

For Automotive
Electronics

Passive Components

Selection Guide

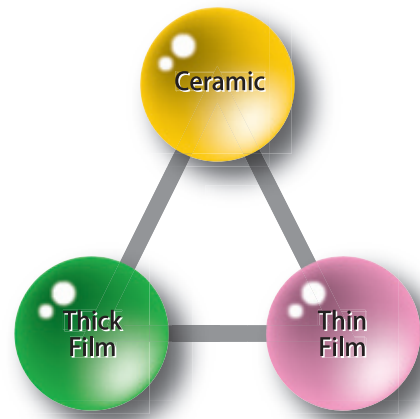
The KOA logo consists of the letters 'KOA' in a bold, white, sans-serif font. The 'K' is stylized with a blue outline. The background of the entire page is a blue and black circuit board pattern with various electronic components scattered across it, including capacitors, resistors, and integrated circuits.

<http://www.koanet.co.jp>

Wide range Passive components

KOA's wide product lineup offers you the passive components you want. Our flagship products are resistors, inductors and thermistors. We also offer you some useful components such as overcurrent protection fuses, over-voltage / ESD protection varistors and platinum thermal sensors for precise temperature detection.

Combined components and higher scale integration into hybrid ICs of these elements are also provided.



Supreme Technology

KOA has developed a ceramic technology which helps to enhance its current portfolio of thick and thin film technologies.

These new and unique products are based on the future-orientated technologies and will help to support your new product design.

While helping to save the development time with simulation, KOA's new products are innovated taking into consideration heat radiation design, as well as supporting applications under high temperatures. KOA's solutions are designed to offer support on circuit designs focusing on "speed", and are also in a position to offer new products based on your requested functionality and timing.

The results of these new developments are products with the highest reliability, even in the smallest size.

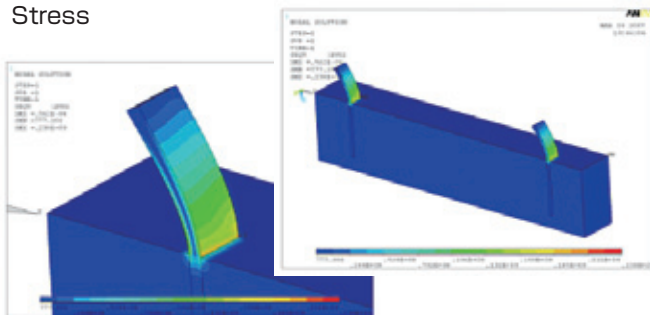
Considering the environment, we are supplying lead-free terminals and lead-free products compliant with the regulations such as RoHS, WEEE, ELV, REACH and halogen-free.

We are willing to receive your various requests: "Can you make such a product?"

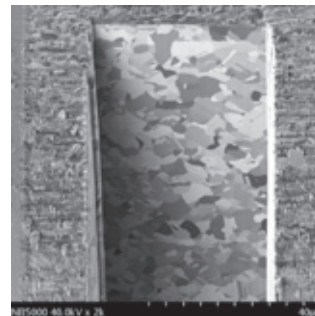


LTCC (Low Temperature Co-fired Ceramic) Substrate

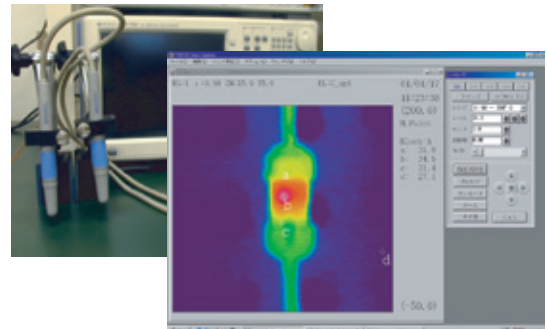
Simulation Stress



Analysis FIB-SEM observation image

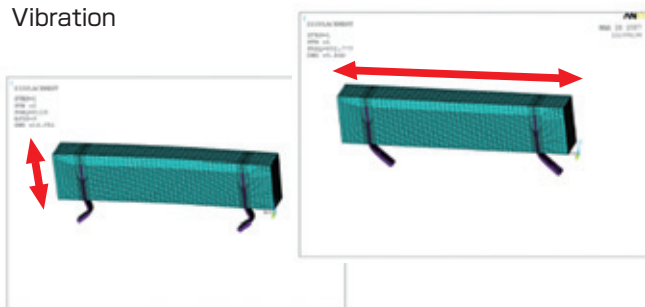


EO Sampling Oscilloscope



High Sensitivity Infrared Radiation Thermometer

Vibration



Quality - 1st

Increased clock speed and miniaturization in computers, AV and portable equipment demand miniaturization and high integration for their components. On the other hand, high reliability is required by infrastructures in network, automotive, medical and measurement equipment.

