

■ General Description

The AME8861 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-25 package is 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.

In applications requiring a low noise, regulated supply, place a 1000 pF capacitor between Bypass and ground.

The AME8861 is stable with an output capacitance of 2.2 μ F or greater.

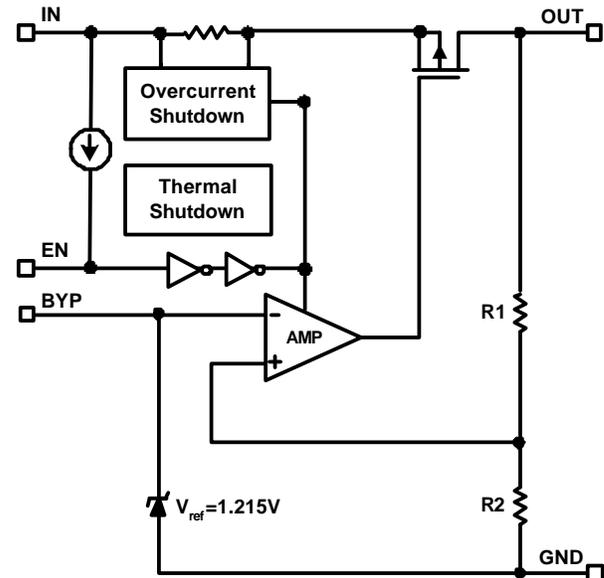
■ Features

- Very Low Dropout Voltage
- 600mA Output
- Accurate to within 1.5%
- 30 μ A Quiescent Current
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Noise Reduction Bypass Capacitor
- Power-Saving Shutdown Mode
- Space-Saving SOT-25 Package
- Factory Pre-set Output Voltages
- Low Temperature Coefficient
- All AME's Lead Free Products Meet RoHS Standards

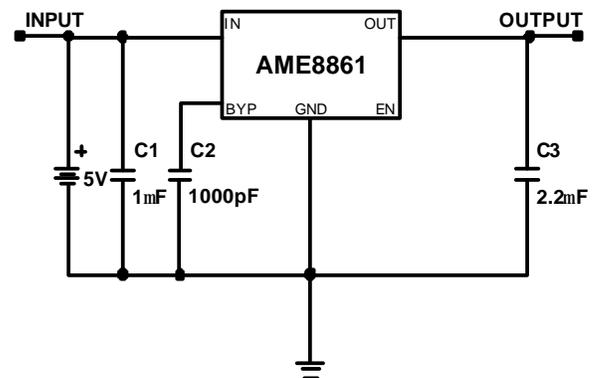
■ Applications

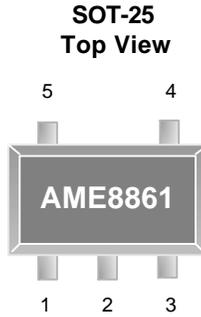
- Instrumentation
- Portable Electronics
- Wireless Devices
- Cordless Phones
- PC Peripherals
- Battery Powered Widgets
- Electronic Scales

