

■ General Description

The AME8891's ultra-low I_Q (500nA) is designed specifically for the applications requiring extreme low quiescent current. This LDO could increase battery life through maintaining low I_Q consumption even in drop-out mode.

The feature of 0.5 μ A low quiescent current and 0.1 μ A shutdown current are ideal for the battery application with long service life. The other features include current limit function, over temperature protection and output discharge function.

Package available in SOT-25 & DFN-4A(1x1x0.4mm).

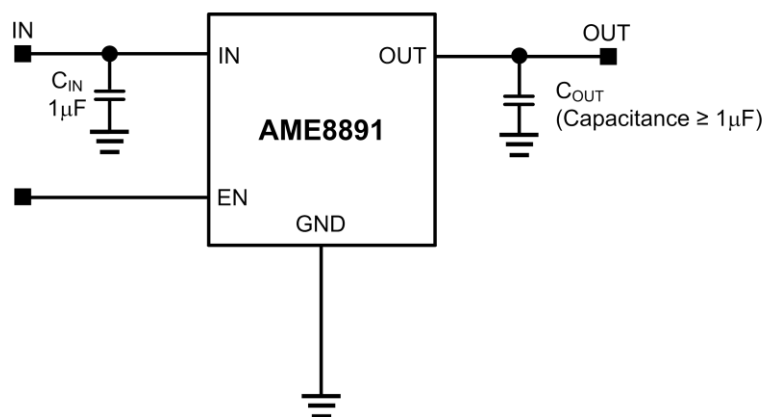
■ Features

- Input Voltage Range: 2.5V to 5.5V
- Output Voltage Range: 1.2V to 4.5V
- Output Voltage Tolerance: $\pm 2\%$
- Low Quiescent Current: 500nA(Max)
- Dropout Voltage: 400mV(typ.)@ 300mA
- Over Temperature Protection
- Internal Short-Circuit Current Limit
- RoHS, Halogen Free & TSCA Compliance

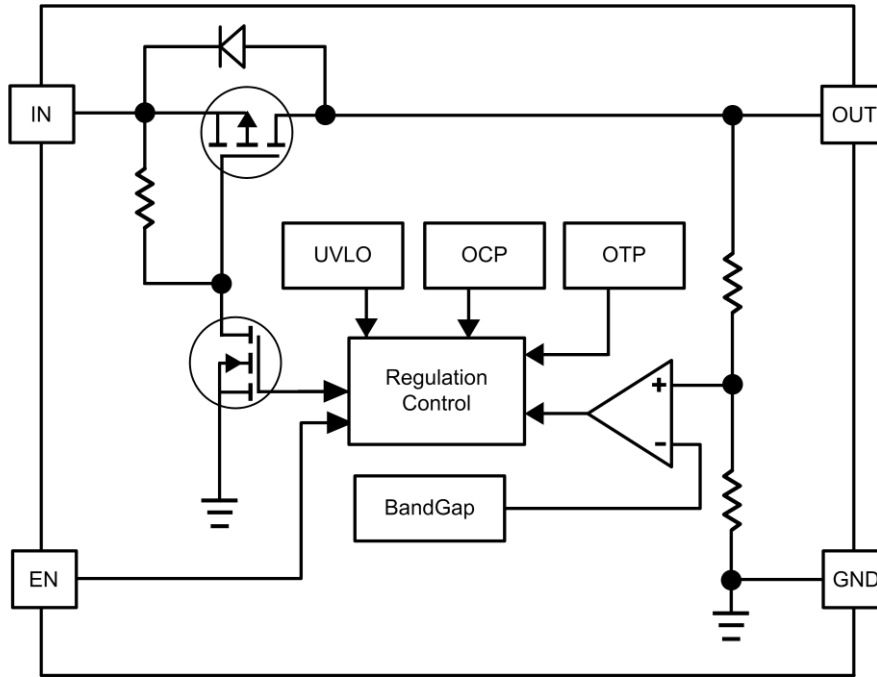
■ Application

- Portable Device, Tablet and Smartphone
- Camera, VCR and Car Dashboard Camera
- Communications and Infrastructure
- AR and VR Application
- FA Equipment and Smart Meter

