SecureIoT1702 Development Board

User's Guide

Microchip Direct Order #DM990012

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: 9781522426684

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.

Table of Contents

Preface

NOTICE TO CUSTOMERS

All documentation becomes dated, and this manual is no exception. Microchip tools and documentation are constantly evolving to meet customer needs, so some actual dialogs and/or tool descriptions may differ from those in this document. Please refer to our web site (www.microchip.com) to obtain the latest documentation available.

Documents are identified with a "DS" number. This number is located on the bottom of each page, in front of the page number. The numbering convention for the DS number is "DSXXXXXA", where "XXXXX" is the document number and "A" is the revision level of the document.

For the most up-to-date information on development tools, see the MPLAB® IDE online help. Select the Help menu, and then Topics to open a list of available online help files.

INTRODUCTION

This chapter contains general information that will be useful to know before using the SecureIoT1702 Development Board. Items discussed in this chapter include:

- Document Layout
- Conventions Used in this Guide
- The Microchip Web Site
- Development Systems Customer Change Notification Service
- Customer Support
- Document Revision History

DOCUMENT LAYOUT

This document describes how to use the SecureIoT1702 Development Board. The manual layout is as follows:

- **Chapter 1. "Introduction"** – Shows a brief description of the SecureIoT1702 Development Board.
- **Chapter 2. "Features"** – Identifies the SecureIoT1702 Development Board layout.
- **Chapter 3. "Recommended Tools and Accessories"** – Provides tools and accessories to get started with the SecureIoT1702 Development Board.
- **Chapter 4. "Powering the SecureIoT1702 Development Board"** – Explains how the SecureIoT1702 Development Board is powered.
- **Chapter 5. "Jumper Options"** – Provides a table which summarizes several jumpers.
- **Chapter 6. "Using the FT230X USB-Serial Converter"** – Provides information on a USB-UART interface for the SecureIoT1702 Development Board.

- **Chapter 7. “Programming and Debugging”** - Explains how to debug and program the SecureIoT1702 Development Board.
- **Chapter 8. “Schematics”** - Provides SecureIoT1702 Schematic.
- **Chapter 9. “Bill of Materials”** - Provides SecureIoT1702 Bill of Materials.

CONVENTIONS USED IN THIS GUIDE

This manual uses the following documentation conventions:

DOCUMENTATION CONVENTIONS

Description	Represents	Examples
Arial font:		
Italic characters	Referenced books	*MPLAB® IDE User’s Guide*
	Emphasized text	...is the *only* compiler...
Initial caps	A window	the Output window
	A dialog	the Settings dialog
	A menu selection	select Enable Programmer
Quotes	A field name in a window or dialog	“Save project before build”
Underlined, italic text with right angle bracket	A menu path	*File>Save*
Bold characters	A dialog button	Click **OK**
	A tab	Click the **Power** tab
N‘Rnnnn	A number in verilog format, where N is the total number of digits, R is the radix and n is a digit.	4‘b0010, 2‘hF1
Text in angle brackets < >	A key on the keyboard	Press <Enter>, <F1>
Courier New font:		
Plain Courier New	Sample source code	`#define START`
	Filenames	`autoexec.bat`
	File paths	`c:\mcc18\h`
	Keywords	`_asm, _endasm, static`
	Command-line options	`-Opa+, -Opa-`
	Bit values	`0, 1`
	Constants	`0xFF, ‘A’`
Italic Courier New	A variable argument	*`file`*`.o`, where *`file`* can be any valid filename
Square brackets [ ]	Optional arguments	`mcc18 [options]` *`file`* `[options]`
Curly brackets and pipe character: { | }	Choice of mutually exclusive arguments; an OR selection	`errorlevel {0|1}`
Ellipses...	Replaces repeated text	`var_name [, var_name...]`
	Represents code supplied by user	`void main (void) { ... }`

THE MICROCHIP WEB SITE

Microchip provides online support via our web 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 (FAQs), 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

DEVELOPMENT SYSTEMS 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, click on Customer Change Notification and follow the registration instructions.

