Preliminary – LD6706

2A Step-Down Voltage Regulator & Operational Amplifier

Features

- Output voltages - 3.3V, 5V, and adjustable
- Adjustable version output voltage range is within1.23V to 37V
- 52 kHz fixed switching frequency
- Voltage mode non-synchronous PWM control
- Thermal-shutdown and current-limit protection
- On/Off shutdown control input.
- Short circuit protect (SCP)
- Wide output current – up to 2.1A Low power standby mode
- Load regulation ~ 0.2 %, line regulation ~0.2%

Applications

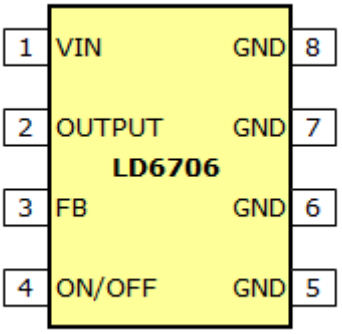
- Simple high-efficiency step-down (buck) regulator
- Efficient pre-regulator for linear regulators
- On-card switching regulators
- Positive-to-negative converter (buck-boost)

General Description

The LD6706 series are monolithic ICs designed for a step-down DC/DC converter, capable of driving 2A load without an additional transistor. It saves a board space. The external shutdown function is controlled by a logic level and then the circuit comes into the standby mode. The internal compensation makes the feedback control with good line and load regulation characteristics without an external design. Regarding the protection functions – the thermal shutdown prevents circuit damage during the over temperature operation and the current limit is against over current operation of the output switch. If the case for the current limiting occurs and V_{FB} is down by 40% of the nominal output voltage, the switching frequency shall be reduced.
The fixed output voltage version includes 3.3V, 5V devices, while the adjustable version voltages range from 1.23V to 37V. The chips are available in standard 5-lead TO-220, TO-263 and 8-lead SOP packages. The LD6706 has excellent load regulation and line regulation.

Package Pin Out

SOP8 TO220-5 TO263-5



Pin Assignment of TO220-5 and TO263-5

Pin	Name
1	VIN
2	OUTPUT
3	GND
4	FB
5	ON/OFF

Ordering Information

		Packing Options	
Part No.	Package	Tube (TU)	Tape & Reel (TR)
LD6706	SOP-8	LD6706S1-000-TU	LD6706S1-000-TR
	TO220-5L	LD6706T4-000-TU	LD6706T4-000-TR
	TO263-5L	LD6706T9-000-TU	LD6706T9-000-TR

- Package material default is “Green” package.

Output Voltage Selection

Part No.	V_{OUT}
LD6706S1-000-XX	Adjustable
LD6706S1-033-XX	3.3V
LD6706S1-050-XX	5.0V
LD6706S1-120-XX	12V

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
V_{IN} supply voltage	45	V
Operating V_{IN} supply voltage	4.5 to 40	V
ON/OFF pin voltage	-0.3 to 40, $\leqq V_{IN}$	V
FB pin voltage	-0.3 to 25, $\leqq V_{IN}$	V
OUTPUT pin to GND	-1	V
Short term surge	60	V
Operating current load	2.1	A
Junction temperature	150	°C
Operating temperature range	-40 to +125	°C
Storage temperature range	-65 to +150	°C
Power dissipation	Internal limited	

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.

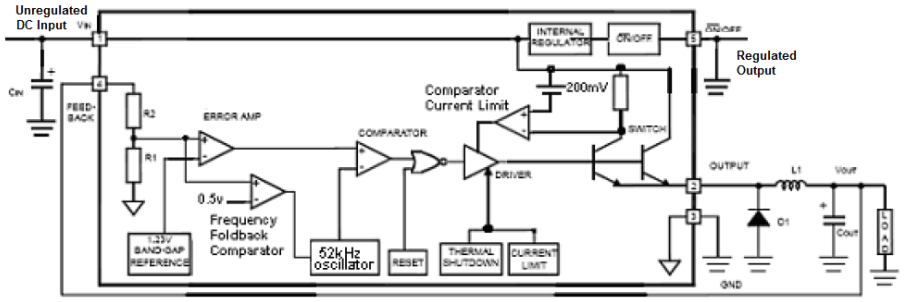
Electrical Characteristics

V_{IN}=12V for 3.3V, 5V and adjustable version, I_{LOAD}=0.5A, T_A=25°C unless specified

