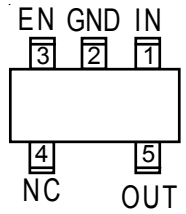
80mA LOW-DROPOUT LINEAR VOLTAGE REGULATORS

- **Wide Selection of Output Voltages**
- **Guaranteed 80mA Output**
- **Low Quiescent Current**
- **Low Dropout Voltage**
- **Tight Load and Line Regulation**
- **Low Temperature Coefficient**
- **Current and Thermal Limiting**
- **Reversed Input Polarity Protection**
- **Zero OFF-Mode Current**
- **Logic-Controlled Shutdown**
- **SOT-23-5 Package**

PIN CONFIGURATION



SOT-23-5
(Top View)

The GM6081 is an 80mA linear voltage regulator with very low dropout voltage (from typically 20mV at light loads to 300mV at 80mA) and very low ground current (225μA at 20mA output). It includes a logic-compatible enable input and provides better than 3% initial accuracy.

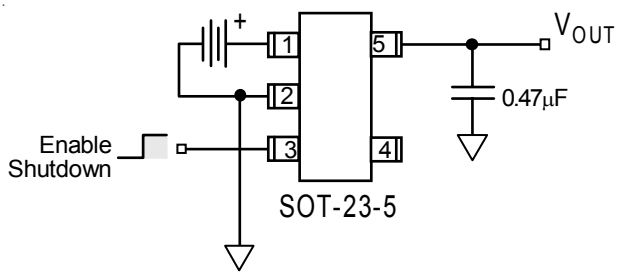
GM6081 is designed for optimal performance with low-value, low-cost ceramic capacitors. In most applications only 0.47μF of output capacitance is required for stability. The GM6081 is designed specifically for battery-powered devices. Itcan be controlled by a CMOS or TTL compatible logic signal. When disabled, power consumption drops practically to zero. If on-off control is not required, the enable pin may be tied to the input for 3-terminal operation. To further enhance battery life, the ground current of the GM6081 increases only slightly in dropout.Notable features of the GM6081 include current limiting, overtemperature shutdown, and protection against reversed battery connection.

The GM6081 is available in 2.8V, 3.0V, 3.3V, 3.6V, 3.8V, 4.0V, 4.5V, 4.75V, and 5.0V fixed voltages. Other voltages are available by special order.

Applications:

- **Cellular Phones**
- **Notebook Computers**
- **Palmtops and PDA's**
- **Battery-Powered Equipment**
- **Bar Code Scanners**
- **High-Efficiency Linear Power Supplies**
- **SMPS Post-Regulator/ DC-to-DC Modules**

TYPICAL APPLICATION CIRCUIT



■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Power Dissipation	P_D	Internally limited	W
Input Supply Voltage	V_{IN}	-20 to +20	V
Enable Input Voltage	V_{EN}	-20 to +20	V
Lead Temperature (Soldering, 5 sec)	T_{LEAD}	260	°C
Storage Temperature Range	T_{STG}	–60 to +150	°C

■ OPERATING RATINGS

Parameter	Symbol	Value	Unit
Input Voltage	V_{IN}	2.5 to 16	V
Enable Input Voltage	V_{EN}	0 to V_{IN}	V
Junction Temperature Range	T_J	–40 to +125	°C
Thermal Resistance	Note 3		

■ PIN FUNCTIONS DESCRIPTION

PIN	Function	Description
2	GND	Ground
3	EN	Enable (Input): TTL/CMOS compatible control input. Logic high = enabled; logic low or open = shutdown.
1	IN	Supply Input
4	NC	not internally connected
5	OUT	Regulator Output

■ ELECTRICAL CHARACTERISTICS

$V_{IN} = V_{OUT} + 1V$; $I_L = 1mA$; $C_L = 0.47\mu F$; $V_{EN} \geq 2.0V$; $T_J = 25°C$, **bold** values indicate $-40°C \leq T_J \leq +125°C$; unless noted.

