



VANTIS

BEYOND PERFORMANCE

Product Menu

An AMD Company

HIGHLIGHTS

MACH® 1-5 CPLD Families
Fastest speeds; Easiest-to-Use
SpeedLocking™ (Fixed, Guaranteed Timing)
32-512 Macrocells; 32-256 I/Os
JTAG-ISP; 3.3-V or 5-V Solutions
PCI-Compliance at 5, 7, 10 and 12ns
EECMOS Technology Leadership
Comprehensive SPLD Offering

MACH 5 Family

Family	Device	Package	Macrocells (PLD Gates)	I/Os	Dedicated Inputs	Output Enables	PT per Output	JTAG- ISP	Commercial		Ind'l ¹		I _{cc} mA (Static)	
									t _{PD} ns	f _{CNT} MHz	t _{PD} ns	t _{SS} ² ns		t _{CO} ³ ns
MACH 5 128 M/C	M5LV-128/68-5	100 PQFP	128 (5,000)	68	4	16	Up to 32	Yes	5.5	167	7.5	3	4.5	35
	M5(LV)-128/68-7	100 TQFP							7.5	125	10	4	6	
	M5(LV)-128/68-10								10	100	12	5	7	
	M5(LV)-128/68-12								12	83.3	15	6	8	
	M5-128/68-15								15	83.3	20	8	10	
	M5LV-128/74-5	100 TQFP	128 (5,000)	74	4	16	Up to 32	Yes	5.5	167	7.5	3	4.5	35
	M5LV-128/74-7								7.5	125	10	4	6	
	M5LV-128/74-10								10	100	12	5	7	
	M5LV-128/74-12								12	83.3	15	6	8	
	M5LV-128/104-5	144 PQFP	128 (5,000)	104	4	16	Up to 32	Yes	5.5	167	7.5	3	4.5	35
	M5(LV)-128/104-7	144 TQFP							7.5	125	10	4	6	
	M5(LV)-128/104-10								10	100	12	5	7	
	M5(LV)-128/104-12								12	83.3	15	6	8	
	M5-128/104-15								15	83.3	20	8	10	
	M5LV-128/120-5	160 PQFP	128 (5,000)	120	4	16	Up to 32	Yes	5.5	167	7.5	3	4.5	35
	M5(LV)-128/120-7								7.5	125	10	4	6	
M5(LV)-128/120-10		10							100	12	5	7		
M5(LV)-128/120-12		12							83.3	15	6	8		
M5-128/120-15		15							83.3	20	8	10		
MACH 5 192 M/C	M5-192/68-7	100 PQFP	192 (7,500)	68	4	24	Up to 32	Yes	7.5	125	10	4	6	45
	M5-192/68-10	100 TQFP							10	100	12	5	7	
	M5-192/68-12								12	83.3	15	6	8	
	M5-192/68-15								15	83.3	20	8	10	
	M5-192/104-7	144 PQFP	192 (7,500)	104	4	24	Up to 32	Yes	7.5	125	10	4	6	45
	M5-192/104-10								10	100	12	5	7	
	M5-192/104-12								12	83.3	15	6	8	
	M5-192/104-15								15	83.3	20	8	10	
	M5-192/120-7	160 PQFP	192 (7,500)	120	4	24	Up to 32	Yes	7.5	125	10	4	6	45
	M5-192/120-10								10	100	12	5	7	
	M5-192/120-12								12	83.3	15	6	8	
	M5-192/120-15								15	83.3	20	8	10	
	M5-192/160-7	208 PQFP	192 (7,500)	160	4	24	Up to 32	Yes	7.5	125	10	4	6	45
	M5-192/160-10								10	100	12	5	7	
	M5-192/160-12								12	83.3	15	6	8	
	M5-192/160-15								15	83.3	20	8	10	
MACH 5 256 M/C	M5LV-256/68-5	100 PQFP	256 (10,000)	68	4	32	Up to 32	Yes	5.5	167	7.5	3	4.5	55
	M5(LV)-256/68-7	100 TQFP							7.5	125	10	4	6	
	M5(LV)-256/68-10								10	100	12	5	7	
	M5(LV)-256/68-12								12	83.3	15	6	8	
	M5-256/68-15								15	83.3	20	8	10	
	M5LV-256/74-5	100 TQFP	256 (10,000)	74	4	32	Up to 32	Yes	5.5	167	7.5	3	4.5	55
	M5LV-256/74-7								7.5	125	10	4	6	
	M5LV-256/74-10								10	100	12	5	7	
	M5LV-256/74-12								12	83.3	15	6	8	
	M5LV-256/74-15								15	83.3	20	8	10	

