■ General Description

The AME1300 combines a Low Dropout Regulator and a Microprocessor Reset Monitor in a space-saving 8-Pin MSOP package. Total supply current is 50µA(typical),20 to 60 times lower than in bipolar regulators .

The AME1300 has an extremely precise output with a typical accuracy of ±1.5%. Other key features include ultra low noise operation, very low dropout voltage and internal feed-forward compensation for fast response to step changes in load. The AME1300 incorporates both over-temperature and over-current protection. When the shutdown control EN is low, the regulator output voltage falls to zero,$\overline{\text{RESET}}$ output remains valid and supply current is reduced to 10µA(typical). The AME1300 is stable with an output capacitor of only 2.2µF and has a minimum output current of 300 mA.

An active low RESET is asserted when the detected voltage (V_{DET}) falls below the reset voltage threshold. The reset output remains low for 300msec(typical) after V_{DET} rises above reset threshold. The AME1300 also has a fast wake up response time (10µsec typically) when released from shutdown.

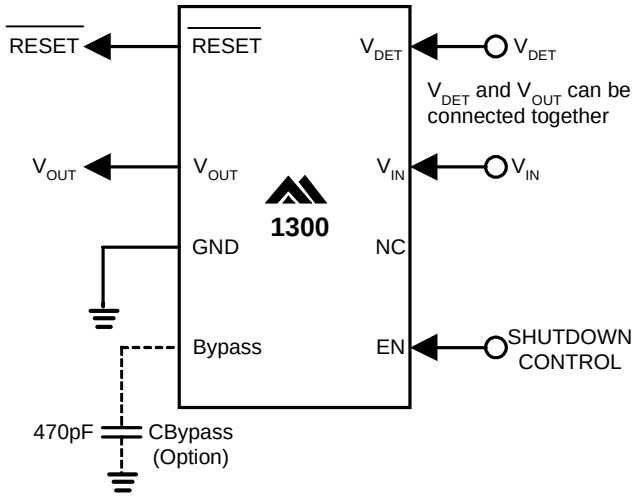
■ Features

- LDO with intergrated Microprocessor Reset Monitor Functionality
- Guaranteed 300mA Output
- Accurate to within 1.5%
- 50µA Quiescent Current
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Noise Reduction Bypass Capacitor
- Power-Saving Shutdown Mode
- Space-Saving MSOP Package
- Factory Pre-set Output Voltages
- Low Temperature Coefficient

■ Applications

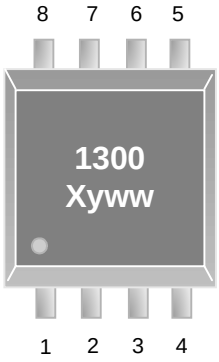
- Instrumentation
- Portable Electronics
- Wireless Devices
- Cellular / GSM / CDMA Phones
- PC Peripherals
- Battery Powered Widgets

■ Typical Applications



■ Pin Configuration

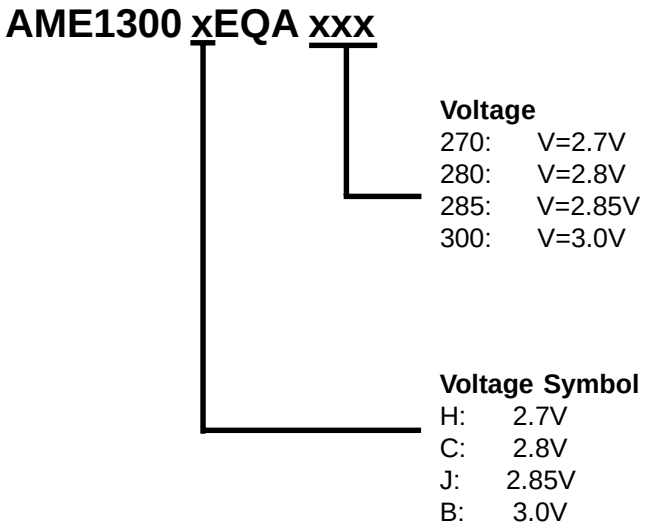
MSOP-8
Top View



1. $\overline{\text{RESET}}$
2. V_{OUT}
3. GND
4. Bypass
5. EN
6. NC
7. V_{IN}
8. V_{DET}

Note: X represents the regulator output voltage. yww represents the date code.
Please contact AME for details

