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A718

1A CONSTANT CURRENT BUCK REGULATOR FOR HIGH POWER LEDS

DESCRIPTION

The A718 is a monolithic switching regulator designed to drive high power LEDs with constant current and is suitable for automotive, industrial, and general lighting applications. The step-down (Buck) regulator contains a high-side N-channel MOSFET switch with a current limit of 1.5A. Hysteretic controlled on-time and an external resistor allow the converter output voltage to adjust as needed to deliver a constant current to series and series-parallel connected LED arrays of varying number and type.

A718 provides broken/open LED protection, low-power shutdown protection and thermal shutdown protection. LED dimming control can be accomplished by pulse width modulation (PWM) via DIM pin.

FEATURES

- **Wide Input Range: 6V to 35V.**
- **Integrated Power Switch: 1.5A Guaranteed.**
- **Cycle-by-Cycle Current Limit.**
- **No Control Loop Compensation Required.**
- **Separate PWM Dimming.**
- **Supports all-ceramic output capacitors and capacitor-less outputs.**
- **Thermal Shutdown Protection**
- **Available in Package of SOP 8-Pin with Thermal Pad.**

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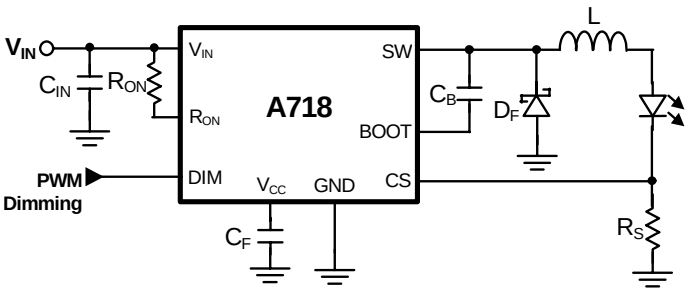
Preliminary

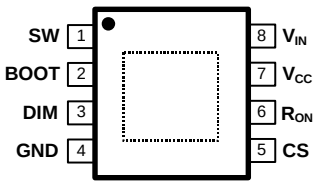
TYPICAL APPLICATION CIRCUIT



APPLICATIONS

- LED Driver
- Constant Current Source
- Automotive Lighting
- General Lighting
- Industrial Lighting

PACKAGE PIN OUT



SOP-EP 8 Pin
(Top View)

ORDER INFORMATION

E	SOP-EP
	8 pin
	A718EFT

Note: All surface-mount packages are available in Tape & Reel. Append the letter "T" to part number (i.e. A718EFT). The letter "F" is marked for Lead Free process.

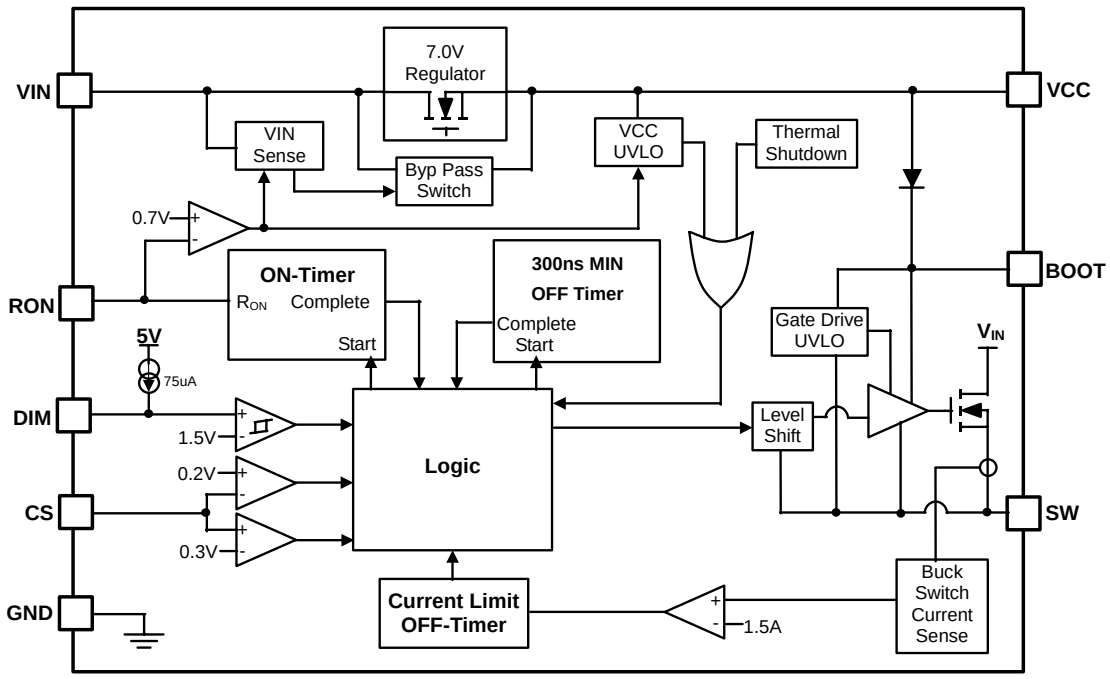
ABSOLUTE MAXIMUM RATINGS (Note)	
V_{IN} to GND	-0.3V to 40V
BOOT to GND	-0.3V to 40V
SW to GND	-1.5V to 40V
BOOT to V_{CC}	-0.3V to 40V
BOOT, V_{CC} to SW	-0.3V to 14V
DIM, CS, R_{ON} to GND	-0.3V to 7V
Maximum Operating Junction Temperature, T_J	150°C
Storage Temperature Range	-65°C to 125°C
Lead Temperature (Soldering, 10 seconds)	260°C
Note: Exceeding these ratings could cause damage to the device. Currents are positive into, negative out of the specified terminal.	

