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Factory Automation Application Guide (Machine Tools)

TTI, Inc., – A Berkshire Hathaway Company



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The Specialist in Electronic Component Distribution



**Global Distribution Centres
with more than 120,000m²
of automated warehousing
in North America, Europe
and Asia.**

Why Choose TTI?

Founded in 1971, TTI has steadily grown to become a world leading specialist distributor of electronic components. The company was founded on the premise that passive component purchasing could be made more efficient by offering product specialization, customer-driven service and proprietary supply chain solutions.

Global Distribution Centres

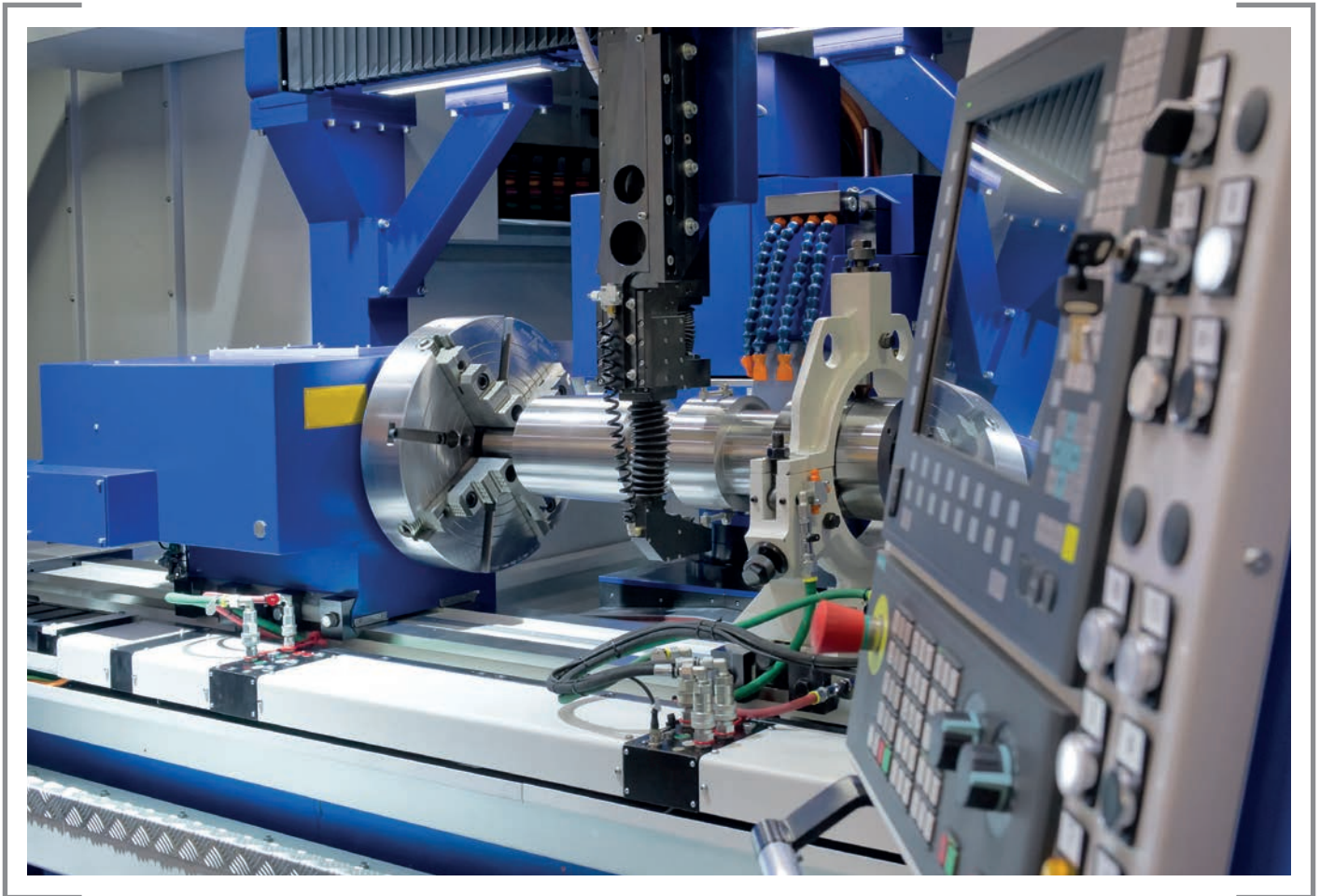
Our European headquarters is located just outside of Munich, Germany in Maisach-Gernlinden. In total, we have 35,000m² of dedicated warehouse space and local sales and technical support in over 40 locations across Europe. TTI has more than 120,000m² of automated warehousing in North America, Europe and Asia. All are linked into a global warehouse management system that provides superior customer service and overall business efficiencies. Wherever you are in the world, TTI can support you.

