

How to Use This Conversion Guide

This Conversion Guide is intended to provide insight into how best to migrate logic designs from older MACH[®] and PALCE[®] devices affected by AMD's Fab 14 shut-down to newer Lattice MACH[®], ispMACH[®] and GAL[®] devices.

It is recommended that these conversion guidelines for Class B and C high-density devices be used only after Last Time Buy options have been explored. With CPLDs, pin-locked design conversions are always subject to difficulties due to architectural as well as AC/DC parametric differences between devices and can require a significant re-design effort. For low-density PLDs, if a detailed timing analysis shows specification differences are inconsequential in a particular design, designs usually convert easily in most instances. However, a small percentage of applications can be sensitive to minute timing differences and we encourage customers to verify conversions using sample devices from Lattice on their printed circuit boards prior to committing to production.

The attached listings highlight Fab 14 obsolete devices and, where available, pin-compatible Lattice alternatives. For each alternative, information is provided as to whether it is pin out, JEDEC fuse map, architecture, and/or AC/DC spec compatible with the original Lattice devices. An additional column indicates whether a detailed Specification Comparison is available between the original device and alternative. For devices with a "Yes" indication, a specification comparison highlighting **only specifications which differ** is found later in this Conversion Guide.

Class A Devices

For this category of device, consisting of only low-density PLDs, conversion is generally easy. The devices are pin out, JEDEC fuse map, and architecture compatible. Minor AC/DC spec differences exist in a few cases. In most cases, one can use the same PALCE JEDEC fuse map to program the equivalent GAL device. Only a few devices will have minor specification differences. One will not have to re-compile the design. No additional software should be needed.

Class B Devices

For these devices, pin compatible alternatives are available, but significant architectural and/or AC/DC spec differences exist.

For the PALCE devices in this category, the customer will generally find a fuse map and functionally-compatible GAL device with the exception of "zero power" GAL devices. "Zero power" GAL devices have a different "wake up" sequence requirement.

The following are PALCE device conversion rules:

- Use source code whenever possible. The ABEL language is a very common source code that can be imported directly into the ispLEVER[™] software to fit the new device.
- Use the PALASM to ABEL source code level equation directive in the ABEL tool (for equation conversion only – not state machine syntax).
- If needed, Lattice Applications can assist the conversion of a JEDEC fuse map to an ABEL source file for common PAL[®]/GAL architectures. Please contact Lattice factory Applications for assistance as noted below.
- For MACH devices in this category, the customer will have to re-target their designs. The .PDS file extension was used with PALASM and MACH-XL 2.1 or earlier. The DSL file is used with MACH-XL 3.0 or later, using the source file name with .SRC extension.

The following are MACH device design conversion rules:

- Use source code whenever possible.
- Use PALASM to ABEL source code level equation directive for equation conversion as discussed above.

- For extreme case where the source code is not available, Lattice Applications can help reconstruct ABEL source code from JEDEC, PDS or DSL files. There is no guarantee that the conversion will yield an exact functional equivalent. Contact Lattice Applications for more information.

Class C Devices

These devices have no pin-compatible alternative and will require a re-design. Starting from the best source code and functional/timing requirements will expedite the redesign effort. Pin-compatible redesigns can be attempted for printed circuit boards (PCBs) that cannot be re-spun, but where PCB re-spins are scheduled, completing a new design with free pin assignments may give the quickest and highest performance results.

In such instances, it may prove beneficial to consider re-targeting the design for a different Lattice device to provide higher integration or more features.

Applications Support

Lattice's factory Applications group is ready to assist with any Fab 14 Conversion questions or re-design efforts. They can be contacted at:

E-mail: techsupport@latticesemi.com -- E-Mail Subject: Fab 14 Conversion Assistance

Telephone: 1-800-LATTICE or 1-408-826-6000 -- Ask for Lattice Applications, Fab 14 Conversion Assistance

