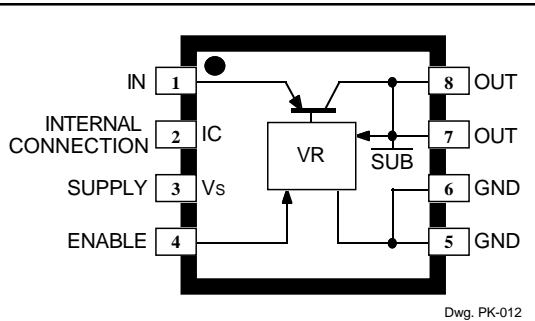


LOW-VOLTAGE, HIGH-CURRENT 1.8 V LINEAR REGULATOR



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 of 150°C.

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

The SI-3018LSA 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 2.5 V or 3.3 V are also available.

The high-current pass element provides an output current to 1 A. Regulator accuracy of $\pm 2\%$ 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

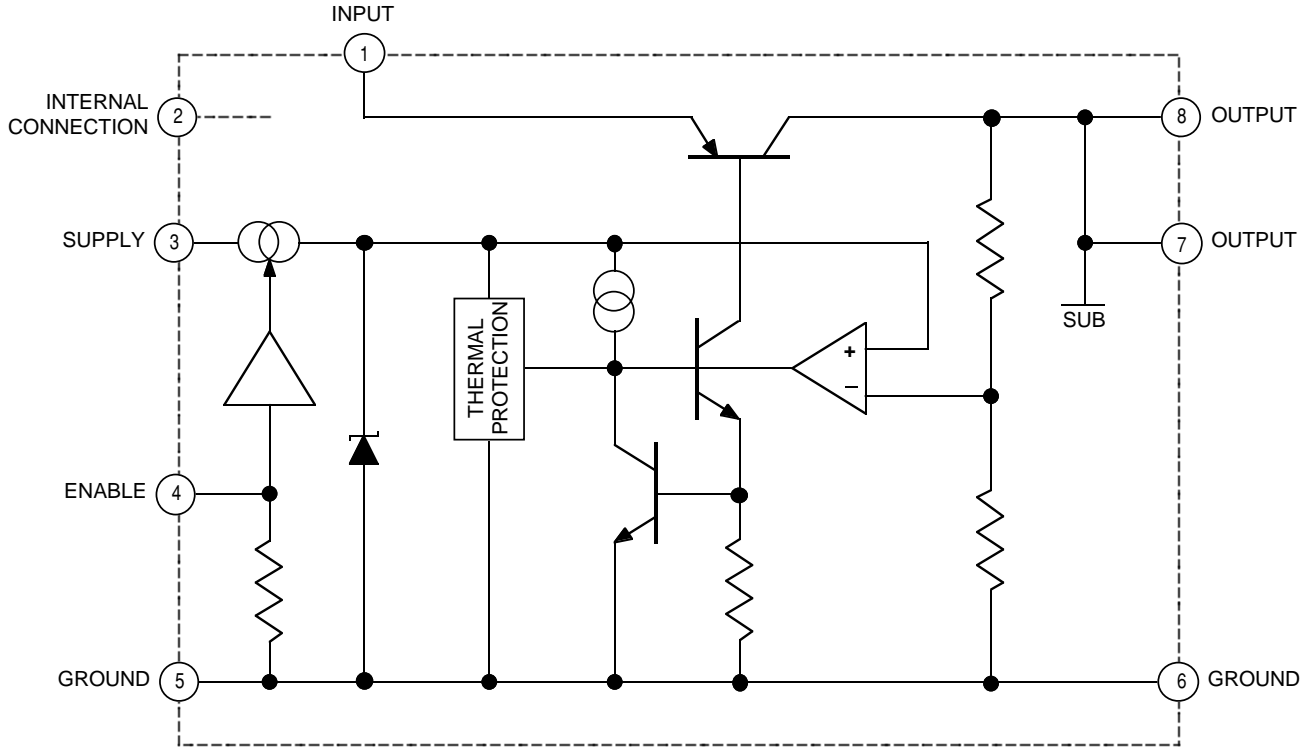
- 1 A Output Current
- LSTTL/CMOS-Compatible On/Off Control
Less Than 1 μ A "Sleep" Current
- Internal Foldback Overcurrent Limiting
- Internal Thermal Protection
- Surface-Mount Package

Always order by complete part number: **SI-3018LSA-TL**, where "TL" indicates tape and reel.

