PRELIMANARY DATA SHEET

42143 RADIATION TOLERANT POWER OPERATIONAL AMPLIFIER

Mii

HYBRID MICROELECTRONICS PRODUCTS DIVISION

Features:

- Designed for 100 krad(Si) Total Dose
- Hermetically Sealed in Metal Flat Package
- Performance over –55°C to +125°C
- Wide Supply Voltage Range
- 2A Output Current
- Short Circuit Protection

Applications:

- Satellite/Space systems
- Military/High Reliability Systems
- Programmable Power Supplies
- Solenoid Driver
- Servo Motor Amplifier
- Synchro Power Amplifier

DESCRIPTION

The 42143 Power Operational Amplifier designed for military and space applications where radiation tolerance is required. Utilizing multi-chip hybrid construction, the 42143 Power Operational Amplifier combines 2A load current capability with the convenience of a monolithic operational amplifier. Output current limiting is provided using external resistors. The 42143 Power Operational Amplifier is supplied in an 8-pin metal flat package.

ABSOLUTE MAXIMUM RATINGS:

Supply Voltage ($\pm V_S$) .... ± 22 V
Input Voltage [(1)] .... ± 22 V
Differential Input Voltage [(2)] .... ± 0.7
Peak Output Current [(3)] .... 2 A
Storage Temperature Range .... -65°C to +150°C
Operating Junction Temperature .... -55°C to +150°C
Lead Solder Temperature for 10 seconds .... 300°C
Power Dissipation [(4)] .... 83 W
Thermal Resistance (Junction to Case), θ_{JC}........................ 1.5 °C/W

WEIGHT: .... 15 grams (typical)

RECOMMENDED OPERATING CONDITIONS:

Parameter	Symbol	Min.	Max.	Units
Supply Voltage	$\pm V_S$	8	20	VDC
Ambient Temperature	T_A	-55	125	°C

ELECTRICAL SPECIFICATIONS (Pre-Irradiation)

V_S = ± 15 V, T_C = -55°C to +125°C unless otherwise specified

Parameter	Symbol	Min.	Typ.*	Max.	Units	Test Conditions
Input Offset Voltage	V_{OS}	—	± 25	± 200	µV	
Input Offset Voltage Drift	—	—	—	± 5	µV/°C	
Input Bias Current	I_{B+}, I_{B-}	—	± 15	± 80	nA	
Input Offset Current	I_{OS}	—	10	75	nA	
DC Open Loop Gain	A_{VOL}	100	126	—	dB	R_L > 2 kΩ, V_O = ± 10V
Common-Mode Input Voltage Range	V_{CM}	± 10.3	± 12.3	—	V	
Common-Mode Rejection Ratio	CMRR	100	—	—	dB	V_{CM} = ± 9 VDC R_L = 10 kΩ
Gain Bandwidth Product (5)	GBW	—	1	—	MHz	R_L = 10 kΩ (small signal)
Phase Margin (5)	Φ_M	—	45	—	deg.	
Slew Rate	SR	2	—	—	V/µs	R_L = 100 Ω R_{CL} = 0.4 Ω
Output Voltage Swing	V_O	± 12 ± 10	—	—	V	R_L = 10 kΩ R_L = 5 Ω
Quiescent Current	I_Q	—	4	7	mA	R_L = ∞ Ω
Thermal Resistance	θ_{JA}	—	30	—	°C/W	

* All typical values are at T_C = 25°C

Notes:

1. For V_S less than ± 22 V, the input voltage is not to exceed ± V_S.
2. Input current must not exceed 25 mA
3. It is recommended that external current limiting resistors (± R_{CL} ≥ 0.4 Ω) be used to ensure that 2.0 A is not exceeded. See Figures 1, 2 and 4 for R_{CL} application information.
4. Case Temperature T_C = 25°C (see Figure 3).
5. Guaranteed by design.

