

BCS SERIES Chip Shunt Resistors

BCS series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. BCS achieves a maximum target tolerance of $\pm 0.5\%$ after stamping without trimming. TCR of BCS series within the temperature range of -55°C to $+170^{\circ}\text{C}$ is $\leq \pm 200\text{ppm}/^{\circ}\text{C}$.

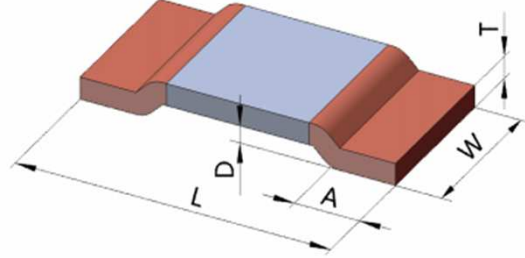


GENERAL SPECIFICATIONS

Model	Resistance Value	Power (@70°C)	Max. Operating Current	TCR (ppm/°C) (+20°C Ref)	Tolerance	Thermal Resistance*	Temperature Range
BCS02D	1.5 mΩ	5 W	57 A	±50		9.7 °C/W	
	2 mΩ	5 W	50 A			13.4 °C/W	
	3 mΩ	4 W	36 A			19.8 °C/W	
	4 mΩ	3 W	27 A			26.9 °C/W	
	5 mΩ	2.5 W	22 A			33.6 °C/W	
BCS02E	2 mΩ	5 W	50 A	±100	±0.5 % ±1.0 % ±5.0 %	13.2 °C/W	-55°C ~ +170°C
	3 mΩ	4 W	36 A			19.8 °C/W	
	4 mΩ	3 W	27 A			24.3 °C/W	
	5 mΩ	2.5 W	22 A			31.1 °C/W	
BCS02C	3 mΩ	4 W	36 A	±25 (-55°C~+125°C)		19.7 °C/W	
	5 mΩ	2.5 W	22 A			31.1 °C/W	
BCS02F	0.3 mΩ	6 W	140 A	±200		4.1 °C/W	
	0.5 mΩ	6 W	109 A			5.1 °C/W	
	1 mΩ	6 W	77 A			11.1 °C/W	
BCS03D	1 mΩ	8 W	89 A	±50		7.6 °C/W	
	2 mΩ	6 W	54 A			15.4 °C/W	
	3 mΩ	5 W	40 A			23.1 °C/W	
	4 mΩ	4 W	30 A			28.9 °C/W	
	5 mΩ	3 W	24 A			36.5 °C/W	
BCS03K	0.2 mΩ	12 W	244 A	±150		3.6 °C/W	
BCS03E	0.3 mΩ	10 W	182 A	±100	±0.5 % ±1.0 % ±5.0 %	3.8 °C/W	-55°C ~ +170°C
	0.5 mΩ	9 W	134 A			6.3 °C/W	
	1 mΩ	8 W	89 A			12.6 °C/W	
BCS03C	1 mΩ	8 W	89 A	±25		7.8 °C/W	
	2 mΩ	6 W	55 A			15.4 °C/W	
	3 mΩ	5 W	41 A			23 °C/W	
	4 mΩ	4 W	32 A			31.1 °C/W	
	5 mΩ	3 W	25 A			38.4 °C/W	
BCS05E	0.2 mΩ	15 W	273 A	±100		2.6 °C/W	-55°C ~ +170°C
	0.5 mΩ	10 W	142 A			6.5 °C/W	
	0.8 mΩ	9 W	105 A			9.3 °C/W	
	1 mΩ	9 W	94 A			11.4 °C/W	
BCS05D	1 mΩ	10 W	100 A	±50	±0.5 % ±1.0 % ±5.0 %	7.8 °C/W	
BCS05C	1 mΩ	10 W	100 A	±25		6.4 °C/W	
	2 mΩ	8 W	63 A			12.6 °C/W	
	3 mΩ	6 W	45 A			19.1 °C/W	

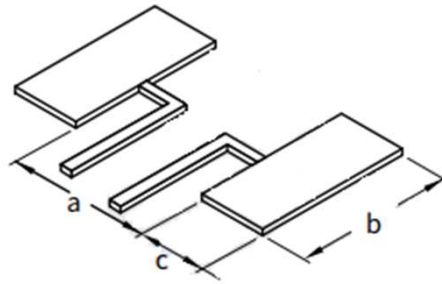
* Thermal Resistance : Refer to the internal thermal resistance between the center of the resistive alloy and the copper electrode. As the heat dissipation efficiency is influenced by operating environment, copper bus bars, PCB design, etc., this parameter is only reference.

