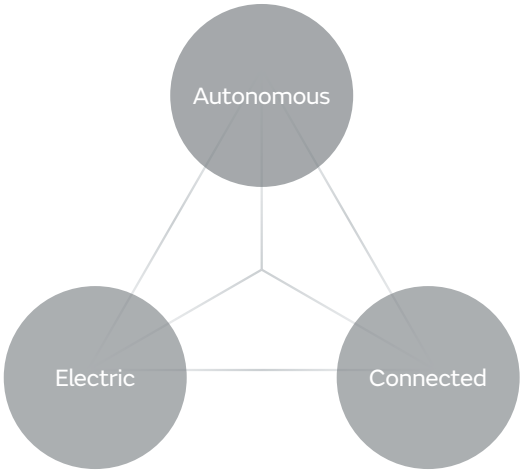
K35E.pdf
Apr.16,2020

muRata
INNOVATOR IN ELECTRONICS

Murata Products for Automotive

Realizing a Safe and Free Mobility Society

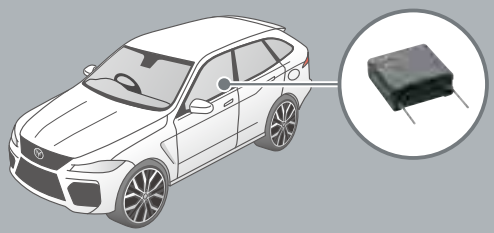
"CASE"—Connected, Autonomous, Shared & Services, Electric—the four trends occurring in the automobile industry are quickly advancing cars to the next level. Automobiles are undergoing rapid electrification, which enables not only car-to-car communication, but also communication between vehicles and social infrastructure such as traffic lights. This so-called "Vehicle to Everything" (V2X) is in progress, changing automobiles into a highly-sophisticated information devices. In the area of autonomous driving supported by advanced drive assistance system (ADAS), cameras and radars, sensors and other sensing components are required to correctly function under severe conditions to deliver safety. The progress of environmental regulations is also pushing forward the electrification of internal combustion engines. Murata Manufacturing uses its accumulated microfabrication and design technologies, as well as a vertically-integrated production system, to work on product development that responds to the vehicle component market where reliability is a key concern. Murata's electronic components will continue to contribute to the realization of a mobility society that is safe for everyone.



Electric

The electrification of automobiles is increasingly expanding the demand for electronic components. Murata delivers products that offer high reliability to respond to the ever-increasing high-performance needs for vehicle parts and components. For example, typical conventional film capacitors for automobiles guarantee operation up to a temperature of 105ºC while Murata's heat-resistant film capacitors enable continuous use in temperature conditions as high as 125ºC. Additionally, our self-recovery function in high temperature conditions prevent short-circuit mode failures. Murata's quality safety functions and guaranteed operations under high temperatures contribute to reliable operation of power electronics systems that operate under high loads.

Applications : Electric Compressor
OBC (On Board Charger)
WPT (Wireless Power Transfer System)



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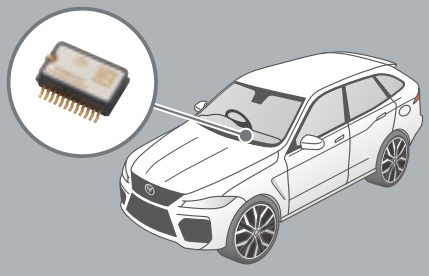
Autonomous

While the autonomy level of self-driving functions may vary, all autonomous driving functions need algorithms to comprehensively process precision sensing and retrieved information. In developing ADAS and other products for autonomous driving, Murata conducts driving experiments with test vehicles equipped with our proprietary inertial measurement unit (IMU) for evaluation as part of our efforts to assess and verify safety with different use cases. Murata's product lineup allows for precision instruments, contributing to higher accuracy of measurement data, a keystone for autonomous vehicle driving.

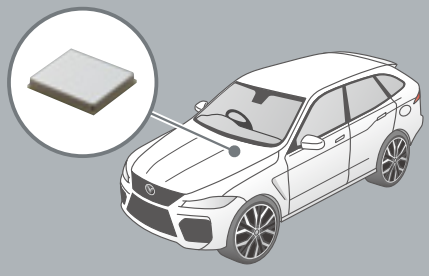
Applications : AD/ADAS



Connected

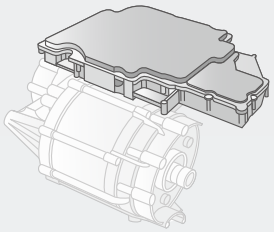
Vehicles are using a number of wireless communications standards for V2X, which calls for an increasing demand in electronic parts and components that constitute quality communication networks. Murata also provides highly-functional, durable products to the telecommunications market, including smartphones and base stations. Drawing on our amassed techniques and design knowledge, Murata contributes to sophisticated vehicle communication with our reliable connectivity modules featuring the thermal and vibration resistance that answers the needs of the vehicle component market.

Applications : IVI System



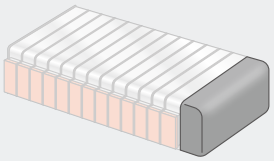
Enabling Automotive

Inverter — Electrified



›P6

BMS (Battery Management System) — Electrified



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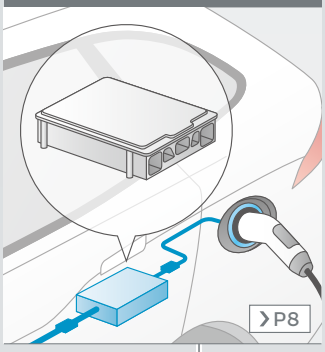
OBC (On Board Charger) — Electrified



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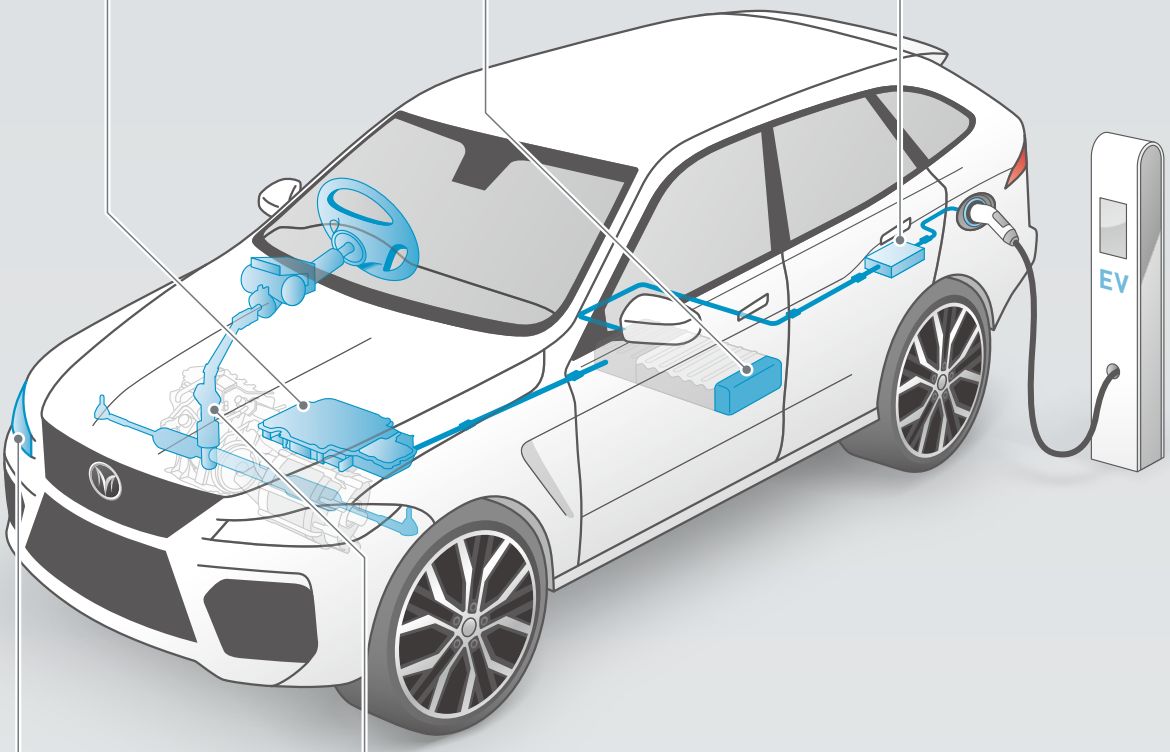
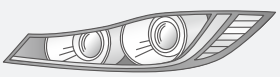
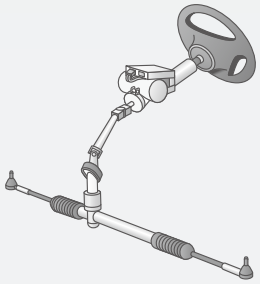


Lighting — Other



›P13

EPS (Electric Power Steering) — Other



›P14

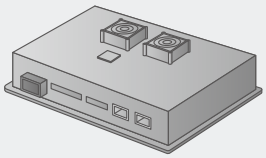
TCU
Connected
(Telematics Control Unit)

›P9

IVI
Connected
(In Vehicle Infotainment)

›P10

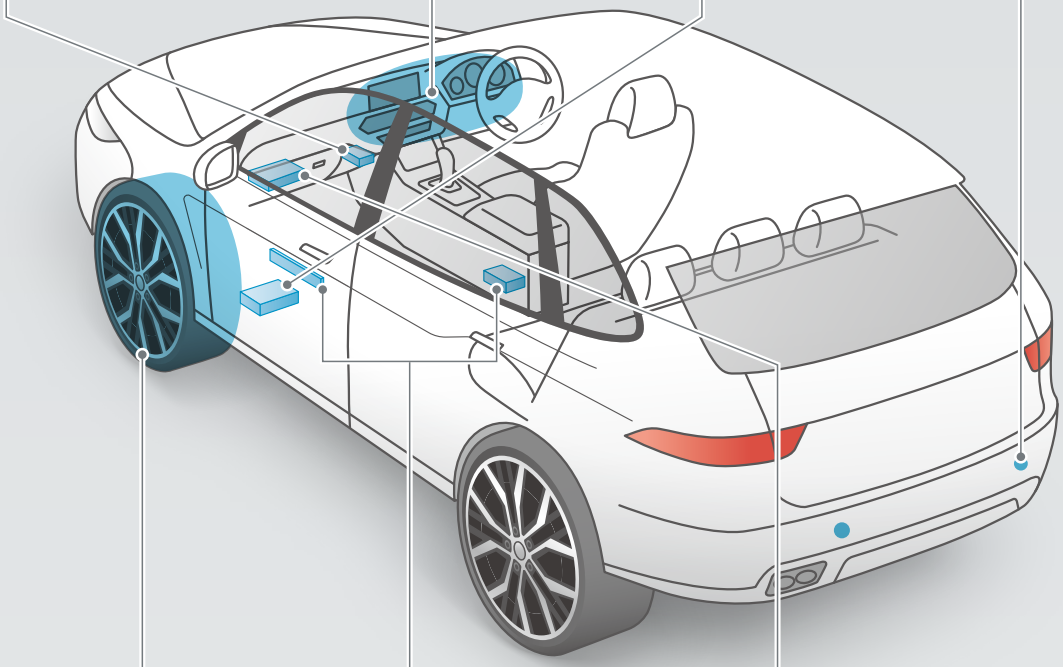
ADAS
AD/ADAS
(Advanced Driver Assist System)



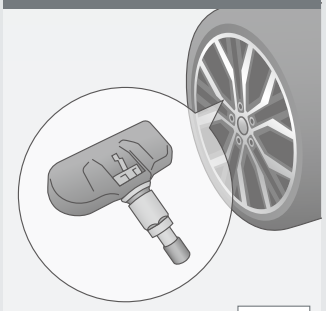
›P11

IPA
AD/ADAS
(Intelligent Parking Assist)

›P12

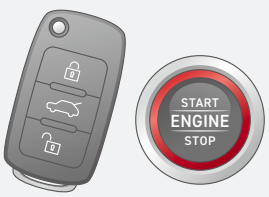


TPMS
Other
(Tire Pressure Monitoring System)



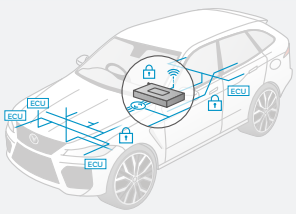
›P15

PKE
Other
(Passive Keyless Entry)



