

FCC Test Report

Report No.: AGC01684180501FE06

FCC ID : 2AJ2B-TPS360
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Handheld Fingerprint Terminal
BRAND NAME : N/A
MODEL NAME : TPS360
CLIENT : Telepower Communication Co., Ltd
DATE OF ISSUE : July 12, 2018
STANDARD(S) : FCC Part 15 Rules
TEST PROCEDURE(S)
REPORT VERSION : V1.1

Attestation of Global Compliance (Shenzhen) Co., Ltd

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	June 25, 2018	Invalid	Original Report
V1.1	1 st	July 12, 2018	Valid	Revise Report P5

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1. VERIFICATION OF CONFORMITY

Applicant	Telepower Communication Co., Ltd
Address	5 Bld, Zone A, Hantian Technology Town, No.17 ShenHai RD, Nanhai District Foshan, China
Manufacturer	Telepower Communication Co., Ltd
Address	5 Bld, Zone A, Hantian Technology Town, No.17 ShenHai RD, Nanhai District Foshan, China
Product Designation	Handheld Fingerprint Terminal
Brand Name	N/A
Test Model	TPS360
Date of test	May. 28, 2018~June 25, 2018
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.225.

Tested By

Donjon Huang

Donjon Huang(Huang
Dongyang)

June 25, 2018

Reviewed By

Bart Xie

Bart Xie(Xie Xiaobin)

July 12, 2018

Approved By

Forrest Lei

Forrest Lei(Lei Yonggang)
Authorized Officer

July 12, 2018

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2. GENERAL INFORMATION

A major technical description of EUT is described as following

Operation Frequency	13.561MHz
Maximum field strength	45.75dBμV/m@3m
Modulation	ASK
Number of channels	1
Antenna Gain	0dBi
Antenna Designation	Internal Antenna (Met 15.203 Antenna requirement)
Hardware Version	MAIN-360D-V2.4
Software Version	TPS360_V1.0.0
Power Supply	DC 3.8V by adapter

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

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4. DESCRIPTION OF TEST MODES

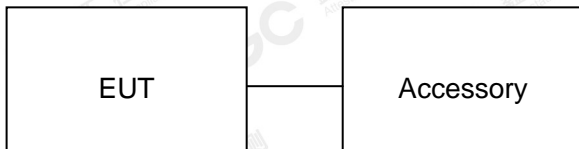
NO.	TEST MODE DESCRIPTION
1	Transmitting
Note: 1. All the test modes can be supply by adapter, only the result of the worst case was recorded in the report, if no other cases. 2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.	

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Handheld Fingerprint Terminal	TPS360	2AJ2B-TPS360	EUT
2	Adapter	SC/10WA050200US	DC 5.0V 2A	Accessory
3	Battery	HDT-7100	DC3.8V/ 3000mAh	Accessory
4	USB	N/A	N/A	Accessory

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.209	Radiated Emission	Compliant
§15.207	Conducted Emission	Compliant
§15.225	Frequency Tolerance	Compliant
§15.225	20dB bandwidth	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
NVLAP LAB CODE	600153-0
Designation Number	CN5028
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
TEST RECEIVER	R&S	ESCI	10096	Jun.18, 2018	Jun.17, 2019
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Active loop antenna (9K-30MHz)	A.H.	SAS-562B	N/A	Feb.27, 2018	Feb.26, 2019
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May.18, 2017	May.17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.18, 2018	Jun.17, 2019
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.20, 2017	Jun.19, 2018
TEST RECEIVER	R&S	ESPI	101206	Jun.18, 2018	Jun.17, 2019
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018

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7. RADIATED EMISSION

7.1 TEST LIMIT

Standard FCC15.225 for within the 13.110MHz-14.010MHz band

Frequencies (MHz)	Field Strength at 30m (microrvolts/meter)	Field Strength at 30m (dBuV/m)	Field Strength at 3m (dBuV/m)
13.553~13.567	15.848	84	124
13.410~13.553 13.567~13.710	334	50.5	90.5
13.110~13.410 13.710~14.010	106	40.5	80.5

According to 15.35, on any frequency or frequencies below or equal to 1000 MHz, the limits Shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test.

