

SEC-FAE-APP-001

High Speed Mode Setting Sequence for the MMC spec 4.X card

Application Note

July-2006, Version 1.0



1. High Speed Mode Setting Issue

Normal MMC operates under 20 MHz and can operate 1 bit data, but High Speed MMC can operate from 0 to 52 MHz. Also it can operate 1 bit to 8 bit data

Even though High Speed mode setting is defined in MMC specification 4.x, most application manufactures are violating High Speed mode setting sequence.

Default HS_TIMING is 0. If you want to use High Speed MMC, you must change the default HS_TIMING to 1.

If the HS_TIMING registry is not modified, then it is possible for the card to operate abnormally due to the lack of timing margin.

Therefore, Samsung recommends following guideline for High speed mode setting sequence to manufactures for preventing compatibility failure.

2. High Speed mode setting guidance

Refer the MMC Specification v 4.x, Section 4.4.2 as shown below for setting High Speed Mode.

2.1. MMC Specification for High Speed Mode

4.4.2 High Speed Mode Selection

After the host verifies that the card complies with version 4.0, or higher, of this standard, it has to enable the high speed mode timing in the card, before changing the clock frequency to a frequency higher than 20MHz.

After power-on, or software reset, the interface timing of the card is set as specified in [Table 74 on page 148](#), in [Chapter 9](#). For the host to change to a higher clock frequency, it has to enable the high speed interface timing. The host uses the SWITCH command to write 0x01 to the HS_TIMING byte, in the Modes segment of the EXT_CSD register.

The valid values for this register are defined in [Section HS_TIMING on page 99](#). If the host tries to write an invalid value, the HS_TIMING byte is not changed, the high speed interface timing is not enabled, and the SWITCH_ERROR bit is set.

2.2. Precondition for High Speed Mode

In order to set the MMC card to High Speed Mode, following conditions should be observed - **The card state should be in the transfer state i.e. card should be able to operate in read/write mode.**

The sequence for setting High Speed Mode in the MMC card is shown below:

Bus Width setting (Using by CMD6) → Bus test (using by CMD14 & CMD19) → HS_TIMING setting (using by CMD6) → Change the frequency (over the 26MHz) → Read the Extended CSD (using by CMD8)

