



CUSTOMER: 研華股份有限公司

APPROVAL SHEET

APPROVED NO. : 90002-T0047

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MODULE PART NO. : 78.B1GDM.AF1

PCB PART NO. : 48.16221.091

IC Brand : Hynix

DESCRIPTION : DDR3 REG DIMM 10600-9 256x8 4GB HYN G

CUSTOMER APPROVAL :

Apacer Technology Inc.

Authorized by : Steven Wang

4GB Registered DDR3 SDRAM DIMM with SPD

Ordering Information

| Part Number | Bandwidth | Speed Grade | Max Frequency | CAS Latency | Density | Organization | Component Composition | Number of Rank |
|--------------|------------|-------------|---------------|-------------|---------|--------------|-----------------------|----------------|
| 78.B1GDM.AF1 | 10.6GB/sec | 1333Mbps | 666MHz | CL9 | 4GB | 512Mx72 | 256Mx8*18EA | 2 |

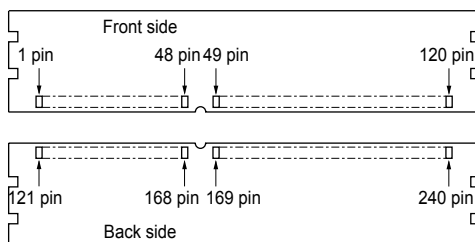
Specifications

- On Dimm Thermal Sensor: Yes
- Density: 4GB
- Organization
 - 512M words × 72 bits, 2 ranks
- Mounting 18 pieces of 2G bits DDR3 SDRAM sealed in FBGA
- Package: 240-pin socket type dual in line memory module (DIMM)
 - PCB height: 30.0mm
 - Lead pitch: 1.0mm (pin)
 - Lead-free (RoHS compliant)
- Power supply: VDD = 1.5V ± 0.075V
- Eight internal banks for concurrent operation (components)
- Interface: SSTL_15
- Burst lengths (BL): 8 and 4 with Burst Chop (BC)
- /CAS Latency (CL): 6, 7, 8, 9
- /CAS write latency (CWL): 5, 6, 7
- Precharge: auto precharge option for each burst access
- Refresh: auto-refresh, self-refresh
- Refresh cycles
 - Average refresh period
 - 7.8μs at 0°C ≤ TC ≤ +85°C
 - 3.9μs at +85°C < TC ≤ +95°C
- Operating case temperature range
 - TC = 0°C to +95°C

Features

- Double-data-rate architecture; two data transfers per clock cycle
- The high-speed data transfer is realized by the 8 bits prefetch pipelined architecture
- Bi-directional differential data strobe (DQS and /DQS) is transmitted/received with data for capturing data at the receiver
- DQS is edge-aligned with data for READs; center-aligned with data for WRITEs
- Differential clock inputs (CK and /CK)
- DLL aligns DQ and DQS transitions with CK transitions
- Commands entered on each positive CK edge; data and data mask referenced to both edges of DQS
- Data mask (DM) for write data
- Posted /CAS by programmable additive latency for better command and data bus efficiency
- On-Die-Termination (ODT) for better signal quality
 - Synchronous ODT
 - Dynamic ODT
 - Asynchronous ODT
- Multi Purpose Register (MPR) for temperature read out
- ZQ calibration for DQ drive and ODT
- Programmable Partial Array Self-Refresh (PASR)
- /RESET pin for Power-up sequence and reset function
- SRT range:
 - Normal/extended
 - Auto/manual self-refresh
- Programmable Output driver impedance control
- 1 piece of registering clock driver and 1 piece of serial EEPROM (256 bytes EEPROM) for Presence Detect (PD).