■ Functional Block Diagram



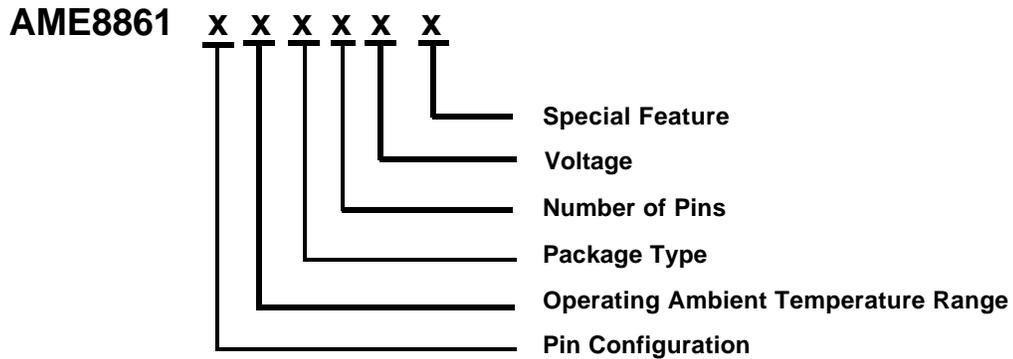
■ Typical Application



■ Pin Configuration

AME8861

1. IN
2. GND
3. EN
4. BYP
5. OUT

* **Die Attach:**
Conductive Epoxy

■ Ordering Information


Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Voltage	Special Feature
A: 1. IN 2. GND 3. EN 4. BYP 5. OUT	E: -40°C to 85°C	E: SOT-2X	V: 5	180: V=1.8V 250: V=2.5V 300: V=3.0V 330: V=3.3V	L: Low Profile Y: Lead Free & Low Profile Z: Lead Free

■ Ordering Information (contd.)

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME8861AEEV180Y	BFNww	1.8V	TSOT-25	- 40°C to + 85°C
AME8861AEEV180Z	BFNww	1.8V	SOT-25	- 40°C to + 85°C
AME8861AEEV250	AXCww	2.5V	SOT-25	- 40°C to + 85°C
AME8861AEEV250L	AXCww	2.5V	TSOT-25	- 40°C to + 85°C
AME8861AEEV250Y	AXCww	2.5V	TSOT-25	- 40°C to + 85°C
AME8861AEEV250Z	AXCww	2.5V	SOT-25	- 40°C to + 85°C
AME8861AEEV300	AWGww	3.0V	SOT-25	- 40°C to + 85°C
AME8861AEEV300L	AWGww	3.0V	TSOT-25	- 40°C to + 85°C
AME8861AEEV300Y	AWGww	3.0V	TSOT-25	- 40°C to + 85°C
AME8861AEEV300Z	AWGww	3.0V	SOT-25	- 40°C to + 85°C
AME8861AEEV330	AXBww	3.3V	SOT-25	- 40°C to + 85°C
AME8861AEEV330L	AXBww	3.3V	TSOT-25	- 40°C to + 85°C
AME8861AEEV330Y	AXBww	3.3V	TSOT-25	- 40°C to + 85°C
AME8861AEEV330Z	AXBww	3.3V	SOT-25	- 40°C to + 85°C

Note: ww represents the date code and pls refer to date Code Rule before Package Dimension.

* A line on top of the first character represents lead free plating such as BFNww.

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

■ Absolute Maximum Ratings

Parameter	Maximum	Unit
Input Voltage	8	V
Output Current	$P_D / (V_{IN} - V_O)$	A
Input, 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.

* HBM B:2000V~3999V

■ Recommended Operating Conditions

