

Dual, 600mA LDO Regulator

DESCRIPTION

The EUP7522 is an efficient, precise dual-channel CMOS LDO regulator with very-low dropout voltage and low ground current. Both regulator outputs are capable of sourcing 600mA of output current.

The EUP7522's performance is optimized for CD/DVD-ROM, CD/RW or wireless communication supply applications, The EUP7522 regulators are stable with output capacitors as low as 2.2 μ F. Key features include current limit, thermal shutdown, fast transient response, high output accuracy, and high ripple rejection ratio.

The EUP7522 regulator is available in a fixed 3.3V/2.5V output voltage configuration.

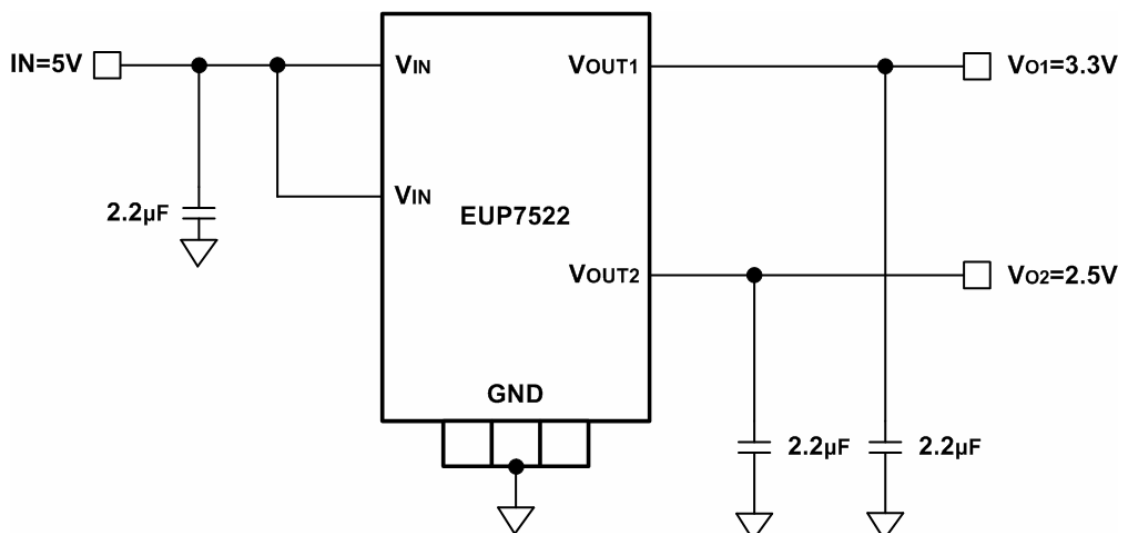
FEATURES

- Low Quiescent Current (Typically 130 μ A)
- Guaranteed 600mA Output Current
- Low Dropout Voltage: 600mV at 600mA
- Wide Operating Voltage Ranges : 2.5V to 5.5V
- Ultra-Fast Transient Response
- Tight Load and Line Regulation
- Current Limiting Protection
- Thermal Shutdown Protection
- Only low-ESR Ceramic Capacitors Required for Stability
- Available in SOP-8 Package
- RoHS Compliant and 100% Lead (Pb)-Free

APPLICATIONS

- CD/DVD-ROM, CD/RW
- Wireless LAN Card/Keyboard/Mouse
- Battery-Powered Equipment
- XDSL Router

Typical Application Circuit



3.3V/2.5V Dual LDO

Figure 1.

Pin Configurations

Part Number	Pin Configurations
EUP7522 SOP-8	

Pin Description

PIN	PIN NAME	DESCRIPTION
1	VOUT1	Regulator A Output
2,3	VIN	Power Input
4	VOUT2	Regulator B Output
5,6,7,8	GND	Ground

