

## ■ General Description

The AME5110 family of Fixed Frequency, High Efficiency, Synchronous Buck, DC-DC Converters, apply the latest innovations in Current-Mode Technology. Available in SOT-25 package, these devices are typically twice as efficient as standard LDO's, making them well suited for most portable applications.

The AME5110 is simple to use. As with standard LDO's, (1) Input, and (1) Output capacitor are required. The only other element is a small, low cost, 2.2μH inductor. The AME5110 is available with fixed output voltages of 1.5V and 1.8V, or adjustable at 600mA. Using a proprietary "Extreme Green" Technology, battery life is maximized with Frequency Foldback at light Load, and 100% duty when  $V_{in}$  approaches  $V_{out}$ .

## ■ Features

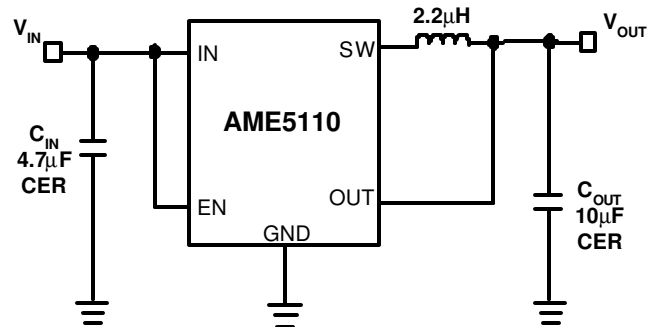
- High Efficiency "Extreme Green"
- 2.5V to 5.5V Input
- Short Circuit Protection
- Over-Temperature Shutdown
- Under-Voltage Lockout
- Superb Transient Response
- All AME's Lead Free Products Meet RoHS Standards

## ■ Applications

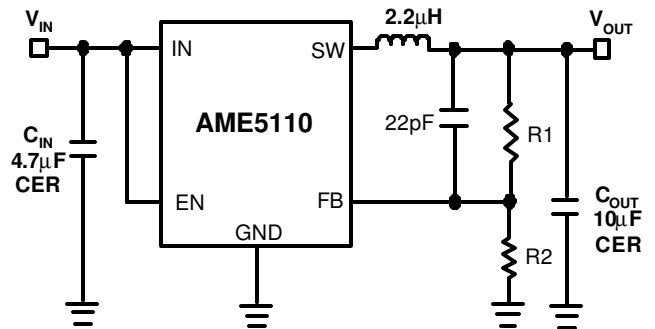
- Cellular Phones
- Digital Cameras
- Portable Electronics
- USB Devices
- MP3 Players
- LDO Replacement

