Data Sheet | August 1999 | File Number 3624.2

Low Power, High Performance Radiation Hardened Operational Amplifier

HS-2700RH is radiation hardened internally compensated operational amplifiers which employ dielectric isolation to achieve excellent DC and dynamic performance with very low quiescent power consumption.

DC performance of the amplifier input is characterized by high CMRR (106dB), low offset voltage (0.5mV), along with low bias and offset current (5.0nA and 2.5nA respectively). These input specifications, in conjunction with offset null capability and open-loop gain of 300,000V/V, enable HS-2700RH to provide accurate, high-gain signal amplification. Gain bandwidth 1MHz and slew rate of 20V/µs allow for processing of fast, wideband signals. Input and output signal amplitudes of at least ±11V can be accommodated while providing output drive capability of 10mA. For maximum reliability, the output is protected in the event of short circuits to ground.

The amplifier operates from a wide range of supplies (±5.5V to ±20V) with a maximum quiescent supply drain of only 150µA. HS-2700RH is therefore, ideally suited to low-power instrumentation and filtering applications that require fast, accurate response over a wide range of signal frequency.

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

Detailed Electrical Specifications for these devices are contained in SMD 5962-95670. A "hot-link" is provided on our homepage for downloading. www.intersil.com/spacedefense/space.asp

Features

- Electrically Screened to SMD # 5962-95670
- QML Qualified per MIL-PRF-38535 Requirements
- Low Power Supply Current . . . . . 150µA (Max) 90µA (Typ)
- High CMRR . . . . . 86dB (Min) 106dB (Typ)
- Low Input Bias Current . . . . . 20nA (Min) 5nA (Typ)
- Low Offset Current . . . . . 10nA (Min) 2.5nA (Typ)
- Total Dose . . . . . 1×10^4 RAD(Si)

Applications

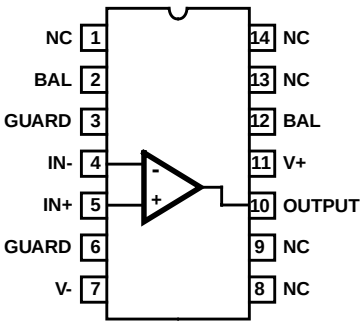
- High Gain Amplifier
- Instrumentation Amplifiers
- Active Filters
- Telemetry Systems
- Battery-Powered Equipment

Ordering Information

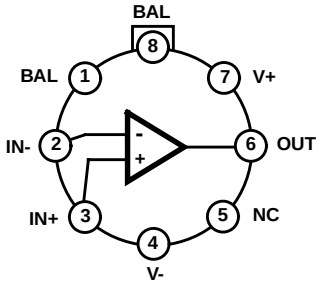
ORDERING NUMBER	INTERNAL MKT. NUMBER	TEMP. RANGE (^oC)
5962D9567002VCA	HS1-2700RH-Q	-55 to 125
5962D9567002VCC	HS1B-2700RH-Q	-55 to 125
5962D9567002VGA	HS2-2700RH-Q	-55 to 125

