

EMC TEST REPORT

For

Bluetooth headset

Test Model: Q2

Prepared for :

Address :

Prepared by : Shenzhen SIT Testing Technology Co., Ltd.

Address : 4th Floor, Co-talent Creative Park, Liuxian Road, Baoan 68
District, Shenzhen

Date of receipt of test sample : Apr. 18, 2017

Number of tested samples : 1

Serial number : Prototype

Date of Test : Apr. 18, 2017 - Apr. 26, 2017

Date of Report : Apr. 26, 2017



EMC TEST REPORT**ETSI EN 301 489-17 V2.2.1(2012-09)**

Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services

Report Reference No. : SIT170418058ER-2

Date Of Issue : Apr. 26, 2017

Testing Laboratory Name..... : Shenzhen SIT Testing Technology Co., Ltd.

**Address : 4th Floor, Co-talent Creative Park, Liuxian Road,
Baoan 68 District, Shenzhen**

**Testing Location/ Procedure..... : Full application of Harmonised standards ☒
Partial application of Harmonised standards ☐
Other standard testing method ☐**

Applicant's Name..... :

Address..... :

Test Specification

**Standard..... : ETSI EN 301 489-1 V1.9.2 (2011-09)
ETSI EN 301 489-17 V2.2.1 (2012-09)**

Test Report Form No. : SITEMC-1.0

TRF Originator : Shenzhen SIT Testing Technology Co., Ltd.

Master TRF..... : Dated 2016-04

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Test Item Description. : Bluetooth headset

Trade Mark : N/A

Model/ Type Reference : Q2

Ratings..... : Input: 5V \equiv 500mA

Result : Positive

Tested By:



Tom / Test Engineer

Reviewed By:



Leon Li / Project Engineer

Approved By:



Kevin Sun / Manager

EMC -- TEST REPORT**Test Report No. : SIT170418058ER-2**Apr. 26, 2017

Date of issue

Type / Model..... : Q2

EUT..... : Bluetooth headset

Applicant..... :

Address..... :

Telephone..... : /

Fax..... : /

Manufacturer..... :

Address..... :

Telephone..... : /

Fax..... : /

Test Result**Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	Apr. 26, 2017	Initial Issue	Kevin Sun

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1. GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

EUT	: Bluetooth headset
Test Model	: Q2
Power Supply	: Input: 5V \equiv 500mA
Hardware Version	: -----
Software Version	: -----
Bluetooth	:
Frequency Range	: 2.402-2.480GHz
Channel Number	: 79 channels for Bluetooth
Channel Spacing	: 1MHz
Modulation Type	: GFSK, 8DPSK, Pi/4 QPSK,
Bluetooth Version	: 4.2
Antenna Description	: PCB Antenna, 0.5dBi(Max.)

Objective

ETSI EN 301 489-1	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electro Magnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
ETSI EN 301 489-17	Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment Part 17: Specific conditions for Broadband Data Transmission Systems

The objective is to determine compliance with ETSI EN 301 489-1 V1.9.2 (2012-09), ETSI EN 301 489-17 V2.2.1 (2012-09).

Related Submittal(s)/Grant(s)

No Related Submittals.

Test Methodology

All measurements contained in this report were conducted with ETSI EN 301 489-1 V1.9.2 (2012-09), ETSI EN 301 489-17 V2.2.1 (2012-09).

Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
--	--	--	--	--

External I/O

I/O Port Description	Quantity	Cable
DC IN	1	N/A

Measurement Uncertainty

Item	MU	Remark
Uncertainty for Power point Conducted Emissions Test	2.42dB	
Uncertainty for Radiation Emission test in 3m chamber (30MHz to 1GHz)	3.54dB	Polarize: V
	4.1dB	Polarize: H
Uncertainty for Radiation Emission test in 3m chamber (1GHz to 25GHz)	2.08dB	Polarize: H
	2.56dB	Polarize: V
Uncertainty for radio frequency	0.01ppm	
Uncertainty for conducted RF Power	0.65dB	
Uncertainty for temperature	0.2°C	
Uncertainty for humidity	1%	
Uncertainty for DC and low frequency voltages	0.06%	

1.8. Description Of Test Modes

There was 3 test Modes. TM1 to TM3 were shown below:

TM1: Operate in Bluetooth mode.

TS6: Playing music mode. TM3:

Idle mode

***Note:

All test modes were tested, but we only recorded the worst case in this report.

2. SUMMARY OF TEST RESULTS

Rule	Description of Test Items	Result
§7.1	Reference to clauses EN 301 489-1 §8.4 AC mains power input/output ports	N/A
§7.1	Reference to clauses EN 301 489-1 §8.3 DC power input/output ports	N/A*
§7.1	Reference to clauses EN 301 489-1 §8.2 Enclosure of ancillary equipment measured on a stand alone basis	Compliant
§7.1	Reference to clauses EN 301 489-1 §8.5 Harmonic current emissions (AC mains input port)	N/A
§7.1	Reference to clauses EN 301 489-1 §8.6 Voltage fluctuations and flicker (AC mains input port)	N/A
§7.1	Reference to clauses EN 301 489-1 §8.7 Telecommunication ports	N/A*
§7.2	Reference to clauses EN 301 489-1 §9.3 Electrostatic discharge (EN 61000-4-2)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.2 Radio frequency electromagnetic field (80 MHz to 1 000 MHz and 1 400 MHz to 2 000 MHz)(EN 61000-4-3)	Compliant
§7.2	Reference to clauses EN 301 489-1 §9.4 Fast transients, common mode (EN 61000-4-4)	N/A
§7.2	Reference to clauses EN 301 489-1 §9.8 Surges (EN 61000-4-5)	N/A
§7.2	Reference to clauses EN 301 489-1 §9.5 Radio frequency, common mode (EN 61000-4-6)	N/A
§7.2	Reference to clauses EN 301 489-1 §9.6 Transients and surges in the vehicular environment (ISO 7637-2)	N/A*
§7.2	Reference to clauses EN 301 489-1 §9.7 Voltage dips and interruptions (EN 61000-4-11)	N/A

