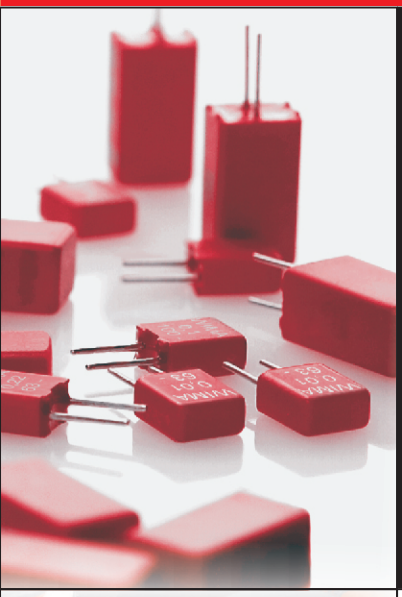
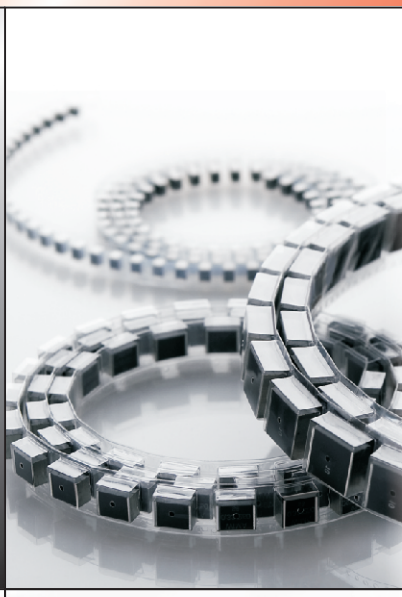
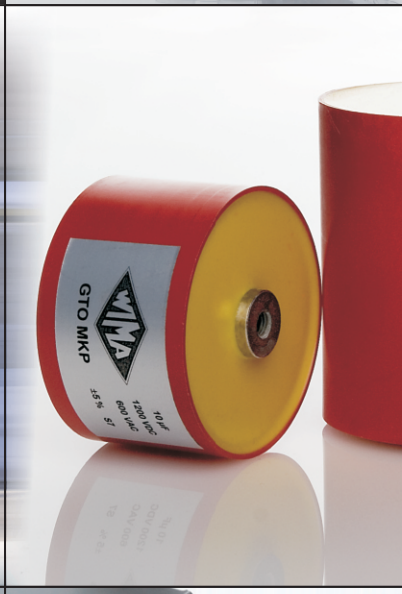
WIMA®



BEST CAPACITORS
MADE IN GERMANY





WIMA Application Guide

www.wima.com

Overview

Product Family	Range Description	Picture	Fields of Application: Automotive	Power	Lighting	Medical	Consumer	Telecom/ Data	New Energy
SMD Capacitors	**Size Codes 1812-6054** SMD-PET/-PPS		✓	✓		✓	✓	✓	
Film Capacitors	**PCM 2.5 - 52.5 mm** MKS, MKP, FKS, FKP		✓	✓	✓	✓	✓	✓	
Pulse Duty Capacitors	**PCM 7.5 - 52.5 mm** MKP 10, FKP 4, FKP 1		✓	✓	✓	✓	✓	✓	
EMI Suppression Capacitors	**PCM 7.5 - 27.5 mm** MKP-X2/-Y2 MP 3-X2/-X1/-Y2/R-Y2			✓	✓	✓	✓	✓	✓
Snubber Capacitors	**Variable terminations** Snubber MKP/FKP		✓	✓		✓	✓		✓
GTO Capacitors	**Axial screw connection** GTO MKP			✓					✓
DC-LINK Capacitors	**Variable contacts** DC-LINK MKP 3/4/5/6/ HC/HY		✓	✓					✓
SuperCap	**Cylindrical/rectangular** SuperCap C/MC/R/MR		✓	✓		✓		✓	✓

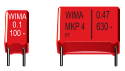
Automotive

WIMA Products		Fields of Application: Safety: Airbag control unit	Braking system control unit (ABS/ESC)	Tire pressure monitoring unit	HID lamps	Auxiliaries: Small motor drives (e.g. seats, mirrors, windows etc.)	Electrical power steering	Remote keyless entry	Powertrain: DC/DC converter and inverter. Electric drives	Fuel pump, diesel filter control unit	Features
SMD 0.01 µF - 6.8 µF 63 -1000 VDC 1812 - 6054		SMD-PPS	SMD-PPS	SMD-PET, SMD-PPS		SMD-PET	SMD-PET	SMD-PET		SMD-PET	■ Operating temp. up to 140°C ■ Operating life >300.000 h ■ Suitable for lead-free soldering at T≤ 250°C
Film 1000 pF - 220 µF 50 - 2000 VDC PCM 2.5 - 52.5			MKS, FKS	MKS, FKS		MKP	MKS, MKP, FKS	MKP		MKS	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Smallest PCM 2.5 mm
Pulse Duty 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5					MKP 10, FKP 1/4, MKP				MKP 10, FKP 1/4, MKP		■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Highest du/dt
Snubber 0.01 µF - 25 µF 250 - 4000 VDC Variable contacts									Snubber MKP/FKP		■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Various contact configura-tions
DC-LINK 2 µF - 4920 µF 400 -1600 VDC Variable contacts									DC-LINK		■ Operating temp. up to 100°C ■ Operating life >200.000 h ■ 2-pin, 4-pin, screwable plate or screw connections
SuperCap 12 F - 840 F 2.5 - 112 VDC (+ customized)		SuperCap MC/MR modules for boardnet stabilisation and safety backup				SuperCap MC/MR modules for local power supply			SuperCap MC/MR modules for recupe-ration of braking energy/power boost		■ Operating temp. -30/+65°C ■ Operating life >10 years ■ Discharge current up to several 1000 A

