

Annex C - Raw Card C

DDR3 Registered DIMM Design File

RC	Applicable Design File	Applicable BOM
C1	PC3-RDIMM_V070_RC_C1_20071126.brd	PC3-RDIMM_V070_RC_C1_20070831_BOM.txt
C2	PC3-RDIMM_V089_RC_C2_20110311.brd	PC3-RDIMM_V089_RC_C2_20070831_BOM.txt

NOTE "Reference" design file updates will be released as needed. This Registered DIMM specification will reflect the most recent design files, but may also be updated to reflect clarifications to the specification only; in these cases the design files will not be updated.

Module Configuration

DIMM		SDRAM		# of SDRAMs	# of Physical Ranks	# of Address bits row/col/Bank	MO-269 variation
Capacity	Organization	Density	Organization				
1GB	128Mb x 72	512Mbit	128Mb x 4	18	1	13/11/3	AB
2GB	256Mb x 72	1Gbit	256Mb x 4	18	1	14/11/3	AB
4GB	512Mb x 72	2Gbit	512Mb x 4	18	1	15/11/3	AB
8GB	1Gb x 72	4Gbit	1Gb x 4	18	1	16/11/3	AB
16GB	2Gb x 72	8Gbit	2Gb x 4	18	1	16/12/3	AB

SDRAM Configuration

Supported DRAM Outline (Width x Length) max.	# of Banks in SDRAM	SDRAM Package Type	SDRAM Organization	MO-207 variation
11.9 mm x 21.0 mm	8	106 Ball FBGA	x4, planar, single row	DW-z

DRAM pitch is 12.6 mm

Supported Speeds

Registration	Voltage	PC3-6400	PC3-8500	PC3-10600	PC3-12800	PC3-14900	PC3-17000	Notes
C1	DDR3	X	X	X	X			
	DDR3L	X	X	X	X			
C2	DDR3	X	X	X	X	X		
	DDR3L	X	X	X	X			
	DDR3U	X	X	X				

NOTE 1 X will reflect passed committee ballot at the time when specification is issued at BOD ballot

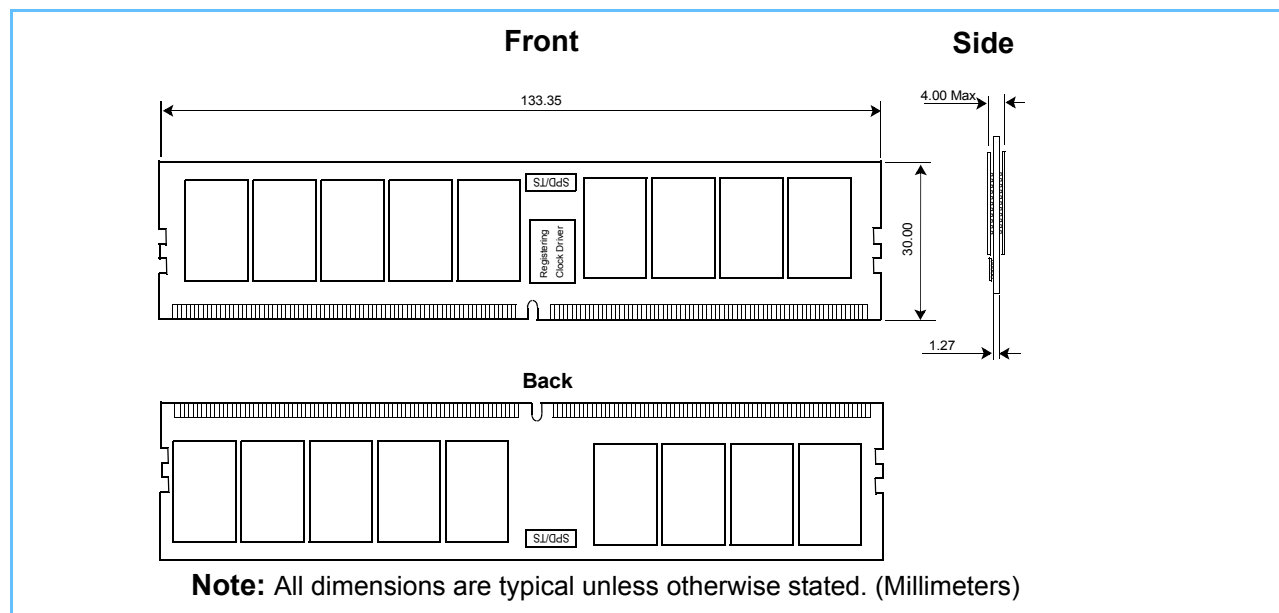
NOTE 2 P means the proposed speed for committee ballot.

