

TEST REPORT

Application No.: GZCR2106020401AT
Applicant: Guangzhou Andea Electronics Technology Co., Ltd.
Address of Applicant: Room 401, Building H, Jingye San Street, Yushu Industrial Park, Economic And Technological Development Zone, Guangzhou
Manufacturer: Guangzhou Andea Electronics Technology Co., Ltd.
Address of Manufacturer: Room 401, Building H, Jingye San Street, Yushu Industrial Park, Economic And Technological Development Zone, Guangzhou
Factory: Guangzhou Andea Electronics Technology Co., Ltd.
Address of Factory: Room 401, Building H, Jingye San Street, Yushu Industrial Park, Economic And Technological Development Zone, Guangzhou
Equipment Under Test (EUT):
EUT Name: HF RFID Embedded Reader
Model No.: PBYTJ160
Trade Mark: 
Standard(s) : 47 CFR Part 15, Subpart C 15.225
Date of Receipt: 2021-06-08
Date of Test: 2021-06-16 to 2021-07-23
Date of Issue: 2021-07-26

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Kobe Jian
EMC Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-07-26		Original

Authorized for issue by				
		Kevin Zhang		
		Kevin Zhang/Project Engineer		
		Ricky Liu		
		Ricky Liu/Reviewer		

2 Test Summary

Radio Spectrum Technical Requirement				
Item	Standard	Method	Requirement	Result
Antenna Requirement	47 CFR Part 15, Subpart C 15.225	N/A	47 CFR Part 15, Subpart C 15.203	Pass

Radio Spectrum Matter Part				
Item	Standard	Method	Requirement	Result
20dB Bandwidth	47 CFR Part 15, Subpart C 15.225	ANSI C63.10 (2013) Section 6.9	47 CFR Part 15, Subpart C 15.215	Pass
Conducted Emissions at Mains Terminals (150kHz-30MHz)		ANSI C63.10 (2013) Section 6.2	47 CFR Part 15, Subpart C 15.207	Pass
Emission Mask		ANSI C63.10 (2013) Section 6.4	47 CFR Part 15, Subpart C 15.225(a)&(b)&(C)	Pass
Frequency tolerance		ANSI C63.10 (2013) Section 6.8	47 CFR Part 15, Subpart C 15.225(e)	Pass
Radiated Emissions (30MHz-1GHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass
Radiated Emissions (9kHz-30MHz)		ANSI C63.10 (2013) Section 6.4&6.5	47 CFR Part 15, Subpart C 15.225(d) & 15.209	Pass

Note:

E.U.T./EUT means Equipment Under Test.

Pass means the test result passed the test standard requirement, please find the detailed decision rule in the report relative section.

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4 General Information

4.1 Details of E.U.T.

Power supply:	DC 12 V
Cable(s):	Input ports with shielded cables with 2 ferrites in both end (2.4 m)
Test Voltage:	AC 120 V, 60 Hz powered by DC Power Supply refer to section 4.2
Antenna Type	Dedicated Antenna
Channel Spacing	N/A
Modulation Type	ASK declared by applicant
Number of Channels	1
Operation Frequency	13.56MHz
Function:	13.56MHz HF RFID Embedded Reader
S/N	M1
Hardware Version	RL17P_V00.04
Firmware	SV01
Test Software	N/A
Power Setting	Default

4.2 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
DC Power Supply	GWINSTEK	GPS-3030DD (Input: AC100-240V, 50/60Hz; Output: DC Max.30V, 3A)	EMC0008
RFID Card	Offered by applicant	None	None

4.3 Measurement Uncertainty

Test Item	Measurement Uncertainty
20dB Bandwidth	± 3%
Conducted Emissions at Mains Terminals (150kHz-30MHz)	3.12dB
Emission Mask	± 4.5dB (Below 1GHz)
Frequency tolerance	± 3%
Radiated Emissions (30MHz-1GHz)	5.06dB (3m) 4.46dB (10m)
Radiated Emissions (9kHz-30MHz)	± 4.5dB (Below 1GHz)

4.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou Branch EMC Laboratory,
198 Kezhu Road, Sciencetech Park, Guangzhou Economic & Technology Development District,
Guangzhou, China 510663

Tel: +86 20 82155555 Fax: +86 20 82075059

No tests were sub-contracted.

4.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **NVLAP (Lab Code: 200611-0)**

SGS-CSTC Standards Technical Services Co., Ltd., Guangzhou EMC Laboratory is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP/NIST). NVLAP Code: 200611-0.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

- **ACMA**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory can also perform testing for the Australian/New Zealand Regulatory Compliance Mark (RCM).

- **SGS UK(Certificate No.: 32), SGS-TUV SAARLAND and SGS-FIMKO**

Have approved SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory as a supplier of EMC TESTING SERVICES and SAFETY TESTING SERVICES.

- **CNAS (Lab Code: L0167)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been assessed and in compliance with CNAS-CL01:2018 accreditation criteria for testing laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of Testing Laboratories.

- **FCC Recognized Accredited Test Firm(Registration No.: 486818)**

SGS-CSTC Standards Technical Services Co., Ltd., EMC Laboratory has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: CN5016, Test Firm Registration Number: 486818.

- **ISED (Registration No.: 4620B, CAB identifier: CN0052)**

SGS-CSTC Standards Technical Services Co., Ltd., has been registered by Innovation Science and Economic Development Canada for Wireless Device Testing laboratories to test to Canadian radio equipment requirements. Registration No. 4620B, CAB identifier: CN0052.

- **VCCI (Registration No.: R-12460, C-12584, G-20107 and T-11179)**

The 10m Semi-anechoic chamber, 966 Anechoic Chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-12460, C-12584, G-20107 and T-11179 respectively.

- **CBTL (Lab Code: TL129)**

SGS-CSTC Standards Technical Services Co., Ltd., E&E Laboratory has been assessed and fully comply with the requirements of ISO/IEC 17025:2017, the Basic Rules, IECEE 01 and Rules of procedure IECEE 02, and the relevant IECEE CB-Scheme Operational documents.



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4.6 Deviation from Standards

None

4.7 Abnormalities from Standard Conditions

None



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5 Equipment List

20dB Bandwidth					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01

Conducted Emissions at Mains Terminals (150kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Shielding Room	ChangZhou ZhongYu	8m x 3m x 3.8m	EMC0306	N/A	N/A
Two-Line V-Network	Rohde & Schwarz	ENV216	EMC0118	2021-01-08	2022-01-06
Two-Line V-Network-GZ	Rohde & Schwarz	ENV216	EMC2135	2020-09-25	2021-09-24
Coaxial Cable	HangTianXing	2m	EMC0107	2020-09-09	2022-09-08
Test Software E3c	Audix	Ver. 5.4.1221b	GZE100-62	N/A	N/A
EMI Test Receiver(9kHz-3.6GHz)	Rohde & Schwarz	ESR4	EMC2221	2021-06-01	2022-05-31

Emission Mask					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25

Frequency tolerance					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
EXA Signal Analyzer(10Hz-44GHz)	Agilent Technologies	N9010A	EMC2138	2020-09-17	2021-09-16
6dB Attenuator	HP	8491A	EMC2062	2020-04-15	2022-04-14
Test Software JS1120-3	HangTianXing	V2.6	GZE100-69	N/A	N/A
MI CABLE	SGS-EMC	0.8M	EMC2136	2019-11-02	2021-11-01
Temperature Chamber	GZ GongWen Co.Ltd.	GDJW-100	EMC0039	2021-07-04	2022-07-03



Radiated Emissions (30MHz-1GHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Trilog Broadband Antenna(25MHz-1GHz)-Lab	SCHWARZBECK MESS-ELEKTRONIK	VULB 9168	SEM003-18	2019-02-22	2022-02-22
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25

Radiated Emissions (9kHz-30MHz)					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
Chamber cable	HangTianXing	N/A	EMC0542	2020-09-09	2022-09-08
Amplifier(9kHz-1.3GHz)	HP	8447F	EMC2065	2021-05-19	2022-05-18
Active Loop Antenna-RED	ETS-Lindgren	6502	EMC2190	2019-12-27	2021-12-26
10m Semi-Anechoic Chamber	ETS	N/A	EMC0530	2019-10-20	2022-10-19
Test Software E3	Audix	Ver.6.120110a	GZE100-61	N/A	N/A
EMI Test Receiver(1Hz-8GHz)	Rohde & Schwarz	ESW8	EMC2220	2021-05-26	2022-05-25

General used equipment					
Equipment	Manufacturer	Model No	Inventory No	Cal Date	Cal Due Date
DMM	Fluke	73	EMC0006	2021-07-05	2022-07-05
DMM	Fluke	73	EMC0007	2021-07-05	2022-07-05



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6 Radio Spectrum Technical Requirement

6.1 Antenna Requirement

6.1.1 Test Requirement:

47 CFR Part 15, Subpart C 15.203

6.1.2 Conclusion

Standard Requirement:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

EUT Antenna:

The antenna is integrated on the main PCB and no consideration of replacement.

