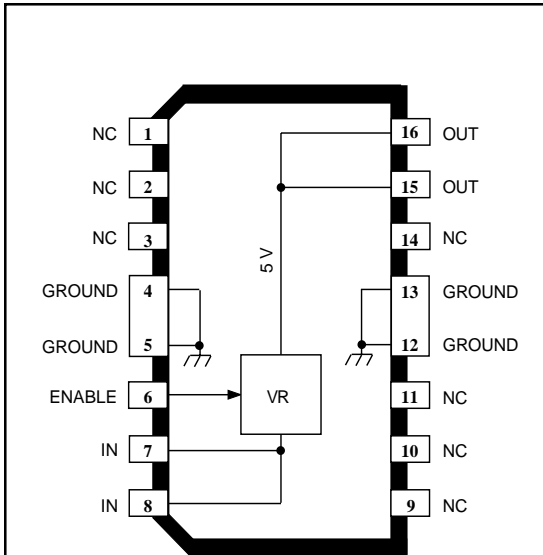


## LOW-DROPOUT, 5 V REGULATOR — HIGH EFFICIENCY



Dwg. PS-018

### ABSOLUTE MAXIMUM RATINGS at $T_A = +25^\circ\text{C}$

Input Voltage, $V_I$ .....	<b>10 V</b>
Output Current, $I_O$ (40% duty cycle) .....	<b>1 A*</b>
(75% duty cycle) .....	<b>500 mA*</b>
(continuous) .....	<b>370 mA*</b>
Operating Temperature Range, $T_A$ .....	<b><math>-20^\circ\text{C}</math> to <math>+85^\circ\text{C}</math></b>
Junction Temperature, $T_J$ .....	<b><math>+150^\circ\text{C}^\dagger</math></b>
Storage Temperature Range, $T_S$ .....	<b><math>-40^\circ\text{C}</math> to <math>+150^\circ\text{C}</math></b>

\* 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  $+150^\circ\text{C}$ . 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.

Especially suited for hand-held, portable, battery-operated equipment such as cellular telephones, the A8181SLB low dropout voltage regulator provides high efficiency for maximum battery life in a minimum package size. Equally applicable to camcorders and portable computers, the device provides a fixed 5 V regulated continuous output at almost 200 mA of load current under worst-case conditions. Under normal operating conditions, output currents over 500 mA are permitted.

A MOSFET pass element delivers high output current with an input-output differential of less than 300 mV. For high efficiency, the low dropout voltage allows a longer battery discharge before output voltage regulation is lost. A low quiescent current, even during high load conditions, makes the device ideal for standby power systems. High regulator accuracy and excellent temperature characteristics are provided by a bandgap reference. An enable input gives the designer complete control over sequential power-up or emergency shutdown.

This device is supplied in a 16-lead wide-body, small-outline plastic power package (SOIC) for surface-mount applications. The copper batwing provides for maximum package power dissipation in the smallest possible construction. The A8181SLB is rated for operation over a temperature range of  $-20^\circ\text{C}$  to  $+85^\circ\text{C}$ .