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

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOT-25	Conductive Epoxy	θ_{JC}	81	°C / W
Thermal Resistance (Junction to Ambient)			θ_{JA}	260	
Internal Power Dissipation			P_D	400	mW
Maximum Junction Temperature				150	°C
Solder Iron (10 Sec)**				350	°C

* Measure θ_{JC} on center of molding compound if IC has no tab.

** MIL-STD-202G 210F

■ Electrical Specifications

TA = 25°C unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units	
Input Voltage	V_{IN}		Note 1		7	V	
Output Voltage Accuracy	V_O	$I_O=1mA$	-1.5		1.5	%	
Dropout Voltage	$V_{DROPOUT}$	$I_O=600mA$ $V_O=V_{O(NOM)}-2.0\%$	$1.3V \leq V_{O(NOM)} \leq 1.4V$	See chart	1900	mV	
			$1.4V < V_{O(NOM)} \leq 2.0V$		1400		
			$2.0V < V_{O(NOM)} \leq 2.8V$		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	$1.3V \leq V_O \leq 1.4V$	-0.2		0.2	%
			$1.4V < V_O \leq 2.0V$	-0.15		0.15	
			$2.0V < V_O < 4.0V$	-0.1	0.02	0.1	
			$V_O \geq 4.0V$	-0.4	0.2	0.4	
Load Regulation	REG_{LOAD}	$I_O=1mA$ to 600mA		0.2	1	%	
Over Temperature Shutdown	OTS			150		$^{\circ}C$	
Over Temperature Hysteresis	OTH			30		$^{\circ}C$	
V_O Temperature Coefficient	TC			30		ppm/ $^{\circ}C$	
Power Supply Rejection	PSRR	$I_O=100mA$ $C_O=2.2\mu F$ ceramic $C_{BYP}=0.01\mu F$	$f=1kHz$		75	dB	
			$f=10kHz$		55		
			$f=100kHz$		30		
Output Voltage Noise	eN	$f=10Hz$ to 100kHz $I_O=10mA$, $C_{BYP}=0.01\mu F$			30	μV_{rms}	
EN Input Threshold	V_{EH}	$V_{IN}=2.7V$ to 7V	2.0		V_{in}	V	
	V_{EL}	$V_{IN}=2.7V$ to 7V	0		0.4	V	
EN Input Bias Current	I_{EH}	$V_{EN}=V_{IN}$, $V_{IN}=2.7V$ to 7V			0.1	μA	
	I_{EL}	$V_{EN}=0V$, $V_{IN}=2.7V$ to 7V			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}	$V_{PG}=7V$			1	μA	

