



Global United Technology Services Co., Ltd.

Report No.: GTS202211000051F01

TEST REPORT

Applicant: PowerFleet Inc.

Address of Applicant: 123 Tice Boulevard Suite 101, Woodcliff Lake, NJ 07677,

United States

Manufacturer: PowerFleet Inc.

Address of 123 Tice Boulevard Suite 101, Woodcliff Lake, NJ 07677,

Manufacturer: United States

Equipment Under Test (EUT)

Product Name: LV500\Cellotrack Solar

Model No.: LV500

FCC ID: 2AG69LV5XXN

Applicable standards: FCC CFR Title 47 Part 15 Subpart C Section 15.247

Date of sample receipt: November 07, 2022

Date of Test: November 08-24, 2022

Date of report issued: November 24, 2022

Test Result : PASS *

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.

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





Version

Version No.	Date	Description
00	November 24, 2022	Original

Prepared By:	Project Engineer	Date:	November 24, 2022
Check By:	Reviewer	Date:	November 24, 2022





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4 Test Summary

Test Item	Section in CFR 47	Result
Antenna requirement	15.203/15.247 (c)	Pass
AC Power Line Conducted Emission	15.207	N/A
Conducted Output Power	15.247 (b)(3)	Pass
Channel Bandwidth	15.247 (a)(2)	Pass
Power Spectral Density	15.247 (e)	Pass
Band Edge	15.247(d)	Pass
Spurious Emission	15.205/15.209	Pass

Remarks:

1. Pass: The EUT complies with the essential requirements in the standard.

2. Test according to ANSI C63.10:2013

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)		
Radiated Emission	18GHz-40GHz	3.30dB	(1)		
AC Power Line Conducted 0.15MHz ~ 30MHz 3.44dB					
Note (1): The measurement unce	ertainty 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:	LV500\Cellotrack Solar
Model No.:	LV500
Test sample(s) ID:	GTS202211000051-1
Sample(s) Status:	Engineer sample
Serial No.:	1879254
Operation Frequency:	2402MHz~2480MHz
Channel Numbers:	40
Channel Separation:	2MHz
Modulation Type:	GFSK
Antenna Type:	PCB Antenna
Antenna Gain:	0.53dBi(declare by applicant)
Power Supply:	DC 3.6V





Operation Frequency each of channel								
Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency	
1	2402 MHz	11	2422 MHz	21	2442 MHz	31	2462 MHz	
2	2404 MHz	12	2424 MHz	22	2444 MHz	32	2464 MHz	
3	2406 MHz	13	2426 MHz	23	2446 MHz	33	2466 MHz	
4	2408 MHz	14	2428 MHz	24	2448 MHz	34	2468 MHz	
5	2410 MHz	15	2430 MHz	25	2450 MHz	35	2470 MHz	
6	2412 MHz	16	2432 MHz	26	2452 MHz	36	2472 MHz	
7	2414 MHz	17	2434 MHz	27	2454 MHz	37	2474 MHz	
8	2416 MHz	18	2436 MHz	28	2456 MHz	38	2476 MHz	
9	2418 MHz	19	2438 MHz	29	2458 MHz	39	2478 MHz	
10	2420 MHz	20	2440 MHz	30	2460 MHz	40	2480 MHz	

Note:

In section 15.31(m), regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

Channel	Frequency
The lowest channel	2402MHz
The middle channel	2440MHz
The Highest channel	2480MHz





5.2 Test mode

Transmitting mode Keep the EUT in continuously transmitting mode.

5.3 Description of Support Units

None.

5.4 Deviation from Standards

None.

5.5 Abnormalities from Standard Conditions

None.

5.6 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.

• IC —Registration No.: 9079A

CAB identifier: CN0091

The 3m Semi-anechoic chamber of Global United Technology Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada 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).