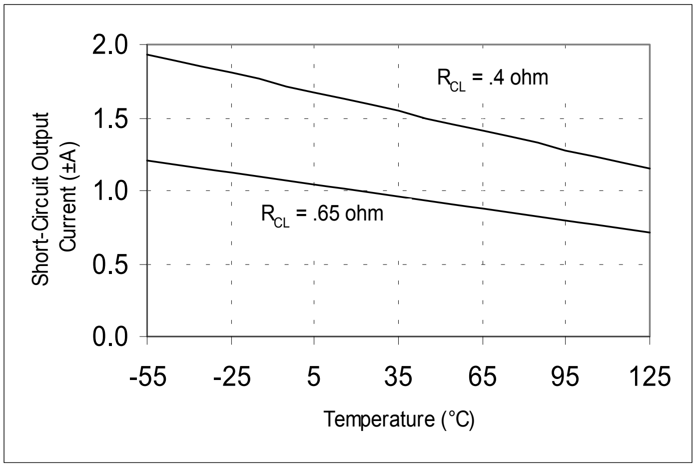


Figure 1. Typical Short-Circuit Output Current vs. Current Limiting Resistors (±R_{CL})

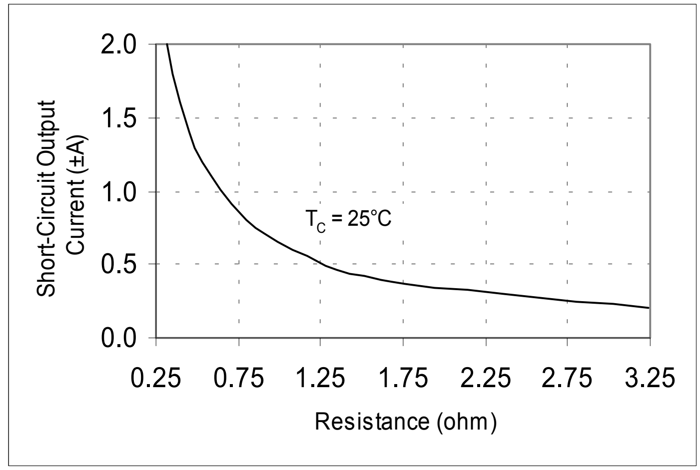


Figure 2. Short-Circuit Output Current vs. Case Temperature (typical data).

