

Radiation Hardened, Very Low Noise Quad Operational Amplifiers

HS-OP470ARH, HS-OP470AEH

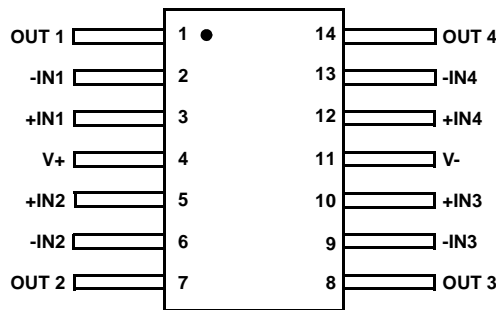
The HS-OP470ARH, HS-OP470AEH are a radiation hardened, monolithic quad operational amplifiers that provide highly reliable performance in harsh radiation environments. Excellent noise characteristics coupled with a unique array of dynamic specifications make these amplifiers well-suited for a variety of satellite system applications. Dielectrically isolated, bipolar processing makes these devices immune to Single Event Latch-up.

The HS-OP470ARH, HS-OP470AEH shows almost no change in offset voltage after exposure to 100krad(Si) gamma radiation, with only a minor increase in current. Complementing these specifications is a post radiation open loop gain in excess of 40kV/V.

These quad operational amplifiers are available in an industry standard pinout, allowing for immediate interchangeability with most other quad operational amplifiers.

Pin Configuration

HS-OP470ARH, HS-OP470AEH
(14 LD FLATPACK)
TOP VIEW



Features

- Electrically screened to SMD # [5962-98533](#)
- QML Qualified Per MIL-PRF-38535 requirements
- Radiation environment
 - High dose rate (50-300rad(Si)/s) 100krad(Si)
 - Low dose rate (0.01rad(Si)/s) 50krad(Si)
- Low noise
 - At 1kHz 4.3nV/ $\sqrt{\text{Hz}}$ (Typ)
 - At 1kHz 0.6pA/ $\sqrt{\text{Hz}}$ (Typ)
- Low offset voltage 2.1mV (Max)
- High slew rate 1.7V/ μs (Min)
- Gain bandwidth product 8.0MHz (Typ)

Applications

- High Q, active filters
- Voltage regulators
- Integrators
- Signal generators
- Voltage references
- Space environments

HS-OP470ARH, HS-OP470AEH

Ordering Information

ORDERING/SMD NUMBER	PART NUMBER (Note 1)	TEMP. RANGE (°C)	PART MARKING	PACKAGE (RoHS Compliant) (Note 2)	PKG. DWG. #
5962R9853301VXC	HS9-OP470ARH-Q	-55 to +125	Q 5962R98 53301VXC	14 Ld Flatpack	K14.A
5962R9853302VXC	HS9-OP470AEH-Q	-55 to +125	Q 5962R98 53302VXC	14 Ld Flatpack	K14.A
5962R9853301V9A	HS0-OP470ARH-Q	-55 to +125		Die	
5962R9853302V9A	HS0-OP470AEH-Q	-55 to +125		Die	
HS0-OP470ARH/SAMPLE	HS0-OP470ARH/SAMPLE	-55 to +125		Die	
5962R9853301QXC	HS9-OP470ARH-8	-55 to +125	Q 5962R98 53301QXC	14 Ld Flatpack	K14.A
HS9-OP470ARH/PROTO	HS9-OP470ARH/PROTO	-55 to +125	HS9-OP470ARH/PROTO	14 Ld Flatpack	K14.A
HS-OP470ARHEV1Z	HS-OP470ARHEV1Z	Evaluation Board			

1. Specifications for Rad Hard QML devices are controlled by the Defense Logistics Agency Land and Maritime (DLA). The SMD numbers listed in the "Ordering Information" table must be used when ordering.
2. These Intersil Pb-free Hermetic packaged products employ 100% Au plate - e4 termination finish, which is RoHS compliant and compatible with both SnPb and Pb-free soldering operations.

