Step-down LED Driver

FEATURES

- **Up to 80% Efficiency**
- **Output driving current up to 350mA**
- **0.1uA Low Shutdown Supply Current**
- **SOT-23 Package**
- **ESD Human Body Mode Over 3.5KV**

APPLICATIONS

- Lighting (MR-16)
- Portable Communication Devices
- Handheld Electronics
- DC/DC LED driver

PART NUMBER EXAMPLES

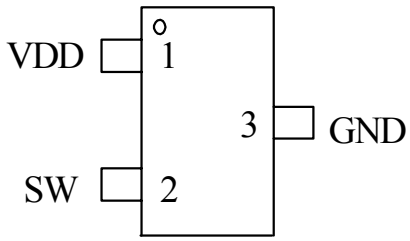
Part no.	Package type
T6321A-AX	SOT23-3
T6321A-AXG	SOT23-3 lead free

GRNERAL DESCRIPTION

The T6321A is a PFM Power LED driver IC, driving current up to 350mA, It allows high brightness power LED operating at high efficiency from DC 6V to 18V.

PIN ARRANGEMENT

SOT23-3 (Top view)



PIN DESCRIPTION

SYMBOL	Pin No.	DESCRIPTION
	SOT23-3	
VDD	1	Input supply pin. Must be locally bypassed.
SW	2	Switch pin. Connect inductor/diode here. Minimize trace area at this pin to reduce EMI.
GND	3	Ground pin. Connect to local ground plane.

Absolute Maximum Ratings

Supply Voltage ..... -0.3V to 8V
SW Pin Switch Voltage ..... -0.3V to 20V
SW Pin Switch Current 400mA
Continuous power dissipation, PD @ T_A = 25°C SOT-23 ..... 0.35W
Package Thermal Resistance SOT-23, θJA ..... 150°C /W
Operating Juction Temperature ..... 150°C
Operating temperature range ..... -40°C to +85°C
Storage temperature range, TSTG ..... -55°C to +150°C
Lead temperature (soldering, 10sec) ..... 260°C
ESD Human Body Mode Over 3.5KV

Electrical Characteristics

(V_{IN}=+3V, TA = 25°C, unless otherwise noted)

Symbol	Description	Conditions	Min.	Typ.	Max	Unit
V_{DD}	Input Voltage		2.5	4	5	V
T_{OFF}	Switch Minimum Off Time		300	400	550	ns
I_{DD2}	Switch Off Current (V_{OUT})			60		uA
$R_{DS(on)}$	Switch ON Resistance			0.6		ohm
I_{LIM}	Current Limit			350		mA

Applications Information

Inductor Selection

The T6321A is designed to work well with a 100uH inductor in most applications. Low inductance values supply higher output current, but also increase the ripple and reduce efficiency. Higher inductor values reduce ripple and improve efficiency, but also limit output current. Choose a low DC-resistance inductor, usually less than 1 Ohm to minimize loss. It is necessary to choose an inductor with saturation current greater than the peak current that the inductor will encounter in the application. Saturation occurs when the inductor's magnetic flux density reaches the maximum level the core can support and inductance falls. Inductor with 600mA rating or greater would be suitable for the T6321A.

Capacitor Selection

The input capacitor stabilizes the input voltage and minimizes the peak current ripple from the source. The value of the capacitor depends on the impedance of the input source used. Small ESR (Equivalent Series Resistance) capacitor with value of 4.7uF would be suitable.

