Fujitsu Semiconductor Design (Chengdu) Co., Ltd.
Application Note

MCU-AN-500111-E-10

F²MC-8FX FAMILY

8-BIT MICROCONTROLLER

MB95410H/470H SERIES

ONE PHASE POWER METER (RN8209) SOLUTION

DISPLAY OPERATION

APPLICATION NOTE

Revision History

Version	Date	Updated by	Modifications
1.0.0	6/1/2011	Funny Chen	First Draft : Write the user manual of display function.

This manual contains 12 pages.

Contents

1 Introduction

This application note describes how to use One Phase Power Meter (RN8209) solution's display function.

Chapter 2 explains the background.

Chapter 3 explains the HW diagram of display function.

Chapter 4 explains the HW reference SCH.

Chapter 5 explains the FW diagram.

Chapter 6 explains the FW function list.

2 Background

Background of display Function

2.1 Overview

On the power meter box, there are 2 keys, display key and program key. The system's default display mode is auto roll displaying, and each display page delay for 5 seconds. When you put down the display key, display mode will change to manual roll displaying. And if you don't put down the display key for 30 seconds, display mode will change to auto roll displaying again.

3 HW Diagram

Hardware diagram of display unit

3.1 The HW diagram of display unit

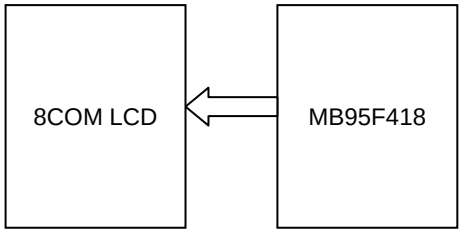

Figure 3-1: Hardware diagram

4 HW Reference SCH

Hardware reference SCH of display unit

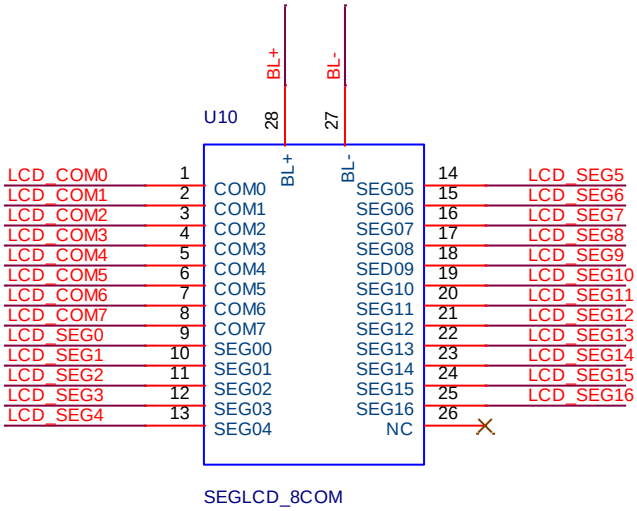

Figure 4-1: 8COM LCD Interface

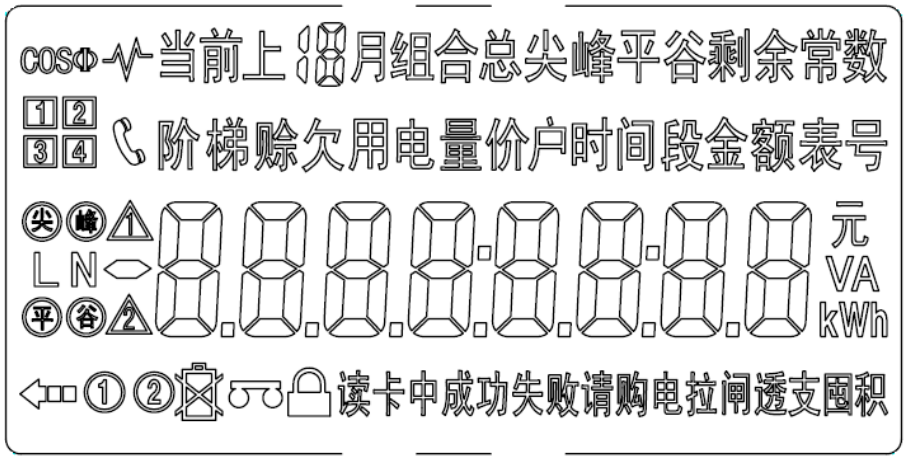

Figure 4-2: 8COM LCD Module

5 FW diagram

Firmware system diagram

5.1 Firmware System Diagram

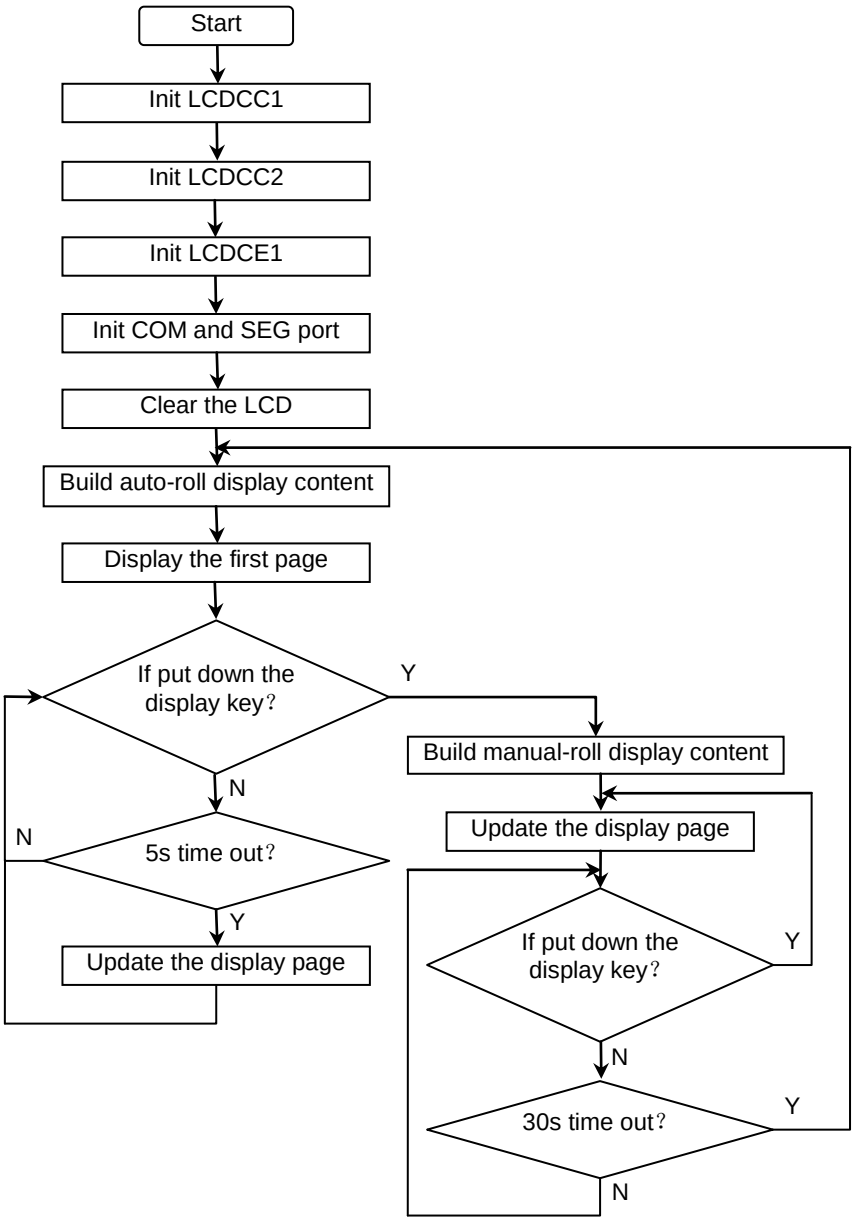

Figure 5-1: Firmware System Diagram

6 FW Function List

6.1 API

Table 6-1: FW API List

Function Prototype	Description
void Lcd_Init(void)	LCD module initialization
