

Step-up DC-DC converter
昇圧型DC-DCコンバータIC



TK11880FTL-G
(SON3024-8)

DESCRIPTION

The TK11880FTL-G is a step-up DC-DC converter designed for White LED driver applications, using constant frequency PWM architecture, with the following built in: a very high current switching transistor (0.6A peak), a high speed oscillator (1.0MHz), a switch over current detector, a low voltage reference ($V_{Ref}=0.495V$), an error amplifier, a PWM comparator, a zener diode for open-circuit protection and ON/OFF control.

TK11880FTL-G can drive up to six White LEDs in series. This IC works with a very wide operation supply range (2.65V~10V) and the adjustable output voltage can be set as high as 24.5V. The white LEDs are connected in series and driven at a constant current, resulting in uniform brightness and high efficiency. The reference voltage is a very low 0.495V, achieving high efficiency operation with the constant current output. The ON/OFF control is built-in and the circuit current can be decreased when the EN pin is low (shutdown mode). The built-in zener diode can be used for open-circuit protection in case the output load is disconnected, such as the string of LEDs opened. The internal zener diode reduces the external component count.

The TK11880FTL-G can also be used in other applications as a step-up DC-DC converter.

The TK11880FTL-G is available in the SON3024-8 surface mount package.

TK11880FTL-Gは白色LEDをドライブするために開発した、PWM方式昇圧型DC-DCコンバータICです。直列に接続された最大6個の白色LEDをドライブ出来ます。白色LED直列接続、定電流駆動構成で、輝度ムラが少なく、高効率で動作します。基準電圧は0.5Vと低く、定電流出力で高効率です。その他、一般的な昇圧型DC-DCコンバータとしても使用可能です。

FEATURES

- Very wide operating voltage range (2.65 to 10V)
- 1.0MHz operation
- Internal switching transistor
- Maximum duty cycle 93%
- 24.5V_{MAX} output
- Very small inductor available
- Very small package SON3024-8
- 動作電圧範囲 2.65 to 10V
- 動作周波数 1MHz
- スイッチングトランジスタ内蔵
- 最大デューティサイクル 93%
- 最大出力電圧24.5V
- 小型コイル使用可能
- 0.75mm薄型パッケージSON3024-8

ABSOLUTE MAXIMUM RATINGS

Parameter	項目	Symbol 記号	Rating	定格	Unit 単位	Remarks	備考
Operating voltage range	動作電圧範囲	V_{OP}	2.65 to 10.0		V		
Operating temperature range	動作温度範囲	T_{OP}	-30 to +85		°C		
Power dissipation	許容消費電力	P_D	600		mW	*Board mounted	基板実装時
Operating frequency range	動作周波数範囲	f_{OP}	1.0		MHz		

