Shanghai Yongming Electronics Co., Ltd.

Liquid aluminum electrolytic capacitor

LIQUID ALUMINUM ELECTROLYTIC CAPACITOR

Automotive Electronics Application Guide

AUTOMOTIVE ELECTRONICS APPLICATION GUIDE



Table of Contents

Company Profile
P01

Introduction to Automotive Applications (P02~P18)

Safety components
- Electronic Power Steering (EPS) 02
- Airbags 03
- Window Controllers 03
- Ventilated Seats 04
- Electronic Stability Control (ESC) 04

Thermal management components
- Cooling fan controller 05
- Air conditioning compressor 06
- PTC heater 07
- Electronic water pump 07

New energy vehicle headlights
- Headlight controller 08

Intelligent driving
- Domain Controller (DCU) 09
- Radar Camera 10
- Smart Cockpit 10
- Door and Window Controller 11
- Automatic Gear Shifter 11
- Telecommunication Module/T-BOX 12

Multimedia system
- Navigation 13
- Head-up Display (HUD) 14
- Audio 14

Support
- Refrigerator Controller 15
- USB/WPT 16

In-vehicle OBC
- OBC-DCDC 17

charging pile
- AC to DC - AC/DC 18
- DC to DC - DC-DC 18

Capacitor Series Introduction (P19~P38)

Liquid surface mount aluminum electrolytic capacitors

105℃
- V3M series (2000~5000H) 20
- VMM series (3000~8000H) 22

125℃
- VKL series (2000~5000H) 27



Liquid leaded aluminum electrolytic capacitor

105℃
- LK series (6000~8000H) 31
- LKG series (8000~12000H) 33

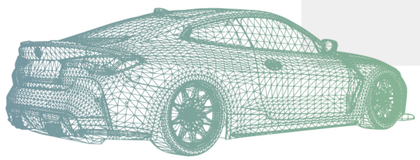
135℃
- LKL(R) series (3000H) 35



Liquid substrate self-standing aluminum electrolytic capacitor

105℃
- CW3 series (3000h) 37





Company List

COMPANY LIST



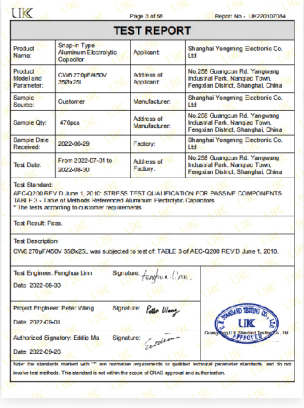






Qualification Certificate

QUALIFICATION CERTIFICATE


TEST REPORT

AEC-Q200


AEC-Q200
Reliability Test Report

AEC-Q200


质量管理体系认证证书

上海永铭电子股份有限公司

IATF16949: 2016

IATF16949


中国合格评定国家认可委员会

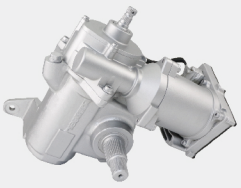
实验室认可证书

CNAS

CNAS

Safety components

SAFETY COMPONENTS



ELECTRONIC POWER STEERING (EPS)



AIRBAGS/WINDOW CONTROLS



SEAT VENTILATION



VEHICLE STABILITY CONTROL (ESC)

Electronic Power Steering (EPS)

Application Requirements

Rapid response; seismic performance; high-temperature durability; safety and reliability;

YMIN Liquid Chip Capacitor Product Advantages

Wide temperature stability design

Adaptable to extreme temperatures from -55℃to125℃,meeting automotive-grade requirements. Low impedance, high capacity, and miniaturized design reduce module size and contribute to system weight reduction. Ensures smooth low-temperature start-up and reliable high-temperature operation.

Overload resistance

The capacitor can withstand the instantaneous high current surge during motor start-up/stop/rotation/lock conditions,making the whole machine more reliable and stable;

YMIN's advantages in liquid lead large-diameter capacitors

High reliability and long life design

Products with a temperature resistance of 135℃ can achieve an actual lifespan of 6000 hours at 135℃, and ultra-low ESR ensures low temperature rise of the capacitor, guaranteeing the normal operation of EPS power steering for extended periods and providing strong protection.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VKL	125℃ 2000H	35 (44)	100	6.3*7.7	0.16	0.48	240	35	UUB/ULT ULH	MVH	TC	27
	VMM	105℃ 2000H	50 (58)	47	6.3*7.7	0.16	0.68	200	23	UWT/UWX UWJ	MVE	FT	22
Lead type	LKL(R)	135℃ 3000H	50 (63)	1300	16*25	0.10	0.055	2500	650	UBW/UBY	GPD/GVD	/	35
			50 (63)	2400	18*35.5	0.12	0.029	3210	1200				
			50 (63)	3000	18*35.5	0.14	0.034	3390	1500				
			50 (79)	3600	18*40	0.14	0.030	3700	1800				
			63 (79)	2700	18*40	0.11	0.028	4100	1701				

airbags

Application Requirements

Long lifespan and durability; low-temperature resistance; seismic performance; impact resistance;

Yongming's advantages in liquid lead large-diameter capacitors

High temperature resistance and long life design

It can withstand temperatures up to 105℃, and its actual lifespan can reach 12,000 hours at 105℃. It can also meet the requirement of 50,000 charge-discharge cycles at 105℃.

High capacity density design

High-density and compact designs can meet customers' PCB layout needs;

Low temperature stability

ESR is stable at -40℃;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
Lead type	LK	105℃ 8000H	25 (31)	4400	16*20	0.18	0.030	2000	1100	UPW/UPM	LBV/LBG	/	31
			35 (44)	3300	18*25	0.12	0.045	3600	155				
			35 (44)	5600	18*25	0.22	0.035	2000	1960				
			35 (44)	7600	18*31.5	0.24	0.032	2600	2660				
			35 (44)	10000	18*40	0.30	0.020	3800	3500				

Window controller

Application Requirements

Long lifespan and durability; low-temperature resistance; seismic performance; impact resistance;

Yongming's advantages in liquid lead small diameter capacitors

Wide temperature stability design

Stable electrical performance over a wide temperature range at 135℃ for 3000 hours;

Long life design

The designed lifespan is 3000 hours, but the actual lifespan can reach more than 5000 hours, which greatly improves

Low ESR, impact resistant

Low ESR, high ripple, and resistant to switching shocks;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
Lead type	LKL(R)	135℃ 3000H	35 (44)	470	10*20	0.20	0.65	780	164.5	UBW/UBY	/	HGX	35
			35 (44)	1200	12.5*20	0.20	0.57	2215	420				
			35 (44)	2200	14.5*25	0.20	0.35	2550	770				

Seat ventilation

Application Requirements

Rapid response; safety and reliability;

Yongming's advantages in liquid lead small diameter capacitors

High temperature resistance and long life design

Stable electrical performance over a wide temperature range at 135℃ for 3000 hours;

High capacity density

The designed lifespan is 3000 hours, but the actual lifespan can reach more than 5000 hours, which greatly improves

Low temperature stability design

Low ESR, high ripple, and resistant to switching shocks;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
Lead type	LKL(R)	135℃ 3000H	16 (20)	2200	10*25	0.26	0.154	1450	352	UBW/UBY	/	HGX	35

Vehicle Stability Control (ESC)

Application Requirements

High temperature resistance; rapid response; lifespan and durability;

Yongming Liquid Chip Capacitor Product Advantages

High temperature resistance and long life design

Withstands high temperatures of 125℃ for 3000 hours, adapts to extreme temperatures ranging from -55℃ to 125℃, and meets automotive-grade requirements. Low-impedance, high-capacity capacitors meet the energy storage and filtering needs of high-power modules, ensuring smooth low-temperature startup and long lifespan.

Wide temperature stability design

Adaptable to extreme temperatures from -55℃ to 125℃, meeting automotive-grade requirements. Low impedance, high capacity, and miniaturized design reduce module size and contribute to system weight reduction. Ensures smooth low-temperature start-up and reliable high-temperature operation.

Low impedance, high ripple resistance design

Small size, high capacity, can meet automotive-grade requirements in both extremely low and high temperatures of -55℃ to 105℃, low impedance and high ripple current resistance, making the whole machine more reliable and stable.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VKL	125℃ 2000H	35 (44)	100	6.3*7.7	0.16	0.48	240	35	UUB/ULT ULH	MVH	TC	27
		125℃ 3000H	35 (44)	330	10*10	0.16	0.22	750	115				
	V3M(T)	105℃ 2000H	35 (40)	100	6.3*5.8	0.12	0.72	300	35	UCM	MZR	FK	/

Thermal management components

THERMAL MANAGEMENT COMPONENTS

IMAGE FOR REFERENCE ONLY.



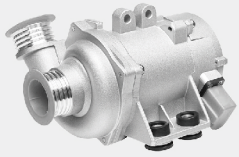
COOLING FAN CONTROLLER



AIR CONDITIONER COMPRESSOR CONTROLLER



PTC HEATER



ELECTRIC WATER PUMP

Cooling fan controller

Application Requirements

Rapid response; seismic performance; high-temperature durability; safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High temperature resistant design

The capacitor is adapted to the extreme temperature environment of the engine compartment and operates stably under high temperature conditions (such as continuous heat dissipation requirements in summer).

Low ESR

To cope with instantaneous current surges during fan start-up and shutdown and sudden load changes, and reduce the risk of capacitor overheating.

Seismic performance

Ensure the capacitor can withstand vehicle bumps and mechanical vibrations, and prevent internal structural breakage or lead desoldering.

Long life design

The capacitor has stable long-term durability, with capacitance decay not exceeding 20% throughout its entire lifespan, ensuring stable and new-like performance of the entire device.

Yongming's advantages in liquid lead large-diameter capacitors

High temperature resistance and long service life

Products that can withstand temperatures up to 135℃ can actually last for 6000 hours at 135℃.

Ultra-low ESR

Ultra-low ESR ensures low capacitor temperature rise, allowing the cooling fan to operate at high temperatures for extended periods.

Yongming's advantages in liquid lead small diameter capacitors

Wide temperature stability design

Stable electrical performance over a wide temperature range at 135℃ for 3000 hours;

Long life design

The designed lifespan is 3000 hours, but the actual lifespan can reach more than 5000 hours, which greatly improves the overall lifespan of the machine.

High ripple resistance

Low leakage current, high ripple, and resistant to switching shocks;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
surface mount type	VKL	125℃ 3000H	35 (44)	330	10*10	0.16	0.22	750	115	UUB/ULT ULH	MVH	/	27
			35 (44)	470	10*16.5	0.16	0.20	1100	164				
Lead type	LKL(R)	135℃ 3000H	25 (31)	3300	16*25	0.18	0.041	3100	825	UBW/UBY	GPD/GVD	HGX	35
			25 (31)	3300	18*25	0.18	0.035	3600	825				
			50 (63)	470	12.5*20	0.2	0.5	1050	235				
			50 (63)	1000	16*20	0.10	0.055	1800	500				
			50 (63)	1200	12.5*25	0.20	0.08	2205	600				
			50 (63)	1300	16*25	0.10	0.055	2500	650				
			50 (63)	1500	14.5*27	0.20	0.065	2420	750				

Air Conditioner Compressor Controller

Application Requirements

Compact and integrated; low power consumption; long lifespan and durability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity

It can meet the requirements of small overall size, adapt to the PCB layout of air conditioner controller, and save space;

Low ESR design

Ensure fast overall machine response, improve touch button sensitivity, and reduce power filtering losses;

Yongming's advantages in liquid lead large-diameter capacitors

High reliability, long lifespan

The capacitors exhibit good consistency in characteristics, meeting the needs of customers for series and parallel applications. Their long lifespan, low ESR, and low temperature rise ensure stable operation of the entire unit over extended periods.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
surface mount type	V3M	105℃ 5000H	50 (63)	220	10*10	0.12	0.25	670	110	UCM	MZR	FK	20
Lead type	LKG	105℃ 12000H	275 (325)	51	16*20	0.08	0.60	1356	346	UCY	KXJ/KXQ	BXW/BHW	33
			450 (500)	56	12.5*35	0.12	1.82	1200	514				
			450 (500)	68	16*35.5	0.12	1.25	1400	622				

PTC heater

Application Requirements

Compact and integrated design; high temperature and corrosion resistance; seismic performance; high energy efficiency and interference resistance;

Yongming Liquid Chip Capacitor Product Advantages

High temperature resistance and long life design

Withstands high temperatures up to 125℃ for 5000 hours, and meets automotive-grade requirements at both low and high temperatures (-40℃ to 125℃). Low leakage current (<20μA) reduces standby power consumption. The large-capacity, miniaturized design reduces module size, contributing to a lighter overall system. Ensures smooth low-temperature startup and reliable operation at ultra-high temperatures.

High capacity density design

Small size, large capacity, withstands high voltage of 450V, instantaneous surge voltage of 1200V, low leakage current <60μA to reduce standby power consumption, while ensuring smooth low-temperature start-up and reliable high-temperature operation life;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VKL	125℃ 5000H	400 (450)	5.6	10*10	0.16	8	130	20	UUB/ULT ULH	MVH	TC	27
	VMM	105℃ 8000H	450 (500)	15	12.5*13.5	0.16	7	225	60	UWT/UWX UWJ	MVE	FT	22

electric water pump

Application Requirements

Compactness and integration; long lifespan and durability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density

Miniaturized packaging, compatible with water valve ECU module design, saving PCB space;

Long life design

The capacitor has stable long-term durability, with capacitance decay not exceeding 20% throughout its entire lifespan, matching the full lifespan requirements of automotive thermal management systems and preventing reduced flow regulation performance due to capacitor aging.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VKL	125℃ 3000H	50 (63)	100	10*10	0.16	0.50	550	50	UUB/ULT ULH	MVH	TC	27
		125℃ 5000H	80 (92)	220	12.5*21	0.16	0.24	890	176				

New energy vehicle headlights

NEW ENERGY VEHICLE LIGHTS



CAR LIGHTS

Headlight controller

Application Requirements

Compact and integrated design; high and low temperature resistance; long lifespan and durability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density

Ultra-small size, high capacity.

Wide temperature stability design

Adaptable to extreme temperatures from -55℃ to 105℃, meeting automotive-grade requirements. Low impedance withstands high ripple current, meeting the energy storage and filtering needs of high-power modules.

Low temperature stability and long life design

Ensures smooth low-temperature start-up and long service life.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	V3M(T)	105℃ 2000H	35 (40)	100	6.3*5.8	0.12	0.72	300	35	UCM	MZR	FK	/
	V3MC	105℃ 2000H	35 (40)	220	6.3*7.7	0.12	0.24	610	77				/
	V3M	105℃ 2000H	50 (63)	220	8*10	0.12	0.36	670	110				20

Intelligent driving

INTELLIGENT DRIVING



CHASSIS DOMAIN CONTROLLER



RADAR CAMERA



SMART COCKPIT, DOOR AND WINDOW CONTROLLER



AUTOMATIC SHIFTER



REMOTE COMMUNICATION MODULE T-BOX

Domain Controller - DCU

Application Requirements

Low power consumption; safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density design

Small size, high capacity.