›P15

Gateway
Other



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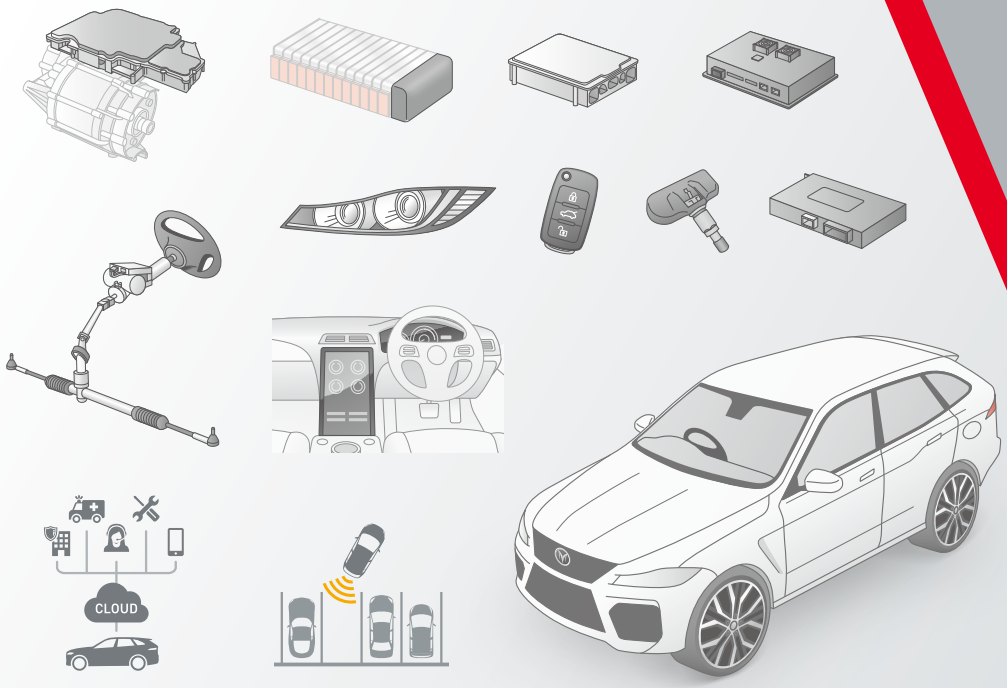
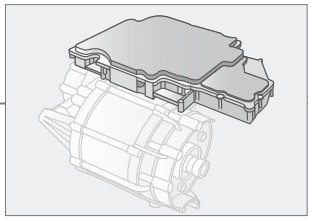
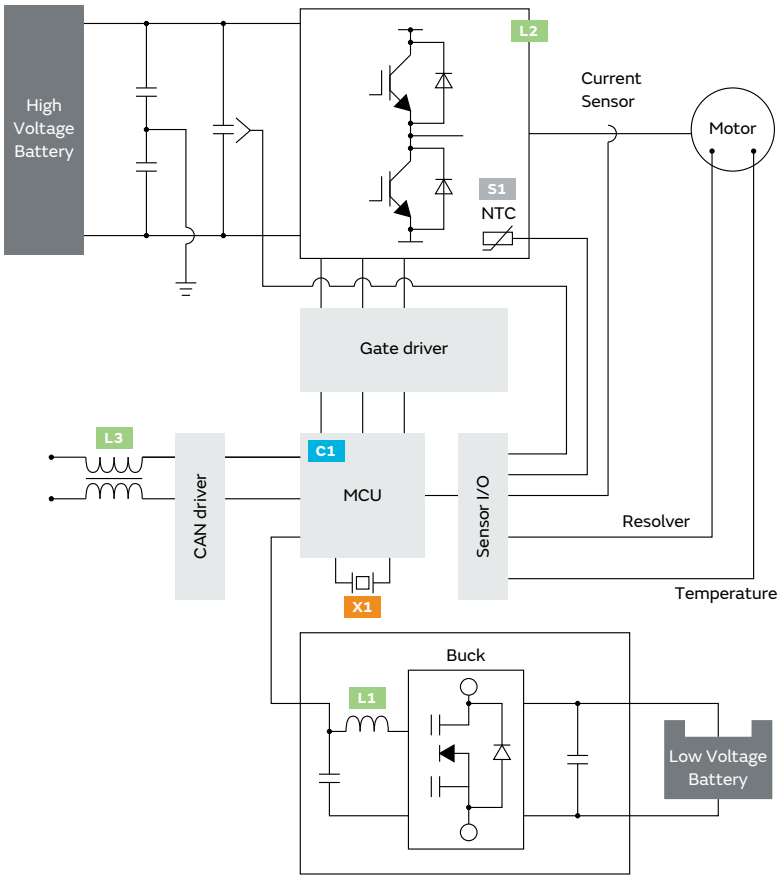


Circuit Applications

Inverter





MCU

C1 Ceramic Capacitors
High capacitance type
GCM

DC-DC

L1 Inductors
Inductor for power lines
DFE, LQH

IGBT

L2 EMI Suppression Filters
Chip ferrite beads
BLM

S1 Thermistors
NTC thermistors
NCU

CAN

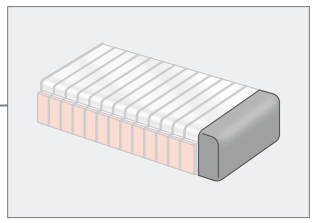
L3 EMI Suppression Filters
Common mode choke coils
DLW32SH/43SH

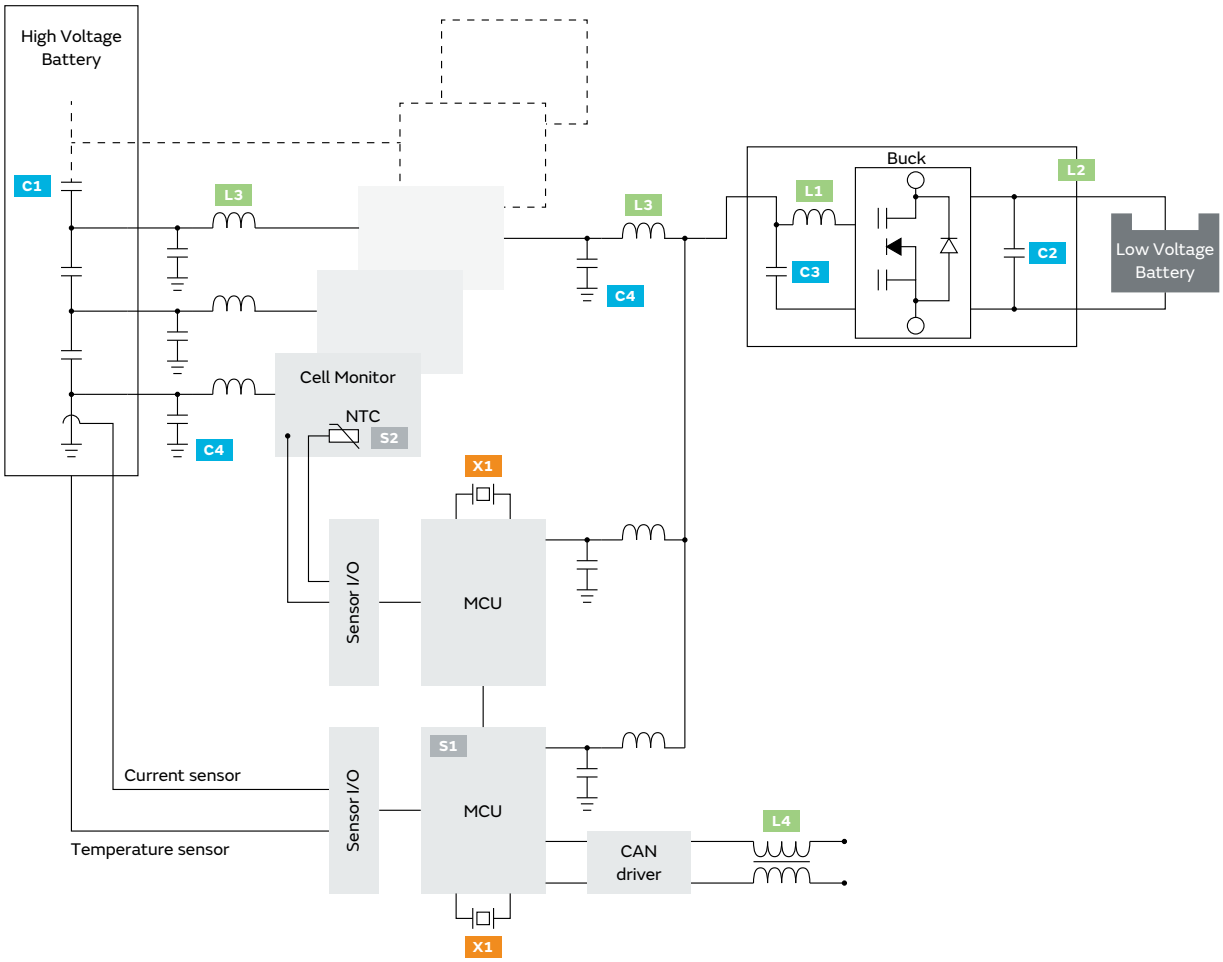
Clock

X1 Timing Devices
Ceramic resonators
(CERALOCK)
CSTN_G/V

BMS

Battery Management System





MCU

S1 Thermistors
NTC thermistors
NCU

Cell Monitor

C4 Ceramic Capacitors
High capacitance type
GCM

L3 EMI Suppression Filters
Chip ferrite beads
BLM

S2 Thermistors
NTC thermistors
NCU, NXFS

Battery

C1 Ceramic Capacitors
Hi-voltage
GCM

DC-DC

C2 Ceramic Capacitors
Resin electrode product/
Metal terminal type
GCJ, KC

C2 Ceramic Capacitors
High capacitance type
GCM

C3 Ceramic Capacitors
High capacitance type
GCM

L1 Inductors
Inductor for power lines
DFE, LQH

L2 EMI Suppression Filters
Common mode choke coils
for power lines
PLT, DLW

CAN

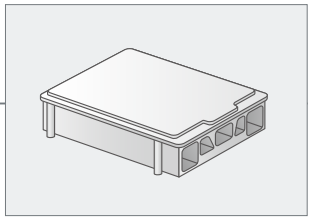
L4 EMI Suppression Filters
Common mode choke coils
DLW32SH/43SH

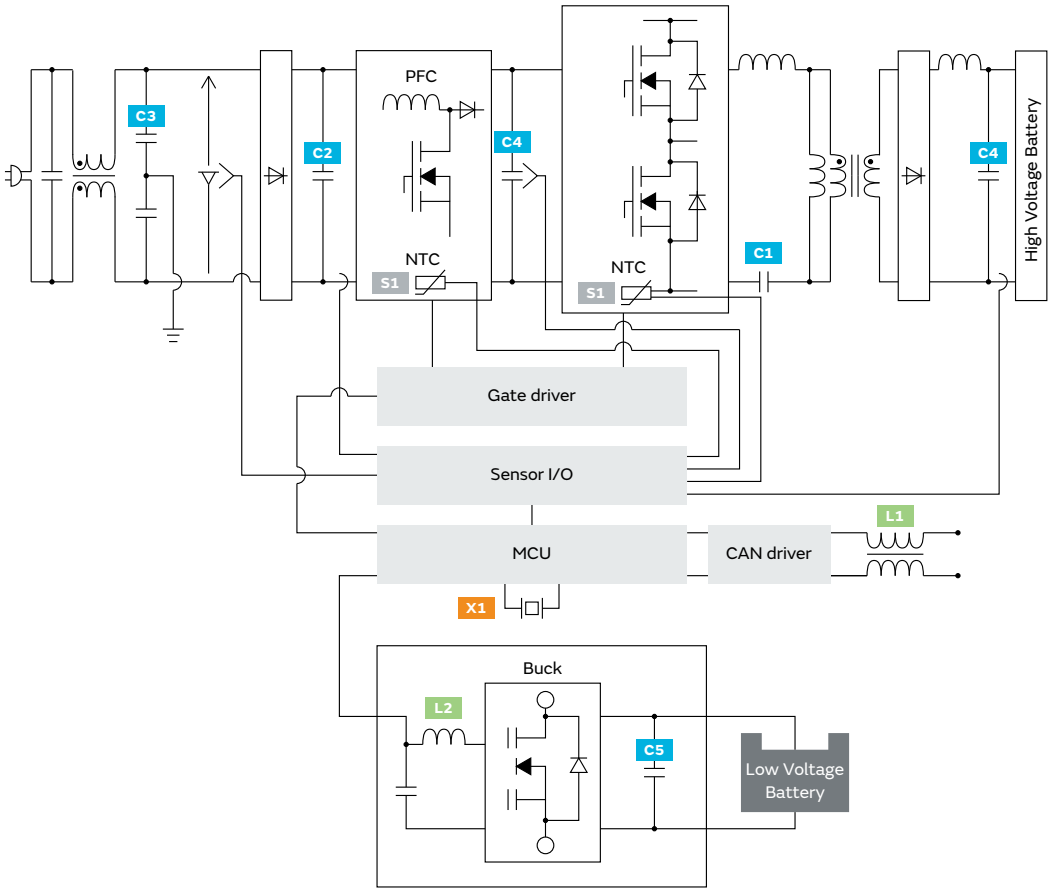
Clock

X1 Timing Devices
Ceramic resonators
(CERALOCK)
CSTN_G/V

OBC

On Board Charger





Filter

C1 Ceramic Capacitors
Hi-voltage
GCM

C2 Ceramic Capacitors
Metal terminal type
KC3

AC-DC

C3 Ceramic Capacitors
Safety standard certified
KCA, DE6

Smoothing

C4 Film Capacitors
High heat resistant
FH

DC-DC

C5 Ceramic Capacitors
Resin electrode product/
Metal terminal type
GCJ, KC

L2 Inductors
Inductor for power lines
DFE, LQH

CAN

L1 EMI Suppression Filters
Common mode choke coils
DLW32SH/43SH

PFC

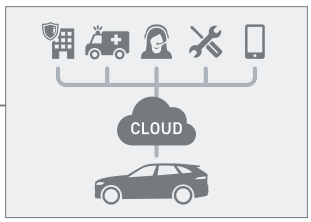
S1 Thermistors
NTC thermistors
NCU

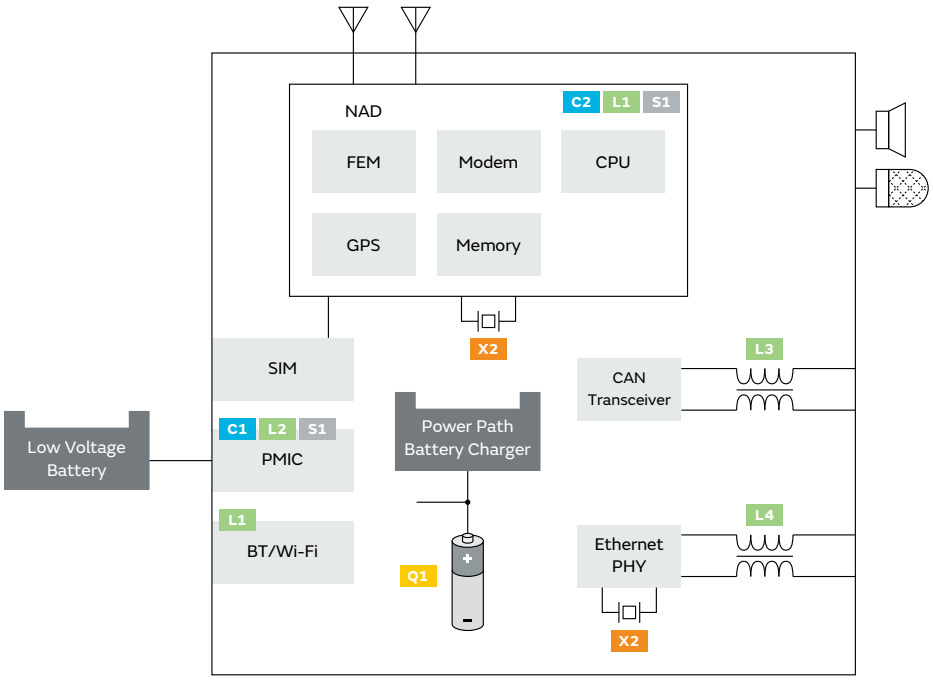
Clock

X1 Timing Devices
Ceramic resonators
(CERALOCK)
CSTN_G/V

TCU

Telematics Control Unit





PMIC

C1	Ceramic Capacitors Resin electrode product/ Metal terminal type GCJ, KC	
C1	Ceramic Capacitors High capacitance type GRT	
L2	Inductors Inductor for power lines DFE, LQH, LQM	
L2	EMI Suppression Filters Chip ferrite beads BLM	
S1	Thermistors NTC thermistors NCU	