Antenna location: Refer to internal photo.

7 Radio Spectrum Matter Test Results

7.1 20dB Bandwidth

Test Requirement 47 CFR Part 15, Subpart C 15.215

Test Method: ANSI C63.10 (2013) Section 6.9

7.1.1 E.U.T. Operation

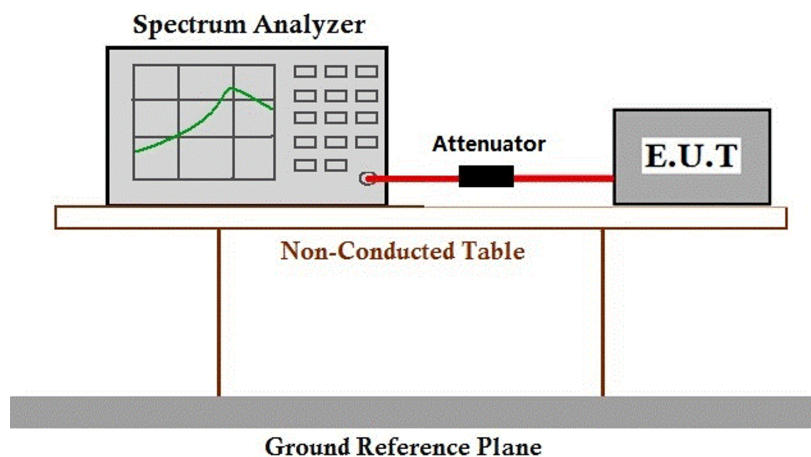
Operating Environment:

Temperature: 24 °C Humidity: 55 % RH Atmospheric Pressure: 1005 mbar

7.1.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode with modulation for PBYTJ160 (M1)

7.1.3 Test Setup Diagram



7.1.4 Measurement Procedure and Data

Cable Loss= 0.9dB

operating frequency	20dB Bandwidth	Limit	Result
13.560 MHz	66.31 kHz	---	Pass



7.2 Conducted Emissions at Mains Terminals (150kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.207

Test Method: ANSI C63.10 (2013) Section 6.2

Limit:

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

7.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.5 °C

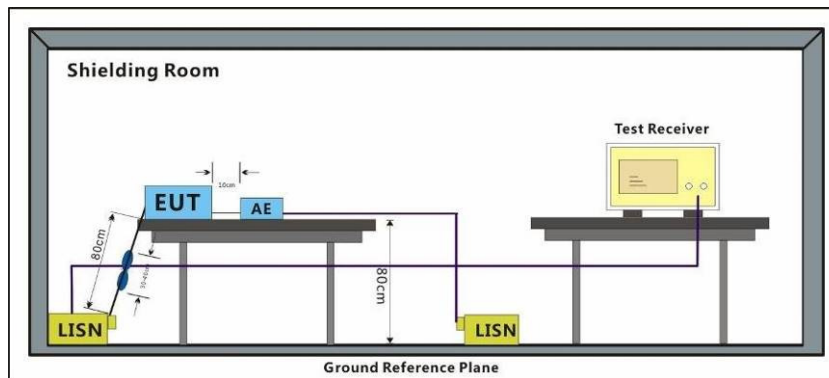
Humidity: 52 % RH

Atmospheric Pressure: 1010 mbar

7.2.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode with modulation for PBYTJ160 (M1)

7.2.3 Test Setup Diagram

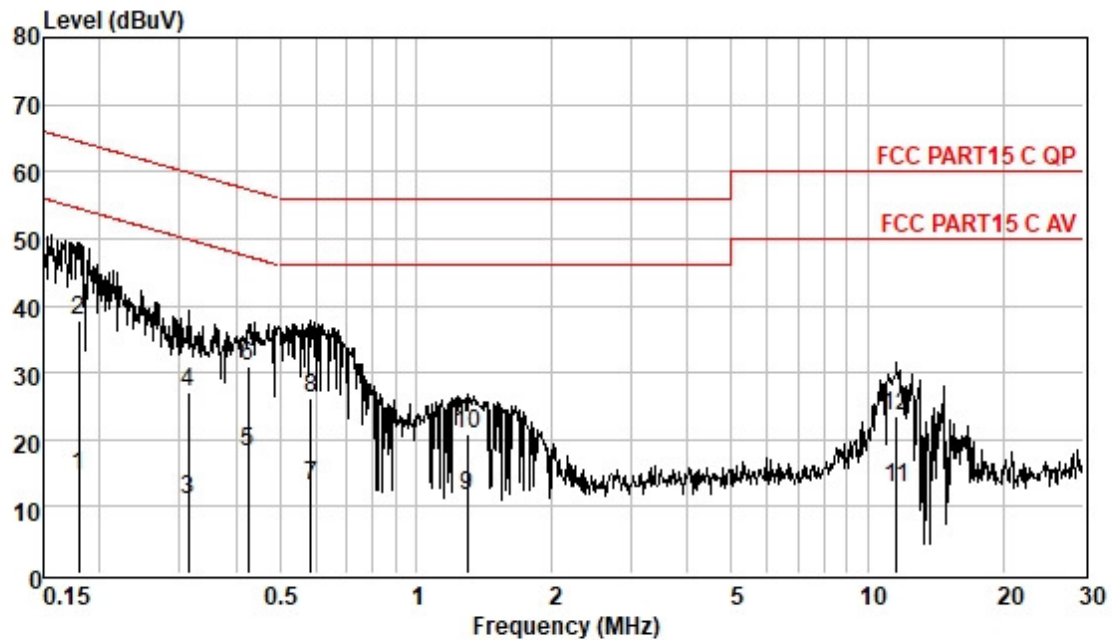


7.2.4 Measurement Procedure and Data

An initial pre-scan was performed with peak detector. Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.

Measured Level = Read level + Cable Loss + LISN Factor

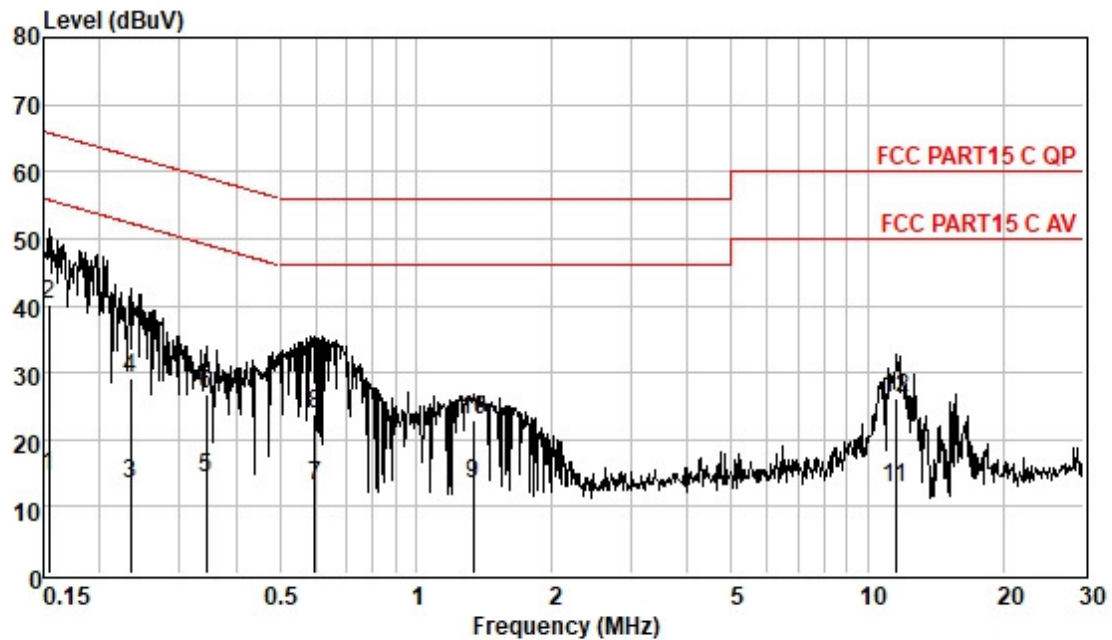
Test Mode: 02; Line: Live line



Pol : LINE
Mode : M1
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.18	4.75	0.06	9.62	14.43	54.50	-40.07	Average
0.18	28.04	0.06	9.62	37.72	64.50	-26.78	QP
0.31	1.25	0.06	9.62	10.93	49.88	-38.95	Average
0.31	17.35	0.06	9.62	27.03	59.88	-32.85	QP
0.43	8.39	0.06	9.62	18.07	47.33	-29.26	Average
0.43	21.38	0.06	9.62	31.06	57.33	-26.27	QP
0.59	3.39	0.07	9.63	13.09	46.00	-32.91	Average
0.59	16.36	0.07	9.63	26.06	56.00	-29.94	QP
1.30	1.89	0.09	9.61	11.59	46.00	-34.41	Average
1.30	11.08	0.09	9.61	20.78	56.00	-35.22	QP
11.56	2.79	0.26	9.71	12.76	50.00	-37.24	Average
11.56	13.60	0.26	9.71	23.57	60.00	-36.43	QP

