ETSI EN 301 489-1 V2.1.1 (2017-02)
Final draft ETSI EN 301 489-3 V2.1.1 (2017-03)

MEASUREMENT AND TEST REPORT

For

Shenzhen Wulian Electronic Co., Limited

Floor 2, Building 3, Masha Industrial Zone, No. 49,
Jiaoyu Road North, Pingdi, Longgang, Shenzhen, China

Model:	CW1，CW2，CW6，CW7，CW8，CW9，CW10，CW12，EW1，EW2，CQ1， CQ3，CQ5，CQ6，CQ7，CQ8，CQ9，CQ10， CR22，CR22A，CR23，CR23A，CR28，CR29，CR30，CT05，CT06，CT07，CT08，CT09，CT10，CT18，CT19，CT20，CT21，CT29，RE01，CK02，CK05，CK06，DB8， DB9，DB10，DB11，DB12，DB15，DT1，DT2，RC1， RC3，RC11，SA1，SA5，WW1，WW2

May 13, 2019

This Report Concerns:	**Equipment Type:**
☒ Original Report	Calling System

Test By:	Angell Liu /
Report Number:	**CTE19ER-514E-2**
Test Date:	May 06-13, 2019
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This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Coffee-T Electronics Technology Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION 4
1.1. Client Information 4
1.2. General Description of EUT (Equipment Under Test) 4
1.3. Block Diagram Showing The Configuration of System Tested 5
..... 5
1.4. Description of Support Units 5
1.5. Description of Operating Mode 5
1.6. Performance Criterion 6
2. TEST RESULTS SUMMARY 8
3. TEST EQUIPMENT USED 9
4. CONDUCTED DISTURBANCE TEST 10
4.1. Test Standard and Limit 10
4.2. Test Setup 10
4.3. Test Procedure 10
4.4. Test Data 11
5. RADIATED EMISSION TEST 14
5.1. Test Standard and Limit 14
5.2. Test Setup 15
5.3. Test Procedure 15
5.4. Test Data 15
6. HARMONIC CURRENT EMISSION TEST 19
6.1. Test Standard and Limit 19
6.2. Test Data 20
7. VOLTAGE FLUCTUATION AND FLICKER TEST 21
7.1. Test Standard and Limit 21
7.2. Test Data 21

8. ELECTROSTATIC DISCHARGE IMMUNITY TEST 22
8.1. Test Requirements 22
8.2. Test Setup 22
8.3. Test Procedure 22
8.4. Test Data 23
9. RADIATED ELECTROMAGNETIC FIELD IMMUNITY TEST 25
9.1. Test Requirements 25
9.2. Test Setup 25
9.3. Test Procedure 25
9.4. Test Data 26
10. ELECTRICAL FAST TRANSIENT/BURST TEST 27
10.1. Test Requirements 27
10.2. Test Setup 27
10.3. Test Procedure 27
10.4. Test Data 28
11. SURGE IMMUNITY TEST 29
11.1. Test Requirements 29
11.2. Test Setup 29
11.3. Test Procedure 29
11.4. Test Data 30
12. CONDUCTED IMMUNITY TEST 32
12.1. Test Requirements 32
12.2. Test Setup 32
12.3. Test Procedure 32
12.4. Test Data 33
13. VOLTAGE DIPS AND INTERRUPTIONS IMMUNITY TEST 34
13.1. Test Requirements 34
13.2. Test Setup 34
13.3. Test Procedure 34
13.4. Test Data 35
14. PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 36

1. General Information

1.1. Client Information

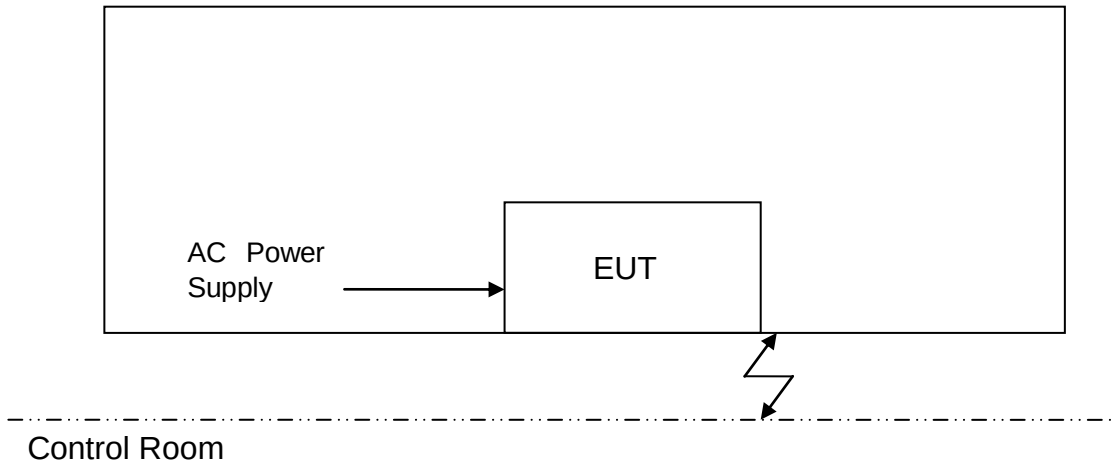
Applicant	:	**Shenzhen Wulian Electronic Co., Limited**
Address	:	Floor 2, Building 3, Masha Industrial Zone, No. 49, Jiaoyu Road North, Pingdi, Longgang, Shenzhen, China
Manufacturer	:	**Shenzhen Wulian Electronic Co., Limited**
Address	:	Floor 2, Building 3, Masha Industrial Zone, No. 49, Jiaoyu Road North, Pingdi, Longgang, Shenzhen, China

1.2. General Description of EUT (Equipment Under Test)

EUT	: Calling System
Model Number	: CQ5
Series No.	: /
Operating Frequency Product Description	
Operating Frequency	: 315~433MHz
Modulation Type	: ASK
Communication rate	: 200Kbps
Antenna	: Integral Antenna, 0dBi(Max.)
Power Supply	: DC 3.7V

1.3. Block Diagram Showing The Configuration of System Tested

Test Mode: TX Mode



1.4. Description of Support Units

Name	Model	S/N	Manufacturer	Used "√"
Wireless Router	TLWR720N	----	TP-Link	√
Printer	HP1020	CNCJ410726	HP	√
LCD Monitor	G205HV	10306738385	ACER	√
PC	ASPIREM1830	PTSF90C00305005CAC3000	ACER	√
Keyboard	SK-9625	KBUSB1580500037E0100	ACER	√
Mouse	MS.11200.014	M-UAY-ACR2	ACER	√

1.5. Description of Operating Mode

To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	Normal Operating Mode
Mode 2	Idle Mode

The EUT system operated these modes were found to be the worst case during the pre-scanning test as Following:

For EMI Test	
Final Test Mode	**Description**
Mode 1	Normal Operating Mode

For EMS Test	
Final Test Mode	**Description**
Mode 1	Normal Operating Mode

1.6. Performance Criterion

According to **ETSI EN 301 489-3** standard, the general performance criteria as following:

Criteria	During Test	After Test
A	Shall operate as intended, May show degradation of performance (see note 1), Shall be no loss of function, Shall be no unintentional transmissions.	Shall operated 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	May show loss of function (one or more) May show degradation of performance (see note 1) No unintentional transmissions	Function shall be self-recoverable, Shall operated as intended after recovering, Shall be no degradation of performance (see note 2) Shall be no loss of stored data or user programmable functions
C	May be loss of function (one or more)	Function shall be recoverable by the operator, Shall operate as intended after recovering Shall be no degradation of the performance (see note 2)
Note 1: Degradation of the performance during the test is understood as a degradation to a level not below a minimum performance level specified by the manufacturer for 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 (include leaflets and advertising) and what the user reasonably expect from the apparatus if used as intended.		
Note 2: No degradation of the performance after the test is understood as no degradation below a minimum performance level specified by the manufacturer for the apparatus as intended. In some cases the specified minimum performance level may be replaced by a permissible degradation of performance. After 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 (include leaflets and advertising)		

and what the user reasonably expect from the apparatus if used as intended.
performance criteria A for immunity test with phenomena of continuous nature; performance criteria B for immunity test with phenomena of transient nature; Performance criteria C for immunity test with power interruptions exceeding a certain time.

