

Test Report

Report No: EED32H002420

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Client & Address 1 : Golding Multimedia (Huizhou) Co.,LTD
No.5 District, Hechang 2th road zhongkai New High industrial
Development Zone, Huizhou, Guangdong China

Client & Address 2 : Hong Kong Productivity Council
HKPC Building, 78 Tat Chee Avenue, Kowloon Tong, Hong Kong

Description of the submitted sample(s):

Product : M828
Model/Type reference : N/A
Ratings Voltage : DC 24V
Test Item : Radiated emission(ECE R10.05:2014)
Transient conduction emission(ISO 7637-2:2004)
Transient conducted immunity along supply lines
(ISO 7637-2:2004)

State of Sample(s) : Normal
Sample Quantity : 1 Head unit+2 Terminals
Manufacturer : Golding Multimedia (Huizhou) Co.,LTD

Sample Received Date : Dec. 04, 2016
Sample tested Date : Dec. 04, 2016 to Dec. 07, 2016
Test Requested : ECE R10.05:2014
ISO 7637-2:2004
Requirement of Client

Test Results: Pass

Compiled by:

Lily Li

Reviewed by:

Rita Xiao

Approved by:

Christy Chen

Date:

Dec. 31, 2016

Christy Chen
Lab supervisor

Check No.: 1022541842

Centre Testing International Group Co., Ltd.

Hongwei Industrial Zone, Bao'an 70 District, Shenzhen, Guangdong, China



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1 TEST SUMMARY

The Product has been tested according to the following specifications:

Standard	Test Item	Test Result
ECE R10.05	Radiated emission test	PASS
ISO 7637-2	Transient conduction emission	PASS
ISO 7637-2	Transients conducted immunity along supply lines	PASS

2 MEASUREMENT UNCERTAINTY

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

Test item	Value (dB)
Radiated emission test	5.3

3 EQUIPMENT LIST

Conducted emission				
Equipment	Manufacturer	Model	Serial No.	Due Date
LISN	schwarzbeck	NNBM8125	81251547	06/29/2017
LISN	schwarzbeck	NNBM8125	81251548	06/29/2017
Receiver	R&S	ESCI	100435	06/29/2017

Radiated disturbance test				
Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06/01/2017
Receiver	R&S	ESCI	100435	06/29/2017
Artificial Mains Network	schwarzbeck	NNBM8125	81251547	06/29/2017
Artificial Mains Network	schwarzbeck	NNBM8125	81251548	06/29/2017
Monopole Antenna	schwarzbeck	VAMP 9243	9243-213	10/16/2017
Log.-per. Antenna	schwarzbeck	VUSLP 9111B	9111B-088	03/19/2018
Biconical Antenna	schwarzbeck	VHBB 9124 + BBA 9106	9124-587	03/19/2018
Horn Antenna	ETS-LINGREN	3117	00057407	07/18/2019
Microwave amplifier	Agilent	11909A	186871	06/29/2017

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Transient conduction emission				
Equipment	Manufacturer	Model	Serial No.	Due Date
ISO7637 Test System	TESEQ	NSG5500/5600	W124	01/28/2017
Mechanical Switch	TESEQ	MS 5500	201-958-SN:104	01/28/2017
Electron Switch	TESEQ	ES 5500	201-957-SN:104	01/28/2017
Controller	TESEQ	SC 5500	201-956-SN:104	01/28/2017
LISN	TESEQ	AN 5500	201-959-SN:104	01/28/2017
Oscilloscope	TEK	TDS3054C	/	09/22/2017

Transients conducted immunity				
Equipment	Manufacturer	Model	Serial No.	Due Date
ISO7637 Test System	TESEQ	NSG5500/5600	W124	01/28/2017

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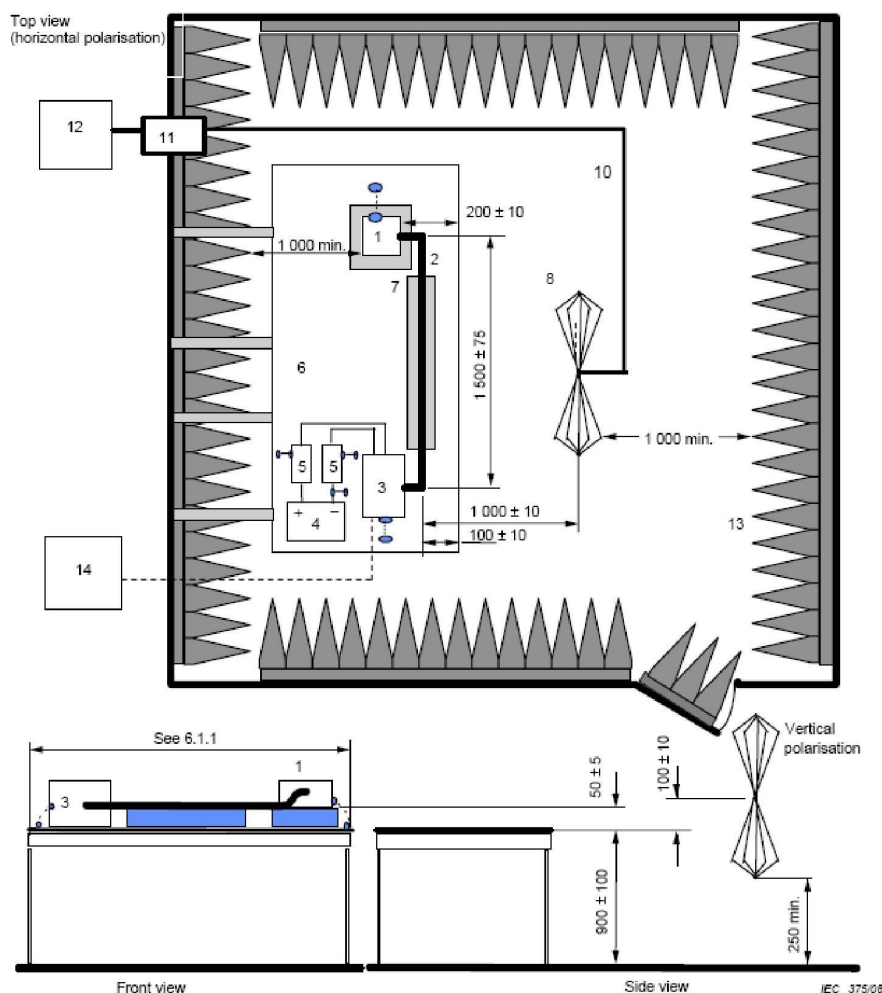
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4 Radiated Emission (RE)