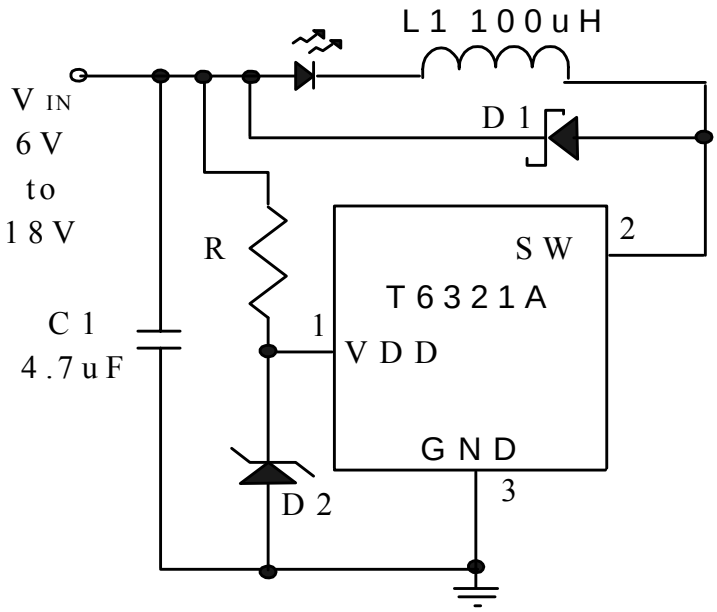
Schottky Diode Selection

The diode is the largest source of loss in DC-DC converters. The most important parameters which affect the efficiency are the forward voltage drop, V_F, and the reverse recovery time. The forward voltage drop creates a loss just by having a voltage across the device while a current flowing through it. The reverse recovery time generates a loss when the diode is reverse biased, and the current appears to actually flow backwards through the diode due to the minority carriers being swept from the P-N junction. A Schottky diode with the following characteristics is recommended:
Small forward voltage, VF = 0.3 V
Small reverse leakage current Fast reverse recovery time/switching speed Rated current larger than peak inductor current Reverse voltage larger than output voltage.

Layout Considerations

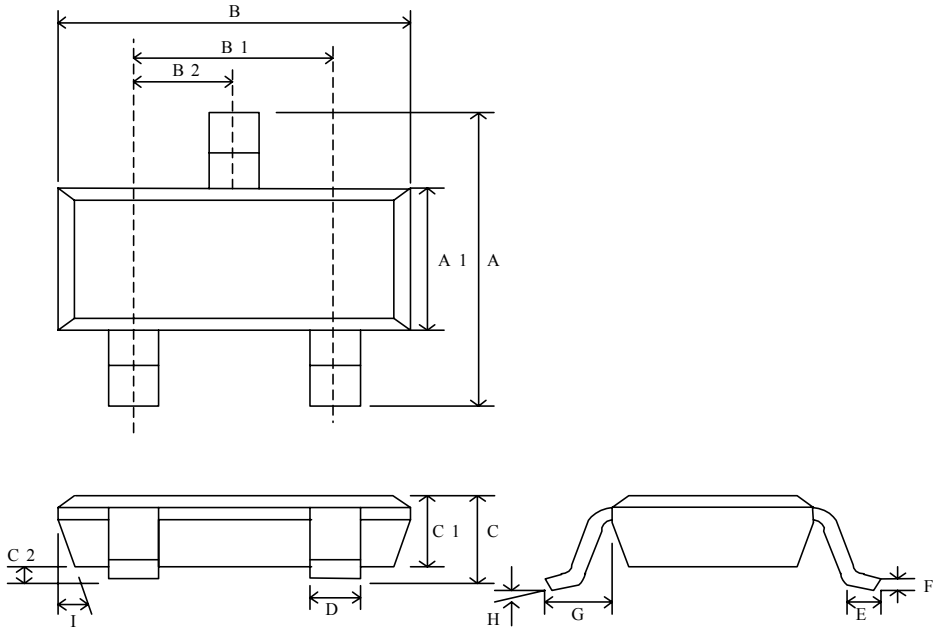
High switching frequencies make PC board layout a very important part of design. Good design minimizes excessive EMI on the feedback paths and voltage gradients in the ground plane, both of which can result in instability or regulation errors.
Connect the inductor, input filter capacitor, and output filter capacitor as close to the device as possible, and keep their traces short, direct, and wide to reduce power loss so as to improve efficiency. Connect their ground pins at a single common node in a star ground configuration, or at a full ground plane.
The output capacitor should be placed close to the output terminals to obtain better smoothing effect on the output ripple.

TYPICAL APPLICATION CIRCUITS



SOT-23-3 package

PACKAGE DIMENSIONS
SOT-23-3



Symbol	Dimension in mm			Dimension in inch		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.60	2.80	3.00	0.102	0.110	0.118
A1	1.40	1.575	1.60	0.055	0.062	0.063
B	2.70	2.85	3.00	0.106	0.112	0.118
B1		1.90(BSC)			0.075(BSC)	
B2		0.95(BSC)			0.037(BSC)	
C	0.95	1.20	1.45	0.037	0.047	0.057
C1	0.90	1.10	1.30	0.035	0.043	0.051
C2	0	0.075	0.150	0	0.003	0.06
D		0.40			0.015	
E	0.30	0.45	0.60	0.012	0.018	0.023
F	0.08	0.15	0.22	0.003	0.006	0.009
G		0.60(REF)				
H	0~8°			0~8°		
I	5~15°			5~15°		