Table 1. Compatibility

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
A	PALCE16V8H-10JC/4	PLCC	20	GAL16V8D-10LJ	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-10JI/4	PLCC	20	GAL16V8D-10LJI	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-10PC/4	PDIP	20	GAL16V8D-10LP	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-10PI/4	PDIP	20	GAL16V8D-10LPI	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-10SC/4	SOIC	20	GAL16V8D-10LS	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-15JC/4	PLCC	20	GAL16V8D-15LJ	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-15JI/4	PLCC	20	GAL16V8D-15LJI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-15PC/4	PDIP	20	GAL16V8D-15LP	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-15PI/4	PDIP	20	GAL16V8D-15LPI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-15SC/4	SOIC	20	GAL16V8D-15LS	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-25JC/4	PLCC	20	GAL16V8D-25LJ	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-25JI/4	PLCC	20	GAL16V8D-25LJI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-25PC/4	PDIP	20	GAL16V8D-25LP	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-25PI/4	PDIP	20	GAL16V8D-25LPI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-25SC/4	SOIC	20	GAL16V8D-25LS	Yes	Yes	Yes	Yes	No	
A	PALCE16V8H-5JC/5	PLCC	20	GAL16V8D-5LJ	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-7JC/5	PLCC	20	GAL16V8D-7LJ	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-7PC/5	PDIP	20	GAL16V8D-7LP	Yes	Yes	Yes	No	Yes	
A	PALCE16V8H-7SC/5	SOIC	20	GAL16V8D-7LS	Yes	Yes	Yes	No	Yes	
A	PALCE16V8Q-10JC/5	PLCC	20	GAL16V8D-10QJ	Yes	Yes	Yes	No	Yes	
A	PALCE16V8Q-15JC/4	PLCC	20	GAL16V8D-15QJ	Yes	Yes	Yes	Yes	No	
A	PALCE16V8Q-15PC/4	PDIP	20	GAL16V8D-15QP	Yes	Yes	Yes	Yes	No	
A	PALCE16V8Q-20JI/4	PLCC	20	GAL16V8D-20QJI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8Q-20PI/4	PDIP	20	GAL16V8D-20QPI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8Q-25JC/4	PLCC	20	GAL16V8D-25QJ	Yes	Yes	Yes	Yes	No	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
A	PALCE16V8Q-25JI/4	PLCC	20	GAL16V8D-25LJI	Yes	Yes	Yes	Yes	No	
A	PALCE16V8Q-25PC/4	PDIP	20	GAL16V8D-25QP	Yes	Yes	Yes	Yes	No	
A	PALCE16V8Q-25PI/4	PDIP	20	GAL16V8D-25QPI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-10JC/4	PLCC	28	GAL20V8C-10LJ	Yes	Yes	Yes	No	Yes	
A	PALCE20V8H-10PC/4	PDIP	24	GAL20V8B-10LP	Yes	Yes	Yes	No	Yes	
A	PALCE20V8H-15JC/4	PLCC	28	GAL20V8B-15LJ	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-15JI/4	PLCC	28	GAL20V8B-15LJI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-15PC/4	PDIP	24	GAL20V8B-15LP	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-15PI/4	PDIP	24	GAL20V8B-15LPI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-25JC/4	PLCC	28	GAL20V8B-25LJ	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-25JI/4	PLCC	28	GAL20V8B-25LJI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-25PC/4	PDIP	24	GAL20V8B-25LP	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-25PI/4	PDIP	24	GAL20V8B-25LPI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8H-5JC/5	PLCC	28	GAL20V8C-5LJ	Yes	Yes	Yes	No	Yes	
A	PALCE20V8H-7JC/5	PLCC	28	GAL20V8C-7LJ	Yes	Yes	Yes	No	Yes	
A	PALCE20V8H-7PC/5	PDIP	24	GAL20V8B-7LP	Yes	Yes	Yes	No	Yes	
A	PALCE20V8Q-15JC/4	PLCC	28	GAL20V8B-15QJ	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-15PC/4	PDIP	24	GAL20V8B-15QP	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-20JI/4	PLCC	28	GAL20V8B-20QJI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-20PI/4	PDIP	24	GAL20V8B-20QPI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-25JC/4	PLCC	28	GAL20V8B-25QJ	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-25JI/4	PLCC	28	GAL20V8B-25QJI	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-25PC/4	PDIP	24	GAL20V8B-25QP	Yes	Yes	Yes	Yes	No	
