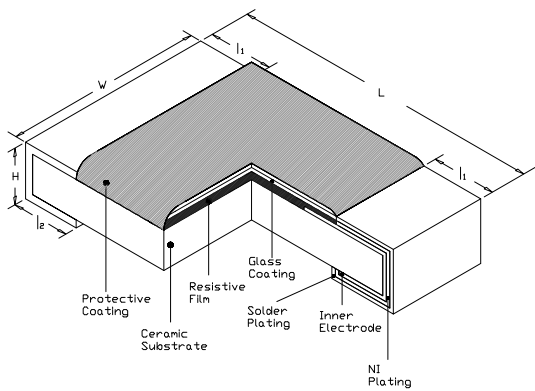


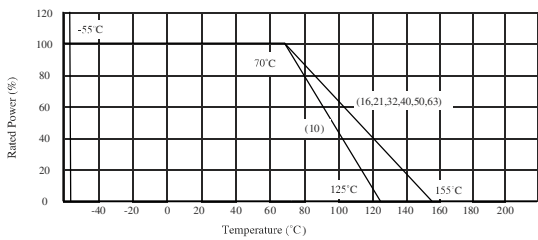
Dimensions and Construction



Features

- Excellent anti-sulphuration characteristics due to usage of high sulphuration-proof inner top electrode material
- Excellent heat resistance and moisture resistance ensured
- Greater reliability and stability in sulphur-rich environments compared to standard products
- Suitable for both flow and reflow soldering

Type	Dimensions				
	Inches (Millimeters)				
	L	W	H	l ₁	l ₂
SAS10 0402 (1005)	0.040 ± 0.004 (1.00 ± 0.10)	0.020 ± 0.002 (0.50 ± 0.05)	0.014 ± 0.002 (0.35 ± 0.05)	0.008 ± 0.004 (0.20 ± 0.10)	0.010 ± 0.004 (0.25 ± 0.10)
SAS16 0603 (1608)	0.063 ± 0.004 (1.60 ± 0.10)	0.031 ± 0.004 (0.80 ± 0.10)	0.018 ± 0.004 (0.45 ± 0.10)	0.012 ± 0.008 (0.30 ± 0.20)	0.012 ± 0.008 (0.30 ± 0.20)
SAS21 0805 (2012)	0.079 ± 0.006 (2.00 ± 0.15)	0.049 ± 0.004 (1.25 ± 0.10)	0.020 ± 0.004 (0.50 ± 0.10)	0.016 ± 0.008 (0.40 ± 0.20)	0.016 ± 0.008 (0.40 ± 0.20)
SAS32 1206 (3216)	0.122 ± 0.004 (3.10 ± 0.10)	0.063 ± 0.006 (1.60 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.020 ± 0.010 (0.50 ± 0.25)	0.020 ± 0.010 (0.50 ± 0.25)
SAS40 1210 (3225)	0.122 ± 0.004 (3.10 ± 0.10)	0.098 ± 0.006 (2.50 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.020 ± 0.010 (0.50 ± 0.25)	0.016 ± 0.008 (0.40 ± 0.20)
SAS50 2010 (5025)	0.200 ± 0.006 (5.00 ± 0.15)	0.098 ± 0.006 (2.50 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.024 ± 0.010 (0.60 ± 0.25)	0.016 ± 0.008 (0.40 ± 0.20)
SAS63 2512 (6432)	0.250 ± 0.006 (6.30 ± 0.15)	0.126 ± 0.006 (3.20 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.024 ± 0.010 (0.60 ± 0.25)	0.016 ± 0.008 (0.40 ± 0.20)



