

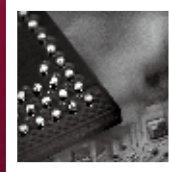


MACRONIX
INTERNATIONAL Co., LTD.

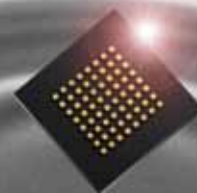
www.macronix.com

PRODUCT SELECTION GUIDE

June 2010



PARALLEL FLASH MEMORY
SERIAL FLASH MEMORY
SECURE FLASH MEMORY
ROM





MACRONIX, THE COMPANY

Macronix, the leading provider of innovative Non-Volatile Memory (NVM) semiconductor solutions, is the largest supplier of ROM products and Serial NOR Flash worldwide. The company currently produces a wide range of ROM and NOR Flash memories across various densities in embedded, consumer, and enterprise applications. Flash products are also available in packages with a small footprint and very small height for space-constrained applications.

Macronix is one of the few IDM companies worldwide with complete capabilities for Design, Manufacturing and Marketing under their own brand. Macronix dedicates itself to developing top-notch home-grown technologies and improving its manufacturing capability to offer its customers high quality products and services.

Macronix has received

- Green Partner Certificates from leading multi-national companies
- Social Accountability Management SA 8000 Certificate
- ISO 14064 GreenHouse Gases Emissions Verification

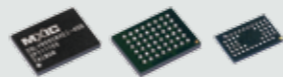


HIGH QUALITY GREEN PARTNER

Our stringent quality standards, based on the ISO 9001 philosophy, have resulted in TS16949 certification. With the mind-set of building up a responsible business, Macronix is ISO14001(Environmental Management), IECQC 080000(Hazardous Substances Management), and SA 8000(Social Accountability Management) certified as well as our assembly and test subcontractors.

Our Green Product Management system has been highly recognized by customers, thereby, Macronix is SONY's Green Partner, and has green partnership approvals from Nintendo, Samsung, LG and Canon. All Macronix products are RoHS compliant, and Halogen-Free. Macronix has a well-run program working with our supply chain partners to fully comply with green product requirements.

PARALLEL FLASH



Macronix's industry standard Parallel Flash memories offer an extensive line of 3V products from 4Mb to 512Mb densities. Macronix Flash memory provides customers with cost-effective, high performance and reliable products that offer low-power consumption and high endurance. 4Mb and 8Mb products are also offered in 4mm x 6mm BGA packages for space-constrained applications.

Macronix also offers a family of 1.8V Products. 4Mb and 8Mb products use a Vcc of 1.8V, whereas the 16Mb and 32Mb products interface an I/O voltage of 1.8V. These products are used in applications like Bluetooth, MP3 Players, GPS as well as other portable applications.

Standard Read Access

The standard read access Parallel Flash series (MX29F, MX29LV and MX29SL) offer Boot and Uniform Sector architectures in selectable x8, x16 and x8/x16 configurations at single 5V, 3V and 1.8V power-supply voltages.

Page Mode Read Access

The MX29GL product series provide an advanced page mode interface to optimize the system performance for both read and program operations.

Applications

| | ≤8Mb | 16Mb | 32Mb | 64Mb | 128Mb | 256Mb | 512Mb |
|------------------|------|------|------|------|-------|-------|-------|
| Bluetooth | ● | ● | | | | | |
| AP Router | | ● | ● | ● | ● | | |
| WiMAX | | | | ● | ● | ● | |
| IAD/Home Gateway | | | ● | ● | ● | ● | ● |
| Switching Router | | | | ● | ● | ● | ● |
| Digital TV | | ● | ● | ● | ● | ● | |
| Set Top Box | | | ● | ● | ● | ● | ● |
| G-PON | | | | | ● | ● | |
| Telematics | ● | | | | ● | ● | ● |
| IP Phone | | | ● | ● | ● | | |
| DSC | | | ● | ● | ● | | |

Standard Read Access Family:

| Part Number | Density | Bus Width | Access Time(ns) | Package | Vcc. | Features |
|--------------------|---------|-----------|-----------------|---|------|-------------------------|
| 5V Series | | | | | | |
| MX29F200CT/B | 2Mb | x8/ x16 | 70/90 | 44-SOP, 48-TSOP | 5V | Boot Sector |
| MX29F040C | 4Mb | x8 | 70/90 | 32-TSOP, 32-PLCC | 5V | Uniform Sector |
| MX29F400CT/B | 4Mb | x8/ x16 | 70/90 | 48-TSOP, 44-SOP | 5V | Boot Sector |
| MX29F800CT/B | 8Mb | x8/ x16 | 70/90 | 44-SOP, 48-TSOP, 48-TFBGA | 5V | Boot Sector |
| 3V Series | | | | | | |
| MX29LV004CT/B | 4Mb | x 8 | 55 / 70 / 90 | 40-TSOP, 32-PLCC | 3V | Boot Sector |
| MX29LV040C | 4Mb | x 8 | 55 / 70 / 90 | 32-TSOP, 32-PLCC | 3V | Uniform Sector |
| MX29LV400CT/B | 4Mb | x8/ x16 | 55 / 70 / 90 | 44-SOP, 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFLGA | 3V | Boot Sector |
| MX29LV800CT/B | 8Mb | x8/ x16 | 55 / 70 / 90 | 44-SOP, 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFLGA | 3V | Boot Sector |
| MX29LV160DT/B | 16Mb | x8/ x16 | 70 / 90 | 44-SOP, 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA, 48-XFLGA | 3V | Boot Sector |
| MX29LV161DT/B | 16Mb | x16 | 90 | 48-TSOP, 48-WFBGA, 48-TFBGA, 48-XFLGA | 3V | Boot Sector; V I/O=1.8V |
| MX29LV320ET/B | 32Mb | x8/ x16 | 70 / 90 | 48-TSOP, 48-TFBGA, 48-LFBGA, 44-SOP | 3V | Boot Sector |
| MX29LV321DT/B | 32Mb | x16 | 90 | 48-TSOP, 48-TFBGA | 3V | Boot Sector; V I/O=1.8V |
| MX29LV640ET/B | 64Mb | x8/ x16 | 70 | 48-TSOP, 48-LFBGA | 3V | Boot Sector |
| 1.8V Series | | | | | | |
| MX29SL402CT/B | 4Mb | x8/ x16 | 90 | 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA | 1.8V | Boot Sector |
| MX29SL800CT/B | 8Mb | x8/ x16 | 90 | 48-TSOP, 48-WFBGA, 48-TFBGA, 48-LFBGA | 1.8V | Boot Sector |

Page Mode Read Access Family:

| Part Number | Density | Bus Width | Access Time(ns) | Package | Vcc. | Features |
|---------------|---------|-----------|-----------------|---------------------------|------|----------------|
| MX29GL320EH/L | 32Mb | x8/ x16 | 70 | 56-TSOP, 64-FBGA | 3V | Uniform Sector |
| MX29GL320ET/B | 32Mb | x8/ x16 | 70 | 48-TSOP, 48-LFBGA | 3V | Boot Sector |
| MX29GL640EH/L | 64Mb | x8/ x16 | 90 | 56-TSOP, 64-FBGA | 3V | Uniform Sector |
| MX29GL640ET/B | 64Mb | x8/ x16 | 90 | 48-TSOP, 48-LFBGA | 3V | Boot Sector |
| MX29GL128EH/L | 128Mb | x8/ x16 | 90 | 56-TSOP, 64-FBGA, 70-SSOP | 3V | Uniform Sector |
| MX29GL128EU/D | 128Mb | x8/ x16 | 110 | 56-TSOP, 64-FBGA | 3V | V I/O=1.8V |
| MX29GL256EH/L | 256Mb | x8/ x16 | 90 | 56-TSOP, 64-FBGA, 70-SSOP | 3V | Uniform Sector |
| MX29GL256EU/D | 256Mb | x8/ x16 | 110 | 56-TSOP, 64-FBGA | 3V | V I/O=1.8V |
| MX29GL512EH/L | 512Mb | x8/ x16 | 100 | 56-TSOP, 64-FBGA, 70-SSOP | 3V | Uniform Sector |



Parallel Flash Example

MX 29GL 256 E H XF I - 90 Q

DEVICE :
 29F: 5V
 29LV/29GL: 3V
 29SL: 1.8V
 29LA/ 29GA: Security type

DENSITY :
 20x: 2Mb
 40x: 4Mb
 80x: 8Mb
 16x: 16Mb
 32x: 32Mb
 64x: 64Mb
 12x: 128Mb
 25x: 256Mb
 51x: 512Mb

PROCESS REVISION :
 C: 150nm
 D: 130nm
 E: 110nm

SPEED :
 55: 55ns
 70: 70ns
 90: 90ns
 10: 100ns
 11: 110ns

OPTION :
 G: RoHS Compliant
 Q: Restricted
 Vcc: (3.0V-3.6V),
 RoHS Compliant

TEMPERATURE RANGE :
 C: Commercial(0°C to 70°C)
 I: Industrial(-40°C to 85°C)

PACKAGE TYPE :
 P: PDIP
 M: SOP
 Q: PLCC
 T/T2: TSOP
 XB - 0.8 mm Ball Pitch / 0.3 mm Ball Size
 XC - 1.0 mm Ball Pitch / 0.4 mm Ball Size
 XE - 0.8 mm Ball Pitch / 0.4 mm Ball Size
 XF - 1.0 mm Ball Pitch / 0.6 mm Ball Size
 XH - 0.5 mm Ball Pitch / 0.3 mm Ball Size
 GB - 0.5 mm Ball Pitch / 0.25 mm Ball Size