Block Diagram

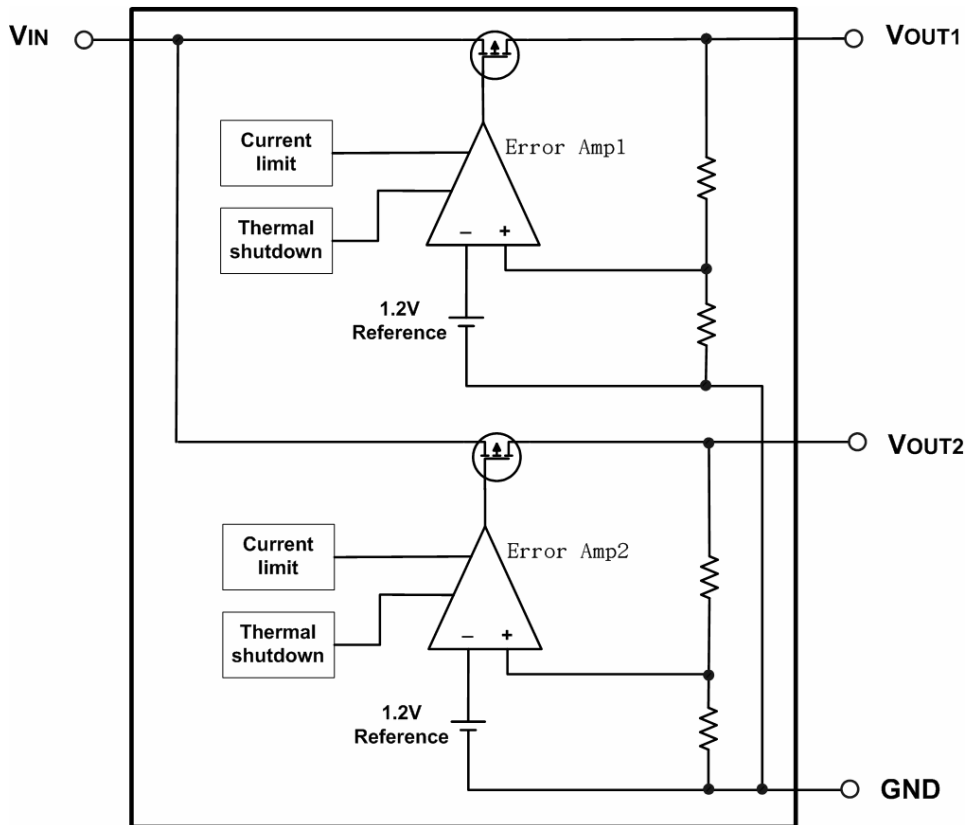




Figure 2.

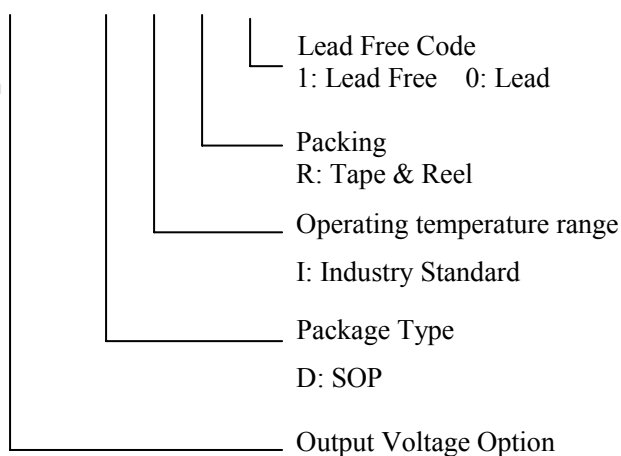
Ordering Information

Order Number	Package Type	Marking	Operating Temperature range
EUP7522-3.3/2.5DIR1	SOP-8	 XXXX EUP7522 I	-40 °C to 85°C
EUP7522-3.3/2.5DIR0	SOP-8	 XXXX EUP7522 I	-40 °C to 85°C

* For other output voltage options, contact EUT marketing.

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Absolute Maximum Ratings

Supply Input Voltage	-----	6V
Package Thermal Resistance		
SOP-8, θ_{JC}	-----	15.7°C/W
Lead Temperature (Soldering, 10 sec.)	-----	260°C
Junction Temperature	-----	150°C
Storage Temperature Rang, T_{stg}	-----	-65°C to 150°C
ESD Susceptibility		
HBM	-----	2kV
MM	-----	200V

Recommended Operating Conditions

Supply Input Voltage	-----	2.5V to 5.5V
Junction Temperature	-----	-40°C to 125°C

Electrical Characteristics

Unless otherwise noted these specifications apply over full temperature, $C_{IN}=2.2\mu F$, $C_{OUT1}=2.2\mu F$, $C_{OUT2}=2.2\mu F$, $T_J=0$ to 125°C. Typical values refer to $T_J=25^\circ C$.