Pin Configurations



| Pin No. | Pin name | Pin No. | Pin name | Pin No. | Pin name | Pin No. | Pin name |
|---------|----------|---------|----------|---------|------------|---------|------------|
| 1 | VREFDQ | 61 | A2 | 121 | VSS | 181 | A1 |
| 2 | VSS | 62 | VDD | 122 | DQ4 | 182 | VDD |
| 3 | DQ0 | 63 | CK1 | 123 | DQ5 | 183 | VDD |
| 4 | DQ1 | 64 | /CK1 | 124 | VSS | 184 | CK0 |
| 5 | VSS | 65 | VDD | 125 | DM0/TDQS9 | 185 | /CK0 |
| 6 | /DQS0 | 66 | VDD | 126 | NU//TDQS9 | 186 | VDD |
| 7 | DQS0 | 67 | VREFCA | 127 | VSS | 187 | /EVENT |
| 8 | VSS | 68 | Par_In | 128 | DQ6 | 188 | A0 |
| 9 | DQ2 | 69 | VDD | 129 | DQ7 | 189 | VDD |
| 10 | DQ3 | 70 | A10(AP) | 130 | VSS | 190 | BA1 |
| 11 | VSS | 71 | BA0 | 131 | DQ12 | 191 | VDD |
| 12 | DQ8 | 72 | VDD | 132 | DQ13 | 192 | /RAS |
| 13 | DQ9 | 73 | /WE | 133 | VSS | 193 | /CS0 |
| 14 | VSS | 74 | /CAS | 134 | DM1/TDQS10 | 194 | VDD |
| 15 | /DQS1 | 75 | VDD | 135 | NU//TDQS10 | 195 | ODT0 |
| 16 | DQS1 | 76 | /CS1 | 136 | VSS | 196 | A13 |
| 17 | VSS | 77 | ODT1 | 137 | DQ14 | 197 | VDD |
| 18 | DQ10 | 78 | VDD | 138 | DQ15 | 198 | NC |
| 19 | DQ11 | 79 | NC | 139 | VSS | 199 | VSS |
| 20 | VSS | 80 | VSS | 140 | DQ20 | 200 | DQ36 |
| 21 | DQ16 | 81 | DQ32 | 141 | DQ21 | 201 | DQ37 |
| 22 | DQ17 | 82 | DQ33 | 142 | VSS | 202 | VSS |
| 23 | VSS | 83 | VSS | 143 | DM2/TDQS11 | 203 | DM4/TDQS13 |
| 24 | /DQS2 | 84 | /DQS4 | 144 | NU//TDQS11 | 204 | NU//TDQS13 |
| 25 | DQS2 | 85 | DQS4 | 145 | VSS | 205 | VSS |
| 26 | VSS | 86 | VSS | 146 | DQ22 | 206 | DQ38 |
| 27 | DQ18 | 87 | DQ34 | 147 | DQ23 | 207 | DQ39 |
| 28 | DQ19 | 88 | DQ35 | 148 | VSS | 208 | VSS |
| 29 | VSS | 89 | VSS | 149 | DQ28 | 209 | DQ44 |
| 30 | DQ24 | 90 | DQ40 | 150 | DQ29 | 210 | DQ45 |
| 31 | DQ25 | 91 | DQ41 | 151 | VSS | 211 | VSS |
| 32 | VSS | 92 | VSS | 152 | DM3/TDQS12 | 212 | DM5/TDQS14 |
| 33 | /DQS3 | 93 | /DQS5 | 153 | NU//TDQS12 | 213 | NU//TDQS14 |
| 34 | DQS3 | 94 | DQS5 | 154 | VSS | 214 | VSS |
| 35 | VSS | 95 | VSS | 155 | DQ30 | 215 | DQ46 |
| 36 | DQ26 | 96 | DQ42 | 156 | DQ31 | 216 | DQ47 |