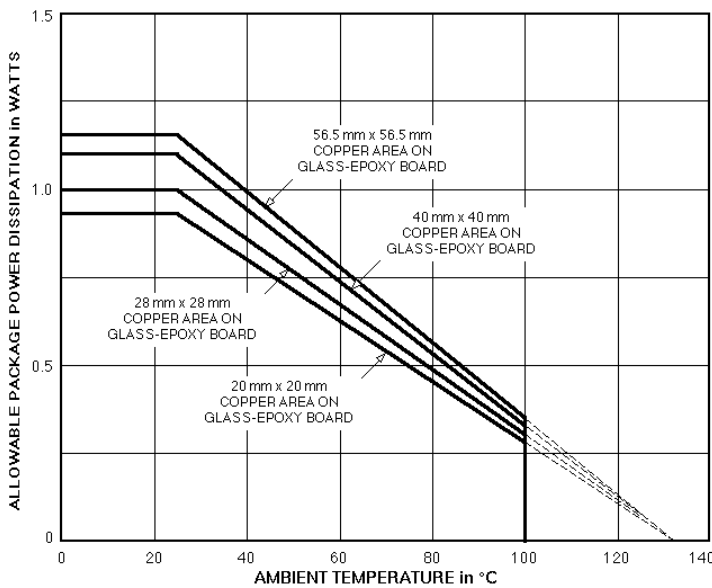
SI-3018LSA
LOW-VOLTAGE, HIGH-CURRENT
1.8 V LINEAR REGULATOR

*Linear
Regulators*

FUNCTIONAL BLOCK DIAGRAM



Dwg. FK-019



Dwg. GK-010-1

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**

For the availability of parts meeting -40°C requirements, contact Allegro's Sales Representative.

This data sheet is based on Sanken data sheet SSJ-01835.

ELECTRICAL CHARACTERISTICS at $T_A = +25^\circ\text{C}$, $V_I = V_S = 3.3\text{ V}$, $V_E = 2.0\text{ V}$ (unless otherwise noted).

| Characteristic | Symbol | Test Conditions | Limits | | | |
|---------------------------|----------------------------|---|--------|-----------|-------|----------------------|
| | | | Min. | Typ. | Max. | Units |
| Output Voltage | V_O | $I_O = 500\text{ mA}$ | 1.764 | 1.800 | 1.836 | V |
| | V_{OQ} | $V_E = 0\text{ V}$, Output Off | — | — | 0.5 | V |
| Output Volt. Temp. Coeff. | a_{VO} | $I_O = 5\text{ mA}$, $0^\circ\text{C} \leq T_J \leq 100^\circ\text{C}$ | — | ± 0.3 | — | mV/ $^\circ\text{C}$ |
| Overcurrent Limit | I_{OM} | $V_O = 95\%$ of V_O at $I_O = 500\text{ mA}$ | 1.2 | 1.5 | — | A |
| Line Regulation | $\Delta V_{O(\Delta V_I)}$ | $3.1\text{ V} \leq V_I = V_S \leq 3.5\text{ V}$, $I_O = 300\text{ mA}$ | — | 2.0 | 10 | mV |
| Load Regulation | $\Delta V_{O(\Delta I_O)}$ | $0 \leq I_O \leq 1\text{ A}$ | — | 10 | 20 | mV |
| Dropout Voltage | $V_{i\text{min}} - V_O$ | $I_O \leq 1\text{ A}$ | — | 0.55 | 1.2 | V |
| Ground Terminal Current | I_{GND} | $I_O = 0\text{ mA}$ | — | 1.7 | 2.5 | mA |
| | I_Q | $V_E = 0\text{ V}$, $I_O = 0\text{ mA}$ | — | — | 1.0 | μA |
| Rejection Ratio | PSRR | $100\text{ Hz} \leq f \leq 120\text{ Hz}$ | — | 60 | — | dB |
| ENABLE Input Voltage | V_{EH} | Output On | 2.0 | — | — | V |
| | V_{EL} | Output Off | — | — | 0.8 | V |
| ENABLE Input Current | I_{EH} | $V_E = 2\text{ V}$, Output On | — | 30 | 80 | μA |
| | I_{EL} | $V_E = 0\text{ V}$, Output Off | — | 0 | -5.0 | μA |
| Thermal Protection Temp. | T_J | | 135 | 150 | — | $^\circ\text{C}$ |
| Thermal Resistance | $R_{\theta JL}$ | To terminals 7 and 8 | — | 36 | — | $^\circ\text{C/W}$ |

