EV173

Evaluation Board for the AAT4292 Seven-Channel High-Side I/O Expander

Introduction

The AAT4292IJS-DB1 EVAL board demonstrates the AAT4292 SmartSwitch™, which has seven P-channel MOSFETs and one single-wire series control interface and is configured for use as a microprocessor I/O expander application, or for cell phone keypad, backlight and fashion lighting control, or multi-channel low power switching applications. Having independent drain outputs and a common source input, the device operates with an input voltage range of 1.8V to 5.5V, making it ideal for 1.8V, 2.5V, 3.3V, or 5V systems, as well as systems powered by Lithium-Ion/Polymer batteries. The AAT4292 features a 500ns slew rate limited turn-on time and is controlled by an AS²Cwire™ (Advanced Simple Serial Control™) interface, which permits ease of control and efficiency.

This document describes the evaluation board as illustrated in Figure 1a and 1b, and its accompanying user interface. In addition, a brief Getting Started section is included to help the user begin operating the evaluation board. A schematic of the complete circuit is shown in Figure 2. The actual board layout is shown in Figure 3 and 4. For additional information, please consult the AAT4292 product datasheet.

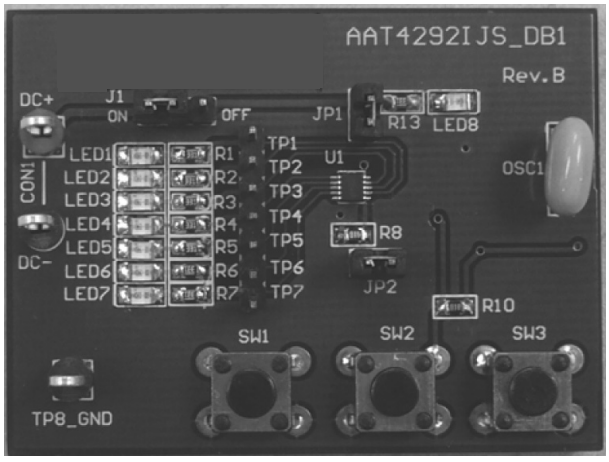

Figure 1a: AAT4292 Evaluation Board Top View.

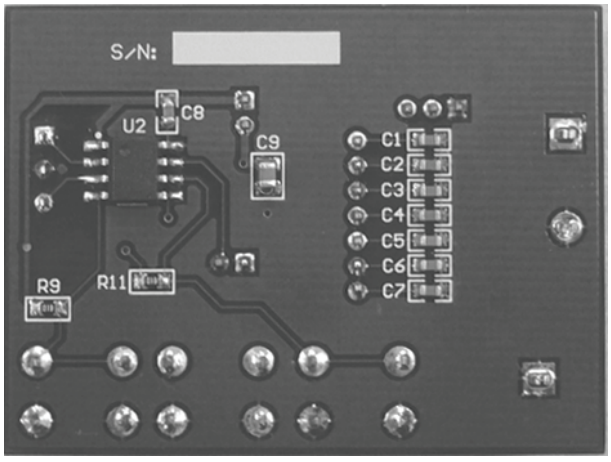

Figure 1b: AAT4292 Evaluation Board Bottom View.

Layout Guidelines

The following guidelines should be followed to ensure proper operation of the AAT4292:

1. If the device outputs OUT1 to OUT7 have capacitor load, depending on the load capacitor value, it is recommended that a 1µF to 10µF 0603 or 0805 ceramic capacitor be placed as close as possible between V_{IN} and GND. This helps to provide a low impedence loop to charge the load capacitor during the MOSFET switches' turn on transient and keep the VIN voltage stable.
2. It is recommended to connect a 100kΩ pull-low resistor at the EN/SET pin, to avoid floating this pin.

