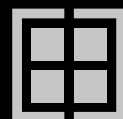


Committed to excellence

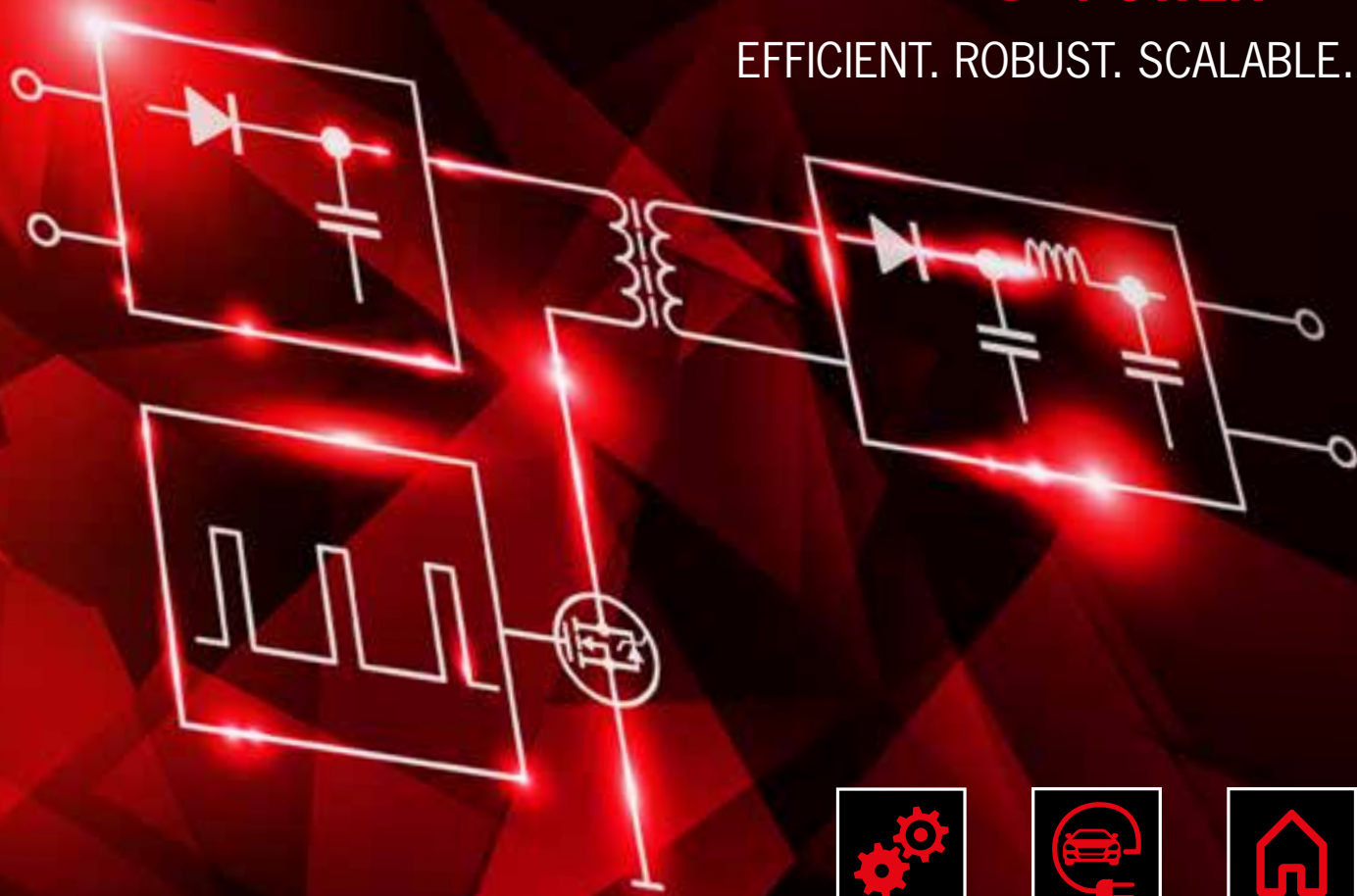


RUTRONIK
ELECTRONICS WORLDWIDE

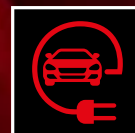


RUTRONIK
POWER

EFFICIENT. ROBUST. SCALABLE.



Industrial



eMobility



Home
Appliance

Power Application Highlights

V1.0

Amphenol
FCi

ASSMANN
electronics

AVX

DIODES

FSP

Infineon

JAE

KEKO

WALCON

KRAH

Littelfuse

muRata

NESSCAP

OMRON

Pulse

RECOM

ROHM

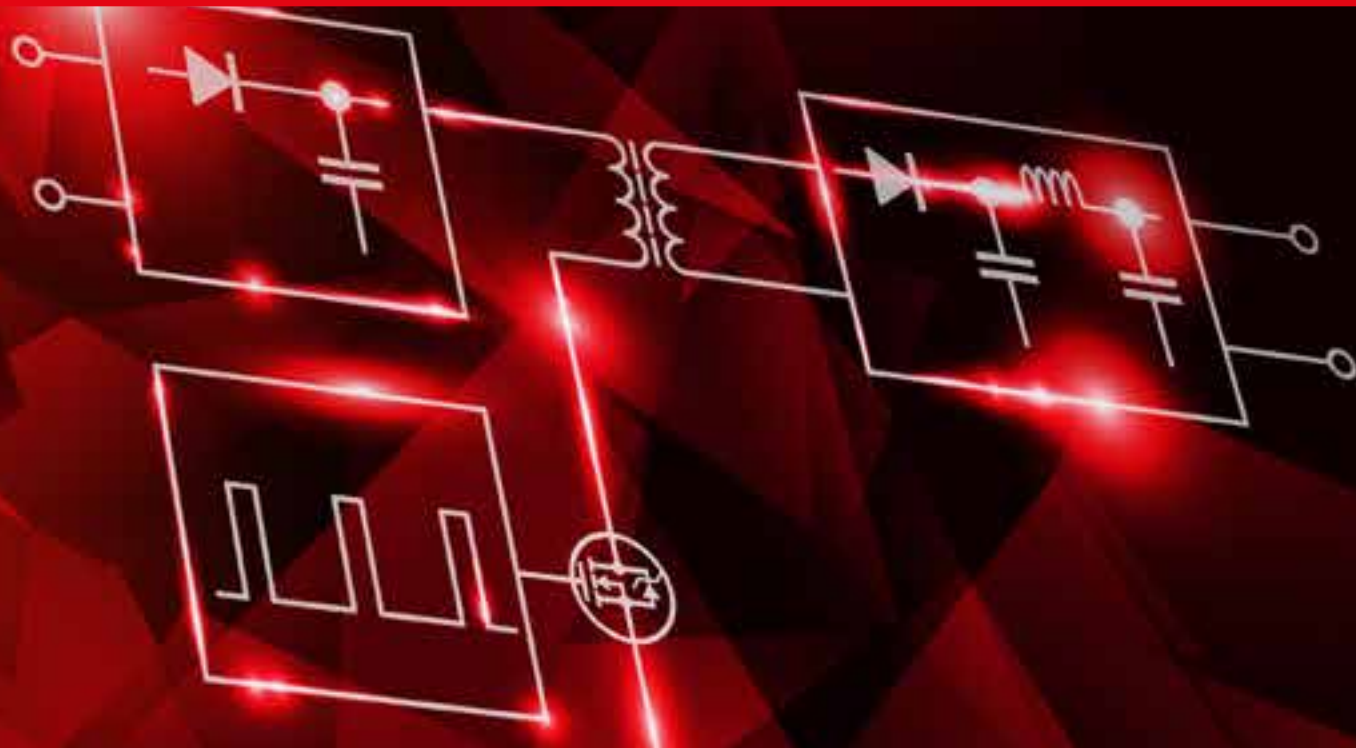
Rubycon

SI

sumida

VISHAY

WIMA





RUTRONIK **POWER**


The Markets are Changing


Changing markets demand new solutions. Many markets are saturated, and products are being ever more replaceable and increasingly offering similar functionality thanks to growing standardization. Technological, regulatory and economic challenges along with growing functional complexity are a reality of numerous market segments, particularly for the industrial, automation, automotive and white goods (electronic household appliances for private and commercial use) segments.


Our Product Portfolio


 Semiconductors

 Displays & Boards


 Passive Components


 Storage Technologies


 Electromechanical Components

 Wireless Technologies

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 <https://rutronik-tec.com>

Get your Rutronik App:  

Committed to excellence

Consult – Know-how. Built-in.
The technical competence from Rutronik

Worldwide and individual consulting on the spot: by competent sales staff, application engineers and product specialists.

Components – Variety. Built-in.
The product portfolio from Rutronik

Wide product range of semiconductors, passive and electromechanical components, storage, displays & boards and wireless technologies for optimum coverage of your needs.

Logistics – Reliability. Built-in.
The delivery service from Rutronik

Innovative and flexible solutions: from supply chain management to individual logistics systems.

Quality – Security. Built-in.
Quality management without compromise

The integrated management system (IMS) encompasses quality control, environmental protection and occupational health and safety.

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Trends in High-Performance Electronics

In addition to the trends in the market segments, there are also developments that are affecting the entire high-performance electronics sector. The most important of these developments are “digital power” also with the related topics of “functional safety” and “robustness”. These have direct effects on operating conditions, technology and manufacturing methods.

Digital Power

One “power future trend” is that of “digital power”, also referred to as “intelligent digital power”. In electrical engineering, this buzzword refers to digitally controlled or monitored power supply units. In conventional switched-mode power supply units, an analog switch controls and monitors the output voltage. In digital power supply units, a microcontroller or DSP handles one or several of these functions. The control process is integrated into the controller at software level.

One of the major advantages of digitally-controlled switched power supply units over analog solutions is the option of being able to intervene in the control process at any time and to adapt it to the current needs of the power supply. While this increases the level of effectiveness of the digital PSU compared to an analog variant, this does also increase the amount of technical development work required, which is reflected in the costs. Digital technology aims to satisfy the needs of the now ever more complex power supply systems.

Functional Safety and Robustness

Innovations that do not take safety into account cannot endure, which is why high functional safety and robustness are essential. In a robustness validation, for example, the reliability of electronic components is assessed by comparing the specific product requirements against the actual service life, taking into account the increase in efficiency.

The fundamental concept behind functional safety is the strategy for reducing actual risks. The goal is to create a safe system in that every reasonable measure has been taken to avoid damage to property and danger to people, ensuring traditional safety measures.

Effects

These trends cover many industries and are directly related to operating conditions, technologies and manufacturing processes. In other words, changes to operating conditions or other techniques or manufacturing processes will also mean the involvement of different requirements imposed upon the installed components. This can be more clearly illustrated in the example of energy storage. If the conditions in which a battery is operated or if new technologies or manufacturing processes are implemented, this gives rise to new requirements imposed upon the charging strategy or the battery management system.

The operating parameters are of critical importance to the service life of an energy storage facility within an application. While developers often have no influence on the operating conditions, there is scope for optimization in the battery management system, although this scope is often used inadequately.

As a result, operating conditions are changed without implementing the battery management system accordingly. In this connection, the most frequent recorded electrical failures are due to defective or discharged starter batteries. Specifically in the automotive industry, such battery failures were mainly found in luxury vehicles until the year 2000. The main cause was the growth in electronic component use and other electricity consumers in the vehicles, because even in a parked vehicle, the starter battery is constantly being discharged by the monitoring and control electronics. While the currents involved here – referred to as “standby currents” – are low, the battery can suffer from deep discharge if left dormant for long periods of time. For manufacturers, this raises the question of whether this know-how needs to be developed internally or whether the market might offer a suitable solution.

The Answer – RUTRONIK POWER

RUTRONIK POWER is much more than a complete portfolio of power components for various voltage classes and different applications. RUTRONIK POWER also offers a selection of components for a variety of applications suitable for the respective circuit. This means that under every position in the block diagram, there are products from multiple selected suppliers in the respective product segments.

RUTRONIK accommodates as broad a range of requirements as possible here – whether low-cost or high-performance. For example, for a motor control circuit in the power range of 2KW, RUTRONIK offers appropriately designed IGBT modules, gate drivers as well as microcontrollers, driver modules, heatsinks and plug connectors.

For power semiconductors, RUTRONIK caters for everything today, from discrete to high-integration components, power ICs and power modules. As a broadline distributor, RUTRONIK offers all other components in addition to its power semiconductors, not only active but also electromechanical and passive components. The spectrum ranges from simple plug connectors to supercaps. This covers around 98% of the PCB. This also applies to other product segments such as high-current connectors supporting up to 1000A and supercaps supporting up to 3400 farad/cell.

But RUTRONIK POWER is much more than a broad selection of components. The decisive difference lies in RUTRONIK compiling relevant expertise, not only for individual products and technologies, but also on their compatibility with one another.

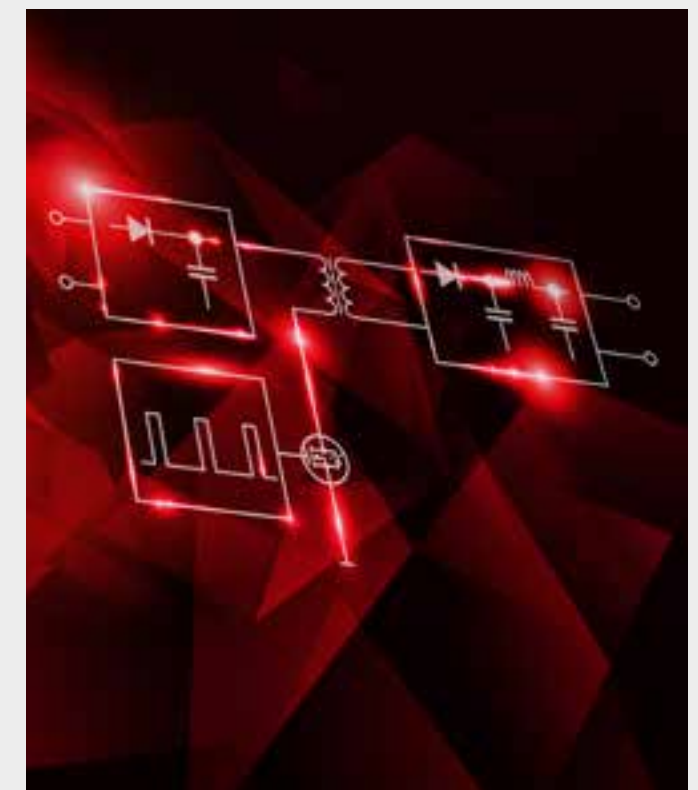
This helps to guarantee extensive support – with development at application level by professionally qualified Field Application Engineers (FAEs), Product Managers at component level and supply at the end of a product lifecycle lasting several years. FAEs are particularly important for technical customer support.

RUTRONIK’s experts advise and support activities ranging from the design-in process, the product evaluation and application development, the strategic marketing of product groups for which theoretical assistance is necessary, down to the

development of logistics solutions with comprehensive system solutions that are optimized to the customer’s needs.

RUTRONIK POWER focuses less on individual components and more on the overall solution.

RUTRONIK gives absolute priority not only to reducing the prevailing complexity of the offer-range but also to providing support at the product development stage at application level with relevant technical expertise and vertical system solutions based on suitable components.



The Advantages

RUTRONIK POWER serves as a single source for all components, from individual components to a basis for operational applications. But RUTRONIK POWER does not compete with its customers with their own components and applications, because the extensive range is combined into complete, vertically integrated system solutions.

The product portfolio consists of decided manufacturers who are leaders in their respective fields and with some of whom the company has worked for decades. This ensures an extensive and consistent transfer of knowledge from the very start, both between the supplier and Rutronik as well as a collective exchange of expertise with the customer, for example concerning seminars, webinars and professional conferences.

The bundling of expertise and experience in the RUTRONIK POWER team guarantees that the customer receives extensive advice in respect of the overall application, the market and its requirements.

RUTRONIK’s experts have a profound understanding of all relevant factors, with specialists from a variety of fields supporting each other, enabling the benefit of synergies across teams to be utilized more effectively, because market segments overlap in numerous aspects – and customers benefit from such coordinated consulting.

This understanding of not only the customer’s requirements but also the technical options and the market conditions enables a precisely tailored solution to be developed – not off the shelf, but customized specifically to the customer’s needs.

Working with the customer and with its suppliers, RUTRONIK develops forward-looking approaches, thereby contributing to research and development at application level. This is why RUTRONIK provides tools for certified applications that stand out not only with their extraordinary functionality, quality and robustness but also with their energy efficiency. This is exactly what RUTRONIK POWER stands for.

The RUTRONIK POWER team consists of specialists from the active power semiconductors, passive, electromechanical and embedded segments, utilizing the company’s extensive product portfolio.

ACTIVE

- Power Semiconductors

PASSIVE

- Resistors
- Inductivities
- Capacitors

EMECH

- Connectors & Cables
- Relays, Batteries, Fuses, Switches, Heat Management

EMBEDDED

- Power Supplies

Application Examples

**Industrial Application –
Frequency Inverter**



**eMobility Application –
Forklift Vehicle**



**Home Appliance Application –
Induction Hob**





Selection Guide

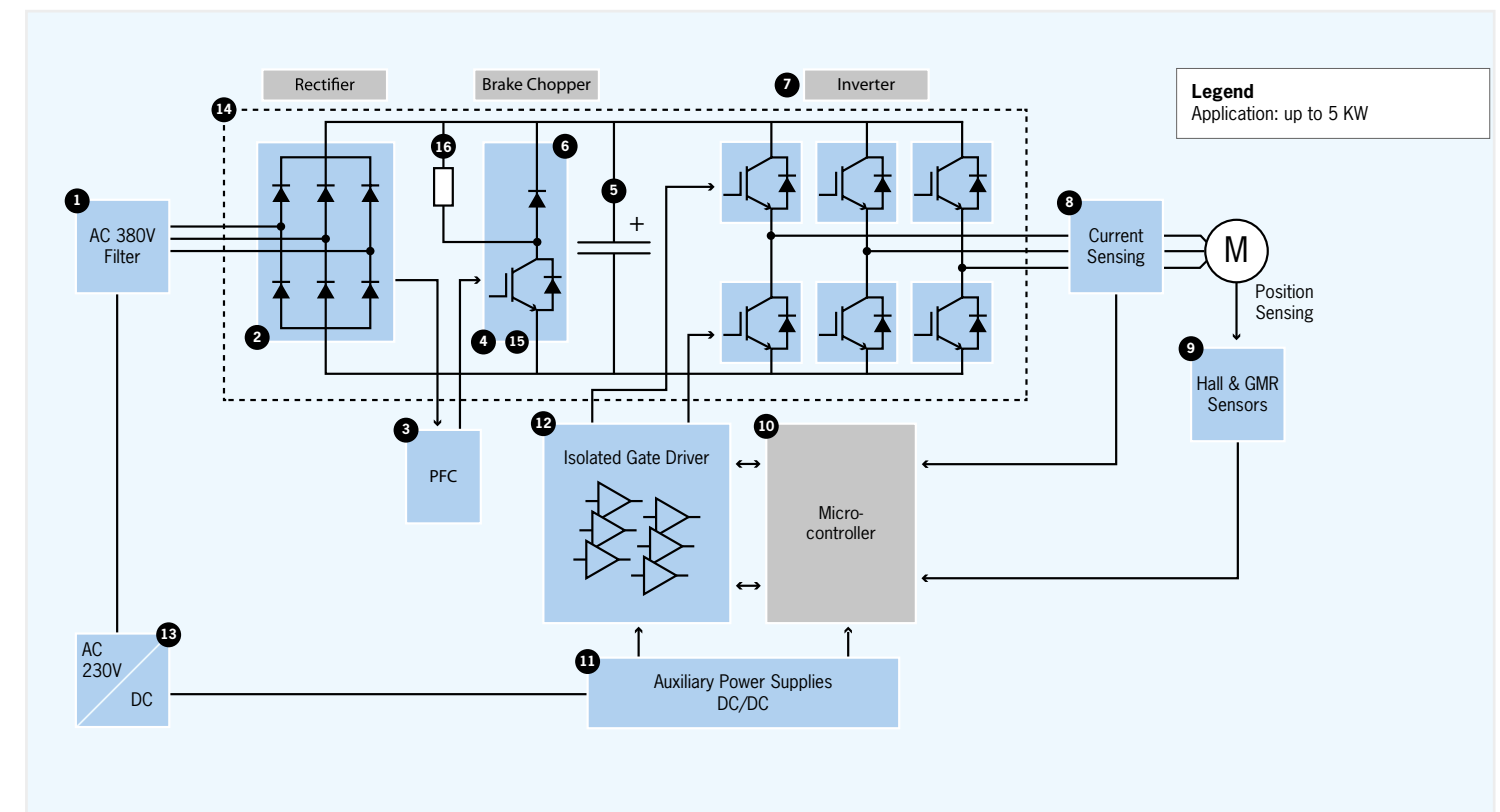
No	Type	Active							
		Diodes	Infineon	Littelfuse	Recom	Rohm	ST	Vishay	
2	Rectifier (Bridge)		X					X	
	AC/DC PWM-PFC Controller		X				X		
3	Diode	X	X			X	X		
	MOSFet		X			X	X	X	
	Rectifier	X		X			X	X	
4	IGBT Module (Brake Chopper)		X					X	
6	Diode	X	X			X			
	Rectifier	X					X	X	
	IGBT		X				X		
7	IGBT Module		X	X			X	X	
	MOSFet		X			X	X	X	
8	Sensor	X	X						
9	Hall Switch	X	X			X			
	Magnetic Position Sensor	X	X			X			
10	Microcontroller		X				X		
	DC/DC Converter (Module)				X				
	DC/DC Switching Converter	X	X			X	X		
11	Diode	X	X			X	X		
	LDO	X	X			X	X		
	MOSFet	X	X			X	X	X	
	Rectifier	X		X			X	X	
12	Gate Driver	X	X			X	X		
	Gate Driver (Isolated)		X			X	X		
	Motor Control IC		X			X	X		
13	AC/DC Converter Module				X				
	Diode (Protection)	X	X	X		X	X	X	
	Diode (Schottky)	X		X		X	X	X	
14	IGBT Module		X	X					
	IPM		X			X	X		
	TIM		X						
15	IGBT		X				X		

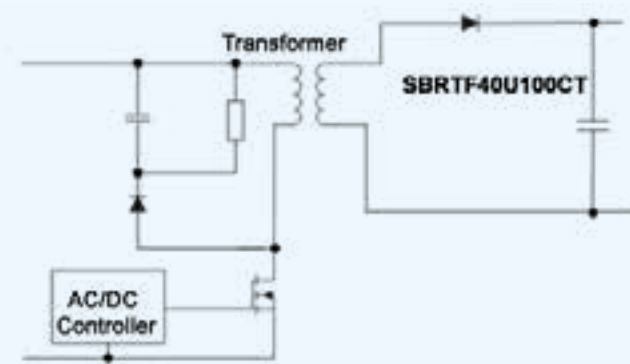
No	Type	Passive							
		AVX	KEKO	Varicon	Littelfuse	KRAH	Murata	Pulse	Rubycon
	Filter						X	X	X
1	Resistor (liquid-cooled)				X				
	Resistor (wire-wound)				X				
2	Varistor	X	X	X					
	Capacitor (Foil)								X
	Capacitor (Electrolyte)								X
3	Capacitor (Foil)								X
	Inductor					X	X		X
5	Capacitor (Electrolyte)								X
	Capacitor (Foil)								X
6	Resistor								X

No	Type	Passive							
		AVX	KEKO	Varicon	Littelfuse	KRAH	Murata	Pulse	Rubycon
7	Inductor					X			X
	Power Transformer						X		X
	Resistor							X	X
8	Current Transformer					X	X		X
	Capacitor (Foil)								X
9	Varistor	X	X	X					
	Capacitor (Foil)								X
10	Varistor	X	X	X					
11	Capacitor (Foil)								X
12	Resistor (wire-wound)					X			
13	Capacitor (Foil)								X
	Resistor					X			
16	Resistor (liquid-cooled)					X			
	Resistor (wire-wound)					X			

No	Type	E-Mech				
		Amphenol FCI	ASSMANN WSW	JAE	Littelfuse	Omron
1	Fuse				X	
2	Heatsink (Extruded profile)		X			
3	Heatsink (Extruded profile)		X			
4	Heatsink (Extruded profile)		X			
5	Heatsink (Extruded profile)		X			
6	Heatsink (Extruded profile)		X			
7	Heatsink (Extruded profile)		X			
	Heatsink (SMD and copper)		X			
	Heatsink (Stamped finger shaped)		X			
	Connector	X				
	Heatsink (Cross cut CPU)		X			
8	Heatsink (Round pin fin CPU)		X			
	Heatsink (Stamped CPU)		X			
9	Heatsink (Cross cut CPU)		X			
	Heatsink (Round pin fin CPU)		X			
	Heatsink (Stamped CPU)		X			
	Connector			X		
	Heatsink (Cross cut CPU)		X			
	Heatsink (Round pin fin CPU)		X			
10	Heatsink (SMD and copper)		X			
	Heatsink (Stamped CPU)		X			
11	Heatsink (Extruded profile)		X			
13	Heatsink (Extruded profile)		X			
14	Relay					X

No	Type	Embedded	
		FSP	
13	Power Supply		X





Typical SMPS Application

100V/40A Trench SBR® Delivers Industry-Leading, Ultra-Low Forward Voltage



The SBRTF40U100CT and SBRTF40U100CTFP offers industry-leading low forward voltage as well as optimal reverse leakage current at high temperatures. Indeed, these devices can improve efficiency by up to 2% while reducing operating temperature by as much as 10°C.

