

High Efficiency 1.5MHz 1.2A Synchronous Step Down Regulator

Description

The FP6357 is a high efficiency, high frequency synchronous DC-DC step-down converter. The 100% duty cycle feature provides low dropout operation, extending battery life in portable systems.

The internal synchronous switch increases efficiency and eliminates the need for external Schottky diode. At shutdown mode, the input supply current is less than 1 μ A.

The current limit protection and on-chip thermal shutdown features provide protection against any combination of overload or ambient temperature.

Features

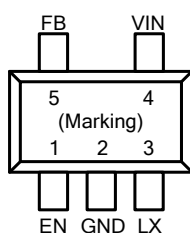
- Low $R_{DS(ON)}$ for Internal Switch (Top/Bottom): 200/150m Ω
- 2.5V~5.5V Input Voltage Range
- 1.2A Output Current
- High Efficiency up to 95%
- 1.5MHz Switching Frequency Minimizes the External Components
- Internal Soft-Start Limits the Inrush Current
- Internal Compensation Function
- 100% Dropout Operation
- Power Good Indicator Output (SOT-23-6 only)
- RoHS Compliant and Halogen Free
- SOT-23-5 and SOT-23-6 Packages

Applications

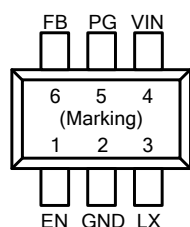
- Set Top Box
- LCD TV
- Mini-Notebook
- Net PC

Pin Assignments

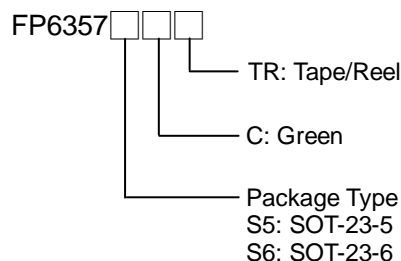
S5 Package (SOT-23-5)



S6 Package (SOT-23-6)



Ordering Information



SOT-23-5 Marking

Part Number	Product Code
FP6357S5CTR	Fi3

SOT-23-6 Marking

Part Number	Product Code
FP6357S6CTR	Fi4

Figure 1. Pin Assignment of FP6357

Typical Application Circuit

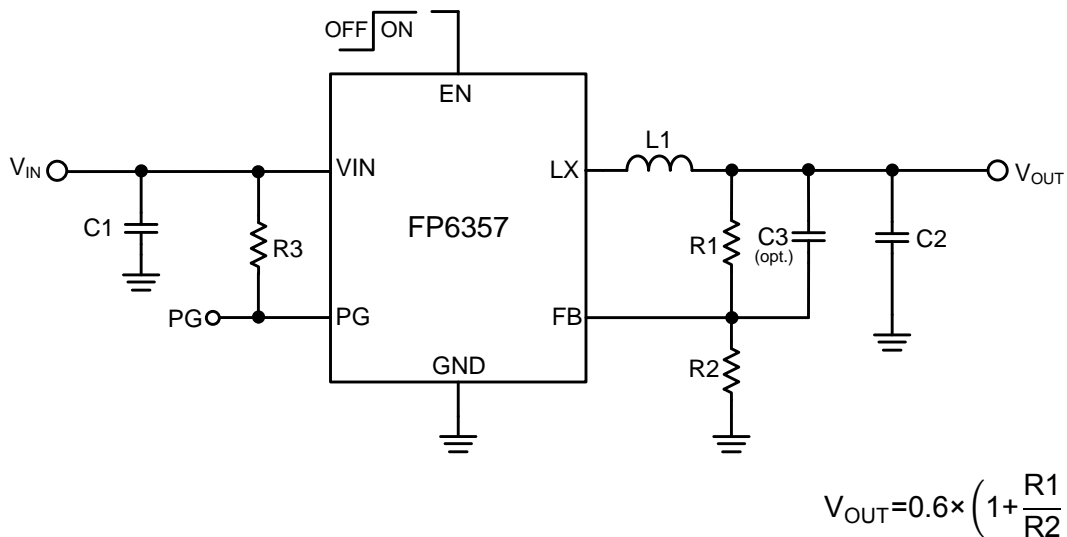


Figure 2. Schematic Diagram

V _{OUT}	C1	R1	R2	L1	C2
3.3V	4.7μF MLCC	453kΩ	100kΩ	2.2μH	10μF MLCC
2.5V	4.7μF MLCC	316kΩ	100kΩ	2.2μH	10μF MLCC
1.8V	4.7μF MLCC	200kΩ	100kΩ	1.8μH	10μF MLCC
1.5V	4.7μF MLCC	150kΩ	100kΩ	1.5μH	10μF MLCC
1.2V	4.7μF MLCC	100kΩ	100kΩ	1.5μH	10μF MLCC
1.05V	4.7μF MLCC	75kΩ	100kΩ	1.2μH	10μF MLCC

