

**The IP&E
Specialist**

Advanced Driver Assistance Systems Application Guide

TTI, Inc., – A Berkshire Hathaway Company



The IP&E Specialist

The Specialist in Electronics Component Distribution

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.

Why TTI?

- **Technical Experts** TTI's European team of field-based Sales Engineers and local Product and Technical Specialists are here to support you; from understanding component trends, sustainable sourceability and new product roadmaps, to in depth technical support for your design from our technical engineering experts.

- **Value Added Services** Connector assembly is one of the most important value-added services at TTI, Inc. – Europe. We are specialized in distributing manufacturer controlled and certified connectors and interconnect solutions from globally leading suppliers. Thanks to a large inventory level of connector components, TTI, Inc. – Europe can serve any market requirements.

- **Global Distribution Centers** Our European headquarters is located just outside of Munich, Germany in Maisach-Gernlinden. In total, we have 45.000m² of dedicated warehouse space and local sales and technical support in over 40 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.





80+
Suppliers



45.000 m²
Warehousing Space



One of the largest Autostore systems in Europe



40
Sales Locations

24/7
Available to Order Online

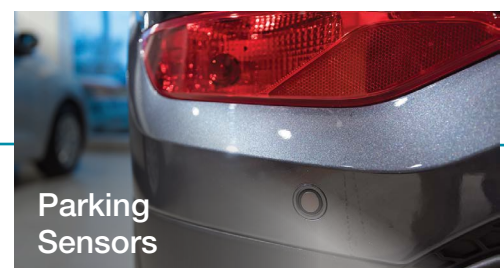
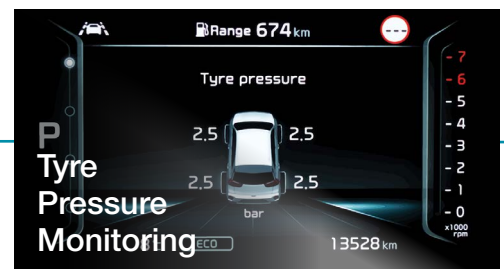


www.ttieurope.com

ADAS Applications

Potential Applications

- Adaptive cruise control
- Adaptive light control
- Automatic parking
- Automotive navigation system
- Automotive night vision
- Blind spot monitor
- Collision avoidance system
- Crosswind stabilization
- Driver drowsiness detection
- Driver monitoring system
- Electric vehicle warning sound
- Emergency braking system
- Emergency driver assistant
- Forward collision warning
- Hill descent control
- Intersection assistant
- Intelligent speed adaptation
- Lane change assistance
- Lane departure warning system
- Night vision
- Parking sensor
- Pedestrian protection system
- Rain sensor
- Surround view system
- Traffic sign recognition
- Turning assistant
- Tyre pressure monitoring
- Vehicular communication system
- Wrong-way driving warning



Connectors

<p>Amphenol COMMUNICATIONS SOLUTIONS</p>	<p>Amphenol COMMUNICATIONS SOLUTIONS</p>	<p>Amphenol COMMUNICATIONS SOLUTIONS</p>	<p>Amphenol COMMUNICATIONS SOLUTIONS</p>
<p>Automotive USB Solution - Mini HSBridge+</p>	<p>BergStak® 0.40mm Board-to-Board Connector</p>	<p>FlexLock™ Flex-to-Board Connectors</p>	<p>FLTStack 0.50mm Board-to-Board Connector</p>
<ul style="list-style-type: none"> • Standard USB Type C interface • With CPA, can meet USCAR-2 V1 vibration • Compliant with USB 3.2 Gen 2 performance 	<ul style="list-style-type: none"> • 0.40mm fine pitch design • Supports speed performance up to 8Gb/s • Meets USCAR-2 vibration and shock limits" 	<ul style="list-style-type: none"> • Current rating 2A with each contact • Terminal Position Assurance (TPA) • Hold down increases board grip force 	<ul style="list-style-type: none"> • Floating range of ±0.50mm in the X, Y directions • 3Gb/s high-speed transmission • Multiple stack height variations from 4mm to 11mm
			
<p>Amphenol COMMUNICATIONS SOLUTIONS</p>	<p>Amphenol COMMUNICATIONS SOLUTIONS</p>	<p>Amphenol COMMUNICATIONS SOLUTIONS</p>	<p>Amphenol COMMUNICATIONS SOLUTIONS</p>
<p>HSD (High Speed Data) Connector System</p>	<p>MicroSpaceXS™ 1.27mm Waterproof</p>	<p>NETBridge™</p>	<p>Ve-NET™</p>
<ul style="list-style-type: none"> • Color coding effectiveness compliant to automotive requirements • High retention force between the die-casting and plastic housing 	<ul style="list-style-type: none"> • LV214 up to Severity-3 and USCAR-T4V2 • Terminal Positioning Assurance (TPA) • Connector Positioning Assurance (CPA) 	<ul style="list-style-type: none"> • Automotive grade Ethernet • Port options up to 1x7 ports • Right angle and vertical connectors" 	<ul style="list-style-type: none"> • Meets USCAR-2, USCAR12-6, USCAR-25, • LV214, IEEE 802.3bw / bp / ch and USCAR Ethernet standards • Available for UTP and STP cable
			
