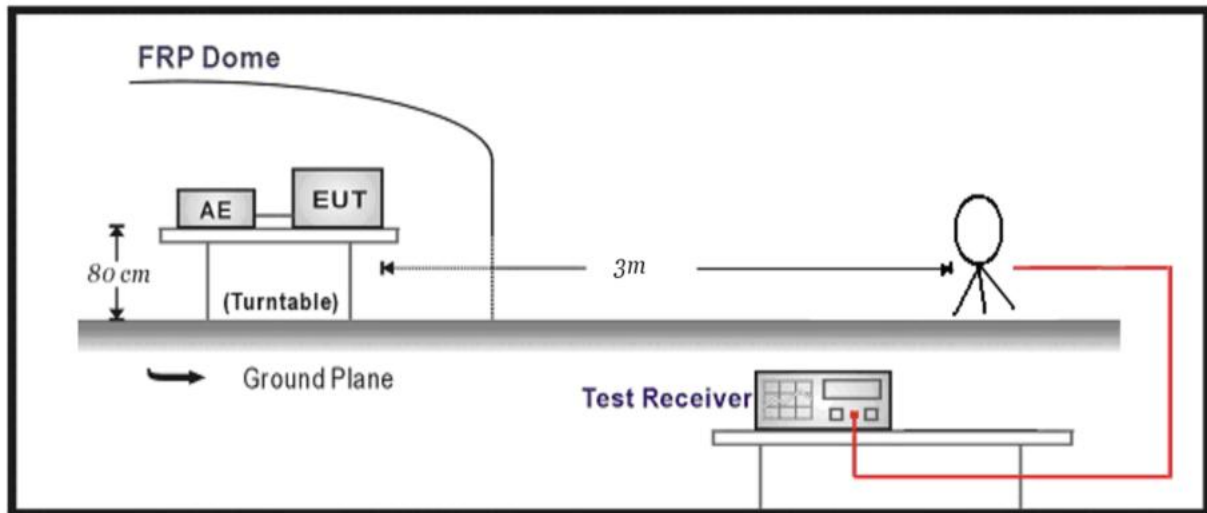
- The EUT was placed on the top of a rotating table 1.5 meters(above 1GHz) and 0.8 meters(below 1GHz) above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- For below 1GHz was used bilog antenna, and above 1GHz was used horn antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- For below 30MHz, a loop antenna with its vertical plane is place 3m from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. And the centre of the loop shall be 1m above the ground.
- During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using fresh batteries. The turntable was rotated to maximize the emission level.

**NOTE:**

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle  $< 98\%$ ) or 10Hz (Duty cycle  $> 98\%$ ) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.
5. The testing of the EUT was performed on all 3 orthogonal axes; the worst-case test configuration was reported on the file test setup photo.

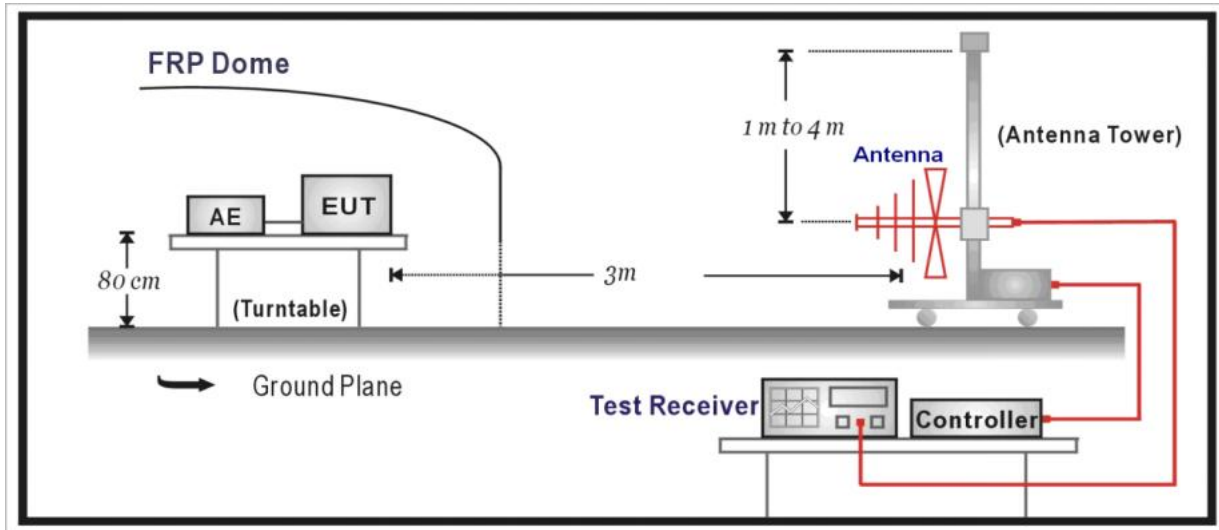
**3.2.3 Test setup**

Below 30MHz Test Setup:

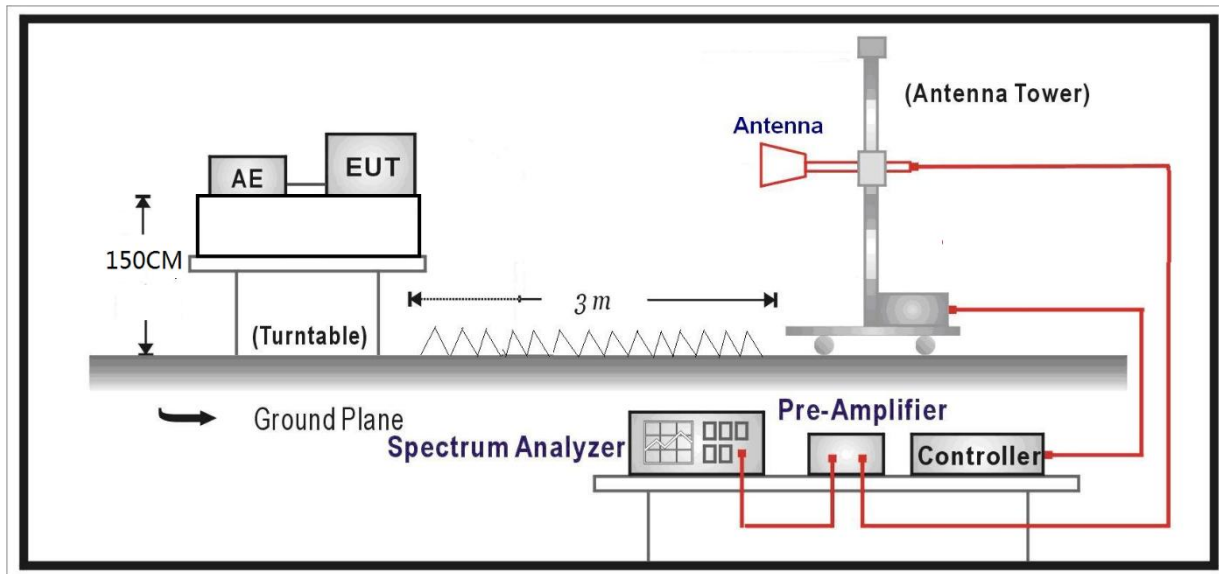




Below 1GHz Test Setup:

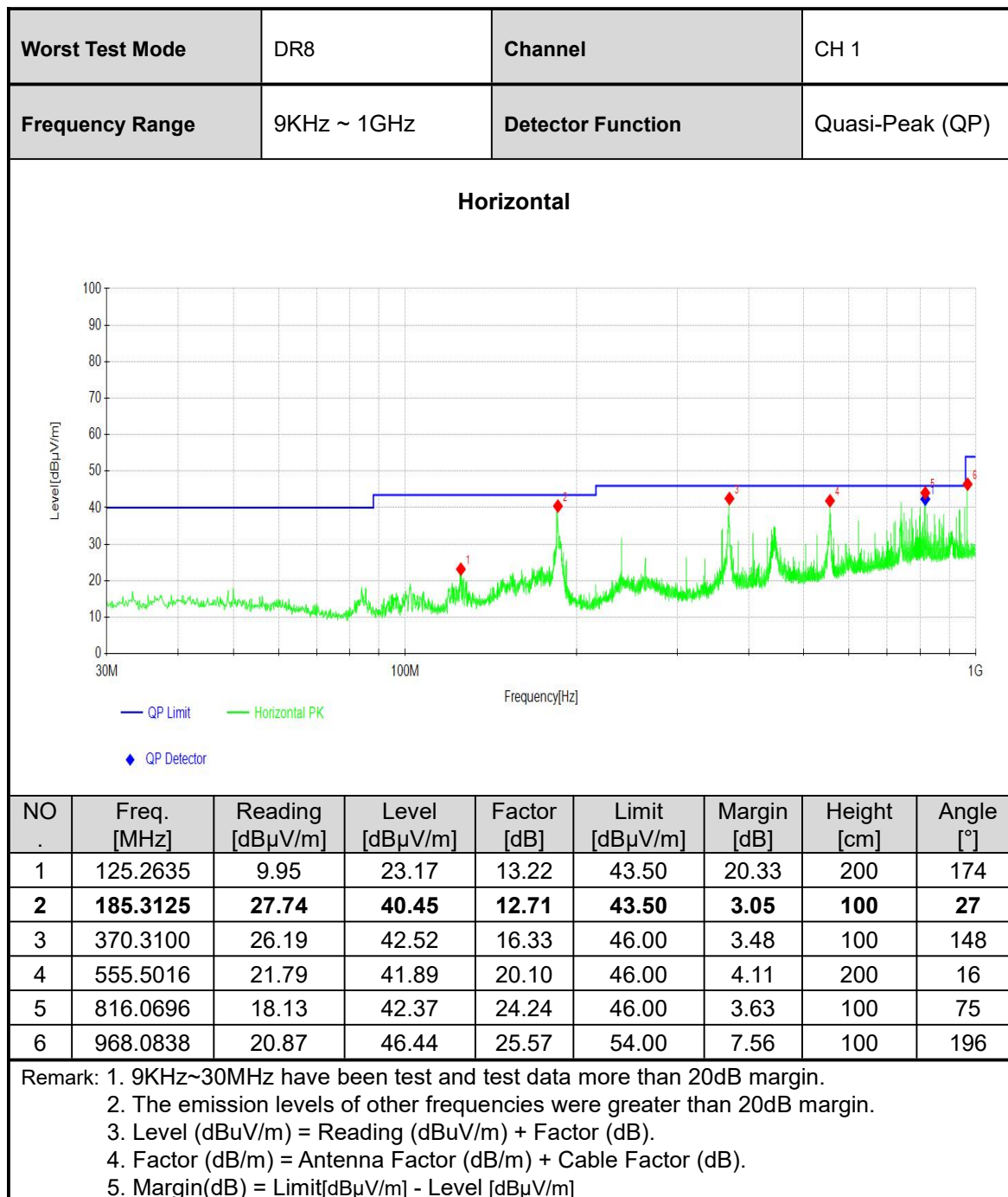


Above 1GHz Test Setup:

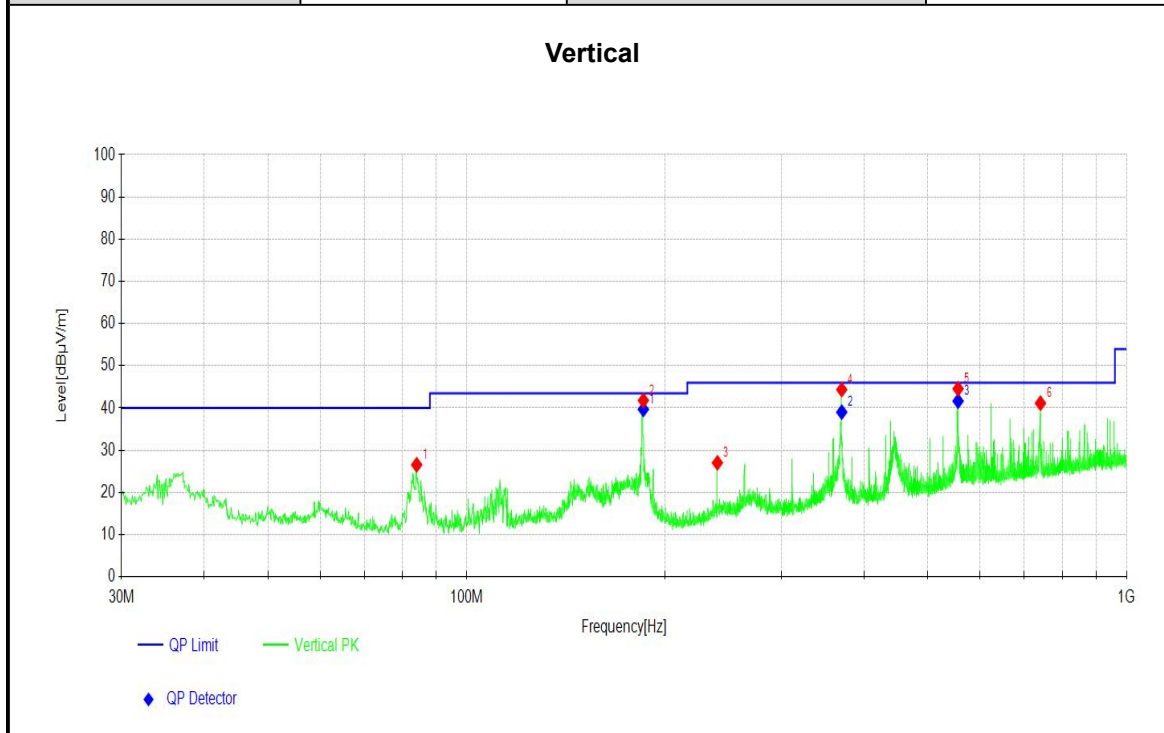


## 3.2.4 Test results

BELOW 1GHz WORST-CASE DATA:



Worst Test Mode	DR8	Channel	CH 1
Frequency Range	9KHz ~ 1GHz	Detector Function	Quasi-Peak (QP)



NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]
1	84.0344	16.16	26.55	10.39	40.00	13.45	100	122
2	185.3125	26.98	39.69	12.71	43.50	3.81	100	35
3	239.9290	13.58	27.02	13.44	46.00	18.98	200	99
4	370.2130	22.69	39.02	16.33	46.00	6.98	100	165
5	555.5986	21.56	41.66	20.10	46.00	4.34	200	62
6	740.4991	17.78	41.15	23.37	46.00	4.85	100	195

