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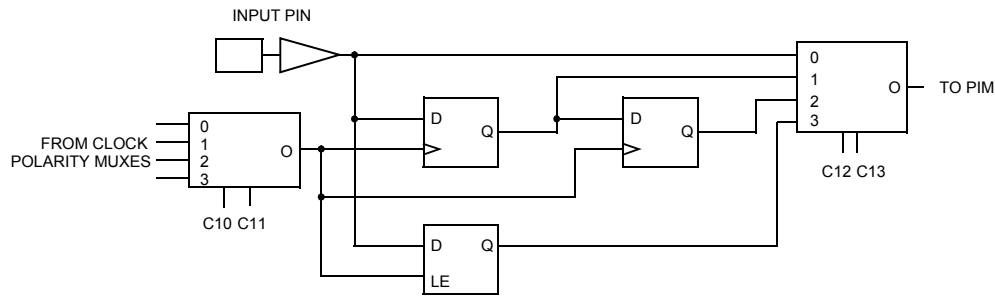
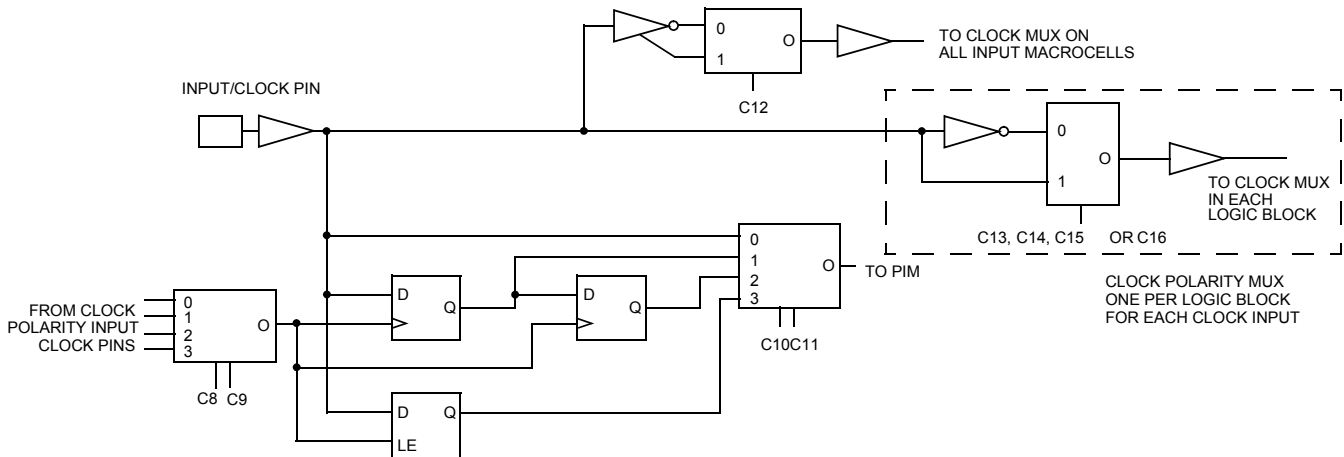
Understanding [Embedded - CPLDs \(Complex Programmable Logic Devices\)](#)

Embedded - CPLDs, or Complex Programmable Logic Devices, are highly versatile digital logic devices used in electronic systems. These programmable components are designed to perform complex logical operations and can be customized for specific applications. Unlike fixed-function ICs, CPLDs offer the flexibility to reprogram their configuration, making them an ideal choice for various embedded systems. They consist of a set of logic gates and programmable interconnects, allowing designers to implement complex logic circuits without needing custom hardware.

Applications of Embedded - CPLDs

Details

Product Status	Obsolete
Programmable Type	In-System Reprogrammable™ (ISR™) CMOS
Delay Time tpd(1) Max	15 ns
Voltage Supply - Internal	4.75V ~ 5.25V
Number of Logic Elements/Blocks	-
Number of Macrocells	192
Number of Gates	-
Number of I/O	125
Operating Temperature	0°C ~ 70°C (TA)
Mounting Type	Surface Mount
Package / Case	160-LQFP
Supplier Device Package	160-TQFP (24x24)
Purchase URL	https://www.e-xfl.com/product-detail/infineon-technologies/cy37192p160-83axc


Figure 3. Input Macrocell

Figure 4. Input/Clock Macrocell

Clocking

Each I/O and buried macrocell has access to four synchronous clocks (CLK0, CLK1, CLK2 and CLK3) as well as an asynchronous product term clock PTCLK. Each input macrocell has access to all four synchronous clocks.

Dedicated Inputs/Clocks

Five pins on each member of the Ultra37000 family are designated as input-only. There are two types of dedicated inputs on Ultra37000 devices: input pins and input/clock pins. *Figure 3* illustrates the architecture for input pins. Four input options are available for the user: combinatorial, registered, double-registered, or latched. If a registered or latched option is selected, any one of the input clocks can be selected for control.

Figure 4 illustrates the architecture for the input/clock pins. Like the input pins, input/clock pins can be combinatorial, registered, double-registered, or latched. In addition, these pins feed the clocking structures throughout the device. The clock path at the input has user-configurable polarity.

Product Term Clocking

In addition to the four synchronous clocks, the Ultra37000 family also has a product term clock for asynchronous clocking. Each logic block has an independent product term clock which is available to all 16 macrocells. Each product term clock also supports user configurable polarity selection.

Timing Model

One of the most important features of the Ultra37000 family is the simplicity of its timing. All delays are worst case and system performance is unaffected by the features used. *Figure 5* illustrates the true timing model for the 167-MHz devices in high speed mode. For combinatorial paths, any input to any output incurs a 6.5-ns worst-case delay regardless of the amount of logic used. For synchronous systems, the input set-up time to the output macrocells for any input is 3.5 ns and the clock to output time is also 4.0 ns. These measurements are for any output and synchronous clock, regardless of the logic used.

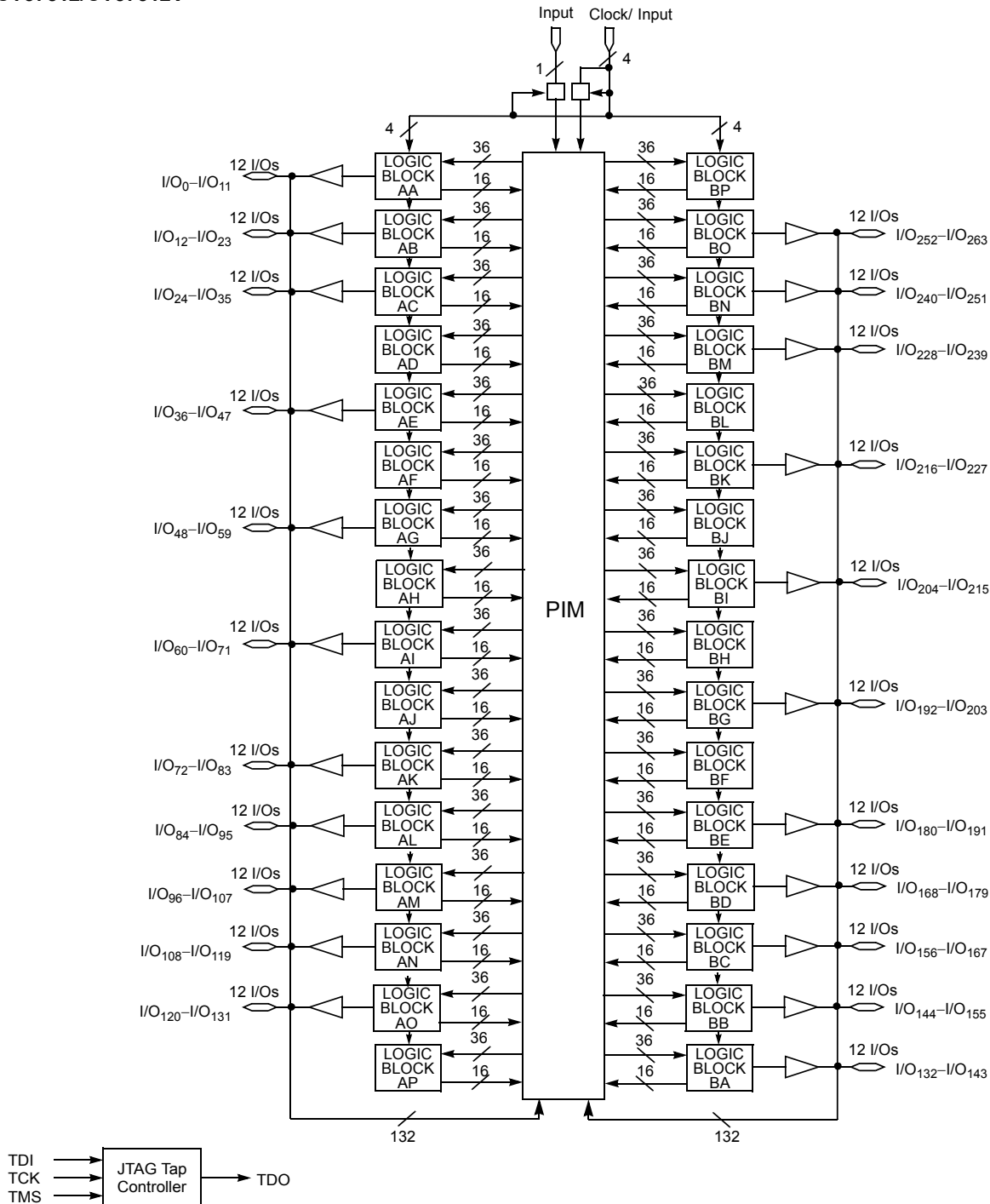
The Ultra37000 features:

