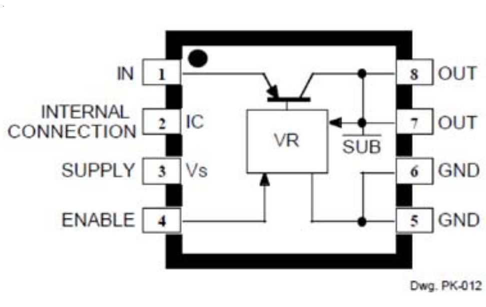
SI-3025LSA

Data Sheet 27468.25

LOW-VOLTAGE, HIGH-CURRENT 2.5 V LINEAR REGULATOR



ABSOLUTE MAXIMUM RATINGS

Input Voltage, V_I .... **16 V**

Supply Voltage, V_S .... **16 V**

Continuous Output Current, I_O .... **1.0 A***

Logic Input Voltage, V_E .... **V_S**

Package Power Dissipation,
P_D .... **See Graph**

Output Junction Temperature,
T_J .... **+150°C†**

Operating Temperature Range,
T_A .... **-30°C to +100°C**

Storage Temperature Range,
T_{stg} .... **-30°C to +150°C**

* Output current rating may be limited by duty cycle, ambient temperature, and heat sinking. Under any set of conditions, do not exceed the specified current rating or a junction temperature of150½C.

† Fault conditions that produce excessive junction temperature will activate the device's thermal shutdown circuitry. These conditions can be tolerated but should be avoided.

The SI-3025LSA is designed to meet the requirement for increased integration and reliability in low-voltage, high-current, linear regulator applications such as personal computers (PCs) and set-top boxes. Each device incorporates a monolithic low-level reference and control circuit with a high-current pnp transistor in a power multi-chip module (PMCM™). Regulated output voltages of 1.8 V or 3.3 V are also available.

The high-current pass element provides a low dropout voltage with output current to 1 A. Regulator accuracy of ±2 % and excellent temperature characteristics are provided. The logic-compatible ENABLE input gives the designer complete control over power up, power down, and standby or sleep.

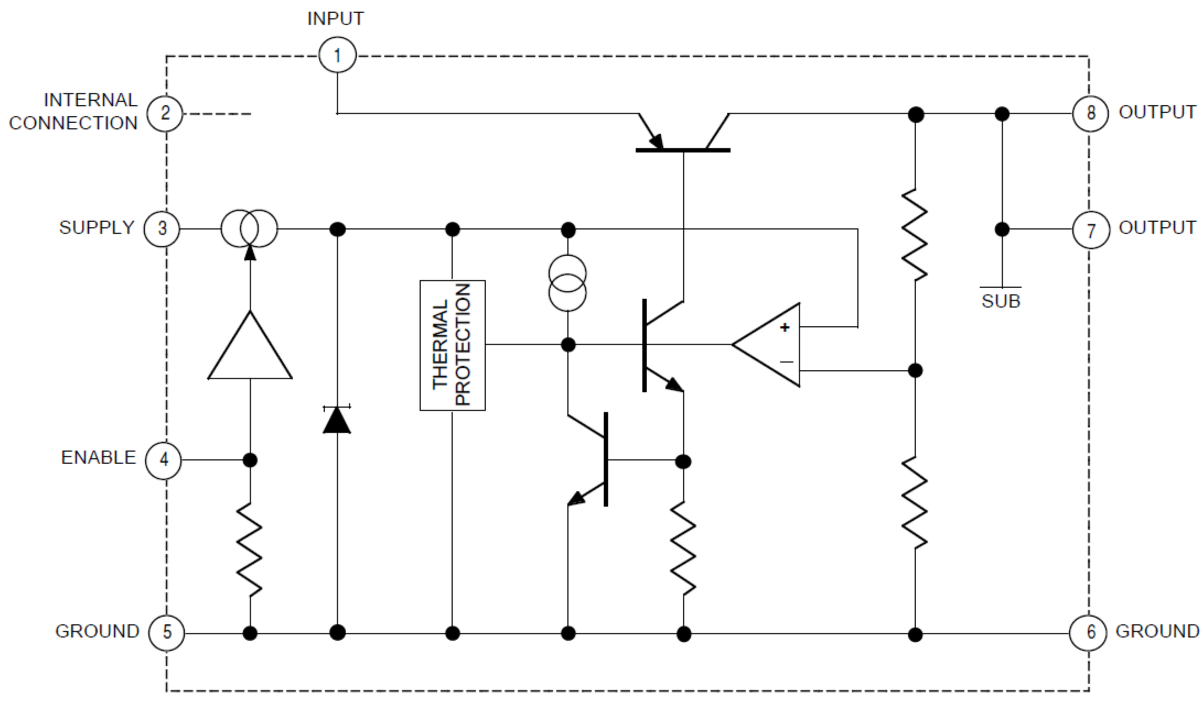
These devices are supplied in a fully molded 8-lead miniature surface-mount package (tape and reel) with enhanced power-dissipating qualities. They are rated for continuous operation between -30°C and +100°C.

