



# PIC32MZ2048ECH144, PIC32MZ2048EFH144

## PIC32MZ EC and PIC32MZ EF Bluetooth® Audio 144-pin to 100-pin TQFP Plug-In Module (PIM) Information Sheet

The PIC32MZ2048ECH144 Bluetooth Audio PIM (MA320016) and the PIC32MZ2048EFH144 Bluetooth Audio PIM (MA320018) are designed to demonstrate the capabilities of the PIC32MZ EC and PIC32MZ EF families of devices using the PIC32 Bluetooth Audio Development Kit (DV320032).

**Note:** These PIMs can only be used with the PIC32 Bluetooth Audio Development Board. To get started with development, please visit: <http://www.microchip.com/pic32tools> and click the PIC32 Bluetooth Audio Development Board product link.

The PIC32MZ EC and PIC32MZ EF families of devices are high-performance 32-bit microcontrollers that can perform a wide variety of functionality for embedded applications.

### Physical Description

The PIC32MZ2048ECH144 is denoted by the silk screen towards the top of the PIM labeled: PIC32MZ Audio PIM.

The PIC32MZ2048EFH144 is denoted by the silk screen towards the bottom of the PIM labeled: PIC32MZ EF Audio PIM.

Table 1 shows the mapping between the development board functions and the device pins.

**TABLE 1: 144-PIN DEVICE TO 100-PIN PIM MAPPING**

Device Pin #	PIC32MZ EC/PIC32MZ EF Pin Name	PIM Pin #	PIC32 Bluetooth Audio Development Kit Port Name
1	AN23/RG15	1	GPIO_12/STBY/RST#
2	EBIA5/AN34/PMA5/RA5	No Connect	No Connect
3	EBID5/AN17/RPE5/PMD5/RE5	3	LCD1_DB5
4	EBID6/AN16/PMD6/RE6	4	LCD1_DB6
5	EBID7/AN15/PMD7/RE7	5	LCD1_DB7
6	EBIA6/AN22/RPC1/PMA6/RC1	6	LCD1_RESET
7	AN35/ETXD0/RJ8	No Connect	No Connect
8	AN36/ETXD1/RJ9	8	ACC_ID_SEL
9	EBIBS0/RJ12	9	GPIO_17
10	EBIBS1/RJ10	19	SELECT
11	EBIA12/AN21/RPC2/PMA12/RC2	7	GPIO_24/I2S2_LRCL
12	EBIWE/AN20/RPC3/PMWR/RC3	81	LCD1_WR
13	EBIOE/AN19/EPC4/PMRD/RC4	82	LCD1_RD
14	AN14/C1IND/RPG6/SCK2/RG6	10	GPIO_22/I2S2_BCLK
15	AN13/C1INC/RPG7/SDA4/RG7	11	GPIO_27/SPI2_SDI
16	AN12/C2IND/RPG8/SCL4/RG8	12	GPIO_25/I2S2_SDO
17	Vss	15, 31, 36, 45, 65, 75	VSS
18	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
19	EBIA16/RK0	17	SW1#
20	MCLR	13	MCLR#
21	EBIA2/AN11/C2INC/RPG9/PMA2/RG9	18	GPIO_15/SS2#
22	TMS/AN24/RA0	22	GPIO_16/AN( C)
23	AN25/RPE8/RE8	20	GPIO_29/AN(E)
24	AN26/RPE9/RE9	24	OVERCURRENT
25	AN45/C1INA/RPB6/RB5	23	GPIO_20/UART2_CTS#

