

■ General Description

The AME8863 family of positive, linear regulators feature low quiescent current (30 μ A typ.) with low dropout voltage, making them ideal for battery applications. The space-saving SOT-23-6 and DFN packages are attractive for "Pocket" and "Hand Held" applications.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

An additional feature is a "Power Good" detector, which pulls low when the output is out of regulation.

The AME8863 is stable with an output capacitance of 2.2 μ F or greater.

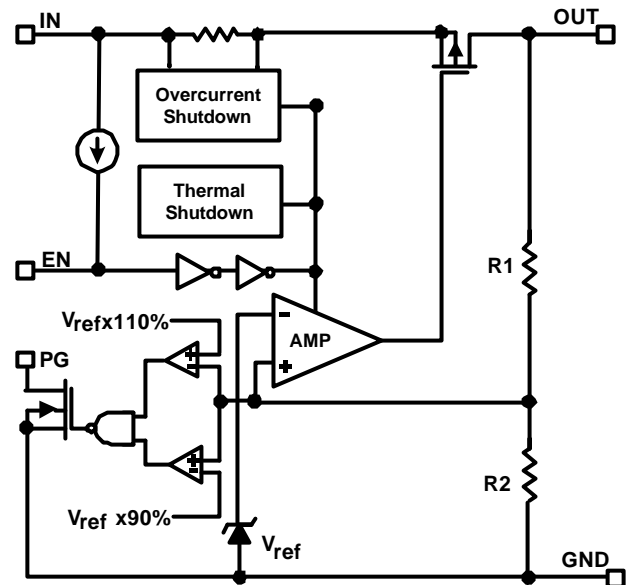
■ Features

- Very Low Dropout Voltage
- Guaranteed 600mA Output
- Accurate to within 1.5%
- 30 μ A Quiescent Current
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Power Good Output Function
- Power-Saving Shutdown Mode
- Space-Saving SOT-23-6, DFN
- Factory Pre-set Output Voltages
- Low Temperature Coefficient

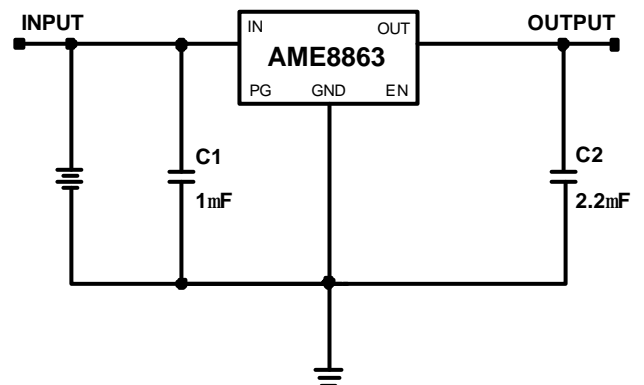
■ Applications

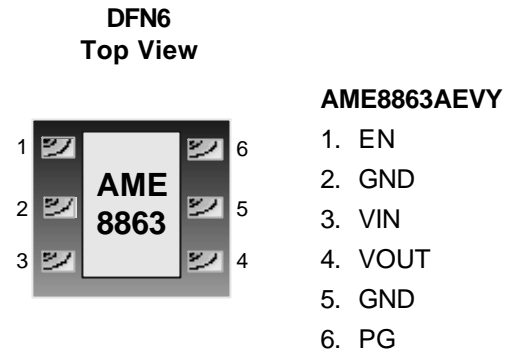
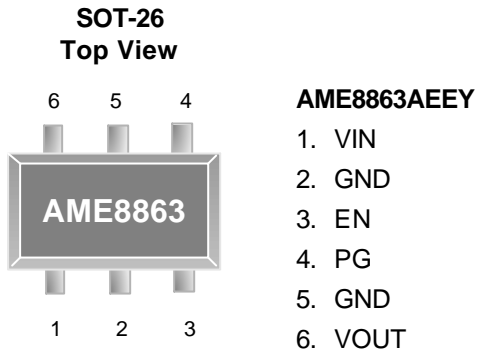
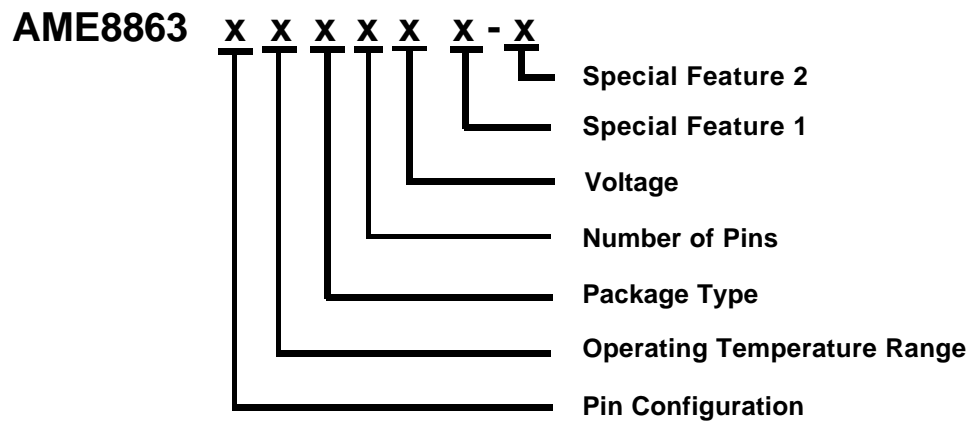
- Instrumentation
- Portable Electronics
- Wireless Devices
- Cordless Phones
- PC Peripherals
- Battery Powered Widgets
- Electronic Scales

