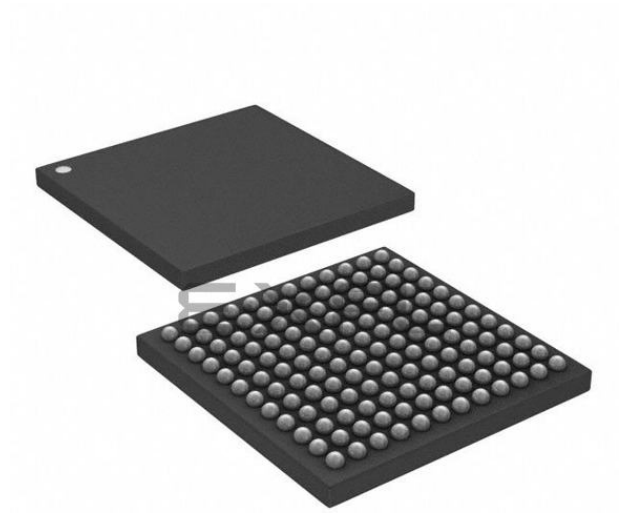


Welcome to E-XFL.COM

Embedded - Microcontrollers - Application Specific: Tailored Solutions for Precision and Performance

Embedded - Microcontrollers - Application Specific represents a category of microcontrollers designed with unique features and capabilities tailored to specific application needs. Unlike general-purpose microcontrollers, application-specific microcontrollers are optimized for particular tasks, offering enhanced performance, efficiency, and functionality to meet the demands of specialized applications.

What Are Embedded - Microcontrollers - Application Specific?

Application-specific microcontrollers are engineered to

Details	
Product Status	Active
Applications	I/O Controller
Core Processor	ARC-625D
Program Memory Type	FLASH (192kB)
Controller Series	-
RAM Size	16KB
Interface	ACPI, BC-Link, I²C/SMBus, LPC, PECI, PS/2, SPI, VLPC
Number of I/O	115
Voltage - Supply	3.3V
Operating Temperature	-40°C ~ 85°C
Mounting Type	Surface Mount
Package / Case	144-LFBGA
Supplier Device Package	144-LFBGA (10x10)
Purchase URL	https://www.e-xfl.com/product-detail/microchip-technology/mec1609i-pzp

MEC1609/MEC1609i

Mixed Signal Mobile Embedded Flash ARC EC BC-Link/ VLPC Base Component

Product Features

- 3.3V Operation
- ACPI Compliant
- LPC Interface
  - LPC I/O and Trusted Cycles Decoded
- VTR (standby) and VBAT (Power Planes)
  - Low Standby Current in Sleep Mode
- Configuration Register Set
  - Compatible with ISA Plug-and-Play Standard
  - EC-Programmable Base Address
- ARC-625D Embedded Controller (EC)
  - 16 KB Single Cycle 32-bit Wide Dual-ported SRAM, Accessible as Closely Coupled Data Memory and Instruction Memory
  - 2 KB Instruction Cache and AHB Memory-mapped SPI Flash Read Controller
  - 32 x 32 x 64 Fast Multiply
  - Divide Assist and Saturation Arithmetic
  - Maskable Interrupt Aggregator/Accelerator Interface
  - Maskable Hardware Wake-Up Events
  - Sleep mode
  - JTAG Debug Port, Includes JTAG Master
  - MCU Serial Debug Port
  - 8-Channel DMA Interface Supports SMBus Controllers and EC/Host GP-SPI Controllers
- Embedded Flash
  - 192 KB user space + 2kB info block, 32-bit Access, 35ns Access Time, 1 K Cycles Endurance
  - Programmable by LPC, EC and JTAG Interfaces
  - Flash Security Enhancements
    - 4K Boot Block Protection
    - Direct JTAG and Direct LPC-protected (2) Pages at or Near Top of Memory for Password Protection
- Legacy Support
  - Fast GATEA20 & Fast CPU_RESET
- System to EC Message Interface
  - 8042 Style Host Interface
  - Embedded Memory Interface
    - Host Serial or Parallel IRQ Source
    - Provides Two Windows to On-Chip SRAM for Host Access
    - Two Register Mailbox Command Interface
    - Host Access of Virtual Registers Without EC Intervention
  - Mailbox Registers Interface
    - Thirty-two 8-Bit Scratch Registers
    - Two Register Mailbox Command Interface
    - Two Register SMI Source Interface
  - ACPI Embedded Controller Interface
    - Four Instances
    - 1 or 4 Byte Data transfer capable
  - ACPI Power Management Interface
    - SCI Event-Generating Functions
- Battery Backed Resources
  - Power-Fail Status Register
  - 32 KHz Clock Generator
  - Week Alarm Timer Interface with Programmable Wake-up from 1ms to 45 Days
  - VBAT-Powered Control Interface
  - VBAT-Backed 64 Byte Memory
- Three EC-based SMBus 2.0 Host Controllers
  - Allows Master or Dual Slave Operation
  - Controllers are Fully Operational on Standby Power
  - DMA-driven I^2C Network Layer Hardware
  - I^2C Datalink Compatibility Mode
  - Multi-Master Capable
  - Supports Clock Stretching
  - Programmable Bus Speeds
  - 400 KHz Capable
  - Hardware Bus Access “Fairness” Interface
  - SMBus Time-outs Interface
  - 8 x 3 x 3 Port Multiplexing
- PECI Interface 2.0
- 18 x 8 Interrupt Capable Multiplexed Keyboard Scan Matrix
- Three independent Hardware Driven PS/2 Ports
  - Fully functional on Main and/or Suspend Power
  - PS/2 Edge Wake Capable
- 115 General Purpose I/O Pins
  - 8 GPIO Pass-Through Port (GPTP)

