Our commitment to quality in everything we do is paying off... in the past two years we’ve received ten major customer quality awards. We’re the industry’s most recognized and awarded supplier for achieving the highest product quality, on-time delivery and responsive customer service.

From Concept to Reality

Our wide range of passive component solutions will help you make the leap

Whether you’re designing the car of tomorrow or connecting the Internet of Things, you need cutting-edge product solutions to bring your design to fruition. At KOA Speer, we’re the ideal partner to help you do just that. Our constantly expanding line of passive components will give you the solution to make your concept a reality!

Quality 1st

You expect product quality from any component that makes it into one of your designs. But in today’s competitive global marketplace, there’s so much more to the quality equation. At KOA Speer, our Quality 1st initiative reinforces our organization wide focus on serving you at the highest possible level.

Our commitment to quality in everything we do is paying off... in the past two years we’ve received ten major customer quality awards. We’re the industry’s most recognized and awarded supplier for achieving the highest product quality, on-time delivery and responsive customer service.
KOA SPEER... More Than Just Resistors

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RESISTORS

**Precision Thick Film**
RS73-Ultra Precision High Reliability Thick Film
- Excellent long-term stability with $\Delta R$ of $\pm0.2\%$ & $\pm0.5\%$ in the reliability test
- Power rating: 0.2W (0603), 0.25W (0805), 0.33W (1206)
- Low TCR: $\pm25ppm/°C$, $\pm50ppm/°C$
- Tolerance: $\pm0.1\%$, $\pm0.25\%$, $\pm0.5\%$, $\pm1\%$
- Resistance range: 10 ~ 10MΩ

**RK73G High Precision Thick Film**
- Resistive film applies a metal glaze thick film to achieve excellent heat resistance
- TCR: $\pm50ppm/°C$
- Resistance range: 10 ~ 1MΩ
- Tolerance: $\pm0.25\%$, $\pm0.5\%$, $\pm1\%$
- Sizes available: 0201 ~ 1206

**RS73-RT Anti-Sulfur version of RS73**
- Excellent anti-sulfur characteristics (see page 7)
- High reliability with $\Delta R$ of $\pm0.2\%$, $\pm0.4\%$ in reliability test
- Low TCR: $\pm25ppm/°C$
- Passes ASTM-809 anti-sulfuration testing

**Surge Current Thick Film**
SG73G Endured Pulse Power
- Ultra precision grade
- TCR: $\pm50ppm/°C$
- Resistance range: 10 ~ 1MΩ
- Sizes: 0603 ~ 1206
- Tolerance: $\pm0.25\%$, $\pm0.5\%$

**SG73 Pulse/Surge**
- Superior to RK73 series in surge/pulse withstanding voltage
- Resistance range: 1 ~ 1MΩ
- Sizes available: 0603 ~ 2512
- Tolerance: $\pm10\%$, $\pm20\%$

**Wide Terminal Thick Film**
WG73 Surge Current Wide Terminal
- Superior to WK73 in pulse withstanding voltage
- Power rating: 1W (0612, 1020), 2W (1225)
- Resistance range: 560m ~ 1KΩ
- Tolerance: $\pm10\%$, $\pm20\%$

**RK73G-RT Anti-Sulfur version of RK73G**
- Excellent anti-sulfur characteristics (see page 7)
- $\pm0.5\%$, $\pm1\%$ Ultra Precision Flat Chip Resistor
- Low TCR: $\pm50ppm/°C$
- Passes ASTM-809 anti-sulfuration testing

**SG73P Pulse Precision**
- Provides higher pulse ratings than standard RK73
- Power rating: 0.1W, 0.125W, 0.33W, 0.5W, 0.75W, 1W
- Passes ASTM-809 anti-sulfuration testing

**SG73P-RT Anti-Sulfur version of SG73P**
- Excellent anti-sulfur characteristics (see page 7)
- Able to select resistance from $+0.5\%$
- Power rating: 0.75W, 1W
- Passes ASTM-809 anti-sulfuration testing

**SG73S Surge Protection**
- Endures the ESD limiting voltage
- Resistance range: 1 ~ 10MΩ
- Sizes available: 0402 ~ 1210
- Tolerances: $\pm0.5\%$, $\pm1\%$, $\pm2\%$, $\pm5\%$

**SG73S-RT Anti-Sulfur version of SG73S**
- Excellent anti-sulfur characteristics (see page 7)
- Surge Precision
- Low Resistance (0.1Ω)
- Power rating: 0.75W, 1W
- Passes ASTM-809 anti-sulfuration testing
**WK73R-RT Anti-Sulfur version of WK73R**
- Excellent anti-sulfur characteristics (see page 7)
- Power rating: 0.75W (0508, 0612), 1W (0508, 0612, 1020, 1218), 1.5W (1225), 2W (1225)
- Higher power rating: 1.5W (0612), 2W (1020), 3W (1225)
- Passes ASTM-809 anti-sulfuration testing

**HV73-RT Anti-Sulfur version of HV73**
- Excellent anti-sulfur characteristics (see page 7)
- High Voltage Flat Chip Resistor for Automotive
- AEC-Q200 Qualified
- Passes ASTM-809 anti-sulfuration testing

**High Voltage**

**HV73-High Voltage**
- Maximum working voltage as high as 800V (1206), 3000V D.C. (2512)
- Superior to RK73 in maximum working voltage
- Resistance range: 10K ~ 100MΩ
- Sizes: 0603 ~ 2512

