An Innodisk White Paper
June 2014

Pin 7
Power Design for SATA Modules

Cable-less Power Supply Design For High Speed, Small Form Factor SATA Storage

Revision History

Date	Version	Information
2012.07.09	1.0	First Release
2014.6.16	2.0	Update new logo and add SATAIII products.

Introduction

This white paper presents Innodisk's Pin 7 Technology used to free Serial ATA drives from the use of power cables, thereby making for smaller and more rugged SATA Disk-on-Module (DOM) storage drives for extra stability and reliability. The Pin 7 circuitry design has the added benefit of protecting regular SATA devices (where Pin 7 is a ground wire) from damage to the DOM caused by short-circuits.

How Pin 7 Works

A Serial ATA device may be either directly connected to a host or connected to a host through a cable. When connected by cables, Pin 7 on the SATADOM acts as a ground wire. External cables do not maximize space and ruggedness of the SSD design. See Figure 1.

Figure 1: SATA with cables

In Innodisk's SATADOM series, however, Pin 7 functions as a connector for power supply. This built-in power pin feeds power to the storage drive. Table 1 illustrates SATADOM's pin assignments.

Innodisk SATADOM Pin Assignment

Pins	Signal	Function	Remark
Pin 1	GND	Shielding	SATA-IO Standard
Pin 2	A+	Differential signal to A	SATA-IO Standard
Pin 3	A-	Differential signal to A-	SATA-IO Standard
Pin 4	GND	Shielding	SATA-IO Standard
Pin 5	B-	Differential signal to B	SATA-IO Standard
Pin 6	B+	Differential signal to B	SATA-IO Standard
Pin 7	GND	Shielding	SATA-IO Standard
	VCC (+5V)	*Power*	*Innodisk Pin 7 Technology*

Table 1: Innodisk SATADOM Pin Assignment

Application

Intel's new Romley server boards incorporate Innodisk's optional Pin 7 Power Design. Figure 2 shows a circuit design for the Intel server board. Figure 3 is a picture of Intel's server board with an Innodisk SATADOM that incorporates Pin 7 technology.