BT/Wi-Fi

L1	Inductors RF inductors LQP, LQG, LQW	

NAD

C2	Ceramic Capacitors Three terminal type NFM	
C2	Ceramic Capacitors High capacitance type GRT	
L1	Inductors RF inductors LQP, LQG, LQW	
S1	Thermistors NTC thermistors NCU	

CAN

L3	EMI Suppression Filters Common mode choke coils DLW32SH/43SH	

Ethernet

L4	EMI Suppression Filters Common mode choke coils DLW32MH/43MH	

e-Call

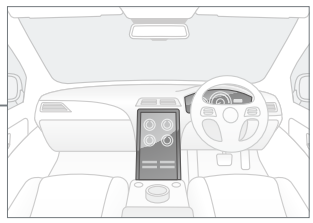
Q1	Cylindrical Type Lithium Ion Secondary Batteries Cell type LFP-Gr	

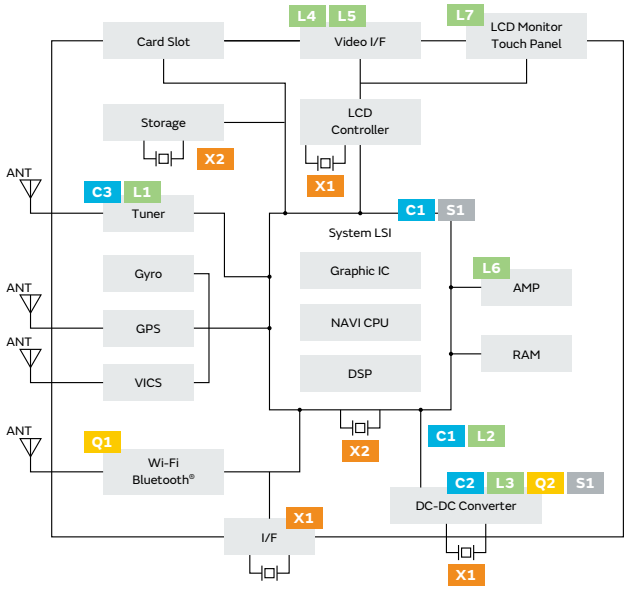
Clock

X2	Timing Devices Crystal units XRC_F_A	

IVI

In Vehicle Infotainment





Tuner

- C3 — Ceramic Capacitors — Hi-Q type — GCQ
- L1 — Inductors — RF inductors — LQP, LQG, LQW
- L1 — Inductors — Variable inductors — 5CCEG

Video I/F

- L4 — EMI Suppression Filters — Common mode choke coils — DLW21SZ
- L4 — Inductors — Inductor for power lines — LQW18C/32FT, LQH
- L5 — EMI Suppression Filters — Common mode choke coils — DLW32MH/43MH

System LSI

- C1 — Ceramic Capacitors — Three terminal type — NFM
- C1 — Ceramic Capacitors — High capacitance type — GRT
- C1 — Aluminum Electrolytic Capacitors — Conductive polymer type — ECAS
- S1 — Thermistors — NTC thermistors — NCU

I/F

- X1 — Timing Devices — Ceramic resonators (CERALOCK) — CSTN_G/V

AMP

- L6 — Inductors — Inductor for power lines — DFE, FDSD, DEM, HEAWS
- L6 — EMI Suppression Filters — Common mode choke coils — UCMH, DLW

DC-DC Converter

- C2 — Ceramic Capacitors — High capacitance type — GRT
- C2 — Aluminum Electrolytic Capacitors — Conductive polymer type — ECAS
- L3 — EMI Suppression Filters — Common mode choke coils for power lines — PLT, UCMH, DLW
- L3 — EMI Suppression Filters — Chip ferrite beads — BLM
- S1 — Thermistors — NTC thermistors — NCU
- Q2 — DC-DC Converters — MYMG

Secondary

- C1 — Ceramic Capacitors — Three terminal type — NFM
- C1 — Ceramic Capacitors — High capacitance type — GRT
- C1 — Aluminum Electrolytic Capacitors — Conductive polymer type — ECAS
- L2 — Inductors — Inductor for power lines — DFE, LQH, LQM
- L2 — EMI Suppression Filters — Chip ferrite beads — BLM

Clock

- X1 — Timing Devices — Ceramic resonators (CERALOCK) — CSTN_G/V
- X2 — Timing Devices — Crystal units — XRC_F_A

Connectivity

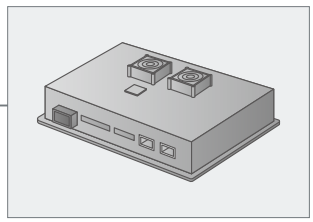
- Q1 — Connectivity Module — Wi-Fi and Bluetooth modules

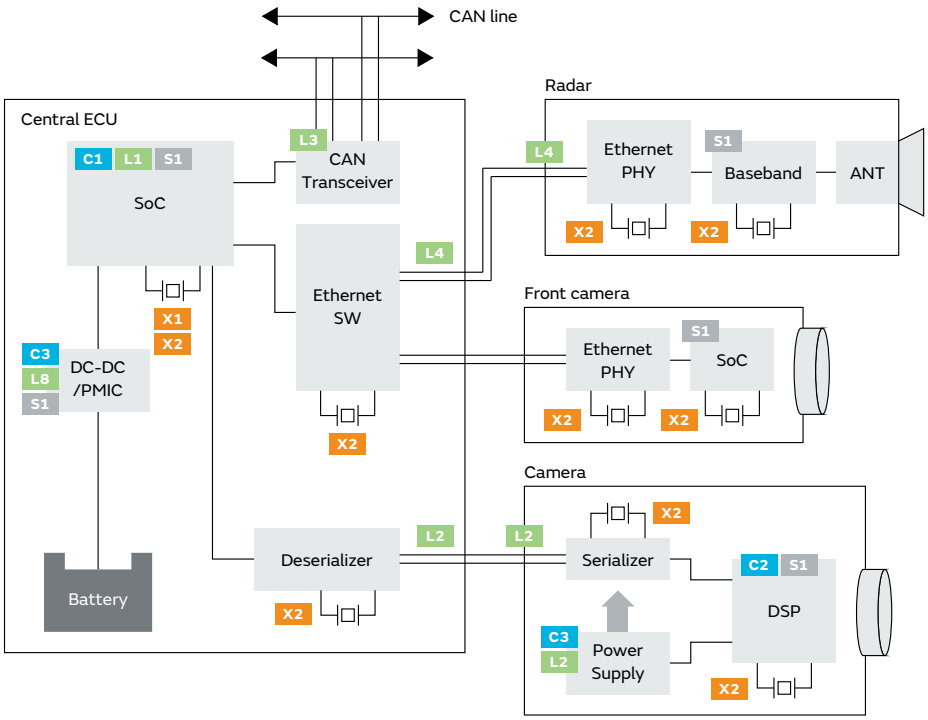
LCD Monitor Touch Panel

- L7 — EMI Suppression Filters — Chip EMIFIL — NFL

ADAS

Advanced Driver Assist System





SoC

C1	Ceramic Capacitors Three terminal type NFM	
C1	Ceramic Capacitors High capacitance type GCM	
L1	EMI Suppression Filters Chip ferrite beads BLM	
S1	Thermistors NTC thermistors NCU	

DC-DC/PMIC

C3	Ceramic Capacitors Resin electrode product/ Metal terminal type GCJ, KC	
C3	Ceramic Capacitors High capacitance type GCM	
L8	Inductors Inductor for power lines DFE, LQH	
S1	Thermistors NTC thermistors NCU	

Power Supply

C3	EMI Suppression Filters Resin electrode product/ Metal terminal type GCJ, KC	
C3	Ceramic Capacitors High capacitance type GCM	
L2	EMI Suppression Filters Chip ferrite beads BLM	
L2	Inductors Inductor for power lines LQW18C/32FT, LQH	

Baseband

S1	Thermistors NTC thermistors NCU	

Clock

X1	Timing Devices Ceramic resonators (CERALOCK) CSTN_G/V	
X2	Timing Devices Crystal units XRC_F_A	

DSP

C2	Ceramic Capacitors High capacitance type GCM	
C2	Ceramic Capacitors Three terminal type NFM	
S1	Thermistors NTC thermistors NCU	

SerDes

L2	EMI Suppression Filters Chip ferrite beads BLM	
L2	Inductors Inductor for power lines LQW18C/32FT, LQH	

CAN Transceiver

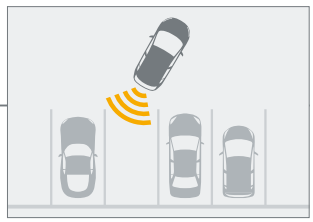
L3	EMI Suppression Filters Common mode choke coils DLW32SH/43SH	

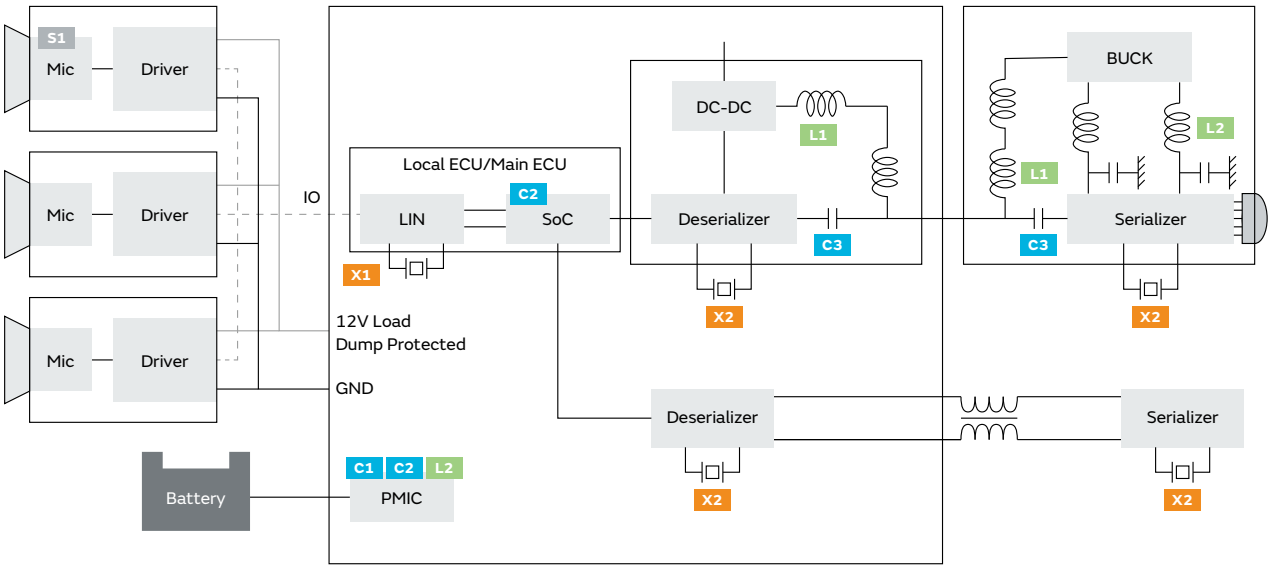
Ethernet

L4	EMI Suppression Filters Common mode choke coils DLW32MH/43MH	

IPA

Intelligent Parking Assist





Mic

S1	Sensors Ultrasonic sensors MA58	

PMIC

C1	Ceramic Capacitors Resin electrode product/ Metal terminal type GCJ, KC	
C1	Ceramic Capacitors High capacitance type GCM	
C2	Ceramic Capacitors Three terminal type NFM	
C2	Ceramic Capacitors High capacitance type GCM	
L2	Inductors Inductor for power lines DFE, LQM, LQH	

SoC

C2	Ceramic Capacitors Three terminal type NFM	
C2	Ceramic Capacitors High capacitance type GCM	

PoC

C3	Ceramic Capacitors High capacitance type GCM	
L1	EMI Suppression Filters Chip ferrite beads BLM	
L1	Inductors Inductor for power lines LQW18C/32FT, LQH	

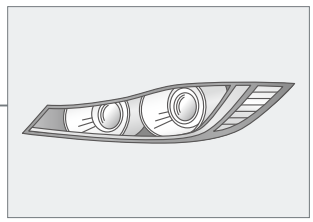
DC-DC

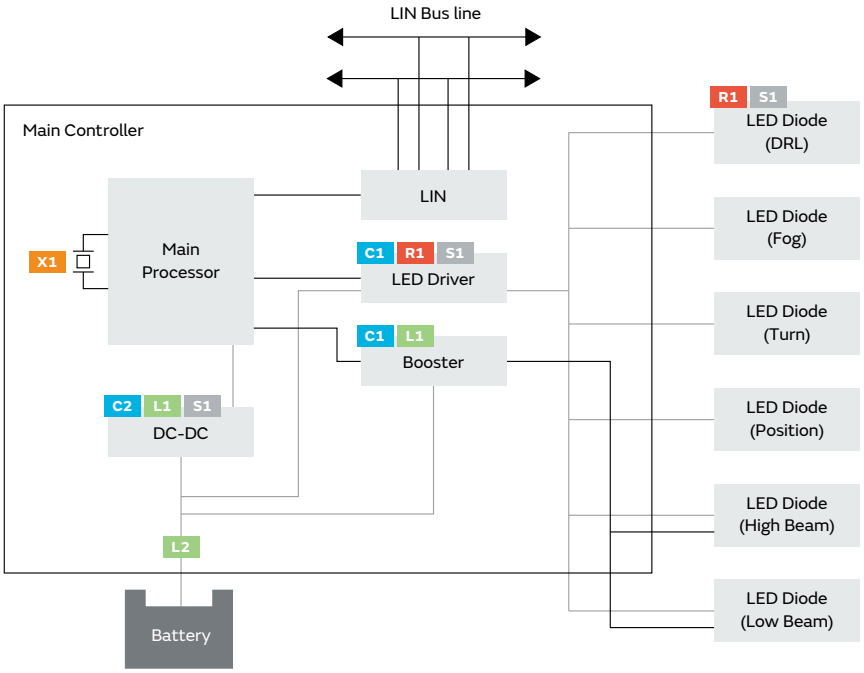
L2	Inductors Inductor for power lines DFE, LQM, LQH	