Ultra-Low Forward Voltage

- With ultra-low forward voltage ($V_{F_TYP} = 0.27V @ I_F = 2A, T_A = 85^\circ C$), these two devices reduce conduction losses. Moreover, a unique property of them is that higher the ambient and operating temperature is as lower is the V_F

Low Reverse Leakage Current

- These two devices have low reverse leakage current ($I_{R_MAX} = 0.5mA @ V_R = 100V$), which provides improved energy efficiency under nominal and extremely high temperatures

Circuit Functions

- Rectifier
- Blocking Diode
- Freewheeling Diode
- Switching Diode

Excellent Thermal Transfer Properties

- The thermally efficient TO220AB and ITO-220AB packages allow these devices to operate reliably in volatile environments

High, Forward Surge Current and Avalanche Ruggedness

- SBRTF40U100CT and SBRTF40U100CTFP have high average rectified output current ($I_O = 40A$ per device) and high forward surge current capability ($I_{FSM} = 200A$). In conjunction to the class-leading avalanche rating ($E_{AS} = 340mJ$), excellent product reliability and operational ruggedness are resulted

Target Markets

- AC/DC Adaptors
- Switched-Mode Power Supplies
- DC/DC Converters
- Fast Chargers
- USB Type-C/PD

Part Number	Maximum Average Rectified Current I_O per diode (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Typical Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (mA)	Maximum Peak Forward Surge Current I_{FSM} (A)	Maximum Operating and Storage Temperature T_J ($^\circ C$)	Typical Junction Capacitance C_J (pF)	Non- Repetitive Avalanche Energy E_{AS} (mJ)
SBRTF40U100CT	20	100	0.61	0.5	200	150	250	340
SBRTF40U100CTFP	20	100	0.61	0.5	200	150	250	340

600V, 700V and 800V CoolMOS™ P7 Series One-Stop Shop for High-Voltage MOSFETs



With the CoolMOS™ P7 product families, Infineon offers customers a one-stop shop for highly optimized high-voltage MOSFETs supporting various SMPS applications over a wide power range from low as 5W all the way up to 10kW and beyond. These product families are the MOSFETs of choice for SMPS applications, providing the perfect match for today's performance, usability and pricing demands. CoolMOS™ P7 product families offer the widest portfolio on the market in both standard and industrial grade. Customers can simplify design, save cost and increase their competitiveness by selecting the perfect fit for their ease-of-use and price/performance requirements.

600V CoolMOS™ P7 –

Optimized Balance between High Efficiency and Ease of Use

- Fully optimized for both soft (LLC) and hard switching (PFC, flyback) topologies
- Integrated ESD protection ($>2kV$ HBM)
- Improved efficiency and thermal performance
- Recommended for charger stations, servers, telecom systems, PC power packs, TVs, adapters, etc.

700V/800V CoolMOS™ P7 –

A New Benchmark in Low-Power SMPS Applications

- Fully optimized for hard switching (flyback) topologies
- Integrated ESD protection up to 2kV (HBM)
- Best-in-class efficiency and thermal performance
- Recommended for adapters, chargers, lights, audio systems, AUX power units, TVs, etc.

Industrial Grade – 600 V CoolMOS™ P7										
R _{DS(on)} [mΩ]	TO-251 IPAK	TO-251 IPAK SL	TO-220	TO-220 FullPAK	TO-220 FP Narrow Lead	TO-252 DPAK	TO-252 D2PAK	ThinPAK 8x8	TO-247	TO-247 4pin
37									IPW60R037P7	IPZ60R037P7
60/65			IPP60R060P7*	IPA60R060P7*			IPB60R060P7*	IPL60R065P7*	IPW60R060P7*	IPZ60R060P7*
80/85			IPP60R080P7*	IPA60R080P7*			IPB60R080P7*	IPL60R085P7*	IPW60R080P7*	IPZ60R080P7*
99/104			IPP60R099P7*	IPA60R099P7*			IPB60R099P7*	IPL60R104P7*	IPW60R099P7*	IPZ60R099P7*
120/125			IPP60R120P7*	IPA60R120P7*			IPB60R120P7*	IPL60R125P7*	IPW60R120P7*	IPZ60R120P7*
180/185			IPP60R180P7	IPA60R180P7		IPD60R180P7	IPB60R180P7*	IPL60R185P7	IPW60R180P7	IPZ60R180P7*
280/285			IPP60R280P7*	IPA60R280P7*		IPD60R280P7*	IPB60R280P7*	IPL60R285P7*		
360/365			IPP60R360P7	IPA60R360P7		IPD60R360P7	IPB60R360P7*	IPL60R365P7		
600			IPP60R600P7	IPA60R600P7*		IPD60R600P7				
Industrial Grade – 800 V CoolMOS™ P7										
280			IPP80R280P7	IPA80R280P7	IPAN80R280P7	IPD80R280P7			IPW80R280P7	
360			IPP80R360P7	IPA80R360P7	IPAN-80R360P7*	IPD80R360P7			IPW80R360P7	
450			IPP80R450P7	IPA80R450P7	IPAN80R450P7	IPD80R450P7				
600	IPU80R600P7	IPS80R600P7	IPP80R600P7	IPA80R600P7	IPAN80R600P7	IPD80R600P7				
750	IPU80R750P7*	IPS80R750P7*	IPP80R750P7*	IPA80R750P7*		IPD80R750P7*				
900	IPU80R900P7	IPS80R900P7	IPP80R900P7	IPA80R900P7		IPD80R900P7				
1200	IPU80R1K2P7*	IPS80R1K2P7*	IPP80R1K2P7*	IPA80R1K2P7*		IPD80R1K2P7*				
1400	IPU80R1K4P7	IPS80R1K4P7	IPP80R1K4P7	IPA80R1K4P7		IPD80R1K4P7				
2000	IPU80R2K0P7	IPS80R2K0P7				IPD80R2K0P7				
2400	IPU80R2K4P7*	IPS80R2K4P7*				IPD80R2K4P7*				
3300	IPU80R3K3P7*					IPD80R3K3P7*				
Standard Grade – 600 V CoolMOS™ P7										
R _{DS(on)} [mΩ]	TO-251 IPAK Short Lead with ISO-Standoff	TO-251 IPAK Short Lead (SL)	TO-220 FullPAK Narrow Lead	TO-220 FullPAK	TO-220 FullPAK Wide Creepage			DPAK	SOT-223	
180					IPA60R180P7S*			IPAW60R180P7S*	IPD60R180P7S*	
280					IPA60R280P7S*			IPAW60R280P7S	IPD60R280P7S*	
360					IPA60R360P7S*			IPAW60R360P7S	IPD60R360P7S*	
600					IPA60R600P7S*			IPAW60R600P7S*	IPD60R600P7S*	
Standard Grade – 700 V CoolMOS™ P7										
360	IPSA70R360P7S*	IPS70R360P7S	IPAN70R360P7S	IPA70R360P7S					IPD70R360P7S	
450	IPSA70R450P7S*			IPA70R450P7S*						
600	IPSA70R600P7S*	IPS70R600P7S	IPAN70R600P7S	IPA70R600P7S					IPD70R600P7S	
750	IPSA70R750P7S*			IPA70R750P7S*					IPN70R750P7S*	
900	IPSA70R900P7S*	IPS70R900P7S		IPA70R900P7S*					IPD70R900P7S	
1200	IPSA70R1K2P7S*	IPS70R1K4P7S							IPN70R1K2P7S*	
1400	IPSA70R1K4P7S*								IPN70R1K4P7S*	
2000									IPN70R2K0P7S*	

*Coming soon, starting mid of 2017





SiC Power Devices

A New Benchmark in Efficiency and Thermal Performance



SiC is emerging as the most viable candidate in the search for the next-generation of low-loss technology due to its low ON resistance and superior characteristics at high temperatures. ROHM is one of the market leader in the development of SiC power devices and modules for improved power savings in many applications like frequency inverter and power supplies.

SiC Schottky Barrier Diodes

SiC Schottky Barrier Diodes feature an ultra-low and temperature independent reverse recovery charge Q_{rr} . The wide band gap makes SiC diodes suitable for very fast switching frequencies and high break down voltages. Design engineers can fully utilize SiC performance advantages which lead to reduce losses, smaller inductance and lower total system cost.

Key Features

- Industry-leading low forward voltage (lowest in the market)
- High Speed recovery characteristics
- Lower Switching losses

Applications

- Renewable Energy/Energy Storage
- EV/HEV Inverter and Chargers
- Induction Heating/Welding
- PFC/SMPS
- HVDC

3rd Generation SiC SBD with high Ifsm capability just released

- 650V types in the range of 2A~10A (12A~20A in development)

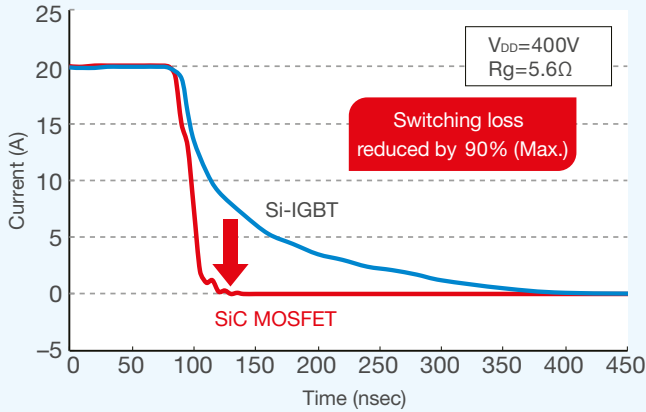


Lineup 2nd Generation

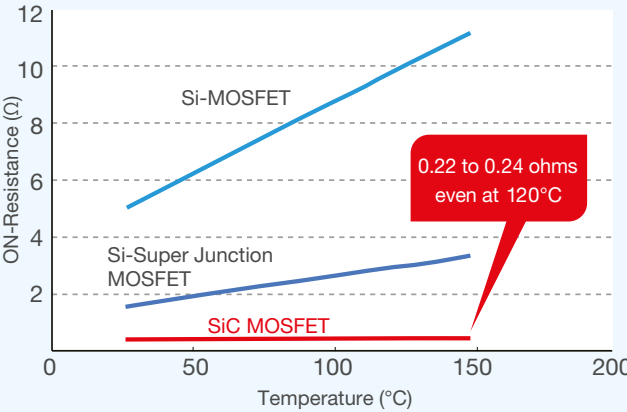
650V	5A	6A	8A	10A	12A	15A	20A	30A	40A	Description
TO-220AC2L SCS2xxAG		✓★	✓★	✓★	✓★	✓★	✓★			
TO-220FM2L SCS2xxAM		✓	✓	✓	✓	✓	✓			
TO-2473L SCS2xxAE						✓	✓			
TO-2473L SCS2xxAE2							✓★	✓★	✓★	Dual Chip
TO-263AB3L SCS2xxAJ		✓★	✓★	✓★	✓★	✓★	✓★			
1200V	5A	6A	8A	10A	12A	15A	20A	30A	40A	Description
TO-220AC2L SCS2xxKG	✓★			✓★		✓★	✓★			
TO-2473L SCS2xxKE	✓★									
TO-2473L SCS2xxKE2				✓★			✓★	✓★	✓★	Dual Chip

★ Automotive grade available

Turn OFF Characteristics (Compared with 1,200V-Class Products)



ON-Resistance Temperature Characteristics (Compared with 650V-Class Products)



SiC MOSFET

ROHM Semiconductor's line-up of 650V, 1200V and 1700V SiC MOSFETs are designed to deliver cost-effective and breakthrough performance in inverters and converters. The devices offer dramatically lower switching losses - up to 90% less compared to traditional SiC IGBT. The popular SCH2080KE is the industry's first SiC MOSFET combined in the same package with a discrete anti-parallel SiC Schottky barrier diode with a forward voltage three times smaller compared to the body diode. This further minimizes power loss by 70% or more.

Key Features

- High-speed switching
- Qualified body-diode with low reverse recovery
- Low switching losses
- High temp. operation (T_j max=175°C)
- High reliability (e.g. Gate oxide)
- Low V_{th} shift

Applications

- PFC/SMPS/Aux Power Supply
- Renewable Energy Inverter/Converter
- EV/HEV Inverter and Chargers
- Induction Heating/Welding
- HVDC
- Motor Drivers

New 3rd Generation Trench MOSFET

ROHM Semiconductor develops the 3rd Generation of SiC MOS using advanced Trench MOSFET technology.

- 650V with $R_{ds(on)}$ of 17, 22, 30, 60, 120mΩ
- 1200V with $R_{ds(on)}$ typ. 22, 30, 40, 80, 160mΩ

Lineup 2nd Generation

Part No.	V_{DS} [V]	$R_{DS(on)}$ typ. [mΩ] @ $V_{GS}=18V$	I_D [A] @ $T_C=25°C$	I_D [A] @ $T_C=100°C$	T_{jmax} [°C]	Package	Bare Die Part No.
SCT2120AF	650	120	29	20	175	TO-220	S2206
SCT2450KE	1200	450	10	7	175	TO-247	S2305
SCT2280KE	1200	280	14	10	175	TO-247	S2308
SCT2160KE	1200	160	22	16	175	TO-247	S2306
SCH2080KE	1200	80	40	28	175	TO-247	S2301/S6304
SCT2080KE	1200	80	40	28	175	TO-247	S2301
	1200	45	68	-	175	Bare die	S2307
SCT2H12NZ	1700	1150	3.7	2.6	175	TO-3PFM	-
SCT2H12NY	1700	1150	4	2.9	175	TO-268-2L	-
SCT2750NY	1700	750	5.9	4	175	TO-268-2L	-
	1700	100	34	-	175	Bare die	S2409

1700V SiC-MOSFET

ROHM Semiconductor develops a new 1700V series of SiC MOSFETs which makes SiC an option for new applications like AC/DC or DC/DC converters. e.g. Auxiliary Power Supplies.

Part No.	Package	V_{DS}	$R_{DS(on)}$ typ. @ $V_{GS}=18V$	I_D @ $T_C=25°C$
SCT2H12NZ	TO-3PFM	1700V	1150mΩ	3.7A
SCT2H12NY	TO-268-2L	1700V	1150mΩ	4.0A
SCT2750NY	TO-268-2L	1700V	750mΩ	5.9A
S2409	Bare die	1700V	100mΩ	34A





NCS3 Series

Isolated 3W 4:1 Input Single Output DC/DC Converters



The NCS3 series of DC/DC converters offers a single output voltage from input voltage ranges of 9-36V and 18-75V. The NCS3 is housed in an industry standard package with a standard pinout.

Features & Benefits

- UL 60950 recognised
- 4:1 wide range voltage input
- Operating temperature range -40°C to 85°C with derating
- 1.5 kV_{DC} Isolation 'Hi Pot Test'
- 3.3V, 5V, 12V & 15V outputs
- No electrolytic capacitors
- Continuous short circuit protection

Applications

- Telecommunications
- Battery powered systems
- Process control
- Distributed power systems



Selection Guide

Order Code	Input Voltage	Output Voltage	Minimum Load	Rated Input Current 12V or 48V Input	Rated Input Current 24V Input	Output Current	Efficiency 12V or 48V Input		Efficiency 24V Input		Ripple and Noise		MTTF ¹
							Min.	Typ.	Min.	Typ.	Typ.	Max.	
	V	V	%	mA	mA	mA	%	%	%	%	mVp/p	mVp/p	
NCS3S1203SC	12	3.3	10	250	125	700	74	77	73	76	32	55	1335
NCS3S1205SC	12	5	5	305	150	600	79	82	79	81	34	60	1081
NCS3S1212SC	12	12	0	300	150	250	81	84	80	83	28	55	1272
NCS3S1215SC	12	15	0	300	150	200	82	86	81	85	20	50	1617
NCS3S4803SC	48	3.3	10	124	65	700	70	74	74	77	22	55	1327
NCS3S4805SC	48	5	5	153	80	600	77.5	80	79	81	36	75	1117
NCS3S4812SC	48	12	0	150	80	250	77	81	80	83	31	65	1211
NCS3S4815SC	48	15	0	149	80	200	78	81	81	83	22	55	1574

1) Calculated using MIL-HDBK-217 FN2

CRE1 Series

Isolated 1W Single Output Isolated DC/DC Converters



The CRE1 series is a cost effective 1W DC/DC converter series in industry standard packages with industry standard pinout. Popular input and output voltages are available. The galvanic isolation allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist.

Features

- UL 60950 recognition pending
- Single isolated output
- 1kV_{DC} or 3kV_{DC} option 'Hi Pot Test'
- Wide temperature performance at full 1W load -40°C to 85°C
- Industry standard pinout
- 3.3V, 5V, 12V & 24V inputs
- 5V, 12V & 15V outputs
- Pin compatible with CME, CRL2, LME, MEE1, MEE3, NKE, NME, & NML series



Selection Guide

Order Code	Nominal Input Voltage	Output Voltage	Output Current	Load Regulation		Ripple & Noise		Input Current at Rated Load	Efficiency		Isolation Capacitance
				Typ.	Max.	Typ.	Max.		Min.	Typ.	
	V	V	mA	%	%	mVp/p	mVp/p	mA	%	%	pF
CRE1S0505DC	5	5	200	12	14	16	40	286	67	70	30
CRE1S0505SC	5	5	200	12	14	16	40	286	67	70	30
CRE1S0515SC	5	15	67	6	7.5	10	25	250	77	80	40
CRE1S1205SC	12	5	200	8	10	12	30	117	68	71	33
CRE1S1212SC	12	12	83	4	5	8	20	104	75	80	55
CRE1S2405SC	24	5	200	8.5	10	13	30	58	67	71	40
CRE1S2412SC	24	12	83	3	4	10	25	52	75	80	78
3kV_{DC} Isolation Options											
CRE1S0305S3C	3.3	5	200	10	12	15	25	400	72	75	35
CRE1S0505S3C	5	5	200	6	8	15	25	250	73	77	24





MGJ1 Series

5.2kV_{DC} Isolated 1W SM Gate Drive DC/DC Converters

The MGJ1 series of DC/DC converters is ideal for powering 'high side' and 'low side' gate drive circuits for IGBTs and MOSFETs in bridge circuits. A choice of asymmetric output voltages allows optimum drive levels for best system efficiency. The MGJ1 series is characterised for high isolation requirements commonly seen in bridge circuits used in motor drives and inverters, while the MGJ1 industrial grade temperature rating and construction gives long service life and reliability.

Features & Benefits

- Patent pending
- Optimised bipolar output voltages for IGBT / MOSFET gate drives
- Reinforced insulation to UL 60950 recognition pending
- ANSI / AAMI ES60601-1 recognition pending
- 5.2kV_{DC} isolation test voltage 'Hi Pot Test'
- Ultra low coupling capacitance
- Surface mount package style
- 5V, 12V & 24V inputs
- +15V/-9V, +15V/-5V & +19V/-5V outputs
- Operation to 105°C
- Short circuit protection
- Thermal shutdown
- Characterised partial discharge performance
- DC link voltage 3kV_{DC}

Selection Guide

Order Code ¹	Nominal Input Voltage	Output Voltage 1	Output Voltage 2	Output Current 1	Output Current 2	Input Current at Rated Load	Output 1 Load Regulation		Output 2 Load Regulation	
							(Typ)	(Max)	(Typ)	(Max)
	V			mA			%			
MGJ1D051505MPC	5	15	-5	50	50	320	7	8.1	0.3	0.5
MGJ1D051510MPC	5	15	-10	40	40	310	7.6	8.8	0	0.1
MGJ1D051905MPC	5	19	-5	42	42	320	6.2	7.4	0.2	0.3
MGJ1D121505MPC	12	15	-5	50	50	115	5.6	6.6	0.3	0.4
MGJ1D121509MPC	12	15	-9	42	42	115	6.6	7.6	0	0.1
MGJ1D121905MPC	12	19	-5	42	42	115	5.1	6	0.2	0.3
MGJ1D241505MPC	24	15	-5	50	50	65	3.8	5.2	0.2	0.3
MGJ1D241509MPC	24	15	-9	42	42	65	4.5	6	0	0.1
MGJ1D241905MPC	24	19	-5	42	42	65	3.4	4.5	0.2	0.3

Order Code ¹	Ripple & Noise (Typ) ³	Ripple & Noise (Max) ³	Efficiency (Min)	Efficiency (Typ)	Isolation Capacitance	MTTF ²	
						MIL.	Tel.
	mVp-p		%		pF	kHrs	
MGJ1D051505MPC	15	30	60	63.5	5	1964	70733
MGJ1D051510MPC	14	30	60	64	5	1872	65924
MGJ1D051905MPC	14	30	61	64.5	5	1816	55135
MGJ1D121505MPC	10	20	67	71.5	5	2214	39194
MGJ1D121509MPC	10	20	68	73	5	2069	37971
MGJ1D121905MPC	10	20	67	72	5	1908	37172
MGJ1D241505MPC	15	30	57	64	5	1500	33052
MGJ1D241509MPC	15	30	60	64	5	1378	31761
MGJ1D241905MPC	15	30	58	64	5	1356	29139

1) Components are supplied in tape and reel packaging, please refer to package specification section. Orderable part numbers are MGJ1D051505MPC-R7 (80 pieces per reel), or MGJ1D051505MPC-R13 (400 pieces per reel).

2) Calculated using MIL-HDBK-217 FN2 and Telcordia SR-332 calculation model with nominal input voltage at full load.

3) See ripple & noise test method.

All specifications typical at TA=25°C, nominal input voltage and rated output current unless otherwise specified.

RUTRONIK

next generation e-commerce

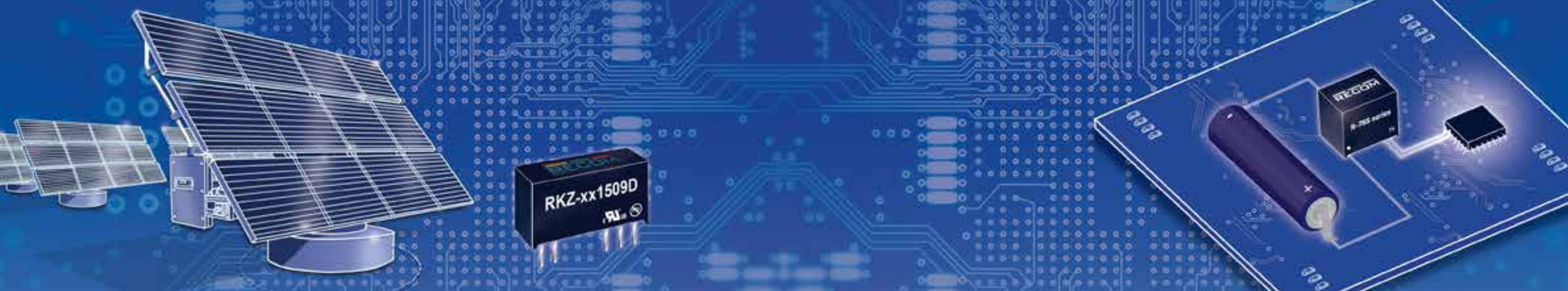
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Faster. Easier. Just more personal. rutronik24.com





High-Isolation DC/DC Converters for Gate Drivers

RECOM

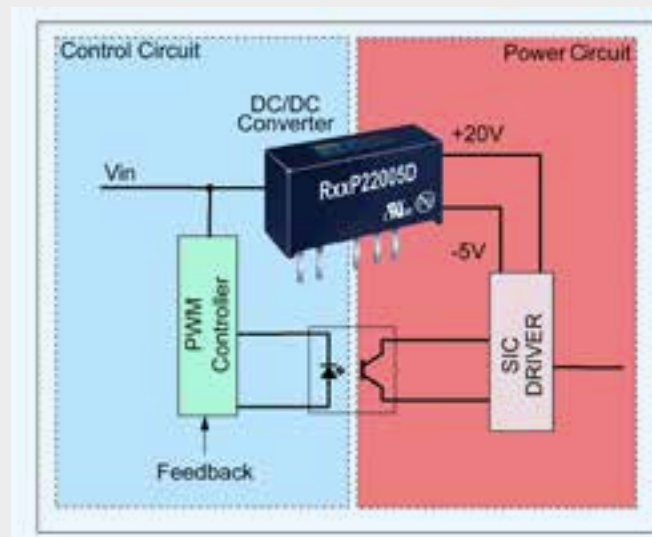
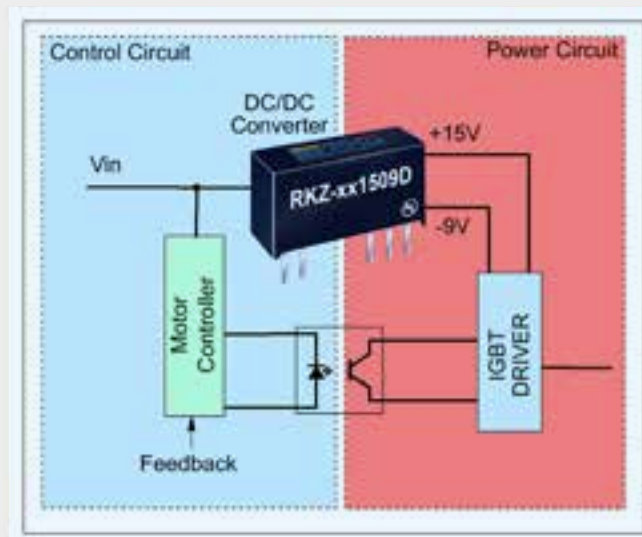
AC/DC inverters found in frequency inverter applications are often floated a few hundred voltages. Most applications typically are using an isolation level which is twice the working voltage in order to remain safe. Taking into account the rapid switching rates and high floating voltages, converters with high degrees of isolation are needed to power up these gate drivers. Optocouplers act as a barrier for the control signal, but there is also a need for an insulator on the power side. RECOM's specialized converters for gate-drivers combine the asymmetric voltages often necessary for optimized switching into one module. Whether IGBT or SiC MOSFET, RECOM's specialized DC/DC converters are simple drop-in modules to extend the lifetime and reliability of these AC/DC inverters.