**HV73V-High Voltage for Automotive**
- AEC-Q200 Qualified
- Maximum working voltage as high as 350V (0603), 800V (1206)
- Superior to RK73 in maximum working voltage
- Working voltage: 350V ~ 800V
- Resistance range: 10K ~ 51MΩ
- Sizes: 0603 ~ 1206

**HV73V-RT Anti-Sulfur version of HV73V**
- Excellent anti-sulfur characteristics (see page 7)
- High Voltage Flat Chip Resistor for Automotive
- AEC-Q200 Qualified
- Passes ASTM-809 anti-sulfuration testing

**Thin Film**

**RN73R-High Reliability Thin Film**
- Improved moisture resistance with high humidity coating
- High precision tolerance: ±0.05% ~ ±1%
- High performance TCR: ±5 ~ ±100ppm/°C
- Resistance range: 10 ~ 1MΩ
- Sizes: 0402 ~ 1206
- AEC-Q200 Qualified

**RN73H-Thin Film for Automotive**
- Improved moisture resistance by special protective coating
- High precision tolerance: ±0.05% ~ ±1%
- High performance TCR: ±5 ~ ±100ppm/°C
- Resistance range: 10 ~ 1MΩ
- Sizes: 0402 ~ 1210
- AEC-Q200 Qualified

**HRK73-High Temperature Gold Terminations**
- Maximum operating temperature: 200°C
- Flat chip resistor with gold terminations
- Metal glaze thick film ensures excellent heat and weather resistance
- Resistance range: 1 ~ 10MΩ
- Sizes available: 0603 ~ 1206
- AEC-Q200 Qualified

**Embedded**

**XR73-Embedded Substrate Flat Chip Resistor**
- Interlayer embedding in the multilayer substrates applicable from the height of 0.13 to 0.14mm
- Cu via hole connection is applicable
- Resistance range: 1 ~ 10MΩ, zero ohm offered
- Sizes available: 0201, 0402
General Purpose
RK73B-General Purpose 2%, 5%
Tolerance Thick Film Chip Resistor
RK73B-RT Anti-Sulfur
version of RK73B
• Excellent anti-sulfur characteristics (see page 7)
• ±2%, ±5% General Purpose Flat Chip Resistor
• Passes ASTM-809 anti-sulfuration testing
RK73H-Precision 0.5%,1% Tolerance
Thick Film Chip Resistor
RK73H-RT Anti-Sulfur
version of RK73H
• Excellent anti-sulfur characteristics (see page 7)
• ±0.5%, ±1% High Precision Flat Chip Resistor
• Passes ASTM-809 anti-sulfuration testing
RK73Z-Zero ohm Jumper
Thick Film Chip Resistor
RK73Z-RT Anti-Sulfur
version of RK73Z
• Excellent anti-sulfur characteristics (see page 7)
• Zero ohm with max. resistance of 50mΩ
• Passes ASTM-809 anti-sulfuration testing

Networks
CNN-Thin Film Chip Network
• Excellent in relative TCR (5ppm/°C)
• Pair resistors for high precision OP-amplifiers
• Custom products: any pairs between 1K ~ 100KΩ available upon request

HVD-High Voltage Divider-Precision Type
- Max. resistance value 11.5MΩ
- Max. working voltage 1000V
- Max. resistance Ratio 1:1000
- Relative tolerance: 0.1%
- TCR tracking: 10ppm/°C
- TCR: ±25, ±50ppm/°C
- Absolute resistance tolerance: ±0.1% ~ ±1%

RTY-Precision Voltage Divider-Thin Film
- Ratio matching
- TCR: ±10, ±25, ±50, ±100ppm/°C
- TCR matching: 5, 10, 25, 50ppm/°C
- Power rating: 50mW

RBA, RBB-Bussed Resistor Network
- TCR: ±25, ±50, ±100ppm/°C
- Resistance range: 10 ~ 100KΩ
- Absolute tolerance: ±1% ~ ±5%

RNX-High Precision Custom Resistor Network
- Number of pins: 8, 14, 16, 20, 24
- Resistance range: 10 ~ 510KΩ
- TCR tracking: 5, 10, 25, 50ppm/°C

ACI-Thin Film Network
- Available in SCIS & PECL termination
- Resistance range: 51 ~ 40KΩ
- Power rating: 50mW, 200mW
- TCR: ±25, ±50, ±100ppm/°C

Fusing Resistors
RF73-Fusing Resistor Performs Like RK73 under normal conditions
- Fuses when overloaded
- Fusing Power: 2.1W ~ 6.5W
- Fusing Time: 60 seconds, maximum
- Sizes available: 0603 ~ 2512

Melf Resistors
RD41-Fixed Carbon Film MELF Resistor
- Metal plate terminals
- Meets or exceeds IEC 60115-8, EIA RC-2131A
- TCR: ±350 ~ -1300ppm/°C
- Power Rating: 0.25W

RN41, RM41-Fixed Metal Film MELF Resistors
- Higher stability in short and long term tests
- TCR: ±25 ~ ±350ppm/°C
- Power Rating: 0.125W, 0.2W, 0.25W, 0.4W, 0.5W, 1W
- Resistance range: 0.22 ~ 5.11MΩ
Anti-Sulfur Chip Resistors

Why Choose Anti-Sulfur?
Sulfuration is a phenomenon that occurs in most thick film resistors, with silver-based inner electrodes. When a resistor is used in a high-sulfur atmosphere, the sulfur molecules can migrate between the protective film and the outer electrode to the inner electrode, where they react to form silver sulfide. Silver sulfide is an insulator, and the resistance of the device increases toward an open circuit. KOA’s product line includes resistors with sulfuration-resistant inner electrodes.

