

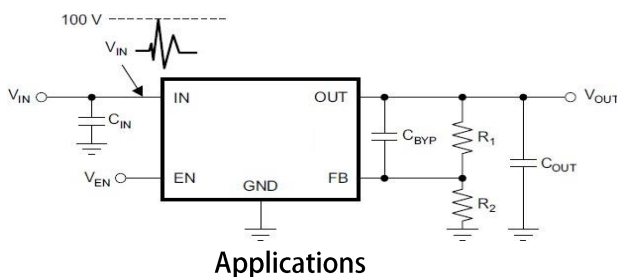
LR8410B Series High Voltage Linear Regulator

1 Features

- High input voltage withstand: 100V
- Low quiescent current: $23\ \mu\text{A}$
- Shutdown quiescent current: $8\ \mu\text{A}$
- Output current: 50mA
- High output accuracy: $\pm 1.5\%$
- Integrated short-circuit and thermal protection
- Adjustable output voltage: 1.2V to 90V

2 Applications

- Micro-control systems with transient high-voltage power supply
- Smart lighting equipment
- Power over Ethernet (PoE)
- Auxiliary power supply for dedicated switching power supplies
- Power supply for IoT sensor devices



3 Product Description

LR8410B is a high-voltage linear regulator that can withstand continuous DC or transient input voltage up to 100V. LR8410B operates properly with an output capacitor greater than $2.2\ \mu\text{F}$ and an input capacitor greater than $0.47\ \mu\text{F}$. In addition, LR8410B provides a standard CMOS-compatible enable pin (EN) to activate the low-current shutdown mode. LR8410B features internal thermal shutdown and current limiting to protect the system under fault conditions. The device operating junction temperature range is -40°C to 125°C .

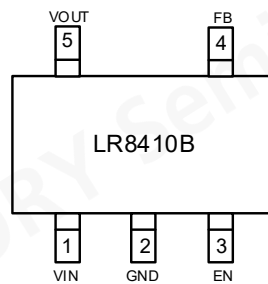
LR8410B is an ideal choice for generating low-voltage power supplies from intermediate voltage rails in telecommunication and industrial applications. It provides a stable voltage and maintains normal operation under extremely high and fast-transient voltage conditions.

LR8410B enables a simpler and more cost-effective surge protection circuit, and is widely used in PoE, bias power supplies, and LED lighting.

4 Device Information

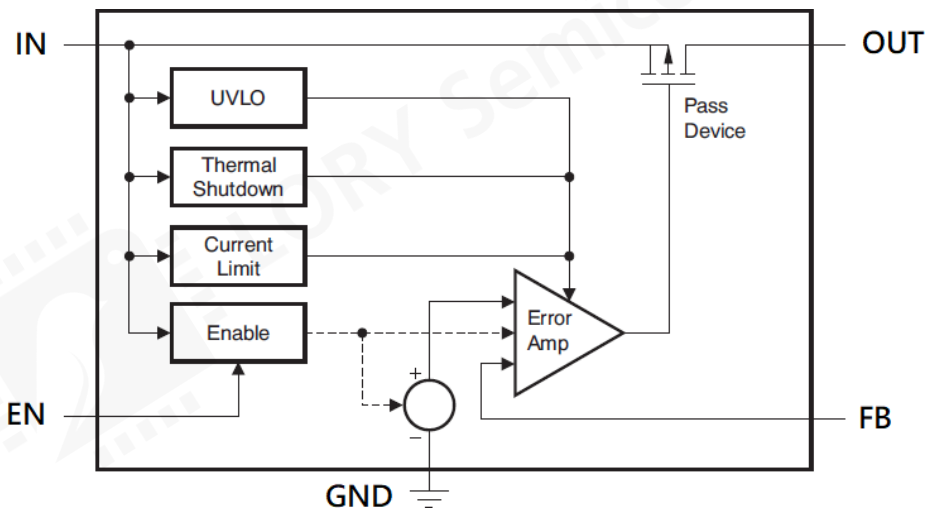
Part Number	Output Voltage	Package	Marking	Min. Pack Quantity
LR8410B-TJ	Adjustable	SOT23-5L	LR8410 B PXX	3000

5 Pin Definition and Function



Name	Pin No.	Function
Vin	1	Power Input
GND	2	GND
EN	3	Enable
FB	4	Feedback
VOUT	5	Voltage Output

