DESCRIPTION

MT7606 is a high current precision linear LED driver. The output constant current is programmable by an external resistor.

MT7606 integrates high voltage power MOSFET and high voltage power supply circuit, the peripheral circuit is simplified. It can easily pass EMI without inductor, transformer or other magnetic components, low BOM cost is achieved.

The good line regulation keeps input power constant. The chip integrates thermal regulation function to balance the output power and system temperature. The output current will be reduced while the junction temperature goes higher than the threshold, system reliability is guaranteed.

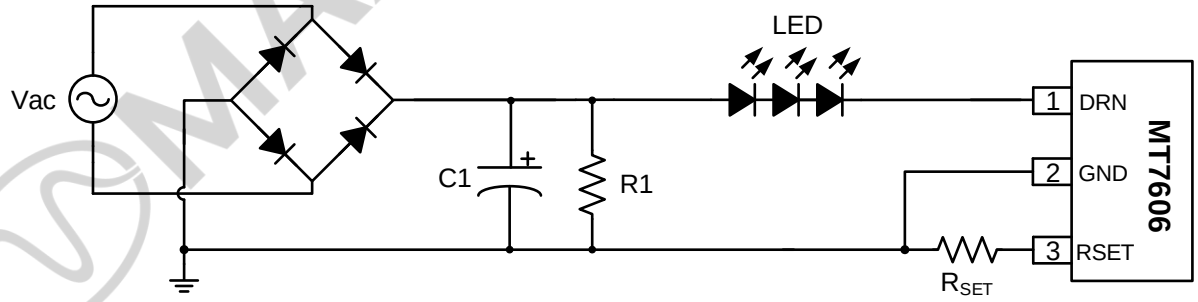
FEATURES

- Few external components, low BOM cost
- Good line regulation keeps input power constant
- Integrated with 500V power MOSFET
- LED current set by external resistor
- Constant current precision: ±5%
- Low EMI interference
- Embedded thermal regulation function
- Available in SOT89-3,TO252-3,ESOP8 package

APPLICATION

- LED candle, Filament lamp
- LED fluorescent, panel light
- LED Bulb, Projection lamp
- Other compact LED lightings

TYPICAL APPLICATION CIRCUIT



ABSOLUTE MAXIMUM RATINGS

RSET/GND pin voltage	-0.3V ~ 6V
DRN pin voltage	-0.3V ~ 500V
Lead temperature (soldering, 10 sec.)	260°C
Maximum power dissipation (P_{DMAX})	0.8W (SOT89-3)
	1.2W (ESOP8)
	2W (TO252-3)
Storage temperature (T_{STG})	-55°C~150°C
Operating junction temperature (T_J)	-40°C~150°C

THERMAL RESISTANCE①

Junction to Ambient ($R_{\theta JA}$)	78°C/W (SOT89-3)
	85°C/W (ESOP8)
	55°C/W (TO252-3)
Junction to Case ($R_{\theta JC}$)	45°C/W (SOT89-3)
	50°C/W (ESOP8)
	25°C/W (TO252-3)

Note:

① *$R_{\theta JA}$, $R_{\theta JC}$ are measured in the natural convection at T_A = 25°C on a low effective single layer thermal conductivity test board of JEDEC 51-3 thermal measurement standard. Test condition: Device mounted on 2" X 2" FR-4 substrate PCB, 2oz copper, with minimum recommended pad on top layer and thermal vias to bottom layer ground plane.*

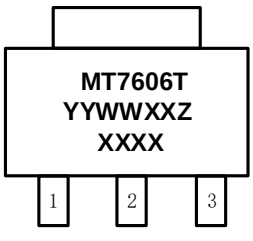
ORDERING INFORMATION

Device	Package	Packing Method	Chip Mark	Moisture Sensitivity Level	Threshold of Thermal Regulation (T_{OTR}②)
MT7606EL	ESOP8	Tape 4,000 Pcs/Reel	MT7606E YYWWXXL XXXX	3	130°C
MT7606TL	SOT89-3	Tape 4,000 Pcs/Reel Tape 1,000 Pcs/Reel	MT7606T YYWWXXL XXXX	3	130°C
MT7606DL	TO252-3	Tape 2,500 Pcs/Reel	MT7606D YYWWXXL XXXX	3	130°C
MT7606TH	SOT89-3	Tape 4,000 Pcs/Reel Tape 1,000 Pcs/Reel	MT7606T YYWWXXH XXXX	3	150°C
MT7606DH	TO252-3	Tape 2,500 Pcs/Reel	MT7606D YYWWXXH XXXX	3	150°C
MT7606EH	ESOP8	Tape 4,000 Pcs/Reel	MT7606E YYWWXXH XXXX	3	150°C
MT7606TM	SOT89-3	Tape 4,000 Pcs/Reel Tape 1,000 Pcs/Reel	MT7606T YYWWXXM XXXX	3	80°C

