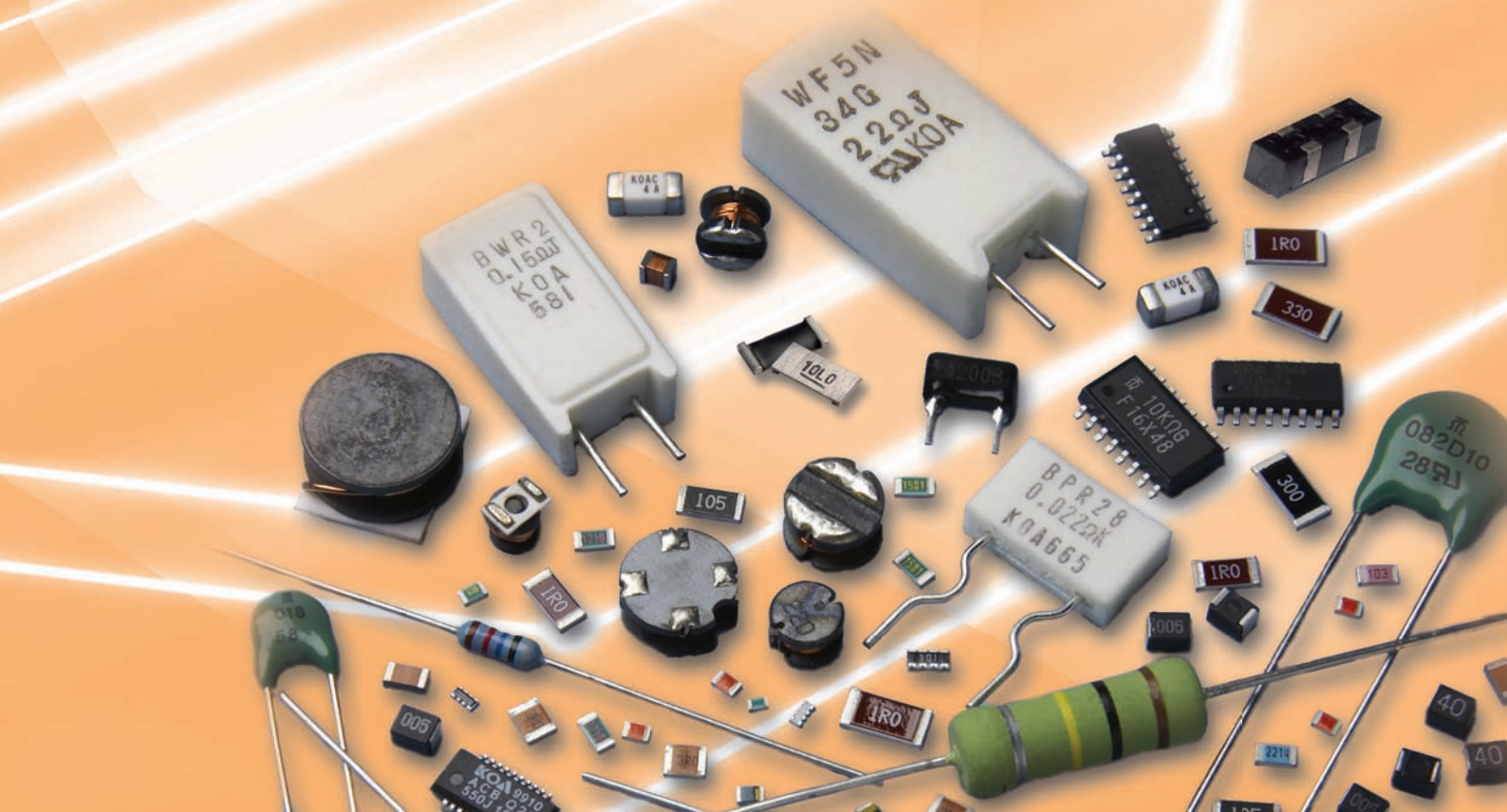
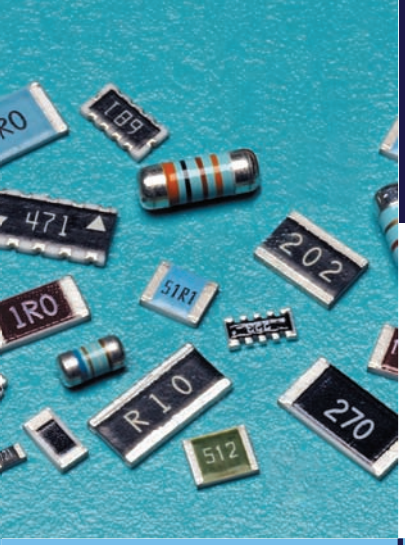
KOA

Your Passive Solution

PASSIVE COMPONENTS

Selection Guide



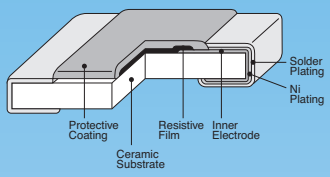


Surface Mount Resistors & Arrays

Flat chip resistors and arrays include general purpose, high precision, pulse and surge, high voltage, high heat, anti sulfuration and zero ohm types for applications ranging from general purpose to ultra precision.

RoHS COMPLIANT

Thick Film



- Sizes available:

01005	0603	1210
0201	0805	2010
0402	1206	2512

- RuO_2 thick film

General Purpose - RK73B
- Tolerance: ±2% and ±5%
- Resistance range: 1Ω ~ 22MΩ

Precision - RK73H
- Tolerance: ±0.5% and ±1%
- Resistance range: 1Ω ~ 10MΩ

High Precision - RK73G
- T.C.R.: ±50 ppm/K
- Resistance range: 10Ω ~ 1MΩ
- Tolerance: ±0.5% and ±1%

Zero Ohm - RK73Z
- Maximum resistance of 50mΩ
- Maximum continuous current @70°C: 0.5A ~ 2.0A

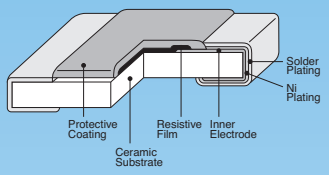
Anti Sulfur

NEW RT-Series
- Excellent anti-sulfuration characteristics due to using high-sulfuration-proof inner top electrode material
- Intended for use under harsh environment
- Available for several standard product series:

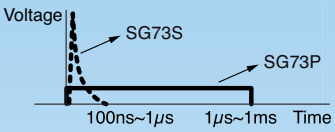
RK73B RT	CN_RT	SG73 RT
RK73H RT	CN_KRT	**SG73S RT**
RK73Z RT	CNZ_RT	**SG73P RT**
RK73G RT	**HV73 RT**	**WK73 RT**

Specialty

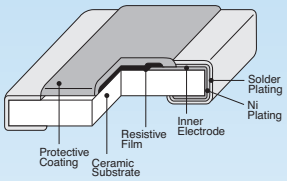
Surge Current - SG73
- 10x pulse power capability
- Resistance range: 1Ω ~ 1MΩ
- Tolerance: ±10%, ±20%
- Sizes available: 0603, 0805,1206, 1210, 2010, 2512



NEW Pulse SG73P and Surge SG73S
- Resistance range: 1Ω ~ 10MΩ
- Tolerance: ±0.5%, ±1%, ±2%, ±5%
- Sizes available: **0402**, 0603, 0805, 1206, 1210
- **Increased power rating** (e.g.: 0805 = 0.5W)



Wide Terminal - WK73R
- Robust thermal cycle characteristic
- Power rating: 0.75W ~ **2W**
- Resistance range: 10Ω ~ 1MΩ
- Tolerance: ±1% or ±5%
- T.C.R.: ±100 and ± 200 ppm/K
- Sizes available: 0612, 1020, 1218, 2512

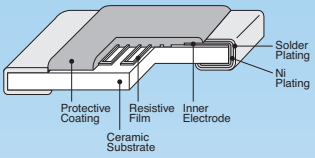


High Voltage - HV73
- 2.5x to 10x rated working voltage of standard thick film
- Chip size 2512 with 3kV rated voltage
- Sizes available: 0603, 0805, 1206, 2010, 2512 350V, 400V, 500V, 2kV, 3kV
- Resistance range: 10kΩ ~ 51MΩ
- Tolerance: ±0.5%, ±1%, ±2%, ±5%

Thin Film

Ultra Precision - RN73
- Tolerance: ±0.05% ~ ±1%
- T.C.R. max.: ±5, ±10, ±25, ±50 or ±100 ppm/K
- Resistance range: 10Ω ~ 1MΩ
- Nickel chromium thin film resistor element

Ultra Precision - RN73H
- Higher temperature range up to +155°C
- Higher rated ambient temperature: +85°C
- Improved moisture resistance by special coating
- Resistance range: **10Ω ~ 1MΩ**
- Tolerance: ±0.05% ~ ±1%
- T.C.R. max.: ±5, ±10, ±25, ±50 or ±100 ppm/K
- Sizes available: 0402, 0603, 0805, 1206, 1210

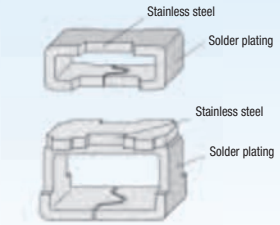


MELF

Carbon Film/Metal Film/Zero Ohm
- RD41 Carbon film series
- RN41 Metal film series
- CC Zero ohm series

Checker Chips

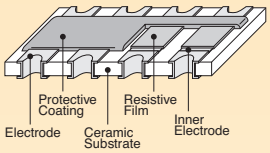
Checker Chips – RCU/RCT/RCS/RCW
- Surface mountable test terminals
- Automatic mounting possible
- Standard chip sizes: 0603, 0805, 1206
- Maximum resistance: 50mΩ
- Rated current: 2A



Resistor Arrays

Isolated Resistors

Convex, Square Corners - CN_K
- Resistance range: 10Ω ~ 1MΩ
- Tolerance: ±1% ~ ±5%
- Sizes available: **0201**, 0402, 0603 x2, x4, x8 elements



Concave, Square Corners - CN
- Resistance range: 10Ω ~ 1MΩ
- Tolerance: ±1% ~ ±5%
- Sizes available: 0402, 0603, 0805, 1206 x2, x4, x8 elements

Convex, Scalloped Corners - CN_A
- Resistance range: 1Ω ~ 1MΩ
- Tolerance: ±1% and ±5%
- Sizes available: 0603, 1206 x2, x4 elements

Zero Ohm Jumper - CNZ
Convex or Concave
- Current rating @70°C (per element): 0.5A and 1.0A
- Sizes available: 0402, 0603, 0805, 1206 x2, x4, x8 elements

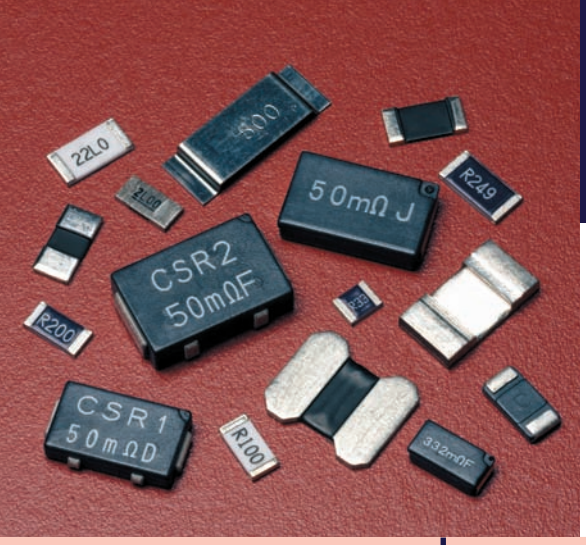
NEW Anti-Sulfur
- Excellent anti-sulfuration characteristics
- High heat and weather resistance
- Series available:
  CN_RT CN_KRT CNZ_RT

Bussed Resistors

Convex or Concave - CND
- Reverse common electrode and side electrode type circuits available
- Resistance range: 22Ω ~ 100KΩ
- Tolerance: ±5%
- Sizes available: 1206, 1608 and 2512

Convex Staggered Terminations - CNB
- Resistance range: 1KΩ ~ 470KΩ
- Tolerance: ±5%
- 4 or 8 elements included in one array in 2 sizes

BGA (Ball Grid Array) - BR
- High level of integration
- Low inductance
- 18 integrated resistors
- Isolated or bussed



Current Sense Resistors

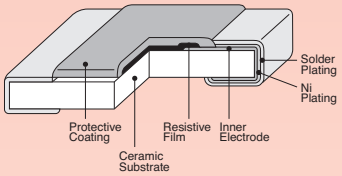
Four basic types of current sensing resistors are available in low-ohm, high precision, 4-terminal Kelvin, high power, low profile, high frequency, high heat, and power shunt chips for a wide range of detecting applications and power applications.