## ■ Typical Application

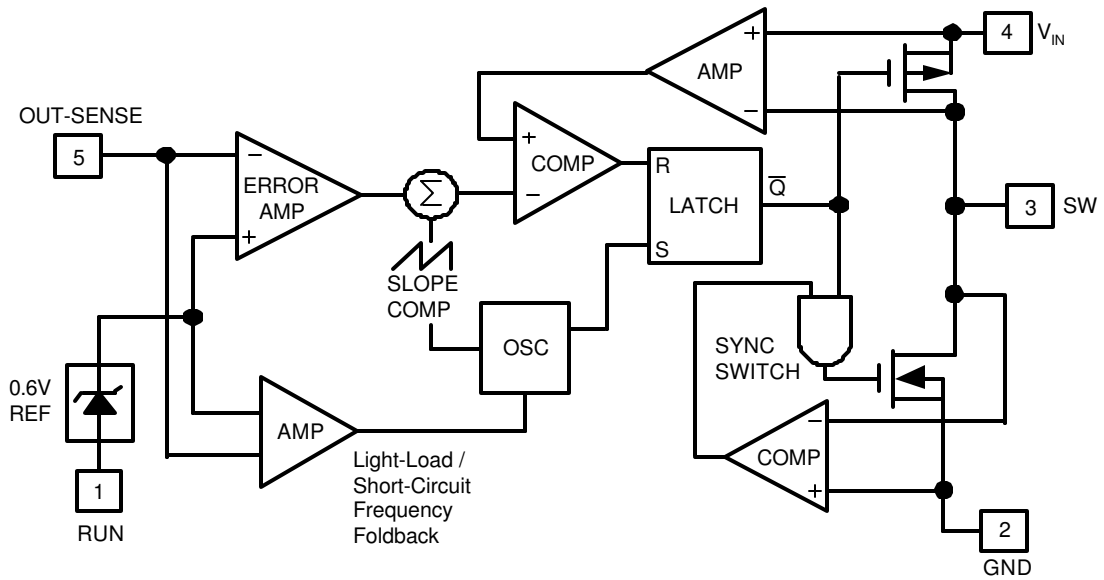
### Fixed Voltage Version

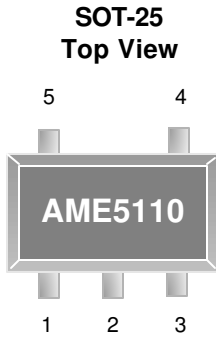


### Adjustable Voltage Version



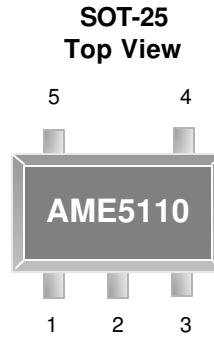
$$V_{OUT} = V_{FB} \frac{(R1+R2)}{R2}$$

**AME5110**
**■ Function Diagram**


**■ Pin Configuration**

**AME5110AEEVxxx**

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

**\* Die Attach:  
Conductive Epoxy**

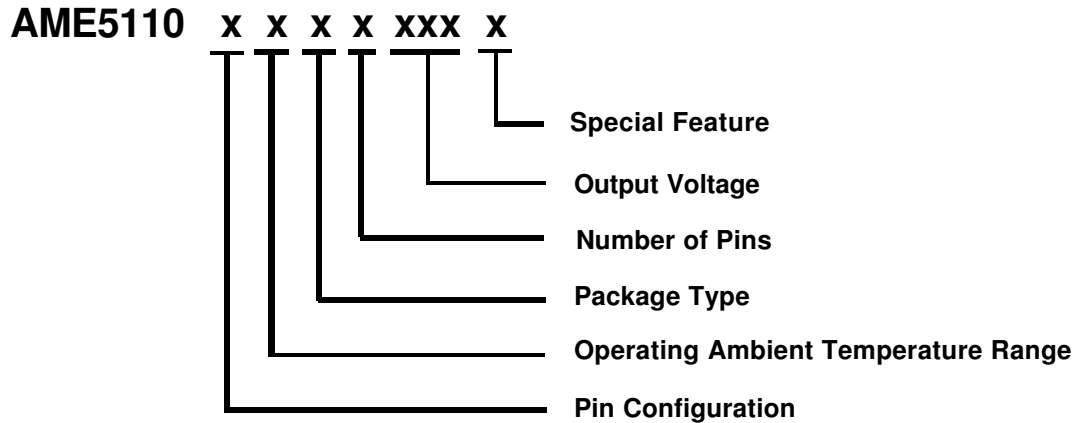

**AME5110BEEVADJ**

1. EN
2. GND
3. SW
4. IN
5. FB

**\* Die Attach:  
Conductive Epoxy**

**■ Pin Description**

Pin Number		Pin Name	Pin Description
AME5110AEEVxxx	AME5110BEEVADJ		
1	1	EN	Enable Control Input. Forcing this pin above 1.5V enables the part. Forcing this pin below 0.3V shuts down the device. In shutdown, all functions are disabled drawing <math><1\mu\text{A}</math> supply current. Do not leave EN floating.
2	2	GND	Ground Pin
3	3	SW	Switch Node Connection to Inductor. This pin connects to the drains of the internal main and synchronous power MOSFET switches.
4	4	IN	Main Supply Pin. Must be closely decoupled to GND, Pin2, with a 2.2 $\mu\text{F}$ or greater ceramic capacitor.
N/A	5	FB	Feedback Pin. Receives the feedback voltage from an external resistive divider across the output.
5	N/A	OUT	Output Voltage for fixed version

