

3A/2A Bus Termination Regulator

Description

The FP6137A/B linear regulator is designed to provide the transient peaks up to 3A/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 FP6137A/B provides current limit in both sourcing/sinking mode and thermal shutdown function which protects the excessive heating due to high current and high junction temperature.

The FP6137A are available in SOP-8 (exposed pad), TO-252-5 and TO-263-5 packages. The FP6137B are available in the SOP-8 (fused), SOP-8 (exposed pad) and TO-252-5 packages.

Features

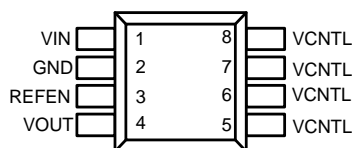
- 3A/2A Source or Sink Current
- Power MOSFET Integrated
- Low Output Voltage Offset
- Current Limit Protection
- Thermal Shutdown Protection
- Adjusted Output by External Resistors
- Shutdown for Standby or Suspend Mode
- SOP-8, TO-252-5 and TO-263-5 Packages
- RoHS Compliant

Applications

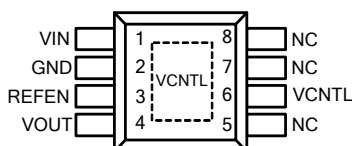
- DDR-I and DDR-II Bus Termination Voltage
- SSTL-2 and SSTL-3 Termination
- Active Termination Buses

Pin Assignments

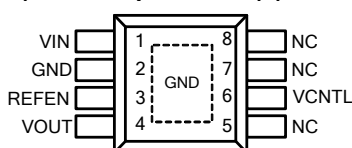
SF Package (SOP-8<Fused>) (FP6137B)



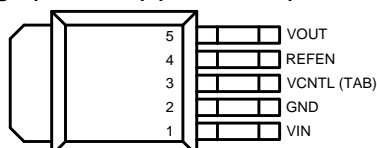
SP Package (SOP-8 Exposed Pad) (FP6137B)



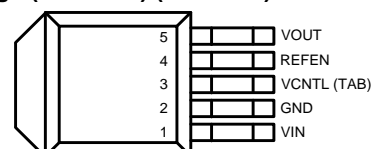
SP Package (SOP-8 Exposed Pad) (FP6137A)



T5 Package (TO-252-5) (FP6137A/B)



T6 Package (TO-263-5) (FP6137A)



Ordering Information

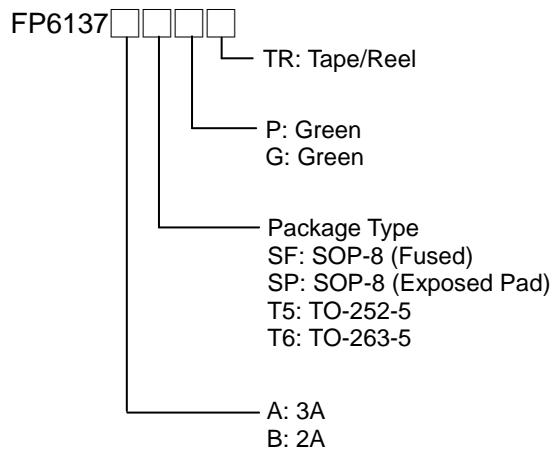


Figure 1. Pin Assignment of FP6137 (Top View)

