

**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

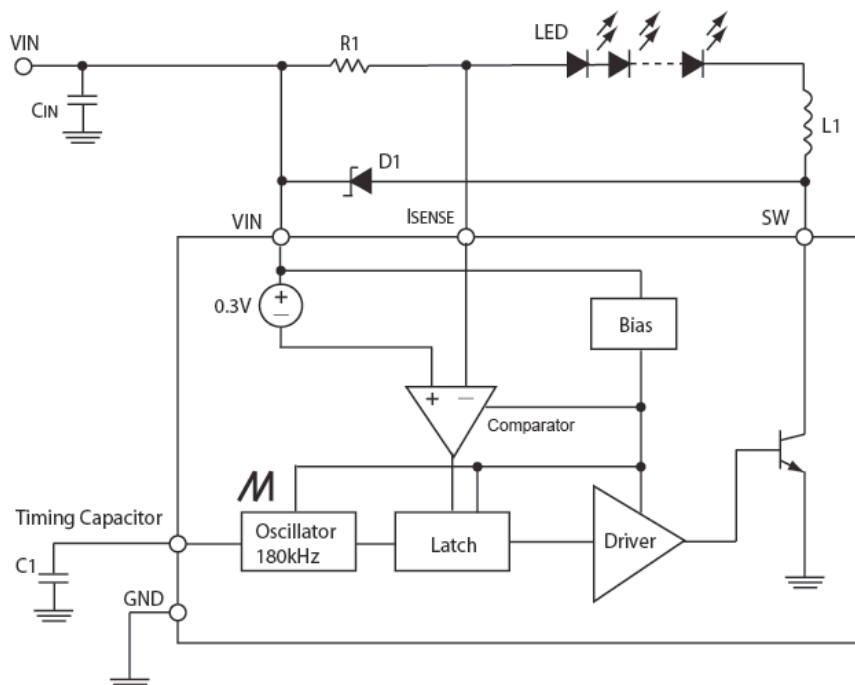
### Application

- 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** ( $T_a = 25^{\circ}\text{C}$ , 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              | $I_{CHARGE}$    | $V_{IN} = 6V \sim 40V$               | --  | 30  | 45  | uA    |
| Discharge Current           | $I_{DISCHARGE}$ | $V_{IN} = 6V \sim 40V$               | 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              | $I_{CC}$        | $V_{IN} = 6V \sim 40V$ , $C_T = 1nF$ | --  | 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 <sub>SENSE</sub> | Peak current sense input to monitor the voltage drop across an external resistor to limit the peak current through the circuit |
| 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**

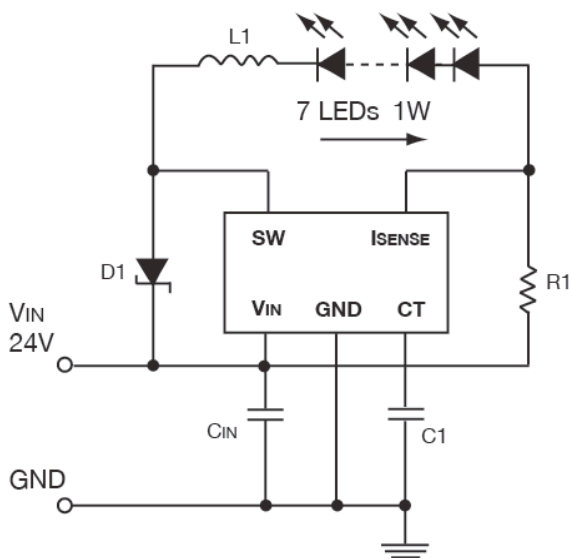
Schottky diodes, with their low forward voltage drop and fast reverse recovery, are the ideal choices for TS19373 applications. The forward voltage drop of a Schottky diode represents the conduction losses in the diode while the diode capacitance represents the switching losses. For diode selection, 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**

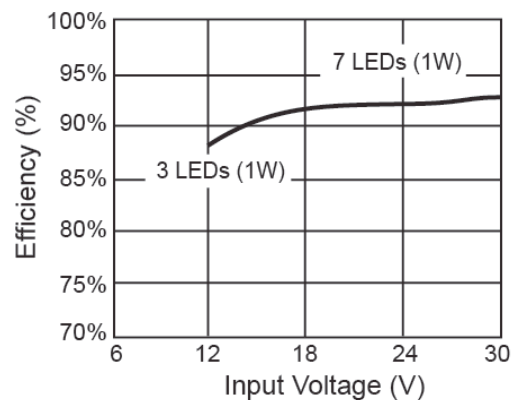
For Input capacitor and timing capacitor are able to use small ceramic capacitor for most of TS19373 applications.

When AC input, to add a 100μF electric capacitor for input capacitor is recommended.

