

Anhui Huami Information Technology Co., Ltd.

CE TEST REPORT

SCOPE OF WORK:

Article 3.1b of RE directive (2014/53/EU) – EMC report

Model:

XMSH15HM

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Summary

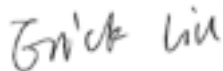
The equipment complies with the requirements according to the following standard(s) or Specification:

EN 301 489-1 V2.2.3: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU

EN 301 489-17 V3.2.4: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU

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Revision History

Report No.	Version	Description	Issued Date
201202629SHA-003	Rev. 01	Initial issue of report	February 02, 2021

Measurement result summary

TEST ITEM	TEST RESULT	NOTE
Conducted emission on DC power input/output ports	NA	<i>There's no DC power ports</i>
Conducted emission on AC power input/output ports	NA	
Conducted emission on wired network ports	NA	<i>There's no wired network ports</i>
Radiation emission	NA	<i>There's no ancillary device</i>
Harmonic current emission	NA	
Voltage fluctuations and flicker	NA	
Electrostatic discharge	Pass	
Radio frequency electromagnetic field	Pass	
Fast transients, common mode	NA	
Surges	NA	
Radio frequency, common mode	NA	
Voltage dips and interruptions	NA	
Transients and surges in the vehicular environment	NA	<i>The product is not intended for vehicular use</i>

Notes: 1: NA =Not Applicable

2. Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name	:	Smart Band
Type/Model	:	XMSH15HM
Description of EUT	:	The EUT is a smart band with BLE function, it has only one model.
Rating	:	5V DC 250 mA
EUT for	:	<input type="checkbox"/> Fixed use <input type="checkbox"/> vehicular use <input checked="" type="checkbox"/> portable use
EUT used in	:	<input type="checkbox"/> telecommunication centres and industrial environment <input checked="" type="checkbox"/> other environment
EUT type	:	<input checked="" type="checkbox"/> Table-top <input type="checkbox"/> Floor standing
Hardware version	:	V1.0
Software version	:	V1.0
Cable supplied	:	Refer to the user's manual
Sample received date	:	January 07, 2021
Date of test	:	January 08, 2021 – January 30, 2021

1.2 Description of Test Facility

Name : Intertek Testing Services Shanghai
Address : Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China
Telephone : 86 21 61278200
Telefax : 86 21 54262353

The test facility is recognized, certified, or accredited by these organizations :

- CNAS Accreditation Lab
Registration No. CNAS L0139
- FCC Accredited Lab
Designation Number: CN1175
- IC Registration Lab
CAB identifier.: CN0051
- VCCI Registration Lab
Registration No.: R-14243, G-10845, C-14723, T-12252
- A2LA Accreditation Lab
Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Normative references

CENELEC EN 55032 (2015): "Electromagnetic compatibility of multimedia equipment - Emission Requirements".

CENELEC EN 61000-4-2 (2009): "Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test".

CENELEC EN 61000-4-3 (2006), A1 (2008) and A2 (2010): "Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test".

CENELEC EN 61000-4-4 (2012): "Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test".

CENELEC EN 61000-4-5 (2006): "Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test".

CENELEC EN 61000-4-6 (2009): "Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields".

CENELEC EN 61000-4-11 (2004): "Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests".

CENELEC EN 61000-3-2 (2014): "Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current ≤ 16 A per phase)".

CENELEC EN 61000-3-3 (2013): "Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤ 16 A per phase and not subject to conditional connection".

CISPR 25 (2nd Edition 2002) and COR1 (2004): "Radio disturbance characteristics for the protection of receivers used on board vehicles, boats, and on devices - Limits and methods of measurement".

ISO 7637-2 (2004): "Road vehicles - Electrical disturbances from conduction and coupling - Part 2: Electrical transient conduction along supply lines only".

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency is specified if used.

2.3 Test peripherals used

Item No	Description	Band and Model	S/No
-	-	-	-

2.4 Record of climatic conditions

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (kPa)
Conducted emission on DC power input/output ports	NA	NA	NA
Conducted emission on AC power input/output ports	NA	NA	NA
Conducted emission on wired network ports	NA	NA	NA
Radiation emission	NA	NA	NA
Harmonic current emission	NA	NA	NA
Voltage fluctuations and flicker	NA	NA	NA
Electrostatic discharge	24	55	101.1
Radio frequency electromagnetic field	24	55	/
Fast transients, common mode	NA	NA	NA
Surges	NA	NA	NA
Radio frequency, common mode	NA	NA	NA
Voltage dips and interruptions	NA	NA	NA
Transients and surges in the vehicular environment	NA	NA	NA

Notes: NA =Not Applicable

2.5 Instrument list

Conducted Emission/Disturbance Power/Tri-loop Test/CDN method					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Test Receiver	R&S	ESCS 30	EC 2107	2021-07-15
<input type="checkbox"/>	A.M.N.	R&S	ESH2-Z5	EC 3119	2021-12-06
<input type="checkbox"/>	A.M.N.	R&S	ENV 216	EC 3393	2021-07-04
<input type="checkbox"/>	A.M.N.	R&S	ENV4200	EC 3558	2021-06-10
<input type="checkbox"/>	Absorbing clamp	R&S	MDS 21	EC 2108	2021-06-19
<input type="checkbox"/>	CDN	Frankonia	CDN M2M316	EC 5969	2021-03-15
<input type="checkbox"/>	CDN	Schaffner	CDN M316	EC 2113-1	2021-07-16
<input type="checkbox"/>	Attenuator	Weinschel	68-6-44	EC 3043-9	2022-02-05
<input type="checkbox"/>	Tri-loop	Schwarzbeck	HXYZ 9170	EC 3384	2021-10-10
<input type="checkbox"/>	Voltage Probe	Schwarzbeck	TK9420	EC 4888	2021-09-10
<input type="checkbox"/>	Current probe	R&S	EZ-17	EC 3221	2021-03-15
<input type="checkbox"/>	I.S.N.	FCC	FCC-TLISN -T2-02	EC 3754	2022-02-05
<input type="checkbox"/>	I.S.N.	FCC	FCC-TLISN -T4-02	EC 3755	2022-02-05
<input type="checkbox"/>	I.S.N.	FCC	FCC-TLISN -T8-02	EC 3756	2022-02-05
Discontinuous Disturbance Voltage					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Click meter	AFJ	DDA55	EC 5320	2021-03-08
<input type="checkbox"/>	A.M.N.	AFJ	LS16C	EC 5320-1	2021-12-07
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2021-09-11
<input type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2021-06-10
<input type="checkbox"/>	Pre-amplifier	R&S	AFS42-00101800- 25-S-42	EC5262	2021-06-10
<input type="checkbox"/>	Horn antenna	R&S	HF 906	EC 3049	2021-11-17

<input type="checkbox"/>	Horn antenna	ETS	3117	EC 4792-1	2021-01-09
<input type="checkbox"/>	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2021-07-09
<input type="checkbox"/>	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2021-03-07
Harmonics / Flicker / Low-frequency immunity test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Harmonic-flicker	CI	5001ix-PACS-1	EC 2110	2021-11-08
<input type="checkbox"/>	Three phase Harmonic-flicker system	EM TEST	DPA503N	EC 5383	2022-01-31
		EM TEST	NETWAVE-30-400	EC 5383-2	2021-06-19
ESD					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	ESD generator	EM TEST	ditto	EC 2956	2021-06-19
<input checked="" type="checkbox"/>	ESD generator	TESEQ	NSG 437	EC 4792-4	2021-03-22
EFT/Surge Voltage Dips					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Conduct immunity system	EM TEST	UCS 500M6B	EC 2958	2021-04-07
<input type="checkbox"/>	Automatic transformer	EM TEST	MV2616	EC 2957	2021-04-07
<input type="checkbox"/>	Capacity clamp	EM TEST	HFK	EC 2959	2022-02-13
<input type="checkbox"/>	Surge generator	EM TEST	TSS 500M2F	EC 2960	2021-08-15
<input type="checkbox"/>	Surge generator	EM TEST	TSS 500M4	EC 2961	2022-01-05
<input type="checkbox"/>	Surge Coupling network	EM TEST	CNV 504M	EC 2958-2	2022-02-05
<input type="checkbox"/>	Surge Coupling network	EM TEST	CNV 504S1	EC 2958-1	2022-02-05
<input type="checkbox"/>	DIPs generator	SANKI	SKS-1130GT	EC 5033	2022-01-05
<input type="checkbox"/>	Ring wave generator	SANKI	SKS-1206GB	EC 5033-1	2022-01-05
<input type="checkbox"/>	EFT generator	SANKI	SKS-0404IB	EC 5033-2	2021-03-08
<input type="checkbox"/>	Surge generator	SANKI	SKS-0506GB-30	EC 5033-3	2021-03-08

