Jupiter EVM Getting Started

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1 Introduction

Congratulations on your purchase of a Elevate Semiconductor Jupiter EVM evaluation system. You will find that it serves as an invaluable development platform to help get your product to market in the shortest possible time. The Jupiter EVM and Graphical User Interface (GUI) allow the customer to demonstrate and evaluate the Jupiter performance and functionality.

This document provides the instructions to install, setup, and operate the Jupiter EVM. Refer to the *Elevate Semiconductor EVM User's Guide* for a detailed description of the EVM system.

1.1 Unpacking - Jupiter EVM Contents

Please check the contents of the Jupiter EVM shipping carton to make sure you have received all of the items listed in Table 1. The system is already configured for the best setup, except for connections to the power supply, PC controller, and test equipment.

Table 1: Jupiter EVM Contents

| Qty | Description | | | |
|-------|--|--|--|--|
| 1 ea. | Jupiter EVM System (3 boards: Motherboard, FVMI Board, Jupiter | | | |
| | Loadboard) | | | |
| 1 ea. | a. Jupiter EVM Getting Started (this document) | | | |
| 1 ea. | CD Contents List | | | |
| 1 ea. | Elevate Semiconductor User Interface Program Installation CD | | | |
| 1 ea. | USB A/B Cable | | | |

1.2 <u>Recommended Test and Measurement Setup</u>

1.2.1 Power Supply

Table 2 provides the required power supplies and current rating. The power supplies are connected using standard banana plugs. The customer needs to provide the power supply cables.

It is recommended to use a triple supply to control the EVM supplies. This allows the 3 EVM supplies to be turned on at the same time. However, if this is not feasible, then the supplies should be enabled in the following sequence. Power down should be performed in the reverse order.

- 1. +20V
- 2. -15V
- 3. +5V

The Jupiter VCC, VCC_OUT and VEE are gated using an Opto-FET switch on the loadboard so it is safe to set and enable the Jupiter supplies before powering up the EVM and running the software.

| Module | Supply | Current Rating |
|---------------------|------------------------|----------------------|
| Motherboard | +20V ⁽¹⁾ | 0.5 A |
| Motherboard | +5V | 0.5 A |
| Motherboard | -15V | 0.5 A |
| Jupiter VCC/VCC_OUT | +16V ^(2, 3) | 2.0 A ⁽⁴⁾ |
| Jupiter VEE | -5V ^(2, 3) | 2.0 A ⁽⁴⁾ |

Table 2: Power Supply Requirements

Notes:

- 1) The EVM +20V could also be used as the Jupiter VCC
- 2) Once the EVM operation is verified, the customer can adjust the VCC, VCCO, VEE supplies
- The Jupiter VCC VEE voltage should not exceed 25V. Refer to the ABS max section in the datasheet.
- 4) The VCC, VCC_OUT, and VEE current requirements are assuming a Master and Slave device is present. If only the Master is present, then a 1 Amp supply is adequate. The program does not have the ability to measure the Jupiter VCC and VEE currents

1.2.2 PC Controller

To use the Jupiter EVM User Interface Program (UIP), a PC with the following configuration is required:

- Windows XP, Windows 2007, Windows 2008, Windows 2010
- USB Port (a USB cable is provided)

1.2.3 DMM or Source Measurement Unit

- Voltage and/or Current Meter
- Voltage and/or Current Source

1.3 <u>Software Installation</u>

There are 2 steps to install the Jupiter EVM demonstration program.

- 1. Install the Jupiter EVM UIP from the Flash Drive.
- 2. Install the USB driver.

Figure 1 illustrates the default directory structure. The user may change the <root dir> during the installation.

Figure 1: Installation Directory Structure

- 📜 EVM GUI
- ISL55180 Docs
- Jupiter Docs
- Mercury-ISL55169 Docs
- Neptune-ISL55187 Docs
- 📕 Pluto Docs
- Saturn-ISL55188 Docs
- Shared Docs
- 📜 Triton-ISL55185 Docs
- Venus Family ISL55161-4 Docs
- 📕 Vesuvius Docs
- 🛃 EVM_CD_Contents_List.pdf
- 📔 Readme.txt

1.3.1 Jupiter EVM UIP Installation

To install the Jupiter EVM software package, run the SETUP program on the distribution Flash Drive and follow the prompts. The **ElevATE.exe** executable will be installed in the **EVM GUI** sub-directory. In addition, a short cut will be installed onto the desktop and in the **Start->Programs** folder. The **Start->Programs** folder also contains links to the different EVM User's Guide, and documentation folders.