With the "Quality 1st" management policy, KOA has been making an effort to provide superior products which satisfy customers.

We have been registered for the quality management system ISO/TS16949, which takes advantage of former ISO9001 and QS9000, and the environment management system ISO14000. We also have been training all employees to provide advanced skills.

All of us always focus on "Quality" first.

Our new solutions, which are beyond simple sales activities, are suitable for your business model and will strengthen both companies with synergy.

**Required products
in the nick of time
as much as you want**

Services

KOA provides top level services and global support with a world wide production and sales organization. Our immediate reply will contribute to your design activity and productivity with our supply chain management support.

Our business area covers all electronic business fields. So our sales are less affected by business cycles. We have been making an effort to maintain a stable supply. We can provide you various solutions and products from standard to custom products according to your order system and distribution.

Moreover, various kinds of technical support are available such as product information on the website, answers and support for several questions and quick delivery for sample requests.

In addition to offering product information, our customer-conscious support has been highly regarded for the proposal of components and/or a simulation based on a circuit operation. We elaborate the support from the waveform analysis for anti-pulse and thermal design for PCB to EMC evaluation.

We are willing to hold customized seminars on your request from a basic educational program for circuit design beginners to a technical forum introducing latest technology and trends for professionals. Please consult with us.

We always welcome you sincerely.

Standards Registration

ISO 9001 Dec. 1994

ISO/TS16949 Oct. 2003

ISO 14001 Apr. 1998

ISO/IEC17025 Jul. 2007

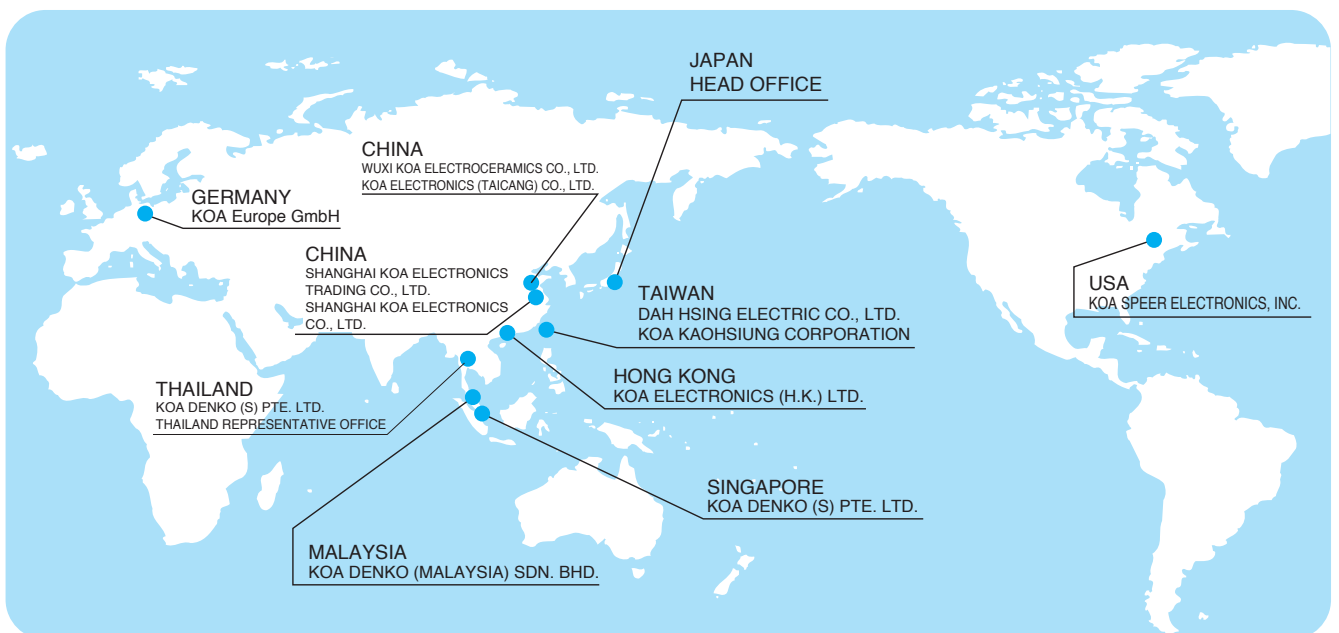
Production and Quality

We have been training each employee to provide customers safe and high quality products which you can use with perfect reliability. All the employees and the manufacturing division are in a body with the confidence that each of us build quality. Therefore, we have been improving quality and reliability every year.

