

SODIMM DDR5 5600 32GB

Datasheet

(SQR-SD5N32G5K6HNAG)

CONTENTS

1. Description	4
2. Features	4
3. Dimension	5
4. Pin Descriptions	6
5. Pin Assignments.....	7
6. Block Diagram.....	8
7. Thermal Characteristics	9
8. IDD, IDDQ and IPP Specifications	10
9. Timing Parameters.....	11
Appendix: Part Number Table.....	17

Revision History

Rev	Date	Modification
1.0	2 nd May, 2024	Official release

Advantech reserves the right to make changes without further notice to any products or data herein to improve reliability, function, or design. Information furnished by Advantech is believed to be accurate and reliable. However, Advantech does not assure any liability arising out of the application or use of this information, nor the application or use of any product or circuit described herein, neither does it convey any license under its patent rights nor the rights of others.

Copyright © 1983-2011 Advantech Co., Ltd. All rights reserved.

1. Description

DDR5 SO-DIMM							
Part Number	Density	Speed	DIMM Organization	Number of DRAM	Number of rank	side	ECC
SQR-SD5N32G5K6HNAG (Hynix 2Gx8(16Gb))	32GB	PC5-5600	4Gx64	16	2	2	N

2. Features

● Key Parameter

Industry Nomenclature	tCK (ns)	tRCD (ns)	tRP (ns)	tRAS (ns)	tRC (ns)
PC5-5600	0.357	16.00	16.00	32.00	48.00

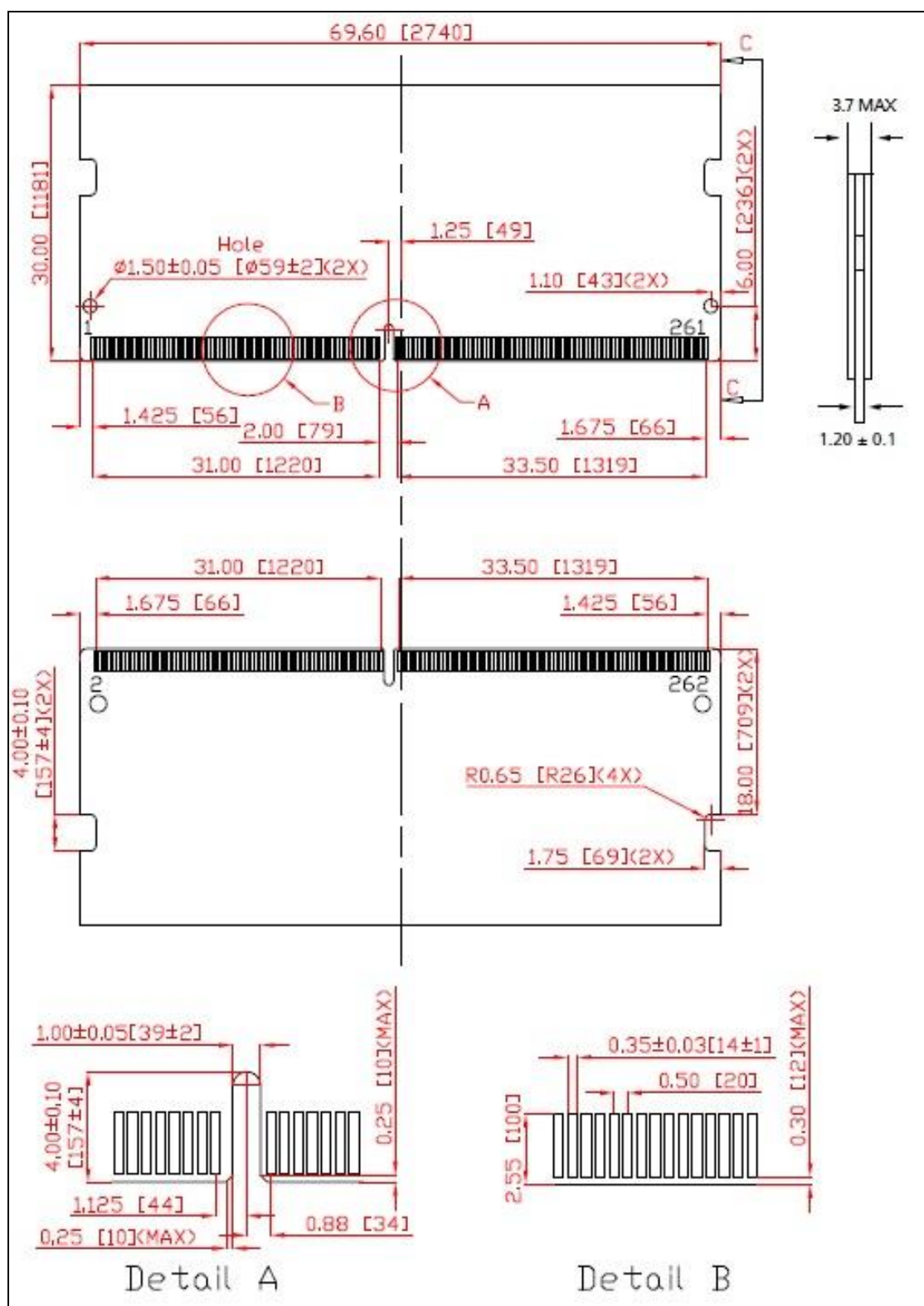
Supported Data Transfer Rate				
Industry Nomenclature	CL=36	CL=40	CL=42	CL=46
PC5-5600	4400	4800	5200	5600