Pinouts

HS1-2700RH (CERDIP) GDIP1-T14
OR
HS1B-2700RH (SBDIP) CDIP2-T14
TOP VIEW

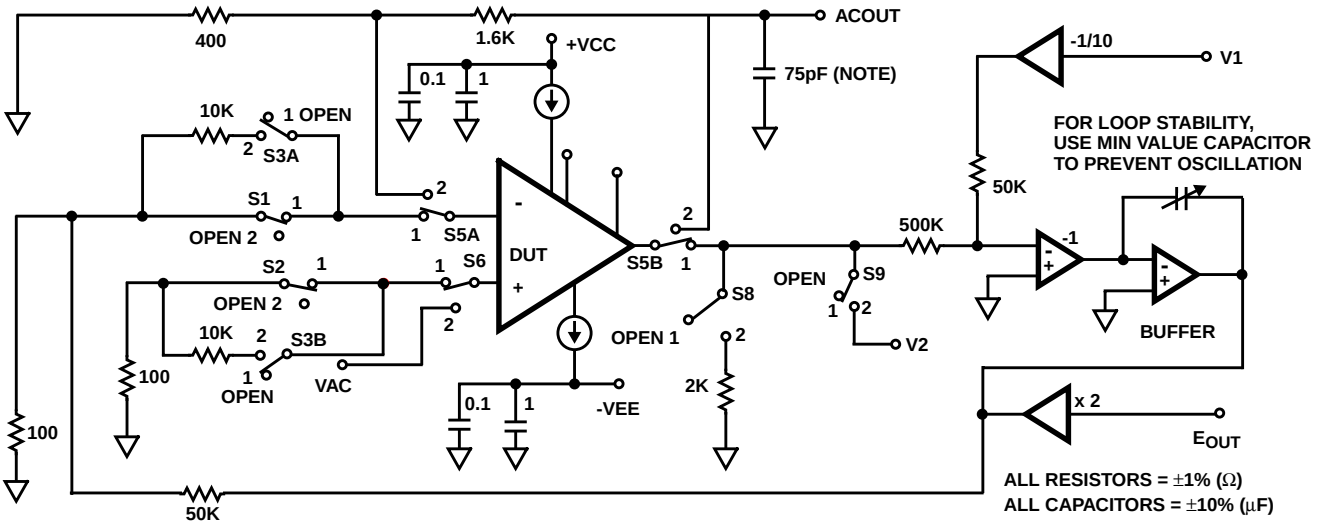


HS2-2700RH (CAN) MACY1-X8
TOP VIEW



CAUTION: These devices are sensitive to electrostatic discharge; follow proper IC Handling Procedures.
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Test Circuit



NOTE: Includes stray capacitances.

Timing Waveforms

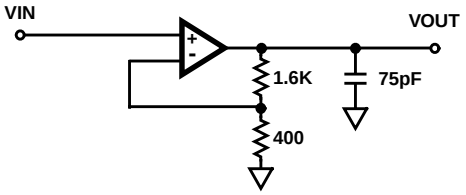


FIGURE 1. SIMPLIFIED TEST CIRCUIT

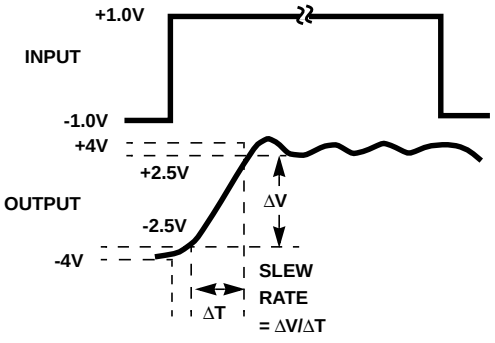


FIGURE 2. SLEW RATE WAVEFORM

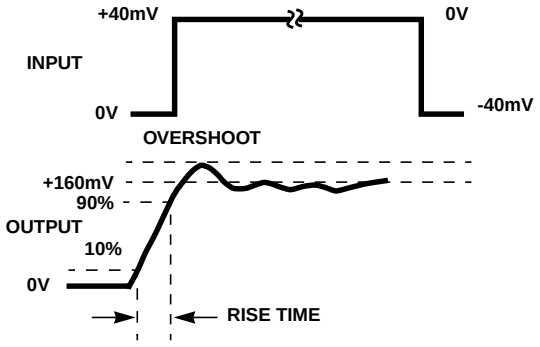


FIGURE 3. TRANSIENT RESPONSE WAVEFORM

NOTE: Measured on both positive and negative transitions. Capacitance at Compensation pin should be minimized.

Typical Performance Curves $T_A = 25^oC$, VSUPPLY = ±15V, Unless Otherwise Specified

