350mA LED Driver with Internal Switch

Halogen Free

General Description

The FP7150 is a continuous mode inductive step down converter. It can driving single or multiple series connected LEDs. The FP7150 includes the output switch and a high-side output current sensing circuit, which use an external resistor to set the average output current. Output current can also be adjusted by applying an external signal to the 'ADJ' pin. The ADJ pin will accept either a DC voltage or a PWM waveform. The PWM filter components are contained within the chip. Applying a voltage under 0.2V to the ADJ pin will turn off the output. The device is assembled in a SOT23-5 pin package.

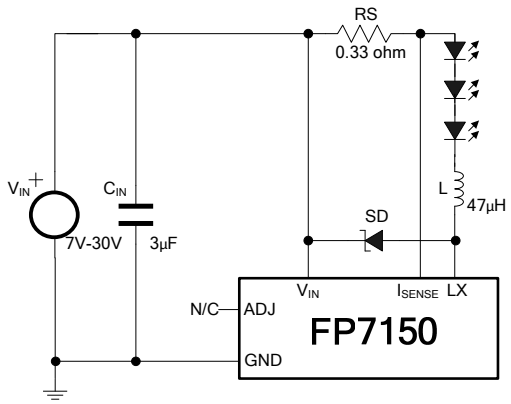
Features

- 350mA Output Current
- Internal 1.5Ω 30V Power MOSFET Switch
- Wide 7 to 30V Operating Input Range
- 20μA Shutdown Mode Current
- Typical 4% Output Current Accuracy
- Signal pin ON / OFF and Brightness Control
- Adjustable Soft-Start
- Up to 95% Efficiency
- Up to 1MHz Switching Frequency
- Internal Dimming Filter