Test Mode: 02; Line: Neutral Line



Pol : NEUTRAL
Mode : M1
Model :

Frequency MHz	Read Level dBuV	Cable Loss dB	LISN Factor dB	Measured Level dBuV	Limit Line dBuV	Over Limit dB	Remark
0.15	4.94	0.06	9.55	14.55	55.78	-41.23	Average
0.15	30.45	0.06	9.55	40.06	65.78	-25.72	QP
0.23	3.64	0.06	9.55	13.25	52.30	-39.05	Average
0.23	19.67	0.06	9.55	29.28	62.30	-33.02	QP
0.34	4.78	0.06	9.54	14.38	49.09	-34.71	Average
0.34	17.18	0.06	9.54	26.78	59.09	-32.31	QP
0.60	3.47	0.07	9.54	13.08	46.00	-32.92	Average
0.60	14.16	0.07	9.54	23.77	56.00	-32.23	QP
1.34	3.65	0.09	9.55	13.29	46.00	-32.71	Average
1.34	13.37	0.09	9.55	23.01	56.00	-32.99	QP
11.50	2.88	0.26	9.61	12.75	50.00	-37.25	Average
11.50	16.38	0.26	9.61	26.25	60.00	-33.75	QP

7.3 Emission Mask

Test Requirement 47 CFR Part 15, Subpart C 15.225(a)&(b)&(C)

Test Method: ANSI C63.10 (2013) Section 6.4

Limit:

(a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Below 30MHz

The test was performed at a 10m test site.

The factor calculated by the following equation:

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right)$$

where

FS_{limit}	is the calculation of field strength at the limit distance, expressed in dBμV/m
FS_{max}	is the measured field strength, expressed in dBμV/m
d_{measure}	is the distance of the measurement point from the EUT
d_{limit}	is the reference distance or the distance of the $\lambda/2\pi$ point

The limit at 10m test distance is below:

The factor of field strength of any emissions within the band 13.553-13.567 MHz shall be 19.08 dB at 10 meters.

7.3.1 E.U.T. Operation

Operating Environment:

Temperature: 21.6 °C

Humidity: 53.0 % RH

Atmospheric Pressure: 1010 mbar

7.3.2 Test Mode Description

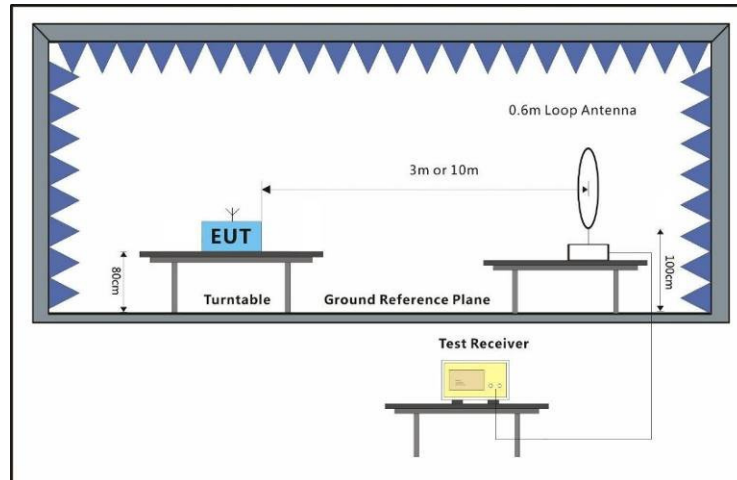
Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode with modulation for PBYTJ160 (M1)



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7.3.3 Test Setup Diagram



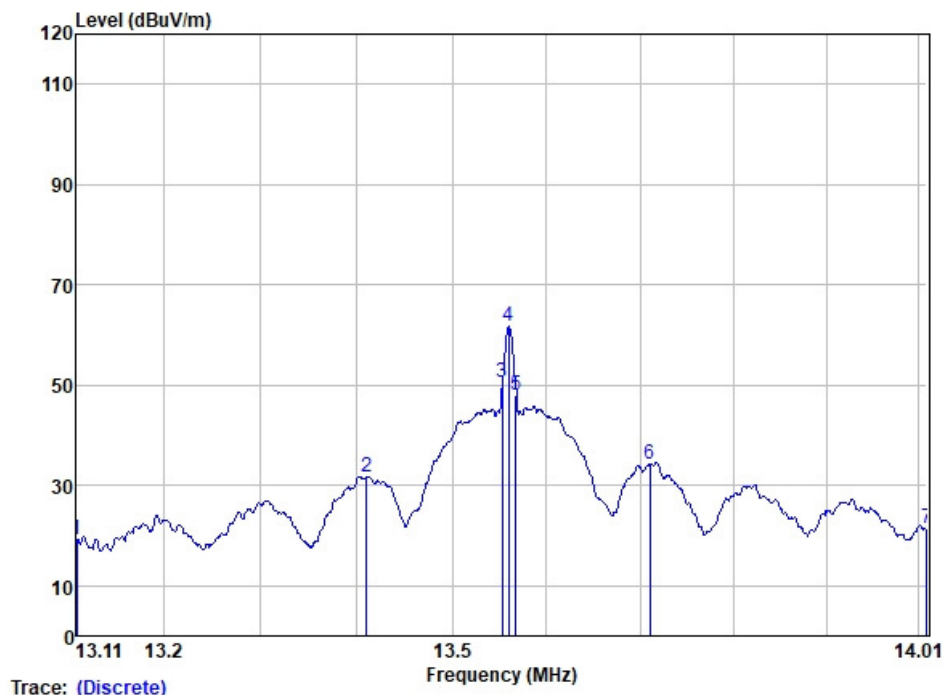
7.3.4 Measurement Procedure and Data

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Measured Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor + Extrapolation Correction

Test Mode: 02; Polarity: Horizontal



Site : SGS
Condition :
Job : HORIZONTAL
Model : PBYTJ160
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	13.11	39.03	9.07	0.40	29.25	19.25			HORIZONTAL	
2	13.41	51.50	8.99	0.40	29.25	31.64			HORIZONTAL	
3	13.55	70.60	8.96	0.40	29.25	50.71			HORIZONTAL	
4	13.56	81.52	8.96	0.40	29.25	61.63			HORIZONTAL	
5	13.57	67.80	8.96	0.40	29.25	47.91			HORIZONTAL	
6	13.71	54.16	8.93	0.40	29.25	34.24			HORIZONTAL	
7	14.01	41.54	8.87	0.40	29.25	21.56			HORIZONTAL	

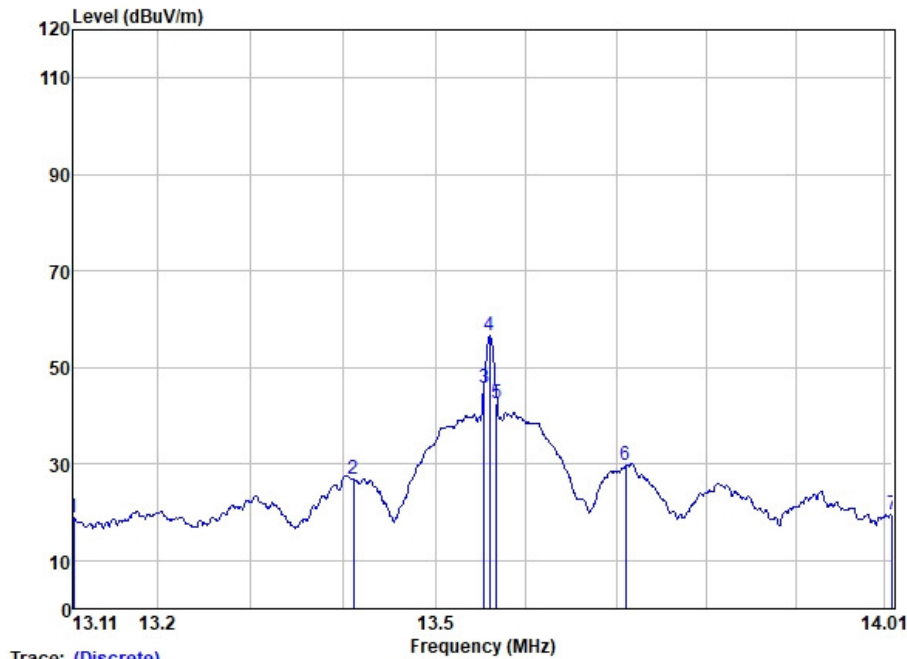
Frequency (MHz)	Level (dBuV/m) @10m	Limit (dBuV/m) @30m	Convert Factor (dB)	Level (dBuV/m) @ 30m	Over limit (dB)
13.110	19.25	29.54	19.08	0.17	-29.37
13.410	31.64	40.51	19.08	12.56	-27.95
13.553	50.71	50.47	19.08	31.63	-18.84
**13.560	61.63	84	19.08	42.55	-41.45
13.567	47.91	50.47	19.08	28.83	-21.64
13.710	34.24	40.51	19.08	15.16	-25.35
14.010	21.56	29.54	19.08	2.48	-27.06

