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 μF. 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.

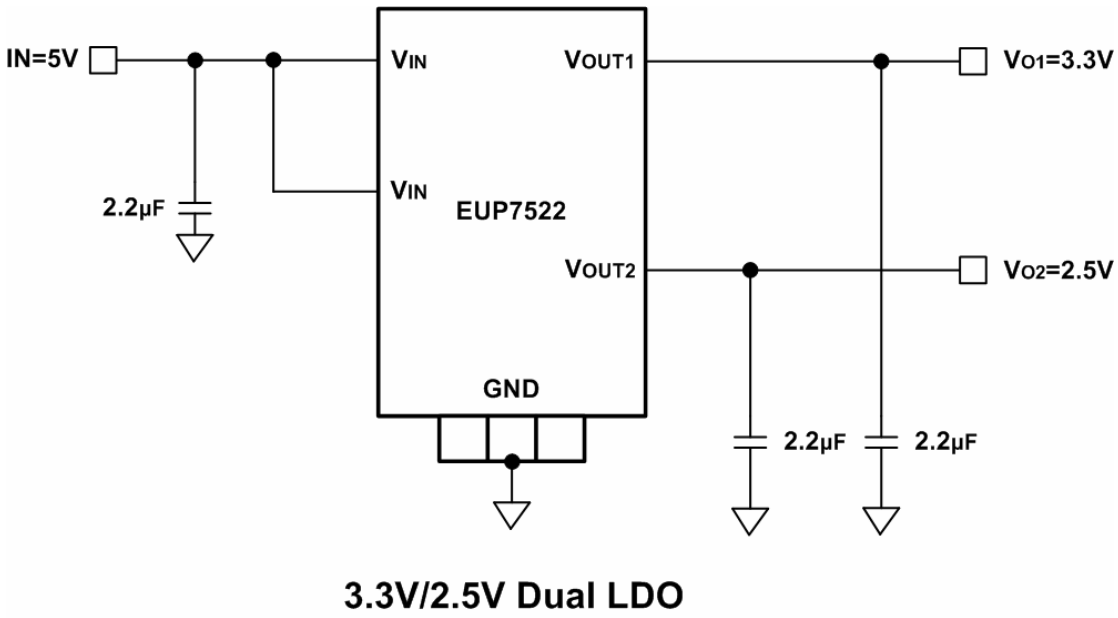
FEATURES

- Low Quiescent Current (Typically 130 μA)
- 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

