

Atmel TPM Power Supply Decoupling Guide

AT97SC3204

1 Overview

The following guidelines are consistent with industry-standard decoupling recommendations for all active system components. Effective decoupling of the power supply inputs to the Atmel® Trusted Platform Module (TPM) is critical to assuring reliable component performance in a high-density printed circuit board environment. The TPM is a complex system-on-a-chip integrated circuit design containing an internal microprocessor, EEPROM, ROM, and SRAM memories, digital logic, and analog components. The TPM executes firmware operations independently of the external system, as well as, executing command operations received over the communications bus. As a result, the TPM is subjected to a wide range of frequencies. These signals must be decoupled from the TPM power supply pins to assure consistently reliable operation over the lifetime of the system.

Table 1. TPM Power Supply Pins

Pin		Pin Number
		Industry Standard 28-pin TSSOP
V _{CC}	Power Supply	10, 19, 24
SB3V	Power Supply	5
GND	Ground	4, 11, 18, 25

2 Atmel TPM Decoupling Recommendations

2.1 Decouple the V_{CC} Pins

Effective decoupling of the V_{CC} inputs to the Atmel TPM is critical to assure consistently reliable operation over the lifetime of the system. The Atmel recommendation for a decoupling bypass capacitor within the range of 2200pF to 4700pF is to be placed as close as possible, < 5mm, to each of the V_{CC} pins, located between each V_{CC} pin and the immediately adjacent GND pin. A 0.1μF decoupling bypass capacitor should be placed at the node in which these V_{CC} traces join, which should be as close as possible, < 10mm, to the TPM. In all cases, this bypass capacitor should be closer than the next closest component. All capacitors should be of high quality, with dielectric ratings of X5R or X7R. A low-power state is automatically entered when the chip is idle. No further action is required by the system to enter low-power mode.



No other component should be placed closer to the TPM V_{CC} pin than the low frequency decoupling capacitor. Each component should be properly decoupled from the power supply signal to prevent injection of noise onto the power plane. All capacitors should have a high quality dielectric rating of X5R or X7R, depending on the system temperature requirements.

2.2 Decouple the SBV3 Pin

In order to decouple the SB3V pin, it is recommended that a decoupling capacitor, no smaller than 2200pF and no larger than 4700pF, be placed as near as possible to the SB3V pin, located between the SB3V pin and the immediately adjacent GND pin in order to address high frequency noise. The placement should be less than 5mm from the SB3V pin; although, best performance is achieved when the capacitor is placed directly next to the chip leads. Chip capacitors of size 0402 will fit well between board traces for the 28-pin TSSOP.

A second 0.1µF decoupling bypass capacitor should be placed between the SB3V pin and the Supply rail, which should be as close as possible (< 10mm) to the TPM. This capacitor will address lower frequency supply noise.

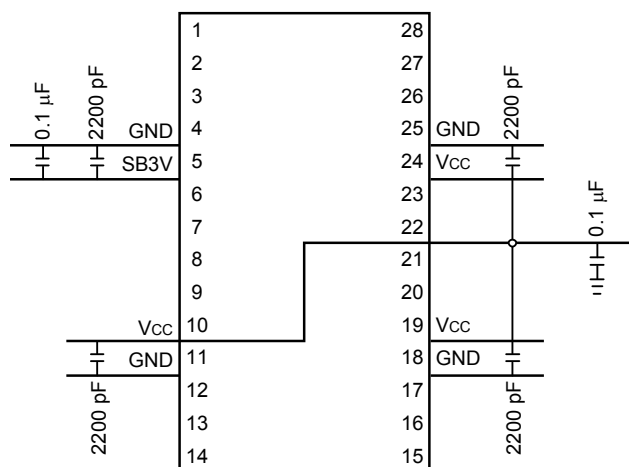


No other component should be placed closer to the TPM SB3V pin than the low frequency decoupling capacitor. Each component should be properly decoupled from the power supply signal to prevent injection of noise onto the power plane. Both capacitors should have a high quality dielectric rating of X5R or X7R, depending on the system temperature requirements.

2.3 Decoupling Diagrams

The below figures illustrate power and ground pins only.

Figure 2-1. 28-pin TSSOP



3 Revision History

Doc Rev.	Date	Comments
8580B	04/2014	Remove AT97SC3204T and 3204P devices. Update template, logos, and disclaimer page.
8580A	12/2008	Initial document release.



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