Typical Application Circuit

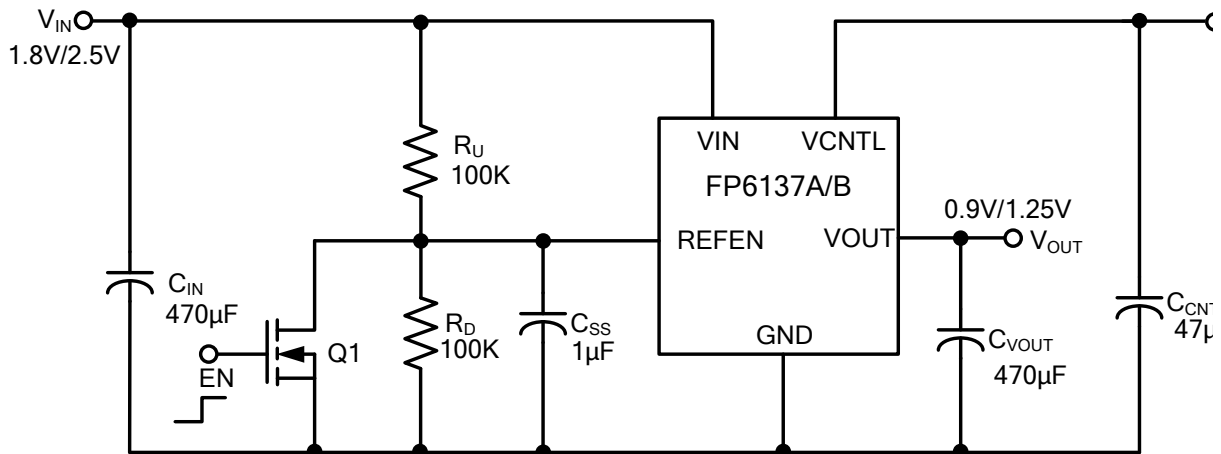


Figure 2. Typical Application Circuit of FP6137

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 3A.

Block Diagram

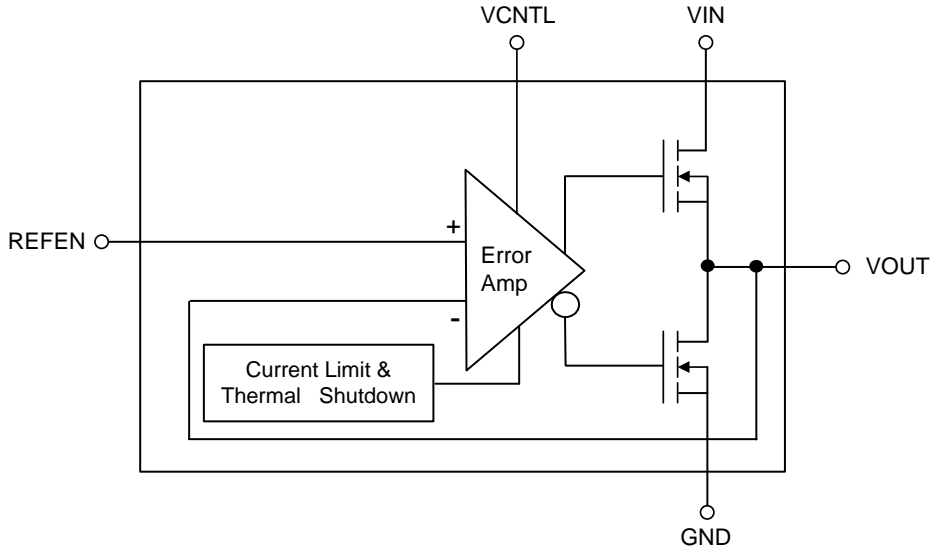


Figure 3. Block Diagram of FP6137

Absolute Maximum Ratings

- VIN to GND ----- 6V
- VCNTL to GND ----- 6V
- Power Dissipation @25°C, (P_D)
 - SOP-8 (Fused) ----- 0.63W
 - SOP-8 (Exposed Pad) ----- 1.25W
 - TO-252-5 ----- 1.33W
 - TO-263-5 ----- 1.67W
- Package Thermal Resistance, (θ_{JA})
 - SOP-8 (Fused) ----- 160°C/W
 - SOP-8 (Exposed Pad) ----- 80°C/W
 - TO-252-5 ----- 75°C/W
 - TO-263-5 ----- 60°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

Note 1 : Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device.

Recommended Operating Conditions

- Input Voltage (V_{IN}) ----- +1.8V or +2.5V
- Input Voltage (V_{CNTL}) ----- +3.3V to +5.5V
- Operating Temperature Range (T_{OPR}) ----- -40°C to +85°C

