

Automotive Grade Shunt Resistor Series Specification

HoFL3 & HoLCFL3

■ High Stability Provided by Precision Alloy

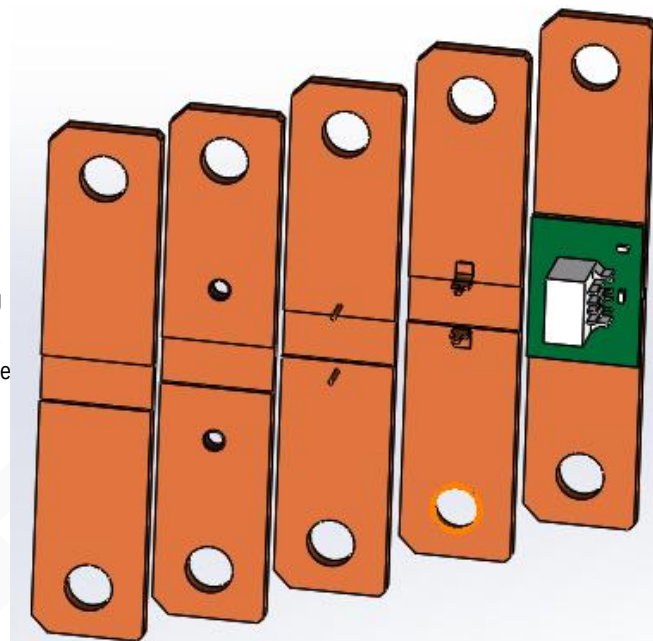
Shunt resistors are designed for automotive-grade current detection, capable of detecting currents ranging from hundreds of amperes up to thousands of amperes. Due to their special alloy material, the shunts offer excellent long-term stability and can withstand pulse current surges several times higher than the rated current without damage.

■ Current Coefficient is Crucial for Current Detection Applications

For a shunt resistor, its resistance value and surface temperature continuously change as current is loaded. The factors causing resistance change include the resistance temperature coefficient and dimensional change due to thermal expansion. When the heating and cooling of the shunt reach a dynamic balance, the shunt resistance tends to stabilize. However, an excessively large Current Coefficient (TCR) can cause the resistance change to exceed the nominal accuracy. The shunt's specialized doping, preparation, and heat treatment processes result in a low Current Coefficient and excellent compensation characteristics.

■ Low Thermo-EMF and Low Inductance

Since a certain distance exists between the voltage sensing point and the resistor's heating center, a temperature difference is present, making a low Thermo-EMF (Thermal Electromotive Force) particularly important. The shunt's Thermo-EMF against copper is less than $0.5\mu\text{V}/^\circ\text{C}$, having minimal impact on millivolt-level voltage output. The flat structure of the shunt results in an inductance of less than 3nH , ensuring excellent performance even at high frequencies.



Automotive Grade Shunt Resistor Series Product Schematic Diagram

Product Series Selection Example: HoFL3-9420-X-100 $\mu\Omega$ -0.5%

<u>Ho</u>	<u>FL3</u>	<u>9420</u>	<u>X</u>	<u>100$\mu\Omega$</u>	<u>0.5%</u>
↓	↓	↓	↓	↓	↓
Manufacturer	Series	Package	Measurement Type	Resistance Value	Tolerance
Milliohm Electronic	FL3=Horizontal Shunt LCFL3=Smart Shunt	9420 8420 8518 6918 8436	X=Basic Model A=Test Holes C=Riveted PINs B= WeldedPINs 4P=4Pins PCB Board 6P=6Pins PCB Board	100 $\mu\Omega$ 50 $\mu\Omega$ 25 $\mu\Omega$	$\pm 5\%$ $\pm 2\%$ $\pm 1\%$ $\pm 0.5\%$ $\pm 0.2\%$

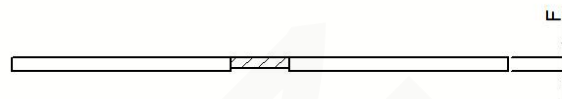
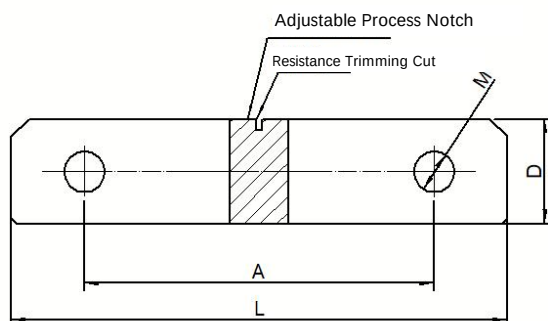
Remarks: The above products are non-plated models; plating can be applied based on customer requirements