LAND PATTERN [mm]



Model	Resistance	TCR (ppm/°C)	L	W	A	T	D
BCS02D	1.5mΩ	±50	6.30±0.30	3.00±0.30	1.30±0.30	0.90±0.20	0.35±0.20
	2mΩ					0.65±0.20	
	3mΩ					0.45±0.20	
	4mΩ					0.33±0.15	
	5mΩ					0.27±0.15	
BCS02E	2mΩ	±100	6.30±0.30	3.00±0.30	1.30±0.30	0.60±0.20	0.35±0.20
	3mΩ					0.40±0.20	
	4mΩ					0.33±0.15	
	5mΩ					0.25±0.15	
BCS02C	3mΩ	±25 (-55°C~+125°C)	6.30±0.30	3.00±0.30	1.30±0.30	0.45±0.20	0.35±0.20
	5mΩ					0.27±0.15	
BCS02F	0.3mΩ	±200	6.30±0.30	3.00±0.30	1.30±0.30	1.00±0.20	0.35±0.20
	0.5mΩ					0.90±0.20	
	1.0mΩ					0.40±0.15	
BCS03D	1mΩ	±50	10.00±0.30	5.20±0.30	2.00±0.30	1.30±0.20	0.50±0.20
	2mΩ					0.60±0.20	
	3mΩ					0.40±0.20	
	4mΩ					0.33±0.15	
	5mΩ					0.25±0.15	
BCS03K	0.2mΩ	±150	10.00±0.30	5.20±0.30	2.00±0.30	1.40±0.20	0.50±0.20
BCS03E	0.3mΩ	±100	10.00±0.30	5.20±0.30	2.00±0.30	1.30±0.20	0.50±0.20
	0.5mΩ					0.80±0.20	
	1mΩ					0.40±0.20	
BCS03C	1mΩ	±25	10.00±0.30	5.20±0.30	2.00±0.30	1.30±0.20	0.50±0.20
	2mΩ					0.65±0.20	
	3mΩ					0.45±0.20	
	4mΩ					0.33±0.15	
	5mΩ					0.27±0.15	
BCS05E	0.2mΩ	±100	15.00±0.30	7.75±0.30	3.80±0.30	1.60±0.20	0.50±0.20
	0.5mΩ					0.65±0.20	
	0.8mΩ					0.47±0.20	
	1mΩ					0.38±0.20	
BCS05D	1mΩ	±50	15.00±0.30	7.75±0.30	3.80±0.30	1.05±0.20	0.50±0.20
BCS05C	1mΩ	±25	15.00±0.30	7.75±0.30	3.80±0.30	1.05±0.20	0.50±0.20
	2mΩ					0.53±0.20	
	3mΩ					0.35±0.20	

DIMENSIONS [mm]