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MACH 5 Family (Cont'd)

Family	Device	Package	Macrocells (PLD Gates)	I/Os	Dedicated Inputs	Output Enables	PT per Output	JTAG- ISP	Commercial		Ind ¹ ns	t _{SS} ² ns	t _{CO} ³ ns	I _{CC} mA (Static)		
									t _{PD} ns	f _{CNT} MHz						
MACH 5 256 M/C	M5LV-256/104-5 M5(LV)-256/104-7 M5(LV)-256/104-10 M5(LV)-256/104-12 M5-256/104-15	144 PQFP, 144 TQFP	256 (10,000)	104	4	32	Up to 32	Yes	5.5 7.5 10 12 15	167 125 100 83.3 83.3	7.5 10 12 15 20	3 4 5 6 8	4.5 6 7 8 10	55		
	M5LV-256/120-5 M5(LV)-256/120-7 M5(LV)-256/120-10 M5(LV)-256/120-12 M5-256/120-15	160 PQFP	256 (10,000)	120	4	32	Up to 32	Yes	5.5 7.5 10 12 15	167 125 100 83.3 83.3	7.5 10 12 15 20	3 4 5 6 8	4.5 6 7 8 10	55		
	M5LV-256/160-5 M5(LV)-256/160-7 M5(LV)-256/160-10 M5(LV)-256/160-12 M5-256/160-15	208 PQFP	256 (10,000)	160	4	32	Up to 32	Yes	5.5 7.5 10 12 15	167 125 100 83.3 83.3	7.5 10 12 15 20	3 4 5 6 8	4.5 6 7 8 10	55		
	MACH 5 320 M/C	M5(LV)-320/120-7 M5(LV)-320/120-10 M5(LV)-320/120-12 M5(LV)-320/120-15	160 PQFP	320 (12,500)	120	4	40	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	70	
		M5(LV)-320/160-7 M5(LV)-320/160-10 M5(LV)-320/160-12 M5(LV)-320/160-15	208 PQFP	320 (12,500)	160	4	40	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	70	
		M5(LV)-320/184-7 M5(LV)-320/184-10 M5(LV)-320/184-12 M5(LV)-320/184-15	240 PQFP	320 (12,500)	184	4	40	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	70	
		M5(LV)-320/192-7 M5(LV)-320/192-10 M5(LV)-320/192-12 M5(LV)-320/192-15	256 BGA	320 (12,500)	192	4	40	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	70	
		MACH 5 384 M/C	M5(LV)-384/120-7 M5(LV)-384/120-10 M5(LV)-384/120-12 M5(LV)-384/120-15	160 PQFP	384 (15,000)	120	4	48	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	75
			M5(LV)-384/160-7 M5(LV)-384/160-10 M5(LV)-384/160-12 M5(LV)-384/160-15	208 PQFP	384 (15,000)	160	4	48	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	75
			M5(LV)-384/184-7 M5(LV)-384/184-10 M5(LV)-384/184-12 M5(LV)-384/184-15	240 PQFP	384 (15,000)	184	4	48	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	75
			M5(LV)-384/192-7 M5(LV)-384/192-10 M5(LV)-384/192-12 M5(LV)-384/192-15	256 BGA	384 (15,000)	192	4	48	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	75
			MACH 5 512 M/C	M5(LV)-512/120-7 M5(LV)-512/120-10 M5(LV)-512/120-12 M5(LV)-512/120-15	160 PQFP	512 (20,000)	120	4	64	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10
M5(LV)-512/160-7 M5(LV)-512/160-10 M5(LV)-512/160-12 M5(LV)-512/160-15				208 PQFP	512 (20,000)	160	4	64	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	100
M5(LV)-512/184-7 M5(LV)-512/184-10 M5(LV)-512/184-12 M5(LV)-512/184-15				240 PQFP	512 (20,000)	184	4	64	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	100
M5(LV)-512/192-7 M5(LV)-512/192-10 M5(LV)-512/192-12 M5(LV)-512/192-15				256 BGA	512 (20,000)	192	4	64	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	100
M5(LV)-512/256-7 M5(LV)-512/256-10 M5(LV)-512/256-12 M5(LV)-512/256-15	352 BGA			512 (20,000)	256	4	64	Up to 32	Yes	7.5 10 12 15	125 100 83.3 83.3	10 12 15 20	4 5 6 8	6 7 8 10	100	

