Over Voltage and Over Current Protection IC

General Description

The LP5302 is an Over-Voltage-Protection (OVP) and programmable Over-Current-Protection (OCP) device. The device will switch off internal MOSFET to disconnect VIN to VOUT to protect load when any of input voltage, input current over the threshold. The Over temperature protection (OTP) function monitors chip temperature to protect the device.

The LP5302 is available in SOT-23-6L package. Standard products are Pb-free and Halogen-free.

Features

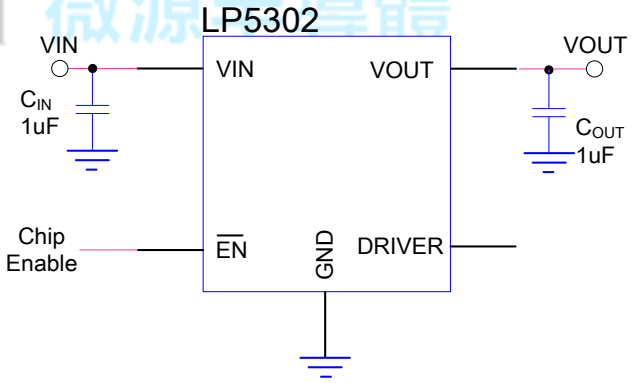
- Input Voltage Range: 3.5V to 36V
- Typical Output Power on Time: 9ms
- OVP Threshold: 6.1V
- OVP Threshold Time Less Than 1μs
- Programmable Current Limit up to 2.1A (without external NMOS)
- Low $R_{DS(ON)}$ Internal Switches:130mΩ @ 5V /1A
- Output Discharge
- Thermal Fault Protection
- SOT23-6Package
- RoHS Compliant and 100% Lead (Pb)-Free

Order Information

LP5302 □ □ □

- F: Pb-Free
- Package Type
  - B6: SOT23-6

Typical Application Circuit



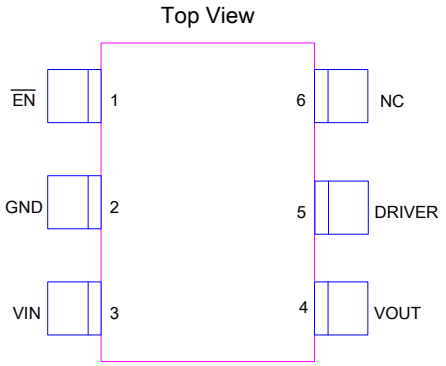
Applications

- GPS
- PMP
- PAD
- MID
- Digital cameras, Digital Videos

Marking Information

Device	Marking	Package	Shipping
LP5302B6F		SOT23-6	3K/REEL
Marking indication: Y:Production year W:Production week X:Production batch			