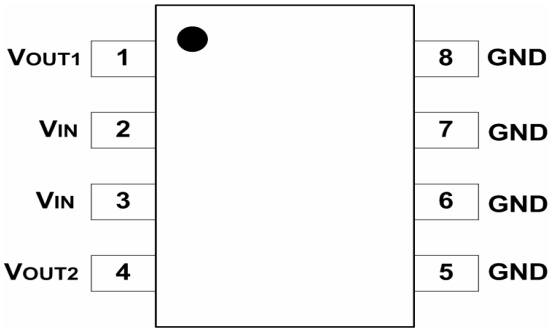
Typical Application Circuit



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

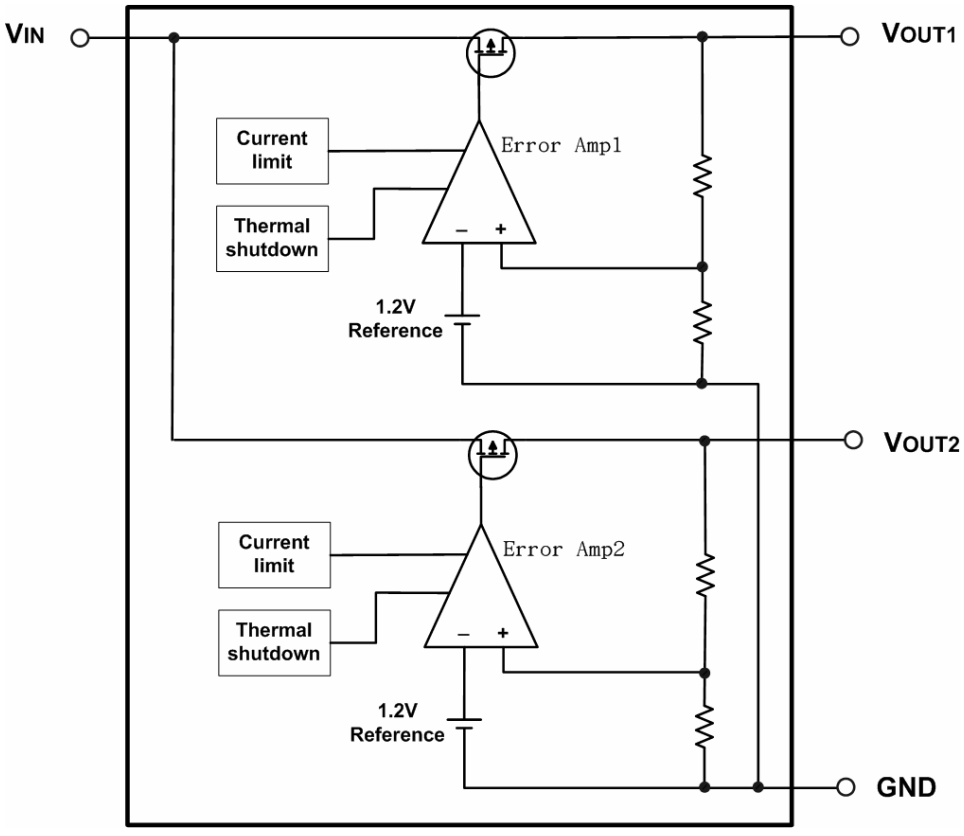


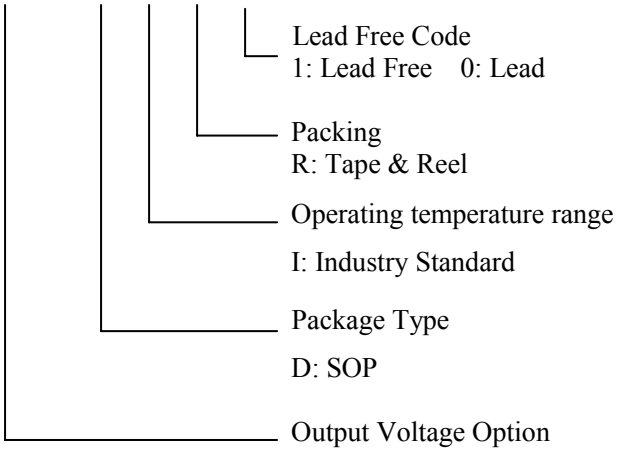
Figure 2.

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.

EUP7522 □□/□□ □ □ □ □



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}=2.2µF, C_{OUT}1=2.2µF , C_{OUT}2=2.2µF, T_J=0 to 125°C. Typical values refer to T_J=25°C.

Symbol	Parameter	Conditions	EUP7522			Unit
			Min	Typ	Max.	
VIN	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_{OUT}1=300mA, I_{OUT}2=300mA		360		µA
		I_{OUT1}=0mA, I_{OUT}2=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<Vcc <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, 1Vpp 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

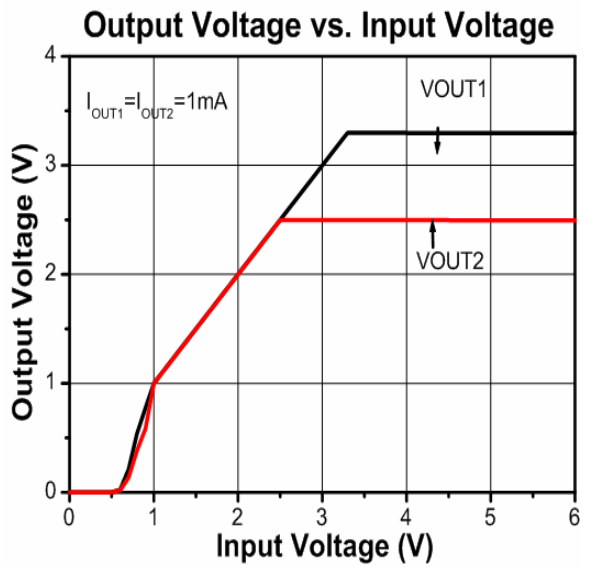
Electrical Characteristics(Cont.)