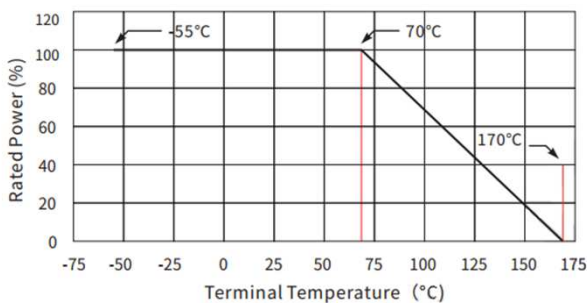


Model	Resistance	TCR(ppm/°C)	a	b	c	Packaging	Quantity	Net Weight
BCS02D	1.5mΩ	±50	3.90±0.20	3.40±0.25	1.80±0.25	Tape & Reel	4000pcs	0.14±0.04g
	2mΩ							0.10±0.03g
	3mΩ							0.07±0.03g
	4mΩ							0.06±0.02g
	5mΩ							0.04±0.02g
BCS02E	2mΩ	±100	3.90±0.20	3.40±0.25	1.80±0.25	Tape & Reel	4000pcs	0.11±0.05g
	3mΩ							0.07±0.05g
	4mΩ							0.06±0.05g
	5mΩ							0.05±0.05g
BCS02C	3mΩ	±25 (-55°C~+125°C)	3.90±0.20	3.40±0.25	1.80±0.25	Tape & Reel	4000pcs	0.07±0.03g
	5mΩ							0.04±0.02g
BCS02F	0.3mΩ	±200	3.90±0.20	3.40±0.25	1.80±0.25	Tape & Reel	4000pcs	0.17±0.05g
	0.5mΩ							0.16±0.05g
	1mΩ							0.07±0.03g
BCS03D	1mΩ	±50	5.60±0.10	6.20±0.20	2.70±0.20	Tape & Reel	2000pcs	0.59±0.10g
	2mΩ							0.27±0.10g
	3mΩ							0.18±0.10g
	4mΩ							0.15±0.10g
	5mΩ							0.11±0.10g
BCS03K	0.2mΩ	±150	5.60±0.10	6.20±0.20	2.70±0.20	Tape & Reel	2000pcs	0.65±0.10g
BCS03E	0.3mΩ	±100	5.60±0.10	6.20±0.20	2.70±0.20	Tape & Reel	2000pcs	0.59±0.10g
	0.5mΩ							0.36±0.10g
	1mΩ							0.18±0.05g
BCS03C	1mΩ	±25	5.60±0.10	6.20±0.20	2.70±0.20	Tape & Reel	2000pcs	0.56±0.10g
	2mΩ							0.28±0.10g
	3mΩ							0.20±0.10g
	4mΩ							0.15±0.10g
	5mΩ							0.12±0.05g
BCS05E	0.2mΩ	±100	5.60±0.10	8.75±0.20	5.20±0.10	Tape & Reel	2000pcs	1.68±0.30g
	0.5mΩ							0.69±0.20g
	0.8mΩ							0.50±0.20g
	1mΩ							0.40±0.20g
BCS05D	1mΩ	±50	5.60±0.10	8.75±0.20	5.20±0.10	Tape & Reel	2000pcs	1.01±0.20g
BCS05C	1mΩ	±25	5.60±0.10	8.75±0.20	5.20±0.10	Tape & Reel	2000pcs	1.01±0.10g
	2mΩ							0.51±0.10g
	3mΩ							0.34±0.10g