■ Functional Block Diagram



■ Typical Application



■ Pin Configuration

■ Ordering Information


Pin Configuration	Operating Temperature Range	Package Type	Number of Pins	Voltage	Special Feature1	Special Feature2 (For DFN package only)
A: 1. VIN (SOT-26) 2. GND 3. EN 4. PG 5. GND 6. VOUT A: 1. EN (DFN6) 2. GND 3. VIN 4. VOUT 5. GND 6. PG	E: -40°C to 85°C	E: SOT-2X V: DFN	Y: 6 V: 5	150: V=1.5V 180: V=1.8V 300: V=3.0V 330: V=3.3V	L: Low Profile Y: Lead Free & Low Profile Z: Lead Free	2: 2x2(mm) (LxW) 3: 3x3(mm) (LxW)

■ Ordering Information (contd.)

Part Number	Marking	Output Voltage	Package	Operating Temp. Range
AME8863AEEY150	AZYww	1.5V	SOT-26	- 40°C to + 85°C
AME8863AEEY150L	AZYww	1.5V	TSOT-26	- 40°C to + 85°C
AME8863AEEY150Z	AZYww	1.5V	SOT-26	- 40°C to + 85°C
AME8863AEEY150Y	AZYww	1.5V	TSOT-26	- 40°C to + 85°C
AME8863AEEY180	AZRww	1.8V	SOT-26	- 40°C to + 85°C
AME8863AEEY180L	AZRww	1.8V	TSOT-26	- 40°C to + 85°C
AME8863AEEY180Z	AZRww	1.8V	SOT-26	- 40°C to + 85°C
AME8863AEEY180Y	AZRww	1.8V	TSOT-26	- 40°C to + 85°C
AME8863AEEY300	AZZww	3.0V	SOT-26	- 40°C to + 85°C
AME8863AEEY300L	AZZww	3.0V	TSOT-26	- 40°C to + 85°C
AME8863AEEY300Z	AZZww	3.0V	SOT-26	- 40°C to + 85°C
AME8863AEEY300Y	AZZww	3.0V	TSOT-26	- 40°C to + 85°C
AME8863AEEY330	AZJww	3.3V	SOT-26	- 40°C to + 85°C
AME8863AEEY330L	AZJww	3.3V	TSOT-26	- 40°C to + 85°C
AME8863AEEY330Z	AZJww	3.3V	SOT-26	- 40°C to + 85°C
AME8863AEEY330Y	AZJww	3.3V	TSOT-26	- 40°C to + 85°C
AME8863AEVY330-2	AZTww	3.3V	DFN6	- 40°C to + 85°C
AME8863AEVY330Z-2	AZTww	3.3V	DFN6	- 40°C to + 85°C

Note: ww represents the date code

* A line on top of the first letter represents lead free plating such as $\overline{\text{A}}\text{ZY}$

Please consult AME sales office or authorized Rep./Distributor for output voltage and package type availability.