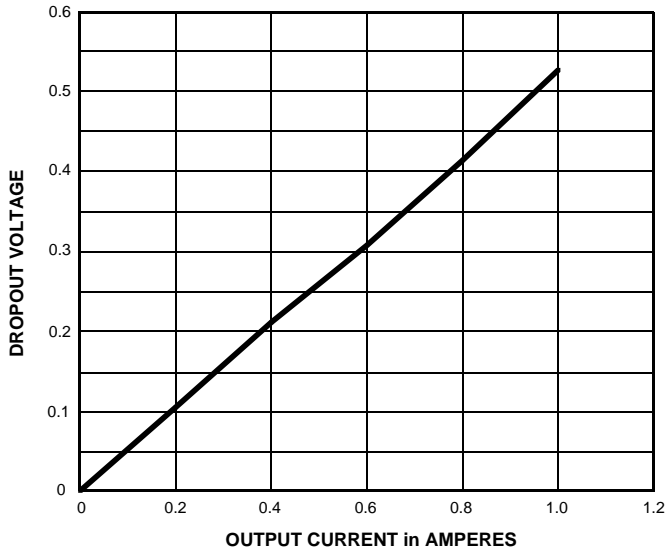
Typical values are at $T_A = +25^\circ\text{C}$ and are given for circuit design information only.

SI-3018LSA
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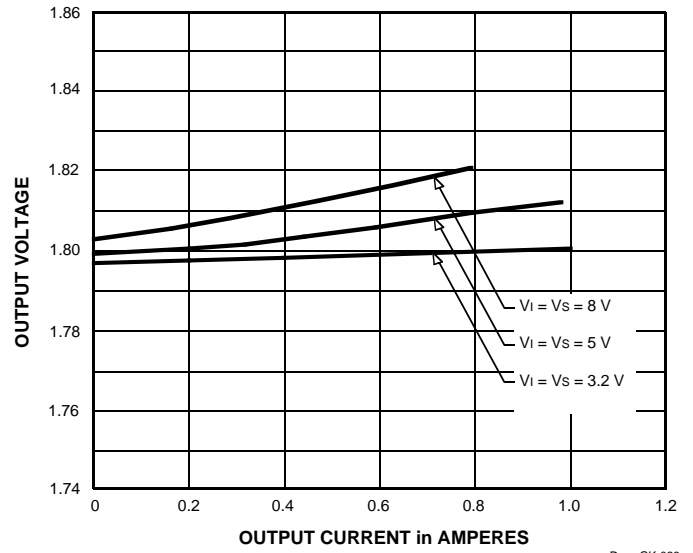
*Linear
Regulators*

TYPICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$

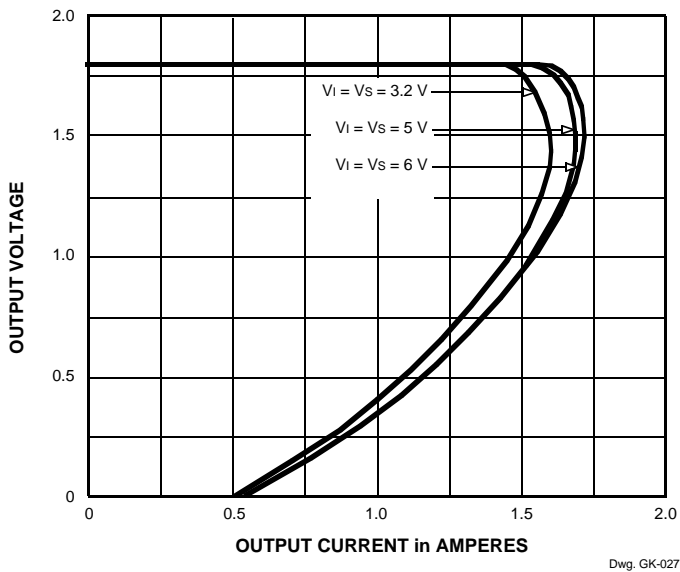
Dropout voltage



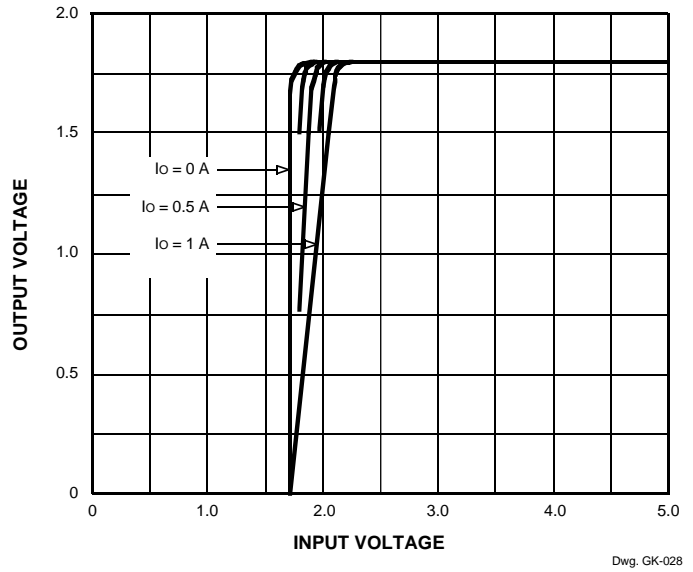
Load regulation



Overcurrent protection

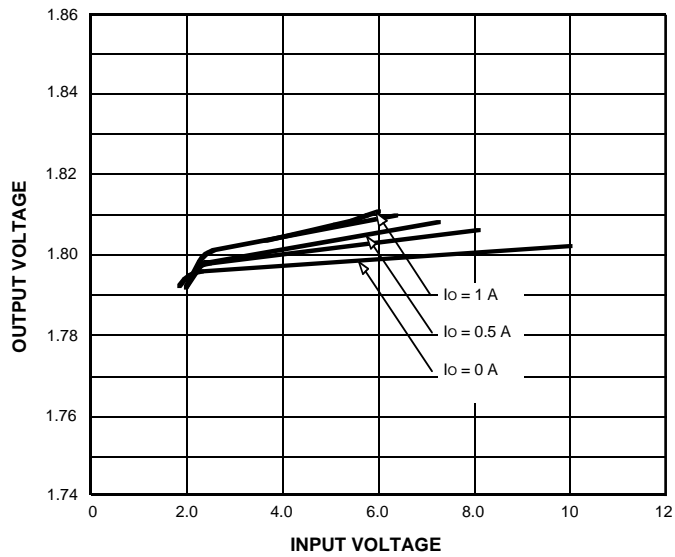


V_{OUT} vs V_{IN}

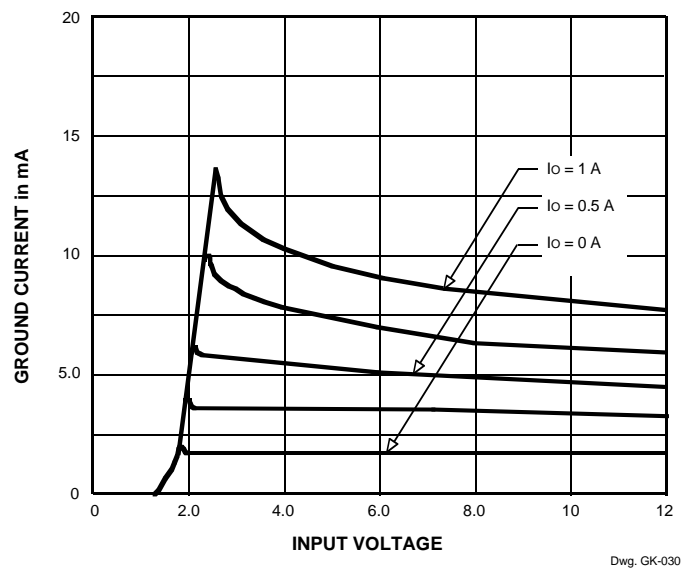


TYPICAL CHARACTERISTICS at $T_A = 25^\circ\text{C}$ (cont'd)

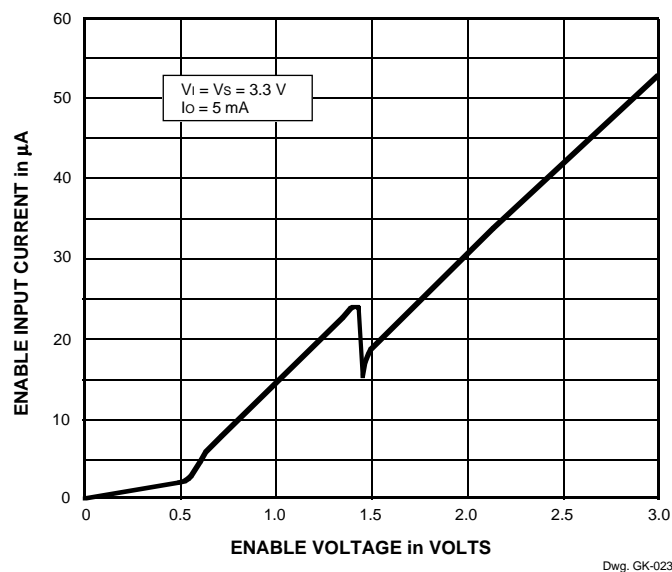
Line regulation



GND current



ENABLE input current



SI-3018LSA
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*Linear
Regulators*

APPLICATIONS INFORMATION