MACH 4 Family

Family	Device	Package	Macrocells (PLD Gates)	I/Os	Dedicated Inputs	Output Enables	PT per Output (w/ NO speed adder)	Flip- Flops	JTAG- ISP	Commercial		Ind'l ¹		I _{CC} mA (Static)	
										t _{PD} ns	f _{CNT} MHz	t _{PD} ns	t _{SS} ² ns		t _{CO} ³ ns
MACH 4	M4(LV)-32/32-7 M4(LV)-32/32-10 M4(LV)-32/32-12 M4(LV)-32/32-15	44PLCC, 44TQFP, 48TQFP	32 (1,250)	32	2	32	Up to 20	32	Yes	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	25
	M4(LV)-64/32-7 M4(LV)-64/32-10 M4(LV)-64/32-12 M4(LV)-64/32-15	44PLCC, 44TQFP, 48TQFP	64 (2,500)	32	2	32	Up to 20	96	Yes	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	25
	M4(LV)-96/48-7 M4(LV)-96/48-10 M4(LV)-96/48-12 M4(LV)-96/48-15	100TQFP	96 (3,750)	48	8	48	Up to 20	144	Yes	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	50
	M4-96/96-15	144PQFP	96 (3,750)	96	6	96	Up to 20	96	Yes	15	66.6	20	10	10	188
	M4(LV)-128N/64-7 M4(LV)-128N/64-10 M4(LV)-128N/64-12 M4(LV)-128N/64-15	84PLCC	128 (5,000)	64	6	64	Up to 20	192	No	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	70
	M4(LV)-128/64-7 M4(LV)-128/64-10 M4(LV)-128/64-12 M4(LV)-128/64-15	100PQFP, 100TQFP	128 (5,000)	64	6	64	Up to 20	192	Yes	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	70
	M4(LV)-192/96-7 M4(LV)-192/96-10 M4(LV)-192/96-12 M4(LV)-192/96-15	144TQFP	192 (7,500)	96	16	96	Up to 20	288	Yes	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	85
	M4(LV)-256/128-7 M4(LV)-256/128-10 M4(LV)-256/128-12 M4(LV)-256/128-15	208PQFP, 256BGA	256 (10,000)	128	14	128	Up to 20	384	Yes	7.5 10 12 15	133 100 83.3 66.6	10 12 14 18	5.5 6 7 10	5.5 6.5 8 10	100

