

## Americas

Atlanta - 678-957-9614  
Boston - 774-760-0087  
Chicago - 630-285-0071  
Cleveland - 216-447-0464  
Dallas - 972-818-7423  
Detroit - 248-538-2250  
Indianapolis - 317-773-8323  
Los Angeles - 949-462-9523  
Phoenix - 480-792-7200  
Santa Clara - 408-961-6445  
Toronto - 905-673-0699

## Asia/Pacific

Australia - Sydney - 61-2-9868-6733  
China - Beijing - 86-10-8569-7000  
China - Chengdu - 86-28-8665-5511  
China - Chongqing - 86-23-8980-9500  
China - Hangzhou - 86-571-2819-3187  
China - Hong Kong SAR - 852-2401-1200  
China - Nanjing - 86-25-8473-2460  
China - Qingdao - 86-532-8502-7355  
China - Shanghai - 86-21-5407-5533  
China - Shenyang - 86-24-2334-2829  
China - Shenzhen - 86-755-8203-2660  
China - Wuhan - 86-27-5980-5300  
China - Xian - 86-29-8833-7252  
China - Xiamen - 86-592-2388138  
China - Zhuhai - 86-756-3210040  
India - Bangalore - 91-80-3090-4444  
India - New Delhi - 91-11-4160-8631  
India - Pune - 91-20-2566-1512  
Japan - Osaka - Tel: 81-66-152-7160  
Japan - Yokohama - 81-45-471-6166  
Korea - Daegu - 82-53-744-4301  
Korea - Seoul - 82-2-554-7200  
Malaysia - Kuala Lumpur - 60-3-6201-9857  
Malaysia - Penang - 60-4-227-8870  
Philippines - Manila - 63-2-634-9065  
Singapore - 65-6334-8870  
Taiwan - Hsin Chu - 886-3-5778-366  
Taiwan - Kaohsiung - 886-7-213-7830  
Taiwan - Taipei - 886-2-2500-6610  
Thailand - Bangkok - 66-2-694-1351

## Europe

Austria - Weis - 43-7242-2244-39  
Denmark - Copenhagen - 45-4450-2828  
France - Paris - 33-1-69-53-63-20  
Germany - Munich - 49-89-627-144-0  
Italy - Milan - 39-0331-742611  
Netherlands - Drunen - 31-416-690399  
Spain - Madrid - 34-91-708-08-90  
UK - Wokingham - 44-118-921-5869

11/29/11



Microchip Technology Inc. • 2355 West Chandler Blvd. • Chandler, AZ 85224-6199

[www.microchip.com](http://www.microchip.com)

The Microchip name and logo, the Microchip logo and MPLAB are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. PICtail and PICkit are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries. All other trademarks mentioned herein are property of their respective companies. © 2011, Microchip Technology Incorporated, Printed in the U.S.A. All Rights Reserved. 12/11

DS52026A

# Introducing the LCD Explorer Demonstration Board

## Overview

The LCD Explorer Demonstration Board is the latest 8-Common LCD Board for evaluation of the PIC24F and PIC18F LCD devices. The board comes with a PIC24FJ128GA310 PIM and has a PICtail™ Plus connector to showcase the PICtail™ Plus with the LCD microcontroller. Future devices with the 8-Common and 1/3 biasing will be supported on this demonstration board.

## Features

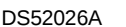
- Eight Common LCD glass
- Supports 1/3 biasing with:
  - External resistor ladder
  - Internal resistor ladder
  - Charge pump biasing with capacitor
- Supports software as well as hardware contrast control
- Hardware RTCC support
- VBAT operation during VDD loss, RTCC can run on VBAT without VDD
- Analog pot to display the A/D capability
- Temperature sensor to display temperature using A/D
- PICtail Plus expansion connector for easy system evaluation with the PICtail Plus daughter cards<sup>(1)</sup>
- CTMU switch to showcase touch sensing
- Four switches implemented for software demonstration
- Three ways to power the board:
  - Using the 9V power supply
  - Through a USB connector
  - Using two AAA batteries (not recommended for PICtail Plus)
- Connector for VBAT current measurement