Wide temperature stability design

Adaptable to extreme temperatures from -55℃ to 125℃, meeting automotive-grade requirements. Low impedance withstands high ripple current, meeting the energy storage and filtering needs of high-power modules.

Low temperature stability and long life design

Ensures smooth low-temperature start-up and long service life.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VMM	105℃ 4000H	35 (44)	68	6.3*7.7	0.18	0.52	300	23	UWT/UWX UWJ	MVE	FT	22
	VKL	125℃ 3000H	35 (44)	220	10*10	0.16	0.30	670	77	UUB/ULT ULH	MVH	TC	27
	V3M	105℃ 5000H	50 (63)	220	10*10	0.12	0.25	670	110	UCM	MZR	FK	20

radar camera

Application Requirements

Compactness and integration; Electromagnetic interference (EMC) immunity;
Safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density design

Small size, high capacity;

Wide temperature stability design

It can withstand extreme temperatures of -55℃ to 125℃ and meets automotive-grade requirements.

Low impedance, high ripple resistance design

Low impedance withstands high ripple current, meeting the energy storage and filtering requirements of high-power modules, ensuring smooth low-temperature start-up and reliable high-temperature operation;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (mΩ100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VMM	105℃ 4000H	35 (44)	68	6.3*7.7	0.18	0.52	300	23	UWT/UWX UWJ	MVE	FT	22
	VKL	125℃ 2000H	35 (44)	100	6.3*7.7	0.16	0.48	240	35	UUB/ULT ULH	MVH	TC	27

Smart Cockpit

Application Requirements

Compactness and integration; Electromagnetic interference (EMC) immunity;
Safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

Small size, high capacity;

Wide temperature stability design

It can withstand extreme temperatures of -55℃ to 105℃ and meets automotive-grade requirements.

Low impedance, high ripple resistance design

Low impedance withstands high ripple current, meeting the energy storage and filtering requirements of high-power modules, ensuring smooth low-temperature start-up and reliable high-temperature operation;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Nominal capacity (μF)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VMM	105℃ 6000H	25 (31)	330	8*10	0.20	0.17	600	82	UWT/UWX UWJ	MVE	FT	22
			35 (44)	220	8*10	0.18	0.21	600	77				
	V3M	105℃ 5000H	50 (63)	220	10*10	0.12	0.25	670	110	UCM	MZR	FK	20

Car door and window controller

Application Requirements

Low power consumption; safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density design

Small size, large capacity;

Wide temperature stability design

It can withstand extreme temperatures of -55℃ to 105℃ and meets automotive-grade requirements.

Low impedance, high ripple resistance design

Low impedance withstands high ripple current, meeting the energy storage and filtering requirements of high-power modules, ensuring smooth low-temperature start-up and reliable high-temperature operation;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VMM	105℃ 6000H	25 (31)	330	8*10	0.20	0.17	600	82	UWT/UWX UWJ	MVE	FT	22
			35 (44)	330	10*10	0.18	0.2	855	115				
		105℃ 4000H	50 (63)	100	8*7.9	0.16	0.42	360	50				

Automatic shifter

Application Requirements

Compactness and integration; low power consumption; security and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density design

Small size, high capacity;

Wide temperature stability design

It can withstand extreme temperatures from -55℃ to 105℃ and meets automotive-grade requirements.

Low temperature stability and long life design

Low impedance withstands high ripple current, meeting the energy storage and filtering requirements of high-power modules, ensuring smooth low-temperature start-up and long lifespan;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	V3M	105℃ 2000H	50 (63)	100	6.3*7.7	0.12	0.68	350	50	UCM	MZR	FK	20

Remote communication module/T-BOX

Application Requirements

Compactness and integration; Electromagnetic interference (EMC) immunity;
Safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density design

Small size, high capacity;

Wide temperature stability design

It can withstand extreme temperatures of -55℃ to 105℃ and meets automotive-grade requirements.

Low impedance, high ripple resistance design

Low impedance withstands high ripple current, meeting the energy storage and filtering requirements of high-power modules, ensuring smooth low-temperature start-up and reliable high-temperature operation;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	V3M	105℃ 2000H	10 (11.5)	470	6.3*7.7	0.19	0.32	600	47	UCM	MZR	FK	20
			50 (63)	100	6.3*7.7	0.12	0.68	350	50				
	V3M(T)	105℃ 2000H	35 (44)	100	6.3*5.8	0.12	0.72	300	35	UCM	MZR	FK	/

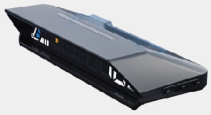
multimedia

MULTIMEDIA



COMBINATION INSTRUMENTSIN-VEHICLE SCREEN/NAVIGATION





HUD



AUDIO

Instrument cluster, in-vehicle screen, navigation

Application Requirements

Compactness and integration; Electromagnetic interference (EMC) immunity; Safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

Low ESR design

It can effectively suppress high-frequency ripple in the power supply circuit (10kHz~1MHz), reduce MCU power supply noise, and improve the accuracy of instrument signal processing and the stability of the display screen.

High capacity density, wide temperature stability design

Compact size, high capacity, adaptable to extreme temperatures from -55℃ to 105℃, meeting automotive-grade requirements. Low impedance withstands high ripple current, meeting the energy storage and filtering needs of high-power modules, ensuring smooth low-temperature startup and long lifespan.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	V3M	105℃ 2000H	10 (12.5)	470	6.3*7.7	0.19	0.32	600	47	UCM	MZR	FK	20
			16 (20)	100	6.3*5.8	0.16	0.56	255	16				
			50 (63)	220	8*10	0.12	0.36	670	110				
			50 (63)	220	10*10	0.12	0.25	670	110				
			50 (63)	330	10*10	0.12	0.24	900	165				

Head-up Display (HUD)

Application Requirements

High and low temperature resistance; safety and reliability; long lifespan and durability;

Yongming Liquid Chip Capacitor Product Advantages

Wide temperature stability design

To ensure stable operation of the HUD in high-temperature (such as direct sunlight on the center console) or low-temperature (winter start-up) environments inside the vehicle, and to prevent sudden drop in capacitor capacity and failure.

Overload capacity

To address transient current surges in the HUD backlight driver and power conversion circuits (such as LED backlight startup) and reduce voltage fluctuations caused by capacitor temperature rise;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	V3M(T)	105℃ 2000H	35 (40)	100	6.3*5.8	0.12	0.72	300	35	UCM	MZR	FK	/
	V3M	105℃ 2000H	50 (63)	100	6.3*7.7	0.12	0.68	350	50				20

Audio

Application Requirements

Low power consumption; electromagnetic interference (EMC) immunity; safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density

Small size, large capacity, long lifespan;

Wide temperature stability design

It meets automotive-grade requirements for both extremely low and high temperatures of -55℃ to 105℃;

Low impedance, high ripple resistance design

Low impedance withstands high ripple current;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VKM	105℃ 10000H	25 (31)	2200	16*17	0.20	0.068	3250	550	/	/	HD/FK	/

Support

AUXILIARY



REFRIGERATOR CONTROLLER



USB/WPT

Refrigerator controller

Application Requirements

High and low temperature resistance; safety and reliability; long lifespan and durability;

Yongming Liquid Chip Capacitor Product Advantages

High capacity density design

Compact size, large capacity, long lifespan, and automotive-grade performance in both extremely low and high temperatures (-55℃ to 105℃), with low impedance and high ripple current tolerance. This ensures smooth low-temperature startup of the entire unit.

Wide temperature stability design

Adaptable to extreme temperatures from -55℃ to 125℃, meeting automotive-grade requirements. Low impedance withstands high ripple current, meeting the energy storage and filtering needs of high-power modules.

Low temperature stability and long life design

Ensures smooth low-temperature start-up and long service life.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	VKM	105℃ 10000H	35 (44)	2200	16*21	0.16	0.056	3630	770	/	/	HD/FK	/

USB、WPT

Application Requirements

High energy efficiency and interference resistance; high temperature and durability; compact design and integration; safety and reliability;

Yongming Liquid Chip Capacitor Product Advantages

Wide temperature stability

Adaptable to extreme temperatures from -55℃ to 125℃, meeting automotive-grade requirements; ensuring smooth low-temperature starts and reliable high-temperature operation;

High capacity density design

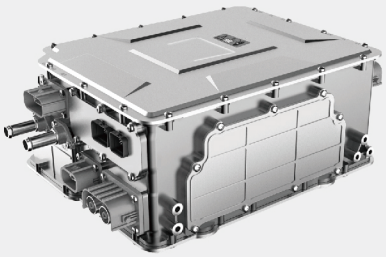
Low impedance, high capacity, and miniaturized design reduce module size and contribute to system lightweighting;

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Panasonic	
surface mount type	V3M	105℃ 2000H	10 (11.5)	330	6.3*7.7	0.19	0.32	600	33	UCM	MZR	FK	20
	VKL	125℃ 2000H	35 (44)	100	6.3*7.7	0.16	0.48	240	35	UUB/ULT ULH	MVH	TC	27

In-vehicle OBC

VEHICLE OBC



OBC-DCDC

OBC-DCDC

Application Requirements

High energy efficiency and interference resistance; high temperature and durability; compact design and integration; safety and reliability;

Advantages of YMin Liquid Substrate Self-standing Capacitors

Operating temperature range

It meets the requirements of low capacitance decay and stable ESR (equivalent series resistance) at high temperatures from -40° C to +105° C.

Low leakage

The leakage current is stable at high temperatures, preventing capacitor failure due to leakage.

Ripple current

In OBC, high-frequency switches (such as LLC topologies) generate large ripple currents, and capacitors can withstand high ripple without overheating

Low ESR

A lower ESR can provide greater current and smoother ripple output for the vehicle OBC;

High capacitance stability

The capacitance value changes little with temperature/voltage ensuring effective filtering.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
substrate self-reliant	CW3H	105℃ 3000H	450 (500)	330	25*50	0.20	0.39	1940	940	LGN/LGM	KHS/KMS KMR/KMQ	MXG/MXK	37
			450 (500)	560	30*50	0.20	0.45	2100	940				

charging pile

CHARGING PILE



CHARGING PILE

AC-DC、DC-DC

Application Requirements

High energy efficiency, anti-interference; wide temperature range stability; low power consumption;

Advantages of YMIN Liquid Substrate Self-standing Capacitors

Low ESR

Ensure effective filtering to guarantee a clean power supply; reduce heat generation and improve overall energy efficiency.

Wide temperature stability design

If the capacitance and ESR change little over a wide temperature range and the parameters remain stable over a wide temperature range, the whole machine can easily cope with extreme temperatures.

Low leakage current

The capacitor's low leakage current design effectively reduces standby power consumption, ensuring extended battery life and improving system security.

Recommended selection (the following are sample specifications for reference only)

shape	series	Temperature life	Rated Voltage (Surge Voltage) (V)	Nominal capacity (μF)	Product dimensions ΦD*L (mm)	Tan (120HZ)	ESR (Ω100kHz)	Rated ripple current (mA/100kHz)	LC (μA)	Replace international counterparts			page number
										Nichicon	NIPPON CHEMI-CON	Rubycon	
substrate self-reliant	CW3H	105℃ 3000H	450 (500)	330	30*30	0.20	0.39	1100	940	LGN/LGM	KHS/KMS KMR/KMQ	MXG/MXK	37
			550 (600)	120	30*30	0.20	0.87	1200	940				
			550 (600)	270	35*40	0.20	0.731	1420	940				

Liquid aluminum electrolytic capacitor

LIQUID ALUMINUM ELECTROLYTIC CAPACITOR



surface mount type

P20 V3M
105℃
2000H~5000H
Low impedance, thin profile
High capacity chemicals

P22 VMM
105℃
3000H~8000H
5mm high, thin product

P27 VKL
125℃
2000H~5000H
High ripple current
High temperature resistance
Long lifespan



Lead type

P31 LK
105℃
6000H~8000H
High ripple current
Low impedance
Miniaturization

P33 LKG
105℃
8000H~12000H
High ripple current
Low impedance
Long life

P35 LKL(R)
135℃
3000H
High temperature resistance
Low impedance



snap-in type

P37 CW3
105℃ 3000H
350~600V

V3M

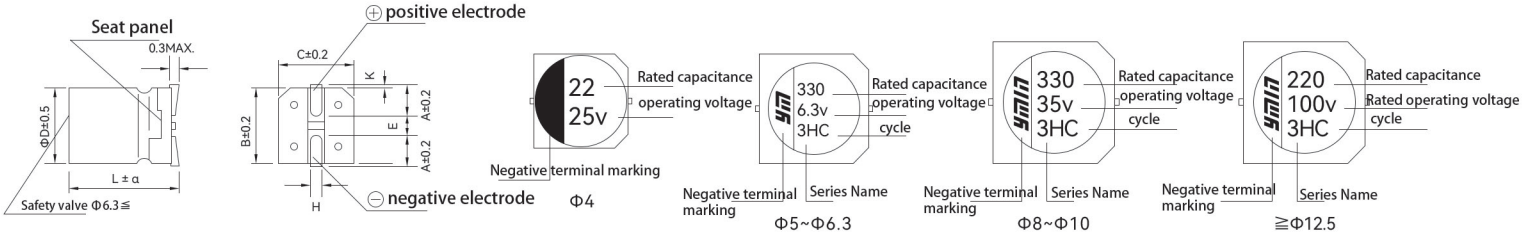
- ◆ Low-impedance, low-profile, high-capacitance V-Chip product
- ◆ 2,000 – 5,000 hours at 105° C
- ◆ AEC-Q200 compliant; RoHS compliant
- ◆ Suitable for high-density, fully automated surface mounting; compatible with high-temperature reflow soldering



■ Key Technical Parameters

project	characteristic
Operating temperature range	≦100V –55~+105℃ ; 160V –40~+105℃
Nominal voltage range	6.3~160V
Permissible capacitance deviation	±20% (25±2℃ 120Hz)
Leakage current (μA)	6.3~100WV I≦0.01CV or 3μA Take the larger value C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading
	160WV I≦0.02CV+10(μA) C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading
Dissipation factor (25±2° C, 120 Hz)	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 / 160 tg δ: 0.26 / 0.19 / 0.16 / 0.14 / 0.12 / 0.12 / 0.12 / 0.12 / 0.12 / 0.14 For nominal capacitance exceeding 1000 μF, the dissipation factor increases by 0.02 for every additional 1000 μF.
Temperature characteristics (120Hz)	Rated voltage (V): 6.3 / 10 / 16 / 25 / 35 / 50 / 63 / 80 / 100 / 160 Impedance ratio Z(-40° C)/Z(20° C): 3 / 3 / 3 / 3 / 3 / 3 / 5 / 5 / 5 / 5
Durability	After being subjected to rated voltage in a 105° C oven for the specified duration and then allowed to stand at room temperature for 16 hours, the capacitor shall be tested at a temperature of 25 ± 2° C;the performance of the capacitor shall meet the following requirements: Capacitance change rate: Within ±30% of the initial value Dissipation factor: Below 300% of the specified value Leakage current: Below the specified value Load life: ≦Φ10 2000h; >Φ10 5000h
High-temperature storage	After storage at 105° C for 1,000 hours and a 16-hour recovery period at room temperature, the capacitor's performance shall meet the following requirements when tested at 25 ± 2° C. Capacitance change rate: Within ±20% of the initial value Dissipation factor: Below 200% of the specified value Leakage current: Below 200% of the specified value

