

# Thermo Scientific ECAT EMC Test System

Expert computer-aided testing for pulsed EMI immunity

The Thermo Scientific ECAT EMC Test System is a modular, full capability system for measuring and analyzing the vulnerability of telecom, electronic, and electrical equipment and components to pulsed EMI hazards, including EFT, surge and PQF™ (Power Quality Failure). Its powerful design enables easy and rapid testing for all pulsed EMI threats and meets Telcordia, UL, FCC, and IEC standards, including pre-compliance, production sampling and final compliance.

- Ideal test system to address most applicable EMC and Telecom standards, including CE Mark/IEC standards
- Easy-to-use Windows®-based application software for quick implementation of international and national test routines
- Virtual Front Panel™ retains key operating parameters during set up and testing
- Multi-level system interlock architecture provides maximum safety
- Single output port/instant mode switching
- AC Mains current monitoring
- Accurate automatic report generation
- Flexible, economically upgradable architecture



## Modular, full capability EMC test systems and instruments

Our flagship EMC test system, the Thermo Scientific™ ECAT EMC Test System, is a modular, full capability system for measuring and analyzing the vulnerability of electronic equipment and components to pulsed EMI hazards. The ECAT EMC system meets virtually all applicable national and international standards.

## A powerful design and production tool

The ECAT EMC Test System features a totally integrated modular architecture that enables manufacturers and designers of communications equipment, computers, and other electronic and electrical products to easily and rapidly test for pulsed EMI threats including pre-compliance, production sampling and final compliance.



## Flexible Options

The ECAT EMC Test System system is available as a complete, integrated system for all pulsed EMI tests, or as individual test modules that can be used as stand-alone testers. If you need to test for additional threats, or as standards change, the system can be easily expanded or upgraded, reducing costly equipment obsolescence. Systems and modules are delivered ready for immediate EMC testing and provide an unprecedented level of operating ease, accuracy and safety.

## Ready-to-use test software

Proprietary Windows®-based software eliminates the need to spend hours programming in order to run meaningful, accurate compliance tests. Its flexibility allows users to quickly implement required routines.

## Reach the Next Level of Success

Experience the many benefits of working with recognized experts in the field of EMC (ElectroMagnetic Compatibility) testing. Our commitment to the discipline is wide ranging; we actively participate on global standards committees and have helped define test methodologies to achieve regulatory standards such as CE Mark requirements, as well as company and market-driven product quality objectives. Our goal is to support you with lifelong service, from applications support, calibration services and preventive maintenance scheduling to full tactical field support.

### ECAT Model E103 Series Control Center

Computer-driven control center and power units required for the operation of any Thermo Scientific ECAT test system

Virtual Front Panel™ Control	8 x 40 character keyboard entry and LCD display—allows operator to see vital test parameters without list scrolling
FiberCom™ Fiber-optic Interface and Control System	Uses ECAT software for full computer control of ECAT test equipment (user-supplied PC running Windows, 8 MB RAM, one serial port)
Module Bay	For one full-width plug-in module or two half-width modules. Up to five additional bays (for a total of six) and/or S-ECAT for floor-standing system available (required for more than three docking bays)
Surge V and I Monitor Ports	For waveform monitoring with an external (user-supplied) oscilloscope at 1kV/V and 200A/V; V & I signals supplied from optional AC coupler/decoupler or ECAT modules/options
Input Voltage	100 V to 240 VAC, 50/60 Hz
Typical Input Current	3.5A @ 100V; 1.5A @ 240V
Operating Temperature	+15°C to +35°C
Operating Humidity	10% to 75% non-condensing

### Options

E103-S—adds oscilloscope trigger for installed surge modules

AC input connectors are available for most national and international standards.

