

Micro-Power Boost DC/DC Converter

Features

- Operating Voltage : 2.7V ~ 5.5V
- High Operating Frequency : 1MHz
- Shutdown Current : <1 μ A
- High Output Voltage : Up to 30V
- Soft Start Function
- Cycle by Cycle Current Limiting
- SOT-23-5 Package

Applications

- STN/OLED BIAS
- Personal Digital Assistants
- DSC

General Description

The M5125 boost converter contains a 0.7 Ω internal switch. The IC operates at constant frequency 1MHz, allowing the use of tiny, low cost and low height inductors and capacitors. The IC operates from a 2.7V to 5.5V supply voltage and can boost supply voltage up to 30V at the output. High inrush current at start-up is eliminated using the soft-start function. Constant frequency current mode PWM architecture results in low, predictable output noise. The M5125 includes cycle-by-cycle 850mA current limiting to maximum inductor current and over-temperature protection circuit. The M5125 is suitable for small or medium size LCD panel of high bias voltage with a constant current to provide PDAs, and other portable devices. The M5125 is available in SOT-23-5 package.

Ordering Information

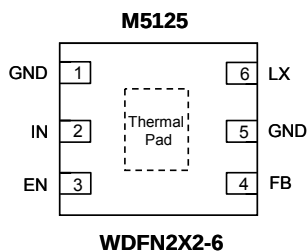
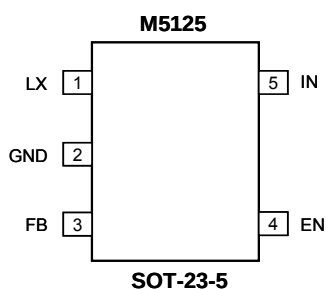
ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
M5125T11U	5125x	-40°C to 85°C	SOT-23-5
M5125U51U	5125	-40°C to 85°C	WDFN2X2-6

Note: T1: SOT-23-5 U5:WDFN2X2-6

1 : Bonding Code

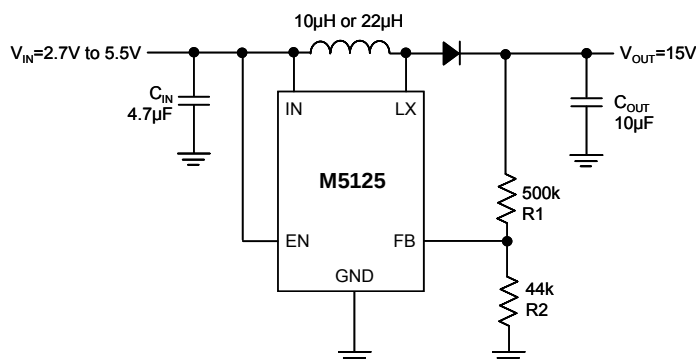
U: Tape & Reel

Pin Configuration



Note: Recommend connecting the Thermal Pad to the Ground for excellent power dissipation.

Typical Application Circuit



Absolute Maximum Ratings

IN to GND. -0.3V to 7V
 LX to GND. -0.3V to 35V
 EN to GND. -0.3V to VIN
 FB to GND. -0.3V to VIN
 Thermal Resistance Junction to Ambient, (θ_{JA})*
 SOT-23-5. 240°C/W
 WDFN2X2-6 TBD°C/W

Continuous Power Dissipation ($T_A=25^\circ\text{C}$)*

SOT-23-5 400mW
 WDFN2X2-6 TBDmW
 Thermal Resistance Junction to Case, (θ_{JC})
 SOT-23-5. 60°C/W
 WDFN2X2-6 TBD°C/W
 Operating Temperature Range -40°C to +85°C
 Junction Temperature +150°C
 Storage Temperature -65°C to +150°C
 Reflow Temperature (soldering, 10sec) 260°C

* Please refer to Minimum Footprint PCB Layout Section.

