

# 1024MB DDR SDRAM SoDIMM

## 200 PIN SO-DIMM

### SDN01G64D1BJ2SA-xxR

### 1GByte in FBGA Technology

### RoHS compliant

#### Options:

- |                                    |               |
|------------------------------------|---------------|
| ▪ Data Rate / Latency              | Marking       |
| DDR 400 MT/s CL3                   | -50           |
| DDR 333 MT/s CL2.5                 | -60           |
| ▪ Module density                   |               |
| 1GByte with 16 dies and 2 rank     |               |
| ▪ Standard Grade (T <sub>A</sub> ) | 0 °C to 70 °C |

\*) The refresh rate has to be doubled when 85 °C < T<sub>C</sub> < 95 °C

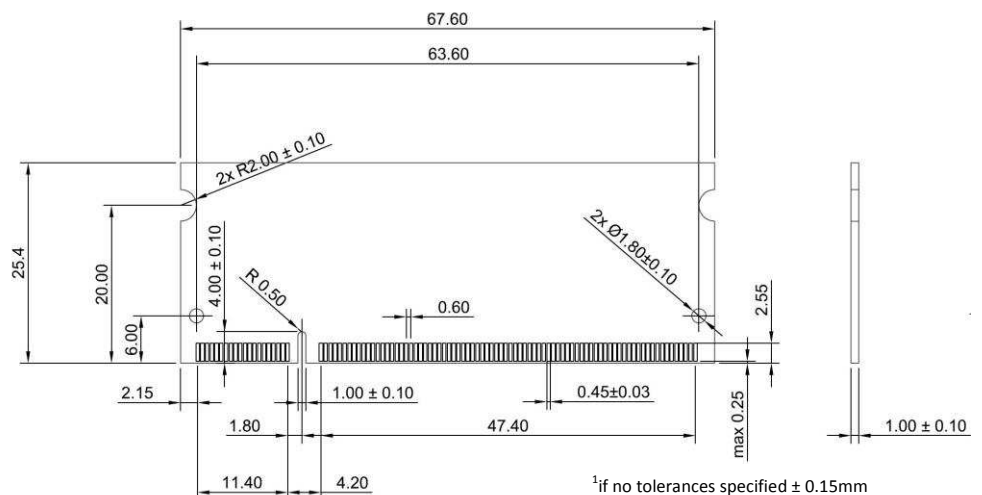
#### Environmental Requirements:

- Operating temperature (ambient) Standard Grade 0 °C to 70 °C
- Operating Humidity 10% to 90% relative humidity, noncondensing
- Operating Pressure 105 to 69 kPa (up to 10000 ft.)
- Storage Temperature -55 °C to 100 °C
- Storage Humidity 5% to 95% relative humidity, noncondensing
- Storage Pressure 1682 PSI (up to 5000 ft.) at 50 °C

#### Features:

- 200-pin 64-bit DDR1 Small Outline Dual-In-Line Double Data Rate Synchronous DRAM module
- Module organization: dual rank 128M x 64
- V<sub>DD</sub> = 2.5V ±0.2V, V<sub>DDQ</sub> 2.5V ±0.2V
- V<sub>DD</sub> = 2.6V ±0.1V, V<sub>DDQ</sub> 2.6V ±0.1V (DDR400)
- 2.5V I/O ( SSTL\_2 compatible)
- Serial Presence Detect with EEPROM
- Gold-contact pads
- This module is fully pin and functional compatible to the JEDEC PC-3200 spec. and JEDEC- Standard MO-224. (see [www.jedec.org](http://www.jedec.org))
- The pcb and all components are manufactured according to the RoHS compliance specification [EU Directive 2002/95/EC Restriction of Hazardous Substances (RoHS)]
- **DDR1 - SDRAM component Samsung K4H510838J**
- 64Mx8 DDR1 SDRAM in 60-ball FBGA package
- Internal, pipelined double-data-rate (DDR)
- 2n pre-fetch architecture
- DLL to align DQ and DQS transitions with CK
- Bidirectional data strobe (DQS) transmitted/received with data, source-synchronous data capture
- Differential clock inputs (CK and CK#)
- Commands entered on each positive CK edge
- Four internal banks for concurrent operation
- Data mask (DM) for masking write data
- Programmable burst length: 2, 4 or 8
- Adjustable data-output drive strength
- Auto Refresh (CBR) and Self Refresh, 8k Refresh every 64ms

Figure: mechanical dimensions<sup>1</sup>



This Swissbit module family is industry standard 200-pin 8-byte Double Data rate synchronous SDRAM Small Outline Dual-In-line Memory Modules (So-DIMMs), which are organized as x64 high speed memory arrays designed for use in non-parity applications. These So-DIMMs are assembled in FBGA Technology. The passive devices and the EEPROM are SMD components.

The So-DIMMs use serial presence detects (SPD) implemented via serial EEPROM using the two-pin-I<sup>2</sup>C protocol. The first 128 bytes are utilized by the So-DIMM manufacturer and the second 128 bytes are available to the end user.

