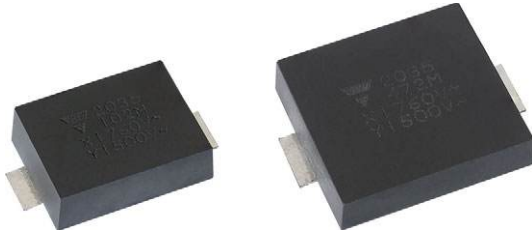


# EMI Suppression Safety Capacitor, Ceramic Disc, Class X1, 760 V<sub>AC</sub>, Class Y1, 500 V<sub>AC</sub>



## FEATURES

- Complying with IEC 60384-14
- 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](http://www.vishay.com/doc?99912)



**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**

## LINKS TO ADDITIONAL RESOURCES



**SPICE**  
Models

QUICK REFERENCE DATA		
DESCRIPTION	VALUE	
Ceramic class	2	
Ceramic dielectric	Y5U	
Voltage (V <sub>AC</sub> )	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  
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
- Line-to-line filtering (Class X)
- Line-to-ground filtering (Class Y)
- Primary and secondary coupling (SMPS)
- 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<sub>R</sub>

IEC 60384-14:

(X1): 760 V<sub>AC</sub>, 50 Hz

(Y1): 500 V<sub>AC</sub>, 50 Hz

Annex H: 1500 V<sub>DC</sub>

## TEST VOLTAGE

Component test (100 %):

4000 V<sub>AC</sub>, 50 Hz, 2 s

Random sampling test (destructive test):

4000 V<sub>AC</sub>, 50 Hz, 60 s

Voltage proof of molding (destructive test):

4000 V<sub>AC</sub>, 50 Hz, 60 s

## INSULATION RESISTANCE

≥ 10 000 MΩ

## CAPACITANCE TOLERANCE

± 20 % (code M)

## DISSIPATION FACTOR

Class 2: max. 2.5 % (1 kHz)



DIMENSIONS in millimeters						
SIZE CODE	W ( $\pm 0.5$ )	L ( $\pm 0.5$ )	A ( $\pm 0.5$ )	B ( $\pm 0.5$ )	K ( $\pm 0.1$ )	T <sub>max.</sub>
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

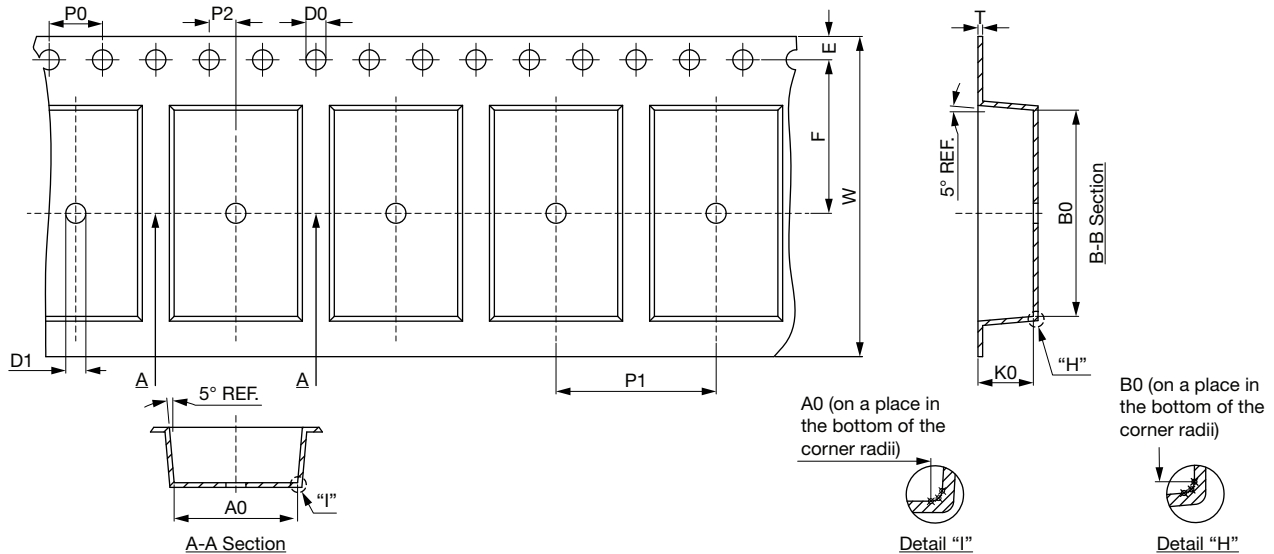
Note

- For soldering recommendation please see [www.vishay.com/doc?28572](http://www.vishay.com/doc?28572)

