



EUROFINS PRODUCT TESTING SERVICE (SHANGHAI) CO., LTD.

EMC TEST- REPORT

TEST REPORT NUMBER: EFSH19042030-IE-04-E01



Eurofins Product Testing Service (Shanghai) Co., Ltd.
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2 General Information

2.1 Notes

The results of this test report relate exclusively to the item tested as specified in chapter "Description of test item" and are not transferable to any other test items.

Eurofins Product Testing Service (Shanghai) Co., Ltd. is not responsible for any generalisations and conclusions drawn from this report. Any modification of the test item can lead to invalidity of test results and this test report may therefore be not applicable to the modified test item.

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Operator:

2019-05-31

Perry Li / Project Engineer



Date

Eurofins-Lab.

Name / Title

Signature

Technical responsibility for area of testing:

2019-05-31

Andy Li / Supervisor



Date

Eurofins

Name / Title

Signature

Test Report No.: EFSH19042030-IE-04-E01

Eurofins Product Testing Service (Shanghai) Co., Ltd.
No.395 West Jiangchang Road, Jing'an District, Shanghai, 200436, P.R. China

2.2 Testing laboratory

Eurofins Product Testing Service (Shanghai) Co., Ltd.

No.395 West Jiangchang Road, Jing'an District, Shanghai, 200436, P.R. China

Telephone : +86-21-61819181

Telefax : +86-21-61819180

Test location, where different:

Subcontractor

Name	: Jiangsu Product Quality Testing & Inspection Institute- National Quality Supervision And Testing Center For Information Network Products
Address	: No.1368, Wuzhong Avenue, Suzhou, Jiangsu, China
Telephone	: + 86-025-84470214
Fax	: + 86-025-84470260

All tests were performed at Jiangsu Product Quality Testing & Inspection Institute-National Quality Supervision And Testing Center For InformationNetwork Products.

2.3 Details of approval holder

Name : Nanjing YANTU Car Accessory Co., Ltd
Address : No.99, Shengtai Road, Jiangning District, Nanjing City, Jiangsu, China
Telephone : ./.
Fax : ./.
/

2.4 Application details

Date of receipt of test item : 2019-04-18
Date of test : 2019-05-11 to 2019-05-31

2.5 EUT information

Product type : Tyre Inflator
Model name : A01
Brand name : ./.
Serial number : ./.
Technical Specification : DC 12V
Test voltage : DC 12V
Additional information : The product is tyre inflator for vehicle use.

2.6 Test standards

Technical standard :

EN 50498:2010

3 Technical test

3.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.



or

The deviations as specified were ascertained in the course of the tests performed.



3.2 Test environment

Temperature	:	20	...	25°C
Relative humidity content	:	30	...	60%
Air pressure	:	100	...	103kPa

3.3 Test mode

Operating

3.4 Test equipment utilized

Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
ESU EMI Test Receiver	R&S	ESU40	NTIe-511-001-01-P	2019-09-10
V-Network	SCHWARZBECK	ESH3-Z6	NTIe-511-001-07-P	2019-09-10
V-Network	SCHWARZBECK	ESH3-Z6	NTIe-511-001-16-P	2019-09-10
Pre-Amplifier	HKM	SCU03	NTIe-511-001-03-P	2019-10-09
Biconical Antenna	SCHWARZBECK	HK116	NTIe-511-001-09-P	2020-01-25
Log-Periodic Broadband Antenna	SCHWARZBECK	HL223	NTIe-511-001-10-P	2020-01-25
Fast Transient Generator	EM TEST	UCS 200N100	NTIe-511-034-04-C	2019-09-12
Voltage Variation Simulator	EM TEST	VDS 200N100	NTIe-511-034-06-C	2019-09-12
Oscilloscope	R&S	RTO1024	NTIe-511-002-00-P	2019-11-27
Artificial mains network	EMTEST	AN 200N100	NTIe-511-034-03-C	2019-09-12

3.5 Test results

☒ 1st test

☐ test after modification

☐ production test

Test case	Sub clause	Required	Test passed	Test failed
Broadband radiated disturbances	Clause 7.1 of EN 50498	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Narrowband disturbances	Clause 7.2 of EN 50498	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted transient disturbances	Clause 7.3 of EN 50498	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Conducted transient immunity	Clause 7.4 of EN 50498	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

4 Emission Test

4.1 Broadband radiated disturbances and Narrowband disturbances

The broadband/narrow electromagnetic radiation generated by the ESA representative of its type shall be measured by the method described in Automotive EMC Directive 2014/30/EU, Annex I, 6.5 and 6.6.

