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Agriculture, Farm and Garden Equipment Application Guide

TTI, Inc., – A Berkshire Hathaway Company



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The Specialist in Electronic Component Distribution



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 42,600m² of dedicated warehouse space and local sales and technical support in over 28 locations across Europe. TTI has more than 195,000m² 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's global warehouses are all ISO-registered and have received certification to the ISO 9001 and ISO 14001 Standards. TTI Europe is also certified to EN9120/EN9100, IECQ-CECC and ISO/IEC 27001 Standards. Additionally, 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.

Global Distribution Centres
with more than 195,000m²
of automated warehousing
in North America, Europe
and Asia.



Agriculture, Farm and Garden Equipment

Application Guide



Agriculture, Farm & Garden Equipment

- Autonomous Tractors
- Tractors
- Harvesting Equipment
- Soil Working Equipment
- Storage / Drying Equipment
- Spraying & Protection Equipment
- Haymaking Equipment
- Breeding Equipment
- Sowing Equipment
- Dairy Equipment
- Transport Equipment
- Vine Harvesting Equipment
- Agricultural Robots
- Robotic Lawn Mowers

Equipment Sub-systems

- Automation & Control
- Cabins
- Cab Electronics
- Engines
- HVAC Systems
- Infotainment / GPS Systems
- Lighting
- Powertrain Components
- Seating
- Telematics

Component Technology Trends

Capacitor

- Wider temp. range
- Lower profile
- Hybrid and Polymer

Circuit Protection

- Data line protection
- HMI interface
- ESD components

Sensors

- 3-D Position Sensing
- Improved temp. and soil detection

Relays

- Move to Automotive Relays and HV Contactors

Resistors

- Thin film precision
- Low ohmic shunts and current sense

Switches

- Enhanced sealing performance
- Need for emergency stops

Antennas

- Smart farming requires GPS & GSM technology
- Automated guided vehicles

Discrete Semiconductors

- Low Voltage Mosfets and TVS Protection Diodes

Connectors

- More high-speed data connections & HV electrification

Power Supplies

- Wider input range DC/DCs supporting battery systems

Electromagnetic

- Power storage
- EMI suppression and filtering

Connectors



<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>
<p>Armor IPX</p>	<p>AT Series</p>	<p>DuraMate</p>	<p>Ecomate Aquarius</p>
<ul style="list-style-type: none"> • Intermateable with standard connectors • Optional header configurations • AT Series™ 12, 24, 36, 48 I/O (A, B, C & D keying) 	<ul style="list-style-type: none"> • 14-22AWG, 13A, size 16 • Thermoplastic housing with integrated latch • High-temp. silicone seals 	<ul style="list-style-type: none"> • 3 key-way bayonet design • Mixed signal & power configurations • Operating range: -55°C to +125°C 	<ul style="list-style-type: none"> • IP67/69K mated • Bayonet rapid coupling System • Power, mixed power/signal
			
<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Amphenol®</p>
<p>Isobus Implement Connectors</p>	<p>J1939 AHD Series</p>	<p>AUTOMATE® Type A Mini-FAKRA</p>	<p>FAKRA Automotive Connector Systems</p>
<ul style="list-style-type: none"> • Compatible to ISO 11783-2 • #8 power contacts for 6/10/16mm² wire gauge • #12 and #16 contacts available 	<ul style="list-style-type: none"> • IP67 rated (mated) • 6 position: 10-14AWG, 25A, size 12 • 9 position: 14-20AWG, 13A, size 16 	<ul style="list-style-type: none"> • Supports data rates up to 20Gbps • High-density savings over traditional FAKRA • Modular multiport design configuration 	<ul style="list-style-type: none"> • Keyed & colour coded • Locking feature & audible click • Tape & reel packaging
			
<p>• APTIV •</p>	<p>• APTIV •</p>	<p>• APTIV •</p>	<p>• APTIV •</p>
<p>APEX Series</p>	<p>CMC Series</p>	<p>CTCS Series</p>	<p>HES Series</p>
<ul style="list-style-type: none"> • VDA & USCAR • 1.2 compatible • Single-piece housing construction • Terminal position assurance (TPA) 	<ul style="list-style-type: none"> • TPA front holder latch for lock & unlock • Smooth guided terminal insertion • High terminal retention force 	<ul style="list-style-type: none"> • Mounting flexibility: panel, strap/clip and bracket • Improved vibration resistance • Robust back shells 	<ul style="list-style-type: none"> • Improved sealing performance • Superior terminal retention • Interchangeability with industry standard circular products
			

