

***RIMM SPD Specification
based on 128M RDRAM(B-die, 32s banks)***

***Version 1.1
October 2000***

Change History

Version 1.1 (Oct. '00)

Based on the Samsung 128M RDRAM (A-die) SPD Specification 1.02 version.

SERIAL PRESENCE DETECT

MR16R0824(6/8/C/G)BN1 RAMBUS MODULE

MR16R0824(6/8)BN1-CK8/CK7/CG6

- Feature : Single Sided Module & 1,250 mil height
- Composition : 8Mx16 *4(6/8)pcs
- Used component type & part number
 - ① Normal Package (K4R271669B-NCK8/NCK7/NCG6)
- # of banks in component : 32s banks (Doubled with Split Banks)
- Refresh : 16K/32ms

MR16R082C(G)BN1-CK8/CK7/CG6

- Feature : Double Sided Module & 1,250 mil height
- Composition : 8Mx16 *12(16)pcs
- Used component type & part number
 - ① Normal Package (K4R271669B-NCK8/NCK7/NCG6)
 - ② Mirrored Package (K4R271669B-MCK8/MCK7/MCG6)
- # of banks in component : 32s banks (Doubled with Split Banks)
- Refresh : 16K/32ms

• Contents ;

Byte # (Dec)	Described Function	Option	Field Width	Units	Supported Function			Hex Value			Note
					K8	K7	G6	K8	K7	G6	
0	SPD Revision Level		8	LUT	SPD Revision 1.0			02h			1
1	Total Number of Bytes in the SPD		8	LUT	256 Bytes			08h			1
2	Device Type		8	LUT	Direct RDRAM			01h			1
3	Module Type		8	LUT	RIMM Module			01h			1
4	Row Address Bits[3:0], Column Address Bits[3:0]		4,4	bits	9 bits, 6 bits			96h			
5	Bank Address Bits and Type		8	LUT	32s banks			C5h			1
6	Refresh Bank Bits		3	bits	32 Refresh Bank Sets			05h			
7	Refresh Period(=t _{REF})		8	ms	32ms			20h			
8	Protocol Version		8	LUT	Protocol Version 1			02h			1
9	Misc. Device Configuration Field		8	n/a	DQS=1.5, no -LP, S28, S3			05h			3
10	Minimum Precharge to RAS time(=t _{RP-R,Min})		5	1/f _{RAS}	8cycles	8cycles	8cycles	08h	08h	08h	
11	Minimum RAS to Precharge time(=t _{RAS-R,Min})		6	1/f _{RAS}	20cycles	20cycles	20cycles	14h	14h	14h	
12	Minimum RAS to CAS time(=t _{RCD-R,Min})		5	1/f _{RAS}	10cycles	8cycles	8cycles	0Ah	08h	08h	
13	Minimum RAS to RAS time(=t _{RR-R,Min})		5	1/f _{RAS}	8cycles	8cycles	8cycles	08h	08h	08h	
14	Minimum Precharge to Precharge time(=t _{PP-R,Min})		5	1/f _{RAS}	8cycles	8cycles	8cycles	08h	08h	08h	
15	Min t _{CYCLE} for Range A		8	128ps	2.50ns	2.80ns	3.33ns	13h	15h	1Ah	
16	Max t _{CYCLE} for Range A		8	128ps	3.83ns	3.83ns	3.83ns	1Eh	1Eh	1Eh	
17	t _{CDLY} Range for Range A		8	t _{CYCLE}	5t _{CYCLE} ~ 9t _{CYCLE}	5t _{CYCLE} ~ 9t _{CYCLE}	5t _{CYCLE} ~ 9t _{CYCLE}	59h	59h	59h	
18	t _{CLS} and t _{CAS} Range for Range A		8	t _{CYCLE}	2t _{CYCLE} for t _{CLS} & t _{CAS}			AAh			
19	Min t _{CYCLE} for Range B		8	128ps	RFU			00h			2
20	Max t _{CYCLE} for Range B		8	128ps	RFU			00h			2
21	t _{CDLY} Range for Range B		8	t _{CYCLE}	RFU			00h			2
22	t _{CLS} and t _{CAS} Range for Range B		8	t _{CYCLE}	RFU			00h			2
23	Min t _{CYCLE} for Range C		8	128ps	RFU			00h			2
24	Max t _{CYCLE} for Range C		8	128ps	RFU			00h			2
25	t _{CDLY} Range for Range C		8	t _{CYCLE}	RFU			00h			2
26	t _{CLS} and t _{CAS} Range for Range C		8	t _{CYCLE}	RFU			00h			2
27	Min t _{CYCLE} for Range D		8	128ps	RFU			00h			2
28	Max t _{CYCLE} for Range D		8	128ps	RFU			00h			2
29	t _{CDLY} Range for Range D		8	t _{CYCLE}	RFU			00h			2
30	t _{CLS} and t _{CAS} Range for Range D		8	t _{CYCLE}	RFU			00h			2
31	Power Down Exit Max.time, Phase A(=t _{PDNXA,Max})		8	us	4us			04h			
32	Power Down Exit Max.time, Phase B(=t _{PDNXB,Max})		8	64t _{CYCLE}	9000t _{CYCLE}			8Dh			
33	Nap Exit Max.time, Phase A(=t _{NAPXA,Max})		8	ns	50ns			32h			
34	Nap Exit Max.time, Phase B(=t _{NAPXB,Max})		8	ns	40ns			28h			
35	f _{IMIN} [11:8] f _{IMAX} [11:8]		4 4	MHz	261MHz 400MHz	261MHz 357MHz	261MHz 300MHz	11h	11h	11h	
36	f _{IMIN} [7:0]		8	MHz	261MHz	261MHz	261MHz	05h	05h	05h	
37	f _{IMAX} [7:0]		8	MHz	400MHz	357MHz	300MHz	90h	65h	2Ch	
38	ODF mapping		-	-	-			00h			