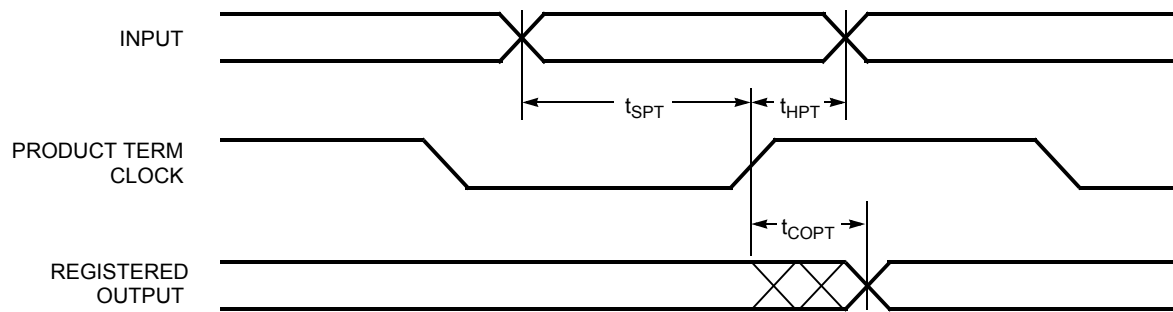
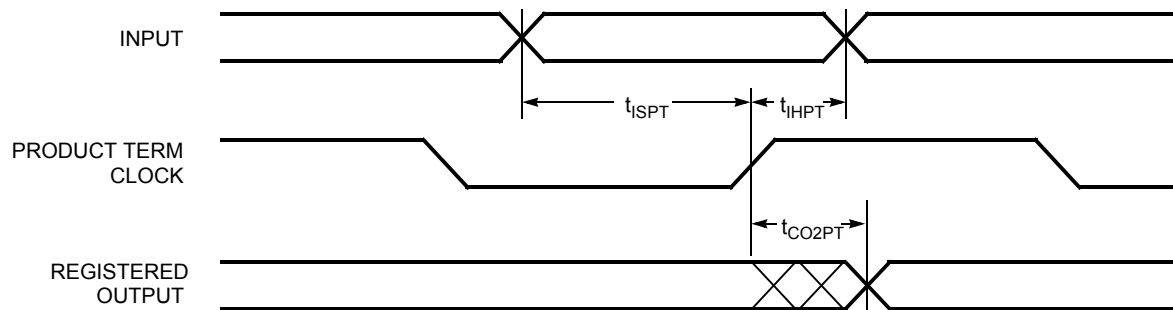
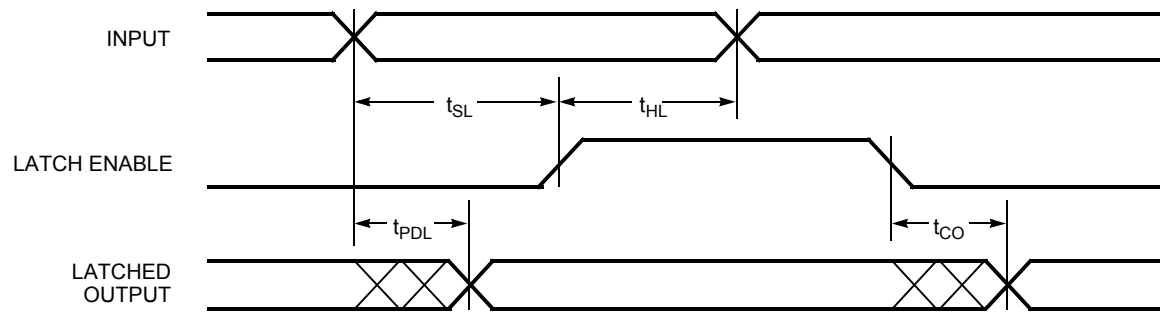
- No fanout delays
- No expander delays
- No dedicated vs. I/O pin delays
- No additional delay through PIM
- No penalty for using 0–16 product terms
- No added delay for steering product terms
- No added delay for sharing product terms
- No routing delays
- No output bypass delays

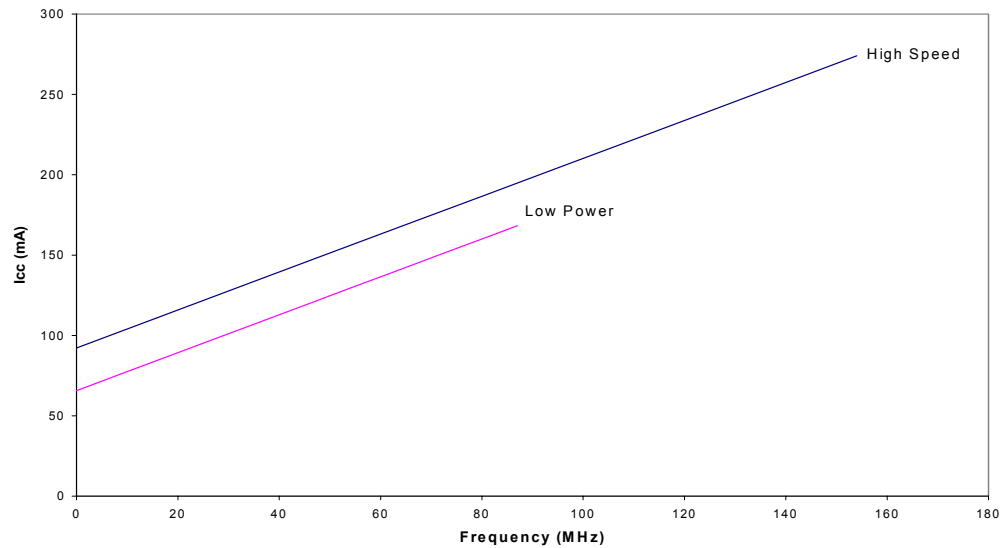
The simple timing model of the Ultra37000 family eliminates unexpected performance penalties.

Logic Block Diagrams (continued)

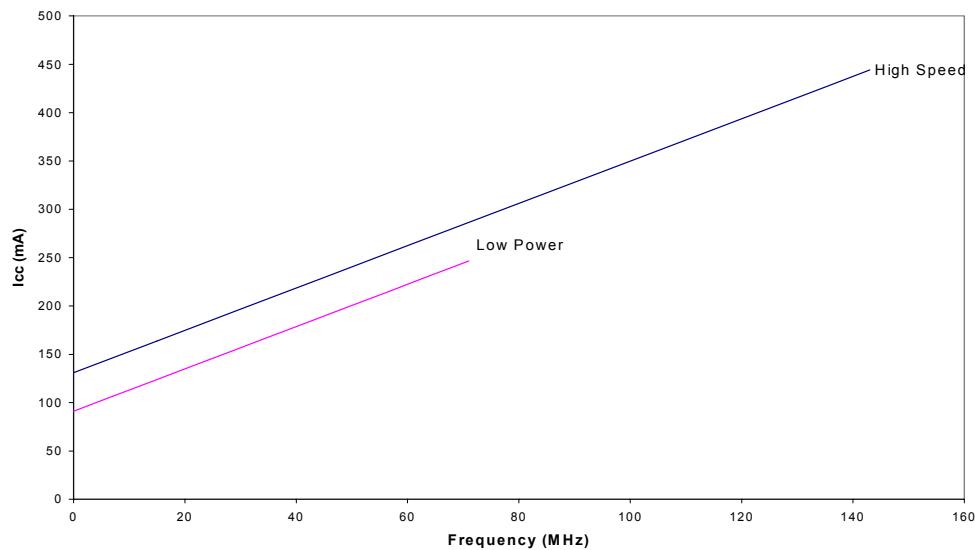
CY37512/CY37512V



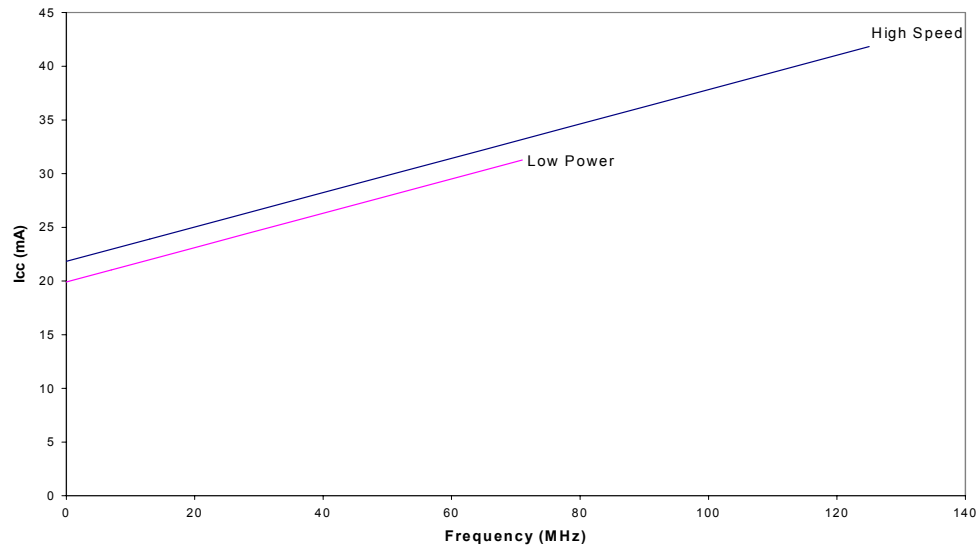
Switching Waveforms (continued)
Registered Output with Product Term Clocking Input Going Through the Array

Registered Output with Product Term Clocking Input Coming From Adjacent Buried Register

