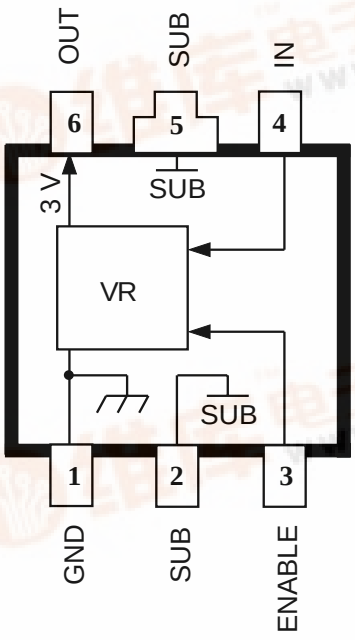
# 8183

# 100 mA, OUT, 3 V REGULATOR — HIGH EFFICIENCY

MicroSystems, Inc.




Dwg. PS-021

## ABSOLUTE MAXIMUM RATINGS

Input Voltage, $V_I$ . . . . . **10 V**
Output Current, $I_O$ . . . . . **150 mA***
Enable Input Voltage, $V_E$ . . . . . **$V_I$**
Operating Temperature Range,
$T_A$ . . . . . **-20°C to +85°C**
Junction Temperature, $T_J$ . . . **+150°C†**
Storage Temperature Range,
$T_S$ . . . . . **-40°C to +150°C**

* Output current rating is limited by input voltage, duty cycle, and ambient temperature. Under any set of conditions, do not exceed a junction temperature of +150°C. See next page.

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

Designed specifically to meet the requirement for extended operation of battery-powered equipment such as cordless and cellular telephones, the A8183SLU voltage regulator offers the reduced dropout voltage and quiescent current essential for maximum battery life. Applicable also to palmtop computers and personal data assistants, the device delivers a regulated, continuous 3 V output at up to 75 mA under normal operating conditions, or to 150 mA (transient) under worst-case conditions.

A PMOS pass element provides a typical dropout voltage of only 90 mV at 60 mA of load current. The low dropout voltage permits deeper battery discharge before output regulation is lost. Furthermore, quiescent current does not increase as the dropout voltage is approached, an ideal feature in standby/resume power systems where data integrity is crucial. Regulator accuracy and excellent temperature characteristics are provided by a bandgap reference. An ENABLE input gives the designer complete control over power up, standby, or power down.

This device is supplied in a 6-lead small-outline plastic package (similar to the SOT-89/TO-243AA) for surface-mount applications. The A8183SLU is rated for operation over a temperature range of -20°C to +85°C.

## FEATURES AND BENEFITS

- High Efficiency Provides Extended Battery Life
- 90 mV Typical Dropout Voltage at $I_O$ = 60 mA
- 45 µA Typical Quiescent Current at $V_I$ = 6 V
  Less Than 1 µA “Sleep” Current
- Up to 150 mA Output Current
- CMOS-Compatible ON/OFF Control
  For Power-Up, Standby, or Shutdown
- Internal Thermal Protection
- Surface-Mount Package

