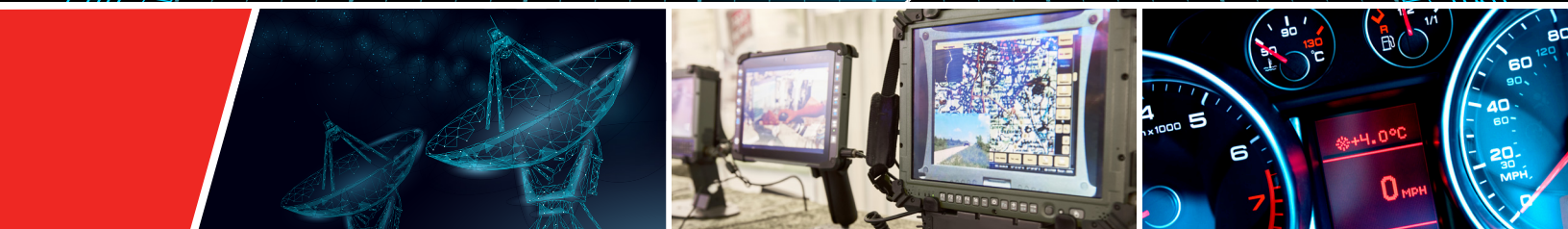




Antifuse Product Information



Axcelerator

The Axcelerator FPGA family is a single-chip, nonvolatile solution offering high performance and unprecedented design security at densities of up to 2 million equivalent system gates. Utilizing the AX architecture, Axcelerator devices have several system-level features, such as embedded SRAM (with embedded FIFO control logic), PLLs, segmentable clocks, chip-wide highway routing and carry logic. Based upon 0.15 µm, seven-layers-of-metal CMOS antifuse process technology, 350 MHz system performance.



- 500+ MHz internal performance
- 500+ MHz embedded FIFOs
- PLL output up to 1 GHz and 8 PLLs per device
- 1.5V, 1.8V, 2.5V and 3.3V mixed-voltage operation
- Bank-selectable I/Os—8 banks per chip
- 4.5 Kbits variable-aspect RAM blocks with built-in FIFO control

Axcelerator Devices

Capacity (in equivalent system gates)	AX250	AX500	AX1000	AX2000
	250,000	500,000	1,000,000	2,000,000
Typical Gates	154,000	286,000	612,000	1,060,000
Register (R-cells)	1,408	2,688	6,048	10,752
Combinatorial (C-cells)	2,816	5,376	12,096	21,504
Maximum Flip-Flops	2,816	5,376	12,096	21,504
Number of Core RAM Blocks	12	16	36	64
Total Bits of Core RAM	55,296	73,728	165,888	294,912
Clocks (hardwired)	4	4	4	4
Clocks (routed)	4	4	4	4
PLLs	8	8	8	8
I/O Banks	8	8	8	8
Maximum User I/Os	248	336	516	684
Maximum LVDS Channels	124	168	258	342
Total I/O Registers	744	1,008	1,548	2,052
Speed Grades	Std., -1, -2	Std., -1, -2	Std., -1, -2	Std., -1, -2
Temperature Grades	C, I, M	C, I, M	C, I, M	C, I, M

C – Commercial I – Industrial A – Automotive M – Military

I/Os Per Package

Axcelerator Devices	AX250	AX500	AX1000	AX2000
PQFP	208	208		
PBGA			729	
FBGA	256, 484	484, 676	484, 676, 896	896, 1152
CQFP	208, 352	208	352	256, 352
CCGA /CLGA				624

eX

The eX Family of FPGAs, with its features, can meet all of your power, speed, package and price requirements. eX devices are optimized for wired and mobile e-appliances and enable you to use a flexible single-chip FPGA for their traditional low-density ASIC requirements without the long lead times and costly NRE charges.