Table 1. Recommended Component Values

Functional Pin Description

Pin Name	Pin No. (SOT-23-5)	Pin No. (SOT-23-6)	Pin Function
EN	1	1	Enable Control. Pull high to turn the IC on, and pull low to disable the IC.
GND	2	2	Ground Pin.
LX	3	3	Inductor connection to the drains of the internal power MOSFETs.
VIN	4	4	Power Supply Input Pin. Drive VIN pin by 2.5V to 5.5V voltage to power on the chip.
FB	5	6	Voltage Feedback Input Pin. Connect FB and VOUT with a resistive voltage divider. This IC senses feedback voltage via FB and regulates it at 0.6V.
PG	--	5	Open Drain Power Good Output Pin. (SOT-23-6 only)

Block Diagram

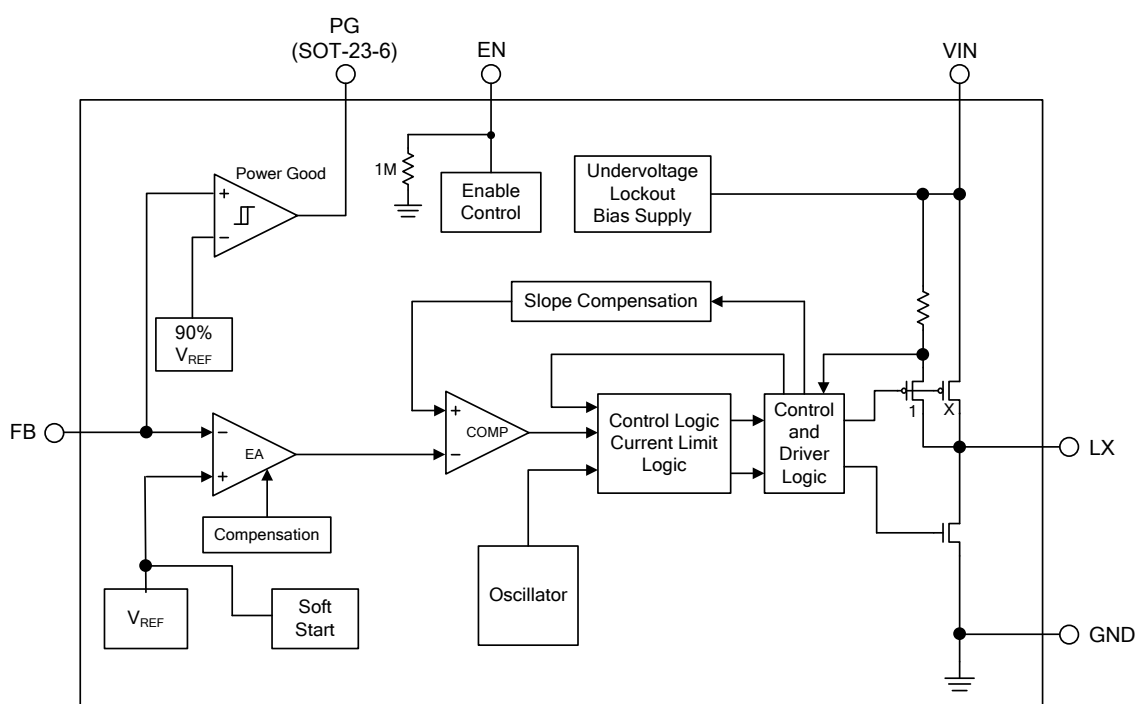


Figure 3. Block Diagram of FP6357

Absolute Maximum Ratings (Note 1)