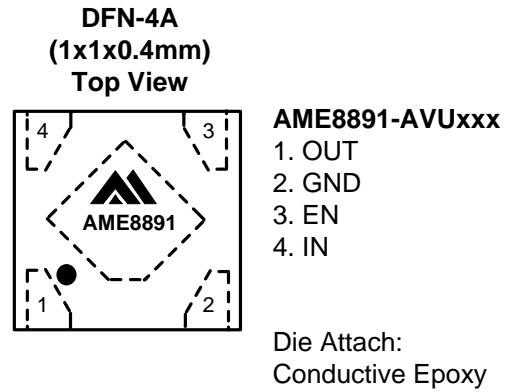
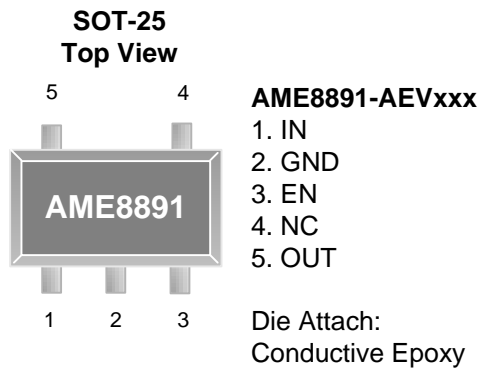
■ Typical Application Schematic



■ **Function Block Diagram**

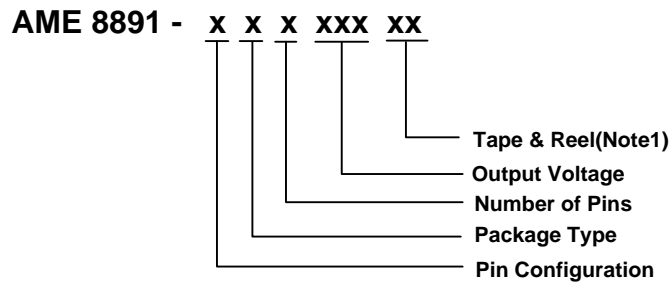


■ **Pin Configuration**



■ **Pin Description**

Pin Name	I/O	Description	Pin Number	
			SOT-25	DFN-4A
IN	I	Input Voltage pin	1	4
GND	N/A	Ground connection	2	2
OUT	O	Output Voltage pin	5	1
EN	I	Enable pin	3	3
NC	N/A	No Connection	4	NA

■ Ordering Information


Pin Configuration	Pack Type	Number of Pins	Output Voltage
A 1. IN (SOT-25) 2. GND 3. EN 4. NC 5. OUT	E: SOT-2X V: DFN	U : 4 V : 5	120: 1.2V 150: 1.5V 180: 1.8V 250: 2.5V 280: 2.8V 300: 3.0V 330: 3.3V
A 1. OUT (DFN-4A) 2. GND 3. EN 4. IN			

Note1: For DFN package only, please refer to AME8891 Available Option or consult AME sales office or authorized Rep. / Distributor for detail information.

■ Absolute Maximum Ratings

Parameter		Value	Unit
Input Voltage		-0.3 to 6	V
Enable Voltage		-0.3 to 6	V
Output Voltage		-0.3 to 6	V
ESD Classification	HBM	±4	kV
	MM	±200	V
	CDM	±1000	V

■ Recommended Operation Conditions

Parameter	Symbol	Rating	Unit
Input Voltage	V _{IN}	2.5 to 5.5	V
Output Voltage Range	V _{OUT}	1.2 to 4.5	V
Ambient Temperature Range	T _A	-40 to +85	°C
Junction Temperature Range	T _J	-40 to +125	
Storage Temperature	T _{STG}	-65 to +150	

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOT-25	Conductive Epoxy	θ _{JC}	81	°C / W
	DFN-4A	Conductive Epoxy		130	
Thermal Resistance (Junction to Ambient)	SOT-25	Conductive Epoxy	θ _{JA}	260	°C / W
	DFN-4A	Conductive Epoxy		188	
Internal Power Dissipation	SOT-25	Conductive Epoxy	P _D	400	mW
	DFN-4A	Conductive Epoxy		530	
Lead Temperature (soldering 10 sec)**				300	°C

* Measure θ_{JC} on top of package.

