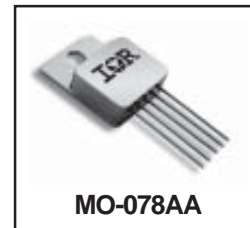


**1 M Rad(Si) Ultra Low Dropout  
 Linear Regulator  
 Hermetic Package**

**OMR9601SC  
 OMR9601SF  
 + 3.3Vin to +2.5Vout at 3.0A**

**Product Summary**

Part Number	Dropout	Io	Vin	Vout	Package
OMR9601SC	0.4 V	3.0A	3.3V	2.5V	MO-078AA
OMR9601SF	0.4 V	3.0A	3.3V	2.5V	8-pin Flatpack



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 1.0 Mrad (Si) per MIL-STD-883, Method 1019, Condition D 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 to 1.0 Mrad (Si) and low dose capability to 500 krad (Si) allows use in space applications
- Single Event latchup Immune  
 LET= 84 MeV/(mg/cm<sup>2</sup>)  
 Fluency = 1x10<sup>9</sup> ions/cm<sup>2</sup>
- Low noise, higher efficiency
- Ultra low dropout voltage of 0.4V@ 3A out significantly reduces power consumption
- 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
Io	Output Current	3.5	A
Vin	Input Voltage	+7.0	V
P <sub>TOT</sub>	Power Dissipation TC=25 °C	19	W
R <sub>THJC</sub>	Thermal Resistance, Junction to Case (MO-078AA)	6.5	°C/W
R <sub>THJC</sub>	Thermal Resistance, Junction to Case (8-lead flatpack)	6.5	°C/W
T <sub>J</sub>	Operating Junction	-55 to +125	°C
T <sub>STG</sub>	Storage Temperature Range	-65 to +150	°C
T <sub>L</sub>	Lead Temperature	300	°C

**Electrical Characteristics @ Ta = 25 °C (unless otherwise specified)**

Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Output Voltage	Vin= 3.3V, Io= 50mA	Vout	2.475	2.5	2.525	V
Output Voltage OMR9601SC	Vin= 3.3V, Io= 3.0A	Vout	2.475	2.5	2.525	
Input Voltage Range-Operating	Io= 3.0A	Vin	2.9	-	6.5	
Line Regulation	3.13 ≤ Vin ≤ 3.46, Io= 3.0A	Vline	-100	-	+100	mV
	2.9 ≤ Vin ≤ 3.8, Io= 50mA		-5.0	-	+5.0	
Load Regulation OMR9601SC OMR9601SF	Vin= 3.3V	Vload	-20	-	+20	mV
	50mA ≤ Iout ≤ 3.0A		-40	-	+40	
Dropout Voltage	Io= 3.0A, Vout= 2.5V	Vdrop	-	-	0.4	V
Current Limit	Vin= 3.3V, Overcurrent Latch Up	I <sub>latch</sub>	3.0	-	-	A
Ripple Rejection	F= 120 Hz., Iout = 50mA		65	-	-	dB
Shutdown Source Current	Vshdn= 5.0V	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	

**Electrical Characteristics @ Ta = -55°C to +125°C (unless otherwise specified)**

Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Output Voltage	Vin= 3.3V, Io= 50mA	Vout	2.375	2.5	2.625	V
Output Voltage OMR9601SC	Vin= 3.3V, Io= 3.0A	Vout	2.375	2.5	2.625	
Input Voltage Range- Operating	Io= 3.0A	Vin	2.9	-	6.5	
Line Regulation	3.13 ≤ Vin ≤ 3.46, Io= 3.0A	Vline	-150	-	150	mV
	2.9 ≤ Vin ≤ 3.8, Io= 50mA		-150	-	150	
Load Regulation	Vin= 3.3V 50mA ≤ Iout ≤ 3.0A	Vload	-150	-	150	mV
Dropout Voltage	Io= 3.0A, Vout= 2.5V	Vdrop	-	-	0.4	V
Overcurrent Latch Up	Vin= 3.3V	I <sub>latch</sub>	3.0	-	-	A
Ripple Rejection	F= 120 Hz., Iout = 50mA		65	-	-	dB
Shutdown Source Current	Vshdn= 5.0V	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	