### ECAT Model E411 True-EFT™ Simulator

EFT/Noise Burst simulator for testing in accordance with IEC 61000-4-4 Edition 2 to 4.4kV

Burst Polarity	Positive, negative, alternating
Burst Voltage	200 V to 4.4 kV
Burst Voltage Resolution	5 V
Burst Voltage Tolerance	±10% of setting with no load ÷ 2 with 50 load; ±20% of setting
Burst Frequency	Adjustable from 1 kHz to 1 MHz up to 4.4 kV
Burst Duration	1.0 ms to 20 ms; 1.0 ms resolution or 1 to 200 pulses
Period Between Bursts	Adjustable from 300 ms to 5 s; 1ms resolution
Burst Test Length	1 to 360 sec.; 1 second resolution 1 to 240 min.; 1 minute resolution 1 to 24 hours; 1 hour resolution
Wait Time Between Tests	1 to 360 sec.; 1 second resolution 1 to 240 min.; 1 minute resolution 1 to 24 hours; 1 hour resolution
Voltage Monitor	Built-in; 150 MHz bandwidth
Minimum System Requirements	E100 Series control center with blank plug-in module (if no other half-width module is ordered)
Coupler/Decoupler	Model E455X

Note: For any combination of frequency, duration and period, the number of pulses cannot exceed 600 per second and 200 per burst.

### Options

E411-2MHz - increases EFT burst frequency to 2MHz @ <math>\leq 3kV</math>

E411-CH - adds Chirp

CCL - capacitive coupling clamp per IEC 61000-4-4

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**ECAT Model E412** True-EFT™ Simulator

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EFT/Noise Burst simulator with built-in, single phase AC mains coupler/decoupler for testing in accordance with IEC 61000-4-4 Edition 2 to 4.4kV. Model E412 features all specifications and options noted in Model E411 (above), as well as the following:

Coupling Capacitors	33nf per line
Voltage	0-277/250* AC rms or DC
Current	16 A continuous*
Coupling Modes	Software selectable
Line Sync	Software selectable 0-360°
Line Sync Accuracy	±15°
Minimum System Requirements	E100 Series control center with blank plug-in module (if no other half-width module is ordered)

\*The actual AC mains voltage and current limit is based on the mains connector selected

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**ECAT Model E421** True-EFT™ Simulator

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FT/Noise™ Burst Simulator for IEC 61000-4-4 Edition 2 to 8 kV

Burst Polarity	Positive, negative, alternating
Burst Voltage	200V to 8.0kV, ±10%; 5 V resolution
Burst Frequency	Adjustable from 1 kHz to 1 MHz up to 4.4 kV; 1 kHz to 250 kHz from 4.4 kV to 8.0 kV
Burst Duration	1.0 ms to 20 ms; 1.0 ms resolution
Period Between Bursts	Adjustable from 300 ms to 5 s; 1 ms resolution
Burst Test Length	1 to 360 sec.; 1 second resolution 1 to 240 min.; 1 minute resolution 1 to 24 hours; 1 hour resolution
Wait Time Between Tests	1 to 360 sec.; 1 second resolution 1 to 240 min.; 1 minute resolution 1 to 24 hours; 1 hour resolution
Voltage Monitor	Built-in; 150 MHz bandwidth
Minimum System Requirements	E100 series control center
Coupler/Decoupler	See Model E455X

**Options**

E421-2MHz - increases EFT burst frequency to 2MHz @ <math>\leq 3kV</math>

E421-CH - adds Chirp

CCL - capacitive coupling clamp per IEC 61000-4-4

Note: For any combination of frequency, duration and period, the number of pulses can not exceed 600 per second and 200 per burst.

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**ECAT Model E501B** Surge Simulator

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Plug-in combination wave surge simulator to produce the combination waves required by IEC 6100-4-5, ANSI/IEEE C62.41 Cat. B and UL 1449 at 3kA

Open-Circuit Voltage	1.2/50 $\mu$ s, 200 V - 6.6 kV -5 +10% in 1-volt steps
Short-Circuit Current	8/20 $\mu$ s, 100A - 3.3kA -0 +10% with 2 ohm effective source impedance. With a 12 ohm effective source impedance, the peak short-circuit current = open-circuit voltage $\div$ 12
Rise Time Tolerance	±30% for voltage; ±20% for current
Duration Tolerance	±20%

Note: When used with a three-phase coupler/decoupler, the voltage waveform durations may be reduced when coupling with multiple lines to PE.