Connectors



<p>• A P T I V •</p>	<p>• A P T I V •</p>	<p>cannon</p>	<p>cannon</p>
<p>OCS Series</p>	<p>SICMA Series</p>	<p>APD Series</p>	<p>CA Bayonet Series</p>
<ul style="list-style-type: none"> • Housing lock overstress protection • Enhanced audible click • Optimized primary lock reinforcement (PLR) 	<ul style="list-style-type: none"> • High performance connector featuring T4/V3 performance • Backshell covers available • Suitable for harsh environment 	<ul style="list-style-type: none"> • Designed according to ISO 15170 • Bayonet locking with secondary locking feature • Up to IP69k sealing level 	<ul style="list-style-type: none"> • Rapid mating and unmating • IP67K / 68K / 69K environmental resistance • Shock and vibration proof
			
<p>cannon</p>	<p>cannon</p>	<p>Littelfuse</p>	<p>Littelfuse</p>
<p>CTC Series</p>	<p>Trident Series</p>	<p>Hard Wired - (PDM) Power Distribution Modules</p>	<p>Fuse Only - (PDM) Power Distribution Module</p>
<ul style="list-style-type: none"> • Simple to install and maintain • Hand insertable contacts • From 8-way to 24-way layouts • Up to IP69k sealing 	<ul style="list-style-type: none"> • High voltage: up to 500VAC • Circular and rectangular variants with mixed power & signal layouts • High sealing & vibration with shielded variants 	<ul style="list-style-type: none"> • PDM for vehicles or commercial equipment • Multiple electrical power outputs • Accepts many fuses, fuse types & relays 	<ul style="list-style-type: none"> • Fuse only PDM for vehicles • Multiple electrical power outputs • Accepts many fuses and fuse types
			
<p>Littelfuse</p>	<p>Littelfuse</p>	<p>molex</p>	<p>molex</p>
<p>POWR-BLOK Modular Power Distribution</p>	<p>Automotive and Commercial Vehicle Fuse Holders</p>	<p>MX150 Sealed and Unsealed Connector System</p>	<p>FAKRA and Sealed FAKRA Systems</p>
<ul style="list-style-type: none"> • Components for modular junction blocks • Supports ATO, Mini, MAXI Fuses, Relay Modules, Flasher Modules, Circuit Breakers 	<ul style="list-style-type: none"> • Fuseholders for MINI, ATO, MAXI, MIDI, MEGA, JCASE Fuses • Available for In-Line, Bolt-Down, Panel Mount & PCB applications 	<ul style="list-style-type: none"> • Pre-assembled TPA housing • 1.50mm low insertion force terminal system • Tin, silver & gold options • Current rating up to 22.0A 	<ul style="list-style-type: none"> • Colour-coded & keyed shrouds • Designed for automotive telematic applications • Low cost & high performance
			

Connectors



<p>molex</p>	<p>molex</p>	<p>EATON Powering Business Worldwide</p>	<p>EATON Powering Business Worldwide</p>
<p>HSAutoLink Interconnect Systems</p>	<p>External Combo Antennas</p>	<p>Clipper Series</p>	<p>UTGX Series</p>
<ul style="list-style-type: none"> • Standard Molex automotive and USB connector components used • Data rates up to 5Gbps • Available in 6 and 12 circuits 	<ul style="list-style-type: none"> • X-in-1 antennas with multiple protocols • Ready-to-use for a number of IoT and smart devices • Suitable for a range of form factors 	<ul style="list-style-type: none"> • Plastic cost effective IP68/69K connector • Salt spray: up to 1000h • Temp. range: -40°C to +125°C • UL94V0, REACH, RoHS 	<ul style="list-style-type: none"> • Ruggedized connectors for harsh environments • Outdoor & shock-proof • Waterproof UV resistant • Quick mating
			