Power Electronics

WIMA Products		Fields of Application: Power Electronics: Battery charger	Frequency converter	Power supply/ SMPS	UPS	Electronic power meter	Features
SMD Capacitors 0.01 µF - 6.8 µF 63 -1000 VDC Size codes 1812 - 6054		SMD-PET				SMD-PET, SMD-PPS	■ Operating temp. up to 140°C ■ Operating life >300.000 h ■ Suitable for lead-free soldering at T⩽ 250°C
Film Capacitors 1000 pF - 220 µF 50 - 2000 VDC PCM 2.5 - 52.5 mm		MKS, MKP, FKS				MKS, MKP, FKS	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Smallest PCM 2.5 mm
Pulse Duty Capacitors 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5 mm			MKP 10, FKP 1/4, MKP	MKP 10, FKP 1/4, MKP			■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Highest du/dt
EMI Suppression Cap. 1000 pF - 2.2 µF 250 - 500 VAC PCM 7.5 - 27.5 mm		MP 3-X1/-X2/ -Y2, MKP-X2/-Y2	MP 3-X1/-X2/ -Y2, MKP-X2/-Y2	MP 3-X1/-X2/ -Y2, MKP-X2/-Y2			■ Operating temp. up to 110°C ■ Operating life >300.000 h ■ High reliability against active or passive flammability (MP)
Snubber Capacitors 0.01 µF - 25 µF 250 - 4000 VDC Variable terminations			Snubber MKP/FKP	Snubber MKP/FKP	Snubber MKP/FKP		■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Various contact configura-tions
DC-LINK Capacitors 2 µF - 4920 µF 400 -1600 VDC Variable terminations			DC-LINK				■ Operating temp. up to 100°C ■ Operating life >200.000 h ■ 2-pin, 4-pin, screwable plate or screw connections
SuperCap 12 F - 840 F 2.5 - 112 VDC (+ customized)					SuperCap MC/MR as emergency backup system		■ Operating temp. -30/+65°C ■ Operating life >10 years ■ Discharge current up to several 1000 A

Lighting

WIMA Products		Fields of Application: Lighting: Electronic ballasts	Energy saving lamps	Features
Metallized Capacitors 1000 pF - 220 µF 50 -2000 VDC PCM 5 - 52.5 mm		MKP 2, MKS 4, MKP 4	MKS 2, MKP 2, MKS 4, MKP 4	■ Polyethylene-therephthalate (PET) dielectric ■ Good resistiveness to increased temperatures ■ Low dissipation factor ■ Self-healing properties ■ Polypropylene (PP) dielectric ■ Negative capacitance change versus temperature ■ Very low dissipation factor ■ Self-healing properties
Pulse Duty Capacitors 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5 mm		MKP 10, FKP 4, FKP 1	MKP 10, FKP 4, FKP 1	■ Polypropylene (PP) dielectric ■ High pulse duty ■ Internal series connection (MKP 10 ⩾ 630 VDC, FKP 4, FKP 1) ■ Negative capacitance change versus temperature ■ Very low dissipation factor ■ Self-healing properties
EMI Suppression Capacitors 1000 pF - 2.2 µF 275 VAC, 305 VAC PCM 7.5 - 27.5 mm Class X2, Y2		MKP-X2, MKP-Y2	MKP-X2, MKP-Y2	■ Polypropylene (PP) dielectric ■ High degree of interference suppression due to good attenuation and low ESR ■ Self-healing properties

Medical

WIMA Products		Fields of Application: Medical Equipment: Imaging equipment (CT, MRT, X-Ray, ultrasound)	Anesthesia equipment	Cleaning equipment	Defibrillation devices	Patient care monitoring (glucose meter, blood gas analyser, telemetry)	Respiration technology	Features
SMD Capacitors 0.01 µF - 6.8 µF 63 -1000 VDC Size 1812 - 6054			SMD-PET, SMD-PPS	SMD-PET, SMD-PPS		SMD-PET, SMD-PPS	SMD-PET, SMD-PPS	■ Operating temp. up to 140°C ■ Operating life >300.000 h ■ Suitable for lead-free soldering at T≤ 250°C
Film Capacitors 1000 pF - 220 µF 50 - 2000 VDC PCM 2.5 - 52.5 mm		MKP	MKS, MKP	MKS, MKP		MKS, MKP	MKS, MKP	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Smallest PCM 2.5 mm
Pulse Duty Cap. 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5 mm		MKP 10, FKP 1/4			MKP 10, FKP 1/4	MKP 10, FKP 1/4		■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Highest du/dt
EMI Suppr. Cap. 1000 pF - 1.0 µF 250 - 500 VAC PCM 7.5 - 27.5 mm		MP 3-X1/-X2/ -Y2	MP 3-X1/-X2/ -Y2	MP 3-X1/-X2/ -Y2	MP 3-X1/-X2/ -Y2	MP 3-X1/-X2/ -Y2	MP 3-X1/-X2/ -Y2	■ Operating temp. up to 110°C ■ Operating life >300.000 h ■ High reliability against active or passive flammability
Snubber Cap. 0.01 µF - 25 µF 250 - 4000 VDC Variable terminations		Snubber MKP/FKP						■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Various contact configura-tions
SuperCap 100 F - 6500 F 2.5 VDC (+ customized)					SuperCap C/R			■ Operating temp. -30/+65°C ■ Operating life >10 years ■ Discharge current up to several 1000 A