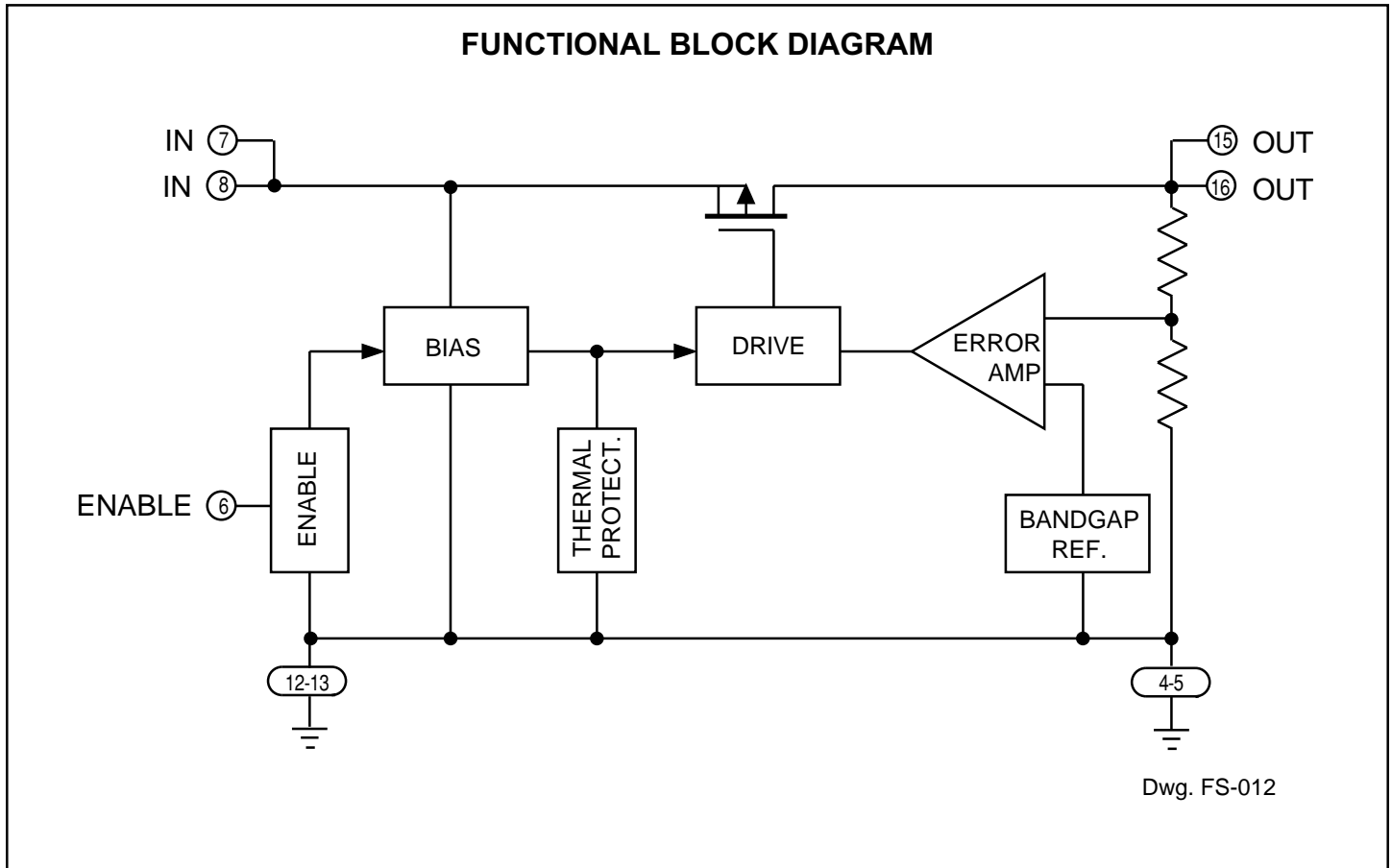
### FEATURES AND BENEFITS

- High Efficiency Provides Extended Battery Life
- Less Than 300 mV Dropout Voltage
- Low Quiescent Current
- $>200$  mA Output Current
- LSTTL-Compatible ON/OFF Control  
For Sequential Power-up or Emergency Shutdown
- Internal Thermal Protection
- SOIC Surface-Mount Package

Always order by complete part number: **A8181SLB** .

# 8181 LOW-DROPOUT, 5 V REGULATOR

## FUNCTIONAL BLOCK DIAGRAM



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.