Conducted Immunity					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Signal generator	R&S	SML 01	EC 2338	2021-09-09
<input type="checkbox"/>	Power amplifier	AR	75A250	EC 3043-1	2021-07-15
<input type="checkbox"/>	Attenuator	EM TEST	ATT6/75	EC 3043-3	2022-02-05
<input type="checkbox"/>	CDN	Frankonia	CDN M2M316	EC 5969	2021-03-15
<input type="checkbox"/>	CDN	Schaffner	CDN M316	EC 2113-1	2021-07-16
<input type="checkbox"/>	CDN	EM TEST	CDN T2	EC 4970	2021-09-11
<input type="checkbox"/>	CDN	EM TEST	CDN T4	EC 3043-4	2022-02-05
<input type="checkbox"/>	CDN	EM TEST	CDN M1/16A	EC 4792-6	2021-10-08
<input type="checkbox"/>	CDN	EM TEST	CDN M1/16A	EC 4792-7	2021-09-11
<input type="checkbox"/>	CDN	EM TEST	CDN M1/32A	EC4792-10	2022-02-05
<input type="checkbox"/>	CDN	EM TEST	CDNM3N/16A	EC 4792-12	2022-02-05
<input type="checkbox"/>	CDN	EM TEST	CDNM3N/32A	EC 4792-13	2022-02-05
<input type="checkbox"/>	CDN	EM TEST	CDN T8-RJ45	EC 4792-15	2021-09-11
<input type="checkbox"/>	EM clamp	EM TEST	EM 101	EC 3043-6	2021-12-07
<input type="checkbox"/>	DDC	AR	DC 2600	EC 3043-5	2022-02-05
Radiated Immunity					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Signal generator	R&S	SMR 20	EC 3044-1	2022-01-29
<input checked="" type="checkbox"/>	Power amplifier	AR	250W1000B	EC 5818-2	2021-04-19
<input checked="" type="checkbox"/>	Power amplifier	BONN	BLMA1060-100	EC 5818-4	2021-04-19
<input checked="" type="checkbox"/>	Log-period antenna	AR	AT 1080	EC 3044-7	2022-01-03
<input checked="" type="checkbox"/>	Horn antenna	Schwarzbeck	STLP 9149	EC5881	2021-06-19
<input checked="" type="checkbox"/>	Field meter	AR	FL17000	EC 5818-1	2021-05-21
<input checked="" type="checkbox"/>	Power sensor	Keysight	N1914A	EC 5818-3	2021-04-19
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date

<input type="checkbox"/>	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2021-03-05
<input type="checkbox"/>	Power sensor	Agilent	U2021XA	EC 5338-1	2021-03-05
<input type="checkbox"/>	Vector Signal Generator	Agilent	N5182B	EC 5175	2021-03-05
<input type="checkbox"/>	Spectrum analyzer	R&S	CMW500	EC5944	2021-12-07
<input type="checkbox"/>	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2021-03-05
<input type="checkbox"/>	Mobile Test System	Litepoint	Iqxel	EC 5176	2022-01-09
<input type="checkbox"/>	Test Receiver	R&S	ESCI 7	EC 4501	2021-09-12
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Shielded room	Zhongyu	-	EC 2838	2022-01-07
<input checked="" type="checkbox"/>	Shielded room	Zhongyu	-	EC 2839	2022-01-14
<input type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2021-07-31
<input checked="" type="checkbox"/>	Fully-anechoic chamber	Albatross project	-	EC 3047	2021-07-31
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input type="checkbox"/>	Spectrum analyzer	Agilent	E7402A	EC 2254	2021-07-15
<input type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2022-02-28
<input checked="" type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 2122	2021-03-11
<input type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 5198	2022-01-18
<input checked="" type="checkbox"/>	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3326	2021-03-28
<input checked="" type="checkbox"/>	Pressure meter	YM3	Shanghai Mengde	EC 3320	2021-07-01

2.6 Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted emission at mains ports	9kHz ~ 150kHz	3.52 dB
	150kHz ~ 30MHz	3.19 dB
Continuous disturbance voltage at telecom ports	150kHz ~ 30MHz	3.64 dB
Continuous disturbance current at telecom ports	150kHz ~ 30MHz	2.62 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.90 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.02 dB
	6GHz ~ 18GHz	5.28 dB
Harmonic current emission	-	3.90%
Voltage fluctuations and flicker	-	10.34%

3 Conducted emission on DC power input/output ports

Test result: NA

3.1 Limits

3.1.1 Limits of conducted emissions for equipment intended to be used in telecommunication centres and industrial environment

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

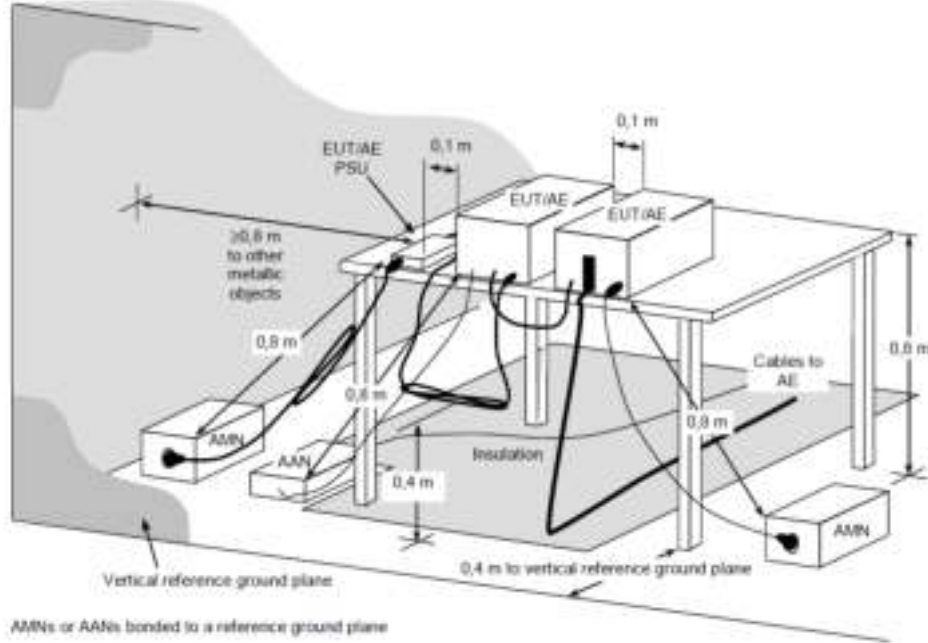
3.1.2 Limits of conducted emissions for other equipment

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

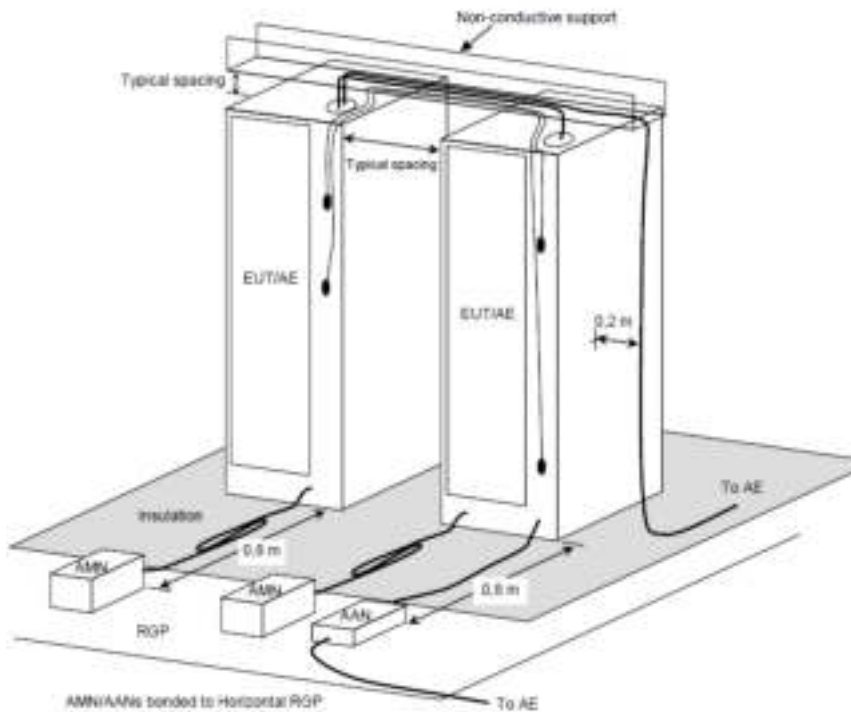
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

3.2 Test setup

For table-top equipment



For floor standing equipment



3.3 Test Procedure

Measurement was performed in shielded room, and instruments used were followed EN 301 489-1 clause 8.3.

Detailed test procedure and arrangement was followed EN 301 489-1 clause 8.3.

Frequency range 150kHz - 30MHz was checked and EMI receiver measurement bandwidth was set to 9kHz.

3.4 Test Result

Test Curve:

Test Data:

Frequency (MHz)	Quasi-peak			Average			Line
	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)	

Note: * means the emission level 20dB below the relevant limit.

- Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
 Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
 Then Correct Factor = 10.00 + 2.00 = 12.00dB;
 Corrected Reading = 10dBuV + 12.00dB = 22.00dBuV;
 Margin = 66.00dBuV – 22.00dBuV = 44.00dB.