ELECTRICAL CHARACTERISTICS

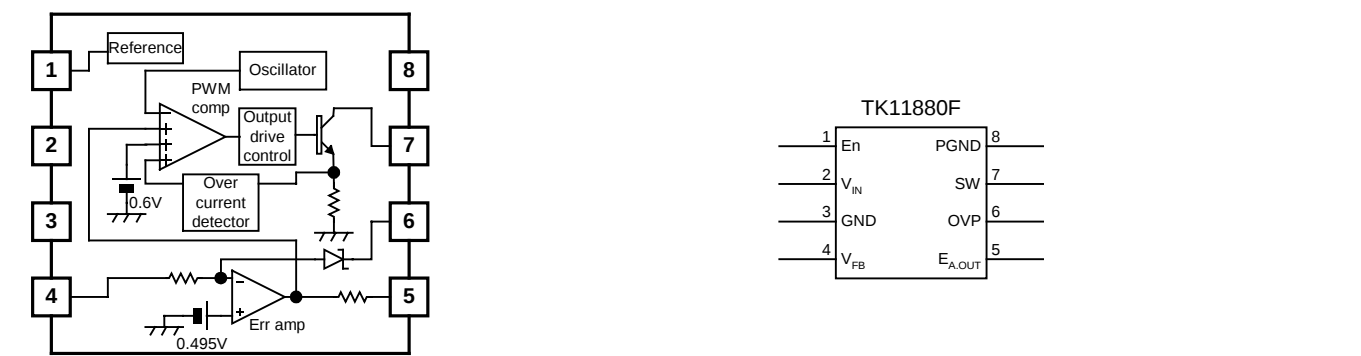
$V_{IN}=3V, T_A=25^{\circ}C$

Parameter	項目	Symbol 記号	Value			Unit 単位	Conditions	条件
			MIN.	TYP.	MAX.			
Oscillator section 発振器部								
Operating frequency	動作周波数	f	0.7	1.0	1.3	MHz		
Error amplifier section (V_{fb} pin, Ea_{out} pin) エラーアンプ部 (V_{FB} 端子, EA_{OUT} 端子)								

V_{IN}=3V, T_A=25°C

Parameter	項目Symbol 記号	Value			Unit 単位	Conditions	条件
		MIN.	TYP.	MAX.			
Threshold voltage	スレッシュホールド電圧	V _{EA}	475	495	515	mV	
Input bias current	V _{FB} 端子入力電流	I _{EAIN}	-1.0	-0.2	1.0	μA	V _{FB} =0V
Voltage gain	電圧利得	A _V	-	40	-	dB	
Gain band width	周波数帯域幅	GBW	-	2	-	MHz	A _V =0dB
Output high voltage	出力ハイ電圧	V _{EAOUT,HIGH}	0.78	0.87	-	V	V _{FB} =0V
Output low voltage	出力ロー電圧	V _{EAOUT,LOW}	-	0.05	0.2	V	V _{FB} =1.0V
Output source current	出力ソース電流	I _{FAOUT,SOURCE}	-	-36	-21	μA	V _{FAOUT} =0.45V
Output sink current	出力シンク電流	I _{EAOUT,SINK}	21	36	-	μA	V _{EAOUT} =0.45V
Dead time control section 休止期間調整部							
Maximum duty cycle	最大デューティサイクル	D _{MAX}	88	93	-	%	V _{FB} =0V
Shutdown section (En pin) シャットダウン部 (EN 端子)							
En input voltage +	EN端子入力ハイ電圧	V _{EN,HIGH}	1.2	-	20	V	On mode
En input voltage -	EN端子入力ロー電圧	V _{EN,LOW}	0	-	0.3	V	Shutdown mode
En pin input bias current	EN端子入力電流	I _{ENIN}	-	25	55	μA	V _{EN} =3V
Output switch section (Sw pin) 出力部 (SW 端子)							
Switch current limit	スイッチ制限電流	I _{SW,LIMIT}	0.6	1.3	1.8	A	
Switch saturation voltage	スイッチ飽和電圧	V _{SW,SAT}	-	0.12	0.2	V	I _{SW} =200mA
Switch leakage current	スイッチオフ時リーク電流	I _{SW,OFF}	-	0.01	2.0	μA	V _{FB} =1V, V _{SW} =24.5V
Open-circuit protection section (OVP pin) LEDオープン保護回路 (OVP 端子)							
Open-circuit voltage	OVP端子電圧	V _{OVP}	25.0	26.6	28.6	V	I _z =0.6mA
V _{in} section (V _{in} pin) 電源電圧部 (V _{IN} 端子)							
Low voltage stop	低入力停止電圧	V _{IN,LOW}	2.20	2.45	2.65	V	
Quiescent supply current	静止動作消費電流	I _{IN,ON}	2.4	3.9	5.4	mA	V _{FB} =1V
Shutdown supply current	シャットダウン消費電流	I _{IN,OFF}	-	0.01	1.0	μA	V _{EN} =0V

BLOCK DIAGRAM



6 W-LEDs DRIVER APPLICATION

■ Designed Performance

Parameter	Value
Input Voltage	V _{IN} =3.0 to 9.0V
LED Current	I _{LED} =20mA
Oscillation Frequency	1.0MHz
Inductor Peak Current	300mA
Coil (TOKO)	Type DB318C 15μH A997AS-150M Type D52LC 10μH A914BYW-100M

