

Shenzhen Huatongwei International Inspection Co.,Ltd. Huatongwei 101, No.006, Keji south 12th Road, High-tech zone community, Yuehai Street, Nanshan District, Shenzhen, Guangdong, China Phone:86-755-26715499 E-mail: cs@szhtw.com.cn Website:http://www.szhtw.com.cn

TE	EST REPORT	
	For NFC	回流影响就起回
Report No	CHTW24100053 Report	verification:
Project No	SHT2407073401W	
FCC ID	2AYEZ-MT-100	
Applicant's name:	Telo Communication (Shenzher	n) Co., Ltd
Address	13th Floor, Building B, Union RSD Rd., Bao'an District, Shenzhen, C	
Product Name	Smart LTE Terminal	
Trade Mark	TELOX	
Model No	MT-100	
Listed Model(s)	MT-100L, MT-100M, MT-100X, MT-100P, MT-100K	
Standard:	FCC CFR Title 47 Part 15 Subpart C § 15.225	
Date of receipt of test sample	Aug. 15, 2024	
Date of testing	Aug. 19, 2024- Aug. 29, 2024	
Date of issue	Oct. 17, 2024	
Result:	PASS	
Compiled by (position+printedname+signature):	File administrators Xiaodong Zhao	Xiaodong Zheo
Supervised by (position+printedname+signature):	Project Engineer Xiaodong Zhao	Xiaodong Zheo Lu, Jong
Approved by		1 2
(position+printedname+signature):	RF Manager Xu yang	An. Jong
Testing Laboratory Name: :	Shenzhen Huatongwei Internati	onal Inspection Co., Ltd.
Address	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China	

Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

The test report merely correspond to the test sample.

	Contents	
<u>1.</u>	TEST STANDARDS AND REPORT VERSION	3
1.1. 1.2.	Test Standards Report version information	3 3
<u>2.</u>	TEST DESCRIPTION	4
<u>3.</u>	SUMMARY	5
3.1. 3.2. 3.3. 3.4.	Client Information Product Description Radio Specification Description Testing Laboratory Information	5 5 5 6
<u>4.</u>	TEST CONFIGURATION	7
4.1. 4.2. 4.3. 4.4. 4.5. 4.6.	Test mode Test sample information Support unit used in test configuration and system Testing environmental condition Statement of the measurement uncertainty Equipments Used during the Test	7 7 7 8 9
<u>5.</u>	TEST CONDITIONS AND RESULTS	10
5.1. 5.2. 5.3. 5.4. 5.5. 5.6.	Antenna requirement AC Power Conducted Emissions Field Strength of the Fundamental and Mask Measurement 20dB Bandwidth Radiated Spurious Emission Frequency Stability	10 11 14 16 18 22
<u>6.</u>	TEST SETUP PHOTOS	24
<u>7.</u>	EXTERNAL AND INTERNAL PHOTOS OF THE EUT	25

Report No.:

CHTW24100053

Page:

2 of 25

Date of issue:

2024-10-17

2024-10-17

1.1. Test Standards

The tests were performed according to following standards:

FCC CFR Title 47 Part 15 Subpart C § 15.225: Operation within the band 13.110-14.010 MHz

ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2024-10-17	Original

2024-10-17

2. TEST DESCRIPTION

Report clause	Test Items	Standard Requirement	Result	Test Engineer
5.1	Antenna requirement	15.203	PASS	Chenxin Ling
5.2	AC Power Conducted Emissions	15.207	PASS	Yating Chen
5 X	Field Strength of the Fundamental and Mask Measurement	15.225(a)(b)(c)	PASS	Yifan Wang
5.4	20dB Bandwidth	15.215	PASS	Chenxin Ling
5.5	Radiated Spurious Emission	15.225(d)&15.209	PASS	Yifan Wang
5.6	Frequency Stability	15.225(e)	PASS	Chenxin Ling

Note: The measurement uncertainty is not included in the test result.

