

■ LED DRIVE IC

PWM Control 1.5A Step-Down Converter

FEATURES

- Wide Input Voltage Range: 7V to 38V
- LED Output Current Up to 1.5A
- Soft-start
- Single pin on/off and brightness control using DC voltage or PWM
- High efficiency (up to 97%)
- Up to 1MHz switching frequency
- Typical 5% output current accuracy
- SOT-23 and SOP-8 Lead-free Package

Applications

- LED/Display Back Light Driver
- Lightings
- Portable Communication Devices
- Handheld Electronics

GENERAL DESCRIPTION

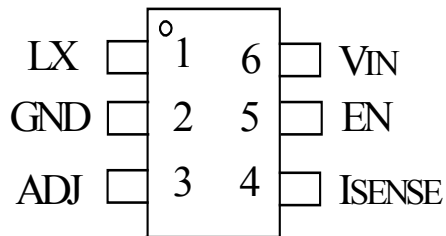
The T7122A is a continuous mode inductive step-down converter, designed for driving single or multiple series connected LEDs efficiently from a voltage source higher than the LED voltage. The device operates from an input supply between 7V and 30V and provides an externally adjustable output current of up to 1.5A. Depending upon supply voltage and external components, this can provide up to 42 watts of output power. The T7122A includes the output switch and a high-side output current sensing circuit, which uses an external resistor to set the nominal average output current. Output current can be adjusted above, or below the set value, by applying an external control signal to the 'ADJ' pin. The ADJ pin will accept either a DC voltage or a PWM waveform. Depending upon the control frequency, this will provide either a continuous or a gated output current. The PWM filter components are contained within the chip. The T7122A is available in SOT-23 and SOP-8 Lead-free package.

PART NUMBER EXAMPLES

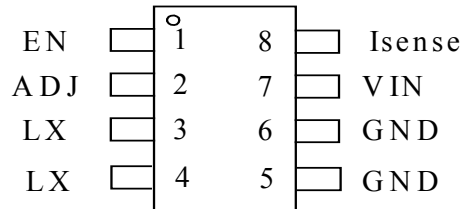
PART NO.	PACKAGE
T7122A-AXG	SOT-23
T7122A-ADG	SOP-8

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PIN ARRANGEMENT(Top view)



SOT-23-6



SOP-8

PIN DESCRIPTION

SYMBOL	SOT-23	SOP-8	DESCRIPTION
LX	1	3,4	Drain of NDMOS switch
GND	2	5,6	Ground
ADJ	3	2	Multi-function On/Off and brightness control pin: <ul style="list-style-type: none"> • Leave floating for normal operation.($V_{ADJ} = V_{REF} = 1.25V$ giving nominal average output current $I_{OUTnom} = 0.1/RS$) • Drive with DC voltage ($0V < V_{ADJ} < 2.5V$) to adjust output current from 0% to 200% of I_{OUTnom} • Drive with PWM signal from open-collector or open-drain transistor, to adjust output current. Adjustment range 0% to 100% of I_{OUTnom} for $f > 10kHz$ and 0% to 100% of I_{OUTnom} for $f < 500Hz$
ISENSE	4	8	Connect resistor R_s from this pin to V_{IN} to define nominal average output current $I_{OUTnom} = 0.1/RS$
EN	5	1	Enable control signal, H: Active, L : Power Down
VIN	6	7	Input voltage (7V to 30V). Decouple to ground with 10uF or higher X7R ceramic capacitor close to device

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ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Voltage on input pin relative to GND	V_{IN}	-0.3 to +36	V
ISENSE pin Voltage		-5 to +0.3	V
ADJ and EN pin Voltage		-0.3 to +6	V
Operating Temperature Rang	T_A	-40 to +125	°C
Maximum Soldering Temperature (at leads, 10 sec)	T_{LEAD}	300	°C
Storage Temperature Rang	T_S	-65 to +150	°C

Electrical Characteristics

($T_A = -40$ to 85°C unless otherwise noted. Typical values are at $T_A = 25^\circ\text{C}$, $V_{DD} = 12\text{V}$)

Symbol	Description	Conditions	Min.	Typ.	Max	Unit
V_{IN}	Input Voltage		7	-	30	V
V_{IRU}	Internal regulator start-up threshold	V_{IN} rising		5.65		V
V_{IRD}	Internal regulator shutdown	V_{IN} falling		5.55		V
I_{QOFF}	Quiescent supply current with output off	EN pin grounded		35		uA
I_{QON}	Quiescent supply current with output switching	ADJ pin floating $f = 250\text{kHz}$		1.8	5.0	mA
V_{SENSE}	Mean current sense threshold Voltage (Defines LED current setting accuracy)	Measured on ISENSE pin with respect to V_{IN} , $V_{ADJ} = 1.25\text{V}$	95	100	105	mV
V_{SENTH}	Sense threshold hysteresis			±15		%
I_{SENSE}	ISENSE pin input current	$V_{SENSE} = V_{IN} - 0.1$		10		uA
V_{REF}	Internal reference voltage	Measured on ADJ pin with pin floating		1.25		V
$\Delta V_{REF}/\Delta T$	Temperature coefficient of V_{REF}			50		ppm/K
V_{ADJ}	External control voltage range on ADJ pin for DC brightness control*		0		2.5	V
V_{IHEN}	EN Input Voltage Hight		2			V
V_{ILEN}	EN Input Voltage Low				0.8	V
R_{ADJ}	Resistance between ADJ pin and V_{REF}	$0 < V_{ADJ} < 2.5\text{V}$		200		Kohm
I_{LXM}	Continuous LX switch current				1.5	A
R_{LX}	LX Switch 'On' resistance	@ $I_{LX} = 1.5\text{ A}$		0.3	0.45	ohm
I_{LXI}	LX switch leakage current				5	uA

LED DRIVE IC

Electrical Characteristics (continuous)

DPWML	Duty cycle range of PWM signal applied to ADJ pin during low frequency PWM dimming mode	PWM frequency < 500Hz PWM amplitude = VREF Measured on ADJ pin	0.01		1	
	Brightness control range			100:1		
DPWMH	Duty cycle range of PWM signal applied to ADJ pin during high frequency PWM dimming mode	PWM frequency > 10KHz PWM amplitude = VREF Measured on ADJ pin	0.16		1	
	Brightness control range			5:1		
fLX	Operating frequency	ADJ pin floating, L = 33uH (0.093 ohm) IOUT=1A @VLED = 3.6V Driving 1 LED	280			KHz
TONmin	Minimum switch 'ON' time	LX switch 'ON'	240**			ns
TOFFmin	Minimum switch 'OFF' time	LX switch 'OFF'	200**			ns
TONminR	Recommended minimum switch 'ON' time	LX switch 'ON'	800			ns
fLXmax	Recommended maximum operating frequency				1	MHz
DLX	Recommended duty cycle range of output switch at fLXmax		0.3		0.7	
TPD	Internal comparator propagation delay			50		ns

Notes :

*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.

**Parameters are not tested at production. Parameters are guaranteed by design, characterization and process control.

Block Diagram

