



# DRAM qualification report

in combination with embedded HW / SBC

Revision: 000

Date: 2021-08-30

### Revision History

Rev.	Date	Author	Modifications
000	26.01.2021	C. Schubert	Initial revision

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Table of contents

**1 Test results .....4**

**2 Description / specs of the devices under test .....5**

2.1 DRAM module(s) ..... 5

2.2 Embedded HW / SBC ..... 5

**3 Test scope in details .....9**

3.1 Test criteria: ..... 9

3.2 Test passes scenario: ..... 9

3.2.1 2510 / 540 MemTest86 passes, ambient temperature: 60° C / maximum spec. temp. ....9

3.2.2 555 / 510 MemTest86 passes, ambient temperature 0° C / minimum spec. temp. ....9

3.2.3 Full test suite MemTest86.....9

3.3 Test result log files: ..... 10

3.3.1 2510 / 540 MemTest86 passes, ambient temperature: 60° C / maximum spec. temp. ....10

3.3.2 555 / 510 MemTest86 passes, ambient temperature 0° C / minimum spec. temp. ....10

3.3.3 Full test suite MemTest86.....10

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# 1 Test results

<b>Project no.</b>	TKA 81004327
<b>Ident. no.</b>	12029336 conga-TC-175/3965U MAN1 12053927 DDR4-SODIMM-2666MHz-4GB 12053928 DDR4-SODIMM-2666MHz-4GB
<b>Revision</b>	A01 (12029340 Kit MAN)
<b>Status of DUT</b>	series production status [ x ] close-to-production sample [ ] functional sample [ ]

**All test cases: 100% pass**

**Executed & examined by**

**Approval / Head of R&D Display Solutions**

**C. Schubert**

**E. Kurz**

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## 2 Description / specs of the devices under test

### 2.1 DRAM module(s)

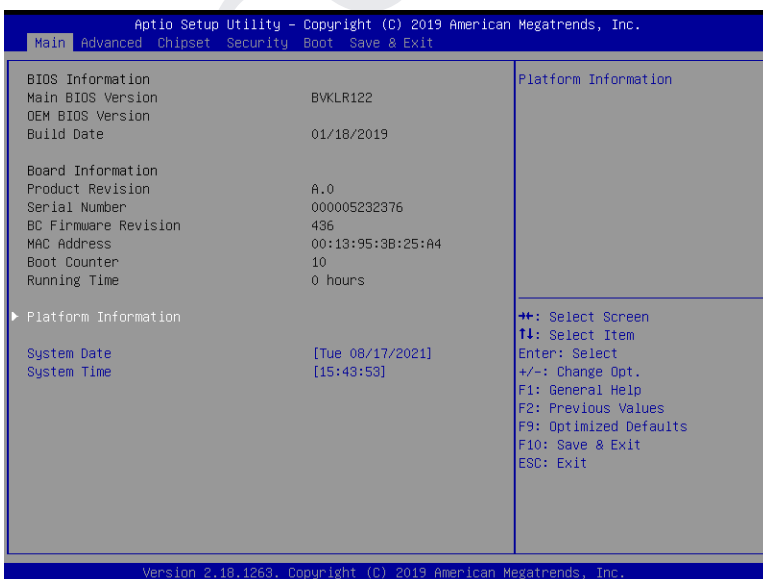
Vendor	Size	Speed	Type	ECC	SN	Vendor PN	Memory Manufacturer	Operating temperature
Data Modul	4 GB	DDR4 2666	SODIMM DDR4	No	2F293453	12053927	Samsung	0°C to +85°C
Data Modul	4 GB	DDR4 2666	SODIMM DDR4	No	F8293453 E4293453	12053928	Nanya	0°C to +85°C

