



Product information presented is current as of publication date. Details are subject to change without notice

## CONSTANT CURRENT BOOST CONVERTER FOR 1 TO 4 WHITE LEDS

### Features

- Up to 4 LEDs at 2.8V Supply
- High Efficiency (85%)
- Output Over Voltage Protection
- HV Internal Switch
- 1 MHz PWM Switching Frequency
- Uses Tiny 1 mm Height Inductor
- 2.6V to 6V Input Range
- 0.1μA Shutdown Current
- SOT-26 & VQFN-8 Package Available

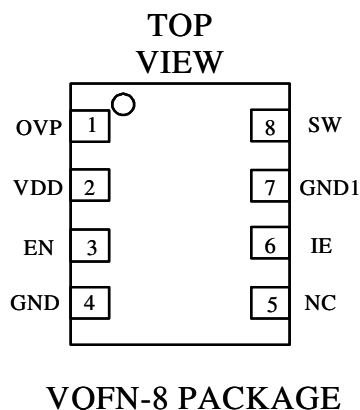
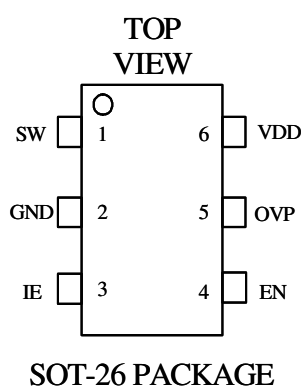
### General Description

The AAT1500 is a step-up converter that provides a solution to drive 1 to 4 white LEDs with a constant current from a Lithium Ion cell, and its switching frequency is fixed at 1 MHz.

The AAT1500 offers a low 0.25V reference, which minimizes power loss in the current setting resistor and improves efficiency. Protection feature includes output over voltage protection. The AAT1500 consists of a 0.1μA shutdown current, and HV internal switch. Input supply range allows operation from 2.6V to 6V.

### Pin Configuration

The AAT1500 is available in 6-pin SOT-26 and 8-pin VQFN-8 package.



### Applications

- Palmtops
- MP3 Player
- Digital Still Cameras
- Portable Media Player
- Cell Phones and Smart Phones
- Electronic Information Organizers

**Pin Description**

PIN NO SOT-26	PIN NO VQFN-8	NAME	I/O	DESCRIPTION
1	8	SW	O	Switch Pin
2	4	GND	-	Ground
3	6	IE	I	Inverting Input Pin of Error Amplifier
4	3	EN	I	Chip Enable/Disable(Active High)
5	1	OVP	I	Over Voltage Protection
6	2	VDD	-	Supply Voltage
-	7	GND1	-	SW MOS Ground
-	5	NC	-	NC

**Absolute Maximum Ratings** (Note 1)

CHARACTERISTICS	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{DD}$	-0.3 to 7	V
SW, OVP to GND		-0.3 to 21	V
Other I/O Pin Voltage		-0.3 to 6	V
Junction Temperature		125	°C
Storage Temperature Range	$T_{storage}$	-45 to 125	°C
Operating Temperature Range	$T_C$	-40 to 85	°C
Lead Temperature	$T_L$	260	°C

**Recommended Operating Conditions**

CHARACTERISTICS	SYMBOL	VALUE	UNIT
Supply Voltage	$V_{DD}$	2.6 to 6	V

**Dissipation Ratings**

CHARACTERISTICS	PACKAGE	SYMBOL	VALUE	UNIT
Package Thermal Resistance	SOT-26	$\theta_{JA}$	208	°C/W
	VQFN-8	$\theta_{JA}$	50	°C/W
Power Dissipation, $T_C = 25^\circ\text{C}$	SOT-26	$P_d$	0.48	W
	VQFN-8	$P_d$	2	W

**Electrical Characteristics,  $V_{DD} = 3.6\text{ V}$ ,  $T_C = 25\text{ }^\circ\text{C}$  (Unless Otherwise Specified)****Operating Condition**

