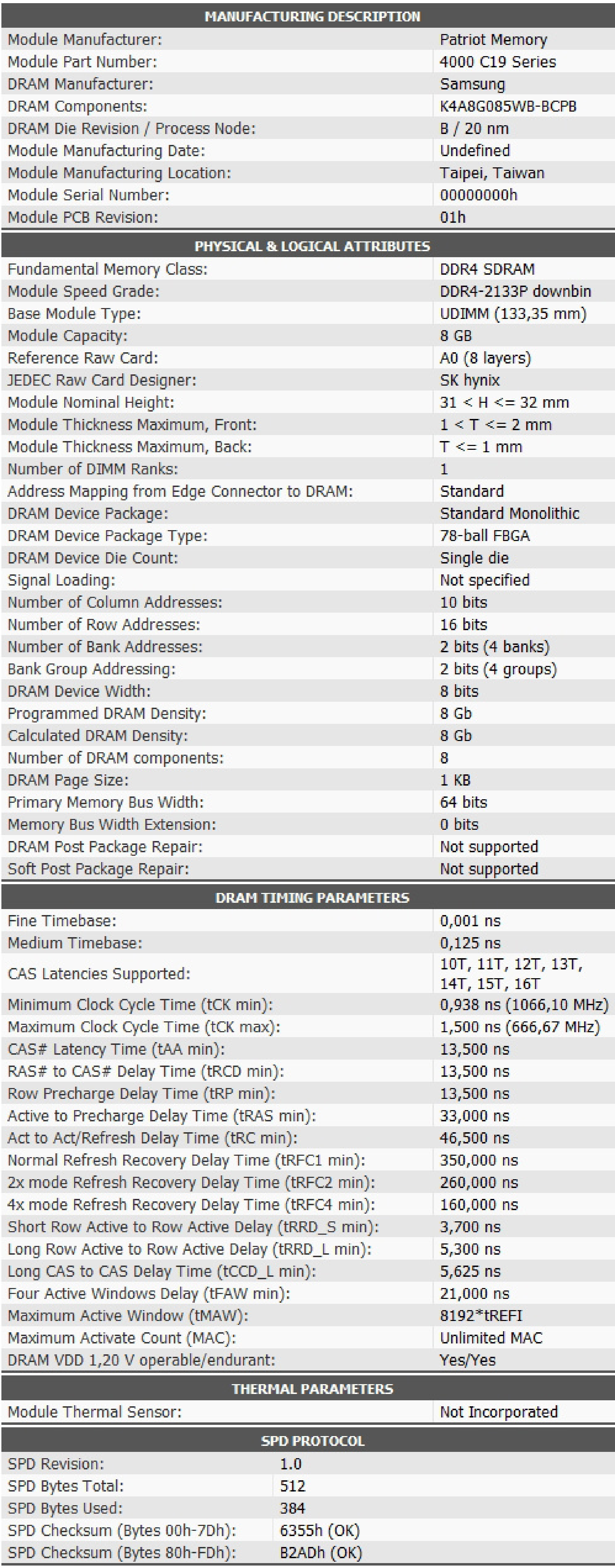


MANUFACTURING DESCRIPTION

Module Manufacturer:	Patriot Memory
Module Part Number:	4000 C19 Series
DRAM Manufacturer:	Samsung
DRAM Components:	K4A8G085WB-BCPB
DRAM Die Revision / Process Node:	B / 20 nm
Module Manufacturing Date:	Undefined
Module Manufacturing Location:	Taipei, Taiwan
Module Serial Number:	00000000h
Module PCB Revision:	01h

PHYSICAL & LOGICAL ATTRIBUTES

Fundamental Memory Class:	DDR4 SDRAM
Module Speed Grade:	DDR4-2133P downbin
Base Module Type:	UDIMM (133,35 mm)
Module Capacity:	8 GB
Reference Raw Card:	A0 (8 layers)
JEDEC Raw Card Designer:	SK hynix
Module Nominal Height:	31 < H <= 32 mm
Module Thickness Maximum, Front:	1 < T <= 2 mm
Module Thickness Maximum, Back:	T <= 1 mm
Number of DIMM Ranks:	1
Address Mapping from Edge Connector to DRAM:	Standard
DRAM Device Package:	Standard Monolithic
DRAM Device Package Type:	78-ball FBGA
DRAM Device Die Count:	Single die
Signal Loading:	Not specified
Number of Column Addresses:	10 bits
Number of Row Addresses:	16 bits
Number of Bank Addresses:	2 bits (4 banks)
Bank Group Addressing:	2 bits (4 groups)
DRAM Device Width:	8 bits
Programmed DRAM Density:	8 Gb
Calculated DRAM Density:	8 Gb
Number of DRAM components:	8
DRAM Page Size:	1 KB
Primary Memory Bus Width:	64 bits
Memory Bus Width Extension:	0 bits
DRAM Post Package Repair:	Not supported
Soft Post Package Repair:	Not supported