**AME5110**
**■ Ordering Information**


Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Voltage	Special Feature
<b>A</b> (SOT-25) 1. EN 2. GND 3. SW 4. IN 5. OUT  <b>B</b> (SOT-25) 1. EN 2. GND 3. SW 4. IN 5. FB	E: -40°C to 85°C	E: SOT-2X	V: 5	150: 1.5V 180: 1.8V ADJ: Adjustable	Z: Lead free Y: Lead free & Low profile

**■ Ordering Information**

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME5110AEEV150Y	BARww	1.5V	TSOT-25	-40°C to 85°C
AME5110AEEV150Z	BARww	1.5V	SOT-25	-40°C to 85°C
AME5110AEEV180Y	BASww	1.8V	TSOT-25	-40°C to 85°C
AME5110AEEV180Z	BASww	1.8V	SOT-25	-40°C to 85°C
AME5110BEEVADJY	BATww	ADJ	TSOT-25	-40°C to 85°C
AME5110BEEVADJZ	BATww	ADJ	SOT-25	-40°C to 85°C

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

\* A line on top of the first letter represents lead free plating such as BARww.

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

**■ Absolute Maximum Ratings**

Parameter	Symbol	Maximum	Unit
Input Supply Voltage	$V_{IN}$	GND-0.3 to 6	V
EN, FB Voltages	$V_{EN}, V_{FB}$	GND-0.3 to $V_{IN}$	V
SW Voltage	$V_{SW}$	GND-0.3 to $V_{IN}+0.3$	V
ESD Classification		C*	