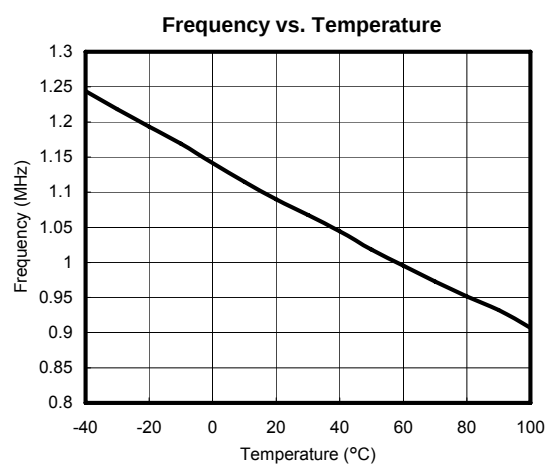
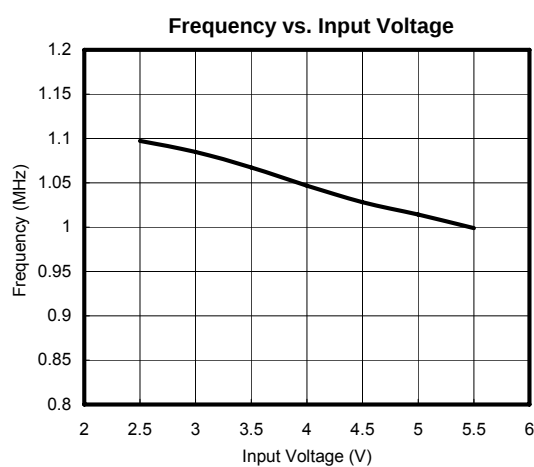
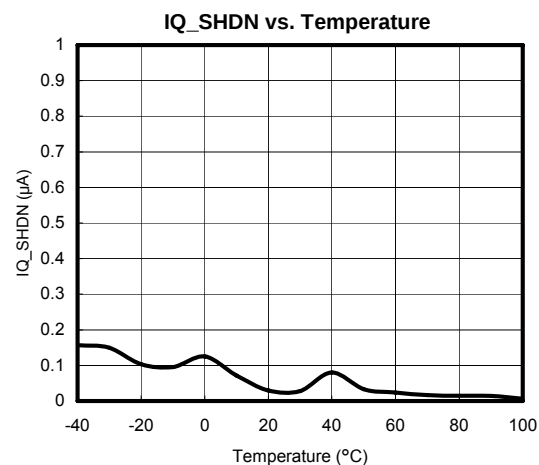
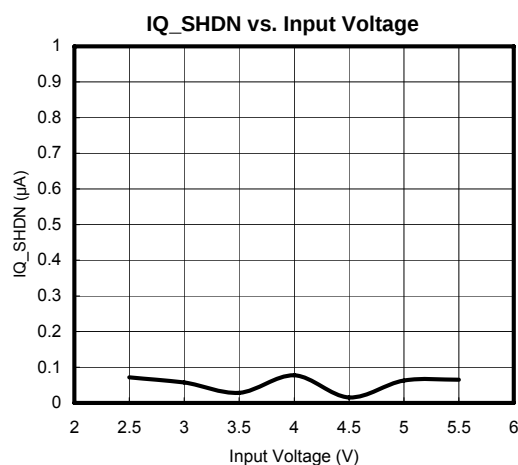
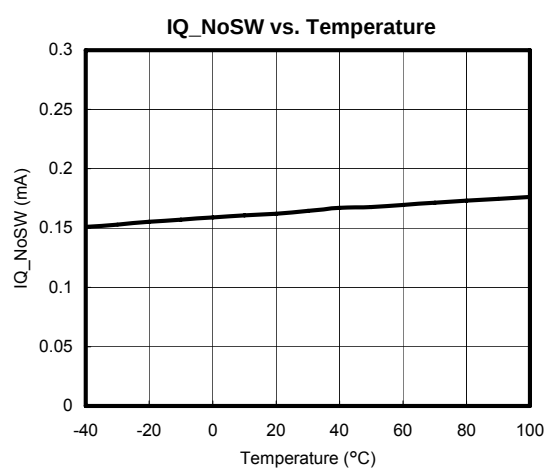
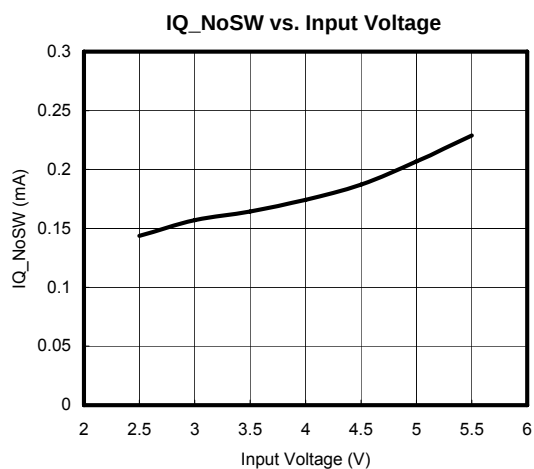
Electrical Characteristics

$V_{IN}=V_{EN}=3.6\text{V}$, $T_A = 25^\circ\text{C}$.