■ Ordering Information



Part Number	Marking	Output Voltage	Package	Operating Temp. Range
AME1300HEQA270	1300 Hyww	2.7V	MSOP-8	- 40°C to + 85°C
AME1300CEQA280	1300 Cyww	2.8V	MSOP-8	- 40°C to + 85°C
AME1300JEQA285	1300 Jyww	2.85V	MSOP-8	- 40°C to + 85°C
AME1300BEQA300	1300 Byww	3.0V	MSOP-8	- 40°C to + 85°C

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

■ Absolute Maximum Ratings

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

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

■ Recommended Operating Conditions

Parameter	Rating	Unit
Ambient Temperature Range	- 40 to + 85	^oC
Junction Temperature	- 40 to + 125	^oC

■ Thermal Information

Parameter		Maximum	Unit
Thermal Resistance (θ_{jc})	MSOP-8	39	^oC / W
Thermal Resistance (θ_{ja})	MSOP-8	206	^oC / W
Maximum Junction Temperature		150	^oC
Maximum Lead Temperature (10 Sec)		300	^oC

■ Electrical Specifications

TA= 25^{0}C unless otherwise noted, $V_{IN}=V_{O(NOM)}+1V$, $I_O=1mA$, $V_{EN}=V_{IN,}$

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	$V_{DROPOUT}$	$V_O=V_{O(NOM)}$ -2.0%	I_O=0.1mA		1	30	mV
			I_O=100mA		70	130	
			300mA		210	390	
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=0V			300	600	mA
Quiescent Current	I_Q	I_O=0mA			40	50	µA
Ground Pin Current	I_{GND}	I_O=1mA to 300mA			40		µA
Line Regulation	REG_{LINE}	I_O=1mA $V_{IN}=V_O+1$ to V_O+2	2.0V<= V_O < 4.0V	-0.1	0.02	0.1	%
			4.0V <= Vo	-0.4	0.2	0.4	%
Load Regulation	REG_{LOAD}	I_O=1mA to 300mA		-1	0.2	1	%
Over Temerature Shutdown	OTS				150		^{o}C
Over Temerature Hysterisis	OTH				30		^{o}C
V_O Temperature Coefficient	TC				30		ppm/^{o}C
Power Supply Rejection	PSRR	I_O=100mA C_O=2.2µF	f=1kHz		50		dB
Output Voltage Noise	eN	f=10Hz to 100kHz I_O=10mA	Co=2.2µF		30		µVrms
EN Input Threshold	V_{EH}	V_{IN}=5V		2.0		Vin	V
	V_{EL}	V_{IN}=5V		0		0.4	V
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}$, V_{IN}=5V				0.5	µA
	I_{EL}	V_{EN}=0V, V_{IN}=5V				0.1	µA
Shutdown Supply Current	I_{SD}	V_{IN}=5V, V_O=0V, V_{EN}=0				10	µA
Shutdown Output Voltage	$V_{O,SD}$	I_O=0.4mA, V_{EN}=0		0		0.4	V

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

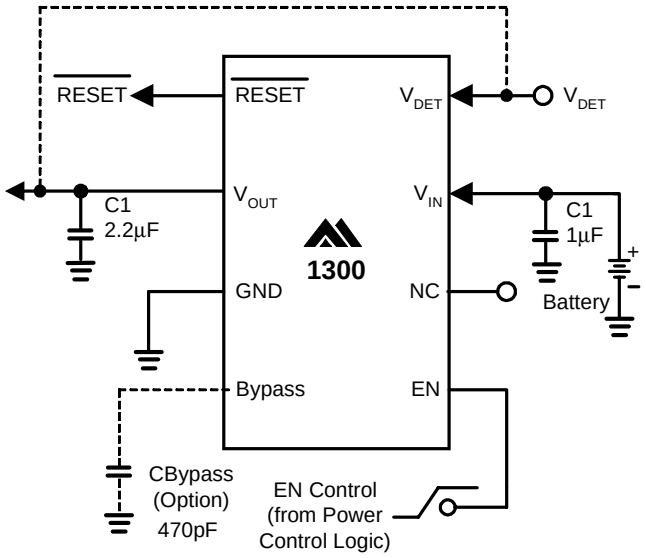
■ Electrical Specifications(contd.)