2. Test Results Summary

ETSI EN 301 489-1 V2.1.1 (2017-02) Final draft ETSI EN 301 489-3 V2.1.1 (2017-03)				
EMC Emission				
Standard	**Test Item**	**Limit**	**Judgment**	**Remark**
EN 55022: 2010	Conducted Emission	Class B	PASS	
	Radiated Emission	Class B	PASS	
EN 61000-3-2:2006 +A1:2009+A2:2009	Harmonic Current Emission	Class A or D NOTE(2)	N/A	
EN 6000-3-3:2013	Voltage Fluctuations& Flicker	/	N/A	
EMC Immunity				
Standard	**Test Item**	**Performance Criteria**	**Judgment**	**Remark**
EN 61000-4-2:2009	Electrostatic Discharge	B	PASS	
EN 61000-4-3:2006 +A1:2008+A2:2010	RF electromagnetic field	A	PASS	
EN 61000-4-4:2004+ A1:2010	Fast transients	B	PASS	
EN 61000-4-5:2006	Surges	B	PASS	
EN 61000-4-6:2009	Injected Current	A	PASS	
EN 61000-4-11:2004	Volt. Interruptions Volt. Dips	B / C / C NOTE (3)	PASS	
NOTE:				
	(1) ” N/A” denotes test is not applicable in this Test Report			
	(2) The power consumption of EUT is less than 75W and no Limits apply.			
	(3) Voltage dip: 100% reduction – Performance Criteria B			
	Voltage dip: 100% reduction – Performance Criteria B			
	Voltage dip: 70% reduction – Performance Criteria C			
	Voltage Interruption: 0% Interruption – Performance Criteria C			

3. Test Equipment Used

Equipment	Manufacturer	Model No.	Calibration Date	Calibration Date
EMI Test Receiver	R&S	ESCI	2019-3-22	2020-3-21
EMI Test Receiver	R&S	ESPI	2019-3-22	2020-3-21
Amplifier	HP	8447D	2019-3-22	2020-3-21
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2019-3-22	2020-3-21
Single Power Conductor Module	FCC	FCC-LISN-5-50-1-01-CISPR25	2019-3-22	2020-3-21
Power Clamp	SCHWARZBECK	MDS-21	2019-3-22	2020-3-21
Positioning Controller	C&C	CC-C-1F	2019-3-22	2020-3-21
Electrostatic Discharge Simulator	TESEQ	NSG437	2019-3-22	2020-3-21
Fast Transient Burst Generator	SCHAFFNER	MODULA6150	2019-3-22	2020-3-21
Fast Transient Noise Simulator	Noiseken	FNS-105AX	2019-3-22	2020-3-21
Capacitive Coupling Clamp	TESEQ	CDN8014	2019-3-22	2020-3-21
High Field Bucolical Antenna	ELECTRO-METRICS	EM-6913	2019-3-22	2020-3-21
Log Periodic Antenna	ELECTRO-METRICS	EM-6950	2019-3-22	2020-3-21
Remote Active Vertical Antenna	ELECTRO-METRICS	EM-6892	2019-3-22	2020-3-21
TRILOG Broadband Test-Antenna	SCHWARZBECK	VULB9163	2019-3-22	2020-3-21
Horn Antenna	SCHWARZBECK	BBHA9120A	2019-3-22	2020-3-21
Toe Line Single Phase Module	SCHWARZBECK	NSLK8128	2019-3-22	2020-3-21
10dB attenuator	SCHWARZBECK	MTAIMP-136	2019-3-22	2020-3-21
Electric Bridge	Zentech	100 LCR METER	N/A	N/A
RF Current Probe	FCC	F-33-4	2019-3-22	2020-3-21
SIGNAL GENERATOR	HP	8647A	2019-3-22	2020-3-21
MICROWAVE AMPLIFIER	HP	8349B	2019-3-22	2020-3-21
Triple-Loop Antenna	EVERFINE	LLA-2	2019-3-22	2020-3-21

4. Conducted Disturbance Test

4.1. Test Standard and Limit

4.1.1. Test Standard

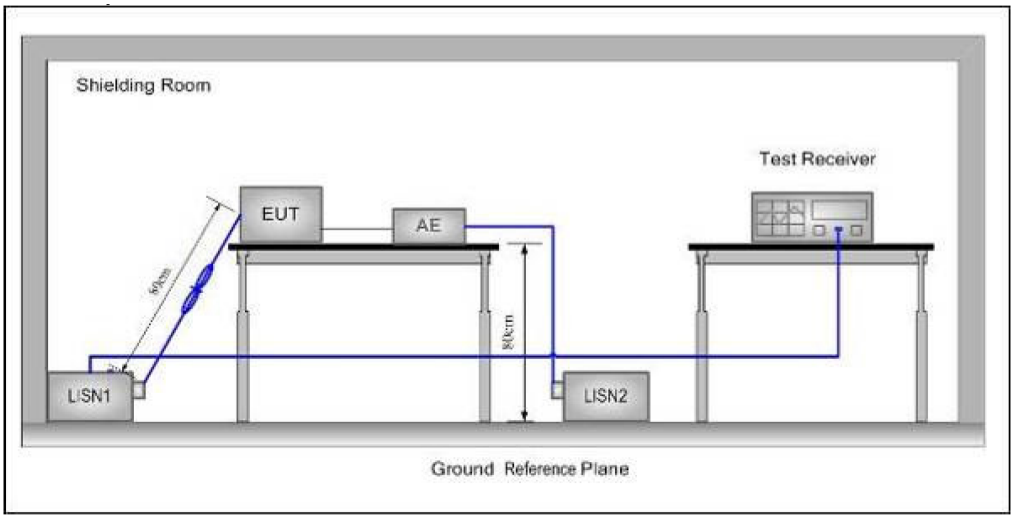
Final draft ETSI EN 301 489-3 V2.1.1 (EN 55032 Class B)

4.1.2. Test Limit

Conducted Disturbance Test Limit

Frequency	Maximum RF Line Voltage (dBμV)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50
Remark: *Decreasing linearly with logarithm of the frequency		