BLOCK TYPE :
 T: Top Boot
 B: Bottom Boot
 H: Uniform Sector, Highest Address Sector Protected
 L: Uniform Sector, Lowest Address Sector Protected
 U: V I/O=1.65 to VCC, VCC=2.7 to 3.6V, Highest Address Sector Protected
 D: V I/O=1.65 to VCC, VCC=2.7 to 3.6V, Lowest Address Sector Protected
 C: Read Protection, Highest Address Sector Protected
 F: Read Protection, Lowest Address Sector Protected

SERIAL FLASH

Macronix offers industry standard Serial Flash products from 512Kb to 256Mb densities and also provides backward compatible high performance Serial Flash MXSMIO® family and MXSMIO® Duplex (DTR) family as below:

MX25xxx05/06 - Standard Serial Interface Series

The MX25xxx05 and MX25xxx06 series provide Standard Serial Interface x1 or x2 I/O [Single I/O or Dual I/O] at single 3V or 2.5V power-supply voltage. These products are offered with 4KB sectors and 64KB blocks, ranging from 512Kb to 128Mb density.

MX25xxx08 - Unique ID Series

The MX25xxx08 series provides 512-bit secured area, independent from main array, to store unique ID data for system identifier. These products are offered from 16Mb to 64Mb density.

MX25xxx25/ 26 - Default Lock Protection Series

The default lock protection series is optimized for Parameter Protection applications. These products utilize the BP volatile protection bits to protect selected boot areas of memory against misuse of program and erase instructions in the protected area.

MX25xxx35/36/45 - MXSMIO® (Multi-I/O) & MXSMIO® Duplex (DTR) Series

Macronix Serial Multi-I/O (MXSMIO®) Flash provides two kinds of different Multi-I/O interfaces. One of them is MX25xxx35 series, which offers Multi-in / Multi-out interface. The other is MX25xxx36 series, which offers Single-in / Multi-out interface.

Both series are available on Quad I/O operation which quadruples the read performance of systems for high-end consumer applications. The MX25xxx35 and MX25xxx36 families are provided from 4Mb to 256Mb.

Furthermore, the MXSMIO® Duplex family, MX25xxx45 series, offers Quad I/O interface with Double Transfer Rate (DTR) mode operation providing fast data transfer rate up to 400MHz, which makes it the fastest Serial Flash in the industry. MXSMIO® Duplex family is provided from 64Mb to 128Mb density with independent block lock protection on boot sector.



Serial Flash Portfolio Table

| | 512Kb | 1Mb | 2Mb | 4Mb | 8Mb | 16Mb | 32Mb | 64Mb | 128Mb | 256Mb |
|---|-------|-----|-----|-----|-----|------|------|------|-------|-------|
| MX25Lxx05 Standard Serial Interface | V | V | | | | | | | | |
| MX25Lxx06 Single-in/Multi-out series | | | V | V | V | V | V | V | | |
| MX25Lxx08 Unique ID series | | | | | | V | V | V | | |
| 3V MX25Lxx25/ 26 Default Lock Protection series | | V | V | V | | | V | | | |
| MX25Lxx35/36/45 MXSMIO® & MXSMIO® Duplex series | | | | | V | V | V | V | V | V |
| MX25Lxx55 MXSMIO® Secure series | | | | | | V | V | V | V | V |
| 2.5V MX25Vxx05 Standard Serial Interface | V | | | V | V | | | | | |
| MX25Vxx35 MXSMIO® series | | | | V | V | | | | | |
| 1.8V MX25Uxx35 MXSMIO® series | | | | V | V | V | V | V | | |

3V Serial Flash Family:

| Part number | Density | Organization | I/O Bus | Frequency (MHz) | Package | Voltage |
|--|---------|--------------|----------------------|---------------------|--|----------|
| Standard Serial Interface Series: | | | | | | |
| MX25L512C | 512Kb | 4KB / 64KB | Single | 85 | 150mil 8-SOP, 8-TSSOP, 8-USON(2x3mm) | 2.7~3.6V |
| MX25L1005C | 1Mb | 4KB / 64KB | Single | 85 | 150mil 8-SOP, 8-USON(2x3mm) | 2.7~3.6V |
| Single-in Dual-out Series: | | | | | | |
| MX25L2006E | 2Mb | 4KB / 64KB | Single / Dual | 86(x1), 80(x2) | 150mil 8-SOP, 8-WSON(6x5mm) | 2.7~3.6V |
| MX25L4006E | 4Mb | 4KB / 64KB | Single / Dual | 86(x1), 80(x2) | 150mil 8-SOP, 200mil 8-SOP, 300mil 8-PDIP, 8-WSON(6x5mm) | 2.7~3.6V |
| MX25L8006E | 8Mb | 4KB / 64KB | Single / Dual | 86(x1), 80(x2) | 150mil 8-SOP, 200mil 8-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm) | 2.7~3.6V |
| MX25L1606E | 16Mb | 4KB / 64KB | Single / Dual | 86(x1), 80(x2) | 150mil 8-SOP, 200mil 8-SOP, 300mil 16-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm) | 2.7~3.6V |
| MX25L3206E | 32Mb | 4KB / 64KB | Single / Dual | 86(x1), 80(x2) | 200mil 8-SOP, 300mil 16-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm) | 2.7~3.6V |
| MX25L6406E | 64Mb | 4KB / 64KB | Single / Dual | 86(x1), 80(x2) | 200mil 8-SOP, 300mil 16-SOP, 8-WSON(8x6mm) | 2.7~3.6V |
| Default Lock Protection Series | | | | | | |
| MX25L1025C | 1Mb | 4KB / 64KB | Single | 85 | 150mil 8-SOP | 2.7~3.6V |
| MX25L2026E | 2Mb | 4KB / 64KB | Single/Dual | 86(x1), 80(x2) | 150mil 8-SOP | 2.7~3.6V |
| MX25L4026E | 4Mb | 4KB / 64KB | Single/Dual | 86(x1), 80(x2) | 150mil 8-SOP | 2.7~3.6V |
| MX25L3225D | 32Mb | 4KB / 64KB | Single / Dual / Quad | 104(x1), 75(x2), x4 | 200mil 8-SOP | 2.7~3.6V |

3V Serial Flash Family:

| Part number | Density | Organization | I/O Bus | Frequency(MHz) | Package | Voltage | Features |
|---|---------|-------------------|--------------------------|---------------------|--|----------|---|
| MXSMIO® & MXSMIO® Duplex Series: | | | | | | | |
| MX25L8035E | 8Mb | 4KB / 64KB | Single/Dual/Quad | 108(x1, x4), 80(x2) | 200mil 8-SOP | 2.7~3.6V | Multi-in, Multi-out |
| MX25L8036E | 8Mb | 4KB / 64KB | Single/Dual/Quad | 133(x1, x2, x4) | 200mil 8-SOP | 2.7~3.6V | Single-in, Multi-out |
| MX25L1633E | 16Mb | 4KB / 64KB | Single/Dual/Quad | 104(x1), 75(x2, x4) | 200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm) | 2.7~3.6V | Multi-in, Multi-out |
| MX25L1635D | 16Mb | 4KB / 64KB | Single/Dual/Quad | 104(x1), 75(x2, x4) | 200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm) | 2.7~3.6V | Multi-in, Multi-out |
| MX25L1636D | 16Mb | 4KB / 64KB | Single/Dual/Quad | 86(x1), 75(x2, x4) | 200mil 8-SOP, 300mil 16-SOP | 2.7~3.6V | Single-in, Multi-out |
| MX25L3235D | 32Mb | 4KB / 64KB | Single/Dual/Quad | 104(x1), 75(x2, x4) | 200mil 8-SOP, 300mil 16-SOP, 8-WSON(6x5mm), 8-WSON(8x6mm) | 2.7~3.6V | Multi-in, Multi-out |
| MX25L3236D | 32Mb | 4KB / 64KB | Single/Dual/Quad | 86(x1), 75(x2, x4) | 200mil 8-SOP | 2.7~3.6V | Single-in, Multi-out |
| MX25L3237D | 32Mb | 4KB / 64KB | Single/Dual/Quad | 86(x1), 75(x2, x4) | 300mil 16-SOP 8-WSON(6x5mm) | 2.7~3.6V | VI/O=1.8V Multi-in, Multi-out |
| MX25L6436E | 64Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 104(x1), 70(x2, x4) | 200mil 8-SOP | 2.7~3.6V | Single-in, Multi-out. |
| MX25L6445E | 64Mb | 4KB / 32KB / 64KB | Single/Dual/Quad/ DTR | 104(x1), 70(x2, x4) | 200mil 8-SOP 300mil 16-SOP 8-WSON(8x6mm) | 2.7~3.6V | Multi-in, Multi-out With DTR Function. |
| MX25L12836E | 128Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 104(x1), 70(x2, x4) | 300mil 16-SOP | 2.7~3.6V | Single-in, Multi-out. |
| MX25L12845E | 128Mb | 4KB / 32KB / 64KB | Single/Dual/Quad/ DTR | 104(x1), 70(x2, x4) | 300mil 16-SOP 8-WSON(8x6mm) | 2.7~3.6V | Multi-in, Multi-out With DTR Function. |
| MX25L25635E | 256Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 80(x1), 70(x2, x4) | 300mil 16-SOP 8-WSON(8x6mm) | 2.7~3.6V | Multi-in, Multi-out |
| MX25L25735E | 256Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 80(x1), 70(x2, x4) | 300mil 16-SOP 8-WSON(8x6mm) | 2.7~3.6V | Multi-in, Multi-out |

