

**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?

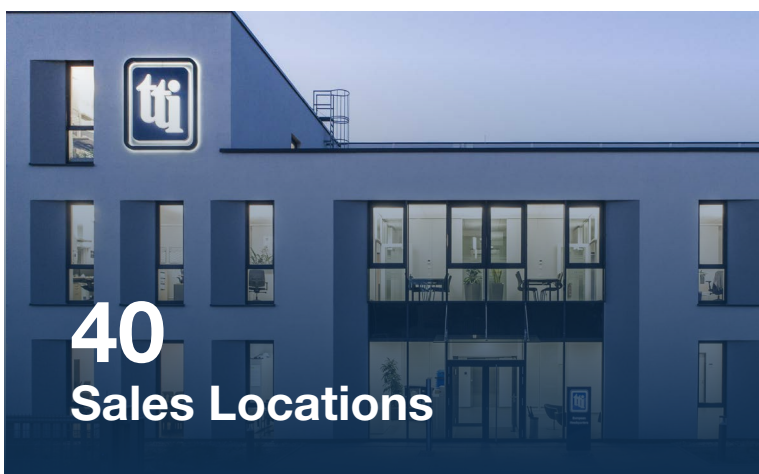
• **Technical Experts** TTI's European team of field-based Sales Engineers and local Product and Technical Specialists are here to support you; from understanding component trends, sustainable sourceability and new product roadmaps, to in depth technical support for your design from our technical engineering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





24/7
Available to Order Online

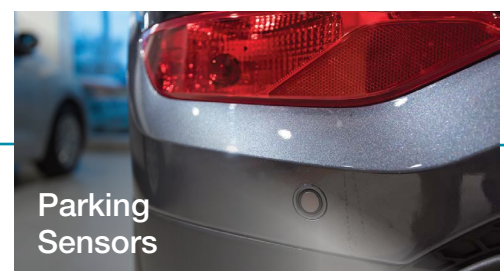
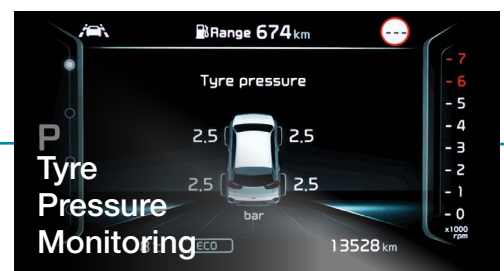


www.ttieurope.com

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



Antenna & Wireless Modules

- Stamped Metal Antennas for high efficiency
- Bluetooth and Wi-Fi 6 modules using different supplier chipsets
- Multiband Antenna supporting up to nine different communication protocols

Capacitors

- Polymer Aluminum Capacitors offer super low ESR, Impedance and high-heat-resistance
- Supercapacitors being used as a back up power supply
- Higher capacitance MLCCs available with low ESL and excellent frequency characteristics

Circuit Protection

- Resettable fuses with fast time to trip response
- Varistors that can operate at temperature up to 175C
- Smaller PPTC devices allow the use of smaller wire sizes in the resulting harnesses.

Connectors

- New Co-Ax interfaces supporting speeds up to 25 Gbps
- Differential pair interface standard supports 10G Base-T and 25 Gbps
- New high speed Board to Board connectors with higher pin counts and data rates

Discrete Semiconductors

- New MOSFETs providing better efficiency, low figure of merit (FOM) and reduction in board space;
- New DFN packages replacing established standard Diode packages with same power rating and less space needed

Electromagnetic

- New EMI Filters supporting Automotive Ethernet and USB 3.1/3.2 data rates
- Industry solutions for LIN, CAN, CAN-FD, Ethernet and Flex Ray applications
- New High Frequency and High Inductance products for ADAS applications

Optoelectronics

- New Optoelectronics solutions for Rain Sensors, HUD and HMI applications
- Light Sensors for Smart Mirror applications
- High Power IR Leds for Driver Monitoring

Relays

- Full coverage of small signal relays and HF relays for data transmission
- New power relays for PCB and quick connect connections

Resistors

- Higher Power Current Sense Resistors
- Anti Sulphuration resistors for improved heat resistance
- New chip resistors able to withstand operating voltage up to 1000V

Sensors

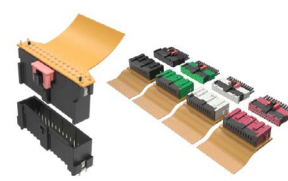
- High speed position sensors - ADAS actuator systems
- Inertial 6 DOF IMU sensors - safety systems
- Optical / Radar sensors - passenger recognition and activity

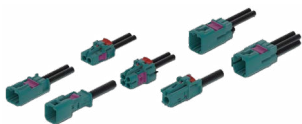
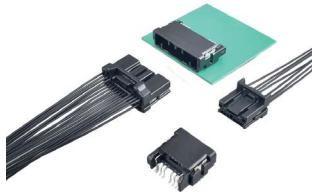
Switches