Design Rules and Deviations

None

General Layout

x72 DIMM, populated as one physical rank of x4 DDR3 SDRAMs)



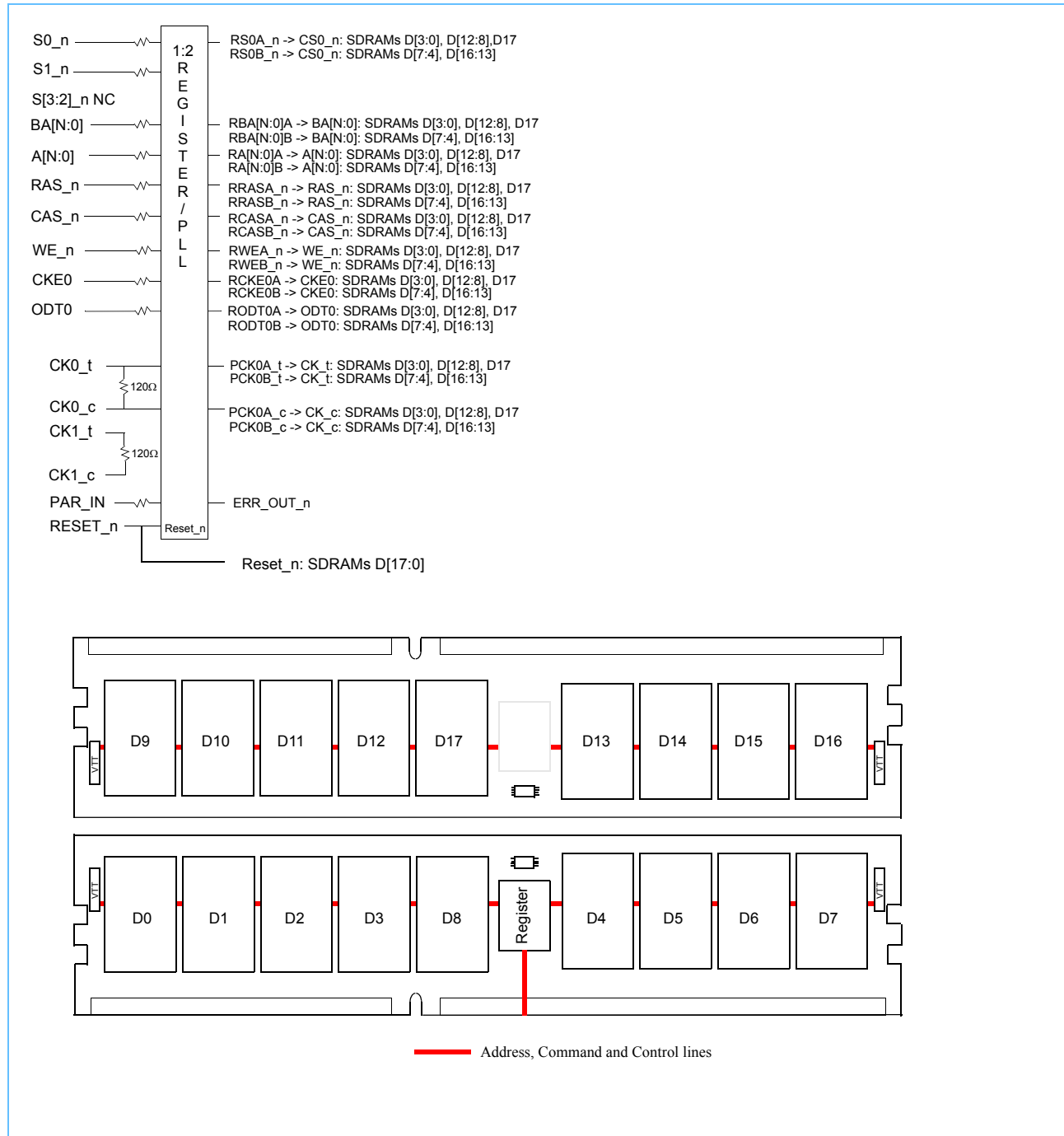
NOTE 1 Implementation and dimensions without heatspreader.