Using the highest level in-house analyzing equipment, we will immediately reply to analysis of failure and research for environmental hazardous contents.

KOA's unique KPS (Koa Profit System) activity, based on our just-in-time policy, has improved lead time, ratio of facility turnover, and above all, a short and well-regulated process with our Shop system. In addition to your satisfaction with our QCD support, our total SCM activity, which included information exchange and improved physical distribution will support your productivity.

Concerned with the environment, our manufacturing aims to reducing discharge of CO₂ and to achieve zero-emission. We have realized a clean process and green products by a reduction of environmental hazardous substance. Additionally, we have been promoting a company-wide green purchasing and green procurement plan.





Thin Film Resistors

RN73H	Thin Film Flat Chip Resistors
Features	High precision Excellent in long term stability 0402~1210 inch size
Performance	Resistance tolerance : $\pm 0.05\%$ ~ T.C.R. : $\pm 5 \times 10^{-6}/K$ ~ Operating temp. range : $-55^{\circ}C \sim +155^{\circ}C$
KPC	Thin Film Resistor Networks
Features	Ultra high precision High reliability package SOT23, QSOP16/20/24L, SOP8L
Performance	Relative resistance tolerance : $\pm 0.05\%$ ~ Tracking T.C.R. : $\pm 5 \times 10^{-6}/K$ ~ Operating temp. range : $-55^{\circ}C \sim +125^{\circ}C$



Inductors

LCM/LPC	Power Chip Inductors
Features	High rated current, Low DCR. LCM1060 : 1010mm size LPC4235/4545/4045
Performance	Inductance range : $0.82 \mu H \sim 2.2mH$ Allowable DC current : $0.12A \sim 6.8A$ Operating temp. range : $-40^{\circ}C \sim +150^{\circ}C (+125/+85)$
KT/KTZ	Transponder Coil
Features	Single LF antenna for receiver. High sensitivity $\sim 75mV/\mu T$ $11.8 \times 3.6 \times 3.0mm / 10.1 \times 10.0 \times 3.2mm$
Performance	Inductance : $\sim 12mH$ Inductance tolerance : $\pm 2\%$ ~ Operating temp. range : $-40^{\circ}C \sim +125^{\circ}C$
KL73, KQ	Chip Inductors for High Frequency Circuit
Features	KL73 : Thin Film Chip Inductors (High precision) KQ : Air-Core Chip Inductors (High Q)
Performance	Inductance range : $0.56n \sim 10 \mu H$ Inductance tolerance : $\pm 2\%$ ~ Operating temp. range : $-40^{\circ}C \sim +125^{\circ}C$
LFC32	Wire Wound Molded Chip Inductors
Features	Wire wound inductors for various signal lines. Excellent stability due to the molding structure. 3225mm size
Performance	Inductance range : $5nH \sim 330 \mu H$ Quality factor : $11 \sim 30$ Operating temp. range : $-40^{\circ}C \sim +100^{\circ}C$



Thick Film Resistors

RK73, WK73	Flat Chip Resistors
Features	General purpose to precision. RK73_RT : Flat Chip Resistors (Anti Sulfuration) WK73_RT : Wide Terminal (Anti Sulfuration)
Performance	Resistance tolerance : $\pm 0.5\% \sim \pm 5\%$ Operating temp. range : $-55^{\circ}C \sim +155^{\circ}C$
SG73	Surge Current Flat Chip Resistors
Features	Excellent surge resistant characteristic. SG73S : Anti Surge (Precision) SG73P : Anti Pulse (Precision) SG73_RT : Surge Resistors (Anti Sulfuration)
Performance	Resistance tolerance : $\pm 0.5\% \sim \pm 20\%$ Operating temp. range : $-55^{\circ}C \sim +155^{\circ}C$

