WAN_0264

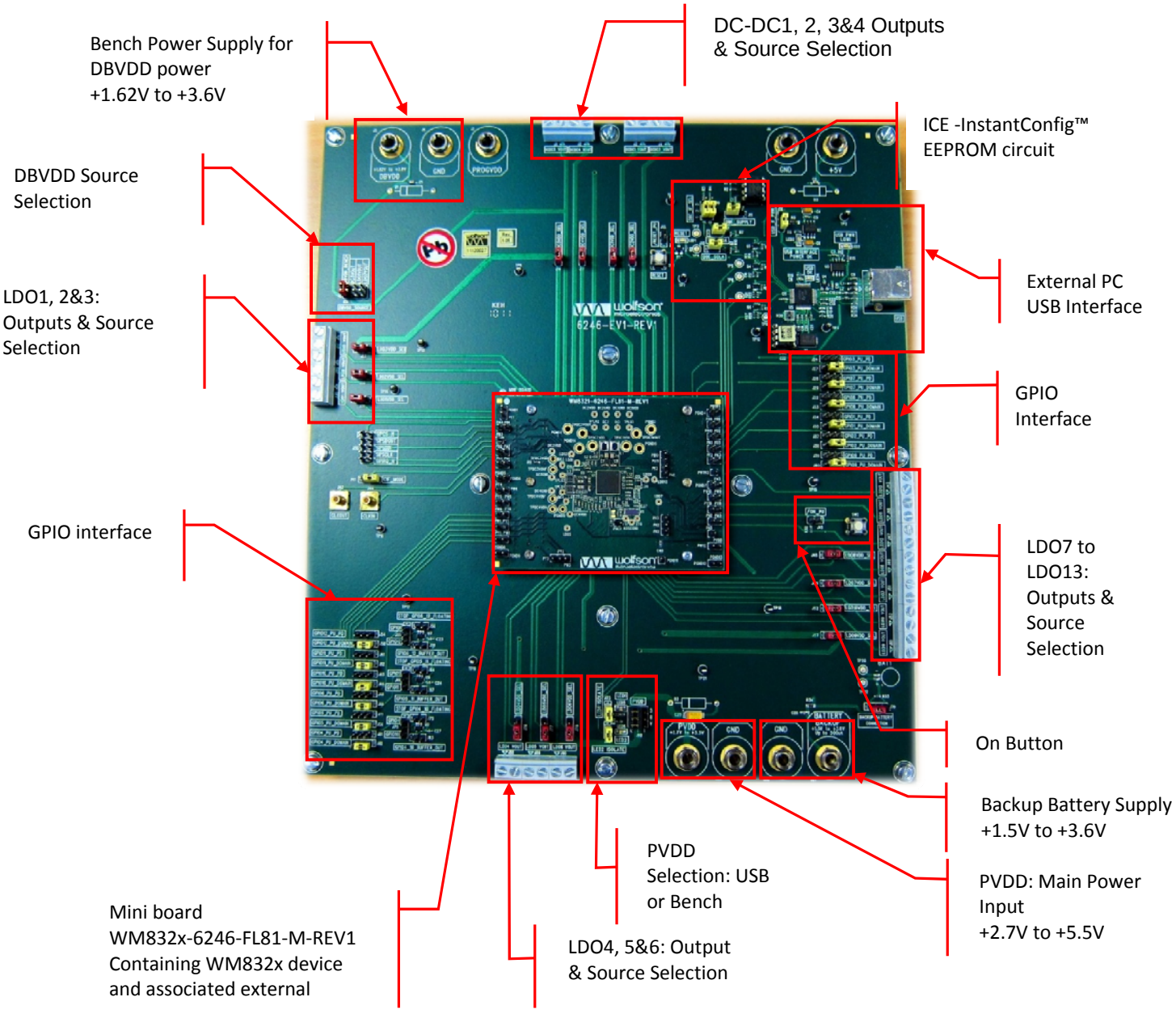
WM832x Customer Evaluation System Set-up Guide