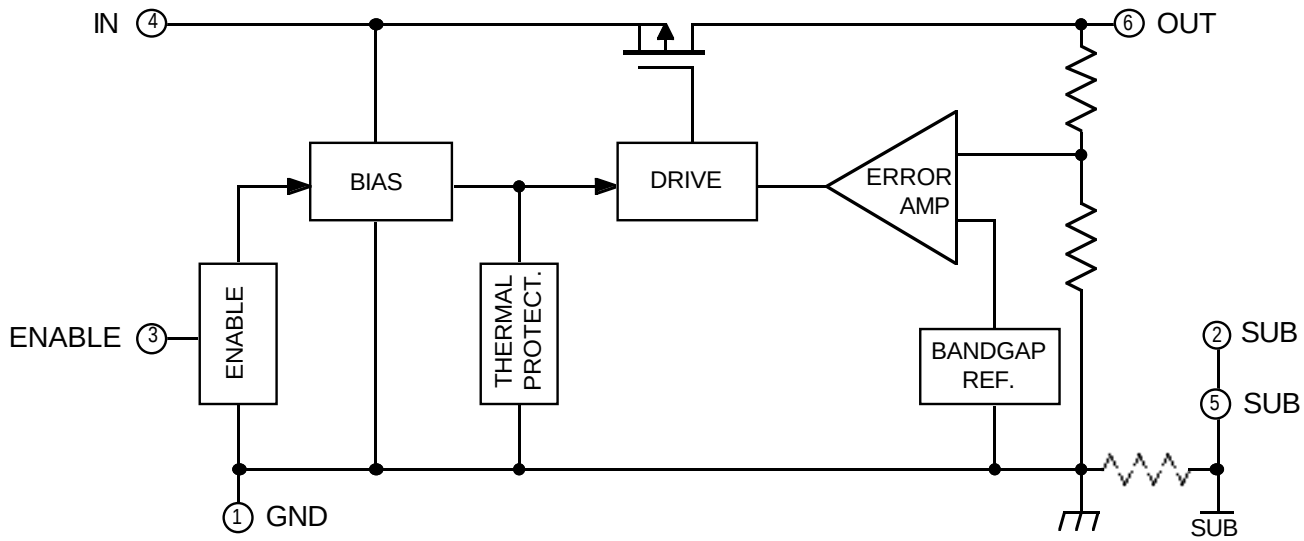
## APPLICATIONS

- Cordless and Cellular Telephones
- Personal Data Assistants
- Personal Communicators
- Palmtop Computers

Always order by complete part number: **A8183SLU** .

# 8183
## *LOW-DROPOUT, 3 V REGULATOR*

### FUNCTIONAL BLOCK DIAGRAM




Dwg. FS-012-3

Terminal numbering is in accordance with EIA/JEDEC convention. Where EIAJ conventions apply, the tab is not numbered, resulting in terminal 6 being designated terminal 5.

For proper operation, terminals 1 and 2 must be externally connected together.

### MAXIMUM ALLOWABLE OUTPUT CURRENT with device mounted on 2.24" x 2.24" (56.9 mm x 56.9 mm) solder-coated copper-clad board in still air.

| | Maximum Allowable Output Current in Milliamperes with $V_I$ = 8 V, $T_J$ = 150°C, Period ≤10 s* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | dc (Duty Cycle) | | | | | | | | |
| $T_A$ | 100% | 90% | 80% | 70% | 60% | 50% | 40% | 30% | 20% |
| 25°C | 95 | 105 | 120 | 135 | 150 | 150 | 150 | 150 | 150 |
| 50°C | 75 | 85 | 95 | 110 | 125 | 150 | 150 | 150 | 150 |
| 70°C | 60 | 65 | 75 | 85 | 100 | 120 | 150 | 150 | 150 |
| 85°C | 50 | 55 | 60 | 70 | 80 | 100 | 125 | 150 | 150 |

* $I_O = (T_J - T_A)/([V_I - V_O] R_{\theta JA} \bullet dc) = (150 - T_A)/(5 \bullet 258 \bullet dc)$

Output current rating can be increased (to 150 mA maximum) by heat sinking or reducing the input voltage. Conditions that produce excessive junction temperature will activate device thermal shutdown circuitry. These conditions can be tolerated but should be avoided.

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**ELECTRICAL CHARACTERISTICS at $T_A$ = +25°C (unless otherwise noted).**

