EMC TEST REPORT

Product	:	Car camera
Trade mark	:	N/A
Model/Type reference	:	LC-018A, LC-018B, LC-018C, LC-018D, LC-018E, LC-012A, LC-012AT, LC-012AT2, LC-028A, LC-007A, LC-009A, LC-009B, LC-009C, LC-009D, LC-009E, LC-015DB, LC-10B, LC-015A
Serial Number	:	N/A
Ratings	:	DC 12V
Report Number	:	EED32H000319
Date	:	Apr. 17, 2015
Regulations	:	See below

Test Standards	Results
☒ EN 50498: 2010	PASS

Prepared for:

LINTECH ENTERPRISES LIMITED
No.9 2nd Street, xinshi, Changping Town, Dongguan City, Guangdong, China

Prepared by:

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Tested by: Lily Li Reviewed by:

Approved by: Louisa Lu Date: Apr. 17, 2015

Louisa Lu
Lab supervisor

Check No.: 1727857928

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(Note: N/A means not applicable)

1. GENERAL INFORMATION

Applicant:	LINTECH ENTERPRISES LIMITED No.9 2nd Street, xinshi, Changping Town, Dongguan City, Guangdong, China
Manufacturer:	LINTECH ENTERPRISES LIMITED No.9 2nd Street, xinshi, Changping Town, Dongguan City, Guangdong, China
EMC Directive:	2004/108/EC
Product:	Car camera
Trade mark:	N/A
Model/Type reference:	LC-018A, LC-018B, LC-018C, LC-018D, LC-018E, LC-012A, LC-012AT, LC-012AT2, LC-028A, LC-007A, LC-009A, LC-009B, LC-009C, LC-009D, LC-009E, LC-015DB, LC-10B, LC-015A
Serial Number:	N/A
Report Number:	EED32H000319
Sample Received Date:	Jan. 26, 2015
Sample tested Date:	Jan. 26, 2015 to Feb. 05, 2015

All test data come from the report of No. EED32H000126.

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item （Test method is refer to 2004/104/EC 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)	4.9

4. PRODUCT INFORMATION AND TEST SETUP

4.1 PRODUCT INFORMATION

Ratings: DC 12V

Model difference: All models are identical except the model number, appearance and size. The test model is LC-018A 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.	Car LCD monitor	LINTECH	LM-070C2	---	Shielding 1m	Detachable

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. 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	---	06/01/2016
Receiver	R&S	ESCI	100435	07/08/2015
LISN	schwarzbeck	NNBM8125	81251547	07/08/2015
LISN	schwarzbeck	NNBM8125	81251546	07/08/2015
Log.-per. Antenna	SCHWARZBECK	VUSLP 9111B	9111B-088	03/19/2015
Biconical Antenna	SCHWARZBECK	VHBB 9124 + BBA 9106	9124-587	03/19/2015

Conducted Transient Disturbances Test				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Due Date**
ISO7637 Test System	TESEQ	NSG5500/5600	104	03/18/2015

Conducted Transient Immunity Test				
Equipment	**Manufacturer**	**Model**	**Serial No.**	**Due Date**
ISO7637 Test System	TESEQ	NSG5500/5600	W124	03/18/2015

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

Operation mode : Normal

Test voltage : DC 12V

Test Condition : Temp: 25.1℃
Related Humidity: 51%
Air pressure: 101.0Kpa

Model/Type reference : LC-018A

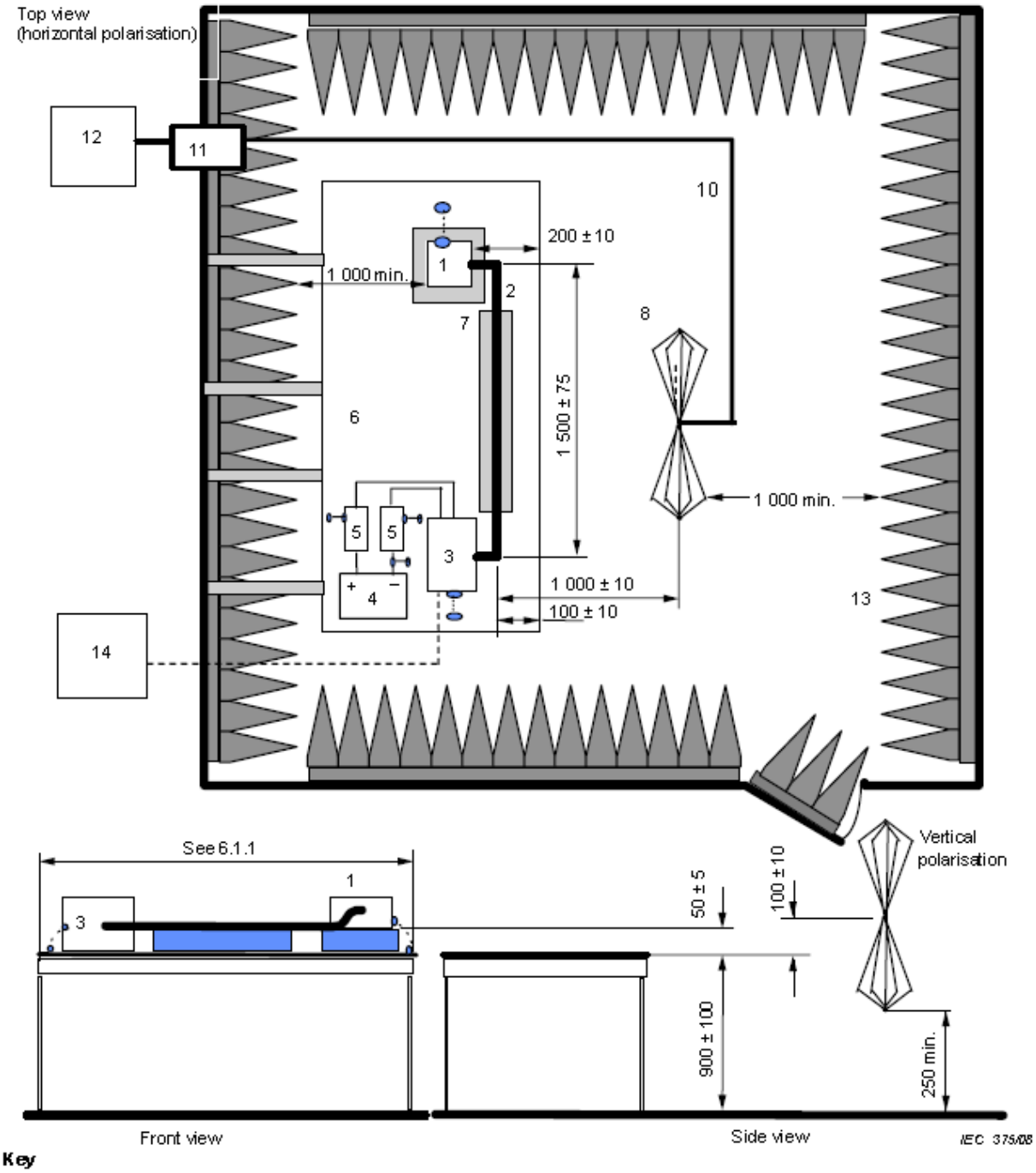
6.2 LIMITS

Frequency (MHz)	Broadband limits at 1m dB(μV/m)
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 Limits at 1m dB(μV/m)
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.