Symbol	Parameter	Conditions	EUP7522			Unit
			Min	Typ	Max.	
V _{IN}	Input voltage		2.5		5.5	V
OTS	Over Temperature Shutdown			150		°C
	Over Temperature Shutdown Hysteresis	Hysteresis		20		°C
TC	Output Voltage Temperature Coefficient			40		ppm/°C
I _Q	Quiescent Current	I _{OUT1} =300mA, I _{OUT2} =300mA		360		μA
		I _{OUT1} =0mA, I _{OUT2} =0mA		130	200	
Regulator 1						
V _{OUT}	Output voltage	V _{IN} =5V	V _{OUT} -2%	3.3	V _{OUT} +2%	V
I _{LIMIT}	Circuit Current Limit	V _{IN} =V _{OUT} + 1V		900		mA
I _{OUT}	Load Current	V _{IN} =V _{OUT} + 1V	600			mA
REG _{LINE}	Line Regulation	V _{OUT} + 1V < V _{CC} < 5.5V, I _{OUT} =1mA		1.5	4	mV
REG _{LOAD}	Load Regulation	V _{IN} =V _{OUT} + 1V, 0mA < I _{OUT} < I _{MAX}		20	40	mV
PSRR	Ripple Rejection	F ≤ 1kHz, 1V _{pp} at I _{OUT} =50mA		62		dB
V _{DROP}	Dropout Voltage (Note 1)	I _{OUT} =600mA		600		mV
C _{OUT}	Output Capacitor			2.2		μF
	ESR		0.01	0.1	1	Ohm