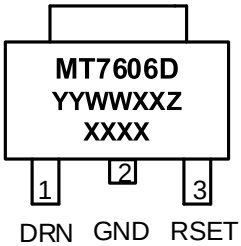
Note:

② *T_{OTR} is the threshold of thermal regulation when the output current drops. In applications, the surface temperature of the chip is about 20°C lower than T_{OTR}. Tested on the MAXIC DEMO board, when the surface temperature of the MT7606EL/TL/DL is about 110°C, the output current begins to drop. When the surface temperature of the MT7606TH/DH/EH is about 130°C, the output current begins to drop. When the surface temperature of the MT7606TM is about 70°C, the output current begins to drop. Considering the different PCB board and heat dissipation conditions in different applications, when output current drops, the surface temperature of the chip will have a certain difference.*

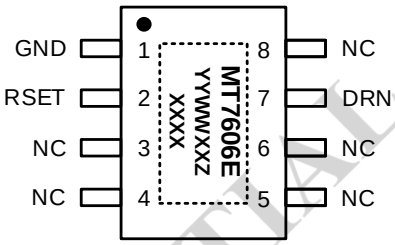
PIN CONFIGURATIONS



(SOT89-3)



(TO252-3)



(ESOP8)

Chip Mark

MT7606□ — Package code: T: SOT89-3, D: TO252-3, E: ESOP8

X: Manufacture code
W: Week code
Y: Year code
Z: T_{OTR} code

PIN DESCRIPTION

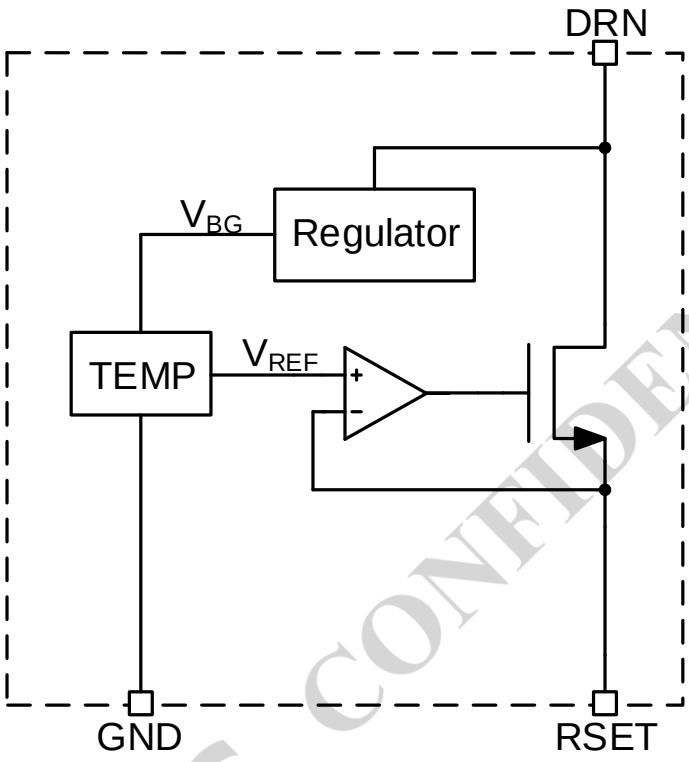
Name	Pin No			Description
	SOT89-3	TO252-3	ESOP8	
DRN	1	1	7	Drain of the internal MOSFET.
GND	2	2	1	Chip ground.
RSET	3	3	2	LED current setting pin.
NC	-	-	3,4,5,6,8	Floating pin.

ELECTRICAL CHARACTERISTICS

Test conditions: T_A=25°C unless otherwise stated.