■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	7	V
Output Current	$P_D / (V_{IN} - V_O)$	A
Output Voltage	GND - 0.3 to $V_{IN} + 0.3$	V
ESD Classification	B	

Caution: Stress above the listed absolute rating may cause permanent damage to the device

■ Recommended Operating Conditions

Parameter	Rating	Unit
Ambient Temperature Range	- 40 to + 85	°C
Junction Temperature	- 40 to + 125	°C

■ Thermal Information

Parameter	Maximum	Unit
Thermal Resistance (θ_{ja})	260	°C / W
Internal Power Dissipation (P_D) ($\Delta T = 100^\circ C$)	380	mW
Maximum Junction Temperature	150	°C
Maximum Lead Temperature (10 Sec)	300	°C

■ Electrical Specifications

TA = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units	
Input Voltage	V_{IN}		Note 1		6	V	
Output Voltage Accuracy	V_O	$I_O=1mA$	-1.5		1.5	%	
Dropout Voltage	$V_{DROPOUT}$	$I_O=600mA$ $V_O=V_{O(NOM)}-2.0\%$	$1.4V \leq V_{O(NOM)} \leq 2.0$	See chart	1400	mV	
			$2.0V < V_{O(NOM)} \leq 2.8V$		800		
			$2.8V < V_{O(NOM)}$		600		
Output Current	I_O	$V_O > 1.2V$	600			mA	
Current Limit	I_{LIM}	$V_O > 1.2V$	600	800		mA	
Short Circuit Current	I_{SC}	$V_O < 0.8V$		300	600	mA	
Quiescent Current	I_Q	$I_O=0mA$		30	50	μA	
Ground Pin Current	I_{GND}	$I_O=1mA$ to 600mA		35		μA	
Line Regulation	REG_{LINE}	$I_O=1mA$ $V_{IN}=V_O+1$ to V_O+2	$1.4V < V_O \leq 2.0V$	-0.15		0.15	%
			$2.0V < V_O < 4.0V$	-0.1	0.02	0.1	
Load Regulation	REG_{LOAD}	$I_O=1mA$ to 600mA		0.2	1	%	
Over Temperature Shutdown	OTS			150		°C	
Over Temperature Hysteresis	OTH			30		°C	
V_O Temperature Coefficient	TC			30		ppm/°C	
Power Supply Rejection	PSRR	$I_O=100mA$ $C_O=2.2\mu F$ ceramic	$f=1kHz$		75	dB	
			$f=10kHz$		55		
			$f=100kHz$		30		
Output Voltage Noise	eN	$f=10Hz$ to 100kHz $I_O=10mA$			30	μV_{rms}	
EN Input Threshold	V_{EH}	$V_{IN}=2.7V$ to 6V	2.0		V_{in}	V	
	V_{EL}	$V_{IN}=2.7V$ to 6V	0		0.4	V	
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}$, $V_{IN}=2.7V$ to 6V			0.1	μA	
	I_{EL}	$V_{EN}=0V$, $V_{IN}=2.7V$ to 6V			0.5	μA	
Shutdown Supply Current	I_{SD}	$V_{IN}=5V$, $V_O=0V$, $V_{EN}<V_{EL}$		0.5	1	μA	
PG Leakage Current	I_{LC}	$V_{PG}=6V$			1	μA	
PG Voltage Rating	V_{PG}	V_O in regulation			6	V	
PG Voltage Low	V_{OL}	$I_{SINK}=0.4mA$			0.4	V	

Note1: $V_{IN(min)} = V_{OUT} + V_{DROPOUT}$

Note2: To prevent the Short Circuit Current protection feature from being prematurely activated, the input voltage must be applied before a current source load is applied.



■ Detailed Description

The AME8863 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, thermal shutdown, and power good function.

The P-channel pass transistor receives data from the error amplifier, over-current shutdown, and thermal protection circuits. During normal operation, the error amplifier compares the output voltage to a precision reference. Over-current and Thermal shutdown circuits become active when the junction temperature exceeds 150°C, or the current exceeds 600mA. During thermal shutdown, the output voltage remains low. Normal operation is restored when the junction temperature drops below 120°C.

The AME8863 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The AME8863 also incorporates current foldback to reduce power dissipation when the output is short circuited. This feature becomes active when the output drops below 0.8volts, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 volts.

■ External Capacitors

The AME8863 is stable with an output capacitor to ground of 2.2 μ F or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1 μ F ceramic capacitor with a 10 μ F Aluminum Electrolytic. The benefit is low ESR, high capacitance, and low overall cost.

A second capacitor is recommended between the input and ground to stabilize V_{in} . The input capacitor should be at least 0.1 μ F to have a beneficial effect.

All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

■ Enable

The Enable pin normally floats high. When actively, pulled low, the PMOS pass transistor shuts off, and all internal circuits are powered down. In this state, the quiescent current is less than 1 μ A. This pin behaves much like an electronic switch.

