2A BUS TERMINATION REGULATOR

Description

The FP6137E linear regulator is designed to provide the transient peaks up to 2A sourcing or sinking capability for DDR SDRAM bus termination application. The output voltage can track half of input power by two external voltage divider resistors.

The FP6137E provides current limiting in both sourcing/sinking mode and thermal shutdown function which protects the excessive heating due to high current and high junction temperature.

The FP6137E is available in the SOP-8 (Exposed Pad) package.

Features

- 2A Source or Sink 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

- DDR-I, DDR-II, and DDR-III Bus Termination Voltage
- SSTL-2 and SSTL-3 Termination
- Active Termination Buses

Pin Assignments

SP Package (SOP-8<Exposed Pad>)

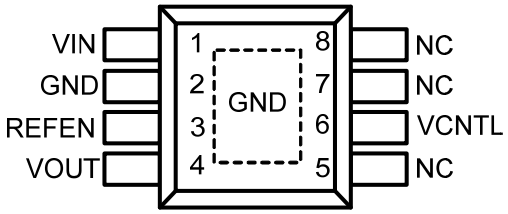
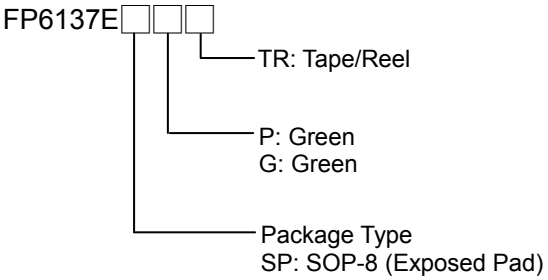


Figure 1. Pin Assignment of FP6137E (Top View)

Ordering Information



Typical Application Circuit

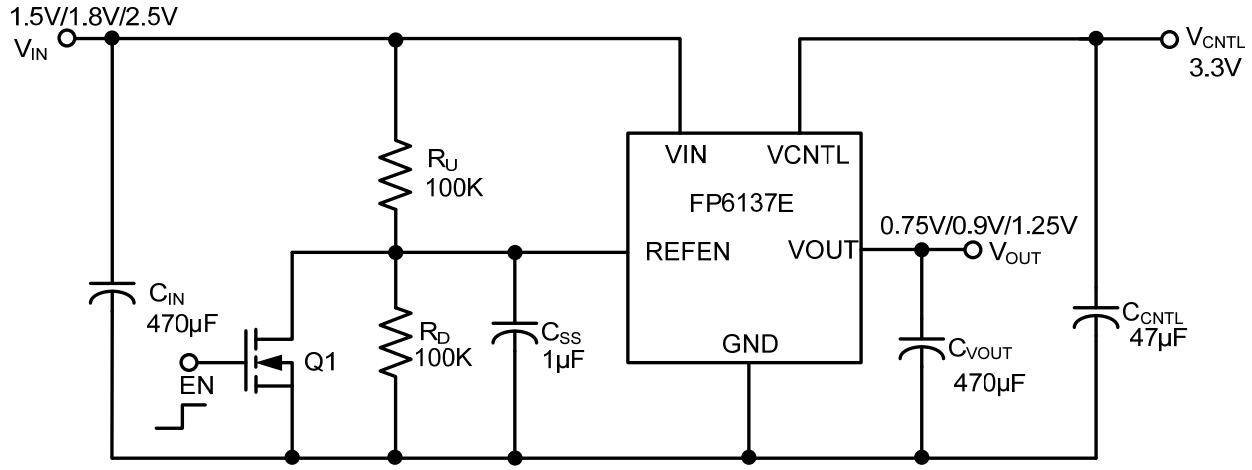


Figure 2. Typical Application Circuit of FP6137E

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. The VOUT sinks current to GND by lower NMOS.
VCNTL	Power input pin. The VCNTL power supplies the internal control circuitry and gate drive voltage.
REFEN	Chip enable, and input reference voltage pin. The reference voltage is half of the VIN power by two external voltage divide resistors.
VOUT	Regulator output pin. VOUT voltage tracks the REFEN voltage and is capable of sourcing or sinking current up to peak 2A.