Remark: 1. 9KHz~30MHz have been test and test data more than 20dB margin.  
 2. The emission levels of other frequencies were greater than 20dB margin.  
 3. Level (dBμV/m) = Reading (dBμV/m) + Factor (dB).  
 4. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).  
 5. Margin(dB) = Limit[dBμV/m] - Level [dBμV/m]

**ABOVE 1GHz DATA**

Channel		CH 1		Frequency		903MHz			
Frequency Range		1GHz~9.3G		Detector Function		PK/AV			
Horizontal									
NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1806	43.52	7.74	51.26	54.00	2.74	253	142	AV
2	1806	47.71	7.74	55.45	74.00	18.55	253	136	PK
3	2709	44.05	11.23	55.28	74.00	18.72	210	329	PK
4	2709	35.61	11.23	46.84	54.00	7.16	210	215	AV
5	3612	43.23	14.88	58.11	74.00	15.89	103	36	PK
6	3612	35.33	14.88	50.21	54.00	3.79	103	102	AV
Vertical									
NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1806	46.26	7.74	54.00	74.00	20.00	148	23	PK
2	1806	40.99	7.74	48.73	54.00	5.27	148	23	AV
3	2709	35.95	11.23	47.18	54.00	6.82	117	261	AV
4	2709	44.20	11.23	55.43	74.00	18.57	117	50	PK
5	3612	43.85	14.88	58.73	74.00	15.27	196	76	PK
6	3612	35.32	14.88	50.20	54.00	3.80	196	37	AV
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBμV/m] - Level [dBμV/m]									



Channel		CH 8		Frequency		914.2MHz			
Frequency Range		1GHz~9.3G		Detector Function		PK/AV			
Horizontal									
NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1815.6	44.57	7.85	52.42	74.00	21.58	194	142	PK
2	1815.6	37.49	7.85	45.34	54.00	8.66	194	142	AV
3	2723.4	37.49	12.12	49.61	54.00	4.39	132	221	AV
4	2723.4	43.51	12.12	55.63	74.00	18.37	132	214	PK
5	3631.2	43.03	15.14	58.17	74.00	15.83	279	68	PK
6	3631.2	35.13	15.14	50.27	54.00	3.73	279	128	AV
Vertical									
NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1815.6	37.99	7.85	45.84	54.00	8.16	277	228	AV
2	1815.6	44.60	7.85	52.45	74.00	21.55	277	62	PK
3	2723.4	44.15	12.12	56.27	74.00	17.73	226	181	PK
4	2723.4	37.53	12.12	49.65	54.00	4.35	226	102	AV
5	3631.2	34.85	15.14	49.99	54.00	4.01	207	148	AV
6	3631.2	41.88	15.14	57.02	74.00	16.98	207	35	PK
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBμV/m] - Level [dBμV/m]									



Channel		CH 16		Frequency		927.5MHz			
Frequency Range		1GHz~9.3G		Detector Function		PK/AV			
Horizontal									
NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1855.0	44.94	8.05	52.99	74.00	21.01	259	359	PK
2	1855.0	37.53	8.05	45.58	54.00	8.42	259	2	AV
3	2782.5	36.57	11.24	47.81	54.00	6.19	126	51	AV
4	2782.5	44.54	11.24	55.78	74.00	18.22	126	97	PK
5	3710.0	43.32	15.34	58.66	74.00	15.34	146	341	PK
6	3710.0	35.41	15.34	50.75	54.00	3.25	146	183	AV
Vertical									
NO	Freq. [MHz]	Reading [dBμV/m]	Level [dBμV/m]	Factor [dB]	Limit [dBμV/m]	Margin [dB]	Height [cm]	Angle [°]	Remark
1	1855.0	37.06	8.05	45.11	54.00	8.89	106	90	AV
2	1855.0	44.17	8.05	52.22	74.00	21.78	106	90	PK
3	2782.5	44.23	11.24	55.47	74.00	18.53	133	169	PK
4	2782.5	36.38	11.24	47.62	54.00	6.38	133	216	AV
5	3710.0	35.50	15.34	50.84	54.00	3.16	289	295	AV
6	3710.0	43.13	15.34	58.47	74.00	15.53	289	136	PK
Remark: 1. The emission levels of other frequencies were greater than 20dB margin. 2. Level (dBuV/m) = Reading (dBuV/m) + Factor (dB). 3. Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB). 4. Margin(dB) = Limit[dBuV/m] - Level [dBuV/m]									