4.1 Test Condition

Operation Mode : NORMAL
Operation Voltage : DC 24V
Temperature / Humidity / Air Pressure : 24°C/53%/101Kpa

4.2 Test Setup



Key

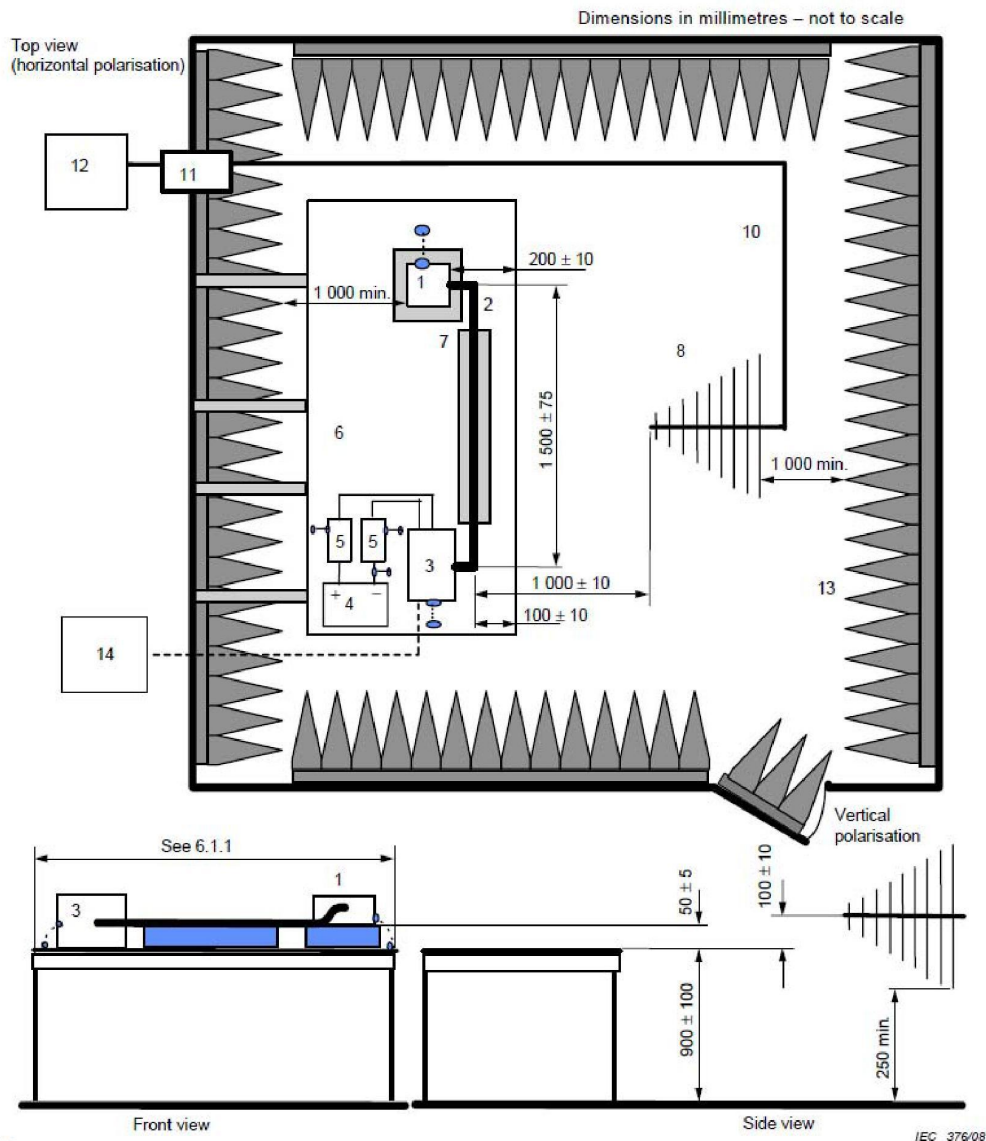
- | | |
|---|---|
| 1 EUT (grounded locally if required in test plan) | 8 Biconical antenna |
| 2 Test harness | |
| 3 Load simulator (placement and ground connection according to 6.4.2.5) | 10 High-quality coaxial cable e.g. double-shielded (50 Ω) |
| 4 Power supply (location optional) | 11 Bulkhead connector |
| 5 Artificial network (AN) | 12 Measuring instrument |
| 6 Ground plane (bonded to shielded enclosure) | 13 RF absorber material |
| 7 Low relative permittivity support ($\epsilon_r \leq 1.4$) | 14 Stimulation and monitoring system |

Figure -1 30MHz-200MHz Test Setup

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Key

- | | |
|---|---|
| 1 EUT (grounded locally if required in test plan) | 8 Log-periodic antenna |
| 2 Test harness | |
| 3 Load simulator (placement and ground connection according to 6.4.2.5) | 10 High-quality coaxial cable e.g. double-shielded (50 Ω) |
| 4 Power supply (location optional) | 11 Bulkhead connector |
| 5 Artificial network (AN) | 12 Measuring instrument |
| 6 Ground plane (bonded to shielded enclosure) | 13 RF absorber material |
| 7 Low relative permittivity support ($\epsilon_r \leq 1,4$) | 14 Stimulation and monitoring system |

Figure-2 200MHz-1GHz Test Setup

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4.3 Limits

Frequency (MHz)	Broadband (Quasi-peak) limits at 1m
30-75	62-52 ^a
75-400	52-63 ^b
400-1000	63
^a Decreasing linearly with the log of the frequency. ^b Increasing linearly with the log of the frequency.	