T <sub>A</sub>	Maximum Allowable Output Current in Milliamperes with V <sub>I</sub> = 10 V, T <sub>J</sub> = 150°C*								
	dc (Duty Cycle)								
	100%	90%	80%	70%	60%	50%	40%	30%	20%
25°C	370	415	465	530	620	745	930	1000	1000
50°C	295	330	370	425	495	595	745	995	1000
70°C	235	265	295	340	395	475	595	795	1000
85°C	190	215	240	275	320	385	485	645	970

$$* I_o = (T_J - T_A) / ([V_I - V_O] R_{\theta JA} \cdot dc) = (150 - T_A) / (5 \cdot 67 \cdot dc)$$

Output current rating can be increased (to 1 A maximum) by heat sinking or reducing the input voltage. With an infinite heat sink, R<sub>JA</sub> = R<sub>JT</sub> = 6°C/W. Conditions that produce excessive junction temperature will activate device thermal shutdown circuitry. These conditions can be tolerated but should be avoided.



**8181**  
**LOW-DROPOUT,**  
**5 V REGULATOR**

**ELECTRICAL CHARACTERISTICS at  $T_A +25^\circ\text{C}$  (unless otherwise noted).**

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Output Voltage	$V_O$	$T_A = 25^\circ\text{C}$ , $5.5\text{ V} \leq V_I \leq 10\text{ V}$ , $0\text{ mA} \leq I_O \leq 500\text{ mA}\dagger$	4.90	5.00	5.10	V
		$T_A = 85^\circ\text{C}$ , $5.5\text{ V} \leq V_I \leq 10\text{ V}$ , $0\text{ mA} \leq I_O \leq 500\text{ mA}^*\dagger$	4.85	—	5.15	V
Output Volt. Temp. Coeff.	$\alpha_{V_O}$	$I_O = 0$	—	$\pm 100$	—	$\mu\text{V}/^\circ\text{C}$
Line Regulation	$\Delta V_{O(\Delta V_I)}$	$5.5\text{ V} \leq V_I \leq 10\text{ V}$ , Output open	—	10	30	mV
Load Regulation	$\Delta V_{O(\Delta I_O)}$	$0\text{ mA} \leq I_O \leq 500\text{ mA}\dagger$ , $V_I = 6\text{ V}$	—	40	100	mV
Dropout Voltage	$V_{I\text{min}} - V_O$	$I_O = 500\text{ mA}\dagger$	—	—	300	mV
Quiescent Current (GND terminal current)	$I_Q$	$V_I = 10\text{ V}$ , $I_O = 500\text{ mA}\dagger$	—	87	120	$\mu\text{A}$
		$V_I = 10\text{ V}$ , Output open	—	86	120	$\mu\text{A}$
	$I_{Q(\text{off})}$	$V_I = 10\text{ V}$ , Output open, $V_E = 0.4\text{ V}$	—	—	20	$\mu\text{A}$
ENABLE Input Voltage	$V_{EH}$	Output ON, $V_I = 10\text{ V}$	2.4	—	—	V
	$V_{EL}$	Output OFF, $V_I = 10\text{ V}$	—	—	0.4	V
ENABLE Input Current	$I_E$	$V_E = V_I = 10\text{ V}$	—	—	$\pm 0.1$	$\mu\text{A}$
Thermal Shutdown Temp.	$T_J$		—	165	—	$^\circ\text{C}$
Thermal Resistance	$R_{\theta JA}$	Mounted on 2.24" x 2.24" solder-coated copper-clad board in still air	—	67	—	$^\circ\text{C}/\text{W}$
	$R_{\theta JT}$		—	6.0	—	$^\circ\text{C}/\text{W}$

Typical values are given for circuit design information only.