FEATURES

- 1 A Output Current
- Low Dropout voltage
- LSTTL/CMOS-Compatible On/Off Control
  Less Than 1 µA "Sleep" Current
- Internal Foldback Overcurrent Limiting
- Internal Thermal Shutdown
- Surface-Mount Package

Always order by complete part number: **SI-3025LSA-TL** , where "-TL" indicates tape and reel.

FUNCTIONAL BLOCK DIAGRAM



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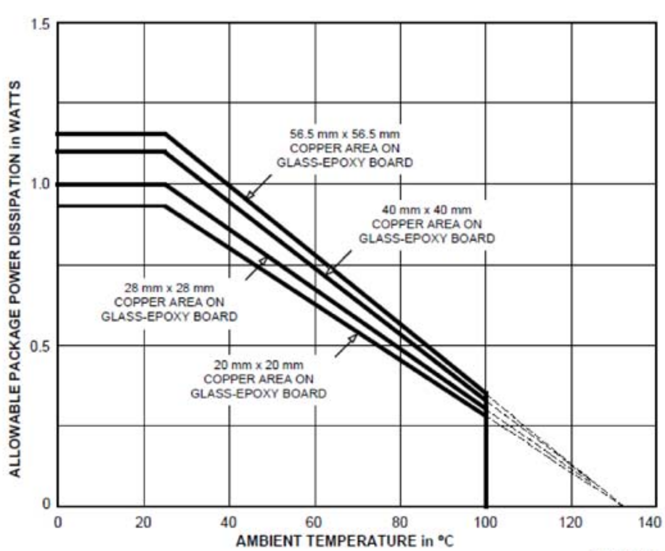

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Leads 7 and 8 are soldered to the copper area and provide heat sinking of the pass transistor.

RECOMMENDED OPERATING CONDITIONS

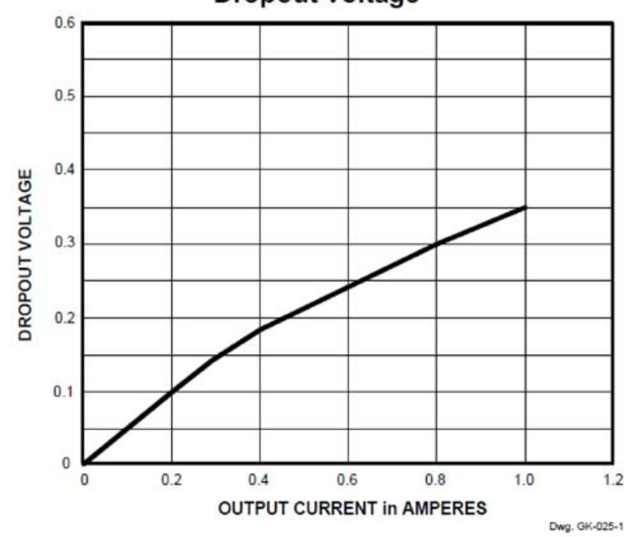
Max. Input Voltage, V_I .... **3.5 V**
Output Current, I_O .... **0 A to 1.0 A**
Output Junction Temperature Range, T_J **-20 °C to +125°C**
Ambient Temperature Range, T_A .... **-30°C to +85°C**

ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_I = V_S = 3.3 V, V_E = 2.0 V (unless otherwise noted).