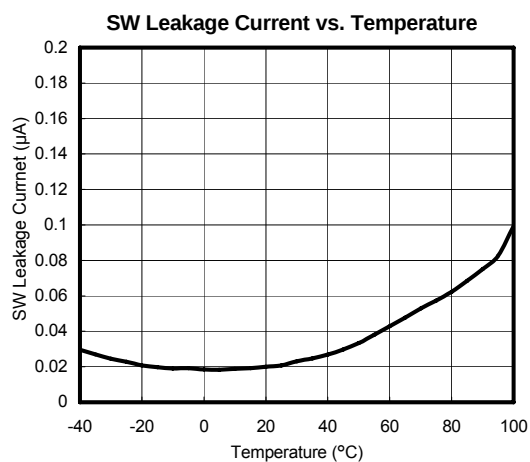
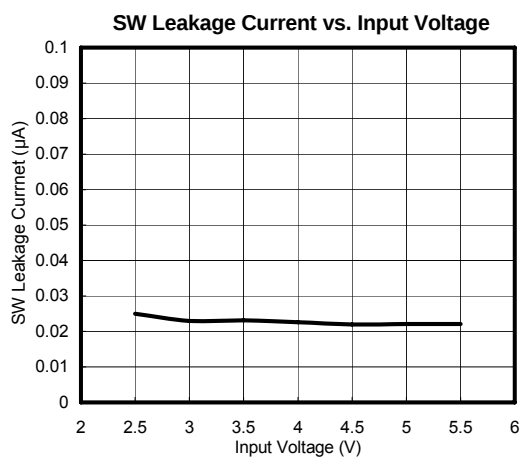
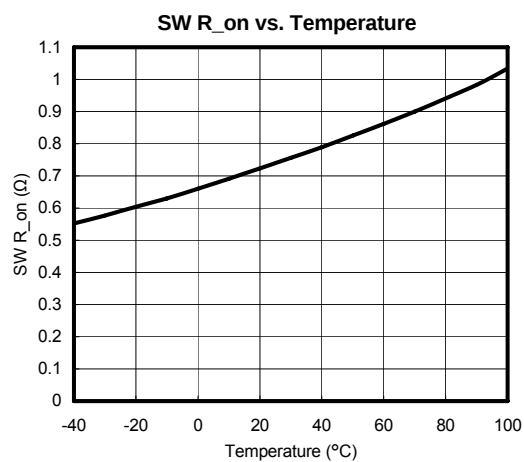
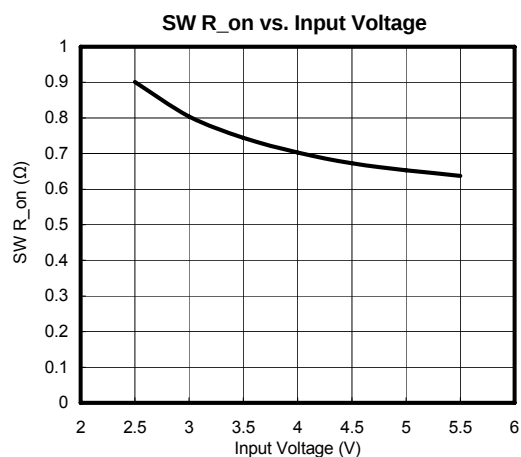
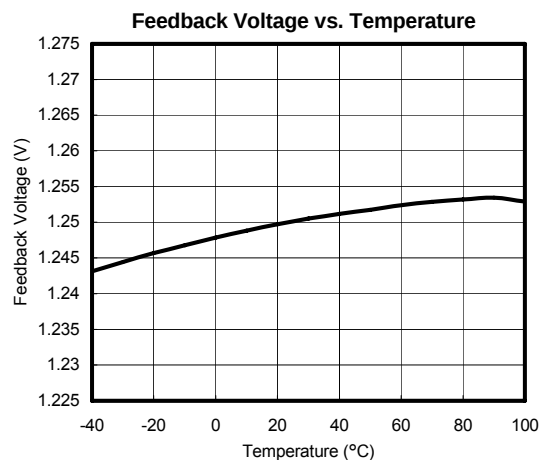
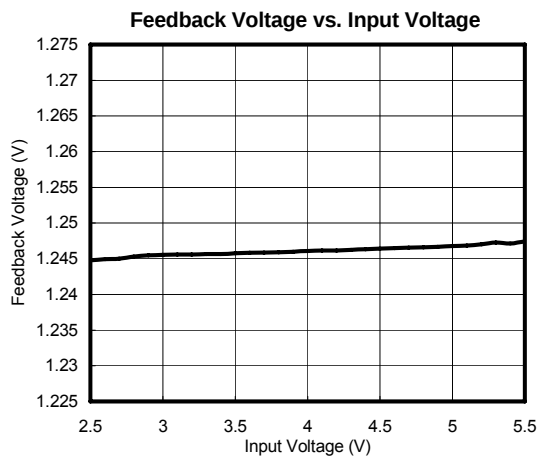
PARAMETER		CONDITIONS	MIN	TYP	MAX	UNITS
Operating Input Voltage			2.7	---	5.5	V
Quiescent Current		No Switching	---	0.2	0.3	mA
Shutdown Supply Current		EN=0V	---	0	1	μA
EN Input Level	V_{IH}		1.5	---	---	V
	V_{IL}		---	---	0.8	V
UVLO _{RISE}			2	2.25	2.5	V
Oscillator Frequency			---	1	---	MHz
Maximum Duty Cycle			85	90	---	%
Feedback Regulation Voltage			1.225	1.250	1.275	V
NMOS R_{DS-ON}		$I_{LX}=200\text{mA}$	---	700	---	mΩ
LX Leakage Current		EN=0, $V_{LX}=35\text{V}$	---	---	10	μA
Switching Current Limit		duty cycle=80%	500	850	1300	mA
Over Temperature	Trigger		---	120	---	°C
	Hysteresis		---	20	---	°C
Soft Start			---	0.5	---	ms