Frequency (MHz)	Narrowband (Average) Limits at 1m
30-75	52-42 ^a
75-400	42-53 ^b
400-1000	53
^a Decreasing linearly with the log of the frequency. ^b Increasing linearly with the log of the frequency.	

NOTE: The lower limit shall apply at the transition frequencies.

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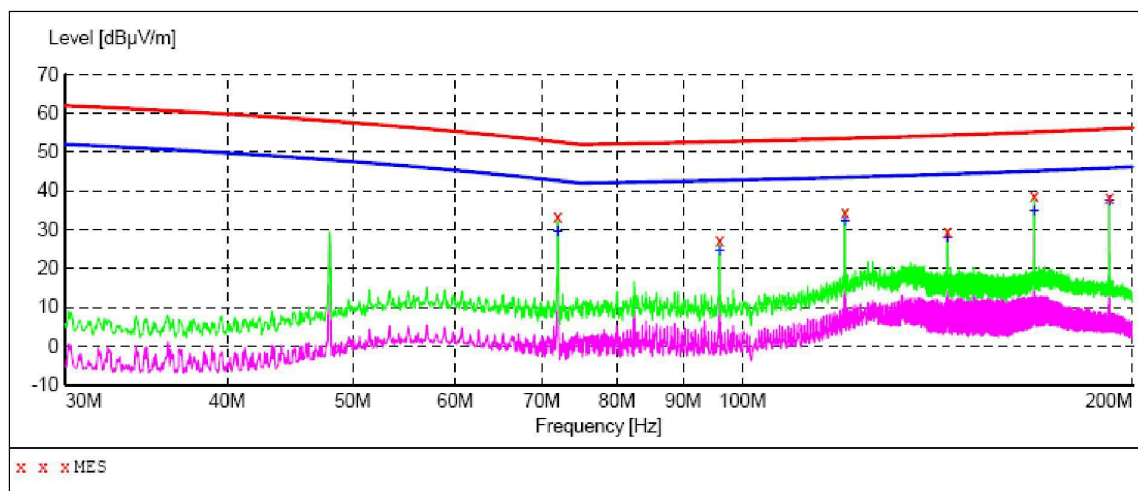
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4.4 Test Result

Product : M828
Power : DC 24V
Range : 30MHz-200MHz

Model/Type reference : N/A
Mode : Normal



MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
72.000000	33.30	-22.5	52.7	19.4	QP	0.0	0.00	HORIZONTAL
96.000000	27.30	-22.4	52.7	25.4	QP	0.0	0.00	HORIZONTAL
120.000000	34.60	-21.0	53.5	18.9	QP	0.0	0.00	HORIZONTAL
144.000000	29.50	-19.5	54.3	24.8	QP	0.0	0.00	HORIZONTAL
168.000000	38.70	-18.2	55.1	16.4	QP	0.0	0.00	HORIZONTAL
192.000000	38.30	-16.9	56.0	17.7	QP	0.0	0.00	HORIZONTAL

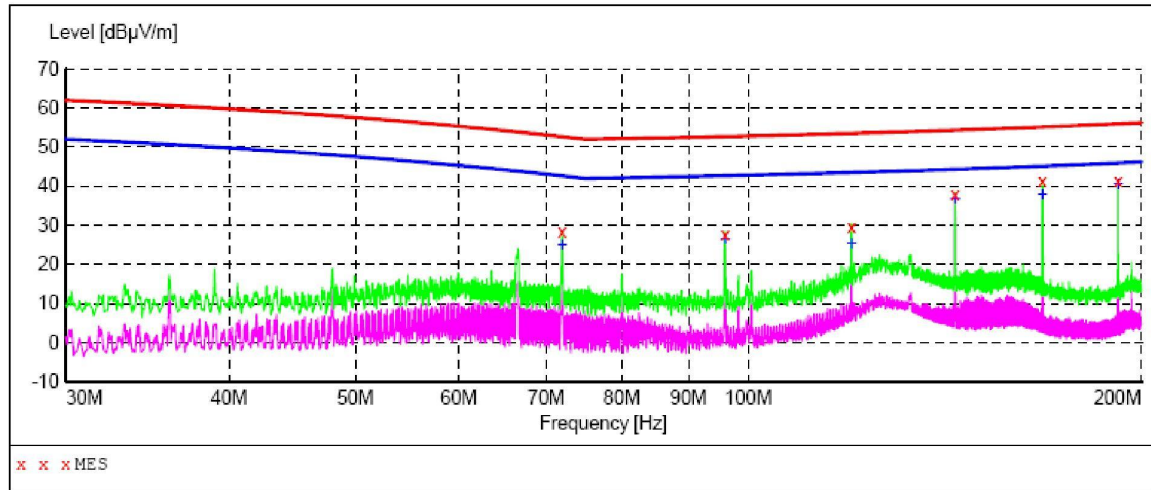
MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
72.000000	29.60	-22.5	42.7	13.1	AV	0.0	0.00	HORIZONTAL
96.000000	24.50	-22.4	42.7	18.2	AV	0.0	0.00	HORIZONTAL
120.000000	32.40	-21.0	43.5	11.1	AV	0.0	0.00	HORIZONTAL
144.000000	27.90	-19.5	44.3	16.4	AV	0.0	0.00	HORIZONTAL
168.000000	34.90	-18.2	45.1	10.2	AV	0.0	0.00	HORIZONTAL
192.000000	37.60	-16.9	46.0	8.4	AV	0.0	0.00	HORIZONTAL

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MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
72.000000	28.60	-22.5	52.7	24.1	QP	0.0	0.00	VERTICAL
96.000000	27.80	-22.4	52.7	24.9	QP	0.0	0.00	VERTICAL
120.000000	29.70	-21.0	53.5	23.8	QP	0.0	0.00	VERTICAL
144.000000	37.90	-19.5	54.3	16.4	QP	0.0	0.00	VERTICAL
168.000000	41.50	-18.2	55.1	13.6	QP	0.0	0.00	VERTICAL
192.000000	41.30	-16.9	56.0	14.7	QP	0.0	0.00	VERTICAL

MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
72.000000	24.90	-22.5	42.7	17.8	AV	0.0	0.00	VERTICAL
96.000000	26.40	-22.4	42.7	16.3	AV	0.0	0.00	VERTICAL
120.000000	25.50	-21.0	43.5	18.0	AV	0.0	0.00	VERTICAL
144.000000	36.90	-19.5	44.3	7.4	AV	0.0	0.00	VERTICAL
168.000000	37.90	-18.2	45.1	7.2	AV	0.0	0.00	VERTICAL
192.000000	40.60	-16.9	46.0	5.4	AV	0.0	0.00	VERTICAL

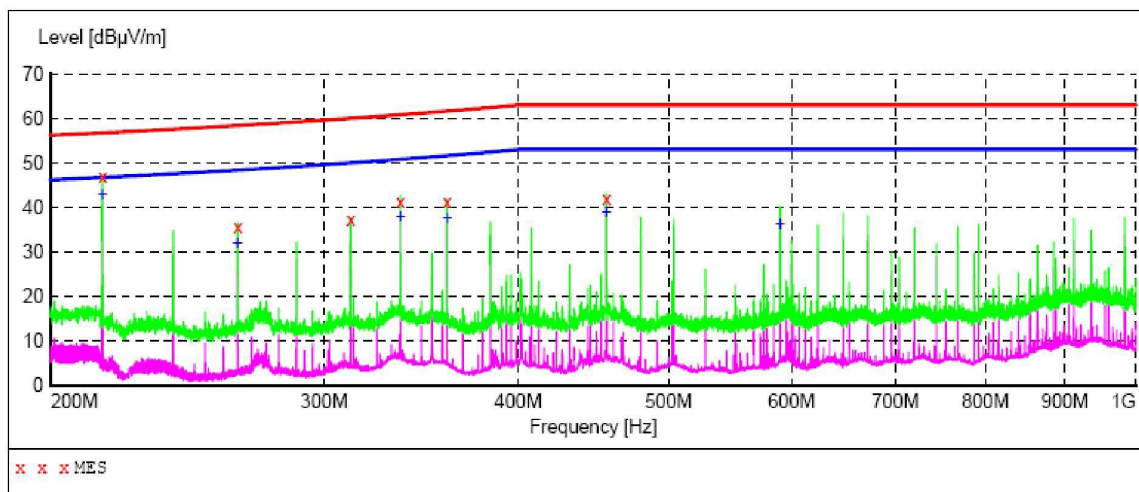
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Product : M828
Power : DC 24V
Range : 200MHz-1000MHz

Model/Type reference : N/A
Mode : Normal



MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
216.020000	46.80	-16.9	56.8	10.0	QP	0.0	0.00	HORIZONTAL
264.020000	35.70	-16.0	58.4	22.7	QP	0.0	0.00	HORIZONTAL
312.020000	37.40	-14.2	60.0	22.6	QP	0.0	0.00	HORIZONTAL
336.020000	41.40	-13.4	60.8	19.4	QP	0.0	0.00	HORIZONTAL
360.020000	41.40	-13.0	61.6	20.2	QP	0.0	0.00	HORIZONTAL
456.020000	42.00	-12.5	63.0	21.0	QP	0.0	0.00	HORIZONTAL

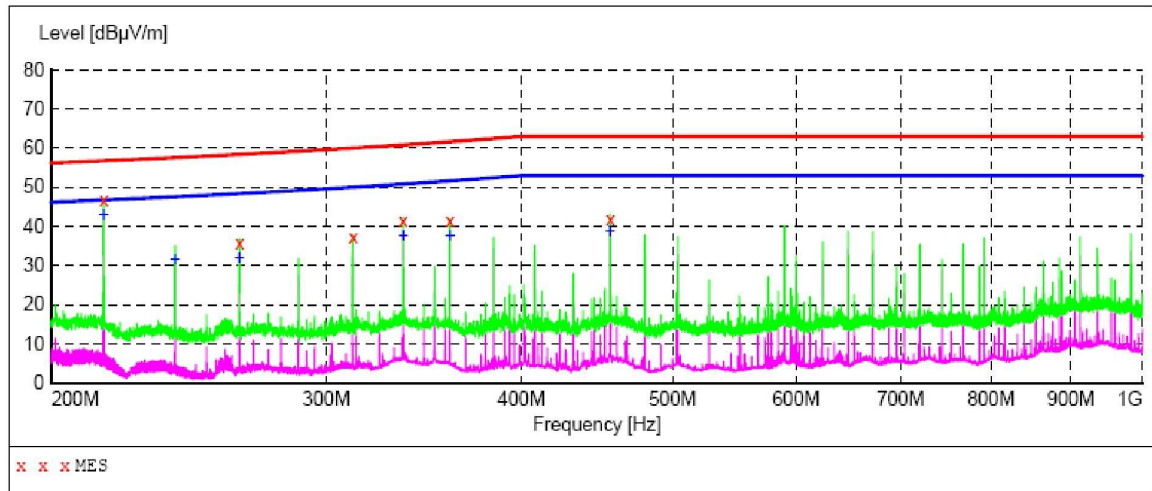
MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
216.020000	42.90	-16.9	46.8	3.9	AV	0.0	0.00	HORIZONTAL
264.020000	31.90	-16.0	48.4	16.5	AV	0.0	0.00	HORIZONTAL
336.020000	37.80	-13.4	50.8	13.0	AV	0.0	0.00	HORIZONTAL
360.020000	37.60	-13.0	51.6	14.0	AV	0.0	0.00	HORIZONTAL
456.020000	39.00	-12.5	53.0	14.0	AV	0.0	0.00	HORIZONTAL
589.940000	36.30	-10.2	53.0	16.7	AV	0.0	0.00	HORIZONTAL

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MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
216.020000	46.80	-16.9	56.8	10.0	QP	0.0	0.00	VERTICAL
264.020000	35.80	-16.0	58.4	22.6	QP	0.0	0.00	VERTICAL
312.020000	37.20	-14.2	60.0	22.8	QP	0.0	0.00	VERTICAL
336.020000	41.50	-13.4	60.8	19.3	QP	0.0	0.00	VERTICAL
360.020000	41.50	-13.0	61.6	20.1	QP	0.0	0.00	VERTICAL
456.020000	41.90	-12.5	63.0	21.1	QP	0.0	0.00	VERTICAL

