

Murata solution for xEV application

Murata Mfg. Co., Ltd.
2020

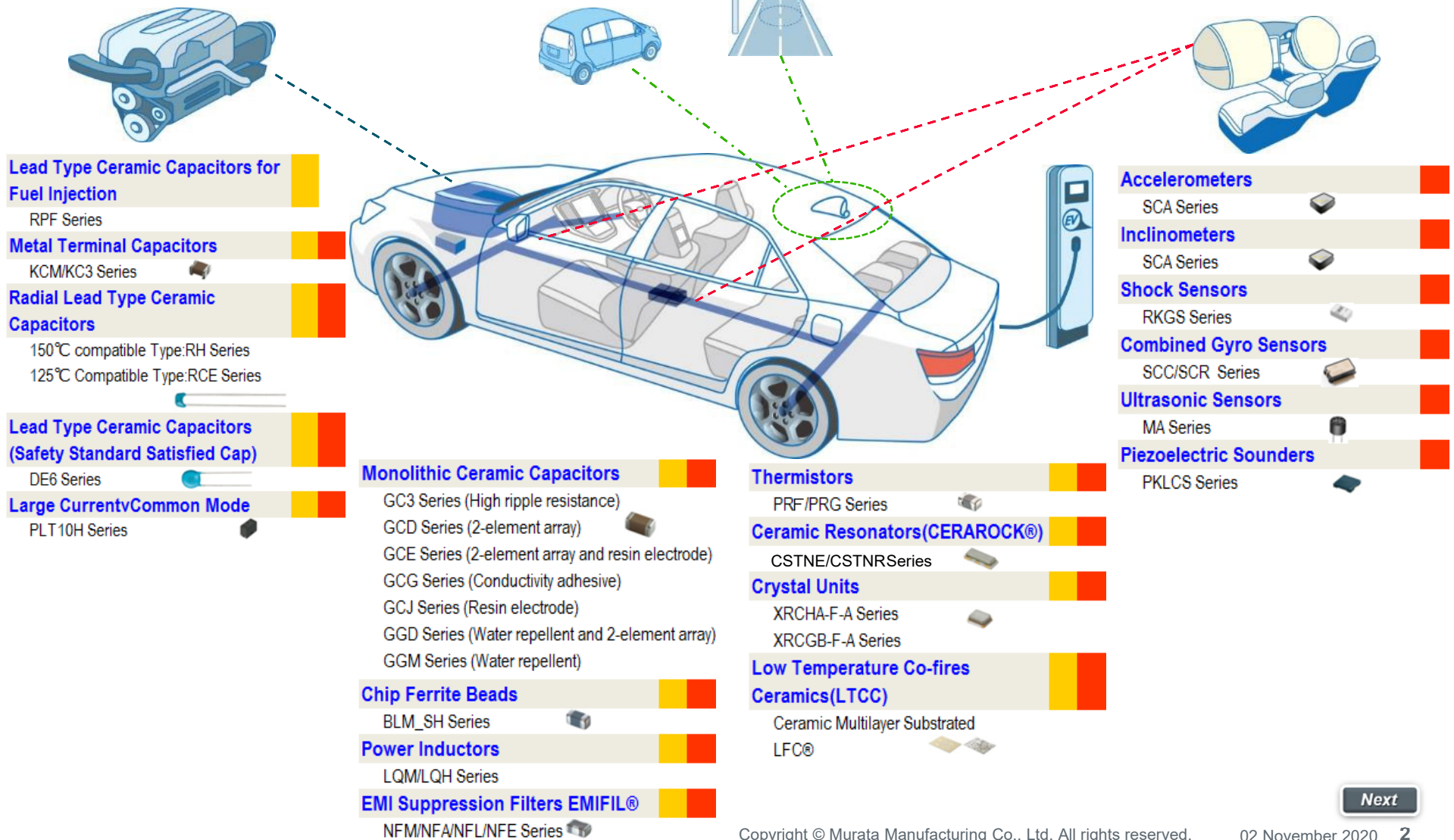


Products for Powertrain & ADAS



Powertrain

Safety



Next

Products for Infotainment & Comfort

Infotainment



SAW Filters/Resonators

SF/RF/RO series

Polymer Aluminu Electrotyc Capacitors

ECAS Series

Connectivity Module

Wi-Fi® Bluetooth®

Ceramic ESD Protection Devices

LXES Series

DC-DC converters

MY Series

Chip Multilayer LC Filters **

LFB18/ LFB21_V Series

LFL18/ LFL21_V Series

Chip Multilayer Baluns **

LDB21_V/LDM18_V Series

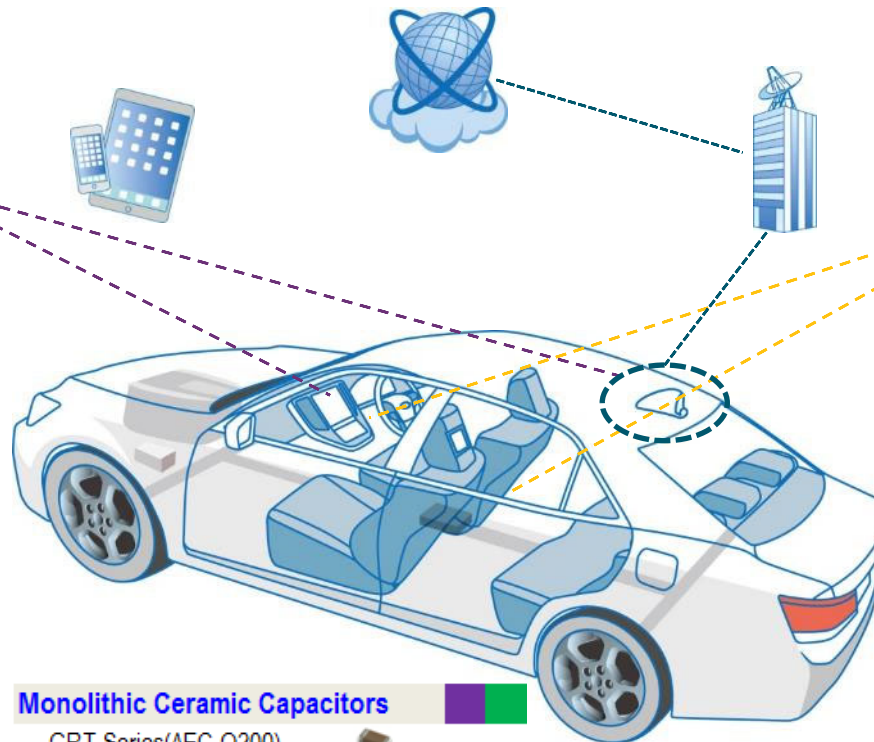
Chip Multilayer Hybrid Dividers **

LDD18_V/LDD21_V Series

Chip Multilayer Couplers **

LDC18_V/LDC21_V Series

****Consumer Grade & Available
for consumer grade use only**



Monolithic Ceramic Capacitors

GRT Series(AEC-Q200)

Chip Ferrite Beads

BLM_SZ Series

Power Inductors

LQM/LQH Series

RF Inductors

LQW/LQG/LQP Series

EMI Suppression Filters EMIFIL®

NFM/NFA/NFL/NFE Series

Chip Common Mode Choke Coils

DLW Series

Comfort / LAN



Ceramic Filters CERAFIL®

SFECF Series

Rotary Position Sensors

SV Series

Thermistors

PRF/PRG Series

Ceramic Resonators(CERAROCK®)

