

PSG5220 Integration for White Bluff Intel Form Factor Validation System for Huron River

Executive Summary

The PSG5220 advanced SATA power management IC can be easily integrated into Intel's Form Factor Validation System, "White Bluff". When enabled, the PSG5220 reduces the power consumed by the HDD, SSD, and ODD by providing real-time, autonomous voltage scaling to the drives through Packet Digital's On-Demand Power. This application note walks through how to integrate the PSG5220 as a PCI Express Mini Card module for rapid in-system verification.



1 Introduction

The PSG5220 can be easily integrated into the White Bluff FFVS. To evaluate the PSG5220 SATA power management IC in the White Bluff, the PSG5220 PCI Express card should be installed. The PSG5220 module can be obtained through Packet Digital sales and support (www.packetdigital.com).

2 PSG5220 PCI Express Mini Card Module

The PSG5220 PCI Express mini card module is designed to work with the PCI Express form factor. There are two PCI Express modules on the White Bluff FFVS platform. The smaller module is populated with a Wi-Fi card. The standard size module is used for the PSG5220 module. Connections to power, ground, and signaling are made through solder points on the module and the White Bluff FFVS motherboard.



Figure 1: PSG5220 PCI Express Mini Card Module

2.1 Connections to Power and Ground

Although the PSG5220 module fits in the form-factor of the PCI express card, the input/output power/ground must be connected with soldered wires to the mainboard. Intel has designed the board to easily isolate the HDD and ODD as well as accept short wires for power and ground.

To connect the output of the PSG5220 module to the drives, remove the ferrite beads, FB24 and FB25, that connect the HDD and ODD to the main system power. Next connect V_{OUT1} from the PSG5220 module to the HDD side of the FB25 pad. Similarly, connect V_{OUT2} from the PSG5220 module to the ODD side of the FB24 pad. These connections are shown in Figure 2.

V_{IN} (battery voltage) and Ground are connected to the PSG5220 module from short wires from C717. To provide 5V system power to the PSG5220 module, connect V5A from the PSG5220 module to the system side of the FB25 pad. The V_{IN} and the V5A connection is pictured in Figure 2.

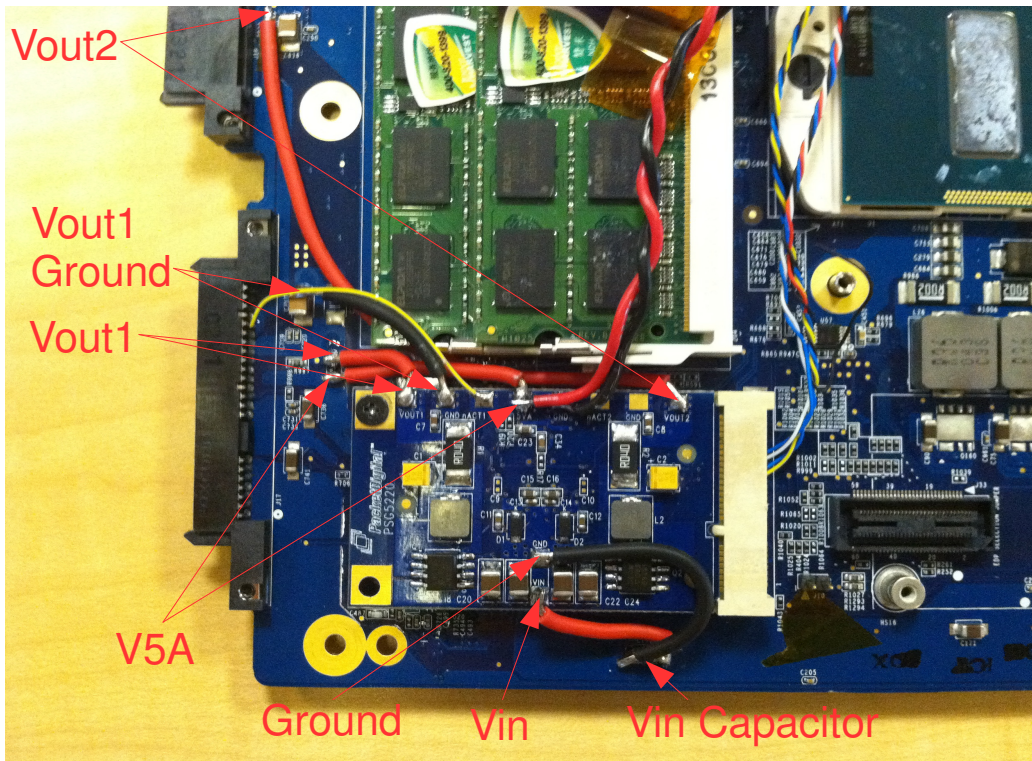


Figure 2: Connections to Power and Ground

2.2 Connections to Activity Signals

HDD activity must be connected from the mainboard to the PSG5220 module. Connect pin 11 of the HDD SATA power connector to the nACT1 pad on the module. An illustration of this connection can be seen below in Figure 3.

