

TEST REPORT

Applicant: EPIROC DIGITAL SAFETY SOLUTIONS SOUTH AFRICA (PTY) LTD

Address of Applicant: 51 Adriana Crescent, Gateway Business Park, Centurion, South Africa

Manufacturer/Factory: EPIROC DIGITAL SAFETY SOLUTIONS SOUTH AFRICA (PTY) LTD

Address of Manufacturer/Factory: 51 Adriana Crescent, Gateway Business Park, Centurion, South Africa

Equipment Under Test (EUT)

Product Name: Titan Commander HMI100

Model No.: M-001-192-03-V3

Trade Mark: Titan

FCC ID: 2BPRY-19203V3

Applicable standards: FCC CFR Title 47 Part 15 Subpart C

Date of sample receipt: March 05, 2025

Date of Test: March 06, 2025-June 06, 2025

Date of report issued: June 06, 2025

Test Result : PASS

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Laboratory Manager

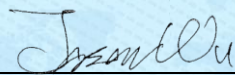
This results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company. The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.



2 Version

Version No.	Date	Description
00	June 06, 2025	Original

Prepared By:

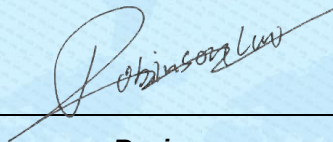


Date:

June 06, 2025

Project Engineer

Check By:



Date:

June 06, 2025

Reviewer

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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna Requirement	15.203	Pass
AC Power Line Conducted Emission	15.207	Pass
Radiated Emission	15.209	Pass
20dB Emission Bandwidth	15.215	Pass

Remark:

1. Pass: The EUT complies with the essential requirements in the standard.
2. N/A: Not applicable.

4.1 Measurement Uncertainty

Test Item	Frequency Range	Measurement Uncertainty	Notes
Radiated Emission	9kHz-30MHz	3.1dB	(1)
Radiated Emission	30MHz-200MHz	3.8039dB	(1)
Radiated Emission	200MHz-1GHz	3.9679dB	(1)
Radiated Emission	1GHz-18GHz	4.29dB	(1)
AC Power Line Conducted Emission	0.15MHz ~ 30MHz	3.44dB	(1)

Note (1): The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

5 General Information

5.1 General Description of EUT

Product Name:	Titan Commander HMI100
Model No.:	M-001-192-03-V3
S/N:	M:001:192:03:V3:00134
Test sample(s) ID:	GTS2025030015-1
Sample(s) Status	Engineered sample
Operation Frequency:	125kHz
Channel Number:	1
Modulation:	OOK
Antenna type:	Internal Antenna
Antenna gain:	0dBi
Power supply:	DC 8V-36V Or DC 7.4V, 1800mAh for Li-ion battery

Remark:

1. Antenna gain information provided by the customer
2. The relevant information of the sample is provided by the entrusting company, and the laboratory is not responsible for its authenticity.

5.2 Test mode

Transmitter mode	Keep the EUT in continuously transmitting.
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5.3 Test Facility

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

- **FCC—Registration No.: 381383**

Designation Number: CN5029

Global United Technology Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in files.

- **ISED—Registration No.: 9079A**

CAB identifier: CN0091

The 3m Semianechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of ISED for radio equipment testing

- **NVLAP (LAB CODE:600179-0)**

Global United Technology Services Co., Ltd., is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP).

5.4 Test Location

All tests were performed at:

Global United Technology Services Co., Ltd.

Address: No. 123-128, Tower A, Jinyuan Business Building, No.2, Laodong Industrial Zone, Xixiang Road, Baoan District, Shenzhen, Guangdong, China 518102

Tel: 0755-27798480

Fax: 0755-27798960

5.5 Description of Support Units

Manufacturer	Description	Model	Serial Number
GW	DC POWER SUPPLY	GPR-6030D	EF924756

