



## EMC TEST REPORT

**Product** : AHD car camera  
**Trade mark** : LINTECH  
**Model/Type reference** : LC-012A,LC-012W, LC-012AT2,  
 LC-028A, LC-018A, LC-018B,  
 LC-018C, LC-018D, LC-018E  
 LC-007A, LC-009D1, LC-010G,  
 LC-10A, LC-10B, LC-10C, LC-024A,  
 LC-015DB, LC-009A, LC-009B,  
 LC-009C, LC-009D, LC-009E  
**Serial Number** : N/A  
**Ratings** : DC 12V  
**Report Number** : EED32I003158  
**Date** : Dec. 29, 2016  
**Regulations** : See below

Test Standards	Results
<input checked="" type="checkbox"/> EN 50498: 2010	PASS

Prepared for:

**LINTECH ENTERPRISES LIMITED**  
 3/F, Blcok A8, Kaida Creative Industry Park, Qiaochang Road, Qiaotou  
 Town, Dongguan City, Guangdong, China

Prepared by:

**Centre Testing International Group Co., Ltd.**  
 Hongwei Industrial Zone, Bao'an 70 District,  
 Shenzhen, Guangdong, China  
**TEL: +86-755-3368 3668**  
**FAX: +86-755-3368 3385**

Compiled by: Jacksoo 2016

Reviewed by: Christy Chen

Approved by: Christy Chen

Date: Dec. 29, 2016

Christy Chen  
 Lab supervisor

Check No.: 2457573957



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

## 1. GENERAL INFORMATION

<b>Applicant:</b>	LINTECH ENTERPRISES LIMITED 3/F, Blcok A8, Kaida Creative Industry Park, Qiaochang Road, Qiaotou Town, Dongguan City, Guangdong,China
<b>Manufacturer:</b>	LINTECH ENTERPRISES LIMITED 3/F, Blcok A8, Kaida Creative Industry Park, Qiaochang Road, Qiaotou Town, Dongguan City, Guangdong,China
<b>EMC Directive:</b>	2014/30/EU
<b>Product:</b>	AHD car camera
<b>Trade mark:</b>	LINTECH
<b>Model/Type reference:</b>	LC-012A,LC-012W, LC-012AT2, LC-028A, LC-018A, LC-018B, LC-018C, LC-018D, LC-018E, LC-007A, LC-009D1, LC-010G,LC-10A, LC-10B, LC-10C, LC-024A, LC-015DB, LC-009A, LC-009B, LC-009C, LC-009D, LC-009E
<b>Serial Number:</b>	N/A
<b>Report Number:</b>	EED32I003158
<b>Sample Received Date:</b>	Oct. 26, 2016
<b>Sample tested Date:</b>	Oct. 26, 2016 to Nov. 17, 2016

The tested sample(s) and the sample information are provided by the client.  
All test data come from the report of No. EED32I002788

## 2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item (Test method is refer to 2014/30/EU directive)	Test Result
Broadband Radiated Disturbances and Narrowband Radiated Disturbance	Pass
Conducted Transient Disturbances	Pass
Conducted Transient Immunity	Pass

## 3. TEST UNCERTAINTY

Where relevant, the following test 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 disturbance (30MHz to 1GHz)	5.3

## 4. PRODUCT INFORMATION AND TEST SETUP

### 4.1 PRODUCT INFORMATION

**Ratings:** DC 12V

**Model difference:** All models are identical except the model name. The test model is LC-012A and the test results are applicable to the others.

### 4.2 TEST SETUP CONFIGURATION

See test photographs attached in Appendix 1 for the actual connections between Product and support equipment.

### 4.3 SUPPORT EQUIPMENT

No.	Device Type	Brand	Model	Series No.	Data Cable	Power Cord
1.	MORNITOR	LINTECH	LM-070C2AHD	---	---	---

**Notes:**

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

## 5. FACILITIES AND ACCREDITATIONS

### 5.1 TEST FACILITY

All test facilities used to collect the test data are located at Hongwei Industrial Zone, 70 Area, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4, CISPR 16-1-1 and other equivalent standards.

### 5.2 TEST EQUIPMENT LIST

**Instrumentation:** The following list contains equipments used at CTI for testing. The calibrations of the measuring instruments, including any accessories that may effect such calibration, are checked frequently to assure their accuracy. Adjustments are made and correction factors applied in accordance with instructions contained in the manual for the measuring instrument.

**Equipment used during the tests:**

3M Semi-anechoic Chamber (2)-Broadband Radiated Disturbances and Narrowband Radiated Disturbance				
Equipment	Manufacturer	Model	Serial No.	Due Date
3M Chamber & Accessory Equipment	TDK	SAC-3	---	06/01/2019
Receiver	R&S	ESCI	100435	06/15/2017
Multi device Controller	maturo	NCD/070/10711 112	---	N/A
LISN	schwarzbeck	NNBM8125	81251547	06/15/2017
LISN	schwarzbeck	NNBM8125	81251546	06/15/2017
Log-periodic Antenna	schwarzbeck	VUSLP 9111B	9111B-088	03/19/2017

Biconical Antenna	schwarzbeck	VHBB 9124 + BBA 9106	9124-587	03/19/2017
Multi device Controller	maturio	NCD/070/10711 112	---	N/A
Microwave Preamplifier	Agilent	8449B	3008A02425	02/17/2017

Conducted Transient Disturbances Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
ISO7637 Test System	TESEQ	NSG5500/5600	104	01/27/2017

Conducted Transient Immunity Test				
Equipment	Manufacturer	Model	Serial No.	Due Date
ISO7637 Test System	TESEQ	NSG5500/5600	W124	01/27/2017

### 5.3 LABORATORY ACCREDITATIONS AND LISTINGS

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable under the ISO/IEC/EN 17025 to international or national standards. Equipment has been calibrated by accredited calibration laboratories.

## 6. BROADBAND RADIATED DISTURBANCES AND NARROWBAND RADIATED DISTURBANCES

### 6.1 TEST CONDITION

<b>Operation mode</b>	: Normal
<b>Test voltage</b>	: DC 12V
<b>Test Condition</b>	: Temp: 24°C Related Humidity: 50% Air pressure: 101Kpa
<b>Model/Type reference</b>	: LC-012A