INTRODUCTION

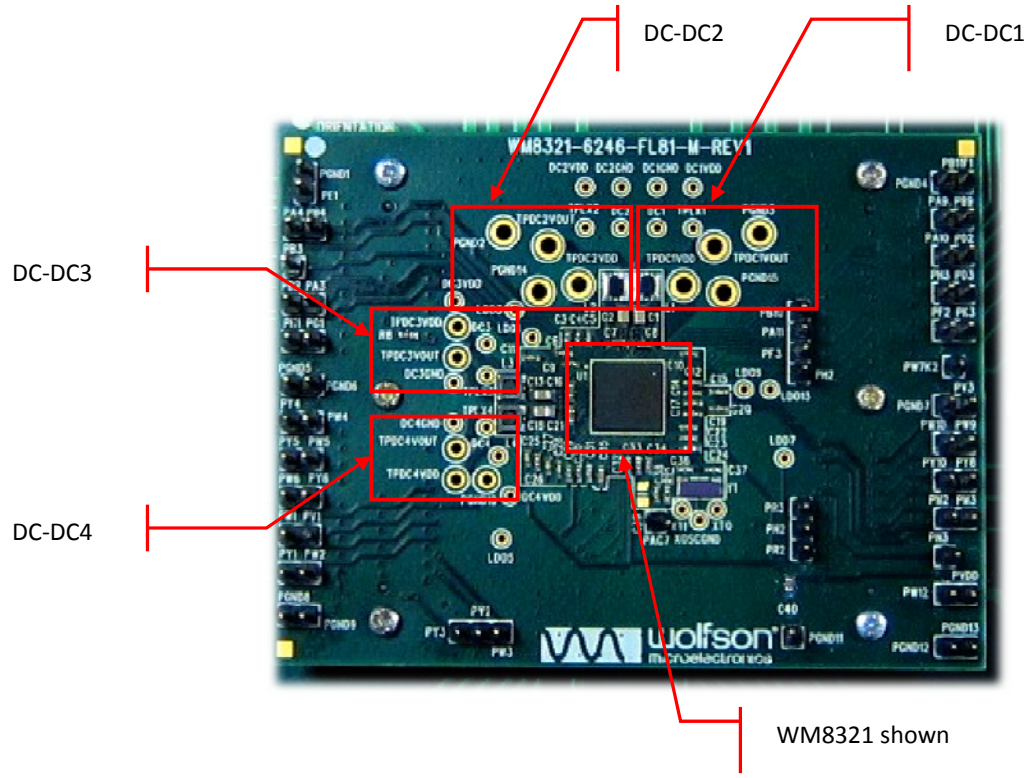
This document is designed to help users setting up the WM832x customer evaluation system.

This document relates to the WM8321, WM8325 and WM8326 Power Management ICs.

MAIN BOARD FEATURES



MINI BOARD – WM8321 SHOWN

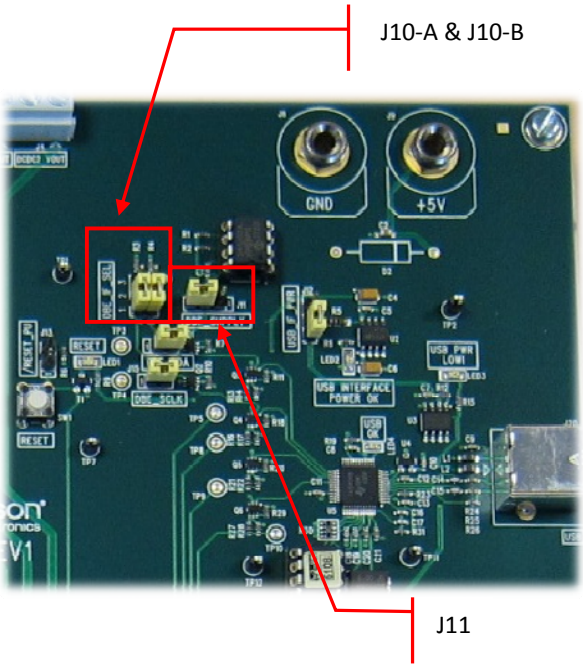


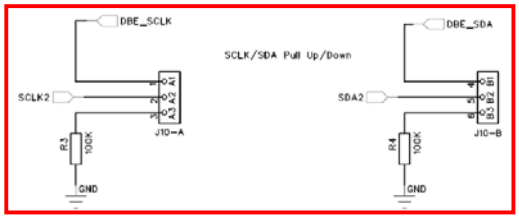
Note:

The maximum current capability of some DC-DC converters is 2.5A, therefore extra care should be taken when evaluating those DC-DC converters at full load.

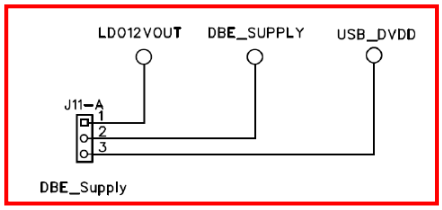
The 2.5A DC-DC converter power sources and respective loads should be connected directly on to the mini-board using the TPDCmVDD and TPDCmVOUT test points, respectively with their associated grounds.

