



GMT2616

500mA Peak Low-Dropout Regulator

DESCRIPTION

The GMT2616 is an efficient linear voltage regulator with high peak output current capability, very low dropout voltage, and better than 1% output voltage accuracy. Dropout is typically 10mV at light loads and less than 500mV at full load. The GMT2616 is designed to provide a peak output current for startup conditions where higher inrush current is demanded. It features a 500mA peak output rating. Continuous output current is limited only by package and layout. The GMT2616 has an internal undervoltage monitor with a flag output. It also can be enabled or shutdown by a CMOS or TTL compatible signal. When disabled, power consumption drops nearly to zero. Dropout ground current is minimized to help prolong battery life. Other key features include reversed-battery protection, current limiting, overtemperature shutdown, and low noise performance. The GMT2616 is available in fixed output voltages in space-saving SOT-23-5 and 8-lead power MSOP packages. .

FEATURES

- ERROR FLAG INDICATES UNDER-VOLTAGE FAULT
- GUARANTEED 500MA PEAK OUTPUT OVER THE FULL OPERATING TEMPERATURE RANGE
- LOW 500mV MAXIMUM DROPOUT VOLTAGE AT FULL LOAD
- EXTREMELY TIGHT LOAD AND LINE REGULATION
- TINY SOT-23-5 AND POWER MSOP-8 PACKAGE
- LOW NOISE OUTPUT
- LOW TEMPERATURE COEFFICIENT
- CURRENT AND THERMAL LIMITING
- REVERSED BATTERY PROTECTION
- CMOS/TTL COMPATIBLE ENABLE/SHUTDOWN CONTROL
- NEAR ZERO SHUTDOWN CURRENT

Applications

- Laptop, notebook, and palmtop computers
- Cellular telephones and battery-powered equipment
- Consumer and personal electronics
- PC Card V_{CC} and V_{PP} regulation and switching
- SMPS post-regulator/dc-to-dc modules

Table 1: ORDERING INFORMATION

PART NUMBER	PACKAGE	VOLTS	JUNCTION TEMP. RANGE
GMT2616R08 – 3.0	MSOP-8	3.0v	-40°C TO 125°C
GMT2616R08 – 3.3	MSOP-8	3.3V	-40°C TO 125°C
GMT2616R08 – 3.6	MSOP-8	3.6V	-40°C TO 125°C
GMT2616R08 – 5.0	MSOP-8	5.0V	-40°C TO 125°C
GMT2616S08 – 3.0	SOT-23-5	3.0V	-40°C TO 125°C
GMT2616S08 – 3.3	SOT-23-5	3.3V	-40°C TO 125°C
GMT2616S08 – 3.6	SOT-23-5	3.6V	-40°C TO 125°C
GMT2616S08 – 5.0	SOT-23-5	5.0V	-40°C TO 125°C

