

INTRODUCTION

CRA90000 is an extension to the Mitel CLA90000 family of gate arrays that offers reduced pad pitch, achieving excellent area savings for pad limited devices. CRA90000 offers a cost effective solution to FPGA conversion and inherits all of the CLA90000 design libraries and system level support for fast time to market.

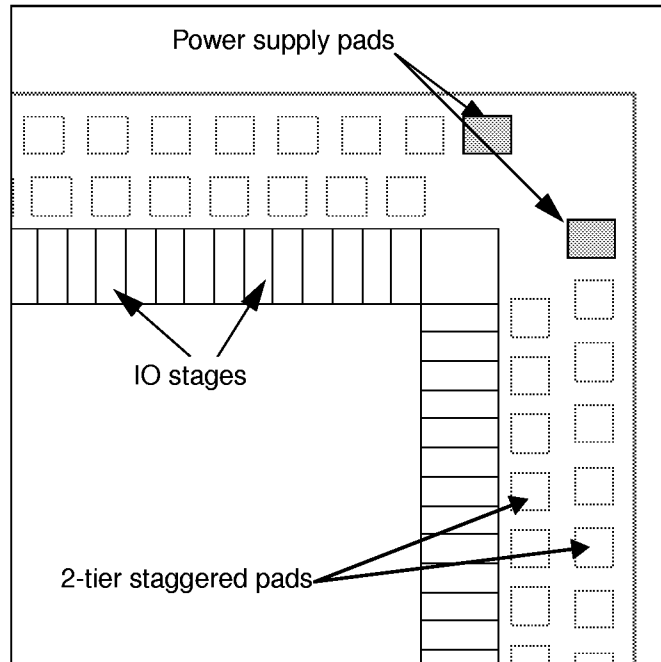
FEATURES

- Low power, 0.5 μ W/MHz/gate at 3V supply (NAND driving 2 input loads)
- 150ps gate delay for 2-input NAND driving two input loads (5V)
- Double or triple layer metal on a 0.6 μ m (drawn) process
- 208-pin, 160-pin or 144-pin packages
- Low cost for pad limited designs
- All CLA90000 core cells, memories and complex cores available
- Embedded, mixed signal cells that connect directly to pads can be used in approved packages
- Simplified power supply options
- Power supply to sensitive input cells can be isolated
- 3.3V or 5V operation
- Up to 6mA drive from a single I/O cell

ARRAY SIZES

Array	No. of Gates	Typical Utilization of Gates		Number of Pads
		2-layer metal	3-layer metal	
CRA 905	49928	20000	30000	≤ 168
CRA 907	84872	34000	51000	≤ 216

BASE ARCHITECTURE



I/O

- Fast and slow slew rate variants for low noise or high speed
- Pullup/pulldown options on input cells
- 2kV ESD protection
- Open source, open drain and tristate outputs
- CMOS and TTL compatible variants

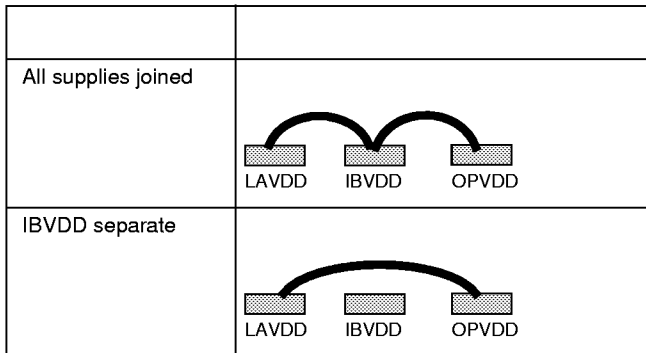
CRA90000 I/O offers most of the features of CLA90000 I/O on single voltage, reduced pad pitch arrays. Output drive strengths are 2, 4 and 6mA giving very low noise. If required, I/O cells that connect in parallel could be designed to drive loads of up to 12mA.