Block Diagram

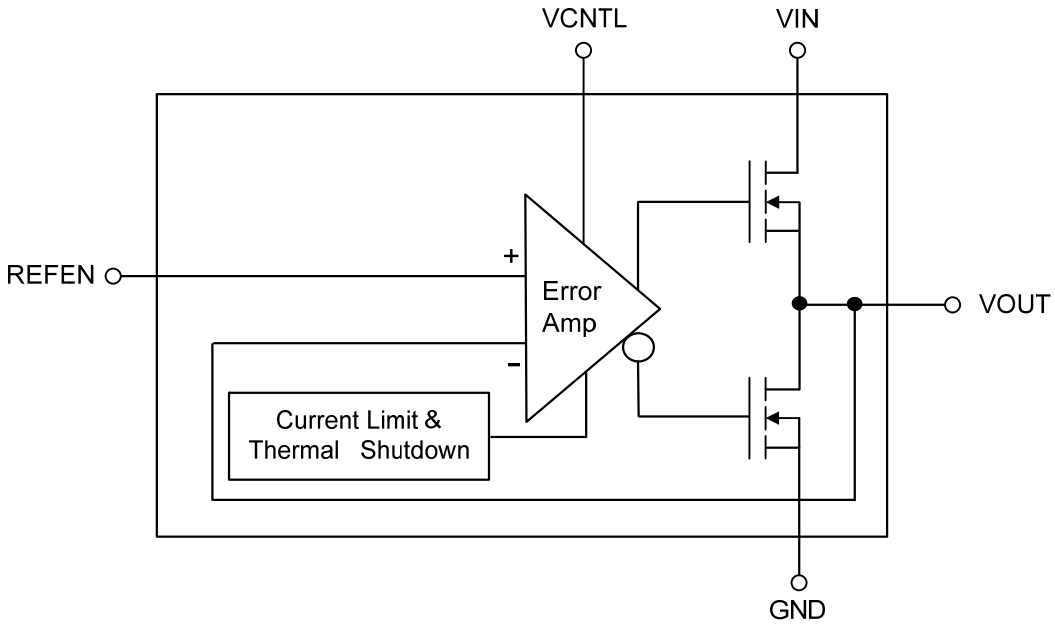


Figure 3. Block Diagram of FP6137E

Absolute Maximum Ratings

- VIN to GND---------- 6V
- VCNTL to GND ---------- 6V
- Power Dissipation @25℃ (P_D) SOP-8 (Exposed Pad) ---------- 1.25W
- Package Thermal Resistance (θ_{JA}) SOP-8 (Exposed Pad) ---------- 80°C/W
- Junction Temperature ---------- 150°C
- Storage Temperature Range---------- -65°C to 150°C
- Lead Temperature (Soldering, 10sec.) ---------- 260°C
- ESD Susceptibility

  HBM(Human Body Mode) ---------- 2KV

  MM(Machine Mode) ---------- 200V

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

Recommended Operating Conditions

- Input Voltage (V_{IN}) ---------- 1.5V, 1.8V or 2.5V
- 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 (DDRI /DDII/ DDR-III)	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) (DDRI/DDII/DDR-III)	$\lvert \Delta V_{LOAD} \rvert$	I_{OUT} = 0 to 2A			20	mV
		I_{OUT} = 0 to 2A			20	
PROTECTION						
Current Limit	I_{LIM}		2.0	2.5		A
Thermal Shutdown Temperature (Note3)	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 is measured at a constant junction temperature by using a 20ms low duty cycle current pulse.
Note3：Guarantee by design.