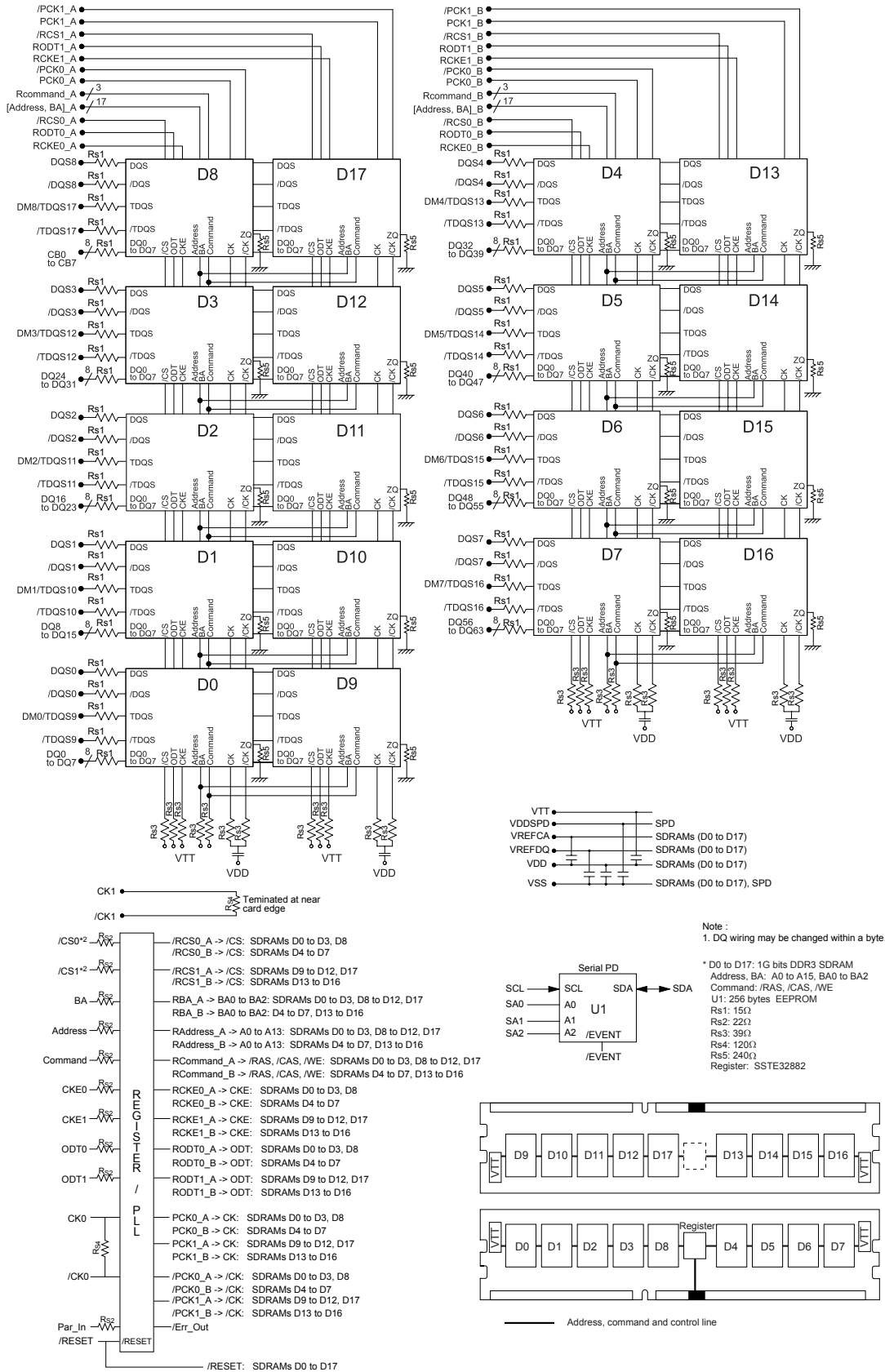
Apacer Memory Product Specification

| Pin No. | Pin name | Pin No. | Pin name | Pin No. | Pin name | Pin No. | Pin name |
|---------|----------|---------|----------|---------|------------|---------|------------|
| 37 | DQ27 | 97 | DQ43 | 157 | VSS | 217 | VSS |
| 38 | VSS | 98 | VSS | 158 | CB4 | 218 | DQ52 |
| 39 | CB0 | 99 | DQ48 | 159 | CB5 | 219 | DQ53 |
| 40 | CB1 | 100 | DQ49 | 160 | VSS | 220 | VSS |
| 41 | VSS | 101 | VSS | 161 | DM8/TDQS17 | 221 | DM6/TDQS15 |
| 42 | /DQS8 | 102 | /DQS6 | 162 | NU//TDQS17 | 222 | NU//TDQS15 |
| 43 | DQS8 | 103 | DQS6 | 163 | VSS | 223 | VSS |
| 44 | VSS | 104 | VSS | 164 | CB6 | 224 | DQ54 |
| 45 | CB2 | 105 | DQ50 | 165 | CB7 | 225 | DQ55 |
| 46 | CB3 | 106 | DQ51 | 166 | VSS | 226 | VSS |