Structural Chart of Flat Chip Resistor (Standard)

All KOA Speer anti-sulfur components (-RT) pass ASTM-809 Anti-Sulfuration Testing

Chip Resistor Disconnected by Sulfuration Needles of Silver Sulfide (Ag2S)

General Purpose
RK73B-RT
• ±2%, ±5% General Purpose Flat Chip Resistor
RK73H-RT
• ±0.5%, ±1% High Precision Flat Chip Resistor
RK73Z-RT
• Zero ohm with max. resistance of 50mΩ

High Precision
RS73-RT
• High reliability with ΔR of ±0.2%, ±0.4% in reliability test
• Low TCR: ±25ppm/°C
RK73G-RT
• ±0.5%, ±1% Ultra Precision Flat Chip Resistor
• Low TCR: ±50ppm/°C

Wide Terminal
WK73R-RT/WK73S-RT
• Power rating: 0.75W (0508, 0612), 1W (0508, 0612, 1020, 1218), 1.5W (1225), 2W (1225)

WK73R-RT/WK73S-RT
• Higher power rating: 1.5W (0612), 2W (1020), 3W (1225)

High Voltage
HV73-RT
• High Voltage Flat Chip Resistor
• Max working voltage as high as 800V (1206), 3000V DC (2512)

HV73V-RT
• High Voltage Flat Chip Resistor for Automotive
• AEC-Q200 Qualified

Anti-Surge
SG73-RT
• Superior to RK73 series in surge withstanding voltage and pulse withstanding voltage
• Power rating: 0.1W, 0.125W, 0.33W, 0.5W, 0.75W, 1W

SG73P-RT
• Able to select resistance from +0.5%
• Power rating: 0.75W, 1W

SG73S-RT
• Surge Precision
• Low Resistance (0.1Ω)
• Power rating: 0.75W, 1W

Current Sense
SR73-RT
• Low Resistance (0.1Ω)

KOASpeer.com/Resistors
CURRENT SENSE/SHUNT RESISTORS

Metal Plate
TLR-Current Sensing, Small Type, Low Resistance
- Power rating: 0402-0.2W, 1206-0.5W, 2010-1W, 2512-1W
- Resistance range: 1 ~ 20mΩ
- Rated Terminal Part Temperature: 105°C
- Tolerance: ±1%, ±2%, ±5%

TLR-Current Sensing, Low Resistance
- Power rating: 1206-1W, 2010-2W, 2512-2W
- Resistance range: 0.5 ~ 20mΩ
- TCR: ±50, ±75ppm/°C
- Tolerance: ±1%

TLR-Current Sensing, Higher Power, Low Resistance
- Power rating: 0805-1W, 1206-1.5W, 2512-3W
- Resistance range: 0.5 ~ 20mΩ
- TCR: ±50, ±75, ±100ppm/°C
- Tolerance: ±1%

TLRH-Current Sensing, Extended Resistance Range, Low Resistance
- Power rating: 0805-0.25W, 0.33W, 0.5W, 2512-2W, 4W, 5W
- Resistance range: 6 ~ 270mΩ
- TCR: ±50, ±75ppm/°C
- Tolerance: ±1%

TLRZ-Current Sensing, Zero Ohm Jumper
- Current Ratings: 0402-10A, 0603-26A, 0805-31.6A, 1206-50A
- Ultra low resistance not to exceed 0.2mΩ
- Operating temperature: -55 ~ +170°C

KOA’s Metal Plate
LARGE Pulse Capability Due to NO Trim Lines

LR72-Custom Milliohm
- Flexible leads allow for thermal expansion
- Unique open-center shapes for cooler operation
- Resistance values: 2 ~ 8mΩ

Thick Film Current Sense
SR73-Low Resistance
- Resistance range: 24m ~ 10Ω
- Power rating: 0201-0.1W ~ 2512-2W
- TCR: 0~±400 ~ ±1000ppm/°C
- Tolerance: ±0.5%, ±1%, ±2%, ±5%

SR73-RT-Anti-Sulfur Version of SR73
- Excellent anti-sulfur characteristics (see page 7)
- Low Resistance (0.1Ω)
- Passes ASTM-809 anti-sulfuration testing

UR73-Low Resistance, Low TCR
- Resistance range: 10m ~ 100mΩ
- TCR: ±100 ~ ±500ppm/°C
- Power rating: 0402-0.125W ~ 2512-1W

UR73V-High Heat, Low Resistance, Low TCR
- Operating temp range: -55°C ~ +155°C
- Resistance range: 10m ~ 100mΩ
- TCR: ±75, 0 ~ +150, 0 ~ +250 ~ ±100ppm/°C
- AEC-Q200 Qualified

KOASpeer.com/CurrentSense
**Power Shunts**

**PSL2-Large Current Sensing, Ultra Low Resistance, 2-Terminal**
- Resistance range: 0.2, 0.3, 0.5mΩ
- Power rating: 8W, 10W
- TCR: ±150ppm/°C
- Tolerance: ±1%
- Resistance range: 10m ~ 9.76mΩ
- Tolerance: ±0.5%, ±1%, ±5%