5.7 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

5.8 Additional Instructions

Test Software	Test command provided by manufacturer
Power level setup	Default





6 **Test Instruments list**

Rad	iated Emission:					
Item	Test Equipment	est Equipment Manufacturer		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	July 02, 2020	July 01, 2025
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	April 22, 2022	April 21, 2023
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9168	GTS640	March 21, 2022	March 20, 2023
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	GTS208	June 12, 2022	June 11, 2023
6	Horn Antenna	ETS-LINDGREN	3160	GTS217	June 23, 2022	June 22, 2023
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	GTS	N/A	GTS213	April 22, 2022	April 21, 2023
9	Coaxial Cable	GTS	N/A	GTS211	April 22, 2022	April 21, 2023
10	Coaxial cable	GTS	N/A	GTS210	April 22, 2022	April 21, 2023
11	Coaxial Cable	GTS	N/A	GTS212	April 22, 2022	April 21, 2023
12	Amplifier(100kHz-3GHz)	HP	8347A	GTS204	April 22, 2022	April 21, 2023
13	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	GTS218	June 23, 2022	June 22, 2023
14	Band filter	Amindeon	82346	GTS219	June 23, 2022	June 22, 2023
15	Power Meter	Anritsu	ML2495A	GTS540	June 23, 2022	June 22, 2023
16	Power Sensor	Anritsu	MA2411B	GTS541	June 23, 2022	June 22, 2023
17	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	GTS575	April 22, 2022	April 21, 2023
18	Splitter	Agilent	11636B	GTS237	June 23, 2022	June 22, 2023
19	Loop Antenna	ZHINAN	ZN30900A	GTS534	Nov. 30, 2021	Nov. 29, 2022
20	Broadband Preamplifier	SCHWARZBECK	BBV9718	GTS535	April 22, 2022	April 21, 2023
21	Breitband hornantenna	SCHWARZBECK	BBHA 9170	GTS579	Oct. 16, 2022	Oct. 15, 2023
22	Amplifier	TDK	PA-02-02	GTS574	Oct. 16, 2022	Oct. 15, 2023
23	Amplifier	TDK	PA-02-03	GTS576	Oct. 16, 2022	Oct. 15, 2023
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	GTS578	June 23, 2022	June 22, 2023
25	Amplifier(1GHz-26.5GHz)	HP	8449B	GTS601	April 22, 2022	April 21, 2023





RF C	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	April 22, 2022	April 21, 2023			
2	EMI Test Receiver	R&S	ESCI 7	GTS552	April 22, 2022	April 21, 2023			
3	Spectrum Analyzer	Agilent	E4440A	GTS536	April 22, 2022	April 21, 2023			
4	MXG vector Signal Generator	Agilent	N5182A	GTS567	April 22, 2022	April 21, 2023			
5	ESG Analog Signal Generator	Agilent	E4428C	GTS568	April 22, 2022	April 21, 2023			
6	USB RF Power Sensor	DARE	RPR3006W	GTS569	April 22, 2022	April 21, 2023			
7	RF Switch Box	Shongyi	RFSW3003328	GTS571	April 22, 2022	April 21, 2023			
8	Programmable Constant Temp & Humi Test Chamber	WEWON	WHTH-150L-40-880	GTS572	April 22, 2022	April 21, 2023			

Ger	General used equipment:							
Item	Test Equipment	Manufacturer	Model No.	Inventory No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)		
1	Humidity/ Temperature Indicator	KTJ	TA328	GTS243	April 25, 2022	April 24, 2023		
2	Barometer	KUMAO	SF132	GTS647	July 26, 2022	July 25, 2023		





7 Test results and Measurement Data

7.1 Antenna requirement

Standard requirement: FCC Part15 C Section 15.203 /247(c)

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.

15.247(c) (1)(i) requirement:

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

E.U.T Antenna:

The antenna is PCB antenna, reference to the appendix II for details





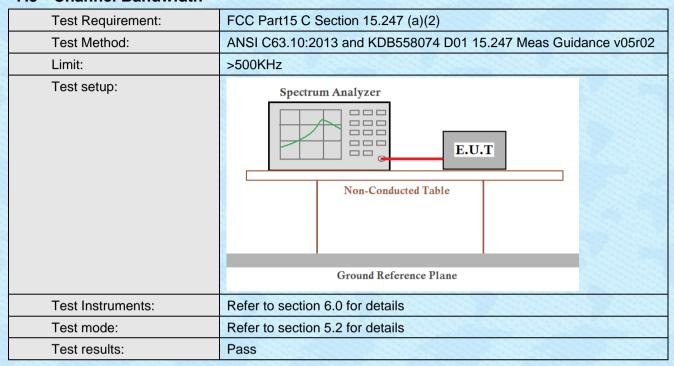
7.2 Conducted Output Power

Test Requirement:	FCC Part15 C Section 15.247 (b)(3)		
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02		
Limit:	30dBm		
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane		
Test Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.2 for details		
Test results:	Pass		