4 Conducted emission on AC power input/output ports

Test result: NA

4.1 Limits

4.1.1 Limits of conducted emissions for equipment intended to be used in telecommunication centres and industrial environment

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

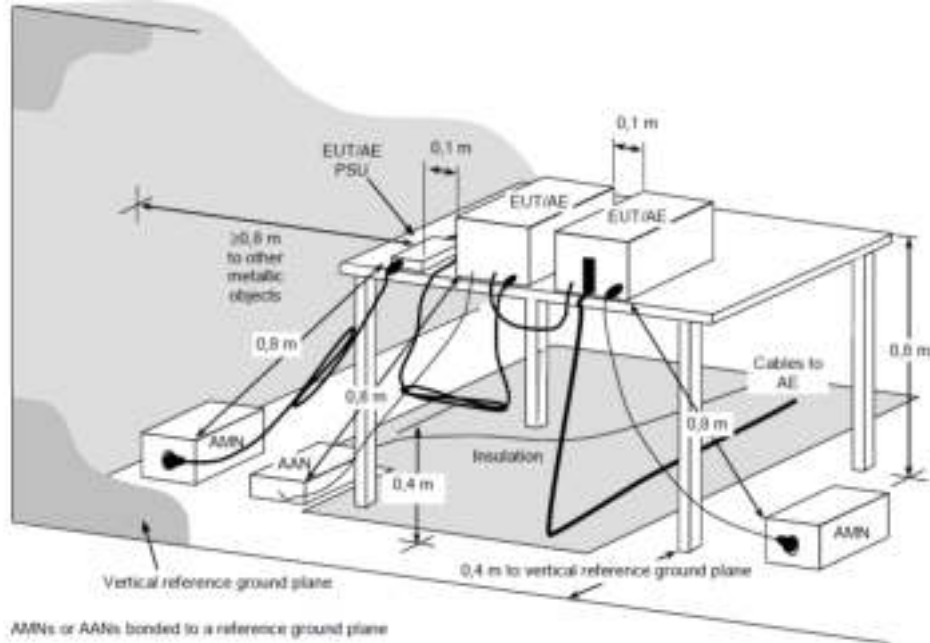
4.1.2 Limits of conducted emissions for other equipment

Frequency range (MHz)	Quasi-peak (dBuV)	Average (dBuV)
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

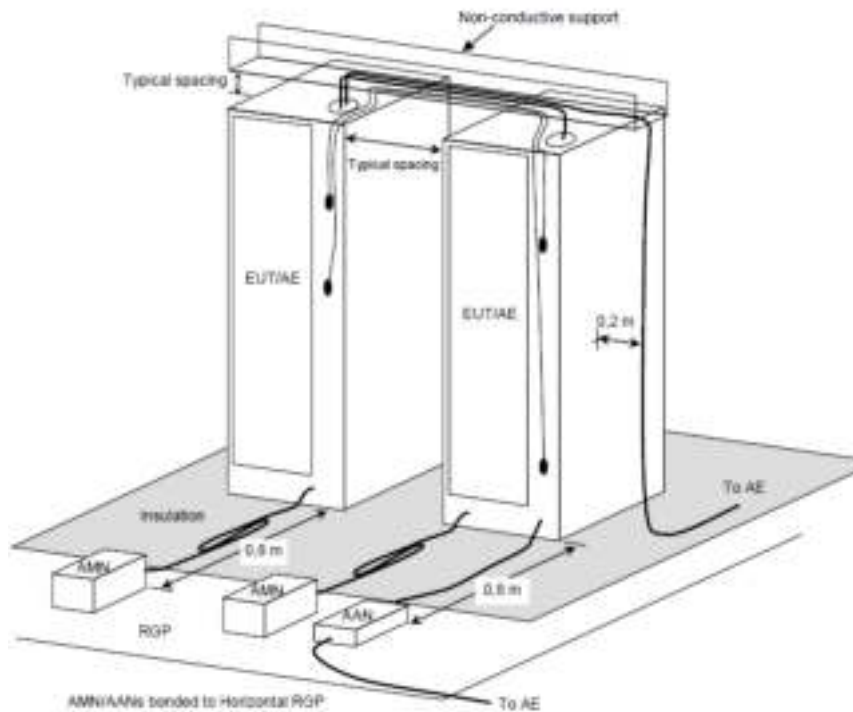
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

4.2 Test setup

For table-top equipment



For floor standing equipment



4.3 Test Procedure

Measurement was performed in shielded room, and instruments used were followed EN 301 489-1 clause 8.4.

Detailed test procedure and arrangement was followed EN 301 489-1 clause 8.4.

Frequency range 150kHz - 30MHz was checked and EMI receiver measurement bandwidth was set to 9kHz.

4.4 Test Result

L line

N line

Test Data:

5 Conducted Emission at wired network ports

Test result: NA

5.1 Limits

5.1.1 Limits of conducted emission for equipment intended to be used exclusively in an industrial environment or a telecommunication centre

Frequency range (MHz)	Voltage Limits (dBuV)		Current limits (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	97 ~ 87	84 ~ 74	53 ~ 43	40 ~ 30
0.5 ~ 30	87	74	43	30

Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

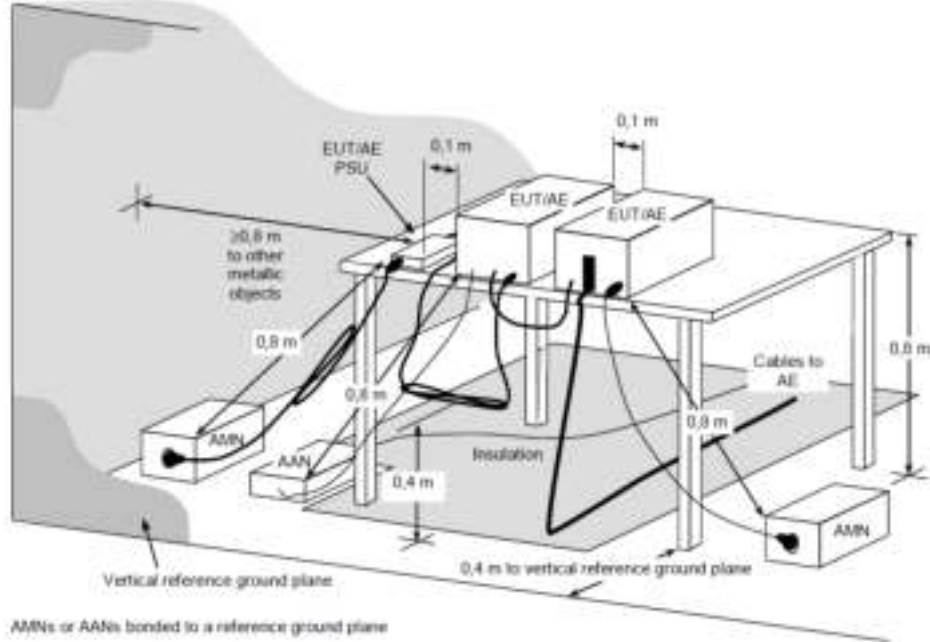
5.1.2 Limits of conducted emission for other equipment

Frequency range (MHz)	Voltage Limits (dBuV)		Current limits (dBuA)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 ~ 0.5	84 ~ 74	74 ~ 64	40 ~ 30	30 ~ 20
0.5 ~ 30	74	64	30	20

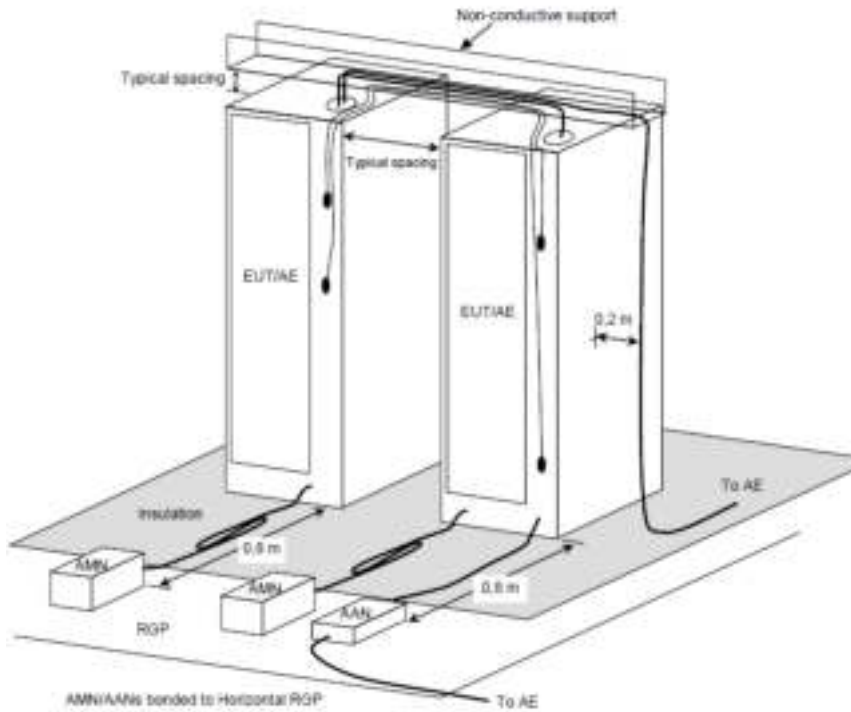
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.

5.2 Test setup

For table-top equipment



For floor standing equipment



5.3 Test Procedure

Measurement was performed in shielded room, and instruments used were followed EN 301 489-1 clause 8.7.

Detailed test procedure and arrangement was followed EN 301 489-1 clause 8.7.

Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9kHz.