3. RADIATED DISTURBANCE

Radiated Emission Limit

ETSI 301 489-1 V1.9.2 (2011-09)/EN 55022 Class B

Limits for radiated disturbance Below 1GHz

FREQUENCY (MHz)	DISTANCE (Meters)	FIELD STRENGTHS LIMIT (dB μ V/m)
30 ~ 230	3	40
230 ~ 1000	3	47

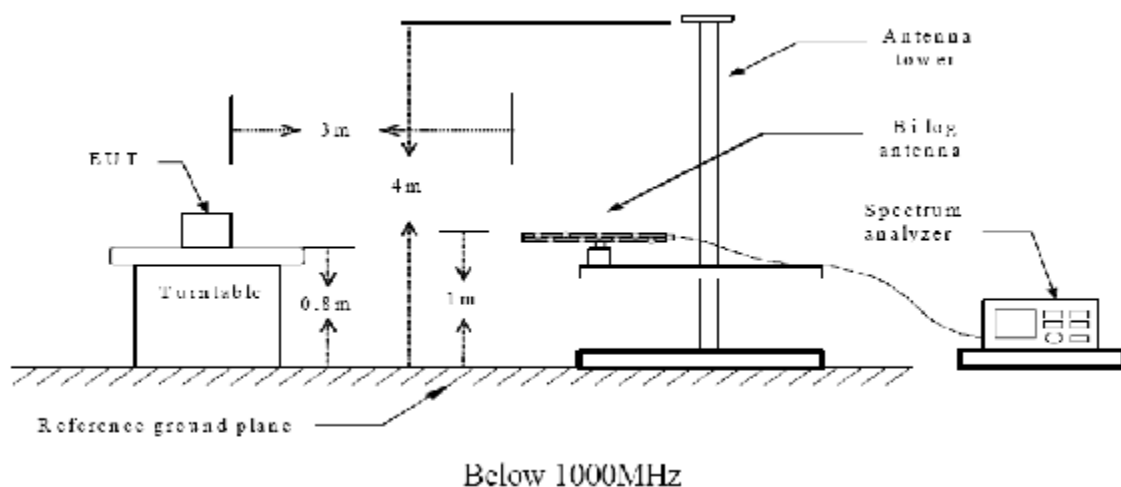
Note: (1) The smaller limit shall apply at the combination point between two frequency bands. (2) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the EUT.

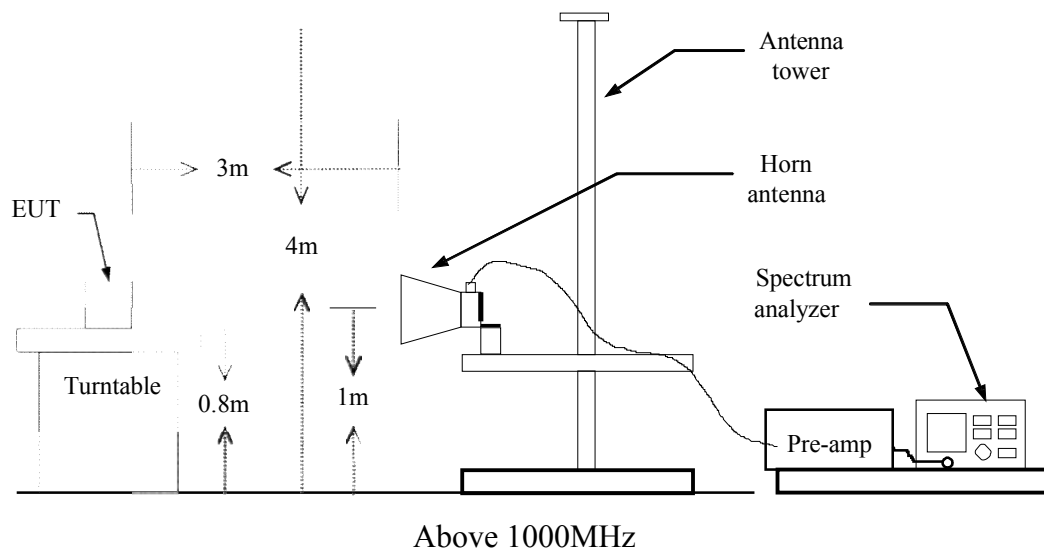
Limits for radiated disturbance Above 1GHz

FREQUENCY (MHz)	DISTANCE (Meters)	Average Limit (dB μ V/m)	Peak Limit (dB μ V/m)
1000-3000	3	50	70
3000-6000	3	54	74

Note: The lower limit applies at the transition frequency.