A	PALCE20V8Q-25PI/4	PDIP	24	GAL20V8B-25QPI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-10JC/5	PLCC	28	GAL22V10D-10LJ	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-10JI/5	PLCC	28	GAL22V10D-10LJI	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-10PC/5	PDIP	24	GAL22V10D-10LP	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-10PI/5	PDIP	24	GAL22V10D-10LPI	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-10SC/5	SOIC	24	GAL22V10D-10LS	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-15JC/4	PLCC	28	GAL22V10D-15LJ	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-15JI/5	PLCC	28	GAL22V10D-15LJI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-15PC/4	PDIP	24	GAL22V10D-15LP	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-15PI/5	PDIP	24	GAL22V10D-15LPI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-15SC/4	SOIC	24	GAL22V10D-15LS	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-20JI/4	PLCC	28	GAL22V10D-20LJI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-20PI/4	PDIP	24	GAL22V10D-20LPI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-25JC/4	PLCC	28	GAL22V10D-25LJ	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-25JI/4	PLCC	28	GAL22V10D-25LJI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-25PC/4	PDIP	24	GAL22V10D-25LP	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-25PI/4	PDIP	24	GAL22V10D-25LPI	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-25SC/4	SOIC	24	GAL22V10D-25LS	Yes	Yes	Yes	Yes	No	
A	PALCE22V10H-5JC/5	PLCC	28	GAL22V10D-5LJ	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-7JC/5	PLCC	28	GAL22V10D-7LJ	Yes	Yes	Yes	No	Yes	
A	PALCE22V10H-7PC/5	PDIP	24	GAL22V10D-7LP	Yes	Yes	Yes	No	Yes	
A	PALCE22V10Q-10JC/5	PLCC	28	GAL22V10D-10QJ	Yes	Yes	Yes	No	Yes	
A	PALCE22V10Q-10PC/5	PDIP	24	GAL22V10D-10QP	Yes	Yes	Yes	No	Yes	
A	PALCE22V10Q-15JC/5	PLCC	28	GAL22V10D-15QJ	Yes	Yes	Yes	Yes	No	
A	PALCE22V10Q-15PC/5	PDIP	24	GAL22V10D-15QP	Yes	Yes	Yes	Yes	No	
A	PALCE22V10Q-25JC/4	PLCC	28	GAL22V10D-25QJ	Yes	Yes	Yes	Yes	No	
A	PALCE22V10Q-25PC/4	PDIP	24	GAL22V10D-25QP	Yes	Yes	Yes	Yes	No	
A	PALCE26V12H-15JC/4	PLCC	28	GAL26V12C-15LJ	Yes	Yes	Yes	No	Yes	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
A	PALCE26V12H-15JI/4	PLCC	28	GAL26V12C-15LJI	Yes	Yes	Yes	No	Yes	
A	PALCE26V12H-15PC/4	PDIP	28	GAL26V12C-15LP	Yes	Yes	Yes	No	Yes	
A	PALCE26V12H-15PI/4	PDIP	28	GAL26V12C-15LPI	Yes	Yes	Yes	No	Yes	
A	PALCE26V12H-20JC/4	PLCC	28	GAL26V12C-20LJ	Yes	Yes	Yes	No	Yes	
A	PALCE26V12H-20JI/4	PLCC	28	GAL26V12C-20LJI	Yes	Yes	Yes	No	Yes	
A	PALCE26V12H-20PC/4	PDIP	28	GAL26V12C-20LP	Yes	Yes	Yes	No	Yes	
A	PALCE26V12H-20PI/4	PDIP	28	GAL26V12C-20LPI	Yes	Yes	Yes	No	Yes	
B	MACH111SP-10JC	PLCC	44	M4A5-32/32-10JC	Yes	No	No	No	No	M4A is superset, direct conversion.
B	MACH111SP-10JI	PLCC	44	M4A5-32/32-10JI	Yes	No	No	No	No	
B	MACH111SP-10VC	TQFP	44	M4A5-32/32-10VC	Yes	No	No	No	No	
B	MACH111SP-12JC	PLCC	44	M4A5-32/32-10JC	Yes	No	No	No	No	
B	MACH111SP-12JI	PLCC	44	M4A5-32/32-12JI	Yes	No	No	No	No	
B	MACH111SP-12VC	TQFP	44	M4A5-32/32-10VC	Yes	No	No	No	No	
B	MACH111SP-14JI	PLCC	44	M4A5-32/32-12JI	Yes	No	No	No	No	
B	MACH111SP-15JC	PLCC	44	M4A5-32/32-10JC	Yes	No	No	No	No	
B	MACH111SP-15VC	TQFP	44	M4A5-32/32-10VC	Yes	No	No	No	No	
B	MACH111SP-18JI	PLCC	44	M4A5-32/32-12JI	Yes	No	No	No	No	
B	MACH111SP-5JC	PLCC	44	M4A5-32/32-5JC	Yes	No	No	No	No	
B	MACH111SP-5VC	TQFP	44	M4A5-32/32-5VC	Yes	No	No	No	No	
B	MACH111SP-7JC	PLCC	44	M4A5-32/32-7JC	Yes	No	No	No	No	
B	MACH111SP-7JI	PLCC	44	M4A5-32/32-7JI	Yes	No	No	No	No	
B	MACH111SP-7VC	TQFP	44	M4A5-32/32-7VC	Yes	No	No	No	No	
B	MACH130-15JC	PLCC	84	M4-128N/64-15JC	Yes	No	No	No	No	
B	MACH130-18JI	PLCC	84	M4-128N/64-18JI	Yes	No	No	No	No	
B	MACH131-10JC/1	PLCC	84	M4-128N/64-10JC	Yes	No	No	No	No	
B	MACH131-10JI/1	PLCC	84	M4-128N/64-10JI	Yes	No	No	No	No	
B	MACH131-12JC/1	PLCC	84	M4-128N/64-12JC	Yes	No	No	No	No	
B	MACH131-12JI/1	PLCC	84	M4-128N/64-12JI	Yes	No	No	No	No	
B	MACH131-14JI/1	PLCC	84	M4-128N/64-14JI	Yes	No	No	No	No	