IGBT

- RxxP2xx, RxxPxx, RP, RH & RKZ series in a compact SIP7 case
- RV & RGZ series in a low profile DIP14 and mini DIP24 case
- +15V and -9V outputs
- Up to 6.4kV_{DC} isolation
- 5V, 12V or 24V inputs
- 1W or 2W total outputs
- Symmetric power
- Up to 86% efficiency
- Up to +90°C operating temperature
- EN certified
- 3 year warranty

SiC

- RxxP22005D, RKZ-xx2005D series in a compact SIP7 case
- +20V and -5V outputs
- Up to 6.4kV_{DC} isolation
- 5V, 12V, 15V or 24V inputs
- 2W total output
- Symmetric power or symmetric current output
- Up to 87% efficiency
- Up to +90°C operating temperature
- EN and UL certified
- 3 year warranty



R-78 Series – Wide Input Switching Regulators for Battery-Driven Systems

RECOM

RECOM's R-78 series is the original non-isolated, high-efficiency switching regulator, designed as a pin compatible drop-in replacement for LM78 linear regulators with no heatsink required! They offer all the advantages of a switching regulator – high-efficiency, wide input voltage range, and accurate output voltage regulation - with a low cost for production quantities. The R-78 series offers a risk-free, pre-tested solution that makes designing a switching regulator circuit unnecessary. It meets all of the most commonly requested specifications yet makes no compromise in quality and reliability as it is guaranteed with a full 3-year warranty.

Applications best utilizing the R-78 switching converters include replacement of up to 3A linear regulators in power supplies (unlike linear regulators, Recom converters can be run continuously at 100% load without the need for derating), industrial 24V_{DC} power supplies, high voltage battery powered supplies (24V, 48V or 60V battery packs) and universal input power supplies (e.g. a 5V regulated output from any supply voltage between 9V and 72V).

Features

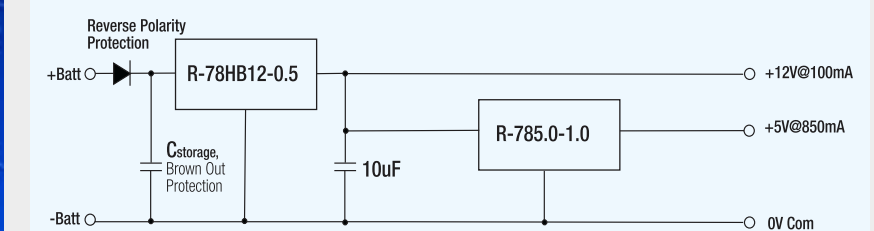
- Step-down and boost regulators with up to 97% efficiency
- Ambient temp. range -40°C to +85°C
- MTBF up to 3.0 million hours
- Ultra-high specifications
- High efficiency - no heatsink required
- RoHS and Reach compliant
- Built-in EN-55022
- FCC class B filter
- 3 year warranty

Applications

- Drop-in replacement for LM78xx
- Point-of-load
- Distributed supply systems
- Battery operated systems
- Controllers and sensors
- Positioning systems
- Robotics
- Medical
- Telecommunications
- Measurement equipment

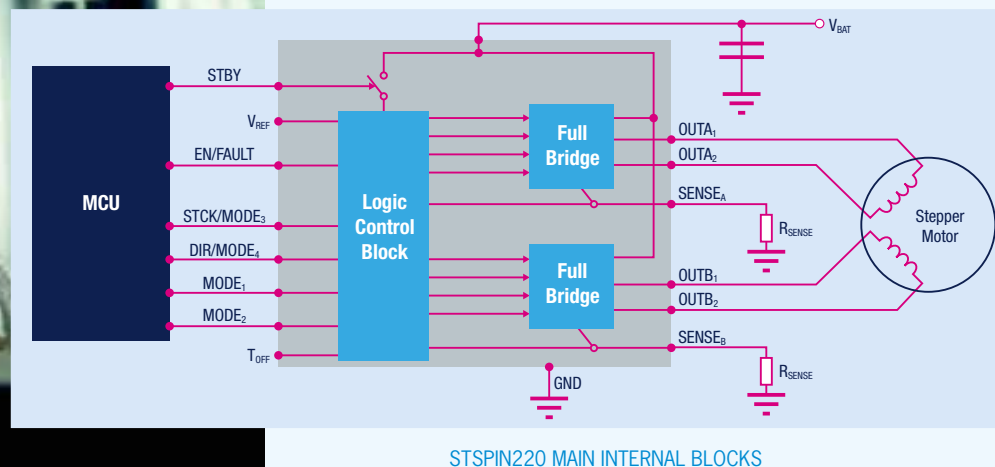


Typical Application Regulated Low Voltage Supplies



- Wide input range 18V to 72V – can be used within 24V, 48V or 60V batteries
- 12V output for interface and display electronics
- 5V high current output for digital electronics
- Further decoupling filtering may be necessary between the converters





STSPIN Low-voltage Monolithic Motor Drivers Deliver Best-In-Class Performance for Battery-Operated Systems



ST's new STSPIN low-voltage monolithic motor drivers with their 3x3mm QFN package are the smallest ICs in the world that integrate a power stage to drive stepper, single and double DC as well as 3-phase brushless DC motors. Furthermore, they are optimized for the requirements of battery-operated systems in terms of low input voltage, low noise, and minimal power consumption at full load as well as in standby conditions. Finally they provide accurate positioning and unprecedented smoothness of motion with up to 256 microsteps per full step.

Key Features & Benefits

- Extremely low operating voltage
- 1.8 – 10V, ideal for low-voltage, battery-operated motors
- High output current up to 1.3 ARMS for each full-bridge
- Energy saving and long battery life with best-in-class standby consumption down to 80nA
- Extreme position accuracy and motion smoothness with up to 256 microsteps per full step (STSPIN220)
- Maximum reliability UVLO, over-current and thermal protection
- Ultra-miniaturized 3x3mm QFN package

Targeted Applications

- Robotics
- Portable medical equipment
- Healthcare and wellness devices (shavers and toothbrushes)
- Portable printers
- Point of sale (POS) devices
- Toys



Part number	Description	Typical $R_{DS(ON)}$ (Ω)	Minimum supply voltage (V)	Maximum supply voltage (V)	Maximum output current (A_{RMS})	Maximum peak output current- (A)	Expansion board for STM32 nucleo board
STSPIN220	Monolithic microstepping driver with up to 256 μ steps / step	0.2	1.8	10	1.3	2	X-NUCLEO-IHM06A1
STSPIN230	Monolithic driver for 3-phase brushless DC (BLDC) motors	0.2	1.8	10	1.3	2	X-NUCLEO-IHM11M1
STSPIN240	Monolithic driver for two DC motors	0.2	1.8	10	1.3	2	X-NUCLEO-IHM12A1
STSPIN250	Monolithic driver for single DC motors	0.1	1.8	10	2.6	4	X-NUCLEO-IHM13A1

Resistors in Automation

Brake

Braking resistors for frequency converters have an overload capacity of up to $250 \times P_{nom}$. For the limitation of high inrush currents and the reduction of discharge time of DC-links.

Charge/Discharge

For the limitation of high inrush currents and the reduction of discharge time of DC-links.



HPR 800 - 2500

High-Power Resistors in a Metal Casing

- Power rating: 750...2500W
- Dimensions: 340x50x100...800x50x100mm
- Resistance range: 90...330 Ω
- Tolerance: $\pm 5\%$... $\pm 10\%$



ZDFL

Flat Oval with Screw Terminals

- Power rating: 40...110W
- Dimensions: 9x27x50...12x45x250mm
- Resistance range: 22...100k Ω
- Tolerance: $\pm 5\%$... $\pm 10\%$



HWG Series

Enclosed High Power Resistors with Protection Against Direct Contact, Assembled

- Power rating: 750...3000W
- Dimensions: 485x95x170...845x185 x170mm
- Resistance range: on request
- Tolerance: $\pm 5\%$... $\pm 10\%$



HPRF Series

High-Power Resistors in a Metal Casing

- Power rating: 100...200W
- Dimensions: 110x80x15...216x80x15mm
- Resistance range: 12...200 Ω
- Tolerance: $\pm 1\%$... $\pm 10\%$



HPRU Series

Wire Wound Resistors in Aluminum Casing

- Power rating: 150W/300W; standard/with cooling plate
- Dimensions: 200x42.5x29mm
- Resistance range: 1.0...250 Ω
- Tolerance: $\pm 5\%$... $\pm 10\%$





Aluminium Electrolytic Capacitors for Rigid Applications

Focus Snap-In Series for DC-Link Circuits



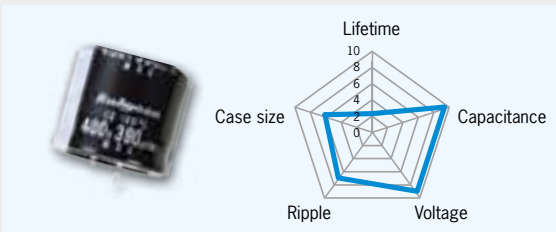
High Performance Radial Series and Special Terminals with Low Thermal Resistance

For Your Applications with Special Demands



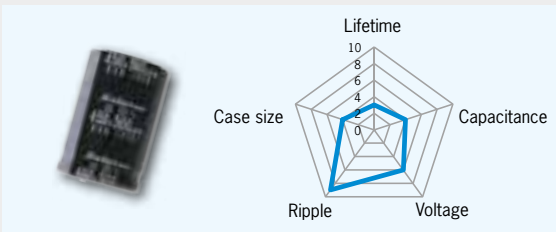
MXG 105°C 3000h

- Standard
- Rated voltage: 10 to 500V
- Capacitance: 39 to 68000µF
- Case size: 20x25 to 35x60mm



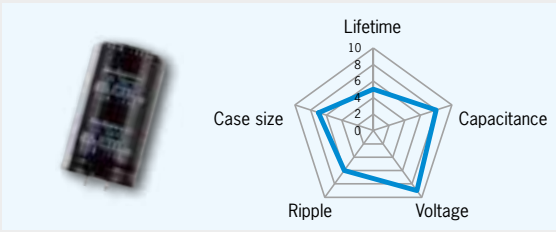
HXG 105°C 3000h

- High Ripple
- Miniaturized
- Rated voltage: 400 to 450V
- Capacitance: 65 to 680µF
- Case size: 22x25 to 35x60mm



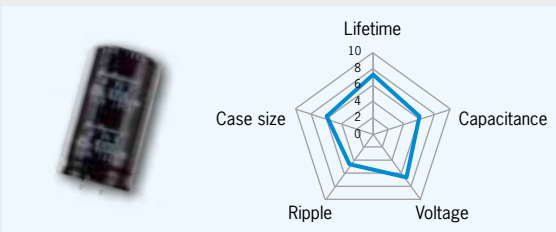
VXG 105°C 5000h

- Long life
- Rated voltage: 10 to 500V
- Capacitance: 47 to 56000µF
- Case size: 22x25 to 35x60mm



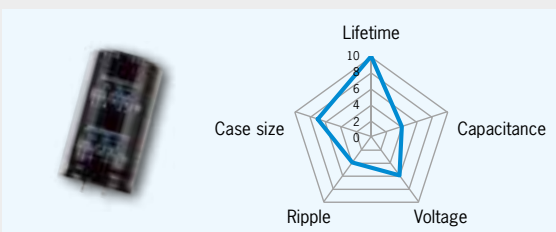
VXR 105°C 7000h

- Super long life
- Rated voltage: 160 to 450V
- Capacitance: 39 to 2200µF
- Case size: 22x25 to 35x50mm



NXG 105°C 10000h

- Super long life
- Rated voltage: 400 to 450V
- Capacitance: 120 to 560µF
- Case size: 20x45 to 35x50mm



Quality

Reliability

Robustness



Features

- Up to 580V
- Stud mounting
- Multi pin
- Low thermal resistance
- High temperature
- High reliability
- Extreme performance

Benefits

- Miniaturized Snap-In capacitors utilizing high density foil to fit into low profile cases
- Higher power density (CV value) in same case size for high power inverters
- Screw type capacitors for very low thermal resistance and high ripple current
- Screw type capacitors with stud mounting for reduced mounting area and improved heat transfer

Applications

- Power supply
- Inverter
- Energy storage

HFG 105°C 5000h

- High ripple current
- Added high capacitance items by increased case length (4pin)
- Rated voltage: 350 to 450V
- Capacitance: 390 to 2700µF



LUR 85°C 5000h

- Long life
- Low thermal resistance
- High ripple current
- Rated voltage: 350 to 500V



LHR 105°C 5000h

- Long life
- Low thermal resistance
- High ripple current
- Rated voltage: 350 to 450V



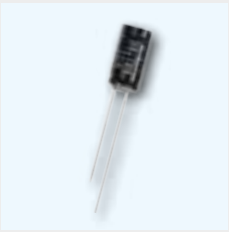
CXW 105°C 5000h

- Bigger than QXW series, but longer life
- Same ripple as QXW series
- Rated voltage: 400 to 450V
- Capacitance: 12 to 220µF
- Case size: 8x25 to 18x50mm



QXW 105°C 2000h

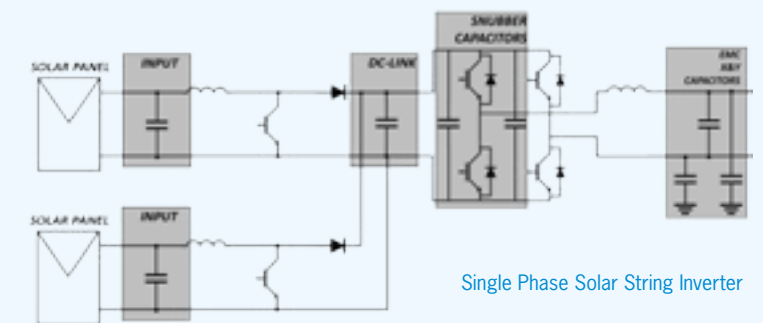
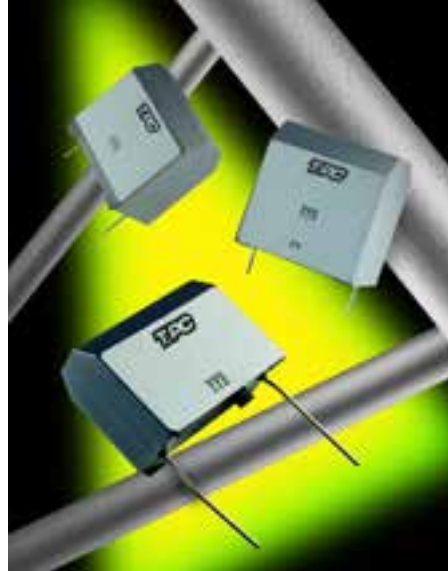
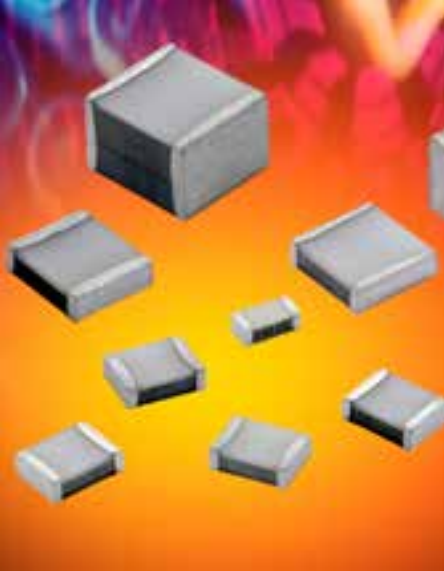
- Ultra miniaturized
- Rated voltage: 400 to 450V
- Capacitance: 12 to 220µF
- Case size: 8x25 to 18x50mm



BXW 105°C 12000h

- Ultra miniaturized
- Rated voltage: 160 to 450V
- Capacitance: 10 to 820µF
- Broad range of case sizes





AVX Film Capacitors

AVX offers wide range of film dielectric components including low power SMD solutions for the commercial and automotive industry and medium power film capacitors suited to all power electronic applications.



SMD Chip Film Capacitors

The self healing property of film dielectric provides an open failure mode capacitor with excellent reliability. The intrinsic characteristic of film provides a capacitor which exhibits low DC Bias, excellent thermal behavior, no piezo effect and low ESR/ESL and dissipation factor with excellent thermal behavior and thermal shock resistance.

SMD film capacitors are available in three dielectrics: PEN, PET-HT, and PPS, and in case sizes ranging from 1206 to 6054.

Features & Benefits

- Self healing property for high dielectric strength
- No piezo effect
- Low ESL/ESR
- Low DC Bias
- Excellent thermal behavior

Applications

AVX SMD Chip film and Medium power film capacitors are used in wide range of application sectors such as:

- Automotive
- HEV and PHEV
- Inductive heating
- Industrial/Professional
- Renewable/Smart Energy
- Power Electronics
- Medical

Medium Power Capacitors

Medium power film capacitors are used for AC & DC filtering, protection, discharge and tuning. Parts offer high RMS current, high temperature up to 105°C and use dry segmented metallization. The segmentation provides controlled self-healing, designed to achieve very high dielectric strength and avoid catastrophic failure. During operation, any dielectric breakdown becomes insulated locally, minimizing the risk of short circuit and the capacitor continues functioning normally

SMD Chip Film

- Case Size: 1206 - 6054
- Working Voltage: 16V – 630V
- Capacitance: 1nF – 4.7μF

Medium Power Film

- Case Size: Radial, Axial, custom
- Working Voltage: 75V – 3kV
- Capacitance: 0.01μF – 25500μF



Film Capacitors

Film capacitors satisfy a large variety of electronic applications, because the dielectrics have excellent electrical characteristics, high stability and a long life time.



DC-Link MKP1848 Family Series

DC-link capacitors act as energy buffer between the DC/DC converter and the AC/DC inverter. DC/DC converters are used in switch-mode power supplies.

Features & Benefits

- High peak current capabilities
- High RMS current capabilities
- Lifetime > 100.000h
- Halogen free materials
- MKP1848 – Automotive AEC-Q200 approved
- MKP1848C –High density economic pack
- MKP1848S –Slim low building height design
- Broadest capacitance range in the market
- Proven reliability with zero field

Focus Applications

- R.E. Inverters
- SMPS's
- On board chargers
- Motor drives
- Welders

For the following applications Vishay recommends these appropriate film capacitors:

AC Motor Drives

Capacitor	Type	Function	Family	Applications
EMC	RFI	X1	338 1	
EMC	RFI	Y2	338 6	
Buffer	DC-link	DC & ripple	MKP1848	
Snubber	AC & Pulse	Reduce spikes	383 / 386M	

Industrial UPS

Capacitor	Type	Function	Family	Applications
EMC (Input)	RFI	X2	339 (310V _{ac})	
EMC (Input)	RFI	Y2	338 6	
EMC (Output)	AC & Pulse	AC	383 / 375	
Snubber	AC & Pulse	Reduce spikes	MKP1848	
Buffer	DC-link	DC + ripple		

3 Phase Solar String Inverter

Capacitor	Function	Product Family		C-range	V-range	Terminals
EMC	X1	RFI	F 338 1	10nF...1μF	440 V _{AC}	2 and 4-Pins
EMC	Y2	RFI	BFC2 338 6	1nF...470nF	300 V _{AC}	2-Pins
Input & DC Link	DC & Ripple	DC Link	MKP 1848	1μF...400μF	450... 1.200 V _{DC}	2 and 4-Pins
Snubber Capacitors	Reduce Spikes	AC & Pulse	BFC2 383	1nF...2.7μF	250... 2.500 V _{DC}	2-Pins
			MKP 386M	100nF...4.7μF	630... 2.500 V _{DC}	4-Pins / Tab Terminals

Single Phase Solar String Inverter

Capacitor	Function	Product Family		C-range	V-range	Terminals
EMC	X1	RFI	F 339M	1nF...40μF	310 V _{AC}	2 and 4-Pins
EMC	Y2	RFI	BFC2 338 6	1nF...470nF	300 V _{AC}	2-Pins
Input & DC Link	DC & Ripple	DC Link	MKP 1848	1μF...400μF	450... 1.200 V _{DC}	2 and 4-Pins
Snubber Capacitors	Reduce Spikes	AC & Pulse	BFC2 383	1nF...2,7μF	250... 2.500 V _{DC}	2-Pins
			MKP 386M	100nF...4,7μF	630... 2.500 V _{DC}	4-Pins / Tab Term.





AVX Ceramic Capacitors



AVX Ceramic Capacitors exhibit low parasitics and excellent EMI filtering capabilities. AVX MLC Capacitors are available in a wide range of values, styles, voltage ratings and dielectrics.

- Ultra Low ESR NP0 - "U" dielectric parts are designed for RF applications requiring ultra-low ESR
- NP0 parts are suitable for use in MHz range with very stable characteristics
- X7R/X5R parts are suitable for use in general kHz range
- X8R/X8L parts are designed for high temperature applications up to +150°C

Features & Benefits

- Low ESR and ESL
- High Q/Ultra low ESR series
- High reliability
- Flexible termination available for SMD
- Low inductance series capacitors
- SMPS Capacitors with excellent high frequency performance
- RoHS Compliant

Applications

AVX Capacitors are used in wide range of application sectors such as:

- Industrial/Professional
- Consumer
- Commercial
- Home appliances
- Automation
- Lighting
- Automotive (AEC-Q200)
- Renewable/Smart Energy

AVX Ceramic capacitors are available in single element 01005 to 2225 case size, multiple element 0508 and 0612 arrays. SMPS capacitors are supplied in stacked configuration with through-hole technology or SMT leads. Through-hole technology components are supplied as conformally epoxy coated axial and radial devices.

Some of the innovative AVX solutions include

- **FLEXITERM™** capacitors have superior resistance to both:
 - Mechanical stress (board flexure - 5mm bend test guaranteed) and
 - Thermal stress (increased temperature cycling performance, 3000 cycles and beyond).
- **FLEXISAFE** – Specifically designed with an industry leading set of safety features for safety critical applications. Combines FLEXITERM™ layer in conjunction with the cascade design.

Case Sizes

- SMT: 01005 - 2225 EIA
- SMT Array: 0508 2x Array
- 0508 4xArray
- 0612 4xArray
- Leaded: Axial and Radial
- Stacked

Electrical Characteristics

- Working Voltage: 4.0 - 5000V_{dc}
- Capacitance: 0.1pF - 1300μF
- Dielectric: NP0, X8R, X8L, X7R, X7S, X6S, X5R, Y5V



Varistors – Protect Your Home



Keko Varicon is a Europe based manufacturer of overvoltage protection with over half a century of production history. Keko Varicon offers one of the widest ranges of varistors and dual function components that comprise both, a varistor and a capacitor. Keko Varicon is a ISO/TS 16949 certified company with UL, VDE approvals among others.

Applications

- Up to 12.5kA (10/350 pulse)
- DC voltage range from 85V to 900V
- AC voltage range from 60V to 680V
- Custom design size and shape
- Traffic and railway signal systems
- Power distribution control equipment
- Railroad equipment
- Mobile power supply stations
- Switch boards
- Power supplies and motor controls in transportation
- Industrial and consumer electrical equipment

Features

- Varistors for SPD Class I:
 - High Iimp up to 12,5kA (10/350μs) – stacked varistors
 - High Inom up to 30kA (8/20μs) – stacked varistors
- Varistors for SPD Class II & III:
 - High Imax up to 45kA (8/20μs) – single disc varistors
 - High Inom up to 20kA (8/20μs) – single disc varistors

Available Product Series

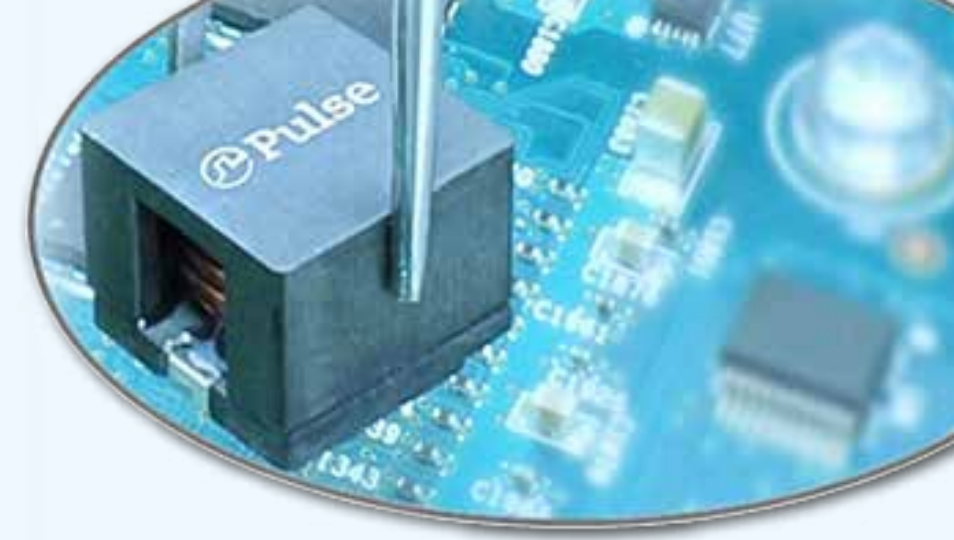
ZOV, ZOVR, ZOVS, ZOVH

- Varistors for Class I, II & III according to UL 1449, IEC 61643-11
- Very low leakage currents
- Custom electrical performances
- Custom designs available for all types of SPDs
- Metallized varistor blocks or epoxy coated varistors with rigid terminals available
- Stacked varistors for improved surge current and energy capabilities





Low Frequency Equivalent Circuit



SIDEWINDER® Current Sensor

PA320XNL Series



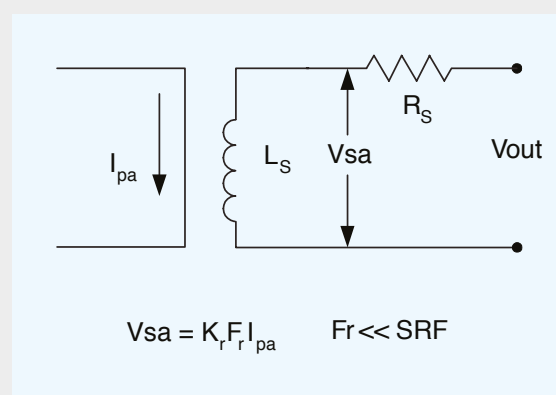
The Pulse Sidewinder® products are the ultimate evolution of the Rogowski Coil principle for AC current sensing applications. The Pulse Sidewinder® patent pending winding technique has been engineered to provide highly linear output voltage over a very wide dynamic range from 0.1 to 1000 A, making them especially suited for applications such as distributed power generation, renewable energy and storage, load balancing, power monitoring, advanced metering infrastructure (AMI), circuit breaker panels and smart meters.