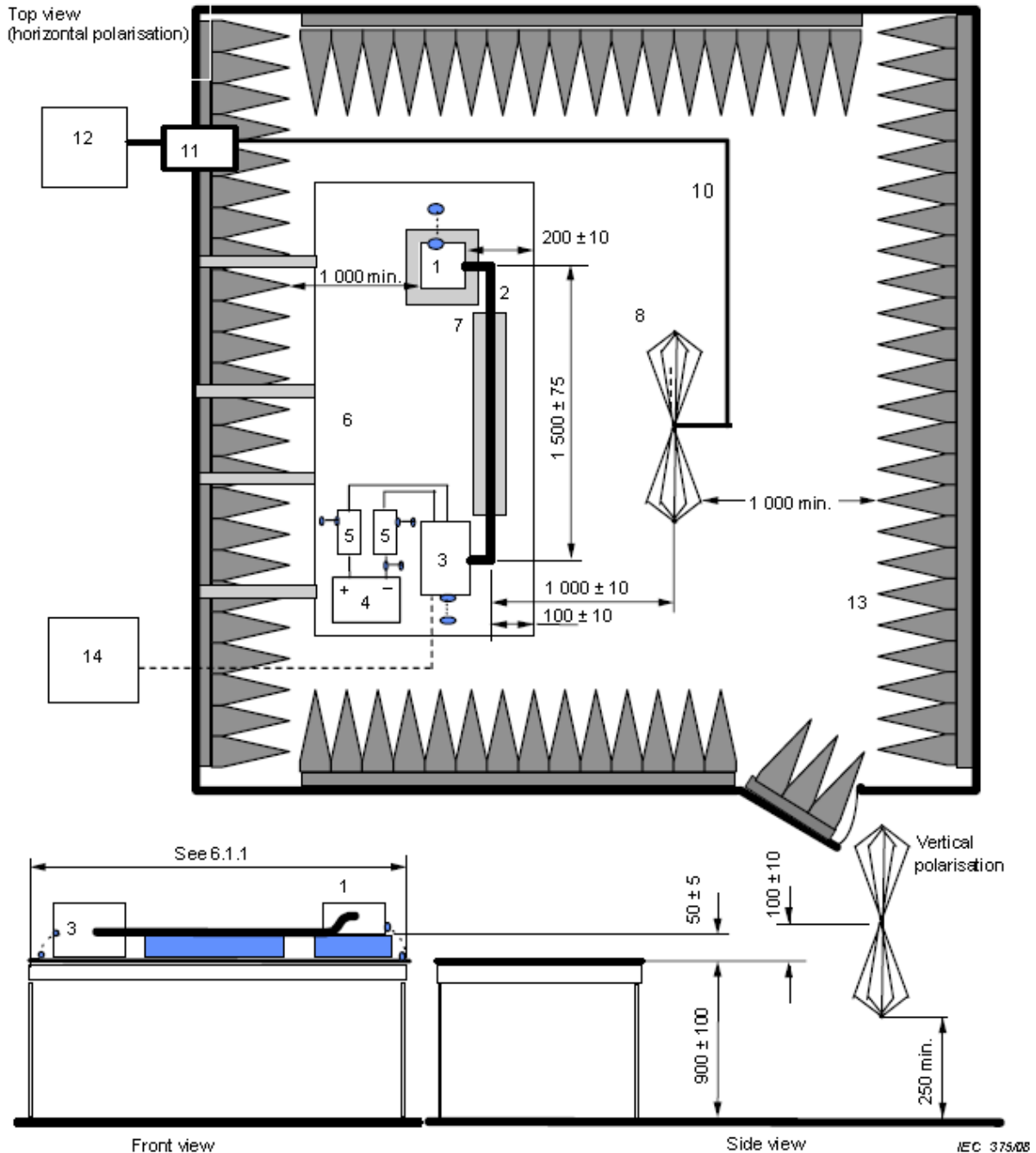
### 6.2 LIMITS

Frequency (MHz)	Broadband limits at 1m dB(μV/m)
30-75	62-52 <sup>a</sup>
75-400	52-63 <sup>b</sup>
400-1000	63
<sup>a</sup> Decreasing linearly with the log of the frequency. <sup>b</sup> Increasing linearly with the log of the frequency.	

Frequency (MHz)	Narrowband Limits at 1m dB(μV/m)
30-75	52-42 <sup>a</sup>
75-400	42-53 <sup>b</sup>
400-1000	53
<sup>a</sup> Decreasing linearly with the log of the frequency. <sup>b</sup> Increasing linearly with the log of the frequency.	

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

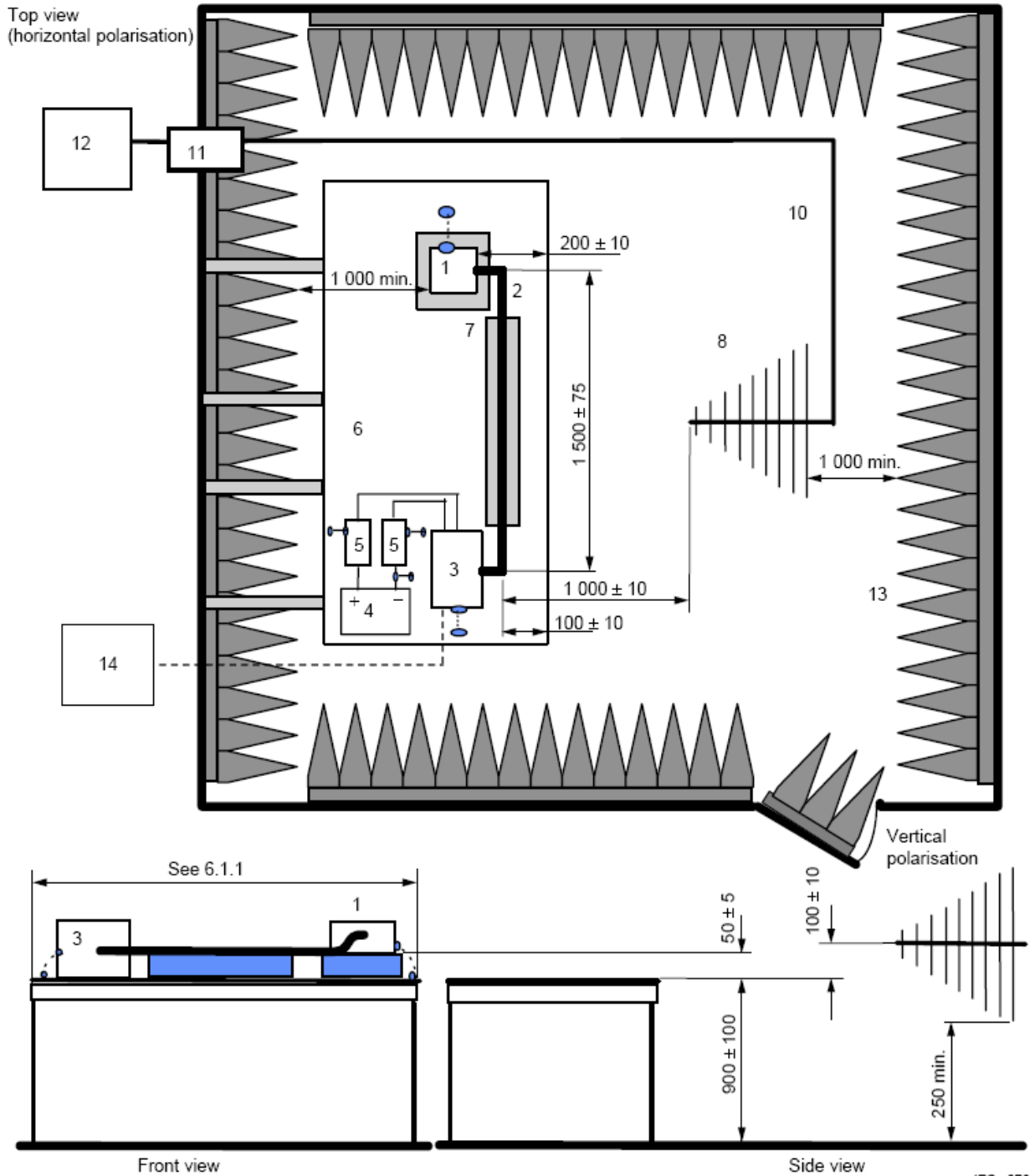
### 6.3 BLOCK DIAGRAM OF TEST SETUP



**Key**

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

Dimensions in millimetres – not to scale



IEC 376/08

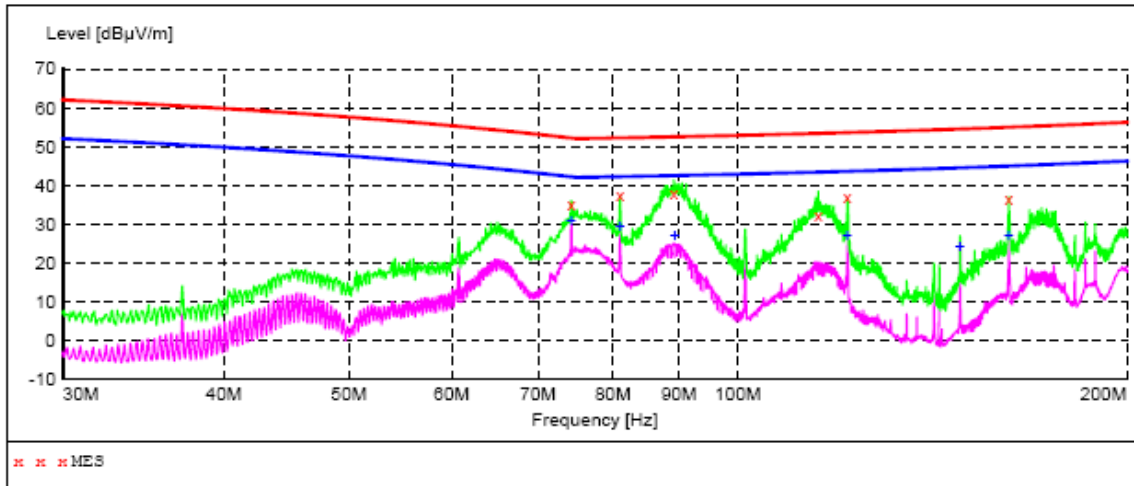
**Key**

- |   |   |
|---|---|
| 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                      |



