

CAR - TEST - SYSTEM 14

EMC-Test Equipment for electrical installation of vehicles

Highlights:

- Rise time variable 1- 5 μ s
- Vehicle voltages :
12V / 24V / 42V / 48V / 70V
- Battery current:
50A / 100A / 200A
- Electronic sense for battery voltage
- Modular and extendable



According to

ISO 7637: 2011

ISO 16750 : 2012

ISO 21848

LV 124, LV 148

... various manufacturer standards

Included Pulse	Waveform	Voltage	Standard	Ri
Pulse 1	1-5/2000 μ s	600 V	ISO	
	1-5/1000 μ s	600 V	ISO / SAE	
Pulse 2a	1 / 50 μ s	600 V	ISO	2/4/10/20/30/50/90/150 Ω
Pulse 3	5/150 ns	800 V	ISO	50 Ω

The EMC test system is designed for testing electromagnetic immunity of the electrical installation of vehicles and components against supply line transients.

The CAR-SYS allows, in its basic configuration generation of transient immunity test pulses, pulse #1, #2 and #3. It contains of a triggerable load switch, an Ethernet interface board and an integrated fast pulse voltage divider to measure the impulse in the electrical.

A microprocessor-controlled 7" touch screen display unit is integrated and permits an easy operation of the generator. The software program CAR-remote permits the PC control of the generator via Ethernet and also allows the standardized documentation according to IEC 17025 and the evaluation of test results. The user can use the standard test routines (ISO, VG, Car manufacturer specific) or define his own test sequences. It is equipped with an Impulse Recording Function (IRF) to record definite impulses (with oscilloscope).

Furthermore, nearly all customer-specific impulse adjustments are possible by the flexible software control.

The CAR-SYS excels by its compact design, simple handling and precise reproducibility of test impulses. High-voltage switching is accomplished by means of a maintenance-free semiconductor switches.

Optionally, it can be expanded with an electronic power supply:

Systems with HILO-TEST power amplifiers:

Variations	Power amplifier	Continuous current
CAR-TEST-SYSTEM SYS 14 I	PS 66-55	50 A
	CAR-AWG 1200	40 A
CAR-TEST-SYSTEM SYS 14 II	PS 66-110	100 A
	CAR-AWG 3000	100 A
CAR-TEST-SYSTEM SYS 14 III	PS 74-220	200 A
	CAR-AWG 6000	200 A

The Power amplifier serves as the battery supply for the DUT. It can as well create remote controlled amplifier pulses, like pulse 2b, pulse 4, sine between, and pulse 5 (Test A and B). Up to 200A.

Comparison of the amplifier extensions:

Type	PS xx-xx			CAR-AWG		
Description	Power supply controllable over Ethernet			Arbitrary Waveform Generator		
Version	66-55	66-110	74-220	1200	3000	6000
Max. Voltage	74V			75V		
Max. Current	50A	100A	200A	40A	100A	200A
Slew Rate	10V/μs			80V/μs		
Bandwidth	-			DC-1MHz		
Controllable battery voltage	✓			✓		
Reversible polarity	✗			✓		
Custom waveforms	✗			✓		

View datasheet of the corresponding power amplifier for further details.

The modular system concept allows realisation of different test requirements:

- Different power supply voltages of 12V, 24V, 42V, 48V and 70V (or specific)
- Different power supply currents, nominal power supply current of 50 A, 100 A and 200A

Configurations for the fulfilment of various standards:

Setup	CAR-SYS + Battery	CAR-SYS + PS xx-xx	CAR-SYS + CAR-AWG	CAR-AWG
ISO 7637 ²⁾	✓ ⁵⁾	✓	✓	✗
ISO 16750 ¹⁾	✗	✓ ⁴⁾	✓	✓
ISO 21848	✗	✓	✓	✓
LV 124/148 ³⁾	✗	✗	✓	✓
MBN 1028-4	✓	✓	✓	✗
Renault 36.00.808 ¹⁾	✗	✗	✓	✗
Nissan 280401ND02	✗	✗	✓	✗
SAEJ 1113-111 ¹⁾	✗	✗	✓	✗
VW TL81000 ¹⁾	✓	✓	✓	✗
...and many other standards				

1) + Load dump (PG2804 / PS-LD)

2) + CAR-TE 14 for 4.3. Transient Emission test

3) + CAR-PFS 80 for LV E-10, E-13 and E-14 Interruptions tests

4) without Superimposed alternating voltage test

5) without Pulse 2b

Options	Description
PC Software CAR-Remote (required to control power amplifiers: CAR-AWG, PS xx-xx)	control of CAR-SYS control of PG2804 control of CAR-Transient Emission 14 control of CAR-PFS 80
Build in 19" Rack (9HE, 600 deep)	