5.4 Test Result

Test Curve:

Test Data:

Frequency (MHz)	Quasi-peak			Average		
	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)	Corrected Reading (dBuV)	Limit (dBuV)	Margin (dB)

- Remark: 1. Correct Factor = AAN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
 2. Corrected Reading = Original Receiver Reading + Correct Factor
 3. Margin = Limit - Corrected Reading
 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming AAN Factor = 10.00dB, Cable Loss = 2.00dB,
 Original Receiver Reading = 10.00dBuV, Limit = 74.00dBuV.
 Then Correct Factor = 10.00 + 2.00 = 12.00dB;
 Corrected Reading = 10dBuV + 12.00dB = 22.00dBuV;
 Margin = 74.00dBuV – 22.00dBuV = 52.00dB.

6 Radiated emission

Test result: NA

6.1 Limits

6.1.1 Limits of radiated emission for ancillary equipment intended to be used exclusively in an industrial environment or telecommunication centres

Frequency (MHz)	Quasi-peak limit in Measurement Distance 3m (dBuV/m)	Quasi-peak limit in Measurement Distance 10m (dBuV/m)
30-230	50	40
230-1000	57	47

Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

Frequency range GHz	Average limit in Measurement Distance 3m (dBuV/m)	Peak limit in Measurement Distance 3m (dBuV/m)
1 to 3	56	76
3 to 6	60	80

NOTE The lower limit applies at the transition frequency.

6.1.2 Limits of radiated emission for other ancillary equipment

Frequency (MHz)	Quasi-peak limit in Measurement Distance 3m (dBuV/m)	Quasi-peak limit in Measurement Distance 10m (dBuV/m)
30-230	40	30
230-1000	47	37

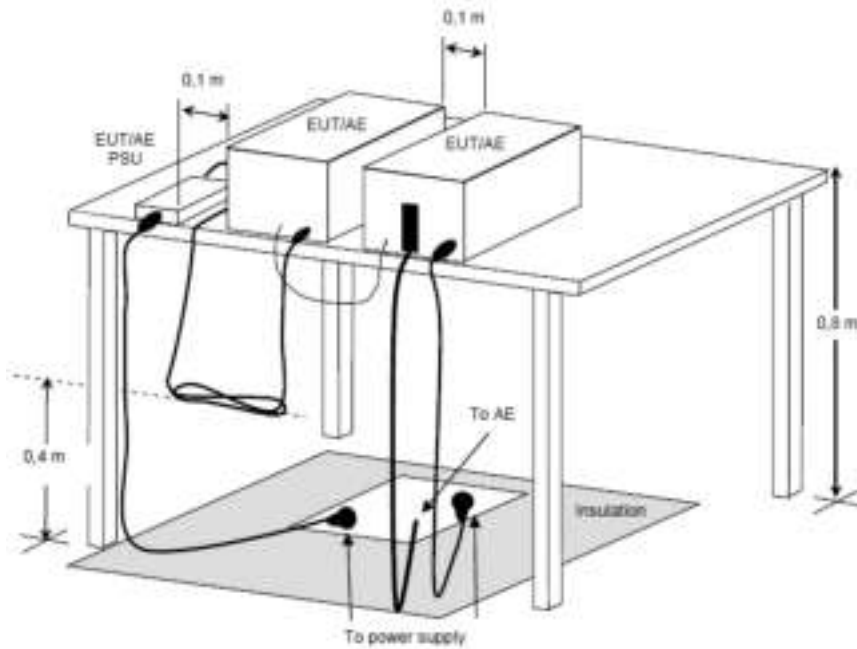
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

Frequency range GHz	Average limit in Measurement Distance 3m (dBuV/m)	Peak limit in Measurement Distance 3m (dBuV/m)
1 to 3	50	70
3 to 6	54	74

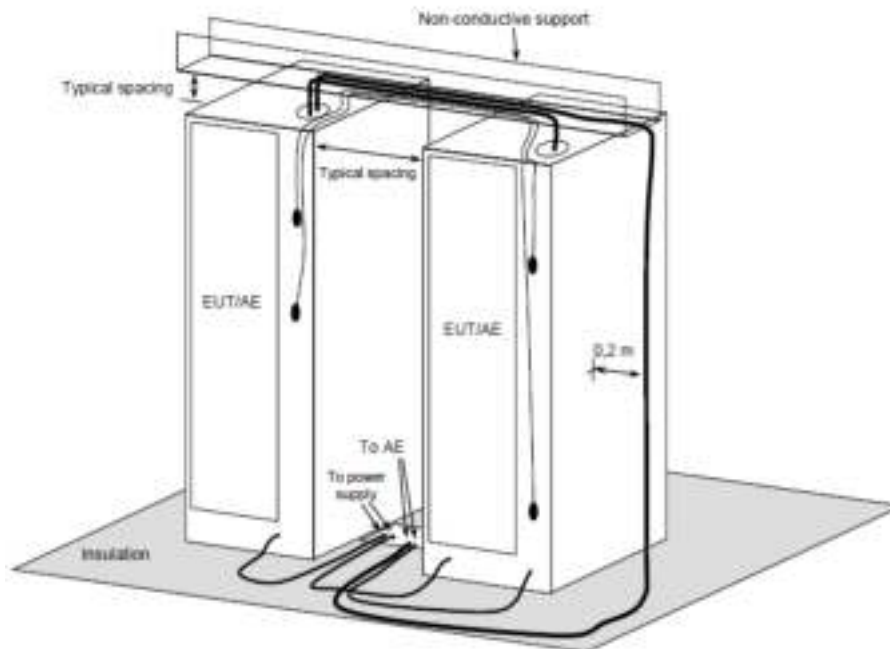
NOTE The lower limit applies at the transition frequency.

6.2 Block diagram of test set up

For table-top equipment



For floor standing equipment



6.3 Test Procedure

The measurement was performed in a semi-anechoic chamber.

The distance from EUT to receiving antenna is 3 meters.

Measurement was performed according to EN 301 489-1 clause 8.2.

EUT arrangement and operate conditions were performed according to EN 301 489-1 clause 8.2.

6.4 Test Result

Test data:

Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limits (dBuV/m)	Margin (dBuV/m)
Horizontal				
Vertical				

Notes:

1. All possible modes of operation were investigated. Only the worst case emissions measured.

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.

2. Corrected Reading = Original Receiver Reading + Correct Factor

3. Margin = Limit - Corrected Reading

4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,

Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV,

Limit = 40.00dBuV/m.

Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;

Corrected Reading = 10dBuV + 0.20dB/m = 10.20dBuV/m;

Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

7 Harmonic current emission

Test result: NA

7.1 Limits

7.1.1 Limits for Class A equipment

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
$15 \leq n \leq 39$	$0,15 \frac{15}{n}$
Even harmonics	
2	1,08
4	0,43
6	0,30
$8 \leq n \leq 40$	$0,23 \frac{8}{n}$

7.1.2 Limits for Class B equipment

For Class B equipment, the harmonics of the input current shall not exceed the values given in Class A limits multiplied by a factor of 1,5

7.1.3 Limits for Class C equipment

a) Active input power > 25 W

Harmonic order n	Maximum permissible harmonic current expressed as a percentage of the input current at the fundamental frequency %
2	2
3	$30 \cdot \lambda^a$
5	10
7	7
9	5
$11 \leq n \leq 39$ (odd harmonics only)	3

^a λ is the circuit power factor.

b) Active input power ≤ 25 W

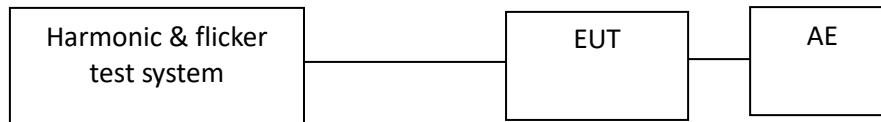
Discharge lighting equipment having an active input power smaller than or equal to 25 W shall comply with one of the following two sets of requirements:

- the harmonic currents shall not exceed the power-related limits of Class D equipment, column 2, or:
- the third harmonic current, expressed as a percentage of the fundamental current, shall not exceed 86 % and the fifth harmonic current shall not exceed 61 %.

7.1.4 Limits for Class D equipment

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
$13 \leq n \leq 39$ (odd harmonics only)	$\frac{3,85}{n}$	See Table 1

7.2 Test Setup



7.3 Test Procedure

Harmonics of the fundamental current were measured up to 40 order harmonics using a digital power meter with an analogue output and frequency analyzer which was integrated in the harmonic & flicker test system. The measurements were carried out under steady conditions.

For the following categories of equipment, limits are not specified in this standard:

- Equipment with a rated power of 75 W or less, other than lighting equipment.
- Professional equipment with a total rated power greater than 1 kW.
- Symmetrically controlled heating elements with a rated power less than or equal to 200 W.
- Independent dimmers for incandescent lamps with a rated power less than or equal to 1 kW.

