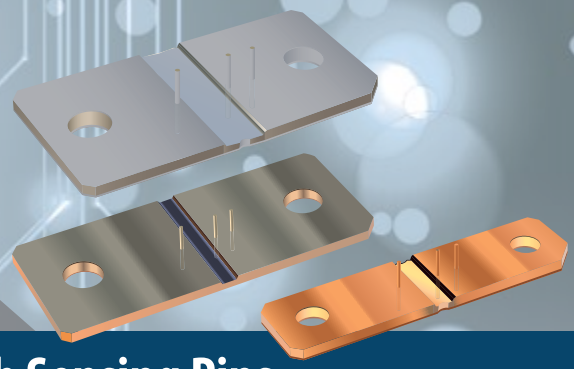


NEW PRODUCT BRIEF

Bourns® Model CSM2F Series with Sensing Pins

High-Power Current Sense Resistors

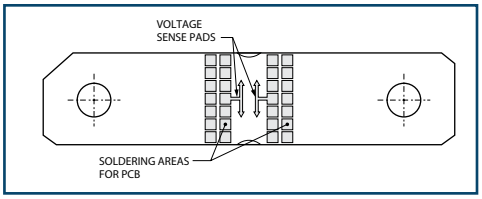
INTRODUCTION

The extension of the Bourns® AEC-Q200 compliant Model CSM2F Series current sense resistor families offers additional sensing pins, which are connected to a customer's PCB by through-hole soldering. Bourns' original Model CSM2F Series without sensing pins are still available and connection to the PCB is accomplished with SMD soldering.

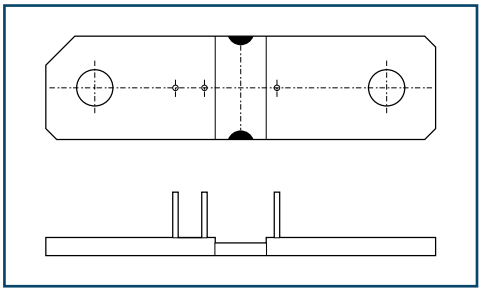
The new sensing pins in the CSM2F Series models are designed for electrical connection and to enable more accurate positioning between the resistor voltage sensing points and the PCB.

The Bourns® Model CSM2F Series current sense resistors are manufactured using advanced electron beam-welded (E-Beam) resistive and copper alloys. This technology allows joining of dissimilar metals. Using tightly-focused electron beams helps to minimize hot spots resulting in low thermal EMF and excellent long term stability. This shunt resistor family is available with three different surface finishing options.

- The "pre-plated" copper terminal versions are tin-plated before the E-Beam welding process. The top and bottom surface of the copper terminals are plated while the side terminals and the resistive element remains unplated due to the stamping process.
- The "fully-plated" versions undergo the tin-plating process after material stamping to ensure that the resistive element and all side terminals are covered by tin. This process enhances current sense resistor performance and delivers improved long-term stability and lower resistance drift.
- The "bare-copper" versions are constructed without tin-plating, providing enhanced TCR performance.



Original Model CSM2F Series recommended solder pad layout for SMD mounting



New Model CSM2F Series with Sensing Pins recommended solder pad layout for through-hole mounting

CURRENT SENSE RESISTOR BASICS

Current sense resistors work by detecting and converting current to voltage. Following Ohm's law, a voltage drop is generated across the resistor of known value, which is proportional to the current ($V_{sense} = I \times R_{shunt}$).

A shunt resistor is placed in series with the electrical load, whereby all the current to be measured will flow through it. The voltage drop across the resistor can be measured by various amplifier options such as with an operational, difference or instrumentation amplifier.

FEATURES

- EB-welded metal strip
- Surface options:
  - Passivated bare copper terminals for better TCR
  - Plated top and bottom surface supports SMD solderability
  - Fully plated terminals for better long term stability and lower resistance drift
- Two sensing pins enable more accurate positioning for the voltage sensing points
- Third optional sensing pin for ground current connection
- Up to 50 W permanent power
- Excellent long-term stability
- Low resistance, low TCR
- Low thermal EMF
- AEC-Q200 compliant
- Automotive grade

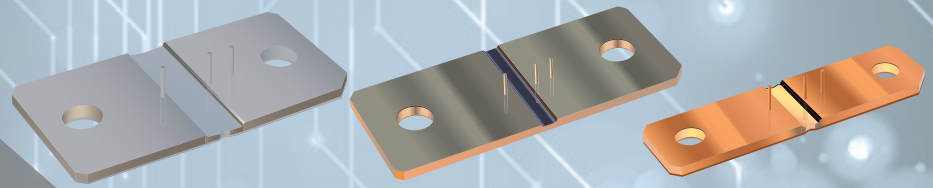
BENEFITS

A resistor that features a metal strip provides an extremely low resistance value to minimize the voltage drop on the resistor. This, in turn, helps to reduce the power loss and heat generated by the resistor ($P_{heat} = I^2 \times R_{shunt}$). Adding a robust metal strip to a current sense resistor results in a higher power rating, which enables the device to accurately measure higher current.