**PSF4-Large Current Sensing, Ultra Low Resistance, 4-Terminal, Low TCR**
- Resistance range: 0.5, 1mΩ
- Power rating: 8W, 10W
- TCR: ±150ppm/°C
- Tolerance: ±1%

**PSJ2-Large Current Sensing, Ultra Low Resistance, 2-Terminal**
- Resistance range: 0.2, 0.5, 1, 2, 3, 4mΩ
- Power rating: 5W, 6W, 9W, 10W, 12W
- TCR: ±50, ±75, ±100, ±200ppm/°C
- Tolerance: ±1%

**PSG4-Large Current Sensing, Ultra Low Resistance, 4-Terminal, Low TCR**
- Resistance range: 0.5, 1mΩ
- Power rating: 8W, 10W
- TCR: ±50ppm/°C
- Tolerance: ±1%

**PSB-Large Current Sensing, Ultra Low Resistance**
- Resistance range: 0.2, 0.3, 0.5mΩ
- Power rating: 8W, 10W
- TCR: ±50ppm/°C
- Tolerance: ±1%

**PSI-Large Current Sensing, Ultra Low Resistance**
- Resistance range: 3, 4mΩ
- Power rating: 3W
- TCR: ±50ppm/°C
- Tolerance: ±1%

**PSE-Large Current Sensing, Ultra Low Resistance**
- Resistance range: 0.5, 1, 1.5, 2mΩ
- Power rating: 3W
- TCR: ±150ppm/°C
- Tolerance: ±1%

**HS-Large Current Sensing, Ultra Low Resistance**
- Resistance Range: 0.1, 0.2mΩ
- Power Rating: 18W, 36W
- Size: 4015 (mm)
- Tolerance: ±5%
- TCR: 50±25ppm/°C

**Molded Plate**

**SL-Current Sensing, Low Resistance**
- Power rating: 2010-0.75W, 2512-1W, 4527-2W, 3W
- Resistance range: 3m ~ 22MΩ
- Tolerance: ±0.5%, ±1%, ±2%, ±5%
- TCR: ±50, ±75, ±180ppm/°C

**SL-Higher Power Current Sensing**
- Power rating: 2010-1W, 2512-1.5W
- TCR: ±50, ±75ppm/°C
- Resistance range: 3 ~ 200mΩ
- Tolerance: ±0.5%, ±1%, ±5%

**SLN-SLW-Higher Power Current Sensing**
- Power rating: 2010-1W, 2512-1.5W, 4527-2W, 3W, 7W
- TCR: ±50, ±75, ±100, ±180ppm/°C
- Resistance range: 5 ~ 200mΩ
- Tolerance: ±0.5%, ±1%, ±2%, ±5%

**TSL-Low Profile Current Sensing**
- Power rating: 2512-1W
- Resistance range: 5~100mΩ
- Operating temperature: -55 ~ +180°C
- Tolerance: ±0.5%, ±1%, ±5%

**CSR-Current Sensing, 4-Terminal, Molded**
- Power rating: 1W, 2W
- Resistance values: 5 ~ 50mΩ
- Tolerance: ±0.5%, ±1%

**BLR-Ceramic, Custom**
- Power rating: 1W, 2W, 15W
- Resistance range: 8m ~ 50mΩ
- Tolerance: ±5%, ±10%
LEADED RESISTORS

General Purpose Leaded

CF-Carbon Film
- Flameproof coating available (CFP)
- Reduced body size offered (CFS, CFPS)
- Resistance range: 1 ~ 5.1MΩ
- Power rating: 0.25W, 0.5W
- Tolerance: ±2%, ±5%

Precision Leaded

MF-Precision Metal Film
- Meets requirements of MIL-R-22684
- MFS two times the power rating of the standard body type
- Resistance range: 0.51 ~ 5.11MΩ
- Power rating: 0.25W, 0.5W, 1W

MRS-Plate Shaped High Precision Metal Film
- Ultra precision TCR up to ±2.5ppm/°C
- Low tolerance: ±0.01%, ~ ±0.5%
- Wide resistance range: 10 ~ 1MΩ

RNS-High Precision Metal Film
- Excellent long term stability in resistance value
- Resistance range: 0.2 ~ 6.8MΩ
- High precision resistance: +0.1% ~ 1%
- Power rating: 0.125W, 0.25W, 0.5W, 1W

High Voltage Circuit Leaded

RK92-L-High Voltage SIP Discharge Resistor
- Excellent overload capability and high stability life and aging even in insulating oil
- Thin SIP shape suitable for space saving mounting
- Custom type three-terminal product is available
- Power rating: 4W
- Resistance range: 1.2M, 3M, 4M, 5M, 8M, 12M, 16MΩ

RK92-High Voltage SIP Resistor
- High resistance resistor for high voltage circuits
- Flame retardant coatings corresponding to UL94V-0 are used
- Thick film resistors (Ru02) ensure high stability in life and change in aging
- Resistance range: 1M ~ 1GΩ

RCR-Anti-Surge Resistor
- Excellent anti-surge characteristics
- Stable characteristics of moisture resistance up to 100MΩ resistance range
- RCR50+, RCR50EN (1M ~ 12MΩ), RCR60 (1M ~ 12MΩ) are conductive-path and discharge path resistors recognized by UL1676 and c-UL (CSA-C22.2 No. 1-M94)
- RCR25EN, RCR50EN (100k ~ 33MΩ), RCR60 (100k ~ 56MΩ) are approved by EN6268-1 G.10 safety

