



# TEST REPORT

Product Name: ROCK Pi 4  
 Trademark: N/A  
 Model Number: ROCK Pi 4 MODEL B  
 ROCK Pi 4 MODEL A, ROCK Pi 4 MODEL A+, ROCK Pi 4 MODEL B+  
 Prepared For: ROCKPI TRADING LIMITED  
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 Manufacturer: ROCKPI TRADING LIMITED  
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 Prepared By: Shenzhen BCTC Testing Co., Ltd.  
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 Sample Received Date: Feb. 25, 2019  
 Sample tested Date: Feb. 25, 2019 to Mar. 11, 2019  
 Issue Date: Mar. 11, 2019  
 Report No.: BCTC-FY190200673-2E  
 Test Standards: Draft ETSI EN 301 489-1 V2.2.0 (2017-03)  
 Draft ETSI EN 301 489-17 V3.2.0 (2017-03)  
 Test Results: PASS  
 Remark: This is RED EMC test report.

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Zero Zhou/Manager

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*(Note: N/A means not applicable)*



## 1. VERSION

Report No.	Issue Date	Description	Approved
BCTC-FY190200673-2E	Mar. 11, 2019	Original	Valid



## 2. TEST SUMMARY

The Product has been tested according to the following specifications:

EMISSION		
Standard	Test Item	Test result
EN 55032	Conducted emissions from the AC mains power ports	Pass
EN 55032	Asymmetric mode conducted emissions	N/A <sup>1</sup>
EN 55032	Conducted differential voltage emissions	N/A <sup>2</sup>
EN 55032	Radiated emissions	Pass
EN 61000-3-2	Harmonic current emission(H)	N/A <sup>3</sup>
EN 61000-3-3	Voltage fluctuations & flicker(F)	N/A <sup>4</sup>

IMMUNITY		
Standard	Test Item	Test result
IEC 61000-4-2	Electrostatic discharge (ESD)	Pass
IEC 61000-4-3	Continuous RF electromagnetic field disturbances(RS)	Pass
IEC 61000-4-4	Electrical fast transients/burst (EFT)	N/A <sup>4</sup>
IEC 61000-4-5	Surges	N/A <sup>4</sup>
IEC 61000-4-6	Radio frequency, common mode	N/A <sup>4</sup>
IEC 61000-4-11	Voltage dips and interruptions (DIPS)	N/A <sup>4</sup>

Remark:

1. Applicable to ports listed above and intended to connect to cables longer than 3 m.
2. The Product has no antenna port.
3. The Product belongs to Class A, and its power is less than 75W, so it deems to fulfil this standard without testing.
4. The EUT is shipped without Adaptor, the test item is not applicable.



### 3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the Product as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

Test item	Value (dB)
Conducted Emission (150kHz-30MHz)	1.82
Radiated Emission(30MHz~1GHz)	2.51
Radiated Emission(1GHz~6GHz)	2.51



## 4. PRODUCT INFORMATION AND TEST SETUP

### 4.1 Product Information

Model(s):	ROCK Pi 4 MODEL B ROCK Pi 4 MODEL A, ROCK Pi 4 MODEL A+, ROCK Pi 4 MODEL B+
Model Description:	The product is different for model number and outlook color
Wi-Fi Specification:	IEEE 802.11a/b/g/n/ac
Bluetooth Version:	Bluetooth v4.0 with BLE
Hardware Version:	N/A
Software Version:	N/A
Operation Frequency:	WiFi: IEEE 802.11b/g/n HT20: 2412-2472MHz IEEE 802.11a/n/ac HT20/HT40/HT80 5180-5240MHz Bluetooth: 2402-2480MHz
Max. RF output power:	WiFi (2.4G) : 9.04dBm WiFi (5.2G) : 8.53dBm Bluetooth: 6.97dBm
Type of Modulation:	WiFi: DSSS, OFDM Bluetooth: GFSK, Pi/4 DQPSK, 8DPSK
Antenna installation:	WiFi/Bluetooth: External antenna with RP-SMA connector
Antenna Gain:	WiFi : 1dBi Bluetooth: 1dBi
Ratings	DC5V From Adaptor



#### 4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

#### 4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	---	---	---	---	---	---

**Notes:**

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

#### 4.4 Test Mode

Test item	Test Mode	Test Voltage
Conducted emissions from the AC mains power ports (150KHz-30MHz) Class B	USB Playing	AC 230V/50Hz*
	WIFI Link	AC 230V/50Hz*
	BT Link	AC 230V/50Hz*
Radiated emissions(30MHz-6GHz) Class B	USB Playing	AC 230V/50Hz*
	WIFI Link	AC 230V/50Hz*
	BT Link	AC 230V/50Hz*
Electrostatic discharge (ESD) <input checked="" type="checkbox"/> Air Discharge: ±2,4,8kV <input checked="" type="checkbox"/> Contact Discharge: ±2,4kV <input checked="" type="checkbox"/> HCP & VCP: ±2,4kV	USB Playing	AC 230V/50Hz*
	WIFI Link	AC 230V/50Hz*
	BT Link	AC 230V/50Hz*





Continuous RF electromagnetic field disturbances(RS) <input checked="" type="checkbox"/> 80MHz-6000MHz , 3V/m,80%	USB Playing	AC 230V/50Hz*
	WIFI Link	AC 230V/50Hz*
	BT Link	AC 230V/50Hz*

All test mode were tested and passed, only Conducted Emissions, Radiated Emissions Harmonic Current Emissions and Voltage Fluctuations and Flicker shows (\*) is the worst case mode which were recorded in this report.

#### 4.5 Test Environment

Temperature:	26
Humidity:	54
Atmospheric Pressure:	101kPa



## 5. TEST FACILITY AND TEST INSTRUMENT USED

### 5.1 Test Facility

All measurement facilities used to collect the measurement data are located at BCTC Building & 1-2F, East of B Building, Pengzhou Industrial, Fuyuan 1st Road, Qiaotou Community, Fuyong Street, Bao'an District, Shenzhen, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

### 5.2 Test Instrument Used

Conducted emissions Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Receiver	R&S	ESR	102075	Jun. 20, 2018	Jun.19, 2019
LISN	R&S	ENV216	101375	Jun. 20, 2018	Jun.19, 2019
ISN	HPX	ISN T800	S1509001	Jun. 20, 2018	Jun.19, 2019
Software	Frad	EZ-EMC	EMC-CON 3A1	\	\

Radiated emissions Test (966 chamber)					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
966 chamber	ChengYu	966 Room	966	Mar. 03, 2016	Mar. 02, 2023
Receiver	R&S	ESRP	101154	Jun. 20, 2018	Jun.19, 2019
Receiver	R&S	ESR	102075	Jun. 20, 2018	Jun.19, 2019
Amplifier	Schwarzbeck	BBV9718	9718-309	Jun. 20, 2018	Jun.19, 2019
Amplifier	Schwarzbeck	BBV9744	9744-0037	Jun. 20, 2018	Jun.19, 2019
TRILOG Broadband Antenna	schwarzbeck	VULB 9163	VULB9163-942	Jun. 23, 2018	Jun.22, 2019
Horn Antenna	SCHWARZBECK	BBHA9120 D	1201	Jun. 23, 2018	Jun.22, 2021
Software	Frad	EZ-EMC	FA-03A2 RE	\	\



Harmonic / Flicker Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Harmonic & Flicker Tester	LAPLAEC	AC2000A	439263	Jun. 20, 2018	Jun.19, 2019
AC Power Supply	LAPLAEC	PCR4000 M	UK001879	Jun. 20, 2018	Jun.19, 2019
Software	TTI	HA-PC Link	3.01	\	\

Electrostatic discharge Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
ESD Tester	KIKISUI	KES4201 A	UH002321	Jun. 22, 2018	Jun. 21, 2019