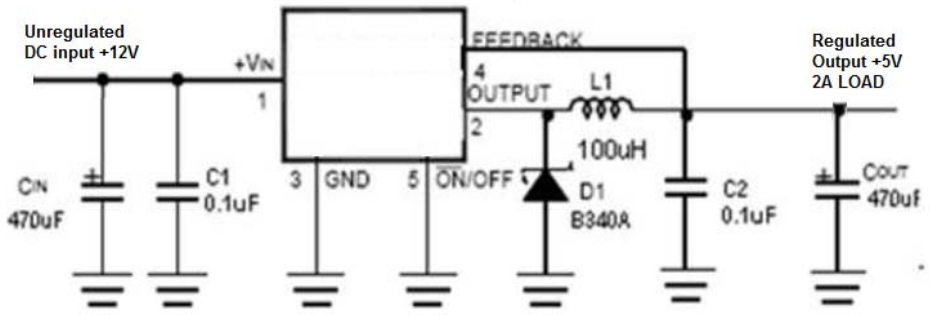
Parameter	Symbol	Condition	Min	Typ.	Max	Unit
System Parameters						
Output voltage range LD6706-033	V_{OUT}	$5.1V \leqq V_{IN} \leqq 40V$, $0.2A \leqq I_{LOAD} \leqq 2.1A$, V_{OUT}=>3.3V	3.200	3.300	3.400	V
		$5.1V \leqq V_{IN} \leqq 40V$, $0.2A \leqq I_{LOAD} \leqq 2.1A$, V_{OUT}=>3.3V *10	3.168	–	3.432	
Output voltage range LD6706-050		$7V \leqq V_{IN} \leqq 40V$, $0.2A \leqq I_{LOAD} \leqq 2.1A$, V_{OUT}=>5.0V	4.85	5.00	5.15	
		$7V \leqq V_{IN} \leqq 40V$, $0.2A \leqq I_{LOAD} \leqq 2.1A$, V_{OUT}=>5.0V *10	4.80	–	5.20	
Output voltage range LD6706-000		$7V \leqq V_{IN} \leqq 40V$, $0.2A \leqq I_{LOAD} \leqq 2.1A$, V_{OUT}=>Adj	1.205	1.230	1.255	
		$7V \leqq V_{IN} \leqq 40V$, $0.2A \leqq I_{LOAD} \leqq 2.1A$, V_{OUT}=>1.23V *10	1.193	–	1.267	
Line regulation	R_{LINE}	$7.5V \leqq V_{IN} \leqq 40V$, I_{LOAD}=0.2A	–	0.2	0.5	%
Load regulation	R_{LOAD}	V_{IN}=12V, $10mA \leqq I_{LOAD} \leqq 2.1A$	–	0.2	0.5	%
Efficiency of LD6706-033	η	V_{IN}=12V, I_{LOAD}=2A, V_{OUT}=>3.3V	–	77	–	%
Efficiency of LD6706-050		V_{IN}=12V, I_{LOAD}=2A, V_{OUT}=>5V	–	79	–	
Efficiency of LD6706-000		V_{IN}=12V, I_{LOAD}=2A, V_{OUT}=>1.23V	–	79	–	
Device Parameters						
Quiescent current	I_Q	V_{FB}=12V (driver off)	–	5	8	mA
Feedback bias current	I_{FB}	V_{FB}=1.3V	-50	-10	–	nA
		V_{FB}=1.3V *10	-100	–	–	
Standby current	I_{STB}	$V_{ON/OFF}$=5V, V_{IN}=40V	–	20	200	μA
		$V_{ON/OFF}$=5V, V_{IN}=40V *10	–	–	250	
Oscillator frequency	F_{OSC}	*6	47	52	57	KHz
		*6*10	42	–	62	
Oscillator frequency at SCP	F_{SCP}	*6	–	19	–	KHz
Maximum duty cycle	DC_{MAX}	V_{FB}=0V (driver on) *10	100	–	–	%
Minimum duty cycle	DC_{MIN}	V_{FB}=12V (driver off) *10	–	–	0	%
Current limit	I_{CL}	V_{FB}=0V, peak current	2.5	3.5	4.5	A
		V_{FB}=0V, peak current *10	2.3	–	5.9	
Saturation voltage	V_{SAT}	V_{FB}=0V, I_{LOAD}=2A	–	1.10	1.20	V
		V_{FB}=0V, I_{LOAD}=2A *10	–	–	1.35	
Output leakage current	I_{OL}	V_{OUT}=0V *4*5	-300	-50	–	μA
		V_{OUT}=-0.8V *4*5	-30	-3	–	mA
ON/OFF input threshold	V_{TH}	–	0.6	1.3	2.0	V
ON/OFF Control						
ON/OFF pin input current	I_{IH}	ON/OFF pin=2.5V(off)	-5	-0.1	5	μA
	I_{IL}	ON/OFF pin=0.5V(on)	-1	-0.01	1	μA
Thermal shutdown temperature	T_{SD}	T_J *10	–	155	–	°C