Engine Control Unit

Chip resistors : **RK73**
Anti sulfuration : **RK73_RT**
High power chip resistors : **WK73**
Anti sulfuration : **WK73S/R_RT**
Current detecting resistors :
SL, TLR, WK73S
Anti surge resistors : **SG73S/P**
Anti sulfuration surge :
SG73_RT
Chip varistors : **NV73DL/DS**
Thermal sensors : **SDT73V**

Electric Power Steering

Precision chip resistors :
RN73H, KPC
Current detecting resistors :
PS, TLR, SL
Anti sulfuration surge :
SG73S/P
Thermal sensors : **SDT73V, LT**

Air Flow Sensors

Platinum thermal sensors : **SDT101B**

Engine Ignition

Ceramic resistors : **CPCN**

Transmission Control

Current detecting resistors :
SL, TLR, WK73
Thermal sensors : **SDT73V**

Air Conditioner Control System

Current detecting : **SL, TLR**
Thermal sensors : **LT73V**
Varistors : **NV73DL/DS**

Electric pump

Current detecting resistors :
TLR, SL

HID • Headlight Control

Anti surge resistors : **S**
Current detecting resistors :
SL, LR, BPR, WK73
Anti sulfuration :
RK73_RT, SG73_RT, WK
Chip varistors : **NV73D**
LED current limiting : **L**
Choke coils : **LCM/LPC**

Network Resistors



CN	Chip Networks
Features	4 elements of SMD resistor arrays, Convex and concave termination available. CN1J4 : Concave Termination Type CN1J4A,1J4K : Convex Termination
Performance	Resistance tolerance : $\pm 1\% \sim \pm 5\%$ Operating temp. range : $-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$