GS-High Voltage, High Resistance Thick Film
- Miniature construction can endure to high power voltage (up to 40kV)
- High power rating up to 12W
- Excellent anti-surge characteristics
- Wide resistance range: 500K ~ 10GΩ

PCF-Ceramic Resistor for Anti-Pulse Surge
- KOA original bulk ceramic resistor
- Coated with UL94V0 flameproof material
- Excellent in anti-pulse characteristics
- Power rating: 0.5W, 1E, 2W
- Resistance range: 3.3 ~ 390kΩ

RK-Metal Glaze Discharge Path Resistor
- Respondable to resistance tolerance ±1% and TCR ±100ppm/°C
- Highly stable against environmental conditions and overload
- Power rating: 0.25W, 0.5W, 1W
- RK1/2G: Discharge path resistor UL1676 available

HPC-Ceramic Resistor for Anti-Pulse Surge
- KOA original bulk ceramic resistor
- Higher reliability against disconnection compared to wirewound resistors and film resistors
- Power rating: 0.5W ~ 5W
- Resistance range: 3.3 ~ 390kΩ

CPCN-Fixed Ceramic Resistor
- Suitable for noise suppression of engine ignition systems
- Reliable in pulse/transient applications
- Power rating: 0.5W, 1W, 1.5W, 2W
- TCR: -1200 ±300ppm/°C

KOASpeer.com/LeadedResistors
P-High Voltage Power Resistor
• PSN is higher power (up to 250W) and for high voltage surge (up to 400kV)
• PSO is a completely moisture resistant version of PSN
• PN is non-inductive type and can be used for high frequency
• PWW are non-inductive wirewound resistors for high voltage with resistance wires wound on insulation pipes
• PAP are non-inductive wirewound resistors with inductance less than PWW, can be used for pulse wave measurement
• Wide power rating: 2W, 5W, 10W, 25W, 50W, 125W, 250W

MOS/MOSX-Reduced Size Metal Oxide Power Type
• MOS/MOSX Small size power type resistor
• Coated with UL94V0 equivalent flameproof material
• Power rating: 0.5W, 1W, 2W, 3W, 5W
• Resistance range: MOS- 10 ~ 100kΩ, MOSX - low resistance range: 0.1 ~ 9.1Ω
• TCR: ±300ppm/°C

CWH-Miniature Wirewound Leaded Resistor
• Meets MIL-PRF-26 (U characteristics)
• High precision resistor with TCR ±20, ±50ppm/°C
• Power rating: 1W, 2W, 3W
• Resistance range: 0.1 ~ 3kΩ

CWP-Precision Coat Insulated Wirewound Resistor
• Flameproof silicone coating equivalent (UL94V0)
• Power rating: 1W, 2W, 3W
• Resistance range: 0.1 ~ 390Ω
• TCR: ±50, ±90ppm/°C
• Tolerance: ±0.25%, ±0.5%, ±1%

Current Sense Leaded
BPR-Rectangular Metal Plate Resistor
• Power type current detecting resistor with flame retardant ceramic case
• Automatic insertion for a 5mm pitch between terminals is applicable (26 type, 58 type)
• Low resistance range: 0.1 ~ 62kΩ
• RW_N are non-inductive wound and can be used in high frequency applications
• Operating temperature range:
  - U: -55°C ~ +275°C, V: -55°C ~ +350°C
  - TCR: -90 ~ +400ppm/°C
• Tolerance: ±0.5%, ±1%, ±3%, ±5%

BSRV-Rectangular Type Metal Oxide Film for Automotive
• Uses flame retardant insulated ceramic case
• Excellent in anti-pulse and inrush current
• Power rating: 5W, 7W, 10W, 15W, 20W, 30W, 40W
• Resistance range: 430 ~ 56kΩ

KOASpeer.com/LeadedResistors
LEADED RESISTORS CONTINUED

Fusing Leaded
RF-Coat Insulated Fusing Resistor
• Functions as a resistor in normal conditions
• Quick fusing protects circuit from excessive overload at an abnormal time
• Fusing time: 30S max, 60S max
• Flame-retardant coating equivalent to UL94V0
• Fusing power: 2.5W ~ 36W

RF25CC-Coat-Insulated Fusing Resistor
• Constant current fuse type
• Fuse with 60 sec in case of over-current
• Fuse in low magnification at 5 times or 10 times the power rating
• Flame retardant coating equivalent to UL94V-0
• Fusing power: 2.5W, 1.25W

Jumper Leaded
Z-Jumper (Coating Type)
• Size compatible with 1/8, 1/4, 1/2 watt resistors
• Max. Amperage: 1.5A, 2.5A, 15A
• Resistance: 20mΩ or less

J-Molded Jumper
• Max. allowable current: 8A, 10A
• Operating temperature range: -55°C ~ +125°C

JL-Jumper Wire
• Suitable for automatic machine insertion
• No rating
• Max. current rating: 8A, 10A, 12A

LR-Custom Milliohm Resistor
• The super low resistance (3m ~ 100mΩ) is suitable for high power current detection
• Pitches and heights are adjustable according to mounting conditions
• All custom made parts
• Max. current rating: 3A ~ 21A

Leaded Resistor Networks/Resistor Arrays
MRP-Precision Metal Film SIP Network
• Custom design network
• Ultra-precision performance for precision analog circuits
• Absolute TCR: ±25, ±50ppm/°C
• Tracking TCR: 2, 5, 10
• Power rating: (mW): element-100, package-200