Product Features	Product Applications
High accuracy, strong reliability, high overload capability, high stability, wide operating temperature range, non-inductive design. RoHS compliant and AEC-Q200 certified.	Battery Management Systems (BMS), Current detection in power electronic devices, Inverters, UPS, Motor control, Electronic load equipment



Product Dimensions (Unit: mm)

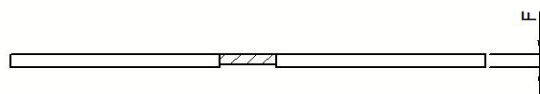
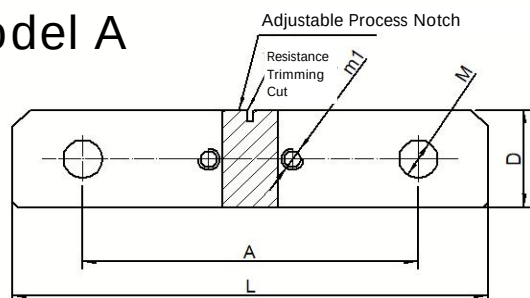
Model X



The diagram is for reference only; the actual product shall prevail.

Remarks: Function of the cut: Used to adjust product accuracy, with no impact on other product performance. When the original accuracy of some products meets the requirements, no cut adjustment is needed.

Model Type	Model	Product Dimensions (Unit: mm)					Remark
		L	A	D	F	M	
	HoFL3-9420-X-100 $\mu\Omega$	94 $\pm$ 0.5	76 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
X	HoFL3-8420-X-100 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
	HoFL3-8518-X-100 $\mu\Omega$	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoFL3-6918-X-100 $\mu\Omega$	69 $\pm$ 0.5	52 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoFL3-8436-X-100 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	
	HoFL3-8420-X-50 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
	HoFL3-9420-X-50 $\mu\Omega$	94 $\pm$ 0.5	76 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
	HoFL3-8518-X-50 $\mu\Omega$	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	2.5 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoFL3-6918-X-50 $\mu\Omega$	69 $\pm$ 0.5	52 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoFL3-8436-X-50 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	
	HoFL3-8436-X-25 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	

Product Dimensions (Unit: mm)
Model A


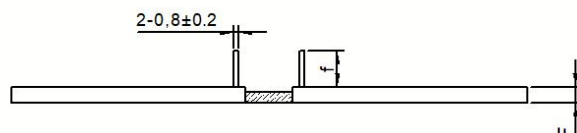
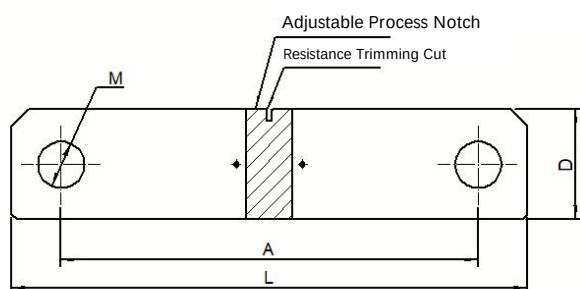
The diagram is for reference only; the actual product shall prevail.

Remarks: Function of the cut: Used to adjust product accuracy, with no impact on other product performance. When the original accuracy of some products meets the requirements, no cut adjustment is needed.

Model Type	Model	Product Dimensions (Unit: mm)						Remark
		L	A	D	F	M	m1	
A	HoFL3-9420-A-100 $\mu\Omega$	94 $\pm$ 0.5	76 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	2-M4	
	HoFL3-8420-A-100 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	2-M4	
	HoFL3-8518-A-100 $\mu\Omega$	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	2.5 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	2-M4	Copper thickness is the same as the Manganese Copper thickness
	HoFL3-8518-A-100 $\mu\Omega$ -DZ	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	2-M4	
	HoFL3-6918-A-100 $\mu\Omega$	69 $\pm$ 0.5	52 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	2-M4	
	HoFL3-8436-A-100 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	2-M4	
	HoFL3-9420-A-50 $\mu\Omega$	94 $\pm$ 0.5	76 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	2-M4	
	HoFL3-8420-A-50 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	2-M4	
	HoFL3-8518-A-50 $\mu\Omega$	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	2.5 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	2-M4	
	HoFL3-8518-A-50 $\mu\Omega$ -DZ	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	2-M4	
	HoFL3-6918-A-50 $\mu\Omega$	69 $\pm$ 0.5	52 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	2-M4	
	HoFL3-8436-A-50 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	2-M4	
	HoFL3-8436-A-25 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	2-M4	