# PIC32MZ2048ECH144, PIC32MZ2048EFH144

**TABLE 1: 144-PIN DEVICE TO 100-PIN PIM MAPPING**

Device Pin #	PIC32MZ EC/PIC32MZ EF Pin Name	PIM Pin #	PIC32 Bluetooth Audio Development Kit Port Name
26	AN4/C1INB/RB4	32	GPIO_13/AN(A)
27	AN37/ERXCLK/EREFCLK/RJ11	21	ACC_PWR
28	EBIA13/PMA13/RJ13	28	LED5#
29	EBIA11/PMA11/RJ14	29	SW3#
30	EBIA0/PMA0/RJ15	44	LCD1_DC#
31	AN3/C2INA/RPB3/RB3	14	GPIO_21/UART2_RTS#
32	Vss	15, 31, 36, 45, 65, 75	VSS
33	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
34	AN2/C2INB/RPB2/RB2	34	GPIO_31/AN(F)
35	PGEC1/AN1/RPB1/RB1	35	VOLUME
36	PGED1/AN0/RPB0/RB0	25	GPIO_30/SS1#
37	PGEC2/AN46/RPB6/RB6	26	PGEC2
38	PGED2/AN47/RPB7/RB7	27	PGED2
39	VREF-/CVREF-/AN27/RA9	33	GPIO_14/AN(B)
40	VREF+/CVREF+/AN28/RA10	38	SW2#
41	AVDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
42	AVSS	15, 31, 36, 45, 65, 75	VSS
43	AN38/ETXD2/RH0	41	SW4#
44	AN39/ETXD3/RH1	42	SW5#
45	EBIRP/RH2	43	USB_SEL#
46	RH3	No Connect	No Connect
47	EBIA10/AN48/RPB8/PMA10/RB8	47	C_RESET
48	EBIA7/AN49/RPB9/RMA7/RB9	48	IPOD_DETECT
49	CVREFOUT/AN5/RPB10/RB10	No Connect	No Connect
50	AN6/RB11	51	GPIO_23/AN(D)
51	EBIA1/PMA1/RK1	No Connect	No Connect
52	EBIA3/PMA3/RK2	No Connect	No Connect
53	EBIA17/RK3	No Connect	No Connect
54	Vss	15, 31, 36, 45, 65, 75	VSS
55	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
56	TCK/AN29/RA1	No Connect	No Connect
57	TDI/AN30/RPF13/SCK5/RF13	39	U4RX
58	TDO/AN31/RPF12/RF12	40	U4TX
59	AN7/RB12	No Connect	No Connect
60	AN8/RB13	60	LED1#
61	AN9/RPB14/SCK3/RB14	61	LED2#
62	AN10/RPB15/OCFB/RB15	No Connect	No Connect
63	Vss	15, 31, 36, 45, 65, 75	VSS
64	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
65	AN40/ERXERR/RH4	No Connect	No Connect
66	AN41/ERXD1/RH5	No Connect	No Connect
67	AN42/ERXD2/RH6	74	IPOD_VBUS
68	EBIA4/PMPA4/RH7	68	ALERT#
69	AN32/AETXD0/RPD14/RD14	50	GPIO_19/UART2_TX
70	AN33/RPD15/SCK6/RD15	53	GPIO_5/I2S1_MCLK
71	OSC1/CLKI/RC12	63	OSCIN
72	OSC2/CLKO/RC15	64	OSCO