■ Power Good

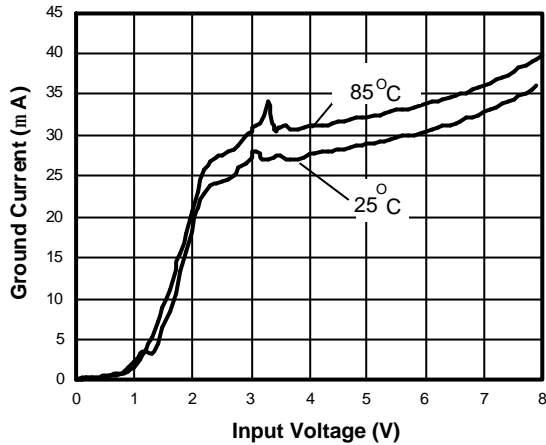
The AME8863 includes the Power Good feature. When the output is not within $\pm 0\%$ of the specified voltage, it pulls low. This can occur under the following conditions:

- 1) Input Voltage too low.
- 2) During Over-Temperature.
- 3) During Over-Current.
- 4) If output is pulled up.

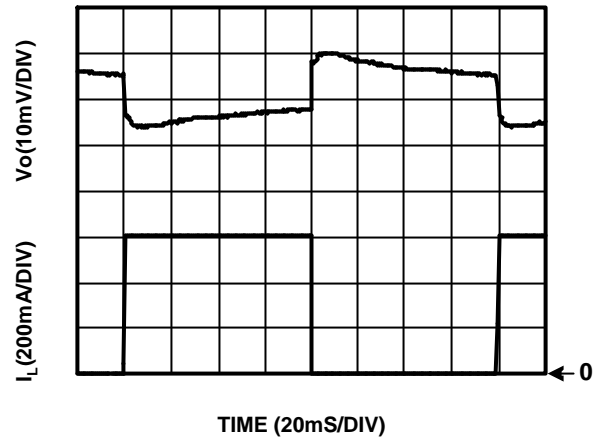
(Note: PG pin is an open-drain output.)



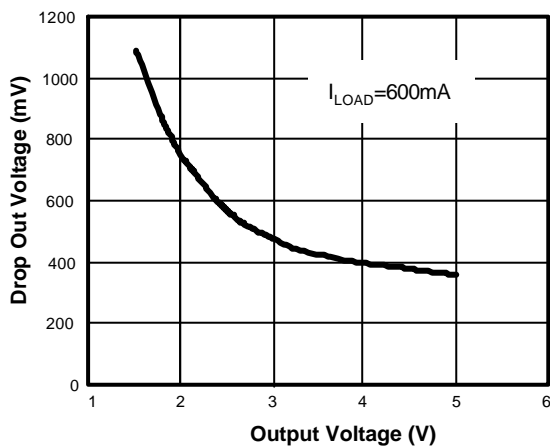
Ground Current vs. Input Voltage



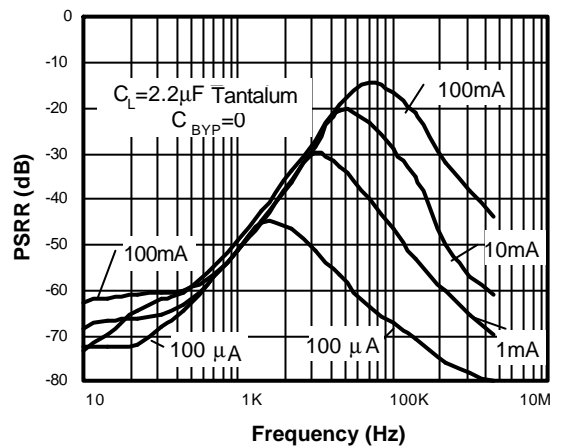
Load Step (1mA-600mA)