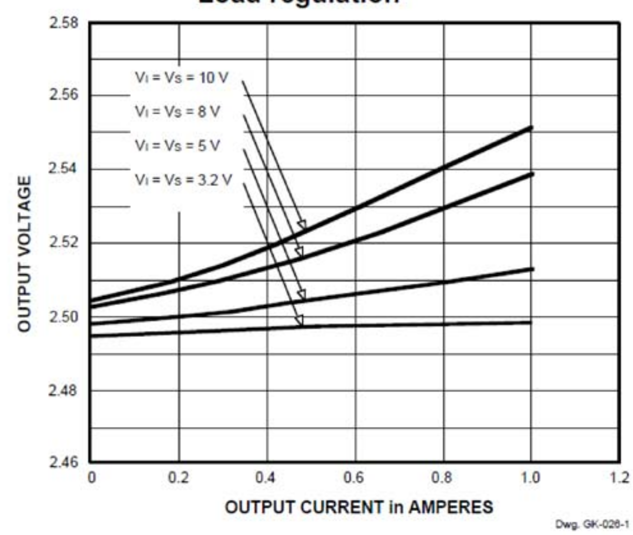
Characteristic	Symbol	Test Conditions	Limits Min.	Limits Typ.	Limits Max.	Units
Output Voltage	V_O	I_O = 500 mA	2.45	2.50	2.55	V
	V_{OQ}	V_E = 0 V, Output Off	—	—	0.5	V
Output Volt. Temp. Coeff.	a_{VO}	I_O = 5 mA, 0°C - T_J - 100°C	—	±0.3	—	mV/°C
Overcurrent Limit	I_{OM}	V_O = 95% of V_O at I_O = 500 mA	1.2	1.5	—	A
Line Regulation	$ÐV_{O(ÐVI)}$	3.1 V - V_I = V_S - 3.5 V, I_O = 300 mA	—	2.0	10	mV
Load Regulation	$ÐV_{O(ÐIO)}$	0 - I_O - 1 A	—	10	20	mV
Dropout Voltage	$V_I$min - V_O	I_O - 0.5 A	—	220	400	mV
		I_O -1 A	—	350	800	mV
Ground Terminal Current	I_{GND}	I_O = 0 mA	—	1.7	2.5	mA
	I_Q	V_E = 0 V, I_O = 0 mA	—	—	1.0	μA
Rejection Ratio	PSRR	100 Hz - f - 120 Hz	—	57	—	dB
ENABLE Input Voltage	V_{EH}	Output On	2.0	—	—	V
	V_{EL}	Output Off	—	—	0.8	V
ENABLE Input Current	I_{EH}	V_E = 2 V, Output On	—	40	80	μA
	I_{EL}	V_E = 0 V, Output Off	—	0	-5.0	μA
Thermal Shutdown Temp.	T_J		135	150	—	°C
Thermal Resistance	$R_{\theta JL}$	To terminals 7 and 8	—	36	—	°C/W

Typical values are at T_A = +25°C and are given for circuit design information only.