B	MACH131-15JC/1	PLCC	84	M4-128N/64-15JC	Yes	No	No	No	No	
B	MACH131-18JI/1	PLCC	84	M4-128N/64-18JI	Yes	No	No	No	No	
B	MACH131-7JC/1	PLCC	84	M4-128N/64-7JC	Yes	No	No	No	No	
B	MACH211SP-10JC	PLCC	44	M4A5-64/32-10JC	Yes	No	No	No	No	M4A is superset, direct conversion.
B	MACH211SP-10JI	PLCC	44	M4A5-64/32-10JI	Yes	No	No	No	No	
B	MACH211SP-10VC	TQFP	44	M4A5-64/32-10VC	Yes	No	No	No	No	
B	MACH211SP-12JC	PLCC	44	M4A5-64/32-10JC	Yes	No	No	No	No	
B	MACH211SP-12JI	PLCC	44	M4A5-64/32-12JI	Yes	No	No	No	No	
B	MACH211SP-12VC	TQFP	44	M4A5-64/32-10VC	Yes	No	No	No	No	
B	MACH211SP-14JI	PLCC	44	M4A5-64/32-12JI	Yes	No	No	No	No	
B	MACH211SP-15JC	PLCC	44	M4A5-64/32-10JC	Yes	No	No	No	No	
B	MACH211SP-15VC	TQFP	44	M4A5-64/32-10VC	Yes	No	No	No	No	
B	MACH211SP-18JI	PLCC	44	M4A5-64/32-12JI	Yes	No	No	No	No	
B	MACH211SP-6JC	PLCC	44	M4A5-64/32-55JC	Yes	No	No	No	No	
B	MACH211SP-6VC	TQFP	44	M4A5-64/32-55VC	Yes	No	No	No	No	
B	MACH211SP-7JC	PLCC	44	M4A5-64/32-7JC	Yes	No	No	No	No	
B	MACH211SP-7VC	TQFP	44	M4A5-64/32-7VC	Yes	No	No	No	No	
B	MACH230-10JC	PLCC	84	M4-128N/64-10JC	Yes	No	No	No	No	
B	MACH230-15JC	PLCC	84	M4-128N/64-15JC	Yes	No	No	No	No	
B	MACH230-18JI	PLCC	84	M4-128N/64-18JI	Yes	No	No	No	No	
B	MACH231-10JC/1	PLCC	84	M4-128N/64-10JC	Yes	No	No	No	No	
B	MACH231-12JC/1	PLCC	84	M4-128N/64-12JC	Yes	No	No	No	No	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
B	MACH231-12JI/1	PLCC	84	M4-128N/64-12JI	Yes	No	No	No	No	
B	MACH231-14JI/1	PLCC	84	M4-128N/64-14JI	Yes	No	No	No	No	
B	MACH231-15JC/1	PLCC	84	M4-128N/64-15JC	Yes	No	No	No	No	
B	MACH231-18JI/1	PLCC	84	M4-128N/64-18JI	Yes	No	No	No	No	
B	MACH231-7JC	PLCC	84	M4-128N/64-7JC	Yes	No	No	No	No	
B	MACH435-12JC	PLCC	84	M4-128N/64-12JC	Yes	Yes	Yes	No	No	M4 Added Slew & Power bits defaults to MACH435. Similar to A category.
B	MACH435-15JC	PLCC	84	M4-128N/64-15JC	Yes	Yes	Yes	No	No	
B	MACH435-20JI	PLCC	84	M4-128N/64-18JI	Yes	Yes	Yes	No	No	
B	MACH435Q-20JC	PLCC	84	M4-128N/64-15JC	Yes	Yes	Yes	No	No	
B	MACH445-12YC	PQFP	100	M4A5-128/64-10YC	Yes	Yes	Yes	No	No	M4 Added Slew & Power bits defaults to MACH445. Similar to A category.
B	MACH445-15YC	PQFP	100	M4A5-128/64-10YC	Yes	Yes	Yes	No	No	
B	MACH445-20YI	PQFP	100	M4A5-128/64-12YI	Yes	Yes	Yes	No	No	
B	PALCE16V8Z-25JC	PLCC	20	GAL16V8Z-15QJ	Yes	Yes	Yes	No	No	Wake up sequence is different on GAL equivalent device.
B	PALCE16V8Z-25PC	PDIP	20	GAL16V8Z-15QP	Yes	Yes	Yes	No	No	
B	PALCE16V8Z-25SC	SOIC	20	GAL16V8Z-15QS	Yes	Yes	Yes	No	No	
B	PALCE20RA10H-10JC	PLCC	28	GAL20RA10B-10LJ	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-10PC	PDIP	24	GAL20RA10B-10LP	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-15JC	PLCC	28	GAL20RA10B-15LJ	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-15PC	PDIP	24	GAL20RA10B-15LP	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-20JC	PLCC	28	GAL20RA10B-20LJ	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-20JI	PLCC	28	GAL20RA10B-20LJI	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-20PC	PDIP	24	GAL20RA10B-20LP	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-20PI	PDIP	24	GAL20RA10B-20LPI	Yes	Yes	Yes	No	Yes	
B	PALCE20RA10H-7JC	PLCC	28	GAL20RA10B-7LJ	Yes	Yes	Yes	No	Yes	
B	PALCE26V12H-10JC/4	PLCC	28	GAL26V12C-10LJ	Yes	Yes	Yes	No	Yes	
B	PALCE26V12H-10JI/4	PLCC	28	GAL26V12C-10LJI	Yes	Yes	Yes	No	Yes	
B	PALCE26V12H-10PC/4	PDIP	28	GAL26V12C-10LP	Yes	Yes	Yes	No	Yes	
B	PALCE26V12H-10PI/4	PDIP	28	GAL26V12C-10LPI	Yes	Yes	Yes	No	Yes	
B	PALCE26V12H-7JC/4	PLCC	28	GAL26V12C-07LJ	Yes	Yes	Yes	No	Yes	
B	PALLV16V8-10JC	PLCC	20	GAL16LV8C-10LJ	Yes	Yes	Yes	No	Yes	
B	PALLV22V10-10JC	PLCC	28	GAL22LV10C-10LJ	Yes	Yes	Yes	No	Yes	
B	PALLV22V10-15JC	PLCC	28	GAL22LV10C-15LJ	Yes	Yes	Yes	No	Yes	
B	PALLV22V10-7JC	PLCC	28	GAL22LV10C-07LJ	Yes	Yes	Yes	No	Yes	
C	M4-96/96-15YC	PQFP	144	None	No	No	No	No	No	
C	M4-96/96-20YI	PQFP	144	None	No	No	No	No	No	