Surge Repetition Rate	1 shot/12 seconds
Line Sync Accuracy	±15° with optional coupler/decoupler
Minimum System Requirements	E100 Series control center with blank plug-in module (if no other half-width module is ordered)

**Options**

E501B-VI - adds voltage and current monitoring

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**ECAT Model E502B** Surge Simulator

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Plug-in module to produce the telecommunications surge wave required by IEC 61000-4-5, FCC Part 68 and ITU Rec K.17, K.20, and K.21 (formerly CCITT)

Open-Circuit Voltage	10/700 $\mu$ s and 0.5/700 $\mu$ s, 200 V - 6.6 kV $\pm$ 10% in 1-volt steps.10/700 $\mu$ s waveform meets both IEC and FCC Part 68 9/720 $\mu$ s requirements. Tighter tolerances for front time and duration ensure compliance with both requirements
Short-Circuit Current	Open-circuit voltage $\div$ 15 with 0 ohm effective source impedance; open-circuit voltage $\div$ 40 with 25 ohm effective source impedance. Tolerance is -0/+10%
Front Time Tolerance	Voltage: 7.0 $\mu$ s to 11.7 $\mu$ s; current: 5.0 $\mu$ s $\pm$ 30%
Duration	Voltage: 576 $\mu$ s to 840 $\mu$ s; current: 320 $\mu$ s $\pm$ 20%
Surge Repetition Rate	1 shot/18 seconds
Minimum System Requirements	E100 Series control center with blank plug-in module (if no other half-width module is ordered)

**Options**

E502B-VI - adds voltage and current monitoring

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**ECAT Model E503** Surge Simulator

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Plug-in module to produce the ring waves specified by ANSI/IEEE C62.41 Cat. A and B, and various UL standards, including UL 864

Voltage Rise Time	0.5 $\mu$ s $\pm$ 30%
Ringing Frequency	100 kHz $\pm$ 20%, 40% decay per peak
Open-Circuit Voltage	200V - 6.6 kV $\pm$ 10%
Short-Circuit Current	Selectable at 200 A max. or 500 A max., when the open-circuit voltage is set to 6.0kV. (Actual short-circuit current at other voltage settings will be open-circuit voltage $\div$ 30 when 200 A is selected and open-circuit voltage $\div$ 12 when 500 A is selected.)
Surge Repetition Rate	1 shot/9 seconds
Line Sync Accuracy	$\pm$ 15° with optional coupler/decoupler
Minimum System Requirements	E100 Series control center with blank plug-in module (if no other half-width module is ordered)

**Options**

E503-VI - adds voltage and current monitoring

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**ECAT Model E504A** Surge Simulator

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Plug-in module to produce the combination wave required by UL 1449 (some devices must also be tested using the E501A surge module)

Open-Circuit Voltage	1.2/50 $\mu$ s, 0 - 6.6 kV $\pm$ 5% in 1-volt steps
Short-Circuit Current	8/20 $\mu$ s, selectable at 125 A, 500 A and 750 A $\pm$ 10% when the open-circuit voltage is set to 6.0 kV. (Actual short-circuit current = open-circuit voltage $\div$ 48 when 125 A is selected; open-circuit voltage $\div$ 12 when 500 A is selected, and open-circuit voltage = 8 when 750 A is selected.)
Front Time Tolerance	$\pm$ 30% for voltage; $\pm$ 20% for current
Duration Tolerance	$\pm$ 20% (Note: When used with an AC mains coupler/decoupler, open-circuit voltage wave durations may be significantly reduced when certain coupling modes are selected.)
Surge Repetition Rate	1 shot/12 seconds
Line Sync Accuracy	$\pm$ 15° with optional AC mains: coupler/decoupler
Minimum System Requirements	E100 series control center

**Options**

E504A-VI - adds voltage and current monitoring

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**ECAT Model E505A** Surge Simulator

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Plug-in module that produces the lightning surge waveforms required by FCC Part 68

Waveforms	<math><2/>160\ \mu\text{s}</math>, 50-1650 V $\pm 10\%$ ; peak short-circuit current is 200 A, -0% +10% when the open-circuit voltage is set to 1500 V <math><2/>560\ \mu\text{s}</math>, 50-880 V $\pm 10\%$ ; peak short-circuit current is 100 A, -0% +10% when the open-circuit voltage is set to 800 V <math><2/>10\ \mu\text{s}</math>, 100-2750 V $\pm 10\%$ ; peak short-circuit current is 1000 A, -0% +10% when the open-circuit voltage is set to 2500 V
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Note: All voltage and current specifications are minimum values in accordance with FCC Part 68