** MIL-STD-202G 210F

■ Electrical Specifications

$V_{IN} = V_{OUT} + 1V$ and $V_{IN} > 3V$, $I_{OUT} = 1mA$, $C_{IN} = C_{OUT} = 1\mu F$, $T_J = 25^\circ C$, unless otherwise specified

Parameter	Symbol	Test Condition	Min	Typ	Max	Units	
Output Voltage Accuracy	$V_{OUT,ACC}$	$I_{LOAD} = 1mA$	-2		2	%	
Line Regulation	REG_{LINE}	$V_{IN} = V_{OUT-NOM} + 1V$ to 5.5V		0.6	1.5	%	
Load Regulation	REG_{LOAD}	$I_{OUT} = 1mA$ to 150mA			2.5	%	
		$I_{OUT} = 1mA$ to 300mA			3		
Dropout Voltage	V_{DROP}	$I_{OUT} = 300mA$	$V_{OUT} < 2V$		Note1	mV	
			$2V \leq V_{OUT} < 3.3V$		500		650
			$3.3V \leq V_{OUT} < 4.5V$		400		520
Quiescent Current	I_Q	$V_{EN} = V_{IN}$, $I_{OUT} = 0mA$		300	500	nA	
Shutdown Current	I_{SHDN}	$V_{EN} = 0V$		0.1	0.25	μA	
Output Current Limit	I_{LIM}	$V_{OUT} = 90\%$ of $V_{OUT-NOM}$	360	560		mA	
Enable High Level	$V_{EN(HI)}$	$V_{IN} = 5V$	1			V	
Enable Low Level	$V_{EN(LO)}$	$V_{IN} = 5V$			0.2	V	
Output Discharge Resistance	R_{DSG}			1.7		K Ω	
Power Supply Ripple Rejection	PSRR	$I_{OUT} = 10mA$, $f = 1KHz$		45		dB	
Over Temperature Shutdown	OTS			150		$^\circ C$	
Over Temperature Hysteresis	OTH			20		$^\circ C$	

Note1: For V_{OUT} below 2V, Dropout Voltage is the V_{IN-MIN} to Output Differential.

■ Detail Description

Overview

The AME8891 is a low dropout linear regulator (LDO) featuring low quiescent current with excellent line and load transient performance designated for power-sensitive applications. The 2% accuracy of output voltage provides low output noise and low-dropout voltage.

Enable Pin

Enable pin is powered-on in Active-High mode. During pulled-low mode, the MOS transistor is off and all off and all of internal circuits are powered down. When the EN pin is floating, the internal mode is pulled-down.

Input and Output Capacitor Selection

AME8891 is designed to stabilize a wide range of output capacitors. The ESR of output capacitor relates to stability. The large ESR of output capacitor decreases the peak deviations and improves transient response during current changes.

The different types of capacitor(aluminum, ceramic and tantalum) have different characterizations, such as temperature and voltage coefficients. All of ceramic capacitors are manufactured with a variety of dielectrics, each with different behavior across temperature and applications. Common dielectrics are X5R, X7R and Y5V. It is recommended to use 1μF to 10μF X5R or X7R dielectric ceramic capacitors with 30mΩ to 50mΩ ESR range between device outputs and ground for stability. The AME8891 is designed to remain stable through ceramic capacitors with low ESR and larger capacitor is very important because it generates a zero to provide phase lead for loop stability.

There is no requirement for the ESR on the input capacitor but it is voltage and temperature coefficient must be considered for the environment of device application.