Ordering Code / Information

SAS	10	-	XXXX	-	F	K
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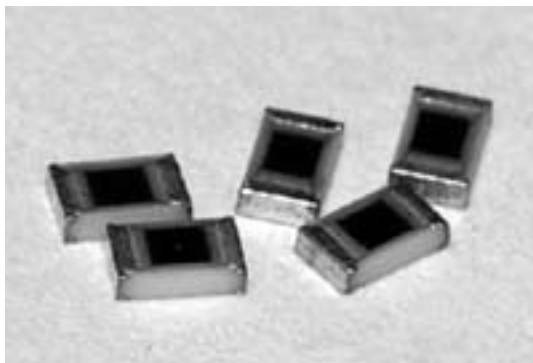
Type	Size (Inch / mm)	Nominal Resistance	Resistance Tolerance	Packaging
Anti-Sulphur Thick Film Chip Resistors	10 (0402/1005) 16 (0603/1608) 21 (0805/2012) 32 (1206/3216) 40 (1210/3225) 50 (2010/5025) 63 (2512/6432)	Resistors 3-Digit: E24 Series 2.2Ω=2R2 100Ω=101 4-Digit: E96 Series 10.2Ω=10R2 10KΩ=1002 0.1Ω = R100 Jumper: 000 - 5% 0000 - 1%	D = ±0.5% F = ±1% G = ±2% J = ±5% Z = Zero Ohm	E = 4,000 pcs Lead Free L = 5,000 pcs Lead Free K = 10,000 pcs Lead Free Y = 20,000 pcs Lead Free

Application and Ratings

Product Type	Power Rating @ 70°C	T.C.R (ppm/°C) Max	Resistance Range E-96, E-24 F(±1%)	Resistance Range E-24 G(±2%), J(±5%)	Jumper Rated Current	Jumper Resistance Value	Max Working Voltage	Max Overload Voltage	Operating Temperature Range
SAS10 0402 (1005)	1/16W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	1A		50V	100V	-55°C to +125°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					
SAS16 0603 (1608)	1/10W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	2A	< 0.05Ω for 5% < 0.02Ω for 1%	150V	300V	-55°C to +155°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					
SAS21 0805 (2012)	1/8W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	2A	< 0.05Ω for 5% < 0.02Ω for 1%	150V	300V	-55°C to +155°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					
SAS32 1206 (3216)	1/4W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	2A	< 0.05Ω for 5% < 0.02Ω for 1%	200V	400V	-55°C to +155°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					
SAS40 1210 (3225)	1/3W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	3A	< 0.05Ω for 5% < 0.02Ω for 1%	200V	400V	-55°C to +155°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					
SAS50 2010 (5025)	3/4W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	3A	< 0.05Ω for 5% < 0.02Ω for 1%	200V	400V	-55°C to +155°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					
SAS63 2512 (6432)	1W	±50	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ	3A	< 0.05Ω for 5% < 0.02Ω for 1%	200V	400V	-55°C to +155°C
		±100	10Ω ≤ R < 1MΩ	10Ω ≤ R < 1MΩ					
		±200	0.1Ω ≤ R < 10Ω	0.1Ω ≤ R < 10Ω					
			1MΩ ≤ R ≤ 10MΩ	1MΩ ≤ R ≤ 10MΩ					

Test	Specification	Test Method
Resistance Value	Within Resistors specification	To be measure at 25°C
Resistance Temperature Coefficient	Within Specification of TCR	25°C/ +125°C
Short Time Overload	±0.5%	For 1% tolerance
	±1.0%	For 2% & 5% tolerance
Resistance to Soldering Heat	±(0.5%+0.05Ω)	For 1% tolerance
	±(1.0%+0.05Ω)	For 2% & 5% tolerance
Moisture Resistance	±(1%+0.1Ω) for 1% , 2% & 5% tolerance resistor	40°C ± 2°C, 90% - 95% RH, 1000 hours
Load Life	±(1.0%+0.05Ω)	For 1% tolerance
	±(2.0%+0.1Ω)	For 2% & 5% tolerance
High Temperature Exposure	±(0.5%+0.05Ω)	For 1% tolerance
	±(1.0%+0.05Ω)	For 2% & 5% tolerance

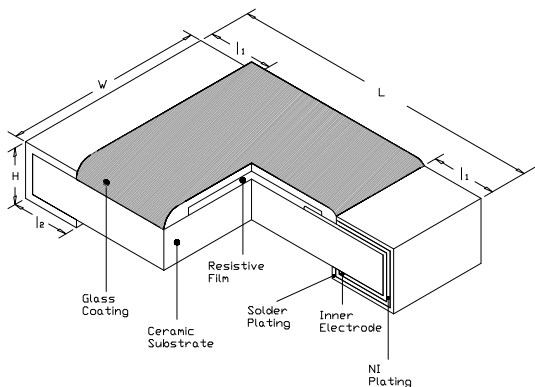
Specifications given herein may be changed at any time without prior notice. Please confirm technical specifications with factory before use.