6.3 BLOCK DIAGRAM OF TEST SETUP



Key

1 EUT (grounded locally if required in test plan)

2 Test harness

3 Load simulator (placement and ground connection according to 6.4.2.5)

4 Power supply (location optional)

5 Artificial network (AN)

6 Ground plane (bonded to shielded enclosure)

7 Low relative permittivity support ($\varepsilon_r \leq 1,4$)

8 Biconical antenna

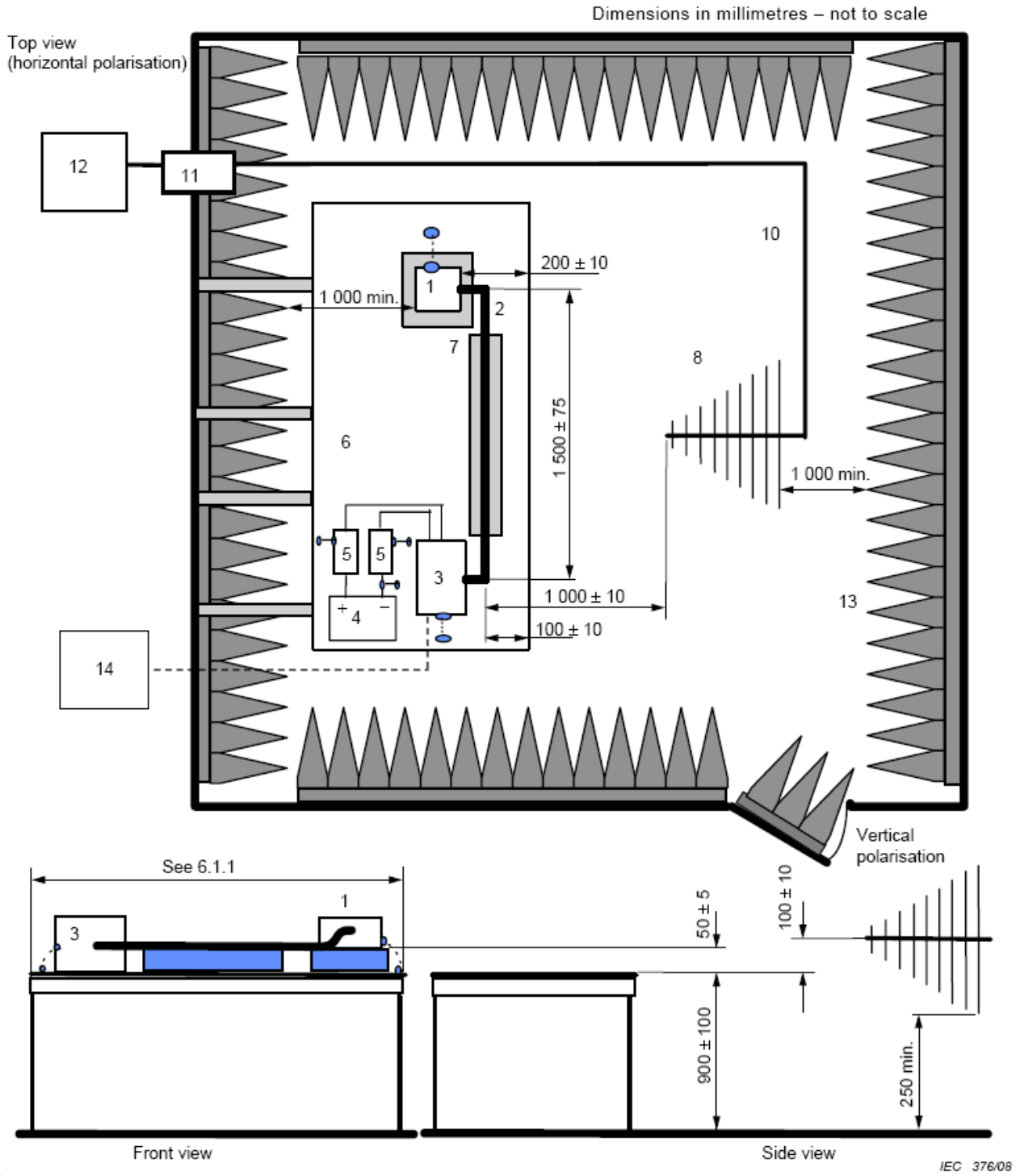
10 High-quality coaxial cable e.g. double-shielded (50 Ω)

11 Bulkhead connector

12 Measuring instrument

13 RF absorber material

14 Stimulation and monitoring system



Key

1 EUT (grounded locally if required in test plan)

2 Test harness

3 Load simulator (placement and ground connection according to 6.4.2.5)

4 Power supply (location optional)

5 Artificial network (AN)

6 Ground plane (bonded to shielded enclosure)

7 Low relative permittivity support ($\varepsilon_r \leq 1{,}4$)

8 Log-periodic antenna

10 High-quality coaxial cable e.g. double-shielded (50 Ω)

11 Bulkhead connector

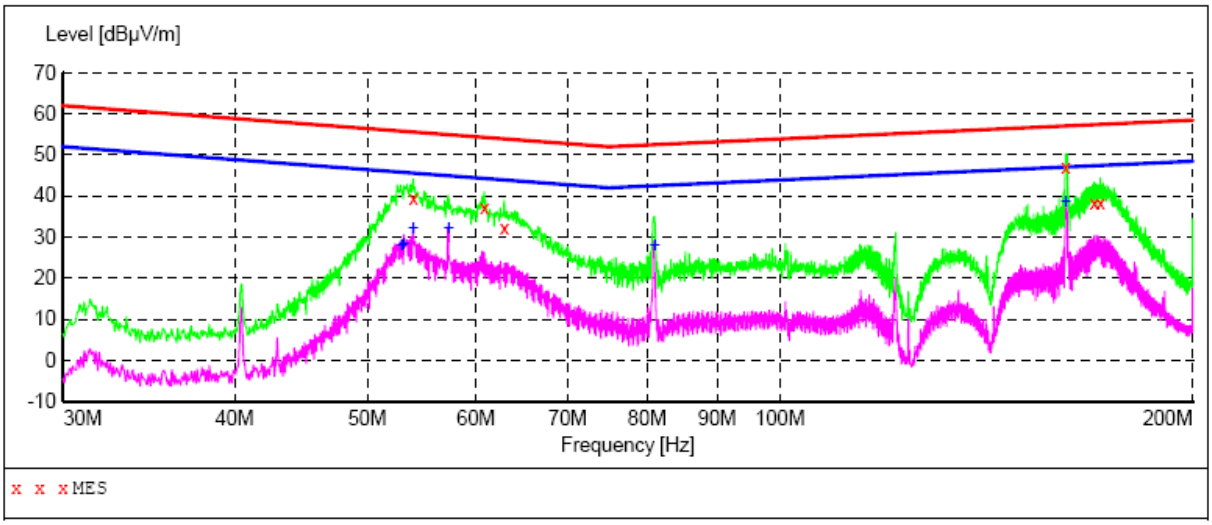
12 Measuring instrument

13 RF absorber material

14 Stimulation and monitoring system

6.4 TEST RESULT

Product	:	Car camera	**Model/Type reference**	:	LC-018A
Power	:	DC 12V	**Mode**	:	Normal
Frequency	:	30MHz-200MHz			

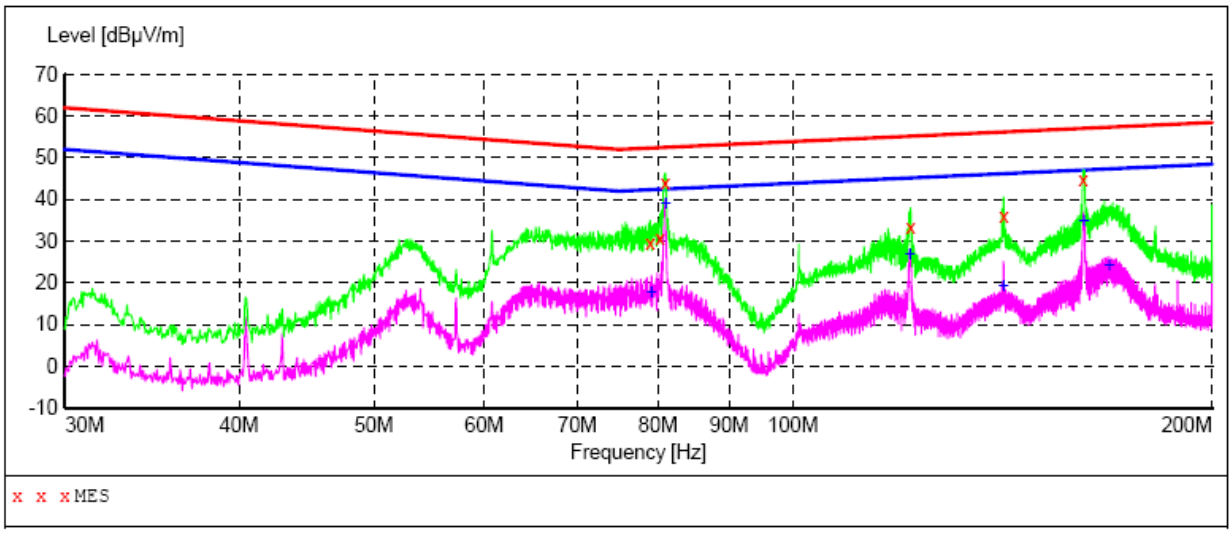


MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
54.000000	39.50	-21.7	55.6	16.1	QP	100.0	0.00	HORIZONTAL
60.840000	37.30	-22.0	54.3	17.0	QP	100.0	0.00	HORIZONTAL
62.940000	32.40	-22.0	53.9	21.5	QP	100.0	0.00	HORIZONTAL
161.640000	47.20	-17.8	57.0	9.8	QP	100.0	0.00	HORIZONTAL
169.500000	38.30	-17.4	57.4	19.1	QP	100.0	0.00	HORIZONTAL
171.300000	38.30	-17.3	57.4	19.1	QP	100.0	0.00	HORIZONTAL

MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
52.980000	28.10	-21.6	45.8	17.7	AV	100.0	0.00	HORIZONTAL
53.160000	28.50	-21.6	45.8	17.3	AV	100.0	0.00	HORIZONTAL
54.000000	32.20	-21.7	45.6	13.4	AV	100.0	0.00	HORIZONTAL
57.300000	32.40	-21.8	44.9	12.5	AV	100.0	0.00	HORIZONTAL
81.000000	28.00	-22.2	42.5	14.5	AV	100.0	0.00	HORIZONTAL
161.640000	38.60	-17.8	47.0	8.4	AV	100.0	0.00	HORIZONTAL



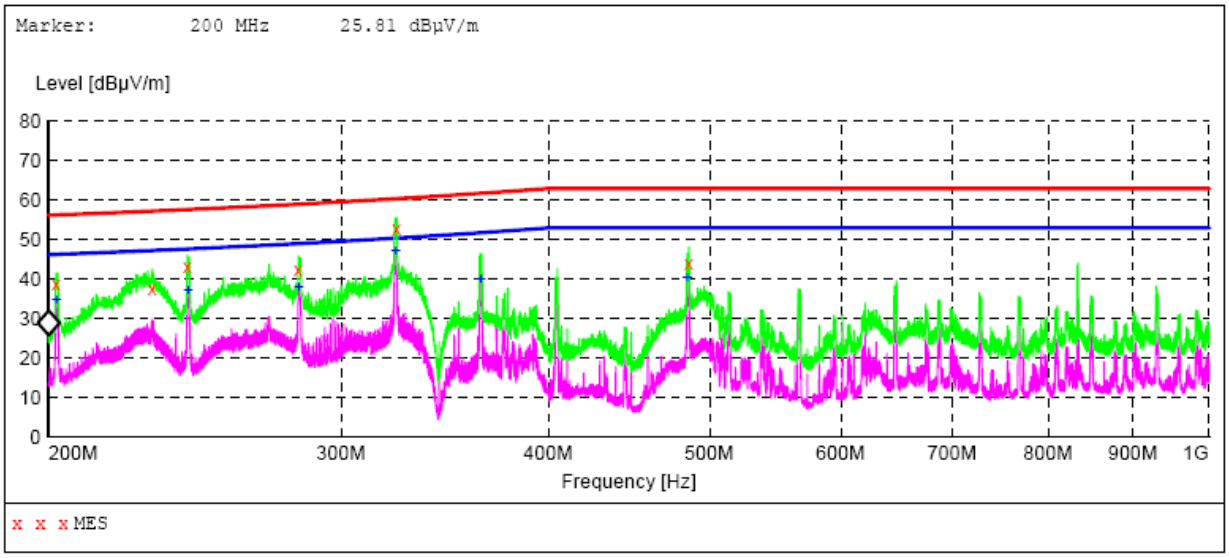
MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
78.960000	29.50	-22.3	52.3	22.8	QP	100.0	0.00	VERTICAL
80.280000	30.90	-22.3	52.4	21.5	QP	100.0	0.00	VERTICAL
80.940000	44.10	-22.2	52.5	8.4	QP	100.0	0.00	VERTICAL
121.500000	33.50	-20.2	55.2	21.7	QP	100.0	0.00	VERTICAL
141.720000	36.20	-19.0	56.2	20.0	QP	100.0	0.00	VERTICAL
161.640000	44.90	-17.8	57.0	12.1	QP	100.0	0.00	VERTICAL

MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
79.140000	18.00	-22.3	42.4	24.4	AV	100.0	0.00	VERTICAL
81.000000	39.20	-22.2	42.5	3.3	AV	100.0	0.00	VERTICAL
121.320000	26.80	-20.2	45.2	18.4	AV	100.0	0.00	VERTICAL
141.720000	19.40	-19.0	46.2	26.8	AV	100.0	0.00	VERTICAL
161.880000	34.90	-17.7	47.1	12.2	AV	100.0	0.00	VERTICAL
168.780000	24.20	-17.4	47.3	23.1	AV	100.0	0.00	VERTICAL

Product	:	Car camera	**Model/Type reference**	:	LC-018A
Power	:	DC 12V	**Mode**	:	Normal
Frequency	:	200MHz-1000MHz			

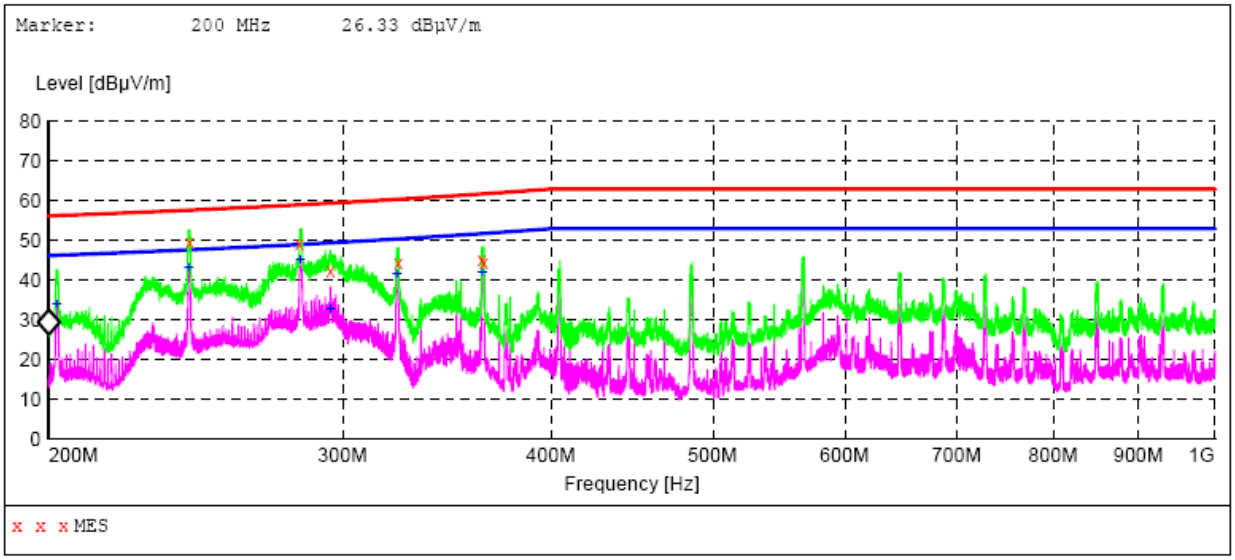


MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
202.040000	38.90	-16.3	56.3	17.4	QP	100.0	0.00	HORIZONTAL
230.900000	37.80	-16.0	57.3	19.5	QP	100.0	0.00	HORIZONTAL
242.420000	43.20	-15.8	57.7	14.5	QP	100.0	0.00	HORIZONTAL
282.800000	42.30	-14.4	59.0	16.7	QP	100.0	0.00	HORIZONTAL
324.020000	52.70	-13.2	60.4	7.7	QP	100.0	0.00	HORIZONTAL
486.080000	44.20	-10.6	63.0	18.8	QP	100.0	0.00	HORIZONTAL

MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
202.280000	34.80	-16.3	46.3	11.5	AV	100.0	0.00	HORIZONTAL
242.780000	37.20	-15.8	47.7	10.5	AV	100.0	0.00	HORIZONTAL
283.100000	37.90	-14.4	49.0	11.1	AV	100.0	0.00	HORIZONTAL
323.780000	47.20	-13.2	50.4	3.2	AV	100.0	0.00	HORIZONTAL
364.220000	40.00	-12.5	51.8	11.8	AV	100.0	0.00	HORIZONTAL
485.120000	40.30	-10.6	53.0	12.7	AV	100.0	0.00	HORIZONTAL



MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
243.020000	49.60	-15.8	57.7	8.1	QP	100.0	0.00	VERTICAL
282.800000	49.30	-14.4	59.0	9.7	QP	100.0	0.00	VERTICAL
294.980000	42.30	-13.9	59.4	17.1	QP	100.0	0.00	VERTICAL
324.020000	44.60	-13.2	60.4	15.8	QP	100.0	0.00	VERTICAL
363.620000	45.30	-12.5	61.8	16.5	QP	100.0	0.00	VERTICAL
364.580000	44.50	-12.5	61.8	17.3	QP	100.0	0.00	VERTICAL

MEASUREMENT RESULT:

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Det.	Height cm	Azimuth deg	Polarization
202.280000	34.10	-16.3	46.3	12.2	AV	100.0	0.00	VERTICAL
242.660000	43.20	-15.8	47.7	4.5	AV	100.0	0.00	VERTICAL
283.100000	45.20	-14.4	49.0	3.8	AV	100.0	0.00	VERTICAL
295.040000	32.70	-13.9	49.4	16.7	AV	100.0	0.00	VERTICAL
323.480000	41.70	-13.2	50.4	8.7	AV	100.0	0.00	VERTICAL
363.920000	42.20	-12.5	51.8	9.6	AV	100.0	0.00	VERTICAL

7. CONDUCTED TRANSIENT DISTURBANCES

7.1 TEST CONDITION

Operation mode : Normal

Test voltage : DC 12V

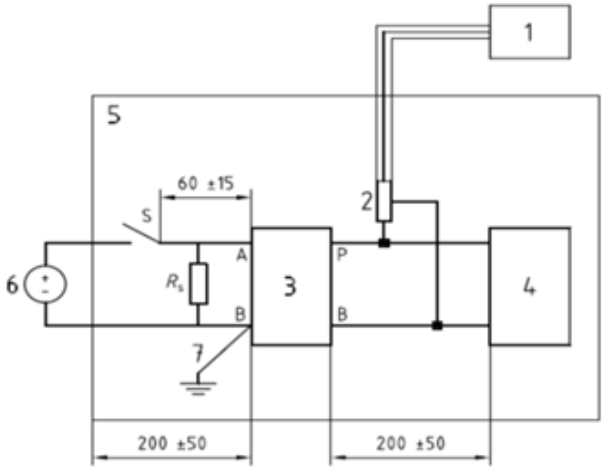
Test Condition : Temp: 24.3℃
Related Humidity: 49%
Air pressure: 101.0Kpa

Model/Type reference : LC-018A

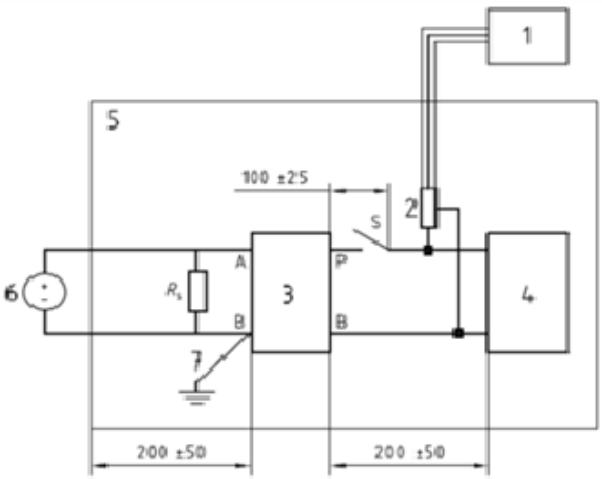
7.2 LIMITS

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



a) Slow pulses (millisecond range or slower)



b) Fast pulses (nanosecond-to-microsecond range)

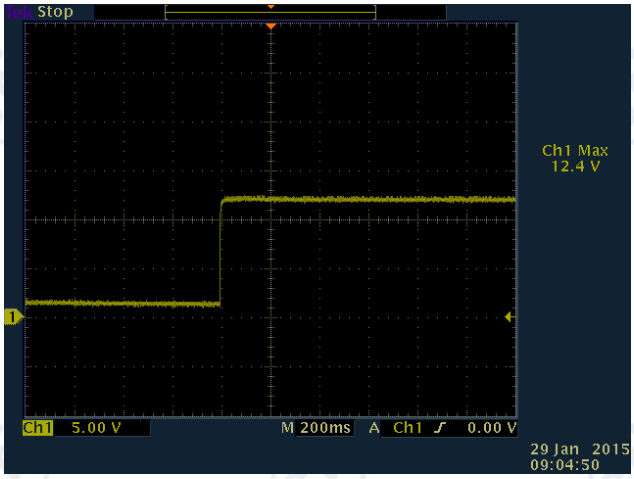
Key

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

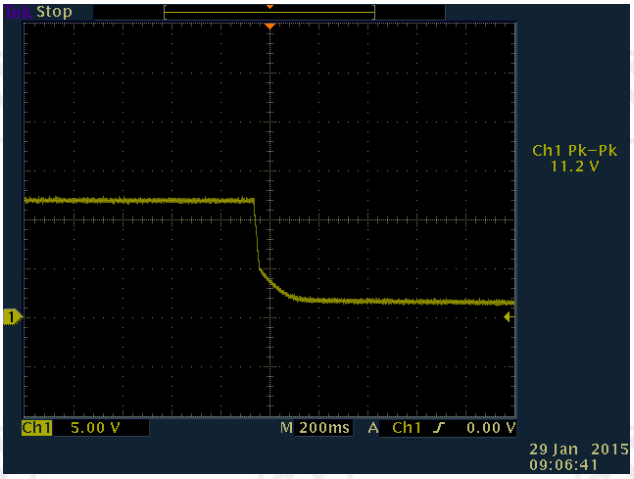
7.4 TEST RESULT

Input DC 12V (Fast pulse)

Positive amplitude



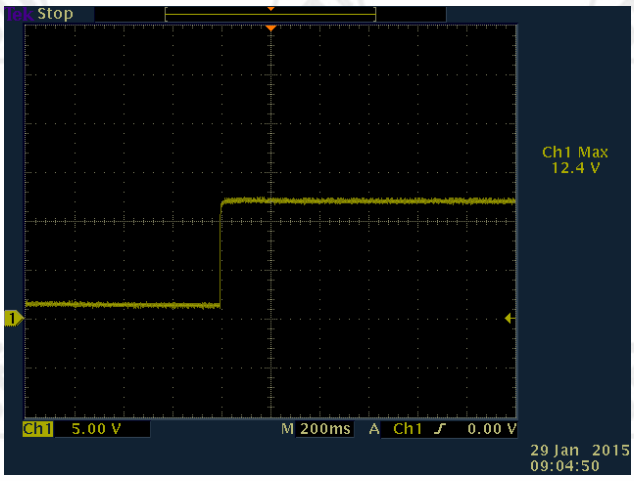
Negative amplitude



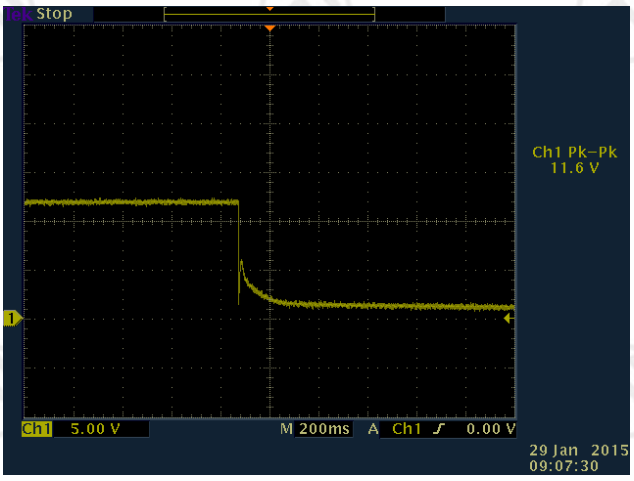
Polarity of pulse amplitude	Maximum allowed pulse amplitude	Maximum level	result
Positive	+75V	+12.4V	Pass
Negative	-100V	-11.2V	Pass

Input DC 12V (Slow pulse)

Positive amplitude



Negative amplitude



Polarity of pulse amplitude	Maximum allowed pulse amplitude	Maximum level	result
Positive	+75V	+12.3V	Pass
Negative	-100V	-11.6V	Pass

