TAIYO YUDEN

High Reliability Products for

Automotive

TAIYO YUDEN CO., LTD.

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104-0031, Japan

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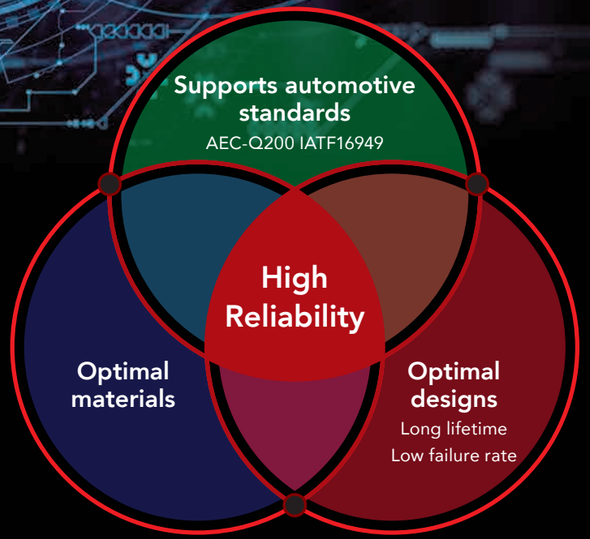
https://www.yuden.co.jp/ut/

J2201

What's the difference?

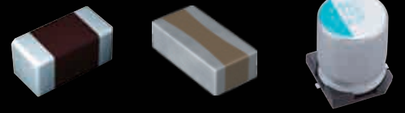
High Reliability Products

Products optimized for the requirements of individual industrial categories, such as automotive device and industrial equipment markets



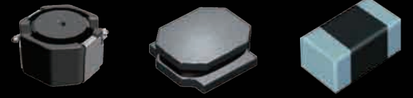
Capacitors

Multilayer Ceramic Capacitors/Conductive Polymer
Hybrid Aluminum Electrolytic Capacitors



Inductor and EMC Suppression Components

Metal Power Inductors／Ferrite Power Inductors
Bead Inductors



Powertain

engine ECU
cruise control unit
4WS (4 weel stearing)
automatic transmission
power steering
HEV/PHV/EV core control
(battery,inverter,DC-DC)
automotive locator
(car location information providing device)

Safety

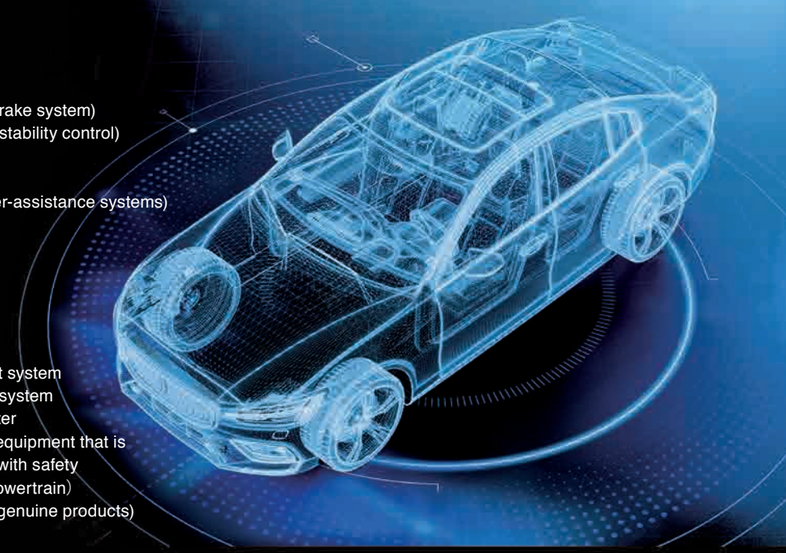
ABS(anti-lock brake system)
ESC(electronic stability control)
airbag
ADAS
(advanced driver-assistance systems)

Body & Chassis

wiper
automatic door
power window
keyless entry system
automobile digital mirror
interior lighting
air conditioning system
TPMS(tire pressure monitoring system)
anti-theft device (immobilizer)

Infotainment

car infotainment system
ITS /telematics system
instrument cluster
ADAS（sensor, equipment that is not interlocked with safety equipment or powertrain）
drive recorder (genuine products)



About Regulation

AEC-Q200

・AEC-Q100: integrated circuits (IC)
・AEC-Q101: discrete semiconductor components (transistors, diodes, etc.)
・AEC-Q200: passive components (capacitors, inductors, etc.)

