

## High-Efficiency, 29V White LED Driver with Dimming Control

### Description

The FP6755 is a step-up DC/DC converter specifically designed for driving WLEDs with a constant current. The FP6755 can drive up to 8 white LEDs in series from a Lithium Ion battery. Series connection of LEDs provides identical LED current for uniform brightness and minimizes the number of traces to the LEDs. The FP6755 uses current mode, fixed frequency of approximately 1.3MHz architecture to regulate the LED current through an external current sense resistor. The low feedback voltage of 195mV can minimize power dissipation.

Other features include current limit protection, thermal shutdown protection, under-voltage lockout (UVLO), and over-voltage function, which can shut off the device if output voltage reaches above 29V.

The FP6755 is available in space saving SOT-23-6, TSOT-23-6 and TDFN-6 (2mmx2mm) packages.

### Features

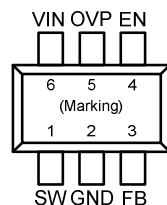
- Wide Range for PWM Dimming, Ranging from 100Hz to 50kHz
- High Efficiency: 87%
- Drives up to 8 WLEDs
- Fast 1.3MHz Switching Frequency
- Low 195mV Feedback Voltage
- Over Voltage Protection
- 1% Min. Dimming Duty at 20kHz
- Low Profile SOT-23-6, TSOT-23-6 and TDFN-6 (2mmx2mm) Packages
- RoHS Compliant

### Applications

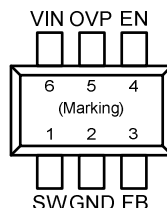
- Cellular Phone
- Digital Camera
- LCD Panel Backlight
- GPS Receiver
- PDA, Handheld Computer

### Pin Assignments

#### S6 Package (SOT-23-6)



#### S9 Package (TSOT-23-6)



#### WD Package (TDFN-6 (2mmx2mm))

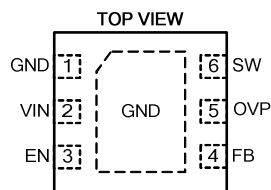
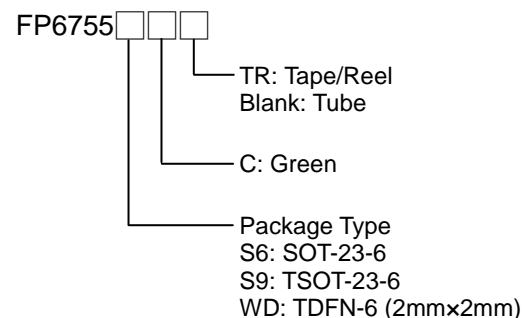