DEVELOPMENT MODE HARDWARE SET-UP





J10-A & J10-B



J11

ICE

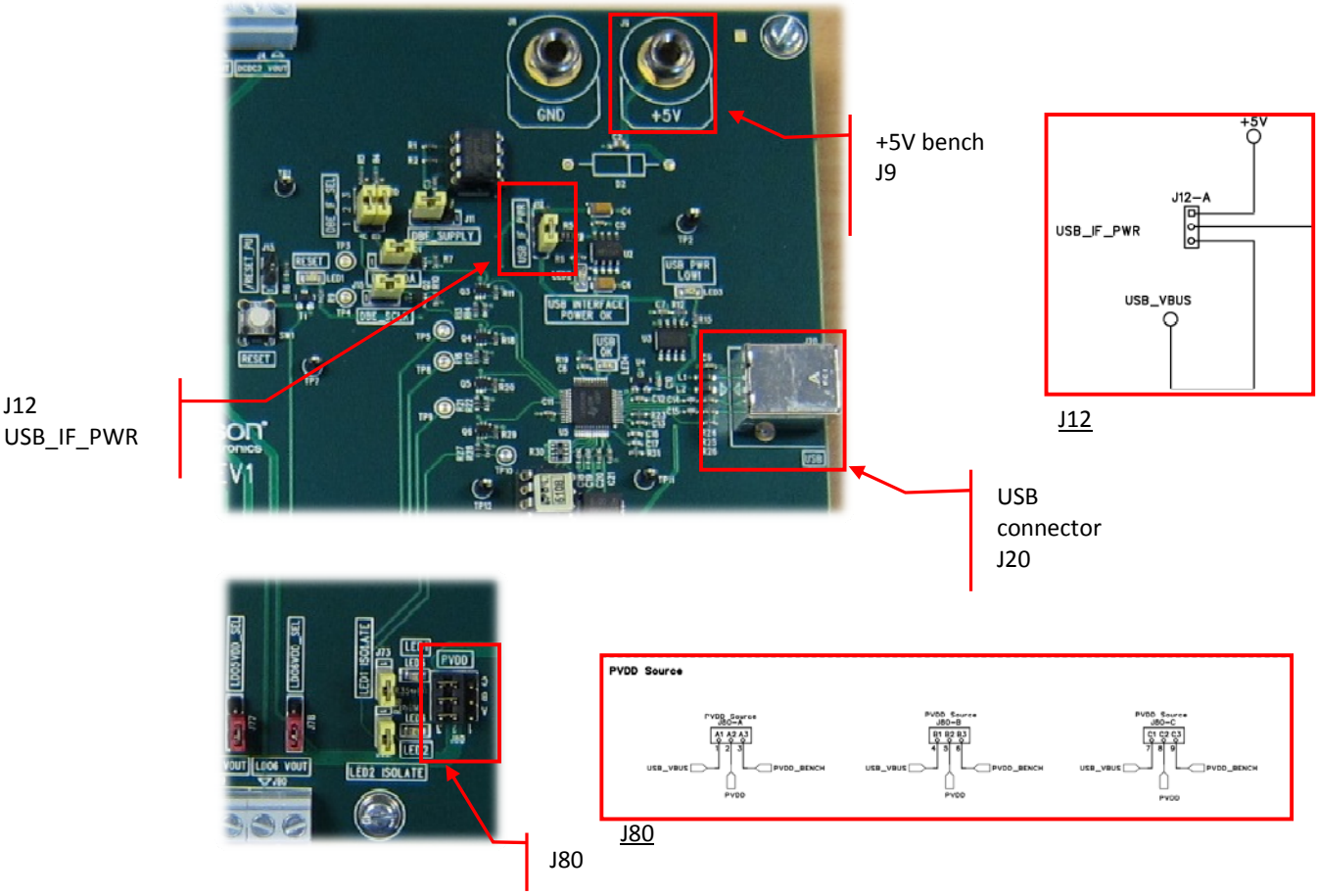
The InstantConfig™ EEPROM (ICE) allows system designers to modify and experiment with different start-up and control settings on the WM832x. This is called Development Mode. When an ON sequence is scheduled the WM832x reads the ICE contents. It then copies the ICE settings into the WM832x register map and applies them during the start-up sequence. The ICE can be programmed using WISCE™. (See section: How to program the ICE using WISCE™).

ICE HARDWARE SET-UP

J11 - ICE is powered from LDO12 (VPMIC) (the alternative is USB_DVDD).

J10 - SCLK2 and SDA2 are pulled up to connect the ICE to the device and place it into Development Mode. A high on SCLK2 indicates to the device that it must go into Development Mode. This essentially means applying the settings contained in the external ICE (EEPROM).

EVB EXTERNALLY POWERED FROM A USB CABLE ONLY



EXAMPLE POWERING ONLY FROM A PC USB CABLE

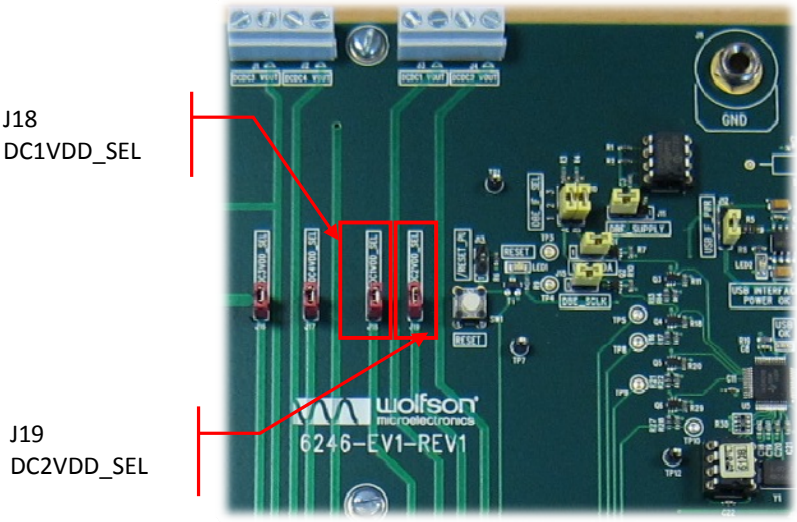
J12: Selects the supply for the auxiliary circuits (PC USB or +5V from J9).