1.3.2 USB Device Driver Installation

Follow section 1.3.2.1 for installation instructions on the Windows 10/8 operating systems, section 1.3.2.2 for instructions for Windows 7, or section 1.3.2.3 for Windows XP

1.3.2.1 Window 10/8

To install the USB driver on Windows 10/8, the Driver Signature Verification needs to be disabled. This is accomplished using the following method.

1.3.2.1.1 Enter the Troubleshoot menu. Click "Restart" from the power options menu and hold down the "Shift" key at the same time. Once the computer has rebooted, you will be able to choose the Troubleshoot option.



1.3.2.1.2 Select "Advanced options" and "Startup Settings".



1.3.2.1.3 You need to restart your computer one last time to modify boot time configuration settings.



1.3.2.1.4 You will be given a list of startup settings, including "Disable driver signature enforcement". To choose the setting, you need to press the "F7" key. This will disable the driver signature enforcement until the computer is rebooted.



1.3.2.1.5 Continue with section 1.3.2.2 to finish installation of USB driver except choose the windows 10 or windows 8 option.

1.3.2.2 Windows 7

To install the USB device driver on a Windows 7 system, connect the "USB FX2 to Parallel" board to a USB port using the included USB A/B cable. The "USB FX2 to Parallel" board does not need any external power or need to be connected to any other board for the device driver installation.

1.3.2.2.1 After connecting the USB cable from the PC to the "USB FX2 to Parallel" board, navigate to the Device Manager screen on your computer and look for the EZ-USB Icon. Right-Click on the EZ-USB Icon and select "Update Drive Software..."



1.3.2.2.2 Select "Browse my computer for driver software".



1.3.2.2.3 Install driver from the newly installed folder on your computer:

Windows 7: \ElevATE Semi\EVM GUI\Elevate USB Driver\wlh-win7\(x64 or x86) Select x64 for a 64-bit system. Select x86 32-bit system.

Select "Next". The USB driver will be installed.

| Brow | se for driver software on your computer |
|---------------------|---|
| Search | for driver software in this location: |
| C:\Ele | vATE Semi\EVM GUI\Elevate USB Driver\wlh-win7\x64 Browse |
| <mark>√</mark> Incl | ude subfolders |
| | |
| | |
| • | Let me pick from a list of device drivers on my computer |
| | This list will show installed driver software compatible with the device, and all driver software in the same category as the device. |
| | |

1.3.2.3 Windows XP

To install the USB device driver on a Windows XP system, connect the "USB FX2 to Parallel" board to a USB port using the included USB A/B cable. The USB FX2 to Parallel board does not need any external power or need to be connected to any other board for the device driver installation.

1.3.2.3.1 After connecting the USB cable from the PC to the "USB FX2 to Parallel" board, the following window appears. Select "No, not this time" and click Next.

| Found New Hardware Wizard | | | |
|--|--|--|--|
| Welcome to the Found New Hardware Wizard Windows will search for current and updated software by looking on your computer, on the hardware installation CD, or the Windows Update Web site (with your permission). Read our privacy policy | | | |
| | Can Windows connect to Windows Update to search for software? O Yes, this time only O Yes, now and gvery time I connect a device No, not this time | | |
| | Click Next to continue. | | |



1.3.2.3.2 Choose "Install from a list or specific location (Advanced)" and click Next.

1.3.2.3.3 Select the top radio button, and check "Include this location in the search." Type the following path into the text box.

Windows XP: \ElevATE Semi\EVM GUI\Elevate USB Driver\wxp\(x64 or x86)

Select x64 for a 64-bit system. Select x86 32-bit system. Select "Next". The USB driver will be installed.

| Hardware Update Wizard | | |
|--|--|--|
| Please choose your search and installation options. | | |
| Search for the best driver in these locations. | | |
| Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed. | | |
| Search removable <u>m</u> edia (floppy, CD-ROM) | | |
| Include this location in the search: | | |
| C:\Elevate Semi\EVM GUI\ElevATE USB Driver\wx 💌 Browse | | |
| Don't search. I will choose the driver to install. | | |
| Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware. | | |
| | | |
| < <u>B</u> ack <u>N</u> ext > Cancel | | |

1.3.3 Reboot Machine

After the Jupiter EVM and USB software is installed, it is recommended to re-boot the machine.