- 3-pin LED Interface
  - Programmable Blink Rates
  - Breathing LED Output
  - Operational in EC Sleep State
- Programmable 16-bit Counter/Timer Interface
  - Four Wake-capable 16-bit Auto-reloading Counter/Timer Instances
  - Four Operating Modes per Instance: Timer, One-shot, Event and Measurement.
  - 4 External Inputs, 4 External Outputs
- Hibernation Timer Interface
  - Two 32.768 KHz Driven Timers
  - Programmable Wake-up from 0.5ms to 128 Minutes
- System Watch Dog Timer (WDT)
- Input Capture and Compare Timer
  - 32-bit Free-running timer
  - Six 32-bit Capture Registers
  - Two 32-bit Compare Registers
  - Capture, Compare and Overflow Interrupts
- Microchip's Multipoint VLPC™ Serial Interconnect Bus Master
  - Forwards LPC transactions to VLPC peripherals
  - Forwards ARC transactions to VLPC peripherals
- BC-Link™ Interconnection Bus
  - Three High Speed and one Low Speed Bus Masters Controllers
- Two General Purpose Serial Peripheral Interface Controllers (ECGP-SPI)
  - One 3-pin EC-driven Full Duplex Serial Communication Interface
  - One 4-pin EC/Host-driven Full Duplex Serial Communication Interface to SPI Flash Interface
  - Flexible Clock Rates
  - SPI Burst Capable
- SPI Flash Read Controller
  - 4 MB AHB Memory-Mapped address space
  - Supports 2 KB EC Instruction Cache
- FAN Support
  - 8 Programmable Pulse-Width Modulator Outputs
    - Multiple Clock Rates
    - 16-Bit 'On' & 16-Bit 'Off' Counters
  - Four Fan Tachometer Inputs
  - 6 x 2 Capture/Compare Timer Interface
- ADC Interface
  - 10-bit Conversion in 10µs
  - 16 Channels
  - Integral Non-Linearity of ±0.5 LSB; Differential Non-Linearity of ±0.5 LSB
- Two Pin Debug Port with Standard 16C550A Register Interface
  - Accessible from Host and EC
  - Programmable Input/output Pin Polarity Inversion
  - Programmable Main Power or Standby Power Functionality
  - Standard Baud Rates to 115.2 Kbps, Custom Baud Rates to 2 Mbps
- Resistor/Capacitor Identification Detection (RC_ID)
  - Single Pin Interface to External Inexpensive RC Circuit
  - Replacement for Multiple GPIO's
  - Provides 8 Quantized States on One Pin
- Integrated Standby Power Reset Generator
- Clock Generator
  - 32.768 KHz-input Clock
  - operational on Suspend Power
  - Programmable Clock Power Management Control & Distribution
  - 64.52 MHz ±2% Accuracy
- Packages
  - 144 Pin LFBGA RoHS Compliant package
  - 144 Pin TFBGA RoHS Compliant package
- Operating Temperature
  - The MEC1609 supports the commercial temperature range of 0^{o} C to $+70^{o}$ C
  - The MEC1609i supports the industrial temperature range of -40^{o} C to $+85^{o}$ C

Description

The MEC1609/MEC1609i is the mixed signal base component of a multi-device advanced I/O controller architecture. The MEC1609/MEC1609i incorporates a high-performance 32-bit ARC 625 embedded microcontroller with a 192 Kilobyte embedded Flash subsystem, 16 Kilobytes of SRAM and 2 Kilobytes of instruction cache with an AHB memory-mapped SPI Flash Read Controller. The MEC1609 communicates with the system host using the Intel® Low Pin Count bus.