- Low-power consumption
- Live at power-up
- 2.5V, 3.3V and 5.0 V mixed-voltage operation with 5.0V input tolerance and 5.0V drive strength
- Up to 100% resource utilization with 100% pin locking
- Fuselock secure programming technology prevents reverse engineering and design theft
- Available in automotive temperature grades

eX Devices

eX Devices	eX64	eX128	eX256
Capacity			
System Gates	3,000	6,000	12,000
Typical Gates	2,000	4,000	8,000
Register Cells			
Dedicated Flip-Flops	64	128	256
Maximum Flip-Flops	128	256	512
Combinatorial Cells	128	256	512
Maximum User I/Os	84	100	132
Global Clocks			
Hardwired	1	1	1
Routed	2	2	2
Speed Grades	-F, Std, -P	-F, Std, -P	-F, Std, -P
Temperature Grades	C, I, A	C, I, A	C, I, A
Package (by pin count)			
TQFP	64	64, 100	100

C – Commercial I – Industrial A – Automotive

SX-A

The SX-A family of FPGAs offers a cost-effective, single-chip solution for low-power, high-performance designs. SX-A devices can be used to generate system-wide savings by integrating multiple functions into a single-chip solution. Providing a combination of performance, security and low power, SX-A FPGAs decrease the premium for performance while providing a solution that is highly resistant to reverse engineering.



- 250 MHz system performance
- 350 MHz internal performance
- Power-up and power-down friendly (no sequencing required for supply voltages)
- 66 MHz, 64-bit 3.3V/5.0V PCI performance (supporting target, master and master/target)
- 2.5V, 3.3V and 5.0V mixed-voltage support
- 100% resource utilization with 100% pin locking

SX-A Devices

SX-A Device	A54SX08A	A54SX16A	A54SX32A	A54SX72A
Typical Gates	8,000	16,000	32,000	72,000
System Gates	12,000	24,000	48,000	108,000
Logic Modules	768	1,452	2,880	6,036
Combinatorial Cells	512	924	1,800	4,024
Dedicated Flip-Flops	256	528	1,080	2,012
Maximum Flip-Flops	512	990	1,980	4,024
Maximum User I/Os	130	180	249	360
Global Clocks	3	3	3	3
Quadrant Clocks	0	0	0	4
Boundary Scan Testing	Yes	Yes	Yes	Yes
3.3V/5V PCI	Yes	Yes	Yes	Yes
Input Set-Up (external)	0 ns	0 ns	0 ns	0 ns
Speed Grades	-F, Std., -1, -2	-F, Std., -1, -2	-F, Std., -1, -2	-F, Std., -1, -2
Temperature Grades	C, I, A, M	C, I, A, M	C, I, A, M, B	C, I, A, M, B

C – Commercial I – Industrial A – Automotive M – MIL-STD-883 Class B

I/Os Per Package

SX-A Devices	A54SX08A	A54SX16A	A54SX32A	A54SX72A
PQFP		208	208	208
VQFP				
TQFP	100, 144	100, 144	100, 144	
PBGA			329	
FBGA			256	256, 484
CQFP			84, 208, 256	208, 256

MX

The Price and Performance Leader at 5.0V



Featuring low power and design security, MX FPGAs offer designers a reliable, single-chip ASIC alternative. MX devices provide high performance while shortening the system design and development cycle. Offering an efficient, flexible 5.0V architecture, MX is an ideal high-volume platform for integrating your legacy PLDs into a single device.

- Single-chip ASIC alternative
- High-performance mixed-voltage solution
- Contains embedded dual-port SRAM modules
- Ceramic devices available to DSCC SM
- Fast wide-decode circuitry
- QML certification

MX Devices

MX Devices	A40MX02	A40MX04	A42MX09	A42MX16	A42MX24	A42MX36
System Gates	3,000	6,000	14,000	24,000	36,000	54,000
SRAM Bits	—	—	—	—	—	2,560
Sequential	—	—	348	624	954	1,230
Combinatorial	295	547	336	608	912	1,184
Decode	—	—	—	—	24	24
Clock-to-Out	9.5 ns	9.5 ns	5.6 ns	6.1 ns	6.1 ns	6.3 ns
SRAM Modules (64x4 or 32x8)	—	—	—	—	—	10
Dedicated Flip-Flops	—	—	348	624	954	1,230
Clocks	1	1	2	2	2	6
Maximum Flip-Flops	147	273	516	928	1,410	1,822
User I/Os (maximum)	57	69	104	140	176	202
PCI	—	—	—	—	Yes	Yes
Boundary Scan Test (BST)	—	—	—	—	Yes	Yes
Speed Grades	-F, Std., -1, -2, -3	-F, Std., -1, -2, -3	-F, Std., -1, -2, -3	-F, Std., -1, -2, -3	-F, Std., -1, -2, -3	-F, Std., -1, -2, -3
Temperature Grades	C, I, M, A	C, I, M, A	C, I, M, A	C, I, M, A	C, I, M, A	C, I, M, A, B

