

# *(Preliminary) MG39U301*

## *Universal PWM Type LED Driver*

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### **1 Features**

- Operation voltage, 7V ~ 450V
- Provide constant frequency or constant off-time control
- Open loop current peak detector
- Linear or PWM dimming control

### **2 Description**

The MG39U301 is a current feedback control, buck type LED driver IC. It achieves good output current regulation without the need of external compensation components.

The MG39U301 integrates a HV start-up circuit, 7~450V linear regulator, precision comparator, PWM control and ring oscillator into one chip. With those building circuits, a precision current output buck mode converter with dimming control (linear or PWM type) can be easily achieved with only few external components. The linear dimming control input is 0~0.25V & the PWM dimming range is 0~100% duty at a frequency of up to 10KHz.

The chip is available in 8-pin or 16-pin SOP package.

### **3 Order Information**

	<b>MG39U301ASC1</b>	<b>MG39U301ASC2</b>
<b>Package</b>	SOP8	SOP16

### **4 Application Field**

DC-DC or AC-DC LED driver application

Backlighting LED driver

General-purpose constant current source

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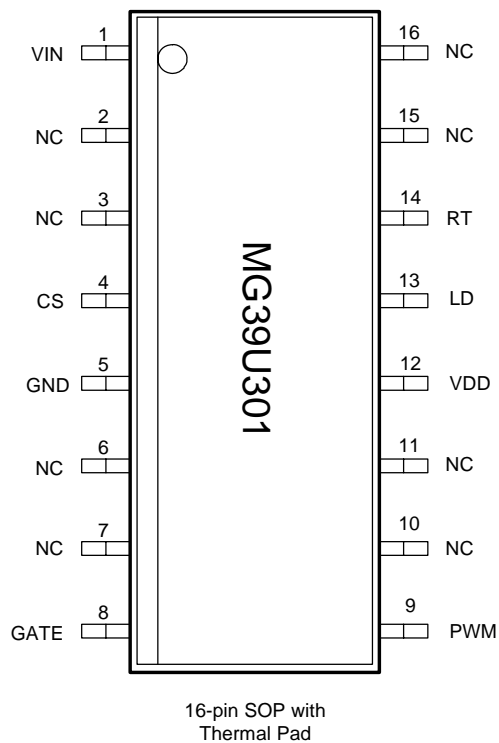
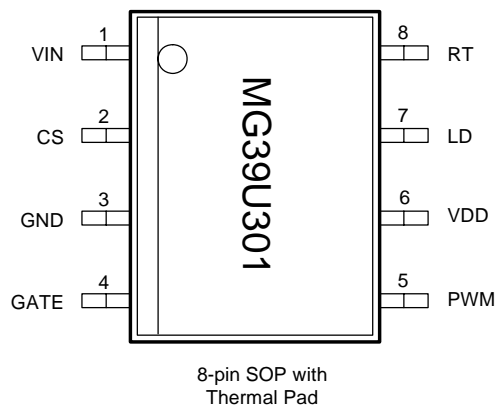


