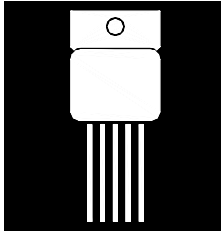


## 1 M Rad (Si), ULTRA LOW DROPOUT POSITIVE LINEAR REGULATOR



**+3.3V<sub>in</sub> to +2.5V Output at 3.0A  
In Hermetic Packages**

### FEATURES

- Total dose and low dose capability to 1M Rad (Si) allows use in space applications
- Ultra low dropout voltage of 0.4V @ 3A out significantly reduces power consumption
- Low noise, higher efficiency
- Remote Shutdown permits power sequencing to be easily implemented
- Hermetic MO-078AA (TO-258) and 8-lead flat pack ensure higher reliability
- K-level screened

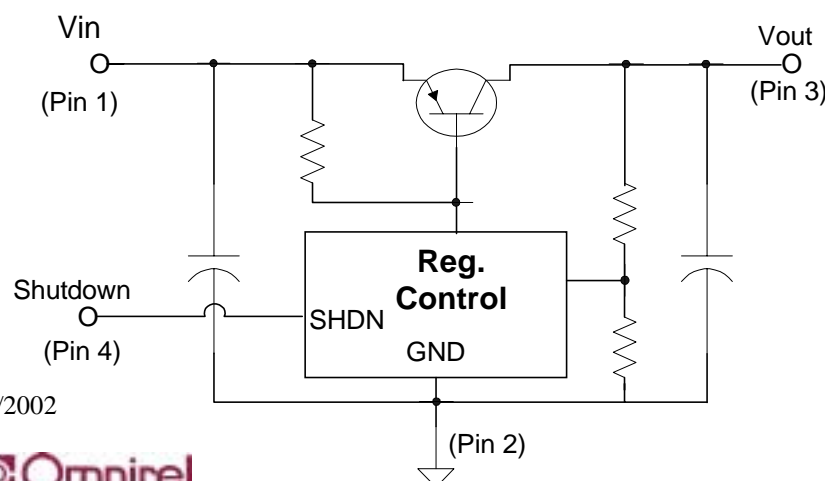
### DESCRIPTION

The OMR9601 is a radiation hardened, ultra low dropout linear regulator designed specifically for space applications. This product has been characterized to a total ionizing dose of 1M Rad (Si) per MIL-STD-883, Method 1019, Condition A at both high and low dose rates under biased and unbiased conditions to account for ELDRE effects in bipolar devices. The ultra low dropout voltage of 0.4V @ 3A makes the part particularly useful for applications requiring low noise and higher efficiency.

### MAXIMUM RATINGS (T<sub>J</sub>=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Output Current	I <sub>o</sub>	3.5	A
Input Voltage	V <sub>in</sub>	+7.0	V
Lead Temperature	T <sub>l</sub>	300	°C
Power Dissipation, T <sub>C</sub> =25°C	P <sub>TOT</sub>	19	W
Thermal Resistance, Junction to Case – MO-078AA	R <sub>thJC</sub>	6.5	°C/W
Thermal Resistance, Junction to Case – 8 Lead Flat Pack	R <sub>thJC</sub>	6.5	°C/W
Operating Temperature	T <sub>j</sub>	-55...+125	°C
Storage Temperature Range	T <sub>s</sub>	-65...+150	°C

### Block Diagram



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**ELECTRICAL CHARACTERISTICS (Ta=25°C unless otherwise specified)**

Parameter	Conditions	Symbol	Min.	Typ	Max	Unit
Output Voltage	Vin= 3.3V, Io= 3.0A	Vout	2.475	2.5	2.525	V
Input Voltage Range-Operating	Io= 3.0A		2.9		6.5	V
Line Regulation	3.13 ≤ Vin ≤ 3.46, Io= 3.0A 2.9 ≤ Vin ≤ 3.8, Io= 50mA	Vline	-100 -5		+100 +5	mV mV
Load Regulation	Vin= 3.3V 10ma ≤ Iout ≤ 3.0A	Vload	-20		+20	mV
Dropout Voltage	Io= 3.0A. Vout= 2.5V	Vdrop			0.4	V
Current Limit	Vin= 3.3V Short Circuit	Isc	3.0			A
Ripple Rejection	F= 120 Hz., Vout= Vref		65			dB
Shutdown source current	Vshdn= 5V	Ishdn		200		uA
Shutdown Pin Threshold	Isource= 200uA	Vshdn	1.0		1.6	V
Output Voltage at Shutdown	Vin= 3.3V, Io= 50mA, Shdn= +5.0V	Vout (shdn)	-0.1		+0.1	V