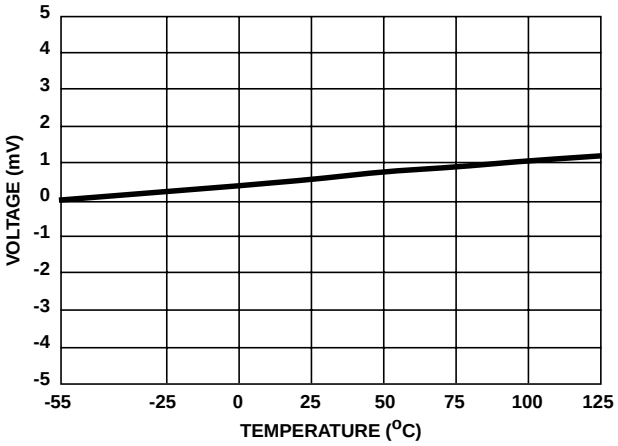


FIGURE 4. OFFSET VOLTAGE AS A FUNCTION OF TEMPERATURE

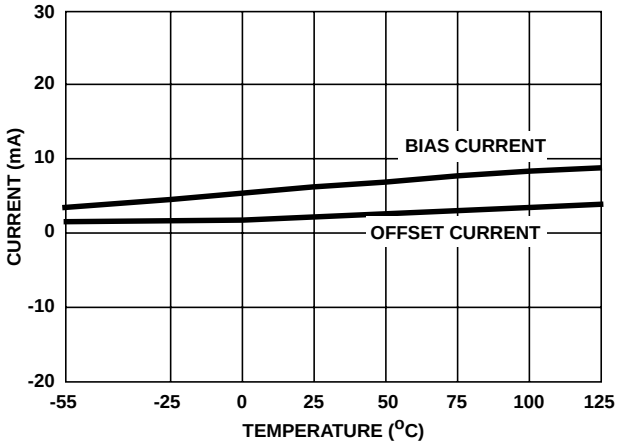


FIGURE 5. INPUT BIAS CURRENT AND OFFSET CURRENT AS A FUNCTION OF TEMPERATURE

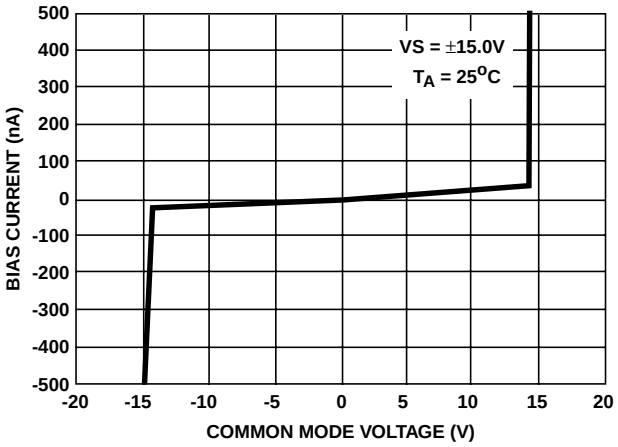


FIGURE 6. BIAS CURRENT AS A FUNCTION OF COMMON MODE VOLTAGE

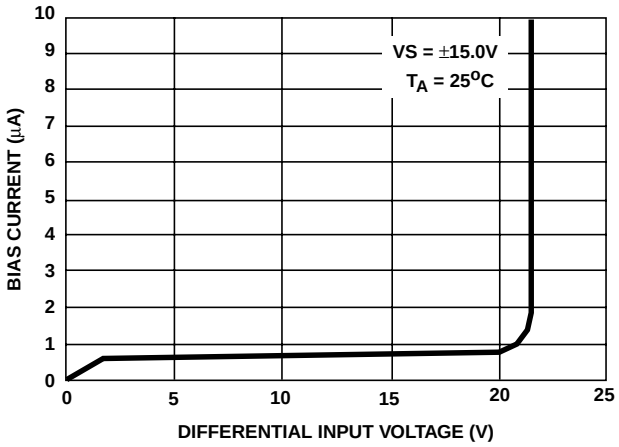


FIGURE 7. BIAS CURRENT AS A FUNCTION OF DIFFERENTIAL INPUT VOLTAGE

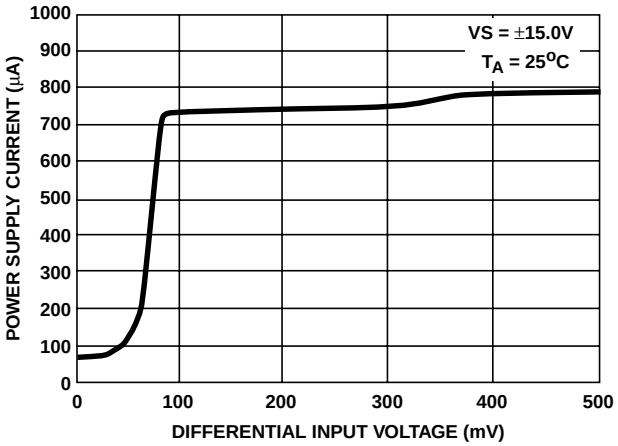


FIGURE 8. POWER SUPPLY CURRENT AS A FUNCTION OF DIFFERENTIAL INPUT VOLTAGE