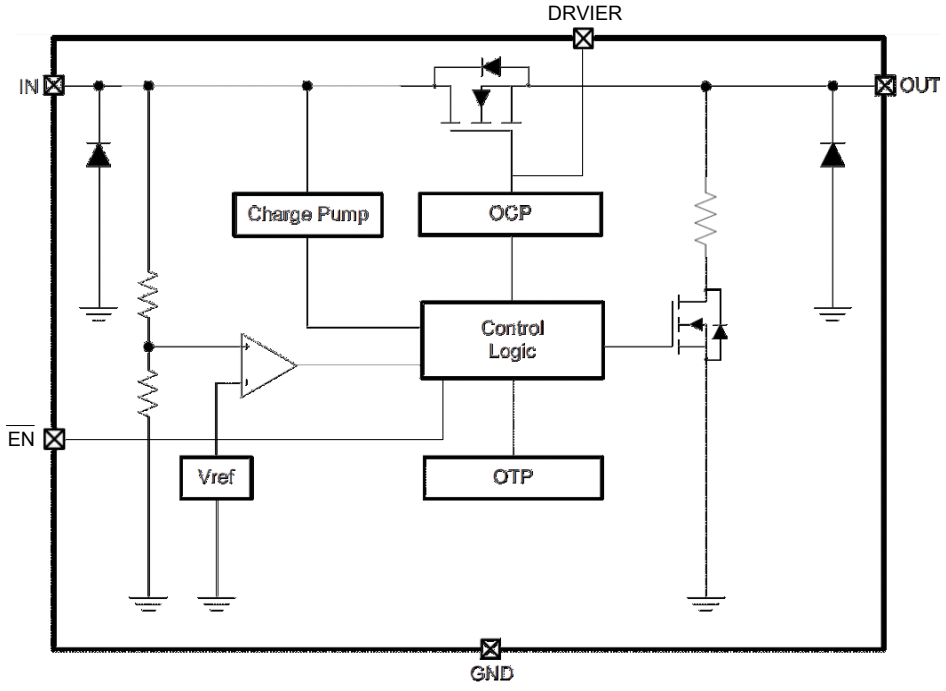
Functional Pin Description



Pin Description

PIN	Name	Description
1	$\overline{EN}$	Chip enable pin. Active low.
2	GND	Ground.
3	VIN	Input pin. A 1μF low ESR ceramic capacitor or larger must be connected as close as to this pin. It is recommended to use 50V capacitor or according to application.
4	VOUT	Output pin.
5	DRIVER	External NMOS gate driver. It must be floating if the application does not use external NMOS.
6	NC	No connection.

Function Diagram



Absolute Maximum Ratings Note 1

- ✧ Input Voltage to GND ---------- 36V
- ✧ Output Voltage to GND ---------- 6.5V
- ✧ DRIVER Voltage to GND ---------- 13V
- ✧ Other Pin to GND ---------- 6V
- ✧ Maximum Junction Temperature ---------- 150℃
- ✧ Operating Ambient Temperature Range (T_A) ---------- -40℃ to 85℃
- ✧ Maximum Soldering Temperature (at leads, 10 sec) ---------- 260℃

Note 1. Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

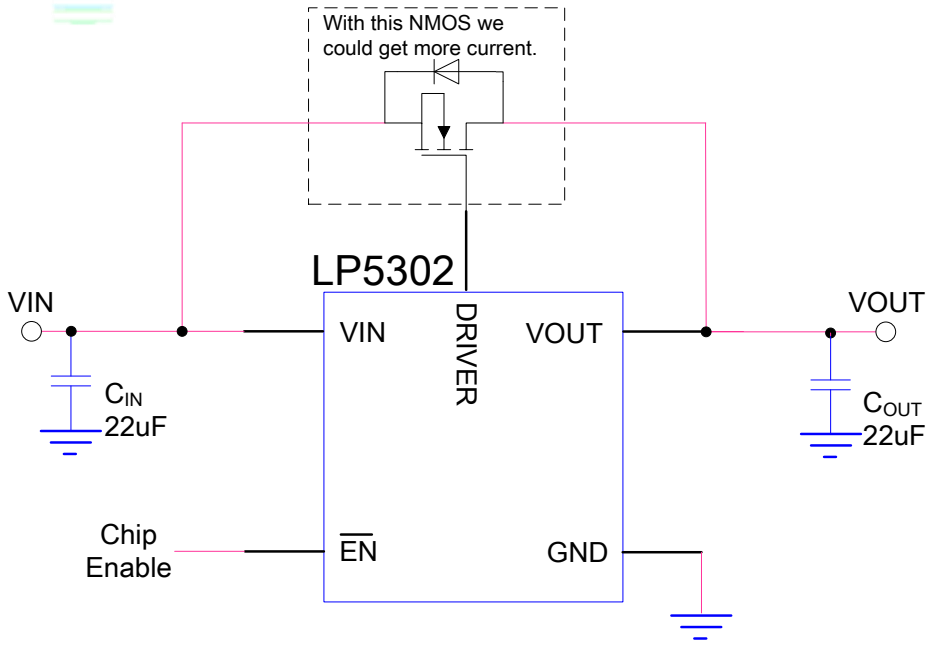
Thermal Information

- ✧ Maximum Power Dissipation (SOT23-6, P_D,T_A=25℃) ---------- 0.45W
- ✧ Thermal Resistance (SOT23-6, θ_{JA}) ---------- 250℃/W

ESD Susceptibility

- ✧ HBM(Human Body Mode) ---------- 2KV
- ✧ MM(Machine Mode) ---------- 200V

Typical Application Circuit with More Current Output Note1



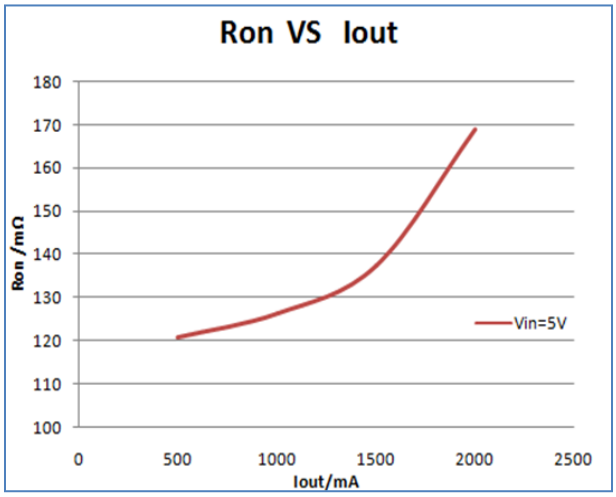
Note1： With external NMOS, the OCP function is disabled.