Consumer

WIMA Products		Fields of Application: Consumer Electronics: High-end audio systems	Amplifier	LCD/ Plasma TVs	Set top boxes	Video systems	Control units for home appliances	White goods (induction cooker, ignition units etc.)	Features
SMD Capacitors 0.01 µF - 6.8 µF 63 -1000 VDC Size 1812 - 6054		SMD-PPS	SMD-PET, SMD-PPS	SMD-PET		SMD-PET	SMD-PET	SMD-PET	■ Operating temp. up to 140°C ■ Operating life >300.000 h ■ Suitable for lead-free soldering at T≤ 250°C
Film Capacitors 27 pF - 220 µF 50 - 2000 VDC PCM 2.5 - 52.5 mm		MKS, MKP, FKP	MKS, MKP, FKP		MKP	MKS	MKS, MKP	MKS, MKP, FKS	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Smallest PCM 2.5 mm
Pulse Duty Cap. 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5 mm		MKP 10	MKP 10	MKP 10		MKP 10, FKP 1/4		MKP 10 FKP 1/4	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Highest du/dt
EMI Suppr. Cap. 1000 pF - 2.2 µF 250 - 500 VAC PCM 7.5 - 27.5 mm		MP 3-X1/-X2/ -Y2 MKP-X2/-Y2	MP 3-X1/-X2/ -Y2 MKP-X2/-Y2	MKP-X2/-Y2		MKP-X2/-Y2	MKP-X2/-Y2	MP 3-X1/-X2/ -Y2 MKP-X2/-Y2	■ Operating temp. up to 110°C ■ Operating life >300.000 h ■ High reliability against active or passive flammability (MP)
Snubber Cap. 0.01 µF - 25 µF 250 - 4000 VDC Variable terminations								Snubber MKP/FKP	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Various contact configura-tions

Telecom/Data

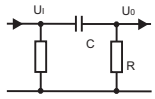
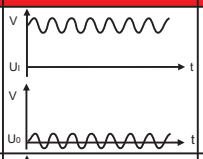
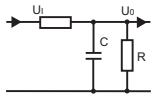
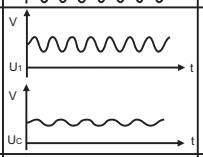
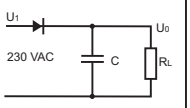
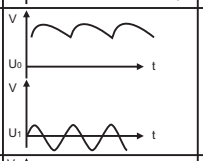
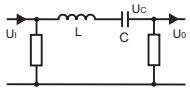
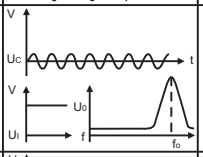
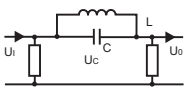
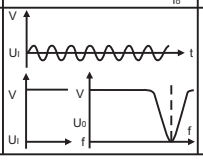
WIMA Products		Fields of Application: Telecommunication/Data Processing: Power supply	Splitter	Data processing systems (server etc.)	Network devices (router, switcher, hubs, modems)	Wireless communication (WLAN, UMTS etc.)	Memory backup	Features
SMD Capacitors 0.01 µF - 6.8 µF 63 -1000 VDC Size 1812 - 6054			SMD-PET, SMD-PPS	SMD-PET, SMD-PPS	SMD-PET, SMD-PPS	SMD-PET, SMD-PPS		■ Operating temp. up to 140°C ■ Operating life >300.000 h ■ Suitable for lead-free soldering at T⩽ 250°C
Film Capacitors 1000 pF - 220 µF 50 - 2000 VDC PCM 2.5 - 52.5 mm			MKS, MKP	MKS, MKP, FKS	MKS, MKP, FKS	MKS, MKP, FKS		■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Smallest PCM 2.5 mm
Pulse Duty Cap. 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5 mm		MKP 10, FKP 1/4		MKP 10, FKP 1/4	MKP 10, FKP 1/4	MKP 10, FKP 1/4		■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Highest du/dt
EMI Suppr. Cap. 1000 pF - 2.2 µF 250 - 500 VAC PCM 7.5 - 27.5 mm		MP 3-X1/-X2/ -Y2, MKP-X2/-Y2		MP 3-X1/-X2/ -Y2 MKP-X2/-Y2	MP 3-X1/-X2/ -Y2 MKP-X2/-Y2			■ Operating temp. up to 110°C ■ Operating life >300.000 h ■ High reliability against active or passive flammability (MP)
SuperCap 100 F - 6500 F 2.5 VDC (+ customized)							SuperCap C/R	■ Operating temp. -30/+65°C ■ Operating life >10 years ■ Discharge current up to several 1000 A