Typical Performance Characteristics

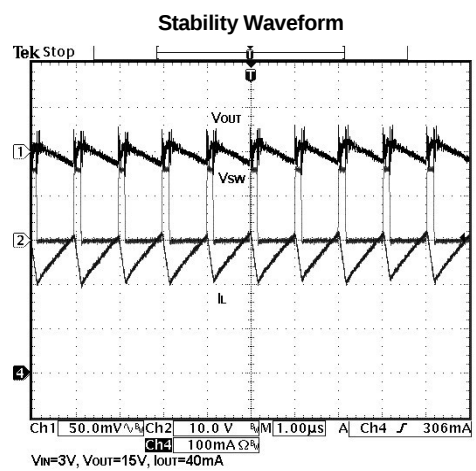
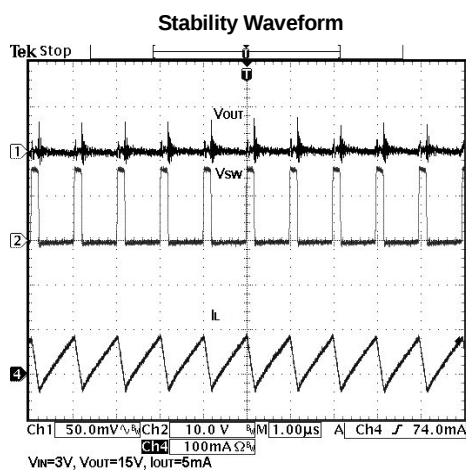
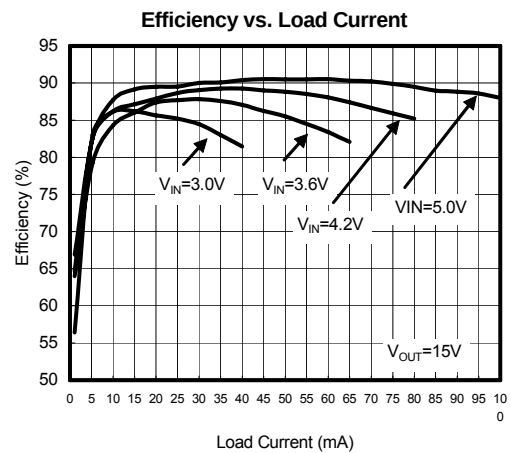
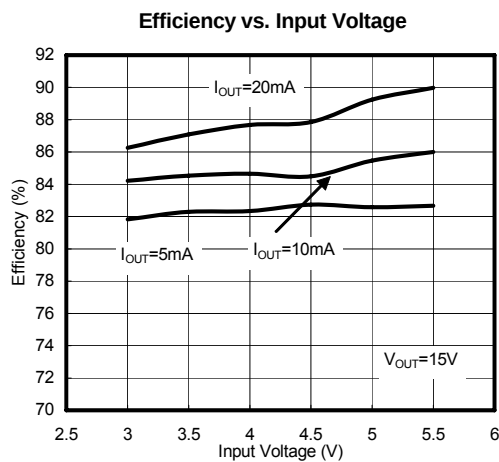
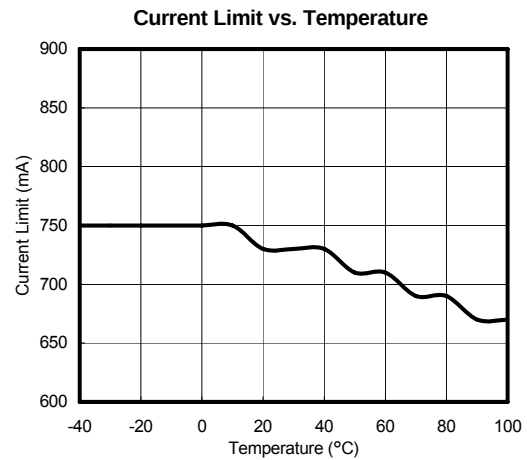
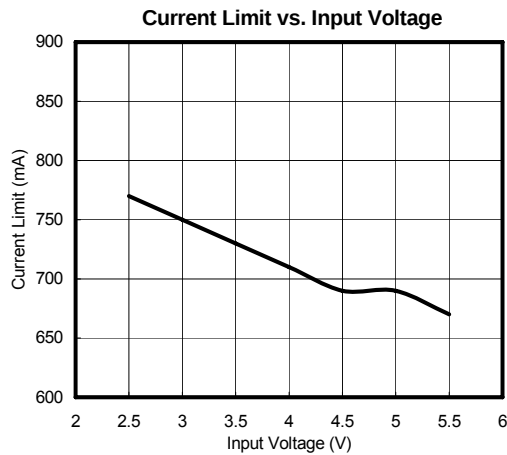
($V_{CC} = +3.6V$, $V_{EN} = +3.6V$, $L = 22\mu H$, $T_A = 25^\circ C$, unless otherwise noted.)



