

FCC Test Report

Equipment : Digitizer module
Brand Name : EMPen
Model No. : T116
FCC ID : QYLEMPT116F
Standard : 47 CFR FCC Part 15.209
Operating Band : 9 – 90 kHz
FCC Classification : DCD
Applicant : **Getac Technology Corporation.**
5F., Building A, No. 209, Sec.1, Nangang Rd.,Nangang
Dist., Taipei City 11568, Taiwan, R.O.C.

The product sample received on Jun. 12, 2017 and completely tested on Jun. 28, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:



Phoenix Chen / Assistant Manager





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Appendix A. Test Photos

Photographs of EUT v01



Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 13.56MHz 56.41 (Margin 8.42dB) - QP 41.28 (Margin 13.55dB) - AV	FCC 15.207	Complied
3.2	15.209	Transmitter Radiated Unwanted Emissions	[dBuV/m at 3m]: 503.3600MHz 38.52 (Margin 7.48dB) - PK	FCC 15.209	Complied
3.3	15.215(c)	Emission Bandwidth	99% Bandwidth: 3.29 [kHz] 20dB Bandwidth: 2.21 [kHz]	N/A	Complied



1 General Description

1.1 Information

1.1.1 RF General Information

RF General Information			
Frequency		9 – 90 kHz	
Modulation	Ch. Frequency (kHz)	Channel Number	Field Strength (dBuV/m@3m)
ASK	83.3kHz	1	67.53

1.1.2 Antenna Information

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input checked="" type="checkbox"/>	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.
<input type="checkbox"/>	External antenna (dedicated antennas)
<input type="checkbox"/>	Single power level with corresponding antenna(s).
<input type="checkbox"/>	Multiple power level and corresponding antenna(s).

No.	Ant. Cat.	Ant. Type
1	Integral	Array Coil Pointing



1.1.3 Type of EUT

Identify EUT	
Presentation of Equipment	<input checked="" type="checkbox"/> Production ; <input type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype
Type of EUT	
<input type="checkbox"/> Stand-alone	
<input type="checkbox"/> Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ...	
<input checked="" type="checkbox"/> Plug-in radio (EUT intended for a variety of host systems) Host System - Equipment Name/Brand Name / Model No.: Tablet/Getac/F110	
<input type="checkbox"/> Other:	

1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input checked="" type="checkbox"/> Operated normal mode for worst duty cycle	
<input type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	
<input checked="" type="checkbox"/> 100.00%	

1.1.5 EUT Operational Condition

Supply Voltage	<input checked="" type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	
Type of DC Source	<input checked="" type="checkbox"/> External AC adapter	<input checked="" type="checkbox"/> From Host System	<input checked="" type="checkbox"/> From Battery

1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15
- ♦ ANSI C63.10-2013

1.3 Testing Location Information

Testing Location				
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL : 886-3-327-3456 FAX : 886-3-327-0973		
Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Bear	21.3°C / 60%	28/Jun/2017
RF Conducted	TH01-HY	Wayne	21.5°C / 63.5%	22/Jun/2017
Radiated Emission	03CH02-HY	Jeff	23.4°C / 53%	21/Jun/2017

Test site registered number [553509] with FCC.

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Measurement Uncertainty		
Test Item		Uncertainty
AC power-line conducted emissions		±2.3 dB
Emission bandwidth, 6dB bandwidth		±0.6 %
RF output power, conducted		±0.1 dB
Power density, conducted		±0.6 dB
Unwanted emissions, conducted	9 – 150 kHz	±0.4 dB
	0.15 – 30 MHz	±0.4 dB
	30 – 1000 MHz	±0.6 dB
	1 – 18 GHz	±0.5 dB
	18 – 40 GHz	±0.5 dB
	40 – 200 GHz	N/A
All emissions, radiated	9 – 150 kHz	±2.5 dB
	0.15 – 30 MHz	±2.3 dB
	30 – 1000 MHz	±2.6 dB
	1 – 18 GHz	±3.6 dB
	18 – 40 GHz	±3.8 dB
	40 – 200 GHz	N/A
Temperature		±0.8 °C
Humidity		±5 %
DC and low frequency voltages		±0.9 %
Time		±1.4 %
Duty Cycle		±0.6 %

2 Test Configuration of EUT

2.1 The Worst Case Modulation Configuration




Transmitter Mode	Field Strength (dBuV/m@3m)
Touch Panel	67.53

2.2 Test Channel Frequencies Configuration

Modulation	Test Channel Frequencies (kHz)
ASK	83.3

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
Operating Mode	Operating Mode Description
1	Adapter Mode

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emission Bandwidth, Field Strength of Fundamental Emissions Transmitter Radiated Unwanted Emissions		
Test Condition	Radiated measurement		
User Position	<input type="checkbox"/> EUT will be placed in fixed position.		
	<input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes.		
	<input checked="" type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.		
Operating Mode	Operating Mode Description		
1	Adapter Mode		
Transmitter Mode	Touch Panel		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT	V		

2.4 Accessory and Support Equipment

Accessories Information				
AC Adapter	Brand Name	Chicony	Model Name	A12-065N2A
	Power Rating	I/P: 100 - 240 Vac, 1.7 A, O/P: 19 Vdc, 3.42 A, 65W		
	Power Cord	1.7 meter, non-shielded cable, with ferrite core		
Power Cable	Brand Name	Getac	Model Name	NA
	Signal Line	1.7 meter, non-shielded cable, w/o ferrite core		
Battery	Brand Name	Getac	Model Name	BP3S1P2160-S
	Power Rating	11.4 Vdc, 2160mAh	Type	Li-ion