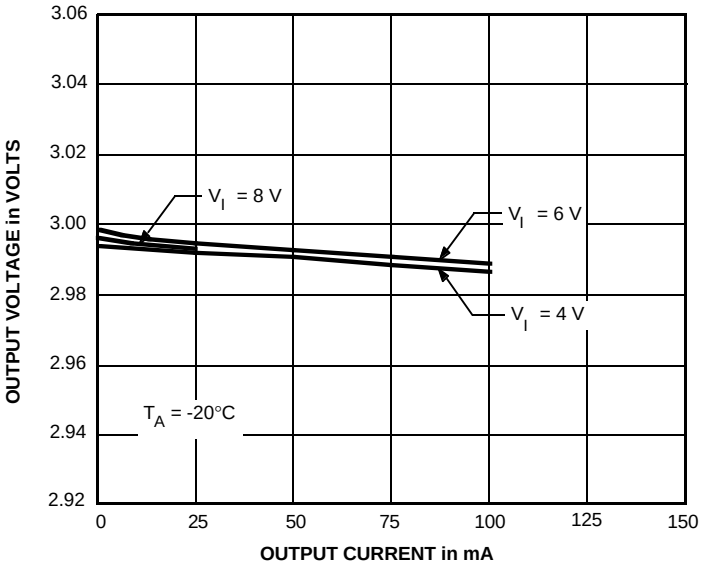
| Characteristic | Symbol | Test Conditions | | Limits Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|---|
| Output Voltage | $V_O$ | 4 V ≤ $V_I$ ≤ 8 V, | $T_A$ = +25°C | 2.95 | 3.00 | 3.05 | V |
| | | 10 µA ≤ $I_O$ ≤ 100 mA* | -20°C ≤ $T_A$ ≤ +85°C | 2.90 | 3.00 | 3.10 | V |
| | | $V_I$ = 3 V, $I_O$ = 60 mA*, -20°C ≤ $T_A$ ≤ +85°C | | 2.70 | — | — | V |
| Output Volt. Temp. Coeff. | $\alpha_{VO}$ | $V_I$ = 6 V, $I_O$ = 10 mA | | — | — | ±1.0 | mV/°C |
| Line Regulation | $\Delta V_{O(\Delta VI)}$ | 6 V ≤ $V_I$ ≤ 8 V, $I_O$ = 1 mA | | — | 4.0 | 10 | mV |
| | | 4 V ≤ $V_I$ ≤ 6 V, $I_O$ = 1 mA | | — | 9.5 | 18 | mV |
| Load Regulation | $\Delta V_{O(\Delta IO)}$ | 1 mA ≤ $I_O$ ≤ 100 mA*, $V_I$ = 8 V | | — | 19 | 30 | mV |
| | | 1 mA ≤ $I_O$ ≤ 100 mA*, $V_I$ = 6 V | | — | 14 | 25 | mV |
| | | 1 mA ≤ $I_O$ ≤ 100 mA*, $V_I$ = 4 V | | — | 8.0 | 20 | mV |
| Dropout Voltage | $V_I$min - $V_O$ | $I_O$ = 60 mA* | | — | 90 | 150 | mV |
| | | $I_O$ = 125 mA* | | — | 190 | 300 | mV |
| Quiescent Current (GND terminal current) | $I_Q$ | $V_I$ = 6 V, 1 mA ≤ $I_O$ ≤ 100 mA*, $V_E$ ≥ 2.0 V | | — | 45 | 60 | µA |
| | | $V_I$ = 8 V, 1 mA ≤ $I_O$ ≤ 100 mA*, $V_E$ ≥ 2.0 V | | — | 50 | 65 | µA |
| | $I_{Q(off)}$ | 4 V ≤ $V_I$ ≤ 8 V, $V_E$ ≤ 0.8 V | | — | — | 1.0 | µA |
| ENABLE Input Voltage | $V_{EH}$ | 4 V ≤ $V_I$ ≤ 8 V, | Output ON | 2.0 | — | — | V |
| | $V_{EL}$ | -20°C ≤ $T_A$ ≤ +85°C | Output OFF | — | — | 0.8 | V |
| ENABLE Input Current | $I_E$ | $T_A$ ≤ +85°C, $V_E$ = $V_I$ = 8 V | | — | — | ±0.1 | µA |
| Thermal Shutdown Temp. | $T_J$ | | | 150 | — | — | °C |
| Thermal Resistance | $R_{\theta JA}$ | Mounted on 2.24" x 2.24" solder-coated copper-clad board in still air | | — | 258 | — | °C/W |

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

* Pulse test (≤20 ms). See previous page for duty cycle limitations.

