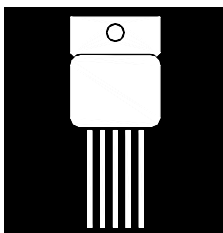


1 M Rad (Si), ULTRA LOW DROPOUT POSITIVE LINEAR REGULATOR



**+3.3V_{in} to +2.5V Output at 3.0A
In Hermetic Packages**

FEATURES

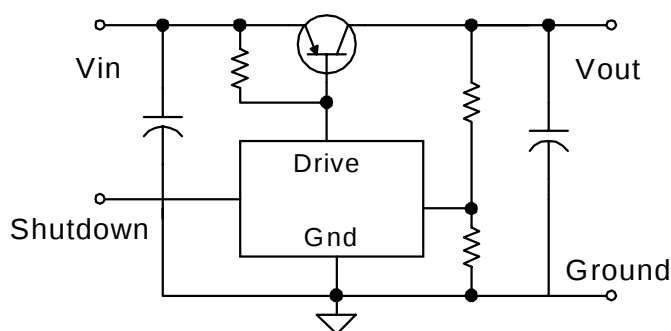
- Total dose and low dose capability to 1M Rad (Si) allows use in space applications
- Ultra low dropout voltage of 0.4V @ 3A out significantly reduces power consumption
- Low noise, higher efficiency
- Remote shutdown permits power sequencing to be easily implemented
- Hermetic MO-078AA (TO-258) and 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_j=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Output Current	I _o	3.5	A
Input Voltage	V _{in}	+7.0	V
Lead Temperature	T _l	300	°C
Power Dissipation, T _C =25°C	P _{TOT}	19	W
Thermal Resistance, Junction to Case – MO-078AA	R _{thJC}	6.5	°C/W
Thermal Resistance, Junction to Case – 8 Lead Flat Pack	R _{thJC}	6.5	°C/W
Operating Temperature	T _j	-55...+125	°C
Storage Temperature Range	T _s	-65...+150	°C