■ Product Dimensions (Unit: mm)



ΦD	L	B	C	A	H	E	K	α
4	5.8	4.3	4.3	1.8	0.75±0.20	1.0	0.5MAX	±0.3
5	5.8	5.3	5.3	2.1	0.75±0.20	1.5	0.7MAX	±0.3
6.3	5.8	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.3
6.3	7.7	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.4
8	10	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
10	10	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
12.5	13.5	13	13	4.7	0.90±0.30	4.4	0.7MAX	±1.0
12.5	14.5	13	13	4.7	0.90±0.30	4.4	0.7MAX	±1.0
12.5	16.5	13	13	4.7	0.90±0.30	4.4	0.7MAX	±1.0
12.5	21	13	13	4.7	0.90±0.30	4.4	0.7MAX	±1.0
16	16.5	17	17	5.5	1.20±0.30	6.7	0.70±0.30	±1.0
16	21	17	17	5.5	1.20±0.30	6.7	0.70±0.30	±1.0
18	16.5	19	19	6.7	1.20±0.30	6.7	0.70±0.30	±1.0
18	21	19	19	6.7	1.20±0.30	6.7	0.70±0.30	±1.0

■ Frequency correction factor

Frequency (Hz)	50	120	1K	≧10K
Coefficient	0.35	0.50	0.83	1.00

V3M

■ List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Impedance (Ω max / 100 kHz 25 ± 2° C)	Ripple current (mA r.m.s / 105° C 100kHz)	Product Number
6.3	100	4×5.8	2.00	160	V3MA0580J101MVTMCG
	220	5×5.8	0.72	240	V3MB0580J221MVTMCG
	330	6.3×5.8	0.52	300	V3MC0580J331MVTMCG
	470	6.3×7.7	0.32	600	V3MC0770J471MVTMCG
	680	6.3×7.7	0.32	600	V3MC0770J681MVTMCG
	1500	8×10	0.16	850	V3MD1000J152MVTMCG
	2200	10×10	0.12	1190	V3ME1000J222MVTMCG
10	68	4×5.8	2.00	160	V3MA0581A680MVTMCG
	150	5×5.8	0.72	240	V3MB0581A151MVTMCG
	220	6.3×5.8	0.52	300	V3MC0581A221MVTMCG
	330	6.3×7.7	0.32	600	V3MC0771A331MVTMCG
	470	6.3×7.7	0.32	600	V3MC0771A471MVTMCG
	1000	8×10	0.16	850	V3MD1001A102MVTMCG
	1500	10×10	0.12	1190	V3ME1001A152MVTMCG
16	47	4×5.8	2.00	160	V3MA0581C470MVTMCG
	68	5×5.8	0.72	240	V3MB0581C680MVTMCG
	100	5×5.8	0.72	240	V3MB0581C101MVTMCG
	150	6.3×5.8	0.52	300	V3MC0581C151MVTMCG
	220	6.3×5.8	0.52	300	V3MC0581C221MVTMCG
	330	6.3×7.7	0.32	600	V3MC0771C331MVTMCG
	680	8×10	0.16	850	V3MD1001C681MVTMCG
	1000	10×10	0.12	1190	V3ME1001C102MVTMCG
25	22	4×5.8	2.00	160	V3MA0581E220MVTMCG
	33	4×5.8	2.00	160	V3MA0581E330MVTMCG
	47	5×5.8	0.72	240	V3MB0581E470MVTMCG
	68	5×5.8	0.72	240	V3MB0581E680MVTMCG
	100	6.3×5.8	0.52	300	V3MC0581E101MVTMCG
	150	6.3×7.7	0.32	600	V3MC0771E151MVTMCG
	220	6.3×7.7	0.32	600	V3MC0771E221MVTMCG
	470	8×10	0.16	850	V3MD1001E471MVTMCG
	820	10×10	0.12	1190	V3ME1001E821MVTMCG
	1500	12.5×13.5	0.116	1420	V3ML1351E152MVTMCG
35	22	4×5.8	2.00	160	V3MA0581V220MVTMCG
	33	5×5.8	0.72	240	V3MB0581V330MVTMCG
	47	5×5.8	0.72	240	V3MB0581V470MVTMCG
	68	6.3×5.8	0.52	300	V3MC0581V680MVTMCG
	100	6.3×5.8	0.52	300	V3MC0581V101MVTMCG
	150	6.3×7.7	0.32	600	V3MC0771V151MVTMCG
	330	8×10	0.16	850	V3MD1001V331MVTMCG
	560	10×10	0.12	1190	V3ME1001V561MVTMCG
	1000	12.5×14.5	0.116	1420	V3ML1451V102MVTMCG
50	10	4×5.8	4.60	85	V3MA0581H100MVTMCG
	10	5×5.8	1.76	165	V3MB0581H100MVTMCG
	22	5×5.8	1.76	165	V3MB0581H220MVTMCG
	47	6.3×5.8	1.36	195	V3MC0581H470MVTMCG
	100	6.3×7.7	0.68	350	V3MC0771H101MVTMCG
	220	8×10	0.36	670	V3MD1001H221MVTMCG
	330	10×10	0.24	900	V3ME1001H331MVTMCG
	470	12.5×13.5	0.24	1340	V3ML1351H471MVTMCG
	1000	16×16.5	0.16	1820	V3MI1651H102MVTMCG
	1500	16×21	0.10	2440	V3MI2101H152MVTMCG
63	470	12.5×16.5	0.28	1250	V3ML1651J471MVTMCG
	680	16×16.5	0.164	1740	V3MI1651J681MVTMCG
	820	18×16.5	0.16	1880	V3MJ1651J821MVTMCG
	1200	16×21	0.108	2430	V3MI2101J122MVTMCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Impedance (Ω max / 100 kHz 25 ± 2° C)	Ripple current (mA r.m.s / 105° C 100kHz)	Product Number
80	220	12.5×13.5	0.36	1050	V3ML1351K221MVTMCG
	470	16×16.5	0.20	1500	V3MI1651K471MVTMCG
	680	16×21	0.132	2040	V3MI2101K681MVTMCG
	820	18×21	0.126	2140	V3MJ2101K821MVTMCG
100	150	12.5×13.5	0.36	1050	V3ML1352A151MVTMCG
	220	12.5×16.5	0.22	1250	V3ML1652A221MVTMCG
	330	16×16.5	0.20	1500	V3MI1652A331MVTMCG
	470	16×21	0.132	2040	V3MI2102A471MVTMCG
	560	18×21	0.126	2140	V3MJ2102A561MVTMCG
160	100	12.5×16.5	4.60	1040	V3ML1652C101MVTMCG
	150	16×21	3.28	1520	V3MI2102C151MVTMCG
	220	18×21	2.58	2140	V3MJ2102C221MVTMCG

VMM

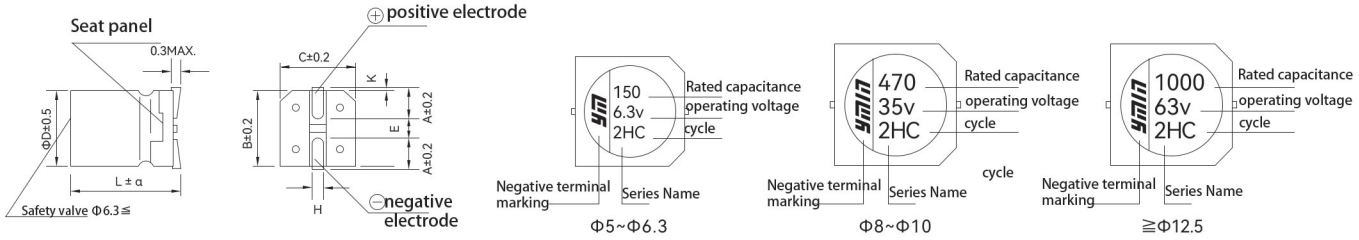
◆ Wide voltage range, compact size, low-profile V-Chip design
◆ 3,000 – 8,000 hours at 105° C
◆ AEC-Q200 compliant; RoHS compliant
◆ Suitable for high-density mounting and fully automated SMT processes; compatible with high-temperature reflow soldering



■ Key Technical Parameters

<table>
<tr><th>project</th><th>characteristic</th></tr>
<tr><td>Operating temperature range</td><td>≦100V –55~+105℃ ; 160~500V –40~+105℃</td></tr>
<tr><td>Nominal voltage range</td><td>6.3~500V</td></tr>
<tr><td>Permissible capacitance deviation</td><td>±20% (25±2℃ 120Hz)</td></tr>
<tr><td>Leakage current (μA)</td><td>6.3~100WV I≦0.01CV or 3μA Take the larger value C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading
160~500WV I≦0.02CV+10(μA) C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading</td></tr>
<tr><td>Dissipation factor
(25±2° C, 120 Hz)</td><td>
<table>
<tr><td>Rated voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td></tr>
<tr><td>tg δ</td><td>0.32</td><td>0.28</td><td>0.24</td><td>0.20</td><td>0.18</td><td>0.16</td><td>0.16</td><td>0.14</td></tr>
<tr><td>Rated voltage (V)</td><td>100</td><td>160</td><td>200</td><td>250</td><td>350</td><td>400</td><td>450</td><td>500</td></tr>
<tr><td>tg δ</td><td>0.14</td><td>0.15</td><td>0.15</td><td>0.15</td><td>0.20</td><td>0.20</td><td>0.20</td><td>0.25</td></tr>
</table>
For nominal capacitance exceeding 1000 μF, the dissipation factor increases by 0.02 for every additional 1000 μF.</td></tr>
<tr><td>Temperature characteristics
(120Hz)</td><td>
<table>
<tr><td>Rated voltage (V)</td><td>6.3</td><td>10</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td></tr>
<tr><td>Impedance ratio Z(-40° C)/Z(20° C)</td><td>14</td><td>12</td><td>10</td><td>10</td><td>10</td><td>7</td><td>7</td><td>7</td></tr>
<tr><td>Rated voltage (V)</td><td>100</td><td>160</td><td>200</td><td>250</td><td>350</td><td>400</td><td>450</td><td>500</td></tr>
<tr><td>Impedance ratio Z(-40° C)/Z(20° C)</td><td>7</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>10</td><td>12</td></tr>
</table></td></tr>
<tr><td>Durability</td><td>After being subjected to rated voltage in a 105° C oven for the specified duration and then allowed to stand at room temperature for 16 hours, the capacitor shall be tested at a temperature of 25 ± 2° C;the performance of the capacitor shall meet the following requirements:
<table>
<tr><td>Capacitance change rate</td><td colspan="4">Within ±30% of the initial value</td></tr>
<tr><td>Dissipation factor</td><td colspan="4">Below 300% of the specified value</td></tr>
<tr><td>Leakage current</td><td colspan="4">Below the specified value</td></tr>
<tr><td rowspan="6">Load life</td><td colspan="2">6.3~100WV</td><td colspan="2">160~500WV</td></tr>
<tr><td>size</td><td>life</td><td>size</td><td>life</td></tr>
<tr><td>ΦD*5.7(6.2,6.9)</td><td>3000</td><td>ΦD*5.7(6.2,6.9)</td><td>3000</td></tr>
<tr><td>ΦD*7.7(7.9,8.4)</td><td>4000</td><td>ΦD*7.7(7.9,8.4)</td><td>5000</td></tr>
<tr><td>Φ5~Φ6.3</td><td>5000</td><td>Φ5~Φ6.3</td><td>6000</td></tr>
<tr><td>Φ8</td><td>6000</td><td>Φ8</td><td>7000</td></tr>
<tr><td>Φ10up</td><td>8000</td><td>Φ10up</td><td>8000</td></tr>
</table></td></tr>
<tr><td>High-temperature storage</td><td>After storage at 105° C for 1,000 hours and a 16-hour recovery period at room temperature, the capacitor's performance shall meet the following requirements when tested at 25 ± 2° C.
<table>
<tr><td>Capacitance change rate</td><td>Within ±20% of the initial value</td></tr>
<tr><td>Dissipation factor</td><td>Below 200% of the specified value</td></tr>
<tr><td>Leakage current</td><td>Below 200% of the specified value</td></tr>
</table></td></tr>
</table>

■ Product Dimensions (Unit: mm)



ΦD	L	B	C	A	H	E	K	α
5	5.7	5.3	5.3	2.1	0.75±0.20	1.5	0.7MAX	±0.3
5	7.9	5.3	5.3	2.1	0.75±0.20	1.5	0.7MAX	±0.3
5	10	5.3	5.3	2.1	0.75±0.20	1.5	0.7MAX	±0.5
6.3	5.7	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.3
6.3	7.7	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.3
6.3	10	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.5
8	6.2	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.3
8	7.9	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.3
8	10	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	12.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	14.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	16.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
10	6.9	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.3
10	8.4	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.3
10	10	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
10	12.5	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
10	13	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
10	14.5	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
10	16.5	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
10	21	10.3	10.3	3.5	0.90±0.20	4.4	0.7MAX	±0.5
12.5	13.5	13	13	4.7	0.90±0.20	4.4	0.7MAX	±1.0
12.5	14.5	13	13	4.7	0.90±0.20	4.4	0.7MAX	±1.0
12.5	16.5	13	13	4.7	0.90±0.20	4.4	0.7MAX	±1.0
16	16.5	17	17	5.5	1.2±0.30	6.7	0.7±0.30	±1.0
16	21	17	17	5.5	1.2±0.30	6.7	0.7±0.30	±1.0
18	17	19	19	6.7	1.2±0.30	6.7	0.7±0.30	±1.0
18	21	19	19	6.7	1.2±0.30	6.7	0.7±0.30	±1.0