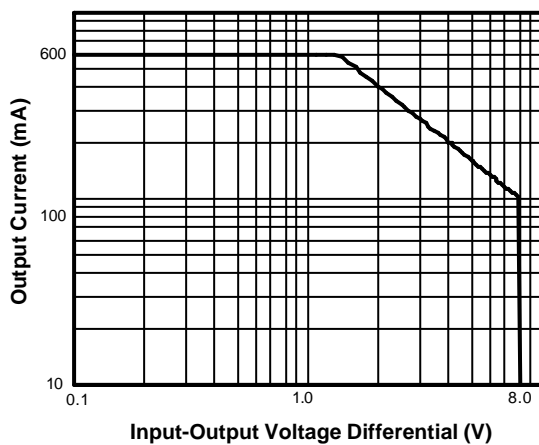
Drop Out Voltage vs. Output Voltage



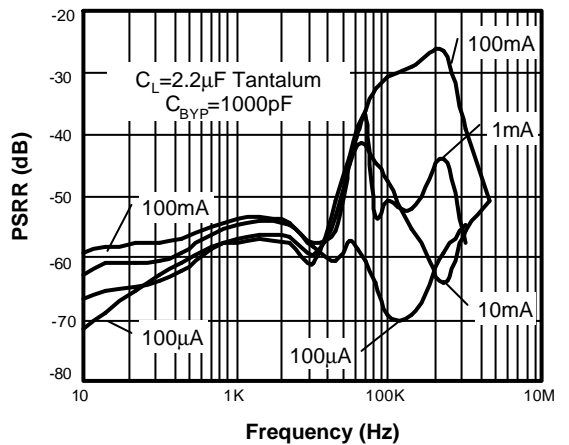
Power Supply Rejection Ratio



Safe Operating Area

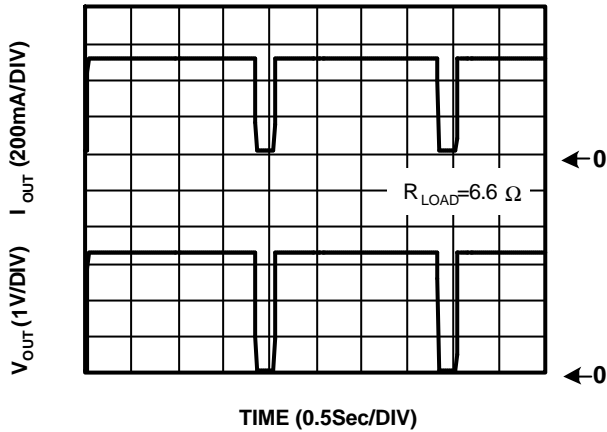


Power Supply Rejection Ratio

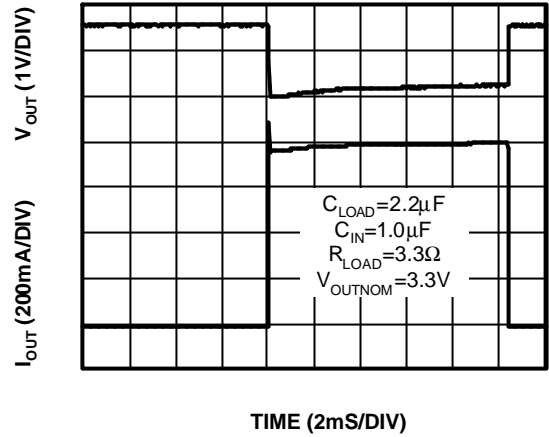




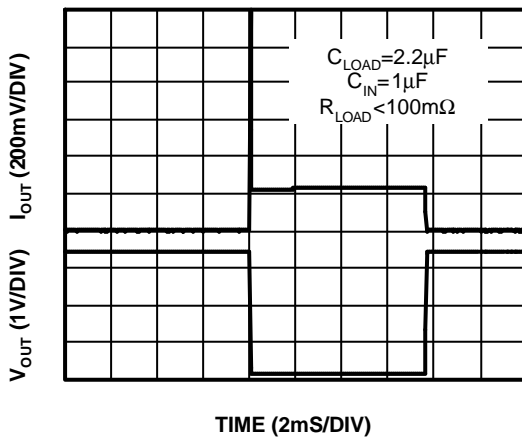
Overtemperature Shutdown



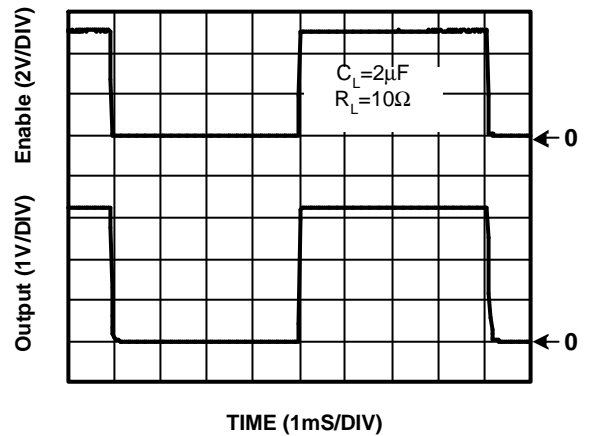
Current Limit Response