### Typical Application Circuit



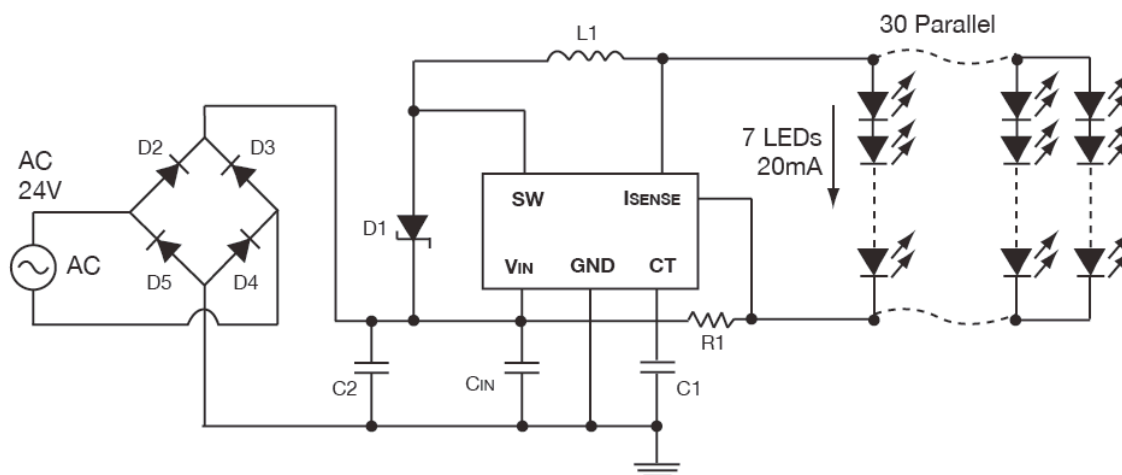
### Input Voltage vs. Efficiency



### Reference Design Information

| VIN Range (V) | L (uH) | LED (Series) | Current (mA) | Efficiency (%) |
|---------------|--------|--------------|--------------|----------------|
| 12            | 68     | 3pcs         | 300          | 89             |
| 24            | 100    | 7pcs         | 300          | 90             |

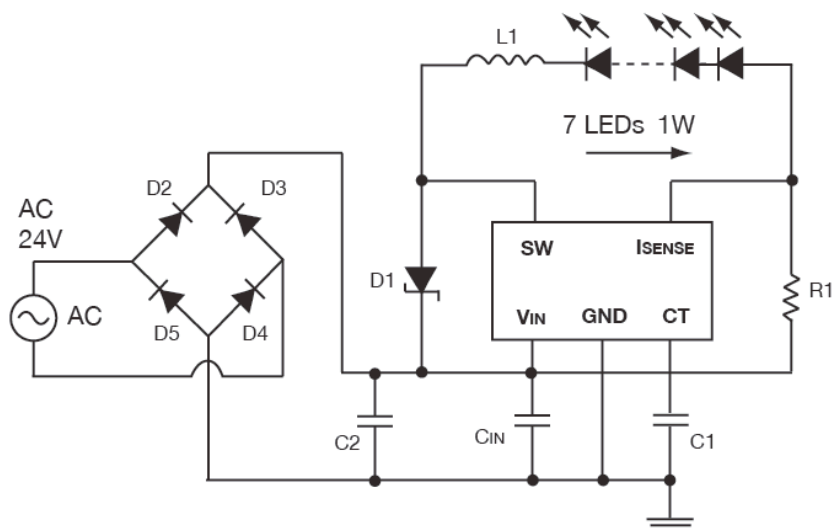
### Typical Application Circuit – LED Tube



### 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 |

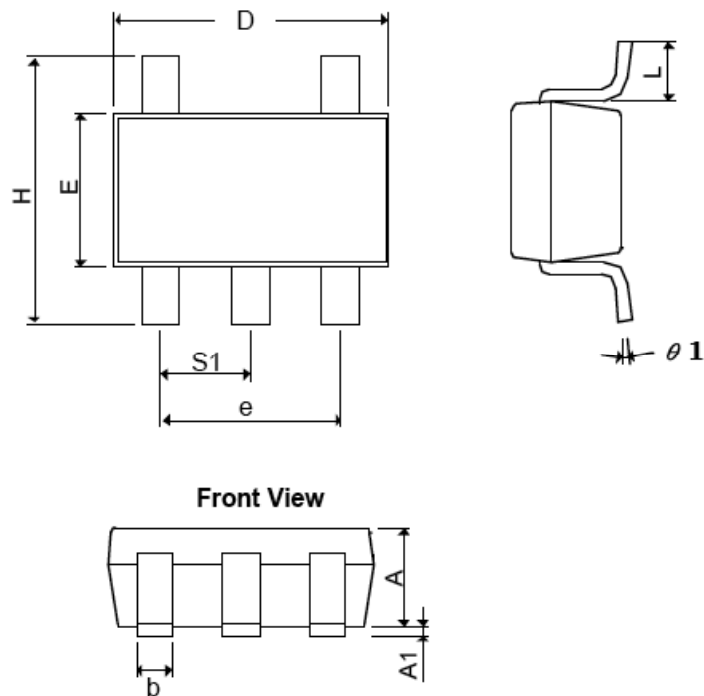
### Typical Application Circuit – MR16



### Bill of Materials:

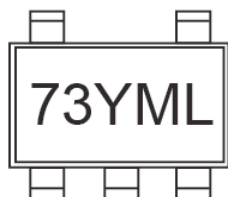
| Designation | Description | Package | Manufacture | Remark                              |
|-------------|-------------|---------|-------------|-------------------------------------|
| LED Driver  | TS19373CX5  | SOT-25  | TSC         | --                                  |
| D1,2,3,4,5  | SS14L       | 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 |

### SOT-25 Mechanical Drawing



| 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 |        |
| $\theta 1$ | 0°          | 10°  | 0°         | 10°    |
| S1         | 0.95 BSC    |      | 0.0374 BSC |        |

### Marking Diagram



**73** = Device Code

**Y** = Year Code

**M** = Month Code

(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apr, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)

**L** = Lot Code

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