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# Application Note

## Clock frequency change sequence

Product : K4J55323QF/K4D55323QF

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# Clock frequency change sequence

This application note is written to inform customers a safe way of a clock frequency change while graphic memory is in operation. It will include detail sequence in clock frequency change for below 4 cases.

This note can be applicable only for **K4J55323QF** and **K4D55323QF**. Other devices may have different procedures.

CASE 1) Clock frequency change from DLL-On to DLL-On

CASE 2) Clock frequency change from DLL-On to DLL-Off

CASE 3) Clock frequency change from DLL-Off to DLL-On

CASE 4) Clock frequency change from DLL-Off to DLL-Off

# Case1) DLL-On → DLL-On

## □ Clock frequency change from DLL-On to DLL-On

- 1) Issue EMRS command to disable the DLL (Optional)
- 2) Change clock frequency within DLL-On frequency range
- 3) Issue EMRS command with DLL-on and ODT-on
- 4) Issue MRS command with specified values to reset DLL and latency.  
(MRS Code=A11~A0=0x321=001100100001)
- 5) Required DLL locking time.
- 6) Issue MRS command with valid field values including CL without DLL reset
- 7) Issue a PRECHARGE-ALL command
- 8) Issue at least two Auto refresh command.

## Case2) DLL-On → DLL-Off

### □ Clock frequency change from DLL-On to DLL-Off

- 1) Issue EMRS command to disable the DLL while ODT-On.
- 2) Change clock frequency from DLL-On range to DLL-Off range
- 3) Issue a PRECHARGE-ALL command
- 4) Issue EMRS command to disable the DLL and ODT
- 5) Issue MRS command with valid field values without DLL reset
- 6) Issue a PRECHARGE-ALL command
- 7) Issue at least two Auto refresh command.

## Case3) DLL-Off → DLL-On

### □ Clock frequency change from DLL-Off to DLL-On

- 1) Issue EMRS command to disable the DLL while enable the ODT
- 2) Change clock frequency from DLL-Off range to DLL-On range
- 3) Issue EMRS command with DLL-on and ODT-on
- 4) Issue MRS command with specified values to reset DLL and latency.  
(MRS Code=A11~A0=0x321=001100100001)
- 5) Required DLL locking time.
- 6) Issue MRS command with valid field values including CL without DLL reset
- 7) Issue a PRECHARGE-ALL command
- 8) Issue at least two Auto refresh command.

## Case4) DLL-Off → DLL-Off

### □ Clock frequency change from DLL-Off to DLL-Off

- 1) Change clock frequency from DLL-Off range to DLL-Off range
- 2) Issue a PRECHARGE-ALL command
- 3) Issue EMRS command to disable the DLL and ODT
- 4) Issue MRS command with valid field values without DLL reset
- 5) Issue a PRECHARGE-ALL command
- 6) Issue at least two Auto refresh command.