New Energy

WIMA Products		Fields of Application: New Energy: Energy storage in photovoltaic systems	Converter	Power supply	UPS	Features
Pulse Duty Capacitors 100 pF - 47 µF 100 - 6000 VDC PCM 7.5 - 52.5 mm			MKP 10, FKP 1/4, MKP	MKP 10, FKP 1/4, MKP	MKP 10, FKP 1/4, MKP	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Highest du/dt
Snubber Capacitors 0.01 µF - 25 µF 250 - 4000 VDC Variable terminations			Snubber MKP/FKP	Snubber MKP/FKP	Snubber MKP/FKP	■ Operating temp. up to 100°C ■ Operating life >300.000 h ■ Various contact configura-tions
GTO Capacitors 1.0 µF - 100 µF 400 - 2000 VDC Axial screw connection			GTO MKP	GTO MKP	GTO MKP	■ Operating temp. up to 85°C ■ Operating life >300.000 h ■ Axial screw and thread connections
DC-LINK Capacitors 2 µF - 4920 µF 400 -1600 VDC Variable terminations			DC-LINK	DC-LINK	DC-LINK	■ Operating temp. up to 100°C ■ Operating life >200.000 h ■ 2-pin, 4-pin, screwable plate or screw connections
SuperCap 12 F - 6500 F 2.5 - 112 VDC (+ customized)		SuperCap C/MC/R/MR		SuperCap MC/MR (e.g. pitch control in wind turbine systems)	SuperCap MC/MR for emergency backup systems	■ Operating temp. -30/+65°C ■ Operating life >10 years ■ Discharge current up to several 1000 A

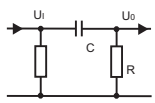
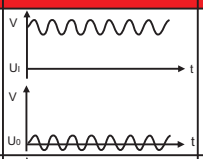
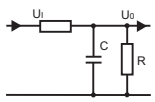
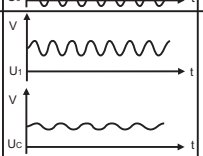
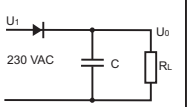
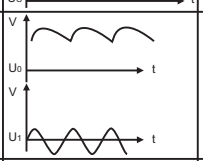
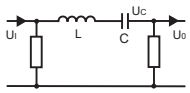
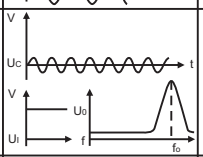
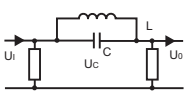
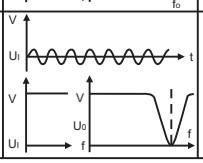
WIMA SMD Capacitors

Fields of Application: Automotive, Power, Medical, Consumer, Telecom/Data

Product Type	Application Function	Circuit Application	Waveform	Requirements	Special Characteristics
SMD-PET, SMD-PPS	**Blocking/Coupling** High-Pass Filter: • preventing DC voltages • transferring AC voltages			• High insulation resistance • Low self-inductance (to observe voltage rating)	■ Operating temperatures up to 100°C (SMD-PET) and 140°C (SMD-PPS) ■ Suitable for lead-free soldering at elevated processing temperature T_{peak} = 250°C (SMD-PPS) ■ Suitable for filtering due to low dissipation factor (SMD-PPS) **Compared to Ceramic SMD (MLCC):** ■ No internal cracks or delamination ■ ΔC/C over temperature: very low (SMD-PET) or extremely low (SMD-PPS) ■ Self-healing capability results in high withstanding voltage, high reliability 
	Bypass/Decoupling Low-Pass Filter: • suppressing transmission of high frequencies (AC voltages)			• High insulation resistance • Low self-inductance	
	Smoothing • smoothing of pulsating DC-voltages from AC-rectifier			• Comparably high capacitance • Low dissipation factor (to observe frequency)	
SMD-PPS	**Band-Pass Filter (e.g. Audio, TV)** • pass frequencies within a certain range • attenuate frequencies outside that range			• Low dissipation factor • Stable capacitance	
	Band-Stop Filter (e.g. Audio, TV) • attenuate frequencies within a specific range • pass frequencies outside that range			• Low dissipation factor • Stable capacitance	

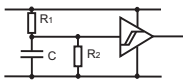
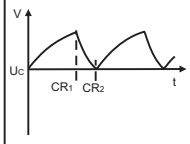
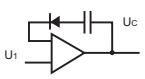
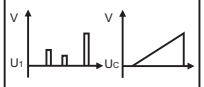
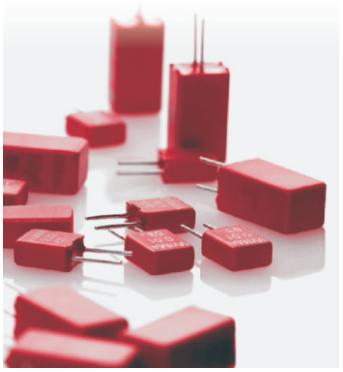
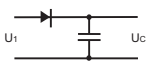
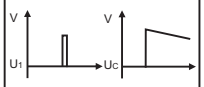
WIMA Film Capacitors (PCM 2.5 - 37.5 mm)

Fields of Application: Automotive, Power, Lighting, Medical, Consumer, Telecom/Data, New Energy

