ES620 Series Compact TLP IV-Curve System

(External Modules Available for HMM, HBM)

1. Description

The model ES620 Series Compact TLP System is an advanced IV-curve characterization system designed to simulate ESD events (TLP/ VF-TLP/ HMM pulse) and monitor a device (semiconductors, discrete, circuit modules, etc) in high power time domain.

The TLP (transmission line pulse) test function is designed to meet the latest ANSI/ESD STM5.5.1 test standard and applies high quality rectangular pulses to devices and records both the voltage across and current through the device. This gives pulsed IV curves, allowing users to characterize a device's transient response over ns time windows. Advanced automatic device failure detection methods are incorporated, such as DC Spot Check (V or I), Static IV curve, Fuse, Breakdown, and Bias Source Fluctuation.

The VF-TLP test function is designed to simulate the CDM speed ESD event and captures the voltage across the DUT and current through the DUT under a very high speed (such as 100 ps rise-time) ESD transient. This allows the user to study the response speed and peak clamping voltage of a device.

The HMM (Human Metal Model) test function is an alternative test method to IEC61000-4-2 system level ESD. It gives the equivalent waveform to an ideal standard waveform for low ohm

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devices and eliminates many IEC gun test problems for components or wafer level tests, such as repeatability, imprecision gun tip, impedance mismatches, EMI interferences from unshielded relays and special setup with large ground plane and coupling plane etc.

2. Features

- Most configurable TLP Pulsed IV-Curve System
- Ultra-Compact Design System
- Ultra-fast Speed with multi-thread processing
- Currently 25 A, 50 A, and 100 A models available
- High quality TLP pulses
- Test Function Expandable with vf-TLP, HMM, HBM options
- Automatic failure detection methods includes DC Spot Check (V or I), Static IV, Fuse, Breakdown, and Bias Source Fluctuation.
- Customization solution is available
- Software controlled pulsing: Burst, Continuous, IV-Curve Characterization
- Rise-Time options from 60 ps to 1200 ns *(depends on model, customization available)
- Pulse-Width options from 1 ns to 3200 ns *(depends on model, customization available)

3. Applications

- Wafer level ESD test
- PCB / package level ESD test
- System / circuit module ESD test
- TLP / VF-TLP option meets ANSI/ESD STM 5.5.1-2016
- HMM option meets ANSI/ESD SP5.6-2009
- HBM option meets ANSI/ESDA/JEDEC JS-001-2017
- Safe Operation Area (SOA) test
- Charge recovery time test
- Differential ESD pulse injection
- Touchscreen ITO trace fuse test
- Touchscreen ITO trace breakdown test

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4. Specifications

ES620 Transmission Line Pulse Base IV-Curve System

Parameters	ES620-25	ES620-50	ES620-100	Unit	Comments
Output voltage @ open load	± 0.5 ~ 1250	± 0.5 ~ 2500	± 0.5 ~ 5000	V	
Output voltage @ 50 Ω load	± 0.25 - 625	± 0.5 ~ 1250	± 0.5 ~ 2500	V	
Min voltage step @ 50 Ω load	0.1	0.1	0.1	V	
Output voltage precision	Better than 5 %			%	After self-calibration
Output current @ short load	± 0.01 ~ 25	± 0.02 ~ 50	± 0.04 ~ 100	A	
Output current @ 50 Ω load	± 0.005 ~ 12.5	± 0.01 ~ 25	± 0.02 ~ 50	A	
Peak power @ 50 Ω load	≥ 7.813	≥ 31.25	≥ 125	kW	
Intrinsic TLP rise-time	≤ 0.1	≤ 0.2	≤ 1	ns	60 ps option is only available on Model ES620-25
Other rise-time options	0.1 ~ 50	0.2 ~ 50	1 ~ 50	ns	Depends on model, check table 2
Intrinsic TLP pulse width	100 ± 1			ns	Default
Other pulse-width options	1 ~ 3200	2.5 ~ 1600	5 ~ 500	ns	Depends on model, check table 3
Test repetition time	Typical 0.5 ~ 2			s	OSC, SMU and state dependent
Dimensions	347 X 300 X 145			mm	
Weight	5	6	8	kg	
Direct I &V Measurement method					
Supported oscilloscopes	Major Series @ Tektronix, Agilent, LeCroy, Rigol.				Others will be supported on request
Supported SMU	Keithley 24xx/26xx series SMU				Others will be supported on request

ES620-HMM1 External Human Metal Model Module

(short circuit DUT, 100 Ω HMM per ANSI/ESD SP5.6-2009)

