

UC20 SD

Application Note

UMTS/HSPA Module Series

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About the Document

History

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1.0	2014-01-09	Mountain ZHOU	Initial.

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1 Introduction

This document briefly introduces the features, pin definition, reference design and layout recommendations of UC20 SD (Secure Digital) interface.

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2 Application

UC20 provides one SD Memory Card interface which has the following features.

- Support 4-bit bidirectional data bus.
- 2.85V operations on SD interface.
- Support SDIO host mode only.
- Support SDHC (Secure Digital High Capacity), up to 32GB memory card.
- Clock output up to 52MHz.

The following table shows the supported protocols.

Table 1: Supported Protocols

Protocol	4-bit	Max Speed (MHz)
SD V2.0	YES	50
SDIO V2.0	YES	50
MMC V4.2	YES	52

2.1. Pin Definition

The following figure shows the pin assignment of UC20 module.

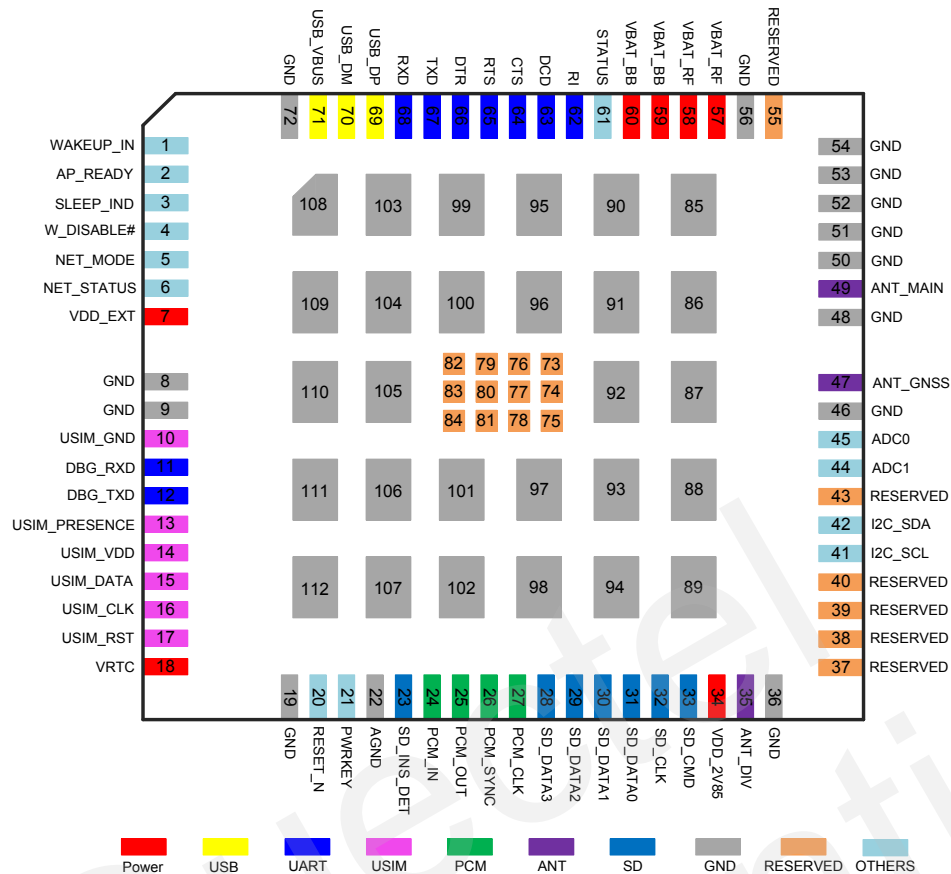


Figure 1: Pin Assignment

The following table shows the SD pin definition.

Table 2: Pin Definition of SD Interface

Pin Name	Pin No.	I/O	Description	Comment
VDD_2V85	34	PO	Power supply for SD card	2.85V power domain
SD_CMD	33	IO	Command pin of SD interface	2.85V power domain
SD_CLK	32	DO	Clock pin of SD interface	2.85V power domain
SD_DATA0	31	IO	Data bit0 of SD interface	2.85V power domain
SD_DATA1	30	IO	Data bit1 of SD interface	2.85V power domain
SD_DATA2	29	IO	Data bit2 of SD interface	2.85V power domain
SD_DATA3	28	IO	Data bit3 of SD interface	2.85V power domain
SD_INS_DET	23	DI	SD card input detection	1.8V power domain

Table 3: Digital I/O Characteristics

Parameter	Min.	Max.	Unit
V_{IL}	-0.3	$0.35 \cdot V_{DD}$	V
V_{IH}	$0.65 \cdot V_{DD}$	$V_{DD} + 0.3$	V
V_{OL}	0	0.45	V
V_{OH}	$V_{DD} - 0.45$	V_{DD}	V

NOTE

$V_{DD} = 1.8V$ for SD_INS_DET pin, and $V_{DD} = 2.85V$ for other SD interface pins.