Product Type	Application Function	Circuit Application	Waveform	Requirements	Special Characteristics
MKS 02, MKS 2, MKS 4, FKS 2, FKS 3 **MKP 2, MKP 4 (HF-Coupling/ Decoupling)**	**Blocking/Coupling** High-Pass Filter: • preventing DC voltages • transferring AC voltages			• High insulation resistance • Low self-inductance (to observe voltage rating)	**Metallized Film Capacitors (MK-Types):** ■ High capacitance values in small box sizes ■ Smallest PCM: 2.5 mm (MKS 02) ■ ΔC/C over temperature: very low (MKS, MKP) ■ Self-healing capability results in high withstanding voltage, high reliability ■ Very low dissipation factor (MKP) ■ High-frequency application (MKP) due to low dissipation factor **Film/Foil Capacitors (FK-Types):** ■ High pulse and current rating ■ Smallest PCM: 2.5 mm (FKP 02) ■ ΔC/C over temperature: very low (FKS, FKP) ■ High insulation resistance (FKS) or very high insulation resistance (FKP)
	Bypass/Decoupling Low-Pass Filter: • suppressing transmission of high frequencies (AC voltages)			• High insulation resistance • Low self-inductance	
MKS 02, MKS 2, MKS 4, MKP 4	**Smoothing** • smoothing of pulsating DC-voltages from AC-rectifier			• Comparably high capacitance • Low dissipation factor (to observe frequency)	
FKP 02, FKP 2, FKP 3, MKP 2, MKP 4,	**Band-Pass Filter (e.g. Audio, TV)** • pass frequencies within a certain range • attenuate frequencies outside that range			• Low dissipation factor • Stable capacitance	
	Band-Stop Filter (e.g. Audio, TV) • attenuate frequencies within a specific range • pass frequencies outside that range			• Low dissipation factor • Stable capacitance	

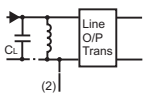
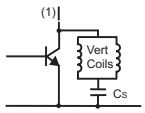
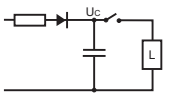
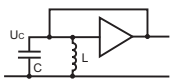
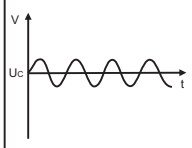
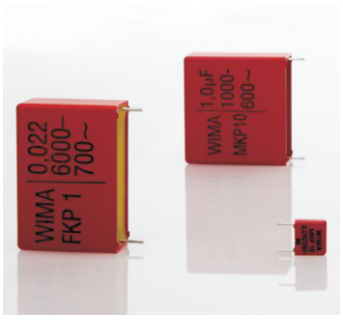
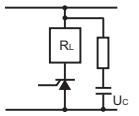
Continuation ...

Fields of Application: Automotive, Power, Lighting, Medical, Consumer, Telecom/Data, New Energy

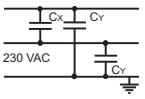
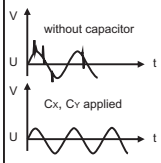
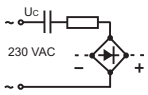
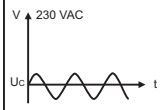
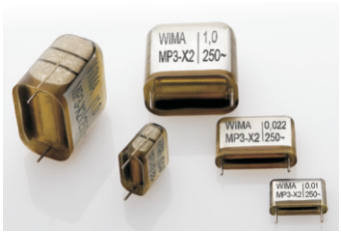
Product Type	Application Function	Circuit Application	Waveform	Requirements	Special Characteristics
FKP 02, FKP 2, FKP 3, MKP 2, MKP 4	**Timing (e.g. Signal Light)** • when capacitor is charged voltage is increasing over time • after passing certain value a new state change occurs			• High insulation resistance • Stable capacitance	**... Continuation** ■ Close tolerances up to ±1% (FKP) ■ High-frequency application (FKP) due to very low dissipation factor ■ High reliability
FKP 02, FKP 2, FKP 3, MKP 2, MKP 4	**Sample & Hold (e.g. Amplifier)** Analogue-Digital Converter: • capacitor is used to store analogue voltage value • electronic switch is used to connect/ disconnect capacitor from analogue input (sampling rate)			• Low dielectric absorption • High insulation resistance	
	Peak Voltage Detectors • diode conducts positive "half cycles" to charge capacitor to peak voltage • DC "peak" stored in the capacitor, the diode is blocking current flow • capacitor retains the peak value even if the waveform drops to zero			• Low dielectric absorption • High insulation resistance	

WIMA Pulse Duty Capacitors (PCM 7.5 - 37.5 mm)

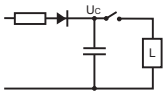
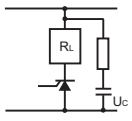
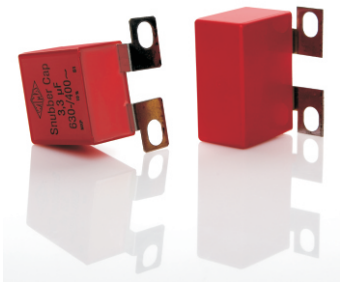
Fields of Application: Automotive, Power, Lighting, Medical, Consumer, Telecom/Data, New Energy

