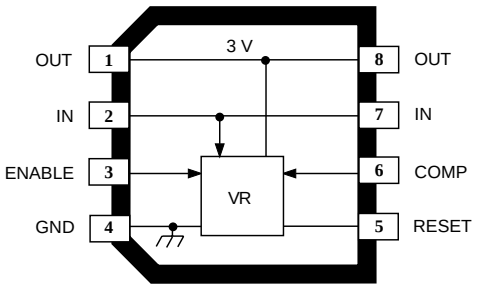
PRELIMINARY INFORMATION DATA SHEET
(Subject to change without notice)
November 14, 1994

8182

Data Sheet
27468.2

LOW-DROPOUT, 3 V REGULATOR — HIGH EFFICIENCY



Dwg. PS-020

ABSOLUTE MAXIMUM RATINGS

Input Voltage, V_I . . . . . **10 V**
Output Current, I_O . . . . . **150 mA***
Enable Input Voltage, V_E . . . . . **V_I**
Reset Output Voltage, V_{OR} . . . . . **V_I**
Reset Output Current, I_{OR} . . . . **1.0 mA**
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 A8182SL 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 3 V output at up to 150 mA.

A PMOS pass element provides a typical dropout voltage of only 85 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 and RESET output gives the designer complete control over power up, standby, or power down.

This device is supplied in an 8-lead small-outline plastic package (SOIC) for surface-mount applications. The A8182SL is rated for operation over a temperature range of -20°C to +85°C.

FEATURES AND BENEFITS

- High Efficiency Provides Extended Battery Life
- 85 mV Typical Dropout Voltage at I_O = 60 mA
- 46 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

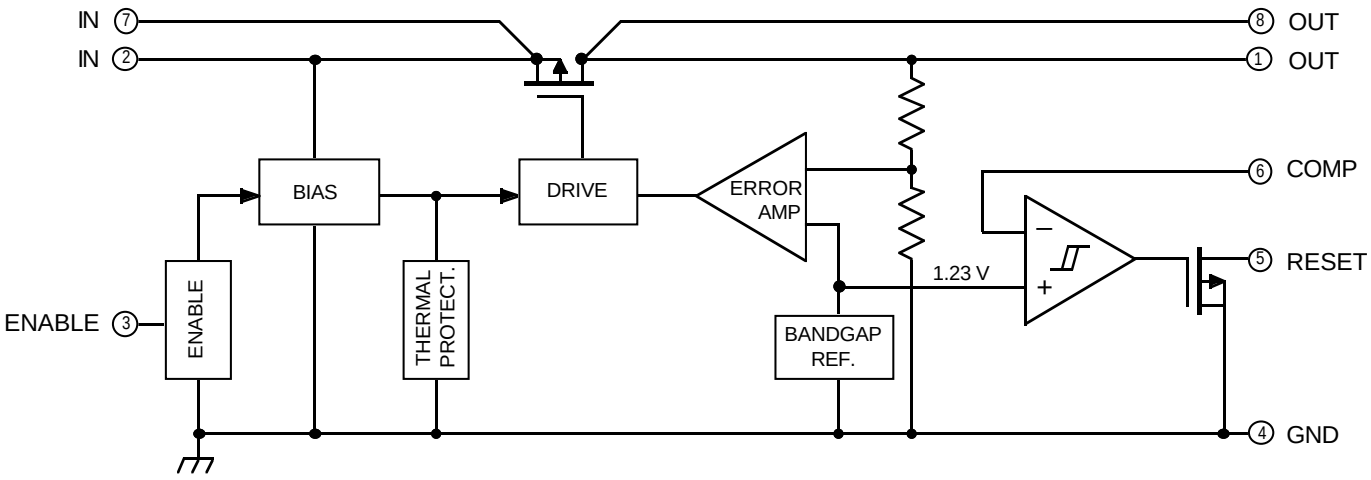
APPLICATIONS

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

Always order by complete part number: **A8182SL** .

