ADVANTECH
Enabling an Intelligent Planet

Advantech AE Technical Share Document

Date	2018/07/10	**Release Note**	□ Internal ■ External
Category	■ FAQ □ SOP	**Related OS**	N/A
Abstract	Unable to boot with DDR3 DIMMs using 512M x8 DRAM chips.		
Keyword	DDR3, DIMM, DRAM, 512M x8, G41, Q57		
Related Product	PCA-6011, AIMB-567, AIMB-580, AIMB-767, AIMB-769, AIMB-780		

■ **Problem Description:**

Platforms using Intel 4 or 5 series chipset (G41, Q57) will not boot after installing DDR3 DIMMs using 512M x8 DRAM chips.

■ **Problem Analysis:**

The maximum size of a DRAM chip supported by the system is limited by the system memory controller, which resides in the north bridge of the motherboard or, in contemporary systems (Core-i Series), integrated into the CPU. Using DIMMs with DRAM size exceeding this limit may cause the system to be unable to boot.

We can check for system memory support in Intel's datasheets. For Core-i series CPU (5-series chipset or later), the information is located in the CPU datasheet.

1.2 Interfaces

1.2.1 System Memory Support

Table 1-1. Intel® Core™ i7-800 and i5-700 Desktop Processor Series SKU Supported Memory Summary

Platform	Memory Type	# of Channels	DIMMs/Channel	Transfer Rate (MT/s)	Notes
Desktop Intel 5 Series Chipset Platform	DDR3: Non-ECC Unbuffered	1 or 2	1 or 2	1066, 1333	1

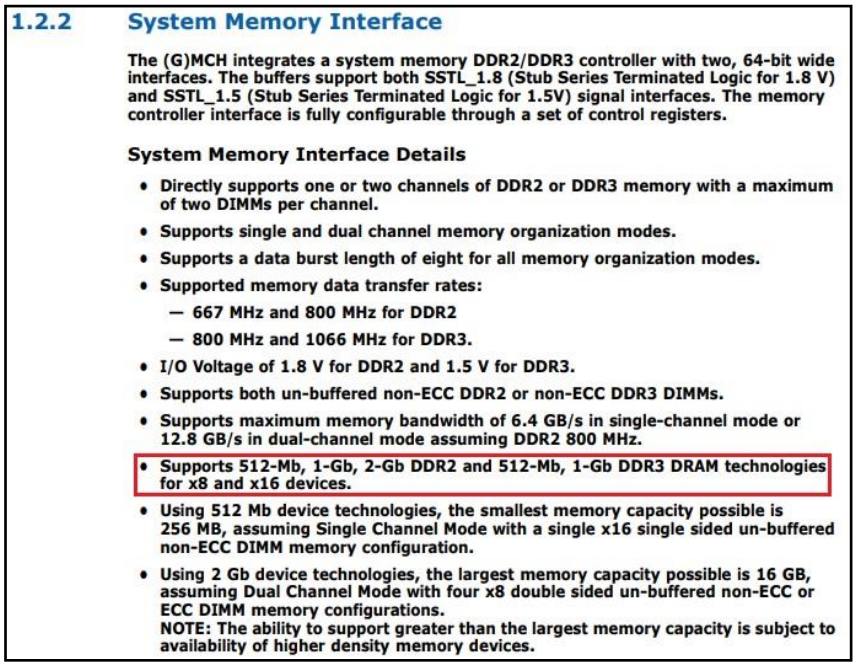
Notes:
1. ECC DIMMs and mixing of non-ECC and ECC DIMMs are not supported.

System memory features include:

- Data burst length of eight for all memory organization modes
- 64-bit wide channels
- DDR3 I/O Voltage of 1.5 V
- Maximum memory bandwidth of 10.6 GB/s in single-channel mode or 21 GB/s in dual-channel mode assuming DDR3 1333 MT/s
- 1-Gb and 2-Gb DDR3 DRAM technologies are supported.
- Using 2-Gb device technologies, the largest memory capacity possible is 16 GB for UDIMMs (assuming Dual Channel Mode with a four dual rank unbuffered DIMM memory configuration)

Picture1: 1st Generation Core-i series CPU only support up to 2Gb = 256M x8 or 128M x16 chips.

