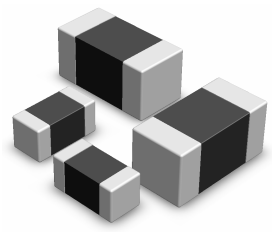
Surface Mount Multilayer Varistor

SC0402E - SC0603E Series

Description

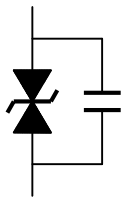
The SC Series is based on Multilayer fabrication technology. These components are designed to suppress a variety of transient events, including those specified in IEC 61000-4-2 or other standards used for Electromagnetic Compliance (EMC). The SC Series is typically applied to protect integrated circuits and other components at the circuit board level. It can operate over a wider temperature range than zener diodes.



Features

- Lead Free type
- SMD type zinc oxide based ceramic chip
- Insulator over coat keeps excellent low and stable leakage current
- Plating termination provided good solderability characteristic
- Wide operating voltage range, VDC: 5.5V to 42V
- Quick response time (<1ns)
- Low clamping voltage
- Meet IEC61000-4-2 standard
- Low capacitance can meet high speed single transient voltage protection

Equivalent Circuits



Applicable

- Low capacitance product applications for high-speed signal lines such as HDMI, DVI, USB, IEEE 1394 Port etc.
- Normal capacitance product applications for I/O Port (RS232, USB, PS2, VGA, Audio) on Mother Board and Notebook, Set – Top Box, MP3 Players, DVD Players, and Docking System etc.

Explanation of Part Number

SC	0402	E	005	M	18
(1)	(2)	(3)	(4)	(5)	(6)

(1) Socay Logo

(2) Chip Size (EIA): 0402 / 0603

(3) Series Type: EMI / ESD Protection

(4) Capacitance: Value - 330= $33X10^{0}$=33pF, 005= $5X10^{-1}$=0.5pF

(5) Capacitance Tolerance: N - ±30%, M - ±20%, L - ±15%, K - ±10%

(6) Working Voltage VDC

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Electrical Characteristics

SC0402E Series

Part Number	Rated Voltage	Varistor Voltage	Clamping Voltage	Capacitance
	V_{DC} (V)	V_V (V)	V_C (V)	C_P (pF)
SC0402E050M05	~5.5	7.6~12	25	5.0
SC0402E100N05	~5.5	7.6~12	25	10
SC0402E050M09	~9	11~17	35	5.0
SC0402E010M18	~18	46~60	110*	1.0

SC0603E Series

Part Number	Rated Voltage	Varistor Voltage	Clamping Voltage	Capacitance
	V_{DC} (V)	V_V (V)	V_C (V)	C_P (pF)
SC0603E050M05	~5.5	7.6~12	25	5.0
SC0603E100N05	~5.5	7.6~12	25	10
SC0603E050M09	~9	11~17	35	5.0
SC0603E010M18	~18	46~60	110*	1.0

V_{DC} – Maximum DC operating voltage the varistor can maintain and not exceed 10μA leakage current.

V_V – Voltage across the device measure at 1mA DC current.

Equivalent to V_B “breakdown voltage”

V_C – Maximum peak current across the varistor with 8/20μs waveform and 1A pulse current.

*: Maximum peak current across the varistor with 8/20μs waveform and 0.5A pulse current.

C_P – Device capacitance measured with zero volt bias 1Vrms at 1MHz. The pF is ±30%

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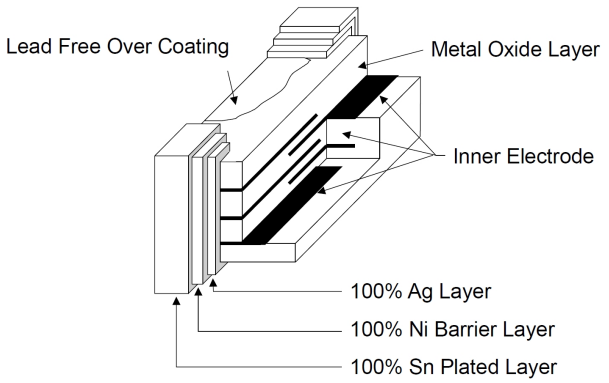
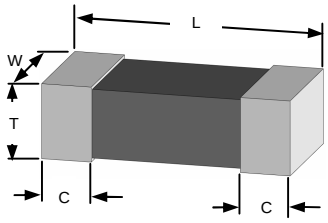
Construction & Dimensions