**ELECTRICAL CHARACTERISTICS (Ta= -55 to +125°C)**

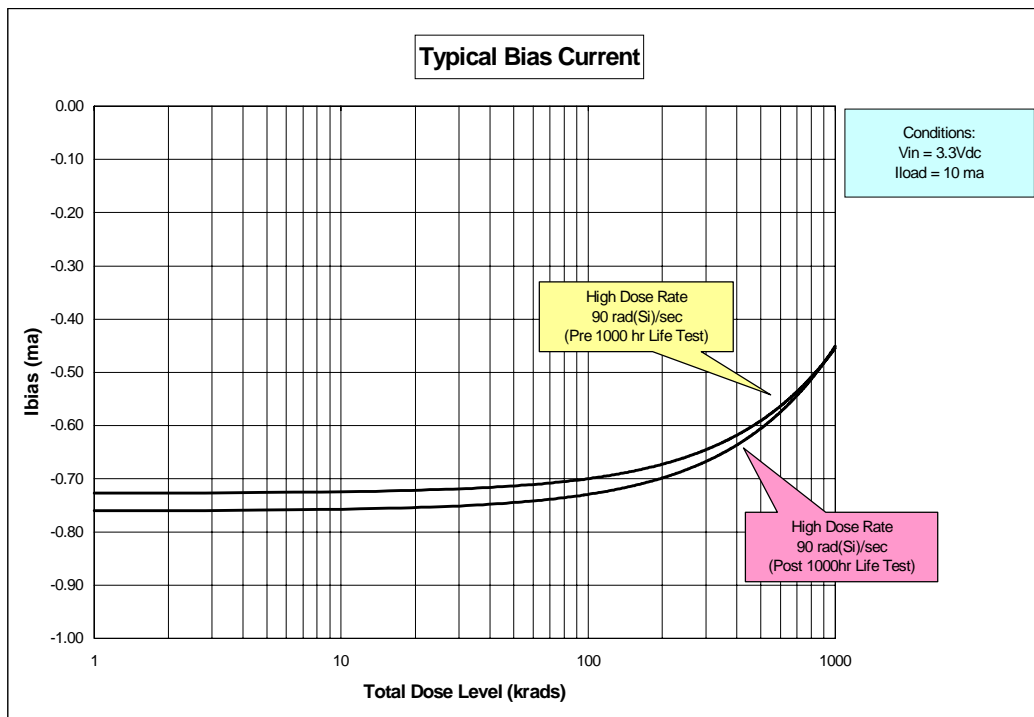
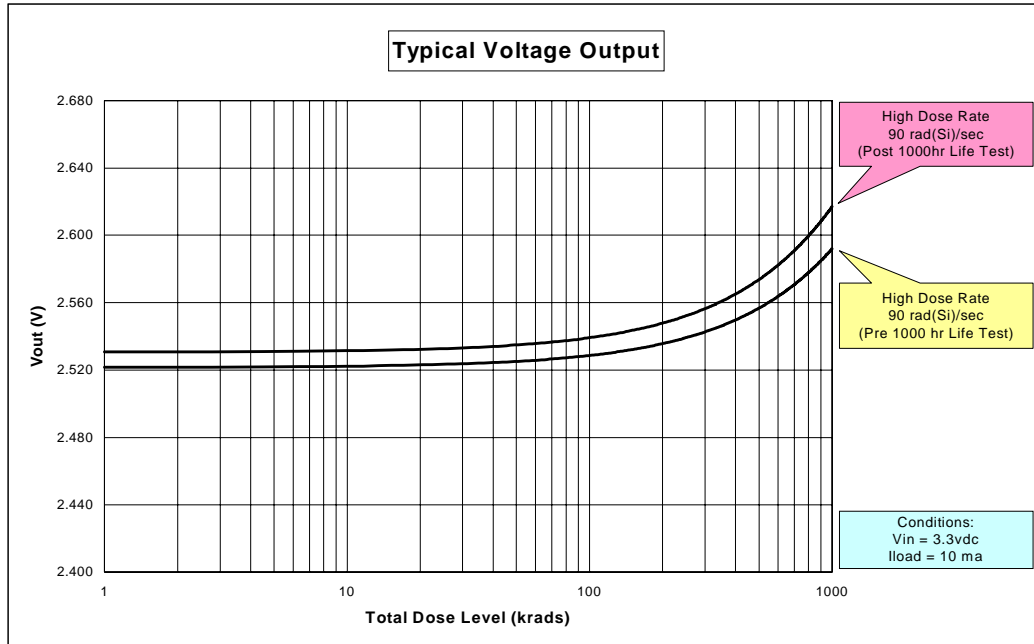
Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Output Voltage	Vin= 3.3V, Io= 3.0A	Vout	2.375	2.5	2.625	V
Input Voltage Range-Operating	Io= 3.0A		2.9		6.5	V
Line Regulation	3.13 ≤ Vin ≤ 3.46, Io= 3.0A 2.9 ≤ Vin ≤ 3.8, Io= 50mA	Vline	-150 -150		+150 +150	mV mV
Load Regulation	Vin= 3.3V 10ma ≤ Iout ≤ 3.0A	Vload	-150		+150	mV
Dropout Voltage	Io= 3.0A. Vout= 2.5V	Vdrop			0.4	V
Current Limit	Vin= 3.3V Short Circuit	Isc	3.0			A
Ripple Rejection	F= 120 Hz., Vout= Vref		65			B
Shutdown source current	Vshdn= 5V	Ishdn		200		uA
Shutdown Pin Threshold	Isource= 200uA	Vshdn	1.0		1.6	V
Output Voltage at Shutdown	Vin= 3.3V, Io= 50mA, Shdn= +5.0V	Vout (shdn)	-0.1		+0.1	V