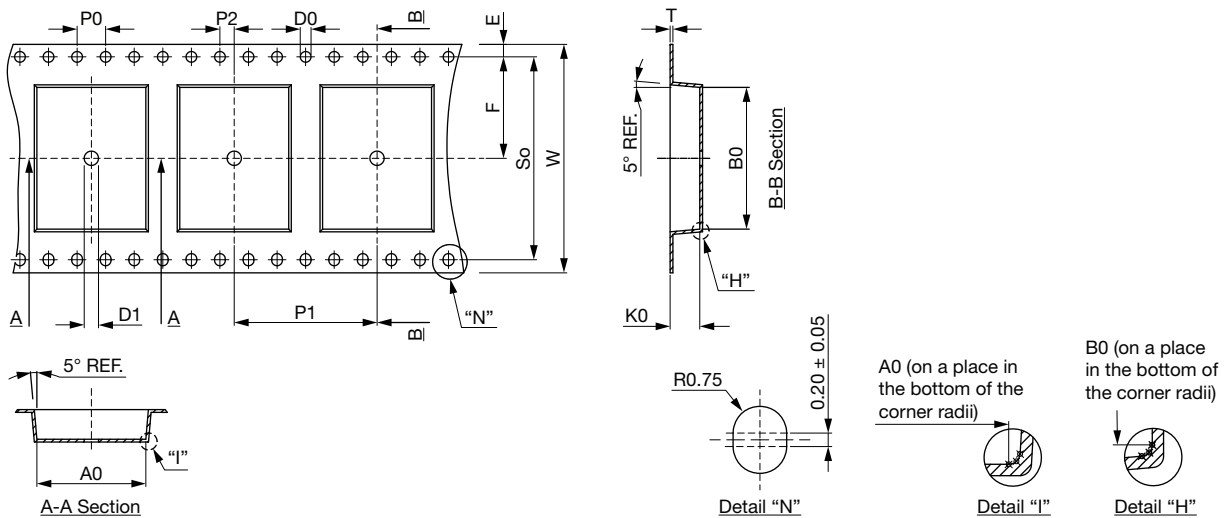
TECHNICAL DATA			
CAPACITANCE (pF)	TOLERANCE (%)	SIZE CODE	PART NUMBER
			MISSING DIGITS SEE ORDERING CODE BELOW
<b>Y5U</b>			
470	± 20	C	SMDY1471MY5UC#
680		C	SMDY1681MY5UC#
1000		C	SMDY1102MY5UC#
1500		C	SMDY1152MY5UC#
2200		D	SMDY1222MY5UD#
3300		D	SMDY1332MY5UD#
3900		D	SMDY1392MY5UD#
4700		D	SMDY1472MY5UD#

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.				
<b>CB Certificate</b> ( <a href="http://www.vishay.com/doc?22268">www.vishay.com/doc?22268</a> )				
Y1-capacitor: CB test certificate:	DE1-63889/A2	470 pF to 4.7 nF	500 V <sub>AC</sub>	
X1-capacitor: CB test certificate:	DE1-63889/A2	470 pF to 4.7 nF	760 V <sub>AC</sub>	
<b>VDE</b> ( <a href="http://www.vishay.com/doc?22269">www.vishay.com/doc?22269</a> )				
Y1-capacitor: VDE marks approval:	40052244	470 pF to 4.7 nF	500 V <sub>AC</sub>	
X1-capacitor: VDE marks approval:	40052244	470 pF to 4.7 nF	760 V <sub>AC</sub>	
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				
<b>Underwriters Laboratories Inc. / Canadian Standards Association</b> ( <a href="http://www.vishay.com/doc?22271">www.vishay.com/doc?22271</a> )				
Y1-capacitor: CSA test certificate:	E183844	470 pF to 4.7 nF	500 V <sub>AC</sub>	
X1-capacitor: CSA test certificate:	E183844	470 pF to 4.7 nF	760 V <sub>AC</sub>	
UL 60384-14, CSA E60384-1:14, CSA E60384-14:14				
Fixed capacitors for electromagnetic interference suppression and connection to the supply mains.				
<b>CQC</b> ( <a href="http://www.vishay.com/doc?22270">www.vishay.com/doc?22270</a> )				
Y1-capacitor: CQC test certificate:	CQC20001274917	470 pF to 4.7 nF	500 V <sub>AC</sub>	
X1-capacitor: CQC test certificate:	CQC20001274917	470 pF to 4.7 nF	760 V <sub>AC</sub>	