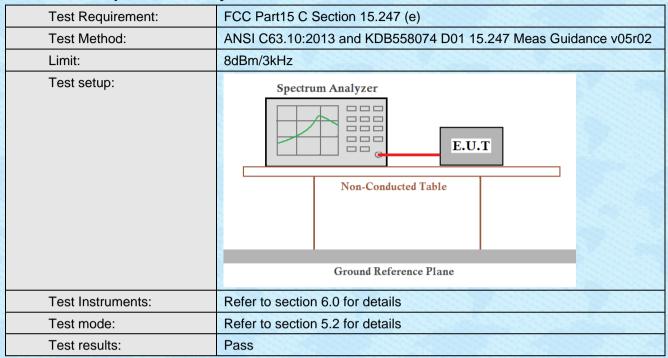
7.3 Channel Bandwidth







7.4 Power Spectral Density







7.5 Spurious Emission in Non-restricted & restricted Bands

7.5.1 Conducted Emission Method

Toot Descripements	FOO Double O Continue 45 047 (d)		
Test Requirement:	FCC Part15 C Section 15.247 (d)		
Test Method:	ANSI C63.10:2013 and KDB558074 D01 15.247 Meas Guidance v05r02		
Limit:	In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.		
Test setup:	Spectrum Analyzer E.U.T Non-Conducted Table Ground Reference Plane		
Test Instruments:	Refer to section 6.0 for details		
Test mode:	Refer to section 5.2 for details		
Test results:	Pass		