### 3.3 6dB BANDWIDTH MEASUREMENT

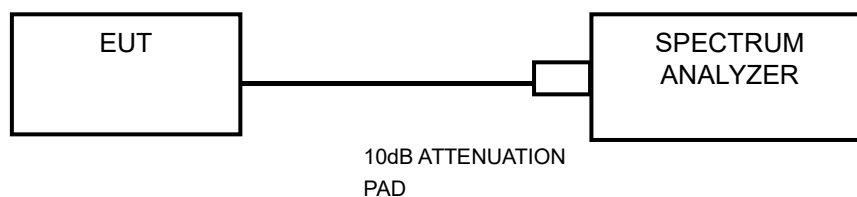
#### 3.3.1 Limits

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 3.3.2 Measurement procedure

- Set resolution bandwidth (RBW) = 100KHz
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

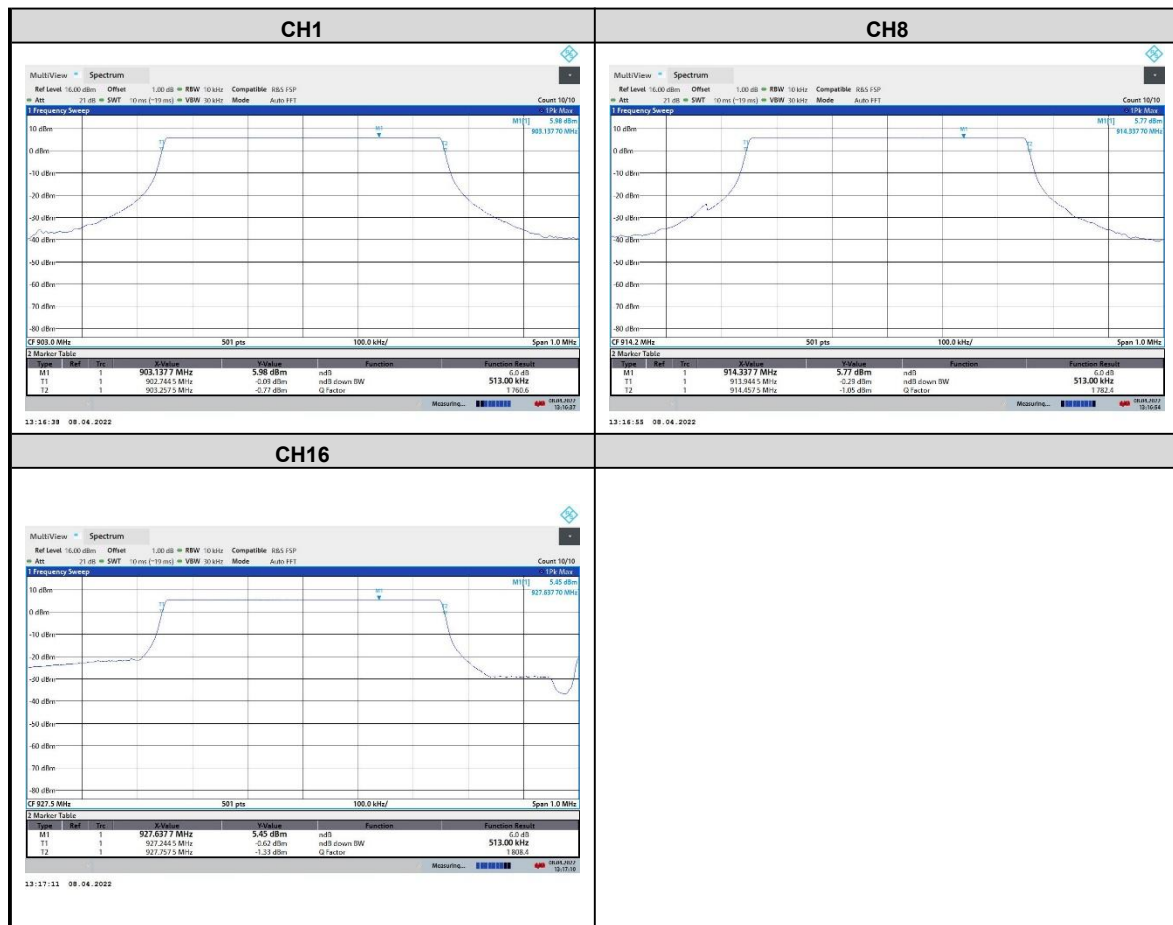
#### 3.3.3 Test setup





## 3.3.4 Test result

Mode	Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (kHz)
DR8	1	903.0	513	≥500
	8	914.2	513	≥500
	16	927.5	513	≥500





### 3.4 CONDUCTED OUTPUT POWER

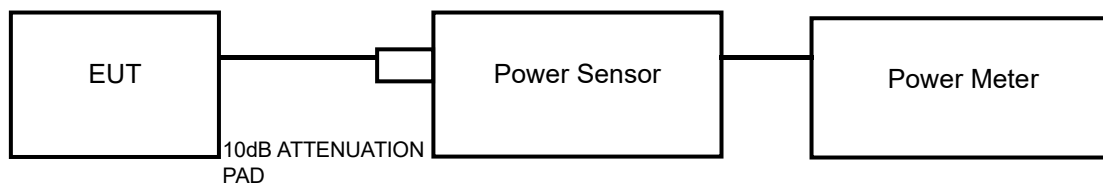
#### 3.4.1 Limits

Forsystems using digital modulation in the 2400–2483.5 MHz band: 1 Watt (30dBm).