Year after year, customers rate our inventory availability, on-time delivery and accuracy among the very best in the industry – contact us today to find out what a true specialist has to offer.

Quality and Reliability

TTI is the first distributor to have all global warehouse locations ISO registered and certified to ISO 9001 and ISO 14001 Standards. TTI Europe is also certified to EN9120/EN9100, IECQ-CECC and ISO/IEC 27001 Standards. Additionally, all of our European sales branches are ISO 9001 certified. TTI has one global documentation system that ensures that every TTI branch and warehouse in the world follows the same processes.

Machine Tools Applications



Machine Tools	Applications	Key Trends
<ul style="list-style-type: none">• Turning machines• Shapers & planers• Drilling machines• Milling machines• Boring machines• Sawing & Cutting• Laser machining• Presses• 3D printers	<ul style="list-style-type: none">• PLC/IPC• HMI/CNC Interfaces• Machine to Machine connectivity• Ethernet Switches• I/O modules• Machine Safety• Light Curtain• Cabinets	<ul style="list-style-type: none">• Modularization → configuration, flexibility• High data volumes• Industry 4.0, digitization• Cost efficiency• Energy & Resource Efficiency• Decentralization (IP67/68)

Connectors

 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>AMPMODU 2mm</p>	<p>AMP-LATCH Ribbon Cable Interconnects</p>	<p>M8/M12 Cable Solutions</p>	<p>M8/M12 Field installable Connector system</p>
<ul style="list-style-type: none"> • Assembly designs offer latching and polarization • Available in three platings • High temperature option is SMT compatible 	<ul style="list-style-type: none"> • Mass termination capabilities • No need to strip or prepare wire • Variety of centre lines and options 	<ul style="list-style-type: none"> • X-coded connectors support higher bandwidth needs of up to 10Gb/s • A,B,D,X,S,T coding available • Easily installable connector system 	<ul style="list-style-type: none"> • A, B, D, X, S, T coding available • Easily installable connector system • Environment protection IP67 and IP68
			
 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>P-Clamp</p>	<p>M12 x-code Field Installation</p>	<p>Industrial Ethernet Solution</p>	<p>Industrial RJ45 Cat6A plug</p>
<ul style="list-style-type: none"> • Quick Flexible Ergonomic 	<ul style="list-style-type: none"> • Automatic wire cut-off function integrated in connector • Tool-less assembly installation • Speed up to 10GB/s 	<ul style="list-style-type: none"> • Extensive temperature range between -40°C to +85°C • Minimum product life requirement of 10 years • 260°C PIP soldering reflow capability 	<ul style="list-style-type: none"> • Single piece common core Cat.6A plug with tool-less installation • Automatic wire cut-off function
			
 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>Circular Plastic Connectors</p>	<p>Dynamic Series Connectors</p>	<p>Circular Hybrid Connectors</p>	<p>Micro-MaTch Connector Family</p>
<ul style="list-style-type: none"> • Versatile, rugged, cost effective design 	<ul style="list-style-type: none"> • Vibration resistant • Housings are keyed preventing mis-mating and misalignment • Positive audible locking sound 	<ul style="list-style-type: none"> • Wire-to-board and wire-to-panel options • Radial sealing for harsh environments 	<ul style="list-style-type: none"> • Tin plated contact design • One of the smallest systems available at 1.27mm • UL-recognized
			













Connectors

<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>
<p>LTW M Series</p>	<p>iX Industrial IP20 Connectors</p>	<p>Ecomate® Rugged Metal Connectors</p>	<p>USB IP68</p>
<ul style="list-style-type: none"> • Wide range of M12 for Data Group (Profibus/DeviceNet, Profibus/Interbus, Ethernet) • Wide range of M12 power group (12A to 16A) 	<ul style="list-style-type: none"> • Complies with IEC61076-3-124 • 10 position connector with Cat6A 10GBASE-T • 360° shielding through mated pair 	<ul style="list-style-type: none"> • EMI/RMI shielding capabilities • Operating temperature: -40°C to +105°C • 500 mating cycles 	<ul style="list-style-type: none"> • Various configurations and interfaces • Available in high speed, super speed and super speed • IP-rated and waterproof versions available
			
