

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 1µA.

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

Features

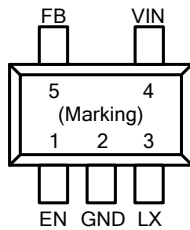
- Low $R_{DS(ON)}$ for Internal Switch (Top/Bottom): 200/150mΩ
- 2.5V~5.5V Input Voltage Range
- 1.2A Output Current
- High Efficiency up to 95%
- 1.5MHz Switching Frequency Minimizes the External Components
- Internal Soft-Start Limits the Inrush Current
- Internal Compensation Function
- 100% Dropout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

Applications

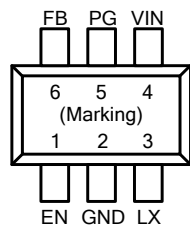
- Set Top Box
- LCD TV
- Mini-Notebook
- Net PC

Pin Assignments

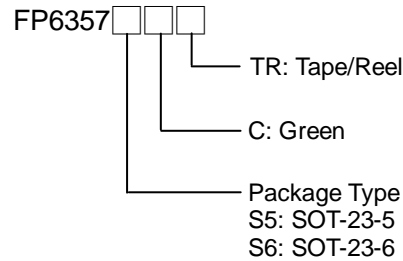
S5 Package (SOT-23-5)



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

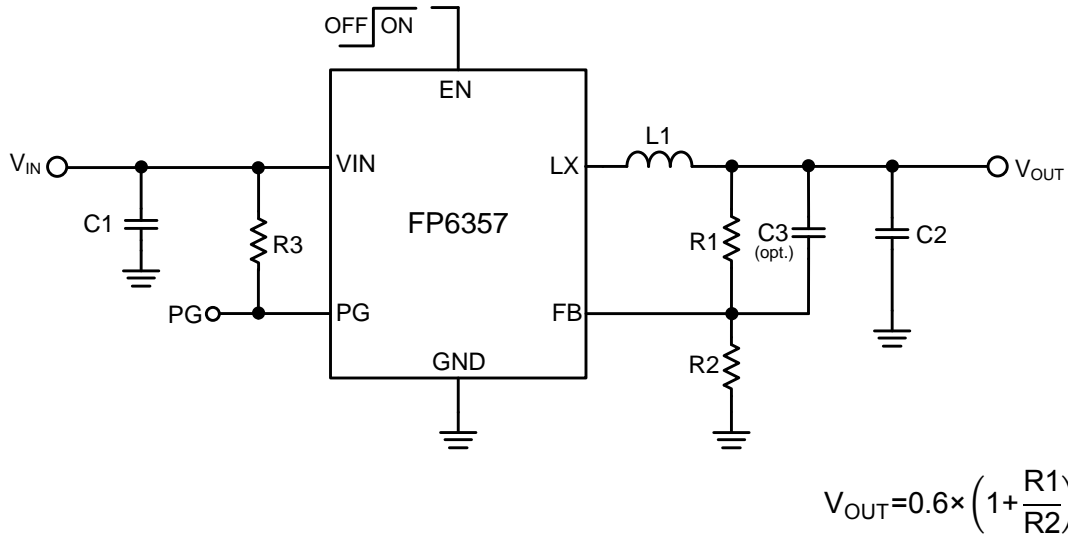


Figure 2. Schematic Diagram

| 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

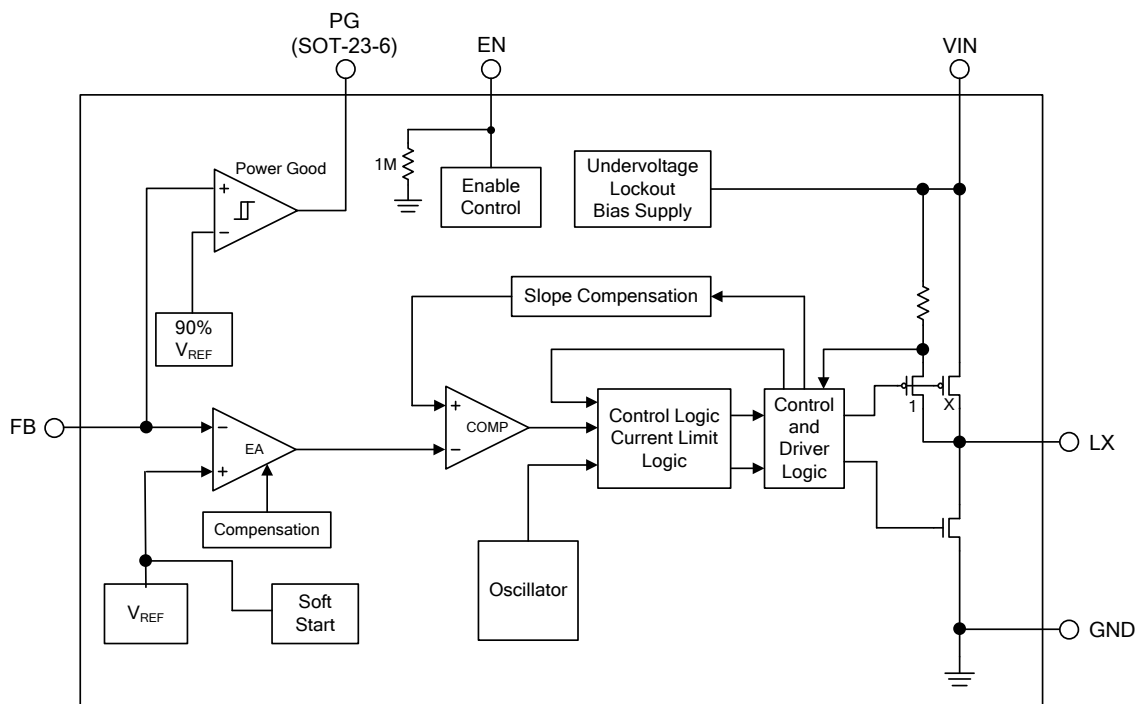


Figure 3. Block Diagram of FP6357

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

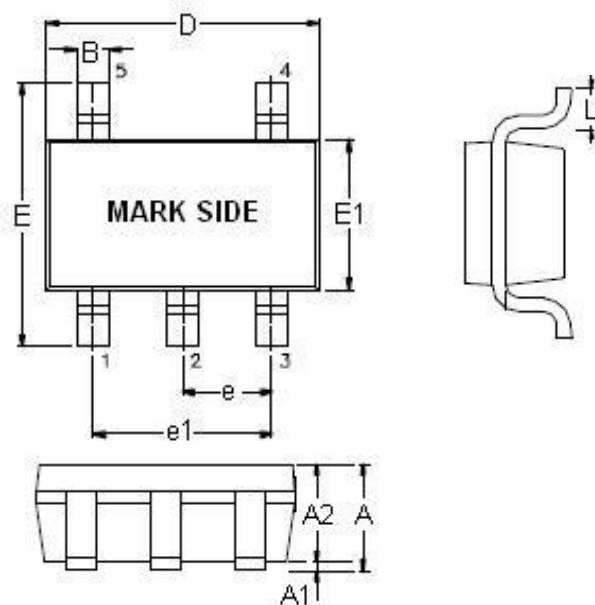
($V_{IN}=5V$, $T_A=25^{\circ}C$, unless otherwise specified.)