<p>Amphenol® RF</p>	<p>Amphenol® RF</p>	<p>• A P T I V •</p>	<p>• A P T I V •</p>
<p>AUTOMATE® Type A Mini-FAKRA</p>	<p>FAKRA Connector System</p>	<p>Apex Series</p>	<p>NanoPack™ CTS Series</p>
<ul style="list-style-type: none"> • Data rates up to 20 Gbps • High-density savings over traditional FAKRA • Modular multiport design configuration 	<ul style="list-style-type: none"> • Keyed and colour coded • Locking feature and audible click • Tape and reel packaging 	<ul style="list-style-type: none"> • VDA and USCAR 1.2 compatible • Single-piece housing construction • Terminal position assurance (TPA) 	<ul style="list-style-type: none"> • Withstands high temperatures and vibrations • Sealed and unsealed versions • Ergonomic handling (USCAR)
			

Connectors

<p>• A P T I V •</p>	<p>• A P T I V •</p>	<p>• A P T I V •</p>	<p>• A P T I V •</p>
<p>CTS 1.2 SensoMate</p>	<p>OCS 1.5 Sealed Series</p>	<p>Pyrofuse Sealed Squib Connectors</p>	<p>Sigma Series</p>
<ul style="list-style-type: none"> • USCAR footprint for long shroud • Cable sealed terminal, 0.35 – 1.0 mm² • GMW3191 T4/V4/S3/D2 	<ul style="list-style-type: none"> • Compatibility with industry standard mating interfaces • Robust reliability and designed-in durability • Enhanced connection system warranty performance 	<ul style="list-style-type: none"> • One-piece terminal • Selectively gold-plated • Sealed connector • Different wire lengths and types 	<ul style="list-style-type: none"> • High performance connector featuring T4/V3 performance • Backshell covers available • Suitable for harsh environment
			
<p>• A P T I V •</p>	<p>• A P T I V •</p>	<p>• A P T I V •</p>	<p>• A P T I V •</p>
<p>Automatable Modular Ethernet Connector (AMEC)</p>	<p>H-MTD</p>	<p>High Speed FAKRA (HSF)</p>	<p>Mini Coax Automotive (MCA)</p>
<ul style="list-style-type: none"> • High Speed Data with standard Components • Modular System, for UTP and STP cables, same interface • Data rates from 100Mb/s up to 1Gb/s 	<ul style="list-style-type: none"> • Fully shielded 2 wire data solution, max 20Ghz • Various Cable Design (UTP, STP (& SPP)) • Optional CPA 	<ul style="list-style-type: none"> • Stamped & formed terminal, automated assembly to cable • Unsealed and sealed, straight and right angle versions available 	<ul style="list-style-type: none"> • Up to 3x higher density compared to standard FAKRA • Operating frequency 9 GHz (future 15 GHz) • Terminals designed for 2.8mm, 3.2mm, and 3.6mm cables
			
<p>JAE</p>	<p>JAE</p>	<p>JAE</p>	<p>JAE</p>
<p>MA01 Series Floating BTB Connectors</p>	<p>MX77A Series</p>	<p>MX80 Series</p>	<p>MA07 Automotive USB 3.2</p>
<ul style="list-style-type: none"> • Improved Assembly Efficiency • Higher Contact Reliability and Transmission Speeds • Protection from Foreign Contaminants 	<ul style="list-style-type: none"> • Compact right angle SMT type • Small size and height • Ultra-compact 0.4mm terminal 	<ul style="list-style-type: none"> • 0.64mm tab size • Terminal position assurance (TPA) • IP67 waterproof rating 	<ul style="list-style-type: none"> • Tested to USCAR2 specifications • USB 3.2 Gen 2: Maximum bandwidth 20Gbps • DisplayPort 1.4: Maximum bandwidth 32.4Gbps
			

Connectors











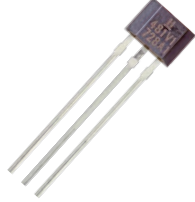




<p style="text-align: center;">JST</p>	<p style="text-align: center;">JST</p>	<p style="text-align: center;">JST</p>	<p style="text-align: center;">JST</p>
<p style="text-align: center;">AIT 2 Series</p>	<p style="text-align: center;">CPT Series</p>	<p style="text-align: center;">JWPF Series</p>	<p style="text-align: center;">MWP Series</p>
<ul style="list-style-type: none"> • Wire-to-wire • 0.64 unsealed low-profile connector series • 14V DC & 5A AC, DC 	<ul style="list-style-type: none"> • Wire-to-board • Surface mounting type connector • 50V & 3A AC, DC 	<ul style="list-style-type: none"> • Wire-to-wire & wire-to-board/ Waterproof • 2 to 8 circuits • 100V & 3A AC, DC 	<ul style="list-style-type: none"> • Wire-to-wire/waterproof • Low insertion force contacts reduce surface finish wear • 300V & 7A AC, DC
			
