

TEL: (852) 2730-8145 FAX: (852) 2730-3245 E-mail: info@solitronics.com

RESISTOR SPECIFICATIONS

Date: 19th June 1997

RoHS COMPLIANT CARBON FILM FIXED RESISTOR

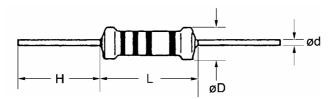
Data Sheet:

SEL-RGD-1001(1)

1. FEATURES

- High quality at competitive prices
- Meet JIS-C-5202 & USA MIL-R-22684B specifications
- Flame retardant type available on request
- Automatically insertable, also available pre-cut and formed for Panasert/Avisert
- Can be bulk-packed, tape/box or tape/reel
- Resistor with special weldable-leads and 38mm lead length available on request
- Too low or too high ohmic value can be supplied only case by case
- Tolerance available: ± 5%, ± 2%, ± 1%
- RoHS Compliant

2. DIMENSION



Sub-Miniature-Size & Micro-size Resistor

٥. ١		Dimension (mm)						
Style	Rating	L	D	d +0.02 -0.05	H ± 3			
CR-12	1/8W	3.5±0.2	1.5±0.2	0.45ø	28±3.0			
CR-12S	1/4W	3.5±0.2	1.5±0.2	0.45ø	28±3.0			
CR-25	1/4W	6.5±0.5	2.3±0.2	0.54ø	28±3.0			
CR-33S	1/3W	6.5±0.5	2.3±0.2	0.54ø	28±3.0			
CR-50SS	1/2W	6.5±0.5	2.3±0.2	0.54ø	28±3.0			

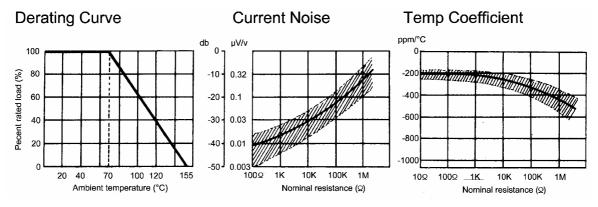
Sub-Miniature-Size & Micro-size Resistor

0. 1	Dimension (mm)						
Style	Rating	L	D	d +0.02 -0.05	H ± 3		
CR-50S	1/2W	8.5±0.5	2.7±0.5	0.54ø	28±3.0		
CR-100S	1.0W	9.0±0.5	3.5±0.5	0.70ø	28±3.0		
CR-100	1.0W	11±1.0	4.0±0.5	0.70ø	35±3.0		
CR-200S	2.0W	11±1.0	4.0±0.5	0.75ø	35±3.0		
CR-200	2.0W	15±1.0	5.0±0.5	0.75ø	35±3.0		

3. VOLTAGE & RATING

Style	Rating Wattage	Max. Working Voltage	Max. Overload Voltage	Resistance Range
CR-12	1/8W	200V	400V	1Ω - 1 Meg Ω
CR-25 CR-12S CR-33S	1/4W	250V	500V	1Ω - 10 Meg Ω
CR-33S	1/4W	250V	500V	1Ω - 10 Meg Ω
CR-50 CR-50SS	1/2W	350V	700V	1Ω - 10 Meg Ω
CR-100 CR-100S	1.0W	500V	1,000V	1Ω - 10 Meg Ω
CR-200 CR-200S	2.0W	500V	1,000V	1 Ω - 10Meg Ω

4. OTHER PHYSICAL PROPERTIES





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RESISTOR SPECIFICATIONS

Date: 19th June 1997

RoHS COMPLIANT CARBON FILM FIXED RESISTOR

Data Sheet: SEL-RGD-1001(2)

