

RAD HARD 1.5 AMP THREE TERMINAL ADJUSTABLE VOLTAGE REGULATOR

DESCRIPTION

The RAD HARD SGR117A 3-terminal positive adjustable regulators have been designed to meet the most stringent space and strategic level radiation requirements while meeting the industry standard LM117A and LM117 electrical specifications.

In addition to the features of the standard SGR117A, these devices are capable of meeting the attached data sheet electricals after the following radiation events:

TOTAL DOSE: EXCEEDS 1 MEG RAD

NEUTRON FLUENCE: 5×10^{12} N/cm²

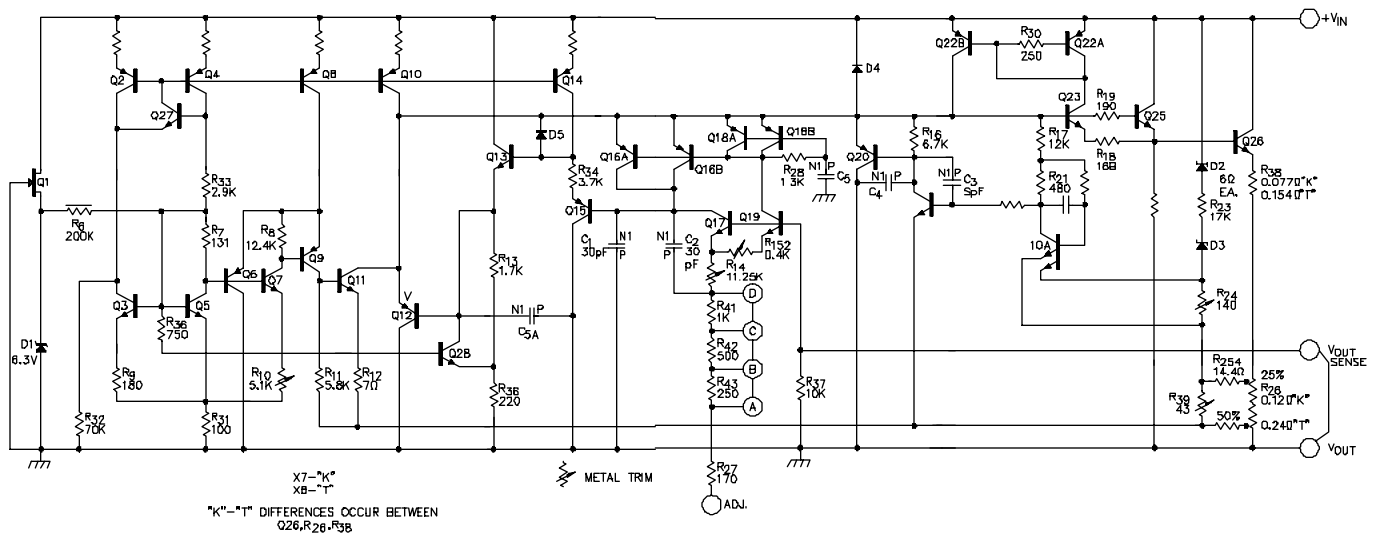
FEATURES

- Full electrical performance after radiation exposure
 1 MEG Rad Total Dose
 5×10^{12} N/cm²
- **1% output voltage tolerance**
- **0.01%/V line regulation**
- **0.3% load regulation**
- **Min. 1.5A output current**
- **Available in TO-257 Package (Hermetic TO-220)**

HIGH RELIABILITY FEATURES-SGR117A

- ◆ Radiation data available
- ◆ Available to MIL-STD-883
- ◆ LMI level "S" processing available

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS (Note 1)

Power Dissipation Internally Limited
 Input to Output Voltage Differential 40V
 Storage Temperature Range -65°C to 150°C

Operating Junction Temperature
 Hermetic (K, R, T, IG-Packages)150°C
 Lead Temperature (Soldering, 10 Seconds) 300°C

Note 1. Exceeding these ratings could cause damage to the device.

THERMAL DATA

K Package:

Thermal Resistance-Junction to Case, θ_{JC} 3.0°C/W
 Thermal Resistance-Junction to Ambient, θ_{JA} 35°C/W

R Package:

Thermal Resistance-Junction to Case, θ_{JC} 5.0°C/W
 Thermal Resistance-Junction to Ambient, θ_{JA} 40°C/W

T Package:

Thermal Resistance-Junction to Case, θ_{JC} 15°C/W
 Thermal Resistance-Junction to Ambient, θ_{JA} 120°C/W

IG Package:

Thermal Resistance-Junction to Case, θ_{JC} 3.5°C/W
 Thermal Resistance-Junction to Ambient, θ_{JA} 42°C/W

Note A. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.

Note B. The above numbers for θ_{JC} are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The θ_{JA} numbers are meant to be guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

RECOMMENDED OPERATING CONDITIONS (Note 2 & 3)

Input Voltage Range ($V_{OUT} + 3.5V$) to 37V

Operating Junction Temperature Range
 SGR117A-55°C to 150°C

Note 2. Range over which the device is functional.

