TS19373

800mA Buck (Step-down) WLED Driver

SOT-25



Pin Definition:

1. V_{IN}
2. Ground
3. C_T
4. I_{SENSE}
5. SW

General Description

The TS19373 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 6V and 40V and provides an externally adjustable output current of up to 800mA.

TS19373 includes the output switch and a high-side output current sensing circuit, which uses an external resistor to set the nominal average output current.

Features

- Wide Input Voltage Range 6V~40V
- 800mA Output Current
- High Efficiency up to 90%
- Drives up to 3 (1~3W) LEDs @ V_{IN} 12V
- Drives up to 7 (1~3W) LEDs @ V_{IN} 24V
- 180kHz Switching Frequency
- Internal PWM Filter

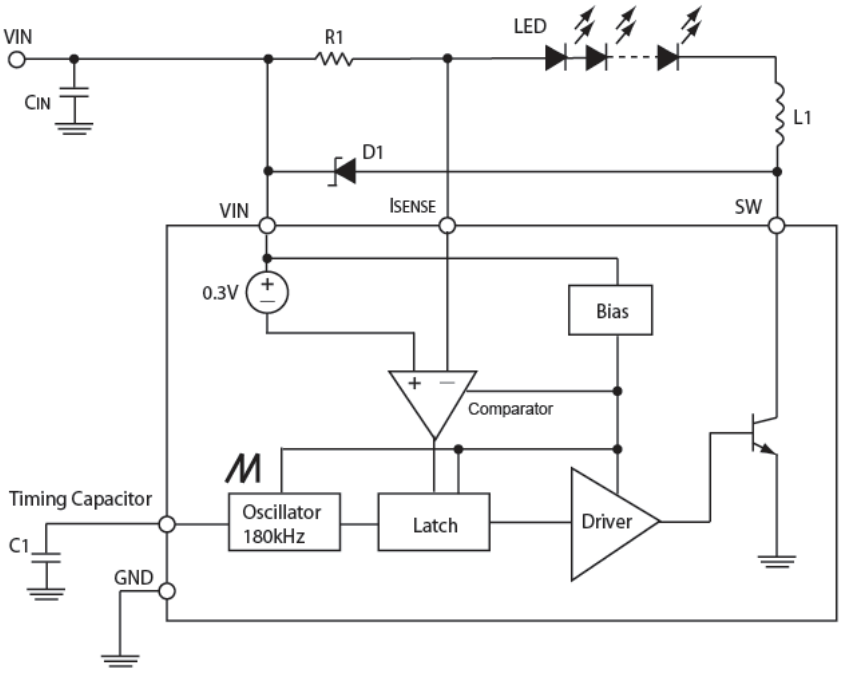
Application

- DC/DC or AC/DC LED driver applications
- Back lighting of flat panel displays
- Signage and decorative LED lightings
- Chargers
- LED Lighting Equipment – MR16, Tube

Ordering Information

Part No.	Package	Packing
TS19373CX5 RF	SOT-25	3Kpcs / 7” Reel

Block Diagram



Absolute Maximum Rating

Parameter	Symbol	Limit	Unit
Input Voltage	V_{IN}	40	V
Supply Voltage (Recommended)	V_{IN}	6 ~ 40	V
FB Voltage	V_{FB}	-0.3 ~ 40	V
SW Voltage	V_{SW}	36	V
Output SW Current	I_{SW}	800	mA
Ambient Temperature Range	T_A	-40 to +85	°C
Junction Temperature Range	T_J	+150	°C

Electrical Specifications (Ta = 25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Input Voltage Range	V_{IN}		6	--	40	V
Line Regulation	REG_{LINE}		--	1.4	5	mV
Charge Current	I_{CHARGE}	V_{IN} =6V~40V	--	30	45	uA
Discharge Current	$I_{DISCHARGE}$	V_{IN} =6V~40V	180	230	290	uA
Switching Frequency	F_{OSC}	C_T =100pF,	--	180	--	kHz
Current Limit Sense Voltage	V_{SENSE}	$I_{DISCHARGE}$ = I_{CHARGE}	250	--	350	mV
Switch V_{CESAT}	V_{SAT}	I_{SW} = 300mA	--	1.0	1.3	V
Supply Current	I_{CC}	V_{IN} =6V~40V, C_T =1nF	--	3	4	mA
Collector off-state Current	$I_{C(OFF)}$	V_{CE} =40V		1	100	uA

Note: Low duty cycle pulse techniques are used during test to maintain junction temperature as close to ambient temperature as possible

Application Information

Pin Description

Pin	Function	Description
1	VIN	Input Voltage Supply pin
2	Ground	Ground Pin
3	Timing Capacitor	Timing capacitor oscillator input
4	I_{SENSE}	Peak current sense input to monitor the voltage drop across an external resistor to limit the peak current through the circuit $I_{SENSE} = \frac{V_{SENSE}}{R1}$
5	SW	Switching Pin. This is the internal Darlington switch collector

Inductor Selection

A 100uH inductor is recommended for most TS19373 applications. Although small size and high efficiency are major concerns, the inductor should have low core losses at 180kHz and low DCR (copper wire resistance).