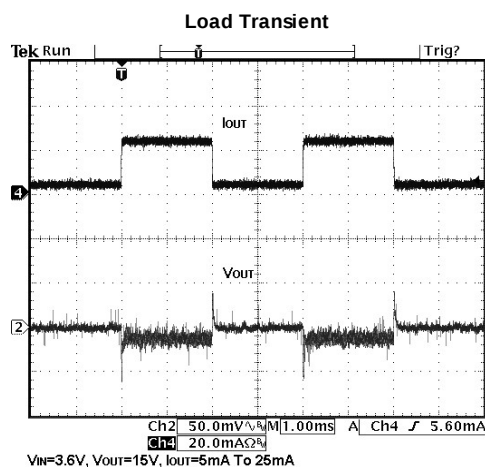
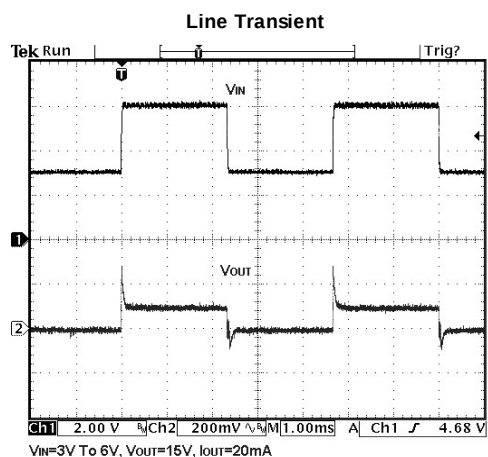
Typical Performance Characteristics (continued)