Continuous RF electromagnetic field disturbances Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Power meter	Keysight	E4419	GB42421440	Apr. 15, 2018	Apr. 14, 2019
Power sensor	Keysight	E9300A	US39211305	Apr. 15, 2018	Apr. 14, 2019
Power sensor	Keysight	E9300A	US39211659	Apr. 15, 2018	Apr. 14, 2019
Amplifier	SKET	HAP-8010 00M-250W	/	Aug. 13, 2018	Aug. 12, 2019
Amplifier	SKET	HAP-8010 00M-75W	/	Aug. 13, 2018	Aug. 12, 2019
Amplifier	SKET	HAP-8010 00M-50W	/	Aug. 12, 2018	Aug. 11, 2019
Stacked double Log.-Per. Antenna	Schwarzbeck	STLP 9129	077	Apr. 15, 2018	Apr. 14, 2019
Field Probe	Narda	EP-601	80256	Jun. 23, 2018	Jun. 22, 2019
Signal Generator	Agilent	N5181A	MY50143748	Jun. 20, 2018	Jun.19, 2019
Software	SKET	EMC-S	1.2.0.18	\	\

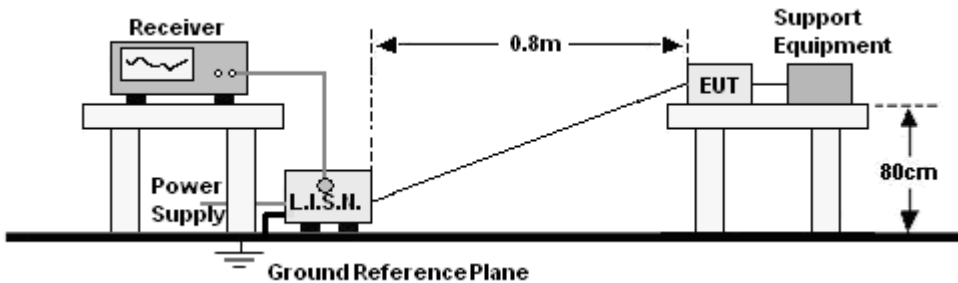
EFT and Surge and Voltage dips and interruptions Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
Compact Generator	TRANSIENT	TRA2000	646	Jul. 11, 2018	Jul. 10, 2019
Coupling Clamp	PARTNER	CN-EFT1000	CN-EFT1000-1624	Aug. 14, 2018	Aug. 13, 2019



Continuous induced RF disturbances Test					
Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
C/S Test System	SCHLODER	CDG-6000-75	126B1405/2016	Jul. 11, 2018	Jul. 10, 2019
Attenuator	SCHLODER	6DB DC-1G	HA1630	Jul. 09, 2018	Jul. 08, 2019
CDN	SCHLODER	CDN M2/M3	A2210389/2016	Jul. 09, 2018	Jul. 08, 2019
Injection Clamp	SCHLOBER	EMCL-20	132A1272/2016	Aug. 14, 2017	Aug. 13, 2020
Software	HUBERT	HUBERT EN 61000-4-6	1.4.1.0	\	\

## 6. CONDUCTED EMISSIONS

### 6.1 Block Diagram Of Test Setup



### 6.2 Limit

Limits for Conducted emissions at the mains ports of Class B MME

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0,15 to 0,50	66 to 56*	56 to 46*
0,50 to 5	56	46
5 to 30	60	50

Notes: 1. \*Decreasing linearly with logarithm of frequency.  
2. The lower limit shall apply at the transition frequencies.

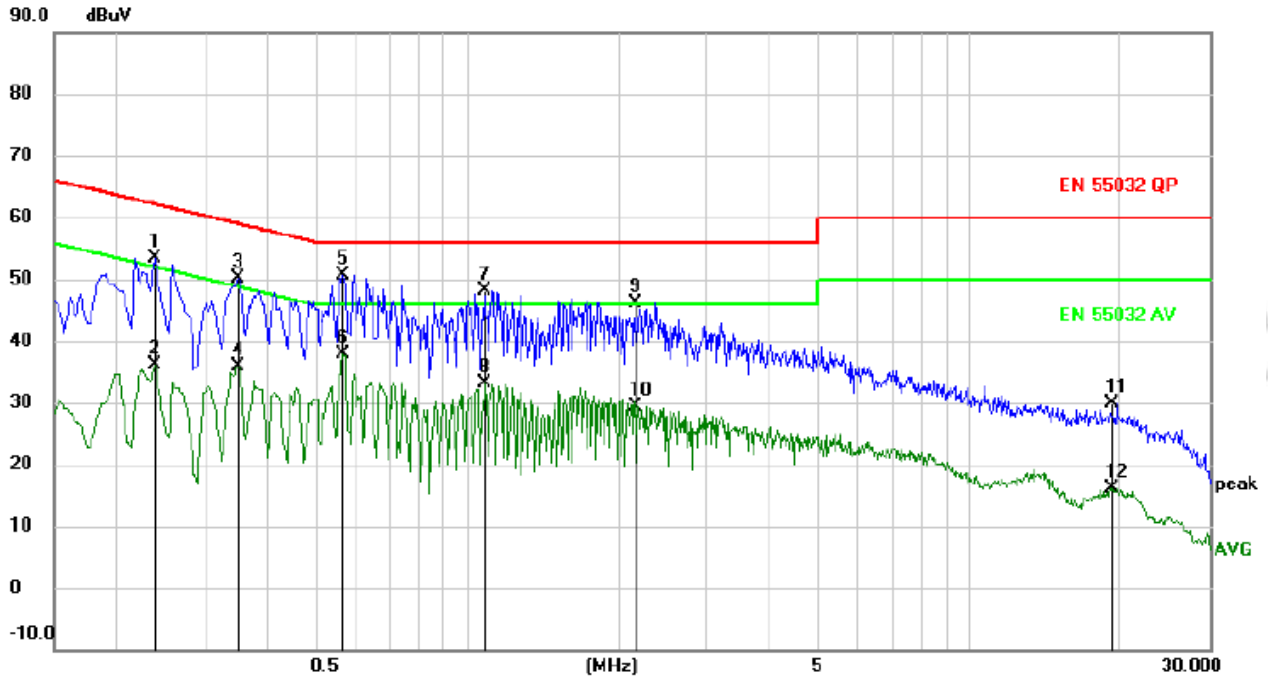
### 6.3 Test procedure

- The Product was placed on a nonconductive table 0.8 m above the horizontal ground reference plane, and 0.4 m from the vertical ground reference plane, and connected to the main through Line Impedance Stability Network (L.I.S.N).
- The RBW of the receiver was set at 9 kHz in 150 kHz ~ 30MHz with Peak and AVG detector in Max Hold mode. Run the receiver's pre-scan to record the maximum disturbance generated from Product in all power lines in the full band.
- For each frequency whose maximum record was higher or close to limit, measure its QP and AVG values and record.



### 6.4 Test Result

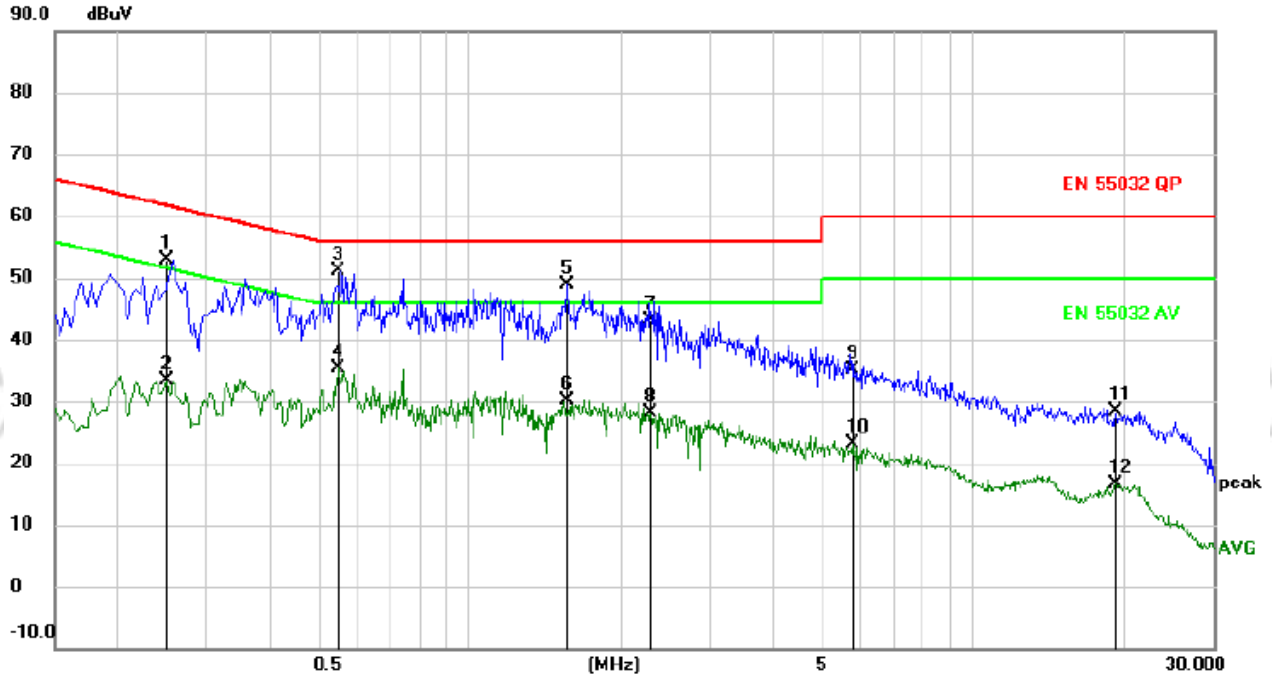
Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	L
Test Mode	1(the worst data)	Remark:	N/A