All Swissbit DDR1 So-DIMMs provide a high performance, flexible 8-byte interface in a 67.6 mm long footprint.

All modules of the extended temperature grade have seen special tests during the manufacturing process to ensure proper operation according to the field of operation as stated in the environmental conditions.

### Module Configuration

Organization	DDR SDRAMs used	Row Addr.	Bank Select	Col. Addr.	Refresh	Module Dimensions in mm
128M x 64	16 x 64M x 8	13	BA0, BA1	11	8k	67.60 x 25.4 x 3.80 max

### Product Spectrum

Part Number	Module Density	Transfer Rate	Clock Cycle/Data bit rate	Latency
SDN01G64D1BJ2SA-50R	1024MB	3.2 GB/s	5.0ns/400MT/s	3.0-3-3
SDN01G64D1BJ2SA-60R	1024MB	2.7 GB/s	6.0ns/333MT/s	2.5-3-3

### Pin Name

A0-9, A11 – A12	Address Inputs
A10/AP	Address Input/Autoprecharge
BA0, BA1	Bank Selects
DQ0 – DQ63	Data Input/Output
DM0-DM7	Data Masks
RAS#	Row Address Strobe
CAS#	Column Address Strobe
WE#	Read / Write Enable
CKE0 – CKE1	Clock Enable
CK0 – CK1	Clock Inputs, positive line
CK0# - CK1#	Clock Inputs, negative line
DQS0- DQS7	Data strobes

S0# - S1#	Chip Select
V <sub>DD</sub>	Power (2.5V± 0.2V)
V <sub>DDQ</sub>	Power (2.5V±0.2V)
V <sub>DDID</sub>	V <sub>DD</sub> , V <sub>DDQ</sub> level detection
V <sub>DDSPD</sub>	SPD Power
V <sub>REF</sub>	Input/Output Reference
V <sub>SS</sub>	Ground
SCL	Clock for Serial Presence Detect
SDA	Serial Data Out for Serial Presence Detect
NC	No Connection