CSTNE/CSTNR Series

Crystal Units

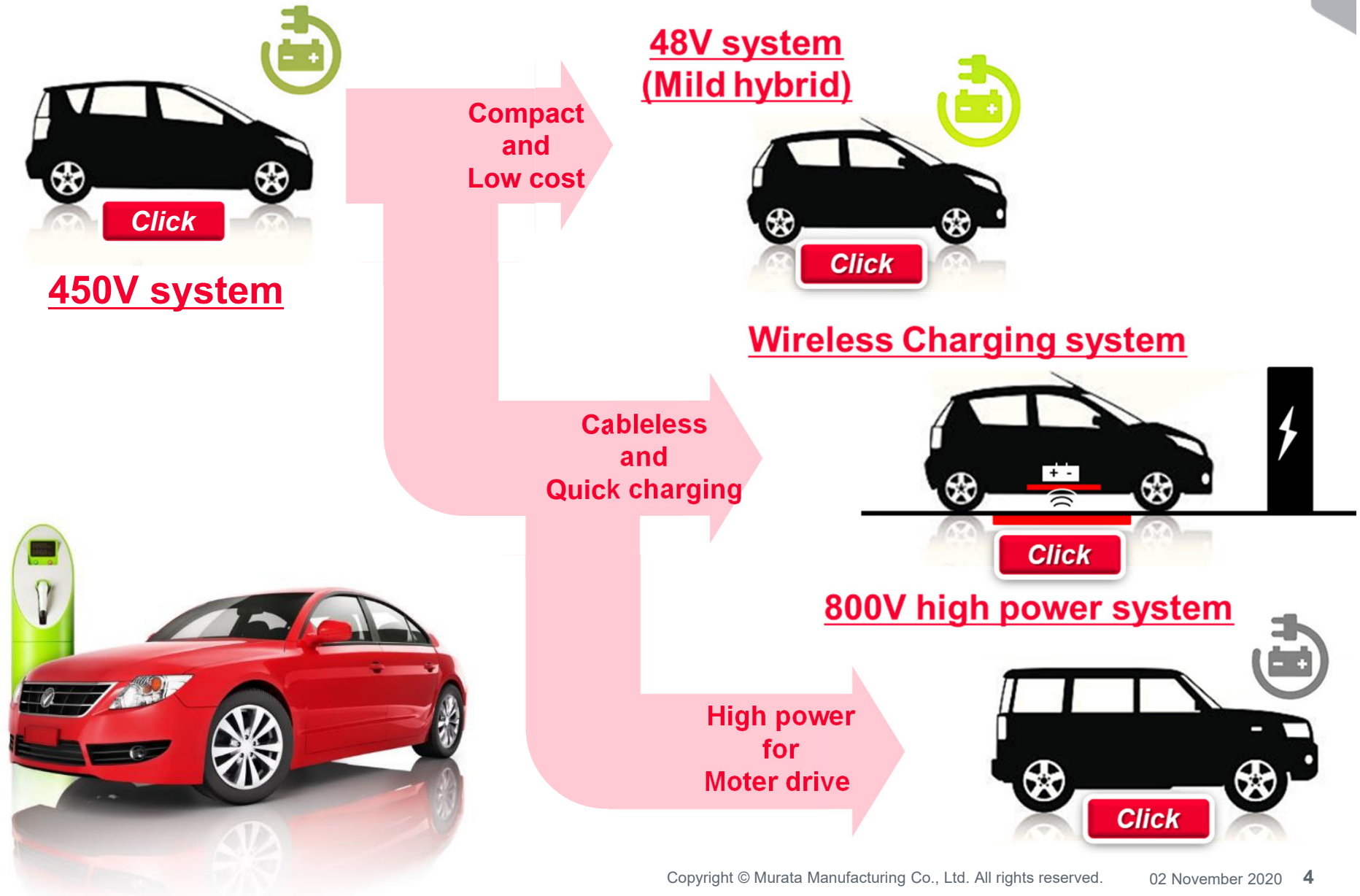
XRCHA-F-A Series

XRCGB-F-A Series

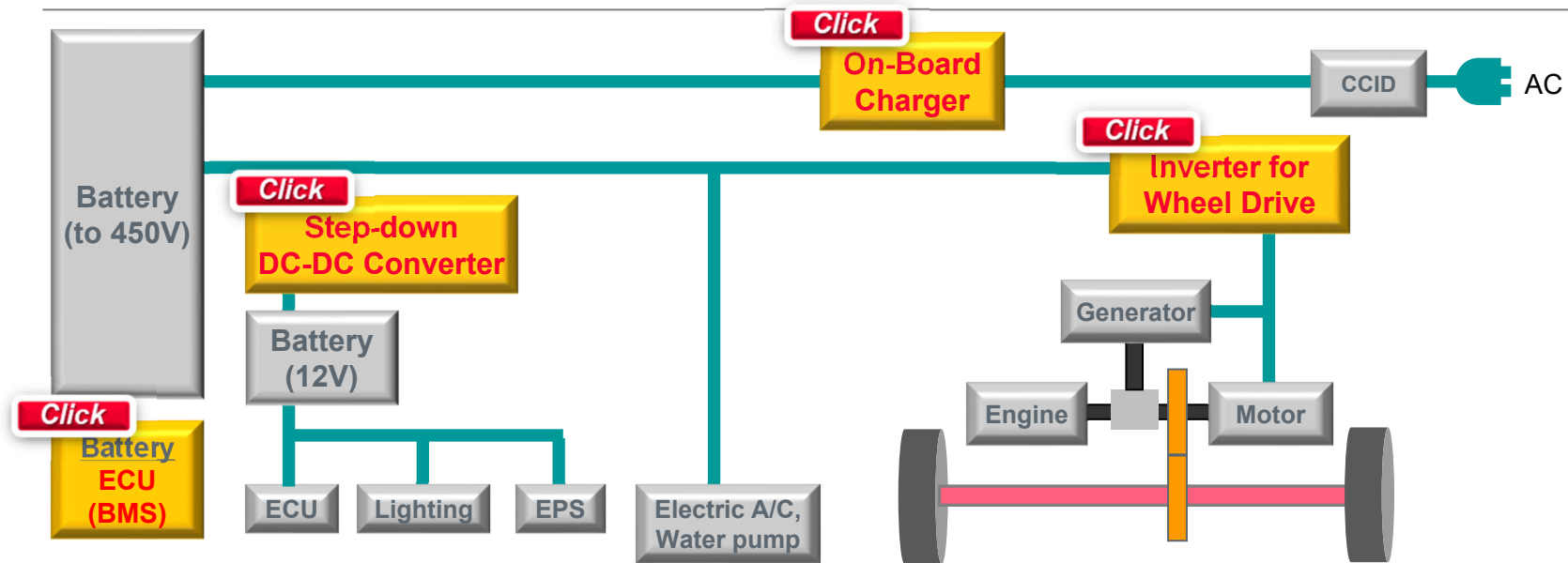
Piezoelectric Sounders

PKLCS/PKMCSSeries

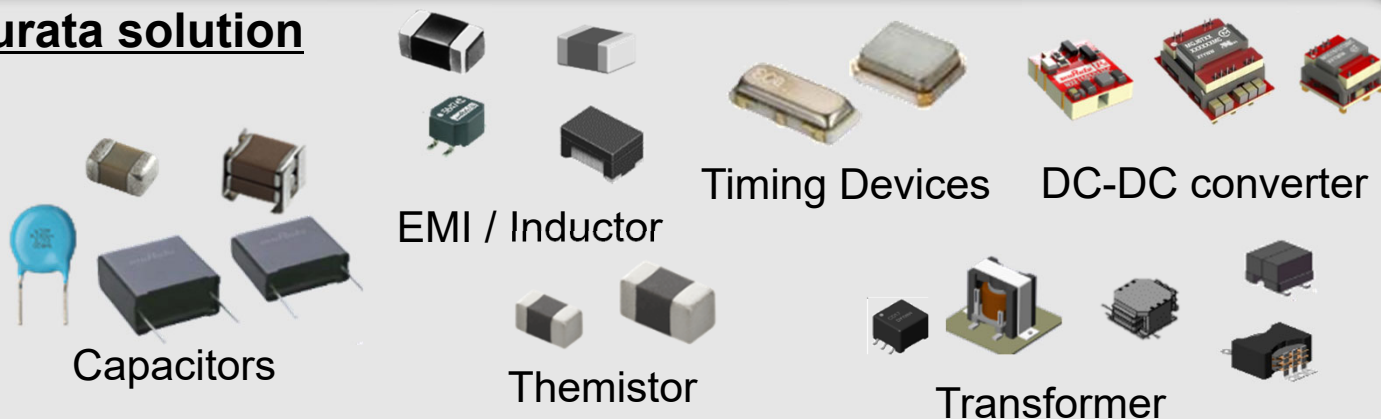
Innovation of electrical vehicle



Murata solution for 450V hybrid system



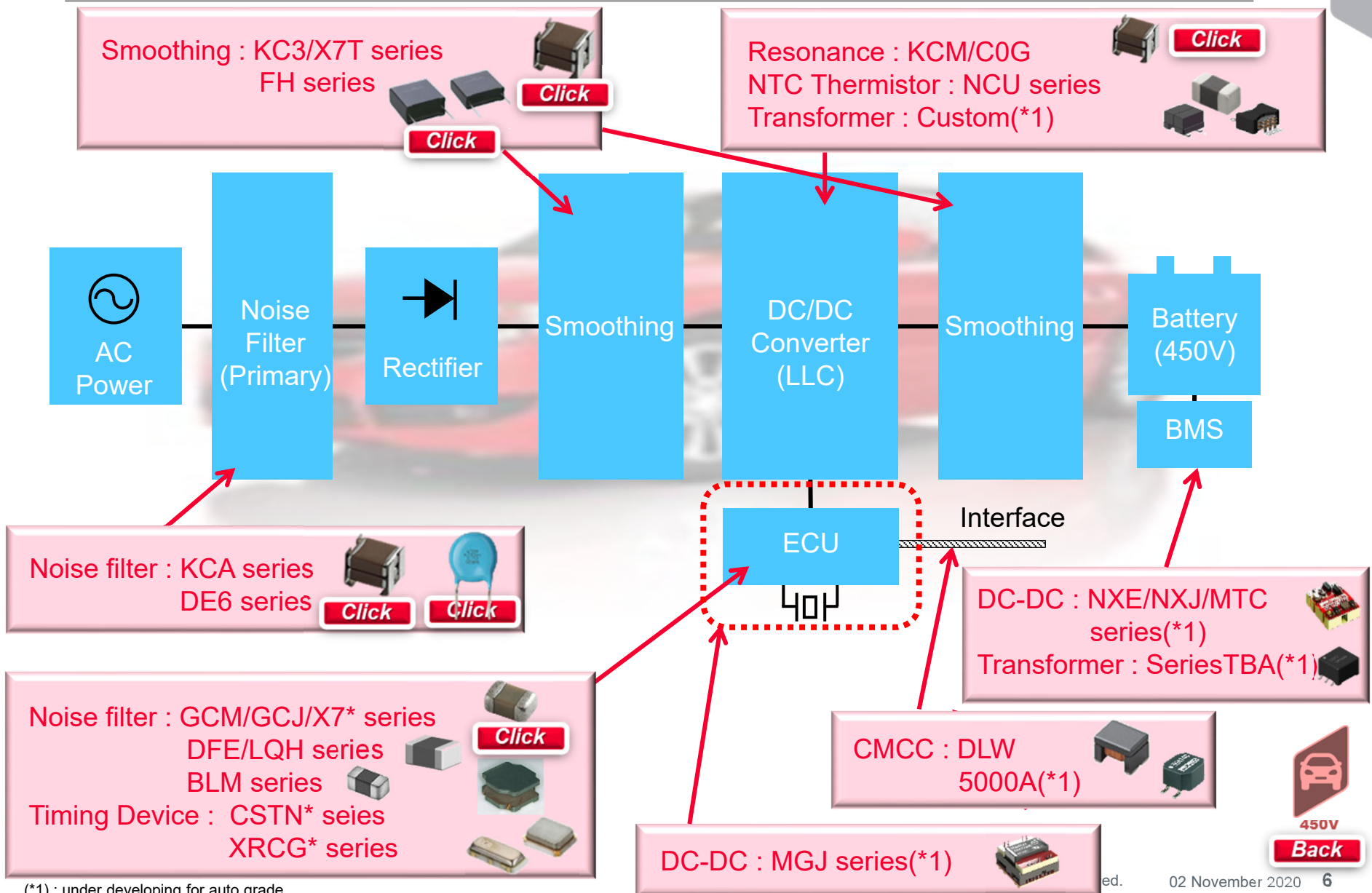
Murata solution



Everything is from Murata!!