1.3.4 Launching the Elevate Semiconductor Program

The user can launch the Elevate Semiconductor GUI from the **Desktop**, **Start->Programs** folder, or *EVM GUI* sub-directory.

1.3.5 Software Un-Installation

The Elevate Semiconductor demonstration program may be un-installed using the **Add/Remove Program** from the Windows Control Panel.

2 Getting Started

The Jupiter EVM is shipped in a pre-configured state that allows a customer to evaluate the DPS Force Voltage (FV), Force Current (FI), and Ganging.

Note: Any external equipment providing digital signals into the Jupiter device should only be enabled after the Jupiter EVM is enabled. Also, the external equipment should be disabled prior to disabling the Jupiter EVM.

2.1 Caution

Jupiter is a high voltage DUT Power Supply (DPS) capable of delivering several amps of current. Configuring the Jupiter device and EVM into an extremely high power condition could cause permanent damage to the Jupiter device, EVM components and/or external equipment.

2.2 Jupiter Loadboard Rev B versus Rev C+

There are 2 different loadboard revisions; Rev B and Rev C+. This document focuses on the Rev C+ loadboard; refer to Section 3 for details. Refer to previous document revisions when using the Rev B loadboard. The software supports both loadboard revisions.

2.3 Quick Start Instructions

- 1. Disable external power supply
- 2. Connect the power supplies cables (not provided) from the power supply to the Elevate Semiconductor EVM Motherboard and Jupiter loadboard; refer to Figure 3.
- 3. Connect the USB cable (provided) from the PC to the USB port on the "USB FX2 to Parallel" board Connect the EVM to any external equipment; refer to Section 2.4.
- 4. Setup Motherboard Jumpers; refer to Section 2.5
- 5. Set external power supply voltages and current limits.
- 6. Enable external power supply.
- 7. Run the Elevate Semiconductor GUI software; refer to Section 1.3.4 for details.
- 8. At the Force Voltage Measure Current dialog box (refer to Figure 2 below):
 - a. Select the EVM Setup option based on the desired configuration, see Section 2.4
 - b. Select the **Enable Supplies** check box
 - c. Hit the **Apply** button to power up the Jupiter device.
 - d. The software will also measure the current consumption. Figure 2 illustrates the expected current readings.
- 9. At this point, the Jupiter should be outputting the desired signal.

Figure 2: Expected Current Readings

| Force Voltage - Measure Current (FVMI) Configuation | | | | | | |
|---|--|--|---|--|-------------------------------|--|
| Revision Jupiter Rev12 LB SN = 31 FVMI SN = 171 Device Options EVM Setup FOR Only a | CE-B Alarms | Must issue whe is cycled on bo system into de C c es transition to En | enever power ard. Will put fault state. alibrate <u>D</u> AC alibrate <u>L</u> evels abled state | PLL_Freq (MHz) PLL_CK 25.000 CLK_REF 25.000 Apply PLL_CK PLL Present ✔ | <u>Apply</u> <u>Cancel</u> | |
| Power Amplifiers | Desired Valtage | Mana Valta an | Current (m A) | Dawar (mM) | Supplies | |
| Chan 1 (VF) (-10.0 to +15.0) | 0.000 | 0.001 | -0.2 | 0.0 | Apply <u>V</u> Force | |
| Chan 2 (VCC) (+3.3 to +32.0) | 16.000 | 16.000 | 31.0 | 496.0 | | |
| Chan 3 (VDD) (0.0 to +5.0) | 3.300 | 3.300 | 17.1 | 56.5 | | |
| Chan 4 (VEE) (-32.0 to +0.0) | -5.000 | -5.000 | 25.0 | 125.0 | | |
| Chan 5 (VF2) (-10.0 to +15.0) | 0.000 | 0.001 | -0.2 | 0.0 | pply VForce2 | |
| Chan 6 (-0.5 to +1.0) | 0.000 | 0.001 | -0.2 | 0.0 | | |
| Chan 7 (VREF) (+2.5 to +3.5) | 3.000 | 3.000 | 0.0 | 0.0 | | |
| | ✓ Perform Rang ✓ Servo Supplies | e Check s | Total Po | ower 695.2 | Measure | |

The **Reset System** will put the EVM and Jupiter device into the default state. The **Reset System** should be issued whenever the power supply is powered OFF then ON. The **Reset System** is automatically performed when the program is initially launched.