**6.4 TEST RESULT**

**Product** : AHD car camera      **Model/Type reference** : LC-012A  
**Power** : DC 12V                      **Mode** : Normal  
**Frequency** : 30MHz-200MHz

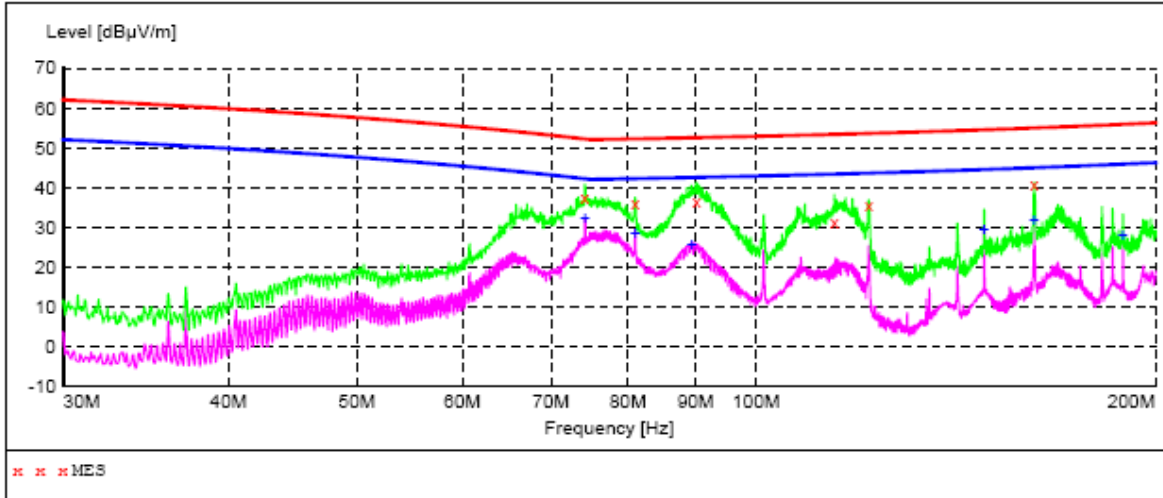


**MEASUREMENT RESULT:**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
74.280000	35.30	-22.6	52.2	16.9	QP	0.0	0.00	HORIZONTAL
81.000000	37.30	-22.7	52.2	14.9	QP	0.0	0.00	HORIZONTAL
89.160000	37.80	-22.5	52.5	14.7	QP	0.0	0.00	HORIZONTAL
115.320000	32.00	-21.3	53.4	21.4	QP	0.0	0.00	HORIZONTAL
121.500000	37.10	-20.9	53.6	16.5	QP	0.0	0.00	HORIZONTAL
162.000000	36.70	-18.5	54.9	18.2	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
74.280000	30.60	-22.6	42.2	11.6	AV	0.0	0.00	HORIZONTAL
81.000000	29.20	-22.7	42.2	13.0	AV	0.0	0.00	HORIZONTAL
89.280000	26.80	-22.5	42.5	15.7	AV	0.0	0.00	HORIZONTAL
121.500000	27.00	-20.9	43.6	16.6	AV	0.0	0.00	HORIZONTAL
148.500000	24.20	-19.2	44.5	20.3	AV	0.0	0.00	HORIZONTAL
162.000000	27.10	-18.5	44.9	17.8	AV	0.0	0.00	HORIZONTAL



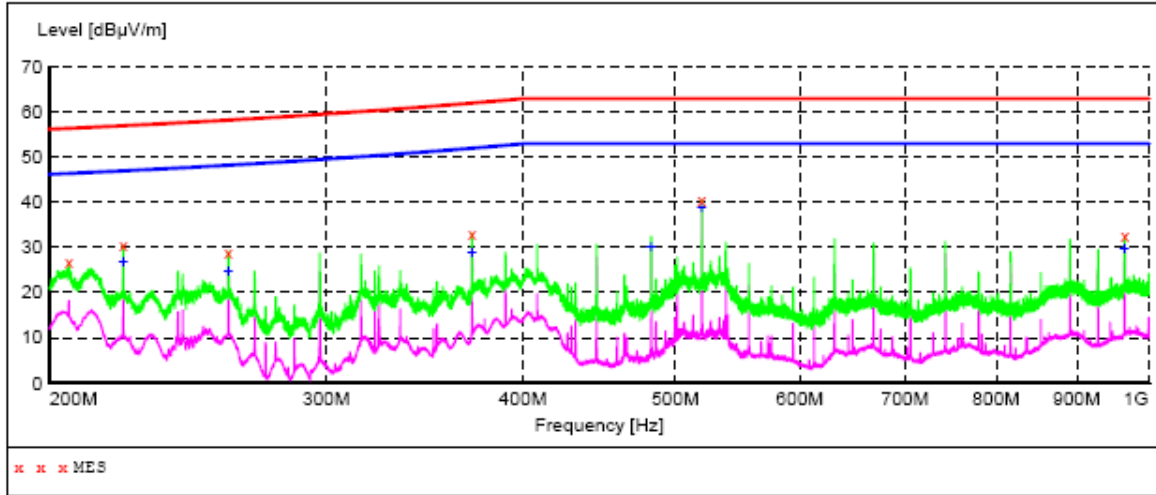
**MEASUREMENT RESULT :**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
74.220000	37.60	-22.6	52.2	14.6	QP	0.0	0.00	VERTICAL
81.000000	35.90	-22.7	52.2	16.3	QP	0.0	0.00	VERTICAL
90.120000	36.30	-22.5	52.5	16.2	QP	0.0	0.00	VERTICAL
114.480000	31.40	-21.4	53.3	21.9	QP	0.0	0.00	VERTICAL
121.560000	35.70	-20.9	53.6	17.9	QP	0.0	0.00	VERTICAL
162.000000	40.80	-18.5	54.9	14.1	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
74.280000	32.00	-22.6	42.2	10.2	AV	0.0	0.00	VERTICAL
81.000000	28.50	-22.7	42.2	13.7	AV	0.0	0.00	VERTICAL
89.400000	25.50	-22.5	42.5	17.0	AV	0.0	0.00	VERTICAL
148.500000	29.60	-19.2	44.5	14.9	AV	0.0	0.00	VERTICAL
162.000000	31.90	-18.5	44.9	13.0	AV	0.0	0.00	VERTICAL
169.000000	28.00	-17.1	45.9	17.9	AV	0.0	0.00	VERTICAL

**Product** : AHD car camera      **Model/Type reference** : LC-012A  
**Power** : DC 12V                      **Mode** : Normal  
**Frequency** : 200MHz-1GHz