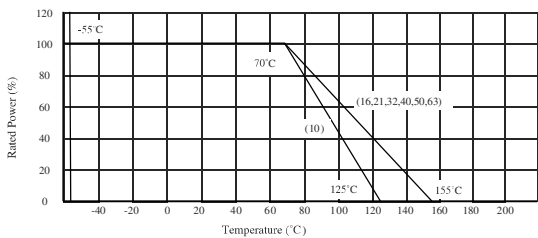
Features

- Suitable for laser fine tune
- Highly reliable multilayer electrode construction

Dimensions and Construction



Type	Dimensions				
	Inches (Millimeters)				
	L	W	H	l ₁	l ₂
TR10 0402 (1005)	0.040 ± 0.004 (1.00 ± 0.10)	0.020 ± 0.002 (0.50 ± 0.05)	0.014 ± 0.002 (0.35 ± 0.05)	0.008 ± 0.004 (0.20 ± 0.10)	0.010 ± 0.004 (0.25 ± 0.10)
TR16 0603 (1608)	0.063 ± 0.004 (1.60 ± 0.10)	0.031 ± 0.004 (0.80 ± 0.10)	0.018 ± 0.004 (0.45 ± 0.10)	0.012 ± 0.008 (0.30 ± 0.20)	0.012 ± 0.008 (0.30 ± 0.20)
TR21 0805 (2012)	0.079 ± 0.006 (2.00 ± 0.15)	0.049 ± 0.004 (1.25 ± 0.10)	0.020 ± 0.004 (0.50 ± 0.10)	0.016 ± 0.008 (0.40 ± 0.20)	0.016 ± 0.008 (0.40 ± 0.20)
TR32 1206 (3216)	0.122 ± 0.004 (3.10 ± 0.10)	0.063 ± 0.006 (1.60 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.020 ± 0.010 (0.50 ± 0.25)	0.020 ± 0.010 (0.50 ± 0.25)
TR40 1210 (3225)	0.122 ± 0.004 (3.10 ± 0.10)	0.098 ± 0.006 (2.50 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.020 ± 0.010 (0.50 ± 0.25)	0.016 ± 0.008 (0.40 ± 0.20)
TR50 2010 (5025)	0.200 ± 0.006 (5.00 ± 0.15)	0.098 ± 0.006 (2.50 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.024 ± 0.010 (0.60 ± 0.25)	0.016 ± 0.008 (0.40 ± 0.20)
TR63 2512 (6432)	0.250 ± 0.006 (6.30 ± 0.15)	0.126 ± 0.006 (3.20 ± 0.15)	0.022 ± 0.002 (0.55 ± 0.05)	0.024 ± 0.010 (0.60 ± 0.25)	0.016 ± 0.008 (0.40 ± 0.20)



Ordering Code / Information

TR	10	-	XXX	-	N	K
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Type	Size (Inch / mm)	Nominal Resistance			Resistance Tolerance	Packaging
Trimmable Thick Film Chip Resistors	10 (0402/1005) 16 (0603/1608) 21 (0805/2012) 32 (1206/3216) 40 (1210/3225) 50 (2010/5025) 63 (2512/6432)	Resistors	3-Digit	E24 Series 2.2Ω=2R2 100Ω=101	N = 0 ~ -30% M = 0 ~ -15% K = ±10% L = ±15%	E = 4,000 pcs Lead Free L = 5,000 pcs Lead Free K = 10,000 pcs Lead Free