There are two distinct protocols that provide communication between the MEC1609/MEC1609i base component and companion components: BC-Link™ and VLPC™. BC-Link™ in the MEC1609/MEC1609i can access up to four companion components. The BC-Link™ protocol is peer-to-peer providing communication between the MEC1609/MEC1609i embedded controller and registers located in a companion. VLPC™ is a multi-drop protocol that matches the MEC1609/MEC1609i with up to three untrusted companion components and one trusted companion component. The MEC1609/MEC1609i accepts LPC Host (ICH/PCH) transactions targeting blocks internal to the MEC1609/MEC1609i and blocks physically located in VLPC™ companions. The ARC 625 embedded microcontroller can also access blocks that are physically located in VLPC™ companion components.

The MEC1609/MEC1609i is directly powered by two separate suspend supply planes (VBAT and VTR) and senses a third runtime power plane (VCC) to provide “instant on” and system power management functions. The MEC1609/MEC1609i also contains an integrated VTR Reset Interface and a system Power Management Interface that supports low-power states and can drive state changes as a result of hardware wake events as defined by the MEC1609/MEC1609i Wake Interface.

The MEC1609/MEC1609i defines a software development system interface that includes an MCU Serial Debug Port, a two pin serial debug port with a 16C550A register interface that is accessible to the EC or to the LPC host and can operate up to 2 MB/s, a flexible Flash programming interface and a JTAG interface. The EC can also drive the JTAG interface as a master.

A top-level block diagram of the MEC1609/MEC1609i is shown in FIGURE 1: MEC1609/MEC1609i Top-Level Block Diagram on page 5. An example of system level connection is shown in FIGURE 2: Example of MEC1609/MEC1609i’s Connections to System Components on page 6.

TO OUR VALUED CUSTOMERS

It is our intention to provide our valued customers with the best documentation possible to ensure successful use of your Microchip products. To this end, we will continue to improve our publications to better suit your needs. Our publications will be refined and enhanced as new volumes and updates are introduced.

If you have any questions or comments regarding this publication, please contact the Marketing Communications Department via E-mail at **docerrors@microchip.com**. We welcome your feedback.

Most Current Data Sheet

To obtain the most up-to-date version of this data sheet, please register at our Worldwide Web site at:

http://www.microchip.com

You can determine the version of a data sheet by examining its literature number found on the bottom outside corner of any page. The last character of the literature number is the version number, (e.g., DS30000000A is version A of document DS30000000).

Errata

An errata sheet, describing minor operational differences from the data sheet and recommended workarounds, may exist for current devices. As device/documentation issues become known to us, we will publish an errata sheet. The errata will specify the revision of silicon and revision of document to which it applies.

To determine if an errata sheet exists for a particular device, please check with one of the following:

- Microchip's Worldwide Web site; http://www.microchip.com
- Your local Microchip sales office (see last page)

When contacting a sales office, please specify which device, revision of silicon and data sheet (include -literature number) you are using.

Customer Notification System

Register on our web site at **www.microchip.com** to receive the most current information on all of our products.