■ Frequency correction factor

Frequency (Hz)	50	120	1K	≧10K
Coefficient	0.65	1.00	1.37	1.50

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■ List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
6.3	22	5×5.7	26	VMMB0570J220MVTMCG
	47	5×5.7	37	VMMB0570J470MVTMCG
	68	5×5.7	45	VMMB0570J680MVTMCG
	100	5×5.7	55	VMMB0570J101MVTMCG
	120	5×5.7	61	VMMB0570J121MVTMCG
	220	6.3×5.7	103	VMMC0570J221MVTMCG
	330	8×6.2	135	VMMD0620J331MVTMCG
	330	6.3×7.7	135	VMMC0770J331MVTMCG
	470	8×7.9	200	VMMD0790J471MVTMCG
	680	8×7.9	254	VMMD0790J681MVTMCG
	680	10×6.9	254	VMME0690J681MVTMCG
	1000	10×8.4	362	VMME0840J102MVTMCG
	1000	8×10	362	VMMD1000J102MVTMCG
	1500	10×12.5	520	VMME1250J152MVTMCG
	2200	10×13	570	VMME1300J222MVTMCG
	3300	10×16.5	760	VMME1650J332MVTMCG
	3300	12.5×13.5	760	VMML1350J332MVTMCG
	3900	12.5×14.5	830	VMML1450J392MVTMCG
	4700	12.5×16.5	910	VMML1650J472MVTMCG
10	47	5×5.7	37	VMMB0571A470MVTMCG
	100	6.3×5.7	78	VMMC0571A101MVTMCG
	120	6.3×5.7	85	VMMC0571A121MVTMCG
	150	6.3×5.7	85	VMMC0571A151MVTMCG
	220	6.3×7.7	103	VMMC0771A221MVTMCG
	330	8×6.2	175	VMMD0621A331MVTMCG
	2700	12.5×13.5	810	VMML1351A272MVTMCG
	3900	12.5×16.5	1060	VMML1651A392MVTMCG
	4700	16×16.5	1360	VMMI1651A472MVTMCG
16	10	5×5.7	26	VMMB0571C100MVTMCG
	22	5×5.7	26	VMMB0571C220MVTMCG
	39	5×5.7	33	VMMB0571C390MVTMCG
	47	5×5.7	37	VMMB0571C470MVTMCG
	56	5×7.7	53	VMMB0771C560MVTMCG
	56	6.3×5.7	53	VMMC0571C560MVTMCG
	100	6.3×5.7	70	VMMC0571C101MVTMCG
	120	6.3×5.7	77	VMMC0571C121MVTMCG
	150	6.3×7.7	109	VMMC0771C151MVTMCG
	150	8×6.2	109	VMMD0621C151MVTMCG
	180	8×6.2	120	VMMD0621C181MVTMCG
	220	8×6.2	132	VMMD0621C221MVTMCG
	330	8×7.9	200	VMMD0791C331MVTMCG
	470	10×8.4	295	VMME0841C471MVTMCG
	1000	10×12.5	580	VMME1251C102MVTMCG
	2200	12.5×14.5	860	VMML1451C222MVTMCG
	2700	12.5×16.5	980	VMML1651C272MVTMCG
	3300	16×16.5	1130	VMMI1651C332MVTMCG
	3900	16×16.5	1250	VMMI1651C392MVTMCG
	4700	18×17	1580	VMMJ1701C472MVTMCG
25	10	5×5.7	26	VMMB0571E100MVTMCG
	15	5×5.7	26	VMMB0571E150MVTMCG
	22	5×5.7	26	VMMB0571E220MVTMCG
	33	5×5.7	30	VMMB0571E330MVTMCG
	47	5×7.7	54	VMMB0771E470MVTMCG
	56	5×7.7	60	VMMB0771E560MVTMCG
	68	6.3×5.7	100	VMMC0571E680MVTMCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
25	82	6.3×7.7	115	VMMC0771E820MVTMCG
	100	8×6.2	160	VMMD0621E101MVTMCG
	120	6.3×7.7	180	VMMC0771E121MVTMCG
	150	8×6.2	200	VMMD0621E151MVTMCG
	180	8×7.9	170	VMMD0791E181MVTMCG
	220	10×6.9	250	VMME0691E221MVTMCG
	330	10×8.4	345	VMME0841E331MVTMCG
	390	10×8.4	380	VMME0841E391MVTMCG
	470	10×10	490	VMME1001E471MVTMCG
	1000	12.5×13.5	780	VMML1351E102MVTMCG
	2200	16×16.5	1100	VMMI1651E222MVTMCG
	3300	18×17	1350	VMMJ1701E332MVTMCG
	3900	18×21	1480	VMMJ2101E392MVTMCG
	4700	18×21	1650	VMMJ2101E472MVTMCG
35	10	5×5.7	26	VMMB0571V100MVTMCG
	15	5×5.7	26	VMMB0571V150MVTMCG
	22	5×5.7	26	VMMB0571V220MVTMCG
	33	6.3×5.7	55	VMMC0571V330MVTMCG
	47	6.3×5.7	67	VMMC0571V470MVTMCG
	68	6.3×7.7	105	VMMC0771V680MVTMCG
	82	6.3×7.7	116	VMMC0771V820MVTMCG
	100	8×7.9	160	VMMD0791V101MVTMCG
	150	8×7.9	180	VMMD0791V151MVTMCG
	220	10×8.4	315	VMME0841V221MVTMCG
	330	10×10	420	VMME1001V331MVTMCG
	470	10×13	570	VMME1301V471MVTMCG
	1000	12.5×16.5	780	VMML1651V102MVTMCG
	1800	16×16.5	1010	VMMI1651V182MVTMCG
	2200	18×17	1100	VMMJ1701V222MVTMCG
	2700	18×21	1230	VMMJ2101V272MVTMCG
50	8.2	5×5.7	26	VMMB0571H8R2MVTMCG
	10	5×5.7	29	VMMB0571H100MVTMCG
	15	5×5.7	35	VMMB0571H150MVTMCG
	22	5×7.7	57	VMMB0771H220MVTMCG
	22	6.3×5.7	57	VMMC0571H220MVTMCG
	33	6.3×7.7	72	VMMC0771H330MVTMCG
	33	8×6.2	72	VMMD0621H330MVTMCG
	47	6.3×7.7	88	VMMC0771H470MVTMCG
	47	8×6.2	88	VMMD0621H470MVTMCG
	56	8×6.2	100	VMMD0621H560MVTMCG
	68	8×7.9	120	VMMD0791H680MVTMCG
	68	10×6.9	120	VMME0691H680MVTMCG
	82	8×7.9	140	VMMD0791H820MVTMCG
	82	10×6.9	140	VMME0691H820MVTMCG
	100	8×7.9	150	VMMD0791H101MVTMCG
	100	10×6.9	150	VMME0691H101MVTMCG
	150	10×8.4	220	VMME0841H151MVTMCG
	180	10×10	310	VMME1001H181MVTMCG
	220	10×12.5	340	VMME1251H221MVTMCG
	270	10×12.5	375	VMME1251H271MVTMCG
	330	12.5×13.5	415	VMML1351H331MVTMCG
	330	10×14.5	415	VMME1451H331MVTMCG
	470	12.5×13.5	500	VMML1351H471MVTMCG
	560	12.5×14.5	550	VMML1451H561MVTMCG
	680	12.5×16.5	610	VMML1651H681MVTMCG

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■ List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
50	1000	16×16.5	680	VMMI1651H102MVTMCG
	1200	18×17	750	VMMJ1701H122MVTMCG
	1500	16×21	830	VMMI2101H152MVTMCG
	1800	18×21	910	VMMJ2101H182MVTMCG
63	4.7	5×5.7	20	VMMB0571J4R7MVTMCG
	10	5×5.7	29	VMMB0571J100MVTMCG
	22	6.3×5.7	60	VMMC0571J220MVTMCG
	27	6.3×7.7	65	VMMC0771J270MVTMCG
	33	6.3×7.7	72	VMMC0771J330MVTMCG
	39	8×6.2	80	VMMD0621J390MVTMCG
	47	8×7.9	88	VMMD0791J470MVTMCG
	47	10×6.9	88	VMME0691J470MVTMCG
	56	8×7.9	98	VMMD0791J560MVTMCG
	56	10×6.9	98	VMME0691J560MVTMCG
	68	8×7.9	110	VMMD0791J680MVTMCG
	68	10×6.9	110	VMME0691J680MVTMCG
	100	10×8.4	180	VMME0841J101MVTMCG
	150	10×12.5	250	VMME1251J151MVTMCG
	180	10×12.5	275	VMME1251J181MVTMCG
	220	12.5×13.5	320	VMML1351J221MVTMCG
	330	12.5×13.5	390	VMML1351J331MVTMCG
	470	12.5×16.5	480	VMML1651J471MVTMCG
	680	16×16.5	610	VMMI1651J681MVTMCG
	1000	18×17	750	VMMJ1701J102MVTMCG
	1200	16×21	830	VMMI2101J122MVTMCG
	1500	18×21	910	VMMJ2101J152MVTMCG
80	2.2	5×5.7	12	VMMB0571K2R2MVTMCG
	10	5×7.7	28	VMMB0771K100MVTMCG
	12	6.3×5.7	31	VMMC0571K120MVTMCG
	15	6.3×7.7	38	VMMC0771K150MVTMCG
	22	6.3×7.7	49	VMMC0771K220MVTMCG
	22	8×6.2	60	VMMD0621K220MVTMCG
	27	8×6.2	65	VMMD0621K270MVTMCG
	33	8×7.9	78	VMMD0791K330MVTMCG
	33	10×6.9	78	VMME0691K330MVTMCG
	39	8×7.9	86	VMMD0791K390MVTMCG
	39	10×6.9	86	VMME0691K390MVTMCG
	47	10×8.4	110	VMME0841K470MVTMCG
	68	10×8.4	155	VMME0841K680MVTMCG
	82	10×10	180	VMME1001K820MVTMCG
	100	10×10	200	VMME1001K101MVTMCG
	120	10×12.5	250	VMME1251K121MVTMCG
	220	12.5×13.5	320	VMML1351K221MVTMCG
	270	12.5×14.5	390	VMML1451K271MVTMCG
	330	12.5×16.5	480	VMML1651K331MVTMCG
	470	16×16.5	590	VMMI1651K471MVTMCG
	560	18×17	700	VMMJ1701K561MVTMCG
	680	16×21	700	VMMI2101K681MVTMCG
	820	18×21	850	VMMJ2101K821MVTMCG
100	2.2	5×5.7	12	VMMB0572A2R2MVTMCG
	3.9	5×5.7	18	VMMB0572A3R9MVTMCG
	4.7	5×5.7	20	VMMB0572A4R7MVTMCG
	10	6.3×5.7	28	VMMC0572A100MVTMCG
	15	6.3×7.7	34	VMMC0772A150MVTMCG
	15	8×6.2	34	VMMD0622A150MVTMCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
100	18	8×6.2	44	VMMD0622A180MVTMCG
	22	8×7.9	60	VMMD0792A220MVTMCG
	22	10×6.9	60	VMME0692A220MVTMCG
	27	8×7.9	78	VMMD0792A270MVTMCG
	27	10×6.9	78	VMME0692A270MVTMCG
	47	10×8.4	140	VMME0842A470MVTMCG
	56	10×10	170	VMME1002A560MVTMCG
	68	10×12.5	200	VMME1252A680MVTMCG
	82	10×13	250	VMME1302A820MVTMCG
	100	12.5×13.5	310	VMML1352A101MVTMCG
	120	12.5×13.5	320	VMML1352A121MVTMCG
	150	12.5×13.5	320	VMML1352A151MVTMCG
	220	12.5×16.5	480	VMML1652A221MVTMCG
	330	16×16.5	590	VMMI1652A331MVTMCG
	390	18×17	700	VMMJ1702A391MVTMCG
	470	16×21	700	VMMI2102A471MVTMCG
	560	18×21	850	VMMJ2102A561MVTMCG
160	3.3	6.3×5.7	22	VMMC0572C3R3MVTMCG
	3.9	6.3×5.7	22	VMMC0572C3R9MVTMCG
	4.7	6.3×7.7	28	VMMC0772C4R7MVTMCG
	5.6	6.3×7.7	40	VMMC0772C5R6MVTMCG
	6.8	8×6.2	45	VMMD0622C6R8MVTMCG
	8.2	8×6.2	51	VMMD0622C8R2MVTMCG
	10	8×7.9	56	VMMD0792C100MVTMCG
	10	10×6.9	56	VMME0692C100MVTMCG
	12	8×7.9	62	VMMD0792C120MVTMCG
	12	10×6.9	62	VMME0692C120MVTMCG
	15	10×8.4	87	VMME0842C150MVTMCG
	18	10×8.4	95	VMME0842C180MVTMCG
	22	10×10	110	VMME1002C220MVTMCG
	33	10×12.5	165	VMME1252C330MVTMCG
	56	12.5×13.5	330	VMML1352C560MVTMCG
	100	12.5×16.5	440	VMML1652C101MVTMCG
	180	18×17	630	VMMJ1702C181MVTMCG
	220	18×21	835	VMMJ2102C221MVTMCG
200	1.2	5×5.7	18	VMMB0572D1R2MVTMCG
	2.7	6.3×5.7	31	VMMC0572D2R7MVTMCG
	3.3	6.3×5.7	35	VMMC0572D3R3MVTMCG
	4.7	6.3×7.7	45	VMMC0772D4R7MVTMCG
	5.6	8×6.2	50	VMMD0622D5R6MVTMCG
	10	8×7.9	72	VMMD0792D100MVTMCG
	10	10×6.9	72	VMME0692D100MVTMCG
	12	8×10	90	VMMD1002D120MVTMCG
	12	10×8.4	90	VMME0842D120MVTMCG
	15	10×8.4	105	VMME0842D150MVTMCG
	22	10×12.5	180	VMME1252D220MVTMCG
	33	10×14.5	250	VMME1452D330MVTMCG
	47	12.5×13.5	330	VMML1352D470MVTMCG
	56	12.5×14.5	340	VMML1452D560MVTMCG
	100	16×16.5	480	VMMI1652D101MVTMCG
	120	18×17	575	VMMJ1702D121MVTMCG
	150	16×21	575	VMMI2102D151MVTMCG
	180	18×21	690	VMMJ2102D181MVTMCG
250	1.0	5×5.7	15	VMMB0572E1R0MVTMCG
	2.2	6.3×5.7	22	VMMC0572E2R2MVTMCG