Latched Output


Typical 5.0V Power Consumption (continued)
CY37256


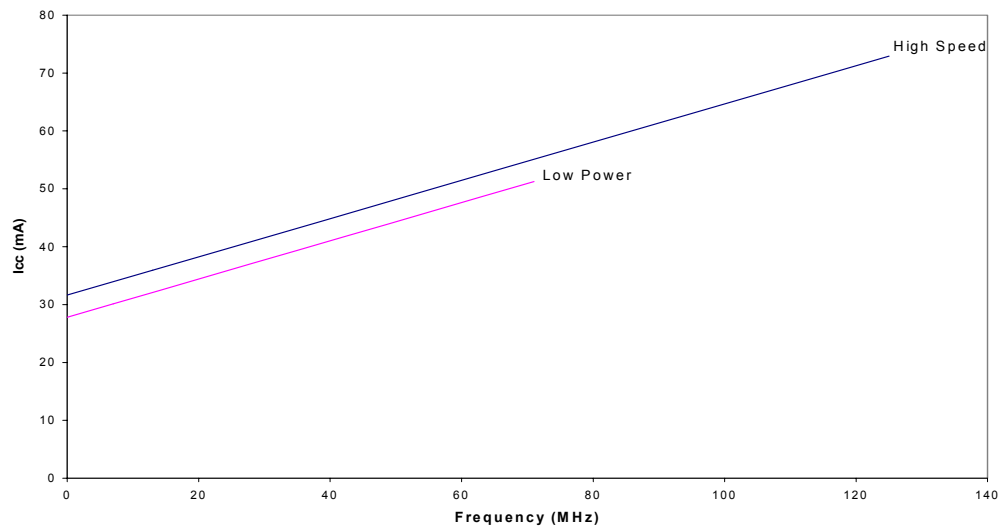
The typical pattern is a 16-bit up counter, per logic block, with outputs disabled.
 $V_{CC} = 5.0V$, $T_A = \text{Room Temperature}$

CY37384


The typical pattern is a 16-bit up counter, per logic block, with outputs disabled.
 $V_{CC} = 5.0V$, $T_A = \text{Room Temperature}$

Typical 3.3V Power Consumption (continued)
CY37064V


The typical pattern is a 16-bit up counter, per logic block, with outputs disabled.
 $V_{CC} = 3.3V$, $T_A = \text{Room Temperature}$

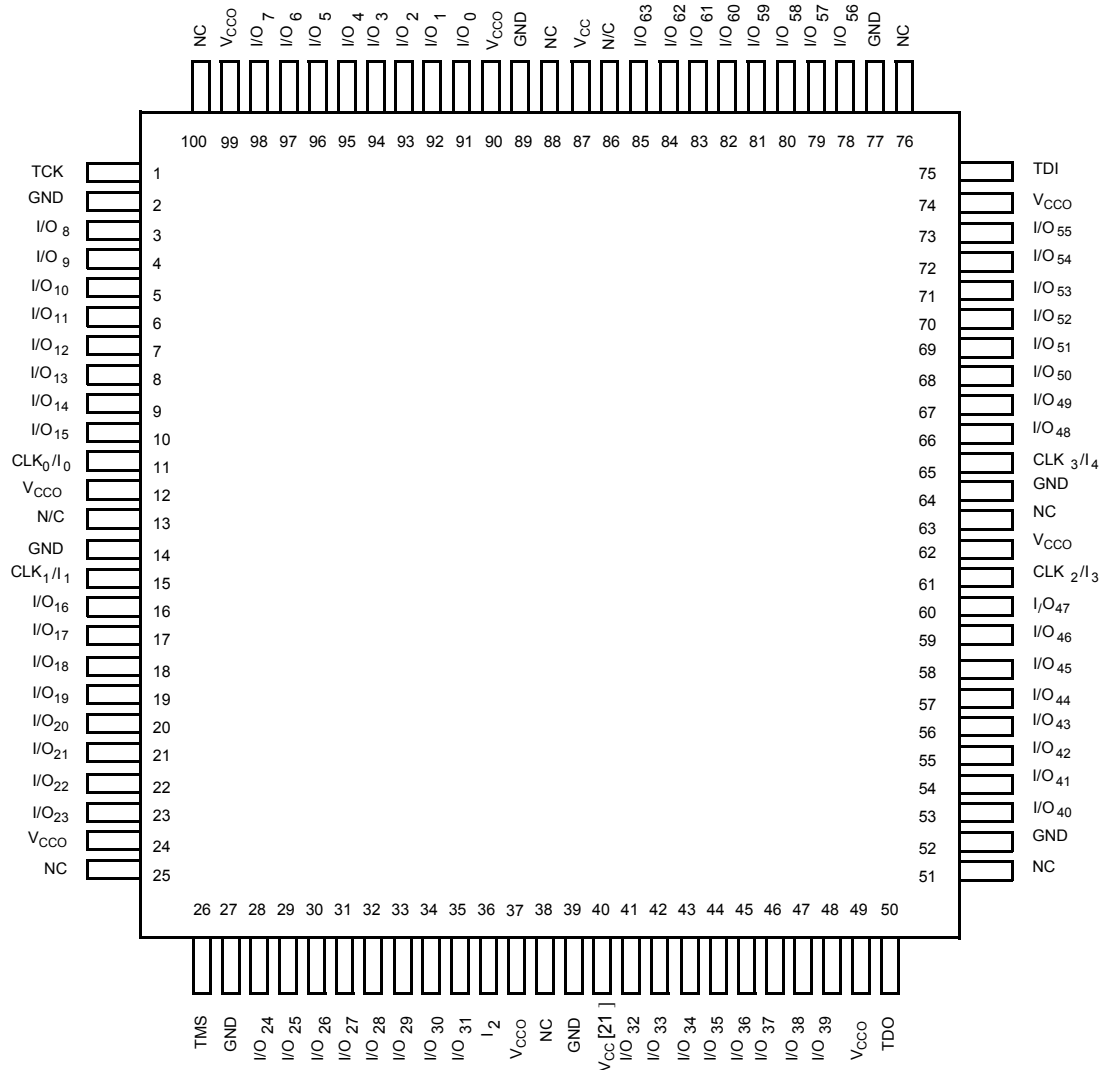
CY37128V


The typical pattern is a 16-bit up counter, per logic block, with outputs disabled.
 $V_{CC} = 3.3V$, $T_A = \text{Room Temperature}$

Pin Configurations^[20] (continued)

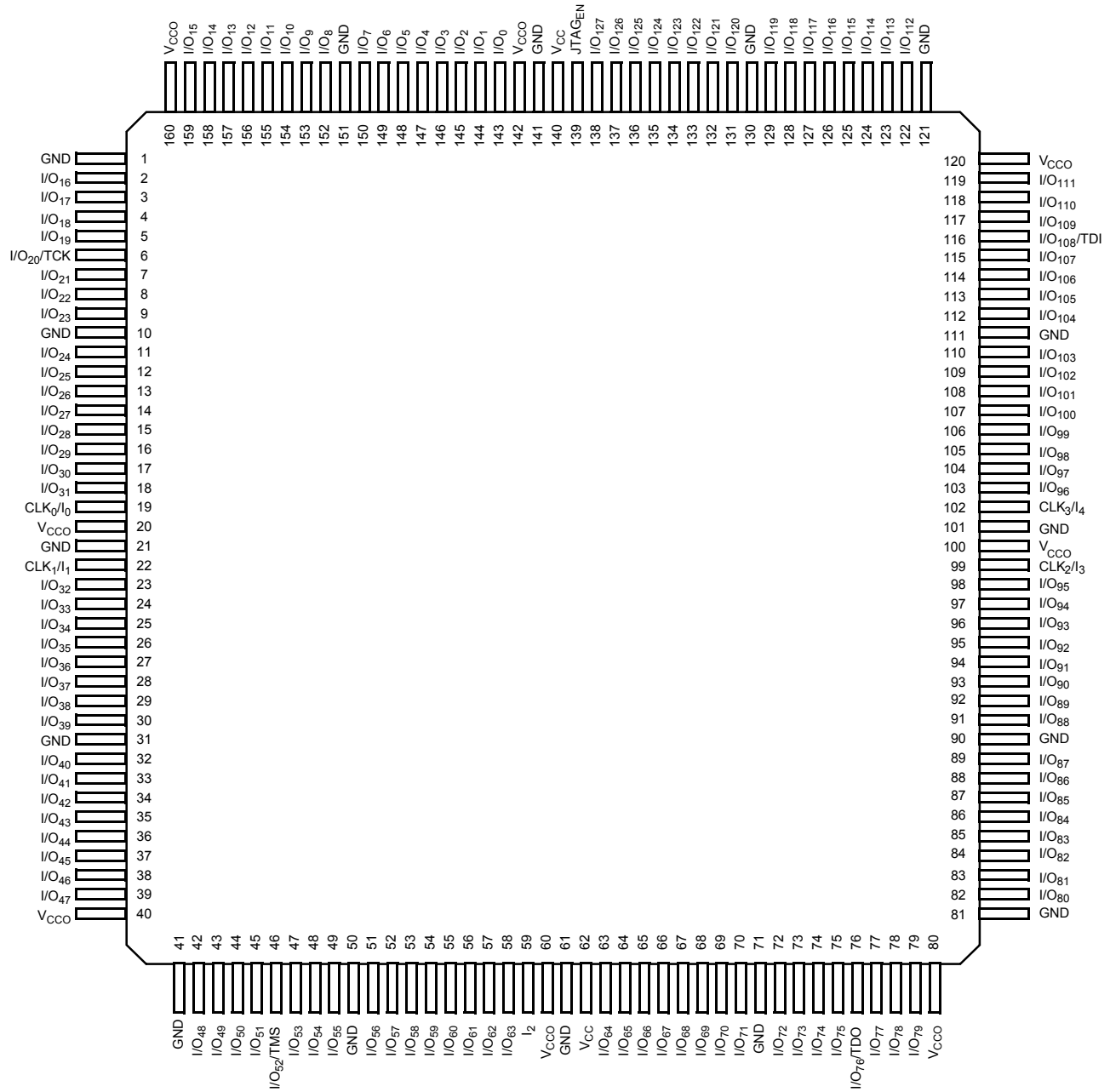
100-lead TQFP (A100)