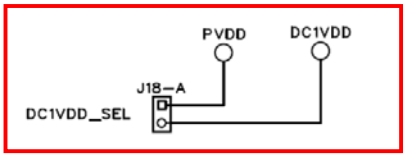
The selection of the USB power is done by J80.

If J80 = 1-2, PVDD=+5V from PC USB

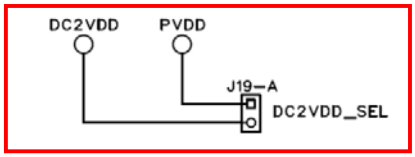
If J80 = 2-3, PVDD=external Bench Power Supply from J84 (PVDD)

USING THE WM8325 AND WM8326 EVB





J18

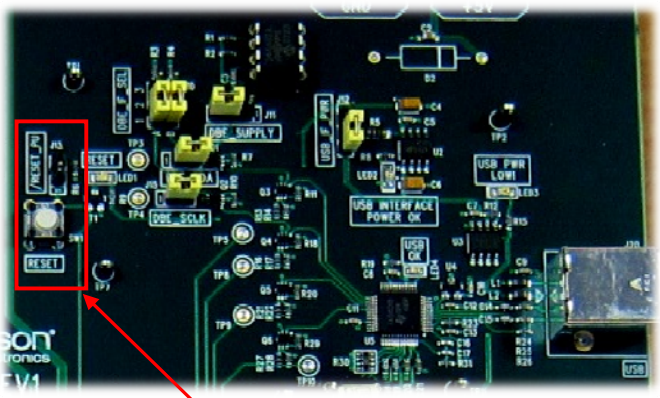


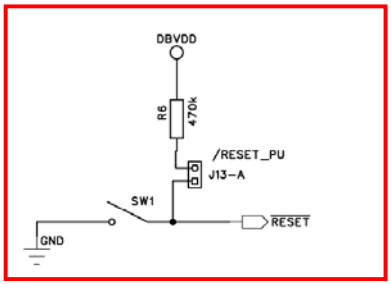
J19

WM8325 DC-DC2 and WM8326 DC-DC1&2 Converters maximum current capability is 2.5A. Therefore, it is recommended to remove jumpers J18 and/or J19 to isolate the mini board DCmVDD from the mother board DCmVDD.

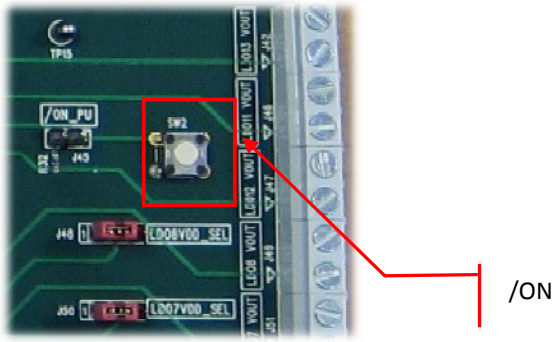
Power to the DC-DC1 and/or DC-DC2 Converters should be directly applied to the appropriate TPDCmVDD test points on the mini-boards, with their associated grounds

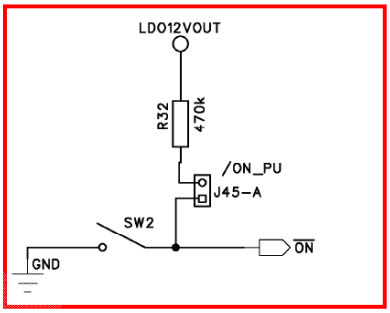
/ON AND /RESET SET-UP





J13





J45

/ON PIN AND /RESET PIN

J13 - /RESET pin pull up to DBVDD. The /RESET pin has an internal pull up so J13 can be omitted.

J45 - /ON pin pull up to LDO12. The /ON pin has an internal pull up so J45 can be omitted.

When /RESET is asserted, for example when the WM832x moves into the OFF power state then the /RESET pin is pulled low.