Thermal protection 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

$$R_{\theta JA} = (135 - T_A) / I_O (V_I - 1.8)$$

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-3018LSA includes an overcurrent protection circuit, which limits the output current at start up. It thus cannot be used with

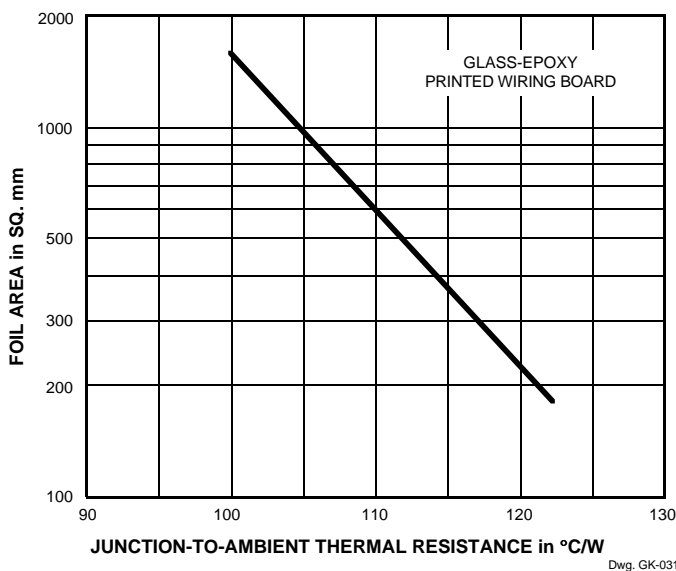
- 1) a constant-current load,
- 2) a power supply with positive and negative to a common load (center-tap type power supply),
- 3) a series power supply, or
- 4) a diode or resistor in series with the device ground to raise the output voltage.