MEASUREMENT RESULT:

Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
216.020000	42.90	-16.9	46.8	3.9	AV	0.0	0.00	VERTICAL
240.020000	31.40	-16.7	47.6	16.2	AV	0.0	0.00	VERTICAL
264.020000	31.80	-16.0	48.4	16.6	AV	0.0	0.00	VERTICAL
336.020000	37.70	-13.4	50.8	13.1	AV	0.0	0.00	VERTICAL
360.020000	37.80	-13.0	51.6	13.8	AV	0.0	0.00	VERTICAL
456.020000	38.90	-12.5	53.0	14.1	AV	0.0	0.00	VERTICAL

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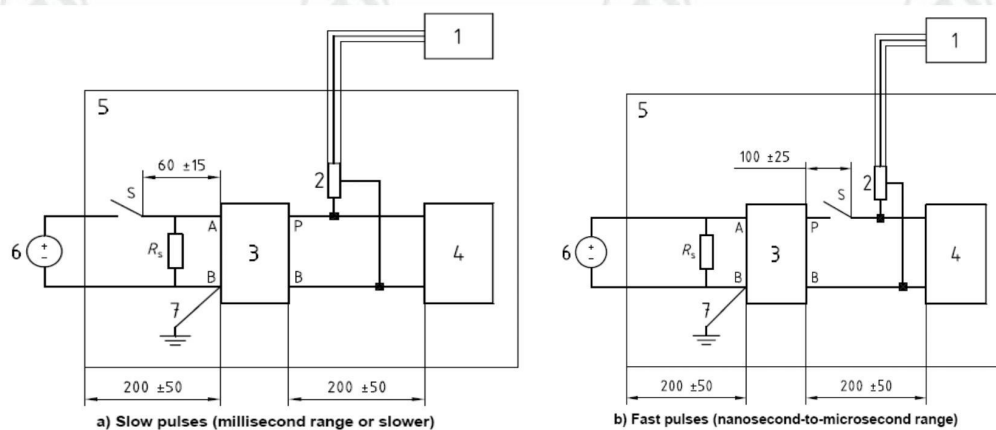
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5 Transients Conducted Emission

5.1 Test Condition

Operation Mode : NORMAL
Operation Voltage : DC 24V
Temperature / Humidity / Air Pressure : 24°C/53%/101Kpa

5.2 Test Setup



Remark:

- 1-Oscilloscope or equivalent
- 2-Voltage probe
- 3-Artificial network
- 4-DUT

- 5-Ground plane
- 6-Power supply
- 7-Ground connection

Figure-3 Transient Conducted Emission Test Setup

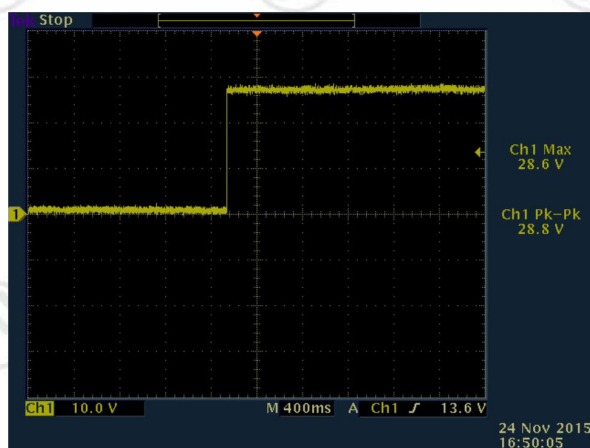
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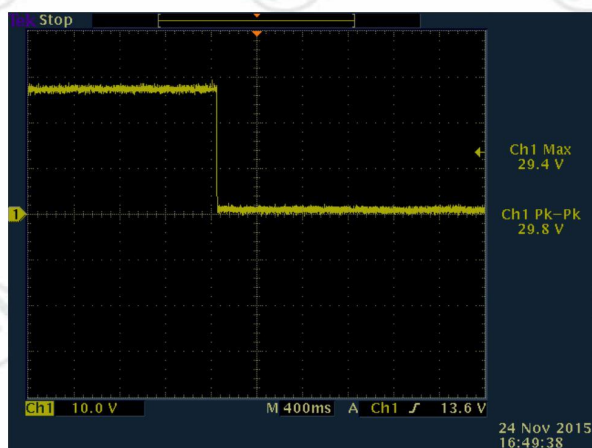
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5.3 Test Result

DC24V System (Slow Pulse) Positive Pulse

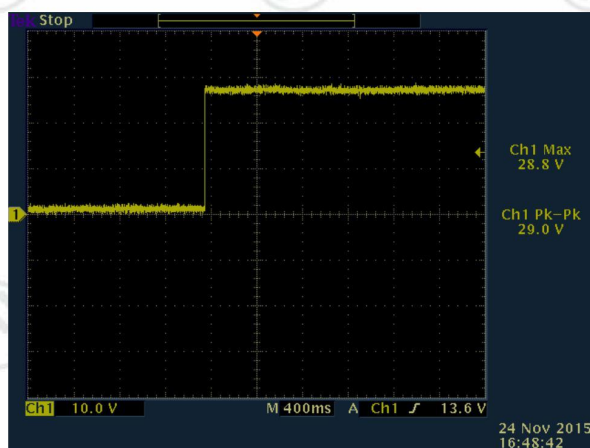


Negative Pulse

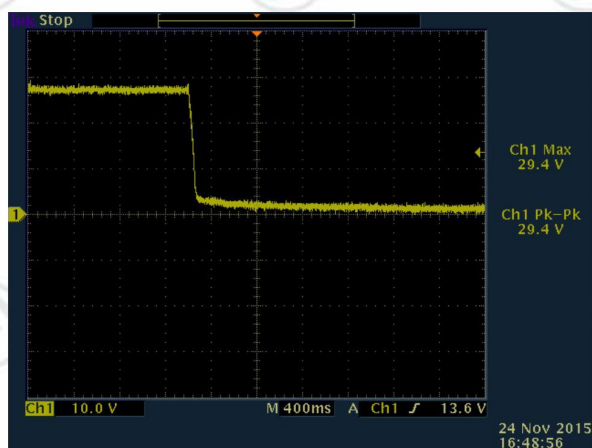


Pulse Amplitude	Require Level	Test Value(Max.)	Test Result
Positive	+150V	+28.6V	PASS
Negative	-450V	-29.8V	PASS