For Core2 or earlier CPUs, the information is located in the chipset datasheet.



1.2.2 System Memory Interface

The (G)MCH integrates a system memory DDR2/DDR3 controller with two, 64-bit wide interfaces. The buffers support both SSTL_1.8 (Stub Series Terminated Logic for 1.8 V) and SSTL_1.5 (Stub Series Terminated Logic for 1.5V) signal interfaces. The memory controller interface is fully configurable through a set of control registers.

System Memory Interface Details

- Directly supports one or two channels of DDR2 or DDR3 memory with a maximum of two DIMMs per channel.
- Supports single and dual channel memory organization modes.
- Supports a data burst length of eight for all memory organization modes.
- Supported memory data transfer rates:
  - 667 MHz and 800 MHz for DDR2
  - 800 MHz and 1066 MHz for DDR3.
- I/O Voltage of 1.8 V for DDR2 and 1.5 V for DDR3.
- Supports both un-buffered non-ECC DDR2 or non-ECC DDR3 DIMMs.
- Supports maximum memory bandwidth of 6.4 GB/s in single-channel mode or 12.8 GB/s in dual-channel mode assuming DDR2 800 MHz.
- Supports 512-Mb, 1-Gb, 2-Gb DDR2 and 512-Mb, 1-Gb DDR3 DRAM technologies for x8 and x16 devices.
- Using 512 Mb device technologies, the smallest memory capacity possible is 256 MB, assuming Single Channel Mode with a single x16 single sided un-buffered non-ECC DIMM memory configuration.
- Using 2 Gb device technologies, the largest memory capacity possible is 16 GB, assuming Dual Channel Mode with four x8 double sided un-buffered non-ECC or ECC DIMM memory configurations.
  NOTE: The ability to support greater than the largest memory capacity is subject to availability of higher density memory devices.

Picture2: Intel 4 series chipset only support up to 2Gb for DDR2, 1Gb for DDR3

*Not listed in datasheet, but with BIOS update 2-Gb DDR3 DRAM technologies can also be supported.

■ **Brief Solution - Step by Step:**

The following products do not support 512M x8 DRAM chips:

PCA-6011, AIMB-567, AIMB-580, AIMB-767, AIMB-769, AIMB-780.

If you need 4GB of RAM on a single slot, please select dual-rank DIMM modules that use 256M x8 chips.

Part Number	Description	
		Capacity
96D3-2G1333E-AP2	2G DDR3-1333 240Pin 256MX8 ECC Hynix Chip	2 GB
96D3-2G1333NN-AP1	2G DDR3-1333 240Pin 256MX8 Unbuffered Hynix Chip	2 GB
96D3-2G1333NN-TR2	2G DDR3-1333 240Pin 128MX8 1.35V Unbuffered Samsung Chip	2 GB
96D3-4G1333E-AP	4G DDR3-1333 240Pin 256MX8 ECC Hynix Chip	4 GB
96D3-4G1333NN-AP	4G DDR3-1333 240Pin 256MX8 Unbuffered Hynix Chip	4 GB
96D3-4G1600NN-APL	4G DDR3-1600 240Pin 256MX8 1.5V VLP Unbuffered Hynix Chip	4 GB
96D3-8G1600E-APL	8G DDR3-1600 240Pin 512MX8 1.5V VLP ECC Micron Chip	8 GB
96D3-8G1600NN-APL	8G DDR3-1600 240Pin 512MX8 1.5V VLP Unbuffered Micron Chip	8 GB

Picture4: How to find DRAM chip size from Advantech website

■ **Reference:**

Advantech Website DRAM Memory Modules