Diode Selection

Schottky diodes, with their low forward voltage drop and fast reverse recovery, are the ideal choices for TS19373 applications. The forward voltage drop of a Schottky diode represents the conduction losses in the diode while the diode capacitance represents the switching losses. For diode selection, both forward voltage drop and diode capacitance need to be considered. Schottky diodes with higher current ratings usually have lower forward voltage drop and larger diode capacitance, which can cause significant switching losses at the 180kHz switching frequency of the TS19373.

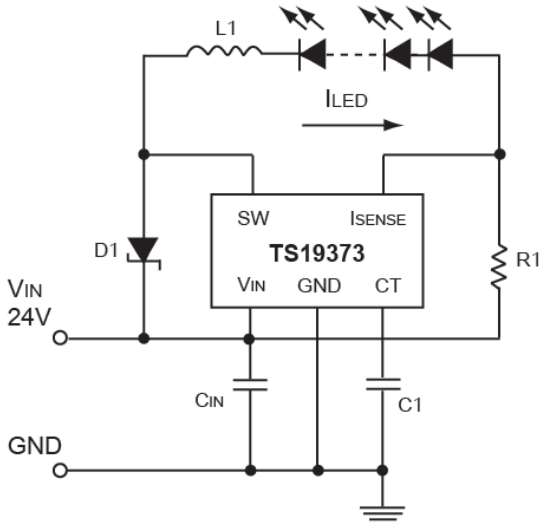
Capacitor Selection

For Input capacitor and timing capacitor are able to use small ceramic capacitor for most of TS19373 applications.
When AC input, to add a 100μF electric capacitor for input capacitor is recommended.

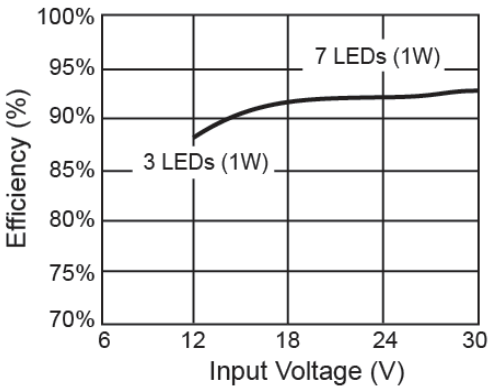
TS19373

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Typical Application Circuit



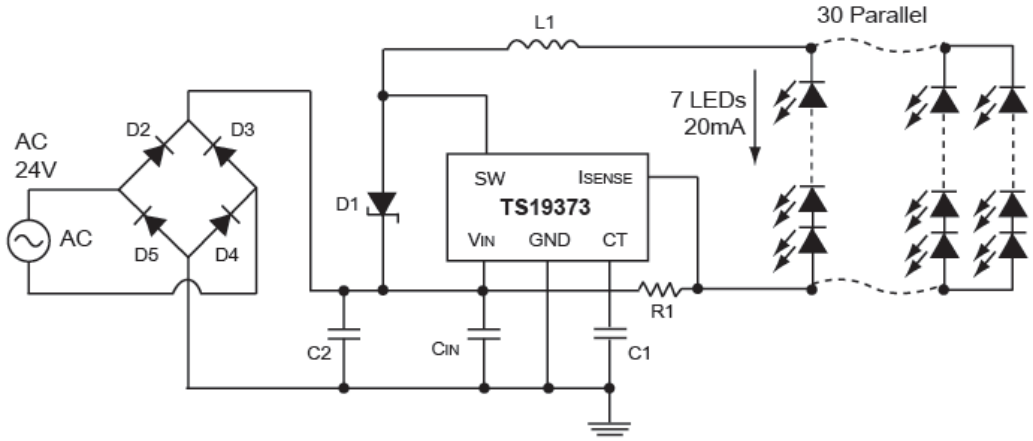
Input Voltage vs. Efficiency



Reference Design Information:

VIN Range (V)	L (uH)	LED (Series)	LED (W)	Current (mA)	R1 (ohm)	Efficiency (%)
12	68	3pcs	1	350	0.5	88
24	100	6pcs	1	350	0.5	92

