100V 50mA Very High Voltage Linear Regulator

General Description

The LT1105 device is a very high voltage-tolerant linear regulator that offers the benefits of a thermally-enhanced package (PSOP8),and is able to withstand continuous DC or transient input voltages of up to 100 V. The LT1105 device is stable with output capacitance greater than 2.2μF and any input capacitance greater than 0.47μF(over temperature and tolerance). Therefore, implementations of this device require minimal board space because of its miniaturized packaging(PSOP8) and a potentially small output capacitor. In addition, the LT1105 device offers an enable pin(EN) compatible with standard CMOS logic to enable a low-current shutdown mode.

The LT1105 device has an internal thermal shutdown and current limiting to protect the system during fault conditions. The PSOP8 packages has an operating temperature range of T_J= - 40°C to 125°C. In addition, the LT1105 device is ideal for generating a low-voltage supply from intermediate voltage rails in telecom and industrial applications; not only can it supply a well-regulated voltage rail, but it can also withstand and maintain regulation during very high and fast voltage transients. These features translate to simpler and more cost-effective electrical surge-protection circuitry for a wide range of applications, including PoE, bias supply, and LED lighting.

Ordering Information

Part Number	Package	Voltage
LT1105	PSOP8 MSOP8 SOT23-5	Adjustable

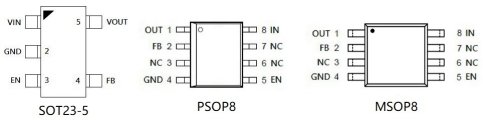
Features

- VIN Range 7 to 100V
- Output Voltage Tolerances of ±1.5%
- Output Current of 50 mA
- Low Quiescent Current 23μA
- Quiescent Current at Shutdown 8μA
- Dropout Voltage 2.8V at I_{OUT} = 50mA
- Internal Thermal Overload Protection
- Internal Short-Circuit Current Limit
- Adjustable Output Voltage from 1.2 to 90V

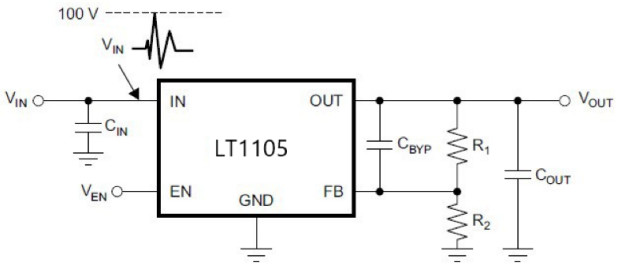
Applications

- Microprocessors, Microcontrollers Powered by Industrial Busses With High Voltage Transients
- Industrial Automation
- Telecom Infrastructure
- Automotive
- Power over Ethernet(PoE)
- LED Lighting

