**ADP1043A Evaluation Board**

**Forward Active Clamp**

**Reference Design**

**PRD 1168**

**FEATURES**

- Forward Active Clamp with Synchronous rectifier
- Voltage Feedback Loop
- Dimensions: 58.4mm × 61mm × 12mm (Half Brick)
- Input Voltage Range: -34V to -60V DC
- Output Voltage/Current: 18V/6A DC
- 95% Max. Efficiency
- I2C serial interface
- Software GUI

**PRD 1168 OVERVIEW**

The PRD 1168 is designed for evaluating ADP1043A application using forward active clamp topology. The ADP1043A is a secondary side power supply controller IC designed to provide all the functions that are typically needed in an AC-DC or isolated DC-DC application.

The board output 18V/6A DC from a -34 to -60VDC input. The maximum efficiency can reach 95%. It has versatile protection, such as OCP, SCP, OTP etc. And the protection mode also can be programmed through GUI.

Using this board and its accompanying software, the ADP1043A can be interfaced to any PC running Windows 2000, Windows NT, Windows XP or Windows Vista via the computer's USB port.

**EVALUATION EQUIPMENT**

To evaluate this demo board, a PC, oscilloscope, electronic load and a DC power source are required.

*Figure 1 Forward Active Clamp Topology.*
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EVALUATION BOARD HARDWARE

SPECIFICATIONS

- Nominal input voltage: -48 DC
- Input voltage range: -34~60V DC
- Nominal output voltage: 18V DC
- Nominal output current: 6A DC
- Switching frequency: 180kHz
- Efficiency: 95% at full load

TOPOLOGY AND OPERATION WAVEFORMS

A typical DC/DC switching power supply is the basis for the eval board. It is a forward active clamp with synchronous rectifier topology, shown as Figure 1. The forward active clamp converter is an isolated converter, which operates with variable duty cycle which can be over 50%, so that a wide range input converter can provide high efficiency under the conditions of regulated output.

The primary side consists of the input terminals, main switch, aux switch (PMOS) and main transformer. The gate driver signal for the switches comes from the ADP1043A, through the iCoupler and the drivers. There is also a current transformer (CT), to transmit the primary side current information to the ADP1043A on the secondary side.

The secondary side power stage consists of the synchronous rectifiers, inductor, output capacitor and sensing resistor. This provides 18V @ 6A at the output. The ADP1043A is located on the secondary side. The ADP1043A provides the feedback signal that is used to regulate the voltage, limit the current, allow current sharing and shutdown to be implemented. Low side current sensing is used.

There is a 8pins connector on the board. 4pins of the connector is for I2C. This allows the PC software to communicate with the eval board through the USB port of the PC. The user can readily change register settings on the ADP1043A this way, and also monitor the status registers.

The eval board is designed with a 2mOhm RSENSE resistor. The power supply is designed to support a maximum continuous output of 6 A.

A variable load is required to perform a thorough evaluation. The output voltage is available between P4 and P5. This is also where the load should be connected.

The power supply will be in Continuous Conduction Mode. If the synchronous rectifiers are enabled, the power supply will remain in CCM mode over the full load range.
The connections to the eval board are shown in Table 1.

### Table 1. Power module pin assignment

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Eval Board Function</th>
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<tbody>
<tr>
<td>P1</td>
<td>Vin-</td>
<td>Negative Input</td>
</tr>
<tr>
<td>P2</td>
<td>On/Off</td>
<td>Remote Control</td>
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<tr>
<td>P3</td>
<td>Vin+</td>
<td>Positive Input</td>
</tr>
<tr>
<td>P4</td>
<td>Vo-</td>
<td>Negative Output</td>
</tr>
<tr>
<td>P5</td>
<td>Vo+</td>
<td>Positive Output</td>
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<tr>
<td>P6</td>
<td>Interface</td>
<td>Interface</td>
</tr>
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</table>

**INTERFACE CONNECTOR**

The signal pins are P6.1–P6.8 as shown in Table 2. Among them P6.7, P6.5, P6.3 and P6.1 are connected to USB dongle.

### Table 2. Signal pins

<table>
<thead>
<tr>
<th>Pin</th>
<th>Designation</th>
<th>Pin</th>
<th>Designation</th>
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<tr>
<td>P6.1</td>
<td>GND</td>
<td>P6.5</td>
<td>SCL</td>
</tr>
<tr>
<td>P6.2</td>
<td>PGOOD</td>
<td>P6.6</td>
<td>Vsen-</td>
</tr>
<tr>
<td>P6.3</td>
<td>SDA</td>
<td>P6.7</td>
<td>5V</td>
</tr>
<tr>
<td>P6.4</td>
<td>Vsen+</td>
<td>P6.8</td>
<td>Address</td>
</tr>
</tbody>
</table>
Figure 3 shows the photo of eval board. Figure 4 provides a typical circuit diagram which details the filtering for normal operation and output ripple test.
TEST RESULTS

Figure 6 Efficiency at nominal output voltage vs. load current for minimum, nominal, and maximum input voltage at 25°C.