Symbol		Parameter	Conditions	Min	Typ	Max	Unit
Operation voltage and Power MOSFET							
V_{DRN_MIN}		Minimum input voltage on DRN pin	I_{DRN}=30mA	9			V
V_{DRN_BV}		Voltage stress of DRN pin	RSET pin floating		500		V
Supply current							
I_{OP}		Operating current	V_{DRN}=12V, Pin RSET floating		90	150	uA
Current sense							
V_{REF}		Reference voltage for current sensing	V_{DRN}=12V, R_{SET}=100Ω	580	600	620	mV
I_{DRN}		Output current		1		110	mA
P_{OUT}		Output current precision			±5		%
Over Temperature Protection							
T_{OTR}	MT7606EL	Threshold of thermal Regulation			130		°C
	MT7606TL				130		°C
	MT7606DL				130		°C
	MT7606TH				150		°C
	MT7606DH				150		°C
	MT7606EH				150		°C
	MT7606TM				80		°C

BLOCK DIAGRAM



APPLICATION INFORMATION

MT7606 is a high current precision linear LED driver. It Integrates power MOSFET and JFET supply circuit, so that the peripheral circuit is simplified, no need of inductor, transformer or other magnetic components and low BOM cost is achieved.

Output LED Current

The LED current can be set by external resistor.

The output LED current is calculated as below.

$$I_{LED} = \frac{V_{REF}}{R_{SET}} = \frac{600}{R_{SET}} mA$$

MT7606 is designed for high voltage linear BUCK LED driver. The input voltage must be higher than the output LED voltage, and the LED current is equal to the power supply current.

The typical efficiency for low Power Factor (PF) application is calculated as below equation.

$$\eta = \frac{P_{LED}}{P_{IN}} = \frac{V_{LED} \times I_{LED}}{V_{IN} \times I_{IN}} = \frac{V_{LED}}{V_{IN}}$$

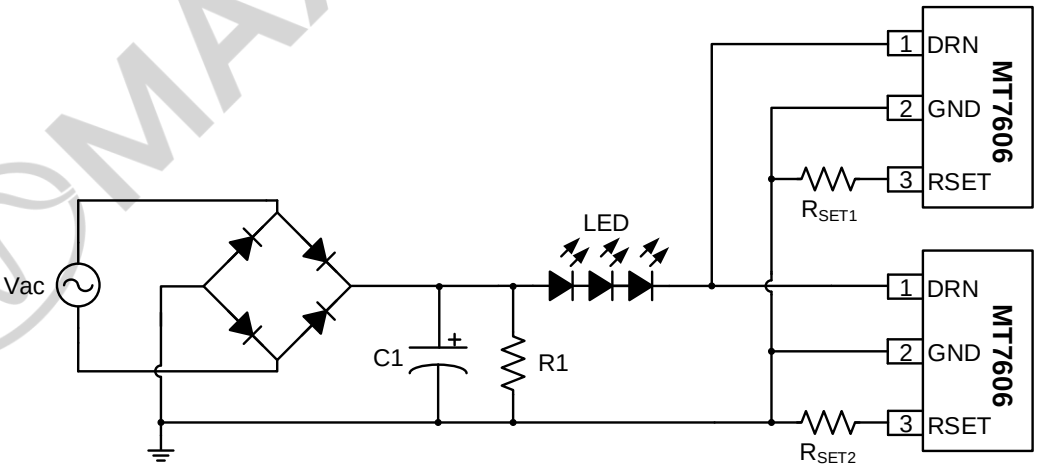
The above equation shows that higher LED voltage will make the system efficiency higher. It is important to set appropriate output LED voltage in real application to get better η.

Over-temperature Protection

When the junction temperature exceeds T_{OTR} (±10°C), the LED output current is gradually reduced. Thus, the output power and thermal dissipation are also reduced, so as to protect the LED lamps, and be able to extend the system life.

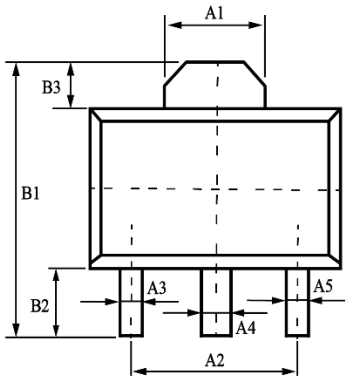
Methods to Increase the Output Current

The peak current of internal power MOSFET is 110mA. Multiple MT7606 can be connected in parallel to increase output LED current greater than the peak current. Refer to Fig.1.