Typical Performance Curves

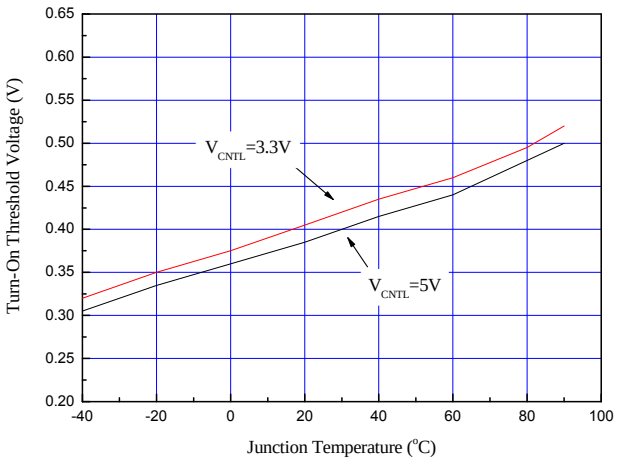


Figure 4. Turn-On Threshold Voltage vs. Junction Temperature

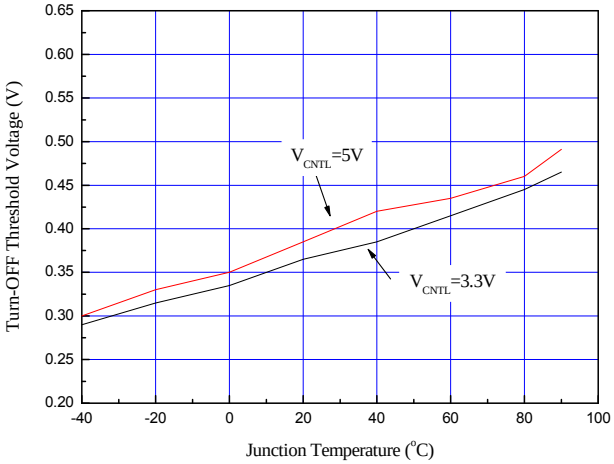


Figure 5. Turn-Off Threshold Voltage vs. Junction Temperature

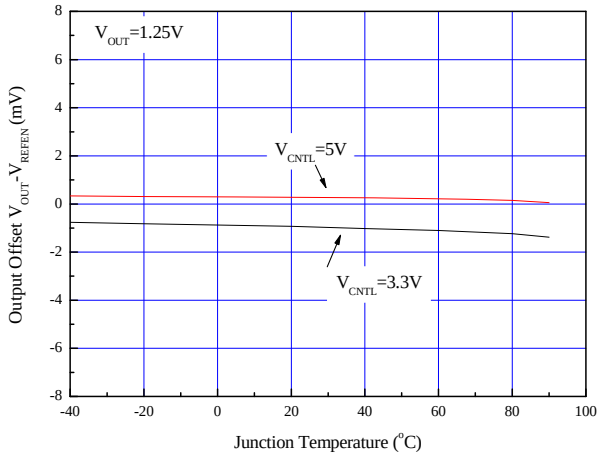


Figure 6. Output offset (V_{OUT}-V_{REFEN}) vs. Junction Temperature

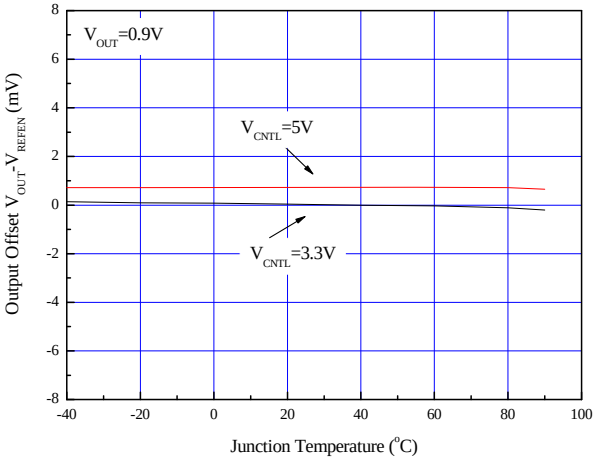


Figure 7. Output offset (V_{OUT}-V_{REFEN}) vs. Junction Temperature

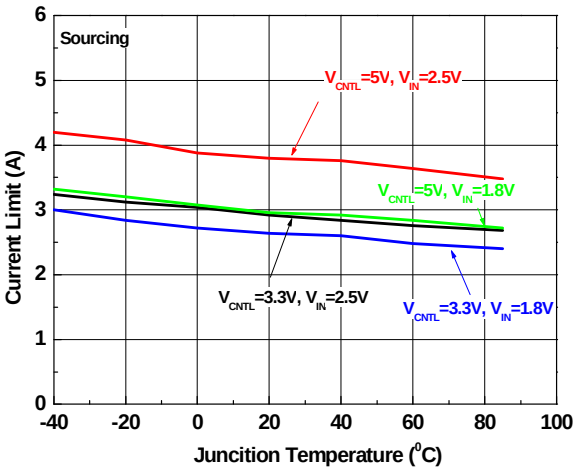


Figure 8. Current Limit vs. Junction Temperature

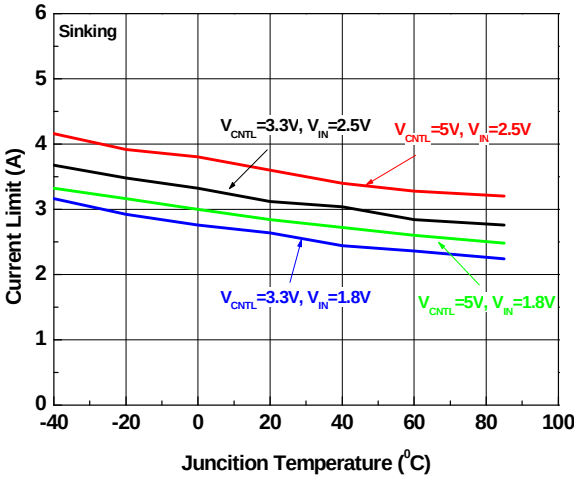


Figure 9. Current Limit vs. Junction Temperature

Typical Performance Curves (Continued)