BLOCK DIAGRAM

FIGURE 1: MEC1609/MEC1609i TOP-LEVEL BLOCK DIAGRAM

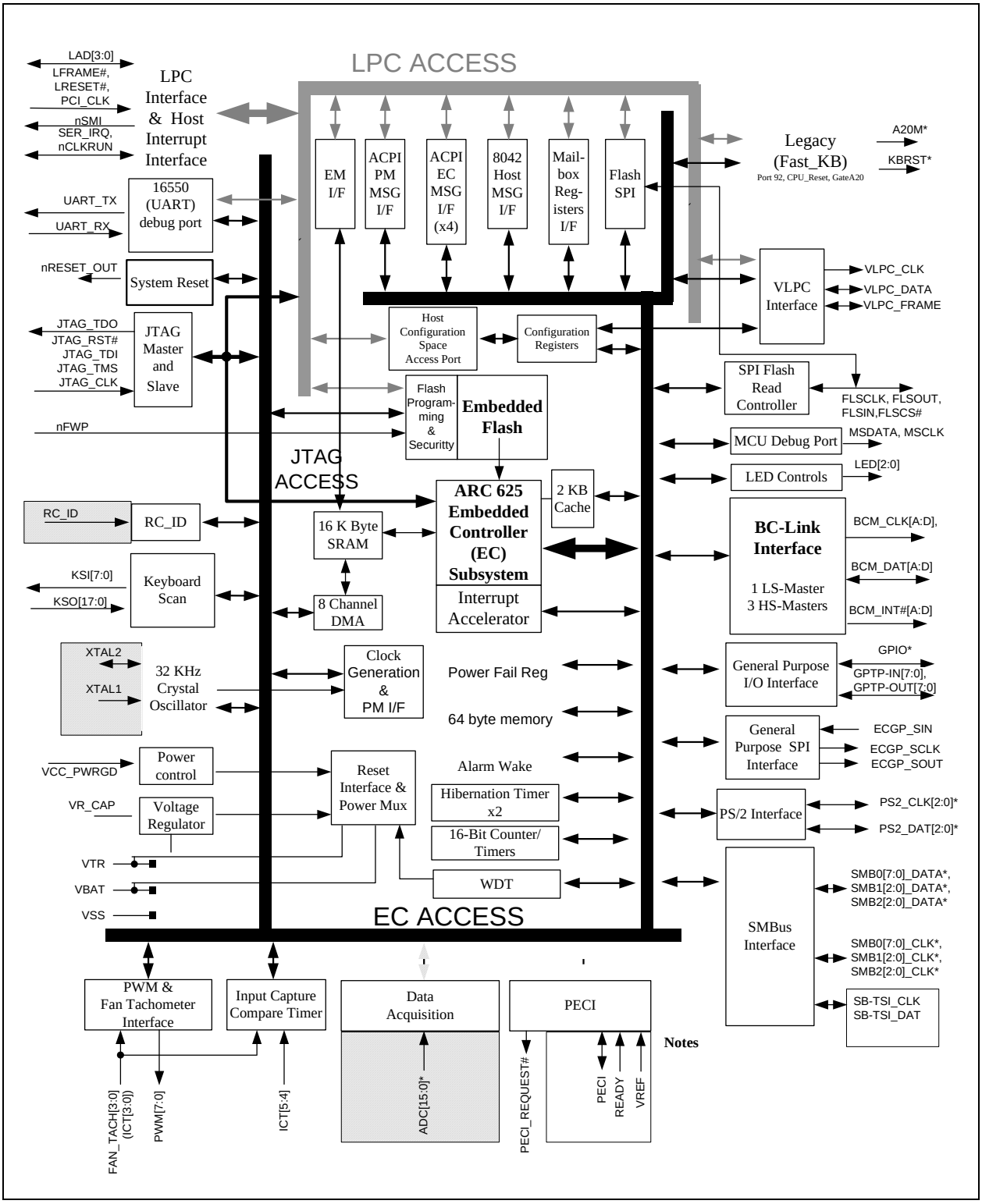
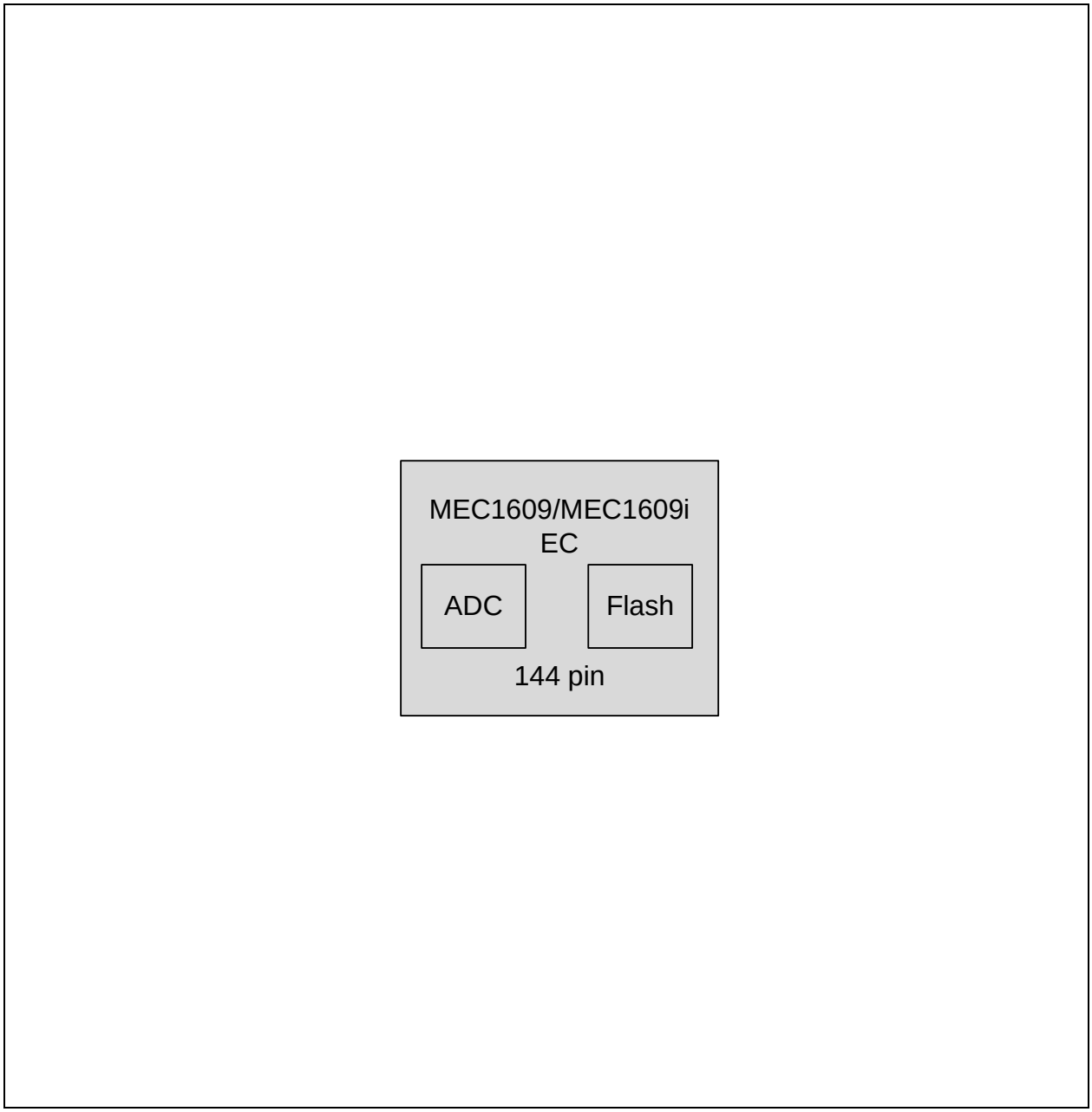


