

ISOLATED SINGLE-STAGE PFC LED DRIVER

DESCRIPTION

SD7529 is a high performance isolated single-stage PFC LED driver.

SD7529 includes a high performance multiplier to reduce AC input current distortion.

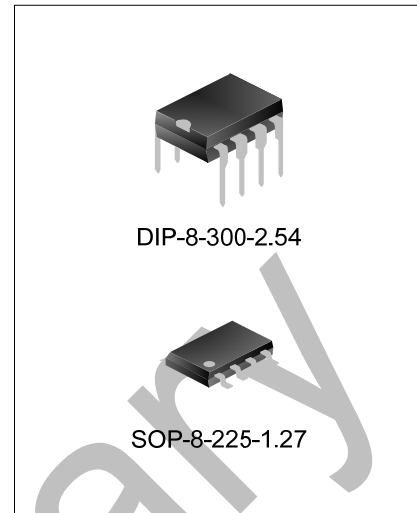
The output voltage is controlled by means of a voltage-mode error amplifier and a precise internal voltage reference.

The device features very low consumption with current maximum 60 μ A before start-up and less than 5mA during working.

SD7529 has a built-in soft-start circuit to avoid the over voltage output under light load start.

SD7529 includes an output short-circuit protection circuit, in this way the current of the system is considerably reduced to avoid the damage to IC.

The totem-pole output stage, capable of 600mA source and 800mA sink current, is suitable for big MOSFET or IGBT, etc.



APPLICATIONS

- * LED Daylight lamp

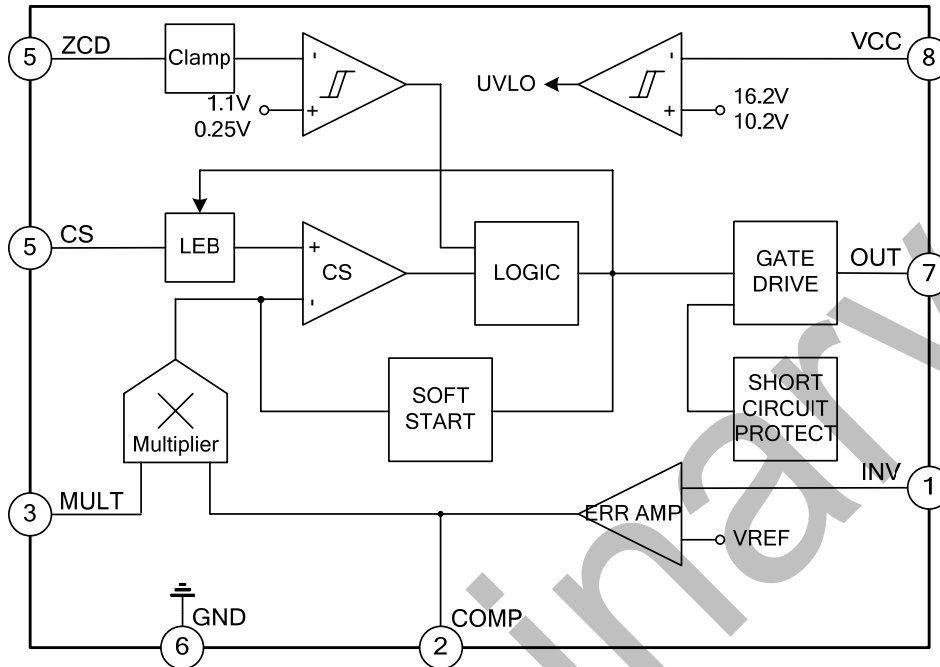
FEATURES

- * High-performance multiplier
- * Built-in restart timer
- * Integrate digital LEB
- * Primary-side over-current protection
- * Built-in soft start
- * Output short-circuit protection
- * Low start-up current (40 μ A)
- * Available in DIP-8 or SOP-8 package.