<p>EATON Powering Business Worldwide</p>	<p>EATON Powering Business Worldwide</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>
<p>UTO Series</p>	<p>UTS Series</p>	<p>AMPSEAL 16 Connectors</p>	<p>DEUTSCH DT Series</p>
<ul style="list-style-type: none"> • Metal IP68K / IP69K connector • Temp. range: -40°C to +105°C • High Vibration and shock resistance • UL94V0 RoHS and REACH 	<ul style="list-style-type: none"> • Plastic IP68K / IP69K waterproof connector • 250 mating cycles • Temp. range: -40°C to +105°C • UL94V0, UL94HB RoHS and REACH 	<ul style="list-style-type: none"> • 14-20AWG (2.50 to .50mm²) • 2, 3, 4, 6, 8, and 12 circuits • In-line mount • Rectangular, thermoplastic housing 	<ul style="list-style-type: none"> • 14-20AWG (2.50 to .50mm²) wiring • 2, 3, 4, 6, 8, and 12 circuit arrangements • In-line, flange, or PCB mount • Rectangular housing
			
<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>
<p>DT-XT Sealed Connector Systems</p>	<p>Heavy Duty Sealed Connector Series</p>	<p>M2M MiMo LTE Antennas</p>	<p>SiSo Rooftop Antennas</p>
<ul style="list-style-type: none"> • Rear seals made from HCR (high consistency rubber) • Housings are pre-assembled • Housing in various color codes 	<ul style="list-style-type: none"> • Contact sizes 6.3/4.8K (up to 40A) • 2.8 (up to 40A), and 1.5K (up to 20A) • 2, 3, 4, 6, 7, 8, 10, 12, 15, 16, and 18 circuits 	<ul style="list-style-type: none"> • MiMo Cellular / LTE antenna function • Compact, robust weatherproof low-profile housing • Freq. range 698 to 960MHz or 1710 to 3800MHz 	<ul style="list-style-type: none"> • Cellular 698 to 6000MHZ • UHF versions covering 380 to 430MHz or 450 to 470MHz • Optional active GPS / GLONASS antenna
			

Power Supplies & Relays

			
<p>Rectifier CP3500AC65TEZ</p>	<p>CoolX Configurable Power Supplies</p>	<p>LCC Series Conduction Cooled PSU</p>	<p>Ultra Wide Input Din Rail DDRH-60</p>
<ul style="list-style-type: none"> • Compact 1RU form factor with 40w/in³ • Efficiency exceeding 96% (meets 80+ titanium) • Programmable output 23 to 65VDC 	<ul style="list-style-type: none"> • No fans, noise or vibrations (1000W & 600W) • Industrial approvals: 5 years warranty • Field-configurable: plug & play 	<ul style="list-style-type: none"> • IP65 rated options available • No fans needed • 250W, 600W, 1200W (24/28Vout) 	<ul style="list-style-type: none"> • High power density • Output: 24V to 48V with digital control • High efficiency: up to 94.5% • 5 year warranty
			
			
<p>XLG Series Constant Power LED Driver</p>	<p>AC/DC Charger DPU/DBR-3200</p>	<p>G7EB High Power PCB Relays</p>	<p>G8NB Automotive PCB Relays</p>
<ul style="list-style-type: none"> • Metal case with IP67K for outdoor applications • Perfect driver for demanding outdoor environments • Good surge protection up to 10KV 	<ul style="list-style-type: none"> • High power density • Output: 24V to 48V with digital control • High efficiency: up to 94.5% • 5 year warranty 	<ul style="list-style-type: none"> • 480VAC / 100A • Withstand voltage of 10kV • Low contact resistance of $\geq 5 \text{ m}\Omega$ • Contact gap $\geq 3.6\text{mm}$ (applied to VDE0126) 	<ul style="list-style-type: none"> • GM certified • High switching current (25A) • Standard, low or super low operating voltage • Applicable to pin in paste reflow
			
		 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>HE-S Relays</p>	<p>HE-V Relays</p>	<p>IHV100 Series Contactors</p>	<p>KILOVAC EV250</p>
<ul style="list-style-type: none"> • Contact gap 3.2mm • 35A / 480VAC • Ambient temp.: -40°C to +85°C • Contact arrangement 2FormA, 2FormA, 1FormB 	<ul style="list-style-type: none"> • Contact gap 3.8mm • 20A / 1.000VDC • Ambient temp.: -40°C to +85°C • Contact arrangement 2FormA 	<ul style="list-style-type: none"> • Hermetically sealed - intrinsically safe • 8kV isolation between open contacts • Optional auxiliary contact 	<ul style="list-style-type: none"> • Hydrogen dielectric • 400A carry, 2.500A interrupt @ 320Vdc • Suited for circuit protection, control and battery switching
			