Intel Circuit Design using Pin 7

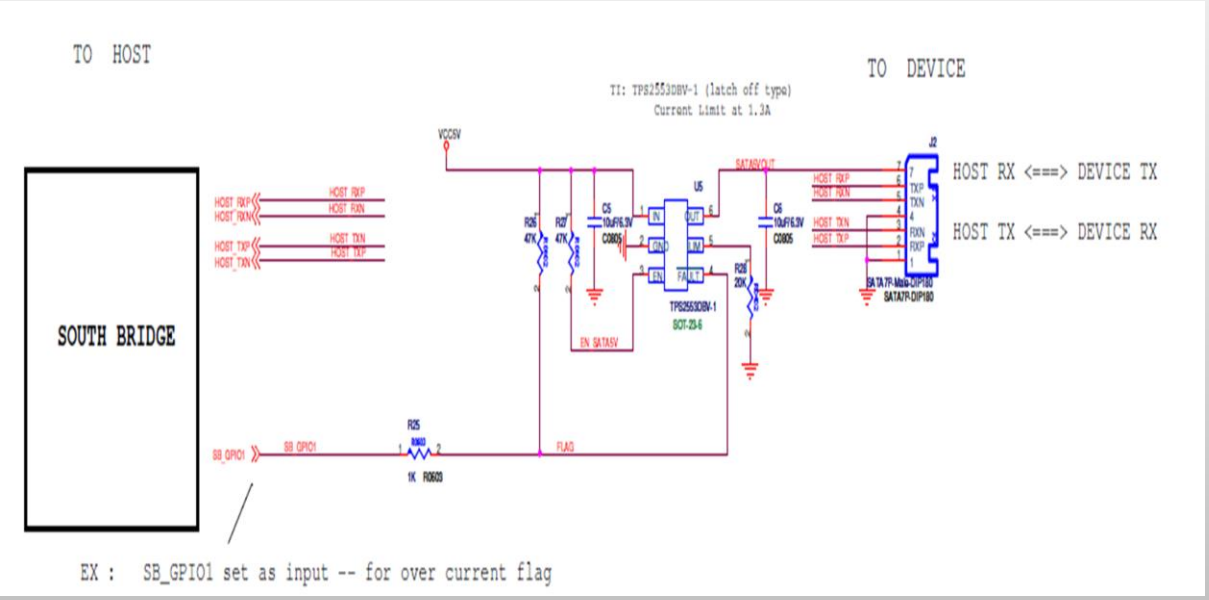

Figure 2: Circuit Design for Intel Server Board using Pin 7 Power Design

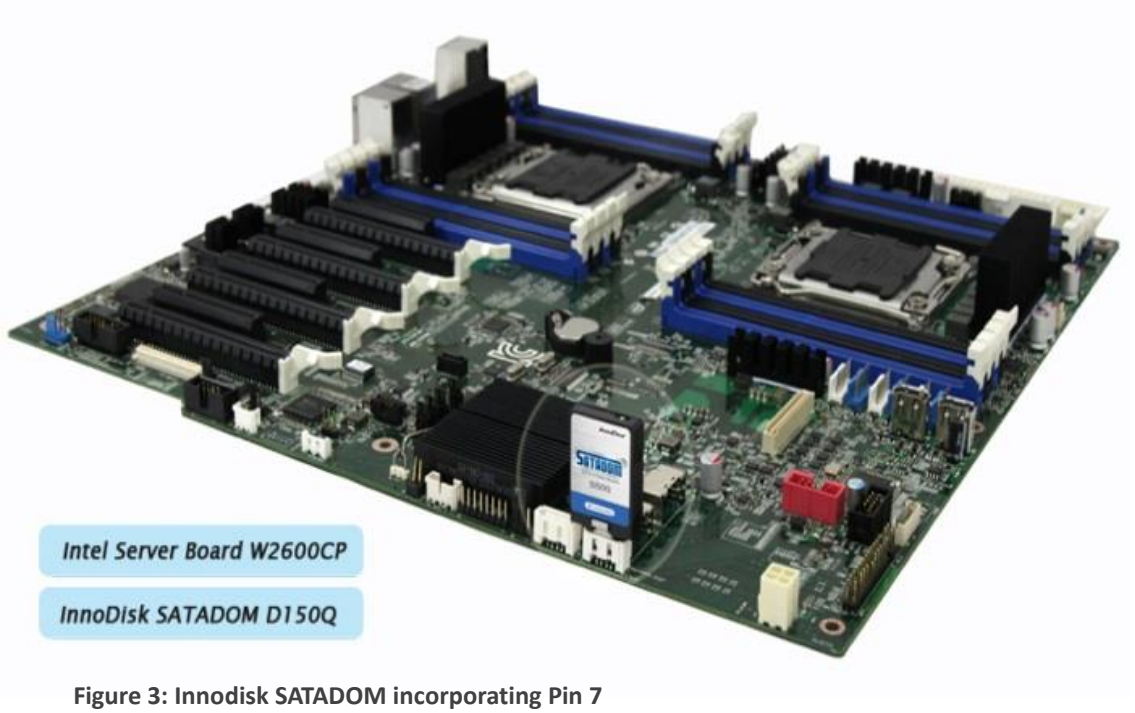

Figure 3: Innodisk SATADOM incorporating Pin 7 technology

Testing Data

As highlighted above, Innodisk's Pin 7 circuitry can protect regular SATA devices – where the 7th pin is a ground wire – from damage to the DOM caused by short-circuits. The waveforms captured below show a continuous 5V input from HOST to SATADOM. See Figure 4.

Innodisk's Pin 7 Technology guarantees that the quality of the SATA differential signals in adjacent pins is not degraded. The image below shows a perfect, zero-interference pattern for differential signals using Innodisk's SATA Eye Pattern signal analysis tool. See Figure 5.

Pin 7 Circuitry For Short-Circuit Protection

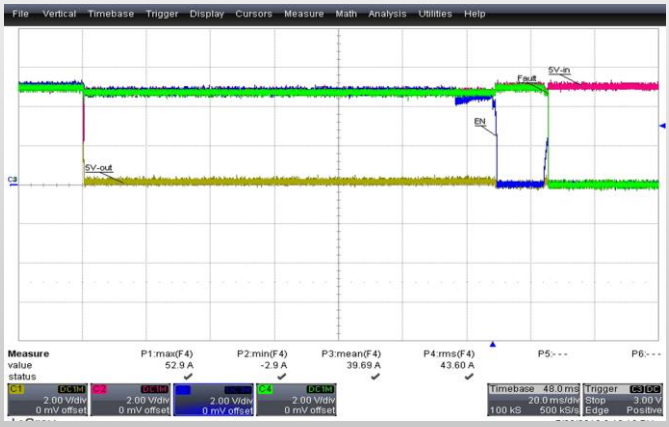

Figure 4: Pin 7 circuitry provides short-circuit protection for regular SATA devices (Pin 7 is ground)

SATA Eye Pattern Signal Analysis

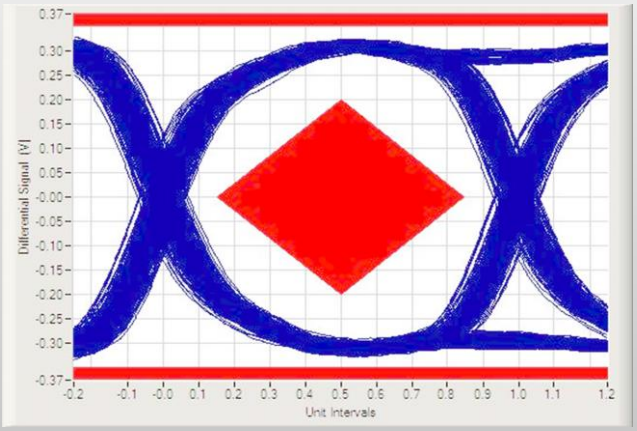

Figure 5: SATA Eye Pattern showing zero interference on differential signals from Pin 7

Conclusion

Innodisk's Pin 7 Power Design is an essential technology for any application requiring compact, reliable SSD data storage solutions. Pin 7 allows for the world's smallest SATA form factor, and gives system integrators greater flexibility in the design of their systems. Innodisk's circuit design provides short-circuiting protection to the DOM and allows for direct power supply to the drive without the need of external cables.

Innodisk SSD series that incorporate Pin 7 Power Design

SATADOM series, including SATADOM 3ME/3MG-P/3IE/3SE/3SE-P

About us

Innodisk is a service driven provider of flash memory and DRAM products for the industrial and enterprise applications. With satisfied customers across the embedded, aerospace and defense, cloud storage markets and more, we have set ourselves apart with a commitment to dependable products and unparalleled

service. This has resulted in products including embedded peripherals designed to supplement existing industrial solutions and high IOPS flash arrays for industrial and enterprise applications. The expanded business lines are leading our next step in being a comprehensive solution and service provider in industrial storage industry.

For more information on Innodisk's product line, technologies and applications, please visit www.Innodisk.com