# PIC32MZ2048ECH144, PIC32MZ2048EFH144

**TABLE 1: 144-PIN DEVICE TO 100-PIN PIM MAPPING**

Device Pin #	PIC32MZ EC/PIC32MZ EF Pin Name	PIM Pin #	PIC32 Bluetooth Audio Development Kit Port Name
73	VBUS	54	5V_SW_DIG
74	VUSB3V3	2, 16, 30, 37, 45, 55, 62, 86	VDD
75	VSS	15, 31, 36, 45, 65, 75	VSS
76	D-	56	PIC32_D-
77	D+	57	PIC32_D+
78	RPF3/USBID/RF3	52	FLASH_CS#
79	SDA3/RPF2/RF2	91	LED3#
80	SCL3/RPF8/RF8	49	GPIO_18/UART2_RX
81	ERXD0/RH8	80	VBUS_SENSE
82	ERXD3/RH9	87	GPIO_33/PD1#
83	ECOL/RH10	83	A_DET#
84	EBIRDY2/RH11	84	GPIO_32
85	SCL2/RA2	58	I2C2_SCL
86	EBIRDY1/SDA2/RA3	59	I2C2_SDA
87	EBIA14/PMCS1/PMA14/RA4	71	LCD1_CS#
88	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
89	VSS	15, 31, 36, 45, 65, 75	VSS
90	EBIA9/RPF4/SDA5/PMA9/RF4	88	GPIO_34/PD2#
91	EBIA8/RPF5/SCL5/PMA8/RF5	72	GPIO_9/I2S1_SDO
92	EBIA18/RK4	89	USB_SEL1
93	EBIA19/RK5	90	USB_SEL0
94	EBIA20/RK6	95	USB_ACC#
95	RPA14/SCL1/RA14	66	GPIO_10/I2C1_SCL
96	RPA15/SDA1/RA15	67	GPIO_7/I2C1_SDA
97	EBIA15/RPD9/PMCS2/PMA15/RD9	69	GPIO_8/I2S1_LRCL
98	RPD10/SCK4/RD10	96	USB_MINI_B#
99	EMDC/RPD11/RD11	97	USB_TYPE_A#
100	ECRS/RH12	92	LED4#
101	ERXDV/ECRSV/AECRSV/RH13	No Connect	No Connect
102	RH14	No Connect	No Connect
103	EBIA23/RH15	No Connect	No Connect
104	RPD0/RTCC/INT0/RD0	No Connect	No Connect
105	SOSCI/PC13/RC13	No Connect	No Connect
106	SOSCO/PC14/T1CK/RC14	73	GPIO_11/SPI1_SDI
107	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
108	VSS	15, 31, 36, 45, 65, 75	VSS
109	RPD1/SCK1/RD1	70	GPIO_6/I2S1_BCLK
110	EBID14/RPD2/PMD14/RD2	77	GPIO_1/UART1_RX
111	EBID15/RPD3/PMD15/RD3	78	GPIO_2/UART1_TX
112	EBID12/RPD12/PMD12/RD12	79	GPIO_3/UART_CTS#
113	EBID13/PMD13/RD13	No Connect	No Connect
114	ETXERR/RJ0	No Connect	No Connect
115	EMDIO/RJ1	No Connect	No Connect
116	EBIRDY3/RJ2	No Connect	No Connect
117	EBIA22/RJ3	No Connect	No Connect
118	SQICS0/RPD4/RD4	No Connect	No Connect
119	SQICS1/RPD5/RD5	76	GPIO_4/UART1_RTS#