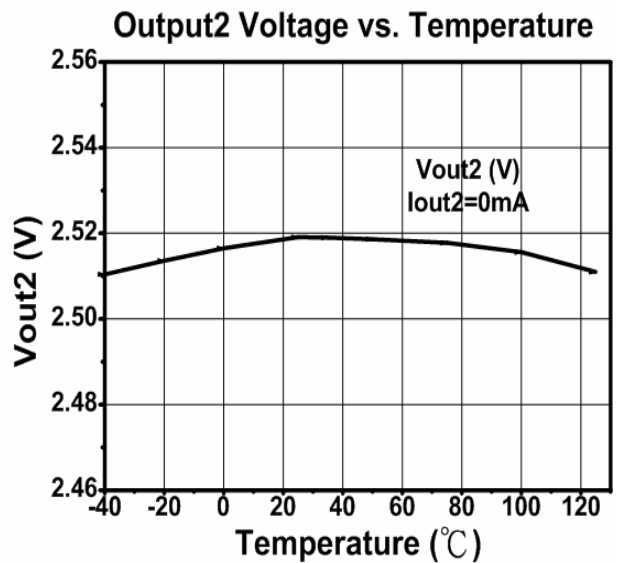
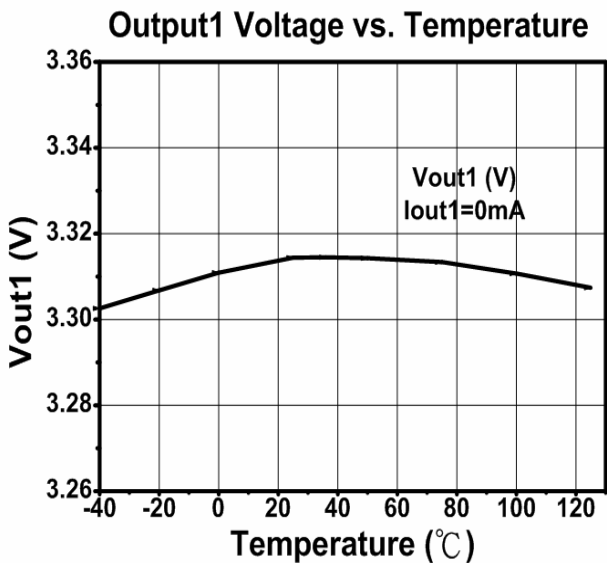
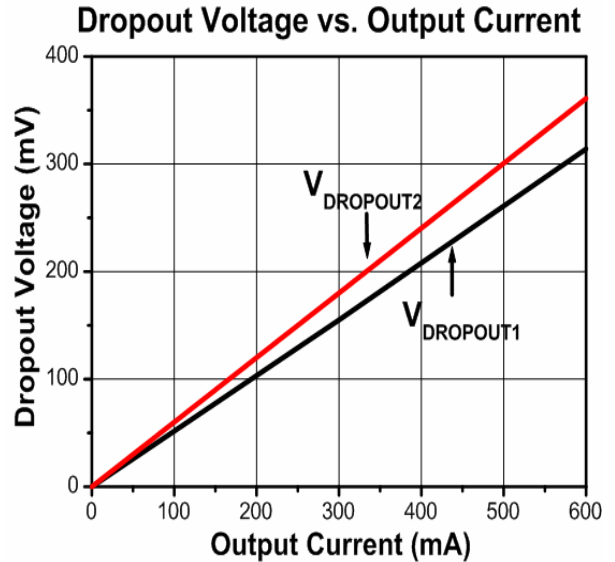
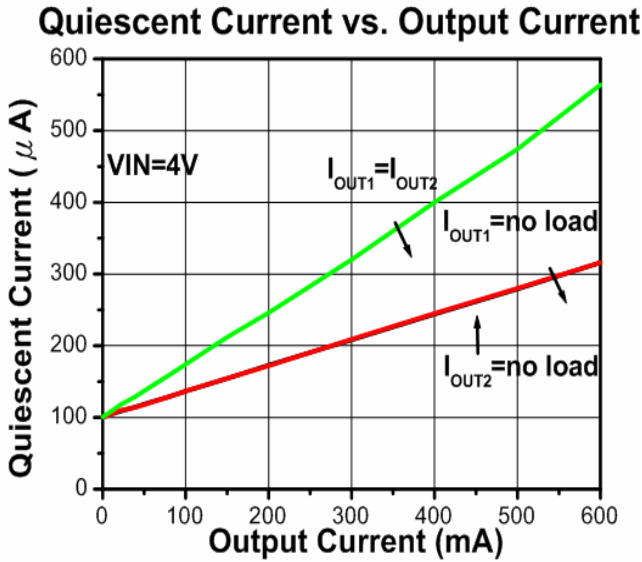
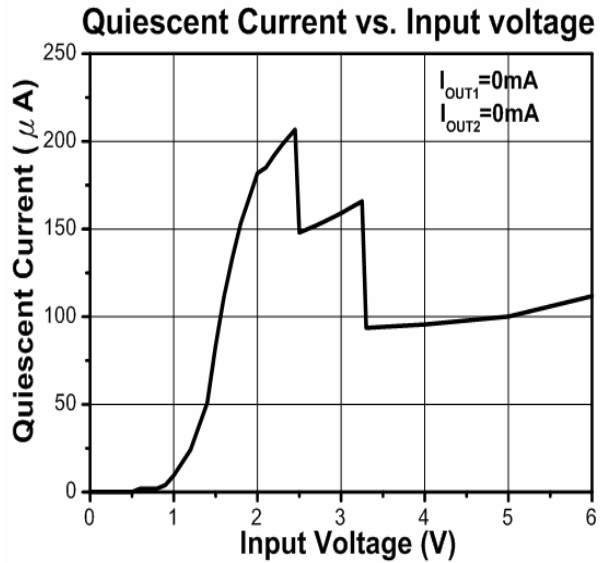
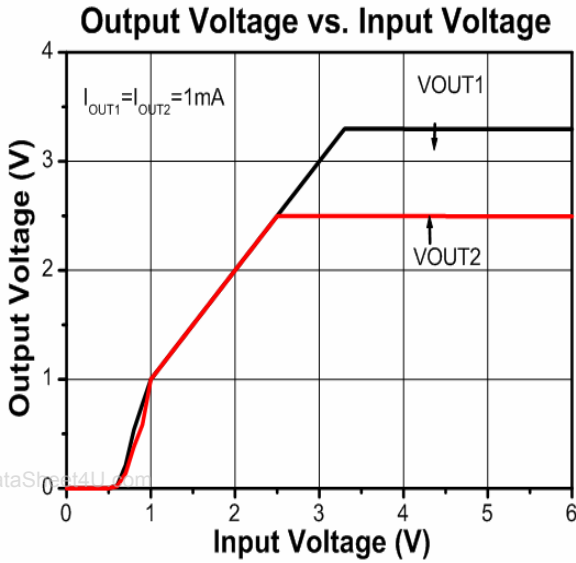
Electrical Characteristics(Cont.)