Sensors



<p>Amphenol®</p>	<p>Amphenol®</p>	<p>Honeywell</p>	<p>Honeywell</p>
<p>NKI Series Noise Immune Thermistors</p>	<p>IPS Series i2s Pressure Sensors</p>	<p>MIPS Series Industrial Pressure Sensors</p>	<p>SNG-Q Series Speed Sensors</p>
<ul style="list-style-type: none"> • NTC element-level EMI protection which eliminates the need for shielded cables • Fast time response 	<ul style="list-style-type: none"> • Suitable for hydrogen fuel (H₂), compressed natural gas (CNG), and liquid petroleum gas (LPG) applications 	<ul style="list-style-type: none"> • Heavy duty, media isolated pressure transducer • Can handle aggressive fluids and water media • -40°C to +125°C 	<ul style="list-style-type: none"> • For monitoring speed and direction of rotating equipment • Wide selection of connector types • IP69K with lifetime 2 million cycles
			
<p>Honeywell</p>	<p>muRata INNOVATOR IN ELECTRONICS</p>	<p>muRata INNOVATOR IN ELECTRONICS</p>	<p>muRata INNOVATOR IN ELECTRONICS</p>
<p>TARS - Vehicle Acceleration and Attitude Sensors</p>	<p>SCL3300 Series 3 Axis Inclinometers</p>	<p>SCC2000 Series 3D MEMS Gyro Sensors</p>	<p>SCHA63T Series Inertial Sensors</p>
<ul style="list-style-type: none"> • Ruggedized PBT thermoplastic housing IP67/69K • Advanced filtering for noise & vibration • 36V vehicle power systems 	<ul style="list-style-type: none"> • Ideal for applications demanding high stability & accuracy with tough environmental requirements 	<ul style="list-style-type: none"> • Combined X-axis or Z-axis Gyroscope & 3-axis Accelerometer • Insensitive to mechanical shocks & vibrations 	<ul style="list-style-type: none"> • Single package 6DOF Gyro & Accelerometer • Can be used in safety critical applications • AEC-Q100 qualified
			
<p>Sensata Technologies</p>	<p>Sensata Technologies</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>	<p>TE connectivity AUTHORIZED DISTRIBUTOR</p>
<p>PTE7100 Series Analog Pressure Sensors</p>	<p>ACW4 Series Position Sensors</p>	<p>DOG2 Series Inclinometer</p>	<p>Triaxial Board Mount Accelerometers</p>
<ul style="list-style-type: none"> • Stainless steel design • Wide range of ports, connectors, and electrical outputs • Can handle extreme shock & vibration 	<ul style="list-style-type: none"> • Robust, proven magnetic technology • IP67 standard (IP69K option) • Two-part design offers flexibility for installation 	<ul style="list-style-type: none"> • Digital signal processing with 12 bit resolution • Vibration damping & temp. compensation • -40°C to +85°C temp. range 	<ul style="list-style-type: none"> • Triaxial output • Hermetically sealed • Piezo-ceramic crystals • -40°C to +150°C operating range
			

Switches



			
<p>FD Series</p>	<p>KR Rocker Switches</p>	<p>QH Series</p>	<p>APB, PNP, PT Series</p>
<ul style="list-style-type: none"> • Quality of screen printed legends • Uniform luminosity without hot spot • Snap-in and threaded bushing versions 	<ul style="list-style-type: none"> • Wide choice of colors • Laser etched symbols • Illuminated or non-illuminated • Optionally sealed to IP68 or IP69K 	<ul style="list-style-type: none"> • Anti rotation pin as standard • Zero behind panel depth • 200mm 26AWG UL1061 wire terminations • Panel sealed: up to IP67K 	<ul style="list-style-type: none"> • IP67 sealed • Between 100,000 and 1,000,000 cycles • Threaded or snap-in mounting
			
