Electric Vehicle High Voltage Performance Test System

- ISO 21498-2:2024
- LV 123, 2009-11
- VW 80300:2021-02
- MBN 11123 2019-10
- Q-JLY J7111974A-2024
- QMAT 5502-2023

Features

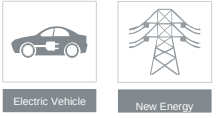
> Voltage slope control greater than 250 V/ms
> Meet the latest ISO 21498-2:2024, VW 80300:2021-02 standard test projects
> Simulate the complex electrical environment of high voltage components of new energy vehicles in the actual scene
> Test the scheduling function
> Support DC 0 V ~ 1500 V voltage output, can be arbitrarily edited waveform output, two-way power supply
> The system has strong scalability, and the power supply can be extended to 1 main N slave, so that the output current can achieve 60 A, 120 A, 240 A...

Introduction

The high voltage piezoelectric performance test system for electric vehicles is suitable for the high voltage parts test of new energy vehicles in the voltage class DC 60 V ~ 1500 V. HV battery systems, DC/DC converter HV/LV, On-board chargers and Air conditioning compressors can be verified through a series of electrical characteristic tests Electrical parameters and safety of high voltage components such as conditioning compressor.

From EVTS 150C24 electric performance of high voltage measuring support DC 0 V to 1500 V voltage output, voltage slope control more than 250 V/ms, to complete the ISO 21498-2:2024 test project, At the same time, it can meet the relevant test requirements of LV 123 and VW 80300_2021, and the system has strong scalability.

Application Areas



Composition of System Equipment

Number	Name	Model	Introduction
1	High Voltage Integrated Performance Tester for Electric Vehicles	EVTS 150C24	Output voltage: 0~1500 Vdc; Current: 240 A Power: 120 kW (expandable according to requirements)
2	High Voltage Manual Network	AN 150C30	Impedance: 0 m Ω, 2 * 10 m Ω, 2 * 25 m Ω, 2 * 50 m Ω, 2 * 100 m Ω Built in capacitor ≥ 10 mF Maximum input voltage: 1500 Vdc Maximum current: 300 A Applicable to ISO 21498-2, MBN_11123 standards AN 150C10： Impedance: 0 m Ω, 2 * 10 m Ω, 2 * 25 m Ω, 2 * 50 m Ω, 2 * 100 m Ω, 50 m Ω, 100 m Ω, 200 m Ω Built in capacitor: 10 mF (0 ~ +10%) Maximum input voltage: 1500 Vdc Current: 100 A Applicable to ISO 21498-2, MBN_11123, and VW 80300 standards
3	High Voltage Test Set	HTS 150C30	Impedance: 50 m Ω, 100 m Ω, 200 m Ω Capacitor 10 mF Maximum input voltage: 1500 Vdc Current: 100 A HTS 1501：100 A /1500 Vdc Built in capacitor 10 mF Applicable to VW 800300 standard
4	Ripple Signal Generator	RSG 80C50	10 Hz ~ 300 kHz Vp: 80V Ip: 50A
5	Coupling Transformer	TPT-7637-4C300B1、B2	10Hz ~ 300 kHz ;Current: 300 A Note: Select the corresponding generator model according to the actual current demand TPT-7637-4C100B:100 A /10 Hz ~ 300 kHz TPT-7637-4C1000C:1000 A /300 Hz ~ 300 kHz
6	Electric Vehicle Dumping Load Simulator	EVDG 20	VW80300-2021 ： EHV-10-1 / EHV-10-2 Pulse amplitude: 20 V ~ 200 V DUT load capacity: 1000 V DC / 100 A
7	High-voltage Pulse Jamming Generator for Electric Vehicles	EVPG 20	VW80300-2021 ： EHV-16 Pulse amplitude: 20 V ~ 200 V DUT bearing capacity: 1000 V DC/ 100 A
8	Automotive Immunity Test Software	Autolab	Automotive immunity test software
9	Oscilloscope	MDO32	Bandwidth 1GHz, sampling rate 5 G Sa/s, 2 analog channels
10	High Voltage Differential Voltage Probe	THDP0200	Attenuation:50 X / 500 X，bandwidth:200 MHz Maximum voltage 1500 Vdc
11	Current Probe	PT-722	DC ~ 200 kHz，0.5 ~ 1000 A (4000 Ap - p)
12	Wide-Range Adjustable Pre-Charging Circuit Test Device	RC 150C100	VW80300-2021 ： EHV-04 Test Voltage Vmax : 1500 V Test Current Imax : 100 A DUT bearing capacity: 1000 V DC/ 100 A