Surge Repetition Rate	1 shot/18 seconds for all waves except <math><2/>10\ \mu\text{s}</math> which is 1 shot/24 seconds
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Line Sync Accuracy	$\pm 15^\circ$ with optional coupler/decoupler
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Minimum System Requirements	E100 series control center
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**Options**

E505A-VI - adds voltage and current monitoring

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**ECAT Model E506-4W** Surge Simulator

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Plug-in module to produce the 2/10  $\mu\text{s}$  surges required by Telcordia GR-1089 CORE for up to five-wire (four terminal) testing

Waveforms	<math><2/>10\ \mu\text{s}</math>, 50-800 V, 100 A/terminal with 800 V open-circuit voltage <math><2/>10\ \mu\text{s}</math>, 50-1500 V, 100 A/terminal with 1500 V open-circuit voltage <math><2/>10\ \mu\text{s}</math>, 100-2500 V, 500 A/terminal with 2500 V open-circuit voltage <math><2/>10\ \mu\text{s}</math>, 200-5000 V, 500 A/terminal with 5000 V open-circuit voltage
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Tolerances	All peak open-circuit voltages and short-circuit currents are -0%/+20%
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Outputs	Front panel terminals for connection to T1, R1, T2, R2 and Ground
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Surge	Repetition Rate: 1 shot/16 seconds
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Minimum System Requirements	E100 series control center
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**Options**

E506-4W-VI - adds voltage and current monitoring

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**ECAT Model E508 and E508-12P** Surge Simulator

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Plug-in modules to produce the 10/360  $\mu\text{s}$  surges required by Telcordia GR-1089 CORE

Open-Circuit Voltage	10/360 $\mu\text{s}$ , 50-1100 V, -0/+15% in 1-volt steps. Tip and ring outputs independent and isolated to ensure true, three-terminal simultaneous testing of up to 12 pair. Waveforms as defined by Telcordia GR-1089-CORE
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Short-Circuit Current	100 A/side -0/+15% at a voltage setting of 1.0 kV
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Front Time Tolerance	-30/+0% for voltage and current
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Duration Tolerance	-0/+30%
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Surge Repetition Rate	1 shot/50 seconds
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**E508-12P Waveforms**

Open-Circuit Voltage	10/360 $\mu\text{s}$ , 50-1100 V, -0/+15% in 1-volt steps. Tip and ring outputs independent and isolated to insure true, three-terminal simultaneous testing of up to 12 pair. Waveforms as defined by Telcordia GR-1089-CORE.
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Short-Circuit Current	25 A/side -0/+15% at a voltage setting of 1.0 kV
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Front Time Tolerance	-25%/+0 for voltage; -30%/+0 for current
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Duration Tolerance	-0/+30%
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Surge Repetition Rate	1 shot/150 seconds
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Minimum System Requirements	E100 series control center
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**Options**

E508-VI - adds voltage and current monitoring

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**ECAT Model E510A** Surge Simulator

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Plug-in module to produce combination wave specified by ANSI/IEEE C62.41 Cat. B and IEC 61000 4-5 to 10kV and 5kA

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Electrical Open-Circuit Voltage	1.2/50 $\mu$ s, 0-10.1kV $\pm$ 10% in 1 volt steps
Short-Circuit Current	8/20 $\mu$ s, 0-5.05 kA with 2 ohm effective source impedance, $\pm$ 10% With the additional 10-ohm resistor, the peak short-circuit current = open-circuit voltage $\div$ 12, $\pm$ 10%. (The short-circuit current waveform is modified by the additional resistance.)
Front Time Tolerance	$\pm$ 30% for voltage; $\pm$ 20% for current
Duration Tolerance	$\pm$ 20% voltage and current
Surge Repetition Rate	1 shot/18 seconds
Line Sync Accuracy	+15° with optional coupler/decoupler
Compatible Powerline	E455x-kV, E4555, E4556
Minimum System Requirements	E100 series control center

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**Options**

E510A-VI - adds voltage and current monitoring

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**ECAT Model E511** Surge Simulator

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Plug-in module to provide combination waves to 6 kV and 5 kA, as required by British Telecom standards