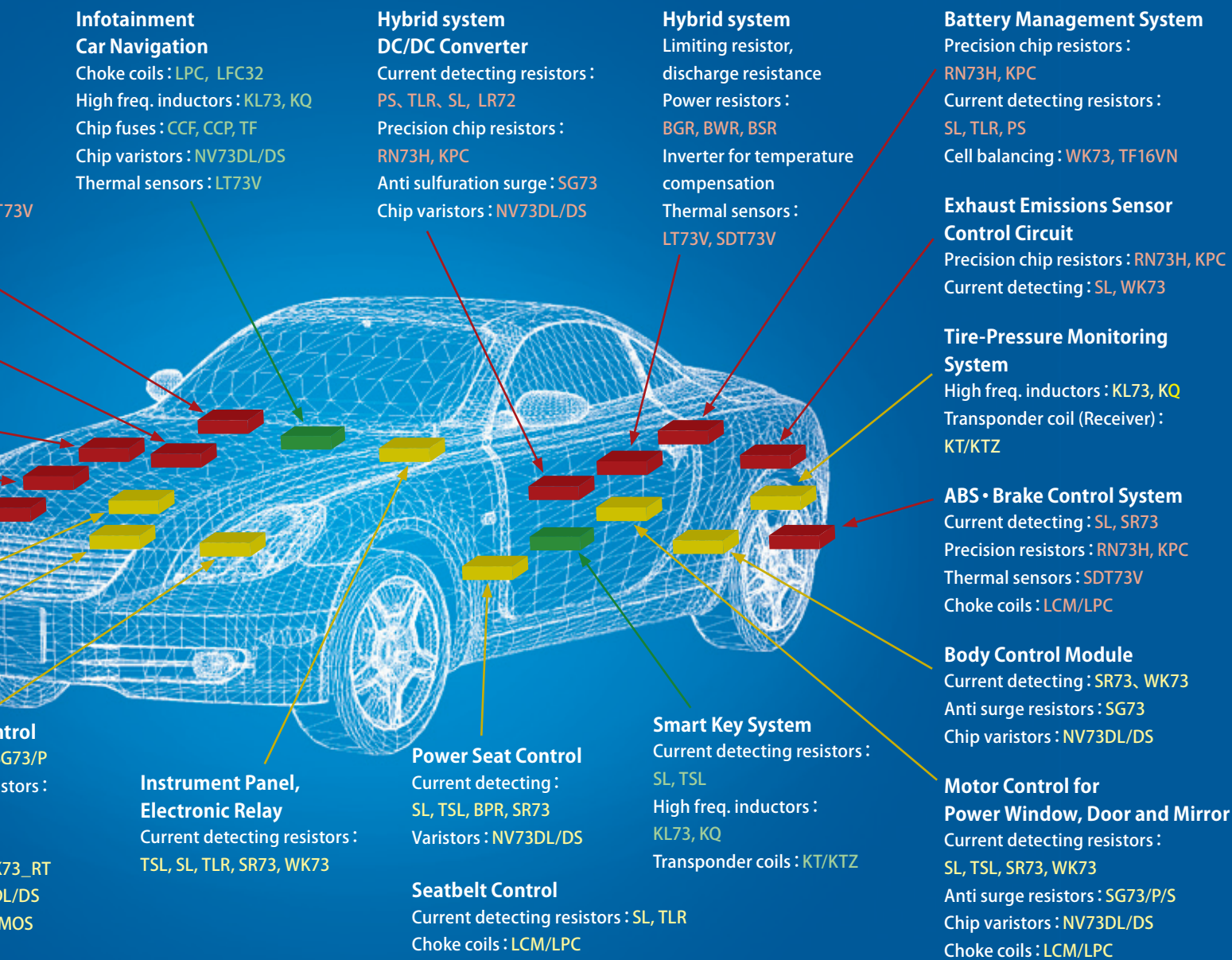
Power Resistors



BGR	Wirewound Resistors (Glass Core)
Features	Ceramic case type. BWR : Wirewound Resistors (Ceramic Core) BSR : Metal Oxide Film Resistors
Performance	Resistance range : $0.1 \sim 75\text{k}\Omega$ Power rating : $1\text{W} \sim 10\text{W}$ (70°C) , $15\text{W} \sim 40\text{W}$ (25°C) Operating temp. range : $-40^{\circ}\text{C} \sim +155^{\circ}\text{C}$

CPCN	Ceramic Resistors/Noise suppressor
Features	Noise reduction of engine ignition circuit. $10.7 \times 3.5\text{mm} \sim 18.3 \times 7.2\text{mm}$
Performance	Resistance : 1k, 5k, 10k, 15k Ω Power rating : $0.5\text{W} \sim 2\text{W}$ Operating temp. range : $-40^{\circ}\text{C} \sim +200^{\circ}\text{C}$

MOS	Metal Oxide Resistors
Features	Flame retardant coating (Equivalent to UL94V-0) Power rating $0.5\text{W} \sim 5\text{W}$ MOSX : Small Metal Film Resistors
Performance	Resistance range : $10 \sim 100\text{k}\Omega$ MOSX : $0.1 \sim 9.1\Omega$ Operating temp. range : $-55^{\circ}\text{C} \sim +200^{\circ}\text{C}$



Infotainment Car Navigation

Choke coils : LPC, LFC32
High freq. inductors : KL73, KQ
Chip fuses : CCF, CCP, TF
Chip varistors : NV73DL/DS
Thermal sensors : LT73V

Hybrid system DC/DC Converter

Current detecting resistors : PS, TLR, SL, LR72
Precision chip resistors : RN73H, KPC
Anti sulfuration surge : SG73
Chip varistors : NV73DL/DS

Hybrid system

Limiting resistor, discharge resistance
Power resistors : BGR, BWR, BSR
Inverter for temperature compensation
Thermal sensors : LT73V, SDT73V

Battery Management System

Precision chip resistors : RN73H, KPC
Current detecting resistors : SL, TLR, PS
Cell balancing : WK73, TF16VN

Exhaust Emissions Sensor Control Circuit

Precision chip resistors : RN73H, KPC
Current detecting : SL, WK73

Tire-Pressure Monitoring System

High freq. inductors : KL73, KQ
Transponder coil (Receiver) : KT/KTZ

ABS • Brake Control System

Current detecting : SL, SR73
Precision resistors : RN73H, KPC
Thermal sensors : SDT73V
Choke coils : LCM/LPC

Body Control Module

Current detecting : SR73, WK73
Anti surge resistors : SG73
Chip varistors : NV73DL/DS

Motor Control for Power Window, Door and Mirror

Current detecting resistors : SL, TSL, SR73, WK73
Anti surge resistors : SG73/P/S
Chip varistors : NV73DL/DS
Choke coils : LCM/LPC

Instrument Panel, Electronic Relay

Current detecting resistors : TSL, SL, TLR, SR73, WK73

Power Seat Control

Current detecting : SL, TSL, BPR, SR73
Varistors : NV73DL/DS

Seatbelt Control

Current detecting resistors : SL, TLR
Choke coils : LCM/LPC

Smart Key System

Current detecting resistors : SL, TSL
High freq. inductors : KL73, KQ
Transponder coils : KT/KTZ

Control
G73/P
Resistors :