The Development Systems product group categories are:

- **Compilers** – The latest information on Microchip C compilers, assemblers, linkers and other language tools. These include all MPLAB C compilers; all MPLAB assemblers (including MPASM assembler); all MPLAB linkers (including MPLINK object linker); and all MPLAB librarians (including MPLIB object librarian).
- **Emulators** – The latest information on Microchip in-circuit emulators.This includes the MPLAB REAL ICE and MPLAB ICE 2000 in-circuit emulators.
- **In-Circuit Debuggers** – The latest information on the Microchip in-circuit debuggers. This includes MPLAB ICD 3 in-circuit debuggers and PICkit 3 debug express.
- **MPLAB IDE** – The latest information on Microchip MPLAB IDE, the Windows Integrated Development Environment for development systems tools. This list is focused on the MPLAB IDE, MPLAB IDE Project Manager, MPLAB Editor and MPLAB SIM simulator, as well as general editing and debugging features.
- **Programmers** – The latest information on Microchip programmers. These include production programmers such as MPLAB REAL ICE in-circuit emulator, MPLAB ICD 3 in-circuit debugger and MPLAB PM3 device programmers. Also included are nonproduction development programmers such as PICSTART Plus and PIC-kit 2 and 3.

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

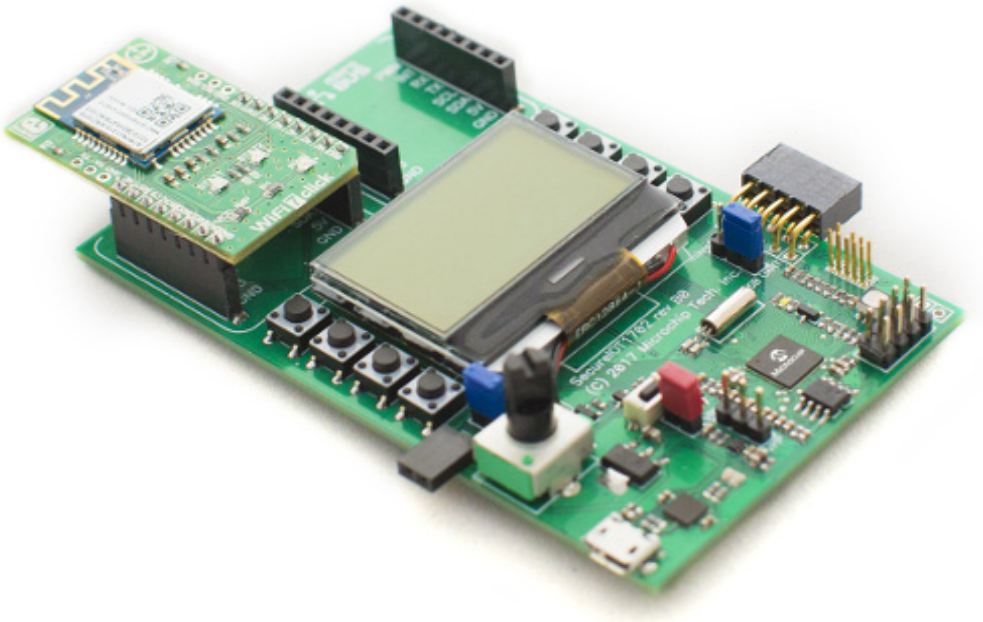
DOCUMENT REVISION HISTORY

Revision	Section/Figure/Entry	Correction
DS50002729A (02-12-18)	Initial Release	

Chapter 1. Introduction

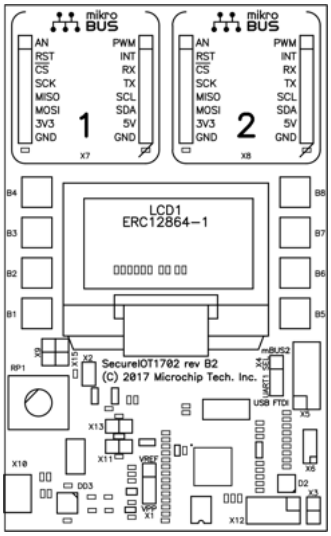
1.1 INTRODUCTION

The SecureIoT1702 Development Board is intended as a development, demonstration, and testing platform for Internet-of-Things applications using the CEC1702, a 32-bit ARM® Cortex®-M4-based microcontroller with additional security peripherals. The board features a variety of hardware options (including a power supply, user interface, serial communications, and expansion headers) that enable rapid prototyping and development of embedded, secure Internet-of-Things applications. In addition to the native hardware features provided by the SecureIoT1702, hardware expansion is possible through the use of mikroBUS™ accessory boards.



