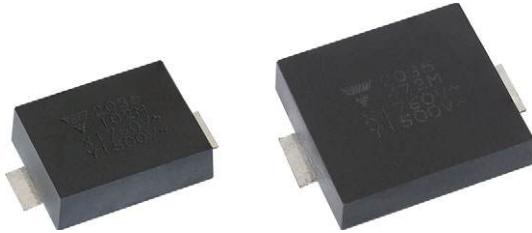


AC Line Rated Ceramic Disc Capacitors Class X1, 760 V_{AC}, Class Y1, 500 V_{AC}



RoHS
COMPLIANT
HALOGEN
FREE

FEATURES

- Complying with IEC 60384-14 4th edition
- Humidity class IIB annex I achieved
- Singlelayer AC disc safety capacitors
- Mounting: surface-mount
- Material categorization:
for definitions of compliance please see
www.vishay.com/doc?99912

LINKS TO ADDITIONAL RESOURCES



SPICE
Models

QUICK REFERENCE DATA	
DESCRIPTION	VALUE
Ceramic class	2
Ceramic dielectric	Y5U
Voltage (V _{AC})	500 760
Min. capacitance (pF)	470
Max. capacitance (pF)	4700
Mounting	Surface mount (reflow soldering)

OPERATING TEMPERATURE RANGE

-55 °C to +125 °C

TEMPERATURE CHARACTERISTICS

Y5U

SECTIONAL SPECIFICATIONS

Climatic category (according to EN 60058-1)
Class 2: 55/125/21

MOLDING

According to UL 94 V-0
Epoxy resin, isolating, flame retardant
Halogen-free
Reinforced insulation
Moisture sensitivity level: MSL 2a

APPROVALS

IEC 60384-14.4
UL 60384-14
DIN EN 60384-14
CSA E60384-1:14, CSA E60384-14:14
CQC11-471112-2015

APPLICATIONS

- X1, Y1 according to IEC 60384-14.4
- Across-the-line
- Line by-pass
- Antenna coupling
- Industrial and consumer
- EMI / RFI suppression and filtering

DESIGN

The capacitor consists of a ceramic disc which is copper plated on both sides. Encapsulation is made of flame retardant epoxy resin in accordance with UL 94 V-0.

CAPACITANCE RANGE

470 pF to 4700 pF

RATED VOLTAGE U_R

IEC 60384-14.4:
(X1): 760 V_{AC}, 50 Hz
(Y1): 500 V_{AC}, 50 Hz
Annex H: 1500 V_{DC}

TEST VOLTAGE

Component test (100 %):
4000 V_{AC}, 50 Hz, 2 s
Random sampling test (destructive test):
4000 V_{AC}, 50 Hz, 60 s
Voltage proof of molding (destructive test):
4000 V_{AC}, 50 Hz, 60 s