5. PERFORMANCE SPECIFICATION

Characteristics		Limi	its		Test Methods			
	RANGE		T.C.R		Natural resistance change per temp. degree centigrade.			
T.C.R. JIS-C 5202 5.2	1E – 91K		0450ppm	n/°C	$\frac{R_2 - R_1}{R_1(t_2 - t_1)}$ x 10 ⁶ (ppm/°C)			
JIS-C 5202 5.2	100K – 1M	100K – 1M 0 – -700ppm/°C			R ₁ : Resistance value at room temperature (t ₁)			
	1.1M – 10M	-800 — -1500ppm/°C				tance value at room ter ern: Room temp., Roor		
Dielectric withstanding voltage JIS-C-5202 5.7	No evidence of flashover mechanical damage arcing or insulation breakdown.				Resistor shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively specified in the above list for 60+10/– 0 seconds.			
						ce change after contine specified below.	uous five cycles for	
			(40) 00=0\	.	Sten	Temperature	Time	
Temperature cycling JIS-C-5202 7.4	Resistance change rate			Max. with	1	-55°C ± 3°C	30 minutes	
313-0-3202 7.4	no evidence of mechan	licai	uarriage.		2	Room temp.	10 – 15 minutes	
					3	+155°C ± 2°C	30 minutes	
					4	Room temp.	10 – 15 minutes	
Short-time overload JIS-C-5202 5.5	Resistance change rate no evidence of mechan			Max. with		nt resistance change ntial of 2.5 times RCW\		
0.0 0 0202 0.0	Resistance			ΔR/R				
Load Life in humidity	Normal type	Less	s than 100 K Ω	± 3% ± 5%	RCWV w	ce change after 1,000 vith duty cycle of 1.5 h	nours "on", 0.5 hour	
JIS-C-5202 5.9	Elame retardant type Less than 100K ± 5%				"off" in a humidity test chamber controlled at 40°C ± 2°C and 90 to 95% relative humidity.			
	Resistance			ΔR/R				
	Less than 56KO + 29			± 2%	Permane	nt resistance change	after 1,000 hours	
Load life	Normal type		$SK\Omega$ or more	± 3%	Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "on", 0.5 hour "off" at 70°C ± 2% ambient.			
JIS-C-5202 7.10	F		ss than 100K	±5%				
	Flame retardant type		0KΩ or more	± 10%				
Insulation resistance JIS-C-5202 5.6	Insulation resistance is	10,0	000 MΩ Min.		Resistors shall be clamped in the trough of 90° metallic V-block and shall be tested at DC. potential respectively specified in the above list for 60 +10/–0 seconds.			
Terminal strength JIS-C-5202 6.1	No evidence of mechanical damage.				the dire leads. Twist test Termina of about shall be axis of a total of	nce to a 2.5kg direct lo ction of the longitudina: al leads shall be bent that 6mm from the body e rotated through 360 the bent terminal in altof 3 rotations.	Il axis of the terminal arrough 90° at a point of the resistor and about the original ernating direction for	
Resistance to soldering heat JIS-C-5202 6.4	Resistance change rate is \pm (1% + 0.05 Ω) Max. with no evidence of mechanical damage.			Max. with	Permanent resistance change when leads			
Solderability JIS-C-5202 6.5	95% coverage Min.				and con pinholes. Test temp	covered with a new, stinuous surface free co. of solder: $235^{\circ}C \pm 5^{\circ}$ e in solder: $3 + 0.5/-0.5$	from concentrated	



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RESISTOR SPECIFICATIONS

Date: 23rd July, 1997

Data Sheet:

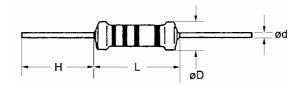
RoHS COMPLIANT PRECISION METAL FILM RESISTOR

SEL-RGD-1002(1)

1. MATERIALS & FEATURES

- Meet US military specification MIL-R-10509F and JIS-C-5202 5.2
- Nichrome resistor element provides stable performance in various environments
- Wide precision range in small package
- Multiple epoxy coating on vacuum-deposited metal film provides superior moisture protection
- Low T. C. of R.
- Flame retardant type available
- Low noise & voltage coefficient
- · EIA standard color coding
- Too low or too high ohmic value can be supplied only case by case.
- RoHS Compliant