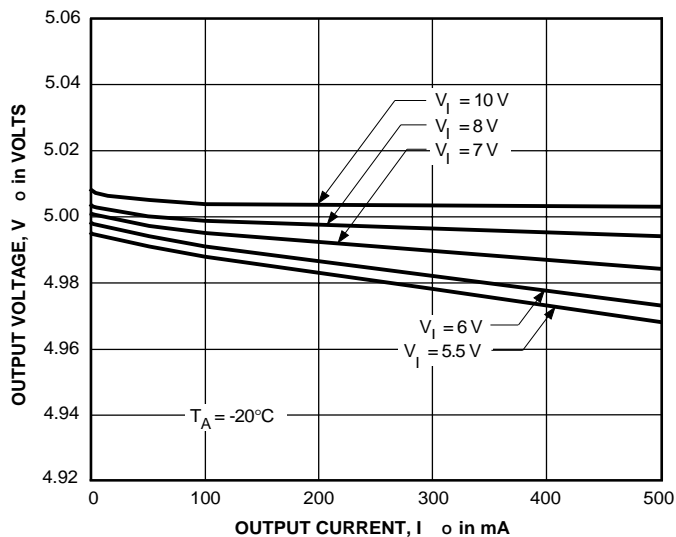
\* This parameter is tested to a lot sample plan only.

† Pulse test (<20 ms).