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## Post Radiation Characteristics

### High Dose Rate Characteristics (90 Rads(Si)/Sec)

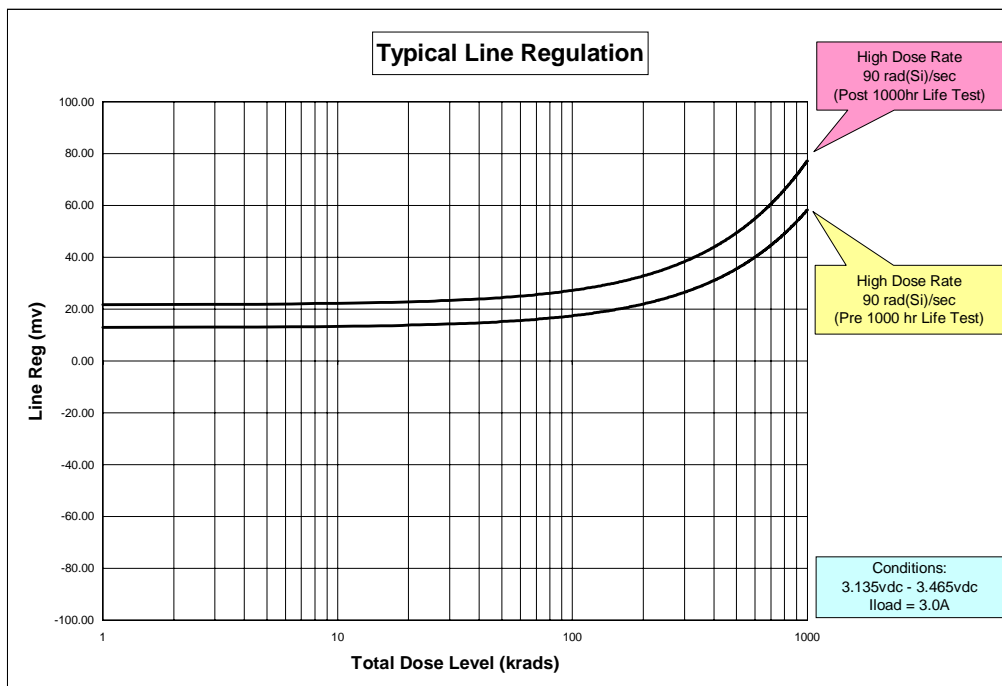
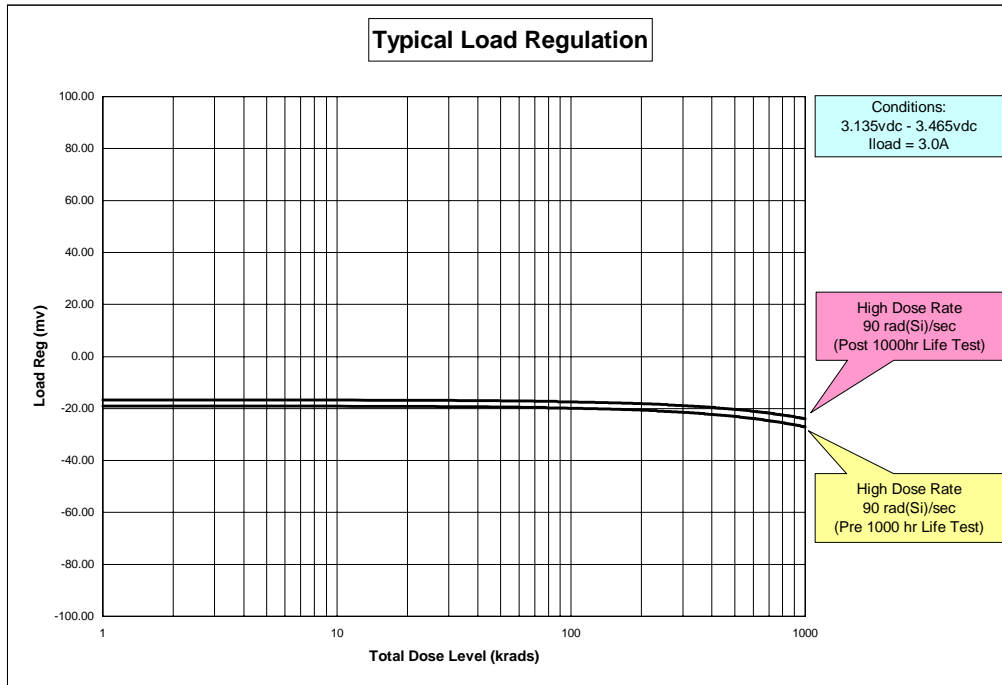


