



AME5142

■ General Description

The AME5142 is a Boost DC/DC converter specifically designed to drive white LEDs with a constant current. The device can drive one to six LEDs in series from a Li-Ion cell. Series connection of the LEDs provides identical LED currents resulting in uniform brightness and eliminating the need for ballast resistors. The AME5142 switches at 1.2MHz, allowing the use of tiny external components. The input and output capacitor can be as small as 1µF (or 4.7µF), saving space and cost versus alternative solutions. A low 0.15V feedback voltage minimizes power loss in the current setting resistor for better efficiency. The AME5142 is available in TSOT-26 & TSOT-25 packages.

■ Typical Application

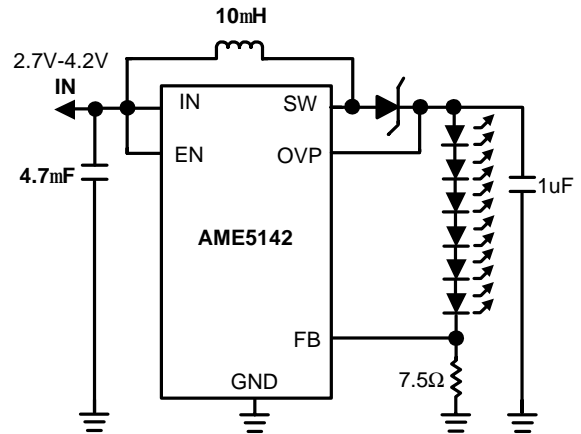


Figure 1: Six White LEDs Application in Li-Ion Battery

■ Features

- 1.2MHz Fixed Switching Frequency
- 25V Over Voltage Protection
- Over temperature protection
- Under voltage lockout protection
- Internal Soft Start
- Drives Up to 6 LEDs from a 2.7V Supply at 20mA
- 30V Internal Switch
- Requires Tiny Inductor and Capacitors
- Cycle-by-cycle current Limiting
- All AME's Lead Free Product Meet RoHS Standard