4.1.1 Limits

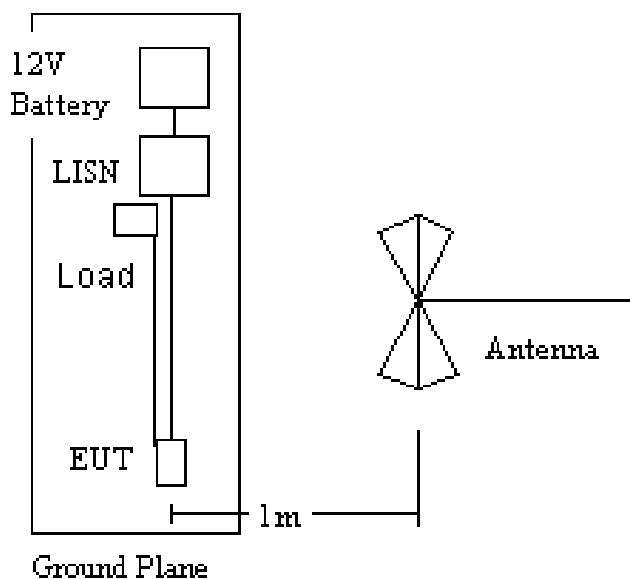
Limits for broadband radiated disturbances

Frequency range F MHz	Limits Quasi peak dB μ V/m
30 to 75	62 – 52 ^a
75 to 400	52 – 63 ^b
400 to 1 000	63
^a Decreasing linearly with the log of the frequency. ^b Increasing linearly with the log of the frequency.	

Limits for narrowband radiated disturbances

Frequency range F MHz	Limits Average dB μ V/m
30 to 75	52 – 42 ^a
75 to 400	42 – 53 ^b
400 to 1 000	53
^a Decreasing linearly with the log of the frequency. ^b Increasing linearly with the log of the frequency.	