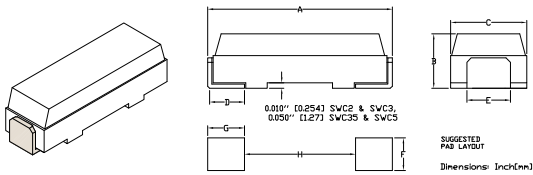
Application and Ratings

Product Type	Power Rating @ 70°C	T.C.R (ppm/°C) Max	Resistance Range E-24 N(0~-30%), M(0~-15%) K(±10%), L(±15%)	Max Working Voltage	Max Overload Voltage	Operating Temperature Range
TR10 0402 (1005)	1/16W	±100	10Ω ≤ R < 1MΩ	50V	100V	-55°C to +125°C
		±200	1MΩ ≤ R < 10MΩ			
TR16 0603 (1608)	1/10W	±100	10Ω ≤ R < 1MΩ			
		±200	1MΩ ≤ R < 10MΩ			
TR21 0805 (2012)	1/8W	±100	10Ω ≤ R < 1MΩ	150V	300V	-55°C to +155°C
		±200	1MΩ ≤ R < 10MΩ			
TR32 1206 (3216)	1/4W	±100	10Ω ≤ R < 1MΩ	200V	400V	
		±200	1MΩ ≤ R < 10MΩ			
TR40 1210 (3225)	1/3W	±100	10Ω ≤ R < 1MΩ			
		±200	1MΩ ≤ R < 10MΩ			
TR50 2010 (5025)	3/4W	±100	10Ω ≤ R < 1MΩ			
		±200	1MΩ ≤ R < 10MΩ			
TR63 2512 (6432)	1W	±100	10Ω ≤ R < 1MΩ			
		±200	1MΩ ≤ R < 10MΩ			

Test	Specification		Test Method
Resistance Value	Within Resistors specification		To be measure at 25°C
Resistance Temperature Coefficient	Within Specification of TCR		25°C/ +125°C
Short Time Overload	± 0.5%	For 1% tolerance	Apply 2.5 times of rated voltage or maximum overload voltage for 5 secs which is lower
	±1.0%	For 2% & 5% tolerance	
Resistance to Soldering Heat	±(0.5%+0.05Ω)	For 1% tolerance	260°C ± 5°C, 10 seconds ± 1 second
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	
Moisture Resistance	±(1%+0.1Ω) for 1% , 2% & 5% tolerance resistor		40°C ± 2°C, 90% - 95% RH, 1000 hours
Load Life	±(1.0%+0.05Ω)	For 1% tolerance	70°C ± 2°C , 1000 hours, 1.5 hours On, 0.5 hours Off cycle
	±(2.0%+0.1Ω)	For 2% & 5% tolerance	
High Temperature Exposure	±(0.5%+0.05Ω)	For 1% tolerance	125°C , 1000 hours. Unpowered. Measurement at 24 ± 2 hours after test conclusion.
	±(1.0%+0.05Ω)	For 2% & 5% tolerance	



Dimensions and Construction



Derating Information

- Standard SWC1/2 to SWC5 are derated by 0.67%/°C when ambient temperature exceeds 25°C.
- Low Profile parts SWC1/2L to SWC2SSL are derated by 0.95%/°C above 70°C.

Features

- Large terminals and optimized body shape for power dissipation
- Extremely precise tolerance (±0.01%), Low Temperature Coefficient of Resistance of ±30ppm
- Widely used in applications where surge voltages or in surge currents are present