CRA90000

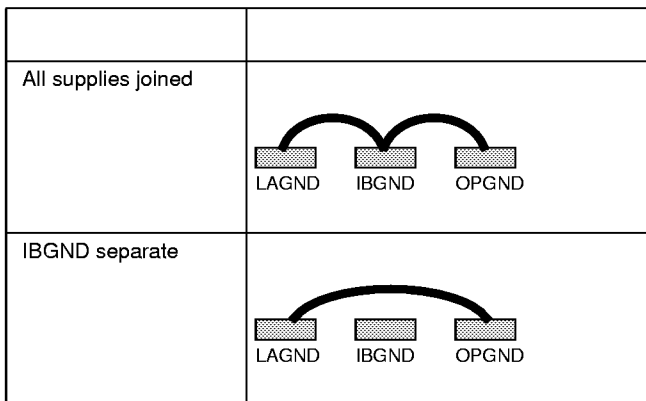
SUPPLY OPTIONS

CRA90000 has three VDD rails and three GND rails, which supply the core, intermediate buffer and output areas. Devices must be single voltage, but the intermediate buffer supply rails can be separated for noise isolation. The following power supply configurations are available:

VDD OPTIONS



GND OPTIONS



CAE SUPPORT

CLA90000 and CRA90000 have identical design tool support, including the following features:

- Synthesis with Synopsys, Mentor or Cadence
- Sign-off simulation with Mentor, Cadence or Synopsys VCS simulators
- VITAL compliant library
- Full top-down design flow support
- Point tools supported, including Zycad and Powermill
- Direct route to layout and test
- Advanced delay modelling and netlist checking

The Mitel Universal Delay Compiler (UDC) is supplied with all design kits for advanced delay modelling and comprehensive netlist checking. The UDC matches Synopsys and Mentor native delay calculation.

PACKAGING

Array	Number of Pads	Packages
CRA 905	≤ 168	144 MQFP, 144 LQFP (Fine Pitch)
CRA 907	≤ 216	160 MQFP, 208 MQFP

144-PIN PACKAGE FOR CRA905

Symbol	Control Dimensions in millimetres			Altern. Dimensions in inches		
	MIN	Nominal	MAX	MIN	Nominal	MAX
A	3.45		4.10	0.136		0.161
A1	0.25		0.50	0.010		0.020
A2	3.20		3.60	0.126		0.142
D	30.95		31.45	1.219		1.238
D1	27.80		28.20	1.094		1.110
D3	22.75 REF.			0.896 REF.		
E	30.95		31.45	1.219		1.238
E1	27.80		28.20	1.094		1.110
E3	22.75 REF.			0.896 REF.		
L	0.73		1.03	0.029		0.041
e	0.65 BSC.			0.026 BSC.		
b	0.22		0.38	0.009		0.015
c	0.11		0.23	0.004		0.009
Pin features						
N	144					
ND	36					
NE	36					
NOTE	SQUARE					

Notes:

- Pin 1 indicator may be a corner chamfer, dot or both.
- Controlling dimensions are in millimeters.
- The top package body size may be smaller than the bottom package body size by a max. of 0.15 mm.
- Dimension D1 and E1 do not include mould protusion. Allowable protusion is 0.25 mm per side. D1 and E1 are maximum plastic body size dimensions including mould mismatch.
- Dimension b does not include dambar protusion. Allowable dambar protusion shall not cause the lead width to exceed the maximum b dimension by more than 0.08 mm.
- Coplanarity, measured at seating plane G, to be 0.10 mm max.

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ORIGINATING SITE: SWINDON

Title: Package Outline Drawing for 144 lds MQFP (GP) (28x28x3.4) mm, Body+3.2 mm

Drawing Number: GPD00303

144-PIN FINE PITCH PACKAGE FOR CRA905

Symbol	Control Dimensions in millimetres			Altern. Dimensions in inches		
	MIN	Nominal	MAX	MIN	Nominal	MAX
A	1.40		1.60	0.055		0.063
A1	0.05		0.15	0.002		0.006
A2	1.35		1.45	0.053		0.057
D	21.80		22.20	0.858		0.874
D1	19.80		20.20	0.780		0.795
D3	17.50 REF.			0.689 REF.		
E	21.80		22.20	0.858		0.874
E1	19.80		20.20	0.780		0.795
E3	17.50 REF.			0.689 REF.		
L	0.45		0.75	0.018		0.030
e	0.50 BSC.			0.020 BSC.		
b	0.17		0.27	0.007		0.011
c	0.09		0.20	0.004		0.008
Pin features						
N	144					
ND	36					
NE	36					
NOTE	SQUARE					

Notes:

- Pin 1 indicator may be a corner chamfer, dot or both.
- Controlling dimensions are in millimeters.
- The top package body size may be smaller than the bottom package body size by a max. of 0.15 mm.
- Dimension D1 and E1 do not include mould protusion. Allowable protusion is 0.25 mm per side. D1 and E1 are maximum plastic body size dimensions including mould mismatch.
- Dimension b does not include dambar protusion. Allowable dambar protusion shall not cause the lead width to exceed the maximum b dimension by more than 0.08 mm.
- Coplanarity, measured at seating plane G, to be 0.08 mm max.