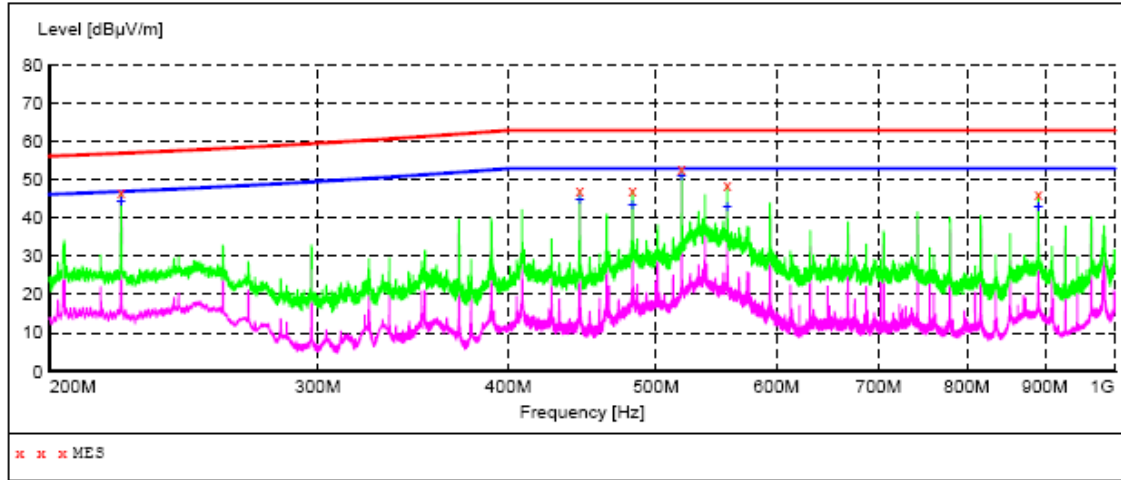


**MEASUREMENT RESULT :**

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
205.700000	26.80	-17.1	56.4	29.6	QP	0.0	0.00	HORIZONTAL
222.740000	30.50	-16.9	57.0	26.5	QP	0.0	0.00	HORIZONTAL
259.880000	29.10	-16.2	58.3	29.2	QP	0.0	0.00	HORIZONTAL
371.240000	33.20	-13.0	62.0	28.8	QP	0.0	0.00	HORIZONTAL
519.740000	40.70	-11.3	63.0	22.3	QP	0.0	0.00	HORIZONTAL
965.240000	32.50	-3.1	63.0	30.5	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
222.740000	27.00	-16.9	47.0	20.0	AV	0.0	0.00	HORIZONTAL
259.880000	24.60	-16.2	48.3	23.7	AV	0.0	0.00	HORIZONTAL
371.240000	28.70	-13.0	52.0	23.3	AV	0.0	0.00	HORIZONTAL
482.600000	30.10	-11.9	53.0	22.9	AV	0.0	0.00	HORIZONTAL
519.740000	39.00	-11.3	53.0	14.0	AV	0.0	0.00	HORIZONTAL
965.240000	29.80	-3.1	53.0	23.2	AV	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
222.740000	46.80	-16.9	57.0	10.2	QP	0.0	0.00	VERTICAL
445.520000	47.30	-12.7	63.0	15.7	QP	0.0	0.00	VERTICAL
482.600000	47.30	-11.9	63.0	15.7	QP	0.0	0.00	VERTICAL
519.740000	53.10	-11.3	63.0	9.9	QP	0.0	0.00	VERTICAL
556.880000	48.50	-10.9	63.0	14.5	QP	0.0	0.00	VERTICAL
891.020000	46.40	-4.4	63.0	16.6	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
222.740000	44.30	-16.9	47.0	2.7	AV	0.0	0.00	VERTICAL
445.520000	44.90	-12.7	53.0	8.1	AV	0.0	0.00	VERTICAL
482.600000	43.50	-11.9	53.0	9.5	AV	0.0	0.00	VERTICAL
519.740000	51.30	-11.3	53.0	1.7	AV	0.0	0.00	VERTICAL
556.880000	42.80	-10.9	53.0	10.2	AV	0.0	0.00	VERTICAL
891.020000	43.10	-4.4	53.0	9.9	AV	0.0	0.00	VERTICAL

## 7. CONDUCTED TRANSIENT DISTURBANCES

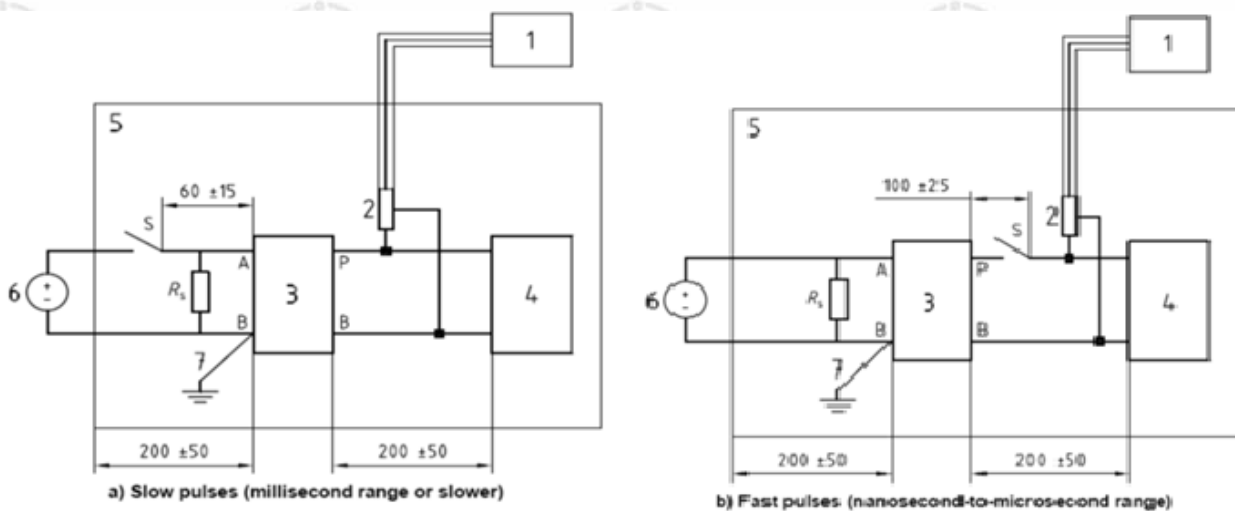
### 7.1 TEST CONDITION

<b>Operation mode</b>	: Normal
<b>Test voltage</b>	: DC 12V
<b>Test Condition</b>	: Temp: 24°C Related Humidity: 50% Air pressure: 101Kpa
<b>Model/Type reference</b>	: LC-012A

### 7.2 LIMITS

Polarity of pulse amplitude	Maximum allowed pulse amplitude for	
	Vehicles with 12V systems	Vehicles with 24V systems
Positive	+75	+150
Negative	-100	-450

### 7.3 BLOCK DIAGRAM OF TEST SETUP



#### Key

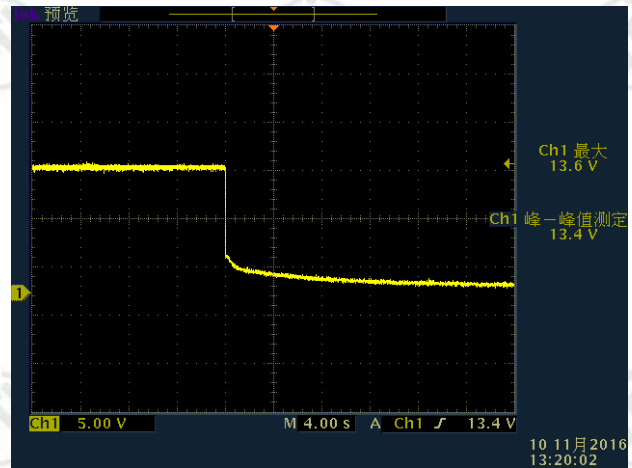
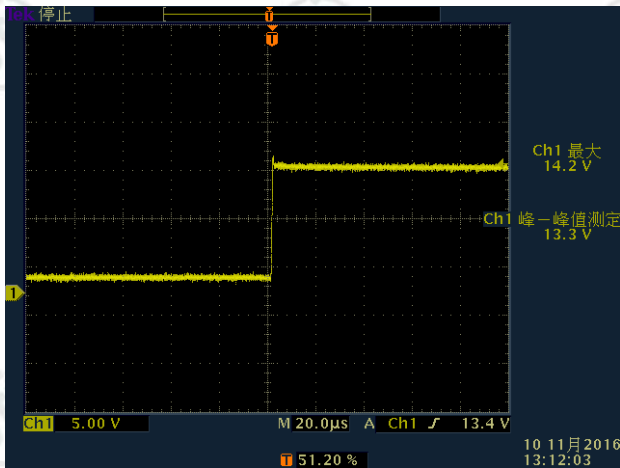
- |   |                            |   |                                    |
|---|----------------------------|---|------------------------------------|
| 1 | oscilloscope or equivalent | 5 | ground plane                       |
| 2 | voltage probe              | 6 | power supply                       |
| 3 | artificial network         | 7 | Ground connection; length < 100 mm |
| 4 | DUT (source of transient)  |   |                                    |