RoHS COMPLIANT

Thick Film

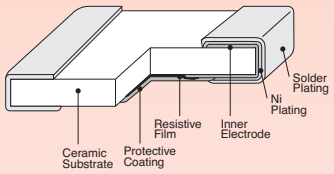
Low-Ohm - SR73 Series

- Resistance range: 24mΩ ~ 10Ω
- Tolerance: ±0.5% ~ ±5%
- Sizes available: **0201** ~ 2512
- Best T.C.R.: ±100 ppm/K



Ultra-Low Ohm - UR73(D) Series

- Face-up and face-down types available
- Resistance range: 10mΩ ~ 100mΩ
- Tolerance: ±1%
- Improved T.C.R.: ±100 ~ ±300 ppm/K
- Sizes available: 0402 ~ 2512

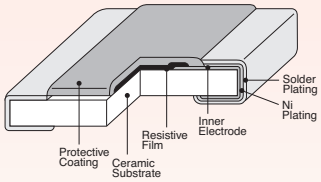


NEW Ultra-Low Ohm – UR73V(D) Series

- Automotive, AEC-Q200 qualified
- Size 1206, 0.5W
- Resistance range: 10mΩ ~ 100mΩ
- T.C.R.: ±100 ~ +250ppm/K
- Operating temp. up to +155°C

Wide Terminal - WK73S

- Robust thermal cycle characteristic
- Power rating: 0.75W ~ **2W**
- Resistance range: 10mΩ ~ 9.1Ω
- Tolerance: ±1% or ±5%
- T.C.R.: ±100, ±200, ±300 or ±800ppm/K
- Sizes available: 0612, 1020, 1218, 1225



NEW Wide Terminal – WU73 Series

- Improved T.C.R. type
- Resistance range: 10mΩ ~ 100mΩ
- T.C.R.: ±100 ~ ±150ppm/K
- Size 1206, 1W
- Automotive, AEC-Q200 qualified

NEW Wide Terminal Anti Sulfur – WK73S RT Series

- Excellent anti sulfuration characteristics
- High heat and weather resistance

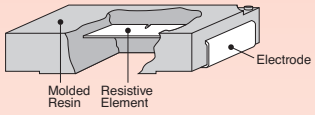
Molded

Robust Lead - Frame SL(N)/TSL Series

- Molded with flame retardant resin (UL94 V-0)
- Non-wirewound, excellent for high frequency
- Enhanced thermal shock capability
- Operating temperature: up to +180°C
- **Increased power rating** e.g.:
  SLW07(2010) = 1W
  SLW1(2512) = 1.5W
- Resistance range: 3mΩ ~ 22MΩ
- Tolerance: ±0.5%, ±1%, ±2%, ±5%
- T.C.R.: **±50** ~ ±200 ppm/K

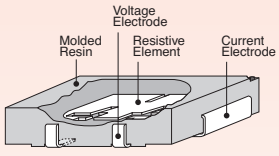
NEW Jumper – SLZ1 Series

- Maximum resistance of 0.5mΩ
- Current rating: 44A



4 Terminal - CSR Series

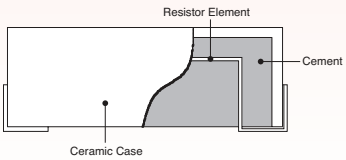
- Suitable for Kelvin applications
- Power rating: 1W & 2W
- Resistance range: 5mΩ ~ 50mΩ
- Tolerance: ±0.5 or ±1%
- T.C.R.: ±50 ppm/K



Ceramic Case

Ceramic Case - BLR Series

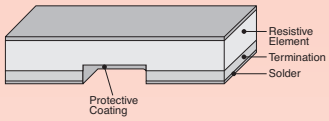
- Flame retardant ceramic case
- Resistance range: 8mΩ ~ 50mΩ
- Tolerance: ±5%, ±10%
- Power rating: 1W, 2W or 15W



Metal Plate

TLR Series

- Resistance range: **0.5mΩ** ~ 20mΩ
- Tolerance: ±1%, ±2% or 5%
- Ultra low T.C.R.: **±50, ±75**, ±100 ppm/K
- 0402, 0805, 1206, 2010, 2512 chip size
- Ultra low height: 0.25 ~ 0.6mm
- **Increased power rating** e.g.:
  TLR2BW (1206) = 1W
  TLR2HW (2010) = 2W
  TLR3AP (2512) = 3W

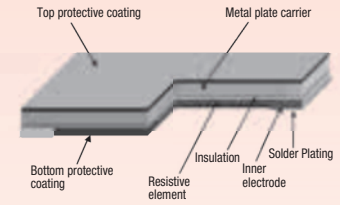


NEW Jumper – TLRZ Series

- Sizes 0603, 0805
- Maximum resistance of 0.2mΩ
- Current rating: 20A

TLR H Series

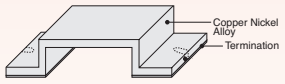
- Resistance range: 10mΩ - 270mΩ
- Tolerance: ±1%
- Ultra low T.C.R.: ±50, ±75 ppm/K
- Ultra low height: 0.25, 0.5 mm
- 0805, 2512 chip size
- Power rating 0.25W, 2W



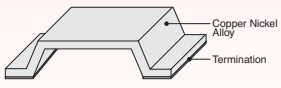
LR72 Series

- Power rating: 0.25W, 0.5W, 1W
- Resistance range: 2mΩ ~ 8mΩ
- Tolerance: ±5%
- T.C.R.: ±100, ±350 ppm/K
- Custom configurations available

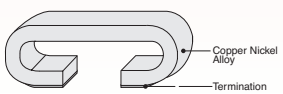
LR72A



LR72B



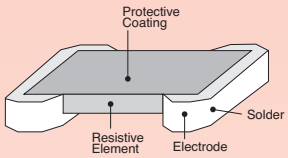
LR72C



Power Shunt

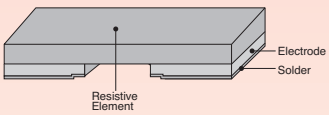
High Power - PSB Series

- Power rating: 6W, 7W
- Resistance range: 0.2mΩ, 0.75mΩ, 1mΩ
- Tolerance: ±1%
- T.C.R.: ±75 ppm/K, ±100 ppm/K
- Special electrode shape ensures excellent temperature cycling characteristics