● tRFC parameter by Density

Parameter	16Gb	Unit
tRFC1,min	295	ns
tRFC2,min	160	ns
tRFCsb,min	130	ns

- JEDEC Standard 262-pin Small Outline Dual In-Line Memory Module
- CL-tRCD-tRP: 46-45-45
- VDD=VDDQ= 1.1V (1.067V ~ 1.166V)
- VPP=1.8V (1.746V ~ 1.908V)
- VDDSPD= 1.8V
- On-die, internal, adjustable VREF generation for DQ,CA,CS
- 16n-bit prefetch
- Two independent I/O sub channels
- Programmable /CAS Latency: 22,26,28,30,32,36,40,42,46,50
- Operating temperature Tcase: 0-95°C
 - ◆ tREFI 3.9us for 0°C ≤ Tcase < 85°C
 - ◆ tREFI 1.95us for 85°C < Tcase ≤ 95°C
- On-Die ECC
- PMIC on DIMM, VIN_Bulk input supply range: 4.25V to 5.5V
- Fly-by topology
- I3C/I2C support
- Terminated control and C/A bus
- SPD EEPROM Hub and Integrated Thermal Sensor
- Halogen-free

3. Dimension



Note: All dimensions are in millimeters (mils) and should be kept within a tolerance of ± 0.15 (6), unless otherwise specified.