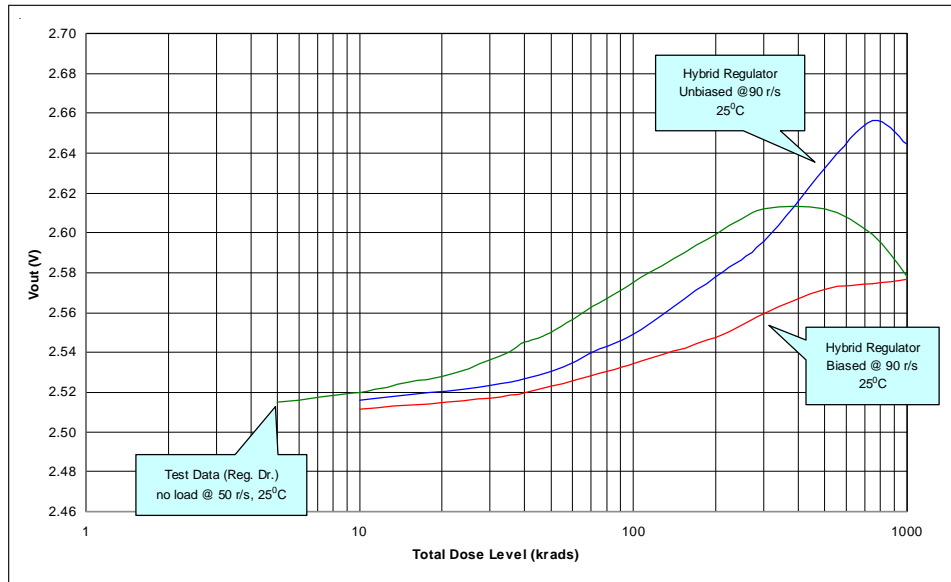


Fig 1. Total Ionizing Dose (TID) Voltage Output vs TID