Electrical Characteristics

($V_{CNTL}=3.3V$, $V_{IN}=2.5V$, $V_{REFEN}=0.5 \cdot V_{IN}$, $C_{OUT}=10\mu F$, $T_A=25^\circ C$, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
INPUT						
Operation Voltage Range (DDRI and DDII)	V_{IN}		1.6	2.5/1.8		V
	V_{CNTL}			3.3	5.5	
V_{CNTL} Quiescent Current	I_{CNTL}	No Load		1.5	3.0	mA
Shutdown Current	I_{SD}	$V_{REFEN}<0.2V$		5	30	μA
OUTPUT VOLTAGE						
Output Offset Voltage	V_{OS}	No Load , ($V_{REFEN}-V_{OUT}$)	-20	0	20	mV
Load Regulation (DDRI and DDII) (Note2)	$ \Delta V_{LOAD} $	$I_{OUT} = 0$ to 2A			20	mV
		$I_{OUT} = 0$ to -2A			20	
PROTECTION						
Current Limit	I_{LIM}	FP6137A	3.0	3.5		A
		FP6137B	2.0	2.5		A
Thermal Shutdown Temperature (Note3)	T_{SD}			170		$^\circ C$
	ΔT_{SD}	Hysteresis		35		$^\circ C$
SHUTDOWN CONTROL						
Enable High Level	V_{REF-H}		0.6			V
Shutdown Low Level	V_{REF-L}				0.2	V

Note 2 : Load regulation is measured at a constant junction temperature by using a 20ms low duty cycle current pulse.

Note 3 : Guarantee by design.

