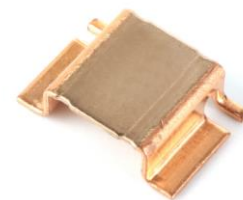


BWR05 SERIES High Precision Shunt Resistors

BWR05 series is based on a precision resistive alloy, welded by a specialized electron beam welding equipment. Both resistive alloy and welding equipment are independently designed and manufactured by C&B Electronics. Because of controlling the consistency of resistive alloys, precision processing ability and efficient welding, BWR05 achieves a maximum target tolerance of $\pm 0.5\%$ after stamping without trimming. TCR of BWR05 series within the temperature range of $+20^{\circ}\text{C}$ to $+120^{\circ}\text{C}$ is $\leq \pm 75\text{ppm}/^{\circ}\text{C}$ ($1\text{m}\Omega \sim 2\text{m}\Omega$) and $\pm 50\text{ppm}/^{\circ}\text{C}$ ($3\text{m}\Omega \sim 5\text{m}\Omega$).



GENERAL SPECIFICATIONS

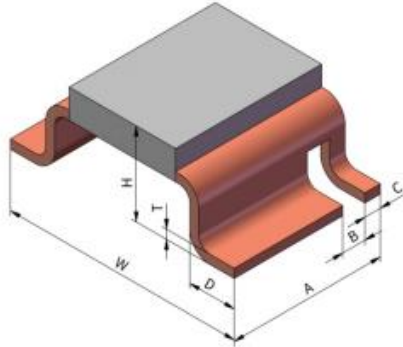
Model	Resistance Value	Power [W] (@70°C)	Max. Operating Current	TCR (ppm/°C) (+20°C Ref) (+20°C~+120°C)	Tolerance
BWR05	1.0mΩ	7	83A	± 75	D [$\pm 0.5\%$] F [$\pm 1.0\%$] J [$\pm 5.0\%$]
BWR05	1.3mΩ	7	73A	± 75	
BWR05	2.0mΩ	6	54A	± 75	
BWR05	3.0mΩ	5	40A	± 50	
BWR05	4.0mΩ	4	31A	± 50	
BWR05	5.0mΩ	3	24A	± 50	

CHARACTERISTICS

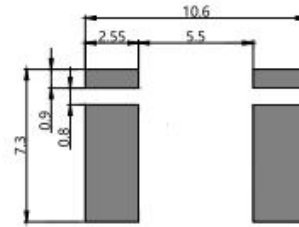
Operating Temperature		$-55^{\circ}\text{C} \sim +170^{\circ}\text{C}$
High Temperature Exposure	$\Delta R \pm 1\%$	1000Hrs. @T=170°C. Unpowered.
Thermal Shock	$\Delta R \pm 0.5\%$	-55°C , 15min~ambient temperature <20s~ $+155^{\circ}\text{C}$, 15min, 1000cycles.
Biased Humidity	$\Delta R \pm 0.5\%$	85°C, 85RH, powered no less than 10% rated power for, 1000h.
Load Life	$\Delta R \pm 1\%$	2000h @+70°C, rated power, 90min on, 30min off +70°C refers to terminal temperature.
Resistance to Solvents	Clear making, No visible damage	Immerse in solvent for 3min and wipe 10times. Three cycles of three solvents. Dry at ambient temperature after cleaning.
Mechanical Shock	$\Delta R \pm 0.2\%$	Half Sine Wave, peak acceleration 100g's, pulse duration 6ms, 3times in each of six directions, on three different axes.
Vibration	$\Delta R \pm 0.2\%$	10-2KHz, 5g's, 20min/cycles, 12cycles in each directions of X Y Z.
Resistance to Soldering Heat	$\Delta R \pm 0.5\%$	+260°C constant temperature heating station for 10s.
Solderability	No visible damage. Min. 95% coverage.	+245°C tin bath for 3s.
T.C.R	Max. $\pm 75\text{ppm}/^{\circ}\text{C}$ ($1\text{m}\Omega \sim 2\text{m}\Omega$) and $\pm 50\text{ppm}/^{\circ}\text{C}$ ($3\text{m}\Omega \sim 5\text{m}\Omega$)	+20°C and +120°C, +20°C Ref.
Substrate Bending	$\Delta R \pm 0.5\%$	2mm. Duration : 60s.
Short Time Over Load	$\Delta R \pm 0.5\%$	5×rated power, 5s.
Low Temperature Storage	$\Delta R \pm 0.1\%$	-55°C for 96h, unpowered.
Moisture Resistance	$\Delta R \pm 0.2\%$	Apply T=24h/cycle, zero power, method 7a and 7b are not required.