DC24V System (Fast Pulse) Positive Pulse



Negative Pulse



Pulse Amplitude	Require Level	Test Value(Max.)	Test Result
Positive	+150V	+28.8V	PASS
Negative	-450V	-29.4V	PASS

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6 Immunity Test

General Performance Criteria	
ISO 7637-2:2004 Annex A.4	
Class A	All functions of a device/system perform as designed during and after exposure to disturbance.
Class B	All functions of a device/system perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A.
Class C	One or more functions of a device/system do not perform as designed during exposure but return automatically to normal operation after operation after exposure is removed.
Class D	One or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple operator/use action.
Class E	One or more functions of a device/system do not perform as designed during and after exposure and can not be returned proper operation without repairing or replacing the device/system.

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7 Transient Conducted Immunity along supply lines

7.1 Test Condition

Operation Mode : NORMAL
Operation Voltage : DC 24V
Temperature / Humidity / Air Pressure : 24°C/53%/101Kpa

7.2 Test Setup

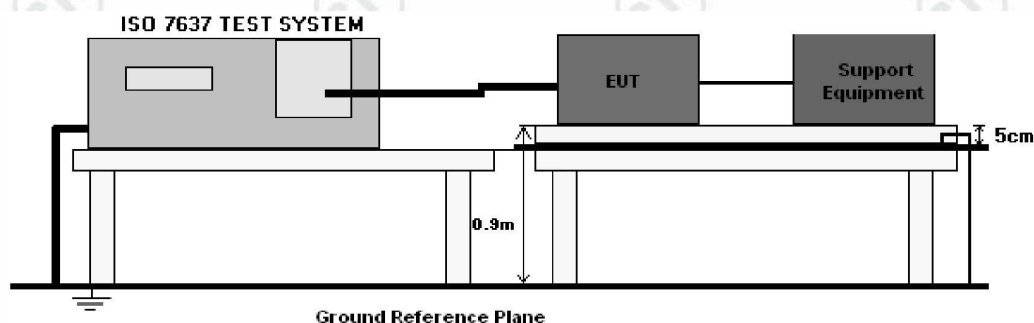
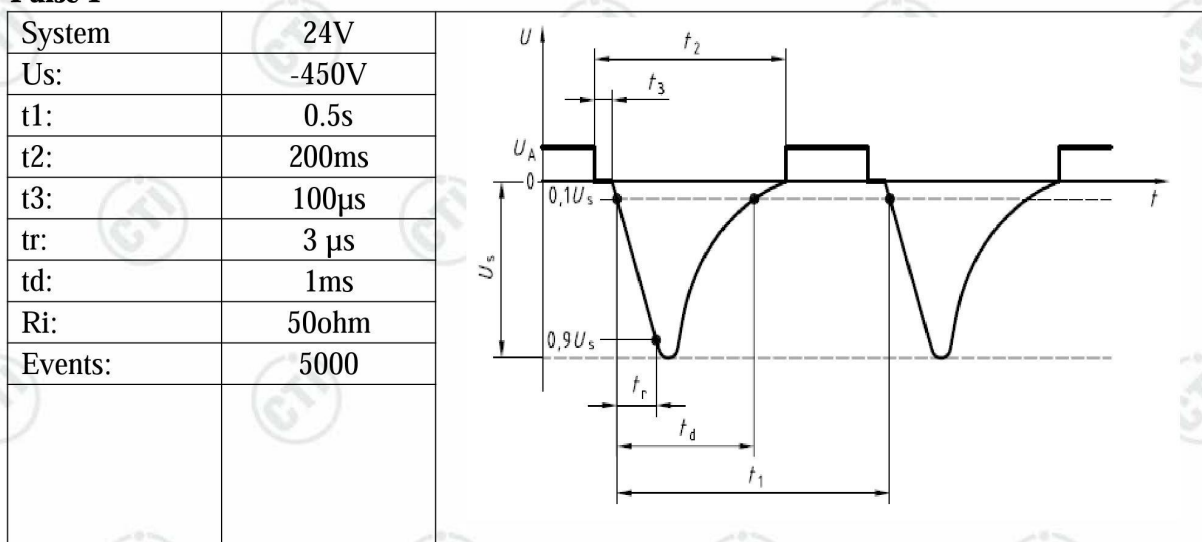


Figure-8 Transient Conducted Immunity along supply lines Test Setup

7.3 Test Pulse and Parameters

Pulse 1



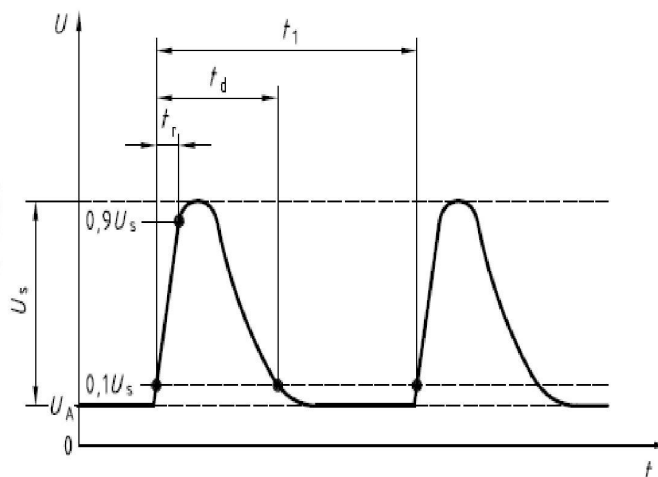
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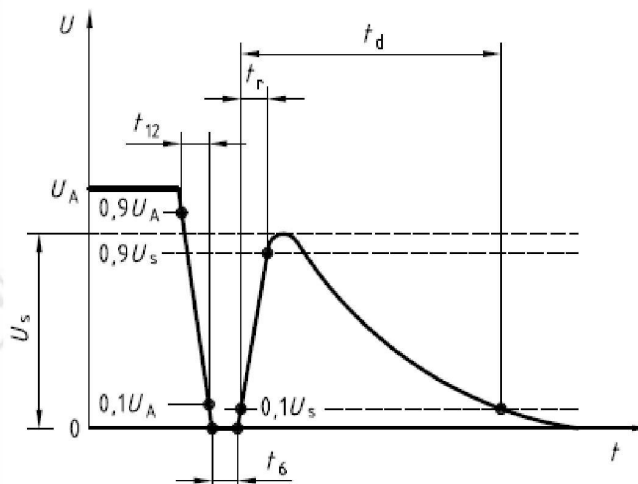
Pulse 2a