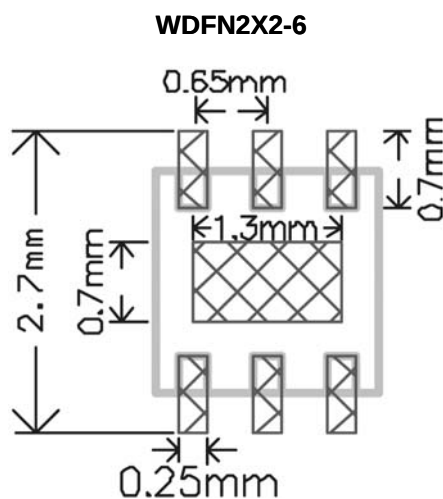
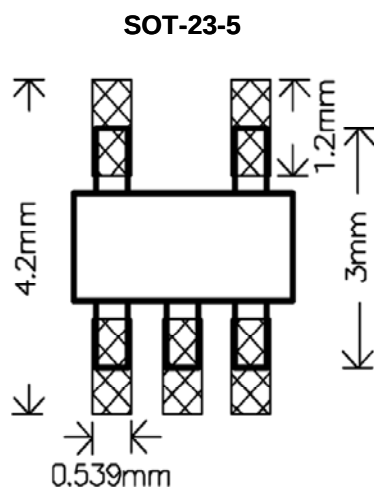
Typical Performance Characteristics (continued)



Typical Performance Characteristics (continued)



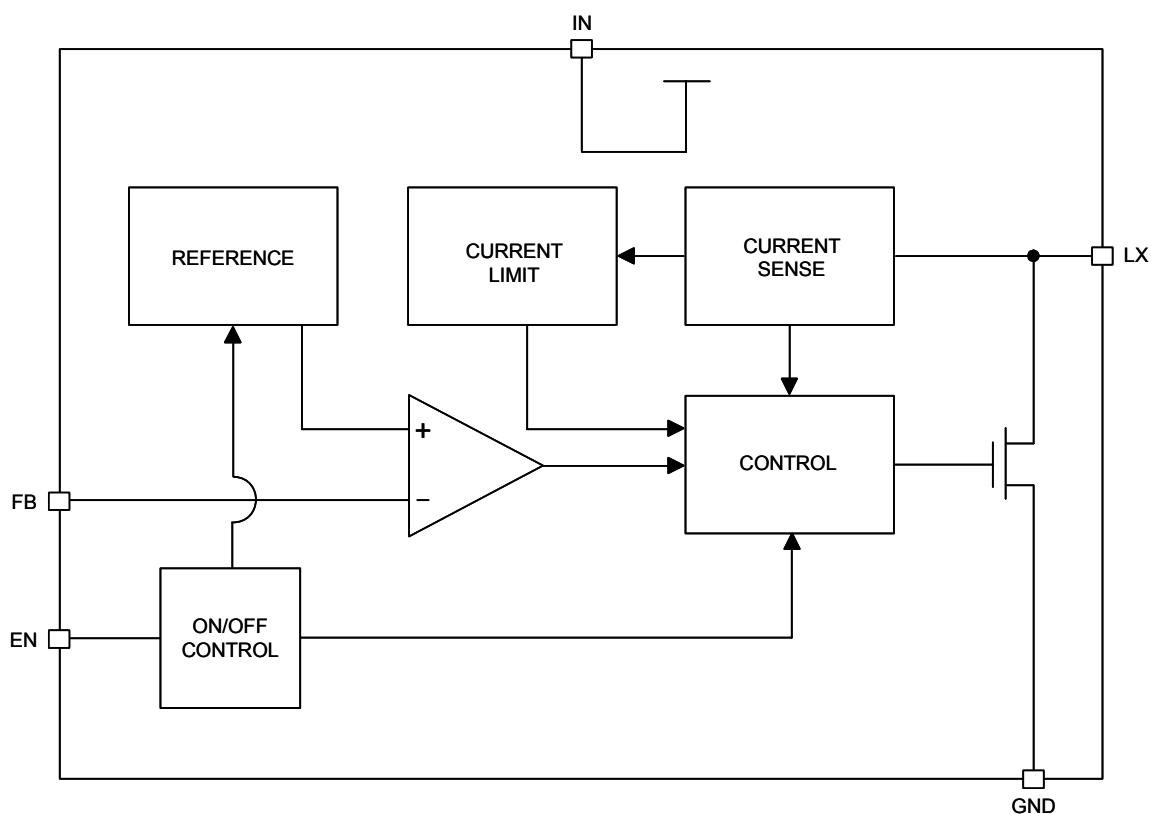
Minimum Footprint PCB Layout Section



Pin Descriptions

PIN		Name	FUNCTION
SOT-23-5	WDFN2X2-6		
1	6	LX	Power Switching Output
2	1,5	GND	Ground Pin.
3	4	FB	Feedback Input.
4	3	EN	Enable Input. Drive EN high to turn on the regulator, drive it low to turn it off.
5	2	IN	Power Input Pin. It must be bypassed with a low-ESR capacitor.