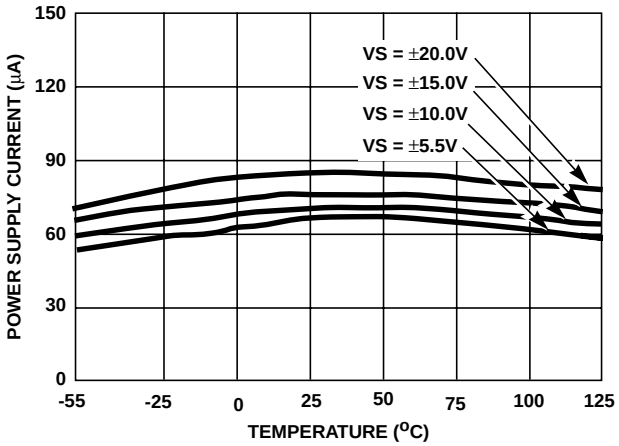


FIGURE 9. POWER SUPPLY CURRENT AS A FUNCTION OF TEMPERATURE

Typical Performance Curves T_A = 25°C, VSUPPLY = ±15V, Unless Otherwise Specified **(Continued)**

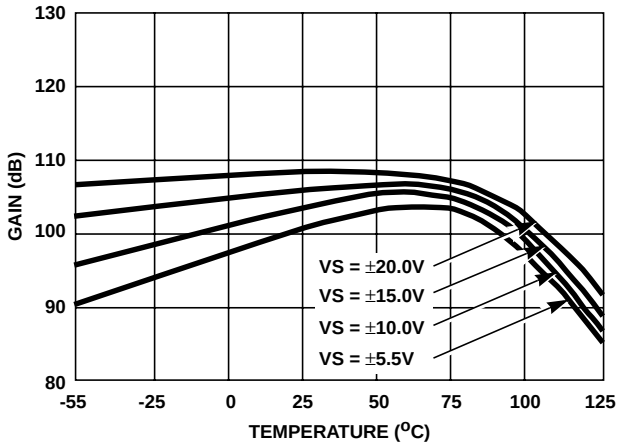
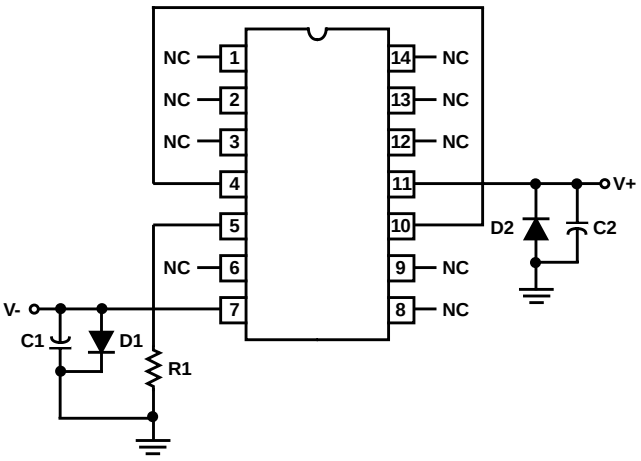


FIGURE 10. VOLTAGE GAIN AS A FUNCTION OF TEMPERATURE

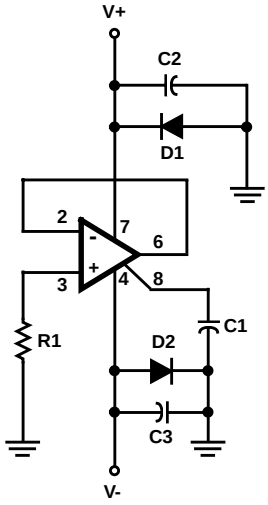
NOTE: Open loop (comparator) applications are not recommended, because of the above characteristic.