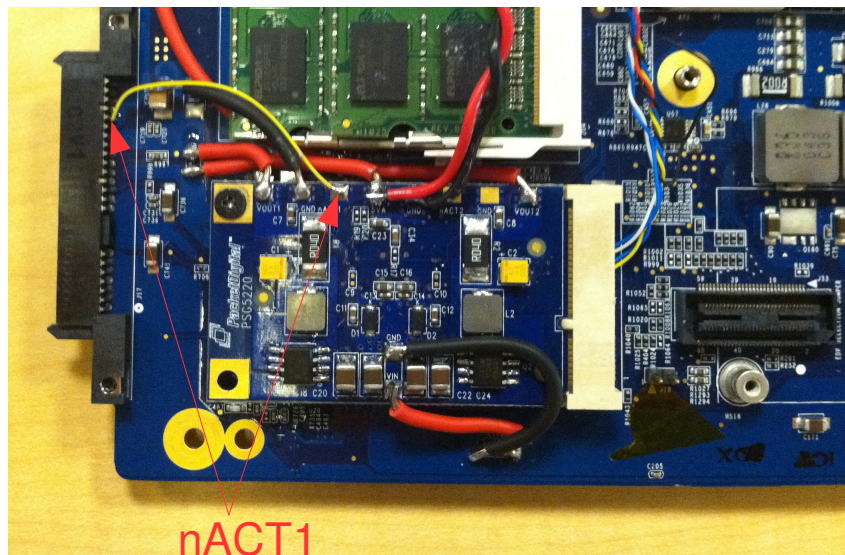


Figure 3: Connections to Activity Signals

3 Enabling On-Demand Power

When On-Demand Power is enabled the PSG5220 will be a point-of-load voltage regulator for the HDD and ODD connected to the White Bluff platform. To enable the power saving features of the PSG5220, register writes through SMBUS are required. The values to be written to the registers vary depending on the HDD/ODD manufacturer and model.

3.1 SMBUS Serial Communication

SMBUS writes to the PSG5220 can be accomplished through customized firmware to the embedded controller (H8) or externally with an external SMBUS master. To connect an external SMBUS master, use 30 AWG wire to connect SMBCLK to pin 47 and SMBDAT to pin 48 of the PCI express mini card. Also use system ground when connecting external SMBUS equipment.

3.2 Register Settings

Configuring and enabling On-Demand Power is accomplished through a series of register writes through SMBUS. The values to be written to the registers varies depending on the HDD/ODD manufacturer and model. To use On-Demand Power with the default configuration of drives shipped with White Bluff, the settings in Table 1 can be used. To disable On-Demand Power and return the system to a default state without dynamic voltage scaling, the settings used in Table 2 can be used. For drives other than the default configuration, please contact Packet Digital support for appropriate configuration settings.

Table 1: Register Settings for Enabling On-Demand Power

Address	Data
0x06	0x29
0x07	0x3A
0x0B	0x24
0x0C	0x24
0x10	0x1F
0x12	0x50
0x13	0xC3
0x16	0x50
0x17	0xC3
0x1F	0x82
0x03	0x09
0x25	0x4A
0x26	0x52
0x2A	0x37
0x2B	0x37
0x2F	0xFF
0x31	0xD8
0x32	0xB8
0x35	0xD8
0x36	0xB8
0x3E	0x82
0x03	0x09
0x22	0x0D

Table 2: Register Settings for Disabling On-Demand Power

Address	Data
0x03	0x08
0x22	0x08

4 Summary

Packet Digital worked in cooperation with Intel to successfully integrate the PSG5220 into their Form Factor Validation System, "White Bluff".

5 Contact info

Packet Digital's world-wide engineering support team will assist you with any questions you may have about integrating PSG5220. Please contact us at:

Phone: 701.232.0661

Email: web-sales@packetdigital.com