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# RT8H084C

## *Under development*

＊This product is under development and may change at a later date.

LED driver circuit with UVLO

**DESCRIPTION**

RT8H084C is composed by NPN transistors,PNP transistors and resistors.It can miniaturization of a set and reduce parts or time necessary for completion.

RT8H084C constitutes the LED driver circuit. The voltage rise of the resistor RCS connected to he GND side is detected by the CSP terminal, and the LED current is adjusted by comparing it with the built-in voltage of 0.2V.

The off-time can be set by connecting an external resistor and capacitor to the CT terminal.

It is also has a built-in UVLO function to prevent malfunction at 6.5V or less and thermal shutdown function.

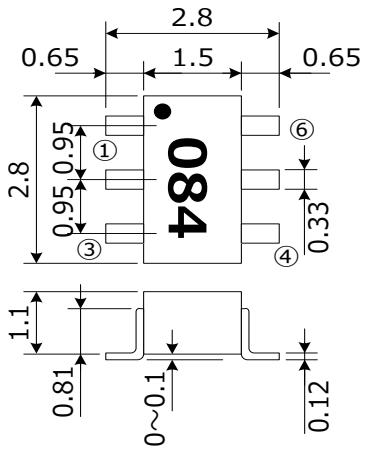
**FEATURES**

- Miniaturization of a set.
- External setting of a switch-off time is possible. with the switch-off time setting terminals (CT).
- Built-on UVLO function and thermal shutdown function.

**APPLICATION**

- LED driver circuit

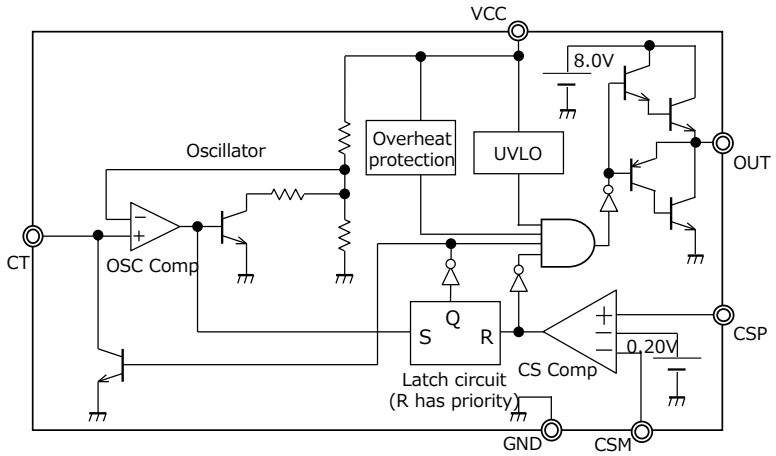
**OUTLINE DRAWING** Unit : mm




PIN CONFIGURATION

| | |
|---|---|
| ①OUT | ⑥CSP |
| ②VCC | ⑤GND |
| ③CSM | ④CT |

**BLOCK DIAGRAM**



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**ABSOLUTE MAXIMUM RATINGS (Ta=25℃)**

| Symbol | Parameter | Conditions | Ratings | Unit |
|---|---|---|---|---|
| VCC | Supply voltage | | 40 | V |
| IOUT | Output current | | 10 | mA |
| Pd | Internal power dissipation | | 200 | mW |
| Kθ | Thermal derating | Ta≧25℃ | 1.6 | mW/℃ |
| Tj | Junction temperature | | 150 | ℃ |
| Tstg | Storage temperature | (keep dry) | −40～150 | ℃ |
| Topr | Operating temperature | (keep dry) | −20～85 | ℃ |

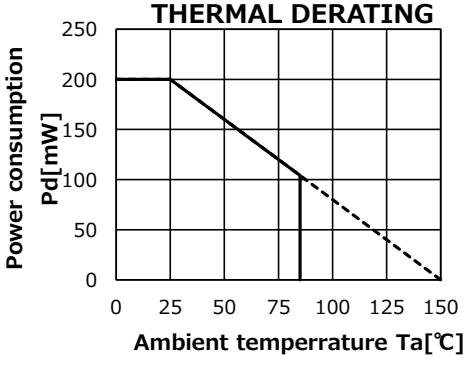
**RECOMMENDED OPERATING RANGE**

| Symbol | Parameter | Ratings | | Unit |
|---|---|---|---|---|
| | | Min | Max | |
| VCC | Supply voltage range | 6.5 | 37 | V |
| f | Frequency range | - | 200 | kHz |