4.2. Test Setup



4.3. Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

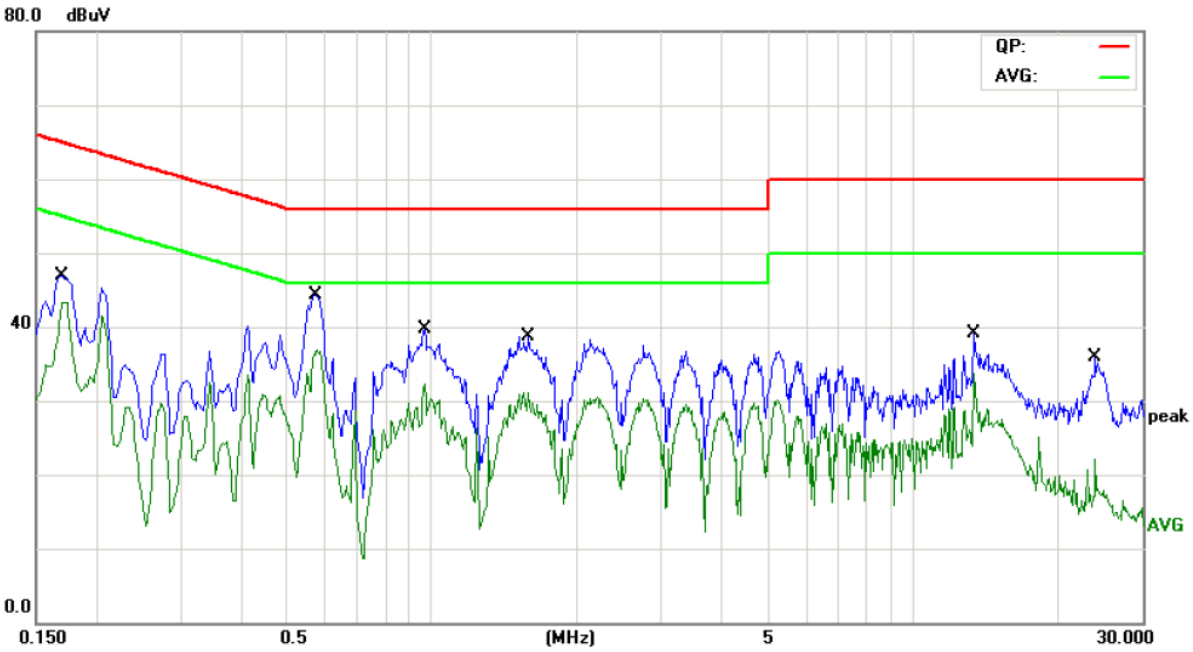
LISN at least 80 cm from the nearest part of EUT chassis.

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

4.4. Test Data

Conducted Emission Test Data

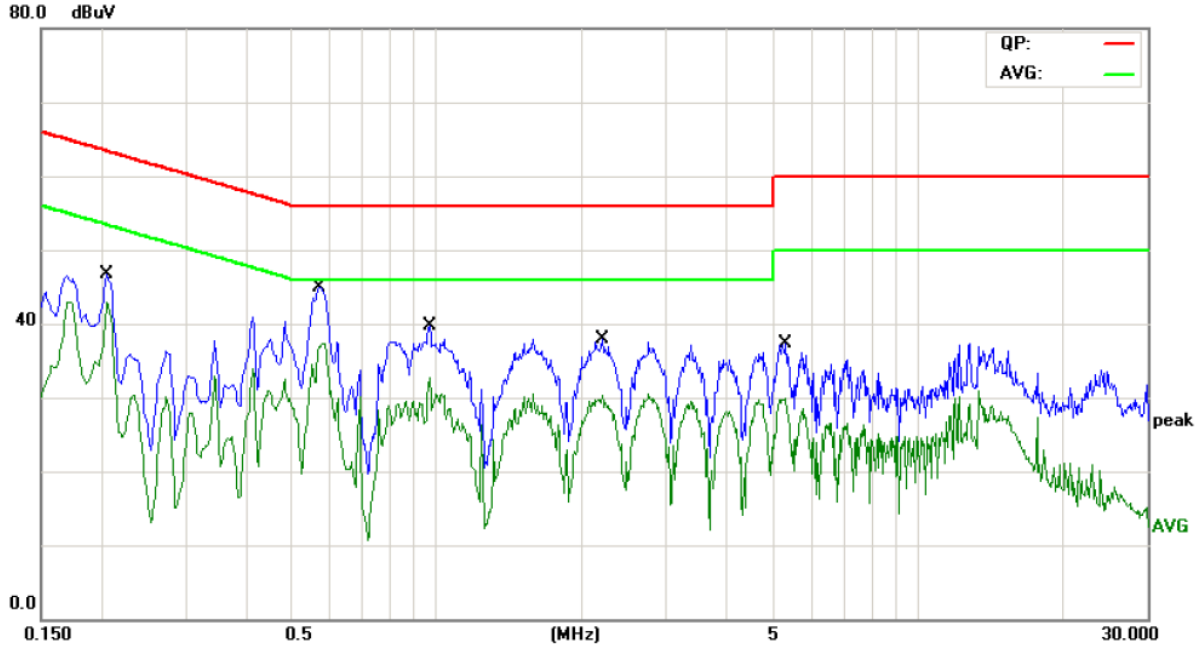
EUT:	Calling System	M/N: CQ5
Operating Condition:	TX Mode	
Test Site:	Shielded room	
Operator:	Angell	
Polarization:	Line	
Note	Tem:25℃ Hum:50%	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1700	33.96	10.67	44.63	64.96	-20.33	QP	
2		0.1700	32.08	10.67	42.75	54.96	-12.21	AVG	
3		0.5740	32.95	9.42	42.37	56.00	-13.63	QP	
4	*	0.5740	26.07	9.42	35.49	46.00	-10.51	AVG	
5		0.9660	27.48	9.33	36.81	56.00	-19.19	QP	
6		0.9660	21.76	9.33	31.09	46.00	-14.91	AVG	
7		1.5859	26.20	9.32	35.52	56.00	-20.48	QP	
8		1.5859	20.99	9.32	30.31	46.00	-15.69	AVG	
9		13.3579	28.40	10.00	38.40	60.00	-21.60	QP	
10		13.3579	24.45	10.00	34.45	50.00	-15.55	AVG	
11		23.9940	21.84	9.99	31.83	60.00	-28.17	QP	
12		23.9940	13.94	9.99	23.93	50.00	-26.07	AVG	

Conducted Emission Test Data

EUT:	Calling System	M/N: CQ5
Operating Condition:	TX Mode	
Test Site:	Shielded room	
Operator:	Angell	
Polarization:	Neutral	
Note	Tem:25℃ Hum:50%	



No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.2060	36.36	10.31	46.67	63.36	-16.69	QP	
2		0.2060	32.51	10.31	42.82	53.36	-10.54	AVG	
3		0.5700	35.42	9.45	44.87	56.00	-11.13	QP	
4	*	0.5700	27.39	9.45	36.84	46.00	-9.16	AVG	
5		0.9660	30.40	9.35	39.75	56.00	-16.25	QP	
6		0.9660	23.28	9.35	32.63	46.00	-13.37	AVG	
7		2.2020	28.55	9.37	37.92	56.00	-18.08	QP	
8		2.2020	20.89	9.37	30.26	46.00	-15.74	AVG	
9		5.3059	27.65	9.57	37.22	60.00	-22.78	QP	
10		5.3059	20.41	9.57	29.98	50.00	-20.02	AVG	

5. Radiated Emission Test

5.1. Test Standard and Limit

5.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 55032 Class B)

5.1.1. Test Limit

Radiated Disturbance Test Limit (Class B)

Frequency (MHz)	Limit (dBμV/m)
	Quasi-peak Level
30MHz~230MHz	40
230MHz~1000MHz	47
Remark: 1. The lower limit shall apply at the transition frequency. 2. The test distance is 3m.	