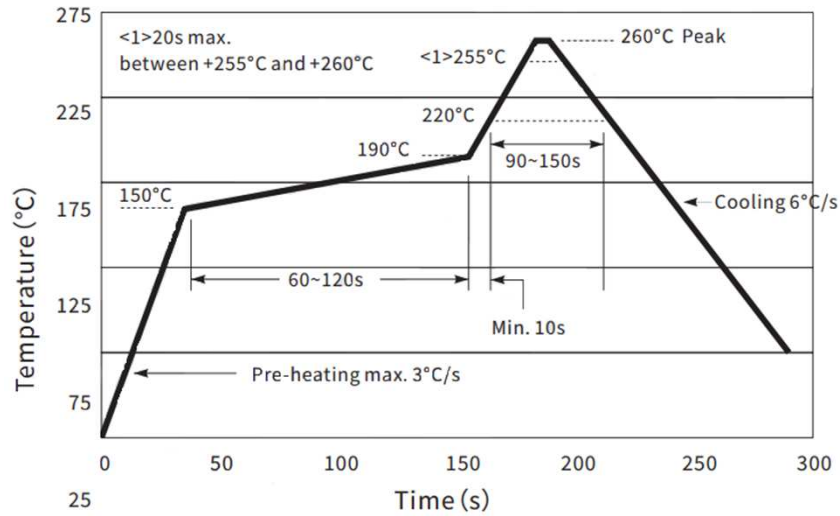
CHARACTERISTICS

Test	Test Method	Standards	Typical	Max.
High Temperature Storage	1000h@+170°C, unpowered	AEC-Q200 TEST 3 MIL-STD-202 Method 108	$\Delta R \leq \pm 0.5\%$	$\Delta R \leq \pm 1.0\%$
Thermal Shock	-55°C, 15min~ambient temperature < 20S~+155°C, 15min, 1000cycles	AEC-Q200 TEST 16 MIL-STD-202 Method 107	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Bias Humidity	+85°C,85%RH, powered no less than 10% rated power for 1000h	AEC-Q200 TEST 7 MIL-STD-202 Method 103	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Load Life	2000h @+70°C, rated power, 90min on, 30min off, 70°C refers to terminal temperature	AEC-Q200 TEST 8 MIL-STD-202 Method 108	$\Delta R \leq \pm 0.5\%$	$\Delta R \leq \pm 1.0\%$
Resistance to Solvent	Immerse in solvent for 3min and wipe 10 times. Three cycles of three solvents. Dry at ambient temperature after cleaning	AEC-Q200 TEST 12 MIL-STD-202 Method 215	Clear marking. No visible damage	
Mechanical Shock	Half sine wave, peak acceleration 100g's, pulse duration 6ms, 3times in each of six directions, on three different axes	AEC-Q200 TEST 13 MIL-STD-202 Method 213	$\Delta R \leq \pm 0.01\%$ *BCS05PM $\Delta R \leq \pm 0.05\%$	$\Delta R \leq \pm 0.2\%$
Vibration	10-2KHz, 5g's, 20min/cycle, 12 cycles in each directions of X,Y,Z	AEC-Q200 TEST 14 MIL-STD-202 Method 204	$\Delta R \leq \pm 0.01\%$ *BCS05PM $\Delta R \leq \pm 0.05\%$	$\Delta R \leq \pm 0.2\%$
Resistance to Solder Heat	+260°C tin bath for 10s	AEC-Q200 TEST 15 MIL-STD-202 Method 210	$\Delta R \leq \pm 0.2\%$	$\Delta R \leq \pm 0.5\%$
Solderability	+245°C tin bath for 3s ▽ BCS02, 03 $\pm 25\text{ppm}/^\circ\text{C}$ +235°C tin bath for 3s	AEC-Q200 TEST 18 IEC 60115-1 4.17	No visible damage. 95% minimum coverage	
TCR	-55°C and +170°C, +20°C Ref.	AEC-Q200 TEST 19 IEC 60115-1 4.8	Refer to "General Specifications"	
Substrate Bending	2mm. Duration : 60s.	AEC-Q200 TEST 21 AEC-Q200-005	$\Delta R \leq \pm 0.1\%$ *BCS05PM $\Delta R \leq \pm 0.01\%$	$\Delta R \leq \pm 0.5\%$ *BCS05PM $\Delta R \leq \pm 0.1\%$
Short Time Overload	5×rated voltage, 5s	IEC 60115-1 4.13	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Low Temperature Storage	-55°C for 96h, unpowered	IEC 60068-2-1	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Moisture Resistance	Apply T=24h/cycle, zero power, method 7a and 7b are not required	MIL-STD-202 Method 106	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$
Low Temperature Operating	-55°C, unpowered for 1hr, load rated power for 45min, unpowered for 15min (Only BCS03SF)	IEC 60068-2-1 4.36	$\Delta R \leq \pm 0.1\%$	$\Delta R \leq \pm 0.5\%$