void LoadLcdPara(INT8U* lcdPara)	Load LCD display parameters from EEPROM
void LcdPowerCtl(INT8U pwrNml)	LCD power on/save control
void LcdPageDisplay(void)	Display various data page on LCD screen
void LcdPageManual(INT8U pageSet)	Manual change LCD page
void LcdPageChange(INT8U pageSet)	LCD screen page up/down control
void* FindPageDispThread(INT8U* targetId)	Find page display thread using data ID
void BuildPowerUpLcdPage(void)	Build Power-up LCD page content
void BuildAutoRollLcdPage(void)	Build auto-rolling LCD page content
void BuildManlRollLcdPage(void)	Build manual-rolling LCD page list
void BuildPowerDnLcdPage(void)	Build power-down LCD page content
void LcdParaReloadEnable(void)	Enable LCD parameter reload using system reset
void DispSegmentEnergy(INT8U pageMode, INT8U monthId, INT8U dispSegId)	Display segment energy
void DispPrepayBalance(INT8U pageMode)	Display prepay balance
void DispCurrentTarrifRate(INT8U pageMode)	Display current tariff rate
void DispUserNumLow8b(INT8U pageMode)	Display user number low 8 bit
void DispUserNumHigh4b(INT8U pageMode)	Display user number high 8 bit
void DispMeterNumLow8b(INT8U pageMode)	Display meter number low 8 bit
void DispMeterNumHigh4b(INT8U pageMode)	Display meter number high 8 bit
void DispErrorNum(INT8U pageMode)	Display error number
void DispVoltage(INT8U pageMode)	Display voltage
void DispLoadCurrent(INT8U pageMode)	Display load current
void DispNeutralCurrent(INT8U pageMode)	Display neutral current
void DispPower(INT8U pageMode)	Display power
void DispPowerFactor(INT8U pageMode)	Display power factor
void DispCurrentDate(INT8U pageMode)	Display current date
void DispCurrentTime(INT8U pageMode)	Display current time

6.2 HAL

Table 6-2: FW HAL List

Function Prototype	Description
void LcdCardCommDisp(INT8U value)	
void LcdEnergyPurchaseDisp(INT8U onOff)	
void LcdEnergyPurchaseDisp(INT8U onOff)	