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

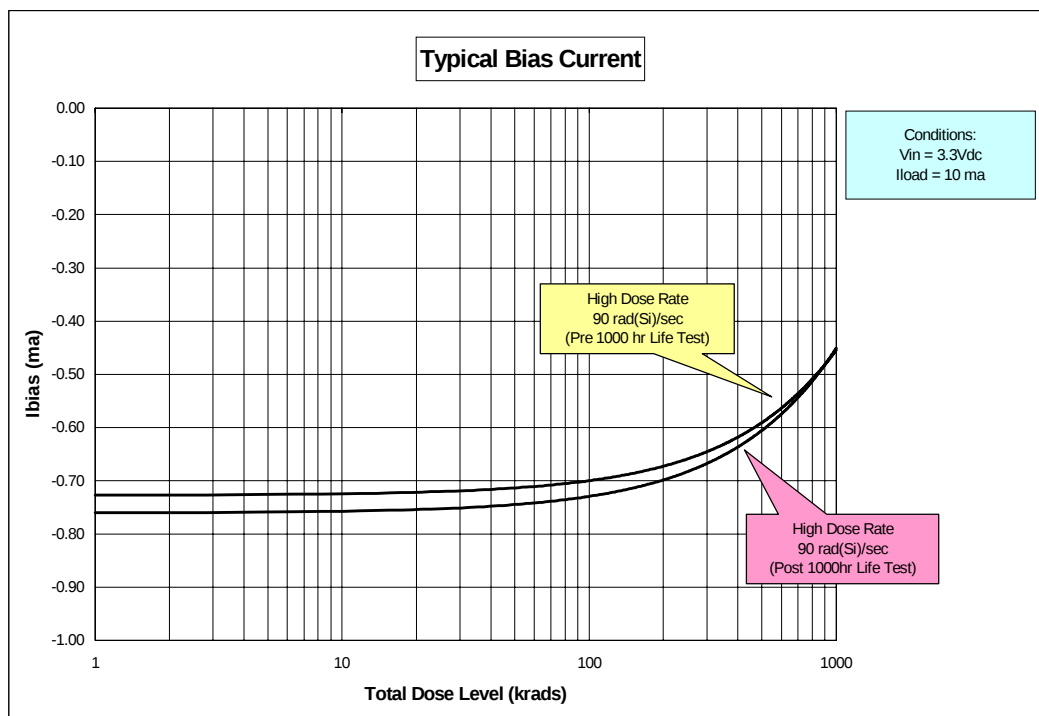
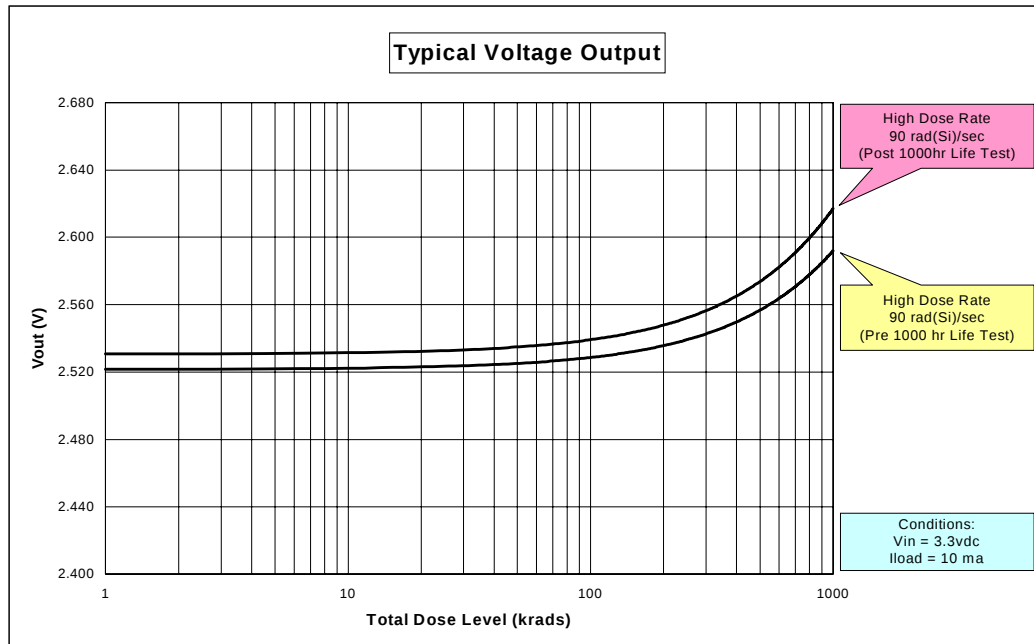
Parameter	Conditions	Symbol	Min.	Typ.	Max	Unit
Output Voltage	Vin= 3.3V, Io= 3.0A	Vout	2.475	2.5	2.525	V
Input Voltage Range-Operating	Io= 3.0A		2.9		6.5	V
Line Regulation	3.13 ≤ Vin ≤ 3.46, Io= 3.0A 2.9 ≤ Vin ≤ 3.8, Io= 50mA	Vline	-100 -5		+100 +5	mV mV
Load Regulation	Vin= 3.3V 10ma ≤ Iout ≤ 3.0A	Vload	-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

