TRANSITION-MODE PFC CONTROLLER

DESCRIPTION

SD7528 is a high performance transition-mode power factor correction (PFC) controller.
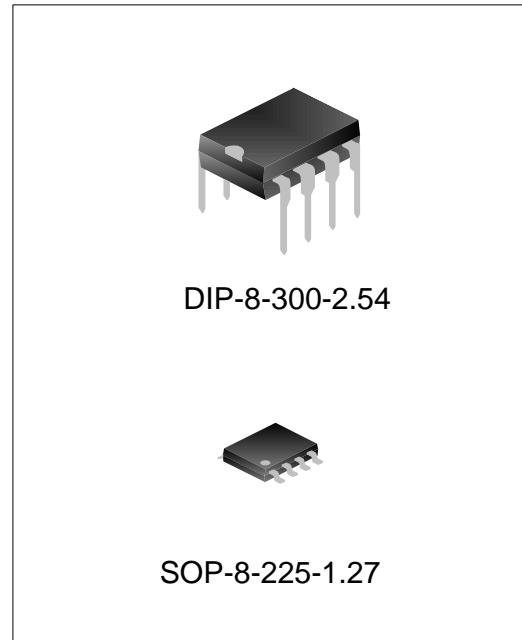
SD7528 includes a highly linear multiplier, able to reduce AC input current distortion.

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 15μA before start-up and less than 5.5mA during working.

SD7528 includes a disable function suitable for IC remote ON/OFF.

An effective two-step OVP enables to safely handle over-voltage either occurring at start-up or resulting from load disconnection.

DIP-8-300-2.54

SOP-8-225-1.27

FEATURES

- High-performance linear multiplier
- Zero current detector
- Built-in restart timer
- Integrate digital LEB
- Precision adjustable overvoltage protection
- Disable function
- Low start-up current (15μA)
- Low quiescent operating current (3.0mA)
- Available in DIP-8 or SOP-8 package.
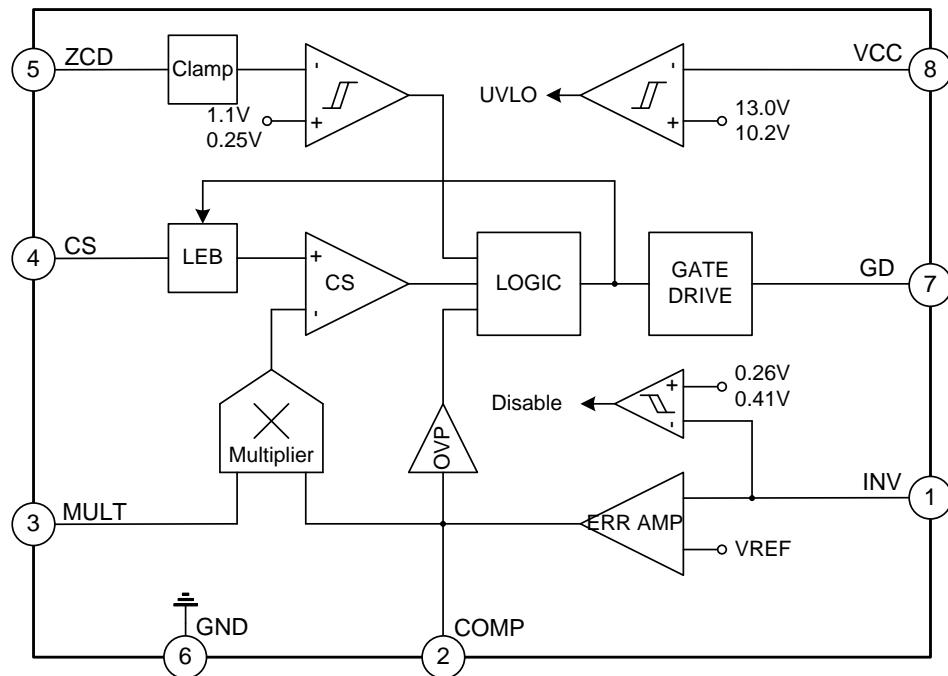
APPLICATIONS

- Illumination power
- TV power
- Power adapter

ORDERING INFORMATION

Part No.	Package	Marking	Hazardous Substance Control	Packing Type
SD7528	DIP-8-300-2.54	SD7528	Halogen free	Tube
SD7528S	SOP-8-225-1.27	SD7528S	Halogen free	Tube
SD7528STR	SOP-8-225-1.27	SD7528S	Halogen free	Tape&Reel

BLOCK DIAGRAM

ABSOLUTE MAXIMUM RATINGS

Characteristics	Symbol	Rating		Unit
Supply voltage (I_{CC}<20mA)	V_{CC}	25		V
Voltage on analog input and output pins	--	-0.3 ~ 8		V
Power dissipation (ambient temperature:50°C)	P_{diss}	SD7528	1	W
		SD7528S	0.65	W
Storage temperature range	T_{stg}	-55~+150		°C
Junction temperature	T_j	-40~+150		°C
Thermal resistance from chip surface to the ambient	$R_{th(j-a)}$	SD7528	100	°C/W
		SD7528S	150	°C/W