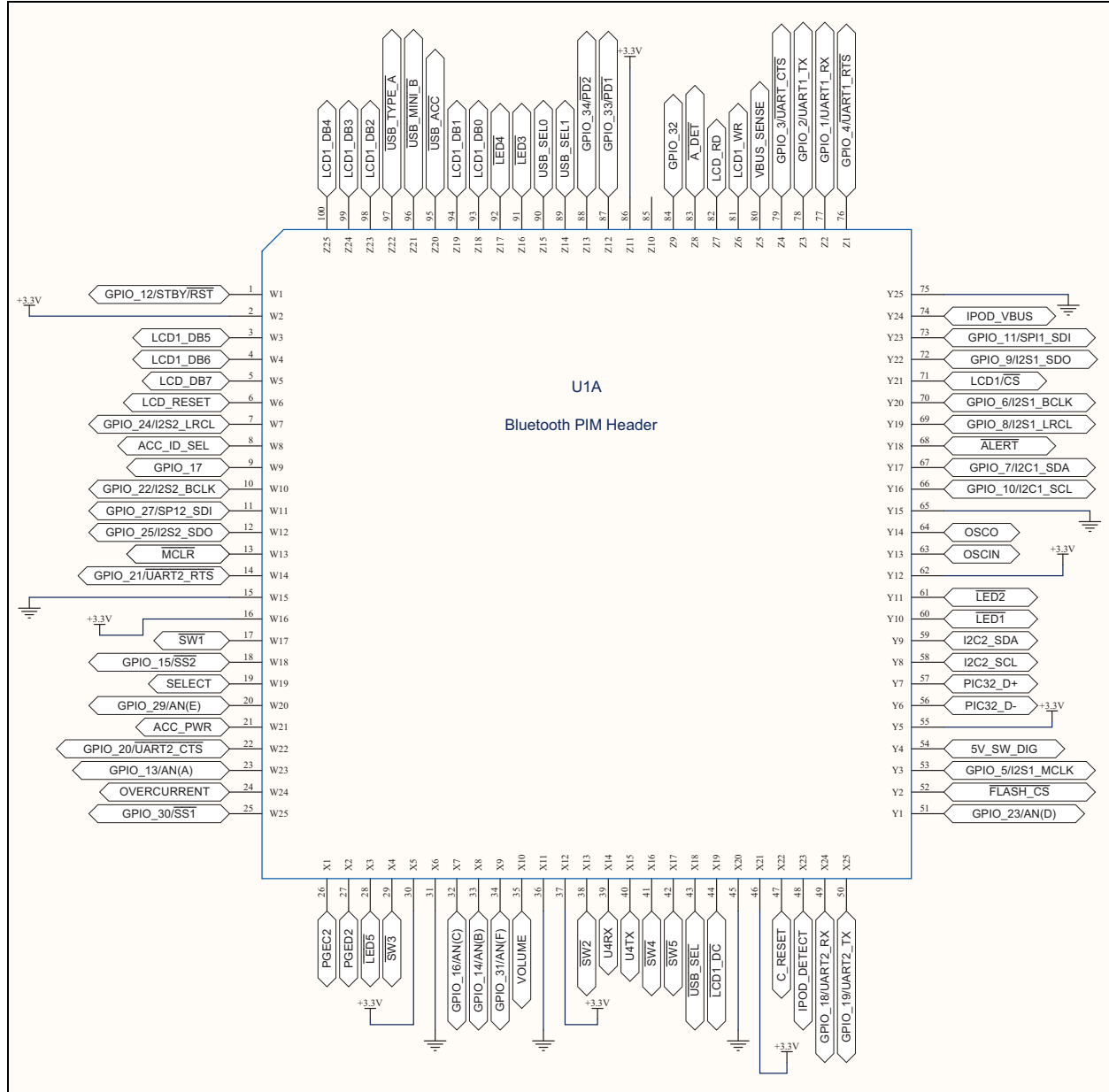
# PIC32MZ2048ECH144, PIC32MZ2048EFH144

**TABLE 1: 144-PIN DEVICE TO 100-PIN PIM MAPPING**

Device Pin #	PIC32MZ EC/PIC32MZ EF Pin Name	PIM Pin #	PIC32 Bluetooth Audio Development Kit Port Name
120	ETXEN/RPD6/RD6	No Connect	No Connect
121	ETXCLK/RPD7/RD7	No Connect	No Connect
122	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
123	VSS	15, 31, 36, 45, 65, 75	VSS
124	EBID11/RPF0/PMD11/RF0	No Connect	No Connect
125	EBID10/RPF1/PMD10/RF1	No Connect	No Connect
126	EBIA21/RK7	No Connect	No Connect
127	EBID9/RPG1/PMD9/RG1	No Connect	No Connect
128	EBID8/RPG0/PMD8/RG0	No Connect	No Connect
129	TRCLK/SQICLK/RA6	TH1	Not Applicable
130	TRD3/SQID3/RA7	TH9	Not Applicable
131	EBICS0/RJ4	No Connect	No Connect
132	EBICS1/RJ5	No Connect	No Connect
133	EBICS2/RJ6	No Connect	No Connect
134	EBICS3/RJ7	No Connect	No Connect
135	EBID0/PMD0/RE0	93	LCD1_DB0
136	VSS	15, 31, 36, 45, 65, 75	VSS
137	VDD	2, 16, 30, 37, 45, 55, 62, 86	VDD
138	EBID1/PMD1/RE1	94	LCD1_DB1
139	TRD2/SQID2/RG14	TH7	Not Applicable
140	TRD1/SQID1/RG12	TH5	Not Applicable
141	TRD0/DQID0/RG13	TH3	Not Applicable
142	EBID2/PMD2/RE2	98	LCD1_DB2
143	EBID3/RPE3/PMD3/RE3	99	LCD1_DB3
144	EBID4/AN18/PMD4/RE4	100	LCD1_DB4