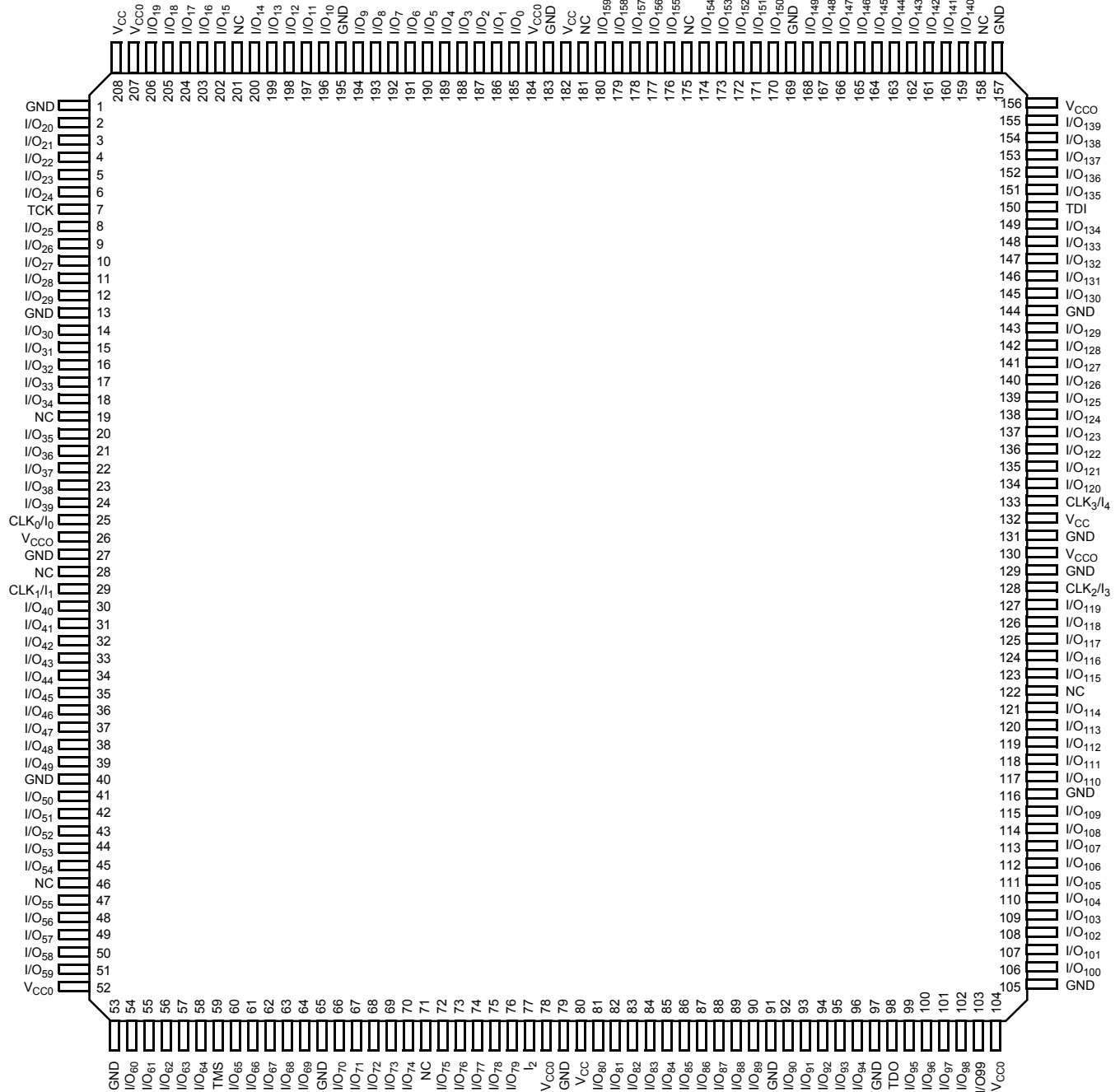
Top View



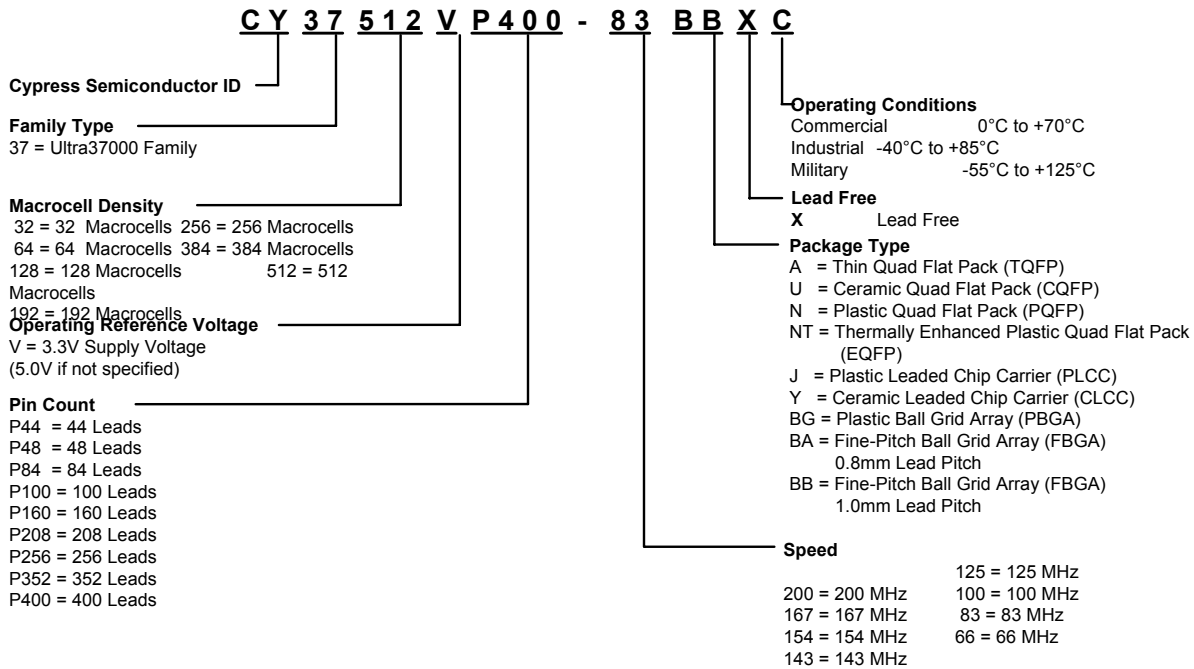
Pin Configurations^[20] (continued)

160-Lead TQFP (A160) / CQFP (U162)
for CY37128(V) and CY37256(V)
Top View



Pin Configurations^[20] (continued)
**208-Lead PQFP (N208) / CQFP (U208)
Top View**


Ordering Information



5.0V Ordering Information

Macrocells	Speed (MHz)	Ordering Code	Package Name	Package Type	Operating Range
32	200	CY37032P44-200AC	A44	44-Lead Thin Quad Flat Pack	Commercial
		CY37032P44-200AXC	A44	44-Lead Lead Free Thin Quad Flat Pack	
		CY37032P44-200JC	J67	44-Lead Plastic Leaded Chip Carrier	
		CY37032P44-200JXC	J67	44-Lead Lead Free Plastic Leaded Chip Carrier	
	154	CY37032P44-154AC	A44	44-Lead Thin Quad Flat Pack	Commercial
		CY37032P44-154JC	J67	44-Lead Plastic Leaded Chip Carrier	
		CY37032P44-154AI	A44	44-Lead Thin Quad Flat Pack	Industrial
		CY37032P44-154AXI	A44	44-Lead Lead Free Thin Quad Flat Pack	
		CY37032P44-154JI	J67	44-Lead Plastic Leaded Chip Carrier	
		CY37032P44-154JXI	J67	44-Lead Lead Free Plastic Leaded Chip Carrier	
	125	CY37032P44-125AC	A44	44-Lead Thin Quad Flat Pack	Commercial
		CY37032P44-125AXC	A44	44-Lead Lead Free Thin Quad Flat Pack	
		CY37032P44-125JC	J67	44-Lead Plastic Leaded Chip Carrier	
		CY37032P44-125JXC	J67	44-Lead Lead Free Plastic Leaded Chip Carrier	
		CY37032P44-125AI	A44	44-Lead Thin Quad Flat Pack	Industrial
		CY37032P44-125JI	J67	44-Lead Plastic Leaded Chip Carrier	
64	200	CY37064P44-200AC	A44	44-Lead Thin Quad Flat Pack	Commercial
		CY37064P44-200AXC	A44	44-Lead Lead Free Thin Quad Flat Pack	
		CY37064P44-200JC	J67	44-Lead Plastic Leaded Chip Carrier	
		CY37064P44-200JXC	J67	44-Lead Lead Free Plastic Leaded Chip Carrier	
		CY37064P84-200JC	J83	84-Lead Plastic Leaded Chip Carrier	
		CY37064P100-200AC	A100	100-Lead Thin Quad Flat Pack	
		CY37064P100-200AXC	A100	100-Lead Lead Free Thin Quad Flat Pack	

5.0V Ordering Information (continued)