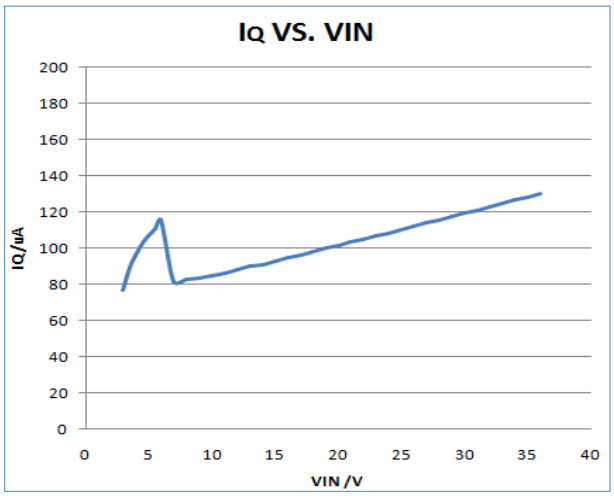
Electrical Characteristics

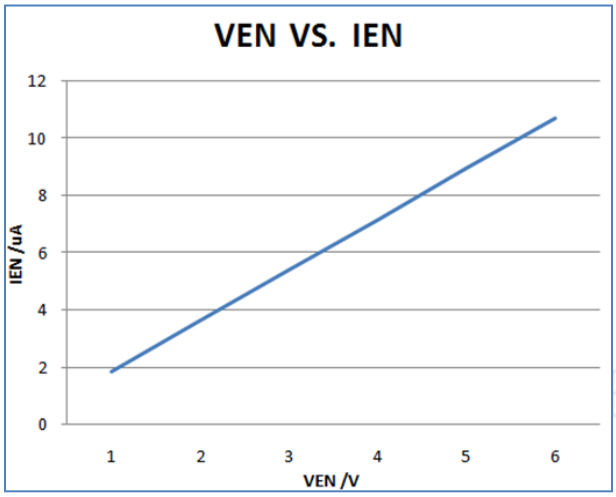
V_{IN}=5V , T_A=25℃, unless otherwise noted

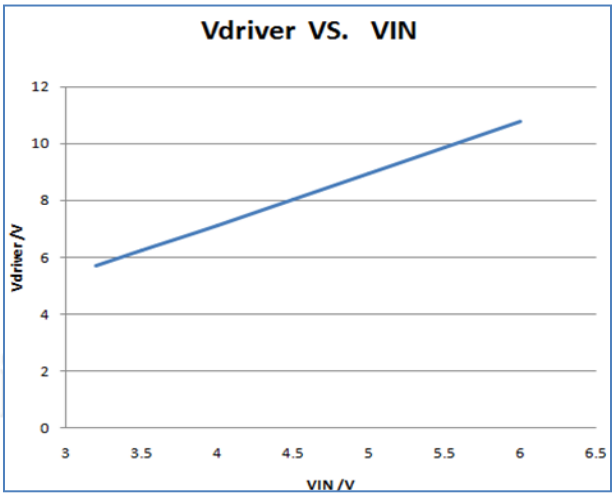
Symbol	Parameter	Condition	Min	Typ	Max	Units
DC characteristics and Power-ON-Reset						
V_{IN}	Input Voltage		3.5		36	V
I_Q	Input quiescent current	EN=LOW, I_{OUT}=0A		110		μA
I_{SD}		EN=HIGH, I_{OUT}=0A			1	
R_{ON}	IN-to-OUT ON resistance	I_{OUT}=1A		130		mΩ
$R_{DISCHARGE}$	Output discharge resistance			4.3		kΩ
$V_{EN(L)}$	Enable Threshold Low	Chip enable			0.4	V
$V_{EN(H)}$	Enable Threshold High	Chip shutdown	1.4			V
UVLO	Under voltage lock out threshold	V_{IN} increasing from 0~5V	2.6	2.8	3	V
$V_{HYS-UVLO}$	Under voltage lock out hysteresis	V_{IN} decreasing from 5~0V		500		mV
T_{ON}	Output power-on time	EN=LOW, V_{IN}=0->5V to output ON		9		ms
	Turn on through EN	EN=HIGH->LOW to output ON		9		
Input Over-Voltage-Protection (OVP)						
V_{OVP}	OVP threshold	V_{IN} increasing from 5~7V	5.8	6.1	6.4	V
$V_{HYS-OVP}$	OVP hysteresis	V_{IN} decreasing from 7~5V		300		mV
T_{OVP}	OVP active time	V_{IN}=5→10V		500	1000	ns
$T_{ON(OVP)}$	OVP recovery time	V_{IN}=10→5V to output ON		9		ms
Input Over-Current-Protection (OCP)						
I_{OCP}	OCP threshold		2.1	2.5		A
T_{OCP}	OCP active time			30		ms
V_{DRIVER}	DRIVER Voltage	V_{IN}=5V		9		V
$T_{ON(OCP)}$	OCP recovery time			1		s
Over-Temperature-Protection (OTP)						
T_{OTP}	OTP threshold			150		℃
T_{OTP_HYS}	OTP hysteresis			20		℃