Product Dimensions (Unit: mm)

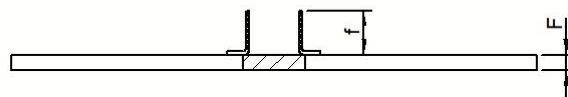
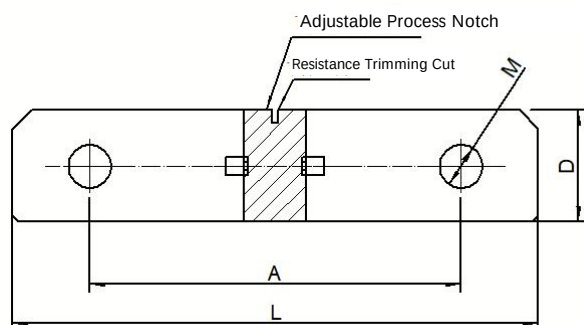
Model C



The diagram is for reference only; the actual product shall prevail.

Remarks: Function of the cut: Used to adjust product accuracy, with no impact on other product performance. When the original accuracy of some products meets the requirements, no cut adjustment is needed.

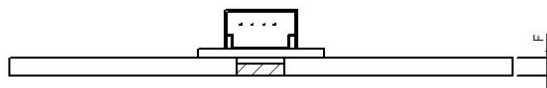
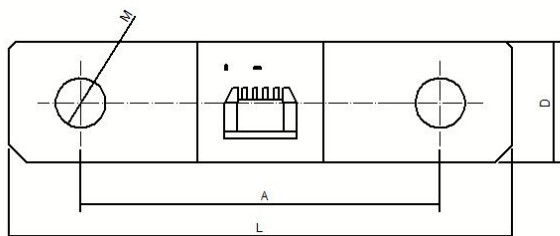
Model Type	Model	Product Dimensions (Unit: mm)						Remark
		L	A	D	F	M	f	
	HoFL3-9420-C-100μΩ	94±0.5	76±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	6±0.5	
C	HoFL3-8420-C-100μΩ	84±0.5	60±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	6±0.5	
	HoFL3-8518-C-100μΩ	85±0.5	60±0.5	18±0.5	2.5±0.2	2-Φ7±0.5	6.5±0.5	Copper thickness is the same as the Manganese Copper thickness
	HoFL3-8518-C-100μΩ-DZ	85±0.5	60±0.5	18±0.5	3.0±0.2	2-Φ7±0.5	6±0.5	
	HoFL3-6918-C-100μΩ	69±0.5	52±0.5	18±0.5	3±0.2	2-Φ7±0.5	6±0.5	
	HoFL3-8436-B-100μΩ	84±0.5	60±0.5	36±0.5	3±0.2	2-Φ8±0.5	6±0.5	
	HoFL3-9420-C-50μΩ	94±0.5	76±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	6±0.5	
	HoFL3-8420-C-50μΩ	84±0.5	60±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	6±0.5	
	HoFL3-8518-C-50μΩ	85±0.5	60±0.5	18±0.5	2.5±0.2	2-Φ7±0.5	6.5±0.5	
	HoFL3-8518-C-50μΩ-DZ	85±0.5	60±0.5	18±0.5	3±0.2	2-Φ7±0.5	6±0.5	
	HoFL3-6918-C-50μΩ	69±0.5	52±0.5	18±0.5	3±0.2	2-Φ7±0.5	6±0.5	
	HoFL3-8436-C-50μΩ	84±0.5	60±0.5	36±0.5	3±0.2	2-Φ8±0.5	6±0.5	
	HoFL3-8436-C-25μΩ	84±0.5	60±0.5	36±0.5	3±0.2	2-Φ8±0.5	6±0.5	

Product Dimensions (Unit: mm)
Model B


The diagram is for reference only; the actual product shall prevail.

