1A Ultra Low Dropout Regulator

Description

The FP6153 is a high performance positive voltage regulator designed for use in applications requiring very low input voltage and very low dropout voltage at up to 1A.

The FP6153 provides current limiting and thermal shutdown function which protects the excessive heating due to high current and high junction temperature.

The FP6153 is available in the SOT-23-5 and TDFN-6 packages.

Features

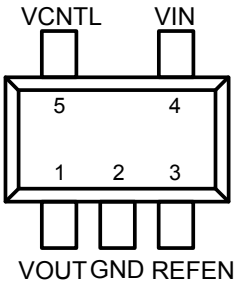
- 300mV Dropout at 1A current.
- Power MOSFET Integrated
- Low Output Voltage Offset
- Current Limiting Protection
- Thermal Shutdown Protection
- Adjusted Output by External Resistors
- Shutdown for Standby or Suspend Mode
- RoHS Compliant

Applications

- Motherboard Applications
- NoteBook PC Applications
- Set Top Boxes

Pin Assignments

S5 Package (SOT-23-5)



WD Package (TDFN- 6) (2x2mm)

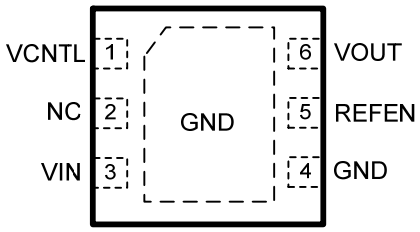
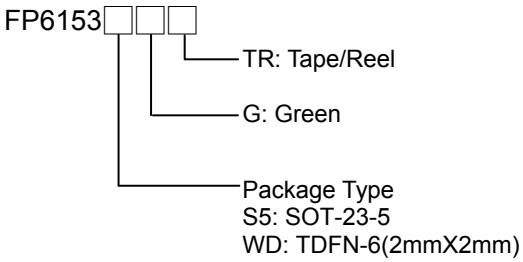


Figure 1. Pin Assignment of FP6153 (Top View)

Ordering Information



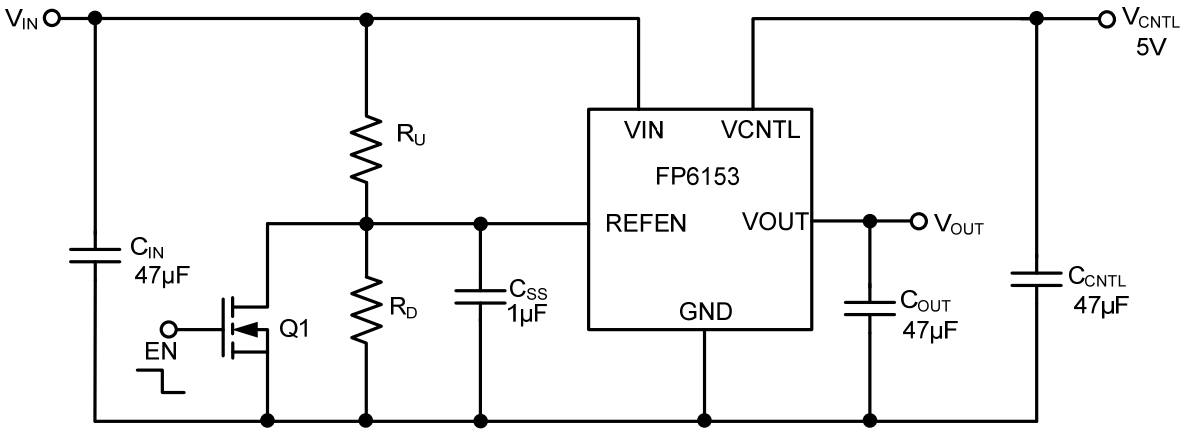
SOT-23-5 Marking

Part Number	Product Code
FP6153S5GTR	U8=

TDFN-6(2x2mm) Marking

Part Number	Product Code
FP6153WDGTR	U9G

Typical Application Circuit



$$V_{OUT} = V_{REFEN} = V_{IN} \times \frac{R_D}{R_U + R_D}$$

Figure 2. Typical Application Circuit of FP6153

Functional Pin Description

Pin Name	Pin Function
VIN	Power input pin. VIN is the input power supply used to create the external reference voltage for regulating VOUT. VIN sources current to VOUT by upper NMOS.
GND	Common ground pin.
VCNTL	Power input pin. The VCNTL power supplies the internal control circuitry and gate drive voltage.
REFEN	Chip enable, and input reference voltage pin.
VOUT	Regulator output pin. VOUT voltage tracks the REFEN voltage.