6 Function Block Diagram



7 Electrical Characteristics

7.1 Absolute Maximum Ratings

Tested at ambient temperature (unless otherwise noted)⁽¹⁾

Parameter	Symbol	Min.	Max.	Unit
Maximum Input Supply	V_{IN}	–	110	V
Maximum Output Current	I_{OUT}	–	50	mA
Power Dissipation	P_D (SOT23-5L)	–	250	mW
Operating Temperature	T_{OPR}	-40	+105	°C
Storage Temperature	T_{STG}	-40	+150	°C

(1) Operation beyond the absolute maximum ratings listed above may cause permanent damage to the device. These are stress ratings only; extended exposure to maximum absolute rating conditions may affect device reliability.

7.2 Electrical Parameters

$V_{IN}=V_{OUT}+4V$ or $V_{IN}=7V$ (whichever is larger), $I_{OUT}=100\mu A$, $C_{IN}=1\mu F$, $C_{OUT}=4.7\mu F$, $T_J=25^\circ C$, unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input Voltage	V_{IN}	–	7	–	100	V
Internal Reference Voltage	V_{REF}	–	0.788	0.8	0.812	V
Line Regulation	ΔV_{LINE}	$V_{IN}=7V$ to 100V, $V_{OUT}=1.6V$	–	3	20	mV
Load Regulation	ΔV_{LOAD}	$100\mu A < I_{OUT} < 50mA$, $V_{OUT}=1.6V$	–	20	50	mV
Minimum Dropout Voltage	V_{DROP}	$I_{OUT}=20mA$	–	1000	–	mV
		$I_{OUT}=50mA$	–	2800	–	mV
Quiescent Current	I_Q	$I_{OUT} = 0mA$	–	23	40	μA
Shutdown Current	I_{SD}	$V_{EN} = 0V$	–	8	15	μA
Current Limit	I_{CL}	$V_{OUT} = 90\% V_{OUT(NOM)}$	55	120	200	mA
Enable High Voltage	V_{ENHI}	–	1.5	–	–	V
Enable Low Voltage	V_{ENLO}	–	–	–	0.4	V
Enable Pin Current	I_{EN}	$7V < V_{IN} < 100V$, $V_{IN}=V_{EN}$	–	0.02	1	μA
Feedback Pin Current	I_{FB}	–	–	0.01	0.11	μA
Thermal Shutdown	T_{SD}	Shutdown when temperature rising	–	160	–	$^\circ C$
		Recovery when temperature falling	–	140	–	$^\circ C$

8 Electrical Characteristics

$V_{IN}=12V, V_{OUT}=5V, I_{OUT}=1mA, C_{IN}=0.47\mu F, C_{OUT}=2.2\mu F, T_J=25^{\circ}C$, unless otherwise specified.

