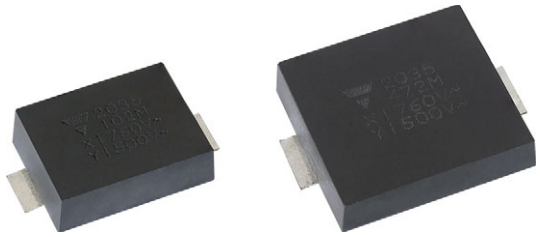
EMI Suppression Safety Capacitor, Ceramic Disc, Class X1, 760 V_{AC}, Class Y1, 500 V_{AC}



LINKS TO ADDITIONAL RESOURCES

Related Documents | Infographics | 3D Models | 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
UL 60384-14
DIN EN 60384-14
CSA E60384-1:14, CSA E60384-14:14
CQC11-471112-2015

FEATURES

- AEC-Q200 qualification planned for Q1/2025
- 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

Pb e3 RoHS COMPLIANT HALOGEN FREE

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_R

IEC 60384-14:
(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)

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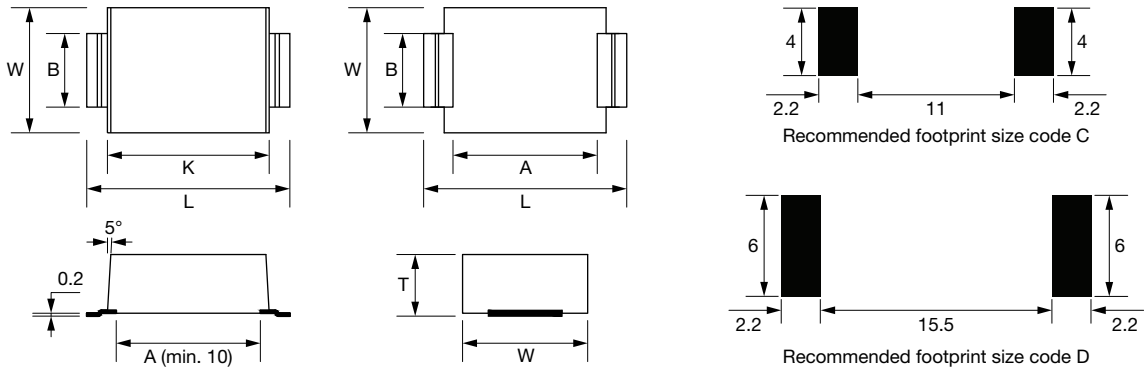
DIMENSIONS in millimeters



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			
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