- Longer life switches that can support up to one million cycles
- Smaller more rugged switches that support IP67 performance requirements
- Ultralow profile switches with heights below 1mm

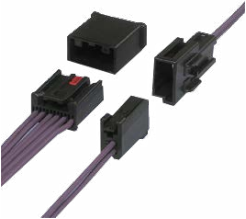
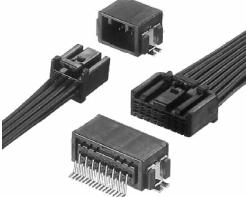
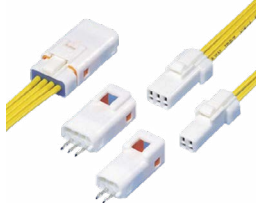
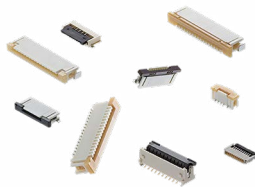


Connectors

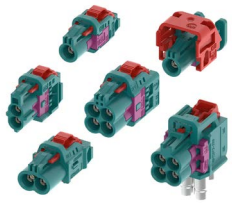
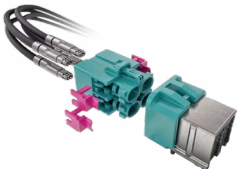
Amphenol COMMUNICATIONS SOLUTIONS	Amphenol COMMUNICATIONS SOLUTIONS	Amphenol COMMUNICATIONS SOLUTIONS	Amphenol COMMUNICATIONS SOLUTIONS
Automotive USB Solution - Mini HSBridge+	BergStak® 0.40mm Board-to-Board Connector	FlexLock™ Flex-to-Board Connectors	FLTStack 0.50mm Board-to-Board Connector
- Standard USB Type C interface - With CPA, can meet USCAR-2 V1 vibration - Compliant with USB 3.2 Gen 2 performance	0.40mm fine pitch design - Supports speed performance up to 8Gb/s - Meets USCAR-2 vibration and shock limits"	- Current rating 2A with each contact - Terminal Position Assurance (TPA) - Hold down increases board grip force	- Floating range of $\pm 0.50\text{mm}$ in the X, Y directions 3Gb/s high-speed transmission - Multiple stack height variations from 4mm to 11mm
			
Amphenol COMMUNICATIONS SOLUTIONS	Amphenol COMMUNICATIONS SOLUTIONS	Amphenol COMMUNICATIONS SOLUTIONS	Amphenol COMMUNICATIONS SOLUTIONS
HSD (High Speed Data) Connector System	MicroSpaceXS™ 1.27mm Waterproof	NETBridge™	Ve-NET™
- Color coding effectiveness compliant to automotive requirements - High retention force between the die-casting and plastic housing	- LV214 up to Severity-3 and USCAR-T4V2 - Terminal Positioning Assurance (TPA) - Connector Positioning Assurance (CPA)	- Automotive grade Ethernet - Port options up to 1x7 ports - Right angle and vertical connectors"	- Meets USCAR-2, USCAR12-6, USCAR-25, - LV214, IEEE 802.3bw / bp / ch and USCAR Ethernet standards - Available for UTP and STP cable
			
Amphenol® RF	Amphenol® RF	• A P T I V •	• A P T I V •
AUTOMATE® Type A Mini-FAKRA	FAKRA Connector System	Apex Series	NanoPack™ CTS Series
- Data rates up to 20 Gbps - High-density savings over traditional FAKRA - Modular multiport design configuration	- Keyed and colour coded - Locking feature and audible click - Tape and reel packaging	- VDA and USCAR 1.2 compatible - Single-piece housing construction - Terminal position assurance (TPA)	- Withstands high temperatures and vibrations - Sealed and unsealed versions - Ergonomic handling (USCAR)
			

• A P T I V • CTS 1.2 SensoMate • USCAR footprint for long shroud • Cable sealed terminal, 0.35 – 1.0 mm² • GMW3191 T4/V4/S3/D2 	• A P T I V • OCS 1.5 Sealed Series • Compatibility with industry standard mating interfaces • Robust reliability and designed-in durability • Enhanced connection system warranty performance 	• A P T I V • Pyrofuse Sealed Squib Connectors • One-piece terminal • Selectively gold-plated • Sealed connector • Different wire lengths and types 	• A P T I V • Sigma Series • High performance connector featuring T4/V3 performance • Backshell covers available • Suitable for harsh environment 
• A P T I V • Automatable Modular Ethernet Connector (AMEC) • High Speed Data with standard Components • Modular System, for UTP and STP cables, same interface • Data rates from 100Mb/s up to 1Gb/s 	• A P T I V • H-MTD • Fully shielded 2 wire data solution, max 20Ghz • Various Cable Design (UTP, STP (& SPP)) • Optional CPA 	• A P T I V • High Speed FAKRA (HSF) • Stamped & formed terminal, automated assembly to cable • Unsealed and sealed, straight and right angle versions available 	• A P T I V • Mini Coax Automotive (MCA) • 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 
JAE MA01 Series Floating BTB Connectors • Improved Assembly Efficiency • Higher Contact Reliability and Transmission Speeds • Protection from Foreign Contaminants 	JAE MX77A Series • Compact right angle SMT type • Small size and height • Ultra-compact 0.4mm terminal 	JAE MX80 Series • 0.64mm tab size • Terminal position assurance (TPA) • IP67 waterproof rating 	JAE MA07 Automotive USB 3.2 • Tested to USCAR2 specifications • USB 3.2 Gen 2: Maximum bandwidth 20Gbps • DisplayPort 1.4: Maximum bandwidth 32.4Gbps 