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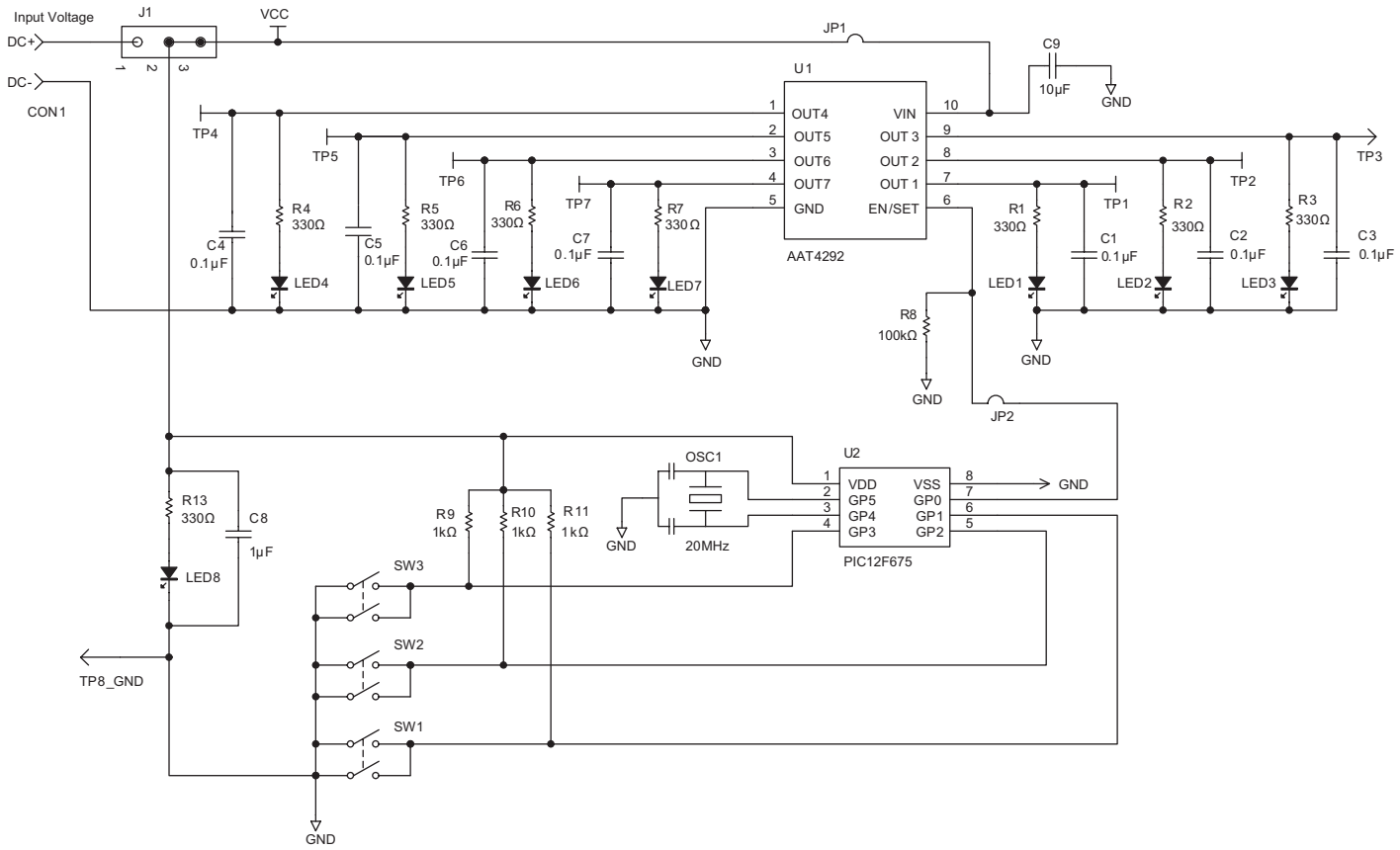

Figure 2: AAT4292IJS-DB1 Evaluation Board Schematic.

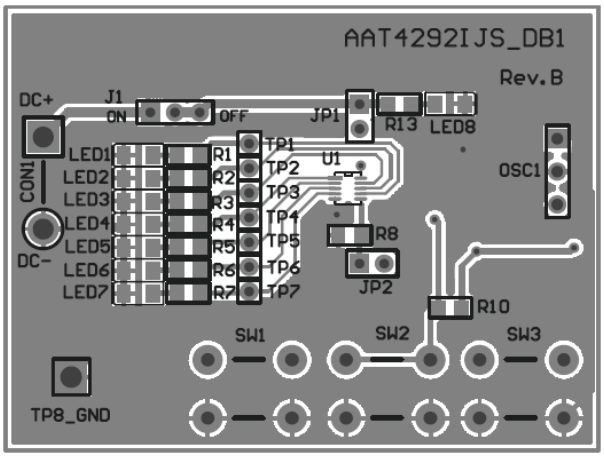

Figure 3: AAT4292 Evaluation Board Top Side Layout (not to scale).