RESET Output

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
V_{DET} Range	V_{DET}	TA=-40~85°C		1		5.5	V
Reset Threshold	V_{TH}	TA=25°C		2.59	2.63	2.67	V
		TA=-40~85°C		2.58		2.68	
RESET Threshold Tempco					30		ppm
RESETB Output Voltage Low	V_{OL}	V_{DET}<V_{TH} min	I_{SINK}=1.2mA, TA= -40~85°C			0.5	V
RESETB Output Voltage High	V_{OH}	V_{DET}>V_{TH} max	I_{SOURCE}=0.5mA, TA= -40~85°C	0.8V_{DET}			V
V_{DET} to Reset Delay	T_{D1}	V_{DET}= V_{TH} - 100mV, TA= -40 ~ 85°C			40		μS
Reset Active Timeout Period*	T_{D2}	TA= -40 ~ 85°C		140	210	500	mS

■ Detailed Description

The AME1300 is a combination of a fixed output, low drop-out regulator and microprocessor monitor. Unlike bipolar regulators, the AME1300 supply current does not increase with load current. In addition, V_{OUT} remains stable and within regulation at very low load currents(an important consideration in RTC and CMOS RAM battery back-up applications) as well as with any type of capacitor (see below). AME1300 pin functions are detailed below:



■ Pin Description

Pin #	Pin Name	Pin Description
1	$\overline{\text{RESET}}$	$\overline{\text{RESET}}$ output remains low while V_{DET} is below the reset voltage threshold, and for 300msec V_{DET} rises above reset theshold.
2	V_{OUT}	Regulated Voltage Output.
3	GND	Ground Terminal.
4	Bypass	Reference Bypass Input. Connecting a 1000pF to this input further reduces output noise.
5	EN	Shutdown Control Input. The regulator is fully enabled when a logic high is applied to this input. The regulator enters shutdown when a logic low is applied to this input. During shutdown, regulator output voltage falls to zero, $\overline{\text{RESET}}$ output remains valid and supply current is reduced to 10µA (typ.)
6	NC	No connect.
7	V_{IN}	Power Supply Input.
8	V_{DET}	Detected input Voltage. V_{DET} and V_{OUT} can be connected together.

■ Enable

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 10µA. This pin behaves much like an electronic switch.

$\overline{\text{RESET}}$ Output

The $\overline{\text{RESET}}$ output is driven active low within 40µsec of V_{DET} falling through the reset threshold.$\overline{\text{RESET}}$ is maintained active for a minimum of 140msec after V_{DET} rises above the reset threshold. The AME1300 has an active-low $\overline{\text{RESET}}$ output. The output of the AME1300 is guaranteed vaild down to V_{DET} = 1V and is optimized to reject fast transient glitches on the V_{DET} line.

■ External Capacitors

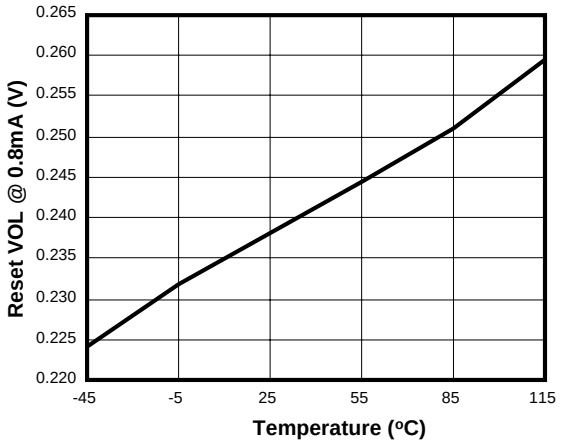
The AME1300 is stable with an output capacitor to ground of 2.2µF or greater. Ceramic capacitors have the lowest ESR, and will offer the best AC performance. Conversely, Aluminum Electrolytic capacitors exhibit the highest ESR, resulting in the poorest AC response. Unfortunately, large value ceramic capacitors are comparatively expensive. One option is to parallel a 0.1µF ceramic capacitor with a 10µF 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 Vin. The input capacitor should be at least 0.1µF to have a beneficial effect.