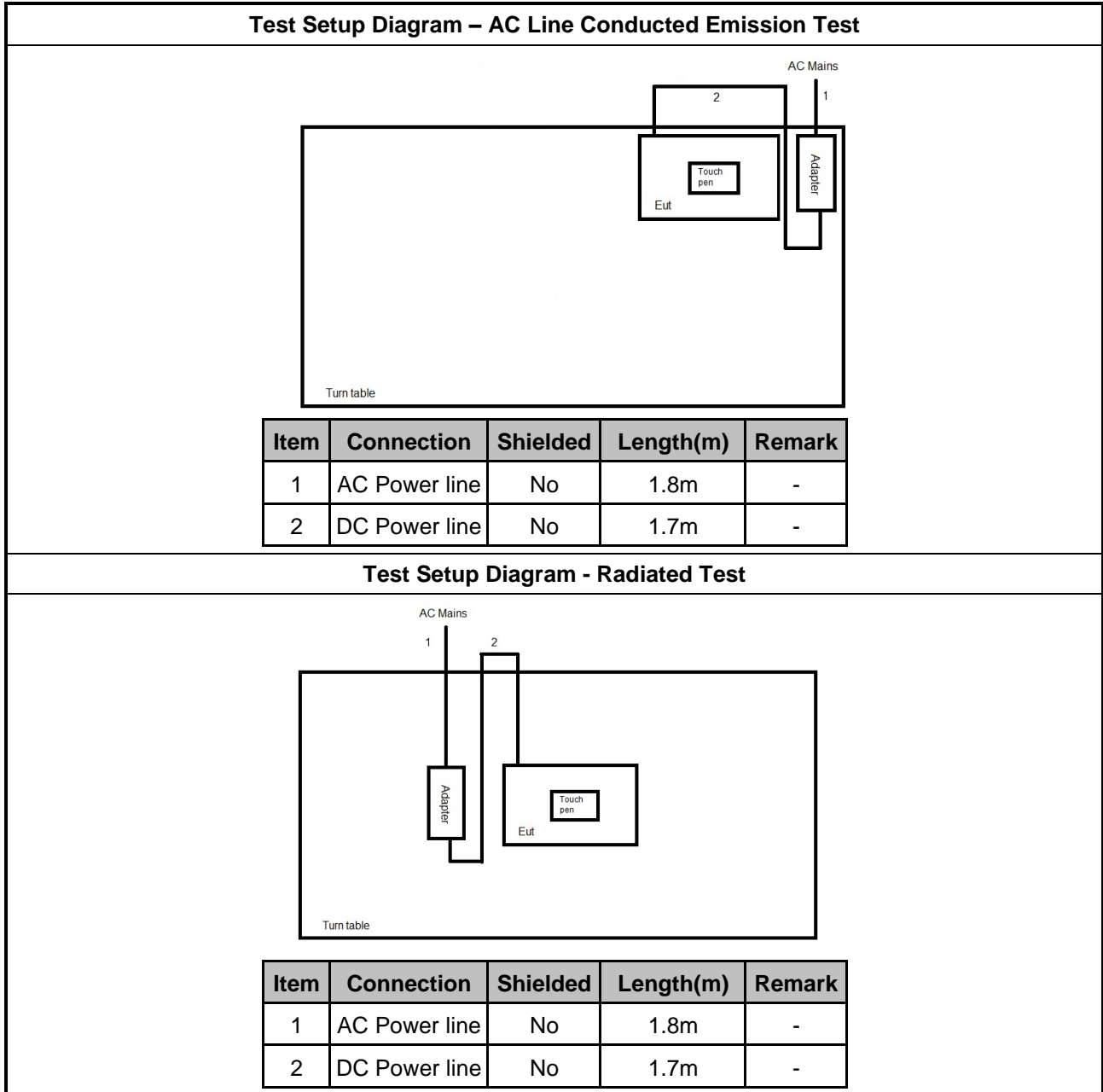
Note: Regarding to more detail and other information, please refer to user manual.

Support Equipment - AC Conduction			
No.	Equipment	Brand Name	Model Name
-	-	-	-

Support Equipment - Radiated			
No.	Equipment	Brand Name	Model Name
-	-	-	-

Support Equipment- RF Conducted			
No.	Equipment	Brand Name	Model Name
-	-	-	-

2.5 Test Setup Diagram



3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: * Decreases with the logarithm of the frequency.

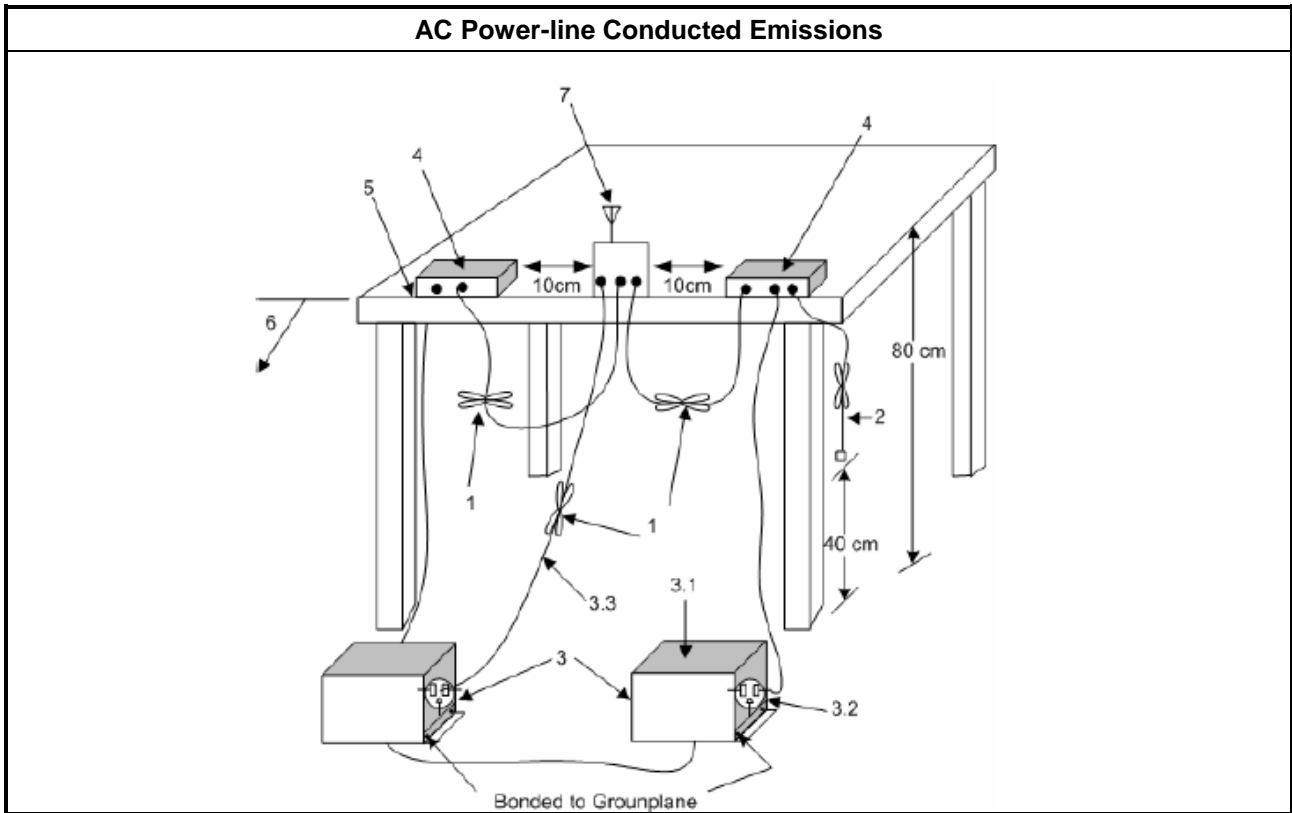
3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