### 7.4 TEST RESULT

#### Input DC 12V(Fast pulses)

Positive amplitude

Negative amplitude

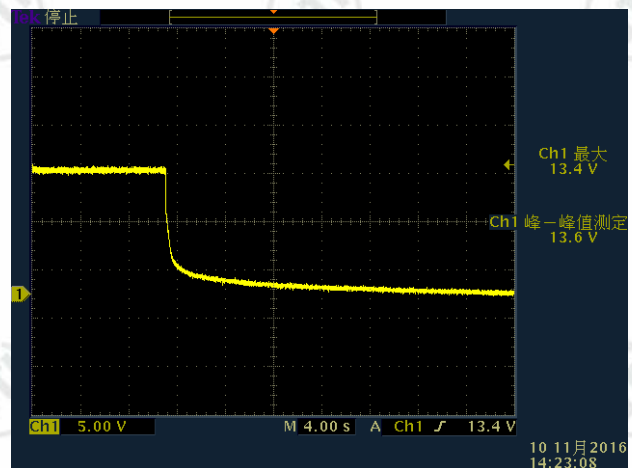
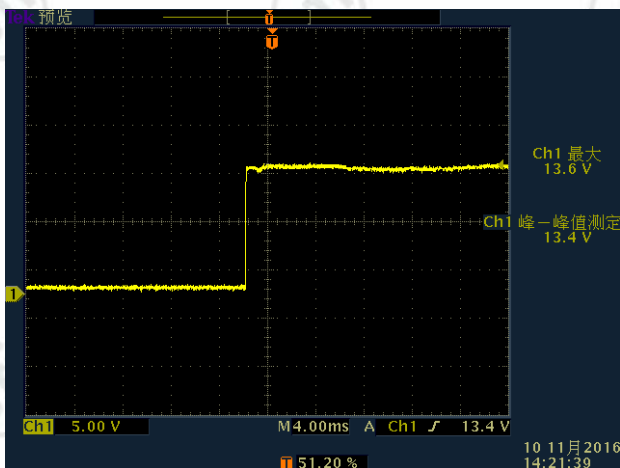


Polarity of pulse amplitude	Maximum allowed pulse amplitude	Maximum level	result
Positive	+75V	+14.2V	Pass
negative	-100V	-13.4V	Pass

#### Input DC 12V(Slow pulses)

Positive amplitude

Negative amplitude



Polarity of pulse amplitude	Maximum allowed pulse amplitude	Maximum level	result
Positive	+75V	+13.6V	Pass
negative	-100V	-13.6V	Pass

## 8. CONDUCTED TRANSIENT IMMUNITY

### 8.1 TEST CONDITION

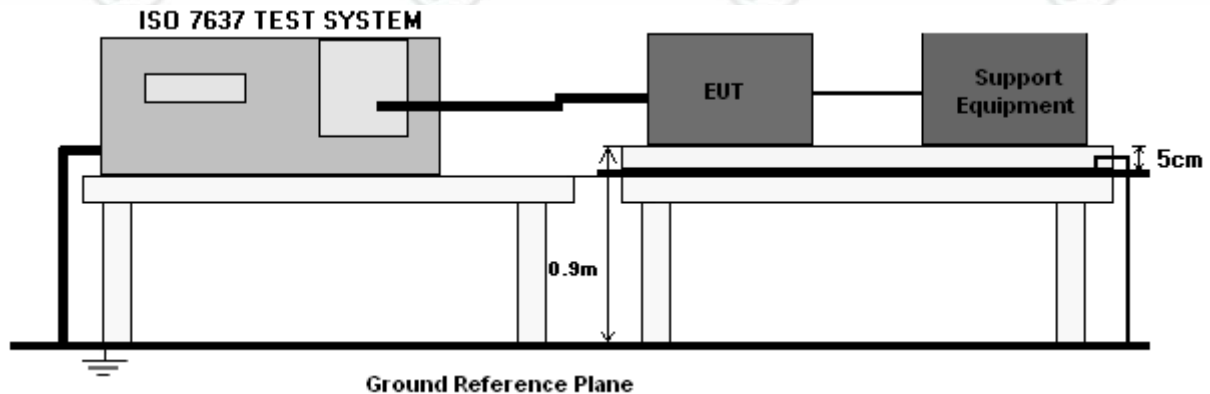
<b>Operation mode</b>	: Normal
<b>Test voltage</b>	: DC 12V
<b>Test Condition</b>	: Temp: 24°C Related Humidity: 50% Air pressure: 101Kpa
<b>Model/Type reference</b>	: LC-012A

### 8.2 TEST LEVELS AND FUNCTIONAL STATUS

Test pulse number	Immunity test level	Functional status
1	III	D
2a	III	D
2b	III	D
3a/3b	III	D
4	III	D

Functional status D is where one or more functions of the ESA do not perform as designed during and after exposure and do not return to normal operation until exposure is removed and the ESA is reset by simple "operator/use" action.

### 8.3 BLOCK DIAGRAM OF TEST SETUP



## 8.4 CLASSIFICATION OF FUNCTIONAL STATUS

**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.

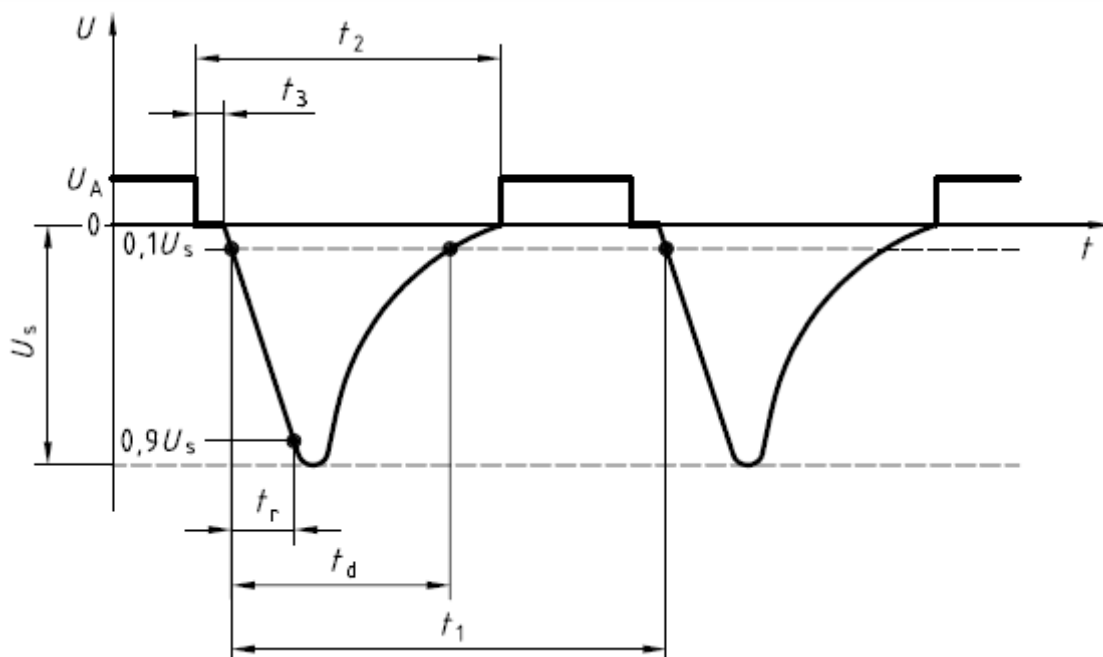
**Class D:** one or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple operator/use action.