Clock

X1	Timing Devices Ceramic resonators (CERALOCK) CSTN_G/V	
X2	Timing Devices Crystal units XRC_F_A	

Lighting





DC-DC

C2 Ceramic Capacitors
Resin electrode product/ Metal terminal type
GCJ, KC

C2 Ceramic Capacitors
High capacitance type
GCM

L1 Inductors
Inductor for power lines
LQH

S1 Thermistors
NTC thermistors
NCU

LED Driver

C1 Ceramic Capacitors
High capacitance type
GCM

R1 Thermistors
PTC thermistors
PRF, PRG

S1 Thermistors
NTC thermistors
NCU

Booster

C1 Ceramic Capacitors
High capacitance type
GCM

L1 Inductors
Inductor for power lines
LQH

LED Diode (DRL)

R1 Thermistors
PTC thermistors
PRF, PRG

S1 Thermistors
NTC thermistors
NCU

Primary

L2 EMI Suppression Filters
Chip ferrite beads
BLM

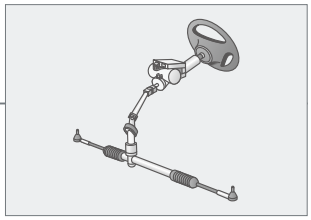
L2 EMI Suppression Filters
Common mode choke coils for power lines
PLT, DLW

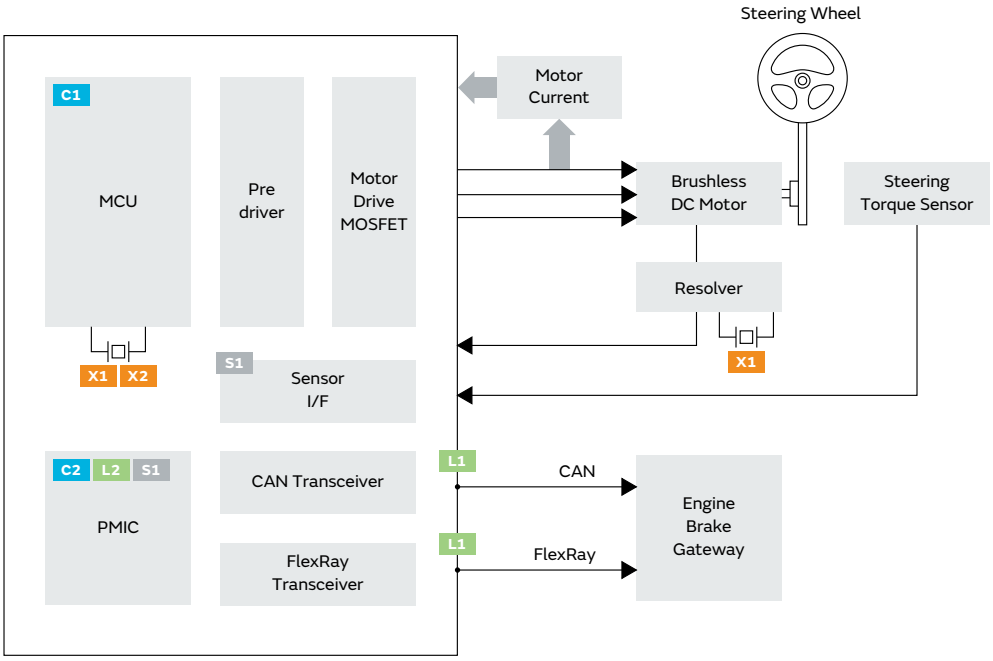
Clock

X1 Timing Devices
Ceramic resonators (CERALOCK)
CSTN_G/V

EPS

Electric Power Steering





MCU

C1	Ceramic Capacitors High capacitance type GCM	

Clock

X1	Timing Devices Ceramic resonators (CERALOCK) CSTN_G/V	
X2	Timing Devices Crystal units XRC_F_A	

PMIC

C2	Ceramic Capacitors Resin electrode product/ Metal terminal type GCJ, KC	
C2	Ceramic Capacitors High capacitance type GCM	
L2	EMI Suppression Filters Chip ferrite beads BLM	
S1	Thermistors NTC thermistors NCU	

PHY

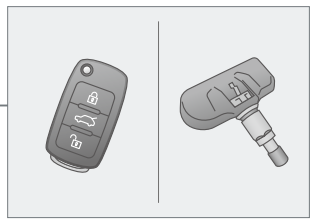
L1	EMI Suppression Filters Common mode choke coils DLW32SH/43SH	

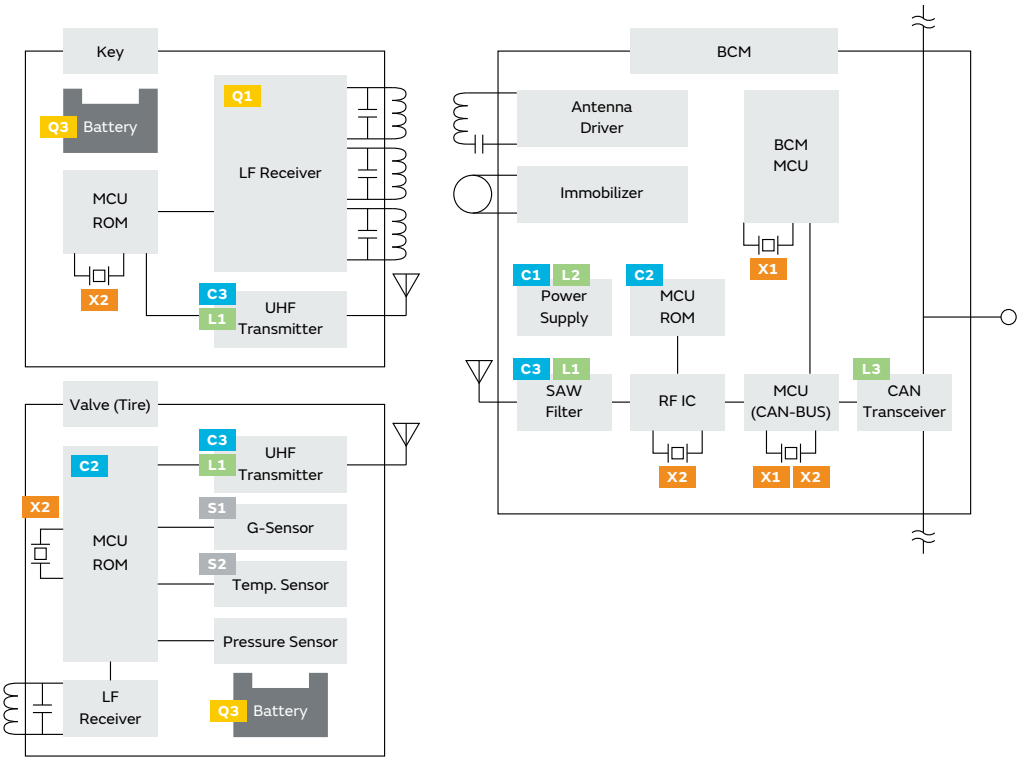
Sensor I/F

S1	Thermistors NTC thermistors NCU	

PKE / TPMS

Passive Keyless Entry / Tire Pressure Monitoring System





Battery

Q3 Micro Batteries

LF Receiver

Q1 Antenna Coils
3d Rx-LF antenna coils
SA3D12, SA3D14

UHF Transmitter

C3 Ceramic Capacitors
Hi-Q type
GCQ

L1 Inductors
RF inductors
LQP, LQG, LQW

MCU ROM

C2 Ceramic Capacitors
High capacitance type
GCM

G-Sensor

S1 Sensors
Shock sensors
PKGS

Temp. Sensor

S2 Thermistors
NTC thermistors
NCU

Power Supply

C1 Ceramic Capacitors
Resin electrode product/
Metal terminal type
GCJ, KC

C1 Ceramic Capacitors
High capacitance type
GCM

L2 Inductors
Inductor for power lines
DFE□PD

L2 Inductors
Inductor for power lines
LQH_P, LQM_P

L2 EMI Suppression Filters
Chip ferrite beads
BLM_P

SAW Filter

C3 Ceramic Capacitors
Hi-Q type
GCQ

L1 Inductors
RF inductors
LQP, LQG, LQW

CAN Transceiver

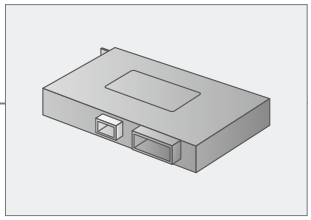
L3 EMI Suppression Filters
Common mode choke coils
DLW32SH/43SH

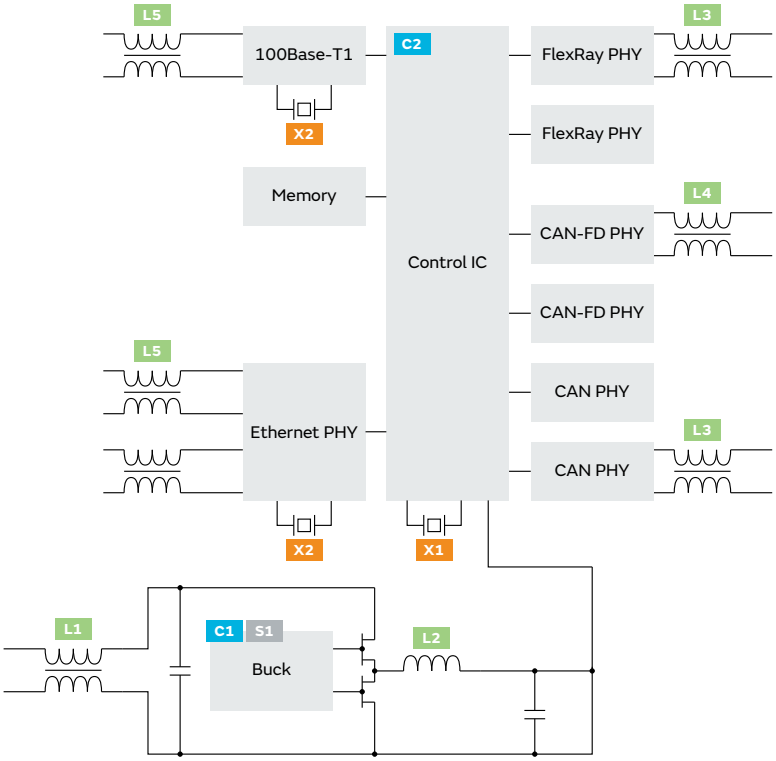
Clock

X1 Timing Devices
Ceramic resonators
(CERALOCK)
CSTN_G/V

X2 Timing Devices
Crystal units
XRC_F_A

Gateway / In-vehicle LAN





DC-DC		
C1	Ceramic Capacitors Resin electrode product/ Metal terminal type GCJ, KC	
C1	Ceramic Capacitors High capacitance type GCM	
L1	EMI Suppression Filters Common mode choke coils for power lines PLT, DLW	
L2	Inductors Inductor for power lines DFE, LQH, LQM	
S1	Thermistors NTC thermistors NCU	

Control IC		
C2	Ceramic Capacitors High capacitance type GCM	
C2	Ceramic Capacitors Three terminal type NFM	

PHY		
L3	EMI Suppression Filters Common mode choke coils DLW32SH/43SH	
L4	EMI Suppression Filters Common mode choke coils DLW32SH/43SH	

OBD		
L5	EMI Suppression Filters Common mode choke coils DLW32MH/43MH	

Clock		
X1	Timing Devices Ceramic resonators (CERALOCK) CSTN_G/V	
X2	Timing Devices Crystal units XRC_F_A	

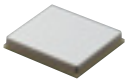
Specific Use Products Lineup

Specific Use Products Lineup

RF Components

Connectivity Modules

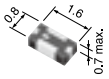
This product is an integrated module that encompass various functional parts used in vehicle wireless circuits for Bluetooth and Wi-Fi.



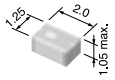
Chip Multilayer LC Filters

Ultra-small and low-profile filters based on ceramic multilayer technology.

Band Pass Filters



LFB18_V Series

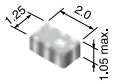


LFB21_V Series

(in mm)

Low Pass Filters

LFL18_V Series

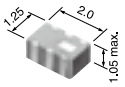


LFL21_V Series

(in mm)

Baluns

SMD baluns constructed with a copper conductor and ceramic material. Ideal for high-frequency applications. Small-size and low-loss baluns can be customized for balance impedance of 50Ω to 200Ω.



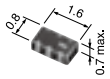
LDB21_V Series

LDM18_V Series

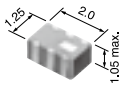
(in mm)

Chip Multilayer Hybrid Dividers

Power divider with a multilayer low pass filter in an ultra-compact package.



LDD18_V Series

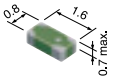


LDD21_V Series

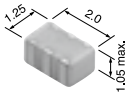
(in mm)

Couplers

An ultra-small, low-profile directional coupler based on ceramic multilayer technology. This coupler achieves ultra-small size, low insertion loss, and high isolation.



LDC18_V Series



LDC21_V Series

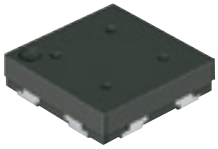
(in mm)

Antenna Coils

This highly reliable antenna coil for transponders which conforms to automotive standards is ideal for automobile keyless entry.

Rx 3D-ANT

SA3D12 Series



SA3D14 Series

Series	Test Frequency (kHz)	Dimensions (mm)	Inductance Range (mH)
SA3D12	125/134.2	11.9 X 11.9 X 3.2 Typ.	X : 2.2 to 6.3
			Y : 2.2 to 6.3
			Z : 2.2 to 9.0
SA3D14		13.8 X 13.8 X 3.6 Typ.	X : 2.2 to 6.3
			Y : 2.2 to 6.3
			Z : 2.2 to 9.0

Specific Use Products Lineup

Sensors

Ultrasonic sensors

Ultrasonic sensors emit ultrasonic waves in the air that reflect off of objects.
The reflected sound is then received by the sensor. This technology is used for detection of objects in burglar alarms and automatic doors as well as for range measurement in automotive parking assistance systems.