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

\* HBM C: 4000V+

**■ 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
Storage Temperature Range	$T_{STG}$	- 65 to 150	°C

**■ Thermal Information**

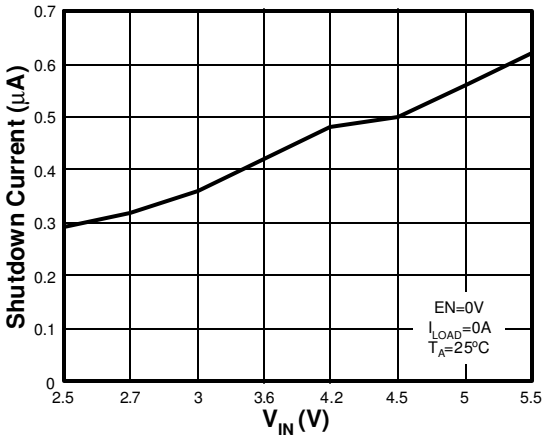
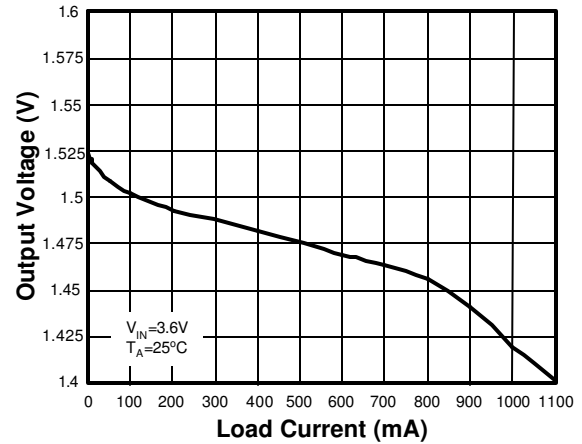
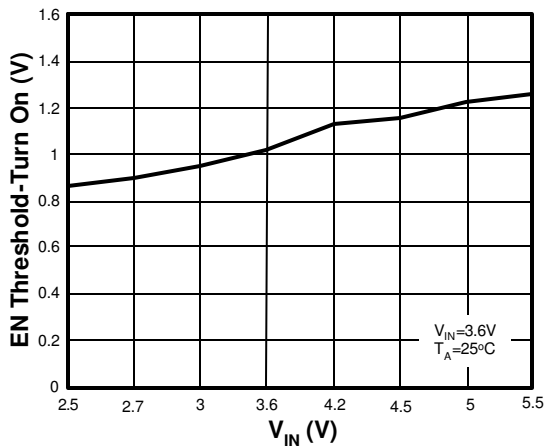
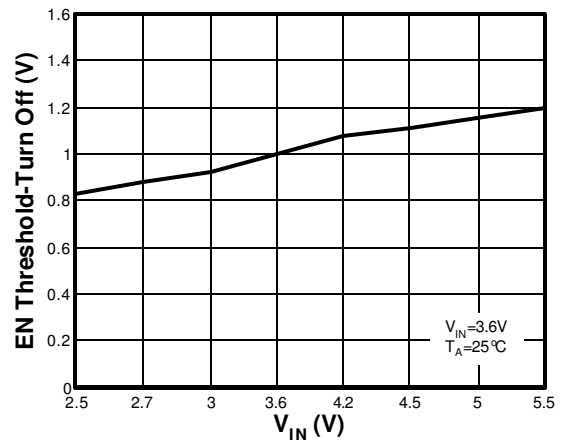
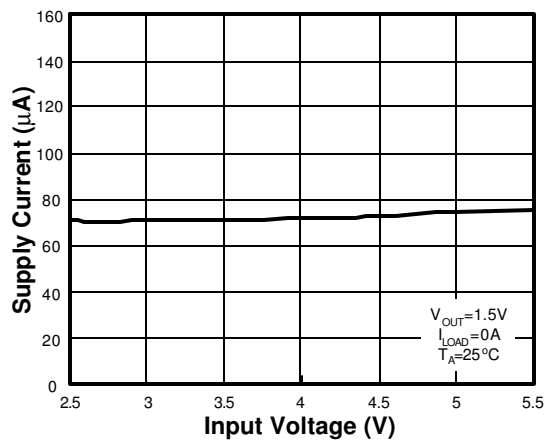
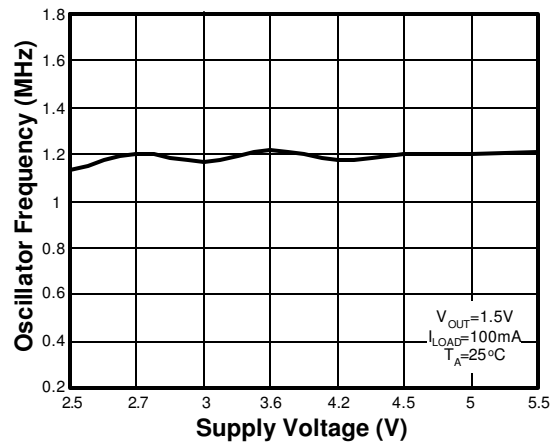
Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	SOT-25	Conductive Epoxy	$\theta_{JC}$	81	°C / W
Thermal Resistance (Junction to Ambient)			$\theta_{JA}$	260	°C / W
Internal Power Dissipation			$P_D$	400	mW
Maximum Junction Temperature				150	°C
Solder Iron (10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