Test Configuration





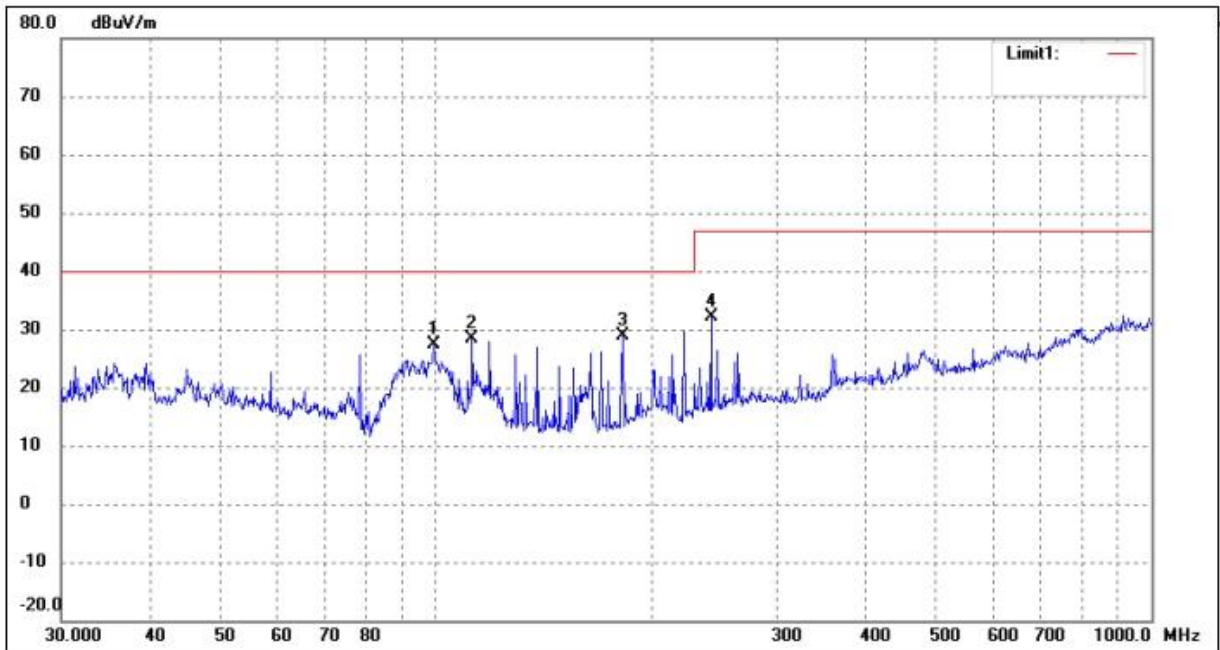
Test Procedure

Please refer to ETSI EN 301 489-1 Clause 8.2.3 and EN 55022 Clause 6 for the measurement methods.

Test Data

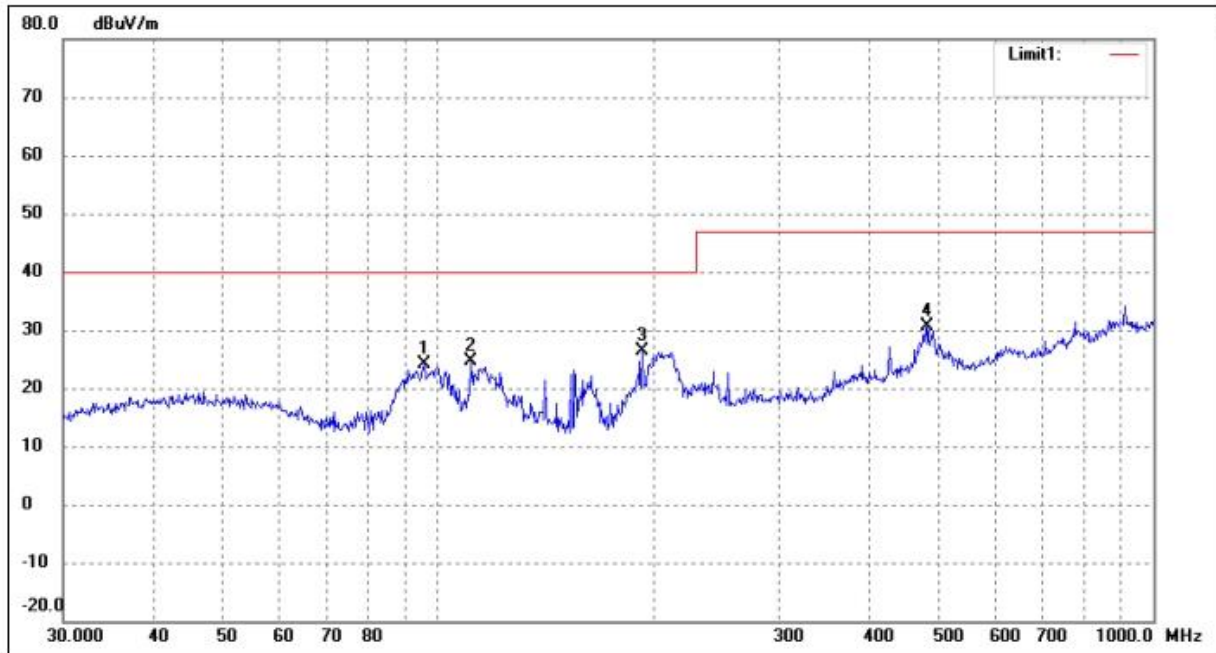
The worst test mode of the EUT was Mode 1, and its test data was showed as the follow:

Job No.:	RE	Polarization:	Vertical
Standard:	EN55032 ClassB RE	Power Source:	AC 230V/50Hz
Test item:	Radiation Test	Date:	17/01/13/
Temp.(C)/Hum.(%RH):	22(C)/54%RH	Time:	11/30/55
EUT:	Bluetooth headset	Test By:	
Model:	S6	Distance:	3m



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	99.5281	38.91	-11.50	27.41	40.00	-12.59	peak
2	112.5244	41.10	-12.84	28.26	40.00	-11.74	peak
3	182.5592	42.76	-13.88	28.88	40.00	-11.12	peak
4	242.5253	43.05	-10.84	32.21	47.00	-14.79	peak

Job No.:	RE	Polarization:	Horizontal
Standard:	EN55022 ClassB RE	Power Source:	AC 230V/50Hz
Test item:	Radiation Test	Date:	17/01/13/
Temp.(22(C)/54%RH	Time:	11/29/10
C)/Hum.(%RH):			
EUT:	Bluetooth headset	Test By:	
Model:	S6	Distance:	3m