INSULATION RESISTANCE

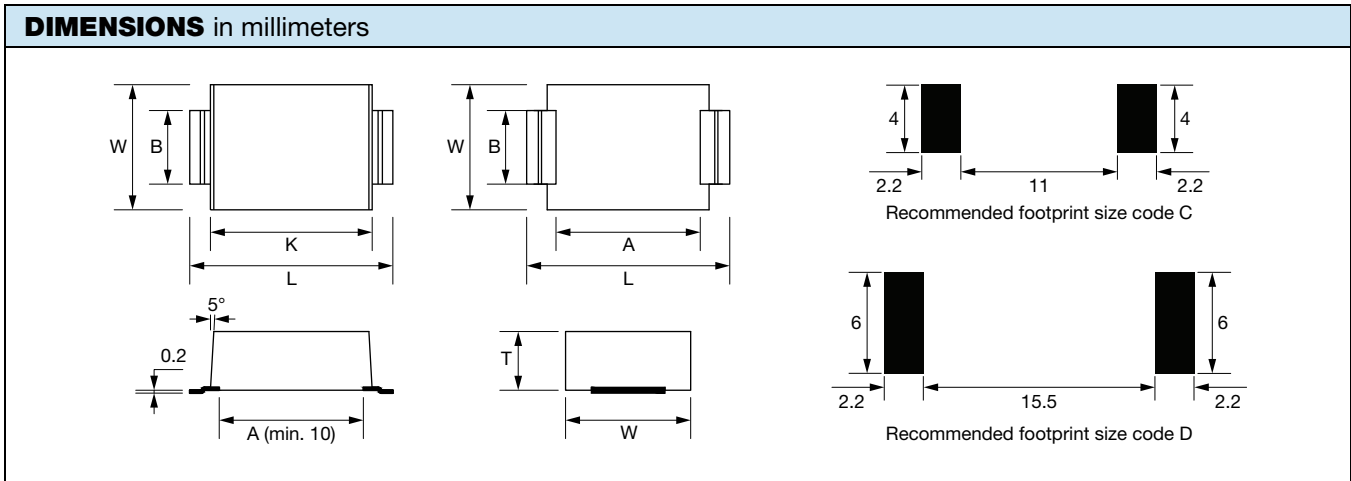
≥ 10 000 MΩ

CAPACITANCE TOLERANCE

± 20 % (code M)

DISSIPATION FACTOR

Class 2: max. 2.5 % (1 kHz)



SIZE CODE	W (± 0.5)	L (± 0.5)	A (± 0.5)	B (± 0.5)	K (± 0.1)	T _{max.}
C	8.60	14.80	10.50	3.50	11.80	4.00
D	14.60	19.20	15.00	5.00	16.20	4.00