2.5V Serial Flash Family:

| Part Number | Density | Organization | I/O Bus | Frequency (MHz) | Package |
|--|---------|-------------------|------------------|--------------------|--------------------------------|
| Standard Serial Interface Series: | | | | | |
| MX25V512C | 512Kb | 4KB / 64KB | Single | 50 | 8-WSON(2x3mm) |
| MX25V4005C | 4Mb | 4KB / 64KB | Single | 50 | 150mil 8-SOP 8-WSON(6x5mm) |
| MX25V8005 | 8Mb | 4KB / 64KB | Single | 50 | 150mil 8-SOP 8-WSON(6x5mm) |
| MXSMIO® Series: | | | | | |
| MX25V4035 | 4Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 66(x1), 50(x2, x4) | 150mil 8-SOP, 8-WSON(6x5mm) |
| MX25V8035 | 8Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 66(x1), 50(x2, x4) | 150mil 8-SOP, 8-WSON(6x5mm) |

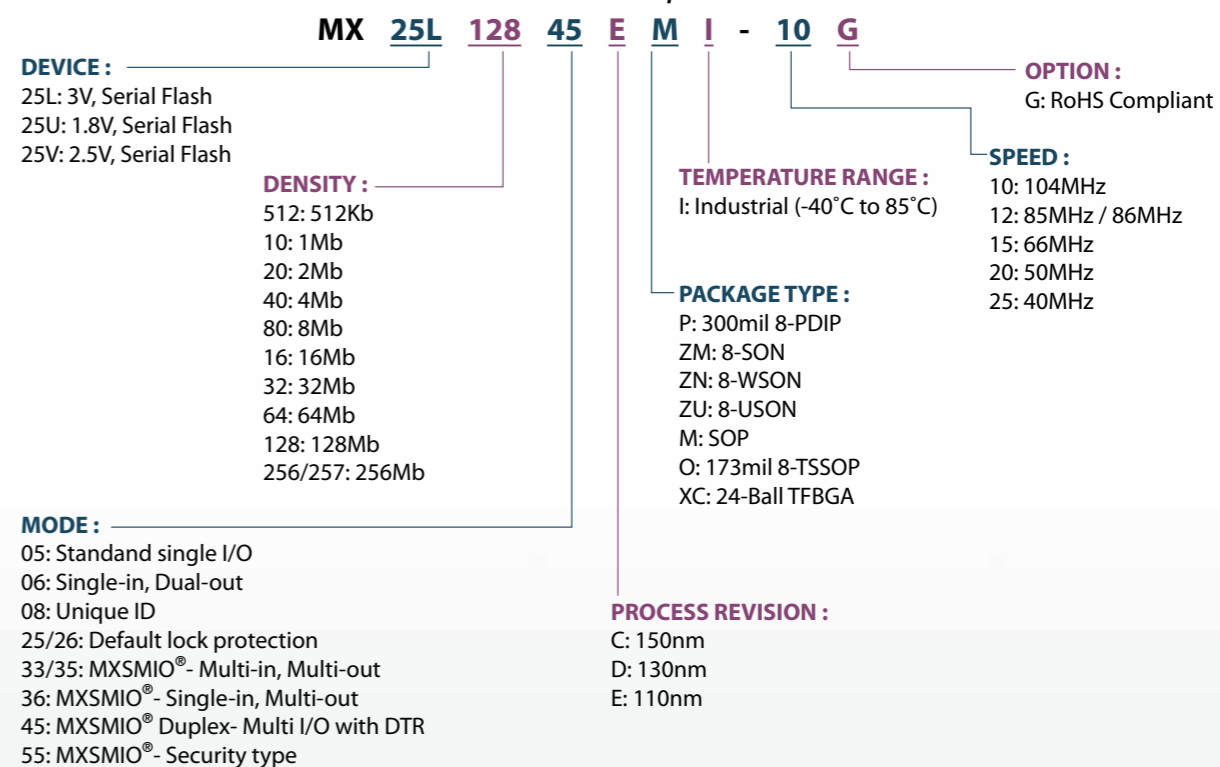
1.8V MXSMIO® Family:

| Part Number | Density | Organization | I/O Bus | Frequency (MHz) | Package | Feature |
|-------------|---------|-------------------|------------------|---------------------|---|---------|
| MX25U4035 | 4Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 40(x1, x2), 33(x4) | 150mil 8-SOP, 8-WSON(6x5mm), 8USON(4x4mm) | |
| MX25U8035E | 8Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 104(x1, x4), 84(x2) | 150mil 8-SOP,200mil 8-SOP, 8-WSON(6x5mm),8-USON(4x4mm) | QPI |
| MX25U1635E | 16Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 104(x1, x4), 84(x2) | 150mil 8-SOP,200mil 8-SOP, 8-WSON(6x5mm),8-USON(4x4mm) | QPI |
| MX25U3235E | 32Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 104(x1, x4), 84(x2) | 8-WSON(6x5mm),8-USON(4x4mm) | QPI |
| MX25U6435E | 64Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 104(x1, x4), 84(x2) | 8-WSON(6x5mm) | QPI |