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.2380	43.85	9.51	53.36	62.17	-8.81	QP
2		0.2380	26.68	9.51	36.19	52.17	-15.98	AVG
3		0.3500	40.62	9.54	50.16	58.96	-8.80	QP
4		0.3500	26.43	9.54	35.97	48.96	-12.99	AVG
5	*	0.5660	40.83	9.86	50.69	56.00	-5.31	QP
6		0.5660	28.13	9.86	37.99	46.00	-8.01	AVG
7		1.0859	38.65	9.57	48.22	56.00	-7.78	QP
8		1.0859	23.64	9.57	33.21	46.00	-12.79	AVG
9		2.1580	36.59	9.60	46.19	56.00	-9.81	QP
10		2.1580	19.81	9.60	29.41	46.00	-16.59	AVG
11		19.1500	20.05	9.77	29.82	60.00	-30.18	QP
12		19.1500	6.44	9.77	16.21	50.00	-33.79	AVG



Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010hPa	Phase :	N
Test Mode	1(the worst data)	Remark:	N/A



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Detector
		MHz	dBuV		dBuV	dBuV	dB	
1		0.2500	43.32	9.52	52.84	61.76	-8.92	QP
2		0.2500	23.74	9.52	33.26	51.76	-18.50	AVG
3	*	0.5500	41.29	9.80	51.09	56.00	-4.91	QP
4		0.5500	25.59	9.80	35.39	46.00	-10.61	AVG
5		1.5620	39.36	9.58	48.94	56.00	-7.06	QP
6		1.5620	20.57	9.58	30.15	46.00	-15.85	AVG
7		2.2940	33.45	9.61	43.06	56.00	-12.94	QP
8		2.2940	18.62	9.61	28.23	46.00	-17.77	AVG
9		5.7740	25.27	9.77	35.04	60.00	-24.96	QP
10		5.7740	13.34	9.77	23.11	50.00	-26.89	AVG
11		19.1940	18.68	9.78	28.46	60.00	-31.54	QP
12		19.1940	6.77	9.78	16.55	50.00	-33.45	AVG

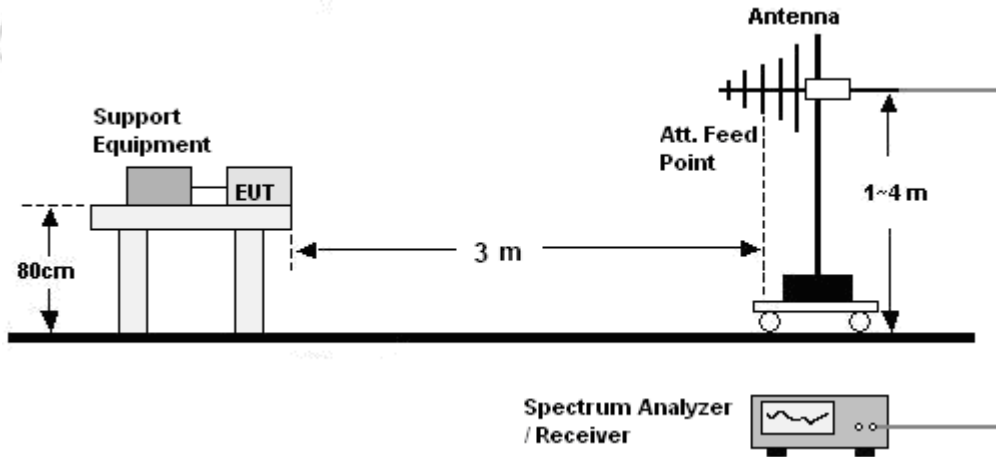
Remark:

- All readings are Quasi-Peak and Average values.
- Factor = Insertion Loss + Cable Loss.

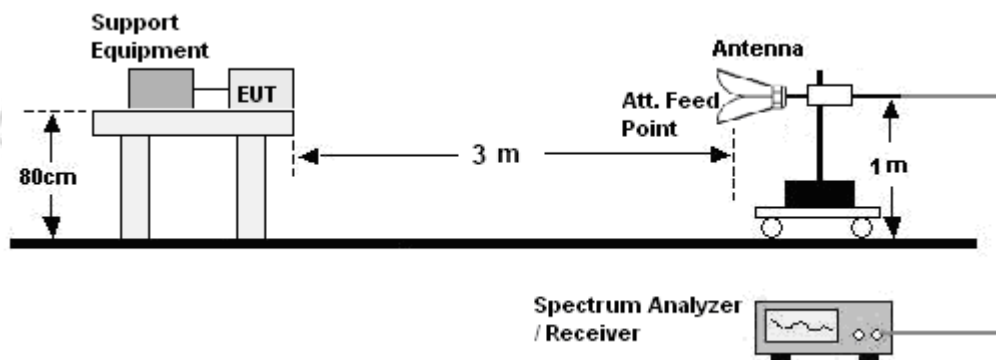
## 7. RADIATED EMISSIONS TEST

### 7.1 Block Diagram Of Test Setup

30MHz ~ 1GHz:



Above 1GHz:



### 7.2 Limits

Limits for radiated disturbance of Class B MME

Frequency (MHz)	Quasi-peak limits at 3m dB( $\mu$ V/m)	
30-230	40	
230-1000	47	
Frequency (GHz)	limit above 1G at 3m dB( $\mu$ V/m)	
	Average	peak
1-3	50	70
3-6	54	74

**Note:** The lower limit shall apply at the transition frequencies.





### 7.3 Test Procedure

#### **30MHz ~ 1GHz:**

- a. The Product was placed on the nonconductive turntable 0.8m above the ground in a semi anechoic chamber.
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 120 kHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied between 1~4 m in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its QP value: vary the antenna's height and rotate the turntable from 0 to 360 degrees to find the height and degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to QP Detector and specified bandwidth with Maximum Hold Mode, and record the maximum value.