ISO 21498-2
Match the situation

Test Requirement	Type of Test	Match the Situation	Equipment Needed
6.2 The Voltage Varies Within the Working Range	Immunity - voltage variation	satisfy	1. Oscilloscope 2. Current probe 3. Automotive immunity test software 4. High voltage differential voltage probe 5. High voltage manual network 6. Ripple signal generator 7. High voltage integrated performance tester for electric vehicles 8. Coupling transformer
6.3 Generated Voltage Slope	Emission	satisfy	
6.4 Voltage Slope Immunity	Immunity - voltage variation	satisfy	
6.5 Generated Voltage Ripple	Emission	satisfy	
6.6 Voltage Ripple Immunity	Immunity - DC ripple	satisfy	
6.7 Overvoltage	Immunity - voltage variation	satisfy	
6.8 Undervoltage	Immunity - voltage variation	satisfy	
6.9 Voltage Offset	Immunity - voltage variation	satisfy	
6.10 The Resulting Throw Load	Emission	satisfy	
6.11 Throw Load Voltage Immunity	Immunity - voltage variation	satisfy	
Note: The test was carried out by the automotive immunity test software.			

LV 123
Match the situation

Test Requirement	Type of Test	Match the Situation	Equipment Needed
10.4.1 Unlimited Operating Capability Range	Immunity - voltage variation	satisfy	1. Oscilloscope 2. Current probe 3. Automotive immunity test software 4. High voltage differential voltage probe 5. High voltage manual network 6. Ripple signal generator 7. High voltage integrated performance tester for electric vehicles 8. Coupling transformer
10.4.2 Upper Limit of Operation Capability	Immunity - voltage variation	satisfy	
10.4.3 Lower Limit Operating Capability Range	Immunity - voltage variation	satisfy	
10.4.4 Limit Operating Capacity Range	Immunity - voltage variation	satisfy	
10.4.5 Dynamic Voltage - Immunity	Immunity - voltage slope change	satisfy	
10.4.6 Voltage Ripple Emission	Immunity - DC ripple	satisfy	
10.4.7 Overvoltage	Immunity - voltage variation	satisfy	
10.4.8 Undervoltage	Immunity - voltage variation	satisfy	
10.4.9 Throw Load	Immunity - voltage variation	satisfy	
10.4.10 Voltage Excursion	Immunity - voltage variation	satisfy	
10.4.11 The Interaction Between Low-and-High Pressure Systems	Functional test	Power supply only	
Note: LV 123 standard against ISO 21498-2-2024 standard requirements.			

VW80300_2021 Match the situation

Test Requirement	Type of Test	Match the Situation	Equipment Needed
EHV-01 The Voltage Varies Within the operating range	Immunity - voltage variation	satisfy	1. Oscilloscope 2. Current probe 3. Automotive immunity test software 4. High voltage differential voltage probe 5. High voltage test set 6. Ripple signal generator 7. High voltage integrated performance tester for electric vehicles 8. Coupling transformer 9. Electric vehicle dumping load simulator 10. High-voltage pulse jamming generator for electric vehicles
EHV-02 Operate Within the Overvoltage Range	Immunity - voltage variation	satisfy	
EHV-03 Operate in the Undervoltage Range	Immunity - voltage variation	satisfy	
EHV-04 Pre-Charge	Functional test	satisfy	
EHV-05 High Voltage Generated	Emission	satisfy	
EHV-06 The System High Voltage Fluctuates	Immunity - voltage variation	satisfy	
EHV-07 Energy Storage Device High Voltage Dynamic	Battery testing	satisfy	
EHV-08 High Voltage Ripple Generated	Emission	satisfy	
EHV-09 System High Voltage Ripple	Immunity - DC superimposed ripple	satisfy	
EHV-10 Throw Load	Immunity - Pulse immunity	satisfy	
EHV-11 High Voltage Offset	Immunity - Pulse immunity	satisfy	
EHV-12 High Voltage Overcurrent	Current variation	satisfy	
EHV-13 High Pressure Life	Periodic test	satisfy	
EHV-14 High Voltage Component Switch Durability Test	Periodic test	satisfy	
EHV-15 High Voltage Interlock Service Disconnects and Crash Signal Operation	Functional test	satisfy	
EHV-16 High Voltage Pulse	Immunity - Pulse immunity	satisfy	
EHV-17 Throw load voltage	Emission	satisfy	