Connectors

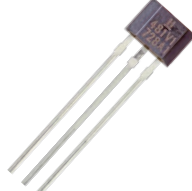
JST AIT 2 Series • Wire-to-wire • 0.64 unsealed low-profile connector series • 14V DC & 5A AC, DC 	JST CPT Series • Wire-to-board • Surface mounting type connector • 50V & 3A AC, DC 	JST JWPF Series • Wire-to-wire & wire-to-board/ Waterproof • 2 to 8 circuits • 100V & 3A AC, DC 	JST MWP Series • Wire-to-wire/waterproof • Low insertion force contacts reduce surface finish wear • 300V & 7A AC, DC 
molex Camera Connectors • Improves Assembly Speed and Quality • Enhances Design Flexibility • Delivers Reliable Operation 	molex ConnTAK50 Connectors • Single row: 2 to 6 circuits • Dual Row: 10 and 22 circuits (8 and 20 with a CPA) • Right Angle, Vertical SMT 	molex DuraClik Connectors • Pitch: 2.00mm • Current: 3.0A • Circuits: 2 to 15 • Operating Temperature: -40 to +125°C 	molex Easy-On FFC FPC Connectors • 0.20 to 2.00mm • Front flip, back flip, non-ZIF, Slider, Flexi-Latch, One-Touch • 2 to 120 Circuits 
molex HFM • Frequencies - Up to 20 GHz • Data rate - Up to 28Gbps • Supports multiple Data Protocols 	molex HS Autolink C • 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 	molex Mini50 Connection Systems • 4, 8, 12, 16, 20, and 24 circuits • USCAR 050 specifications • Independent secondary lock 	molex MX-DASH • 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 

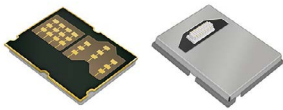
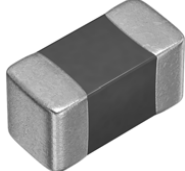
Connectors

molex	molex	Rosenberger	Rosenberger
SlimStack Floating FSB5 Series	stAK50h Connectors	Fakra	HSD
• $\pm 0.50\text{mm}$ floating range in X, Y and Z directions • Smallest floating 0.40mm B-to-B • Vacuum pick-up area and grip	• 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	• Cable connectors - straight, right angle • PCB connectors - pin-in-paste soldering, SMD • Standardized housings - single, double, triple, quad	• Cable connectors - straight, right angle • PCB connectors - pin-in-paste soldering, SMD • Standardized housings - single, double
			
Rosenberger	Rosenberger		
HFM	H-MTD	FAKRA	HSD/HSL
• Cable connectors - straight, right angle • PCB connectors - straight, right angle • Modular housings - single, double, quad	• H-MTD® single, H-MTD® double • H-MTD® quad, H-MTD® six • H-MTD®+ variants with additional power pins	• Coaxial 6 GHz • SerDes: GMSL2/3, FPD-Link III/IV, APIX3, MIPI analog (antennas) • Up to 6 Gbps	• Star quad 2 GHz • SerDes: GMSL1, FPDIII, APIX2, USB 2.0 • 3 Gbps (6 Gbps dual lane)
			
			
MATE-AX	MATEnet	GEMnet	USB Type-C 3.1
• Coaxial Typical: 9 GHz • SerDes: GMSL2/3, FPD-Link III/IV, APIX3, MIPI Analog (Antennas) • 12 Gbps (NRZ), 24 Gbps (PAM4)	• Twisted Pair 1 GHz • 1000BASE-T1, 100BASE-T1, HDBaseT, PCIe, A2B / C2B • 1 Gbps for Ethernet (up to 4 Gbps for alternative technologies)	• Automotive robust and compact • High bandwidth / data rates of up to 15 GHz / 56 Gbps • Suitable for STP, UTP and SPP cables	• 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)
			

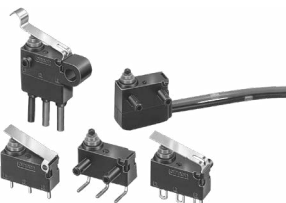
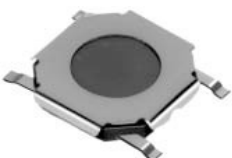
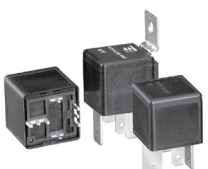
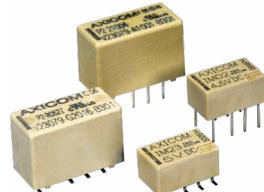
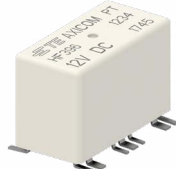
Connectors