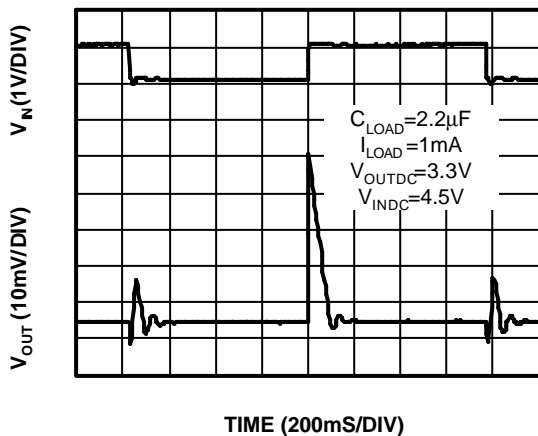
Short Circuit Response



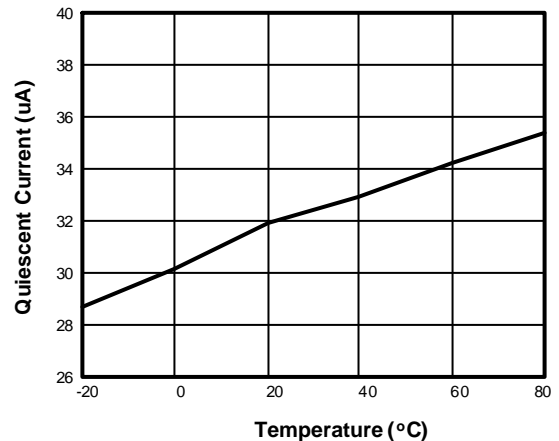
Chip Enable Transient Response



Line Transient Response

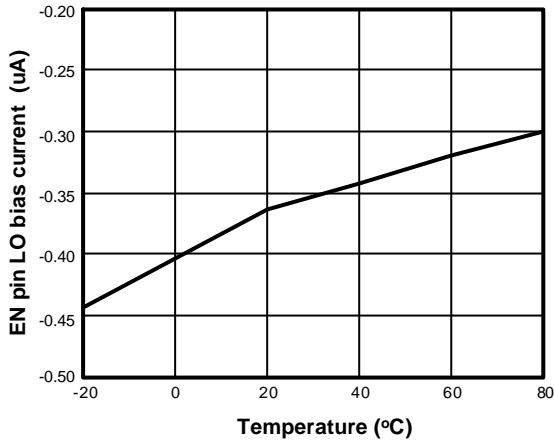


Quiescent Current vs. Temp.

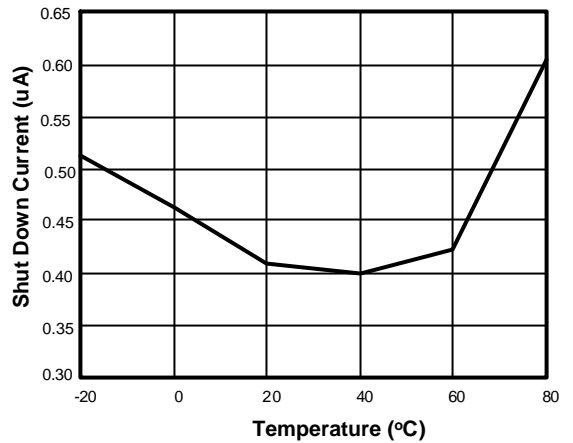




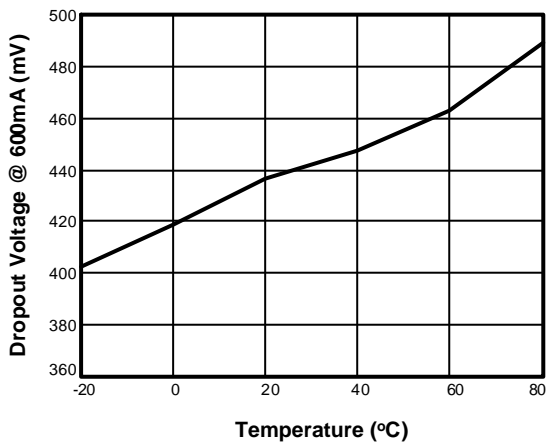
EN pin vs. Temp.



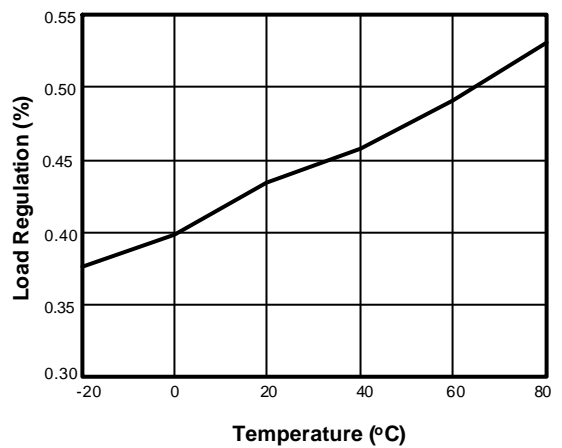
Shut Down Current vs. Temp.