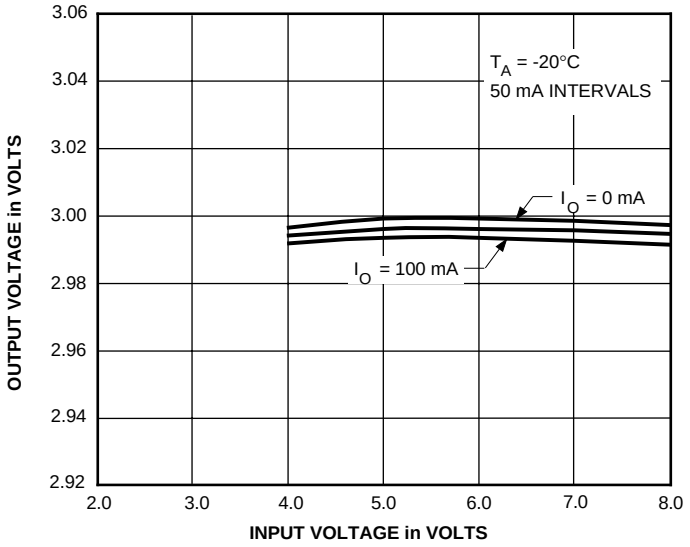
## TYPICAL CHARACTERISTICS

### LOAD REGULATION

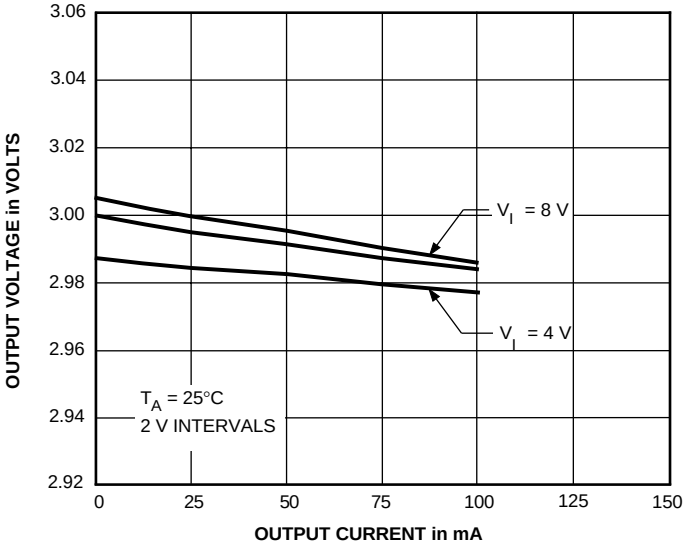



Dwg. GP-052-3

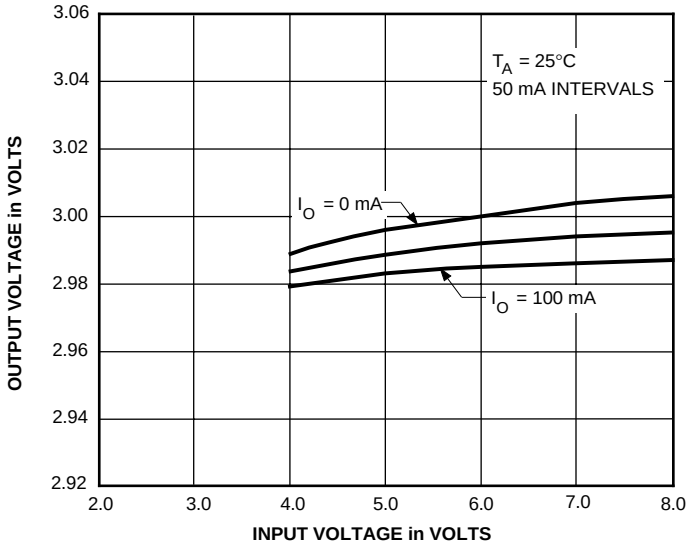
### LINE REGULATION




Dwg. GP-053-3




Dwg. GP-052-4




Dwg. GP-053-4

**CAUTION:** Maximum allowable duty cycle will be significantly less than 100% at high temperatures, at high input voltages, or at high output currents. See Maximum Allowable Output Current table.