3. <u>SUMMARY</u>

3.1. Client Information

Applicant:	Telo Communication (Shenzhen) Co., Ltd	
Address:	13th Floor, Building B, Union RSD Center, No. 287 Guangshen Rd., Bao'an District, Shenzhen, China	
Manufacturer:	Telo Communication (Shenzhen) Co., Ltd	
Address:	13th Floor, Building B, Union RSD Center, No. 287 Guangshen Rd., Bao'an District, Shenzhen, China	
Factory:	Telo Communication (Shenzhen) Co., Ltd	
Address:	13th Floor, Building B, Union RSD Center, No. 287 Guangshen Rd., Bao'an District, Shenzhen, China	

3.2. Product Description

Main unit information:		
Product Name:	Smart LTE Terminal	
Trade Mark:	TELOX	
Model No.:	MT-100	
Listed Model(s):	MT-100L, MT-100M, MT-100X, MT-100P, MT-100K	
Power supply:	DC 3.87V from Battery	
Hardware version:	V1.0	
Software version:	MT100_US_V1P_20240531	
Accessory unit information:		
Battery information:	3.87V 4000mAh 15.48Wh Model: TEB-4000T Limited Charge Voltage: 4.45V	
Adapter information:	MODEL: MR-0502000US INPUT:100-240V~50/60Hz 0.3A OUTPUT:DC 5V 2.0A Shen zhen Mao Two Power Co., Ltd	

3.3. Radio Specification Description

Radio function:	NFC
Operation frequency:	13.56MHz
Channel number:	1
Antenna type:	LOOP antenna
Antenna Gain:	-5.00dBi

Laboratory Name	Shenzhen Huatongwei International Inspection Co., Ltd.	
Laboratory Location	Building 7, Baiwang Idea Factory, No.1051, Songbai Road, Yangguang Community, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong, China	
Contact information:	Phone: 86-755-26715499 E-mail: <u>cs@szhtw.com.cn</u> <u>http://www.szhtw.com.cn</u>	
	Туре	Accreditation Number
Qualifications	FCC Registration Number	762235
	FCC Designation Number	CN1181

4. TEST CONFIGURATION

4.1. Test mode

For RF test items

The engineering test program was provided and enabled to make EUT continuous transmit.

For AC power line conducted emissions:

The engineering test program was provided and enabled to make EUT continuous transmit.

For Radiated spurious emissions test item:

The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.

4.2. Test sample information

Test item	HTW sample no.
RF Radiated test items	YPHT24070734001
EMI test items	YPHT24070734001

Note:

RF Radiated test items: Field Strength of the Fundamental and Mask Measurement, 20dB Bandwidth, Radiated Spurious Emission, Frequency Stability

EMI test items : AC Power Conducted Emissions

4.3. Support unit used in test configuration and system

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

The following peripheral devices and interface cables were connected during the measurement:

Whether su	Whether support unit is used?		
✓ No			
Item	Equipement	Trade Name	Model No.
1			
2			

4.4. Testing environmental condition

Туре	Requirement	Actual
Temperature:	15~35°C	25°C
Relative Humidity:	25~75%	50%
Air Pressure:	860~1060mbar	1000mbar

4.5. Statement of the measurement uncertainty

Test Items	Measurement Uncertainty
AC Power Conducted Emissions	3.21 dB
Radiated emissions below 1GHz	4.54dB
Radiated emissions above 1GHz	5.10 dB
Occupied Bandwidth	0.002%

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

•	RF Conducted test item									
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)			
•	Signal and spectrum Analyzer	R&S	HTWE0242	FSV40	100048	2024/08/27	2025/08/26			
•	Signal & Spectrum Analyzer	R&S	HTWE0262	FSW26	103440	2024/08/21	2025/08/20			
•	Vector signal generator	R&S	HTWE0244	SMBV100A	260790	2024/5/25	2025/5/24			
•	Test software	Tonscend	N/A	JS1120	N/A	N/A	N/A			