6 Test Instruments list

Radiated Emission:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	GTS250	Apr. 11, 2025	Apr. 10, 2026
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	GTS251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	GTS203	Apr. 12, 2025	Apr. 11, 2026
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	Apr. 12, 2025	Apr. 11, 2026
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	Apr. 11, 2025	Apr. 10, 2026
6	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	Jul. 02, 2024	Jul. 01, 2025
7	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov.16, 2024	Nov.15, 2025
8	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	Apr. 11, 2025	Apr. 10, 2026
9	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	Apr. 11, 2025	Apr. 10, 2026
10	Horn Antenna (18GH-40GHz)	Schwarzbeck	BBHA 9170	GTS691	Apr. 11, 2025	Apr. 10, 2026
11	FSV·Signal Analyzer (10Hz-40GHz)	Keysight	FSV-40-N	GTS666	Mar. 11, 2025	Mar. 10, 2026
12	Amplifier	/	LNA-1000-30S	GTS650	Apr. 11, 2025	Apr. 10, 2026
13	CDNE M2+M3-16A	HCT	30MHz-300MHz	GTS692	Nov. 13, 2024	Nov. 12, 2025
14	Wideband Amplifier	/	WDA-01004000-15P35	GTS602	Apr. 11, 2025	Apr. 10, 2026
15	Thermo meter	JINCHUANG	GSP-8A	GTS643	Apr. 15, 2025	Apr. 14, 2026
16	RE cable 1	GTS	N/A	GTS675	Jul. 02, 2024	Jul. 01, 2025
17	RE cable 2	GTS	N/A	GTS676	Jul. 02, 2024	Jul. 01, 2025
18	RE cable 3	GTS	N/A	GTS677	Jul. 02, 2024	Jul. 01, 2025
19	RE cable 4	GTS	N/A	GTS678	Jul. 02, 2024	Jul. 01, 2025
20	RE cable 5	GTS	N/A	GTS679	Jul. 02, 2024	Jul. 01, 2025
21	RE cable 6	GTS	N/A	GTS680	Jul. 02, 2024	Jul. 01, 2025
22	RE cable 7	GTS	N/A	GTS681	Jul. 05, 2024	Jul. 04, 2025
23	RE cable 8	GTS	N/A	GTS682	Jul. 05, 2024	Jul. 04, 2025
24	EMI Test Software	AUDIX	E3-6.100614a	GTS725	N/A	N/A

Conducted Emission						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Shielding Room	ZhongYu Electron	7.3(L)x3.1(W)x2.9(H)	GTS252	Jul. 12, 2022	Jul. 11, 2027
2	EMI Test Receiver	R&S	ESCI 7	GTS552	Apr. 12, 2025	Apr. 11, 2026
3	LISN	ROHDE & SCHWARZ	ENV216	GTS226	Apr. 11, 2025	Apr. 10, 2026
4	Coaxial Cable	GTS	N/A	GTS227	N/A	N/A
5	Thermo meter	JINCHUANG	GSP-8A	GTS642	Apr. 15, 2025	Apr. 14, 2026
6	Absorbing clamp	Elektronik-Feinmechanik	MDS21	GTS229	Apr. 12, 2025	Apr. 11, 2026
7	ISN	SCHWARZBECK	NTFM 8158	GTS565	Apr. 11, 2025	Apr. 10, 2026
8	High voltage probe	SCHWARZBECK	TK9420	GTS537	Apr. 11, 2025	Apr. 10, 2026
9	Antenna end assembly	Weinschel	1870A	GTS560	Apr. 11, 2025	Apr. 10, 2026
10	EMI Test Software	AUDIX	E3-6.100622	GTS726	N/A	N/A
11	Current probe	CYBERTEK	EM5011	GTS698	Jan. 13, 2025	Jan. 12, 2026

RF Conducted Test:						
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	MXA Signal Analyzer	Agilent	N9020A	GTS566	Apr. 11, 2025	Apr. 10, 2026
2	EMI Test Receiver	R&S	ESCI 7	GTS552	Apr. 12, 2025	Apr. 11, 2026
3	PSA Series Spectrum Analyzer	Agilent	E4440A	GTS536	Apr. 11, 2025	Apr. 10, 2026
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	Apr. 11, 2025	Apr. 10, 2026
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	Apr. 11, 2025	Apr. 10, 2026
6	Wideband Power Meter	Keysight	N1924A	GTS673	Apr. 11, 2025	Apr. 10, 2026
7	USB RF Power Sensor	DARE	RPR3006W	GTS569	Apr. 11, 2025	Apr. 10, 2026
8	RF Switch Box	Shongyi	RFSW3003328	GTS571	Apr. 11, 2025	Apr. 10, 2026
9	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	Apr. 11, 2025	Apr. 10, 2026
10	Thermo meter	JINCHUANG	GSP-8A	GTS641	Apr. 15, 2025	Apr. 14, 2026
11	EXA Signal Analyzer	Keysight	N9010B	MY60241168	Nov. 02, 2024	Nov. 01, 2025