# 8181 LOW-DROPOUT, 5 V REGULATOR

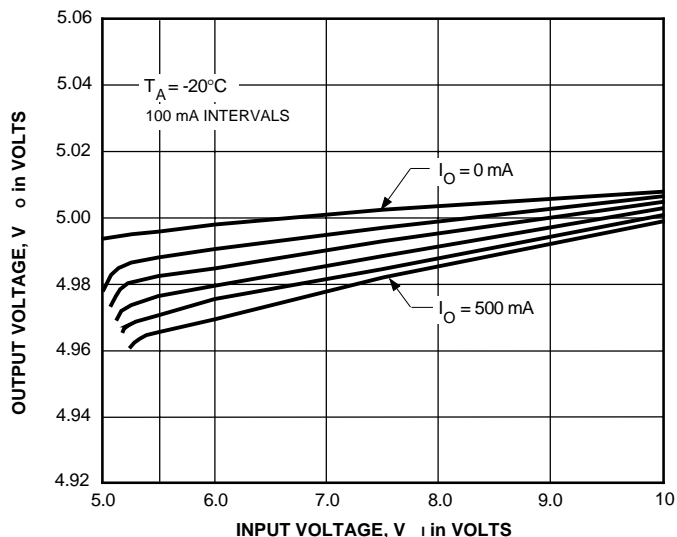
## TYPICAL CHARACTERISTICS

### LOAD REGULATION

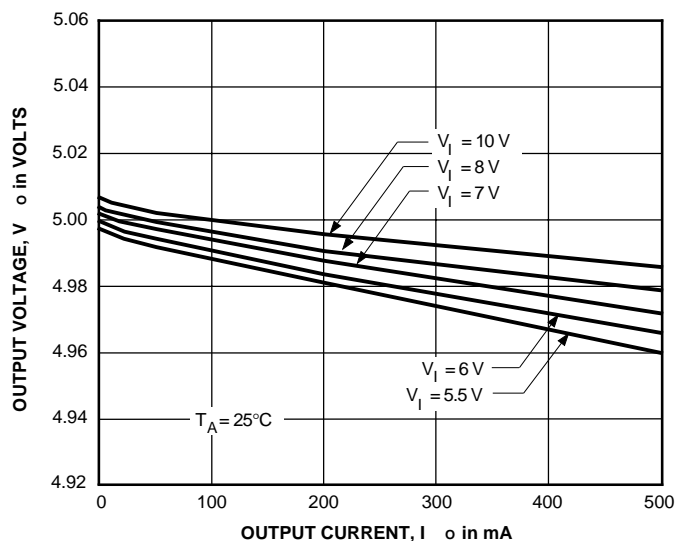


Dwg. GP-039

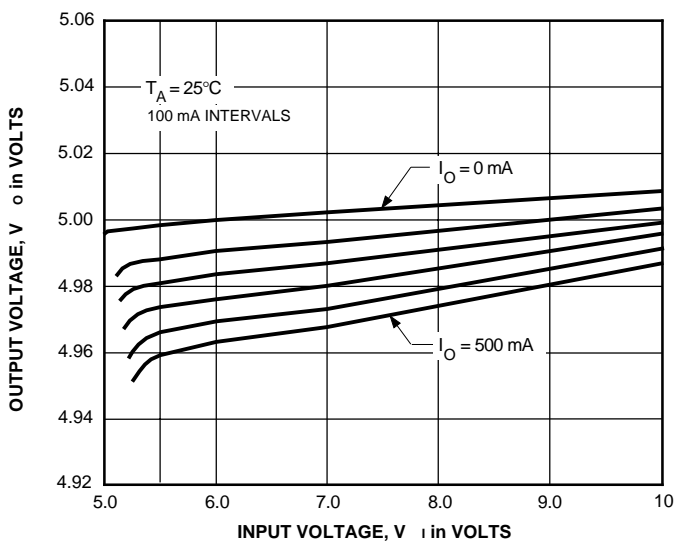
### LINE REGULATION



Dwg. GP-040



Dwg. GP-039-1



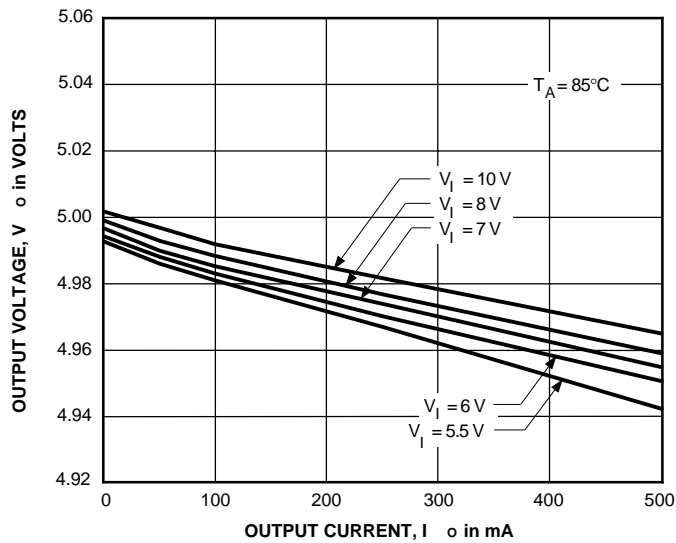
Dwg. GP-040-1

**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.



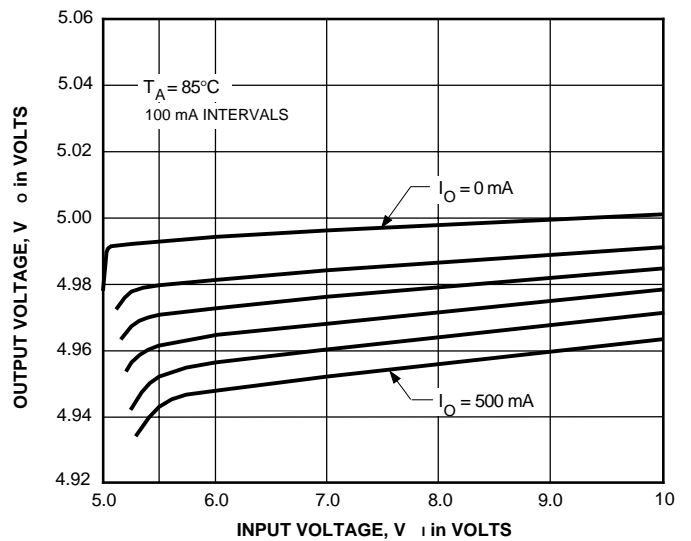
TYPICAL CHARACTERISTICS (cont'd)