System	24V
Us:	+37V
t1:	0.2s
tr:	1 μ s
td:	50 μ s
Ri:	2ohm
Events:	5000



Pulse 2b

System	24V
Us:	+20V
t6:	1ms
t12:	1ms
td:	0.2s
tr:	1ms
Ri:	0.05ohm
Events:	10



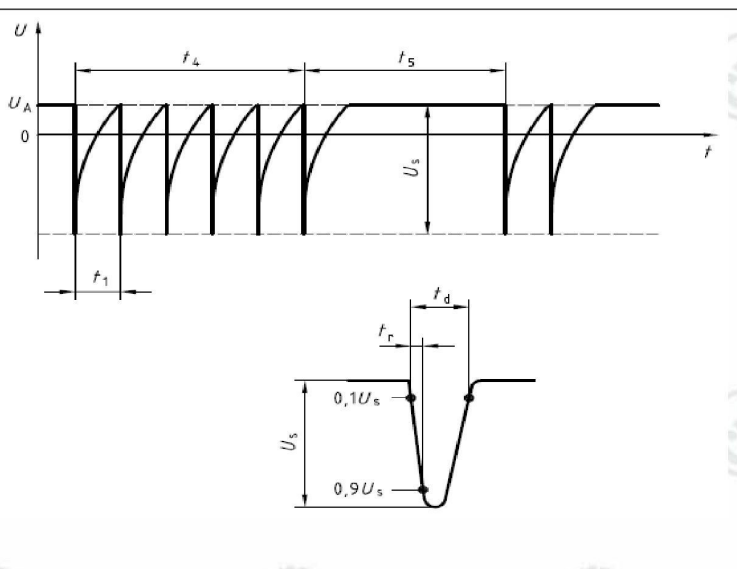
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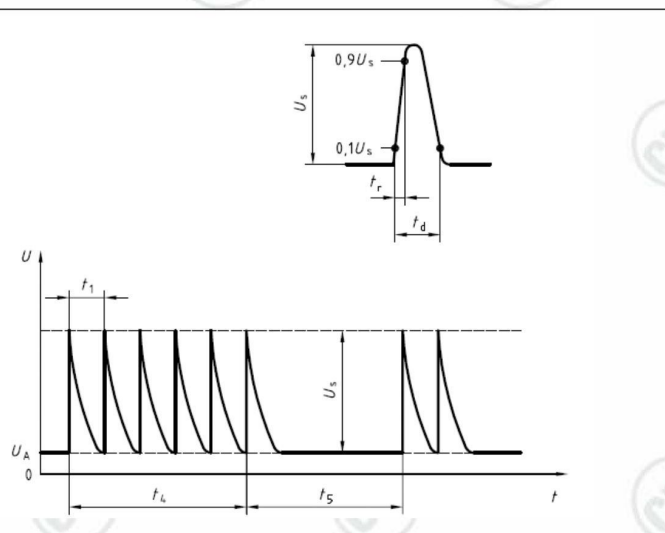
Pulse 3a

System	24V
Us:	-150V
t1:	100μs
t4:	10ms
t5:	90ms
tr:	5ns
td:	150ns
Ri:	50ohm
Duration:	1h



Pulse 3b

System	24V
Us:	+150V
t1:	100μs
t4:	10ms
t5:	90ms
tr:	5ns
td:	150ns
Ri:	50ohm
Duration:	1h

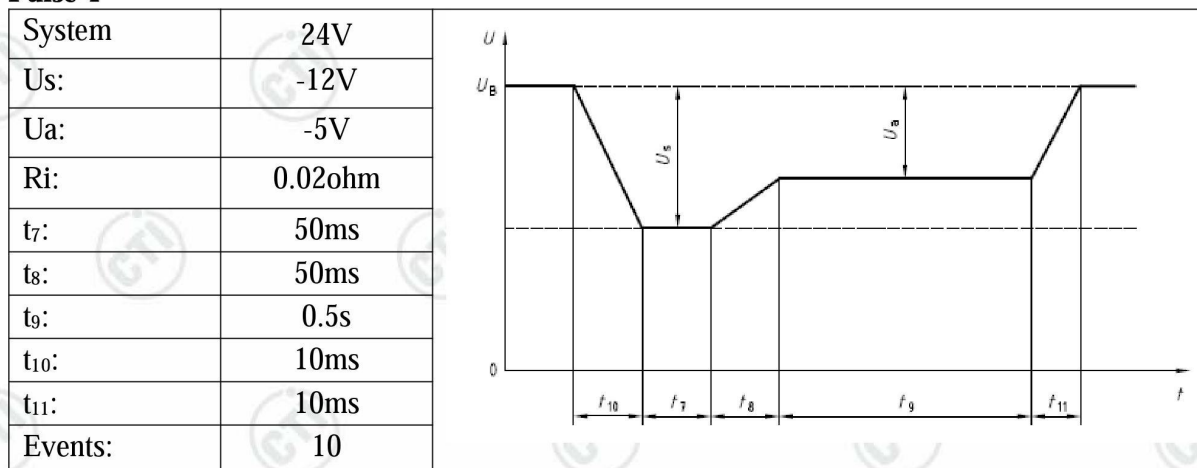


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Pulse 4



7.4 Test Results

Test Pulse	24V system test Voltage(V)	Min. Number of pulses or test time	Require Level	Test Level	Test Result
1	-450	5000 pulses	D	C ¹	PASS
2a	+37	5000 pulses	D	A	PASS
2b	+20	10 pulses	D	C ¹	PASS
3a	-150	1h	D	A	PASS
3b	+150	1h	D	A	PASS
4	-12	10 pulses	D	A	PASS