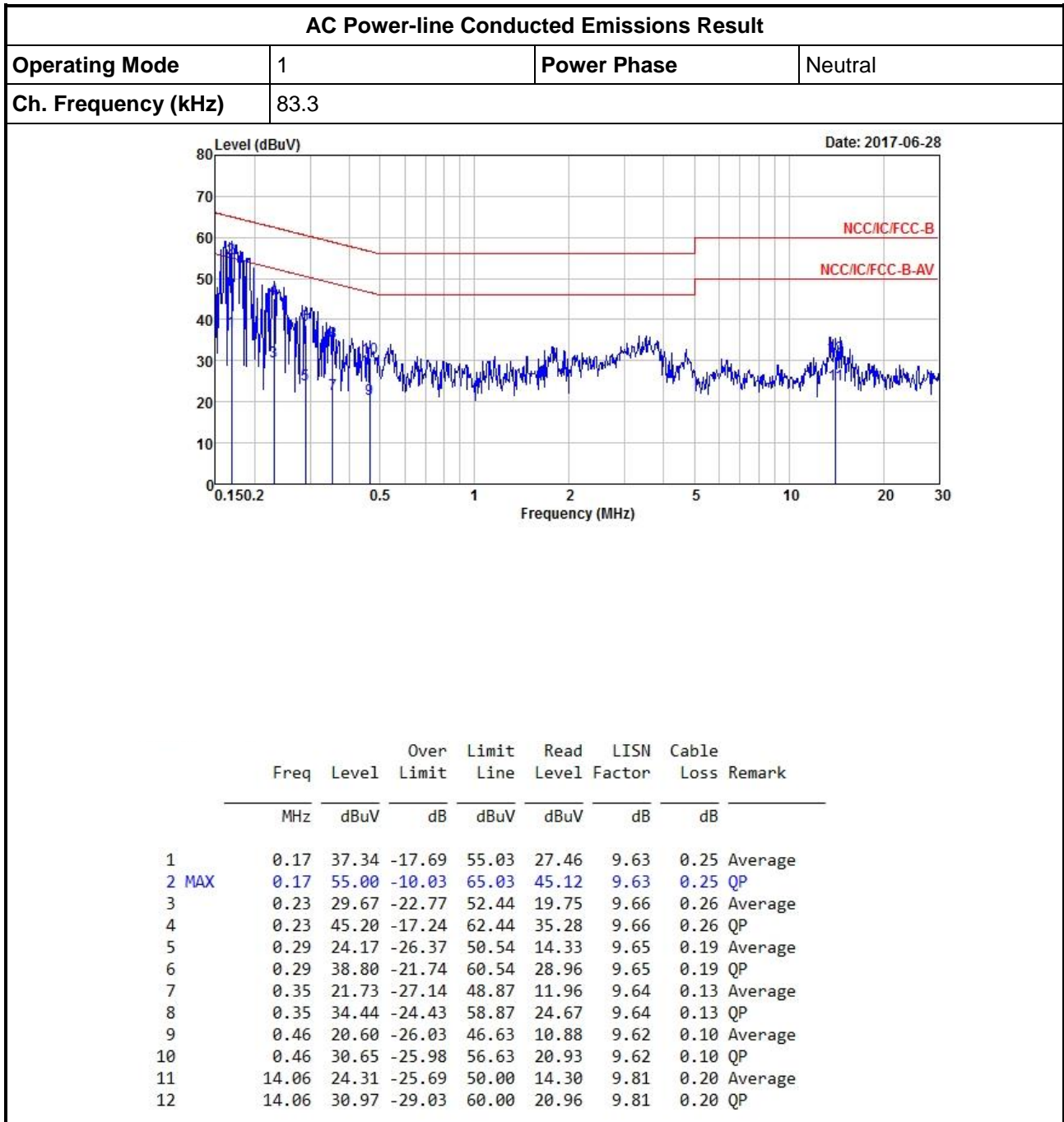
3.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.
<input checked="" type="checkbox"/>	If AC conducted emissions fall in operating band, then following below test method confirm final result.
<input type="checkbox"/>	Accept measurements done with a suitable dummy load replacing the antenna under the following conditions: (1) Perform the AC line conducted tests with the antenna connected to determine compliance with FCC 15.207 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load to determine compliance with FCC 15.207 limits within the transmitter's fundamental emission band.
<input checked="" type="checkbox"/>	For a device with a permanent antenna operating at or below 30 MHz, accept measurements done with a suitable dummy load, in lieu of the permanent antenna under the following conditions: (1) Perform the AC line conducted tests with the permanent antenna to determine compliance with the FCC 15.207 limits outside the transmitter's fundamental emission band; (2) Retest with a dummy load in lieu of the permanent antenna to determine compliance with the FCC 15.207 limits within the transmitter's fundamental emission band.