Note:
1. The VW 80300 _2021 artificial network (HTS 150C30) and ISO 21498-2-2021 standard in different network.
2. The EHV-04 Pre-charging: The pre-charging function can be tested through the company's RC 150C100 equipment.
3. The EHV - 07 energy storage device of high voltage dynamic, by changing the load current mutation.
4. The EHV - 12 high pressure flow, by changing the DUT output load current increase 3 times.
5. EHV - 13 high service life, programmable ac/dc power frequency to 40 KHz.
6. EHV - 14 high-pressure components switch durability test, reliability test.

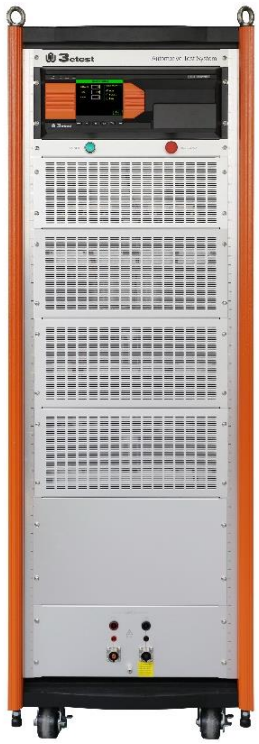
EVTS 150C24

High Voltage Integrated Performance Tester for Electric Vehicles-Technical Parameters		
Equipment Model	EVTS 150C24 (Legend)	EVTS 150C12
Line Voltage Max	1500 V DC	1500 V DC
Max Current	240 A	120 A
Max Power	120 kW	60 kW
Number of Power Modules	4 sets (single 30 kW / 60 A)	2 sets (single 30 kW / 60 A)
Overvoltage Protection Range	0 ~ 1650 V	0 ~ 1650 V
Overcurrent Protection Range	0 ~ 264 A	0 ~ 132 A
Overpower Protection Range	0 ~ 132 kW	0 ~ 66 kW
Voltage Range	0 ~ 1500 V	
Waveform	Sine waves, triangular waves, slope waves	
Amplitude and Position Change	Static, linear	
Maximum Number of Supported Segments	100	
Input/Output Port	100 A solid port, 300 A high voltage shielding terminal	100 A solid terminal
Extend	Current and power can be customized expansion, parallel power modules, 1 master N slave.	
Generate Throw Load Voltage Function		
Dimensions	19 inches/35U rack 600mm(W)*1850mm(H)*800mm (D)	19 inches/22U rack 600mm(W)*1250mm(H)*800mm(D)
Weight	Approx. 305 kg (with power supply)	Approx. 220 kg (with power supply)

AN 150C30

High Voltage Manual Network-Technical Parameters		
Unit Type	AN 150C30 (Legend)	AN 150C10
Test Voltage Vmax	1500 V DC	1500 V DC
Test Current Imax	0 mΩ,2*10 mΩ 300 A 2*25 mΩ 200 A 2*50 mΩ, 2*100 mΩ 100 A	100 A
Impedance	0 mΩ，2*10 mΩ，2*25 mΩ，2*50 mΩ，2*100 mΩ	0 mΩ、2*10 mΩ，2*25 mΩ，2*50 mΩ，2*100 mΩ、50 mΩ、100 mΩ、200 mΩ
Inductance	1 μH	1 μH
Decoupling Capacitor	≥ 10 mF	10 mF (0 ~ +10%)
Grounded Capacitance	1 μF	1 μF or 220 nF
Frequency Range	10 Hz ~ 150 kHz	10 Hz ~ 150 kHz
Capacitance Voltage Monitoring	Lower computer screen display	Lower computer screen display
Input/Output Port	16 A banana head terminal, 300A high voltage shielding terminal	16 A banana terminal, 100A solid terminal
Temperature Protection	The device stops running when the internal temperature exceeds 80 °C	
Max Power Dissipation	350 W	400 W
Dimensions	19 inches/35U rack 600mm(W)*1850mm(H)*800mm(D)	
Weight	Approx. 230 kg	Approx. 260 kg
Note: The artificial network complies with ISO 21498-2, MBN_11123 standards and is suitable for 300 A testing systems.	The artificial network complies with ISO 21498-2, MBN_11123, and VW 80300 standards and is suitable for 100 A testing systems.	