## 5 Pin Description

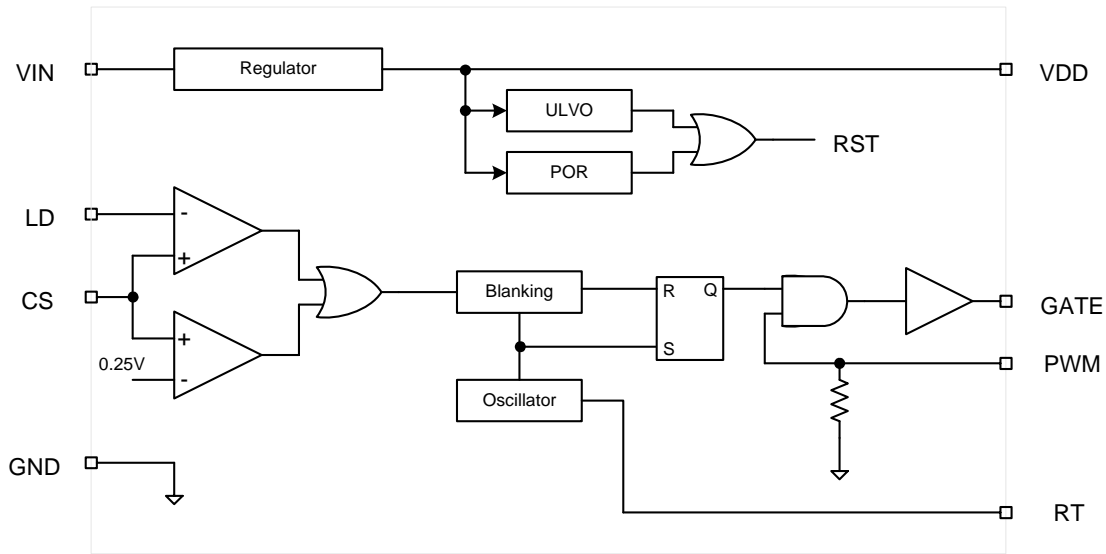
### 5.1 Pin Definition

SOP8	SOP16	Pin Name	Description
1	1	VIN	7~450V high voltage input
2	4	CS	Current sense input pin
3	5	GND	Ground pin
4	8	GATE	Driver for external power MOS
5	9	PWM	PWM dimming input
6	12	VDD	Regulated core supply
7	13	LD	Linear dimming input. If current sense threshold is required less than 0.25V, an external voltage can be applied to this pin.
8	14	RT	Ring oscillator bias input. When RT is connected to ground via a resistor, the MG39U301 operates in constant frequency mode. When the resistor is connected between RT & GATE, the MG39U301 operates in constant off-time mode.
-	2, 3, 6, 7, 10, 11, 15, 16	NC	No connection