<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>
<p>HeavyMate</p>	<p>LTW X-LOK IP68</p>	<p>Anytek Terminal Blocks</p>	<p>Minitek MicroSpace™ 1.27mm</p>
<ul style="list-style-type: none"> • Connections in harsh industrial environment • Robust design • High number of poles or transmission of different kinds of signals 	<ul style="list-style-type: none"> • Push lock design • Excellent performance under harsh environmental conditions • Easy-grip design 	<ul style="list-style-type: none"> • Rising clamp system • Screw pluggable system • Spring pluggable system 	<ul style="list-style-type: none"> • Keying to prevent visual mismatching • Terminal positioning assurance (TPA) • Primary and secondary contact retention
			
<p>molex</p>	<p>molex</p>	<p>molex</p>	<p>molex</p>
<p>Brad HarshIO Modules</p>	<p>CP Wire-to-Board and Wire-to-Wire Connector Systems</p>	<p>CLIK-Mate Wire-to-Board Connectors</p>	<p>Fit Family Power Connectors</p>
<ul style="list-style-type: none"> • Fieldbus connectivity for PROFIBUS-DP, DeviceNet, CANopen Ethernet fieldbus; Modbus TCP, EtherNet/IP, PROFINET • IP67-rated housing 	<ul style="list-style-type: none"> • Wide spectrum of housing colours • Polarization keys on housing rib • Positive lock feature on housing 	<ul style="list-style-type: none"> • Wide variety of circuit sizes, mounting styles • Dual positive inner lock • Compact 1.50mm pitch 	<ul style="list-style-type: none"> • Polarised and keyed feature prevents mismatching • Headers are molded in LCP that can withstand +260°C during reflow processing
			

Connectors

<h2 style="text-align: center;">molex</h2>	<h2 style="text-align: center;">molex</h2>	<h2 style="text-align: center;">molex</h2>	<h2 style="text-align: center;">molex</h2>
<p style="text-align: center;">Micro-Fit TPA Connector System with TPA</p>	<p style="text-align: center;">Brad MX-PTL M12 Cordsets</p>	<p style="text-align: center;">FCT High-Density D-Sub Connectors</p>	<p style="text-align: center;">mPm DIN Valve Connectors</p>
<ul style="list-style-type: none"> • Terminal position assurance (TPA) with integrated secondary lock • Compatible with all existing Micro-Fit 3.0 headers and plugs 	<ul style="list-style-type: none"> • Quick and reliable push-to-lock connections • Mates to standard M12 threaded receptacles • Threadless design 	<ul style="list-style-type: none"> • Many different combinations of materials and plating • Snap-in board locks for easy and secure assembly prior to soldering 	<ul style="list-style-type: none"> • Ergonomic external-nut design • Plus / minus screw head on terminal • IP67-rated when mated
			
<h2 style="text-align: center;">molex</h2>	<h2 style="text-align: center;">3M</h2>	<h2 style="text-align: center;">JAE</h2>	<h2 style="text-align: center;">HARWiN</h2>
<p style="text-align: center;">M12 Circular Connectors</p>	<p style="text-align: center;">450 High Density Wire-to-Board Connectors</p>	<p style="text-align: center;">AX01</p>	<p style="text-align: center;">Datamate J-Tek 2mm</p>
<ul style="list-style-type: none"> • Rated to 250V AC/DC, up to 4.0A • Anti-vibration feature 	<ul style="list-style-type: none"> • Available with or without ejector latches • Vertical mount, thru-hole and SMT configurations available 	<ul style="list-style-type: none"> • 8 Gbps+ high-speed transmission • Two-point contact structure • Various pin counts: 2 row 30 – 140 pins 	<ul style="list-style-type: none"> • 4-finger beryllium copper and gold-plated contact • Achieves 3A per contact, electrically loaded • Withstands extremes of shock and vibration
			