Remarks: Function of the cut: Used to adjust product accuracy, with no impact on other product performance. When the original accuracy of some products meets the requirements, no cut adjustment is needed.

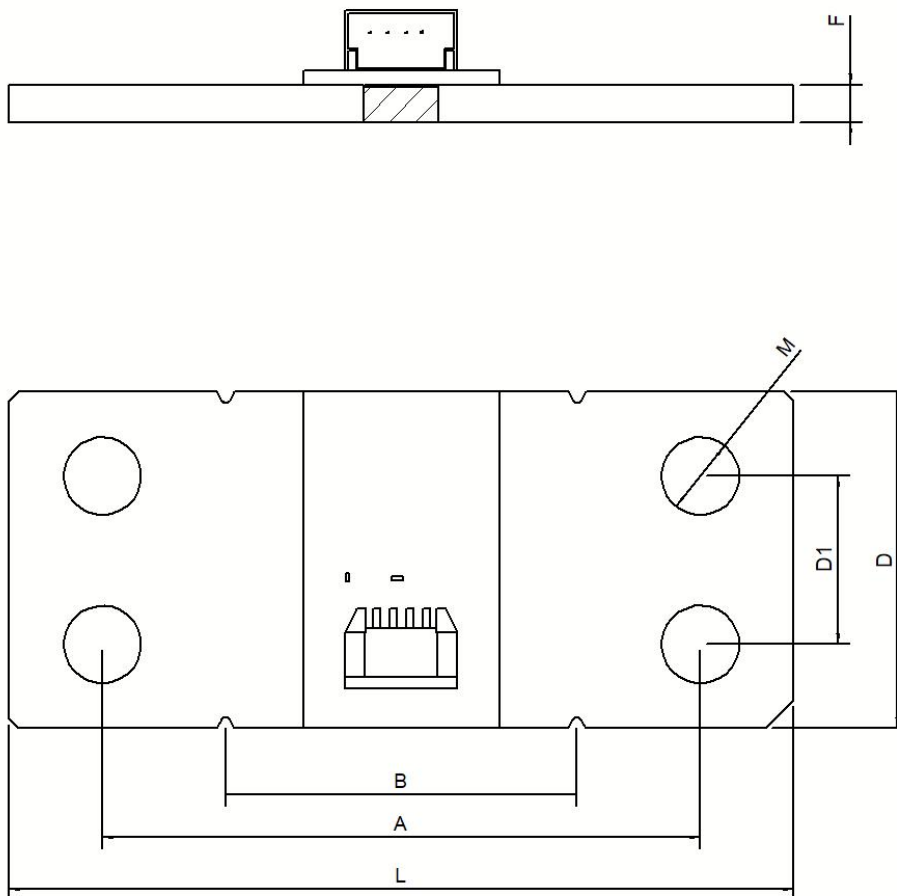
Model Type	Model	Product Dimensions (Unit: mm)						Remark
		L	A	D	F	M	f	
	HoFL3-9420-B-100μΩ	94±0.5	76±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	7.2±0.5	
B	HoFL3-8420-B-100μΩ	84±0.5	60±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	7.2±0.5	
	HoFL3-8518-B-100μΩ	85±0.5	60±0.5	18±0.5	2.5±0.2	2-Φ7±0.5	7.2±0.5	
	HoFL3-8518-B-100μΩ-DZ	85±0.5	60±0.5	18±0.5	3.0±0.2	2-Φ7±0.5	7.2±0.5	
	HoFL3-6918-B-100μΩ	69±0.5	52±0.5	18±0.5	3±0.2	2-Φ7±0.5	7.2±0.5	
	HoFL3-8436-B-100μΩ	84±0.5	60±0.5	36±0.5	3±0.2	2-Φ8±0.5	7.2±0.5	
	HoFL3-9420-B-50μΩ	94±0.5	76±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	7.2±0.5	
	HoFL3-8420-B-50μΩ	84±0.5	60±0.5	20±0.5	3±0.2	2-Φ8.5±0.5	7.2±0.5	
	HoFL3-8518-B-50μΩ	85±0.5	60±0.5	18±0.5	2.5±0.2	2-Φ7±0.5	7.2±0.5	
	HoFL3-8518-B-50μΩ-DZ	85±0.5	60±0.5	18±0.5	3±0.2	2-Φ7±0.5	7.2±0.5	
	HoFL3-6918-B-50μΩ	69±0.5	52±0.5	18±0.5	3±0.2	2-Φ7±0.5	7.2±0.5	
	HoFL3-8436-B-50μΩ	84±0.5	60±0.5	36±0.5	3±0.2	2-Φ8±0.5	7.2±0.5	
	HoFL3-8436-B-25μΩ	84±0.5	60±0.5	36±0.5	3±0.2	2-Φ8±0.5	7.2±0.5	

