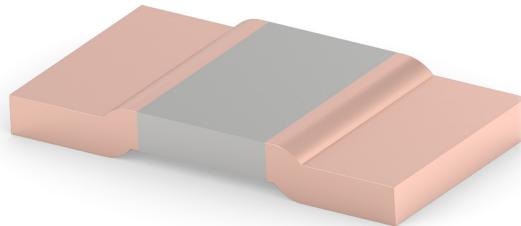


LOW OHMIC CURRENT SENSE SMD SHUNT RESISTORS

TYPE SVSQ SERIES

INTRODUCTION

TE Connectivity (TE) is proud to introduce a high-precision, low-ohmic surface mount shunt resistor designed for demanding applications. Featuring heavy copper connectors that are electron beam welded to a manganin or AC alloy sensing element, this resistor delivers exceptional long-term stability and low inductance. It is compatible with reflow soldering or direct copper welding for flexible and reliable mounting options.



FEATURES

- Up to 15 watts permanent power (0.2mΩ)
- Constant current up to 274 amps (0.2mΩ)
- High conductivity copper connections
- Excellent long-term stability
- High application temperature
- Max. solder temperature up to 350°C / 30 seconds
- Flame resistant
- Solid metal construction
- RoHS and REACH compliant
- AEC-Q200 Compliant
- MSL Level 1

Note: SMD (Surface mount devices) resistors and inductors should be kept in their original packaging to protect them from ESD (Electrostatic Discharge). The full reels can be broken into smaller quantities, without exposing them to ESD, as long as the components are still in the plastic or paper tape. These resistors and inductors should not be removed from the plastic or paper tape unless they are in an ESD protected environment.

APPLICATIONS

- Current sensing/ feedback
- Automotive applications
- Power modules
- Frequency convertors
- Inverters
- Low inductance applications
- Battery Management System Circuits

ELECTRICAL CHARACTERISTICS

	SVSQ 2512	SVSQ 3920	SVSQ 5930
Resistance values (mΩ)	0, 0.2, 0.3, 0.5, 1, 1.3, 2, 3, 4, 5, 6.8, 10,	0.1, 0.2, 0.3, 0.4, 0.5, 0.7, 1, 1.5, 2, 2.5, 3, 4, 5	0.1, 0.2, 0.25, 0.3, 0.4, 0.5, 0.6, 1, 2, 3
Tolerance	1%, 2%, 5%	1%, 5%	1%, 5%
TCR – Temperature coefficient (resistive alloy) (ppm/K)	<±20 (Copper manganese alloys) <-35 (Aluchrom alloy)	<±20 (Copper manganese alloys) <-35 (FeCrAl alloy)	<±20 (Copper manganese alloys) <-35 (Aluchrom alloy)
Applicable temperature range	-65 to +170°C	-65 to +170°C	-55 to +170°C
Load capacity	See size related chart below		
Inductance (nH)	<2	<3	<3
Stability deviation (%)	<0.5 after 2000 hours, Tt*=110°C	<0.5 after 2000 hours, Tt*=110°C	<0.5 after 2000 hours, Tt*=110°C
* Tt = Terminal temperature	<1.0 after 2000 hours, Tt*=140°C	<1.0 after 2000 hours, Tt*=140°C	<1.0 after 2000 hours, Tt*=140°C