FIGURE 2: EXAMPLE OF MEC1609/MEC1609i'S CONNECTIONS TO SYSTEM COMPONENTS



PACKAGE OUTLINES

Note: For the most current package drawings, see the Microchip Packaging Specification at http://www.microchip.com/packaging.

FIGURE 3: 144-PIN LFBGA 10X10X0.8 MM PACKAGE OUTLINE (1.4 MM HEIGHT)

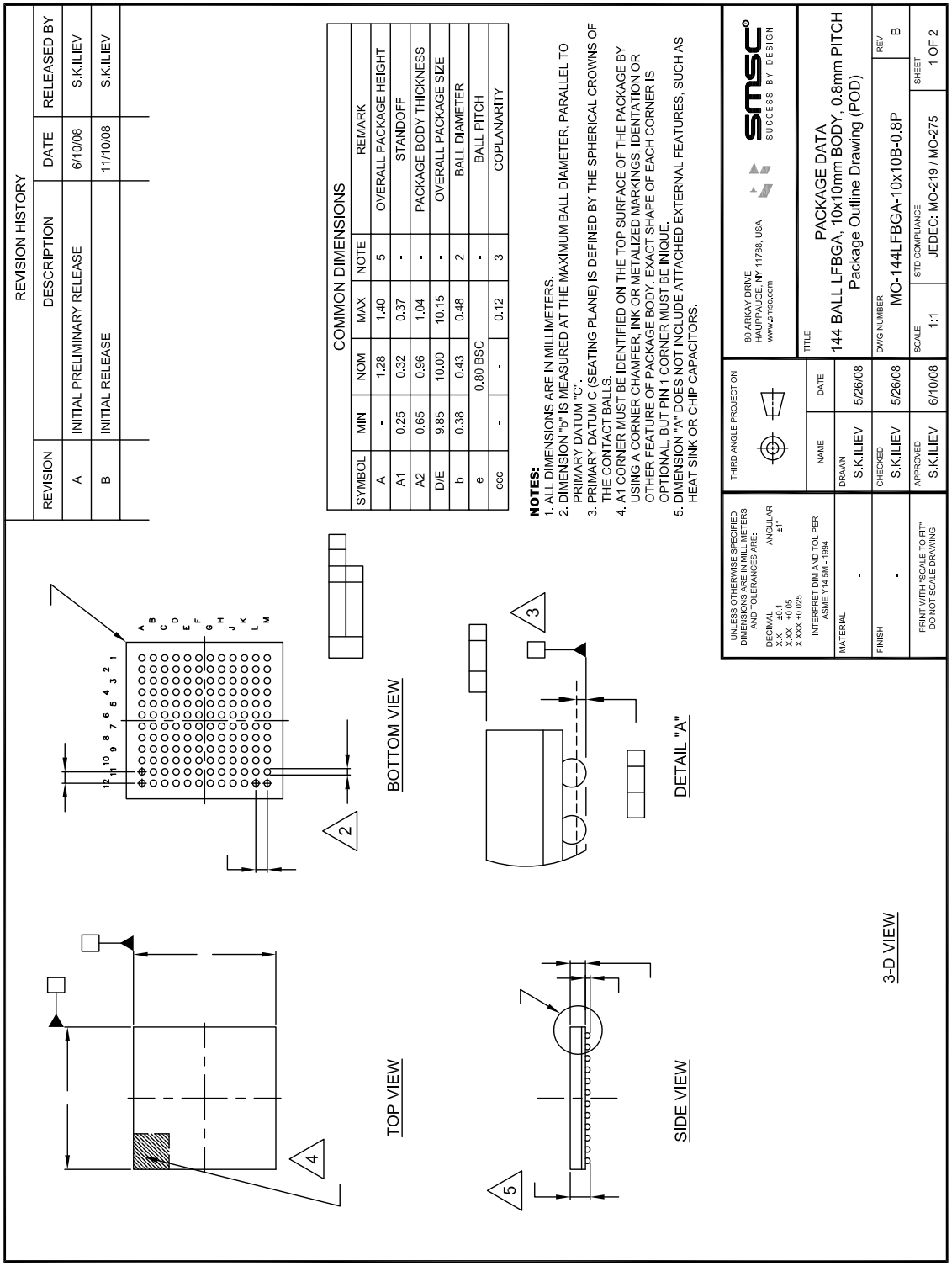
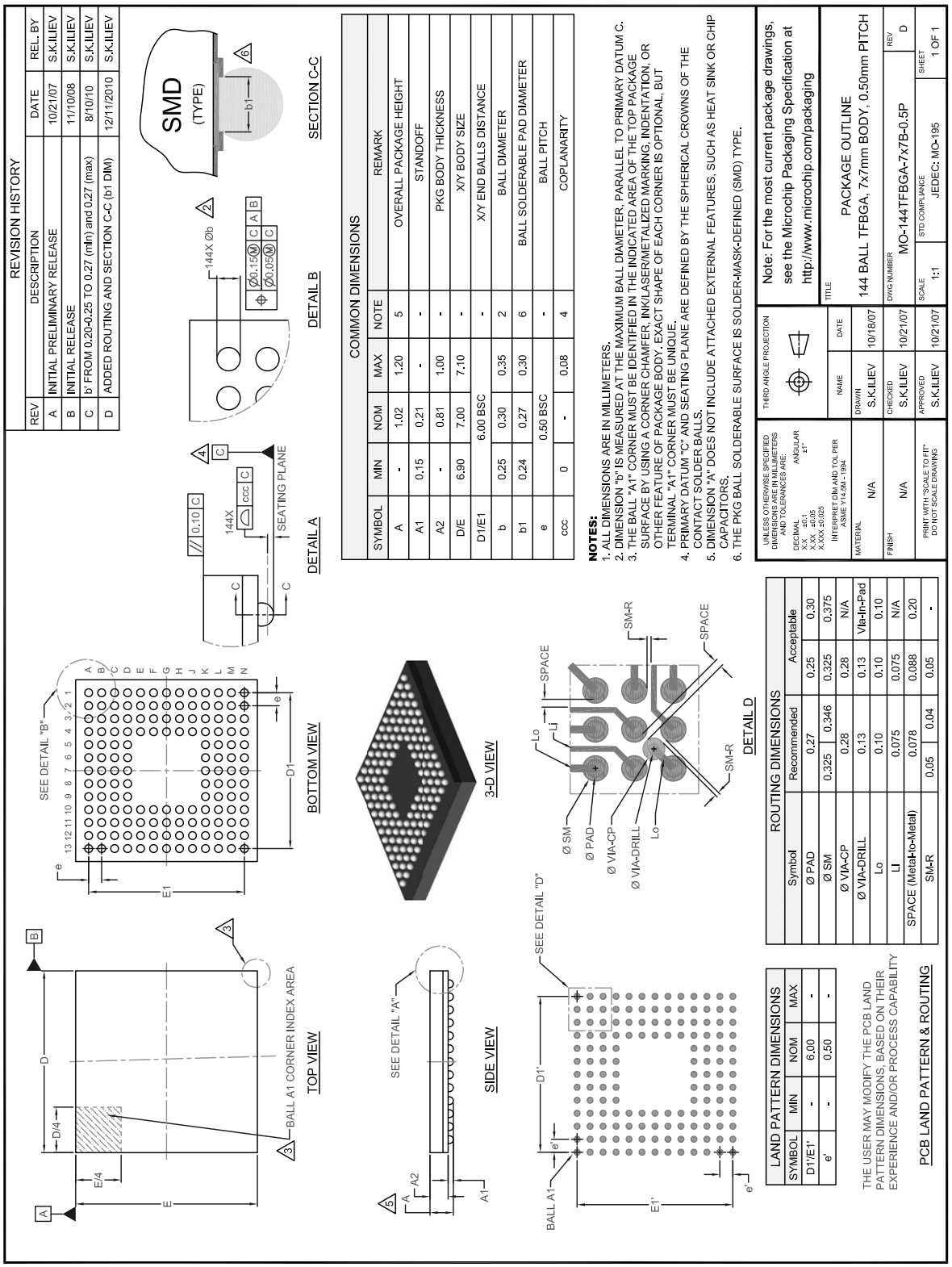


