

For Automotive Electronics

Passive Components

Selection Guide



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For the future, create New Value together with customers

Creation of New Value

KOA, for nearly 30 years, has been engaging in business improvement activities under the banner of the KPS (KOA Profit System) with the involvement of all employees. Currently, KOA is in the third phase of KPS to focus on building a business model of offering New Value to its customers by tapping into its product development capabilities made possible by its fundamental technologies to capitalize on innovations transpiring in the future.

KOA, since its foundation over 70 years ago, has accumulated a variety of fundamental technologies for Materials, Processing, Evaluation, etc., in the process of expanding its electronic components business with resistors being its mainstay products. Through deepening further and linking its fundamental technologies and by pursuing Open Innovation with research institutions working on cutting-edge projects and with partner companies, KOA is striving to create New Value together with its customers.



KOA Smart Option

It is our wish that even in new markets that emerge from innovations, choosing KOA as a partner is the "smart option" for our customers.



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For Autom



Thick Film Resistors

RS73F/RK73F/RK73G Precision	
Features	Excellent Resistance Tolerance and T.C.R. RS73 : Low T.C.R., High Reliability (Ultra Precision) RK73F : Low T.C.R. (Ultra Precision)
Performance	Resistance tolerance : $\pm 0.1\%$ ~ T.C.R. : $\pm 25 \times 10^{-6}/K$ Long term stability : 0.2%~
HRK73 High Temperature	
Features	Suitable for conductive glue mounting 0603~1206 inch Size
Performance	Operating temp. range : $-55^{\circ}C \sim 200^{\circ}C$
WK73R Wide Terminal Type	
Features	High rated power and resistant to heat cycle 0204~1225 inch Size WG73 : Anti Surge (2010 inch size)
Performance	Power rating : 0.33W~3W
SG73 Anti Surge • Anti Pulse	
Features	SG73S : Anti Surge (Precision) SG73P : Anti Pulse (Precision) SG73G : Low T.C.R. Type (Ultra Precision)
Performance	Resistance tolerance : $\pm 0.25\%$ ~ $\pm 20\%$ T.C.R. : $\pm 50 \times 10^{-6}/K$ ~
HV73V High Voltage	
Features	Excellent for higher Working Voltages 0603~1206 inch Size
Performance	Max. working voltage : $\sim 800V$ (1206 inch size)
□-RT Anti Sulfuration	
Features	Excellent anti-sulfuration characteristic Line up various types from general purpose to low resistance General, Precision, Anti Surge, Wide Terminal, High Voltage, Network, Low resistance
Performance	Resistance tolerance : $\pm 0.1\%$ ~ $\pm 20\%$



Network Resistors

CN Chip Networks	
Features	4 elements of SMD resistor arrays, CN1J4 : Concave Termination Type CN1E4K, 1J4K : Convex Termination Type
Performance	Resistance tolerance : $\pm 1\%$ ~ $\pm 5\%$



Current Sensing Resistors

HS Large Current Type	
Features	Bus bar and Cable can be screwed on. 4015 millimeter~ size Correct electric current detection by a voltage pin is possible
Performance	Current rating : $\sim 600A$ Resistance Range : 0.1m~0.2m Ω T.C.R. : $\pm 50 \times 10^{-6}/K$ ~
PS Chip Type Power Shunt	
Features	Metal plate type 2 terminal : PSL2/2512 inch, PSJ2/3920 inch size 4 terminal : PSF4/1216 inch, PSG4/2725 inch size
Performance	Resistance Range : PSL2/PSJ2:0.2m Ω ~ PSF4/PSG4:0.5m Ω , 1m Ω Power rating : $\sim 12W$ T.C.R. : $\pm 50 \times 10^{-6}/K$ ~
TLR Metal Plate	
Features	0402~2512 inch size TLRZ : Jumper Type 0.2m Ω Max.~ TLRH : Low T.C.R., 6m~270m Ω (0805, 2512 inch size)
Performance	Resistance Range: 0.5m~20m Ω Power rating : 0.25~5W T.C.R. : $\pm 50 \times 10^{-6}/K$ ~
SL Molded Type	
Features	SLN : Low T.C.R. Type
Performance	Resistance Range: 3m~360m Ω Power rating : 0.75~7W T.C.R. : $\pm 50 \times 10^{-6}/K$ ~
WU73/WK73S Thick Film Wide Terminal Type	
Features	Thick film wide termination type, 10m~9.76 Ω Resistant to heat cycle WU73 : Low T.C.R. Type (0612 inch size)
Performance	Power Rating : 0.75~3W T.C.R. : $\pm 75 \times 10^{-6}/K$ ~
UR73V/SR73 Thick Film	
Features	Thick film type, 10m~10 Ω 0201~2512 inch size UR73V : Low T.C.R. Type (0805, 1206 inch size)
Performance	Power Rating : 0.166~2W T.C.R. : $\pm 75 \times 10^{-6}/K$ ~