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Open-Circuit Voltage	1.2/50 $\mu$ s, 200 V to 6.6 kV $\pm$ 5% in 1-volt steps
Short-Circuit Current	8/20 $\mu$ s, 170 A to 5.5 kA with 1.2 ohm effective source impedance, $\pm$ 10%
Front Time Tolerance	$\pm$ 30% for voltage; $\pm$ 20% for current
Duration Tolerance	$\pm$ 20% voltage and current
Surge Repetition Rate	1 shot/12 seconds
Line Sync Accuracy	$\pm$ 15° with optional coupler/decoupler
Minimum System Requirements	E100 Series control center with blank plug-in module (if no other half-width module is ordered)

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**Options**

E511-VI - adds voltage and current monitoring

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**ECAT Model E513** Surge Simulator

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Plug-in module to produce voltage ramps for testing surge protection components such as gas tube arrestors; meets surge simulator requirements of UL 864

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Voltage Ramps	0.1 kV/ $\mu$ s, 0.5 kV/ $\mu$ s, 1.0 kV/ $\mu$ s, 5.0 kV/ $\mu$ s, 10 kV/ $\mu$ s, 0.1 kV/ $\mu$ s is linear to 2.5 kV; all other ramps linear to 3.0 kV
Note: Specified ramp rates are obtained with an open-circuit voltage setting of 3.0 kV	
Voltage Durations	$\sim$ 65 $\mu$ s for 0.1 kV/ $\mu$ s; $\sim$ 40 $\mu$ s for 0.5 kV/ $\mu$ s and 1kV/ $\mu$ s; $\sim$ 5 $\mu$ s for 5kV/ $\mu$ s and 10kV/ $\mu$ s
Current Durations	$\sim$ 45 $\mu$ s at 0.1 kV/ $\mu$ s; $\sim$ 40 $\mu$ s at 0.5 kV/ $\mu$ s and 1.0 kV/ $\mu$ s; $\sim$ 5 $\mu$ s at 5 kV/ $\mu$ s and 10 kV/ $\mu$ s
Open-Circuit Voltage	0-3000 V; $\pm$ 5% in 1-volt steps
Short-Circuit Current	50 A, $\pm$ 10% when the peak open-circuit voltage is set to 3.0 kV

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Minimum System Requirements E100 series control center with blank plug-in module (if no other half-width module is ordered)

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**Options**

E513-VI - adds voltage and current monitoring

NOTE: To obtain linear fronts, waves are quasi-square waves with 20-25% initial overshoots beyond peak open-circuit voltages, except for the 0.1 kV/ $\mu$ s which is roughly triangular. Undershoots range from 5 to 25%.

<b>ECAT Model E514</b>		Surge Simulator
Surge simulator for 10/1000 $\mu$ s current waves		
Open-Circuit Voltage	Open-circuit voltage waveforms vary according to the peak short-circuit current level selected:	
	<b>Peak I</b>	<b>Open-Circuit V</b>
	15A	10/1000 $\mu$ s, 50-1650 V $\pm$ 10%
	60A	1 kV/ $\mu$ s linear ramp, 50-1650 V
	100A	10/1000 $\mu$ s, 50-1000 V
	250A	1 kV/ $\mu$ s linear ramp, 50-1650 V $\pm$ 10%
Short-Circuit Current	10/1000 $\mu$ s; software selectable at 15 A, 60 A, 100 A, and 250 A, $\pm$ 10%	
Rise Time Tolerance	$\pm$ 30%	
Duration Tolerance	$\pm$ 20%	
Surge Repetition Rate	15 A, 60 A - 1 shot/21 seconds; 100 A, 250 A - 1 shot/59 seconds	
Minimum System Requirements	E100 series control center	

### Options

E514-VI: Provides monitoring of the peak surge voltages and currents at the output of the E514 module. All measurements are logged by software for diagnostic evaluation of Go/No-Go testing.

NOTE: Note: If an ECAT coupler/decoupler is included, waveform monitoring is available at the output of the coupler/decoupler without the addition of the E514 VI option.