 MCON 0.5mm Sealed • PCB footprint reduction of up to 50% • IPx9k level of water protection • Operates up to 170°C (Ag) 	 NanoMQS • Signal terminal max. 6 Amps • Pin dimensions 0.5mm x 0.4mm • Nominal pitch 1.8mm • Wire size range max. 0.13 – 0.35mm² 	 Pico-MQS • 1.27mm pin-to-pin pitch, SG2 Vibration Grade • 0.13mm² to 0.22mm² wirerange • Current capacity: 4A (90°C) 	 Microbridge • Compliant to LV214 automotive standards • Temperature resistance of up to 150 °C • Connectors provide Koshiri security 
 enetSEAL+ Connectors • Compliant with IEEE 802.3bw 100BASE-T1 • IP67, IP69K and USCAR2 (with backshell) • Temperature range from -40°C to +125°C 	 HDSCS with MATEnet Inserts • IP67/IP69K (with backshell) dust and water protection • Temperature range from -40°C to +125°C (cable dependent) • Hybrid connector – Ethernet + power 	 DT Highspeed Connectors • 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 	 AMPSEAL 16 with Coaxial Terminals • Up to 6GHz operating frequency • IP67/IP69K (with backshell) dust and water protection • Temperature range from -40°C to +125°C (cable dependent) 
 YESC 0.5mm PCB HEADER SERIES • PCB position assurance pins • Suitable for THT technology • Various mechanical and color codings available 	 YMT 1.2/2.8mm NWP PCB HEADER SERIES • 90° and 180° PCB mounted versions available • Suitable for THT & THT-R technology • Various mechanical and color codings available 	 HSD STP CONNECTOR SERIES • Fully compatible to HSD interface de-facto standard • Adaptability to a big variety of jacketed UTP cables / wire sizes 	 1DP STP CONNECTOR SERIES • Interface compatible to the H-MTD® de facto standard • Optional CPA - for safety applications • Designed for fully automatic processability 

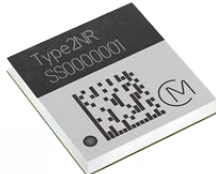
 muRata INNOVATOR IN ELECTRONICS	 muRata INNOVATOR IN ELECTRONICS	 Amphenol®	 i2s an Amphenol company
MGJ2 Series DC/DC Convertors • SMT 5.7KVDC isolated 2 watt gate drive • Ideal for high-side & low-side IGBT/SiC gate drive circuits • Used in AC climate control	NXJ1 Series DC/DC Convertors • Low profile isolated 1W DC/DC convertor • Ideal for automatic headlight control • AECQ-104 versions available	Thermometrics Dual Solar Sensors • Measures light intensity • Air temperature is automatically adjusted • Ideal for Dual A/C and HVAC systems	CCT Series Pressure Sensors • Climate control pressure transmitter (CCT) • Hermetically sealed • Ideal for high-pressure applications
			
 PIHER <i>sensing systems</i> an Amphenol® company	 PIHER <i>sensing systems</i> an Amphenol® company	 SGX SENSORTech	 Honeywell
PSCI / PSTI Inductive Motor Position Sensor • High Speed Inductive Rotor position sensor • Compact • Low weight • Redundant ASIL Level designs	HRPM Rotary Position Sensor • True touchless operation • Unlimited mechanical life • Made for harsh environments • Compact and low-profile package	AZ65A Series Air Quality Sensor • Intelligent sensor and signal analysis system • Measuring CO, HC, NO2 and NH3 • With PWM or LINbus outputs	VG481V1 Speed Sensors • Dual peak detecting circuit with hall-effect element • Can operate from -40°C to 150°C • AEC-Q100 (Grade 0) approved
			
 Honeywell	 Honeywell	 muRata INNOVATOR IN ELECTRONICS	 muRata INNOVATOR IN ELECTRONICS
RTY Series Rotary Position Sensor • Rugged IP69K Sealed Package • Automotive Grade EMC/EMI tested • Solid state Hall Effect technology	IMU TARS-B • 6DOF IMU • IP69K Sealed Rugged housing • Off Road ADAS systems	SCH1600 Series • Automotive grade high performance IMU • ±300°/s angular rate measurement range • ±8g acceleration measurement range	MA58 Series Ultrasonic Sensors • Drip proof hermetically sealed structure • Used for obstacle detection • ADAS & automatic parking systems
			