Typical Performance Curves

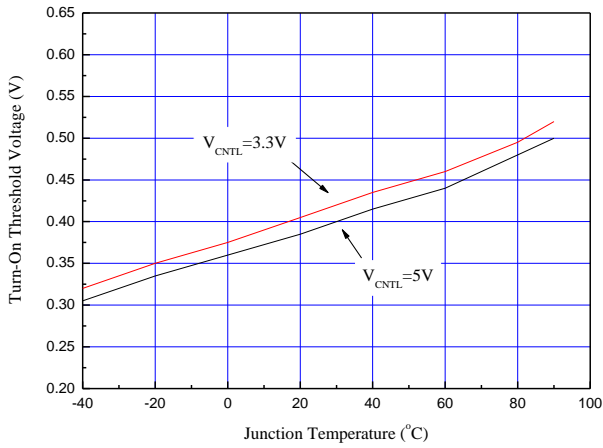


Figure 4. Turn-On Threshold Voltage vs. Junction Temperature

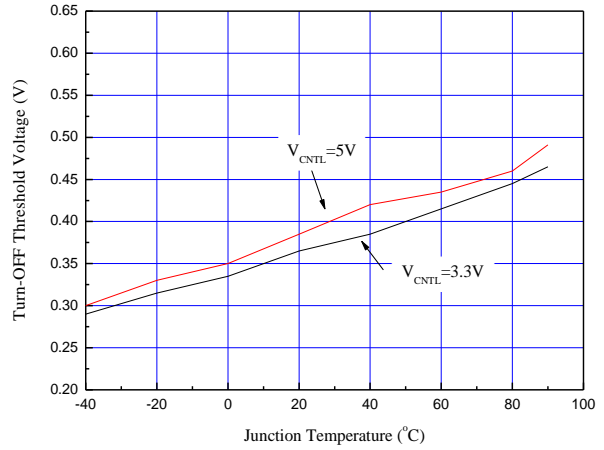


Figure 5. Turn-Off Threshold Voltage vs. Junction Temperature

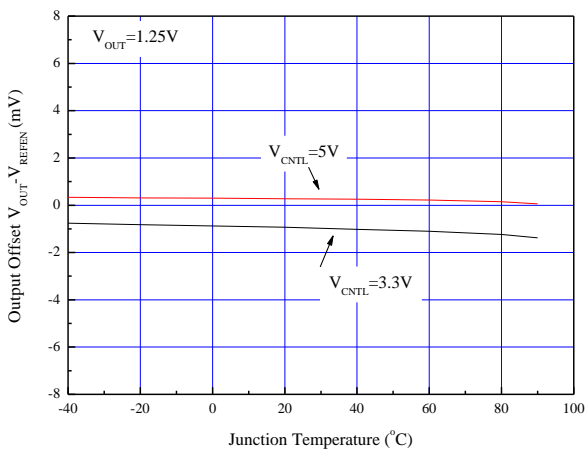


Figure 6. Output offset ($V_{OUT} - V_{REFEN}$) vs. Junction Temperature

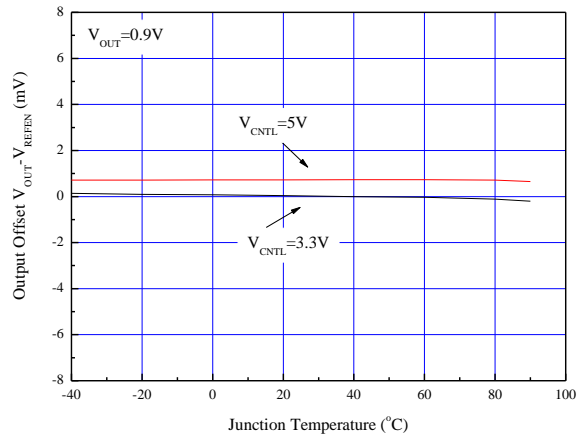


Figure 7. Output offset ($V_{OUT} - V_{REFEN}$) vs. Junction Temperature

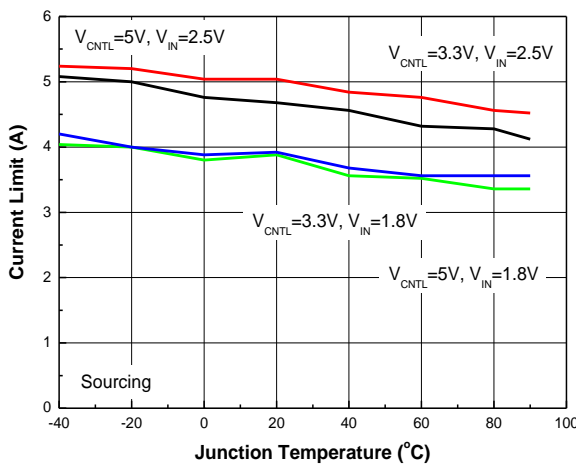


Figure 8. Current Limit vs. Junction Temperature

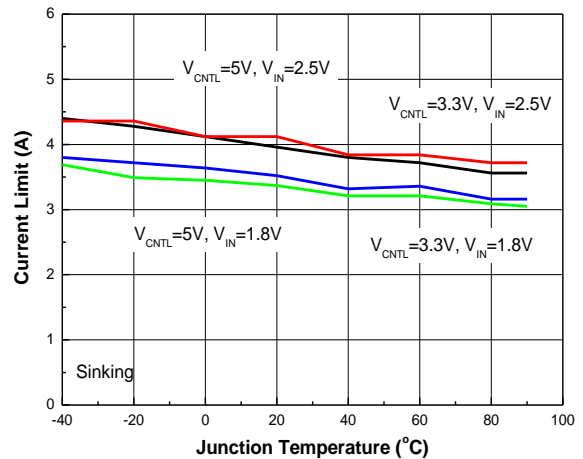


Figure 9. Current Limit vs. Junction Temperature

Typical Performance Curves (Continued)