<p style="text-align: center;">molex</p>	<p style="text-align: center;">molex</p>	<p style="text-align: center;">molex</p>	<p style="text-align: center;">molex</p>
<p style="text-align: center;">Camera Connectors</p>	<p style="text-align: center;">ConnTAK50 Connectors</p>	<p style="text-align: center;">DuraClik Connectors</p>	<p style="text-align: center;">Easy-On FFC FPC Connectors</p>
<ul style="list-style-type: none"> • Improves Assembly Speed and Quality • Enhances Design Flexibility • Delivers Reliable Operation 	<ul style="list-style-type: none"> • Single row: 2 to 6 circuits • Dual Row: 10 and 22 circuits (8 and 20 with a CPA) • Right Angle, Vertical SMT 	<ul style="list-style-type: none"> • Pitch: 2.00mm • Current: 3.0A • Circuits: 2 to 15 • Operating Temperature: -40 to +125°C 	<ul style="list-style-type: none"> • 0.20 to 2.00mm • Front flip, back flip, non-ZIF, Slider, Flexi-Latch, One-Touch • 2 to 120 Circuits
			
<p style="text-align: center;">molex</p>	<p style="text-align: center;">molex</p>	<p style="text-align: center;">molex</p>	<p style="text-align: center;">molex</p>
<p style="text-align: center;">HFM</p>	<p style="text-align: center;">HS Autolink C</p>	<p style="text-align: center;">Mini50 Connection Systems</p>	<p style="text-align: center;">MX-DASH</p>
<ul style="list-style-type: none"> • Frequencies - Up to 20 GHz • Data rate - Up to 28Gbps • Supports multiple Data Protocols 	<ul style="list-style-type: none"> • USCAR Interface - Type C, 999-U-USB-Z02, 999-S-USB-Z02 • Data Protocols - USB 2.0 to USB 3.2 Gen 2x2, DisplayPort • Data Rate - Up to 40Gbps 	<ul style="list-style-type: none"> • 4, 8, 12, 16, 20, and 24 circuits • USCAR 050 specifications • Independent secondary lock 	<ul style="list-style-type: none"> • Sealed or unsealed WTW / WTB designs • 0.50, 0.64, 1.20, 1.50, 2.80, and 4.80mm Terminal Sizes • HFM and H-MTD Data Connections
			

<h2 style="color: red;">molex</h2>	<h2 style="color: red;">molex</h2>	<h2 style="color: red;">Rosenberger</h2>	<h2 style="color: red;">Rosenberger</h2>
<p>SlimStack Floating FSB5 Series</p>	<p>stAK50h Connectors</p>	<p>Fakra</p>	<p>HSD</p>
<ul style="list-style-type: none"> • ±0.50mm floating range in X, Y and Z directions • Smallest floating 0.40mm B-to-B • Vacuum pick-up area and grip 	<ul style="list-style-type: none"> • Through-hole, Reflow • 0.50mm, 1.20mm, 2.80mm Terminal Sizes • 5.0A for 0.50mm, 12.0A for 1.20mm, 30.0A for 2.80mm 	<ul style="list-style-type: none"> • Cable connectors - straight, right angle • PCB connectors - pin-in-paste soldering, SMD • Standardized housings - single, double, triple, quad 	<ul style="list-style-type: none"> • Cable connectors - straight, right angle • PCB connectors - pin-in-paste soldering, SMD • Standardized housings - single, double
			
<h2 style="color: red;">Rosenberger</h2>	<h2 style="color: red;">Rosenberger</h2>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>HFM</p>	<p>H-MTD</p>	<p>FAKRA</p>	<p>HSD/HSL</p>
<ul style="list-style-type: none"> • Cable connectors - straight, right angle • PCB connectors - straight, right angle • Modular housings - single, double, quad 	<ul style="list-style-type: none"> • H-MTD® single, H-MTD® double • H-MTD® quad, H-MTD® six • H-MTD®+ variants with additional power pins 	<ul style="list-style-type: none"> • Coaxial 6 GHz • SerDes: GMSL2/3, FPD-Link III/IV, APIX3, MIPI analog (antennas) • Up to 6 Gbps 	<ul style="list-style-type: none"> • Star quad 2 GHz • SerDes: GMSL1, FPDIII, APIX2, USB 2.0 • 3Gbps (6 Gbps dual lane)
			
 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>MATE-AX</p>	<p>MATEnet</p>	<p>GEMnet</p>	<p>USB Type-C 3.1</p>
<ul style="list-style-type: none"> • Coaxial Typical: 9 GHz • SerDes: GMSL2/3, FPD-Link III/IV, APIX3, MIPI Analog (Antennas) • 12 Gbps (NRZ), 24 Gbps (PAM4) 	<ul style="list-style-type: none"> • Twisted Pair 1 GHz • 1000BASE-T1, 100BASE-T1, HDBaseT, PCIe, A2B / C2B • 1 Gbps for Ethernet (up to 4 Gbps for alternative technologies) 	<ul style="list-style-type: none"> • Automotive robust and compact • High bandwidth / data rates of up to 15 GHz / 56 Gbps • Suitable for STP, UTP and SPP cables 	<ul style="list-style-type: none"> • Twisted pair, parallel pair 5 GHz and up • USB 3.1 Gen (potential for Gen 2), USB 2.0, DisplayPort • Up to 5Gbps (potential for up to 10Gbps)
			

Connectors

 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>MCON 0.5mm Sealed</p>	<p>NanoMQS</p>	<p>Pico-MQS</p>	<p>Microbridge</p>
<ul style="list-style-type: none"> • PCB footprint reduction of up to 50% • IPx9k level of water protection • Operates up to 170°C (Ag) 	<ul style="list-style-type: none"> • Signal terminal max. 6 Amps • Pin dimensions 0.5mm x 0.4mm • Nominal pitch 1.8mm • Wire size range max. 0.13 – 0.35mm² 	<ul style="list-style-type: none"> • 1.27mm pin-to-pin pitch, SG2 Vibration Grade • 0.13mm² to 0.22mm² wirerange • Current capacity: 4A (90°C) 	<ul style="list-style-type: none"> • Compliant to LV214 automotive standards • Temperature resistance of up to 150 °C • Connectors provide Koshiri security
			