Low Ohmic Current Sense SMD Shunt Resistors

Type SVSQ Series

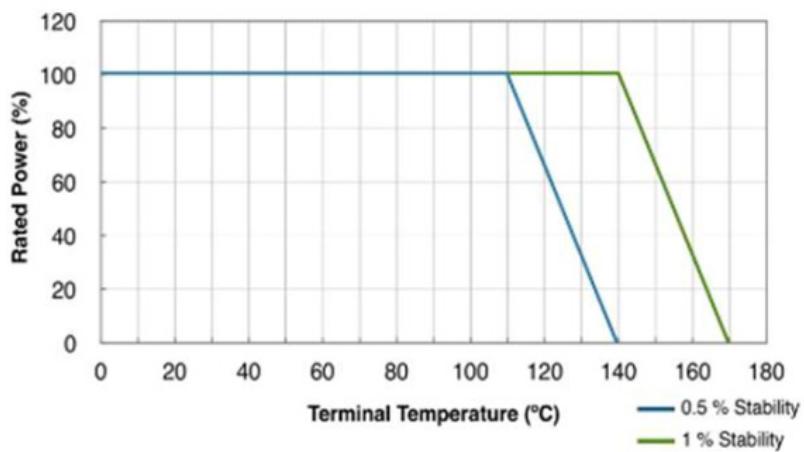
ENVIRONMENTAL CHARACTERISTICS

Characteristic	Reference standard	Test specifications	Acceptance criteria
High temperature exposure	MIL-STD-202 method 108	1000 hrs @T=170°C unpowered	ΔR ±1%
Temperature cycling	JESD22 method JA-104	-55°C to 150°C, 1000 cycles, 30 minutes at each extreme	ΔR ±0.5%
Biased humidity	MIL-STD-202 method 103	85°C & 85RH with 10% operating power, 1000 hrs.	ΔR ±0.5%
Operational life	MIL-STD-202 method 108	125°C at rated power, 1000 hrs.	ΔR ±1%
External visual	MIL-STD-883 method 2009	Visual inspection	Visual
Physical dimension	JESD22 method JB-100	Dimensional inspection as per specification	Shall confirm within tolerance limits
Resistance to solvents	MIL-STD-202 method 215	Clean with aqueous chemical	Marking shall be legible
Mechanical shock	MIL-STD-202 method 213	100g for 6ms, half sine	ΔR ±0.2%
Vibration	MIL-STD-202 method 204	5g for 20 minutes, 12 cycles each of 3 orientations. 10-2000Hz	ΔR ±0.2%
Resistance to soldering heat	MIL-STD-202 method 210	Solder temp. 260°C, time 10 seconds	ΔR ±0.5%
Solderability	J-STD-002	As per J-STD-002	>95% coverage in 10x magnification
Electrical characterization	User spec.	Resistance as defined	Shall confirm within tolerance limits
Short term over load	--	5x rated power for 5 seconds	ΔR ±1%
Low temperature storage	--	-65°C for 24 hrs.	ΔR ±0.2%

POWER DERATING CURVE AT 70°C

SVSQ 2512 / SVSQ 3920 / SVSQ 5930

SVSQ251260R0005FTDG / SVSQ3920100R0005FTDG / SVSQ593080R0005FTDG



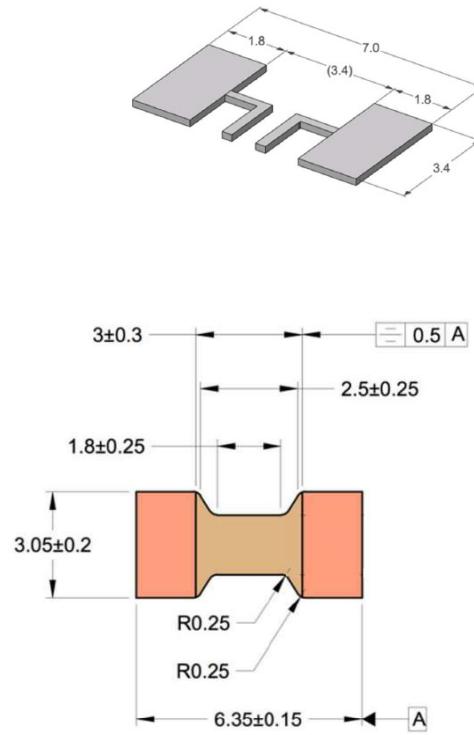
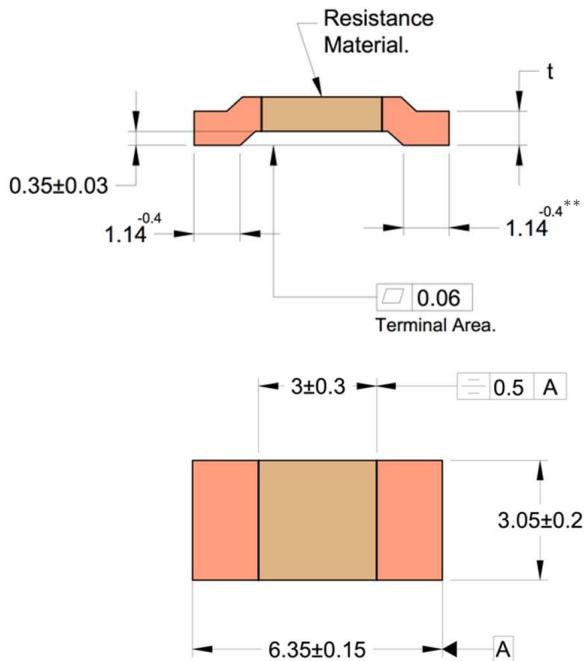
Low Ohmic Current Sense SMD Shunt Resistors

