



5A Buck LED Driver with Integrated MOSFET

General Description

The VAS1263 is a step-down constant current high brightness LED (HBLED) driver with integrated power switch. VAS1263 provides a cost-effective solution for outdoor lighting, architectural, automotive headlight and other LED illumination applications. VAS1263 can operate from 5V to 40V and provide an externally adjustable output current up to 5A.

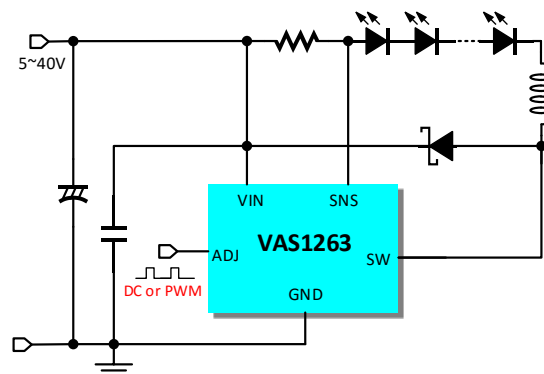
The device is well suited for applications requiring a wide input voltage range. The high-side current-sensing and an integrated current setting circuitry minimize the number of external components while delivering an LED current with $\pm 5\%$ accuracy. A novel control algorithm ensures excellent input-supply rejection and fast response during load transients and PWM dimming. The device operates up to 400 KHz switching frequency, thus allowing for small component size.

The device operates over the $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ temperature range and available in thermal enhanced SOP8 package.

Application

- Architectural, Industrial and Automotive Lighting
- MR16 and other LED Lighting

Typical Application Circuit



Features

- Up to 97% Efficiency
- Integrated 40V/60mΩ N-channel Switch
- Wide supply range from 5V to 40V
- High-Side Current Sense
- Compatible with Analog and PWM Dimming
- 20kHz Maximum PWM Dimming Frequency
- No Compensation Capacitor needed
- $\pm 5\%$ LED Current Accuracy
- Adjustable Constant LED Current
- $-40\text{ }^{\circ}\text{C}$ to $85\text{ }^{\circ}\text{C}$ Operating Temperature Range

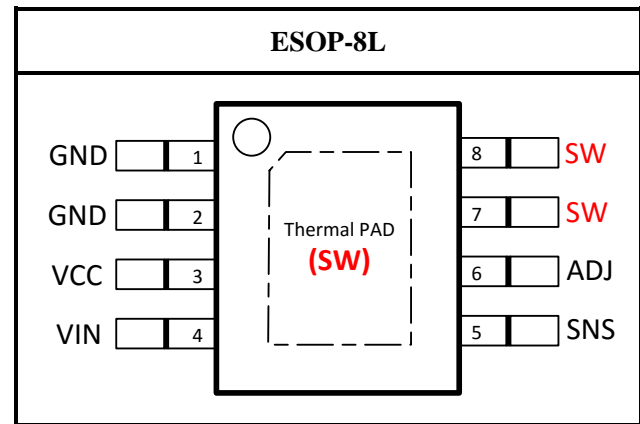
Ordering Information

Order Number	Package Type	Temp. Range
VAS1263ID08E	ESOP-8L	$-40\text{ }^{\circ}\text{C}$ to $85\text{ }^{\circ}\text{C}$