VMM

■List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
250	3.9	6.3×7.7	40	VMMC0772E3R9MVTMCG
	3.9	8×6.2	40	VMMD0622E3R9MVTMCG
	4.7	8×6.2	50	VMMD0622E4R7MVTMCG
	5.6	8×7.9	55	VMMD0792E5R6MVTMCG
	5.6	10×6.9	55	VMME0692E5R6MVTMCG
	6.8	8×7.9	65	VMMD0792E6R8MVTMCG
	6.8	10×6.9	65	VMME0692E6R8MVTMCG
	10	10×8.4	95	VMME0842E100MVTMCG
	18	10×12.5	140	VMME1252E180MVTMCG
	22	10×12.5	180	VMME1252E220MVTMCG
	33	12.5×13.5	270	VMML1352E330MVTMCG
	47	12.5×16.5	375	VMML1652E470MVTMCG
	82	16×16.5	450	VMMI1652E820MVTMCG
	100	18×17	500	VMMJ1702E101MVTMCG
	120	16×21	540	VMMI2102E121MVTMCG
	150	18×21	670	VMMJ2102E151MVTMCG
350	1.5	6.3×5.7	25	VMMC0572V1R5MVTMCG
	4.7	8×7.9	70	VMMD0792V4R7MVTMCG
	4.7	10×6.9	70	VMME0692V4R7MVTMCG
	6.8	8×10	84	VMMD1002V6R8MVTMCG
	6.8	10×8.4	88	VMME0842V6R8MVTMCG
	10	10×10	105	VMME1002V100MVTMCG
	22	12.5×13.5	150	VMML1352V220MVTMCG
	47	16×16.5	258	VMMI1652V470MVTMCG
	68	18×17	340	VMMJ1702V680MVTMCG
	82	18×21	380	VMMJ2102V820MVTMCG
	100	18×21	410	VMMJ2102V101MVTMCG
400	1.0	5×7.7	18	VMMB0772G1R0MVTMCG
	1.2	6.3×5.7	20	VMMC0572G1R2MVTMCG
	1.5	6.3×7.7	28	VMMC0772G1R5MVTMCG
	1.8	6.3×7.7	31	VMMC0772G1R8MVTMCG
	2.2	6.3×7.7	40	VMMC0772G2R2MVTMCG
	2.2	8×6.2	44	VMMD0622G2R2MVTMCG
	2.7	8×6.2	48	VMMD0622G2R7MVTMCG
	3.3	8×7.9	55	VMMD0792G3R3MVTMCG
	4.7	10×6.9	70	VMME0692G4R7MVTMCG
	5.6	8×10	84	VMMD1002G5R6MVTMCG
	5.6	10×8.4	84	VMME0842G5R6MVTMCG
	6.8	8×12.5	88	VMMD1252G6R8MVTMCG
	6.8	10×8.4	88	VMME0842G6R8MVTMCG
	8.2	10×10	105	VMME1002G8R2MVTMCG
	10	10×12.5	120	VMME1252G100MVTMCG
	22	12.5×14.5	165	VMML1452G220MVTMCG
	33	12.5×16.5	200	VMML1652G330MVTMCG
	47	16×16.5	258	VMMI1652G470MVTMCG
	56	18×17	310	VMMJ1702G560MVTMCG
	68	16×21	340	VMMI2102G680MVTMCG
	82	18×21	380	VMMJ2102G820MVTMCG
450	1.0	6.3×5.7	20	VMMC0572W1R0MVTMCG
	1.2	8×6.2	24	VMMD0622W1R2MVTMCG
	1.5	6.3×7.7	28	VMMC0772W1R5MVTMCG
	1.8	8×6.2	37	VMMD0622W1R8MVTMCG
	3.3	8×7.9	55	VMMD0792W3R3MVTMCG
	3.3	10×6.9	55	VMME0692W3R3MVTMCG
	4.7	10×8.4	72	VMME0842W4R7MVTMCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
450	5.6	10×10	88	VMME1002W5R6MVTMCG
	6.8	10×12.5	105	VMME1252W6R8MVTMCG
	10	10×13	126	VMME1302W100MVTMCG
	15	12.5×13.5	150	VMML1352W150MVTMCG
	22	12.5×16.5	200	VMML1652W220MVTMCG
	33	16×16.5	258	VMMI1652W330MVTMCG
	39	18×17	310	VMMJ1702W390MVTMCG
	47	16×21	340	VMMI2102W470MVTMCG
	56	18×21	380	VMMJ2102W560MVTMCG
500	1.0	6.3×7.7	20	VMMC0772H1R0MVTMCG
	1.5	8×6.2	20	VMMD0622H1R5MVTMCG
	2.2	8×7.9	30	VMMD0792H2R2MVTMCG
	3.3	10×8.4	36	VMME0842H3R3MVTMCG
	4.7	8×14.5	50	VMMD1452H4R7MVTMCG
	4.7	10×10	50	VMME1002H4R7MVTMCG
	10	10×14.5	72	VMME1452H100MVTMCG
	10	12.5×13.5	86	VMML1352H100MVTMCG
	15	12.5×14.5	105	VMML1452H150MVTMCG
	18	12.5×16.5	125	VMML1652H180MVTMCG
	27	16×16.5	165	VMMI1652H270MVTMCG
	33	18×17	180	VMMJ1702H330MVTMCG
	39	16×21	215	VMMI2102H390MVTMCG
	47	18×21	258	VMMJ2102H470MVTMCG

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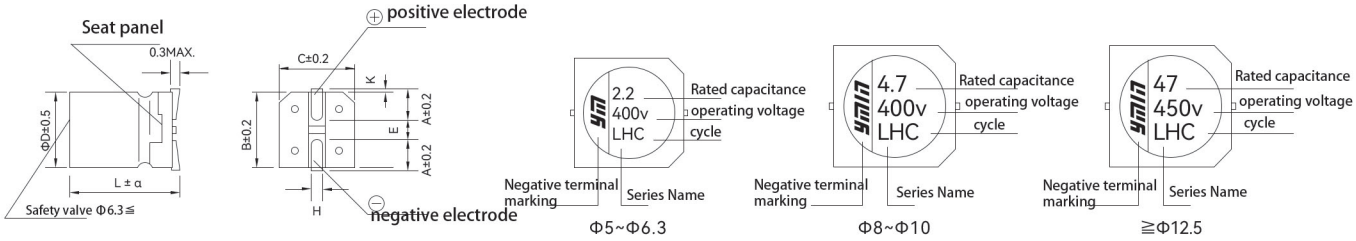
◆ High-temperature resistance, long service life, high-frequency/high-ripple current capability; designed for high-end power supplies
◆ 2,000 – 5,000 hours at 125° C
◆ AEC-Q200 compliant; RoHS compliant
◆ Suitable for high-density designs and fully automated surface mounting; compatible with high-temperature reflow soldering

■ Key Technical Parameters

<table>
<tr><th>project</th><th>characteristic</th></tr>
<tr><td>Operating temperature range</td><td>≦100V －40~+125℃ ; 160~450V －25~+125℃</td></tr>
<tr><td>Nominal voltage range</td><td>16~450V</td></tr>
<tr><td>Permissible capacitance deviation</td><td>±20% (25±2℃ 120Hz)</td></tr>
<tr><td rowspan="2">Leakage current (μA)</td><td>16~100WV I≦0.01CV or 3μA Take the larger value C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading</td></tr>
<tr><td>160~450WV I≦0.02CV+10(μA) C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading</td></tr>
<tr><td>Dissipation factor
(25±2° C, 120 Hz)</td><td>
<table>
<tr><td>Rated voltage (V)</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td></tr>
<tr><td>tg δ</td><td>0.24</td><td>0.20</td><td>0.16</td><td>0.14</td><td>0.14</td><td>0.12</td><td>0.12</td></tr>
<tr><td>Rated voltage (V)</td><td>160</td><td>200</td><td>250</td><td>400</td><td>450</td><td></td><td></td></tr>
<tr><td>tg δ</td><td>0.15</td><td>0.15</td><td>0.15</td><td>0.20</td><td>0.20</td><td></td><td></td></tr>
</table>
For nominal capacitance exceeding 1000 μF, the dissipation factor increases by 0.02 for every additional 1000 μF.
</td></tr>
<tr><td>Temperature characteristics
(120Hz)</td><td>
<table>
<tr><td>Rated voltage (V)</td><td>16</td><td>25</td><td>35</td><td>50</td><td>63</td><td>80</td><td>100</td></tr>
<tr><td>Impedance ratio Z(-40° C)/Z(20° C)</td><td>4</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td><td>3</td></tr>
<tr><td>Rated voltage (V)</td><td>160</td><td>200</td><td>250</td><td>400</td><td>450</td><td></td><td></td></tr>
<tr><td>Impedance ratio Z(-40° C)/Z(20° C)</td><td>5</td><td>5</td><td>5</td><td>7</td><td>7</td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Durability</td><td>
After being subjected to rated voltage in a 105° C oven for the specified duration and then allowed to stand at room temperature for 16 hours, the capacitor shall be tested at a temperature of 25 ± 2° C;the performance of the capacitor shall meet the following requirements:
<table>
<tr><td rowspan="2">Rate of capacity change</td><td colspan="4">16~100WV Within ±30% of the initial value</td></tr>
<tr><td colspan="4">160~450WV Within 300% of the initial value</td></tr>
<tr><td rowspan="2">Loss tangent value</td><td colspan="4">16~100WV Within 300% of the initial value</td></tr>
<tr><td colspan="4">160~450WV Within 200% of the initial value</td></tr>
<tr><td>Leakage current</td><td colspan="4">Within the specified limits</td></tr>
<tr><td rowspan="4">Load life</td><td colspan="2">16~100WV</td><td colspan="2">160~450WV</td></tr>
<tr><td>size</td><td>life</td><td>size</td><td>life</td></tr>
<tr><td>ΦD=5、6.3</td><td>2000小时</td><td>ΦD=5、6.3</td><td>2000h</td></tr>
<tr><td>ΦD=8、10</td><td>3000小时</td><td>ΦD=8</td><td>3000h</td></tr>
<tr><td></td><td>ΦD≧12.5</td><td>5000小时</td><td>ΦD≧10</td><td>5000h</td></tr>
</table>
</td></tr>
<tr><td>High-temperature storage</td><td>
After storage at 105° C for 1,000 hours and a 16-hour recovery period at room temperature, the capacitor's performance shall meet the following requirements when tested at 25 ± 2° C.
<table>
<tr><td>Capacitance change rate</td><td>Within ±20% of the initial value</td></tr>
<tr><td>Dissipation factor</td><td>Below 200% of the specified value</td></tr>
<tr><td>Leakage current</td><td>Below 200% of the specified value</td></tr>
</table>
</td></tr>
</table>

■ Product Dimensions (Unit: mm)



ΦD	L	B	C	A	H	E	K	α
5	10	5.3	5.3	2.1	0.75±0.20	1.3	0.7MAX	±0.5
5	12	5.3	5.3	2.1	0.75±0.20	1.3	0.7MAX	±0.5
6.3	10	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.5
6.3	12	6.6	6.6	2.6	0.75±0.20	1.8	0.7MAX	±0.5
8	10	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	12.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	14.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	16.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
8	20.5	8.3	8.3	3.0	0.90±0.20	3.1	0.7MAX	±0.5
10	10	10.3	10.3	3.5	0.90±0.20	4.6	0.7MAX	±0.5
10	13	10.3	10.3	3.5	0.90±0.20	4.6	0.7MAX	±0.5
10	14.5	10.3	10.3	3.5	0.90±0.20	4.6	0.7MAX	±0.5
10	16.5	10.3	10.3	3.5	0.90±0.20	4.6	0.7MAX	±0.5
10	21	10.3	10.3	3.5	0.90±0.20	4.6	0.7MAX	±0.5
12.5	13.5	13.0	13.0	4.7	0.90±0.30	4.4	0.7MAX	±1.0
12.5	14.5	13.0	13.0	4.7	0.90±0.30	4.4	0.7MAX	±1.0
12.5	16.5	13.0	13.0	4.7	0.90±0.30	4.4	0.7MAX	±1.0
12.5	21	13.0	13.0	4.7	0.90±0.30	4.4	0.7MAX	±1.0
16	16.5	17.0	17.0	5.5	1.20±0.30	6.7	0.7±0.30	±1.0
16	21	17.0	17.0	5.5	1.20±0.30	6.7	0.7±0.30	±1.0
18	16.5	19.0	19.0	6.7	1.20±0.30	6.7	0.7±0.30	±1.0
18	21	19.0	19.0	6.7	1.20±0.30	6.7	0.7±0.30	±1.0

■ Frequency correction factor

Frequency (Hz)		120	1K	10K	100K≦
coefficient	0.47~8.2	0.42	0.60	0.80	1.00
	10~39	0.45	0.75	0.90	1.00
	47~180	0.50	0.80	0.95	1.00
	220以上	0.60	0.85	0.95	1.00