Type SVSQ Series

DIMENSIONS AND CONSTRUCTION (Unit:mm)

SVSQ 2512

RECOMMENDED LAND PATTERN



Part No.	Resistance value (mΩ)	Material	R _{thi} (°C/W)	t ±0.1 (mm)	TCR (ppm)	P (W) @ 70°C ambient	Wt.(nom) gm
SVSQ2512R000FTDG	0.0	Tin plated copper	-	0.42	-	-	0.07
SVSQ251260R0002FTDG	0.2	Copper manganese tin alloy	4	1.0	<225	6	0.16
SVSQ251260R0003FTDG	0.3		4	0.95	<175	6	0.16
SVSQ251260R0005FTDG	0.5		7	0.85	<120	6	0.15
SVSQ251260R001FTDG	1.0		12	0.42	<100	6	0.07
SVSQ251250R0013FTDG	1.3		15	0.33	<100	5	0.06
SVSQ251250R002FTDG	2.0		17	0.67	<50	5	0.11
SVSQ251240R003FTDG	3.0	*Aluchrom alloy	20	0.45	<50	4	0.08
SVSQ251230R004FTDG	4.0		25	0.33	<50	3	0.06
SVSQ251225R005FTDG	5.0		40	0.33	<50	2.5	0.06
SVSQ251220R0068FTDG	6.8		55	0.33	<50	2.0	0.06
SVSQ251215R010FTDG	10		65	0.33	<50	1.5	0.06

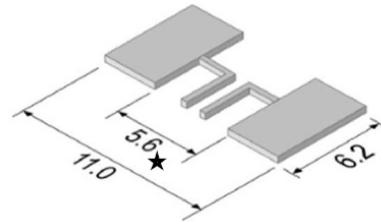
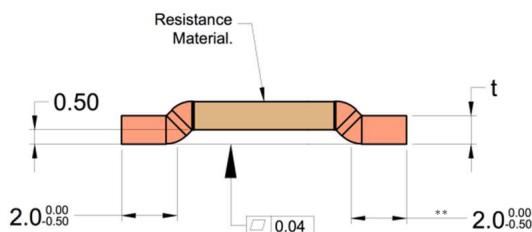
*Aluchrom is ferro-magnetic and is not recommended for AC applications.