<b>ECAT Model E515</b>		Surge Simulator
Module to produce the 10/250 $\mu$ s surges required by Telcordia GR-1089-CORE		
Waveform	<10/>250 $\mu$ s, 200-4000 V -0/+16% peak open-circuit voltage; 100-2000 A -0/+16% peak short-circuit current.	
Front Time Tolerance	-60%/+0 for voltage; -30%/+0 for current	
Duration Tolerance	-0/+60% for voltage; -0/+20% for current	
Surge Repetition Rate	1 shot/126 seconds 0 to 4 kV range; 1 shot/63 seconds 0 to 2 kV range	
Minimum System Requirements	E100 series control center	

### Options

E515-VI - adds voltage and current monitoring.

<b>ECAT Model E518</b>		Surge Simulator
Plug-in module to produce the 10/1000 $\mu$ s waveforms to 2kV as required by Telcordia GR-1089-CORE for both Lightning Surge and Protection Coordination. Includes HB-ECAT.		
Waveforms	10/1000 $\mu$ s, 50-600 V -0/+15% peak open-circuit voltage; 100 A/side -0/+15% peak short-circuit current 10/1000 $\mu$ s, 50-1000 V -0/+15% peak open-circuit voltage; 100 A/side -0/+15% peak short-circuit current 10/1000 $\mu$ s, 50-2000 V -0/+15% peak open-circuit voltage; 100 A/side @ 1 kV; 200 A/side @ 2 kV -0/+15% peak short-circuit current	
NOTE: All voltage and current specifications are minimum values, in accordance with Telcordia GR-1089-CORE		
Outputs are all true three-terminal outputs for testing either two or three-terminal devices or inputs. Outputs can be connected in parallel to double the available peak short-circuit current when testing two-terminal devices.		
Front Time Tolerance	-30%/+0%	
Duration Tolerance	-0/+50%	
Surge Repetition Rate	1 shot/40 seconds at 600V and 1kV; longer	
Minimum System Requirements	E100 series control center	

### Options

E518-VI - adds voltage and current monitoring

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**ECAT Models E521 and E522** Surge Simulator

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Surge systems that produce the high voltage, high current combination waves required by ANSI standards for service entrance and outside connected electronics; meets requirements of IEC 61000-4-5 for all exposure categories. ECAT Model E521 includes built-in AC coupler/decoupler for single-phase lines to 480V, 32A; ECAT Model E522 includes built-in AC coupler/decoupler for three-phase lines to 480V, 32A/phase (actual AC mains current per AC line connector limits).

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Open-Circuit Voltage	1.2/50 $\mu$ s, 200V to 20.2kV $\pm$ 10%
Short-Circuit Current	8/20 $\mu$ s, 100A to 10.1kA $\pm$ 10%, with 2 ohm effective source impedance. With a 12 ohm effective source impedance, the peak short-circuit current = open-circuit voltage $\div$ 12
Rise Time Tolerance	$\pm$ 30% for voltage; $\pm$ 20% for current
Duration Tolerance	$\pm$ 20% for voltage and current
Surge Repetition Rate	1 shot/30 seconds @ $\leq$ 10kV; 1 shot/minute @ $>$ 10kV
Line Sync Accuracy	$\pm$ 5 $^\circ$

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Minimum System Requirements: E100 series control center

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**Options**

E521-VI - adds 3-wire VI monitoring plus automatic software selection to Model E521  
E522-VI - adds 5-wire VI monitoring plus automatic software selection to Model E522

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**ECAT Model E551** Surge Coupler/Decouplers

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A single-phase AC line (power lines) coupler/decoupler for surge waves, as specified by IEC 61000-4-5.

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Voltage	250 V rms AC, single-phase
Current	16A continuous with appropriate connectors (i.e., Schuko or other) 15 A continuous with NEMA 5-15 style connector used in the U.S.A.
Coupling Mode Selection	Coupling mode selection is programmable -manually from the control center, or automatically using SurgeWare™ software.
Monitoring	Monitoring and peak detection of surge voltage across any two manually-selected lines. Monitoring can be at the EUT or at the front panel of the coupler/decoupler. Monitoring and peak detection of surge current in either High or Neutral, selected by the ECAT Control Center or the computer, measured without including back-filter surge current.