Thermal Consideration

The power handling capability of device will be limited by allowable operating junction temperature(125°C). The maximum output power of AME8891 is limited by the maximum power dissipation of each package. The calculation of power dissipation is according to input voltage, output voltage and output current. The maximum power dissipation should not exceed the package's maximum power rating.

$$P_{MAX} = (V_{IN-MAX} - V_{OUT}) \times I_{OUT}$$

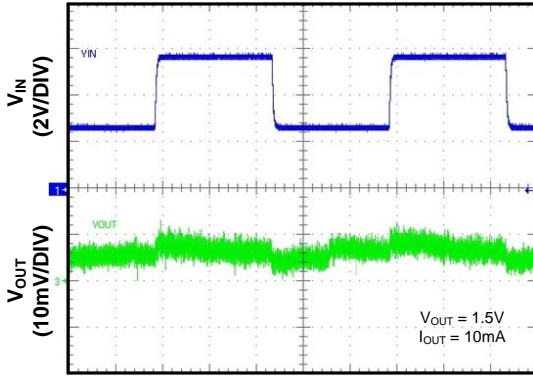
Where

V_{IN-MAX} = maximum input voltage

P_{MAX} = maximum power dissipation of the package

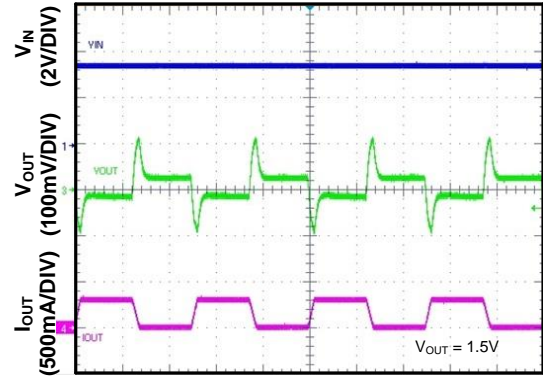
■ **Characterization Curve**

LINE Transient Response



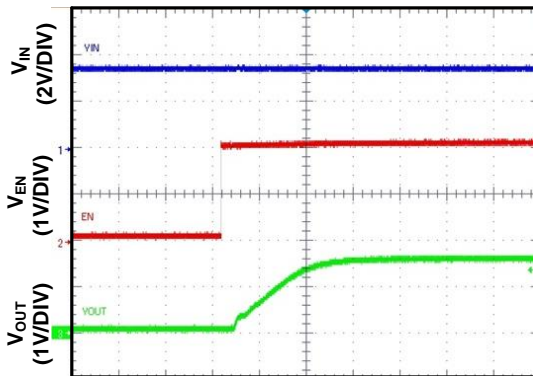
Time (200ms/DIV)

LOAD Transient Response



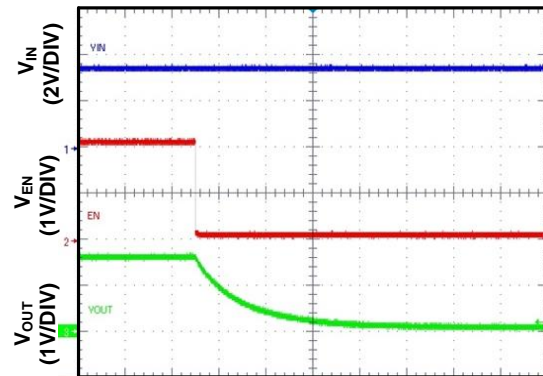
Time (400 μ s/DIV)

Power On Transition



Time (40 μ s/DIV)