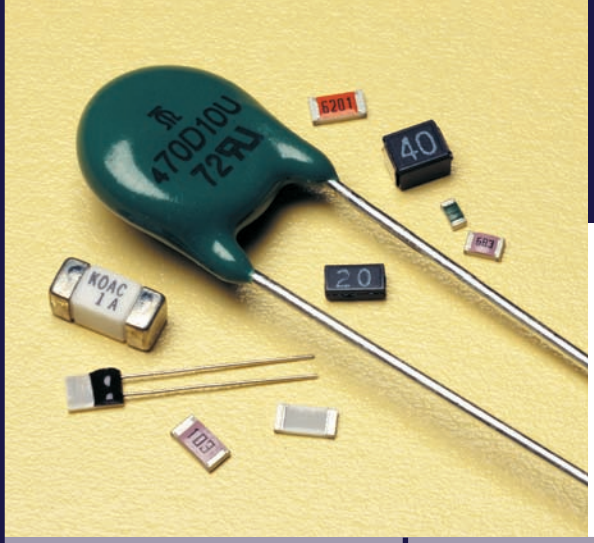
High Power - PSI Series

- Power rating: 3W
- Resistance range: 3mΩ, 4mΩ
- Tolerance: ±1%
- T.C.R.: ±50 ppm/K
- Smooth current flow, suitable for large current detection



High Power - PSE Series

- Power rating: 3W, 5W
- Resistance range: 0.5mΩ ~ 2mΩ
- Tolerance: ±1%, ±5%
- T.C.R.: ±150 ppm/K
- Smooth current flow, suitable for large current detection



Thermal Sensors and Circuit Protection

In addition to our flat chip resistors we offer a complete line of circuit protection products including thermistors, platinum sensors, chip and ceramic case fuses and metal oxide varistors.

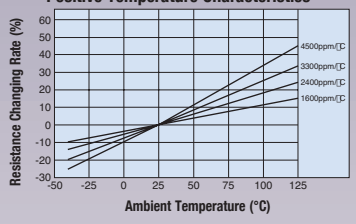
RoHS COMPLIANT

Thermal Sensors

Thin Film Linear Positive - LT73(V)/LP73

- LT73 available in 25 specifiable temperature characteristics
- LT73V: 0805 & 1206 for automotive
- Resistance range: 51Ω ~ 51kΩ
- Tolerance: ±1% ~ ±5%
- T.C.R.: ±150 ~ ±5000 ppm/K
- T.C.R. Tolerance: ±150 ppm/K ~ ±15%
- Sizes available: 0603, 0805 & 1206

Positive Temperature Characteristics



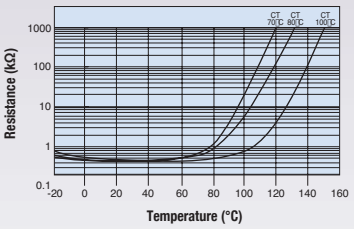
Thick Film Linear Positive - LA73

- Available in 13 specifiable temperature characteristics
- T.C.R. Tolerance: ±200 ppm/K or ±10%
- Resistance range: 22Ω ~ 10KΩ, ±5%
- Sizes available: 0603, 0805 & 1206

PTC Thermistor - PT72

- Three curie temperatures: 70°C, 80°C & 100°C
- Resistance range: 50Ω, 120Ω, 470Ω & 1kΩ
- Sizes available: 0805 & 1206

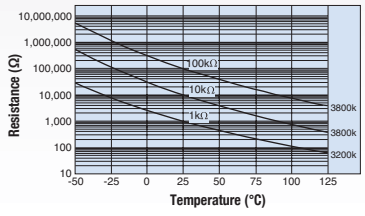
Temperature Characteristics



NTC Thermistor- NT73

- Resistance range: 1kΩ ~ 150 kΩ
- Resistance tolerance: ±5% ~ ±15%
- B constant tolerance: ±3% ~ ±10%
- Sizes available: 0603, 0805, 1206

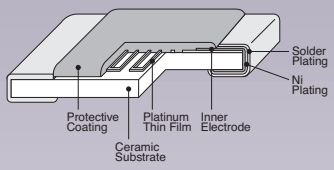
Negative Temperature Characteristics



Platinum Thermal Sensors

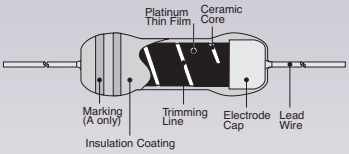
Chip Type Sensor - SDT73H/S/V

- T.C.R in accordance with DIN EN/IEC 60751
- SDT73V series = AEC-Q200 tested
- Resistance range: 100Ω & 500Ω
- Resistance tolerance: ±0.2% or 1%
- Operating temperature up to **+250°C**
- T.C.R.: ±3850ppm/K ±50ppm/K



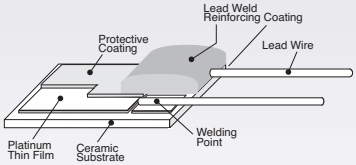
Axial Type - SDT101A/SDT101B

- -55 to +300°C operating temperature
- Resistance range: 10Ω, 100Ω, 500Ω
- Resistance tolerance: ±0.5% or ±1%
- T.C.R.: ±3500 ppm/K ±1% or ±2%



Radial Type - SDT310

- T.C.R. in accordance with JIS/DIN standards
- High resistance in small package
- Resistance range: 10Ω, 500Ω, 1kΩ
- Tolerance of measuring temp.: down to ±(0.15+0.002|t|)°C
- Temperature range: -55°C ~ +650°C



Custom Configurations - ST Series/AFS Units

- Customer configurations based on use of SDT101 and SDT310 products

Applications for Temperature Compensation

- Flow sensor (automobiles, industrial equipment, home appliances)
- Measuring equipment (electric scale, load cell, flow sensors, automotives)
- Cold junction compensation of thermocouple temperature controllers

Fuses

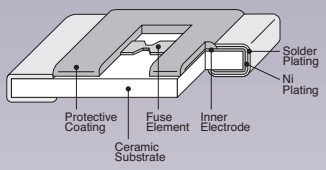
Fusing Flat Chip Resistors - RF73

- Resistance range: 0.2Ω ~ 510Ω
- Tolerance: ±5%
- Sizes available: 0603 ~ 2512

Chip Current Fuses - TF

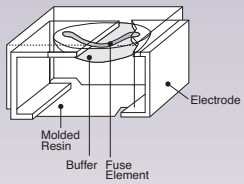
- Rated current: 0.2A ~ 5A
- Rated voltage: 24V & 32V
- Sizes available: 0402 & 0603
- TF16AT: Anti pulse