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).

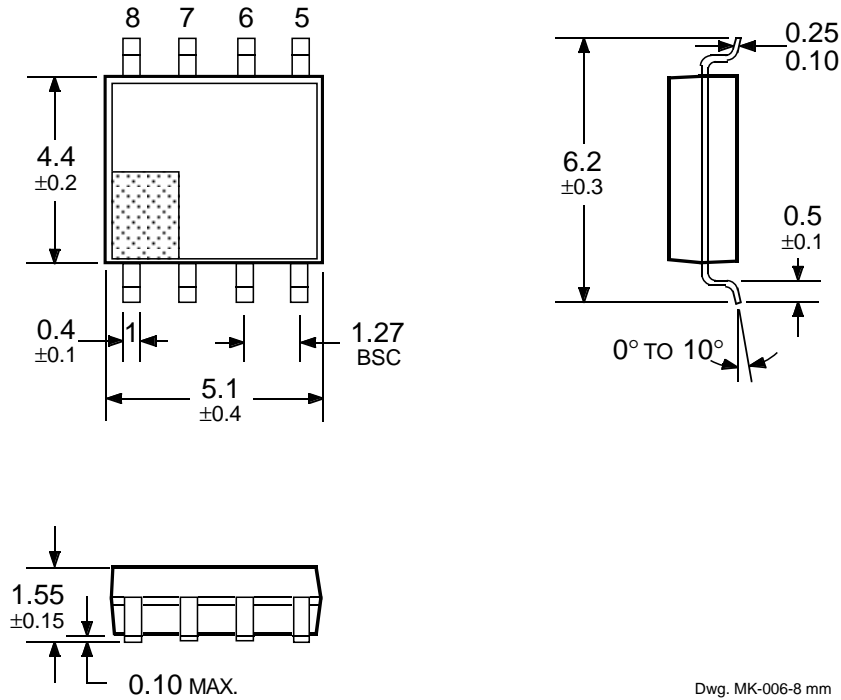
In most applications, the input voltage (terminal 1, V_I) and the supply voltage (terminal 3, V_S) are connected together.

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)