### 2.2 Embedded HW / SBC

Test Configuration:	
Item	Description
Model Name	Conga-TC175, Version A.0
SN:	5232380
Operating temp.	0°C to +60°C
BIOS / EC/IO Contr.	AMI 5.12, Version: BVKLR122, date: 2019-01-18 / conga emb. BC Ver. 436
CPU	Intel Core i3-7100U @ 2.40GHz, 15 Watt
DRAM type	Dual channel DDR4 2133MT/s
max. capacity	Up to 32 GB
socket	2 x 260-pin SODIMM
SSD	SATA, TS128GMSA370
PSU	Mean Well LRS-150F-24, DC 24V, 6.5A
LAN Driver	Intel I219-LM GbE
VGA Driver	Intel HD Graphics 620
Audio Driver	Realtek ALC888 HD Audio Codec
USB 3.0 Driver	Intel Host Controller USB 3.1 Gen1
OS	MemTest86 (bootable Linux Test suite) / Windows 10 Pro 21H1
Panel / Display	Acer B226HQL

COM Express module data sheet attached: **conga-TC175 (583344).pdf**

Screenshots: EFI (platform and memory info) and OS (memory module info read by Thaiphoon Burner)



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Main

Intel(R) Core(TM) i3-7100U CPU @ 2.40GHz	
Codename	Kabylake ULT
Processor Speed	2400 MHz
Processor Signature	0x806E9
Stepping	H0/J0
Processor Cores	2Core(s) / 4Thread(s)
Microcode Revision	9A
Processor Graphics Controller	GT2 (0x5916)
eDRAM Size	N/A
IGD VBIOS Version	N/A
IGD GOP Version	N/A
Total Memory	4096 MB
Memory Frequency	2133 MHz
PCH Information	
Codename	SKL PCH-LP
PCH SKU	(U) iHDCP 2.2 Premium
Stepping	C1
Hsio Revision	52
Production Type	Production

++: Select Screen  
 ↑↓: Select Item  
 Enter: Select  
 +/-: Change Opt.  
 F1: General Help  
 F2: Previous Values  
 F9: Optimized Defaults  
 F10: Save & Exit  
 ESC: Exit

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Chipset

▶ Memory Thermal Configuration	
▶ Memory Training Algorithms	
Memory Configuration	
Memory RC Version	2.8.1.0
Memory Frequency	2133 MHz
Memory Timings (tCL-tRCD-tRP-tRAS)	15-16-16-32
Channel 0 Slot 0	Not Populated / Disabled
Channel 0 Slot 1	Not Populated / Disabled
Channel 1 Slot 0	Populated & Enabled
Size	4096 MB (DDR4)
Number of Ranks	1
Manufacturer	Unknown
Channel 1 Slot 1	Not Populated / Disabled
Memory ratio/reference clock options moved to Overclock->Memory->Custom Profile menu	
MRC ULT Safe Config	[Disabled]
Maximum Memory Frequency	[2133]
HOB Buffer Size	[Auto]
Max TOLUD	[Dynamic]
SA GV	[Fixed High]

Memory Thermal Configuration Options

++: Select Screen  
 ↑↓: Select Item  
 Enter: Select  
 +/-: Change Opt.  
 F1: General Help  
 F2: Previous Values  
 F9: Optimized Defaults  
 F10: Save & Exit  
 ESC: Exit

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Memory module #1 info:

MEMORY MODULE		DRAM COMPONENTS									
<b>SERIES</b> Not determined	<b>PART NUMBER</b> K4A8G165W?-BCPB										
<b>PART NUMBER</b> DM4S4G26AC1-SCTD	<b>PACKAGE</b> Standard Monolithic 96-ball FBGA										
<b>SERIAL NUMBER</b> 2F293453h	<b>DIE DENSITY / COUNT</b> 8 Gb / 1 die										
<b>JEDEC DIMM LABEL</b> 4GB 1Rx16 PC4-2666U-SE0-10	<b>COMPOSITION</b> 512Mb x16 (64Mb x16 x 8 banks)										
<b>ARCHITECTURE</b> DDR4 SDRAM SO-DIMM	<b>CLOCK FREQUENCY</b> 1333 MHz (0,750 ns)										
<b>SPEED GRADE</b> DDR4-2666U	<b>MINIMUM TIMING DELAYS</b> 18-19-19-39-58										
<b>CAPACITY</b> 4 GB (4 components)	<b>READ LATENCIES SUPPORTED</b> 20T, 19T, 18T, 17T, 16T, 15T, 14T...										
<b>ORGANIZATION</b> 512M x64 (1 rank)	<b>SUPPLY VOLTAGE</b> 1,20 V										
<b>REGISTER MODEL</b> N/A	<b>XMP CERTIFIED</b> Not programmed										
<b>MANUFACTURING DATE</b> May 24-28 / Week 21, 2021	<b>XMP EXTREME</b> Not programmed										
<b>MANUFACTURING LOCATION</b> Unknown: 00h	<b>SPD REVISION</b> 1.0 / January 2014										
<b>REVISION / RAW CARD</b> 0000h / E0 (10 layers)	<b>XMP REVISION</b> Undefined										
FREQUENCY	CAS	RCD	RP	RAS	RC	FAW	RRDS	RRDL	CCDL		
1333 MHz	20	19	19	39	58	28	5	8	8		
1333 MHz	19	19	19	39	58	28	5	8	8		
1333 MHz	18	19	19	39	58	28	5	8	8		
1200 MHz	17	18	18	36	53	26	5	8	7		
1067 MHz	16	16	16	32	47	23	4	7	6		
1067 MHz	15	16	16	32	47	23	4	7	6		
933 MHz	14	14	14	28	41	20	4	6	5		
933 MHz	13	14	14	28	41	20	4	6	5		
800 MHz	12	12	12	24	35	17	3	5	5		
800 MHz	11	12	12	24	35	17	3	5	5		
667 MHz	10	10	10	20	29	14	3	4	4		

Version: 16.0.1.0 Build 1014

Memory module #2 info:

MEMORY MODULE		DRAM COMPONENTS									
<b>SERIES</b> Not determined	<b>PART NUMBER</b> NT5AD512M16A4-HP										
<b>PART NUMBER</b> DM4S4G26AC1-NCHR	<b>PACKAGE</b> Standard Monolithic 96-ball FBGA										
<b>SERIAL NUMBER</b> F8293453h	<b>DIE DENSITY / COUNT</b> 8 Gb A-die (20 nm) / 1 die										
<b>JEDEC DIMM LABEL</b> 4GB 1Rx16 PC4-2666U-SE0-12	<b>COMPOSITION</b> 512Mb x16 (64Mb x16 x 8 banks)										
<b>ARCHITECTURE</b> DDR4 SDRAM SO-DIMM	<b>CLOCK FREQUENCY</b> 1333 MHz (0,750 ns)										
<b>SPEED GRADE</b> DDR4-2666U	<b>MINIMUM TIMING DELAYS</b> 18-19-19-39-58										
<b>CAPACITY</b> 4 GB (4 components)	<b>READ LATENCIES SUPPORTED</b> 20T, 19T, 18T, 17T, 16T, 15T, 14T...										
<b>ORGANIZATION</b> 512M x64 (1 rank)	<b>SUPPLY VOLTAGE</b> 1,20 V										
<b>REGISTER MODEL</b> N/A	<b>XMP CERTIFIED</b> Not programmed										
<b>MANUFACTURING DATE</b> May 24-28 / Week 21, 2021	<b>XMP EXTREME</b> Not programmed										
<b>MANUFACTURING LOCATION</b> Unknown: 00h	<b>SPD REVISION</b> 1.2 / August 2019										
<b>REVISION / RAW CARD</b> 0000h / E0 (10 layers)	<b>XMP REVISION</b> Undefined										
FREQUENCY	CAS	RCD	RP	RAS	RC	FAW	RRDS	RRDL	WR	WTRS	
1333 MHz	20	19	19	39	58	28	5	8	0	0	
1333 MHz	19	19	19	39	58	28	5	8	0	0	
1333 MHz	18	19	19	39	58	28	5	8	0	0	
1200 MHz	17	18	18	36	53	26	5	8	0	0	
1067 MHz	16	16	16	32	47	23	4	7	0	0	
1067 MHz	15	16	16	32	47	23	4	7	0	0	
933 MHz	14	14	14	28	41	20	4	6	0	0	
933 MHz	13	14	14	28	41	20	4	6	0	0	
800 MHz	12	12	12	24	35	17	3	5	0	0	
800 MHz	11	12	12	24	35	17	3	5	0	0	
667 MHz	10	10	10	20	29	14	3	4	0	0	

Version: 16.0.1.0 Build 1014

### 3 Test scope in details

#### 3.1 Test criteria:

Supported memory speed, capacity, channel mode must meet specification.  
 Proof: BIOS / SW tools.Values shown in BIOS / EFI:  
 Memory frequency is 2133 MHz, which is the max. frequency supported by the CPU.  
 The DUT must complete all test passes without error.