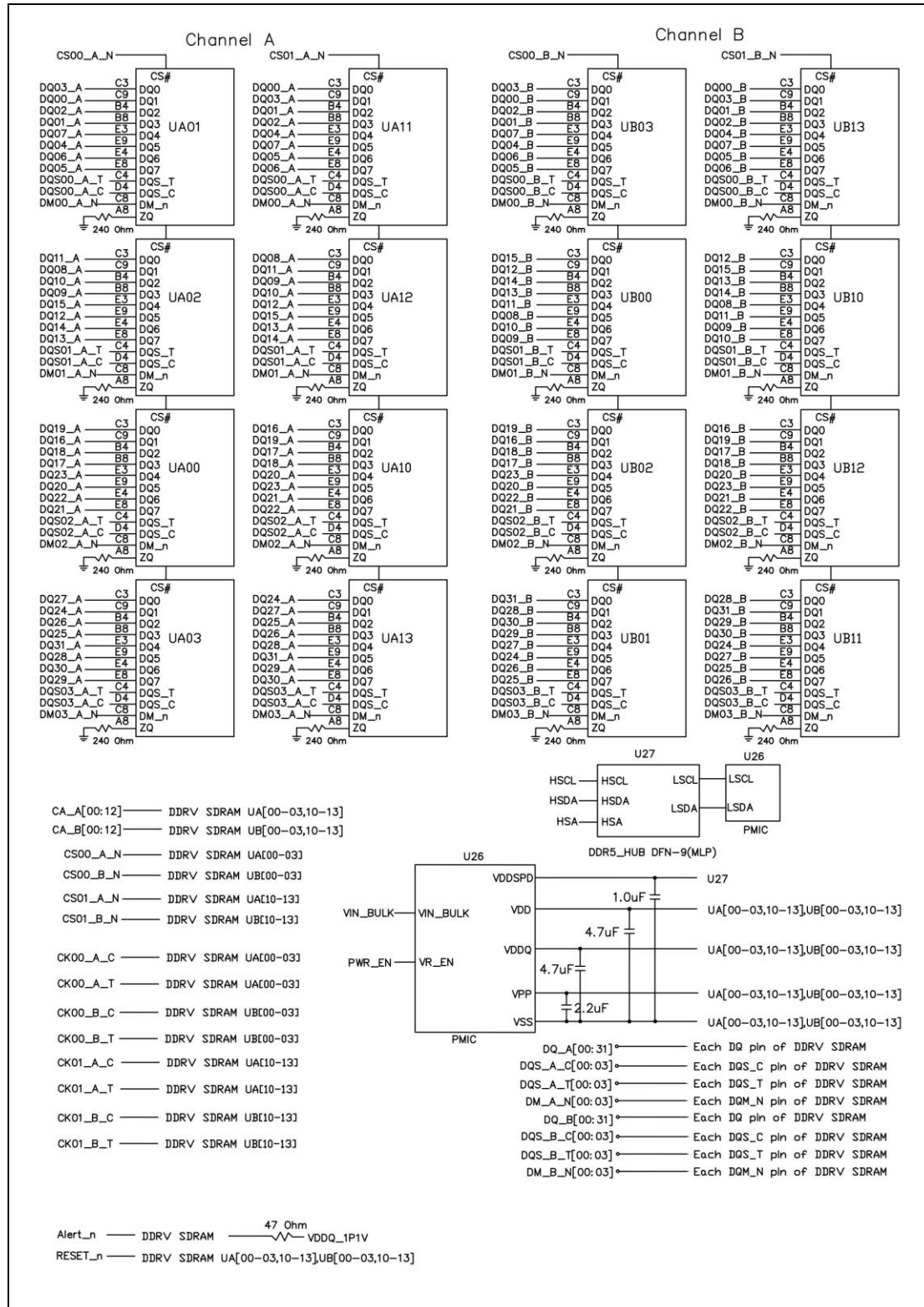
4. Pin Descriptions

Symbol	Type	I/O Level	Description	Symbol	Type	I/O Level	Description
CK_t, CK_c	Input	VDDQ	Clock	DQ[31:0]_A DQ[31:0]_B	Input/ Output	VDDQ	Data Input/Output
CA[12:0]_A CA[12:0]_B	Input	VDDQ	Command/Address Inputs	CB[3:0]_A CB[3:0]_B	Input/ Output	VDDQ	ECC Check Bits Input/Output
CS[1:0]_A CS[1:0]_B	Input	VDDQ	Chip Select	DQS[4:0]_A_t DQS[4:0]_B_t	Input/ Output	VDDQ	Data Strobe
ALERT_n	Output	VDDQ	Alert	DQS[4:0]_A_c DQS[4:0]_B_c	Input/ Output	VDDQ	Data Strobe
RESET_n	CMOS Input	VDDQ	Active Low Asynchronous Reset	DM[3:0]_A_n DM[3:0]_B_n	Input	VDDQ	Input Data Mask
PWR_GOOD	Input/ Output	VDDQ	Power Good Indicator	VIN_BULK	Supply		External Power Supply
HSCL	Input	VOUT	Host Sideband Bus Clock	PWR_EN	Input		PMIC Enable
HSDA	Input/ Output	VOUT	Host Sideband Bus Data	VSS	Supply		Ground
HSA	Input	GND	Host Sideband Bus Device ID	RFU			Reserved for future use