Pin Configuration



Typical Application Circuit

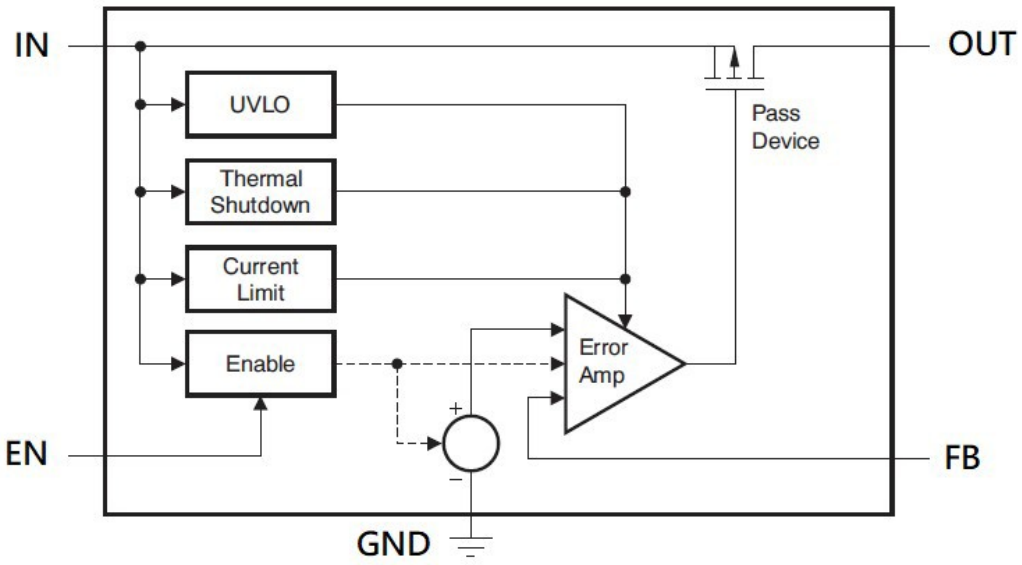


Ceramic Capacitor Stable

Pin Assignment

Pin Name	Pin No. PSOP8	Pin No. MSOP8	Pin No. SOT23-5	Pin Function
VOUT	1	1	5	Output Voltage Pin
FB	2	2	4	Feedback
NC	3,6,7	3,6,7	-	Non Connect
GND	4	4	2	Ground
EN	5	5	3	Enable
VIN	8	8	1	Input Voltage Pin

Function Block Diagram



Absolute Maximum Ratings (Note1)

- VIN ..... -0.3 V to + 110 V
- VOUT ..... -0.3 V to + 110 V
- FB ..... -0.3 V to + 5.5 V
- EN ..... -0.3 V to + 110 V
- Junction Temperature ..... 125 °C
- Lead Temperature (Soldering, 10 sec.) ..... 300 °C
- Storage Temperature ..... - 65 °C to 150 °C

Recommended Operating Conditions

- Input Voltage, V_{IN} ..... +7 V to +100 V
- Output Voltage, V_{OUT} ..... +1.2 V to +90 V
- Enable Voltage, V_{EN} ..... 0 V to +100 V
- Output Current, I_{OUT} ..... 0 mA to +50 mA
- Junction Temperature ..... -40 °C to 125 °C

Note1: Stresses beyond those listed "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

Electrical Characteristics

V_{IN}=V_{OUT}+3V or V_{IN}=7V (whichever is greater), I_{OUT}=100μA, C_{IN}=1μF,C_{OUT}=4.7μF, T_J = 25 °C, unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage	V_{IN}		7		100	V
Internal Reference	V_{REF}		0.788	0.8	0.812	V
Line Regulation	ΔV_{LINE}	V_{IN} = 7 V to 100 V		3	20	mV
Load Regulation	ΔV_{LOAD}	100μA < I_{OUT} < 50 mA		20	50	mV
Dropout Voltage	V_{DROP}	I_{OUT}=20 mA I_{OUT}=50 mA		1000 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 level	V_{ENHI}		1.0		V_{IN}	V
Enable low level	V_{ENLO}		0		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, Temp. increasing Reset, Temp. decreasing		160 140		°C

Typical Characteristics

V_{IN} = 12V, V_{OUT} = 5V, I_{OUT} = 1mA, C_{IN} = 0.47μF, C_{OUT} = 2.2μF, T_J = 25°C, unless otherwise specified