NOTE 2 Thermal sensor is placed within the Thermal Sensor Placement Area as defined in MO-269.

NOTE 3 In the event that a heat spreader is added to this module, module thickness would increase. Please refer to MO-269 for dimensions of specific variations with heatspreader attached.

Block Diagram

(x72 DIMM, populated as one physical rank of x4 DDR3 SDRAMs, Part 1 of 2)



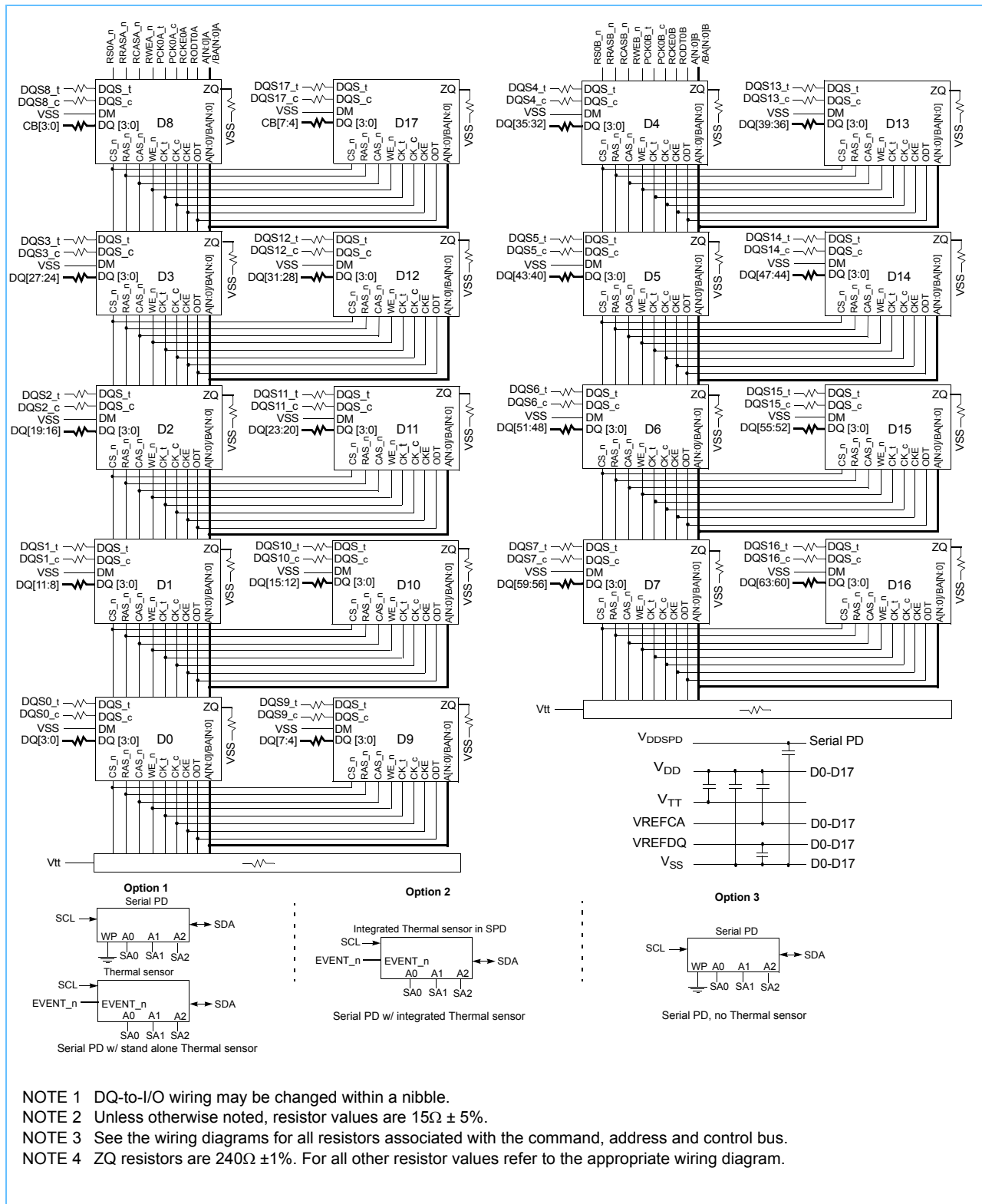
NOTE 1 CK0_t, CK0_c terminated with $120\Omega \pm 5\%$ resistor.