#### **Above 1GHz:**

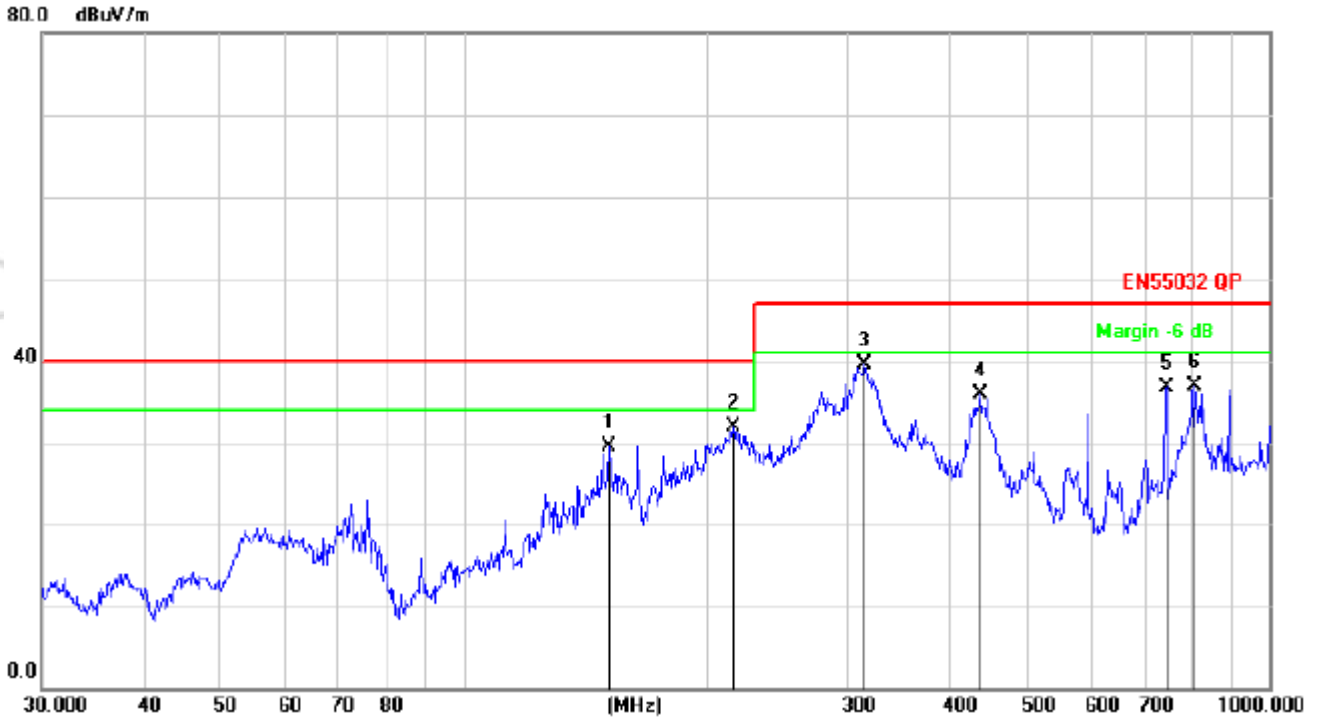
- a. The Product was placed on the non-conductive turntable 0.8 m above the ground in a full anechoic chamber..
- b. Set the spectrum analyzer/receiver in Peak detector, Max Hold mode, and 1MHz RBW. Record the maximum field strength of all the pre-scan process in the full band when the antenna is varied in both horizontal and vertical, and the turntable is rotated from 0 to 360 degrees.
- c. For each frequency whose maximum record was higher or close to limit, measure its AV value: rotate the turntable from 0 to 360 degrees to find the degree where Product radiated the maximum emission, then set the test frequency analyzer/receiver to AV value and specified bandwidth with Maximum Hold Mode, and record the maximum value.



### 7.4 Test Results

Below 1GHz

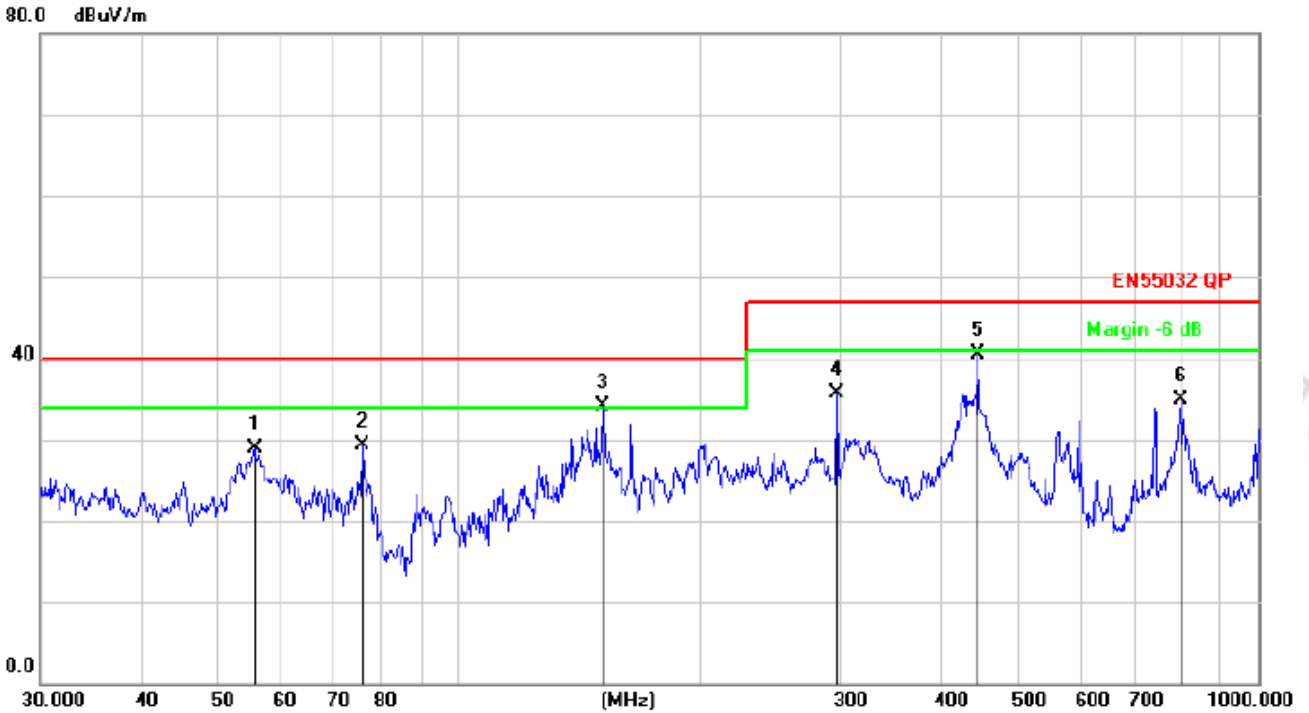
Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010hPa	Polarization :	Horizontal
Test Mode	1(the worst data)	Remark:	N/A



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		151.5972	48.99	-19.40	29.59	40.00	-10.41	QP
2		216.0240	47.87	-15.93	31.94	40.00	-8.06	QP
3	*	314.3765	52.75	-13.21	39.54	47.00	-7.46	QP
4		437.1199	46.14	-10.26	35.88	47.00	-11.12	QP
5		744.8661	41.22	-4.42	36.80	47.00	-10.20	QP
6		807.4291	40.34	-3.47	36.87	47.00	-10.13	QP



Temperature:	26°C	Relative Humidity:	54%
Pressure:	1010hPa	Polarization :	Vertical
Test Mode	1(the worst data)	Remark:	N/A



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dB/m	Over dB	Detector
1		55.6094	44.25	-15.44	28.81	40.00	-11.19	QP
2		75.7114	48.75	-19.46	29.29	40.00	-10.71	QP
3	*	151.5972	53.57	-19.40	34.17	40.00	-5.83	QP
4		297.2241	49.36	-13.69	35.67	47.00	-11.33	QP
5		446.4141	50.54	-10.05	40.49	47.00	-6.51	QP
6		801.7863	38.47	-3.60	34.87	47.00	-12.13	QP

Remark:

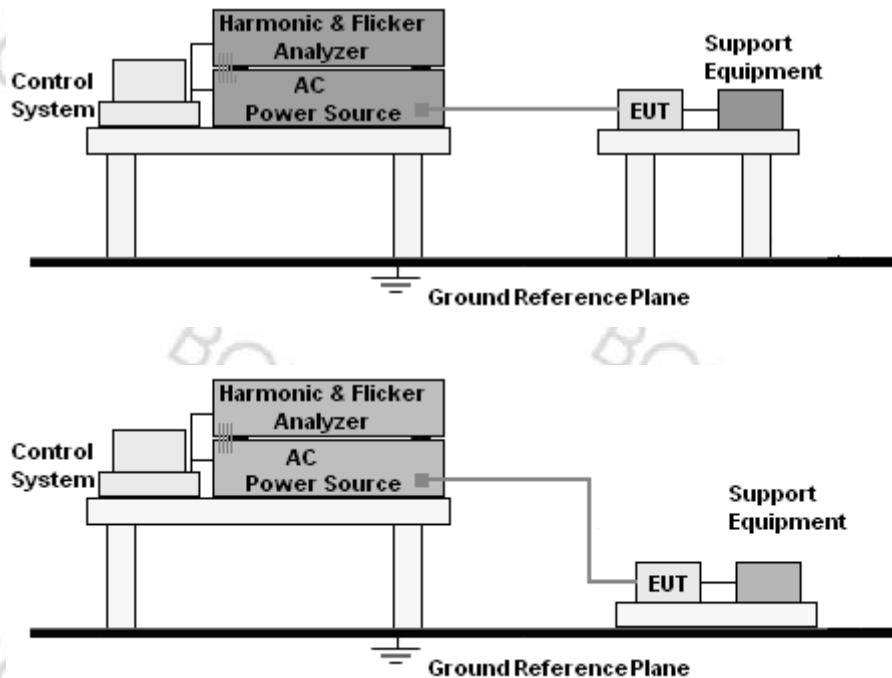
Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Above 1GHz

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

## 8. HARMONIC CURRENT EMISSION(H)

### 8.1 Block Diagram of Test Setup



### 8.2 Limit

EN 61000-3-2:2014 Clause 7.

