MANUFACTURING DESCRIPTION

Module Manufacturer:	Team Group
Module Part Number:	TEAMGROUP-UD4-3600
DRAM Manufacturer:	Hynix
DRAM Components:	H5ANAG8N?JR-UHC
DRAM Die Revision / Process Node:	N/A / Not determined
Module Manufacturing Date:	Week 37, 2023
Manufacturing Date Decoded:	September 11-15, 2023
Module Manufacturing Location:	Taiwan
Module Serial Number:	01A41FC8h
Module PCB Revision:	00h

PHYSICAL & LOGICAL ATTRIBUTES

Fundamental Memory Class:	DDR4 SDRAM
Module Speed Grade:	DDR4-2400R
Base Module Type:	UDIMM (133,35 mm)
Module Capacity:	16 GB
Reference Raw Card:	A3 (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:	1 < T <= 2 mm
Number of DIMM Ranks:	1
Address Mapping from Edge Connector to DRAM:	Mirrored
DRAM Device Package:	Standard Monolithic
DRAM Device Package Type:	78-ball FBGA
DRAM Device Die Count:	Single die
Signal Loading:	Not specified
DRAM I/O Width:	8 bits
Column Addressing:	10 bits
Row Addressing:	17 bits
Bank Addressing:	2 bits (4 banks)
Bank Group Addressing:	2 bits (4 groups)
Programmed DRAM Density:	16 Gb
Calculated DRAM Density:	16 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:	Supported
Soft Post Package Repair:	Supported

DRAM TIMING PARAMETERS

Fine Timebase:	0,001 ns
Medium Timebase:	0,125 ns
CAS Latencies Supported:	10T, 11T, 12T, 13T, 14T, 15T, 16T, 17T, 18T
Minimum Clock Cycle Time (tCK min):	0,833 ns (1200,48 MHz)
Maximum Clock Cycle Time (tCK max):	1,625 ns (615,38 MHz)
CAS# Latency Time (tAA min):	13,320 ns
RAS# to CAS# Delay Time (tRCD min):	13,320 ns
Row Precharge Delay Time (tRP min):	13,320 ns
Active to Precharge Delay Time (tRAS min):	32,000 ns
Act to Act/Refresh Delay Time (tRC min):	45,320 ns
Normal Refresh Recovery Delay Time (tRFC1 min):	550,000 ns
2x mode Refresh Recovery Delay Time (tRFC2 min):	350,000 ns
4x mode Refresh Recovery Delay Time (tRFC4 min):	260,000 ns
Short Row Active to Row Active Delay (tRRD_S min):	3,300 ns

Long Row Active to Row Active Delay (tRRD_L min):	4,900 ns
Write Recovery Time (tWR min):	0,000 ns
Short Write to Read Command Delay (tWTR_S min):	0,000 ns
Long Write to Read Command Delay (tWTR_L min):	0,000 ns
Long CAS to CAS Delay Time (tCCD_L min):	5,000 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
Supply Voltage (VDD), Min / Typical / Max:	1,16V / 1,20V / 1,26V
Activation Supply Voltage (VPP), Min / Typical / Max:	2,41V / 2,50V / 2,75V
Termination Voltage (VTT), Min / Typical / Max:	0,565V / 0,605V / 0,640V

THERMAL PARAMETERS

Module Thermal Sensor:	Not Incorporated

SPD PROTOCOL

SPD Revision:	1.1
SPD Bytes Total:	512
SPD Bytes Used:	384
SPD Checksum (Bytes 00h-7Dh):	A322h (OK)
SPD Checksum (Bytes 80h-FDh):	6CCEh (OK)

PART NUMBER DETAILS

JEDEC DIMM Label:	16GB 1Rx8 PC4-2400R-UA3-11

Frequency	CAS	RCD	RP	RAS	RC	RRDS	RRDL	WR	WTRS	WTRL	FAW
1200 MHz	18	16	16	39	55	4	6	0	0	0	26
1200 MHz	17	16	16	39	55	4	6	0	0	0	26
1200 MHz	16	16	16	39	55	4	6	0	0	0	26
1067 MHz	15	15	15	35	49	4	6	0	0	0	23
933 MHz	14	13	13	30	43	4	5	0	0	0	20
933 MHz	13	13	13	30	43	4	5	0	0	0	20
800 MHz	12	11	11	26	37	3	4	0	0	0	17
800 MHz	11	11	11	26	37	3	4	0	0	0	17
667 MHz	10	9	9	22	31	3	4	0	0	0	14

INTEL EXTREME MEMORY PROFILES

Profiles Revision: 2.0
Profile 1 (Certified) Enabled: Yes
Profile 2 (Extreme) Enabled: No
Profile 1 Channel Config: 1 DIMM/channel

XMP PARAMETER	PROFILE 1	PROFILE 2
Speed Grade:	DDR4-3598	N/A
DRAM Clock Frequency:	1799 MHz	N/A
Module VDD Voltage Level:	1,35 V	N/A
Minimum DRAM Cycle Time (tCK):	0,556 ns	N/A
CAS Latencies Supported:	19T,18T,17T,16T, 15T	N/A
CAS Latency Time (tAA):	10,000 ns	N/A
RAS# to CAS# Delay Time (tRCD):	12,138 ns	N/A
Row Precharge Delay Time (tRP):	12,138 ns	N/A
Active to Precharge Delay Time (tRAS):	23,250 ns	N/A
Active to Active/Refresh Delay Time (tRC):	35,500 ns	N/A
Four Activate Window Delay Time (tFAW):	21,000 ns	N/A
Short Activate to Activate Delay Time (tRRD_S):	5,000 ns	N/A
Long Activate to Activate Delay Time (tRRD_L):	5,000 ns	N/A
Normal Refresh Recovery Delay Time (tRFC1):	550,000 ns	N/A
2x mode Refresh Recovery Delay Time (tRFC2):	350,000 ns	N/A
4x mode Refresh Recovery Delay Time (tRFC4):	260,000 ns	N/A

Show delays in clock cycles