HS-OP470ARH, HS-OP470AEH

Die Characteristics

DIE DIMENSIONS:

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

METALLIZATION:

Type: Al, 1% Cu
Thickness: 16k \AA ± 2 k \AA

SUBSTRATE POTENTIAL (Powered Up):

Unbiased

BACKSIDE FINISH:

Silicon

PASSIVATION:

Type: Nitride (Si3N4) over Silox (SiO2, 5% Phos.)
Silox Thickness: 12k \AA ± 2 k \AA
Nitride Thickness: 3.5k \AA ± 1.5 k \AA

WORST CASE CURRENT DENSITY:

$< 2.0 \times 10^5$ A/cm²

TRANSISTOR COUNT:

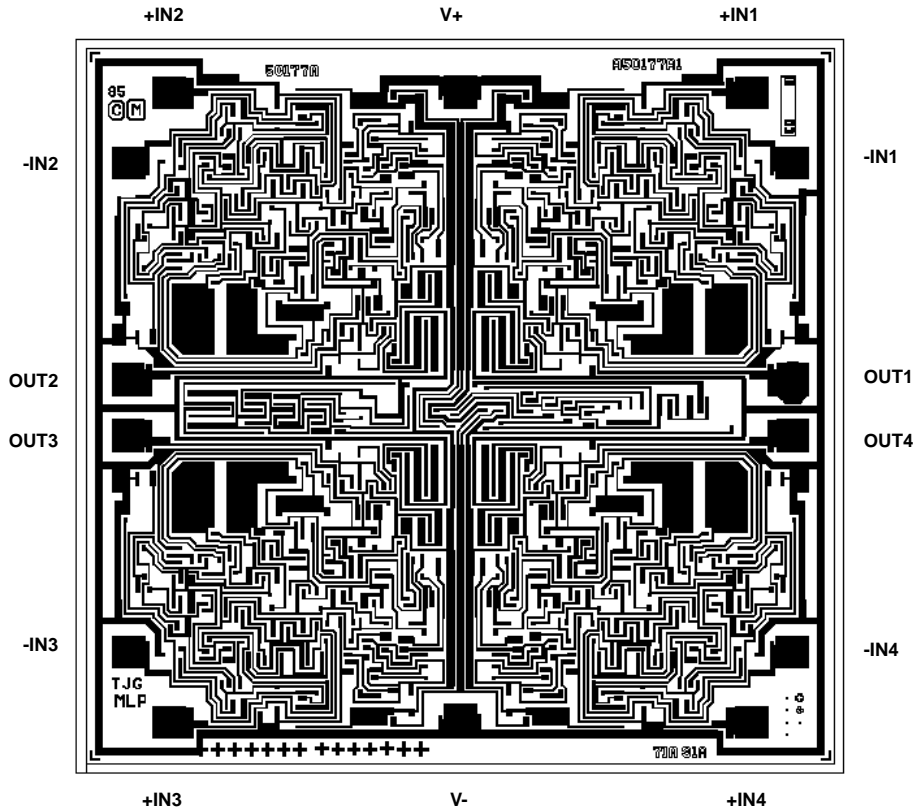
175

PROCESS:

Bipolar Dielectric Isolation

Metallization Mask Layout

HS-OP470ARH, HS-OP470AEH



For additional products, see www.intersil.com/en/products.html

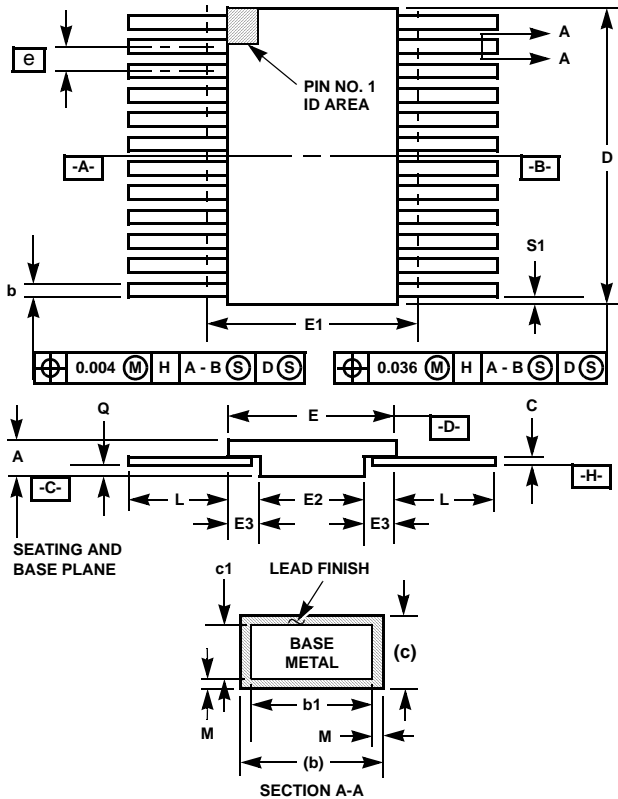
Intersil products are manufactured, assembled and tested utilizing ISO9000 quality systems as noted in the quality certifications found at www.intersil.com/en/support/qualandreliability.html

Intersil products are sold by description only. Intersil Corporation reserves the right to make changes in circuit design, software and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that data sheets are current before placing orders. Information furnished by Intersil is believed to be accurate and reliable. However, no responsibility is assumed by Intersil or its subsidiaries for its use; nor for any infringements of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of Intersil or its subsidiaries.

For information regarding Intersil Corporation and its products, see www.intersil.com

HS-OP470ARH, HS-OP470AEH

Ceramic Metal Seal Flatpack Packages (Flatpack)



**K14.A MIL-STD-1835 CDFP3-F14 (F-2A, CONFIGURATION B)
14 LEAD CERAMIC METAL SEAL FLATPACK PACKAGE**

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN	MAX	MIN	MAX	
A	0.045	0.115	1.14	2.92	-
b	0.015	0.022	0.38	0.56	-
b1	0.015	0.019	0.38	0.48	-
c	0.004	0.009	0.10	0.23	-
c1	0.004	0.006	0.10	0.15	-
D	-	0.390	-	9.91	3
E	0.235	0.260	5.97	6.60	-
E1	-	0.290	-	7.11	3
E2	0.125	-	3.18	-	-
E3	0.030	-	0.76	-	7
e	0.050 BSC		1.27 BSC		-
k	0.008	0.015	0.20	0.38	2
L	0.270	0.370	6.86	9.40	-
Q	0.026	0.045	0.66	1.14	8
S1	0.005	-	0.13	-	6
M	-	0.0015	-	0.04	-
N	14		14		-

Rev. 0 5/18/94

NOTES:

1. Index area: A notch or a pin one identification mark shall be located adjacent to pin one and shall be located within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark. Alternately, a tab (dimension k) may be used to identify pin one.
2. If a pin one identification mark is used in addition to a tab, the limits of dimension k do not apply.
3. This dimension allows for off-center lid, meniscus, and glass overrun.
4. Dimensions b1 and c1 apply to lead base metal only. Dimension M applies to lead plating and finish thickness. The maximum limits of lead dimensions b and c or M shall be measured at the centroid of the finished lead surfaces, when solder dip or tin plate lead finish is applied.
5. N is the maximum number of terminal positions.
6. Measure dimension S1 at all four corners.
7. For bottom-brazed lead packages, no organic or polymeric materials shall be molded to the bottom of the package to cover the leads.
8. Dimension Q shall be measured at the point of exit (beyond the meniscus) of the lead from the body. Dimension Q minimum shall be reduced by 0.0015 inch (0.038mm) maximum when solder dip lead finish is applied.
9. Dimensioning and tolerancing per ANSI Y14.5M - 1982.
10. Controlling dimension: INCH.