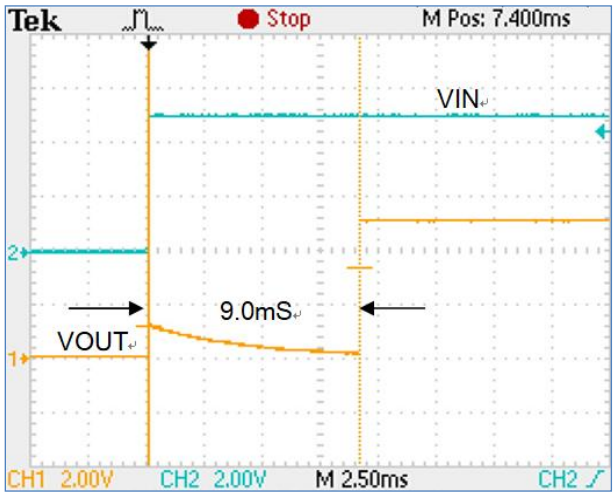
Typical Operating Characteristics



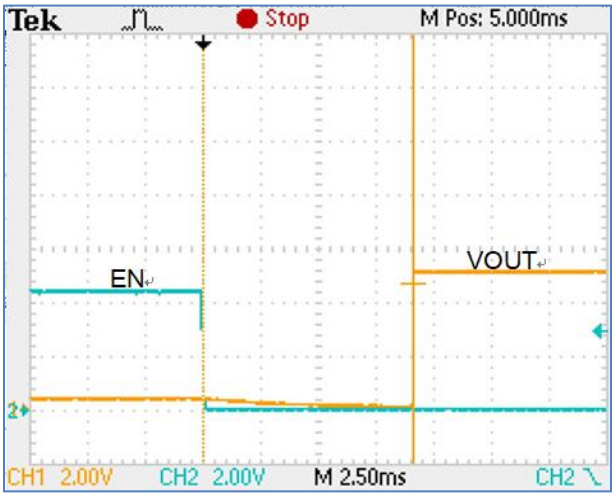




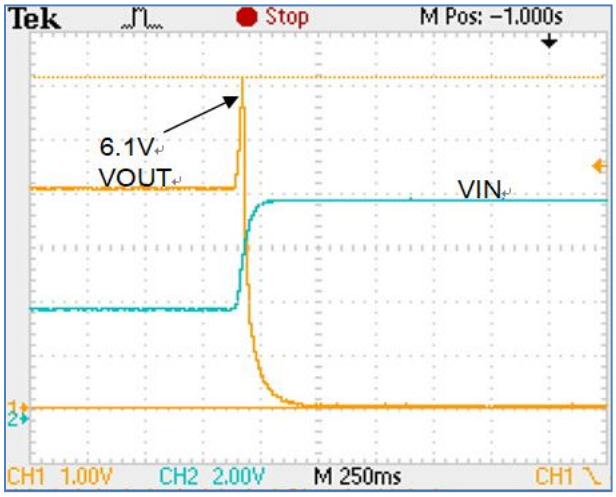




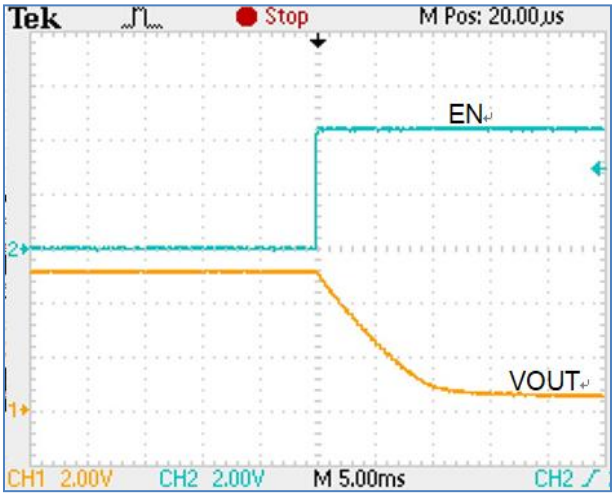
Turn on with V_{EN}=0V



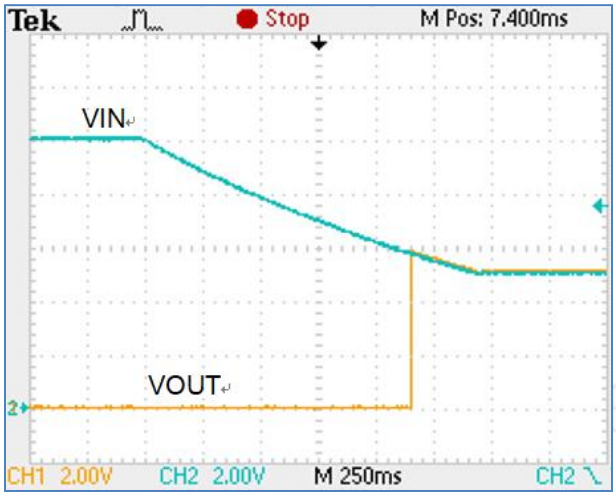
Turn on with V_{IN}=5V



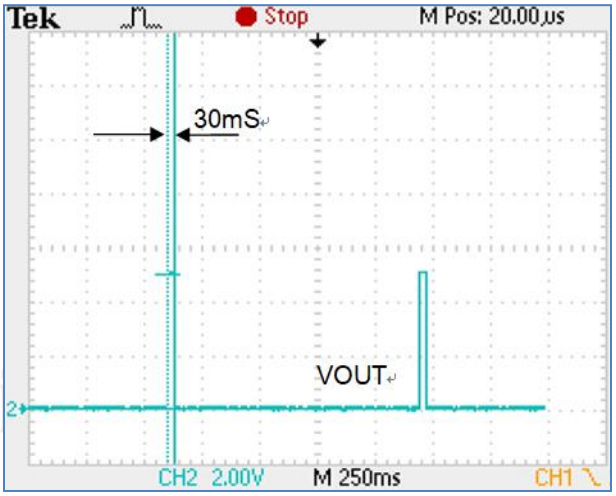
OVP waveform