Product Dimensions (Unit: mm)
Model 4Pins


The diagram is for reference only; the actual product shall prevail.

Remark: Thermistor Model: NTCG163JF103FT1S; Capacitor Model: CGA4J2X7R2A104KT0Y0

Model Type	Model	Product Dimensions (Unit: mm)					Remark
		L	A	D	F	M	
	HoLCFL3-9420-4P-100 $\mu\Omega$	94 $\pm$ 0.5	76 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
4P	HoLCFL3-8420-4P-100 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
	HoLCFL3-8518-4P-100 $\mu\Omega$	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoLCFL3-6918-4P-100 $\mu\Omega$	69 $\pm$ 0.5	52 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoLCFL3-8436-4P-100 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	
	HoLCFL3-9420-4P-50 $\mu\Omega$	94 $\pm$ 0.5	76 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
	HoLCFL3-8420-4P-50 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	20 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8.5 $\pm$ 0.5	
	HoLCFL3-8518-4P-50 $\mu\Omega$	85 $\pm$ 0.5	60 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoLCFL3-6918-4P-50 $\mu\Omega$	69 $\pm$ 0.5	52 $\pm$ 0.5	18 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 7 $\pm$ 0.5	
	HoLCFL3-8436-4P-50 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	
	HoLCFL3-8436-4P-25 $\mu\Omega$	84 $\pm$ 0.5	60 $\pm$ 0.5	36 $\pm$ 0.5	3 $\pm$ 0.2	2- Φ 8 $\pm$ 0.5	

Product Dimensions (Unit: mm)
Model 6Pins


The diagram is for reference only; the actual product shall prevail.