Part Number	Type	Using Method	Nominal Frequency (kHz)	Overall Sensitivity (V0-p)	Directivity (deg.)	Dimensions (mm)
MA58MF14-7N	Drip Proof Type	For Dual Use	58	More than 1	80 X 34 typ.	ø14

Shock sensors

To reduce the TPMS module's battery consumption, it detects the tires' rotational speed and uses a shock sensor to wake up the system.

Part Number	Primary Axis Inclined Angle (deg.)	G Sensitivity	Insulation Resistance (MΩ)	Resonance Frequency (kHz)	Capacitance (pF)	Operating Temperature Range (°C)	Dimensions (mm)
PKGS-25TA-R	25	0.205pC/G	500 min.	39 typ.	240	-40 to +125	4.8 X 2.3 X 1.3
PKGS-00TAV-R	0	0.80mV/G	500 min.	39 typ.	245		
PKGS-45TAV-R1	45	0.77mV/G	500 min.	37 typ.	195		

Gyro Sensors

The high-sensitivity low-g accelerometers and gyroscope sensors are widely used in the automotive area.

Gyro Sensors

Series	Axis	Maximum Range	Supply Voltage (V)	Operating Temperature Range (°C)	Sensitivity	Amplitude Response (Hz)	Output Type	Typical Applications
SCC2000 Series	1-Axis (X or Z) Gyro	±125dps / ±300dps	3.0 to 3.6	-40 to +125	50 LSB/dps (Gyro)	10/60 (Gyro)	SPI	Electronic Stability Control Roll Over detection Navigation system Advanced Driving Assistant System (ADAS) Inertial Measurement Units (IMUs) Platform stabilization and control Machine control systems Hill Start Assist (HSA)
	3-Axis Accelerometer	±2g / ±6g			1962 LSB/g (Accelerometer)	10/60 (Accelerometer)		

Accelerometers

Series	Axis	Maximum Range (g)	Supply Voltage (V)	Operating Temperature Range (°C)	Sensitivity (count/g)	Amplitude Response (Hz)	Output Type	Typical Applications
SCA800	1-axis	±2	3.0 to 3.6	-40 to +125	900	6.25, 50	SPI	Headlight leveling Lidar leveling Transmission control Electronic stability control Hill Start Assist (HSA) IMUs for heavy machine & automotive
SCA3100	3-Axis	±2 ±6	3.0 to 3.6	-40 to +125	900 650	45	SPI	
SCA3300	3-Axis	±1.5, ±3, ±6 User Selectable	3.0 to 3.6	-40 to +125	5400/2700/ 1350	70/10	SPI	

Specific Use Products Lineup

Power Devices

DC-DC Converters

Murata Manufacturing's the surface mounted type point-of-load (PoL) DC-DC converter
for camera module integrates component parts with plastic.
The MYPMA series is a non-isolated DC-DC converter for auxiliary circuits used on E-motorcycles and forklifts.
This series features a lightweight, compact palm-size design and meets IP56 protection (dust-proof and waterproof).

Series		Output Current (A)	Input Voltage (V)	Output Voltage (V)	Dimensions (mm)			Efficiency (%)
					W	L	H (max.)	
 MYMGA/MYMGK	MYMGA5R04RELA5RA	4	8 to 16	3.3 to 5.0	10.5	9	5.5	94 (12Vin/5Vo)
	MYMGK00504ERSR	4	8 to 15	0.7 to 5	9	7.5	5	96.1 (12Vin/5Vo)
 MYMGC	MYMGC0R88RFLF2RV	8	3.3 to 5.5	0.85	15	11.9	2.4	81 (5Vin)
	MYMGC1R83BFPF2RV (4 outputs product)	3.2	3.3 to 5.5	0.85	15	11.9	2.4	81 (5Vin)
		0.5		0.85				
		0.5		1.2				
		1.5		1.8				
	MYMGC3R32EFPF2RV (4 outputs product)	2.5	4.3 to 5.5	1.2	15	11.9	2.4	91 (5Vin)
		1		1.8				
		2		3.3				
		1.5		2.5				
 MYPMA	MYPMA01218RCF-CAB	10	36 to 75	12	86.5	122.36*	35.85	96.5peak (48Vin)
	MYPMA01218RCF-CCB	10	36 to 75	12	86.5	122.36*	35.85	96peak (48Vin)
		1		5				

*Not including the lengths of the wire and connector.

Specific Use Products Lineup

Batteries

Cylindrical Type Lithium Ion Secondary Batteries

Cylindrical type lithium ion secondary batteries are packaged in metal cans. These batteries has a long life with a high level of safety.

Model		Cell Type	Dimensions (mm)	Rated Capacity (mAh)	Continuous Maximum Discharging Current (A)	Average Voltage (V)	Operating Temperature Range (°C)
	US14500FT1	LFP-Gr	14.00 X 49.10	500	5.0	3.2	-40 to +90
	US18650FTC1	LFP-Gr	18.20 X 64.90	1050	20.0	3.2	-40 to +90
	US18650FTC2	LFP-Gr	18.35 X 65.05	1350	20.0	3.2	-40 to +90
	US26650FTC1A	LFP-Gr	26.25 X 65.50	2850	25.0	3.2	-20 to +60

Coin Manganese Dioxide Lithium Batteries

The coin-type lithium manganese dioxide battery (CR battery) is a small, primary battery that uses manganese dioxide on the positive side and lithium on the negative side. It is used in a wide variety of applications, including IoT device and automotive devices of tire-pressure monitoring systems (TPMS) and smart entry systems.

Heat-resistant

Ideal for devices used in severe operating temperature environments including automobiles and FA, etc.


CR2050W-MP6

Model	Electrical Characteristics			Dimensions			Operating Temperature Range (°C)
	Nominal Voltage (V)	Nominal Capacity (mAh)	Recommended Continuous Discharge Current (mA)	Diameter (mm)	Height (mm)	Weight (g)	
CR2032W	3	210	≦1	20.0	3.2	3.1	-40 to +125
CR2050W	3	345	≦1	20.0	5.0	4.2	-40 to +125
CR2450W	3	550	≦1	24.5	5.0	6.7	-40 to +125
CR2477W	3	1000	≦1	24.5	7.7	11	-40 to +125

Extended Temperature

Designed for automotive devices and outdoor IoT systems, including smart meters and FA control systems.
Recommended as an alternative smaller and thinner solution to conventional cylindrical lithium batteries.


CR2032X-HE1

Model	Electrical Characteristics				Dimensions			Operating Temperature Range (°C)
	Nominal Voltage (V)	Nominal Capacity (mAh)	Recommended Continuous Discharge Current (mA)	Maximum Pulse Discharge Current*1 (mA)	Diameter (mm)	Height (mm)	Weight (g)	
CR2032X	3.0	220	≦1	30	20.0	3.2	3.0	-40 to +85
CR2450X	3.0	600	≦1	30	24.5	5.0	6.2	-40 to +85
CR2477X	3.0	1000	≦1	30	24.5	7.7	9.5	-40 to +85
CR3677X*2	3.0	2000	≦1	80	36.5	7.7	20	-40 to +85

*1 Current for maintaining minimum 2V voltage with pulsed discharge of 3 seconds and 50% nominal capacity discharged (ambient temperature 23°C)
*2 Shipment of mass-produced CR3677X is scheduled to start at the end of 2019.

High Drain

Ideal for tracking devices for logistics and asset management by adopting Low Power Wide Area (LPWA) networks such as LoRa and SIGFOX as well as for outdoor infrastructures, FA control systems, and environment monitoring sensors.


CR2450R-HO5

Model	Electrical Characteristics				Dimensions			Operating Temperature Range (°C)
	Nominal Voltage (V)	Nominal Capacity (mAh)	Recommended Continuous Discharge Current (mA)	Maximum Pulse Discharge Current*1 (mA)	Diameter (mm)	Height (mm)	Weight (g)	
CR2032R	3.0	200	≦3	50	20.0	3.2	3.0	-30 to +70
CR2450R	3.0	500	≦3	50	24.5	5.0	6.2	-30 to +70

*1 Current for maintaining minimum 2V voltage with pulsed discharge of 3 seconds and 50% nominal capacity discharged (ambient temperature 23°C)

Silicon Capacitors

Automotive high temperature Si capacitors up to 200°C (ATSC)

Series		Capacitance	Dimensions (mm)	Thickness (µm)	Breakdown Voltage (V)	Recommended Voltage* (V)
 ATSC	ATSC	1nF	0.65 X 0.65	250	30	16
		10nF	0.65 X 0.65	250	30	16
		47nF	1.32 X 1.32	250	30	16
		100nF	1.59 X 1.32	250	30	16

*Values are based on 10 years of intrinsic life-time prediction at 100°C continuous operation.

Ultra large-band wire-bondable vertical Si capacitors up to 26GHz+ (UWSC)

Series		Capacitance	Dimensions (mm)	Thickness (µm)	Breakdown Voltage (V)	Recommended Voltage* (V)
 UWSC	UWSC	100pF	0.25 X 0.25	100	150	68
		100pF	0.5 X 0.5	100	150	68
		100pF	0.5 X 0.5	250	150	68
		150pF	0.381 X 0.381	100	150	68
		1nF	0.5 X 0.5	100	150	68
		1nF	0.5 X 0.5	250	150	68

*Values are based on 10 years of intrinsic life-time prediction at 100°C continuous operation.

Wire-bondable Vertical Si Capacitors up to 250ºC (WBSC)

Series		Capacitance	Dimensions (mm)	Thickness (µm)	Breakdown Voltage (V)	Recommended Voltage* (V)
 WBSC	WBSC	100pF	0.5 X 0.5	250	150	68
		1nF	0.5 X 0.5	250	150	68
		2.7nF	0.5 X 1.25	250	150	68
		3.7nF	0.5 X 1.625	250	150	68
		4.7nF	0.5 X 2.0	250	150	68

*Values are based on 10 years of intrinsic life-time prediction at 100ºC continuous operation.

Wire-bondable vertical low-profile Si capacitors down to 100µm (WLSC)

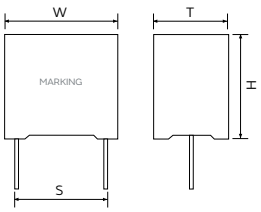
Series		Capacitance	Dimensions (mm)	Thickness (µm)	Breakdown Voltage (V)	Recommended Voltage* (V)
 WLSC	WLSC	100pF	0.25 X 0.25	100	150	68
		100pF	0.5 X 0.5	100	150	68
		150pF	0.381 X 0.381	100	150	68
		470pF	0.8 X 0.5	100	450	198
		1nF	0.5 X 0.5	100	150	68
		2.7nF	0.5 X 1.25	100	150	68
		3.7nF	0.5 X 1.625	100	150	68
		4.7nF	0.5 X 2.0	100	150	68

*Values are based on 10 years of intrinsic life-time prediction at 100ºC continuous operation.

Film Capacitors

FHA50Y206KS

FHA50Y156KS
FHA50Y106KS

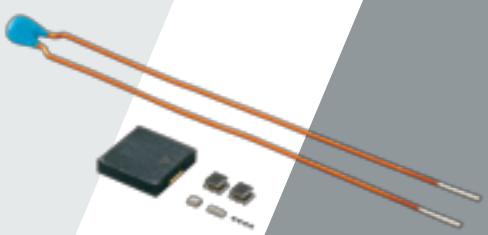


Specifications

Items	Basic Specifications
Rated Capacitance	10, 15, 20µF
Rated Voltage	500V
Operational Life	125ºC/500V 2000h
Biased Humidity	85ºC/85%RH/500V 1000h

Dimensions

Part Number	Capacitance (µF)	Dimensions (mm)			
		W	H	T	S
FHA50Y206KS	20	35.0	37.0	20.0	29.0
FHA50Y156KS	15	35.0	35.5	14.5	29.0
FHA50Y106KS	10	35.0	35.5	14.5	29.0



Products Lineup

(High Reliability)

Products Lineup (High Reliability)

Capacitors

Icons

Info-tainment	Infotainment for automotive Products for entertainment equipment like car navigation, car audio, and body control equipment like wipers and power windows.
Power-train	Powertrain/Safety for automotive Products used for applications (running, turning, stopping, and safety devices) that particularly concern human life, such as in devices for automotive.
AEC-Q200	AEC-Q200 compliant product
Safety standard	Products that acquired safety standard certification IEC60384-14.
High Q	Low dissipation for high frequency By devising ceramic materials and electrode materials, low dissipation is achieved in frequency bands of VHF, UHF, and microwave or beyond.
Low ESL	Low inductance This capacitor is designed so that the parasitic inductance component (ESL) that the capacitor has on the high frequency side becomes lower.
Deflecting crack	Product resistant to deflection cracking This capacitor is designed to prevent failures as much as possible by short mode caused by cracking when there is board deflection.
Soldering crack	Product with solder cracking suppression This capacitor is configured with metal terminals and leads connected to the chip. The metal terminals and leads relieve the stress from expansion and contraction of the solder, to suppress solder cracking.
Anti-noise	Product suitable for acoustic noise reduction and low distortion This product suppresses acoustic noise, which occurs when a ceramic capacitor is used, by devising the materials and configuration.
EMI Filter	Low-inductance product suitable for noise suppression This product has extremely low ESL and is suitable for suppression of noise, including high frequencies.
Limited to conductive glue mounting	Limited to conductive glue mounting Since silver palladium is used for the external electrodes, the capacitor can be mounted by conductive adhesive.