8182
LOW-DROPOUT, 3 V REGULATOR

FUNCTIONAL BLOCK DIAGRAM



Dwg. FS-012-2

For proper operation, terminals 1 and 8 should be externally connected together, terminals 2 and 7 should 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	150	150	150	150	150	150	150	150	150
50°C	150	150	150	150	150	150	150	150	150
70°C	145	150	150	150	150	150	150	150	150
85°C	120	130	150	150	150	150	150	150	150

* $I_O = (T_J - T_A)/([V_I - V_O] R_{\theta JA} \bullet dc) = (150 - T_A)/(5 \bullet 108 \bullet dc)$

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).

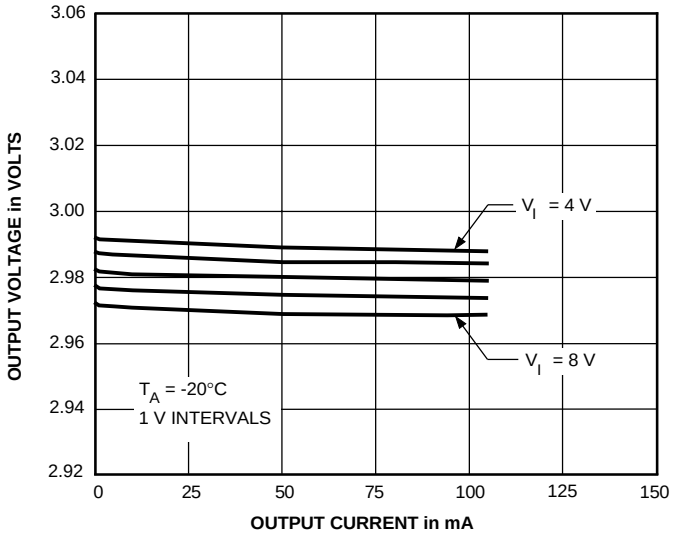
Characteristic	Symbol	Test Conditions		Limits Min.	Typ.	Max.	Units
Output Voltage	V_O	4 V ≤ V_I ≤ 8 V,	T_A = +25°C	2.95	3.00	3.05	V
		10 µA ≤ I_O ≤ 100 mA	-20°C ≤ T_A ≤ +85°C	2.90	3.00	3.10	V
		V_I = 3 V, I_O = 60 mA, -20°C ≤ T_A ≤ +85°C		2.70	—	—	V
Output Volt. Temp. Coeff.	α_{VO}	V_I = 6 V, I_O = 10 mA		—	—	±0.5	mV/°C
Line Regulation	$\Delta V_{O(\Delta VI)}$	6 V ≤ V_I ≤ 8 V, I_O = 1 mA		—	7.0	14	mV
		4 V ≤ V_I ≤ 6 V, I_O = 1 mA		—	5.5	11	mV
Load Regulation	$\Delta V_{O(\Delta IO)}$	1 mA ≤ I_O ≤ 100 mA, V_I = 8 V		—	12	30	mV
		1 mA ≤ I_O ≤ 100 mA, V_I = 6 V		—	11	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		—	85	150	mV
		I_O = 125 mA*		—	175	TBD	mV
Quiescent Current (GND terminal current)	I_Q	V_I = 6 V, 1 mA ≤ I_O ≤ 100 mA, V_E ≥ 2.0 V		—	46	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		—	0.05	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
COMP Threshold Voltage	$V_{C(t)}$	4 V ≤ V_I ≤ 8 V, V_C increasing from 0		1.20	1.23	1.30	V
COMP Threshold Volt. TC	α_{VC}	4 V ≤ V_I ≤ 8 V		—	—	±0.5	mV/°C
COMP Threshold Hys.	$V_{C(hys)}$	4 V ≤ V_I ≤ 8 V		12	34	50	mV
COMP Input Current	I_C	0 V ≤ V_C ≤ V_O		—	-25	TBD	nA
COMP Input Current TC	α_{IC}	4 V ≤ V_I ≤ 8 V		—	-0.5	-2.5	nA/°C
RESET Leakage Current	I_{OR}	V_{OR} = V_I = 10 V, T_A = +85°C		—	—	2.0	µA
RESET Output Voltage	V_{OR}	I_{OR} = 500 µA		—	100	400	mV
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		—	108	—	°C/W

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

* Pulse test (≤50 ms). See previous page for duty cycle limitations.

