

Radiation Hardened CMOS Dual SPDT Analog Switch

HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH

The HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH analog switches are monolithic devices fabricated using Intersil's dielectrically isolated Radiation Hardened Silicon Gate (RSG) process technology to insure latch-up free operation. They are pinout compatible and functionally equivalent to the HS-303RH, but offer improved 300kRAD(Si) total dose capability. These switches offers low-resistance switching performance for analog voltages up to the supply rails. "ON" resistance is low and stays reasonably constant over the full range of operating voltage and current. "ON" resistance also stays reasonably constant when exposed to radiation. Break-before-make switching is controlled by 5V digital inputs. The HS-303ARH should be operated with nominal ±15V supplies, while the HS-303BRH should be operated with nominal ±12V supplies.

Specifications

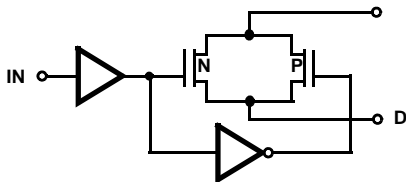
Specifications for Rad Hard QML devices are controlled by the Defense Supply Center in Columbus (DSCC). The SMD numbers listed below must be used when ordering.

Detailed Electrical Specifications for the HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH are contained in SMD [5962-95813](#). A "hot-link" is provided from our website for downloading

Features

- QML, Per MIL-PRF-38535
- Radiation Performance
 - Total Dose: 3×10^5 RAD(Si)
 - SEE: For LET = 60MeV-mg/cm² at 60° Incident Angle, <150pC Charge Transferred to the Output of an Off Switch
- No Latch-Up, Dielectrically Isolated Device Islands
- Pinout and Functionally Compatible with Intersil HS-303RH and HI-303 Series Analog Switches
- Analog Signal Range Equal to the Supply Voltage Range
- Low Leakage. 100nA (Max, Post-Rad)
- Low r_{ON} 70Ω (Max, Post-Rad)
- Low Standby Supply Current. +150μA/-100μA (Max, Post-Rad)

Functional Diagram

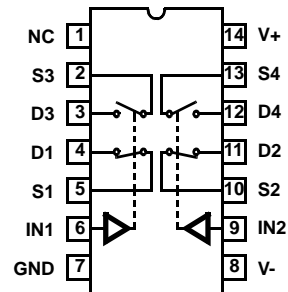


TRUTH TABLE

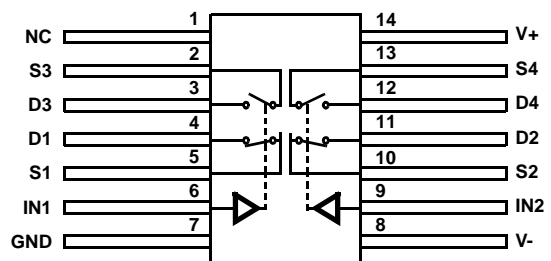
| LOGIC | SW1 AND SW2 | SW3 AND SW4 |
|-------|-------------|-------------|
| 0 | OFF | ON |
| 1 | ON | OFF |

Pin Configurations

HS1-303ARH, HS-303BRH (SBDIP), CDIP2-T14 TOP VIEW



HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH (FLATPACK) CDFP3-F14 TOP VIEW



HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH

Ordering Information

| ORDERING NUMBER (Note) | PART NUMBER | TEMP. RANGE (°C) | PKG. | PKG. DWG. # |
|---------------------------|-------------------|---------------------|----------------|----------------|
| 5962F9581304QCC | HS1-303ARH-8 | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581304QXC | HS9-303ARH-8 | -55 to +125 | 14 LD Flatpack | K14.A |
| 5962F9581304V9A | HS0-303ARH-Q | -55 to +125 | 14 Ld SBDIP | D14.3 |
| 5962F9581306V9A | HS0-303AEH-Q | -55 to +125 | 14 Ld SBDIP | D14.3 |
| 5962F9581304VCC | HS1-303ARH-Q | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581306VCC | HS1-303AEH-Q | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581304VXC | HS9-303ARH-Q | -55 to +125 | 14 LD Flatpack | K14.A |
| HS0-303ARH/SAMPLE | HS0-303ARH/SAMPLE | -55 to +125 | | |
| HS1-303ARH/PROTO | HS1-303ARH/PROTO | -55 to +125 | 14 LD SBDIP | D14.3 |
| HS9-303ARH/PROTO | HS9-303ARH/PROTO | -55 to +125 | 14 LD Flatpack | K14.A |
| 5962F9581306VXC | HS9-303AEH-Q | -55 to +125 | 14 LD Flatpack | K14.A |
| 5962F9581305QCC | HS1-303BRH-8 | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581305QXC | HS9-303BRH-8 | -55 to +125 | 14 LD Flatpack | K14.A |
| 5962F9581305V9A | HS0-303BRH-Q | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581307V9A | HS0-303BEH-Q | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581305VCC | HS1-303BRH-Q | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581307VCC | HS1-303BEH-Q | -55 to +125 | 14 LD SBDIP | D14.3 |
| 5962F9581305VXC | HS9-303BRH-Q | -55 to +125 | 14 LD Flatpack | K14.A |
| HS0-303BRH/SAMPLE | HS0-303BRH/SAMPLE | -55 to +125 | | |
| HS1-303BRH/PROTO | HS1-303BRH/PROTO | -55 to +125 | 14 LD SBDIP | D14.3 |
| HS9-303BRH/PROTO | HS9-303BRH/PROTO | -55 to +125 | 14 LD Flatpack | K14.A |
| 5962F9581307VXC | HS9-303BEH-Q | -55 to +125 | 14 LD Flatpack | K14.A |