FIGURE 4: 144-PIN TFBGA 7X7X0.5 MM PACKAGE OUTLINE (1.2 MM HEIGHT)



APPENDIX A: PRODUCT BRIEF REVISION HISTORY

TABLE A-1: REVISION HISTORY

Revision	Section/Figure/Entry	Correction
DS00001769A (06-03-14)	Document Release	

THE MICROCHIP WEB SITE

Microchip provides online support via our WWW site at www.microchip.com. This web site is used as a means to make files and information easily available to customers. Accessible by using your favorite Internet browser, the web site contains the following information:

- **Product Support** – Data sheets and errata, application notes and sample programs, design resources, user's guides and hardware support documents, latest software releases and archived software
- **General Technical Support** – Frequently Asked Questions (FAQ), technical support requests, online discussion groups, Microchip consultant program member listing
- **Business of Microchip** – Product selector and ordering guides, latest Microchip press releases, listing of seminars and events, listings of Microchip sales offices, distributors and factory representatives

CUSTOMER CHANGE NOTIFICATION SERVICE

Microchip's customer notification service helps keep customers current on Microchip products. Subscribers will receive e-mail notification whenever there are changes, updates, revisions or errata related to a specified product family or development tool of interest.

To register, access the Microchip web site at www.microchip.com. Under "Support", click on "Customer Change Notification" and follow the registration instructions.

CUSTOMER SUPPORT

Users of Microchip products can receive assistance through several channels:

- Distributor or Representative
- Local Sales Office
- Field Application Engineer (FAE)
- Technical Support

Customers should contact their distributor, representative or field application engineer (FAE) for support. Local sales offices are also available to help customers. A listing of sales offices and locations is included in the back of this document.

Technical support is available through the web site at: http://www.microchip.com/support

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	[X]	-	XXX	-	[X](1)
Device	Temperature Range		Package		Tape and Reel Option

Device:	MEC1609, MEC1609i	
Temperature Range:	Blank = 0°C to +70°C i = -40°C to +85°C	(Extended Commercial) (Industrial)
Package:	PZV = 144-pin TFBGA PZP = 144-pin LFBGA	
Tape and Reel Option:	Blank = Standard packaging (tray) TR = Tape and Reel(1)	

Examples:

a) MEC1609-PZV
144-pin TFBGA (7mm x 7mm, 0.5 pitch)
RoHS Compliant package

b) MEC1609-PZP
144-pin TFBGA (10mm x 10mm, 0.8 pitch)
RoHS Compliant package

c) MEC1609i-PZV
Industrial temperature,
144-pin TFBGA (7mm x 7mm, 0.5 pitch)
RoHS Compliant package

d) MEC1609i-PZP
Industrial temperature,
144-pin TFBGA (10mm x 10mm, 0.8 pitch)
RoHS Compliant package

Note 1: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option. Reel size is 4,000.

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as "unbreakable."