Parameters	ES620-25	ES620-50	ES620-100	Unit	Comments
HMM first peak current	22.5	45	90	A	3.75 A per 1 kV ≤ ± 10 % IEC 61000-4-2 (R=330Ω, C=150pF)
HMM current @ 30 ns	12	24	48	A	≤ ± 10 % (better than ±30% IEC)
HMM current @ 60 ns	6	12	24	A	≤ ± 10 % (better than ±30% IEC)

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ES620-HBM1 External Human Body Model Module
(ANSI/ESDA/JEDEC JS-001-2014 R=1.5 kΩ, C=100 pF)

Parameters	ES620-25	ES620-50	ES620-100	Unit	Comments
Maximum HBM Test Level	± 2	± 4	± 8	Kv	
Minimum HBM Test Level		± 50		V	
Minimum Test Level Step		1		V	PCB controlled via USB
Charge Removal Resistance		10 K		Ohm	
Voltage Output Sensitivity		1/201		V/V	± 3% into 50 Ohm
Current Sensor Sensitivity		1		V/A	± 3% into 50 Ohm
Measurement Repetition Time		>= 1		S	Per Standard 1P/S Maximum
Physical Dimensions		90 X 90 X 130		mm	

5. Ordering Information

Line	Part # or Option #	Description
		TLP IV-Curve System Basic Configuration
1.1	ES620-25	ES620 Compact TLP IV-Curve System, 25 A Base Unit
1.2	ES620-50	ES620 Compact TLP IV-Curve System, 50 A Base Unit
1.3	ES620-100	ES620 Compact TLP IV-Curve System, 100 A Base Unit
		Rise-time Options
2.1	ES62x-PRT4	Programmable pulse rise-time filter X4 module (Default: Intrinsic, 1 ns, 5 ns, 10 ns, customization available)
2.2	ES62x-PRT7	Programmable pulse rise-time filter X7 module (Default: Intrinsic, 0.5ns, 1 ns, 2ns, 5 ns, 10 ns, 20ns, customization available)
2.3	ES62x-ERTF	External Rise-time Filter (customizable from 0.1 ~ 50 ns)
		Pulse-width Options
3.1	ES620-MPLEx	Manual Pulse Width Extremal Change Option
3.2	ES620-PPL4	Programmable Internal pulse length X4 module
3.3	ES620-PPL7	Programmable Internal pulse length X7 module
		External Pulse Module Options
4.1	ES620-HBM1	Human Body Model (HBM) ESD Pulse Module and Measurement Setup Option (ANSI/ESDA/JEDEC JS-001-2014 Pulse Test with IV Measurement)
4.2	ES620-HMM1	Human Metal Model (HMM) ESD Pulse Module and Measurement Setup Option (IEC61000-4-2 Pulse Test with IV Measurement)

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Leakage or DC IV Measurement Options		
5.1	ES62X -KSMU	Leakage Measurement Options with Keithley SMU (SMU Option: 2401, 2400, 2450, 2410, 2602B, 2635B)
5.2	ES62X -SSM	System Switch Module (switching between TLP and leakage tests)
DC Bias Measurement Options		
6.1	KPU2230-30-1	Programmable Keithley 2230-20-1 3-Channel Programmable DC Power Supply
6.2	ES62X-BT1	TLP Test Bias Tee, 100 kHz – 6 GHz, 100V, 0.5 A DC/2.5 A Pulse Current
6.3	ES62X-BT2	TLP Test Bias Tee, 30 kHz – 6 GHz, 100V, 2 A DC/10 A Pulse Current
6.4	ES62X-BT3	TLP Test Bias Tee, 30 kHz – 4 GHz, 450V, 2 A DC/10 A Pulse Current
ESD Injection and IV-Curve Measurement Options		
7.1	ES62X-PSTT	TDR-O Measurement Setup for package level standard TLP test
7.2	ES62X-PVFTT	TDR-S Measurement Setup for package level VF-TLP test
7.3	ES62X-CMPS	Compact Manual Probe Station with flexible moving vacuum chuck and microscope
7.4	ES62X-WSTT	TDR-O Measurement Setup for wafer level TLP test includes micro-positioners
7.5	ES62X-WVFTT	TDR-S Measurement Setup for wafer level VF-TLP test includes micro-positioners
Oscilloscope Paired with TLP System		
8.1	MISC-OSC1	Digital Oscilloscope (1 GHz, 5 Gs, 4 Ch) (Recommended for standard TLP test)
8.2	MISC-OSC6	Digital Oscilloscope (6 GHz, 20 Gs, 4 Ch) (Recommended for VF-TLP test)

Customized solutions are available upon request

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