7.4 Test Result

8 Voltage fluctuations and flicker

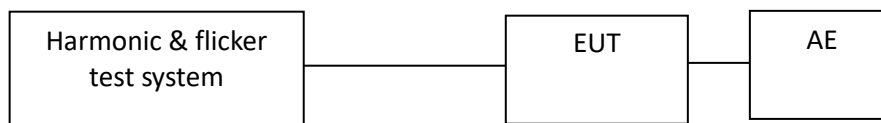
Test result: NA

8.1 Limits

- The value of P_{st} shall not be greater than 1,0;
- The value of P_{lt} shall not be greater than 0,65;
- T_{max} , the accumulated time value of $d(t)$ with a deviation exceeding 3,3 % during a single voltage change at the EUT terminals, shall not exceed 500 ms;
- The maximum relative steady-state voltage change, dc , shall not exceed 3,3 %;
- The maximum relative voltage change d_{max} , shall not exceed:
 - a) 4 % without additional conditions;
 - b) 6 % for equipment which is:
 - switched manually, or
 - switched automatically more frequently than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds), or manual restart, after a power supply interruption.
 - c) 7 % for equipment which is:
 - attended whilst in use (for example: hair dryers, vacuum cleaners, kitchen equipment such as mixers, garden equipment such as lawn mowers, portable tools such as electric drills), or
 - switched on automatically, or is intended to be switched on manually, no more than twice per day, and also has either a delayed restart (the delay being not less than a few tens of seconds) or manual restart, after a power supply interruption.

P_{st} and P_{lt} requirements shall not be applied to voltage changes caused by manual switching.

8.2 Test Setup



8.3 Test Procedure

Voltage fluctuations and flicker were measured by a digital power meter with an analogue output and frequency analyzer which was integrated in the harmonic & flicker test system.

- The EUT is unlikely to produce significant voltage fluctuations or flicker by technical analysis and evaluation. So it is deemed to fulfil the requirements without testing.

8.4 Test Result

Immunity Test

Performance criteria

Performance criteria A for immunity tests with phenomena of a continuous nature;
 Performance criteria B for immunity tests with phenomena of a transient nature;
 Performance criteria C for immunity tests with power interruptions exceeding a certain time.

Criteria	During test	After test
A	Shall operate as intended. (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 3). 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 2). Shall be no unintentional transmissions.	Functions shall be self-recoverable. Shall operate as intended after recovering. Shall be no degradation of performance (see note 3). Shall be no loss of stored data or user programmable functions.
C	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 3).
<p>NOTE 1: Operate as intended during the test allows a level of degradation 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.</p> <p>NOTE 2: 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.</p> <p>NOTE 3: No degradation of performance after the test is understood as no 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.</p>		

9 Electrostatic Discharge (ESD)

Test result **Pass**

9.1 Severity Level and Performance Criterion

9.1.1 Test level

Contact discharge		Air discharge	
Level	Test voltage (kV)	Level	Test voltage (Kv)
1	2	1	2
2	4	2	4
3	6	3	8
4	8	4	15
X	Special	X	Special

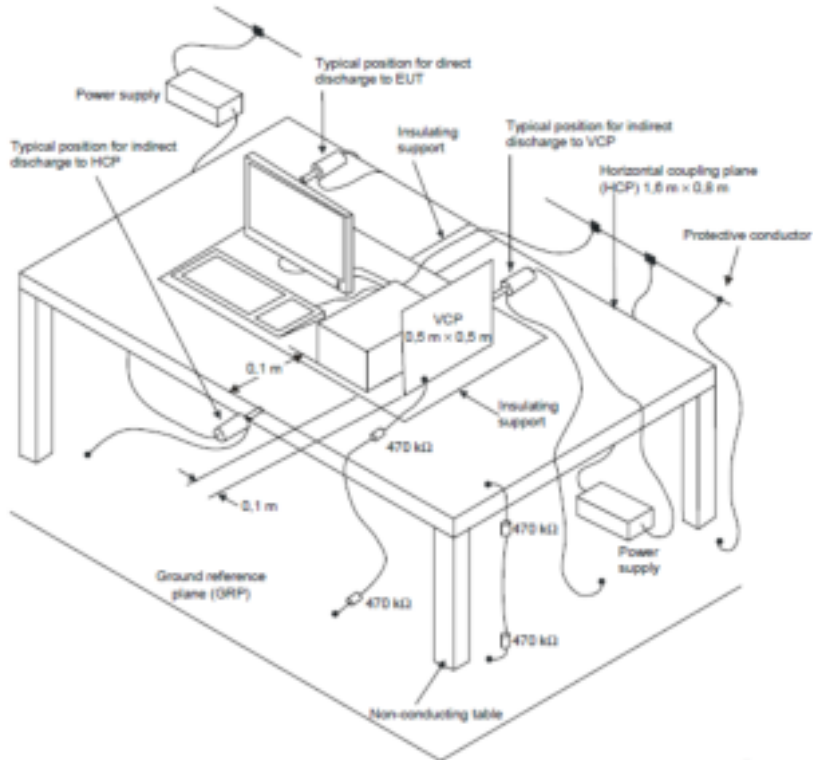
Notes: 1. "X" is an open level. The level has to be specified in the dedicated equipment specification.
 If higher voltages than those shown are specified, special test equipment may be needed.
 2. The gray rows were the selected test level.

9.1.2 Performance Criterion

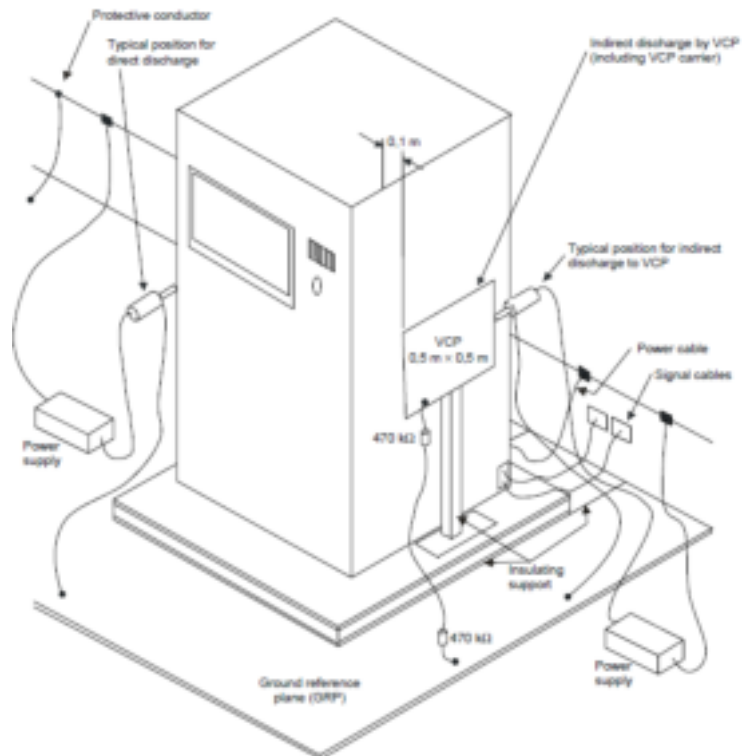
Criterion B

9.2 Test Setup

For table-top equipment



For floor standing equipment



9.3 Test Procedure

Measurement was performed in shielded room.

Measurement procedure was applied according to EN 61000-4-2 clause 8.

The test method and equipment was specified by EN 61000-4-2.

9.4 Test Result

Direct discharges were applied at the following selected points:

Test level [kV]	Air/Contact	Polarity (+/-)	Pass/Fail/NA	Comment
4	Contact	+/-	Pass	Accessible metal parts of the EUT
4	Contact	+/-	Pass	All touchable screws of enclosure
2/4/8	Air	+/-	Pass	Air gap of the switch, button
2/4/8	Air	+/-	Pass	Slots around the EUT

Indirect contact discharges were applied to the VCP and the HCP at the following selected points:

For table-top equipment

Position	Description	Point	Pass/Fail/NA
HCP front	0,1m from the front of the EUT	Edge of centre on HCP	Pass
HCP back	0,1m from the back of the EUT	Edge of centre on HCP	Pass
HCP right	0,1m from the right side of the EUT	Edge of centre on HCP	Pass
HCP left	0,1m from the left side of the EUT	Edge of centre on HCP	Pass
VCP front	0,1m from the front of the EUT	Edge of centre on VCP	Pass
VCP back	0,1m from the back of the EUT	Edge of centre on VCP	Pass
VCP right	0,1m from the right of the EUT	Edge of centre on VCP	Pass
VCP left	0,1m from the left of the EUT	Edge of centre on VCP	Pass

For floor standing equipment

Position	Description	Point	Pass/Fail/NA
CP front	0,1m from the front of the EUT	Edge of centre on VCP	NA
CP back	0,1m from the back of the EUT	Edge of centre on VCP	NA
CP right	0,1m from the right of the EUT	Edge of centre on VCP	NA
CP left	0,1m from the left of the EUT	Edge of centre on VCP	NA

Observation: All the functions were operated as normal after the test.

Conclusion: The EUT can meet the requirement of Performance Criterion B.