void BcdCount2LcdDigit(INT8U *bcdCount, INT8U *lcdDigit)	Convert 4 bytes of BCD string to 8 digits of LCD display data string
void LcdMainLineDisp(INT8U* dataStr)	Display main line on LCD screen
void LcdDigitDisp(INT8U digitId, INT8U digitCode)	Display a digit on LCD screen
void LcdColonDisp(INT8U colonTag)	Display colon on LCD screen
void LcdDotDisp(INT8U dpTag)	Display dot-point on LCD screen
void LcdLedTimeSegId(INT8U segId)	Display tariff time-seg LED id
void LcdTxtTimeSegId(INT8U segId)	Display time-seg text id
void LcdDateTimeDisp(INT8U dtState)	Display date/time text
void LcdLastMonthDisp(INT8U month)	Display month
void LcdBattDisp(INT8U battState)	Set LCD battery Display On/Off
void LcdCommDisp(INT8U ch, INT8U commState)	Set LCD Comm Display On/Off
void LcdProgramDisp(INT8U programState)	Set LCD programmable sign Display On/Off
void LcdLockDisp(INT8U lockState)	Set LCD Lock Display On/Off
void LcdKwhDisp(INT8U kwhState)	Set LCD KWh Display On/Off
void LcdKwDisp(INT8U kwState)	Set LCD KW Display On/Off
void LcdRmbDisp(INT8U rmbState)	Set LCD RMB Display On/Off
void LcdEnergyDirDisp(void)	Display Energy direction
INT8U LcdRemoveHeading0(INT8U *buff, INT8U ptPos)	Remove useless heading zero for main display line
void LcdNegativeSignDisp(INT8U onOff)	Set negative sign Display On/Off
void LcdCosineSignDisp(INT8U onOff)	Set cosine sign Display On/Off
void LcdDatSend(INT8U* dispDat, INT8U size)c	Send a string of display data to LCD controller module

7 Additional Information

For more Information on FUJITSU semiconductor products, visit the following websites:

English version address:

http://www.fujitsu.com/cn/fsp/services/mcu/mb95/application_notes.html

Chinese version address:

http://www.fujitsu.com/cn/fss/services/mcu/mb95/application_notes.html

8 Appendix

8.1 List of Figures and Tables