On-Board Charger for 450V hybrid system



(*1) : under developing for auto grade

ed.

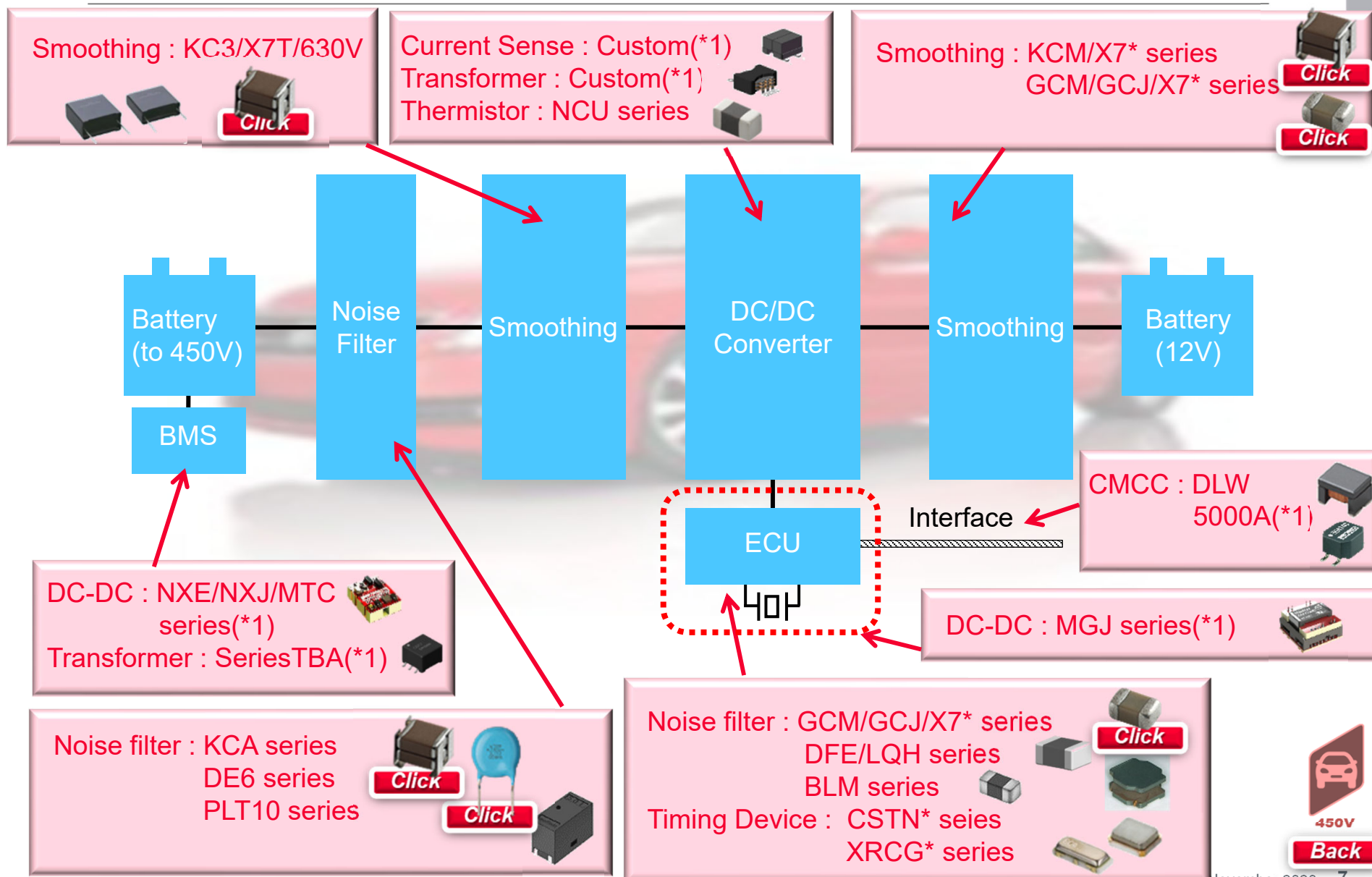
02 November 2020

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Step-down DC-DC converter for 450V hybrid system



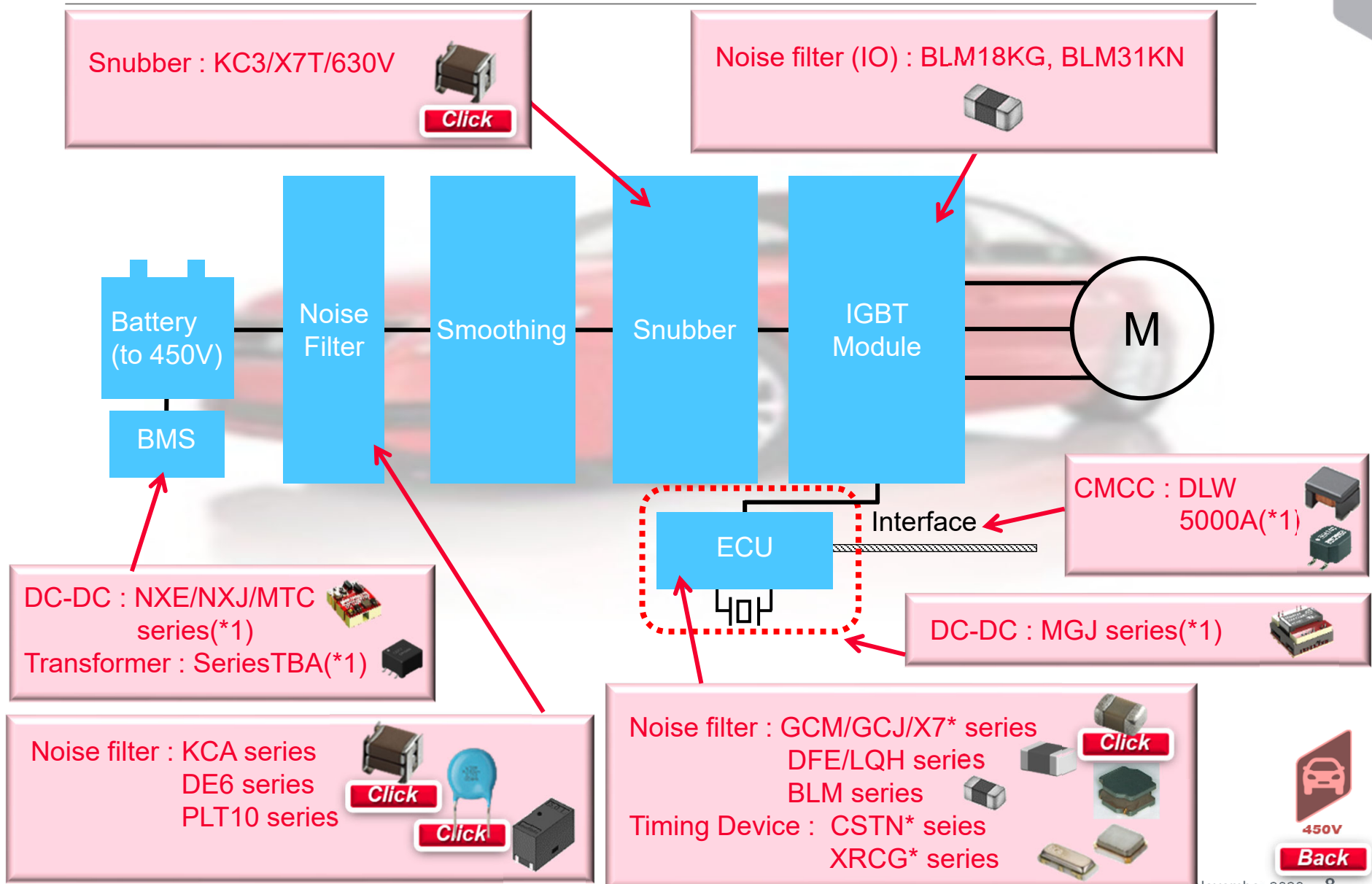
(*1) : under developing for auto grade



450V

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Inverter for 450V hybrid system