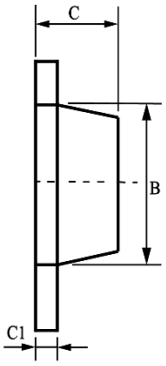


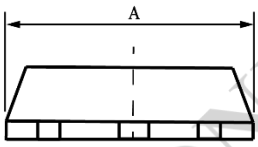
PACKAGE INFORMATION

SOT89-3 PACKAGE OUTLINE AND DIMENSIONS



Top View

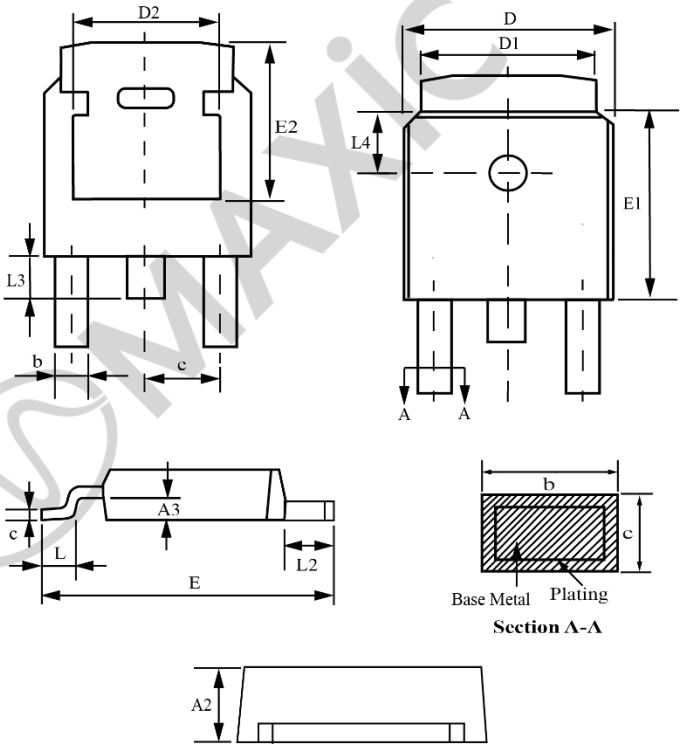




Side View

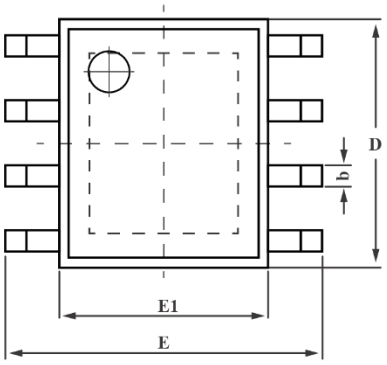
Symbol	Dimensions in millimeters	
	Min	Max
A	4.40	4.60
A1	1.65	1.75
A2	2.95	3.05
A3	0.35	0.45
A4	0.40	0.58
A5	0.32	0.52
B	2.40	2.60
B1	4.05	4.25
B2	0.82	0.83
B3	0.82	0.83
C	1.40	1.60
C1	0.35	0.45

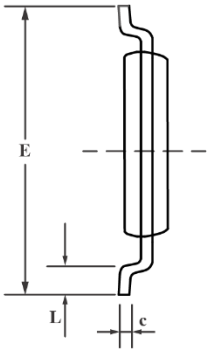
TO252-3 PACKAGE OUTLINE AND DIMENSION

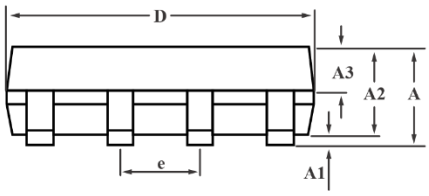


Symbol	Dimensions in millimeters	
	Max	Min
A2	2.200	2.400
A3	1.000	1.120
b	0.710	0.820
c	0.498	0.550
D	6.500	6.700
D1	5.330REF	
E	9.800	10.300
E1	6.000	6.200
E2	5.330REF	
e	2.286BSC	
L	1.400	1.600
L2	0.900	1.250
L3	0.600	1.000

ES/SOP8 PACKAGE OUTLINE AND DIMENSIONS







SYMBOL	MILIMETER		
	MIN	NOM	MAX
A	1.35	-	1.75
A1	0.10	-	0.25
A2	1.30	1.40	1.50
A3	0.55	0.65	0.70
b	0.33	-	0.51
c	0.17	-	0.25
D	4.70	4.90	5.10
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.40	0.60	0.80

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