 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>	 <p>AUTHORIZED DISTRIBUTOR</p>
<p>enetSEAL+ Connectors</p>	<p>HDSCS with MATEnet Inserts</p>	<p>DT Highspeed Connectors</p>	<p>AMPSEAL 16 with Coaxial Terminals</p>
<ul style="list-style-type: none"> • Compliant with IEEE 802.3bw 100BASE-T1 • IP67, IP69K and USCAR2 (with backshell) • Temperature range from -40°C to +125°C 	<ul style="list-style-type: none"> • IP67/IP69K (with backshell) dust and water protection • Temperature range from -40°C to +125°C (cable dependent) • Hybrid connector – Ethernet + power 	<ul style="list-style-type: none"> • 1000BASE-T1 (1Gb) Type A (15m) and Type B (40m) • Cable Size: 0.50mm² (20AWG) to 0.35mm² (22AWG) • Sealing Performance: IP67, IP69K and USCAR2 	<ul style="list-style-type: none"> • Up to 6GHz operating frequency • IP67/IP69K (with backshell) dust and water protection • Temperature range from -40°C to +125°C (cable dependent)
			
			
<p>YESC 0.5mm PCB HEADER SERIES</p>	<p>YMT 1.2/2.8mm NWP PCB HEADER SERIES</p>	<p>HSD STP CONNECTOR SERIES</p>	<p>1DP STP CONNECTOR SERIES</p>
<ul style="list-style-type: none"> • PCB position assurance pins • Suitable for THT technology • Various mechanical and color codings available 	<ul style="list-style-type: none"> • 90° and 180° PCB mounted versions available • Suitable for THT & THT-R technology • Various mechanical and color codings available 	<ul style="list-style-type: none"> • Fully compatible to HSD interface de-facto standard • Adaptability to a big variety of jacketed UTP cables / wire sizes 	<ul style="list-style-type: none"> • Interface compatible to the H-MTD® de facto standard • Optional CPA - for safety applications • Designed for fully automatic processability
			

Power & Sensors

 <p>muRata INNOVATOR IN ELECTRONICS</p>	 <p>muRata INNOVATOR IN ELECTRONICS</p>	<p>Amphenol®</p>	 <p>i2s an Amphenol company</p>
<p>MGJ2 Series DC/DC Convertors</p>	<p>NXJ1 Series DC/DC Convertors</p>	<p>Thermometrics Dual Solar Sensors</p>	<p>CCT Series Pressure Sensors</p>
<ul style="list-style-type: none"> • SMT 5.7KVDC isolated 2 watt gate drive • Ideal for high-side & low-side IGBT/SiC gate drive circuits • Used in AC climate control 	<ul style="list-style-type: none"> • Low profile isolated 1W DC/DC convertor • Ideal for automatic headlight control • AECQ-104 versions available 	<ul style="list-style-type: none"> • Measures light intensity • Air temperature is automatically adjusted • Ideal for Dual A/C and HVAC systems 	<ul style="list-style-type: none"> • Climate control pressure transmitter (CCT) • Hermetically sealed • Ideal for high-pressure applications
			
 <p>PIHER sensing systems an Amphenol® company</p>	 <p>PIHER sensing systems an Amphenol® company</p>	 <p>SGX SENSORTECH</p>	<p>Honeywell</p>
<p>PSCI / PSTI Inductive Motor Position Sensor</p>	<p>HRPM Rotary Position Sensor</p>	<p>AZ65A Series Air Quality Sensor</p>	<p>VG481V1 Speed Sensors</p>
<ul style="list-style-type: none"> • High Speed Inductive Rotor position sensor • Compact • Low weight • Redundant ASIL Level designs 	<ul style="list-style-type: none"> • True touchless operation • Unlimited mechanical life • Made for harsh environments • Compact and low-profile package 	<ul style="list-style-type: none"> • Intelligent sensor and signal analysis system • Measuring CO, HC, NO2 and NH3 • With PWM or LINbus outputs 	<ul style="list-style-type: none"> • Dual peak detecting circuit with hall-effect element • Can operate from -40°C to 150°C • AEC-Q100 (Grade 0) approved
			
<p>Honeywell</p>	<p>Honeywell</p>	 <p>muRata INNOVATOR IN ELECTRONICS</p>	 <p>muRata INNOVATOR IN ELECTRONICS</p>
<p>RTY Series Rotary Position Sensor</p>	<p>IMU TARS-B</p>	<p>SCH1600 Series</p>	<p>MA58 Series Ultrasonic Sensors</p>
<ul style="list-style-type: none"> • Rugged IP69K Sealed Package • Automotive Grade EMC/EMI tested • Solid state Hall Effect technology 	<ul style="list-style-type: none"> • 6DOF IMU • IP69K Sealed Rugged housing • Off Road ADAS systems 	<ul style="list-style-type: none"> • Automotive grade high performance IMU • ±300°/s angular rate measurement range • ±8g acceleration measurement range 	<ul style="list-style-type: none"> • Drip proof hermetically sealed structure • Used for obstacle detection • ADAS & automatic parking systems
			