**Pin Configuration**

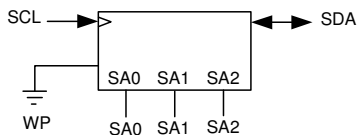
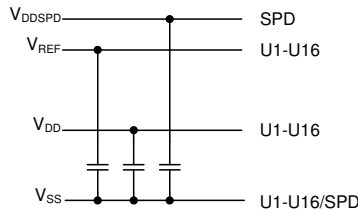
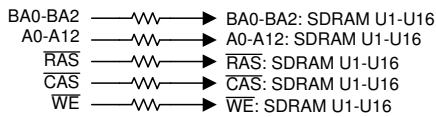
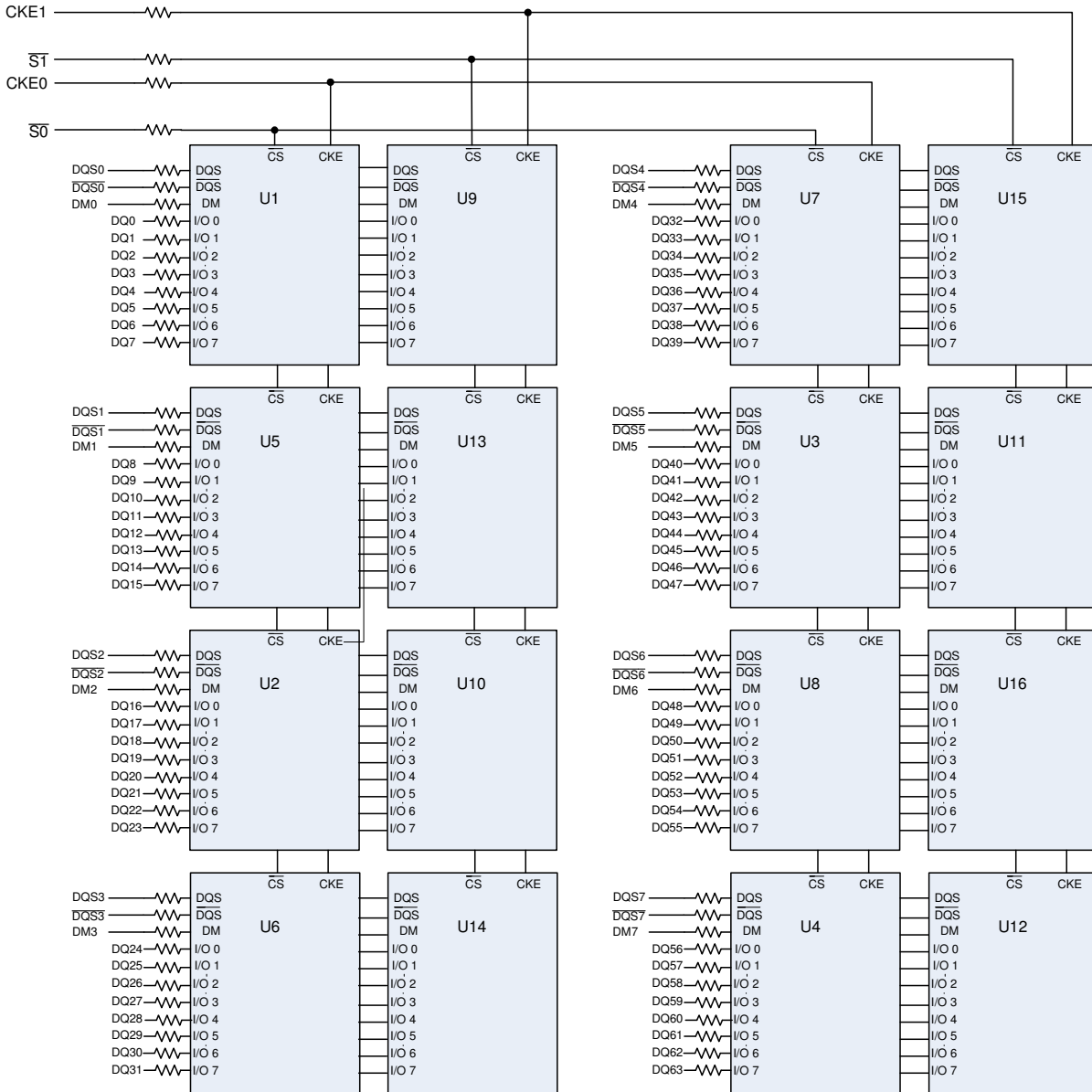
PIN #	Front Side	PIN #	Back Side	PIN #	Front Side	PIN #	Back Side
1	V <sub>REF</sub>	2	V <sub>REF</sub>	101	A9	102	A8
3	V <sub>SS</sub>	4	V <sub>SS</sub>	103	V <sub>SS</sub>	104	V <sub>SS</sub>
5	DQ0	6	DQ4	105	A7	106	A6
7	DQ1	8	DQ5	107	A5	108	A4
9	V <sub>DD</sub>	10	V <sub>DD</sub>	109	A3	110	A2
11	DQS0	12	DM0	111	A1	112	A0
13	DQ2	14	DQ6	113	V <sub>DD</sub>	114	V <sub>DD</sub>
15	V <sub>SS</sub>	16	V <sub>SS</sub>	115	A10/AP	116	BA1
17	DQ3	18	DQ7	117	BA0	118	RAS#
19	DQ8	20	DQ12	119	WE#	120	CAS#
21	V <sub>DD</sub>	22	V <sub>DD</sub>	121	S0#	122	S1#
23	DQ9	24	DQ13	123	NC/(A13)	124	NC
25	DQS1	26	DM1	125	V <sub>SS</sub>	126	V <sub>SS</sub>
27	V <sub>SS</sub>	28	V <sub>SS</sub>	127	DQ32	128	DQ36
29	DQ10	30	DQ14	129	DQ33	130	DQ37
31	DQ11	32	DQ15	131	V <sub>DD</sub>	132	V <sub>DD</sub>
33	V <sub>DD</sub>	34	V <sub>DD</sub>	133	DQS4	134	DM4
35	CK0	36	V <sub>DD</sub>	135	DQ34	136	DQ38
37	CK0#	38	V <sub>SS</sub>	137	V <sub>SS</sub>	138	V <sub>SS</sub>
39	V <sub>SS</sub>	40	V <sub>SS</sub>	139	DQ35	140	DQ39
41	DQ16	42	DQ20	141	DQ40	142	DQ44
43	DQ17	44	DQ21	143	V <sub>DD</sub>	144	V <sub>DD</sub>
45	V <sub>DD</sub>	46	V <sub>DD</sub>	145	DQ41	146	DQ45
47	DQS2	48	DM2	147	DQS5	148	DM5
49	DQ18	50	DQ22	149	V <sub>SS</sub>	150	V <sub>SS</sub>
51	V <sub>SS</sub>	52	V <sub>SS</sub>	151	DQ42	152	DQ46

(Sig): Signal in brackets may be routed to the socket connector, but is not used on the module