Block Diagram



Operating

The M5125 step-up DC-DC converter operates from a 2.7V to 5.5V supply and converts up to 30V. The device includes an internal switching MOSFET with a 0.7Ω on-resistance and consumes 200 μ A of supply current. During startup, the M5125 limits the maximum on-time to limit initial battery inrush current. Adjust the output voltage by connecting a voltage divider from the output (VOUT) to FB. Select R1 and R2 (see application circuit) to set the voltage of FB (VFB) equaling 1.25V and VOUT may up to 30V. The M5125 built in a cycle-by-cycle 850mA current-limit function to maximum inductor current. The M5125 consumes 0.1 μ A when voltage of EN is Low.

Application Information

Inductor Selection

The inductor's saturation current rating should be greater than the peak switching current. The large inductance prevents the large inductor's current ripple to induce maximum current limit in on-time period and output voltage ripple can be reduced also. Inductor with low core losses and small DCR (cooper wire resistance) is recommended.

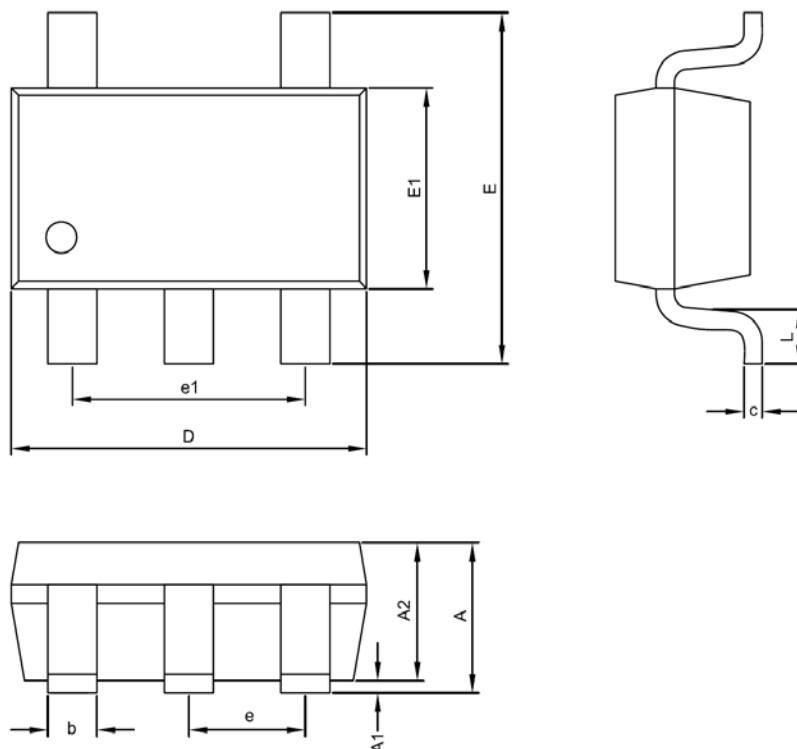
Capacitor Selection

The small size of ceramic capacitors makes them suitable for M5125 applications. X5R and X7R types are recommended because they retain their capacitance over wider voltage and temperature ranges than other types such as Y5V or Z5U. A minimum 10 μ F capacitor for output is required for most applications. Larger input/output capacitor minimizes input/output ripple.

Diode Selection

Schottky diodes, with their low forward voltage drop and fast reverse recovery, are the ideal choices for M5125 applications. The forward voltage drop of a Schottky diode represents the conduction losses in the diode, while the diode capacitance (C_T or C_D) represents the switching losses. For diode selection, both forward voltage drop and diode capacitance need to be considered. Schottky diodes with higher current ratings usually have lower forward voltage drop and large diode capacitance, which can cause significant switching losses at the 1MHz switching frequency of the M5125.