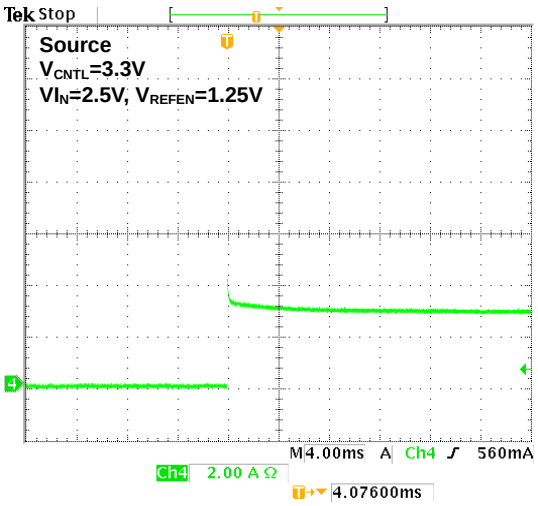


Figure10. Output Short-Circuit Protection

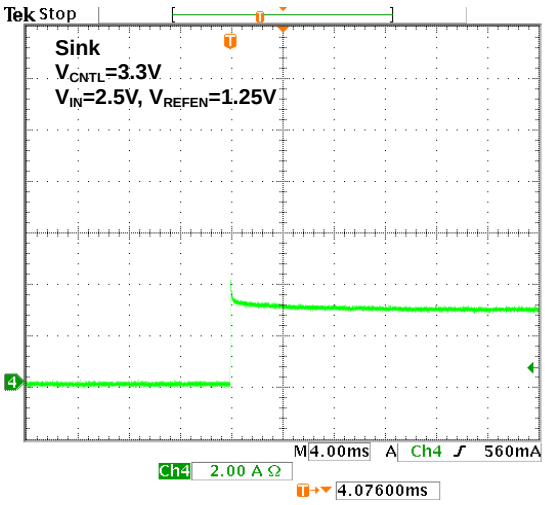


Figure11. Output Short-Circuit Protection

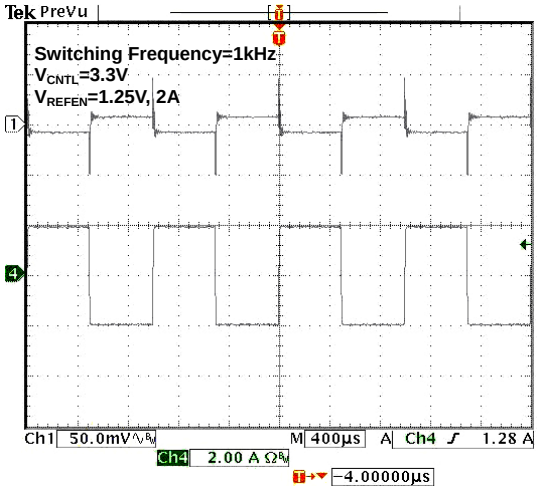


Figure12. 1.25V_{OUT} @ 2A Transient Response

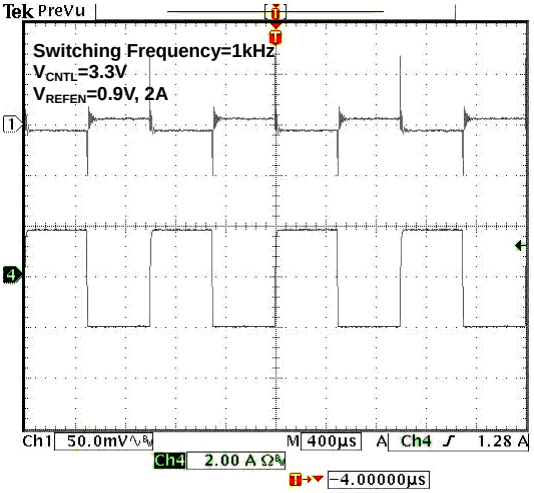
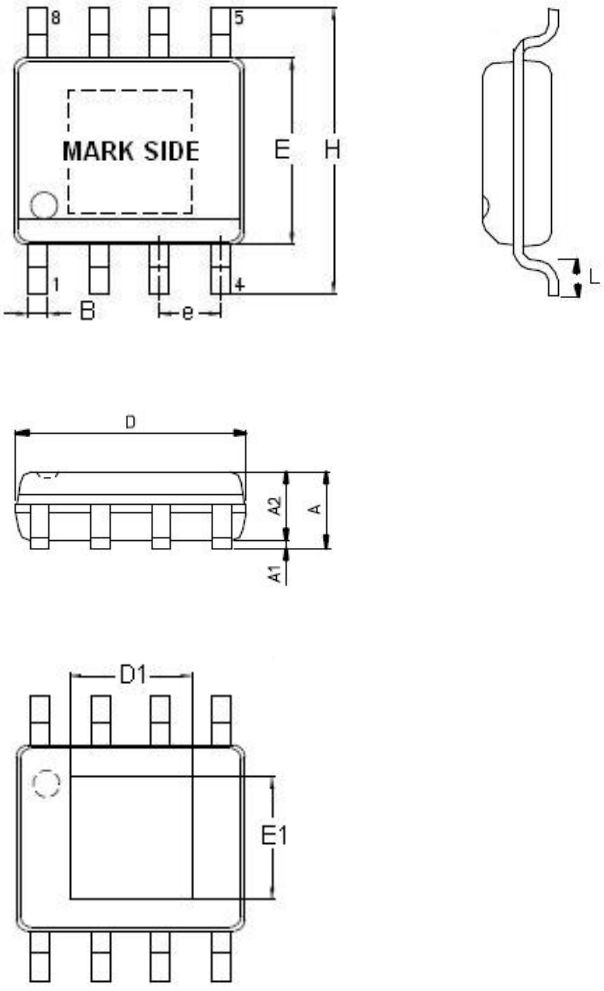


Figure13. 0.9V_{OUT} @ 2A Transient Response

Outline Information

SOP- 8 (Exposed Pad) Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	1.25	1.70
A1	0.00	0.15
A2	1.25	1.55
B	0.31	0.51
D	4.80	5.00
D1	1.82	3.35
E	3.80	4.00
E1	1.82	2.41
e	1.20	1.34
H	5.80	6.20
L	0.40	1.27

Note：Followed From JEDEC MO-012-E.