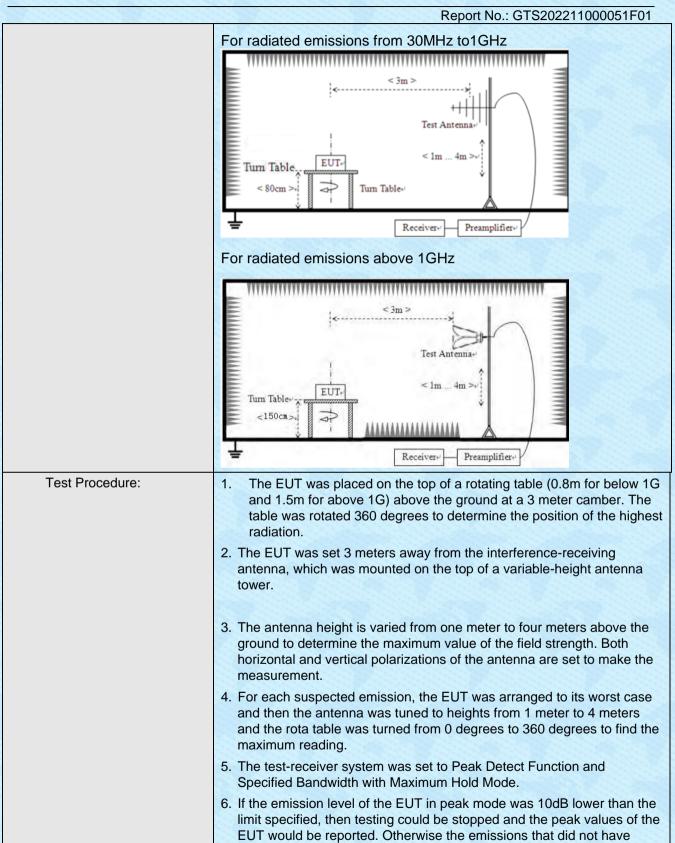




7.5.2 Radiated Emission Method

Test Requirement:	FCC Part15 C Section	on 15	.209				
Test Method:	ANSI C63.10:2013						
Test Frequency Range:	9kHz to 25GHz						
Test site:	Measurement Distar	nce: 3	3m				
Receiver setup:	Frequency	D	etector	RB\	N	VBW	Value
	9KHz-150KHz	Qu	asi-peak	200H	Ηz	600Hz	Quasi-peak
	150KHz-30MHz	Qu	asi-peak	9KH	łz	30KHz	Quasi-peak
	30MHz-1GHz	Qu	asi-peak	120K	Hz	300KHz	Quasi-peak
	Above 1GHz		Peak	1MF	Ηz	3MHz	Peak
	Above IGHZ		Peak	1MF	Ηz	10Hz	Average
Limit:	Frequency		Limit (u\	//m)	,	/alue	Measurement Distance
	0.009MHz-0.490M	lHz	2400/F(K	(Hz)	PK	/QP/AV	300m
	0.490MHz-1.705M	lHz	24000/F(I	KHz)		QP	30m
	1.705MHz-30MH	lz	30			QP	30m
	30MHz-88MHz		100			QP	
	88MHz-216MHz	Z	150			QP	
	216MHz-960MH	z	200			QP	3m
	960MHz-1GHz		500			QP	Sili
	Above 1GHz 500			A	/erage		
	710070 10112		5000			Peak	
Test setup:	For radiated emiss	sions	from 9kH	z to 30)MH	Z	
	E ************************************	1111111	*********	******	*****	********	
	Turn Table EUT		< 3m > Test A m Table ∫	ntenna 1m			
	-			Receiver			





Test Instruments: Refer to section 6.0 for details

Test mode: Refer to section 5.2 for details

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.





Report No.: GTS202211000051F01					00051F01	
Test environment:	Temp.:	25 °C	Humid.:	52%	Press.:	1012mbar
Test voltage:	DC 3.6V					
Test results:	Pass					

Measurement data:

Remark:

Pre-scan all kind of the place mode (X-axis, Y-axis, Z-axis), and found the Y-axis which it is worse case.

■ 9kHz~30MHz

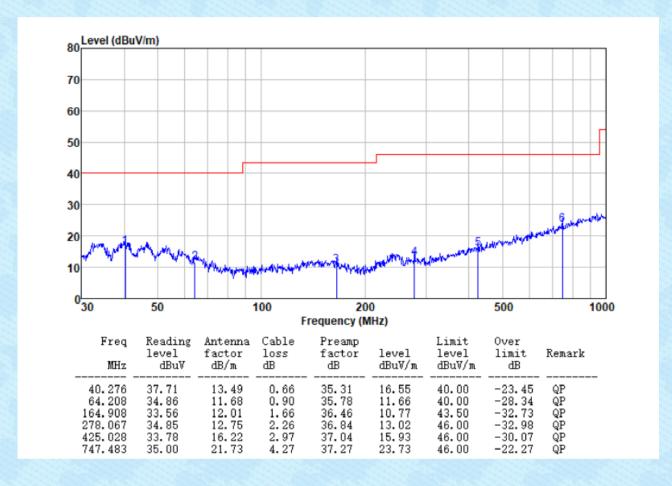
The low frequency, which started from 9 kHz to 30 MHz, was pre-scanned and the result which was 20 dB lower than the limit line per 15.31(o) was not reported.





■ Below 1GHz

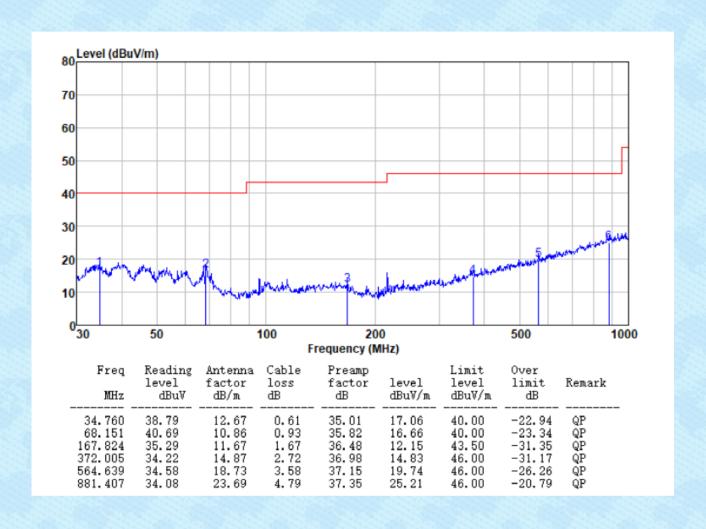
Pre-scan all test modes, found worst case at 2480MHz, and so only show the test result of 2480MHz **Horizontal:**