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■List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
16	10	5×10	72	VKLB1001C100MVTMCG
	22	5×10	72	VKLB1001C220MVTMCG
	47	5×10	114	VKLB1001C470MVTMCG
	100	6.3×10	200	VKLC1001C101MVTMCG
	150	6.3×10	240	VKLC1001C151MVTMCG
	220	8×10	324	VKLD1001C221MVTMCG
	330	8×10	380	VKLD1001C331MVTMCG
	470	8×12.5	650	VKLD1251C471MVTMCG
	1000	10×16.5	1000	VKLE1651C102MVTMCG
	2200	12.5×21	1500	VKLL2101C222MVTMCG
	3300	18×21	2400	VKLJ2101C332MVTMCG
25	10	5×10	72	VKLB1001E100MVTMCG
	22	5×10	72	VKLB1001E220MVTMCG
	47	5×10	114	VKLB1001E470MVTMCG
	100	6.3×10	240	VKLC1001E101MVTMCG
	150	8×10	324	VKLD1001E151MVTMCG
	220	8×12.5	380	VKLD1251E221MVTMCG
	330	8×14.5	650	VKLD1451E331MVTMCG
	330	10×13	650	VKLE1301E331MVTMCG
	470	10×13	850	VKLE1301E471MVTMCG
	1000	10×21	1155	VKLE2101E102MVTMCG
	2200	18×21	2400	VKLJ2101E222MVTMCG
35	10	5×10	81	VKLB1001V100MVTMCG
	22	5×10	81	VKLB1001V220MVTMCG
	47	6.3×10	240	VKLC1001V470MVTMCG
	100	8×10	324	VKLD1001V101MVTMCG
	150	8×12.5	380	VKLD1251V151MVTMCG
	150	10×10	324	VKLE1001V151MVTMCG
	220	8×12.5	650	VKLD1251V221MVTMCG
	330	10×13	850	VKLE1301V331MVTMCG
	470	10×16.5	1000	VKLE1651V471MVTMCG
	1000	12.5×21	1500	VKLL2101V102MVTMCG
50	1.0	5×10	32	VKLB1001H1R0MVTMCG
	1.5	5×10	32	VKLB1001H1R5MVTMCG
	1.8	5×10	32	VKLB1001H1R8MVTMCG
	2.2	5×10	45	VKLB1001H2R2MVTMCG
	3.3	5×10	63	VKLB1001H3R3MVTMCG
	3.9	5×10	63	VKLB1001H3R9MVTMCG
	4.7	5×10	90	VKLB1001H4R7MVTMCG
	5.6	5×10	90	VKLB1001H5R6MVTMCG
	6.8	5×10	94	VKLB1001H6R8MVTMCG
	8.2	5×10	98	VKLB1001H8R2MVTMCG
	10	5×10	98	VKLB1001H100MVTMCG
	15	5×10	108	VKLB1001H150MVTMCG
	22	6.3×10	170	VKLC1001H220MVTMCG
	33	6.3×10	245	VKLC1001H330MVTMCG
	47	6.3×12	320	VKLC1201H470MVTMCG
	47	8×10	330	VKLD1001H470MVTMCG
	56	8×10	330	VKLD1001H560MVTMCG
	100	8×12.5	500	VKLD1251H101MVTMCG
	100	10×10	550	VKLE1001H101MVTMCG
	220	10×16.5	940	VKLE1651H221MVTMCG
	330	12.5×16.5	980	VKLL1651H331MVTMCG
	470	12.5×21	1050	VKLL2101H471MVTMCG
	1000	18×21	2290	VKLJ2101H102MVTMCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
63	1.0	5×10	32	VKLB1001J1R0MVTMCG
	1.5	5×10	32	VKLB1001J1R5MVTMCG
	1.8	5×10	32	VKLB1001J1R8MVTMCG
	2.2	5×10	45	VKLB1001J2R2MVTMCG
	3.3	5×10	63	VKLB1001J3R3MVTMCG
	3.9	5×10	63	VKLB1001J3R9MVTMCG
	4.7	5×10	90	VKLB1001J4R7MVTMCG
	5.6	5×10	90	VKLB1001J5R6MVTMCG
	6.8	5×10	94	VKLB1001J6R8MVTMCG
	8.2	5×10	98	VKLB1001J8R2MVTMCG
	10	5×10	108	VKLB1001J100MVTMCG
	15	5×10	118	VKLB1001J150MVTMCG
	22	6.3×10	180	VKLC1001J220MVTMCG
	33	6.3×12	265	VKLC1201J330MVTMCG
	33	8×10	280	VKLD1001J330MVTMCG
	47	8×10	420	VKLD1001J470MVTMCG
	56	8×10	420	VKLD1001J560MVTMCG
	100	8×16.5	590	VKLD1651J101MVTMCG
	100	10×13	590	VKLE1301J101MVTMCG
	220	10×21	860	VKLE2101J221MVTMCG
	330	12.5×21	1050	VKLL2101J331MVTMCG
	470	16×21	1570	VKLI2101J471MVTMCG
80	1.0	5×10	32	VKLB1001K1R0MVTMCG
	1.5	5×10	32	VKLB1001K1R5MVTMCG
	1.8	5×10	32	VKLB1001K1R8MVTMCG
	2.2	5×10	45	VKLB1001K2R2MVTMCG
	2.7	5×10	45	VKLB1001K2R7MVTMCG
	3.3	5×10	63	VKLB1001K3R3MVTMCG
	3.9	5×10	63	VKLB1001K3R9MVTMCG
	4.7	5×10	90	VKLB1001K4R7MVTMCG
	5.6	5×10	90	VKLB1001K5R6MVTMCG
	6.8	5×10	90	VKLB1001K6R8MVTMCG
	8.2	5×10	90	VKLB1001K8R2MVTMCG
	10	6.3×10	108	VKLC1001K100MVTMCG
	15	6.3×10	180	VKLC1001K150MVTMCG
	22	6.3×12	210	VKLC1201K220MVTMCG
	22	8×10	180	VKLD1001K220MVTMCG
	33	6.3×12	230	VKLC1201K330MVTMCG
	33	8×10	198	VKLD1001K330MVTMCG
	47	8×12.5	280	VKLD1251K470MVTMCG
	47	10×10	280	VKLE1001K470MVTMCG
	56	10×10	280	VKLE1001K560MVTMCG
	100	10×16.5	550	VKLE1651K101MVTMCG
	220	12.5×21	890	VKLL2101K221MVTMCG
	330	12.5×21	1050	VKLL2101K331MVTMCG
	470	18×21	1400	VKLJ2101K471MVTMCG
100	1.0	5×10	32	VKLB1002A1R0MVTMCG
	1.5	5×10	32	VKLB1002A1R5MVTMCG
	1.8	5×10	32	VKLB1002A1R8MVTMCG
	2.2	5×10	45	VKLB1002A2R2MVTMCG
	3.3	5×10	63	VKLB1002A3R3MVTMCG
	3.9	5×10	63	VKLB1002A3R9MVTMCG
	4.7	5×10	90	VKLB1002A4R7MVTMCG
	5.6	6.3×10	90	VKLC1002A5R6MVTMCG
	6.8	6.3×10	90	VKLC1002A6R8MVTMCG

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■List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
100	8.2	6.3×10	90	VKLC1002A8R2MVTMCG
	10	6.3×10	180	VKLC1002A100MVTMCG
	15	6.3×12	210	VKLC1202A150MVTMCG
	15	8×10	180	VKLD1002A150MVTMCG
	22	8×12.5	230	VKLD1252A220MVTMCG
	22	10×10	198	VKLE1002A220MVTMCG
	33	8×12.5	280	VKLD1252A330MVTMCG
	33	10×10	280	VKLE1002A330MVTMCG
	47	10×13	350	VKLE1302A470MVTMCG
	56	10×13	350	VKLE1302A560MVTMCG
	100	12.5×16.5	700	VKLL1652A101MVTMCG
	220	16×21	1155	VKLI2102A221MVTMCG
	330	18×21	1400	VKLJ2102A331MVTMCG
160	1.0	6.3×10	48	VKLC1002C1R0MVTMCG
	1.5	6.3×10	48	VKLC1002C1R5MVTMCG
	1.8	6.3×10	68	VKLC1002C1R8MVTMCG
	2.2	6.3×10	68	VKLC1002C2R2MVTMCG
	3.3	6.3×10	72	VKLC1002C3R3MVTMCG
	3.9	6.3×10	72	VKLC1002C3R9MVTMCG
	4.7	6.3×10	81	VKLC1002C4R7MVTMCG
	5.6	6.3×10	85	VKLC1002C5R6MVTMCG
	6.8	6.3×12	90	VKLC1202C6R8MVTMCG
	8.2	8×10	107	VKLD1002C8R2MVTMCG
	10	8×10	107	VKLD1002C100MVTMCG
	15	8×12.5	117	VKLD1252C150MVTMCG
	22	8×14.5	160	VKLD1452C220MVTMCG
	22	10×13	178	VKLE1302C220MVTMCG
	33	10×14.5	255	VKLE1452C330MVTMCG
	47	10×21	400	VKLE2102C470MVTMCG
	56	12.5×16.5	608	VKLL1652C560MVTMCG
	100	16×21	825	VKLI2102C101MVTMCG
200	1.0	6.3×10	68	VKLC1002D1R0MVTMCG
	1.5	6.3×10	68	VKLC1002D1R5MVTMCG
	1.8	6.3×10	72	VKLC1002D1R8MVTMCG
	2.2	6.3×10	81	VKLC1002D2R2MVTMCG
	2.7	6.3×10	81	VKLC1002D2R7MVTMCG
	3.3	6.3×10	85	VKLC1002D3R3MVTMCG
	3.9	6.3×10	90	VKLC1002D3R9MVTMCG
	4.7	6.3×12	110	VKLC1202D4R7MVTMCG
	5.6	8×10	117	VKLD1002D5R6MVTMCG
	6.8	8×10	117	VKLD1002D6R8MVTMCG
	8.2	8×12.5	165	VKLD1252D8R2MVTMCG
	8.2	10×10	160	VKLE1002D8R2MVTMCG
	10	8×14.5	210	VKLD1452D100MVTMCG
	10	10×10	160	VKLE1002D100MVTMCG
	15	8×16.5	210	VKLD1652D150MVTMCG
	22	8×20.5	250	VKLD2052D220MVTMCG
	22	10×14.5	250	VKLE1452D220MVTMCG
	33	10×21	340	VKLE2102D330MVTMCG
	47	12.5×21	400	VKLL2102D470MVTMCG
	56	12.5×21	500	VKLL2102D560MVTMCG
	100	16×21	800	VKLI2102D101MVTMCG
250	1.0	6.3×10	68	VKLC1002E1R0MVTMCG
	1.5	6.3×10	68	VKLC1002E1R5MVTMCG
	1.8	6.3×10	81	VKLC1002E1R8MVTMCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
250	2.2	6.3×10	81	VKLC1002E2R2MVTMCG
	2.7	6.3×10	81	VKLC1002E2R7MVTMCG
	3.3	6.3×10	90	VKLC1002E3R3MVTMCG
	3.9	6.3×12	110	VKLC1202E3R9MVTMCG
	4.7	6.3×12	110	VKLC1202E4R7MVTMCG
	4.7	8×10	90	VKLD1002E4R7MVTMCG
	5.6	8×10	117	VKLD1002E5R6MVTMCG
	6.8	8×10	162	VKLD1002E6R8MVTMCG
	8.2	8×12.5	165	VKLD1252E8R2MVTMCG
	8.2	10×10	160	VKLE1002E8R2MVTMCG
	10	8×14.5	210	VKLD1452E100MVTMCG
	15	8×16.5	210	VKLD1652E150MVTMCG
	22	8×20.5	250	VKLD2052E220MVTMCG
	22	10×14.5	250	VKLE1452E220MVTMCG
	33	10×21	340	VKLE2102E330MVTMCG
	47	12.5×21	400	VKLL2102E470MVTMCG
	56	12.5×21	500	VKLL2102E560MVTMCG
	100	18×21	800	VKLJ2102E101MVTMCG
400	1.0	6.3×10	54	VKLC1002G1R0MVTMCG
	1.5	6.3×10	68	VKLC1002G1R5MVTMCG
	1.8	6.3×10	68	VKLC1002G1R8MVTMCG
	2.2	6.3×10	80	VKLC1002G2R2MVTMCG
	3.3	8×10	110	VKLD1002G3R3MVTMCG
	3.9	8×12.5	125	VKLD1252G3R9MVTMCG
	4.7	8×12.5	125	VKLD1252G4R7MVTMCG
	4.7	10×10	125	VKLE1002G4R7MVTMCG
	5.6	8×14.5	130	VKLD1452G5R6MVTMCG
	6.8	10×13	208	VKLE1302G6R8MVTMCG
	8.2	8×20.5	250	VKLD2052G8R2MVTMCG
	8.2	10×14.5	260	VKLE1452G8R2MVTMCG
	10	10×16.5	330	VKLE1652G100MVTMCG
	10	12.5×14.5	360	VKLL1452G100MVTMCG
	15	12.5×16.5	410	VKLL1652G150MVTMCG
	22	12.5×21	500	VKLL2102G220MVTMCG
	33	16×21	730	VKLI2102G330MVTMCG
	47	18×21	850	VKLJ2102G470MVTMCG
450	1.0	6.3×10	60	VKLC1002W1R0MVTMCG
	1.5	6.3×10	60	VKLC1002W1R5MVTMCG
	1.8	8×10	84	VKLD1002W1R8MVTMCG
	2.2	8×10	90	VKLD1002W2R2MVTMCG
	2.7	8×10	120	VKLD1002W2R7MVTMCG
	3.3	8×12.5	120	VKLD1252W3R3MVTMCG
	3.9	8×12.5	130	VKLD1252W3R9MVTMCG
	4.7	8×14.5	130	VKLD1452W4R7MVTMCG
	5.6	10×13	140	VKLE1302W5R6MVTMCG
	6.8	10×14.5	260	VKLE1452W6R8MVTMCG
	8.2	8×20.5	260	VKLD2052W8R2MVTMCG
	8.2	10×14.5	260	VKLE1452W8R2MVTMCG
	10	10×16.5	320	VKLE1652W100MVTMCG
	10	12.5×14.5	360	VKLL1452W100MVTMCG
	15	12.5×16.5	410	VKLL1652W150MVTMCG
	22	12.5×21	500	VKLL2102W220MVTMCG
	33	16×21	820	VKLI2102W330MVTMCG
	47	18×21	980	VKLJ2102W470MVTMCG

LK

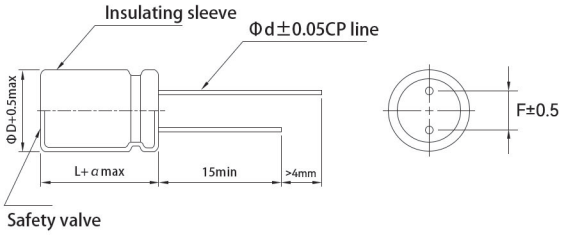
◆ Compact size; withstands high-frequency, high-ripple currents; high-frequency, low-impedance characteristics; designed for high-end power supplies
◆ 6,000 – 8,000 hours at 105° C
◆ AEC-Q200 compliant; RoHS compliant



■ Key Technical Parameters

project	characteristic
Operating temperature range	−55~+105℃
Nominal voltage range	25~100V
Permissible capacitance deviation	±20% (25±2℃ 120Hz)
Leakage current (μA)	25~100WV I≦0.01CV or 3μA Take the larger value C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading
Dissipation factor (25±2° C, 120 Hz)	Rated voltage (V): 25 / 35 / 50 / 63 / 80 / 100 tg δ: 0.14 / 0.12 / 0.10 / 0.09 / 0.09 / 0.09 For nominal capacitance exceeding 1000 μF, the dissipation factor increases by 0.02 for every additional 1000 μF.
Temperature characteristics (120Hz)	Rated voltage (V): 25 / 35 / 50 / 63 / 80 / 100 Impedance ratio Z(-40° C)/Z(20° C): 3 / 3 / 3 / 3 / 3 / 3
Durability	After being subjected to rated voltage in a 105° C oven for the specified duration and then allowed to stand at room temperature for 16 hours, the capacitor shall be tested at a temperature of 25 ± 2° C;the performance of the capacitor shall meet the following requirements: Capacitance change rate: Within ±20% of the initial value Dissipation factor: Below 200% of the specified value Leakage current: Below the specified value Load life: ≦Φ5~Φ6.3: 6000h; ≧Φ8: 8000h
High-temperature storage	After storage at 105° C for 1,000 hours and a 16-hour recovery period at room temperature, the capacitor's performance shall meet the following requirements when tested at 25 ± 2° C. Capacitance change rate: Within ±20% of the initial value Dissipation factor: Below 200% of the specified value Leakage current: Below 200% of the specified value

■ Product Dimensions (Unit: mm)



L=9	α=1.0
L≦16	α=1.5
L > 16	α=2.0

D	8	10	12.5~13	12.5~13(h≥30)	14.5	16	18
d	0.6	0.6	0.7	0.6	0.8	0.8	0.8
F	3.5	5.0	5.0	5.0	7.5	7.5	7.5

Note: Products with a diameter of Φ6.3 or larger are equipped with a safety valve.