Macrocells	Speed (MHz)	Ordering Code	Package Name	Package Type	Operating Range
128	167	CY37128P84-167JC	J83	84-Lead Plastic Leaded Chip Carrier	Commercial
		CY37128P84-167JXC	J83	84-Lead Lead Free Plastic Leaded Chip Carrier	
		CY37128P100-167AC	A100	100-Lead Thin Quad Flat Pack	
		CY37128P100-167AXC	A100	100-Lead Lead Free Thin Quad Flat Pack	
		CY37128P160-167AC	A160	160-Lead Thin Quad Flat Pack	
		CY37128P160-167AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
	125	CY37128P84-125JC	J83	84-Lead Plastic Leaded Chip Carrier	Commercial
		CY37128P84-125JXC	J83	84-Lead Lead Free Plastic Leaded Chip Carrier	
		CY37128P100-125AC	A100	100-Lead Thin Quad Flat Pack	
		CY37128P100-125AXC	A100	100-Lead Lead Free Thin Quad Flat Pack	
		CY37128P160-125AC	A160	160-Lead Thin Quad Flat Pack	
		CY37128P160-125AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37128P84-125JI	J83	84-Lead Plastic Leaded Chip Carrier	Industrial
		CY37128P84-125JXI	J83	84-Lead Lead Free Plastic Leaded Chip Carrier	
		CY37128P100-125AI	A100	100-Lead Thin Quad Flat Pack	
		CY37128P100-125AXI	A100	100-Lead Lead Free Thin Quad Flat Pack	
		CY37128P160-125AI	A160	160-Lead Thin Quad Flat Pack	
		CY37128P160-125AXI	A160	160-Lead Lead Free Thin Quad Flat Pack	
		5962-9952102QYA	Y84	84-Lead Ceramic Leaded Chip Carrier	Military
	100	CY37128P84-100JC	J83	84-Lead Plastic Leaded Chip Carrier	Commercial
		CY37128P84-100JXC	J83	84-Lead Lead Free Plastic Leaded Chip Carrier	
		CY37128P100-100AC	A100	100-Lead Thin Quad Flat Pack	
		CY37128P100-100AXC	A100	100-Lead Lead Free Thin Quad Flat Pack	
		CY37128P160-100AC	A160	160-Lead Thin Quad Flat Pack	
		CY37128P160-100AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37128P84-100JI	J83	84-Lead Plastic Leaded Chip Carrier	Industrial
		CY37128P100-100AI	A100	100-Lead Thin Quad Flat Pack	
		CY37128P100-100AXI	A100	100-Lead Lead Free Thin Quad Flat Pack	
		CY37128P160-100AI	A160	160-Lead Thin Quad Flat Pack	
		5962-9952101QYA	Y84	84-Lead Ceramic Leaded Chip Carrier	Military
192	154	CY37192P160-154AC	A160	160-Lead Thin Quad Flat Pack	Commercial
		CY37192P160-154AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
	125	CY37192P160-125AC	A160	160-Lead Thin Quad Flat Pack	Commercial
		CY37192P160-125AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37192P160-125AI	A160	160-Lead Thin Quad Flat Pack	Industrial
		CY37192P160-125AXI	A160	160-Lead Lead Free Thin Quad Flat Pack	
	83	CY37192P160-83AC	A160	160-Lead Thin Quad Flat Pack	Commercial
		CY37192P160-83AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37192P160-83AI	A160	160-Lead Thin Quad Flat Pack	Industrial
		CY37192P160-83AXI	A160	160-Lead Lead Free Thin Quad Flat Pack	

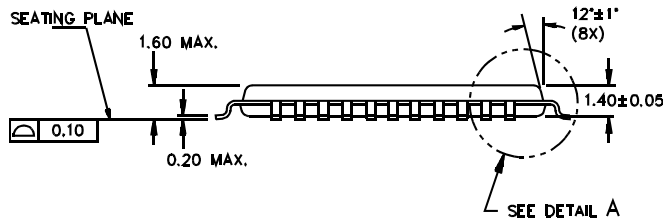
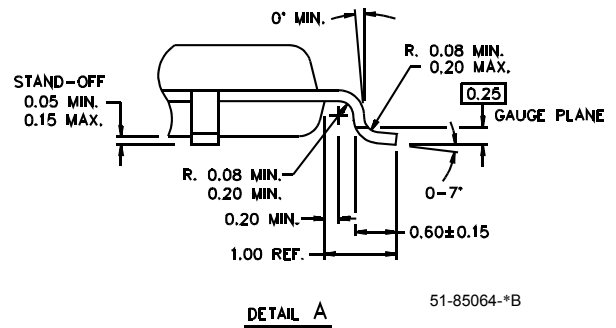
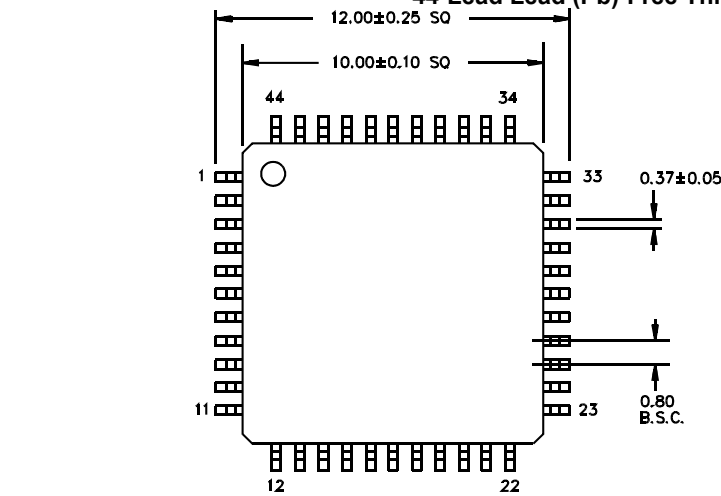
5.0V Ordering Information (continued)

Macrocells	Speed (MHz)	Ordering Code	Package Name	Package Type	Operating Range
256	154	CY37256P160-154AC	A160	160-Lead Thin Quad Flat Pack	Commercial
		CY37256P160-154AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37256P208-154NC	N208	208-Lead Plastic Quad Flat Pack	
		CY37256P256-154BGC	BG292	292-Ball Plastic Ball Grid Array	
	125	CY37256P160-125AC	A160	160-Lead Thin Quad Flat Pack	Commercial
		CY37256P160-125AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37256P208-125NC	N208	208-Lead Plastic Quad Flat Pack	
		CY37256P256-125BGC	BG292	292-Ball Plastic Ball Grid Array	
		CY37256P160-125AI	A160	160-Lead Thin Quad Flat Pack	Industrial
		CY37256P160-125AXI	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37256P208-125NI	N208	208-Lead Plastic Quad Flat Pack	
		CY37256P256-125BGI	BG292	292-Ball Plastic Ball Grid Array	
		5962-9952302QZC	U162	160-Lead Ceramic Quad Flat Pack	Military
	83	CY37256P160-83AC	A160	160-Lead Thin Quad Flat Pack	Commercial
		CY37256P160-83AXC	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37256P208-83NC	N208	208-Lead Plastic Quad Flat Pack	
		CY37256P256-83BGC	BG292	292-Ball Plastic Ball Grid Array	
		CY37256P160-83AI	A160	160-Lead Thin Quad Flat Pack	Industrial
		CY37256P160-83AXI	A160	160-Lead Lead Free Thin Quad Flat Pack	
		CY37256P208-83NI	N208	208-Lead Plastic Quad Flat Pack	
		CY37256P256-83BGI	BG292	292-Ball Plastic Ball Grid Array	
		5962-9952301QZC	U162	160-Lead Ceramic Quad Flat Pack	Military
384	125	CY37384P208-125NC	N208	208-Lead Plastic Quad Flat Pack	Commercial
		CY37384P256-125BGC	BG292	292-Ball Plastic Ball Grid Array	
	83	CY37384P208-83NC	N208	208-Lead Plastic Quad Flat Pack	Commercial
		CY37384P256-83BGC	BG292	292-Ball Plastic Ball Grid Array	
		CY37384P208-83NI	N208	208-Lead Plastic Quad Flat Pack	Industrial
		CY37384P256-83BGI	BG292	292-Ball Plastic Ball Grid Array	

Package Diagrams

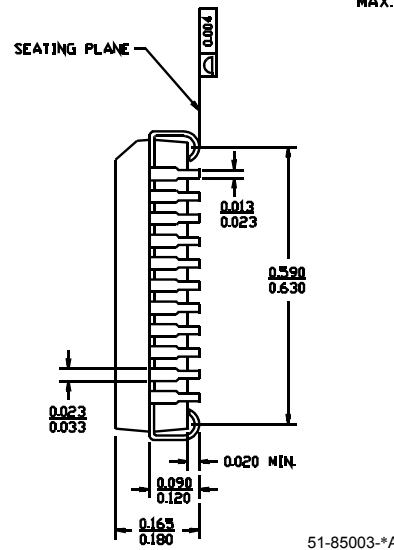
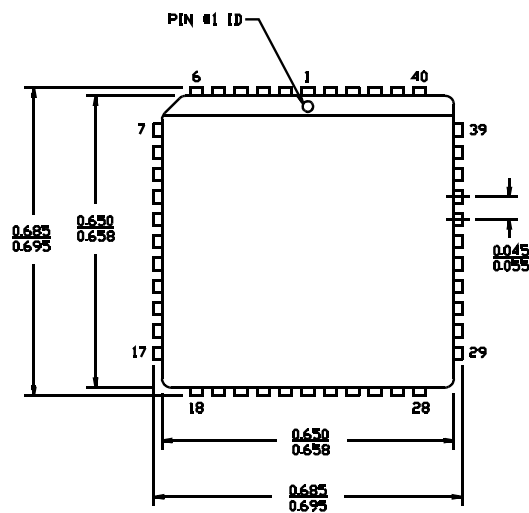
44-Lead Lead (Pb)-Free Thin Plastic Quad Flat Pack A44