Expandable equipment	Description
CAR-AWG X	Remote controlled amplifier, arbitrary generator
PS XX-XX	Remote controlled amplifier
CAR-Transient Emission 14	Used to check the transient transition behaviour, when switching (slow and fast) loads on the vehicle electrical system.
CAR-PFS 80	Automotive power fail simulator, which is designed for performing fast voltage dips and drops (micro-interruptions). The electronic switches in the generators allow switching times below 1 microsecond.
Load Dump PG 2804 acc. to ISO 16750	Test A, Test B (former Pulse #5) 800J
Electronic LD-PS acc. to ISO 16750	Electronic LD, Test A + Test B (former Pulse #5)
CDN 2012 acc. to ISO 7637-3	Capacitive Coupling clamp
ICC-F65 acc. to ISO 7637-3	Inductive coupling clamp
CAR-CAL-KIT	Resistor box containing all load resistors required to verify CAR pulse.
BCK 400 F 2	Calibration Kit, to measure the pulse output voltage of burst generators

Example configuration of HILO-TEST system

CAR-TEST-SYSTEM 14 I

Pulse #1, #2 und #3, Built-in 19" Rack

+ Option Power Supply CAR-AWG 3000 (75V, 100A)

Pulse #2b, #4, and more, 50A continuous current (battery load), see technical specification

+ Option PG 2804

Load Dump

+ Option CAR-PFS 80

Micro-interruptions

+ Option 19" rack

9HE, 600 mm deep



Technical specifications:		CAR-TEST-SYSTEM 14
Mainframe		
Microprocessor controlled touch panel		7", capacitive
Ethernet Interface for remote control of the generator		built-in
Interface for saving reports		USB
External trigger input /output		Switch/ 10 V
Connector for external safety interlock loop		24 V=
External red and green warning lamps acc. to VDE 0104		24 V=, 40 mA
Cooling		Controlled fans and heat sink
Mains power		90V - 264V, 50/60 Hz
Dimensions, case, 7 HE, W * H * D		450*310*500 mm ³
Weight		35kg
Measurement Equipment		
Impulse voltage divider, 4.95 k Ω / 50 Ω		100:1, 1 kV-peak
Power supply switch:		
Output current, depending on system type		50 A, 100 A, 200 A
Max. reverse voltage		800 V
Transient over voltage protection		>1000V
High short circuit current capability		900A
Protection with automatic circuit breaker		50 A, 100 A, 200 A
Amplifier sense line decoupled from output		built-in
Trigger input, connectable to external modules		built-in
Integrated Pulse forms, according ISO 7637-2, 2011		
Surge Mainframe (Pulse 1 and Pulse 2a)		(see ISO 7637-2 5.6.1/2)
Charging voltage, adjustable		\pm (0 - 600) V \pm 10%
Max. stored energy		18 J
Polarity, switch able		positive, negative
Source resistance; switch able		150/90/50/30/20/10/4/2 Ω
Only with negative pulse polarity		
Power supply disconnection time, t ₂		(0.2-200) ms \pm 20%
Trigger delay, t ₃		< 100 μ s
Rise time, variable		1 μ s - 5 μ s, 1 μ s steps
Pulse 1		(see ISO 7637-2 5.6.1)
Waveform		1-5/2000 μ s, 1-5/1000 μ s or 1-5/500 μ s
Rise time, t _r		1 μ s - 5 μ s, 1 μ s steps
Rise time, tolerance		1.0 μ s + 0/-0.5 μ s; 3.0 μ s +0/-1.5 μ s
Pulse duration, t _d		2000 μ s / 1000 μ s / 500 μ s \pm 20%
Rep. time, t ₁		0.5 sec – 100 sec
Pulse 2a		(see ISO 7637-2 5.6.2)
Waveform 1/50 μ s		1/50 μ s
Rise time, t _r		1.0 μ s +0 μ s/-0.5 μ s
Pulse duration, t _d		50 μ s \pm 20%
Rep. time, t ₁		0.2 sec – 100 sec

Technical specifications:	CAR-TEST-SYSTEM 14
BURST Pulse 3a/3b ISO 7637-2, 2011	(see ISO 7637-2 5.6.3)
Amplitude of burst output voltage, adjustable	$\pm (25-800) \text{ V} \pm 10\%$
Waveform	
Rise time, tr	5.0 ns $\pm 30\%$
Pulse duration, td	150 ns $\pm 30\%$
Source resistance, Rs	50 Ω
Polarity, switch able	pos / neg
Pulse period t1, adjustable	0,01 ms - 1.0 ms
Burst duration t4, adjustable	0,01 ms - 25 ms
Burst period t5, adjustable	10 ms - 1000 ms
Max. continuous burst frequency	20 kHz