Ordering number : ENA1950

SANYO Semiconductors
DATA SHEET

An ON Semiconductor Company

Bi-CMOS IC

LV5026M — LED Driver IC

Overview

LV5026M is a High Voltage LED drive controller which drives LED current up to 3A with external MOSFET. LV5026M is realized very simple LED circuits with a few external parts. It corresponds to various wide dimming controls including the TRIAC dimming control.

Functions

- High Voltage LED Controller
- Various Dimming Control
  -TRIAC & Analog Input & PWM Input
- Soft Start function
- Built-in TRIAC stabilized function
- Built-in circuit of detection of overvoltage of CS pin.
- Selectable Switching frequency [50 kHz or 70 kHz, open: 50 kHz]
- Short Protection Circuit
- Selectable reference Voltage
  -Internal 0.605V & External Input Voltage
- Low noise switching system
  - 5 stages skip mode Frequency
  - Soft driving

Specifications

Maximum Ratings at Ta = 25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum Input voltage	V_{IN} max		-0.3 to 42	V
REF_OUT, REF_IN, RT, CS, PWM_D, ACS			-0.3 to 7	V
OUT1 pin	V_{OUT}_abs		-0.3 to 42	V
OUT2 pin	V_{OUT}2_abs		-0.3 to 42	V
Allowable power dissipation	Pd max	With specified board*	1.0	W
Junction temperature	Tj		150	°C
Operating temperature	Topr		-30 to +125	°C
Storage temperature	Tstg		-40 to +150	°C

*Specified board: 58.0×54.0×1.6mm (glass epoxy board)

Recommended Operating Conditions at Ta = 25°C

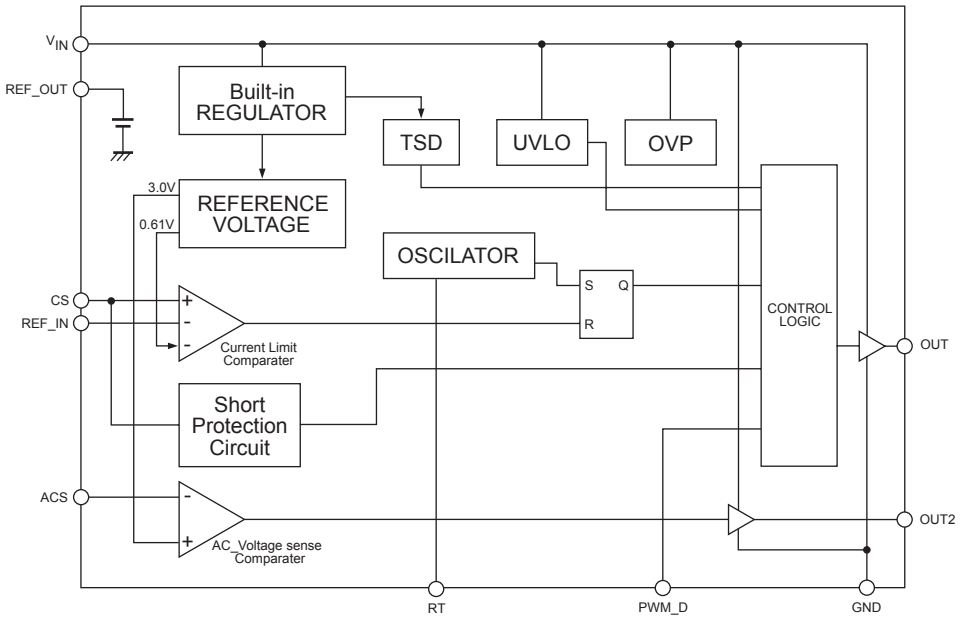
Parameter	Symbol	Conditions	Ratings	Unit
Input voltage	V_{IN}		8.5 to 42	V

Electrical Characteristics at Ta = 25°C, V_{IN} = 12V, unless otherwise specified.