Vertical:



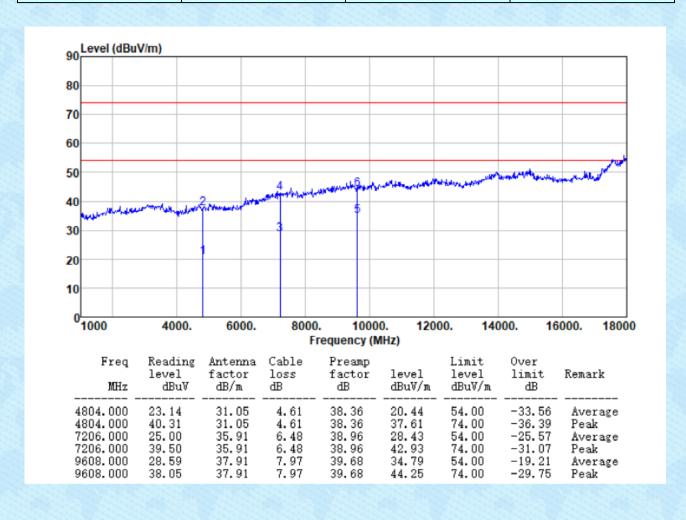




Above 1GHz

Unwanted Emissions in Restricted Frequency Bands

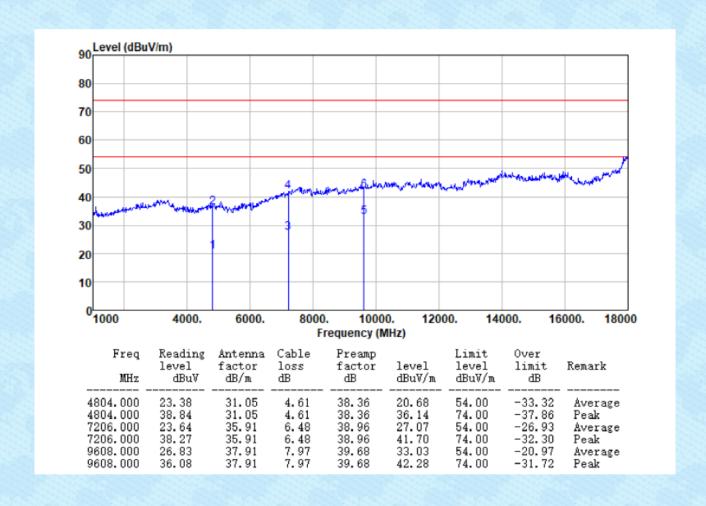
Tes	st channel:	Lowest	Polarization:	Horizontal
-----	-------------	--------	---------------	------------







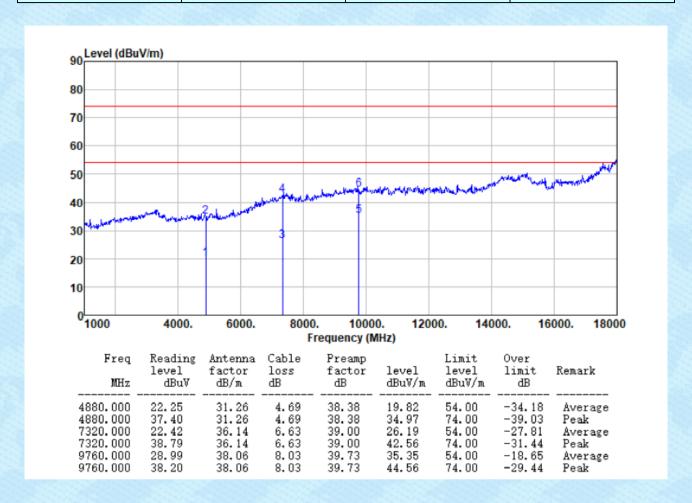
Test channel: Lowest	Polarization:	Vertical
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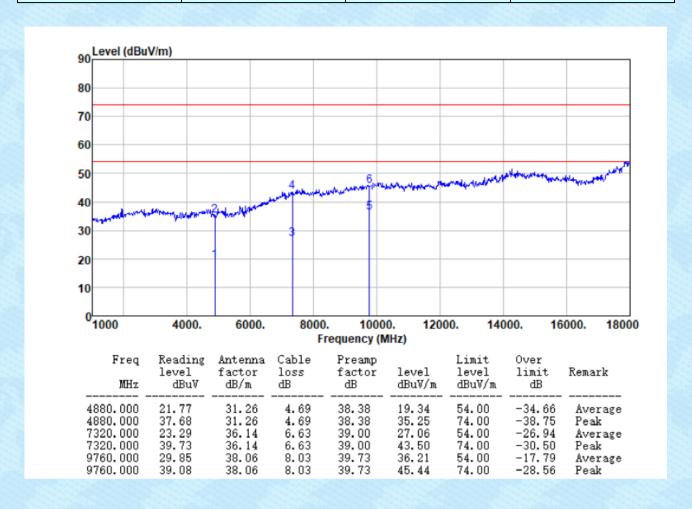
Tost channel:	Middle	Polorization:	Horizontal
l est channel:	Miladie	Polarization:	Horizontal