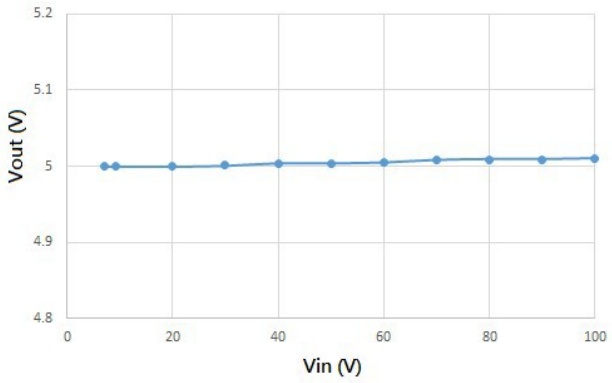


Fig 1. Vout vs Vin

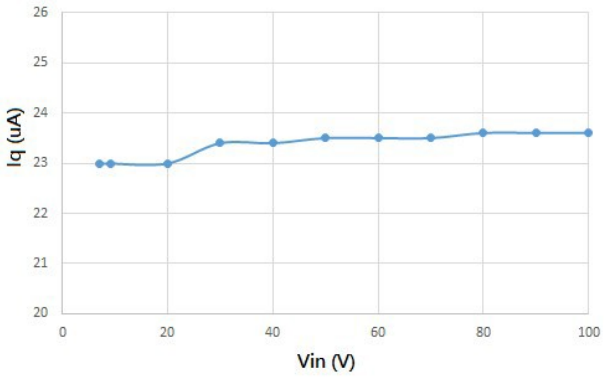


Fig 2. Iq vs Vin

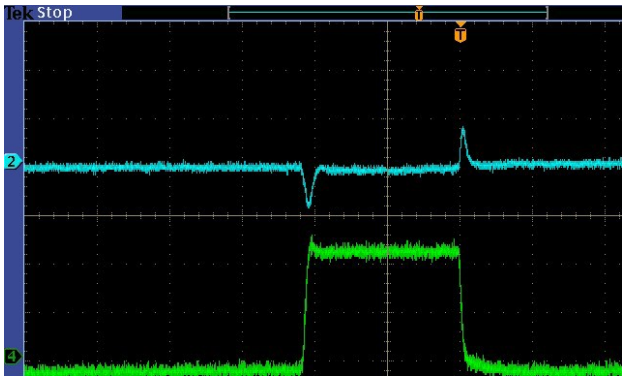


Fig 3. Load transient 0 to 50mA

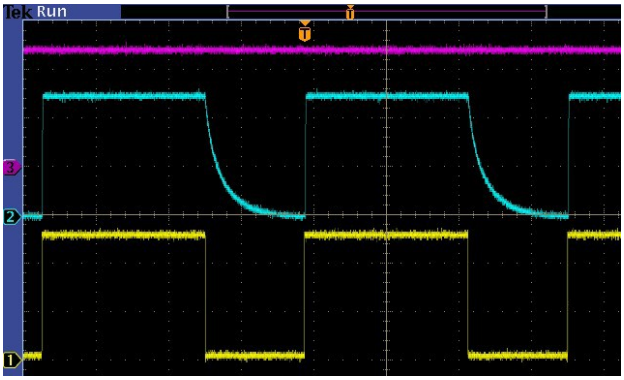


Fig 4. Enable ON/OFF

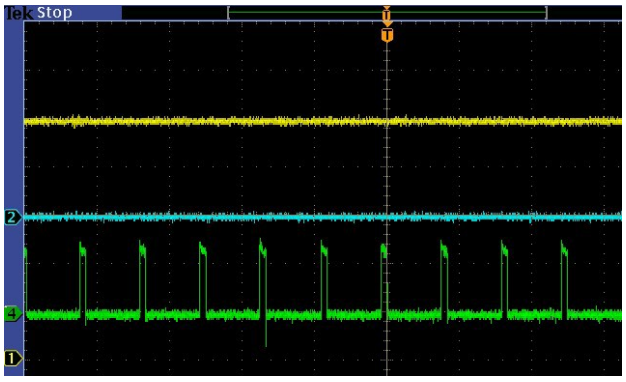


Fig 5. V_{IN} = 100V, V_{OUT} = short to GND

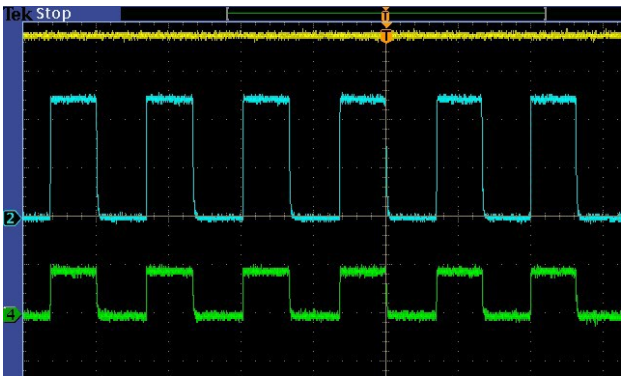
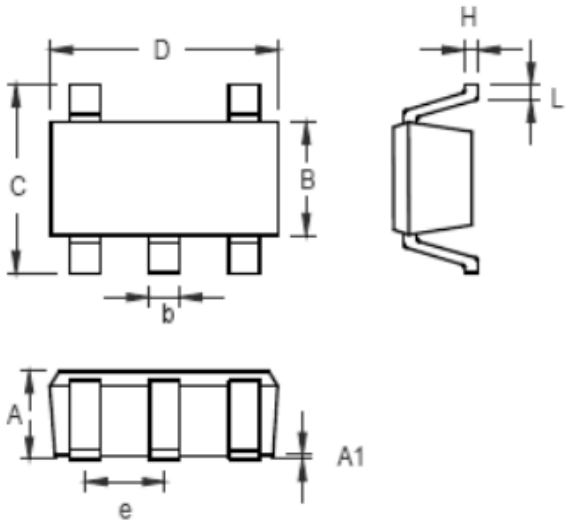