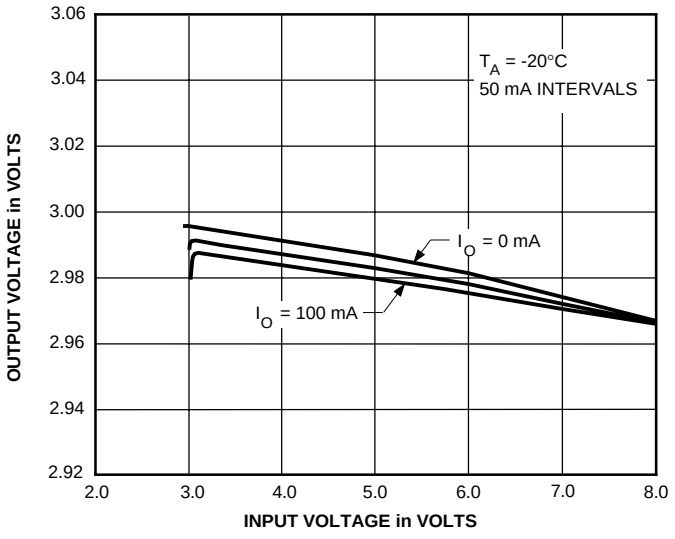
TYPICAL CHARACTERISTICS

LOAD REGULATION

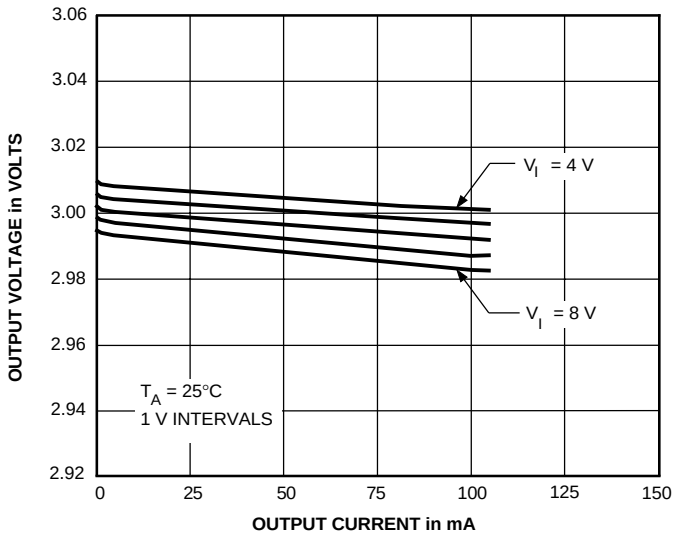


Dwg. GP-052

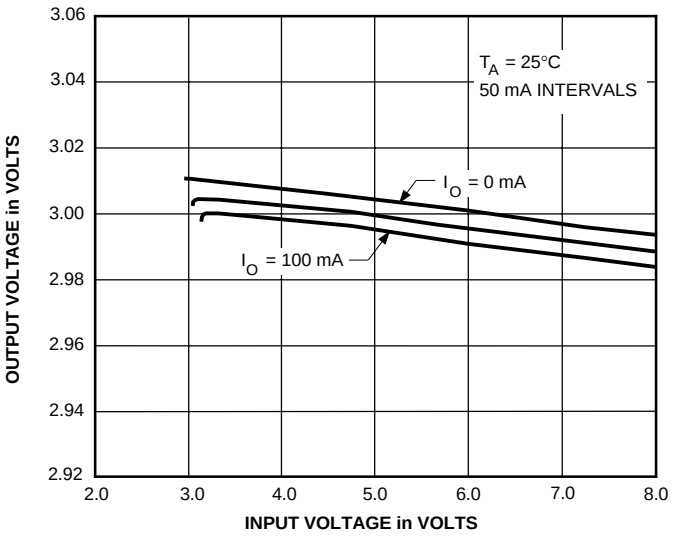
LINE REGULATION



Dwg. GP-053