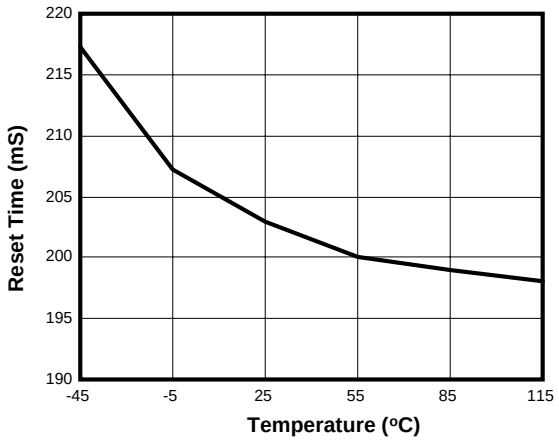
A third capacitor can be connected between the BYPASS pin and GND. This capacitor can be a low cost Polyester Film variety between the value of 0.001~0.01µF. A larger capacitor improves the AC ripple re-jection,but also makes the output come slowly. This “Soft” turn-on is desirable in some applications to limit turn-on surges.

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.

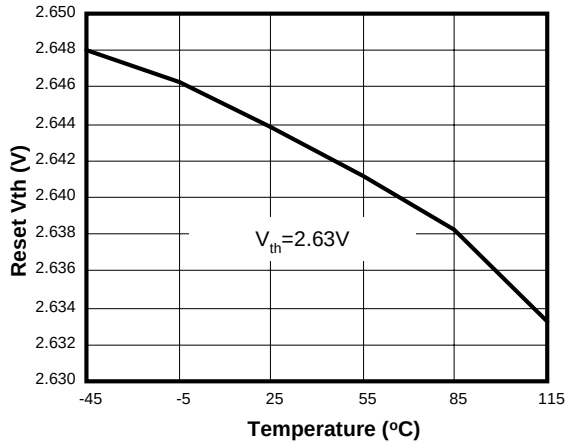
Reset VOLt VS. Temperature



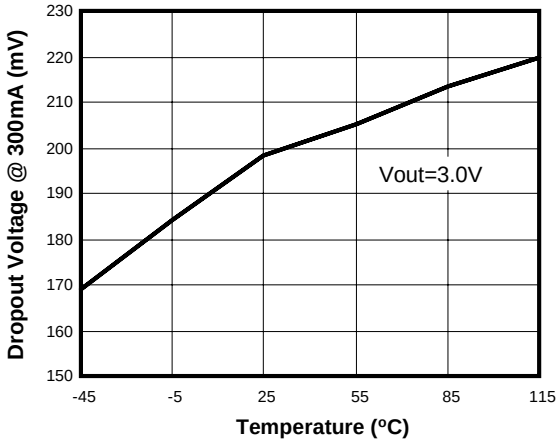
Reset Time VS. Temperature



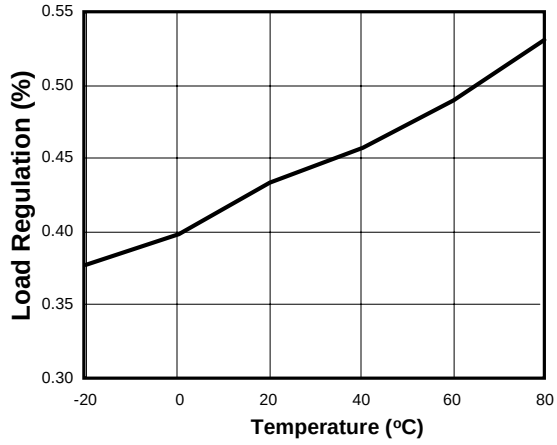
Reset Vth VS. Temperature



Dropout Voltage VS. Temp.