4.6. Equipments Used during the Test

•	Conducted Emission									
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)			
•	EMI Test Receiver	R&S	HTWE0111	ESCI	101247	2024/08/12	2025/08/11			
•	Artificial Mains	SCHWARZBECK	HTWE0113	NNLK 8121	573	2024/08/12	2025/08/11			
•	Protection Network	SCHWARZBECK	HTWE0567	VTSD9561FN	00899	2024/08/12	2025/08/11			
•	ISN	FCC	HTWE0148	FCC-TLISN-T2- 02	20371	2024/08/12	2025/08/11			
•	ISN	FCC	HTWE0150	FCC-TLISN-T8- 02	20375	2024/08/12	2025/08/11			
•	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A			

•	Radiated Emission – 9kHz~30MHz									
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)			
•	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/04/06	2026/04/05			
•	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2024/08/12	2025/08/11			
•	Loop Antenna	R&S	HTWE0170	HFH2-Z2	100020	2024/04/08	2027/04/07			
•	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A			

•	Radiated Emission - 30MHz~1GHz_3M										
Used	Test Equipment	Manufacturer	Equipment No.	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)				
•	Semi-Anechoic Chamber	Albatross projects	HTWE0127	SAC-3m-02	C11121	2023/04/06	2026/04/05				
•	EMI Test Receiver	R&S	HTWE0099	ESCI 7	100900	2024/08/12	2025/08/11				
•	Ultra-Broadband Antenna	SCHWARZBEC K	HTWE0119	VULB9163	546	2023/2/22	2026/2/21				
•	Pre-Amplifer	SCHWARZBEC K	HTWE0295	BBV 9742	/	2024/5/24	2025/5/23				
•	Test Software	R&S	N/A	EMC32	N/A	N/A	N/A				

Page:

5.1. Antenna requirement

<u>Requirement</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responseble 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.

TEST RESULT

☑ Passed □ Not Applicable

The antenna type is a LOOP antenna, please refer to the below antenna photo.



5.2. AC Power Conducted Emissions

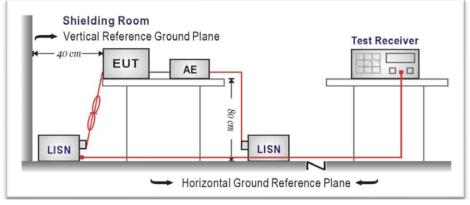
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207:

Frequency renge (MHz)	Limit (d	BuV)
Frequency range (MHz)	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 CONFIGURATION



TEST PROCEDURE

- 1. The EUT was setup according to ANSI C63.10
- The EUT was placed on a plat form 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.
- 3. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50ohm / 50uH coupling impedance for the measuring equipment.
- 4. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)
- 5. 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.
- 6. 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.
- 7. Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.
- 8. During the above scans, the emissions were maximized by cable manipulation.

TEST MODE:

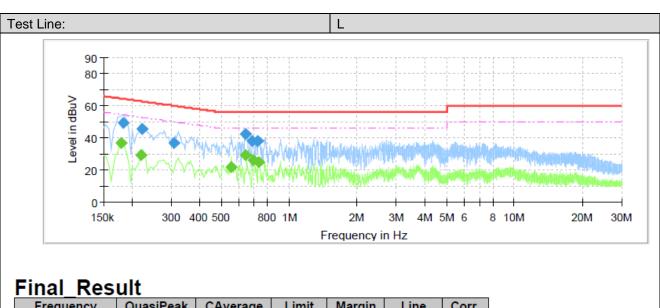
Please refer to the clause 4.1

TEST RESULTS

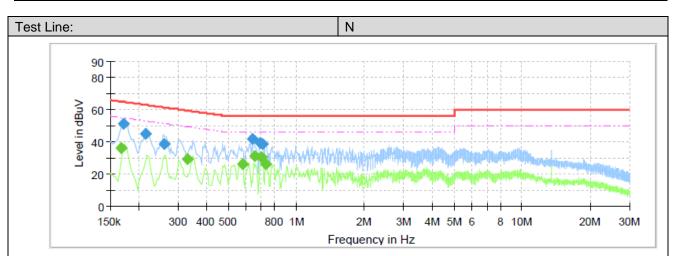
☑ Passed □ Not Applicable

Shenzhen Huatongwei International Inspection Co., Ltd.