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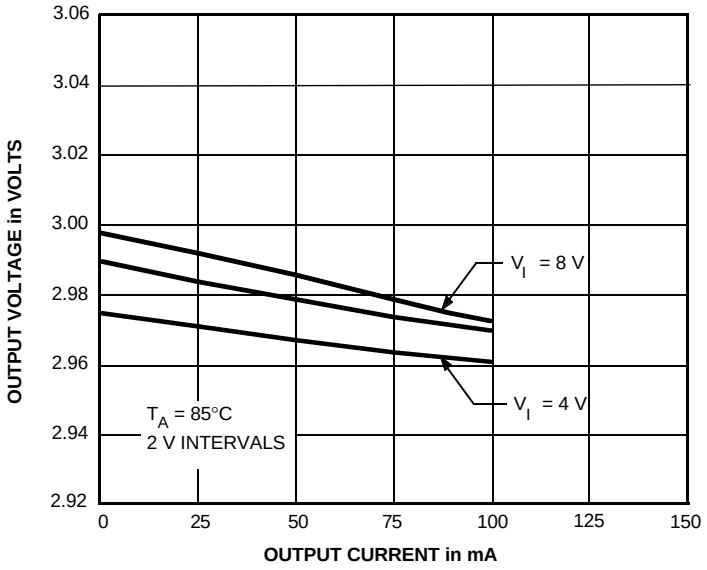
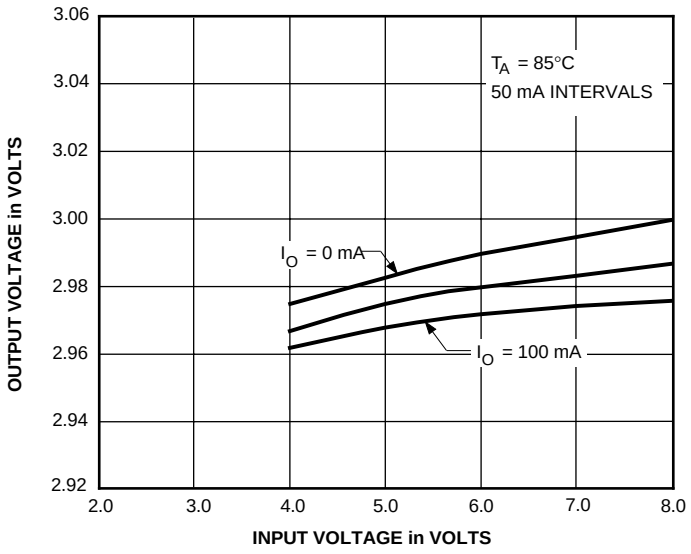
## TYPICAL CHARACTERISTICS (cont'd)