5. Pin Assignments

Pin	Front Side Pin Label	Pin	Back Side Pin Label	Pin	Front Side Pin Label	Pin	Back Side Pin Label	Pin	Front Side Pin Label	Pin	Back Side Pin Label	Pin	Front Side Pin Label	Pin	Back Side Pin Label
1	VIN_BULK	2	HSA	67	VSS	68	DQ21_A	131	CK0_A_t	132	CK1_A_t	197	VSS	198	DQ7_B
3	VIN_BULK	4	HSCL	69	DQ22_A	70	VSS	133	CK0_A_c	134	CK1_A_c	199	DQ8_B	200	VSS
5	RFU	6	HSDA	71	VSS	72	DQ23_A	135	VSS	136	VSS	201	VSS	202	DQ9_B
7	PWR_GOOD	8	PWR_EN	73	DQ24_A	74	VSS	137	CK0_B_t	138	CK1_B_t	203	DQ10_B	204	VSS
9	VSS	10	VSS	75	VSS	76	DQ25_A	139	CK0_B_c	140	CK1_B_c	205	VSS	206	DQ11_B
11	DQ0_A	12	DQ1_A	77	DQ26_A	78	VSS	141	VSS	142	VSS	207	DQS1_B_c	208	VSS
13	VSS	14	VSS	79	VSS	80	DQ27_A	143	RFU	144	CA12_B	209	DQS1_B_t	210	DM1_B_n
15	DQ2_A	16	DQ3_A	81	DQS3_A_c	82	VSS	145	CA11_B	146	CA10_B	211	VSS	212	VSS
17	VSS	18	VSS	83	DQS3_A_t	84	DM3_A_n	147	VSS	148	VSS	213	DQ12_B	214	DQ13_B
19	DM0_A_n	20	DQS0_A_c	85	VSS	86	VSS	149	CA9_B	150	CA8_B	215	VSS	216	VSS
21	VSS	22	DQS0_A_t	87	DQ28_A	88	DQ29_A	151	CA7_B	152	CA6_B	217	DQ14_B	218	DQ15_B
23	DQ4_A	24	VSS	89	VSS	90	VSS	153	VSS	154	VSS	219	VSS	220	VSS
25	VSS	26	DQ5_A	91	DQ30_A	92	DQ31_A	155	CA5_B	156	CA4_B	221	DQ16_B	222	DQ17_B
27	DQ6_A	28	VSS	93	VSS	94	VSS	157	CA3_B	158	CA2_B	223	VSS	224	VSS
29	VSS	30	DQ7_A	95	CB0_A	96	CB1_A	159	VSS	160	VSS	225	DQ18_B	226	DQ19_B
31	DQ8_A	32	VSS	97	VSS	98	VSS	161	CS0_B_n	162	CA1_B	227	VSS	228	VSS
33	VSS	34	DQ09_A	99	CB2_A	100	DQS4_A_c	163	RESET_n	164	CA0_B	229	DM2_B_n	230	DQS2_B_c
35	DQ10_A	36	VSS	101	VSS	102	DQS4_A_t	165	CS1_B_n	166	VSS	231	VSS	232	DQS2_B_t
37	VSS	38	DQ11_A	103	CB3_A	104	VSS	167	VSS	168	CB0_B	233	DQ20_B	234	VSS
39	DQS1_A_c	40	VSS	105	VSS	106	CS0_A_n	169	DQS4_B_c	170	VSS	235	VSS	236	DQ21_B
41	DQS1_A_t	42	DM1_A_n	107	CA0_A	108	ALERT_n	171	DQS4_B_t	172	CB1_B	237	DQ22_B	238	VSS
43	VSS	44	VSS	109	CA1_A	110	CS1_A_n	173	VSS	174	VSS	239	VSS	240	DQ23_B
45	DQ12_A	46	DQ13_A	111	VSS	112	VSS	175	CB3_B	176	CB2_B	241	DQ24_B	242	VSS
47	VSS	48	VSS	113	CA2_A	114	CA3_A	177	VSS	178	VSS	243	VSS	244	DQ25_B
49	DQ14_A	50	DQ15_A	115	CA4_A	116	CA5_A	179	DQ0_B	180	DQ1_B	245	DQ26_B	246	VSS
51	VSS	52	VSS	117	VSS	118	VSS	181	VSS	182	VSS	247	VSS	248	DQ27_B
53	DQ16_A	54	DQ17_A	119	CA6_A	120	CA7_A	183	DQ2_B	184	DQ3_B	249	DQS3_B_c	250	VSS
55	VSS	56	VSS	121	CA8_A	122	CA9_A	185	VSS	186	VSS	251	DQS3_B_t	252	DM3_B_n
57	DQ18_A	58	DQ19_A	123	VSS	124	VSS	187	DM0_B_n	188	DQS0_B_c	253	VSS	254	VSS
59	VSS	60	VSS	125	CA10_A	126	CA11_A	189	VSS	190	DQS0_B_t	255	DQ28_B	256	DQ29_B
61	DM2_A_n	62	DQS2_A_c	KEY				191	DQ4_B	192	VSS	257	VSS	258	VSS
63	VSS	64	DQS2_A_t	127	CA12_A	128	RFU	193	VSS	194	DQ5_B	259	DQ30_B	260	DQ31_B
65	DQ20_A	66	VSS	129	VSS	130	VSS	195	DQ6_B	196	VSS	261	VSS	262	VSS

6. Block Diagram



7. Thermal Characteristics

Symbol	Parameter		Rating	Units	Note
T _c	Operation Temperature	Normal Operating Temp.	0 to 85	°C	1,2,3
		Extended Temp.	85 to 95	°C	1,2,3,4
T _{STG}	Storage Temperature		-55 to 100	°C	5
HSTG	Non-operating storage relative humidity (non-condensing)		5 to 95	%	

Note:

1. Maximum operating case temperature; T_c is measured in the center of the package.
2. A thermal solution must be designed to ensure the DRAM device does not exceed the maximum T_c during operation.
3. Device functionality is not guaranteed if the DRAM device exceeds the maximum T_c during operation.
4. If T_c exceeds 85°C, the DRAM must be refreshed externally at 2X refresh, which is a 1.95μs interval refresh rate.
5. Storage temperature is defined as the temperature of the top/center of the DRAM and does not reflect the storage temperatures of shipping trays.