**ELECTRICAL CHARACTERISTIC (Ta=25℃,VCC=12V unless otherwise noted.)**

| Symbol | Parameter | Test condition | Designed value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| VCC | Operating supply voltage range | | 4.5 | 12 | 37 | V |
| VCTH1 | Operation start voltage | | 5.98 | 6.50 | 7.02 | V |
| VCTH2 | Operation stop voltage | | 5.24 | 5.70 | 6.16 | V |
| VCSPTH | CSM threshold voltage | | 0.188 | 0.200 | 0.212 | V |
| ICC1 | Circuit current1 | CSM:0V, CSP:2V, CT:0V | 0.56 | 0.80 | 1.04 | mA |
| ICC2 | Circuit current2 | CSM:OPEN, CSP:0V, CT:5V | 0.56 | 0.80 | 1.04 | mA |
| IBCSP | CSP bias current | CSM:OPEN, CSP:0V/IM, CT:0V | -300 | -120 | 0 | nA |
| IBCSM | CSM bias current | CSM:0V/IM, CSP:0.2V, CT:0V | -300 | -120 | 0 | nA |
| VTHCT1 | CT threshold voltage 1 | CSP:0V, CT:0V ⇒ SWEEP(L→H)/IM | 2.60 | 3.10 | 3.60 | V |
| VTHCT2 | CT threshold voltage 2 | CSM:0V, CSP:3V CT:VTHCT1 ⇒ SWEEP(H→L)/IM | 1.55 | 1.85 | 2.15 | V |
| VOSAT1 | OUT saturation voltage 1 | CSM:OPEN, CSP:0V, CT:0V, OUT:-5mA | 5.95 | 7.00 | 8.05 | V |
| VOSAT2 | OUT saturation voltage 2 | CSM:0V, CSP:0.2V, CT:0V, OUT:5mA | 0.67 | 0.75 | 0.83 | V |
| TOOFF(※) | Switch-off time | RCT=47kΩ, CCT=330pF | - | 5.00 | - | us |
| TSD(※) | Thermal shutdown | | - | 170 | - | ℃ |

## CHARACTERISTICS



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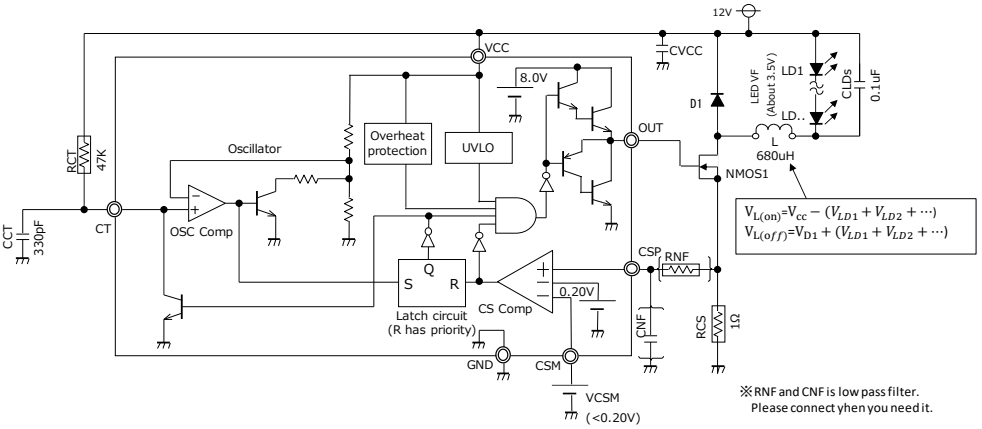
### APPLICATION CIRCUIT EXAMPLES




○Setting off-time ($t_{off}$)

The off-time is determined by the time when the charging voltage of the CT terminal resistor $R_{CT}$ and the capacitor $C_{CT}$ reaches the upper limit of the CT terminal voltage ($V_{CT(H)}$) set inside the RT8H094C.

$$t_{off} = R_{CT} \cdot C_{CT} \cdot \ln\left(\frac{V_{CC} - V_{CT(L)}}{V_{CC} - V_{CT(H)}}\right)$$

($V_{CT(H)}$ : CT terminal voltage (output HIGH), $V_{CT(L)}$: CT terminal voltage (output LOW))

○Setting on-time ($t_{on}$)

$$t_{on} = \frac{L}{V_{L(on)}}(I - I_{min})$$

$I_{min}$ refers to the diode current just before the OUT terminal voltage turns from off to on.

The $I$ and $I_{min}$ arithmetic expressions are as follows.

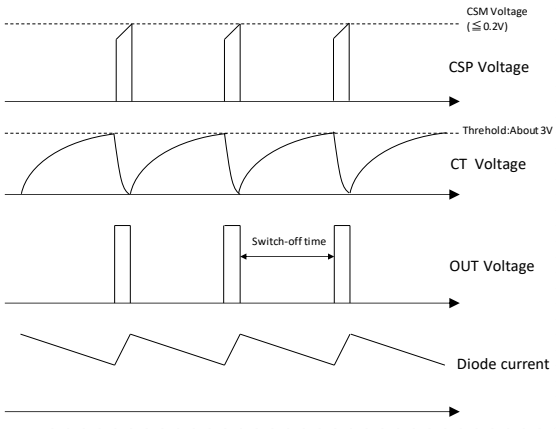
※The accuracy of $I_{ave}$ is about ±7% only for product variations.

(When the constants of the external components are the above application circuit example.)

$$I = \frac{V_{CSPTH}}{R_{CS}} \qquad I_{min} = I - \frac{V_{L(off)}}{L} t_{off} \qquad I_{ave} = \frac{I+I_{min}}{2} = \frac{V_{CSM}}{R_{CS}} - \frac{V_{L(off)}}{2L} t_{off}$$

### TIMING CHART

(It is based on the application circuit example)



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