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Minimum System Requirements: E100 series control center and AC mains surge network

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**Options**

E551-DC - allows use of surge coupler/decouplers on DC power mains

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**ECAT Models EP61 and EP62** PQF (Power Quality Failure) Modules

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Plug-in modules provide swells, dips and interrupts on AC power mains in compliance with, and exceeding the requirements of IEC 61000-4-11 Edition 2. Model EP61 for single-phase AC lines to 240 RMS, 16A; Model EP62 for single-phase AC lines to 240 RMS, 32A

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Input Voltage for 100%	50 to 240 V at 50 Hz and to 277 V at 60 Hz
Output Voltages on the Selected Phase	0% (open or short), 40%, 50%, 70%, 80%, 90%, 100%, 110%, 120% and 150%
EP61 Output Current	16 A at 250 V; 20 A at 125 V*
EP62 Output Current	32 A at 250 V; 30 A at 125 V*

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\*The actual AC mains voltage and current limit is based on the mains connector selected.

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Inrush Current	$>$ 250 A at 120 V; $>$ 500 A at 220-240 V
Event Duration	From 0.03 cycle (10 $^\circ$ ) to 500 minutes; maximum 12 events per cycle
Switching Times	1-5 $\mu$ s into a 100 ohm load
Overshoot	$<$ 5%
Undershoot	$<$ 5%
rms Voltage	0-300 V, 0.5% of range + 1% of reading
rms Current	0-40 A, 0.5% of range + 1% of reading
Peak Current	0-1000 A, 1% of range + 5% of reading
Inrush Current Qualification	Internal, built-in circuit according to IEC 61000-4-11. Automatically measures peak inrush current at 90 $^\circ$ and 270 $^\circ$ . Peak values are reported via the control software.

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Minimum System Requirements: E100 series control center

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## ECAT Model E455x Combined Surge & EFT Coupler/Decoupler

Single and three-phase AC line coupler/decouplers for EFT and Surge waves, as specified by IEC 61000-4-4 Edition 2 and IEC 61000-4-5

Model	Single- or Three-phase	Voltage	Current per Phase**
E4551A/E4551kV*	Single-phase	250 V rms	15/16 A***
E4552A/E4552kV*	Single-phase	277 V rms	32 A
E4553A/E4553kV*	Three-phase	480 V rms	16 A
E4555	Three-phase	600 V rms	50 A
E4556	Three-phase	600 V rms	100 A

\*kV version is required for operation with surge modules greater than 7 kV, such as the E510 A. All standard coupler/decoupler options apply.

\*\*Actual current capability may be limited by the AC line connectors selected.

\*\*\*Depends on connector selected. Typically 15 A with U.S. NEMA connector; 16 A with appropriate European style connectors

**Coupling Mode** Coupling mode selection is controlled manually from the control selection center, or automatically using SurgeWare™ or BurstWare™ software. Coupling is allowed from any line to any other line or combination of lines.

**Monitoring** Monitoring and peak detection of surge voltage across any two manually-selected lines. Monitoring can be at the EUT or at the front panel of the coupler/decoupler.

Monitoring and peak detection of surge current in either High or Neutral, selected by the ECAT Control Center or the computer, measured without including back-filter surge current.

**Minimum System Requirements** E100 series control center EFT or mains-coupled surge module

### Options

E455x-DC Allows the E455x coupler/decoupler to be used with DC as well as AC mains. The DC current ratings for essentially resistive loads are:

	to 48 V	to 110 V	to 220 V
E4551A/E4551kV	15 A	5 A	0.8 A
E4552A/E4552kV	15 A	5 A	0.8 A
E4553A/E4553kV	20 A	8 A	1.2 A
E4554A/E4554kV	25 A	8 A	1.2 A
E4555	50 A	50 A (120 V)	30 A
E4556	100 A	50 A (120 V)	30 A

**E455x-VI** Enhanced V and I monitoring. Adds monitoring and peak detection of surge voltage and current. Upper and lower limits can be placed on surge peaks. Monitoring of 3 wires is provided in single-phase systems, 5 wires in three-phase systems. Selection of the V and I inputs is performed from the control center or can be made automatically with SurgeWare control software

**E455x-HV** Increases the AC mains voltage rating from 277 V to 480 V rms in the E4552, and from 480 V to 600 V rms in the E4553 and E4554. The HV option is not available in the E4551, E4555 and E4556.

Physical size of module varies depending on model number



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