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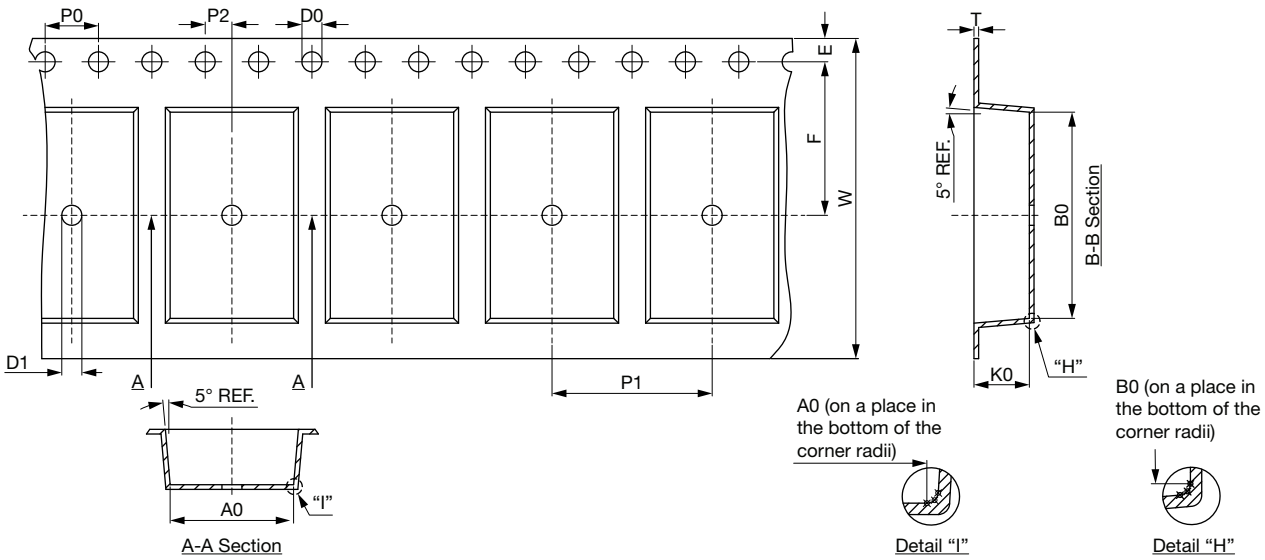
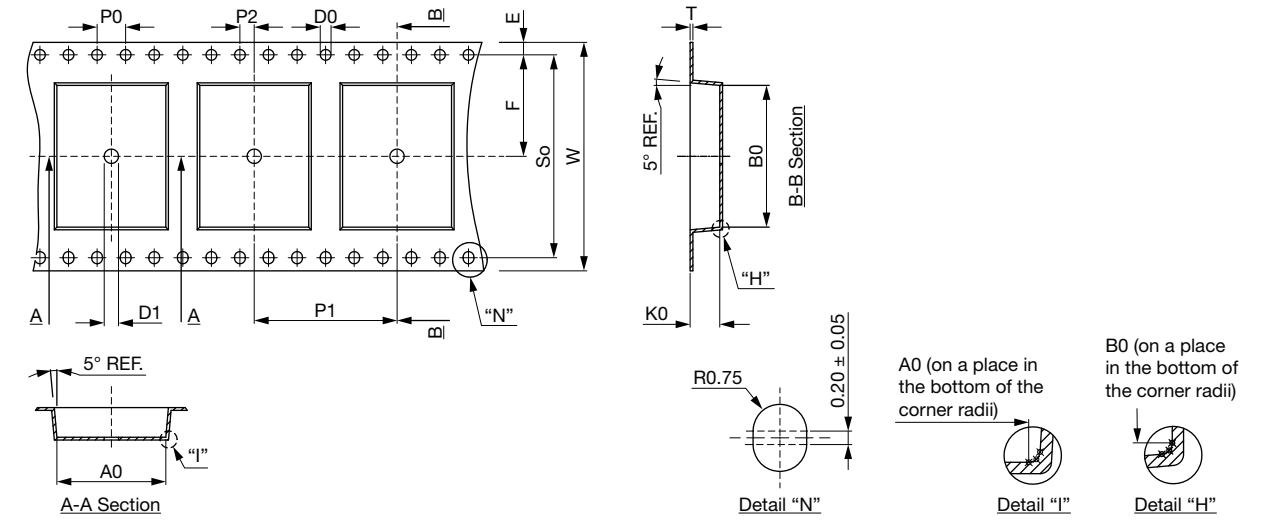
CARRIER TAPE DIMENSIONS FOR SIZE CODE C in millimeters



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.

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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}

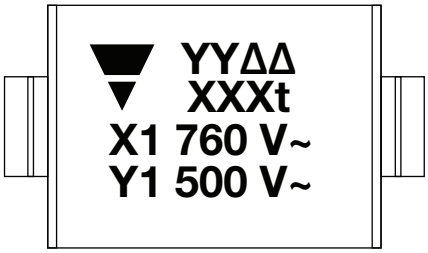
UL 60384-14, CSA E60384-1:14, CSA E60384-14:14

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



YY: year, ΔΔ: week,
XXX: capacitance value, t: tolerance code (1)