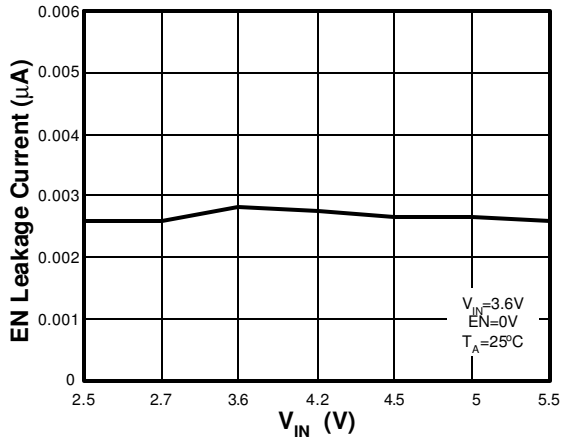
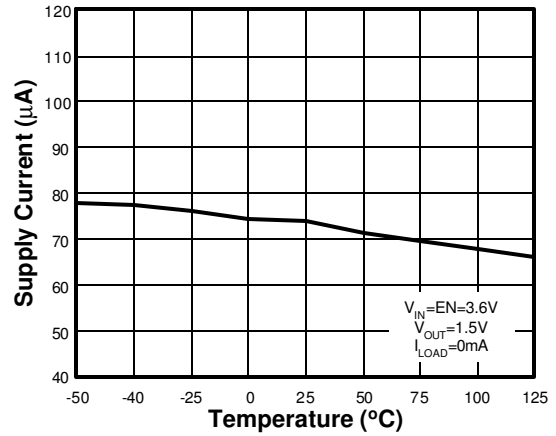
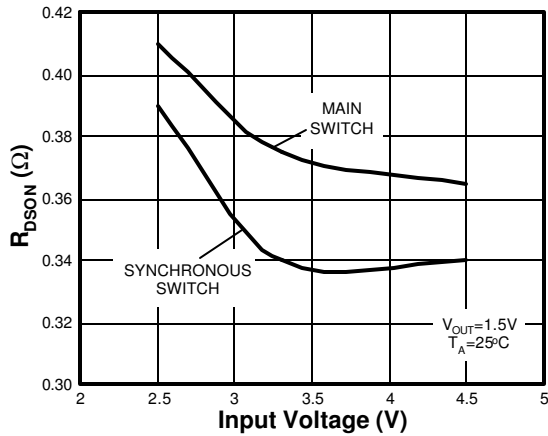
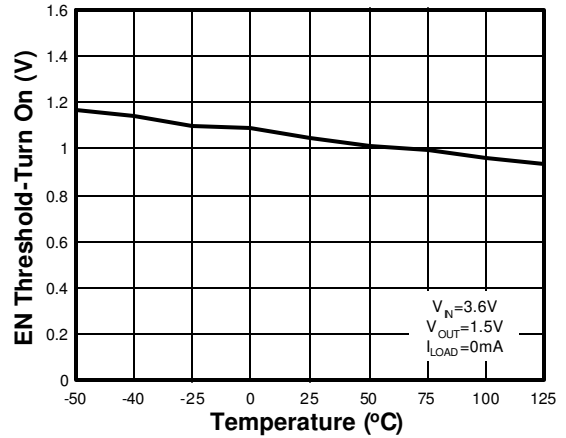
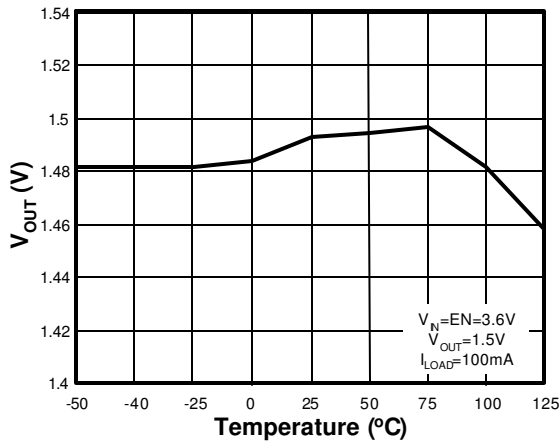
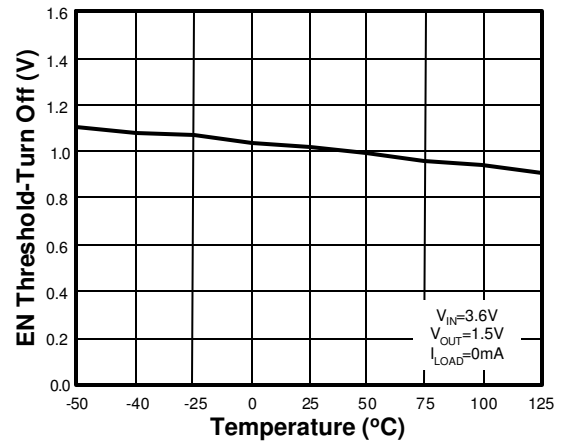
\* Measure  $\theta_{JC}$  on center of molding compound if IC has no tab.

\*\* MIL-STD-202G210F

**AME5110**
**■ Electrical Specifications**
 $T_A=25^{\circ}\text{C}$ .  $V_{IN}=3.6\text{V}$  unless otherwise specified.