NOTE: 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-303ARH, HS-303AEH, HS-303BRH, HS-303BEH

Die Characteristics

DIE DIMENSIONS:

2690 μ m x 5200 μ m (106mils x 205mils)
Thickness: 483 μ m \pm 25.4 μ m (19mils \pm 1mil)

INTERFACE MATERIALS:

Glassivation:

Type: PSG (Phosphorous Silicon Glass)
Thickness: 8.0k \AA \pm 1.0k \AA

Top Metallization:

Type: AlSiCu
Thickness: 16.0k \AA \pm 2k \AA

Substrate:

Radiation Hardened Silicon Gate,
Dielectric Isolation

Backside Finish:

Silicon

ASSEMBLY RELATED INFORMATION:

Substrate Potential:

Unbiased (DI)

ADDITIONAL INFORMATION:

Worst Case Current Density:

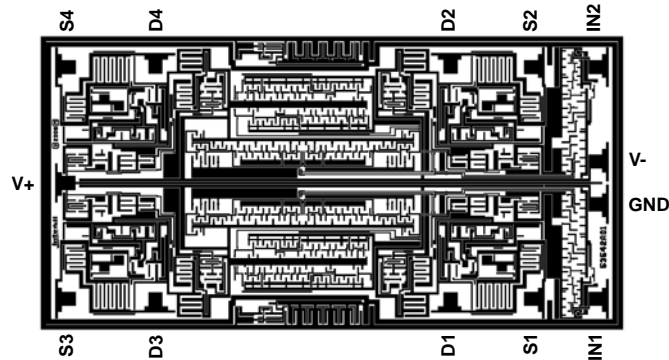
$<2.0 \times 10^5$ A/cm²

Transistor Count:

196

Metallization Mask Layout

HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH



For additional products, see www.intersil.com/product_tree

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

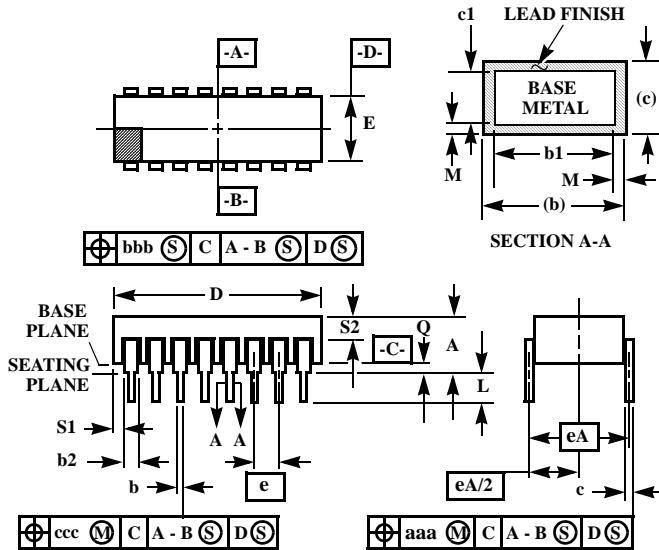
Intersil products are sold by description only. Intersil Corporation reserves the right to make changes in circuit design, software and/or specifications at any time without notice. Accordingly, the reader is cautioned to verify that data sheets are current before placing orders. Information furnished 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-303ARH, HS-303AEH, HS-303BRH, HS-303BEH

Ceramic Dual-In-Line Metal Seal Packages (SBDIP)