U.D. **TF16VN**: 0603 for automotive



Micro-Fuse - CCP

- UL 248.14 approved, File #131375
- Fusing Current: 1A ~ 10A
- Rated Voltage: 24V ~ 76V
- Sizes available: 1206 & 1210



Chip Fuse - CCF1N

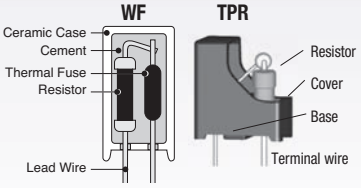
- Square ceramic body
- Size: 6.0 x 2.5 x 2.5 mm
- Up to AC125V and DC160V
- UL248.14, c-UL(CSA)C22.2
- Rated current: 0.4A ~ 15A

NEW Chip Fuse - CCF1F

- Fast acting
- Meets IEC60127-4 specifications
- Universal modular fuse-links standard sheet 2

Thermal Fuse & Power Resistor - WF

- Rated current: 2A & 10A
- Rated voltage: 250V AC
- Resistance range: 1Ω ~ 10KΩ



NEW Temperature Protection Resistor – TPR

- Quickly fusing to overcurrent
- Circuit is completely interrupted after fusing
- Lightning surge test (IEC61000-4-5) effective
- UL1412 (File E344400) approval awarded
- Power rating: 1Watt
- Resistance range: 2Ω ~ 10kΩ

Varistors

Metal Oxide Chip - NV73

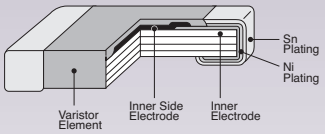
- Protects against static electricity, switching and incoming surges
- Varistor voltage: 8Vc ~ 165Vc
- Sizes available: 0201 ~ 2220
- Maximum energy: 0.005J ~ 14.0J

Automotive Metal Oxide Chip - NV73DL

- Conforming to AEC-Q200
- Low leakage current
- Operating temperature: up to +125°C
- Varistors voltage: 10 ~ 90 V_{1mA}
- Sizes available: 0603, 0805 & 1206

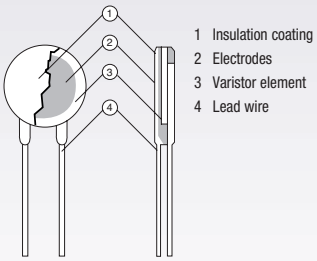
NEW Chip Varistor for Load Dump Surge – NV73DS

- Meets load dump surge test of JASO
- High energy power - comparable to power zener diodes
- Size: 6.1 x 5.1 x 3.7mm
- Varistor voltage: 20~25V; 40~45V (20A)
- Max. load dump surge energy: 63J ~ 70J



Metal Oxide Disc Type - NVD

- Higher surge current
- Absorbs positive and negative surges
- Varistor voltage: 16V~1980V
- Disc diameters of 05, 07, 10, 14 & 20
- Maximum energy: 0.3J ~ 360J



Inductors

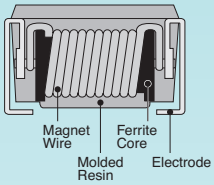
Coil solutions on different cores cover an application range from RF to power by using ferrite, ceramic, thin film and choke coil technologies.

RoHS COMPLIANT

Wirewound

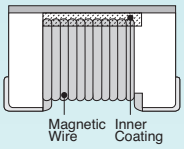
1210 Molded Ferrite Core - KL32/LFC32

- Wide range of applications
- Molded resin
- Flat-top design
- High Q with wirewound structure
- Inductance range: 0.005µH to 330µH
- Inductance tolerance: ±5% ~ ±20%



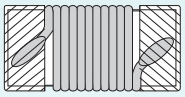
High Q Air Core - KQ/KQT

- High self resonant frequency
- Ideal for low loss, high output power consumption
- Q Factor min.: 16 ~ 65
- Inductance Range: 1.0nH ~ 10µH
- Inductance tolerance: ±0.1nH ~ ±20%
- Sizes available: 0402, 0603, 0805 & 1008



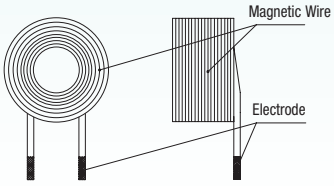
High Current Air Core - KQC

- Low DC resistance, high allowable DC current
- Nominal inductance: 1.4nH ~ 27nH
- Inductance tolerance: ±0.1nH ~ ±5%
- Sizes available: 0402, 0603



Custom Wirewound Coil – LWA

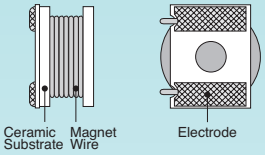
- Custom product which keeps its shape even if no core nor bobbin are used
- Different shapes, dimensions, inductances on request
- Coils for wire-less power supply, actuator, etc.
- Inductance range: approx. 10µH ~ 1mH
- Inductance tolerance: approx. +-5%



Choke Coils

Power - LPC

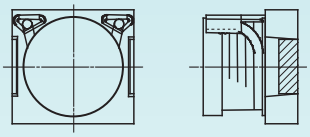
- Non-shielded construction with bottom terminations in sizes: 4045, 9040, 10065, 12065
- DC Current max.: 0.12A ~ 10A
- Inductance range: 0.68µH ~ 6.8mH
- Inductance tolerance: ±10% ~ ±30%



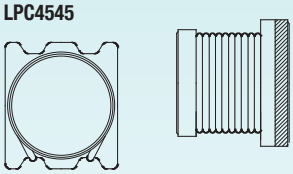
Power - LPC 4235/LPC 4545

- 4 mm size with bottom and side terminations
- Tested acc. to AEC-Q200 requirements
- DC Current max.: 0.07A ~ 3.66A
- Inductance range: 0.82µH ~ 2200µH
- Inductance tolerance: ± 10% or ±20%