Burn-In Circuits

HS1-2700RH CERDIP



HS2-2700RH METAL CAN



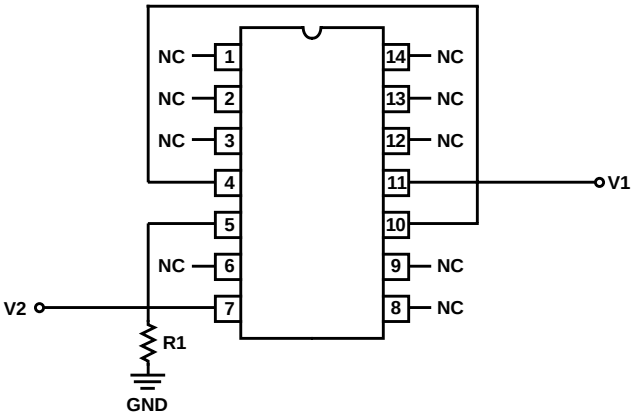
NOTES:

1. R1 = 1MΩ, ±5%, 1/4W (Min)
2. C1 = C2 = 0.01µF/Socket (Min) or 0.1µF/Row (Min)
3. D1 = D2 = 1N4002 or equivalent (per board)
4. |(V+) - (V-)| = 31V ±1V

NOTES:

5. R1 = 1MΩ, ±5%, 1/4W (Min)
6. C1 = 0.01µF/Socket (Min)
7. C2 = C3 = 0.01µF/Socket (Min) or 0.1µF/Row (Min)
8. D1 = D2 = 1N4002 or equivalent (per board)
9. |(V+) - (V-)| = 31V ±1V
10. Insulated scope probe must be used during board check-out.