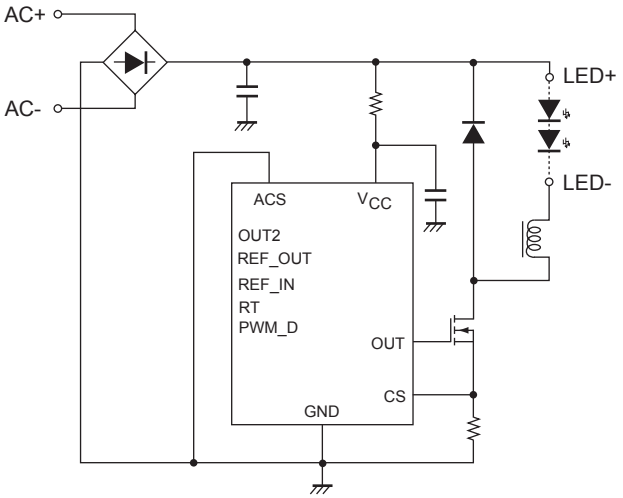
Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Reference Voltage block						
Built-in Reference Voltage	VREF		0.585	0.605	0.625	V
VREF V_{IN} regulation	VREF_LN	V_{IN} = 8.5 to 24V		±0.5		%
Reference Output Voltage	REFOUT	I_{REFOUT} = 0.5mA		3.0		V
- Maximum load	REFOUT_MAX		0.5			mA
- equivalent output impedance	REFOUT_RO			10		Ω
Under Voltage Lockout						
Operation Start Input Voltage	UVLOON		8	9	10	V
Operation Stop Input Voltage	UVLOOFF		6.3	7.3	8.3	V
Hysterisys Voltage	UVLOH			1.7		V
Oscillation						
Frequency	FOSC1	RT = OPEN	40	50	60	kHz
	FOSC2	RT=REF_OUT	55	70	85	kHz
FOSC1 Switch voltage	$V_{OSC}1$		2		5	V
FOSC2 Switch voltage	$V_{OSC}2$				0.5	V
Maximum Duty	MAXDuty			93		%
Comparator						
Input offset Voltage (Between CS and VREF)	V_{IO}_VR			1	10	mV
Input offset Voltage (Between CS and REFOUT)	V_{IO}_RI			1	10	mV
Input current	IIOCS			160		nA
	IIOREF			80		nA
CS pin max voltage	VOM				1	V
malfunction prevention mask time	TMSK			150		ns
PWM_D Circuit						
OFF voltage	V_{OFF}		2		5	V
ON voltage	V_{ON}		0		0.6	V
Thermal protection Circuit						
Thermal shutdown temperature	TSD	*Design guarantee		165		°C
Thermal shutdown hysterisys	ΔTSD	*Design guarantee		30		°C
Drive Circuit						
OUT sink current	I_OI		500	1000		mA
OUT source current	I_OO			120		mA
Minimum On time	TMIN			200	300	ns
TRIAC Stabilization Circuit						
Threshold of OUT2	VACS	OUT2=High [less than right record]	2.8	3.0	3.2	V
OUT2 sink current	I_O2I	VIN=12V, OUT2=6V		0.6		mA
OUT2 source current	I_O2O	VIN=12V, OUT2=6V		0.6		mA
V_{CC} current						
UVLO mode V_{IN} current	I_{CC}OFF	V_{IN}<UVLOON		80	120	μA
Normal mode V_{IN} current	I_{CC}ON	V_{IN}>UVLOON, OUT = OPEN		0.6		mA
V_{IN} Over Voltage Protection Circuit						
V_{IN} over voltage protection voltage	V_{IN}OVP		24	27	30	V
VIN Current at OVP	IINOVP	V_{IN}=30V	0.7	1.0	1.5	mA
CS terminal abnormal sensing circuit						
Abnormal sensing voltage	CSOCP			1.9		V

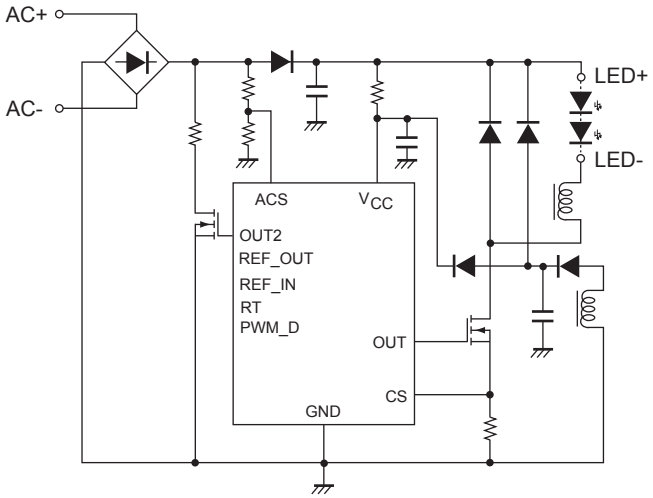
*: Design guarantee (value guaranteed by design and not tested before shipment)