D14.3 MIL-STD-1835 CDIP2-T14 (D-1, CONFIGURATION C) 14 LEAD CERAMIC DUAL-IN-LINE METAL SEAL PACKAGE



NOTES:

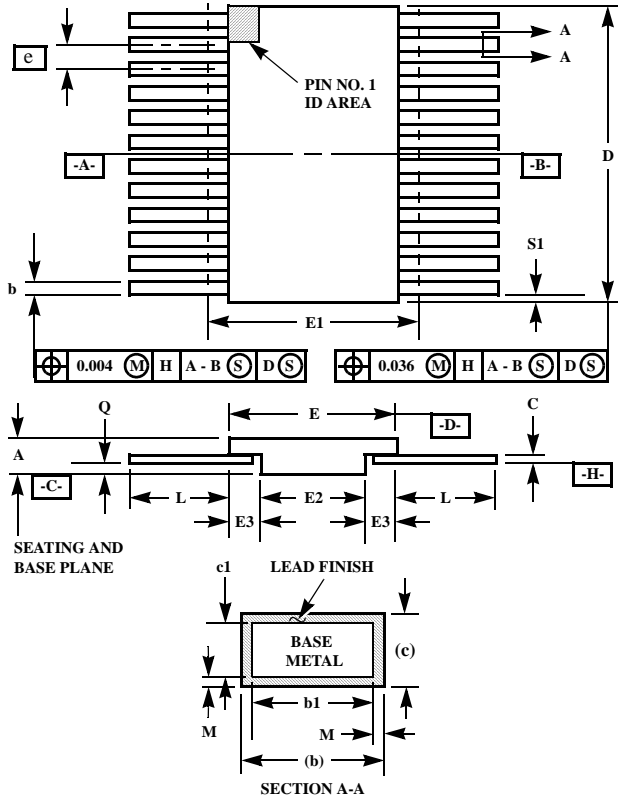
1. Index area: A notch or a pin one identification mark shall be located adjacent to pin one and shall be located within the shaded area shown. The manufacturer's identification shall not be used as a pin one identification mark.
2. The maximum limits of lead dimensions b and c or M shall be measured at the centroid of the finished lead surfaces, when solder dip or tin plate lead finish is applied.
3. Dimensions b1 and c1 apply to lead base metal only. Dimension M applies to lead plating and finish thickness.
4. Corner leads (1, N, N/2, and N/2+1) may be configured with a partial lead paddle. For this configuration dimension b3 replaces dimension b2.
5. Dimension Q shall be measured from the seating plane to the base plane.
6. Measure dimension S1 at all four corners.
7. Measure dimension S2 from the top of the ceramic body to the nearest metallization or lead.
8. N is the maximum number of terminal positions.
9. Braze fillets shall be concave.
10. Dimensioning and tolerancing per ANSI Y14.5M - 1982.
11. Controlling dimension: INCH.

| SYMBOL | INCHES | | MILLIMETERS | | NOTES |
|----------|-----------|--------|-------------|-------|-------|
| | MIN | MAX | MIN | MAX | |
| A | - | 0.200 | - | 5.08 | - |
| b | 0.014 | 0.026 | 0.36 | 0.66 | 2 |
| b1 | 0.014 | 0.023 | 0.36 | 0.58 | 3 |
| b2 | 0.045 | 0.065 | 1.14 | 1.65 | - |
| b3 | 0.023 | 0.045 | 0.58 | 1.14 | 4 |
| c | 0.008 | 0.018 | 0.20 | 0.46 | 2 |
| c1 | 0.008 | 0.015 | 0.20 | 0.38 | 3 |
| D | - | 0.785 | - | 19.94 | - |
| E | 0.220 | 0.310 | 5.59 | 7.87 | - |
| e | 0.100 BSC | | 2.54 BSC | | - |
| eA | 0.300 BSC | | 7.62 BSC | | - |
| eA/2 | 0.150 BSC | | 3.81 BSC | | - |
| L | 0.125 | 0.200 | 3.18 | 5.08 | - |
| Q | 0.015 | 0.060 | 0.38 | 1.52 | 5 |
| S1 | 0.005 | - | 0.13 | - | 6 |
| S2 | 0.005 | - | 0.13 | - | 7 |
| α | 90° | 105° | 90° | 105° | - |
| aaa | - | 0.015 | - | 0.38 | - |
| bbb | - | 0.030 | - | 0.76 | - |
| ccc | - | 0.010 | - | 0.25 | - |
| M | - | 0.0015 | - | 0.038 | 2 |
| N | 14 | | 14 | | 8 |

Rev. 0 4/94

HS-303ARH, HS-303AEH, HS-303BRH, HS-303BEH

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.