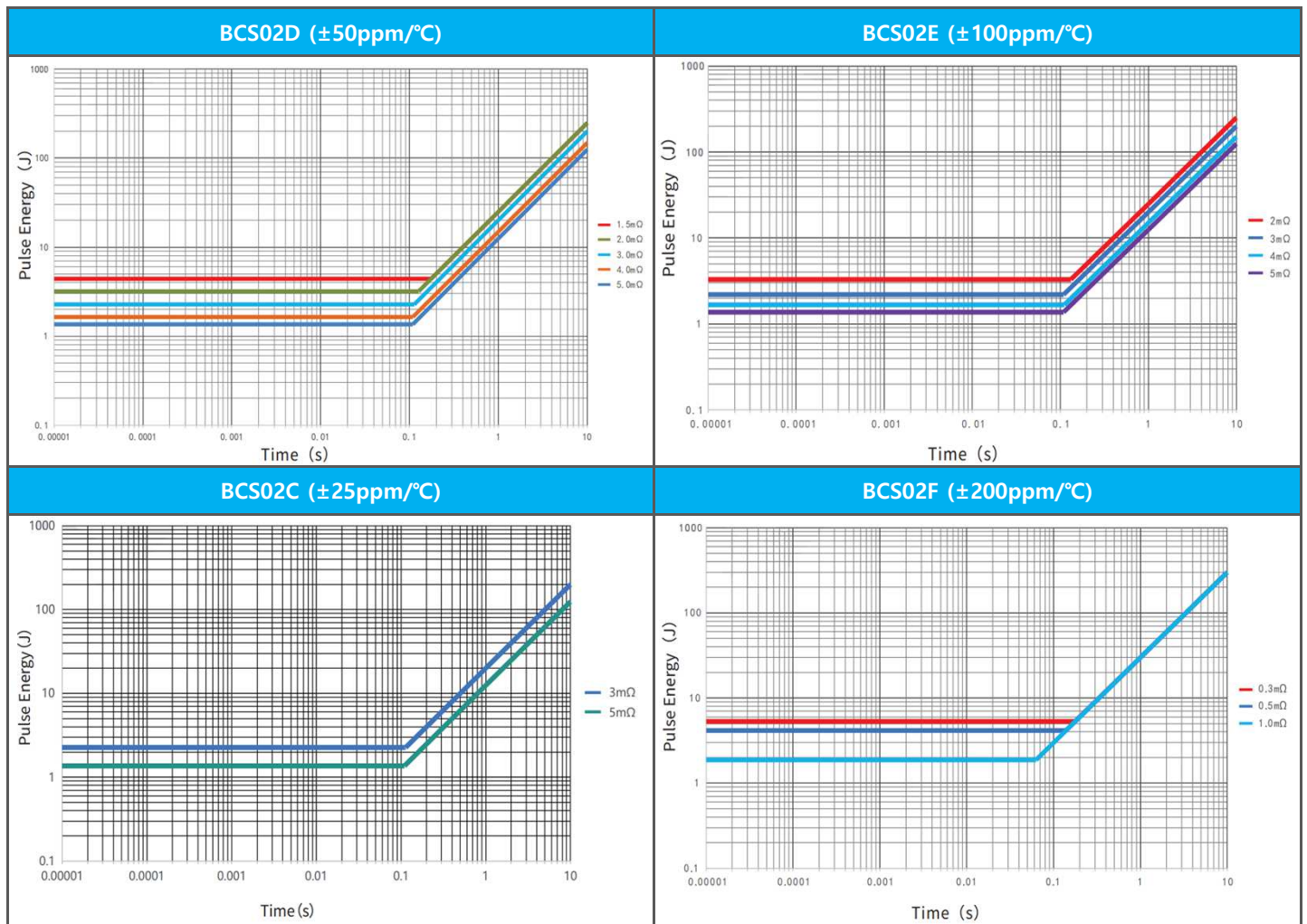
DERATING CURVE



REFOLW SOLDERING PROFILE

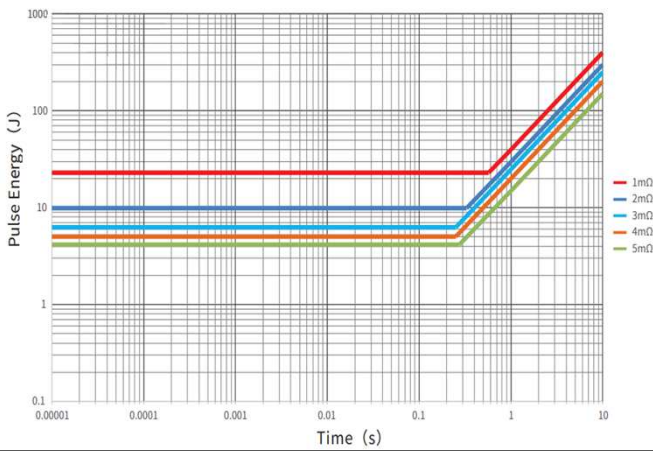


MAXIMUM PULSE ENERGY CURVE

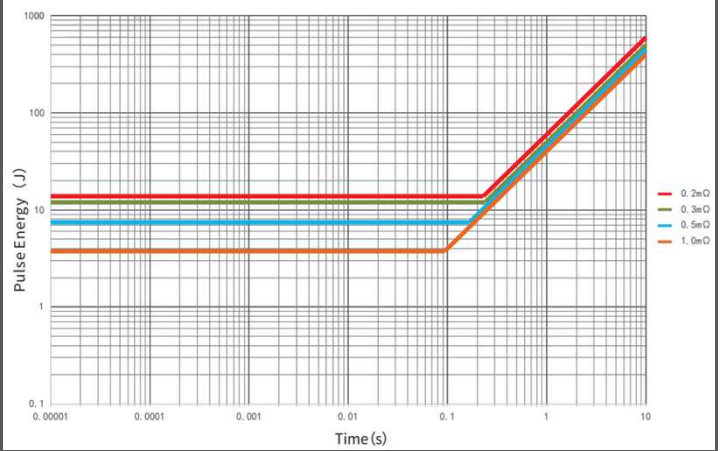


MAXIMUN PULSE ENERGY CURVE