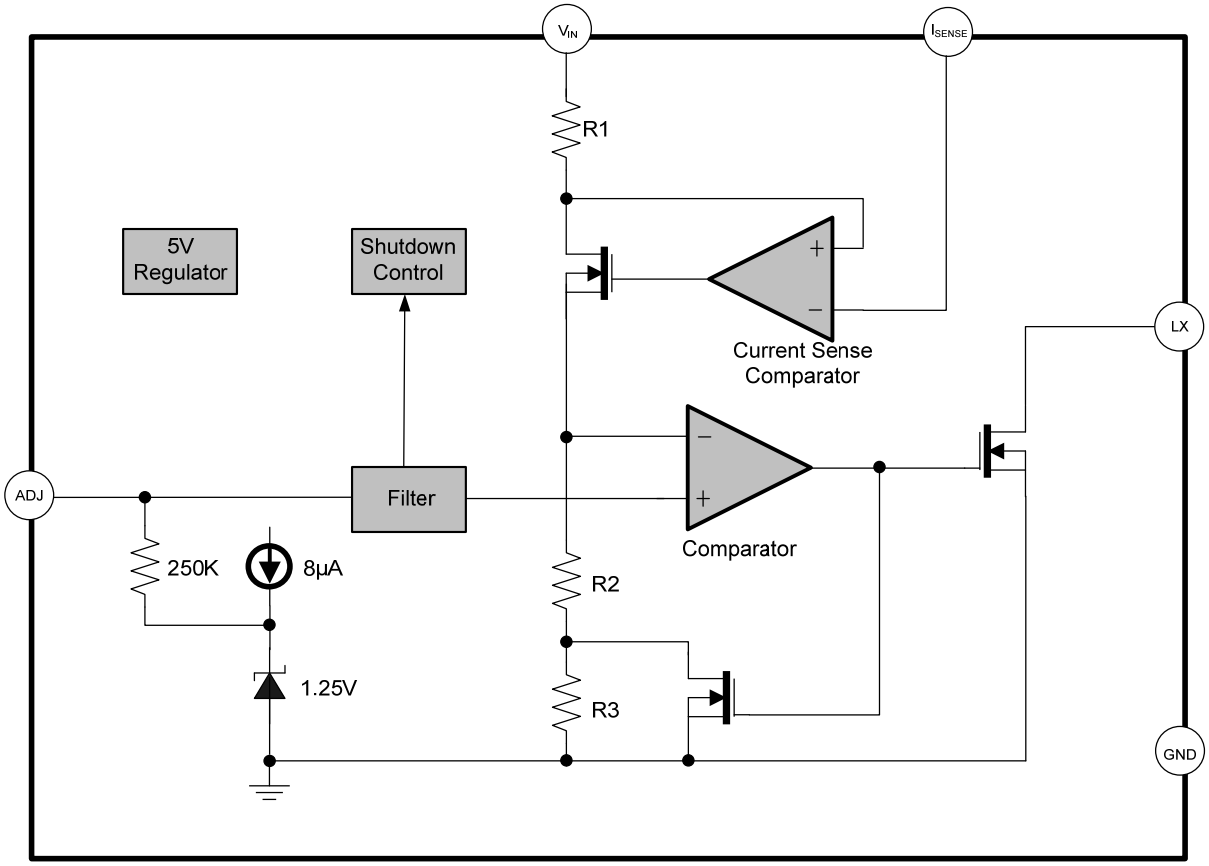
Applications

- Low Voltage Halogen replacement LEDs
- LED back-up lighting

Typical Application Circuit

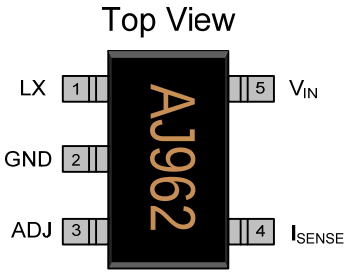


Function Block Diagram



Pin Descriptions

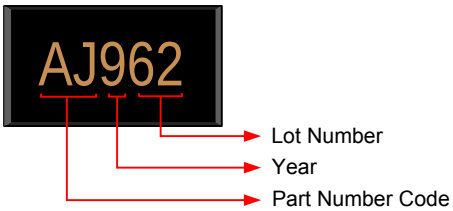
SOT23-5L



Name	No.	I / O	Description
LX	1	O	Power Switch Output
GND	2	P	IC Ground
ADJ	3	I	Multi Function ON / OFF& Brightness Control
I_{SENSE}	4	I	Current Sense Resistor Connected
V_{IN}	5	P	IC Power Supply

Marking Information

SOT23-5L



Lot Number: Wafer lot number's last two digits

For Example: 132362TB → 62

Year: Production year's last digit

Part Number Code: Part number identification code for this product. It should be always "AJ".

Ordering Information

Part Number	Code	Operating Temperature	Package	MOQ	Description
FP7150KR-G1	AJ	-40°C ~ 85°C	SOT23-5L	3000EA	Tape & Reel

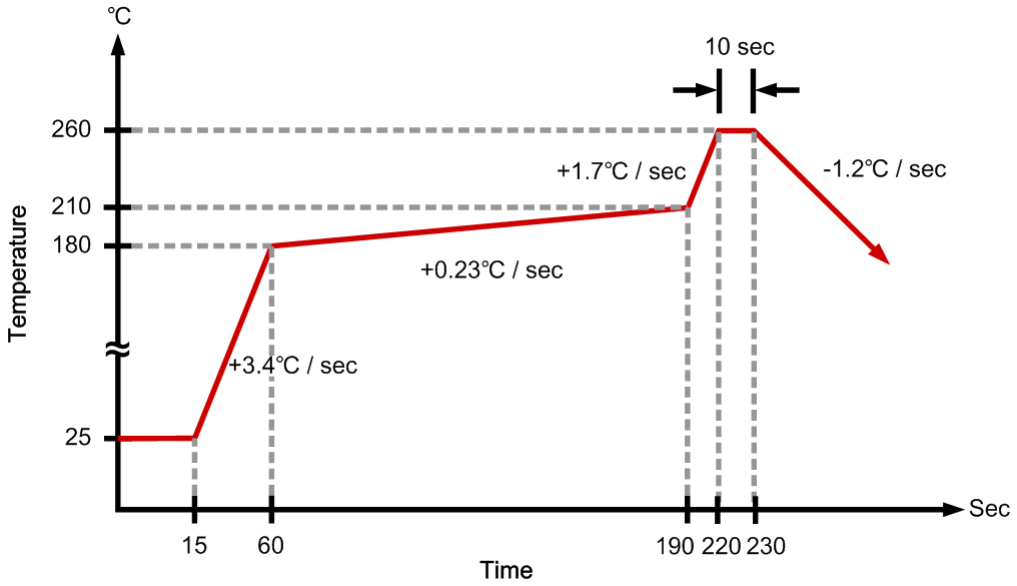
Absolute Maximum Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{IN}		-0.3		30	V
I_{SENSE} Voltage	V_{SENSE}	Measured with Respect to V_{IN}	+0.3		-5	V
LX Input Voltage	V_{LX}		-0.3		30	V
Adjust Pin Input Voltage	V_{ADJ}		-0.3		6	V
Power Dissipation	P_D	SOT23-5L @T_A=25°C			455	mW
Thermal Resistance (Note1)	θ_{JA}	SOT23-5L			+220	°C / W
Junction Temperature	T_J				+150	°C
Operating Temperature	T_{OP}		-40		+85	°C
Storage Temperature	T_{ST}		-65		+150	°C
Lead Temperature		(soldering, 10 sec)			+260	°C

Note1:

θ_{JA} is measured in the natural convection at T_A=25°C on a low effective thermal conductivity test board of JEDEC 51-3 thermal measurement standard.