Block Diagram

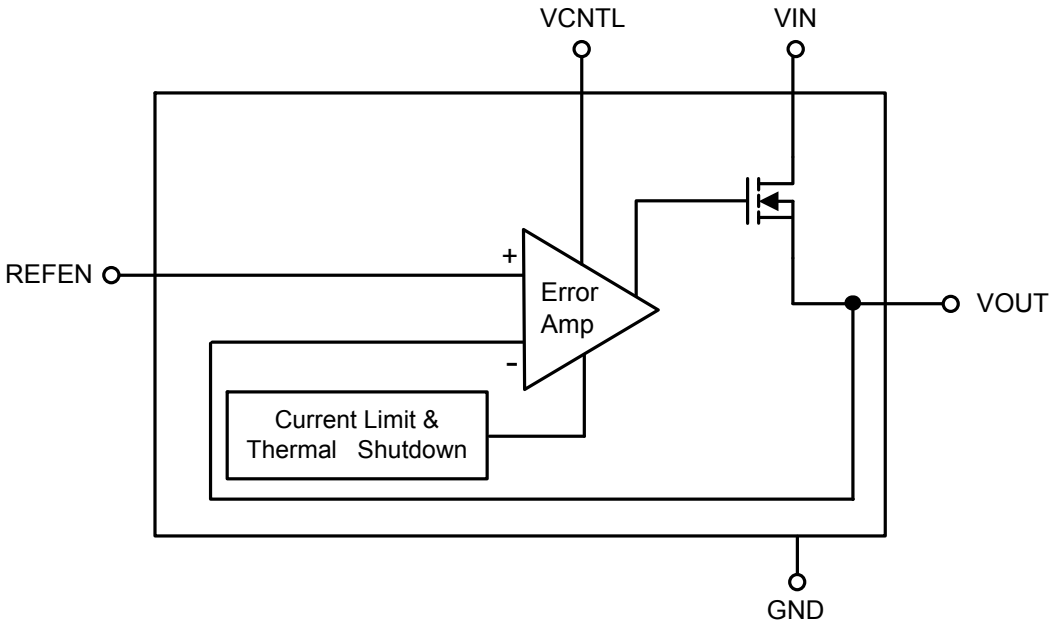


Figure 3. Block Diagram of FP6153

Absolute Maximum Ratings

- VIN to GND---------- 6V
- VCNTL to GND ---------- 6V
- Power Dissipation @25℃ (P_D): 1.25W
  - SOT-23-5 ---------- + 0.4W
  - TDFN-6 (2mX2m) ---------- +1.25W
- Package Thermal Resistance (θ_{JA}):
  - SOT-23-5 ---------- + 250℃/W
  - TDFN-6(2mX2m) ---------- + 80℃/W
- Junction Temperature ---------- 150°C
- Storage Temperature Range---------- -65°C to 150°C
- Lead Temperature (Soldering, 10sec.) ---------- 260°C

Note1：Stresses beyond those listed under “Absolute Maximum Ratings" may cause permanent damage to the device.

Recommended Operating Conditions

- Input Voltage (V_{IN}) ---------- 1.4V to 5.5 V
- Input Voltage (V_{CNTL}) ---------- 3.3V to 5.5V
- Operating Temperature Range (T_{OPR}) ---------- - 40ºC to + 85ºC

Electrical Characteristics

(V_{CNTL}=3.3V, V_{IN}=1.5V/1.8V/2.5V, V_{REFEN}=0.5*V_{IN}, C_{OUT}=10uF, T_A=25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
INPUT						
Operation Voltage Range	V_{CNTL}			3.3	5.5	V
V_{CNTL} Quiescent Current	I_{CNTL}	No Load		1.5	3.0	mA
Shutdown Current	I_{SD}	V_{REFEN}<0.2V		5	30	uA
OUTPUT VOLTAGE						
Output Offset Voltage	V_{OS}	No Load , (V_{REFEN}-V_{OUT})	-20	0	20	mV
Load Regulation (Note2)	ΔV_{LOAD}	I_{OUT} = 0 to 1A			20	mV
Dropout Voltage (Note3)	V_D	V_{CNTL}=5V, I_{OUT} = 1A (for TDFN package)		300		mV
		V_{CNTL}=5V, I_{OUT} = 0.3A		100		
PROTECTION						
Current Limit	I_{LIM}		2.0	2.5		A
Thermal Shutdown Temperature (Note4)	T_{SD}			170		°C
	ΔT_{SD}	Hysteresis		35		°C
SHUTDOWN CONTROL						
Enable High Level	V_{REF-H}		0.6			V
Shutdown Low Level	V_{REF-L}				0.2	V

Note2：Load regulation and dropout voltage are measured at a constant junction temperature by using a 20ms low duty cycle current pulse.