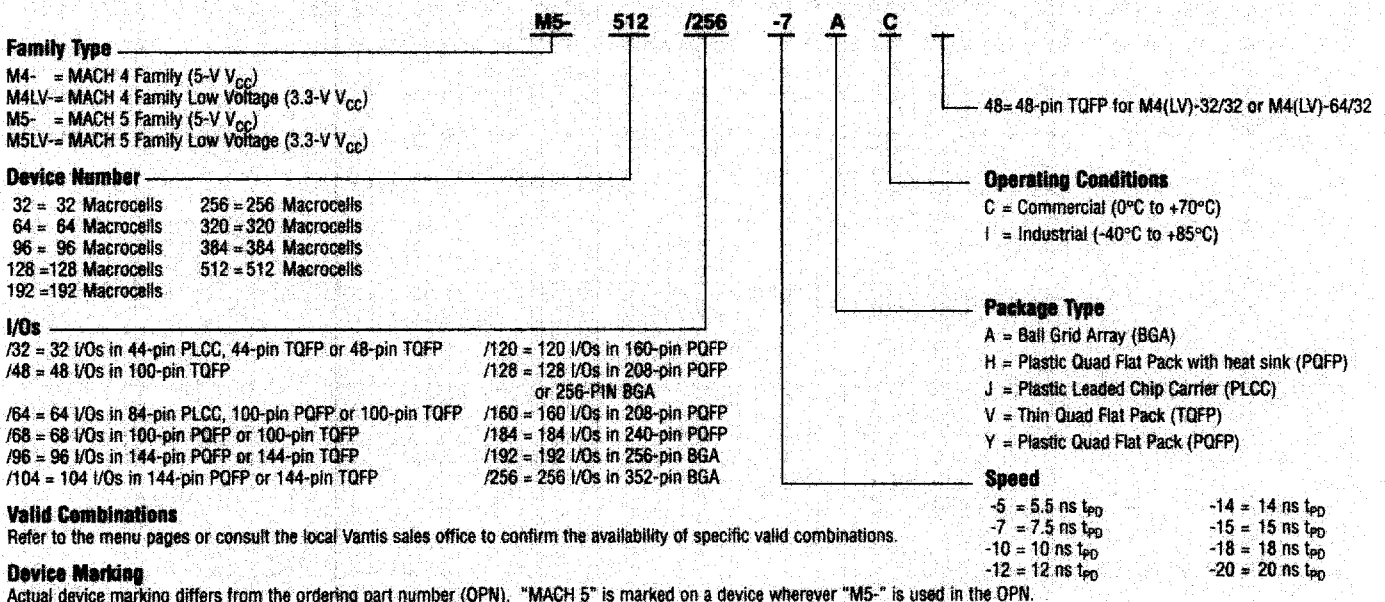
NOTE: M4 devices reflect a new nomenclature. A brief cross reference is provided below:

OLD OPN	NEW M4 OPN
MACH355---->	M4-96/96
MACH436---->	M4-128N/64
MACH446---->	M4-128/64
MACH466---->	M4-256/128

Product Ordering Information

MACH 4 and MACH 5 Families

Vantis programmable logic products are available with several ordering options. The order number (Valid Combination) is formed by a combination of:



Valid Combinations

Refer to the menu pages or consult the local Vantis sales office to confirm the availability of specific valid combinations.

Device Marking

Actual device marking differs from the ordering part number (OPN). "MACH 5" is marked on a device wherever "M5-" is used in the OPN.