12 of 25



Frequency	QuasiPeak	CAverage	Limit	Margin	Line	Corr.
(MHz)	(dBuV)	(dBuV)	(dBuV)	(dB)		(dB)
0.1795		36.88	54.51	17.63	L1	10.2
0.1835	49.19		64.33	15.14	L1	10.2
0.2195		29.57	52.84	23.26	L1	10.2
0.2235	45.33		62.69	17.35	L1	10.2
0.3075	37.04		60.04	23.00	L1	10.3
0.5515		21.57	46.00	24.43	L1	10.4
0.6395	42.49		56.00	13.51	L1	10.4
0.6435		29.34	46.00	16.66	L1	10.4
0.6875	38.40		56.00	17.60	L1	10.4
0.6915		26.17	46.00	19.83	L1	10.4
0.7275	38.13		56.00	17.87	L1	10.4
0.7355		25.06	46.00	20.94	L1	10.4



Final_Result

Frequency	QuasiPeak	CAverage	Limit	Margin	Line	Corr.
(MHz)	(dBuV)	(dBuV)	(dBuV)	(dB)		(dB)
0.1675		36.23	55.08	18.85	N	10.1
0.1715	51.06		64.89	13.83	N	10.1
0.2155	45.15		62.99	17.84	N	10.2
0.2595	38.93		61.45	22.51	N	10.2
0.3315		29.17	49.41	20.25	N	10.2
0.5795		26.28	46.00	19.72	N	10.2
0.6435	41.87		56.00	14.13	N	10.2
0.6555		30.98	46.00	15.02	N	10.2
0.6955	39.30		56.00	16.70	N	10.2
0.7035		30.47	46.00	15.53	N	10.2
0.7075	38.93		56.00	17.07	N	10.2
0.7315		26.24	46.00	19.76	Ν	10.2

5.3. Field Strength of the Fundamental and Mask Measurement

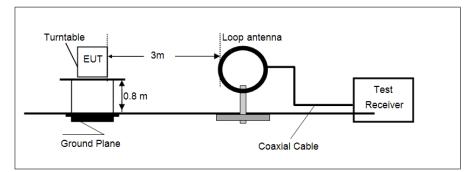
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.225(a)(b)(c)

Fundamental frequency(MHz)	Field strength of fundamental (uV/m @30m)	Field strength of fundamental (dBuV/m @3m)
13.553-13.567	15848	124.0
13.410-13.553&13.567-13.710	334	90.5
13.110-13.410&13.710-14.010	106	80.5

Note: Limit dBuV/m @3m =Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The EUT was setup and tested according to ANSI C63.10 requirements.
- 2. The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT waspositioned such that the distance from antenna to the EUT was 3 meters.
- 4. The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10 on radiated measurement.

TEST MODE:

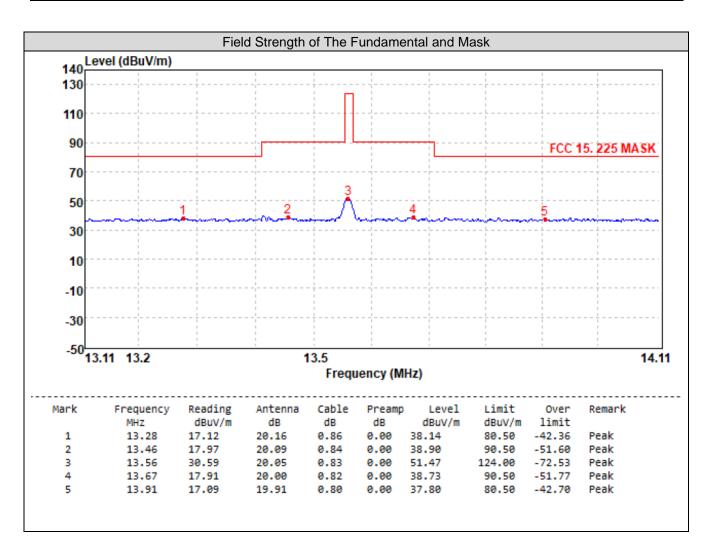
Please refer to the clause 4.1

TEST RESULTS

☑ Passed □ Not Applicable

Page:

2024-10-17



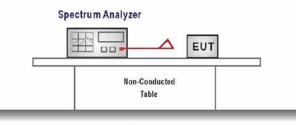
5.4. 20dB Bandwidth

<u>Limit</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.215

Intentional radiators must be designed to ensure that the 20dB emission bandwidth in the specific band 13.553~13.567MHz.