Chapter 2. Features

2.1 SECUREIOT1702 BOARD LAYOUT



1. USB micro-B connector - Provides power to the board and provides an interface for serial input/output using the FT230X Serial-to-USB converter.
2. 10 kΩ Potentiometer – useful as an analog signal source for ADC demonstration or user interface purposes.
3. Analog-to-Digital Converter expansion header – provides an expansion header for variable-resistance circuit elements, such as a thermistor.
4. 32.768 kHz crystal oscillator – provides an external high-precision clock source on the CEC1702's XTAL1/2 oscillator input pins.
5. SST26VF032B Serial Flash – Stores the program image for the CEC1702 and provides additional persistent storage for application information.
6. Serial Flash programming header
7. Color LED – Full color PWM-driven LED.
8. Status Indication LED – Output LED for the CEC1702's Blinking/Breathing LED hardware module.
9. LED Output Header – Expansion header for the second CEC1702 Blinking/Breathing LED hardware module.
10. JTAG Debugging Header
11. I2C Expansion Header
12. 128x64 pixel LCD – EastRising ERC12864 SPI-interface LCD. Useful for displaying user application text/images.
13. 8x general-purpose pushbuttons – provides user input. Readable by the CEC1702's hardware keyscan module or by general-purpose I/O input.
14. 2x mikroBUS™ Interfaces – useful for attaching a wide array of hardware expansion boards to extend the functionality of the platform.

Chapter 3. Recommended Tools and Accessories

To begin development with the CEC1702 and SecureIoT1702, we recommend the Keil µVision® IDE and the MDK-ARM® Standard Cortex®-M compiler license.

Microchip provides several free firmware projects and libraries that are compatible with the SecureIoT1702 Development Board. These demos show the basic functionality of the SecureIoT1702 Development Board and the CEC1702. Details on the usage of these example projects can be found in the documentation accompanying the projects.

The SecureIoT1702's mikroBUS™ expansion headers allow interfacing with a wide variety of click boards™. A list of boards that may facilitate application development is available from MikroElektronika.

MikroElektronika is a trusted third-party tool provider.

Notice: ARM and Cortex are the registered trademarks of ARM Limited in the EU and other countries.

Chapter 4. Powering the SecureIoT1702 Development Board

The SecureIoT1702 is powered directly through the USB micro-B port of the USB-Serial converter (X10). The 5 V input from the USB voltage rail is regulated to 3.3 V by an MCP1755S voltage regulator. A shunt resistor (R30) is provided to allow measurement of the total system power consumption and a jumper (X11) is provided to allow current measurement on the 3.3 V rail.

When operating on USB power only, the total current (sum of 3.3 V + five rail currents) that may be drawn by hardware modules (e.g. CEC1702, mikroBUS™ accessory boards, LCD, and hardware expansion boards) should not exceed 500 mA.

Chapter 5. Jumper Options

The SecureIoT1702 Development Board has several jumpers, summarized as follows:

Jumper	Description	Details
X1	Voltage Reference Input Select	Selects the positive voltage input to the VREF_ADC pin. Shorting the center pin to "VREF" will provide a Vdd/3.3V reference. Shorting the center pin to "VPP" will provide a reference voltage of ~1.59 V when the VPP_EN pin (GPIO012) is driven high; this voltage is required by the CEC1702's EFUSE programming sequence. See the CEC1702 Data Sheet EFUSE chapter for additional information.
X4	Serial Converter Input Select	Selects the UART1 RX source. Shorting the center pin to "mikroBUS" will allow the CEC1702 to receive UART input from the mikroBus 2 connector. Shorting the center pin to "USB UART" will allow the CEC1702 to receive UART input from the FT230X USB-Serial converter.
X11	3.3 V Current Sense	Provides a test point to measure the power consumption on the 3.3 V rail. Removing this jumper will also hard-reset the board.
X15	ADC Header Pull-up	Enables a 3.3 V pull-up for the Analog-to-Digital Converter expansion header.

Chapter 6. Using the FT230X USB-Serial Converter

The FT230X provides a convenient USB-UART interface for the SecureIoT1702 Development Board which can be used to create an interface between the CEC1702 and a host device (e.g. a PC serial terminal application).

6.1 USB DRIVER INSTALLATION

Virtual Com Port drivers for the FT230X are available from FTDI.