Applications

| Segment | Application | 512Kb | 1Mb | 2Mb | 4Mb | 8Mb | 16Mb | 32Mb | 64Mb | 128Mb | 256Mb |
|---------------|-----------------------|-------|-----|-----|-----|-----|------|------|------|-------|-------|
| Computer | Mobile PC | | | | ● | ● | ● | ● | ● | | |
| | DeskTop PC | | | | | ● | ● | ● | ● | | |
| | Server | | | | | | | ● | ● | ● | ● |
| | Printer | | | | | | ● | ● | ● | ● | ● |
| | Graphics | ● | ● | ● | | | | | | | |
| | HDD | ● | ● | ● | ● | ● | | | | | |
| | ODD | | | ● | ● | ● | ● | ● | | | |
| Communication | DSL | | | | | ● | ● | ● | | | |
| | Cable Modem | | | | | | ● | ● | ● | ● | |
| | IAD/Home Gateway | | | | | | | | ● | ● | ● |
| | WiMAX | | | | | | | ● | ● | ● | ● |
| | IP Phone | | | | | | | ● | ● | ● | |
| | AP Router | | | | | ● | ● | ● | ● | | |
| | Digital TV | | | | | | ● | ● | ● | | |
| Consumer | Digital Audio/ DAM | | ● | ● | ● | | | | | | |
| | DVD Player | | | | | ● | ● | ● | | | |
| | Set Top Box | | | | | | ● | ● | ● | | |
| | | | | | | | | | | | |

Serial Flash Example



SECURE FLASH

Several customers have sensitive data stored in their systems on flash memory. To protect this data from hostile access, Macronix provides several Secure Flash products. We provide products from 32Mb to 256Mb densities in Parallel Flash, and from 16Mb to 256Mb densities in Serial Flash - typically used in applications like Set-Top Boxes, Digital TVs and other systems requiring security of their code and data.

Please contact our regional sales representatives for detailed specifications.

Parallel Secure Flash Family:

| Part Number | Density | Organization | Access Time(ns) | Package | Vcc | Features |
|-------------------------------------|---------|--------------|-----------------|---------|-----|----------------|
| Standard Read Access Series | | | | | | |
| MX29LA320DH/L | 32Mb | x8 / x16 | 70 | 64-FBGA | 3V | Uniform Sector |
| MX29LA321DH/L | 32Mb | x8 / x16 | 70 | 64-FBGA | 3V | Uniform Sector |
| MX29LA640EH/L | 64Mb | x8 / x16 | 70 | 64-FBGA | 3V | Uniform Sector |
| MX29LA641DH/L | 64Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| Page Mode Read Access Series | | | | | | |
| MX29GA320E H/L | 32Mb | x8 / x16 | 70 | 64-FBGA | 3V | Uniform Sector |
| MX29GA321E C/F | 32Mb | x8 / x16 | 70 | 64-FBGA | 3V | Uniform Sector |
| MX29GA321E H/L | 32Mb | x8 / x16 | 70 | 64-FBGA | 3V | Uniform Sector |
| MX29GA640E H/L | 64Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| MX29GA641E C/F | 64Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| MX29GA641E H/L | 64Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| MX29GA128E H/L | 128Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| MX29GA129E C/F | 128Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| MX29GA129E H/L | 128Mb | x8 / x16 | 90 | 64-FBGA | 3V | Uniform Sector |
| MX29GA256E H/L | 256Mb | x8 / x16 | 90R | 64-FBGA | 3V | Uniform Sector |
| MX29GA257E C/F | 256Mb | x8 / x16 | 90R | 64-FBGA | 3V | Uniform Sector |
| MX29GA257E H/L | 256Mb | x8 / x16 | 90R | 64-FBGA | 3V | Uniform Sector |

Serial Secure Flash Family:

| Part No. | Density | Organization | I/O Bus | Clock Speed(MHz) | Packages | Vcc |
|-------------|---------|-------------------|----------------------|---------------------|--|-----|
| MX25L1608D | 16Mb | 4KB / 64KB | Single/ Dual | 86(x1), 50(x2) | 150mil 8-SOP, 200mil 8-SOP, 300mil 16-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm) | 3V |
| MX25L1655D | 16Mb | 4KB / 64KB | Single/Dual/Quad | 104(x1), 75(x2, x4) | 200mil 8-SOP, 24-BGA(8x6mm) | 3V |
| MX25L3208D | 32Mb | 4KB / 64KB | Single/ Dual | 86(x1), 50(x2) | 200mil 8-SOP, 300mil 16-SOP, 300mil 8-PDIP, 8-WSON(6x5mm), 8-USON(4x4mm) | 3V |
| MX25L3255D | 32Mb | 4KB / 64KB | Single/Dual/Quad | 104(x1), 75(x2, x4) | 200mil 8-SOP, 24-BGA(8x6mm) | 3V |
| MX25L6408D | 64Mb | 4KB / 64KB | Single/ Dual | 86(x1), 50(x2) | 300mil 16-SOP, 8-WSON(8x6mm)** | 3V |
| MX25L6455E | 64Mb | 4KB / 32KB / 64KB | Single/Dual/Quad/DTR | 104(x1), 70(x2, x4) | 300mil 16-SOP, 24-BGA(8x6mm) | 3V |
| MX25L12855E | 128Mb | 4KB / 32KB / 64KB | Single/Dual/Quad/DTR | 104(x1), 70(x2, x4) | 300mil 16-SOP, 24-BGA(8x6mm) | 3V |
| MX25L25655E | 256Mb | 4KB / 32KB / 64KB | Single/Dual/Quad | 80(x1), 70(x2, x4) | 300mil 16-SOP, 24-BGA(8x6mm) | 3V |

KGD

We also offer a Known Good Die (KGD) program for System in Package (SiP) solutions. Please contact Macronix regional sales for datasheet & technical support.

Known Good Die(KGD)

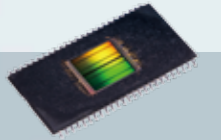
- Manufactured at the Macronix fabrication facilities
- Precision qualification methodology
- High quality assurance.
- Customized KGD specification designed for SiP development .
- Dedicated engineering team and support
- Completely functional testing with 100% automatic visual inspection and probe mark control
- Established production flow controls
- Safe UV light protection shipping

KGD Flash Portfolio

| | 512Kb | 1Mb | 2Mb | 4Mb | 8Mb | 16Mb | 32Mb | 64Mb | 128Mb |
|-----------------------------------|-------|-----|-----|-----|-----|------|------|------|-------|
| MX29LV/GL, 3V Parallel Flash | | | | V | V | V | V | V | V |
| MX29SL, 1.8V Parallel Flash | | | | V | V | | | | |
| MX25Lxxx5, 3V Serial Flash | V | V | V | V | V | V | V | V | V |
| MX25U, 1.8V Serial Flash | | | | V | V | V | V | | |

PACKAGE OPTIONS

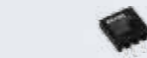
Macronix provides Flash products with extremely Small Packages as well as very thin packages for space-constrained applications.



Serial Packages



| 8 SOP (150mil) | |
|----------------|------|
| Length | 6 |
| Width | 5 |
| Thickness | 1.75 |
| Pitch | 1.27 |
| | (mm) |



| 8 SOP (200mil) | |
|----------------|------|
| Length | 7.9 |
| Width | 5.23 |
| Thickness | 2.16 |
| Pitch | 1.27 |
| | (mm) |



| 16 SOP (300mil) | |
|-----------------|------|
| Length | 10.3 |
| Width | 10.3 |
| Thickness | 2.65 |
| Pitch | 1.27 |
| | (mm) |



| 24 BGA (Ball Dia.0.4) | |
|-----------------------|------|
| Length | 8 |
| Width | 6 |
| Thickness | 1.2 |
| Pitch | 1.0 |
| | (mm) |



| 8 WSON (8x6) | |
|--------------|------|
| Length | 8 |
| Width | 6 |
| Thickness | 0.8 |
| Pitch | 1.27 |
| | (mm) |



| 8 WSON (6x5) | |
|--------------|------|
| Length | 6 |
| Width | 5 |
| Thickness | 0.8 |
| Pitch | 1.27 |
| | (mm) |



| 8 USON (4x4) | |
|--------------|------|
| Length | 4 |
| Width | 4 |
| Thickness | 0.6 |
| Pitch | 0.8 |
| | (mm) |



| 8 USON (2x3) | |
|--------------|------|
| Length | 3 |
| Width | 2 |
| Thickness | 0.6 |
| Pitch | 0.5 |
| | (mm) |

Parallel Packages



| 48 TFPGA (Ball Dia.0.3) | |
|----------------------------|------|
| Length | 8 |
| Width | 6 |
| Thickness | 1.2 |
| Pitch | 0.8 |
| | (mm) |



| 48 XFLGA (Land Open 0.25) | |
|------------------------------|------|
| Length | 6 |
| Width | 4 |
| Thickness | 0.5 |
| Pitch | 0.5 |
| | (mm) |



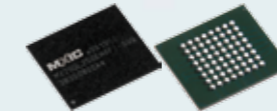
| 44 SOP (500mil) | |
|-----------------|------|
| Length | 28.5 |
| Width | 12.6 |
| Thickness | 3 |
| Pitch | 1.27 |
| | (mm) |



| 56 TSOP (Standard Type) | |
|-------------------------|------|
| Length | 20 |
| Width | 14 |
| Thickness | 1.2 |
| Pitch | 0.5 |
| | (mm) |