TEST CONFIGURATION



➡ Ground Reference Plane

TEST PROCEDURE

- 1. The transmitter output was connected to the spectrum analyzer through an attenuator, the path loss was compensated to the results for each measurement.
- 2. Set to the maximum power setting and enable the EUT transmit continuously
- Use the following spectrum analyzer settings:
 Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ RBW
 - Sweep = auto, Detector function = peak, Trace = max hold
- 4. Measure and record the results in the test report.

TEST MODE:

Please refer to the clause 4.1

TEST RESULTS

☑ Passed □ Not Applicable

Shenzhen Huatongwei International Inspection Co., Ltd.

Report No .:	CHTW24100053	Page:	17 of 25	Date of issue:	2024-10-17

Frequency	Measurement data (MHz)	Limit (MHz)	Result		
fL	13.5594935	>13.553	PASS		
fн	13.5595731	<13.567	PASS		

Spectru	m)											
Ref Leve	I -10.0	0 dBm			RBW	/ 30 Hz							
Att		10 dB	SWT 63	.2 ms 👄	VBV	V 100 Hz	Me	ode Aut	O FFT				
⊖1Pk View													
								M	1[1]			-	38.97 dBm
00 d0												13.559	54410 MHz
-20 dBm—								no					20.00 dB
-30 dBm—								Bi				79.600	000000 Hz
-30 ubiii—					м	1		Q	factor		1	1	170357.2
-40 dBm—					7	ŕ							
-+0 00111					- 11								
-50 dBm—													
-50 abiii					TIN	2							
-60 dBm—					- v	ľ							
00 00111													
-70 dBm—													
				. ~		Mr.							
-80 dBm—			~~~~			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		<u>^</u>					
~ A		, st	-~w W `	1.0			V'n	ՙՙ՚՚	\sim	mr	MAA	_∆∧_	
~9Q qBm√-	- • •	1~JV								(V	ᢂ᠊᠉ᡰᠮ᠋᠊ᠮᡪ	hr√ too	nn. 1
Ť											Ĩ	V V V	' WW
-100 dBm-													
CF 13.56	MHz					691	pts					Spa	n 5.0 kHz
Marker													
Type R	ef Tro	:	X-value	.		Y-value		Func	tion		Fund	tion Result	
M1		1	13.559544			-38.97 dB		ndB	down				79.6 Hz
T1		1	13.559493			-59.23 dB			ndB				20.00 dB
T2		1	13,559573	31 MHz		-56.58 dB	sm	Q	factor				170357
										Mea	suring		120
.									·)		-		

Date: 5.SEP.2024 13:42:27

5.5. Radiated Spurious Emission

<u>LIMIT</u>

FCC CFR Title 47 Part 15 Subpart C Section 15.209&15.225(d)

Limit for frequency below 30MHz:

Frequency	Limit (uV/m)	Measurement Distance(m)	Remark
0.009~0.490	2400/F(kHz)	300	Quasi-peak
0.490~1.705	24000/F(kHz)	30	Quasi-peak
1.705~30.0	30	30	Quasi-peak

Note: Limit dBuV/m @3m = Limit dBuV/m @300m + 40*log(300/3)= Limit dBuV/m @300m +80,

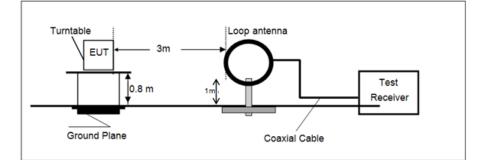
Limit dBuV/m @3m = Limit dBuV/m @30m +40*log(30/3)= Limit dBuV/m @30m + 40.