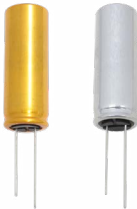
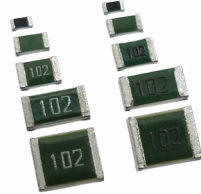
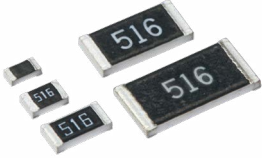
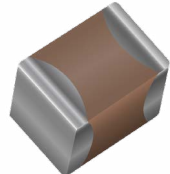
 muRata INNOVATOR IN ELECTRONICS	 muRata INNOVATOR IN ELECTRONICS	Panasonic INDUSTRY	 Sensata Technologies
Type 1VN - 60Ghz Radar Module	SCC3000 Series Automotive Inertial Sensors	6-DoF Automotive Inertial Sensors	PTE7300 Series
• 60GHz Radar Module • Fully integrated Short range radar sensor • TI Chipset	• 3rd Gen. MEMS inertial sensors • High-performance angular rate and accelerometer sensor • Qualified to AEC-Q100	• 3-axis gyro and 3-axis accelerometer • Front camera, radar, LiDAR, AR-head-up display • AEC-Q100 and ISO26262 compliant	• Hydraulic Pressure Transducers • Up to 600bar Pressure Range • ADAS Active Suspension and Braking systems
			
 TDK	 TDK	 TE CONNECTIVITY AUTHORIZED DISTRIBUTOR	 VISHAY
NTCG Series NTC temp sensor	TAS/TAD Series Magnetic TMR Sensors	HTU31 Humidity Sensor Series	VCNL4200 SERIES
• Max. Temp. 175°C • Automotive Grade Compliant with AEC-Q200 • ADAS Camera systems	• Automotive safety critical applications • Steering systems • Absolute Rotary position	• Analogue / Digital • Compact DFN package • Fast Humidity response ADAS cameras and Auto HVAC	• Long Distance Proximity (up to 1.5m) • Integrated ambient light sensor • I2C Interface • Wake up feature / Display dimming
			
 VISHAY	 VISHAY	YAGEO GROUP	YAGEO GROUP
VCNL4035X01	VCNT2025X01	PT1000 Platinum SMD	EC Series Encapsulated PT Temperature Sensor
• Proximity sensor with LED Driver • Gesture control • Proximity detection (up to 1m depending on external emitter)	• Reflective sensor • LiDAR position encoding	• Board Mount Temperature Sensors • SOT223 • Pt 1000 Class 2B	• ADAS E-motors / actuators • Flexible Fluorocarbon housing • Pt 1000 / PT100 element options automotive grade
			

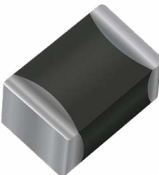
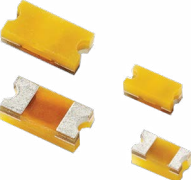
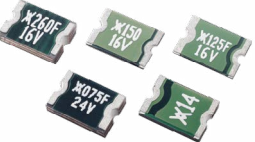
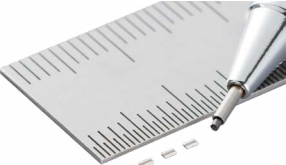
Switches & Relays

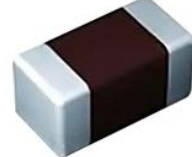
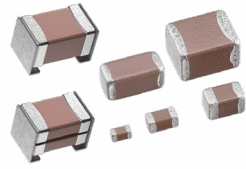
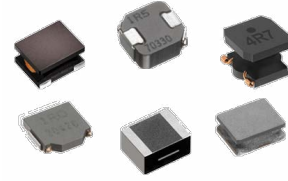
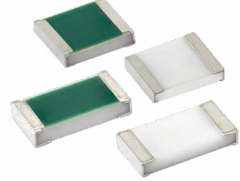
ALPSALPINE	Littelfuse® C&K Switches	Littelfuse® C&K Switches	OMRON
EC11	MPS	KSJ	D2HW/D2QW
• Output signal - Two phase of A, B, Self-return switch • Rating - 10mA 5V DC • Operating life - 15,000 to 100,000 cycles	• Sealed contacts • Quick and easy installation • UL 61058 approved • Long life—4M operations	• Actuation force off center +/- 30° to vertical • Compliant side actuation • Designed for mechanisms	• The case dimensions are 78% of conventional models • Extra-long stroke even without levers
			
OMRON	Panasonic INDUSTRY	Panasonic INDUSTRY	Panasonic INDUSTRY
B3AL	SKQG	EVPAW Series	ASQM (ASQ Mini)
• High operation forces up to 5N • Long stroke achieved by using a rubber plunger • Long life between 500k and 1 million cycles	• Low profile with dimensions 5.2x5.2x1.5mm • Operating temperature range -30° to +85°C • Versions with and without stem available	• External Dimensions: 3.0mm x 2.0mm x 0.6mm • High operability – equipped with an actuator (push plate) • IP67 characteristic	• High contact reliability to support low level switching loads • Highly effective sealing (IP67)
			
