Features

- Fast average current control
- Programmable constant off-time switching
- Linear dimming input
- PWM dimming input
- Output short circuit protection with skip mode
- Ambient operating temperature -40˚C to +125˚C
- Pin-compatible with the LD7101

Applications

- DC/DC or AC/DC LED driver applications
- RGB backlighting LED driver
- Backlighting of flat panel displays
- General-purpose constant current source
- Signage and decorative LED lighting
- Automotive
- Chargers

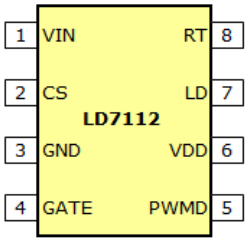
General Description

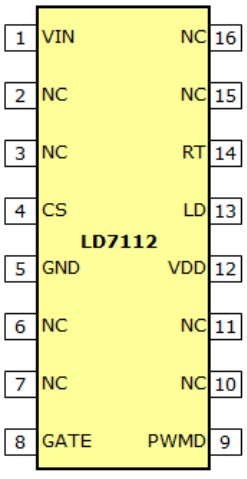
The LD7112 is an average current mode control LED driver IC operating in a constant off-time mode. Unlike LD7101, this control IC does not produce a peak-to-average error, and therefore greatly improves accuracy, line and load regulation of the LED current without any need for loop compensation or high-side current sensing. The output LED current accuracy is ±3%.

The IC is equipped with a current limit comparator for hiccup-mode output short circuit protection.

The LD7112 can be powered from 8V to 450V supply. A PWM dimming input is provided that accepts an external control TTL compatible signal. The output current can be programmed by an internal 275mV reference, or controlled externally through a 0~1.5V dimming input.

Package Pin Out





Ordering Information

		Packing Options	
Part No.	Package	Tube (TU)	Tape & Reel (TR)
LD7112	SOP-8	LD7112S1-TU	LD7112S1-TR
	SOP-16	LD7112S3-TU	LD7112S3-TR

- Package material default is “Green” package.

Product Marking

LD8888
SSSSS…
●

- ✧ Line 1 – “LD” is a fixed character
  8888: product name
- ✧ Line 2 – SSSSS…: lot number

Absolute Maximum Ratings

Parameter	Maximum	Unit
VIN to GND	-0.5 to +500	V
VDD to GND	12	V
CS, LD, PWMD, GATE, RT to GND	-0.3 to VDD+0.3	V
Power dissipation T_A = +25°C SOP-8	650	mW
Power dissipation T_A = +25°C SOP-16	1100	mW
Operating temperature range	-40 to +125	°C
Junction temperature range	-45 to +150	°C
Storage temperature range	-65 to +150	°C

The values beyond the boundaries of absolute maximum rating may cause the damage to the device. Functional operation in this context is not implied. Continuous use of the device at the absolute rating level might influence device reliability. All voltages have their reference to device ground.

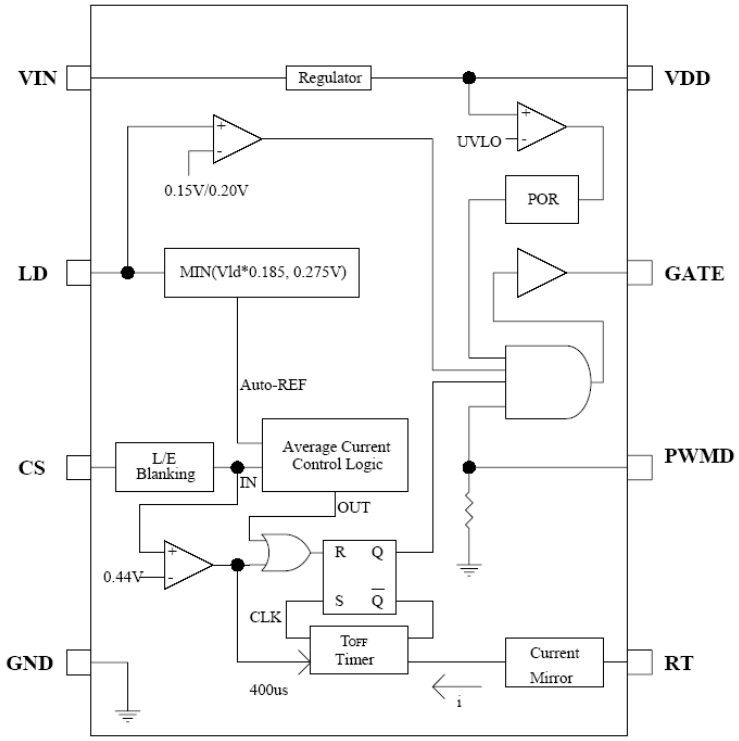
Electrical Characteristics

V_{IN}=12V, V_{LD}=V_{DD}, V_{PWMD}=V_{DD}, T_A=25°C unless specified, otherwise values are guaranteed by production testing requirements.