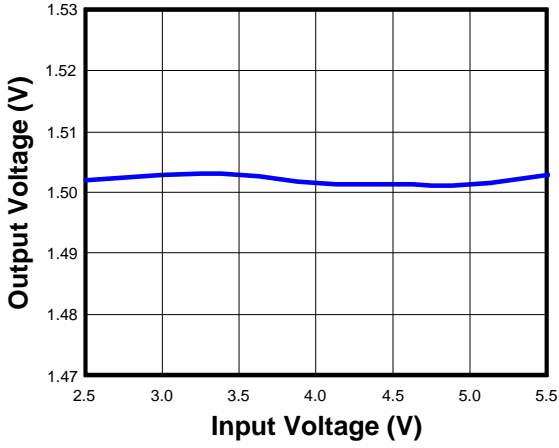
Power Off Transition



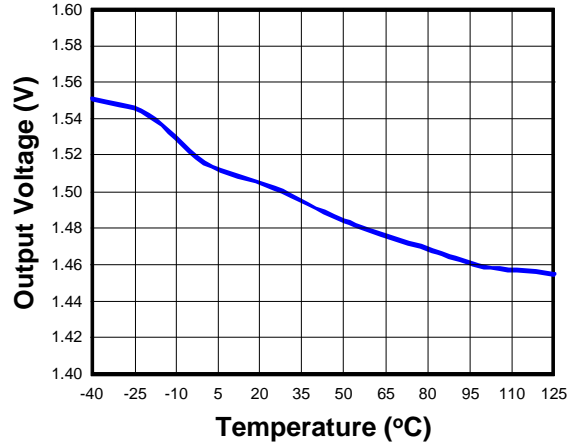
Time (2ms/DIV)

■ **Characterization Curve (Contd.)**

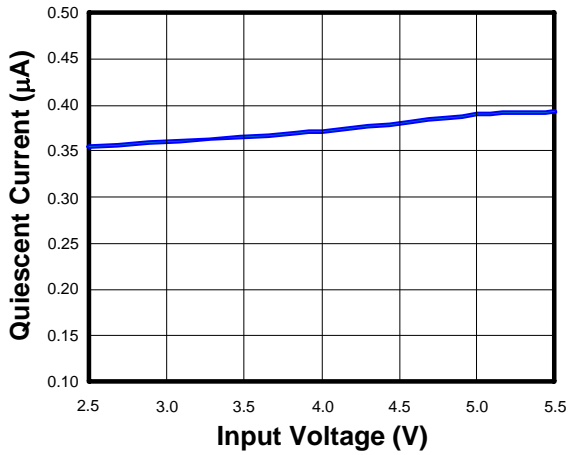
V_{IN} vs. V_{OUT}



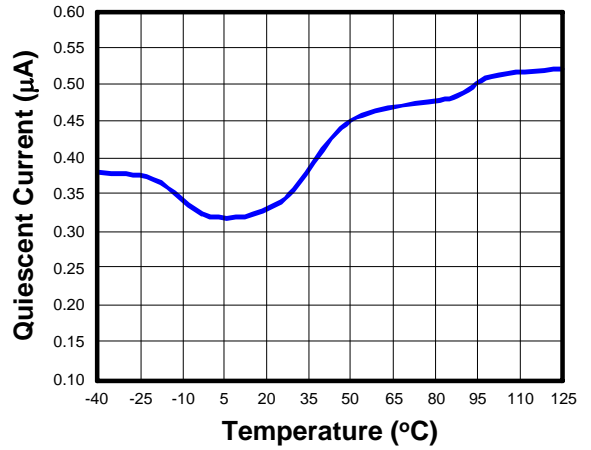
V_{OUT} vs. Temp



I_Q vs V_{IN}

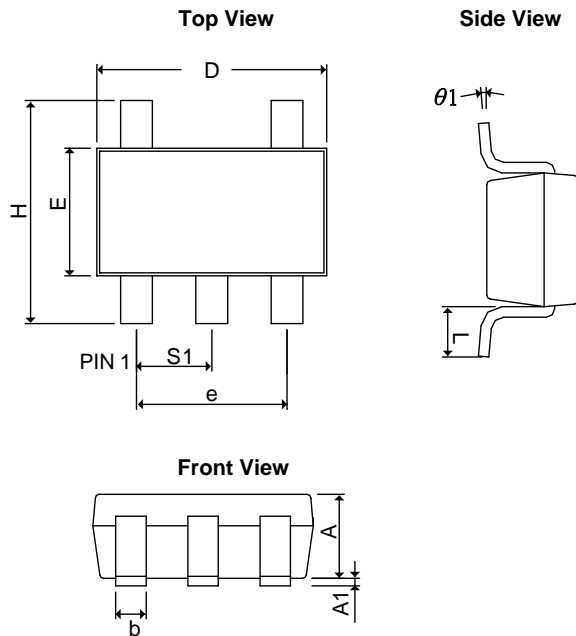


I_Q vs. Temp.