OMRON	TE CONNECTIVITY AUTHORIZED DISTRIBUTOR	TE CONNECTIVITY AUTHORIZED DISTRIBUTOR	TE CONNECTIVITY AUTHORIZED DISTRIBUTOR
G8NB/G8NDL/ G8FE/G8PM-1AW	F7 Power Relay	IM Relay Series	HF3/HF6 Relay Series
• High switching current (Up to 60A) • Standard, low or super low operating voltage • Applicable to pin in paste reflow	• Integrated components possible (e.g. resistor, diode) • 12V, 24V and 48V (on request) coil versions • PCB and Plug-In versions available	• Slim line 10x6mm • Low profile 5.65mm and min. board-space 60mm² • Switching current 2/5A • Switching power 60W/62.5VA	• Y-Design • Frequency range DC to 6GHz • Impedance 50Ω or 75Ω • Small dimensions (14.6x7.2x10mm)
			

Antennas & Wireless Modules

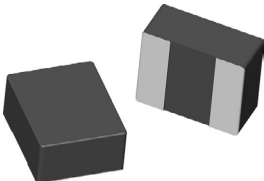
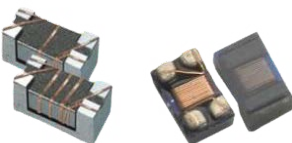
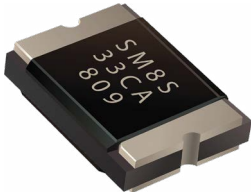
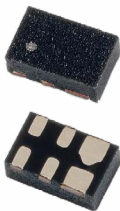
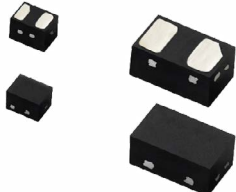
			
AN01 Stamp Metal Antennas	A1004795 LTE Antenna	Type 2NR BLE Module	Type 2EA Wi-Fi 6E + BLE Module
- High efficiency - Edge center mount - Automotive grade available - Available in different frequencies	- Fulfills AEC-Q200 Standard - Covers all LTE bands + RKE frequencies - Works with small GND plane as well	- Based on Nordic nRF54L15 - Ultra-small size - Integrated antenna - Supports multiple radio technology	- Based on Infineon CYW55573 - Supports 2x2 MIMO Wi-Fi - Up to 1.2 Gbps data rate
			
			
PAN1783 BLE Module	PAN W602-1/2 Wi-Fi 6 Module	Inception Series Multiband GNSS Antenna	SDCP.5900.12.4.A.40 DSRC Antenna
- Based on Nordic nRF5340 - Supports LE Audio - Available with on-board chip antenna or RF-bottom pad	- Cost Effective Wi-Fi 6 + BLE module - Single-band and Dual-band versions - Built on TI chipsets	- Patch within a patch design - Low profile - Covering L1+L2 or L1+L5 - Dual Feed SMD configuration	- SMD Patch antenna - Circular polarized - IATF16949 Production
			
			
2195846-X 5G FPC Antenna	2108784 5G SMD Antenna	GNSSL1L2L5 Multiband GNSS Antenna	CDB Series Multiband Antenna
- Compact size - Wideband (698-7125 MHz) - Different cable length and connector options available	- Wideband (698-6000 MHz) - Omnidirectional pattern - Available in Tape&Reel	- Stacked L1/L2 + L5 Antenna - Available with 15 dB and 30 dB amplifier - With Microcoax and MHF connector	9-in-1 Multi-Band Support - Wideband LTE 5G Coverage - WiFi 6E and 7 Ready - Optimized Isolation and Gain
			

BOURNS® SRR6838A Series Power Inductors - AEC-Q200 compliant - Halogen-free - RoHS compliant	BOURNS® Current Sense Resistors - Excellent long term stability - Low inductance - Low thermal EMF	BOURNS® MF-MSMF Polymer PTC Resettable Fuses - Fast time-to-trip response - Low-profile surface-mount design - Mechanical shock resistance	CHEMI-CON HXK Conductive Polymer Hybrid Aluminium Capacitor - Voltage 16 to 35V - Capacitance 270 to 1,200µF - For high temperature and high reliability applications
			
CHEMI-CON PXD Polymer Aluminium Solid Capacitor - Super low ESR, impedance and high heat resistance - Voltage 2.5 to 10Vdc - Capacitance 47 to 470µF	CHEMI-CON DKA Supercapacitor - Very low DCIR at low and high temperature -40°C to +70°C (2.5V) - Ideal as a backup power supply	EATON <i>Powering Business Worldwide</i> Power Inductors - AEC-Q200 qualified 125°C max operating temperature - Iron powder core material	KOA Anti Surge Resistors - Outstanding pulse performance (SG73, SG73P, SG73G) - Excellent in ESD characteristics (SG73, SG73S)
			