C	M5-192/160-10YC	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-10YI	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-12YC	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-12YI	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-15YC	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-15YI	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-20YI	PQFP	208	None	No	No	No	No	No	
C	M5-192/160-7YC	PQFP	208	None	No	No	No	No	No	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
C	MACH110-12JC	PLCC	44	None	No	No	No	No	No	If dedicated input pins 10,12,13 and 15 are not used, the design can convert to M4A5 equivalent macrocell device.
C	MACH110-14JI	PLCC	44	None	No	No	No	No	No	
C	MACH110-15JC	PLCC	44	None	No	No	No	No	No	
C	MACH110-18JI	PLCC	44	None	No	No	No	No	No	
C	MACH111-10JC	PLCC	44	None	No	No	No	No	No	
C	MACH111-10JI	PLCC	44	None	No	No	No	No	No	
C	MACH111-10VC	TQFP	44	None	No	No	No	No	No	
C	MACH111-12JC	PLCC	44	None	No	No	No	No	No	
C	MACH111-12JI	PLCC	44	None	No	No	No	No	No	
C	MACH111-12VC	TQFP	44	None	No	No	No	No	No	
C	MACH111-14JI	PLCC	44	None	No	No	No	No	No	
C	MACH111-15JC	PLCC	44	None	No	No	No	No	No	
C	MACH111-15VC	TQFP	44	None	No	No	No	No	No	
C	MACH111-18JI	PLCC	44	None	No	No	No	No	No	
C	MACH111-5JC	PLCC	44	None	No	No	No	No	No	
C	MACH111-5VC	TQFP	44	None	No	No	No	No	No	
C	MACH111-7JC	PLCC	44	None	No	No	No	No	No	
C	MACH111-7JI	PLCC	44	None	No	No	No	No	No	
C	MACH111-7VC	TQFP	44	None	No	No	No	No	No	
C	MACH120-12JC	PLCC	68	None	No	No	No	No	No	
C	MACH120-15JC	PLCC	68	None	No	No	No	No	No	
C	MACH120-18JI	PLCC	68	None	No	No	No	No	No	
C	MACH131-5JC/1	PLCC	84	M4-128N/64-7JC	Yes	No	No	No	No Speed Equivalent	
C	MACH131-7JI/1	PLCC	84	M4-128N/64-10JI	Yes	No	No	No		
C	MACH131SP-10VC	TQFP	100	None	No	No	No	No	No	
C	MACH131SP-10YC	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-10YI	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-12VC	TQFP	100	None	No	No	No	No	No	
C	MACH131SP-12YC	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-12YI	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-14YI	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-15VC	TQFP	100	None	No	No	No	No	No	
C	MACH131SP-15YC	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-18YI	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-5VC	TQFP	100	None	No	No	No	No	No	
C	MACH131SP-5YC	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-7VC	TQFP	100	None	No	No	No	No	No	
C	MACH131SP-7YC	PQFP	100	None	No	No	No	No	No	
C	MACH131SP-7YI	PQFP	100	None	No	No	No	No	No	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
C	MACH210-12JC	PLCC	44	None	No	No	No	No	No	If dedicated input pins 10,12,13 and 15 are not used, the design can convert to M4A5 equivalent macrocell device.
C	MACH210-14JI	PLCC	44	None	No	No	No	No	No	
C	MACH210-15JC	PLCC	44	None	No	No	No	No	No	
C	MACH210-18JI	PLCC	44	None	No	No	No	No	No	
C	MACH210A-10JC	PLCC	44	None	No	No	No	No	No	
C	MACH210A-10VC	TQFP	44	None	No	No	No	No	No	
C	MACH210A-12JC	PLCC	44	None	No	No	No	No	No	
C	MACH210A-12JI	PLCC	44	None	No	No	No	No	No	
C	MACH210A-12VC	TQFP	44	None	No	No	No	No	No	
C	MACH210A-14JI	PLCC	44	None	No	No	No	No	No	
C	MACH210A-7JC	PLCC	44	None	No	No	No	No	No	
C	MACH210A-7VC	TQFP	44	None	No	No	No	No	No	
C	MACH210AQ-12JC	PLCC	44	None	No	No	No	No	No	
C	MACH210AQ-15JC	PLCC	44	None	No	No	No	No	No	
C	MACH210AQ-18JI	PLCC	44	None	No	No	No	No	No	
C	MACH211-10JC	PLCC	44	None	No	No	No	No	No	
C	MACH211-10JI	PLCC	44	None	No	No	No	No	No	
C	MACH211-10VC	TQFP	44	None	No	No	No	No	No	
C	MACH211-12JC	PLCC	44	None	No	No	No	No	No	
C	MACH211-12JI	PLCC	44	None	No	No	No	No	No	
C	MACH211-12VC	TQFP	44	None	No	No	No	No	No	
C	MACH211-14JI	PLCC	44	None	No	No	No	No	No	
C	MACH211-15JC	PLCC	44	None	No	No	No	No	No	
C	MACH211-15VC	TQFP	44	None	No	No	No	No	No	
C	MACH211-18JI	PLCC	44	None	No	No	No	No	No	
C	MACH211-7JC	PLCC	44	None	No	No	No	No	No	
C	MACH211-7VC	TQFP	44	None	No	No	No	No	No	
C	MACH215-12JC	PLCC	44	None	No	No	No	No	No	
C	MACH215-14JI	PLCC	44	None	No	No	No	No	No	