8. CONDUCTED TRANSIENT IMMUNITY

8.1 TEST CONDITION

Operation mode : Normal

Test voltage : DC 12V

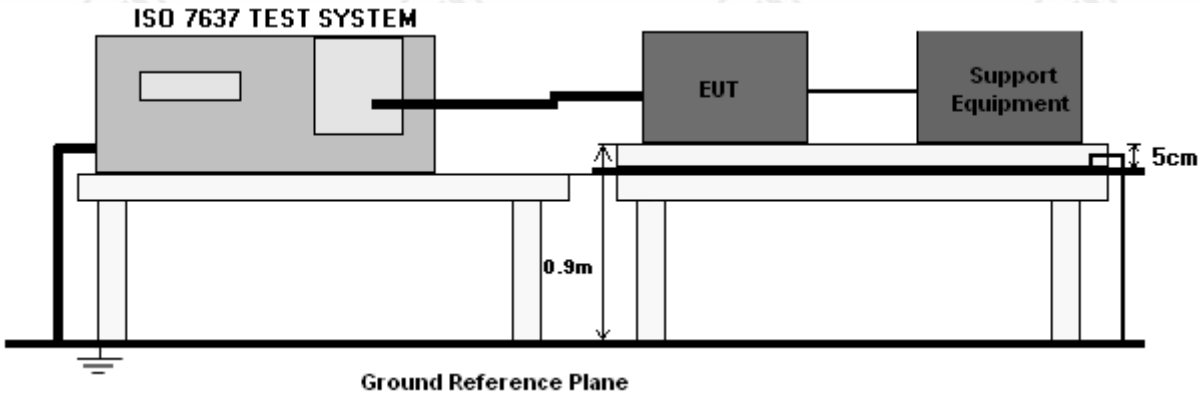
Test Condition : Temp: 24.3℃
Related Humidity: 49%
Air pressure: 101.0Kpa

Model/Type reference : LC-018A

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.

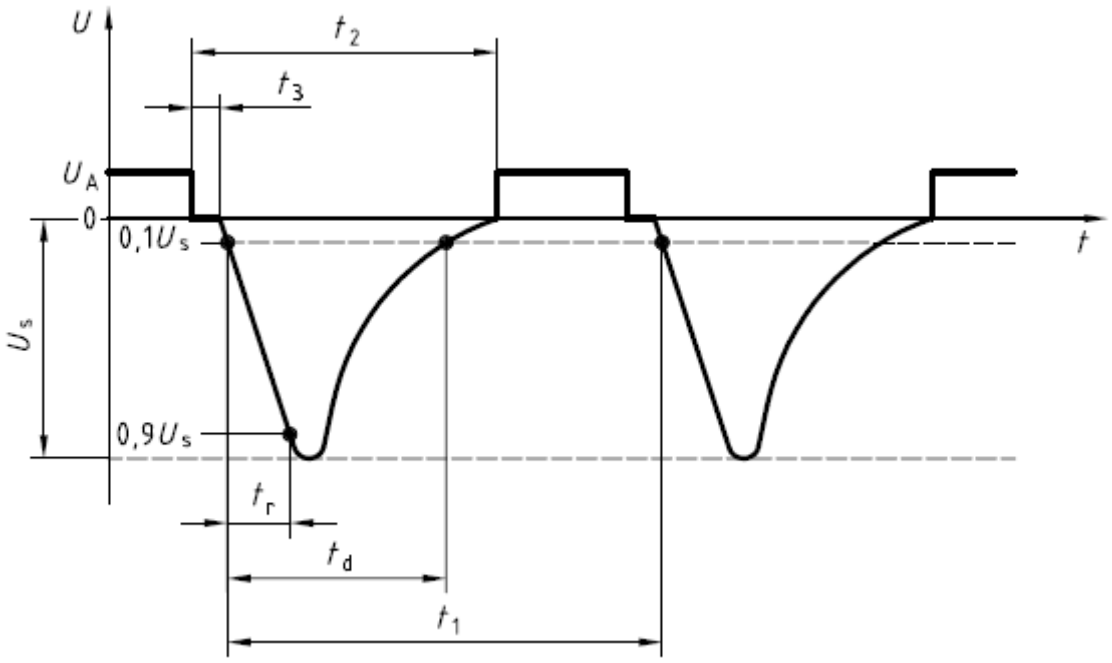
Class D: one or more functions of a device/system do not perform as designed during exposure and do not return to normal operation until exposure is removed and the device/system is reset by simple operator/use action.

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

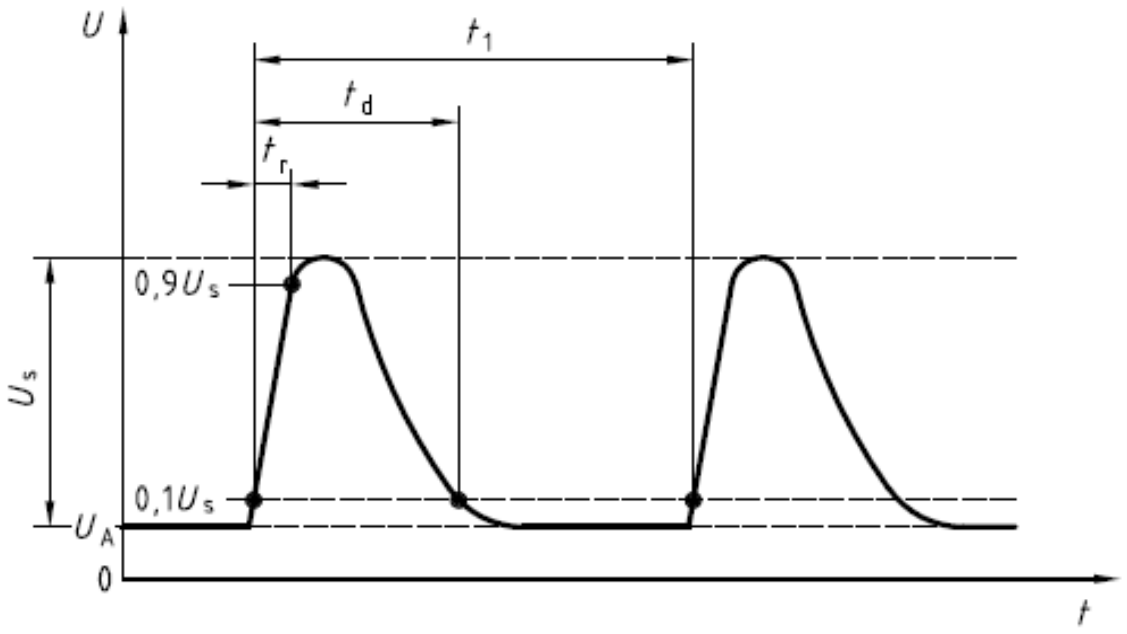


Parameter	12 V system	24 V system
U_s	–75 V to – 100 V	– 450 V to – 600 V
R_i	10 Ω	50 Ω
t_d	2 ms	1 ms
t_r	1^{0}_{-05} µs	$3^{0}_{-1,5}$ µs
t_1 [a]	0,5 s to 5 s	
t_2	200 ms	
t_3 [b]	< 100 µs	

[a] t_1 shall be chosen such that the DUT is correctly initialized before the application of the next pulse.

[b] t_3 is the smallest possible time necessary between the disconnection of the supply source and the application of the pulse.