#### 3.4.2 Measurement procedure

- A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor and set the detector to PEAK. Record the power level.
- An average power sensor was used on the output port of the EUT. A power meter was used to read the response of the average power sensor and set the detector to AVERAGE. Record the power level.

#### 3.4.3 Test setup





## 3.4.4 Test result

### PEAK OUTPUT POWER

#### GFSK

CHANNEL	Channel Frequency (MHz)	Peak Power (dBm)	Peak Power (mW)	Peak Power Limit (mW)	Verdict
1	903.0	22.64	183.654	1000	PASS
8	914.2	22.42	174.582	1000	PASS
16	927.5	22.09	161.808	1000	PASS

### AVERAGE OUTPUT POWER(For reference)

Mode	Channel Frequency (MHz)	Average Power (dBm)	Average Power (mW)	Average Power Limit (mW)	Verdict
1	903.0	5.37	3.443	1000	PASS
8	914.2	5.14	3.266	1000	PASS
16	927.5	4.80	3.020	1000	PASS

### 3.5 POWER SPECTRAL DENSITY MEASUREMENT

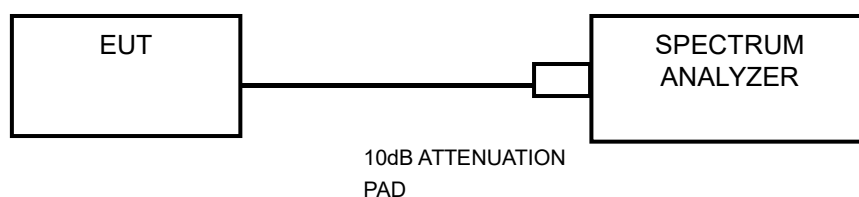
#### 3.5.1 Limits

The Maximum of Power Spectral Density Measurement is 8dBm/3KHz.

#### 3.5.2 Measurement procedure

- Set instrument center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set RBW to: 3KHz
- Set VBW  $\geq 3 \times$  RBW.
- Detector = peak
- Ensure that the number of measurement points in the sweep  $\geq 2 \times$  span/RBW.
- Sweep time = auto couple.
- Use the peak marker function to determine the maximum amplitude level.