KOA Anti Sulfuration Resistors - AEC-Q200 tested - ASTM B 809-95 anti-sulfuration tested - High heat resistance and environmental resistance	KOA Thick Film Chip Resistor - AEC-Q200 qualified in sizes 0402 to 1210 - Compatible with reflow and flow soldering - Lead-free terminations comply with EU RoHS	KYOCERA AVXX CX2016SA series Crystal Units - Size 2016, Low Profile H 0.5mm - Low Frequency 16 to 80MHz - Tight Stability +/-10ppm @ 25+/-3°C - AEC-Q200	KYOCERA AVXX KAM series HI-CV Automotive MLCC - Mainly used for CPU/MPU decoupling - Reducing mounting space and securing enough capacitance value - AEC-Q200
			

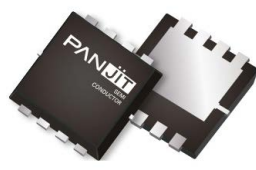
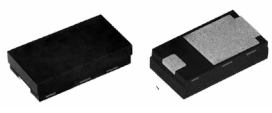
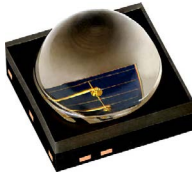
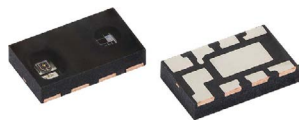
			
175 Deg Varistors	HBW - Hybrid Capacitor	VUK - Aluminum Electrolytic Capacitor	VZH - Aluminum Electrolytic Capacitor
- Miniature MLVs for ESD Protection - Power, Data, Ethernet, RF 150/175°C & FLEXITERM® options - AEC-Q200	125°C / 4,000 hours - Low ESR and High ripple current 30g vibration resistant on request - AEC-Q200	125°C / 3,000 ~ 5,000 hours - Diameters from 8 up to 18 mm 30g vibration resistant on request - AEC-Q200	105°C / 3,000 ~ 5,000 hours - Diameters from 4 up to 18 mm - Surface mounting on high density PCB - AEC-Q200
			
			
AXGD	miniASMD	SM10 Varistors	Low ESL MLCC
- AEC-Q200 qualified - High ESD rating up to 30kV contact/air discharge - RoHS compliant, lead-free and halogen-free	- Products meet applicable automotive industry standards - Compatible with high volume electronics assembly - Small footprint – 1812 size	- AEC-Q200 qualified - Compliant with automotive-grade products - Environment-friendly	- Low ESL - Allows a reduction in the number of components - Contributes to noise suppression
			
			
LCC152	PTC Thermistors	PCW Aluminum Organic Polymer Capacitor	UCM Aluminium Electrolytic Capacitor
- Easy to meet the target Z - Can be put between the package and main PCB - Contributes to a reduction in the number of components	- Automatic reset functionality - Fastest time to trip - High reliability with ceramic material	- Temperature -55°C to +125°C - Voltage 2.5V to 6.3V - Capacitance 150µF to 1800µF 2000 hours at 125°C	- Temperature -55°C to +105°C - Voltage 6.3V to 100V - Capacitance 10µF to 5100µF 5000 hours at 105°C
			

nichicon GYG Polymer Hybrid Aluminium Capacitor • Temperature -55°C to +125°C • Voltage 25 to 35V • Capacitance 82µF to 680µF • 4000 hours at 125°C	Panasonic INDUSTRY Hybrid Aluminium Capacitor • Capacitance up to 1,000µF • High reliability 4000h @135°C • Anti-Vibration 30G • High Ripple Current to 6.1A	Panasonic INDUSTRY Aluminum Electrolytic Capacitor • Low ESR • Long lifetime up to 10,000h • Large capacitance in smaller case size • Anti-vibration available 30G	Panasonic INDUSTRY LP Series Power Inductors • High reliability • Land-pattern compatible • AEC-Q200 compliant • 0.105 to 100uH • Low profile 3 - 4mm
			
TAIYO YUDEN Metal Power Inductors • AEC-Q200 qualification • Compact structure • High current capacity	TAIYO YUDEN MCAS MLCC • AEC-Q200 tested • Extremely low rates of failure • RoHS and REACH compliant	TAIYO YUDEN Soft Termination MLCC • Surface Mount Technology (SMT) • Compliant with RoHS • Low Equivalent Series Resistance (ESR)	TDK MLCC • High capacitance ceramic capacitor • Superior strength and reliability • Low ESL and excellent frequency characteristics
			