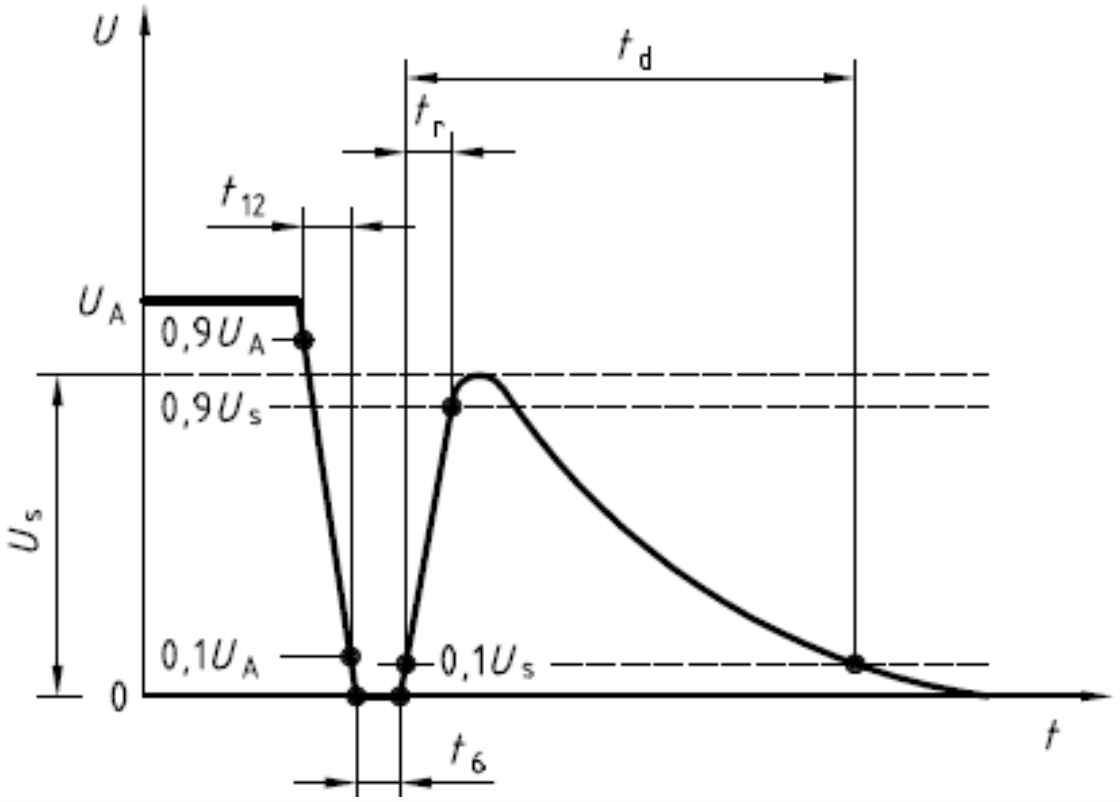
8.5.2 TEST PULSE 2A



Parameter	12 V system	24 V system
U_s	+ 37 V to + 50 V	
R_i	2 Ω	
t_d	0,05 ms	
t_r	$\left(1\ ^{0}_{-0,5}\right)$ µs	
t_1 [a]	0,2 s to 5 s	

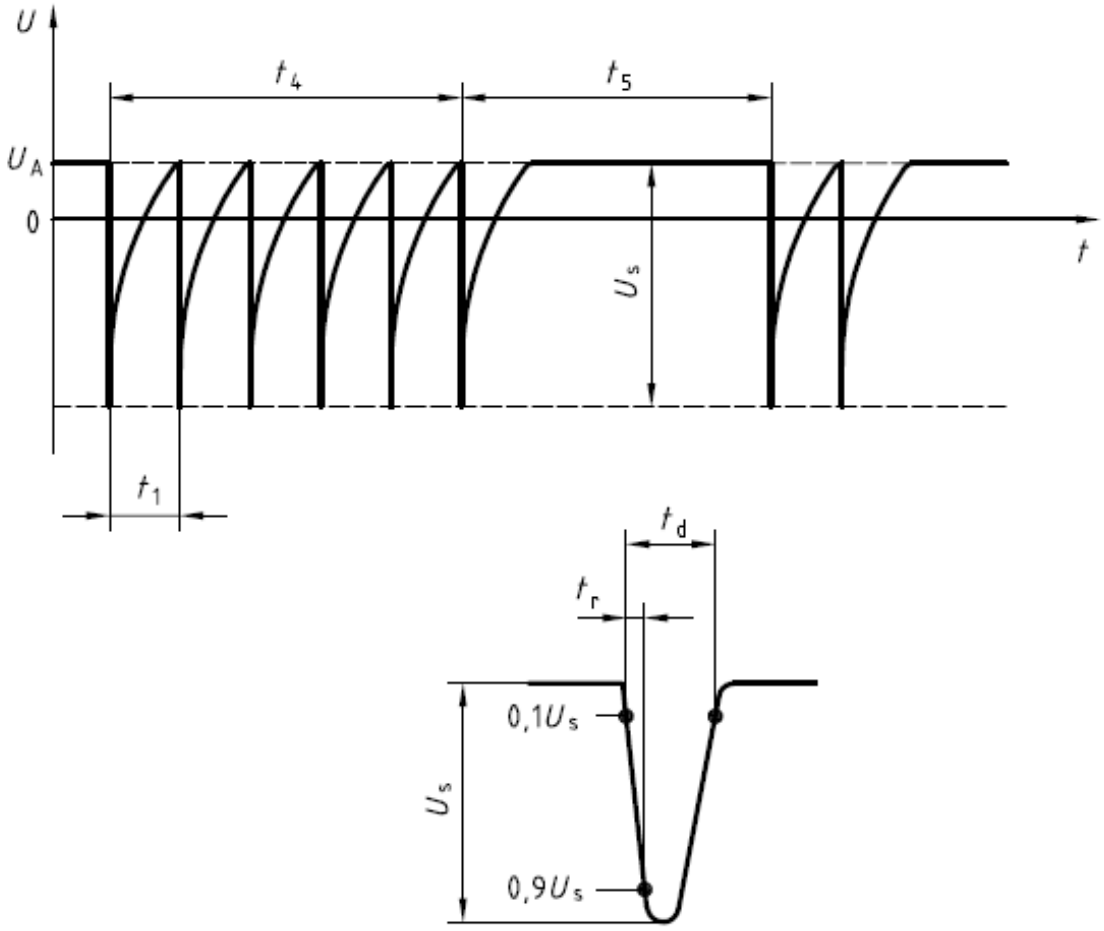
[a] The repetition time t_1 can be short, depending on the switching. The use of a short repetition time reduces the test time.

8.5.3 TEST PULSE 2B



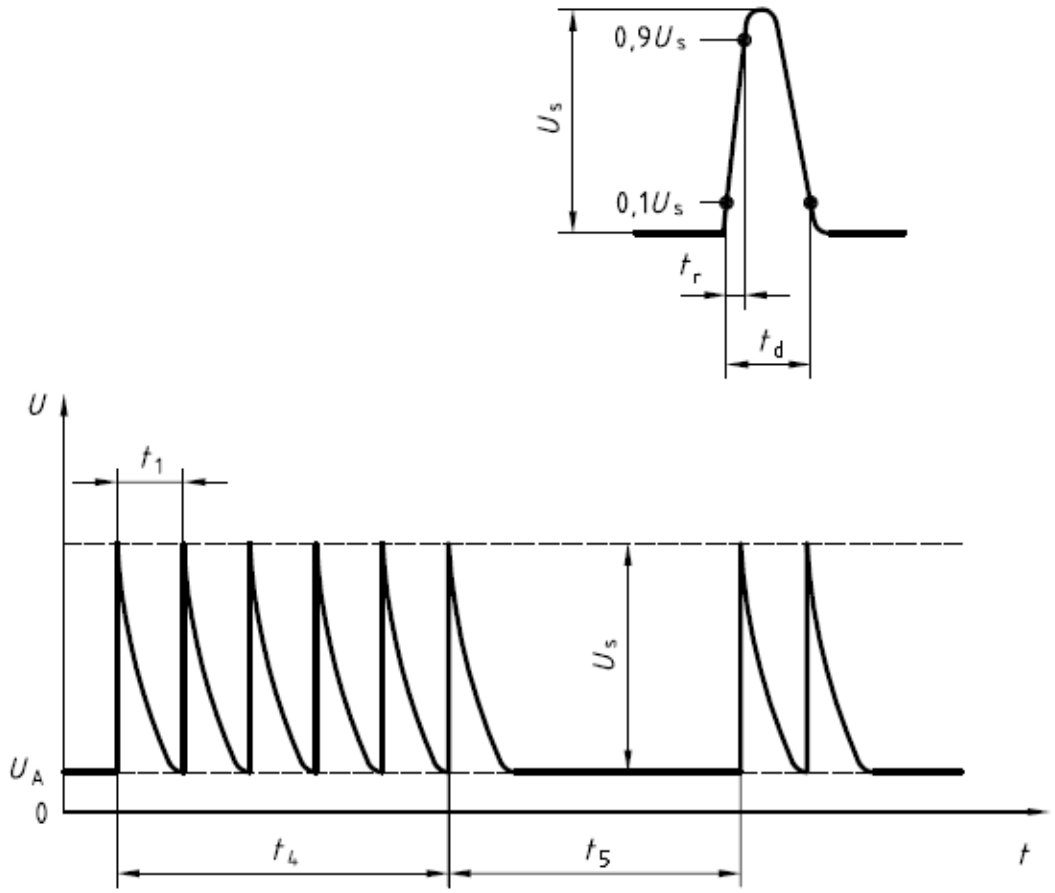
Parameter	12 V system	24 V system
U_s	10 V	20 V
R_i	0 Ω to 0,05 Ω	
t_d	0,2 s to 2 s	
t_{12}	1 ms ± 0,5 ms	
t_r	1 ms ± 0,5 ms	
t_6	1 ms ± 0,5 ms	