2. DIMENSIONS



Normal Size

041-	D-ti	MIL-R		Dimension (mm)					
Style	Rating	10509F	L Max.	D Max.	d +0.02 -0.05	H ± 3			
MF-12	0.125W	RN50	4.2	2.0	0.45	28			
MF-25	0.250W	RN55	6.8	2.5	0.54	28			
MF-50	0.500W	RN60	10.0	3.5	0.54	28			
MF-100	1.000W	RN65	12.0	5.0	0.70	28			
MF-200	2.000W	RN70	16.0	5.5	0.70	28			

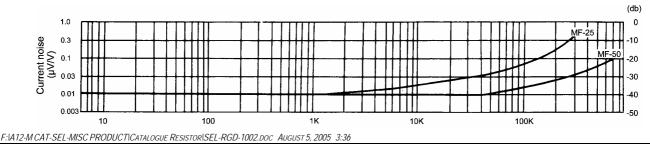
Small Size

0.1	Dimension (mm)							
Style	Rating			d +0.02 -0.05	H ± 3			
MF-25-SS	0.25W	3.7	1.9	0.45	28			
MF-40-SS	0.40W	3.7	1.9	0.45	28			
MF-50-S	0.50W	9.0	3.0	0.54	28			
MF-50-SS	0.50W	6.8	2.5	0.54	28			
MF-60-S	1.00W	6.8	2.5	0.70	28			

3. GENERAL SPECIFICATION

	Rating	Max.	Max.	Resistance		Resistance		Special order	
Style	Wattage	Working V. (At 70°C)	Overload V. (At 70°C)	Tolerance	T.C.R.	Range	Resistance Tolerance	T.C.R.	Resistance Range
MF-12	0.125W	200V		± 5%	± 200ppm/°C		± 0.25%	± 15 ppm	51.1 Ω -200K Ω
MF-25-SS	0.250W	250V	400V	± 2%	± 100ppm/°C	$10.0\Omega - 1M\Omega$	± 0.50%	± 25 ppm	51.1Ω-511ΚΩ
MF-40-SS	0.400W	350V		± 1%	± 50ppm/°C			± 50 ppm	
MF-25	0.250W			± 5%	± 200ppm/°C	$1.0\Omega - 1M\Omega$	± 0.10%	± 15 ppm	100Ω-100ΚΩ
MF-50-SS	0.500W	250V	500V	± 2%	± 100ppm/°C	$2.2\Omega - 1M\Omega$	± 0.25%	± 25 ppm	51.1 Ω -330K Ω
MF-60-S	0.600W			± 1%	± 50ppm/°C	$10.2\Omega - 1M\Omega$	± 0.50%	± 50 ppm	10Ω-1ΜΩ
ME EO				± 5%	± 200ppm/°C	$10.0\Omega - 1M\Omega$	± 0.10%	± 15 ppm	100 Ω -330K Ω
MF-50 MF-50-S	0.500W	350V	700V	± 2%	± 100ppm/°C	$2.2\Omega - 1M\Omega$	± 0.25%	± 25 ppm	51.1Ω - $511K\Omega$
WII - 30-0				± 1%	± 50ppm/°C	$10.0\Omega - 1M\Omega$	± 0.50%	± 50 ppm	10Ω-1ΜΩ
				± 5%	± 200ppm/°C	$10.0\Omega - 1M\Omega$	± 0.10%	± 15 ppm	100 Ω -330K Ω
MF-100	1.000W	500V	1000V	± 2%	± 100ppm/°C	$51.1\Omega - 1M\Omega$	± 0.25%	± 25 ppm	$51.1\Omega\text{-}511\text{K}\Omega$
				± 1%	± 50ppm/°C	$51.1\Omega - 1M\Omega$	± 0.50%	± 50 ppm	10Ω-1ΜΩ
				± 5%	± 200ppm/°C	$10.0\Omega - 1M\Omega$	± 0.10%	± 15 ppm	100Ω-330KΩ
MF-200	2.000W	500V	1000V	± 2%	± 100ppm/°C	$51.1\Omega - 1M\Omega$	± 0.25%	± 25 ppm	51.1Ω - $511K\Omega$
				± 1%	± 50ppm/°C	$51.1\Omega - 1M\Omega$	± 0.50%	± 50 ppm	10Ω-1ΜΩ