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

**Note**

<sup>(1)</sup> Identify “XXX” and “t” by the ordering code

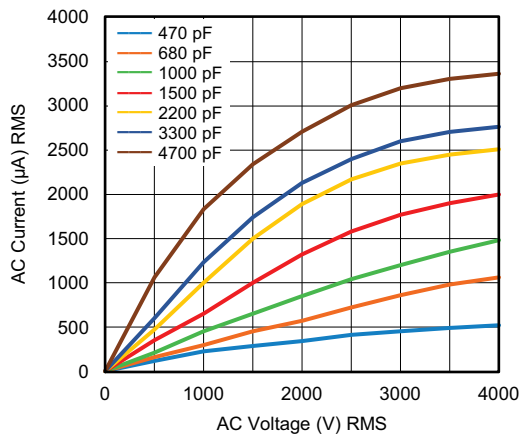
PERFORMANCE		
TEST	TEST CONDITION	TEST LIMITS
Visual and mechanical inspection	Optical inspection, dimensions measured with caliper	No visual damage, marking legible
Capacitance (C)	25 °C ± 3 °C; RH ≤ 75 %; 1.0 V <sub>RMS</sub> ± 0.2 V <sub>RMS</sub> at 1 kHz	Capacitance within specified tolerance
Dissipation factor (DF)		DF ≤ 2.5 %
Insulation resistance (IR)	Measured with 60 s ± 5 s after charging at 500 V <sub>DC</sub>	Min. 10 000 MΩ
Dielectric strength	4000 V <sub>AC</sub> 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 <sub>AC</sub> at 50 Hz; 1000 h 125 °C; 2250 V <sub>DC</sub> ; 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 <sub>AC</sub> at 50 Hz 500 h +48 h / -0 h; 40 °C $\pm$ 2 °C; 90 % to 95 % RH; 1500 V <sub>DC</sub>	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 <sub>AC</sub> at 50 Hz 500 h +48 h / -0 h; 85 °C $\pm$ 3 °C / 85 % RH; 1500 V <sub>DC</sub>	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 to +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

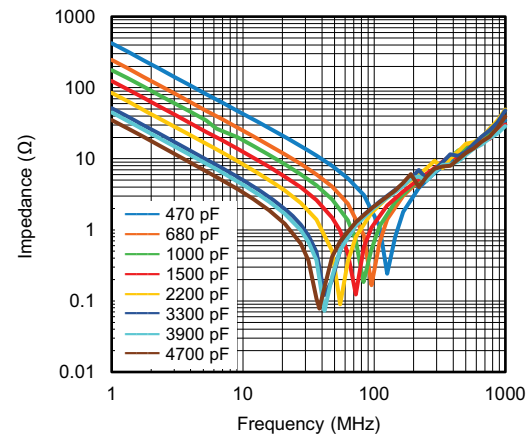


PERFORMANCE		
TEST	TEST CONDITION	TEST LIMITS
Electrical characterization	25 °C and -40 °C, +125 °C	Capacitance within specified tolerance
		DF ≤ 2.5 %
		Min. 10 000 MΩ
Mechanical shock	Half-sine; 100 g/s; 6 ms; 3 shocks each of 6 orientation	No visual damage
		ΔC/C < ± 10 %
		DF ≤ 5 %
Vibration	5 g/s; 1.5 mm amplitude; 20 min; 12 cycles each of orientation; 10 Hz to 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	<a href="http://www.vishay.com/doc?22268">www.vishay.com/doc?22268</a>
VDE Marks Approval	<a href="http://www.vishay.com/doc?22269">www.vishay.com/doc?22269</a>
UL Test Certificate	<a href="http://www.vishay.com/doc?22271">www.vishay.com/doc?22271</a>
CQC Test Certificate	<a href="http://www.vishay.com/doc?22270">www.vishay.com/doc?22270</a>
Soldering Recommendation	<a href="http://www.vishay.com/doc?28572">www.vishay.com/doc?28572</a>



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