ORDERING INFORMATION

Part No.	Package	Marking	Material	Packing
SD7529	DIP-8-300-2.54	SD7529	Pb free	Tube
SD7529S	SOP-8-225-1.27	SD7529S	Pb free	Tube
SD7529STR	SOP-8-225-1.27	SD7529S	Pb free	Tape&Reel

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Rating	Unit	
Supply voltage ($I_{CC} < 20\text{mA}$)	V_{CC}	25	V	
Peak drive output current	I_{OH}/I_{OL}	-600/800	mA	
Voltage on analog input and output pins	-	-0.3 ~ 8	V	
Maximum current of zero current detector	-	± 10	mA	
Power dissipation (ambient temperature: 50°C)	P_{diss}	SD7529	1	W
		SD7529S	0.65	W
Operating temperature range	T_{amb}	-20~+85	°C	
Storage temperature range	T_{stg}	-40~+125	°C	
Junction temperature	T_j	+150	°C	
Thermal resistance from chip surface to the ambient	$R_{th(j-a)}$	SD7529	100	°C/W
		SD7529S	150	°C/W

ELECTRICAL CHARACTERISTICS(Unless otherwise stated, $V_{CC}=18\text{V}$; $C_O=1\text{nF}$; $-25^\circ\text{C} < T_{amb} < 125^\circ\text{C}$)

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Power supply						
Operating voltage range	V_{CC}	After start-up	10.5	-	22.5	V
Turn-on threshold	V_{CCon}	*	15.4	16.2	17.0	V
Turn-off threshold	V_{CCoff}	*	9.7	10.2	10.7	V

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Hysteresis voltage	V_{CChys}		5.7	-	6.3	V
Clamp voltage	V_z	$I_{CC}=20mA$	22.5	25	28	V
Supply current						
Start current	I_{ST}	Before start-up, $V_{CC}=15V$	-	44	60	μA
Quiescent current	I_Q	After start-up	-	2.5	3.75	mA
Operating current	I_{CC}	$f=70kHz$	-	3.5	5	mA
Multiplier						
Input bias current	I_{MULT}	$V_{MULT} = 0 \sim 4V$	-	-	-1	μA
Input voltage range	V_{MULT}		0 ~ 3			V
Gain **	K	$V_{MULT}=1V, V_{COMP}=4V$	0.32	0.38	0.44	V
Maximum output slope	$\frac{\Delta V_{CS}}{\Delta V_{MULT}}$	$V_{MULT}=0 \sim 1V$ $V_{COMP}=\text{upper voltage}$	1	1.1	-	V/V
Error amplifier						
Voltage feedback input threshold	V_{REF}	$T_{amb}=25^\circ C$	2.475	2.5	2.525	V
		$10.5V < V_{CC} < 22.5V$ *	2.455	-	2.545	
Linear regulation	-	$V_{CC} = 10.5V \sim 22.5V$	-	2	5	mV
Input bias current	I_{INV}	$V_{INV} = 0 \sim 3V$	-	-	-1	μA
Voltage gain	G_V	Open loop	60	80	-	dB
Gain bandwidth product	G_B		-	1	-	MHz
Source current	I_{COMP}	$V_{COMP}=4V, V_{INV}=2.4V$	-2	-3.5	-5	mA
Sink current	I_{COMP}	$V_{COMP}=4V, V_{INV}=2.6V$	2.5	4.5	-	mA
Upper clamp voltage	V_{COMP}	$I_{source}=0.5mA$	5.3	5.7	6	V
Lower clamp voltage	V_{COMP}	$I_{sink}=0.5mA$ *	2.1	2.25	2.4	V
Current sense comparator						
Input bias current	I_{CS}	$V_{CS}=0V$	-	-	-1	μA
LEB	t_{LEB}		100	200	300	ns
Delay to output	$t_{d(H-L)}$		-	175	-	ns
Current sense clamp	V_{CS}	$V_{COMP}=\text{Upper clamp}$ $V_{MULT}=1.5V$	1.0	1.08	1.16	V
Current sense offset	V_{offset}	$V_{MULT}=0V$	-	25	-	mV
		$V_{MULT}=2.5V$	-	5	-	
Zero current detector						
Input bias current	I_{ZCD}	$V_{ZCD}=1 \sim 4.5V$	-	2	-	μA
Detect threshold	$V_{th(det)}$	Positive-going edge ***	-	1.1	-	V
Detect hysteresis	HY(det)	***	-	0.85	-	V
Upper clamp voltage	V_{ZCD}	$I_{ZCD}=2.5mA$	5.0	5.7	6.5	V
Lower clamp voltage	V_{ZCD}	$I_{ZCD}=-2.5mA$	-0.3	0	0.3	V
Source current capability	I_{src}		-2.5	-	-	mA
Sink current capability	I_{snk}		2.5	-	-	mA
Restart timer						
Restart timer period	$t_{d(rst)}$		35	40	45	μs