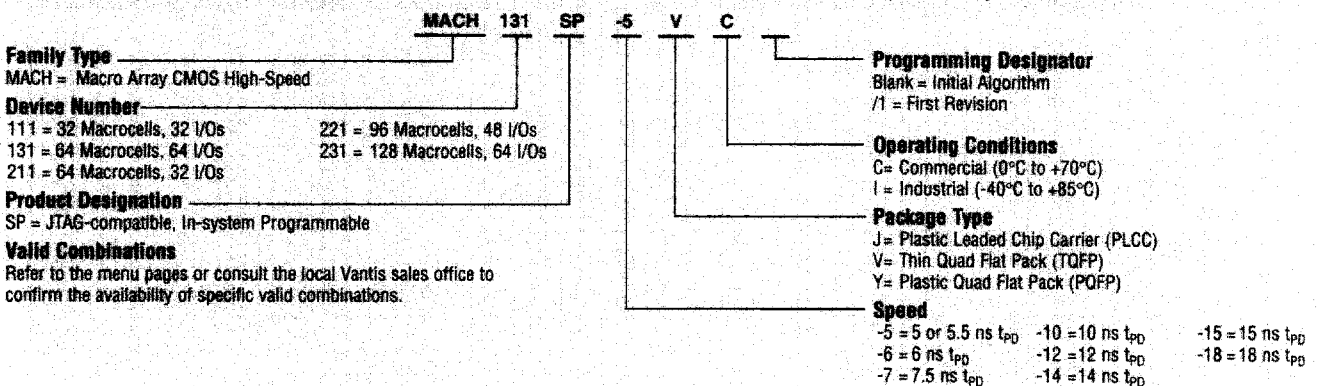
MACH 1 / MACH 2 Family

Family	Device	Package	Macrocells (PLD Gates)	I/Os	Dedicated Inputs	Output Enables	PT per Output (w/ NO speed adder)	JTAG-ISP	Commercial		Ind ¹		t _{CO} ³ ns	I _{CC} mA (Static)	
									t _{PD} ns	t _{CNT} MHz	t _{PD} ns	t _{SS} ² ns			
MACH 1	MACH111-5	44PLCC, 44TQFP	32 (1250)	32	6	8	Up to 12	No	5	182	7.5	3.5	3.5	40	
	MACH111-7								7.5	133	10	5.5			
	MACH111-10								10	100	12	6.5			
	MACH111-12								12	76.9	14	7			
	MACH111-15								15	66.6	18	10			
	MACH131-5	84PLCC	64 (2500)	64	6	16	Up to 12	No	5.5	182	7.5	3.5	4	75	
	MACH131-7								7.5	133	10	5.5			
	MACH131-10								10	100	12	6.5			
	MACH131-12								12	76.8	14	7			
	MACH131-15								15	66.6	18	10			
MACH 2	MACH211-7	44PLCC, 44TQFP	64 (2500)	32	6	8	Up to 16	No	7.5	133	10	5.5	5	40	
	MACH211-10								10	100	12	6.5			
	MACH211-12								12	83.3	14	7			
	MACH211-15								15	66.6	18	10			
	MACH221-7	68PLCC	96 (3750)	48	8	16	Up to 16	No	7.5	133	10	5.5	5	70	
	MACH221-10								10	100	12	6.5			
	MACH221-12								12	83.3	14	7			
	MACH221-15								15	66.6	18	10			
	MACH231-6	84PLCC	128 (5000)	64	6	16	Up to 16	No	6	166	-	5	4	135	
	MACH231-7								7.5	133	-	5.5			
	MACH231-10								10	100	12	6.5			
	MACH231-12								12	83.3	14	7			
	MACH231-15								15	66.6	18	10			
	MACH 1 ISP	MACH111SP-5	44PLCC, 44TQFP	32 (1250)	32	2	8	Up to 12	Yes	5	182	7.5	3.5	3.5	45
		MACH111SP-7								7.5	133	10	5.5		
MACH111SP-10		10								100	12	6.5			
MACH111SP-12		12								76.9	14	7			
MACH111SP-15		15								66.6	18	10			
MACH131SP-5		100PQFP, 100TQFP	64 (2500)	64	6	16	Up to 12	Yes	5.5	182	7.5	3.5	4	75	
MACH131SP-7									7.5	133	10	5.5			
MACH131SP-10									10	100	12	6.5			
MACH131SP-12									12	76.8	14	7			
MACH131SP-15									15	66.6	18	10			
MACH 2 ISP	MACH211SP-6	44PLCC, 44TQFP	64 (2500)	32	2	8	Up to 16	Yes	6	166	-	5	4	40	
	MACH211SP-7								7.5	133	10	5.5			
	MACH211SP-10								10	100	12	6.5			
	MACH211SP-12								12	83.3	14	7			
	MACH211SP-15	15	66.6	18	10										
	MACH221SP-7	100PQFP	96 (3750)	48	8	16	Up to 16	Yes	7.5	133	10	5.5	5	70	
	MACH221SP-10								10	100	12	6.5			
	MACH221SP-12								12	83.3	14	7			
	MACH221SP-15								15	66.6	18	10			
	MACH231SP-10	100PQFP, 100TQFP	128 (5000)	64	6	16	Up to 16	Yes	10	100	12	6.5	6.5	90	
	MACH231SP-12								12	83.3	14	7			
	MACH231SP-15								15	66.6	18	10			

Product Ordering Information

MACH 1 and MACH 2 Families

Vantis programmable logic products are available with several ordering options. The order number (Valid Combination) is formed by a combination of:



Universal CMOS PAL® Family

Family	Device	Package	I/Os	Dedicated Inputs	PT per Output	Features	Commercial		Ind ¹		I _{cc} mA	
							t _{PD} ns	f _{CNT} MHz	t _{PD} ns	t _{SS} ² ns		t _{CO} ³ ns
16V8	PALCE16V8H-5	20J	8	10	8	Half Power CMOS PAL Device	5	166	-	3	4	125
	PALCE16V8H-7	20P, S, J					7.5	125	-	5	5	115
	PALCE16V8H-10						10	71.4	10	7.5	7.5	115
	PALCE16V8H-15	20P, J	15	50	15	12	10	90				
	PALCE16V8H-25		25	40	25	13	11	90				
	PALCE16V8Q-10	20P, J	8	10	8	Quarter Power CMOS PAL Device	10	71.4	-	7.5	7.5	55
PALCE16V8Q-15	20P, J	15					50	15	12	10	55	
PALCE16V8Q-20		-					-	20	13	11	65	
PALCE16V8Q-25		25					40	25	15	12	55	
20V8	PALCE20V8H-5	28J	8	14	8	Half Power CMOS PAL Device	5	166	-	3	4	125
	PALCE20V8H-7	24P, 28J					7.5	125	-	5	5	115
	PALCE20V8H-10						10	71.4	-	7.5	7.5	115
	PALCE20V8H-15	24P, 28J	15	50	15	12	10	90				
	PALCE20V8H-25		25	40	25	15	12	90				
	PALCE20V8Q-10	24P, 28J	8	14	8	Quarter Power CMOS PAL Device	10	71.4	-	7.5	7.5	55
PALCE20V8Q-15	15						50	-	12	10	55	
PALCE20V8Q-20	-						-	20	13	11	65	
PALCE20V8Q-25	25						40	25	15	12	55	
22V10	PALCE22V10H-5	28J	10	12	8 to 16	Half Power Varied Prod Term Distribution Bus-Friendly™	5	150	-	3	4	125
	PALCE22V10H-7	24P, 28J					7.5	133	-	4.5	4.5	115
	PALCE22V10H-10	24P, S, 28J					10	110	10	6	6	120
	PALCE22V10H-15	24P, 28J, S					15	58.8	15	10	10	90
	PALCE22V10H-20	24P, 28J					-	-	20	12	12	100
	PALCE22V10H-25	24P, S, 28J					25	35.7	25	15	15	90
PALCE22V10Q-10	24P, 28J	10	12	8 to 16	Quarter Power Bus-Friendly	10	110	-	6	6	55	
PALCE22V10Q-15						15	58.8	-	10	10	55	
PALCE22V10Q-25						25	35.7	-	15	15	55	
24V10	PALCE24V10H-15	28P, J	10	16	8	CMOS PAL Device	15	66	-	10	10	115
	PALCE24V10H-25	25					50	-	12	12	115	
26V12	PALCE26V12H-7	28J	12	14	8 to 16	Adv. 22V10 M/C Bus-Friendly	7.5	125	-	3.5	6	115
	PALCE26V12H-10	28P, J					10	105	10	5	9	115
	PALCE26V12H-15						15	58.8	15	10	10	105
	PALCE26V12H-20						20	43	20	13	12	105
29M16	PALCE29M16H-25	24P, 28J	16	5	8 to 16	Adv. Macrocell	25	33.3	-	15	15	100

Zero Power CMOS PAL Family

Family	Device	Package	I/Os	Dedicated Inputs	PT per Output	Features	Commercial		Ind ¹		I _{cc} mA	
							t _{PD} ns	f _{CNT} MHz	t _{PD} ns	t _{SS} ² ns		t _{CO} ³ ns
16V8	PALCE16V8Z-12	20P, J	8	10	8	Zero Power CMOS PAL Device	-	-	12	8	8	0.03
	PALCE16V8Z-15						-	-	15	10	10	0.015
	PALCE16V8Z-25	20P, S, J					25	50	25	20	10	0.015
22V10	PALCE22V10Z-15	24P, 28J	10	12	8 to 16	Zero Power	-	-	15	10	10	0.03
	PALCE22V10Z-25	24P, S, 28J					25	35.7	25	15	15	0.03

3.3V Low Voltage CMOS PAL Family

Family	Device	Package	I/Os	Dedicated Inputs	PT per Output	Features	Commercial		Ind ¹		I _{cc} mA	
							t _{PD} ns	f _{CNT} MHz	t _{PD} ns	t _{SS} ² ns		t _{CO} ³ ns
16V8	PALLV16V8-10	20P, S, J	8	10	8	3.3V	10	83.3	-	7	7	55
	PALLV16V8-20	20P, J				3.3V, Zero Power	-	-	20	15	10	0.03
22V10	PALLV22V10-7	28J	10	12	8 to 16	3.3V	7.5	133	-	4.5	5.5	75
	PALLV22V10-10	24P, 28J					10	110	-	5.5	6.5	60
	PALLV22V10-15						15	58.8	15	10	10	60
	PALLV22V10Z-25	24P, 28J					3.3V, Zero Power	-	-	25	15	15