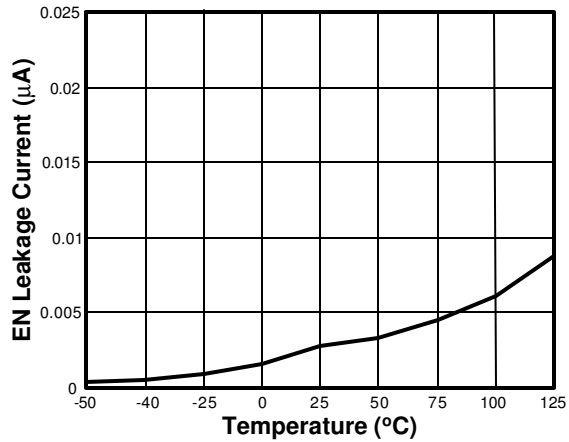
Parameter	Symbol	Test Condition		Min	Typ	Max	Units
Input Voltage	$V_{IN}$			2.5		5.5	V
Feedback Current	$I_{FB}$			-30		+30	nA
Regulated Feedback Voltage	$V_{FB}$	$T_A=25^{\circ}\text{C}$	AME 5110BEEVADJZ and AME	0.5880	0.6	0.6250	V
		$T_A= 0^{\circ}\text{C to } 85^{\circ}\text{C}$		0.5865	0.6	0.6280	
		$T_A= -40^{\circ}\text{C to } 85^{\circ}\text{C}$		0.5820	0.6	0.6300	
Feedback Voltage Line Regulation	$\Delta V_{FB}$	$V_{IN}=2.5\text{V to } 5.5\text{V}$	5110BEEVADJY		0.04	0.4	%/V
Regulated Output Voltage	$V_{OUT}$	$V_{OUT}=1.5\text{V},$ $I_{OUT}=100\text{mA}$	AME 5110AEEVxxxZ and AME	1.455	1.5	1.545	V
		$V_{OUT}=1.8\text{V},$ $I_{OUT}=100\text{mA}$		1.746	1.8	1.854	
Output Voltage Line Regulation	$REG_{LINE}$	$V_{IN}=2.5\text{V to } 5.5\text{V}$	5110AEEVxxxY		0.04	0.4	%/V
Switch Current Limit	$I_{CL}$	$V_{IN}=3\text{V}, V_{FB}=0.5\text{V}$ Duty Cycle < 35%	AME 5110BEEVADJZ and AME 5110BEEVADJY		1.7		A
		$V_{IN}=3\text{V}, V_{OUT}=90\%$ Duty Cycle < 35%	AME 5110AEEVxxxZ and AME 5110AEEVxxxY				
Output Voltage Load Regulation	$REG_{LOAD}$				5		%
Shutdown Current	$I_{SD}$	$V_{EN}=0\text{V}, V_{IN}=4.2\text{V}$	$T_A= -40^{\circ}\text{C to } 85^{\circ}\text{C}$		0.1	1	$\mu\text{A}$
Quiescent Current	$I_Q$	$V_{FB}=0.5\text{V or } V_{OUT}=90\%$ $V_{EN}=V_{IN}=4.2\text{V}$	$T_A= -40^{\circ}\text{C to } 85^{\circ}\text{C}$		350	500	
Oscillator Frequency	$f_{OSC}$	$V_{IN}=2.5\text{V} \& I_{OUT}=100\text{mA}$			1.2		MHz
		$V_{FB}=0\text{V or } V_{OUT}=0\text{V}$			310		kHz
$R_{DS(on)}$ of P-Channel FET	$R_{DS(on)(P)}$	$I_{SW}=100\text{mA}$			0.4	0.5	$\Omega$
$R_{DS(on)}$ of N-Channel FET	$R_{DS(on)(N)}$	$I_{SW}= -100\text{mA}$			0.35	0.45	$\Omega$
Switch Leakage Current	$I_{SW}$	$V_{EN}=0\text{V},$ $V_{SW}=0\text{V or } 5\text{V}, V_{IN}=5\text{V}$		-1		+1	$\mu\text{A}$
EN Input Threshold (High)	$V_{EH}$	$T_A= -40^{\circ}\text{C to } 85^{\circ}\text{C}$		1.5			V
EN Input Threshold (Low)	$V_{EL}$	$T_A= -40^{\circ}\text{C to } 85^{\circ}\text{C}$				0.3	
EN Input Current	$I_{EN}$	$T_A= -40^{\circ}\text{C to } 85^{\circ}\text{C}$		-1		+1	$\mu\text{A}$