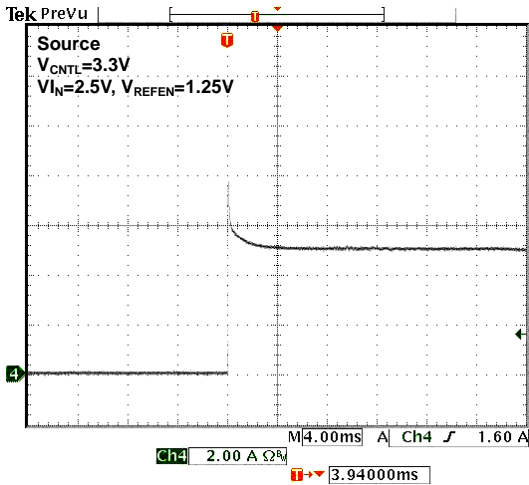


Figure10. Output Short-Circuit Protection

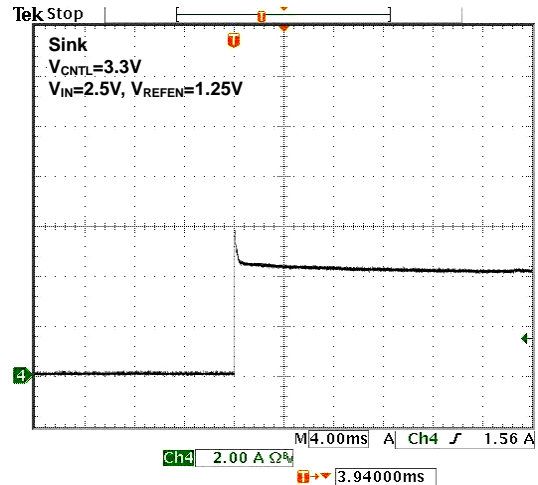


Figure11. Output Short-Circuit Protection

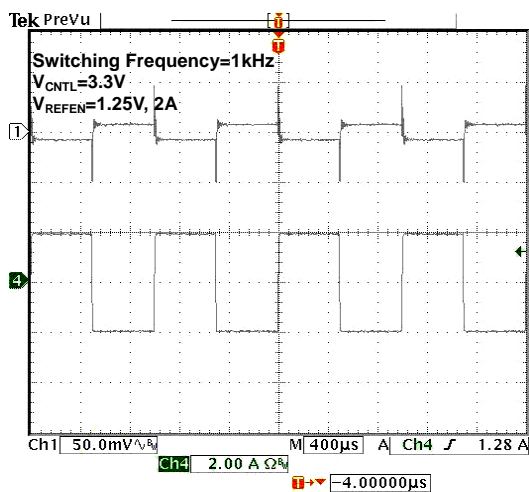


Figure12. 1.25V_{OUT} @ 2A Transient Response

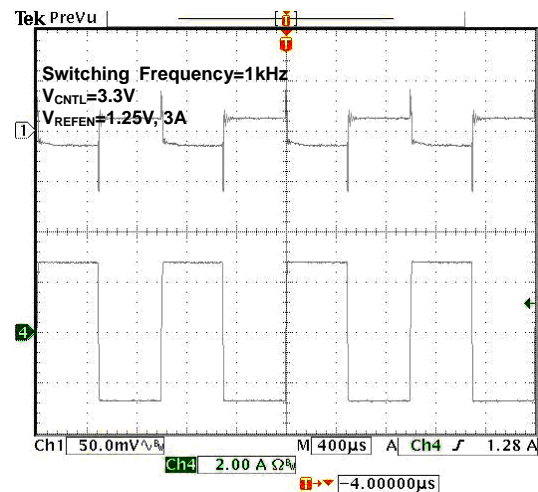


Figure13. 1.25V_{OUT} @ 3A Transient Response

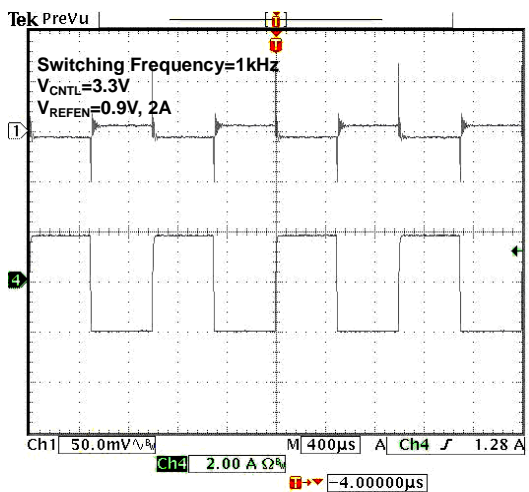


Figure 14. 0.9V_{OUT} @ 2A Transient Response

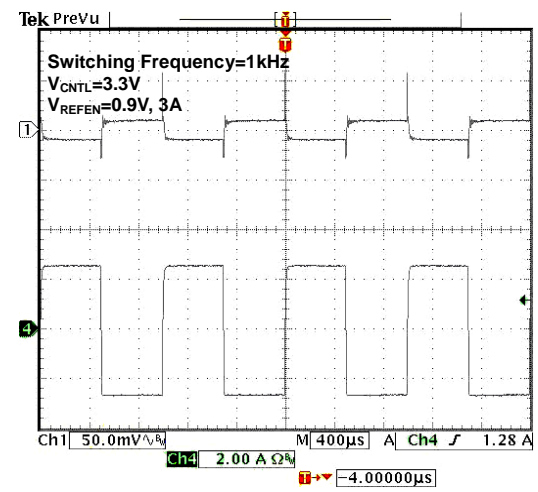
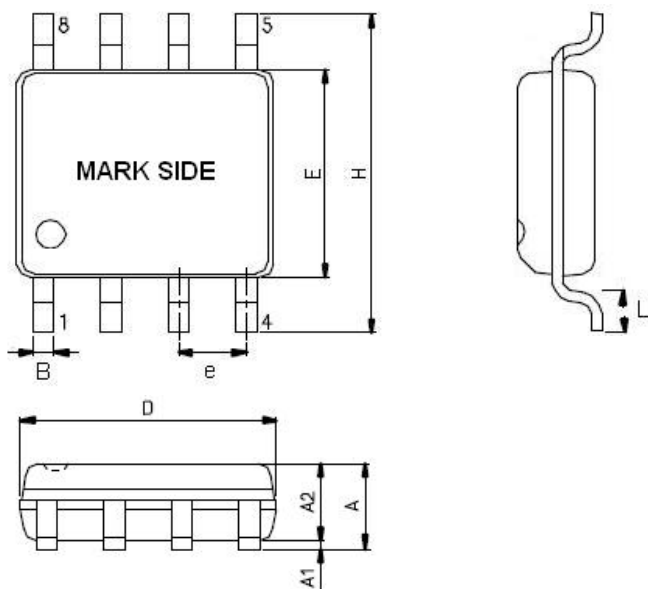