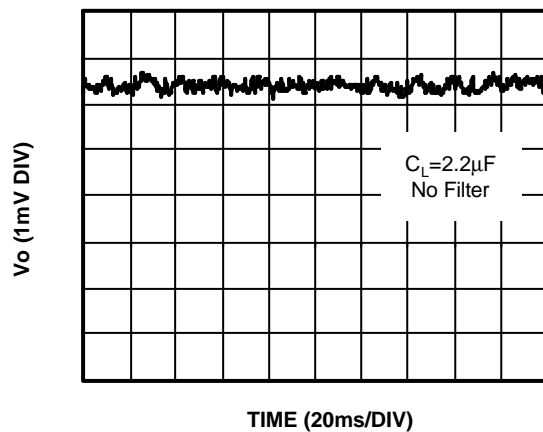
Dropout Voltage vs. Temp.



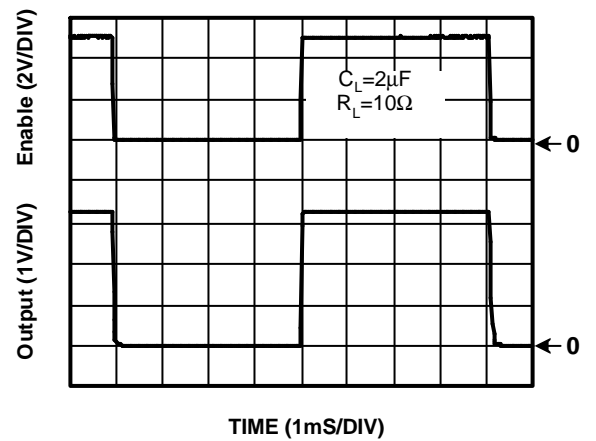
Load Regulation vs. Temp.



Noise Measurement



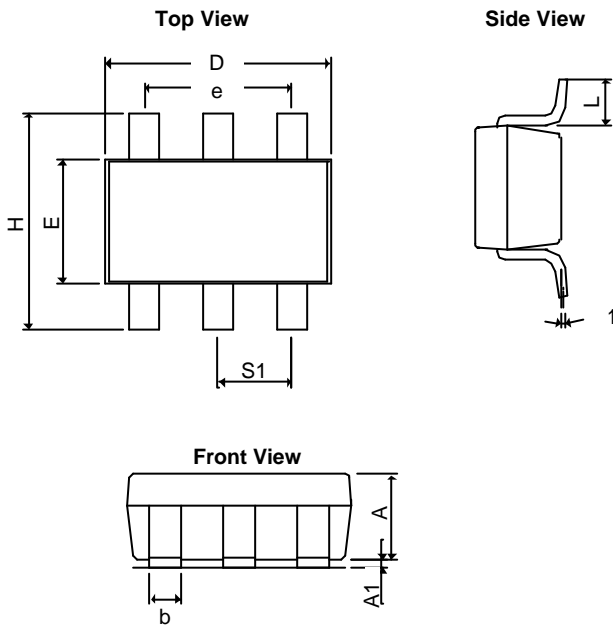
Chip Enable Transient Response





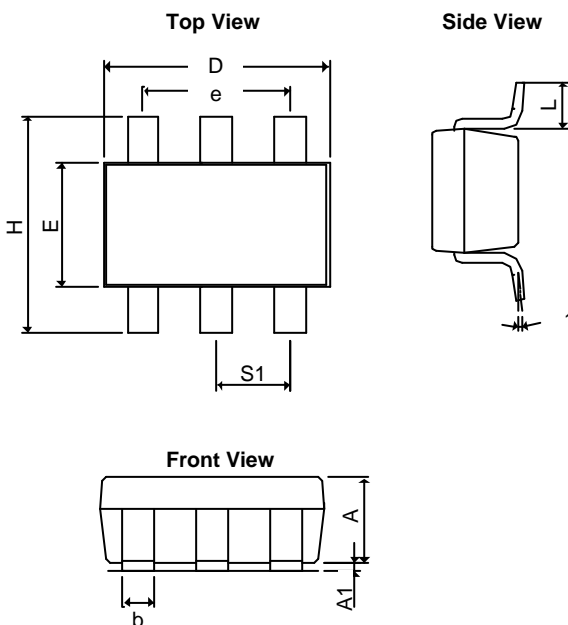
■ Package Dimension

SOT-26(Wide)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.20REF		0.0472REF	
A ₁	0.00	0.15	0.000	0.006
b	0.30	0.55	0.012	0.022
D	2.70	3.10	0.106	0.122
E	1.40	2.00	0.055	0.079
e	1.90REF		0.0748REF	
H	2.60	3.00	0.1024	0.1181
L	0.37REF		0.0146REF	
q1	0°	10°	0°	10°
S ₁	0.95REF		0.0374REF	