73_RT
DL/DS
MOS

Products

Selection

Category	Type	Product Name	Accessories	Body Controls	Power Trains
			-40°C~+85°C	-40°C~+105°C	-40°C~+155°C
Thick Film Resistors	RK73	Flat Chip Resistors	○	○	○
	RK73_RT	Flat Chip Resistors (Anti Sulfuration)	○	○	○
	SG73/S/P	Surge Current Flat Chip Resistors	○	○	○
	SG73_RT	Surge Resistors (Anti Sulfuration)	○	○	○
	WK73_RT	Wide Terminal (Anti Sulfuration)	○	○	○
	CN1J4/A/K	Chip Networks	○	○	○
Current Detecting Resistors	SR73	Low Resistance Flat Chip Resistors	○	○	○
	UR73	Low Resistance Flat Chip (Low T.C.R.)	○	○	○
	WK73	Wide Terminal Type Flat Chip Resistors	○	○	○
	SL	Current Detecting Chip Resistors	○	○	○
	TLR	Metal Plate Chip Resistors	○	○	○
	PS	Chip Type Power Shunt Resistors	○	○	○
	LR	Milliohm Resistors	○	○	○
	LR72	Surface Mount Milliohm Resistors	○	○	○
Thin Film Resistors	RN73H	Thin Film Flat Chip Resistors	○	○	○
	KPC	Thin Film Resistor Networks	○	○	○
	RN41	Melf Type Thin film Resistors	○	○	○
Power Resistors	MOS (X)	Metal Oxide Film Resistors	○	○	○
	CPCN	Ceramic Resistors	○	○	○
	BGR	Wirewound Resistors (Glass Core)	○	○	○
	BWR	Wirewound Resistors (Ceramic Core)	○	○	○
	BSR	Metal Oxide Film Resistors	○	○	○
Thermal Sensors	SDT73V	Platinum Thermal Chip Sensors	○	○	○
	SDT101B	Platinum Thin Film Thermal Sensors	○	○	○
	ST	Custom Thermal Sensors (Platinum Thin Film)	○	○	○
	LT73V	Linear PTC Flat Chip Resistors	○	○	○
Circuit Protectors	NV73DL/DS	Multilayer Metal Oxide Chip Varistors	○	○	○
	CCF	Chip Current Fuses	○	○	○
	CCP	Chip Circuit Protectors	○	○	○
	TF	Chip Current Fuses	○	○	○
	TF16VN	Chip Current Fuses (For Automotive)	○	○	○
	SA	Surge Absorbers	○	○	○
Inductors	LPC	Power Chip Inductors	○	○	○
	LPC4235 • 4545	Power Chip Inductors	○	○	○
	LCM	Power Chip Inductors	○	○	○
	LFC32	Wire Wound Molded Chip Inductors	○	○	○
	KL73	Thin Film Chip Inductors	○	○	○
	KQ	Air-Core Chip Inductors	○	○	○
	KT, KTZ	Transponder Coil	○	○	○
LTCC	KLC	LTCC Multilayer Substrate	○	○	○

○: Applicable

● Description of classification by use for automotive

Power train • Chassis control system : Engine ECU • Transmission ECU • Battery management system and inverter control unit of hybrid vehicle • Electric power steering, ABS, Electric brake etc., operating temperature range of the installation environment is roughly -40°C~+155°C.

Body electrical system : Electric pump, Electric mirror • Power seat • Air-bag ECU • Head lamp control • TPMS • Radar system etc., operating temperature range of the installation environment is roughly -40°C~+105°C.

Accessories : Car-audiovideo • Navigation • ETC • Back sonar • Back monitoring camera etc., operating temperature range of the installation environment is roughly -40°C~+85°C.

- The categories are our own example and will not limit the use of the products nor guarantee the performance unconditionally.
- Should you wish to use the products introduced here contact our sales because this is only a guide to decide which product is to be used for automotive applications. Test and check the products mounted on the actual applications.

Guide

- Below is our products recommended for automotive applications.
- Ask our business contact for other products applicable to automotive applications.