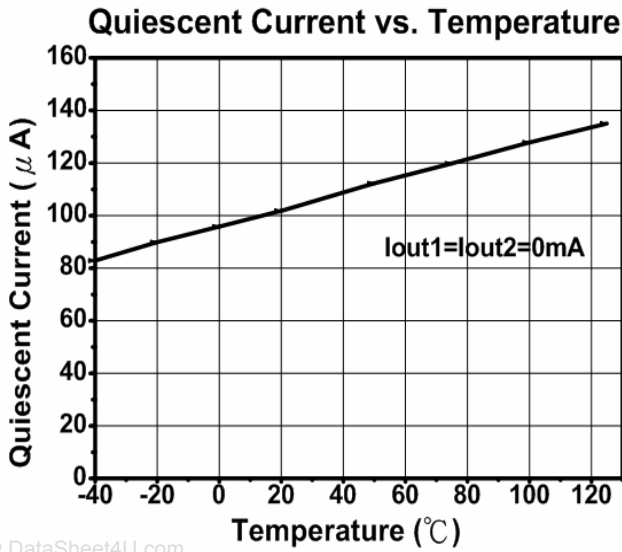
Unless otherwise noted these specifications apply over full temperature, $C_{IN}=2.2\mu\text{F}$, $C_{OUT1}=2.2\mu\text{F}$, $C_{OUT2}=2.2\mu\text{F}$, $T_J=0$ to 125°C . Typical values refer to $T_J=25^\circ\text{C}$.

Symbol	Parameter	Conditions	EUA7522			Unit
			Min	Typ	Max.	
Regulator 2						
V_{OUT}	Output voltage	$V_{IN}=5\text{V}$	$V_{OUT}-2\%$	2.5	$V_{OUT}+2\%$	V
I_{LIMIT}	Circuit Current Limit	$V_{IN}=V_{OUT}+1\text{V}$		900		mA
I_{OUT}	Load Current	$V_{IN}=V_{OUT}+1\text{V}$	600			mA
REG_{LINE}	Line Regulation	$V_{OUT}+1\text{V} < V_{CC} < 3.5\text{V}$, $I_{OUT}=1\text{mA}$		1.5	4	mV
REG_{LOAD}	Load Regulation	$V_{IN}=V_{OUT}+1\text{V}$, $0\text{mA} < I_{OUT} < I_{MAX}$		20	40	mV
PSRR	Ripple Rejection	$F \leq 1\text{kHz}$, 1V_{pp} at $I_{OUT}=50\text{mA}$		62		dB
V_{DROP}	Dropout Voltage (Note 1)	$I_{OUT}=600\text{mA}$		600		mV
C_{OUT}	Output Capacitor			2.2		μF
	ESR		0.01	0.1	1	Ohm

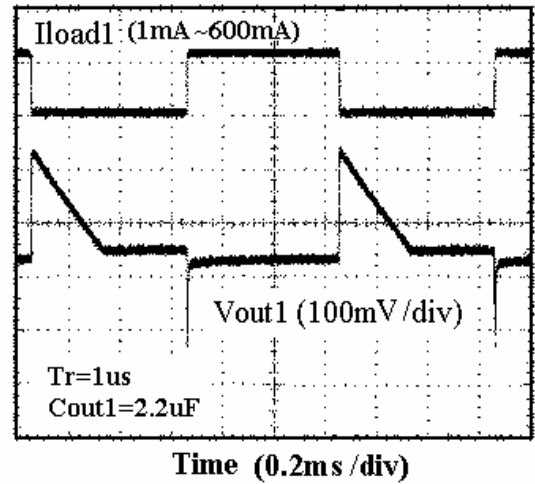
Note 1: dropout voltage definition : $V_{IN}-V_{OUT}$ when V_{OUT} is 2% below the value of V_{OUT} for $V_{IN}=V_{OUT}+1\text{V}$