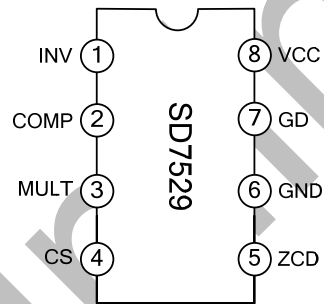
Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Gate driver						
Output low voltage	V_{OL}	$I_{sink}=100mA$	-	0.6	1.2	V
Output high voltage	V_{OH}	$I_{source}=5mA$	9.8	10.3	-	V
Peak drive current	I_{srcpk}		-0.6	-	-	A
	I_{snkpk}		0.8	-	-	A
Voltage fall time	t_f		-	30	70	ns
Voltage rise time	t_r		-	60	110	ns
Output clamp voltage	V_{clamp}	$I_{source}=5mA; V_{CC}=20V$	10	12	15	V
Output voltage when UVLO is active	V_{omin}	$V_{CC}=0 \sim V_{CCon}, I_{snk}=2mA$	-	-	1.1	V

* All the parameters are in tracking

** The multiplier output is given by: $V_{CS} = K \times V_{MULT} \times (V_{COMP} - 2.5)$

*** Parameters guaranteed by design.

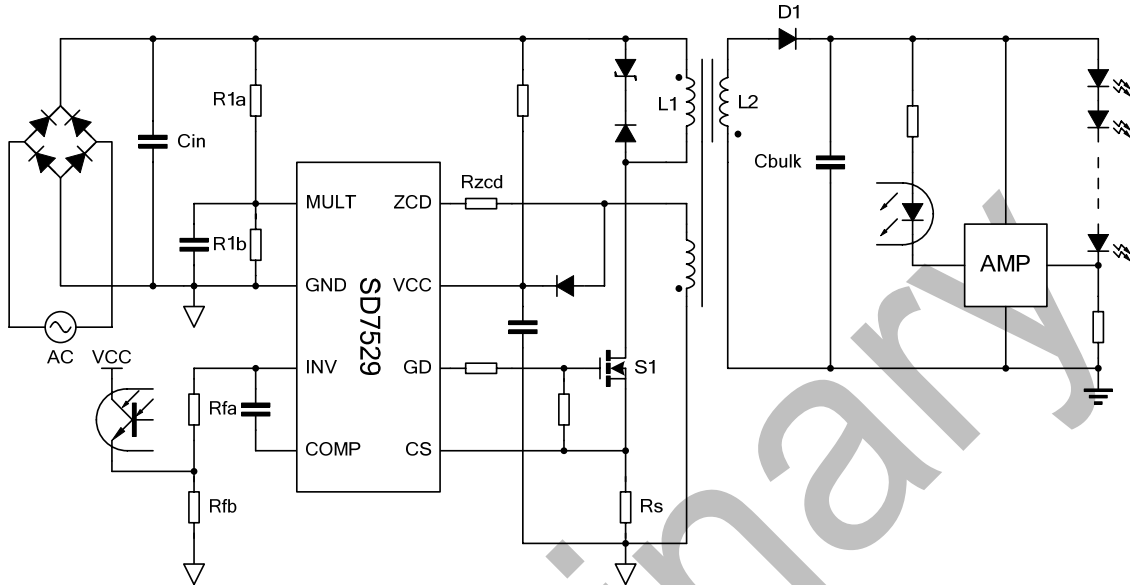
PIN CONFIGURATIONS



PIN DESCRIPTIONS

Pin No.	Pin Name	I/O	Description
1	INV	I	Inverting input of the error amplifier. The pin can also be used as an ON/OFF control input.
2	COMP	I/O	Output of the error amplifier. A compensation network is placed between this pin and INV.
3	MULT	I	Input to the multiplier.
4	CS	I	Input to the PWM comparator. The current flowing in the MOSFET is sensed through a resistor, the resulting voltage is applied to this pin.
5	ZCD	I	Input to the zero current detector.
6	GND	I/O	Ground.
7	GD	O	Gate driver output.
8	VCC	I/O	Supply voltage.