LTCC Substrate

KLC LTCC Multilayer Substrate	
Features	Excellent high frequency performance ceramics of low dielectric-loss Custom Hybrid IC is available
Performance	Dielectric constant : 7, C.T.E. : $5.5 \times 10^{-6}/K$ Conductor resistivity : Silver 2.5m $\Omega \cdot cm$ Line/Space : 60/60 μm Min.

otive Electronics KOA



Thin Film Resistors



HVD	Thin Film Resistors Network For High Voltage Divider	RN73H	Thin Film Flat Chip Resistors
Features	High precision high voltage divider Relative precision of pair resistors is guaranteed High reliability, long term stability package	Features	High precision Excellent in long term stability 0402~1210 inch size
Performance	Max. working voltage : ~1000V Resistance range : ~11.5MΩ Operating temp. range : -55°C~155°C	Performance	Resistance tolerance : ±0.05%~ T.C.R. : ±5×10 ⁻⁶ /K~ Operating temp. range : -55°C~+155°C
KPC	Thin Film Resistor Networks	LT73V	Linear PTC Flat Chip Resistors
Features	Ultra high precision High reliability, long term stability package SOT-23, QSOP 16/20/24, SOIC 08/14/16	Features	SMD thin film thermal sensors
Performance	Relative resistance tolerance : ±0.05%~ Tracking T.C.R. : ±5×10 ⁻⁶ /K~ Operating temp. range : -55°C~+125°C (155°C is custom)	Performance	Rated ambient temp. : 85°C Resistance tolerance : ±2%, ±5% T.C.R. : 150~4500×10 ⁻⁶ /K

EV/PHEV Inverter

Current sensing : PS, TLR, SL
High Temperature : HRK73
Anti surge, Anti pulse : SG73/S/P/G
High Voltage : HV73V
Precision :
RS73, RK73F, HVD, RN73H, KPC
High Power : BGRV, BSRV
Thermal sensors : LT73V

EV/PHEV Battery Management System

Large current shunt : HS
Current sensing : PS, TLR, SL
High Voltage : HV73V
High voltage divider : HVD
Precision :
RS73, RK73F, RN73H, KPC
Cell balancing :
SG73S/P/G, WK73R, TF16VN

EV/PHEV DC/DC Converter

Current sensing :
PS, TLR, SL
Anti surge, Anti pulse :
SG73/S/P/G
Precision :
RS73, RK73F, HVD,
RN73H, KPC
Chip varistors :
NV73DL/DS
Thermal sensors :
LT73V

EV/PHEV On board charger

Current sensing :
PS, TLR, SL
High Voltage : HV73V
Pre-charge,
Discharge : BGRV, BSRV
Thermal sensors :
LT73V, SDT73V

Engine ECU

Current sensing :
TLR, SL, WK73S, WU73, UR73V
High power : WK73
Anti surge, Anti pulse : SG73/S/P/G
Anti sulfuration :
WK73_RT, SG73_RT, SR73_RT
Chip varistors : NV73DL/DS

ASC/ESC Brake Control System

Current sensing :
PS, TLR, SL, WK73S, WU73, UR73V, SR73
Precision : RN73H, KPC
Thermal sensors : SDT73V, SDT101B
Choke coils : LPC