DIMENSIONS [mm]

Resistor



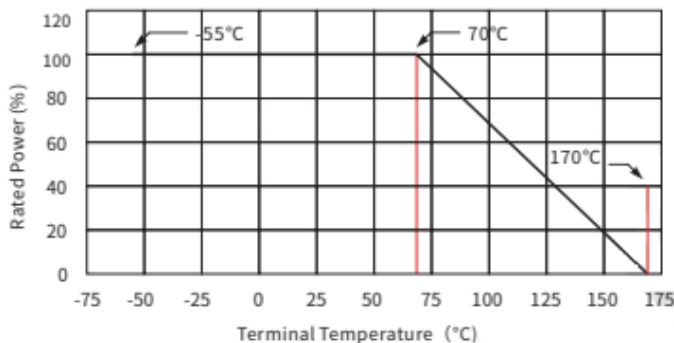
Land Pattern



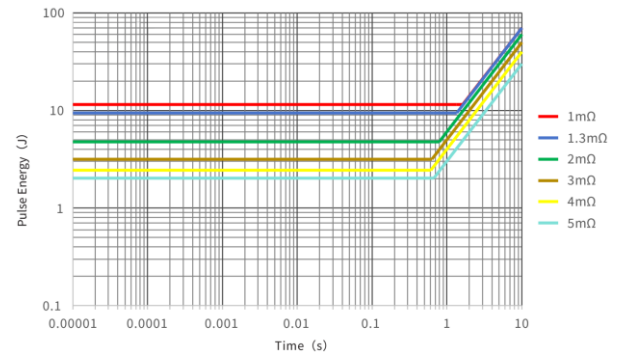
Not following the recommended land pattern design can seriously affect the temperature coefficient measurement results and current sensing accuracy.

Resistance	T \pm 0.2	H \pm 0.5	W \pm 0.3	A \pm 0.3	B \pm 0.3	C \pm 0.3	D \pm 0.3	Packing	Quantity	Net Weight
1.0m Ω	0.4	3.75	10.1	6.6	1.0	0.7	2.0	Tape & Reel	1200 pcs	0.55 \pm 0.2g
1.3m Ω	0.4	3.50	10.1	6.6	1.0	0.7	2.0			0.45 \pm 0.2g
2.0m Ω	0.4	2.98	10.1	6.6	1.0	0.7	2.0			0.30 \pm 0.1g
3.0m Ω	0.4	2.85	10.1	6.6	1.0	0.7	2.0			0.25 \pm 0.1g
4.0m Ω	0.4	2.85	10.1	6.6	1.0	0.7	2.0			0.25 \pm 0.1g
5.0m Ω	0.4	2.85	10.1	6.6	1.0	0.7	2.0			0.25 \pm 0.1g