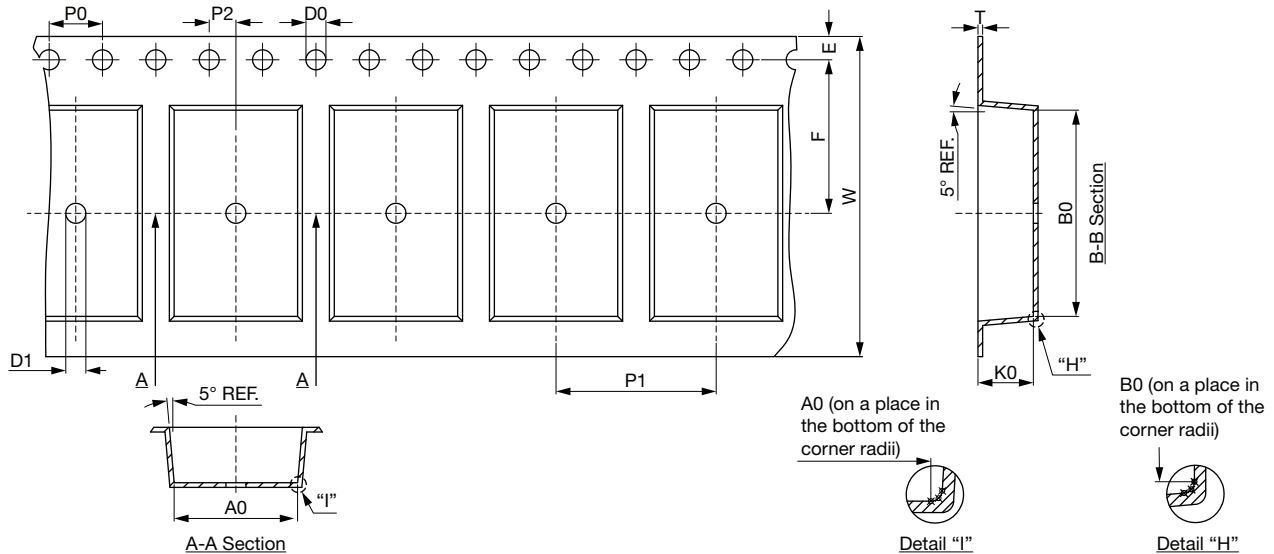
Note

- For soldering recommendation please see www.vishay.com/doc?28572

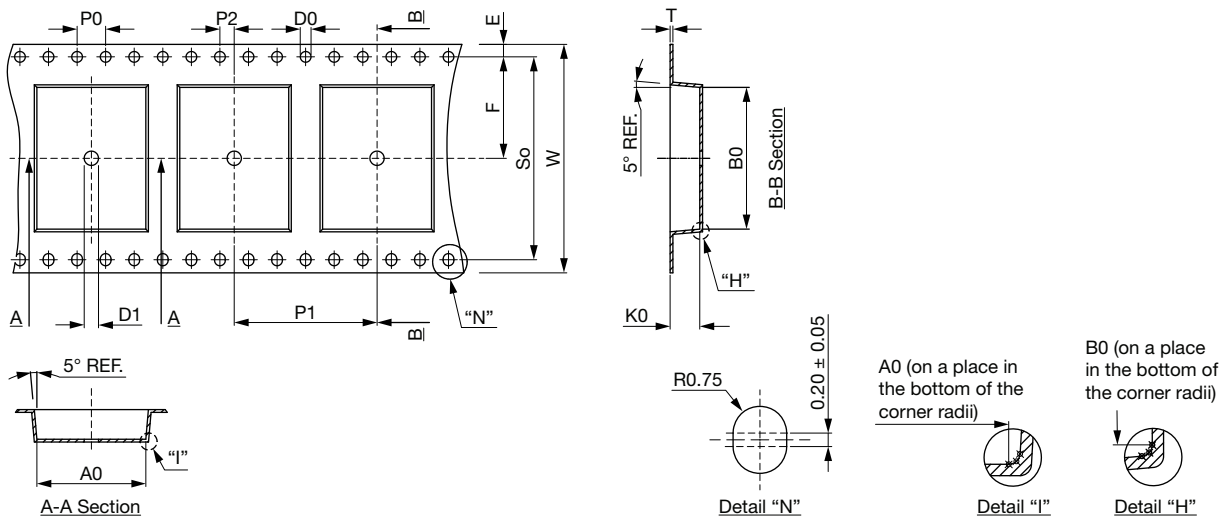
TECHNICAL DATA			
CAPACITANCE (pF)	TOLERANCE (%)	SIZE CODE	PART NUMBER
			MISSING DIGITS SEE ORDERING CODE BELOW
Y5U (2E3)			
470	± 20	C	SMDY1471MY5UC#
680		C	SMDY1681MY5UC#
1000		C	SMDY1102MY5UC#
1500		C	SMDY1152MY5UC#
2200		D	SMDY1222MY5UD#
3300		D	SMDY1332MY5UD#
3900		D	SMDY1392MY5UD#
4700		D	SMDY1472MY5UD#

ORDERING CODE						
Example	SMDY1	472	M	Y5U	D	B
	Series	Capacitance value	Tolerance code	Temperature coefficient	Size code	Packaging code
						B = bulk R = tape and reel

PACKAGING		
SIZE CODE	PACKAGING QUANTITIES	
	BULK	REEL
C	1000	1000
D	500	500

CARRIER TAPE DIMENSIONS FOR SIZE CODE C in millimeters


A0	B0	K0	P0	P1	P2	T	W	10 P0	E	F	D0	D1
9.25 ± 0.10	15.45 ± 0.10	4.15 ± 0.10	4.00 ± 0.10	12.00 ± 0.10	2.00 ± 0.10	0.35 ± 0.05	24.00 ± 0.30	40.00 ± 0.20	1.75 ± 0.10	11.50 ± 0.10	1.55 ± 0.05	1.5 min.

CARRIER TAPE DIMENSIONS FOR SIZE CODE D in millimeters


A0	B0	K0	P0	P1	P2	T	W	10 P0	So	E	F	D0	D1
15.25 ± 0.10	19.85 ± 0.10	4.15 ± 0.10	4.00 ± 0.10	20.00 ± 0.10	2.00 ± 0.10	0.35 ± 0.05	32.00 ± 0.30	40.00 ± 0.20	28.40 ± 0.10	1.75 ± 0.10	14.20 ± 0.10	1.50 + 0.10	2.0 min.