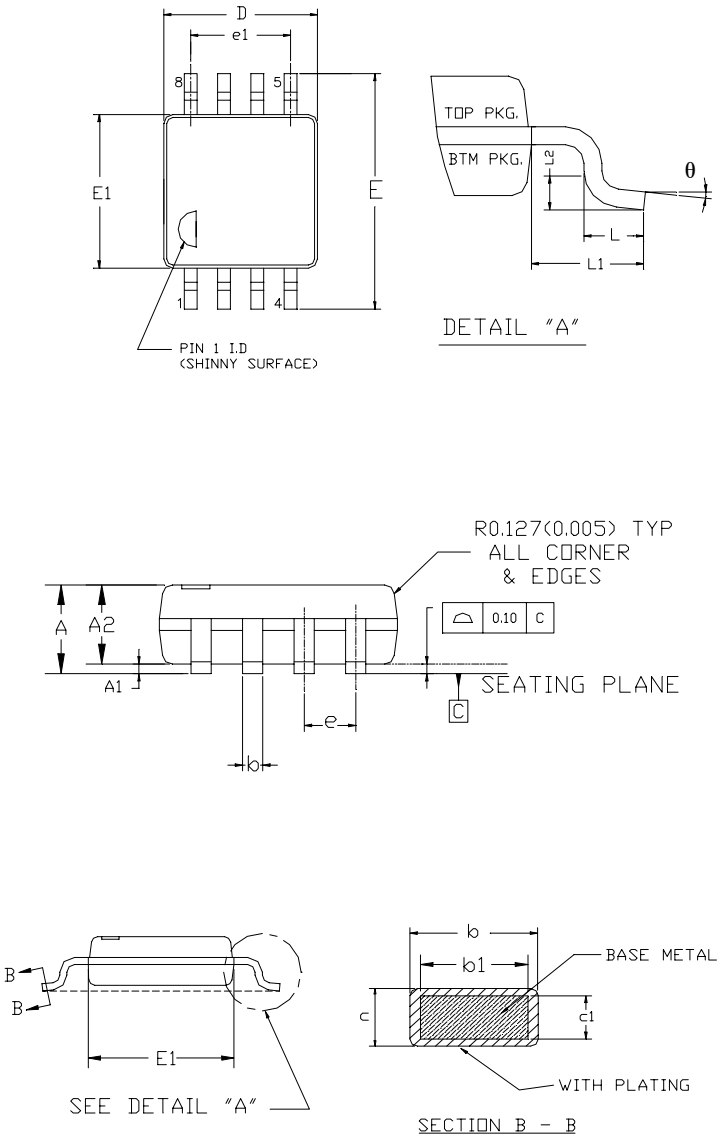


Load Regulation VS. Temp.



■ Package Dimension

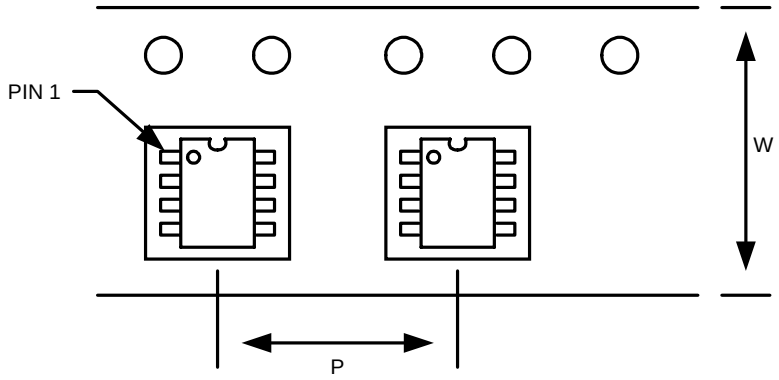
MSOP-8



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	1.07	-	0.042
A_1	0.05	0.20	0.002	0.006
A2	0.81	0.91	0.03	0.036
b	0.28	0.38	0.011	0.015
b1	0.03	0.33	0.011	0.013
c	0.14	0.23	0.0055	0.009
c1	0.14	0.17	0.006	0.0065
D	2.90	3.10	0.114	0.12
E	4.78	4.98	0.188	0.196
E1	2.90	3.10	0.114	0.122
e	0.65 TYP		0.0255 TYP	
e1	1.95 TYP		0.0767 TYP	
L	0.406	0.686	0.016	0.027
L1	0.94 REF		0.037 REF	
L2	0.254 TYP		0.010 TYP	
θ	0^o	8^o	0^o	8^o

NOTE:
1. Controlling dimension : Millimeter, converted inchdimension are not necessarily exact.
2. Dimensiioning and tolerancing per ansi Y14.5m-1994.
3. Dimension "d" does not include mold flash,protrusion or gate burr, mold flash,protrusion and gate burr shall not exceed 0.15mm(0.006") per side. Dimension e1 do not include inter-lead flash or protrusion, inter-lead flash and protrusion shall not exceed 0.15mm(0.006") per side.
4. The package top be smaller than the package bottom. Dimension d and e1 are determined at outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs and interlead flash, but including any mismatch between the top and bottom of the plastic body.
5. Dimension 'b' does not include dambar protrusion. Allowable dambar protrusion shall be 0.08mm(0.0031) total in excess of the "b" dimension at maximum material condition.

■ Tape and Reel Diagram



Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
MSOP-8L	12mm	9.1mm	4000	13in

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