PIN #	Front Side	PIN #	Back Side	PIN #	Front Side	PIN #	Back Side
53	DQ19	54	DQ23	153	DQ43	154	DQ47
55	DQ24	56	DQ28	155	V <sub>DD</sub>	156	V <sub>DD</sub>
57	V <sub>DD</sub>	58	V <sub>DD</sub>	157	V <sub>DD</sub>	158	CK1#
59	DQ25	60	DQ29	159	V <sub>SS</sub>	160	CK1
61	DQS3	62	DM3	161	V <sub>SS</sub>	162	V <sub>SS</sub>
63	V <sub>SS</sub>	64	V <sub>SS</sub>	163	DQ48	164	DQ52
65	DQ26	66	DQ30	165	DQ49	166	DQ53
67	DQ27	68	DQ31	167	V <sub>DD</sub>	168	V <sub>DD</sub>
69	V <sub>DD</sub>	70	V <sub>DD</sub>	169	DQS6	170	DM6
71	NC/(CB0)	72	NC/(CB4)	171	DQ50	172	DQ54
73	NC/(CB1)	74	NC/(CB5)	173	V <sub>SS</sub>	174	V <sub>SS</sub>
75	V <sub>SS</sub>	76	V <sub>SS</sub>	175	DQ51	176	DQ55
77	NC/(DQS8)	78	NC/(DM8)	177	DQ56	178	DQ60
79	NC/(CB2)	80	NC/(CB6)	179	V <sub>DD</sub>	180	V <sub>DD</sub>
81	V <sub>DD</sub>	82	V <sub>DD</sub>	181	DQ57	182	DQ61
83	NC/(CB3)	84	NC/(CB7)	183	DQS7	184	DM7
85	NC	86	NC/(RESET)	185	V <sub>SS</sub>	186	V <sub>SS</sub>
87	V <sub>SS</sub>	88	V <sub>SS</sub>	187	DQ58	188	DQ62
89	NC/(CK2)	90	V <sub>SS</sub>	189	DQ59	190	DQ63
91	NC/(CK2#)	92	V <sub>DD</sub>	191	V <sub>DD</sub>	192	V <sub>DD</sub>
93	V <sub>DD</sub>	94	V <sub>DD</sub>	193	SDA	194	SA0
95	CKE1	96	CKE0	195	SCL	196	SA1
97	NC	98	NC/(BA2)	197	V <sub>DD_SPD</sub>	198	SA2
99	A12	100	A11	199	V <sub>DD_ID</sub>	200	NC

(Sig): Signal in brackets may be routed to the socket connector, but is not used on the module

**FUNCTIONAL BLOCK DIAGRAM 1024MB DDR SDRAM SODIMM 2RANK; NON-ECC**



**DC ELECTRICAL CHARACTERISTICS AND OPERATING CONDITIONS**

 (0°C ≤ T<sub>A</sub> ≤ + 70°C; V<sub>DDQ</sub> = +2.5V ± 0.2V, V<sub>DD</sub> = +2.5V ± 0.2V) see Note 1 on Page 9

PARAMETER/ CONDITION	SYMBOL	MIN	MAX	UNITS
Supply Voltage	V <sub>DD</sub>	2.3	2.7	V
I/O Supply Voltage	V <sub>DDQ</sub>	2.3	2.7	V
I/O Reference Voltage	V <sub>REF</sub>	0.49 x V <sub>DDQ</sub>	0.51x V <sub>DDQ</sub>	V
I/O Termination Voltage (system)	V <sub>TT</sub>	V <sub>REF</sub> - 0.04	V <sub>REF</sub> + 0.04	V
Input High (Logic 1) Voltage	V <sub>IH (DC)</sub>	V <sub>REF</sub> + 0.15	V <sub>DD</sub> + 0.3	V
Input Low (Logic 0) Voltage	V <sub>IL (DC)</sub>	-0.3	V <sub>REF</sub> - 0.15	V
INPUT LEAKAGE CURRENT Any input 0V ≤ V <sub>IN</sub> ≤ V <sub>DD</sub> , V <sub>REF</sub> pin 0V ≤ V <sub>IN</sub> ≤ 1.35V (All other pins not under test = 0V)	I <sub>I</sub>	-16	16	μA
OUTPUT LEAKAGE CURRENT (DQ <sub>S</sub> are disabled; 0V ≤ V <sub>OUT</sub> ≤ V <sub>DDQ</sub> )	I <sub>OZ</sub>	-40	40	μA
OUTPUT LEVELS: High Current (V <sub>OUT</sub> = V <sub>DDQ</sub> -0.373V, minimum V <sub>REF</sub> , minimum V <sub>TT</sub> )	I <sub>OH</sub>	-16.8	-	mA
Low Current (V <sub>OUT</sub> = 0.373V, maximum V <sub>REF</sub> , maximum V <sub>TT</sub> )	I <sub>OL</sub>	16.8	-	mA

**AC INPUT OPERATING CONDITIONS**

 (0°C ≤ T<sub>A</sub> ≤ + 70°C; V<sub>DDQ</sub> = +2.5V ± 0.2V, V<sub>DD</sub> = +2.5V ± 0.2V) see Note 1 on Page 9

PARAMETER/ CONDITION	SYMBOL	MIN	MAX	UNITS
Input High (Logic 1) Voltage	V <sub>IH (AC)</sub>	V <sub>REF</sub> + 0.310	-	V
Input Low (Logic 0) Voltage	V <sub>IL (AC)</sub>	-	V <sub>REF</sub> - 0.310	V
I/O Reference Voltage	V <sub>REF(AC)</sub>	0.49 x V <sub>DDQ</sub>	0.51x V <sub>DDQ</sub>	V