2.2. SD Card Detection

Two ways of SD card detection mechanisms are supported:

- Software based detection (polling) mechanism:

Card insertion: Software checks for the presence of a card by periodically sending commands only when the application calls for it through the SD_CMD line. In other words, even though the card is inserted, the card does not do anything until the application calls for it.

Card removal: Software checks for the removal of the card by periodically sending commands. If there is no response, then the card was removed or is malfunctioning.

- GPIO interrupt detection mechanism:

GPIO interrupt based card detection mechanism is implemented in both hardware and software. Pull up the SD_INS_DET pin with 51KR resistor, and module will check the SD card status by sending commands when there is an edge trigger on this pin.

2.3. Reference Design

The following figures show the reference design of UC20 SD interface and SD card.

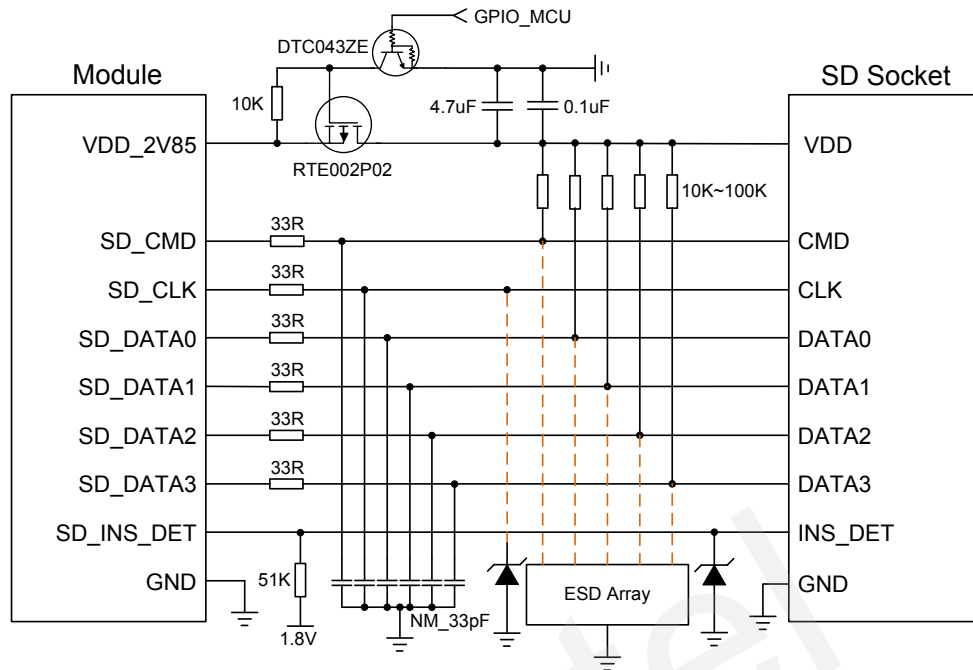


Figure 2: Reference Design

NOTES

1. Reserved 33ohm resistors and 33pF capacitors on SD card data, command and clock lines.
2. SD card data and command lines should be pulled up to VDD_2V85 with 10K~100K ohm resistor.
3. Turn off the VDD_2V85 power supply with GPIO_MCU when SD card is not used.
4. It is recommended to keep TVS components on SD interface to get good ESD performance, and the parasitic capacitance of the components should be smaller than 15pF.

2.4. Layout Recommendations

The following section provides some layout recommendations for SD card that must be followed in the design of your applications.

- For adequate isolation, avoid routing SD signals on the surface layer (its 52MHz clock rate and harmonics threaten sensitive functions).
- Isolate SD signals from others to avoid crosstalk problems. In particular, stay away from RF, XO, and audio components.
- Route the SD data signals as a bus to limit the area they affect, and provide at least 8-mil spacing to adjacent traces.
- Provide ground isolation for SD_CLK.
- Use ground plane on each side to isolate SD signals from other traces.