DRAM TIMING PARAMETERS

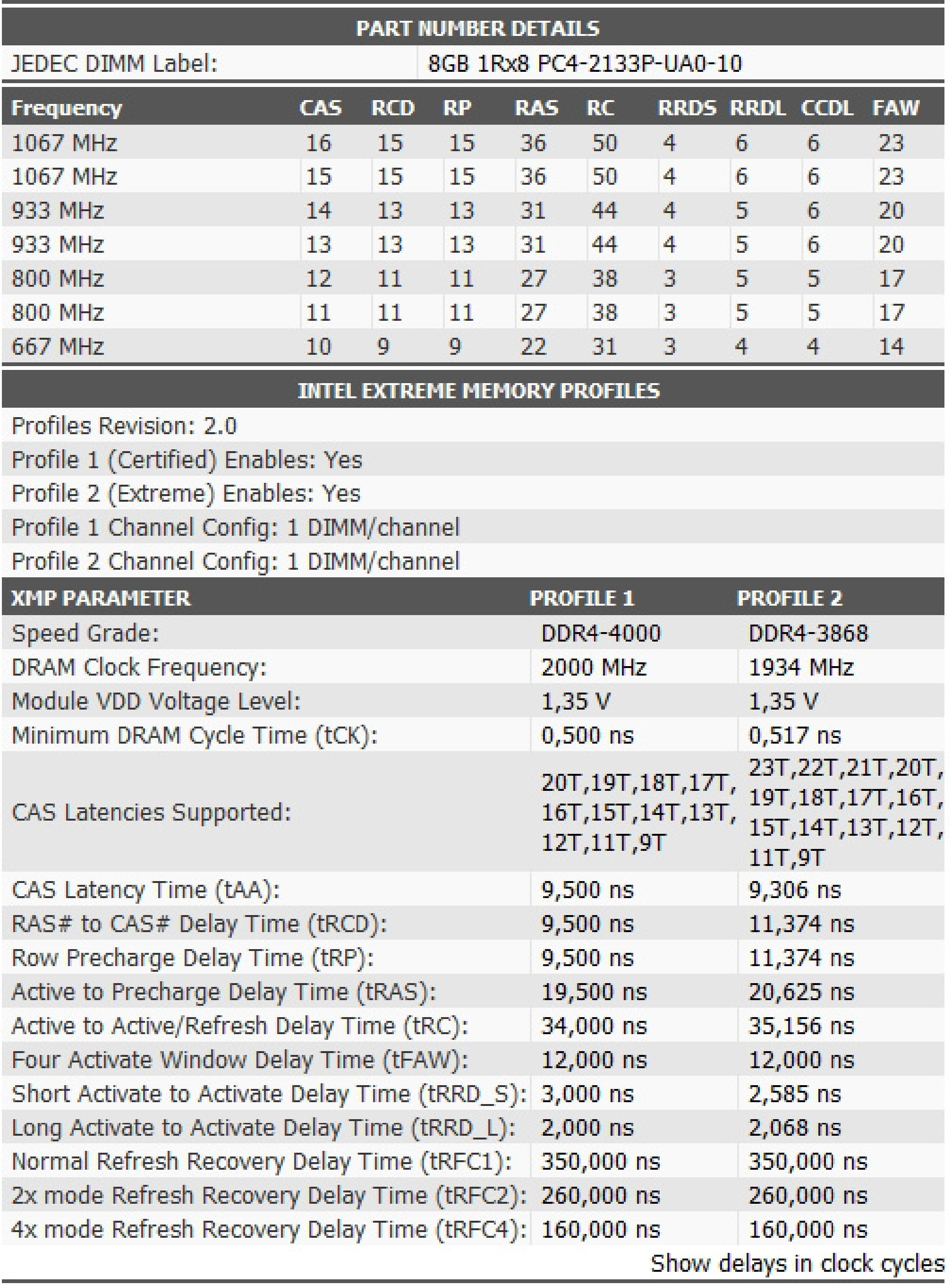
Fine Timebase:	0,001 ns
Medium Timebase:	0,125 ns
CAS Latencies Supported:	10T, 11T, 12T, 13T, 14T, 15T, 16T
Minimum Clock Cycle Time (tCK min):	0,938 ns (1066,10 MHz)
Maximum Clock Cycle Time (tCK max):	1,500 ns (666,67 MHz)
CAS# Latency Time (tAA min):	13,500 ns
RAS# to CAS# Delay Time (tRCD min):	13,500 ns
Row Precharge Delay Time (tRP min):	13,500 ns
Active to Precharge Delay Time (tRAS min):	33,000 ns
Act to Act/Refresh Delay Time (tRC min):	46,500 ns
Normal Refresh Recovery Delay Time (tRFC1 min):	350,000 ns
2x mode Refresh Recovery Delay Time (tRFC2 min):	260,000 ns
4x mode Refresh Recovery Delay Time (tRFC4 min):	160,000 ns
Short Row Active to Row Active Delay (tRRD_S min):	3,700 ns
Long Row Active to Row Active Delay (tRRD_L min):	5,300 ns
Long CAS to CAS Delay Time (tCCD_L min):	5,625 ns
Four Active Windows Delay (tFAW min):	21,000 ns
Maximum Active Window (tMAW):	8192*tREFI
Maximum Activate Count (MAC):	Unlimited MAC
DRAM VDD 1,20 V operable/endurant:	Yes/Yes