**CAPACITANCE**

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input/Output Capacitance: DQ, DQS	C <sub>10</sub>	4.0	5.0	pF
Input Capacitance: Command and Address	C <sub>11</sub>	18.0	27.0	pF
Input Capacitance: /S 0,1	C <sub>11</sub>	18.0	27.0	pF
Input Capacitance: CK, /CK	C <sub>12</sub>	10.0	14.0	pF
Input Capacitance: CKE	C <sub>13</sub>	18.0	27.0	pF

**I<sub>DD</sub> Specifications AND CONDITIONS**

 (0°C ≤ T<sub>A</sub> ≤ +70°C; V<sub>DDQ</sub> = +2.5V ± 0.2V, V<sub>DD</sub> = +2.5V ± 0.2V) see Note 1 on Page 9

Parameter & Test Condition	Symbol	max.		Unit
		3200-3.033	2700-2.533	
<b>OPERATING CURRENT; *)</b> : One device bank; Active-Precharge; t <sub>RC</sub> = t <sub>RC</sub> (Min); t <sub>CK</sub> = t <sub>CK</sub> (Min); DQ, DM and DQS inputs changing once per clock cycle; Address and control inputs changing once every two clock cycles	I <sub>DD0</sub>	560	520	mA
<b>OPERATING CURRENT;*)</b> One device bank; Active-Read-Precharge; Burst = 2; t <sub>RC</sub> = t <sub>RC</sub> (Min); t <sub>CK</sub> = t <sub>CK</sub> (Min); I <sub>OUT</sub> = 0mA; Address and control inputs changing once per clock cycle	I <sub>DD1</sub>	784	600	mA
<b>PRECHARGE POWER-DOWN STANDBY CURRENT;</b> All device banks idle; Power-down mode; t <sub>CK</sub> = t <sub>CK</sub> (Min); CKE = (LOW)	I <sub>DD2P</sub>	80	80	mA
<b>IDLE STANDBY CURRENT;</b> CS# = HIGH; All device banks idle; t <sub>CK</sub> = t <sub>CK</sub> (Min); CKE = HIGH; Address and other control inputs changing once per clock cycle. V <sub>IN</sub> = V <sub>REF</sub> for DQ, DQS, and DM	I <sub>DD2F</sub>	368	368	mA
<b>PRECHARGE QUIET STANDBY CURRENT;</b> CS# > V <sub>IH</sub> (min); All banks idle; CKE >= V <sub>IH</sub> (min); t <sub>CK</sub> = 6ns for DDR333, 5ns for DDR400; Address and other control inputs stable at >=V <sub>IH</sub> (min) or <= V <sub>IL</sub> (max); V <sub>IN</sub> = V <sub>REF</sub> for DQ, DQS and DM	I <sub>DD2Q</sub>	240	240	mA
<b>ACTIVE POWER-DOWN STANDBY CURRENT;</b> One device bank active; Power-down mode; t <sub>CK</sub> = t <sub>CK</sub> (Min); CKE = LOW	I <sub>DD3P</sub>	240	240	mA
<b>ACTIVE STANDBY CURRENT;</b> CS# = HIGH; CKE = HIGH; One device bank; Active-Precharge; t <sub>RC</sub> = t <sub>RAS</sub> (Max); t <sub>CK</sub> = t <sub>CK</sub> (Min); DQ, DM and DQS inputs changing twice per clock cycle; Address and other control inputs changing once per clock cycle	I <sub>DD3N</sub>	560	560	mA
<b>OPERATING CURRENT;</b> Burst = 2; Reads; Continuous burst; One bank active; Address and control inputs changing once per clock cycle; t <sub>CK</sub> = t <sub>CK</sub> (Min); I <sub>OUT</sub> = 0mA	I <sub>DD4R</sub>	840	760	mA
<b>OPERATING CURRENT;</b> Burst = 2; Writes; Continuous burst; One device bank active; Address and control inputs changing once per clock cycle; t <sub>CK</sub> = t <sub>CK</sub> (Min); DQ, DM, and DQS inputs changing twice per clock cycle	I <sub>DD4W</sub>	760	680	mA
<b>AUTO REFRESH CURRENT;</b> t <sub>RC</sub> = t <sub>RC</sub> (Min)	I <sub>DD5</sub>	1920	1600	mA
<b>SELF REFRESH CURRENT;</b> CKE ≤ 0.2V; External clock on; T <sub>ck</sub> = 6ns for DDR333, 5ns for DDR400	I <sub>DD6(normal)</sub>	80	80	mA
	I <sub>DD6(Low power)</sub>	48	48	mA
<b>OPERATING CURRENT – FOUR BANK OPERATION;</b> Four bank interleaving with BL=4	I <sub>DD7A</sub>	1640	1480	mA

\*) Value calculated as one module rank in this operating condition, and all other module ranks in IDD2P (CKE LOW) mode.