Dwg. GP-052-1

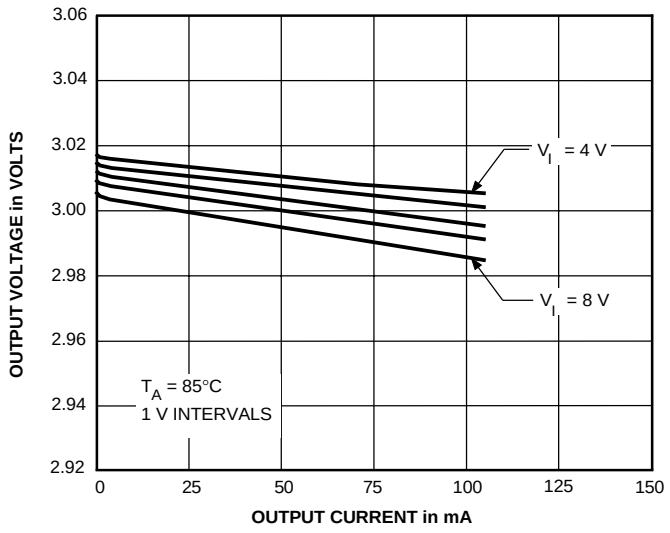


Dwg. GP-053-1

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.

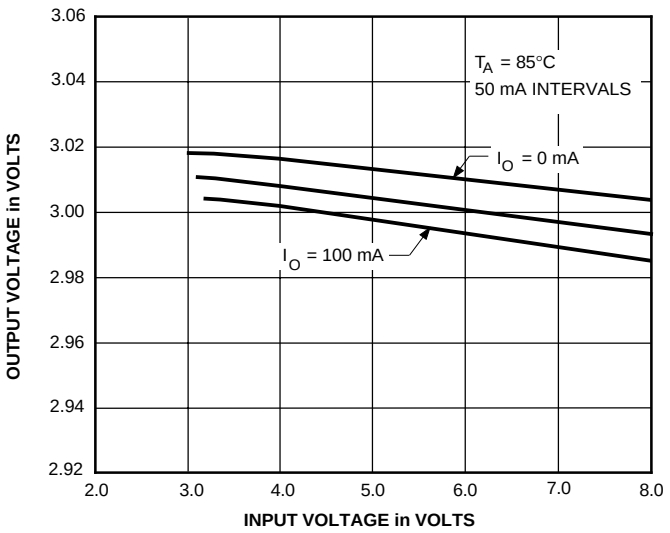
TYPICAL CHARACTERISTICS (cont'd)