3.1.4 Test Setup



3.1.5 Test Result of AC Power-line Conducted Emissions

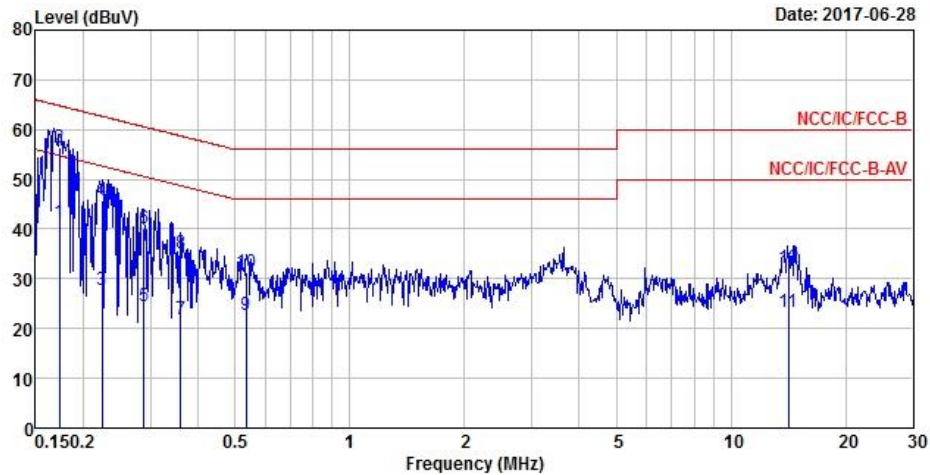


Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)
 Note 3: When emissions are in operating band over limits, retest with a dummy load for final in-band results.



AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Ch. Frequency (kHz)	83.3		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.17	41.28	-13.55	54.83	31.36	9.66	0.26	Average
2	0.17	56.41	-8.42	64.83	46.49	9.66	0.26	QP
3	0.22	27.81	-24.85	52.66	17.89	9.65	0.27	Average
4	0.22	45.78	-16.88	62.66	35.86	9.65	0.27	QP
5	0.29	24.63	-25.96	50.59	14.76	9.67	0.20	Average
6	0.29	40.16	-20.43	60.59	30.29	9.67	0.20	QP
7	0.36	21.93	-26.81	48.74	12.12	9.68	0.13	Average
8	0.36	35.19	-23.55	58.74	25.38	9.68	0.13	QP
9	0.53	22.61	-23.39	46.00	12.85	9.66	0.10	Average
10	0.53	31.42	-24.58	56.00	21.66	9.66	0.10	QP
11	14.15	23.37	-26.63	50.00	13.35	9.82	0.20	Average
12	14.15	32.09	-27.91	60.00	22.07	9.82	0.20	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)
 Note 3: When emissions are in operating band over limits, retest with a dummy load for final in-band results.

3.2 Transmitter Radiated Emissions

3.2.1 Transmitter Radiated Emissions Limit

Transmitter Radiated Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: the frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 1GHz measurements employing a CISPR quasi-peak detector.

3.2.2 Measuring Instruments

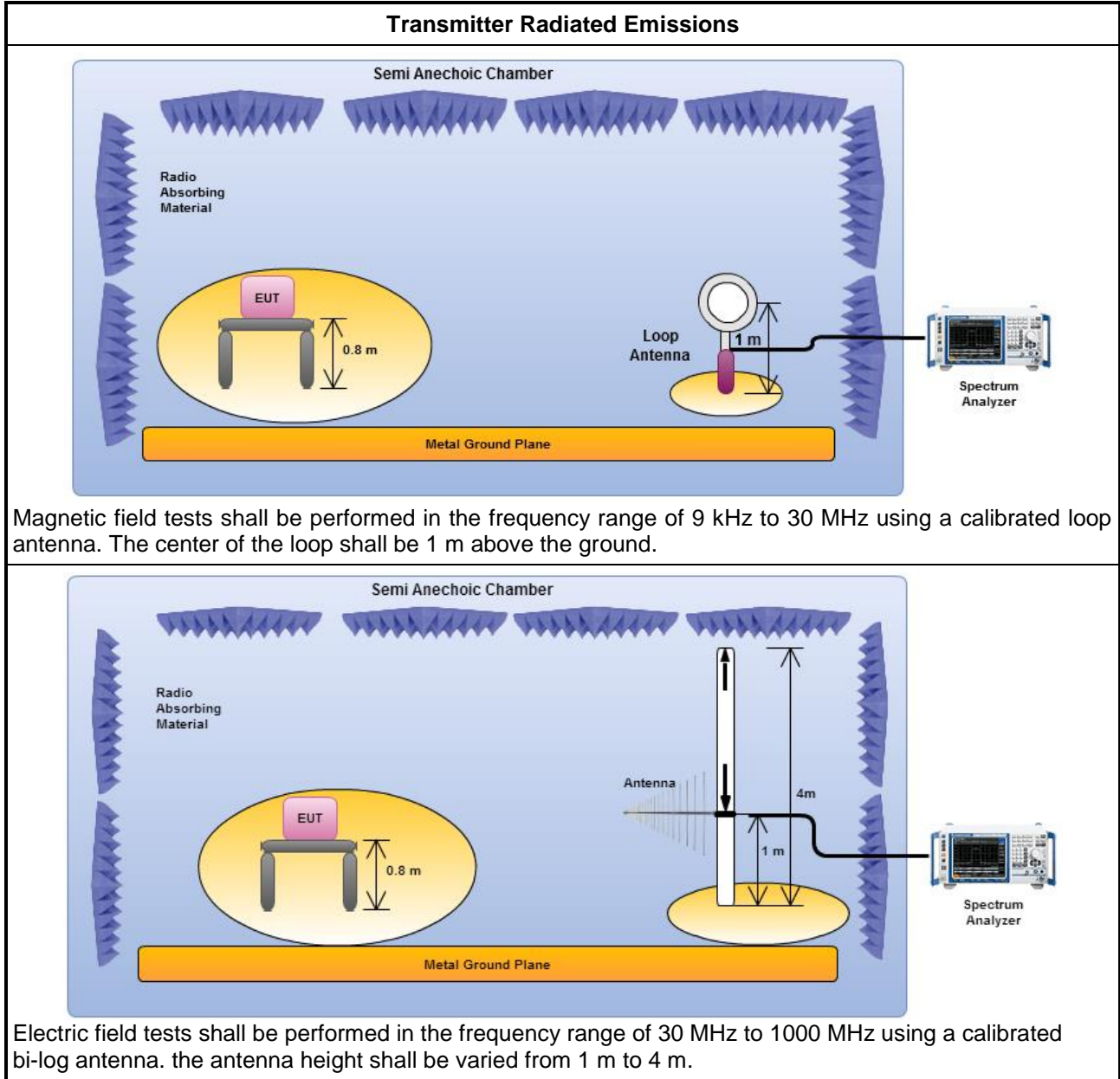
Refer a test equipment and calibration data table in this test report.