**Remark: This is the main operating frequency of the EUT.



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Test Mode: 02; Polarity: Vertical



Site : SGS
 Condition :
 Job :
 Model : PBYTJ160
 Power :
 Test Mode :

VERTICAL

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	13.11	38.51	9.07	0.40	29.25	18.73			VERTICAL	
2	13.41	46.81	8.99	0.40	29.25	26.95			VERTICAL	
3	13.55	65.56	8.96	0.40	29.25	45.67			VERTICAL	
4	13.56	76.38	8.96	0.40	29.25	56.49			VERTICAL	
5	13.57	62.54	8.96	0.40	29.25	42.65			VERTICAL	
6	13.71	49.65	8.93	0.40	29.25	29.73			VERTICAL	
7	14.01	39.35	8.87	0.40	29.25	19.37			VERTICAL	

Frequency (MHz)	Level (dBuV/m) @10m	Limit (dBuV/m) @30m	Convert Factor (dB)	Level (dBuV/m) @ 30m	Over limit (dB)
13.110	18.73	29.54	19.08	-0.35	-29.89
13.410	26.95	40.51	19.08	7.87	-32.64
13.553	45.67	50.47	19.08	26.59	-23.88
**13.560	56.49	84	19.08	37.41	-46.59
13.567	42.65	50.47	19.08	23.57	-26.9
13.710	29.73	40.51	19.08	10.65	-29.86
14.010	19.37	29.54	19.08	0.29	-29.25

**Remark: This is the main operating frequency of the EUT.



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7.4 Frequency tolerance

Test Requirement 47 CFR Part 15, Subpart C 15.225(e)
Test Method: ANSI C63.10 (2013) Section 6.8
Limit: $\pm 0.01\%$ ($\pm 1.356\text{kHz}$)

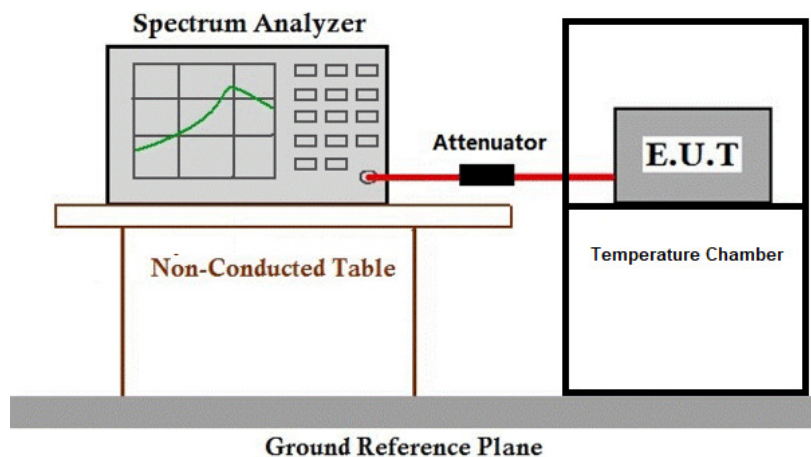
7.4.1 E.U.T. Operation

Operating Environment:
Temperature: 24 °C Humidity: 56 % RH Atmospheric Pressure: 1005 mbar

7.4.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode with modulation for PBYTJ160 (M1)

7.4.3 Test Setup Diagram



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7.4.4 Measurement Procedure and Data

M1

At startup:

Measurement Conditions		Limit: $\pm 100\text{ppm}$		Verdict
Voltage (V DC)	Temperature ($^{\circ}\text{C}$)	Frequency Measured (MHz)	Test data (ppm)	
$V_{\text{norm}} : 12$	-20	13.561211	52.43	PASS
	-10	13.561233	54.05	PASS
	0	13.561188	50.74	PASS
	+10	13.561292	58.40	PASS
	$T_{\text{normal}} : +20$	13.5605	Ref	PASS
	+30	13.561259	55.97	PASS
	+40	13.561167	49.19	PASS
	+50	13.561108	44.84	PASS
$V_{\text{max}} : 13.2$	$T_{\text{normal}} : +20$	13.56117	49.41	PASS
$V_{\text{min}} : 10.8$		13.561091	43.58	PASS

At 2 minutes later:

Measurement Conditions		Limit: $\pm 100\text{ppm}$		Verdict
Voltage (V DC)	Temperature ($^{\circ}\text{C}$)	Frequency Measured (MHz)	Test data (ppm)	
$V_{\text{norm}} : 12$	-20	13.561179	50.07	PASS
	-10	13.561327	60.99	PASS
	0	13.561047	40.34	PASS
	+10	13.561242	54.72	PASS
	$T_{\text{normal}} : +20$	13.5605	Ref	PASS
	+30	13.561296	58.70	PASS
	+40	13.561001	36.95	PASS
	+50	13.56135	62.68	PASS
$V_{\text{max}} : 13.2$	$T_{\text{normal}} : +20$	13.561192	51.03	PASS
$V_{\text{min}} : 10.8$		13.561201	51.69	PASS

7.4.5



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At 5 minutes later:

Measurement Conditions		Limit: $\pm 100\text{ppm}$		Verdict
Voltage (V DC)	Temperature ($^{\circ}\text{C}$)	Frequency Measured (MHz)	Test data (ppm)	
$V_{\text{norm}} : 12$	-20	13.561303	59.22	PASS
	-10	13.561155	48.30	PASS
	0	13.561338	61.80	PASS
	+10	13.561101	44.32	PASS
	$T_{\text{normal}} : +20$	13.5605	Ref	PASS
	+30	13.561063	41.52	PASS
	+40	13.561262	56.19	PASS
	+50	13.561005	37.24	PASS
$V_{\text{max}} : 13.2$	$T_{\text{normal}} : +20$	13.561288	58.11	PASS
$V_{\text{min}} : 10.8$		13.561252	55.46	PASS

At 10 minutes later:

Measurement Conditions		Limit: $\pm 100\text{ppm}$		Verdict
Voltage (V DC)	Temperature ($^{\circ}\text{C}$)	Frequency Measured (MHz)	Test data (ppm)	
$V_{\text{norm}} : 12$	-20	13.561324	60.76	PASS
	-10	13.561336	61.65	PASS
	0	13.56133	61.21	PASS
	+10	13.561291	58.33	PASS
	$T_{\text{normal}} : +20$	13.5605	Ref	PASS
	+30	13.561097	44.02	PASS
	+40	13.561098	44.10	PASS
	+50	13.561248	55.16	PASS
$V_{\text{max}} : 13.2$	$T_{\text{normal}} : +20$	13.56134	61.94	PASS
$V_{\text{min}} : 10.8$		13.561158	48.52	PASS

7.5 Radiated Emissions (30MHz-1GHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Limit:

Frequency	Field strength (microvolt/meter)	Limit (dBuV/m)	Remark	Measurement distance (m)
30MHz-88MHz	100	40.0	Quasi-peak	3
88MHz-216MHz	150	43.5	Quasi-peak	3
216MHz-960MHz	200	46.0	Quasi-peak	3
960MHz-1GHz	500	54.0	Quasi-peak	3

7.5.1 E.U.T. Operation

Operating Environment:

Temperature: 23.8 °C

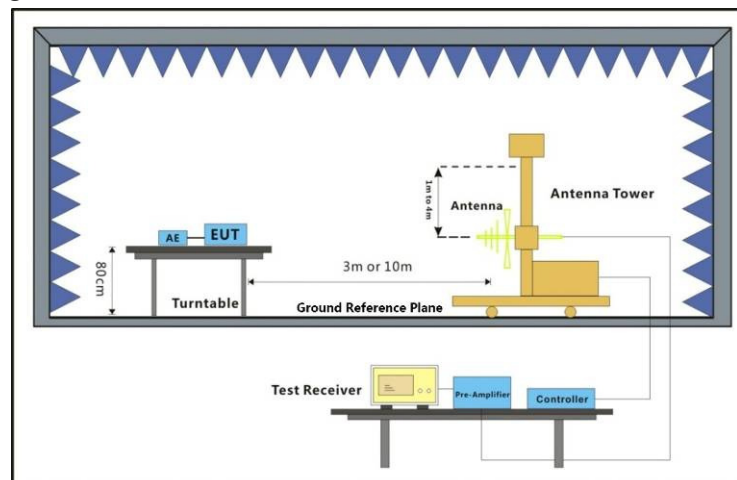
Humidity: 54.7 % RH

Atmospheric Pressure: 1005 mbar

7.5.2 Test Mode Description

Pre-scan / Mode	Description
Final test Code	
Final test 02	TX mode with modulation for PBYTJ160 (M1)

