

## White LED/OLED Step-Up Converter

### ● Features

- Integrated 500mΩ Power MOSFET
- 40μA Quiescent Current
- 2.5V to 5.5V Input Voltage
- 1.2MHz Fixed Switching Frequency
- Internal 1.5A Switch Current Limit
- Internal Compensation
- Up to 28V Output Voltage
- Automatic Pulse Frequency Modulation Mode at Light Loads
- Over 85% Efficiency
- Available in a 5-Pin TSOT23-5 Package

### ● Applications

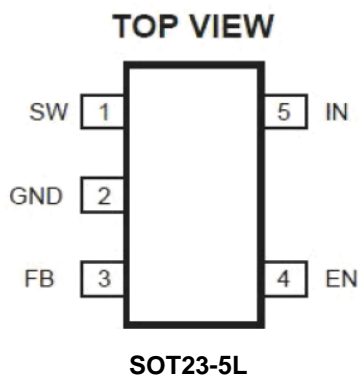
- . OLED Applications
- . Cell Phones
- . Digital Cameras
- . PDAs, Laptops
- . MP3 Players
- . GPS

### ● General Description

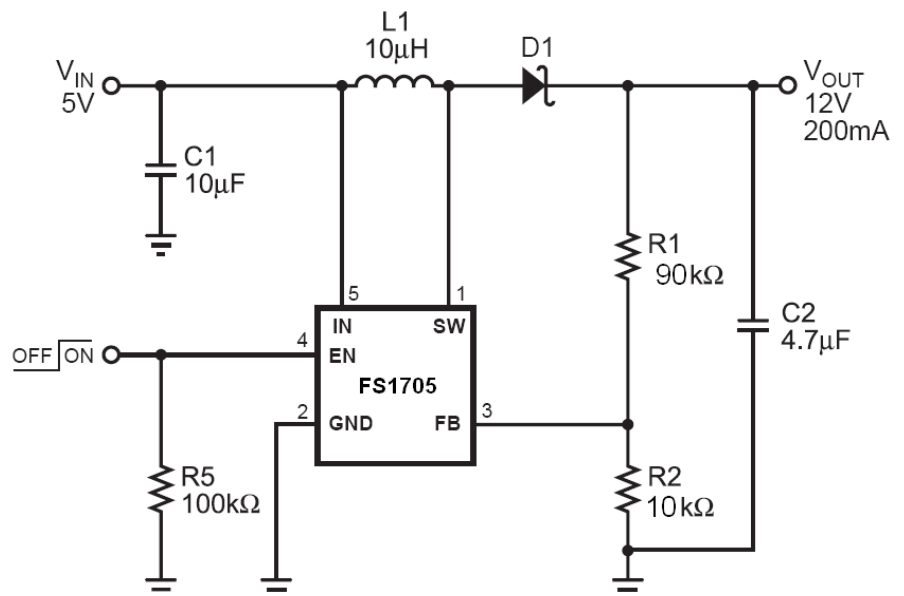
The FS1705 is a constant frequency, 5-pin TSOT25 current mode step-up converter intended for small, low power applications. The FS1705 switches at 1.2MHz and allows the use of tiny, low cost capacitors and inductors 2mm or less in height. Internal soft-start results in small inrush current and extends battery life. The FS1705 operates from an input voltage as low as 2.5V and can generate 28V at up to 100mA from a 5V supply.

The FS1705 features automatic shifting to pulse frequency modulation mode at light loads. The FS1705 includes under-voltage lockout, current limiting, and thermal overload protection to prevent damage in the event of an output overload.