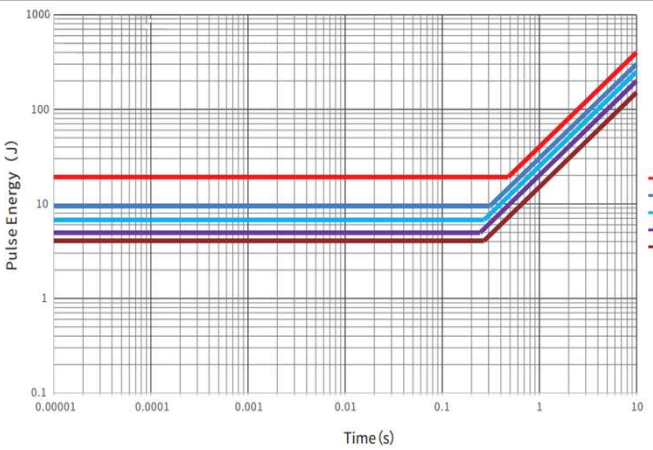
BCS03D ($\pm 50\text{ppm}/^\circ\text{C}$)



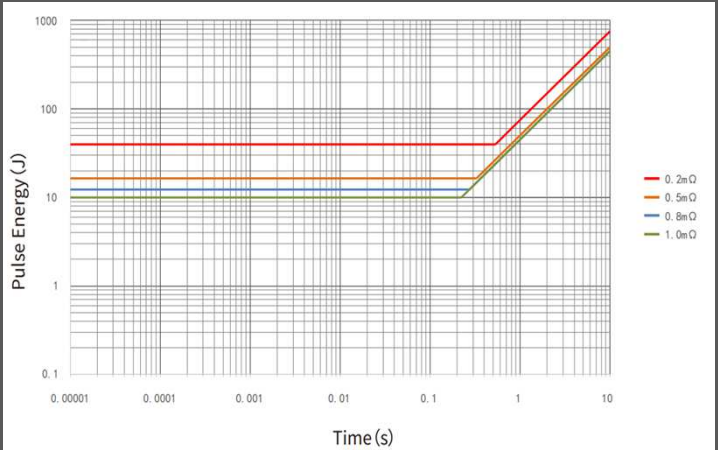
BCS03K&E ($\leq \pm 150\text{ppm}/^\circ\text{C}$ and $\leq \pm 100\text{ppm}/^\circ\text{C}$)