7.5.3 Test Setup Diagram



7.5.4 Measurement Procedure and Data

- a. For below 1GHz, the EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. For above 1GHz, the EUT was placed on the top of a rotating table 1.5 meters above the ground at a 3 meter fully-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The EUT was set 3 or 10 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- d. The antenna 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.
- e. 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 (for the test frequency of below 30MHz, the antenna was tuned to heights 1 meter) and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- f. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- g. If the emission level of the EUT in peak mode was 10dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
- h. The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Remark 1: Level= Read Level+ Cable Loss+ Antenna Factor- Preamp Factor

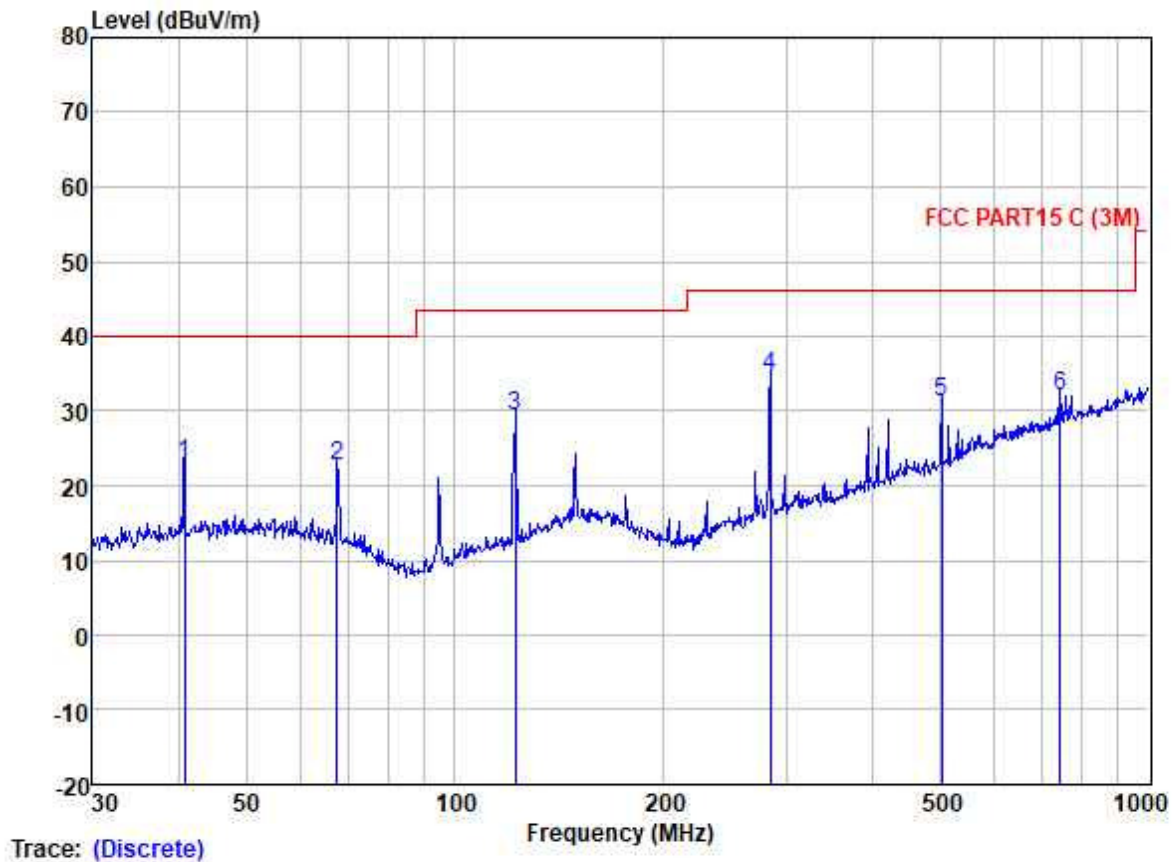
Remark 2: For frequencies above 1GHz, the field strength limits are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation. For the emissions whose peak level is lower than the average limit, only the peak measurement is shown in the report.



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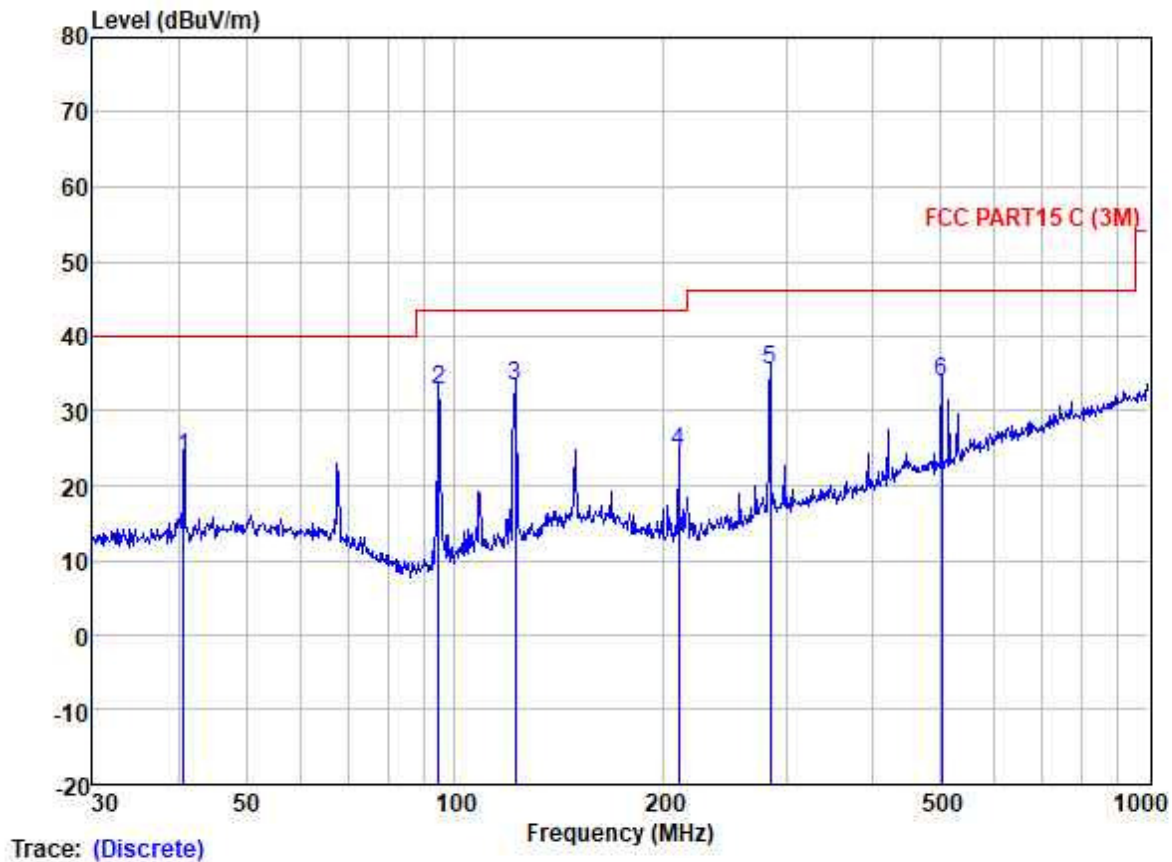
Test Mode: 02; Polarity: Horizontal



Site : SGS
Condition : FCC PART15 C (3M) HORIZONTAL
Job :
Model : PBYTJ160
Power :
Test Mode : RT

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	40.70	35.35	13.57	1.10	27.18	22.84	40.00	-17.16	HORIZONTAL	QP
2	67.68	36.26	12.24	1.38	27.14	22.74	40.00	-17.26	HORIZONTAL	QP
3	121.98	43.41	11.10	1.89	27.02	29.38	43.50	-14.12	HORIZONTAL	QP
4	284.98	44.70	13.30	3.11	26.56	34.55	46.00	-11.45	HORIZONTAL	QP
5	502.94	36.82	17.96	4.43	27.98	31.23	46.00	-14.77	HORIZONTAL	QP
6	747.48	32.00	22.15	5.97	28.10	32.02	46.00	-13.98	HORIZONTAL	QP

Test Mode: 02; Polarity: Vertical



Site : SGS
Condition : FCC PART15 C (3M) VERTICAL
Job :
Model : PBYTJ160
Power :
Test Mode : RT