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## Post Radiation Characteristics

### High Dose Rate Characteristics (90 Rads (Si)/Sec)

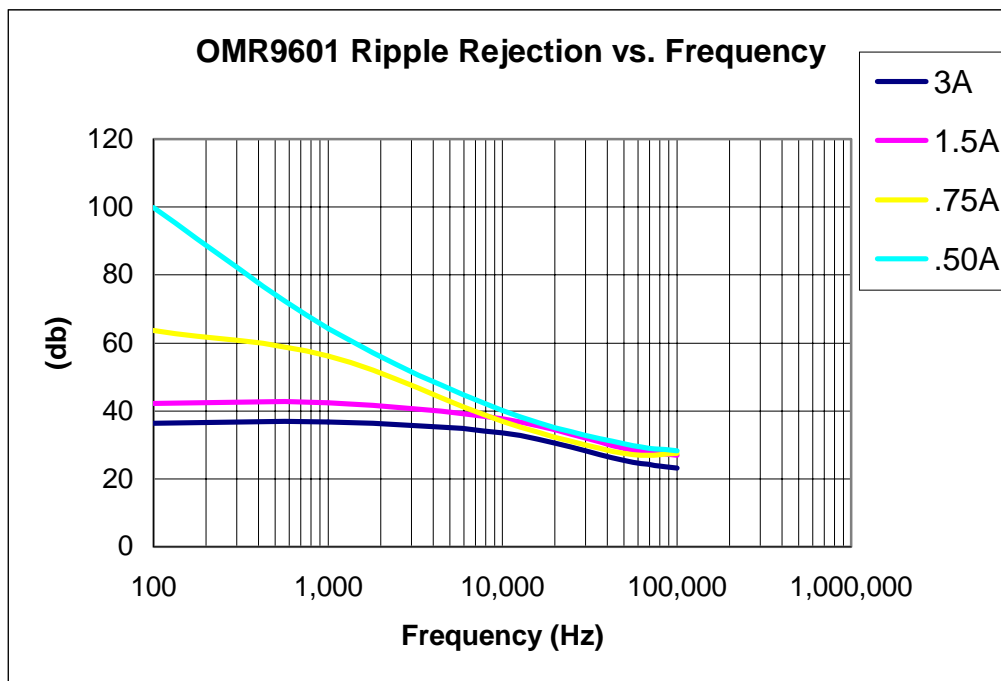
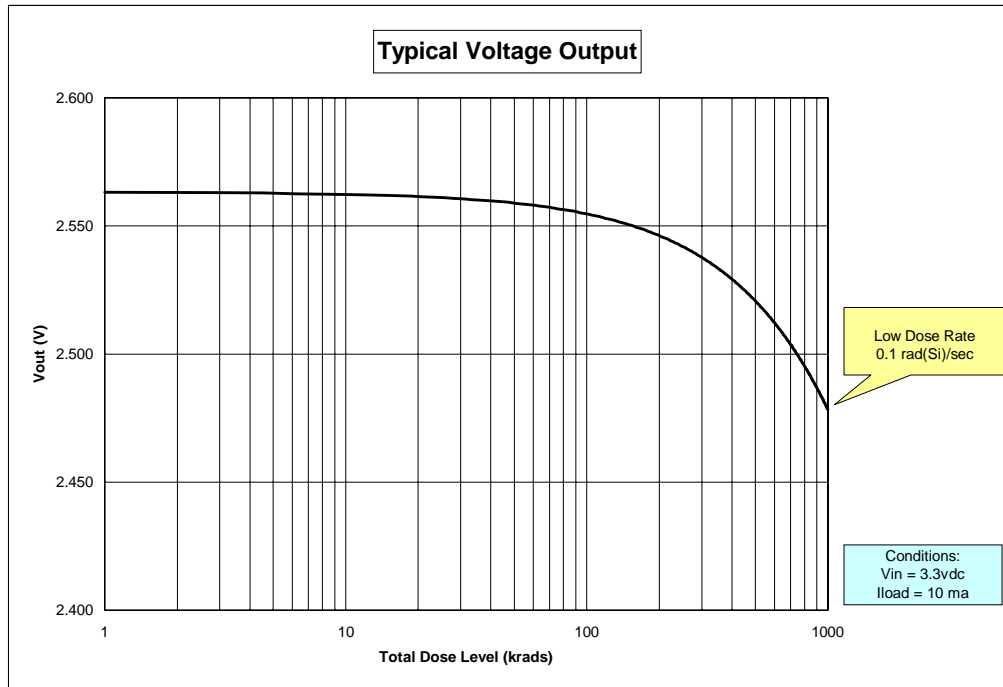