| 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

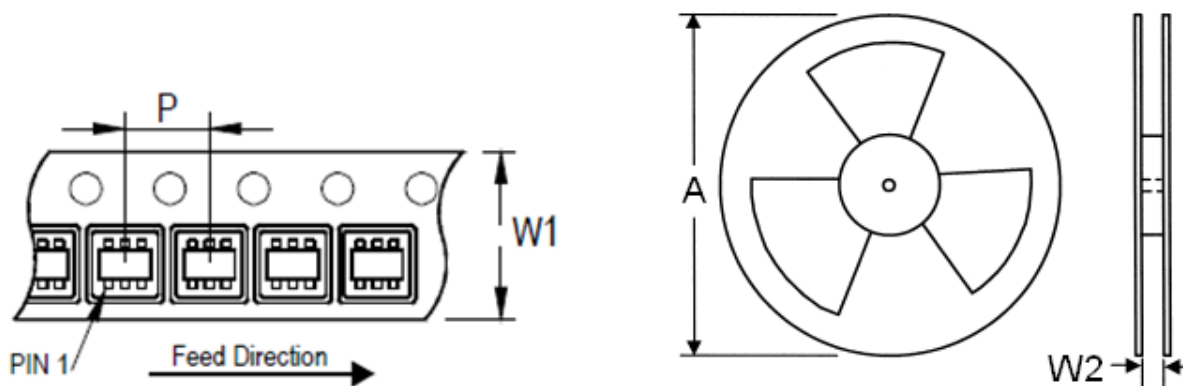
SOT-23-5 Package (Unit: mm)



| 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.

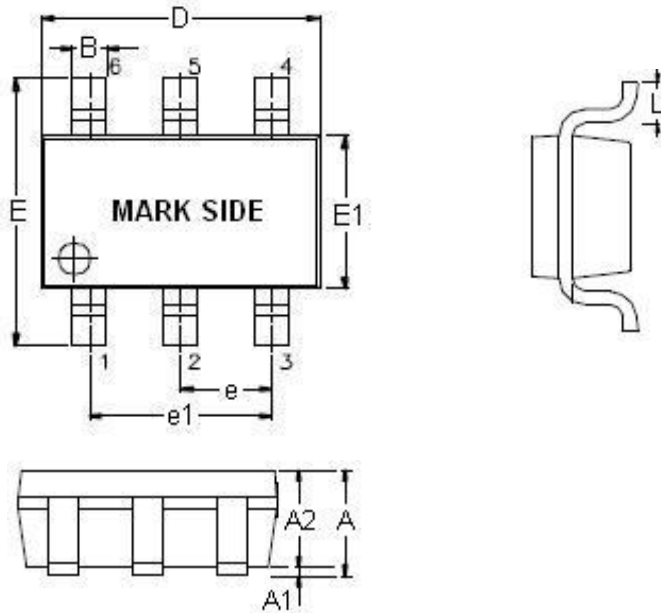
Carrier Dimensions



| 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)

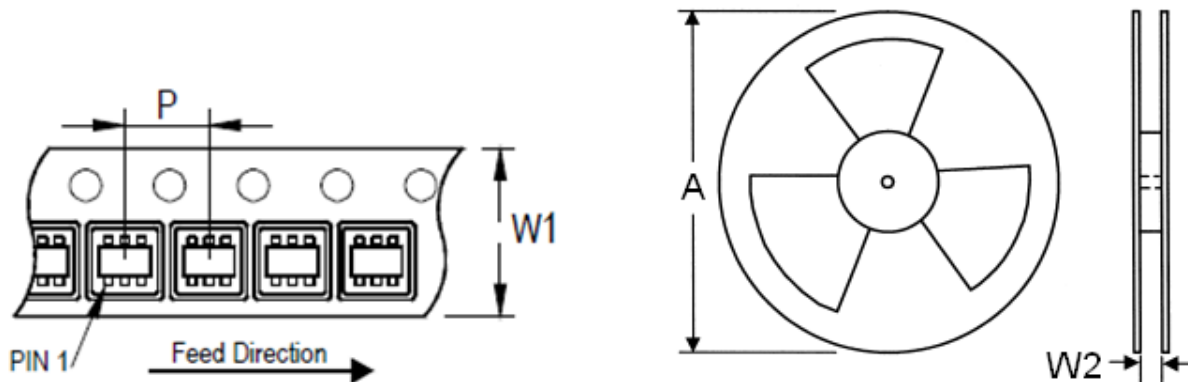
SOT-23-6 Package (Unit: mm)



| 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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|----------------------|------------------------|---------------|-----|-----------------------|---------------------------|----------------|
| | | in | mm | | | |
| 8 | 4 | 7 | 180 | 8.4 | 300~1000 | 3,000 |

Life Support Policy

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