C – Commercial I – Industrial A – Automotive M – MIL-STD-883 Class B

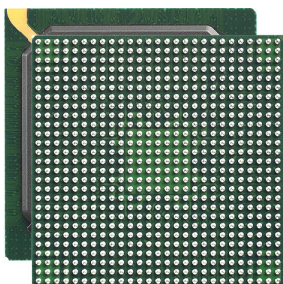
I/Os Per Package

MX Devices	A40MX02	A40MX04	A42MX09	A42MX16	A42MX24	A42MX36
PLCC	44, 68	44, 68, 84	84	84	84	
PQFP	100	100	100, 160	100, 160, 208	160, 208	208, 240
VQFP	80	80	100	100		
TQFP			176	176	176	
CQFP						208, 256
PBGA						272

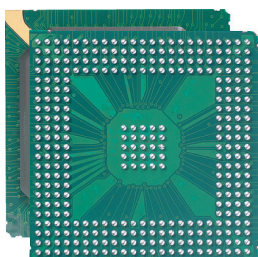
Key: **f** –family **bs** –package body size excluding leads **ps** –overall package dimensions including package leads
h –package thickness **p** –pin pitch/ball pitch

BG729

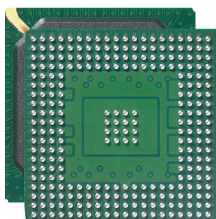
f Axcelerator
ps 35 × 35 mm
h 2.33 mm
p 1.27 mm


BG329

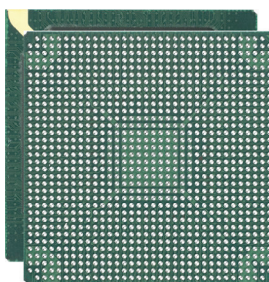
f SX-A
 SX
ps 31 × 31 mm
h 2.33 mm
p 1.27 mm


BG272

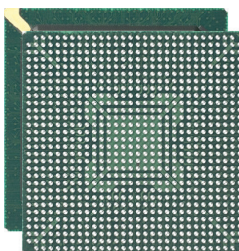
f MX
ps 27 × 27 mm
h 2.33 mm
p 1.27 mm


FG1152

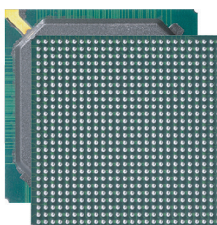
f Axcelerator
ps 35 × 35 mm
h 2.23 mm
p 1.00 mm


FG896

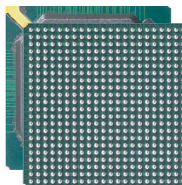
f Axcelerator
ps 31 × 31 mm
h 2.23 mm
p 1.00 mm


FG676

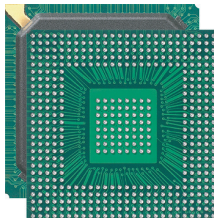
f Axcelerator
ps 27 × 27 mm
h 2.23 mm
p 1.00 mm


FG484

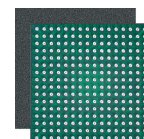
f Axcelerator
ps 23 × 23 mm
h 2.23 mm
p 1.00 mm


FG484

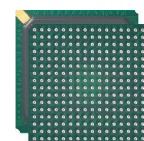
f SX-A
ps 27 × 27 mm
h 2.23 mm
p 1.00 mm


FG256

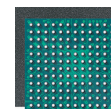
f Axcelerator
ps 17 × 17 mm
h 1.60 mm
p 1.00 mm


FG256

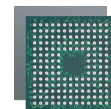
f SX-A
ps 17 × 17 mm
h 1.76 mm
p 1.00 mm