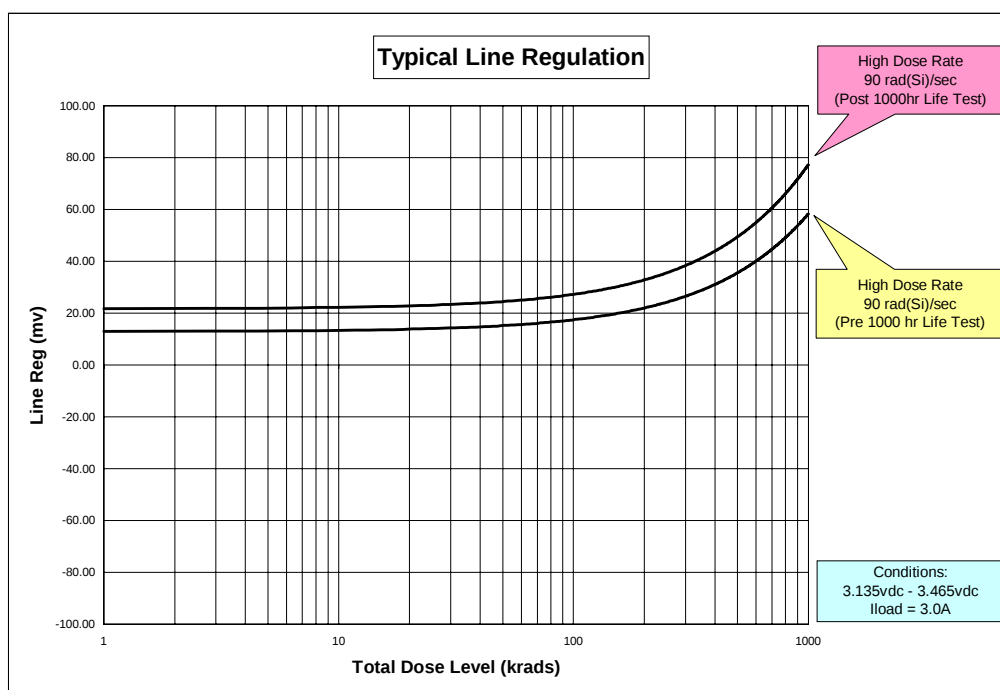
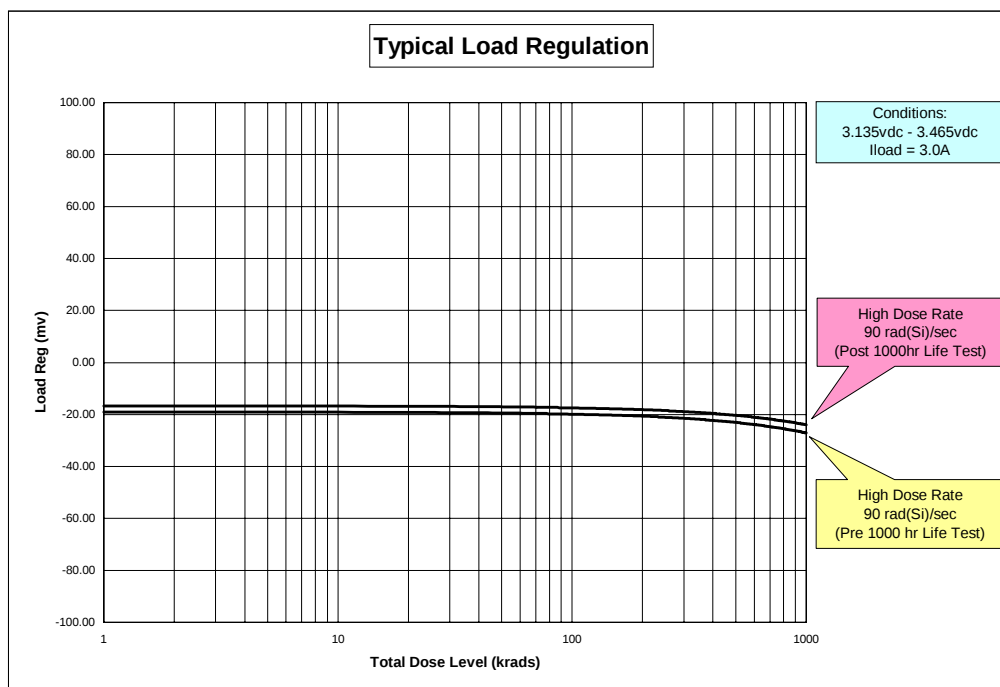
Post Radiation Characteristics