Block Diagram



Sample Application Circuit

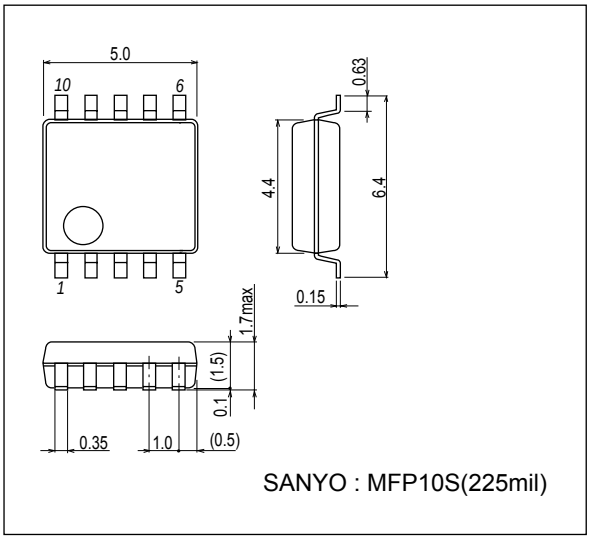




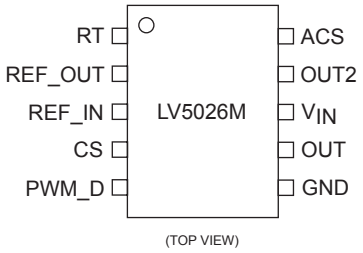
Package Dimensions

unit : mm (typ)

3086B



Pin Assignment

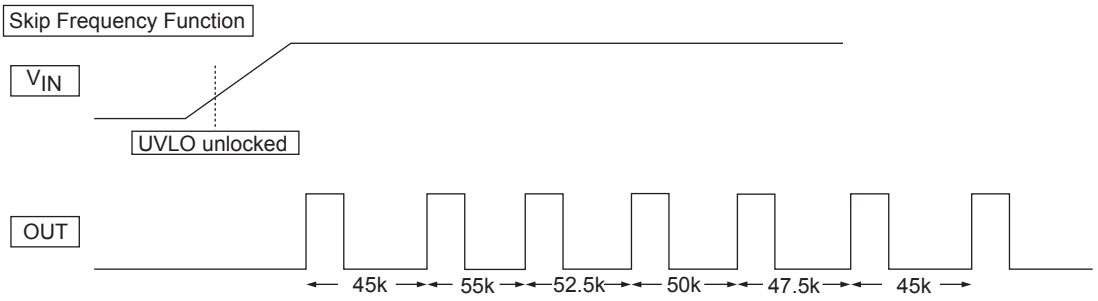


Pin Function

Pin No.	Pin name	Function
1	RT	Switching Frequency selection Pin. [L or Open : 50kHz Switching / H(2V – 5V) : 70 kHz Switching]
2	REF_OUT	Built-in 3V Regulate out Pin. [If this function isn't used, please connect GND or no connection.]
3	REF_IN	External LED current Limit Setting Pin. If less than VREF (0.605V) voltage is input, Peak current value is used at the input voltage. If more than Vref voltage is input, it is done at VREF voltage. [If this function isn't used, please connect nothing.]
4	CS	LED current sensing pin. When this pin voltage exceeds VREF (or REF_IN), external FET is OFF. And if the voltage of the pin exceeds 1.9V, LV5026M turns to latch-off mode.
5	PWM_D	PWM DIMMING pin. [L or open :normal operation, H: Stop operation]
6	GND	GND pin
7	OUT	Driving the external FET Gate pin.
8	V_{IN}	Power supply pin. Operation: V_{IN} > UVLOON Stop: V_{IN} < UVLOOFF Switching Stop: V_{IN} > V_{IN}OVP
9	OUT2	This terminal is driving the FET which is stabilized the TRIAC application. If ACS is less than 3V, OUT2 outputs VIN. [If this function isn't used, please connect nothing.]
10	ACS	This terminal is sensing the AC Voltage. [If this function isn't used, please connect GND.]

Skip frequency function

LV5026M contains the skip frequency function for reduction of the peak value of conduction noise. This function changes the frequency as follows.



Switching frequency is changed as follows.
… ×0.9 → ×1.1 → ×1.05 → ×1 → ×0.95 → ×0.9 → ×1.1 …
It's repeated by this loop.

CS pin abnormal stop function

If the voltage of the pin exceeds 1.9V, LV5026M turns to latch-off mode and switching is stopping.