Note3：The dropout voltage is defined as V_{IN}-V_{OUT}, which is measured when V_{OUT} drops 2% of its normal value with the specified output current.

Note4：The specification is guaranteed by design, not production tested.

Typical Performance Curves

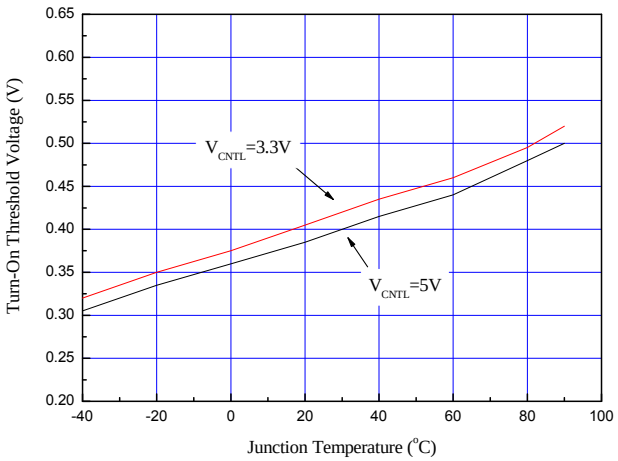


Figure 4. Turn-On Threshold Voltage vs. Junction Temperature

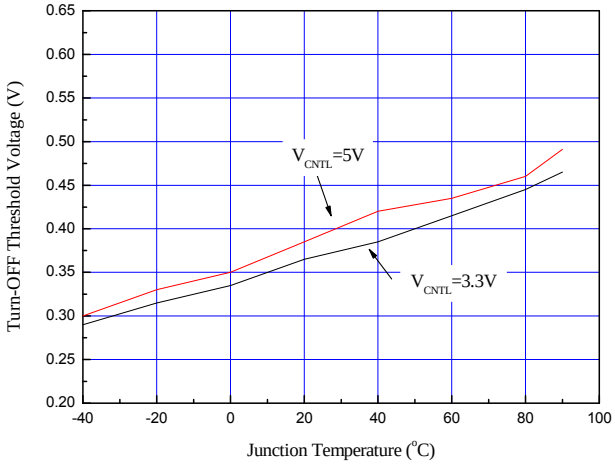


Figure 5. Turn-Off Threshold Voltage vs. Junction Temperature

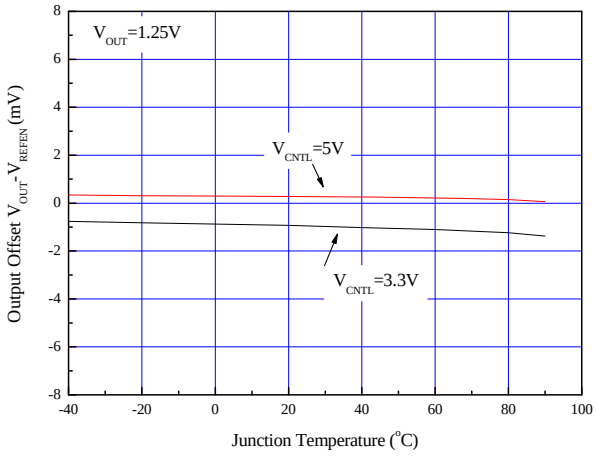


Figure 6. Output offset (V_{OUT}-V_{REFEN}) vs. Junction Temperature

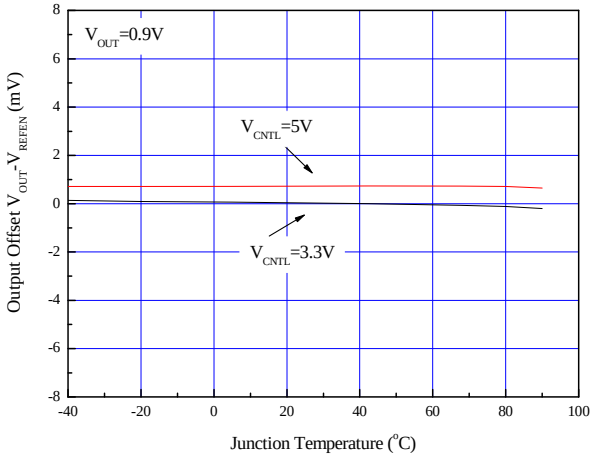


Figure 7. Output offset (V_{OUT}-V_{REFEN}) vs. Junction Temperature