I: Industry, $-40\sim 85^{\circ}\text{C}$
08: Pin Number

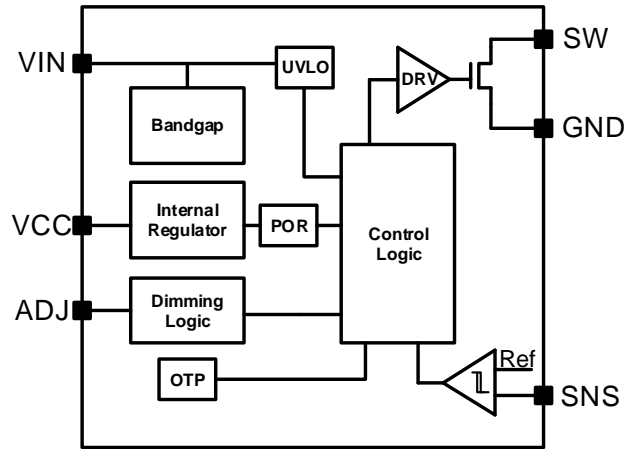
D: ESOP
E: ROHS

Pin Configuration





Block Diagram



PIN Description

PIN NO.	Name	Description
1, 2	GND	Ground
3	VCC	Voltage Regulator Output. Connect a 1 μ F capacitor from VCC to GND
4	VIN	Positive Supply Voltage Input. Bypass with a 1 μ F or higher value capacitor to GND
5	SNS	Current Sense Input
6	ADJ	Multi-function On/Off and brightness control pin: <ul style="list-style-type: none"> • Drive to voltage below 0.2V to turn off output current and for over 40ms to shut down the device • Leave floating for normal operation, output current $I_{OUTNOM}=0.2/R_{SNS}$ • Drive with DC voltage ($0.3V < V_{ADJ} < 1.2V$) to adjust output current from 25% to 100% of I_{OUTNOM} • Drive with a PWM signal to adjust output current
7, 8	SW	Power switching node
EP(Thermal Pad)	SW	Connect to PIN7 and PIN8



Absolute Maximum Ratings ^(Note1)

Parameters	Maximum Ratings
VIN, SNS, SW to GND	-0.3V to 44V
VIN to SNS	-0.3V to +0.3V
ADJ to GND	-0.3V to 6V
VCC to GND	-0.3V to 18V
Operating temperature range	-40 °C to +85 °C
Junction temperature	-40 °C to +150 °C
Storage temperature range	-65 °C to +150 °C
ESD human body model	2000V

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. Electrical Characteristics state DC and AC electrical specifications under particular test conditions which guarantee specific performance limits. This assumes that the device is within the Operating Ratings. Specifications are not guaranteed for parameters where no limit is given, however, the typical value is a good indication of device performance.

Electrical Characteristics

Typical case ^(Note2): VCC=12V, T_A=25 °C (unless otherwise specified)

Symbol	Parameter	Condition	spec			Unit
			Min.	Typ.	Max.	
VIN	Input voltage range		5		40	V
I _{CC}	Quiescent current	ADJ floating, all external devices open		250	400	μA
UVLO	Under-voltage Lockout			4.3	4.8	V
UVLO-HYS	UVLO Hysteresis			0.2		V
DIMMING INPUT						
F _{PWM}	PWM dimming range		100		20,000	Hz
V _{IH}	PWM Dimming Input-Voltage-High		1.5			V
V _{IL}	PWM Dimming Input-Voltage-Low				0.15	V
V _{ADJ}	External control voltage range on ADJ pin for dc brightness control		0.3		1.2	V
V _{ADJoff}	DC voltage on ADJ pin to switch device from active (on) state to quiescent (off) state	V _{ADJ} ramping down	0.15	0.2	0.25	V
V _{ADJon}	DC voltage on ADJ pin to switch device from quiescent (off) state to active (on) state	V _{ADJ} rising	0.2	0.25	0.3	V
SENSE COMPARATOR						
V _{SNS}	Mean current sense threshold voltage(defines LED current setting accuracy)	Measured on SNS pin with respect to VIN, ADJ pin floating	190	200	210	mV



V_{SNS_HYS}	Sense threshold hysteresis			$\pm 10\%$		
I_{SNS}	Current Sense Input Current	$V_{IN} - V_{SNS} = 200mV$		5		μA
T_{PD}	Internal comparator Propagation Delay			50		nS
INTERNAL SWITCH						
$R_{DS(ON)}$	Static Drain-Source On-Resistance	Guaranteed by design		60	80	$m\Omega$
VCC REGULATOR						
VCC	Regulator Output Voltage			10		V

Note 2: Production testing of the device is performed at 25 °C. Functional operation of the device and parameters specified over other temperature range, are guaranteed by design, characterization and process control.