			
<p>ATP Family</p>	<p>K12 Series</p>	<p>THB Series</p>	<p>Micro Switch™</p>
<ul style="list-style-type: none"> • IP67K sealed to endure harsh environments • IK10 rated impact protection • Snap-action provides positive feedback • 1,000,000 life cycles 	<ul style="list-style-type: none"> • IP67K sealed • Between 200,000 and 1,000,000 cycles • Multiple LED colors available • Excellent tactile feel 	<ul style="list-style-type: none"> • Reduced “Dead Zone” slack & wide angular sweep • 2-axis, multi-direction operation • 2,000,000 life cycle for toggle • Center select momentary switch 	<ul style="list-style-type: none"> • SPDT or DPDT circuitry • Snap-action, positive-break contacts • Silver alloy and gold plated contacts • UL, CE, cUL, CCC approvals
			
			
<p>MT, NT and TL Series Toggles</p>	<p>V15W Switches</p>	<p>E-Stop Switches</p>	<p>XN Series</p>
<ul style="list-style-type: none"> • TL series qualified to MIL-DTL-3950 • NT/MT series are sealed to IP67/68K • UL recognized, CSA certified, and CE approved 	<ul style="list-style-type: none"> • Degree of protection: IP67K • Wide current range: 0.1A, 5A, 10A • SPDT, SPNC, SPNO options • Pre-leaded wires for easy installation 	<ul style="list-style-type: none"> • Highest safety level provided • Fool-proof “Safe break action” • 3rd gen E-stop with IDEC’s original “reverse energy control” 	<ul style="list-style-type: none"> • Available in plastic bezel, metallic padlock, flush bezel • Unique safe break action • Direct opening action
			

Passive Components



	 <i>Powering Business Worldwide</i>	 a YAGEO company	 <small>PRECISION DEVICES COMPLEX - DLI - JOHANNON MFG NOVACAP - SYFER - VOLTRONICS</small>
Non Contacting Rotary Pots	High Power TVS Diodes	KC Link Capacitors	High Voltage MLCC
<ul style="list-style-type: none"> • Non-contacting magnetic technology • Highly resistant to vibration & shock • Highly resistant to fluid & dust ingress 	<ul style="list-style-type: none"> • AECQ-101 compliant to ISO16750-2 5a & 5b standards • SMT from 400W to 8000W power dissipation & 247A • HT up to 12 kW peak power & 270A 	<ul style="list-style-type: none"> • EIA 1812, 2220, and 3640 case size • AEC-Q200 automotive qualified • Flexible termination option available 	<ul style="list-style-type: none"> • High temp. MLCCs available up to 250°C • Approvals to TÜV and UL specifications • Includes 1812 Y2 safety capacitor
			
		 <small>INNOVATOR IN ELECTRONICS</small>	Panasonic INDUSTRY
High Temp. Varistors	High Current Fuse	Three Terminal MLCC	ETQP Metal Comp Choke
<ul style="list-style-type: none"> • 175°C rated, with no derating • AEC-Q200 qualified • Bi-Directional transient voltage protection • EMI/RFI attenuation 	<ul style="list-style-type: none"> • Interrupting rating: 16kA @ 500VDC • Voltage rating: 500VDC • Current ratings 60 to 125A 	<ul style="list-style-type: none"> • Allow a reduction in the number of components • Contribute to noise suppression 	<ul style="list-style-type: none"> • Low profile (min. 3.0mm) • Corresponding to AEC-Q200 • Non-hard saturation characteristic • Up to 30G vibration resistance
			
			
Harsh Environment DC Link Cap	Metal Element Inverse Shunts	Compact Potentiometer	Through Hole Aluminium Resistors
<ul style="list-style-type: none"> • THB Test (85°C / 85%RH / V_R / 1000h) • Operating temp.: -40°C to 105°C • 450V to 1600V 	<ul style="list-style-type: none"> • Inverse 1020 & 1225 SMD shunt, • 0.1 to 3m Ohms, down to 1% • Ultra-low ohmic values support high energy efficiency in the end product 	<ul style="list-style-type: none"> • Knob material either metallic or plastic • Several color of knobs available 	<ul style="list-style-type: none"> • High power rating: 75W-500W • Wirewound resistors, high power, aluminum housed, heatsink type • Resistance range: 0.1Ω to 51kΩ
			