**Note 1:** Only the upper slot can be used for the PICtail Plus.

## Demonstration Software Operation

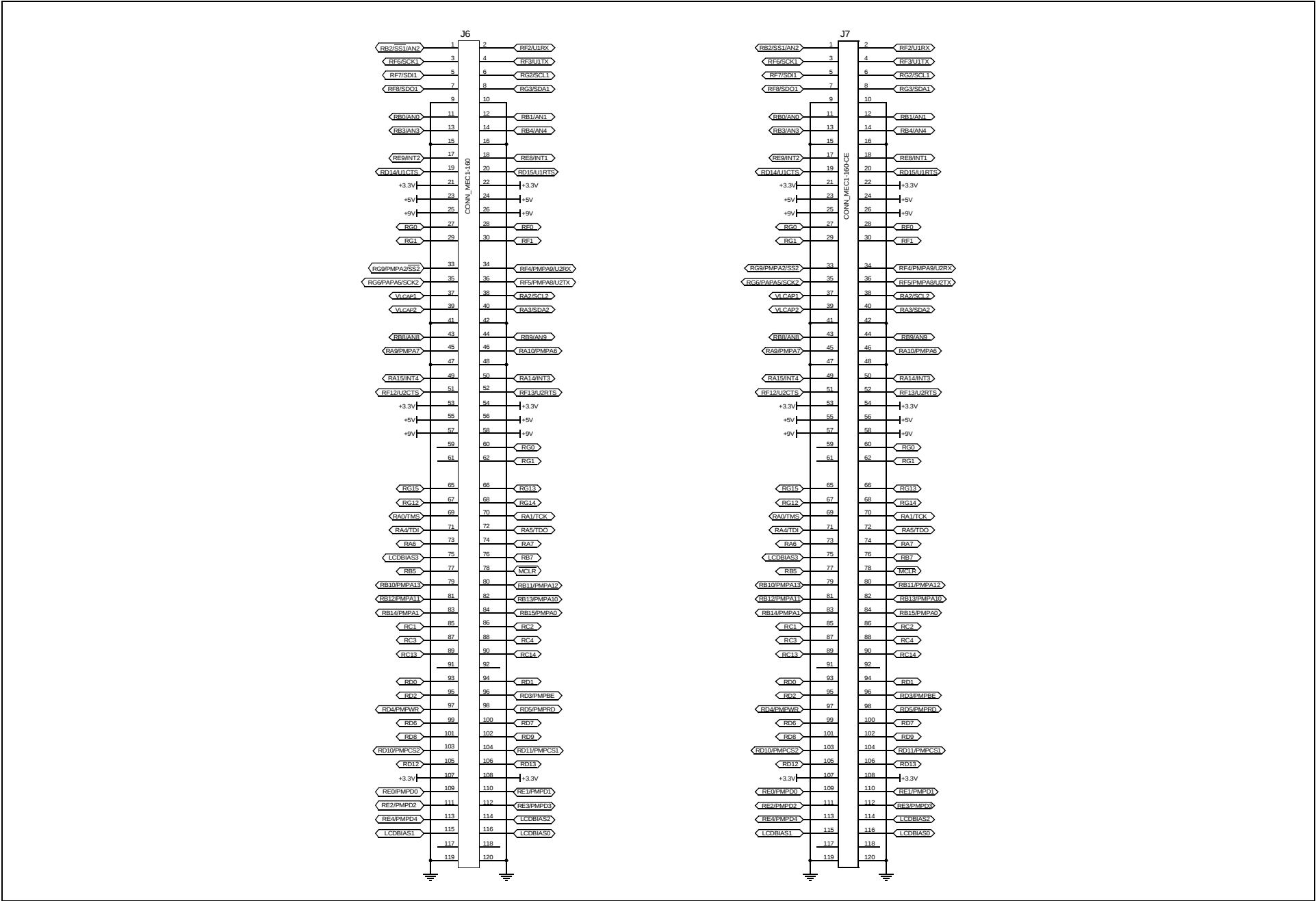
1. **Scrolling Banner:** In this mode, the LCD will scroll text, displaying the features of the device on the board. Pressing Switches, S3 or S4, will increase or decrease the speed of the scroll and Switch S1 or S2 will take the code to the voltmeter.
2. **Voltmeter:** This mode uses the A/D module to measure the voltage of the R20 pot through the analog channel. A voltage between 0.00V and VDD is displayed on the LCD using the LCD module. The voltage is continually updated until the mode is exited by pressing either S1 or S2 (which will go to Mode 4 or Mode 2).
3. **Thermometer:** This mode uses the A/D module to measure the temperature using TC1047AVNBTR, and converts to temperature, both in Celsius and Fahrenheit. The temperature is displayed on the LCD using the LCD module. Temperature is continually updated until the mode is exited by pressing either S1 or S2.
4. **Clock:** In this mode, the hardware RTCC runs and displays the time on the LCD screen until the mode is exited by pressing either S1 or S2.
5. **Software Contrast:** This mode will showcase the software contrast control and will display the variation by changing the bias levels through software. The mode is exited by pressing either the S1 or S2 switch. The software, documentation, firmware and other material for this demo can be downloaded from: <http://www.microchip.com/LCDEXplorer>