■ Ripple current compensation factor

Frequency correction factor

Frequency (Hz)	50	120	1K	10K~50K	100K
Coefficient	0.40	0.50	0.80	0.90	1.00

Temperature correction factor

Ambient temperature	50℃	70℃	85℃	105℃
Correction factor	2.1	1.8	1.4	1.0

LK

■ List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
25	220	8×9	441	OLKD0901E221MFCG
	330	10×9	765	OLKE0901E331MFCG
	470	10×12.5	1150	OLKE1251E471MFCG
	820	10×16	1550	OLKE1601E821MFCG
	1000	12.5×14	1808	OLKL1401E102MFCG
	1200	12.5×16	1910	OLKL1601E122MFCG
	1500	12.5×20	2250	OLKL2001E152MFCG
	1800	12.5×20	2250	OLKL2001E182MFCG
	2200	12.5×25	2620	OLKL2501E222MFCG
	3300	14.5×20	3180	OLKU2001E332MFCG
	3900	14.5×25	3350	OLKU2501E392MFCG
	4400	16×20	2000	OLKI2001E442MFCG
	4700	14.5×27	3460	OLKU2701E472MFCG
	5700	18×20	2100	OLKJ2001E572MFCG
	6200	16×25	2300	OLKI2501E622MFCG
	8100	18×25	2400	OLKJ2501E812MFCG
	8500	16×30	2550	OLKI3001E852MFCG
	9900	16×35	2700	OLKI3501E992MFCG
	11000	16×40	2900	OLKI4001E113MFCG
	11000	18×30	2700	OLKJ3001E113MFCG
	12000	18×35	2900	OLKJ3501E123MFCG
	15000	18×40	3100	OLKJ4001E153MFCG
35	100	8×9	441	OLKD0901V101MFCG
	220	10×9	765	OLKE0901V221MFCG
	330	10×12.5	1150	OLKE1251V331MFCG
	470	10×16	1550	OLKE1601V471MFCG
	680	10×20	1590	OLKE2001V681MFCG
	820	12.5×16	1910	OLKL1601V821MFCG
	1000	12.5×20	2250	OLKL2001V102MFCG
	1500	12.5×25	2620	OLKL2501V152MFCG
	1800	14.5×16	3180	OLKU1601V182MFCG
	2200	14.5×20	3215	OLKU2001V222MFCG
	3000	16×20	2000	OLKI2001V302MFCG
	3300	14.5×25	3400	OLKU2501V332MFCG
	3300	18×25	2000	OLKJ2501V332MFCG
	3900	14.5×27	3520	OLKU2701V392MFCG
	4000	18×20	2100	OLKJ2001V402MFCG
	4300	16×25	2300	OLKI2501V432MFCG
	5600	18×25	2400	OLKJ2501V562MFCG
	5900	16×30	2550	OLKI3001V592MFCG
	6900	16×35	2700	OLKI3501V692MFCG
	7600	18×30	2700	OLKJ3001V762MFCG
	7600	18×31.5	2700	OLKJ3151V762MFCG
	8200	16×40	2900	OLKI4001V822MFCG
	9000	18×35	2900	OLKJ3501V902MFCG
	10000	18×40	3100	OLKJ4001V103MFCG
50	100	8×9	585	OLKD0901H101MFCG
	220	10×12.5	875	OLKE1251H221MFCG
	330	10×16	1250	OLKE1601H331MFCG
	470	12.5×16	1080	OLKL1601H471MFCG
	680	12.5×20	1850	OLKL2001H681MFCG
	820	12.5×25	2170	OLKL2501H821MFCG
	1000	14.5×20	2580	OLKU2001H102MFCG
	1000	16×20	2600	OLKI2001H102MFCG
	1200	12.5×30	2500	OLKL3001H122MFCG
	1500	14.5×25	2680	OLKU2501H152MFCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
50	1500	18×20	2700	OLKJ2001H152MFCG
	2200	14.5×27	2780	OLKU2701H222MFCG
	2200	18×25	2800	OLKJ2501H222MFCG
63	47	8×9	260	OLKD0901J470MFCG
	100	10×9	500	OLKE0901J101MFCG
	220	10×16	900	OLKE1601J221MFCG
	330	12.5×16	1080	OLKL1601J331MFCG
	470	12.5×20	1415	OLKL2001J471MFCG
	560	12.5×25	1800	OLKL2501J561MFCG
	680	14.5×16	1620	OLKU1601J681MFCG
	1000	14.5×20	2180	OLKU2001J102MFCG
	1000	16×20	2300	OLKI2001J102MFCG
	1200	14.5×25	2420	OLKU2501J122MFCG
	1200	18×20	2400	OLKJ2001J122MFCG
	1500	14.5×27	2540	OLKU2701J152MFCG
	1500	18×25	2500	OLKJ2501J152MFCG
80	33	8×9	260	OLKD0901K330MFCG
	47	8×11.5	410	OLKD1151K470MFCG
	100	10×12.5	565	OLKE1251K101MFCG
	220	12.5×16	1020	OLKL1601K221MFCG
	330	12.5×20	1290	OLKL2001K331MFCG
	470	12.5×25	1460	OLKL2501K471MFCG
	680	14.5×20	1720	OLKU2001K681MFCG
	820	14.5×25	1990	OLKU2501K821MFCG
	820	16×25	2000	OLKI2501K821MFCG
	1000	14.5×27	2080	OLKU2701K102MFCG
	1000	18×25	2100	OLKJ2501K102MFCG
	1200	16×30	2300	OLKI3001K122MFCG
	1500	18×35	2600	OLKJ3501K152MFCG
100	470	16×25	1900	OLKI2502A471MFCG
	560	18×20	1900	OLKJ2002A561MFCG
	680	16×30	2100	OLKI3002A681MFCG
	680	18×25	2100	OLKJ2502A681MFCG

LKG

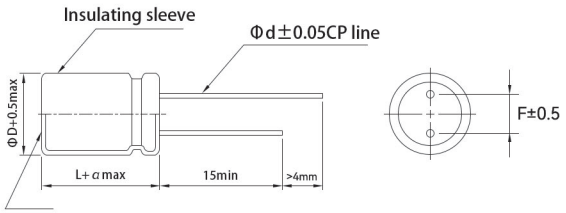
◆Long lifespan, high frequency and high ripple current resistant, high frequency and low impedance, dedicated power supply product
◆8000~12000 hours at 105℃
◆Compliant with AEC-Q200 RoHS directive



■ Key Technical Parameters

project	characteristic
Operating temperature range	450~500V −40~+105℃
Nominal voltage range	450~500V
Permissible capacitance deviation	±20% (25±2℃ 120Hz)
Leakage current (μA)	450~500WV I≦0.02CV+10(μA) C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading
Dissipation factor (25±2° C, 120 Hz)	Rated voltage (V): 450 / 500; tg δ: 0.12 / 0.20 For nominal capacitance exceeding 1000 μF, the dissipation factor increases by 0.02 for every additional 1000 μF.
Temperature characteristics (120Hz)	Rated voltage (V): 450 / 500; Impedance ratio Z(-40° C)/Z(20° C): 7 / 8
Durability	After being subjected to rated voltage in a 105° C oven for the specified duration and then allowed to stand at room temperature for 16 hours, the capacitor shall be tested at a temperature of 25 ± 2° C;the performance of the capacitor shall meet the following requirements: Capacitance change rate: Within ±20% of the initial value Dissipation factor: Below 200% of the specified value Leakage current: Below the specified value Load life: 450~500WV Φ5~Φ6.3 10000小时 ≧Φ8 12000小时
High-temperature storage	After storage at 105° C for 1,000 hours and a 16-hour recovery period at room temperature, the capacitor's performance shall meet the following requirements when tested at 25 ± 2° C. Capacitance change rate: Within ±20% of the initial value Dissipation factor: Below 200% of the specified value Leakage current: Below 200% of the specified value

■ Product Dimensions (Unit: mm)



L=9	α=1.0
L≦16	α=1.5
L > 16	α=2.0

D	8	10	12.5~13	12.5~13(h≥30)	14.5	16	18
d	0.6	0.6	0.7	0.6	0.8	0.8	0.8
F	3.5	5.0	5.0	5.0	7.5	7.5	7.5

Safety valve
Note: Products with a diameter of Φ6.3 or larger are equipped with a safety valve.

■ Ripple current compensation factor

Frequency correction factor

Frequency (Hz)	50	120	1K	10K~50K	100K
Coefficient	0.40	0.50	0.80	0.90	1.00

Temperature correction factor

Ambient temperature	50℃	70℃	85℃	105℃
Correction factor	2.1	1.8	1.4	1.0

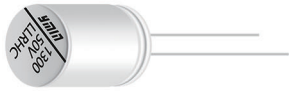
LKG

■ List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
450	15	12×16	460	LKGL1602W150MFCG
	22	12.5×20	500	LKGL2002W220MFCG
	33	14.5×16	700	LKGU1602W330MFCG
	39	14.5×20	760	LKGU2002W390MFCG
	47	12.5×30	750	LKGL3002W470MFCG
	47	14.5×23	810	LKGU2302W470MFCG
	47	16×25	1200	LKGI2502W470MFCG
	56	12.5×35	1320	LKGL3502W560MFCG
	56	14.5×25	950	LKGU2502W560MFCG
	56	16×25	1200	LKGI2502W560MFCG
	68	16×30	1300	LKGI3002W680MFCG
	68	16×35.5	1400	LKGI3552W680MFCG
	82	16×35	1400	LKGI3502W820MFCG
	82	16×40	1460	LKGI4002W820MFCG
	82	18×30	1400	LKGJ3002W820MFCG
	100	18×35.5	1750	LKGJ3552W101MFCG
	120	18×40	1900	LKGJ4002W121MFCG
	150	18×45	2000	LKGJ4502W151MFCG
	180	18×50	2180	LKGJ5002W181MFCG
500	2.2	8×11.5	90	LKGD1152H2R2MFCG
	3.3	8×14	110	LKGD1402H3R3MFCG
	4.7	8×20	130	LKGD2002H4R7MFCG
	6.8	10×16	250	LKGE1602H6R8MFCG
	8.2	10×20	250	LKGE2002H8R2MFCG
	10	12.5×14	320	LKGL1402H100MFCG
	15	12.5×20	480	LKGL2002H150MFCG
	22	12.5×25	520	LKGL2502H220MFCG
	33	14.5×20	635	LKGU2002H330MFCG
	33	16×20	700	LKGI2002H330MFCG
	47	14.5×25	660	LKGU2502H470MFCG
	47	16×25	740	LKGI2502H470MFCG
	56	14.5×27	680	LKGU2702H560MFCG
	56	18×25	740	LKGJ2502H560MFCG
	68	18×30	850	LKGJ3002H680MFCG
	82	18×35	1100	LKGJ3502H820MFCG
	100	18×40	1200	LKGJ4002H101MFCG
	120	18×45	1300	LKGJ4502H121MFCG
	150	18×50	1450	LKGJ5002H151MFCG

LKL(R)

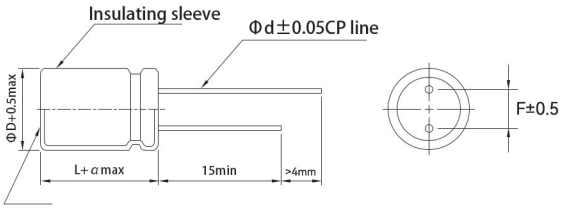
◆High temperature resistance, low impedance, and high reliability
◆3000 hours of operation at 135℃
◆Compliant with AEC-Q200 RoHS directive



■ Key Technical Parameters

project	characteristic
Operating temperature range	－55~+135℃
Nominal voltage range	25~100V
Permissible capacitance deviation	±20% (25±2℃ 120Hz)
Leakage current (μA)	50WV I≦0.01CV or 3μA C: Nominal capacitance (μF) V: Rated voltage (V) 2-minute reading
Dissipation factor (25±2° C, 120 Hz)	Rated voltage (V): 25 / 35 / 50 / 63 / 80 / 100 tg δ: 0.14 / 0.12 / 0.10 / 0.09 / 0.09 / 0.08 For nominal capacitance exceeding 1000 μF, the dissipation factor increases by 0.02 for every additional 1000 μF.
Temperature characteristics (120Hz)	Rated voltage (V): 25 / 35 / 50 / 63 / 80 / 100 Impedance ratio Z(-40° C)/Z(20° C): 6 / 4 / 4 / 4 / 4 / 4
Durability	After being subjected to rated voltage in a 135° C oven for the specified duration and then allowed to stand at room temperature for 16 hours, the capacitor shall be tested at a temperature of 25 ± 2° C;the performance of the capacitor shall meet the following requirements: Capacitance change rate: Within ±30% of the initial value Dissipation factor: Below 300% of the specified value Leakage current: Below the specified value Load life: 3000h
High-temperature storage	After storage at 105° C for 1,000 hours and a 16-hour recovery period at room temperature, the capacitor's performance shall meet the following requirements when tested at 25 ± 2° C. Capacitance change rate: Within ±20% of the initial value Dissipation factor: Below 200% of the specified value Leakage current: Below 200% of the specified value

■ Product Dimensions (Unit: mm)



Safety valve

Note: Products with a diameter of Φ6.3 or larger are equipped with a safety valve.

