

Date : March 09 , 2005

Application Note

Title :

*The comparison of 8Mx32 GDDR F-die and F'-die
in view of tRP/tWR/ tWR_A/tDAL*

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< Purpose >

The purpose of this application note is to provide the comparison for the difference of 8Mx32 GDDR F-die and F'-die in view of tRP/tWR/ tWR_A/ tDAL to the customers so that they don't misunderstand to use these devices in their systems.

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8Mx32 GDDR F-die vs. F'-die Comparison

1. Key difference are tRP/ tWR/ tWR_A/tDAL

< 8Mx32 GDDR F-die >

Parameter		Sym-bol	-25		-2A		-33		Unit
			Min	Max	Min	Max	Min	Max	
CK Cycle time	CL=4	tCK	-	6.0	-	6.0	-	6.0	ns
	CL=5		3.3	4	2.86	4	3.3	4	ns
	CL=6		2.5		-		-		ns
Row precharge time		tRP	5	-	5	-	4	-	tCK
Last data in to Row Precharge @ Normal Precharge		tWR	5	-	5	-	4	-	tCK
Last data in to Row Precharge @ Auto Precharge		tWR_A	5	-	5	-	5	-	tCK
Auto precharge write recovery + Precharge		tDAL	10	-	10	-	9	-	tCK

< 8Mx32 GDDR F'-die >

Parameter		Sym-bol	-25		-2A		-33		Unit
			Min	Max	Min	Max	Min	Max	
CK Cycle time	CL=3	tCK	-	10	-	10	5	10	ns
	CL=4		-		-		3.3		ns
	CL=5		2.5		2.86		-		ns
	CL=6		-		-		-		ns
Row precharge time		tRP	15	-	16.5	-	16.5	-	ns
Last data in to Row Precharge @ Normal Precharge		tWR	15	-	16.5	-	16.5	-	ns
Last data in to Row Precharge @ Auto Precharge		tWR_A ^{*1}	6	-	6	-	5	-	tCK
Auto precharge write recovery + Precharge		tDAL	30	-	33	-	33	-	ns

Note *1:

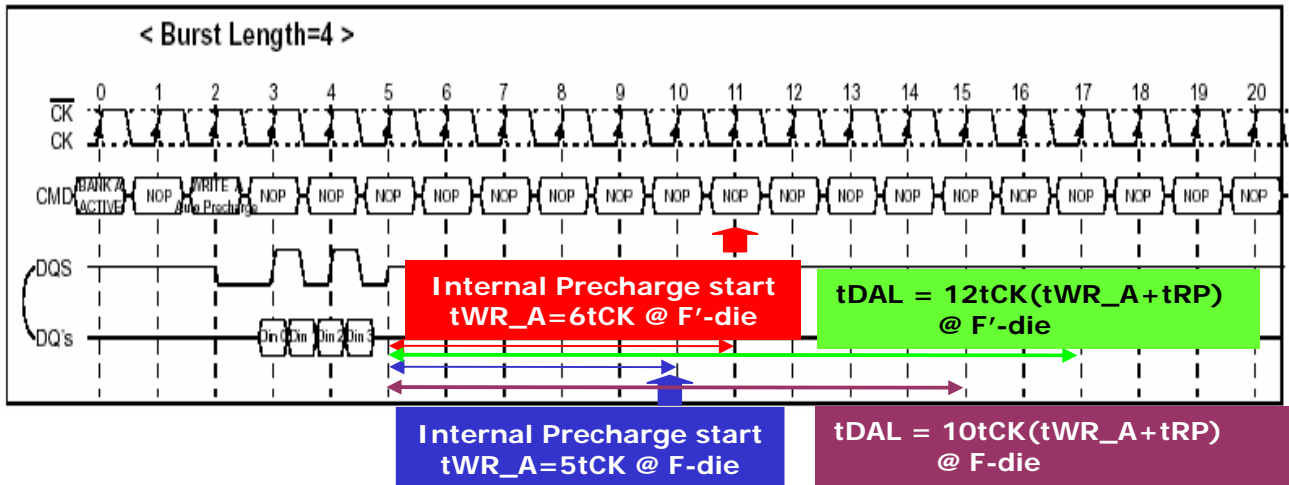
tRP parameter can be used to scale down by tCK. but the tWR_A can't be changed by operating tCK because it's fixed in circuit internally based on the number of clock of it. and tWR_A is related with CL. It's equal to CL+1. So, if customer use write with Auto Precharge (tWR_A) function, the customer must meet tDAL(tWR_A+tRP) spec whereas tWR_A fixed and tRP scalable by operating tCK.