 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 AME8861 family of CMOS regulators contain a PMOS pass transistor, voltage reference, error amplifier, over-current protection, and thermal shutdown.

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 AME8861 switches from voltage mode to current mode when the load exceeds the rated output current. This prevents over-stress. The AME8861 also incorporates current foldback to reduce power dissipation when the output is short circuited. This feature becomes active when the output drops below 0.8 volts, and reduces the current flow by 65%. Full current is restored when the voltage exceeds 0.8 volts.

■ External Capacitors

The AME8861 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.

A third capacitor can be connected between the BY-PASS pin and GND. This capacitor can be a low cost Polyester Film variety between the value of 0.001 ~ 0.01 μ F. A larger capacitor improves the AC ripple rejection, but also makes the output come up slowly. This "Soft" turn-on is desirable in some applications to limit turn-on surges.

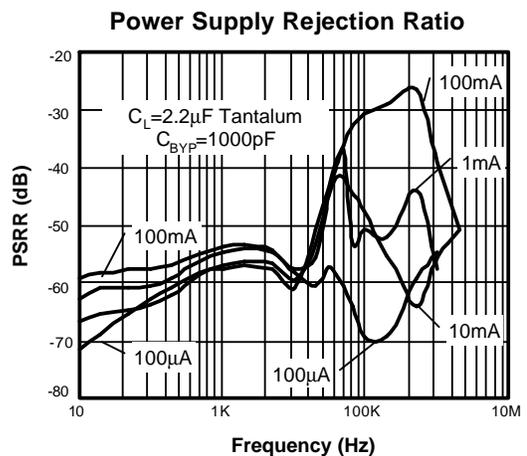
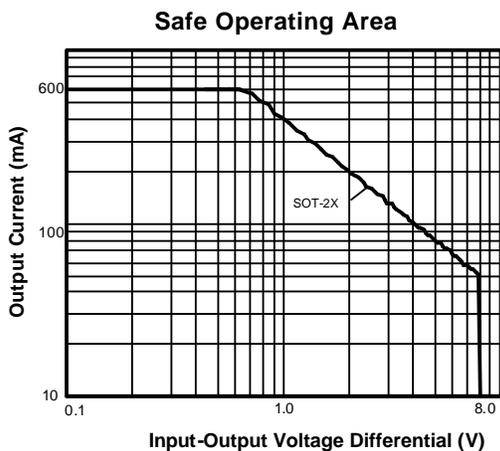
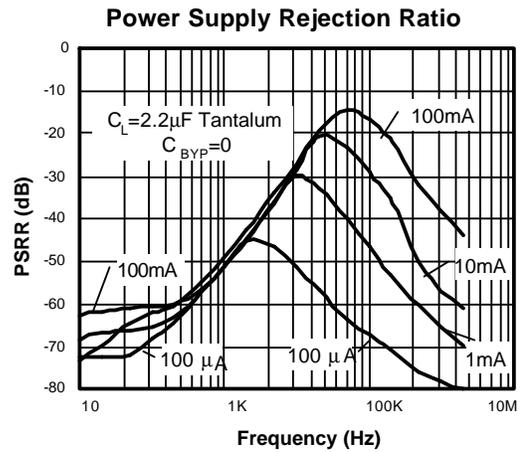
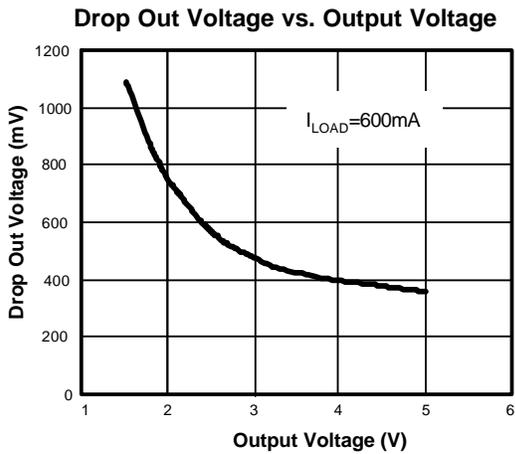
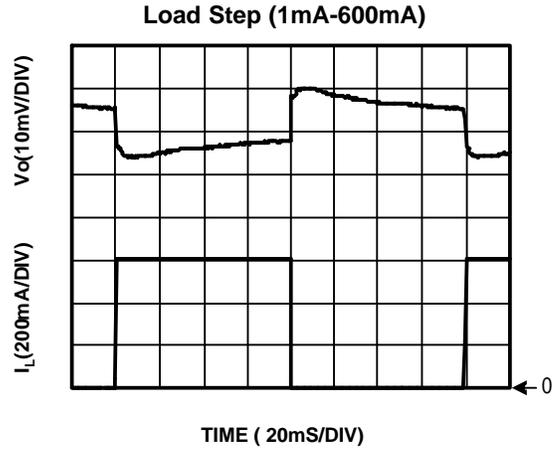
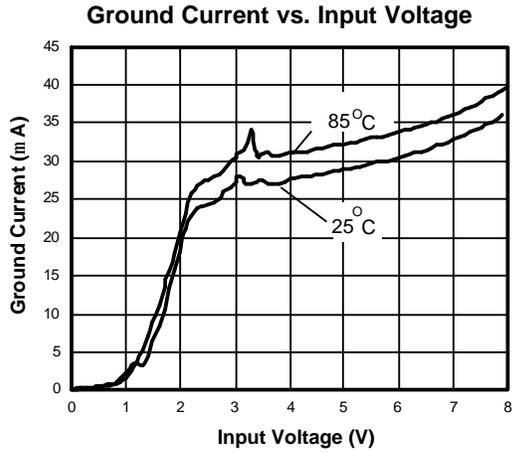
All capacitors should be placed in close proximity to the pins. A "Quiet" ground termination is desirable. This can be achieved with a "Star" connection.