Low Ohmic Current Sense SMD Shunt Resistors

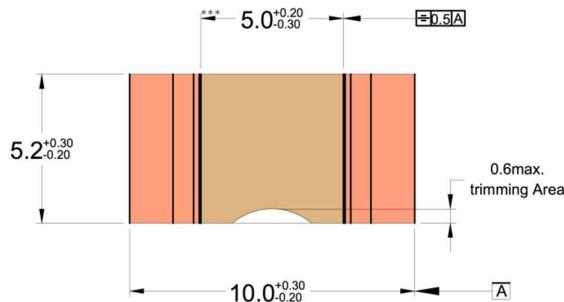
Type SVSQ Series

SVSQ 3920

RECOMMENDED LAND PATTERN



*For SVSQ3920120R0001FTDG is 3.7mm



** This tolerance (2.0+0, -0.5) applies to $t \leq 0.68$ mm, for $t > 0.68$ mm applicable tolerance is 2.0, +0/-0.8mm and for SVSQ3920120R0001FTDG 3.0 +/-0.5mm

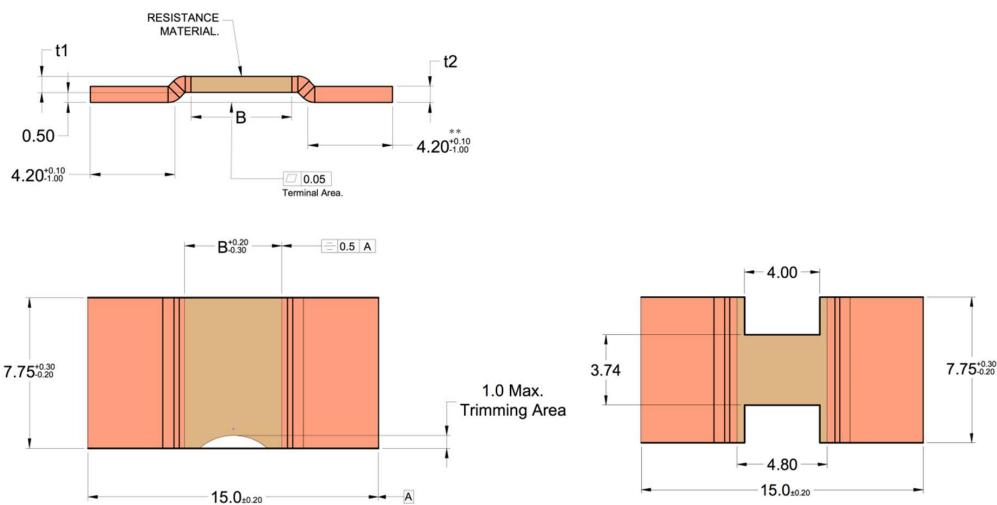
*** This dimension is 3.5 + 0.2, -0.3 and for SVSQ3920120R0001FTDG 2.5 +/-0.5mm

Part No.	Resistance value (mΩ)	Material	R _{thi} (°C/W)	t ± 0.1 (mm)	TCR (ppm)	P (W) @ 70°C ambient	Wt.(nom) gm
SVSQ3920120R0001FTDG*	0.1	Copper manganese tin alloy	2.5	1.42	<250	12	0.65
SVSQ3920120R0002FTDG	0.2		2.5	1.42	<100	12	0.65
SVSQ3920100R0003FTDG	0.3	Copper manganese alloy	3.0	1.42	<150	10	0.65
SVSQ3920100R0004FTDG	0.4		7.0	1.05	<150	10	0.48
SVSQ3920100R0005FTDG	0.5		7.0	0.84	<70	10	0.39
SVSQ392080R0007FTDG	0.7		8.0	0.60	<60	8	0.28
SVSQ392070R001FTDG	1.0		10.0	0.42	<50	7	0.19
SVSQ392080R001FTDG	1.0	FeCrAl alloy	8.0	1.36	<50	8	0.62
SVSQ392070R0015FTDG	1.5		10.0	0.91	<50	7	0.42
SVSQ392060R002FTDG	2.0		12.0	0.68	<50	6	0.31
SVSQ392050R0025FTDG	2.5		13.0	0.54	<50	5	0.25
SVSQ392050R003FTDG	3.0		18.0	0.45	<50	5	0.21
SVSQ392050R004FTDG	4.0		22.0	0.34	<50	5	0.16
SVSQ392030R005FTDG	5.0		30.0	0.27	<50	3	0.12