8. IDD, IDDQ and IPP Specifications

Symbol	Description	Value (Typical)		Units
		IDD Max.	IPP Max.	
IDD0	Operating One Bank Active-Precharge Current	912	88	mA
IDD0F	Operating Four Bank Active-Precharge Current	1184	168	mA
IDD2N	Precharge Standby Current	816	64	mA
IDD2P	Precharge Power-Down Current	688	64	mA
IDD3N	Active Standby Current	1920	240	mA
IDD3P	Active Power-Down Current	1792	224	mA
IDD4R	Operating Burst Read Current	2608	176	mA
IDD4W	Operating Burst Write Current	2912	200	mA
IDD5B	Burst Refresh Current (Normal Refresh Mode)	2240	392	mA
IDD5C	Burst Refresh Current (Same Bank Refresh Mode)	1264	392	mA
IDD6E	Self Refresh Current: Extended Temperature Range	816	104	mA
IDD7	Operating Bank Interleave Read Current	2904	456	mA
IDD8	Maximum Power Saving Deep Power Down Current	416	64	mA

9. Timing Parameters

Parameter	Symbol	5600		6000		6400		Unit
		Min	Max	Min	Max	Min	Max	
Clock Timing								
Average clock period	tCK,AVG	0.357		0.333		0.312		ns
Command and Address Timing								
Read to Read command delay for same bank group	tCCD_L	8nCK,5ns (MAX)		8nCK,5ns (MAX)		8nCK,5ns (MAX)		nCK
WRITE to WRITE command delay for same bank group	tCCD_L_WR	32nCK, 20ns (MAX)		32nCK, 20ns (MAX)		32nCK, 20ns (MAX)		nCK
WRITE to WRITE command delay for same bank group, second WRITE not RMW	tCCD_L_WR2	16nCK, 10ns (MAX)		16nCK, 10ns (MAX)		16nCK, 10ns (MAX)		nCK
Read to Read or Write to Write command delay for different bank group for BL16, BC8 OTF	tCCD_S	8		8		8		nCK
ACTIVATE to ACTIVATE command delay to different bank group for 2KB page size	tRRD_S,2K	8		8		8		nCK
ACTIVATE to ACTIVATE command delay to different bank group for 1KB page size	tRRD_S,1K	8		8		8		nCK
ACTIVATE to ACTIVATE command delay to same bank group for 2KB page size	tRRD_L,2K	8nCK,5ns (MAX)		8nCK,5ns (MAX)		8nCK,5ns (MAX)		nCK
ACTIVATE to ACTIVATE command delay to same bank group for 1KB page size	tRRD_L,1K	8nCK,5ns (MAX)		8nCK,5ns (MAX)		8nCK,5ns (MAX)		nCK
Four activate window for 2KB page size	tFAW,2K	40nCK, 14.280ns (MAX)		40nCK, 13.333ns (MAX)		40nCK, 12.500ns (MAX)		ns
Four activate window for 1KB page size	tFAW,1K	32nCK, 11.428ns (MAX)		32nCK, 10.666ns (MAX)		32nCK, 10.000ns (MAX)		ns
Delay from start of internal WRITE transaction to internal READ command for different bank group	tWTR_S	2.5		2.5		2.5		ns
Delay from start of internal WRITE transaction to internal READ command for same bank group	tWTR_L	10		10		10		ns
Delay from start of internal WRITE transaction to internal READ with AUTO PRECHARGE command for same bank	tWTRA	tWR-tRTP		tWR-tRTP		tWR-tRTP		ns
Internal READ command to PRECHARGE command delay	tRTP	7.5		7.5		7.5		ns
PRECHARGE to PRECHARGE delay	tPPD	2		2		2		nCK
WRITE recovery time	tWR	30		30		30		ns