- Features**
- 50/60 Hz, Single Phase, AC Current Sensor
 - Dynamic Range from 0.1 to 1000 Amps
 - Meets ANSI C12.20 Accuracy Class 0.2
 - Meets IEC 62053-21 class 1
 - Phase error < 0.05 degree
 - Bandwidth 500KHz
 - Immune to external AC magnetic fields
 - Immune to DC current & DC magnetic field
 - Very low temperature coefficient
 - Patent pending

- Applications**
- Distributed power generation
 - Renewable energy and storage
 - Load balancing
 - Power monitoring
 - Advanced metering infrastructure (AMI)
 - Circuit breaker panels
 - Smart meters



Low Frequency Equivalent Circuit



Electrical Specifications at 25°C Temp Range -40°C to 130°C							Actual Secondary Output Voltage (Vsa)	
Part Number	Accuracy Class	Kr (μΩ/Hz typ)	Pri-Sec Isolation (V min)	Ls (mH typ)	Rs (Ohms typ)	SRF (Hz typ)	@ 50 Hz (μV/A)	@ 60 Hz (μV/A)
PA3202NL	0.2	8.33	6,000	1.75	57.3	160,000	416	500
PA3206NL	0.2	7.66	6000	1.14	37.6	200,000	383	460
PA3208NL	0.2	7.66	6000	1.14	37.6	200,000	383	460

SMT Power Inductors

Flat Coils – PG0871NL Series



Our high quality flat coil inductors come in a shielded, surface mount (SMT) construction type. Rectangular cross-section wire wound into a helical coil gives our flat coil technology high current capacity in a low profile. The core material is typically powdered iron with the associated soft-saturation and low-noise benefits. Use the table below to search through our flat coil inductor products and access datasheets.

- Features**
- Current Rating: up to 28Apk
 - Inductance Range: 0.46μH to 10.5μH
 - Height: 6.4mm max
 - Footprint: 7.6x7.4mm max

Power Inductor Requirements for better SMPS Design

The demand for higher power efficiencies and the proliferation of distributed-power architecture has forced many design engineers – some of whom are more comfortable working in the digital domain to turn their attention to system power requirements. Since these power considerations are no longer the preserve of the hardware design engineer, this article gives a step-by-step explanation of the fundamental requirements of power inductors in switch-mode power supplies (SMPS).



Electrical Specifications at 25°C – Operating Temperature -40°C to +130°C								
Part Number	Inductance @ Irated (μH TYP)	K Irated (A)	Controlled Electrical Specifications		Saturation Current Isat (A TYP)		Heating Current Idc (A TYP)	Core Loss Factor (K2)
			DCR (mΩ) ±8%	Inductance @ 0Adc (μH ± 20%)	25°C	100°C		
PG0871.461NL	0.42	24.0	1.5	0.46	28.0	25.0	24.0	14.196
PG0871.681NL	0.64	19.0	2.3	0.68	24.5	20.0	19.0	10.647
PG0871.821NL	0.71	19.0	2.3	0.82	21.0	18.0	19.0	10.647
PG0871.102NL	0.80	17.5	2.3	1.00	17.5	15.5	19.0	10.647
PG0871.152NL	1.20	13.5	4.4	1.5	14	12.5	13.5	8.517
PG0871.222NL	2.00	9.5	7.6	2.20	12.0	10.5	9.5	7.098
PG0871.332NL	3.00	7.1	13.5	3.30	10.5	9.5	7.1	5.324
PG0871.472NL	4.50	6.7	17.0	4.70	9.3	8.0	6.7	4.259
PG0871.682NL	6.40	5.8	20.0	6.80	7.8	6.5	5.8	3.549
PG0871.922NL	8.80	4.9	30.0	9.20	6.7	5.5	4.9	3.042
PG0871.103NL	9.50	4.7	31.5	10.50	6.3	5.3	4.7	2.839





SUMIDA Chokes – Solutions for Every Application



SUMIDA offers a wide range of chokes in many different technologies for automotive, industrial, medical and consumer applications. The product spectrum covers standard types as well as custom solutions – designed and manufactured on a highest quality level.

Benefits

- Compact component sizes
- Operating currents up to 100A
- Low losses / high efficiency
- High frequencies
- For automotive, industrial, medical and consumer applications
- Production possibilities in Europe and Asia
- Innovative and cost effective solutions (DTC approach)
- Rapid prototyping of new, customized core and bobbin geometries

Applications

- Common Mode Chokes (CMC)
- Differential Mode Chokes (DMC)
- Storage (output) chokes
- Power Factor Correction (PFC) chokes
- Used in Switch Mode Power Supplies (SMPS) and inverter circuits
- Versions**
- Horizontal / vertical designs
- Toroid / E- / U- and other core shapes
- Drum and rod core designs
- SMD / THD or customized connection technologies
- Potted / varnished versions if needed

Special Features

- According to international safety standards
- Insulation Systems on request
- Wide selection of ferrite, amorphous metal-compound and iron powder materials
- Many different winding and finishing technologies available
- Customized (application-specific) solutions possible
- Wide range of existing standard solutions
- Flexible pinning
- Extensive test and qualification capabilities e.g. temperature, shock, vibration, AEC-Q200 etc.



New Relays Improve Frequency Inverter Performance



Energy efficiency is key in the design of industrial frequency inverters – and relays play a major role in ensuring that it is achieved. Important factors in component selection are long electrical life and coil isolation.

G6DN AC Series

Omron Electronic Components recently unveiled a new compact and efficient power relay for frequency inverters, the G6DN, capable of switching 5A at 250V_{AC}.

Features

- Smallest design of its specification – just 5mm thick x 20mm x 12.5mm high
- Low coil power consumption – just 110mW
- Electrical life of 80K operations at 5A / 250V_{AC}

G7J AC Series

For high current applications, the G7J is a high capacity, high dielectric strength relay.

Features

- Switching currents up to 25A
- Available with up to 4 poles for switching 3 phase currents
- No contact chattering for momentary voltage drops up to 50% of rated voltage
- Withstanding more than 4kV between contacts of different polarity and between coil and contacts
- Full disconnection isolation (3mm) via open contact
- PCB and Wallmount types available

Alternative AC Solutions

- G7Z: DIN rail mounting type, four pole relay with a capacity of up to 160A when 4 contacts in parallel.
- G7L: a PCB mounting type, 1 or 2 pole relay with 20A to 30A contact rating, full disconnection isolation (3mm) via open contact
- G6RL: just 12.3mm high, able to interrupt 10A at 250V_{AC} with a dielectric strength of 5kV between the coil and the contacts
- G5Q: which offers 8kV withstand and can switch up to 10A

Signal relays are also used in frequency inverters for alarm signalling, to trigger a brake mechanism or to control the input to a PLC. As an alternative to an electro-mechanical solution, MOSFET relays G3VM are finding growing acceptance in these applications. For Output Switching the G3MC, an SSR Relay, is able to switch up to 2A/250VAC, and is just 4.5mm thick.

G2RL DC Series

For the DC intermediate circuit to reduce inrush currents as the load capacitors charge, a relay like the G2RL is very suitable.

Features

- Low profile of just 15.7mm
- Switching capacity up to 16A DC
- High sensitivity type (250mW) available





Extruded Profile Heatsinks

for High Power Frequency Inverter Applications



In the field of high power applications like frequency inverters, ASSMANN WSW components with the experience of more than 45 years in thermal management offers a large range of massive extruded standard profile heatsinks. Special solutions and developments with alternative materials, specific profile dimensions, modern CNC machining with necessary milling work (punching, drilling, threading), special profile shapes like hollow profiles, welded heatsinks, special anodization for visual and decorative surfaces or special packaging are available according to customer's application.

The heatsink development for any applications begins with the construction of a suitable profile heatsink. The application itself with the important factors like heat development and the available space for an aluminum heatsink are needed.

An additional important aspect is also to minimize the thermal resistance. A high surface roughness of the devices and the heatsink itself can be avoided by several methods, such as mechanical CNC surface treatment or using thermal interface materials, such as conductive paste, adhesive or foil which ASSMANN WSW carries in their production range as well.

Product Range for Extruded Profile Heatsinks

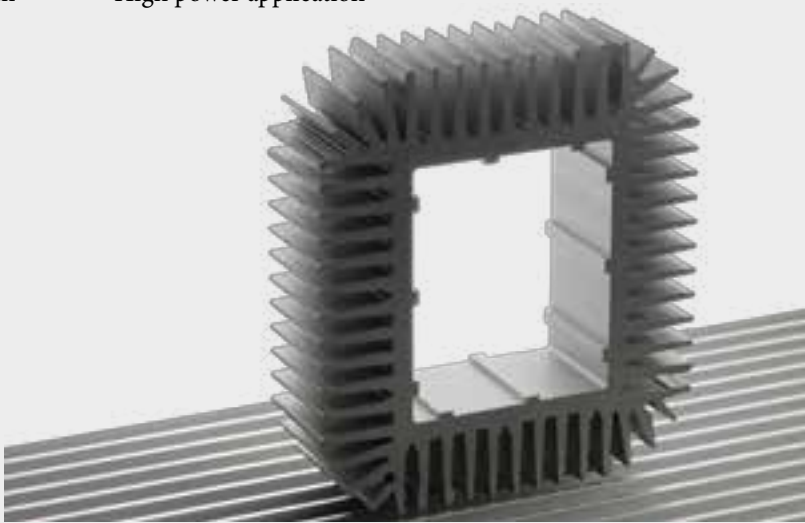
- Flat back and double sided fin heatsink
- Flat-, quadrangular-, angled-, U & T- shape profile heatsinks
- Cannelure fin heatsinks
- Profiles incl. extruded rails for ASSMANN WSW clip system
- Customized profile heatsinks (hollow profiles, extruded thread)

Features of Extruded Profile Heatsinks

- Wide standard product range
- Material AL6063, AL6060
- Thermal resistance from 16K/W down to >0,5K/W
- Processing by modern CNC-milling and drilling machines
- Industrial or special decoration surface finish
- Welded profiles
- Design and development of customized profiles

Applications for Large Extruded Profiles

- Power supplies
- Amplifier (decoration surface finish)
- Frequency inverters
- High power application



SheerPwr™ Circular Connector

PCB-to-Busbar & PCB-to-PCB Connectors



Repeated Low Resistance & High Mis-Alignment

SheerPwr™ Circular is a high-current, low-resistance interface designed for connecting busbars to circuit boards. It uses a robust and compliant power contact assembled in a circular orientation. The result is a power socket, designed to mate with traditional machined pins, which provides repeated low resistance, high mis-alignment and high current carrying capabilities.

Features

- Large beam deflection range handles up to $\pm 0.64\text{mm}$ permanent mis-alignment
- Redundant contact points
- Large gatherability
- AGT® silver plated contacts
- 3.6mm, 6mm and 8mm mating pin sizes
- Low 6.8mm connector height
- Low halogen materials
- Provides a minimum of 4.0mm of gatherability, increases with pin diameter

Target Markets/Applications

- AC/DC pluggable power supplies
- Pluggable circuit breakers
- Networking equipment
- Switches
- Server
- Storage
- Industrial
- Medical

Selection Guide

Receptacle Pin Diameter	Press-fit to PCB	Mating Plug Pin Diameter	Style A Press-fit to PCB	Stack Height *	Style B Press-fit to Busbar	Stack Height *
3.6mm	10132381-20360LF	3.6mm	10140847-3601LF	42mm	10137675-XXXXLF 10139665-XXXXLF	Follows customer application
6.0mm	10132381-20600LF	6.0mm	10140553-XXXXLF	Follows customer application		Follows customer application
8.0mm	10132381-20800LF	8.0mm	10140847-XXXXLF	Follows customer application		Follows customer application

* Other stack heights available upon request

Benefits

- When fully mis-aligned, all of the beams still make contact with the pin
- Low and stable resistance
- For blind-mate applications
- Lower resistance
- 70Amps, 120Amps or 160Amps per contact
- Compact size fits in many applications and allows for greater airflow
- Meets JEDEC JS709 Electronics Industry Standards

Electrical Performance

- Contact resistance: 0.05 to 0.1m Ω
- Current rating (30°C temperature rise in still air)
3.6mm- 70A; 6mm- 120A; 8mm- 160A
- Operating voltage: depends on application
- Dielectric withstanding voltage: 1000V





PwrBlade ULTRA® Connector System



The PwrBlade ULTRA® connector is the newest addition to the PwrBlade® product line. This new design offers an overall height reduction of 24% to reduce airflow impedance in high density power supplies. Three contact choices are available: High Power, Low Power and Signal. Ultra-high conductivity materials and new highly conductive plating, combine to produce an ultra-low resistance of just 0.4mΩ at end-of-life conditions. The result is the lowest profile power distribution connector capable of delivering more than 200Amps per linear inch.

Features

- Up to 65A per contact for high power and up to 25A per contact for low power
- 9.6mm height
- Highly vented housing design
- Halogen-free housing material
- Operating temperature ranges from -40°C to 125°C
- Right angle header, right angle receptacle and vertical receptacle types
- Number and placement of power and signal contacts are configurable for customer needs
- Solder or press-fit tails

Electrical Performance

- High power contact current: Up to 65A/contact at 30°C T-rise in still air
- Low power contact current rating: Up to 25A/contact at 30°C T-rise in still air
- Operating voltage
 - High power on 7.00mm pitch -400V
 - High power on 5.00mm pitch -200V
 - Low power on 3.5mm pitch -218V
- Dielectric withstanding voltage
 - High/low power contacts: 2500V

Benefits

- Provide excellent power density and multiple power voltage
- Low profile configuration ideal for 1U power supplies or power distribution system
- Maximizes heat dissipation for effective system cooling
- Meets next-generation environmental requirements
- Adaptable to extreme environments
- For both co-planar applications and backplane applications
- Design flexibility and choices for customers
- Termination flexibility

Electrical Performance

- Insulation resistance: > 1000mΩ max. at end of life
- Contact resistance
 - Power contact: 0.4mΩ max. at end of life
 - Signal contact: 20mΩ max. at end of life

Part Numbers

Description	Part Numbers
Right Angle Header	1012739X-XXXXXXLF
Vertical receptacle	1012740X-XXXXXXLF

PwrMAX® Ortho Power Connector

100Amps, Orthogonal Application Power Connector



The PwrMAX® Ortho power connector offers a compact means for connecting up to 100A DC power in a pcb edge-to-pcb edge application. The blind mate connector offers low resistance to satisfy modern orthogonal systems architectures.

Features

- 100A per contact
- Supports airflow passage around and through the connector, eliminating midplane and backplane air blockage
- GCS™ plating technology
- Press-fit terminated
- Rugged chamfered housings
- Industry-proven contact design with 10 points of contact
- High temperature thermoplastic housing
- Halogen-free housing

Target Markets/Applications

- Telecom
- Switches
- Datacom/Networking Equipment
- Server
- Storage Equipment
- Industrial Equipment

Part Numbers

Description	Mouting Style	Part Numbers
PwrMAX® Ortho Right Angle Header	PCB boardlocks	10132640-001LF
PwrMAX® Ortho Right Angle Receptacle	PCB retention pegs	10132644-002LF
PwrMAX® Ortho Vertical Receptacle	PCB retention pegs	10133407-002LF

Benefits

- Provides very low resistance and low voltage drop
- Supports both PCB and busbar applications
- Supports ± 3.5mm gatherability
- Provides superior and long term reliability
- Wide operating temperature from -40°C to +125°C
- Meets next generation environmental requirements

Electrical Performance

- Current Rating (30°C temperature rise in still air): up to 100A per contact
- Operating Voltage: up to 400V_{DC}
- Dielectric Withstanding Voltage: 1800V
- Insulation Resistance: 10,000MΩ
- Contact Resistance: 0.3mΩ max. at end-of-life conditions





Connectors for Energy Saving and Storage



WP10 Series

For compact hand-held devices such as smartphones, wearable devices and tablet PCs, the needs for larger battery capacity and faster charging are becoming prominent, and high current compatible internal connectors are required to connect the battery and the power supply circuit.

Features

- 2 rows, 0.7mm stacking height, 2.2mm width
- Power terminals compatible with 10A power and 10A return.
- 2-point contact structure for all terminals to ensure reliable connection under twisting stress, and to enhance retention strength.
- Durable hold-down structure which has a lock area that enhances retention force, and adds protection to the mating surface to prevent damage to the plastic insulator. (Armored)
- Improved workability with a clear click feeling.
- Contact structure ensures high wear-resistance and high connection reliability.
- Pb-free. (Nickel barrier in contact finish prevents solder migration)

Applicable Markets

- Smartphones, wearable devices, tablet PCs, laptop PCs, digital still cameras, digital video cameras, and other compact hand-held devices

DW07 Series

JAE has developed and started general sales of the DW07 Series connector, which was designed for busbar connection of devices requiring high-current power lines.

Features

- Floating connection: The DW07 Series compensates for mis-alignment between the rigid busbars being connected
- Flexible current amount: The required electrical current can be attained by the number of connectors used.
- Attachment without using screws: Connector attaches easily with one hand by clipping onto mating holes in the busbar.

Specifications

- Contact Resistance: 0.13 mΩ max. (initial), 0.16 mΩ max. (post-test)
- Insertion Force: 120N max.
- Extraction Force: 50N max.
- Durability: 100 times
- Operating Temp.: -25°C to +105 °C

Applicable Markets

- Electric conversion and energy storage applications, and other applications using busbars.
- Communication facilities and industrial equipment using busbars.

KN01 Series

The KN01 Series is a waterproof, lightweight, high-density rectangular connector with a great variety of wiring variation and superior operability. The insulator being a block style with an insert structure that can be customized to comply with various pin counts offers a great flexibility to meet broad customer demands.

Features

- Rack and pinion system lever structure allows for little operating force for engagement.
- Enhanced safety where the lever is stationary before mating and dual lock to prevent incorrect operation after mating.
- Arrangement of insulator block, with insertion orientation selection (pin or socket insert can be selected based on application requirement), allows for suitable pin counts and arrangement.
- Insulator with EMI noise control shielding as an option in the lineup, to be allow combined use of power and signal lines in a single unit.

Applicable Markets

- Factory automation equipment, such as robotics, automation machineries and other machine tools requiring environmental resilience.
- Industrial devices, communication devices, medical equipment and general devices requiring mutli-contact wiring connection

High-current Connector for Green Energy



DW Series

Along with the expansion of green energy such as solar power generation, in order to stabilize current for electric power stations and to respond to the peak cut and shift in offices and HEMS at home for power-saving, the usage of storage battery systems to store electricity temporarily is increasing in a proactive manner.

Recently, the lithium-ion type storage battery is increasing for storage systems. Add to the power supply type, we have proposed a rack and panel type complex connector with a signal contact to check the condition of cell in consideration of the character which every cell has some variation in the amount of accumulation of electricity. The DW Series connector could reduce manufacturing work time for customers and is available in four kinds of product lineup including cable type for small-scale storage.

Features & Benefits

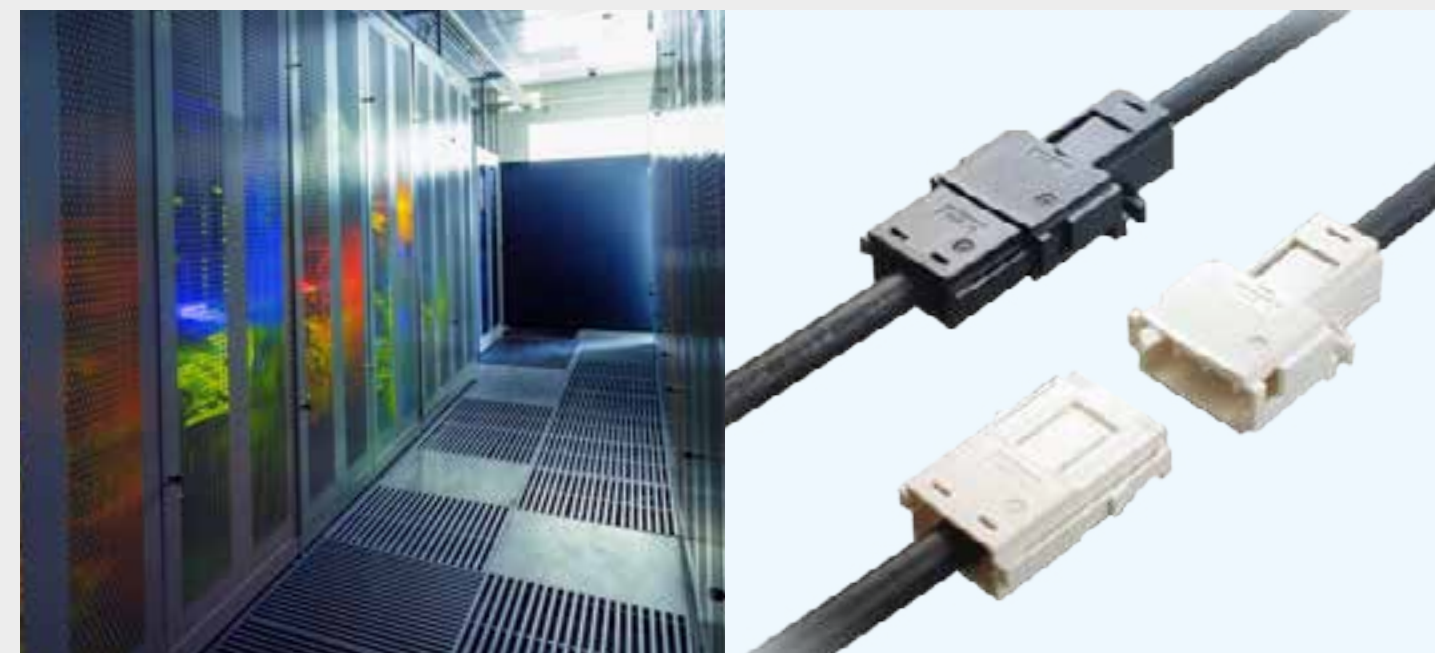
- Power and signal contacts in one robust insulator
- Easy to harness signal contact unit
- High reliability
- One side floats when mounted for easy mating
- Electric shock prevention
- Electrification countermeasure
- UL approved

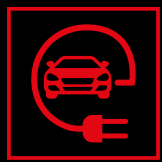
Applications

- Storage Battery Systems
- Power Supply Systems
- Power Supply control equipment