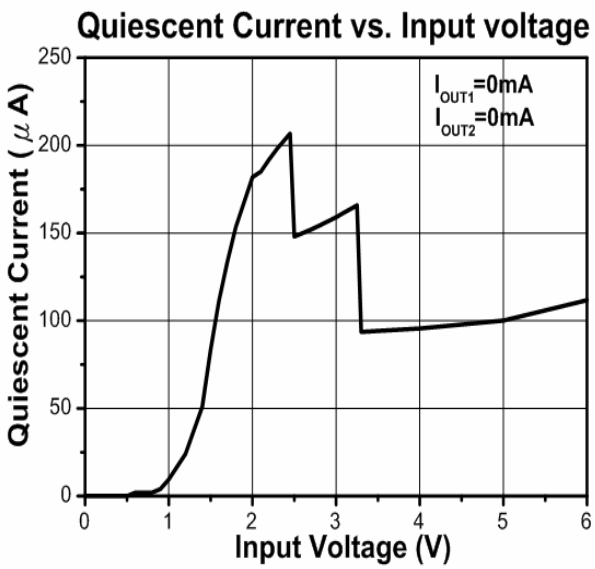
Unless otherwise noted these specifications apply over full temperature, C_{IN}=2.2µF, C_{OUT}1=2.2µF , C_{OUT}2=2.2µF, T_J=0 to 125°C. Typical values refer to T_J=25°C.

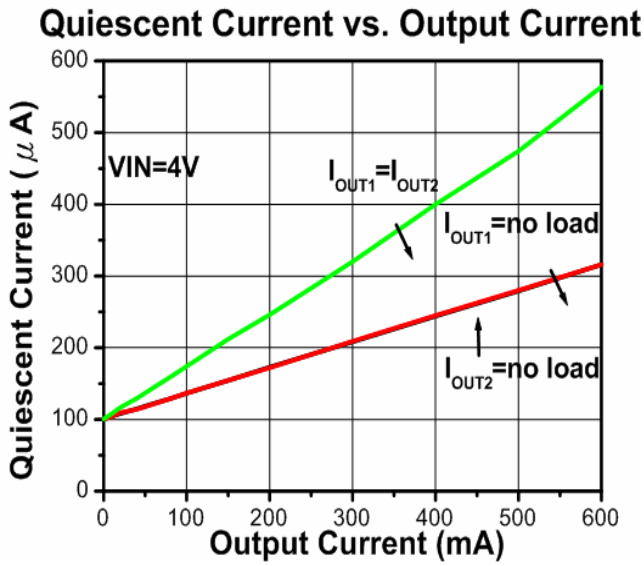
Symbol	Parameter	Conditions	EUA7522			Unit
			Min	Typ	Max.	
Regulator 2						
V_{OUT}	Output voltage	V_{IN}=5V	$V_{OUT-2\%}$	2.5	$V_{OUT+2\%}$	V
I_{LIMIT}	Circuit Current Limit	V_{IN}=V_{OUT}+ 1V		900		mA
I_{OUT}	Load Current	V_{IN}=V_{OUT}+ 1V	600			mA
REG_{LINE}	Line Regulation	V_{OUT}+ 1V<Vcc <3.5V, 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, 1Vpp 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

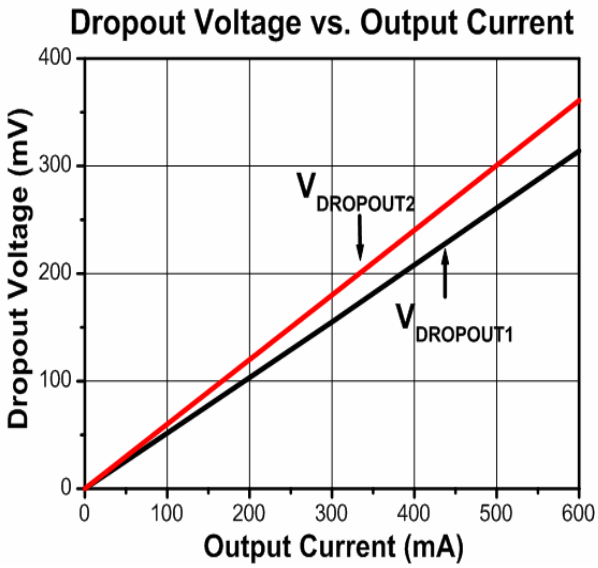
Note 1: dropout voltage definition : V_{IN}-V_{OUT} when V_{OUT} is 2% below the value of V_{OUT} for V_{IN}=V_{OUT}+ 1V