DERATING CURVE

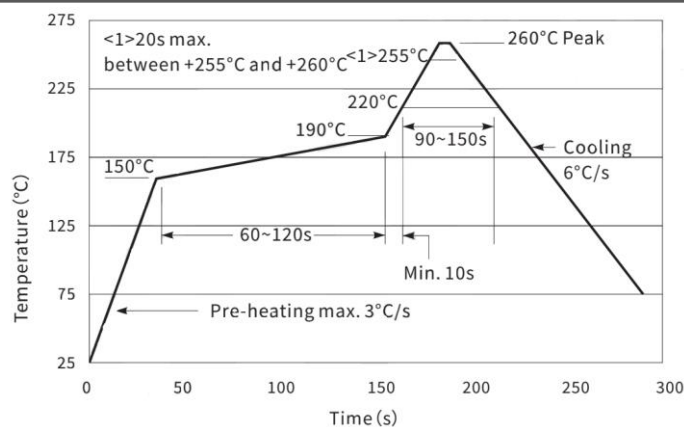


MAXIMUM PULSE ENERGY CURVE



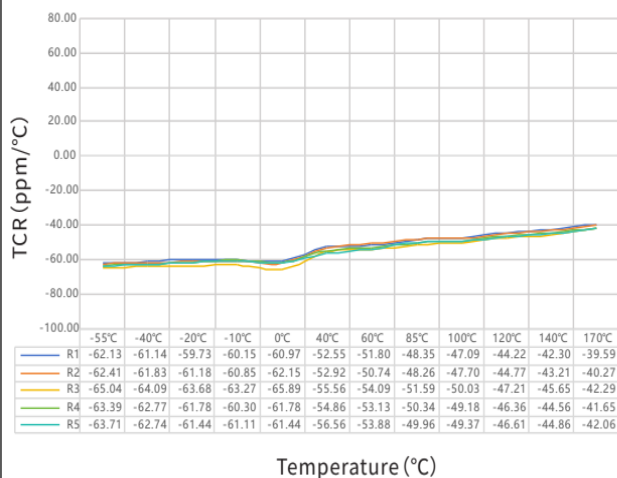
REFLOW SOLDERING PROFILE

Resistor Surface Temperature
 Pre-Heat : +150°C~+190°C, 60~120sec.
 Reflow : Above +220°C, 90~150sec.
 Applicable Solder Composition : Sn-Ag-Cu