Product Type	Application Function	Circuit Application	Waveform	Requirements	Special Characteristics
MKP 10, FKP 4, FKP 1	**Fly-Back (e.g. Monitor, TV)** • current flows from deflection coil to fly-back capacitor • electron beam is rapidly shifted from right to left side of screen			• Low dissipation factor • High pulse rise time • High dielectric strength	■ Pulse and current rating: high (MKP 10), very high (FKP 4) or extremely high (FKP 1) ■ Self-healing capability results in high withstanding voltage, outstanding reliability ■ Very low dissipation factor ■ High insulation resistance
MKP 10 (MKP 4)	**S-Correction (Smoothing)** • current flows from C_L through trafo deflection coils to C_S • C_S is smoothing pulsating DC-voltages			• Low dissipation factor • Good pulse rise time	
MKP 10, FKP 4, FKP 1	**Energy Storage (e.g. Ballasts)** • capacitor is charged to a high voltage, stores the energy and then releases it in short time			• High pulse rise time • High (surge) current carrying capacity • High insulation resistance	
MKP 10, FKP 4, FKP 1	**Oscillating Circuit** Resonant system (LC): • AC voltage oscillates at resonant frequency • see also filter applications			• Low dissipation factor • Stable capacitance (please refer to technical data)	
MKP 10, FKP 4, FKP 1, (FKP 02, FKP 2, FKP 3)	**Snubbing (e.g. Relay)** • capacitor attenuates over-voltage peaks by high current switching			• Low dissipation factor • High pulse rise time (please refer to technical data)	

WIMA EMI Suppression Capacitors

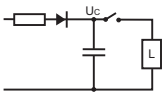
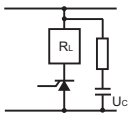
Fields of Application: Automotive, Power, Lighting, Medical, Consumer, Telecom/Data, New Energy					
Product Type	**Application Function**	**Circuit Application**	**Waveform**	**Requirements**	**Special Characteristics**
MKP-X2, MKP-Y2, MP 3-X2, MP 3-X1, MP 3-Y2, MP 3R-Y2	**EMI Suppression** • capacitor suppress high-frequency disturbances of electrical equipment on the mains • class X capacitors are connected between phase and neutral or phase and phase conductors • class Y capacitors are connected between phase conductors and earthed casing and thus by-pass operating insulation			• Particular high reliability against active and passive flammability	■ High reliability against active and passive flammability (MP 3-X2, MP 3-X1, MP 3-Y2, MP 3R-Y2) ■ High degree of interference suppression due to good attenuation and low ESR ■ High volume/capacitance ratio (MKP-X2, MKP-X2 R, MKP-Y2)
MKP-X2, MKP-X2 R, (MP 3-X1), (MKS 4), (⩾ 630 VDC, ⩾ PCM 10)	**Voltage Dropper** • capacitor voltage divider			• High capacitance stability • Flame retardant (please check if approvals are required)	

WIMA Snubber Capacitors

Fields of Application: Power, Medical, Consumer, New Energy					
Product Type	**Application Function**	**Circuit Application**	**Waveform**	**Requirements**	**Special Characteristics**
Snubber MKP, Snubber FKP	**Energy Storage** • capacitor is charged to a high voltage, stores the energy and releases it in short time			• High pulse rise time • High (surge) current carrying capacity • High insulation resistance	■ Pulse and current rating: high (Snubber MKP) or very high (Snubber FKP) ■ High volume/capacitance ratio (Snubber MKP) ■ Self-healing capability results in high withstanding voltage, outstanding reliability ■ Very low dissipation factor ■ High insulation resistance ■ Low self-inductance ■ Particularly reliable contact configurations: 4-lead versions or screwable plate connections
Snubber MKP, Snubber FKP	**Snubbing (e.g. IGBT)** • capacitor attenuates over-voltage peaks by high current switching			• Low dissipation factor • High pulse rise time (please refer to technical data) • Low self- inductivity	

WIMA GTO Capacitors

Fields of Application: Power, New Energy

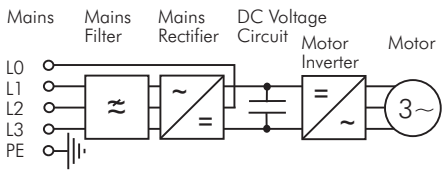
Product Type	Application Function	Circuit Application	Waveform	Requirements	Special Characteristics
GTO MKP	**Energy Storage** • capacitor is charged to a high voltage, stores the energy and releases it in short time			• High pulse rise time • High (surge) current carrying capacity • High insulation resistance	■ Very high pulse and current rating ■ Self-healing capability results in high withstanding voltage, outstanding reliability ■ Very low dissipation factor ■ High insulation resistance ■ Low self-inductance ■ High mechanical stability ■ High shock and vibration resistance
GTO MKP	**Snubbing (e.g. GTO-Thyristor)** • capacitor attenuates over-voltage peaks by high current switching			• Low dissipation factor • High pulse rise time (please refer to technical data) • Low self-inductivity	