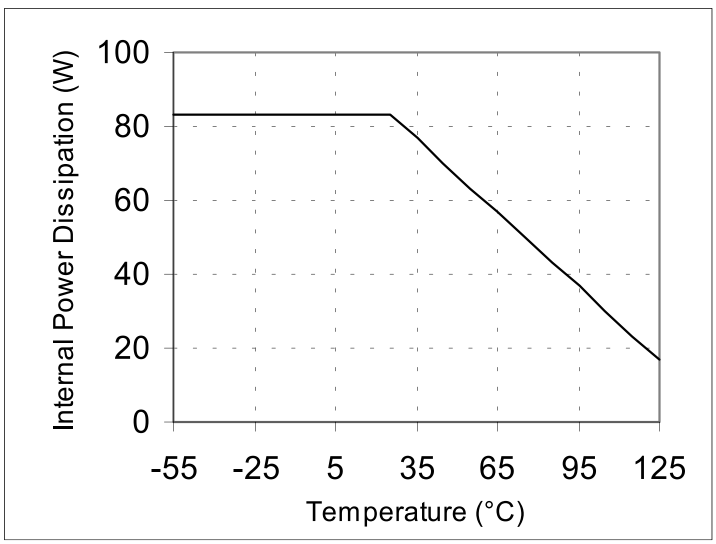


Figure 3. Maximum Average Power Dissipation vs. Case Temperature

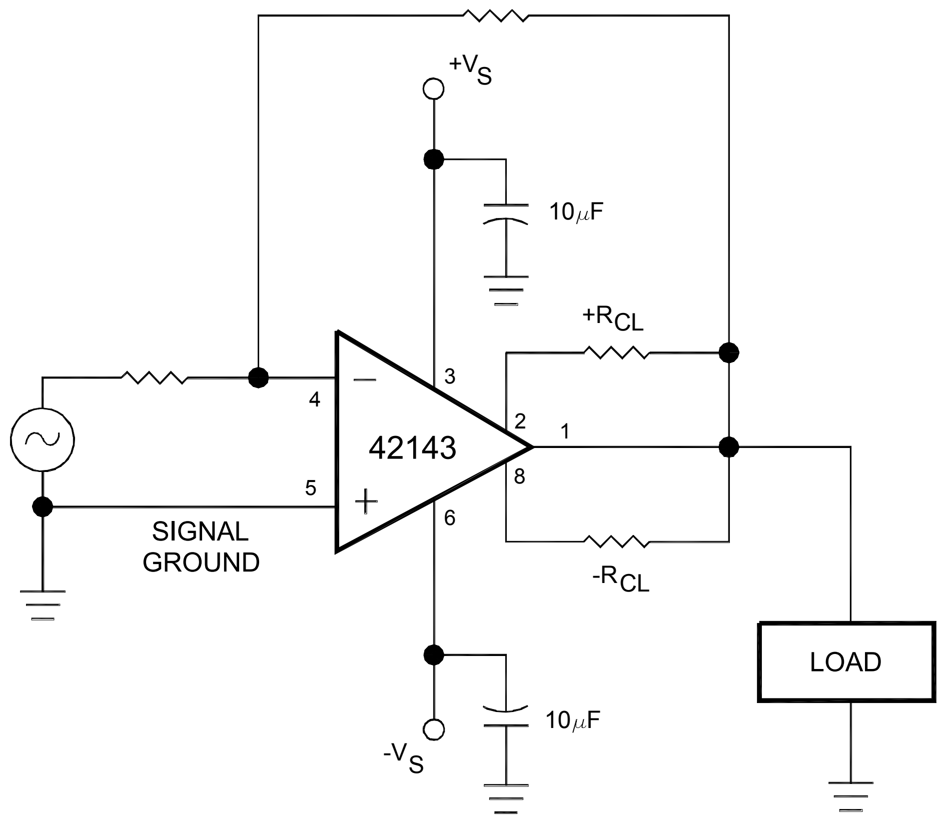


Figure 4. Application Information

Controlling the short circuit current to the minimum necessary for a given application maximizes device protection and reliability.

Approximate values for the current limiting resistors can be determined from the equation:

$R_{CL} = ((0.65/I_{SC}) - 0.01)\ \Omega$

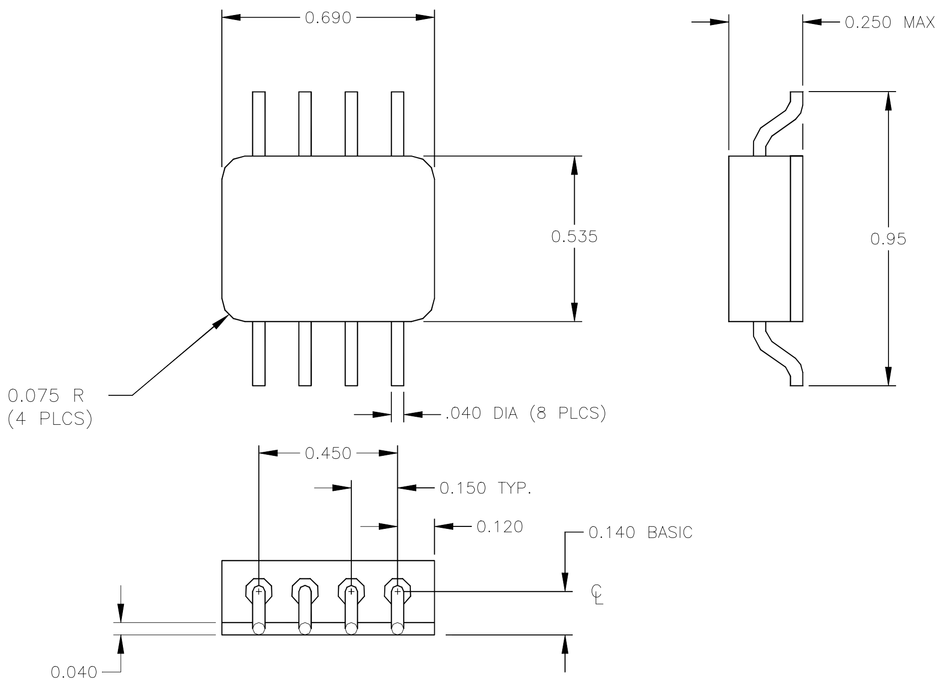
where I_{SC} is the short circuit current limit in amperes at $T_C = 25°C$.

Current limits for positive and negative load currents can be set independently.

Current limiting resistors carry the full output current, therefore the short circuit current limit should be used in determining resistor wattage. Lead lengths of the limiting resistors should be minimized and highly inductive resistor types should be avoided.

Large bypass capacitors are recommended across the power supply terminals if the application requires large output current transients. Care should be taken to keep the power supply ground currents from flowing through the signal ground path.

CASE OUTLINE



NOTE: Dimensions in inches.

ELECTRICAL CONNECTIONS

Pin 1 .... $+V_S$
Pin 2 .... -IN
Pin 3 .... +IN
Pin 4 .... $-V_S$
Pin 5 .... CL-
Pin 6 .... OUT
Pin 7 .... NC
Pin 8 .... CL+