Note 3. These ratings are applicable for junction temperatures of less than 150°C.

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over full operating ambient temperatures for SGR117 with $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$, $V_{IN} - V_{OUT} = 5.0V$, and for $I_{OUT} = 500\text{mA}$ (K and IG), and $I_{OUT} = 100\text{mA}$ (T package). Although power dissipation is internally limited, these specifications are applicable for power dissipations of 2W for the T package, and 20W for the K and IG packages. I_{MAX} is 1.5A for the K and IG packages and 500mA for the T package. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Parameter	Test Conditions	PRE RAD		POST NEUTRON 5 x 10 ¹² N/cm ²			Units	
		SGR117A			SGR117A			
		Min.	Typ.	Max.	Min.	Typ.		Max.
Reference Voltage	$I_{OUT} = 10\text{mA}$, $T_A = 25^\circ\text{C}$ $3V \leq (V_{IN} - V_{OUT}) \leq 40V$, $P \leq P_{MAX}$	1.238	1.250	1.262	1.220		1.275	V
	$10\text{mA} \leq I_{OUT} \leq I_{MAX}$	1.225	1.250	1.270	1.220	1.25	1.275	V
Line Regulation (Note 4)	$3V \leq (V_{IN} - V_{OUT}) \leq 40V$, $I_L = 10\text{mA}$ $T_A = 25^\circ\text{C}$		0.005	0.01		0.01	0.03	%/V
	$T_A = T_{MIN}$ to T_{MAX}		0.01	0.02		0.02	0.05	%/V
Load Regulation (Note 4)	$10\text{mA} \leq I_{OUT} \leq I_{MAX}$							
	$V_{OUT} \leq 5V$, $T_A = 25^\circ\text{C}$		5	15		5	50	mV
	$V_{OUT} \geq 5V$, $T_A = 25^\circ\text{C}$		0.1	0.3		0.1	1	%
	$V_{OUT} \leq 5V$		20	50		20	50	mV
	$V_{OUT} \geq 5V$		0.3	1		0.3	1	%
Thermal Regulation (Note 5)	$T_A = 25^\circ\text{C}$, 20ms pulse		0.002	0.02		0.03	0.07	%/W
Ripple Rejection	$V_{OUT} = 10V$, $f = 120\text{Hz}$ $C_{ADJ} = 1\mu\text{F}$, $T_A = 25^\circ\text{C}$ $C_{ADJ} = 10\mu\text{F}$	66	65		66	65		dB
Adjust Pin Current			80	100		80	100	μA
Adjust Pin Current Change	$10\text{mA} \leq I_{OUT} \leq I_{MAX}$, $2.5V \leq (V_{IN} - V_{OUT}) \leq 40V$		0.2	5		0.2	8	μA

ELECTRICAL CHARACTERISTICS (continued)

Parameter	Test Conditions	PRE RAD			POST NEUTRON 5 x 10 ¹² N/cm ²			Units
		SGR117A			SGR117A			
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Minimum Load Current	(V _{IN} - V _{OUT}) = 40V		3.5	5		3.5	8	mA
Current Limit	(V _{IN} - V _{OUT}) ≤ 15V							
	K, R, IG Packages	1.5	2.2		1.5	2.2		A
	T Package	0.5	0.8		0.5	0.8		A
	(V _{IN} - V _{OUT}) = 40V, T _J = 25°C							
	K, R, IG Packages	0.3	0.4		0.3	0.4		A
	T Package	0.15	0.2		0.15	0.2		A
Temperature Stability (Note 5)			1	2				%
Long Term Stability (Note 5)	T _A = 125°C, 1000 Hours		0.3	1				%
RMS Output Noise (% of V _{OUT})	T _A = 25°C, 10Hz ≤ f ≤ 10 KHz (Note 5)		0.001					%

Note 4. Regulation is measured at constant junction temperature, using pulse testing with a low duty cycle. Changes in output voltage due to heating effects are covered under the specification for thermal regulation.

Note 5. These parameters, although guaranteed, are not tested in production.

CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No.	Ambient Temperature Range	Connection Diagram
3-TERMINAL TO-3 METAL CAN K-PACKAGE	SGR117AK SGR117AK/883B	-55°C to 125°C -55°C to 125°C	
3-TERMINAL TO-66 METAL CAN R-PACKAGE	SGR117AR SGR117AR/883B	-55°C to 125°C -55°C to 125°C	
3-PIN TO-39 METAL CAN T-PACKAGE	SGR117AT SGR117AT/883B	-55°C to 125°C -55°C to 125°C	
3-PIN HERMETIC TO-257 IG-PACKAGE (Isolated)	SGR117AIG/883B SGR117AIG	-55°C to 125°C -55°C to 125°C	

Note 1. Contact factory for JAN and DESC product availability.
 Note 2. All parts are viewed from the top.