**Shutdown Current vs  $V_{IN}$** 

**Output Voltage vs. Load Current**

**EN Threshold-Turn On vs.  $V_{IN}$** 

**EN Threshold-Turn Off vs.  $V_{IN}$** 

**Supply Current vs Supply Voltage**

**Oscillator Frequency vs. Supply Voltage**


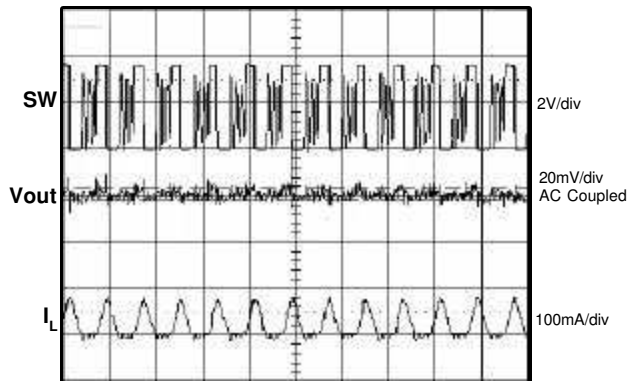
**EN Leakage Current vs.  $V_{IN}$** 

**Supply Current vs. Temp**

 **$R_{DS(on)}$  vs Input Voltage**

**EN Threshold-Turn On vs. Temp**

 **$V_{OUT}$  vs. Temperature**

**EN Threshold-Turn Off vs. Temp**




EN Leakage Current vs. Temp



Discontinuous Operation

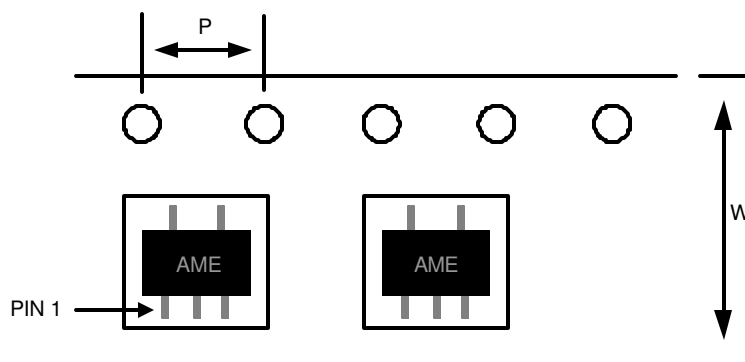


$V_{IN}=3.6V$   
 $V_{OUT}=1.5V$   
 $I_{LOAD}=50mA$   
 $T_A=25^{\circ}C$

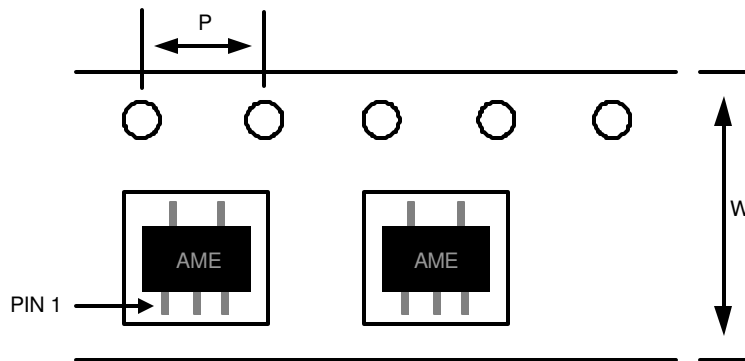
1µS/DIV

**AME5110**
**■ Date Code Rule**

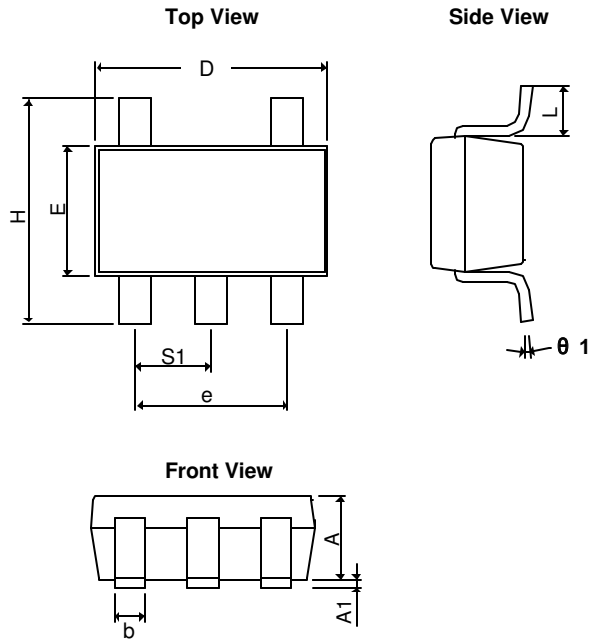
Marking			Date Code		Year
A	A	A	W	W	xxx0
A	A	A	W	<u>W</u>	xxx1
A	A	A	<u>W</u>	W	xxx2
A	A	A	<u>W</u>	<u>W</u>	xxx3
A	A	<u>A</u>	W	W	xxx4
A	A	<u>A</u>	W	<u>W</u>	xxx5