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Supply Voltage	$V_{DD}$		2.6		6.0	V
Under Voltage Lockout	$V_{UVLO}$		1.8	2.2	2.3	V
Operating Current	$I_{DD}$	$V_{DD} = 5.5\text{V}$ , Switch On			2	mA
Quiescent Current	$I_Q$	$V_{DD} = 5.5\text{V}$ $V_{FB} = 1.3\text{V}$ , Switch Off		250	500	$\mu\text{A}$
Shutdown Current	$I_{SD}$	$V_{DD} = 5.5\text{V}$ , $V_{EN} < 0.4\text{V}$		0.1	1	$\mu\text{A}$

**Oscillator**

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Operating Frequency	$f_{OSC}$		0.8	1.0	1.2	MHz
Maximum Duty Cycle	$D_{MAX}$		79	85	92	%

**Reference Voltage**

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Feedback Voltage	$V_{IE}$	Note 2	0.237	0.250	0.263	V

**N-Channel Switch**

PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Current Limit	$I_{LIM}$		0.60	0.75	0.90	A
On-Resistance	$R_{ON}$		0.50	0.75	1.00	$\Omega$
Leakage Current	$I_{SWOFF}$	$V_{SW} = 12\text{V}$		0.01	20.00	$\mu\text{A}$

**Control and Protection**

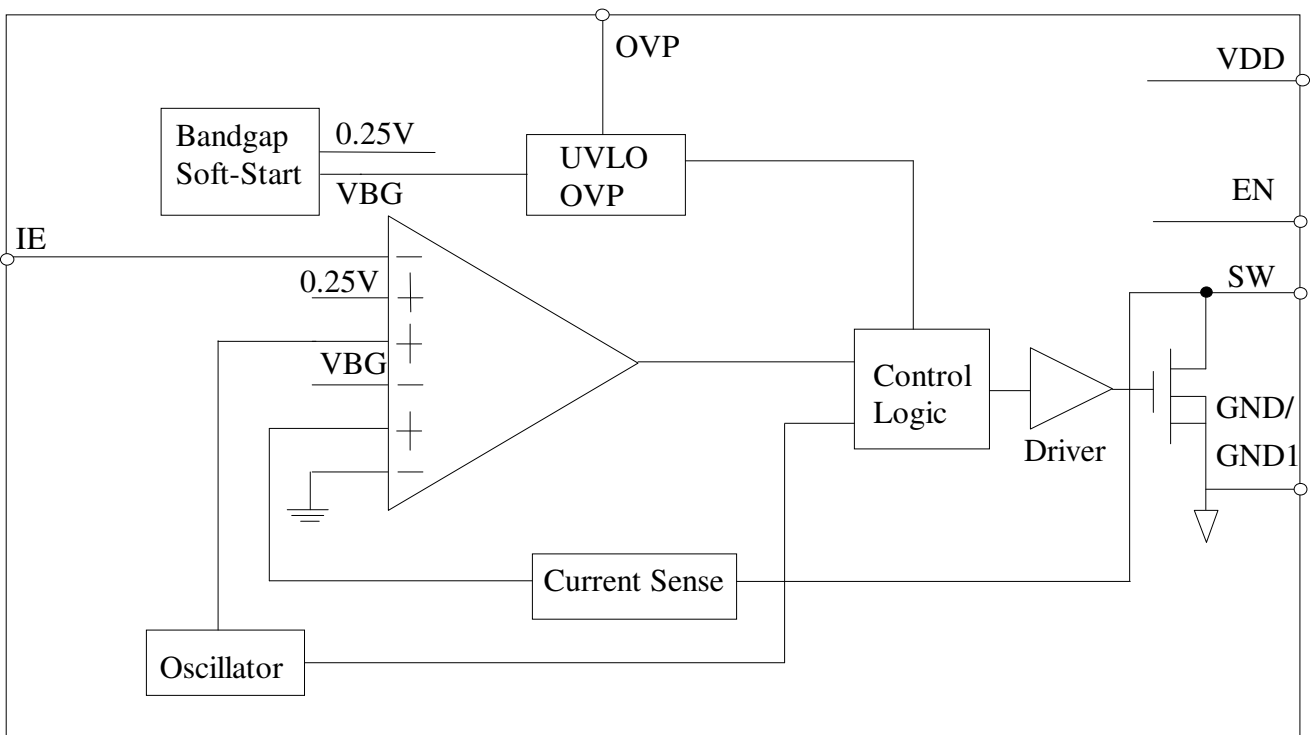
PARAMETER	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
EN pin Current	$I_{EN}$			4	6	$\mu\text{A}$
OVP Threshold	$V_{OVP}$		14.5	15.5	20.0	V
Chip Enable/Disable	$V_{ENH}$	Chip Enable		0.8	1.4	V
	$V_{ENL}$	Chip Disable	0.4	0.8		V