LOAD REGULATION



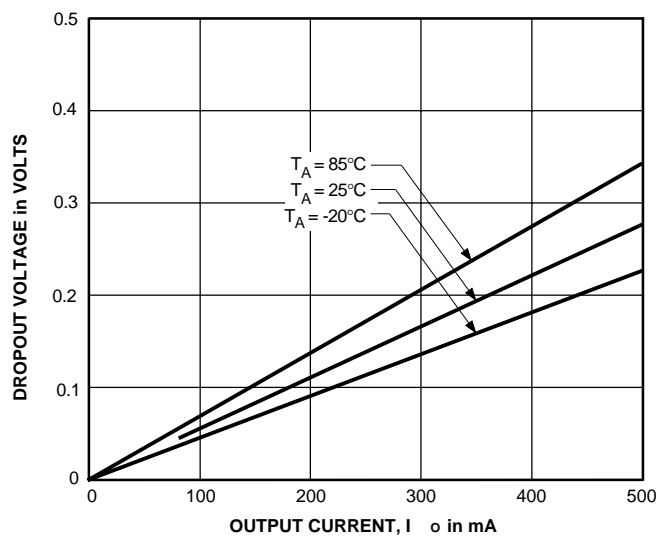
Dwg. GP-039-2

LINE REGULATION



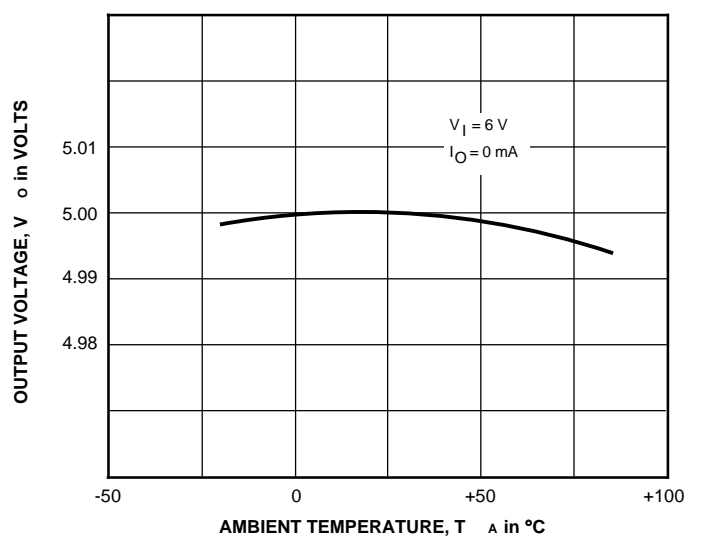
Dwg. GP-040-2

DROPOUT VOLTAGE



Dwg. GP-041

OUTPUT VOLTAGE vs TEMP.