APPROVALS				
IEC 60384-14 - Safety tests This approval together with CB test certificate substitutes all national approvals.				
CB Certificate (www.vishay.com/doc?22268)				
Y1-capacitor: CB test certificate:	DE1-63889/A2	470 pF to 4.7 nF	500 V _{AC}	
X1-capacitor: CB test certificate:	DE1-63889/A2	470 pF to 4.7 nF	760 V _{AC}	
VDE (www.vishay.com/doc?22269)				
Y1-capacitor: VDE marks approval:	40052244	470 pF to 4.7 nF	500 V _{AC}	
X1-capacitor: VDE marks approval:	40052244	470 pF to 4.7 nF	760 V _{AC}	
DIN EN 60384-14 (VDE 0565-1-1):2014-04; EN 60384-14:2013-08 DIN EN 60384-14/A1 (VDE 0565-1-1/A1):2017-04; EN 60384-14:2013/A1:2016				
Underwriters Laboratories Inc. / Canadian Standards Association (www.vishay.com/doc?22271)				
Y1-capacitor: CSA test certificate:	E183844	470 pF to 4.7 nF	500 V _{AC}	
X1-capacitor: CSA test certificate:	E183844	470 pF to 4.7 nF	760 V _{AC}	
UL 60384-14, CSA E60384-1:14, CSA E60384-14:14				
Fixed capacitors for electromagnetic interference suppression and connection to the supply mains.				
CQC (www.vishay.com/doc?22270)				
Y1-capacitor: CQC test certificate:	CQC20001274917	470 pF to 4.7 nF	500 V _{AC}	
X1-capacitor: CQC test certificate:	CQC20001274917	470 pF to 4.7 nF	760 V _{AC}	

MARKING	
<p>YY: year, ΔΔ: week, XXX: capacitance value, t: tolerance code ⁽¹⁾</p>	

Note

⁽¹⁾ Identify “XXX” and “t” by the ordering code

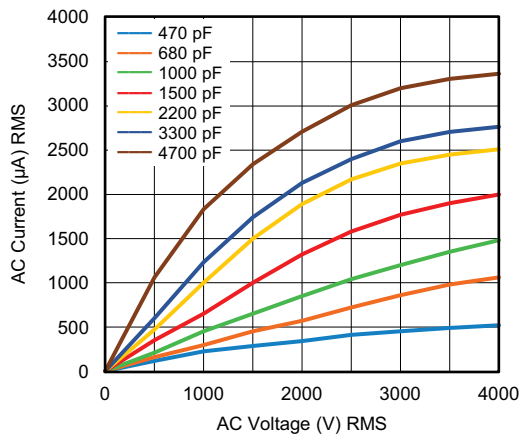
PERFORMANCE		
TEST	TEST CONDITION	TEST LIMITS
Visual and mechanical inspection	Optical inspection, dimensions measured with caliper	No visual damage, marking legible
Capacitance (C)	25 °C ± 3 °C; RH ≤ 75 %; 1.0 V _{RMS} ± 0.2 V _{RMS} at 1 kHz	Capacitance within specified tolerance
Dissipation factor (DF)		DF ≤ 2.5 %
Insulation resistance (IR)	Measured with 60 s ± 5 s after charging at 500 V _{DC}	Min. 10 000 MΩ
Dielectric strength	4000 V _{AC} at 50 Hz / 60 Hz for 1 min 50 mA max.	No failure
Solderability of termination	Immerse in solder bath for 2 s with 255 °C ± 5 °C after fluxing	95 % of the terminations are to be soldered
Impulse voltage	3 pulses of 8 kV	No failure