LPC4235



LPC4545



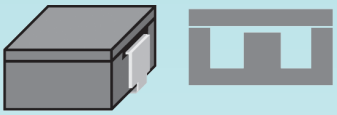
Power - SDR

- Sizes 0603, 0604, 0805, 1006, 0906
- DC Current max.: 0.2A ~ 3A
- Inductance range: 1.5µH ~1200µH
- Inductance tolerance: ±10% ~ ±20%

Choke Coils

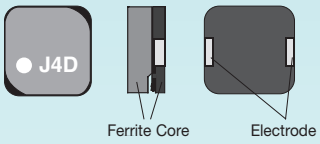
NEW Magnetic Shielded Power – LCM1060

- Extremely low leakage magnetic flux
- High rated current in 10 x 10mm size
- Tested acc. to AEC-Q200 requirements
- DC Current max.: 0.6A ~ 6.8A
- Inductance range: 1.5µH ~ 470µH
- Inductance tolerance: ±20%, ±30%



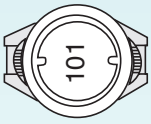
Shielded - LKS

- Sizes 0745, 1045, 1260
- DC Current max.: 0.15A ~ 6.6A
- Inductance range: 3.3µH ~ 10000µH
- Inductance tolerance: ±20% or ±30%



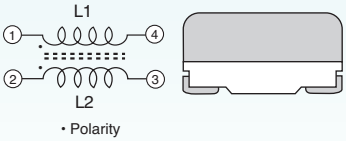
Shielded - SDS

- Sizes available: 0804 ~ 1208
- DC Current max.: 0.07A ~ 7.5A
- Inductance range: 2.2µH ~ 15000µH
- Inductance tolerance: ±10% ~ ±20%



Common Mode - SLF

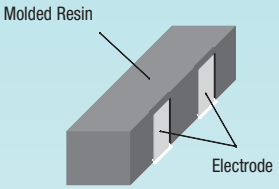
- Size available: 0905
- DC Current max.: 600mA ~ 1600mA
- Inductance range: 10µH ~ 2000µH
- Inductance tolerance: ±50% or ±30%

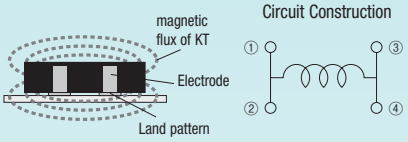


Transponder Coil

Rx-Receiver – KT 11835

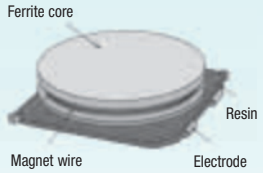
- Single-axis LF antenna (for receiving)
- High Q and high sensitivity
- Strong to vibration, shock and substrate bending
- 4 element terminal structure
- DC current max: 12mA ~ 30mA
- Inductance range: 2.4mH ~ 12mH
- Inductance tolerance: ±2%, ±3%, ±5%





NEW Z-Axis LF Antenna Coil – KTZ1030

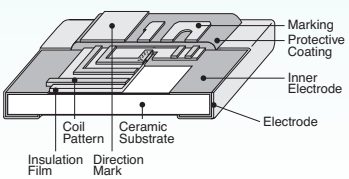
- High Q and high sensitivity
- Strong fixation with PC board by 4 metal terminal electrodes
- Low height of 3mm
- Inductance range: 7.6mH ~ 16mH
- Inductance tolerance: ±2%, ±3%, ±5%
- Excellent high frequency characteristic



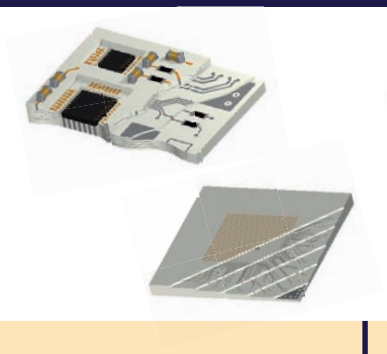
Thin Film

Thin Film Inductor - KL73

- High self resonant frequency
- Low DC resistance
- Inductance range: 0.56nH ~ 100nH
- Inductance tolerance: ±0.1nH ~ ± 5%
- Sizes available: 0402 ~ 1206



LTCC Substrates



RoHS COMPLIANT

Integrated Components

Improve performance, save space and lower costs by combining components using our thin film, silicon based, multi-element technology.

RoHS COMPLIANT

Low Temperature Co-Fired Ceramic LTCC-KLC

Technology

Low Temperature Co-fired Ceramic is a multilayer ceramic technology that allows for moderate firing temperatures. The LTCC process is similar to the thick film hybrid process employed for multilayer ceramic capacitor and chip inductors. The moderate firing temperature level below 900 °C is achieved by mixing alumina and glass as main ingredients of the ceramic tape, the so-called green sheets. This permits the co-firing with highly conductive material (silver) for the electrodes. LTCC also support the creation of buried components and thus contribute to miniaturization.

Shrinkage Control

The LTCCs are fired under free shrinkage conditions: The material is allowed to shrink in all three dimensions.

The highly homogeneous structure of the green sheets and precise process control ensures high reproducibility of the dimensional accuracy. Relative accuracies of 0.05 % can be achieved. This high accuracy allows for the realization of dimensionally accurate cavities for the mounting of bare die semiconductor chips.

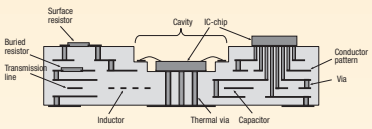
Features

- Excellent dimensional accuracy by KOA's original shrinkage control technology
- Multi layer technology up to 20 layers (more than 20 layers available on request)
- Surface Flatness down to ±5 µm on request
- High-density wiring by fine line patterning
- Miniaturization by buried R, L, C and strip-lines
- Back volumes and channels
- Excellent high frequency performance up to 60 GHz by the use of low loss ceramics and conductors
- Thermal expansion coefficient similar to Si and GaAs
- Precision cavities enable bare chip mounting with short bond wires
- Thermal vias under bare chips enhance heat transport
- Superior heat and humidity resistance

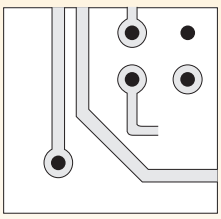
Low Temperature Co-Fired Ceramic LTCC-KLC