No.	Frequency (MHz)	Reading (dBuV/m)	Correct dB/m	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
1	95.7622	36.38	-12.34	24.04	40.00	-15.96	peak
2	111.3468	37.38	-12.71	24.67	40.00	-15.33	peak
3	193.0945	39.00	-12.50	26.50	40.00	-13.50	peak
4	483.9094	36.23	-5.51	30.72	47.00	-16.28	peak

Test Mode: TM1(above 1GHz)	Tested by: Debe
Test voltage: DC 3.7V	Test Distance: 3m
Detector Function: Peak+AV	Test Results: Passed

Polarization	Frequency MHz	Emission Level dB μ V/m		Limits dB μ V/m		Margin dB μ V/m	
Horizontal	1399.7	56.42	37.06	70	50	-13.58	-12.94
	1856.3	55.52	35.41	70	50	-14.48	-14.59
	3223.5	56.66	35.66	74	54	-17.34	-18.34
	3960.0	58.45	36.66	74	54	-15.55	-17.34
	4454.6	60.87	40.22	74	54	-13.13	-13.78
	4865.4	63.74	34.89	74	54	-10.26	-19.11
Vertical	1381.4	54.87	35.98	70	50	-15.13	-14.02
	1881.2	58.57	33.46	70	50	-11.43	-16.54
	3232.0	57.69	39.56	74	54	-16.31	-14.44
	3726.6	64.00	37.18	74	54	-10.00	-16.82
	4447.9	60.23	39.00	74	54	-13.77	-15.00
	4857.6	61.67	36.73	74	54	-12.33	-17.27

1. Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
2. Measurements above show only up to 6 maximum emissions noted.
3. Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

4. GENERAL PERFORMANCE CRITERIA FOR IMMUNITY TEST

Performance criteria for Continuous phenomena applied to Transmitter (CT)

For equipment of type II or type III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence.

Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

Performance criteria for Transient phenomena applied to Transmitter (TT)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transmitter, tests shall be repeated with the EUT in standby mode to ensure that any unintentional transmission does not occur.

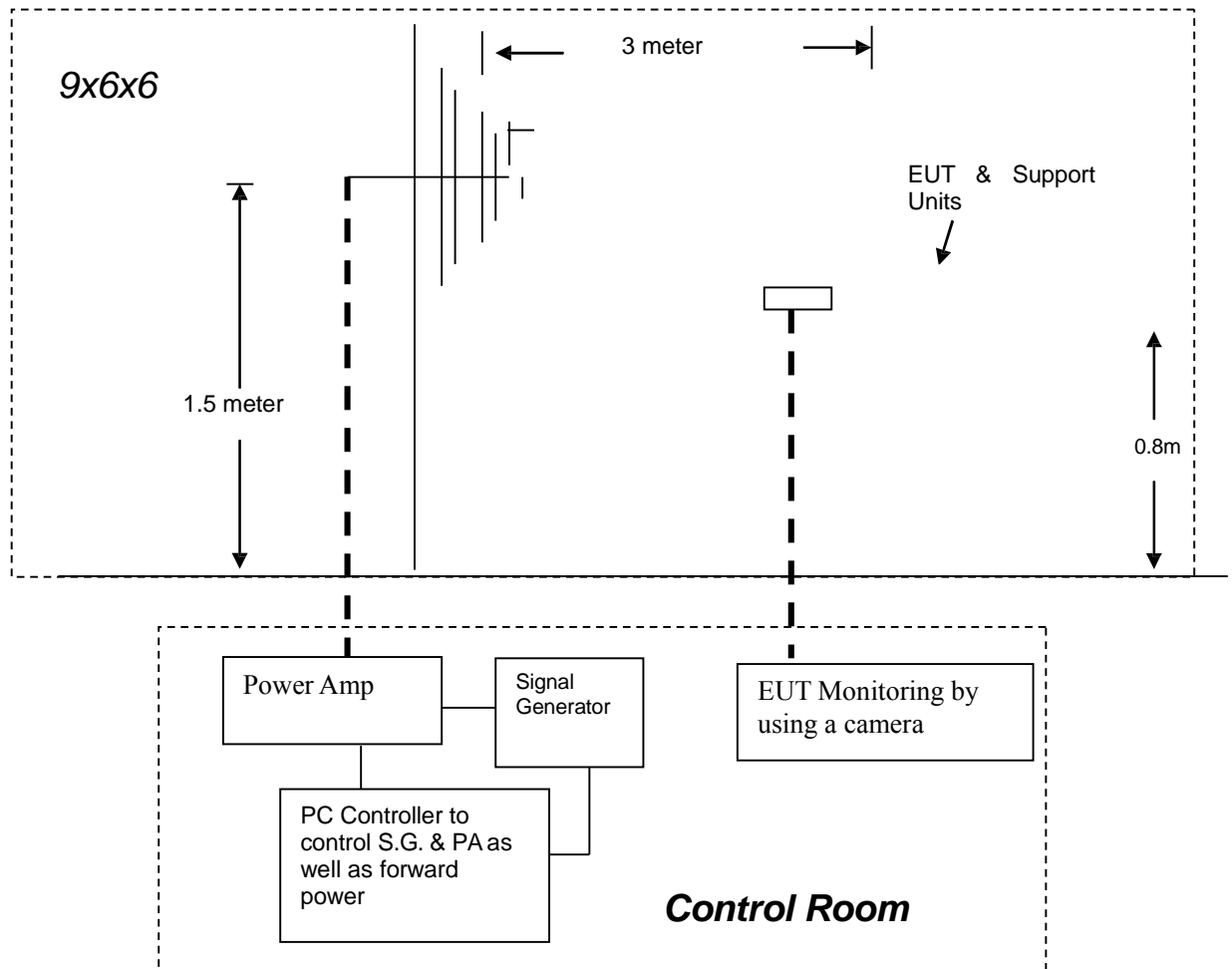
Performance criteria for Continuous phenomena applied to Receiver (CR)

For equipment of type II or III that requires a communication link that is maintained during the test, it shall be verified by appropriate means supplied by the manufacturer that the communication link is maintained during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Performance criteria for Transient phenomena applied to Receiver (TR)

For equipment of type II or type III that requires a communication link that is maintained during the test, this shall be verified by appropriate means supplied by the manufacturer during each individual exposure in the test sequence. Where the EUT is a transceiver, under no circumstances shall the transmitter operate unintentionally during the test.