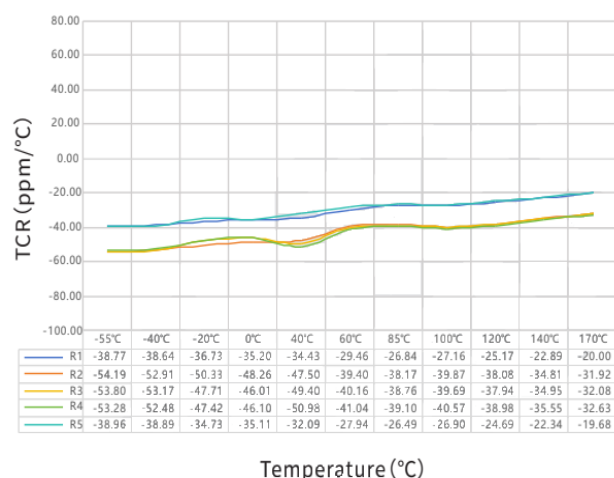


TEMPERATURE COEFFICIENT OF RESISTANCE TEST CURVE

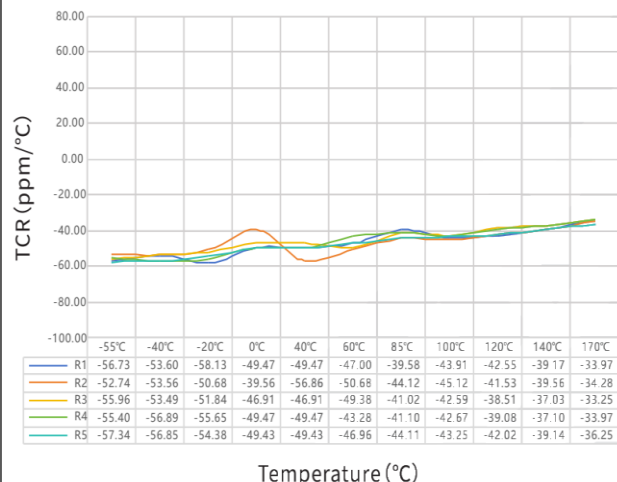
TCR Test Curve - 1.0mΩ



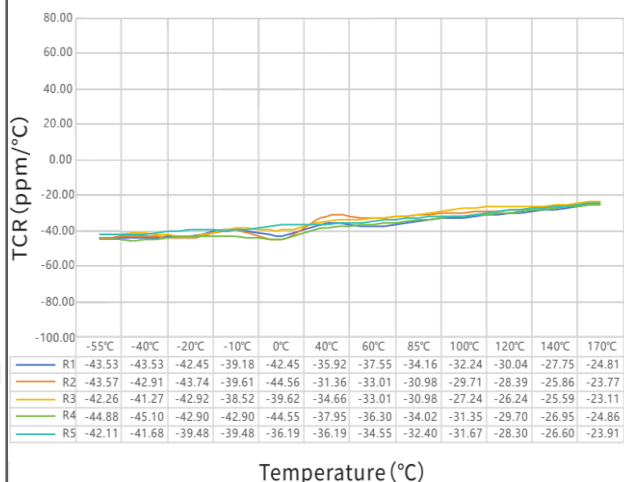
TCR Test Curve - 1.3mΩ



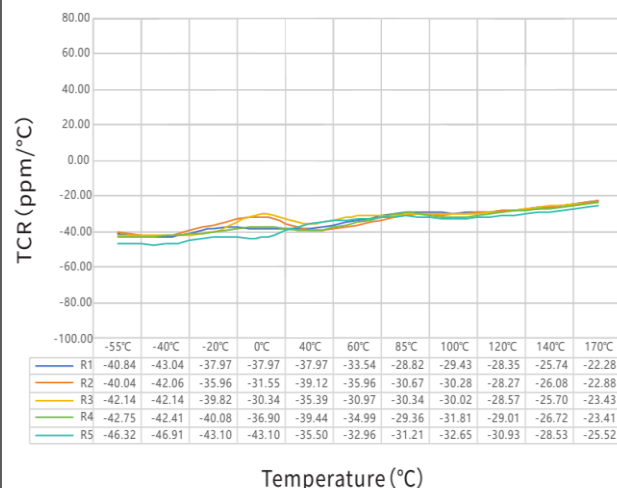
TCR Test Curve - 2.0mΩ



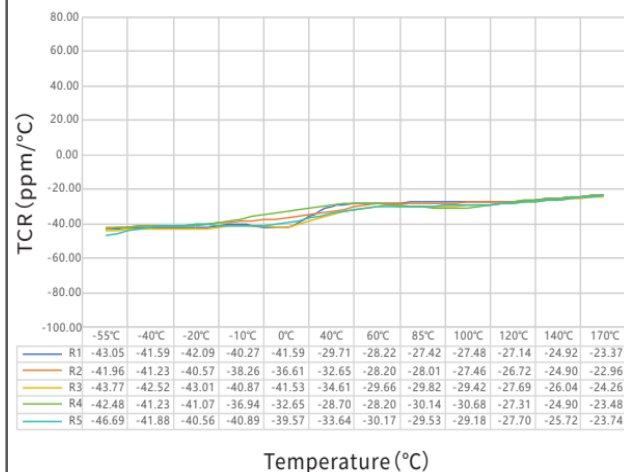
TCR Test Curve - 3.0mΩ



TCR Test Curve - 4.0mΩ

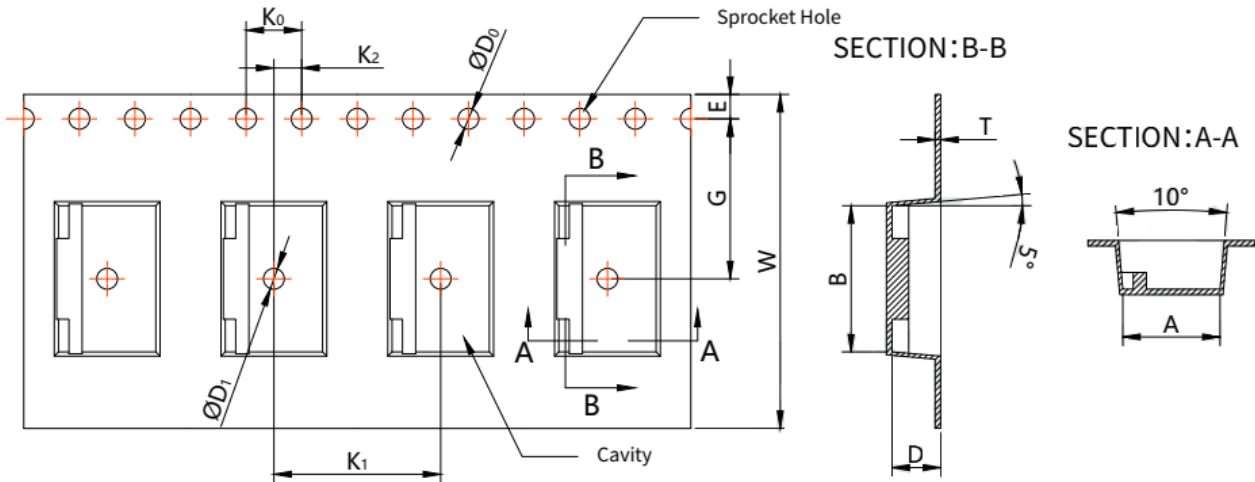


TCR Test Curve - 5.0mΩ



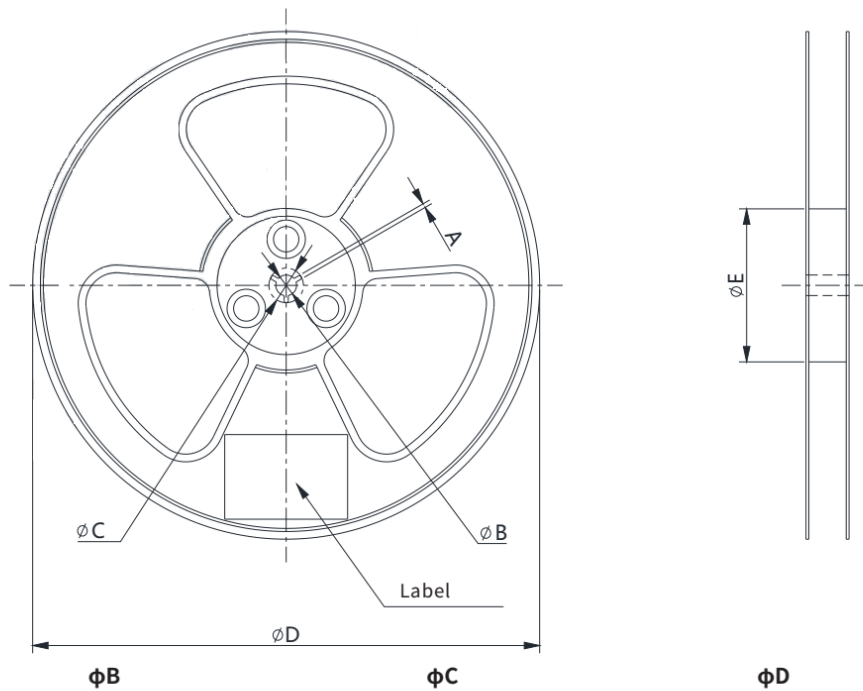
PACKAGING

* Tape Specifications



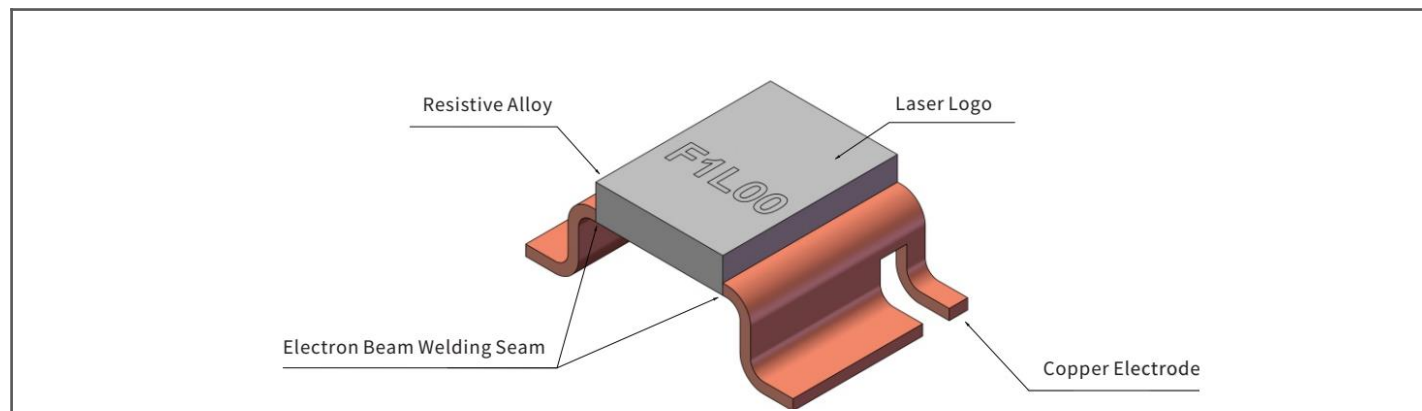
Resistance	A	B	ϕD_0	ϕD_1	K_0	K_1	K_2	E	G	W	D	T
1.0m Ω	7.0 \pm 0.1	10.5 \pm 0.1	1.5 \pm 0.1	1.5 \pm 0.1	4.0 \pm 0.1	12.0 \pm 0.1	2.0 \pm 0.1	1.75 \pm 0.1	11.5 \pm 0.1	24.0 \pm 0.3	4.2 \pm 0.1	0.4 \pm 0.05
1.3m Ω	7.0 \pm 0.1	10.5 \pm 0.1	1.5 \pm 0.1	1.5 \pm 0.1	4.0 \pm 0.1	12.0 \pm 0.1	2.0 \pm 0.1	1.75 \pm 0.1	11.5 \pm 0.1	24.0 \pm 0.3	4.2 \pm 0.1	0.4 \pm 0.05
2.0m Ω	7.0 \pm 0.1	10.5 \pm 0.1	1.5 \pm 0.1	1.5 \pm 0.1	4.0 \pm 0.1	12.0 \pm 0.1	2.0 \pm 0.1	1.75 \pm 0.1	11.5 \pm 0.1	24.0 \pm 0.3	3.5 \pm 0.1	0.4 \pm 0.05