**DDR SDRAM COMPONENT ELECTRICAL CHARACTERISTICS AND RECOMMENDED AC OPERATING CONDITIONS**

 (0°C ≤ T<sub>A</sub> ≤ +70°C; V<sub>DDQ</sub> = +2.5V ± 0.2V; V<sub>DD</sub> = +2.5V ± 0.2V) see Note 1 on Page 9

AC CHARACTERISTICS		3200-3.0-3-3		2700-2.5-3-3			
PARAMETER	SYMBOL	MIN	MAX	MIN	MAX	Unit	
Access window of DQ <sub>s</sub> CK/CK#	t <sub>AC</sub>	-0.65	+0.65	-0.65	+0.65	ns	
CK high-level width	t <sub>CH</sub>	0.45	0.55	0.45	0.55	t <sub>CK</sub>	
CK low-level width	t <sub>CL</sub>	0.45	0.55	0.45	0.55	t <sub>CK</sub>	
Clock cycle time	CL=2.0	t <sub>CK(2.0)</sub>	7.5	13.0	7.5	13.0	ns
	CL=2.5	t <sub>CK(2.5)</sub>	6.0	13.0	6.0	13.0	
	CL=3.0	t <sub>CK(3.0)</sub>	5.0	13.0	-	-	
DQ and DM input hold time relative to DQS	t <sub>DH</sub>	0.40	-	0.45	-	ns	
DQ and DM input setup time relative to DQS	t <sub>DS</sub>	0.40	-	0.45	-	ns	
DQ and DM input pulse width ( for each input )	t <sub>DIPW</sub>	1.75	-	1.75	-	ns	
Access window of DQS from CK/CK#	t <sub>DQSCK</sub>	-0.6	+0.6	-0.6	+0.6	ns	
DQS input high pulse width	t <sub>DQSH</sub>	0.35	-	0.35	-	t <sub>CK</sub>	
DQS input low pulse width	t <sub>DQSL</sub>	0.35	-	0.35	-	t <sub>CK</sub>	
DQS -DQ skew, DQS to last DQ valid, per group, per access	t <sub>DQSQ</sub>	-	0.40	-	0.45	ns	
Write command to first DQS latching transition	t <sub>DQSS</sub>	0.72	1.28	0.75	1.25	t <sub>CK</sub>	
DQS falling edge to CK rising- setup time	t <sub>DSS</sub>	0.2	-	0.2	-	t <sub>CK</sub>	
DQS falling edge from CK rising- hold time	t <sub>DSH</sub>	0.2	-	0.2	-	t <sub>CK</sub>	
Half clock period	t <sub>HP</sub>	t <sub>ch</sub> , t <sub>cl</sub>	-	t <sub>ch</sub> , t <sub>cl</sub>	-	ns	
Data-out high-impedance window from CK/CK#	t <sub>HZ</sub>	-0.7	+0.7	-0.7	+0.7	ns	
Data-out low-impedance window from CK/CK#	t <sub>LZ</sub>	-0.7	+0.7	-0.7	+0.7	ns	
Address and control input hold time ( fast slew rate )	t <sub>IHF</sub>	0.6	-	0.75	-	ns	
Address and control input setup time ( fast slew rate )	t <sub>ISF</sub>	0.6	-	0.75	-	ns	
Address and control input hold time ( slow slew rate )	t <sub>IHS</sub>	0.7	-	0.8	-	ns	
Address and control input setup time ( slow slew rate )	t <sub>ISS</sub>	0.6	-	0.8	-	ns	
LOAD MODE REGISTER command cycle time	t <sub>MRD</sub>	10	-	12	-	ns	
Adress and control input pulse width (for each input)	t <sub>IPW</sub>	2.2	-	2.2	-	ns	
DQ-DQS hold, DQS to first DQ to go non-valid, per access	t <sub>QH</sub>	t <sub>HP</sub> - t <sub>QHS</sub>		t <sub>HP</sub> - t <sub>QHS</sub>		ns	
Data hold skew factor	t <sub>QHS</sub>	-	0.5	-	0.6	ns	