Test Configuration



Test Standard

ETSI 301 489-1, ETSI 301 489-3, EN 301 489-7, EN 301 489-17& EN 301 489-24
(EN 61000-4-3: 2006+A1: 2008+A2: 2010)

Test level 2 at 3V / m.

Severity Level

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

Performance criterion: A

Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. EUT is set 3 meter away from the transmitting antenna which is mounted on an antenna tower. Both horizontal and vertical polarization of the antenna are set on test. Each of the four sides of EUT must be faced this transmitting antenna and measured individually. In order to judge the EUT performance, a CCD camera is used to monitor EUT screen. All the scanning conditions are as follows:

Condition of Test		Remarks
1.	Fielded Strength	3 V/m (Severity Level 2)
2.	Radiated Signal	Unmodulated
3.	Scanning Frequency	80 - 1000MHz & 1400 - 2700 MHz
4.	Dwell time of radiated	0.0015 decade/s
5.	Waiting Time	3 Sec.

Test Result

Bluetooth Test Result:

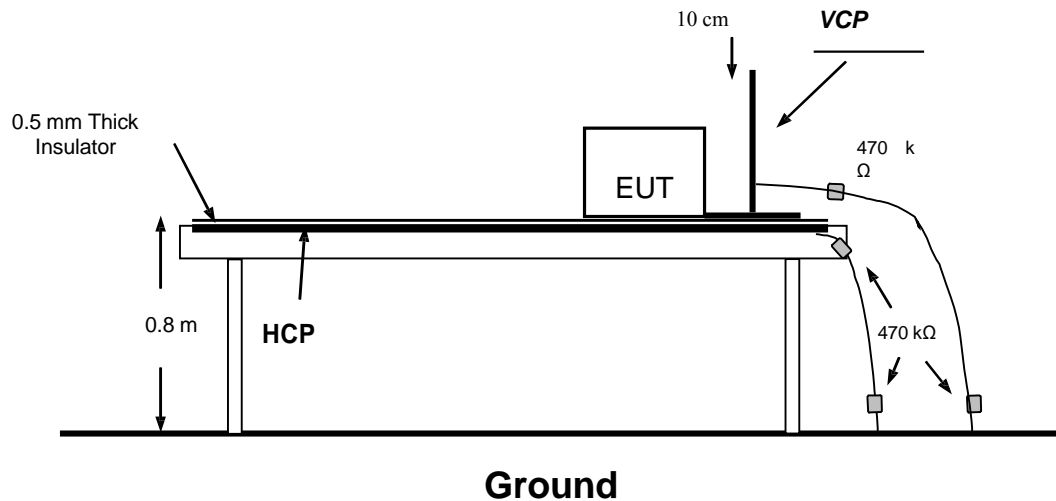
EUT Working Mode	Antenna Polarity	Frequency (MHz)	Field Strength (V/m)	Observation	Position	Conclusion
Operating Mode	Vertical	80-1000, 1400-2700	3	CT,CR	Front, Right, Left, Back	Pass
	Horizontal	80-1000, 1400-2700	3	CT,CR	Front, Right, Left, Back	Pass
Idle	Vertical	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass
	Horizontal	80-1000, 1400-2700	3	See Note	Front, Right, Left, Back	Pass

***Note: Unintentional transmission is not founded from the EUT.

6. ELECTROSTATIC DISCHARGE

Please refer to ETSI EN 301 489-1 and EN 61000-4-2.

Test Configuration



EN 61000-4-2 specifies that a tabletop EUT shall be placed on a non-conducting table which is 80 centimeters above a ground reference plane and that floor mounted equipment shall be placed on a insulating support approximately 10 centimeters above a ground plane. During the tests, the EUT is positioned over a ground reference plane in conformance with this requirement.

For tabletop equipment, a 1.5 by 1.0-meter metal sheet (HCP) is placed on the table and connected to the ground plane via a metal strap with two 470 k Ohms resistors in series. The EUT and attached cables are isolated from this metal sheet by 0.5-millimeter thick insulating material. A Vertical Coupling Plane (VCP) grounded on the ground plane through the same configuration as in the HCP is used.

Test Procedure

ETSI 301 489-1 V1.9.2 (2011-09)/ EN 61000-4-2: 2009

Test level 3 for Air Discharge at ± 8 kV

Test level 2 for Contact Discharge at ± 4 kV

Air Discharge

This test is done on a non-conductive surface. The round discharge tip of the discharge electrode shall be approached as fast as possible to touch the EUT. After each discharge, the discharge electrode shall be removed from the EUT. The generator is then re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. This procedure shall be repeated until all the air discharge completed.

Contact Discharge

All the procedure shall be same as Section 6.2.1. except that the tip of the discharge electrode shall touch the EUT before the discharge switch is operated.

Indirect Discharge For Horizontal Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied at the front edge of each HCP opposite the center point of each unit (if applicable) of the EUT and 0.1m from the front of the EUT. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

Indirect Discharge For Vertical Coupling Plane

At least 10 single discharges (in the most sensitive polarity) shall be applied to the center of one vertical edge of the coupling plane. The coupling plane, of dimensions 0.5m X 0.5m, is placed parallel to, and positioned at a distance of 0.1m from the EUT. Discharges shall be applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.