Figure 7 Output voltage response to step-change in load current (25%-75%-25% of Iout(max): dI/dt = 1A/μs). Ch 2: Vout (500mV/div), Ch 4: Iout (2A/div).

Figure 8 Output voltage ripple at nominal input voltage and no load current. Ch 2: Vout (50mV/div), Bandwidth: 20 MHz.

Figure 9 Output voltage ripple at nominal input voltage and nominal load current. Ch 2: Vout (50mV/div), Bandwidth: 20 MHz.
Figure 10: Turn-on transient at nominal input voltage and no load current. Ch 2: Vout (5V/div), Ch 4: Load Current (5A/div).

Figure 11: Turn-on transient at nominal input voltage and nominal load current. Ch 2: Vout (5V/div), Ch 4: Load Current (5A/div).

Figure 12: Output overcurrent protection function. Increase load current at nominal input voltage to overcurrent limit. Ch 2: Vout (5V/div), Ch 4: Load Current (5A/div).

Figure 13: Output short circuit protection function. Turn on at nominal input voltage and rated load current then short circuit. Ch 2: Vout (5V/div), Ch 4: Load Current (5A/div).
GETTING STARTED

EQUIPMENT

- DC Power Supply 0-60V (Sorensen DLM150-20E)
- Electronic Load capable of 18V/6A (Chroma 63112)
- Oscilloscope (Tektronix TDS5054B)
- PC with ADP1043A GUI installed
- Precision Digital Multi-meters (Agilent 34401A)
- Current Probe for measuring up to 6A DC (Tektronix TCP202)

SETUP

NOTE: DO NOT CONNECT THE USB CABLE TO THE EVAL BOARD UNTIL AFTER THE SOFTWARE HAS BEEN INSTALLED.

Figure 14  Connection with Computer

1. Install the ADP1043A software. Refer to the Quick Start Guide that comes on the CD (If already installed, skip to the next step).

2. Connect the evaluation board to the USB port on the computer, using the “USB to I2C interface” dongle. If the dongle driver was not previously installed, run the software from the Start Menu under “Programs/ADI/ADP1043A”.

3. The software should report that the ADP1043A has been located on the board. Click Finish to proceed to the Main Software Interface Window.

Figure 15  Getting Started

4. Click on the icon and “Load Board Setting”: select the “PRD1168.43b file”. This file contains all the board information including values of shunt and voltage dividers.
5. The ADP1043A is pre-programmed and calibrated, so there is no programming necessary.
6. Connect an electronic load at the output.
7. For the input voltage source, a DC power supply can be used. The input voltage range is -34V to -60 VDC (-48VDC is recommended). This input voltage is the signal which will be regulated to provide a 18V/6A supply at the output. Set the voltage to -48VDC.
8. The eval board should now up and running, and ready to evaluate. The output should be 18 VDC.
BOARD EVALUATION

The ADP1043A is optimized for improving the power supply design and evaluation process. The goal of this eval kit is to allow the user to get an insight into the flexibility offered by the extensive programming options offered by the ADP1043A.

The ADP1043A performs many monitoring and housekeeping functions in the power supply. The eval board allows the user to simulate various events that could affect the ADP1043A in a working system. The user can monitor how the ADP1043A handles this event in many ways. One way is to use an oscilloscope and/or multi-meter, and probe the eval board, to see various conditions in the system. The user can also use the software to monitor the conditions of the ADP1043A, and how it has reacted to the event. The following section gives some experiments that the user might typically evaluate.

LINE AND LOAD VOLTAGE REGULATION

Vary the input voltage from -34VDC to -60VDC. The output voltage remains 18V. Vary the load current from 0 to 6A. The output voltage remains 18V. The line and load regulation are less than ±1%.

OUTPUT VOLTAGE SETTING

The output voltage setting is programmable. Using the Voltage Setting window in the software, adjust the output voltage (using the o/p trim menu). Monitor the actual output voltage of the power supply using the software or a multi-meter, or looking at the output voltage reading on the electronic load. It should match the programmed value. This will be used to calibrate the power supply in the production environment. By doing this evaluation, the user can see how the ADP1043A can be trimmed digitally to adjust the output voltage.

SOFT START

Once the input voltage is applied it is possible to test the Soft Start of the ADP1043A. The settings are located in the General Settings Window. Please refer to the Software Reference Guide for a detailed explanation of all the controls (EVAL-ADP1043A-GUI-RG).
Soft Start is enabled and set to 20ms. You can experiment with different times.

**DIGITAL FILTER – TRANSIENT ANALYSIS**

The digital filter can be changed using the software. The effect on transient analysis can be evaluated this way. Connect a switching electronic load to the output of the eval board. The load should be set to switch between 25%-75%, changing every 10msecs. Set up an oscilloscope to capture the transient waveform of the power supply output.

Use a differential probe on the scope, connecting it to the eval board output. Turn on the load, and note the waveform response.

Now, vary the digital filter using the software. Click on “Filter Settings” the window shows the filter settings for Normal mode. Click on the curve to move position of poles, zeroes and gains.