Limits Of Radiated Emission Measurement (Above 1000MHz)

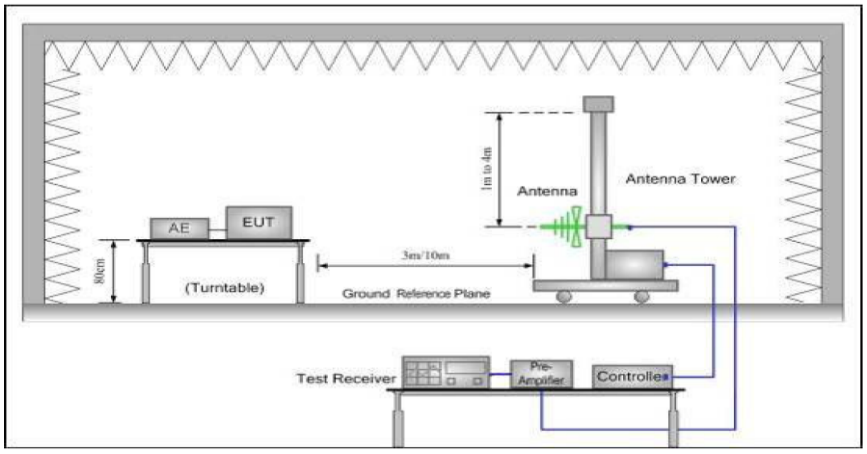
Frequency (MHz)	Class B (dBuV/m)	
	Peak	Average
1000 MHz -3000 MHz	70	50
3000 MHz -6000 MHz	74	54
Remark: 1. The lower limit applies at the transition frequency. 2. The test distance is 3m.		

Frequency Range Of Radiated Measurement

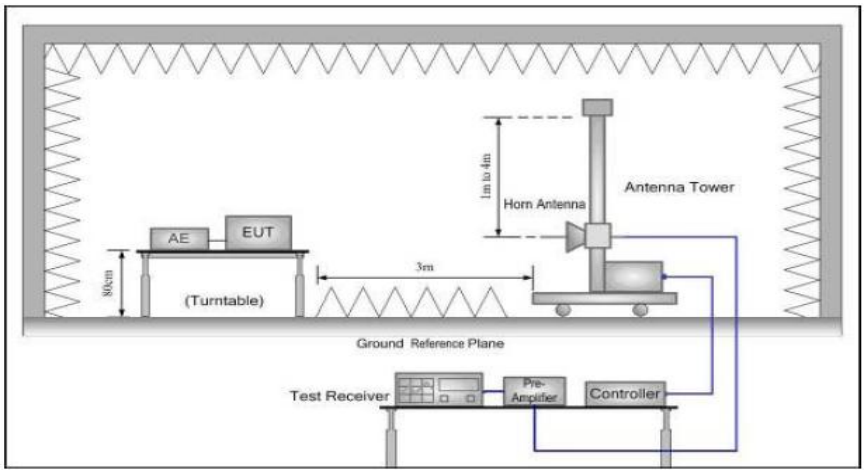
Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5th harmonic of the highest frequency or 6 GHz, whichever is lower

5.2. Test Setup

Below 1GHz



Above 1GHz



5.3. Test Procedure

The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3m. The table was rotated 360 degrees to determine the position of the highest radiation.

The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

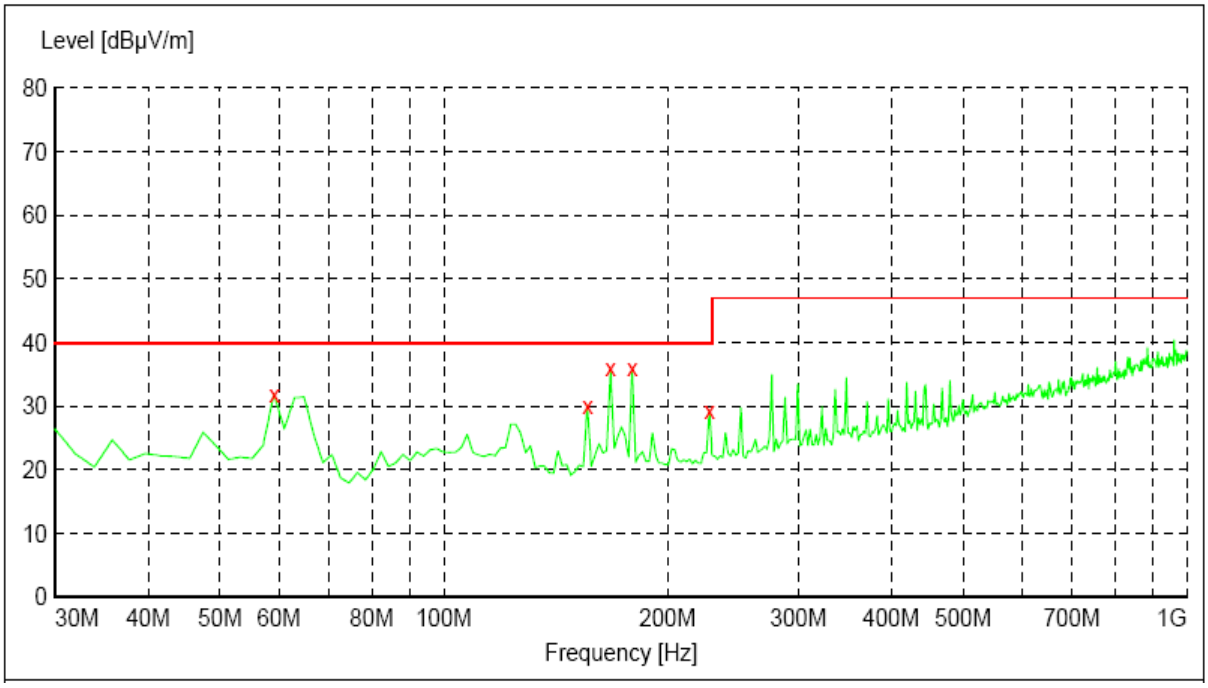
The initial step in collecting radiated emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range.

If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.

5.4. Test Data

Radiated Emission Test Data (Below 1 GHz)

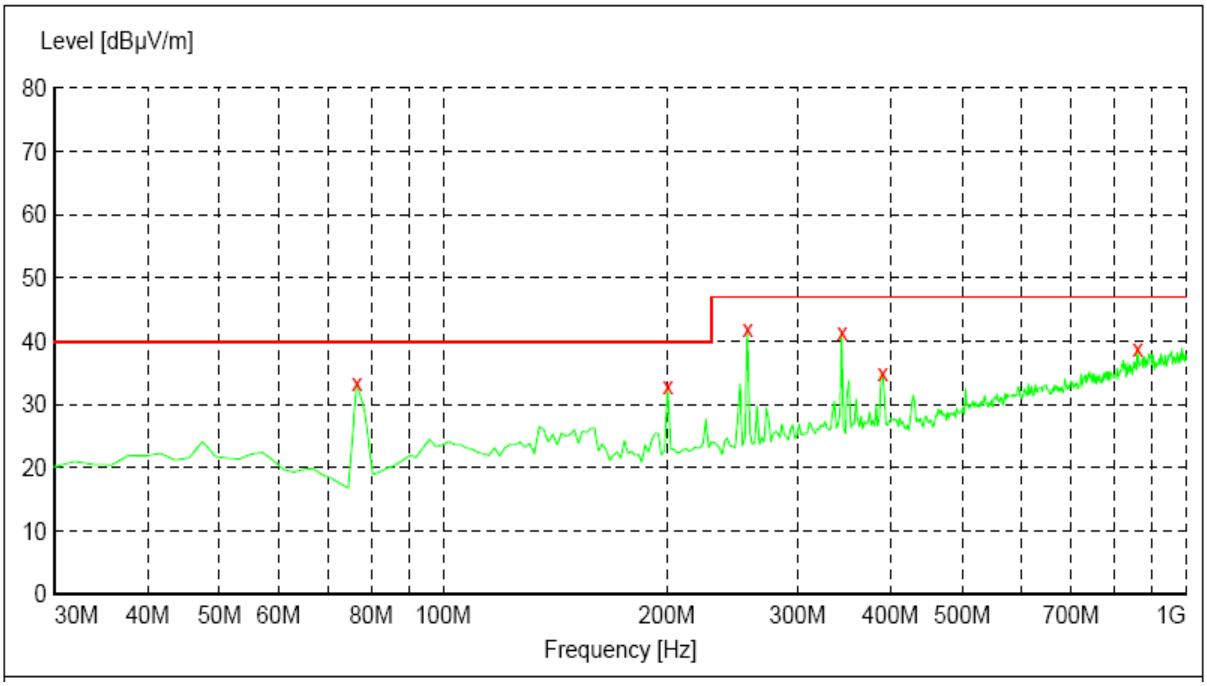
EUT:	Calling System	M/N: CQ5
Operating Condition:	TX Mode	
Test Site:	3m Chamber	
Operator:	Angell	
Polarization:	Vertical	
Note	Tem:25℃	Hum:50%