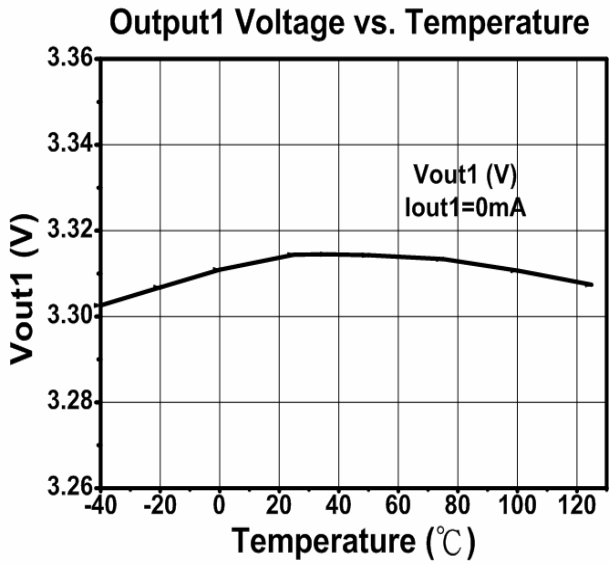
Typical Operating Characteristics

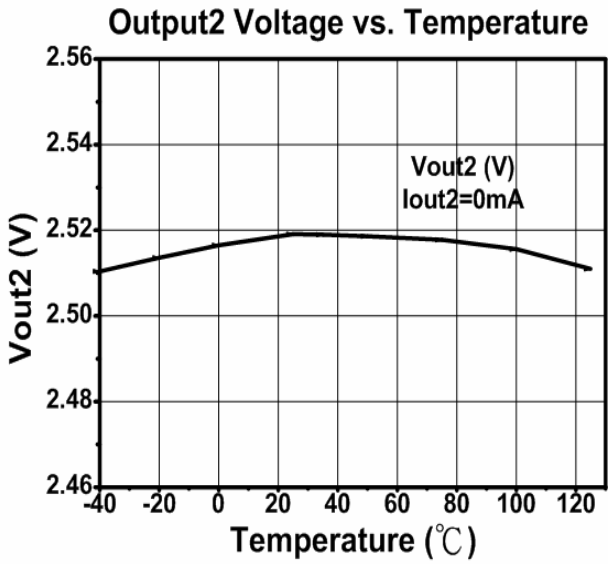


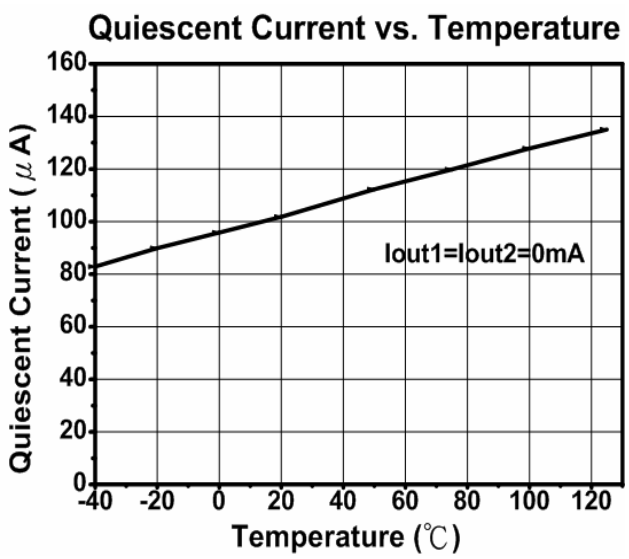


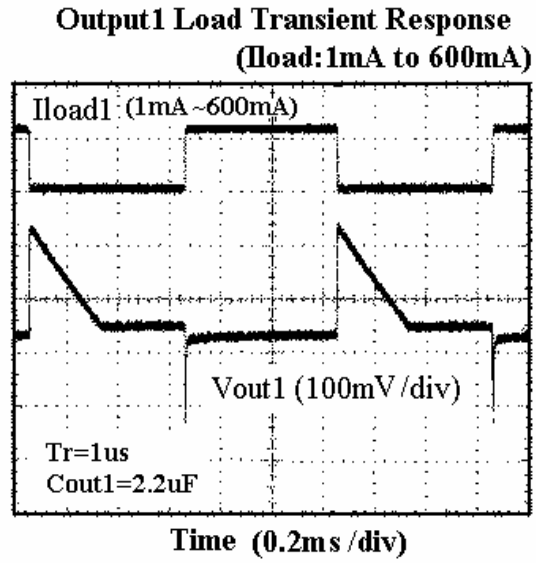


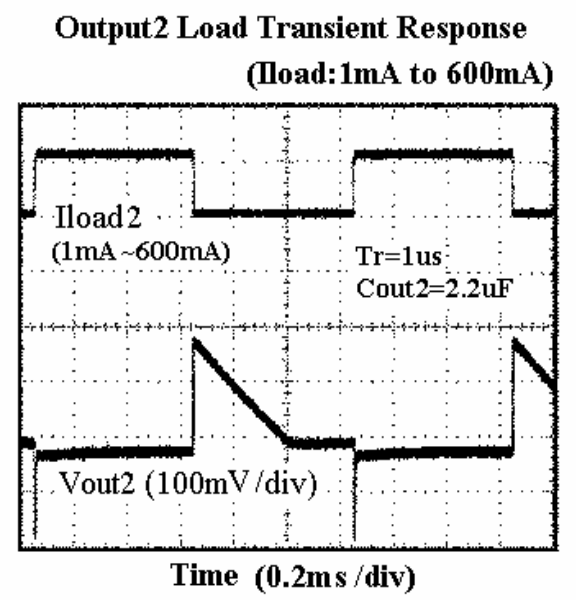


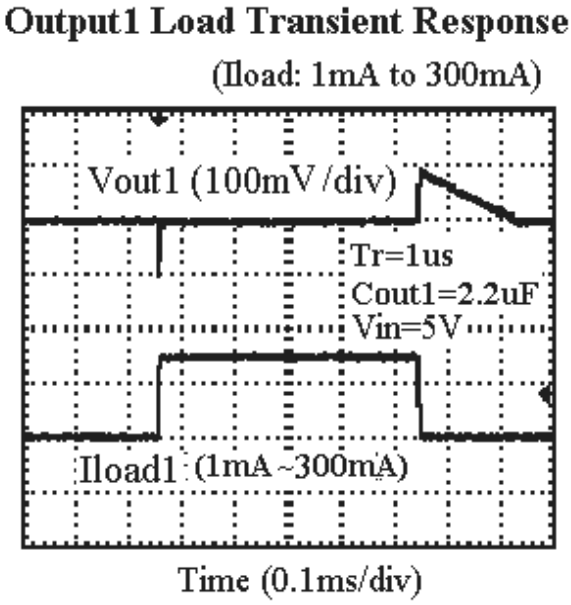


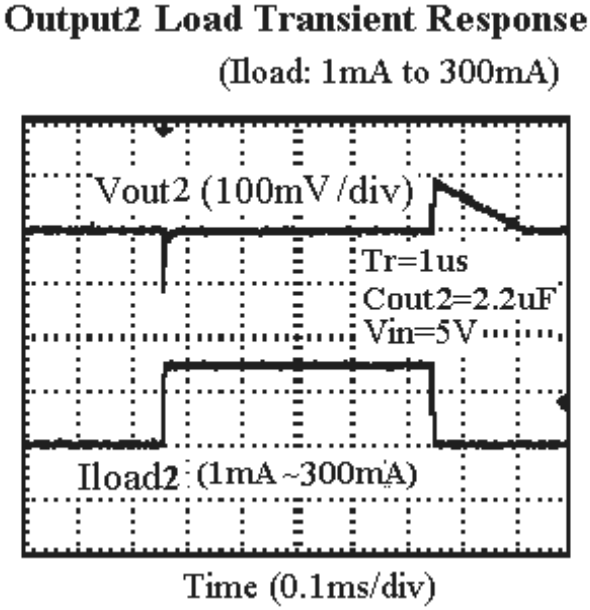


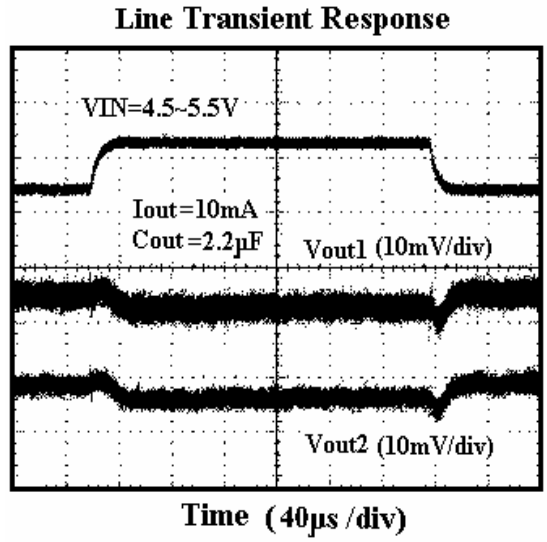

Quiescent Current vs. Temperature
Quiescent Current (μA)
160
140
120
100
80
60
40
20
0
-40 -20 0 20 40 60 80 100 120
Temperature (℃)
Iout1=Iout2=0mA


Output1 Load Transient Response
(Iload:1mA to 600mA)
Iload1 (1mA~600mA)
Vout1 (100mV/div)
Tr=1us
Cout1=2.2uF
Time (0.2ms/div)


Output2 Load Transient Response
(Iload:1mA to 600mA)
Iload2
(1mA~600mA)
Tr=1us