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ORIGINATING SITE: SWINDON

Title: Package Outline Drawing for 144 lds LQFP (GP) (20x20x1.4) mm, Body+2.0 mm

Drawing Number: GPD00251

This drawing supersedes 418/ED/51210/026 (Swindon)

CRA90000

160-PIN PACKAGE FOR CRA07

Symbol	Control Dimensions in millimetres			Altern. Dimensions in inches		
	MIN	Nominal	MAX	MIN	Nominal	MAX
A	3.45		4.10	0.136		0.161
A1	0.25		0.50	0.010		0.020
A2	3.20		3.60	0.126		0.142
D	30.95		31.45	1.219		1.238
D1	27.80		28.20	1.094		1.110
D3	25.35 REF.			0.998 REF.		
E	30.95		31.45	1.219		1.238
E1	27.80		28.20	1.094		1.110
E3	25.35 REF.			0.998 REF.		
L	0.73		1.03	0.029		0.041
e	0.65 BSC.			0.026 BSC.		
b	0.22		0.38	0.009		0.015
c	0.11		0.23	0.004		0.009
Pin features						
N	160					
ND	40					
NE	40					
NOTE	SQUARE					

Notes:

- Pin 1 indicator may be a corner chamfer, dot or both.
- Controlling dimensions are in millimeters.
- The top package body size may be smaller than the bottom package body size by a max. of 0.15 mm.
- Dimension D1 and E1 do not include mould protusion. Allowable protusion is 0.25 mm per side. D1 and E1 are maximum plastic body size dimensions including mould mismatch.
- Dimension b does not include dambar protusion. Allowable dambar protusion shall not cause the lead width to exceed the maximum b dimension by more than 0.08 mm.
- Coplanarity, measured at seating plane G, to be 0.10 mm max.

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ORIGINATING SITE: SWINDON

ISSUE 1

ACN 202051

DATE 20.FEB.97

APPROVED

Title: Package Outline Drawing for 160 lds MQFP (GP) (28x28x3.4) mm, Body+3.2 mm

Drawing Number GPD00302

Conforms to JEDEC MS-022 DD-1 Iss. A

208-PIN PACKAGE FOR CRA907

Symbol	Control Dimensions in millimetres			Altern. Dimensions in inches		
	MIN	Nominal	MAX	MIN	Nominal	MAX
A	3.45		4.10	0.136		0.161
A1	0.25		0.90	0.010		0.035
A2	3.20		3.60	0.126		0.142
D	30.40		30.80	1.197		1.213
D1	27.80		28.20	1.094		1.110
D3	25.50 REF.			1.004 REF.		
E	30.40		30.80	1.197		1.213
E1	27.80		28.20	1.094		1.110
E3	25.50 REF.			1.004 REF.		
L	0.45		0.75	0.018		0.030
e	0.50 BSC.			0.020 BSC.		
b	0.17		0.27	0.007		0.011
c	0.09		0.20	0.004		0.008
Pin features						
N	208					
ND	52					
NE	52					
NOTE	SQUARE					

Notes:

- Pin 1 indicator may be a corner chamfer, dot or both.
- Controlling dimensions are in millimeters.
- The top package body size may be smaller than the bottom package body size by a max. of 0.15 mm.
- Dimension D1 and E1 do not include mould protusion. Allowable protusion is 0.25 mm per side. D1 and E1 are maximum plastic body size dimensions including mould mismatch.
- Dimension b does not include dambar protusion. Allowable dambar protusion shall not cause the lead width to exceed the maximum b dimension by more than 0.08 mm.
- Coplanarity, measured at seating plane G, to be 0.08 mm max.

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ORIGINATING SITE: SWINDON

ISSUE 1

ACN 201351

DATE 25OCT96

APPROVED

Title: Package Outline Drawing for 208 lds MQFP (GP) (28x28x3.4) mm, Body+2.6 mm

Drawing Number GPD00236

Conforms to JEDEC MO-143 FA-1 Iss. B

This drawing supersedes 418/ED/51210/010 (Swindon)