Parameter	Symbol	Conditions	MIN	TYP	MAX	Unit
Output Voltage Accuracy	V_O		-3 **-4**		3 **4**	% %
Output Voltage Temerature Coefficient	$\Delta V_O/\Delta T$	**Note 4**		**50**	**200**	ppm/°C
Line Regulation	$\Delta V_O/\Delta V_O$	$V_{IN} = V_{OUT}$ + 1V to 16V		0.08	0.3 **0.5**	% %
Load Regulation	$\Delta V_O/\Delta V_O$	I_L = 0.1mA to 80mA, **Note 5**		0.08	0.3 **0.5**	% %
Dropout Voltage, Note 7	V_{IN}-V_O	I_L = 100µA		20		mV
		I_L = 20mA		200	**350**	mV
		I_L = 50mA		250		mV
		I_L = 80mA		300	**600**	mV
Quiescent Current	IQ	$V_{EN} \leq 0.4V$ (shutdown)		0.01	10	µA
Ground Pin Current, Note 8	I_{GND}	I_L = 100µA, $V_{EN} \geq 2.0V$ (active)		180		µA
		I_L = 20mA, $V_{EN} \geq 2.0V$ (active)		225	**750**	µA
		I_L = 50mA,$V_{EN} \geq 2.0V$ (active)		850		µA
		I_L = 80mA, $V_{EN} \geq 2.0V$ (active)		1800	**3000**	µA
Ground Pin Current at Dropout	I_{GNDDO}	$V_{IN} = V_{OUT(nominal)}$ - 0.5V, **Note 7**		200	**300**	µA
Current Limit	I_{LIMIT}	V_{OUT} = 0V		180	**250**	mA
Thermal Regulation	$\Delta V_O/\Delta P_D$	**Note 8**		0.05		%/W
Enable Input						
Enable Input Voltage Level	V_{IL}	Logic Low (OFF)			**0.6**	V
	V_{IH}	Logic High (ON)	**2.0**			V
Enable Input Current	V_{IL}	$V_{IL} \leq 0.6V$		0.01	1	µA
	V_{IH}	$V_{IH} \geq 2.0V$		15	**50**	µA

Note 1. Exceeding the absolute maximum rating may damage the device.
Note 2. The device is not guaranteed to function outside its operating rating.
Note 3: The maximum allowable power dissipation is a function of the maximum junction temperature, $T_{J(max)}$, the junction-to-ambient thermal resistance, θ_{JA}, and the ambient temperature, T_A. The maximum allowable power dissipation at any ambient temperature is calculated using: $P_{D(max)} = (T_{J(max)} - T_A) \div \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and regulator will go into thermal shutdown. θ_{JA} of the SOT-23-5 is 220°C/W, and 250°C/W for SOT-143 mounted on a PC (printed circuit) board.
Note 4: Output voltage temperature coefficient is defined as the worst case voltage change divided by the total temperature range.
Note 5: Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 0.1mA to 150mA. Changes in output voltage due to heating effects are covered by the thermal regulation specification.
Note 6: Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value measured at 1V differential.
Note 7: Ground PIN current is the regulator quiescent current plus pass transistor base current. The total current drawn from the supply is the sum ofthe load current plus the ground pin current.
Note 8: Thermal regulation is defined as the change in output voltage at a time "t" after a change in power dissipation is applied, excluding load or lineregulation effects. Specifications are for an 80mA load pulse at V_{IN} = 16V for t = 10ms.

■ APPLICATIONS INFORMATION

Input Capacitor
Place a 0.1μF capacitor from IN to GND in applications where there is more than 10 inches of wire between the input and the AC filter capacitor, or where a battery is used as the input.

Output Capacitor
As with any PNP-based regulator, the GM6081 requires an output capacitor to prevent oscillation. However, the GM6081 is extremely stable, and requires only 0.47μF of output capacitance for stability. You can use the GM6081 with any type of capacitor, but it works great with cheap, tiny ceramic capacitiors--so, why spend more? You can increase the output capacitor value without limit to improve transient response.