ELECTRICAL CHARACTERISTICS(UNLESS OTHERWISE STATED,V_{CC}=18V；C_O=1nF；T_{amb}=25°C)
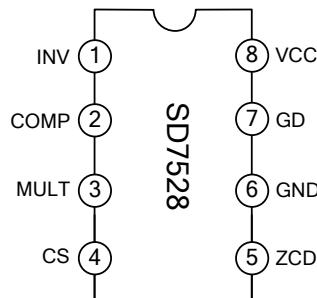
Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Power supply						
Operating voltage range	V_{CC}	After start-up	12	--	25	V
Turn-on threshold	V_{CCon}	*	11.7	13.0	14.3	V
Turn-off threshold	V_{CCoff}	*	9.2	10.2	11.2	V
Clamp voltage	V_z	I_{CC}=20mA	--	31	--	V
Supply current						
Start current	I_{ST}	Before start-up, V_{CC}=11V	--	4	15	μA
Quiescent current	I_Q	After start-up	--	3.1	4.5	mA
Operating current	I_{CC}	f=70kHz (no Co)	--	4.0	6.0	mA
Disable current	I_{Qdis}	Dynamic or static OVP or V_{INV}<210mV	--	1.4	2.8	mA
Multiplier						
Input voltage range	V_{MULT}	--	0 ~ 3	--	--	V
Gain **	K	V_{MULT}=1V，V_{COMP}=4V	0.40	0.46	0.52	V
Maximum output slope	$\dfrac{\Delta V_{CS}}{\Delta V_{MULT}}$	V_{MULT}=0 ~ 1V,V_{COMP}=upper voltage	0.95	1.1	--	V/V
Error amplifier						
Voltage feedback input threshold	V_{REF}	--	2.45	2.5	2.55	V
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	3.0	5.0	--	mA
Upper clamp voltage	V_{COMP}	I_{source}=0.5mA	5.6	6.0	6.6	V
Lower clamp voltage	V_{COMP}	I_{sink}=0.5mA *	2.1	2.25	2.4	V
Disable threshold	V_{dis}	--	210	260	310	mV
Restart threshold	V_{res}	--	370	410	450	mV
Output over-voltage protection						
Dynamic OVP triggering current	I_{DOVP}	--	22	27	32	μA
Hysteresis current	I_{Hys}	--	--	18	--	μA
Static OVP threshold	V_{SOVP}	*	2.1	2.25	2.4	V
Current sense comparator						
LEB	t_{LEB}	--	150	250	350	ns
Current sense clamp	V_{CS}	V_{COMP}=Upper clamp V_{MULT}=1.5V	1.0	1.08	1.16	V
Zero current detector						
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	6.0	6.6	7.5	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	$t_{d(rst)}$	--	100	160	220	μs
Gate driver						
Output low voltage	V_{OL}	I_{sink}=100mA	--	0.9	1.5	V

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Output high voltage	V_{OH}	$I_{source}=5mA$	11	12	--	V
Peak drive current	I_{srcpk}	--	-0.6	--	--	A
	I_{snkpk}	--	0.8	--	--	A
Voltage fall time	t_f	--	--	56	--	ns
Voltage rise time	t_r	--	--	72	--	ns
Output clamp voltage	V_{clamp}	$I_{source}=5mA$；$V_{CC}=20V$	12	14.5	16	V