Test Data

PASS.

Electrostatic Discharge Test Results

Standard	<input checked="" type="radio"/> IEC 61000-4-2 <input checked="" type="radio"/> EN 61000-4-2		
Applicant			
EUT	Bluetooth headset	Temperature	24℃
M/N	Q2	Humidity	53%
Criterion	B	Pressure	1021mbar
Test Mode	TM1-TM3	Test Engineer	Debe

TEST RESULT OF BLUETOOTH

Test Voltage	Coupling	Observation	Result (Pass/Fail)
±2KV, ±4kV	Contact Discharge	TT, TR	Pass
±2KV, ±4kV, ±8kV	Air Discharge	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge HCP	TT, TR	Pass
±2KV, ±4kV	Indirect Discharge VCP	TT, TR	Pass

Note: The EUT performance complied with performance criteria for CT&CR to MS Function and there is no any degradation of performance and function.

7. PHOTOGRAPHS OF EUT



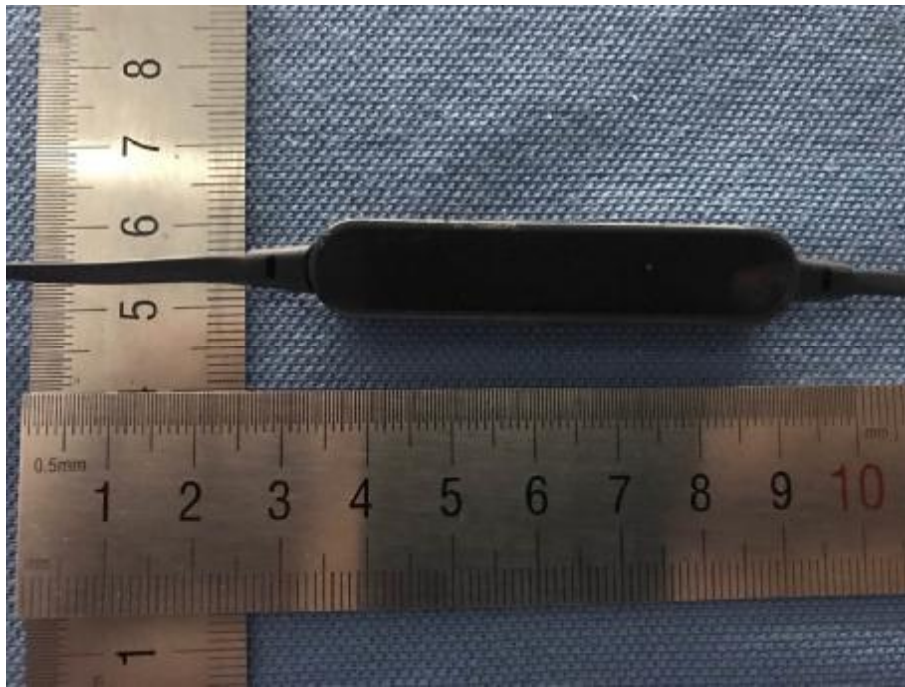


Fig.3



Fig.4

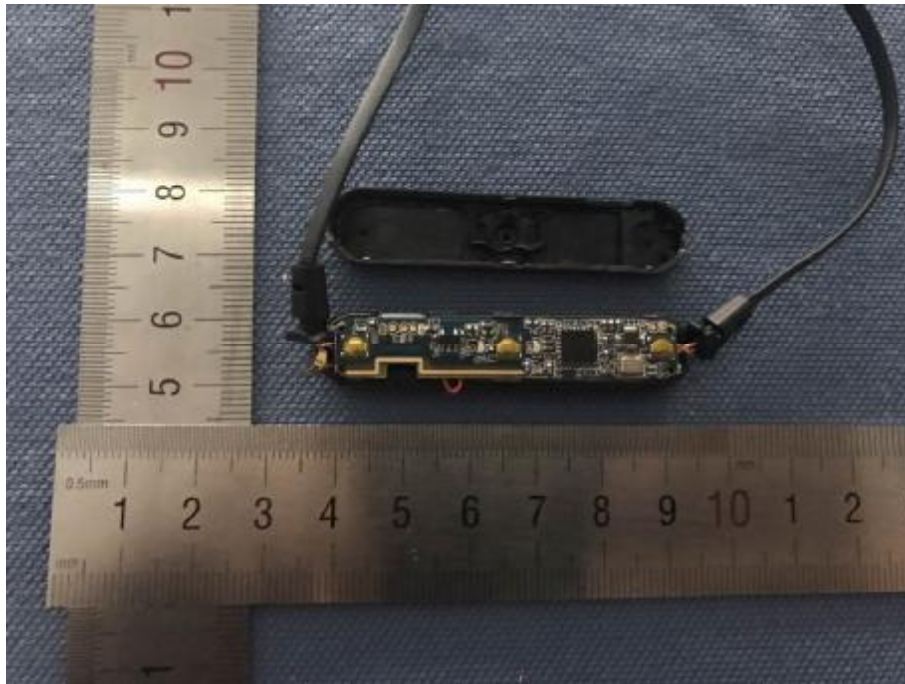


Fig.5

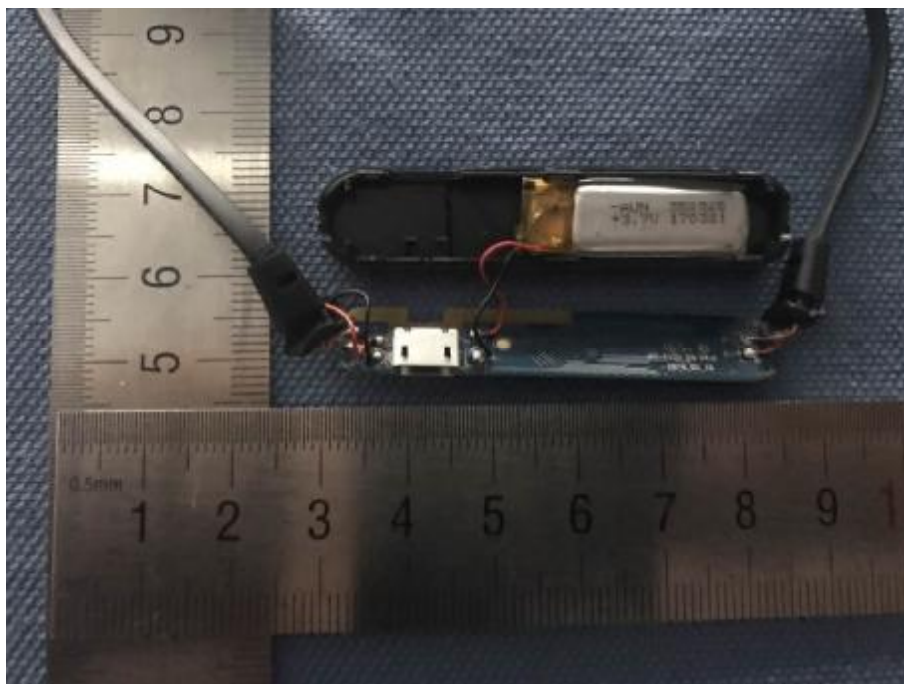


Fig.6

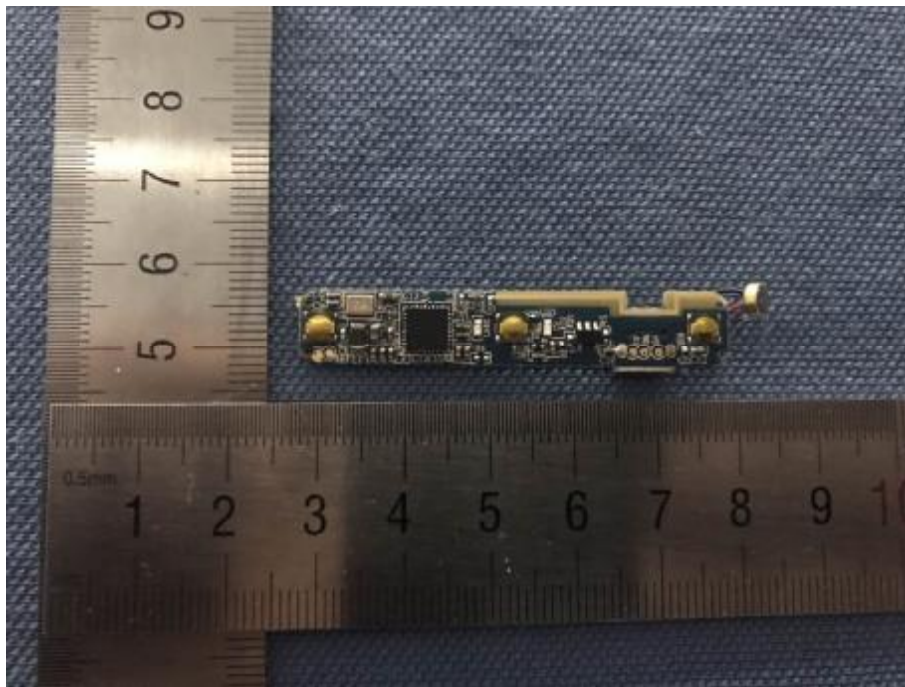


Fig.7

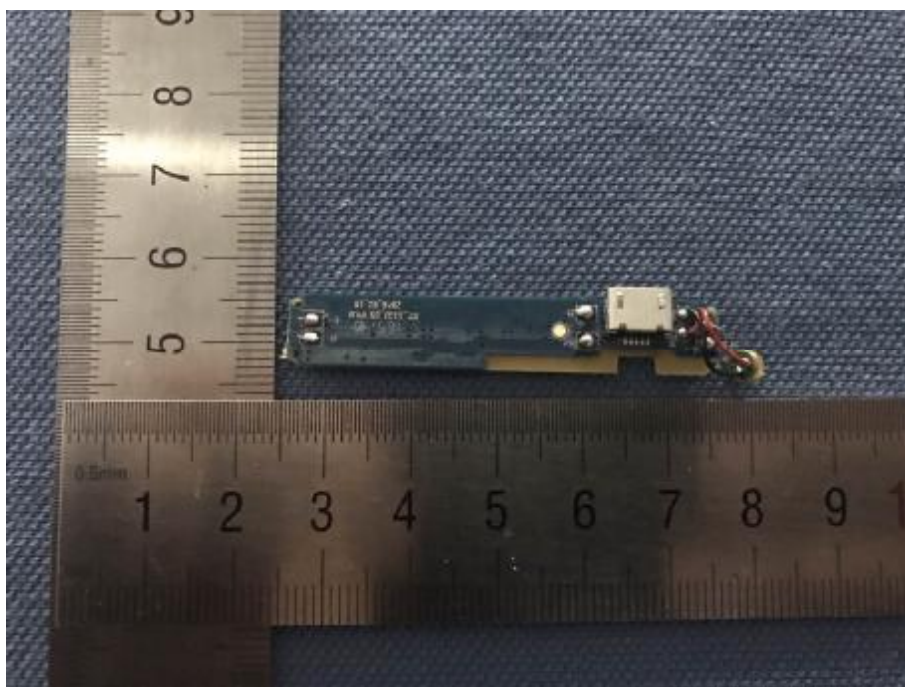


Fig.8

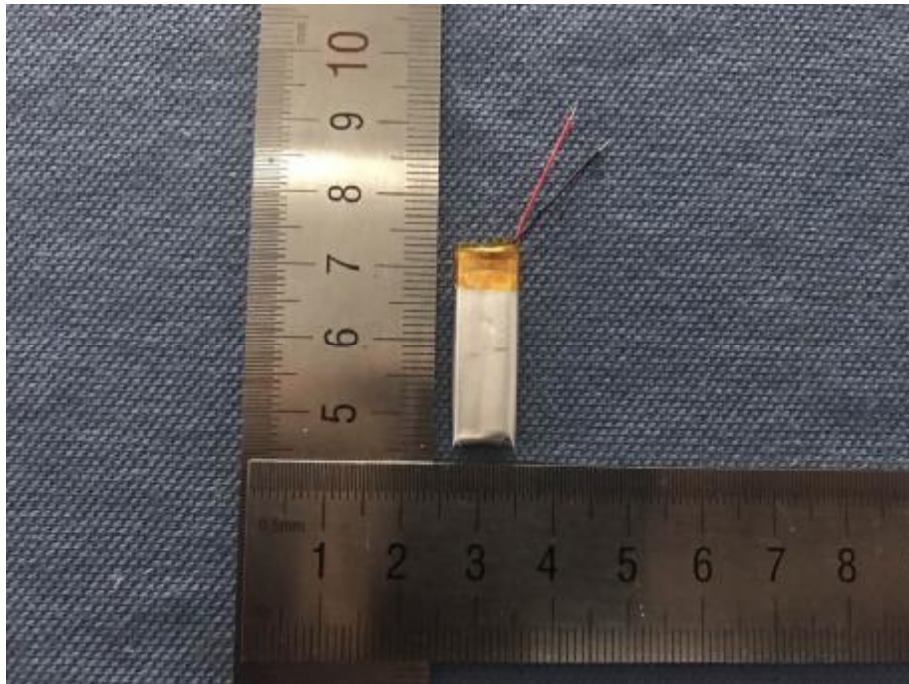


Fig.8

8. LIST OF MEASURING EQUIPMENT

Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Due Cal.
EMI Test Receiver	ROHDE & SCHWARZ	ESCI	101142	2015/06/18	2017/06/17