C	MACH215-15JC	PLCC	44	None	No	No	No	No	No	
C	MACH215-18JI	PLCC	44	None	No	No	No	No	No	
C	MACH220-10JC	PLCC	68	None	No	No	No	No	No	
C	MACH220-12JC	PLCC	68	None	No	No	No	No	No	
C	MACH220-15JC	PLCC	68	None	No	No	No	No	No	
C	MACH220-18JI	PLCC	68	None	No	No	No	No	No	
C	MACH221-10JC	PLCC	68	None	No	No	No	No	No	
C	MACH221-10JI	PLCC	68	None	No	No	No	No	No	
C	MACH221-12JC	PLCC	68	None	No	No	No	No	No	
C	MACH221-12JI	PLCC	68	None	No	No	No	No	No	
C	MACH221-14JI	PLCC	68	None	No	No	No	No	No	
C	MACH221-15JC	PLCC	68	None	No	No	No	No	No	
C	MACH221-18JI	PLCC	68	None	No	No	No	No	No	
C	MACH221-7JC	PLCC	68	None	No	No	No	No	No	
C	MACH221SP-10YC	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-10YI	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-12YC	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-12YI	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-14YI	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-15YC	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-18YI	PQFP	100	None	No	No	No	No	No	
C	MACH221SP-7YC	PQFP	100	None	No	No	No	No	No	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility					Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs	Spec Comparison Available	
C	MACH231-6JC	PLCC	84	M4-128N/64-7JC	Yes	No	No	No	No	
C	MACH231SP-10VC	TQFP	100	None	No	No	No	No	No	Pin compatible with M5-128/68 equivalent package device.
C	MACH231SP-10YC	PQFP	100	None	No	No	No	No	No	
C	MACH231SP-12VC	TQFP	100	None	No	No	No	No	No	
C	MACH231SP-12YC	PQFP	100	None	No	No	No	No	No	
C	MACH231SP-12YI	PQFP	100	None	No	No	No	No	No	
C	MACH231SP-14YI	PQFP	100	None	No	No	No	No	No	
C	MACH231SP-15VC	TQFP	100	None	No	No	No	No	No	
C	MACH231SP-15YC	PQFP	100	None	No	No	No	No	No	
C	MACH231SP-18YI	PQFP	100	None	No	No	No	No	No	
C	MACHLV210-12JC	PLCC	44	None	No	No	No	No	No	If dedicated input pins I0,I2,I3 and I5 are not used, the design can convert to M4A3 equivalent macrocell device.
C	MACHLV210-15JC	PLCC	44	None	No	No	No	No	No	
C	MACHLV210-18JI	PLCC	44	None	No	No	No	No	No	
C	PALCE16V8Z-12JI	PLCC	20	None	No	No	No	No	No	
C	PALCE16V8Z-12PI	PDIP	20	None	No	No	No	No	No	
C	PALCE16V8Z-15JI	PLCC	20	None	No	No	No	No	No	
C	PALCE16V8Z-15PI	PDIP	20	None	No	No	No	No	No	
C	PALCE16V8Z-25JI	PLCC	20	None	No	No	No	No	No	
C	PALCE16V8Z-25PI	PDIP	20	None	No	No	No	No	No	
C	PALCE16V8Z-25SI	SOIC	20	None	No	No	No	No	No	
C	PALCE20RA10H-10JI	PLCC	28	None	Yes	Yes	Yes	No	No Industrial Grade	
C	PALCE20RA10H-10PI	PDIP	24	None	Yes	Yes	Yes	No		
C	PALCE20RA10H-15JI	PLCC	28	None	Yes	Yes	Yes	No		
C	PALCE20RA10H-15PI	PDIP	24	None	Yes	Yes	Yes	No		
C	PALCE20RA10H-7JI	PLCC	28	None	Yes	Yes	Yes	No		
C	PALCE22V10Z-15JI	PLCC	28	None	No	No	No	No	No	
C	PALCE22V10Z-15PI	PDIP	24	None	No	No	No	No	No	
C	PALCE22V10Z-25JC	PLCC	28	None	No	No	No	No	No	
C	PALCE22V10Z-25JI	PLCC	28	None	No	No	No	No	No	
C	PALCE22V10Z-25PC	PDIP	24	None	No	No	No	No	No	
C	PALCE22V10Z-25PI	PDIP	24	None	No	No	No	No	No	
C	PALCE22V10Z-25SC	SOIC	24	None	No	No	No	No	No	
C	PALCE22V10Z-25SI	SOIC	24	None	No	No	No	No	No	
C	PALCE24V10H-15JC	PLCC	28	None	No	No	No	No	No	
C	PALCE24V10H-15PC	PDIP	28	None	No	No	No	No	No	
C	PALCE24V10H-25JC	PLCC	28	None	No	No	No	No	No	
C	PALCE24V10H-25PC	PDIP	28	None	No	No	No	No	No	
C	PALCE29M16H25JC/4	PLCC	28	None	No	No	No	No	No	
C	PALCE29M16H25PC/4	PDIP	24	None	No	No	No	No	No	
C	PALCE29MA16H25JC/4	PLCC	28	None	No	No	No	No	No	
C	PALCE29MA16H25PC/4	PDIP	24	None	No	No	No	No	No	
C	PALCE610H-15JC	PLCC	28	None	No	No	No	No	No	
C	PALCE610H-15PC	PDIP	24	None	No	No	No	No	No	
C	PALCE610H-25JC	PLCC	28	None	No	No	No	No	No	
C	PALCE610H-25PC	PDIP	24	None	No	No	No	No	No	
C	PALLV16V8-10SC	SOIC	20	None	No	Yes	Yes	No	No Pkg	
C	PALLV16V8-10PC	PDIP	20	None	No	Yes	Yes	No	No Pkg	
C	PALLV16V8Z-20JI	PLCC	20	None	No	No	No	No	No Ind.	
C	PALLV16V8Z-20PI	PDIP	20	None	No	No	No	No	No Ind.	
C	PALLV22V10-10PC	PDIP	24	None	No	Yes	Yes	No	No Pkg	
C	PALLV22V10-15JI	PLCC	28	None	Yes	Yes	Yes	No	No Ind.	