Figure 1: FUNCTIONAL BLOCK DIAGRAM

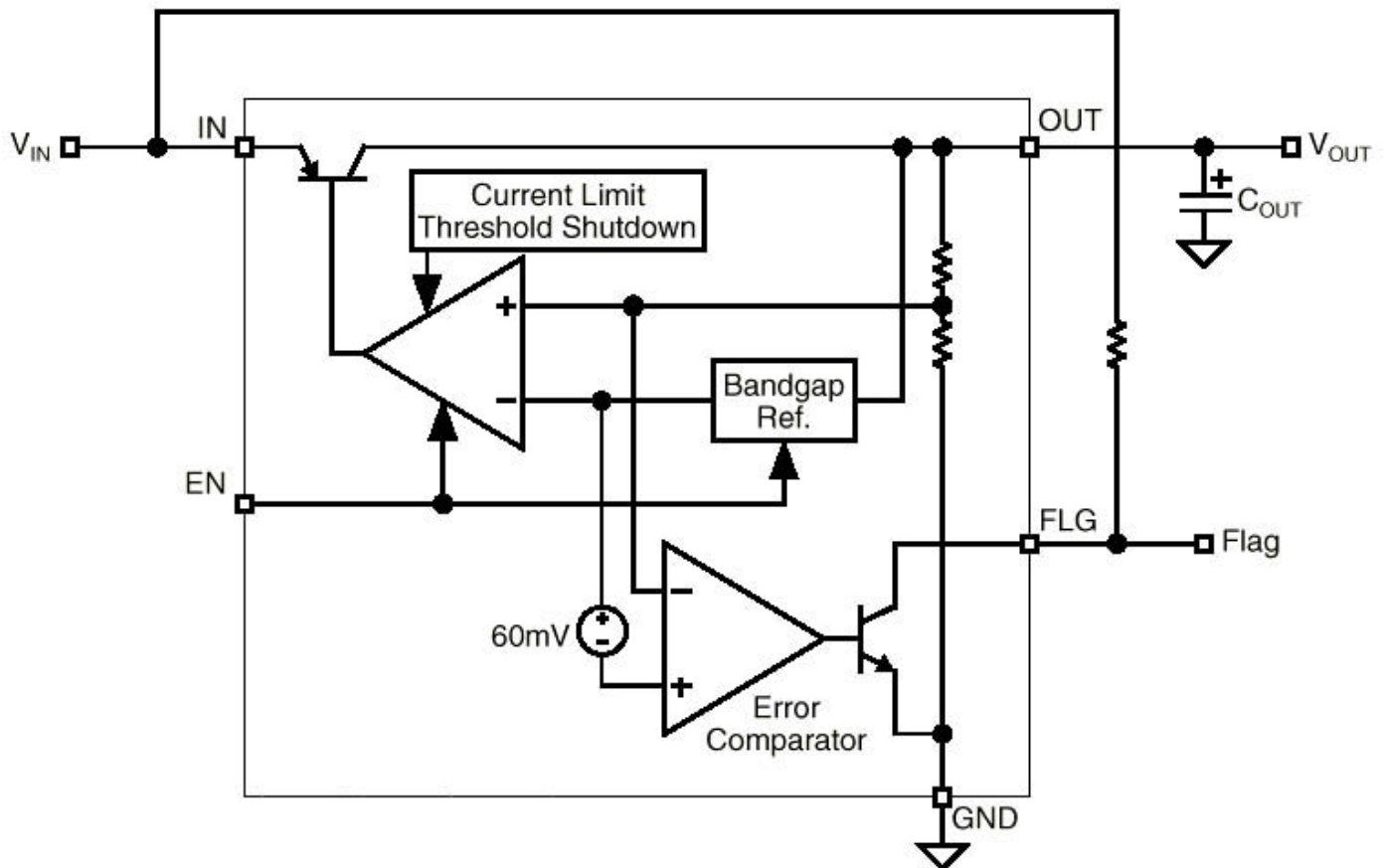


Figure 2: Package Pinout Diagrams

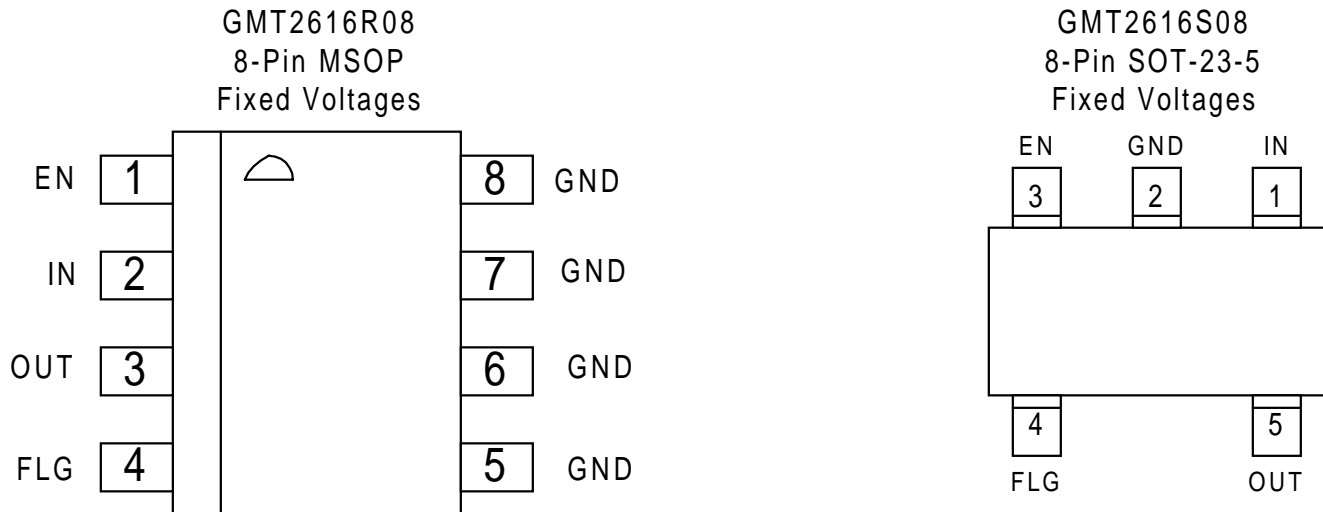


Table 3: ABSOLUTE MAXIMUM RATINGS

Supply Input Voltage (V_{IN})	-20V to +20V
Power Dissipation (P_D)	Internally Limited
Junction Temperature	-40°C to +125°C
Lead Temperature (Soldering, 5 Sec)	260°C

Table 4: OPERATING CONDITIONS

Supply Input Voltage (V_{IN})	+2.5V to +12V
Enable Input Voltage (V_{EN})	0V to V_{IN}
Junction Temperature	-40°C to +125°C
Package Thermal Resistance	See note 1

Table 5: THERMAL DATA

Package	θ_{JA} Recommended Minimum Footprint	θ_{JA} 1" Square 2 oz. Copper	θ_{JC}
MSOP Package	160° C/W	70° C/W	30° C/W
SOT-23-5 Package	220° C/W	170° C/W	130° C/W

Table 6: ELECTRICAL CHARACTERISTICS – 2616

$V_{IN} = V_{OUT} + 1.0V$; $C_{OUT} = 4.7\mu F$, $I_{OUT} = 100\mu A$; $T_J = 25^\circ C$, **bold** values indicate $-40^\circ C \leq T_J \leq +125^\circ C$; unless otherwise noted.

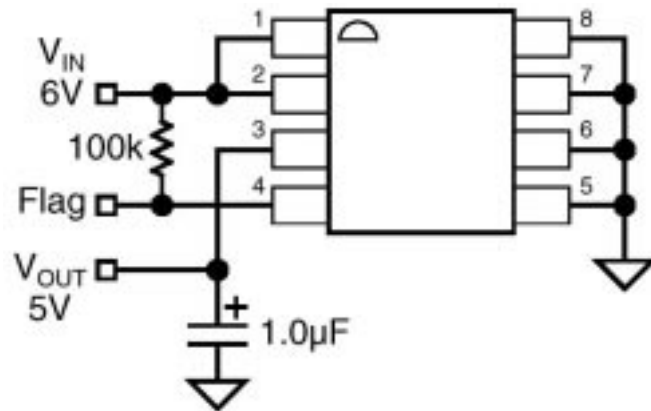
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Output Voltage Accuracy	Variation from nominal V_{OUT}	-1		1	%
		-2		2	%
Output Voltage Temperature Coefficient	Note 2		40		ppm/ $^\circ C$
Line Regulation	$V_{IN} = V_{OUT} + 1V$ to 12V		0.009	0.05 0.1	%/V
