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RT8H164C

LED driver circuit with UVLO

DESCRIPTION

RT8H164C is composed by NPN transistors,PNP transistors and resistors.It can miniaturization of a set and reduce parts or time necessary for completion.

RT8H164C 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.

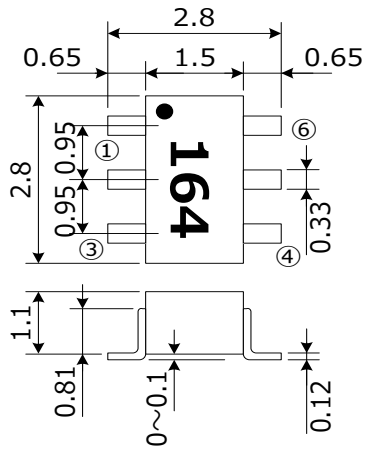
The light intensity of the LED can be adjusted by inputting a signal to the DIM terminal.

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 4V or less and thermal shutdown function.

OUTLINE DRAWING

Unit : mm



PIN CONFIGURATION

①OUT	⑥CSP
②VCC	⑤GND
③DIM	④CT

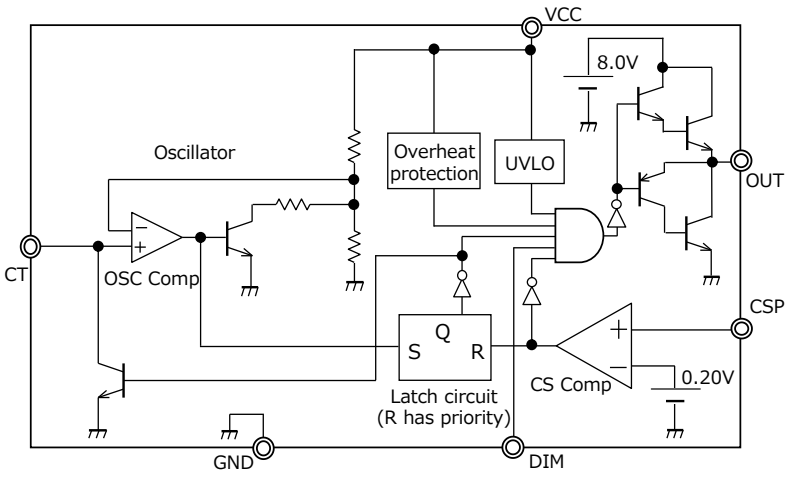
FEATURES

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

APPLICATION

- LED driver circuit

BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

Symbol	Parameter	Conditions	Ratings	Unit
VCC	Supply voltage		40	V
IOUT	Output current		±30	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	℃

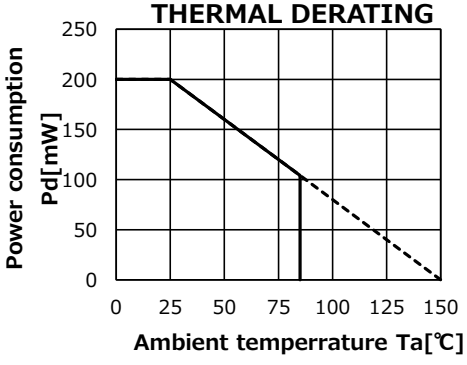
RECOMMENDED OPERATING RANGE

Symbol	Parameter	Ratings		Unit
		Min	Max	
VCC	Supply voltage range	4.5	37	V
f	Frequency range	-	200	kHz

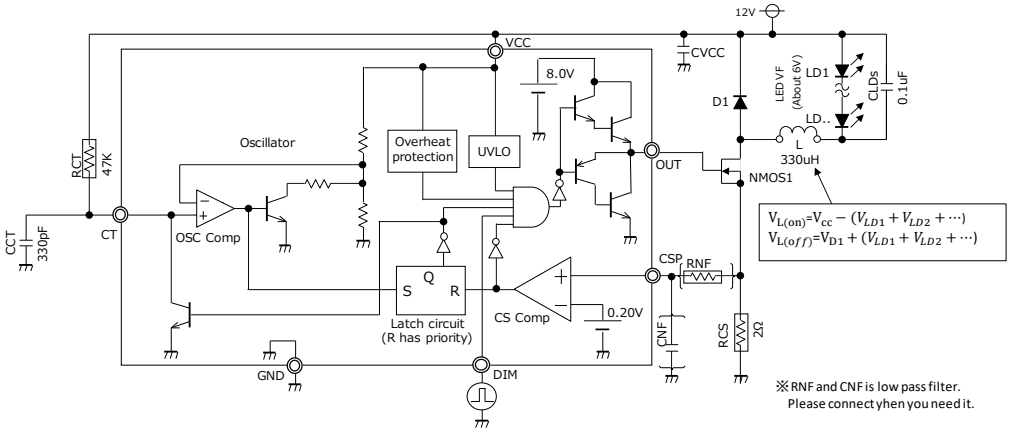
ELECTRICAL CHARACTERISTIC (Ta=25℃,VCC=12V unless otherwise noted.)

Symbol	Parameter	Test condition	Designed value			Unit
			Min	Typ	Max	
VCC	Operating supply voltage range		4.5	12	37	V
VON	Operation start voltage		4.00	4.30	4.60	V
VOFF	Operation stop voltage		3.69	4.05	4.41	V
VTHCSP	CSM threshold voltage		0.188	0.200	0.212	V
ICC1	Circuit current1	CSP:2V, CT:0V	0.62	0.89	1.16	mA
ICC2	Circuit current2	CSP:0V, CT:5V	0.56	0.80	1.04	mA
IBCSP	CSP bias current	CSP:0V/IM, CT:0V	-300	-120	0	nA
VTHDIM	DIM threshold voltage	CSP:0.3V, CT:5V	1.12	1.40	1.68	V
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	CSP:0.3V CT:VTHCT1 ⇒ SWEEP(H→L)/IM	1.55	1.85	2.15	V
VOSAT1	OUT saturation voltage 1	CSP:0V, CT:0V, OUT:-5mA	5.60	7.00	8.40	V
VOSAT2	OUT saturation voltage 2	CSP:0.3V, CT:0V, OUT:5mA	0.60	0.75	0.90	V
TOOFF(※)	Switch-off time	RCT=47kΩ, CCT=330pF	-	4.00	-	us
TSD(※)	Thermal shutdown		-	170	-	℃

CHARACTERISTICS



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})

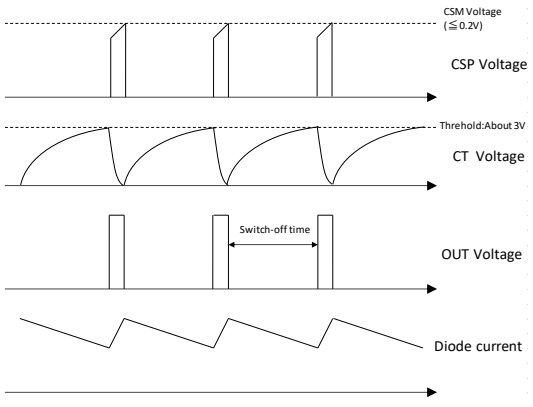
$$t_{on} = \frac{L}{V_{L(on)}}(I - I_{min})$$

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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