Standard FCC 15.209 for outside of the 13.110MHz-14.010MHz band

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μ V)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μ V)/m (Peak) 54.0 dB(μ V)/m (Average)	

Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m
 (2) The smaller limit shall apply at the cross point between two frequency bands.
 (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

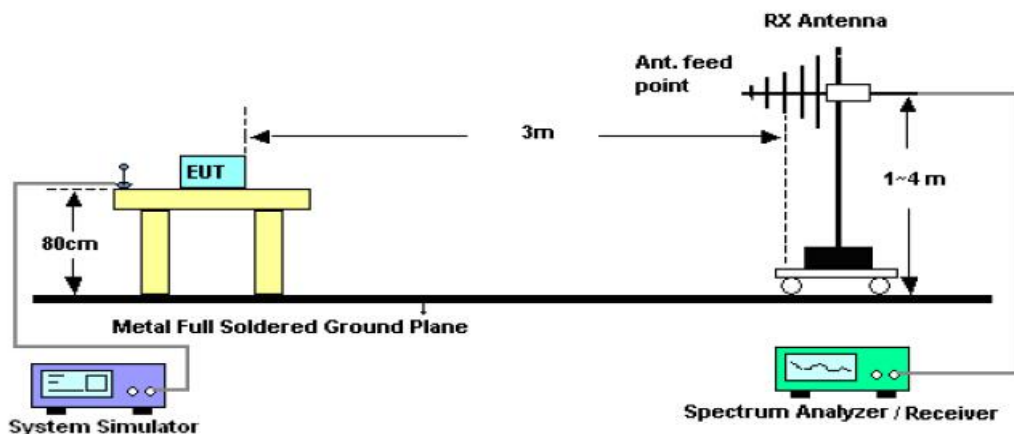
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7.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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7.4. TEST RESULT

RADIATED EMISSION BELOW 30MHZ

EUT :	Handheld Fingerprint Terminal	Model Name	TPS360
Temperature :	20 °C	Relative Humiditytity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 1	Polarization :	

Frequency	Reading	Correction Factor	Result	Limit	Margin	Polar	Detector
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	Side/Face	
13.5610	51.95	-6.29	45.66	124	-78.34	Side	Peak
27.1220	37.86	-7.03	30.83	69.5	-38.67	Side	Peak
13.5610	52.04	-6.29	45.75	124	-78.25	Face	Peak
27.1220	37.38	-7.03	30.35	69.5	-39.15	Face	Peak

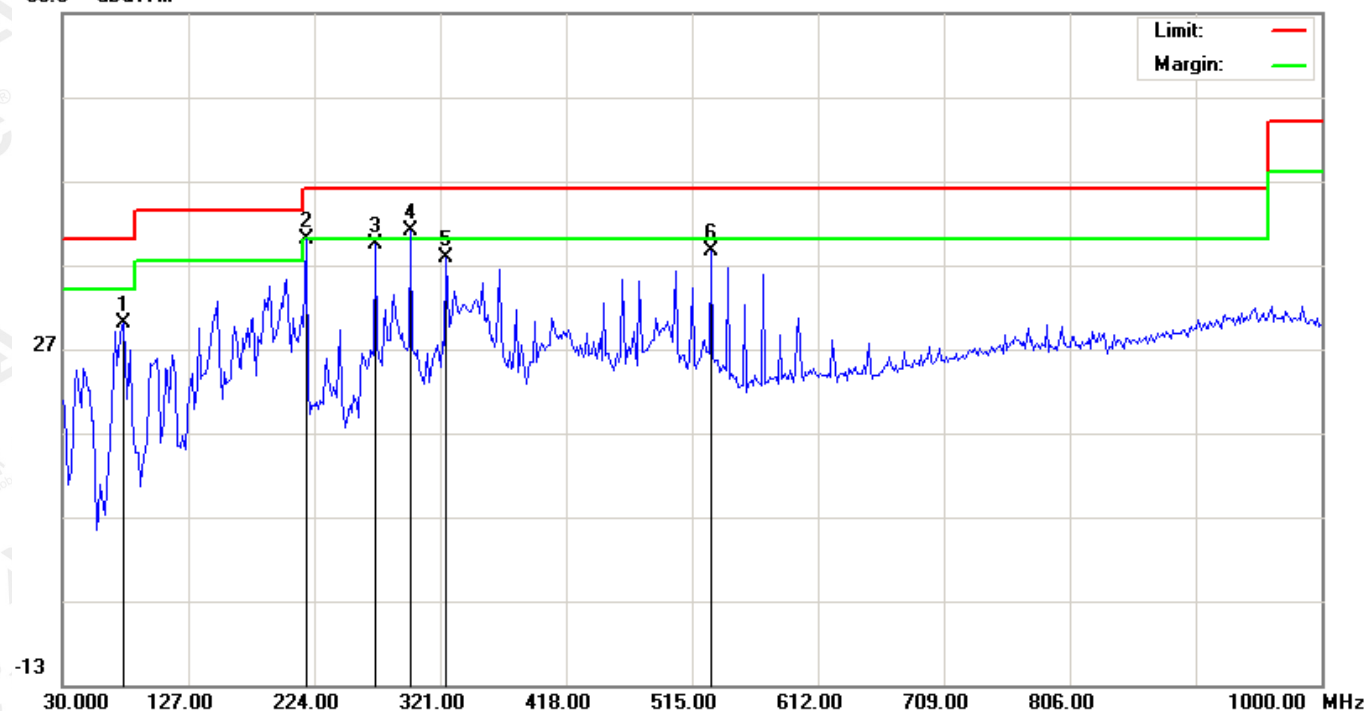
Note: Other emissions from 9 kHz to 30 MHz are considered as ambient noise. No recording in the test report.