RECOMMENDED OPERATING RATINGS	
V_{IN}	6V to 35V
Junction Temperature Range	-40°C to 125°C

PIN DESCRIPTION

Pin	Name	Pin Function
1	SW	Connect this pin to the output inductor and Schottky diode.
2	BOOT	Connect a 10nF ceramic capacitor from this pin to SW pin.
3	DIM	Connect a logic-level PWM signal to this pin to enable/disable the power MOSFET and reduce the average light output of the LED array.
4	GND	Connect this pin to system ground.
5	CS	Set the current through the LED array by connecting a resistor from this pin to ground.
6	R_{ON}	A resistor connected from this pin to V_{IN} sets the regulator controlled on-time.
7	V_{CC}	Bypass this pin to ground with a minimum 0.1µF ceramic capacitor with X5R or X7R dielectric.
8	V_{IN}	Input supply pin.
Thermal Pad	GND	Connect to ground. Place 4-6 vias from top to bottom layer ground plane.

BLOCK DIAGRAM



THERMAL DATA

Thermal Resistance from Junction to Ambient, θ_{JA}	165°C /W

Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.
The θ_{JA} numbers are guidelines for the thermal performance of the device/pc-board system.
Connect the ground pin to ground using a large pad or ground plane for better heat dissipation.
All of the above assume no ambient airflow.

Maximum Power Calculation:

$$P_{D(MAX)} = \frac{T_{J(MAX)} - T_{A(MAX)}}{\theta_{JA}}$$

T_J(°C): Maximum recommended junction temperature

T_A(°C): Ambient temperature of the application

θ_{JA}(°°C /W): Junction-to-Ambient thermal resistance of the package, and other heat dissipating materials.