Typical Operating Characteristics

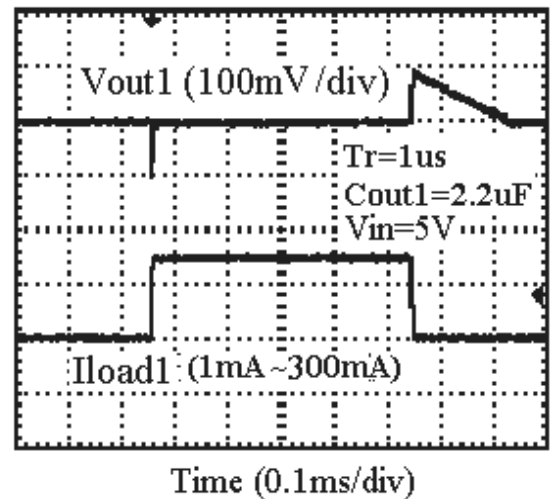




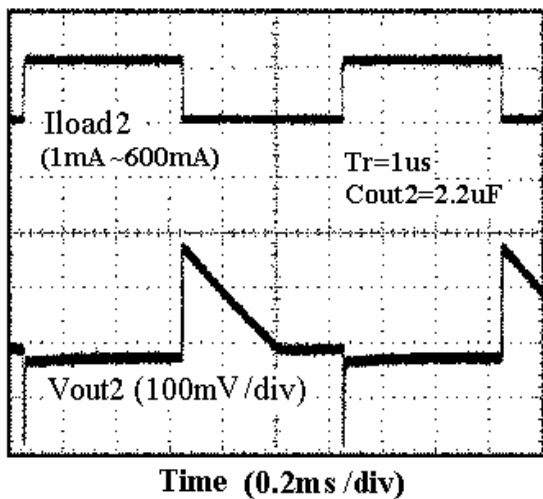
Output1 Load Transient Response
(Iload: 1mA to 600mA)



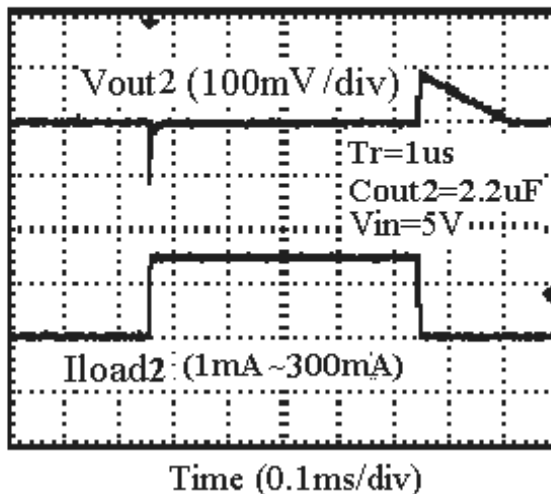
Output1 Load Transient Response
(Iload: 1mA to 300mA)



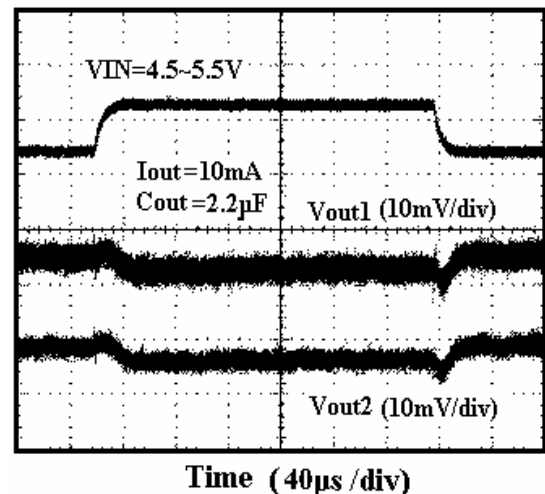
Output2 Load Transient Response
(Iload: 1mA to 600mA)



Output2 Load Transient Response
(Iload: 1mA to 300mA)



Line Transient Response



Application Information

Input Capacitor

A minimum input capacitance of 2.2 μ F is required between the EUP7522 input pin and ground (the amount of the capacitance may be increased without limit). This capacitor must be located a distance of not more than 1cm from the input pin and returned to a clean analog ground.