RKC, RKH, RKL-Thick Film SIP Resistor Network
• Various type of standard circuits in different sizes and power (seated height 0.20", 0.26", 0.42")
• Higher temperature soldering of the leads prevents terminals from loosening during board assembly
• Number of resistors: 3 ~ 16
• Tolerance: ±1%, ±2%, ±5%
• Resistance range: 22 ~ 2.2MΩ

P x No. of Pins

Protective Coating
Resistive Film
Glass Coating
Inner Electrode
Ceramic Substrate
Lead Frame
Solder Plated Copper Wire
Molded Resin
Solder Plated Copper Wire
Platinum Thin Film Thermal Sensors

SDT310VASP-Small Type Platinum Thin Film Thermal Sensor
- Small heater element type with operating temperature range: -55°C ~ +600°C
- Small as quarter volume convenience type 3.2 second thermal time constant
- Excellent heat resistance
- Applies axial lead type suitable to use as heater element
- TCR: +3850±25ppm/°C

SDT101-Axial Platinum Thin Film Thermal Series
- Stable characteristics even in use for a long time with an excellent environment resistance
- Operating temperature range: SDT101A: -55°C ~ +150°C, SDT101B: -55°C ~ +300°C
- Stationary temperature: 0°C, 25°C
- TCR: +3600ppm/°C

SDT310HCTP-Small Type Platinum Thin Film Thermal Sensor
- Characteristics are equivalent with IEC 60751-2008, JISC 1604-2013
- Small package of 1.2mm x 3mm with 100Ω resistance
- Operating temperature range: -55°C ~ +300°C, -55°C ~ +400°C
- Specified current: 1mA Max.

SDT310-Small Type Platinum Thin Film Thermal Sensor
- TCR: +3850ppm/°C is in accordance with JIS-DIN standards IEC
- Small package with a real ability of 1kΩ resistance
- Thermal time constant is improved with the small package
- Operating temperature range: -55°C ~ 155°C, -55°C ~ 400°C, -55°C ~ +650°C

ST-Custom Thermal Sensor
- All ST-series thermal sensors are designed in various shapes in accordance with your application
- TCR: +3600ppm/°C, +3850ppm/°C
- Resistance values at 0°C: 100, 500, 1kΩ

AFS-Air Flow Sensors
- Realized high and long-term stability
- Small platinum thin film thermal sensor and an even temperature differential operating circuit ensure a quick response
- Built-in temperature compensation circuit assures correct values regardless of air temperature
- Products have no rotating mechanism and are resistant to vibration
- Thermal time constant 6.5 seconds

SDT73S-Heat Resistant Chip Series
- SMD platinum thin film thermal sensor
- TCR: +3850ppm/°C is in accordance with JIS-DIN standards IEC
- Operating temperature range: -55°C ~ +250°C
- Thermal time constant 6.5 seconds

SDT73V-Automotive Platinum Thin Film Chip Series
- AEC-Q200 Qualified
- SMD platinum thin film thermal sensor
- TCR: +3850ppm/°C is in accordance with JIS-DIN standards IEC
- Operating temperature range: -55°C ~ +155°C
- Thermal dissipation constant: 2.4mW/°C

SDT73H-General Purpose Chip Series
- SMD platinum thin film thermal sensor
- TCR: +3850ppm/°C is in accordance with JIS-DIN standards IEC
- Operating temperature range: SDT73H: -55°C ~ +150°C, SDT73V: -55°C ~ +300°C
- Stationary temperature: 0°C, 25°C
- TCR: +3500ppm/°C
- Specified current: 1mA Max.

SDT310HCTP-Small Type Platinum Thin Film Thermal Sensor
- Characteristics are equivalent with IEC 60751-2008, JISC 1604-2013
- Small package of 1.2mm x 3mm with 100Ω resistance
- Operating temperature range: -55°C ~ +300°C, -55°C ~ +400°C
- Specified current: 1mA Max.

SDT310-Small Type Platinum Thin Film Thermal Sensor
- TCR: +3850ppm/°C is in accordance with JIS-DIN standards IEC
- Small package with a real ability of 1kΩ resistance
- Thermal time constant is improved with the small package
- Operating temperature range: -55°C ~ 155°C, -55°C ~ 400°C, -55°C ~ +650°C
- Thermal dissipation constant: 2.4mW/°C
## Linear PTC Resistors

**Thin Film Linear PTC Thermistors**

<table>
<thead>
<tr>
<th>Thermistor Styles</th>
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<tbody>
<tr>
<td>LP73</td>
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<tr>
<td>LT73V</td>
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</tbody>
</table>

**LP73-Thin Film Thermal Sensors of SMD Type**
- Resistance tolerance ±1%, ±2%, ±5%
- Wide range of TCR’s: +3000 ~ +5000 ppm/°C
- Suitable for control of temperatures in various industrial equipment
- Sizes: 0603, 0805, 1206
- TCR tolerance: ±5%

**LT73-Linear Positive Tempco Thermistor**
- Anti-leaching nickel barrier terminations
- Twenty-five specifiable temperature characteristics
- Sizes: 0805, 1206
- Thermal time constant: 1 second, 1.5 seconds

**LT73V-Linear Positive Tempco Flat Chip for Automotive**
- AEC-Q200 Qualified
- Various TCR: +150 ~ +4500 ppm/°C available
- Operating temperature range: -55°C ~ +155°C
- Sizes: 0805, 1206
- Rated ambient temperature: +85°C