10 Radio frequency electromagnetic field

Test result Pass

10.1 Severity Level and Performance Criterion

10.1.1 Test level

Level	Test field strength V/m
1	1
2	3
3	10
X	Special

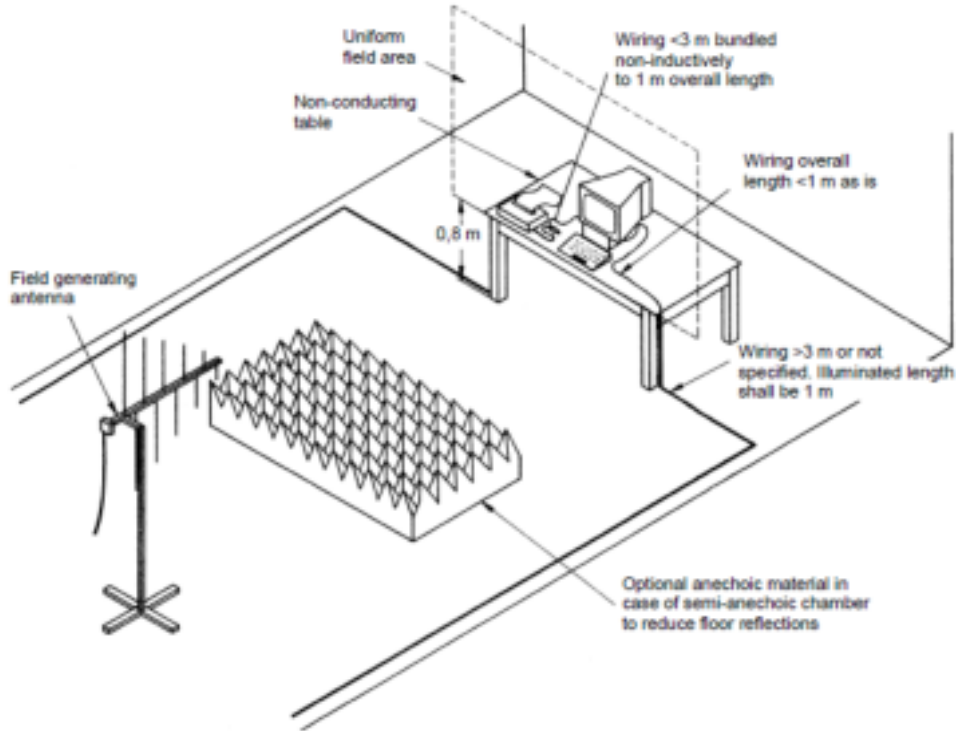
Note: 1. X is an open test level. This level may be given in the product specification.
2. The gray row is the selected test level.

10.1.2 Performance Criterion

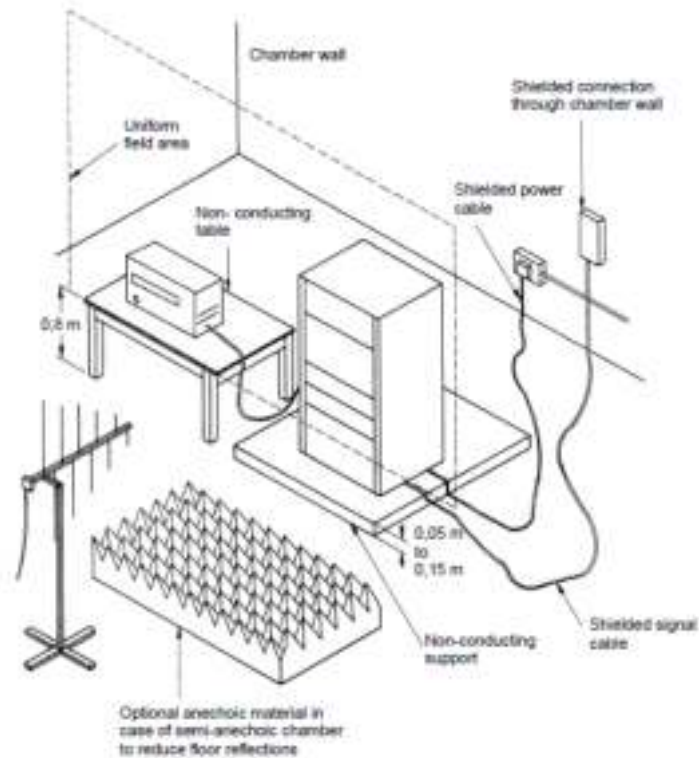
Criterion A

10.2 Test Setup

For table-top equipment



For floor standing equipment



10.3 Test Procedure

Measurement was performed in full-anechoic chamber.

Measurement procedure was applied according to EN 61000-4-3 clause 8.

The test method and equipment was specified by EN 61000-4-3.

10.4 Test Result

Test no.	Frequency (MHz)	Polarization	Test level (V/m)	Modulation	Exposed location	Pass/Fail/NA
1	80-1000	H & V	3	1 kHz, 80% AM 1 % increment	All sides	Pass
2	1000-6000	H & V	3	1 kHz, 80% AM 1 % increment	All sides	Pass

Observation: All the functions were operated as normal during and after test.

Conclusion: The EUT can meet the requirement of Performance Criterion A

11 Fast transients, common mode

Test result NA

11.1 Severity Level and Performance Criterion

11.1.1 Test level

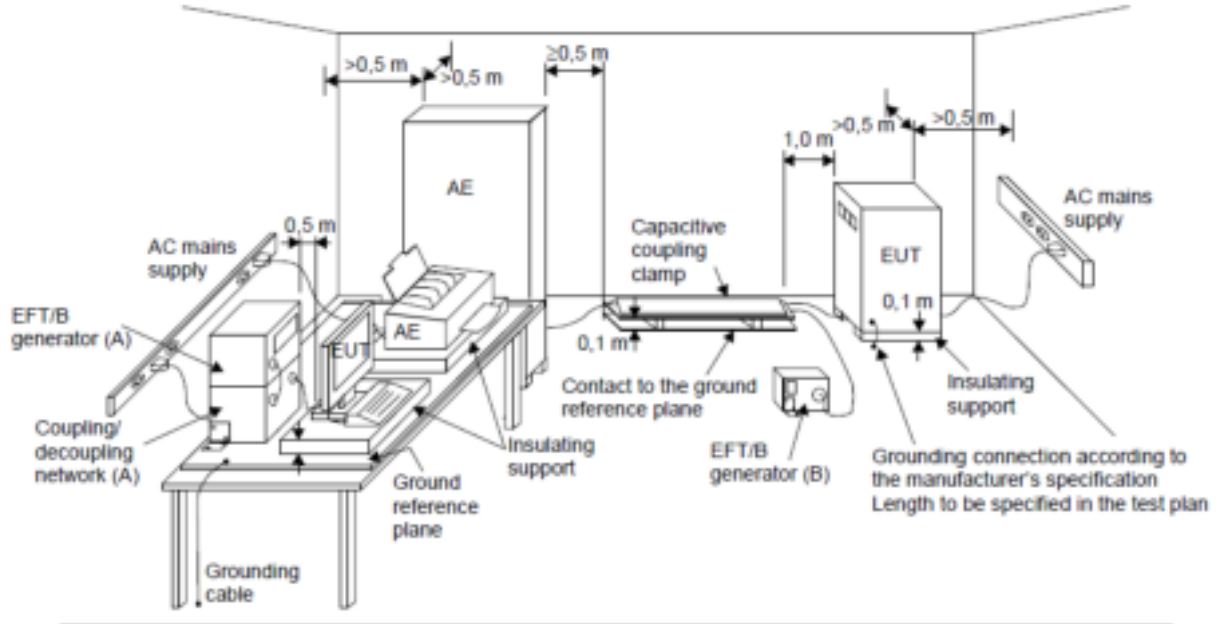
Open circuit output test voltage and repetition rate of the impulses				
Level	AC mains power input ports		Signal ports, wired network ports, control ports, DC power input ports	
	Voltage peak (kV)	Repetition rate (kHz)	Voltage peak (kV)	Repetition rate (kHz)
1	0.5	5	0.25	5/100
2	1	5	0.5	5/100
3	2	5	1	5/100
4	4	2.5	2	5/100
X	Special	Special	Special	Special

Notes: 1. "X" is an open level. The level has to be specified in the dedicated equipment specification.
2. The gray rows were the selected test level.

11.1.2 Performance Criterion

Criterion B

11.2 Test Setup



- (A) location for supply line coupling
- (B) location for signal lines coupling

11.3 Test Procedure

Measurement was performed in shielded room.
Measurement procedure was applied according to EN 61000-4-4 clause 8.
The test method and equipment was specified by EN 61000-4-4.

11.4 Test Result

Test No.	Level (kV)	Polarity (+/-)	Line for test	Pass/Fail/NA
1	1	+/-	AC mains power input ports	
2	0.5	+/-	DC power input ports	
3	0.5	+/-	Wired network ports	
4	0.5	+/-	Signal/control ports	

Observation:
Conclusion:

12 Surges

Test result Pass

12.1 Severity Level and Performance Criterion

12.1.1 Test level

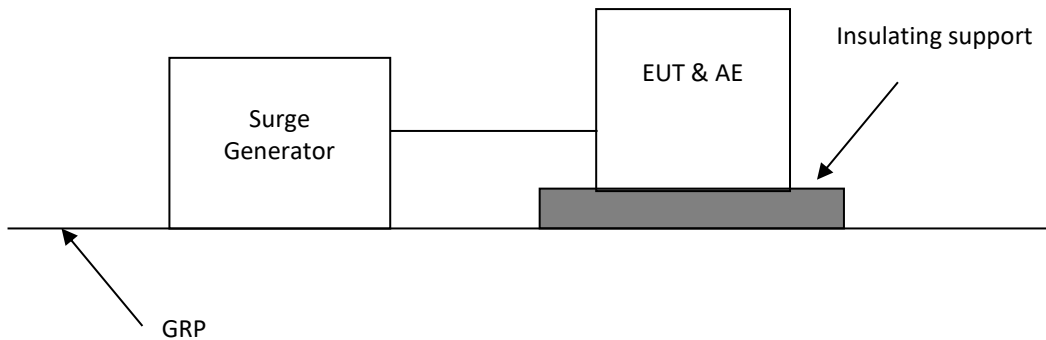
Level	Open-circuit test voltage (kV)
1	0.5
2	1.0
3	2.0
4	4.0
X*	Special

Notes: 1. "X" is an open class. This level can be specified in the product specification
 2. The gray rows are the selected level.