AEC-Q200 features

Establishes standards for high reliability, including high temperature/ high humidity resistance, thermal shock resistance, and durability.

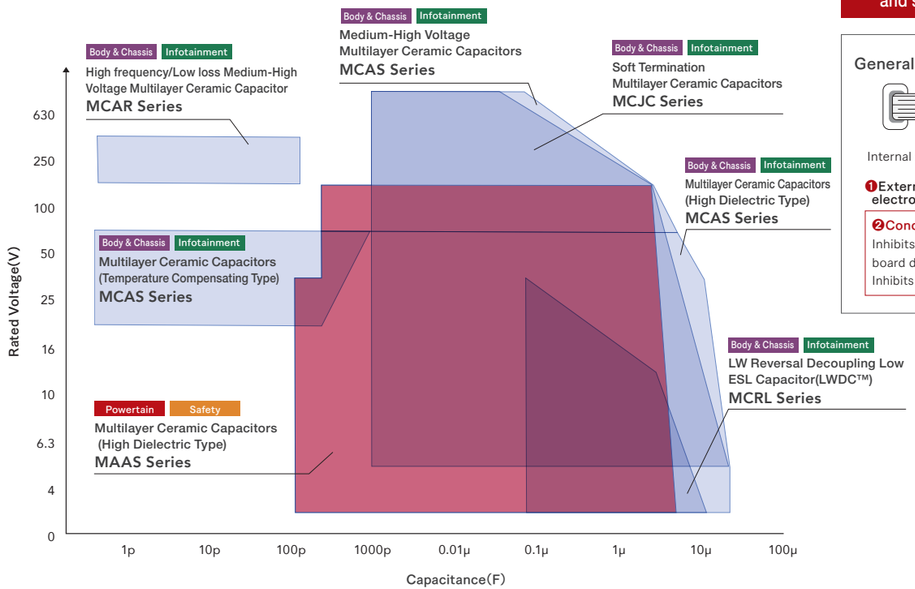
IATF16949(management system standard for the automobile industry)

IATF16949 is a quality management system standard for the automobile industry issued by the IATF (International Automotive Task Force). TAIYO YUDEN plants have received IATF16949 certification not only in Japan, but also in South Korea, China, Philippines, and Malaysia. These plants manufacture a broad range of High Reliability Products. The multipolarization (decentralization) of manufacturing sites minimizes the risk of impact of natural disasters and international conflicts; and utilizes the geographical advantage of being close to customers (consumption area) to establish SCM (supply system) which can deliver products more quickly.

Type & Position

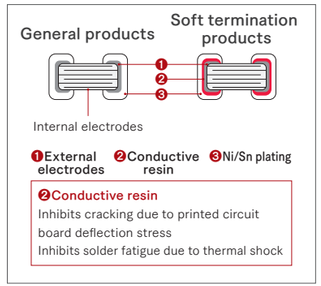
Multilayer Ceramic Capacitors

Performance map



※About "■■■■ Series"
Code in front of Series have been extracted from Part number, which describes the segment of products, such as kinds and characteristics.

Differences between general products and soft termination capacitors



Products

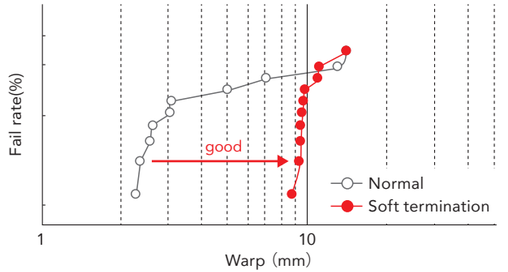
Featured Products

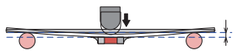
Body & Chassis Infotainment

Soft Termination Multilayer Ceramic Capacitors

Use of a conductive resin for the external electrodes
・Inhibits cracking due to printed circuit board deflection stress
・Inhibits solder fatigue due to thermal shock