2.4 Default Configuration Setup Options

The EVM has several default options for configuring for device and loadboard.

| Table 3: | Jupiter | Default | Configuration | Options |
|----------|---------|---------|---------------|---------|
|----------|---------|---------|---------------|---------|

| Mode | See Section # | Brief Description | |
|----------------------|---------------|--|--|
| Hardware Reset | N/A | All registers default to the hardware default state. | |
| | | Note: Output is always present on FORCE_A. Sel-Force=GND | |
| Three-State (High-Z) | N/A | Puts DPS in three-state (high-Z). Opens all switches. | |
| | | Note: Output is always present on FORCE_A. Sel-Force=GND | |
| FV out FORCE-A | 2.4.2 | FV mode with Alarms enabled. Connect DPS output to | |
| with Alarms | | TEST_NODE via FORCE_A. VF0= 3.0V. | |
| FV out FORCE-B 2.4.2 | | FV mode with Alarms enabled. Connect DPS output to | |
| with Alarms | (default) | TEST_NODE via FORCE_B. VF0= 3.0V. | |
| | | Note: Output is always present on FORCE_A. | |
| Ganging | 2.4.3 | Master (U1) placed into FV mode with Remote Sense. | |
| | | Slave (U2) placed into FI mode using Master's MI as reference. | |
| | | Master/Slave use FORCE-B output connected to TEST_NODE. | |
| | | Alarms are enabled. IR=512mA. | |
| External DAC | 2.4.2 | Bypass the internal DAC and use the FVMI resources as inputs | |
| (FV Mode) | | into Gang2/Gang3. FV mode with Alarms enabled. Connect | |
| | | DPS output to TEST_NODE via FORCE_B. | |
| | | VFORCE2=1.5V, VFORCE=0V | |

Default: applies to all software configurations

- Loadboard: Jumpers E2, E4, and E7 are installed
- Jupiter: CPU-En = 1 and Local-Sense* = 1
- Jupiter: Monitor Enabled, Sel-MV = MV
- Jupiter: Iclamps = +/-700mA. Vclamps = 14V/-2V (but disabled)
- Jupiter: COMP_A, COMP_B, and External CAP_SR connected and SR-Adj = 15

FORCE-A default configuration

- Loadboard: FORCE_A is connected to TEST_NODE (Con-FA-TN)
- Loadboard: SENSE pin is connected to TEST_NODE (Con-Sense-TN)
- Jupiter: Sel-FB (feedback) = FORCE_A
- Jupiter: Con-FA-FB switch = open

FORCE-B default configuration

- Loadboard: FORCE_B is connected to TEST_NODE (Con-FB-TN)
- Loadboard: SENSE pin is connected to TEST_NODE (Con-Sense-TN)
- Jupiter: Sel-FB (feedback) = FORCE_B
- Jupiter: Con-FA-FB switch = closed

FORCE-A/B with Alarms configuration

The device is configured to automatically shut down if an Over Temperature alarm fault is detected

- Over Tempature enabled and set to code=4 (approximately 116'C)
- IClamp Alarm enabled but not routed to Global Alarm (won't shut down DPS)
- Sel-Con-FA-FB = 1 (use On-Chip-En)
- Sel-DPS-En = 1 (use Global-Alarm)
- For FORCE-A, the DPS_EN is used to control the FORCE_A to TEST_NODE relay

Note: the alarms are setup to latch the fault condition. To remove the fault, issue the appropriate 'reset' in the *Jupiter Configuration* dialog box. Use the LEDs or ReadBack to determine which alarm tripped.

2.4.1 Remote Sense Option

Extreme caution should be used when configuring the feedback (SENSE) path to ensure the DPS does not become open loop. The Jupiter device has 2 output pin options (FORCE-A or FORCE-B) and internal mux options. The Loadboard has several jumper and switch options to directly connect to the FORCE-A/B pin or to connect to the TEST NODE.

Note: To put the Jupiter device in remote sense, after selecting the FORCE-A or FORCE-B configuration option then change the 'CPU-Sel-FB' option to SENSE

2.4.2 General DPS Configurations

Figure 3 illustrates the recommended configuration for Jupiter EVM evaluation. After the configuration is completed, use the **Jupiter->DPS Levels** dialog box the change the Jupiter output levels. Use the **Jupiter Loadboard** dialog box to connect to the on-board resistor network and/or capacitive load.

For the External DAC mode, jumper E1 must be installed. The VFORCE2 voltage is connected to the Gang2 (V+) input and the VFORCE voltage is connected to the Gang3 (V-) input. Use the **EVM->FVMI (DPS) Config** dialog box to change the VFORCE and VFORCE2 voltage values.