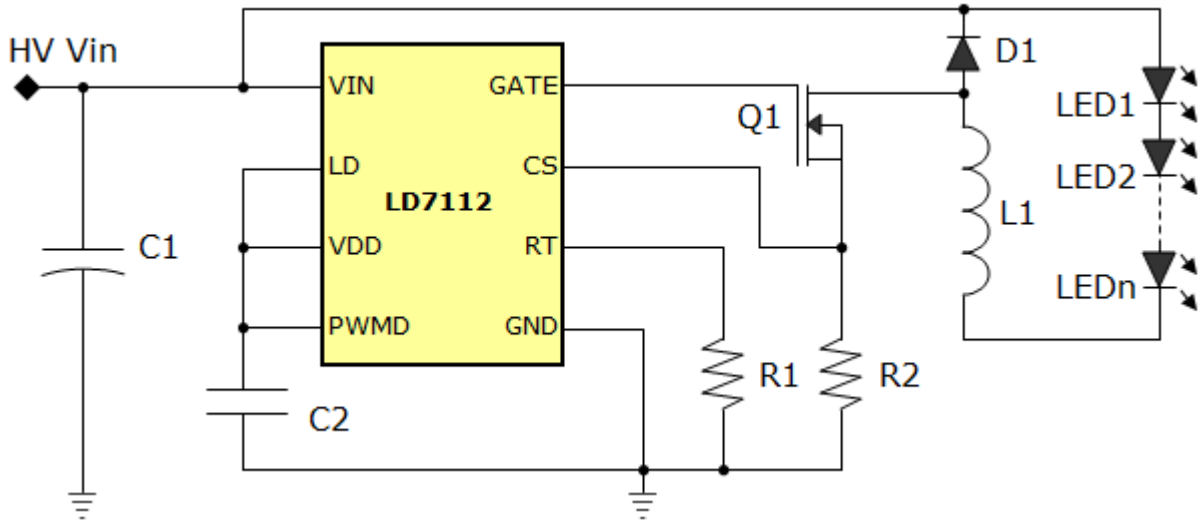
Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Input						
Input DC supply voltage range[*2]	V_{INDC}	DC input voltage	8.0	–	450	V
Shut-down mode supply current[*2]	I_{INSD}	Pin PWMD to GND	–	0.5	1.0	mA
Internal Regulator						
Internally regulated voltage[*1]	V_{DD}	V_{IN} = 8V, $I_{DD(ext)}$=0	7.25	7.5	7.75	V
Line regulation of V_{DD}[*1]	$\triangle V_{DDLINE}$	I_{DDEXT} = 8 to 450V	0	–	1.0	V
Load regulation of V_{DD}[*1]	$\triangle V_{DDLOAD}$	I_{DDEXT} = 0 to 1.0mA	0	–	100	mV
V_{DD} under voltage lockout threshold[*2]	UVLO	V_{IN} rising	6.45	6.7	6.95	mV
V_{DD} under voltage lockout hysteresis	$\triangle$UVLO	V_{IN} falling	–	500	–	mV
Maximum input current[*1]	I_{INMAX}	V_{IN} = 8V	3.5	–	–	mA
		V_{IN} = 8V, limited by UVLO	1.5	–	–	
PWMD Dimming						
Pin PWMD input low voltage[*2]	$V_{EN(lo)}$	V_{IN} = 8 to 450V	–	–	0.8	V
Pin PWMD input high voltage[*2]	$V_{EN(hi)}$	V_{IN} = 8 to 450V	2.2	–	–	V
Pin PWMD pull-down resistance	R_{EN}	V_{PWMD} = 5V	50	100	150	KΩ
Average Current Sense Logic						
Current sense reference voltage	V_{CS}	–	268	–	286	mV
LD to CS voltage ratio	A_{LD}	–	0.182	–	0.188	–
LD to CS voltage offset	V_{OFST}	V_{OFST} =V_{CS}-A_{LD}*V_{LD}, V_{LD}=1.2V	0	–	10	mV
CS threshold temperature regulation[*2]	$\triangle V_{CS}$	–	0	–	5.0	mV
LD shutdown input voltage	V_{LDSDN}	V_{LD} falling	–	150	–	mV
LD enable input voltage	V_{LDENB}	V_{LD} rising	–	200	–	mV
Current sense blanking interval[*2]	T_{BLANK}	–	150	–	320	nS
Minimum on-time	T_{ONMIN}	CS = V_{CS}+ 30mV	–	–	1000	nS
Maximum steady state duty cycle	D_{MAX}	Current reduced may occur if beyond	75	–	–	%
Short Circuit Protection						
HICCUP threshold voltage	V_{CSTH}	–	410	–	470	mV
Current limit delay CS to GATE	T_{DELAY}	CS = V_{CS}+ 30mV	–	–	150	nS
Short circuit HICCUP time	T_{HICCUP}	–	350	–	550	µS
Minimum on-time (short circuit)	T_{ONMINS}	CS = V_{DD}	–	–	430	nS
T_{OFF} Timer						
Off time	T_{OFF}	R_T = 1.00MΩ	32	40	48	µS
		R_T = 226KΩ	8.0	10	12	
GATE Driver						
GATE sourcing current	I_{SOURCE}	V_{GATE} = 0V, V_{DD} = 7.5V	0.165	–	–	A
GATE sinking current	I_{SINK}	V_{GATE} = V_{DD}, V_{DD} = 7.5V	0.165	–	–	A
GATE output rise time	T_{RISE}	C_{GATE} = 500pF, V_{DD} = 7.5V	–	30	50	nS
GATE output fall time	T_{FALL}	C_{GATE} = 500pF, V_{DD} = 7.5V	–	30	50	nS