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	101840	2015/06/18	2017/06/17
Artificial Mains	ROHDE & SCHWARZ	ENV216	101288	2015/06/18	2017/06/17
EMI Test Software	AUDIX	E3	N/A	2015/06/18	2017/06/17
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2015/06/18	2017/06/17
Amplifier	SCHAFFNER	COA9231A	18667	2015/06/18	2017/06/17
Amplifier	Agilent	8449B	3008A02120	2015/06/16	2017/06/15
Amplifier	MITEQ	AMF-6F-260400	9121372	2015/06/16	2017/06/15
Spectrum Analyzer	Agilent	E4407B	MY41440292	2015/06/16	2017/06/15
MXA Signal Analyzer	Agilent	N9020A	MY50510140	2015/10/27	2017/10/26
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	2015/06/16	2017/06/15
Loop Antenna	R&S	HFH2-Z2	860004/001	2015/06/18	2017/06/17
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2015/06/10	2017/06/09
Horn Antenna	EMCO	3115	6741	2015/06/10	2017/06/09
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	2015/06/10	2017/06/09
RF Cable-R03m	Jye Bao	RG142	CB021	2015/06/18	2017/06/17
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2015/06/18	2017/06/17
Power Analyzer Test System	Voltech	PM6000	20000670053	2015/06/18	2017/06/17
Signal Generator	R&S	SMR40	10016	2015/06/16	2017/06/15
Amplifier	AR	500A100	17034	2015/06/18	2017/06/17