10. SPD

Byte Number	Function Described	Function supported	Hex Value
0	Number of Bytes in SPD Device	1024 Bytes	30
1	SPD Revision for Base Configuration Parameters	Revision 1.0	10
2	Key Byte / Host Bus Command Protocol Type	DDR5 SDRAM	12
3	Key Byte / Module Type	SODIMM	03
4	First SDRAM Density and Package	Monolithic 16Gb	04
5	First SDRAM Addressing	10 columns/16 rows	00
6	First SDRAM I/O Width	x8	20
7	First SDRAM Bank Groups & Banks Per Bank Group	8BGs / 4Banks per BG	62
8	Second SDRAM Density and Package	N/A	00
9	Second SDRAM Addressing	N/A	00
10	Second SDRAM I/O Width	N/A	00
11	Second SDRAM Bank Groups & Banks Per Bank Group	N/A	00
12	SDRAM BL32 & Post Package Repair	BL32 not supported /sPPR Undo/Lock supported	20
13	SDRAM Duty Cycle Adjuster & Partial Array Self Refresh	Device supports DCA for 4-phase internal clock(s)	02
14	SDRAM Fault Handling	not supported	00
15	Reserved	Reserved	00
16	SDRAM Nominal Voltage, VDD	1.1V	00
17	SDRAM Nominal Voltage, VDDQ	1.1V	00
18	SDRAM Nominal Voltage, VPP	1.8V	00
19	SDRAM Timing	Standard	00
20	SDRAM Minimum Cycle Time ($t_{CKAVGmin}$), Least Significant Byte	357ps	65
21	SDRAM Minimum Cycle Time ($t_{CKAVGmin}$), Most Significant Byte	357ps	01
22	SDRAM Maximum Cycle Time ($t_{CKAVGmax}$), Least Significant Byte	1010ps	F2
23	SDRAM Maximum Cycle Time ($t_{CKAVGmax}$), Most Significant Byte	1010ps	03
24	CAS Latencies Supported, First Byte	22,26,28,30,32,36,40,42,46,50	7A
25	CAS Latencies Supported, Second Byte	22,26,28,30,32,36,40,42,46,50	AD
26	CAS Latencies Supported, Third Byte	22,26,28,30,32,36,40,42,46,50	00
27	CAS Latencies Supported, Fourth Byte	22,26,28,30,32,36,40,42,46,50	00
28	CAS Latencies Supported, Fifth Byte	22,26,28,30,32,36,40,42,46,50	00
29	Reserved	Reserved	00
30	SDRAM Minimum CAS Latency Time (t_{Amin}), Least Significant Byte	16000ps	80
31	SDRAM Minimum CAS Latency Time (t_{Amin}), Most Significant Byte	16000ps	3E
32	SDRAM Minimum RAS to CAS Delay Time (t_{RCDmin}), Least Significant Byte	16000ps	80
33	SDRAM Minimum RAS to CAS Delay Time (t_{RCDmin}), Most Significant Byte	16000ps	3E
34	SDRAM Minimum Row Precharge Delay Time (t_{RPmin}), Least Significant Byte	16000ps	80
35	SDRAM Minimum Row Precharge Delay Time (t_{RPmin}), Most Significant Byte	16000ps	3E
36	SDRAM Minimum Active to Precharge Delay Time (t_{RASmin}), Least Significant Byte	32000ps	00

37	SDRAM Minimum Active to Precharge Delay Time (t_{RASmin}), Most Significant Byte	32000ps	7D
38	SDRAM Minimum Active to Active/Refresh Delay Time (t_{RCmin}), Least Significant Byte	48000ps	80
39	SDRAM Minimum Active to Active/Refresh Delay Time (t_{RCmin}), Most Significant Byte	48000ps	BB
40	SDRAM Minimum Write Recovery Time (t_{WRmin}), Least Significant Byte	30000ps	30
41	SDRAM Minimum Write Recovery Time (t_{WRmin}), Most Significant Byte	30000ps	75
42	SDRAM Minimum Refresh Recovery Delay Time ($t_{RFC1min}$, $t_{RFC1slr min}$), Least Significant Byte	295ns	27
43	SDRAM Minimum Refresh Recovery Delay Time ($t_{RFC1min}$, $t_{RFC1slr min}$), Most Significant Byte	295ns	01
44	SDRAM Minimum Refresh Recovery Delay Time ($t_{RFC2min}$, $t_{RFC2slr min}$), Least Significant Byte	160ns	A0
45	SDRAM Minimum Refresh Recovery Delay Time ($t_{RFC2min}$, $t_{RFC2slr min}$), Most Significant Byte	160ns	00
46	SDRAM Minimum Refresh Recovery Delay Time ($t_{RFCsbmin}$, $t_{RFCsb slr min}$), Least Significant Byte	130ns	82
47	SDRAM Minimum Refresh Recovery Delay Time ($t_{RFCsb dlr min}$), Most Significant Byte	130ns	00
48	SDRAM Minimum Refresh Recovery Delay Time, 3DS Different Logical Rank ($t_{RFC1 dlr min}$), Least Significant Byte	N/A	00
49	SDRAM Minimum Refresh Recovery Delay Time, 3DS Different Logical Rank ($t_{RFC1 dlr min}$), Most Significant Byte	N/A	00
50	SDRAM Minimum Refresh Recovery Delay Time, 3DS Different Logical Rank ($t_{RFC2 dlr min}$), Least Significant Byte	N/A	00
51	SDRAM Minimum Refresh Recovery Delay Time, 3DS Different Logical Rank ($t_{RFC2 dlr min}$), Most Significant Byte	N/A	00
52	SDRAM Minimum Refresh Recovery Delay Time, 3DS Different Logical Rank ($t_{RFCsb dlr min}$), Least Significant Byte	N/A	00
53	SDRAM Minimum Refresh Recovery Delay Time, 3DS Different Logical Rank ($t_{RFCsb dlr min}$), Most Significant Byte	N/A	00
54	SDRAM Refresh Management, First Byte, First SDRAM	N/A	00
55	SDRAM Refresh Management, Second Byte, First SDRAM	N/A	00
56	SDRAM Refresh Management, First Byte, Second SDRAM	N/A	00
57	SDRAM Refresh Management, Second Byte, Second SDRAM	N/A	00
58	SDRAM Adaptive Refresh Management Level A, First Byte, First SDRAM	N/A	00
59	SDRAM Adaptive Refresh Management Level A, Second Byte, First SDRAM	N/A	00
60	SDRAM Adaptive Refresh Management Level A, First Byte, Second SDRAM	N/A	00
61	SDRAM Adaptive Refresh Management Level A, Second Byte, Second SDRAM	N/A	00
62	SDRAM Adaptive Refresh Management Level B, First Byte, First SDRAM	N/A	00
63	SDRAM Adaptive Refresh Management Level B, Second Byte, First SDRAM	N/A	00
64	SDRAM Adaptive Refresh Management Level B, First Byte, Second SDRAM	N/A	00
65	SDRAM Adaptive Refresh Management Level B, Second Byte, Second SDRAM	N/A	00
66	SDRAM Adaptive Refresh Management Level C, First Byte, First SDRAM	N/A	00
67	SDRAM Adaptive Refresh Management Level C, Second Byte, First SDRAM	N/A	00
68	SDRAM Adaptive Refresh Management Level C, First Byte, Second SDRAM	N/A	00
69	SDRAM Adaptive Refresh Management Level C, Second Byte, Second SDRAM	N/A	00
70	SDRAM Minimum Active to Active Command Delay Time, Same Bank Group (t_{RRD_Lmin}), Least Significant Byte	5000ps	88
71	SDRAM Minimum Active to Active Command Delay Time, Same Bank Group (t_{RRD_Lmin}), Most Significant Byte	5000ps	13
72	SDRAM Minimum Active to Active Command Delay Time, Same Bank Group (t_{RRD_Lmin}), Lower Clock Limit	8nCK	08