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	40.56	36.29	13.55	1.10	27.18	23.76	40.00	-16.24	VERTICAL	QP
2	94.76	49.82	8.40	1.68	27.08	32.82	43.50	-10.68	VERTICAL	QP
3	122.05	47.39	11.10	1.89	27.02	33.36	43.50	-10.14	VERTICAL	QP
4	210.05	38.78	9.80	2.59	26.72	24.45	43.50	-19.05	VERTICAL	QP
5	284.98	45.56	13.30	3.11	26.56	35.41	46.00	-10.59	VERTICAL	QP
6	502.94	39.49	17.96	4.43	27.98	33.90	46.00	-12.10	VERTICAL	QP

7.6 Radiated Emissions (9kHz-30MHz)

Test Requirement 47 CFR Part 15, Subpart C 15.225(d) & 15.209

Test Method: ANSI C63.10 (2013) Section 6.4&6.5

Measurement Distance: 10 m

Limit:

Frequency (MHz)	Field strength (microvolts/meter)	Limit (dBuV/m)	Detector	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	-	-	300
0.490-1.705	24000/F(kHz)	-	-	30
1.705-30	30	-	-	30
30-88	100	40.0	QP	3
88-216	150	43.5	QP	3
216-960	200	46.0	QP	3
960-1000	500	54.0	QP	3
Above 1000	500	54.0	AV	3

According to ANSI C63.10 Section 6.4, the test data shall convert by below formula:

If both the single point and the limit distance are equal to or closer to the EUT than $\lambda/2\pi$, then extrapolation to the limit distance shall be calculated using Equation (4):

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right) \quad (4)$$

where

FS_{limit} is the calculation of field strength at the limit distance, expressed in dBuV/m
 FS_{max} is the measured field strength, expressed in dBuV/m
 $d_{\text{near field}}$ is the $\lambda/2\pi$ distance
 d_{measure} is the distance of the measurement point from the EUT
 d_{limit} is the reference distance or the distance of the $\lambda/2\pi$ point

Table 5—Relationship of frequency and wavelength (informative)

Frequency (MHz)	λ (m)	0.625λ (m)	$\lambda/2\pi$
0.009	33333.3	20833.3	5305.2
0.1	3000.0	1875.0	477.5
0.3	1000.0	625.0	159.2
1	300.0	187.5	47.7
4.76	63.0	39.4	10.0
16	18.8	11.7	3.0
30	10.0	6.3	1.6

The limit at 10m test distance is below:

The factor of field strength of any emissions within the band 0.009-0.490 MHz shall be 59.08 dB and 0.490-30 MHz shall be 19.08 dB at 10 meters.



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7.6.1 E.U.T. Operation

Operating Environment:

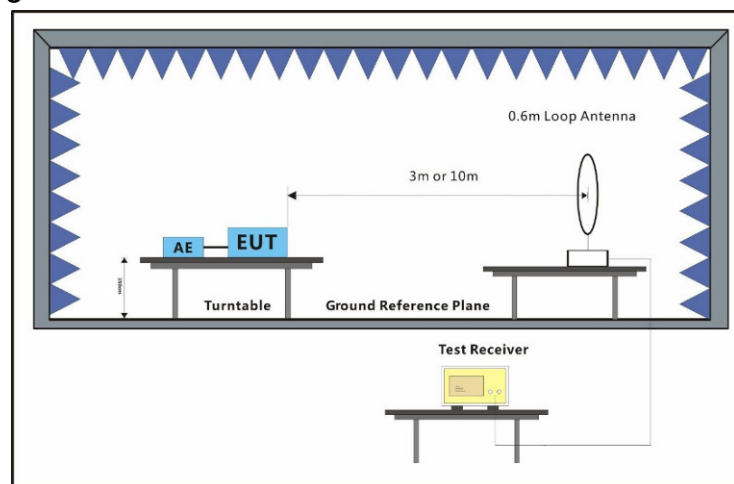
Temperature: 21.7 °C

Humidity: 53.0 % RH

Atmospheric Pressure: 1010 mbar

7.6.2 Test Mode Description

Pre-scan / Final test	Mode Code	Description
Final test	02	TX mode with modulation for PBYTJ160 (M1)

7.6.3 Test Setup Diagram**7.6.4 Measurement Procedure and Data**

Measurement distance: 10 m

For testing performed with the loop antenna, the center of the loop was positioned 1 m above the ground and positioned with its plane vertical at the specified distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

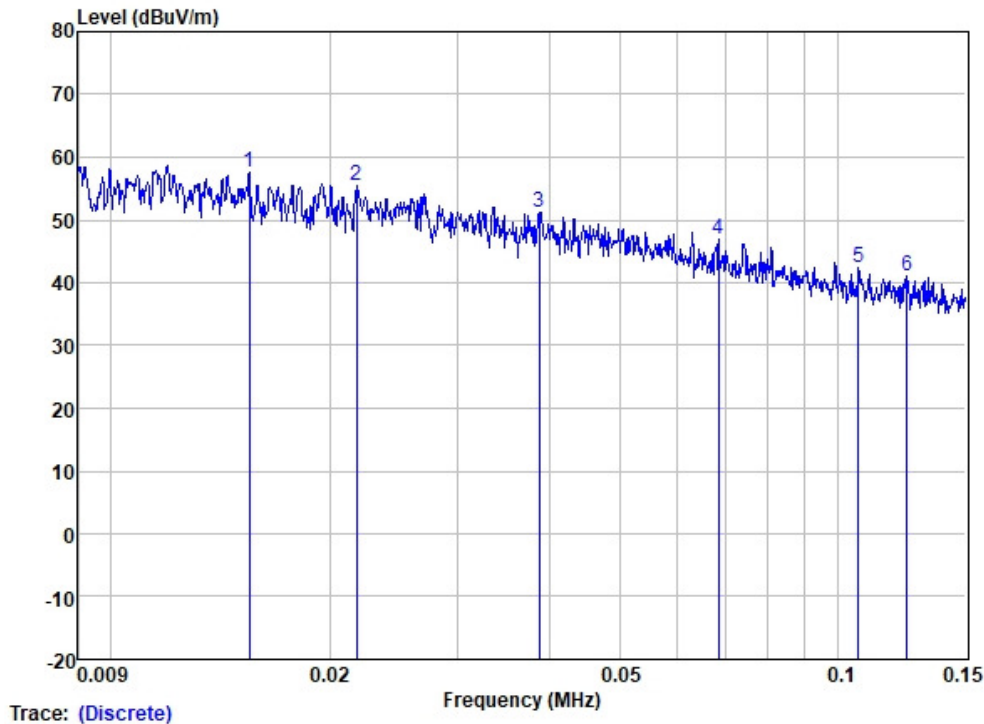
The radiation measurements are performed in X, Y, Z axis positioning. And found the X axis positioning which it is worse case, only the test worst case mode is recorded in the report.

Measured Level $I = \text{Read Level} + \text{Antenna Factor} + \text{Cable Loss} - \text{Preamplifier Factor} + \text{Extrapolation Correction}$

The point 5 is the fundamental operating frequency of the EUT and refer to section 7.3 for details.

All the test data below the background of emissions in the frequency band, and the peak field strength of any emission is not exceeding the maximum permitted average limits specified above. So, no measurement data was shown.

Test Mode: 02; Polarity: Horizontal

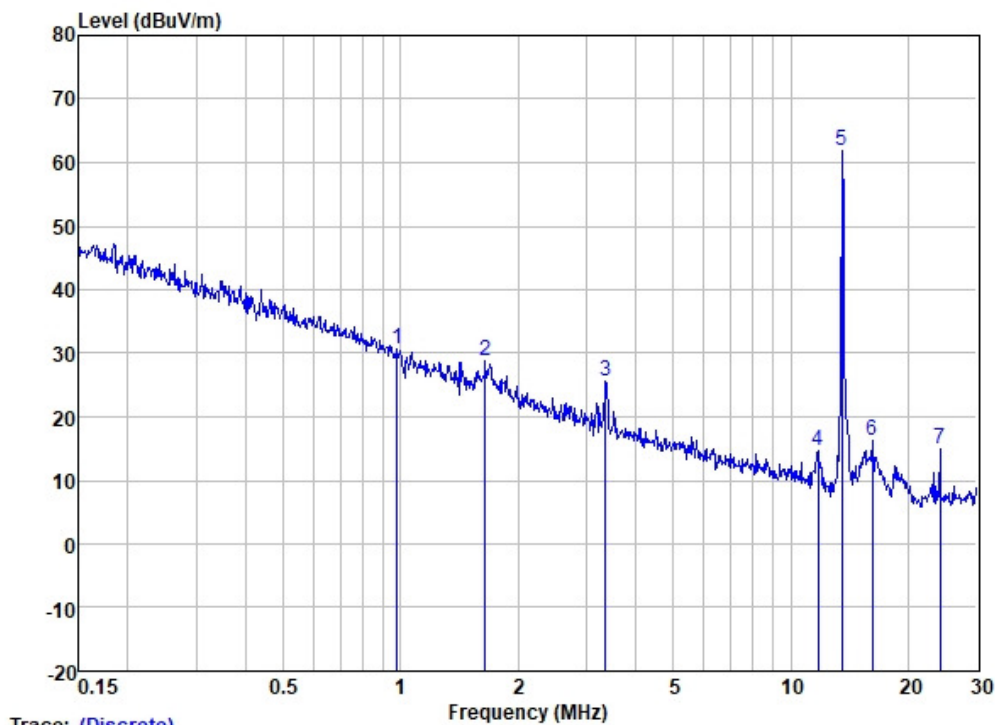


Site : SGS
Condition : HORIZONTAL
Job :
Model : PBYTJ160
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	0.02	71.96	13.77	0.05	28.28	57.50			HORIZONTAL	
2	0.02	70.82	12.95	0.05	28.43	55.39			HORIZONTAL	
3	0.04	68.15	12.08	0.05	29.15	51.13			HORIZONTAL	
4	0.07	64.99	11.30	0.05	29.39	46.95			HORIZONTAL	
5	0.11	61.46	10.42	0.05	29.47	42.46			HORIZONTAL	
6	0.12	60.12	10.49	0.05	29.47	41.19			HORIZONTAL	