### 5.2 Pin Configuration

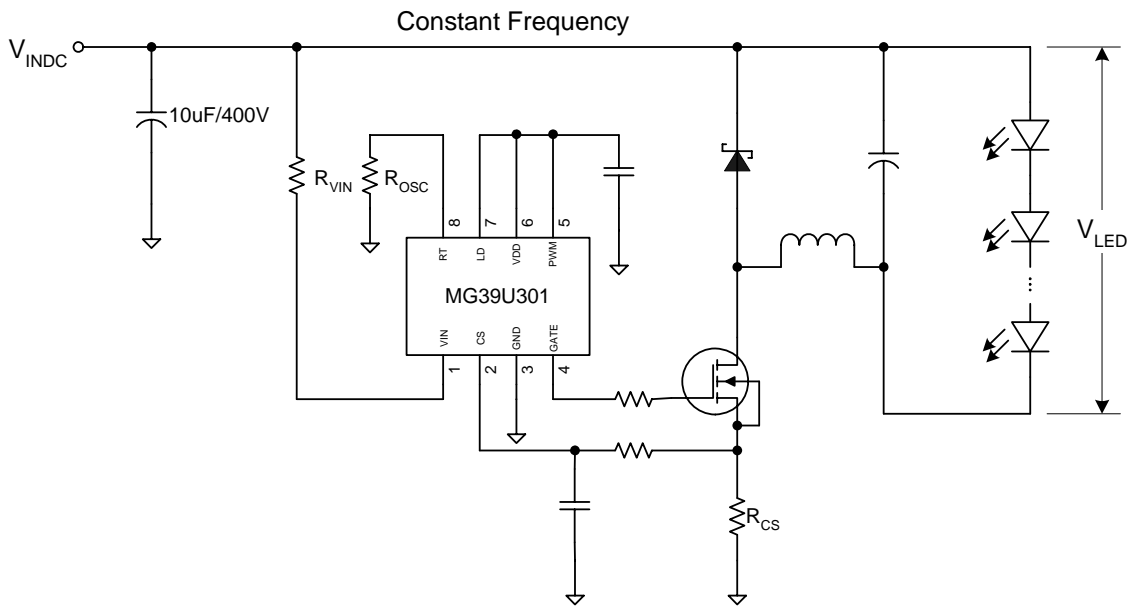


## 6 Block Diagram

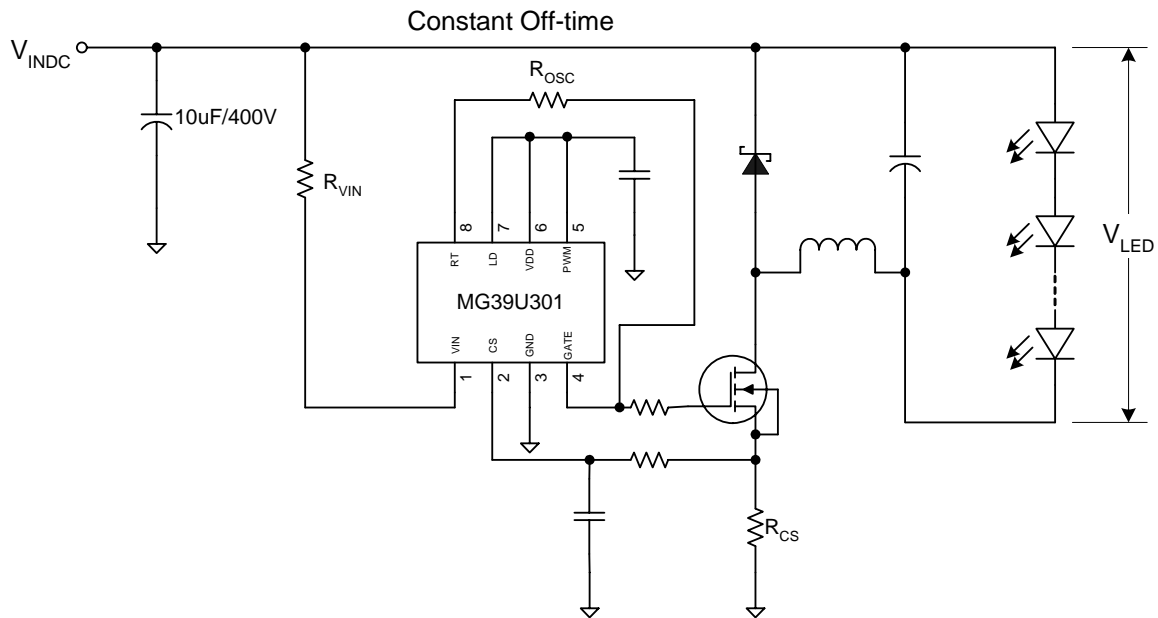


## 7 Application Circuit

Buck Driver Example 1



## Buck Driver Example 2



## 8 Absolute Maximum Rating

Parameter	Rating	Unit
Supply Voltage	-0.5 to +470	V
Ambient Operating Temperature	-40 to +125	°C
Storage temperature	-55 to +155	°C

## 9 Electrical Characteristics

All typical numbers are at  $T_a=25^\circ\text{C}$  and  $V_{IN}=12\text{V}$ , unless otherwise noted.