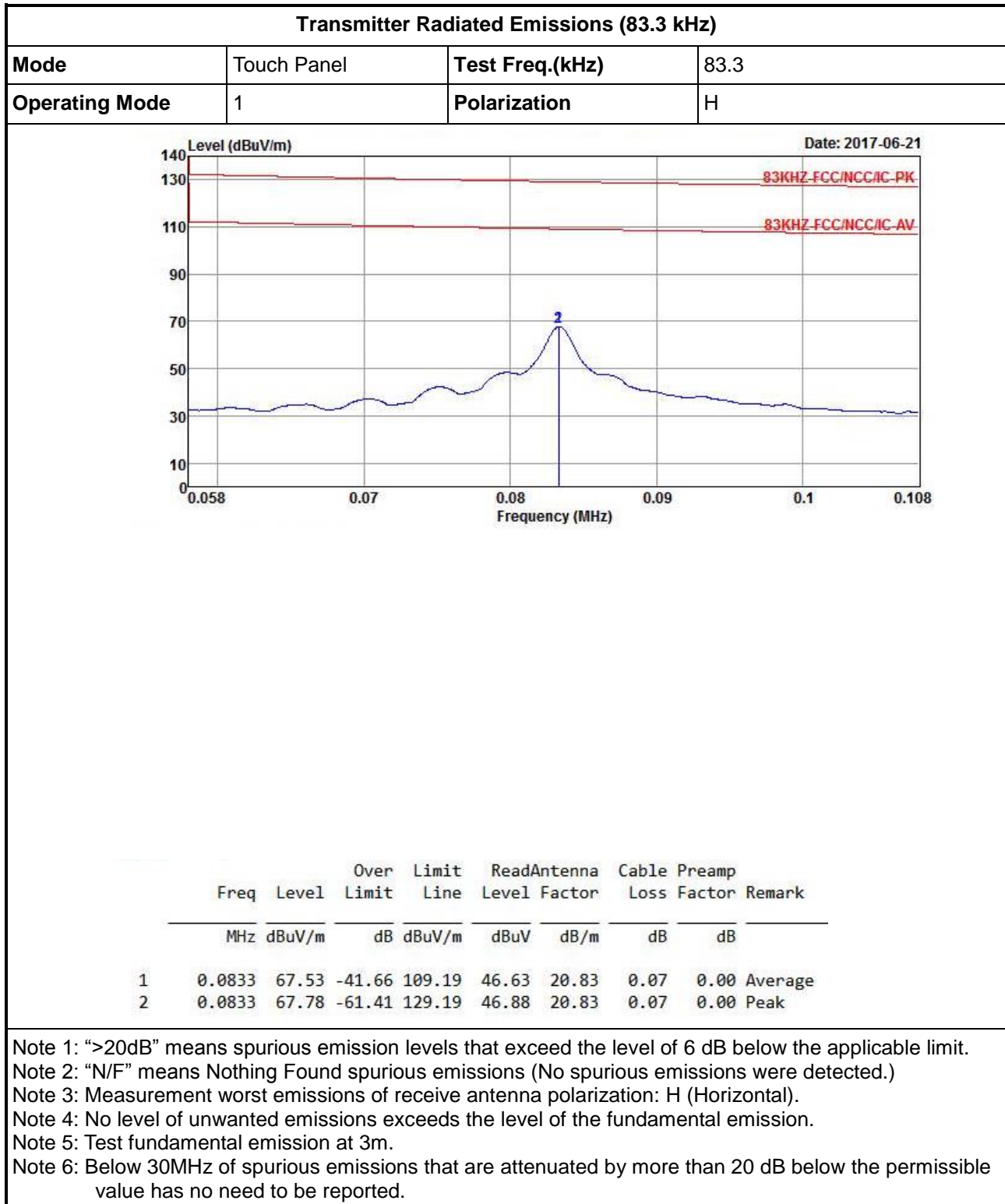
3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1 GHz and test distance is 3m. Note : The test distance of radiated emissions from 662kHz to 672kHz is 1m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. The frequency bands 9-90 kHz, 110-490 kHz measurements employing an average detector and other below 30MHz measurements employing a CISPR quasi-peak detector. Test distance is 3m.
<input checked="" type="checkbox"/>	At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the requirements; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be following below methods. Note: If fundamental emission level is smaller than noise at 3m , we will change distance to 1m.
<input type="checkbox"/>	The results shall be extrapolated to the specified distance by making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor.
<input checked="" type="checkbox"/>	The results shall be by using the square of an inverse linear distance extrapolation factor (40 dB/decade).
<input checked="" type="checkbox"/>	For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.
<input checked="" type="checkbox"/>	The any unwanted emissions level shall not exceed the fundamental emission level.
<input checked="" type="checkbox"/>	All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