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RADIATED EMISSION 30MHz- 1GHz

EUT :	Handheld Fingerprint Terminal	Model Name	TPS360
Temperature :	20 °C	Relative Humidityt :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 1	Polarization :	Horizontal

66.9 dBuV/m



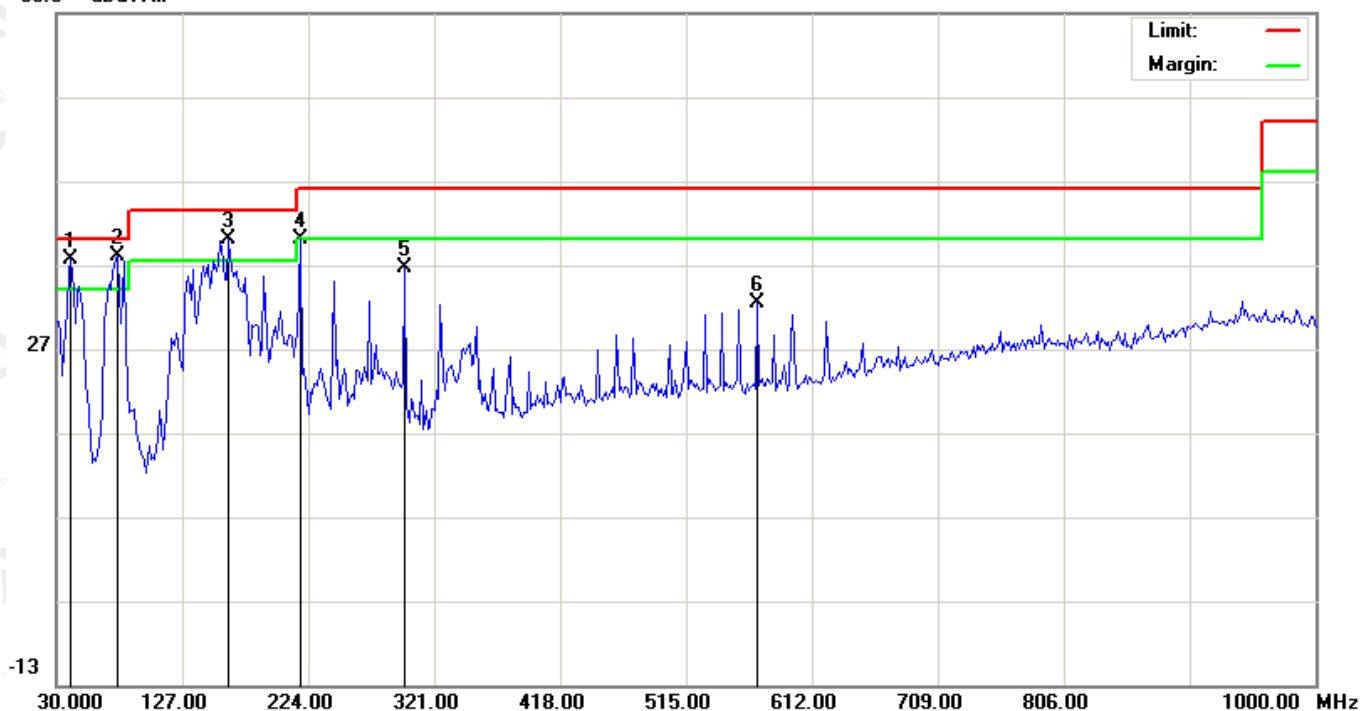
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		76.8833	26.54	3.54	30.08	40.00	-9.92	peak			
2		217.5333	29.74	10.21	39.95	46.00	-6.05	peak			
3		270.8833	29.02	10.45	39.47	46.00	-6.53	peak			
4	*	298.3667	25.92	15.13	41.05	46.00	-4.95	peak			
5		325.8500	20.63	17.13	37.76	46.00	-8.24	peak			
6		529.5500	16.58	21.93	38.51	46.00	-7.49	peak			