6.2 IDENTIFYING AND CONNECTING TO THE FT230X

Once the USB drivers are properly installed, a new serial port object should become available for application use. Under Windows, the serial port should become visible from the Windows Device Manager, in the "Ports (COM & LPT)" category, and should be assigned a new COMx name (where x is a number, ex: "COM2"). The exact COMx number assigned to the hardware will depend in part upon how many COMx based hardware devices have previously been connected to the machine, as each new hardware instance must be assigned a new and unique number, to avoid potential conflicts (e.g., two simultaneously attached hardware devices are not allowed to share the same COMx number).

If a machine currently has more than one COMx based hardware device attached to the machine, multiple COMx entries (but different numbers, e.g., COM1 and COM2) may exist in the Windows Device Manager "Ports (COM & LPT)" category, and it may not be clear which COMx port number is specifically associated with the FT230X device. If this occurs, the COMx number can be manually identified by temporarily detaching the USB connection to the FT230X, while watching the Windows Device Manager, to identify which device entry disappears (and subsequently re-appears in the list, upon re-attaching the FT230X).

Once the COMx port number assigned to the FT230X is known, any conventional serial port terminal program can be used to open/close/read/write to the COMx port. Upon opening the COMx port and writing characters to it, the FT230X will forward the characters out the hardware UART TX pin (which would normally be connected to the PIM microcontroller via jumper J37). Similarly, characters originating from the Explorer 16/32 Development Board (or attached accessories) will be transmitted to the host terminal program, when J38 is capped. Although any standard third party serial terminal program can be used, Microchip provides an example USB serial terminal program called "ComXDBG", which implements the UART Bootloader firmware-programming feature.

Chapter 7. Programming and Debugging

The CEC1702's program and data memory are RAM based. On power-up, a ROM bootloader on the device loads the application code from the external serial flash on the SecureIoT1702. Debugging is accomplished by loading the target code into RAM directly using a JTAG debugger. Programming is accomplished by programming the code image into the serial flash.

7.1 DEBUGGING

The SecureIoT1702 exposes the CEC1702's JTAG debug interface through the X6 header. You can debug your application using a JTAG Debugger such as the Keil ULINKpro with the 10-pin Cortex Debug Connector.

7.2 PROGRAMMING

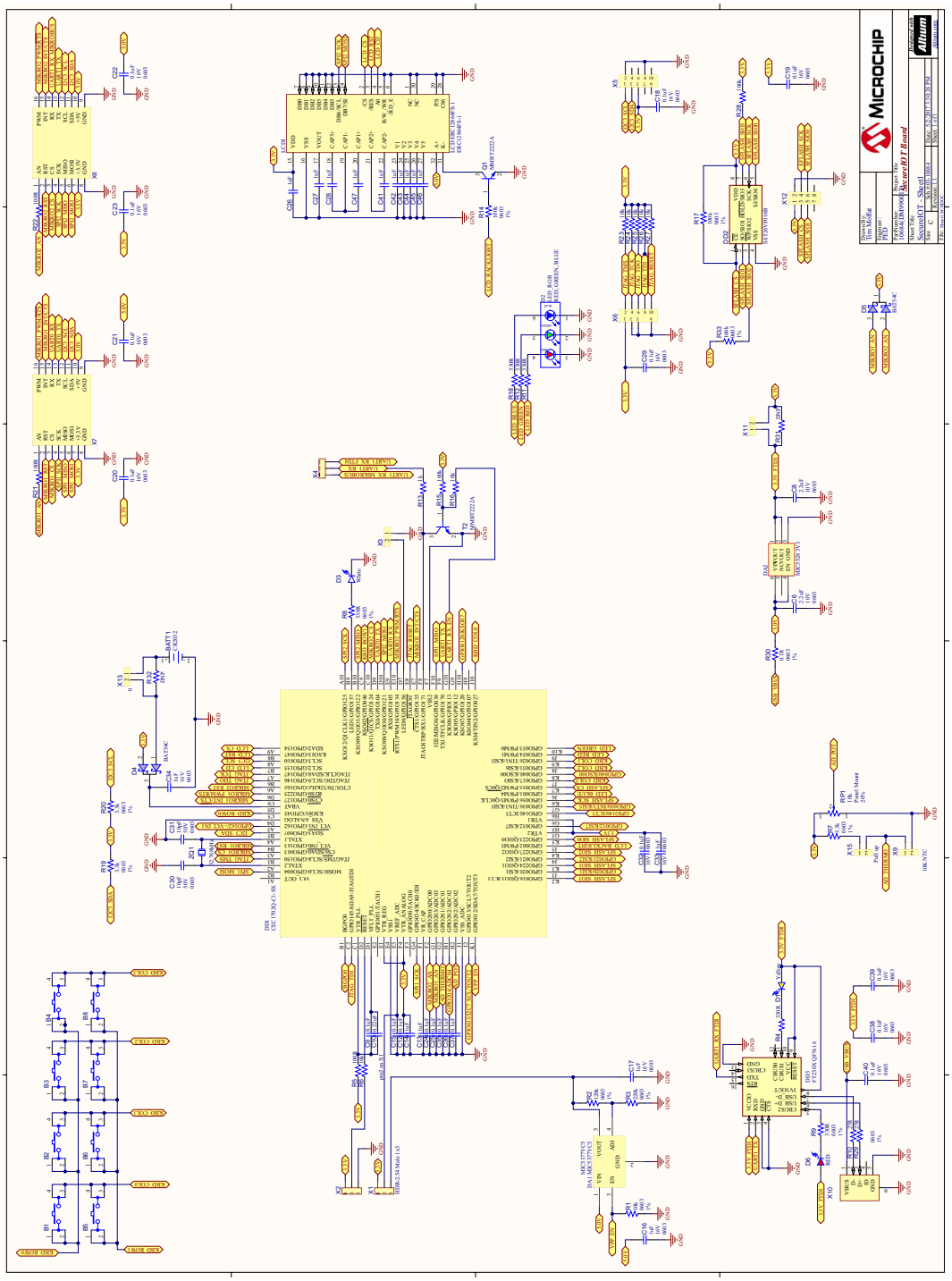
The CEC1702 firmware application is stored in the external SPI flash device. A programmer header is added for using an external SPI flash programmer (such as Dediprog SF100) to program the firmware application.