**Note 1.** Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended period of time may affect device reliability.

**Note 2.** To measure the feedback voltage, the device  $V_{IE}$  would connect to the application circuit. The inductance is 10  $\mu$ H and the output voltage equals 12V.

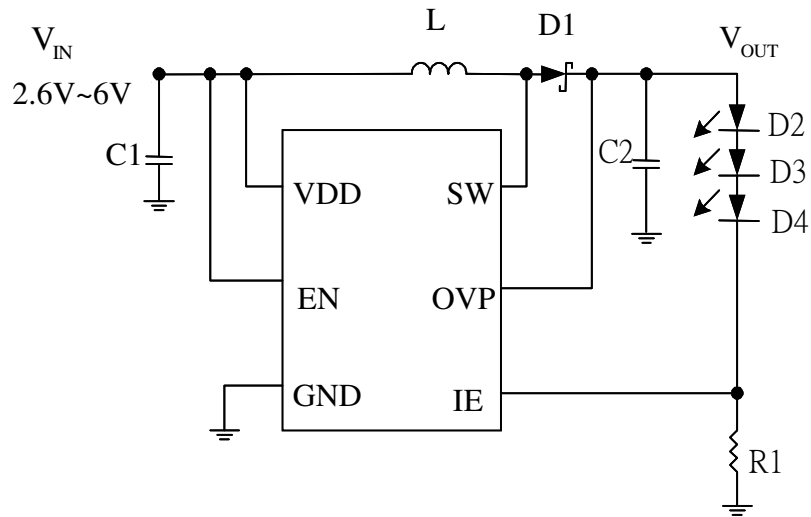
**Block Diagram**  
**SOT-26 and VQFN-8**