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Byte # (Dec)	Described Function	Option	Field Width	Units	Supported Function			Hex Value			Note
					K8	K7	G6	K8	K7	G6	
39	Max. time between Current Control(=t _{CCTRL,Max})		8	ms	100ms			64h			
40	Max. time between Temp. Calibration(=t _{TEMP,Max})		8	ms	100ms			64h			
41	Min. time between Temp. Calibration Enable and Command(=t _{TCEN,Min})		8	t _{CYCLE}	150t _{CYCLE}			96h			
42	Maximum RAS to Precharge time(=t _{RAS-R,Max})		8	us	64us			40h			
43	Maximum time that a Device can stay in Nap Mode(=t _{NLIMIT,Max})		8	us	10us			0Ah			
44	ACTREFPT[3:0], PCHREFPT[3:0]		4,4	t _{CYCLE}	6t _{CYCLE} , 6t _{CYCLE}			66h			
45	CPCHREFPT_DC[3:0], RDREFPT_DC[3:0]		4,4	t _{CYCLE}	5t _{CYCLE} , 5t _{CYCLE}			55h			
46	RETRFPT_DC[3:0], WRREFPT_DC[3:0]		4,4	t _{CYCLE}	5t _{CYCLE} , 13t _{CYCLE}			5Dh			
47~49	Reserved		-	-	-			00h			
50	f _{RAS} [11:8]		4	MHz	400MHz	357MHz	300MHz	01h	01h	01h	
51	f _{RAS} [7:0]		8	MHz				90h	65h	2Ch	
52	PMAX,HI, PMAX,LO, TJ		1,1,6	°C	0,0,100°C	0,0,100°C	0,0,100°C	24h	24h	24h	
53	HeatSpreader, thermal sensor, Tplate		1,1,6	°C	1,0, 92°C	1,0,92°C	1,0,92°C	9Ch	9Ch	9Ch	
54	PSTBY,HI		8	1mA	105mA	100mA	90mA	69h	64h	5Ah	
55	PACTI,HI		8	2mA	165mA	155mA	140mA	52h	4Dh	46h	
56	PACTRW,HI		8	8mA	575mA	525mA	455mA	47h	41h	38h	
57	PSTBY,LO		8	1mA	80mA	80mA	80mA	50h	50h	50h	
58	PACTI,LO		8	2mA	135mA	135mA	135mA	43h	43h	43h	
59	PACTRW,LO		8	8mA	410mA	410mA	410mA	33h	33h	33h	
60	PNAP		8	128uA	4.0mA	4.0mA	4.0mA	1Fh	1Fh	1Fh	
61	PRESA (Reserved for a future thermal parameter)		-	-	-			00h			
62	PRESB (Reserved for a future thermal parameter)		-	-	-			00h			
63	Checksum for bytes 0 ~ 62		8	n/a	-			86h	20h	99h	3
64	Module Manufacturer ID Code		8	n/a	Samsung			CEh			3
65~71	 Module Manufacturer ID Code		56	n/a	Samsung			00h			3
72	Module Manufacturer Location		8	n/a	Onyang Korea			01h			3
73	Module Part Number(Memory module)		8	n/a	M			4Dh			3
74	Module Part Number(Module Configuration)		8	n/a	R			52h			3
75	Module Part Number(Data Bits)		8	n/a	1			31h			3
76	 Module Part Number(Data Bits)		8	n/a	6			36h			3
77	Module Part Number(Feature)		8	n/a	R			52h			3
78	Module Part Number(Module Density)		8	n/a	Blank			20h			3
79	Module Part Number(Module Density)		8	n/a	0			30h			3
80	 Module Part Number(Module Density)		8	n/a	8			38h			3
81	Module Part Number (Refresh, # of banks in comp. & interface)		8	n/a	2			32h			3
82	Module Part Number(# of component)	4d	8	n/a	4			34h			3
		6d	8	n/a	6			36h			3
		8d	8	n/a	8			38h			3
		12d	8	n/a	C			43h			3
		16d	8	n/a	G			47h			3
83	Module Part Number(Component Revision)		8	n/a	B			42h			3
84	Module Part Number(Package Type)		8	n/a	N			4Eh			3
85	Module Part Number(PCB Revision)		8	n/a	1			31h			3
86	Module Part Number(Hyphen)		8	n/a	- (Hyphen)			2Dh			3
87	Module Part Number(Power)		8	n/a	C	C	C	43h	43h	43h	3
88	Module Part Number(t _{RAC} & Speed)		8	n/a	K	K	G	4Bh	4Bh	47h	3
89	Module Part Number(t _{RAC} & Speed)		8	n/a	8	7	6	38h	37h	36h	3
90	Module Part Number(RFU)		8	n/a	-			00h			3