When programming the SPI flash device using an external SPI programmer, the CEC1702 must be in the reset state by holding the RESETI# pin low. The way this is done depends on the version of the SecureIoT1702 demo board:

- Version B2.1: Use the X2 jumper.
- Version B2.0: If the X2 jumper is not present, use a jumper to connect pin 2 to pin 4 of X12. This will prevent the firmware from loading via SPI during Power On Reset and stall the CEC1702. You can then switch to the external SPI programmer to program the application firmware.

Chapter 8. Schematic

8.1 SECUREIOT1702 SCHEMATIC



Chapter 9. Bill of Materials

9.1 SECUREIOT1702 BILL OF MATERIALS

Reference	Description	Manufacturer	Manufacturer Part Number
B1, B2, B3, B4, B5, B6, B7, B8	SWITCH TACT SPST 12V 50mA PTS645SM43SMTR92 LFS SMD	Wurth Electronics Inc	430182043816
BATT1	BATT HOLDER Retainer SMD CR2016, CR2020, CR2025, CR2032	Keystone	3002TR
C6, C8	CAP CER 2.2uF 10V 10% X7R SMD 0603	Murata	GRM188R71A225KE15D
C9, C12, C15, C18, C19, C20, C21, C22, C23, C24, C25, C29, C32, C35, C36, C37, C38, C39, C40	CAP CER 0.1uF 16V 10% X7R SMD 0603	Wurth Electronics Inc	885012206046
C10	CAP CER 0.22uF 25V 10% X7R SMD 0805	Panasonic	ECJ-2YB1E224K
C13, C14, C16, C17, C26, C27, C28, C33, C34, C41, C42, C43, C44, C45, C46, C47	CAP CER 1uF 16V 10% X5R SMD 0603	AVX	0603YD105KAT2A
C30, C31	CAP CER 10pF 50V 5% NP0 SMD 0603	KEMET	C0603C100J5GACTU
D1	DIO LED YELLOW 2.1V 20mA 8mcd Clear SMD 0603	Kingbright	APT1608YC
D2	DIO LED TRI RED, GREEN, BLUE 2.1V, 3.0V, 3.2V 50mA, 35mA, 35mA SMD 6-PLCC	Cree Inc	CLX6D-FKB-CMPQS-GKBB7A363
D3	DIO LED Cool White 2.85V 5mA 147.5mcd Diffused SMD 0603	OSRAM Opto Semiconductors Inc.	LW Q38G-Q1OO-3K6L-1
D4	DIO SCTKYARR BAT54C 800mV 200mA 30V SOT-23-3	Fairchild	BAT54C
D5	DIO SCTKYARR BAT54C 530mV 200mA 30V SOT-23-3	Diodes Incorporated	BAT54CTA
D6	DIO LED RED 2V 30mA 2mcd Clear SMD 0603	Lite-On	LTST-C190EKT
DD3	IC USB SERIAL BASIC UART 16QFN	FTDI, Future Technology Devices International Ltd	FT230XQ-T
LCD1	DISPLAY LCD MODULE COG GRAPHIC 128x64 DISPLAY ST7565R ERC12864FS-1	EastRising Technology Co., Limited	ERC12864FS-1