Sensors

 <p>muRata INNOVATOR IN ELECTRONICS</p>	 <p>muRata INNOVATOR IN ELECTRONICS</p>	<p>Panasonic INDUSTRY</p>	 <p>Sensata Technologies</p>
<p>Type 1VN - 60Ghz Radar Module</p>	<p>SCC3000 Series Automotive Inertial Sensors</p>	<p>6-DoF Automotive Inertial Sensors</p>	<p>PTE7300 Series</p>
<ul style="list-style-type: none"> • 60GHz Radar Module • Fully integrated Short range radar sensor • TI Chipset 	<ul style="list-style-type: none"> • 3rd Gen. MEMS inertial sensors • High-performance angular rate and accelerometer sensor • Qualified to AEC-Q100 	<ul style="list-style-type: none"> • 3-axis gyro and 3-axis accelerometer • Front camera, radar, LiDAR, AR-head-up display • AEC-Q100 and ISO26262 compliant 	<ul style="list-style-type: none"> • Hydraulic Pressure Transducers • Up to 600bar Pressure Range • ADAS Active Suspension and Braking systems
			
 <p>TDK</p>	 <p>TDK</p>	 <p>TE CONNECTIVITY AUTHORIZED DISTRIBUTOR</p>	 <p>ISHAY</p>
<p>NTCG Series NTC temp sensor</p>	<p>TAS/TAD Series Magnetic TMR Sensors</p>	<p>HTU31 Humidity Sensor Series</p>	<p>VCNL4200 SERIES</p>
<ul style="list-style-type: none"> • Max. Temp. 175°C • Automotive Grade Compliant with AEC-Q200 • ADAS Camera systems 	<ul style="list-style-type: none"> • Automotive safety critical applications • Steering systems • Absolute Rotary position 	<ul style="list-style-type: none"> • Analogue / Digital • Compact DFN package • Fast Humidity response ADAS cameras and Auto HVAC 	<ul style="list-style-type: none"> • Long Distance Proximity (up to 1.5m) • Integrated ambient light sensor • I2C Interface • Wake up feature / Display dimming
			
 <p>ISHAY</p>	 <p>ISHAY</p>	<p>YAGEO GROUP</p>	<p>YAGEO GROUP</p>
<p>VCNL4035X01</p>	<p>VCNT2025X01</p>	<p>PT1000 Platinum SMD</p>	<p>EC Series Encapsulated PT Temperature Sensor</p>
<ul style="list-style-type: none"> • Proximity sensor with LED Driver • Gesture control • Proximity detection (up to 1m depending on external emitter) 	<ul style="list-style-type: none"> • Reflective sensor • LiDAR position encoding 	<ul style="list-style-type: none"> • Board Mount Temperature Sensors • SOT223 • Pt 1000 Class 2B 	<ul style="list-style-type: none"> • ADAS E-motors / actuators • Flexible Fluorocarbon housing • Pt 1000 / PT100 element options automotive grade
			

Switches & Relays

			
<p>EC11</p>	<p>MPS</p>	<p>KSJ</p>	<p>D2HW/D2QW</p>
<ul style="list-style-type: none"> • Output signal - Two phase of A, B, Self-return switch • Rating - 10mA 5V DC • Operating life - 15,000 to 100,000 cycles 	<ul style="list-style-type: none"> • Sealed contacts • Quick and easy installation • UL 61058 approved • Long life—4M operations 	<ul style="list-style-type: none"> • Actuation force off center +/- 30° to vertical • Compliant side actuation • Designed for mechanisms 	<ul style="list-style-type: none"> • The case dimensions are 78% of conventional models • Extra-long stroke even without levers
			
			
<p>B3AL</p>	<p>SKQG</p>	<p>EVPAW Series</p>	<p>ASQM (ASQ Mini)</p>
<ul style="list-style-type: none"> • High operation forces up to 5N • Long stroke achieved by using a rubber plunger • Long life between 500k and 1 million cycles 	<ul style="list-style-type: none"> • Low profile with dimensions 5.2x5.2x1.5mm • Operating temperature range -30° to +85°C • Versions with and without stem available 	<ul style="list-style-type: none"> • External Dimensions: 3.0mm x 2.0mm x 0.6mm • High operability – equipped with an actuator (push plate) • IP67 characteristic 	<ul style="list-style-type: none"> • High contact reliability to support low level switching loads • Highly effective sealing (IP67)
			
			
<p>G8NB/G8NDL/ G8FE/G8PM-1AW</p>	<p>F7 Power Relay</p>	<p>IM Relay Series</p>	<p>HF3/HF6 Relay Series</p>
<ul style="list-style-type: none"> • High switching current (Up to 60A) • Standard, low or super low operating voltage • Applicable to pin in paste reflow 	<ul style="list-style-type: none"> • Integrated components possible (e.g. resistor, diode) • 12V, 24V and 48V (on request) coil versions • PCB and Plug-In versions available 	<ul style="list-style-type: none"> • Slim line 10x6mm • Low profile 5.65mm and min. board-space 60mm² • Switching current 2/5A • Switching power 60W/62.5VA 	<ul style="list-style-type: none"> • Y-Design • Frequency range DC to 6GHz • Impedance 50Ω or 75Ω • Small dimensions (14.6x7.2x10mm)
			

