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FAIRCHILD SEMICONDUCTOR®

December 2006

FAN5617 High Efficiency, Constant-Current LED Driver with Adaptive Charge Pump and TinyWire™ Single-Wire Control Evaluation Kit

Features

- 3-Channel Parallel LED Driver with TinyWire™ Digital Brightness Control
- 32 Static Brightness Levels with 5-Bit Internal DAC
- Built-in Charge Pump with Three Modes of Operation: 1x (Linear), 1.5x and 2x
- Up to 90% Efficiency
- Low EMI, Low Ripple
- 2.7V to 5.5V Input Voltage Range
- 1MHz Operating Frequency
- 3x3mm 16-Lead MLP Package

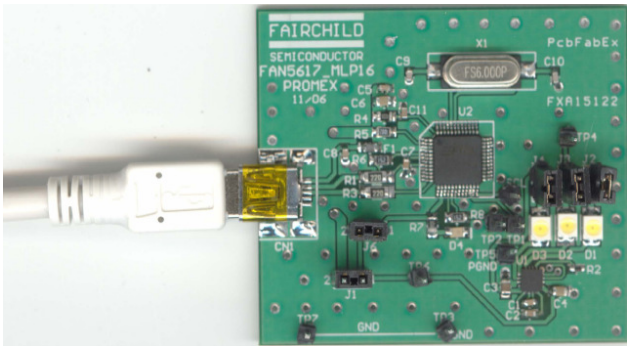

Figure 1: FAN5617MPX Evaluation Board

Description

The **FAN5617 Evaluation Board** is a compact circuit including the FAN5617 in a 3x3mm 16-pin MLP package. LED brightness is controlled via a simple one-wire digital interface. The evaluation board includes a USB interface with mini-B receptacle for easy connection to a PC. A "dashboard" program is provided on an installation CD to set the LED brightness using the TinyWire™ interface. The FAN5617 evaluation board, a completely assembled and tested surface mount board, provides easy probe access points to all inputs and outputs so that electrical characteristics and waveforms can be easily measured.

Kit Contents

- FAN5617 Evaluation Board
- USB Type A to Mini-B Data Cable
- Software Installation CD

PC System Requirements

A PC or Laptop running Windows 2000 or Windows XP with an available USB port connection. USB 2.0 is required for the FAN5617 to run from USB-power. USB 1.1 may be used with an external power supply to run the FAN5617 (see Power Options on next page).

Set-up and Installation Procedure

1. Insert the CD-ROM. If the installation program does not run automatically, run Setup.exe, which is in the root directory of the CD-ROM.
   If you choose to run the program after installation, and before completing step #2 below, you will get an error message.
2. Connect the USB cable between the eval board and PC. Windows should then find the device and attempt to install the driver.
3. Connect any external power supplies, if desired. The FAN5617 eval board can be powered from the USB cable if USB 2.0 is used.
4. Run the software: “FAN5617 TinyWire Control Panel"

Power Options

To Power the FAN5617 from the USB bus:

Connect jumper J1 pins 1 and 2. This is the default configuration when the eval board is shipped.

To use External Power for the FAN5617:

Open jumper J1 pins 1 and 2. Connect power supply + (2.7 - 5.5V) to TP6 and power supply - to TP3.

Measurement Options

Test Point/Jumper	Measurement	Description
TP1: DATA	Monitor DATA or Apply External DATA	Monitor the DATA line via TP1. Or apply external DATA signal to TP1 and either remove jumper J6 or check the "Tri-State Data" Box pictured in Figure 4 to over ride USB chip.
TP2: EN	Monitor ENABLE or Apply External ENABLE	Monitor the EN line via TP2. Or apply external ENABLE signal to TP2.
TP3, TP7: GND	GND	Ground Test Point.
TP4: VOUT	Output Voltage	Apply volt-meter at TP4 to measure output voltage.
TP6: VIN	Supply Current	Apply ammeter between the external power supply V+ output and TP6 +. Remove Jumper J6 to see only the FAN5617 supply current without including the current consumed by the USB chip IO.
J2 - J4	Output LED Current	Apply ammeter to pins 1 and 2 of jumper J2, J3 or J4.