Frequency (MHz)	Level @10m	Limit @30m	Limit @300m	Convert Factor	Level @ 30m	Level @ 300m	Over limit
0.02	59.43	-	41.58	59.08	-	-1.58	-43.16
0.02	57.68	-	41.58	59.08	-	-3.69	-45.27
0.04	54.53	-	35.56	59.08	-	-7.95	-43.51
0.07	53.05	-	30.70	59.08	-	-12.13	-42.83
0.11	48.82	-	26.78	59.08	-	-16.62	-43.40
0.12	47.64	-	26.02	59.08	-	-17.89	-43.91

Test Mode: 02; Polarity: Horizontal

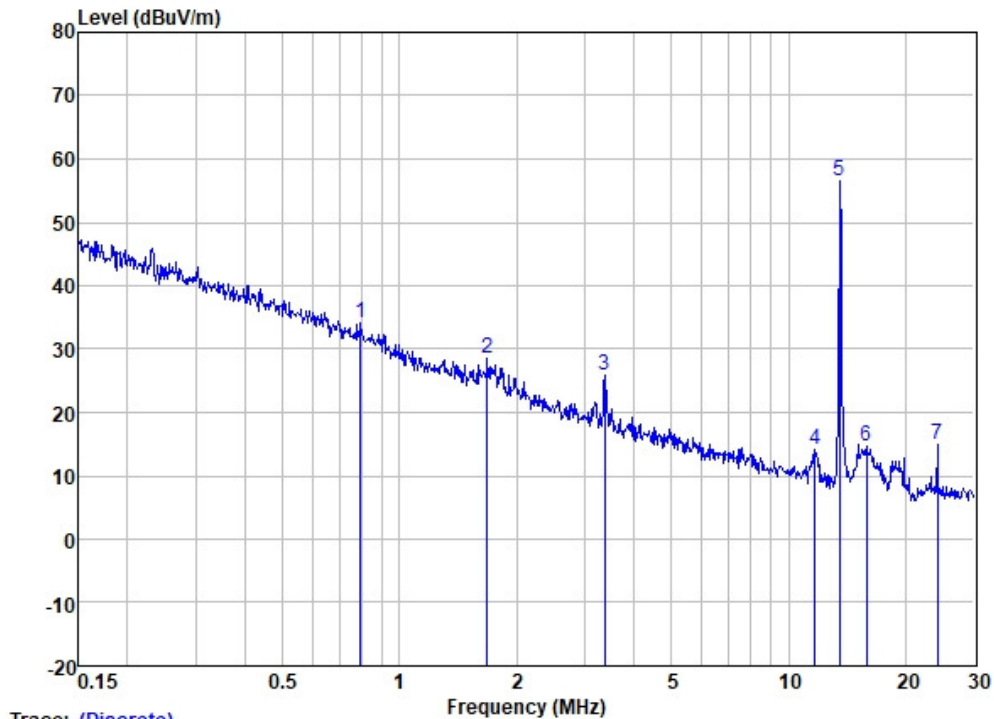


Site : SGS
Condition : HORIZONTAL
Job :
Model : PBYTJ160
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier Factor	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	0.98	49.50	10.41	0.13	29.41	30.63			HORIZONTAL	
2	1.64	47.07	10.89	0.17	29.39	28.74			HORIZONTAL	
3	3.35	44.01	10.67	0.32	29.35	25.65			HORIZONTAL	
4	11.74	33.69	9.66	0.55	29.27	14.63			HORIZONTAL	
5	13.55	81.63	8.96	0.58	29.25	61.92			HORIZONTAL	
6	16.23	36.22	8.64	0.63	29.23	16.26			HORIZONTAL	
7	24.14	34.94	8.31	0.90	29.16	14.99			HORIZONTAL	

Frequency (MHz)	Level @10m	Limit @30m	Limit @300m	Convert Factor	Level @ 30m	Level @ 300m	Over limit
0.98	27.95	30.63	-	19.08	8.87	-	-21.76
1.64	23.41	28.74	-	19.08	4.33	-	-24.41
3.35	21.83	25.65	-	19.08	2.75	-	-22.90
11.74	19.91	14.63	-	19.08	0.83	-	-13.80
16.23	13.92	16.26	-	19.08	-5.16	-	-21.42
24.14	9.22	14.99	-	19.08	-9.86	-	-24.85

Test Mode: 02; Polarity: Vertical

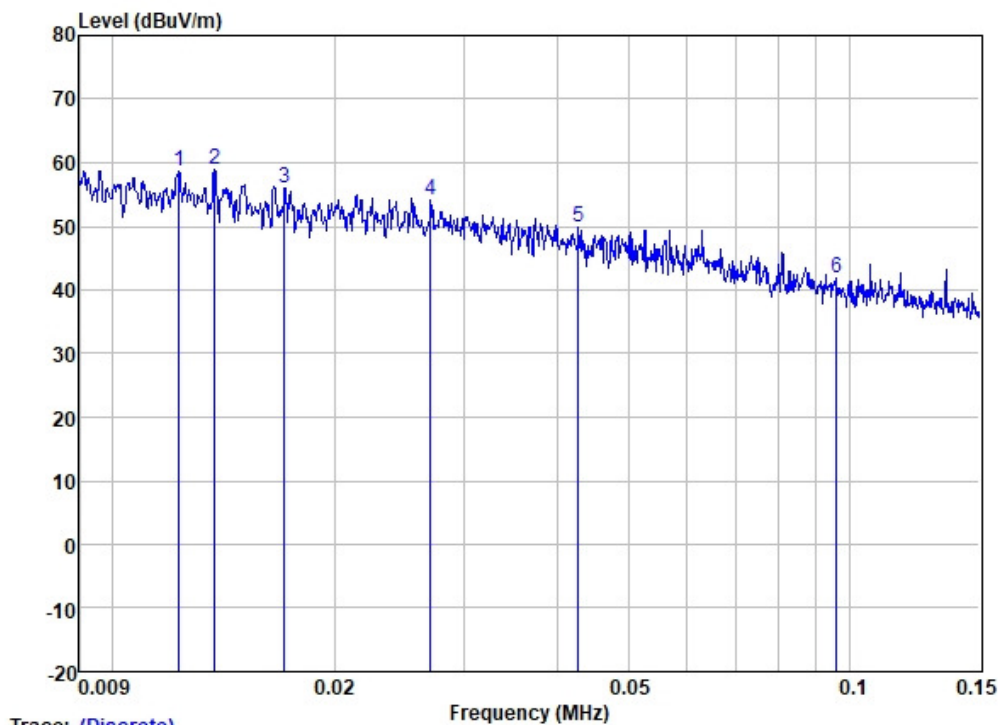


Site : SGS
Condition : VERTICAL
Job :
Model : PBYTJ160
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	0.80	52.92	10.47	0.12	29.41	34.10			VERTICAL	
2	1.68	46.71	10.91	0.17	29.38	28.41			VERTICAL	
3	3.36	44.24	10.67	0.32	29.35	25.88			VERTICAL	
4	11.68	33.22	9.66	0.55	29.27	14.16			VERTICAL	
5	13.55	76.21	8.96	0.58	29.25	56.50			VERTICAL	
6	15.89	34.57	8.65	0.62	29.23	14.61			VERTICAL	
7	24.14	34.97	8.31	0.90	29.16	15.02			VERTICAL	

Frequency (MHz)	Level @10m	Limit @30m	Limit @300m	Convert Factor	Level @ 30m	Level @ 300m	Over limit
0.8	27.95	30.63	-	19.08	8.87	-	-21.76
1.68	23.41	28.74	-	19.08	4.33	-	-24.41
3.36	21.83	25.65	-	19.08	2.75	-	-22.90
11.68	19.91	14.63	-	19.08	0.83	-	-13.80
15.89	13.92	16.26	-	19.08	-5.16	-	-21.42
24.14	9.22	14.99	-	19.08	-9.86	-	-24.85