L=9	α=1.0
L≦16	α=1.5
L > 16	α=2.0

D	10	12.5~13	12.5~13(h≥30)	14.5	16	18
d	0.6	0.7	0.6	0.8	0.8	0.8
F	5.0	5.0	5.0	7.5	7.5	7.5

■ Frequency correction factor

Frequency (Hz)	50	120	1K	≧10K
Coefficient	0.35	0.50	0.83	1.00

LKL(R)

List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
25	1200	16×16	1200	LKL(R)I1601E122MFCG
	1500	16×16	1200	LKL(R)I1601E152MFCG
	1800	16×16	1200	LKL(R)I1601E182MFCG
	2200	18×16	1400	LKL(R)J1601E222MFCG
	2700	16×20	1700	LKL(R)I2001E272MFCG
	3300	16×20	1800	LKL(R)I2001E332MFCG
	3600	12.5×30	2760	LKL(R)L3001E362MFCG
	4300	18×20	1750	LKL(R)J2001E432MFCG
	4700	12.5×35	2850	LKL(R)L3501E472MFCG
	4700	16×25	2650	LKL(R)I2501E472MFCG
	5100	12.5×40	3200	LKL(R)L4001E512MFCG
	5600	16×30	2900	LKL(R)I3001E562MFCG
	6200	18×25	2720	LKL(R)J2501E622MFCG
	7500	16×35	3450	LKL(R)I3501E752MFCG
	7500	18×30	3280	LKL(R)J3001E752MFCG
	9100	16×40	3630	LKL(R)I4001E912MFCG
	10000	18×35	3600	LKL(R)J3501E103MFCG
	12000	18×40	3890	LKL(R)J4001E123MFCG
35	820	16×16	1200	LKL(R)I1601V821MFCG
	1000	16×16	1200	LKL(R)I1601V102MFCG
	1200	18×16	1400	LKL(R)J1601V122MFCG
	1500	16×20	1500	LKL(R)I2001V152MFCG
	1500	18×16	1400	LKL(R)J1601V152MFCG
	1800	18×20	1580	LKL(R)J2001V182MFCG
	2000	16×20	1500	LKL(R)I2001V202MFCG
	2200	12.5×30	2760	LKL(R)L3001V222MFCG
	2200	18×20	1600	LKL(R)J2001V222MFCG
	2400	18×20	1700	LKL(R)J2001V242MFCG
	2700	12.5×35	2890	LKL(R)L3501V272MFCG
	3000	16×25	2740	LKL(R)I2501V302MFCG
	3300	12.5×40	3160	LKL(R)L4001V332MFCG
	3600	16×30	3020	LKL(R)I3001V362MFCG
	3900	18×25	2760	LKL(R)J2501V392MFCG
	4300	16×35	3150	LKL(R)I3501V432MFCG
	4700	18×30	3200	LKL(R)J3001V472MFCG
	5600	16×40	3540	LKL(R)I4001V562MFCG
	6200	18×35	3400	LKL(R)J3501V622MFCG
	7500	18×40	3750	LKL(R)J4001V752MFCG
50	220	10×16	940	LKL(R)E1601H221MFCG
	330	12.5×16	980	LKL(R)L1601H331MFCG
	470	12.5×20	1050	LKL(R)L2001H471MFCG
	470	16×16	1000	LKL(R)I1601H471MFCG
	560	16×16	1000	LKL(R)I1601H561MFCG
	680	14.5×16	1650	LKL(R)U1601H681MFCG
	680	18×16	1200	LKL(R)J1601H681MFCG
	820	14.5×20	1930	LKL(R)U2001H821MFCG
	820	18×16	1200	LKL(R)J1601H821MFCG
	1000	16×20	1800	LKL(R)I2001H102MFCG
	1100	12.5×30	2230	LKL(R)L3001H112MFCG
	1200	18×20	1830	LKL(R)J2001H122MFCG
	1300	12.5×35	2570	LKL(R)L3501H132MFCG
	1300	16*25	2460	LKL(R) I2501H132MFCG
	1300	18×20	1900	LKL(R)J2001H132MFCG
	1600	12.5×40	2700	LKL(R)L4001H162MFCG
	1600	16×30	2660	LKL(R)I3001H162MFCG
	1800	18×25	2350	LKL(R)J2501H182MFCG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)	Product Number
50	2200	16×35	2830	LKL(R)I3501H222MFCG
	2400	18×30	2990	LKL(R)J3001H242MFCG
	2700	16×40	3200	LKL(R)I4001H272MFCG
	3000	18×35	3100	LKL(R)J3501H302MFCG
	3600	18×40	3700	LKL(R)J4001H362MFCG
63	680	16×20	1700	LKL(R)I2001J681MFCG
	750	12.5×30	2480	LKL(R)L3001J751MFCG
	910	12.5×35	2710	LKL(R)L3501J911MFCG
	910	18×20	1900	LKL(R)J2001J911MFCG
	1000	16×25	2390	LKL(R)I2501J102MFCG
	1100	12.5×40	2960	LKL(R)L4001J112MFCG
	1200	16×30	2820	LKL(R)I3001J122MFCG
	1300	18×25	2570	LKL(R)J2501J132MFCG
	1600	16×35	3060	LKL(R)I3501J162MFCG
	1600	18×30	2980	LKL(R)J3001J162MFCG
	1800	16×40	3170	LKL(R)I4001J182MFCG
	2300	18×35	3200	LKL(R)J3501J232MFCG
	2700	18×40	3560	LKL(R)J4001J272MFCG
80	470	16×20	1700	LKL(R)I2001K471MFCG
	680	16×25	2400	LKL(R)I2501K681MFCG
	750	12.5×40	2900	LKL(R)L4001K751MFCG
	1100	16×40	3220	LKL(R)I4001K112MFCG
	1200	18×30	3050	LKL(R)J3001K122MFCG
	1300	18×35	3400	LKL(R)J3501K132MFCG
	1600	18×40	3600	LKL(R)J4001K162MFCG
	2200	18×40	3700	LKL(R)J4001K222MFCG
100	330	12.5×35	2100	LKL(R)L3502A331MFCG
	560	16×30	2450	LKL(R)I3002A561MFCG
	680	18×30	3220	LKL(R)J3002A681MFCG
	750	16×40	3300	LKL(R)I4002A751MFCG
	820	18×35	3300	LKL(R)J3502A821MFCG
	1000	18×40	3500	LKL(R)J4002A102MFCG

CW3

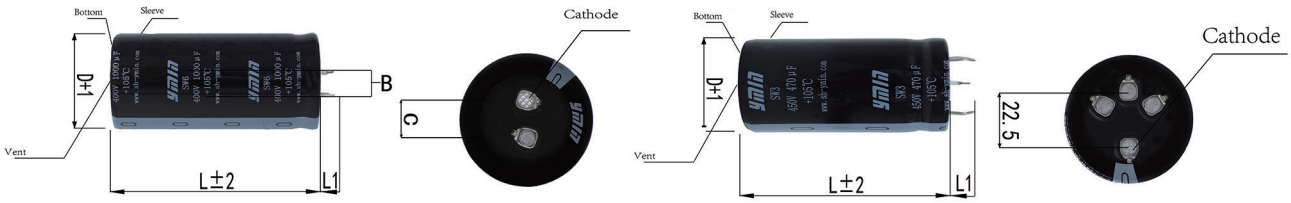


- ◆High reliability, low ESR
- ◆105℃, 3000 hours
- ◆Suitable for automotive electronics, OBCs, and charging stations
- ◆RoHS compliant

■ Key Technical Parameters

project	characteristic
Operating temperature range	−40 ~ +105℃
Nominal voltage range	450 ~ 600V
Rated capacitance range	120 ~ 1000μF (20℃ 120Hz)
Permissible capacitance deviation	±20%
Leakage current (μA)	≦$3\sqrt{CV}$ (C: Nominal capacity; V: Rated voltage) or 0.94mA, whichever is smaller, test for 5 minutes at 20℃.
Maximum loss (20℃)	0.20 (20℃ 120Hz)
Temperature characteristics (120Hz)	C(-25℃)/C(+20℃)≧0.8 ; C(-40℃)/C(+20℃)≧0.65
Impedance characteristics (120Hz)	Z(-25℃)/Z(+20℃)≦5 ; Z(-40℃)/Z(+20℃)≦8
Insulation resistance	The insulation resistance between all terminals and the insulating sleeves and mounting straps on the container sleeve was measured with a DC 500V insulation resistance meter and was ≥100MΩ.
Insulation voltage	An AC 2000V voltage was applied to all terminals and the insulating sleeves and mounting straps on the container sleeve for 1 minute, and no abnormalities were observed.
Durability	Under conditions of 105℃ and above the rated voltage with superimposed rated ripple current, after continuous loading of the rated voltage for 3000 hours and then returning to 20℃, the following requirements should be met. Capacity change rate (ΔC): ≦ ±20% of the initial value Loss value (tg δ): ≦ 200% of the initial specification value Leakage current (LC): ≦ Initial specification value
High temperature no-load characteristics	After being stored at 105℃ for 1000 hours and then restored to 20℃, the following requirements should be met during the test. Capacity change rate (ΔC): ≦ ±15% of the initial value Loss value (tg δ): ≦ 150% of the initial specification value Leakage current (LC): ≦ Initial specification value Voltage pretreatment is required before the test: Apply the rated voltage across the capacitor through a resistor of approximately 1000Ω and maintain it for 1 hour. After pretreatment, discharge the capacitor through a resistor of approximately 1Ω/V. After complete discharge, place the capacitor at room temperature for 24 hours before starting the test.

■ Product Dimensions (Unit: mm)



ΦD	Φ22	Φ25	Φ30	Φ35	Φ40
B	11.6	11.8	11.8	11.8	12.25
C	8.4	10	10	10	10
L_1	6.5	6.5	6.5	6.5	6.5

■ Ripple current compensation factor

Frequency correction factor

Frequency (Hz)	50Hz	120Hz	500Hz	1kHz	≧10kHz
Coefficient	0.80	1.00	1.20	1.25	1.40

Temperature correction factor

Ambient temperature	40℃	60℃	85℃	105℃
Correction factor	2.7	2.2	1.7	1.0

CW3

■ List of Standard Reference Materials

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)		Product Number
450(500)	120	22×40	0.69	1880	CW32W121MNNZS05S2CG
	120	25×25	0.69	1880	CW32W121MNNYS02S2CG
	120	30×25	0.71	1880	CW32W121MNNXS02S2CG
	120	35×20	0.71	1880	CW32W121MNNAS01S2CG
	150	22×45	0.77	987	CW32W151MNNZS06S2CG
	150	25×30	0.77	987	CW32W151MNNYS03S2CG
	150	30×25	0.79	987	CW32W151MNNXS02S2CG
	150	35×25	0.79	987	CW32W151MNNAS02S2CG
	180	22×40	0.81	822	CW32W181MNNZS05S2CG
	180	25×35	0.81	822	CW32W181MNNYS04S2CG
	180	30×30	0.83	822	CW32W181MNNXS03S2CG
	220	25×40	0.96	673	CW32W221MNNYS05S2CG
	220	30×30	0.94	673	CW32W221MNNXS03S2CG
	220	35×25	0.97	673	CW32W221MNNAS02S2CG
	270	25×45	1.11	549	CW32W271MNNYS06S2CG
	270	30×35	1.10	549	CW32W271MNNXS06S2CG
	270	35×30	1.14	549	CW32W271MNNAS03S2CG
	330	25×50	1.94	390	CW32W331MNNYS07S2CG
	330	30×30	1.10	390	CW32W331MNNXS03S2CG
	330	30×40	1.29	449	CW32W331MNNXS05S2CG
	330	35×35	1.29	449	CW32W331MNNAS04S2CG
	390	30×45	1.47	379	CW32W391MNNXS06S2CG
	390	35×35	1.45	379	CW32W391MNNAS04S2CG
	470	30×50	1.68	314	CW32W471MNNXS07S2CG
	470	35×40	1.65	314	CW32W471MNNAS05S2CG
	560	30×50	2.10	450	CW32W561MNNXS07S2CG
	560	30×60	1.97	263	CW32W561MNNXS09S2CG
	560	35×45	1.94	263	CW32W561MNNAS06S2CG
	680	35×55	2.25	216	CW32W681MNNAS08S2CG
	820	35×60	2.52	179	CW32W821MNNAS09S2CG
	1000	35×70	2.85	147	CW32W102MNNAG01S2CG
500(550)	120	22×50	1.78	1415	CW32H121MNNZS07S2CG
	120	25×40	1.78	1415	CW32H121MNNYS05S2CG
	120	30×30	1.76	1415	CW32H121MNNXS03S2CG
	120	35×25	1.70	1415	CW32H121MNNAS02S2CG
	150	22×50	1.97	1132	CW32H151MNNZS07S2CG
	150	25×40	1.89	1132	CW32H151MNNYS05S2CG
	150	30×30	1.89	1132	CW32H151MNNXS03S2CG
	150	35×25	1.92	1132	CW32H151MNNAS02S2CG
	180	22×60	2.32	943	CW32H181MNNZS09S2CG
	180	25×50	2.30	943	CW32H181MNNYS07S2CG
	180	30×35	2.21	943	CW32H181MNNXS04S2CG
	180	35×30	2.21	943	CW32H181MNNAS03S2CG
	220	22×65	2.62	771	CW32H221MNNZS10S2CG
	220	25×55	2.51	771	CW32H221MNNYS08S2CG
	220	30×40	2.51	771	CW32H221MNNXS05S2CG
	220	35×25	2.43	771	CW32H221MNNAS02S2CG
	270	25×60	3.00	628	CW32H271MNNYS09S2CG
	270	30×45	2.92	628	CW32H271MNNXS06S2CG
	270	35×35	2.86	628	CW32H271MNNAS04S2CG
	330	25×70	3.54	513	CW32H331MNNYG01S2CG
	330	30×50	3.43	513	CW32H331MNNXS07S2CG
	330	35×40	3.38	513	CW32H331MNNAS05S2CG
	390	30×60	3.92	435	CW32H391MNNXS09S2CG
	390	35×45	3.92	435	CW32H391MNNAS06S2CG

Voltage (V)	Capacitance (μF)	Dimensions ΦD×L (mm)	Ripple current (mA r.m.s / 105° C 120Hz)		Product Number
500(550)	470	30×65	4.43	360	CW32H471MNNXS10S2CG
	470	35×50	4.29	360	CW32H471MNNAS07S2CG
	560	30×75	5.13	302	CW32H561MNNXG02S2CG
	560	35×60	5.05	302	CW32H561MNNAS09S2CG
	680	35×75	6.08	248	CW32H681MNNAG02S2CG
	820	35×90	7.21	205	CW32H821MNNAG05S2CG
	1000	35×100	8.24	169	CW32H102MNNAG07S2CG
550(600)	120	30×30	1.20	870	CW32L121MNNXS03S2CG
	150	30×35	1.06	1317	CW32L151MNNXS04S2CG
	180	30×40	1.13	1097	CW32L181MNNXS05S2CG
	180	35×30	1.11	1097	CW32L181MNNAS03S2CG
	220	30×50	1.26	898	CW32L221MNNXS07S2CG
	220	35×40	1.24	898	CW32L221MNNAS05S2CG
	270	35×40	1.42	731	CW32L271MNNAS05S2CG
	270	35×45	1.39	731	CW32L271MNNAS06S2CG
	330	35×50	1.59	598	CW32L331MNNAS07S2CG
	390	35×60	1.76	505	CW32L391MNNAS09S2CG
	470	35×65	2.05	419	CW32L471MNNAS10S2CG
	560	35×75	2.33	351	CW32L561MNNAG02S2CG
	560	35×80	2.20	351	CW32L561MNNAG03S2CG
600(650)	120	30×40	1.00	2016	CW32M121MNNXS05S2CG
	120	35×30	0.96	2016	CW32M121MNNAS03S2CG
	150	30×45	1.15	1612	CW32M151MNNXS06S2CG
	150	35×35	1.12	1612	CW32M151MNNAS04S2CG
	180	30×50	1.28	1343	CW32M181MNNXS07S2CG
	180	35×40	1.25	1343	CW32M181MNNAS05S2CG
	220	30×60	1.47	1098	CW32M221MNNXS09S2CG
	220	35×45	1.46	1098	CW32M221MNNAS06S2CG
	270	35×50	1.63	894	CW32M271MNNAS07S2CG
	330	35×55	1.87	731	CW32M331MNNAS08S2CG
	390	35×60	2.92	618	CW32M391MNNAS09S2CG
	470	40×60	3.06	512	CW32M471MNNBS09S2CG
	560	40×80	3.22	429	CW32M561MNNBG03S2CG

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