#### 3.5.3 Test setup

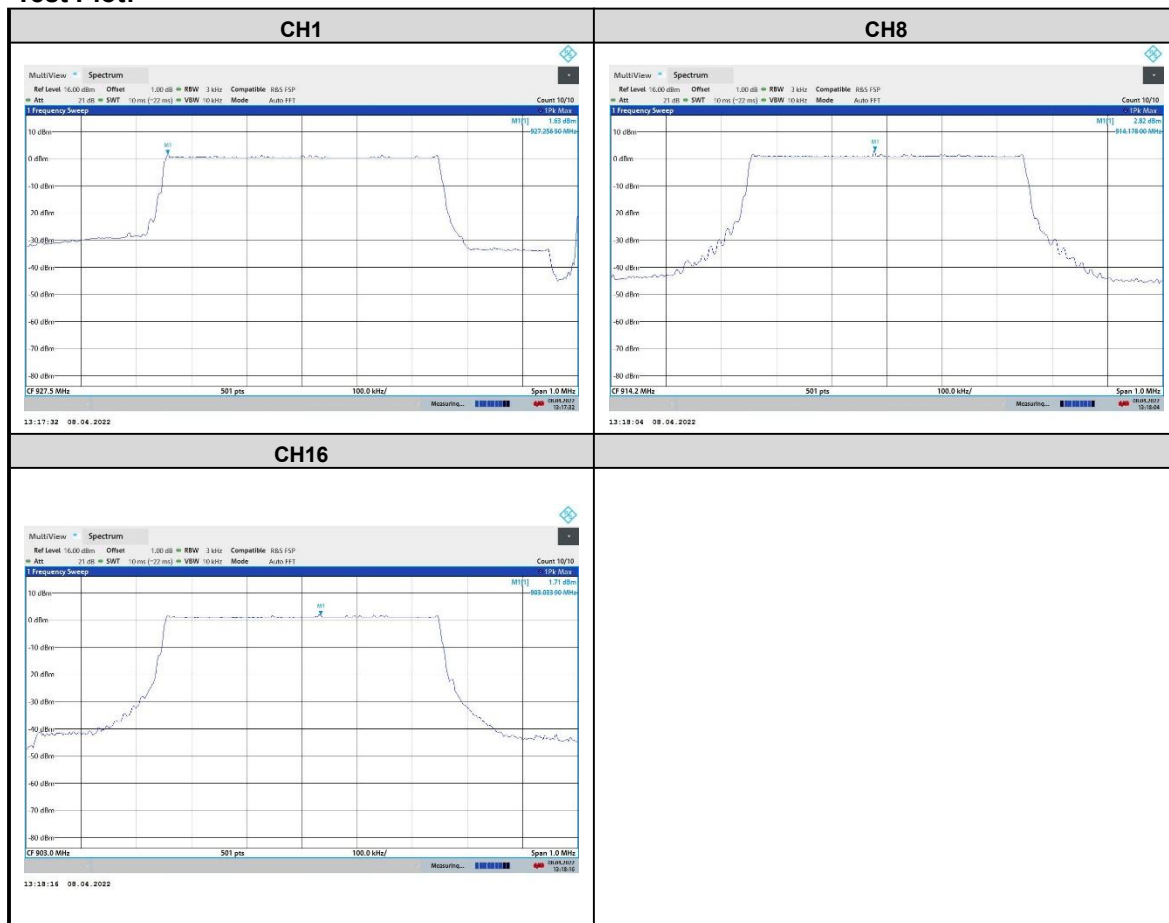




## 3.5.4 Test result

CHANNEL	CHANNEL FREQUENCY (MHz)	PSD(dBm/3kHz)	Limit (dBm/3kHz)	PASS / FAIL
1	903.0	1.65	8	PASS
8	914.2	2.82	8	PASS
16	927.5	1.71	8	PASS

### Test Plot:



### 3.6 OUT OF BAND EMISSION MEASUREMENT

#### 3.6.1 Limits

Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

#### 3.6.2 Measurement procedure

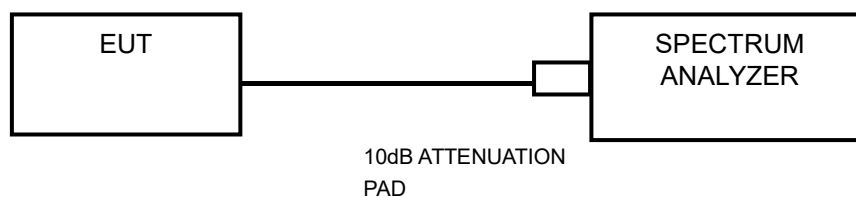
##### Measurement Procedure -Reference Level

- Set the RBW = 100 kHz.
- Set the VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHzband segment within the fundamental EBW.

##### Measurement Procedure –Unwanted Emission Level

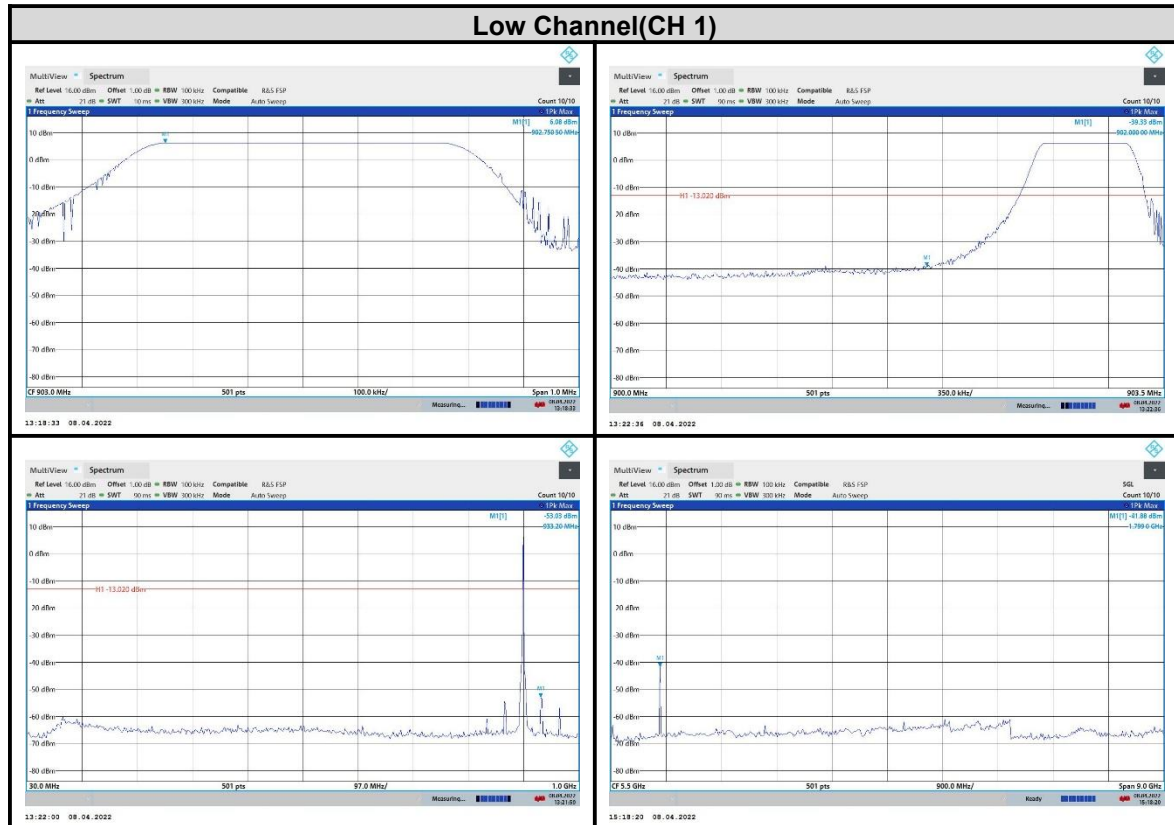
- Set RBW = 100 kHz.
- Set VBW  $\geq$  300 kHz.
- Set span to encompass the spectrum to be examined
- Detector = peak.
- Trace Mode = max hold.
- Sweep = auto couple.