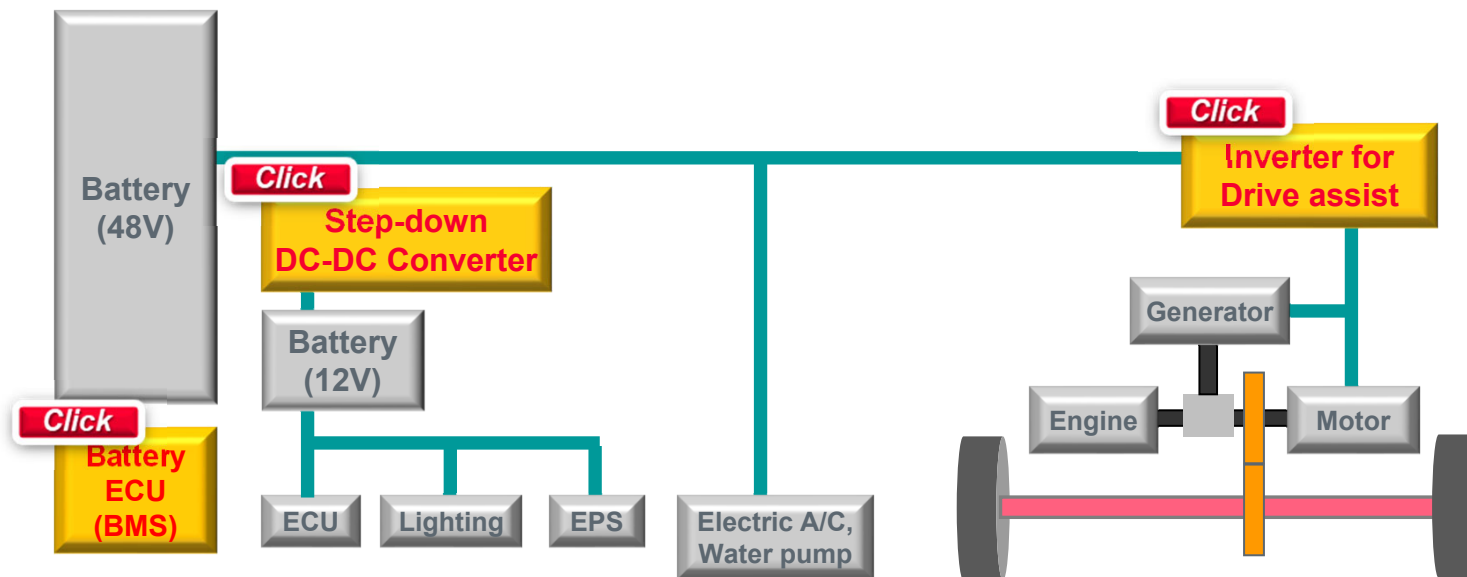
(*1) : under developing for auto grade



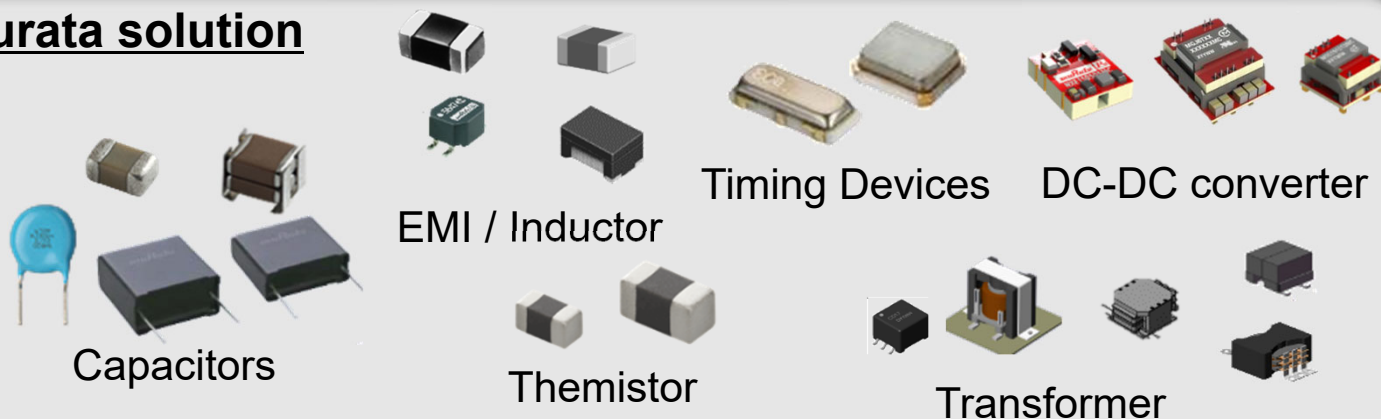
450V

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Murata solution for 48V mild hybrid system



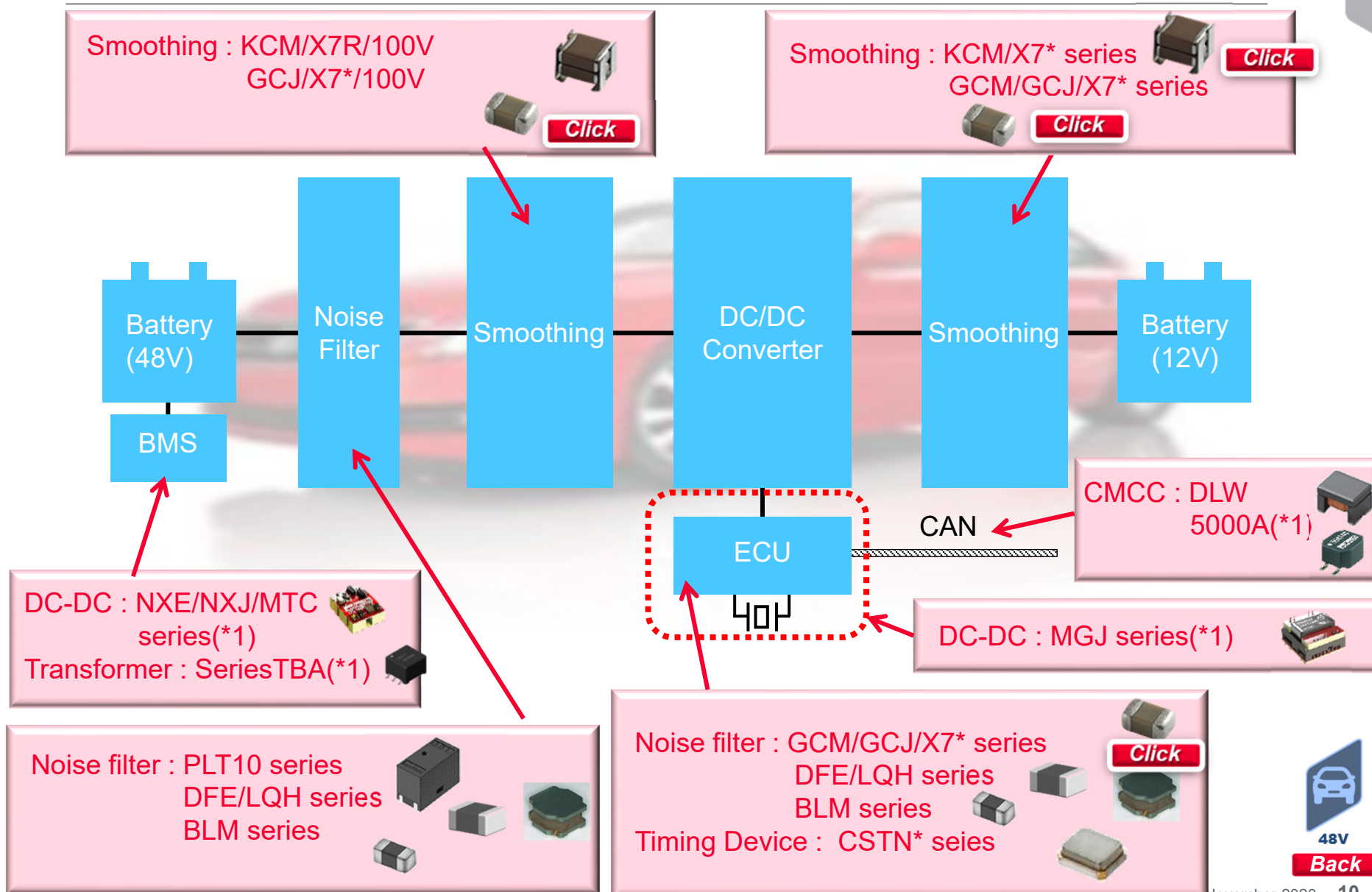
Murata solution



Everything is from Murata!!