### LOAD REGULATION



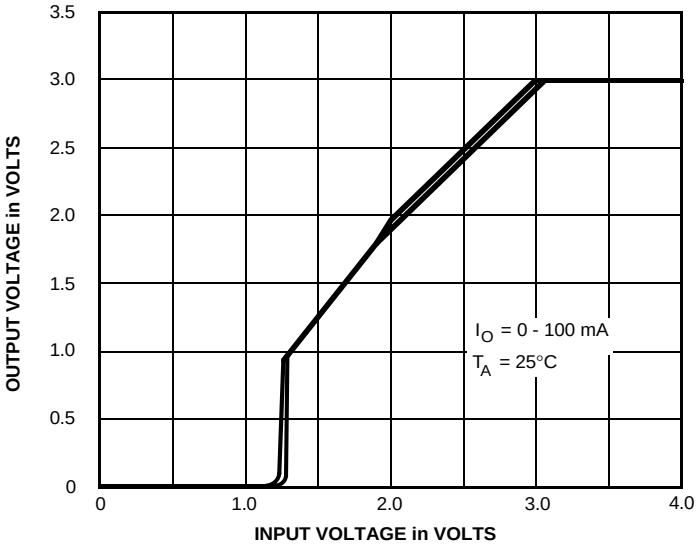

Dwg. GP-052-5

### LINE REGULATION

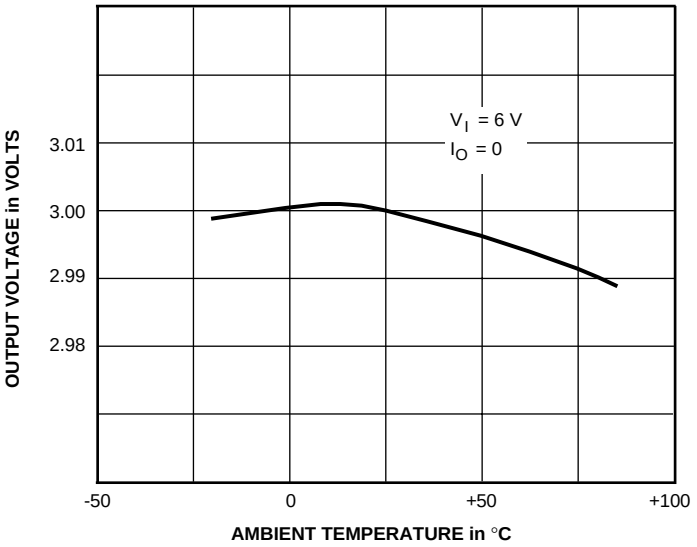



Dwg. GP-053-5

### OUTPUT VOLTAGE




Dwg. GP-059

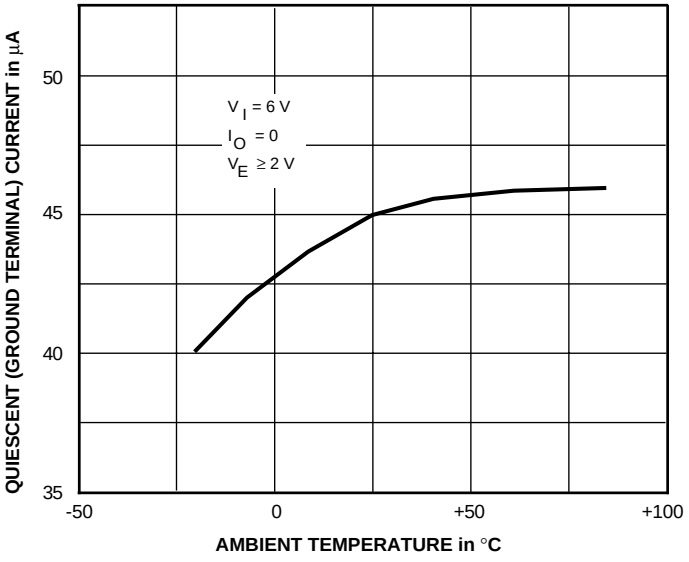



Dwg. GP-050-1

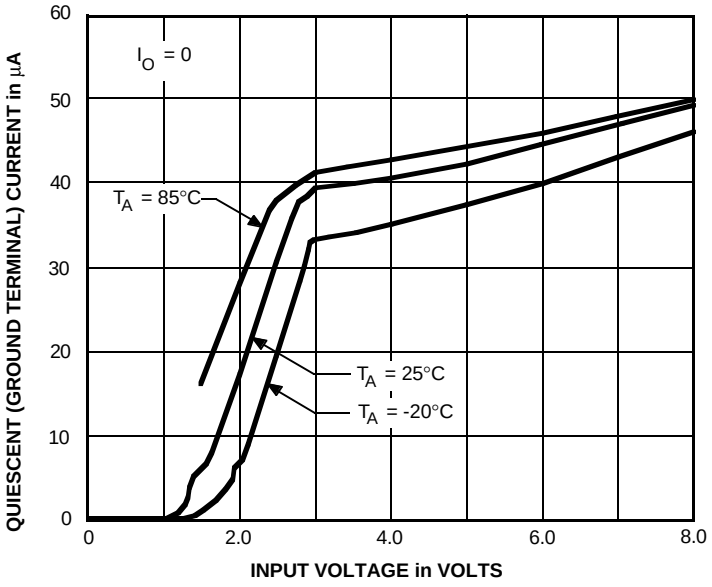
**CAUTION:** Maximum allowable duty cycle will be significantly less than 100% at high temperatures, at high input voltages, or at high output currents. See Maximum Allowable Output Current table.