**LP-High TCR Thin Film Resistance Thermal Sensor**
- High TCR: +5000 ppm/°C
- Accommodates resistance tolerance ±1%, ±2%, ±5%
- Power rating: 0.063W, 0.125W
- Resistance range: 1 ~ 30kΩ

## Negative Tempco Thermistors

**NT73-Temperature Compensation Thick Film**
- Twelve standard resistance values
- Sizes: 0603, 0805, 1206
- B constant @25°C/75°C: 3200K ~ 4100K
- B constant tolerance: ±3%, ±5%, ±10%

## Inductors

**KQC-High Current Inductor**
- Low DC resistance and high allowable DC current
- Low profile style of 0.027 inches (0.7mm) typical
- Nominal inductance range: 1.2 ~ 27nH
- Tolerance: ±0.1 ~ ±5%
- Sizes: 0402, 0603

**KQ/KQT-High Q Inductor**
- Ideal for low loss, high output power consumption
- Q factor min.: 16 ~ 65
- Inductance range: 1 ~ 10000nH
- Tolerance: ±0.1n ~ ±20%

**LPC-Power Chip Inductor**
- Low DC resistance and high allowable current due to proprietary construction & wiring technology
- DC current max.: 0.07 ~ 3.66A
- Inductance range: 0.82 ~ 2200µH
- Tolerance: ±10%, ±20%
- Sizes: 4045, 4235, 4545

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**Thermistor Styles**

- SDT
- LP73
- LT73V
- LP73

**Resistance vs. Temperature (°C)**

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<thead>
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<th>Temperature (°C)</th>
<th>Resistance</th>
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<td>150</td>
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**Magnet Wire**

| Ceramic Core |
| Electrode   |
| Inner Coating |
| Magnetic Wire |

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**Linear PTC Resistors**

**Thin Film Linear PTC Thermistors**

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---

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- B constant tolerance: ±3%, ±5%, ±10%
Fuses – Flat Chip
TF16VN - Chip Current Fuse for Automotive
- Small and light for the secondary circuit
- Current rating: 0.04 ~ 3.15A
- Temperature cycle (-55°C ~ 125°C), 1000 cycle
- Anti-pulse type in 0603 size
- AEC-Q200 Qualified

RF73-Fusing Flat Chip Resistor
- Fuses when overloaded
- Resistance range: 0.2 ~ 510Ω
- Tolerance: ±5%
- Sizes available: 0603 ~ 2512
- UL1412 Approved (0805 ~ 2512 sizes)

TF-Thin Film Chip Fuse
- Special manufacturing method stabilizes fusing characteristics
- Low power consumption and less voltage drop due to low internal resistance
- Rated current from 0.20 ~ 5A
- Sizes available: 0402, 0603

CCP-Fast Blow Chip Fuse
- Immediate cut-off of excessive heat
- No generation of heat
- UL94V0 epoxy case
- Current rating: 0.75 ~ 5A
- Sizes available: 1206, 1210

Varistors
NV73-Metal Oxide Varistor
- Multilayer structure with high surge current
- Protector against static electricity, switching and incoming surges
- Varistor Voltage: 6.8 ~ 120V
- Sizes available: 0201 ~ 2220
- Max. Energy: 0.001J ~ 14J

NV73DL-Metal Oxide Varistor for Automotive
- Ideal for countermeasures against ESD (conforming to IEC61000-4-2)
- Max. energy type up to 1.5J
- High resistance to cyclic temperature stress
- Varistor voltage: 10 ~ 90V1mA
- Sizes available: 0603 ~ 1206
- AEC-Q200 Qualified

NV73DS - Load Dump Surge Metal Oxide Varistor
- Symmetrical non-linearity V-I characteristics absorb positive and negative surge
- Meets JASO load dump surge test requirements
- Max. load dump surge energy: 63 ~ 70J
- Operating temperature: up to +125°C
- Sizes available: 2420
- AEC-Q200 Qualified
**LTCC Substrates**

**KLC-LTCC Multilayer Substrates**
- Stack accuracy <20µm
- Line width as low as 60µm
- Special shapes of substrates and cavity (circle, polygonal, concave or convex shape available)
- Line-to-line spacing as low as 60µm
- Cavity flatness: <25µm
- Cavity dimension: 600µm min.
- Cavity depth: 100µm min.
- Cavity wall thickness: 500µm min.
- Flexural/bonding strength: 250MPa (TCE): 5.5x10^-6/K
- Thermal conductivity: 3W/m-K
- Min. insulation resistance: 1x10^13W - cm
- Density: 2.8g/cm³
- Fired layer thickness: 80µm, 100µm, 125µm
- Via diameter: 100µm, 150µm, 200µm

**Other Products**

**RC-Test Point Chip**
- Surface-mountable chip type test terminal
- Rated Current: 2A
- Standard resistance: 50mΩ or less
- Sizes available: 0603, 0805, 1206
- AEC-Q200 Qualified

**Hybrid IC**

**KA-Hybrid IC**
- High density mounting by bonding (COB)
- Adjusted processes are decreased by function and ratio trimmings
- Substrate materials: al2O3 alumina and glass epoxy

**MCM-Multi-chip Module**
- SMD (Hybrid IC)
- Multiple semiconductors in one package offers downsized system with high performance and standardization
- High precision modules by function trimming
- Terminal pitch: 0.8mm ~
- Mountable device: SMD, bare chip, printed resistor (trimmable)