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## Post Radiation Characteristics

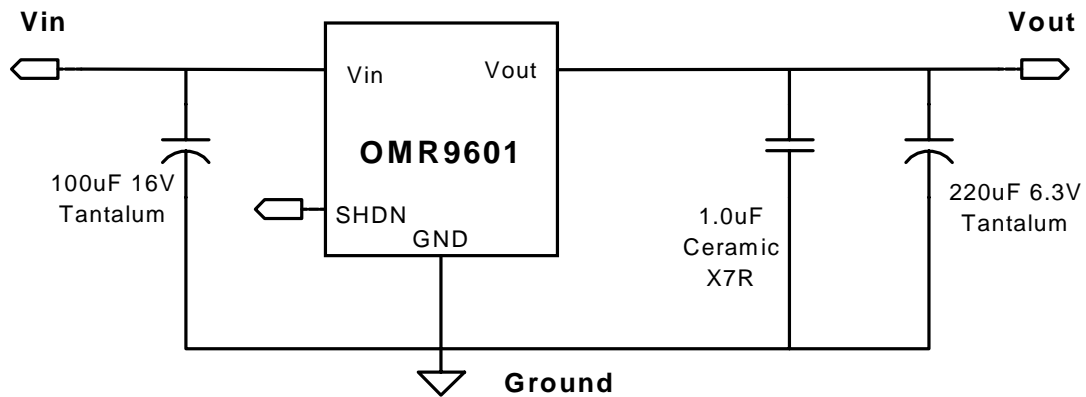
### Low Dose Rate Characteristics (0.1 Rads (Si)/Sec)