Low Ohmic Current Sense SMD Shunt Resistors

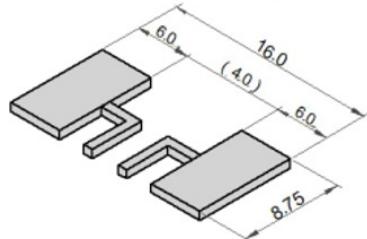
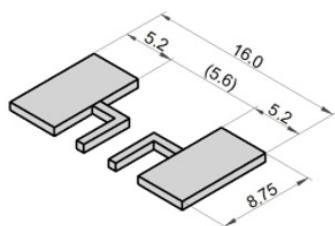
Type SVSQ Series

SVSQ 5930



** For SVSQ5930150R0001FTDG, 4.8 mm +0.1/-1.0 mm

RECOMMENDED LAND PATTERN



Optional:
Solder pad layout for improved TCR (applicable to SVSQ5930150R0001FTDG)

Part No.	Resistance value (mΩ)	Material	R _{thi} (°C/W)	t ₁ ±0.1 (mm)	t 2±0.1 (mm)	B (mm)	TCR (ppm)	P (W) @ 70°C ambient	Wt. (nom.) gm
SVSQ5930150R0001FTDG**	0.1	Copper manganese tin alloy	2.0	1.42	1.42	3.7	<300	15	1.47
SVSQ5930150R0002FTDG	0.2		3.0	1.40	1.40	5.0	<200	15	1.44
SVSQ5930100R00025FTDG	0.25		3.0	1.12	1.12	5.0	<200	10	1.15
SVSQ5930100R0003FTDG	0.3		4.0	0.93	0.93	5.0	<175	10	0.96
SVSQ593090R0004FTDG	0.4		8.0	0.72	0.72	5.0	<175	9	0.74
SVSQ593080R0005FTDG	0.5		8.0	0.56	0.56	5.0	<175	8	0.58
SVSQ5930100R0005FTDG	0.5	*Aluchrom alloy	8.0	1.62	1.42	4.4	<100	10	1.53
SVSQ593080R0006FTDG	0.6	Copper manganese alloy	8.0	0.47	0.47	5.0	<175	8	0.48
SVSQ593090R001FTDG	1.0	*Aluchrom alloy	8.0	0.91	0.91	5.0	<75	9	0.94
SVSQ593070R002FTDG	2.0		14.5	0.46	0.70	5.0	<75	7	0.64
SVSQ593050R003FTDG	3.0		22.0	0.31	0.50	5.0	<75	5	0.45

*Aluchrom is ferro-magnetic and is not recommended for AC applications.

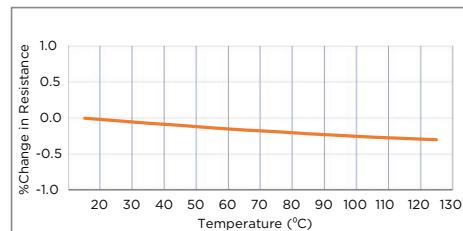
Low Ohmic Current Sense SMD Shunt Resistors

Type SVSQ Series

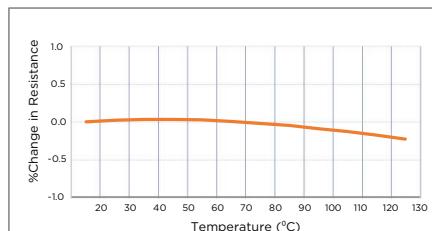
RESISTANCE CHANGE VS TEMPERATURE

SVSQ 2512

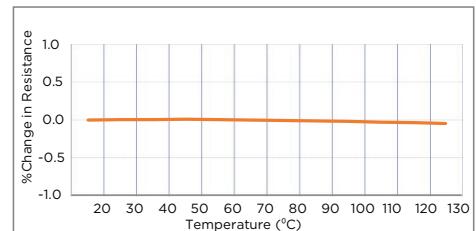
Typical resistance drift (AC alloy)



Typical resistance drift (Copper maganese alloy)