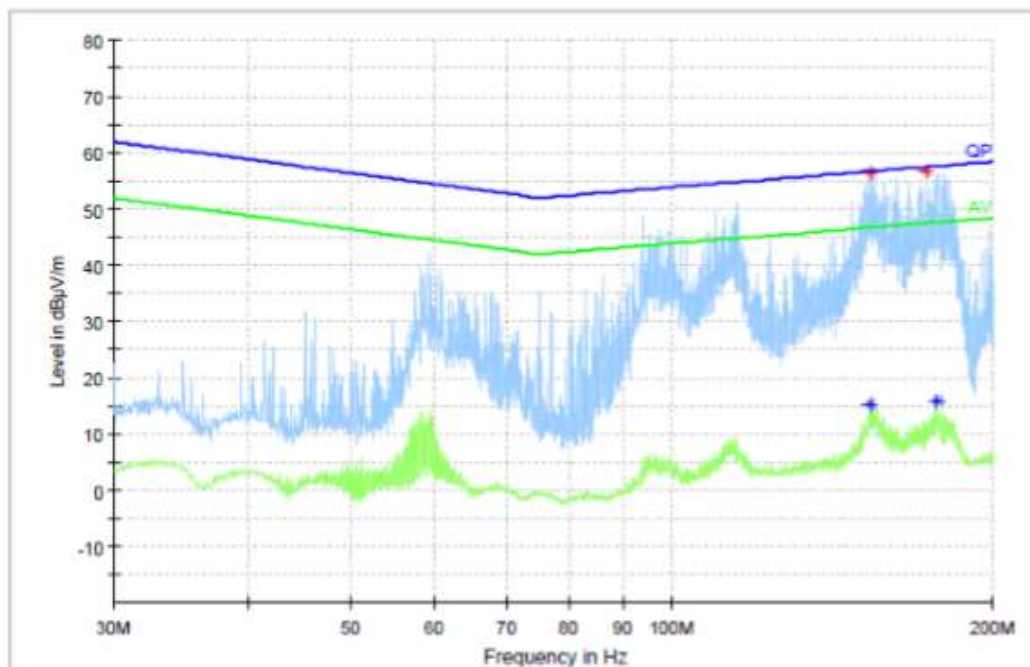
4.1.2 Measurement procedure



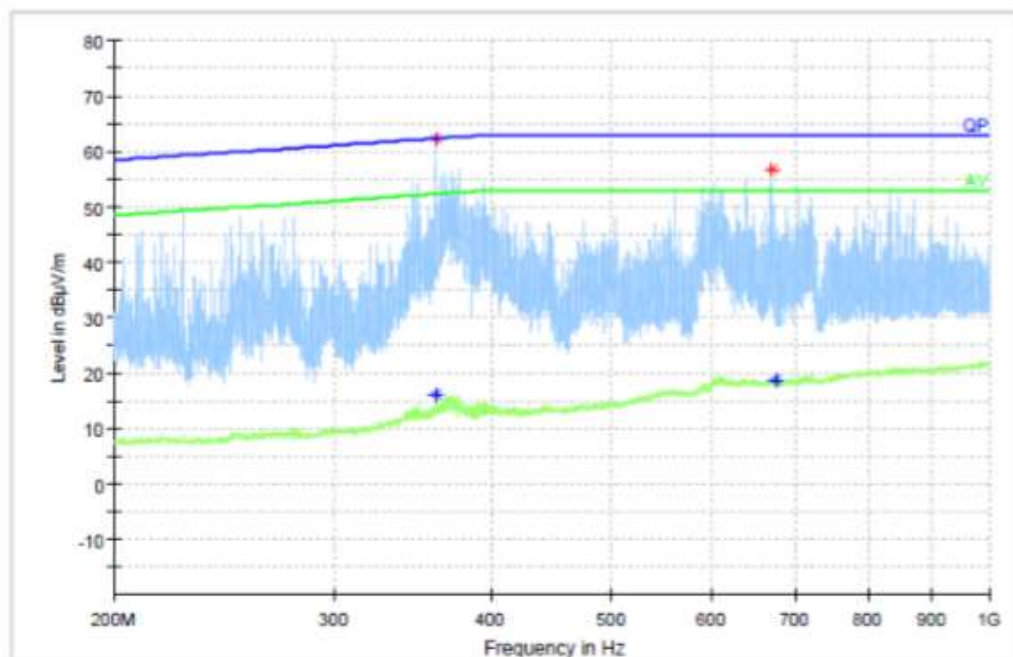
The EUT was insulated placed 50mm above the ground plane; the height of the ground plane (test bench) shall be 900 mm above the floor. The minimum width of the ground plane for radiated emissions shall be 1 000 mm. The minimum length of the ground plane for radiated emissions shall be 2 000 mm, or underneath the entire equipment plus 200 mm, whichever is larger. No additional electric connection was made between the EUT and ground plane as the EUT will not be intended to be bonded to the bodywork of the vehicle. The EUT was powered by vehicle battery.