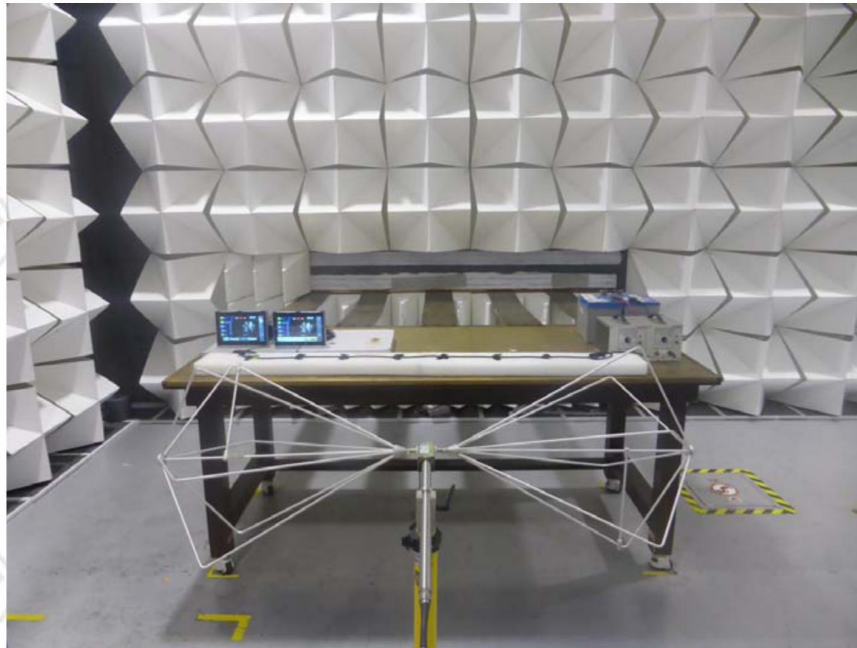
Remark: 1. During the test, the EUT stop working, the EUT can automatically recover to normally after the test.

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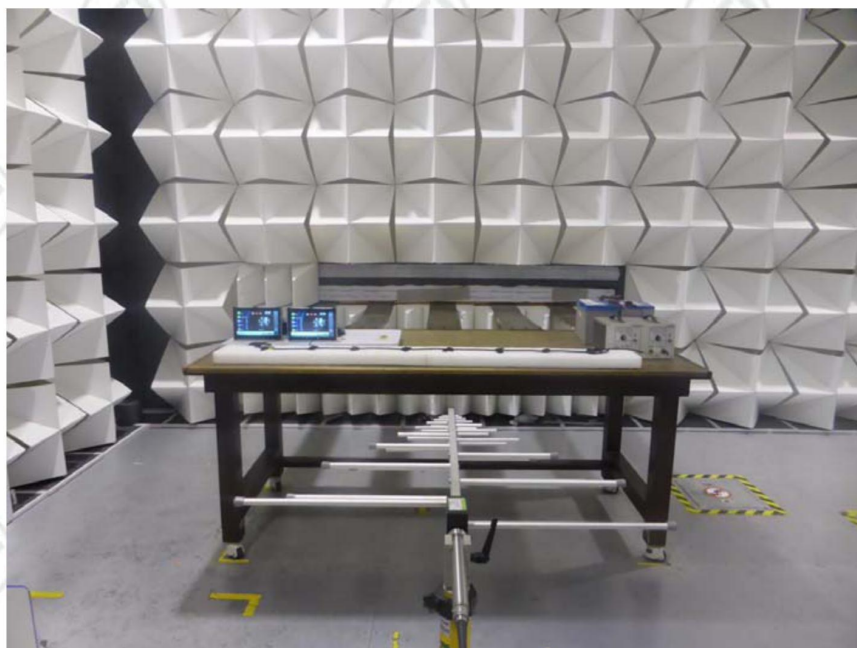
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Test Photo



Radiated emission 30MHz-200MHz



Radiated emission 200MHz-1000MHz

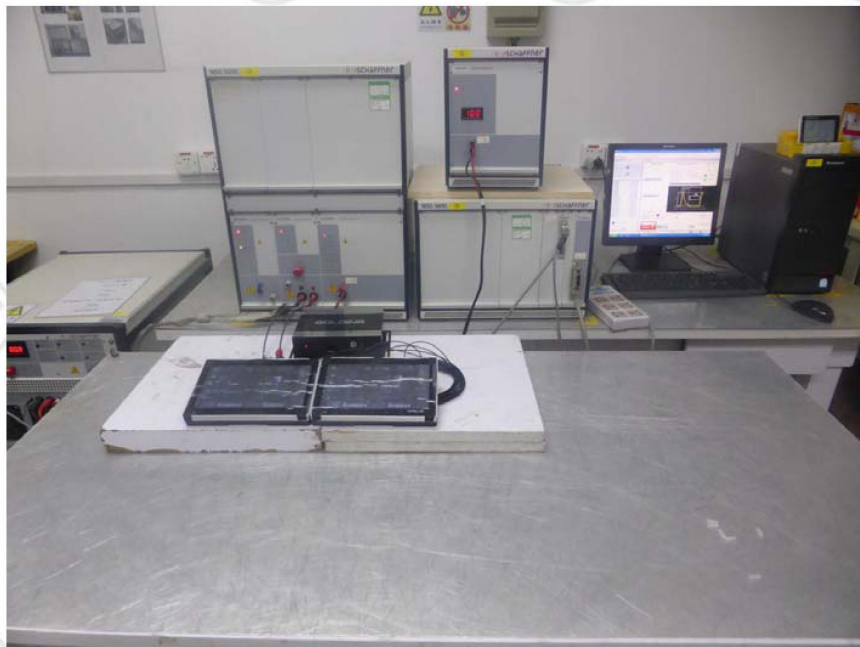
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Transient conduction emission



Transient conducted immunity-Supply Lines

*** End of Report ***

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