Step-down DC-DC converter for 48V mild hybrid system



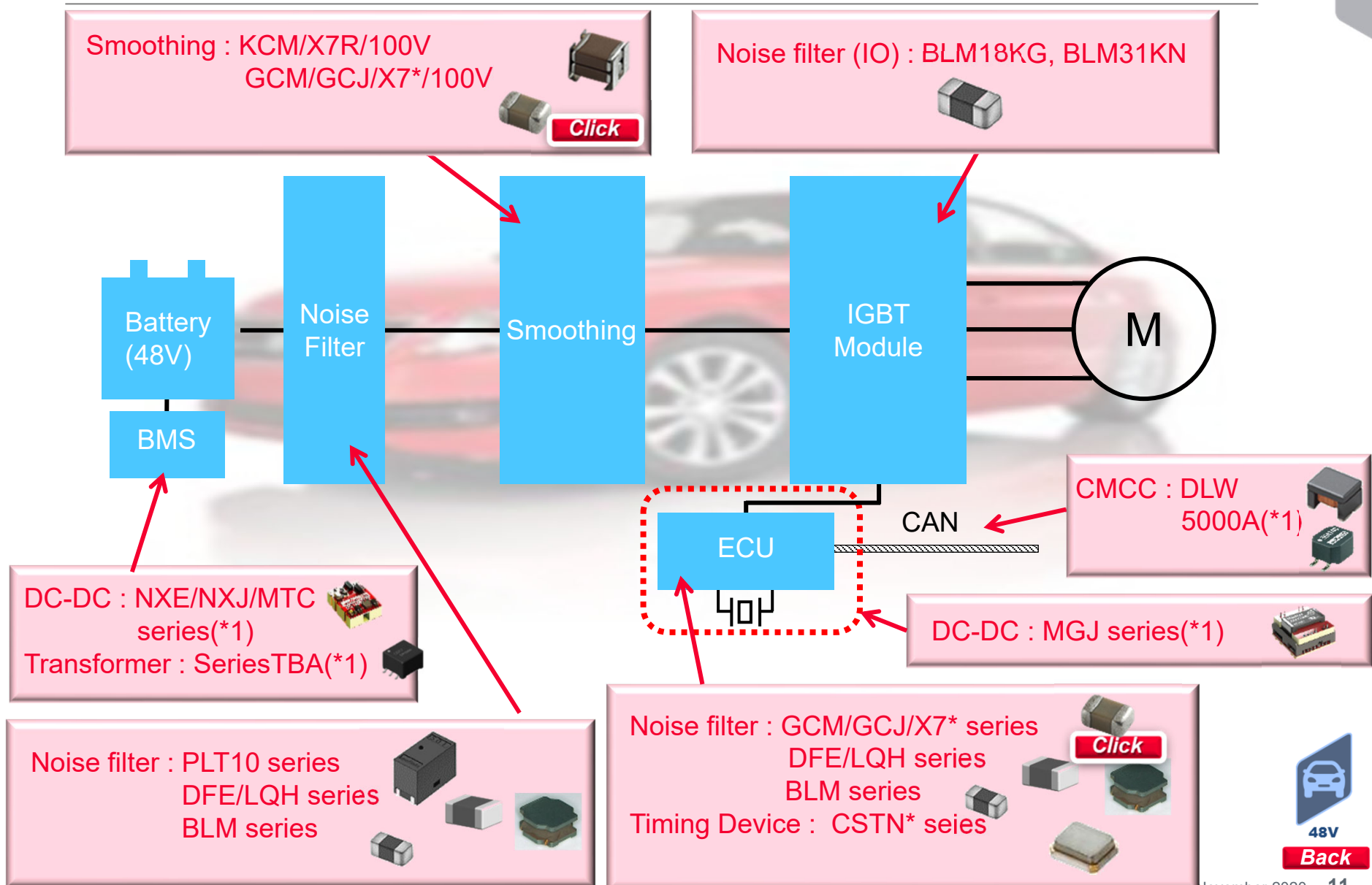
(*1) : under developing for auto grade



48V

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Inverter for 48V mild hybrid system



(*1) : under developing for auto grade



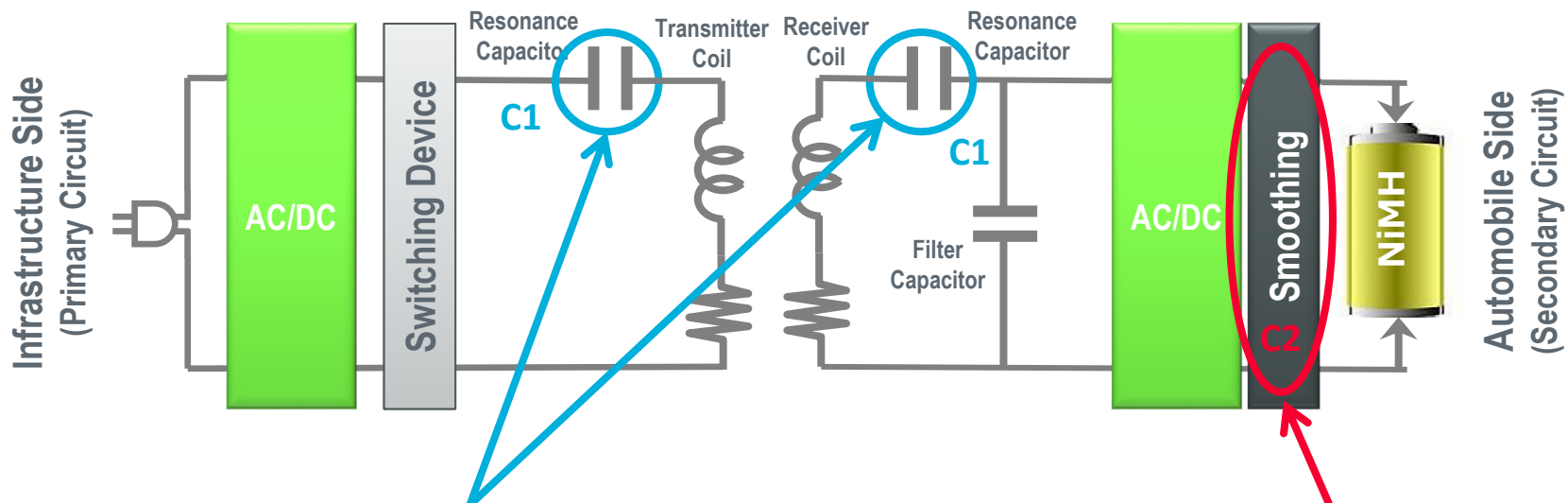
48V

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Wireless Charging system



Typical Circuit of WPT (Wireless Power Transformer) 85KHz



C1:Capacitor for Resonance

GCM series and KCM series(C0G)
DC630V, 54nF, ~125degC
for AC voltage use
※Module sample board available



C2:Capacitor for Smoothing

FH series
WV:DC500V,
10-20uF, 8-10Arms
~125degC



Any other noise filter requirement?

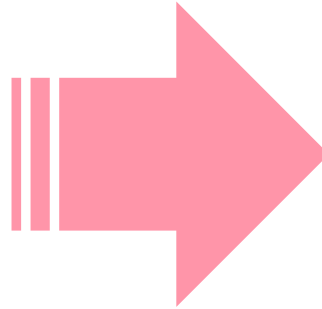
- Common Mode Choke
- Inductor



800V high power system



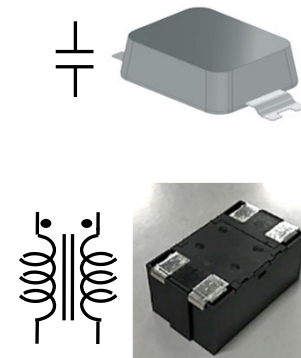
450V system



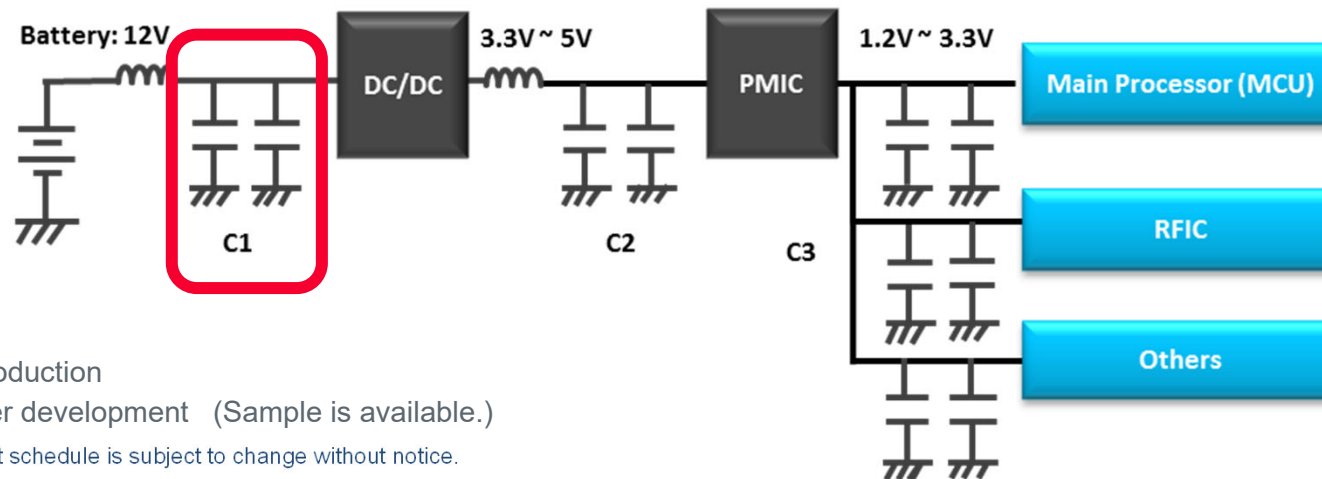
800V high power system

How Murata can contribute?

- High withstanding voltage ?
- High creepage distance / clearance ?
- High power (High current) ?
- Software for new system ?



Proposal for 12V battery line



 : In production
 : Under development (Sample is available.)