73	SDRAM Minimum CAS _n to CAS _n Command Delay Time, Same Bank Group (tCCD _L min), Least Significant Byte	5000ps	88
74	SDRAM Minimum CAS _n to CAS _n Command Delay Time, Same Bank Group (tCCD _L min), Most Significant Byte	5000ps	13
75	SDRAM Minimum CAS _n to CAS _n Command Delay Time, Same Bank Group (tCCD _L min), Lower Clock Limit	8nCK	08
76	SDRAM Minimum Write CAS _n to Write CAS _n Command Delay Time, Same Bank Group (tCCD _L WRmin), Least Significant Byte	20000ps	20
77	SDRAM Minimum Write CAS _n to Write CAS _n Command Delay Time, Same Bank Group (tCCD _L WRmin), Most Significant Byte	20000ps	4E
78	SDRAM Minimum Write CAS _n to Write CAS _n Command Delay Time, Same Bank Group (tCCD _L WRmin), Lower Clock Limit	32nCK	20
79	SDRAM Minimum Write CAS _n to Write CAS _n Command Delay Time, Second Write not RMW, Same Bank Group (tCCD _L WR2min), Least Significant Byte	10000ps	10
80	SDRAM Minimum Write CAS _n to Write CAS _n Command Delay Time, Second Write not RMW, Same Bank Group (tCCD _L WR2min), Most Significant Byte	10000ps	27
81	SDRAM Minimum Write CAS _n to Write CAS _n Command Delay Time, Second Write not RMW, Same Bank Group (tCCD _L WR2min), Lower Clock Limit	16nCK	10
82	SDRAM Minimum Four Activate Window (tFAWmin), Least Significant Byte	11428ps	A4
83	SDRAM Minimum Four Activate Window (tFAWmin), Most Significant Byte	11428ps	2C
84	SDRAM Minimum Four Activate Window (tFAWmin), Lower Clock Limit	32nCK	20
85	SDRAM Minimum Internal Write to Read Command Delay Time, Same Bank Group, (tWTR _L min), Least Significant Byte	10000ps	10
86	SDRAM Minimum Internal Write to Read Command Delay Time, Same Bank Group, (tWTR _L min), Most Significant Byte	10000ps	27
87	SDRAM Minimum Internal Write to Read Command Delay Time, Same Bank Group, (tWTR _L min), Lower Clock Limit	16nCK	10
88	SDRAM Minimum Internal Write to Read Command Delay Time, Different Bank Group, (tWTR _S min), Least Significant Byte	2500ps	C4
89	SDRAM Minimum Internal Write to Read Command Delay Time, Different Bank Group, (tWTR _S min), Most Significant Byte	2500ps	09
90	SDRAM Minimum Internal Write to Read Command Delay Time, Different Bank Group, (tWTR _S min), Lower Clock Limit	4nCK	04
91	SDRAM Minimum Internal Read to Precharge Command Delay Time, (tRTPmin), Least Significant Byte	7500ps	4C
92	SDRAM Minimum Internal Read to Precharge Command Delay Time, (tRTPmin), Most Significant Byte	7500ps	1D
93	SDRAM Minimum Internal Read to Precharge Command Delay Time, (tRTPmin), Lower Clock Limit	12nCK	0C
94~127	Reserved -- must be coded as 0x00	Reserved	00
128~191	Reserved for future use	Reserved	00
192	SPD Revision for SPD bytes 192~447	Revision 1.0	10
193	Hashing Sequence	No authentication	00
194	SPD Manufacturer ID Code, First Byte	IDT (Renesas)	80
195	SPD Manufacturer ID Code, Second Byte	IDT (Renesas)	B3
196	SPD Device Type	IDT (Renesas)	80
197	SPD Device Revision Number	IDT (Renesas)	21
198	PMIC 0 Manufacturer ID Code, First Byte	Anpec	0B
199	PMIC 0 Manufacturer ID Code, Second Byte	Anpec	10
200	PMIC 0 Device Type	Anpec	82
201	PMIC 0 Revision Number	Anpec	36
202	PMIC 1 Manufacturer ID Code, First Byte	N/A	00
203	PMIC 1 Manufacturer ID Code, Second Byte	N/A	00