Ceramic Capacitors SMD Type for Automotive

AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment

Temperature Compensating Type

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GRT	GRT03	0.6 X 0.3 <0201>	100	1.0pF to 100pF
			50	1.0pF to 220pF
			25	1.0pF to 1000pF
	GRT15	1.0 X 0.5 <0402>	100	1.0pF to 100pF
			50	1.0pF to 1000pF
			25	10pF to 1000pF
	GRT18	1.6 X 0.8 <0603>	100	120pF to 1500pF
			50	1200pF to 10000pF
			25	1200pF to 10000pF
	GRT21	2.0 X 1.25 <0805>	100	1800pF to 3300pF
			50	18000pF to 22000pF
			25	1800pF to 2200pF
	GRT31	3.2 X 1.6 <1206>	100	3900pF to 22000pF
			50	56000pF to 0.10μF
			25	0.10μF to 0.12μF
			16	0.12μF

High Dielectric Constant Type

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GRT	GRT03	0.6 X 0.3 <0201>	35	0.10μF
			25	100pF to 0.10μF
			16	10000pF to 0.10μF
			10	1500pF to 1.0μF
			6.3	2200pF to 1.0μF
			4	68000pF to 1.0μF
			2.5	1.0μF
	GRT15	1.0 X 0.5 <0402>	50	220pF to 0.10μF
			35	0.22μF to 1.0μF
			25	10000pF to 2.2μF
			16	10000pF to 2.2μF
			10	0.22μF to 4.7μF
			6.3	22000pF to 4.7μF
			4	1.0μF to 4.7μF
			2.5	10μF
	GRT18	1.6 X 0.8 <0603>	100	3300pF to 10000pF
			50	1.0μF to 2.2μF
			35	1.0μF to 4.7μF
			25	0.15μF to 10μF
			16	0.33μF to 10μF
			10	10μF to 22μF
			6.3	10μF to 22μF
			4	1.0μF to 22μF
			2.5	22μF

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GRT	GRT21	2.0 X 1.25 <0805>	100	47000pF
			50	0.47μF to 4.7μF
			35	4.7μF
			25	2.2μF to 22μF
			16	2.2μF to 22μF
			10	3.3μF to 22μF
			6.3	3.3μF to 47μF
			4	47μF
	GRT31	3.2 X 1.6 <1206>	50	1.0μF to 10μF
			35	10μF
			25	1.5μF to 10μF
			16	1.5μF to 22μF
			10	47μF
			6.3	15μF to 47μF
	GRT32	3.2 X 2.5 <1210>	50	3.3μF to 4.7μF
			25	6.8μF
			16	47μF
			10	47μF
			6.3	33μF to 100μF

Chip Multilayer Ceramic Capacitors for Automotive

Temperature Compensating Type

Power-train AEC-Q200

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCM	GCM03	0.6 X 0.3 <0201>	50	1.0pF to 100pF
			25	1.0pF to 100pF
	GCM15	1.0 X 0.5 <0402>	50	1.0pF to 1000pF
	GCM18	1.6 X 0.8 <0603>	100	1.0pF to 10000pF
			80	1800pF to 3900pF
			50	1000pF to 10000pF
	GCM21	2.0 X 1.25 <0805>	630	10pF to 2200pF
			250	10pF to 10000pF
			100	1000pF to 3300pF
			80	4700pF to 22000pF
			50	12000pF to 22000pF
	GCM31	3.2 X 1.6 <1206>	1000	10pF to 1000pF
			630	10pF to 4700pF
			250	6800pF to 22000pF
			100	3900pF to 0.10μF
			80	27000pF to 33000pF
			50	68000pF to 0.10μF
	GCM32	3.2 X 2.5 <1210>	1000	1500pF to 2200pF
			630	1500pF to 10000pF
	GCM43	4.5 X 3.2 <1812>	1000	3300pF to 4700pF
			630	15000pF to 22000pF
	GCM55	5.7 X 5.0 <2220>	1000	6800pF to 10000pF
			630	33000pF to 47000pF

High Dielectric Constant Type

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCM	GCM03	0.6 X 0.3 <0201>	25	100pF to 3300pF
			16	330pF to 3300pF
			10	4700pF to 10000pF
	GCM15	1.0 X 0.5 <0402>	100	220pF to 4700pF
			50	220pF to 0.10μF
			25	10000pF to 0.10μF
			16	33000pF to 0.22μF
			10	0.47μF to 1.0μF
	GCM18	1.6 X 0.8 <0603>	100	6800pF to 22000pF
			50	0.22μF
			25	0.22μF to 1.0μF
			16	0.33μF to 1.0μF
			6.3	2.2μF to 10μF
			4	10μF
	GCM21	2.0 X 1.25 <0805>	100	33000pF to 1.0μF
			50	0.22μF to 1.0μF
			35	0.68μF to 4.7μF
			25	0.33μF to 4.7μF
			16	1.0μF to 10μF
			10	2.2μF to 10μF
			6.3	10μF
	GCM31	3.2 X 1.6 <1206>	100	0.22μF to 2.2μF
			50	1.0μF to 4.7μF
			25	1.0μF to 10μF
			16	4.7μF to 10μF
			10	22μF
			6.3	22μF
	GCM32	3.2 X 2.5 <1210>	100	4.7μF
			50	4.7μF to 10μF
			35	10μF
			25	10μF to 22μF
			16	22μF
			10	22μF to 47μF
			6.3	47μF

High Effective Capacitance & High Ripple Current Chip Multilayer Ceramic Capacitors for Automotive

Power-train AEC-Q200 Anti-noise

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GC3	GC321	2.0 X 1.25 <0805>	250	10000pF to 22000pF
	GC331	3.2 X 1.6 <1206>	630	10000pF to 15000pF
			450	10000pF to 47000pF
			250	33000pF to 68000pF
	GC332	3.2 X 2.5 <1210>	630	22000pF to 47000pF
			450	68000pF to 0.10μF
			250	0.10μF to 0.15μF
	GC343	4.5 X 3.2 <1812>	630	68000pF
			450	0.15μF
			250	0.22μF to 0.33μF
	GC355	5.7 X 5.0 <2220>	630	0.10μF to 0.22μF
			450	0.22μF to 0.47μF
			250	0.47μF to 1.0μF

Soft Termination Chip Multilayer Ceramic Capacitors for Automotive

Power-train AEC-Q200 Deflecting crack

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCJ	GCJ18	1.6 X 0.8 <0603>	100	1000pF to 0.10μF
			50	1000pF to 0.22μF
			35	33000pF to 68000pF
			25	1000pF to 1.0μF
			16	27000pF to 0.47μF
			10	0.22μF
			6.3	2.2μF to 4.7μF
	GCJ21	2.0 X 1.25 <0805>	250	1000pF to 22000pF
			100	27000pF to 1.0μF
			50	82000pF to 1.0μF
			35	0.12μF to 0.47μF
			25	0.12μF to 2.2μF
			16	0.27μF to 4.7μF
			10	2.2μF to 10μF
	GCJ31	3.2 X 1.6 <1206>	1000	1000pF to 10000pF
			630	1000pF to 22000pF
			250	15000pF to 0.10μF
			100	0.15μF to 2.2μF
			50	0.47μF to 4.7μF
			35	0.56μF to 1.0μF
			25	2.2μF to 10μF
			16	3.3μF to 10μF
			10	6.8μF to 22μF
			6.3	22μF
	GCJ32	3.2 X 2.5 <1210>	1000	15000pF to 22000pF
			630	6800pF to 47000pF
			250	68000pF to 0.22μF

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCJ	GCJ32	3.2 X 2.5 <1210>	100	2.2μF to 4.7μF
			50	4.7μF to 10μF
			25	4.7μF to 22μF
			16	6.8μF to 22μF
			6.3	47μF
	GCJ43	4.5 X 3.2 <1812>	1000	33000pF to 47000pF
			630	33000pF to 0.10μF
			250	0.15μF to 0.47μF
	GCJ55	5.7 X 5.0 <2220>	1000	68000pF to 0.10μF
			630	0.10μF to 0.22μF
			250	0.33μF to 1.0μF

High Q Chip Multilayer Ceramic Capacitors for Automotive

Power-train AEC-Q200 High Q

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCQ	GCQ15	1.0 X 0.5 <0402>	50	0.10pF to 47pF

MLSC Design Chip Multilayer Ceramic Capacitors for Automotive

Power-train AEC-Q200 Deflecting crack

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCD	GCD18	1.6 X 0.8 <0603>	100	1000pF to 22000pF
			50	1000pF to 22000pF
			25	27000pF to 47000pF
	GCD21	2.0 X 1.25 <0805>	100	27000pF to 0.10μF
			50	27000pF to 0.10μF
			16	0.47μF

Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive

Power-train AEC-Q200 Deflecting crack

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCE	GCE18	1.6 X 0.8 <0603>	100	1000pF to 22000pF
			50	1000pF to 22000pF
			25	27000pF to 47000pF
	GCE21	2.0 X 1.25 <0805>	100	27000pF to 0.10μF
			50	27000pF to 0.10μF

3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive

Power-train | AEC-Q200 | Low ESL | EMI Filter

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 NFM	NFM18	1.6 X 0.8 <0603>	16	1.0μF
			6.3	1.0μF
	NFM21	2.0 X 1.25 <0805>	50	220pF to 22000pF
			16	1.0μF
			10	0.10μF to 0.47μF
	NFM31	3.2 X 1.6 <1206>	100	10000pF
			50	10000pF to 0.10μF

Metal Terminal Type Multilayer Ceramic Capacitors for Automotive

Temperature Compensating Type

Power-train | AEC-Q200 | Deflecting crack | Soldering crack | Anti-noise

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 KCM	KCM55	6.1 X 5.1	630	15000pF to 54000pF

High Dielectric Constant Type

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 KCM	KCM55	6.1 X 5.3	100	4.7μF to 22μF
			63	4.7μF to 22μF
			50	4.7μF to 33μF
			35	10μF to 47μF
			25	15μF to 100μF

High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive

Power-train | AEC-Q200 | Deflecting crack | Soldering crack | Anti-noise

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 KC3	KC355	6.1 X 5.3	630	0.10μF to 1.2μF
			450	0.22μF to 2.2μF
			250	0.47μF to 2.2μF

Safety Standard Certified Metal Terminal Type Multilayer Ceramic Capacitors for Automotive

Power-train | AEC-Q200 | Safety standard | Deflecting crack | Soldering crack | Anti-noise

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 KCA	KCA55	6.1 X 5.1	AC250 (r.m.s.)	100pF to 10000pF

AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive

Power-train | AEC-Q200 | Deflecting crack | Soldering crack | Limited to conductive glue mounting

Temperature Compensating Type

Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCG	GCG15	1.0 X 0.5 <0402>	50	120pF to 470pF
	GCG18	1.6 X 0.8 <0603>	100	10pF to 10000pF
			50	10pF to 2200pF
	GCG21	2.0 X 1.25 <0805>	50	1000pF to 10000pF

High Dielectric Constant Type

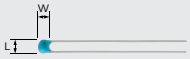
Series		LXW (mm) <Size Code (inch)>	Rated Voltage (Vdc)	Capacitance Range
 GCG	GCG15	1.0 X 0.5 <0402>	50	220pF to 4700pF
			25	5600pF to 10000pF
			16	15000pF to 0.10μF
	GCG18	1.6 X 0.8 <0603>	100	1000pF to 0.10μF
			50	1200pF to 0.22μF
			25	0.12μF to 0.47μF
			16	0.15μF to 1.0μF
			10	2.2μF
			6.3	2.2μF
	GCG21	2.0 X 1.25 <0805>	50	0.15μF to 1.0μF
			35	0.68μF to 1.0μF
			25	0.27μF to 1.0μF
			16	0.33μF to 4.7μF
			10	10μF
			6.3	10μF
	GCG31	3.2 X 1.6 <1206>	50	0.22μF to 0.33μF
			25	1.2μF to 4.7μF
			16	0.68μF4.7μF
			6.3	22μF
	GCG32	3.2 X 2.5 <1210>	50	10μF
			35	10μF
			25	10μF to 22μF
			16	6.8μF to 10μF
			6.3	47μF

Ceramic Capacitors Lead Type for Automotive

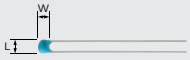
Leaded Multilayer Ceramic Capacitors for Automotive

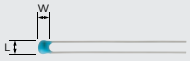
Temperature Compensating Type

Power-train | AEC-Q200 | Deflecting crack | Soldering crack | Anti-noise

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 RCE	RCE5C	3.6 X 3.5	100	1.0pF to 1500pF
			50	1.0pF to 3900pF
		4.0 X 3.5	630	10pF to 2200pF
			250	10pF to 10000pF
			100	1800pF to 3300pF
			50	4700pF to 22000pF
		5.5 X 4.0	1000	10pF to 1000pF
			630	10pF to 4700pF
			250	10pF to 22000pF
			100	3900pF to 10000pF
			50	27000pF to 0.10μF
	RCE7U	4.0 X 3.5	250	100pF to 4700pF
		5.5 X 4.0	1000	10pF to 1000pF
			630	10pF to 4700pF
			250	6800pF to 10000pF
		5.5 X 5.0	1000	1500pF to 2200pF
			630	6800pF to 10000pF
		7.5 X 5.5	1000	3300pF to 4700pF
			630	15000pF to 22000pF
		7.5 X 8.0	1000	6800pF to 10000pF
			630	33000pF to 47000pF
		7.7 X 13.0	1000	20000pF
			630	94000pF

High Dielectric Constant Type

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 RCE	RCEC7	4.0 X 3.5	50	1.0μF
		5.5 X 4.0	50	4.7μF
		5.5 X 5.0	100	1.5μF to 2.2μF
			50	10μF
		5.5 X 7.5	100	4.7μF
			50	22μF
	RCER7	3.6 X 3.5	100	220pF to 22000pF
			50	220pF to 0.10μF
			25	0.10μF to 0.22μF
		4.0 X 3.5	250	1000pF to 22000pF
			100	33000pF to 0.33μF
			50	0.15μF to 0.47μF
			25	0.33μF to 1.0μF
		5.5 X 4.0	1000	1000pF to 10000pF
			630	22000pF to 22000pF
			250	33000pF to 0.10μF
			100	0.15μF to 1.0μF
			50	0.68μF to 2.2μF
			25	1.5μF to 4.7μF

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 RCE	RCER7	5.5 X 5.0	1000	15000pF to 22000pF
			630	33000pF to 47000pF
			250	0.15μF to 0.22μF
			50	3.3μF to 4.7μF
			25	10μF
		5.5 X 7.5	50	10μF
			25	22μF
		7.5 X 5.5	1000	33000pF to 47000pF
			630	68000pF to 0.10μF
			250	0.33μF to 0.47μF
		7.5 X 7.5	250	0.68μF to 1.0μF
		7.5 X 8.0	1000	68000pF to 0.10μF
			630	0.15μF to 0.22μF
		7.7 X 12.5	250	2.2μF
		7.7 X 13.0	1000	0.22μF
			630	0.47μF