For example, Model CSM2F-7036-L025J has a resistance value of 25 µΩ with 50 W rated power. So, the maximum current that can be measured is calculated in this equation:
$\sqrt{(P/R)} = \sqrt{(50/0.000025)} = 1414$ Amps

APPLICATIONS

- Battery management systems
- Current sensing in hybrid and electric vehicles
- Current sensing in bus bars
- Current sensing in welding equipment
- Voltage divider
- Power modules
- Frequency converters



NEW PRODUCT BRIEF

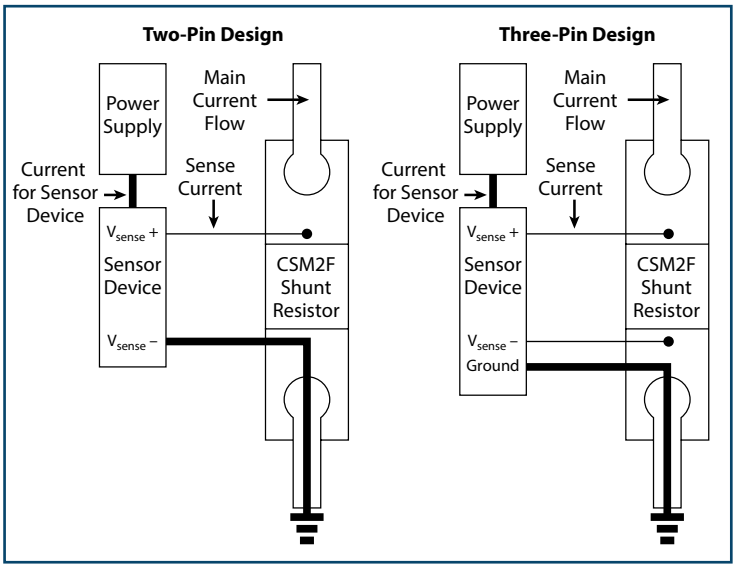
Bourns® Model CSM2F Series with Sensing Pins

High-Power Current Sense Resistors

DIMENSIONS & ELECTRICAL CHARACTERISTICS

Model Number	Package	Size	Power Rating @ 125 °C	Available Resistance Values	Operating Temperature Range	Temperature Coefficient of Resistance	Resistance Tolerance
CSM2F-6918	6918	69 x18 mm	36 W	50; 100; 200 µΩ	-40 to +170 °C	< 50 PPM / °C	± 5 %
CSM2F-7036	7036	70 x 36 mm	50 W	25; 50; 100 µΩ	-40 to +170 °C	< 50 PPM / °C	± 5 %
CSM2F-8518	8518	85 x 18 mm	36 W	50; 100; 200 µΩ	-40 to +170 °C	< 50 PPM / °C	± 5 %
CSM2F-8536	8536	85 x 36 mm	50 W	25; 50; 100 µΩ	-40 to +170 °C	< 50 PPM / °C	± 5 %

OPTIONS FOR INCREASED ACCURACY REQUIREMENTS



HOW TO ORDER

CSM 2F - 7036 - L100 J 2 2

- Model
- No. of Terminals & Style
- Size (Metric)
  - 6918 8518
  - 7036 8536
- Resistance Code (Milliohms)
  - "L" Represents Decimal Point
  - L100 = 100 MicroOhms
- Resistance Tolerance
  - J = ±5 %
- Packaging / Number of Pins
  - 0 = Bulk
  - 1 = Tray / Without Sensing Pins
  - 2 = Tray / 2 Sensing Pins NEW
  - 3 = Tray / 3 Sensing Pins NEW
- Surface Finishing
  - 0 = Bare Copper Terminals
  - 1 = Tinned Terminals
  - 2 = Fully Tinned Terminals

The new current sense resistor models from Bourns are available in two or three tin-plated copper pin options. The two pins are designated for current measurement, whereas the third pin option is for designs that need to be connected to the ground side of the circuit.

With the two-pin design, the current used/consumed by the sensor device flows through the ground side pin. This causes a voltage drop between the PCB connection and the resistor, resulting in a measuring error. The three-pin design reduces the sensing error by carrying the ground current from the sensing circuit through a separate path.

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