Caveat: Use a capacitor with a resonant frequency above 500kHz. Ceramic capacitors work great, but some dielectrics have poor temperature coefficients, which affect the capacitance value over temperature. Tantalum capacitors are very stable over temperature, but are larger and much more expensive. Aluminum electrolytic capacitors also work, but they have electrolytes which freeze at ~ –30°C. So, use tantalum or ceramic capacitors for operation below –25°C.

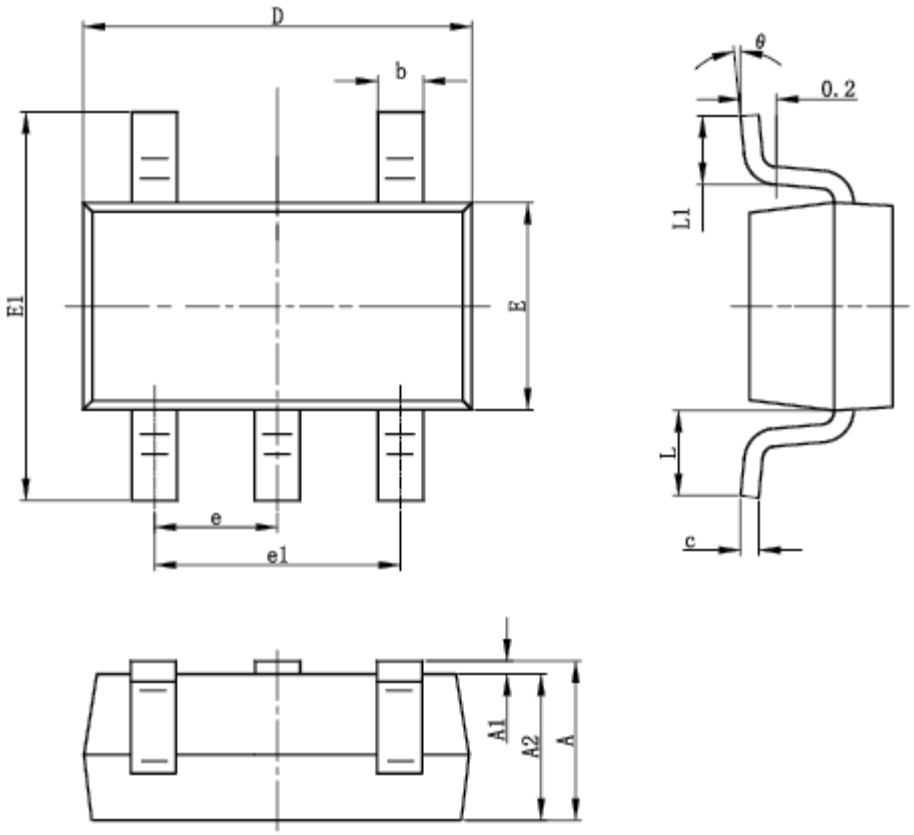
No-Load Stability
Unlike most regulators, the GM6081 will remain stable and in regulation with no load other than the internal voltage divider. This makes the GM6081 ideal for CMOS RAM keep-alive applications.

Enable Input
The GM6081 has practically zero off-mode current. When the enable input (EN) is held below 0.6V, the GM6081 is powered off. Pulling EN high (over 2.0V) turns on the GM6081. When EN is held low, the regulator typically draws only 15nA of current. While the logic threshold is TTL/CMOS compatible, EN may be pulled as high as 20V, independent of V_{IN}.

■ ORDERING INFORMATION

	PACKAGE	Output Voltage				
GM6081	SOT-23-5	2.8V	3.0V	3.3V	3.6V	3.8V
		GM6081-2.8ST235	GM6081-3.0ST235	GM6081-3.3ST235	GM6081-3.6ST235	GM6081-3.8ST235
		4.0V	4.5V	4.75V	5.0V	ADJ
		GM6081-4.0ST235	GM6081-4.5ST235	GM6081-4.75ST235	GM6081-5.0ST235	-

■ SOT-23-5 PACKAGE OUTLINE DIMENSIONS



SYMBOL	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°