4. CURRENT NOISE LEVEL





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RESISTOR SPECIFICATIONS

Date: 23rd July, 1997

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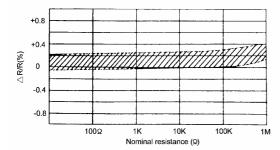
PRECISION METAL FILM FIXED RESISTOR

SEL-RGD-1002(2)

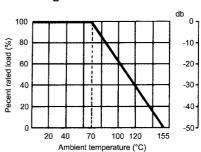
6. PERFORMANCE SPECIFICATIONS

Characteristics	Limits		Test Methods		
	Within the temperature coefficient	Natural resis	tance change per temp. d	egree centigrade.	
Taman a nati ina	specified below	R2 – R1 4064 (20)			
Temperature coefficient	Max. T: C. R.	$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{(ppm/°C)}$			
JIS-C 5202 5.2	± 25 ppm/°C ± 100 ppm/°C	R ₁ : Resistance value at room temperature (t ₁)			
313-0 3202 3.2	± 25 ppm/°C ± 200 ppm/°C	R ₂ : Resistance value at room temp. plus 100°C (t ₂)			
	± 50 ppm/°C		Room temp., Room temp		
Dielectric withstanding	No evidence of fleebover mechanical democra	Resistor sha	Il be clamped in the troug	gh of a 90° metallic V	
voltage	No evidence of flashover, mechanical damage, arcing or insulation breakdown.		shall be tested at AC		
JIS-C-5202 5.7	arding of insulation breakdown.		he above list for 60+10/-0		
			change after continuous fiv	e cycles for duty cycle	
		specified bel	OW.		
Temperature cycling	Resistance change rate is \pm (1% + 0.05 Ω) Max.	Step	Temperature	Time	
JIS-C-5202 7.4	with no evidence of mechanical damage.	1	−55°C ± 3°C	30 minutes	
0.0 0 0202 111	That he evidence of mooridined damage.	2	Room temp.	10 – 15 minutes	
		3	+155°C ± 2°C	30 minutes	
		4	Room temp.	10 – 15 minutes	
Humidity (steady state)	Resistance change rate is \pm (2% + 0.05 Ω) Max.		esistance change after a		
JIS-C-5202 7.5	with no evidence of mechanical damage.		st chamber controlled at 4	10°C ±2°C and at 90 to	
Chart times a susula and		95% relative		the emplication of	
Short-time overload JIS-C-5202 5.5	Resistance change rate is $\pm (0.5\% + 0.05\Omega)$ Max.		resistance change after .5 times RCWV for 5 seco		
Pulse overload	with no evidence of mechanical damage. Resistance change rate is \pm (1% + 0.05 Ω) Max.		change after 10,000 cycle		
JIS-C-5202 5.8	with no evidence of mechanical damage.		F") at 4 times RCWV.	S (1 Second ON, 20	
				2 (1.5 hours "on" 0.4	
Load life in humidity	Resistance change rate is \pm (5% + 0.05 Ω) Max.	Resistance change after 1,000 hours (1.5 hours "on", 0.5 hour "off") at RCWV in a humidity test chamber controlled at			
JIS-C-5202 7.9	with no evidence of mechanical damage.		and at 90 to 95% relative I		
1 115-	D :		esistance change after 1,0		
Load life	Resistance change rate is \pm (5% + 0.05 Ω) Max.	RCWV, with duty cycle of 1.5 hours "on", 0.5 hour "off" at			
JIS-C-5202 7.10	with no evidence of mechanical damage.	70°C ±2°C a	mbient temperature.		
		Direct load:			
		Resistance to a 2.5kg direct load for 10 seconds in the			
-		direction of the longitudinal axis of the terminal leads.			
Terminal strength	With no evidence of mechanical damage	Twist test:	المام المام المام ما المام ما	000 at a maint of abou	
JIS-C-5202 6.1	· ·		ds shall be bent through the body of the resistor		
		6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in			
			rection for a total of 3 rotal		
			vered total with a new, sm		
Solderability	050/ Min		urface free from concentra		
JIS-C-5202 6.5	95% coverage Min.	Test temp. of solder: 235°C ± 5°C			
		Dwell time in solder: 3 + 0.5/–0 seconds			
Resistance to solvent	No deterioration of protective coatings and	Specimens :	shall be immersed in a b	oath of trichloroethane	
JIS-C-5202 6.9	markings	completely for	or 3 minutes with ultrasonic	•	