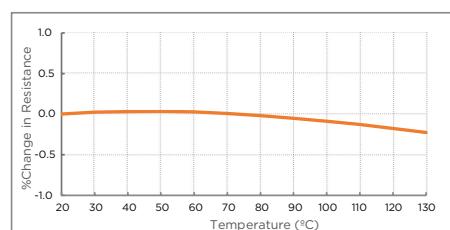


Typical resistance drift (Copper maganese tin alloy)

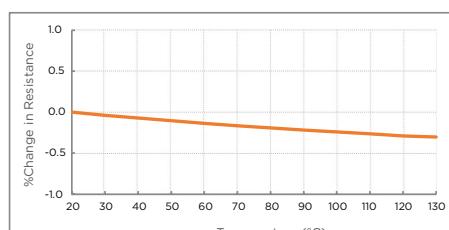


SVSQ 3920

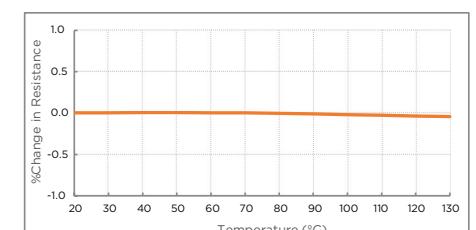
Typical resistance drift (AC alloy)



Typical resistance drift (Copper maganese alloy)

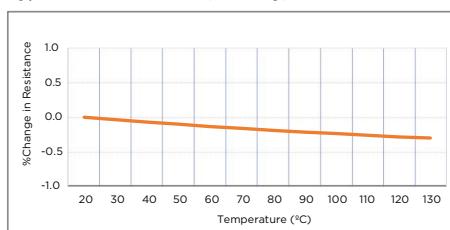


Typical resistance drift (Copper maganese tin alloy)

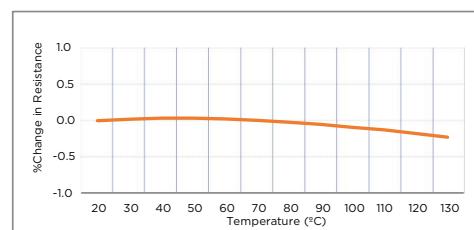


SVSQ 5930

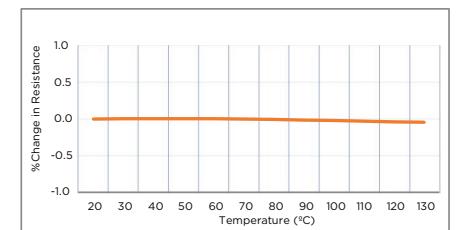
Typical resistance drift (AC alloy)



Typical resistance drift (Copper maganese alloy)

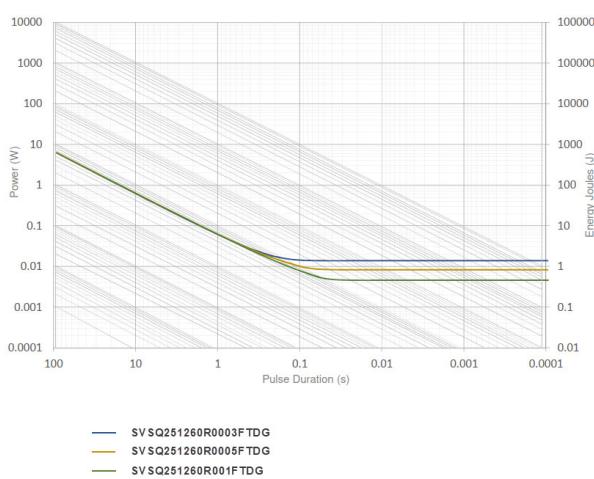


Typical resistance drift (Copper maganese tin alloy)