3.2.4 Test Setup



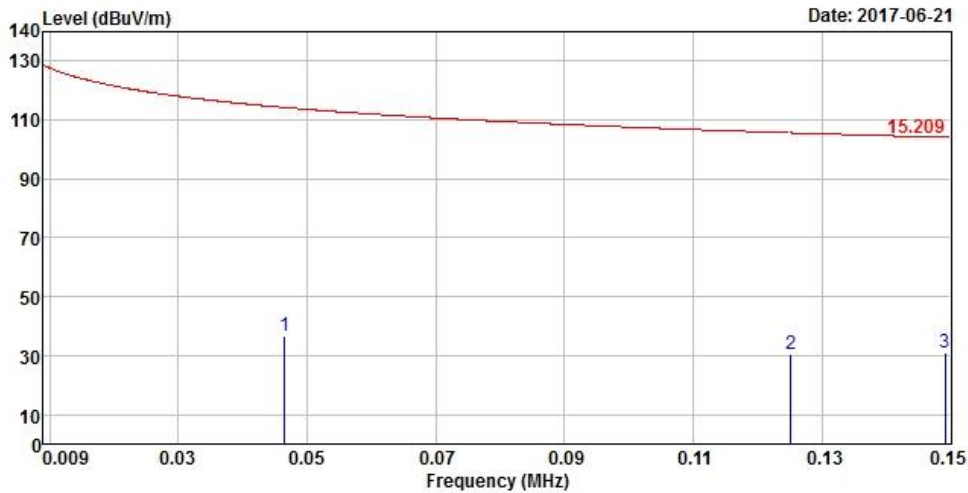
3.2.5 Transmitter Radiated Emissions (Below 30MHz)





Transmitter Radiated Emissions (9kHz~150kHz)

Mode	Touch Panel	Test Freq.(kHz)	83.3
Operating Mode	1	Polarization	H

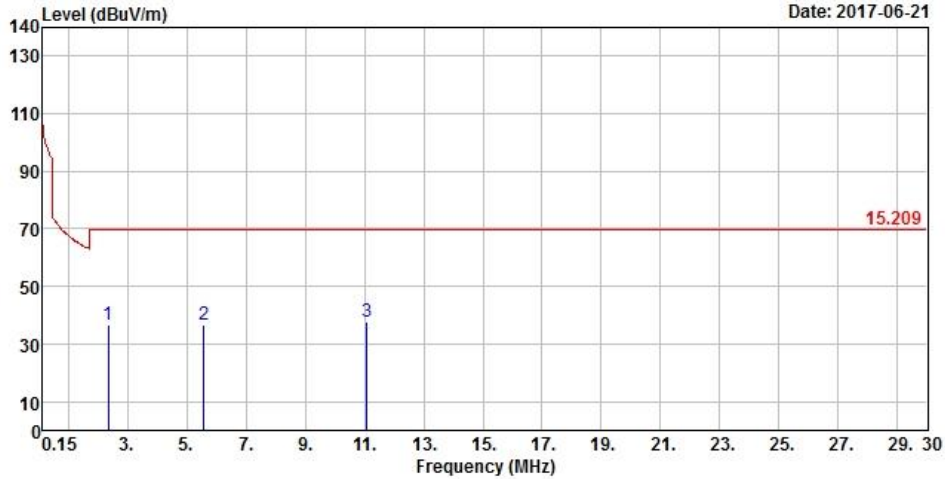


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	0.0465	36.54	-77.72	114.26	15.28	21.26	0.00	0.00	Peak
2	0.1252	30.70	-74.96	105.66	10.03	20.67	0.00	0.00	Peak
3	0.1492	30.87	-73.27	104.14	10.22	20.65	0.00	0.00	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement worst emissions of receive antenna polarization: H (Horizontal).
 Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
 Note 5: Except fundamental emission, other emissions from digital circuitry used to control additional panel functions or display capabilities other than the touch panel radio transmission. While disable touch panel radio transmission, other emissions have the same levels. Therefore other emissions level could be exceed the fundamental emission level.
 Note 6 : Below 30MHz of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



Transmitter Radiated Emissions (150kHz~30MHz)			
Mode	Touch Panel	Test Freq.(kHz)	83.3
Operating Mode	1	Polarization	H