#### 3.2 Test passes scenario:

##### 3.2.1 2510 / 540 MemTest86 passes, ambient temperature: 60° C / maximum spec. temp.

Test algorithms: Test 6 [Block move, 64-byte blocks], Test 13 [Hammer test], logging via MemTest86 Pro of all test passes with date and timestamps, system temperatures.

DRAM Module	4 GB (Nanya)	4 GB (Samsung)	16 GB
Test passes	2510	540	-
Duration <sup>1</sup>	~115 h	~22,5 h	-

##### 3.2.2 555 / 510 MemTest86 passes, ambient temperature 0° C / minimum spec. temp.

Test algorithms: Test 6 [Block move, 64-byte blocks], Test 13 [Hammer test], logging via MemTest86 Pro of all test passes with date and timestamps, system temperatures.

DRAM Module	4 GB (Nanya)	4 GB (Samsung)	16 GB
Test passes	555	510	-
Duration <sup>1</sup>	~24,5 h	~22 h	-

##### 3.2.3 Full test suite MemTest86

Running a full test suite each with all detection algorithms after completing minimum & maximum temperature test passes to ensure that the module is still working without error.

DRAM Module	4 GB (Nanya)	4 GB (Samsung)	16 GB
Test passes	4	4	-
Duration	~1,5 h	~1,5 h	-

<sup>1</sup> Low power embedded CPUs (Atom / Celeron) need ~18 minutes for one test pass of the selected test cases (test case 6: "block move" and test case 13 "row hammer"), desktop grade CPUs (Skylake based Core i7) need less than 4 minutes for one test pass. Fully automated test via MemTest86 config, soft reboot every 5 to 10 passes: 5 passes for large capacities (16 GB and up) 10 passes for 8 GB or less.

### 3.3 Test result log files:

#### 3.3.1 2510 / 540 MemTest86 passes, ambient temperature: 60° C / maximum spec. temp.

MemTest86 logs attached:

**MemTest86\_logs\_60°C\_2510\_passes\_Nanya.html**  
**MemTest86\_logs\_60°C\_540\_passes\_Samsung.html**

DRAM Module	4 GB (Nanya)	4 GB (Samsung)	16 GB
Test passes	2510	540	-
Duration	~115 h	~22,5 h	-
Result	PASS	PASS	-

#### 3.3.2 555 / 510 MemTest86 passes, ambient temperature 0° C / minimum spec. temp.

MemTest86 logs attached:

**MemTest86\_logs\_0°C\_550\_passes\_Nanya.html**  
**MemTest86\_logs\_0°C\_510\_passes\_Samsung.html**

DRAM Module	4 GB (Nanya)	4 GB (Samsung)	16 GB
Test passes	555	510	-
Duration	~24,5 h	~22 h	-
Result	PASS	PASS	-

#### 3.3.3 Full test suite MemTest86

MemTest86 logs attached:

**MemTest86\_Full\_Testsuite\_logs\_2\_passes\_after\_60°C\_Nanya.html**  
**MemTest86\_Full\_Testsuite\_logs\_2\_passes\_after\_60°C\_Samsung.html**  
**MemTest86\_Full\_Testsuite\_logs\_2\_passes\_after\_0°C\_Nanya**  
**MemTest86\_Full\_Testsuite\_logs\_2\_passes\_after\_0°C\_Samsung.html**

DRAM Module	4 GB (Nanya)	4 GB (Samsung)	16 GB
Test passes	4	4	-
Duration	~1,5 h	~1,5 h	-
Result	PASS	PASS	-

# DATA MODUL



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