12.1.2 Performance Criterion

Criterion B

12.2 Test Setup



12.3 Test Procedure

Measurement was performed in shielded room.
 Measurement procedure was applied according to EN 61000-4-5 clause 8.
 The test method and equipment was specified by EN 61000-4-5.

12.4 Test Result

Test No.	Level [kV]	Polarity +/-	Line for test	Pass/Fail/NA
1	0.5/1	+/-	AC mains power input port (line to line)	
2	0.5/1/2	+/-	AC mains power input port (line to earth)	
3	0.5	+/-	Wired network ports	

Observation:

Conclusion:

13 Radio frequency, common mode

Test result **Pass**

13.1 Severity Level and Performance Criterion

13.1.1 Test level

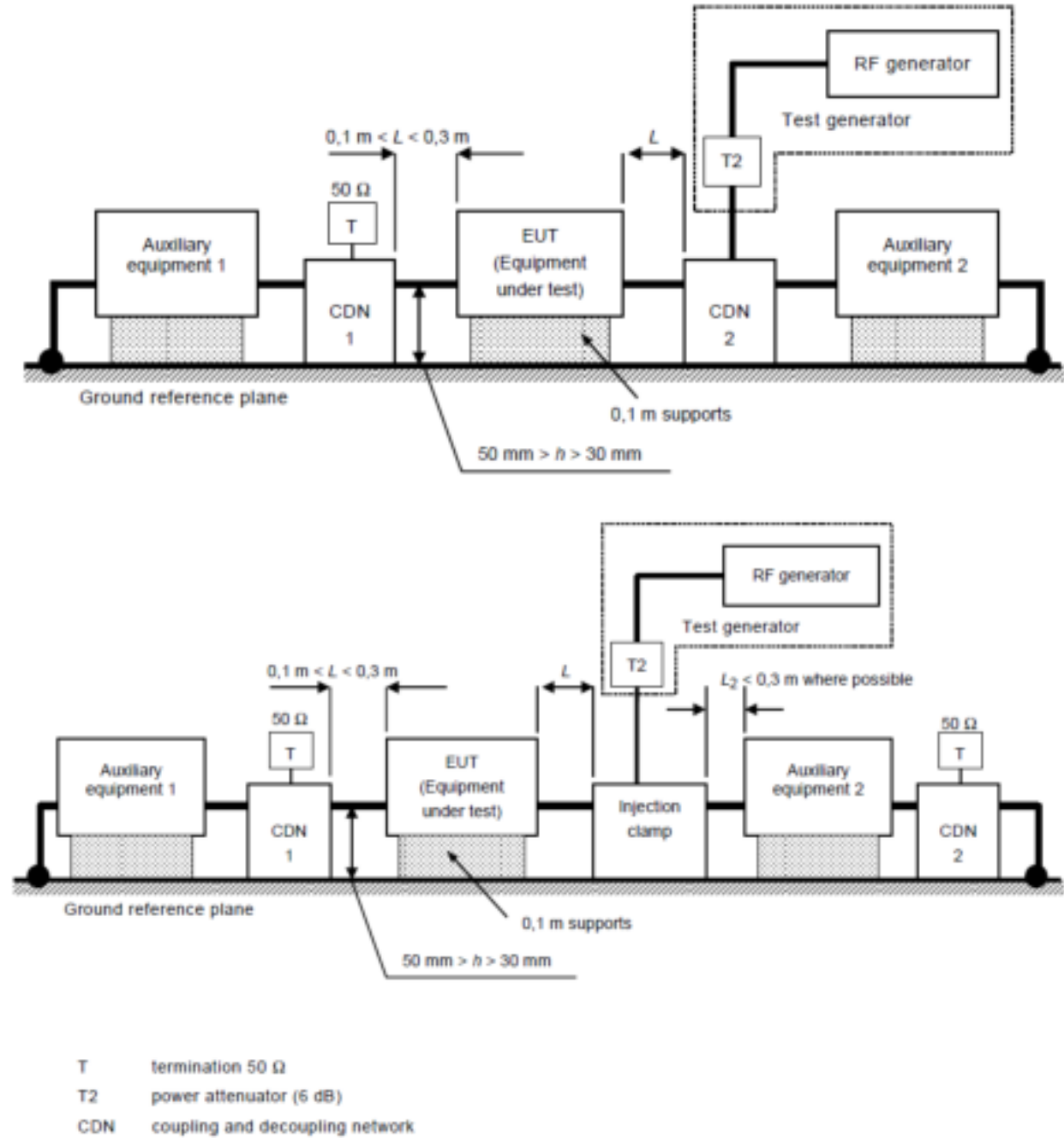
Frequency range 150kHz – 80MHz		
Level	Voltage level	
	U ₀ (dBuV)	U ₀ (V)
1	120	1
2	130	3
3	140	10
X	Special	Special

Notes: 1. "X" is an open level
2. The gray row is the selected test level.

13.1.2 Performance Criterion

Criterion A

13.2 Block Diagram of Test Setup



13.3 Test Procedure

Measurement procedure was applied according to EN 61000-4-6 clause 8. The test method and equipment was specified by EN 61000-4-6.

13.4 Test Result

Test No.	Frequency (MHz)	Level (V)	Modulation	Injected point	Pass/Fail/NA
1	0.15~80	3	80%, 1 kHz, AM	AC mains power port	
2	0.15~80	3	80%, 1 kHz, AM	DC power port	
3	0.15~80	3	80%, 1 kHz, AM	Wired network ports	
4	0.15~80	3	80%, 1 kHz, AM	Signal/control ports	

Observation:

Conclusion:

14 Voltage dips and interruptions

Test result NA

14.1 Severity Level and Performance Criterion

14.1.1 Test level

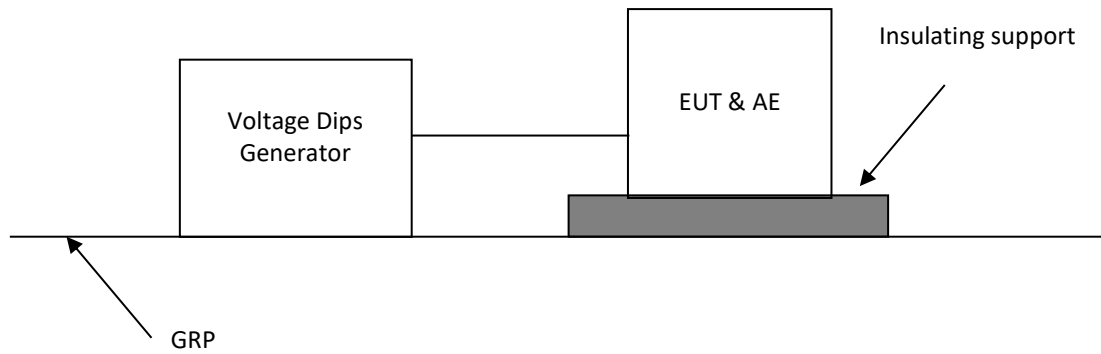
Test level (% Ut)	Voltage dip and short interruptions (% Ut)	Duration (in period)
0	100	0.5
0	100	1
0	100	250
70	30	25

Notes: The gray rows are selected test level.

14.1.2 Performance Criterion

0% Ut / 250 period, Criterion C
Others, Criterion B

14.2 Test Setup



14.3 Test Procedure

Measurement was performed in shielded room.
 Measurement procedure was applied according to EN 61000-4-11 clause 8.
 The test method and equipment was specified by EN 61000-4-11.