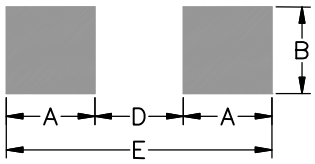
Size EIA (EIAJ)	0402 (1005)		0603 (1608)	
Symbol	Inches	Millimeters	Inches	Millimeters
L	0.038±0.005	0.96±0.12	0.063±0.006	1.60±0.15
W	0.019±0.003	0.48±0.0.07	0.031±0.004	0.80±0.10
T	0.020±0.004	0.50±0.10	0.031±0.008	0.80±0.20
C	0.010±0.006	0.25±0.15	0.012±0.008	0.30±0.20

Pad Layouts & Precaution for handling of substrate

Solder cream in reflow soldering

Refer to the recommendable land pattern as printing mask pattern for solder cream.

(1) Print solder in a thickness of 150 to 200μm



Size EIA (EIAJ)	0402 (1005)		0603 (1608)	
Symbol	Inches	Millimeters	Inches	Millimeters
A	0.024	0.61	0.040	1.02
B	0.020	0.51	0.030	0.76
D	0.020	0.51	0.020	0.50
E	0.067	1.70	0.100	2.54

Precaution for handling of substrate

Do not exceed to bend the board after soldering thes product extremely. (reference examples)

- Mounting place must be as far as possible from the position, which is close to the break line of board or on the line of large holes of board.
- Do not bend extremely the board, in mounting another component. If necessary, use back-up pin (support pin) to prevent from bending extremely.
- Do not break the board by hand. We recommend to use the machine or the jig to break it.

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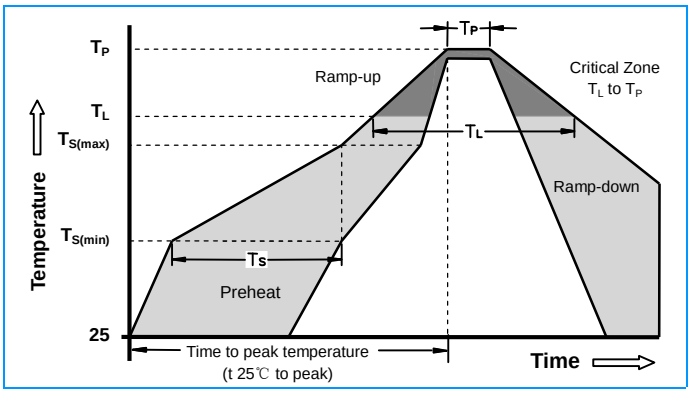
Soldering Parameters



Reflow Condition		Pb-Free assembly
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150°C
	-Temperature Max ($T_{s(max)}$)	+200°C
	-Time (min to max) (T_S)	60 -180 Seconds
Average ramp up rate (Liquidus Temp T_L) to peak		3°C/Second Max
$T_{S(max)}$ to T_L - Ramp-up Rate		3°C/Second Max
Reflow	- Temperature (T_L) (Liquidus)	+217°C
	- Time (min to max) (T_L)	60 -150 Seconds
Peak Temperature (T_P)		260 +0/-5°C
Time within 5°C of actual peak Temperature (T_P)		20-40 Seconds
Ramp-down Rate		6°C/Second Max
Time 25°C to peak Temperature (T_P)		8 minutes Max

Precaution for soldering

Note that this product will be easily damaged by rapid heating, rapid cooling or local heating.
Do not give heat shock over 100°C in the process of soldering.
We recommend to take preheating and gradual cooling

Soldering gun procedure

Note the follows, in case of using solder gun for replacement.
1) The tip temperature must be less than 280 for the period within 3 seconds by using soldering gun under 30W
2) The soldering gun tip shall not touch this product directly.

Soldering volume

Note that excess of soldering volume will easily get crack the body of this product.