- Stack accuracy: 20µm max.
- Line width as low as 60µm
- Line-to-line spacing as low as 60µm
- Substrate flatness: 30 µm max.
- Via diameter: 100µm, 150µm, 200µm
- Through-via pad diameter: Via diameter +50µm min.
- Cavity width: 600µm min.
- Cavity depth: 100µm min.
- Cavity wall thickness: 500µm min
- Flexural/bending strength: 250MPa
- Coefficient of Thermal Expansion: 5.5ppm/K
- Thermal conductivity: 3W/m • K
- Minimum insulation resistance: $1x10^{13}\Omega$ • cm
- Dielectric constant at 1MHz: 7
- Dielectric loss at 1MHz: <0.003
- Density: 2.8g/cm^3
- Max. surface roughness (Ra): 0.4µm
- Min. withstanding voltage: 15kV/mm
- Fired layer thickness: 40µm ~ 125µm

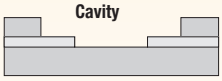
Cross-sectional structure



Inner layer



Cavity



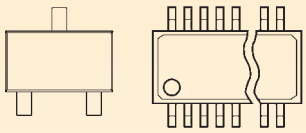
Applications:

- High density sensor interconnect
- MEMS Packages
- High frequency: Microwave, Milliwave
- Harsh environment: High Temperature, High humidity
- Mobile Communications
- Multi Chip Modules
- Interposer substrates

Resistor Networks

KOA's Integrated Passive Components - KPC

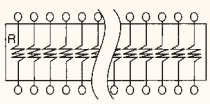
- Thin film (metal film) resistor array on Silicon wafer
- Excellent resistance matching, TCR tracking and stability
- Custom circuits are available with flexible layout (Different resistance combinations possible)
- Higher Integration saves board space and overall assembly costs
- Excellent reliability with standard molded IC package
- Suitable for reflow soldering
- Standard packagings:
  SOT-23
  QSOP 16, QSOP 20, QSOP 24
  SOIC-N08, SOIC-N14, SOIC-N16



- Typical applications
  - Highly accurate peripheral resistors for analog operational amplifiers
  - Automotives, Analog instrumentations, IC-testers
  - Computers, Data communications, Network systems
  - Operational amplifiers, Terminations, Pull-up/Pull-down
  - Meets or exceeds IEC 60115-1, JIS C 5201-1, JIS C 5101-1

Isolated Resistors – RIA

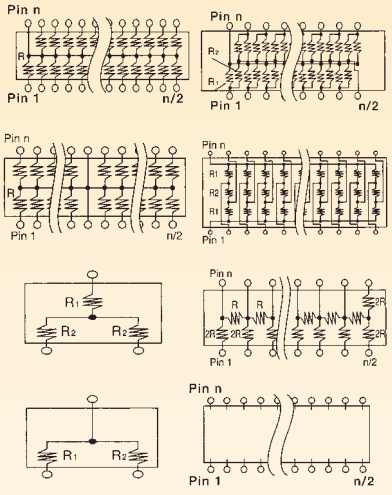
- Precision value matching
- Relative resistance tolerances: 0.05% ~ 2%
- T.C.R. tracking: 5ppm/K ~ 50 ppm/K
- Resistance range: 10Ω ~ 510kΩ



Resistor Networks

Bussed Resistors

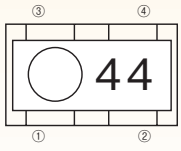
- Standard Combinations
  Bussed – RBA
  High speed bussed – RBB
  Dual terminator – RDA
  Differential terminator – RDB
  R2R network – RLA
  SOT-23 network – RTX, RTY
  Custom – RNX
- T.C.R.: ±10ppm/K ~ ±100ppm/K
- Resistance range: 10Ω ~ 100kΩ

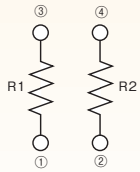


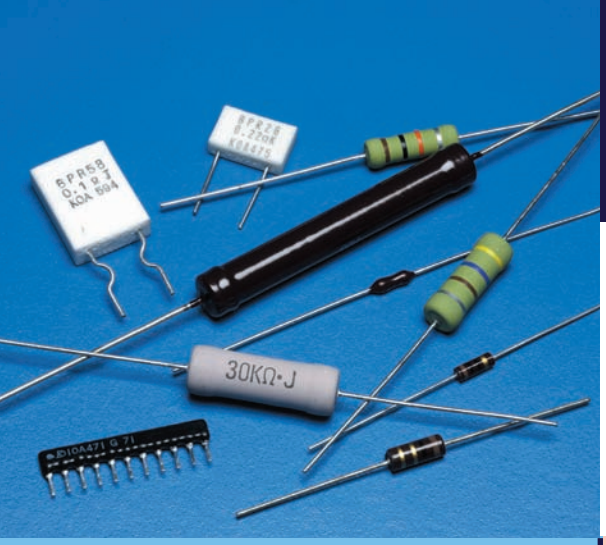
Custom Resistor Networks

Precision Pair Resistors – CNN

- Thin film on ceramic
- Pair resistors for high precision ratio
- Resistance tolerance
  absolute: ±0.1%, ±0.25%
  relative: 0.05%, 0.1%
- T.C.R. absolute: ±25ppm/K
- T.C.R. relative: 5ppm/K







Leaded Resistors

The industry's broadest line of leaded resistors and networks include designs with various material composition and structure for use in general purpose, precision, anti-surge, high voltage, high resistance, PTC and fusing applications.

RoHS COMPLIANT

Carbon film

General Purpose - Reduced Size and Flame Proof CF/CFB/CFS/CFP Series
- Power rating: 0.25W ~ 0.5W
- Resistance range: 2.2Ω ~ 5.1MΩ
- Tolerance: ±2% or ±5%

High Power Resistor - SPR and SPRX
- Power rating: 0.25W ~ 5W
- Resistance range: 0.1Ω ~ 110kΩ
- Tolerance: ±1%, ±2% or ±5%

Metal film

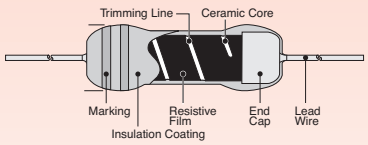
General purpose - Reduced Size MF/MFP/MFS/SN Series
- Power rating: 0.25W ~ 2W
- Resistance range: 0.51Ω ~ 5.11MΩ
- Tolerance: ±0.1% ~ ±5%
- T.C.R.: ±50 ~ ±200 ppm/K

Precision - RNS/SF Series
- Power rating: 0.125W ~ 1W
- Resistance range: 0.2Ω ~ 6.8MΩ
- Tolerance: ±0.01% ~ ±1%
- T.C.R.: 5 ~ 50 ppm/K