TDK ESD Protection • European production (short reaction times & high flexibility) • Short leadtime of 4-8 weeks • Wide product portfolio • No derating up to 150°C	TDK Power Inductors • Temperature range up to 125°C • Automotive grade versions are available • Low DCR characteristics	VISHAY IHLD Inductors • Two IHLP® style inductors placed vertically in one board-space saving package • AEC-Q200 qualified • Two sizes available: 3232 and 4032	VISHAY Hi Voltage Chip Resistors • 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
- AEC-Q200 qualified - Handles high transient current spikes - High temperature, up to 180°C	- AEC-Q200 - Ultra Low ESR - High Temperature up to 150°C - No capacitance loss over time, temperature or frequency	- AEC-Q200 - Surface Mount And Through-Hole - Current Rating from mA to 40Arms - Impedence up to 27.5 kΩ	- 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
- AEC-Q200 1% and 5% tolerances - High Power up to 5W - Operating Temperature Range up to 170°C	- AEC-Q200 - High precision Chip Resistors - Tolerance to 0.1% - TC10 to TC50	- Maximum Peak Power: 7000 W - Meets ISO7637-2/ISO16750-2 - AEC-Q101 compliant	- 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
- Low capacitance of 1pF (TYP) per I/O - Low leakage current of 0.01μA (TYP) at 5V - μDFN (JEDEC MO-229) package	- Low clamping voltage - Low leakage current - AEC-Q101 qualified - SOT23-3 Package	- Zener transient – overvoltage suppressors - Peak power – 600W at 1.0ms - Low leakage < 5.0 μA	- Ultra-low capacitance TVS - Low profile 0201 and 0402 DFN packages - Facilitates excellent signal integrity - ELV compliant
			

Discrete & Opto Components

PANJIT SEMI CONDUCTOR	PANJIT SEMI CONDUCTOR	PANJIT SEMI CONDUCTOR	VISHAY
MER2DAFC-AU Super Fast Recovery Rectifier	PJQ5548-AU 40V N-Channel MOSFET	PJQ4548P-AU 40V N-Channel MOSFET	SQRS140ELP Automotive N-Channel 40 V
• Superfast recovery times • Low forward voltage, high current capability • Low leakage • AEC-Q101 qualified	• RDS(ON), VGS@10V, ID@20A<8.8mΩ • Excellent FOM • Logic Level Drive • AEC-Q101 qualified	• RDS(ON), VGS@10V, ID@10A<9.1mΩ • Excellent FOM • Logic Level Drive • AEC-Q101 qualified	• TrenchFET® Gen IV power MOSFET • AEC-Q101 qualified • 100 % Rg and UIS tested • 175 °C MOSFET in 5x6mm package
			
VISHAY	VISHAY	VISHAY	VISHAY
SQS142ELNW Automotive N-Channel 40V	T6N30CA TVS Protection Diode	V2NM63HM3 Schottky Rectification Diode	SQS966ENW Dual N-Channel 60 V MOSFET
• AEC-Q101 qualified • Wettable flank terminals • Low thermal resistance with 0.75 mm profile • 175 °C MOSFET in 3x3mm package	• Leadless DFN 3820A package • TJ = 185 °C capability • Bidirectional • Excellent clamping capability • Peak pulse power: 600 W	• Leadless DFN3820A package • Trench MOS Schottky technology • Low power losses, high efficiency • Low forward voltage drop	• 175 °C TrenchFET® power MOSFET • AEC-Q101 qualified • PowerPAK 1212-8W • 100 % Rg and UIS tested
			
VISHAY	VISHAY	VISHAY	YAGEO GROUP
VSMA1094251X02 High Power IR Emitter	VCNL4030X01 Proximity & Ambient Light Sensor	DGQ2788A 125 °C Analog Switch Dual DPDT / Quad SPDT	SMAJ33A-AT TVS Diodes
• High power SMD with lens • Peak wavelength: $\lambda_p = 950 \text{ nm}$ • AEC-Q102 qualified • Angle of half intensity: $\varphi = \pm 28^\circ$	• Presence and proximity sensing up to 1.5 meters • Low profile of 0.75mm • Fully integrated solutions • Operates ALS and PS in parallel structure	• 1.8 V to 5.5 V single supply operation • Low resistance: 0.37R/typ. at 2.7 V • Highly flat and matched RON	• 400W in SMA Package • Low profile package • Glass passivated junction • Low inductance • Excellent clamping capability
			



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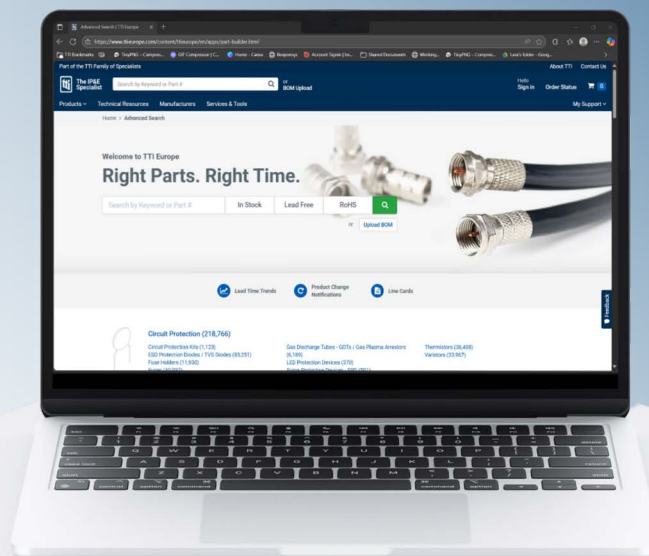
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