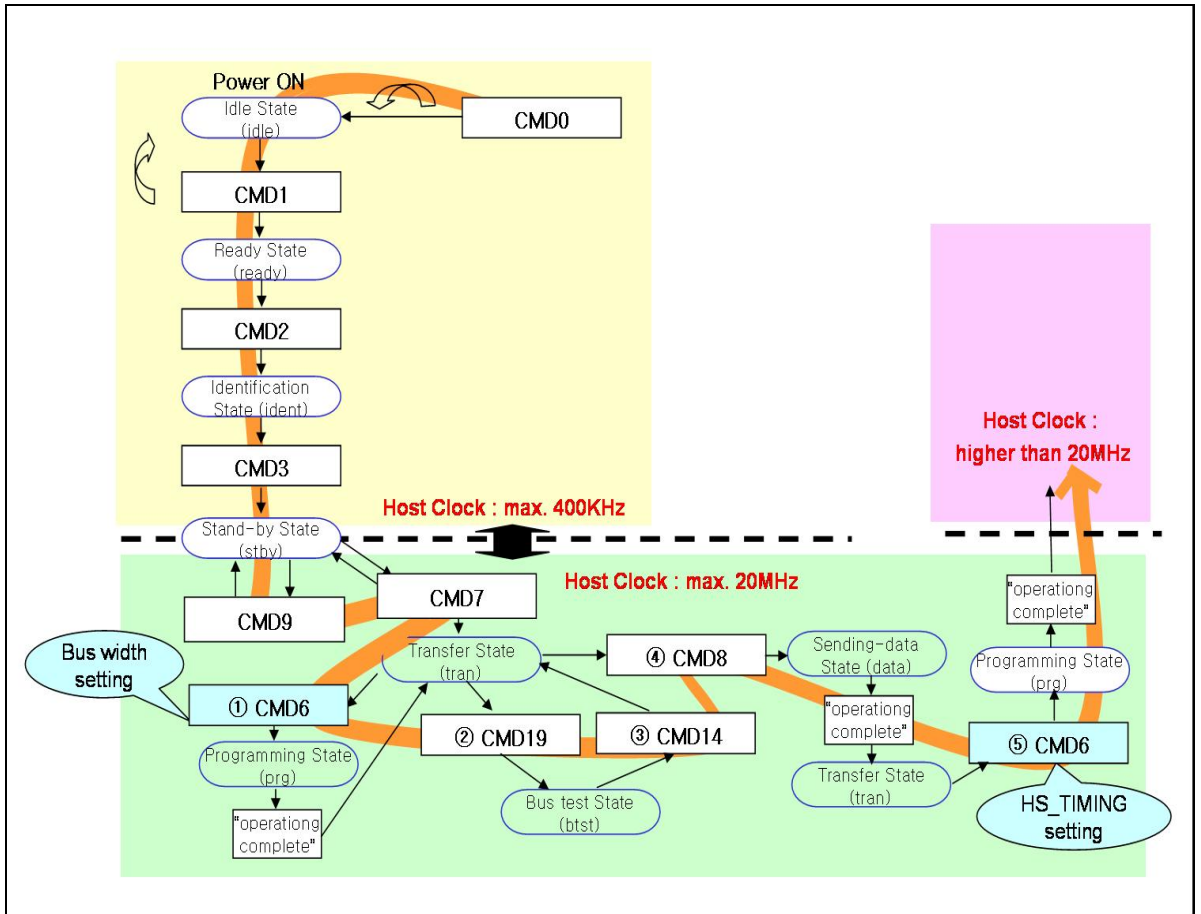


Figure 1 Host Clock Setting

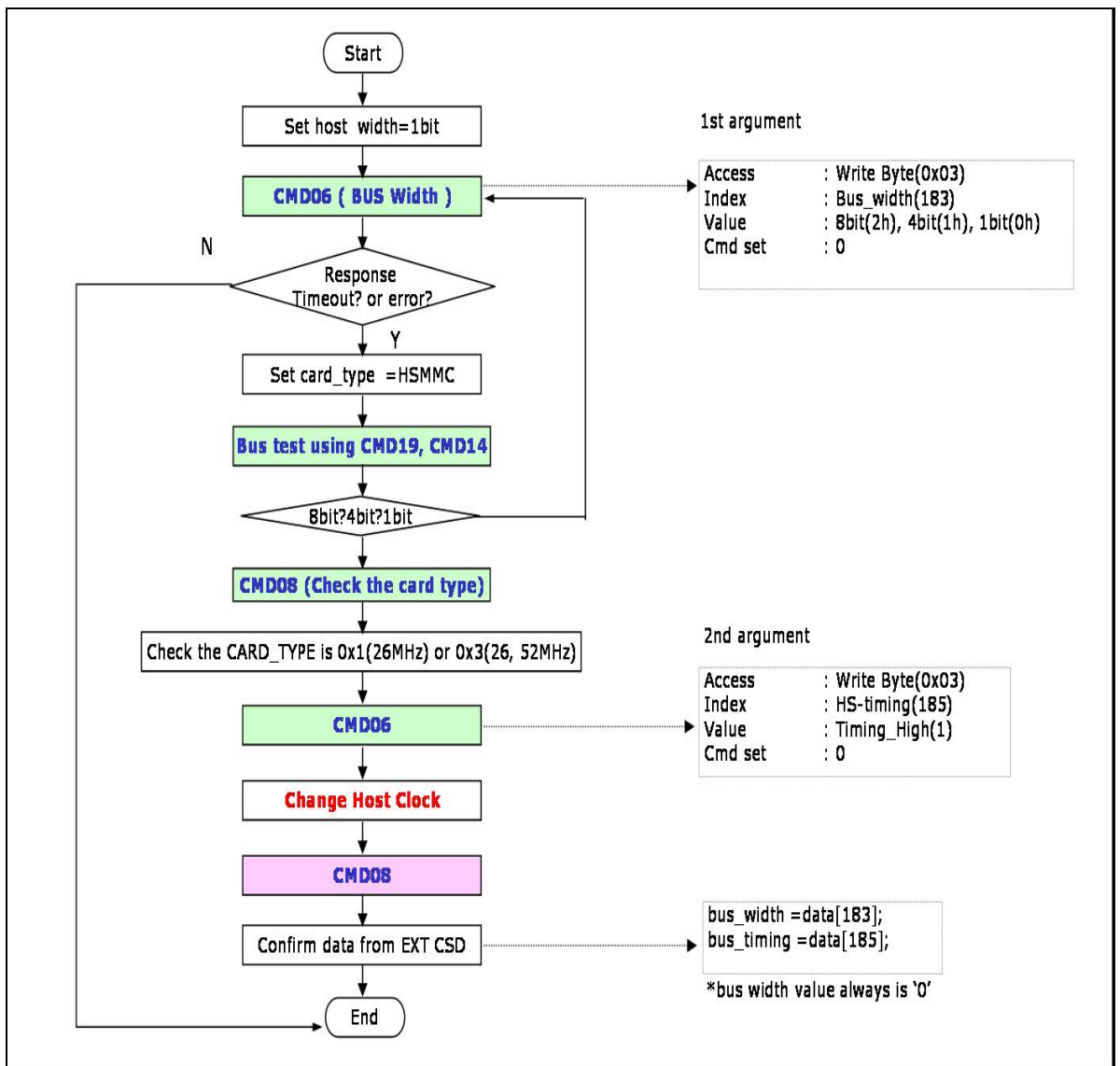


Figure 2 High Speed Mode Setting Flow

2.3. Example : G company USB reader using MMC Card

■ Command sequence

(374.5KHz) CMD0 → CMD55 → CMD1 → CMD2 → CMD3 → CMD9 →