**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.

NOTE The word “function” in this context refers only to the function performed by the electronic system.

## 8.5 TEST PULSE AND PARAMETERS

### 8.5.1 TEST PULSE 1



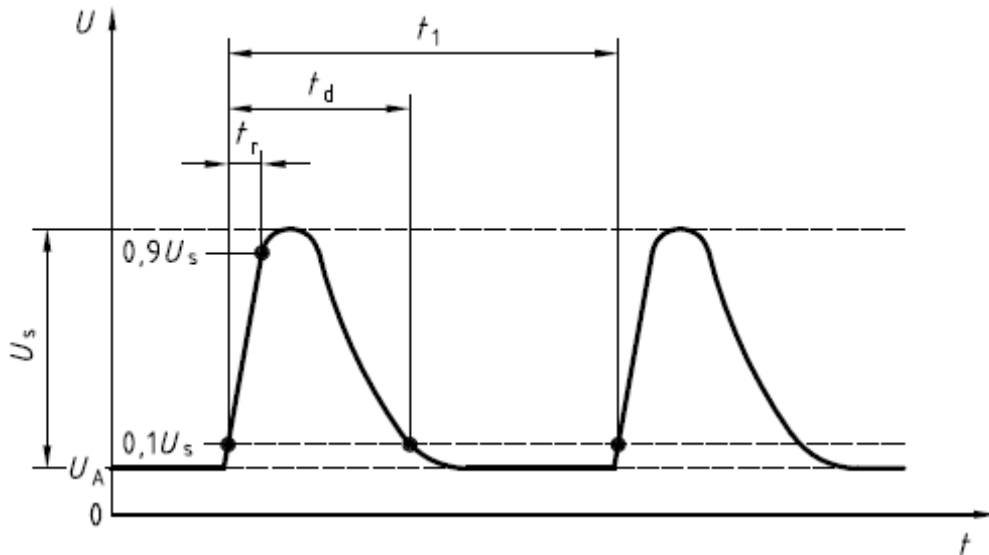


Parameter	12 V system	24 V system
$U_s$	-75 V to - 100 V	- 450 V to - 600 V
$R_i$	10 $\Omega$	50 $\Omega$
$t_d$	2 ms	1 ms
$t_r$	$1_{-0,5}^0 \mu\text{s}$	$3_{-1,5}^0 \mu\text{s}$
$t_1^a$	0,5 s to 5 s	
$t_2$	200 ms	
$t_3^b$	< 100 $\mu\text{s}$	

<sup>a</sup>  $t_1$  shall be chosen such that the DUT is correctly initialized before the application of the next pulse.

<sup>b</sup>  $t_3$  is the smallest possible time necessary between the disconnection of the supply source and the application of the pulse.

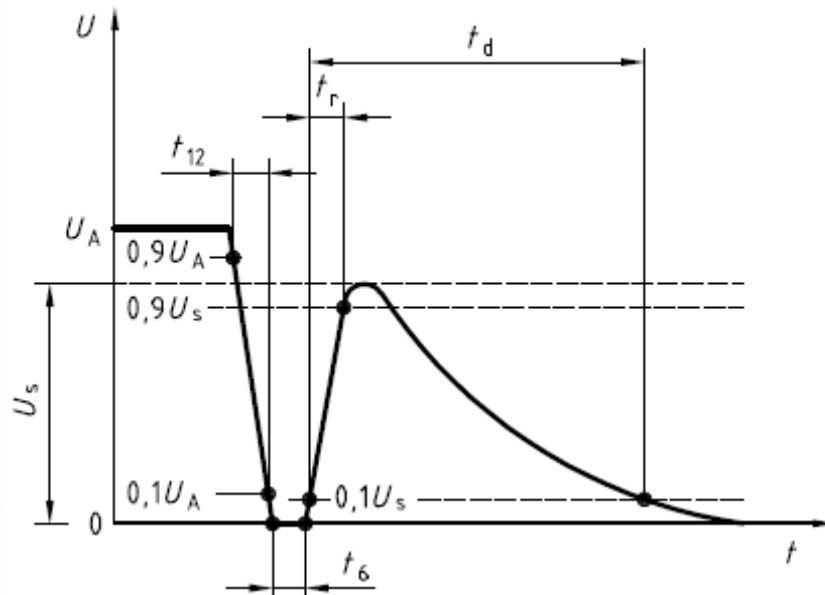
### 8.5.2 TEST PULSE 2A



Parameter	12 V system	24 V system
$U_s$	+ 37 V to + 50 V	
$R_i$	2 $\Omega$	
$t_d$	0,05 ms	
$t_r$	$\left( 1 \begin{smallmatrix} 0 \\ -0,5 \end{smallmatrix} \right) \mu\text{s}$	
$t_1^a$	0,2 s to 5 s	

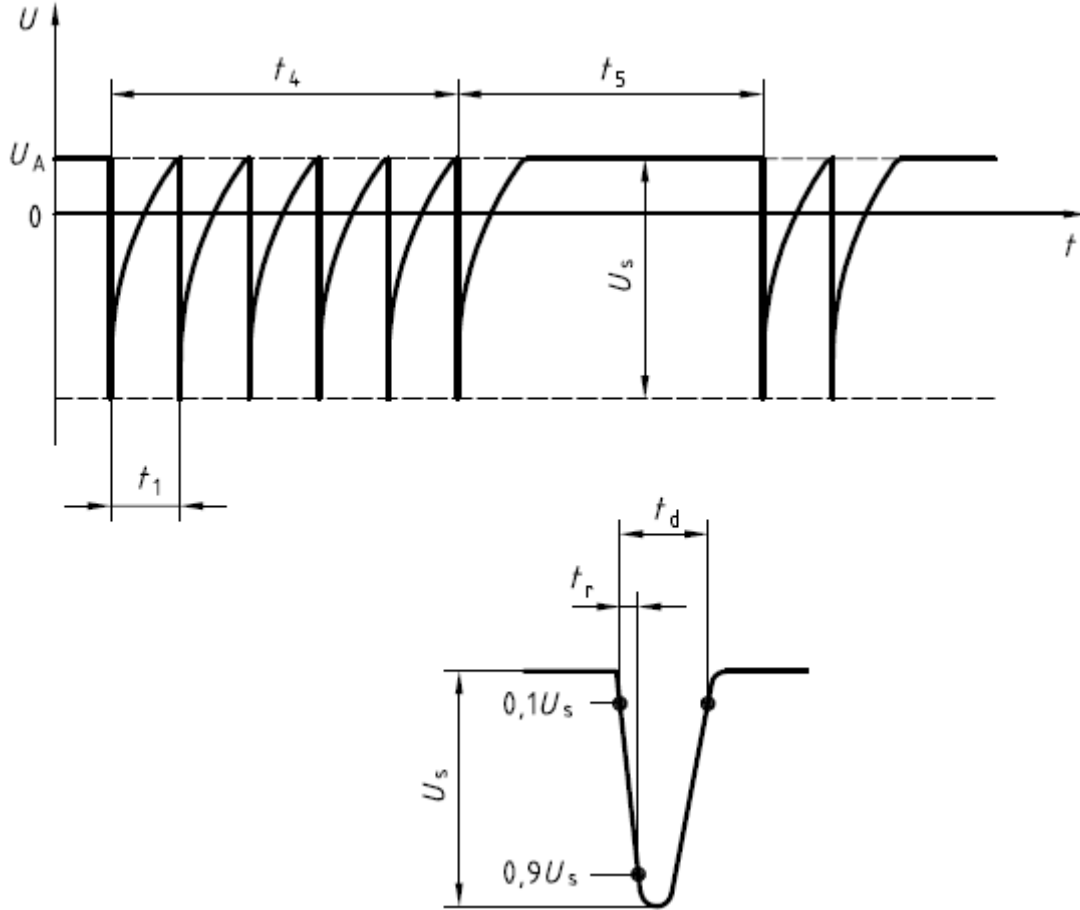
<sup>a</sup> The repetition time  $t_1$  can be short, depending on the switching. The use of a short repetition time reduces the test time.