■ Applications

- LCD Bias
- Hand-held Computers
- Battery Backup
- Digital Cameras



AME5142

■ Function Block Diagram

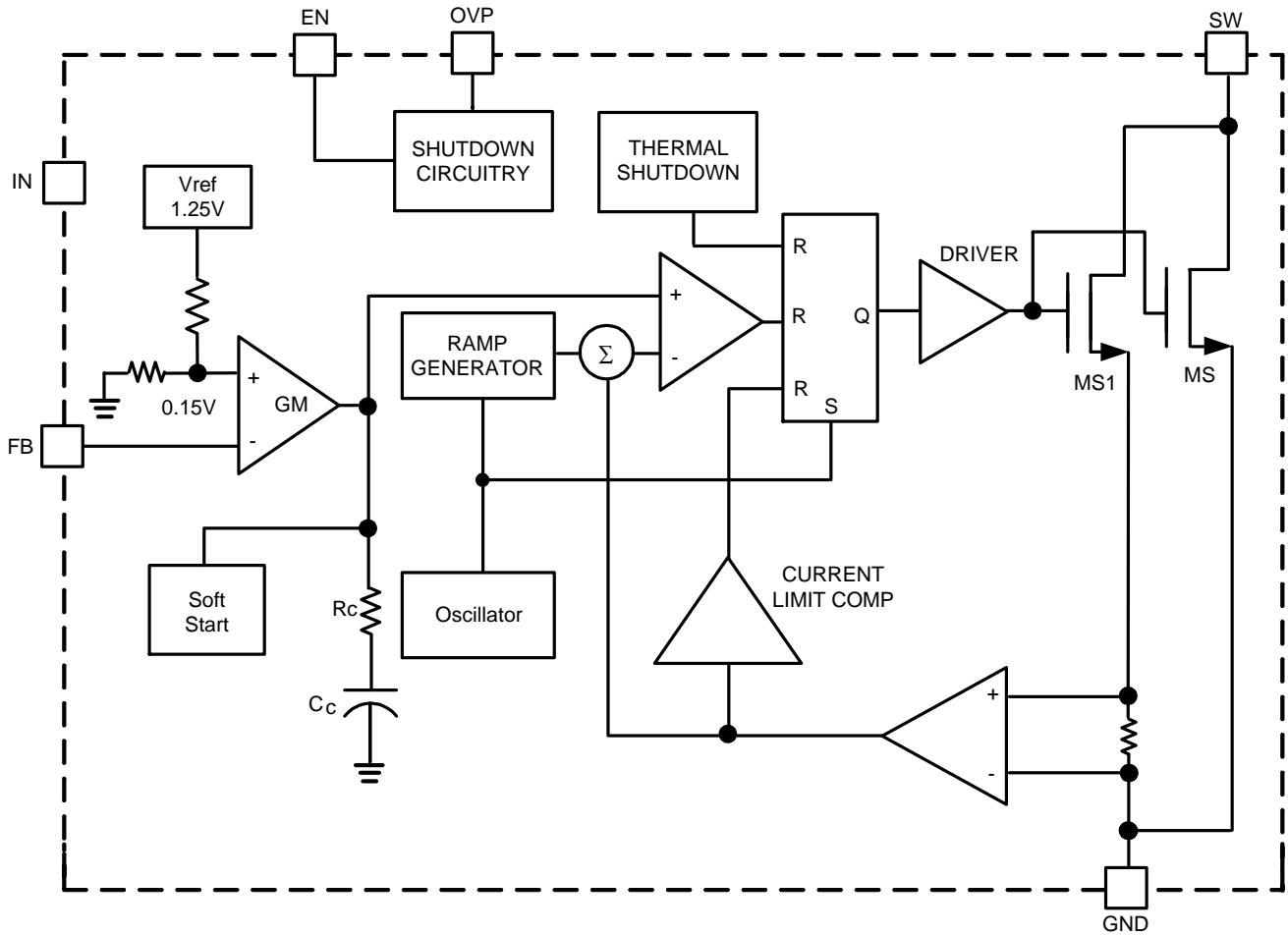
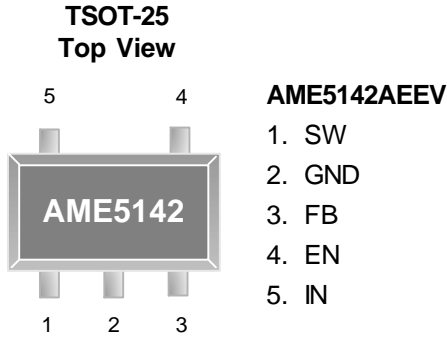


Figure 2 : AME5142 Block Diagram

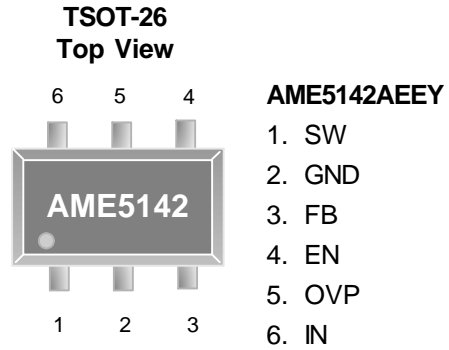


AME5142

■ Pin Configuration



* Die Attach:
Conductive Epoxy



* Die Attach:
Conductive Epoxy

■ Pin Description

AME5142AEEV

Pin Number	Pin Name	Pin Description
1	SW	Power Switch input. This is the drain of the internal NMOS power switch. Minimize the metal trace area connected to this pin to minimize EMI.
2	GND	Ground. Tie directly to ground plane.
3	FB	Output voltage feedback input. Connect the ground of the feedback network to an AGND (Analog Ground) plane which should be tied directly to the GND pin.
4	EN	Enable control input, active high. The enable pin is an active high control. Tie this pin above 1.5V to enable the device. Tie this pin below 0.4V to turn off the device.
5	IN	Analog and Power input. Input Supply Pin. Bypass this pin with a capacitor as close to the device as possible.