# PIC32MZ2048ECH144, PIC32MZ2048EFH144

FIGURE 1: 100-PIN PIM SOCKET SCHEMATIC



# PIC32MZ2048ECH144, PIC32MZ2048EFH144

FIGURE 2: 144-PIN PIM DEVICE SCHEMATIC

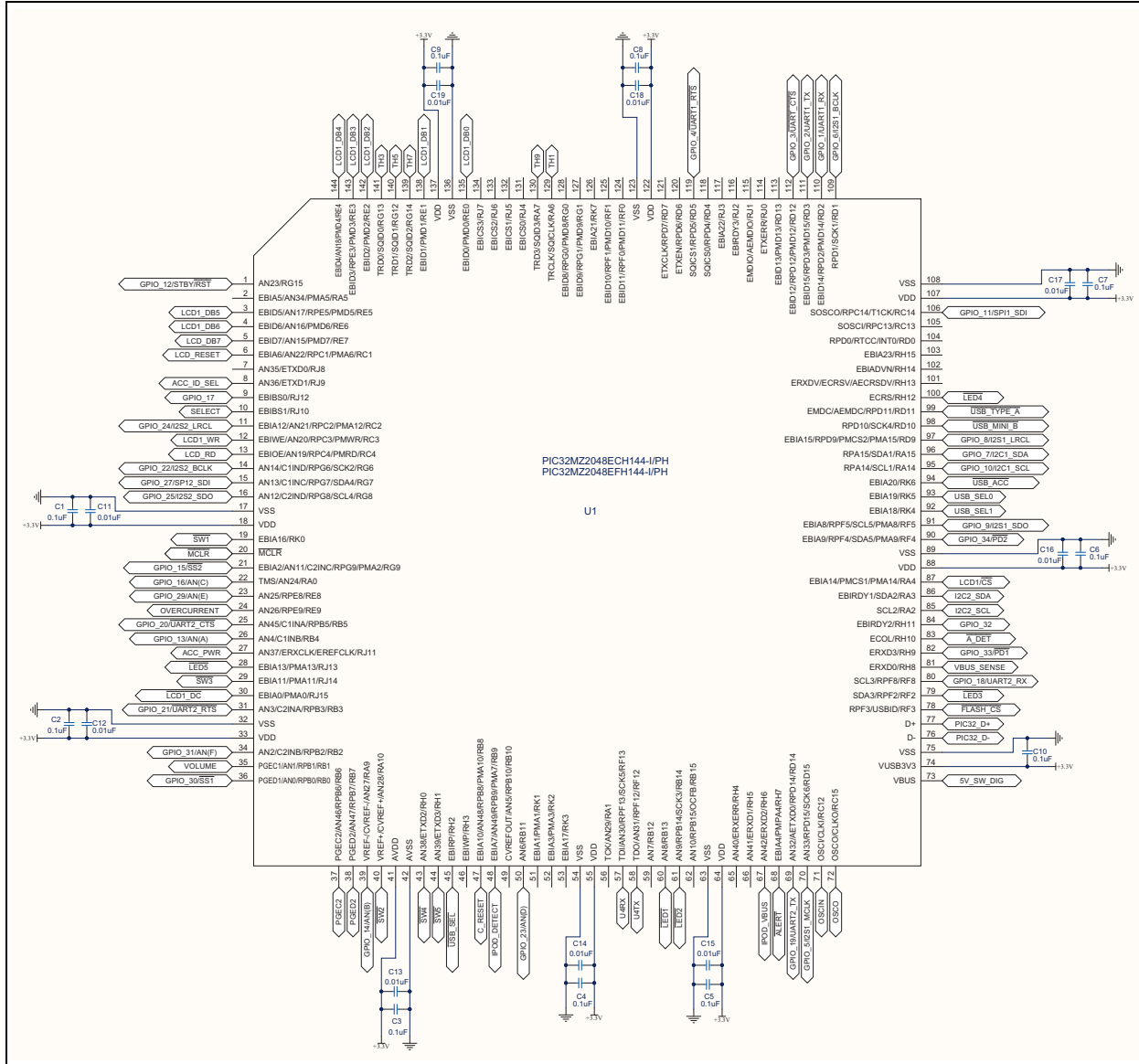
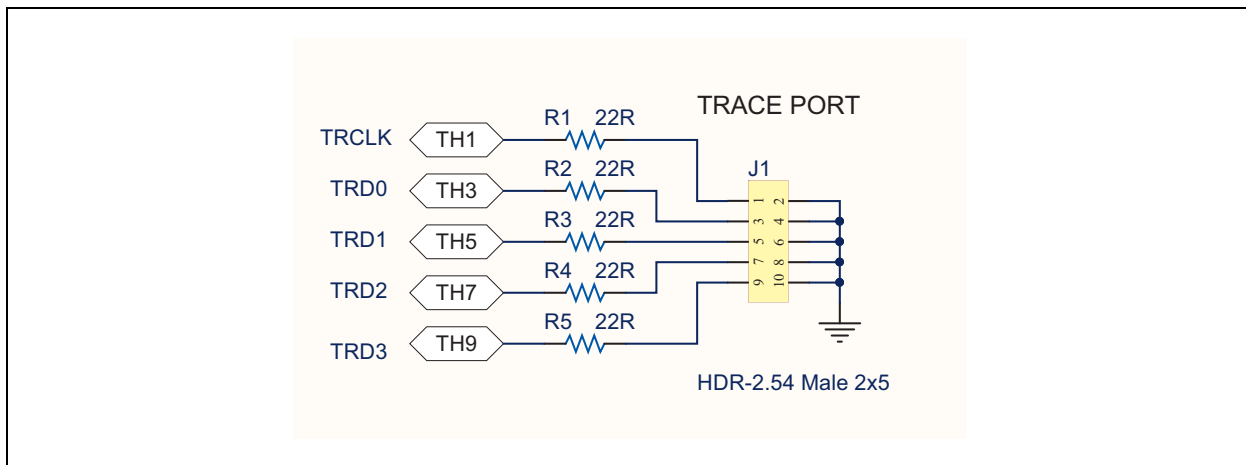