## LCD Explorer Development Board Schematic



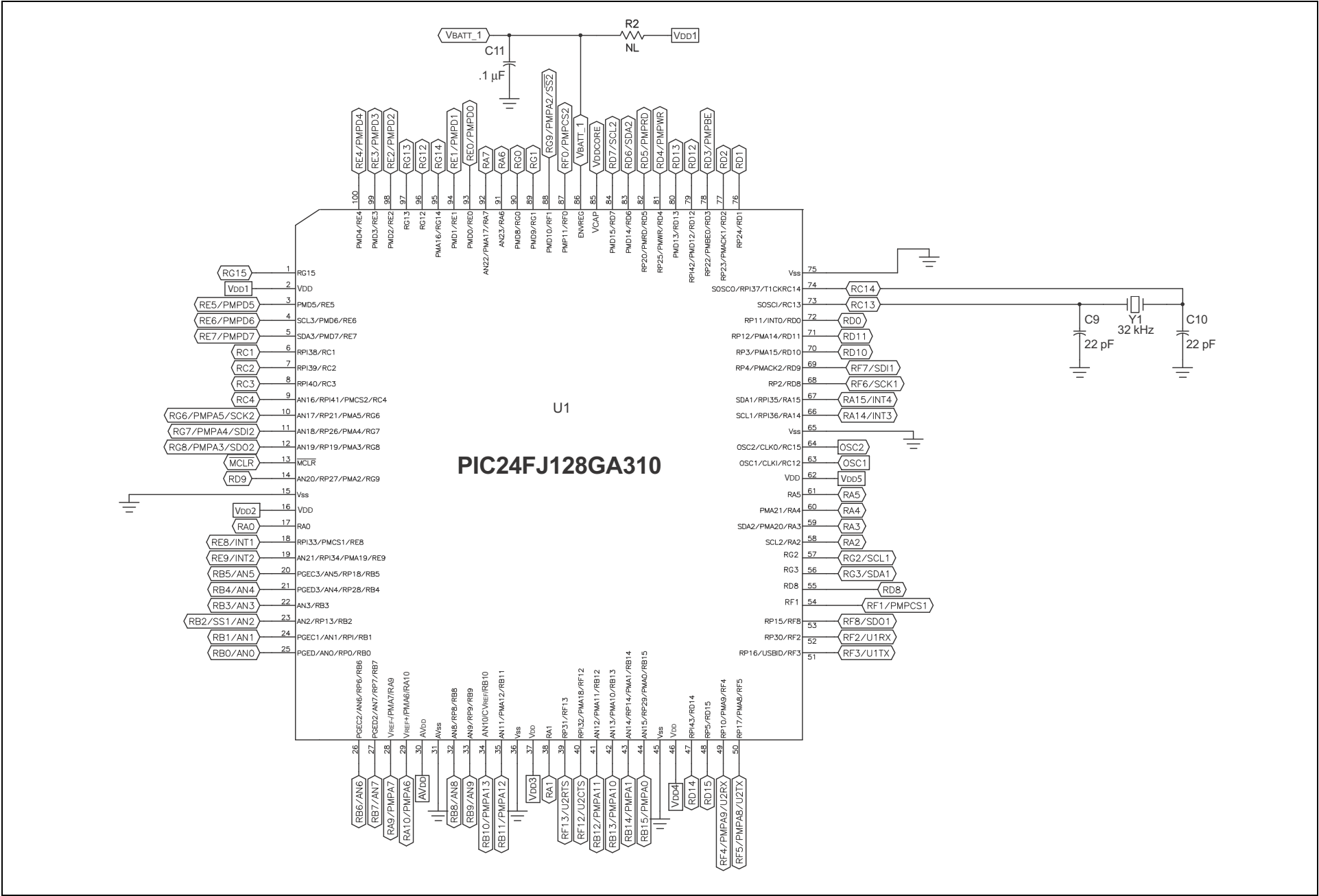
Introducing the LCD Explorer Demonstration Board

