

**Radiation Hardened Low Noise Quad Operational Amplifier**

Intersil's Satellite Applications Flow<sup>TM</sup> (SAF) devices are fully tested and guaranteed to 100kRAD total dose. These QML Class T devices are processed to a standard flow intended to meet the cost and shorter lead-time needs of large volume satellite manufacturers, while maintaining a high level of reliability.

The HS-5104ARH-T is a radiation hardened, monolithic quad operational amplifier that provides highly reliable performance in harsh radiation environments. Its excellent noise characteristics coupled with a unique array of dynamic specifications make this amplifier well-suited for a variety of satellite system applications. Dielectrically isolated, bipolar processing makes this device immune to Single Event Latch-up.

The HS-5104ARH-T shows almost no change in offset voltage after exposure to 100K RAD(Si) gamma radiation, with only a minor increase in current. Complementing these specifications is a post radiation open loop gain in excess of 40K.

This quad operational amplifier is available in an industry standard pinout, allowing for immediate interchangeability with most other quad operational amplifiers.

**Specifications**

Specifications for Rad Hard QML devices are controlled by the Defense Supply Center in Columbus (DSCC). The SMD numbers listed below must be used when ordering.

**Detailed Electrical Specifications for the HS-5104ARH-T are contained in SMD 5962-95690.** For more information, visit our website at: [www.intersil.com/](http://www.intersil.com/)

Intersil's Quality Management Plan (QM Plan), listing all Class T screening operations, is also available on our

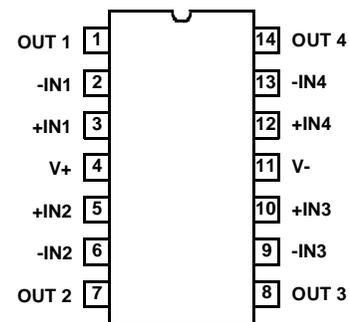
website.

[www.intersil.com/](http://www.intersil.com/)

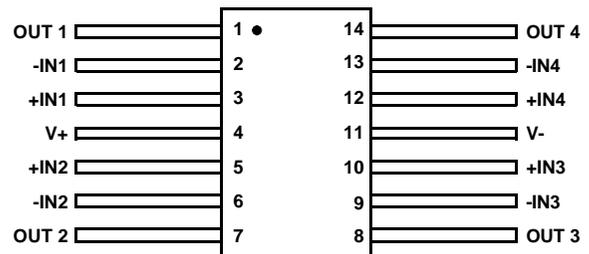
- QML Class T, Per MIL-PRF-38535
- Radiation Performance
  - Gamma Dose ( $\gamma$ )  $1 \times 10^5$  RAD(Si)
  - No Latch-Up, Dielectrically Isolated Device Islands
- Low Noise
  - At 1kHz ..... 4.3nV/ $\sqrt{\text{Hz}}$  (Typ)
  - At 1kHz ..... 0.6pA/ $\sqrt{\text{Hz}}$  (Typ)
- Low Offset Voltage ..... 3.0mV (Max)
- High Slew Rate ..... 2.0V/ $\mu\text{s}$  (Typ)
- Gain Bandwidth Product ..... 8.0MHz (Typ)

**Pinouts**

**HS1-5104ARH-T (SBDIP), CDIP2-T14**  
TOP VIEW



**HS9-5104ARH-T (FLATPACK), CDFP3-F14**  
TOP VIEW



**Die Characteristics**

**DIE DIMENSIONS:**

(2420 $\mu$ m x 2530 $\mu$ m x 483 $\mu$ m  $\pm$ 25.4 $\mu$ m)  
 95 x 99 x 19mils  $\pm$ 1mil

**METALLIZATION:**

Type: Al Si Cu  
 Thickness: 16.0k $\text{\AA}$   $\pm$ 2k $\text{\AA}$

**SUBSTRATE POTENTIAL:**

Unbiased (DI)

**BACKSIDE FINISH:**

Silicon

**PASSIVATION:**

Type: Nitride (Si<sub>3</sub>N<sub>4</sub>) over Silox (SiO<sub>2</sub>)  
 Nitride Thickness: 3.5k $\text{\AA}$   $\pm$ 1.5k $\text{\AA}$   
 Silox Thickness: 12.0k $\text{\AA}$   $\pm$ 2k $\text{\AA}$

**WORST CASE CURRENT DENSITY:**

< 2.0e5 A/cm<sup>2</sup>

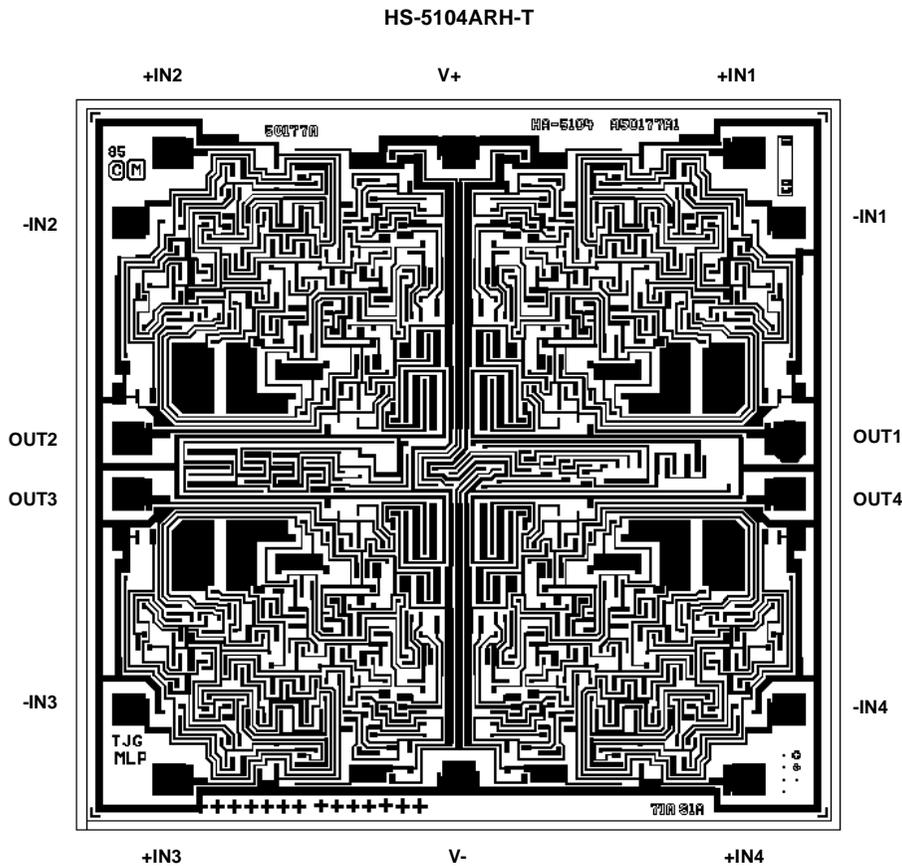
**TRANSISTOR COUNT:**

175

**PROCESS:**

Bipolar DI

**Metallization Mask Layout**



All Intersil U.S. products are manufactured, assembled and tested utilizing ISO9000 quality systems.  
 Intersil Corporation's quality certifications can be viewed at [www.intersil.com/design/quality](http://www.intersil.com/design/quality)

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