Antennas & Wireless Modules

			
<p>AN01 Stamp Metal Antennas</p>	<p>A1004795 LTE Antenna</p>	<p>Type 2NR BLE Module</p>	<p>Type 2EA Wi-Fi 6E + BLE Module</p>
<ul style="list-style-type: none"> • High efficiency • Edge center mount • Automotive grade available • Available in different frequencies 	<ul style="list-style-type: none"> • Fulfills AEC-Q200 Standard • Covers all LTE bands + RKE frequencies • Works with small GND plane as well 	<ul style="list-style-type: none"> • Based on Nordic nRF54L15 • Ultra-small size • Integrated antenna • Supports multiple radio technology 	<ul style="list-style-type: none"> • Based on Infineon CYW55573 • Supports 2x2 MIMO Wi-Fi • Up to 1.2 Gbps data rate
			
			
<p>PAN1783 BLE Module</p>	<p>PAN W602-1/2 Wi-Fi 6 Module</p>	<p>Inception Series Multiband GNSS Antenna</p>	<p>SDCP.5900.12.4.A.40 DSRC Antenna</p>
<ul style="list-style-type: none"> • Based on Nordic nRF5340 • Supports LE Audio • Available with on-board chip antenna or RF-bottom pad 	<ul style="list-style-type: none"> • Cost Effective Wi-Fi 6 + BLE module • Single-band and Dual-band versions • Built on TI chipsets 	<ul style="list-style-type: none"> • Patch within a patch design • Low profile • Covering L1+L2 or L1+L5 • Dual Feed SMD configuration 	<ul style="list-style-type: none"> • SMD Patch antenna • Circular polarized • IATF16949 Production
			
			
<p>2195846-X 5G FPC Antenna</p>	<p>2108784 5G SMD Antenna</p>	<p>GNSSL1L2L5 Multiband GNSS Antenna</p>	<p>CDB Series Multiband Antenna</p>
<ul style="list-style-type: none"> • Compact size • Wideband (698-7125 MHz) • Different cable length and connector options available 	<ul style="list-style-type: none"> • Wideband (698-6000 MHz) • Omnidirectional pattern • Available in Tape&Reel 	<ul style="list-style-type: none"> • Stacked L1/L2 + L5 Antenna • Available with 15 dB and 30 dB amplifier • With Microcoax and MHF connector 	<ul style="list-style-type: none"> • 9-in-1 Multi-Band Support • Wideband LTE 5G Coverage • WiFi 6E and 7 Ready • Optimized Isolation and Gain
			

<p>BOURNS®</p>	<p>BOURNS®</p>	<p>BOURNS®</p>	<p>CHEMI-CON</p>
<p>SRR6838A Series Power Inductors</p>	<p>Current Sense Resistors</p>	<p>MF-MSMF Polymer PTC Resettable Fuses</p>	<p>HXK Conductive Polymer Hybrid Aluminium Capacitor</p>
<ul style="list-style-type: none"> • AEC-Q200 compliant • Halogen-free • RoHS compliant 	<ul style="list-style-type: none"> • Excellent long term stability • Low inductance • Low thermal EMF 	<ul style="list-style-type: none"> • Fast time-to-trip response • Low-profile surface-mount design • Mechanical shock resistance 	<ul style="list-style-type: none"> • Voltage 16 to 35V • Capacitance 270 to 1,200µF • For high temperature and high reliability applications
			
<p>CHEMI-CON</p>	<p>CHEMI-CON</p>	<p>EATON Powering Business Worldwide</p>	<p>KOA</p>
<p>PXD Polymer Aluminium Solid Capacitor</p>	<p>DKA Supercapacitor</p>	<p>Power Inductors</p>	<p>Anti Surge Resistors</p>
<ul style="list-style-type: none"> • Super low ESR, impedance and high heat resistance • Voltage 2.5 to 10Vdc • Capacitance 47 to 470µF 	<ul style="list-style-type: none"> • Very low DCIR at low and high temperature • -40°C to +70°C (2.5V) • Ideal as a backup power supply 	<ul style="list-style-type: none"> • AEC-Q200 qualified • 125°C max operating temperature • Iron powder core material 	<ul style="list-style-type: none"> • Outstanding pulse performance (SG73, SG73P, SG73G) • Excellent in ESD characteristics (SG73, SG73S)
			
<p>KOA</p>	<p>KOA</p>	<p>KYOCERA AVXX</p>	<p>KYOCERA AVXX</p>
<p>Anti Sulfuration Resistors</p>	<p>Thick Film Chip Resistor</p>	<p>CX2016SA series Crystal Units</p>	<p>KAM series HI-CV Automotive MLCC</p>
<ul style="list-style-type: none"> • AEC-Q200 tested • ASTM B 809-95 anti-sulfuration tested • High heat resistance and environmental resistance 	<ul style="list-style-type: none"> • AEC-Q200 qualified in sizes 0402 to 1210 • Compatible with reflow and flow soldering • Lead-free terminations comply with EU RoHS 	<ul style="list-style-type: none"> • Size 2016, Low Profile H 0.5mm • Low Frequency 16 to 80MHz • Tight Stability +/-10ppm @ 25+/-3°C • AEC-Q200 	<ul style="list-style-type: none"> • Mainly used for CPU/MPU decoupling • Reducing mounting space and securing enough capacitance value • AEC-Q200
			