PERFORMANCE			
TEST	TEST CONDITION	TEST LIMITS	
Life test	125 °C; 1.5 kV _{AC} at 50 Hz; 1000 h 125 °C; 2250 V _{DC} ; 1000 h	No visual damage	
		$\Delta C/C < \pm 15\%$	
		DF $\leq 5\%$	
		IR $\geq 3000\text{ M}\Omega$	
		Dielectric strength: no failure	
Humidity test	500 h +48 h / -0 h; 40 °C \pm 2 °C; 90 % to 95 % RH; 760 V _{AC} at 50 Hz 500 h +48 h / -0 h; 40 °C \pm 2 °C; 90 % to 95 % RH; 1500 V _{DC}	No visual damage	
		$\Delta C/C < \pm 15\%$	
		DF $\leq 5\%$	
		IR $\geq 3000\text{ M}\Omega$	
		Dielectric strength: no failure	
	500 h +48 h / -0 h; 40 °C \pm 2 °C / 90 % to 95 % RH; 0 V loading	No visual damage	
		$\Delta C/C < \pm 15\%$	
		DF $\leq 5\%$	
		IR $\geq 3000\text{ M}\Omega$	
		Dielectric strength: no failure	
	500 h +48 h / -0 h; 85 °C \pm 3 °C / 85 % RH; 760 V _{AC} at 50 Hz 500 h +48 h / -0 h; 85 °C \pm 3 °C / 85 % RH; 1500 V _{DC}	No visual damage	
		$\Delta C/C < \pm 15\%$	
		DF $\leq 5\%$	
		IR $\geq 3000\text{ M}\Omega$	
		Dielectric strength: no failure	
Robustness of termination	Shear test: 10 N for 10 s \pm 1 s for soldered on PCB	No damage to capacitor body and pin	
	Bending test: 1 mm bending constant for 5 s \pm 1 s		
Resistance to soldering heat (solder bath)	20 mm/s dipping speed; dwell 10 s at 2 mm dipping; 260 °C \pm 5 °C	No visual damage	
		$\Delta C/C < \pm 10\%$	
		DF $\leq 5\%$	
		IR $\geq 3000\text{ M}\Omega$	
		Dielectric strength: no failure	
Temperature cycling	-55 °C ~ +125 °C; 5 cycles	No visual damage	
		$\Delta C/C < \pm 30\%$	
		DF $\leq 5\%$	
		IR $\geq 3000\text{ M}\Omega$	
		Dielectric strength: no failure	

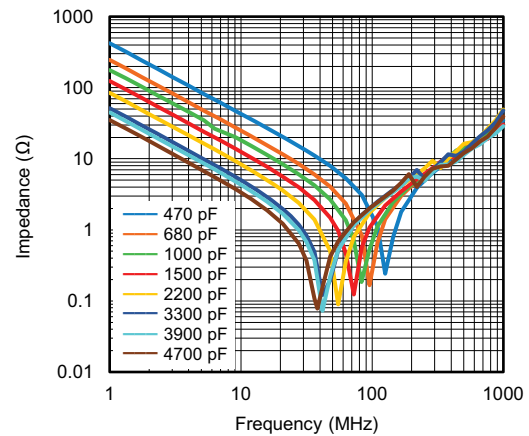


PERFORMANCE		
TEST	TEST CONDITION	TEST LIMITS
Electrical characterization	25 °C and -40 °C, +125 °C	Capacitance within specified tolerance
		DF ≤ 2.5 %
		Min. 10 000 MΩ
Mechanical shock	Half-sine; 100 g/s; 6 ms; 3 shocks each of 6 orientation	No visual damage
		ΔC/C < ± 10 %
		DF ≤ 5 %
Vibration	5 g/s; 1.5 mm amplitude; 20 min; 12 cycles each of orientation; 10 Hz ~ 2000 Hz	IR ≥ 10 000 MΩ
		No visual damage
		ΔC/C < ± 10 %
		DF ≤ 5 %
		IR ≥ 10 000 MΩ

AC CURRENT VS. VOLTAGE (Typical)



IMPEDANCE VS. FREQUENCY (Typical)



Note

- Unless stated otherwise all electrical values apply at an ambient temperature of 25 °C ± 3 °C, at normal atmospheric conditions

RELATED DOCUMENTS	
CB Test Certificate	www.vishay.com/doc?22268
VDE Marks Approval	www.vishay.com/doc?22269
UL Test Certificate	www.vishay.com/doc?22271
CQC Test Certificate	www.vishay.com/doc?22270
Soldering Recommendation	www.vishay.com/doc?28572



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