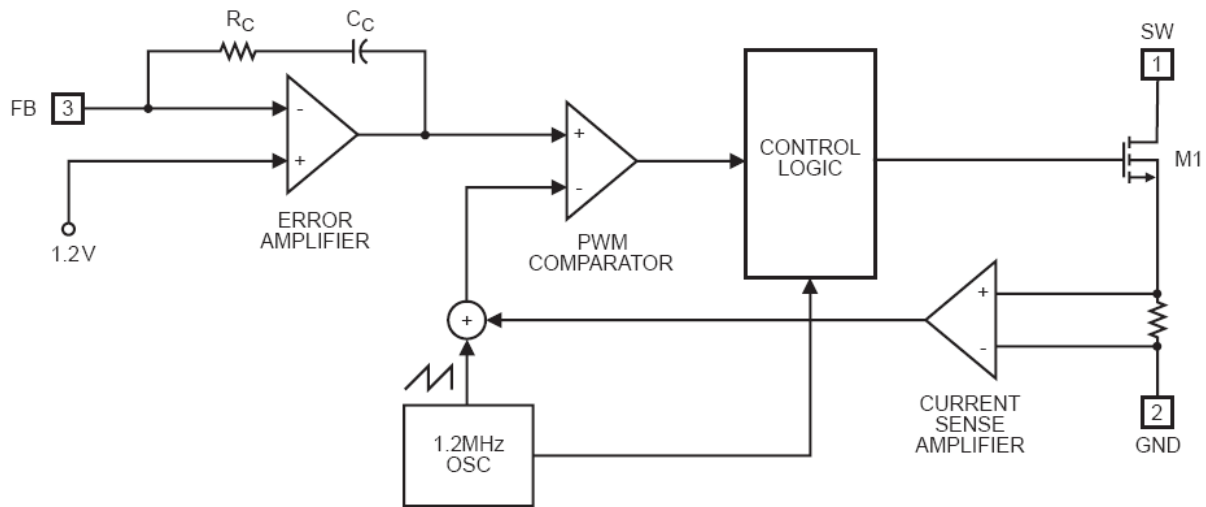
### ● Pin Configurations



### ● Typical Application Circuit



## ● Typical Block Diagram



## ● Pin Description

PIN	NAME	FUNCTION
1	SW	Power Switch Output. SW is the drain of the internal MOSFET switch. Connect the power inductor and output rectifier to SW. SW can swing between GND and 28V
2	GND	Ground Pin
3	FB	Feedback Input. The FB voltage is 1.2V. Connect a resistor divider to FB
4	EN	Regulator On/Off Control Input. A high input at EN turns on the converter, and a low input turns it off. When not used, connect EN to the input supply for automatic startup.
5	IN	Input Supply Pin. Must be locally bypassed.

## ● Absolute Maximum Ratings

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

Parameter	Value	Units
IN, Voltage	-0.3 to 7	V
SW Voltage	-0.3 to 30	V
FB Voltage	-0.3 to $V_{IN} + 0.3$	V
Maximum Power Dissipation (derate 5mW/°C above $T_A = 50^\circ\text{C}$ )	0.4	W
Junction to Ambient Thermal Resistance ( $\theta_{JA}$ )	190	°C/W
Operating Junction Temperature	-40 to 150	°C
Lead Temperature (Soldering, 10 sec)	300	°C

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## ● Electrical Characteristics

( $V_{IN}=V_{EN}=3.7V, T_A=25^{\circ}C, C_{IN}=C_{OUT}=1.0\mu F$  all capacitors are ceramic unless otherwise specified.)

Parameter	Conditions	MIN	TYP	MAX	unit
Input Voltage Range		2.5		5.5	V
UVLO Threshold			2.2	2.45	V
Under Voltage Lockout Hysteresis			100		mV
Shutdown Current	$V_{EN}=0V$		0.1	1	$\mu A$
Quiescent Current (PFM)	$V_{FB}=1.4V$ , No switch		40	60	$\mu A$
Supply Current (PWM)	$V_{FB}=1V$ , switch		0.6	1	mA
Regulated Feedback Voltage		1.176	1.2	1.224	V
FB Input Bias Current	$V_{FB} = 1.2V$	-50	-10		nA
Oscillation Frequency			1.2		MHz
Maximum Duty Cycle	$V_{FB} = 0V$	90			%
ON Resistance of NMOS(1)			0.5		$\Omega$
Peak Current Limit(1)	$V_{IN} = 4.2V$ , Duty cycle=50%		1.5		A
EN Shutdown Voltage				0.4	V
EN Enable Voltage		1.5			V
SW Leakage Current	$V_{sw}=20V$			1.0	$\mu A$
Thermal Shutdown			155		$^{\circ}C$

## ● Application Information

### Setting the Output Voltage

Set the output voltage by selecting the resistive voltage divider ratio. Determine the high-side resistor R1 by the equation:

$$R1 = \frac{R2(V_{OUT} - V_{FB})}{V_{FB}}$$

Where  $V_{OUT}$  is the output voltage and  $V_{FB}$  is the feedback voltage.