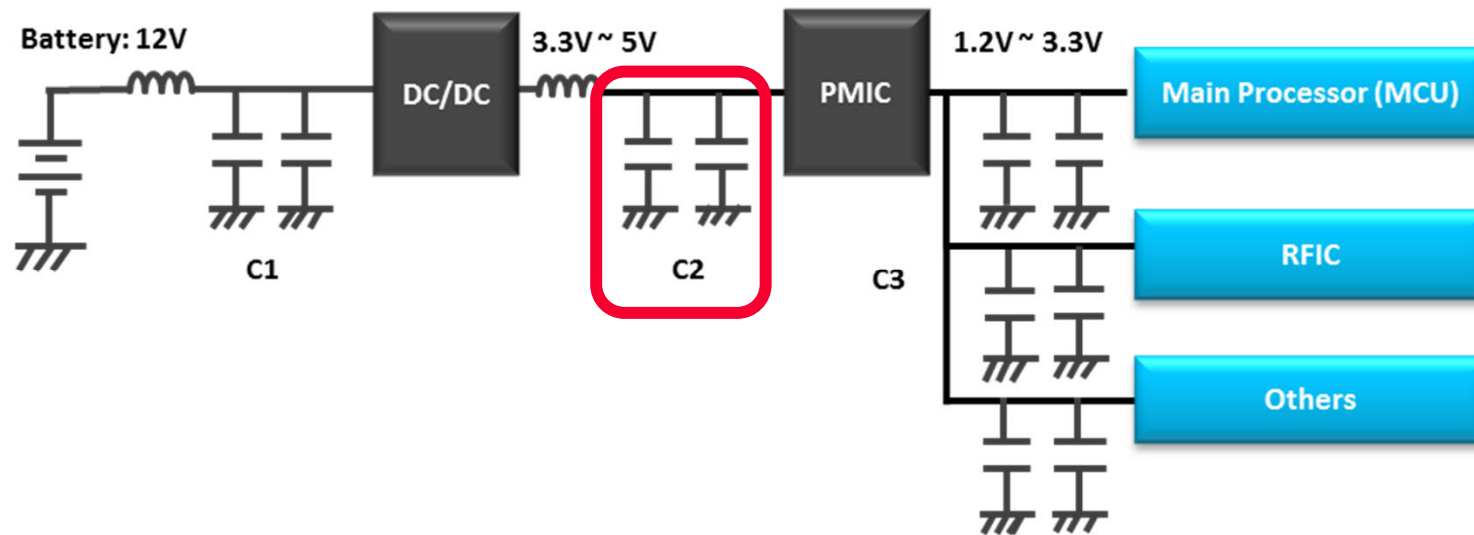
*Development schedule is subject to change without notice.

Type/Size	RV	Cap							Murata PN (14digit)	Description
		105	225	475	106	226	476	107		
GCM18, GCJ18 (0603 case size)	25V	X7R							GCM188R71E105K	0603, X7R, 25V, 1uF
									GCJ188R71E105K	0603, X7R, 25V, 1uF, Soft term.
GCM21, GCJ21 (0805 case size)	50V	X7R							GCM21BR71H105K	0805, X7R, 50V, 1uF
									GCJ21BR71H105K	0805, X7R, 50V, 1uF, Soft term.
	25V		X7R	X7S					GCM21BR71E225K/GCM21BC71E475	0805, X7R, 25V, 2.2uF/ X7S, 4.7uF
									GCJ21BR71E225K	0805, X7R, 25V, 2.2uF, Soft term
GCM31 & GCJ31 (1206 case size)	50V			X7S	X7T				GCM31CC71H475K/GCM31CD71H106K	1206, X7S, 50V, 4.7uF/X7T, 10uF
									GCJ31CC71H475K/GCJ31CD71H106K	1206, X7S, 50V, 4.7uF/X7T, 10uF, Soft term
	25V				X7S				GCM31CC71E106K	1206, X7S, 25V, 10uF
									GCJ31CC71E106K	1206, X7S, 25V, 10uF, Soft term
GCM32 & GCJ32 (1210 case size)	50V				X7S				GCM32EC71H106K	1210, X7S, 50V, 10uF
									GCJ32EC71H106K	1210, X7S, 50V, 10uF, Soft term
	25V					X7S			GCM32EC71E226K	1210, X7S, 25V, 22uF
									GCJ32EC71E226K	1210, X7S, 25V, 22uF, Soft term
KCM	50V					X7R			KCM55TR71H226M	2220, X7R, 50V, 22uF, Metal term
	25V						X7S		KCM55QC71E476K	2220, X7S, 25V, 47uF, Metal term
	25V							X7S	KCM55WC71E107M	2220, X7S, 25V, 100uF, Metal term



Next

Proposal for low voltage power line



Type/Size	RV	Cap					Murata PN 14digit	Description
		104	105	106	226	476		
GCM15	16V	X7R					GCM155R71C104K	0402, X7R, 16V, 0.1uF
GCM15	10V		X7S				GCM155C71A105K	0402, X7S, 10V, 1uF
GCM18	16V		X7R				GCM188R71C105K	0603, X7R, 16V, 1uF
GCM21	16V			X7S			GCM21BC71C106K	0805, X7S, 16V, 10uF
GCM21	10V			X7R			GCM21BR71A106K	0805, X7R, 10V, 10uF
GCM31	10V				X7R		GCM31CR71A226K	1206, X7R, 10V, 22uF
GCM32	16V				X7R		GCM32ER71C226M	1210, X7R, 16V, 22uF
GCM32	10V					X7S	GCM32EC71A476K	1210, X7S, 10V, 47uF

 : In production

 : Under development (Sample is available.)

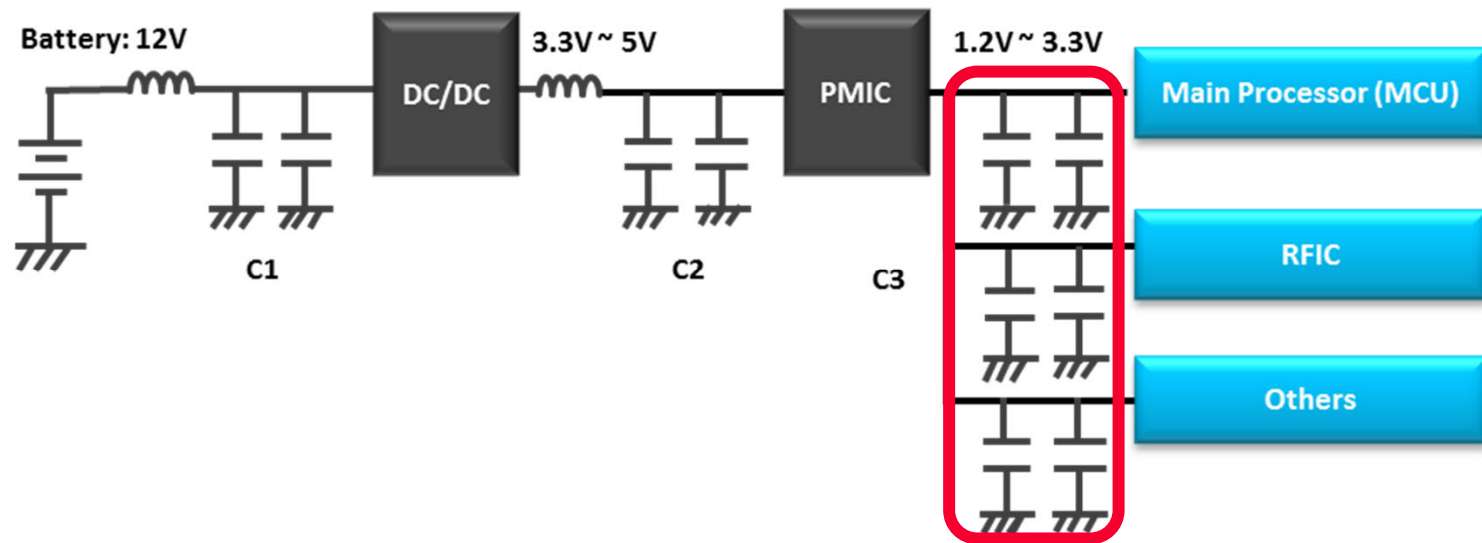
*Development schedule is subject to change without notice.



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Proposal for low voltage power line



Type/Size	RV	Cap						Murata PN 14digit	Description
		104	105	106	226	476	107		
GCM03	6.3V	X7S						GCM033C70J104K	0201, X7S, 6.3V, 100nF
GCM15	10V		X7S					GCM155C71A105K	0402, X7S, 10V, 1uF
GCM18	6.3V			X7T				GCM188D70J106M	0603, X7T, 6.3V, 10uF
GCM21	6.3V				X7T			GCM21BD70J226M	0805, X7T, 6.3V, 22uF
GCM31	4V					X7T		GCM31CD70G476M	1206, X7T, 4V, 47uF
GCM32	4V						X7T	GCM32ED70G107M	1210, X7T, 4V, 100uF

 : In production

 : Under development (Sample is available.)

*Development schedule is subject to change without notice.

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Automotive grade, Metal terminal capacitor KC* series (X7*)



KC	*	**	*	**	**	***	*	***	*
Product ID	Series	L X W	T	Temp. Char.	Rated Voltage	Capacitance	Cap. Tol.	Individual Spec. Code	Packing



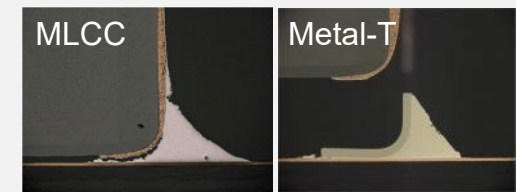
Background of Development

Metal terminal capacitor has benefit of **High capacitance with small case size** and **High solder junction reliability**



Features

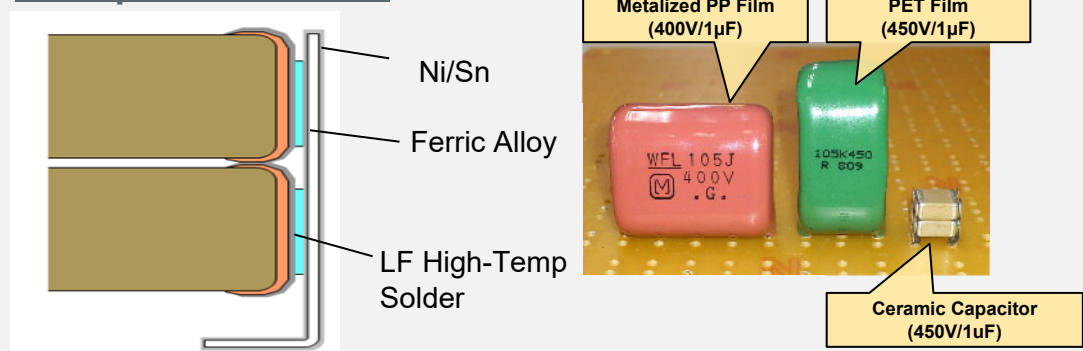
- Metal terminal capacitor can suppress solder cracks by heat stress.
- By stacking a pair of capacitors one on top of the other, less space is required for mounting, and a high level of capacitance is achieved.
- Drastically reduce acoustic noise caused by piezoelectric property of MLCC.