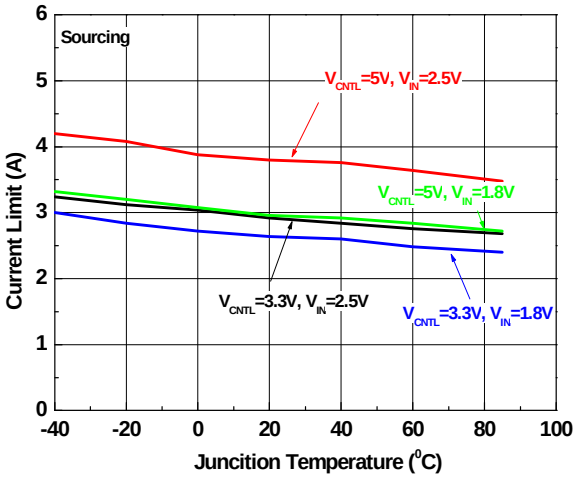


Figure 8. Current Limit vs. Junction Temperature

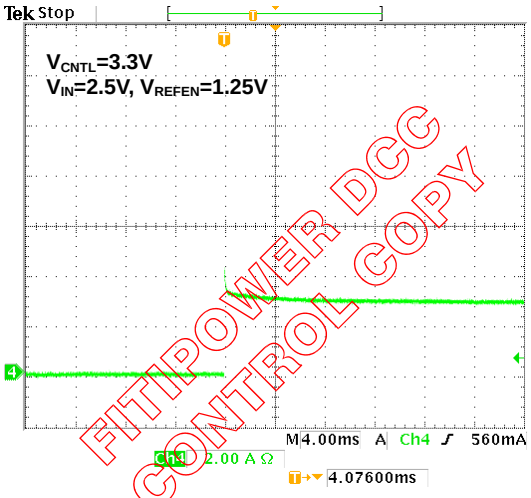
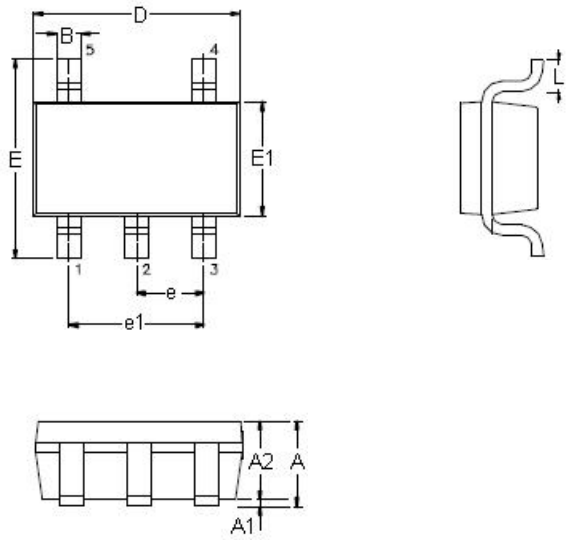


Figure9. Output Short-Circuit Protection

Outline Information

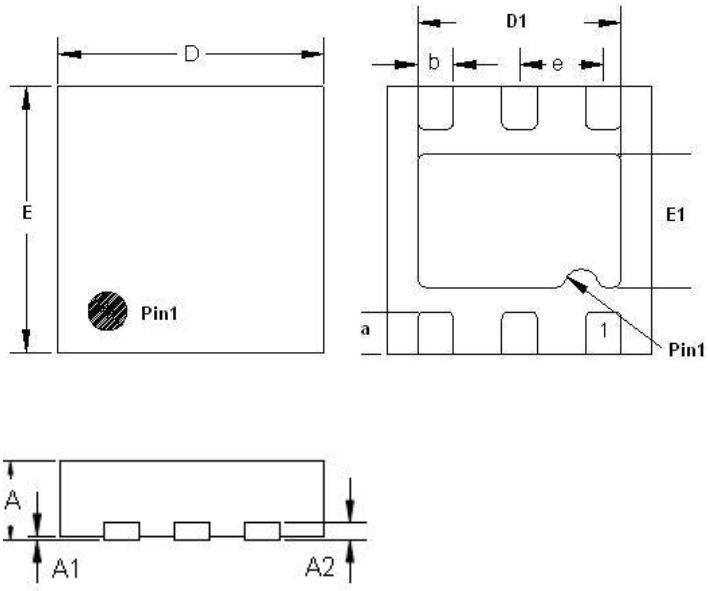
SOT-23-5 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	1.00	1.20
A1	0.00	0.10
A2	1.00	1.10
B	0.35	0.50
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.70
e	0.90	1.00
e1	1.80	2.00
L	0.35	0.55

Note：Followed From JEDEC MO-178-C.

TDFN- 6 2mm×2mm Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A2	0.18	0.25
D	1.95	2.05
E	1.95	2.05
a	0.30	0.40
b	0.20	0.30
e	0.60	0.70
D1	1.35	1.45
E1	0.75	0.85

Note：Followed From JEDEC MO-229-C.