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



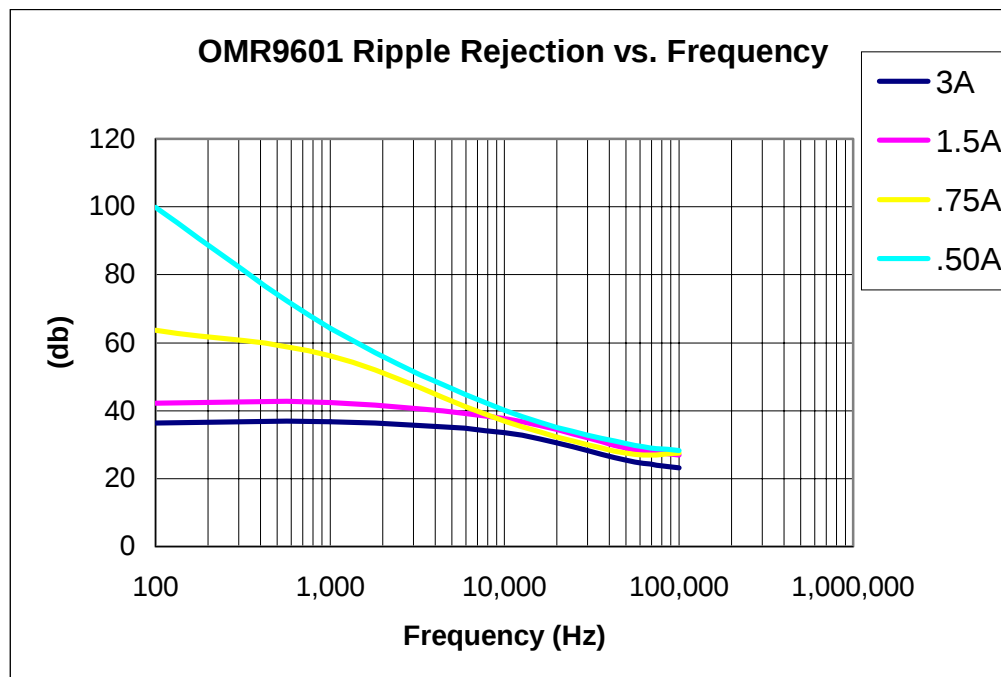
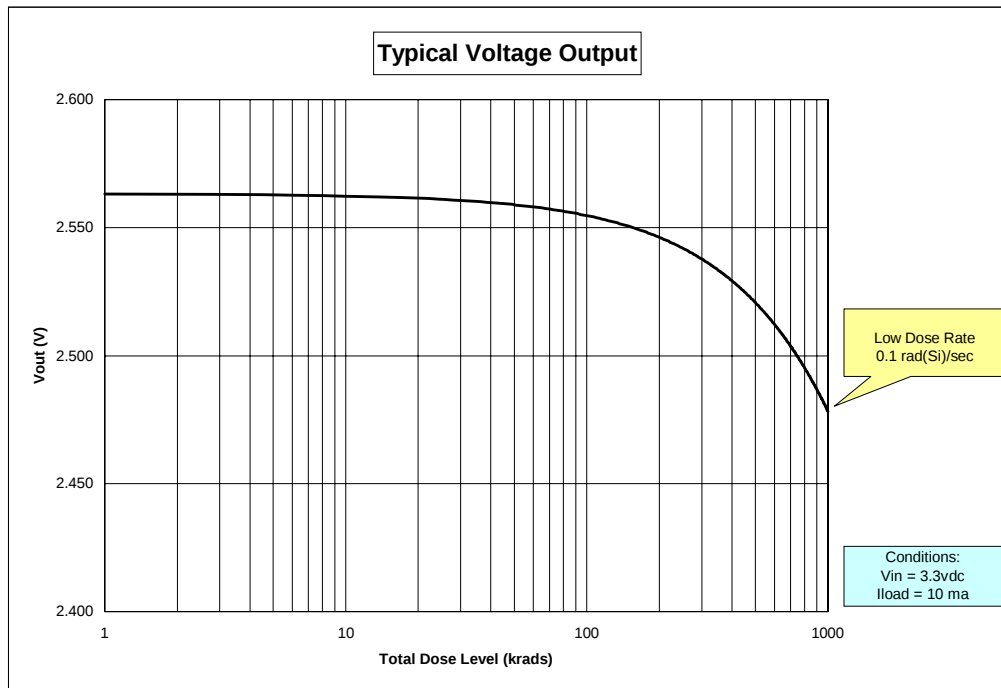
Post Radiation Characteristics