Specifications

Size	6.1 x 5.3mm
Temp. Char.	X7R, X7S, X7T
Rated Volt.	25Vdc to 630Vdc
Capacitance	100nF to 100uF

Example of Structure



Applications

All automotive applications (ECUs, xEV applications, etc.)



Next

Product lineup of Metal Term. KCM series

(Meet AEC-Q200, Class2, R.V.≤100V, 125deg.C, X7* type)



KCM series X7R,X7S char. Rated Voltage : DC25V to DC100V

Series	LW size (mm)	Temp. Char.	Rated Voltage(DC)	Element	Height (mm)	Capacitance (Three-digit)										
						225	335	475	685	106	156	226	336	476	686	107
KCM	6.1×5.3	X7R X7S	25V	1	2.8											
					3.7											
				2	4.8											
					6.4											
			35V	1	2.8											
					3.7											
				2	4.8											
					6.4											
			50V	1	2.8											
					3.7											
				2	4.8											
					6.4											
			63V	1	2.8											
					3.7											
				2	4.8											
					6.4											
			100V	1	2.8											
					3.7											
				2	4.8											
					6.4											

: In production

: Under development (Sample is available.)



Product lineup of Metal Term. KC3 series (Meet AEC-Q200, Class2, R.V.≥100V, 125deg.C, X7T type)

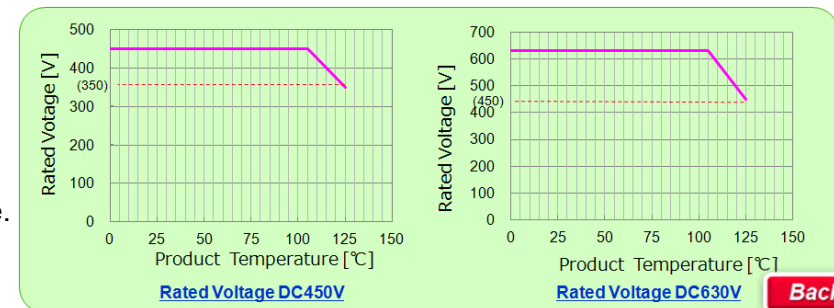


KC3 series X7T char. Rated Voltage : DC250V to DC630V

Series	LW size (mm)	Temp. Char.	Rated Voltage(DC)	Element	Height (mm)	Capacitance (Three-digit)														
						104	154	224	274	334	474	564	684	105	125	155	225	335	475	
KC3	6.1×5.3	X7T	250V	1	2.8															
					3.7															
				2	4.8															
					6.4															
			450V	1	2.8							*								
					3.7								*							
				2	4.8										*					
					6.4												*			
			630V	1	2.8					*	*									
					3.7							*								
				2	4.8								*	*						
					6.4										*					

 : In production
 : Under development (Sample is available.)

*:Rated voltage derating product
 When the product temperature exceeds 105°C, reduce rated voltage.
 Please see the following derating curve.



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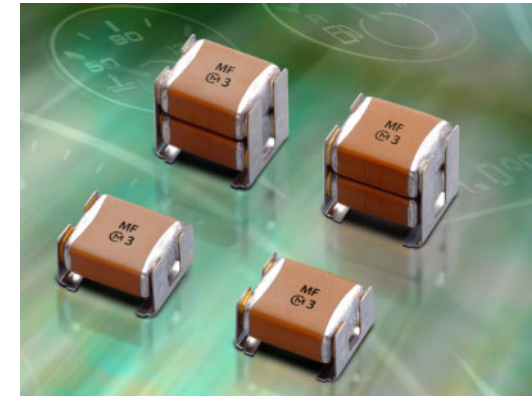


Product lineup of Metal Term. KCA series (Meet AEC-Q200, 125deg.C, Safety certified type)



Metal Terminal Capacitor for Line Filter (KCA series / U2J Char.)

Murata P.N. : KCA55*7UMF*****
Cap. Value : 100pF(101) to 10000pF(103)
Rated Voltage : **AC250Vrms & DC630V**
Operating Temp. : -55 to +125 degree C.
LW size : 6.1 x 5.1 mm
Feature : >Reduce Acoustic Noise, High Reliability
 >**Meet IEC60384-14, Meet AEC-Q200**
Test Voltage : **AC2000Vrms, 60sec. / DC2500V, 60sec.**
Schedule : Engineering Sample _ OK, MP _ OK



Series	Chip size (inch)	Temp. Char.	Rated Voltage (AC(rms))	Element	Capacitance (Three-digit)												
					101	151	221	331	471	681	102	152	222	332	472	682	103
KCA	2220	U2J	250V	1													
				2													

Full lineup with 4mm creepage distance.
In case of any inquiry please contact
your sales representative.

: In production
 : Under development (Sample is available.)

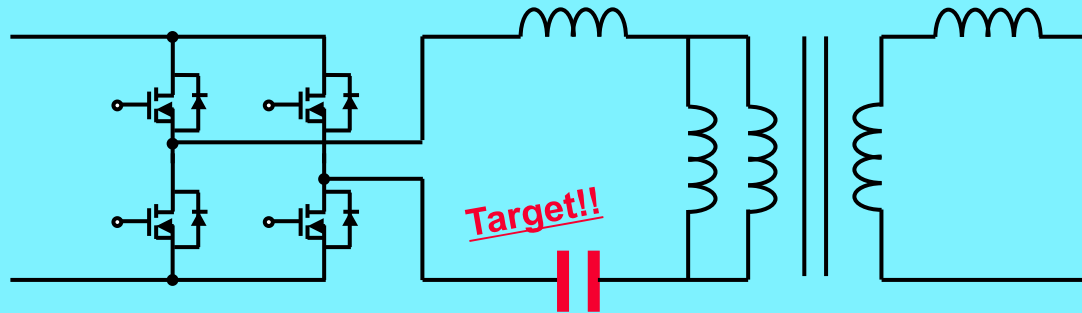
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Product lineup of GCM series and KCM series (Meet AEC-Q200, Class1, 125deg.C, C0G type)



Resonance circuit



What is requirement for capacitor?

- Capacitance (nF)
- Voltage (Vrms)
- Current (Arms)
- Temp. (deg.C)
- Frequency (Hz)

Tolerance : $\pm 5\%$

Type/Size	RVdc	Cap								Murata PN 14digit	remark
		102	222	472	103	223	333	543	125		
GCM21/31 	630	C0G	C0G	C0G	C0G					GCM31C5C2J103J	
GCM32 	630					C0G	C0G			GCM32E5C2J333J	Cap: 123-333 available
KCM55 	630					C0G	C0G	C0G		KCM55V5C2J543J	Cap: 153-543 available

■ : In production

■ : Under development (Sample is available.)



Safety certified Automotive grade capacitor, DE6 / Type KJ

muRata
INNOVATOR IN ELECTRONICS



DE	6	**	KJ	***	*	***
Product ID	Series	Temp. Char	Rated Voltage	Capacitance	Cap.-tol	Lead Style

**Meet
AEC-Q200**

Background

- Y capacitor for PHEV/EV
- Automotive-grade devices

Feature

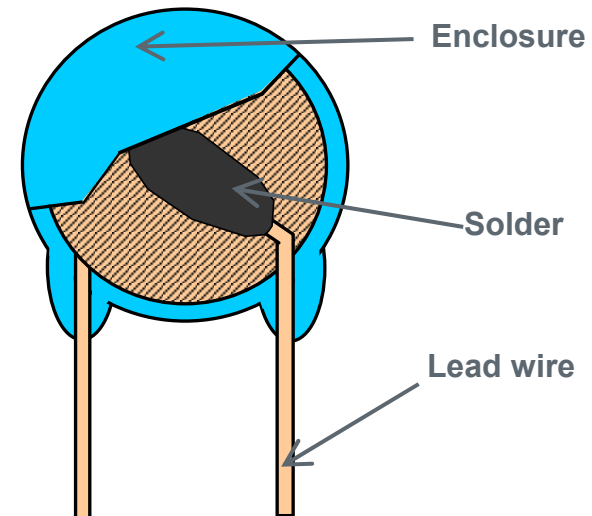
- AC300Vr.m.s. , **DC1kV** rated
- Safety Recognition (ClassY2)
- Dielectric Strength (Between Terminals)
AC2600Vr.m.s. / 60sec., **DC3000V / 60sec.**
- Meet AEC-Q200

Application

- AC Line Filter for PHEV/EV

Line up

- E Char. :1000 - 4700pF



Enclosure : Epoxy resin (approved UL94V-0)

Solder : Sn/Cu

Lead wire : Solder coated copper wire
(Solder: Sn/Cu)

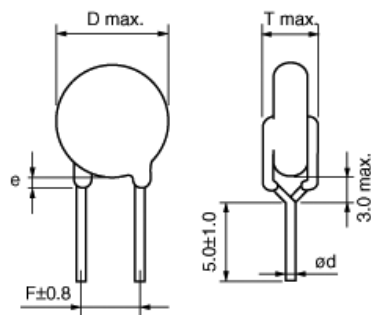


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Product Lineup of DE6 / Type KJ (Meet AEC-Q22, Safety certified capacitor)