Limit for frequency above 30MHz:

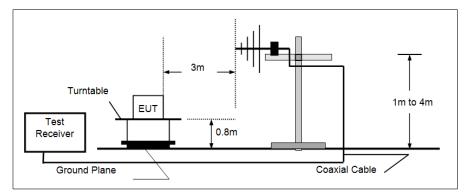
Frequency	Limit (dBuV/m@3m) Remark		
30MHz~88MHz	40.00	Quasi-peak	
88MHz~216MHz	43.50	Quasi-peak	
216MHz~960MHz	46.00	Quasi-peak	
960MHz-1GHz	54.00	Quasi-peak	
Above 1GHz	54.00	Average	
	74.00	Peak	

TEST CONFIGURATION

• 9 kHz ~ 30 MHz



• 30 MHz ~ 1 GHz



TEST PROCEDURE

1. The EUT was setup and tested according to ANSI C63.10 requirements.

Page:

- 2. The EUT is placed on a turn table which is 0.8 meter above ground for below 1 GHz, The turn table is rotated 360 degrees to determine the position of the maximum emission level.
- 3. The EUT was set 3 meters from the receiving antenna, which was mounted on the top of a variable height antenna tower.
- 4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
- 5. Set to the maximum power setting and enable the EUT transmit continuously.
- 6. Use the following spectrum analyzer settings
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Below 30MHz:
 - RBW=10 kHz, VBW=30 kHz, Sweep=auto, Detector function=peak, Trace=max hold; (3) 30MHz to 1 GHz:
 - RBW=120 kHz, VBW=300 kHz, Sweep=auto, Detector function=peak, Trace=max hold; If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

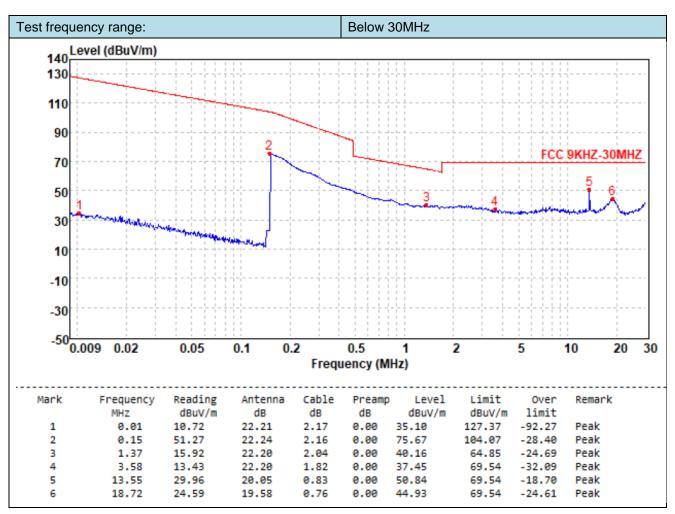
TEST MODE:

Please refer to the clause 4.1

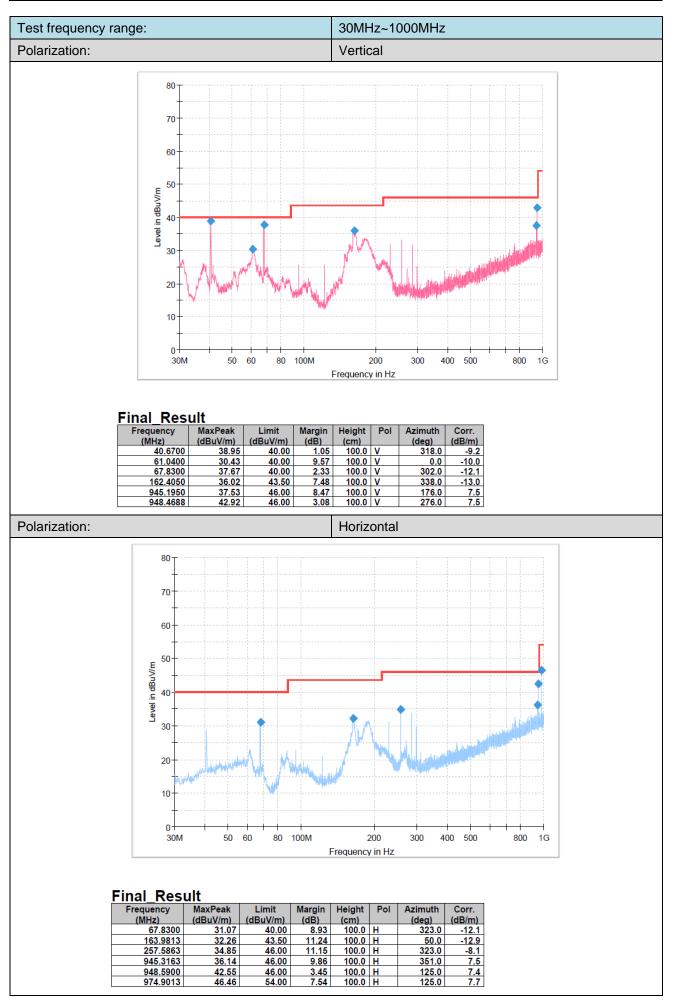
TEST RESULTS

☑ Passed □ Not Applicable

Page:



21 of 25



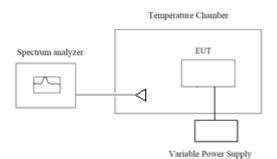
Shenzhen Huatongwei International Inspection Co., Ltd.

5.6. Frequency Stability

<u>LIMIT</u>

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

TEST CONFIGURATION



TEST PROCEDURE

- 1. The equipment under test was connected to an external power supply.
- 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
- 3. The EUT was placed inside the temperature chamber.
- Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25℃ operating frequency as reference frequency.
- 5. Turn EUT off and set the chamber temperature to -20° C. After the temperature stabilized for approximately 30 minutes recorded the frequency.
- 6. Repeat step measure with 10° increased per stage until the highest temperature of +50 $^{\circ}$ reached.

TEST MODE:

Please refer to the clause 4.1

TEST RESULTS

☑ Passed □ Not Applicable

Test Enviroment		Measurement	Frequency	Limit	Deput
Voltage	Temperature(℃)	data (MHz)	Error (%)	Limit	Result
DC 3.87V	-20	13.56100	0.0000	±0.01%	Pass
	-10	13.56112	0.0003	±0.01%	Pass
	0	13.56114	0.0004	±0.01%	Pass
	10	13.56112	0.0001	±0.01%	Pass
	20	13.56108	0.0002	±0.01%	Pass
	30	13.56102	0.0004	±0.01%	Pass
	40	13.56119	0.0005	±0.01%	Pass
	50	13.56103	0.0002	±0.01%	Pass

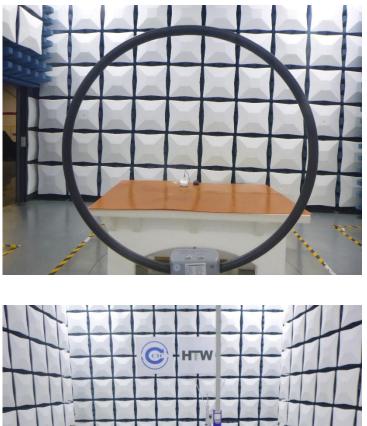
2024-10-17

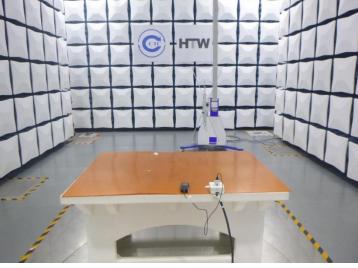
6. TEST SETUP PHOTOS

Conducted Emissions (AC Mains)



Radiated Emissions





7. EXTERNAL AND INTERNAL PHOTOS OF THE EUT

Refer to the test report No.: CHTW24100045

-----End of Report------