LCD Explorer Development Board Schematic (Continued)

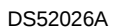


# Introducing the LCD Explorer Demonstration Board

## PIM for the PIC24FJ128GA310 LCD Plug-in Module



### **PIM for the PIC24FJ128GA310 Plug-in Module (Continued)**



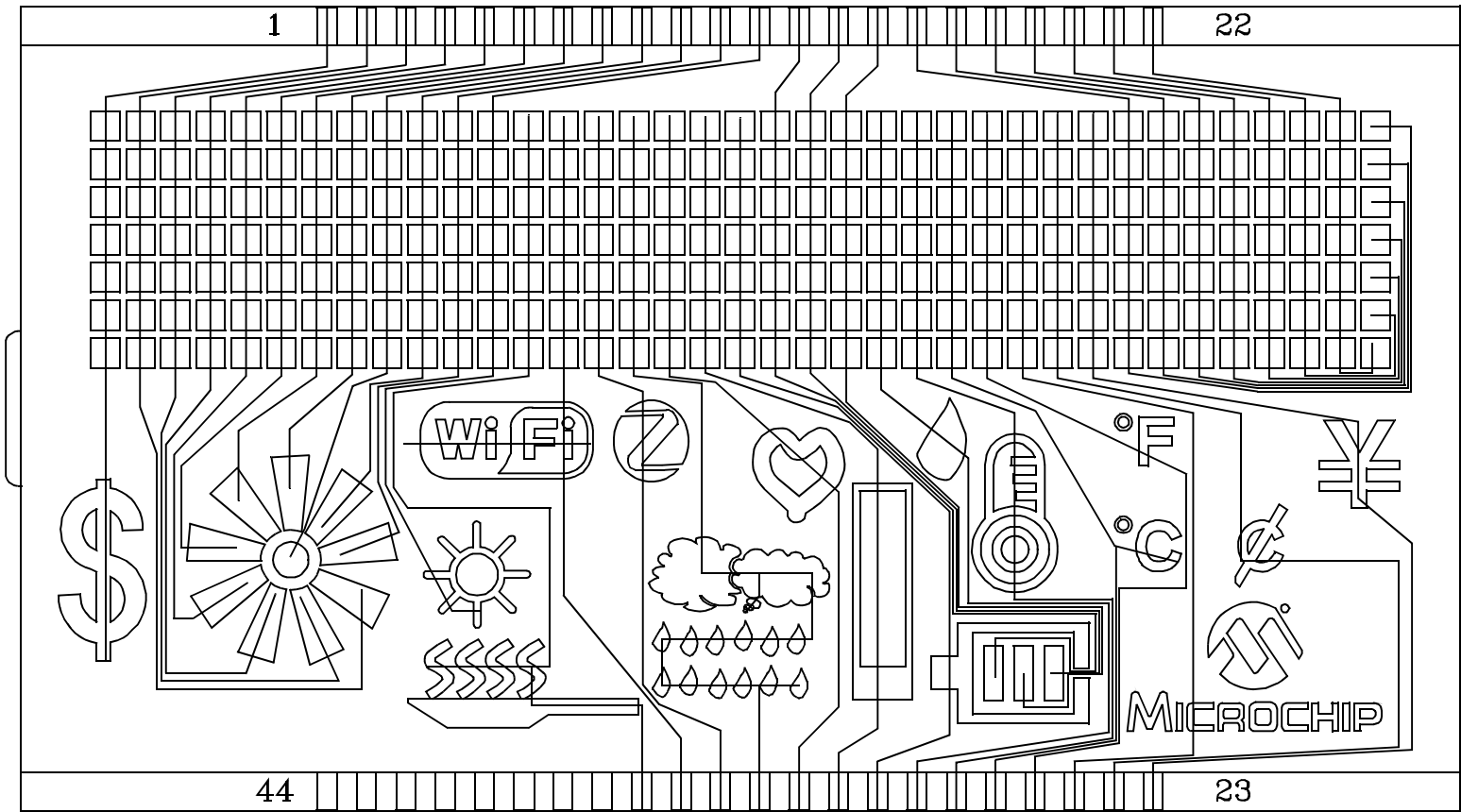
# Introducing the LCD Explorer Demonstration Board