Figure 1. Pin Assignment of FP6755

### Ordering Information



#### SOT-23-6 Marking

Part Number	Product Code
FP6755S6CTR	FG4

#### TSOT-23-6 Marking

Part Number	Product Code
FP6755S9CTR	FG5

#### TDFN-6 (2mmx2mm) Marking

Part Number	Product Code
FP6755WDCTR	FG6

## Typical Application Circuit

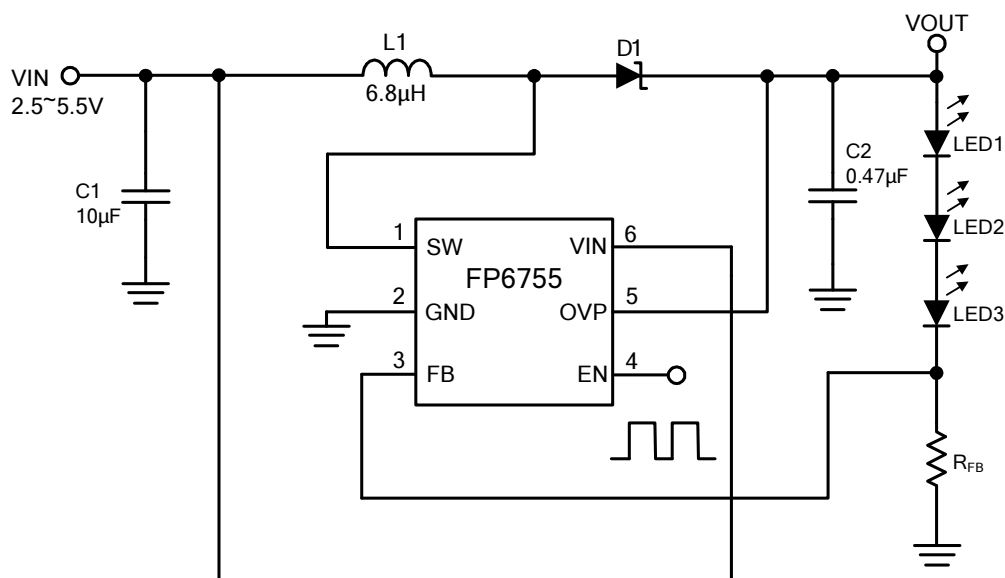


Figure 2. Typical Application Circuit of FP6755

## Functional Pin Description

Pin Name	Pin No. (SOT-23-6) (TSOT-23-6)	Pin No. (TDFN-6)	Pin Function
SW	1	6	Switch Node Pin. Connect inductor/diode here. Minimize trace area at this node to reduce EMI.
GND	2	5	Ground Pin. Connect directly to local ground plane.
FB	3	4	Feedback Pin. Reference voltage is 195mV. Connect cathode of the lowest LED and resistor here. Calculate resistor value according to the formula: $R_{FB} = V_{FB} / I_{LED}$
EN	4	3	Enable and dimming control 1. Enable: Logic high enables the device; logic low forces the device into shutdown mode. 2. Digital dimming control: apply external 100Hz to 50kHz PWM pulse signal with amplitude greater than 1.5V.
OVP	5	2	Over Voltage Input. OVP measures the output voltage for open circuit protection. Connect OVP to the output at the top of the LED string.
VIN	6	1	Input Supply Pin. Must be locally bypassed.