■ Pin Description

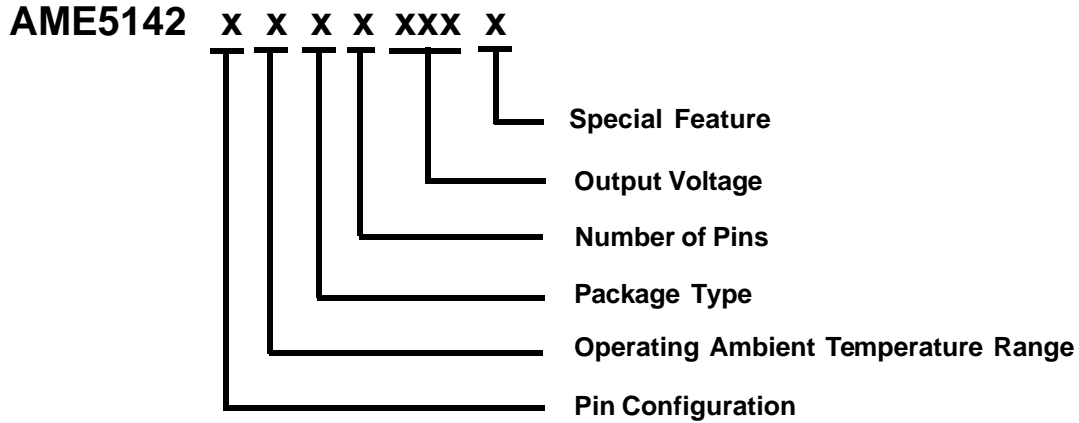
AME5142AEEY

Pin Number	Pin Name	Pin Description
1	SW	Power Switch input. This is the drain of the internal NMOS power switch. Minimize the metal trace area connected to this pin to minimize EMI.
2	GND	Ground. Tie directly to ground plane.
3	FB	Output voltage feedback input. Connect the ground of the feedback network to an AGND(Analog Ground) plane which should be tied directly to the GND pin.
4	EN	Enable control input, active high. The enable pin is an active high control. Tie this pin above 1.5V to enable the device. Tie this pin below 0.4V to turn off the device.
5	OVP	Over Voltage Protection.
6	IN	Analog and Power input. Input Supply Pin. Bypass this pin with a capacitor as close to the device as possible.



AME5142

Ordering Information



Pin Configuration	Operating Ambient Temperature Range	Package Type	Number of Pins	Output Voltage	Special Feature
A (TSOT-25) 1. SW 2. GND 3. FB 4. EN 5. IN A (TSOT-26) 1. SW 2. GND 3. FB 4. EN 5. OVP 6. IN	E: -40°C to 85°C	E: SOT-2X	V: 5 Y: 6	ADJ: Adjustable	Y: Lead free & Low profile

Ordering Information

Part Number	Marking*	Output Voltage	Package	Operating Ambient Temperature Range
AME5142AEEYADJY	BJGww	ADJ	TSOT-26	-40°C to 85°C
AME5142AEEVADJY	BJHww	ADJ	TSOT-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 $\overline{\text{B}}$ JEww.

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



AME5142

■ Absolute Maximum Ratings

Parameter	Symbol	Maximum	Unit
Input Supply Voltage	V_{IN}	6	V
EN, FB Voltages	V_{EN}, V_{FB}	V_{IN}	V
SW, OVP Voltage	V_{SW}, V_{OVP}	30	V

■ Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
Ambient Temperature Range	T_A	-40 to 85	°C
Junction Temperature Range	T_J	-40 to 125	
Storage Temperature Range	T_{STG}	-65 to 150	

■ Thermal Information

Parameter	Package	Die Attach	Symbol	Maximum	Unit
Thermal Resistance* (Junction to Case)	TSOT-25 TSOT-26	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 (10Sec)**				350	°C

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

** MIL-STD-202G 210F



AME5142

■ Electrical Specifications

$V_{IN}=4.2V$, $EN = V_{IN}$, $T_A = 25^\circ C$ Unless otherwise noted.