## LCD Specifications/Connections

### LCD Glass Specification

|                       |                             |
|-----------------------|-----------------------------|
| Type                  | STN, POSITIVE               |
| Viewing Direction     | 6 o' Clock                  |
| Driving Method        | 1/8 Duty, 1/3 Bias VOP = 3V |
| Operating Temperature | -20°C to +70°C              |
| Storage Temperature   | -30°C to +80°C              |
| Connection            | PIN                         |

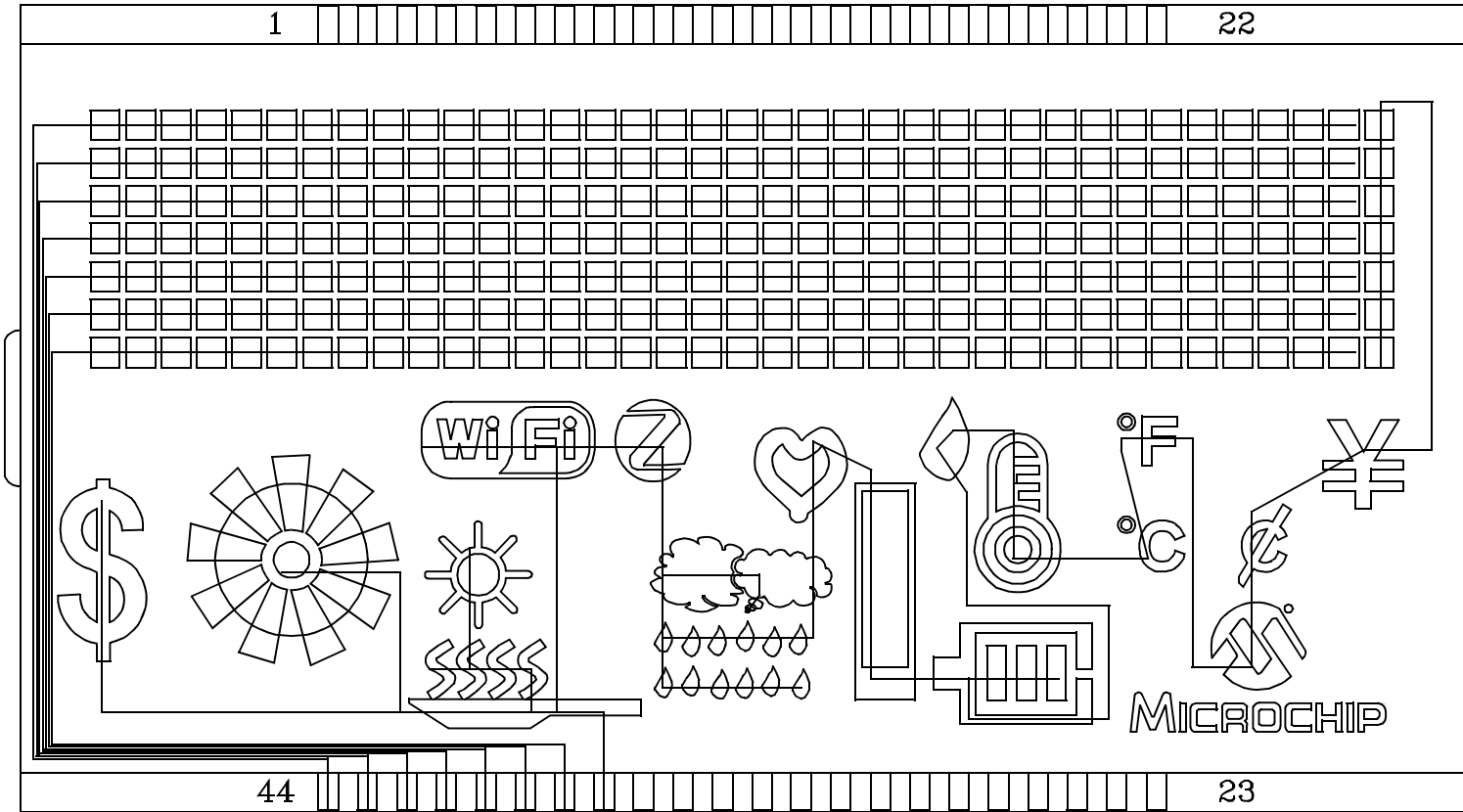
### LCD Segment Connection



Introducing the LCD Explorer Demonstration Board

LCD Connections/COM vs. Segments

LCD Common Connections



COM vs. Segment Table

| PIN  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37   | 38   | 39   | 40   | 41   | 42 | 43   | 44   |   |
|------|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|----|------|------|---|
| COM1 | 1A | 2A | 3A | 4A | 5A | 6A | 7A | 8A | 9A | 10A | 11A | 12A | 20A | 21A | 22A | 30A | 31A | 32A | 33A | 34A | 35A | 36A | 29A | 28A | 27A | 26A | 25A | 24A | 23A | 19A | 18A | 17A | 16A | 15A | 14A | 13A | \    | \    | \    | \    | \    | \  | \    | COM1 |   |
| COM2 | 1B | 2B | 3B | 4B | 5B | 6B | 7B | 8B | 9B | 10B | 11B | 12B | 20B | 21B | 22B | 30B | 31B | 32B | 33B | 34B | 35B | 36B | 29B | 28B | 27B | 26B | 25B | 24B | 23B | 19B | 18B | 17B | 16B | 15B | 14B | 13B | \    | \    | \    | \    | \    | \  | \    | COM2 | \ |