### 8.3 Test Procedure

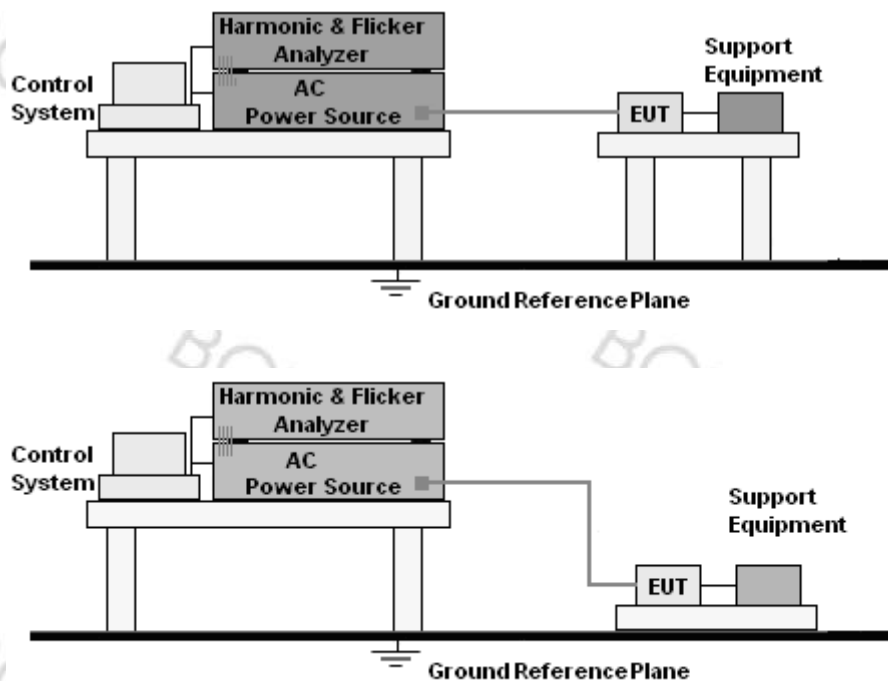
- The Product was placed on the top of a non-conductive table above the ground and operated to produce the maximum harmonic components under normal operating conditions for each successive harmonic component in turn.
- The correspondent test program of test instrument to measure the current harmonics emanated from Product was chosen. The measure time shall be not less than the time necessary for the Product to be exercised.

### 8.4 Test Results

The Product belongs to Class A, and its power is less than 75W, so it deems to fulfil this standard without testing.

## 9. VOLTAGE FLUCTUATIONS & FLICKER(F)

### 9.1 Block Diagram of Test Setup



### 9.2 Limit

EN 61000-3-3:2013 Clause 5.

### 9.3 Test Procedure

- The Product was placed on the top of a non-conductive table above the ground and operated to produce the most unfavorable sequence of voltage changes under normal operating conditions.
- During the flick test, the measure time shall include that part of whole operation cycle in which the Product produce the most unfavorable sequence of voltage changes. The observation period for short-term flicker indicator is 10 minutes and the observation period for long-term flicker indicator is 2 hours.

### 9.4 Test Results

The EUT is powered by the DC only, the test item is not applicable.



## 10. IMMUNITY TEST OF GENERAL THE PERFORMANCE CRITERIA

According To EN 301489 -17standard, The General Performance Criteria As Following:

Criteria	During the test	After the test
<b>A</b>	Shall operate as intended May show degradation of performance (see note 1) Shall be no loss of function Shall be no unintentional transmissions	Shall operate as intended Shall be no degradation of performance (see note 2) Shall be no loss of function Shall be no loss of stored data or user programmable functions
<b>B</b>	May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions	Functions shall be self-recoverable Shall operate as intended after recovering Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions
<b>C</b>	May be loss of function (one or more)	Functions shall be recoverable by the operator Shall operate as intended after recovering Shall be no degradation of performance (see note 2)

NOTE 1: Degradation of performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.

NOTE 2: no degradation of performance after the test is understood as any degradation below a minimum performance level specified by the manufacturer for the use of the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After the test no change of actual operating data or user retrievable data is allowed. If the minimum performance level or the permissible performance degradation is not specified by the manufacturer then either of these may be derived from the product description and documentation (including leaflets and advertising) and what the user may reasonably expect from the apparatus if used as intended.



### **PERFORMANCE FOR TT**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration, for which performance criteria C shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an acknowledgement (ACK) or not-acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **PERFORMANCE FOR TR**

The performance criteria B shall apply, except for voltage dips of 100 ms and voltage interruptions of 5 000 ms duration for which performance criteria C shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **PERFORMANCE FOR CT**

The performance criteria A shall apply. Tests shall be repeated with the EUT in standby mode (if applicable) to ensure that unintentional transmission does not occur. In systems using acknowledgement signals, it is recognized that an Acknowledgement (ACK) or Not Acknowledgement (NACK) transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

### **PERFORMANCE FOR CR**

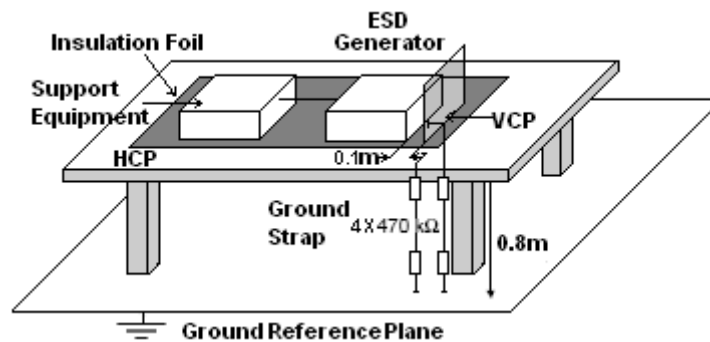
The performance criteria A shall apply. Where the EUT is a transceiver, under no circumstances, shall the transmitter operate unintentionally during the test. In systems using acknowledgement signals, it is recognized that an ACK or NACK transmission may occur, and steps should be taken to ensure that any transmission resulting from the application of the test is correctly interpreted.

## 11. ELECTROSTATIC DISCHARGE (ESD)

### 11.1 Test Specification

<b>Test Port</b>	: Enclosure port
<b>Discharge Impedance</b>	: 330 ohm / 150 pF
<b>Discharge Mode</b>	: Single Discharge
<b>Discharge Period</b>	: one second between each discharge

### 11.2 Block Diagram of Test Setup



### 11.3 Test Procedure

- Electrostatic discharges were applied only to those points and surfaces of the Product that are accessible to users during normal operation.
- The test was performed with at least ten single discharges on the pre-selected points in the most sensitive polarity.
- The time interval between two successive single discharges was at least 1 second.
- The ESD generator was held perpendicularly to the surface to which the discharge was applied and the return cable was at least 0.2 meters from the Product.
- Contact discharges were applied to the non-insulating coating, with the pointed tip of the generator penetrating the coating and contacting the conducting substrate.
- Air discharges were applied with the round discharge tip of the discharge electrode approaching the Product as fast as possible (without causing mechanical damage) to touch the Product. After each discharge, the ESD generator was removed from the Product and re-triggered for a new single discharge. The test was repeated until all discharges were complete.