Class	Obsolete Ordering Part Number OPN	Pkg	Pins	Pin-Compatible Alternative OPN	Compatibility				Spec Comparison Available	Comments/ Recommendations
					Pin Out	JEDEC Fuse Map	Arch.	AC/DC Specs		
C	PALLV22V10-15PC	PDIP	24	None	No	Yes	Yes	No	No Pkg	
C	PALLV22V10Z-25JI	PLCC	28	None	Yes	Yes	Yes	No	No Ind.	
C	PALLV22V10Z-25PI	PDIP	24	None	No	Yes	Yes	No	No Ind.	

Table 2. 16V8

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
16V8-5/-7	Tskew	Max	1.0 ns	Not Specified
16V8-5	Ten (I/O)	Min	2.0 ns	1.0 ns
16V8-5	Tdis (I/O)	Min	2.0 ns	1.0 ns
16V8-5	Iol	DC	-24 mA	-16 mA
16V8-7	Tpd	Min	3.0 ns	1.0 ns
16V8-7/-10	Ten (I/O)	Min	3.0 ns	1.0 ns
16V8-7/-10	Tdis (I/O)	Min	3.0 ns	1.0 ns
16V8-10	Tco	Min	3.0 ns	2.0 ns
16V8-10	Ten (OE#)	Min	2.0 ns	1.0 ns
16V8-10	Tdis (OE#)	Min	2.0 ns	1.0 ns

Table 3. 16LV8

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
16LV8-10	Vih	Max	5.5V	5.25V
16LV8-10	Icc (Dynamic)	Max	55 mA @ 15MHz	65 mA @ 1MHz
16LV8-10	Cin	-	5 pF (TYP)	8 Pf (Max)
16LV8-10	IIL*	Max	-100uA	-10uA

* GAL device does not have input pullups.

Table 4. 20V8

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
20V8-5/-7/-10	Tskew	Max	1.0 ns	Not Specified
20V8-5/-7/-10	Tdis (I/O)	Min	2.0 / 3.0 / 3.0 ns	1.0 / 2.0 / 2.0 ns
20V8-5/-7/-10	Iol	DC	-24 mA	-16 mA
20V8-7/-10	Tsu	Min	5.0 / 7.5 ns	7.0 / 10.0 ns
20V8-7/-10	Fmax (ext)	Min	100 / 66.7 MHz	83.3 / 58.8 MHz
20V8-7/-10	Fmax (int)	Min	125 / 71.4 MHz	100 / 62.5 MHz
20V8-7/-10	Fmax (tog)	Min	125 / 83.3 MHz	100 / 62.5 MHz
20V8-7/-10	Twl / Twh	Min	4.0 / 6.0 ns	5.0 / 8.0 ns
20V8-10	Tco	Min	3.0 ns	2.0 ns
20V8-10	Tdis (OE#)	Min	2.0 ns	1.5 ns