LOAD REGULATION



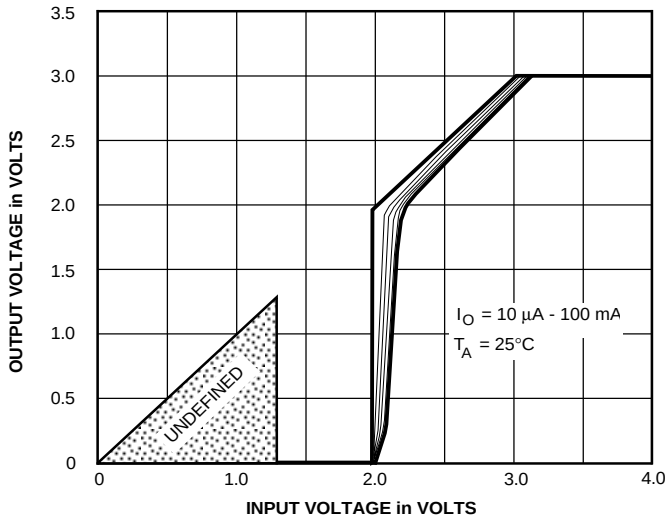
Dwg. GP-052-2

LINE REGULATION

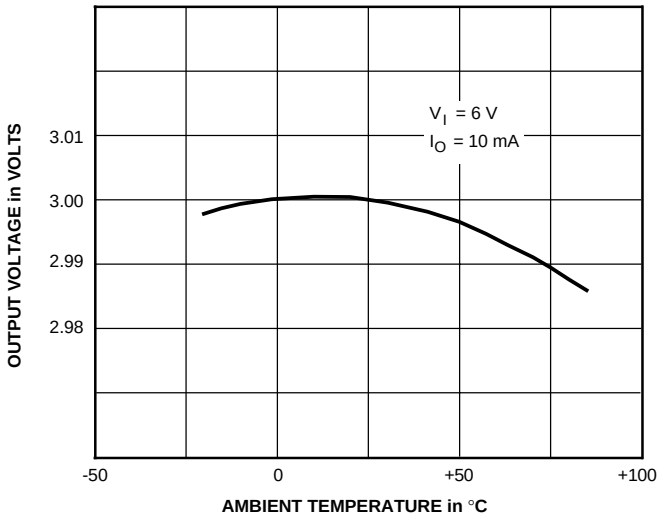


Dwg. GP-053-2

OUTPUT VOLTAGE



Dwg. GP-056-1

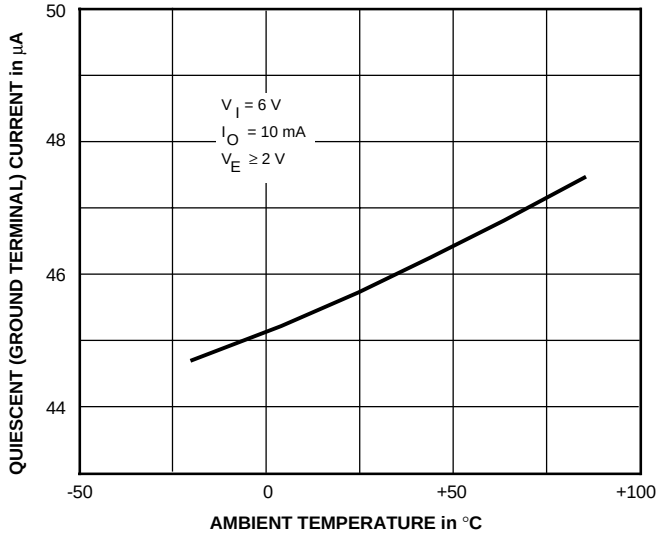


Dwg. GP-050

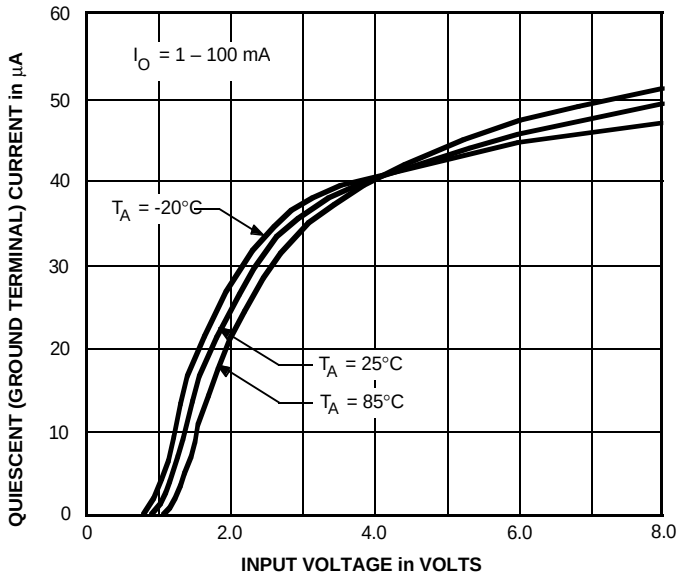
CAUTION: Maximum allowable duty cycle will be significantly less than 100% at high temperatures, at high input voltages, or at high output currents. See Maximum Allowable Output Current table.