RESULT: PASS

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EUT :	Handheld Fingerprint Terminal	Model Name	TPS360
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Test Voltage :	DC 3.8V
Test Mode :	Mode 1	Polarization :	Vertical

66.9 dBuV/m



No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	!	41.3167	28.80	8.81	37.61	40.00	-2.39	peak			
2	*	76.8833	35.34	2.57	37.91	40.00	-2.09	peak			
3	!	162.5667	24.90	15.17	40.07	43.50	-3.43	peak			
4	!	217.5333	29.31	10.72	40.03	46.00	-5.97	peak			
5		298.3667	21.27	15.36	36.63	46.00	-9.37	peak			
6		569.9667	9.88	22.58	32.46	46.00	-13.54	peak			

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Margin=Result-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

The mode 1 is the worst case, and only the data of the worst case recorded in this test report.

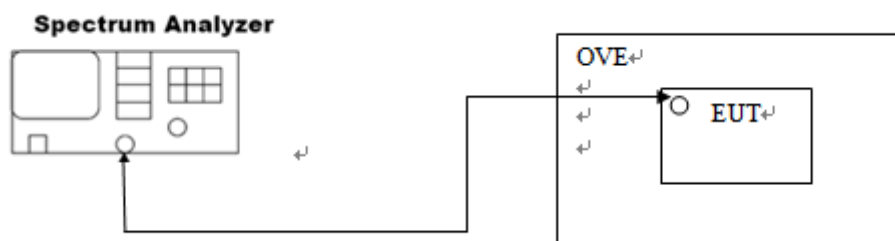
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8. FREQUENCY STABILITY

8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the operation frequency.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 1 KHz, VBW \geq 3 \times RBW.
4. Set SPA Trace 1 Max hold, then View.
5. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
6. Extreme temperature rule is -20°C~50°C.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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8.3. MEASUREMENT RESULTS

Operating frequency: 13.561MHz

Voltage vs. Frequency Stability (Test Temperature: 20°C)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
3.8	13.56139	0.00040	0.001356	PASS
3.42	13.56138			
4.18	13.56140			

Temperature vs. Frequency Stability (Test Voltage: 5.0V)

Temperature	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
-20°C	13.56138	0.00039	0.001356	PASS
-10°C	13.56137			
0°C	13.56137			
10°C	13.56139			
20°C	13.56138			
30°C	13.56136			
40°C	13.56138			
50°C	13.56139			

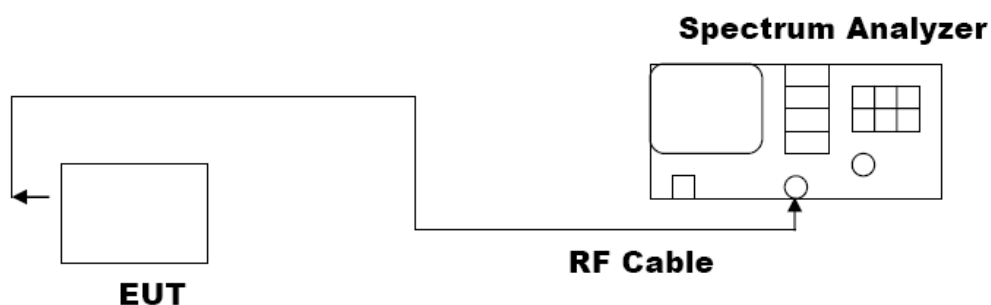
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9. 20DB BANDWIDTH

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the operation frequency.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 1 KHz, VBW \geq 3 \times RBW.
4. Set SPA Trace 1 Max hold, then View.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