## Block Diagram

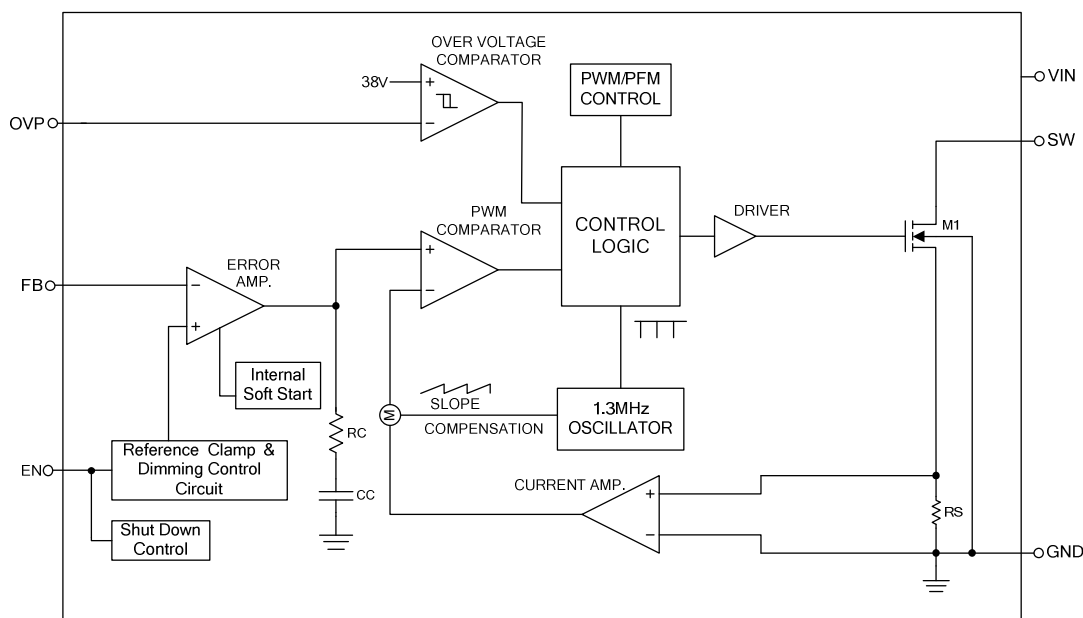


Figure 3. Block Diagram of FP6755

## Absolute Maximum Ratings

- VIN ----- +6V
- SW Voltage ----- +33V
- FB Voltage ----- +6V
- EN Voltage ----- +6V
- Maximum Junction Temperature ( $T_J$ ) ----- +150°C
- Power Dissipation @  $T_A=25^\circ\text{C}$ , ( $P_D$ )
  - SOT-23-6/TSOT-23-6 ----- + 0.40W
  - TDFN-6 (2mmx2mm) ----- +1.25W
- Package Thermal Resistance, ( $\theta_{JA}$ )
  - SOT-23-6/TSOT-23-6 ----- +250°C/W
  - TDFN-6 (2mmx2mm) ----- +80°C/W
- Storage Temperature Range ( $T_S$ ) ----- -65°C to +150°C
- Lead Temperature (Soldering, 10 sec.) ( $T_{LEAD}$ ) ----- +260°C

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

## Recommended Operating Conditions

- Input Voltage ( $V_{IN}$ ) ----- +2.5 to +5.5V
- Operating Temperature Range ----- -40°C to +85°C

## Electrical Characteristics

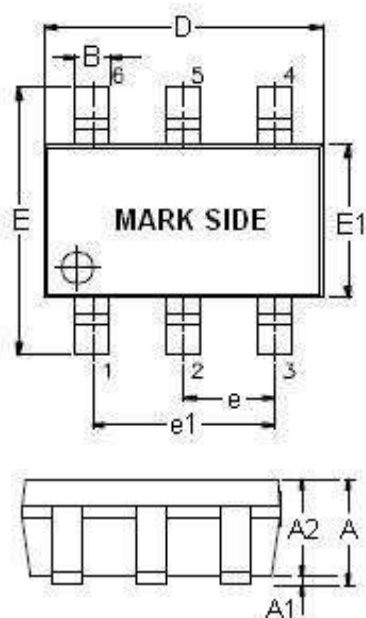
( $V_{IN}=V_{EN}=5V$ ,  $T_A=+25^{\circ}C$ , unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating Input Voltage	$V_{IN}$		2.5		5.5	V
Operation Current	$I_{SD}$	$V_{EN}=0V$		4	8	$\mu A$
	$I_Q$	$V_{FB}=0.2V$		430	550	$\mu A$
Switching Frequency	$f_{SW}$		1.0	1.3	1.5	MHz
Maximum Duty Cycle	Duty	$V_{FB}=0V$	92			%
<b>Under Voltage Lockout</b>						
VIN Under Voltage Lockout	UVLO	$V_{IN}$ Rising		2.25	2.45	V
Under Voltage Lockout Hysteresis				92		mV
Open Lamp Shutdown Threshold	$V_{OV}$	$V_{OUT}$ Rising	28	29		V
<b>Enable</b>						
EN OFF Threshold		$V_{EN}$ Falling			0.4	V
EN ON Threshold		$V_{EN}$ Rising	1.4			V
Dimming On Time	$T_{ON}$	$V_{IN}=5V$	1			$\mu s$
<b>Feedback</b>						
FB Voltage	$V_{FB}$	$V_{EN}=1.5V$	185	195	205	mV
FB Input Bias Current	$I_{FB}$	$V_{FB}=0.1V$		-300		nA
<b>Output Switch</b>						
SW ON-Resistance (Note 2)	$R_{ON}$			0.25		$\Omega$
SW Current Limit (Note 2)	$I_{LM}$			2		A
Thermal Shutdown (Note 2)	$T_{SD}$			150		$^{\circ}C$

Note 2 : The specification is guaranteed by design, not production test.