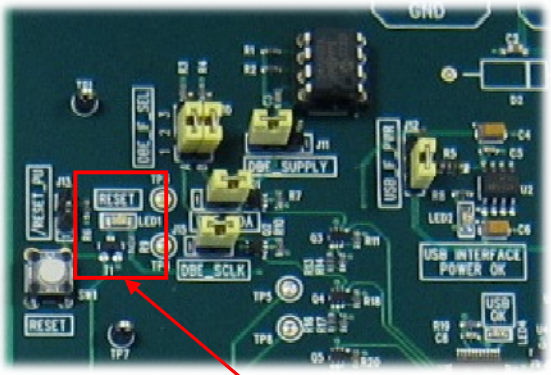
When /RESET is de-asserted, for example when the WM832x moves to the ON power state then the /RESET is pulled up to DBVDD.

The /ON pin is pulled up to LDO12 (2.1V reference voltage). By default the WM832x requires a logic low level at the /ON pin as a valid 'On' event. Pressing SW2 will provide a valid 'On' event and the WM832x will execute the start-up sequence and transition to the ON state.

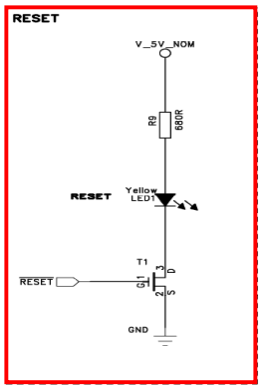
Registers R4005h and R4006h, below, detail the additional programmable functionality of the /ON and /RESET pins.

R4005h	ON Pin Control	Read	Write	021Ah	0	0	0	0	0	0	ON_PIN_SECACT=10		0	0	ON_PIN_PRIMACT=01		PIN_STS=1	0	ON_PIN_TO=10				
R4006h	Reset Control	Read	SW Reset	8473h	P_AT_ON=1	0	DRV_STR=0	FET_ENA=0	0	SET_CFG=1	0	0	0	_SLPENA=1	SLP_MSK=1	_SLPENA=1	0	0	RST_DUR=11				

LED1 ON STATE INDICATOR



LED1 indicates the status of the PMIC /RESET signal



RESET

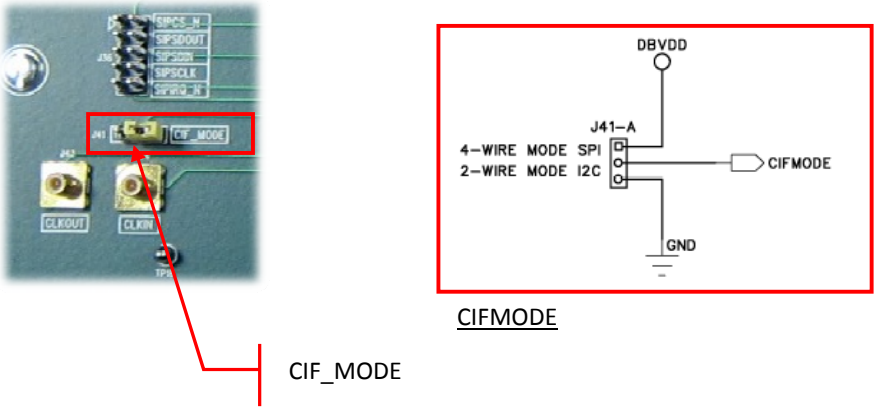
LED1 is a helpful indicator hard wired to the WM832x /RESET pin. Located on the Main Board, LED1 indicates the main device Power States, via /RESET assertion and de-assertion. LED1 can assist in a debug situation where the device is not set-up to indicate the current status in any other way:

LED1 = ON = ON power state

LED1 = OFF = OFF power state

LED1 can also indicate WM832x SLEEP state if the /RESET is programmed to assert when going into SLEEP.

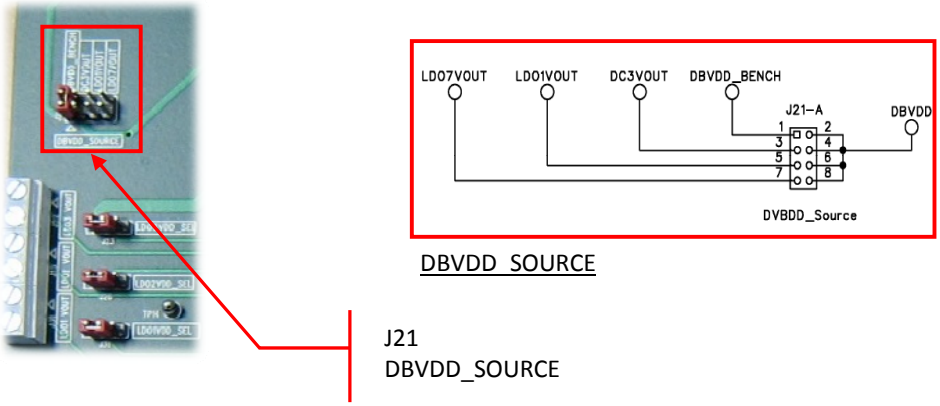
CONTROL INTERFACE



CIF MODE

Control Interface Mode selects between 2-wire I2C mode and 4-wire SPI mode.