Asynchronous Universal PAL Family

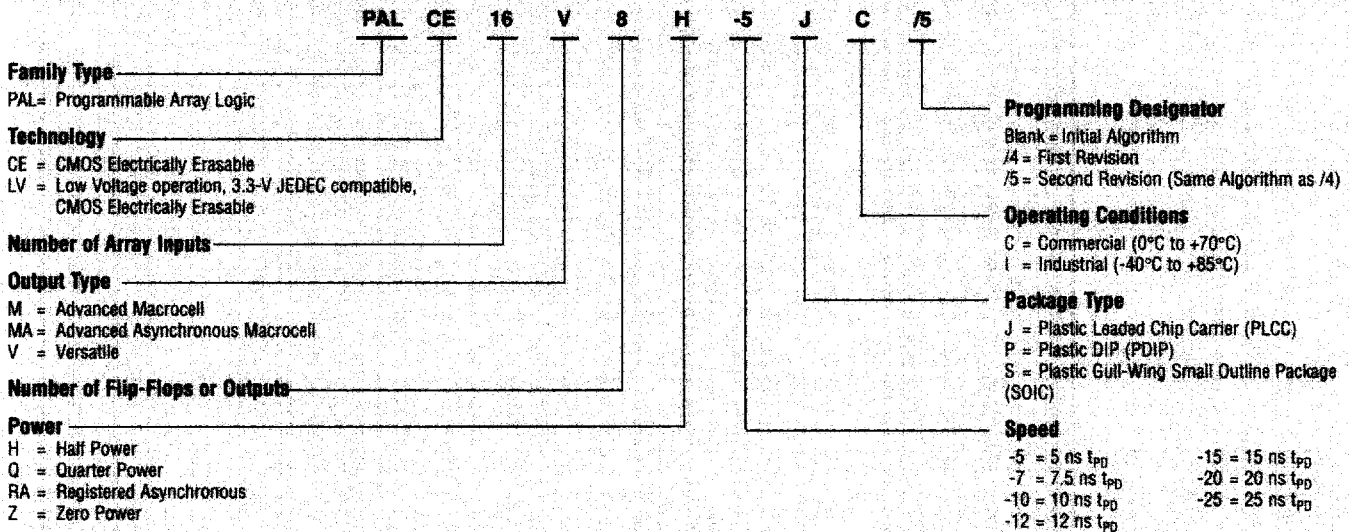
Family	Device	Package	I/Os	Dedicated Inputs	PT per Output	Features	Commercial		Ind'l ¹		t _{CO} ³ ns	I _{CC} mA
							t _{PD} ns	f _{CNT} MHz	t _{PD} ns	t _{SS} ² ns		
610	PALCE610H-15	24P, 28J	16	4	8	J-K F/F Programmable CLK	15	76.1	-	12	8	90
	25						40	-	15	12	90	
20RA10	PALCE20RA10H-7	28J	10	10	4	Programmable CLK	7.5	100*	7.5	2.5	7.5	100
	PALCE20RA10H-10	24P, 28J					10	76.9*	10	3	10	100
	PALCE20RA10H-15						15	52.6*	15	4	15	100
	PALCE20RA10H-20						20	37*	20	4	20	90
29MA16	PALCE29MA16H-25	24P, 28J	16	5	4 to 12	Prog. CLK, Adv M/C	25	33.3	-	15	15	100

* Specified as f_{MAX} (External Feedback)

Product Ordering Information

CMOS PAL Family

Vantis programmable logic products are available with several ordering options. The order number (Valid Combination) is formed by a combination of:



Valid Combinations

Refer to the menu pages or consult the local Vantis sales office to confirm the availability of specific valid combinations.

Notes:

- MACH devices are dual-marked with both commercial and industrial speeds while CMOS PAL devices are marked separately.
- Minimum setup time from input, I/O, or feedback to clock.
- Maximum time from clock to output.

Trademarks

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An AMD Company

Please consult your local Vantis sales channel to verify availability or lead time of any device shown in this menu.

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