Standard Models

Type	Dimensions							
	Inches (Millimeters)							
	A	B (Max)	C	D (Min)	E	F	G	H
SWC1/2 (1/2W)	0.204 ± 0.02 (5.2 ± 0.5)	0.111 (2.82)	0.125 ± 0.01 (3.2 ± 0.25)	0.025 (0.63)	0.045 ± 0.015 (1.14 ± 0.4)	0.08 (2.0)	0.1 (2.5)	0.08 (2.0)
SWC1 (1W)	0.258 ± 0.02 (6.55 ± 0.5)	0.125 (3.17)	0.15 ± 0.015 (3.8 ± 0.4)	0.032 (0.8)	0.06 ± 0.015 (1.15 ± 0.4)	0.1 (2.5)	0.125 (3.2)	0.12 (3.0)
SWC2 (2W)	0.449 ± 0.032 (11.4 ± 0.8)	0.208 (5.28)	0.225 ± 0.015 (5.7 ± 0.4)	0.06 (1.5)	0.07 ± 0.02 (1.78 ± 0.5)	0.16 (4.0)	0.157 (4.0)	0.2 (5.0)
SWC2SS (2W)	0.297 ± 0.02 (7.5 ± 0.5)	0.165 (4.19)	0.15 ± 0.015 (3.8 ± 0.4)	0.044 (1.1)	0.05 ± 0.016 (1.27 ± 0.4)	0.1 (2.5)	0.125 (3.2)	0.14 (3.6)
SWC27 (2.7W)	0.48 ± 0.032 (12.2 ± 0.8)	0.23 (5.84)	0.228 ± 0.016 (5.8 ± 0.4)	0.05 (1.27)	0.07 ± 0.02 (1.78 ± 0.5)	0.16 (4.0)	0.18 (4.57)	0.2 (5.0)
SWC3 (3W)	0.625 ± 0.032 (15.9 ± 0.8)	0.27 (6.86)	0.275 ± 0.015 (7 ± 0.38)	0.05 (1.27)	0.085 ± 0.016 (2.16 ± 0.4)	0.16 (4.0)	0.175 (4.5)	0.4 (10.0)
SWC35 (3.5W)	0.811 ± 0.020 (20.6 ± 0.5)	0.295 (7.49)	0.273 ± 0.02 (6.9 ± 0.5)	0.063 (1.6)	0.102 ± 0.028 (2.6 ± 0.7)	0.2 (5.0)	0.2 (5.0)	0.6 (15.0)
SWC5 (5W)	0.811 ± 0.02 (20.6 ± 0.5)	0.295 (7.49)	0.273 ± 0.02 (6.9 ± 0.5)	0.063 (1.6)	0.102 ± 0.028 (2.6 ± 0.7)	0.2 (5.0)	0.25 (6.4)	0.6 (15.0)

Low Profile Metal Plate Models

Type	Dimensions							
	Inches (Millimeters)							
	A	B (Max)	C	D (Min)	E (Minimum)	F	G	H
SWC1/2L (1/2W)	0.2 ± 0.012 (5.1 ± 0.3)	0.053 (1.35)	0.1 ± 0.01 (2.54 ± 0.25)	0.025 (0.63)	0.06 (1.5)	0.08 (2.0)	0.1 (2.5)	0.08 (2.0)
SWC1L (1W)	0.25 ± 0.012 (6.3 ± 0.3)	0.057 (1.45)	0.126 ± 0.012 (3.2 ± 0.3)	0.025 (0.63)	0.07 (1.8)	0.15 (3.8)	0.125 (3.2)	0.12 (3.0)
SWC2L (2W)	0.33 ± 0.012 (8.38 ± 0.3)	0.057 (1.45)	0.157 ± 0.012 (4.0 ± 0.3)	0.032 (0.8)	0.1 (2.5)	0.197 (5.0)	0.157 (4.0)	0.157 (4.0)
SWC2SSL (2W)	0.25 ± 0.012 (6.3 ± 0.3)	0.079 (2.0)	0.126 ± 0.012 (3.2 ± 0.3)	0.032 (0.8)	0.08 (2.0)	0.15 (3.8)	0.125 (3.2)	0.12 (3.0)

Ordering Code / Information

SWC	1/2	L	-	XXXX	-	F	TR	-	F
Type	Power Rating	Option		Nominal Resistance		Resistance Tolerance	Packaging		T.C.R (ppm/°C)
SMD WireWound Resistors (Chip Type)	1/2 - 1/2W 1 - 1W 2 - 2W 2SS - 2W 27 - 2.7W 3 - 3W 35 - 3.5W 5 - 5W	X = Non Inductive P = Increased Pulse Capability M = Power Metal Film Element L = Low Profile Non-Inductive Metal Plate Design E = Low Thermal EMF Design (Leave blank if standard) (Refer to Application Notes)		Resistors	3-Digit: E24 Series 2.2Ω=2R2 100Ω=101 4-Digit: E96, E192 Series 10.2Ω=10R2 10KΩ=1002 5-Digit: Resistance values below 0.001Ω 0.0005Ω=R0005	T = ±0.01% Q = ±0.02% A = ±0.05% B = ±0.1% C = ±0.25% D = ±0.5% F = ±1% G = ±2% J = ±5%	TR		A = ± 5 B = ± 10 20 = ± 20 D = ± 25 30 = ± 30 E = ± 50 F = ± 100 G = ± 200 (Leave Blank if Standard)