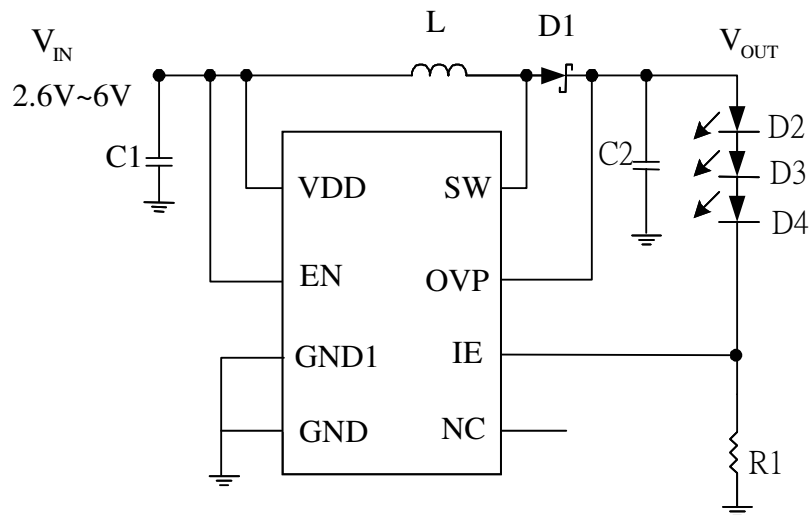


Application Circuit

SOT-26

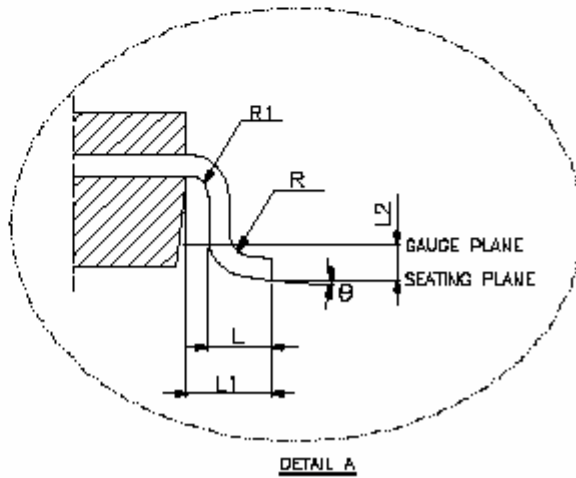
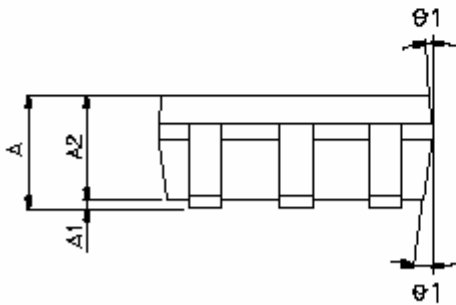
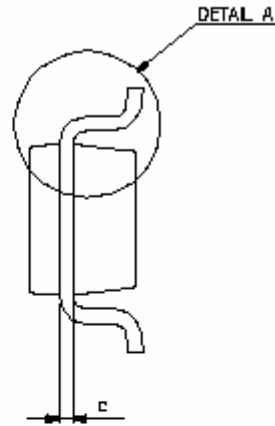
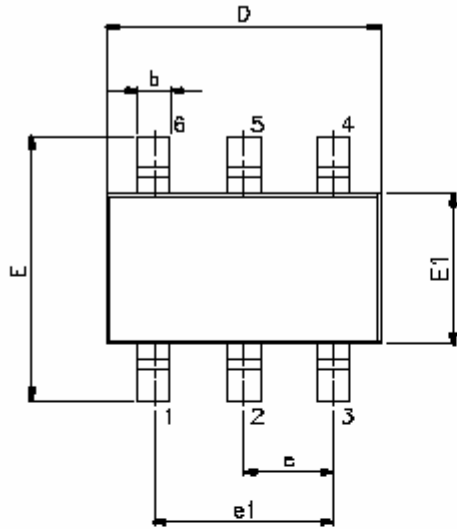


VQFN-8





Package Dimensions  
SOT-26





**Package Dimensions**

**SOT-26(Cont.)**

**VARIATION (ALL DIMENSIONS SHOWN IN MILLIMETERS)**

<b>SYMBOL</b>	<b>MIN</b>	<b>TYP</b>	<b>MAX</b>
<b>L</b>			
A	-----	-----	1.45
A1	-----	-----	0.15
A2	0.90	1.15	1.30
b	0.30	-----	0.50
c	0.08	-----	0.22
D	2.90 BSC		
E	2.80 BSC		
E1	1.60 BSC		
e	0.95 BSC		
e1	1.90 BSC		
L	0.30	0.45	0.60
L1	0.60 REF		
L2	0.25 BSC		
R	0.10	-----	-----
R1	0.10	-----	0.25
$\theta$	0°	4°	8°
$\theta_1$	5°	10°	15°

NOTE:

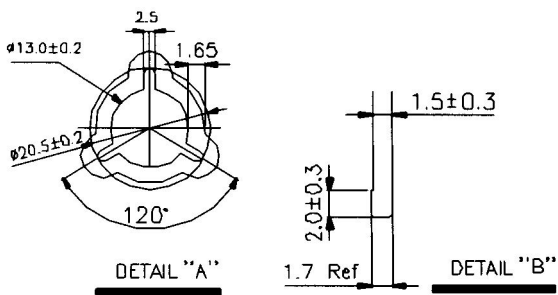
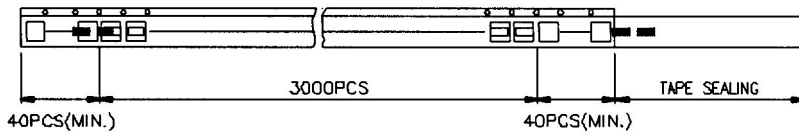
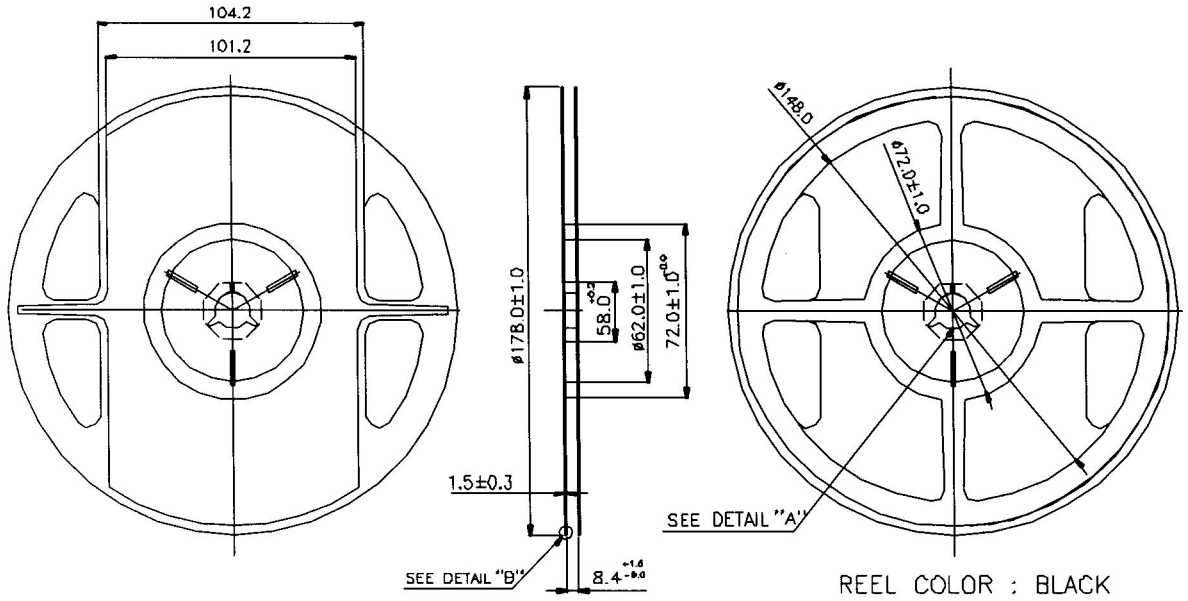
1 JEDEC OUTLINE: MO-178 AB



**Tape and Reel**

**SOT-26**

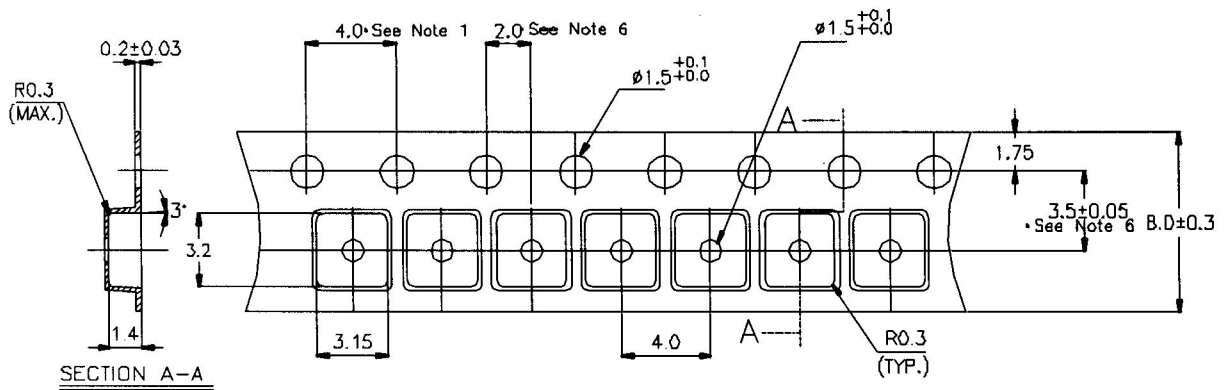
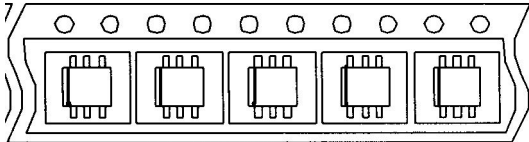
**Packing Method: 3,000pcs/reel, 5 reels/box**