Any good quality ceramic, tantalum, or film capacitor may be used at the input. If a tantalum capacitor is used at the input, it must be guaranteed by the manufacturer to have a surge current rating sufficient for the application.

No-Load Stability

The EUP7522 will remain stable and in regulation with no external load. This is specially important in CMOS RAM keep-alive applications.

Output Capacitance

The EUP7522 is specifically designed to employ ceramic output capacitors as low as 2.2 μ F. Ceramic capacitors below 10 μ F offer significant cost and space savings, along with high frequency noise filtering. Higher values and other types and of capacitor may be used, but their equivalent series resistance (ESR) should be maintained below 0.5 Ω . Ceramic capacitor of the value required by the EUP7522 are available in the following dielectric types: Z5U, Y5V, X5R, and X7R. The Z5U and Y5V types exhibit a 50% or more drop in capacitance value as their temperature increase from 25 $^{\circ}$ C, an important consideration. The X5R generally maintain their capacitance value within \pm 20%. The X7R type are desirable for their tighter tolerance of 10% over temperature.

Power Dissipation and Junction Temperature

Specified regulator operation is assured to a junction temperature of 125 $^{\circ}$ C; the maximum junction temperature should be restricted to 125 $^{\circ}$ C under normal operating conditions. This restriction limits the power dissipation the regulator can handle in any given application. To ensure the junction temperature is within acceptable limits, calculate the maximum allowable dissipation, $P_{D(max)}$, and the actual dissipation, P_D , which must be less than or equal to $P_{D(max)}$.

The maximum-power-dissipation limit is determined using the following equation:

$$P_{D(max)} = \frac{T_{Jmax} - T_A}{R_{\theta JA}}$$

Where:

T_{JMAX} is the maximum allowable junction temperature.

$R_{\theta JA}$ is the thermal resistance junction-to-ambient for the package

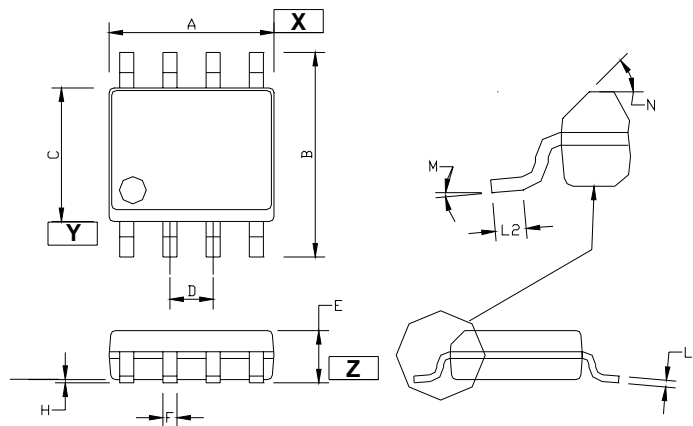
T_A is the ambient temperature.

The regulator dissipation is calculated using:

$$P_D = (V_I - V_O) \times I_O$$

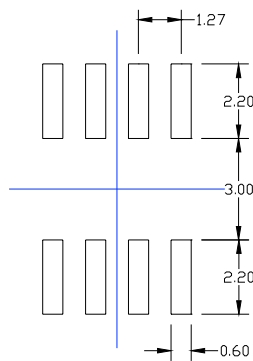
Power dissipation resulting from quiescent current is negligible. Excessive power dissipation triggers the thermal protection circuit.

Packaging Information



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Standard Solder Map



Symbols	Dimension in Millimeters		Dimension in Inches	
	Min.	Max.	Min.	Max.
A	4.80	5.00	0.189	0.197
B	5.80	6.20	0.228	0.244
C	3.80	4.00	0.150	0.157
D	1.194	1.346	0.047	0.053
E	1.45	1.55	0.057	0.061
H	0.00	0.10	0.000	0.004
F	0.33	0.51	0.013	0.020
L1	0.19	0.25	0.007	0.010
L2	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	40°	50°	40°	50°

8 – Lead SOP Plastic Package