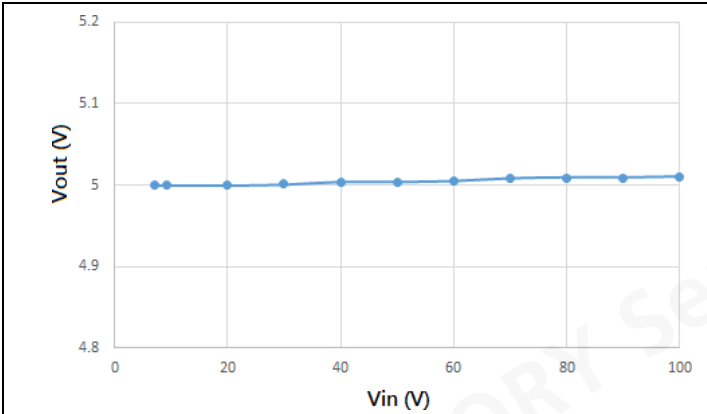


Fig1 Vout vs. Vin

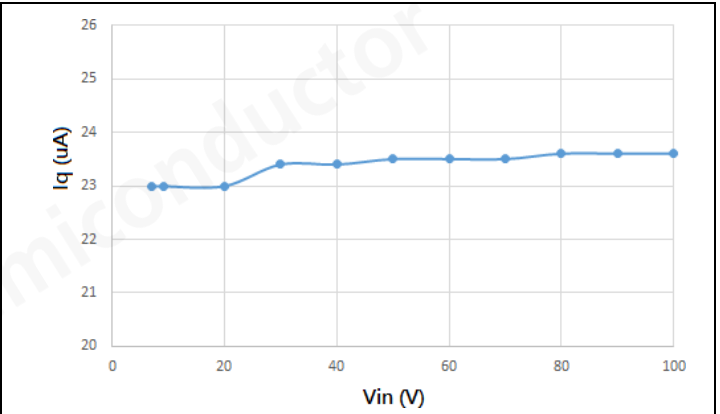


Fig2 Iq vs. Vin

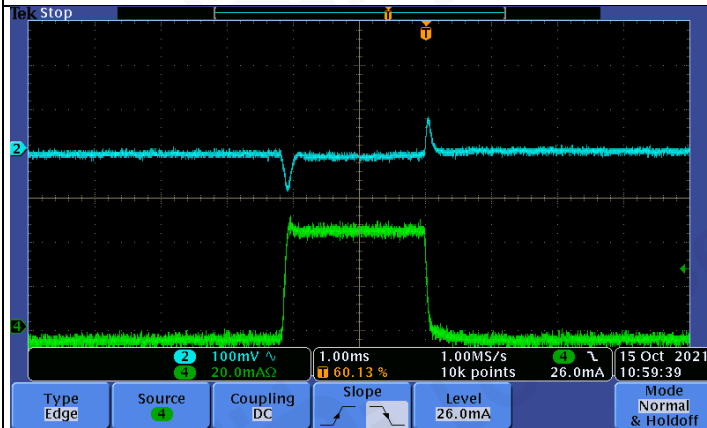


Fig3 Load transient 0 to 50mA

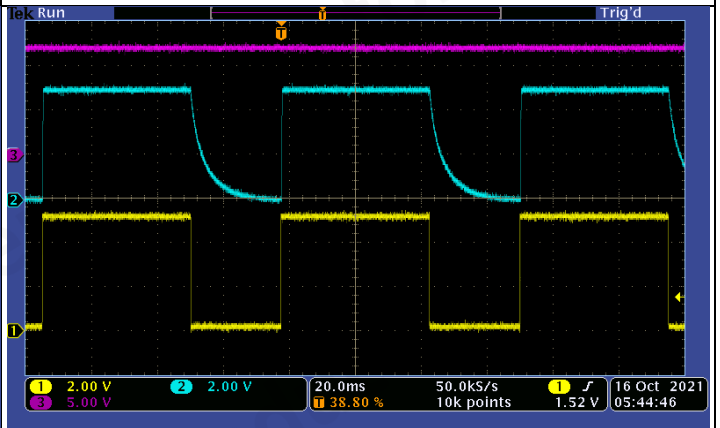


Fig4 Enable ON/OFF

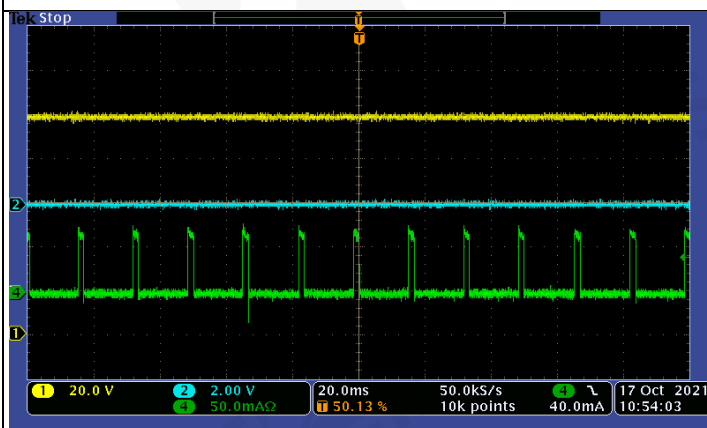


Fig5 $V_{IN}=100V, V_{OUT}$ short to GND

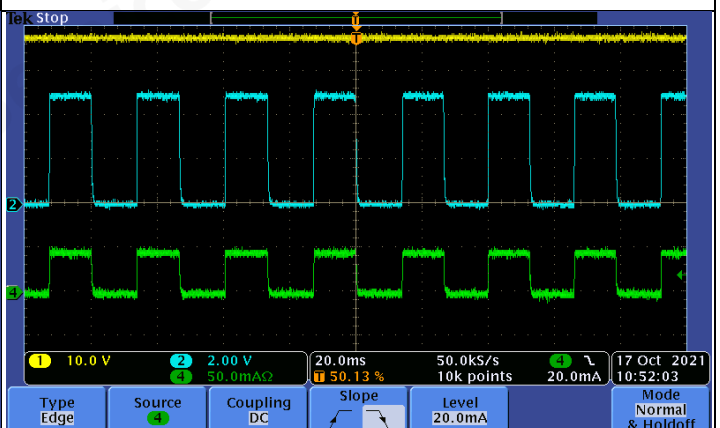
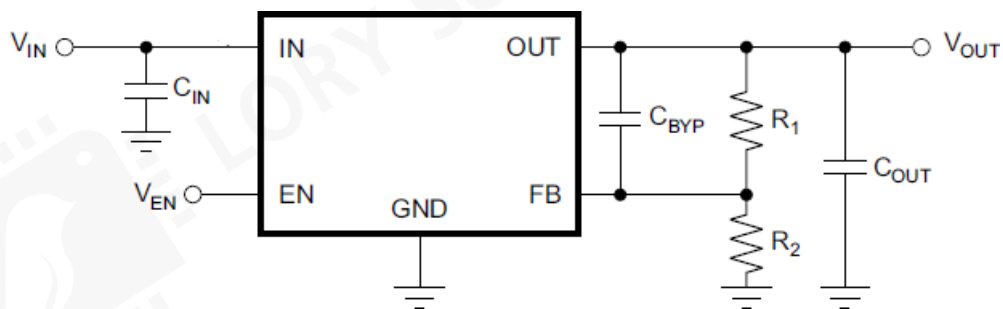


Fig6 $V_{IN}=36V, V_{OUT}=5V, R_{LOAD}=100\Omega$, thermal protect

9 Design Reference

V _{out} (V)	C _{in} (μF)	C _{out} (μF)	*C _{bypass} (nF)	R1 (kohm)	R2 (kohm)
12	10	10	10	698	49.9
5	10	10	10	262	49.9
3.3	10	10	10	156	49.9
1.8	10	10	10	62.5	49.9

*Bypass capacitor (C_{bypass}) is used for optimal AC performance; not required in this design.



$$1. V_{out} = 0.8V * (R1 + R2) / R2$$

$$2. 10\mu A < V_{out} / (R1 + R2) < 30\mu A$$

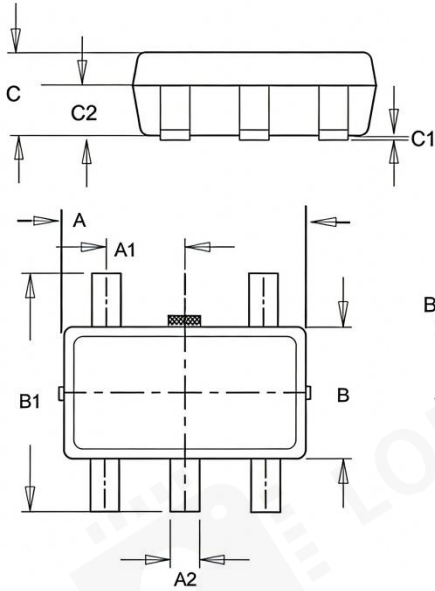
10 PCB Layout Recommendations

The following points should be noted:

- (1) Place C_{IN} and C_{OUT} as close to the LDO as possible. C_{IN}=C_{OUT} is recommended between 1 μF and 10 μF; pay attention to the voltage rating of input capacitors.
- (2) A series resistor of approximately 10Ω is recommended at the LDO input to absorb input spike voltages from the preceding stage.
- (3) Maximize the ground copper area to improve anti-interference and enhance LDO heat dissipation.

11 Physical Dimensions

■ SOT23-5L



COMMON DIMENSIONS UNITS MEASURE = MILLIMETER			
SYMBOL	MIN	MID	MAX
A	2.87	2.92	2.97
A1	0.90	0.95	1.0
A2	0.30	0.35	0.40
B	1.30	1.60	1.80
B1	2.75	2.90	3.05
B2		0.127BSC	
C	0.95	1.00	1.45
C1	0.00	0.06	0.12
C2	0.57	0.60	0.63
D	0.57	0.65	0.73
D1	0.3	0.40	0.5

12 Revision History

Revision Date	Content	Version Number
Dec.25, 2023	First version	A
Dec.10, 2023	Correction of partial formats	B