Remark: Thermistor Model: NTCG163JF103FT1S; Capacitor Model: CGA4J2X7R2A104KT0Y0

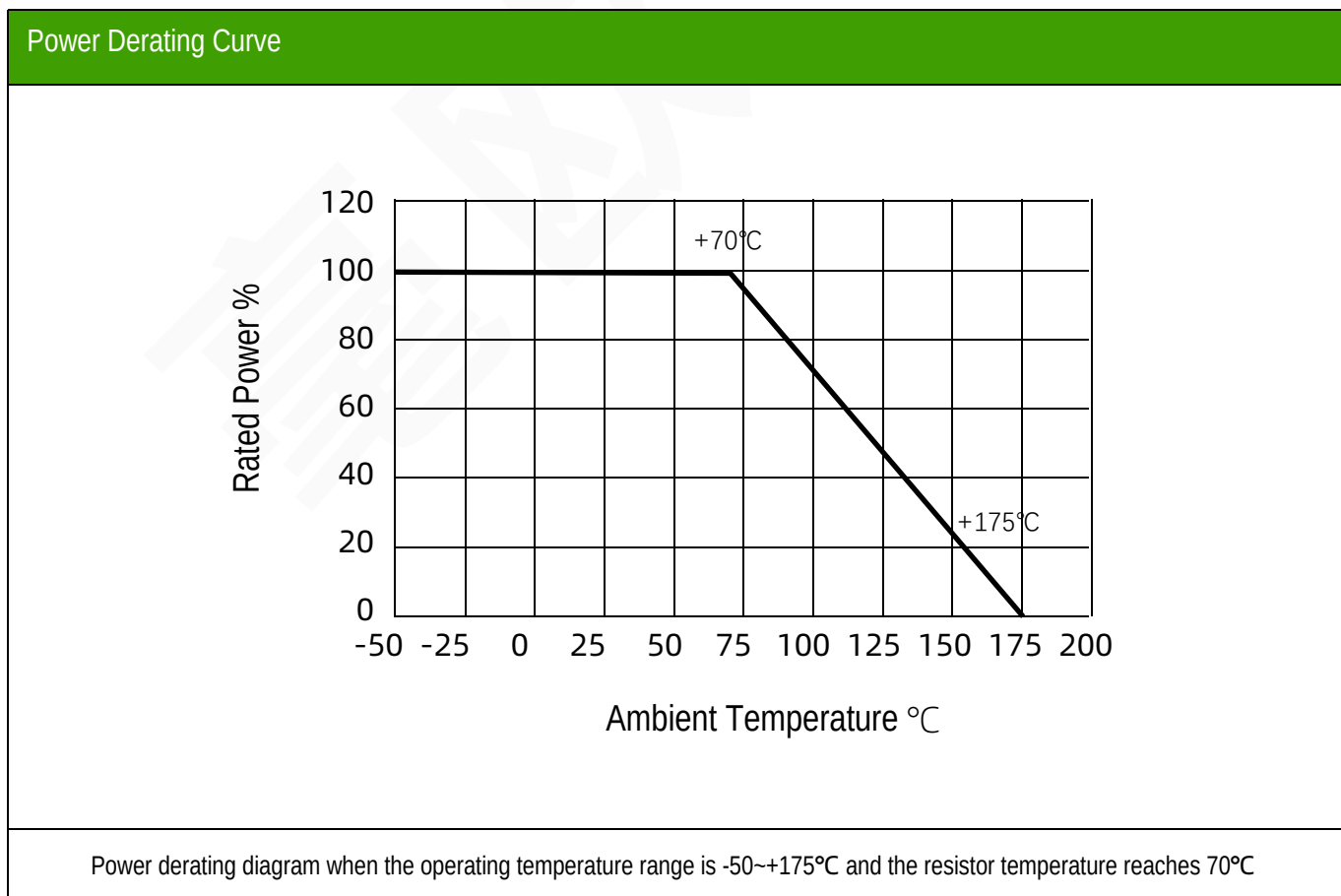
Model Type	Model	Product Dimensions (Unit: mm)							Remark
		L	A	D	F	M	B	D1	
6P	HoLCFL3-8436-6P-50 $\mu\Omega$	84 $\pm$ 0.5	64 $\pm$ 0.5	36 $\pm$ 0.5	4 $\pm$ 0.2	4- Φ 8.3 $\pm$ 0.3	37.6 $\pm$ 0.3	18 $\pm$ 0.5	
	HoLCFL3-8436-6P-25 $\mu\Omega$	84 $\pm$ 0.5	64 $\pm$ 0.5	36 $\pm$ 0.5	4 $\pm$ 0.2	4- Φ 8.3 $\pm$ 0.3	37.6 $\pm$ 0.3	18 $\pm$ 0.5	

Product Parameters						
Model	Resistance Value	TCR (+20℃ Ref)	Rated Current	Rated Power	Inductance	Voltage Output Terminal Structure
Ho9420-A	100μΩ	150ppm/℃ (+20℃~+175℃) 200ppm/°C (-55℃~+20℃)	500A	25W	<3nH (20KHz)	M4 Screw Hole
Ho8420-A						
Ho8518-A						
Ho6918-A						
Ho8436-A						
Ho9420-B		150ppm/℃ (+20℃~+175℃) 200ppm/°C (-55℃~+20℃)				Welded PINs
Ho8420-B						
Ho8518-B						
Ho6918-B						
Ho8436-B						
Ho9420-C		150ppm/℃ (+20℃~+175℃) 200ppm/°C (-55℃~+20℃)				Riveted PINs
Ho8420-C						
Ho8518-C						
Ho6918-C						
Ho8436-C						
Ho9420-X		150ppm/℃ (+20℃~+175℃) 200ppm/°C (-55℃~+20℃)				Basic Type
Ho8420-X						
Ho8518-X						
Ho6918-X						
Ho8436-X						
Ho9420-4P	50ppm/℃ (+20℃~+175℃) 200ppm/°C (-55℃~+20℃)	PCB Board				
Ho8420-4p						
Ho8518-4P						
Ho6918-4P						
Ho8436-4P						