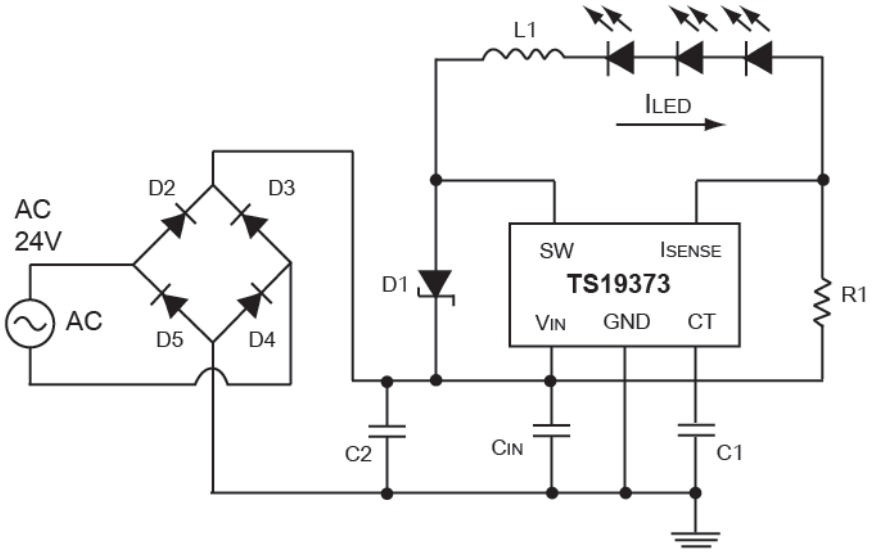
Typical Application Circuit – LED Tube



Bill of Materials:

Designation	Description	Package	Manufacture	Remark
LED Driver	TS19373CX5	SOT-25	TSC	--
D1,2,3,4,5	SS14L	SMA	TSC	1A, 40V
L1	100uH	--	Generic	Isat > 500mA
R1	0.5Ω	1206	Generic	--
Cin	10uF	805	Generic	Ceramic
C1	200pF	805	Generic	Ceramic
C2	100uF		Generic	Tantalum or Electrolysis * AC Input

Typical Application Circuit – MR16



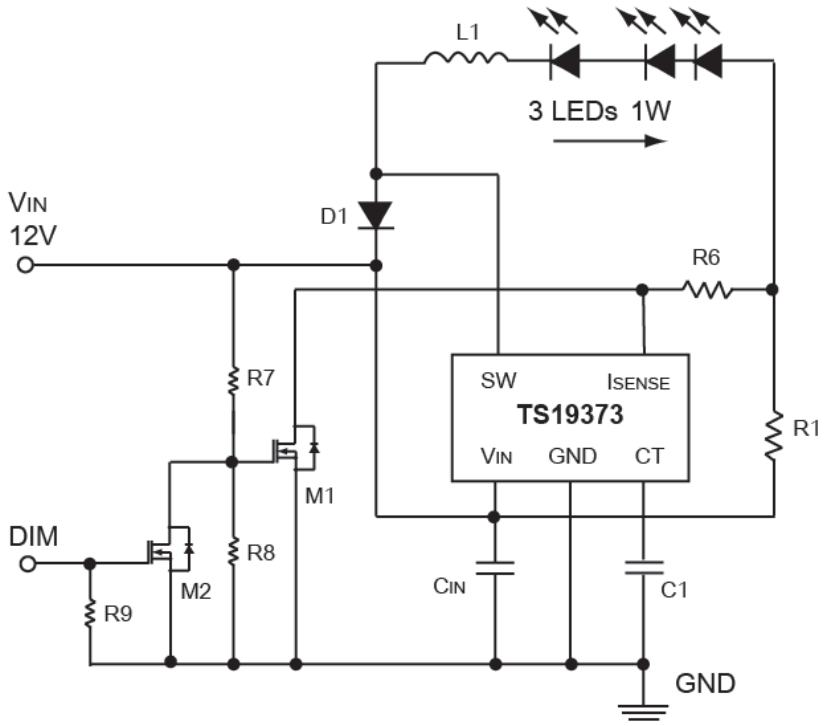
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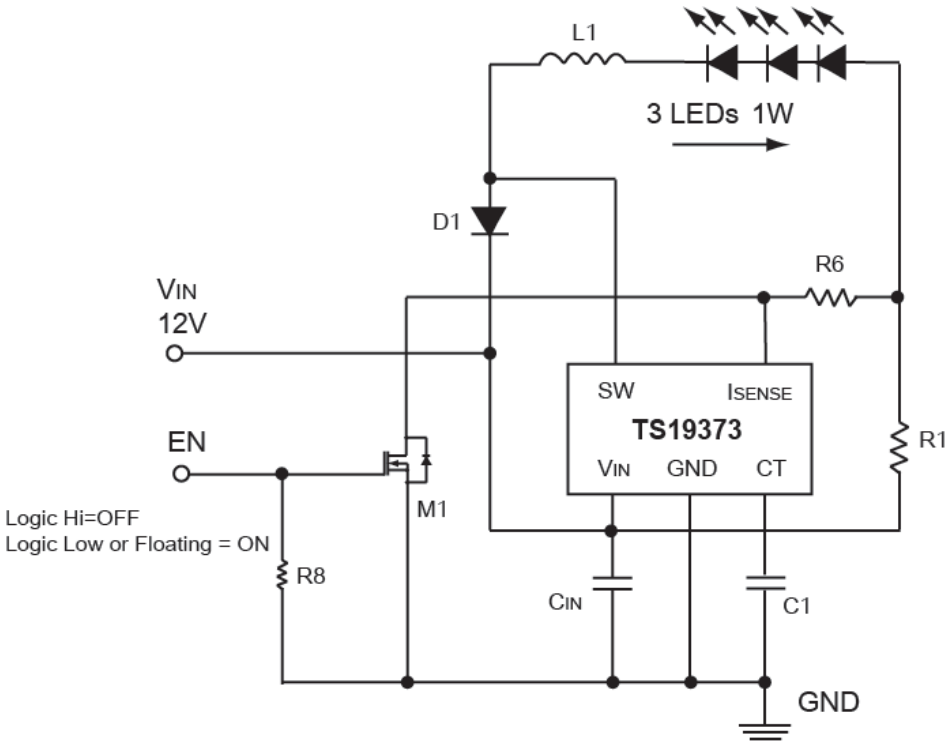
Typical Application Circuit – Buck Dimming Control Circuit 1W LED 3S1P