AC CHARACTERISTICS		3200-3.0-3-3		2700-2.5-3-3		
PARAMETER	SYMBOL	MIN	MAX	MIN	MAX	Unit
ACTIVE to PRECHARGE command	t <sub>RAS</sub>	40	70.000	42	70.000	ns
ACTIVE to READ with Auto precharge command	t <sub>RAP</sub>	15	-	15	-	ns
ACTIVE to ACTIVE/AUTO REFRESH command period	t <sub>RC</sub>	55	-	60	-	ns
AUTO REFRESH command period	t <sub>RFC</sub>	70	-	72	-	ns
ACTIVE to READ or WRITE delay	t <sub>RCD</sub>	15	-	18	-	ns
PRECHARGE command period	t <sub>RP</sub>	15	-	18	-	ns
DQS read preamble	t <sub>RPRE</sub>	0.9	1.1	0.9	1.1	t <sub>CK</sub>
DQS read postamble	t <sub>RPST</sub>	0.4	0.6	0.4	0.6	t <sub>CK</sub>
ACTIVE bank a to ACTIVE bank b command	t <sub>RRD</sub>	10	-	12	-	ns
DQS write preamble	t <sub>WPREH</sub>	0.25	-	0.25	-	t <sub>CK</sub>
DQS write preamble setup time	t <sub>WPRES</sub>	0	-	0	-	ns
DQS write postamble	t <sub>WPST</sub>	0.4	0.6	0.4	0.6	t <sub>CK</sub>
Write recovery time	t <sub>WR</sub>	15	-	15	-	ns
Internal WRITE to READ command delay	t <sub>WTR</sub>	2	-	1	-	t <sub>CK</sub>
Data valid output window	N/A	t <sub>QH</sub> - t <sub>DQSQ</sub>		t <sub>QH</sub> - t <sub>DQSQ</sub>		ns
REFRESH to REFRESH command interval	t <sub>REFC</sub>	-	70.3	-	70.3	μs
Average periodic refresh interval 0 °C ≤ T <sub>CASE</sub> ≤ 85°C	t <sub>REFI</sub>	-	7.8	-	7.8	μs
85 °C < T <sub>CASE</sub> ≤ 95°C	t <sub>REFI (IT)</sub>	-	3.9	-	3.9	
Terminating voltage delay to V <sub>DD</sub>	t <sub>VTD</sub>	0	-	0	-	ns
Exit SELF REFRESH to non-READ command	t <sub>XSNR</sub>	70	-	75	-	ns
Exit SELF REFRESH to READ command	t <sub>XSRD</sub>	200	-	200	-	t <sub>CK</sub>

Note 1: Values for AC timing, IDD, and electrical AC and DC characteristics might have been collected within the standard temperature range and at nominal reference/supply voltage levels, but the related specifications and device operation are guaranteed for the full voltage range specified and for the corresponding field of operation according to the actual temperature grade of the module (extended E, I or W; refer to the environmental conditions for more details).