Inhibits cracking due to printed circuit board deflection stress





Measurement of the amount of deflection when a crack is formed

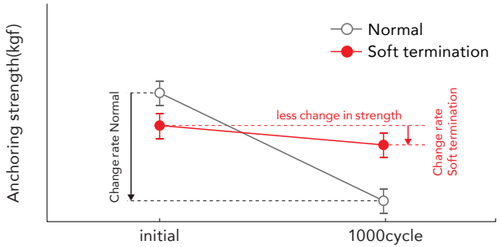
After measurement

【Normal】

【Soft termination】

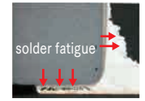
The resin layer alleviates the stress to supress the occurrence of cracks

Inhibits solder fatigue due to thermal shock



After measurement

【Normal】



【Soft termination】

Type & Position

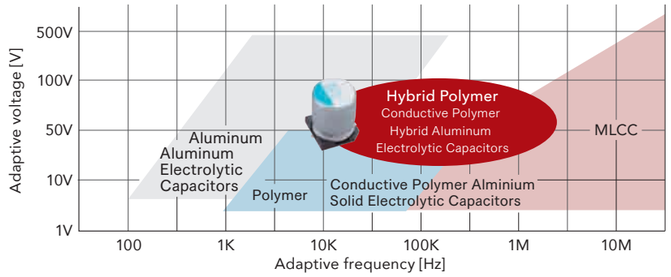
Aluminum Electrolytic Capacitors

Powertain Safety Body & Chassis Infotainment

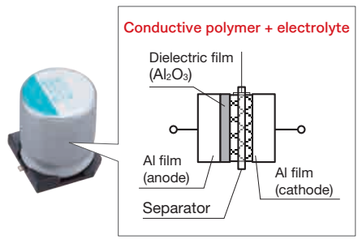
Conductive Polymer Hybrid Alminium Electrolytic Capacitors

Realizing a low ESR, long life, and low leak current with a hybrid structure (electrolyte + conductive polymer)

Performance map



Conductive Polymer Hybrid Aluminum Electrolytic Capacitors Structure chart



Charateristics comparison

Item	Aluminum Electrolytic Capacitors	Conductive Polymer Hybrid Aluminum Electrolytic Capacitors
Electrolyte	electrolytic solution	Conductive Polymer + electrolytic solution
ESR @20℃ 100kHz	Average	**Excellent**
Leakage current	Good	**Excellent**
Rated ripple current	Average	Good
High Freq. Characteristics at low temperature	Average	**Excellent**
Guaranteed life	Average	**Excellent**

Products

Featured Products

Powertain Safety Body & Chassis Infotainment

Vibration resistant

Vibration resistant	with lead	Chip type	
	Aluminum Electrolytic Capacitors	Aluminum Electrolytic Capacitors	Conductive Polymer Hybrid Aluminum Electrolytic Capacitors
30G	RARPK Series (RPK Series) ※ (125°C)	RARTZ Series (RTZ Series) ※ (105°C) RARTD Series (RTD Series) ※ (105°C) RARTT Series (RTT Series) ※ (125°C) RARTQ Series (RTQ Series) ※ (150°C)	RAHT1 Series (HT Series) ※ (105°C) RAHTK Series (HTK Series) ※ (125°C) RAHTX Series (HTX Series) ※ (135°C)
40G	RARKE Series (RKE Series) ※ (125°C) RARKF Series (RKF Series) ※ (135°C) RARKG Series (RKG Series) ※ (150°C)	—	—

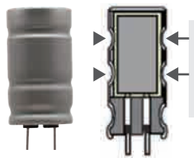
with lead

RARPK Series(RPK Series)※

Auxiliary terminals
(Not connected)