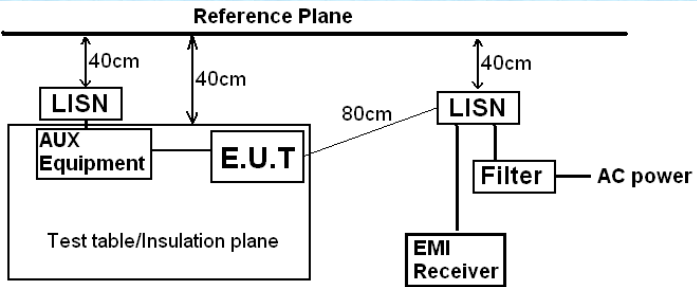
General used equipment:						
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)
1	Barometer	KUMAO	SF132	GTS647	Aug. 17, 2024	Aug. 16, 2025

7 Test results and Measurement Data

7.1 Antenna requirement:

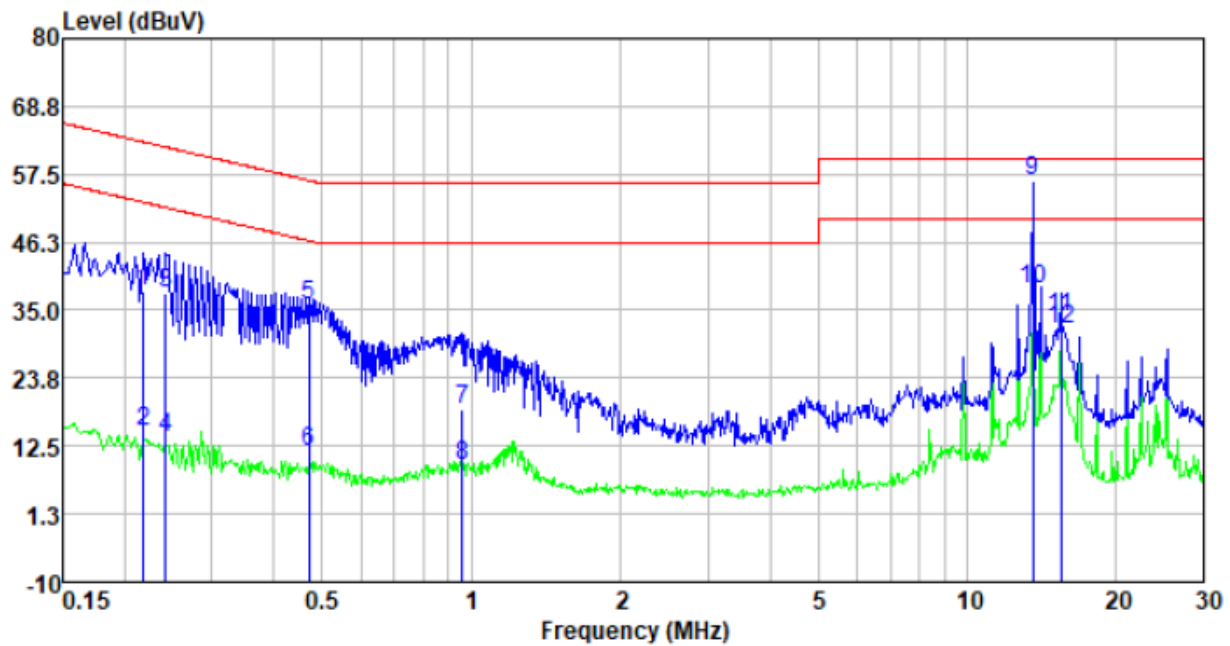
Standard requirement:	FCC Part15 C Section 15.203
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling 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.	
E.U.T Antenna:	
The antenna is internal antenna, reference to the appendix II for details	

7.2 Conducted Emissions

Test Requirement:	FCC Part15 C Section 15.207						
Test Method:	ANSI C63.10:2013						
Test Frequency Range:	150KHz to 30MHz						
Class / Severity:	Class B						
Receiver setup:	RBW=9KHz, VBW=30KHz, Sweep time=auto						
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.							
Test setup:	Reference Plane  <i>Remark</i> E.U.T.: Equipment Under Test LISN: Line Impedance Stabilization Network Test table height=0.8m						
Test procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.10:2013 on conducted measurement.						
Test Instruments:	Refer to section 6.0 for details						
Test mode:	Refer to section 5.2 for details						
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar	
Test voltage:	DC 12V						
Test results:	Pass						