SOT-26

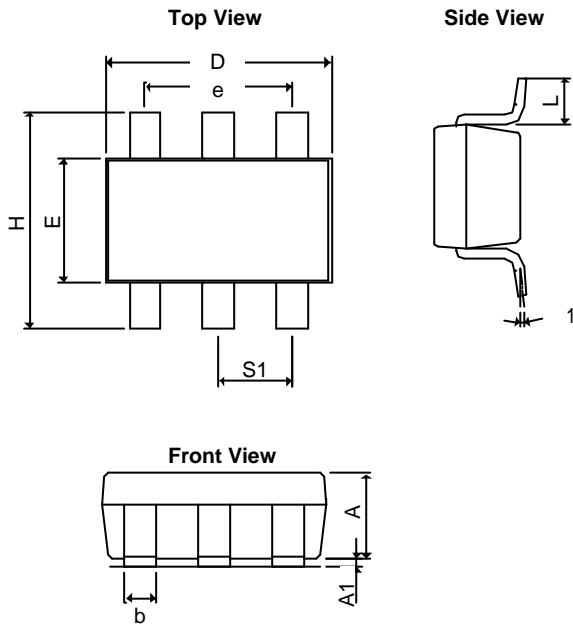


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.20REF		0.0472REF	
A ₁	0.00	0.15	0.0000	0.0059
b	0.30	0.55	0.0118	0.0217
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.0748 BSC	
H	2.60	3.00	0.10236	0.11811
L	0.37REF		0.0146REF	
q1	0°	10°	0°	10°
S ₁	0.95REF		0.0374REF	



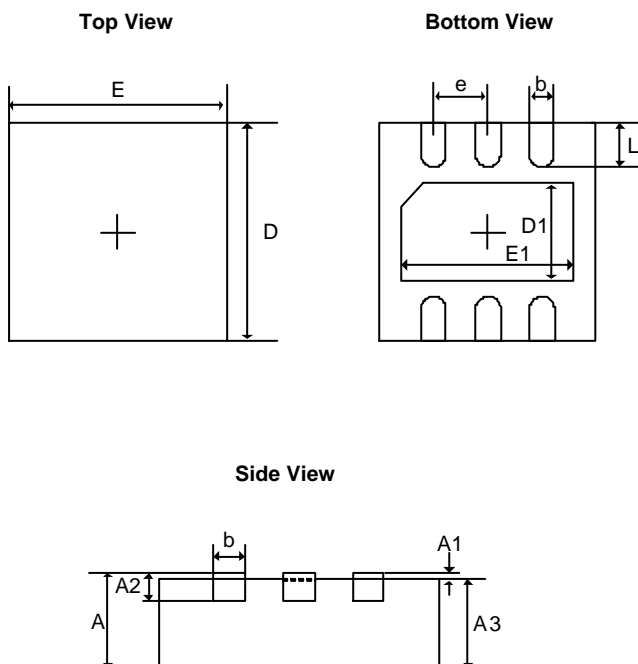
■ Package Dimension

TSOT-26



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A+A ₁	0.90	1.25	0.0354	0.0492
b	0.30	0.50	0.0118	0.0197
c	0.09	0.25	0.0035	0.0098
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.07480 BSC	
H	2.40	3.00	0.09449	0.11811
L	0.35BSC		0.0138BSC	
q1	0°	10°	0°	10°
S ₁	0.95BSC		0.0374BSC	

DFN6 (2x2)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.80		0.031	
A ₁	0.00	0.05	0.000	0.002
A ₂	0.2 TYP		0.008 TYP	
A ₃	0.70	0.80	0.028	0.031
D	1.90	2.10	0.075	0.083
E	1.90	2.10	0.075	0.083
D ₁	0.90 TYP		0.035 TYP	
E ₁	1.60 TYP		0.063 TYP	
b	0.23 TYP		0.009 TYP	
e	0.50 TYP		0.020 TYP	
L	0.40 TYP		0.016 TYP	



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