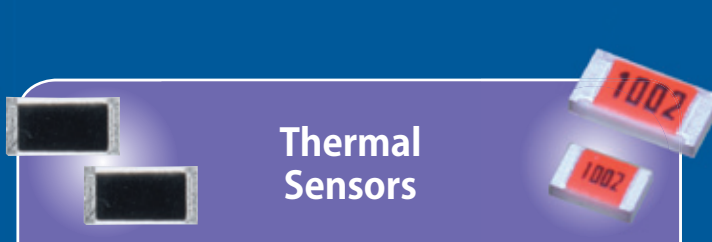
Current Detecting Resistors

TLR	Metal Plate Chip Resistors
Features	Metal plate type, 0.5m~20mΩ 0805~2512 inch size TLRH : Low T.C.R. Type 10mΩ~270mΩ
Performance	Power rating : 0.5W~3W Resistance tolerance : ±1% T.C.R. : ±50×10 ⁻⁶ /K~
PS	Chip Type Power Shunt Resistors
Features	PSB : 3933 inch size : 0.2mΩ=7W, 0.75mΩ/1mΩ=6W PSI : 3921 inch size : 3mΩ/4mΩ=3W PSE : 2525 inch size : 0.5mΩ~2.0mΩ=3W~5W
Performance	Resistance tolerance : ±1%~ T.C.R. : ±50×10 ⁻⁶ /K~ Operating temp. range : -65°C~+155°C
SL	Current Detecting Chip Resistors
Features	Resin molded type, 3m~22MΩ TSL : Low Profile Type SLN : Low T.C.R. Type
Performance	Power rating : 0.75W~3W Resistance tolerance : ±0.5%~ T.C.R. : ±75×10 ⁻⁶ /K~
WK73	Wide Terminal Type Flat Chip Resistors
Features	Thick film wide termination type, 10m~1MΩ High power and strong solder joint. 0612~1225 inch size
Performance	Resistance tolerance : ±0.5%, 1%, 5% T.C.R. : ±100×10 ⁻⁶ /K~ Operating temp. range : -55°C~+155°C
SR73	Low Resistance Flat Chip Resistors
Features	Thick film type, 100m~10Ω 0201~2512 inch size UR73 : Low T.C.R. Type
Performance	Resistance tolerance : ±0.5%~±5% T.C.R. : ±100×10 ⁻⁶ /K~ Operating temp. range : -55°C~+150°C



LTCC Substrate

KLC	LTCC Multilayer Substrate
Features	Low dielectric-loss and low loss conductors. Excellent in the heat dissipation. KA • SC • MCM : Custom Hybrid IC
Performance	Stack accuracy : 20μm max. Line & space : 60μm min. Substrate flatness : 30μm (/15mm) max.



Thermal Sensors

SDT73V	Platinum Thermal Chip Sensors
Features	SMD platinum thin film thermal sensors. T.C.R. is in accordance with JIS, IEC standards. For automotive applications.
Performance	Resistance tolerance : ±0.2%~ T.C.R. : 3850±50×10 ⁻⁶ /K~ Operating temp. range : -55°C~+155°C
SDT101B	Platinum Thin Film Thermal Sensors
Features	Resistance value : 10, 100, 500Ω Usable as a heater of hot film flow sensor. ST : Thermal Sensors
Performance	Resistance tolerance : ±0.5%~ T.C.R. : 3500×10 ⁻⁶ /K~ Operating temp. range : -55°C~+300°C
LT73V	Linear PTC Flat Chip Resistors
Features	SMD thin film thermal sensors. For automotive applications.
Performance	Rated Ambient Temp. +85°C Resistance tolerance : ±2%, 5% T.C.R. : 150~4500×10 ⁻⁶ /K~ Operating temp. range : -55°C~+155°C



Circuit Protectors

NV73DL/DS	Multilayer Metal Oxide Chip Varistors
Features	Surge voltage protectors for automotive. Suitable for the countermeasure against ESD. 0603~1206, 2420 inch size
Performance	Varistor voltage : 12~82V Maximum peak current (8/20μs) : 80~300A Operating temp. range : -40°C~+125°C
CCF	Chip Current Fuses
Features	Surface mounting fuses with ceramic body. Rapid change of temp. -55°C/+125°C, 100 cycles 2410 inch size
Performance	Rated current : 0.4~15A Rated voltage : DC 60~160V Operating temp. range : -40°C~+125°C
TF/CCP	Chip Current Fuses
Features	SMD over current protectors. Rapid change of temp. -55°C/+125°C, 10 cycles TF16VN : Rapid change of temp. -55°C/+125°C, 1000 cycles CCP : Chip Circuit Protectors
Performance	Rated current : 0.4~5A Rated voltage : 32V, 72V Operating temp. range : -55°C~+125°C