Product Parameters						
Model	Resistance Value	TCR (+20°C Ref)	Rated Current	Rated Power	Inductance	Voltage Output Terminal Structure
Ho9420-A	50μΩ	150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)	1000A	50W	<3nH (20KHz)	M4 Screw Hole
Ho8420-A						
Ho8518-A						
Ho6918-A						
Ho8436-A						
Ho9420-B		150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				Welded PINs
Ho8420-B						
Ho8518-B						
Ho6918-B						
Ho8436-B						
Ho9420-C		150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				Riveted PINs
Ho8420-C						
Ho8518-C						
Ho6918-C						
Ho8436-C						
Ho9420-X		150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				Basic Type
Ho8420-X						
Ho8518-X						
Ho6918-X						
Ho8436-X						
Ho9420-4P	50ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)	PCB Board				
Ho8420-4p						
Ho8518-4P						
Ho6918-4P						
Ho8436-4P						

Product Parameters						
Model	Resistance Value	TCR (+20°C Ref)	Rated Current	Rated Power	Inductance	Voltage Output Terminal Structure
Ho8436-A	25μΩ	150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)	1000A	25W	<3nH (20KHz)	M4 Screw Hole
Ho8436-B		150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				Welded PINs
Ho8436-C		150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				Riveted PINs
Ho8436-X		150ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				Basic Type
Ho8436-4P		50ppm/°C (+20°C~+175°C) 200ppm/°C (-55°C~+20°C)				PCB Board
Ho8436-6P						

Performance Test		
Item	Test Conditions	Resistance Change Range
Thermal Shock	-55°C to +150 °C , 1000 cycles, 15 minutes at each extreme	±0.5%R
Short-Time Overload	5 times rated power, sustained for 5 seconds	±0.5%R
Low-Temperature Storage	-55°C for 24 hours	±0.5%R
High-Temperature Exposure	1000 hours at +170°C	±1.0%R
Biased Humidity	+85°C, 85% RH, 10% of rated power, 1000 hours	±0.5%R
Mechanical Shock	Half-sine wave, peak acceleration 100g, pulse duration 6ms, 3 shocks in each of the six directions across three axes (total 18 shocks)	±0.5%R
Vibration	Frequency varies from 10Hz to 2000Hz in 1 minute, across 3 directions, for 12 hours	±1.0%
Load Life	Within rated power, 1000 hours at +70°C, 1.5 hours "ON", 0.5 hours "OFF"	±0.5%



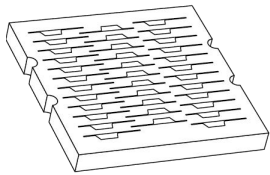
■ Packaging and Assembly Instructions

- 1.Assembly direction: The product's silkscreened side is the front, and the product must be assembled with the front side facing up.
- 2.Optimal assembly time: Optimal assembly time is one to three months at normal temperature. If the product packaging is intact, the optimal assembly time can be extended up to 6 months. Within the optimal assembly time, the product surface is clean, bright, and free of rust spots. Exceeding this time or if the product packaging seal is damaged, or if the product storage warehouse humidity is too high, surface oxidation may occur.
- 3.Storage Environment: Product storage environmental temperature is 5~35°C, humidity <65%RH, and humidity should be kept as low as possible.
- 4.Handling: Gloves must be worn during the installation process or... (The sentence is truncated in the source).

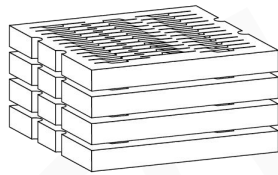
■ Packaging

- 1.Products are placed in a pearl foam ;
- 2.3 to 4 reels per bundle ;
- 3.Each product bundle requires heat-sealed plastic film ;
- 4.Each case is sealed with clear adhesive tape and placed in a cardboard box.

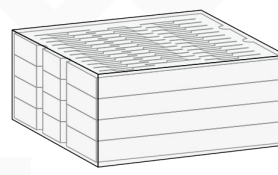
■ Packaging Diagram



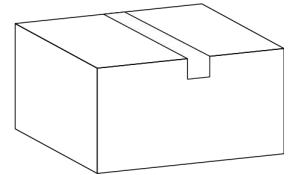
1.Products are placed in a pearl foam



2.3 to 4 reels per bundle



3.Each product bundle requires heat-sealed plastic film



4.Each case is sealed with clear adhesive tape and placed in a cardboard box

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Version Revision

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Ho-A0	2025/08/13	Format standardization	/	/