DIMENSIONS ARE IN MILLIMETERS



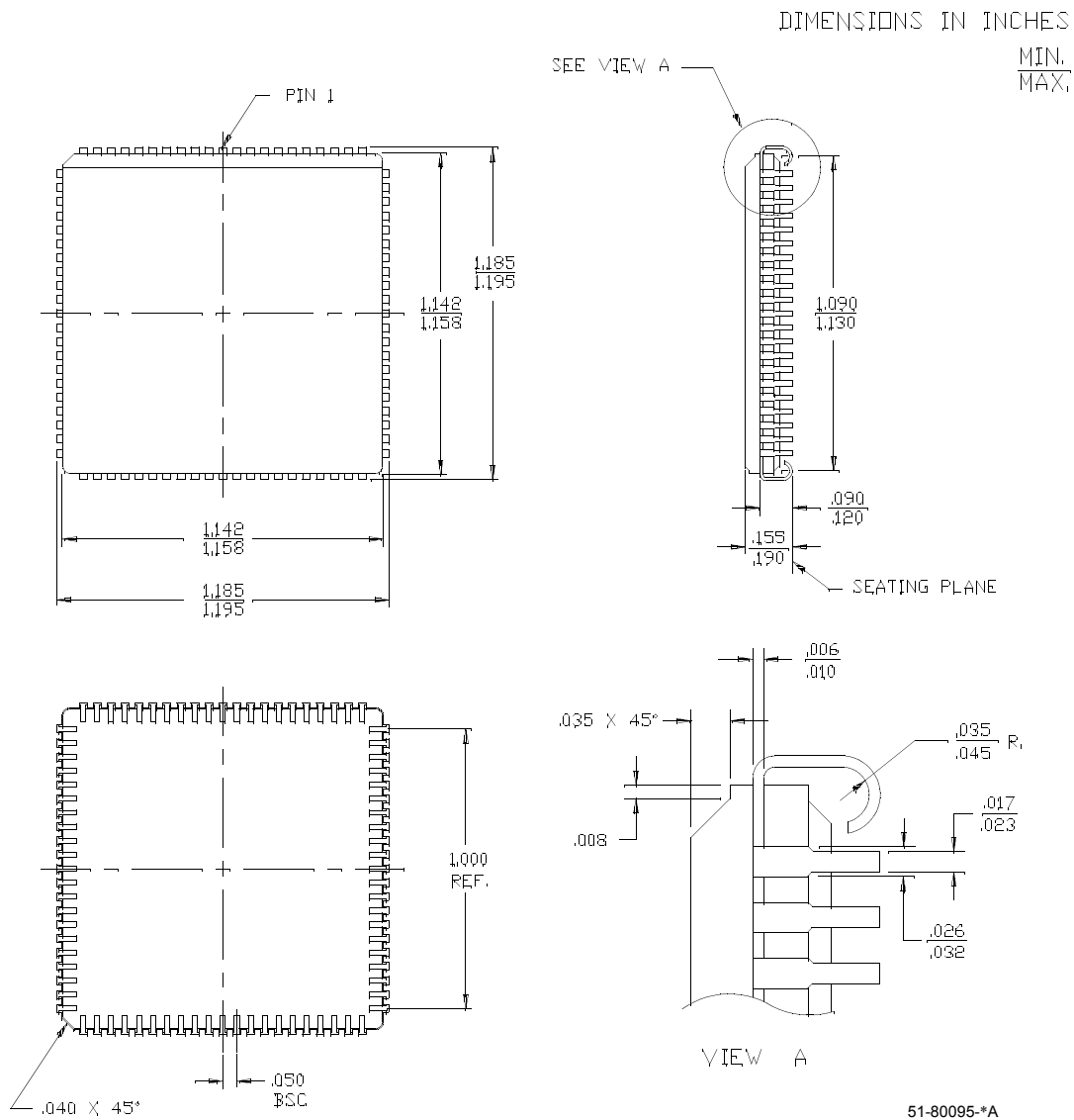
44-Lead Lead (Pb)-Free Plastic Leaded Chip Carrier J67

DIMENSIONS IN INCHES MIN. MAX.



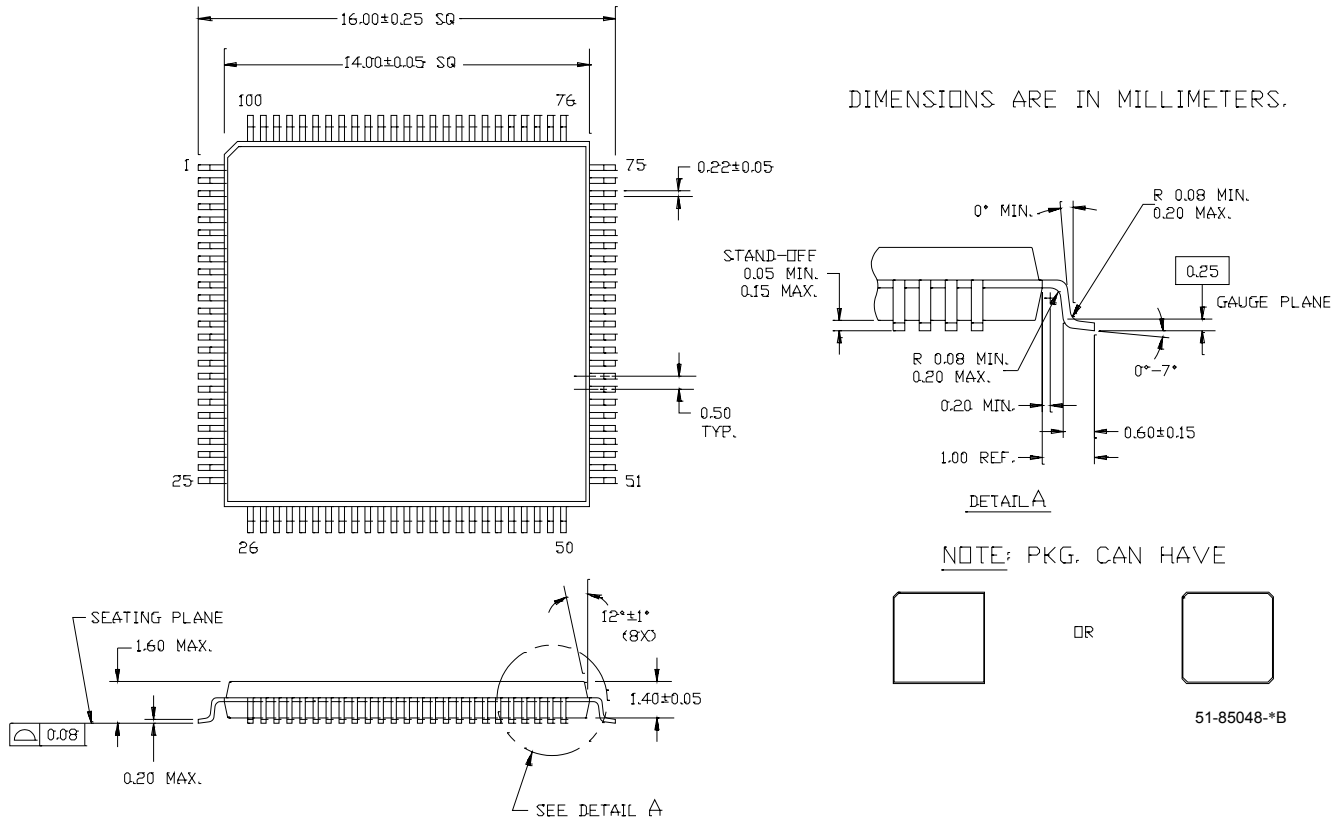
Package Diagrams (continued)

84-Lead Ceramic Leaded Chip Carrier Y84



Package Diagrams (continued)