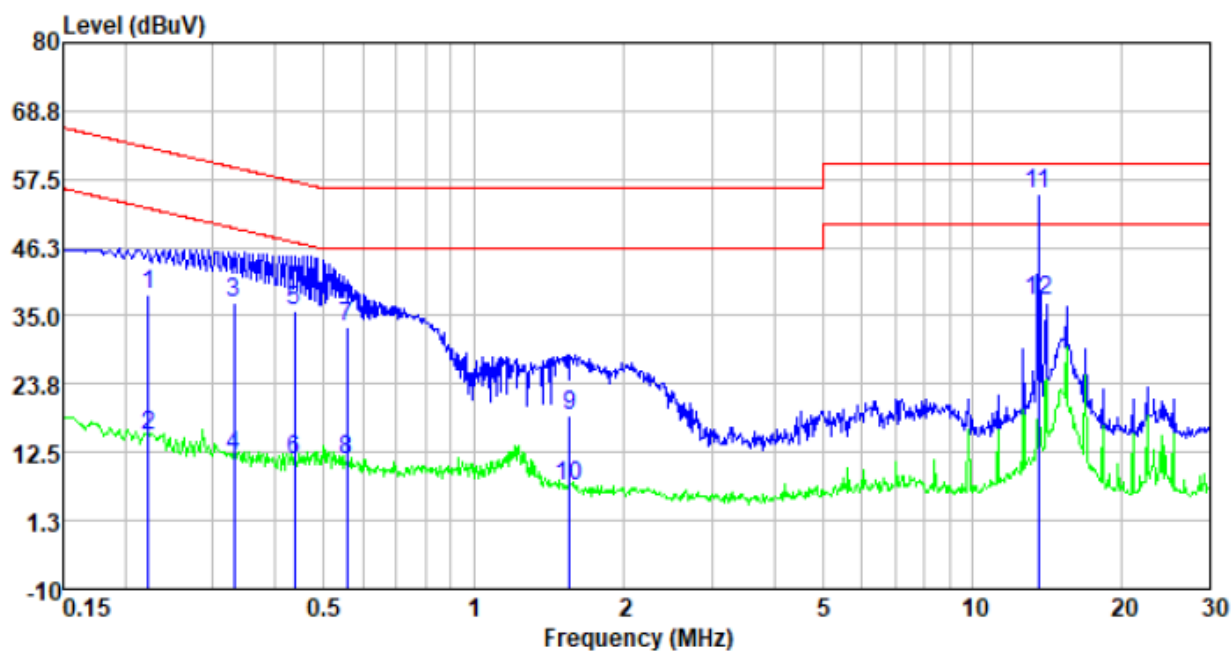
Measurement data:

Line:



Freq	Reading	LISN/ISN	Cable		Limit	Over	
	level	factor	loss	Level	level	limit	Remark
MHz	dBuV	dB	dB	dBuV	dBuV	dB	
0.22	18.59	9.56	0.01	38.16	62.88	-24.72	QP
0.22	-4.53	9.56	0.01	15.04	52.88	-37.84	Average
0.24	18.18	9.58	0.01	37.77	62.04	-24.27	QP
0.24	-5.74	9.58	0.01	13.85	52.04	-38.19	Average
0.47	15.89	9.80	0.01	35.70	56.49	-20.79	QP
0.47	-8.14	9.80	0.01	11.67	46.49	-34.82	Average
0.96	-0.87	9.56	0.03	18.72	56.00	-37.28	QP
0.96	-10.36	9.56	0.03	9.23	46.00	-36.77	Average
13.56	36.52	9.66	0.15	56.33	60.00	-3.67	QP
13.56	18.72	9.66	0.15	38.53	50.00	-11.47	Average
15.45	14.13	9.63	0.16	33.92	60.00	-26.08	QP
15.45	11.97	9.63	0.16	31.76	50.00	-18.24	Average

Neutral:



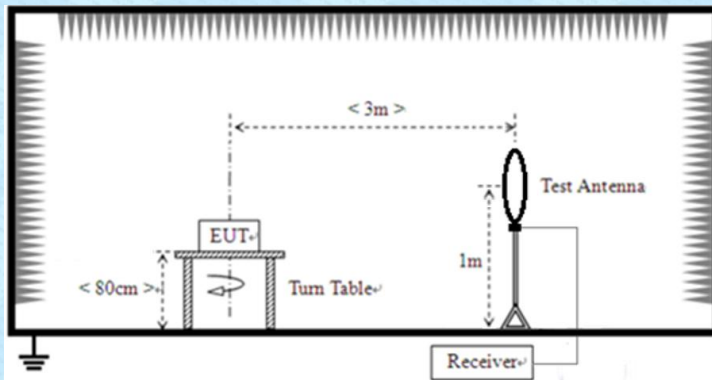
Freq	Reading	LISN/ISN	Cable	Level	Limit	Over	Remark
MHz	dBuV	factor	loss	dBuV	dBuV	limit	
0.22	18.54	9.79	0.01	38.34	62.74	-24.40	QP
0.22	-4.51	9.79	0.01	15.29	52.74	-37.45	Average
0.33	17.34	9.82	0.01	37.17	59.44	-22.27	QP
0.33	-7.77	9.82	0.01	12.06	49.44	-37.38	Average
0.44	16.16	9.69	0.01	35.86	57.11	-21.25	QP
0.44	-8.44	9.69	0.01	11.26	47.11	-35.85	Average
0.56	13.34	9.82	0.02	33.18	56.00	-22.82	QP
0.56	-8.74	9.82	0.02	11.10	46.00	-34.90	Average
1.56	-1.22	9.87	0.04	18.69	56.00	-37.31	QP
1.56	-13.14	9.87	0.04	6.77	46.00	-39.23	Average
13.56	35.13	9.95	0.15	55.23	60.00	-4.77	QP
13.56	17.36	9.95	0.15	37.46	50.00	-12.54	Average

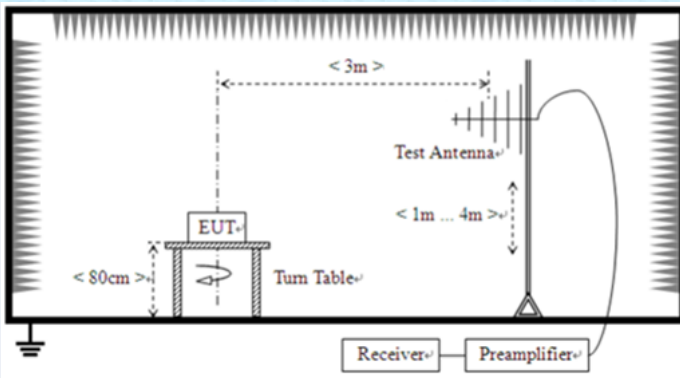
Notes:

1. An initial pre-scan was performed on the line and neutral lines with peak detector.
2. Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission.
3. Final Level = Receiver Read level + LISN Factor + Cable Loss

If the average limit is met when using a quasi-peak detector receiver, the EUT shall be deemed to meet both limits and measurement with the average detector receiver is unnecessary.