			
<p>175 Deg Varistors</p>	<p>HBW - Hybrid Capacitor</p>	<p>VUK - Aluminum Electrolytic Capacitor</p>	<p>VZH - Aluminum Electrolytic Capacitor</p>
<ul style="list-style-type: none"> • Miniature MLVs for ESD Protection • Power, Data, Ethernet, RF • 150/175°C & FLEXITERM® options • AEC-Q200 	<ul style="list-style-type: none"> • 125°C / 4,000 hours • Low ESR and High ripple current • 30g vibration resistant on request • AEC-Q200 	<ul style="list-style-type: none"> • 125°C / 3,000 ~ 5,000 hours • Diameters from 8 up to 18 mm • 30g vibration resistant on request • AEC-Q200 	<ul style="list-style-type: none"> • 105°C / 3,000 ~ 5,000 hours • Diameters from 4 up to 18 mm • Surface mounting on high density PCB • AEC-Q200
			
			
<p>AXGD</p>	<p>miniASMD</p>	<p>SM10 Varistors</p>	<p>Low ESL MLCC</p>
<ul style="list-style-type: none"> • AEC-Q200 qualified • High ESD rating up to 30kV contact/air discharge • RoHS compliant, lead-free and halogen-free 	<ul style="list-style-type: none"> • Products meet applicable automotive industry standards • Compatible with high volume electronics assembly • Small footprint – 1812 size 	<ul style="list-style-type: none"> • AEC-Q200 qualified • Compliant with automotive-grade products • Environment-friendly 	<ul style="list-style-type: none"> • Low ESL • Allows a reduction in the number of components • Contributes to noise suppression
			
			
<p>LCC152</p>	<p>PTC Thermistors</p>	<p>PCW Aluminum Organic Polymer Capacitor</p>	<p>UCM Aluminium Electrolytic Capacitor</p>
<ul style="list-style-type: none"> • Easy to meet the target Z • Can be put between the package and main PCB • Contributes to a reduction in the number of components 	<ul style="list-style-type: none"> • Automatic reset functionality • Fastest time to trip • High reliability with ceramic material 	<ul style="list-style-type: none"> • Temperature -55°C to +125°C • Voltage 2.5V to 6.3V • Capacitance 150µF to 1800µF • 2000 hours at 125°C 	<ul style="list-style-type: none"> • Temperature -55°C to +105°C • Voltage 6.3V to 100V • Capacitance 10µF to 5100µF • 5000 hours at 105°C
			

<p>nichicon</p>	<p>Panasonic INDUSTRY</p>	<p>Panasonic INDUSTRY</p>	<p>Panasonic INDUSTRY</p>
<p>GYG Polymer Hybrid Aluminium Capacitor</p>	<p>Hybrid Aluminium Capacitor</p>	<p>Aluminum Electrolytic Capacitor</p>	<p>LP Series Power Inductors</p>
<ul style="list-style-type: none"> • Temperature -55°C to +125°C • Voltage 25 to 35V • Capacitance 82µF to 680µF • 4000 hours at 125°C 	<ul style="list-style-type: none"> • Capacitance up to 1,000µF • High reliability 4000h @135°C • Anti-Vibration 30G • High Ripple Current to 6.1A 	<ul style="list-style-type: none"> • Low ESR • Long lifetime up to 10,000h • Large capacitance in smaller case size • Anti-vibration available 30G 	<ul style="list-style-type: none"> • High reliability • Land-pattern compatible • AEC-Q200 compliant • 0.105 to 100uH • Low profile 3 - 4mm
			
<p>TAIYO YUDEN</p>	<p>TAIYO YUDEN</p>	<p>TAIYO YUDEN</p>	<p>TDK</p>
<p>Metal Power Inductors</p>	<p>MCAS MLCC</p>	<p>Soft Termination MLCC</p>	<p>MLCC</p>
<ul style="list-style-type: none"> • AEC-Q200 qualification • Compact structure • High current capacity 	<ul style="list-style-type: none"> • AEC-Q200 tested • Extremely low rates of failure • RoHS and REACH compliant 	<ul style="list-style-type: none"> • Surface Mount Technology (SMT) • Compliant with RoHS • Low Equivalent Series Resistance (ESR) 	<ul style="list-style-type: none"> • High capacitance ceramic capacitor • Superior strength and reliability • Low ESL and excellent frequency characteristics
			
<p>TDK</p>	<p>TDK</p>	<p>ISHAY</p>	<p>ISHAY</p>
<p>ESD Protection</p>	<p>Power Inductors</p>	<p>IHLD Inductors</p>	<p>Hi Voltage Chip Resistors</p>
<ul style="list-style-type: none"> • European production (short reaction times & high flexibility) • Short leadtime of 4–8 weeks • Wide product portfolio • No derating up to 150°C 	<ul style="list-style-type: none"> • Temperature range up to 125°C • Automotive grade versions are available • Low DCR characteristics 	<ul style="list-style-type: none"> • Two IHLP® style inductors placed vertically in one board-space saving package • AEC-Q200 qualified • Two sizes available: 3232 and 4032 	<ul style="list-style-type: none"> • High operating voltage up to 1.000V • Precision tolerance down to ±0.1% and TCR down to ±10 ppm/K
			