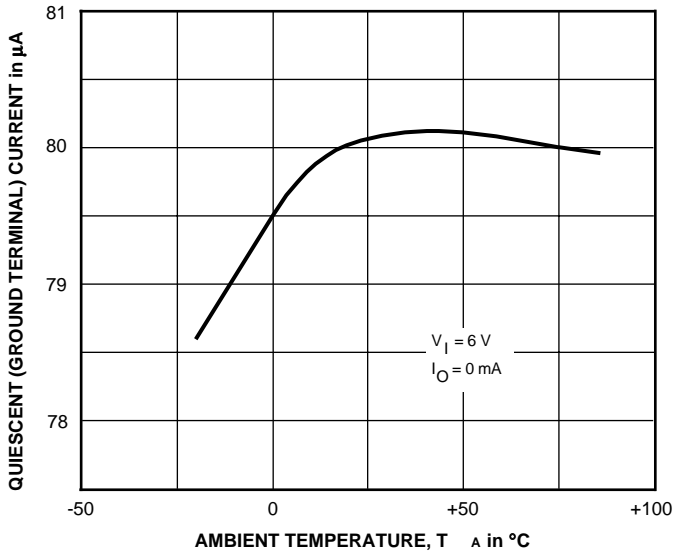
Dwg. GP-036

**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.

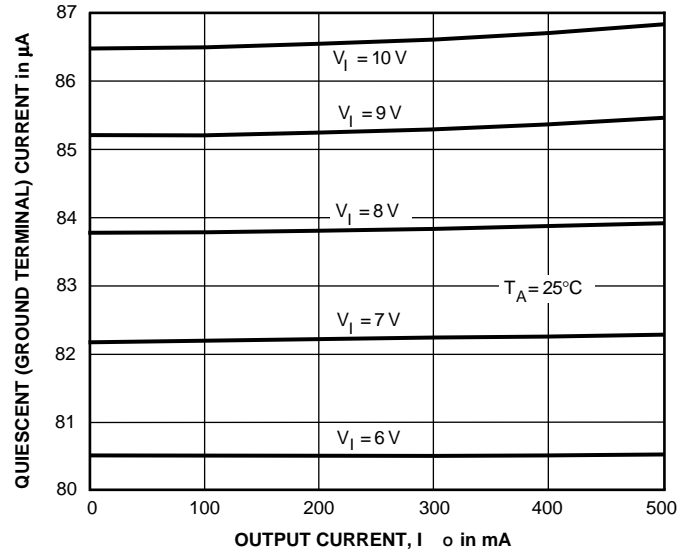
# 8181 LOW-DROPOUT, 5 V REGULATOR

## TYPICAL CHARACTERISTICS (cont'd)

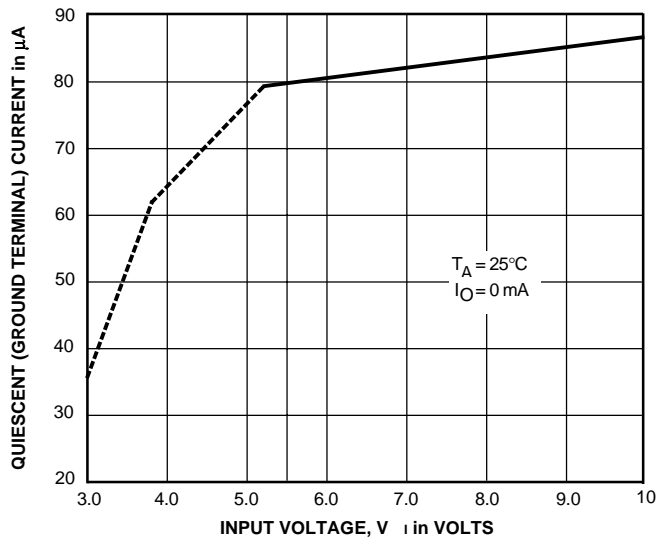
### QUIESCENT (GROUND TERMINAL) CURRENT



Dwg. GP-037



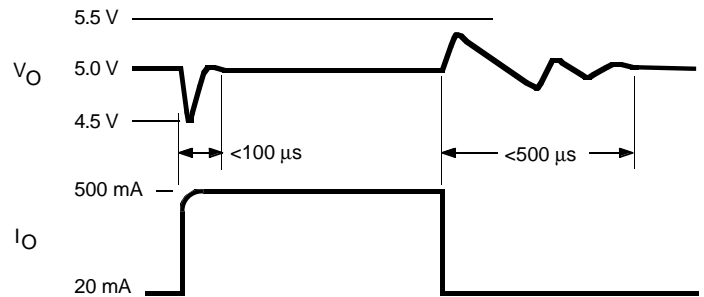
Dwg. GP-038



Dwg. GP-042

### TRANSIENT PERFORMANCE

$V_I = 5.5\text{ V to }10\text{ V}$ ,  $T_A = -20^{\circ}\text{C to }+85^{\circ}\text{C}$ ,  $C_O = 4.7\ \mu\text{F}$