DBVDD POWER SOURCE



DBVDD POWER SOURCE

J21 - Allows DBVDD to come from various power sources, Bench Power Supply, DC-DC3, LDO1 or LDO7.

EXAMPLE POWERING FROM A SINGLE PC USB CABLE

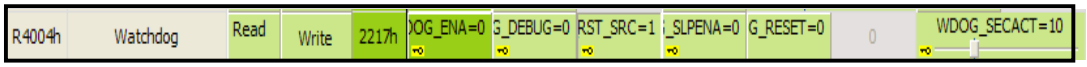
Set the EVB as shown in section 4. To start full communications with the device, the DBVDD must power up when the /ON key is pressed. So DBVDD must come from one of the device on-board regulators, i.e. LDO7, or an external power source (see J21 jumper setting above).

The ICE must first be programmed to enable LDO7 in one of the device Time Slots LDO7_ON_SLOT and the appropriate system voltage set using LDO7_ON_VSEL register bits.

USER KEY

Certain register bits are protected behind a User Key which locks down the functionality and only enables the protected bits to be written to if the User Key (Unlock) has been previously written.

The user key is 9716h

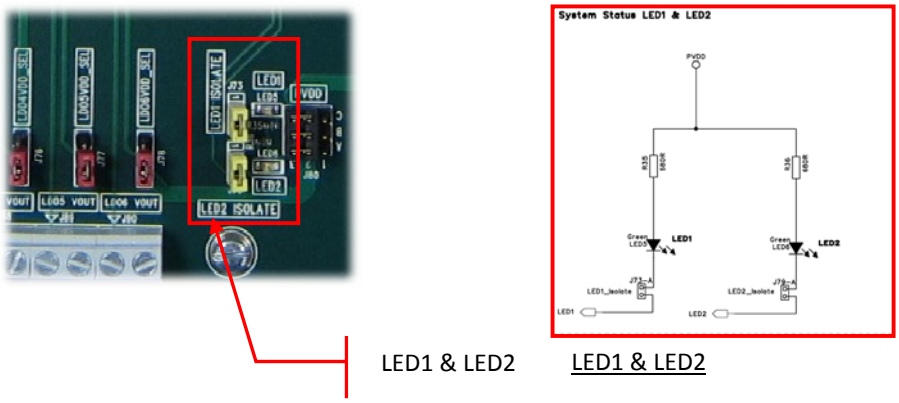


Locked bits are identified with a small key symbol as shown above.

Note:

It is recommended to relock the protected register immediately after writing to them. This helps protect the system against accidental overwriting of register values. To lock the protected registers, a value of 0000h should be written to the Security register.

STATUS LED1 AND LED2



STATUS LED1 AND LED2 SET-UP

The WM832x provides two System Status LED drivers. These are digital outputs intended for driving LEDs directly. The LED outputs can be assigned to indicate Power State status and other control features. They can also be controlled via register control to provide a custom indication.

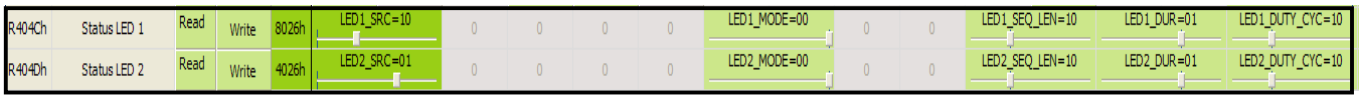
Examples:

- R404Ch = Status **LED1** (below LED1_SRC=10= **Reserved** status)
  LED1 also indicates completion of OTP Auto Program.
- R404Dh= Status **LED2** (below LED2_SRC=01= **Power State** status)

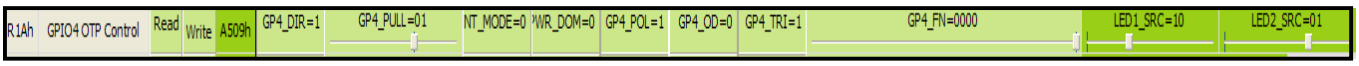
POWER STATE STATUS

DESCRIPTION	DRIVE MODE	LED 'ON' TIME	ON:OFF DUTY CYCLE
Power Sequence Failure	Pulsed sequence (4 pulses)	1s	1:1
PVDD low	Continuous pulsed	250ms	1:3
ON state	Constant	N/A	N/A
SLEEP state	Continuous pulsed	250ms	1:7

LED2 also indicates an OTP Auto Program Error condition.



Status LED function is a control setting that can be a pre-programmed ICE setting.



GPIO SET-UP

There are 12 general-purpose GPIO pins (GPIO1 – GPIO12) that can be configured as inputs or outputs, active high or active low, with optional on-chip pull-up or pull-down resistors.

GPIO outputs can either be CMOS driven or Open Drain configuration.

Each GPIO pin can be tri-stated and can also be used to trigger Interrupts.