A	A	<u>A</u>	<u>W</u>	W	xxx6
A	A	<u>A</u>	<u>W</u>	<u>W</u>	xxx7
A	<u>A</u>	A	W	W	xxx8
A	<u>A</u>	A	W	<u>W</u>	xxx9

**■ Tape and Reel Dimension**
**SOT-25**

**Carrier Tape, Number of Components Per Reel and Reel Size**

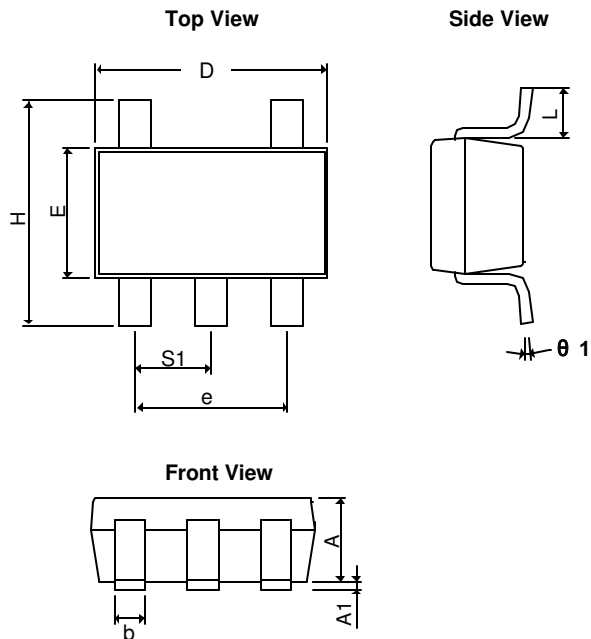
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
SOT-25	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm

**■ 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

**AME5110**
**■ Package Dimension**
**SOT-25**


SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
<b>A</b>	1.20REF		0.0472REF	
<b>A<sub>1</sub></b>	0.00	0.15	0.0000	0.0059
<b>b</b>	0.30	0.55	0.0118	0.0217
<b>D</b>	2.70	3.10	0.1063	0.1220
<b>E</b>	1.40	1.80	0.0551	0.0709
<b>e</b>	1.90 BSC		0.07480 BSC	
<b>H</b>	2.60	3.00	0.10236	0.11811
<b>L</b>	0.37BSC		0.0146BSC	
$\theta 1$	0°	10°	0°	10°
<b>S<sub>1</sub></b>	0.95BSC		0.0374BSC	

**TSOT-25**


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