

Application of the Type CHR High Resistance Precision Chip Resistors

When using the Type CHR resistor three factors are key to optimizing the performance of this high resistance precision chip resistor: Temperature, Circuit Board Layout, and Solder Attachment. These high resistance precision chip resistors are designed for use in extremely low signal detection / amplification circuits. The designer can choose from a number of available standard resistance values to optimize the circuit design. Applications include Photodiode signal amplification, photomultipliers, ionization detection, etc. These precision high resistance chip resistors can also be ideal for use as the input resistor for high impedance voltage division and gain setting.

Operating Temperature vs. optimized performance: The Type CHR High Resistance Precision Chip has a very low temperature coefficient relative to the operating temperature. For resistance of 10 Meg up to 25 Meg the low $\pm 25\text{ppm}/^\circ\text{C}$ applies over the temperature range of -40°C to $+85^\circ\text{C}$, referenced to $+25^\circ\text{C}$. For resistance values above 25 Meg the temperature coefficient is defined in two temperature ranges to help in optimizing performance. A temperature Coefficient of $\pm 35\text{ppm}/^\circ\text{C}$ applies from $+10^\circ\text{C}$ to $+40^\circ\text{C}$, referenced to $+25^\circ\text{C}$ and $\pm 70\text{ppm}/^\circ\text{C}$ applies over the temperature range of -40°C to $+85^\circ\text{C}$, referenced to $+25^\circ\text{C}$. For maximum stability, the product should be operated in an ambient temperature below $+85^\circ\text{C}$.

Operating Stability, TC performance vs. circuit board layout: The Type CHR High Resistance Precision Chip Resistor has excellent Temperature Coefficient and stability specifications. To achieve the best performance it is important to minimize the contribution of circuit board issues relative to high resistance leakage. To optimize the layout for this chip resistor the circuit board should have a slot designed in the board directly under the resistor element to provide for enhanced cleaning under

this high resistance chip. Additionally, the slot will provide high insulation resistance, provided by the "slot", the air gap. The slot will also reduce capacitive coupling to the circuit board from the chip resistor element (the Flip Chip "FC Style" chip resistor's element faces toward the board surface in the soldering of this resistor to the circuit board). There should not be any copper trace in the layout directly under the resistor (the slot helps to prevent this design error as well). (See Fig.#1 for circuit board layout sketch).

Style FC – Flip Chip Version for surface mount applications. This version has solderable metallized termination pads on one side of the substrate, the same side as the resistive element. The backside of the substrate is bare ceramic

Solder attachment note: The recommended solders for flip chip solder attachment are 62Sn/36Pb/2Ag, 96.5Sn/3.5Ag or standard Sn/Ag/Cu solder alloys.