General Technical Data

Operating Temperature		-40 ~ +85°C
Storage Temperature		-40 ~ +85°C
Response Time		<1 ns
Solderability		245±5°C, 3±1sec
Solder Leach Resistance		260±5°C, 10±1sec
Solder leach resistance		-40 ~ +85°C
Taping Package Storage Condition	Storage Temperature	5 ~ 40°C
	Relative Humidity	To 65%
	Storage Time	12 Months max

Environmental Performance

Item	Specifications	Test Condition
Bias Humidity	$\triangle V_V / V_V \leq \pm 10$ %	90%RH, 40°C, Working Voltage, 1000 hrs
Thermal Shock	$\triangle V_V / V_V \leq \pm 10$ %	-40°C to 85°C, 30 min. cycle, 5 cycles
Full Load Voltage	$\triangle V_V / V_V \leq \pm 10$ %	Working Voltage, 85°C,1000 hrs

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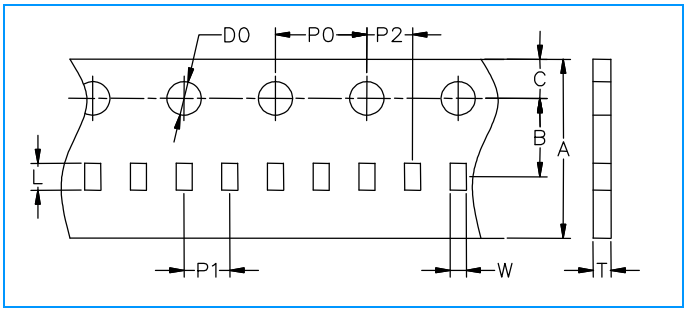
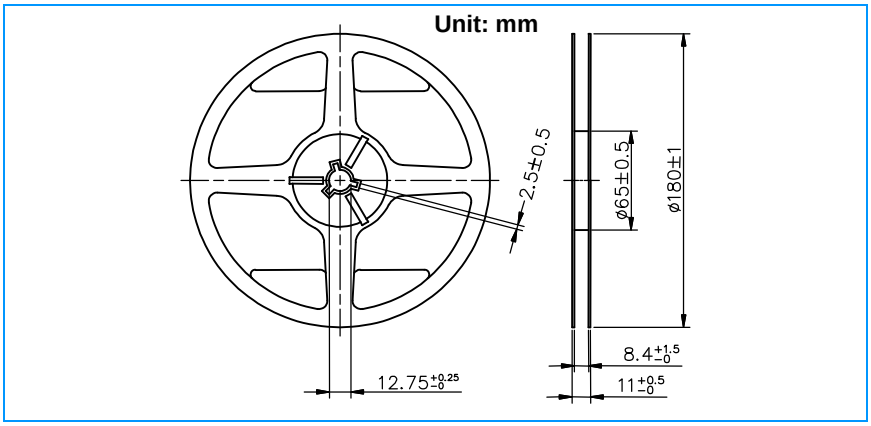
Packaging Information

Carrier Tape Dimensions



Size EIA (EIAJ)	0402 (1005)		0603 (1608)	
Symbol	Inches	Millimeters	Inches	Millimeters
A	0.315±0.012	8.00±0.30	0.315±0.012	8.00±0.30
B	0.138±0.002	3.50±0.05	0.138±0.002	3.50±0.05
C	0.069±0.002	1.75±0.05	0.069±0.002	1.75±0.10
D0	0.061±0.002	1.55±0.05	0.061±0.002	1.55±0.05
P0	0.157±0.004	4.00±0.10	0.157±0.004	4.00±0.10
P1	0.079±0.002	2.00±0.05	0.079±0.002	4.00±0.10
P2	0.079±0.002	2.00±0.05	0.079±0.002	2.00±0.05
W	0.023±0.001	0.59±0.03	0.041±0.006	1.05±0.15
L	0.044±0.001	1.12±0.03	0.075±0.006	1.90±0.15
T	0.024±0.001	0.60±0.03	0.037±0.002	0.95±0.05

Taping Reel Dimensions



Taping Specifications

There Shall be the portion having no product in both the head and the end of taping, and there shall be the cover tape in the heat of taping.

Quantity of products in the taping package

SIZE EIA (EIAJ)	0402 (1005)	0603 (1608)
Standard Packing Quantity (PCS / reel)	10,000	4,000

The contents of a box :

0402 Series: 6 reels / inner box

0603 Series: 6 reels / inner box