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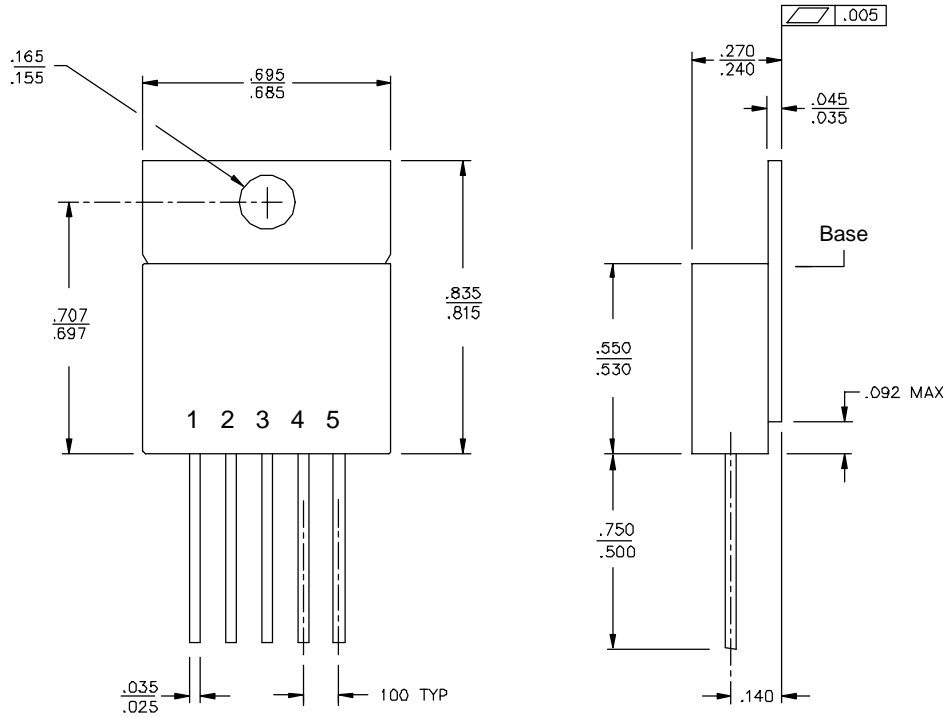
## Application Schematic



In order to maintain regulation and stability specified additional input and output bulk capacitors are recommended. Capacitors recommended above should be low ESR tantalums with tolerances of  $\pm 20\%$  max. Internal to the product are a 4.7uF input capacitor and a 4.7uF output capacitor in parallel with a 0.33uF ceramic capacitor.

**Shutdown:** The regulator can be shutdown by applying a voltage  $> 1.6V$  to pin 4. The regulator will restart when the SHDN pin is pulled below the shutdown threshold of 1.0V. If remote shutdown is not required, pin 4 should be connected to GND to insure a safe “off” state.