DC ELECTRICAL CHARACTERISTICS

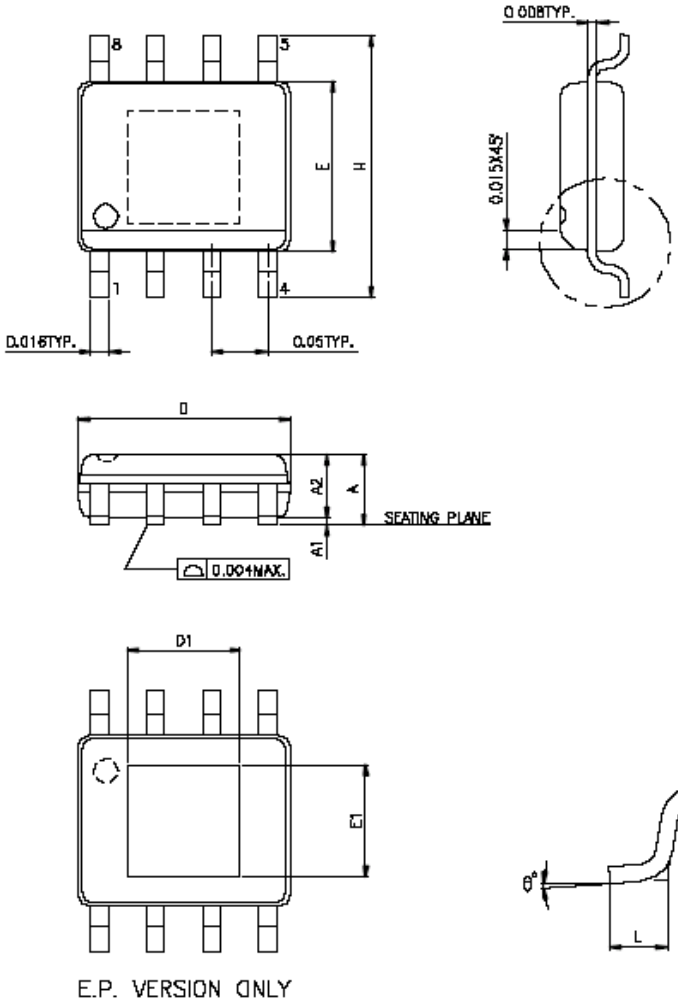
V_{IN} = 24V, T_A = 25°C, (Unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
On-time 1	t_{ON-1}	V_{IN}=10V, R_{ON}=200kΩ	2.1	2.75	3.4	us
On-time 2	t_{ON-2}	V_{IN}=40V, R_{ON}=200kΩ	515	675	835	ns
CS Regulation Threshold	$V_{REF-REG}$	CS Decreasing, SW turns on	194	200	206	mV
CS Over-Voltage Threshold	V_{REF-0V}	CS Increasing, SW turns off		300		mV
CS Bias Current	I_{CS}	CS=0V		0.1		uA
Shutdown Threshold	V_{STD-TH}	R_{ON} / SD Increasing	0.3	0.7	1.05	V
Shutdown Hysteresis	$V_{STD-HYS}$	R_{ON} / SD Decreasing		40		mV
Minimum Off-time	$t_{OFF-MIN}$	CS=0V		400		ns
V_{CC} Regulated Output	V_{CC-REG}		6.0	7	7.4	V
V_{IN} - V_{CC}	V_{IN-DO}	I_{CC}=5mA, 6.0V<V_{IN}< 8.0V		400		mV
V_{CC} Bypass Threshold	$V_{CC-BP-TH}$	V_{IN} Increasing		8.8		V
V_{CC} Bypass Hysteresis	$V_{CC-BP-HYS}$	V_{IN} Decreasing		230		mV
V_{CC} Current Limit (Note)	V_{CC-LIM}	V_{CC} Current Limit (Note 3)		16		mA
V_{CC} UVLO Threshold	$V_{CC-UV-TH}$	V_{CC} Increasing		5.3		V
V_{CC} UVLO Hysteresis	$V_{CC-UV-HYS}$	V_{CC} Decreasing		150		mV
V_{CC} UVLO Filter Delay	$V_{CC-UV-DLY}$	100 mV Overdrive		3		us
I_{IN} Operating Current	I_{IN-OP}	Non-switching, CS=0.5V		625	900	uA
Current Limit Threshold	I_{LIM}	Current Limit Threshold	1.5			A
DIM Input High Voltage	V_{IH}	DIM Increasing	2.2			V
DIM Input Low Voltage	V_{IL}	DIM Decreasing			0.8	V
DIM Pull-up Current	I_{DIM-PU}	DIM=1.5V		80		uA
Buck Switch On Resistance	R_{DS-ON}	I_{SW}=200mA, BST-SW=6.3V		0.37	0.75	Ω
BST UVLO Threshold	$V_{DR-UVLO}$	BST–SW Increasing	1.7	3	4	mV
BST UVLO Hysteresis	V_{DR-HYS}	BST–SW Decreasing		400		
Thermal Shutdown Threshold	T_{SD}			165		°C
Thermal Shutdown Hysteresis	T_{SD-HYS}			25		

Note : V_{CC} provides self bias for the internal gate drive and control circuits. Device thermal limitations limit external loading.

PACKAGE

8-Pin Plastic S.O.I.C.



SYMBOLS	MIN.	MAX.
A	0.053	0.069
A1	0.002	0.006
A2	-	0.059
D	0.189	0.196
E	0.150	0.157
H	0.228	0.244
L	0.016	0.050
θ°	0	8

UNIT: INCH

THERMALLY ENHANCED DIMENSIONS

PAD SIZE	E1	D1
90X90E	0.081 REF	0.081 REF
95X13E	0.086 REF	0.117 REF

UNIT: INCH

NOTES:

1. JEDEC OUTLINE. N/A
2. DIMENSIONS “D” DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 15mm (.005in) PER SIDE.
3. DIMENSIONS “E” DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED .25mm (.010in) PER SIDE.

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IMPORTANT NOTICE

ADDtek reserves the right to make changes to its products or to discontinue any integrated circuit product or service without notice, and advises its customers to obtain the latest version of relevant information to verify, before placing orders, that the information being relied on is current.

A few applications using integrated circuit products may involve potential risks of death, personal injury, or severe property or environmental damage. ADDtek integrated circuit products are not designed, intended, authorized, or warranted to be suitable for use in life-support applications, devices or systems or other critical applications. Use of ADDtek products in such applications is understood to be fully at the risk of the customer. In order to minimize risks associated with the customer's applications, the customer should provide adequate design and operating safeguards.

ADDtek assumes to no liability to customer product design or application support. ADDtek warrants the performance of its products to the specifications applicable at the time of sale.

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