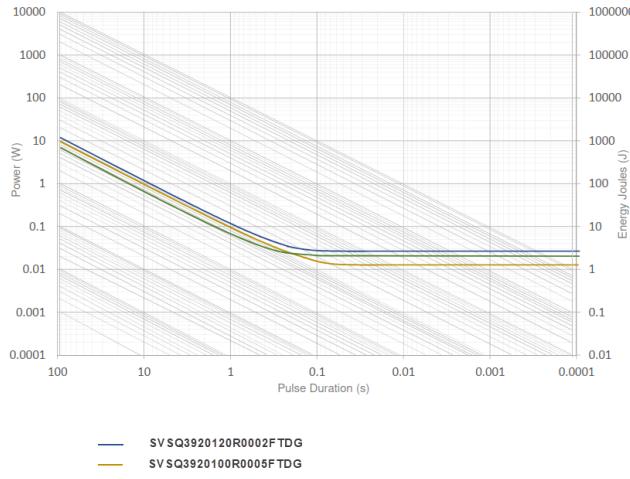


PULSE CHARACTERISTICS

SVSQ 2512



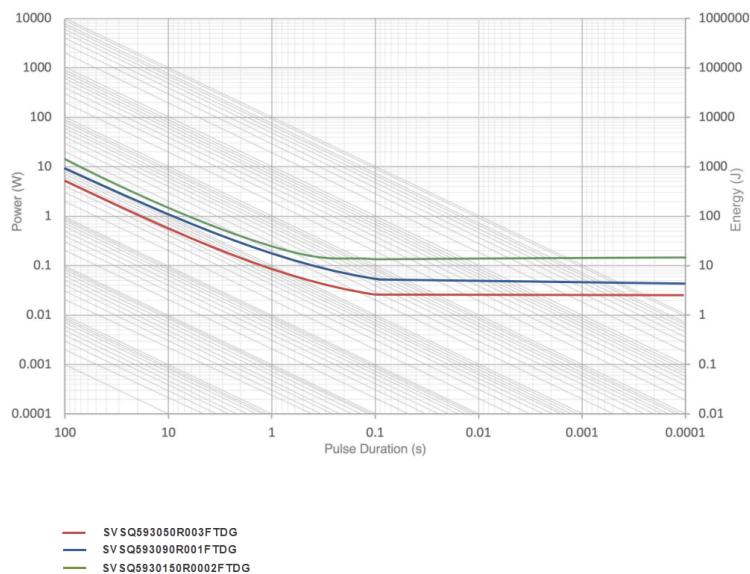
SVSQ 3920



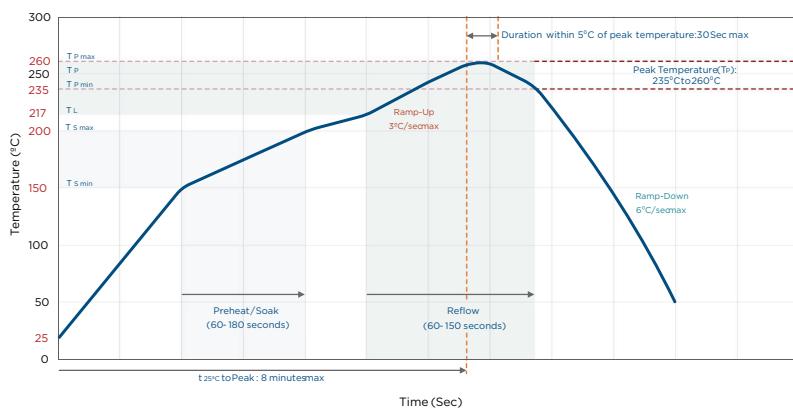
Low Ohmic Current Sense SMD Shunt Resistors

Type SVSQ Series

SVSQ 5930



REFLOW SOLDERING PROFILE



Note:

- The optimal solder reflow profile for a surface mounted electron beam welded resistor depends on the solder type, amount of solder, flux, thermal characteristics of the PCB and the layout of the components. Actual board assembly profile should be developed based on specific process needs and board designs and should not exceed the parameters in this table.
- Reference data as specified is IPC/J-STD-020E December 2014.