Bill of Materials:

Designation	Description	Package	Manufacture	Remark
LED Driver	TS19373CX5	SOT-25	TSC	--
M1, M2	TSM2N7002KCX	SOT-23	TSC	
D1	SS14L	SMA	TSC	1A, 40V
L1	68uH	--	Generic	Isat > 500mA
R1	0.5Ω	1206	Generic	--
R6	1kΩ	1206	Generic	
R7, R8, R9	10kΩ	1206	Generic	
Cin	10uF	805	Generic	Ceramic
C1	470pF	805	Generic	Ceramic

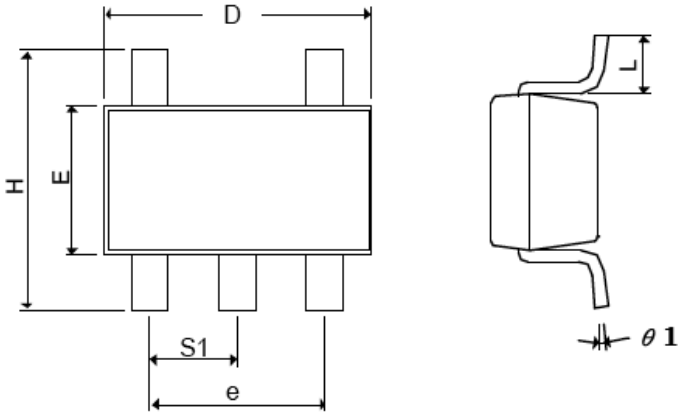
Typical Application Circuit – Buck ON/OFF Control Circuit 1W LED 3S1P



Bill of Materials:

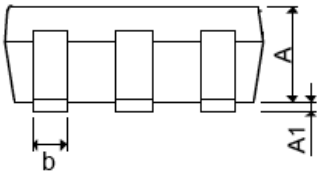
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M1	TSM2N7002KCX	SOT-23	TSC	
D1	SS14L	SMA	TSC	1A, 40V
L1	68uH	--	Generic	Isat > 500mA
R1	0.5Ω	1206	Generic	--
R6	1kΩ	1206	Generic	
R8	10kΩ	1206	Generic	
Cin	10uF	805	Generic	Ceramic
C1	470pF	805	Generic	Ceramic

SOT-25 Mechanical Drawing

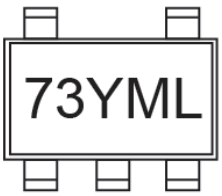


SOT-25 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A+A1	0.09	1.25	0.0354	0.0492
B	0.30	0.50	0.0118	0.0197
C	0.09	0.25	0.0035	0.0098
D	2.70	3.10	0.1063	0.1220
E	1.40	1.80	0.0551	0.0709
e	1.90 BSC		0.0748 BSC	
H	2.40	3.00	0.09449	0.1181
L	0.35 BSC		0.0138 BSC	
θ1	0°	10°	0°	10°
S1	0.95 BSC		0.0374 BSC	

Front View



Marking Diagram



73 = Device Code
Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code

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