| 47 | VSS | 107 | VSS | 167 | NC | 227 | DQ60 |
| 48 | VTT | 108 | DQ56 | 168 | /RESET | 228 | DQ61 |
| 49 | VTT | 109 | DQ57 | 169 | CKE1 | 229 | VSS |
| 50 | CKE0 | 110 | VSS | 170 | VDD | 230 | DM7/TDQS16 |
| 51 | VDD | 111 | /DQS7 | 171 | A15 | 231 | NU//TDQS16 |
| 52 | BA2 | 112 | DQS7 | 172 | A14 | 232 | VSS |
| 53 | /Err_Out | 113 | VSS | 173 | VDD | 233 | DQ62 |
| 54 | VDD | 114 | DQ58 | 174 | A12 | 234 | DQ63 |
| 55 | A11 | 115 | DQ59 | 175 | A9 | 235 | VSS |
| 56 | A7 | 116 | VSS | 176 | VDD | 236 | VDDSPD |
| 57 | VDD | 117 | SA0 | 177 | A8 | 237 | SA1 |
| 58 | A5 | 118 | SCL | 178 | A6 | 238 | SDA |
| 59 | A4 | 119 | SA2 | 179 | VDD | 239 | VSS |
| 60 | VDD | 120 | VTT | 180 | A3 | 240 | VTT |

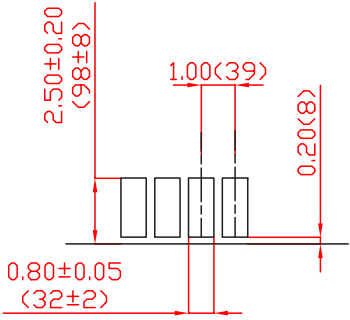
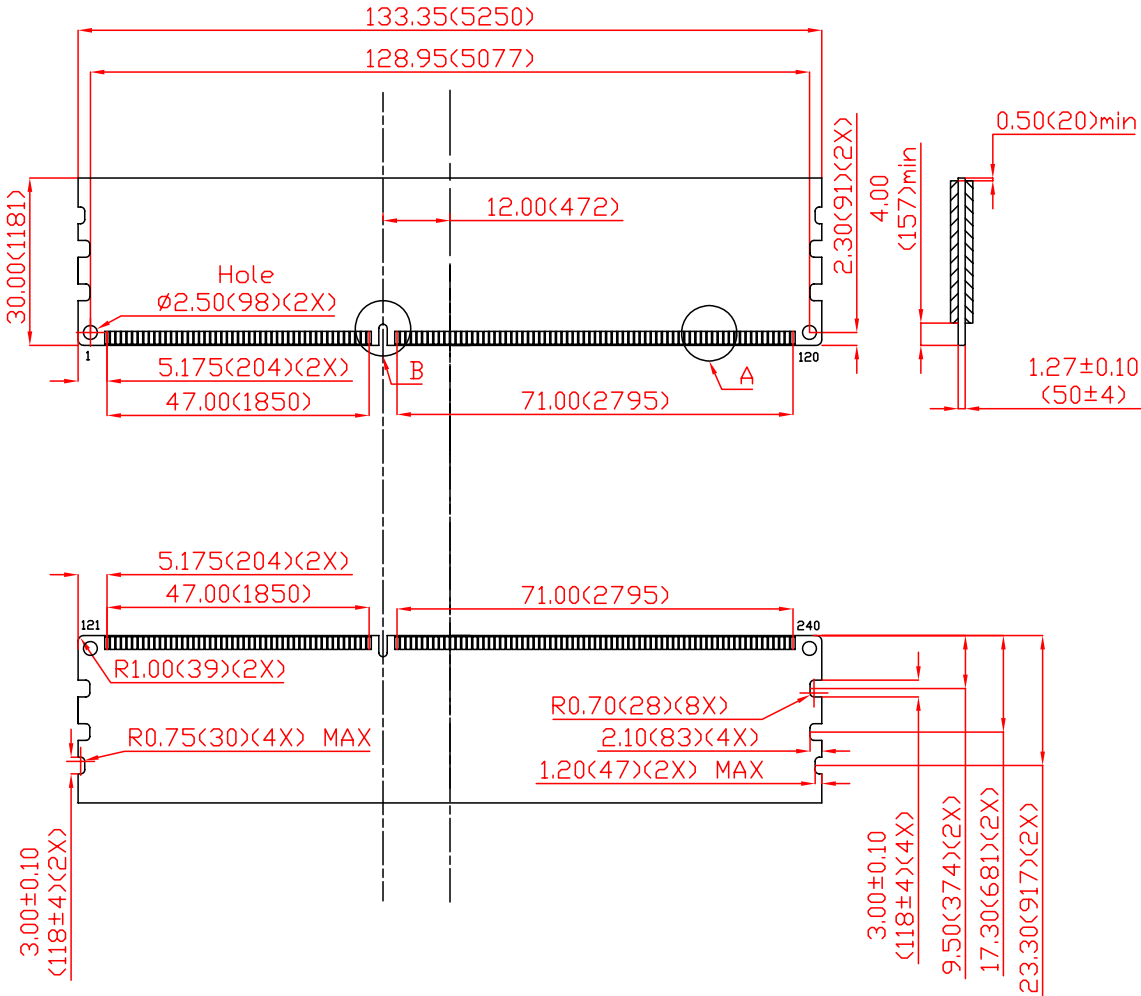
Pin Description