Electrical Characteristics

- Current Rating: 150A-500A
- No. of contacts: 1 to 2 pos.
- Operating temperature: -40°C to +105°C





eMobility Application – Forklift Vehicle

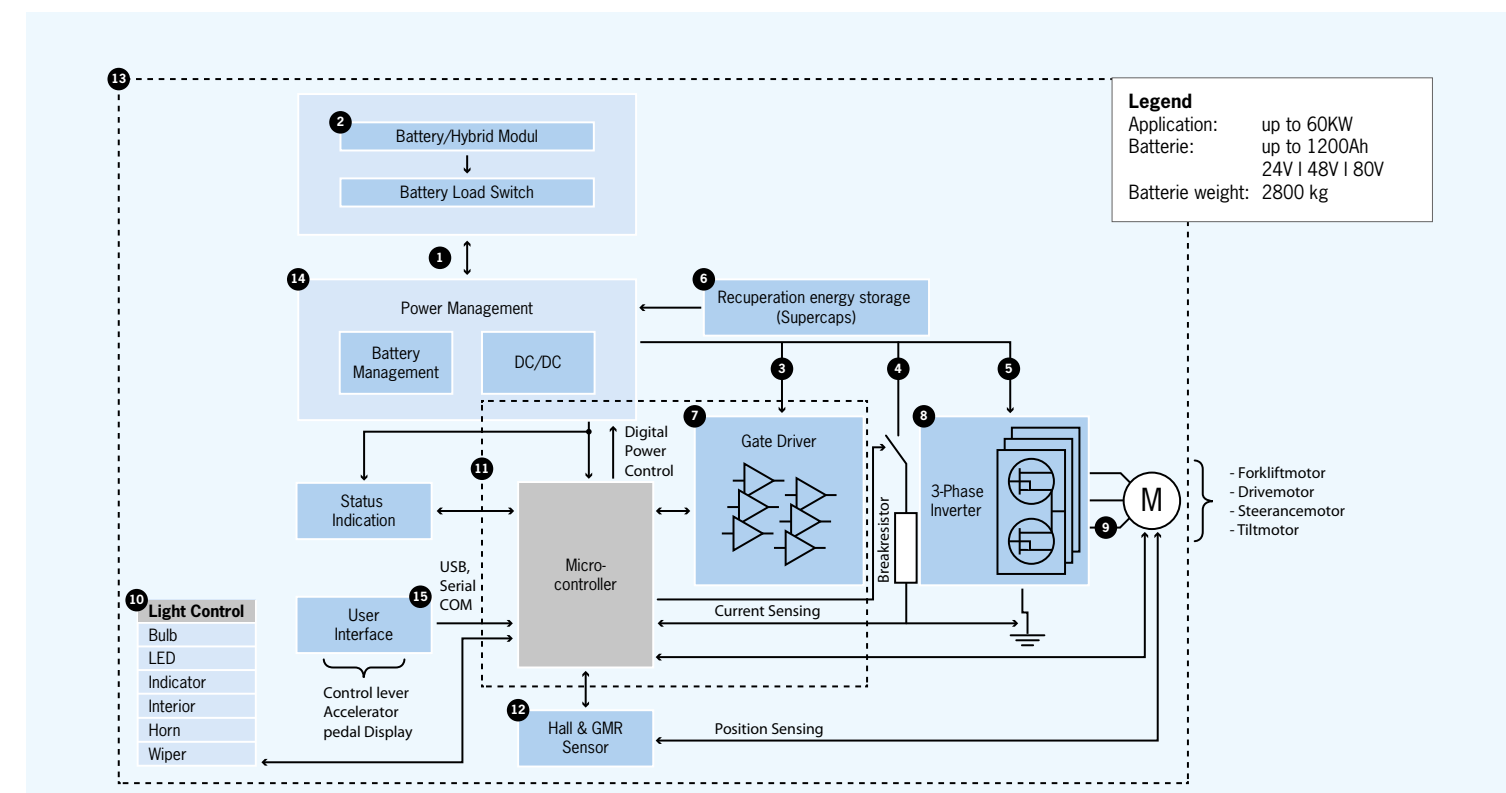
Selection Guide

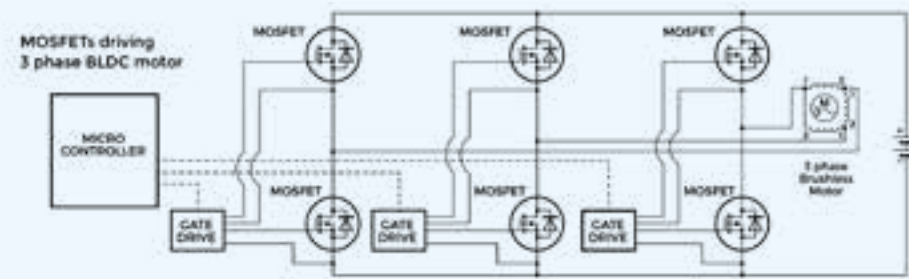
No	Type	Active						
		Diodes	Infineon	Littelfuse	Rohm	STMicro-electronics	Vishay	
2	DC-DC Converter		X			X		
	MOSFet (N-Channel)	X	X		X	X	X	
	Gate Driver		X		X			
7	Gate Driver (Isolated)		X		X	X		
	Motor Control IC		X		X	X		
	IGBT		X			X		
8	IGBT (Modul)		X					
	MOSFet (N-Channel)	X	X		X	X	X	
9	Diode (Protection)	X		X	X	X	X	
	LED Driver	X	X		X	X		
10	MOSFet (Protected)	X	X		X	X		
	Transistor (Bipolar)	X			X			
	Transistor (Digital)	X			X			
11	Motor Control IC (Embedded Power)		X		X			
12	Sensor	X	X					
13	Diode (Protection)	X		X	X	X	X	
14	PWM/PFC Controller		X		X	X		
15	Diode (Protection)	X		X	X	X	X	

No	Type	E-Mech					
		Amphenol FCI	ASS-MANN WSW	JAE	Littelfuse	Omron	
1	Connector	X					
2	Heatsink (Extruded profile)		X				
3	Switch				X		
3	Heatsink (Extruded profile)		X				
4	Relay					X	
4	Heatsink		X				
4	Heatsink (SMD & copper)		X				
5	Connector	X		X			
5	Heatsink (Extruded profile)		X				
6	Connector	X		X			
6	Heatsink (Extruded profile)		X				
7	Heatsink (Round pin fin CPU)		X				
7	Heatsink (SMD & copper)		X				
7	Heatsink (Stamped finger shaped)		X				
8	Heatsink (Extruded profile)		X				
9	Connector	X		X			
9	Heatsink (Round pin fin CPU)		X				
10	Heatsink (SMD & copper)		X				
10	Heatsink (Stamped finger shaped)		X				
11	Connector			X			

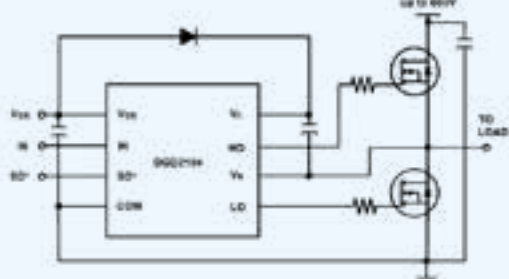
No	Type	Passive											
		AVX	Keko Varicon	Littelfuse	KRAH	Murata	Nesscap	Pulse	Rubycon	Sumida	Vishay	WIMA	
1	Resistor										X		
	Varistor	X	X	X									
2	Capacitor (Foil)										X	X	
	Resistor										X		
3	Varistor	X	X	X									
4	Varistor	X	X	X									
4	Resistor										X		
5	Varistor	X	X	X									
6	Capacitor (EDLC)						X					X	
6	Varistor	X	X	X									
7	MLCC	X				X					X		
7	Resistor				X								
	Capacitor (Electrolyte)								X				
8	Capacitor (Foil)								X		X	X	
	MLCC	X				X					X		
	Resistor										X		
9	Varistor	X	X	X									
10	Capacitor (Foil)										X		
10	Varistor	X	X	X									
	Filter					X		X		X			
13	Resistor										X		
	Transformer					X		X		X			

No	Type	Embedded	
		FSP	
13	Power Supply		X

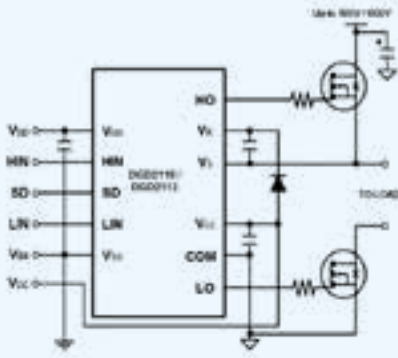




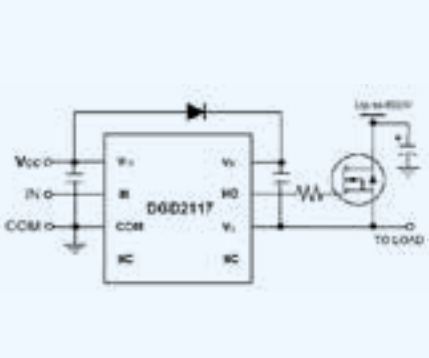
MOSFET and Gate Drivers



DGD2104



DGD2110/DGD2113



DGD2117



MOSFETs and Gate Drivers for BLDC Motors



Brushless DC (BLDC) motor control provides improved performance, longer lifetime, reduced noise and greater ease of use when compared to equivalent mechanical solutions. Consequently, three phase BLDC motor systems are widely used in eMobility, forklifts, pumps, industrial automation, and white goods. The motor power will depend on the application's performance requirements. In BLDC motor systems, MOSFETs and Gate Drivers are typically configured in a three phase bridge arrangement to drive the DC motor and must be capable of handling start-up and stalled motor currents up to six times the continuous current rating of the motor.

- Features**

 - I_d up to 100A ($T_c=25^{\circ}C$)
 - Logic level for direct drive from MCU
 - Avalanche Rugged (100% UIS)
 - Low Figure of Merit (FOM)
- $DMTH = 175^{\circ}C$ max T_j
 - AEC-Q101 Qualified
 - Automotive Q-parts available

40V MOSFETs for BLDC Motors

Part Number	V_{DS} (V)	$R_{DS(on)}$ (m Ω) @10V	$R_{DS(on)}$ (m Ω) @4.5V	Q_g (nC)	Q_{gd} (nC)	Package
DMTH4004SPS	40	2.3	-	69	14.2	PowerDI5060
DMTH4004SK3	40	2.6	-	69	14.2	TO252 (DPAK)
DMTH4004SCTB	40	2.5	-	69	14.2	TO263 (D2PAK)
DMTH4004LK3	40	2.4	4	83	11.2	TO252 (DPAK)
DMTH4004LPS	40	2.4	4	83	11.2	PowerDI5060
DMTH4005SPS	40	2.9	-	49	13	PowerDI5060
DMTH4005SK3	40	3.6	-	49	13	TO252 (DPAK)
DMTH4005SCT	40	3.6	-	49	13	TO220

Typical $R_{DS(on)}$ and Q_g @ $V_{gs} = 10V$ & $T_a = 25^{\circ}C$

60V MOSFETs for BLDC Motors

Part Number	V_{DS} (V)	$R_{DS(on)}$ (m Ω) @10V	$R_{DS(on)}$ (m Ω) @4.5V	Q_g (nC)	Q_{gd} (nC)	Package
DMTH6004SPS	60	2.5	-	95	20	PowerDI5060
DMTH6004SK3	60	3	-	95	20	TO252 (DPAK)
DMTH6004SCTB	60	2.9	-	95	20	TO263 (D2PAK)
DMTH6004SCT	60	3.1	4	95	20	TO220
DMTH6004LPS	60	2.5	3.3	96	21.4	PowerDI5060
DMTH6005LPS	60	4.4	7.7	47	12.5	PowerDI5060
DMTH6005LK3	60	4.5	7.9	47	12.5	TO252 (DPAK)

Typical $R_{DS(on)}$ and Q_g @ $V_{gs} = 10V$ & $T_a = 25^{\circ}C$



Half-Bridge Gate Drivers

Part Number	Offset Voltage Max (V)	Inputs	Output Current I_{o+Typ} (mA)	Output Current I_{o-Typ} (mA)	Internal Deadtime typ (ns)	t_{ON} / t_{OFF} Typ (ns)	t_r / t_f Typ (ns)	Package
DGD2103AS8	600	HIN, LIN*	210	360	520	680 / 150	100 / 50	S08
DGD2104AS8	600	IN, SD^	210	360	520	680 / 150	100 / 50	S08
DGD2103S8	600	HIN, LIN*	290	600	520	680 / 150	70 / 35	S08
DGD2104S8	600	IN, SD^	290	600	520	680 / 150	70 / 35	S08
DGD2108S8	600	HIN, LIN*	290	600	540	220 / 200	100/35	S08
DGD2108S14	600	HIN, LIN*	290	600	540 - 5000 #	220 / 200	100 / 35	S014
DGD2184S8	600	IN, SD^	1900	2300	400	680 / 270	40 / 20	S08
DGD2184S14	600	IN, SD^	1900	2300	400 - 5000 #	680 / 270	40 / 20	S014

* = out of phase # = Adjustable by external resistor ^ = Enable low

High-Side/Low-Side Gate Drivers

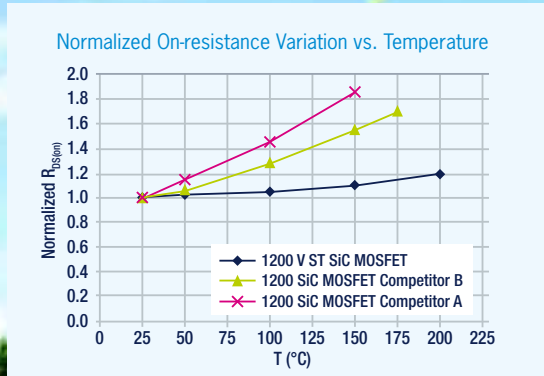
Part Number	Offset Voltage Max (V)	Inputs	Output Current I_{o+Typ} (mA)	Output Current I_{o-Typ} (mA)	t_{ON} / t_{OFF} Typ (ns)	t_r / t_f Typ (ns)	Package
DGD2110S16	500	HIN, LIN, SD	2500	2500	105 / 94	25 / 17	S016
DGD2101S8	600	HIN, LIN	290	600	160 / 150	70 / 35	S08
DGD2106S8	600	HIN, LIN	290	600	220 / 200	100 / 35	S08
DGD2106S14	600	HIN, LIN	290	600	220 / 200	100 / 35	S014
DGD2181S8	600	HIN, LIN	1900	2300	180 / 220	40 / 20	S08
DGD2181S14	600	HIN, LIN	1900	2300	180 / 220	40 / 20	S014
DGD2113S16	600	HIN, LIN, SD	2500	2500	105 / 94	25 / 17	S016
DGD2190S8	600	HIN, LIN	4500	4500	140 / 140	25 / 20	S08

Single Channel Drivers

Part Number	Offset Voltage Max (V)	Inputs	Output Current I_{o+Typ} (mA)	Output Current I_{o-Typ} (mA)	t_{ON} / t_{OFF} Typ (ns)	t_r / t_f Typ (ns)	Package
DGD2117S8	600	IN	290	600	125 / 105	75 / 35	S08
DGD2118S8	600	IN*	290	600	125 / 105	75 / 35	S08

* = out of phase





SiC MOSFET

The Real Breakthrough in High-voltage Switching

Based on the advanced and innovative properties of wide bandgap materials, ST's silicon carbide (SiC) MOSFET feature very low $R_{DS(on)}$ per area for the 1200V rating combined with excellent switching performance, translating into more efficient and compact designs.



Industry-leading 200°C Rating for More Efficient and Simplified Designs

ST is among the first companies to produce high-voltage SiC MOSFET. This new family features the industry's highest temperature rating of 200°C for improved thermal design of power electronics systems. Compared to silicon MOSFET, SiC MOSFET also feature significantly reduced switching losses with minimal variation versus the temperature.

Key Features

- Very low switching losses
- Low power losses at high temperatures
- Higher operating temperature (200°C)
- Body diode with no recovery losses
- Easy to drive

Key Benefits

- Smaller form factor and lighter systems
- Reduced size/cost of passive components
- Higher system efficiency
- Reduced cooling requirements and heatsink size

Target Applications

- Solar inverters
- High-frequency power supplies
- Motor drives

SiC MOSFET vs. Silicon IGBT

The table compares the 1200V, 80mΩ SCT30N120 SiC MOSFET with a trench field-stop IGBT of the same voltage rating and equivalent R_{ON} . You can see that the SiC MOSFET exhibits significantly reduced switching losses, even at high temperatures. This enables designers to operate at very high switching frequencies, reducing the size of passive components for smaller form factors. In addition, the variation of E_{ON} and E_{OFF} with temperature is very small. For example, the E_{OFF} of the SiC MOSFET increases only by 25% as the temperature rises from 25°C to 175°C, while the E_{OFF} of the IGBT increases by 90%. Also the on-state resistance variation versus temperature is very tight.

Switching Loss Comparison						
Device	$V_{DS, typ}$ (V) @ 25 °C, 20 A	$V_{DS, typ}$ (V) @ 175 °C, 20 A	E_{ON} (μJ) @ 20 A, 900 V		E_{OFF} (μJ) @ 20 A, 900 V	
			25 °C	175 °C	25 °C	175 °C
SCT30N120 SiC MOSFET	2	2.4	725*	965*	245	307
Trench field-stop IGBT	1.95	2.35	2140	3100	980	1850

Note: * E_{on} measured using the SiC intrinsic body diode

+25% from 25 °C to 175 °C +90% from 25 °C to 175 °C

Products

Part Number	Package	BV_{DSS} [V]	I_D [A]	$R_{DS(on)}$ [Ω]	Q_g [nC]	T_J max [°C]
SCT10N120	HiP247 IN LINE	1200	12	0.69	22	200
SCT20N120	HiP247 IN LINE	1200	20	0.239	45	200
SCT30N120	HiP247 IN LINE	1200	45	0.1	105	200
SCT50N120	HiP247 IN LINE	1200	65	0.069	122	200
SCTWA50N120	HiP247 LONG LEADS	1200	65	0.069	122	200



SiC Power Devices

A New Benchmark in Efficiency and Thermal Performance



SiC is emerging as the most viable candidate in the search for the next-generation low-loss technology due to its low ON resistance and superior characteristics at high temperatures.

SiC – Schottky Barrier Diodes

SiC Schottky Barrier Diodes feature an ultra low and temperature independent reverse recovery charge Q_{rr} . The wide band gap makes SiC diodes suitable for very fast switching frequencies and high break down voltages. Design engineers can fully utilize SiC performance advantages which lead to reduce losses, smaller inductance and lower total system cost.

Key Features

- Industry-leading low forward Voltage (lowest in the market)
- High Speed recovery characteristics
- Lower Switching losses

Applications

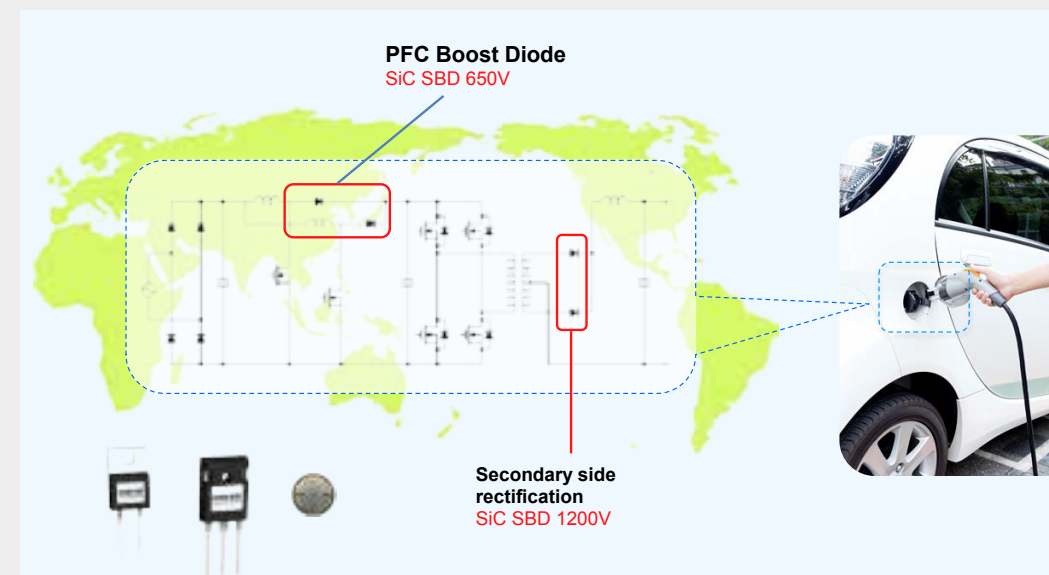
- Renewable Energy/ Energy Storage
- EV/HEV Inverter and Chargers
- Induction Heating/ Welding
- PFC/ SMPS
- HVDC

2nd Generation SiC SBD

- 650V types in the range of 6A – 40A
- 1200V types in the range of 5A – 40A

3rd Generation SiC SBD with high I_{FSM} Capability

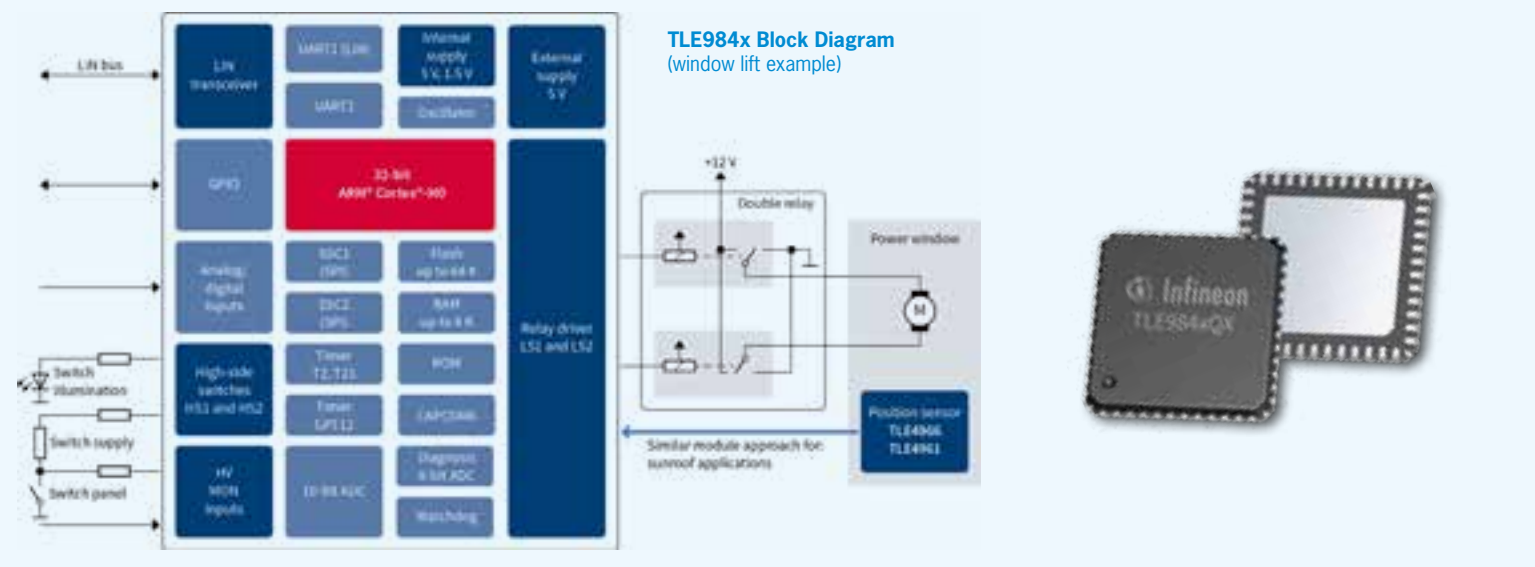
- 650V types in the range of 2A~10A (12A~20A in development)



The Revolution of SiC has started in the Automotive

ROHM SiC-SBD has a line up of automotive grade ones since 2012. This product lineup has opened the new market sector of automotive application for SiC-SBD.





TLE984x Series – Infineon® Embedded Power IC

The TLE984x product family integrates an ARM® Cortex®-M0 microcontroller core along with relay drivers, high-side switches, LIN transceiver and a power supply system that enables the device to operate at the vehicle battery level. The TLE984x family is the successor of the TLE983x family and is specifically designed to drive a wide range of LIN-slave automotive motor control applications via a relay or via a PN MOSFET half-bridge.

Features

- Two protected low-side switches (min. 270mA)
- Up to two protected high-side switches (min. 150mA)
- Up to five high-voltage inputs with wake up functionality
- Integrated LIN transceiver compatible with LIN 2.2 and SAE-J2602
- Two full duplex serial interface (UART) with LIN support
- Two synchronous serial channel (SSC), compatible with SPI
- On-chip oscillator and PLL for clock generation
- Measurement unit:
 - 8-bit ADC module with 7 multiplexed inputs for system supervision
 - 10-bit ADC module with 13 multiplexed inputs
 - On chip temperature and battery voltage measurement
- Independent programmable window watchdog
- 5V/1.5V Internal supplies
- External Supply (VDDEXT): 5V+/-2% @ 20mA
- Power saving modes
 - MCU slow-down Mode
 - Sleep & stop mode
 - Cyclic wake-up from Sleep Mode or Stop Mode

Features of the Integrated Microcontroller and its Peripheral

- 32 bit ARM® Cortex® M0 Core, 25/40MHz clock frequency
- 36kB to 64kB flash memory for code and data
- Boot ROM for startup firmware and Flash routines
- Up to 4kByte RAM memory
- Thumb® + Thumb-2® Instruction Set
- Nine 16-bit timers
- Capture/compare unit for PWM signal generation (CCU6) with 2x16-bit timers

Benefits

- Complete System-Chip for a wide range of LIN based Mechatronic Window Lift and Sunroof applications
- One platform for relay or low-end PN FET DC Motor Control
- Min. number of external components for reduced BOM cost
- VQFN package, 7x7mm footprint resulting in PCB space saving

Applications

- Window lift
- Fan/blower motor control
- Pump motor control
- Sunroof
- LIN addressed relay motor applications
- Wiper

Product Name	Flash [kB]	RAM [kB]	EEPROM in Flash included [kB]	Frequency (max) [MHz]	High-side Switch	High-voltage Monitor Input	PN MOS Driver
TLE9842QX	36	2	4	25	1	4	No
TLE9842-2QX	40	2	4	40	2	5	No
TLE9843QX	48	4	4	25	1	4	No
TLE9843-2QX	52	4	4	40	2	5	No
TLE9844QX	64	4	4	25	1	4	No
TLE9844-2QX	64	4	4	40	2	5	No
TLE9845QX	48	4	4	40	2	5	Yes



RFI Capacitors for Overvoltage Protection



Radio interference suppression capacitors serve to reduce or suppress the HF voltage interference in electronic equipment. The RFI capacitors remain on the mains for an uninterrupted period of 10, 20 or more years and have to both protect the appliance against line-side surge voltages/transients and suppress reactions of the appliance on the mains supply.