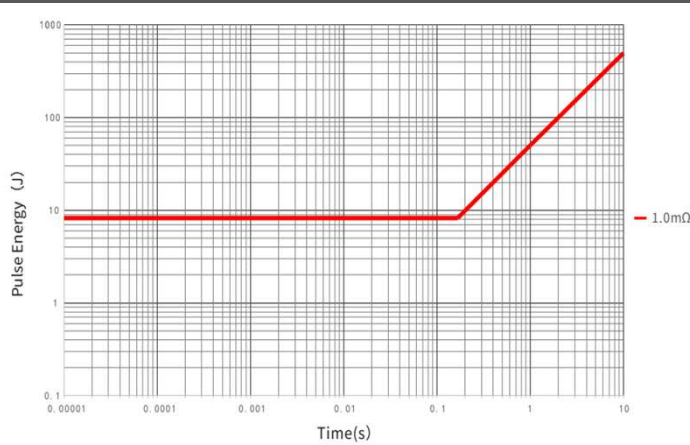
BCS03C ($\pm 25\text{ppm}/^\circ\text{C}$)



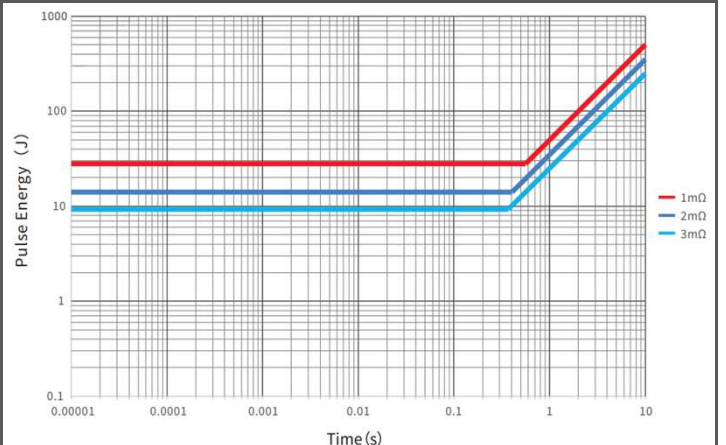
BCS05E ($\pm 100\text{ppm}/^\circ\text{C}$)



BCS05D ($\pm 50\text{ppm}/^\circ\text{C}$)

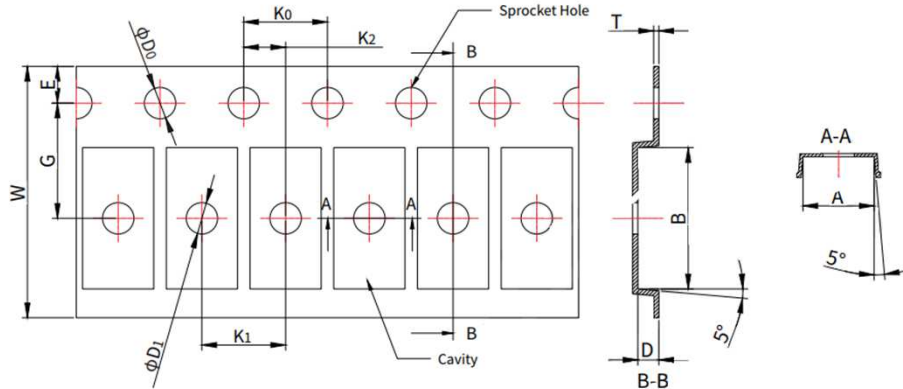


BCS05C ($\pm 25\text{ppm}/^\circ\text{C}$)



PACKAGING [mm]