| COM3 | 1C | 2C | 3C | 4C | 5C | 6C | 7C | 8C | 9C | 10C | 11C | 12C | 20C | 21C | 22C | 30C | 31C | 32C | 33C | 34C | 35C | 36C | 29C | 28C | 27C | 26C | 25C | 24C | 23C | 19C | 18C | 17C | 16C | 15C | 14C | 13C | \    | \    | \    | \    | \    | \  | COM3 | \    | \ |
| COM4 | 1D | 2D | 3D | 4D | 5D | 6D | 7D | 8D | 9D | 10D | 11D | 12D | 20D | 21D | 22D | 30D | 31D | 32D | 33D | 34D | 35D | 36D | 29D | 28D | 27D | 26D | 25D | 24D | 23D | 19D | 18D | 17D | 16D | 15D | 14D | 13D | \    | \    | \    | \    | COM4 | \  | \    | \    | \ |
| COM5 | 1E | 2E | 3E | 4E | 5E | 6E | 7E | 8E | 9E | 10E | 11E | 12E | 20E | 21E | 22E | 30E | 31E | 32E | 33E | 34E | 35E | 36E | 29E | 28E | 27E | 26E | 25E | 24E | 23E | 19E | 18E | 17E | 16E | 15E | 14E | 13E | \    | \    | \    | COM5 | \    | \  | \    | \    | \ |
| COM6 | 1F | 2F | 3F | 4F | 5F | 6F | 7F | 8F | 9F | 10F | 11F | 12F | 20F | 21F | 22F | 30F | 31F | 32F | 33F | 34F | 35F | 36F | 29F | 28F | 27F | 26F | 25F | 24F | 23F | 19F | 18F | 17F | 16F | 15F | 14F | 13F | \    | \    | COM6 | \    | \    | \  | \    | \    | \ |
| COM7 | 1G | 2G | 3G | 4G | 5G | 6G | 7G | 8G | 9G | 10G | 11G | 12G | 20G | 21G | 22G | 30G | 31G | 32G | 33G | 34G | 35G | 36G | 29G | 28G | 27G | 26G | 25G | 24G | 23G | 19G | 18G | 17G | 16G | 15G | 14G | 13G | \    | COM7 | \    | \    | \    | \  | \    | \    | \ |
| COM8 | T1 | T2 | T3 | T4 | T5 | T6 | T7 | T8 | T9 | T10 | T11 | T12 | T20 | T21 | T22 | 37A | 37B | 37C | 37D | 37E | 37F | 37G | T29 | T28 | T27 | T26 | T25 | T24 | T23 | T19 | T18 | T17 | T16 | T15 | T14 | T13 | COM8 | \    | \    | \    | \    | \  | \    | \    | \ |

Introducing the LCD Explorer Demonstration Board

Glass Layout with the Pixel Name/Numbering