* All the parameters are in tracking

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

PIN CONFIGURATIONS

```
        ┌──────┐
INV  ①  │      │  ⑧  VCC
        │  S   │
COMP ②  │  D   │  ⑦  GD
        │  7   │
MULT ③  │  5   │  ⑥  GND
        │  2   │
        │  8   │
CS   ④  │      │  ⑤  ZCD
        └──────┘
```
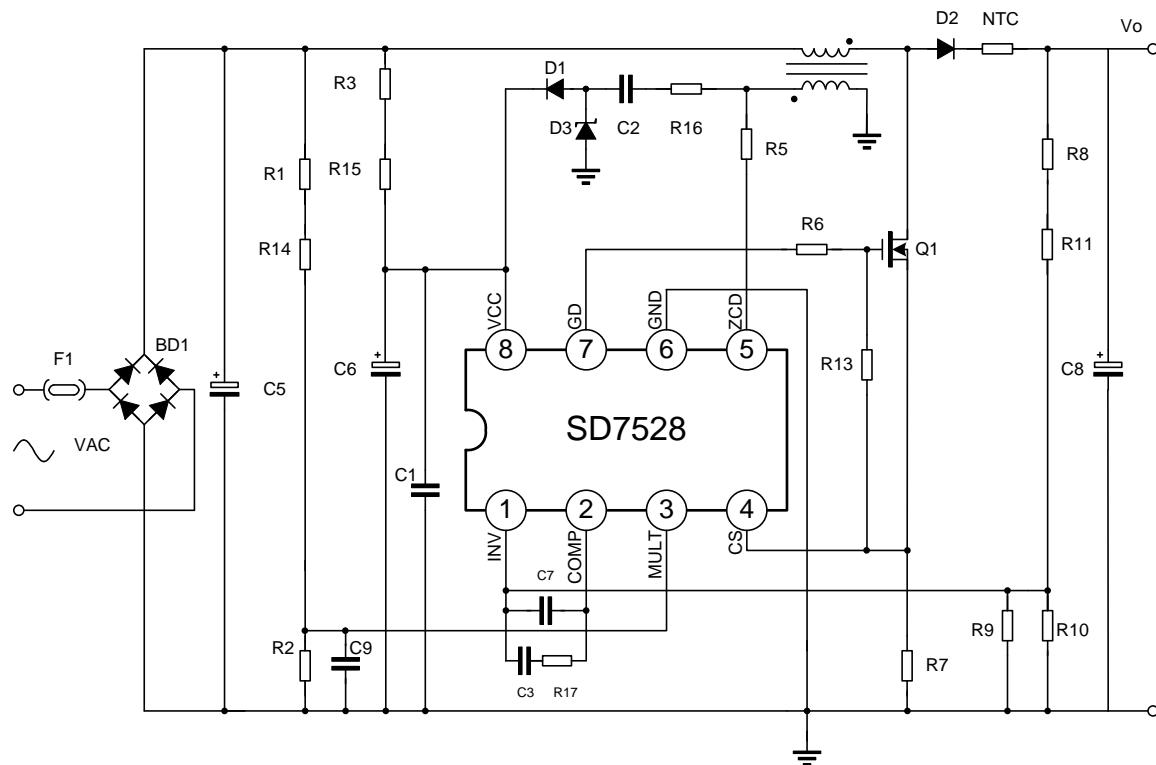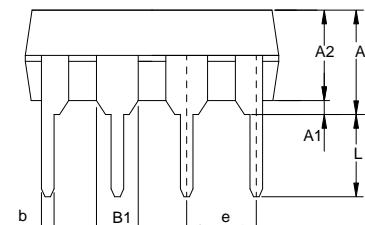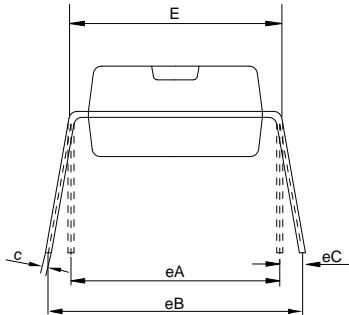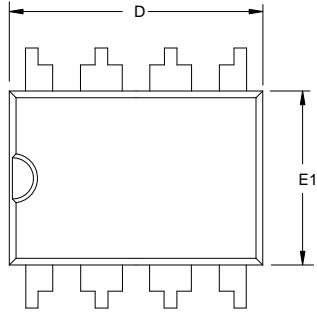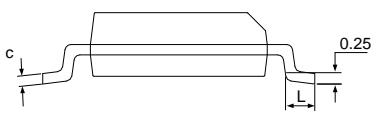
PIN DESCRIPTIONS

Pin No.	Pin Name	I/O	Description
1	INV	I	Inverting input of the error amplifier. The pin multiplex 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	Main 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

Note: The circuit and parameters are for reference only; please set the parameters of the real application circuit based on the real test.

PACKAGE OUTLINE

DIP-8-300-2.54   UNIT: mm

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	4.10
A1	0.50	—	—
A2	2.90	3.30	3.40
b	0.38	0.46	0.55
B1	1.22	1.52	1.82
c	0.20	0.25	0.32
D	9.00	9.40	9.80
E	7.62	7.87	8.26
E1	6.10	6.35	6.60
e	2.54BSC		
eA	7.62BSC		
eB	7.62	—	9.30
eC	0	—	1.52
L	3.00	—	—

SOP-8-225-1.27   UNIT: mm

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.05	0.15	0.25
A2	1.25	—	1.65
b	0.32	0.42	0.52
c	0.15	0.20	0.26
D	4.70	4.90	5.30
E	5.60	6.00	6.40
E1	3.60	3.90	4.20
e	1.27BSC		
L	0.30	—	1.27

CAUTION
ELECTROSTATIC
SENSITIVE DEVICE
DO NOT OPEN OR HANDLE
EXPECT AT A STATIC-FREE
WORKSTATION

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.

Important notice :

- **The instructions are subject to change without notice！ Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.**
- **Our products are consumer electronic products, and / or civil electronic products.**
- **When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.**
- **It is strongly recommended to identify the trademark when buying our products. Please conatus us if there is any question.**
- **When exporting, using and reselling our products, buyer must comply with the international export control laws and regulations of China, the United States, the United Kingdom, the European Union and other countries & regions.**
- **Product promotion is endless, our company will wholeheartedly provide customers with better products!**
- **Website: http: //www.silan.com.cn**

Part No.:	SD7528	Document Type:	Datasheet
Copyright:	HANGZHOU SILAN MICROELECTRONICS CO.,LTD	Website:	http: //www.silan.com.cn

Rev.:   1.0

Revision History:

1. First release