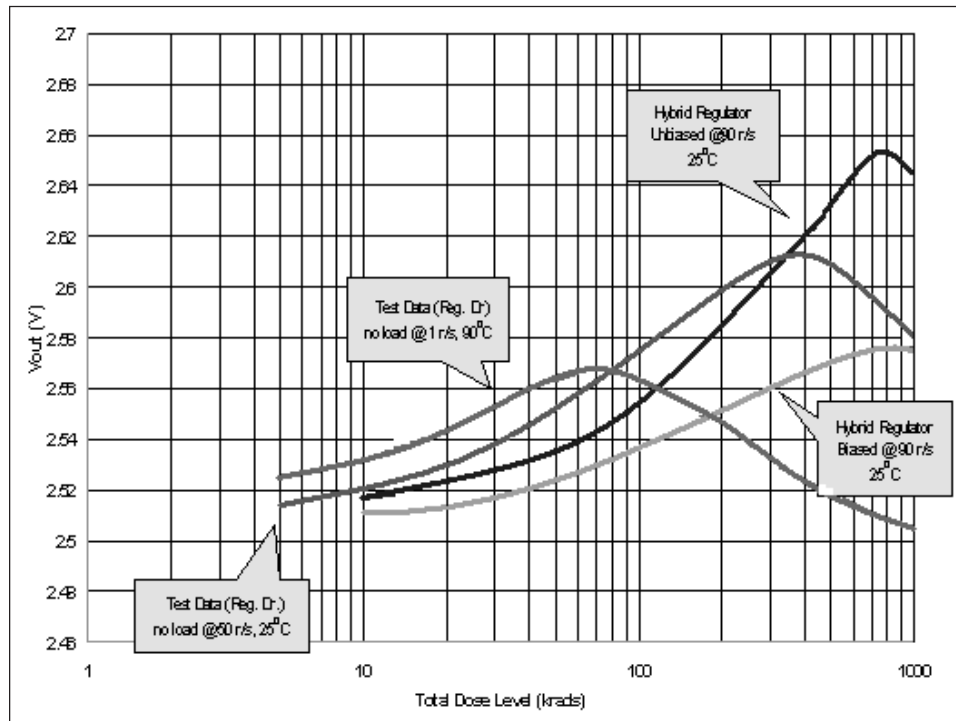
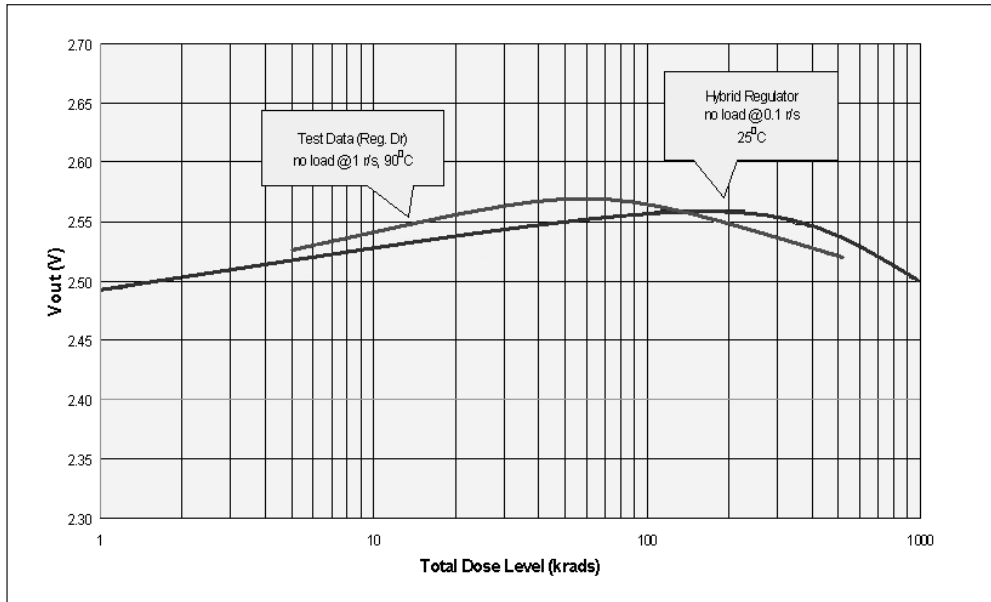
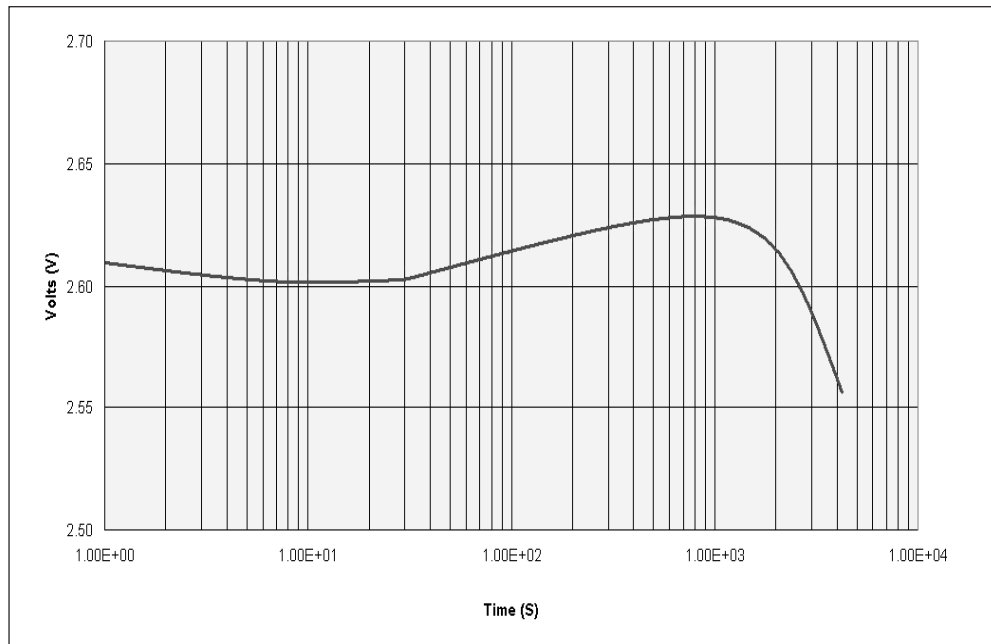