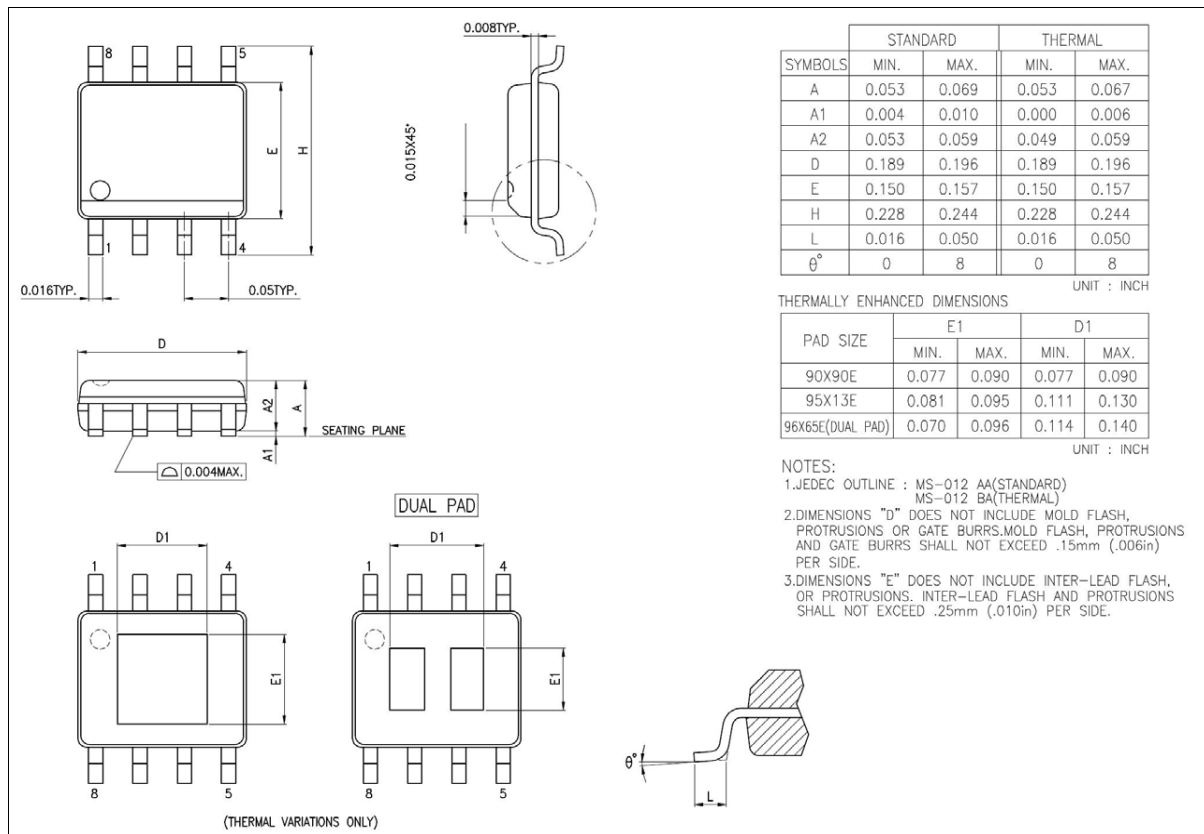
Parameter	Sym.	Conditions	Min.	Typ.	Max.	Unit
Input DC supply voltage range	$V_{INDC}$	DC input voltage	7	-	450	V
Shut down mode supply current	$I_{INSD}$	PWM=0, $V_{IN}=7\text{V}$	-	0.5	0.8	mA
Operating Current	$I_{OP}$	$V_{IN} > 7\text{V}$ , $R_{OSC}=226\text{K}$ and $C_{GATE}=500\text{P}$	-	0.8	1.2	mA
<b>Internal Regulator</b>						
Internally regulated Voltage	$V_{DD}$	$V_{IN}=7\text{V} \sim 450\text{V}$ , $R_{OSC}=226\text{K}$ , $C_{GATE} = 500\text{pF}$ , No load in pin VDD	5.0	5.6	6.0	V
Maximal pin VDD voltage	$V_{DDMAX}$	When an external voltage applied to pin VDD	-	-	7.0	V
Output current of the regulator	$I_{SOURCE}$	VDD = 5.6V	-	1	-	mA
VDD under-voltage lockout threshold	$V_{UVLO}$	$V_{IN}$ rising	-	5.30	-	V
VDD under-voltage lockout hysteresis	$\Delta UVLO$	$V_{IN}$ falling	100	300	500	mV
<b>PWM Dimming</b>						
Pin PWM input high voltage	$V_{PWM(H)}$	$V_{IN}=7\text{V} \sim 450\text{V}$	2.0	-	-	V
Pin PWM input low voltage	$V_{PWM(L)}$	$V_{IN}=7\text{V} \sim 450\text{V}$	-	-	0.8	V
Pin PWM pull-down resistance	$R_{PWM}$	$V_{DD}=5.5\text{V}$	50	100	150	$\text{K}\Omega$
PWM signal duty	$D_{PWM}$		0	-	100	%
<b>Current Sense Input</b>						
Current sense pull-in threshold voltage	$V_{CSTH}$	$T_a= 0^\circ\text{C}$ to $+125^\circ\text{C}$ , VDD = 5.6V	255	275	285	mV
		$T_a= -40^\circ\text{C}$ , VDD = 5.6V	200	-	-	mV
Offset voltage of comparator	$V_{OS}$		-20	-	20	mV
Linear dimming pin voltage range	$V_{LD}$		0	-	$V_{CSTH}$	mV
Current sense blanking interval	$t_{BLANK}$	$V_{CS}=0.55 V_{LD}$ , $V_{LD}=V_{DD}$	150	215	285	nS
Delay from CS trip to GATE IO	$t_{DELAY}$	$V_{LD}=V_{DD}$ , $V_{CS}= V_{CSTH}$ +50mV after $t_{BLANK}$	-	-	300	nS

Electrical Characteristics (continued)