Table 5. 22V10

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
22V10-5/-7	Tskew	Max	0.5 / 1.0 ns	Not Specified
22V10-5/-7	Icc (Static)	Max	125 / 115 mA	Not Specified
22V10-7	Tpd	Min	3.0 ns	1.0 ns
22V10-7	Tco	Min	2.0 ns	1.0 ns
22V10-10	Icc (dyn) - Com/ Ind	Max	120 / 130 mA	130 / 160 mA
22V10-10	Tco	Max	6.0 ns	7.0 ns
22V10-10	Icc (Static)	Max	55 mA	Not Specified

Table 6. 22LV10

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
22LV10-7/10/15	Vol	Max	16 mA (@ 0.5V Vol)	8 mA (@ 0.4V Vol)
22LV10-7/10/15	Iozh	Max	10 mA	30 mA
22LV10-7/10/15	Cin	-	5 pF (TYP)	8 pF (Max)
22LV10-7/10/15	IIL*	Max	-100uA	-10uA
22LV10-7	Ts1	Min	4.5 ns	6.5 ns
22LV10-7	Ts2	Min	5.5 ns	Not Specified
22LV10-7	Tarw	Min	6.0 ns	7.0 ns
22LV10-7	Tarr	Min	6.0 ns	7.0 ns
22LV10-7	Tspr	Min	6.0 ns	8.0 ns
22LV10-7	Fmax (ext.)	Min	100 MHz	87 MHz

Table 7. 26V12

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
26V12-7	Tsu1 - Com	Min	3.5ns	6.5ns
26V12-7	Tsu2 - Com	Min	4.5ns	5.5ns
26V12-7	Fmax External	Min	105.3 MHz	90.9 MHz
26V12-10	Tsu1 - Com/Ind	Min	5ns	6.5/7ns
26V12-10	Tsu2 - Com/Ind	Min	5ns	5.5/6ns
26V12-7/10/15/20	Icc Static - Com	Max	105mA	Not Specified
26V12-10/15/20	Icc Static - Ind	Max	130mA	Not Specified

Table 8. 20RA10

Generic Name	Spec Differences			
	Spec Name	Min/Max/DC	PALCE Spec Value	GAL Spec Value
20RA10-7/10/15			Com./Ind.	Com. Only
20RA10-7/10/15/20	Vol	Max.	0.4V @ 16mA	0.5V @ 8mA
20RA10-7/10/15/20	Isc	Max.	130mA	135mA
20RA10-20	Icc (com.)	Max.	90mA Static	100mA @ 15MHz
20RA10-20	Icc (Ind.)	Max.	100mA Static	120mA @ 15MHz
20RA10-7	Ts	Min	2.5ns	3.0ns
20RA10-7	Tco	Max.	7.5ns	9.0ns
20RA10-7	Tap/Tar	Max.	7.5ns	9.0ns
20RA10-7	Tapw/Tarw	Min	5.0ns	6.0ns
20RA10-7	Tapr/Tarr	Max.	5.0ns	7.0ns
20RA10-7	Twl/Twh	Min	4.0ns	6.0ns
20RA10-7	Fmax (ext.)	Min	100MHz	83.3MHz
20RA10-7	Fmax (no fb.)	Min	125MHz	83.3MHz
20RA10-7	Twp	Min	5.0ns	8.0ns
20RA10-10	Ts	Min	3.0ns	4.0ns
20RA10-10	Tco	Max.	10.0ns	11.0ns
20RA10-10	Tap/Tar	Max.	10.0ns	11.0ns
20RA10-10	Tapw/Tarw	Min	8.0ns	10.0ns
20RA10-10	Twl/Twh	Min	5.0ns	7.0ns
20RA10-10	Fmax (ext.)	Min	76.9MHz	66.7MHz
20RA10-10	Fmax (no fb.)	Min	100MHz	71.4MHz
20RA10-10	Tpzx/Tpxz	Max.	8.0ns	9.0ns
20RA10-10	Twp	Min	7.0ns	10.0ns
20RA10-15	Ts	Min	4.0ns	7.0ns
20RA10-15	Tapw/Tarw	Min	10.0ns	15.0ns
20RA10-15	Twl/Twh	Min	8.0ns	10.0ns
20RA10-15	Fmax (ext.)	Min	52.6MHz	45.0MHz
20RA10-15	Fmax (no fb.)	Min	62.5MHz	50.0MHz
20RA10-15	Tpzx/Tpxz	Max.	10.0ns	12.0ns
20RA10-15	Twp	Min	10.0ns	15.0ns
20RA10-20	Ts	Min	4.0ns	10.0ns
20RA10-20	Tapw/Tarw	Min	12.0ns	20.0ns
20RA10-20	Fmax (ext.)	Min	37MHz	33.3MHz
20RA10-20	Twp	Min	15.0ns	20.0ns