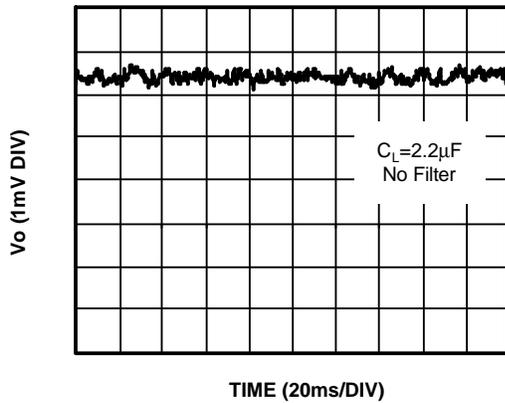
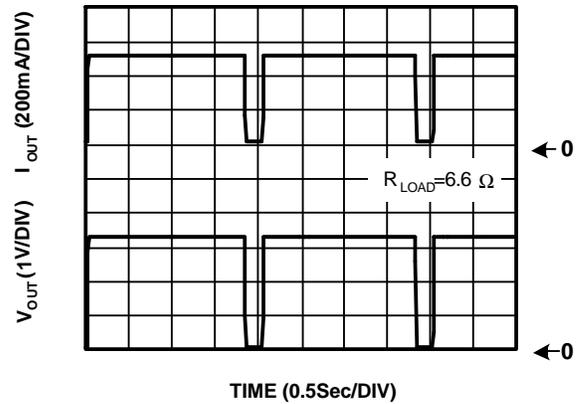
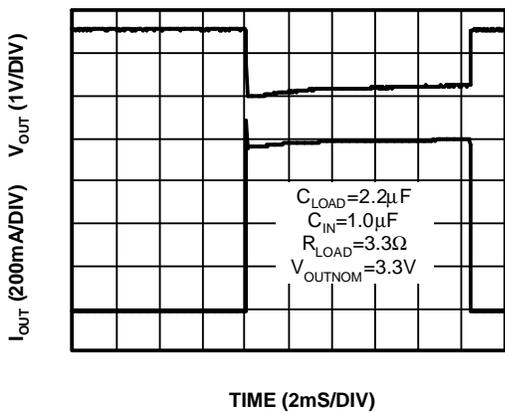
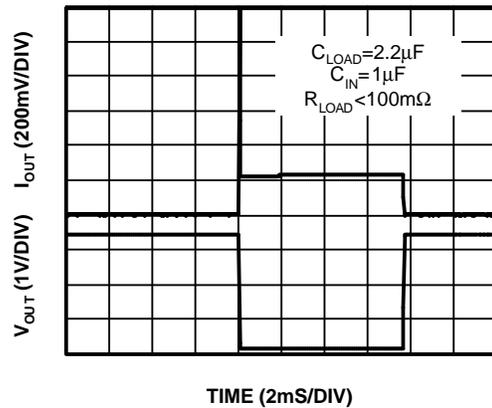
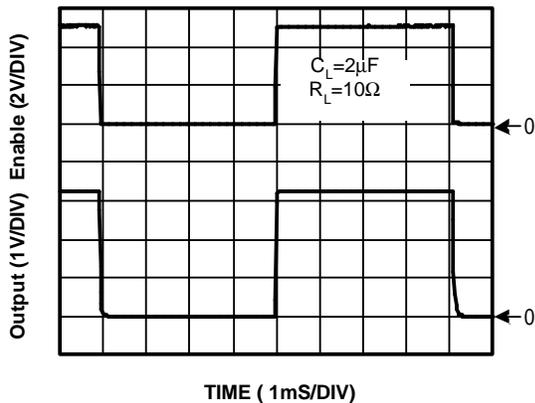
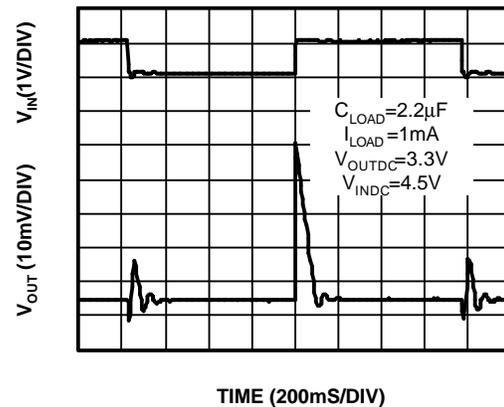
■ Enable

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.



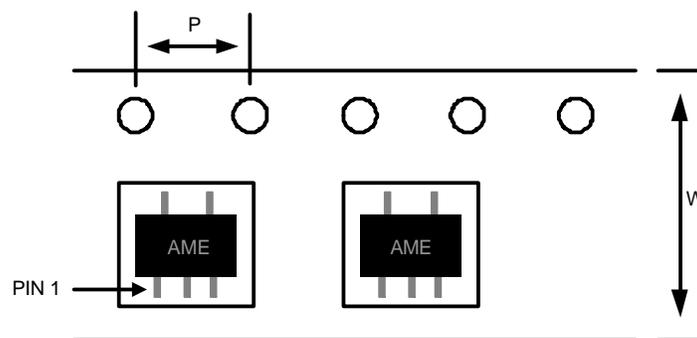
■ Characterization Curve(For reference only)