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

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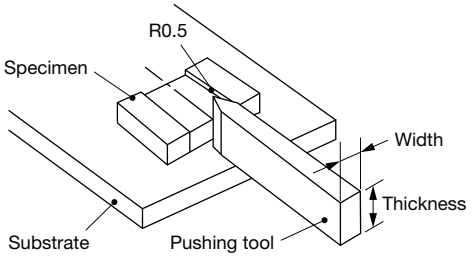
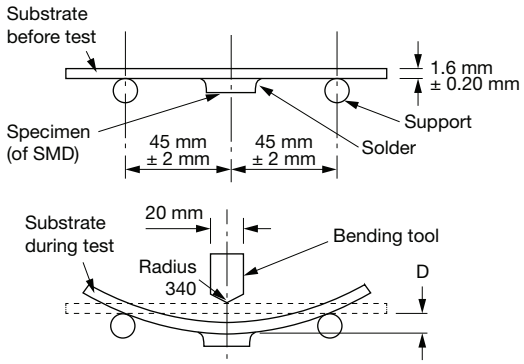
PERFORMANCE		
TEST	**TEST CONDITION**	**TEST LIMITS**
Life test	125 °C; 1.5 kV_{AC} at 50 Hz; 1000 h 125 °C; 2250 V_{DC}; 1000 h	No visual damage ΔC/C < ± 15 % DF ≤ 5 % IR ≥ 3000 MΩ Dielectric strength: no failure
Humidity test	500 h +48 h / -0 h; 40 °C ± 2 °C; 90 % to 95 % RH; 760 V_{AC} at 50 Hz 500 h +48 h / -0 h; 40 °C ± 2 °C; 90 % to 95 % RH; 1500 V_{DC}	No visual damage ΔC/C < ± 15 % DF ≤ 5 % IR ≥ 3000 MΩ Dielectric strength: no failure
	500 h +48 h / -0 h; 40 °C ± 2 °C / 90 % to 95 % RH; 0 V loading	No visual damage ΔC/C < ± 15 % DF ≤ 5 % IR ≥ 3000 MΩ Dielectric strength: no failure
	500 h +48 h / -0 h; 85 °C ± 3 °C / 85 % RH; 760 V_{AC} at 50 Hz 500 h +48 h / -0 h; 85 °C ± 3 °C / 85 % RH; 1500 V_{DC}	No visual damage ΔC/C < ± 15 % DF ≤ 5 % IR ≥ 3000 MΩ Dielectric strength: no failure
Robustness of termination	Shear test: 17.7 N for 10 s ± 1 s for soldered on PCB  	No damage to capacitor body and pin
	Bending test: 1 mm bending constant for 5 s ± 1 s  	
Resistance to soldering heat (solder bath)	20 mm/s dipping speed; dwell 10 s at 2 mm dipping; 260 °C ± 5 °C	No visual damage ΔC/C < ± 10 % DF ≤ 5 % IR ≥ 3000 MΩ Dielectric strength: no failure
Temperature cycling	-55 °C to +125 °C; 5 cycles	No visual damage ΔC/C < ± 30 % DF ≤ 5 % IR ≥ 3000 MΩ Dielectric strength: no failure

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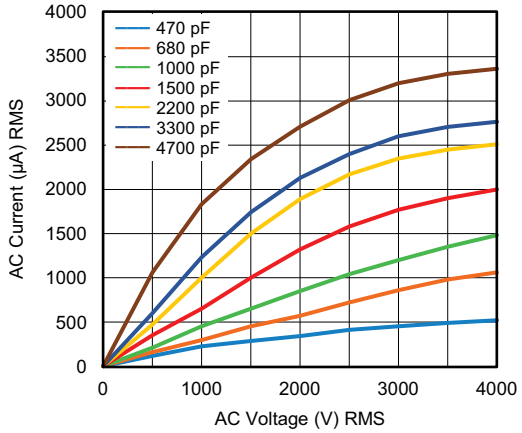
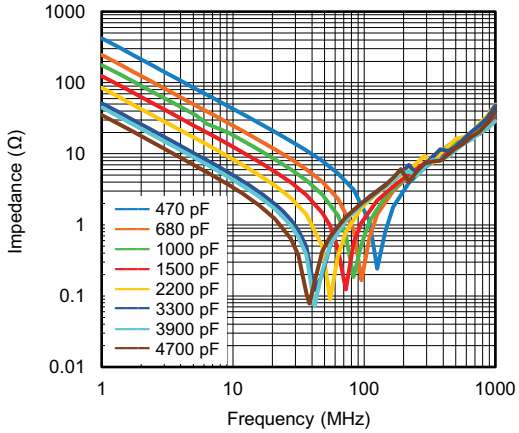
PERFORMANCE		
TEST	**TEST CONDITION**	**TEST LIMITS**
Electrical characterization	25 °C and -40 °C, +125 °C	Capacitance within specified tolerance
		DF ≤ 2.5 %
		Min. 10 000 MΩ
Mechanical shock	Half-sine; 100 *g*/s; 6 ms; 3 shocks each of 6 orientation	No visual damage
		ΔC/C < ± 10 %
		DF ≤ 5 %
		IR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