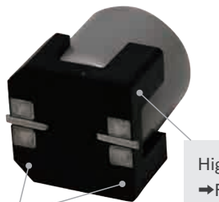
Auxiliary terminals➡Enhanced adhesion

RARKE Series(RKE Series)※



Internal element
Vibration prevention

Chip type



High-wall base
➡Fixed main part

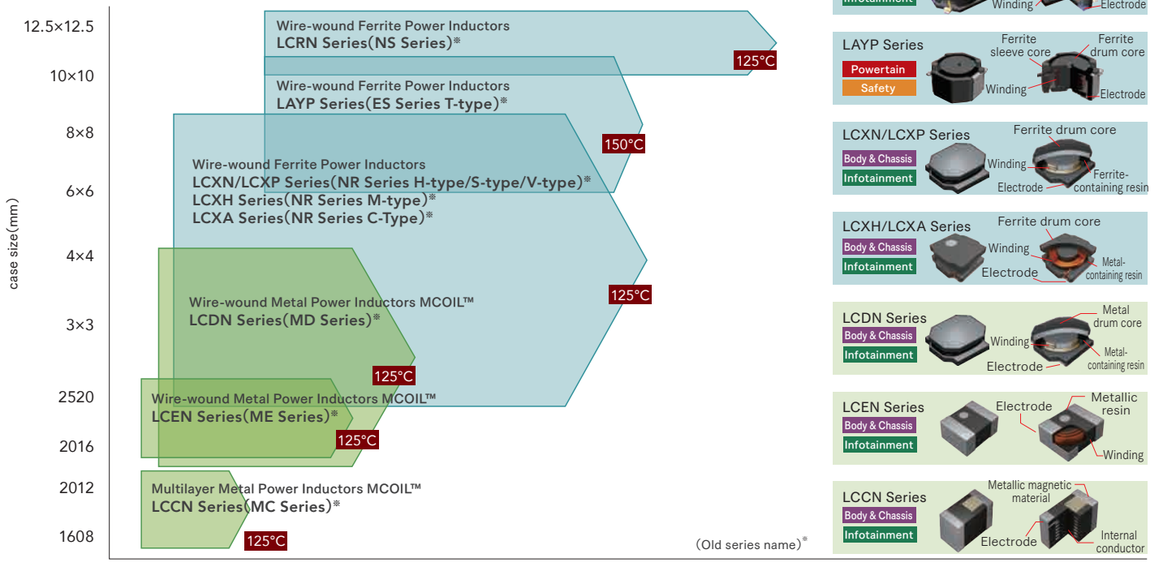
Auxiliary terminals
➡Enhanced adhesion

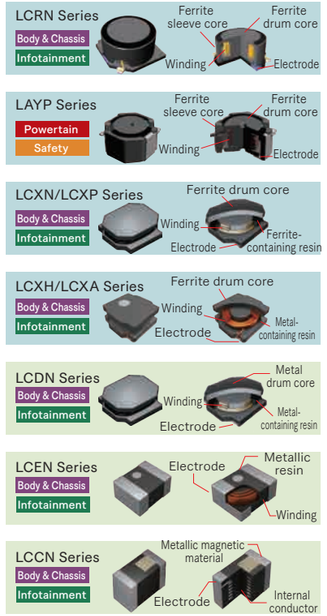
(Old series name)※

Type & Position

Inductors

Power Inductors





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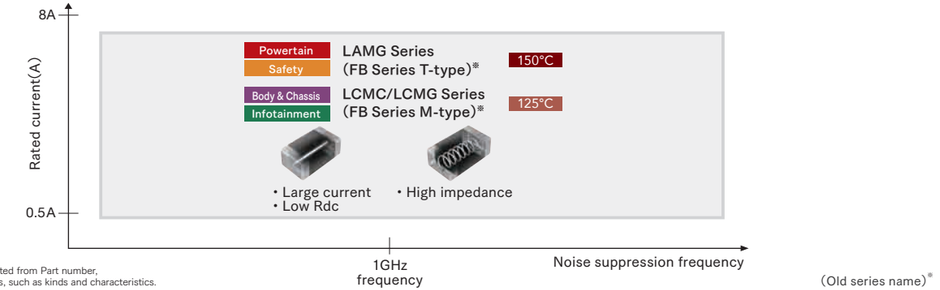
Type & Position

EMC

Bead Inductors

Performance map



※About "■■■■ Series"
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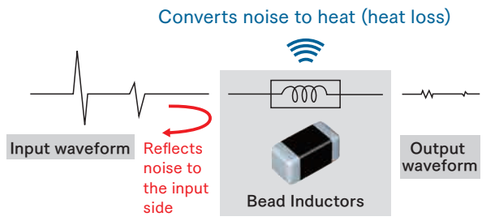
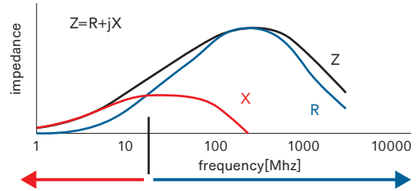
Functions of bead inductors