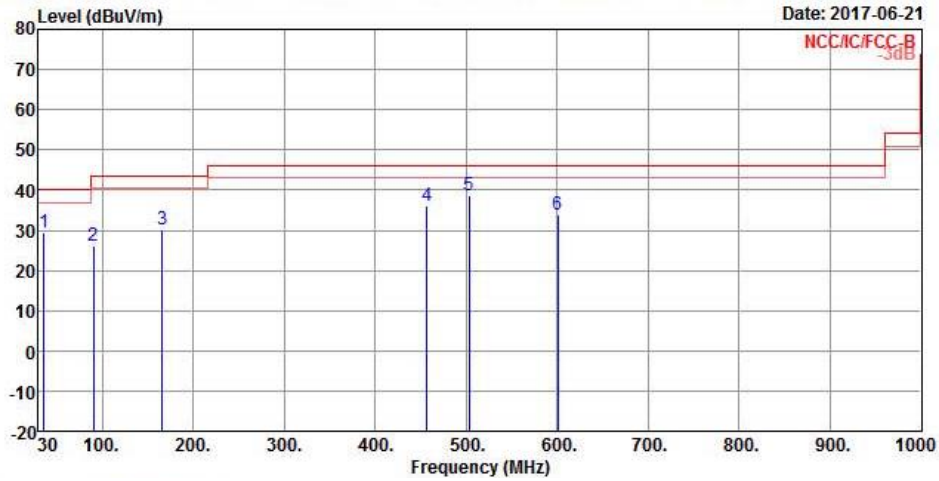
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	2.3589	36.92	-32.62	69.54	16.42	20.50	0.00	0.00	Peak
2	5.5827	36.77	-32.77	69.54	15.98	20.79	0.00	0.00	Peak
3	11.0751	37.61	-31.93	69.54	16.01	21.60	0.00	0.00	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement worst emissions of receive antenna polarization: H (Horizontal).
 Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
 Note 5: Except fundamental emission, other emissions from digital circuitry used to control additional panel functions or display capabilities other than the touch panel radio transmission. While disable touch panel radio transmission, other emissions have the same levels. Therefore other emissions level could be exceed the fundamental emission level.
 Note 6 : Below 30MHz of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



3.2.6 Transmitter Radiated Emissions (Above 30MHz)

Transmitter Radiated Emissions (Above 30MHz)			
Mode	Touch Panel	Test Freq.(kHz)	83.3
Operating Mode	1	Polarization	V

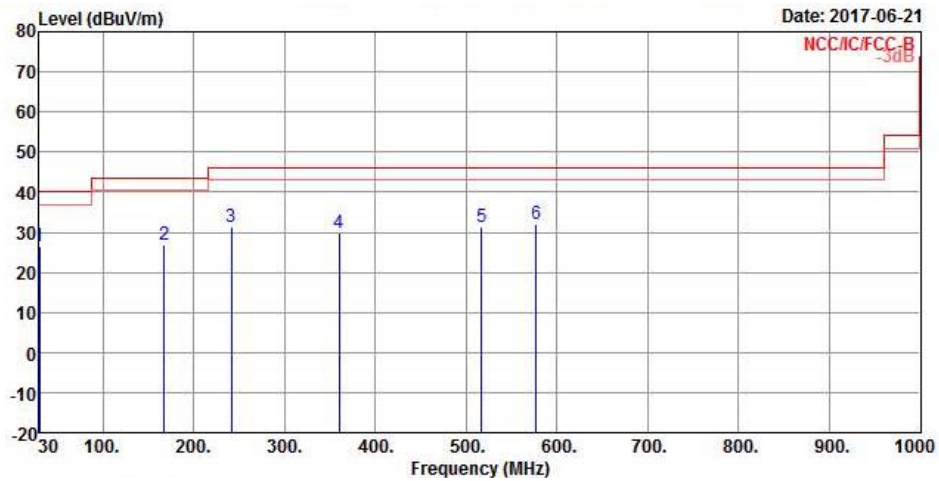


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB
1	35.8200	29.50	-10.50	40.00	35.31	21.16	0.85	27.82 Peak
2	90.1400	26.06	-17.44	43.50	38.14	14.26	1.40	27.74 Peak
3	165.8000	30.06	-13.44	43.50	40.29	15.45	1.87	27.55 Peak
4	456.8000	36.01	-9.99	46.00	38.59	22.37	3.24	28.19 Peak
5	503.3600	38.52	-7.48	46.00	40.42	23.11	3.41	28.42 Peak
6	600.3600	33.76	-12.24	46.00	34.13	24.26	3.79	28.42 Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
 Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
 Note 5: Except fundamental emission, other emissions from digital circuitry used to control additional panel functions or display capabilities other than the touch panel radio transmission. While disable touch panel radio transmission, other emissions have the same levels. Therefore other emissions level could be exceed the fundamental emission level.



Transmitter Radiated Emissions (Above 30MHz)			
Mode	Touch Panel	Test Freq.(kHz)	83.3
Operating Mode	1	Polarization	H



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Cable Factor	Preamp Loss	Preamp Factor	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	
1	30.0000	26.64	-13.36	40.00	28.79	24.95	0.78	27.88	Peak
2	167.7400	27.04	-16.46	43.50	37.33	15.37	1.88	27.54	Peak
3	241.4600	31.45	-14.55	46.00	39.18	17.29	2.25	27.27	Peak
4	359.8000	29.68	-16.32	46.00	33.71	20.69	2.83	27.55	Peak
5	516.9400	31.36	-14.64	46.00	33.01	23.32	3.45	28.42	Peak
6	577.0800	31.94	-14.06	46.00	32.61	24.07	3.68	28.42	Peak

Note 1: ">20dB" means spurious emission levels that exceed the level of 6 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).
 Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.
 Note 5: Except fundamental emission, other emissions from digital circuitry used to control additional panel functions or display capabilities other than the touch panel radio transmission. While disable touch panel radio transmission, other emissions have the same levels. Therefore other emissions level could be exceed the fundamental emission level.