14.4 Test Result

Test no.	Dips to (% Ut)	Voltage dip and short interruptions (% Ut)	Duration (in periods)	Pass/Fail/NA
1	70	30%	25	
2	0	100%	0.5	
3	0	100%	1	
4	0	100%	250	

Observation:

Conclusion:

15 Transients and surges in the vehicular environment

Test result NA

15.1 Severity Level and Performance Criterion

15.1.1 Test level

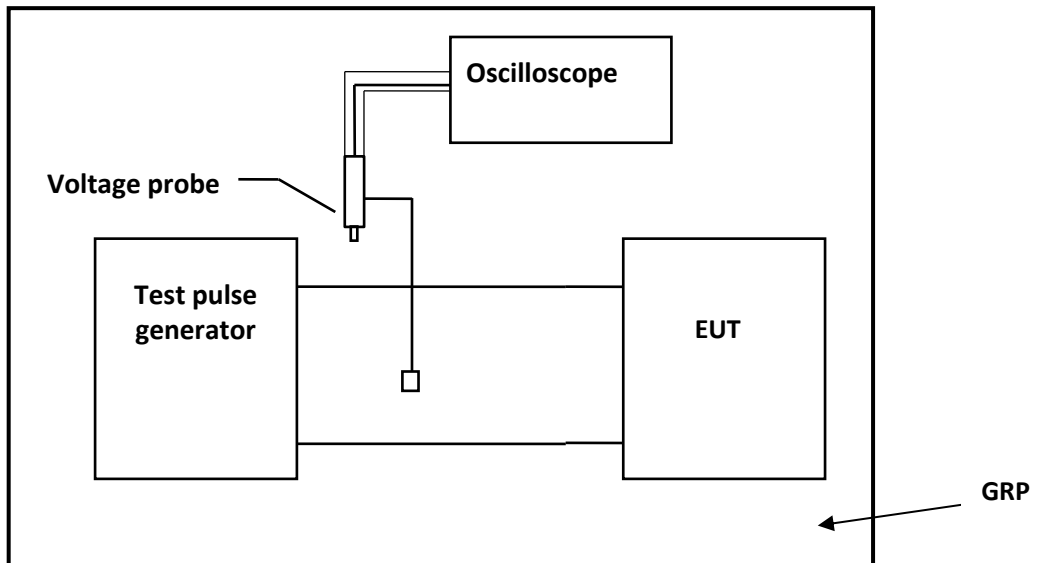
Pulse No.	Test Level III	Number of Pulses or Application Time	Burst/pulse cycle time	
			minimum	maximum
1	- 75V	10 pulses	0,5 s	5 s
2a	+ 37V	10 pulses	0,2 s	5 s
2b	+ 10V	10 pulses	0,5 s	5 s
3a	- 112V	20 minutes	90 ms	100 ms
3b	+ 75V	20 minutes	90 ms	100 ms
4	- 6V	10 pulses	1 min	-

15.1.2 Performance Criterion

Pulse 3a and 3b, Criterion A

Pulse 1, 2a, 2b, and 4, Criterion B

15.2 Test Setup



15.3 Test Procedure

Measurement was performed in shielded room.

Measurement and setting of EUT was applied according to ISO 7637-2 clause 4.4.

The test method and equipment was specified by ISO 7637-2 with additions and modifications by EN301 489-1 clause 9.6.

15.4 Test Result

Pulse No.	Level	Number of Pulses or Application Time	Burst/pulse cycle time	Pass/Fail/NA
1	III	10 pulses	0,5 s	
2a	III	10 pulses	0,2 s	
2b	III	10 pulses	0,5 s	
3a	III	20 minutes	90 ms	
3b	III	20 minutes	90 ms	
4	III	10 pulses	1 min	

Observation:

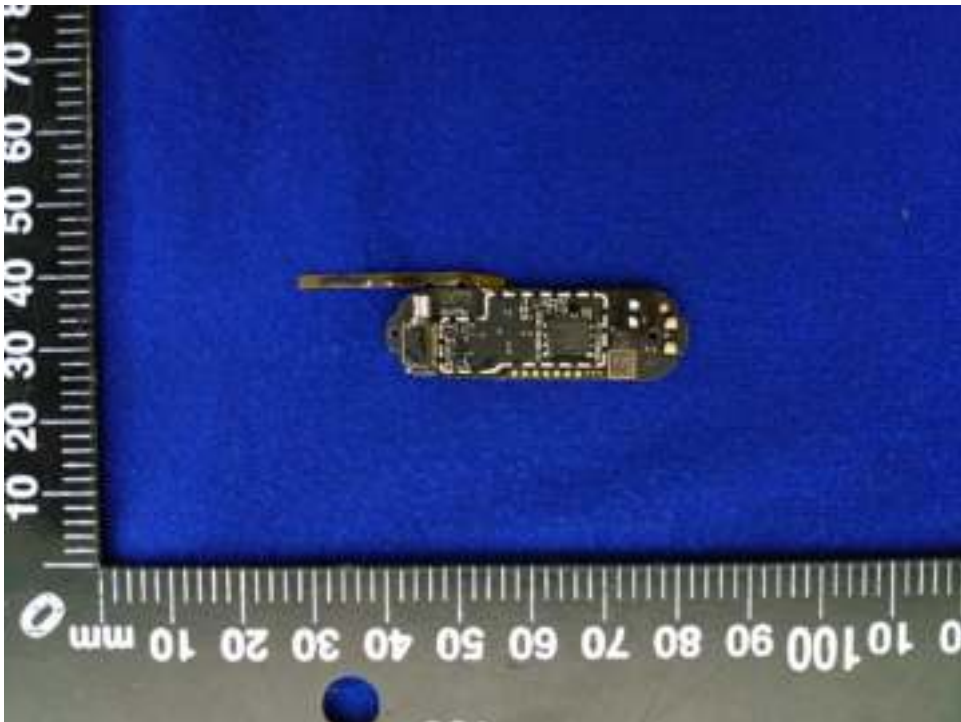
Conclusion:

Appendix I: Photograph of equipment under test

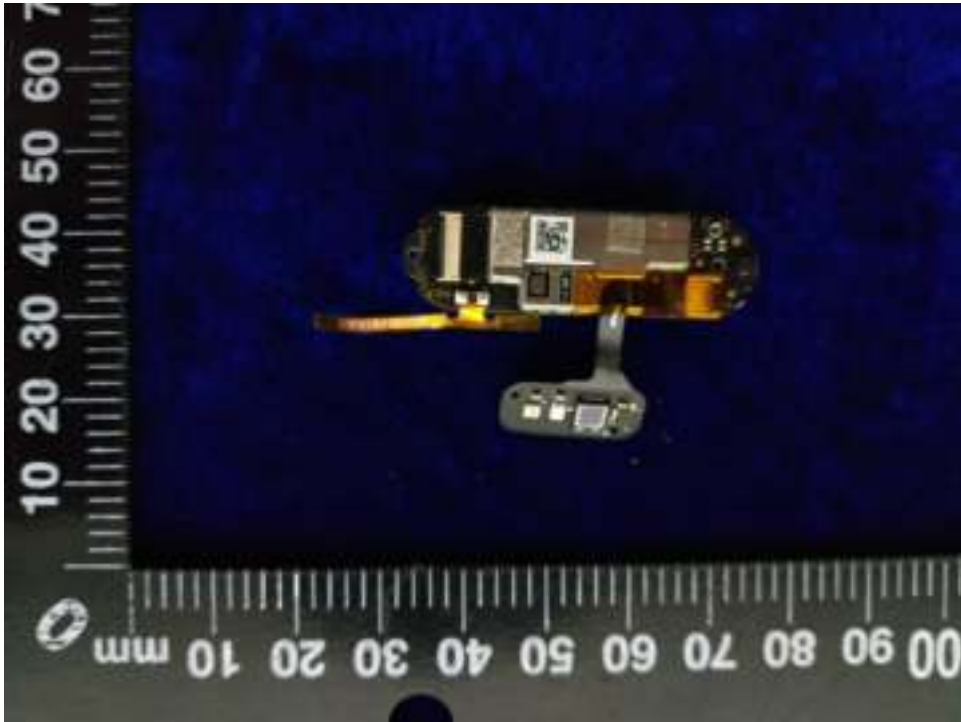


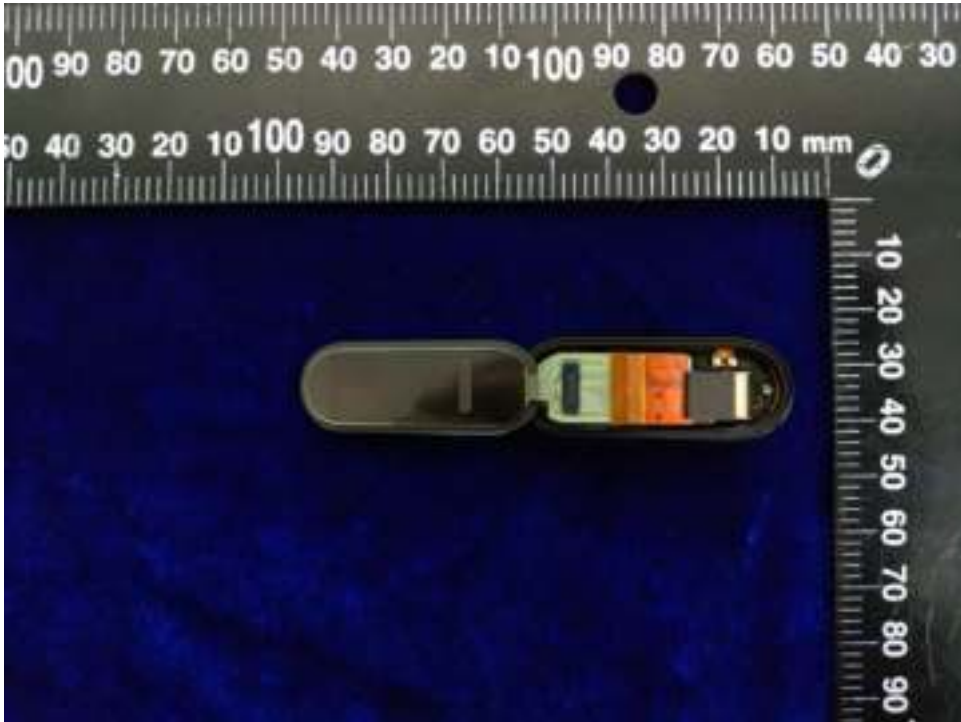














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