TYPICAL CHARACTERISTICS (cont'd)

QUIESCENT (GROUND TERMINAL) CURRENT

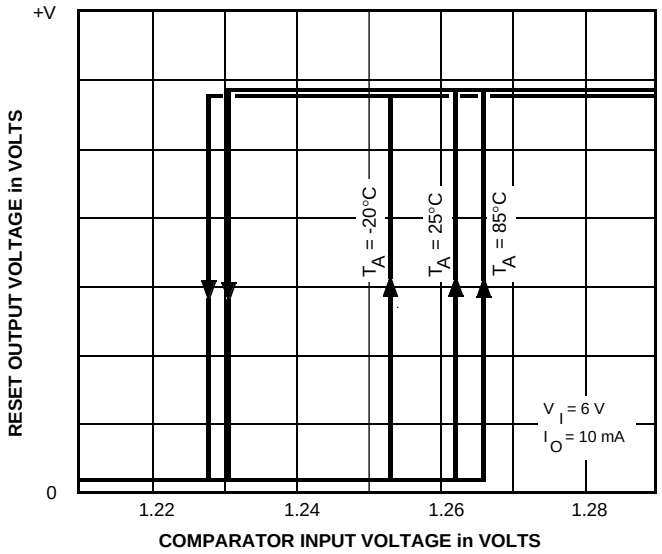


Dwg. GP-051



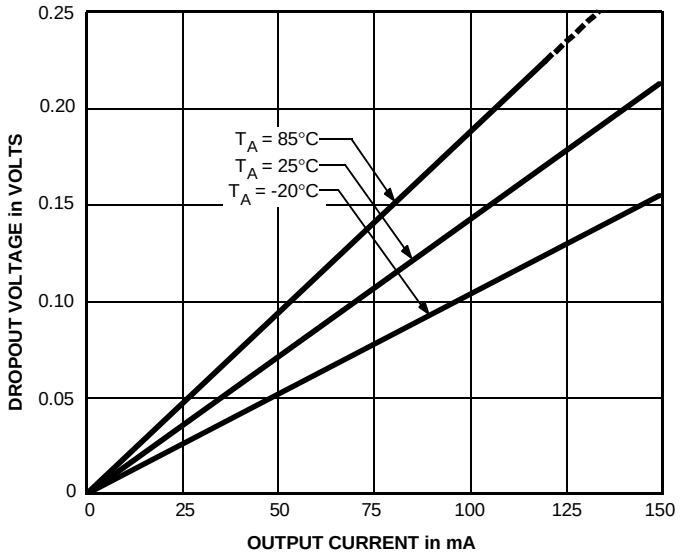
Dwg. GP-055

COMPARATOR VOLTAGE



Dwg. GP-057

DROPOUT VOLTAGE



Dwg. GP-054

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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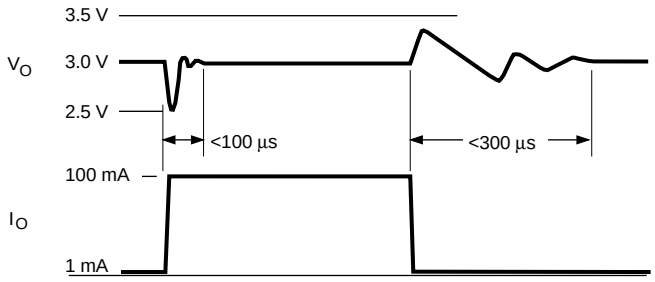
TYPICAL CHARACTERISTICS (concluded)

LOAD TRANSIENT PERFORMANCE

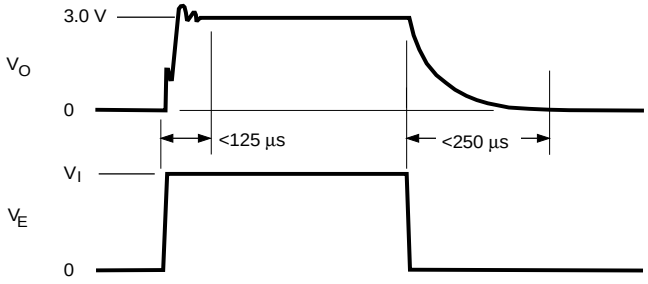
V_I = 3.2 V to 6.2 V, C_O = 1 µF, T_A = 25°C