Metal Oxide

General Purpose - MO/MOX Series
- Power rating: 0.5W ~ 3W
- Resistance range: 5.1Ω ~ 150kΩ
- Tolerance: ±2%, ±5%
- T.C.R.: ±200 ppm/K

Reduced Size - MOS/MOSX Series
- Power rating: 0.5W ~ 5W
- Resistance range: 0.1Ω ~ 100kΩ
- Tolerance: ±1%, ±2% or ±5%
- T.C.R.: ±300 ppm/K



Power Type - BSR Series
- Rectangular ceramic case
- Power rating: 2W ~ 20W
- Resistance range: 430Ω ~ 75kΩ
- Tolerance: ±5%
- T.C.R.: ±300 ppm/K

Wirewound

Miniature Type - CW/CWP/CWH/CWS/CWX Series
- Power rating: 0.25W ~ 3W
- Resistance range: 0.1Ω ~ 3kΩ
- Tolerance: ±0.25% ~ ±10%

Power - RW/RWN Series
- RWN: Non-inductive winding
- Power rating: 0.5W ~14W
- Resistance range: 0.1Ω ~ 62kΩ
- Tolerance: ±0.5% ~ ±5%

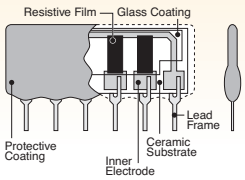
Power Rectangular Type - BGR, BWR Series
- Rectangular ceramic case
- BGR with glass core
- BWR with ceramic core
- Power rating: 1W ~ 40W
- Resistance range: 0.1Ω ~ 390Ω
- Tolerance: ±1% ~ ±10%

High Voltage/High Power - P Series
- Special shape parts
- Power rating: up to 250W
- Working voltage: up to 300 kV

Leaded SIP networks

Thick Film - RKC/RKH/RKL Series
- Number of pins: 3 ~ 16
- Resistance range: 10Ω ~ 2.2MΩ
- Tolerance: ±1% ~ ±5%
- Various circuit and custom parts available

Precision Metal film - MRP
- Resistance range: 50Ω ~100kΩ
- Absolute tolerance: ±0.1% ~ ±1%
- Ratio tolerance: 0.025% ~ 0.5%

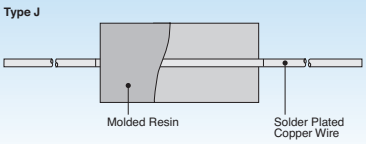


Zero Ohm/Jumper

Conformal coated - Z Series
- Max. amperage: 1.5A, 2.5A
- Resistance: less than 20mΩ

Molded - J Series
- Max. allowable current: 8A, 10A
- Resistance: 10mΩ max.

Jumper Wire - JL Series
- Max. allowable current: 8A, 10A
- Wire diameter: 0.5 or 0.6mm



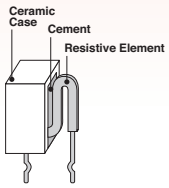
Specialty

Anti-Surge, Metal Glaze - RCR Series
- Awarded UL1676, EN60065 & c-UL approvals
- Max. working voltage: 500V ~ 5000V
- Power rating: 0.25W ~ 3W
- Resistance range: 3.3Ω ~ 100MΩ
- Tolerance: ±1% or ±5%

High Voltage, Metal Glaze - GS Series
- Max. working voltage: 0.5kV ~ 40kV
- Power rating: 0.25W ~ 12W
- Resistance range: 0.5MΩ ~ 10GΩ
- Tolerance: ±0.5% ~ ±10%

Ceramic Composition - PCF/HPC/CPCN Series
- KOA original ceramic resistor
- Excellent characteristic against high voltage surge current
- Avaiable as PTH or without leads (CPCN)
- CPCN is suitable as noise suppressor of engine ignition circuit systems
- Power rating: 0.5W ~ 5W
- Resistance range: 3.3Ω ~ 390kΩ
- Tolerance: ±10% or ±20%

Current Sensing Rectangular Type - BPR Series
- Power rating: 2W ~ 14W
- Resistance range: 0.01Ω ~ 1Ω
- Tolerance: ±5% or ±10%
- Twin type with 3 leads available



Linear Thin Film PTC - LT/LP Series
- Resistance range: 1Ω ~ 100kΩ
- Tolerance: ±1%, ±2%, ±5%
- T.C.R.: 150ppm/K ~ 5000ppm/K
- T.C.R.: Tolerance: ±50ppm/K, ±5% ~ ±15%

Fusing Resistors - RF/BMF Series
- Power rating: 0.17W ~ 5W
- Resistance range: 0.1Ω ~ 15kΩ
- Tolerance: ±5%, ±10%
- RF25CC: constant current fusing type
- RF26: Radial type, L-style
- BMF: Rectangular type
- WF: Thermal fuse built-in
- **TPR1**: Temperature protection resistor

For an Innovative Partnership

KOA Europe…In Dägeling, Product and Application Engineers, together with an experienced Sales Force and a dedicated Customer Service Team, share one focus: our mutual growth and success.
Such aspirations necessitate all-round competence including continuous efforts in:

- A wide programme of passive components
- Product innovations
- Superior Customer Support
- Total Quality Management
- Custom-built logistic packages
- Competitive prices

Logistics is the key to efficiency and worldwide success.
KOA Europe runs a warehouse with approx. 2 billion pieces stock on hand to support customers within 24 hours with the most common parts. Our experts are pleased to share their experience with you:

- JIT shipments
- Customer specific labelling
- Full range of EDI possibilities
- Electronic incoming and dispatch control
- Consignment Stock

Continuous improvement is a "must" for today´s global business

- We achieved ISO 9001 certification the year following our foundation
- Moreover, KOA´s production plants are ISO/TS 16949 and ISO 14001 approved

Technical Support plays a critical role in helping customers to improve product quality.
KOA´s technical staff is highly trained in:

- Development of new products
- Design-In
- Application Engineering
- Product Performance Characteristics

Even with all this expertise, a company can only be as good as its Customer Service Team. At KOA you will find:

- Competent and reliable partners for your enquiries
- A multi-lingual team
- Automated order and sample processing
- Prompt, efficient responses

And yet continuous improvement is our goal. Constant staff training is one means by which we are aiming to achieve it, good communication with you is another.

Let´s work together for…

Your Passive Solution

Your KOA Europe Team

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