### 11.4 Test Results

Temperature :	26°C	Relative Humidity:	54%
Pressure :	1010 hPa	Test Mode :	Mode1

Mode	Air Discharge (Test result)								Contact Discharge (Test result)								Observation	Perform Criteria	Judgment		
	2		4		8		15		2		4		6		8						
Test level (kV)	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-			
HCP									A	A	A	A							CT,CR	B	PASS
VCP									A	A	A	A							CT,CR	B	PASS
enclosure	A	A	A	A	A	A													CT,CR	B	PASS

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) Test condition:  
Direct / Indirect (HCP/VCP) discharges: Minimum 50 times (Positive/Negative) at each point. Air discharges: Minimum 10 times (Positive/Negative) at each point.
- 3) N/A - denotes test is not applicable in this test report
- 4) There was not any unintentional transmission in standby mode

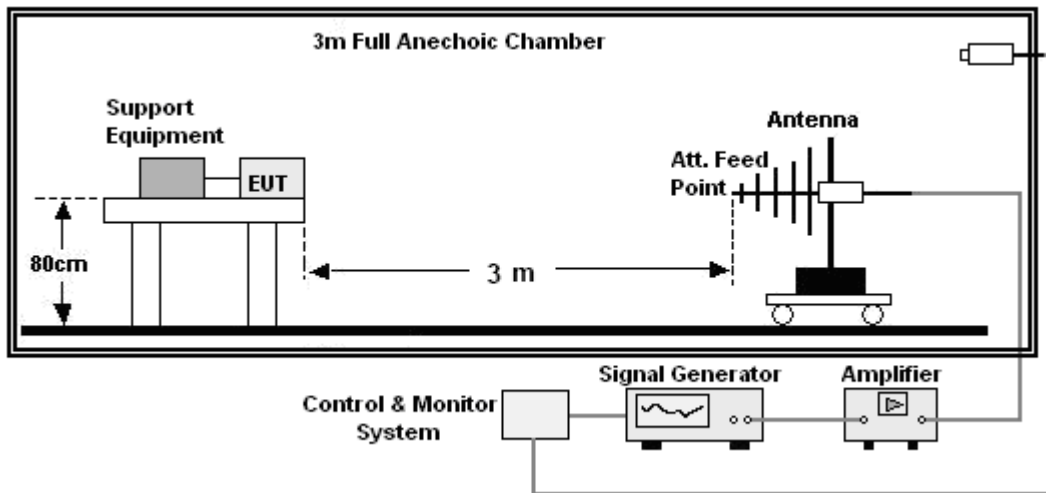
## 12. CONTINUOUS RF ELECTROMAGNETIC FIELD DISTURBANCES(RS)

### 12.1 Test Specification

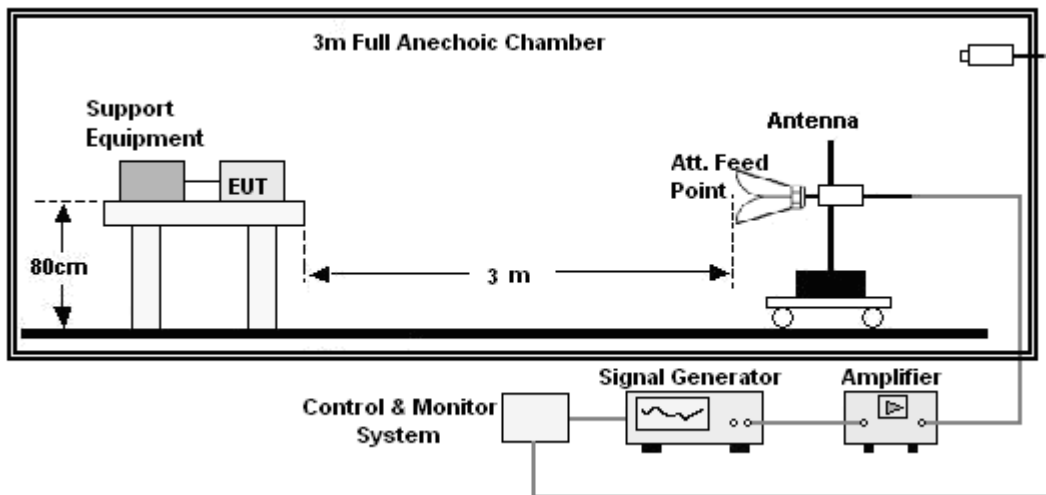
Test Port	: Enclosure port
Step Size	: 1%
Modulation	: 1kHz, 80% AM
Dwell Time	: 1 second
Polarization	: Horizontal & Vertical

### 12.2 Block Diagram of Test Setup

Below 1GHz:



Above 1GHz:





### 12.3 Test Procedure

- a. The testing was performed in a fully-anechoic chamber. The transmit antenna was located at a distance of 3 meters from the Product.
- b. The frequency range is swept from 80MHz to 1000MHz, 1800MHz, 2600MHz, 3500MHz, 5000MHz, with the signal 80% amplitude modulated with a 1 kHz sine wave, and the step size was 1%.
- c. The dwell time at each frequency shall not be less than the time necessary for the EUT to be exercised and to be able to respond, but should not exceed 5 s at each of the frequencies during the scan.
- d. The test was performed with the Product exposed to both vertically and horizontally polarized fields on each of the four sides.
- e. For Broadcast reception function: Group 2 not apply in this test.

### 12.4 Test Results

Temperature :	26°C	Relative Humidity:	54%
Pressure :	1010 hPa	Test Mode :	Mode1

Frequency Range (MHz)	RF Field Position	R.F. Field Strength	Azimuth	Observation	Perform Criteria	Test Result	Judgment
80~6000	H / V	3 V/m (rms) AM Modulated 1000Hz, 80%	Front	CT,CR	A	A	PASS
			Rear				
			Left				
			Right				

Note:

- 1) P/N denotes the Positive/Negative polarity of the output voltage.
- 2) N/A - denotes test is not applicable in this test report.
- 3) There was no change operated with initial operating during the test.
- 4) There was not any unintentional transmission in standby mode

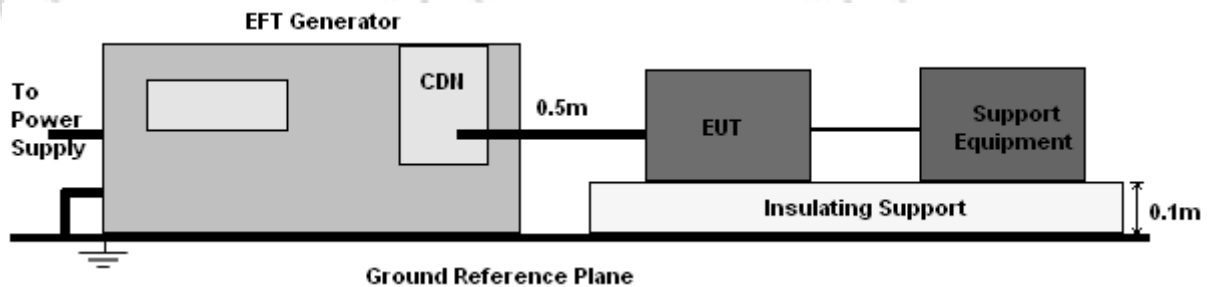
## 13. ELECTRICAL FAST TRANSIENTS/BURST (EFT)

### 13.1 Test Specification

<b>Test Port</b>	: input AC power port
<b>Impulse Frequency</b>	: 5 kHz
<b>Impulse Wave-shape</b>	: 5/50 ns
<b>Burst Duration</b>	: 15 ms
<b>Burst Period</b>	: 300 ms
<b>Test Duration</b>	: 2 minutes per polarity

### 13.2 Block Diagram of EUT Test Setup

For input AC power port:



### 13.3 Test Procedure

- The Product and support units were located on a non-conductive table above ground reference plane.
- A 0.5m-long power cord was attached to Product during the test.