The function of each GPIO pin is selected individually.

Different voltage power domains are selectable on a pin by pin basis for GPIO 1-12.

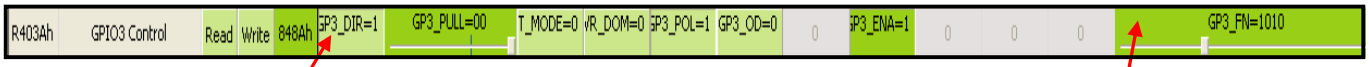
Input de-bounce is automatically implemented on selected GPIO functions.

EXAMPLE: HARDWARE ENABLE (GPIO) CONTROL

DC-DC1 Set-up to be enabled by an external Hardware enable connected to GPIO3.

Firstly set GPIO3 to be an input, with no internal pull-up or pull downs and set the function to be HWE1 (Hardware enable 1). R403Ah = 848Ah.

DC-DC1 is then configured to be controlled by GPIO3. In this case DC-DC1 R4058h (15:13) = 110



DIR= Set GPIO as Input

Function=HW Enable 1 input

DC1_ON_SLOT =110 set to be enabled by HW Enable 1 input = external signal on GPIO3

POWER STATE TRANSITION

Under typical operating conditions, the device is powered up and shut down under the control of the /ON pin = SW2 on the Main Board.

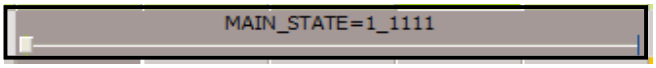
ON Power state transition = **momentarily press and hold** SW2 push button for ~1 second (default).

OFF Power state transition = **press and hold** SW2 push button for ~8 seconds (default).

SLEEP Power state transition = **register write** to R4003h (bit 14) = CHIP_SLP

R4003h	Power State	Read	Write	8833h	CHIP_ON=1	CHIP_SLP=0

Main Power State status can be monitored via R400Dh bits 0:4 = MAIN_STATE

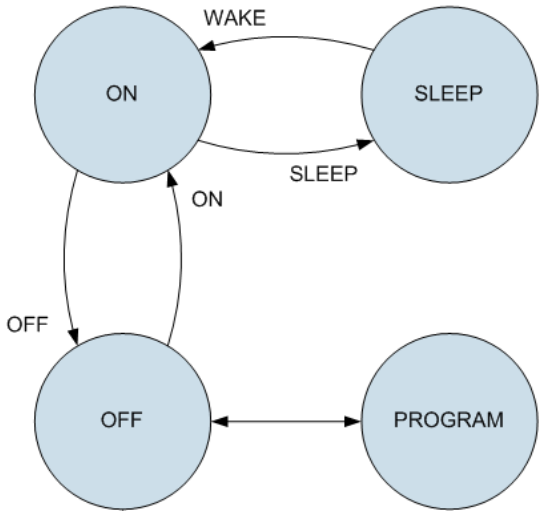


MAIN_STATE= 0_0000=OFF Power State

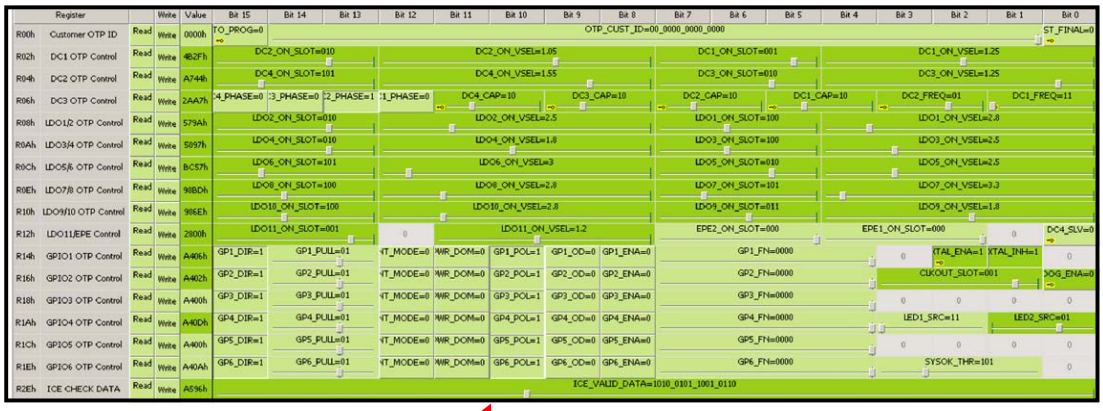
MAIN_STATE= 0_1011=PROGRAM State

MAIN_STATE= 1_1100=SLEEP Power State

MAIN_STATE= 1_1111=ACTIVE (ON) Power State



HOW TO PROGRAM THE ICE USING WISCE™



WISCE™ interface for the ICE.
The register bits associated with configuring the device, for a pre-defined system start-up procedure, are isolated from the main register map.