WIMA DC-LINK Capacitors

Fields of Application: Power, New Energy

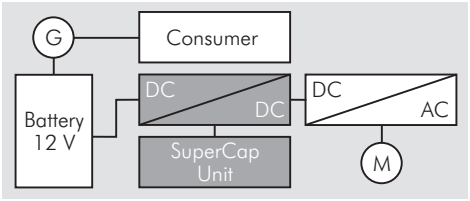
Product Type	Application Function	Requirements	Special Characteristics
DC-LINK MKP 3, DC-LINK MKP 4, DC-LINK MKP 4S, DC-LINK MKP 5, DC-LINK MKP 6, DC-LINK HC, DC-LINK HY	**Energy Buffer (e.g. Converter)** • capacitor stores DC-voltage in an intermediate circuit • high frequency ripple voltage generated by inverter is short-circuited	• High volume/capacitance ratio • High DC-voltage strength • Low dissipation factor	■ Volume/capacitance ratio: high (DC-LINK MKP 3/4/4S/5) or very high (DC-LINK MKP 6, DC-LINK HC, DC-LINK HY) ■ High mechanical stability ■ Particularly reliable contact configurations: 2-pin, 4-pin, screwable plate or screw connections (male or female) **Advantages Compared to Aluminium Electrolytic Capacitors:** ■ Low self-inductance ■ High ripple current capability ■ High voltage/over-voltage strength by specific metallization (≥ 450 VDC) due to self-healing capability ■ Very constant ΔC/C ■ Very low ESR and dissipation factor ■ Dry construction without electrolyte results in high reliability ■ Non polar construction ■ High insulation resistance

Circuit Application



WIMA SuperCaps - Automotive

Fields of Application: Automotive (Passenger Cars, Trucks, Busses, Military Vehicles and Forklifts)

Product Type	Application Function	Figure	Requirements	Special Characteristics
SuperCap MC/MR "customized"	**Recuperation of Braking Energy/Power Boost** • SuperCap unit stores energy generated by braking and releases it within short time for acceleration **Peak-Load Levelling** • SuperCap unit supports battery by covering power-peaks **Local Power Supply** • SuperCap unit supplies local electric systems which need peak-power within short time **Boardnet Stabilisation** • Safety backup for security relevant on-board electronic systems	**Combination with Batteries in Hybrid and Electric Cars**  • Engine starting • Start-stop • Electric heating • Electric steering • Electronic stability control • 4-wheel steering • Electric brakes • Electric fan • Electric water pump • Audio system • Door close/lock 	• Low fuel consumption • Low CO_2 emission • High dynamic • Low weight of battery • High efficiency • Long life-time of battery • High reliability of on-board electronics	■ Fast supply of several 100 A up to 3000 A in direct current operation ■ Operating temperature range from -30°C to +65°C ■ Many years of maintenance-free operation with clearly more than 500.000 charge/discharge cycles ■ Life expectancy of more than 15 years ■ Low weight as against batteries or secondary batteries ■ Environmentally friendly materials 
SuperCap MC/MR (MC 110/14, MC 200/14, "customized")	**Cranking of Engines** • SuperCap unit supplies peak-power within a short time to crank an engine • After cranking the engine the SuperCap unit gets charged immediately	**Replacement of Starter Batteries**   	• Power supply under extreme weather conditions (-30°C) • Long de-energized periods (vintage cars) • Low maintenance cost	

WIMA SuperCaps - Transportation

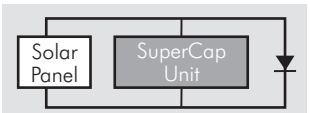
Fields of Application: Transportation

Product Type	Application Function	Figure	Requirements	Special Characteristics
SuperCap MC/MR "customized"	**Recuperation of Braking Energy/Power Boost** • SuperCap unit stores energy generated by braking and releases it within short time for acceleration **Peak-Load Levelling** • Coverage of power-peaks **Short-Term Energy Storage** • Network support in local traffic systems by energy storage	**"Rolling Stock"**   - Integrated heat sink - Saving of approx. 30% of energy by recuperation - Efficiency > 95%	• Energy saving • High dynamic • High efficiency • Peak-power supply • Reduction of over-head contact lines in historic cities	■ Fast supply of several 100 A up to 3000 A in direct current operation ■ Operating temperature range from -30°C to +65°C ■ Many years of maintenance-free operation with clearly more than 500.000 charge/discharge cycles ■ Life expectancy of more than 15 years ■ Low weight as against batteries or secondary batteries ■ Environmentally friendly materials
SuperCap MC/MR "customized"	**Motor Start** • SuperCap unit supplies peak-power within a short time to crank an engine	**Replacement of Starter Batteries** (e.g. diesel-electric engines) Saving: - approx. 90% of weight - approx. 25% of fuel  	• Power supply under extreme weather conditions (-30°C) • Low weight • Low fuel consumption • Low maintenance cost	

WIMA SuperCaps - Power Supply (UPS); Telecom/Data

Fields of Application: Power Supply (UPS); Telecom/Data (Memory Backup)				
Product Type	**Application Function**	**Figure**	**Requirements**	**Special Characteristics**
SuperCap MC/MR "customized"	**UPS** • Short-term power supply when mains power failure **Peak-Load Levelling** • Coverage of power-peaks	**UPS - Emergency Backup in Hospitals, Tele-communication Systems, Oil and Gas Extraction** (cost-intensive processes)  - Micro-turbine start bridging	• Emergency backup to avoid downtime after short blackout • Peak-power supply • Long life-time • Low maintenance cost	■ Fast supply of several 100 A up to 3000 A in direct current operation ■ Operating temperature range from -30°C to +65°C ■ Many years of maintenance-free operation with clearly more than 500.000 charge/discharge cycles ■ Life expectancy of more than 15 years ■ Low weight as against batteries or secondary batteries ■ Environmentally friendly materials
SuperCap C/R	**Short-Term Energy Storage** • SuperCap unit stores energy for a short time e.g. after voltage drop	**Memory Backup - On-Board Logic**  - Transferring data from DDR memory to flash card **Memory Backup - Time Switch** - Protection of clock information after voltage drop 	• Memory backup for seconds/minutes • Low weight • Low maintenance cost	