## TYPICAL CHARACTERISTICS (cont'd)

### QUIESCENT (GROUND TERMINAL) CURRENT

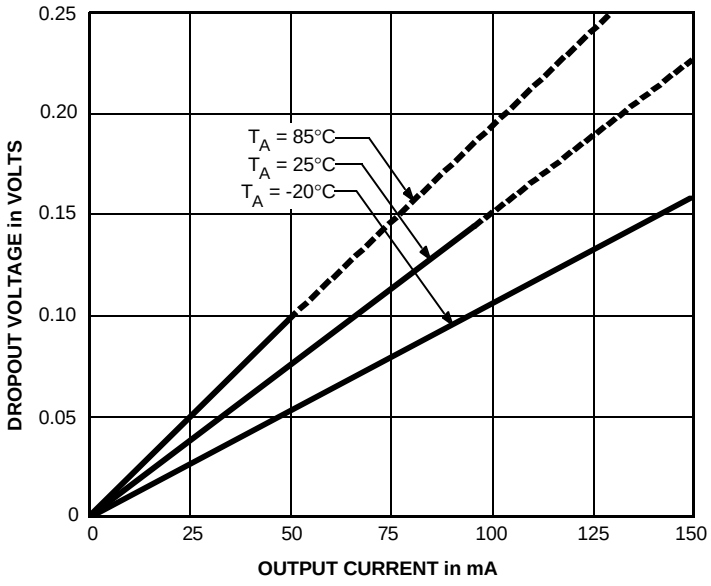



Dwg. GP-051-1




Dwg. GP-058

### DROPOUT VOLTAGE




Dwg. GP-054-1

**CAUTION:** Maximum allowable duty cycle will be significantly less than 100% at high temperatures, at high input voltages, or at high output currents. See Maximum Allowable Output Current table.

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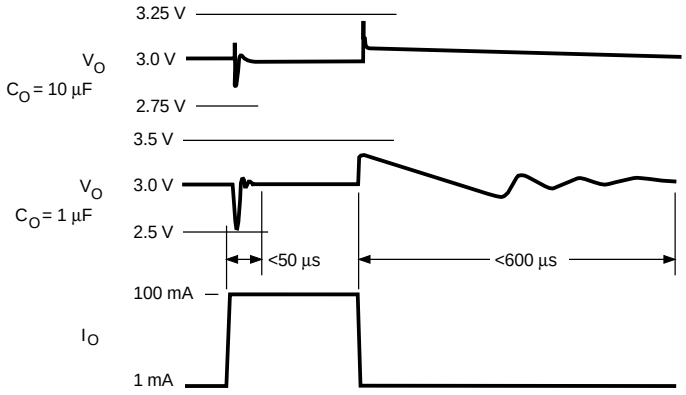
## TYPICAL CHARACTERISTICS (concluded)

### LOAD TRANSIENT PERFORMANCE

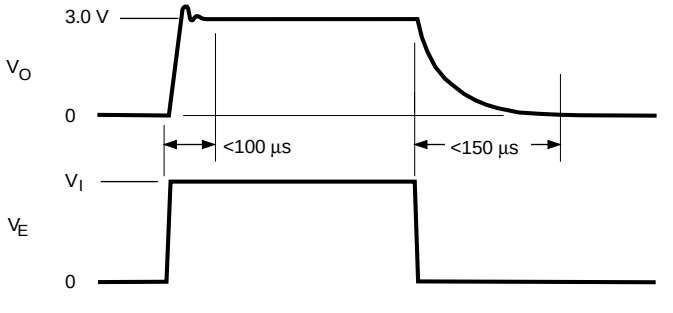
$V_I$ = 3.2 V to 6.2 V, $C_O$ as specified, $T_A$ = 25°C