3.0m Ω	7.0 \pm 0.1	10.5 \pm 0.1	1.5 \pm 0.1	1.5 \pm 0.1	4.0 \pm 0.1	12.0 \pm 0.1	2.0 \pm 0.1	1.75 \pm 0.1	11.5 \pm 0.1	24.0 \pm 0.3	3.5 \pm 0.1	0.4 \pm 0.05
4.0m Ω	7.0 \pm 0.1	10.5 \pm 0.1	1.5 \pm 0.1	1.5 \pm 0.1	4.0 \pm 0.1	12.0 \pm 0.1	2.0 \pm 0.1	1.75 \pm 0.1	11.5 \pm 0.1	24.0 \pm 0.3	3.5 \pm 0.1	0.4 \pm 0.05
5.0m Ω	7.0 \pm 0.1	10.5 \pm 0.1	1.5 \pm 0.1	1.5 \pm 0.1	4.0 \pm 0.1	12.0 \pm 0.1	2.0 \pm 0.1	1.75 \pm 0.1	11.5 \pm 0.1	24.0 \pm 0.3	3.5 \pm 0.1	0.4 \pm 0.05

* Reel Specifications



A	ϕB	ϕC	ϕD	ϕE
1.5 Min.	13.0 +0.5/-0.2	20.2 Min.	330 \pm 2	100 \pm 2

■ CONSTRUCTION



■ STORAGE INSTRUCTIONS

1. Resistors should be stored at a temperature of 5°C 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.

■ USAGE SUGGESTIONS

1. Please protect the surface of the resistor during use. Prevent defects such as scratches, bumps, and oil stains on the surface.
2. Do not use sharp tweezers to move the resistor. Scratches on the surface can cause resistance drift and resistor failure.
3. When installing and using resistors, avoid the impact of mechanical stress on the resistor.
4. The long-term operating power of resistors should be less than the rated power to avoid resistance drift caused by long-term overload.
5. Please refer to the derating curve when operating under high temperature conditions or poor heat dissipation environment.
6. If the operating conditions exceed the pulse specified in the pulse curve, a systematic evaluation is required.
7. If the resistor is not used after being moved from the packaging, it should be stored under vacuum to avoid risks such as poor solderability caused by oxidation of the resistor

■ ORDERING PROCEDURE EXAMPLE

Model#	T.C.R code	Resistance	Tolerance
BWR05	Q = ±50ppm/°C A = ±75ppm/°C	1L00 = 1.0mΩ 1L30 = 1.3mΩ 2L00 = 2.0mΩ 3L00 = 3.0mΩ 4L00 = 4.0mΩ 5L00 = 5.0mΩ	D = ± 0.5% F = ± 1.0% J = ± 5.0%

■ MARKIN EXAMPLE

1.0mΩD	D1L00	3.0mΩD	D3L00
1.3mΩF	F1L30	4.0mΩF	F4L00
2.0mΩJ	J2L00	5.0mΩJ	J5L00

* Note) BWR05 is only suitable for DC low-frequency sampling circuits.