FG144

f SX-A
 SX
ps 13 × 13 mm
h 1.45 mm
p 1.00 mm


CS180

f Axcelerator
 eX
ps 13 × 13 mm
h 1.35 mm
p 0.80 mm


CS128

f eX
ps 11 × 11 mm
h 1.35 mm
p 0.80 mm


CS49

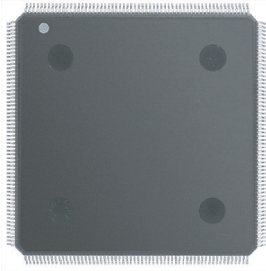
f eX
ps 7 × 7 mm
h 1.35 mm
p 0.80 mm



FPGA Packages

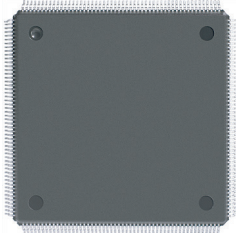
PQ240

f MX
 bs 32 × 32 mm
 ps 34.6 × 34.6 mm
 h 3.40 mm
 p 0.50 mm



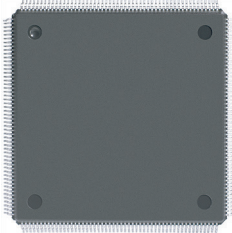
PQ208

f Accelerator
 SX-A
 SX
 MX
 bs 28 × 28 mm
 ps 30.6 × 30.6 mm
 h 3.40 mm
 p 0.50 mm



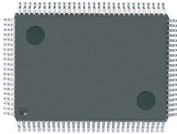
PQ160

f MX
 bs 28 × 28 mm
 ps 31.2 × 31.2 mm
 h 3.37 mm
 p 0.65 mm



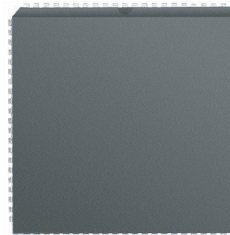
PQ100

f MX
 bs 14 × 20 mm
 ps 17.2 × 23.2 mm
 h 2.80 mm
 p 0.65 mm



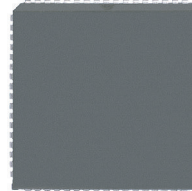
PL84

f SX
 MX
 ps 1.154 × 1.154
 h 0.150
 p 0.050



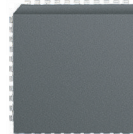
PL68

f MX
 ps 0.954 × 0.954
 h 0.150"
 p 0.050"



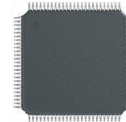
PL44

f MX
 ps 0.654 × 0.654
 h 0.152
 p 0.050



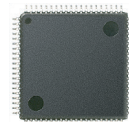
VQ100

f SX
 MX
 bs 14 × 14 mm
 ps 16 × 16 mm
 h 1.00 mm
 p 0.50 mm



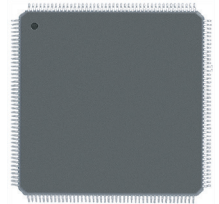
VQ80

f MX
 bs 14 × 14 mm
 ps 16 × 16 mm
 h 1.00 mm
 p 0.65 mm



TQ176

f SX-A
 SX
 MX
 bs 24 × 24 mm
 ps 26 × 26 mm
 h 1.40 mm
 p 0.50 mm



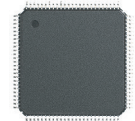
TQ144

f SX-A
 SX
 bs 20 × 20 mm
 ps 22 × 22 mm
 h 1.40 mm
 p 0.50 mm



TQ100

f SX-A
 eX
 bs 14 × 14 mm
 ps 16 × 16 mm
 h 1.40 mm
 p 0.50 mm



TQ64

f eX
 bs 10 × 10 mm
 ps 12 × 12 mm
 h 1.40 mm
 p 0.50 mm



Support

Microchip is committed to supporting its customers in developing products faster and more efficiently. We maintain a worldwide network of field applications engineers and technical support ready to provide product and system assistance. For more information, please visit www.microchip.com:

- Technical Support: www.microchip.com/support
- Evaluation samples of any Microchip device: www.microchip.com/sample
- Knowledge base and peer help: www.microchip.com/forums
- Sales and Global Distribution: www.microchip.com/sales

Training

If additional training interests you, Microchip offers several resources including in-depth technical training and reference material, self-paced tutorials and significant online resources.