If using an external measurement unit (MU), the MU should be configured in the opposite mode as Jupiter.

| Jupiter | MU |
|---------|------|
| FVMI | FIMV |
| FIMV | FVMI |

Important note: the FORCE_A is always connected to the high power op-amp stage and can not be put into HiZ (disabled). Therefore when using the FORCE_A option, it is recommended to connect any load to the TEST_NODE SMA so the Con-FA-TN relay can be opened in the event of an alarm condition.

Figure 3: Jupiter EVM Simplified Block Diagram



2.4.3 Ganging (Merging) Configuration

Figure 4 illustrates the recommended configuration for the ganging application. The Master (U1) is configured in FV mode in Remote Sense while the Slave (U2) is configured in FI mode. The Master and Slave both use the FORCE_B output pin which allows for internal alarm shut down. The Master and Slave are connected to the TEST_NODE SMA via the loadboard relays and 2-pin jumpers (E7 for Master and E5 for Slave). The E4 jumper must also be installed which provides the SENSE return path. The GANG_0 node is used to provide the Master MI signal to the Slave device.

The loadboard SLAVE_EN (CBit4) control bit is used to completely isolate and/or connect the Slave device supplies. The Slave device has the VCC and VCCO power pins tied together therefore the user should tie the Master (main) VCC and VCCOUT together. The Slave shares the Master's CPU_CK and SDIO signals while the Master and Slave have dedicated STB and RESET signals. The Slave's input signals are tied low so there is no real-time control. The Slave's Alarm is connected to an LED. The Slave's CBit outputs are not connected. The Slave's MONITOR and TJ pins are accessible by the A/D on the FVMI board; these results can be found in the **EVM Config->FVMI Measure** dialog box.

Note: The hardware supports Ganging via the FORCE_A pins; however, the software does not have a default configuration for using FORCE_A.



Figure 4: Jupiter EVM Ganging Configuration Simplified Block Diagram

2.5 Jupiter Loadboard Jumper Definitions

Table 5 lists the Jupiter Loadboard Jumper definitions. These jumpers provide different remote sense options, the ability to isolate analog pins for low current leakage measurements, and other test options.

Important Note: Extreme caution should be used when configuring for different feedback options. Always ensure there is a proper feedback so the DPS op-amp isn't open loop.

| Table 4: | Jupiter | Loadboard | Jumper | Definitions |
|----------|---------|-----------|--------|-------------|
|----------|---------|-----------|--------|-------------|

| Jumper | Description | Default Configuration |
|--------|--|-------------------------|
| E1 | Connect VFORCE | Installed (for ExtDAC) |
| E2 | FORCE_A to TEST_NODE | Installed |
| E3 | FORCE_A to SENSE | Open |
| E4 | SENSE to TEST_NODE | Installed |
| E5 | Slave FORCE_B to TEST_NODE | Installed (for Ganging) |
| E7 | FORCE_B to TEST_NODE | Installed |
| E8 | FORCE_B to SENSE | Open |
| E9 | Use DPS_EN to control FORCE_A select switch | Installed |
| E10 | Use EVM Latch to control FORCE_A select switch | Open |
| E11 | Slave FORCE_A to TEST_NODE | Open |
| E12 | Fan PWR | TBD |
| E13 | Fan PWR | TBD |

2.6 Motherboard Jumper and SMA Definition

Table 5 lists the Motherboard Jumper/SMA definitions for the Jupiter EVM. Only the EN (E3) jumper/SMA would be optionally used by a customer. The other jumpers must be shorted between pin 1&2 (towards back of board) to ensure proper operation.

| TC# | Jumper | Usage | Configuration |
|------|--------|-------------|--|
| TC30 | E12 | Reserved | Short Pin 1 & 2. towards back of board |
| TC29 | E11 | Reserved | Short Pin 1 & 2. towards back of board |
| TC28 | E14 | SDI_DATA | Short Pin 1 & 2. towards back of board |
| TC27 | E15 | SDI_SCK | Short Pin 1 & 2. towards back of board |
| TC26 | E2 | SDI_RCK | Short Pin 1 & 2. towards back of board |
| TC25 | E10 | Slave RESET | Short Pin 1 & 2. towards back of board |
| TC24 | E9 | Slave STB | Short Pin 1 & 2. towards back of board |
| TC23 | E8 | EXT_MON_OE | Short Pin 1 & 2. towards back of board |
| TC22 | E7 | Unused | Short Pin 1 & 2. towards back of board |
| TC21 | E1 | EXT_TJ_EN | Short Pin 1 & 2. towards back of board |
| TC20 | E6 | EXT_LD | Short Pin 1 & 2. towards back of board |
| TC19 | E5 | EXT_UD | Short Pin 1 & 2. towards back of board |
| TC18 | E4 | EXT_ADDR_CK | Short Pin 1 & 2. towards back of board |
| TC17 | E3 | EN | Short Pin 1 & 2: source from latch |
| | | | Short Pin 2 & 3: source from SMA |
| TC16 | E13 | N/A | Don't care |
| TC15 | E20 | N/A | Don't care |