Application and Ratings

Product Type	Power Rating	WireWound & Option L Metal Plate			Option M Film Element			Operating Temperature Range
		T.C.R (ppm/°C) Max (Standard parts power rated @ 25°C, Low Profile parts power rated @ 70°C)	Resistance Range E-192, E-96, E-24 T(±0.01%), Q(±0.02%), A(±0.05%), B(±0.1%), C(±0.25%), D(±0.5%), F(±1%), G(±2%), J(±5%)	Max Working Voltage	T.C.R (ppm/°C) Max	Resistance Range E-192, E-96, E-24 C(± 0.25%), D(± 0.5%), F(± 1%), G(± 2%), J(± 5%)	Max Working Voltage	
SWC1/2	1/2W	0.0005Ω ≤ X < 0.025Ω (±400) 0.025Ω ≤ X < 0.05Ω (±300) 0.05Ω ≤ X < 0.1Ω (±200) 0.1Ω ≤ X < 1Ω (±90) 1Ω ≤ X < 10Ω (±50) > 10Ω (±30)	0.01Ω - 2KΩ	33V	0.1Ω ≤ X < 1Ω (±350) 1Ω ≤ X < 10Ω (±200) > 10Ω (±100)	5Ω - 1MΩ	33V	-55°C to +175°C
SWC1	1W		0.001Ω - 10KΩ	58V		0.1Ω - 1MΩ	58V	
SWC2	2W		0.002Ω - 25KΩ	120V		0.1Ω - 1MΩ	120V	
SWC2SS	2W		0.1Ω - 200Ω	80V		1Ω - 1MΩ	80V	
SWC27	2.7W		0.005Ω - 20KΩ	180V		1Ω - 1MΩ	180V	
SWC3	3W		0.005Ω - 25KΩ	200V		1Ω - 1MΩ	200V	
SWC35	3.5W		0.005Ω - 50KΩ	250V		1Ω - 1MΩ	250V	
SWC5	5W		0.005Ω - 100kΩ	300V		-	300V	
SWC1/2L	1/2W		0.003Ω - 0.05Ω	√(P*R)		-	-	
SWC1L	1W		0.001Ω - 0.1Ω	√(P*R)		-	-	
SWC2L	2W		0.002Ω - 0.2Ω	√(P*R)		-	-	
SWC2SSL	2W		0.0005Ω - 0.005Ω	√(P*R)		-	-	

Temperature Coefficient of Resistance	Standard WireWound Type / Option L (Low Profile Non-Inductive Metal Plate Design)		Option M (Power Metal Film Element)	
	Standard (ppm/°C)	Optional (ppm/°C)	Standard (ppm/°C)	Optional (ppm/°C)
Resistance Value				
0.0005Ω - 0.024Ω	400	100, 200	-	-
0.025Ω - 0.049Ω	300	100, 200	-	-
0.050Ω - 0.099Ω	200	50, 100	-	-
0.1Ω - 0.99Ω	90	20, 30, 50	350	200
1Ω - 9.9Ω	50	10, 20, 30	200	100
10Ω & above	30	5, 10, 20	100	25, 50

Application Notes:

- Power Rating:** Resistors may be operated up to full rated power with consideration of mounting density, pad and trace geometry, PCB material, and ambient temperature. Standard parts should be derated (Power & Voltage) by 0.67%/°C when ambient temperature exceeds 25°C. Low Profile models should be derated by 1%/°C above 70°C.
- Inductance:** Standard wirewound parts' inductance are typically 1uH to 20uH. For Option X (Non Inductive design), the inductance for resistance ≤ 50Ω is 0.2uH maximum, and 0.37uH for resistance > 50Ω. Option L (Low Profile Non-Inductive Metal Plate Design) and Option M (Power Metal Film Element) are inherently low inductance (Typically 1nH to 10nH). Consult factory for more information.
- Pulse Capability:** Standard SWC series (WireWound) and Option L (Low Profile Non-Inductive Metal Plate Design) offer excellent overload capability, greatly exceeding that of film resistors. The overload level can often be economically enhanced by a factor of 50% or more via selecting Option P (Increased Pulse Capability). Pulse capability is highly dependent on size and resistance (available up to 50 Joules). Consult factory for more information.