Figure 2: Test Point and Jumper Summary

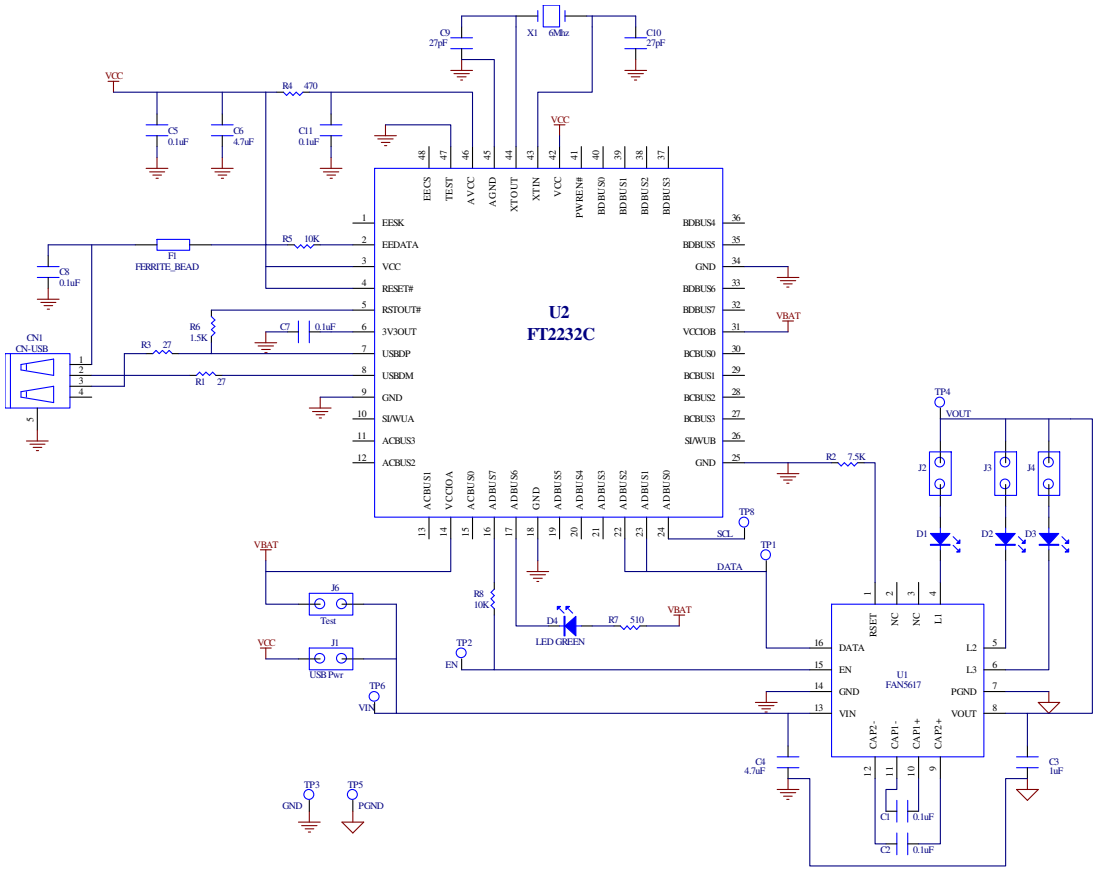

Figure 3: FAN5617MPX Schematic

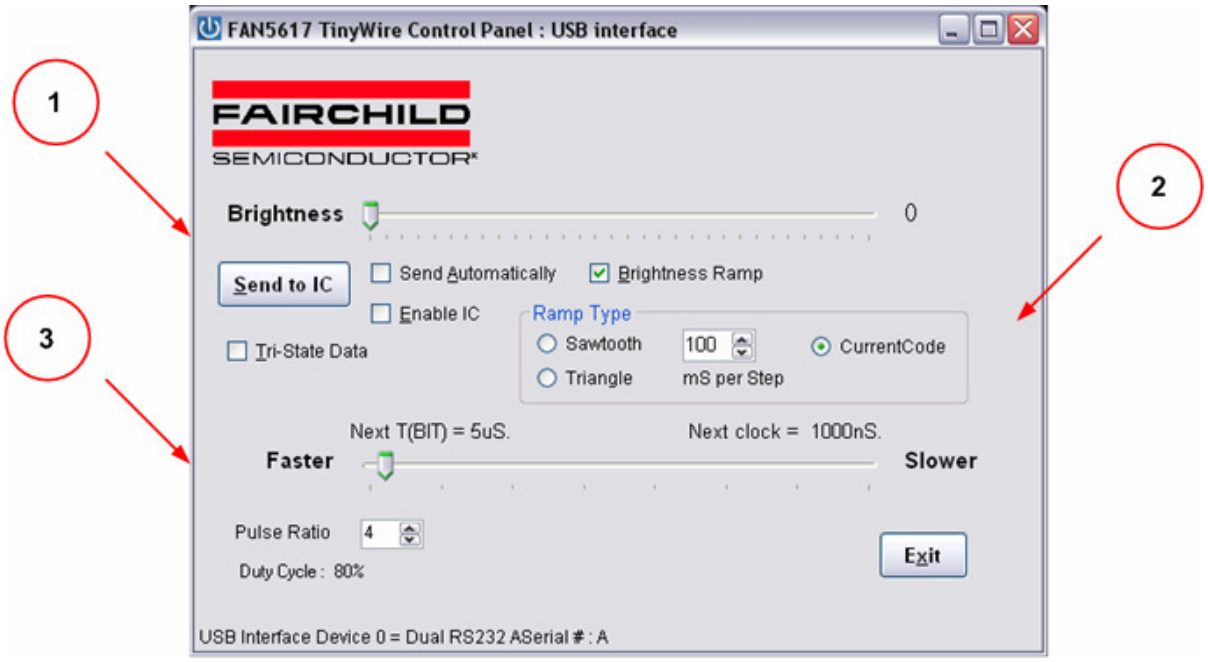

Figure 4: FAN5617 TinyWire Control Panel

Software Functionality (see datasheet for timing diagram)

Control Panel Area	Control	Description	Range
1	**Brightness**	Brightness slider to monitor brightness level or manually drag pointer to desired level.	0 - 31 brightness levels
	Send To IC	Send EN and brightness level to IC.	
	Send Automatically	When checked, sends a new brightness level whenever the brightness slider changes.	
	Enable IC	EN is high when checked.	
	Brightness Ramp	Sends continual brightness commands in ramp, triangle or repeating single command patterns.	
	Tri-State Data	When checked, the DATA line from the USB interface is tri-stated, allowing external DATA to be applied to TP1.	
2	**Sawtooth**	When selected, the brightness level will step from 0 to 31 repeatedly, returning to 0 after code 31 is transmitted.	
	Triangle	When selected the brightness level will step from 0 to 31 to 0 repeatedly.	
	mS per Step	Sets Time Per brightness command Step. Time Per Step varies slightly due to USB latency, which also sets the minimum step time.	30 - 950 mS
	CurrentCode	Repeatedly sends out the current brightness command.	
3	**Next T(BIT)**	Set the time of the next falling edge.	2499ns - 76 µS
	Next Clock	Sets the next clock width of the shortest pulse.	833nS - 25 µS
	Pulse Ratio	Ratio of width of first bit to other bits.	2 - 5