Air Flow Sensors

Platinum thermal sensors :
SDT310VASP, SDT101B

Engine Ignition

Ceramic resistors : CPCN

Transmission Control

Current sensing :
TLR, SL, WK73S, WU73, UR73V
High Temperature :
HRK73

Anti sulfuration :

WK73_RT, SG73_RT, SR73_RT

Air Conditioner Control System Electric compressor

Current sensing : PS, TLR, SL
Varistors : NV73DL/DS
Thermal sensors : LT73V

Electric Pump Oil Pump/Fuel Pump/Water Pump

Current sensing : PS, TLR, SL
Anti surge, Anti pulse : SG73S/P/G

LED/HID Headlight Control

Current sensing : SL, WK73S
Anti surge, Anti pulse : SG73/S/P/G
Anti sulfuration :
WK73_RT, SG73_RT, SR73_RT
Current limiting : MOS
Chip varistors : NV73DL/DS
Choke coils : LPC
Thermal sensors : LT73V

AFS/Auto leveling

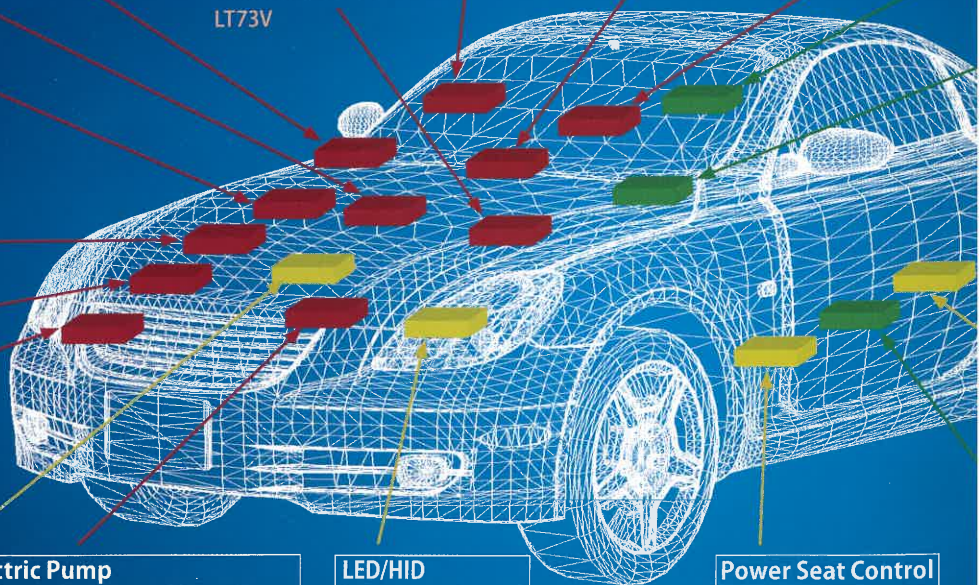
Current sensing : UR73V, SR73

Power Seat Control

Current sensing :
SL, UR73V, SR73
Varistors : NV73DL/DS

Seatbelt Control

Current sensing : TLR, SL
Choke coils : LPC



Products

Selection

Thermal Sensors

SDT310VASP Small type Platinum Thin Film Thermal Sensors (Small Heater Element)

Features
Resistance value 20Ω
Usable as a heater of hot film flow sensor
Thermal time constant 3.2s

Performance
Resistance tolerance: ±1%
Power rating: 0.5W
Operating temp. range: -55°C~+600°C

SDT101B/SDT73V Platinum Thin Film Thermal Sensors

Features
SDT101B: Leded type (Resistance: 10, 100, 500Ω)
Usable as a heater of hot film flow sensor
SDT73V: SMD type (Resistance: 100, 500Ω)

Performance
Resistance tolerance: ±0.2%~
T.C.R.: $3500 \times 10^{-6}/K$ (SDT101B), $3850 \times 10^{-6}/K$ (SDT73V)
Operating temp. range: -55°C~+300°C (SDT73V: ~155°C)

Electric Power Steering

Current sensing:

PS, TLR, SL

Precision: RN73H, KPC

Anti surge, Anti pulse:

SG73/S/P/G

ADAS

Camera, millimeter wave, LIDAR,
HUD, Electric mirror

Current sensing:

WK73S, WU73, UR73V, SR73

Anti surge, Anti pulse: SG73/S/P/G

Chip varistors: NV73DL/DS

Infotainment Car Navigation

Current sensing: UR73V

Chip fuses: TF16VN

Chip varistors: NV73DL/DS

Choke coils: LPC

High freq. inductors: KQ

Thermal sensors: LT73V

Exhaust Emissions Sensor Control Circuit

Precision: RN73H, KPC

Current sensing: SL, WK73S

Thermal sensors: SDT310VASP

Tire-Pressure Monitoring System

High freq. inductors: KQ

Body Control Module

Current sensing:

WK73S, WU73, UR73V, SR73

Anti surge, Anti pulse: SG73/S/P/G

Chip varistors: NV73DL/DS

Motor Control for Power Window, Door and Mirror

Current sensing:

TLR, SL, WK73S, WU73, UR73V, SR73

Anti surge, Anti pulse: SG73/P/S/G

Chip varistors: NV73DL/DS

Choke coils: LPC

Smart Key System

Current sensing: SL

High freq. inductors: KQ

Power Resistors

B□RV Ceramic Case Resistors

Features
Resistors with ceramic case
BGRV: Wirewound Resistors (Glass Core)
BSRV: Metal Oxide Film Resistors (Ceramic Core)

Performance
Resistance range: 0.51~56kΩ
Power rating: 15W~40W
Operating temp. range: -40°C~+155°C

CPCN Ceramic Resistors/Noise suppressor

Features
Noise reduction of engine ignition circuit.
10.7×3.5mm~18.3×7.2mm
2NS: SUS304 Electrode cap

Performance
Resistance: 1k, 2k, 5k, 10k, 15kΩ
Power rating: 0.5W~2W
Operating temp. range: -40°C~+200°C

Inductors

LPC Power Chip Inductors

Features
High rated current, Low DC Resistance
LPC4235/4545/4045

Performance
Inductance range: 0.82μH~2.2mH
Allowable DC current: 0.12A~3.66A

KQ Chip Inductors for High Frequency Circuits

Features
Air Core Chip Inductors(High Q)

Performance
Inductance range: 1nH~10μH
Inductance tolerance: ±2%~

Circuit Protectors

TF16VN Chip Current Fuses

Features
SMD over current protectors
Rapid change of temp. -55°C/+125°C, 1000 cycles

Performance
Rated current: 0.40~3.15A
Rated voltage: 32V

NV73DL/DS Multilayer Metal Oxide Chip Varistors

Features
Surge voltage protectors
Suitable as countermeasure against ESD and load dump surge
0603~1206, 2420 inch size