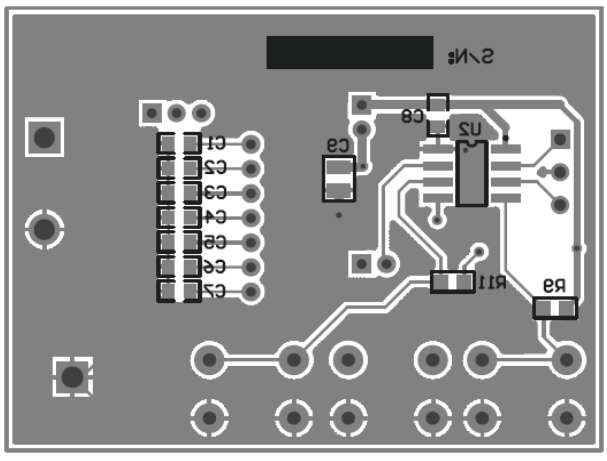

Figure 4: AAT4292 Evaluation Board Bottom Side Layout (not to scale).

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Getting Started

The AAT4292IJS-DB1 evaluation board is typically mounted on a battery pack. The jumper J1 is inline with the battery supply for connecting/disconnecting the power for U2 (PIC12F675) and/or U1 (AAT4292IJS). There is an additional shunt JP1 to connect/disconnect the power for U1 (AAT4292IJS). The shunt JP2 provides the connection/disconnection from the AS²Cwire signal generator U2 to control U1.

The AAT4292 may be operated from an external power source. The shunt JP1 should be removed; the external power may be applied to JP1 Pin 2 (which is connected to U1 VIN Pin 10). The external power source should be set from 1.8V to 5.5V before the AAT4292 is turned on by mounting the shunt on JP2 and sending the pulsed signal from the signal generator U2.

There are three buttons (SW1, SW2, and SW3) on the board, which enable and disable the ON and OFF state for the seven output channels. Once a button or combination of buttons is toggled, the corresponding LED for OUT1 to OUT7 will turn ON or OFF accordingly, depending on the previous state. This indicates that the selected state has been submitted through the EN/SET line to the AAT4292. Detailed operations are listed in Table 1.

The AAT4292 outputs can be probed via the test points (TP1 to TP7).

Button(s) Pushed	Description
SW2 one time, then SW1	Toggle OUT1 on/off.
SW2 two times, then SW1	Toggle OUT2 on/off.
SW2 three times, then SW1	Toggle OUT3 on/off.
SW2 four times, then SW1	Toggle OUT4 on/off.
SW2 five times, then SW1	Toggle OUT5 on/off.
SW2 six times, then SW1	Toggle OUT6 on/off.
SW2 seven times, then SW1	Toggle OUT7 on/off.
SW3	Auto cycling. All outputs blink (on and off) five times, and cycling turn on OUT1 to OUT7 five times, then ordinal turn on the output from OUT1 to OUT7 five times. Auto cycling repeats three times.
SW2 + SW3 (simultaneous)	All outputs ON.
SW1 + SW2 + SW3 (simultaneous)	All outputs OFF (OUT1-OUT7 floating).

Table 1: User Interface Functionality.

Component	Part Number	Description	Manufacturer
U1	AAT4292	Seven Channel High-Side I/O Expander	Skyworks
U2	PIC12F675	8-bit CMOS, Flash-Based µC; 8-Pin SOIC Package	Microchip
SW1-SW3	Switch	Switch Tact, SPST, 5mm	
OSC1	CSTLS20M0X54	Ceramic Resonator, 20MHz, 3 pins	Murata
R1-R7, R13	Chip Resistor	SMD, 330Ω, 5%, 150mW, 0603	Vishay
R9-R11	Chip Resistor	SMD, 1kΩ, 5%, 150mW, 0603	Vishay
R8	Chip Resistor	SMD, 100kΩ, 5%, 150mW, 0603	Vishay
C1-C7 (optional)	GRM188R71C104KA01D	SMD, Cap Ceramic 0.1µF 0603 X5R 16V 10%	Murata
C8	GRM188R61A105KA61	SMD, Cap Ceramic 1µF 0603 X5R 10V 10%	Murata
C9	GRM21BR61C106K	SMD, Cap Ceramic 10µF 0805 X5R 16V 10%	Murata
LED1-LED7	RS-0805UW	SMD, White LED, 0805	XRX
LED8	LED	Yellow LED, 0805	
TP1-TP8	Connector	Connector for Test Point	
CON1	Connector	Header, 2 pins, for DC input	
J1	Connector	Header, 3 pins, pitch 75mil	
JP1, JP2	Connector	Header, 2 pins, pitch 75mil	
	Shunt	Shunt for connector	
	PCB	AAT4292 Evaluation Board PCB	Skyworks

Table 2: AAT4292IJS-DB1 EVAL Board Bill of Materials.