Amplifier	AR	100W/1000M1	17028	2015/06/18	2017/06/17
Isotropic Field Monitor	AR	FS6000	16829	2015/06/18	2017/06/17
Isotropic Field Probe	AR	FP2000	16755	2015/06/18	2017/06/17
Bi-conic Antenna	EMCO	3108	9507-2534	2015/06/18	2017/06/17
By-log-periodic Antenna	AR	AT1080	16812	2015/06/18	2017/06/17
EMS Test Software	ROHDE & SCHWARZ	ESK1	N/A	2015/06/18	2017/06/17
ESD Simulator	KIKUSUI	KC001311	KES4021	2015/06/18	2017/06/17
Electrical fast transient(EFT) generator	3CTEST	EFT-4021	EC0461044	2015/06/18	2017/06/17
Coupling Clamp	3CTEST	EFTC	EC0441098	2015/06/18	2017/06/17
Simulator	EMTEST	CWS500C	0900-12	2015/06/18	2017/06/17
CDN	EMTEST	CDN-S6	5100100100	2015/06/18	2017/06/17
CDN	EMTEST	CDN-M3	0900-11	2015/06/18	2017/06/17
Injection Clamp	EMTEST	F-2031-23MM	368	2015/06/18	2017/06/17
Attenuator	EMTEST	ATT6	0010222A	2015/06/18	2017/06/17
Surge test system	3CTEST	EC0171014	VDG-1105G	2015/06/18	2017/06/17
Coupling/decoupling network	3CTEST	ECS5591033	SGN-5010G	2015/06/18	2017/06/17
Voltage dips and up generator	3CTEST	VDG-1105G	EC0171014	2015/06/18	2017/06/17
Audio Analyzer	R&S	UPL16	/	2015/06/18	2017/06/17
Universal Radio Communication Tester	ROHDE & SCHWARZ	CMU200	112012	2015/06/18	2017/06/17

-----THE END OF TEST REPORT-----