Dwg. WP-026

ENABLE TRANSIENT PERFORMANCE

V_I = 3.2 V to 6.2 V, C_O = 1 µF, I_O = 60 mA, T_A = 25°C

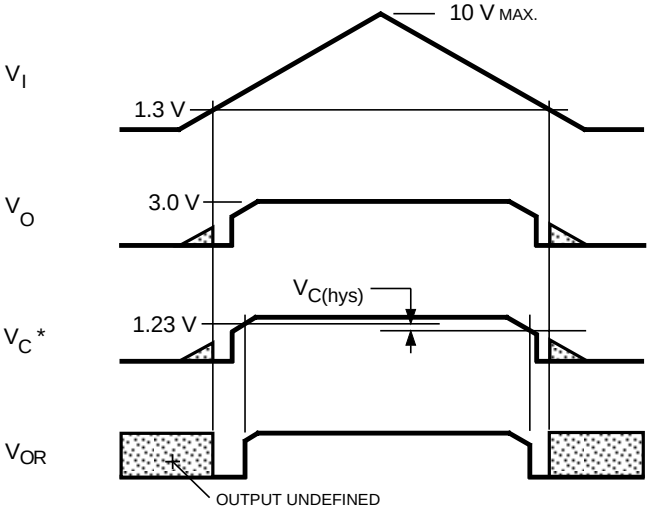


Dwg. WP-027

INPUT, COMPARATOR, & OUTPUT RELATIONSHIPS

The RESET output of the comparator produces a logic low whenever the COMP input is below 1.23 V. An out-of-regulation detector can be configured by dividing down the regulator output (an R/R divider is typical) and connecting it to the COMP input. As tne regulator input is ramped up, the RESET signal becomes valid (low) at approximately V_I = 1.3 V. The RESET signal will go high when V_C = 1.23 V (V_O = 2.46 V with an R/R divider). Comparator hysteresis prevents oscillations under low battery conditions.

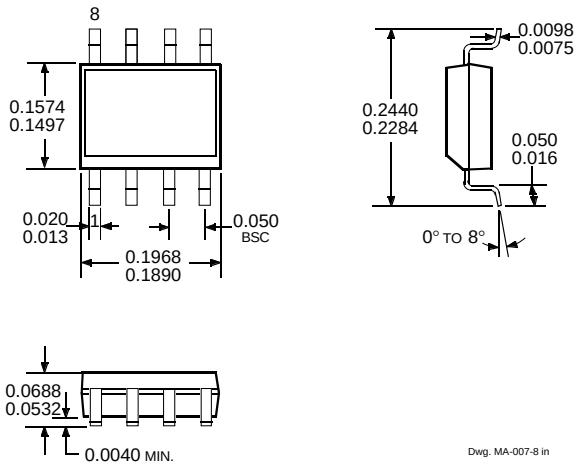
The RESET open-drain output requires an external pull-up resistor. This can be returned to either the input supply or the regulator output, depending on suystem requirements. Note that the RESET sink current is adds to the battery drain in a low-battery condition. Suggested values range from 100 kΩ to 1 MΩ. RESET should be left unconnected if it is not used.



Dwg. WP-025

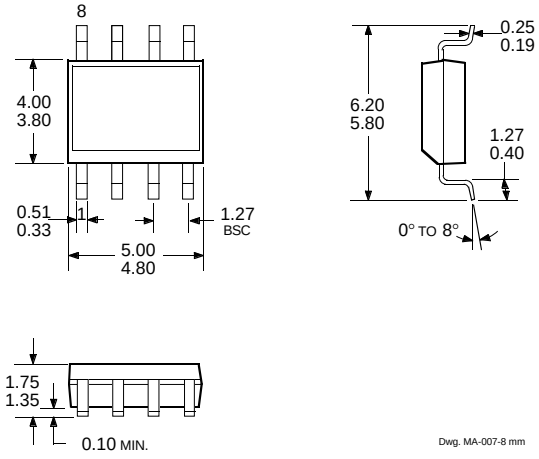
*Comparator input voltage is normally obtained from a resistive divider off of the output.

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



Dwg. MA-007-8 in

Dimensions in Millimeters



Dwg. MA-007-8 mm

NOTES: 1. Lead spacing tolerance is non-cumulative.

2. Exact body and lead configuration at vendor's option within limits shown.

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