Radio Interference suppression capacitors are used to block and attenuate these voltage spikes and are defined in X and Y classes according to the demands they have to satisfy:

Class X

Class X capacitors have unlimited capacitance and are connected between phase to neutral or phase to phase conductors.

Class Y

Class Y capacitors have increased electrical and mechanical safety and are installed between phase conductors and the shock protected earthed casing, thus bridging the insulation of the appliance.

WIMA offers approved RFI capacitors with polypropylene dielectric as well as with metallized paper dielectric:

Polypropylene Capacitors

Polypropylene capacitors feature high capacitance values at smaller case sizes compared to metallized paper capacitors. They are available with capacitances from 1000pF to 10µF and AC voltages of 300V_{AC}, 305V_{AC} and 440V_{AC} for class X2, X1 and Y2. Based on the dielectric used they are highly cost-effective.

Metallized Paper Capacitors

Metallized paper capacitors are neither actively nor passively flammable. The components are resin impregnated under vacuum and encapsulated with self-extinguishing cast resin. Thanks to the good oxidation behaviour of the paper dielectric, they have outstanding self-healing properties even with high energy pulses. WIMA metallized paper capacitors are specified for temperatures up to 110°C and are available with capacitances up to 1µF and voltage ranges from 250V_{AC} up to 500V_{AC} for class X1, X2 and Y2 applications.

WIMA MKP 4F – Metallized Polypropylene AC Filter Capacitors

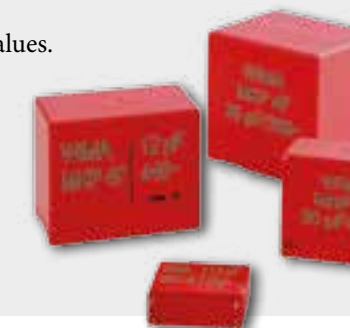
Features

- New range of filter capacitors based on metallized polypropylene (PP) dielectric
- Printed circuit modules (PCM) from 27.5mm to 52.5mm
- Capacitances from 0.68µF to 75µF
- Nominal voltages from 230V_{AC} to 440V_{AC}

Due to their typical circuit position AC filter capacitors have to exhibit good high-frequency characteristics and at the same time high AC voltage capabilities. They in general fulfil two requirements:

- Low AC impedance to dissipate high-frequency interference signals
- Attenuation of transient voltage pulses caused e.g. by switching

WIMA filter capacitors are designed on the basis of low-loss polypropylene film and exhibit high AC current capability at high frequencies as well as low ESL and ESR values.





DC-LINK Capacitors

The Alternative to Electrolytic Capacitors in Intermediate Circuit Applications

DC-Link capacitors are used in intermediate circuit applications in power electronics, e.g. power conversion technique where they couples different electrical grids to one DC voltage level. They should have a preferably high volume/capacitance ratio and nominal voltages ranging from 400V_{DC} to 1500V_{DC}. Also of importance is a high life time as well as a robust and safe terminating configuration.



In general aluminium electrolytic capacitors are used in power electronics due to their very high power density. However, in an increasing number of applications film capacitors with polypropylene film are selected.

Their Fundamental Advantages Towards Electrolytic Capacitors

- Three times higher dielectric voltage strength
- Very low dissipation factor (ESR)
- Very high insulation resistance
- Considerably higher reliability by outstanding self-healing properties
- Long life expectancy
- Temperature resistance up to -55°C
- Non-polarized construction
- High vibration and shock resistance
- Excellent mechanical stability

WIMA DC-LINK Capacitors

WIMA DC-Link capacitors are constructed of low-loss, metallized polypropylene films. They are available in several product ranges both in prismatic and cylindrical shape versions.

WIMA DC-LINK MKP 4 Capacitors

are constructed of low-loss, metallized polypropylene films. They are available in several product ranges both in prismatic and cylindrical shape versions.

WIMA DC-LINK MKP 5 Capacitors

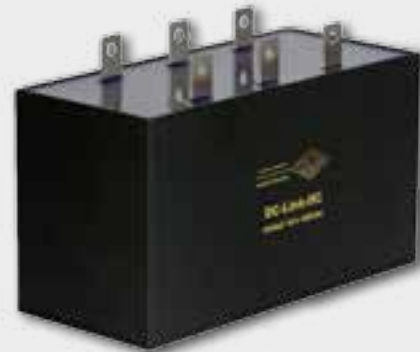
in cylindrical plastic cases are available with capacitances from 16µF to 260µF and with rated voltages of 500V_{DC} to 1300V_{DC}. They are provided with tinned wire terminations for PCB mounting.

WIMA DC-LINK MKP 6 Capacitors

have a cylindrical aluminium case. They are available with capacitances from 75µF to 4920µF and with rated voltages of 600V_{DC} to 1500V_{DC}. For bus bar mounting they are designed with M6 screw terminations and M12 screw bolt.

Customized solutions can be realized with WIMA DC-LINK HC with capacitance values from 140µF to 8250µF and voltage ranges from 450V_{DC} to 1500V_{DC}.

In modern drive engineering the intermediate circuit capacitor manufactured on the basis of low-loss polypropylene film scores with its robustness, its insensitivity against high temperatures and its temperature adaptability. Above all, in cases where a high load transfer by an increasing intermediate circuit voltage occurs, reliable operation at high life time is permitted even without susceptible cascading of capacitances. Its tolerance towards highest ripple currents and the option of a low-inductive construction – values of approx. 10nH at a capacitance of 1000µF are possible – enable a low-resonance frequency response which is advantageous for the entire circuit.



Pulse Capacitors

For Good Contacts at High Pulse Ratings

An important construction criterion in the manufacture of reliable, self-healing capacitors for pulse applications is the current-carrying capacity of the contacts, i.e. the connection between the terminating wires and the electrodes.



MKP 10 Series

The construction principle of the series WIMA MKP 10 consists of a non-metallized dielectric film and a plastic film metallized on both sides acting as electrode. Thanks to the metallization on both sides, the electrical conductivity is considerably improved and the contact surface between the electrodes and the schoopage layer is doubled. This results in better contact and allows for high current and pulse loading capability. The properties of metallized capacitors such as excellent self-healing and high volume capacitance remain unchanged.

FKP 1 Series

The WIMA FKP 1 series was developed for extremely high pulse loads. It has an internal series connection. The metal foil electrodes are combined with a floating electrode metallized on both sides. The metal foil electrodes are safely contacted on both sides of the end surfaces. At the same time the capacitor is fully self-healing due to the floating electrode metallized on both sides. As regards pulse loading capability, WIMA FKP 1 represents the high-end of capacitor technology. WIMA has now further developed the FKP 1 rage by using PCM 52.5mm which enables the voltage ranges 400V_{DC} to 6000V_{DC} to be supplemented by higher capacitance values. The rated capacitances now range from 100pF up to 4.7µF.

Pulse Capacitors

WIMA pulse capacitors are used in applications with high pulses and frequencies, e. g. switch mode power supplies, TV and monitor sets, lighting industry, audio/video equipment, converters in drives and power electronics as well as electronic ballasts.

They are available with capacitances from 100pF to 47µF and with voltage ratings from 100V_{DC} to 6000V_{DC}.

Snubber Capacitors

With Plates or Pin Terminations for Best Contacts

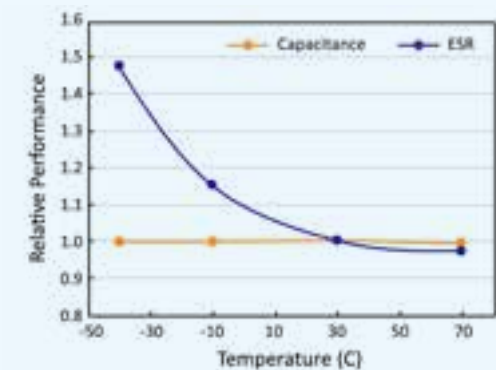
WIMA Snubber capacitors are available both as double-sided metallized pulse version – WIMA Snubber MKP – and for extremely high pulse ratings in self-healing film/foil technology – WIMA Snubber FKP. Their electrical performance as well as the manifold number of available connecting options makes the WIMA Snubber technology unique.



- Plates soldered directly to the schoopage for safe contacts at high RMS currents
- Low inductance construction achieved by end-surface contacts
- High pulse reliability due to double-sided metallization and/or film construction
- High voltage/overvoltage strength by internal series connection with self-healing metallized floating electrode
- Available in various contact configurations
- Flame retardant plastic case in accordance with UL 94 V-0
- Production sites ISO 9001:2008 certified

The Snubber capacitor range has been reworked. The capacitance range now comprises values from 0.047µF up to 8µF and voltage ranges of 700V_{DC} up to 3000V_{DC}. WIMA Snubber capacitors are manufactured under conditions of large volume production, but are also available in small quantities as individually configurable high-reliable components.





Ultracapacitors



Nesscap Energy is a world leader in ultracapacitor technology. We're producing a large range of products which include single cells, ranging from 3F up to 3400F as well as modules with multiple voltage platforms from 5V up to 125V. Nesscap's large-sized cylindrical EDLC cells range from 600F to 3400F in capacitance with operating voltage up to 3V. These cells were developed to meet market requirements for robustness, compact size, high energy density and long cycle life.

Features

- Large range of products
 - Single cells from 3F up to 3400F
 - Modules with multiple voltage platforms from 5V up to 125V
 - Large-sized cylindrical EDLC cells (600F – 3400F) with operating voltage up to 3V
- High quality standards – compliance to RoHS, UL, REACH
- High performance power products with very low ESR and low RC time constant

Applications

- Driverless transport systems
- Hybrid drive train systems
- UPS- and backup systems
- Windmill pitch control
- Medical devices
- Harbor cranes
- Automotive
- Actuators
- Forklifts



N60™ Ultracapacitor

Nesscap Energy Inc. is proud to introduce the new N60™ 3V / 3400-farad ultracapacitor. This cell significantly raises the standard for power, energy, and overall performance, all within the industry-standard 60mm cylindrical form factor. N60™ delivers 42% greater power density and stores 40% more energy compared to Nesscap's standard 2.7V / 3000-farad cells. N60™ represents a major step forward for the industry and further establishes Nesscap's technology leadership and highly regarded product line.



Features

- Highly Efficient and Rugged Mechanical Design**
Exceptional shock and vibration performance
- Low Equivalent Series Resistance (ESR)**
Patented electrode technology enables lowest resistance possible
- Industry Standard 60mm Design**
Ease of use for integration or replacement of existing large-cell designs
- Wide Temperature Range**
Extremely reliable performance from -40°C to +65°C
- Long Operational Life**
1,000,000 cycles
(rated voltage to half-rated voltage)

Applications

- Automated guided vehicles
- Railway, tram & subway
- Windmill pitch control
- Hybrid truck & bus
- Power back-up
- Automotive
- Power grid
- Cranes



Part Number	Rating	DC-ESR	Terminal Type	Gravimetric Specific Energy	Impedance Match Specific Power	Nominal Weight
NE03V03400ST001	3.0V 3400F	0.15 mΩ	Threaded	8.4 Wh/kg	18.5 kW/kg	505 g
NE03V03400SW001	3.0V 3400F	0.15 mΩ	Welded	8.5 Wh/kg	18.7 kW/kg	500 g

Nesscap Modules



Nesscap offers multi-cell modules with operating voltages of 5V, 16V, 48V, 64V, 86V and 125V in order to satisfy higher voltage requirements of many integrated systems. These standardized multi-cell modules can be simply connected in series to meet even higher voltage requirements. 5V modules are composed of two 2.7V / 3F (or two 2.7V / 5F) cells connected in series and typically used for AMR (Automatic Meter Reading) and other applications which require a small amount of capacitance and are mainly used for small pulse power or power back-up systems. 16V and higher voltage modules are composed of large cylindrical cells targeting automotive and industrial applications such as transit buses and heavy duty vehicles.

Small Modules 5V

- Addresses particular applications requiring relative small amount of energy and mainly used for small pulse power distribution
- Industrial applications:
 - Power back-up system
 - Actuators
 - AMR



16V and Higher Voltage Modules

- Cell to cell balancing
- Thermal management
- Voltage monitoring
- Communication interface
- Composed of large cylindrical cells targeting industrial and other heavy duty applications:
 - UPS- and back-up systems
 - Hybrid drive train systems
 - Forklifts
 - Robotics
 - Cranes



Overview Nesscap Modules

Capacitance (F)	1.5–500
Voltage (V)	5–125
Form factor	Various standard and customized
Terminal type	Radial lead and internal thread
Major application	AMR, hybrid tram, Windmill pitch control system, hybrid bus and vehicle, cranes, UPS- and back-up systems, driverless transport systems





XP™-Series XTRA Performance



XP™ products are engineered specifically for applications that operate over long durations in environments with high temperature and humidity. Proprietary product and manufacturing enhancements, designed into XP™, significantly reduce the likelihood of long term reliability issues resulting from prolonged operation in adverse environmental conditions. Under biased test conditions (2.7V, 90% relative humidity, 60°C), XP™ products deliver a 3 times improvement compared to benchmarked industry-standard cells. XP™ products are offered at capacitances ranging from 3F to 50F with dimensions and electrical specifications identical to those of Nesscap's corresponding standard cells. All products have been extensively tested to ensure adherence to strict performance standards and will be compliant with RoHS, UL and REACH.

Features & Benefits

Highly Efficient Rugged Component

- Biased Humidity Test Conditions (at V_R , 60°C, and 90% RH)

Low Equivalent Series Resistance(ESR)

- Patented electrode technology and contact methods enables lowest resistance

Wide Temperature Range

- Very good temperature performance down to -40°C and up to +65°C

Long Operational Life

- Offers >500k cycles (nominal voltage down to half voltage)

High Endurance

- Endurance equal to standard series
- Highly superior results at Biased Humidity Test

Applications

- Advanced metering
- Emergency lighting
- Smoke detectors
- Security devices
- Medical devices
- Safety devices
- Automotive



Product Overview XP™-Series

Nesscap Part Number	RUTRONIK Part Number	Capacitance Rating	DC-ESR	Terminal Type	Max Leakage Current	Size	Biased Humidity Life *
ESHSR-0003C0-002R7UC	KUK974	2.7V 3F	<55 mΩ	Radial Lead	5μA	8x20mm	2,000 Hrs
ESHSR-0005C0-002R7UC	KUK973	2.7V 5F	<35 mΩ	Radial Lead	8μA	10x20mm	2,500 Hrs
ESHSR-0006C0-002R7UC	KUK972	2.7V 6F	<33 mΩ	Radial Lead	17μA	8x30mm	2,000 Hrs
ESHSR-0010C0-002R7UC	KUK971	2.7V 10F	<30 mΩ	Radial Lead	23μA	10x30mm	2,500 Hrs
ESHSR-0025C0-002R7UC	KUK965	2.7V 25F	<25 mΩ	Radial Lead	49μA	16x25mm	3,000 Hrs
ESHSR-0050C0-002R7UC	KUK970	2.7V 50F	<16 mΩ	Radial Lead	73μA	18x40mm	3,000 Hrs

*Biased Humidity Test (at VR, 60°C, and 90% RH)

Aluminium Electrolytic Capacitors

for Automotive Applications

Quality, Reliability, Robustness



Features

- Multi pin
- High temperature
- Long lifetime
- High currents
- Snap-In capacitors with AECQ-200

Benefits

- Miniaturized Snap-In capacitors utilizing high density foil to fit into low profile cases
- Higher power density (CV value) in same case size for high power inverters
- Special series for demanding applications
- Customized solutions

Applications

- Charging circuits
- Power train
- DC/DC converter
- BLDC control
- High voltage inverter

BXW 105°C 12000h

- Miniaturization
- Long lifetime
- AECQ-200 possible
- Rated voltage: 160 to 450V
- Capacitance: 10 to 820μF



RX30 130°C 4000h

- High current, low ESR
- Rated voltage: 10 to 400V
- Capacitance: 1 to 4700μF
- Can be specified up to 150°C



HBX 125°C 3000h

- High current, low ESR
- High voltage inverter
- Rated voltage: 250 to 275V
- Capacitance: 30 to 56μF



MXG 105°C 3000h

- Multi pin terminal available
- AECQ-200 possible
- Rated voltage: up to 500V
- Capacitance: up to 68000μF



PEV 105°C 10000h

- Polymer Hybrid technology
- High current, low ESR
- Stable over lifetime
- Rated voltage: up to 63V
- Capacitance: up to 330μF



PFV 125°C 4000h

- Polymer Hybrid technology
- High current, low ESR
- Stable over lifetime
- Rated voltage: up to 63V
- Capacitance: up to 470μF
- Can be specified up to 150°C





Resistors in eMobility Application



Brake

Braking resistors for hybrid and electric vehicles when the battery is fully charged and in recuperation mode.

Change/Discharge

To reduce high operating voltages of electric vehicles in the event of a crash; AECQ qualified.

FHPR Series

High-Power Resistors with Cooling Fins

- Power rating: 200W/400W...500W/1.000W only convection/forced cooling >3m/s
- Dimensions: 135x90x60...305x90x60mm
- Resistance range: 0.80...250Ω
- Tolerance: $\pm 2\%$... $\pm 10\%$



LCPR Series

Liquid Cooled Power Resistors

- $\leq 20\text{KW}$
- High power density with compact shape
- Low surface temperatures
- High packing density
- Pulse resistant
- High electric strength/inherently safe
- Suitable for most cooling liquids



HPRS Series

High-Power Resistors in a Metal Casing

- Power rating: 100...200W
- Dimensions: 110x80x15...216x80x15mm
- Resistance range: 12...200Ω
- Tolerance: $\pm 1\%$... $\pm 10\%$



ZDFL Series

Cement Coated Wire Wound Resistors with Two or More Lugs

- Power rating: 6...65W
- Dimensions: 9x45...21x120mm
- Resistance range: 39...160kΩ
- Tolerance: $\pm 5\%$... $\pm 10\%$



AVX Multilayer Varistors



AVX varistors are ideal choice for circuit protection thanks to wide range of components from low capacitance varistors for high speed data lines or RF circuits up to high energy varistors. AVX varistors are also ideal choice for circuit protection thanks to wide range of components from low capacitance varistors for high speed data lines or RF circuits up to high energy varistors.

AVX TransGuard® Multilayer Varistors with unique high-energy multilayer construction represent state-of-the-art overvoltage circuit protection from voltage transients caused by:

- ESD (e.g. IEC 61000-4-2)
- Inductive or digital switching
- Harsh environment transients
- Connection to power source or interface
- Automotive related transients (AEC-Q200 qualified series)

AVX surface mount varistors are available in single element 0201 to 3220 case size or multiple element 0405, 0508 and 0612 arrays. Thru-hole components are supplied as conformally epoxy coated axial and radial devices.

Electrical advantages include bi-directional transient voltage protection, EMI filter response in the off-state, fast turn on time and repetitive strike capability. A single MLV takes the place of a back-to-back diode plus an EMC capacitor, thereby saving up to 90% of the board space.

Applications

- Automotive (AEC-Q200)
- Consumer
- Commercial
- Home appliances
- Automation
- Lighting
- Industrial/Professional
- Renewable/Smart Energy

Features & Benefits

- Bi-directional transient voltage protection
- EMI Filtering in the off-state
- Very fast response ($< 1\text{ns}$)
- Multiple strikes capability
- High reliability
- No derating over operating temperature range
- RoHS Compliant
- High peak current and high energy series
- Low capacitance parts for RF, high speed data lines and capacitance sensitive applications
- Low leakage components for battery operated or leakage sensitive devices
- AEC-Q200 qualified automotive series

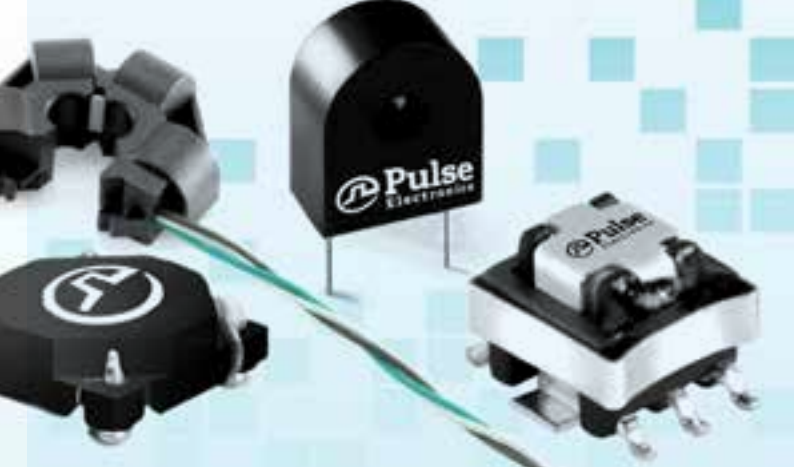
Electrical Characteristics

- Working Voltage: 3.0 - 385V_{DC}
- Peak Current: up to 3000A
- Energy Rating: up to 15J
- Leakage Current: from 0.01μA
- Capacitance: 0.47pF - 30000pF (0.47μF and 1.0 μF for CapGuard)

Case Sizes

- SMT: 0201 - 3220 EIA
- SMT Array:
 - 0405 2x Array
 - 0508 2x Array
 - 0612 4x Array
- Leaded: Axial and Radial





SMT Current Sense Transformer

PA1005.XXXQNL Series



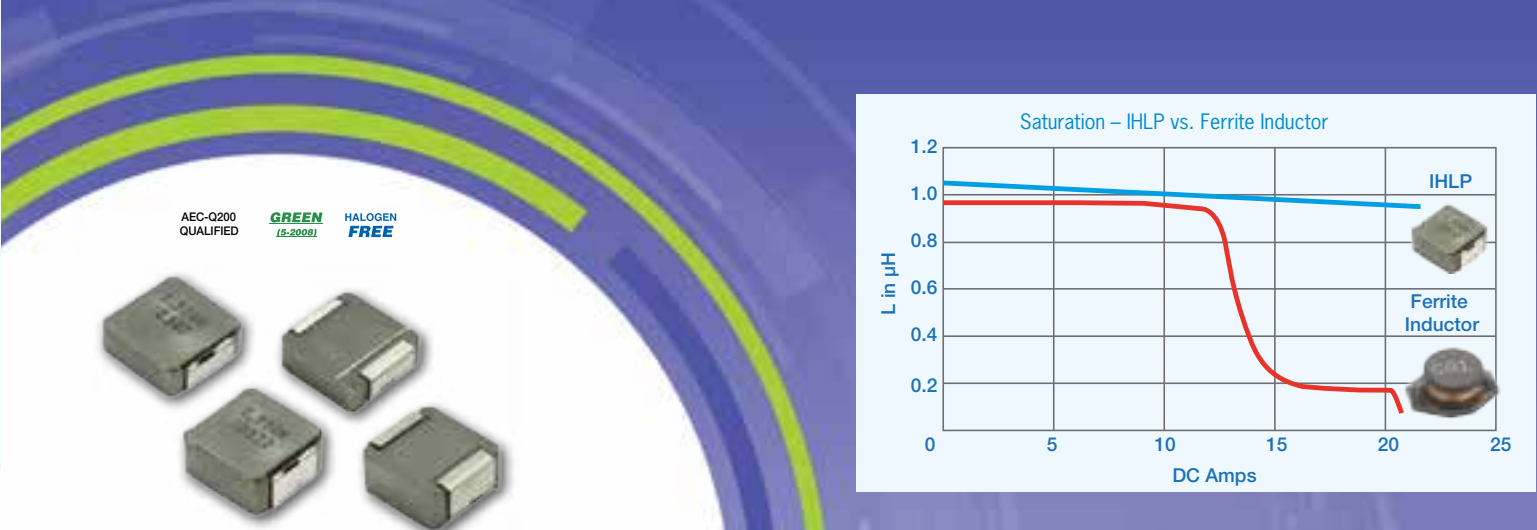
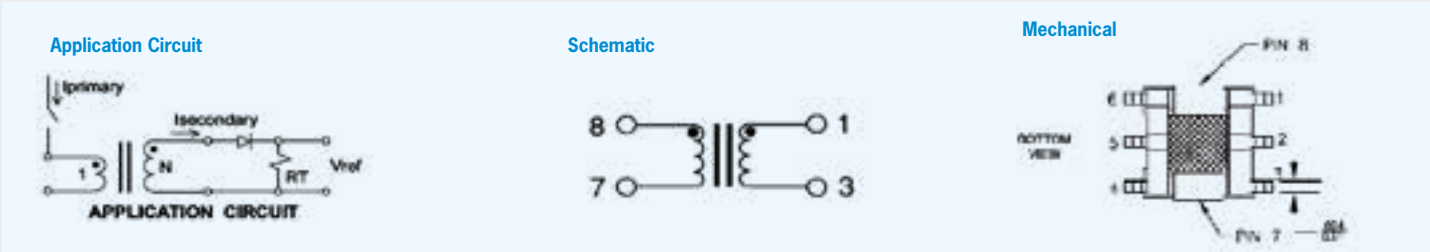
Our surface mount and through hole current sense magnetics are excellent solutions for low-cost regulation of switch mode power supplies. RoHS compliant and available with both reinforced and functional safety levels, our current sensing products are ideal for Smart Grid and other applications focused on energy management. View our current sensing products, request a custom design or view our Sidewinder® products for AC current sensing applications.