204	PMIC 1 Device Type	N/A	00
205	PMIC 1 Revision Number	N/A	00
206	PMIC 2 Manufacturer ID Code, First Byte	N/A	00
207	PMIC 2 Manufacturer ID Code, Second Byte	N/A	00
208	PMIC 2 Device Type	N/A	00
209	PMIC 2 Revision Number	N/A	00
210	Thermal Sensor Manufacturer ID Code, First Byte	N/A	00
211	Thermal Sensor Manufacturer ID Code, Second Byte	N/A	00
212	Thermal Sensor Device Type	N/A	00
213	Thermal Sensor Revision Number	N/A	00
214	DRAM Specification Level	Reserved	00
215	SPD Specification Level	N/A	00
216	PMIC0 Specification Level	N/A	00
217	PMIC1 Specification Level	N/A	00
218	PMIC2 Specification Level	N/A	00
219	TS Specification Level	N/A	00
220	DIMM Specification Level	N/A	00
221~229	Reserved	Reserved	00
230	Module Nominal Height	31 < height <= 32 mm	11
231	Module Maximum Thickness	1 < thickness <= 2 mm Front side	01
232	Reference Raw Card Used	R/C B rev 0	01
233	DIMM Attributes	Tc 0 to +95 °C, 1row	81
234	Module Organization	Symmetrical 2 Package Ranks	08
235	Memory Channel Bus Width	2 channels, 32 bits per channel	22
236~239	Reserved	Reserved	00
240~447	Reserved	Reserved	00
448~509	Reserved for future use	Reserved	00
510~511	CRC for SPD bytes 0~509	CRC	-
512	Module Manufacturer ID Code, First Byte	Advantech	8A
513	Module Manufacturer ID Code, Second Byte	Advantech	C8
514	Module Manufacturing Location	Made in Taiwan	02
515~516	Module Manufacturing Date		-
517~520	Module Serial Number		-
521~550	Module Part Number	SQR-SD5N32G5K6HNAG	53 51 52 2D 53 44 35 4E 33 32 47 35 4B 36 48 4E 41 47 20 20 20 20 20 20 20 20 20 20 20 20
551	Module Revision Code		00
552	DRAM Manufacturer ID Code, First Byte	SKhynix	80
553	DRAM Manufacturer ID Code, Second Byte	Skhynix	AD

554	DRAM Stepping	Undefined (No Stepping Number Provided)	FF
555~639	Manufacturer's Specific Data		-
640~703	End User Programmable	Reserved	00
704~767	End User Programmable	Reserved	00
768~831	End User Programmable	Reserved	00
832~895	End User Programmable	Reserved	00
896~959	End User Programmable	Reserved	00
960~1023	End User Programmable	Reserved	00

Appendix: Part Number Table

Product	Advantech PN
SGRAM 32GB SO-DDR5-5600 2Gx8 Hynix (0~95)	SQR-SD5N32G5K6HNAG