### 8.5.3 TEST PULSE 2B



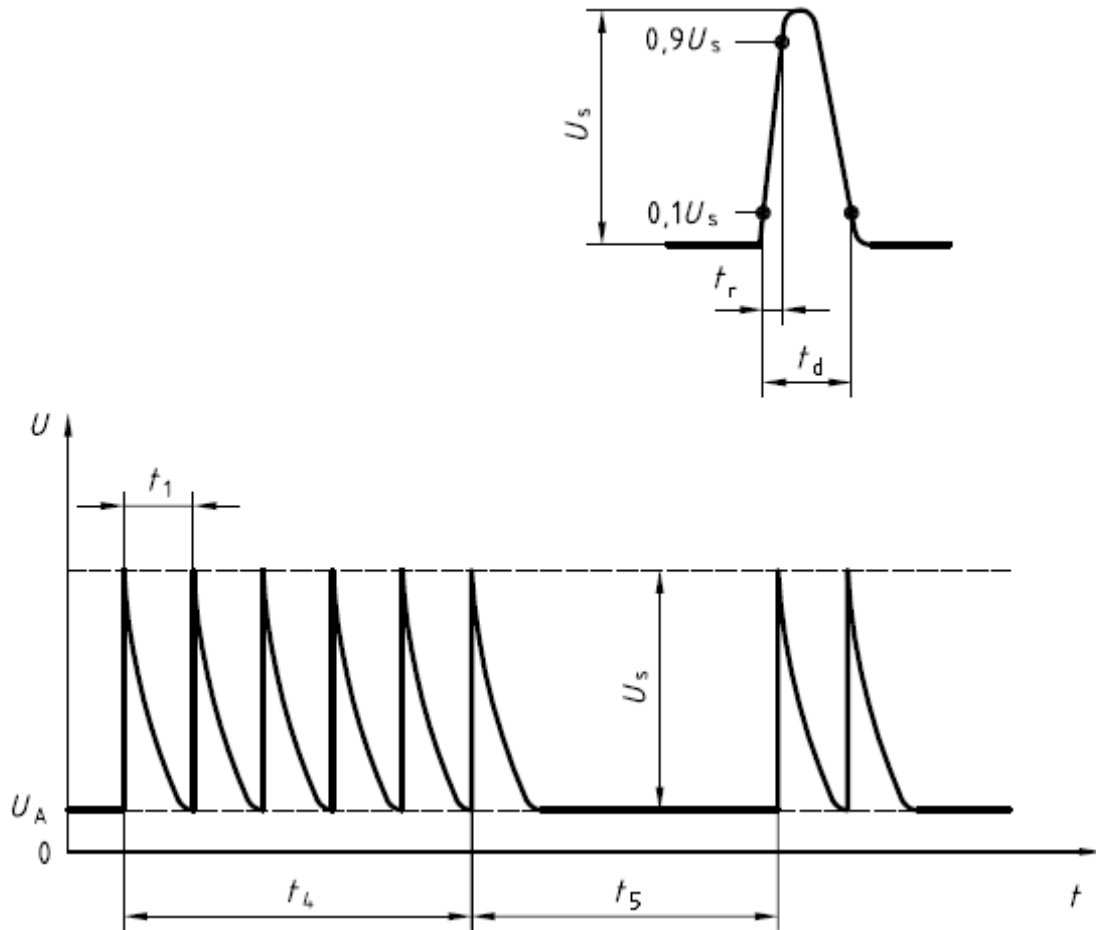
Parameter	12 V system	24 V system
$U_s$	10 V	20 V
$R_i$	0 $\Omega$ to 0,05 $\Omega$	
$t_d$	0,2 s to 2 s	
$t_{12}$	1 ms $\pm$ 0,5 ms	
$t_r$	1 ms $\pm$ 0,5 ms	
$t_6$	1 ms $\pm$ 0,5 ms	

**8.5.4 TEST PULSE 3A**



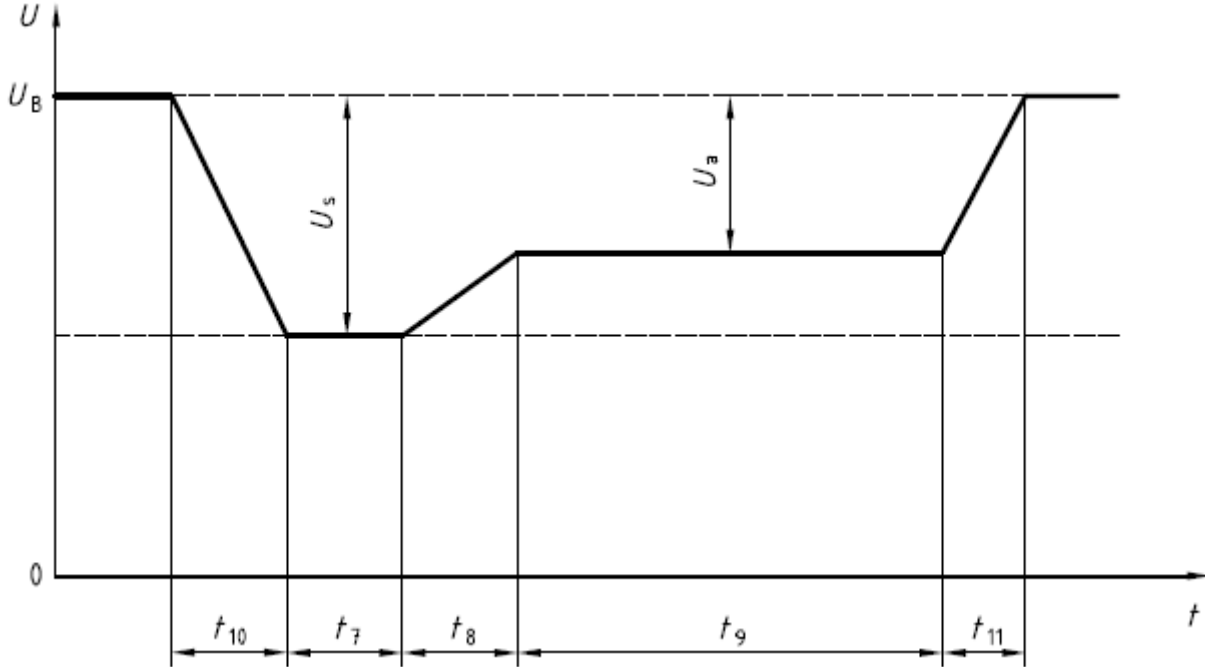
Parameter	12 V system	24 V system
$U_s$	- 112 V to - 150 V	- 150 V to - 200 V
$R_i$	50 $\Omega$	
$t_d$	$(0,1^{+0,1}_0)$ $\mu$ s	
$t_r$	5 ns $\pm$ 1,5 ns	
$t_1$	100 $\mu$ s	
$t_4$	10 ms	
$t_5$	90 ms	

**8.5.5 TEST PULSE 3B**



Parameter	12 V system	24 V system
$U_s$	+ 75 V to + 100 V	+ 150 V to + 200 V
$R_i$	50 $\Omega$	
$t_d$	$(0,1^{+0,1}_0) \mu s$	
$t_r$	5 ns $\pm$ 1,5 ns	
$t_1$	100 $\mu s$	
$t_4$	10 ms	
$t_5$	90 ms	

**8.5.6 TEST PULSE 4**



Parameter	12 V system	24 V system
$U_s$	- 6 V to - 7 V	- 12 V to - 16 V
$U_a$	- 2,5 V to - 6 V with $ U_a  \leq  U_s $	- 5 V to - 12 V with $ U_a  \leq  U_s $
$R_i$	0 $\Omega$ to 0,02 $\Omega$	
$t_7$	15 ms to 40 ms <sup>a</sup>	50 ms to 100 ms <sup>a</sup>
$t_8$	$\leq$ 50 ms	
$t_9$	0,5 s to 20 s <sup>a</sup>	
$t_{10}$	5 ms	10 ms
$t_{11}$	5 ms to 100 ms <sup>b</sup>	10 ms to 100 ms <sup>c</sup>

<sup>a</sup> The value used should be agreed between the vehicle manufacturer and the equipment supplier to suit the proposed application.