WIMA SuperCaps - New Energy

Fields of Application: New Energy (Wind, Solar Systems)				
Product Type	**Application Function**	**Figure**	**Requirements**	**Special Characteristics**
SuperCap MC/MR "customized"	**Power Supply** • SuperCap unit supplies local electric systems which need power within short time	**Pitch Drive of Windmills**  - Continuous adjustment of rotor blade angle - Pitch control functionally independent of line voltage - Emergency stop at blackout	• Power supply under extreme weather conditions (-30°C) • Emergency switch-off system • Life-time for 20 years • Low weight • Low maintenance cost	■ Fast supply of several 100 A up to 3000 A in direct current operation ■ Operating temperature range from -30°C to +65°C ■ Many years of maintenance-free operation with clearly more than 500.000 charge/discharge cycles ■ Life expectancy of more than 15 years ■ Low weight as against batteries or secondary batteries ■ Environmentally friendly materials
SuperCap C/R/MC/MR "customized"	**Short-Term Energy Storage** • Intermediate storage of peak-voltage to provide continued power	**Short-Term Energy Buffer in Solar Systems**  	• Energy buffer to avoid downtime after short blackout • Power supply under extreme weather conditions (-30°C) • Life-time for 20 years • Low weight • Low maintenance cost	

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WIMA Quality and Environmental Philosophy

ISO 9001:2008 Certification

ISO 9001:2008 is an international basic standard of quality assurance systems for all branches of industry. The approval according to ISO 9001:2008 of our factories by the VDE inspectorate certifies that organisation, equipment and monitoring of quality assurance in our factories correspond to internationally recognized standards.

WIMA WPCS

The WIMA Process Control System (WPCS) is a quality surveillance and optimization system developed by WIMA. WPCS is a major part of the quality-oriented WIMA production. Points of application of WPCS during production process:

- **Incoming material inspection**
- **Metallization**
- **Film inspection**
- **Schoopage**
- **Pre-healing**
- **Lead attachment**
- **Cast resin preparation/encapsulation**
- **100% final inspection**
- **AQL check**

WIMA Environmental Policy

All WIMA capacitors, irrespective of whether through-hole devices or SMD, are made of environmentally friendly materials. Neither during manufacture nor in the product itself any toxic substances are used, e.g.

- **Lead**
- **PCB**
- **CFC**
- **Hydrocarbon chlorid**
- **Chromium 6+**
- **PBB/PBDE**
- **Arsenic**
- **Cadmium**
- **Mercury**
- **etc.**

We merely use pure, recyclable materials for packing our components, such as:

- **carton**
- **cardboard**
- **adhesive tape made of paper**
- **polystyrene**

We almost completely refrain from using packing materials such as:

- **foamed polystyrene (Styropor®)**
- **adhesive tapes made of plastic**
- **metal clips**

RoHS Compliance

According to the RoHS Directive 2011/65/EC certain hazardous substances like e.g. lead, cadmium, mercury must not be used any longer in electronic equipment as of July 1st, 2006. For the sake of the environment WIMA has refraind from using such substances since years already.

Tape for lead-free WIMA capacitors

DIN EN ISO 14001:2009

WIMA's environmental management has been established in accordance with the guidelines of DIN EN ISO 14001:2009 to save energy and resources.

Warning Notice / Technical Support

AC Voltage Load at the Mains

Anticipating possible interfering pulses, DC voltage capacitors must not be operated at the mains (line power), irrespective of the rated AC voltage. For this purpose, use approved electromagnetic interference suppression capacitors only.

Thermal Load in the Application

If a plastic film capacitor is overstressed due to inappropriate usage under AC voltage conditions, the temperature inside the component may rise to an impermissibly high level. Thus, the dielectric film may subsequently be damaged leading to a short circuit or formation of smoke and even fire in the capacitor. It may also happen if the capacitor is overheated by an external heat source.

Shock and/or Vibration Load for Larger Case Sizes

For increased shock and vibration applications involving larger case sizes (i.e., PCM 22.5 mm lead spacing or greater), it is recommended to fix capacitors in an appropriate way; or special lead and tab terminations may be required respectively, to minimize lead separation from the capacitor element or the solder joint.

Processing

When processing plastic film capacitors it is mandatory to observe the application recommendations with regard to soldering and/or cleaning and drying processes.

General Remarks

All data, range surveys and application data correspond to the actual state of the art and were elaborated as thoroughly and precisely as possible. They are to be understood as general information, and the right for amendments and construction changes is reserved. Special customized designs which deviate from our catalogue data, irrespective of whether being based on factory standards, specifications or related data, do not release the user from his duty of care with regard to incoming goods inspection and production monitoring. In case of the components being purchased through second or third suppliers we urgently ask to compare the technical details with the data given by the manufacturer. In cases of doubt we recommend use is made of our technical support, since we do not take any responsibility for damages caused by inappropriate use or processing of our capacitors.