< Timing Example(1) for -25/-2A >

1. Write w/AP timing

Write with Auto Precharge

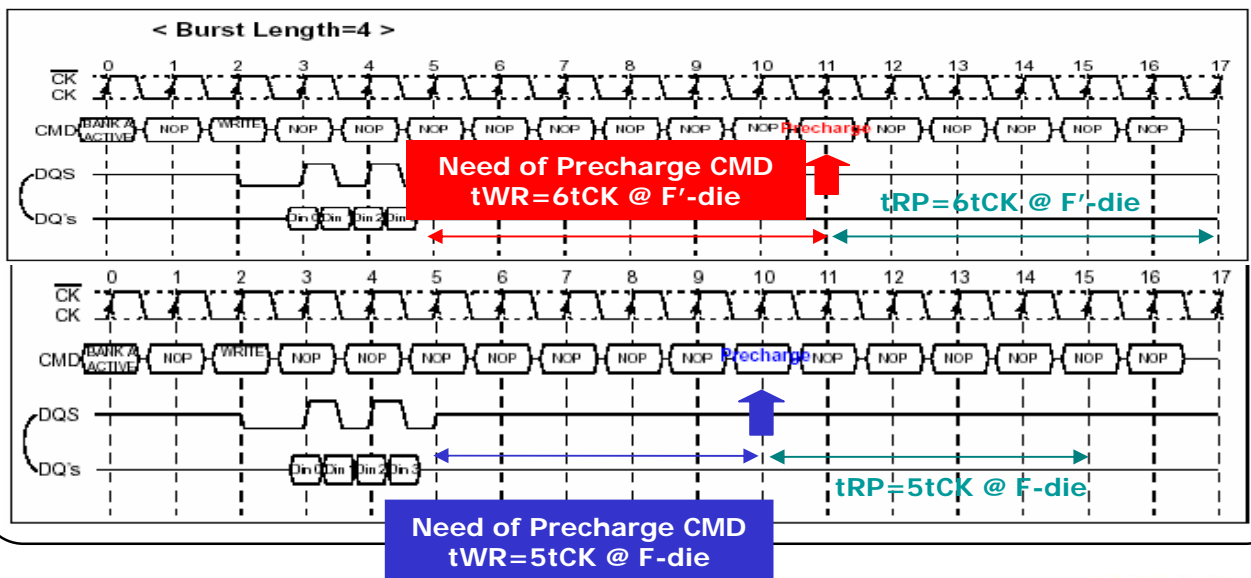
If A8 is high when Write command is issued, the write with Auto-Precharge function is performed. Any new command to the same bank should not be issued until the internal precharge is completed. The internal precharge begins after keeping $t_{WR}(\min)$.



2. Write followed by Precharge

Write followed by Precharge

For write cycle, $t_{WR}(\min)$ must be satisfied until the precharge command can be issued. After t_{RP} from the precharge, an active command to the same bank can be initiated.

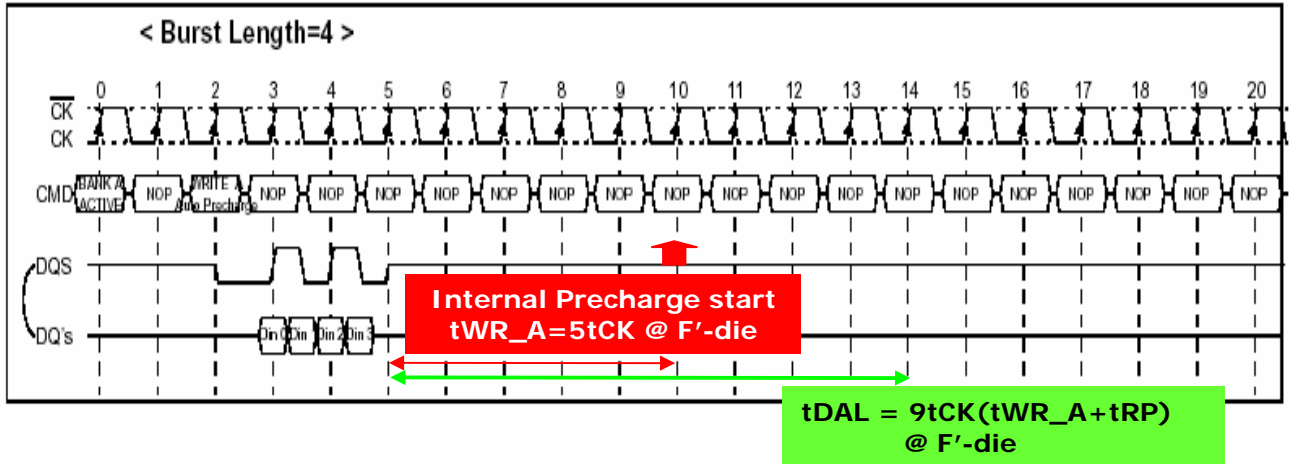


< Timing Example(2) for 230MHz >

1. Write w/AP timing

Write with Auto Precharge

If A8 is high when Write command is issued, the write with Auto-Precharge function is performed. Any new command to the same bank should not be issued until the internal precharge is completed. The internal precharge begins after keeping $t_{WR}(\text{min})$.



2. Write followed by Precharge

Write followed by Precharge

For write cycle, $t_{WR}(\text{min.})$ must be satisfied until the precharge command can be issued. After t_{RP} from the precharge, an active command to the same bank can be initiated.