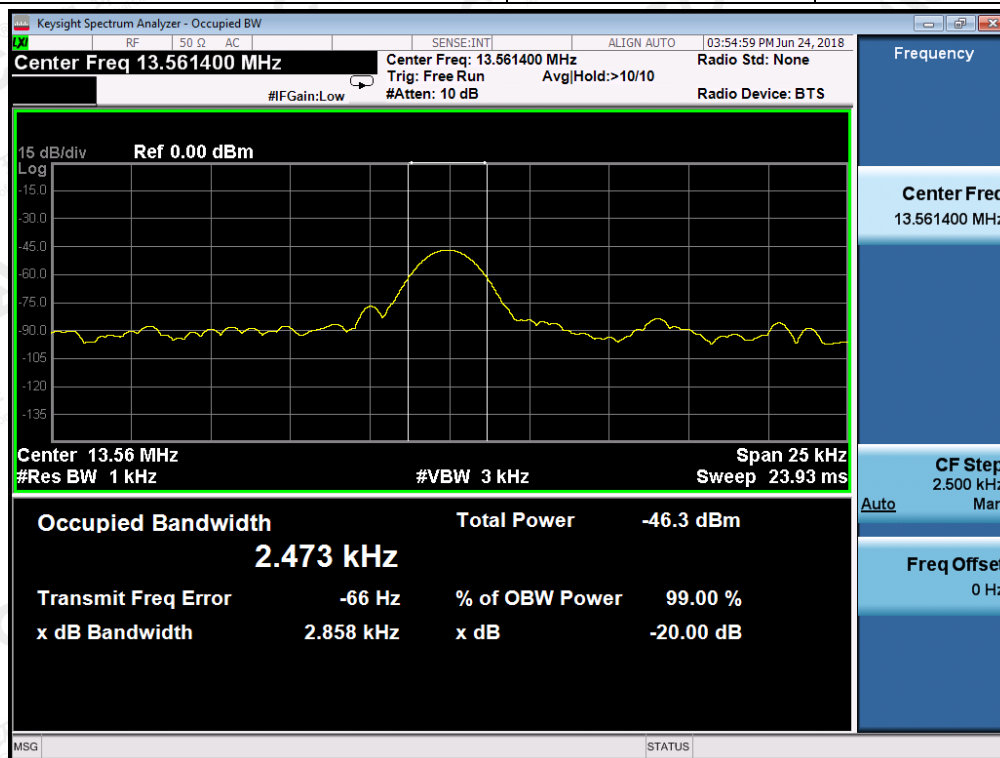


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9.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODE	Mode1

Test Data (kHz)		Criteria
Operate channel	2.858	PASS



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10. FCC LINE CONDUCTED EMISSION TEST

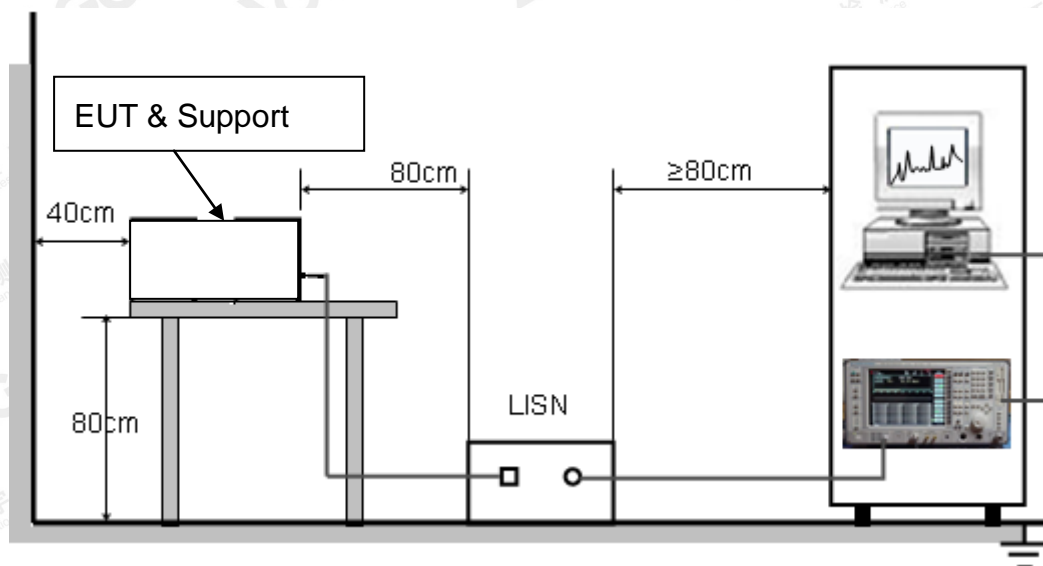
10.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

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

10.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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10.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