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

ISBN: 9781632762627

QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
ISO/TS 16949

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

Worldwide Sales and Service

AMERICAS

Corporate Office
2355 West Chandler Blvd.
Chandler, AZ 85224-6199
Tel: 480-792-7200
Fax: 480-792-7277
Technical Support:
http://www.microchip.com/support
Web Address:
www.microchip.com

Atlanta
Duluth, GA
Tel: 678-957-9614
Fax: 678-957-1455

Austin, TX
Tel: 512-257-3370

Boston
Westborough, MA
Tel: 774-760-0087
Fax: 774-760-0088

Chicago
Itasca, IL
Tel: 630-285-0071
Fax: 630-285-0075

Cleveland
Independence, OH
Tel: 216-447-0464
Fax: 216-447-0643

Dallas
Addison, TX
Tel: 972-818-7423
Fax: 972-818-2924

Detroit
Novi, MI
Tel: 248-848-4000

Houston, TX
Tel: 281-894-5983

Indianapolis
Noblesville, IN
Tel: 317-773-8323
Fax: 317-773-5453

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608

New York, NY
Tel: 631-435-6000

San Jose, CA
Tel: 408-735-9110

Canada - Toronto
Tel: 905-673-0699
Fax: 905-673-6509

ASIA/PACIFIC

Asia Pacific Office
Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon
Hong Kong
Tel: 852-2943-5100
Fax: 852-2401-3431

Australia - Sydney
Tel: 61-2-9868-6733
Fax: 61-2-9868-6755

China - Beijing
Tel: 86-10-8569-7000
Fax: 86-10-8528-2104

China - Chengdu
Tel: 86-28-8665-5511
Fax: 86-28-8665-7889

China - Chongqing
Tel: 86-23-8980-9588
Fax: 86-23-8980-9500

China - Hangzhou
Tel: 86-571-8792-8115
Fax: 86-571-8792-8116

China - Hong Kong SAR
Tel: 852-2943-5100
Fax: 852-2401-3431

China - Nanjing
Tel: 86-25-8473-2460
Fax: 86-25-8473-2470

China - Qingdao
Tel: 86-532-8502-7355
Fax: 86-532-8502-7205

China - Shanghai
Tel: 86-21-5407-5533
Fax: 86-21-5407-5066

China - Shenyang
Tel: 86-24-2334-2829
Fax: 86-24-2334-2393

China - Shenzhen
Tel: 86-755-8864-2200
Fax: 86-755-8203-1760

China - Wuhan
Tel: 86-27-5980-5300
Fax: 86-27-5980-5118

China - Xian
Tel: 86-29-8833-7252
Fax: 86-29-8833-7256

China - Xiamen
Tel: 86-592-2388138
Fax: 86-592-2388130

China - Zhuhai
Tel: 86-756-3210040
Fax: 86-756-3210049

ASIA/PACIFIC

India - Bangalore
Tel: 91-80-3090-4444
Fax: 91-80-3090-4123

India - New Delhi
Tel: 91-11-4160-8631
Fax: 91-11-4160-8632

India - Pune
Tel: 91-20-3019-1500

Japan - Osaka
Tel: 81-6-6152-7160
Fax: 81-6-6152-9310

Japan - Tokyo
Tel: 81-3-6880- 3770
Fax: 81-3-6880-3771

Korea - Daegu
Tel: 82-53-744-4301
Fax: 82-53-744-4302

Korea - Seoul
Tel: 82-2-554-7200
Fax: 82-2-558-5932 or
82-2-558-5934

Malaysia - Kuala Lumpur
Tel: 60-3-6201-9857
Fax: 60-3-6201-9859

Malaysia - Penang
Tel: 60-4-227-8870
Fax: 60-4-227-4068

Philippines - Manila
Tel: 63-2-634-9065
Fax: 63-2-634-9069

Singapore
Tel: 65-6334-8870
Fax: 65-6334-8850

Taiwan - Hsin Chu
Tel: 886-3-5778-366
Fax: 886-3-5770-955

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

Taiwan - Taipei
Tel: 886-2-2508-8600
Fax: 886-2-2508-0102

Thailand - Bangkok
Tel: 66-2-694-1351
Fax: 66-2-694-1350

EUROPE

Austria - Wels
Tel: 43-7242-2244-39
Fax: 43-7242-2244-393

Denmark - Copenhagen
Tel: 45-4450-2828
Fax: 45-4485-2829

France - Paris
Tel: 33-1-69-53-63-20
Fax: 33-1-69-30-90-79

Germany - Dusseldorf
Tel: 49-2129-3766400

Germany - Munich
Tel: 49-89-627-144-0
Fax: 49-89-627-144-44

Germany - Pforzheim
Tel: 49-7231-424750

Italy - Milan
Tel: 39-0331-742611
Fax: 39-0331-466781

Italy - Venice
Tel: 39-049-7625286

Netherlands - Drunen
Tel: 31-416-690399
Fax: 31-416-690340

Poland - Warsaw
Tel: 48-22-3325737

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

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

UK - Wokingham
Tel: 44-118-921-5800
Fax: 44-118-921-5820

03/25/14