HTS 150C30



High Voltage Test Set-Technical Parameters		
Unit Type	HTS 150C30 (Legend)	HTS 1501
Test Voltage Vmax	1500 V DC	1500 V DC
Test Current Imax	200 mΩ 100 A 100 mΩ 200 A 0 mΩ , 50 mΩ 300 A	100 A
Impedance	0 mΩ, 50 mΩ, 100 mΩ, 200 mΩ	
Decoupling Capacitor	10 mF (±10%)	10 mF (±10%)
Box Inductance	2*1 μH (±10%)	2*1 μH (±10%)
Cy	220 nF (±10%）	
Capacitance Voltage Monitoring	Lower computer screen display	Nixie display
Input/Output Port	16 A banana terminal, 300 A high voltage shielding terminal /16 A banana terminal, 100 A solid terminal, 300 A high voltage shielding terminal	16 A banana terminal, 100 A solid terminal /100 A solid terminal
Temperature Protection	The device stops running when the internal temperature exceeds 80 °C	
Frequency Range	10 Hz ~ 150 kHz	10 Hz ~ 150 kHz
Max Power Dissipation	350 W	500 W
Dimensions	19 inches/35U rack 600mm(W)*1850mm(H)*800mm(D)	19 inches/22U rack 600mm(W)*1250mm(H)*800mm(D)
Weight	Approx. 275 kg	Approx. 75 kg
Note: The artificial network meets the requirements of VW 80300_2021 standard and is suitable for 100A and 300A testing systems.		

TPT-7637-4C300B1、B2

Coupling Transformer-Technical Parameters				
Unit Type	TPT-7637-4C300B1, B2 (Legend)	TPT-7637-4C100B	TPT-7637-4C1000C	TPT-7637-4C1000B
Maximum Unsaturated Voltage (Vpp)	140 Vpp	140 Vpp	160 Vpp （1:1）	160 Vpp （2:1）
Maximum Coupling Current (App)	100 App	100 App	240 App （4:1）	400 App （4:1）
Maximum EUT Current (A)	DC 300 A	DC 100 A	DC 1000 A	DC 1000 A
Maximum EUT Voltage (V)	DC 1000 V			
Input/Output Port	16A banana terminal /300A high voltage shielding terminal		1000A solid terminal, through the core terminal	
Turns Ratio	1：1		1：1 2：1 4：1	2：1 4：1
Frequency Range	10 Hz ~ 300 kHz		300 Hz ~ 150 kHz	
Dimensions	440 mm (W)*190 mm (H)*585 mm (D)		800 mm (W)*1150 mm (H)*1405 mm (D)	
Weight	Single unit approx. 65 kg	Approx. 60 kg	Approx. 570 kg	
Up to 300 A secondary current for 300 A test systems.		Maximum 100 A secondary current for 100 A test systems.	600 A DC/1000 V DC @Max 20 min 1000 A DC/1000 V DC @Max 10 min	

RSG 80C50

Ripple Signal Generator-Technical Parameters		
Unit Type	RSG 80C50 (Legend)	RSG 40C20
Up to Standard	ISO/TS 7637-4: 2020, ISO 21498: 2021, VW 80300: 2021	
Frequency Range	10 Hz ~ 300 kHz	
Stepped Frequency	0.01 Hz	
Open-Circuit Output Voltage	160 Vpp	80 Vpp
Ripple Dwell Time	2 s ~ 999 s, resolution 0.1 s	1 s ~ 10 s, resolution 0.1 s
Peak Current	50 A	20 A
Input/Output Port	100 A solid terminal	
Dimensions	19 inches/22U rack 600mm(W)*1250mm(H)*800mm(D)	19 inches/4U rack 450mm(W)*190mm(H)*620mm(D)
Weight	Approx. 156 kg	Approx. 25 kg