Reference	Description	Manufacturer	Manufacturer Part Number
Q1, T2	TRANS BJT NPN MMBT2222A 40V 1A 350mW SOT-23	Fairchild Semiconductor	MMBT2222A
R1	RES TF 10k 1% 1/16W SMD 0603	TE Connectivity	5-1879337-9
R2	RES TKF 120k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1203V
R3	RES TKF 220k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF2203V
R4, R8, R9, R11, R12, R18	RES TKF 330R 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF3300V
R5	RES TKF 100R 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1000V
R6, R16, R23, R24, R25, R26, R27	RES TKF 10k 5% 1/10W SMD 0603	Panasonic	ERJ-3GEYJ103V
R7, R19, R20	RES TKF 3.3k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF3301V
R10, R29	RES SMD 27 OHM 1% 1/10W 0603	Yageo	RC0603FR-0727RL
R13	RES TKF 1k 1% 1/10W SMD 0603	Panasonic	ERJ-3EKF1001V
R14, R15, R17, R28, R33	RES TF 100k 1% 1/8W SMD 0603	Vishay	MCT06030C1003FP500
R21, R22	RES TKF 100R 5% 1/10W SMD 0603	Vishay	CRCW0603100RJNEA
R30	RES TKF 0.1R 1% 1/10W SMD 0603	Panasonic	ERJ-3RSFR10V
RP1	RES VARIABLE 10K 20% TH	ALPS	RK09K1130A5R
X1, X2, X4	CON HDR-2.54 Male 1x3 Tin 5.84MH TH VERT	Samtec	TSW-103-07-T-S
X3, X9, X11, X13, X15	CON HDR-2.54 Male 1x2 Gold 5.84MH TH VERT	FCI	77311-118-02LF
X5	CON HDR-2.54 FEMALE 2X5 GOLD TH VERT	Samtec Inc.	SSQ-105-02-G-D
X6	HDR M 1.27mm 2x5 TH V	Samtec	FTSH-105-01-F-D-007-K
X7, X8	"Connector Header 8 Position 0.100"" (2.54mm) Tin Through Hole"	Sullins Connector Solutions	PPTC081LFBN-RC
X10	CON USB2.0 MICRO-B FEMALE TH/SMD R/A	FCI	10118194-0001LF
X12	CON HDR-2.54 Male 2x4 Gold 5.84MH TH VERT	Wurth Electronics Inc	61300821121
ZQ1	CRYSTAL 32.768kHz 12.5pF SMD ABS07	Seiko	SC32S-12.5PF20PPM
DA1	IC REG LDO ADJ 0.15A SC70-5	Microchip Technology	MIC5377YC5-TR
DA2	MCHP ANALOG LDO 3.3V MIC5528-3.3YMT-TR 6-TDFN	Microchip Technology	MIC5528-3.3YMT-TR
DD1	CRYPTO EMBEDDED CONTROLLER 480 K	Microchip Technology	CEC1702Q-B1-SX
DD2	MCHP MEMORY SERIAL FLASH 16M 104MHz SST26VF016B-104I/SM SOIJ-8	Microchip Technology	SST26VF016B-104I/SM

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

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
Tel: 317-536-2380

Los Angeles
Mission Viejo, CA
Tel: 949-462-9523
Fax: 949-462-9608
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
Fax: 905-695-2078

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 - Xian
Tel: 86-29-8833-7252

China - Xiamen
Tel: 86-592-2388138

China - Zhuhai
Tel: 86-756-3210040

ASIA/PACIFIC

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

EUROPE

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

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

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

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

Germany - Garching
Tel: 49-8931-9700

Germany - Haan
Tel: 49-2129-3766400

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

Germany - Karlsruhe
Tel: 49-721-625370

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

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

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

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

Italy - Padova
Tel: 39-049-7625286

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

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
Fax: 34-91-708-08-91

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

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

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