<h2 style="text-align: center;">HARWiN</h2>	<h2 style="text-align: center;">Weidmüller</h2>	<h2 style="text-align: center;">Weidmüller</h2>	<h2 style="text-align: center;">PHENIX CONTACT</h2>
<p style="text-align: center;">M225 series 2.00mm pitch Connectors</p>	<p style="text-align: center;">OMNIMATE® Power BUF 10.16</p>	<p style="text-align: center;">OMNIMATE® Hybrid Connectors</p>	<p style="text-align: center;">COMBICON PCB Terminal Blocks</p>
<ul style="list-style-type: none"> • 3A per signal contact • Polarized housings with shrouded contacts • Expanding rubber locking fixing 	<ul style="list-style-type: none"> • Tool-free wiring of flexible wires • Easy one-hand operation • Automatic locking 	<ul style="list-style-type: none"> • Tool-free wiring of stripped servo cables • Reliable and robust connection • Shorter installation and servicing times 	<ul style="list-style-type: none"> • Increased safety • More flexibility in device design • Direct PCB connections for conductor cross sections of up to 95mm²
			

Power & Relays

			
<p>GP100 Series</p>	<p>LCC600 Series</p>	<p>COOL X Series</p>	<p>UHP Series</p>
<ul style="list-style-type: none"> • High power rectifier module • Triphase input (without neutral) • Efficiency 95.5% • Only 1 unit height, 19" standard rack 	<ul style="list-style-type: none"> • Full 600W power up to 85°C • Fanless, conduction cooled for longer operational life • IP65 against ingress of dust and water 	<ul style="list-style-type: none"> • 600W fanless with natural convection cooling • Flexible & multi outputs voltages available • 5 years warranty 	<ul style="list-style-type: none"> • Slim and Low profile (31mm) • Fanless design, 500W convection • DC ok active signal and redundant function
			
			<p>Panasonic</p>
<p>HRP-xxxN Series</p>	<p>PQU650 Series</p>	<p>G7EB High Power PCB Relay</p>	<p>SFM Micro Size Safety Relay</p>
<ul style="list-style-type: none"> • Built-in active PFC function, PF > 0.95 • 200% peak power capability • 1U low profile 	<ul style="list-style-type: none"> • 450W convection • 650W forced airflow and 800W power boost • Start up in 4" x 6" foot print • +5V Aux standby and 12V fan outputs 	<ul style="list-style-type: none"> • 480VAC/100A high current switching capacity • High impulse withstand voltage of 10kV • Low initial contact resistance of ≥ 5 mΩ 	<ul style="list-style-type: none"> • Small size, low profile with a height of only 7.8mm • Switching capability NO side 6A/250VAC, 6A/30VDC • Switching capability NC side 4A/250VAC, 4A/30VDC
			
			
<p>CW Series Panel Mount Solid State Relays</p>	<p>T9G Series Potter & Brumfield Relay</p>	<p>Miniature Power PCB RYII Relay</p>	<p>Solid State Relay</p>
<ul style="list-style-type: none"> • Ratings from 10A to 125A at 48-660 VAC • LED status indicator • UL/CSA/TUV approved, CE compliant to EN60950-1 	<ul style="list-style-type: none"> • Smallest relay in its class • UL and VDE certifications • Increased insulation (UL 61810-1) 	<ul style="list-style-type: none"> • 1 pole 8A • Low component height 12.3mm • 5kV/8mm coil-contact 	<ul style="list-style-type: none"> • AC SSRs are qualified to MIL-PRF-28750/9 for 2A rated JDS9 series, and /10 for 25A rated JPS10 series, and to DSCC drawing 86031 for the 10 A PS12 series.
			

Sensors & Switches

<p>Honeywell</p>	<p>Honeywell</p>	<p>molex</p>	<p>Sensata Technologies</p>
<p>PX3 – Heavy Duty Pressure Transducers</p>	<p>SS360/460 Series Magnetic Position Sensors</p>	<p>Contrinex Photo Electric & Inductive Sensors</p>	<p>PTE7100 Series Hermetic Analog Pressure Sensor</p>
<ul style="list-style-type: none"> • Pressure range: 1 bar to 46 bar 15psi to 667psi • Ratio metric output: 0.5Vdc to 4.5Vdc • Fully calibrated and temperature compensated 	<ul style="list-style-type: none"> • Fastest response time in its class • No-chopper-stabilization • High sensitivity 	<ul style="list-style-type: none"> • One-piece factor-1 steel and aluminium housing • IP67 and 69K rated enclosure • Long operating distance – 40.00mm 	<ul style="list-style-type: none"> • Measuring range from 0-50 bar to 0-600 bar • High accuracy • Stainless steel design with hermetic port
			