**KOASpeer.com/LTCC**
LAB KITS

Surface Mount Inductors

Open Core Wirewound Chip Inductors
KQT0402TK001Kit
- Lead-free, 47 values 10 pcs each
KQ0603TK001Kit
- Lead-free, 52 values 10 pcs each
KQ0805TK001Kit
- Lead-free, 36 values 10 pcs each
KQ1008TK001Kit
- Lead-free, 40 values 10 pcs each
KQC0402TK001Kit
- Lead-free, 12 values 20 pcs each
KQC0603TK001Kit
- Lead-free, 12 values 20 pcs each

High Current Chip Inductors
LPC4045AK001kit
- Lead-free, 19 values 25 pcs each
LPC4235AK001kit
- Lead-free, 17 values 25 pcs each

Surface Mount Inductors

High Voltage Flat Chip Resistors
HV73TK001Kit (0603, 0805, 1206, 2010 chip sizes)
- 156 values, Lead-free, 25 pcs each (10k ~ 10M = +1%).

Varistors
NV73TK001Kit (0201, 0402, 0603, 0805, 1206, 1210, 1812, 2220 chip sizes)
- Lead-free, 122 values, 10 pcs each size
NV73DLTK001Kit (0603, 0805, 1206 chip sizes)
- 17 values, Lead-free, 10 pcs each size

Surge Current Flat Chip Resistors
SG73TK001Kit (0603, 0805, 1206, 1210, 2010, 2512 chip sizes)
- 204 values, ±10%, Lead-free, 25 pcs each
SG73STK001Kit (0603, 0805, 1206, 1210 chip sizes)
- 101 values, ±1%, Lead-free, 25 pcs each
SG73PTK001Kit (0603, 0805, 1206, 1210 chip sizes)
- 97 values, ±1%, Lead-free, 25 pcs each

Wide Terminal Flat Chip Resistors
WK73TK001Kit (0612, 1020, 1218 & 1225 chip sizes)
- 79 values, Lead-free, 25 pcs each (±1%, ±5%)
WU73TK001Kit (0612 chip sizes)
- 17 values, 20 pcs each (±1%)

NOTE: Reference product data pages for available values.
Surface Mount Resistors (continued)

Ultra Precision Flat Chip Resistor
RN73H1ET-Kit (0402 chip size)
49 values, Lead-free, 50 pcs each (±0.1%, 25ppm°C)
RN73H1JT-Kit (0603 chip size)
67 values, Lead-free, 50 pcs each (±0.1%, 25ppm°C)
RN73H2AT-Kit (0805 chip size)
73 values, Lead-free, 50 pcs each (±0.1%, 25ppm°C)

Circuit Protection - Thermal Sensors
NT73TK001Kit (0603, 0805, 1206 chip sizes)
Lead-free, 53 values (1J, 2A, 2B), 10 pcs each size

Circuit Protection - Fuses
CCFTK001Kit (2410 chip size)
18 values, Lead-free, 20 pcs each
CCPTK001Kit (1206, 1210 chip sizes)
35 values, Lead-free, 20 pcs each
FuseKit-TF10BN (0402 chip size)
12 values, Lead-free, 100 pcs each
FuseKit-TF16SN (0603 chip size)
14 values, Lead-free, 100 pcs each
FuseKit-TF16AT (0603 chip size)
13 values, Lead-free, 100 pcs each

NOTE: Reference product data pages for available values.

Current Sense Resistors

Surface Mount Molded
SLW07TK001Kit (2010, 1W size)
27 values, 20 pcs each (±1%).
SLW1TK001Kit (2512, 1.5W size)
25 values, 20 pcs each (±0.5%).
SL1TK001Kit (2512, 1W size)
58 values, 20 pcs each (±1%).
SL2TK001Kit (4528, 2W size)
45 values, 20 pcs each (±1%).
SL3TK001Kit (4528, 3W size)
33 values, 20 pcs each (±1%).
SLN3TK001Kit (4528, 3W size)
32 values, 20 pcs each (±0.5%).
SLN5TK001Kit (4528, 5W size)
21 values, 10 pcs each (±0.5%).
TSL1TK001Kit (2512, 1W size)
33 values, Lead-free, 20 pcs each (±1%).
PowerShuntTK001Kit (PSB, PSE, PSI)
9 values, Lead-free, 25 pcs each.

Metal Plate
TLR2ATK001Kit (0805 chip size)
9 values, complete range, 20 pcs each (±1%).
TLR2BWD-Kit (1206 chip size)
18 values, 15 pcs each (±1%).
TLR2HWD-Kit (2010 chip size)
10 values, 15 pcs each (±1%).

Thick Film
SR731HTK001Kit (0201 chip size)
29 values, Lead-free, 50 pcs each (R47 ~ 10R0, ±1%, ±5%).
SR731ETK001Kit (0402 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 1R0, ±1%).
SR731JTK001Kit (0603 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 10R0, ±1%).
SR732ATK001Kit (0805 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 10R0, ±1%).
SR732BTK001Kit (1206 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 10R0, ±1%).
SR732ETK001Kit (1210 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 10R0, ±1%).
SR732HTK001Kit (2010 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 10R0, ±1%).
SR733ATK001Kit (2512 chip size)
49 values, Lead-free, 50 pcs each (R100 ~ 10R0, ±1%).

NOTE: Reference product data pages for available values.
### Significant Figures of Nominal Resistance

#### E-12 Decade Values

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