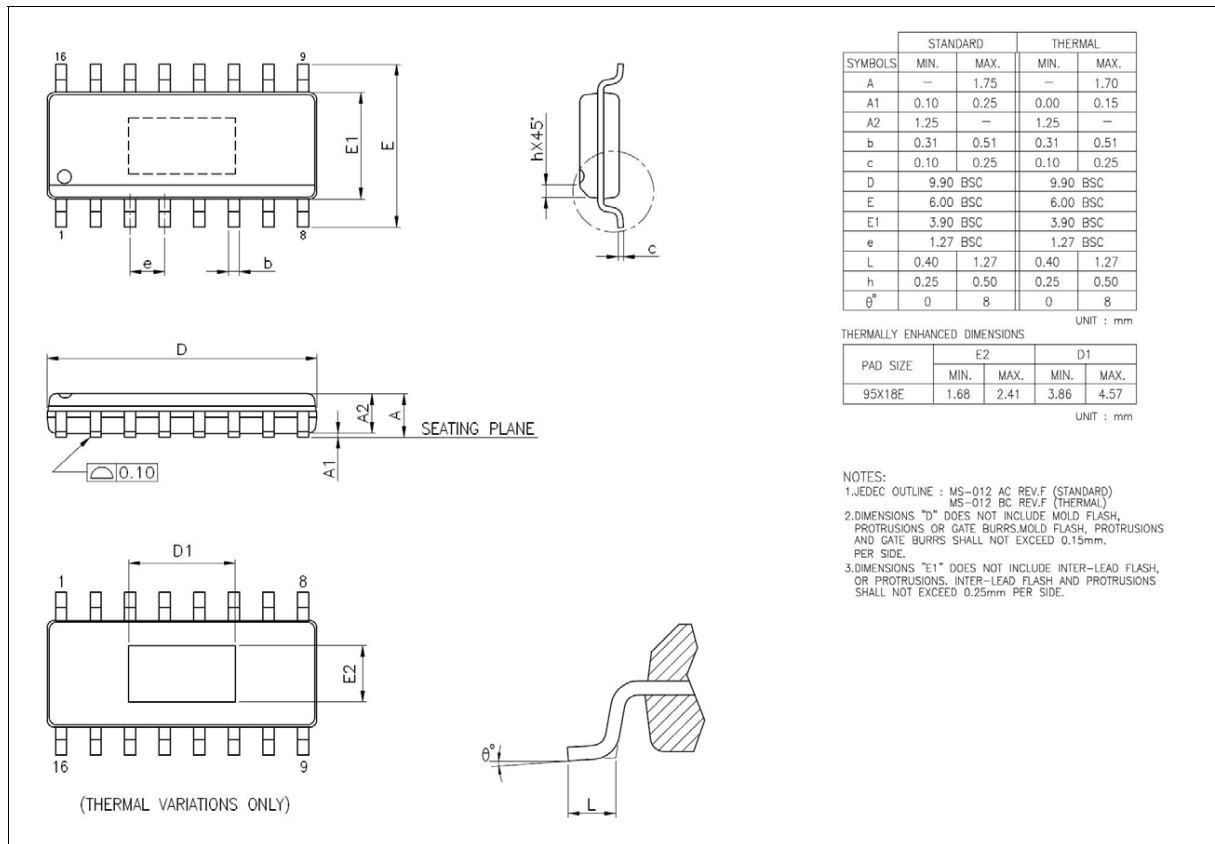
<b>Gate Driver</b>						
GATE output high voltage	$V_{GATE (H)}$		VDD -0.4	-	-	V
GATE output low voltage	$V_{GATE (L)}$		-	-	0.4	V
GATE output high driving current	$I_{GATE (H)}$	$V_{GATE} = VDD - 0.4V$	-	10	-	mA
GATE output low sinking current	$I_{GATE (L)}$	$V_{GATE} = 0.4V$	-	25	-	mA
GATE output rise time	$t_{RISE}$	$C_{GATE} = 500pF$	-	30	50	nS
GATE output fall time	$t_{FALL}$	$C_{GATE} = 500pF$	-	30	50	nS
<b>Oscillator</b>						
Oscillator frequency	$F_{OSC}$	$R_{OSC} = 1.0M\Omega$	22K	27K	32K	Hz
		$R_{OSC} = 226K\Omega$	90K	110K	120K	

## 10 Package Dimension

### 10.1 SOP8 Package Dimension



## 10.2 SOP16 Package Dimension





## 11 Revision History

Revision	Description	Date	Page
V1.01	Initial release	2011/10/03	