

## Soldering a copper chip to a silver dipped brass RF attenuator

**Objective** Soldering a copper chip to a silver plated brass housing

**Material** Copper chip .22" (5.5mm) x .26" (6.6mm), .04" (1mm) thickness, silver dipped brass housing .67" (17mm) diameter and 2.2" (55.8mm) long, solder paste

**Temperature** 425 °F (218 °C)

**Frequency** 264 kHz

**Equipment**

- Ambrell 2.4 kW induction heating system, equipped with a remote workhead containing two 0.5  $\mu$ F capacitors for a total of 1.0  $\mu$ F
- An induction heating coil designed and developed specifically for this application.

**Process** A two turn helical is used to solder the chip to the housing. Solder paste is applied to the base of the copper chip and also to the 2 brass connector pins. The assembly is placed in the coil and power is applied for 55 seconds to flow the solder in the three areas.

**Narrative**

- The customer is currently soldering the three areas individually by hand with a hot plate and soldering iron and experiencing inconsistent results from operator to operator. By switching to induction heat the customer can perform the application with 2 less operators, increase their production rate by 50% and also reduce scrap parts.

**Financial**

- Cost of equipment **-\$ 12,000**
- 2 employees at \$10/hr **+\$ 41,600/year**
- Increased production of 9360 parts per year (production rate of 5 mins/part) sold at a profit of \$10.00 each = increased profit **+\$93,600/year**

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\$12,000 investment netted return on investment of \$123,200/year

\*\*\*Does not factor in any energy savings cost\*\*\*

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### Results/Benefits Induction heating provides:

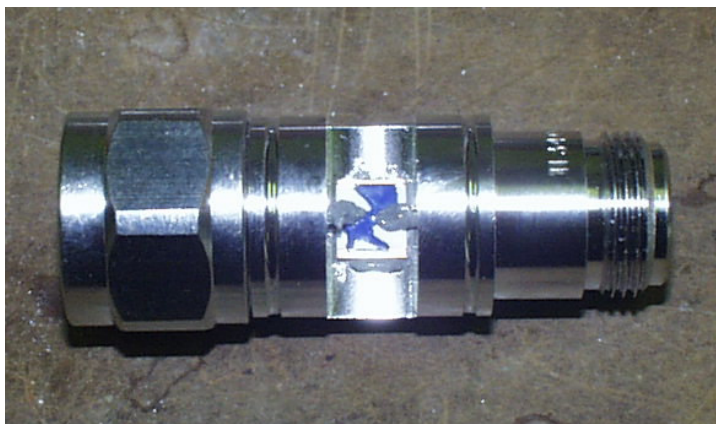
- Repeatable consistent results
- All three areas are soldered at the same time, not individually
- Faster process time, increased production
- Even distribution of heating



Silver dipped housing and copper chip, circle shows location of brass connector rings



Assembly in coil for soldering application



Soldered assembly