### Selecting the Input Capacitor

An input capacitor is required to supply the AC ripple current to the inductor, while limiting noise at the input source. This capacitor must have low ESR, so ceramic is the best choice. Use an input capacitor value of  $4.7\mu F$  or greater. This capacitor must be placed physically close to the IN pin. Since it reduces the voltage ripple seen at IN, it also reduces the amount of EMI passed back along that line to the other circuitry.

### Selecting the Output Capacitor

A single  $4.7\mu F$  to  $10\mu F$  ceramic capacitor usually provides sufficient output capacitance for most applications. If larger amounts of capacitance are desired for improved line support and transient response, tantalum capacitors can be used in parallel with the ceramic. The impedance of the ceramic capacitor at the switching frequency is dominated by the capacitance, and so the output voltage ripple is mostly independent of the ESR.

### Selecting the Inductor

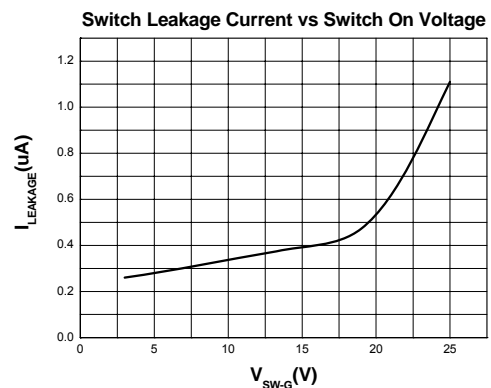
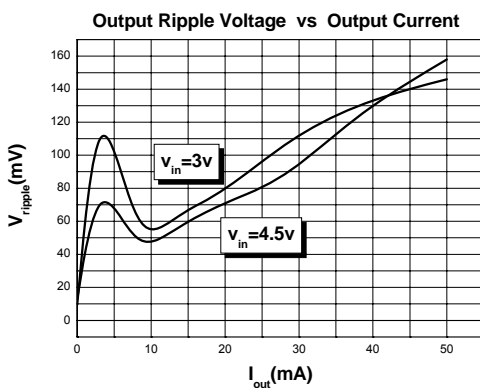
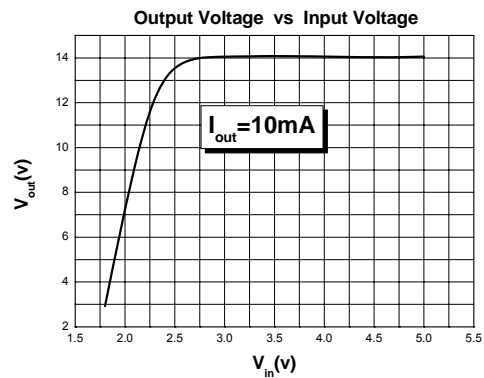
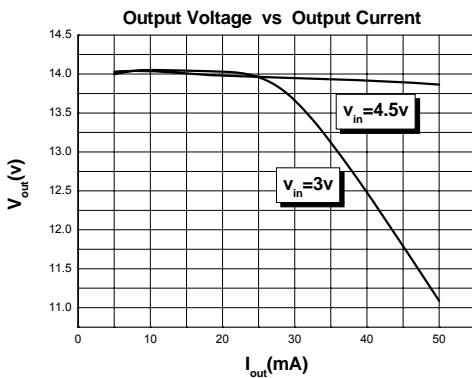
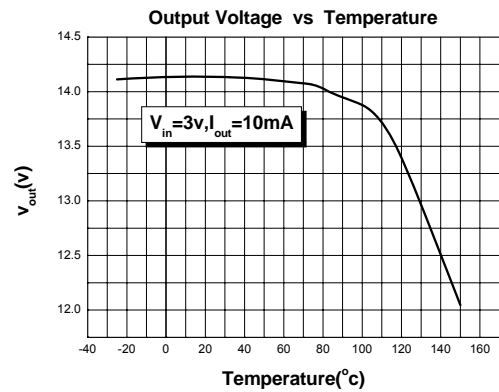
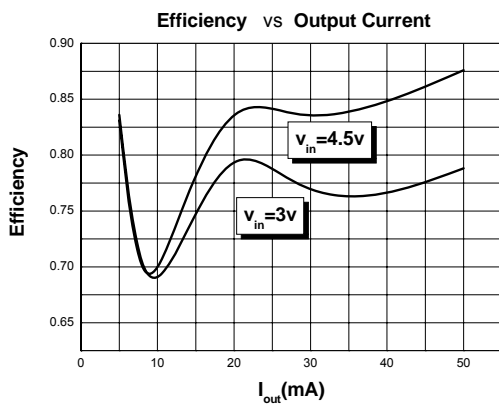
The inductor is required to force the output voltage higher while being driven by the lower input voltage. Choose an inductor that does not saturate at the SW current limit. A good rule for determining the inductance is to allow the peak to peak ripple current to be approximately 30%-50% of the maximum input current. Make sure that the peak inductor current is below 75% of the typical current limit at the duty cycle used to prevent loss of regulation due to the current limit variation.