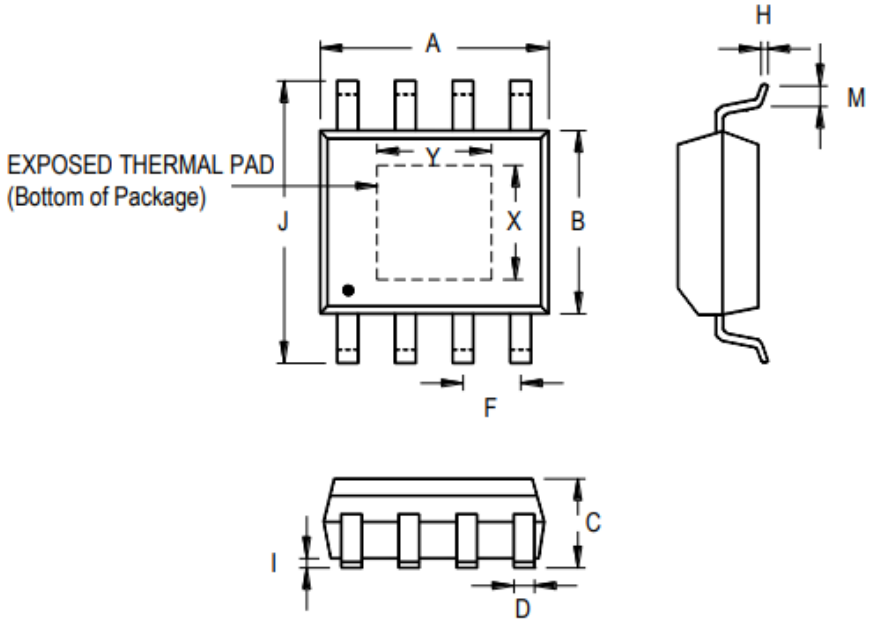
Fig 6. V_{IN}=36V, V_{OUT}=5V, R_{LOAD}= 100 ohm, thermal protect

Package Outline



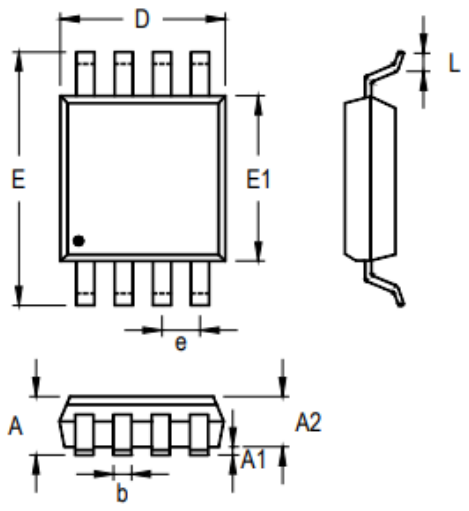
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	—	1.25	—	0.049
A1	0.04	0.10	0.002	0.004
B	1.50	1.70	0.059	0.067
b	0.33	0.41	0.013	0.016
C	2.60	3.00	0.102	0.118
D	2.82	3.02	0.111	0.119
e	0.95		0.037	
H	0.15	0.19	0.006	0.007
L	0.30	0.60	0.012	0.024

SOT-23-5 Surface Mount Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.70	5.10	0.185	0.201
B	3.70	4.10	0.146	0.161
C	—	1.65	—	0.065
D	0.39	0.48	0.015	0.019
F	1.27		0.050	
H	0.21	0.26	0.008	0.010
I	0.00	0.10	0.000	0.004
J	5.80	6.20	0.228	0.244
M	0.50	0.80	0.020	0.031

8-Lead SOP (Exposed Pad) Plastic Package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	—	1.10	—	0.043
A1	0.05	0.15	0.000	0.006
A2	0.75	0.95	0.030	0.037
b	0.28	0.36	0.011	0.014
D	2.90	3.10	0.114	0.122
e	0.65		0.026	
E	4.70	5.10	0.189	0.197
E1	2.90	3.10	0.114	0.122
L	0.40	0.70	0.016	0.028

8-Lead MSOP Plastic Package