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
59.100000	32.00	14.6	40.0	8.0	---	100.0	0.00	VERTICAL
156.100000	30.20	13.6	40.0	9.8	---	100.0	0.00	VERTICAL
167.740000	35.90	14.2	40.0	4.1	---	100.0	0.00	VERTICAL
179.380000	35.90	15.0	40.0	4.1	---	100.0	0.00	VERTICAL
227.880000	29.30	16.5	40.0	10.7	---	100.0	0.00	VERTICAL

Radiated Emission Test Data (Below 1 GHz)

EUT:	Calling System	M/N: CQ5
Operating Condition:	TX Mode	
Test Site:	3m Chamber	
Operator:	Angell	
Polarization:	Horizontal	
Note	Tem:25℃ Hum:50%	



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
76.560000	33.50	12.0	40.0	6.5	---	100.0	0.00	HORIZONTAL
200.720000	32.80	16.2	40.0	7.2	---	100.0	0.00	HORIZONTAL
256.980000	41.90	17.3	47.0	5.1	---	100.0	0.00	HORIZONTAL
344.280000	41.50	20.3	47.0	5.5	---	100.0	0.00	HORIZONTAL
390.840000	35.00	21.2	47.0	12.0	---	100.0	0.00	HORIZONTAL
860.320000	39.00	30.5	47.0	8.0	---	100.0	0.00	HORIZONTAL

Radiated Emission Test Data (Above 1 GHz)

EUT:	Calling System	M/N: CQ5
Operating Condition:	TX Mode	
Test Site:	3m Chamber	
Operator:	Angell	
Polarization:	Vertical	
Note	Tem:25℃ Hum:50%	

No.	Frequency	Measurment	Limit	Margin	Detector	Note
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)		
1	1562.000	35.35	70	34.65	PEAK	/
2	1980.000	29.96	50	20.04	AVG	/

Radiated Emission Test Data (Above 1 GHz)

EUT:	Calling System	M/N: CQ5
Operating Condition:	TX Mode	
Test Site:	3m Chamber	
Operator:	Angell	
Test Specification:	AC 230V/50Hz	
Polarization:	Horizontal	
Note	Tem:25℃ Hum:50%	

No.	Frequency	Measurment	Limit	Margin	Detector	Note
	(MHz)	(dBuV/m)	(dBuV/m)	(dB)		
1	1562.000	39.84	70	30.16	PEAK	/
2	1980.000	34.53	50	15.47	AVG	/

6. Harmonic Current Emission Test

6.1. Test Standard and Limit

6.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-3-2:2006+A1:2009+A2:2009)

6.1.2. Limits

Harmonic Current Test Limit (Class A)

Harmonic order (n)	Maximum permissible harmonic current (A)
Odd harmonics	
3	2.30
5	1.14
7	0.77
9	0.40
11	0.33
13	0.21
15≤n≤39	0.15×15/n
Even harmonics	
2	1.08
4	0.43
6	0.30
8≤n≤40	0.23×8/**n**

Harmonic Current Test Limit (Class D)

Harmonic order (n)	Maximum permissible harmonic current per watt (mA/W)	Maximum permissible harmonic current (A)
3	3.4	2.30
5	1.9	1.14
7	1.0	0.77
9	0.5	0.40
11	0.35	0.33
13≤n≤39 (**Odd harmonics only**)	3.85/n	0.15×15/n

6.2. Test Data

Test result: N/A

Remark: 1. There is no need for Harmonic test to be performed on the product (rated power is less than 75W) in accordance with EN 61000-3-2:2006+A1:2009+A2:2009.

2. For further details, please refer to clause 7, Note 1 of EN 61000-3-2 which states:
"For the following categories of equipment, limits are not specified in this standard:
NOTE 1 Limits may be defined in a future amendment or revision of the standard."

7. Voltage Fluctuation and Flicker Test

7.1. Test Standard and Limit

7.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-3-3)

7.1.2. Limits

Voltage Fluctuation and Flicker Test Limit

Test Items	Limits
Pst	1.0
dc	3.3%
dmax	4.0%
dt	Not exceed 3.3% for 500ms

7.2. Test Data

Test result: N/A

Remark: 1. There is no need for Flicker test to be performed on the product (rated power is less than 75W) in accordance with EN 61000-3-3:2013.

2. For further details, please refer to clause 6.1 of EN 61000-3-3 which states:
"Tests need not be made on equipment which is unlikely to produce significant voltage fluctuations or flicker.
It may be necessary to determine, by examination of the circuit diagram and the specification of the equipment and by a short function test, whether significant voltage fluctuations or flicker are likely to be produced."

8. Electrostatic Discharge Immunity Test

8.1. Test Requirements

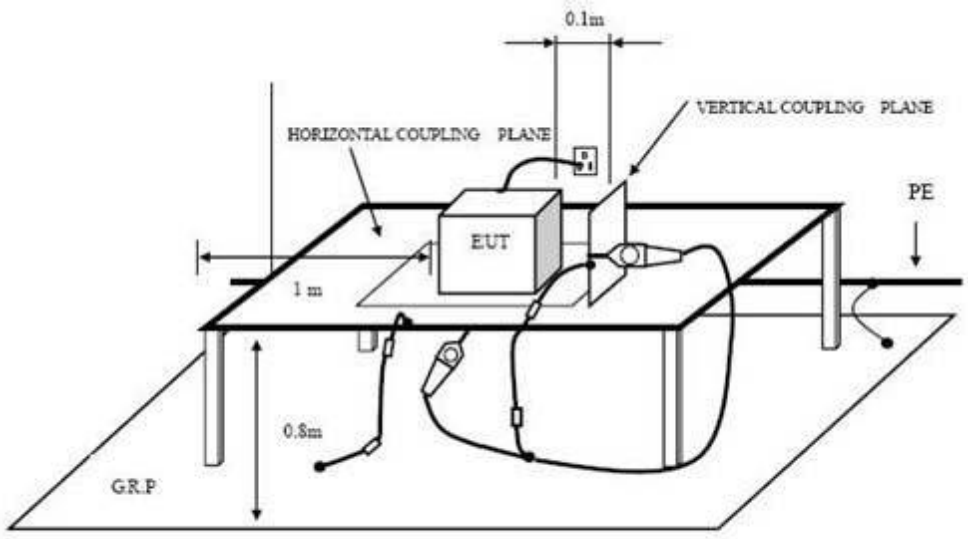
8.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-4-2)

8.1.2. Test Level

Level	Test Voltage Contact Discharge (kV)	Test Voltage Air Discharge (kV)
1	±2	±2
2	±4	±4
3	±6	±8
4	±8	±15
X	Special	Special

8.2. Test Setup



INDIRECT DISCHARGE SETUP

8.3. Test Procedure

8.3.1. Contact discharges to the conductive surfaces and to coupling planes:

The EUT was exposed to at least 200 discharges, 100 each at negative and positive polarity, at a minimum of four test points (a minimum of 50 discharges at each point). One of the test points was subjected to at least 50 indirect discharges (contact) to the centre of the front edge of the horizontal coupling plane. The remaining three test points shall each receive at least 50 direct contact discharges. If no direct contact test points were available, then at least 200 indirect discharges were applied in the indirect mode. Tests were performed at a maximum repetition rate of one discharge

per second.