3.3 Emission Bandwidth

3.3.1 Emission Bandwidth Limit

Emission Bandwidth Limit
N/A

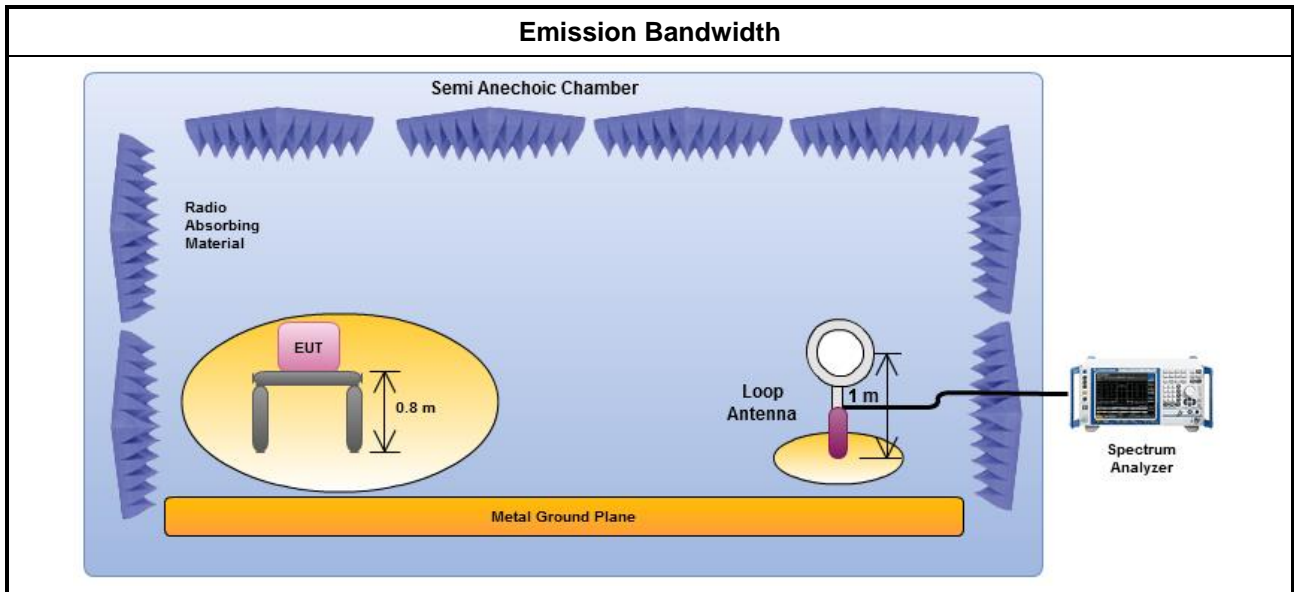
3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

3.3.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> For the emission bandwidth refer ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.
<input checked="" type="checkbox"/> For radiated measurement. Loop antenna was rotated about the horizontal and vertical axis and the equipment to be measured and the test antenna shall be oriented to obtain the maximum emitted field strength level.

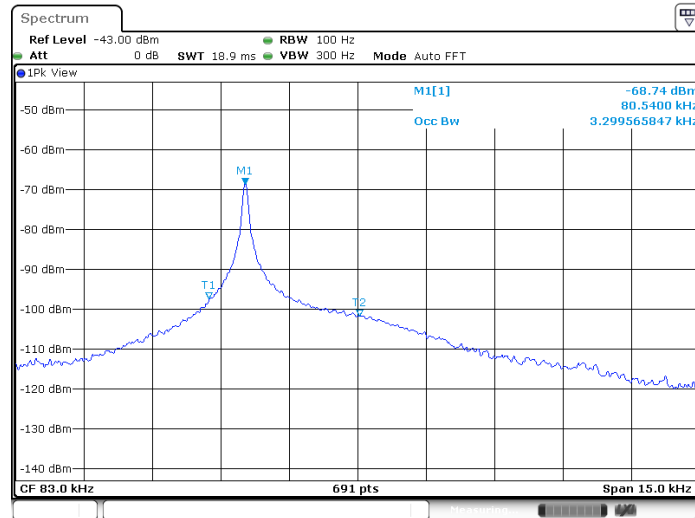
3.3.4 Test Setup



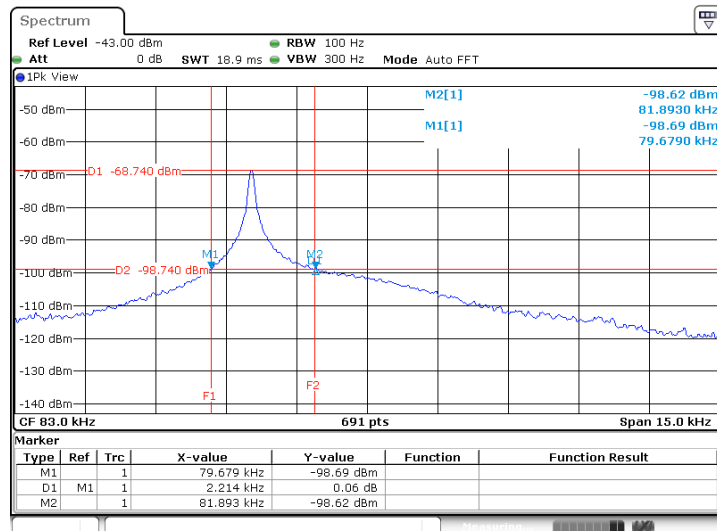
3.3.5 Test Result of Emission Bandwidth

Occupied Channel Bandwidth Result			
Transmitter Mode	Frequency (kHz)	99% Bandwidth (kHz)	20dB Bandwidth (kHz)
Touch Panel	83.3	3.29	2.21
Limit		N/A	
Result		Complied	

Emission Bandwidth Plot - 99% Bandwidth



Emission Bandwidth Plot - 20dB Bandwidth





4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102052	9KHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	15/Nov/2016	14/Nov/2017
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	24/Oct/2016	23/Oct/2017
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	R&S	ESH3-Z2	100921	10 kHz ~ 30 MHz	20/Oct/2016	19/Oct/2017

NCR: No Calibration Require.

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9kHz~40GHz	30/Dec/2016	29/Dec/2017
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/Mar/2017	01/Mar/2018

Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	27/Nov/2016	26/Nov/2017
Amplifier	Keysight	8447D	2944A11149	10kHz ~ 1.3GHz	01/Jul/2016	30/Jun/2017
Spectrum	R&S	FSV40	101515	9kHz ~ 40GHz	28/Nov/ 2016	27/Nov/2017
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	26/Jan/2017	25/Jan/2018
Bilog Antenna	SCHAFFNER	CBL 6112B	2723	30MHz ~ 1GHz	01/Oct/2016	30/Sep/2017
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/Mar/2017	01/Mar/2018