Load Life



Derating Curve



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RESISTOR SPECIFICATIONS

Date: 19th June, 1997

Data Sheet:

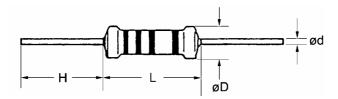
SEL-RGD-1003-(1)

WELDABLE-LEAD CARBON FILM FIXED RESISTOR

1. FEATURES

- Weldable-Leads
- High quality at competitive prices
- Meet JIS-C-5202 & USA MIL-R-22684B specifications
- Flame retardant type available on request
- Automatically insertable, also available pre-cut and formed for Panasert/Avisert
- Can be bulk-packed, tape/box or tape/reel
- Resistor with special weldable-leads and 38mm lead length available on request
- Too low or too high ohmic value can be supplied only case by case
- Tolerance available: ±5%, ±2%, ±1%

2. DIMENSION



Sub-Miniature-Size Resistor

04-4-	Dimension (mm)						
Style	Rating	J L D		d +0.02 -0.02	H ± 3		
CP-12	1/8W	3.5±0.2	1.5±0.2	0.50ø	28±3.0		
CP-12S	1/6W	3.5±0.2	1.5±0.2	0.50ø	28±3.0		
CP-25S	1/4W	3.5±0.5	1.5±0.2	0.50ø	28±3.0		
CP-25	1/4W	6.5±0.5	2.5 Max.	0.50ø	28±3.0		
CP-25-38	1/4W	6.5±0.5	2.5 Max.	0.50ø	38±3.0		

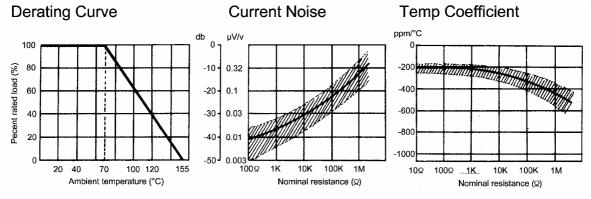
Miniature-Size Resistor

04-4-	Dimension (mm)						
Style	Rating	L	D	d ^{+0.02} -0.02	H ± 3		
CP-33S	1/3W	6.5±0.5	2.5 Max.	0.50ø	28±3.0		
CP-33S-38	1/3W	6.5±0.5	2.5 Max.	0.50ø	38±3.0		
CP-33	1/3W	9.0±1.0	3.0 Max.	0.50ø	35±3.0		
CP-50S	1/2W	9.0±1.0	3.0 Max.	0.50ø	35±3.0		

3. VOLTAGE & RATING

Style	Rating Wattage	Max. Working Voltage	Max. Overload Voltage	Resistance Range
CP-12	1/8W	200V	400V	1Ω - 1MegΩ
CP-12S CP-25S CP-25	1/4W	250V	500V	1Ω - 10 Meg Ω
CP-33 CP-33S	1/3W	300V	600V	1Ω - 10 Meg Ω
CR-50-S	1/2W	350V	700V	1Ω - 10 Meg Ω

4. OTHER PHYSICAL PROPERTIES



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RESISTOR SPECIFICATIONS

Date: 19th June, 1997

WELDABLE-LEAD CARBON FILM FIXED RESISTOR

Data Sheet:

SEL-RGD-1003-(2)

5. PERFORMANCE SPECIFICATION

Characteristics	ı	_imits		Test Methods				
	RANGE	T.C.R	2.		esistance change per te	emp. degree		
				centigrad	e.			
	45 041/	0 450000	~ /0 C					
T.C.R. JIS-C 5202 5.2	1E – 91K	0 – -450ppn	n/°C	R2 – R1 406 ((00)				
JIS-C 5202 5.2	100K – 1M	0700ppn	n/°C		$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{(ppm/°C)}$			
	1.1M – 10M	-800150	Oppm/°C	R₁: Resis	tance value at room ter	mperature (t₁)		
					tance value at room ter ern: Room temp., Roor			
					shall be clamped in t			
Dielectric withstanding	No evidence of flash	nover mechanical	damage,	metallic \	/-block and shall be te	sted at AC potential		
voltage JIS-C-5202 5.7	arcing or insulation brea	ıkdown.	-		ely specified in the ab	ove list for 60 +10		
0.0 0 0202 0				/ -0 sec		uous fivo evoles for		
					ce change after contine specified below.	uous live cycles lor		
				Ston	Temperature	Time		
Temperature cycling	Resistance change rate) Max. with	1	-55°C ± 3°C	30 minutes		
JIS-C-5202 7.4	no evidence of mechan	ıcaı damage.		2	Room temp.	10 – 15 minutes		
				3	+155°C ± 2°C	30 minutes		
				4	Room temp.	10 – 15 minutes		
Short-time overload	Resistance change rate) Max. with	Permane	nt resistance change	after the application		
JIS-C-5202 5.5	no evidence of mechan		4 D /D	or a pote	ntial of 2.5 times RCW\	/ for 5 seconds.		
	Resistance value Δ R/R Less than 100KΩ ± 3%			Resistan	Resistance change after 1,000 hours operating at			
Load Life in humidity	Normal type		00 KΩ or more $\pm 5\%$		RCWV with duty cycle of 1.5 hours "on", 0.5 hour			
JIS-C-5202 5.9		Less than 100K	±5%	"off" in a humidity test chamber controlled at 40°C				
	Flame retardant type	100KΩ or more	± 10%	± 2°C and 90 to 95% relative humidity.				
	Resistance		ΔR/R					
1 127	Less than 56KO + 2%			Permanent resistance change after 1,000 hours				
Load life JIS-C-5202 7.10	Normal type	56 K Ω or more	± 3%		at RCWV with duty			
JIS-C-5202 7.10	Flame retardant type	Less than 100K	± 5%	"on", 0.5 hour "off" at 70°C ± 2% ambient.				
	riame retardant type	100K Ω or more	± 10%					
					shall be clamped in			
Insulation resistance	Insulation resistance is	10,000 MΩ Min.			/-block and shall be tes			
JIS-C-5202 5.6				seconds.	respectively specified in the above list for 60 +10/-0			
				Direct load:				
				Resista	ince to a 2.5kg direct lo	ad for 10 seconds in		
				the dire	ection of the longitudina	I axis of the terminal		
				leads.				
Terminal strength JIS-C-5202 6.1	No evidence of mechar	ical damage.		Twist tes	:: al leads shall be bent th	arough 00° at a point		
JIS-C-5202 0.1					at leads shall be bent that the body			
					e rotated through 360			
				axis of the bent terminal in alternating direction for				
				of 3 rotations.				
Resistance to	Resistance change rate is \pm (1% + 0.05 Ω) Max. with			Permane				
soldering heat JIS-C-5202 6.4	no evidence of mechan			immerse	d to $3.2 - 4.8$ mm from blder for 3 ± 0.5 seconds			
010 0 0202 0.4					covered with a new, s			
Coldorobility					tinuous surface free			
Solderability JIS-C-5202 6.5	95% coverage Min.			pinholes.				
0.0 0 0202 0.0					p. of solder: 235°C ± 5°			
				Dwell time in solder: 3 + 0.5/–0 seconds				