4.1.3 Results -Measurement Data

Horizontal Level

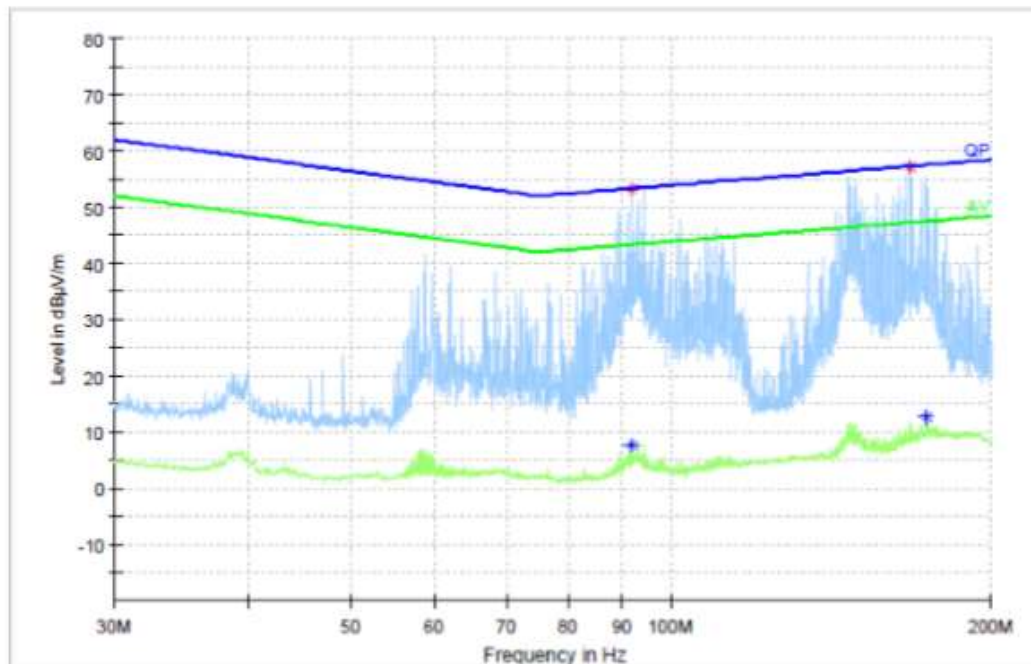


Frequency (MHz)	Max peak	Limit	Frequency (MHz)	Average	Limit
	PK/ dB (μV/m)	QP/ dB (μV/m)		AVG/ dB (μV/m)	AVG/ dB (μV/m)
153.250000	56.54	56.7	153.250000	15	47
172.900000	56.78	57.49	177.000000	16	48

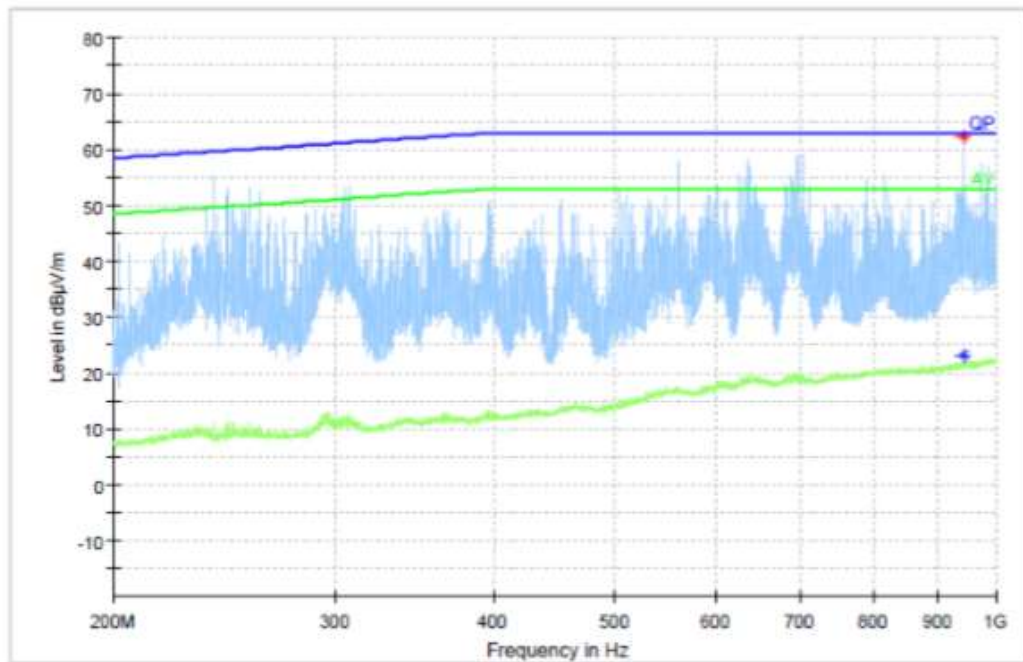


Frequency (MHz)	Max peak	Limit	Frequency (MHz)	Average	Limit
	PK/ dB (μV/m)	QP/ dB (μV/m)		AVG/ dB (μV/m)	AVG/ dB (μV/m)
361.000000	62.27	62.33	361.750000	16	52
670.700000	56.81	63	674.850000	19	53