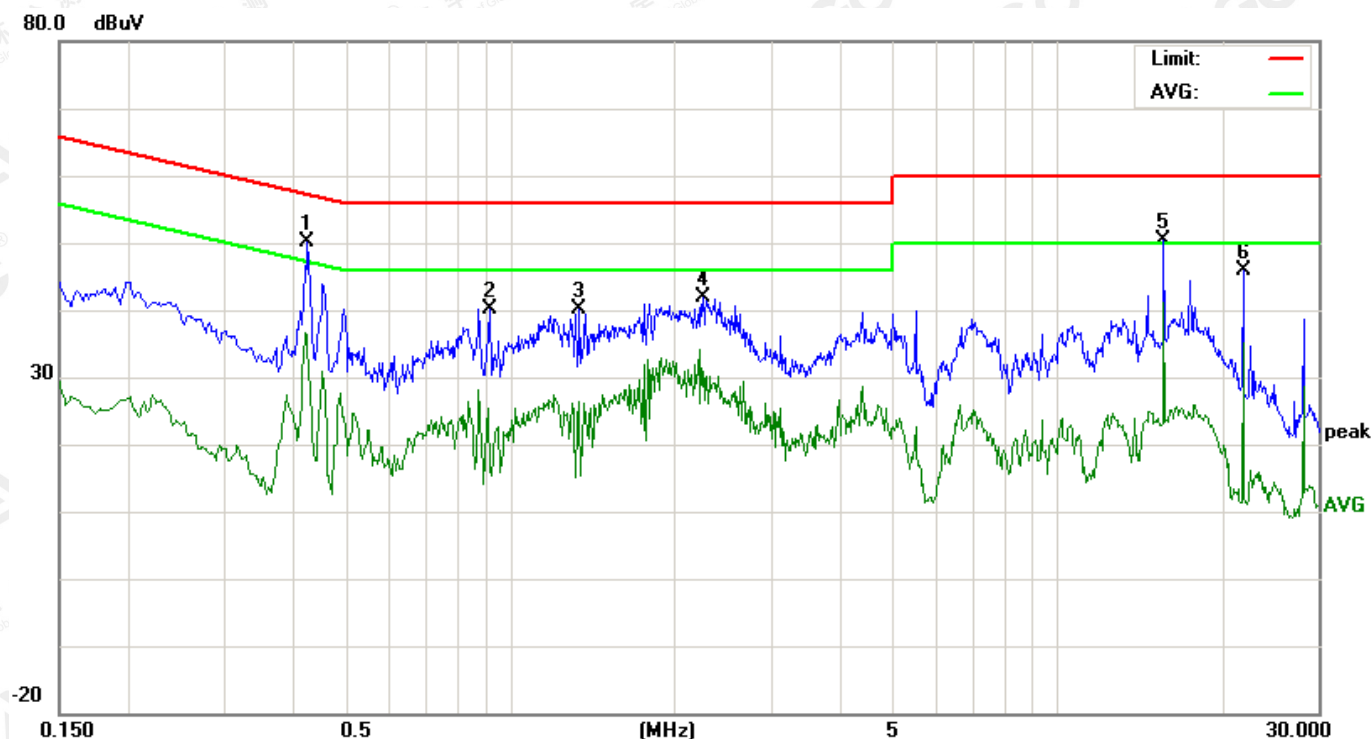
10.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

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10.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