- Features**
 - AEC-Q200 qualified
 - Height: 5.5mm max
 - Footprint: 8.4mm x 7.2mm max
 - Current Rating: up to 20A
 - Frequency Range: 50kHz to 1MHz
- Applications**

Current sensors serve one specific purpose – to detect alternating current (AC) or direct current (DC) in a wire in order to generate a proportional signal. Current sensing is especially critical for power metering applications. The technology behind current sensors (more specifically current sense transformers) comes in various forms

 - Low resistance current shunts
 - Current transformers with amorphous metal core
 - Hall Effect devices
 - Rogowski Coils
 - ➔ Sidewinder products

Electrical Specifications @ 25°C – Operating Temperature -40°C to +125°C						
Part Number	Turns Ratio	Current Rating (A)	Secondary Inductance (mH MIN)	DCR (mΩ Max)		Hipot (V _{RMS})
				Primary (8-7)	Secondary (1-3)	
PA1005.020QNL	1:20	20	0.08	0.75	550	900
PA1005.030QNL	1:30	20	0.18	0.75	870	900
PA1005.040QNL	1:40	20	0.32	0.75	1140	900
PA1005.050QNL	1:50	20	0.50	0.75	1500	900
PA1005.060QNL	1:60	20	0.72	0.75	2250	900
PA1005.070QNL	1:70	20	0.98	0.75	4750	900
PA1005.100QNL	1:100	20	2.00	0.75	5500	900
PA1005.125QNL	1:125	20	3.00	0.75	6500	900
PA1005.150QNL	1:150	20	4.32	0.75	9000	900



Power Inductors

Offer High Temperature and High Current for the Best Power Solutions

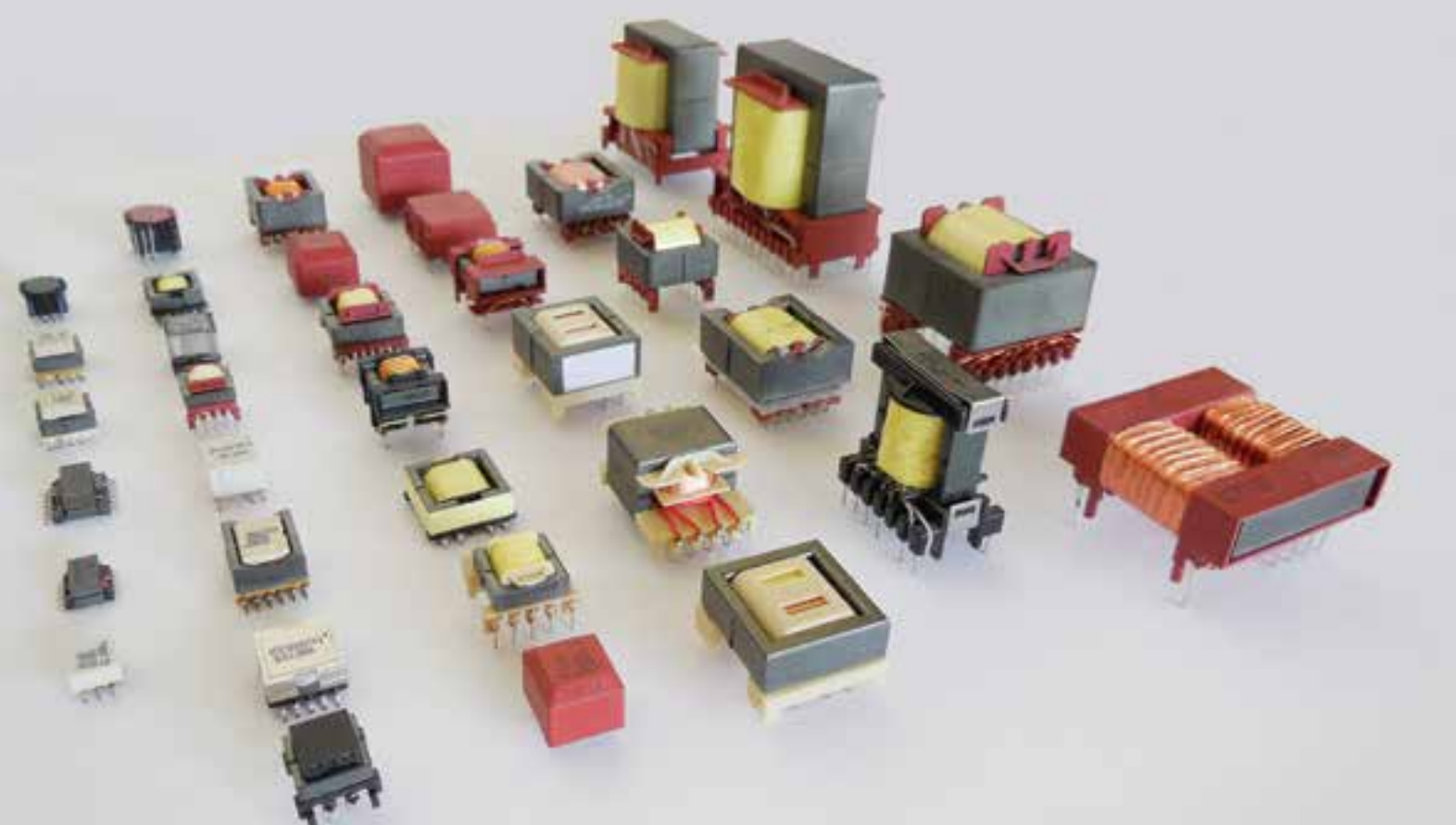


The IHLP® inductor is different from most inductors. The inductor body is a soft magnetic composite (SMC), not a ferrite. It is made from an iron powder mixture and cemented together using a resin binder. This powder mixture, when pressed around the inductor coil, greatly enhances the electrical properties of the inductor and gives protection from environmental forces. After pressing, the component is cured in an oven to increase the bonding strength of the resin binders with the iron powder, yielding excellent electrical and physical properties.

Type	Inductance min. (μH)	Inductance max. (μH)	DCR min. (mΩ)	DCR max. (mΩ)	Rated Current min. (A)	Rated Current max. (A)	Size in mm
IHLP-01 series	0.047	22	0.75	129	1.9	80	1616 to 6767
	Power inductor case sizes 1616 through 6767; original series; best saturation, lowest core loss						
IHLP-A1 series	0.047	22	0.75	129	1.9	80	1616 to 6767
	Power inductor case sizes 1616 through 6767; automotive version of the standard -01 series						
IHLP-11 series	0.1	100	0.67	270	1.7	55	1212 to 6767
	Power inductor case sizes 1212 through 6767; medium permeability series; low DCR						
IHLP-1A series	0.1	100	0.67	270	1.7	55	1616 to 6767
	Power inductor case sizes 1616 through 6767; automotive version of the standard -11 series						
IHLP-51 series	0.47	100	0.67	174	1.2	80	1616 to 8787
	Power inductor case sizes 1616 through 8787; high temperature series						
IHLP-5A series	0.47	100	0.67	174	1.2	80	1616 to 8787
	Power inductor case sizes 1616 through 8787; automotive version of the standard -51 series						

- Benefits**
 - High power
 - Low profile
 - Customized options available
 - Using low-profile IHLP® inductors in your automotive applications helps you to go green
- Applications**
 - Automotive
 - DC/DC converters
 - Filters for noise suppression
 - DC/DC converters
 - Power supplies for computers, notebooks, graphic cards, servers
 - Class “D” amplifiers
 - LCD TVs and portable MP3 speakers
 - LED driver power
 - Commercial LED lighting
 - LCD display backlights





SUMIDA Transformers – Solutions for Every Application



SUMIDA is a well-known supplier of transformers, based on a large bandwidth of technologies. Within our product program, we offer standard types as well as custom solutions – designed and manufactured with the highest level of quality for automotive, industrial, medical and consumer applications.

Benefits

- Compact component sizes
- Power range up to 20kW
- Low losses / high efficiency
- High frequencies
- For automotive, industrial, medical and consumer applications
- Production capabilities in Europe and Asia
- Innovative and cost effective solutions (DTC approach)
- Rapid prototyping of new, customized core and bobbin geometries

Applications

- Power transformers for Switch Mode Power Supplies e.g. flyback, forward, push-pull, resonant, half-bridge, full-bridge converters
- IGBT / gate driver transformers
- Current Transformers

Versions

- Horizontal / vertical designs
- Toroid / E- / U- and other core shapes (also customized)
- SMD / THD or customized solutions
- Potted / varnished versions if needed
- Component designs based on:
 - Multiple chamber bobbins
 - Layer winding (with/without potting)
 - Triple Insulated Wires (TIW)

Special Features

- According to international safety standards (e.g. IEC, VDE, UL)
- Insulation systems on request
- Wide selection of ferrite, amorphous- and iron-powder materials
- Components designs based on:
 - existing standard core and bobbin form factors
 - new special core and bobbin form factors
 - customized (application-specific) requirements
- Flexible pinning
- Extensive test and qualification capabilities e.g. temperature, shock, vibration AEC-Q200 etc.

G9EN Family

New DC Power Relay designs benefit Fork Lift Manufacturers



DC Power Relay development has seen very rapid development as new eco-applications like electric vehicles, solar panels and wind turbines have expanded the market. Designers of more traditional applications like fork lift trucks are able to benefit and are offered relays that are smaller, lighter and more efficient. Typical of the new DC power relay designs that are emerging is the Omron G9EN which uses proprietary sealing technologies and new magnetic control methods. The G9EN is the latest in Omron's family of DC power relays, which also includes the G9EA, EB, EC and ED.

Features

- Available with voltage ratings of 12V, 24V, 48V, 80V, 100V and 400V_{DC}
- Can switch 25A, 80A or 125A depending on the model
- Use a gas-filled construction with magnets to control the arc to reduce size
- Have overall dimensions of 28x64x50mm

Benefits

- Enables DC load interruption at high voltage and current up to 60A at 400V_{DC}
- Is a class leader in size (28x64x50mm) and weight (140g)
- Features a non-polarized contact circuit to simplify the wiring and reduce errors

For the charge circuit, the very high in-rush currents on start-up can be an issue and a pre-charge circuit is often included to charge capacitors in the controller and inverter through a current limiting resistor.

Omron has developed a relay, the G9EJ-1, specifically to switch in this circuit. It is a cost-effective solution that can support up to 150A at 400V_{DC} capacitive short time carry current (1min).

Other Omron relay solutions worth considering for a fork lift truck motor charging units include the G7L and the G7J. These high capacity, high dielectric strength relays operate with no contact chattering for momentary voltage drops of up to 50% of the rated voltage.





SMD & Copper Heatsinks For eMobility Applications



Suitable applications are the cooling of SMD components on PCB's which are included in nearly all kinds of electronic components. Both, the SMD component and the tin plated copper heat sink, are soldered by reflow-soldering-process on the PCB within one production step. Due to this kind of assembly process a manual fixation of the semiconductor on or with the heat sink by screw, clip or gluing is not necessary anymore.

D-PAK semiconductor packages in eMobility application like MO-184, SO-10, TO-252, TO-263 do not get into direct contact with the heat sinks. This process of cooling is called indirect cooling system. The heat will be transferred from the SMD component through a copper drain pad to the heat sink for dissipation. The operating range of thermal resistance for those SMD heat sinks is between 24K/W and 11K/W.

The geometry and the copper material C1100 gives the reasons for this R_{th} – values. This series is only used as tin plated version with a material thickness of 0,6mm. All SMD parts are available in bulk or in tape & reel packing for manual, semi- or full automatic assembly processes.

Product Range for SMD- and Copper Heatsinks

- Heatsinks for D-PAK, MO-184, SO-10, TO-252, TO-263 packages
- Tinned surface finish
- Bulk or tape and reel packing

Features of SMD and Copper Heatsinks

- Mounting of heatsinks by re-flow soldering
- Copper material C1100 (389W/m*K)
- Thermal resistance from 24K/W down to 11K/W
- Soldering surface
- Material thickness 0.6mm
- Customized shape possible

Applications for Large Extruded Profiles

- eMobility
- Industrial
- PCB with SMD devices
- Telecommunication
- Network



Connectors for Electric Vehicles



KW1 Series

Along with the increase in environmental consciousness, electric vehicles that do not emit CO₂ while driving have been strongly entering the market since 2010, and they are expected to continue increasing in popularity.

The "KW1 Series" connector, which is compliant with the JEVS G 105 (1993) standard used for the CHAdeMO quick charger protocol is originated in Japan and is being promoted as a global standard. CHAdeMO protocol chargers were first introduced in Japan but their implementation is also picking-up speed overseas, such as in Europe and the United States. JAE has now received the UL and cUL certification for the KW1 Series with the aim of expanding into the US market. The KW1 Series passed all the tests and its superior reliability has been proven.

Electrical Characteristics

- Current Rating: 125A for power, 2A for signal
- No. of contacts: 2 pos. for power, 7 pos. for signal
- Operating temperature: - 30°C to +50°C
- DC Voltage Rating: 500V
- Durability: more than 10,000 times

Features & Benefits

- Short time charge in public (DC 500V: 15-30min for 80%)
- Intuitive and easy operability
- Designed for safety with usage by everyday people in mind
- Easy maintenance
- Durable and highly weather resistant
- High reliability and safety

Applications

- Quick Charger for Electric Vehicles (CHAdeMO Protocol)

KW02 V2H Series

A crucial element for a switch to renewables, V2X technology enables using EVs as both vehicle and portable batteries.

With V2X devices, EVs can store Energy from home PV panels to use later or feed to the grid and help balance the energy supply, all the while providing financial benefits to the EV owner. Currently, CHAdeMo EVs are the only mass-produced and marketed cars capable of V2X.

Electrical Characteristics

- Current Rating: 125A for power, 2A for signal
- No. of contacts: 2 pos. for power, 7 pos. for signal
- Operating temperature: - 30°C to +50°C
- DC Voltage Rating: 500V
- Durability: more than 10,000 times

Features & Benefits

- User friendly
 - One-action operation allows easy usage
 - User friendly shape allows good operability for users
- High reliability
 - High reliability stainless steel used in latch
 - Protect the inside of products by design of operating part
 - Maintain lock status even after loss of power by self-holding solenoid

Applications

- Charger for Electric Vehicles / Connector with Lead Cable for V2H (Vehicle to Home) / V2X (Vehicle to Environment)



KW1 Series



KW02 V2H Series





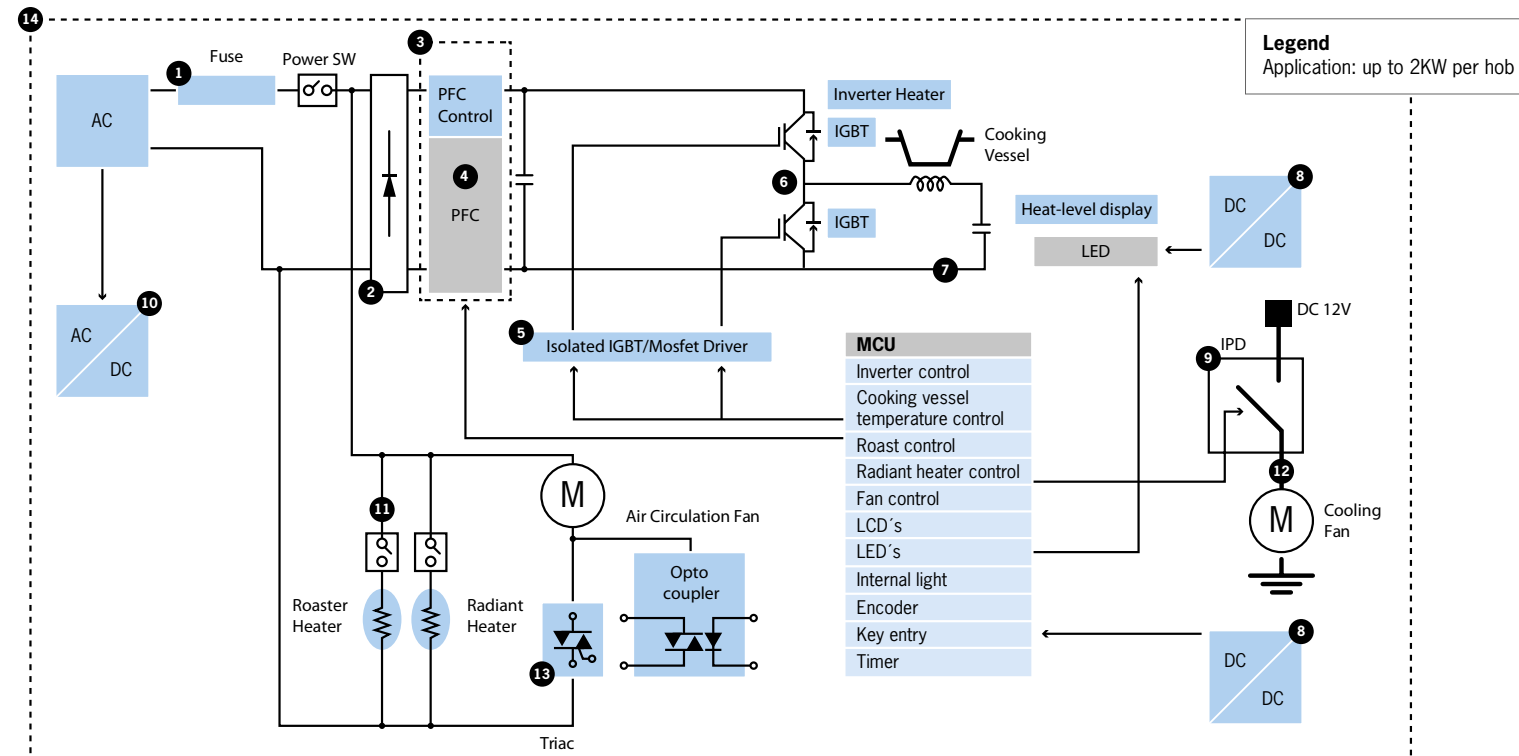
Selection Guide

No	Type	Diodes	Infineon	Littelfuse	Recom	Rohm	STMicro-electronics	Vishay
2	Rectifier (Bridge)							
3	Diode	X	X			X	X	
4	IGBT and PFC Module							
5	Rectifier	X		X			X	X
6	MOSFet		X			X	X	X
8	Gate Driver (Isolated)		X			X	X	
9	IGBT		X				X	
10	DC/DC Converter Module				X			
11	LDO	X	X			X	X	
12	Regulator (Boost)	X				X	X	
13	Regulator (Buck)	X				X	X	
14	Regulator (Buck-Boost)	X				X		
15	MOSFet (Protected)	X	X			X	X	
16	Slew Rate Controlled Load Switch	X						
17	AC/DC Converter		X			X	X	
18	AC/DC Converter Module				X			
19	Rectifier	X		X			X	X
20	Triac		X				X	
21	Diode (Protection)	X	X	X		X	X	X
22	Diode (Schottky)	X		X		X	X	X

No	Type	AVX	KEKO Varicon	Littelfuse	KRAH	Murata	Pulse	Rubycon	Sumida	Vishay	WIMA
1	Varistor	X	X	X							
2	Capacitor (Foil)	X	X	X							
3	Capacitor (Electrolyte)							X			
4	Capacitor (Foil)									X	X
5	Inductors					X	X		X	X	
6	Varistor	X	X	X							
7	Resistor	X	X	X						X	
8	Capacitor (Foil)									X	X
9	Capacitor (Electrolyte)							X			
10	Capacitor (Foil)									X	X
11	Varistor	X	X	X							
12	Capacitor (Electrolyte)			X				X			
13	Capacitor (Foil)									X	X
14	Resistor	X	X	X							
15	Capacitor (Foil)				X						

No	Type	ASSMANN WSW	AVX	Littelfuse	Omron
1	Fuse			X	
2	Heatsink (Extruded profile)	X			
3	Heatsink (Extruded profile)	X			
4	Heatsink	X			
5	Heatsink (SMD and copper)	X			
6	Heatsinks (Extruded in standard length)	X			
7	Heatsink (Cross cut CPU)	X			
8	Heatsink (Stamped CPU)	X			
9	Heatsinks (Round pin fin CPU)	X			
10	Connector		X		
11	Heatsinks (Attachable)	X			
12	Heatsink (Extruded profile with solder pins)	X			
13	Heatsink (Extruded profile)	X			
14	Connector		X		
15	Heatsinks (Attachable)	X			
16	Relay				X
17	Connector		X		

Embedded	No	Type	FSP
	14	Power Supply	X





1-10W LOW POWER AC/DC POWER MODULES

Compact modules with very low standby power consumption and household certification



Compact AC/DC Modules

with Very Low no Load Power for Standby Circuits in Household Appliances



Home appliances such as induction hobs traditionally were designed with one large AC/DC power supply which have notoriously terrible efficiency at low loads. ERP and Energy Star regulations have made such designs a thing of the past. Standby circuits now should be driven by secondary, low power AC/DC converters. RECOM has met the market demand for ultra-low power in a highly efficient compact module that can easily be dropped into any design. RECOM's low power AC/DC converter, along with a simple relay to a standby circuit can drastically reduce the amount of energy a device consumes in standby mode.

The RAC series is a compact and highly efficient modular solution that offers a wide range of output power options from 1 to 10 watts. These AC/DC modules feature outstanding efficiencies as high as 86% are short circuit protected and offer up to 3kV_{AC} isolation voltage. There are two different input voltage versions available for most types: a standard 80-264V_{AC} input or a wider input voltage range of 80-305V_{AC} to power devices such as smart meters, cameras, high bay lights, etc. directly from the US 277V_{AC} line.

The series offer output voltages ranging from 3.3V_{DC} to 24V_{DC}, and for the 4W to 10W series ± 5 , ± 12 and ± 15 V_{DC} dual outputs are also available. All series are CE, EN and UL certified and come with a 3 year warranty.

- Features:**

 - Universal AC/DC input voltage up to 305V_{AC}
 - Regulated outputs
 - Low output ripple & noise
 - Operating temperature up to 85°C
 - Short circuit, overload and overvoltage protection
 - Ultra compact packages
 - Optional flying wires
 - Standard Isolation up to 3kV_{DC}
 - 60335-1 certification
 - Integrated class B filter
 - RoHS compliant with CE and UL approvals
 - 3 year warranty
- Applications:**

 - Energy efficient products for Energy Star systems
 - Industrial controls
 - Board level power supply
 - Remotely controlled and automated systems
 - Test and measurement systems
 - Audio-visual and lighting designs
 - Stand-by power for household appliances
 - Power supplies for panel mounting within enclosures
 - Instrument amplifiers
 - Test and measure instrument equipment



AC/DC Adapter & Desktop Adapters

Power Supply – the Heart of the System



Even when the PSU shouldn't be integrated into the system itself, an AC/DC adapter is recommended. So the variety of possible applications is huge, same as our adapter provided by FSP Group. In our daily life we can find external AC/DC power supplies everywhere e.g. for mobile phones, tablets or even notebooks.

Also a lot of medical devices are getting their power from AC/DC adapters. FSPs AC/DC adapter wide range portfolio offers high efficiency, high altitude and slim size for special applications and medical applications as well.

Features

- Wattage: 5W – 400W
- Output DC Voltages: 5V – 54V
- Medical versions available

Typical Applications

Systems without an integrated PSU and a demand for more than 24V:

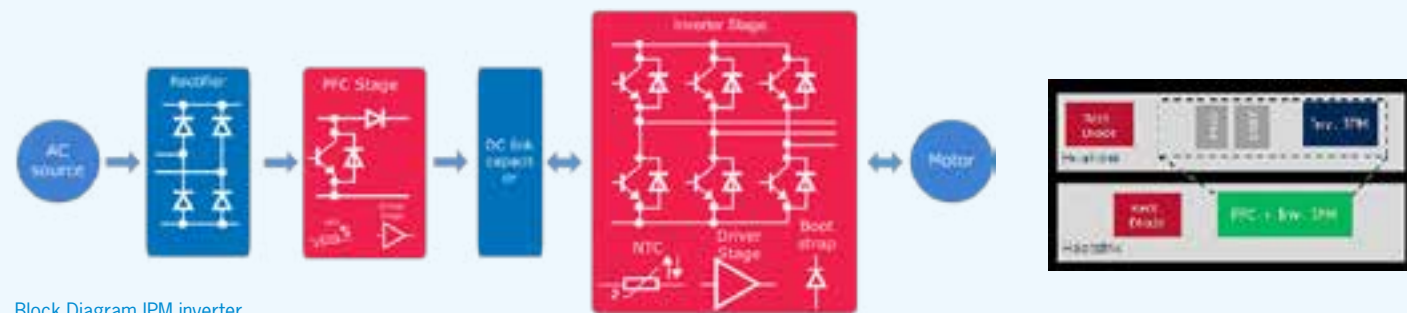
- Notebooks
- Medical Devices
- POS/POI
- Digital Signage
- Thermal Printers

- AC Inlet C6, C8 and C14 available
- Multiple output available
- I/O Switch available for some products
- DC plug and cable length can be modified customized voltage modification possible

Adapters

Type	USB	5V	6V	9V	12V	13V	13.5V	15V	18V	19V	19.5V	20V	24V	27V	28V	30V	36V	48V	54V	PoE
5W	X	X																		
10W	X	X			X					X			X							
12W					X															
15W		X			X															
18W					X															
20W		X																		
24W					X															
25W		X		X	X					X			X					X		
30W				X	X					X			X					X		
35W					X															X
36W					X															
40W				X	X					X		X	X					X		
45W										X			X							
50W					X								X					X		
60W					X					X			X							
65W										X		X						X	X	
70W																				
75W					X					X		X	X							
80W																				
84W					X															
85W																				
90W					X					X		X	X					X	X	
96W					X															
100W													X							
105W								X												
120W					X	X			X	X	X	X	X			X	X	X	X	
135W										X			X							
150W					X					X	X		X							
180W					X				X	X			X					X		
200W																				
220W										X			X					X		
250W													X							

X: industrial and medical safety



Block Diagram IPM inverter



Infineon's Intelligent Power Modules (IPM)



Intelligent Power Modules designed by Infineon represent a functional product family that is dedicated to useful integration of electronics into power modules. Depending on the level of integration and power to be handled, Infineon offers a wide variety of semiconductors in different packages, voltage and current classes, and integrations. These Semiconductor products are separated in CIPOS™ Nano, CIPOS™ Micro, CIPOS™ Mini, CIPOS™ Mini-DCB and MIPAQ™ module families (from lowest to highest power capability).