Air discharge at slots and apertures, and insulating surfaces:

On those parts of the EUT where it was not possible to perform contact discharge testing, the equipment was investigated to identify user accessible points where breakdown may occur. This investigation was restricted to those areas normally handled by the user. A minimum of 10 single air discharges were applied to the selected test point for each such area.

The application of electrostatic discharges to the contacts of open connectors was not required by this standard.

8.3.2. The EUT was put on a 0.8m high wooden table for table-top equipment or 0.1m high for floor standing equipment standing on the ground reference plane(GRP).

8.3.3. A horizontal coupling plane(HCP) 1.6m by 0.8m in size was placed on the table, and the EUT with its cables were isolated from the HCP by an insulating support thick than 0.5mm. The VCP 0.5m by 0.5m in size & HCP were constructed from the same material type & thinkmess as that of the GRP, and connected to the GRP via a 470kΩ resistor at each end. The distance between EUT and any of the other metallic surface excepted the GRP, HCP and VCP was greater than 1m.

8.3.4. During the contact discharges, the tip of the discharge electrode was touch the EUT before the discharge switch is operated. During the air discharges, the round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT.

8.3.5. After each discharge, the ESD generator was removed from the EUT, the generator was then retriggered for a new single discharge. For ungrounded product, a discharge cable with two resistances were used after each discharge to remove remnant electrostatic voltage. 10 times of each polarity single discharge were applied to HCP and VCP.

8.4. Test Data

Please refer to the following pages.

Electrostatic Discharge Test Results

EUT	:	Calling System	M/N	:	CQ5
Temperature	:	22℃	Humidity	:	50%
Power supply	:	DC 3.7V	Test Mode	:	TX Mode

Required Criterion: B Actual performance: A

Air Discharge: ±2kV, ±4kV, ±8kV Contact Discharge: ±2kV, ±4kV

Location	**Kind** A-Air Discharge C-Contact Discharge	**Result**
Nonconductive Enclosure	A	PASS
Slot of the EUT	A	PASS
Button	A	PASS
Conductive Enclosure	C	PASS
HCP	C	PASS
VCP of front	C	PASS
VCP of rear	C	PASS
VCP of left	C	PASS
VCP of right	C	PASS

Remark: N/A

9. Radiated Electromagnetic Field Immunity Test

9.1. Test Requirements

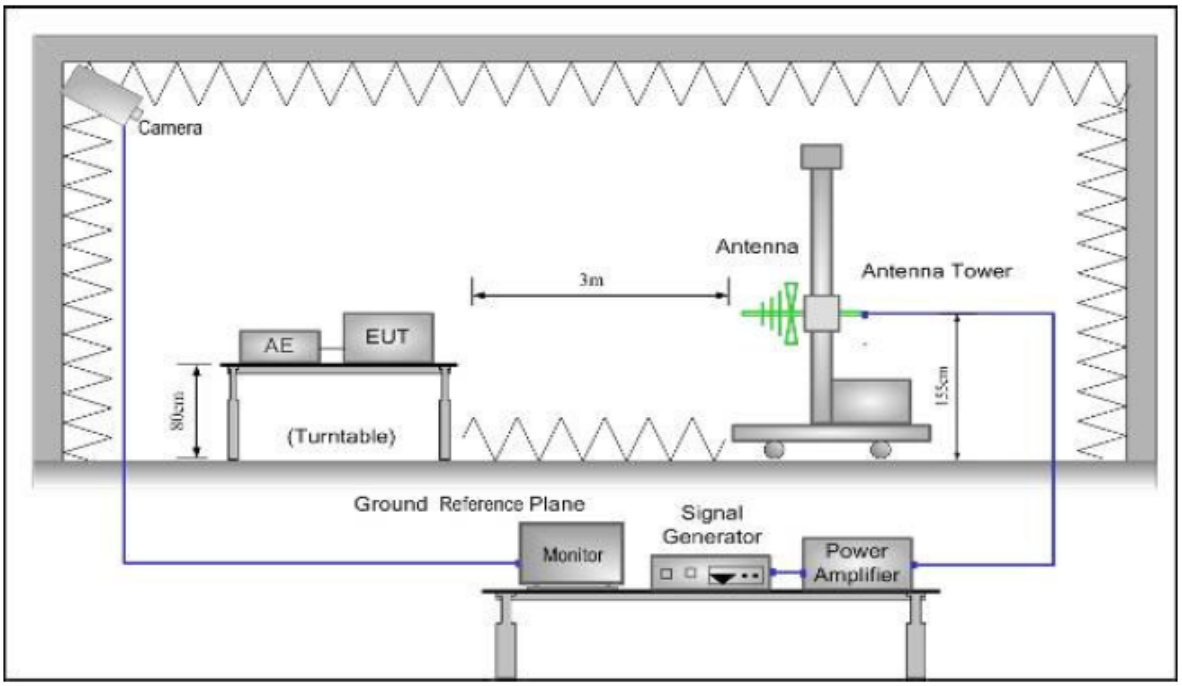
9.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1(EN 61000-4-3)

9.1.2. Test Level

Level	Field Strength V/m
1	1
2	3
3	10
X	Special

9.2. Test Setup



9.3. Test Procedure

The EUT are placed on a table, which is 0.8 meter high above the ground. The EUT is set 3 meters away from the transmitting antenna, which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna is set on test. Each of the four sides of the EUT must be faced this transmitting antenna and measured individually.

In order to judge the EUT performance, a camera is used to monitor its screen.

All the scanning conditions are as following:

Condition of Test	Remark
Fielded strength	3V/m (Severity Level 2)
Radiated signal	Modulated
Scanning frequency	80-1000MHz
Sweep time of radiated	0.0015 Decade/s
Dwell time	1 Sec.

9.4. Test Data

Radiated Electromagnetic Field Immunity Test Results

EUT	:	Calling System	M/N	:	CQ5
Temperature	:	22℃	Humidity	:	50%
Power supply	:	AC 230V/50Hz	Test Mode	:	TX Mode

Required Criterion: A Actual performance: A

Modulation: Unmodulated

Pulse: AM 1KHz 80%

	Frequency Rang 1		Frequency Rang 2	
	80~1000MHz		1400~2700MHz	
	Horizontal	Vertical	Horizontal	Vertical
Front	PASS	PASS	PASS	PASS
Right	PASS	PASS	PASS	PASS
Rear	PASS	PASS	PASS	PASS
Left	PASS	PASS	PASS	PASS