- Overview of Technical Training Resources: www.microchip.com/training
- MASTERS Conferences: www.microchip.com/masters
- Developer Help Website: www.microchip.com/developerhelp
- Technical Training Centers: www.microchip.com/seminars

Sales Office Listing

AMERICAS

Atlanta, GA
Tel: 678-957-9614

Austin, TX
Tel: 512-257-3370

Boston, MA
Tel: 774-760-0087

Chandler, AZ (HQ)
Tel: 480-792-7200

Chicago, IL
Tel: 630-285-0071

Dallas, TX
Tel: 972-818-7423

Detroit, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis, IN
Tel: 317-773-8323
Tel: 317-536-2380

Los Angeles, CA
Tel: 949-462-9523
Tel: 951-273-7800

Raleigh, NC
Tel: 919-844-7510

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110
Tel: 408-436-4270

Canada - Toronto
Tel: 905-695-1980

EUROPE

Austria - Wels
Tel: 43-7242-2244-39

Denmark - Copenhagen
Tel: 45-4450-2828

Finland - Espoo
Tel: 358-9-4520-820

France - Paris
Tel: 33-1-69-53-63-20

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766-400

Germany - Heilbronn
Tel: 49-7131-67-3636

Germany - Karlsruhe
Tel: 49-721-62537-0

Germany - Munich
Tel: 49-89-627-144-0

Germany - Rosenheim
Tel: 49-8031-354-560

EUROPE

Israel - Ra'anana
Tel: 972-9-744-7705

Italy - Milan
Tel: 39-0331-742611

Italy - Padova
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399

Norway - Trondheim
Tel: 47-7289-7561

Poland - Warsaw
Tel: 48-22-3325737

Romania - Bucharest
Tel: 40-21-407-87-50

Spain - Madrid
Tel: 34-91-708-08-90

Sweden - Gothenberg
Tel: 46-31-704-60-40

Sweden - Stockholm
Tel: 46-8-5090-4654

UK - Wokingham
Tel: 44-118-921-5800

ASIA/PACIFIC

Australia - Sydney
Tel: 61-2-9868-6733

China - Beijing
Tel: 86-10-8569-7000

China - Chengdu
Tel: 86-28-8665-5511

China - Chongqing
Tel: 86-23-8980-9588

China - Dongguan
Tel: 86-769-8702-9880

China - Guangzhou
Tel: 86-20-8755-8029

China - Hangzhou
Tel: 86-571-8792-8115

China - Hong Kong SAR
Tel: 852-2943-5100

China - Nanjing
Tel: 86-25-8473-2460

China - Qingdao
Tel: 86-532-8502-7355

China - Shanghai
Tel: 86-21-3326-8000

China - Shenyang
Tel: 86-24-2334-2829

China - Shenzhen
Tel: 86-755-8864-2200

China - Suzhou
Tel: 86-186-6233-1526

China - Wuhan
Tel: 86-27-5980-5300

China - Xiamen
Tel: 86-592-2388138

China - Xian
Tel: 86-29-8833-7252

ASIA/PACIFIC

China - Zhuhai
Tel: 86-756-321-0040

India - Bangalore
Tel: 91-80-3090-4444

India - New Delhi
Tel: 91-11-4160-8631

India - Pune
Tel: 91-20-4121-0141

Japan - Osaka
Tel: 81-6-6152-7160

Japan - Tokyo
Tel: 81-3-6880-3770

Korea - Daegu
Tel: 82-53-744-4301

Korea - Seoul
Tel: 82-2-554-7200

Malaysia - Kuala Lumpur
Tel: 60-3-7651-7906

Malaysia - Penang
Tel: 60-4-227-8870

Philippines - Manila
Tel: 63-2-634-9065

Singapore
Tel: 65-6334-8870

Taiwan - Hsin Chu
Tel: 886-3-577-8366

Taiwan - Kaohsiung
Tel: 886-7-213-7830

Taiwan - Taipei
Tel: 886-2-2508-8600

Thailand - Bangkok
Tel: 66-2-694-1351

Vietnam - Ho Chi Minh
Tel: 84-28-5448-2100

5/15/19



www.microchip.com

Microchip Technology Inc. | 2355 W. Chandler Blvd. | Chandler AZ, 85224-6199

The Microchip name and logo and the Microchip logo are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. All other trademarks mentioned herein are property of their respective companies.

© 2019, Microchip Technology Incorporated. All Rights Reserved. 12/19

DS00003295A