8.5.4 TEST PULSE 3A



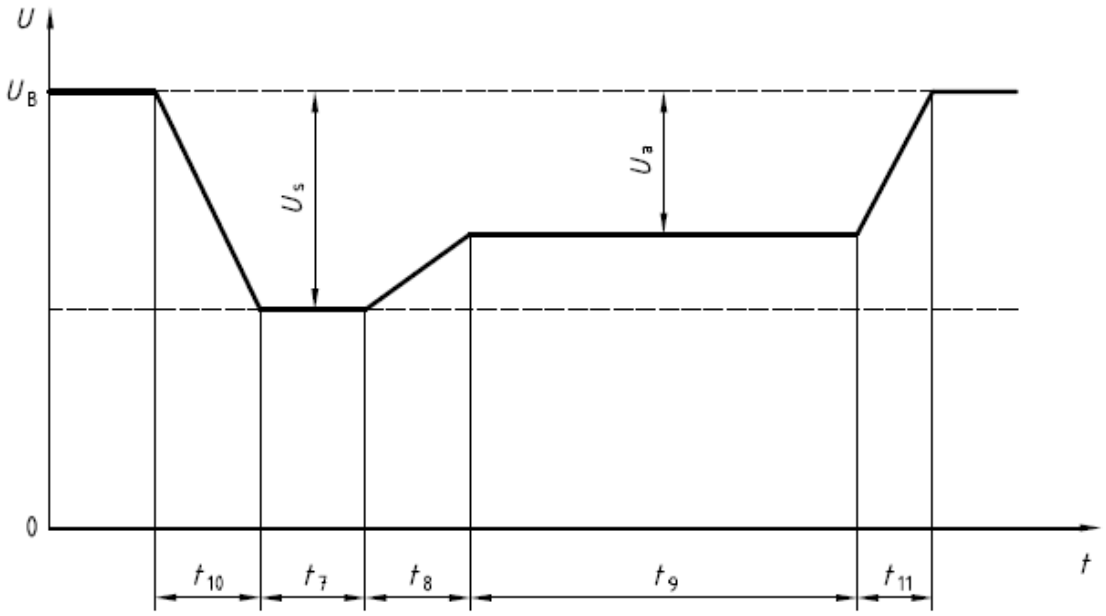
Parameter	12 V system	24 V system
U_s	– 112 V to – 150 V	– 150 V to – 200 V
R_i	50 Ω	
t_d	$(0,1\ ^{+0,1}_{0})$ µs	
t_r	5 ns ± 1,5 ns	
t_1	100 µs	
t_4	10 ms	
t_5	90 ms	

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 Ω	
t_d	$(0,1\ ^{+0,1}_{0})$ µs	
t_r	5 ns ± 1,5 ns	
t_1	100 µs	
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 $\lvert U_a \rvert \leqslant \lvert U_s \rvert$	– 5 V to – 12 V with $\lvert U_a \rvert \leqslant \lvert U_s \rvert$
R_i	0 Ω to 0,02 Ω	
t_7	15 ms to 40 ms [a]	50 ms to 100 ms [a]
t_8	⩽ 50 ms	
t_9	0,5 s to 20 s [a]	
t_{10}	5 ms	10 ms
t_{11}	5 ms to 100 ms [b]	10 ms to 100 ms [c]

[a] The value used should be agreed between the vehicle manufacturer and the equipment supplier to suit the proposed application.

[b] 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.

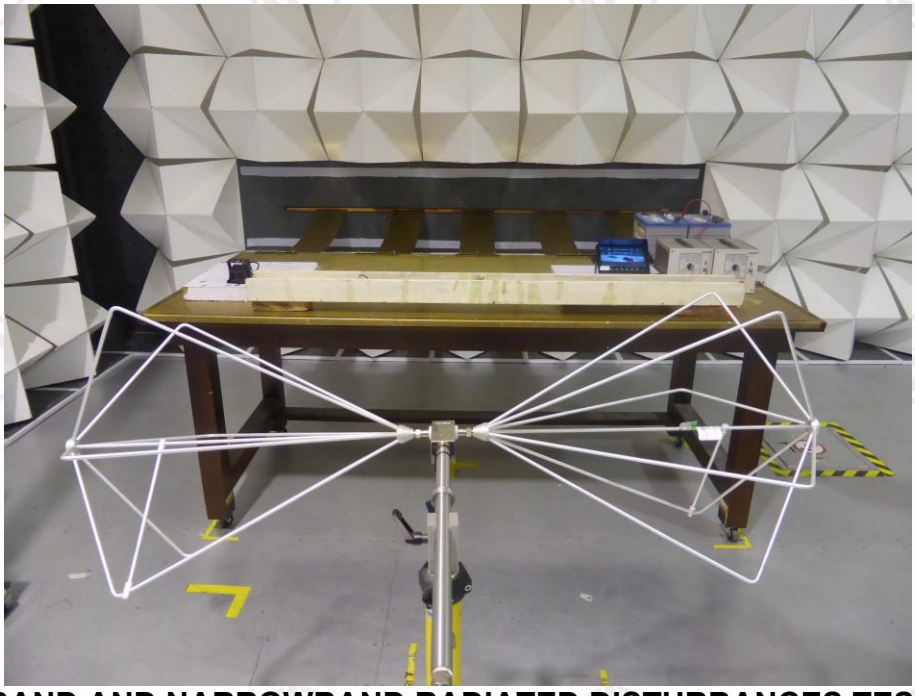
[c] t_{11} = 10 ms is typical of the case when engine starts at the end of the cranking period, while t_{11} = 100 ms is typical of the case when the engine does not start.

8.6 TEST RESULTS

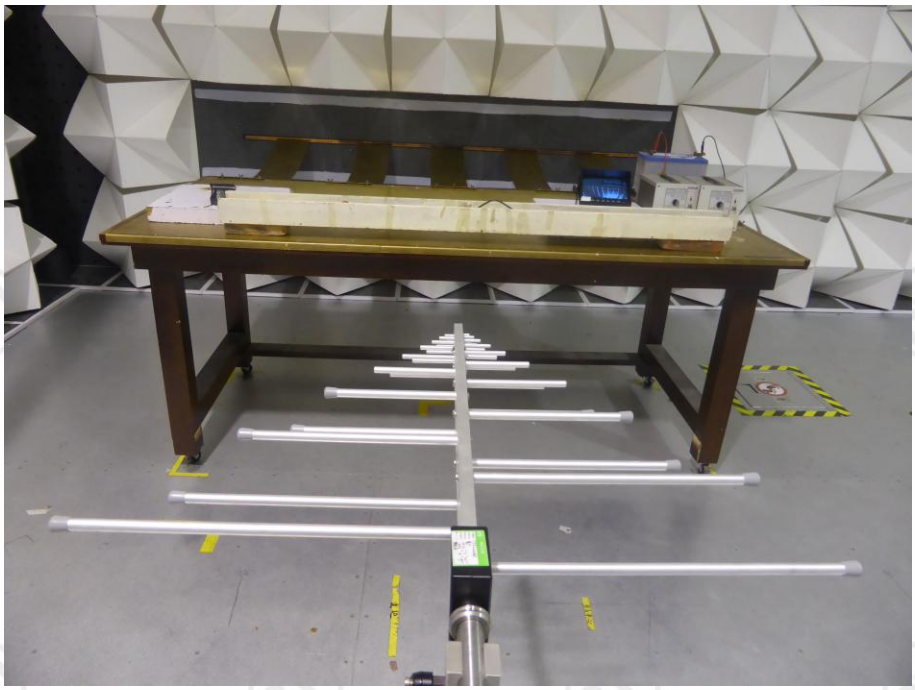
Test Pulse	Test Voltage	Required Level	Test Level	Test Result
1	-75V	D	C[1]	Pass
2a	+37V	D	A	Pass
2b	+10V	D	C[1]	Pass
3a	-112V	D	A	Pass
3b	+75V	D	A	Pass
4	-6V	D	C[1]	Pass

Remarks: 1. During test, the power indicator light is put out and it will recover normally automatically after test.