NOTE 2 CK1_t, CK1_c terminated with $120\Omega \pm 5\%$ resistor, but not used.

NOTE 3 Unused register inputs ODT1 and CKE1 have a resistor to ground. Resistor value is a minimum of 120Ω and a maximum of 330Ω .

Functional Block Diagram

(x72 DIMM, populated as one physical rank of x4 DDR3 SDRAMs, Part 2 of 2)



Registering Clock Driver

Please refer to the register vendor data sheets for all technical specifications and requirements.

DRAMs per output	Register Type	Register Speed Grade PC3-6400	Register Speed Grade PC3-8500	Register Speed Grade PC3-10600	Register Speed Grade PC3-12800	Quantity
10 / 8	1:2 28-bit 1.5V	SSTE32882	SSTE32882	SSTE32882	SSTE32882	1

Register Control Bit Settings

Types of Control Bits:

1. Reserved for future use (RFU):

These bits must be programmed to zero for all raw cards that have been developed/manufactured before this “future use” was defined.

2. Test bits (Test):

These bits are used by Register, DIMM or System vendors for test and characterization purposes only. They must be programmed to zero for normal operation

3. Card type specific (Card):

These values were used during validation of this reference design. It is recommended that systems program these register bits as defined here to ensure operation as validated. Any change from these values to match module implementation must be verified in simulation and testing.

4. Application specific bits (A/S):

These control register bits are freely programmable by the user based on the actual system configuration in which this DIMM is used.

Register Control Word	Bit	Function	Type	Raw Card
				C
RC0	DBA1	B outputs disabled	Card	0
	DBA0	A outputs disabled	Card	0
	DA4	Float outputs	A/S	0 or 1
	DA3	Output Inversion	Card	0
RC1	DBA1	Disable Y3_t/Y3_c clock	Card	1
	DBA0	Disable Y2_t/Y2_cclock	Card	1
	DA4	Disable Y1_t/Y1_c clock	Card	0
	DA3	Disable Y0_t/Y0_c clock	Card	0
RC2	DBA1	Frequency Band Select	Test	0
	DBA0	Input Bus Termination	A/S	0 or 1
	DA4	1T/3T Output timing	A/S	0 or 1
	DA3	Address- and command-nets prelaunch (Control Signals QxCKE, QxCS, QxODT do not apply)	Card	0

Register Control Word	Bit	Function	Type	Raw Card
				C
RC3	DBA1	Driver Characteristics: Command/Address Driver-B Outputs	Card	0
	DBA0		Card	1
	DA4	Driver Characteristics: Command/Address Driver-A Outputs	Card	0
	DA3		Card	1
RC4	DBA1	Driver Characteristics: Control Driver-B Outputs	Card	0
	DBA0		Card	1
	DA4	Driver Characteristics: Control Driver-A Outputs	Card	0
	DA3		Card	1
RC5	DBA1	Driver Characteristics: Clock Y0_t, Y0_c, Y2_t, and Y2_c Output Drivers	Card	0
	DBA0		Card	1
	DA4	Driver Characteristics: Clock Y1_t, Y1_c, Y3_t, and Y3_c Output Drivers	Card	0
	DA3		Card	1
RC6	DBA1	Reserved, free to use by register vendor	Test	0
	DBA0		Test	0
	DA4		Test	0
	DA3		Test	0
RC7	DBA1	Reserved, free to use by register vendor	Test	0
	DBA0		Test	0
	DA4		Test	0
	DA3		Test	0
RC8	DBA1	Extended IBT settings	Card	0
	DBA0		A/S	0 or 1
	DA4		A/S	0 or 1
	DA3		A/S	0 or 1
RC9	DBA1	CKE Power Down Mode Enable	A/S	0 or 1
	DBA0	CKE Power Down Mode	A/S	0 or 1
	DA4	Reserved for Future Use	RFU	0
	DA3	Reduced Drive Mode	A/S	0 or 1
RC10	DBA1	RDIMM Operating Speed	A/S	0 or 1
	DBA0		A/S	0 or 1
	DA4		A/S	0 or 1
	DA3		A/S	0 or 1