| Pin name | Function |
|------------------------------------|---|
| A0 to A15 | Address input Row address A0 to A13 Column address A0 to A9 |
| A10 (AP) | Auto precharge |
| A12 (/BC) | Burst chop |
| BA0, BA1, BA2 | Bank select address |
| DQ0 to DQ63 | Data input/output |
| CB0 to CB7 | Check bit (Data input/output) |
| /RAS | Row address strobe command |
| /CAS | Column address strobe command |
| /WE | Write enable |
| /CS0, /CS1 | Chip select |
| CKE0, CKE1 | Clock enable |
| CK0, CK1 | Clock input |
| /CK0, /CK1 | Differential clock input |
| DQS0 to DQS8, /DQS0 to /DQS8 | Input and output data strobe |
| TDQS9 to TDQS17, /TDQS9 to /TDQS17 | Termination data strobe |
| DM0 to DM8 | Input mask |
| SCL | Clock input for serial PD |
| SDA | Data input/output for serial PD |
| SA0, SA1, SA2 | Serial address input |
| VDD | Power for internal circuit |
| VDDSPD | Power for serial EEPROM |
| VREFCA | Reference voltage for CA |
| VREFDQ | Reference voltage for DQ |
| VSS | Ground |
| VTT | Termination Voltage |
| /RESET | Set DRAM to known state |
| ODT0, ODT1 | ODT control |
| Par_In | Parity bit for the Address and Control bus |
| /Err_Out | Parity error found on the Address and Control bus |
| /Event | Temperature event pin |
| NC | No connection |
| NU | Not usable |

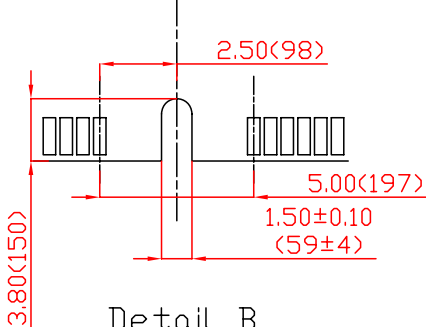
Block Diagram



Physical Outline



Detail A



Detail B

(All dimensions are in millimeters with ± 0.15 mm tolerance unless specified otherwise.)