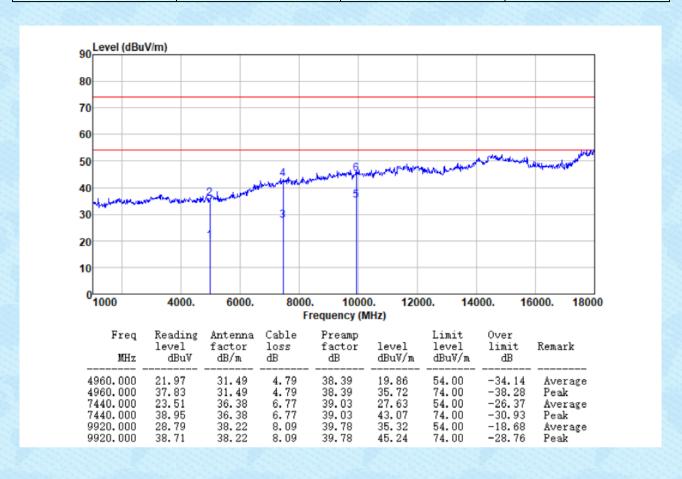
Test channel:	Middle	Polarization:	Vertical
1 oot onarmon	·····aaio	1 Glarization:	







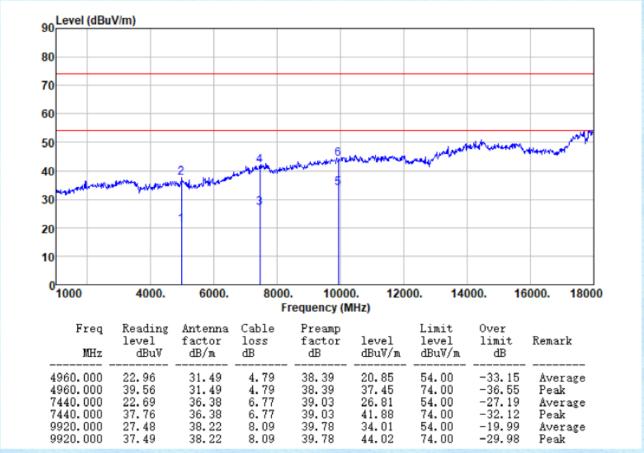
Test channel: Highest Polarization: Horizontal
--







lest channel: Highest Polarization: Vertical
--



Remarks:

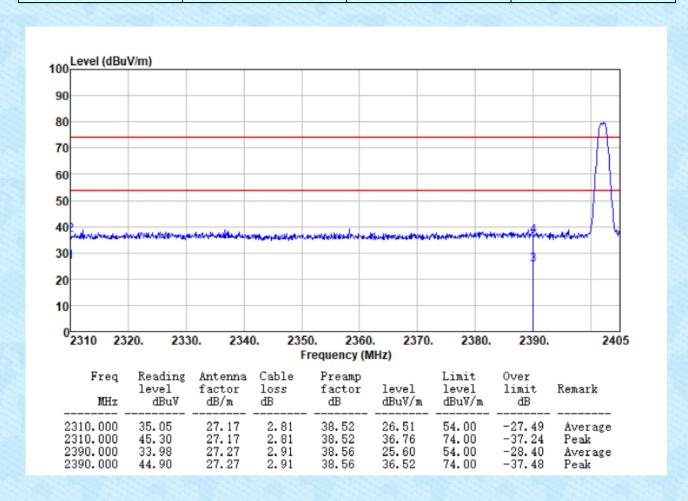
- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.