100-Lead Lead (Pb)-Free Thin Plastic Quad Flat Pack (TQFP) A100

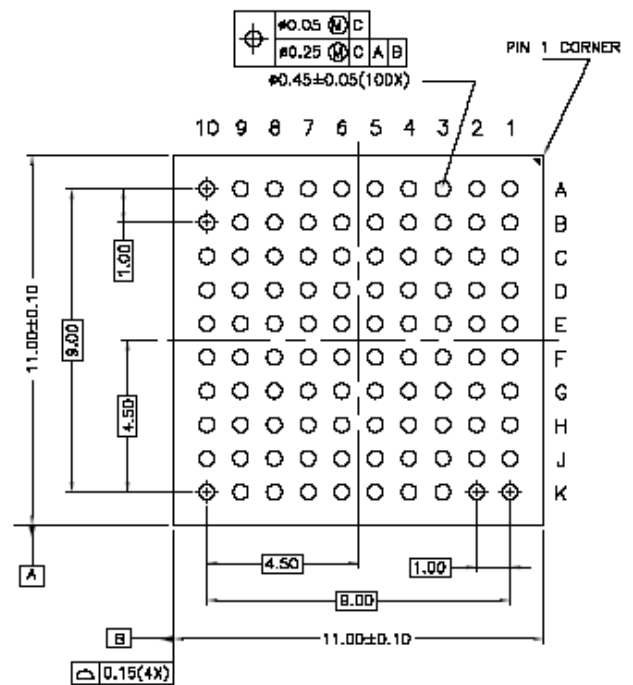
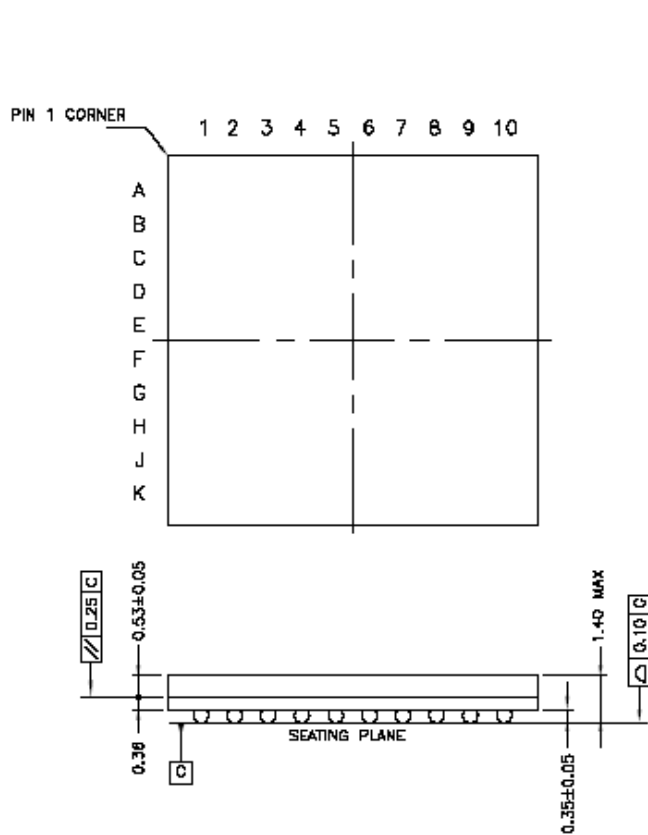


Package Diagrams (continued)

100-Ball Thin Ball Grid Array (11 x 11 x 1.4 mm) BB100

TOP VIEW

BOTTOM VIEW



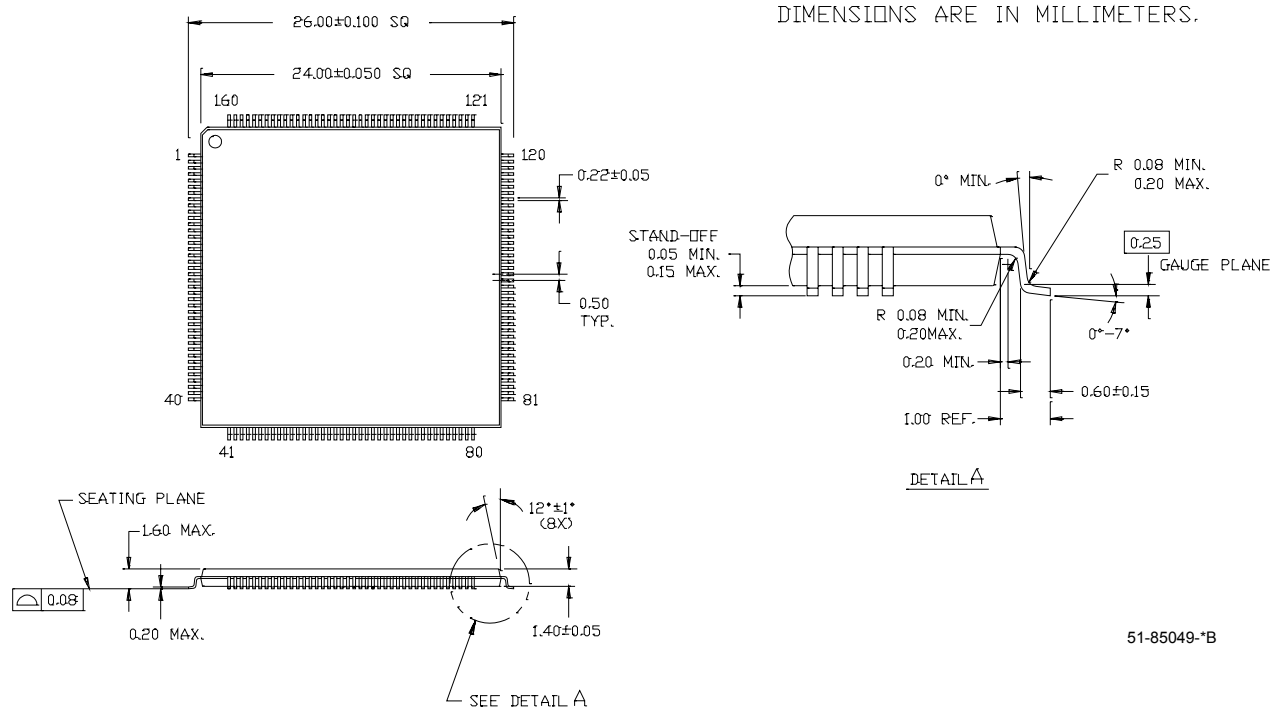
51-85107-B



Ultra37000 CPLD Family

Package Diagrams (continued)

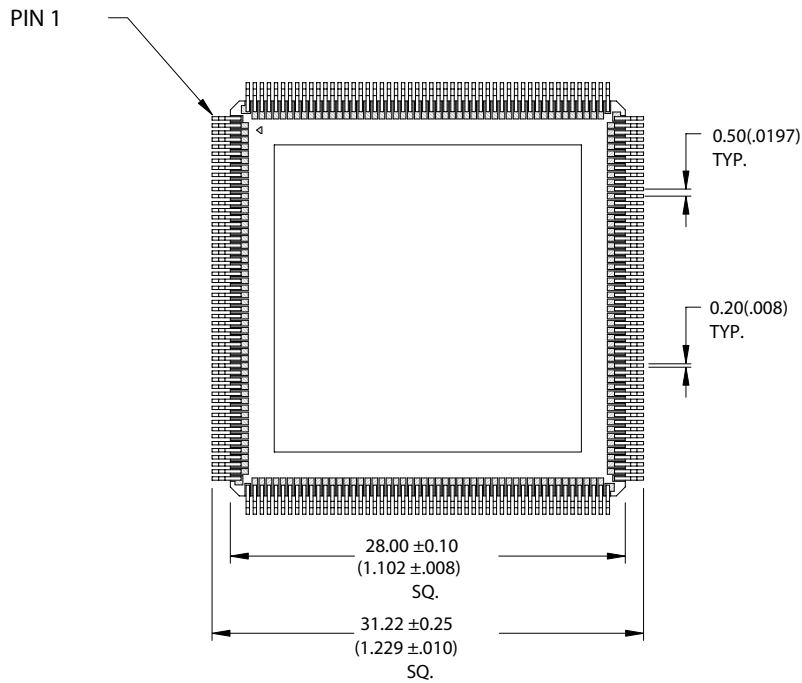
160-Lead Lead (Pb)-Free Thin Plastic Quad Flat Pack (24 x 24 x 1.4 mm) (TQFP) A160



51-85049-*B

Package Diagrams (continued)

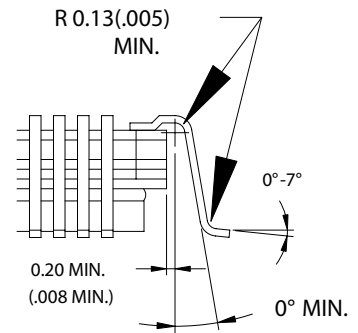
208-Lead Ceramic Quad Flatpack (Cavity Up) U208



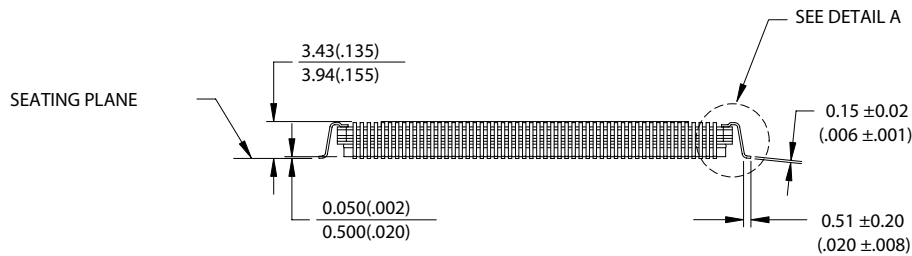
DIMENSIONS IN MM (INCH)