Test Mode: 02; Polarity: Vertical



Trace: (Discrete)

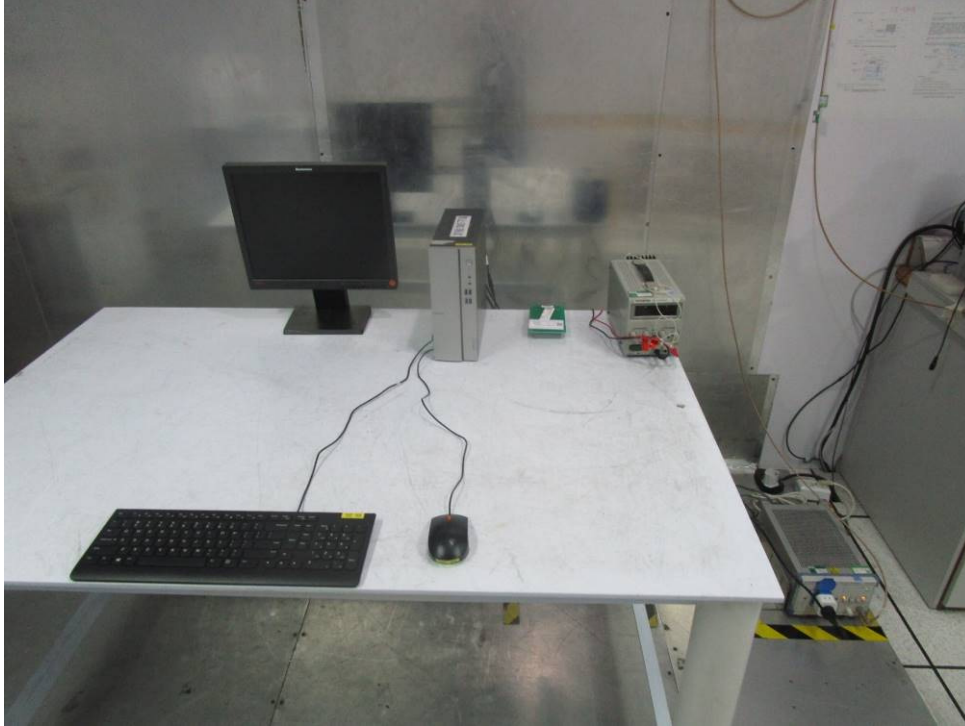
Site : SGS
Condition : VERTICAL
Job :
Model : PBYTJ160
Power :
Test Mode :

	Freq	Read Level	Antenna Factor	Cable Loss	Preamplifier	Measured Level	Limit Line	Over Limit	Pol/Phase	Remark
	MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dBuV		
1	0.01	71.65	15.26	0.05	28.22	58.74			VERTICAL	
2	0.01	72.50	14.68	0.05	28.25	58.98			VERTICAL	
3	0.02	70.86	13.39	0.05	28.32	55.98			VERTICAL	
4	0.03	70.01	12.76	0.05	28.61	54.21			VERTICAL	
5	0.04	66.99	12.00	0.05	29.21	49.83			VERTICAL	
6	0.10	60.75	10.44	0.05	29.46	41.78			VERTICAL	

Frequency (MHz)	Level @10m	Limit @30m	Limit @300m	Convert Factor	Level @ 30m	Level @ 300m	Over limit
0.01	58.74	-	47.60	59.08	-	-0.34	-47.94
0.01	58.98	-	47.60	59.08	-	-0.1	-47.70
0.02	55.98	-	41.58	59.08	-	-3.1	-44.68
0.03	54.21	-	38.06	59.08	-	-4.87	-42.93
0.04	49.83	-	35.56	59.08	-	-9.25	-44.81
0.1	41.78	-	27.60	59.08	-	-17.3	-44.90

8 Test Setup Photo

Conducted Emissions at Mains Terminals (150kHz-30MHz)

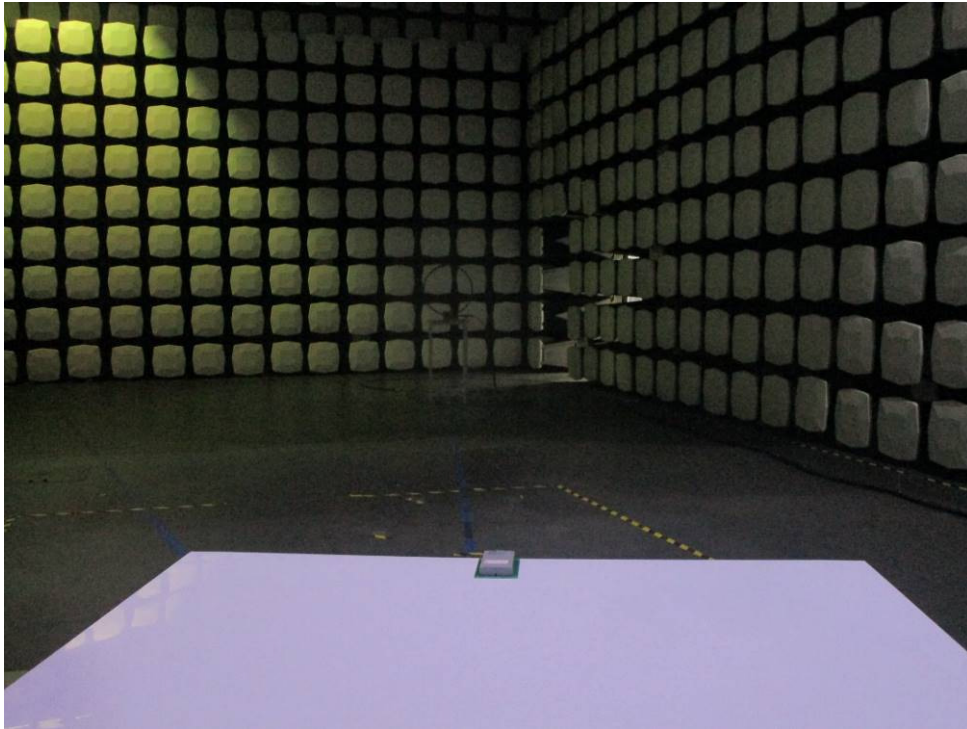


20dB Bandwidth

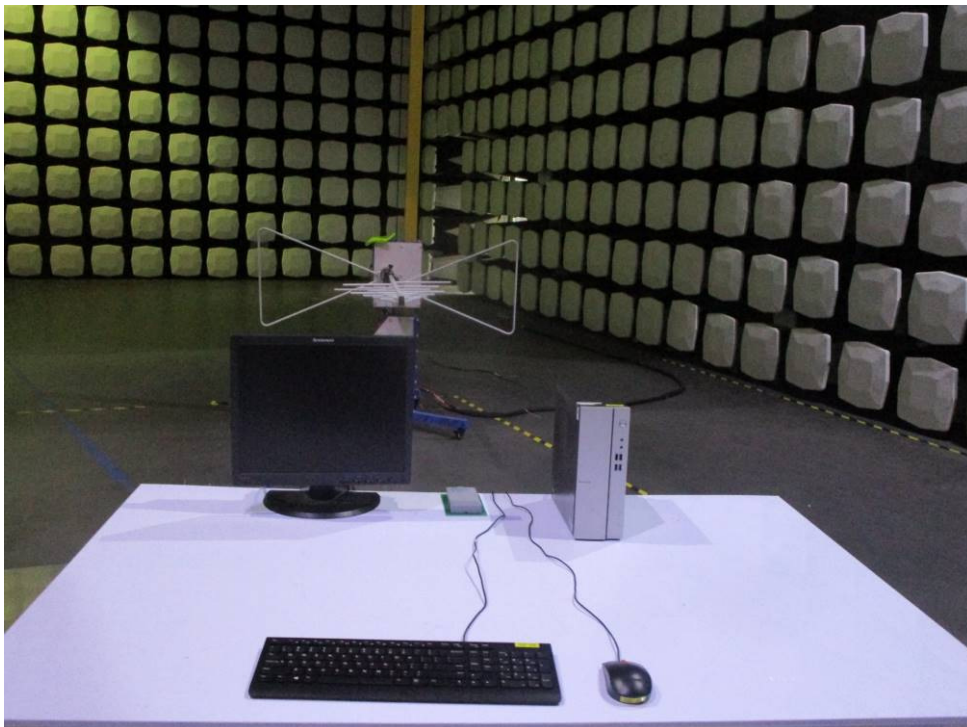


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Emission Mask & Radiated Emissions (9kHz-30MHz)



Radiated Emissions (30MHz-1GHz)



9 EUT Constructional Details (EUT Photos)

Refer to external and internal photos for GZCR2106020401AT

- End of the Report -



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