Cout2=2.2uF
Vout2 (100mV/div)
Time (0.2ms/div)


Output1 Load Transient Response
(Iload: 1mA to 300mA)
Vout1 (100mV/div)
Tr=1us
Cout1=2.2uF
Vin=5V
Iload1 (1mA~300mA)
Time (0.1ms/div)


Output2 Load Transient Response
(Iload: 1mA to 300mA)
Vout2 (100mV/div)
Tr=1us
Cout2=2.2uF
Vin=5V
Iload2 (1mA~300mA)
Time (0.1ms/div)


Line Transient Response
VIN=4.5~5.5V
Iout=10mA
Cout=2.2μF
Vout1 (10mV/div)
Vout2 (10mV/div)
Time (40μs/div)

Application Information

Input Capacitor

A minimum input capacitance of 2.2µF 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 2.2µF. Ceramic capacitors below 10µF 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 0.5Ω. 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°C, an important consideration. The X5R generally maintain their capacitance value within ± 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°C; the maximum junction temperature should be restricted to 125°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:

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

Where:

T_{JMAX} is the maximum allowable junction temperature.

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

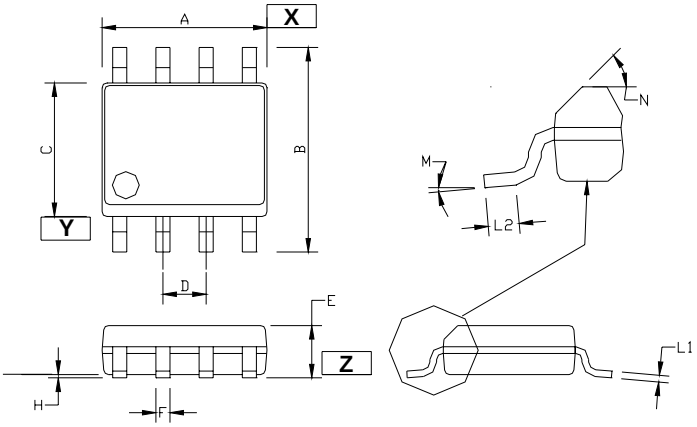
T_A is the ambient temperature.

The regulator dissipation is calculated using:

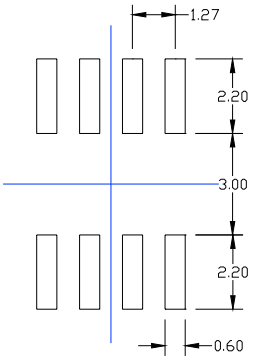
$$P_D=(V_I-V_O) \times I_O$$

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

Packaging Information



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