FIGURE 3: TRACE PORT SCHEMATIC



# PIC32MZ2048ECH144, PIC32MZ2048EFH144

---

## REVISION HISTORY

### Revision A (May 2015)

This is the initial released version of this document.

# PIC32MZ2048ECH144, PIC32MZ2048EFH144

---

NOTES:



---

**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.

---

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights.

#### **Trademarks**

The Microchip name and logo, the Microchip logo, dsPIC, FlashFlex, flexPWR, JukeBlox, KEELOQ, KEELOQ logo, Klear, LANCheck, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC<sup>32</sup> logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

The Embedded Control Solutions Company and mTouch are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, ECAN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, KlearNet, KlearNet logo, MiWi, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, RightTouch logo, REAL ICE, SQI, Serial Quad I/O, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2015, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-63277-363-0

**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<sup>®</sup> MCUs and dsPIC<sup>®</sup> DSCs, KEELOQ<sup>®</sup> 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.*



# MICROCHIP

## 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](http://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 - Dongguan**  
Tel: 86-769-8702-9880

**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

### ASIA/PACIFIC

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

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

**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: 886-7-213-7828

**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

01/27/15

## X-ON Electronics

Largest Supplier of Electrical and Electronic Components

*Click to view similar products for [Daughter Cards & OEM Boards](#) category:*

*Click to view products by [Microchip](#) manufacturer:*

Other Similar products are found below :

[ADZS-21262-1-EZEXT](#) [27911](#) [SPC56ELADPT144S](#) [TMDXRM46CNCD](#) [DM160216](#) [EV-ADUCM350GPIOHZ](#) [EV-ADUCM350-BIO3Z](#)  
[ATSTK521](#) [1130](#) [MA160015](#) [MA180033](#) [MA240013](#) [MA240026](#) [MA320014](#) [MA330014](#) [MA330017](#) [TLK10034SMAEVM](#) [MIKROE-](#)  
[2152](#) [MIKROE-2154](#) [MIKROE-2381](#) [TSSOP20EV](#) [DEV-11723](#) [MIKROE-1108](#) [MIKROE-1516](#) [SPS-READER-GEVK](#) [AC244049](#)  
[AC244050](#) [AC320004-3](#) [2077](#) [ATSMARTCARD-XPRO](#) [EIC - Q600 -230](#) [ATZB-212B-XPRO](#) [SPC560PADPT100S](#) [SPC560BADPT64S](#)  
[MA180018](#) [EIC - Q600 -220](#) [AC164134-1](#) [BOB-12035](#) [STM8/128-D/RAIS](#) [AC164127-6](#) [AC164127-4](#) [AC164134-3](#) [AC164156](#) [MA320021](#)  
[MA320024](#) [DFR0285](#) [DFR0312](#) [DFR0356](#) [MA320023](#) [MIKROE-2564](#)