150°C Operation Leaded Multilayer Ceramic Capacitors for Automotive

Temperature Compensating Type

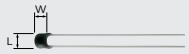
Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 RHE	RHE5G	3.6 X 3.5	100	100pF to 1500pF
			50	100pF to 3900pF
		4.0 X 3.5	100	1800pF to 3300pF
			50	4700pF to 10000pF

High Dielectric Constant Type

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 RHE	RHEL8	3.6 X 3.5	100	220pF to 22000pF
			50	220pF to 0.10μF
			25	0.10μF to 0.22μF
		4.0 X 3.5	100	33000pF to 0.10μF
			50	0.15μF to 0.33μF
			25	0.33μF to 1.0μF
		5.5 X 4.0	100	0.15μF to 0.22μF
			50	0.47μF to 2.2μF
			25	1.5μF to 4.7μF
		5.5 X 5.0	50	3.3μF to 4.7μF
			25	10μF
		5.5 X 7.5	50	10μF
			25	22μF

175ºC/200ºC Operation Leaded Multilayer Ceramic Capacitors for Automotive

Temperature Compensating Type

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 RHS	RHS7G	3.9 X 3.5	100	100pF to 1500pF
		4.2 X 3.5	100	1800pF to 3300pF
	RHS7J	4.2 X 3.5	200	100pF to 4700pF
		5.5 X 4.0	500	100pF to 4700pF
			200	6800pF to 10000pF

Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive

Series		Rated Voltage (Vdc)	D (mm)	Capacitance Range
 DE6	DE6E3	X1: AC440V(r.m.s.) Y2: AC300V(r.m.s.)	7.0 to 12.0	1000pF to 4700pF

Polymer Aluminum Electrolytic Capacitors

Series		LXW (mm)	Rated Voltage (Vdc)	Capacitance Range
 ECAS	ECAS	7.3 X 4.3	25	10µF to 33µF
			20	33µF to 47µF
			16	6.8µF to 68µF
			10	10µF to 100µF
			6.3	10µF to 220µF
			4	68µF to 220µF
			2.5	330µF to 470µF
			2	100µF to 470µF

Products Lineup (High Reliability)

Noise Suppression Products / EMI Suppression Filters

Chip Ferrite Beads / Application Specified Noise Filters

				Part Number	Applications	Size Code inch (mm)	Impedance at 100MHz
For General Band Noise	Signal Lines Type	Universal Type [Power Lines/Signal Lines]		BLM03AX	Info-tainment	0201 (0603)	10Ω to 1000Ω
				BLM15AX	Info-tainment	0402 (1005)	10Ω to 1000Ω
		For General Signal Lines		BLM03AG	Info-tainment	0201 (0603)	10Ω to 1000Ω
				BLM15AG	Info-tainment Power-train	0402 (1005)	10Ω to 1000Ω
				BLM18AG	Info-tainment Power-train	0603 (1608)	120Ω to 1000Ω
				BLM18AG* (150ºC available)	Power-train	0603 (1608)	120Ω to 1000Ω
				BLM18AG* (Conductive glue)	Power-train	0603 (1608)	470Ω to 1000Ω
				BLM21AG	Info-tainment Power-train	0805 (2012)	120Ω to 1000Ω
				BLM21AG* (150ºC available)	Power-train	0805 (2012)	120Ω to 1000Ω
				BLM31AJ	Power-train	1206 (3216)	600Ω
		For High Speed Signal Lines		BLM03B	Info-tainment	0201 (0603)	10Ω to 600Ω
				BLM15B	Info-tainment Power-train	0402 (1005)	5Ω to 1800Ω
				BLM18B	Info-tainment Power-train	0603 (1608)	5Ω to 2500Ω
				BLM18B* (150ºC available)	Power-train	0603 (1608)	47Ω to 2500Ω
				BLM21B	Info-tainment Power-train	0805 (2012)	5Ω to 2700Ω
	Power Lines Type			BLM03PX*	Info-tainment	0201 (0603)	22Ω to 120Ω
				BLM03PG	Info-tainment	0201 (0603)	22Ω to 33Ω
				BLM15PX*	Info-tainment	0402 (1005)	33Ω to 600Ω
				BLM15PG/PD*	Info-tainment	0402 (1005)	10Ω to 120Ω
				BLM18PG*	Info-tainment Power-train	0603 (1608)	30Ω to 470Ω
				BLM21PG*	Info-tainment Power-train	0805 (2012)	22Ω to 330Ω
				BLM21PG* (150ºC available)	Power-train	0805 (2012)	22Ω to 330Ω
				BLM31PG*	Info-tainment Power-train	1206 (3216)	33Ω to 600Ω
				BLM41PG*	Info-tainment Power-train	1806 (4516)	60Ω to 1000Ω
				BLM18KG*	Info-tainment Power-train	0603 (1608)	26Ω to 1000Ω
				BLM18KG* (150ºC available)	Power-train	0603 (1608)	26Ω to 1000Ω
				BLM18KG* (Conductive glue)	Power-train	0603 (1608)	26Ω to 1000Ω
				BLM31KN*	Info-tainment Power-train	1206 (3216)	120Ω to 1000Ω
				BLM31KN* (150ºC available)	Power-train	1206 (3216)	120Ω to 1000Ω
				BLM18SG*	Info-tainment	0603 (1608)	26Ω to 330Ω
				BLM18SN*	Info-tainment Power-train	0603 (1608)	22Ω
				BLM21SP*	Info-tainment Power-train	0805 (2012)	70Ω to 1000Ω
				BLM21SP* (150ºC available)	Power-train	0805 (2012)	70Ω to 1000Ω
				BLM21SN*	Info-tainment Power-train	0805 (2012)	30Ω
				BLM31SN*	Info-tainment Power-train	1206 (3216)	50Ω
				BLE18PS*	Info-tainment Power-train	0603 (1608)	8.5Ω
				BLE32PN	Info-tainment Power-train	1210 (3225)	26Ω to 30Ω

*The derating of rated current is required for some items according to the operating temperature.

		Part Number	Applications	Size Code inch (mm)	Impedance at 100MHz
For GHz Band Noise	Universal Type [Power Lines/Signal Lines]	BLM03EB*	Info-tainment Power-train	0201 (0603)	25Ω to 50Ω
		BLM15EG*	Info-tainment Power-train	0402 (1005)	120Ω to 220Ω
		BLM18EG*	Info-tainment Power-train	0603 (1608)	100Ω to 600Ω
		BLM18HE*	Info-tainment Power-train	0603 (1608)	600Ω to 1500Ω
	Signal Lines Type	BLM03HG	Info-tainment Power-train	0201 (0603)	600Ω to 1200Ω
		BLM03HD	Info-tainment	0201 (0603)	330Ω to 1800Ω
		BLM03HB	Info-tainment	0201 (0603)	190Ω to 400Ω
		BLM15HG	Info-tainment Power-train	0402 (1005)	600Ω to 1000Ω
		BLM15HG* (150°C available)	Power-train	0402 (1005)	600Ω to 1000Ω
		BLM15HD	Info-tainment Power-train	0402 (1005)	600Ω to 1800Ω
		BLM15HB	Info-tainment Power-train	0402 (1005)	120Ω to 220Ω
		BLM18HG	Info-tainment Power-train	0603 (1608)	470Ω to 1000Ω
		BLM18HD	Info-tainment Power-train	0603 (1608)	470Ω to 1000Ω
		BLM18HB	Info-tainment	0603 (1608)	120Ω to 330Ω
For High-GHz Band Noise	Power Lines Type	BLM18DN*	Info-tainment Power-train	0603 (1608)	150Ω to 600Ω
	Signal Lines Type	BLM15GG	Info-tainment	0402 (1005)	220Ω to 470Ω
		BLM15GA	Info-tainment	0402 (1005)	75Ω
		BLM18GG	Info-tainment	0603 (1608)	470Ω

*The derating of rated current is required for some items according to the operating temperature.

Application Specified Noise Filters

	Part Number	Applications	Size Code inch (mm)	Impedance at 700MHz
For 700MHz Band	BLF03JD*	Info-tainment	0201 (0603)	420Ω

*The derating of rated current is required for some items according to the operating temperature.

	Part Number	Applications	Size Code inch (mm)	Impedance at 1MHz
For LED Lines	NFZ32BW*	Info-tainment	1210 (3225)	3.3Ω to 880Ω
	NFZ5BBW*	Info-tainment	2020 (5050)	2.9Ω to 140Ω

*The derating of rated current is required for some items according to the operating temperature.

	Part Number	Applications	Size Code inch (mm)	Impedance at 100MHz	Impedance at 10MHz
For Audio Lines	NFZ15SF	Info-tainment	0402 (1005)	1000Ω	-
	NFZ18SM*	Info-tainment	0603 (1608)	120Ω to 700Ω	-
	NFZ2MSD*	Info-tainment	0806 (2016)	100Ω to 1000Ω	9Ω to 46Ω

*The derating of rated current is required for some items according to the operating temperature.

Chip EMIFIL

	Part Number	Applications	Size Code inch (mm)	Nominal Cut-off Frequency
Signal Lines Type	NFL18ZT	Info-tainment	0603 (1608)	50MHz to 500MHz

	Part Number	Applications	Size Code inch (mm)	Capacitance
Universal Type [Power Lines/Signal Lines]	NFE31ZT	Info-tainment	1206 (3216)	22pF to 2200pF
	NFE61HT	Power-train	2706 (6816)	33pF to 3300pF

Common Mode Choke Coils / Common Mode Noise Filters

		Part Number	Applications	Size Code inch (mm)	Common Mode Impedance at 100MHz
Signal Lines Type	For Differential Signal Lines	DLM11S	Info-tainment	0504 (1210)	45Ω to 90Ω
		DLW21S	Info-tainment	0805 (2012)	67Ω to 490Ω
		DLW31S	Power-train	1206 (3216)	2200Ω
Universal Type [Power Lines/Signal Lines]		DLW5BS	Info-tainment	2020 (5050)	500Ω to 800Ω
		DLW5AT*/DLW5BT*	Info-tainment Power-train	2014 (5036)/ 2020 (5050)	45Ω to 1400Ω
Power Lines Type		UCMH0907	Info-tainment	3527 (9070)	700Ω

*The derating of rated current is required for some items according to the operating temperature.

	Part Number	Applications	Size Code inch (mm)	Common Mode Inductance at 0.1MHz	Common Mode Inductance at 1MHz
For CAN/FlexRay	DLW32SH110XK2	Power-train	1210 (3225)	11μH	-
	DLW32SH220XK2	Power-train	1210 (3225)	22μH	-
	DLW43SH110XK2	Power-train	1812 (4532)	11μH	-
	DLW43SH220XK2	Power-train	1812 (4532)	22μH	-
	DLW43SH510XK2	Power-train	1812 (4532)	-	51μH
	DLW43SH101XK2	Power-train	1812 (4532)	-	100μH
	DLW43SH101XP2	Power-train	1812 (4532)	100μH	-

	Part Number	Applications	Size Code inch (mm)	Common Mode Inductance at 0.1MHz
For CAN/CAN FD	DLW32SH510XK2	Power-train	1210 (3225)	51μH
	DLW32SH101XK2	Power-train	1210 (3225)	100μH
	DLW32SH101XF2	Power-train	1210 (3225)	100μH
For In-vehicle Ethernet (100Mbps)	DLW32MH_XK2	Power-train	1210 (3225)	100μH to 200μH
	DLW43MH	Power-train	1812 (4532)	200μH
For In-vehicle Ethernet (1000Mbps)	DLW32MH_XT2	Power-train	1210 (3225)	100μH (Typ.) at 500mV, 80μH -25% / +50% at 100mV

Large Current Type for Automotive Available

	Part Number	Applications	Size Code inch (mm)	Common Mode Impedance at 10MHz
Power Lines Type	PLT5BP*	Power-train	2020 (5050)	100Ω to 500Ω
	PLT10H*	Power-train	-	45Ω to 1000Ω

*The derating of rated current is required for some items according to the operating temperature.

Block Type EMIFIL

		Part Number	Applications	Height (mm)	Rated Voltage (Vdc)	Rated Current (A)
Power Lines Type	SMD Type	BNX024H01*	Power-train	3.5	50	20
		BNX025H01*	Power-train	3.5	25	20
		BNX026H01*	Power-train	3.5	50	20
		BNX027H01*	Power-train	3.5	16	20
	Lead Type	BNX012H01*	Power-train	8.5 max.	50	15

*The derating of rated current is required for some items according to the operating temperature.