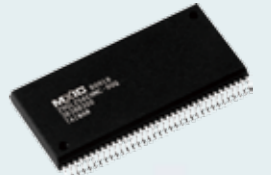
| 48 LFBGA (Ball Dia.0.4) | |
|----------------------------|------|
| Length | 8 |
| Width | 6 |
| Thickness | 1.3 |
| Pitch | 0.8 |
| | (mm) |



| 64 FBGA (Ball Dia. 0.4) | |
|----------------------------|------|
| Length | 13 |
| Width | 10 |
| Thickness | 1.2 |
| Pitch | 1.0 |
| | (mm) |



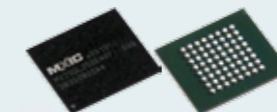
| 48 TSOP (Standard Type) | |
|-------------------------|------|
| Length | 20 |
| Width | 12 |
| Thickness | 1.2 |
| Pitch | 0.5 |
| | (mm) |



| 70 SSOP | |
|-----------|-------|
| Length | 28.5 |
| Width | 16.03 |
| Thickness | 3.05 |
| Pitch | 0.8 |
| | (mm) |



| 48 WFBGA (Ball Dia. 0.3) | |
|-----------------------------|------|
| Length | 6 |
| Width | 4 |
| Thickness | 0.75 |
| Pitch | 0.5 |
| | (mm) |



| 64 FBGA (Ball Dia. 0.6) | |
|----------------------------|------|
| Length | 13 |
| Width | 11 |
| Thickness | 1.4 |
| Pitch | 1.0 |
| | (mm) |

ROM(READ-ONLY MEMORY)

Being the leader in the Mask ROM industry, Macronix continues to provide cutting-edge Mask ROM products to our valued customers. Macronix is the biggest supplier of Mask ROM products in the industry for the past eight years and will continue to support its customers with high quality products in the future.

The table below shows the detailed offering of 3V standard ROM products along with page mode versions. 16Mb through 128Mb density products are available in x8 and x8/x16 configurations as shown.

Mask ROM

| Part No. | Density | Organization | Access Time (ns) | Package | Volt. | Features |
|-------------|----------|-----------------|------------------|------------|-------|------------------------------|
| MX23L1610 | 16M bit | 2M x 8/1M x 16 | 100 | Die/Wafer | 3.3V | x8/x16 Selectable |
| MX23L1611 | 16M bit | 2M x 8/1M x 16 | 100 | Die/Wafer | 3.3V | Page Mode, x8/x16 Selectable |
| MX23L3210 | 32M bit | 4M x 8/2M x 16 | 70 | Die/Wafer | 3.3V | x8/x16 Selectable |
| MX23L3211 | 32M bit | 4M x 8/2M x 16 | 70 | Die/Wafer | 3.3V | Page Mode, x8/x16 Selectable |
| MX23L6410A | 64M bit | 8M x 8/4M x 16 | 70/90 | 48-TSOP(I) | 3.3V | Page Mode, x8/x16 Selectable |
| MX23L12810A | 128M bit | 16M x 8/8M x 16 | 100/120 | 48-TSOP(I) | 3.3V | Page Mode, x8/x16 Selectable |

Macronix offers Serial ROMs in 16M, 32M, 64M, and 128Mbit densities in 16-pin SOP packages. This product family not only simplifies system hardware layout but also increases system reliability. Serial ROMs are conveniently used by customers looking for a smaller package and a simpler interface.

Serial Mask ROM

| Part No. | Density | Organization | Access Time (ns) | Package | Features |
|------------|----------|--------------|------------------|---------|------------------------------|
| MX23L1654 | 16M bit | 16M x 1 | 20 | 16-SOP | Pin Compatible to MX25L1605 |
| MX23L3254 | 32M bit | 32M x 1 | 20 | 16-SOP | Pin Compatible to MX25L3205 |
| MX23L6454 | 64M bit | 64M x 1 | 20 | 16-SOP | Pin Compatible to MX25L6405 |
| MX23L12854 | 128M bit | 128M x 1 | 20 | 16-SOP | Pin Compatible to MX25L12805 |

XtraROM is the leading ROM technology from Macronix without mask charge and with shorter TAT (Turn Around Time). With proven record of delivery and quality, XtraROM offers a robust medium for content publishing. The only thing the host MCU needs to do is READ the contents, there is no need to worry about bad block, wear levelling, and ECC. It is compatible to NAND, but much more robust than NAND - particularly for gaming, electronic dictionary and many other applications.

XtraROM

| Part No. | Density | Organization | Access Time (ns) | Package | Features |
|------------|----------|--------------|------------------|---------|-----------------|
| MX23J51243 | 512M bit | 64M x 8 | 25 | 48-TSOP | NAND Compatible |
| MX23J1G43 | 1G bit | 128M x 8 | 25 | 48-TSOP | NAND Compatible |





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