**Tape and Reel  
SOT-26(Cont.)**



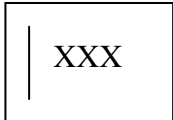
X.XXX X	$\pm 0.0025$
X.XXX	$\pm 0.006$
X.XX	$\pm 0.025$
X.X	$\pm 0.10$
X	$\pm 0.25$

UNIT: MILLIMETERS

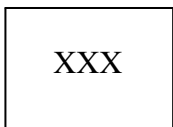


**Part Marking**

**SOT-26 TOP MARKING**



**VQFN-8 TOP MARKING**

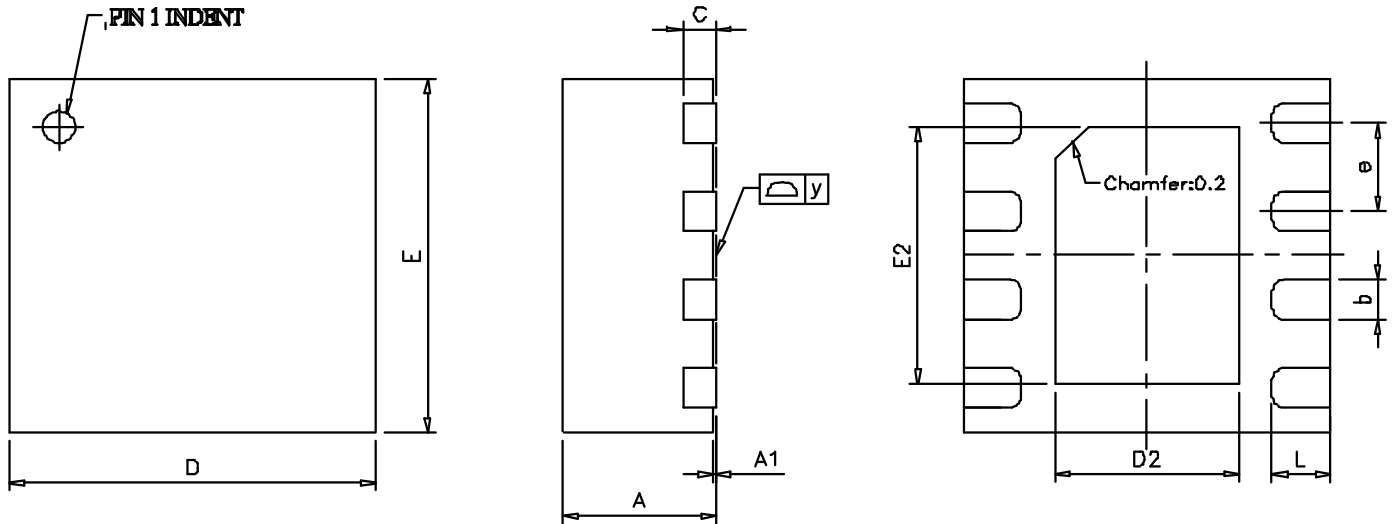


NOTE: BOTH SOT-26 AND VQFN-8 HAVE NO BACK MARKING.



**Package Dimensions**

**VQFN-8**



Symbol	Dimensions In Millimeters		
	Min	TYP	Max
A	0.8	0.9	1.0
A1	0.00	0.02	0.05
b	0.20	0.25	0.30
C	0.19	0.20	0.25
D	2.1	2.2	2.3
D2	1.0	1.1	1.2
E	2.1	2.2	2.3
E2	1.5	1.6	1.7
e	-----	0.55	-----
L	0.25	0.35	0.45
y	0.000	-----	0.076