Discrete Semiconductors



	 <small>Kingbright Electronic Europe GmbH</small>		
<p>630 Series LED Panel Mount Indicators</p>	<p>KPT-1608LVSECK-J3-PRV - Chip LED</p>	<p>IX4351NE Gate Drivers</p>	<p>LSIC1MO120E0080 1200V SIC MOSFETS</p>
<ul style="list-style-type: none"> • Heavy duty • High visibility • Available in a large range of voltage supplies and colors • Blade terminals 	<ul style="list-style-type: none"> • 1.6mm x .8mm SMD LED, .75mm thickness • Low power consumption • Wide viewing angle • Ideal for backlight and indicator 	<ul style="list-style-type: none"> • Separate 9A peak source & sink outputs • Operating voltage range: -10V to +25V • Internal negative charge pump regulator 	<ul style="list-style-type: none"> • Optimized for high-frequency, efficiency applications • Extremely low gate charge & output capacitance • Low gate resistance
			
			
<p>IXA20PG1200DHGLB IGBT</p>	<p>OPV302 850nm VCSE Laser</p>	<p>VCNL4200 - Long Distance Proximity Sensors</p>	<p>SIJH112E-T1-Ge3 - TrenchFET® Gen IV power MOSFETs</p>
<ul style="list-style-type: none"> • Low saturation voltage • Positive temp. coefficient for easy paralleling • Fast switching 	<ul style="list-style-type: none"> • 850nm VCSEL technology • High thermal stability • Low drive current • High output power • Narrow beam angle 	<ul style="list-style-type: none"> • SMD Package • Integrated modules: IRED, ALS, PS, IC • Operates ALS & PS in parallel structure 	<ul style="list-style-type: none"> • Fully lead (Pb)-free device • Up to 200A max. continuous drain current • 50% smaller footprint than D2PAK (TO-263) • 100% Rg and UIS tested
			
			
<p>VEMD5510CF Ambient Light Sensors</p>	<p>VEML6040 Color Sensors</p>	<p>K857PE 4-Quadrant PIN Photodiodes</p>	<p>VSMA10xxx High Power IR-Emitters</p>
<ul style="list-style-type: none"> • SMD package • Radiant sensitive area 7,5mm • High photo sensitivity • Suppression filter • Fast response times 	<ul style="list-style-type: none"> • SMD package • Integrated modules: color sensor (RGBW) and signal conditioning IC • Matching real human eye responses 	<ul style="list-style-type: none"> • SMD package top view • Technology: epitaxial • AEC-Q101 qualified • High photo sensitivity • Each quadrant PD has an active area of 1.6 mm² 	<ul style="list-style-type: none"> • SMD Package • Up to 1.5A (DC) and up to 5A (pulsed) • Low thermal resistance: 6K/W < RthJSP < 9K/W
			



ttieurope.com



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

Corporate Headquarters

TTI, Inc.
2441 Northeast Parkway, Fort Worth, Texas 76106 U.S.A.
T: +1 817 740 9000 | F: +1 817 740 9898
E: information@ttiinc.com

European Headquarters

TTI, Inc.
Ganghoferstr. 34, 82216 Maisach-Gernlinden Germany
T: +49 (0) 81 42 66 80 0 | F: +49 (0) 81 42 66 80 490
E: sales@de.ttiinc.com

European Sales Offices

Austria

Vienna
T: +43 (0) 18 79 85 90
E: sales.vienna@at.ttiinc.com

Belgium

Gent
T: +32 9 274 0670
E: sales.benelux@nl.ttiinc.com

Bulgaria

Varna
T: +359 52 51 10 59
E: sales.varna@bg.ttiinc.com

Czech/Slovak Republic

Brno
T: +420 541 126 714
E: sales.brno@cz.ttiinc.com

Denmark

Brondby
T: +45 (0) 43 29 35 35
E: sales.copenhagen@dk.ttiinc.com
Risskov
T: +45 (0) 38 41 31 00
E: sales.copenhagen@dk.ttiinc.com