Performance
Varistor voltage: 12~82V
Maximum peak current (8/20μs): 80~300A




Guide

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

Category	Type	Product Name	Operating Temperature		AEC-Q200 Data	note		
			Lower (°C)	Upper (°C)				
Thick Film Resistors	RK73	Flat Chip Resistors	-55	155	○※	※Exemption B/H : 1F		
	RK73_RT	Flat Chip Resistors (Anti Sulfuration)			○			
	RS73	High Reliability Flat Chip Resistors			○			
	RS73_RT	High Reliability Flat Chip Resistors (Anti Sulfuration)			○			
	SG73/S/P/G	Surge Current Flat Chip Resistors			○			
	SG73/S/P_RT	Surge Current Flat Chip Resistors (Anti Sulfuration)			○			
	WK73R/WG73	Wide Terminal Type Flat Chip Resistors/Anti Surge			○			
	WK73R/S_RT	Wide Terminal (Anti Sulfuration)			○			
	HV73V	High Voltage Flat Chip Resistors			○			
	CN	Chip Networks			○※	※CN1E4K, CN1J4/K		
	HRK73	High Temperature Flat Chip Resistors			200	○		
Current Detecting Resistors	SR73	Low Resistance Flat Chip Resistors	-55	155	○※	※Exemption 1H		
	SR73_RT	Low Resistance Flat Chip Resistors (Anti Sulfuration)			○			
	UR73V	Low Resistance Flat Chip (Low T.C.R.)			○			
	WU73/WK73S	Wide Terminal Type Low Resistance			○			
	SL/SLN	Current Detecting Chip Resistors			-55※	180	○	※SLN5: -65 to 180°C
	TLR	Metal Plate Chip Resistors			-65	170※1	○※2	※1 1E: to 125°C, 2A: to 155°C ※2 Exemption 1E"
	TLRZ	Metal Plate Chip Jumper			-55	155	○	
	TLRH	Metal Plate Chip Resistors				170※	○	※2A: -65 to 155°C
Thin Film Resistors	PSB/E/I	Chip Type Power Shunt Resistors	-65	155	○			
	PSJ2/L2/G4/F4	Chip Type Power Shunt Resistors			○			
	HS	Large Current shunt			○			
	RN73H	Thin Film Flat Chip Resistors			155	○		
	KPC	Thin Film Resistor Networks			125※	—	※155°C is Custom	
Power Resistors	HVD	Thin Film Resistors Network For High Voltage Divider	-40	155	○			
	RN41	Melf Type Thin Film Resistors			155	○※	※Only 2ES/3AS	
	BGRV	Wirewound Resistors (Glass Core)			155	○		
Thermal Sensors	BSRV	Metal Oxide Film Resistors	-55	200	—	Check the use conditions		
	CPCN/HPC	Ceramic Resistors			600	○		
	SDT310VASP	Small type Platinum Thin Film Thermal Sensors (Small Heater Element)			300	○※	※Only 500Ω	
	SDT101B	Platinum Thin Film Thermal Sensors			155	○		
Circuit Protectors	SDT73V	Platinum Thermal Chip Sensors	-40	125	○			
	LT73V	Linear PTC Flat Chip Resistors			○			
Inductors	NV73DL/DS	Multilayer Metal Oxide Chip Varistors	-55	125	○			
	TF16VN	Chip Current Fuses (For Automotive)			○			
	LPC4235・4545	Power Chip Inductors			-40	125	○	
LTCC	LPC4045	Power Chip Inductors	—	—	○			
	KQ	Air-Core Chip Inductors			85	○		
	KLC	LTCC Multilayer Substrate			—	Check the use conditions		

○: Applicable — : N/A

● 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・Rader 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.

Quality - 1st

Auto market has been evolving with the keywords "environment", "safety" and "convenience". People shift to using electric vehicles with consideration for environment while electronic control is increasingly promoted.

Furthermore, safety control including ADAS(Advanced Driver Assistance System) are enriched and high precision sensing and control system are being developed toward automatic driving, electronic components are indispensable for all these applications that require high performance and reliability.

As miniaturization of portal devices, development of wearable devices and IoT business spreading, small size and high performance electronic devices are required.

High reliability to support safe society is indispensable for medical devices, measuring equipment and infrastructure facilities including telecommunication base station and data center. Under the management policy of Quality 1st and to meet the markcustomer requirements, we promote the activities to achieve Zero Defect Flow and high quality products. For Quality Management System, we have ISO 9001 registration, ISO/TS16949 registration for automotive market, environment management system ISO14001 and ISO/IEC17025 registration for analysis laboratory of environmental hazardous materials.

Service

KOA provides top level global support with a worldwide production and sales organization.

Our website is multilingual with latest product information in Japanese, English and Chinese.

We will help your product inquiries and requests for technical support. Please visit our website.