### 13.4 Test Results

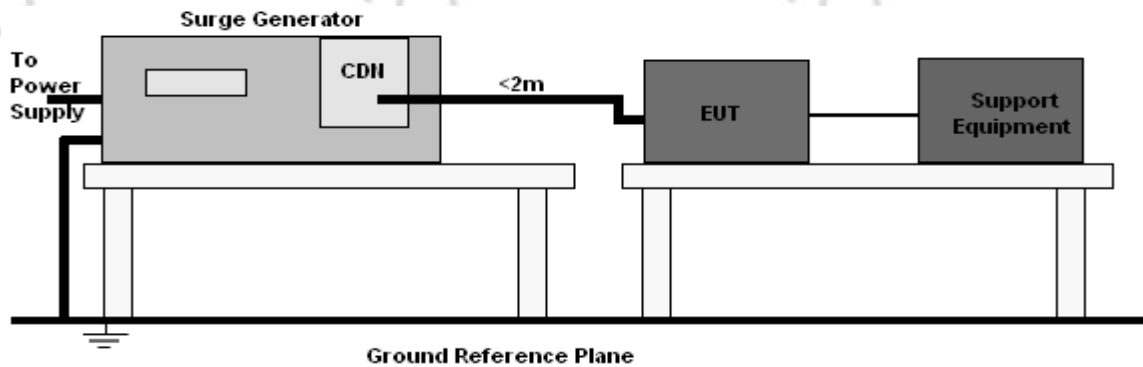
The EUT is powered by the DC only, the test item is not applicable.

## 14. SURGES IMMUNITY TEST

### 14.1 Test Specification

<b>Test Port</b>	: input AC power port
<b>Wave-Shape</b>	: Open Circuit Voltage - 1.2 / 50 us Short Circuit Current - 8 / 20 us
<b>Pulse Repetition Rate</b>	: 1 pulse / min.
<b>Phase Angle</b>	: 0° / 90° / 180° / 270°
<b>Test Events</b>	: 5 pulses (positive & negative) for each polarity

### 14.2 Block Diagram of EUT Test Setup



### 14.3 Test Procedure

- The surge is to be applied to the Product power supply terminals via the capacitive coupling network. Decoupling networks are required in order to avoid possible adverse effects on equipment not under test that may be powered by the same lines, and to provide sufficient decoupling impedance to the surge wave.
- The power cord between the Product and the coupling/decoupling networks shall be 2 meters in length (or shorter). Interconnection line between the Product and the coupling/decoupling networks shall be 2 meters in length (or shorter).

### 14.4 Test Result

The EUT is powered by the DC only, the test item is not applicable.

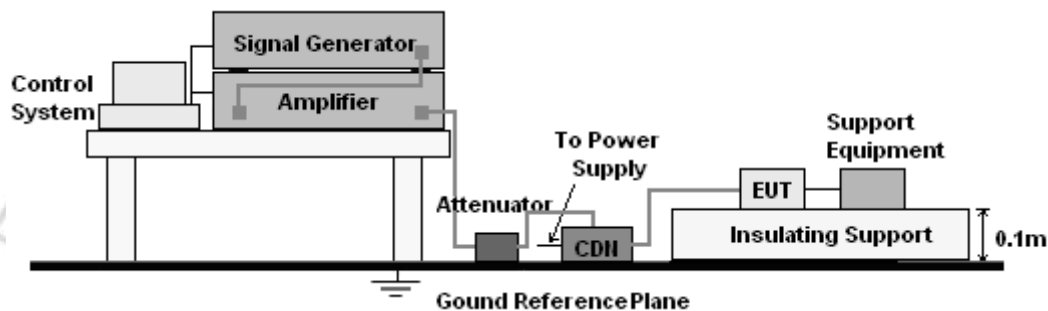
## 15. CONTINUOUS INDUCED RF DISTURBANCES (CS)

### 15.1 Test Specification

<b>Test Port</b>	: input AC. power port analogue/digital data port
<b>Step Size</b>	: 1%
<b>Modulation</b>	: 1kHz, 80% AM
<b>Dwell Time</b>	: 1 second

### 15.2 Block Diagram of EUT Test Setup

For input AC power port:



### 15.3 Test Procedure

For input AC power port:

- The Product and support units were located at a ground reference plane with the interposition of a 0.1 m thickness insulating support and the CDN was located on GRP directly.
- The frequency range is swept from 150 kHz to 10MHz, 10MHz to 30MHz, 30MHz to 80MHz with the signal 80% amplitude modulated with a 1 kHz sine wave, and the step size was 1% of fundamental.
- The dwell time at each frequency shall be not less than the time necessary for the Product to be able to respond.

### 15.4 Test Result

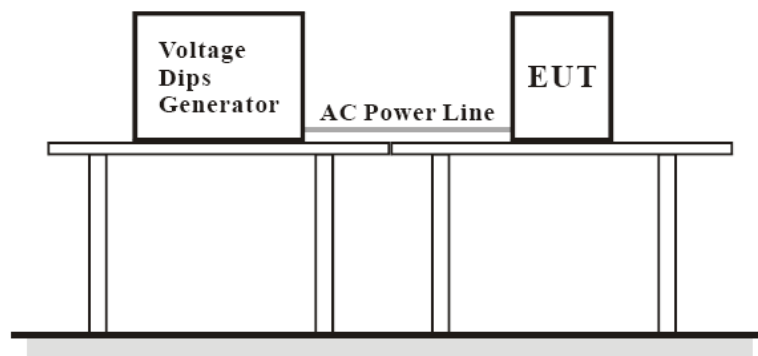
The EUT is powered by the DC only, the test item is not applicable.

## 16. VOLTAGE DIPS AND INTERRUPTIONS (DIPS)

### 16.1 Test Specification

Test Port	:	input AC power port
Phase Angle	:	0°, 180°
Test cycle	:	3 times

### 16.2 Block Diagram of EUT Test Setup



### 16.3 Test Procedure

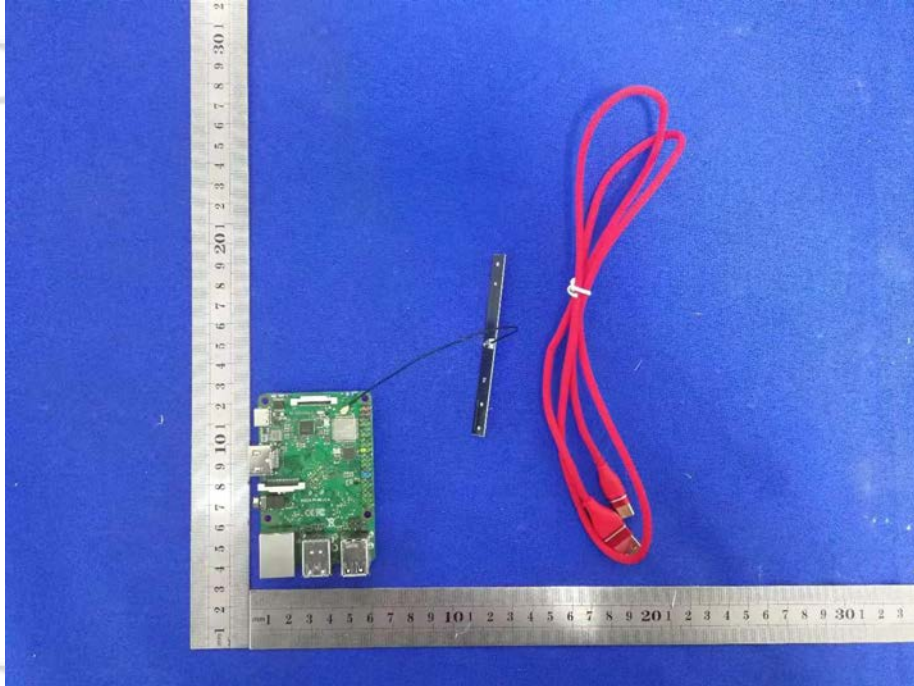
- The Product and support units were located on a non-conductive table above ground floor.
- Set the parameter of tests and then perform the test software of test simulator.
- Conditions changes to occur at 0 degree crossover point of the voltage waveform.