## Mechanical Outline MO-78AA



Base: GLIDCOP  
 Pins: Copper core, Alloy 52  
 Seals: Glass

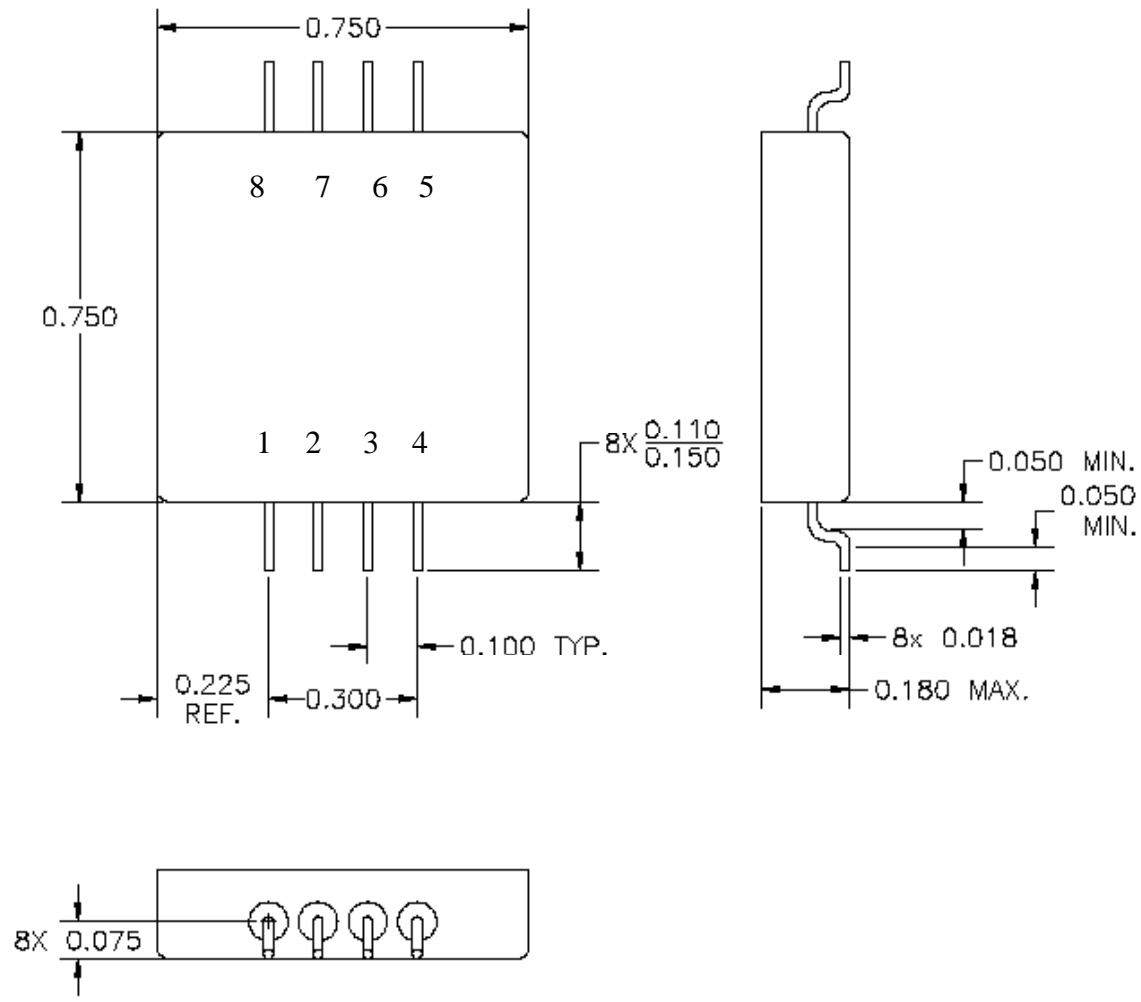
### Pin Connections

Terminal	Description
1	Vin
2	GND
3	Vout
4	Shutdown
5	No Connection

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## Mechanical Outline 8 Lead Flat Pack



Base: 1010-1018 C.R.S.

Pins: #52 Alloy, Copper Cored

Seals: Glass - 9013 or Equiv.

Finish: 100-250 Microinches Electroless Nickel Over 50-250 Microinches Electrolytic Nickel.

### Pin Connections

Terminal	Description
1, 2	GND
3	Shutdown
4	No Connection
5,6	Vout
7,8	Vin

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Omnirel Part Number	Package Description	Screening
OMR9601SCP	MO-078AA 5 - Lead	100% Final Electrical
OMR9601SCH	MO-078AA 5 - Lead	Class H per MIL-PRF-38534
OMR9601SCK	MO-078AA 5 - Lead	Class K per MIL-PRF-38534
OMR9601SFP	8 -Lead Flat Pack	100% Final Electrical
OMR9601SFH	8 -Lead Flat Pack	Class H per MIL-PRF-38534
OMR9601SFK	8 -Lead Flat Pack	Class K per MIL-PRF-38534

Also available in non-rad hard versions

**OM****R****9601****X****X****X**

Omnirel

Radiation  
Hardened/Tolerant

Device

S=Isolated  
N=Non-Isolated

Package

Screening

#### MIL-PRF-38534 Screening Requirements

TEST/INSPECTION	SCREENING LEVEL		MIL-STD-883
	Class H	Class K (Space Level)	Method
Pre Seal Burn-In	Optional	Optional	1030
Nondestructive Bond Pull	N/A	100%	2023
Internal Visual	100%	100%	2017
Temperature Cycle	100%	100%	1010
Constant Acceleration	100%	100%	2001
Mechanical Shock	100%	100%	2002
PIND	N/A	100%	2020
Pre Burn-In Electrical	Optional	100%	
Burn-In	100%	100%	1015
Final Electrical	100%	100%	
Seal	100%	100%	1014
Radiographic	N/A	100%	2012
External Visual	100%	100%	2009

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