KOA Website: www.koaglobal.com

Standards Registration

ISO 9001 Dec. 1994

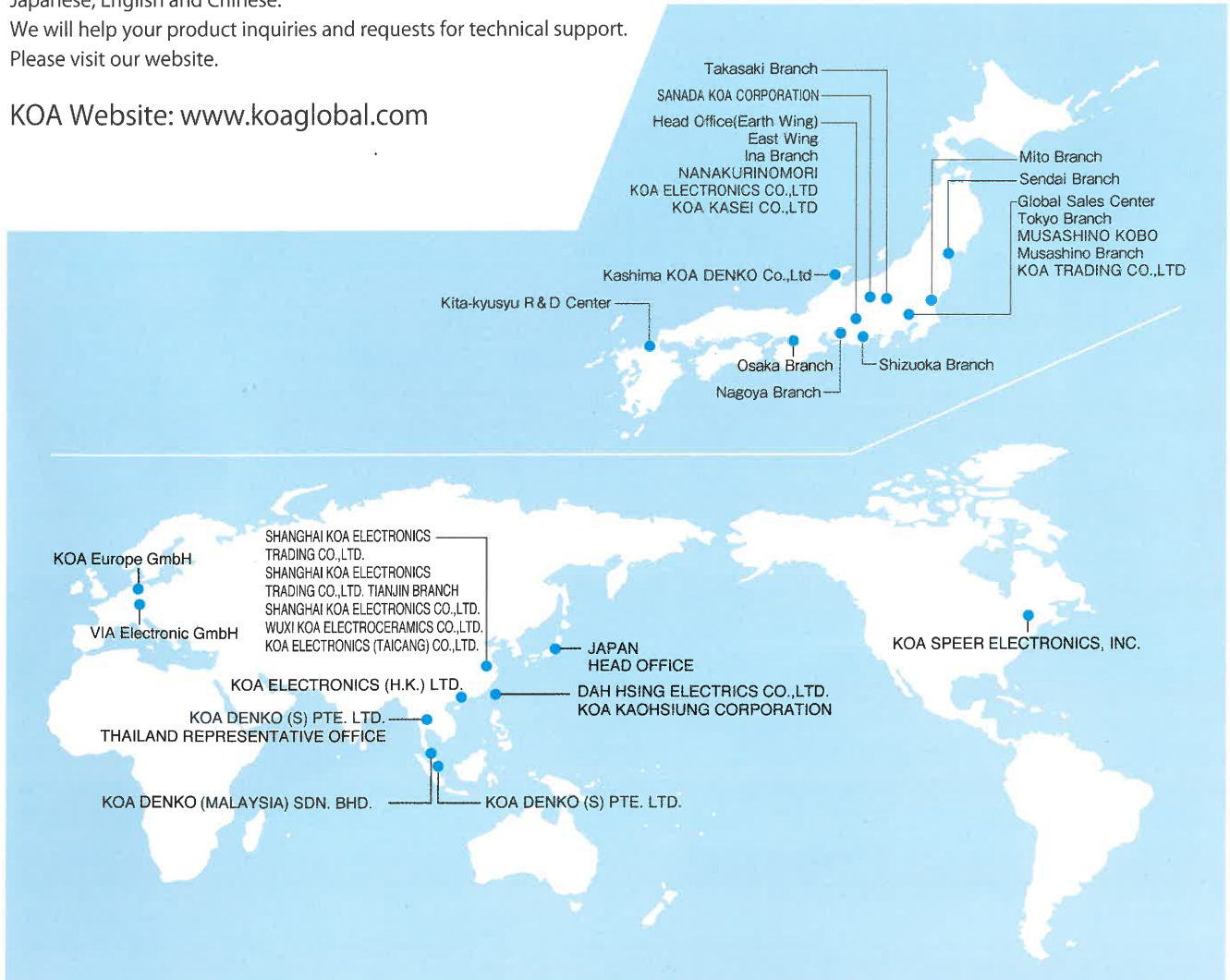
IATF16949 May. 2018

ISO 14001 Apr. 1998

ISO/IEC17025 Jul. 2007

Production

KOA's production through solid supply chain supports production activities and flexibly responses to customers' requirements by KOA's unique production improvement activity, KPS activity, based on our just-in-time policy, only what is needed, when it is needed, and in the amount needed. We operate environment management system conformed to ISO14001, as the name of "Father Sun", to promote green procurement as well as to reduce environmental risks by zero emission, environmental accident protection and energy saving activities.





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	<u>TAIWAN</u>	高雄興垂股份有限公司 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
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