www.koanet.co.jp

	Sales Offices		Address
Japan	JAPAN	GLOBAL SALES CENTER	2-17-2 MIDORI-CHO, FUCHU-SHI, TOKYO 183-0006, JAPAN TEL [+81] 42-336-5755 FAX [+81] 42-336-5353
North and South America	USA	KOA SPEER ELECTRONICS, INC.	199 BOLIVAR DRIVE, BRADFORD, PA. 16701, USA TEL [+1] 814-362-5536 FAX [+1] 814-362-8883
Europe	GERMANY	KOA Europe GmbH	KADDENBUSCH 6, D-25578 DÄGELING ITZEHOE, GERMANY TEL [+49] 4821-8989-0 FAX [+49] 4821-8989-89
Asia	SINGAPORE	KOA DENKO (S) PTE. LTD.	72 BENDEMEER ROAD, #06-28 LUZERNE, SINGAPORE 339941 TEL [+65] 63395151 FAX [+65] 63398556
	THAILAND	KOA DENKO (S) PTE. LTD. THAILAND REPRESENTATIVE OFFICE	38 Q.HOUSE CONVENT BLDG. 7TH FLOOR UNIT 7CD, CONVENT RD., SILOM, BANGRAK, BANGKOK 10500 THAILAND TEL [+66] 2632-0382 FAX [+66] 2632-0903
	MALAYSIA	KOA DENKO (MALAYSIA) SDN. BHD.	LOTS 7, 8 & 9, BATU BERENDAM, FTZ 75350, MALACCA, MALAYSIA TEL [+60] 6-2328031 FAX [+60] 6-2328030
	HONG KONG	KOA ELECTRONICS (H.K.) LTD.	UNIT 2315, METROPOLIS TOWER, 10 METROPOLIS DRIVE, HUNGHOM, KOWLOON, HONG KONG TEL [+852] 2492-6918 FAX [+852] 2492-7398
	CHINA	上海可爾電子貿易有限公司 SHANGHAI KOA ELECTRONICS TRADING CO., LTD.	中国上海市漕河泾新興技術開發区桂平路581号 NO.581 GUIPING ROAD, CAO HE JING, SHANGHAI, 200233, CHINA TEL [+86] 21-64320101 FAX [+86] 21-64320083
	CHINA	上海興亞電子元件有限公司 SHANGHAI KOA ELECTRONICS CO., LTD.	中国上海市漕河泾新興技術開發区桂平路581号 NO.581 GUIPING ROAD, CAO HE JING, SHANGHAI, 200233, CHINA TEL [+86] 21-64850723 FAX [+86] 21-64852960
	CHINA	無錫興和電子陶瓷有限公司 WUXI KOA ELECTROCERAMICS CO., LTD.	中国江蘇省宜興市和橋鎮西鋤村向山路1号 HEQIAO, YIXING CITY, JIANGSU PROVINCE, 214215, CHINA TEL [+86] 510-87871645 FAX [+86] 510-87871626
	CHINA	興和電子(太倉)有限公司 KOA ELECTRONICS (TAICANG) CO., LTD.	中国江蘇省太倉市太倉經濟開發区洛陽東路77号 NO. 77 LUOYANG EAST ROAD, TAICANG ECONOMY DEVELOPMENT AREA, TAICANG, JIANGSU PROVINCE, 215400, CHINA TEL [+86] 512-53561111 FAX [+86] 512-53561600
	TAIWAN	大興電工股份有限公司 DAH HSING ELECTRIC CO., LTD.	中華民國台北市南京東路1段34號平安大樓11樓 11TH FLOOR PING-AN MANSION, NO.34 SEC.1, NAN-KING EAST ROAD, TAIPEI, TAIWAN TEL [+886] 2-2521-4166 FAX [+886] 2-2564-1859
	TAIWAN	高雄興亞股份有限公司 KOA KAOHSIUNG CORPORATION	中華民國高雄市楠梓加工出口區開發路17之2號 17-2 KAI-FA ROAD, N.E.P.Z.KAOHSIUNG, 81170, TAIWAN TEL [+886] 7-363-4157 FAX [+886] 7-363-4543
	JAPAN	HEAD OFFICE	EARTH WING IN KOA PINE PARK 14016, OAZA, NAKA-MINOWA MINOWA-MACHI, KAMIINA-GUN, NAGANO, 399-4697, JAPAN TEL [+81] 265-70-7171