Dwg. WP-028

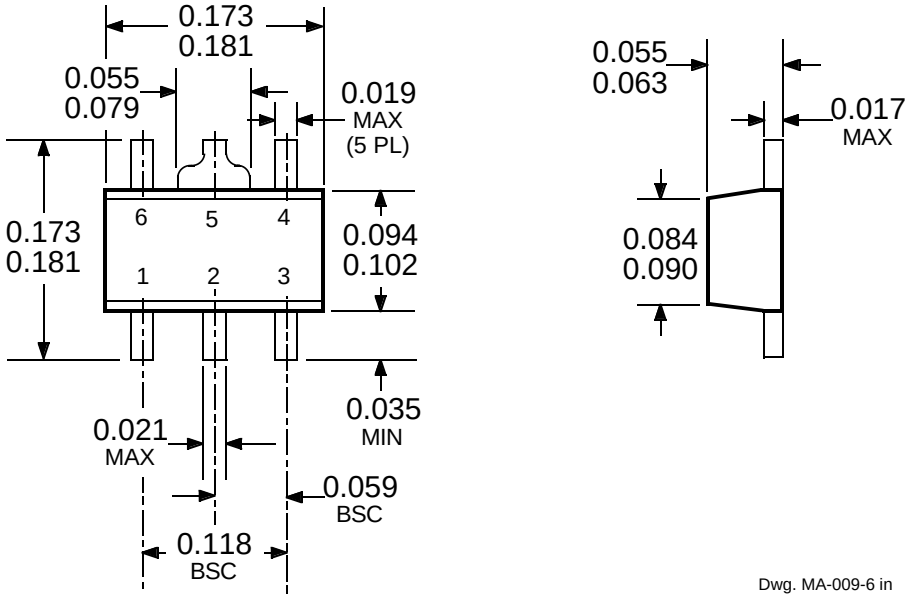
### ENABLE TRANSIENT PERFORMANCE

$V_I$ = 3.2 V to 6.2 V, $C_O$ = 1 µF, $T_A$ = 25°C



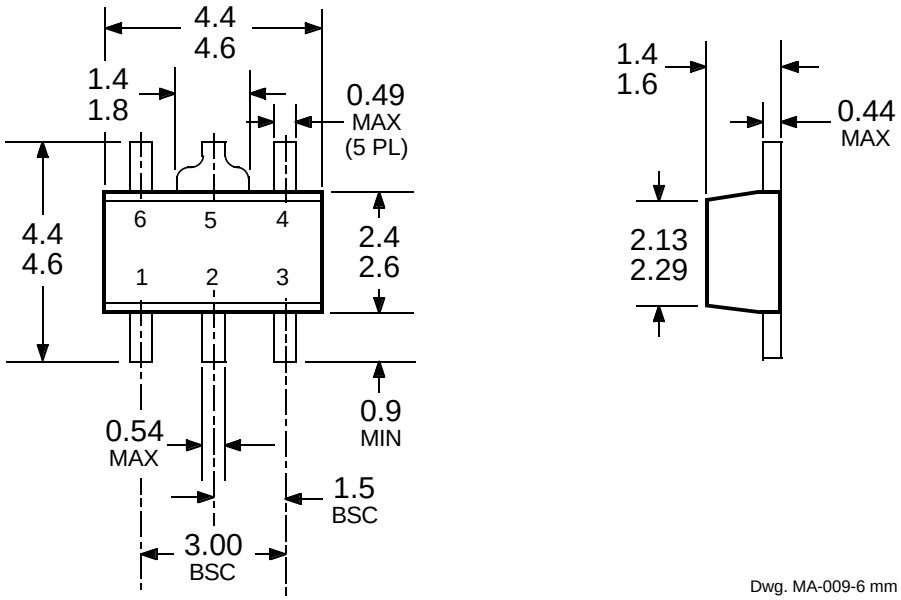

Dwg. WP-027-1

**Dimensions in Inches**
**(Based on 1 mm = 0.03937")**




Dwg. MA-009-6 in

**Dimensions in Millimeters**




Dwg. MA-009-6 mm



NOTES:
1. Lead spacing tolerance is non-cumulative.
2. Exact body and lead configuration at vendor's option within limits shown.
3. Terminal numbering is in accordance with EIA/JEDEC convention. Where EIAJ conventions apply, the tab is not numbered, resulting in terminal 6 being designated terminal 5.