X-component predominates
⇒ Reflection predominates

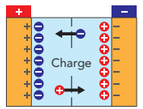
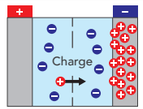
R-component predominates
⇒ Heat loss predominates

Power Storage Devices

Infotainment

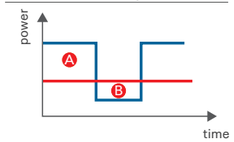
Electric Double-Layer Capacitors

Charateristics comparison

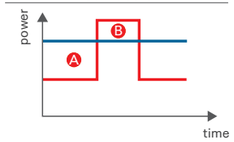
	TAIYO YUDEN Electric Double-Layer Capacitors	Lithium Ion Batteries
Storage method		
Internal resistance	**Excellent** Low	Average High
Voltage Temperature range	2.7 to 0V -40 to 70°C 2.3 to 0V -40 to 85°C	to 4.3V -20 to 60°C
Voltage / Volume	Average 1	**Excellent** 100
Charging/ discharging cycles	**Excellent** 100K+ Cycles	Average 500 to 1K Cycles
Self-discharge	Average	**Excellent**
Safety	**Excellent**	Average
Necessity of voltage monitoring	**None**	Required

Electric Double-Layer Capacitors

Backup



Peak assist

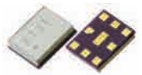


Power supplied by the main power source
Power required by the load
Ⓐ Store the excess power in the capacitor
Ⓑ Discharge the necessary power from the capacitor

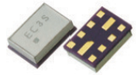
RF Solution for Telematics

FBAR/SAW Devices & Multiplexers

Infotainment



Filter



Duplexer/ Quadplexer

Multilayer Ceramic Devices

Infotainment

Multiplexer

Band Pass Filter

Low Pass Filter

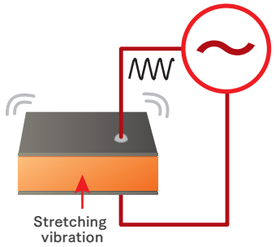
Antenna

Piezoelectric Actuators

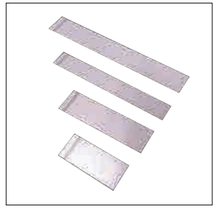
Body & Chassis Infotainment

Functional Elements with High Displacement and Low Power Consumption

Inverse Piezoelectric Effect

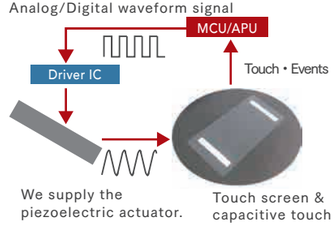


Optimal shape proposals



Optimal circuit proposals

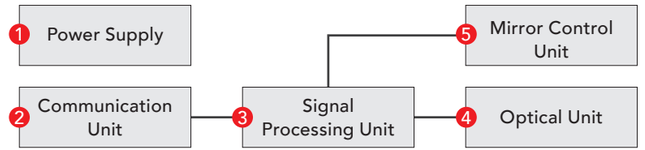
【Business model for piezoelectric actuators】



Visit our website from the URL below or the QR code on the left for proposed solutions to multi-layer piezoelectric actuators.
https://www.yuden.co.jp/ut/solutions/piezoelectric_actuator/