■ Unwanted Emissions in Non-restricted Frequency Bands

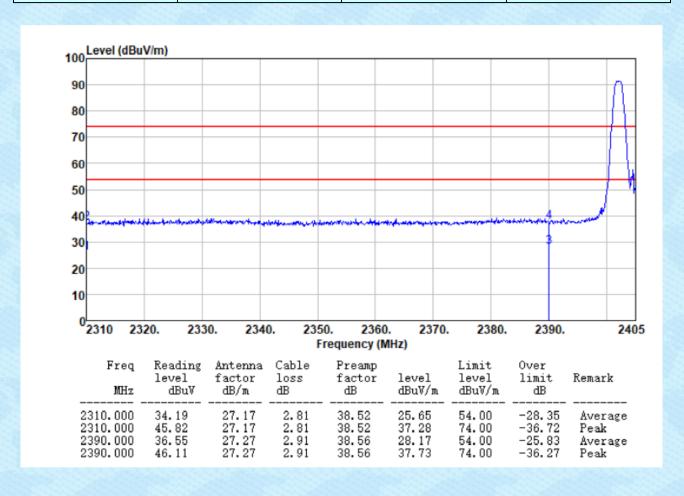
Test channel:	Lowest	Polarization:	Horizontal
	_000.		





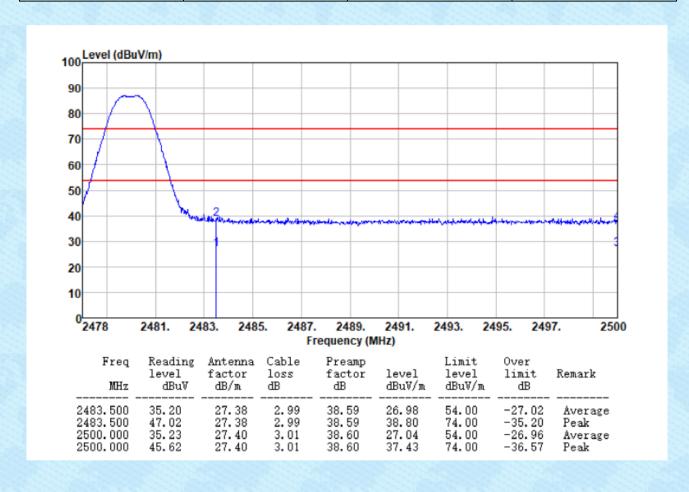


Test channel:	Lowest	Polarization:	Vertical
1 oot onarrion	2011001	1 Glarization:	



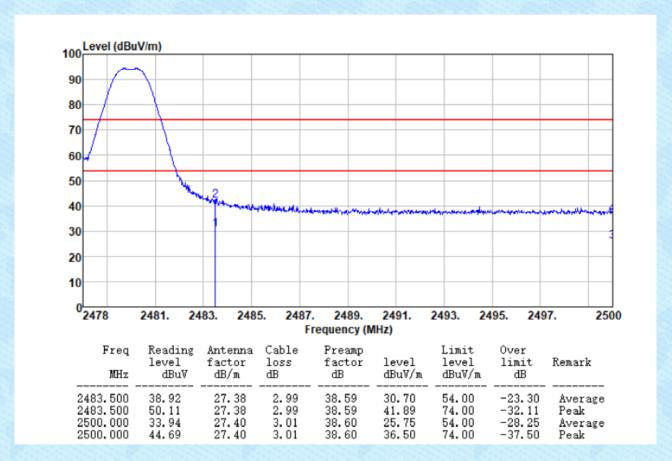












Remarks:

- 1. Final Level = Receiver Read level + Antenna Factor + Cable Loss Preamplifier Factor
- 2. The emission levels of other frequencies are very lower than the limit and not show in test report.





8 Test Setup Photo

Reference to the appendix I for details.

9 EUT Constructional Details

Reference to the appendix II for details.

-----End-----