

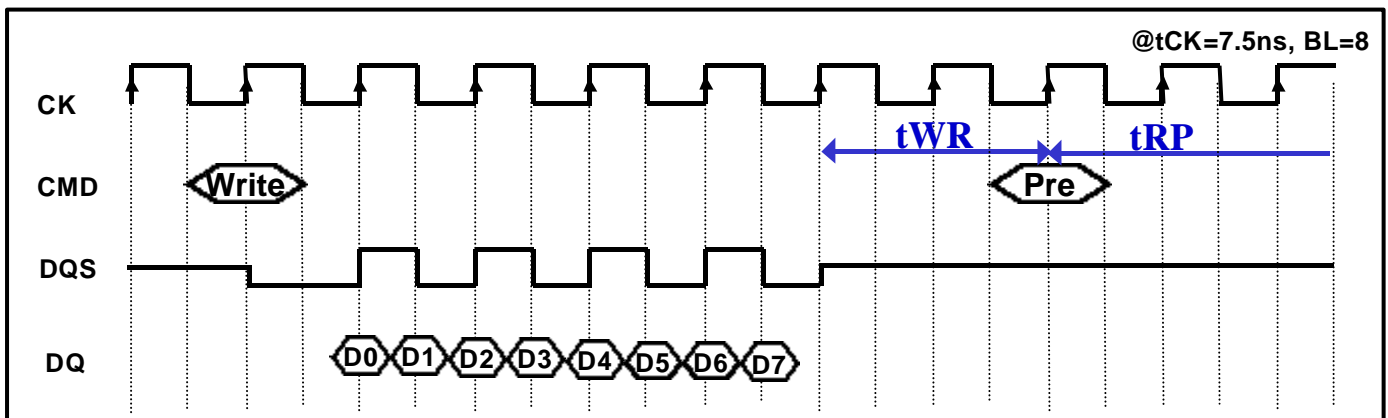
## APPLICATION NOTE

## $t_{WR}$ (Write Recovery time)

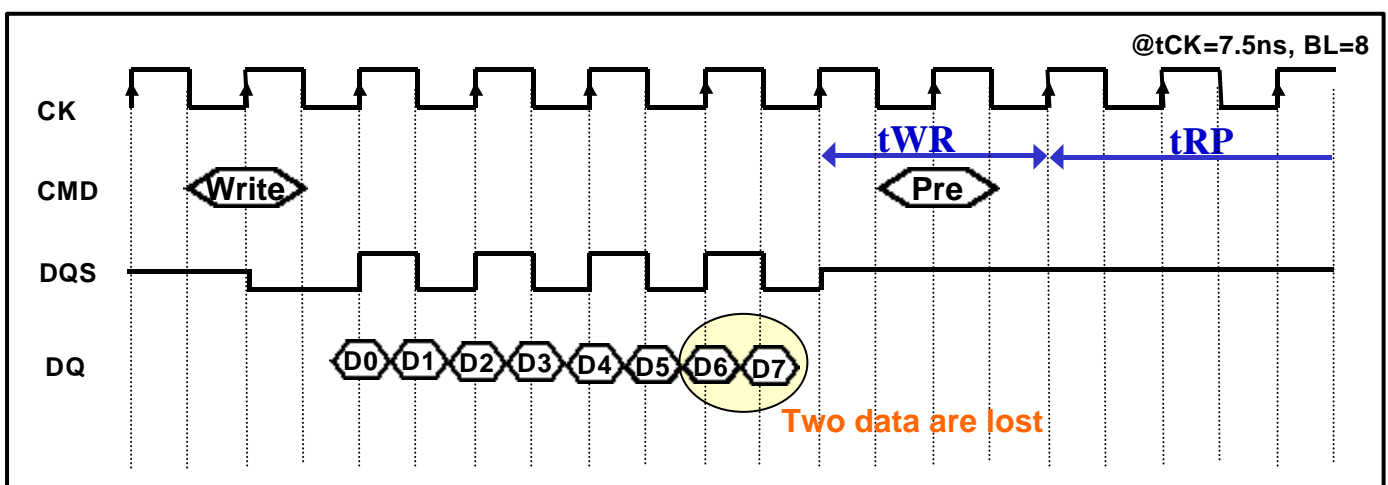
### What is $t_{WR}$ ?

The  $t_{WR}$  is write data recovery time to store write data into the core before precharge. That is,  $t_{WR}$  means necessary time to guarantee data in write buffer can be written safely in DRAM core. If  $t_{WR}$  doesn't be satisfied, data is not stored fully in DRAM cell and can make the read failure.

#### 1) satisfy $t_{WR}$



#### 2) not satisfy $t_{WR}$ (if precharge command issued before completing $t_{WR}$ specification, two datas are lost.)



## tWR 15ns for DDR SDRAM

Different from SDR SDRAM such as PC100 and PC133, JEDEC specified tWR as 15ns.

	SDR	DDR
tWR	1 tCK	15ns

The reason why JEDEC specify tWR as analog number not the number of clock is that the write time(Din buffer to DRAM cell) itself is hard to be improved even though clock frequency is getting higher because minimum feature is getting smaller.

	83Mhz	100Mhz	133Mhz	166Mhz
tWR (15ns)	2	2	2	3