EMI Suppression Filters (Lead Type)

Leaded Multilayer Ferrite Beads

	Part Number	Applications	Height (mm)	Impedance at 100MHz
Signal Lines Type	BLL18AG	Power-train	4.0 max.	120Ω to 1000Ω

3-Terminal Capacitor Lead Type

	Part Number	Applications	Height (mm)	Capacitance
Universal Type [Power Lines/Signal Lines]	DSS1	Info-tainment	7.5 max.	22pF to 100nF

Lead Type Capacitor with Varistor Function

	Part Number	Applications	Height (mm)	Capacitance	Varistor Voltage
Power Lines Type	VFC2	Power-train	6.0 max.	100nF to 1μF	22V to 82V

Products Lineup (High Reliability)

Inductors (Coils)

Inductors for Power Lines

For Power Circuits

Info-tainment

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Multilayer Type	0603 (1608)	LQM18PZ		LQM18PZ_CH	0.6	1μH to 2.5μH	750mA to 950mA
				LQM18PZ_DH	0.75	2.2μH	650mA
				LQM18PZ_FH	0.95	2.2μH	700mA
	0805 (2012)	LQM21PZ		LQM21PZ_C0	0.55	470nH to 2.2μH	600mA to 1.1A
				LQM21PZ_G0	1.0	470nH to 3.3μH	800mA to 1.3A
				LQM21PZ_GC	1.0	1μH to 2.2μH	800mA to 900mA
				LQM21PZ_GR	1.0	1μH to 4.7μH	800mA to 1.3A
Wound Metal Alloy	0806 (2016)	DFE2016		DFE201612P_D	1.2	150nH to 2.2μH	1.7A to 6.2A
Wound Ferrite Core		LQH2MPZ		LQH2MPZ_GR	0.95	330nH to 82μH	210mA to 2.2A
Multilayer Type		LQM2MPZ		LQM2MPZ_G0	1.0	470nH to 4.7μH	1.1A to 1.6A
				LQM2MPZ_JH	1.2	100nH	4A
Wound Ferrite Core	1008 (2520)	LQH2HPZ		LQH2HPZ_DR	0.6	470nH to 22μH	270mA to 1.67A
				LQH2HPZ_GR	1.0	470nH to 22μH	460mA to 2.9A
				LQH2HPZ_JR	1.2	470nH to 22μH	540mA to 3.5A
Multilayer Type		LQM2HPZ		LQM2HPZ_E0	0.8	560nH	1.5A
				LQM2HPZ_G0	1.0	470nH to 4.7μH	1.1A to 1.8A
				LQM2HPZ_GC	1.0	1μH to 4.7μH	800mA to 1.5A
				LQM2HPZ_GS	1.0	2.2μH to 4.7μH	1A to 1.1A
				LQM2HPZ_J0	1.2	1μH to 3.3μH	1A to 1.5A
Wound Metal Alloy		DFE2520		DFE252012P_D	1.2	330nH to 10μH	1.1A to 6A
Wound Ferrite Core	3mm square	LQH3NPZ		LQH3NPZ_GR	1.0	470nH to 47μH	460mA to 2.82A
				LQH3NPZ_JR	1.2	680nH to 47μH	570mA to 2.86A
				LQH3NPZ_ME	1.5	1μH to 100μH	430mA to 3A
Wound Metal Alloy	1210 (3225)	DFE3225		DFE322520F_D	2.0	1μH to 4.7μH	3.4A to 7.5A
Wound Ferrite Core		LQH32PZ		LQH32PZ_N0	1.7	470nH to 120μH	200mA to 3.4A
				LQH32PZ_NC	1.7	470nH to 22μH	650mA to 4.4A
	4mm square	LQH43PZ		LQH43PZ_26	2.8	1μH to 220μH	240mA to 3.4A
	5mm square	LQH5BPZ		LQH5BPZ_T0	2.2	470nH to 22μH	1.4A to 7.7A
	6 to 9mm square	DEM80		DEM8045C_Z	4.5	1.5μH to 47μH	2.1A to 11.2A

For Power Circuits

Power-train

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Multilayer Type	0603 (1608)	LQM18PH		LQM18PH_FR	0.95	220nH to 4.7μH	620mA to 1.25A
	0805 (2012)	LQM21PH		LQM21PH_G0	1.0	0.47μH to 0.54μH	1.3A
				LQM21PH_GC	1.0	1.0μH to 2.2μH	800mA to 1A
Wound Metal Alloy	0806 (2016)	DFE2MCAH		DFE2MCAH_J0	1.2	0.15μH to 2.2μH	1.7A to 6.1A
	1008 (2520)	DFE2HCAH		DFE2HCAH_J0	1.2	330nH to 2.2μH	2.5A to 5.8A
Wound Ferrite Core	1210 (3225)	LQH32PH		LQH32PH_N0	1.7	470nH to 10μH	750mA to 3.4A
				LQH32PH_NC	1.7	470nH to 22μH	650mA to 4.4A
	4mm square	LQH44PH		LQH44PH_PR	1.8	1μH to 220μH	330mA to 4.3A
		LQH43PH		LQH43PH_26	2.8	1μH to 220μH	240mA to 3.4A
	5mm square	LQH5BPH		LQH5BPH_T0	2.2	0.47μH to 47μH	850mA to 7.7A

For Choke Circuits

Info-tainment

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Wound Ferrite Core	1210 (3225)	LQH32D		LQH32DZ_23	2.2	1μH to 470μH	60mA to 800mA
				LQH32DZ_53	1.7	1μH to 100μH	100mA to 1A

For Choke Circuits

Power-train

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Wound Ferrite Core	1210 (3225)	LQH32C		LQH32CH_23	2.2	1μH to 22μH	250mA to 800mA
				LQH32CH_33	2.2	150nH to 10μH	450mA to 1.45A
				LQH32CH_53	1.7	1μH to 22μH	250mA to 1A
		LQW32F		LQW32FT_0H	2.5	10μH to 47μH	500mA to 700mA

RF Inductors

For RF Circuits

Info-tainment

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Wound Non-magnetic Type	0402 (1005)	LQW15A		LQW15AN_0Z	0.6	1.5nH to 120nH	110mA to 1A
				LQW15AN_1Z	0.6	1.3nH to 8.4nH	640mA to 1.2A
				LQW15AN_8Z	0.6	1.3nH to 75nH	320mA to 3.15A
	0603 (1608)	LQW18A		LQW18AN_0Z	1.0	2.2nH to 470nH	75mA to 850mA
				LQW18AN_1Z	1.0	2.2nH to 33nH	550mA to 1.4A
				LQW18AN_8Z	1.0	2.2nH to 390nH	190mA to 3.2A
				LQW18AS_0Z	1.0	1.6nH to 390nH	100mA to 700mA
Film Type	0201 (0603)	LQP03T		LQP03TN_Z2	0.33	0.6nH to 120nH	80mA to 850mA
Multilayer Type	0402 (1005)	LQG15H		LQG15HZ_02	0.55	1nH to 270nH	110mA to 1A
		LQG15W		LQG15WZ_02	0.6	0.7nH to 150nH	110mA to 1.2A

For RF Circuits

Power-train

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Multilayer Type	0402 (1005)	LQG15H		LQG15HH_02	0.55	1nH to 270nH	110mA to 1A
		LQG15W		LQG15WH_02	0.6	0.7nH to 150nH	110mA to 1.2A
	0603 (1608)	LQG18H		LQG18HH_00	0.95	1.2nH to 270nH	200mA to 1.1A

For Choke / Tuner Circuits

Info-tainment

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Wound Ferrite Core Type	0402 (1005)	LQW15C		LQW15CN_0Z	0.6	18nH to 200nH	390mA to 1.4A
				LQW15CN_1Z	0.6	20nH to 560nH	300mA to 2.2A
	0603 (1608)	LQW18C		LQW18CN_0Z	0.95	4.9nH to 650nH	430mA to 2.6A
	1206 (3216)	LQH31H		LQH31HZ_03	2.0	54nH to 880nH	180mA to 920mA

General Purpose

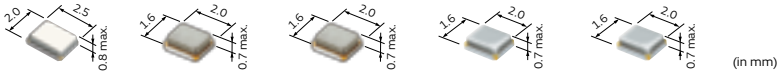
Info-tainment

Structure	Size Code inch (mm)	Series			Thickness (mm/max.)	Inductance Range	Rated Current Range
Wound Ferrite Core Type	1210 (3225)	LQH32NZ		LQH32NZ_23	2.2	1µH to 470µH	45mA to 445mA
	4mm square	LQH43NZ		LQH43NZ_03	2.8	1µH to 2.4mH	25mA to 500mA
2in1 Type	10mm square and over	HEAWS		HEAWS	10.0	3.3µH to 10µH	5A to 8A

Products Lineup (High Reliability)

Timing Devices

Crystal Units



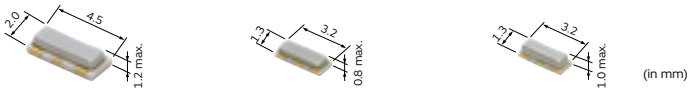
XRCHA_F_A XRCGE_F_A XRCGB_F_A XRCGB_F_C XRCGB_F_G (in mm)

Series	Type	Frequency Range (MHz)	Frequency Tolerance (ppm)	Frequency Shift by Temperature (ppm max.)	Operating Temperature Range (°C)
XRCHA_F_A	HCR2520	16.0000 to 24.0000	±100	±100	-40 to +125
XRCGE_F_A	HCR2016	20.0000 to 23.9999	±30	±45	-40 to +125
		24.5454 to 27.6000	±15	±35	-40 to +125
XRCGB_F_A	HCR2016	24.0000 to 29.9999	±30	±35	-40 to +125
		30.0000 to 48.0000	±50	±65	-40 to +125
XRCGB_F_C	HCR2016	27.6000	±20	±20	-30 to +85
XRCGB_F_G*	HCR2016	24.0000 to 48.0000	±30,±45,±100	±50	-40 to +85

*Only for infotainment.

Ceramic Resonators CERALOCK

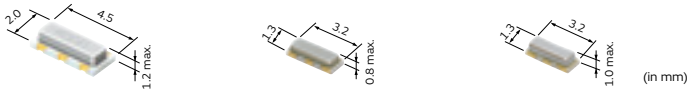
MHz Chip Type for Automotive (Tight Frequency Tolerance)



CSTNR_GH5C CSTNE_GH5C CSTNE_VH3C (in mm)

Series	Frequency Range (MHz)	Frequency Tolerance (%)	Frequency Shift by Temperature (% max.)	Operating Temperature Range (°C)
CSTNR_GH5C	4.00 to 7.99	±0.07	±0.13	-40 to +125
CSTNE_GH5C	8.00 to 13.99	±0.07	±0.13	-40 to +125
CSTNE_VH3C	14.00 to 20.00	±0.07	±0.13	-40 to +125

MHz Chip Type for Automotive (Standard Frequency Tolerance)



CSTCR_G_B CSTNE_G_A CSTNE_V_C (in mm)

Series	Frequency Range (MHz)	Frequency Tolerance (%)	Frequency Shift by Temperature (% max.)	Operating Temperature Range (°C)
CSTCR_G_B	4.00 to 7.99	±0.5	±0.15	-40 to +125
CSTNE_G_A	8.00 to 13.99	±0.5	±0.20	-40 to +125
CSTNE_V_C	14.00 to 20.00	±0.5	±0.15	-40 to +125

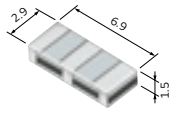
Products Lineup (High Reliability)

Filters

Ceramic Filters CERAFIL

Chip Type

Small and lightweight filters for IF in communications or AV equipment using unique piezoelectric material.

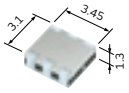


SFECK / SFECV Series

(in mm)

Type	Series	3dB Bandwidth (kHz)		
		E	J	K
		330	150	110
High-reliability Type	SFECK10M7☐	–	●	●
Standard Type	SFECV10M7☐	–	●	●
Standard Type	SFECV15M0☐	●	–	–

☐ is filled with the letter designating the required 3dB bandwidth.



SFECF Series

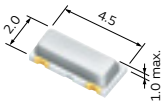
(in mm)

Type	Series	3dB Bandwidth (kHz)				
		D	E	F	G	H
		350	330	280	230	180
Standard Type	SFECF10M7☐	●	●	●	●	●

☐ is filled with the letter designating the required 3dB bandwidth.

Ceramic Discriminators

In combination with ICs, this type obtains stable demodulation characteristics in a wide bandwidth.



CDSCB Series

(in mm)

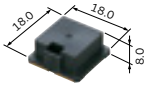
Series	Center Frequency
CDSCB	10.700MHz±30kHz

The recommended part number depends on IC specifications. Please contact us with the IC part number to be applied.

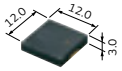
Products Lineup (High Reliability)

Sound Components (Buzzer)

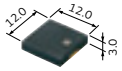
SMD Piezoelectric Sounders



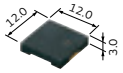
PKMCS1818E20



PKLCS1212E20



PKLCS1212E24



PKLCS1212E40

(in mm)

Applications	Mounting Type	Drive Type	Part Number	Sound Pressure Level (typ.)	Measurement Condition of Sound Pressure Level
For Automotive	Surface Mounting Type	External Drive	PKMCS1818E20A0-R1	100dB	12Vo-p, 2.0kHz, square wave, 10cm
			PKLCS1212E20A0-R1	76dB	±1.5Vo-p, 2.0kHz, square wave, 10cm
			PKLCS1212E24A0-R1	80dB	±1.5Vo-p, 2.4kHz, square wave, 10cm
			PKLCS1212E40A1-R1	84dB	±1.5Vo-p, 4.0kHz, square wave, 10cm

Products Lineup (High Reliability)

Thermistors

NTC thermistors

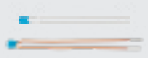
Chip Type

Chip NTC thermistors have Ni barrier terminations, provide excellent solderability, and offer high stability in harsh environments due to their unique inner construction.

Series		Resistance (25°C) (kΩ)	B-Constant (25-50°C) (K)	Operating Temperature Range (°C)
	NCU	10 to 470	3380 to 4500	-40 to +150

Lead Type

This lead NTC thermistor is self-standing and features a flexible design and high lead strength.

Series		Resistance (25°C) (kΩ)	B-Constant (25-50°C) (K)	Operating Temperature Range (°C)
	NXFS	2 to 100	3500 to 4250	-40 to +125
	NXRS	2 to 100	3500 to 4250	-40 to +125

PTC Thermistors (POSISTOR) Chip Type

For overheat sensing for power transistors, power diodes, and power ICs in hybrid circuits.

Series		Sensing Temperature (at 4.7kΩ) (°C)	Maximum Voltage (V)	Operating Temperature Range (°C)
	PRF	+65 to +145*	32	-40 to +150

*The lineup includes nine models for use in different temperature ranges at 10°C intervals. Detection accuracy: ±5°C (±3°C model available)

Overcurrent Protection device with resettable function suitable for current-limiting resistors.

Series		Resistance (25°C) (Ω)	Maximum Voltage (V)	Operating Temperature Range (°C)
	PRG	2.2 to 42	16 to 30	-40 to +105

PTC Thermistors (POSISTOR) Lead Type

Best suited to meet the requirements of power supplies and motor protection. Error-free operation is ensured by rush current.

Series		Resistance Value Tolerance (%)	Operating Temperature Range (°C)	Maximum Voltage (V)
	PTGL□S	±10	-40 to +125	16 to 140

Global Locations

For details please visit www.murata.com

⚠Note

1 Export Control

For customers outside Japan:

No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.

For customers in Japan:

For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.

2 Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.

1. *Aircraft equipment*
2. *Aerospace equipment*
3. *Undersea equipment*
4. *Power plant equipment*
5. *Medical equipment*
6. *Transportation equipment (vehicles, trains, ships, etc.)*
7. *Traffic signal equipment*
8. *Disaster prevention / crime prevention equipment*
9. *Data-processing equipment*
10. *Application of similar complexity and/or reliability requirements to the applications listed above*

3 Product specifications in this catalog are as of March 2020. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.

4 Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.

5 This catalog has only typical specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.

6 Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.

7 No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

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