REFERENCE JEDEC: N/A

PKG. WEIGHT: 6-7gms



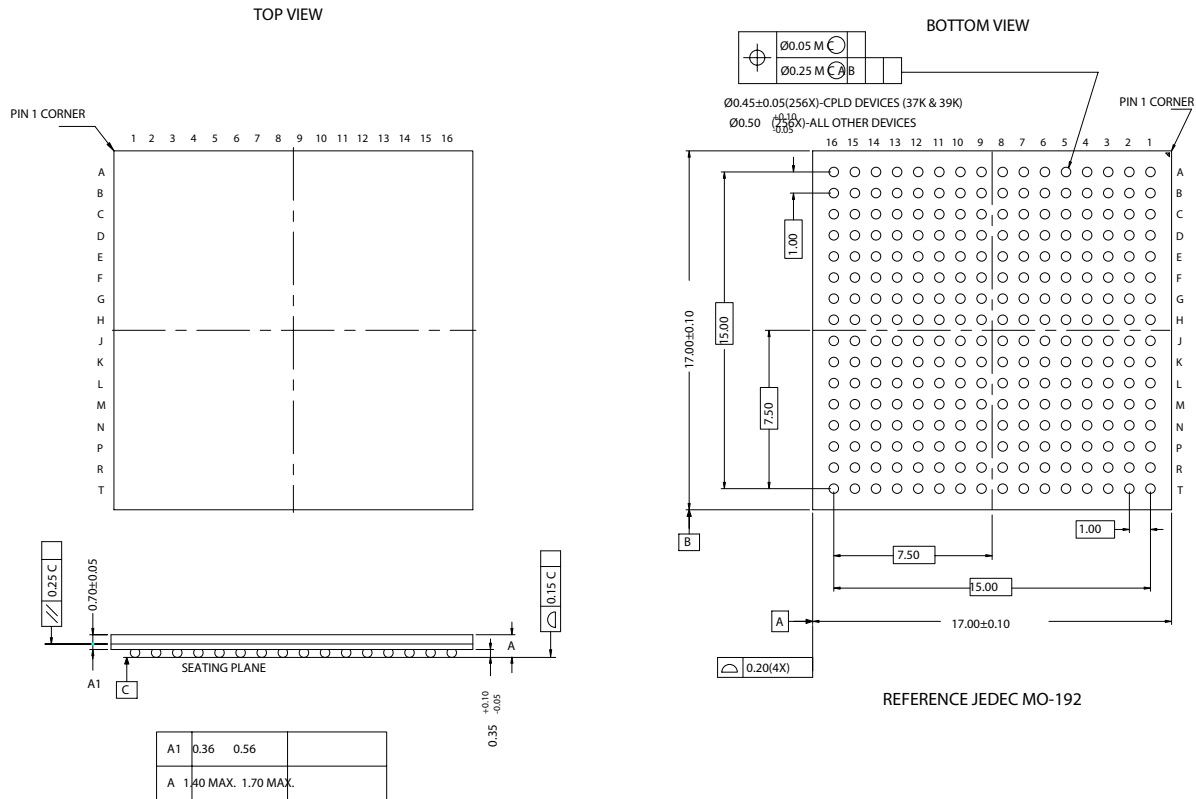
DETAIL A



51-80105-B

Package Diagrams (continued)

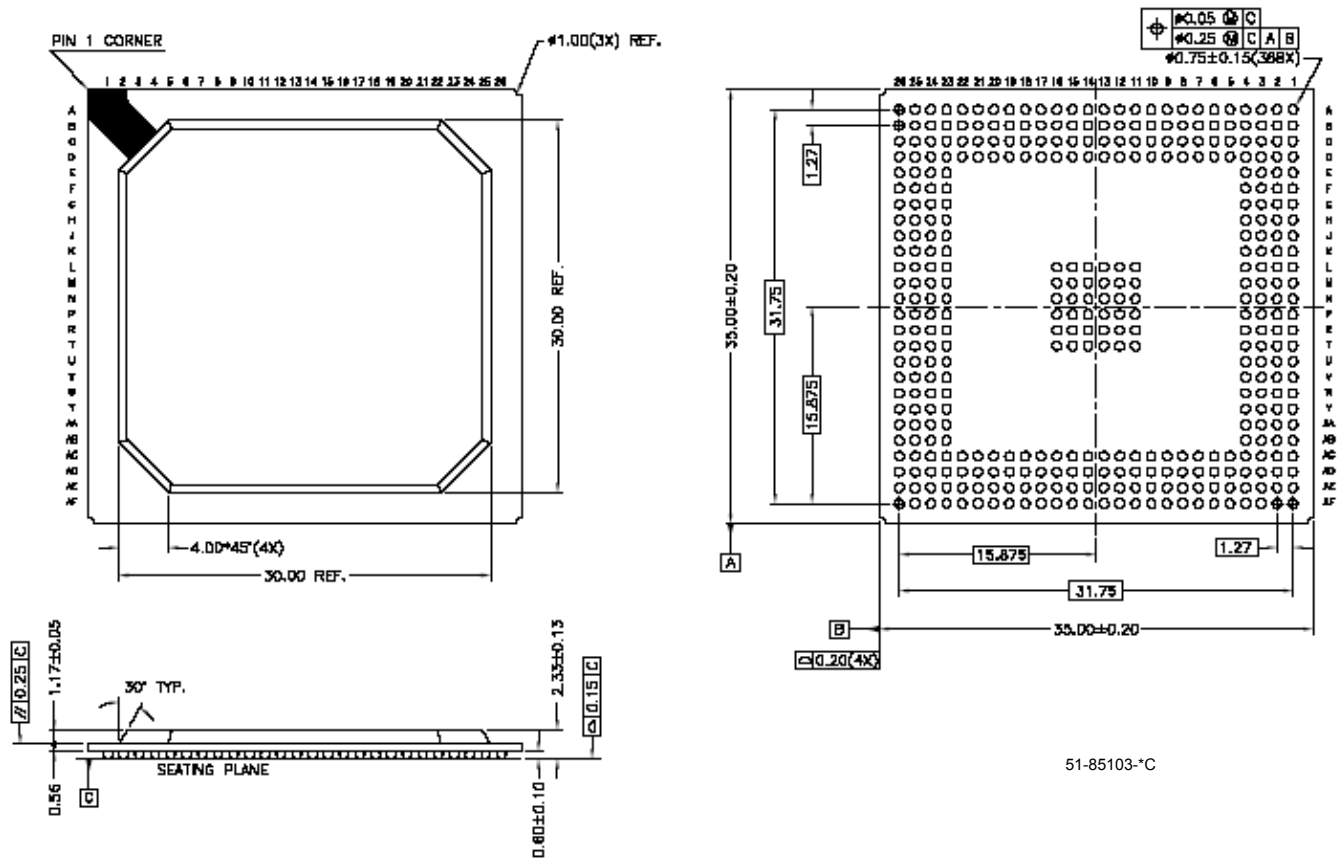
256-Ball FBGA (17 x 17 mm) BB256



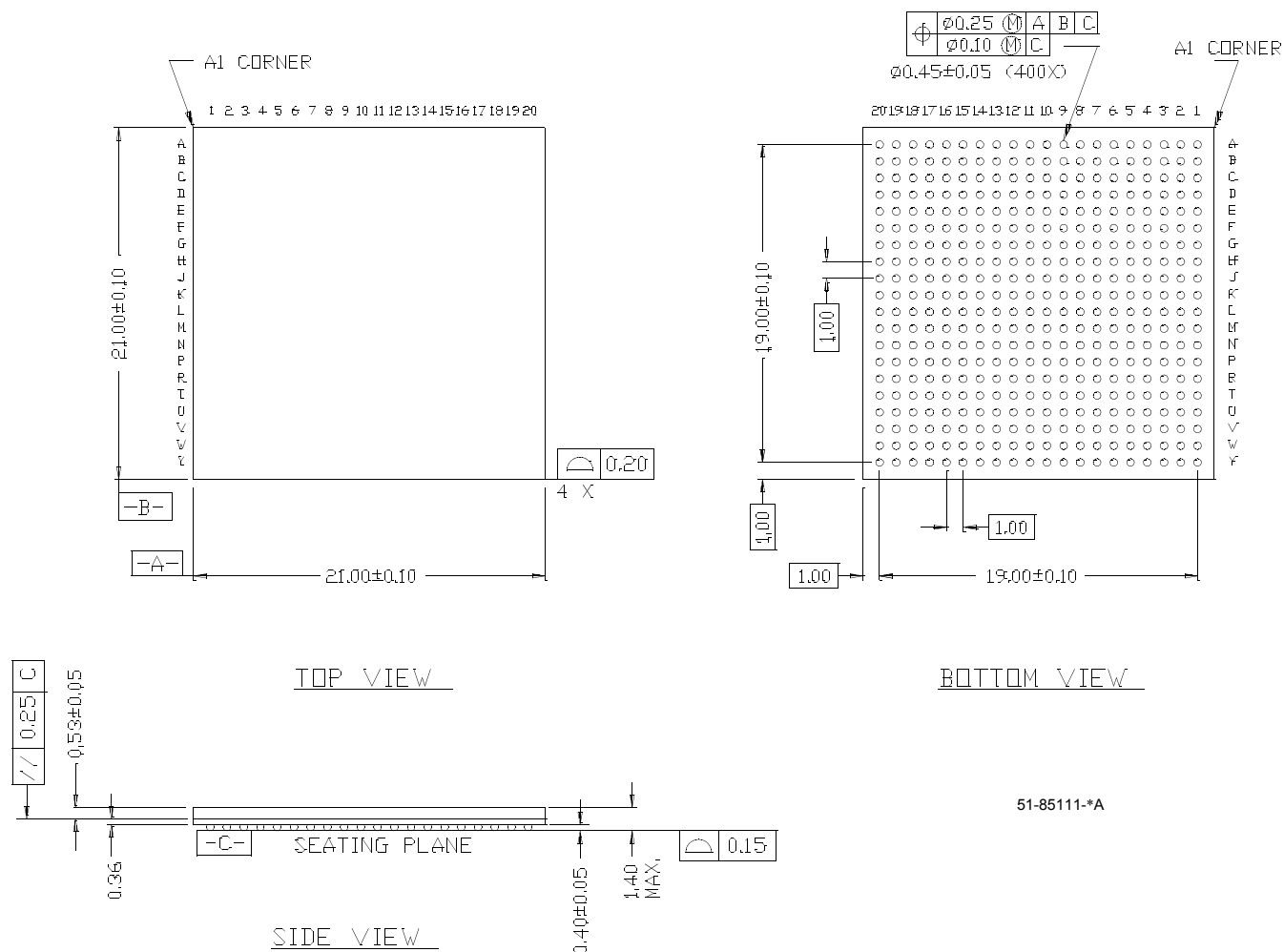
51-85108-1F

Package Diagrams (continued)

388-Ball Plastic Ball Grid Array PBGA (35 x 35 x 2.33 mm) BG388



51-85103-°C

Package Diagrams (continued)
400-Ball FBGA (21 x 21 x 1.4 mm) BB400


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