Estonia

Tallinn
T: +372 664 81 00
E: sales.estonia@ee.ttiinc.com

Finland & Baltic Region

Espoo
T: +358 98 94 65 200
E: sales.finland@fi.ttiinc.com

France

Brive
T: +33 (0) 5 55 92 92 93
E: sales.france@fr.ttiinc.com

Bron

T: +33 (0) 472 81 2030
E: sales.lyon@fr.ttiinc.com

Bruz

T: +33 (0) 2 99 77 60 84
E: sales.rennes@fr.ttiinc.com

La Ciotat

T: +33 (0) 442 84 4142
E: sales.marseille@fr.ttiinc.com

Montigny Le Bretonneux

T: +33 (0) 130 13 7380
E: sales.paris@fr.ttiinc.com

Germany

Berlin
T: +49 (0) 30 8877 40 200
E: sales.berlin@de.ttiinc.com

Dortmund

T: +49 (0) 2301 91 304 0
E: sales.dortmund@de.ttiinc.com

Frankfurt

T: +49 (0) 6102 5999 100
E: sales.frankfurt@de.ttiinc.com

Hannover

T: +49 (0) 5 11 7 80 59 0
E: sales.hannover@de.ttiinc.com

Munich

T: +49 (0) 81 42 66 80 110
E: sales.munich@de.ttiinc.com

Nuremberg

T: +49 (0) 911 9520 0
E: sales.BDG@de.ttiinc.com

Pforzheim

T: +49 (0) 7231 14788 0
E: sales.stuttgart@de.ttiinc.com

Hungary

Budapest
T: +36 1 40 22 111
E: sales.budapest@hu.ttiinc.com

Ireland

T: +44 (0)1494 460000
E: sales.ireland@ie.ttiinc.com

Israel/Ray-Q Ltd.

Airport City
T: +972 3 975 3333
E: sales@ray-q.com

Italy

Civitanova Marche
T: +39 0733 81 8655
E: sales.milan@it.ttiinc.com

Florence

T: +39 (0) 55 094 63 76
E: sales.milan@it.ttiinc.com

Milan

T: +39 02 822 521
E: sales.milan@it.ttiinc.com

Naples

T: +39 081 4245719
E: sales.milan@it.ttiinc.com

Padova

T: +39 049 7802311
E: sales.milan@it.ttiinc.com

Rome

T: +39 0774 57 1302
E: sales.rome@it.ttiinc.com

Netherlands

Eindhoven
T: +31 (0) 40 290 1616
E: sales.benelux@nl.ttiinc.com

Norway

Drammen
T: +47 (0) 92 66 87 66
E: sales.norway@no.ttiinc.com

Poland

Kwidzyn
T: +48 (0) 55 279 67 57
E: sales.poland@pl.ttiinc.com

Portugal

Vila Nova de Famalicao
T: +351 252 493084
E: sales.barcelona@es.ttiinc.com

Romania

Cluj Napoca
T: +40 (0) 733 339 002
E: sales.romania@ro.ttiinc.com

South Africa

Pretoria
T: +27 86 111 2844
E: sales.southafrica@za.ttiinc.com

Spain

Barcelona
T: +34 (0) 93 645 25 75
E: sales.barcelona@es.ttiinc.com

Madrid

T: +34 (0) 91 416 11 90
E: sales.madrid@es.ttiinc.com

Vizcaya

T: +34 (0) 94 623 25 80
E: sales.bilbao@es.ttiinc.com

Sweden

Gothenburg
T: +46 (0) 31 741 12 90
E: sales.gothenburg@se.ttiinc.com

Stockholm

T: +46 (0) 8 594 11 800
E: sales.stockholm@se.ttiinc.com

Switzerland

Baar
T: +41 (0) 41 76741 90
E: sales.swiss@ch.ttiinc.com

Algeria, Egypt & Tunisia

T: +216 (0) 71 862 693
E: sales.tunis@fr.ttiinc.com

Morocco

T: +33(0) 555 92 92 93
E: sales.morocco@de.ttiinc.com

Turkey

Istanbul
T: +90 (0) 216 688 91 75 76
E: sales.turkey@tr.ttiinc.com

United Kingdom

High Wycombe
T: +44 (0)1494 460000
E: sales.london@uk.ttiinc.com

Manchester

T: +44 (0)161 872 2019
E: sales.london@uk.ttiinc.com

Resellers or Distributors

TTI Connect - Europe
T: +49 8142 6680 168
E: service@tticonnect.com

TTI, Inc. Headquarters Europe



www.tuev-sued.de/ms-zert



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