The WM832x will only use the ICE (EEPROM) in Development Mode.

The WM832x cannot program the ICE (EEPROM) it can only read its contents.

In Development Mode the WM832x will read the ICE and use the pre-programmed contents to configure the device to power-up the system as specified.

This allows the user to test alternative start-up sequences in the product development phase.

The EVBs will ship pre-loaded ICE with a generic boot sequence.

To alter the sequence, for example increase LDO1 output voltage, then select the appropriate register bit field (LDO1_ON_VSEL, R08h bits 0:4). Move the slider to the new voltage setting and then use the WRITE button to write the new value to that register (if this is not done automatically by WISCE™). The ICE located on the Main Board is now programmed with the new value.

When an 'On' transition is scheduled, for example with the /ON button key press, the WM832x will read the ICE contents into the WM832x register map. The WM832x enters a Pre-Active state where it applies the start-up profile read from the ICE; for example, enabling converters in programmed timeslots at the correct system start-up voltages.

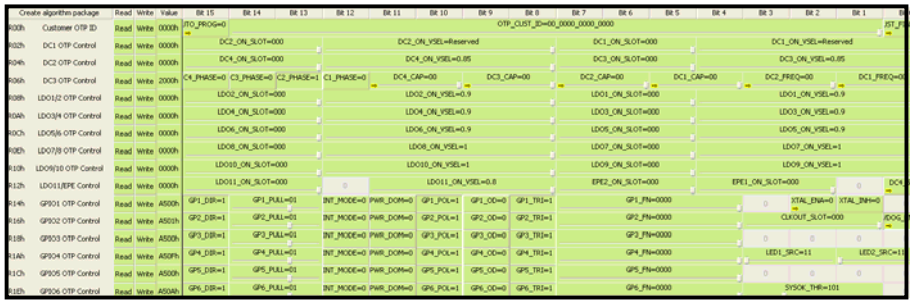
CONFIGURATION OF THE ICE USING WISCE™

The WM832x devices can only read the ICE contents though WISCE™ (Wolfson Interactive Setup and Configuration Environment) by selecting the appropriate WMDBxx device description to program the EEPROM.

The configuration procedure is as below:

1. Open WISCE™ (download WISCE™ software from the Wolfson website: http://www.wolfsonmicro.com/support/wisce/)
2. Load the WMDBxx device by clicking to ''Device'' then ''Load Device''.

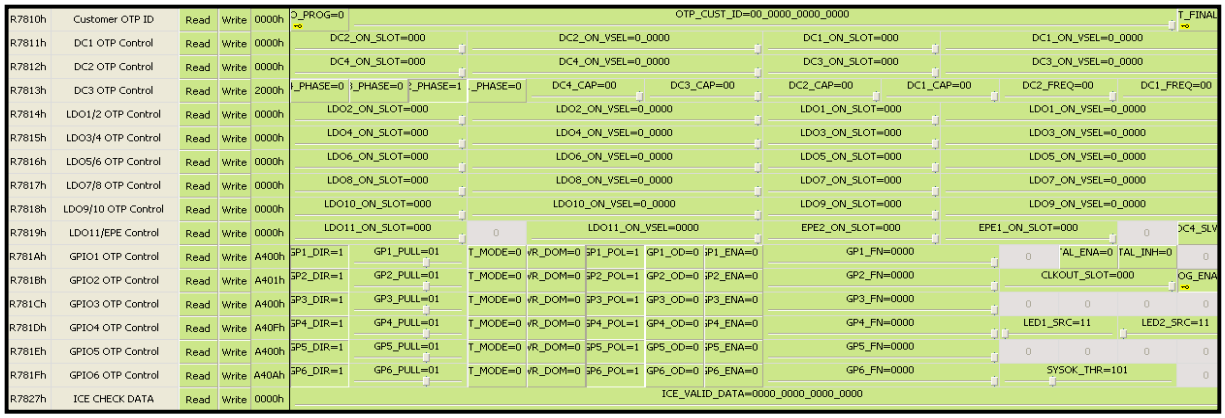
3. Select the desired register settings (register R02h to R1Eh, R00 can be disregarded) using the slides and by clicking on the appropriate register bits.



4. The DBE_VALID_DATA field (R2Eh register) should contain the value ''A596h'' for the ICE data to be deemed valid.

5. Finally, ''Write'' each register values to program the ICE.

After the desired register settings are loaded into the ICE, the same block of data will be mirrored in the main Register Map of the WM832x. Data from the external ICE can be loaded into the Window area in the main Register Map as below (R7810h to R7827h).



The R7810h to R7827 registers contain the bootstrap configuration data. This defines the sequence and voltage requirements for powering up the WM832x and for configuring functions such as the clocks, GPIOs and LED status indicators. Under default conditions, the bootstrap data is loaded into the Window when the WM832x schedules an 'On' transition.

For detailed information on the functionality and ICE connections, please see the WM832x datasheets.

TECHNICAL SUPPORT

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