Remark: N/A

10. Electrical Fast Transient/Burst Test

10.1. Test Requirements

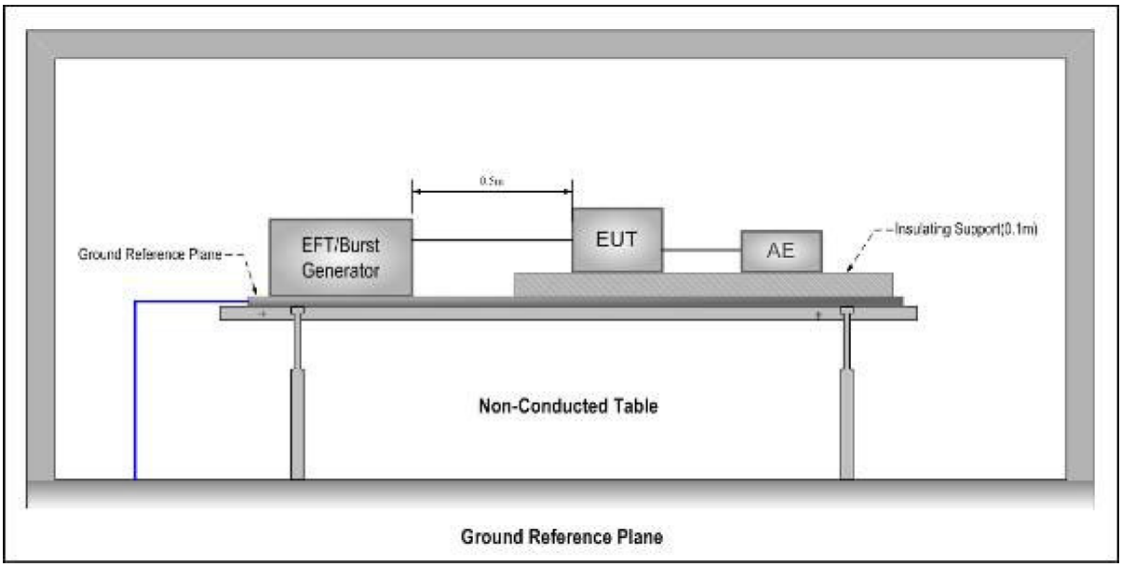
10.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-4-4)

10.1.2. Level

Open Circuit Output Test Voltage ±10%		
Level	**On Switching Adapter Lines**	**On I/O (Input/Output) Signal data and control lines**
1	0.5 KV	0.25 KV
2	1 KV	0.5 KV
3	2 KV	1 KV
4	4 KV	2 KV
X	Special	Special

10.2. Test Setup



10.3. Test Procedure

10.3.1 The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.

10.3.2 The GRP shall project beyond the EUT and the clamp by at least 0.1m on all sides. The distance between the EUT and any other of the metallic surface except the GRP was greater than 0.5m. All cables to the EUT was placed on the insulation support 0.1m above GRP. Cables not subject to EFT was routed as far as possible from cable under test to minimize the coupling between the cables.

10.3.3 The length of signal and power cable between the EUT and EFT generator was 0.5m. If the cable is a non-detachable supply cable more than 0.5m, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1m above the GRP. The EUT was conducted the below specified level voltage test for line to neutral or line to neutral to earth, 120 seconds duration.

10.4. Test Data

Electrical Fast Transient/Burst Test Results

EUT : Calling System		M/N : CQ5	
Temperature : 22℃		Humidity : 50%	
Power supply : DC 3.7V		Test Mode : TX Mode	
Required Criterion: B		Actual performance: A	
Line : ☒ AC Mains Coupling : ☒ Direct			
Line : ☐ Signal ☐ I/O Cable Coupling : ☐ Capacitive			
Line	Voltage(kV)	Result(+)	Result(-)
L	1.0	Pass	Pass
N	1.0	Pass	Pass
L-N	1.0	Pass	Pass
PE	/	/	/
L-PE	/	/	/
N-PE	/	/	/
L-N-PE	/	/	/

11. Surge Immunity Test

11.1. Test Requirements

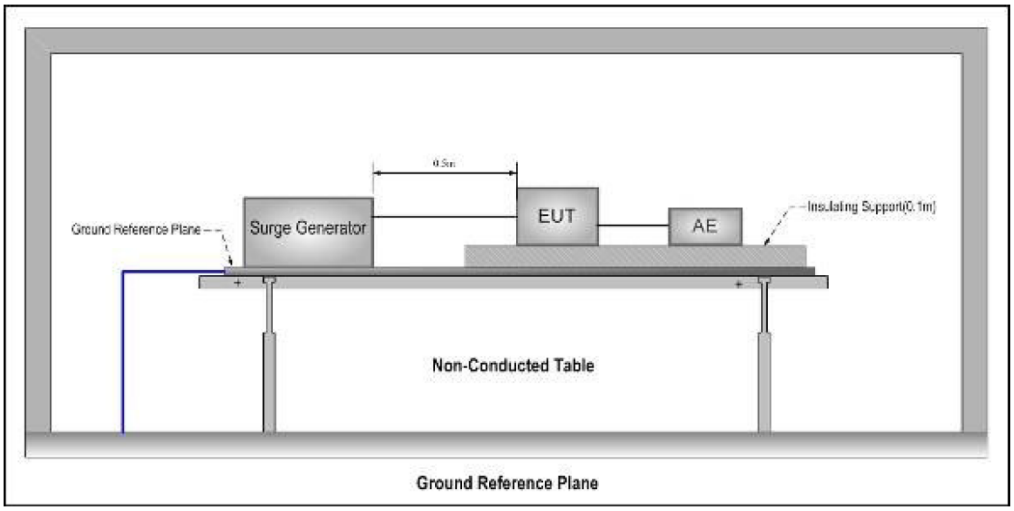
11.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-4-5)

11.1.2. Level

Severity Level	Open-Circuit Test Voltage kV
1	1.5
2	1.0
3	1.0
4	4.0
*	Special

11.2. Test Setup



11.3. Test Procedure

11.3.1 The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.

11.3.2 The 1,2/50 µs surge was to be applied to the EUT power supply terminals via the capacitive coupling network .Decoupling networks were 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 so that the specified wave may be applied on the lines under test.

11.3.3 The power cord between the EUT and the coupling/decoupling network was not exceed 2 m in length. The interconnection line between the EUT and the coupling/ decoupling network shall not exceed 2 m in length.

11.3.4 The EUT was conducted 1kV test voltage for line to line and line to neutral and conducted 2kV test voltage for line to earth and neutral to earth, five positive pulses and five negative pulses each at 0°, 90°, 180° and 270° for a.c. power ports and five positive pulses and five negative surge pulses for d.c. power ports. The test levels were applied on the EUT with a 2Ω generator source impedance for power supply terminals and 40Ω output impedance for interconnection lines. The tests were done at repetition rate 1 per minute.

11.3.5 Record the EUT operating situation during compliance test and decide the EUT immunity criterion for above each test.

11.4. Test Data

Please refer to the following pages.

Surge Immunity Test Results

EUT	:	Calling System	M/N	:	CQ5
Temperature	:	22℃	Humidity	:	50%
Power supply	:	DC 3.7V	Test Mode	:	TX Mode

Required Criterion: B Actual performance: A

Injected Line	Voltage(kV)	Phase	Results	
			(+)	(-)
L-N	1.0	0°	Pass	Pass
		90°	Pass	Pass
		180°	Pass	Pass
		270°	Pass	Pass
L-PE	2.0	0°	/	/
		90°	/	/
		180°	/	/
		270°	/	/
N-PE	2.0	0°	/	/
		90°	/	/
		180°	/	/
		270°	/	/
L-N-PE	2.0	0°	/	/
		90°	/	/
		180°	/	/
		270°	/	/