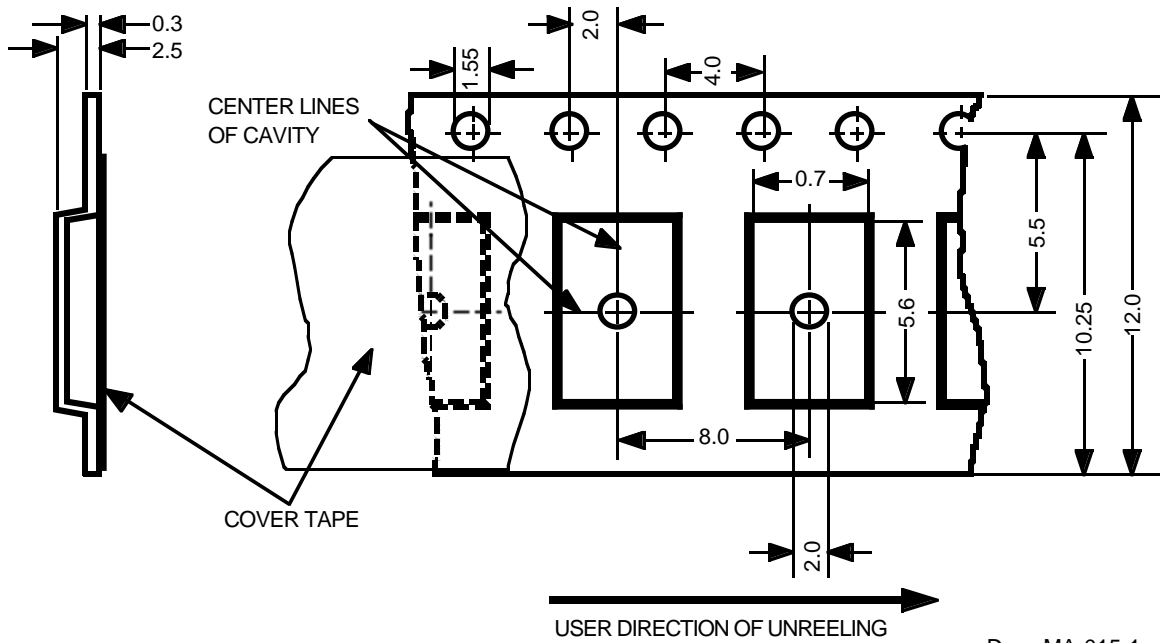
Dwg. MK-006-8 mm

- 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.

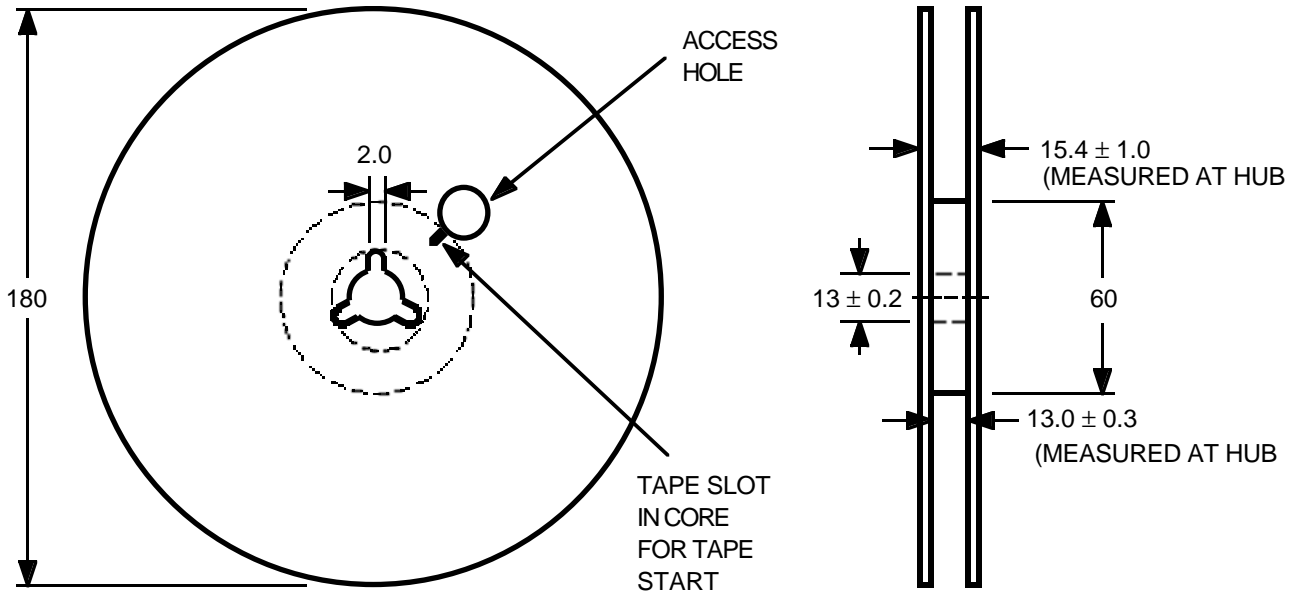
SI-3018LSA
LOW-VOLTAGE, HIGH-CURRENT
1.8 V LINEAR REGULATOR

*Linear
Regulators*

Tape and Reel Dimensions in Millimeters
(controlling dimensions)



Dwg. MA-015-1



Dwg. MA-018-1

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