Turn off waveform with I_{OUT}=0A



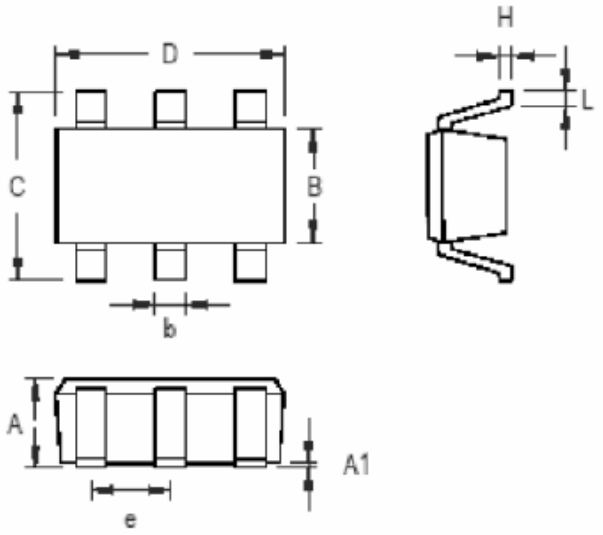
V_{IN} falling waveform



OCP detection time

Packaging Information

SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.889	1.295	0.031	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.250	0.560	0.010	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-6 Surface Mount Package