12. Conducted Immunity Test

12.1. Test Requirements

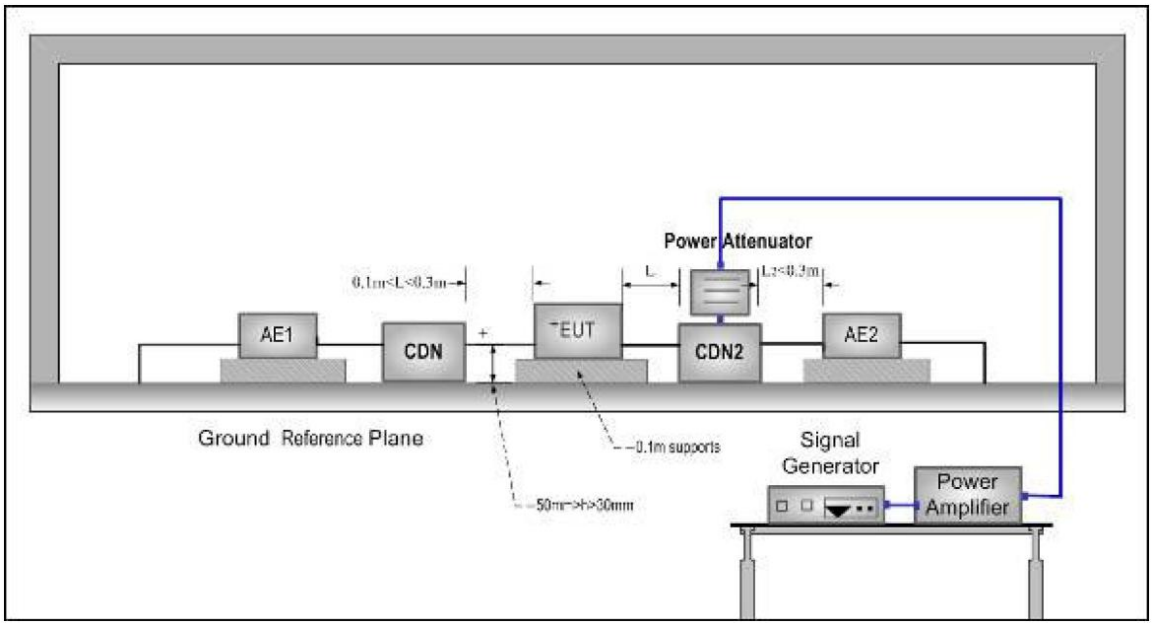
12.1.1. Test Standard

Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-4-6)

12.1.2. Level

Level	Voltage Level (e.m.f.) V
1	1
2	3
3	10
X	Special

12.2. Test Setup



12.3. Test Procedure

12.3.1 The EUT was placed on an insulating support of 0.1m height above a ground reference Plane, arranged and connected to satisfy its functional requirement. All cables exiting the EUT was supported at a height of at least 30 mm above the ground reference plane.

12.3.2 The coupling and decoupling devices were required, they were located between 0,1 m and 0,3 m from the EUT. This distance was to be measured horizontally from the projection of the EUT on to the ground reference plane to the coupling and decoupling device.

12.3.3 Each AE, used with clamp injection, shall be placed on an insulating support 0,1 m above the ground reference plane. A decoupling network shall be installed on each cable between the EUT and AE

except the cable under test. All cables connected to each AE, other than those being connected to the EUT, shall be provided with decoupling networks. The decoupling networks connected to each AE (except those on cables between the EUT and AE) shall be applied no further than 0,3 m from the AE. The cable(s) between the AE and the decoupling network (s) or in between the AE and the injection clamp shall not be bundled nor wrapped and shall be kept between 30 mm and 50 mm above the ground reference plane

12.3.4 The frequency range was swept from 150 kHz to 80 MHz, using the signal levels established during the setting process, and with the disturbance signal 80 % amplitude modulated with a 1 kHz sine wave, pausing to adjust the RF signal level or to change coupling devices as necessary. Where the frequency was swept incrementally, the step size was not exceed 1 % of the preceding frequency value. The dwell time of the amplitude modulated carrier at each frequency was not less than the time necessary for the EUT to be exercised and to respond, and was not less than 0,5 s.

12.4. Test Data

Injected Currents Susceptibility Test Results

EUT	:	Calling System	M/N	:	CQ5
Temperature	:	22℃	Humidity	:	50%
Power supply	:	DC 3.7V	Test Mode	:	TX Mode

Required Criterion: A Actual performance: A

Frequency Range (MHz)	Injected Position	Voltage Level (e.m.f.)	Result
0.15 ~ 80	AC Mains	3V(rms), Unmodulated	PASS
0.15 ~ 80	DC Mains	3V(rms), Unmodulated	/
0.15 ~ 80	Signal Line	3V(rms), Unmodulated	/

13. Voltage Dips and Interruptions Immunity Test

13.1. Test Requirements

13.1.1. Test Standard

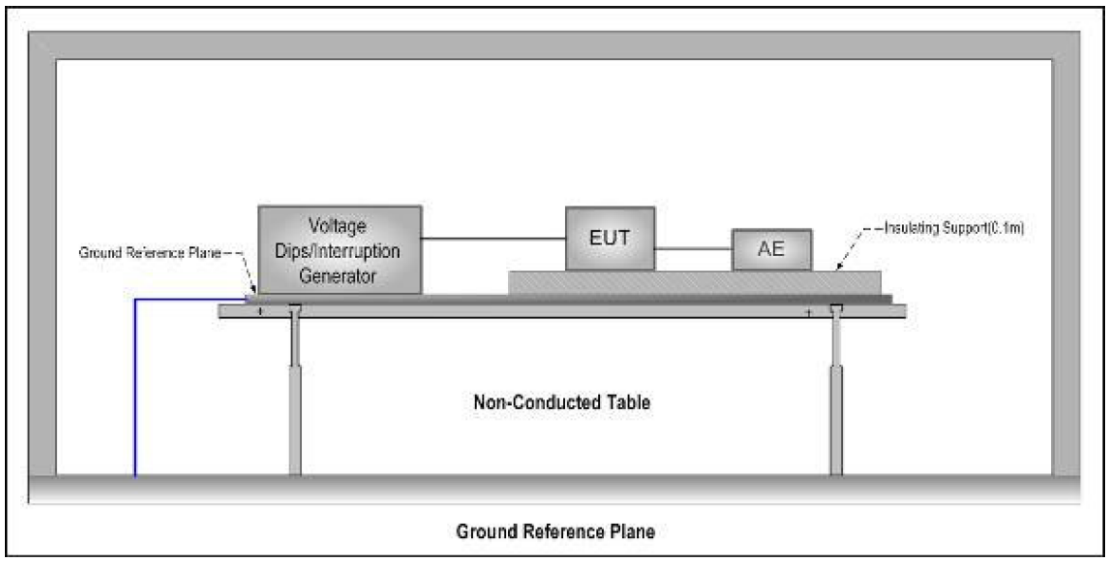
Final draft ETSI EN 301 489-3 V2.1.1 (EN 61000-4-11)

13.1.2. Level

Test Level for Voltage Dips and Interruptions

Test Level %UT	Voltage dip and short interruptions %UT	Duration (in period)
0	100	250
0	100	0.5
70	30	25
40	60	5

13.2. Test Setup



13.3. Test Procedure

13.3.1 The EUT was placed on a ground reference plane(GRP) insulated by an insulating support 0,1 m thick and the GRP was placed on a 0.8m high wooden table for table-top equipment. For floor standing equipment, the EUT was placed on a 0.1m high wooden support above the GRP.

13.3.2 The test was performed with the EUT connected to the test generator with the shortest power supply cable as specified by the EUT manufacturer.

13.3.3 The EUT was tested for each selected combination of test level and duration with a sequence of three dips /interruptions with intervals of 10 s minimum. Each representative mode of operation was tested.

For EUT with more than one power cord, each power cord was tested individually.

13.4. Test Data

Voltage Dips and Interruptions Test Results

EUT	:	Calling System	M/N	:	CQ5
Temperature	:	22℃	Humidity	:	50%
Power supply	:	DC 3.7V	Test Mode	:	TX Mode

Criterion: B&C

Test Level % U_T	Voltage Dips & Short Interruptions % U_T	Duration (in period)	Phase Angle	Result
0	100	250P	0°~360°	PASS
70	30	25P	0°~360°	PASS
0	100	0.5P	0°~360°	PASS

Remark: U_T is the rated voltage for the equipment.

14. Photographs - Constructional Details

Photo 1

Photo 2

Photo 3

Photo 4