CMD7 → (15MHz) → CMD13 → CMD6 → CMD19 → CMD14 → CMD6 →
(48.45MHz) → CMD8 → CMD18 ...

The figure below shows the high speed mode sequence in the MMC card of USB reader

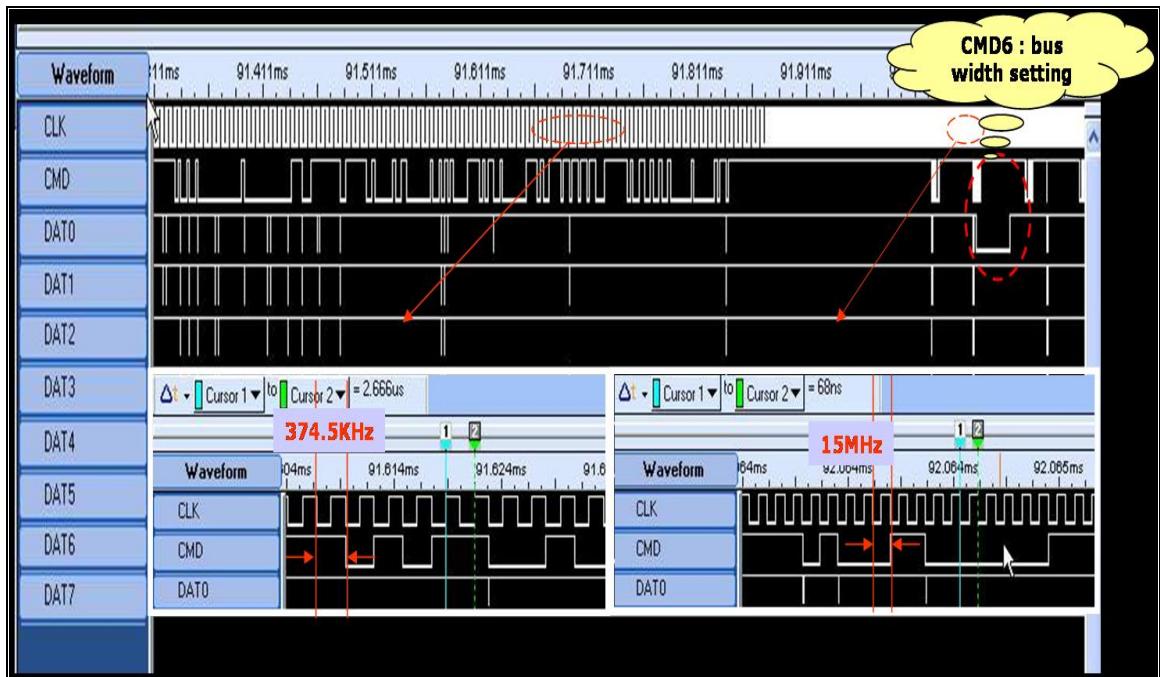


Figure 3 High Speed Flow in USB Reader using MMC card