Typical Performance Characteristics

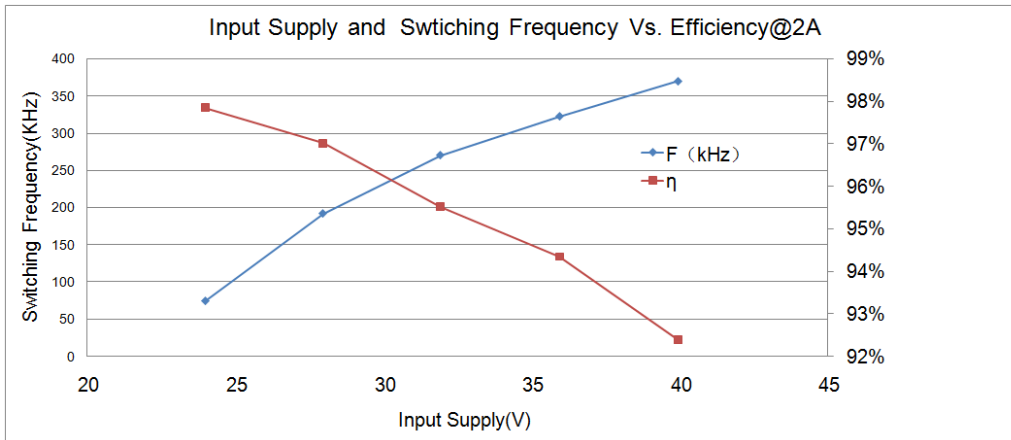


Figure1 Efficiency@ Iout=2A, 5*LED

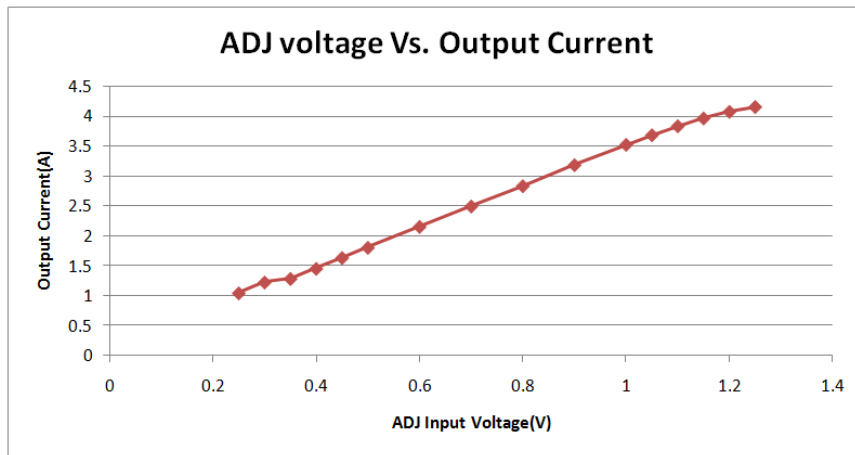


Figure 2 Analog Dimming Controls

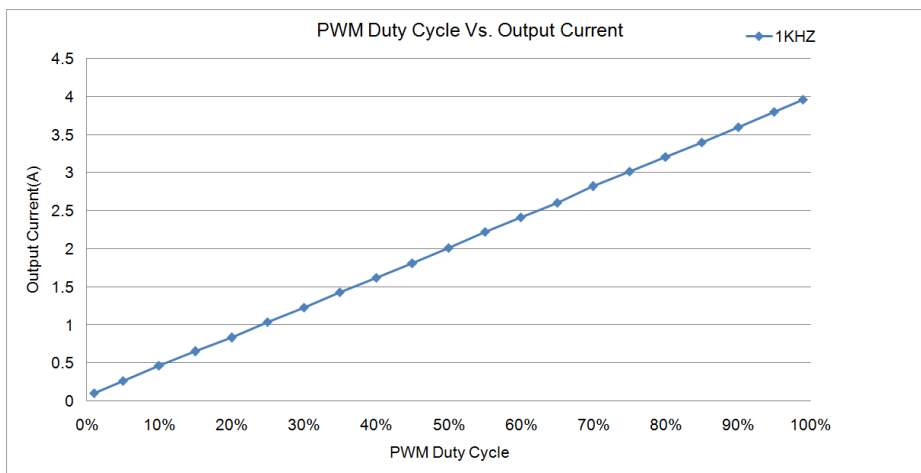
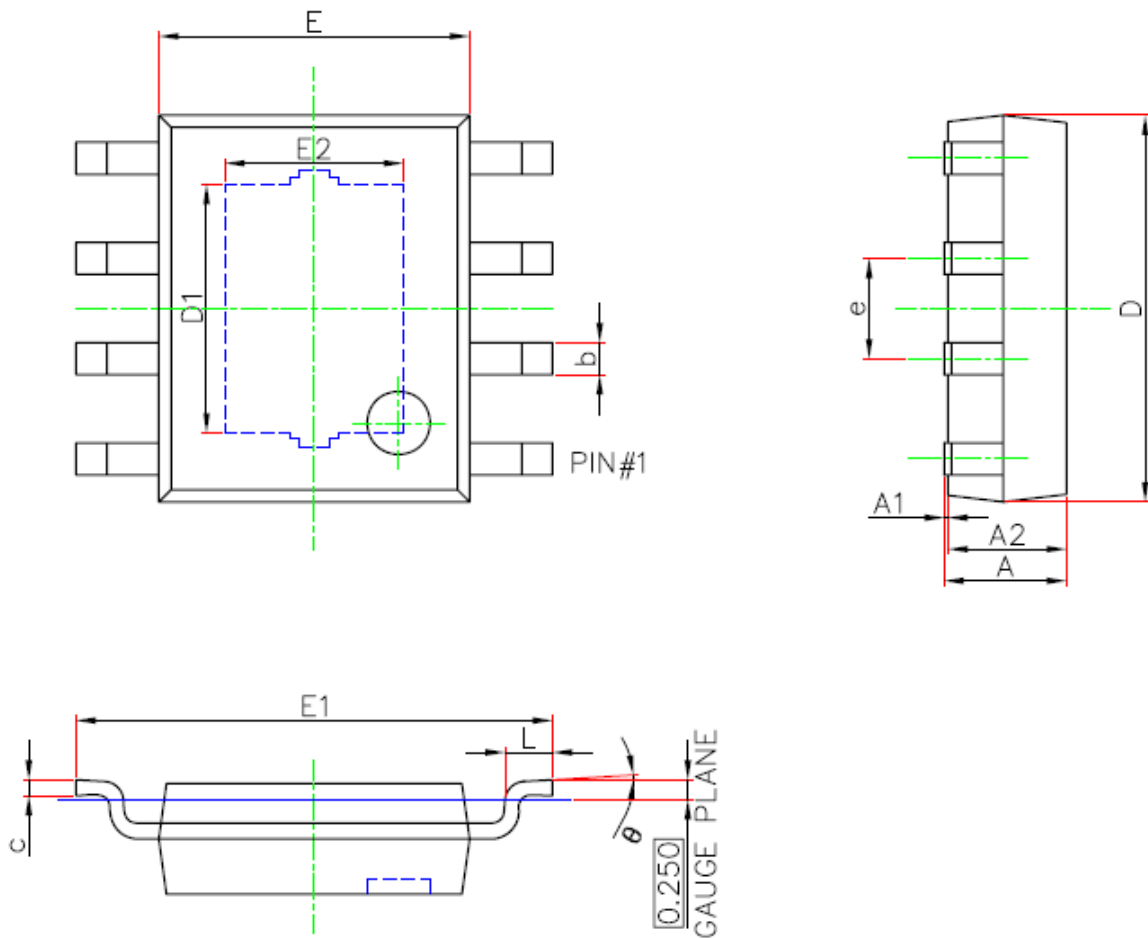


Figure 3 PWM Dimming Controls



Package Information (SOP8-e)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.300	1.700	0.051	0.067
A1	0.000	0.100	0.000	0.004
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.700	5.100	0.185	0.201
D1	3.050	3.250	0.120	0.128
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
E2	2.160	2.360	0.085	0.093
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°