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Input Voltage	V_{IN}		2.7		5.5	V
Quiescent Current	I_Q	Switching, $V_{FB}=0V$		2	3	mA
		Not Switching, $V_{FB}=0.2V$		250	500	μA
Feedback Trip Point	V_{FB}		0.137	0.15	0.163	V
FB Pin Bias Current	I_{FB}	$V_{FB}=0.2V$		0.1	1	μA
Switch Current Limit	I_{CL}		650	850	1000	mA
Switch On-Resistance	R_{DSON}	$I_{SW}=100mA$, $V_{FB}=0.2V$		0.7	1.4	Ω
SW Leakage Current	I_{SW}	$V_{SW}=20V$		1	10	μA
Switch frequency	f_{SW}	$V_{FB}=0.1V$	0.9	1.2	1.5	MHz
Maximum Duty Cycle	D_{max}	$V_{FB}=0V$	88	92		%
Shutdown Supply Current	I_{SD}	$V_{EN}=0V$		0.01	1	μA
Over Temperature Protection	OTP	Shutdown, temperature increasing		160		$^\circ C$
	T_{RS}	Restore, temperature decreasing		140		
Over Voltage Protection	OVP	Rising edge	24	26	28	V
Input Undervoltage Lockout	UVP	V_{IN} rising or falling	2.35	2.5	2.65	V
EN Input Low	V_{EL}				0.4	V
EN Input High	V_{EH}		1.5			
EN Input Current	I_{EN}	$EN=GND$ or V_{IN}		0.1	2	μA



■ Detailed Description

The AME5142 is a constant frequency step-up converter with an internal switch. The operations of AME5142 can be understood from block diagram clearly figure.2. The oscillator triggers the SET input of SR latch to turn on the power switch MS at the start of each cycle. A current sense voltage sum with a stabilizing ramp is connected to the positive terminal of the PWM comparator. When this voltage exceeds the output voltage of the error amplifier, the SR latch is reset to turn off the power switch till next cycle starts. The output voltage of the error amplifier is amplified from the difference between the reference voltage 0.15V and the feedback voltage. In this manner, if the error amplifiers voltage increases, more current is delivered to the output; if it decreases, less current is delivered. A 25V Zener diode connects from OVP pin to FB pin internally to provide an optional protection function which prevents SW pin from over-voltage damage. Especially when the case of the feedback loop broken due to component wear-out or improper connection occurs. The behavior of OVP is to clamp the output voltage to 25V typically. This function is suitable for the applications while driving white LEDs less than 6 in series.



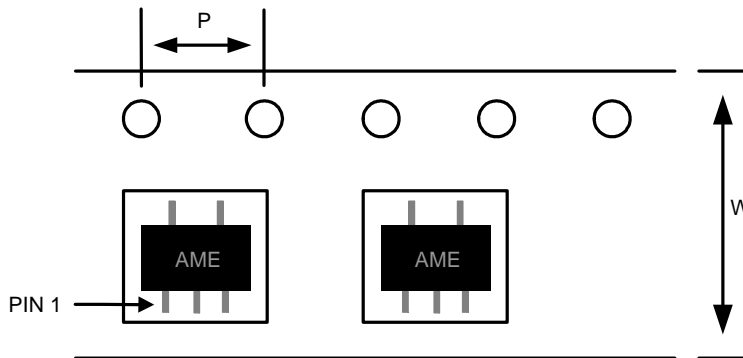
AME5142

■ 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

TSOT-25



Carrier Tape, Number of Components Per Reel and Reel Size

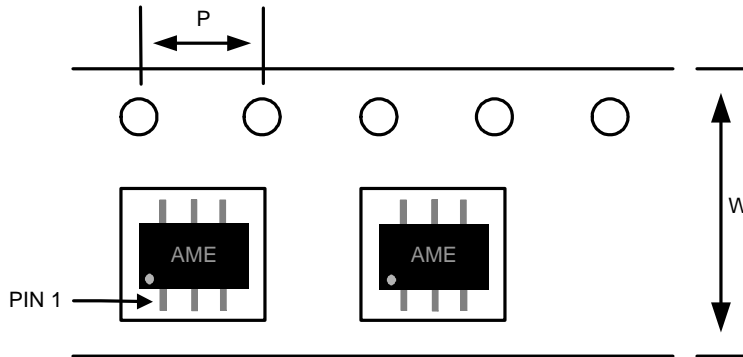
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
TSOT-25	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm



AME5142

■ Tape and Reel Dimension

TSOT-26



Carrier Tape, Number of Components Per Reel and Reel Size

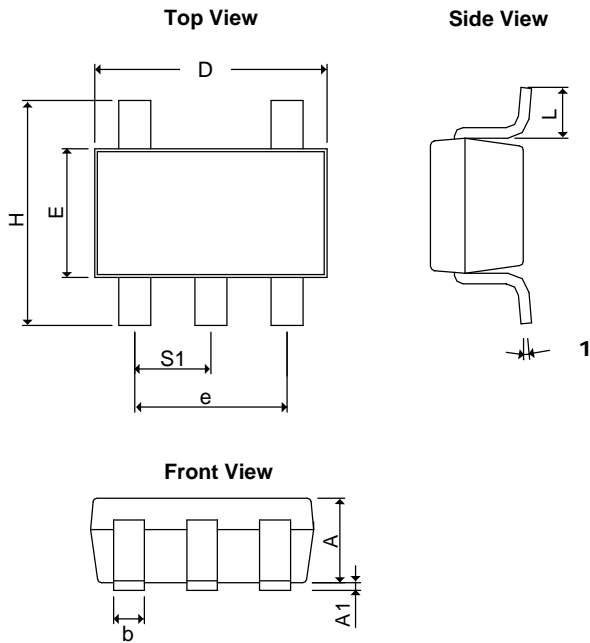
Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
TSOT-26	8.0±0.1 mm	4.0±0.1 mm	3000pcs	180±1 mm



AME5142

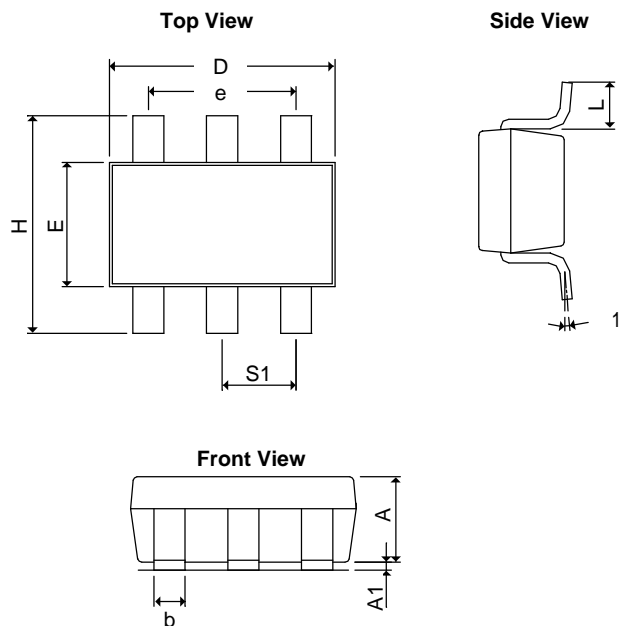
■ Package Dimension

TSOT-25



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
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	

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
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	



www.ame.com.tw
E-Mail: sales@ame.com.tw

Life Support Policy:

These products of AME, Inc. are not authorized for use as critical components in life-support devices or systems, without the express written approval of the president of AME, Inc.

AME, Inc. reserves the right to make changes in the circuitry and specifications of its devices and advises its customers to obtain the latest version of relevant information.

© AME, Inc. , February 2007

Document: 1229-DS5142-ENG.B

Corporate Headquarter
AME, Inc.

2F, 302 Rui-Guang Road, Nei-Hu District
Taipei 114, Taiwan.
Tel: 886 2 2627-8687
Fax: 886 2 2659-2989

U.S.A. (Subsidiary)
Analog Microelectronics, Inc.

3100 De La Cruz Blvd., Suite 201
Santa Clara, CA. 95054-2438
Tel : (408) 988-2388
Fax: (408) 988-2489