Load Regulation	$I_{OUT} = 100\mu A$ to 500 mA Note 3		0.05	0.5 0.7	%
Dropout Voltage, Note 4	$I_{OUT} = 100\mu A$		10	60 80	mV
	$I_{OUT} = 50mA$		115	175 250	mV
	$I_{OUT} = 150mA$		165	300 400	mV
	$I_{OUT} = 500mA$		300	500 600	mV
Ground Pin Current, Notes 5, 6	$V_{EN} \geq 3.0V$, $I_{OUT} = 100\mu A$		80	130 170	μA
	$V_{EN} \geq 3.0V$, $I_{OUT} = 50mA$		350	650 900	μA
	$V_{EN} \geq 3.0V$, $I_{OUT} = 150mA$		1.8	2.5 3.0	mA
	$V_{EN} \geq 3.0V$, $I_{OUT} = 500mA$		8	20 25	mA
Ground Pin Quiescent Current, Note 6	$V_{EN} \leq 0.4V$		0.05	3	μA
	$V_{EN} \leq 0.18V$		0.10	8	μA
Ripple Rejection	$f = 120Hz$		75		dB
Current Limit	$V_{OUT} = 0V$		700	1000	mA
Thermal Regulation	Note 7		0.05		%/W
Output Noise	$I_{OUT} = 50mA$, $C_{OUT} = 2.2\mu F$, $C_{BYP} = 2.2\mu F$		500		nV / \sqrt{Hz}
ENABLE INPUT					
Enable Input Logic-Low Voltage	$V_{EN} = \text{logic low (regulator shutdown)}$			0.4 0.18	V
	$V_{EN} = \text{logic high (regulator enabled)}$	2.0			V
Enable Input Current	$V_{ENL} \leq 0.4V$		0.01	-1	μA
	$V_{ENL} \leq 0.18V$		0.01	-2	μA
	$V_{ENL} \leq 2.0V$		5	20 25	μA
Error Flag Output					
Flag Threshold	undervoltage condition (below nominal) Note 8	-2	-6	-10	%
Output Logic-Low Voltage	$I_L = 1mA$, undervoltage condition		0.2	0.4	V
Flag Leakage Current	flag off, $V_{FLAG} = 0V$ to 12V	-1	.01	+1	μA