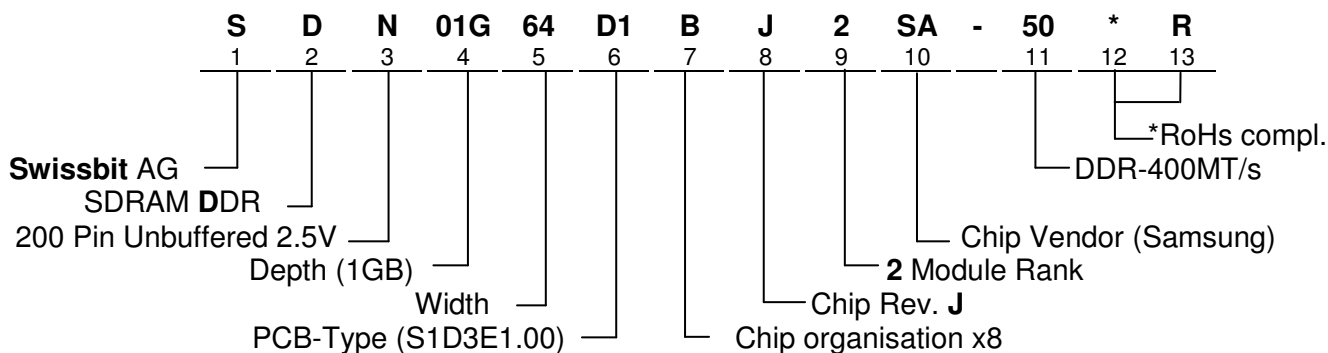
**SERIAL PRESENCE-DETECT MATRIX**

BYTE	DESCRIPTION	3200-3.0-3-3	2700-2.5-3-3
0	NUMBER OF SPD BYTES USED	0x80	
1	TOTAL NUMBER OF BYTES IN SPD DEVICE	0x08	
2	FUNDAMENTAL MEMORY TYPE	0x07	
3	NUMBER OF ROW ADDRESSES ON ASSEMBLY	0x0D	
4	NUMBER OF COLUMN ADDRESSES ON ASSEMBLY	0x0B	
5	NUMBER OF PHYSICAL BANKS ON DIMM	0x02	
6	MODULE DATA WIDTH	0x40	
7	MODULE DATA WIDTH (continued)	0x00	
8	MODULE VOLTAGE INTERFACE LEVELS (V <sub>DDQ</sub> )	0x04	
9	SDRAM CYCLE TIME, (t <sub>CK</sub> ) (CAS LATENCY =2.5 (2700, 2100) ; CL=3* (3200))	0x50	0x60
10	SDRAM ACCESS FROM CLOCK, (t <sub>AC</sub> ) (CAS LATENCY =2.5 (2700, 2100); CL=3* (3200))	0x65	
11	MODULE CONFIGURATION TYPE	0x00	
12	REFRESH RATE/ TYPE	0x82	
13	SDRAM DEVICE WIDTH (PRIMARY SDRAM)	0x08	
14	ERROR- CHECKING SDRAM DATA WIDTH	0x00	
15	MINIMUM CLOCK DELAY, BACK- TO- BACK RANDOM COLUMN ACCESS	0x01	
16	BURST LENGTHS SUPPORTED	0x0E	
17	NUMBER OF BANKS ON SDRAM DEVICE	0x04	
18	CAS LATENCIES SUPPORTED	0x1C	0x0C
19	CS LATENCY	0x01	
20	WE LATENCY	0x02	
21	SDRAM MODULE ATTRIBUTES	0x20	
22	SDRAM DEVICE ATTRIBUTES: GENERAL	0xC1	
23	SDRAM CYCLE TIME, (t <sub>CK</sub> ) (CAS LATENCY=2(2700, 2100) CL=2,5*(3200))	0x60	0x75
24	SDRAM ACCESS FROM CK, (t <sub>AC</sub> ) (CAS LATENCY=2(2700, 2100) CL=2.5*(3200))	0x70	
25	SDRAM CYCLE TIME, (t <sub>CK</sub> ) (CAS LATENCY=1.5(2700, 2100) CL=2*(3200))	0x75	0x00
26	SDRAM ACCESS FROM CK, (t <sub>AC</sub> ) (CAS LATENCY=1.5(2700, 2100) CL=2*(3200))	0x75	0x00
27	MINIMUM ROW PRECHARGE TIME, (t <sub>RP</sub> )	0x3C	0x48
28	MINIMUM ROW ACTIVE TO ROW ACTIVE, (t <sub>RRD</sub> )	0x28	0x30
29	MINIMUM RAS# TO CAS# DELAY, (t <sub>RCD</sub> )	0x3C	0x48
30	MINIMUM RAS# PULSE WIDTH, (t <sub>RAS</sub> )	0x28	0x2A
31	MODULE BANK DENSITY	0x80	
32	ADDRESS AND COMMAND SETUP TIME, (t <sub>IS</sub> )	0x60	0x75
33	ADDRESS AND COOMAND HOLD TIME, (t <sub>IH</sub> )	0x60	0x75
34	DATA/DATA MASK INPUT SETUP TIME, (t <sub>DS</sub> )	0x40	0x45
35	DATA/DATA MASK INPUT HOLD TIME, (t <sub>DH</sub> )	0x40	0x45
36-40	RESERVED	0x00	
41	MIN ACTIVE AUTO REFRESH TIME (t <sub>RC</sub> )	0x37	0x3C
42	MINIMUM AUTO REFRESH TO ACTIVE/ AUTO REFRESH COMMAND PERIOD, (t <sub>RFC</sub> )	0x46	0x48
43	SDRAM DEVICE MAX CYCLE TIME (t <sub>CKMAX</sub> )	0x28	0x30
44	SDRAM DEVICE MAX DQS-DQ SKEW TIME (t <sub>DQSQ</sub> )	0x28	0x2D
45	SDRAM DEVICE MAX READ DATA HOLD SKEW FACTOR (t <sub>QHS</sub> )	0x50	0x55

**SERIAL PRESENCE-DETECT MATRIX (continued)**

BYTE	DESCRIPTION	3200-3.0-3-3	2700-2.5-3-3
46-61	RESERVED	0x00	
62	SPD REVISION	0x11	
63	CHECKSUM FOR BYTES 0-62	0xAF	0x49
64	MANUFACTURER'S JEDEC ID CODE	7F	
65	MANUFACTURER'S JEDEC ID CODE(continued)	7F	
66	MANUFACTURER'S JEDEC ID CODE(continued)	7F	
67	MANUFACTURER'S JEDEC ID CODE(continued)	DA	
72	MANUFACTURING LOCATION	CH = 0x01	GE = 0x02 US = 0x03
73-90	MODULE PART NUMBER (ASCII)	"SDN01G64D1BJ2SA-xx"	
91	PCB IDENTIFICATION CODE	X	
92	PCB IDENTIFICATION CODE (continued)	X	
93	YEAR OF MANUFACTURE IN BCD	X	
94	WEEK OF MANUFACTURE IN BCD	X	
95-98	MODULE SERIAL NUMBER	X	
99-127	MANUFACTURER-SPECIFIC DATA (RSVD)	X	

**Part Number Code**



\* optional / additional information

Revision History		
Revision	Changes	Date
0.9	Preliminary Version	27.11.2012
1.0	Initial Revision	12.12.2012

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# CE Declaration of Conformity

We

**Manufacturer:** Swissbit AG  
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Switzerland

declare under our sole responsibility that the product

**Product Type:** 1GB DDR1 SODIMM  
**Brand Name:** SWISSMEMORY™  
**Product Series:** DDR1 SODIMM  
**Part Number:** SDN01G64D1BJ2SA-xxxR

to which this declaration relates is in conformity with the following directives:

**2002/96/EC Category 3 (WEEE)**

following the provisions of Directive

**Restriction of the use of certain hazardous substances**

**2011/65/EU**

Swissbit AG, December 2012



Manuela Kögel  
Head of Quality Management