Figure 5: Software Functionality

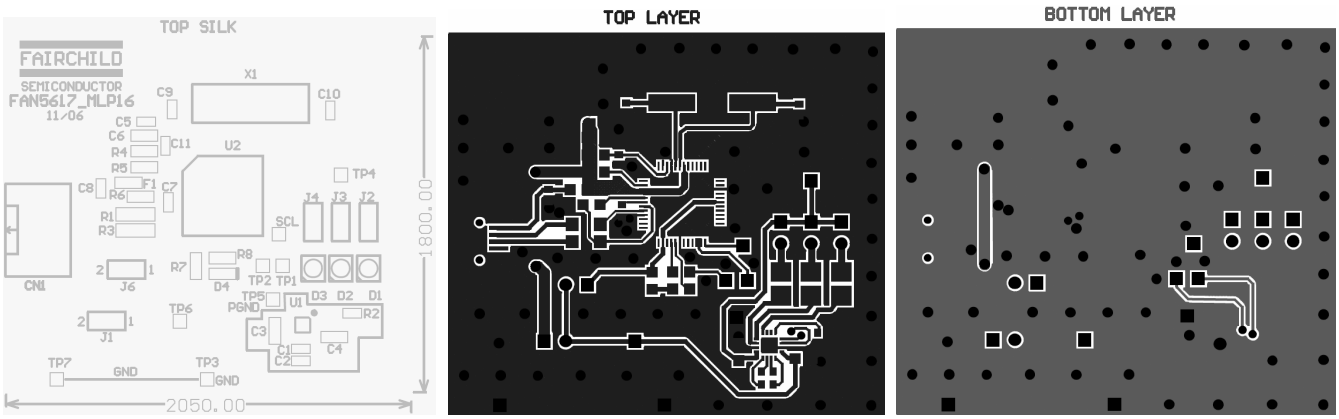

Figure 6: FAN5617 PCB Layout

Description	Qty	Ref	Vendor	Part Number
Connector, USB, Type Mini-B	1	CN1	MOLEX	67503-1020
Ferrite Bead, MI0805K110R-10	1	F1	Steward	MI0805K110R-10
IC, LED Driver, FAN5617	1	U1	Fairchild	FAN5617
IC, USB Interface IC, FTDI2232C	1	U2	FTDI	FT2232C
Crystal, 6Mhz., Surface Mount	1	X1	Fox	FOXSDLF/060-20
Capacitor 1uF, 10%, 10VDC, X7R, 0805	1	C3	Kemet Panasonic Murata	C0805C105K8RACTU ECJ-2YB1A105K GRM21BR71A105K
Capacitor 0.1uF, 10%, 16VDC, X7R, 0603	6	C1, C2, C5, C7, C8, C11	Panasonic	ECJ-1VB1C104K
Capacitor 4.7uF, 20%, 6.3VDC, X5R, 0805	2	C4, C6	Panasonic Taiyo Yuden TDK	ECJ-2FBOJ475M JMK212BJ475MG C2012X5R0J475M
Capacitor 27pF, 10%, 50VDC, NPO, 0603	2	C9, C10	Digikey	PCC270ACVCT-ND
LED Ultra White; 3.5V(typ); 120mW	3	D1, D2, D3	Lumex	SML-LX2832UWC-TR
LED Mount Standard Bright 0805 Yellow,QTLP630C-3	1	D4	Everlight	QTLP630C-3
Connector Male, .025" Square contact post, 2	5	J1 - J4, J6	AMP	103239-2
Resistor 27 Ohm, 5%, 1206	2	R1, R3	Any	
Resistor 7.5 K, 1%, 0603	1	R2	Any	
Resistor 510 Ohm, 1%, 0805	1	R7	Any	
Resistor 470 Ohm, 1%, 0805	1	R4	Any	
Resistor 10 K, 1%, 0805	2	R5, R8	Any	
Resistor 1.5 K, 5%, 0805	1	R6	Any	
Connector Male, .025" Square contact post, 1	5	TP1 - TP4, TP6	AMP	103239-1
Shunt	5	J1 – J4, J6	Digikey	A26227-ND

Figure 7: FAN5617 Bill Of Materials