- Note 1:** Absolute maximum ratings indicate limits beyond which damage to the component may occur. Electrical specifications do not apply when operating the device outside of its operating ratings. 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: $P_{D(max)} = (T_{J(max)} - T_A) / \theta_{JA}$. Exceeding the maximum allowable power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown. See the "Thermal Considerations" section for details.
- Note 2:** Output voltage temperature coefficient is defined as the worst-case voltage change divided by the total temperature range.
- Note 3:** Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 100mA to 500mA. Changes in output voltage due to heating effects are covered by the thermal regulation specification.
- Note 4:** 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 5:** Ground pin current is the regulator quiescent current plus pass transistor base current. The total current drawn from the supply is the sum of the load current plus the ground pin current.
- Note 6:** V_{EN} is the voltage externally applied to devices with the EN (enable) input pin.
- Note 7:** 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 line regulation effects. Specifications are for a 500mA load pulse at $V_{IN} = 12V$ for $t = 10ms$.
- Note 8:** C_{BYP} is an optional, external bypass capacitor connected to devices with a BYP (bypass) or ADJ (adjust) pin.

Table 7: PIN DESCRIPTION

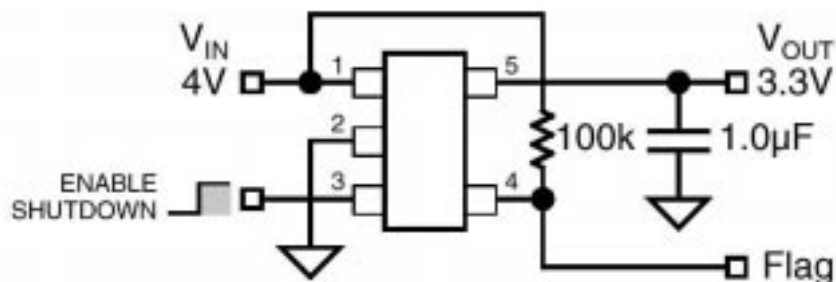
MSOP-08	SOT-23-5	SYMBOL	FUNCTIONS
2	1	IN	Supply Input
5-8	2	GND	Ground: MSOP-8 pins 5 through 8 are internally connected
3	5	OUT	Regulator Output
1	3	EN	Enable (Input): CMOS compatible control input. Logic high = enable; logic low or open = shutdown.
4	4	FLG	Error Flag (Output): Open Collector output. Active low indicates an output undervoltage condition.