EVDG 20

Electric Vehicle Dumping Load Simulator-Technical Parameters		
VW 80300_2021 (EHV-10)	EHV-10-1	EHV-10-2
Pulse Waveform Feature	Approximate double exponential wave	
Pulse Voltage Amplitude	20V ~ 200V，±10%	
Calibration Voltage	50V ~ 200V，±10%	20V ~ 200V，±10%
Pulse Width	10ms (0 ~ 0%) ±10%@2ΩLoad	≥ 1ms (0 ~ 0%), open circuit
Voltage Change Rate (0% ~ 100%)	≥ 250 V/ms	≥ 3000 V/ms
Input/Output Port	100A solid terminal	
Nominal Output Impedance	0.16 Ω	
Pulse Interval Time	3 s ~ 99 s	
Pulse Polarity	Positive only	
Pulse Number	1 ~ 99	
Pulse Triggering Mode	Manual, automatic, external	
Pulse Coupling Mode	Pulse coupled transformer	
DUT Capacity	DC 1000V/100A (customizable)	
Dimensions	19 inches/22U rack 600mm(W)*1250mm(H)*800mm(D)	
Weight	Approx. 187 kg	
Note: Load capacity up to 100 A, larger current systems need to be customized.		

EVPG 20

High-Voltage Pulse Jamming Generator for Electric Vehicles-Technical Parameters		
VW 80300_2021 (EHV-16)	Test case 1	Test case 2
Pulse Waveform Feature	Approximate square wave	
Pulse Voltage Amplitude	20 V ~ 200 V，±10%	
Calibration Voltage	75 V ~ 200 V，±10%	
Pulse Width	1 μs ~ 20 μs，±10%	1 μs ~ 5 μs，±10%
Voltage Change Rate (0% ~ 100%)	＞ 1 V/ns	
Input/Output Port	16A banana terminal, 100A solid terminal /100A solid terminal	
Nominal Output Impedance	0.16 Ω	
Pulse Interval Time	10 ~ 100 ms	0.5 ~ 10 ms
Pulse Polarity	Positive, negative, first positive and then negative	
Pulse Number	1 ~ 100	
Pulse Interval Time	0.1 s ~ 99 s	
Number of Test Groups	1 ~ 100	
Pulse Triggering Mode	Manual, automatic, external	
Pulse Coupling Mode	Coupling capacitance 100 μF/ line	
DUT Capacity	DC 1000 V/100 A (customizable)	
Dimensions	19 inches/6U rack 740mm(W)*390mm(H)*585mm(D)	
Weight	Approx. 69 kg	
Note: Load capacity up to 100 A, larger current systems need to be customized.		

RC 150C100

Wide-Range Adjustable Pre-Charging Circuit Test Device-Technical Parameters	
VW 80300_2021 (EHV-04)	
Test Voltage Vmax	1500 V
Test Current Imax	100 A
Capacitance	10 μF ~ 1200 μF (Accuracy 2%, step 10 μF)
Internal Resistance	0 Ω ~ 6 Ω (Accuracy 2%, step 0.05 Ω)
Discharge Resistance	50 Ω ~ 1200 Ω (Accuracy 2%, step 10 Ω)
High-Voltage	80% ~ 99% (Step 1%)
Hold Time	1 s ~ 9999 s (Step 1 s)
End Voltage	5 V ~ 20 V (Step 1 V)
Pulse Triggering Mode	Manual, automatic, external
Pulse Coupling Mode	Coupling capacitance 100 μF/ line
DUT Capacity	DC 1500 V/100 A (customizable)
Dimensions	19 inches/22U rack 600mm(W)*1250mm(H)*800mm(D)
Weight	Approx. 185 kg
Note: Load capacity up to 100 A, larger current systems need to be customized.	

List of Suggested Selection Guidelines

Model / Name	High Voltage Integrated Performance Tester for Electric Vehicles		High Voltage Manual Network		High Voltage Test Set	Ripple Signal Generator		Coupling Transformer				Electric Vehicle Dumping Load Simulator	High-Voltage Pulse Jamming Generator for Electric Vehicles	Wide-Range Adjustable Pre-Charging Circuit Test Device
	EVTS 150C12	EVTS 150C24	AN 150C10	AN 150C30	HTS 150C30	RSG 40C20	RSG 80C50	TPT-7637-4C100B	TPT-7637-4C300B1/B2	TPT-7637-4C1000B	TPT-7637-4C1000C	EVDG 20	EVPG 20	RC 150C100
100 A High Voltage Performance System	√		√			√		√				√	√	√
240 A High Voltage Performance System		√		√	√		√		√			Customizable		

Note: EVDG, EVPG, RC 150C100 equipment maximum 100 A, if larger load current needs to be customized.

100A High Voltage Performance System Product Diagram (example) :

240A High Voltage Performance System Product Diagram (example) :

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