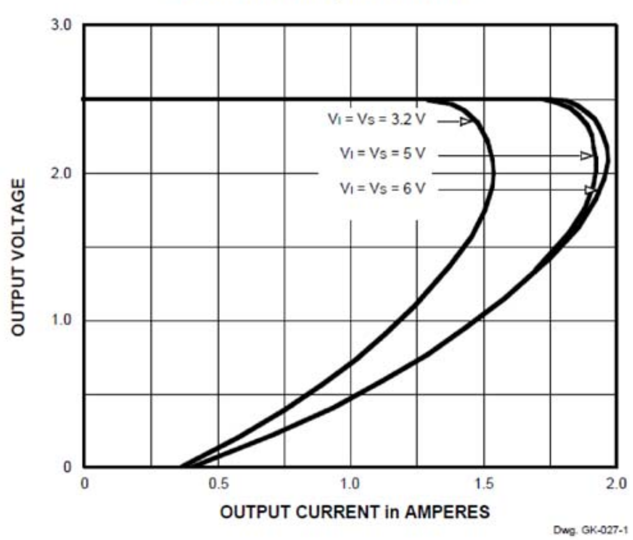
TYPICAL CHARACTERISTICS at T_A = 25°C



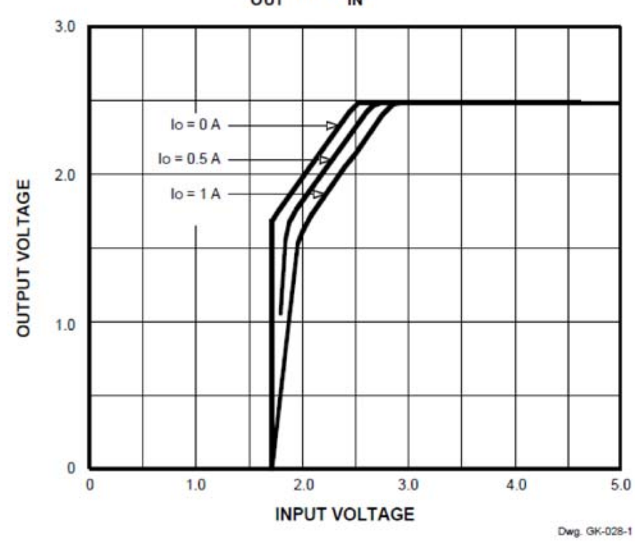
Dropout voltage



Load regulation

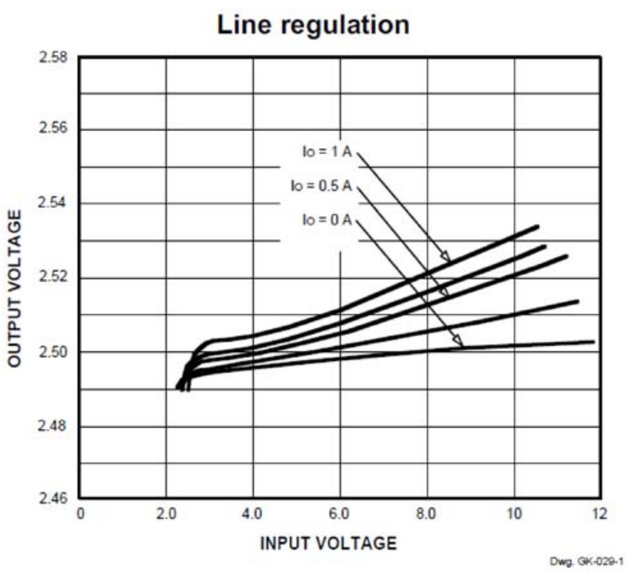


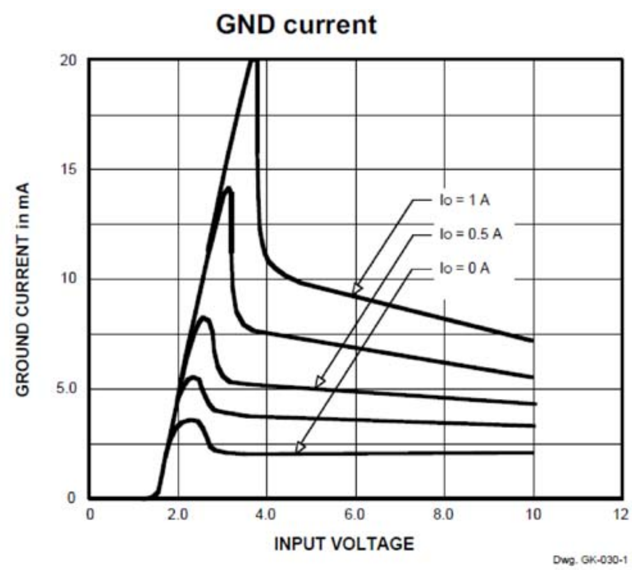
Overcurrent protection

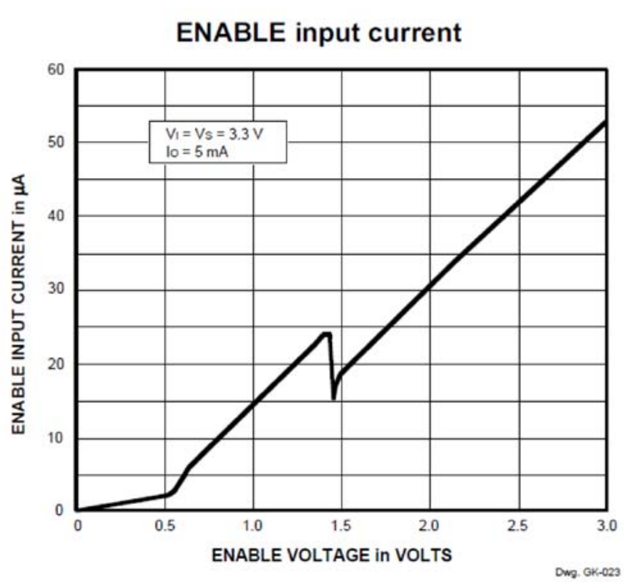


V_{OUT} vs V_{IN}

TYPICAL CHARACTERISTICS at T_A = 25°C (cont'd)







APPLICATIONS INFORMATION

Thermal shutdown and heat sinking. Thermal protection circuitry turns off the device should the junction temperature rise above 135°C. This is intended only to protect the device from failures due to excessive junction temperatures and should not imply that high-temperature operation is permitted. Ambient temperature is affected by air circulation and proximity to other heat-producing components. Normal operation is resumed when the junction temperature is reduced. Output terminals 7 and 8 are the lead frame and substrate of the pass transistor and provide a low thermal-resistance path for heat sinking.