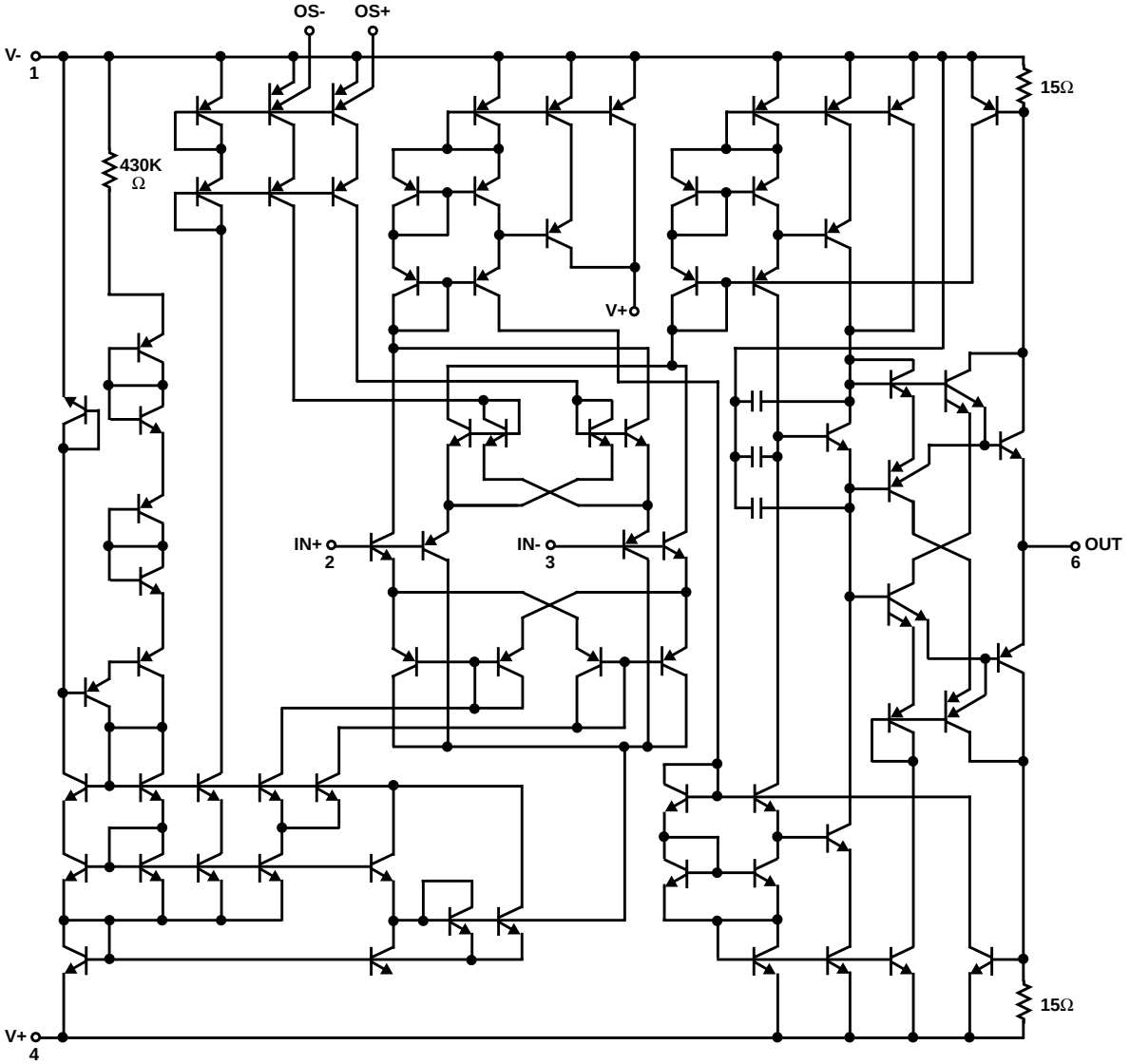
Irradiation Circuit



NOTES:

11. R = 1MΩ, ±5%, 1/4W
12. V1 = +15V + 1.0V
13. V2 = -15V + 1.0V

Schematic Diagram



NOTE: Nominal currents shown in microamperes.

Die Characteristics

DIE DIMENSIONS:

70 mils x 60 mils x 20 mils
(1780µm x 1530µm x 1530µm)

INTERFACE MATERIALS:

Glassivation:

Type: Nitride
Thickness: 7kÅ ±0.7kÅ

Top Metallization:

Type: Aluminum
Thickness: 16kÅ ±2kÅ

Substrate:

Linear Bipolar, DI

Backside Finish:

Silicon

ASSEMBLY RELATED INFORMATION:

Substrate Potential (Powered Up)**:**

Unbiased

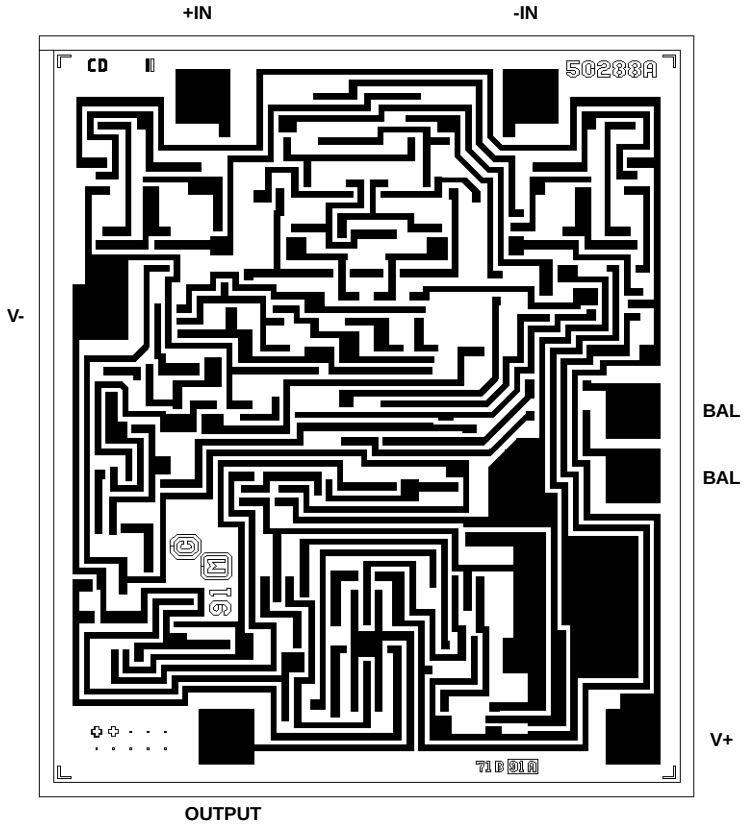
ADDITIONAL INFORMATION:

Worst Case Current Density:

$< 2 \times 10^5$ A/cm^2

Metallization Mask Layout

HS-2700RH



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