Vertical Level



Frequency (MHz)	Max peak	Limit	Frequency (MHz)	Average	Limit
	PK/ dB (μV/m)	QP/ dB (μV/m)		AVG/ dB (μV/m)	AVG/ dB (μV/m)
91.800000	53	53	91.800000	8	43
167.550000	57	57	173.750000	13	48



Frequency (MHz)	Max peak	Limit	Frequency (MHz)	Average	Limit
	PK/ dB (μV/m)	QP/ dB (μV/m)		AVG/ dB (μV/m)	AVG/ dB (μV/m)
943.700000	62	63	943.700000	23	53

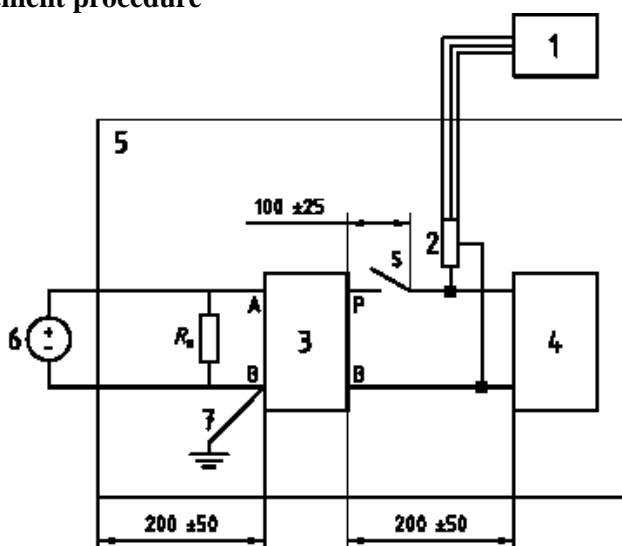
4.2 Conducted transient disturbances

The conducted transients emitted on the power cables of the ESA representative of its type shall be measured according to the method described in Automotive EMC Directive 2014/30/EU, Annex I, 6.9, on supply lines as well as to other connections of ESAs which may be operationally connected to supply lines. The test does not have to be carried out on ESAs that are not switched, contain no switches or do not include inductive loads.

4.2.1 limits

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

4.2.2 Measurement procedure



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

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) | |

NOTE For A, B, P, see Figure 3.

Tests shall be measured according to the method described in Automotive EMC Directive 2014/30/EU, Annex I, 6.9

4.2.3 Results

Polarity	Value	Limit	Comment
Positive	+12V	+75	PASS
Negative	-8V	-100	PASS

4.3 Conducted transient immunity

These tests for measuring the transient emission on supply lines.

4.3.1 limits

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.

4.3.2 Measurement procedure

Pulse 1:

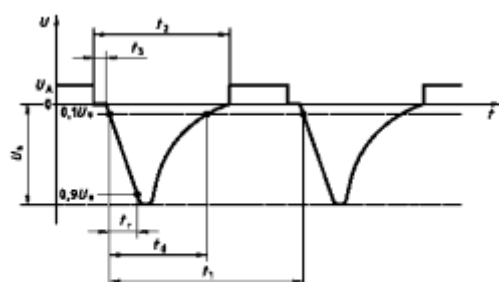


Figure 5 — Test pulse 1

Table 3 — Parameters for test pulse 1

Parameter	12 V system	24 V system
U_s	-75 V to -100 V	-450 V to -600 V
R_l	10 Ω	50 Ω
t_d	2 ms	1 ms
t_r	$\begin{pmatrix} 0 \\ -0.05 \end{pmatrix} \mu s$	$\begin{pmatrix} 0 \\ -1.5 \end{pmatrix} \mu s$
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.