- VIN to GND ----- -0.3V to +6.5V
- LX to GND ----- -0.3V to (VIN+0.3)
- Dynamic LX voltage in 50ns duration ----- -4V to (VIN+3V)
- EN, FB, PG to GND ----- -0.3V to VIN
- Package Thermal Resistance (θ_{JA})
 - SOT-23-5 ----- 250°C/W
 - SOT-23-6 ----- 250°C/W
- Package Thermal Resistance (θ_{JC})
 - SOT-23-5 ----- 130°C/W
 - SOT-23-6 ----- 110°C/W
- Maximum Junction Temperature (T_J) ----- +150°C
- Lead Temperature (Soldering, 10 sec.) ----- +260°C
- Storage Temperature (T_{STG}) ----- -65°C to +150°C

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

Recommended Operating Conditions (Note 2)

- Supply Voltage V_{IN} ----- +2.5V to +5.5V
- Junction Temperature Range ----- -40°C to +125°C
- Ambient Temperature Range ----- -40°C to +85°C

Note 2 : The device is not guaranteed to function outside its operating conditions.

Electrical Characteristics

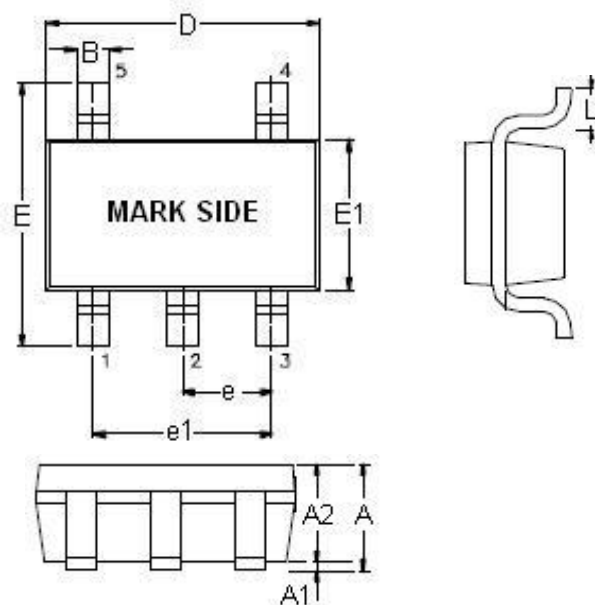
($V_{IN}=5V$, $T_A=25^{\circ}C$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Voltage Range	V_{IN}		2.5		5.5	V
Shutdown Current	I_{SHDN}	EN=GND		0.1	1	μA
Quiescent Current	I_q	$V_{FB}=0.65V$, $I_O=0A$		80		μA
Reference Voltage	V_{REF}		0.588	0.6	0.612	V
FB Input Leakage Current	I_{FB}	$V_{FB}=V_{IN}$		0.01	1	μA
P-Channel MOSFET On-Resistance (Note 3)	$R_{DS(ON)}$			200		m Ω
N-Channel MOSFET On-Resistance (Note 3)	$R_{DS(ON)}$			150		m Ω
P-Channel Current Limit (Note 3)	I_{LIM}		1.5			A
EN High-Level Input Voltage	V_{IH}		1.5			V
EN Low-Level Input Voltage	V_{IL}				0.4	V
Under Voltage Lockout Voltage	UVLO			2.4		V
UVLO Hysteresis	V_{HYS}			0.2		V
Oscillation Frequency	F_{OSC}		1.2	1.5	1.8	MHz
Minimum On Time				50		ns
Maximum Duty Cycle			100			%
PG Rising Threshold (SOT-23-6)	$V_{PG(H)}$	V_{FB} Rising		90		%
PG Sink Current (SOT-23-6)	I_{PG}	$V_{PG}=0.1V$		1		mA
V_{OUT} Discharge Resistance				100		Ω
Thermal Shutdown Temperature (Note 3)	T_{SD}			150		$^{\circ}C$
Internal Soft-Start Time	T_{SS}			1		ms

Note 3 : Guarantee by design.