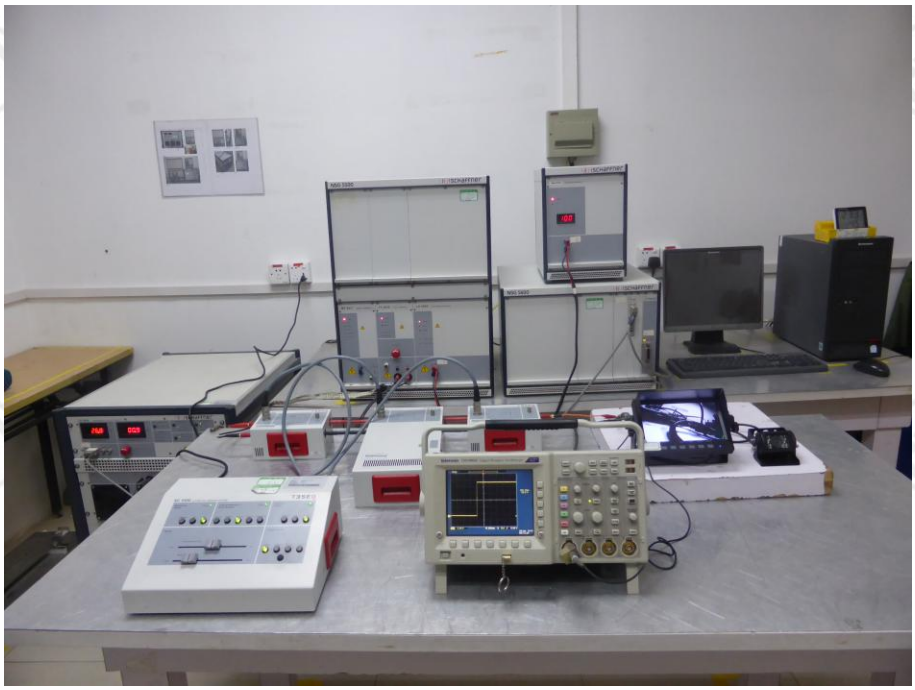
APPENDIX 1 PHOTOGRAPHS OF TEST SETUP



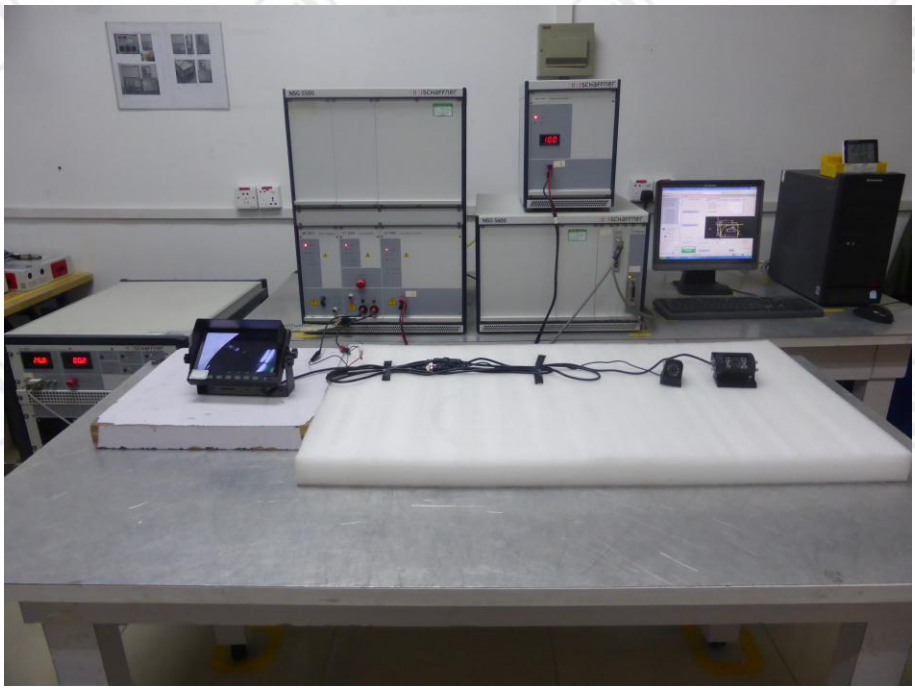
BROADBAND AND NARROWBAND RADIATED DISTURBANCES TEST SETUP (30MHz-200MHz)



BROADBAND AND NARROWBAND RADIATED DISTURBANCES TEST SETUP (200MHz-1000MHz)



CONDUCTED TRANSIENT DISTURBANCES TEST SETUP



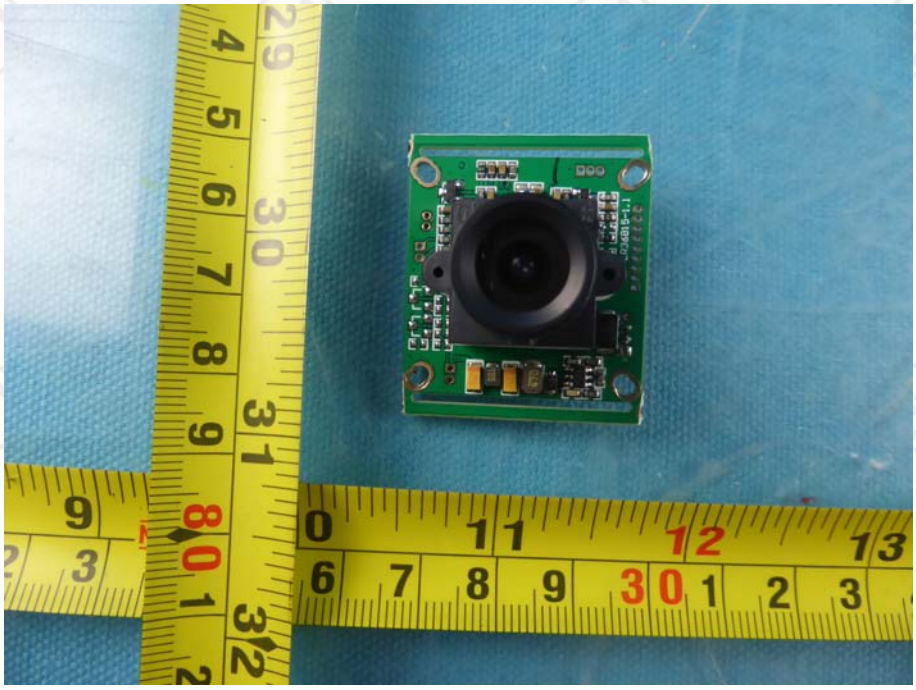
CONDUCTED TRANSIENT IMMUNITY TEST SETUP

APPENDIX 2 PHOTOGRAPHS OF PRODUCT

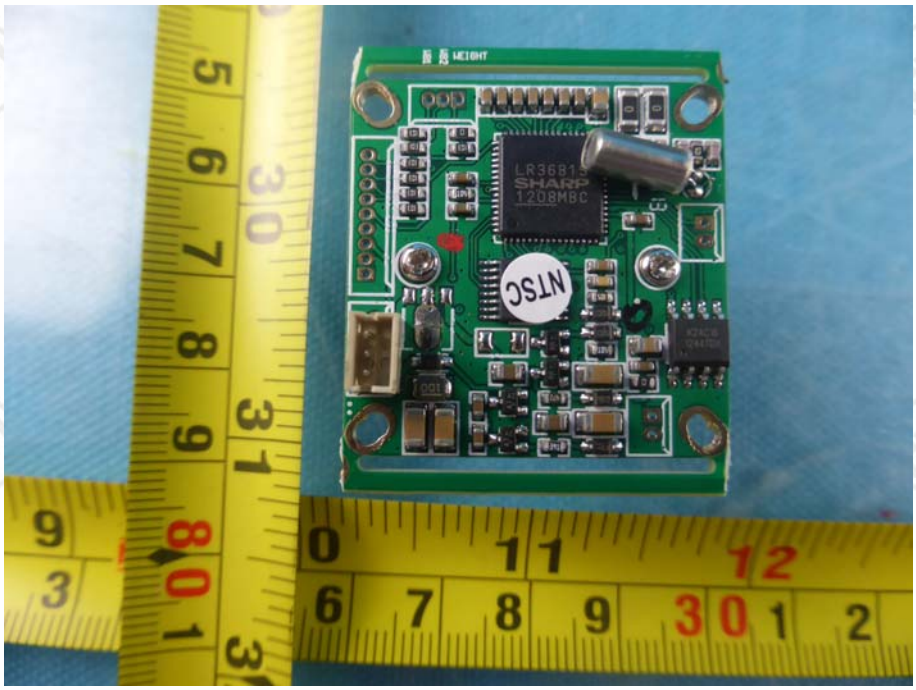
View of Product-1

View of Product-2

View of Product-3



View of Product-4



View of Product-5

*** End of Report ***