LINE CONDUCTED EMISSION TEST LINE -L

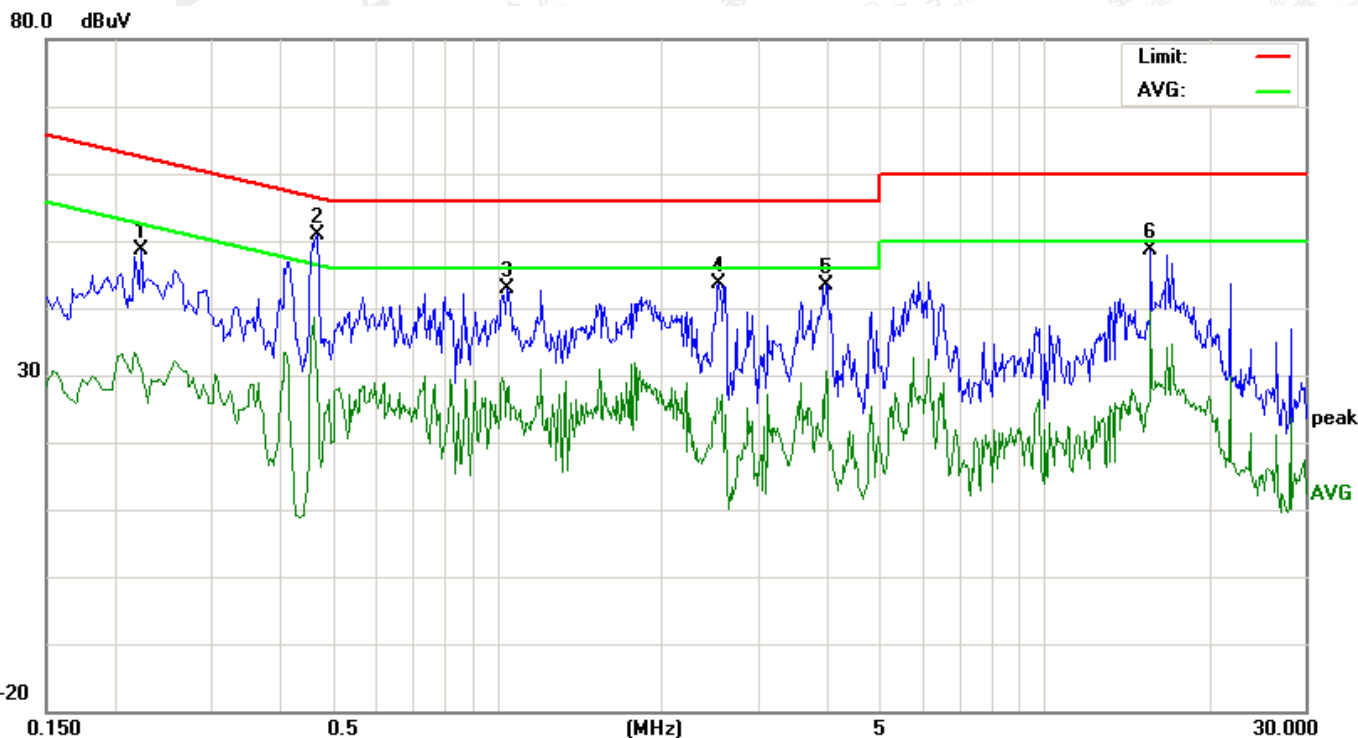


No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4260	39.66		25.34	10.35	50.01		35.69	57.33	47.33	-7.32	-11.64	P	
2	0.9220	29.72		5.85	10.40	40.12		16.25	56.00	46.00	-15.88	-29.75	P	
3	1.3380	29.74		13.78	10.38	40.12		24.16	56.00	46.00	-15.88	-21.84	P	
4	2.2500	31.56		20.23	10.32	41.88		30.55	56.00	46.00	-14.12	-15.45	P	
5	15.6579	40.34		30.95	10.11	50.45		41.06	60.00	50.00	-9.55	-8.94	P	
6	21.9180	35.80		24.93	10.12	45.92		35.05	60.00	50.00	-14.08	-14.95	P	

RESULT: PASS

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Line Conducted Emission Test Line -N