Profile Feature	Pb-Free Assembly
Preheat/Soak Temperature Min($T_{s \min}$)	150°C
Temperature Max($T_{s \max}$)	200°C
Time for ($T_{s \min}$ to $T_{s \max}$)	60-180 seconds
Ramp-Up Rate (T_L to T_p)	3°C/second max
Liquidous Temperature (T_L)	217°C
Time (t_L) maintained above T_L	60-150 seconds
Minimum Peak Temperature ($T_p \min$)	235°C
Recommended Peak Temperature (T_p)	250°C
Maximum Peak Temperature ($T_p \max$)	260°C
Duration within 5°C of Peak (T_p)	30 seconds maximum
Ramp-Down Rate (T_p to T_L)	6°C/second max
Time to TP ($t_{25^\circ C}$)	8 minutes max

Low Ohmic Current Sense SMD Shunt Resistors

Type SVSQ Series

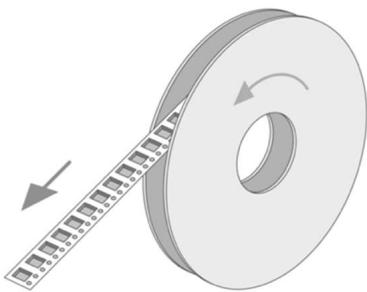
MARKING

Laser marked with resistance rating



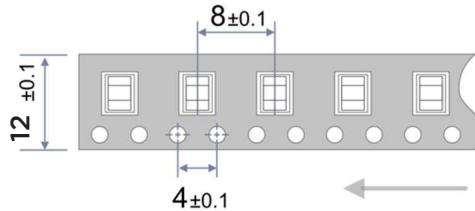
PACKAGING

(REFERENCE STANDARD DIN EN 60286-3)

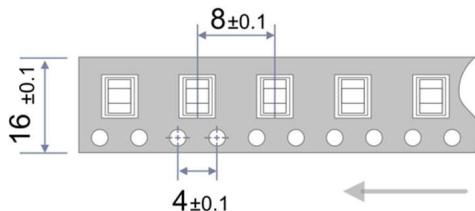


TAPE DIMENSIONS (MM)

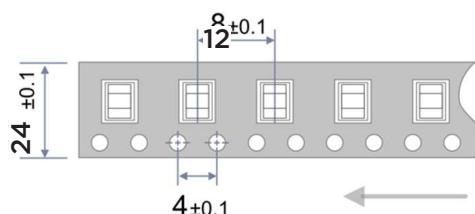
SVSQ 2512



SVSQ 3920



SVSQ 5930



	SVSQ 2512	SVSQ 3920	SVSQ 5930
Width of reel (mm)	12	16	24
Qty pieces per reel	4000	3000	1500

Note: each reel is supplied in a plastic bag with nitrogen flush.

ORDERING INFORMATION

Typical Part Number						
SVSQ	2512	60	R0005	F	TDG	
Product family						
SVSQ	Low ohmic SMD shunt resistor					
Size						
2512	6.35mm x 3.05mm					
3920	10.00mm x 5.2mm					
5930	15.00mm x 7.75mm					
Power Rating (70°C ambient)						
15	1.5W					
20	2W					
25	2.5W					
30	3W etc....					
Packaging						
TDG	Standard tape and reel quantity as above					
Tolerance						
F	*1%					
G	2%					
J	5%					
*Preferred option, other options available on request						
Resistance Value						
R000	.0000 ohm (0mΩ)					
R0003	.0003 ohm (0.3mΩ)					
R0005	.0005 ohm (0.5mΩ)					
R001	.001 ohm (1.0mΩ)					
R0013	.0013 ohm (1.3mΩ)					
R010	.010 ohm (10mΩ)					

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1773467 REV:A1 09/25 ED

PRECISION TECHNOLOGY SOLUTIONS / LOW OHMIC CURRENT SENSE SMD SHUNT RESISTORS - TYPE SVSQ SERIES