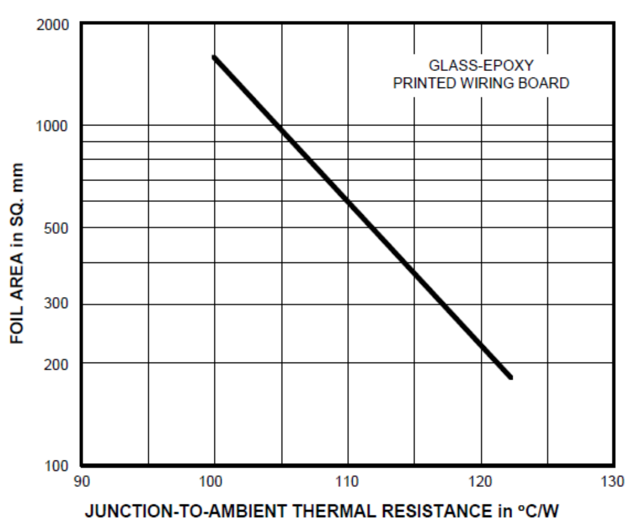
In general, the maximum ambient temperature has the most effect on determining the heat sinking that is needed to maintain a safe normal operating junction temperature. The maximum heat sinking thermal resistance ($R_{\theta JA}$) can be calculated as

$$R_{\theta JA} = (135 - T_A) / I_O (V_I - 2.5)$$

where T_A is the maximum ambient temperature in °C,
I_O is the maximum output (load) current in amperes, and
V_I is the maximum input voltage in volts.

The following graph gives the required copper foil area (soldered to leads 7 and 8) to provide the required thermal resistance. Note that more is always better and both sides of the printed wiring board can be used.

ENABLE input. The ENABLE input includes an internal pull-down resistor. If this terminal is not connected (open-circuit fault), the device output is turned off.



Overcurrent protection. The SI-3025LSA includes an overcurrent protection circuit, which limits the output current at start up. It thus cannot be used with
1) a constant-current load,
2) a power supply with positive and negative to a common load (center-tap type power supply),
3) a series power supply, or
4) a diode or resistor in series with the device ground to raise the output voltage.

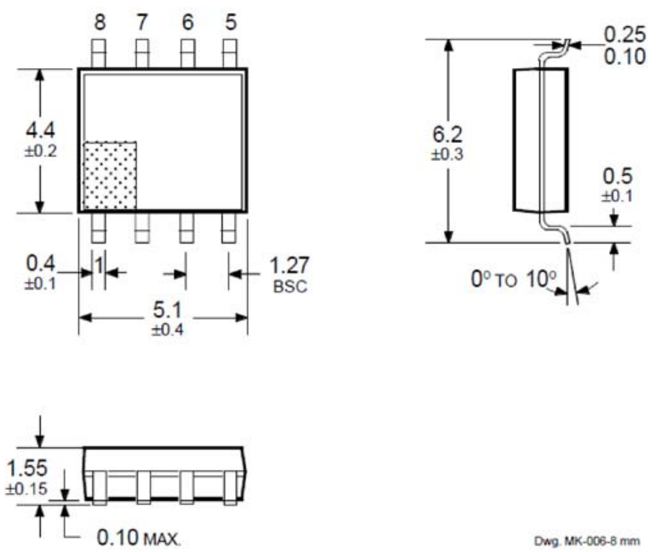
Input voltage. Including ripple voltage and transients, the minimum input voltage should be greater than the sum of the output voltage and the maximum rated dropout voltage; the maximum input voltage must be less than the absolute maximum rated input voltage (16 V).

In most applications, the input voltage (terminal 1, V_I) and the supply voltage (terminal 3, V_S) are connected together.

Output capacitor. A 22 µF tantalum electrolytic capacitor is recommended between the output and ground. Very-low ESR capacitors should not be used.

Input capacitor. A 0.1 µF to 10 µF tantalum capacitor is recommended between the input and ground to prevent oscillation.

Dimensions in Millimeters
(controlling dimensions)



NOTES: 1. Exact body and lead configuration at vendor's option within limits shown.
2. Lead spacing tolerance is non-cumulative.
3. Leads 7 and 8 are internally connected together and provide heat sinking of the pass transistor.

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  In addition, it should be noted that since power devices or IC's including power devices have large self-heating value, the degree of derating of junction temperature affects the reliability significantly.
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