For the FS1705,  $4.7\mu H$  is recommended for input voltages less than 3.3V and  $10\mu H$  for inputs greater than 3.3V.

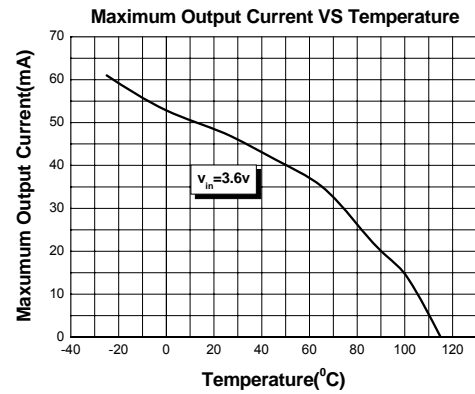
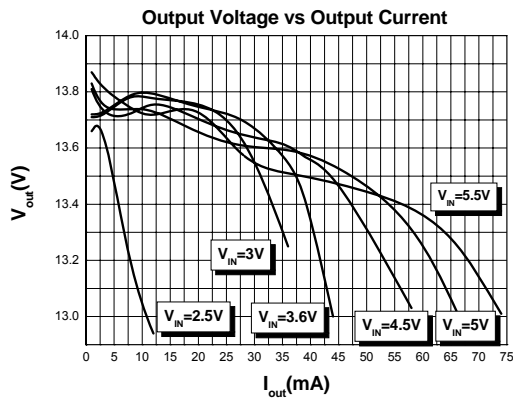
## Selecting the Diode

The output rectifier diode supplies current to the inductor when the internal MOSFET is off. To reduce losses due to diode forward voltage and recovery time, use a Schottky diode. Choose a diode whose maximum reverse voltage rating is greater than the maximum output voltage. It is recommended to choose the MBR0520 for most applications. This diode is used for load currents less than 500mA. If the average current is more than 500mA the Microsemi UPS5817 is a good choice.

- **Typical Performance Characteristics**

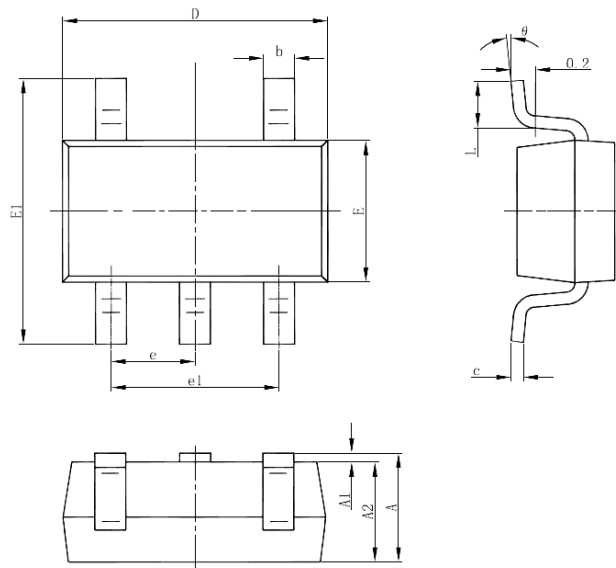


# FS1705



- **Package Information**

**SOT-23-5L PACKAGE OUTLINE DIMENSIONS**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°