<p>Sensata Technologies</p>	<p>TDK</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>	<p>Honeywell</p>
<p>ACW4/TCW4 Series BEI Position Sensor</p>	<p>High-Precision TMR Angle Sensors with Digital Output</p>	<p>820M1 – Predictive Maintenance Condition Sensors</p>	<p>NGC Series Industrial Limit Switches</p>
<ul style="list-style-type: none"> • Rugged and excellent resistance to shock and vibration • Robust, proven magnetic technology 	<ul style="list-style-type: none"> • Fine temperature characteristics/ stability in a compact package 	<ul style="list-style-type: none"> • Amplified $\pm 1.25V$ signal output • 3.0 to 5.5Vdc excitation voltage • Anodized aluminium housing 	<ul style="list-style-type: none"> • SPDT or DPDT configurable circuitry • Snap-action, positive-break contacts • Silver alloy and gold plated contact options
			
<p>Honeywell</p>	<p>Honeywell</p>	<p>IDEC</p>	<p>OMRON</p>
<p>NT and MT Series Toggle Switches</p>	<p>V15W Watertight Miniature Switches</p>	<p>XN Series/ E-Stop Switches</p>	<p>Subminiature Basic Switches</p>
<ul style="list-style-type: none"> • NT/MT Series are sealed to IP67/68 • Up to 4-Pole, 2 or 3 position, maintained and momentary action 	<ul style="list-style-type: none"> • Rugged, highly accurate machine control for turning circuits on and off • Compact, lightweight, and long-lasting 	<ul style="list-style-type: none"> • Available in plastic bezel, metallic padlock, flush bezel • Unique safe break action 	<ul style="list-style-type: none"> • Two split springs ensure high stability and durability of 30 million operations
			

Discrete Components

	 <small>Kingbright Electronic Europe GmbH</small>		
<p align="center">SM8S-Q</p>	<p align="center">KPB-2012SURKCGKC</p>	<p align="center">TVS, SMF, SMF4L</p>	<p align="center">SP3021-01ETG</p>
<ul style="list-style-type: none"> Maximum peak power dissipation: 6600 watts, compact chip package DO-218 size format, AECQ-101 compliant 	<ul style="list-style-type: none"> Dimensions: 2,0mm x 1,25mm x 1,10mm Bi-colour, Low power consumption Wide viewing angle of 150° 	<ul style="list-style-type: none"> 400W peak pulse power capability Compatible with industrial standard package SOD-123FL Low inductance 	<ul style="list-style-type: none"> ESD protection of ±8kV contact discharge Low leakage current of 1µA at 5V Small footprint
			
			
<p align="center">TW070J120B</p>	<p align="center">SUM40014M-GE3</p>	<p align="center">VSMY14940</p>	<p align="center">VEMD2023SLX01</p>
<ul style="list-style-type: none"> Chip design of 2nd generation (Built-in SiC schottky barrier diode) High voltage: VDSS = 1200V 	<ul style="list-style-type: none"> ThunderFET® power MOSFET Maximum 175 °C junction temperature 100 % Rg and UIS tested 	<ul style="list-style-type: none"> High reliability High radiant power Very high radiant intensity 	<ul style="list-style-type: none"> High radiant sensitivity Daylight blocking filter matched with 830nm to 950nm IR emitters Fast response times
			
			
<p align="center">TCUT1800X01</p>	<p align="center">VCNL4035 Proximity & Ambient Light Sensor</p>	<p align="center">VOW3120</p>	<p align="center">SIC931 – DC/DC Regulators POL solutions</p>
<ul style="list-style-type: none"> Detector type: photo transistor Typical output current under test: IC = 1.3mA Emitter wavelength: 950nm 	<ul style="list-style-type: none"> Four different slave addresses saves PCB space programmable interrupt function 	<ul style="list-style-type: none"> 2.5A minimum peak output current 10mm minimum external creepage distance 50kV/µs (typ.) common mode rejection 	<ul style="list-style-type: none"> 4.5 to 16V input voltage 95% peak efficiency SMD package Inductor integrated
			

Capacitors & Resistors

 <p>AVX A KYOCERA GROUP COMPANY</p>	 <p>KEMET a YAGEO company</p>	 <p>knowles PRECISION RESISTORS COMPLEX • DLI • JOHANSON MFG NOVACAP • SYFER • VOLTRONICS</p>	 <p>muRata INNOVATOR IN ELECTRONICS</p>
<p>Supercaps</p>	<p>COG Ceramics</p>	<p>High Voltage MLCCs</p>	<p>Safety Capacitors</p>
<ul style="list-style-type: none"> • Superior reliability, passes 4000 hours life tests • Molded case encapsulation option 	<ul style="list-style-type: none"> • Industry-leading CV values • High volumetric capacitance with low leakage current • High thermal stability 	<ul style="list-style-type: none"> • Highest capacitance values in a given case size • Safety certified ranges available with optional FlexiCap™ flexible terminations 	<ul style="list-style-type: none"> • X1/Y1/Y2 class product • Coated with a flame-retardant epoxy resin • High impulse tolerance
			