### 16.4 Test Result

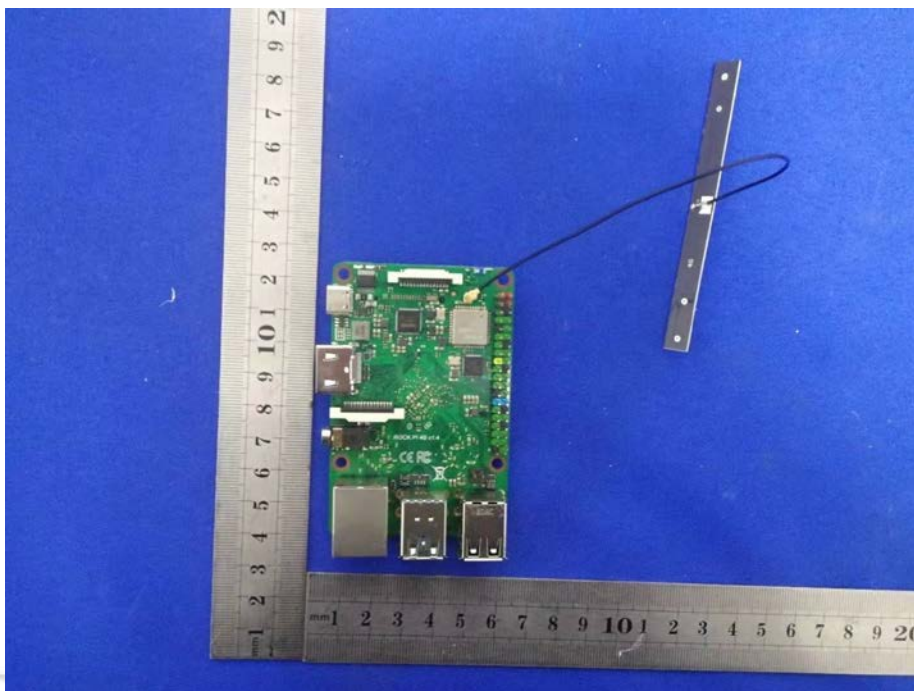
The EUT is powered by the DC only, the test item is not applicable.

## 17. EUT PHOTOGRAPHS

EUT Photo 1

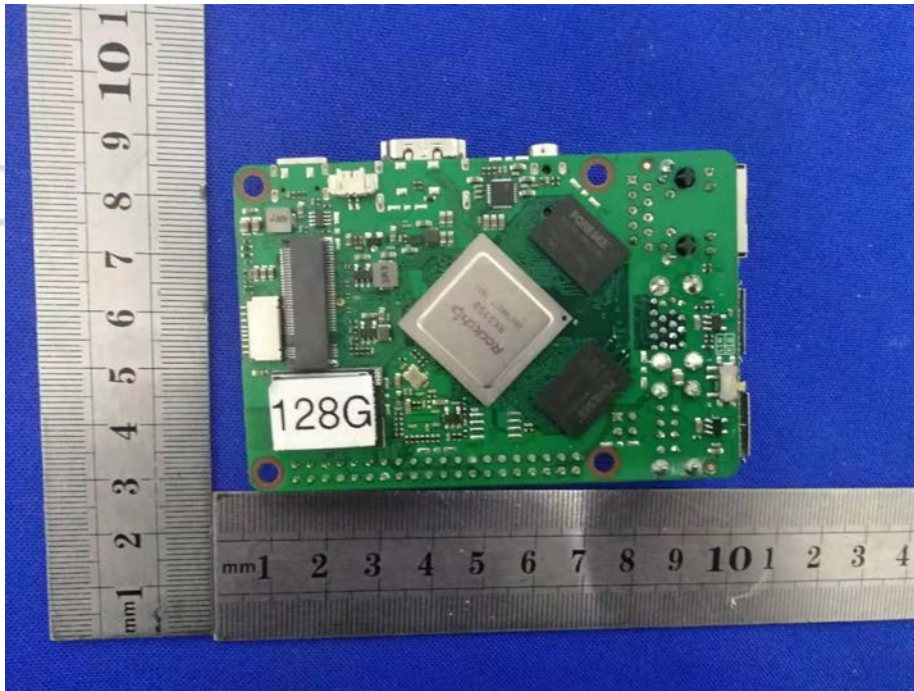


EUT Photo 2





EUT Photo 3



EUT Photo 4



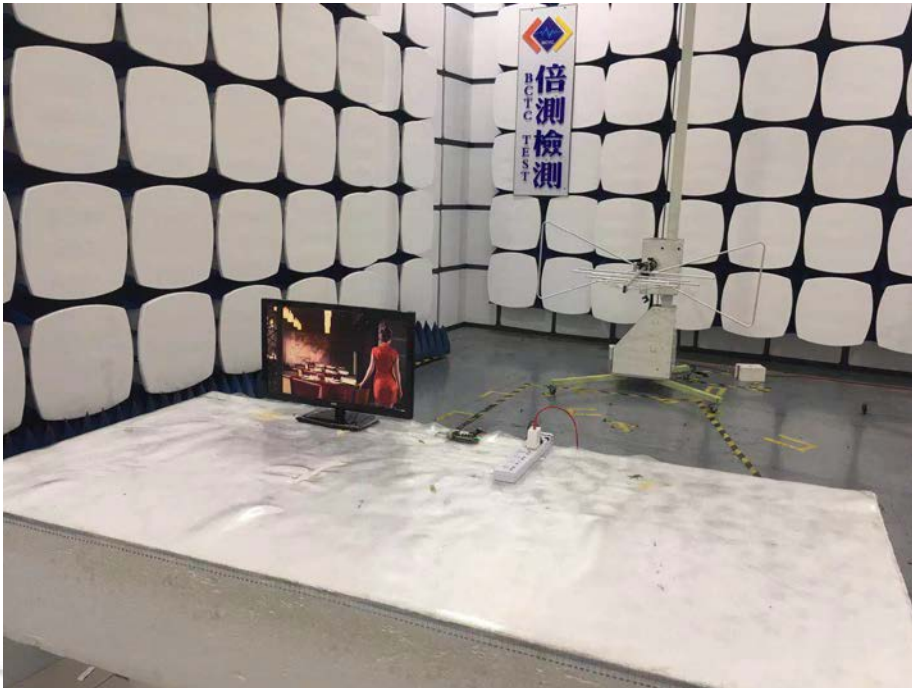


## 18. EUT TEST SETUP PHOTOGRAPHS

Conducted emissions



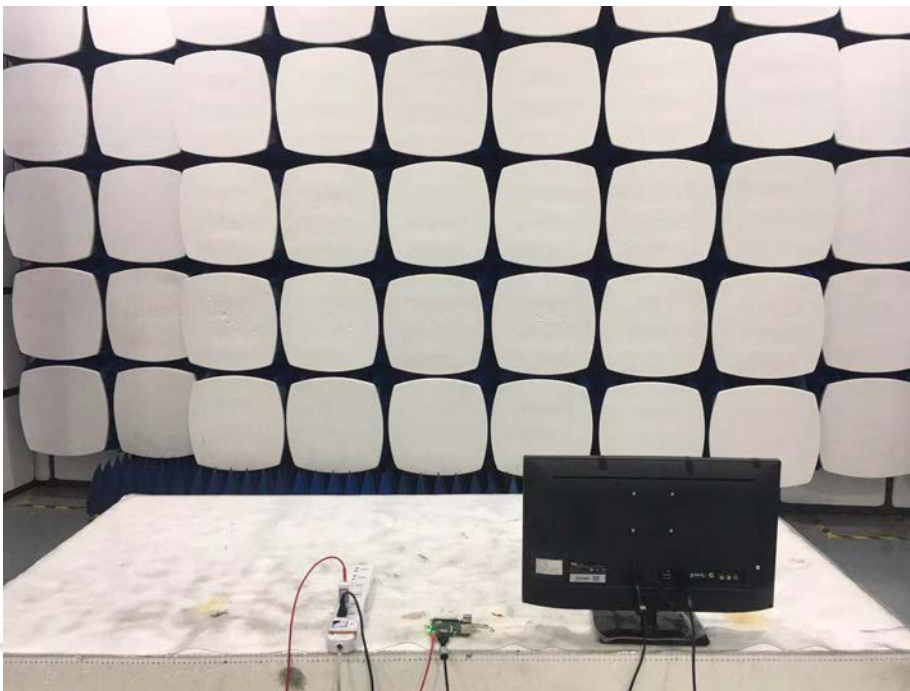
Radiated emissions



ESD



RS



\*\*\*\*\* END OF REPORT \*\*\*\*\*