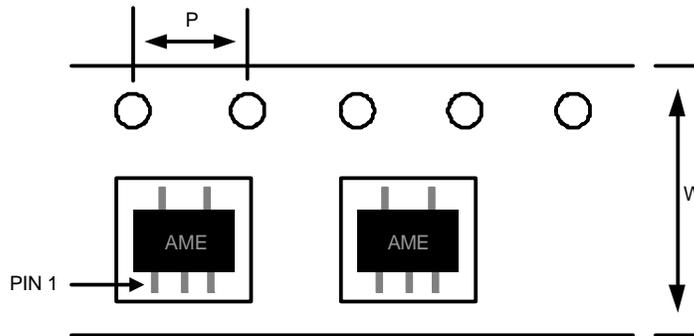
■ Characterization Curve(For reference only)
Noise Measurement

Overtemperature Shutdown

Current Limit Response

Short Circuit Response

Chip Enable Transient Response

Line Transient Response


■ Date Code Rule

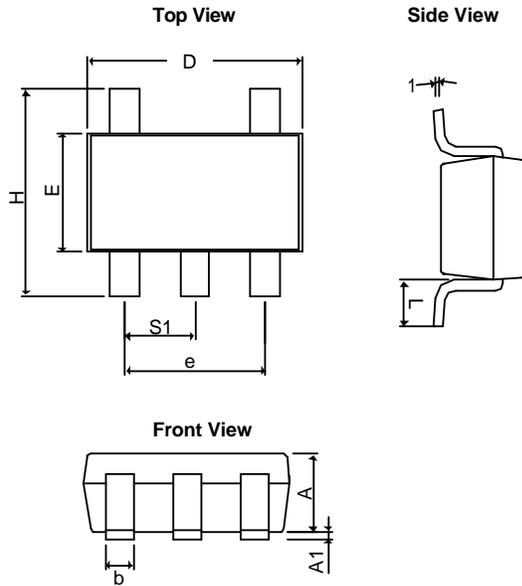
Marking			Date Code		Year
A	A	A	W	W	xxx0
A	A	A	W	<u>W</u>	xxx1
A	A	A	<u>W</u>	W	xxx2
A	A	A	<u>W</u>	<u>W</u>	xxx3
A	A	<u>A</u>	W	W	xxx4
A	A	<u>A</u>	W	<u>W</u>	xxx5
A	A	<u>A</u>	<u>W</u>	W	xxx6
A	A	<u>A</u>	<u>W</u>	<u>W</u>	xxx7
A	<u>A</u>	A	W	W	xxx8
A	<u>A</u>	A	W	<u>W</u>	xxx9

■ Tape and Reel Dimension
SOT-25

Carrier Tape, Number of Components Per Reel and Reel Size

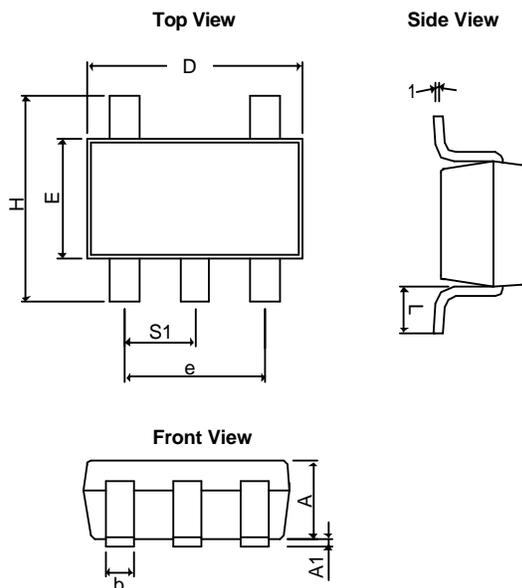
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-25	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

■ Tape and Reel Dimension
TSOT-25

Carrier Tape, Number of Components Per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
TSOT-25	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

■ Package Dimension
SOT-25


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.20REF		0.0472REF	
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		0.07480 BSC	
H	2.60	3.00	0.10236	0.11811
L	0.37BSC		0.0146BSC	
q1	0°	10°	0°	10°
S₁	0.95BSC		0.0374BSC	

TSOT-25


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A+A₁	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°
S₁	0.95BSC		0.0374BSC	



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