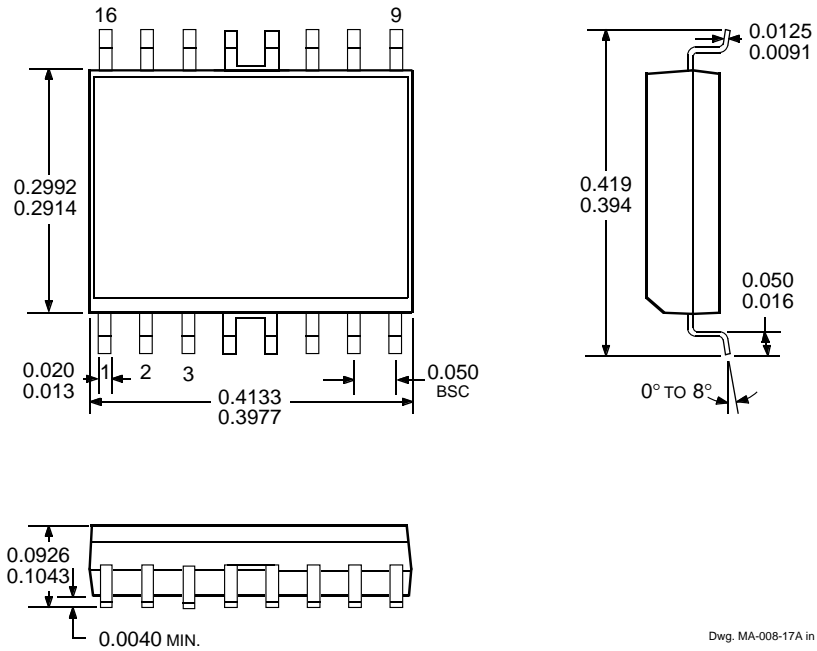


Dwg. WP-018

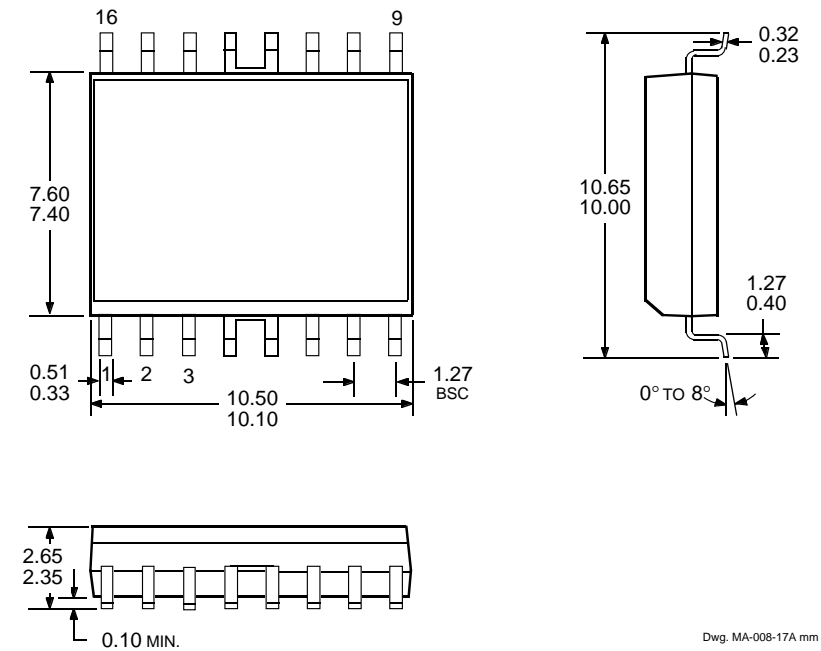
**CAUTION:** Maximum allowable duty cycle will be significantly less than 100% at high temperatures, at high input voltages, or at high output currents. See Maximum Allowable Output Current table.

# 8181 LOW-DROPOUT, 5 V REGULATOR

## Dimensions in Inches (Based on 1 mm = 0.3937")



## Dimensions in Millimeters



- NOTES: 1. Webbed lead frames. Leads 4, 5, 12, and 13 are internally one piece.  
 2. Lead spring tolerance is non-cumulative.  
 3. Exact body and lead configuration at vendor's option within limits shown.

8181  
*LOW-DROPOUT,  
5 V REGULATOR*

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