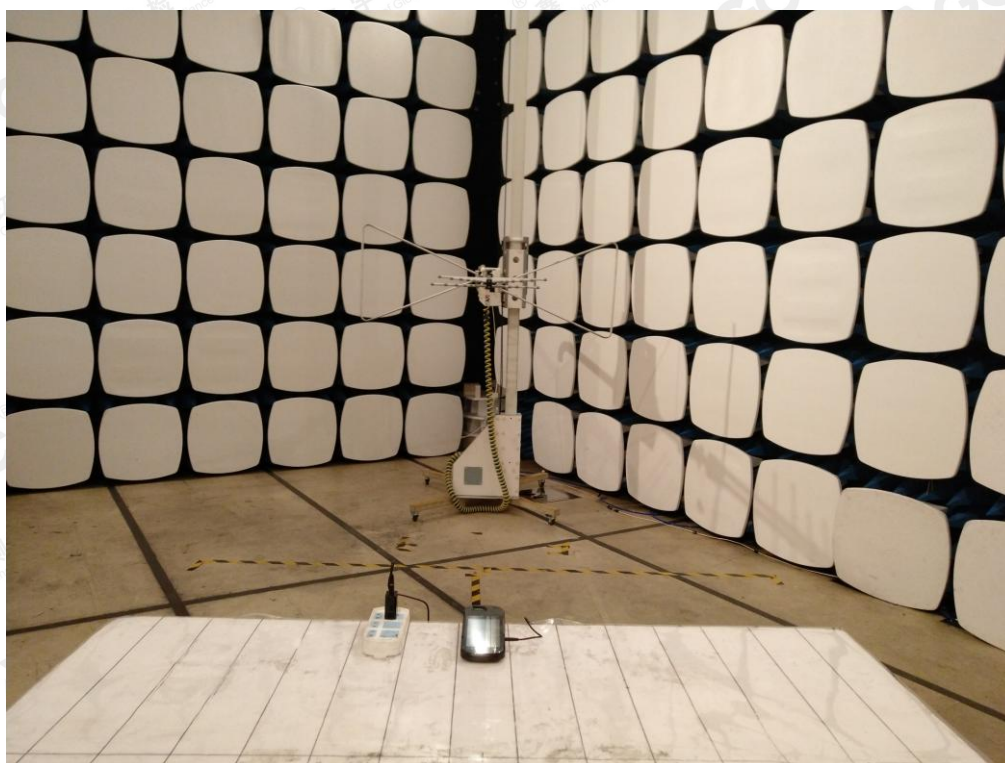
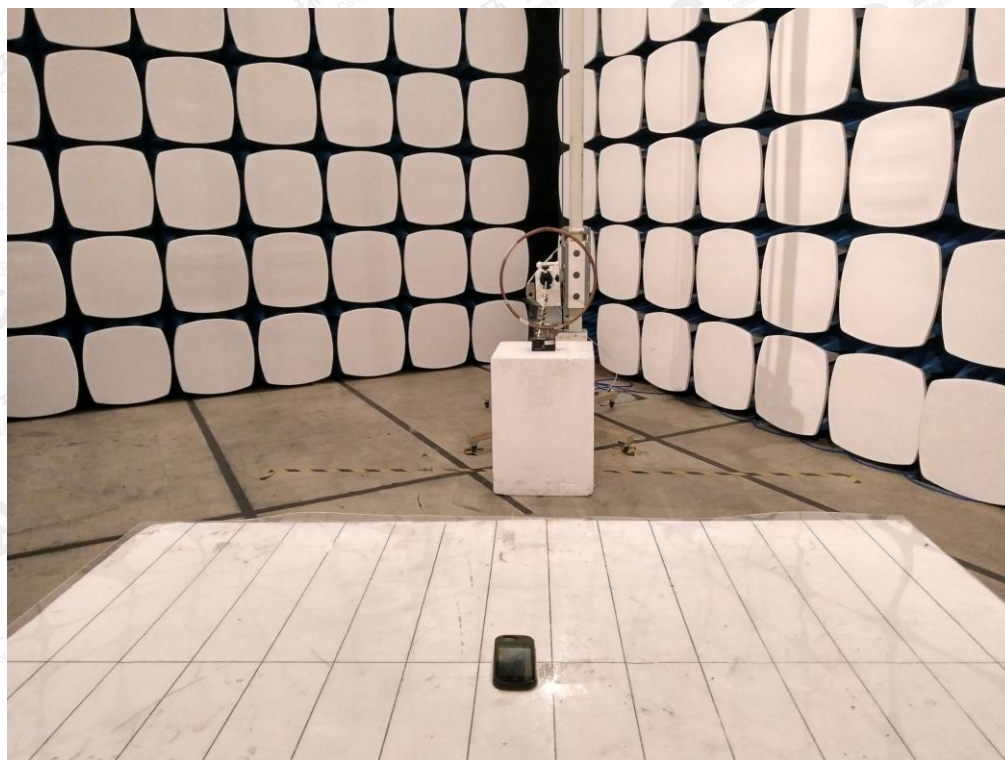
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor (dB)	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.2232	38.46		20.59	10.24	48.70		30.83	62.70	52.70	-14.00	-21.87	P	
2	0.4698	40.59		16.78	10.38	50.97		27.16	56.52	46.52	-5.55	-19.36	P	
3	1.0460	32.55		17.39	10.37	42.92		27.76	56.00	46.00	-13.08	-18.24	P	
4	2.5419	33.23		14.06	10.44	43.67		24.50	56.00	46.00	-12.33	-21.50	P	
5	4.0060	33.01		20.22	10.43	43.44		30.65	56.00	46.00	-12.56	-15.35	P	
6	15.6499	38.58		29.47	10.11	48.69		39.58	60.00	50.00	-11.31	-10.42	P	

RESULT: PASS

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

RADIATED EMISSION TEST SETUP BELOW 1GHz



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FCC LINE CONDUCTED EMISSION TEST SETUP



----END OF REPORT----

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