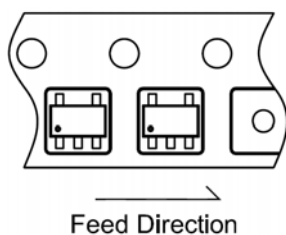
Package Information



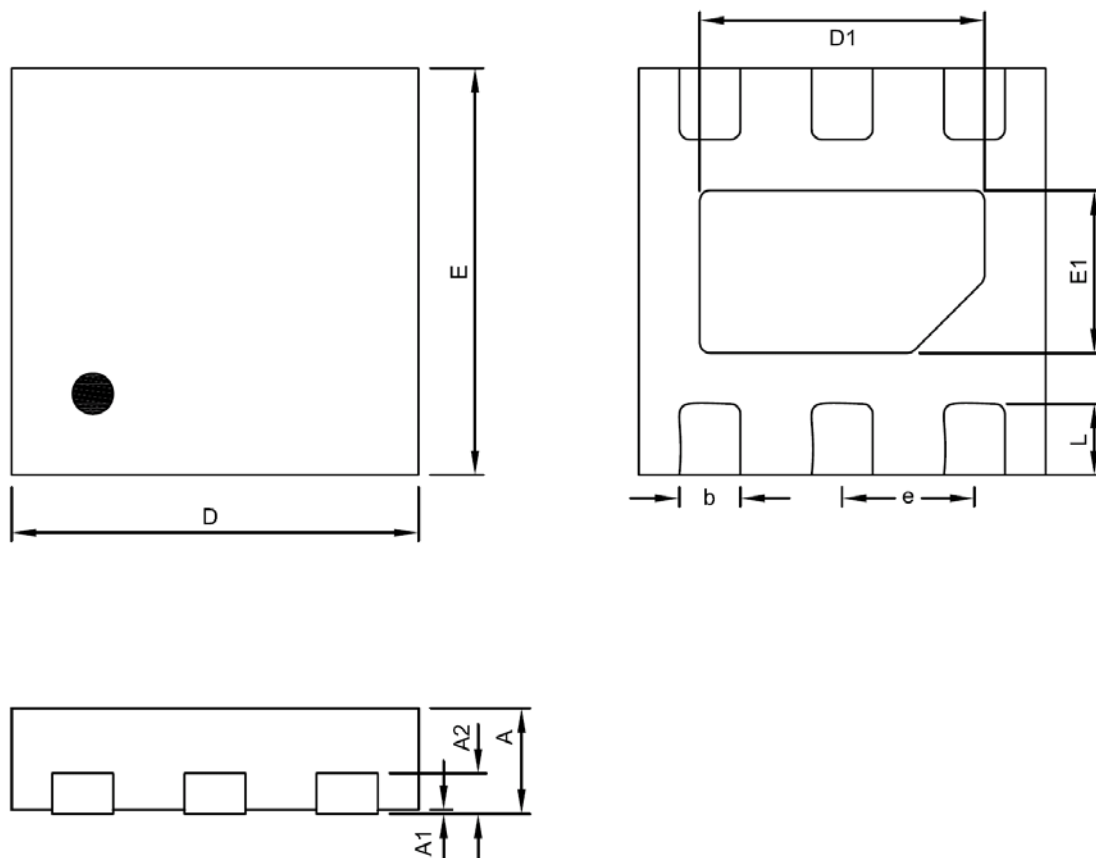
SOT-23-5 Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.00	1.10	1.45	0.039	0.043	0.057
A1	0.00	---	0.15	0.000	---	0.006
A2	1.00	1.10	1.30	0.039	0.043	0.051
D	2.70	2.90	3.10	0.106	0.114	0.122
E	2.60	2.80	3.00	0.102	0.110	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
c	0.08	0.15	0.25	0.003	0.006	0.010
b	0.30	0.40	0.50	0.012	0.016	0.020
e	0.95 BSC			0.037 BSC		
e1	1.90 BSC			0.075 BSC		
L	0.30	0.45	0.60	0.012	0.018	0.024

Taping Specification



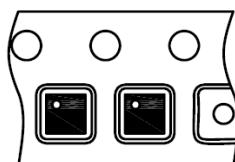
PACKAGE	Q'TY/REEL
SOT-23-5	3,000 ea



WDFN2X2-6 Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.45	0.50	0.55	0.0177	0.0197	0.0217
A1	0.00	---	0.05	0.0000	---	0.0020
A2	0.19	0.20	0.21	0.0075	0.0079	0.0083
D	1.95	2.00	2.05	0.0768	0.0787	0.0807
E	1.95	2.00	2.05	0.0768	0.0787	0.0807
D1	1.30	1.40	1.50	0.0512	0.0551	0.0591
E1	0.70	0.80	0.90	0.0276	0.0315	0.0354
b	0.25	0.30	0.35	0.0098	0.0118	0.0138
e	0.65 BSC			0.0256 BSC		
L	0.30	0.35	0.40	0.0118	0.0138	0.0157

Taping Specification



Feed Direction

PACKAGE	Q'TY/REEL
WDFN2X2-6	3,000 ea