 Table 5: Motherboard SMA and Jumper Definitions (Jupiter Input Signals)

The following table defines the Jupiter output signals. These are always present at the motherboard SMAs.

Table 6: Motherboard SMA Definitions (Jupiter Output Signals)

| TC# | MB EVM |
|------|-------------|
| TC14 | KEL_ALARM_N |
| TC13 | V_ALARM_N |
| TC12 | I_ALARM_N |
| TC11 | OT_ALARM_N |
| TC9 | ALARM_N |
| TC8 | C_BIT_N |
| TC6 | CAP_DIS_N |
| TC5 | DPS EN N |

2.7 Jupiter EVM Menu and Dialog Boxes

Figure 5 illustrates the Jupiter EVM menu options that provide access to the Jupiter dialog boxes. For each Jupiter register, there is a control field allowing the customer to have full control over the Jupiter device. These screen shots show the default '*FV out FORCE-B with Alarms*' configuration.

There are separate menu and dialog boxes for the Master and Slave device. The Slave dialog boxes are only available if the Slave is detected.

Figure 5: Device Config Menu Options

| PlanetATE Evaluation Program | |
|---|-----|
| File Edit View EVM Config Venus Pluto Mercury Neptune Jupiter Saturn Triton Window Test Help Burn-J | 'n |
| Seq0: Volt(-0.8208) = -0.7860 Slave (Dev ①) > Jupiter Config Seq0: Volt(-0.4752) = -0.4322 Slave (Dev ①) > DC Levels State DAC Cal State DAC Cal BT DAC Cal Seq1: Volt(-0.4322) = 0.0113 UR2) Seq1: Offset.gain = 1.025329 ; Offset.offset = 0.0556 Beg1: Volt(0.0432) = 0.0986 Seq2: Volt(0.0432) = 0.0996 Seq2: Volt(0.0432) = 0.0548 Gentral Registers Seq3: Volt(0.752) = 0.5419 Seq3: Volt(0.752) = 0.5419 Gentral Registers Seq3: Volt(0.752) = 0.5419 Seq3: Offset.gain = 1.025248 ; Offset.offset = 0.0547 Seq3: Volt(6.7250) = 6.7339 Seq0: Volt(6.7250) = 6.7439 Seq1: Volt(6.7750) = 6.8026 Seq1: Volt(6.7750) = 7.0250 Seq1: Volt(6.7250) = 7.0718 Seq2: Volt(7.0250) = 7.0718 Seq2: Volt(7.2750) = 7.3531 Seq3: Volt(7.4750) = 7.555 Seq3: Colif, Can offset = 0.0110 Seq3: Volt(7.4750) = 7.5755 Seq3: Colifyered for FV mode to FORCE-B with Alarms enabled. Configuration complete. | |
| Configure Jupiter | NUM |