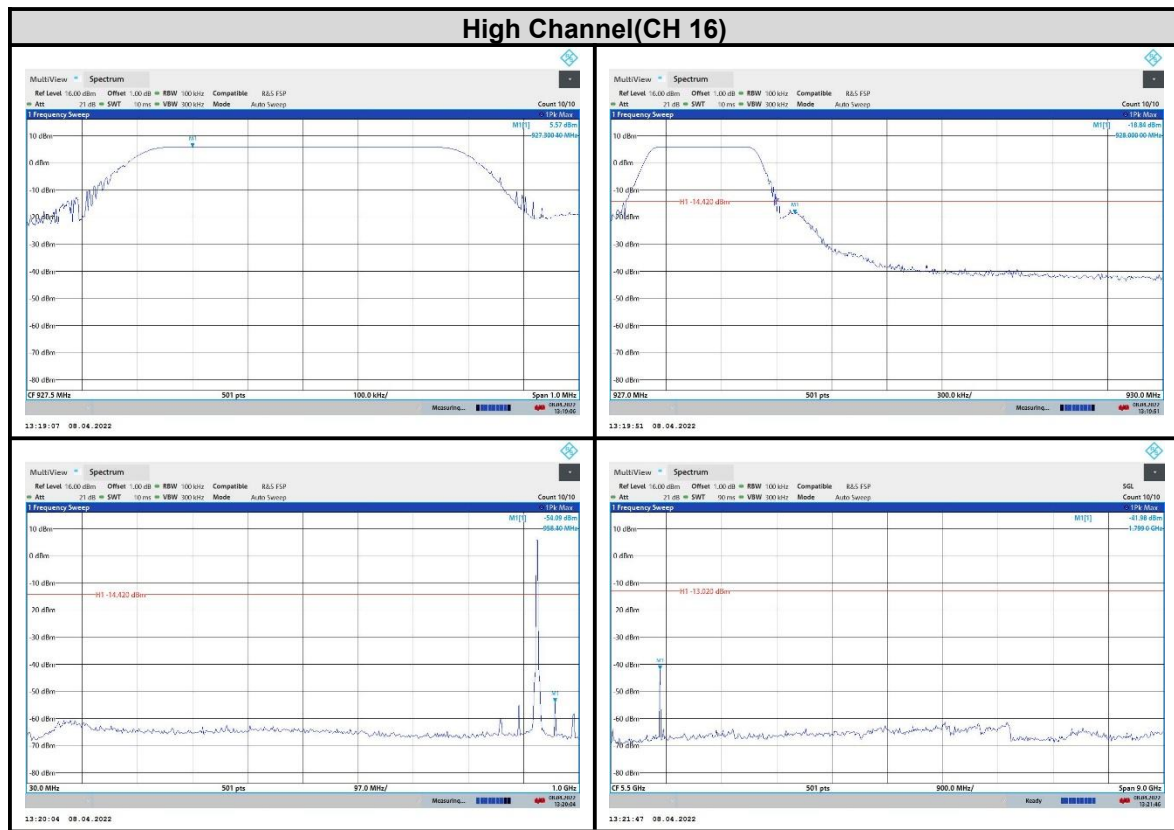
#### 3.6.3 Test setup



## 3.6.4 Test result

The spectrum plots are attached on the following images.







## 4 PHOTOGRAPHS OF TEST SETUP

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





## 5 PHOTOGRAPHS OF THE EUT

Please refer to the attached file (External Photos report and Internal Photos).



## Important

- (1) The test report is valid with the official seal of the laboratory and the signatures of Test engineer, Author and Reviewer simultaneously.
- (2) The test report is invalid if altered.
- (3) Any photocopies or part photocopies in the test report are forbidden without the written permission from the laboratory.
- (4) Objections to the test report must be submitted to the laboratory within 15 days.
- (5) Generally, commission test is responsible for the tested samples only.

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