Outline Information

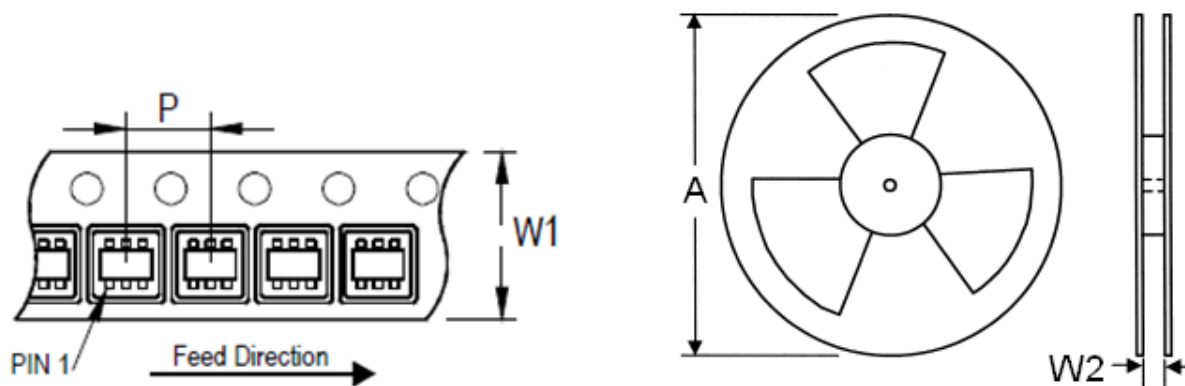
SOT-23-5 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
B	0.30	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	0.30	0.60

Note : Followed From JEDEC MO-178-C.

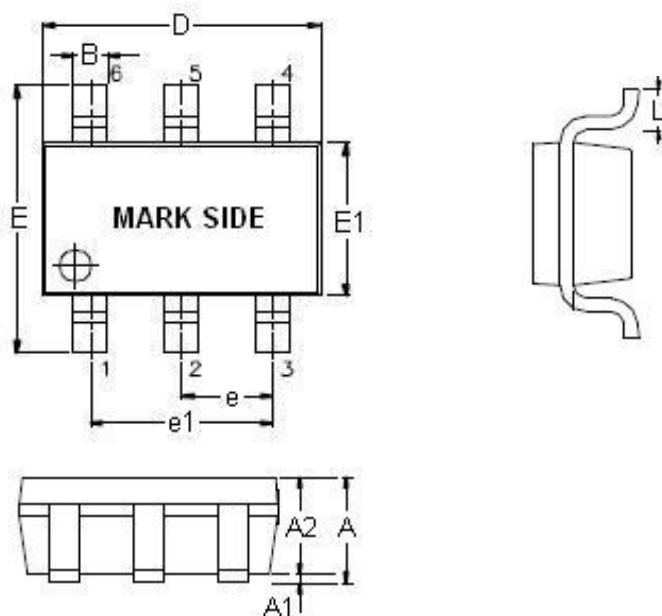
Carrier Dimensions



Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
		in	mm			
8	4	7	180	8.4	300~1000	3,000

Outline Information (Continued)

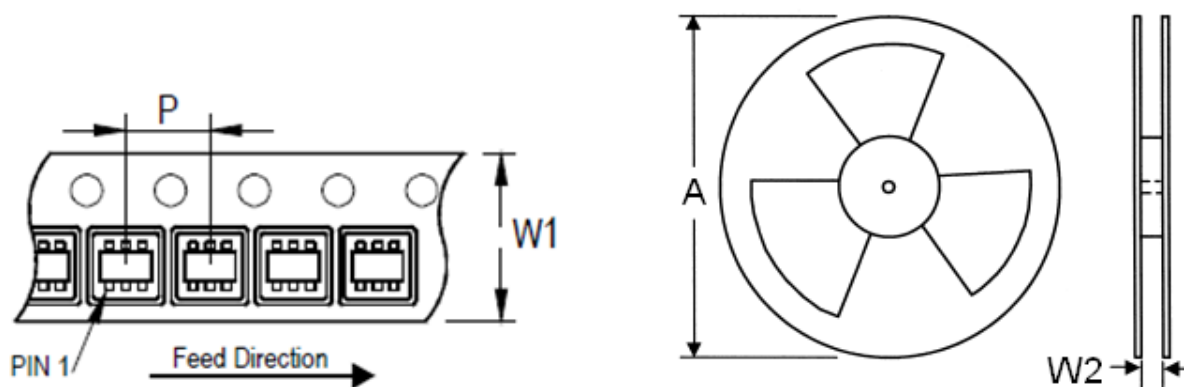
SOT-23-6 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
B	0.30	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	0.30	0.60

Note : Followed From JEDEC MO-178-C.

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Tape Size (W1) mm	Pocket Pitch (P) mm	Reel Size (A)		Reel Width (W2) mm	Empty Cavity Length mm	Units per Reel
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