7.3 Radiated Emission

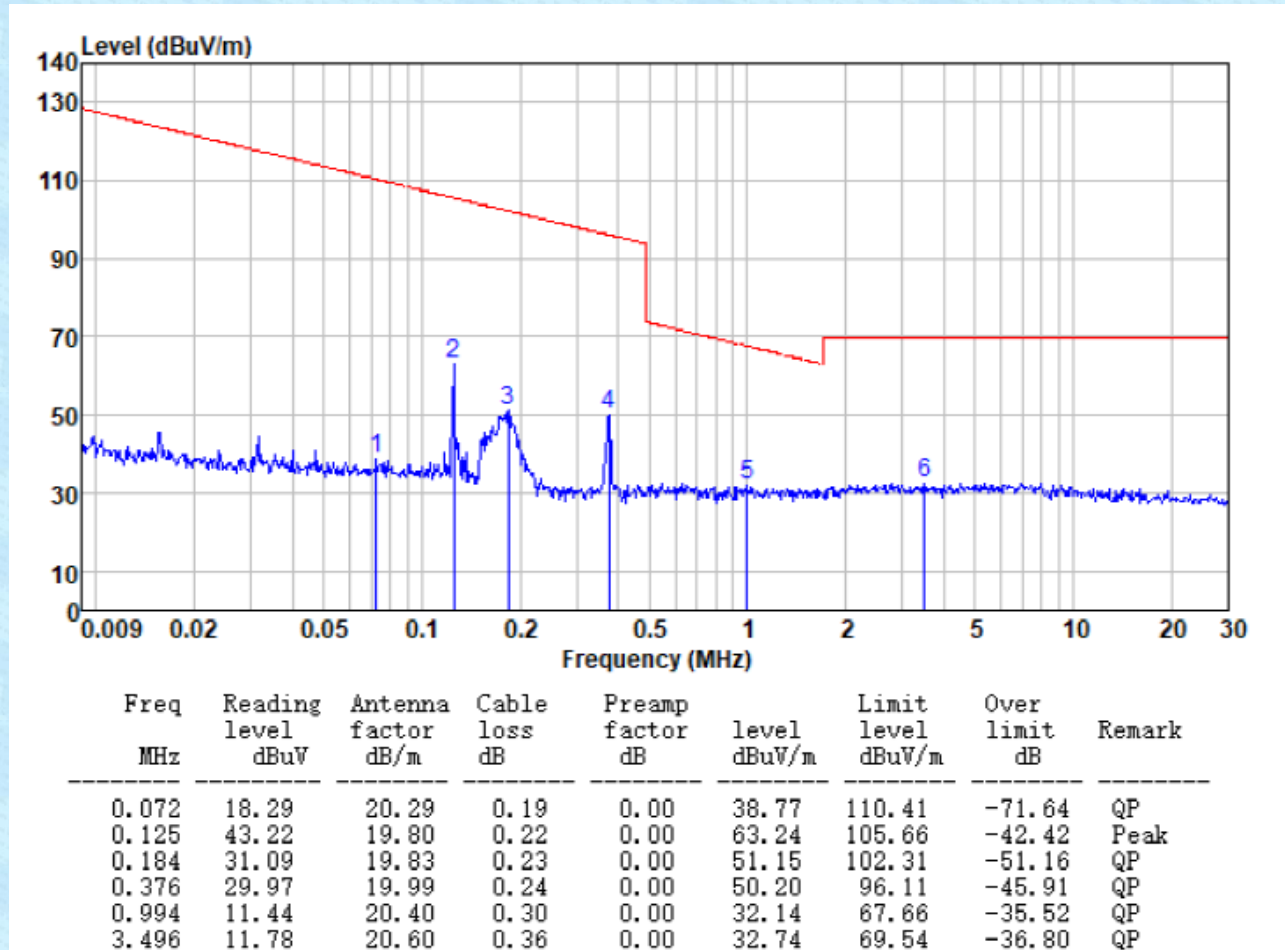
Test Requirement:	FCC Part15.209																												
Test Method:	ANSI C63.10: 2013 & ANSI C63.4: 2014																												
Test Frequency Range:	9KHz to 1000MHz																												
Test site:	Measurement Distance: 3m																												
Receiver setup:	Frequency	Detector	RBW	VBW	Remark																								
	9kHz-150kHz	Quasi-peak	200Hz	300Hz	Quasi-peak Value																								
	150kHz-30MHz	Quasi-peak	9kHz	10kHz	Quasi-peak Value																								
	30MHz-1GHz	Quasi-peak	120KHz	300KHz	Quasi-peak Value																								
FCC Limit:	<table><tr><th>Frequency (MHz)</th><th>Field strength (microvolts/meter)</th><th>Measurement distance (meters)</th></tr><tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr><tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr><tr><td>1.705-30.0</td><td>30</td><td>30</td></tr><tr><td>30-88</td><td>100**</td><td>3</td></tr><tr><td>88-216</td><td>150**</td><td>3</td></tr><tr><td>216-960</td><td>200**</td><td>3</td></tr><tr><td>Above 960</td><td>500</td><td>3</td></tr></table>					Frequency (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
	Frequency (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																											
	The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.																												
Test setup:	Below 30MHz																												
																													
	Above 30MHz																												

						
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	DC 12V					
Test results:	Pass					

Measurement data:

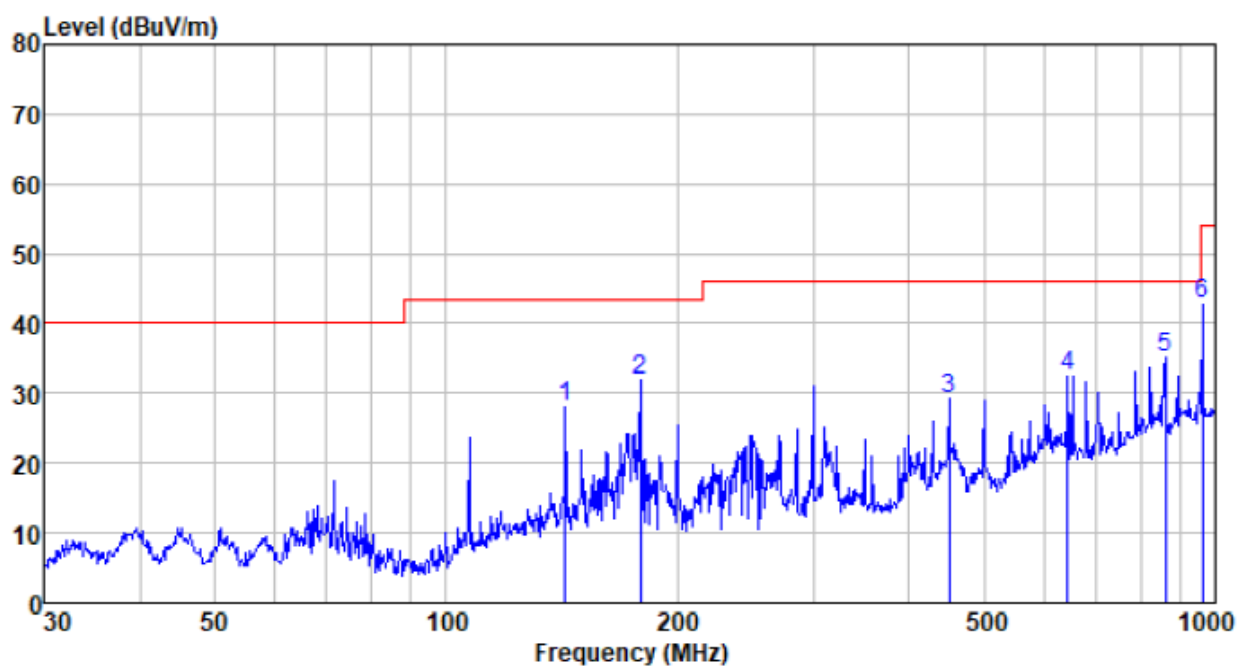
■ 9kHz~30MHz

Test data Coaxial and Coplanar polarity all have been tested, only worse case Coaxial polarity is reported.



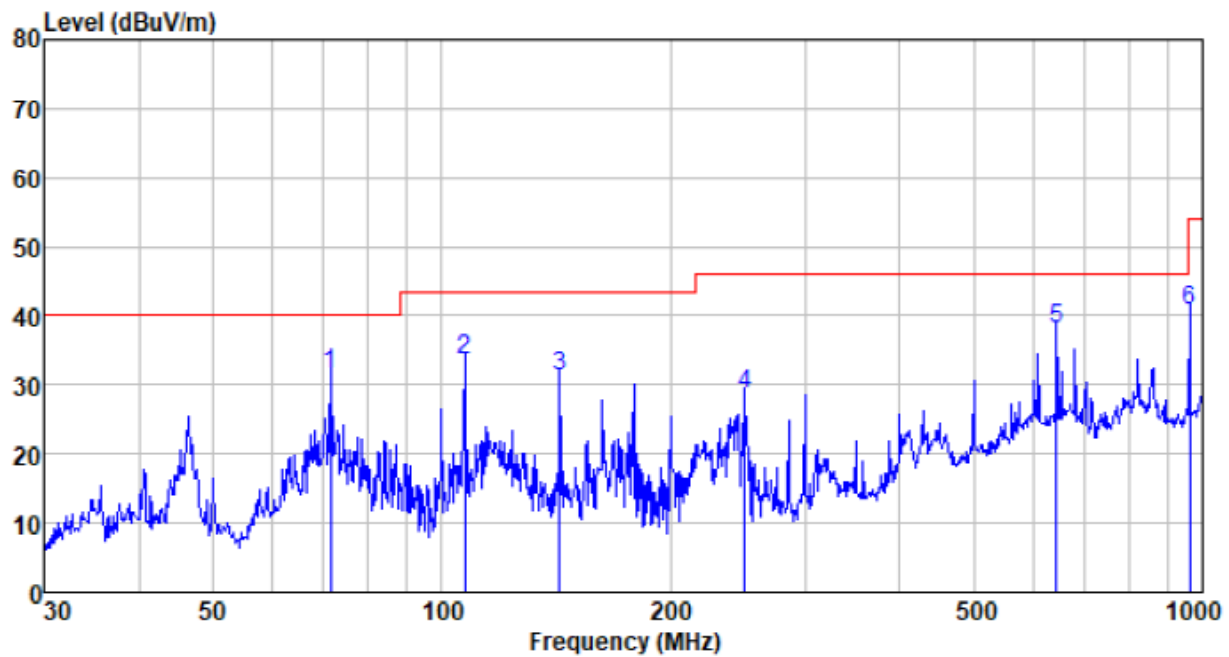
■ 30MHz~1GHz

Horizontal:



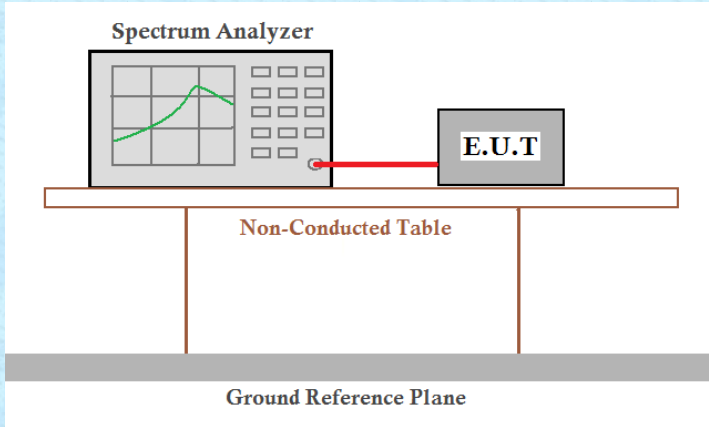
Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
142.824	44.03	13.98	2.40	32.46	27.95	43.50	-15.55	QP
178.758	49.52	12.02	2.70	32.42	31.82	43.50	-11.68	QP
451.135	41.30	16.02	4.05	32.22	29.15	46.00	-16.85	QP
642.861	39.65	19.80	4.83	31.68	32.60	46.00	-13.40	QP
860.035	37.96	22.70	5.63	31.10	35.19	46.00	-10.81	QP
962.162	44.15	23.70	5.91	31.10	42.66	54.00	-11.34	QP

Vertical:



Freq MHz	Reading level dBuV	Antenna factor dB/m	Cable loss dB	Preamp factor dB	level dBuV/m	Limit level dBuV/m	Over limit dB	Remark
71.330	51.56	10.67	1.65	32.39	31.49	40.00	-8.51	QP
107.134	53.35	10.81	2.02	32.49	33.69	43.50	-9.81	QP
142.824	47.34	13.98	2.40	32.46	31.26	43.50	-12.24	QP
250.301	47.31	10.51	3.17	32.35	28.64	46.00	-17.36	QP
642.861	45.02	19.80	4.83	31.68	37.97	46.00	-8.03	QP
962.162	42.12	23.70	5.91	31.10	40.63	54.00	-13.37	QP

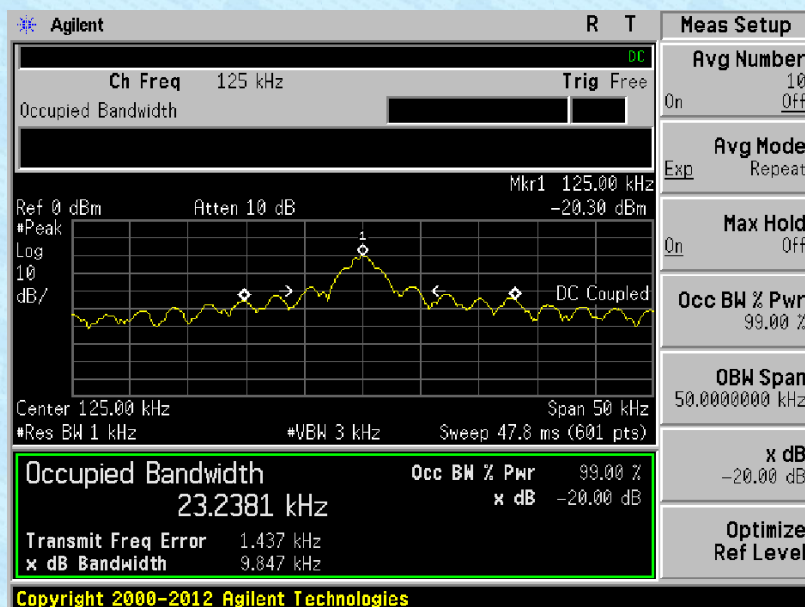
7.4 Occupied Bandwidth

Test Requirement:	FCC Part15.215
Test Method:	ANSI C63.10:2013
Limit:	N/A
Test Procedure:	1. According to the follow Test-setup, keep the relative position between the artificial antenna and the EUT. 2. Set the EUT to proper test channel. 3. Max hold the radiated emissions, mark the peak power frequency point and the -20dB upper and lower frequency points. 4. Read 20dB bandwidth & 99%bandwidth.
Test setup:	 The diagram illustrates the test setup. A Spectrum Analyzer is connected to an E.U.T. (Equipment Under Test) via a red cable. Both the Spectrum Analyzer and the E.U.T. are positioned on a Non-Conducted Table. This table is supported by a Ground Reference Plane.
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details
Test results:	Pass

Measurement Data

Test frequency(kHz)	20dB bandwidth(kHz)	Result
125	9.847	Pass

Test plot as follows:



8 Test Setup Photo

Reference to the **appendix I** for details.

9 EUT Constructional Details

Reference to the **appendix II** for details.

----- End -----