Note: **1**. 500pF at GATE; R_T = 226KΩ, PWMD = V_{DD}. **2**. Denotes the specifications which apply over the full operating ambient temperature range of -40°C < T_A < +125°C. **3**. Guaranteed by design.

Block Diagram

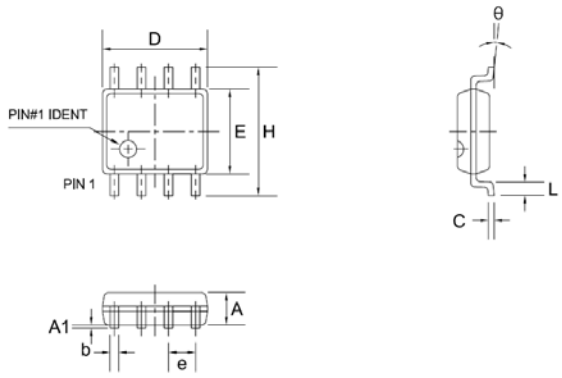


Typical Application Circuit



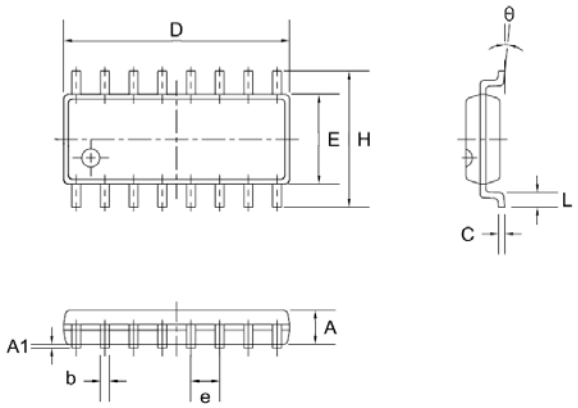
Package Outline

SOP8:



Symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	—	—	4.31	—	—	0.170
A1	0.38	—	—	0.015	—	—
A2	3.15	3.40	3.65	0.124	0.134	0.144
B	—	0.46	—	—	0.018	—
B1	—	1.52	—	—	0.060	—
C	—	0.25	—	—	0.010	—
D	9.00	9.20	9.40	0.354	0.362	0.370
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	—	7.62	—	—	0.300	—
e	—	2.54	—	—	0.100	—
L	3.00	3.30	3.60	0.118	0.130	0.142
θ	0°	—	15°	0°	—	15°

SOP-16:



Symbol	Dimensions In Millmeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	1.30	1.50	1.70	0.051	0.059	0.067
A1	0.06	0.16	0.26	0.002	0.006	0.010
b	0.30	0.40	0.55	0.012	0.016	0.022
C	0.15	0.25	0.35	0.006	0.010	0.014
D	9.70	10.00	10.30	0.382	0.394	0.406
E	3.75	3.95	4.15	0.148	0.156	0.163
e	1.15	1.27	1.39	0.045	0.050	0.055
H	5.70	6.00	6.30	0.224	0.236	0.248
L	0.45	0.65	0.85	0.018	0.026	0.033
θ	0°	—	8°	0°	—	8°

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