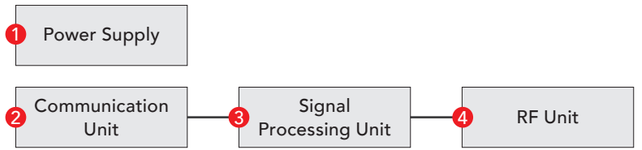
Application Guides

LiDAR Sensor



No	Block	Category	Form Factor	Series
1	Power Supply	MLCC	Chip	Medium-High Voltage Multilayer Ceramic Capacitors for Automotive Body & Chassis and Infotainment Multilayer Ceramic Capacitors (High dielectric type) for Automotive Body & Chassis and Infotainment MCAS Series
		Power Inductor	SMD	Wire-wound Metal Power Inductors MCOIL™ LCDN(MD-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Ferrite Power Inductors LCXN/LCXP(NRH-V,NRS-V,NRV-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Ferrite Power Inductors LCXH(NRM-V)® series for Automotive Body & Chassis and Infotainment
		Power Inductor	Chip	Multilayer Metal Power Inductors MCOIL™ LCCN(MC-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Metal Power Inductors MCOIL™ LCEN(ME-KV)® series for Automotive Body & Chassis and Infotainment
		Bead Inductor	Chip	Wire-wound Ferrite Bead Inductors for Power Lines LCMC/LCMG(FBM-V)® series for Automotive Body & Chassis and Infotainment
		Hybrid AL-CAP	SMD	Low ESR Hybrid Polymer Chip:RCHV1(HV)®series,Low ESR, 125℃, Hybrid Polymer Chip:RCHVK(HVK)®series
2	Communication	Power Inductor	Chip	Multilayer Metal Power Inductors MCOIL™ LCCN(MC-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Metal Power Inductors MCOIL™ LCEN(ME-KV)® series for Automotive Body & Chassis and Infotainment
		MLCC	Chip	Medium-High voltage Multilayer Ceramic Capacitors for Automotive Body & Chassis and Infotainment Multilayer Ceramic Capacitors(High dielectric type)for Automotive Body & Chassis and Infotainment MCAS Series
3	Signal Processing	Power Inductor	Chip	Multilayer Metal Power Inductors MCOIL™ LCCN(MC-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Metal Power Inductors MCOIL™ LCEN(ME-KV)® series for Automotive Body & Chassis and Infotainment
4	Optical	MLCC	Chip	LW Reversal Decoupling Low ESL Capacitors (LWDC™) for Automotive Body & Chassis and Infotainment MCRL Series
		Power Inductor	SMD	Wire-wound Ferrite Power Inductors LCXN/LCXP(NRH-V,NRS-V,NRV-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Ferrite Power Inductors LCXH(NRM-V)® series for Automotive Body & Chassis and Infotainment
5	Mirror Control	Power Inductor	SMD	Wire-wound Ferrite Power Inductors LCXN/LCXP(NRH-V,NRS-V,NRV-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Ferrite Power Inductors LCXH(NRM-V)® series for Automotive Body & Chassis and Infotainment

Radar Sensor



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		Power Inductor	Chip	Multilayer Metal Power Inductors MCOIL™ LCCN(MC-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Metal Power Inductors MCOIL™ LCEN(ME-KV)® series for Automotive Body & Chassis and Infotainment
		Bead Inductor	Chip	Wire-wound Ferrite Bead Inductors for Power Lines LCMC/LCMG(FBM-V)® series for Automotive Body & Chassis and Infotainment
		Hybrid AL-CAP	SMD	Low ESR Hybrid Polymer Chip:RCHV1(HV)® series,Low ESR, 125℃, Hybrid Polymer Chip:RCHVK(HVK)® series
2	Communication	Power Inductor	Chip	Multilayer Metal Power Inductors MCOIL™ LCCN(MC-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Metal Power Inductors MCOIL™ LCEN(ME-KV)® series for Automotive Body & Chassis and Infotainment
3	Signal Processing	Power Inductor	Chip	Multilayer Metal Power Inductors MCOIL™ LCCN(MC-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Metal Power Inductors MCOIL™ LCEN(ME-KV)® series for Automotive Body & Chassis and Infotainment
4	RF	MLCC	Chip	High frequency/Low loss Medium-High Voltage Multilayer Ceramic Capacitors for Automotive Body & Chassis and Infotainment MCAR series
		Power Inductor	SMD	Wire-wound Ferrite Power Inductors LCXN/LCXP(NRH-V,NRS-V,NRV-V)® series for Automotive Body & Chassis and Infotainment Wire-wound Ferrite Power Inductors LCXH(NRM-V)® series for Automotive Body & Chassis and Infotainment

(Old series name)®

Visit our website from the URL below or the QR code on the left for the introduction of various examples of applications.

https://www.yuden.co.jp/ut/product/application/

Changes to Part Numbers

TAIYO YUDEN will implement changes to the part numbers of our products.
By changing the part numbers, we will be able to clarify the target market and equipment in which our products are used,and recommend our customers appropriate products for their intended purposes as possible. In addition, in making the changes, we have established new common rules that will make it easier for our customers to understand and search for part numbers and recommended applications of our products.