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

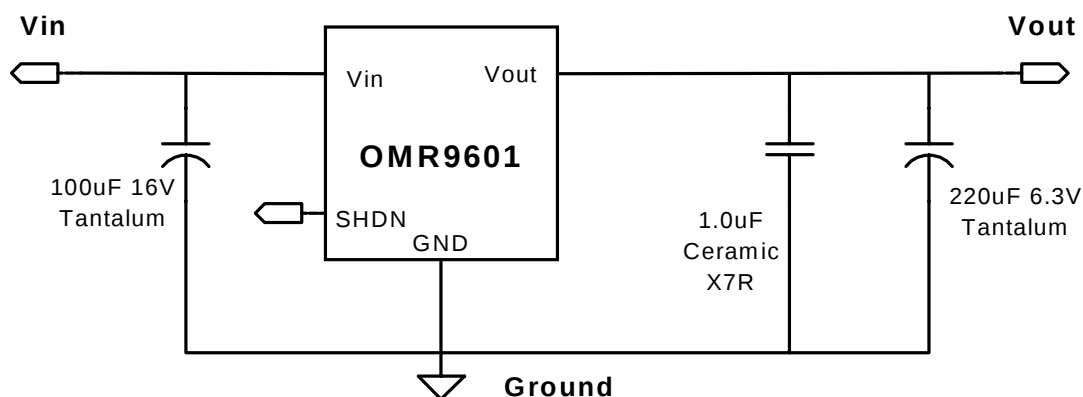


Post Radiation Characteristics

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



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 $> 1.6\text{V}$ 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

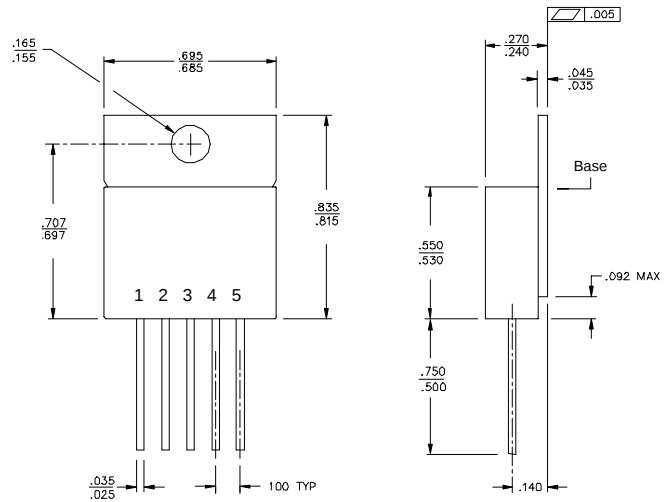
Base: GLIDCOP

Pins: Copper core, Alloy 52

Seals: Glass

Pin Connections

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



Mechanical Outline 8 Lead Flat Pack

Base: 1010-1018 C.R.S.

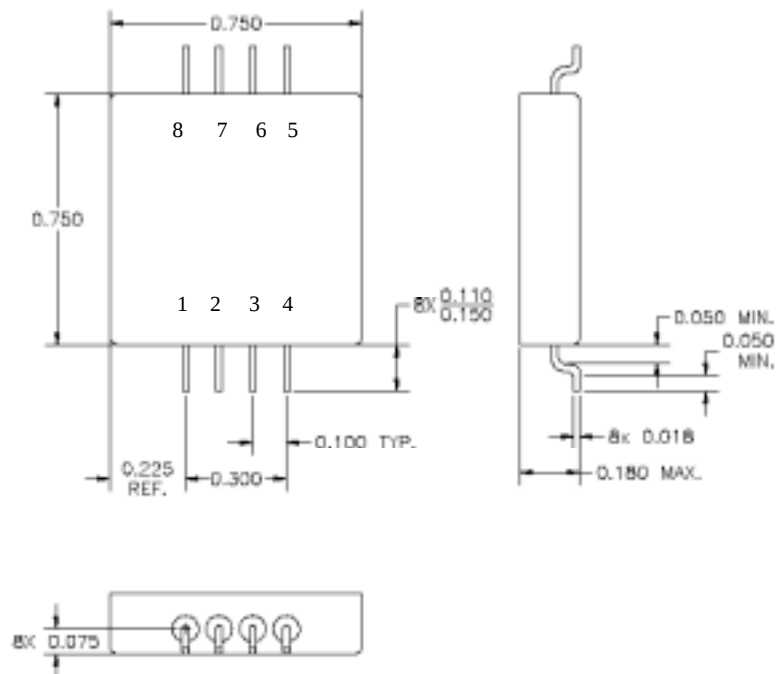
Pins: #52 Alloy, Copper Cored

Seals: Glass – 9013 or Equiv.

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

Pin Connections

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



Radiation Hardened

Omnirel 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

Part Number Nomenclature

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

TEST/INSPECTION	SCREENING Class K (Space Level)	MIL-STD-883 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