Figure 15. 0.9V_{OUT} @ 3A Transient Response

Outline Information

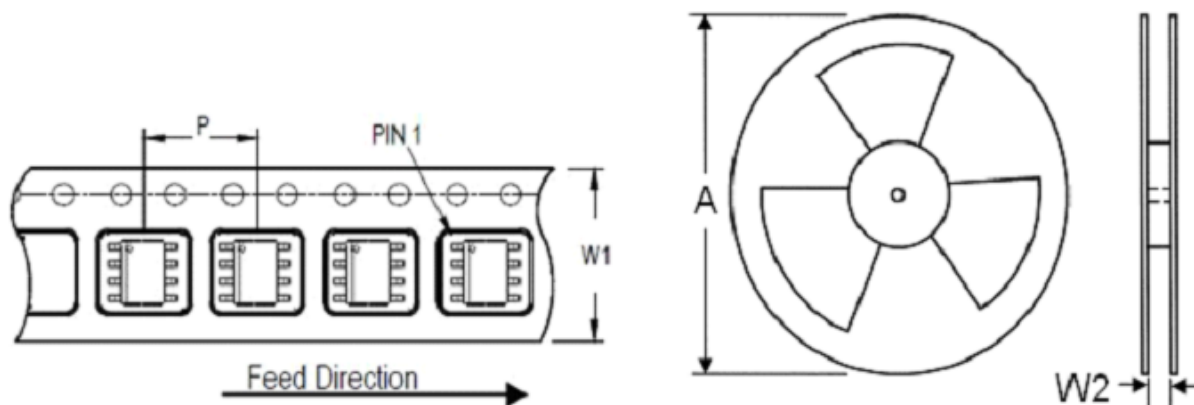
SOP-8 (Fused) Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	1.35	1.75
A1	0.10	0.25
A2	1.25	1.50
B	0.31	0.51
D	4.80	5.00
E	3.80	4.00
e	1.20	1.34
H	5.80	6.20
L	0.40	1.27

Note : Followed From JEDEC MO-012-E

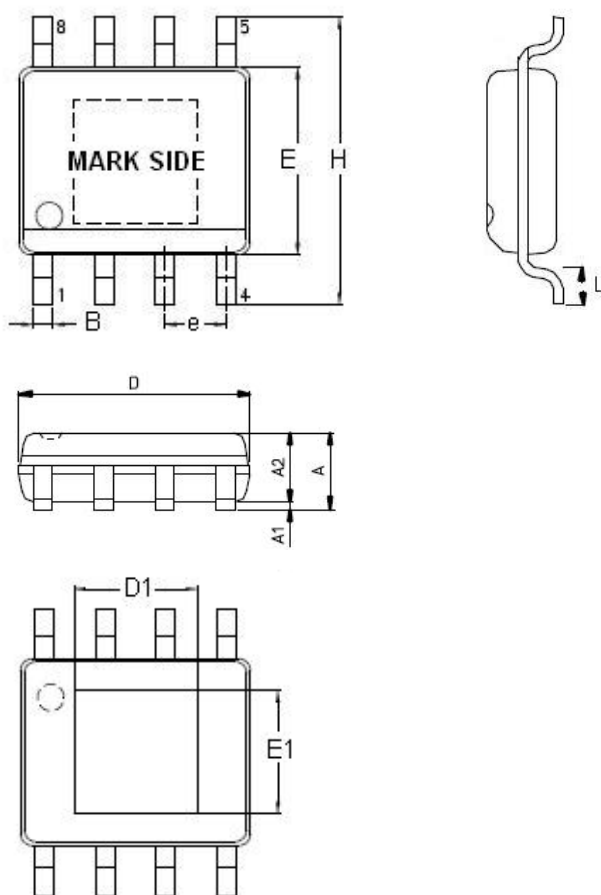
Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
12	8	13	330	12.4	400~1000	2,500