Passives & Discrete

			
IHLP High Current Inductors	T598 Tantalum Capacitor	Common Mode Chokes	MPXV Metal Composite Power Inductors
<ul style="list-style-type: none"> • AEC-Q200 qualified • Handles high transient current spikes • High temperature, up to 180°C 	<ul style="list-style-type: none"> • AEC-Q200 • Ultra Low ESR • High Temperature up to 150°C • No capacitance loss over time, temperature or frequency 	<ul style="list-style-type: none"> • AEC-Q200 • Surface Mount And Through-Hole • Current Rating from mA to 40Arms • Impedence up to 27.5 kΩ 	<ul style="list-style-type: none"> • AEC-Q200 • High Saturation Capabilities • Shielded Construction • Temperature up to +155°C
			
			
PU Shunt Resistors	RP Thin Film Resistors	SM8SFxxA-Q Load Dump TVS Diodes	CDSOT23-T24CAN-Q CANbus Protector
<ul style="list-style-type: none"> • AEC-Q200 • 1% and 5% tolerances • High Power up to 5W • Operating Temperature Range up to 170°C 	<ul style="list-style-type: none"> • AEC-Q200 • High precision Chip Resistors • Tolerance to 0.1% • TC10 to TC50 	<ul style="list-style-type: none"> • Maximum Peak Power: 7000 W • Meets ISO7637-2/ISO16750-2 • AEC-Q101 compliant 	<ul style="list-style-type: none"> • Single device for two I/O lines • Low capacitance for high-speed CANbus • AEC-Q101 compliant • SOT-23 Package
			
			
AQ3400-02UTG ESD Protection Diode Array	AQ24CANFD-02HTG - 200W ESD Protection Diode Array	SZ1SMB TVS Diodes	SESD0402X1BN-0010-098 TVS Diode
<ul style="list-style-type: none"> • Low capacitance of 1pF (TYP) per I/O • Low leakage current of 0.01µA (TYP) at 5V • µDFN (JEDEC MO-229) package 	<ul style="list-style-type: none"> • Low clamping voltage • Low leakage current • AEC-Q101 qualified • SOT23-3 Package 	<ul style="list-style-type: none"> • Zener transient – overvoltage suppressors • Peak power – 600W at 1.0ms • Low leakage < 5.0 µA 	<ul style="list-style-type: none"> • Ultra-low capacitance TVS • Low profile 0201 and 0402 DFN packages • Facilitates excellent signal integrity • ELV compliant
			

Discrete & Opto Components

			
MER2DAFC-AU Super Fast Recovery Rectifier	PJQ5548-AU 40V N-Channel MOSFET	PJQ4548P-AU 40V N-Channel MOSFET	SQRS140ELP Automotive N-Channel 40 V
<ul style="list-style-type: none"> • Superfast recovery times • Low forward voltage, high current capability • Low leakage • AEC-Q101 qualified 	<ul style="list-style-type: none"> • RDS(ON), VGS@10V, ID@20A<8.8mΩ • Excellent FOM • Logic Level Drive • AEC-Q101 qualified 	<ul style="list-style-type: none"> • RDS(ON), VGS@10V, ID@10A<9.1mΩ • Excellent FOM • Logic Level Drive • AEC-Q101 qualified 	<ul style="list-style-type: none"> • TrenchFET® Gen IV power MOSFET • AEC-Q101 qualified • 100 % Rg and UIS tested • 175 °C MOSFET in 5x6mm package
			
			
SQS142ELNW Automotive N-Channel 40V	T6N30CA TVS Protection Diode	V2NM63HM3 Schottky Rectification Diode	SQS966ENW Dual N-Channel 60 V MOSFET
<ul style="list-style-type: none"> • AEC-Q101 qualified • Wettable flank terminals • Low thermal resistance with 0.75 mm profile • 175 °C MOSFET in 3x3mm package 	<ul style="list-style-type: none"> • Leadless DFN 3820A package • TJ = 185 °C capability • Bidirectional • Excellent clamping capability • Peak pulse power: 600 W 	<ul style="list-style-type: none"> • Leadless DFN3820A package • Trench MOS Schottky technology • Low power losses, high efficiency • Low forward voltage drop 	<ul style="list-style-type: none"> • 175 °C TrenchFET® power MOSFET • AEC-Q101 qualified • PowerPAK 1212-8W • 100 % Rg and UIS tested
			
			
VSMA1094251X02 High Power IR Emitter	VCNL4030X01 Proximity & Ambient Light Sensor	DGQ2788A 125 °C Analog Switch Dual DPDT / Quad SPDT	SMAJ33A-AT TVS Diodes
<ul style="list-style-type: none"> • High power SMD with lens • Peak wavelength: $\lambda_p = 950 \text{ nm}$ • AEC-Q102 qualified • Angle of half intensity: $\varphi = \pm 28^\circ$ 	<ul style="list-style-type: none"> • Presence and proximity sensing up to 1.5 meters • Low profile of 0.75mm • Fully integrated solutions • Operates ALS and PS in parallel structure 	<ul style="list-style-type: none"> • 1.8 V to 5.5 V single supply operation • Low resistance: 0.37R/typ. at 2.7 V • Highly flat and matched RON 	<ul style="list-style-type: none"> • 400W in SMA Package • Low profile package • Glass passivated junction • Low inductance • Excellent clamping capability
			

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