IR Re-flow Soldering Curve



DC Electrical Characteristics (Test Conditions: V_{IN}=12V, T_{AMB}=25°C unless otherwise stated)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input voltage	V_{IN}		7		30	V
Internal Regulator Start-up Threshold	V_{SU}	V_{IN} Rising		4.8		V
Quiescent Supply Current with Output off	I_{INQoff}	ADJ pin Grounded		15	20	μA
Quiescent Supply Current with Output Switching	I_{INQon}	ADJ pin Floating f=250kHz		250	500	μA
Mean Current Sense Threshold Voltage (Defines LED Current Setting Accuracy)	V_{SENSE}	Measured on I_{SENSE} pin with Respect to V_{IN} V_{ADJ} =1.25V	95	100	105	mV
Sense Threshold Hysteresis	$V_{SENSEHYS}$			±15		%
I_{SENSE} pin Input Current	I_{SENSE}	V_{SENSE} =V_{IN} -0.1		3	10	μA
Internal Reference Voltage	V_{REF}	Measured on ADJ pin with pin Floating	1.21	1.25	1.29	V
Temperature Coefficient of V_{REF}	$\triangle V_{REF}$ / $\triangle T$			50		ppm / °C
External Control Voltage Range on ADJ pin for Dc Brightness Control (1)	V_{ADJ}		0.3		2.5	V
DC Voltage on ADJ pin to Switch Device from Active (on) State to Quiescent (off) State	V_{ADJoff}	V_{ADJ} Falling	0.15	0.2	0.25	V
DC Voltage on ADJ pin to Switch Device from Quiescent (off) state to Active (on) State	V_{ADJon}	V_{ADJ} Rising	0.2	0.25	0.3	V
Resistance Between ADJ pin and V_{REF}	R_{ADJ}		135		250	kΩ
Continuous LX Switch Current	I_{LXmean}				0.37	A
LX Switch 'On' Resistance	R_{LX}			1.5	2	Ω
LX Switch Leakage Current	$I_{LX\ (leak)}$				1	μA

DC Electrical Characteristics Cont. (Test Conditions: V_{IN}=12V, T_{AMB}=25°C unless otherwise stated)

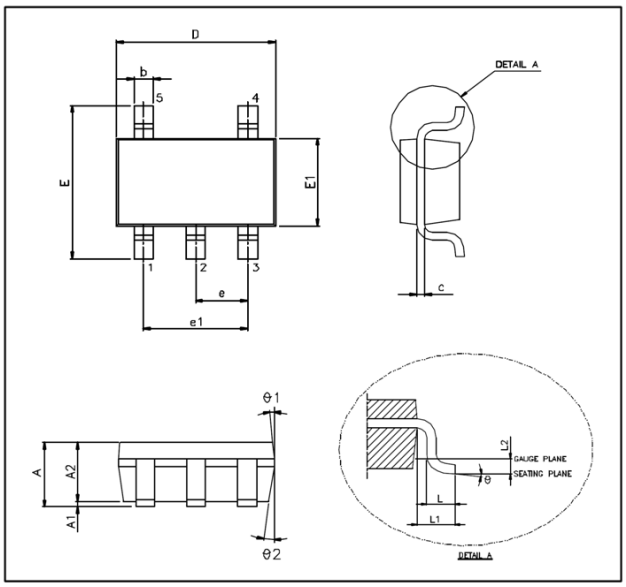
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Duty Cycle Range of PWM Signal Applied to ADJ pin During Low Frequency PWM Dimming Mode	DPWM (LF)	PWM Frequency <500Hz PWM Amplitude= V_{REF} Measured on ADJ pin	0.01		1	
Brightness Control Range				100:1		
Duty Cycle Range of PWM Signal Applied to ADJ pin During High Frequency PWM Dimming Mode	DPWM (HF)	PWM Frequency >10kHz PWM Amplitude= V_{REF} Measured on ADJ pin	0.16		1	
Brightness Control Range				5 :1		
Soft Start Time	TSS	Time Taken for Output Current to Reach 90% of Final Value After Voltage on ADJ pin has Risen Above 0.3V		500		µs
Operating Frequency (See Graphs for more Detail)	fLX	ADJ pin Floating L=100µH (0.82_) I_{OUT}=350mA @ V_{LED}=3.4V Driving 1 LED		250		KHz
Minimum Switch 'ON' Time	TONmin	LX Switch 'ON'	200			ns
Minimum Switch 'OFF' Time	TOFFmin	LX Switch 'OFF'	200			ns
Recommended Maximum Operating Frequency	fLXmax				1	MHz
Recommended Duty Cycle Range of Output Switch at fLXmax	DLX		0.3		0.7	
Internal Comparator Propagation Delay	TPD	V_{ADJ} Falling		50	0.25	ns

Notes：

1. 100% brightness corresponds to V_{ADJ} = V_{ADJ} (nom) = V_{REF}. Driving the ADJ pin above V_{REF} will increase the V_{SENSE} threshold and output current proportionally.

Package Outline

SOT23-5L



UNIT: mm

Symbols	Min. (mm)	Max.(mm)
A	1.050	1.350
A1	0.050	0.150
A2	1.000	1.200
b	0.250	0.500
c	0.080	0.200
D	2.700	3.000
E	2.600	3.000
E1	1.500	1.700
e	0.950 BSC	
e1	1.900 BSC	
L	0.300	0.550
L1	0.600 REF	
L2	0.250 BSC	
θ°	0°	10°
θ1°	3°	7°
θ2°	6°	10°

Note:

1. Package dimensions are in compliance with JEDEC outline: MO-178 AA.
2. Dimension “D” does not include molding flash, protrusions or gate burrs.
3. Dimension “E1” does not include inter-lead flash or protrusions.