Pulse 2a

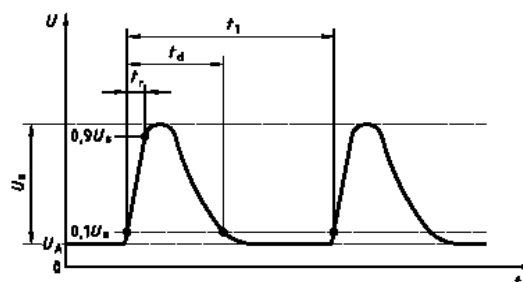


Figure 6 — Test pulse 2a

Table 4 — Parameters for test pulse 2a

Parameter	12 V system	24 V system
U_s	+37 V to +50 V	
R_l	2 Ω	
t_d	0.05 ms	
t_r	$\begin{pmatrix} 10 \\ -0.5 \end{pmatrix} \mu s$	
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.

Pulse 2b

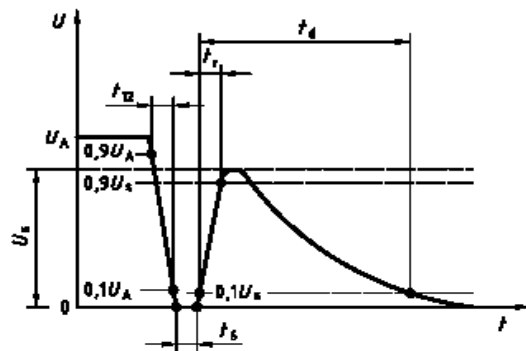


Figure 7 — Test pulse 2b

Table 5 — Parameters for test pulse 2b

Parameter	12 V system	24 V system
U_s	10 V	20 V
R_l	0 Ω to 0,05 Ω	
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	

Pulse 3a

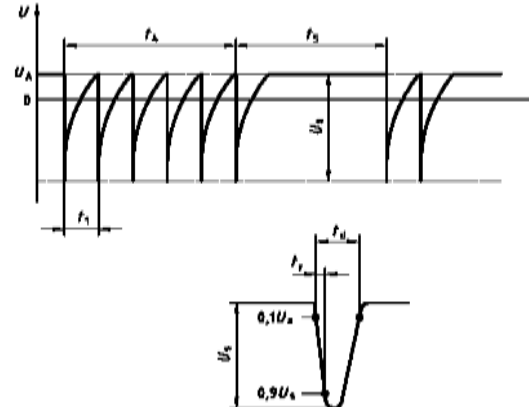


Figure 8 — Test pulse 3a

Table 6 — Parameters for test pulse 3a

Parameter	12 V system	24 V system
U_s	-112 V to -150 V	-150 V to -200 V
R_l	50 Ω	
t_d	(0,1 \pm 0,1) μ s	
t_r	5 ns \pm 1,5 ns	
t_1	100 μ s	
t_d	10 ms	
t_6	90 ms	

Pulse 3b

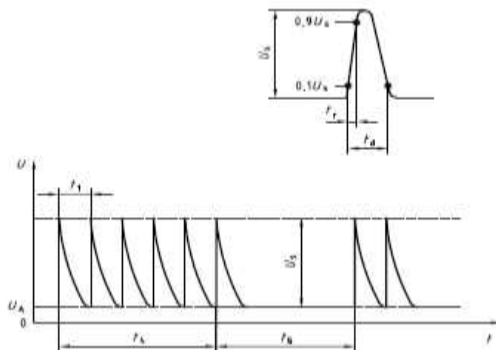


Figure 9 — Test pulse 3b

Table 7 — Parameters for test pulse 3b

Parameter	12 V system	24 V system
U_s	+75 V to +100 V	+150 V to +200 V
R_l	50 Ω	
t_d	(0,1 \pm 0,1) μ s	
t_r	5 ns \pm 1,5 ns	
t_1	100 μ s	
t_d	10 ms	
t_6	90 ms	

Pulse 4

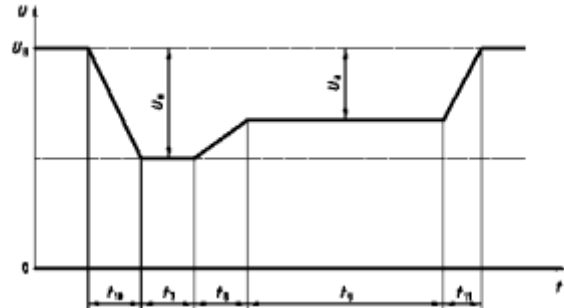


Figure 10 — Test pulse 4

Table 8 — Parameters for 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 < U_s $	-5 V to -12 V with $ U_A < U_s $
R_l	0 Ω to 0,02 Ω	
t_1	15 ms to 40 ms ^a	50 ms to 100 ms ^a
t_d	\leq 50 ms	
t_6	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_{10} = 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_{10} = 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.