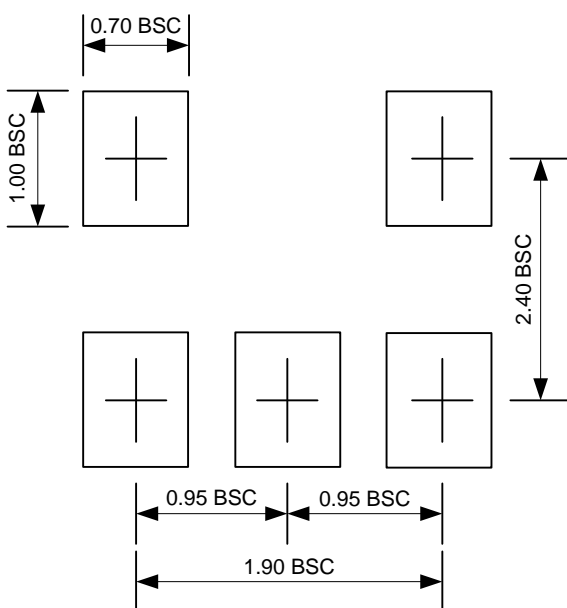
■ Package Dimension

SOT-25



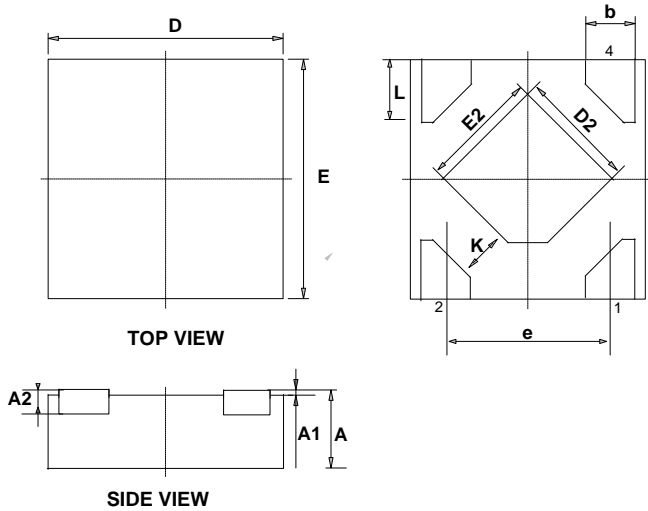
SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.30	0.0354	0.0512
A₁	0.00	0.15	0.0000	0.0059
b	0.30	0.55	0.0118	0.0217
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.0748 BSC	
H	2.60	3.00	0.1024	0.1181
L	0.37 BSC		0.0146 BSC	
θ_1	0°	10°	0°	10°
S₁	0.95 BSC		0.0374 BSC	

■ Lead Pattern

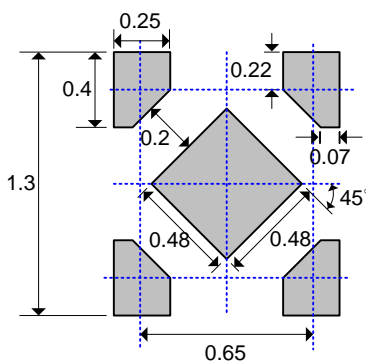


Note:

- Lead pattern unit description:
BSC: Basic. Represents theoretical exact dimension or dimension target.
- Dimensions in Millimeters.
- General tolerance $\pm 0.05\text{mm}$ unless otherwise specified.

■ Package Dimension (Contd.)
DFN-4A
(1x1x0.4mm)


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.320	0.400	0.013	0.016
A₁	0.000	0.050	0.000	0.002
A₂	0.102 REF		0.004 REF	
b	0.150	0.300	0.006	0.012
D	0.950	1.050	0.037	0.041
E	0.950	1.050	0.037	0.041
e	0.650 BSC		0.026 BSC	
D₂	0.380	0.580	0.015	0.023
E₂	0.380	0.580	0.015	0.023
L	0.200	0.300	0.008	0.012
K	0.200 REF		0.008 REF	

■ Lead Pattern

Note:

1. Dimensions in Millimeters.



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