Fig 2. Total Ionizing Dose (TID) Voltage Output vs TID



**Fig 3. Enhanced Low Dose Rate Sensitivity (Dose Rate = 0.1 Rad/s) Voltage Output vs TID**



**Fig 4. Single Event Latch-up Voltage Output vs Time**

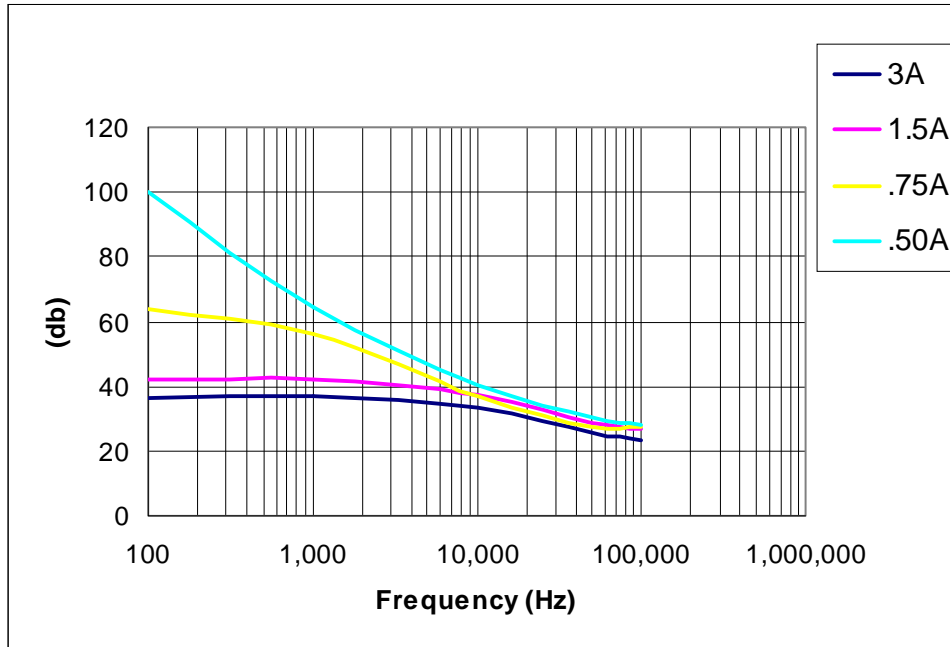
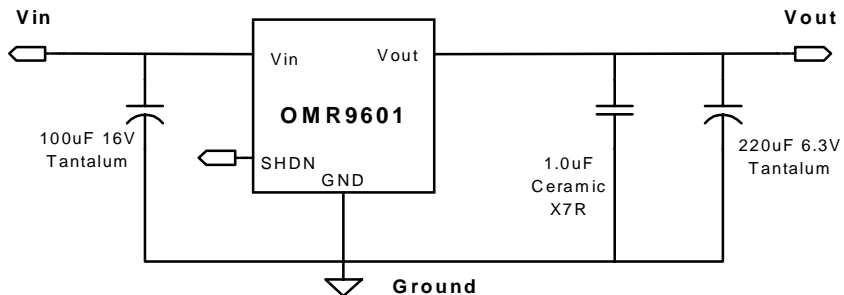


Fig 5. Ripple Rejection vs Frequency

Application Schematic

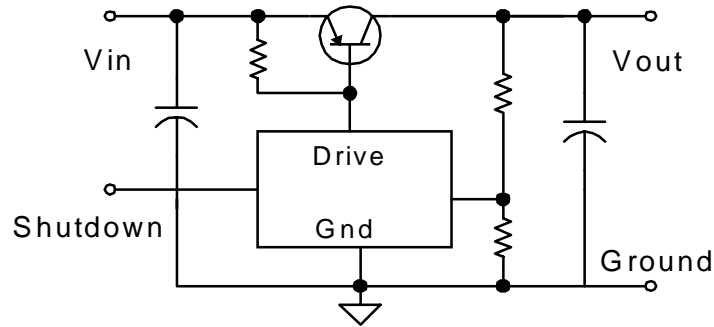


Application Notes:

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.

**Simplified Schematic**



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

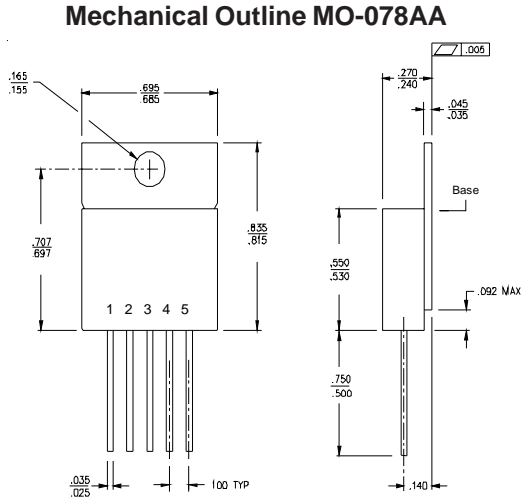
**MIL-PRF-38534 Screening Requirements**

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

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

Pin Connections

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

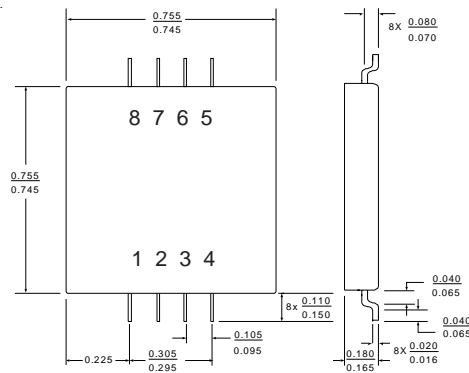


**Base:** 1010-1018 C.R.S.  
**Pins:** #52 Alloy, Copper Cored  
**Seals:** Glass – 9013 or Equiv.  
**Finish:** 100-250 Microinches Electroless Nickel Over 50-250 Microinches Electrolytic Nickel.

Pin Connections

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

**Mechanical Outline 8-Lead Flat Pack**



**Part Number Nomenclature**

<b>OM</b>	<b>R</b>	<b>9601</b>	<b>X</b>	<b>X</b>	<b>X</b>
Omnirel	Radiation Hardened/Tolerant	Device	S=Isolated N=Non-Isolated	Package	Screening