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Byte # (Dec)	Described Function	Option	Field Width	Units	Supported Function			Hex Value			Note
					K8	K7	G6	K8	K7	G6	
91	Module Manufacturer Revision Code (PCB)		8	n/a	1			31h			3
92	 Component Manufacturer Revision Code		8	n/a	B (B die)			42h			3
93	Module Manufacturing Year		8	n/a	-			-			3, 4
94	Module Manufacturing Week		8	n/a	-			-			3, 4
95~98	Module Serial Number		32	n/a	-			-			3, 5
99	Number of Devices on Module	4d	6	devices	4			04h			
		6d	6	devices	6			06h			
		8d	6	devices	8			08h			
		12d	6	devices	12			0Ch			
		16d	6	devices	16			10h			
100	Module Data Width		8	bits	16bits			10h			
101	Devices Enables	4d	8	bits	All 4 devices are enabled			0Fh			
		6d	8	bits	All 6 devices are enabled			3Fh			
		8d	8	bits	All 8 devices are enabled			FFh			
		12d	8	bits	All 12 devices are enabled			FFh			
		16d	8	bits	All 16 devices are enabled			FFh			
102	 Devices Enables	4d	8	bits	All 4 devices are enabled			00h			
		6d	8	bits	All 6 devices are enabled			00h			
		8d	8	bits	All 8 devices are enabled			00h			
		12d	8	bits	All 12 devices are enabled			0Fh			
		16d	8	bits	All 16 devices are enabled			FFh			
103~104	 Devices Enables		16	bits	-			00h			
105	Module Vdd[3:0], Module Voltage Interface Level[3:0]		4,4	LUT	2.5V, 1.8V Vterm			10h			1
106	Module Vdd Tolerance		8	LUT	5% DC, 2% AC			52h			1
107~113	Reserved		56	-	-			00h			
114	CDLY0/1 for tCDLY=3		8	t _{CYCLE}	-			00h			
115	CDLY0/1 for tCDLY=4		8	t _{CYCLE}	-			00h			
116	CDLY0/1 for tCDLY=5		8	t _{CYCLE}	3 / 0			30h			
117	CDLY0/1 for tCDLY=6		8	t _{CYCLE}	3 / 1			31h			
118	CDLY0/1 for tCDLY=7		8	t _{CYCLE}	3 / 2			32h			
119	CDLY0/1 for tCDLY=8		8	t _{CYCLE}	4 / 2			42h			
120	CDLY0/1 for tCDLY=9		8	t _{CYCLE}	5 / 2			52h			
121	CDLY0/1 for tCDLY=10		8	t _{CYCLE}	-			00h			
122	CDLY0/1 for tCDLY=11		8	t _{CYCLE}	-			00h			
123	CDLY0/1 for tCDLY=12		8	t _{CYCLE}	-			00h			
124	CDLY0/1 for tCDLY=13		8	t _{CYCLE}	-			00h			
125	CDLY0/1 for tCDLY=14		8	t _{CYCLE}	-			00h			
126	CDLY0/1 for tCDLY=15		8	t _{CYCLE}	-			00h			
127	Checksum for Bytes 99 ~ 126	4d	8	n/a	-			ACh			3
		6d	8	n/a	-			DEh			
		8d	8	n/a	-			A0h			
		12d	8	n/a	-			B3h			
		16d	8	n/a	-			A7h			3
128 +	Open for Customer Use		-	-	-			Undefined			

<Notes>

1. Please refer to Look-Up Table (LUT) in the Direct Rambus™ SPD specification 1.0
2. It is reserved to future use (RFU).
3. Unit is not available (n/a).
4. These bytes are programmed by code of Date Week & Date Year with binary format.
5. These bytes are programmed by Samsung's own Module Assembly Serial # system. All modules may have unique serial #.