 <p>muRata INNOVATOR IN ELECTRONICS</p>	<p>Panasonic</p>	 <p>SAMSUNG SAMSUNG ELECTRO-MECHANICS</p>	
<p>KCA Series Capacitor</p>	<p>ZS Series capacitor Conductive Polymer</p>	<p>Hi Capacitance MLCC</p>	<p>DC Link Capacitors</p>
<ul style="list-style-type: none"> • Capacitance from 100pF to 10nF • Rated voltage: 250Vac (r.m.s.), 630Vdc • Operating temperature range: -55°C to +125°C 	<ul style="list-style-type: none"> • Surface mount package • 4000-hour life at 125°C • High ripple current and large capacitance 	<ul style="list-style-type: none"> • AEC-Q200 qualified • VW 80808-2 qualified • Excellent electric characteristics 	<ul style="list-style-type: none"> • High reliability for severe ambient conditions • Long life – 50.000h (85°C, rated voltage) • AEC-Q200 qualified capacitors available on request
			
	<p>Panasonic</p>		
<p>High Energy Bulk Ceramic Resistors</p>	<p>Shunt Resistors</p>	<p>Welded Shunt Resistor</p>	<p>Precision High Voltage Resistor</p>
<ul style="list-style-type: none"> • Solid ceramic resistor body • Non-inductive • 25kV pulse voltage (HPC 3, 4, 5) 	<ul style="list-style-type: none"> • Ideal for current sensing solutions • Small case size with high power • Metal plate bonding technology 	<ul style="list-style-type: none"> • Low measurement error frees • Low ohmic values reduce power loss • Robust construction 	<ul style="list-style-type: none"> • High operating voltage up to 1.000V • Precision tolerance down to ±0.1% • Extremely low voltage coefficient of resistance < 1 ppm/V
			

Resistors, Electromechanical & Circuit Protection

			
<p>High Voltage Thin Film</p>	<p>Through Hole FAE Resistors</p>	<p>SRP Power Inductors</p>	<p>MPX Power Inductors</p>
<ul style="list-style-type: none"> • High operating voltages to 1000V • Low voltage coefficient: < 1ppm/V • Unrivalled accuracy at high voltages 	<ul style="list-style-type: none"> • Power rating: 1/2W-3W • Resistance range: 3.3Ω-100RΩ • Tolerance: ±1%, ±5% 	<ul style="list-style-type: none"> • High saturation current, up to 60A • Magnetically shielded • Low DCR 	<ul style="list-style-type: none"> • High efficiency inductor • Metal composite powder • Shielded construction
			
			
<p>Interface Transformer Hi Reliability</p>	<p>Power Inductors</p>	<p>PU Series Shunt Resistors</p>	<p>175 deg Varistor</p>
<ul style="list-style-type: none"> • MIL-PRF-21038 DSCC QPL supplier • Multiple packaging and configurations • Tin/lead finish on leads 	<ul style="list-style-type: none"> • Wide current capability up to 38A • Temperature range up to 125°C • Low profile versions are available 	<ul style="list-style-type: none"> • AEC-Q200 qualified • Excellent heat dissipation • Low thermal EMF 	<ul style="list-style-type: none"> • 175°C rated, with no derating • EMI/RFI attenuation • High reliability
			
			
<p>Fast Acting Fuse</p>	<p>c308F Fuses</p>	<p>Square Body Fuse</p>	<p>Inrush Current Limiter</p>
<ul style="list-style-type: none"> • Single blow fuse for overcurrent protection • 6125 (EIA 2410) footprint • Fast acting precision 	<ul style="list-style-type: none"> • Meets Standards (EN60079-11) for hazardous applications • 3x8.4mm physical size • Fast-acting, high breaking capacity of 4000 amps 	<ul style="list-style-type: none"> • Best in class DC performance • Extremely current limiting • Superior cycling capability 	<ul style="list-style-type: none"> • Extremely stable electrical characteristics • Flame-retardant coating (UL 94 V-0) • UL approval (E69802)
			



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Contact TTI today to see what a true specialist can offer.

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