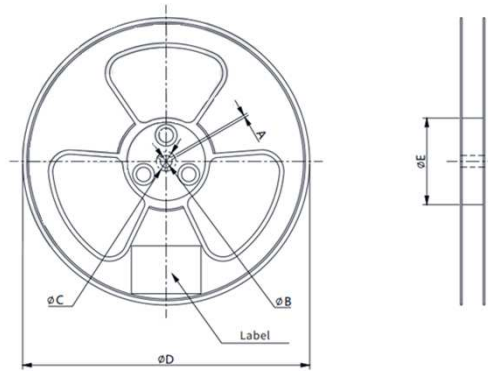
Tape Specifications



Model	Resist ance	TCR (ppm/°C)	A ±0.2	B ±0.2	ΦD0 ±0.1	ΦD1 ±0.1	K0 ±0.1	K1 ±0.1	K2 ±0.1	E ±0.1	G ±0.05	W ±0.3	D ±0.1	T ±0.05	
BCS02 Series	0.3mΩ	±25 ±50 ±100 ±200	3.30	6.60	1.50	1.50	4.00	4.00	2.00	1.75	5.50	12.00	1.50	0.25	
	0.5mΩ		3.30	6.60									1.50	0.25	
	1mΩ		3.30	6.60									0.90	0.23	
	1.5mΩ		3.30	6.60									1.50	0.25	
	2mΩ		3.40	6.75									1.00	0.23	
	3mΩ		3.30	6.60									0.90	0.23	
	4mΩ		3.20	6.50									0.73	0.23	
	5mΩ		3.20	6.50									0.73	0.23	
BCS03 Series	0.2mΩ	±150	5.5	10.5	1.50	1.50	4.00	8.00	2.00	1.75	7.50	16.00	2.70	0.30	
	0.3mΩ	±100	5.5	10.5									2.10	0.30	
	0.5mΩ		5.5	10.5									1.50	0.30	
	1mΩ		5.5	10.5									1.50	0.30	
	1mΩ	±25 ±50	5.5	10.5									2.10	0.30	
	2mΩ		5.5	10.5									1.50	0.30	
	3mΩ		5.5	10.5									1.50	0.30	
	4mΩ		5.65	10.41									1.14	0.40	
	5mΩ		5.65	10.41									1.14	0.40	
BCS05 Series	0.2mΩ	±100	8.05	15.30	1.50	1.50	4.00	12.00	2.00	1.75	11.50	24.00	2.60	0.30	
	0.5mΩ												1.30	0.30	
	0.8mΩ												1.30	0.30	
	1mΩ												1.30	0.30	
	1mΩ	±50											1.90	0.30	
	1mΩ												1.90	0.30	
	2mΩ												±25	1.30	0.30
	3mΩ													1.30	0.30

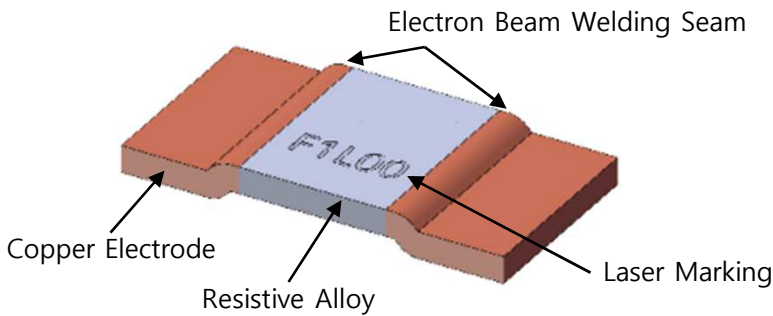
PACKAGING [mm]

Reel Specifications



A	ΦB	ΦC	ΦD	ΦE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330±2	100±2

CONSTRUCTION



STORAGE INSTRUCTIONS

- (1) Resistors should be stored at a temperature of 5 to 35°C, with a humidity of < 60%RH. The humidity should be kept as low as possible.
- (2) Resistors should be protected from direct sunlight.
- (3) Resistors should be stored in a clean and dry environment free of harmful gases (HCl, Sulfuric acid, H₂S, etc.)
- (4) Do not move the resistor from the packaging unless use it.
- (5) Under the above storage conditions, the resistor can be stored for at least 1 year.

ORDERING PROCEDURE EXAMPLE

Model#	T.C.R Code	Resistance Value	Tolerance
BCS02 BCS03 BCS05	C = ±25ppm/°C D = ±50ppm/°C E = ±100ppm/°C K = ±150ppm/°C F = ±200ppm/°C	0.3mΩ / 0.5mΩ / 0.8mΩ / 1mΩ / 1.5mΩ / 2mΩ / 3mΩ / 4mΩ / 5mΩ	D = ± 0.5% F = ± 1.0% J = ± 5.0%

MARKING EXAMPLE

0.3mΩD	DL300	1.0mΩD	D1L00	3mΩD	D3L00
0.5mΩF	FL500	1.5mΩF	F1L50	4mΩF	F4L00
0.8mΩJ	JL800	2mΩJ	J2L00	5mΩJ	J5L00