TYPICAL APPLICATION FOR GMT2616 – 5.0V



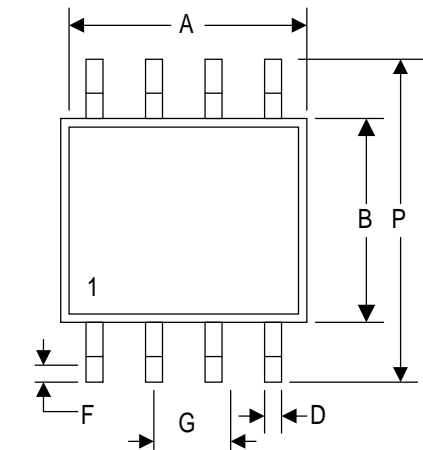
5V Low-Noise Regulator

TYPICAL APPLICATION FOR GMT2616 – 3.3V

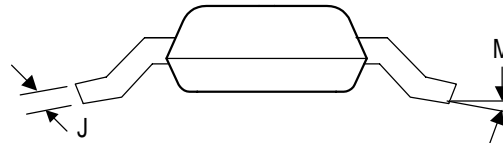
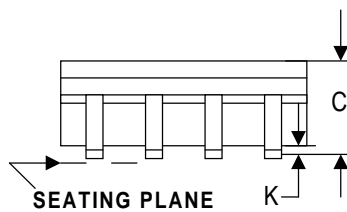


3.3V Low-Noise Regulator

R 8/10 Pin Miniature Shrink Outline Package (MSOP)



Dim	Min	Nom	Max
A	0.40	0.50	0.60
B	2.85	2.95	3.05
C	---	---	1.10
D	0.15	0.23	0.31
F	0.40	0.55	0.70
J	0.13	0.18	0.23
K	0.05	0.10	0.15
M	0	3	6

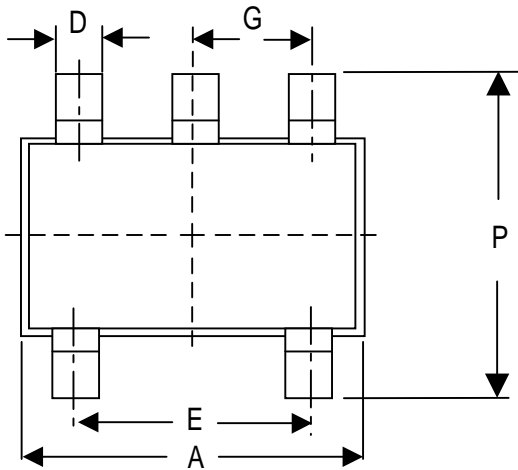


	8	10
G_{MIN}		
G_{NOM}	0.65 BSC	0.50 BSC
G_{MAX}		

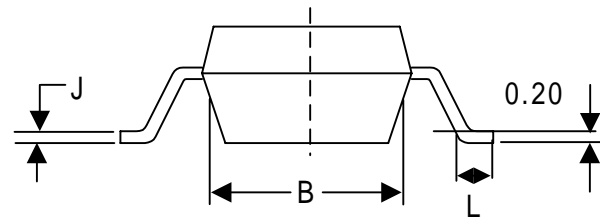
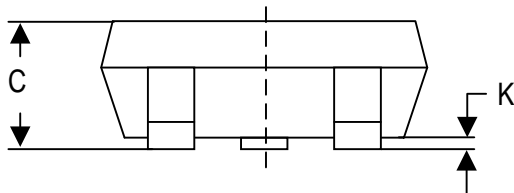
NOTES:

1. All linear dimensions are in millimeters (angles in degrees).
2. This drawing is subject to change without notice.
3. Body dimensions do not include mold flash, protrusions or gate burrs.

S 5 Pin Small Outline (SOT23)



Dim	Min	Nom	Max
A	2.80	---	3.10
B	1.50	---	1.75
C	0.90	---	1.45
D	0.25	---	0.50
E	1.90 REF		
G	0.95 REF		
J	0.09	---	0.20
K	0.00	---	0.15
L	0.35	---	0.55
P	2.60	---	3.00



NOTES:

1. All dimensions are in millimeters.
2. Dimensions are inclusive of plating.
3. Dimensions are exclusive of mold flash and metal burr.
4. Comply to JEDEC TO-236 specification.
5. This package outline is for matrix lead-frame only.



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LIFE SUPPORT USAGE POLICY:

GMT's products are not authorized for use as critical components in life support devices or systems without the express written approval of the CEO of GMT. As used herein:

(a) Life support devices or systems are devices or systems which (1) are intended for surgical implant into the body, or (2) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.

(b) A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system.

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