<sup>b</sup>  $t_{11} = 5$  ms is typical of the case when engine starts at the end of the cranking period, while  $t_{11} = 100$  ms is typical of the case when the engine does not start.

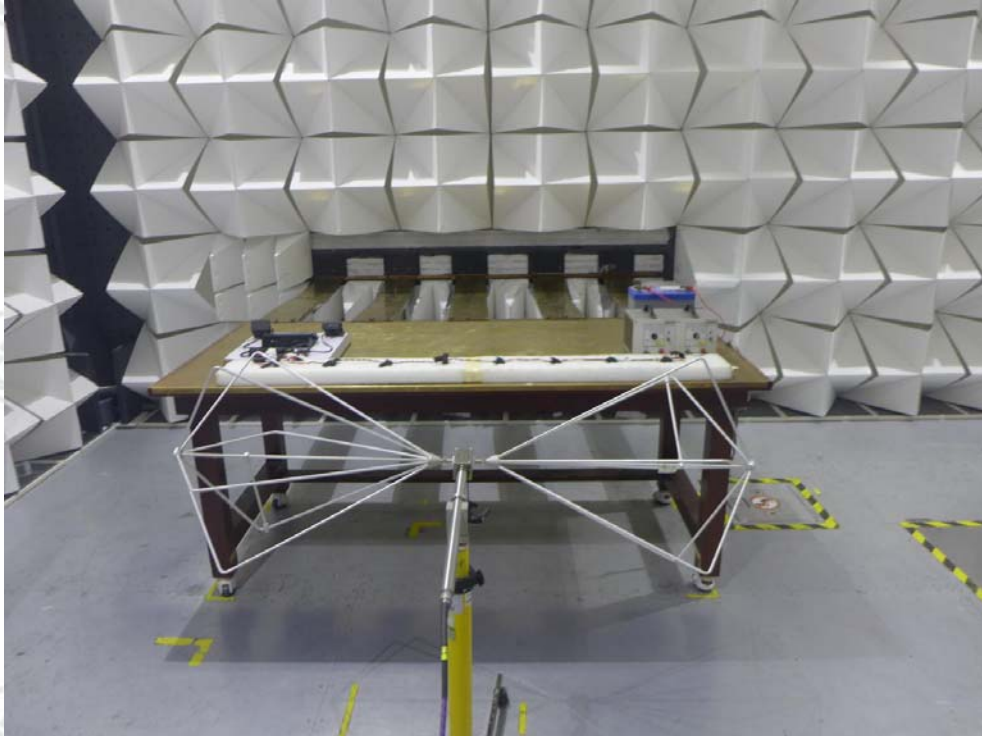
<sup>c</sup>  $t_{11} = 10$  ms is typical of the case when engine starts at the end of the cranking period, while  $t_{11} = 100$  ms is typical of the case when the engine does not start.

## 8.6 TEST RESULTS

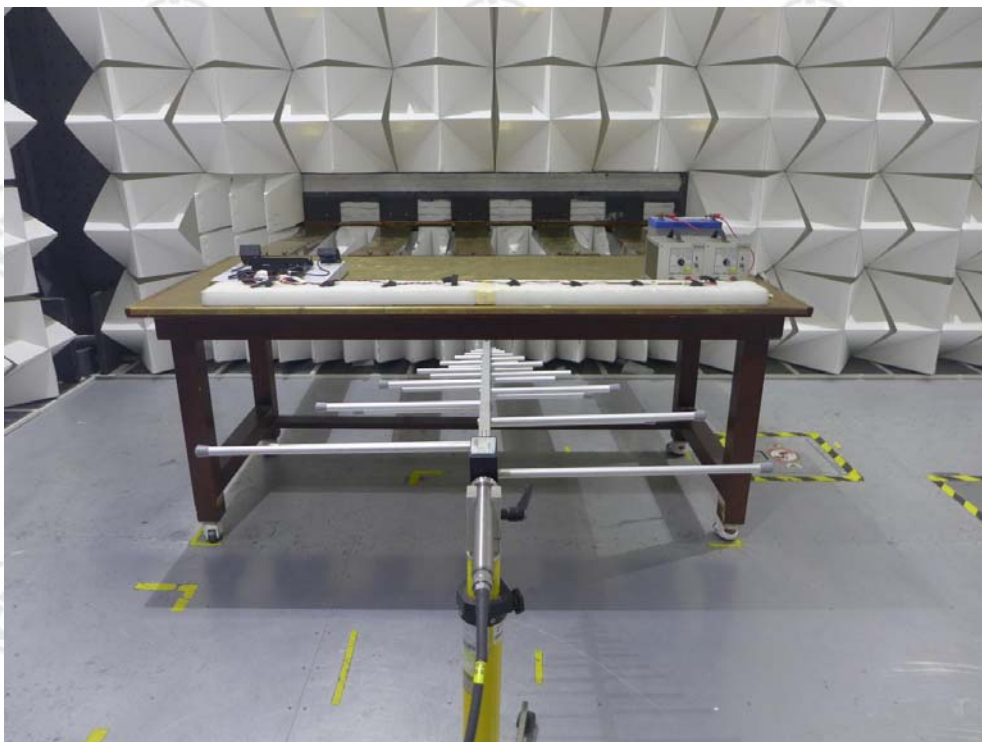
Test Pulse	Test Voltage		Required Level	Test Level	Test Result
	12V system	24V system			
1	-75V	-450V	D	B <sup>1</sup>	Pass
2a	+37V	+37V	D	A	Pass
2b	+10V	+20V	D	C <sup>2</sup>	Pass
3a	-112V	-150V	D	A	Pass
3b	+75V	+150V	D	A	Pass
4	-6V	/	D	C <sup>2</sup>	Pass
4	/	-12V	D	A	Pass

Remarks: 1. During test, the adapter will powered off and the displayer normal working. It will return automatically to normal operation after test.  
2. During test, the adapter will powered off and the displayer is black screen. It will return automatically to normal operation after test.

## APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



**BROADBAND AND NARROWBAND RADIATED DISTURBANCES TEST SETUP  
(30MHZ-200MHZ)**



**BROADBAND AND NARROWBAND RADIATED DISTURBANCES TEST SETUP  
(200MHZ-1GHZ)**



**CONDUCTED TRANSIENT DISTURBANCES TEST SETUP**



**CONDUCTED TRANSIENT IMMUNITY TEST SETUP**



## APPENDIX 2 PHOTOGRAPHS OF PRODUCT



View of Product-1



View of Product-2



View of Product-3



View of Product-4

\*\*\* End of Report \*\*\*

The test report is effective only with both signature and specialized stamp. The result(s) shown in this report refer only to the sample(s) tested. Without written approval of CTI, this report can't be reproduced except in full.