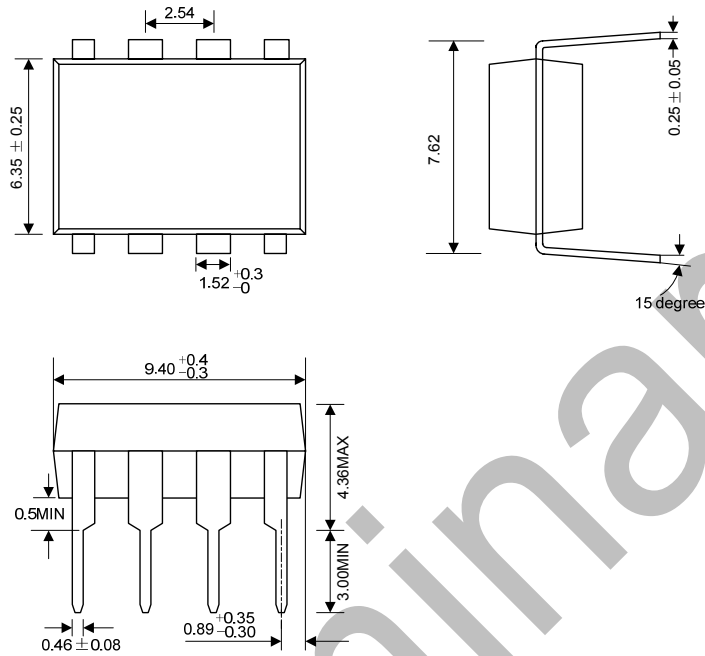
TYPICAL APPLICATION CIRCUIT



PACKAGE OUTLINE

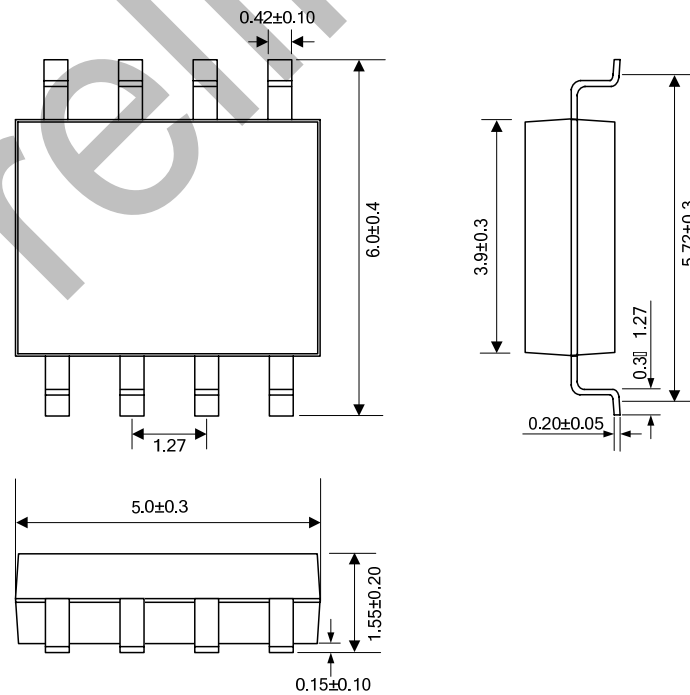
DIP-8-300-2.54

UNIT: mm



SOP-8-225-1.27

UNIT: mm





MOS DEVICES OPERATE NOTES:

Electrostatic charges may exist in many things. Please take following preventive measures to prevent effectively the MOS electric circuit as a result of the damage which is caused by discharge:

- The operator must put on wrist strap which should be earthed to against electrostatic.
- Equipment cases should be earthed.
- All tools used during assembly, including soldering tools and solder baths, must be earthed.
- MOS devices should be packed in antistatic/conductive containers for transportation.

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