The immunity of ESA representative of its type shall be tested by the method described in Automotive EMC Directive 2014/30/EU, Annex I, 6.8. Apply the test pulses 1, 2a, 2b, 3a, 3b and 4 according to ISO 7637-2 to the supply lines as well as to other connections of ESAs which may be operationally connected to supply lines. If the ESA is indirectly connected to the vehicle supply line via a DC adapter, then the test pulses shall be applied to the DC adapter.

4.3.3 Results

Test Pulse		Immunity Test Level	Test duration	Required Criterion					Actual Criterion				
				A	B	C	D	E	A	B	C	D	E
√	1	-75V	5000pulses				√				√		
√	2a	+37V	5000pulses				√		√				
√	2b	+10V	10pulses				√				√		
√	3a	-112V	1 hour				√		√				
√	3b	+75V	1 hour				√		√				
√	4	-6V	1 pulse				√				√		

Remark:

A: No Loss of Function.

B: During test, the EUT would not work normally. After test, it can self-recover.

Conclusion:

The EUT can meet the requirements of the standard.

Remark: function status

A: all functions of a device perform as designed and after exposure to disturbance.

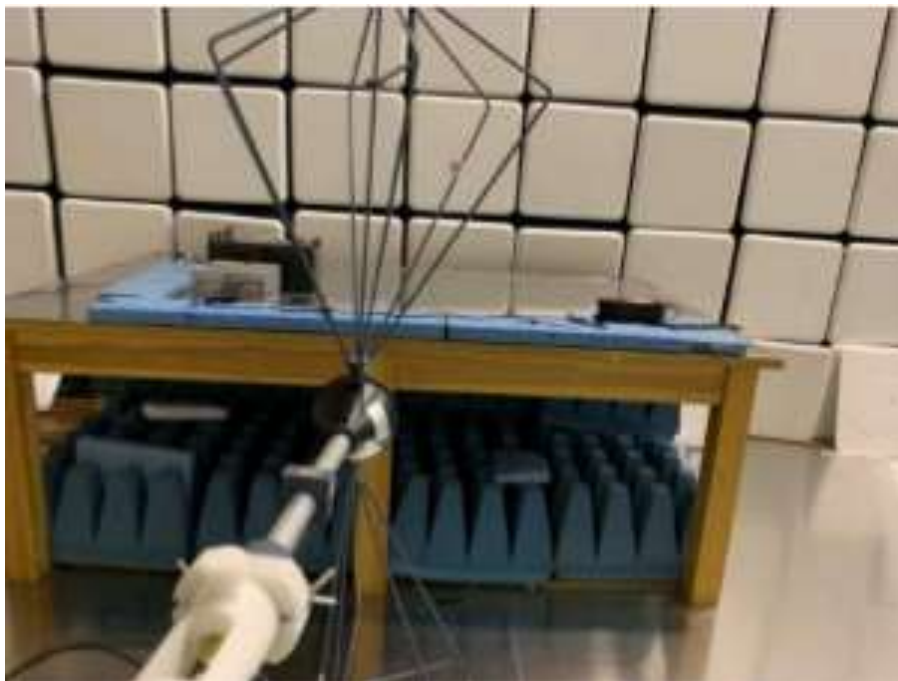
B: all function of a device perform as designed during exposure. However, one or more of them can go beyond specified tolerance. All functions return automatically to within normal limits after exposure is removed. Memory functions shall remain class A.

C: one or more functions of a device do not perform as designed during exposure but return automatically to normal operation after exposure is removed.

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

5 Test setup photos

Broadband/Narrowband radiated disturbances



Conducted transient disturbances



Conducted transient immunity



6 EUT Photos

Overall view



Bottom view



Car adaptor view



Internal view