Notes: 1. this denotes the specifications, which apply over the full operating temperature range.

Block Diagram

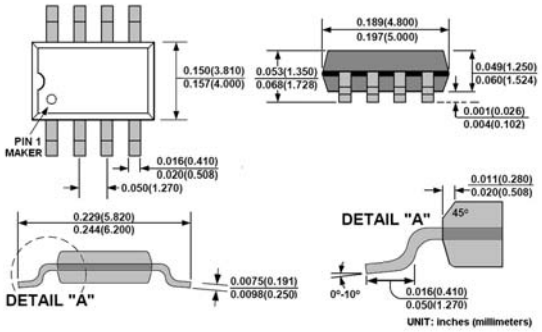


Typical Application Circuit

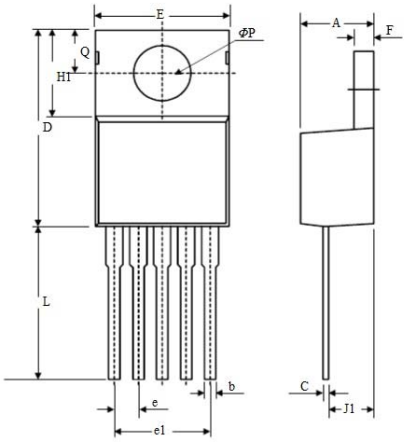


Package Outline

SOP8:

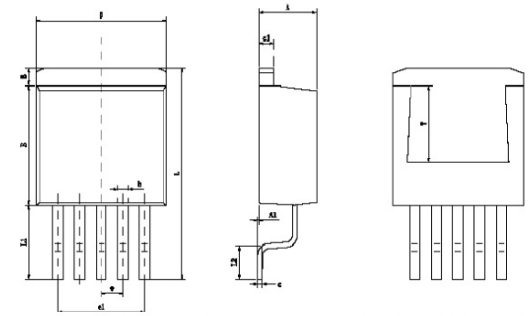


TO220-5:



Symbols	Dimensions in Millimeters		
	Minimum	Normal	Maximum
A	4.07	4.45	4.82
b	0.76	0.89	1.02
C	0.36	0.5	0.64
D	14.22	14.86	15.5
E	9.78	10.16	10.54
e	1.57	1.71	1.85
e1	6.68	6.81	6.93
F	1.14	1.27	1.4
H1	5.46	6.16	6.86
J1	2.29	2.74	3.18
L	13.21	13.97	14.73
ΦP	3.68	3.81	3.94
Q	2.54	2.73	2.92

TO263-5:



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.560	1.760	0.061	0.069
b	0.710	0.910	0.028	0.036
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	9.880	10.180	0.389	0.401
E	8.200	8.600	0.323	0.339
e	1.700TYP		0.067TYP	
e1	6.700	6.900	0.264	0.272
L	15.140	15.540	0.596	0.612
L1	5.080	5.480	0.200	0.216
L2	2.340	2.740	0.092	0.108

LD Tech Corporation

Tel: +886-3-567-8806
Fax: +886-3-567-8706
E-mail: sales@ldtech.com.tw
Website: www.ldtech.com.tw