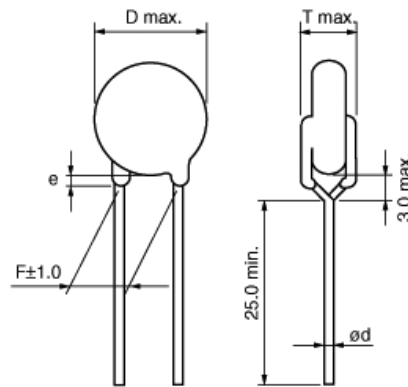


TC	WV	Cap	Cap Tol	Global Part Number Long Bulk	Global Part Number Short Bulk	Global Part Number Taping	Body Dia.D (mm)	Body Thickness T (mm)	Lead Spacing F (mm)
E	AC300V	1000pF	+/-20%	DE6E3KJ102MA3B	DE6E3KJ102MB3B	DE6E3KJ102MN3A	7		
E	AC300V	1500pF	+/-20%	DE6E3KJ152MA3B	DE6E3KJ152MB3B	DE6E3KJ152MN3A	8		
E	AC300V	2200pF	+/-20%	DE6E3KJ222MA3B	DE6E3KJ222MB3B	DE6E3KJ222MN3A	9		
E	AC300V	3300pF	+/-20%	DE6E3KJ332MA3B	DE6E3KJ332MB3B	DE6E3KJ332MN3A	10		
E	AC300V	4700pF	+/-20%	DE6E3KJ472MA3B	DE6E3KJ472MB3B	DE6E3KJ472MN3A	12		



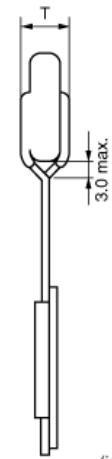
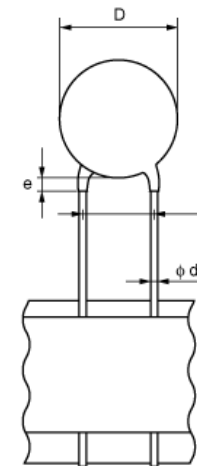
(in mm)

Lead Code	Coating Extension e	ød
B3	Up to the end of crimp	0.6±0.05



(in mm)

Lead Code	Coating Extension e	ød
A2, A3	Up to the end of crimp	0.6±0.05

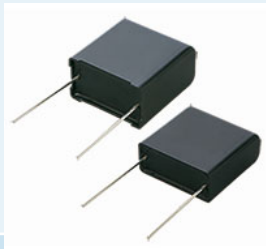
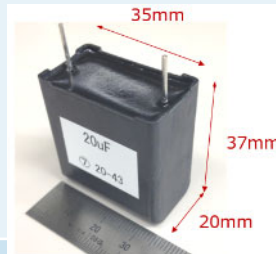


(in mm)



HTFC Introduction



	HTFC (High Temperature Film Capacitor) *Single element Type
Working Voltage	500Vdc (Withstand Voltage:600V)
Temperature	125 °C @hottest point (continuous)
Capacitance	10,15,20μF
Case size	10μF: 35×35.5×14.5mm 20μF: 35×37×20mm
Allowable ripple	10μF: 5Arms (10kHz,@105deg) 20μF: 8Arms (10kHz,@105deg)
Shape	 
M.P. Plan	2020CQ4

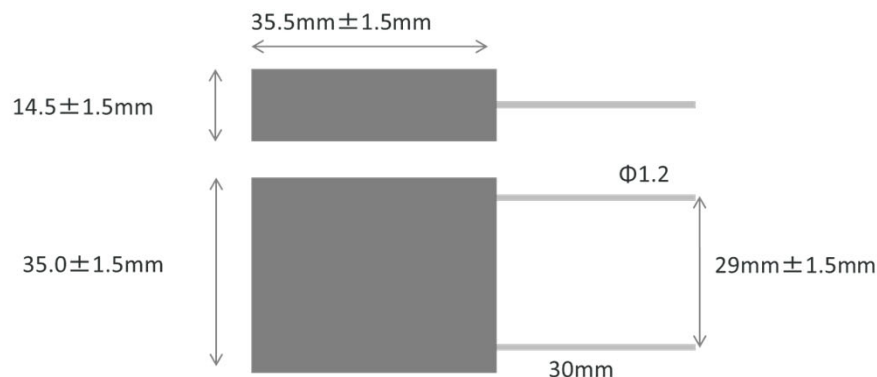
Proto-Type High Temp. Film Cap Specification



HTFC/10uF

[Performance]

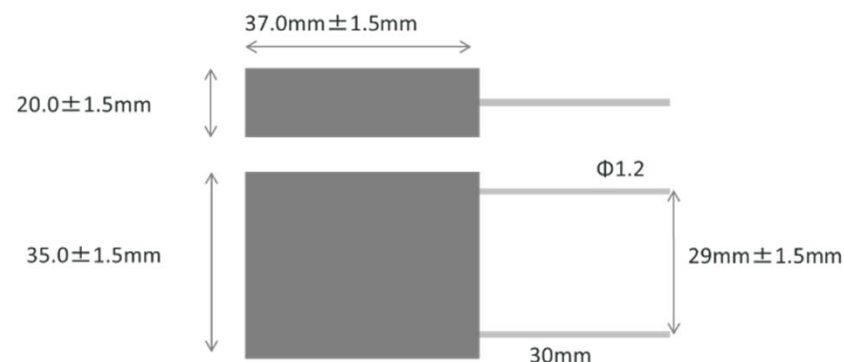
- Rated voltage : 450-500V (Withstand voltage :600V)
- Capacitance : 10 μ F
- Heat resistance : 125°C (Hot-spot)
- Max. ripple current : 5Arms(10kHz,105°C)



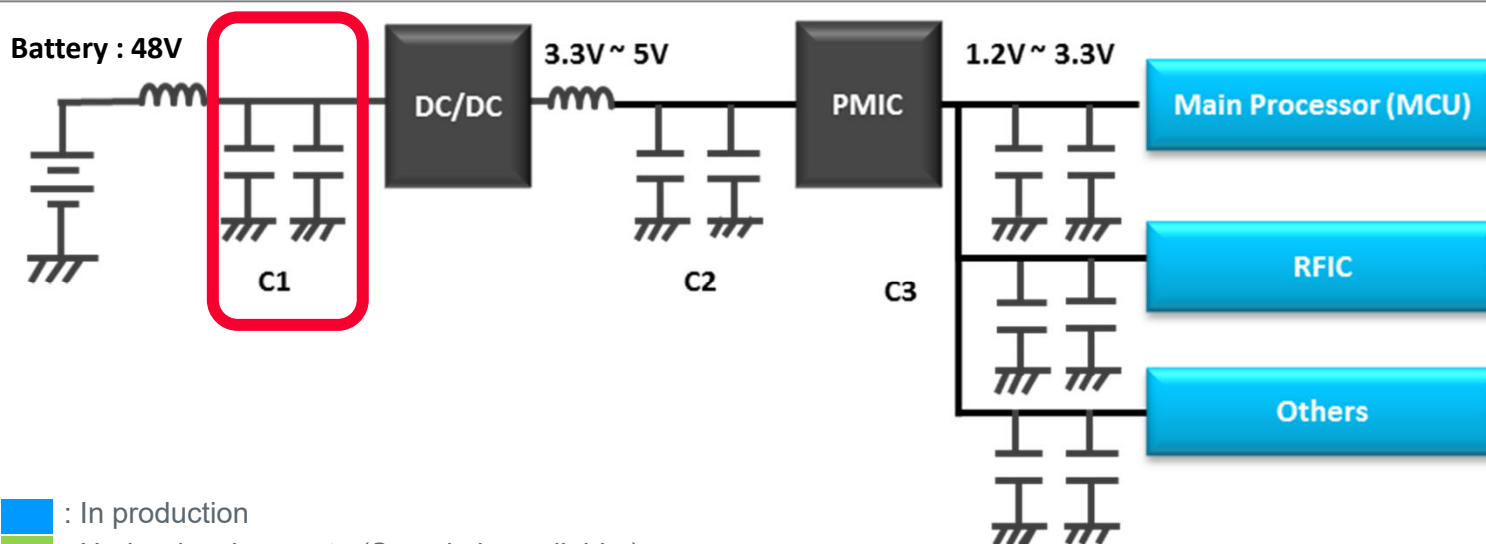
HTFC/20uF

[Performance]

- Rated voltage : 450-500V (Withstand voltage :600V)
- Capacitance : 20 μ F
- Heat resistance : 125°C (Hot-spot)
- Max. ripple current : 8Arms(10kHz,105°C)



Proposal of MLCC for 48V system



 : In production

 : Under development (Sample is available.)

Type/Size	RV	Cap					Murata PN 14digit	Description
		105	225	475	106	226		
GCM/GCJ21	100V	X7S					GCJ21BC72A105K	0805, X7S, 100V, 1uF, Soft term.
GCM/GCJ31	100V		X7S				GCJ31CC72A225K	1206, X7S, 100V, 2.2uF, Soft term.
GCM/GCJ32	100V			X7S			GCJ32DC72A475K	1210, X7S, 100V, 4.7uF, Soft term
					X7S		GCJ32DC72A106*	1210, X7S, 100V, 10uF, Soft term
KCM55/single	100V				X7R		KCM55QR72A106K	2220, X7R, 100V, 10uF, Metal term.
KCM55/double	100V					X7R	KCM55WR72A226M	2220, X7R, 100V, 22uF, Metal term.

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Thank you very much for your attention !!