Outline Information (Continued)

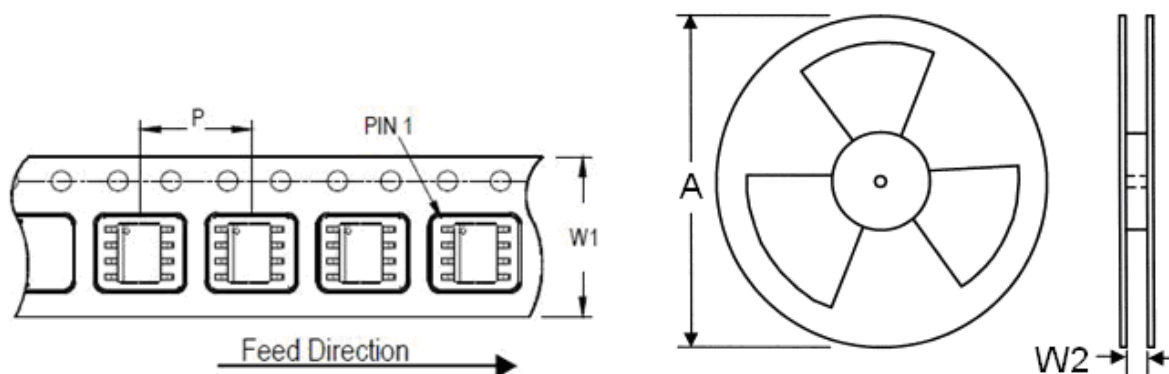
SOP-8 (Exposed Pad) Package (Unit: mm)



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	3.04	3.50
E	3.80	4.00
E1	2.15	2.41
e	1.20	1.34
H	5.80	6.20
L	0.40	1.27

Note : Followed From JEDEC MO-012-E.

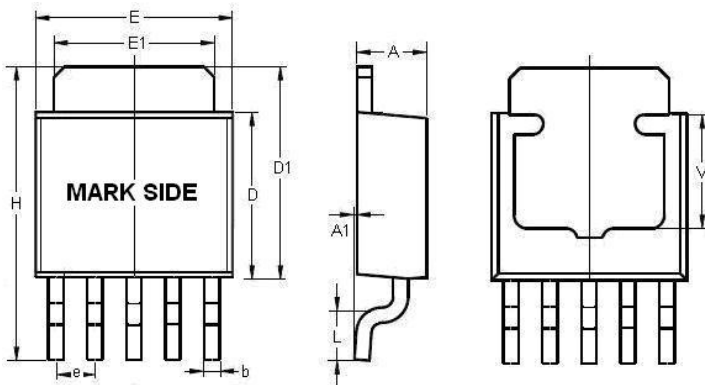
Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
12	8	13	330	12.4	400~1000	2,500

Outline Information (Continued)

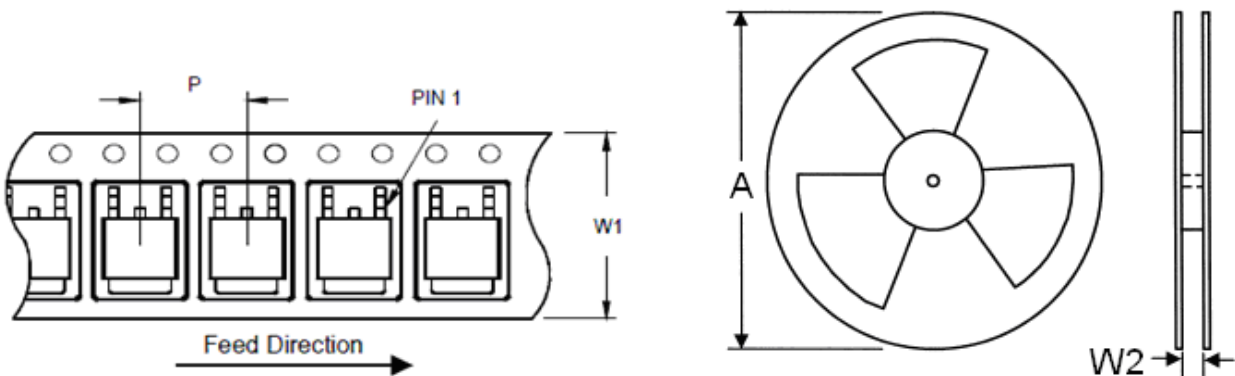
TO-252-5 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	2.22	2.40
A1	0.01	0.13
b	0.55	0.65
D	6.00	6.20
D1	7.10	7.30
E	6.40	6.60
E1	5.30	5.45
e	1.22	1.32
L	1.42	1.65
H	9.50	10.20
V	3.60	4.00

Note : Followed From JEDEC TO-252-E.