## Outline Information

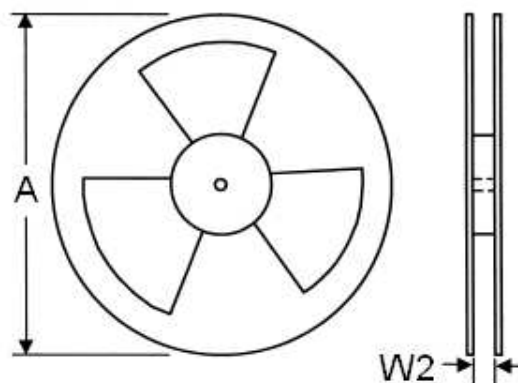
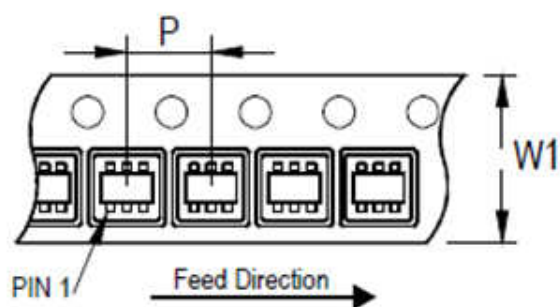
SOT-23-6 Package (Unit: mm)



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.

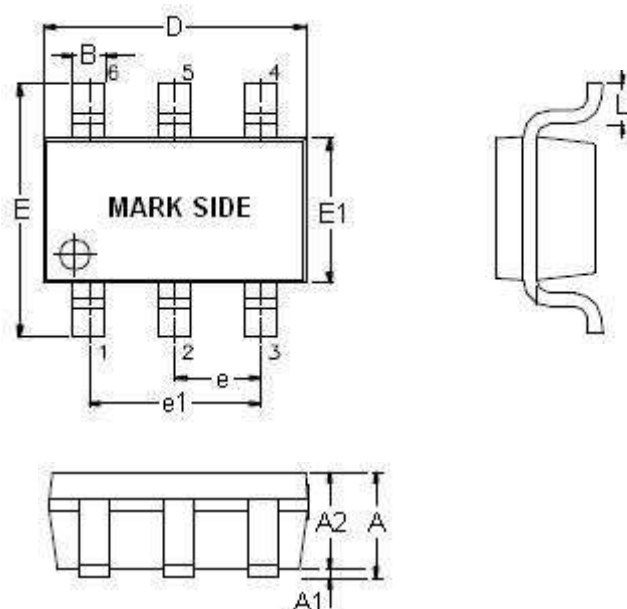
## Carrier Dimensions



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

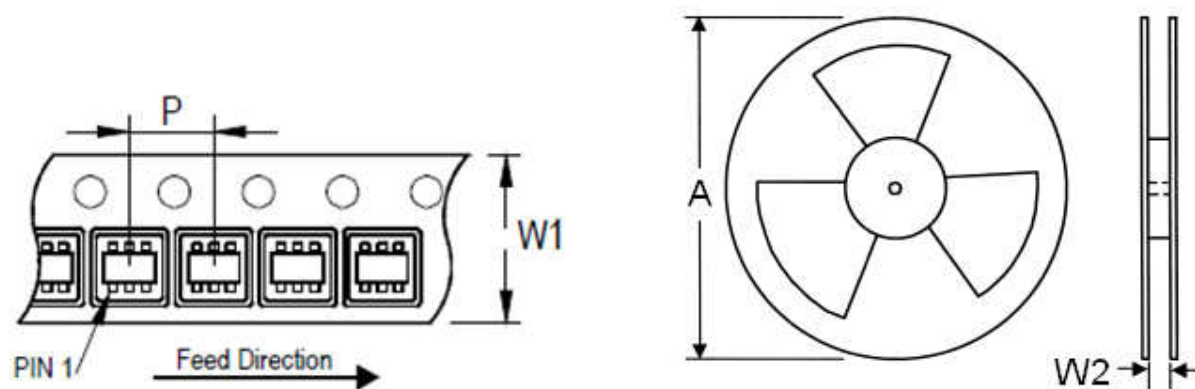
## Outline Information (Continued)

