

**1 M Rad(Si) Ultra Low Dropout
Positive Adjustable Linear Regulator
Hermetic Package**

**OMR9604SC
OMR9604SF
+ 3.3V_{in} at 3.0A**

Product Summary

Part Number	Dropout	I _o	V _{in}	Package
OMR9604SC	0.4 V	3.0A	3.0V	MO-078AA
OMR9604SF	0.4 V	3.0A	3.0V	8-Lead Flatpack



The OMR9604 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 1 M 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 ELDRS 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.

Features:

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

Absolute Maximum Ratings

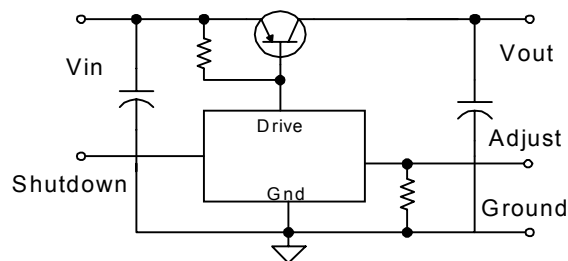
Symbol	Parameter	Value	Units
I _o	Output Current	3.5	A
V _{in}	Input Voltage	+7.0	V
V _{out}	Output Voltage Range	+1.26 to +3.2	V
P _{TOT}	Power Dissipation TC=25 °C	19	W
R _{THJC}	Thermal Resistance, Junction to Case (MO-078AA)	6.5	W/°C
R _{THJC}	Thermal Resistance, Junction to Case (8 lead flatpack)	6.5	W/°C
T _J	Operating Junction	-55 to +125	°C
T _{STG}	Storage Temperature Range	-65 to +150	°C
T _L	Lead Temperature	300	°C

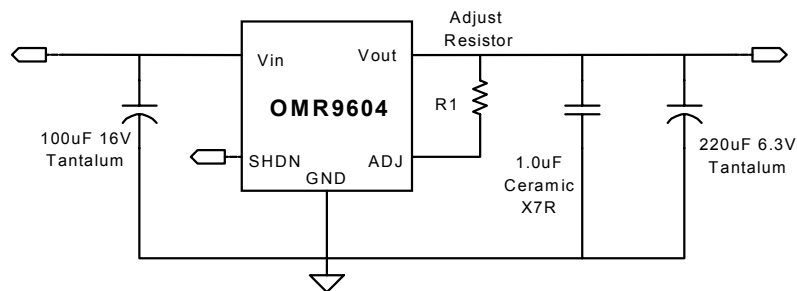
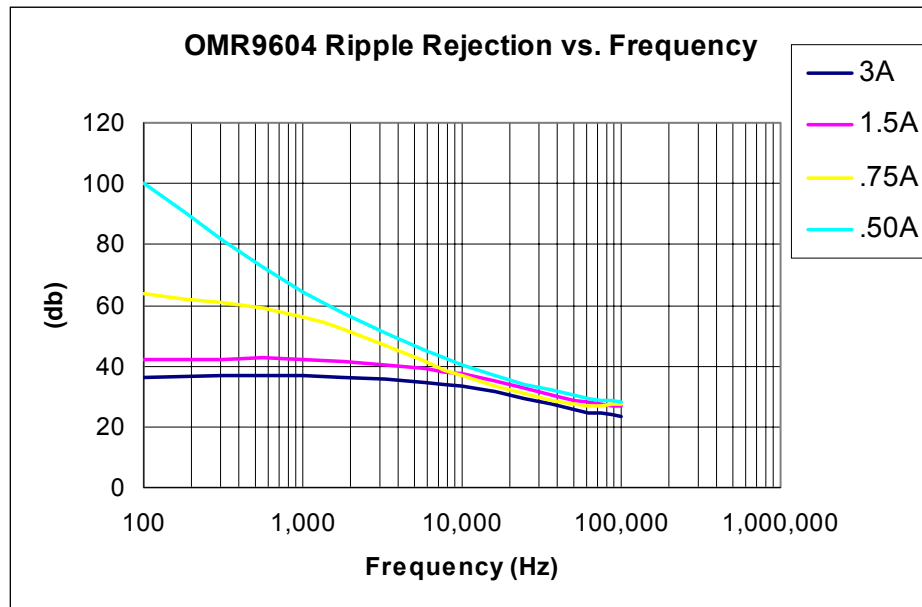
Electrical Characteristics @ TA= 25°C (Unless Otherwise Specified)

Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Input Voltage Range-Operating	$I_o = 3.0A$	V_{in}	2.9		6.5	V
Reference Voltage		V_{ref}	1.252	1.265	1.278	V
Line Regulation	$3.13 \leq V_{in} \leq 3.46, I_o = 3.0A$ $2.9 \leq V_{in} \leq 3.8, I_o = 50mA$	V_{line}	-100 -5		+100 +5	mV mV
Load Regulation	$V_{in} = 3.3V$ $10mA \leq I_{out} \leq 3.0A$	V_{load}	-20		+20	mV
Dropout Voltage	$I_o = 3.0A, V_{out} = 2.5V$	V_{drop}			0.4	V
Current Limit	$V_{in} = 3.3V$, Overcurrent Latchup	I_{latch}	3.0			A
Ripple Rejection	$F = 120 Hz., V_{out} = V_{ref}$		65			dB
Shutdown Source Current	$V_{shdn} = 5V$	I_{shdn}		200		μA
Shutdown Pin Threshold	$I_{source} = 200\mu A$	V_{shdn}	1.0		1.6	V
Output Voltage at Shutdown	$V_{in} = 3.3V, I_o = 50mA,$ $Shdn = +5.0V$	V_{out} (shdn)	-0.1		+0.1	V

Electrical Characteristics TA = -55 to +125°C

Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Input Voltage Range-	$I_o = 3.0A$	V_{in}	2.9		6.5	V
Reference Voltage		V_{ref}	1.225	1.265	1.305	V
Line Regulation	$3.13 \leq V_{in} \leq 3.46, I_o = 3.0A$ $2.9 \leq V_{in} \leq 3.8, I_o = 50mA$	V_{line}	-150 -150		+150 +150	mV mV
Load Regulation	$V_{in} = 3.3V$ $10mA \leq I_{out} \leq 3.0A$	V_{load}	-150		+150	mV
Dropout Voltage	$I_o = 3.0A, V_{out} = 2.5V$	V_{drop}			0.4	V
Current Limit	$V_{in} = 3.3V$, Overcurrent Latchup	I_{latch}	3.0			A
Ripple Rejection	$F = 120 Hz., V_{out} = V_{ref}$		65			dB
Shutdown Source Current	$V_{shdn} = 5V$	I_{shdn}		200		μA
Shutdown Pin Threshold	$I_{source} = 200\mu A$	V_{shdn}	1.0		1.6	V
Output Voltage at Shutdown	$V_{in} = 3.3V, I_o = 50mA,$ $Shdn = +5.0V$	V_{out} (shdn)	-0.1		0.1	V

Simplified Schematic



$$V_{out} = V_{ref} \times (1 + R1/1000)$$

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 +/- 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.

OMR9604SC, OMR9604SF

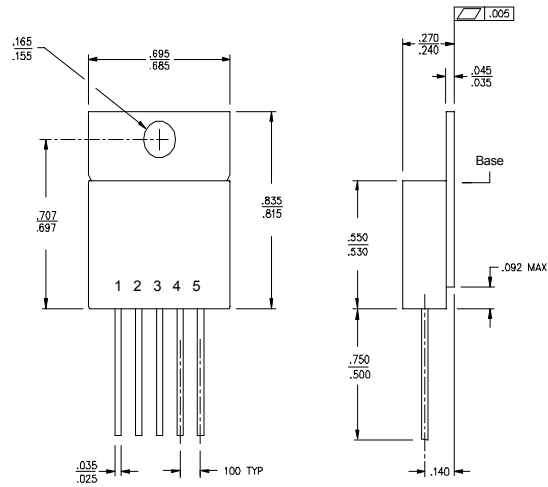
International
IR Rectifier

Mechanical Outline MO-078AA

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

Pin Connections

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

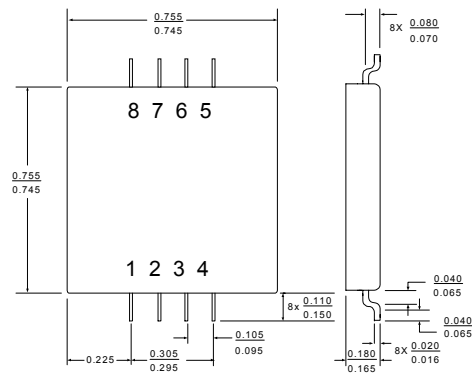


Mechanical Outline 8-Lead Flat Pack

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



Part Number Nomenclature					
OM	R	9604	X	X	X
Omnirel	Radiation Hardened/Tolerant	Device	S=Isolated N=Non-Isolated	Package	Screening

Part Number	Package Description	Screening
OMR9604SCP	MO-078AA 5 - Lead	100% Final Electrical
OMR9604SCK	MO-078AA 5 - Lead	Class K per MIL-PRF-38534
OMR9604SFP	8 -Lead Flat Pack	100% Final Electrical
OMR9604SFK	8 -Lead Flat Pack	Class K per MIL-PRF-38534

MIL-PRF-38534 Screening Requirements

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