All these families are highly integrated, compact power modules designed to drive motors in applications ranging from home appliances to fans, pumps and general purpose drives. These energy-efficient intelligent power modules integrate latest power semiconductor and control ICs technology leveraging Infineon's advanced IGBTs, MOSFETs, next-generation gate driver ICs and state-of-the-art thermo-mechanical technology. In today's competitive, dynamic environment, there is constant pressure to find new ways to increase energy efficiency. At the same time, software's increasingly important role in systems directly contributes to their complexity – and increases costs. iMOTION™ platform, including controller and coming soon more integrated functions, offers complete inverter system that reduce design complexity and system cost, to overcome design challenges.

NEW

CIPOS™ Mini PFC Integrated Inverter IPM

With the CIPOS™ Mini PFC integrated inverter Infineon offers an IPM with Power Factor Control + Inverter in one package for 2kW power rating. It integrates various power and control components to provide customers with high reliability optimize PCB size and cost leadership.

Due to DCB substrate the CIPOS™ Mini PFC + Inverter offers excellent thermal performance. Electrical appliances must comply with IEC61000.3-2 which limits harmonic current emissions.

Features:

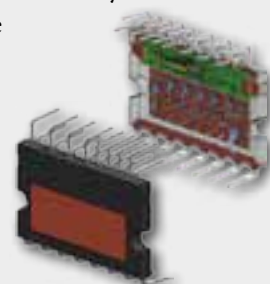
- TRENCHSTOP™ IGBTs
- Dual-in-line molded module with full pack and DCB substrate
- PFC + inverter in one package
- Power capability: 2kW
- Various PFC switching available : 20kHz or 40kHz
- PFC topology: single switch boost
- Rugged SOI gate driver technology with stability against transient and negative voltage
- Integrated bootstrap functionality
- Over current shutdown
- Temperature monitor
- Under-voltage lockout at all channels
- Low side common emitter

Key Benefits

- System size reduction with PFC integration into inverter module
- Cost down due to less BOM counts and less assembly cost
- Smaller and cheaper heatsink
- Possibility to design switching performance of PFC IGBT by using external driver circuit

Target Applications

Refrigerators, washing machine, residential air-conditioners and other home appliances; Low power motor drives.



Integration of various power and control components provide customers with high reliability, optimize PCB size and cost leadership:

Product Name	Converter Section			Inverter Section			Power Capability [kW]	PKG Type
	V _{CEs} [V]	I _L max. [A]	f _{PWM(PFC)} typ. [kHz]	V _{CEs} [V]	I _C [A]	f _{PWM} max. [kHz]		
IFCM04P60GA	650	TBD	TBD	600	-4/+4	20	(0.5)	Fullpack
IFCM06P60GA	650	TBD	TBD	600	-6/+6	20	(0.8)	Fullpack
IFCM10S60GD	650	(30)	(20)	600	-10/+10	20	(1.2)	DCB
IFCM10P60GD	650	(30)	(40)	600	-10/+10	20	(1.2)	DCB
IFCM15S60GD	650	(30)	(20)	600	-15/+15	20	(2)	DCB
IFCM15P60GD	650	(30)	(40)	600	-15/+15	20	(2)	DCB

* Note : () = preliminary data only

SLLIMM™ 2nd Series

Small Low-Loss Intelligent Molded Module



IGBT Intelligent Power Module: Compact and high-perform. AC motor drive for simple and rugged designs up to 3kW

The SLLIMM 2nd series is ST's new family of compact, high efficiency, dual-in-line intelligent power modules, with optional extra features. This family is designed using a new internal configuration with two gate drivers, one high-side driver and one low-side driver as well as an improved trench gate fieldstop IGBT. The best compromise between conduction and switching energy with an outstanding robustness and EMI behavior makes the new series ideal to enhance the efficiency of compressor, pumps, fans and motor drives working up to 20kHz in hard-switching circuitries and for applications with a power range from 300W to 3kW.

Key Features

- 600V_{DC} rating from 8A to 35A at 25°C
- Low V_{CE(sat)}
- Optimized driver and silicon for low EMI
- Lowest R_{th} value on the market for the DBC package versions
- Internal bootstrap diode
- 175°C max. operating junction temperature
- Separate open emitter outputs
- NTC on board
- Integrated temp. sensor on low-side driver
- Comparator for fault protection
- Shutdown input/fault output
- Isolation rating of 1500V_{RMS}/min

Key Benefits

- Easy to drive through microcontroller
- 175°C maximum junction temperature for higher robustness and reliability

Key Applications

- Industrial motor drives
- 3-phase inverter for motor drives up to 3kW
- Home appliances

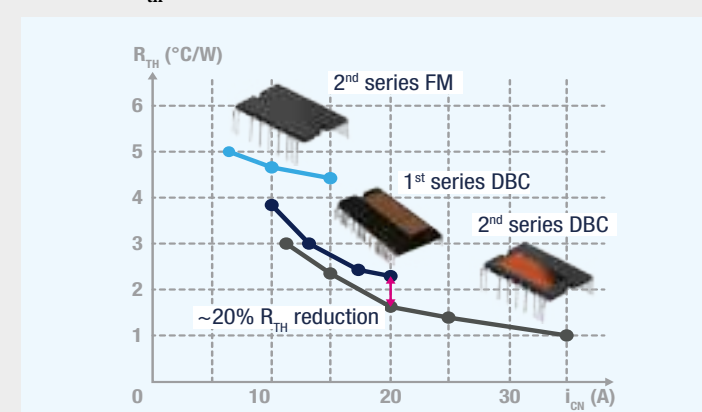
Package	Part Number	I _{on} (A) @ 25 °C @ 80 °C	Voltage (V)	V _{CE(sat)} (V) at I _{on} 25 °C (80 °C)	R _{thJA} (max) (°C/W)	Min Viso (V)	Max T _J (°C)
SDIP2F-26L	STGIF5CH60TS-L(E)	8 (5)	600	1.7 (1.5)	5.0	1500	175
	STGIF7CH60TS-L(E)	10 (7)			4.8		
	STGIF10CH60TS-L(E)	15 (10)			4.6		
SDIP2B-26L	STGIB8CH60TS-L(E)	12 (8)			3.0		
	STGIB10CH60TS-L(E)	15 (10)			2.26		
	STGIB15CH60TS-L(E)	20 (15)			1.85		
	STGIB20M60TS-L(E)	25 (20)			1.4		
	STGIB30M60TS-L(E)	35 (30)			1.2		

Temp. sensing/protection: T= NTC on board S= Temperature sensing

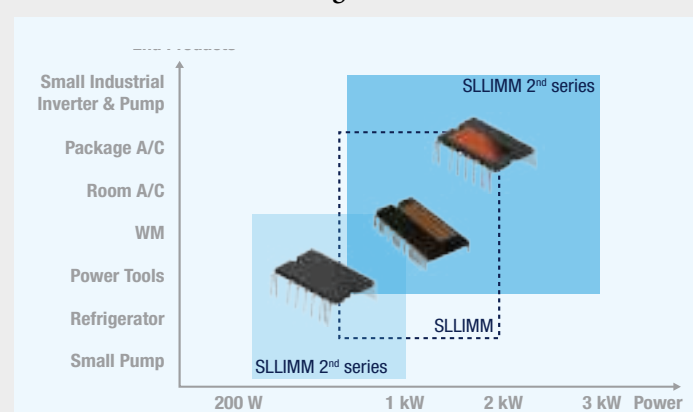
Package and leads finish options: F= Full molded B= DBC (direct bond copper)

E= Short leads and emitter forward L= Long leads

SLLIMM R_{th}



SLLIMM Series: Positioning





KEKOVARICON

Varistors – Specialist in Overvoltage Protection

A tradition of more than 50 years in the production of passive components has given Keko Varicon abundant experience and a large scale of knowledge needed by a high quality manufacturer in branches such as the telecommunications, AC lines and PCB board. All these have helped to make KEKO VARICON become a world-known and top of the art manufacturer in this sector. Household appliances, telecommunications, milking machines, alarm systems. High quality and relatively inexpensive varistors provide best protection against overvoltage surges for sophisticated equipment. Our products protect high end medical equipment, entertainment and consumer electronics, power supplies, energy meters, etc.

SV Series Lead Style Epoxy Coated Square or Rectangular Shaped Varistors

- Full custom parameter designed medium voltage varistors
- AC voltage range from 60V to 550V
- Peak single pulse surge current up to 15kA



CV Series Transient Surge Suppressors, Disc Shaped Varistors

- It requires little mounting space due to radial lead construction



CV+ Series Extended Version of CV Disc Shaped Varistors

- High current and energy capabilities



PV Series of Low & Medium Voltage Plastic – Encapsulated Varistors

- SMD Equivalent to leaded disc varistors
- Non-flammable thermoplastic encapsulation



DV Series of Medium Voltage Varistors

- SMD with very low profile



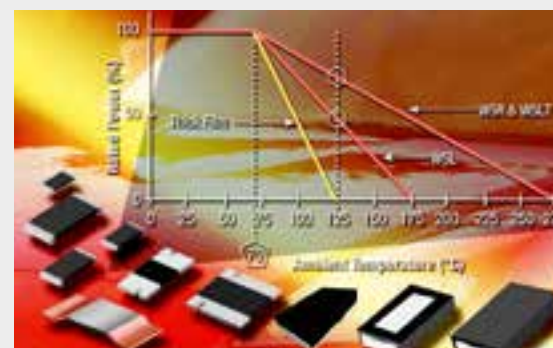
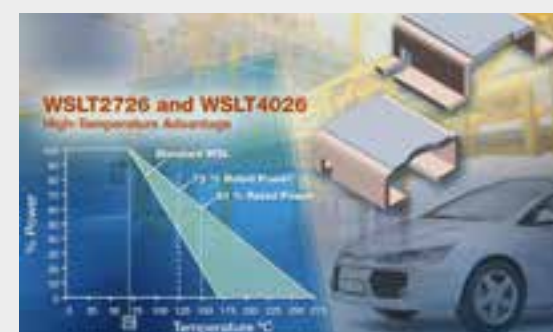
Series WSLT Power Metal Strip® Surface-Mount Resistors



Vishay's Power Metal Strip® current sensing resistors combine superior performance in high-temperature applications with a wide range of package sizes and a choice of resistance values from 0.0002Ω to 1Ω. These state-of-the-art products deliver overload capabilities equivalent to wirewound devices and temperature coefficients as low as 20ppm/°C. Current sensing Power Metal Strip® resistors allow control circuitry to monitor the level of current in a circuit by translating current into a voltage that can be monitored easily. The devices work by resisting the current flow in a circuit to a calibrated level, thus allowing a voltage drop to be detected and monitored by control circuitry. The low resistance values of Power Metal Strip® resistors allow this function to be carried out with exceptional efficiency.

Key Benefits

- Wide range of package sizes (0603 to 5931)
- Wide resistance range (0.2mΩ to 1Ω)
- High-temperature performance (up to 275°C)
- Tight tolerances (down to ±0.1 %)
- Low temperature coefficients (down to ±20ppm/°C)
- Excellent overload capability (equivalent to wirewound)
- Automotive Grade qualified



Applications

Automotive

- Engine controls
- Anti-lock brakes
- Airbag
- Traction controls
- Multimedia
- Climate controls
- Electronic power steering
- Electric/hybrid vehicles

Industrial

- Power supplies
- Power tools
- Bar code scanners
- HVAC
- Other current detection

Medical and Instrumentation

- Monitoring systems
- Defibrillators
- Implantables
- Electronic scales
- Diagnostic equipment

Consumer Goods

- Home electronics
- White goods
- Gaming systems
- Lighting controls
- Video cameras
- Television

Telecom

- Cell phones
- Modems
- Pagers
- Base stations
- Bluetooth
- Switching circuits

Computer

- DC/DC converter
- Disk drives
- Power supplies
- Graphic cards
- PCMCIA
- Li-Ion battery management





SUMIDA Power Inductors – Solutions for Every Application



SUMIDA offers a wide range of power inductors in many different technologies for automotive, industrial, medical and consumer applications. The product spectrum covers standard types as well as custom solutions – designed and manufactured on a highest quality level.

Benefits

- Compact solutions
- Covering wide operational temperature range
- Low losses / high efficiency
- High frequencies und high current types
- Cost effective production set-up

Versions

- Ferrite and metal composite versions
- Shielded or non-shielded types
- Horizontal / vertical / low-profile types
- SMD / Pin-Type customized solutions
- Flat wire versions for high-current applications
- Low leakage-inductance types

Special Features

- According to international safety standards
- Wide range of AEC-Q200 products
- Operating temperature up to 150°C
- Insulation systems on request
- Customized component geometries possible
- Large selection of standard component families

Applications

- DC/DC converters (Step-up / Step-down converters)
- POL power supplies
- EMI filter applications
- Input & output chokes
- Used in automotive, industrial, medical and consumer applications (e.g. LED head lights, ECUs, etc.)



New Relays Address Size & Cost Pressures



Switching relays are still central to induction and other electric hob design, providing the primary means of controlling the power to rings, hot plates and heating elements. Design of this key component needs to fully keep pace with the increasingly demanding regulations covering these appliances. For example, the 5th edition of IEC 60335-1 has now been published. At the same time, relay manufacturers need to recognise the numerous and conflicting pressures facing designers. They need to minimise the cost of the appliance and reduce size to create elegant products in ever smaller homes. Energy efficiency is also a constant demand.

G5NB-EL-HA

Omron has introduced new relay designs that are ideal for power switching in induction hobs. Latest addition is the G5NB-EL, one of the smallest PCB power relays in its class facilitating a size reduction. The relay benefits from the latest contact design and materials, leading to a long electrical life of 200,000 operations.

Features

- Able to switch 7A at 250V_{AC}
- Conformant to IEC 60335-1
- Just 7mm thick and 20.5mm deep x 15.3mm high
- Long electrical life

G2RL & G2RL-CV-HA

For the highest current loads, the G2RL and G2RL-CV-HA are recommended. This relay family includes a wide range of options including single and double pole versions.

Features

- Supports loads up to 16A at 250VAC
- Conformant to IEC 60335-1, EN61810, UL508 and CA22.2
- 12.7x29x15.7mm
- Supports ambient temperatures of up to 105°C (-CV, -HA)
- High sensitivity version with a coil current of 250mW (rated at 10A)

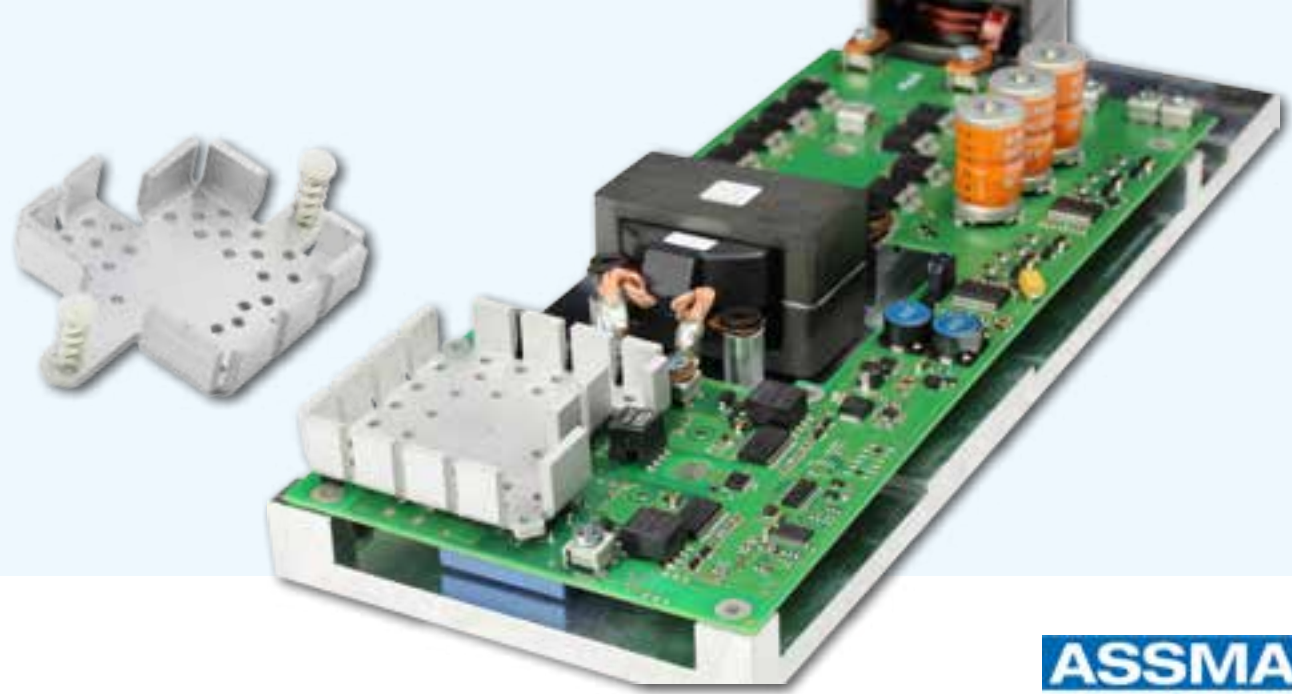
G5Q-EL-HA

The G5Q is a further option and is an attractive alternative to sugar cube relays. It is a compact single-pole relay offering a higher load carrying capacity than the G5NB, but a smaller size than the G2RL.

Features

- Handles loads of up to 10A
- Rated at up to 105°C
- Just 10mm thick and 20.3mm long by 15.8mm
- Low coil current of 200mW (SPST-NO)





ASSMANN
WSW components

Stamped CPU Heatsinks

ASSMANN WSW components with the experience of more than 45 years in thermal management offers an alternative design to the ordinary extruded cross cut heatsinks for home appliance applications.

Stamped CPU Heatsinks

The newly designed “STAMPED CPU Heatsinks” are developed to improve the features for traditional passive cooling systems, because an overheating of the components which are included in home appliance applications will cause a shorter life time or, in the worst case, a break down of the total device.

Having a smaller surface than the traditional CROSS CUT heatsinks, the STAMPED CPU heat sinks bring equal or even better thermal energy flow in a passive cooling system. For traditional CPU heat sinks, inner cooling fins generate heat accumulation which results to less air flow based on heat radiation. The design of STAMPED heat sinks creates an improvement of air convection to optimize the exchange of heat with the ambient air.

Standard Product Range

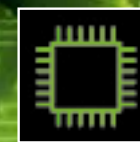
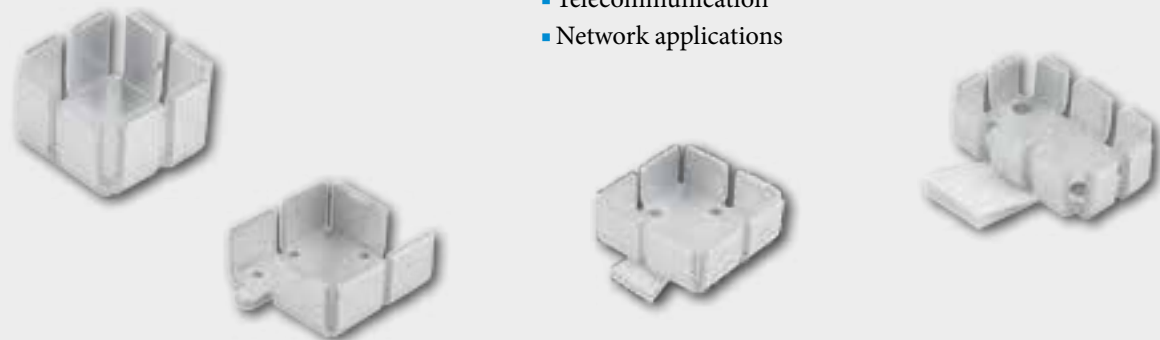
- Different standard sizes available
- Already with or without mounted foil and solder pins
- Material AL1050

Features & Benefits

- Customized material thickness
- Alternative material alloy
- Modifications of dimensions
- Customized hole pattern, cut outs and perforations
- Special surface finish and packing

Applications

- Home appliance applications
- Industrial technology
- CPU processor unit (BGA / PGA)
- Telecommunication
- Network applications



Micro-
controllers



Power
Management



Security



Sensors



Wireless

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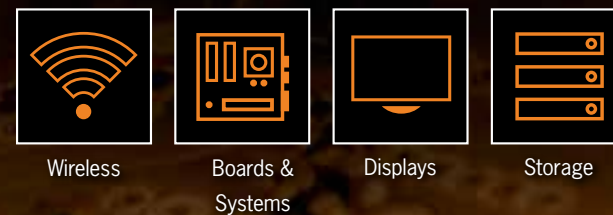
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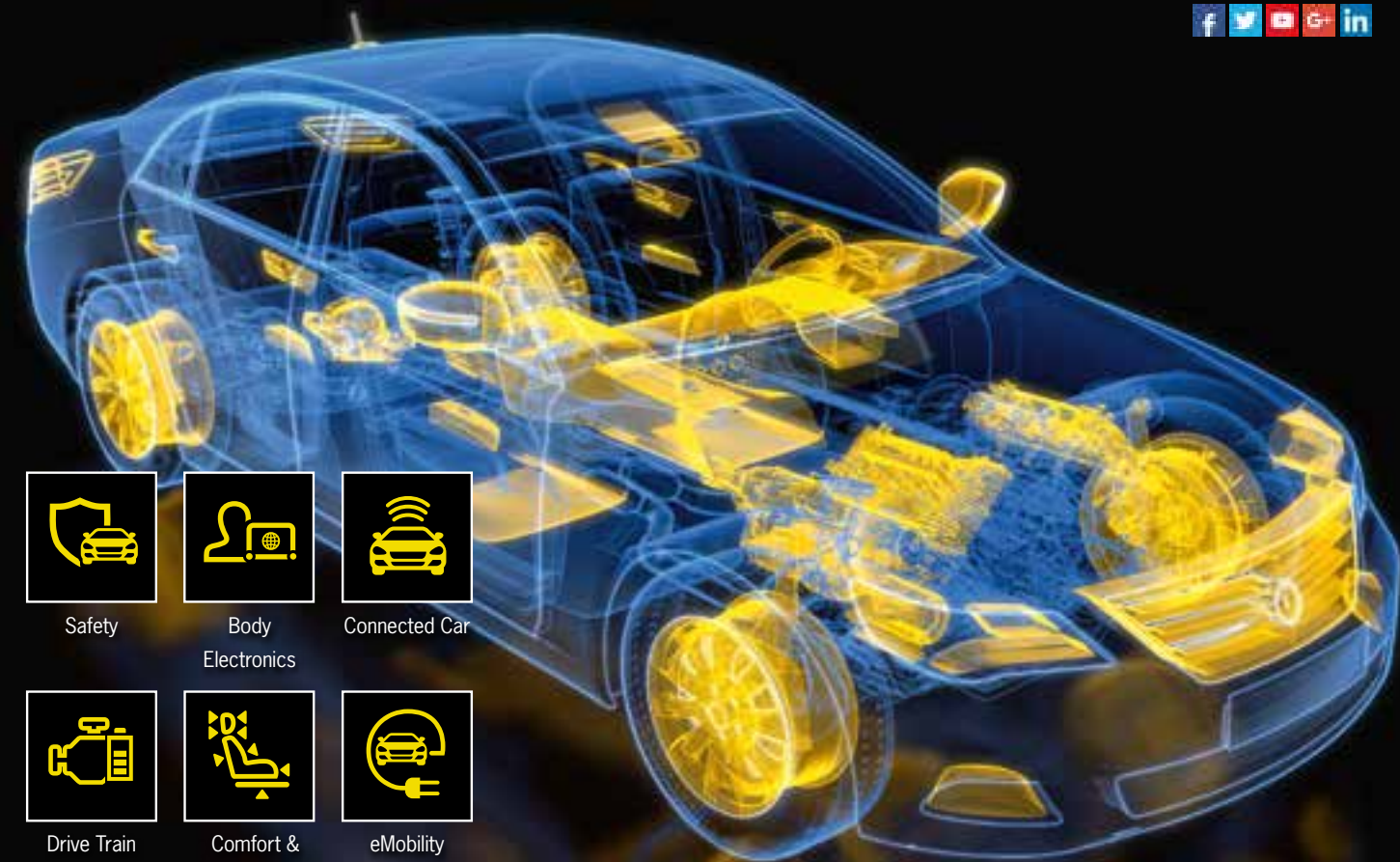


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