| Jupiter (Dev=0) Configuration | | × |
|--|--|---|
| Input Forcing Voltage Options Sel-Force RtDAC Sel-Gang GANG_0 | Mode / Enable FI/FV* Voltage V Sel-Rt-En CPU-En V | CPU Alarm Readback Status Kel-Alarm = 0 OT-Flag = 0 |
| Real-Time (RT) DAC Select Sel-Adder RAM Sel-F-Sel FI/FV* | Sel-DPS-En Global-Alarm Sel-DPS-En-OE Cap-Dis DPS-En-Parity C-Bit | V-Cl = 0 I-Cl = 0 Global-Alarm = 0 |
| CPU+-Sel O Low O High Real-Time (RT) Dac Adder CPU Adder CK | FV Feedback Sel-V-FB (Read Back) CPU-Sel-FB SENSE ♥ Local-Sense* ♥ | CPU-TJ-En CPU-TJ-En CPU-TJ-En OLow OHigh CPU-OT-Flag-Dis CPU-OT-Dis |
| Start (HEX) 8000 Delta (HEX) 1000 RT-Level Readback 8000 | Con-Force_AB & Ext-Force/Sense Sel-Con-FA-FB On-Chip-En ♥ CPU-Con-FA-FB ♥ ES-OE □ Con-EF-FB □ | Sel-Global-OT Global-OT Tj-Max Tj0 OT-Flag-Reset |
| RT-Delta Readback 1000 Sel-Ext-Adder-CK EXT_ADDER_CK | Sel-ES FORCE_A Measure/Monitor Path Sel-MV SENSE | Kelvil Adminik Kel-Al 8 V CPU-Kel-En V CPU-OK-En Sel-Global-Kel RT_KEL_AL V |
| Sel-Ext-Load CPU-Ld CPU-Ld OLow High Sel-Ext-UD* EXT_UD* | Sel-Diag GND V Sel-Mon MV V Sel-Ext-Mon-OE CPU-Mon-OE V | Current Alarm/Clamp Idamp-EN V CPU-OI-En Sel-L-I-Cl En-I-Cl V |
| CPU-UD* Count Up Slew Rate/Compensation Options SR-Adj SR-Adj 15 Con-Cint Con-Cext V | CPU-Mon-OE ♥ Ganging Con-Gang0 ♥ Con-Gang1 Con-Gang2 Con-Gang3 Collection | Voltage Clamp Vdamp-EN |
| Con-CompA Con-CompB | Calibration Adjust CMRR Adj (+/- 15) 0 | MI-OS (+/- 15) 0 |

Figure 6: Jupiter Configuration Dialog Box

Figure 7: Jupiter DC Levels Dialog Box

| Jupiter (De | v=0) DC Leve | s | × |
|--|--|--|-----------------|
| RT-DA | C Range VR0 | Current Range 512mA | |
| Clamp FI & I-Clan | s Range VR3 nps use IR range | v | Apply |
| Volt Ste | ep 0.5000 | | <u>R</u> efresh |
| ICL Step (m | A) 50.0 | | <u>C</u> ancel |
| DC Value | | Offset Correction Gain Correction | n i i |
| VF0 | 3.0000 🛟 | VF0 -0.0000 VF0 1.0000 | Calibrate |
| VF1 | -0.0001 🛟 | VF1 -0.0000 VF1 1.0000 | |
| VCL-HI | 13.9998 🛟 | VCL-HI -0.0000 VCL-HI 1.0000 |] |
| VCL-LO | -2.0005 | VCL-LO -0.0000 VCL-LO 1.0000 |] |
| ICL-HI (mA) | 716.8 | ICL-HI -0.0000 ICL-HI 1.0000 |] |
| ICL-LO (mA) | 716.8 | ICL-LO -0.0000 ICL-LO 1.0000 |] |
| VR0 = -0.5V VR1 = -1.0V VR2 = -2.0V VR3 = -4.0V IR = -1.0V t | / to +3.5V / to +7.0V / to +14.0V / to +28.0V to +1.0V | VR0 = +/- 0.216V VR1 = +/- 0.432V R2 = +/- 0.864V VR2 = +/- 1.684V IR = +/- 0.108V | 25 |





Figure 9: Jupiter Central Register Dialog Box

| Jupiter (Dev=0) Central Reg Config | × |
|---|--|
| | Prod ID = 0x1F4 ; Die Rev = 0x8 VMid (based on VR0) 1.5V Apply Refresh |
| | Cal All Levels |
| Read/Write Register Register Bit Central Bit C Channel Static | FORCE-B Alarms |
| Address (dec) 0 (0 - 127) Write | Toggle Level (program DAC between 2 voltages) |
| Data (HEX) 0000 Read | Channel Chan 0 Volt2 (V) 0 |
| Read Data (HEX) B332 Reg. Dump | Vrange VR1 Vidth (mS) 5 Start Stop Period (mS) 10 |
| | |

3 Jupiter EVM Loadboard Detailed Description

Figure 10 illustrates the Jupiter EVM loadboard. The loadboard contains the Jupiter device as well as the necessary circuitry to validate & characterize on the bench environment. Circuitry highlighted in turquoise is new or modified on the Rev C loadboard.





3.1 Capacitor and Resistor Network Definitions

Figure 11 illustrates while Table 7 and Table 8 list the Jupiter EVM capacitor/resistor load network definitions. Any capacitor combination can be switched in. The software only allows a single resistor value to be switched in. The CON_RNET_TN provides the ability to switch in a 1K resistor between FORCE_B (TestNode) and SENSE; this is used to create an IR drop in order to test/characterize the Kelvin Alarm threshold circuit.