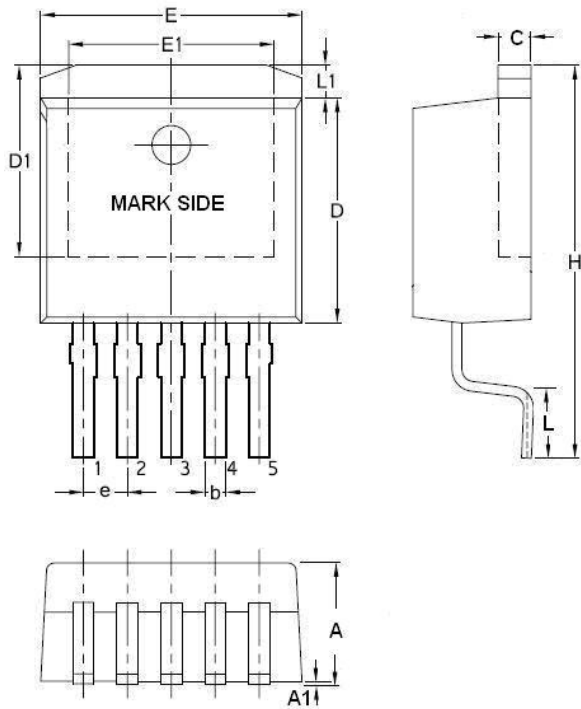
Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
16	8	13	330	16.4	300~1000	3,000

Outline Information (Continued)

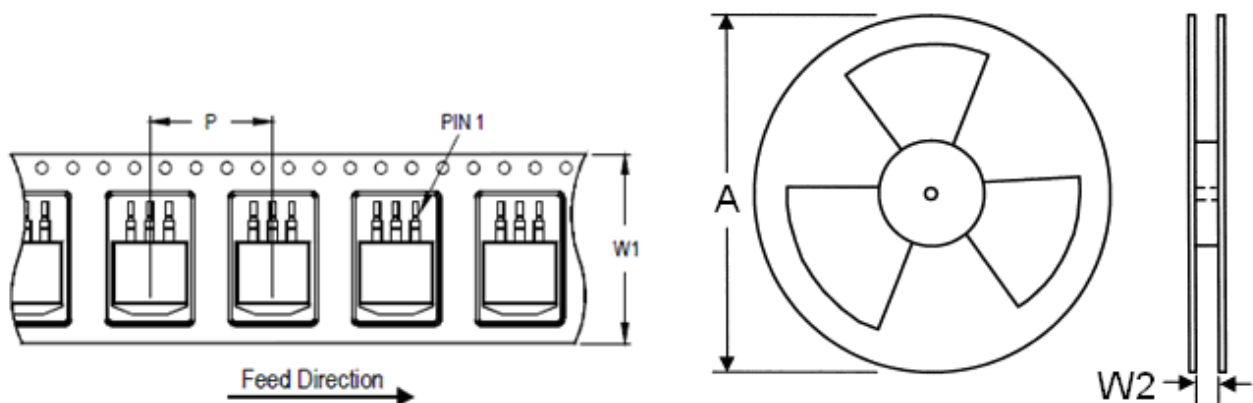
TO-263-5 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	4.064	4.826
A1	0.005	0.254
b	0.508	0.991
C	1.143	1.651
D	8.382	9.652
D1	6.858	7.858
E	9.652	10.668
E1	6.223	7.225
L	1.778	2.800
L1	1.146	1.676
e	1.600	1.800
H	14.605	15.875

Note : Followed From JEDEC TO-263-E

Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
24	16	13	330	24.4	300~1000	800

Life Support Policy

Fitipower's products are not authorized for use as critical components in life support devices or other medical systems.