THERMAL PARAMETERS

Module Thermal Sensor:	Not Incorporated

SPD PROTOCOL

SPD Revision:	1.0
SPD Bytes Total:	512
SPD Bytes Used:	384
SPD Checksum (Bytes 00h-7Dh):	6355h (OK)
SPD Checksum (Bytes 80h-FDh):	B2ADh (OK)



PART NUMBER DETAILS	
JEDEC DIMM Label:	8GB 1Rx8 PC4-2133P-UA0-10

Frequency	CAS	RCD	RP	RAS	RC	RRDS	RRDL	CCDL	FAW
1067 MHz	16	15	15	36	50	4	6	6	23
1067 MHz	15	15	15	36	50	4	6	6	23
933 MHz	14	13	13	31	44	4	5	6	20
933 MHz	13	13	13	31	44	4	5	6	20
800 MHz	12	11	11	27	38	3	5	5	17
800 MHz	11	11	11	27	38	3	5	5	17
667 MHz	10	9	9	22	31	3	4	4	14

INTEL EXTREME MEMORY PROFILES

Profiles Revision: 2.0

Profile 1 (Certified) Enables: Yes

Profile 2 (Extreme) Enables: Yes

Profile 1 Channel Config: 1 DIMM/channel

Profile 2 Channel Config: 1 DIMM/channel

XMP PARAMETER	PROFILE 1	PROFILE 2
Speed Grade:	DDR4-4000	DDR4-3868
DRAM Clock Frequency:	2000 MHz	1934 MHz
Module VDD Voltage Level:	1,35 V	1,35 V
Minimum DRAM Cycle Time (tCK):	0,500 ns	0,517 ns
CAS Latencies Supported:	20T,19T,18T,17T,16T,15T,14T,13T,12T,11T,9T	23T,22T,21T,20T,19T,18T,17T,16T,15T,14T,13T,12T,11T,9T
CAS Latency Time (tAA):	9,500 ns	9,306 ns
RAS# to CAS# Delay Time (tRCD):	9,500 ns	11,374 ns
Row Precharge Delay Time (tRP):	9,500 ns	11,374 ns
Active to Precharge Delay Time (tRAS):	19,500 ns	20,625 ns
Active to Active/Refresh Delay Time (tRC):	34,000 ns	35,156 ns
Four Activate Window Delay Time (tFAW):	12,000 ns	12,000 ns
Short Activate to Activate Delay Time (tRRD_S):	3,000 ns	2,585 ns
Long Activate to Activate Delay Time (tRRD_L):	2,000 ns	2,068 ns
Normal Refresh Recovery Delay Time (tRFC1):	350,000 ns	350,000 ns
2x mode Refresh Recovery Delay Time (tRFC2):	260,000 ns	260,000 ns
4x mode Refresh Recovery Delay Time (tRFC4):	160,000 ns	160,000 ns

Show delays in clock cycles