TSOT-23-6 Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.70	0.90
A1	0.00	0.10
A2	0.70	1.00
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

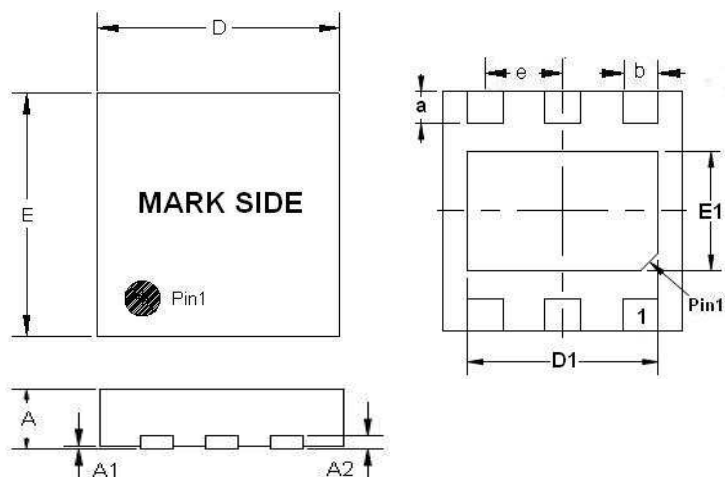
## Carrier Dimensions



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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8	4	7	180	8.4	300~1000	3,000

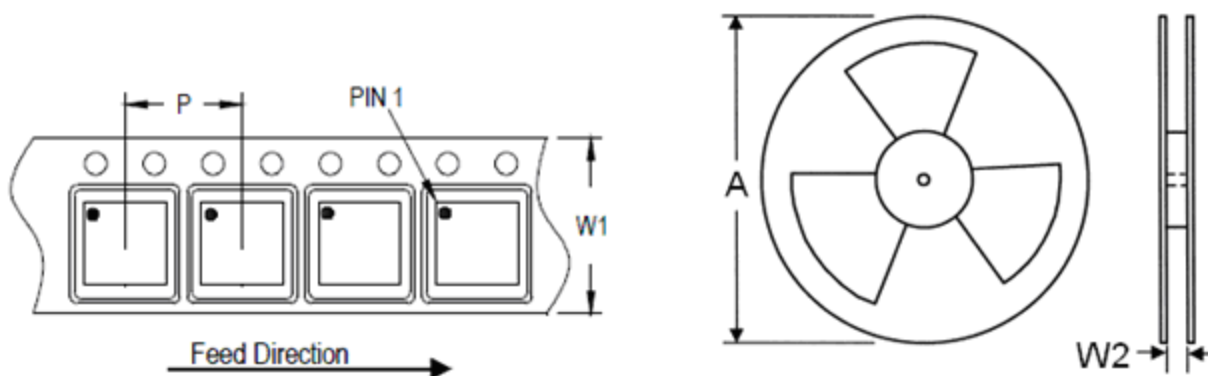
## Outline Information (Continued)

TDFN-6 2mm×2mm (pitch 0.65 mm)Package (Unit: mm)



SYMBOLS UNIT	DIMENSION IN MILLIMETER	
	MIN	MAX
A	0.70	0.80
A1	0.00	0.05
A2	0.19	0.22
D	1.95	2.05
E	1.95	2.05
a	0.20	0.40
b	0.25	0.35
e	0.60	0.70
D1	1.15	1.65
E1	0.55	1.05

## 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	400~1000	3,000

### Life Support Policy

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