 Table 7: Capacitor Network Definitions

| CAP_# | Code | Capacitor Value |
|-------|---------|-----------------|
| | -1 or 0 | Open All |
| CAP1 | 1 | 0.1uF |
| CAP2 | 2 | 1.0uF |
| CAP3 | 4 | 10uF |
| CAP4 | 8 | 47uF |

Table 8: Resistor Network Definitions

| Code | Current Range | Resistor Value(s) |
|------|---------------|-------------------|
| -1 | 0 | Open All |
| 0 | 15.625uA | 64K |
| 1 | 125uA | 8K |
| 2 | 1mA | 1K |
| 3 | 8mA | 125 |
| 4 | 64mA | 15.8 |
| 5 | 512mA | 1.95 |

3.2 ADC and Analog Mux

The Octal FVMI contains a 24-bit ADC and analog muxes. Table 9 lists the Jupiter EVM loadboard specific mux input sources. Table 10 lists the Jupiter EVM loadboard LB_AMUX analog mux which is routed to the VINP13 and VINN8 nodes.

Note: Most signals go through channel protectors or voltage dividers (i.e. VCC) since they could exceed FVMI Supplies (+20V/-15V).

| Addr | VINP# | VINPOS(A) | VINN# | VINNEG(A) |
|------|--------|---------------------|--------|---------------------|
| 7 | VINP8 | Reserved | VINN8 | VREF Div Sense |
| 8 | VINP9 | GANG_MON(p) | VINN9 | TJ (Master) |
| 9 | VINP10 | EXT_SENSE(p) | VINN10 | LB_AMUX (see below) |
| 10 | VINP11 | MONITOR(p) | VINN11 | TJ (Slave) |
| 11 | VINP12 | SENSE(p) | VINN12 | MON_REF(p) |
| 12 | VINP13 | LB_AMUX (see below) | VINN13 | GANG3(p) |
| 13 | VINP14 | TEST_NODE(p) | VINN14 | REXT |

Table 9: FVMI Analog Mux – VINPOS(A) & VINNEG(A) Mapping

|--|

| Addr | Loadboard Amux |
|------|----------------|
| 0 | DUT_GND |
| 1 | VCCOUT_DIV |
| 2 | EXT_SENSE(p) |
| 3 | VCC_DIV |
| 4 | CAP_AP(p) |
| 5 | CAP_AN(p) |
| 6 | TN_DIV |
| 7 | CAP_SR(p) |
| 8 | GANG2(p) |
| 9 | CAP_BP(p) |
| 10 | EXT_FORCE(p) |
| 11 | VEE_DIV |
| 12 | CAP_BN(p) |
| 13 | RNET_SENSE |
| 14 | FORCE_A(p) |
| 15 | FORCE_B(p) |

Note: Addr#8 was connected to SENSE(p) on the RevB loadboard. However, the software never used it.

3.3 Jupiter Loadboard Controller

The Jupiter loadboard contains seven 8-bit latches (registers) and a 16K EEPROM. Figure 12 illustrates the Jupiter EVM controller section.

The latches are daisy chained together using the SDI_SCK/RCK/CS signals originating from the Motherboard. The EEPROM is controlled by the LPORT1_OUT[4:2] signals originating from the motherboard. The loadboard latches are labeled STB_I to STB_O. This was named as an extension to the REG_A to REG_H Octal FVMI / Motherboard registers.

The Cbit1 to CBit7 are also used to control various relays, the C-Bits originate from the Octal FVMI board.



Figure 12: Controller Section Detailed Block Diagram

4 **Document Revision History** Revision Date Description A01 Initial Draft. Jupiter Rev 3- and Loadboard Rev A support B01 Dec 13, 2005 Overhauled for Jupiter Rev 4+ and Loadboard Rev B support B02 May 31, 2006 Jupiter R8+ support. Added ForceA/B with Alarms option B03 Nov 24, 2006 Jupiter Slave support. Added screen shots for all dialog boxes Remove E3/E8 jumpers from Figure 3; was misleading Updated Table 4 : E9 is Installed. E10 is left Open C01 May 17, 2007 Jupiter R10+ support and Loadboard Rev C support C02 Aug 26, 2014 Updated software installation to support USB interface C03 Aug 28, 2018 Updated software installation to support Windows 10