New Part Numbering System

New Common Rules | Set the Numbers for Each Product

Digit	❶	❷	❸	❹	❺	❻	❼	❽	❾	❿	⓫	⓬	⓭	⓮	⓯	⓰	⓱	⓲	⓳	⓴
New Part Number	Product Group	Category	Type	Features・Characteristics																

❶ **Product Group**:Indicates the product group, such as multilayer ceramic capacitors and inductors.
❷ **Category**:Indicates the recommended applications, such as automotive electronic equipment,inductrial equipment, and general electronic equipment for consumer.
❸ **Type**:Indicates the product type, such as the shape and functions of each product.
❹ **Features・Characteristics**:Indicates the features and characteristics for each product.
❺～⓴ :Indicates the specifications, internal code, etc.for each product.

About Product Series

Application	Product Series		Quality Grade※3
	Equipment※1	Category (Part Number Code)※2	
Automotive	Automotive Electronic Equipment(POWERTRAIN, SAFETY)	A	1
	Automotive Electronic Equipment(BODY & CHASSIS, INFOTAINMENT)	C	2
Industrial	Telecommunications Infrastructure andIndustrial Equipment	B	2
Medical	Medical Devices classi ed as GHTF Class C(Japan Class III)	M	2
	Medical Devices classi ed as GHTF Classes A or B(Japan Classes I or II)	L	3
Consumer	General Electronic Equipment	S	3

※1 Based on the general speci cations required for electronic components for such equipment, which are recognized by TAIYO YUDEN, the use of each product series for the equipment is recommended. Please be sure to contact TAIYO YUDEN before using our products for equipment other than those covered by the product series.

※2 On each of our part number, the 2nd code from the left is a code indicating the “Category” as shown in the above table. For details, please check the explanatory materials regarding the part numbering system of each of our products.

※3 Each product series is assigned a “Quality Grade” from 1 to 3 in order of higher quality. Please do not incorporate a product into any equipment with a higher Quality Grade than the Quality Grade of such product without the prior written consent of TAIYO YUDEN.

IATF16949 certified plants

※Contact the sales representative for the latest information.

As of May 2021

Site	Location	Products
TAIYO YUDEN CO., LTD. Tamamura Plant	Japan	Multilayer Ceramic Capacitors
TAIYO YUDEN CO., LTD. Haruna Plant	Japan	Ceramic Powder
TAIYO YUDEN CO., LTD. Nakanojo Plant	Japan	Core, Powder for the Inductors
TAIYO YUDEN CO., LTD. Tamamura Plant	Japan	Multilayer Ceramic Filter
NIIGATA TAIYO YUDEN CO., LTD.	Japan	Multilayer Ceramic Capacitors
TAIYO YUDEN CHEMICAL TECHNOLOGY CO., LTD.	Japan	Plating for Terminal electrode of Multi Layer Ceramic Capasitor
FUKUSHIMA TAIYO YUDEN CO., LTD.	Japan	Ferrite Wire-wound SMD Power Inductors
WAKAYAMA TAIYO YUDEN CO., LTD.	Japan	Chip Inductors
TAIYO YUDEN Mobile Technology Co., Ltd.	Japan	SAW devices, FBAR devices
KOREA KYONG NAM TAIYO YUDEN CO., LTD.	Korea	Multilayer Ceramic Capacitors
TAIYO YUDEN (SARAWAK) SDN. BHD.	Malaysia (Sarawak)	Multilayer Ceramic Chip Capacitors
TAIYO YUDEN (GUANGDONG) CO., LTD.	China(Guangdong)	Multilayer Ceramic Capacitors, SMD Power Inductors, Ring Varistors
TAIYO YUDEN (PHILIPPINES), INC.	Philippines	SMD：Multilayer Chip Inductors, Rectangular Wire Wound Ferrite Chip Inductors, Low Profile Wire Wound Ferrite Inductors, Wire Wound Chip Inductors and Metal Core SMD Power Inductors

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