The transient response will change. This evaluation shows the user how the digital filter can easily be programmed to optimize the transient response of the power supply.
PWM – SWITCHING FREQUENCY
The converter switching frequency is programmable. In the “PWM & SR Settings” change the switching frequency.

The minimum and maximum modulation limits can also be modified.

NOTE: It is recommended to evaluate this feature with the power supply turned off. This prevents the chance of damaging the power supply by introducing shoot-through.

LIGHT LOAD OPTIMIZATION
The ADP1043A can be programmed to optimize performance when a output current drops below a certain level.

The threshold for light load mode can be programmed in the digital filter window.

Once the current will drop below this level the sync rectifiers (SR1 and SR2) will be disabled. The “Light Load Mode Settings” will be used. The response time for the ADP1043A to switch from one mode to another is between 10 and 20ms.

The light load mode can be disabled by selecting a Light Load Current Threshold of 0%.

PRIMARY SIDE CURRENT SENSE AND SECONDARY SIDE CURRENT SENSE
Current sensing is available for both the primary side current and the secondary side current. Primary side current sensing is performed using the current transformer, T1. Secondary side current sensing uses a low-side sense resistor.

Open the Monitor window in the software. Click on the Flags and Readings tab. Adjust the load current from 0A to 6A. The input current and output current values will change in the software, matching the changes being made at the load.
FLAGS AND FAULT CONFIGURATIONS

Open the Monitor window in the software. Click on the Flags and Readings tab. The window will show all of the fault flags. If a flag is set, then there is a red box next to the flag. If the flag is ok, then there is a green box next to the flag.

Set the load current to 0.3A. The CS2 OCP flag should be green.

Now change the load to 8A. The CS2 OCP flag should now have turned red, because the CS2 OCP threshold has been reached. The board will enter hiccup mode and try and restart.

Set the load back to 2A, and the flag turns green again. This shows how the user can easily monitor the health of the power supply by monitoring the status of the various flags.

Flag and Fault Response Configuration:

The ADP1043A is programmed to respond to the various fault conditions in the Fault Configuration Tab.
You can change the resolve issue to “Remain Disabled”. If the over current is applied again the ADP1043A will shut down and remain off until PSON is cycled.

This evaluation shows how it is quite easy to configure the response to a fault condition. Change the load back to 2A, then toggle the PS_ON switch to restart the power supply.
Figure 24   Main Circuit
Figure 25  ADP1043A Control Circuit

Figure 26  Aux. Power Circuit

AUX. Power
## BILL OF MATERIALS

<table>
<thead>
<tr>
<th>Item</th>
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<th>Description</th>
<th>Part Number</th>
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<td>R27</td>
<td>RES 4.7KOHM 5% 1/10W 0603</td>
<td>Generic</td>
<td>1</td>
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<tr>
<td>43</td>
<td>R28,R31,R41,R64,R71</td>
<td>RES 10KOHM 1% 1/16W 0402</td>
<td>Generic</td>
<td>5</td>
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<td>44</td>
<td>R30,R34</td>
<td>RES 25OHM 5% 1/10W 0603</td>
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<td>45</td>
<td>R32,R35,R36</td>
<td>RES 2KOHM 1% 1/16W 0402</td>
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<td>46</td>
<td>R40,R43,R44,R45</td>
<td>RES 2.2KOHM 1% 1/16W 0402</td>
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<td>47</td>
<td>R42</td>
<td>RES 49.9KOHM 0.1% 1/16W 0402</td>
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<td>48</td>
<td>R62,R102</td>
<td>RES 220OHM 5% 1/16W 0402</td>
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<td>49</td>
<td>R65</td>
<td>RES 8.2KOHM 1% 1/16W 0402</td>
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<td>50</td>
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<td>RES 330KOHM 1% 1/16W 0402</td>
<td>Generic</td>
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<td>51</td>
<td>R67,R70</td>
<td>RES 100OHM 5% 1/16W 0402</td>
<td>Generic</td>
<td>2</td>
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<tr>
<td>52</td>
<td>R69</td>
<td>RES 10KOHM 5% 1/10W 0603</td>
<td>Generic</td>
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<tr>
<td>53</td>
<td>R72</td>
<td>RES 1KOHM 5% 1/16W 0402</td>
<td>Generic</td>
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<tr>
<td>54</td>
<td>R74</td>
<td>RES 0OHM 5% 1/16W 0402</td>
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<tr>
<td>55</td>
<td>R76,R77</td>
<td>RES 20KOHM 5% 1/10W 0603</td>
<td>Generic</td>
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<td>56</td>
<td>R78,R85</td>
<td>RES 499KFOHM 5% 1/10W 0603</td>
<td>Generic</td>
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<td>57</td>
<td>R79</td>
<td>RES 20KOHM 5% 1/16W 0402</td>
<td>Generic</td>
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<tr>
<td>58</td>
<td>R80,R81</td>
<td>RES 680OHM 5% 1/8W 0805</td>
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<td>59</td>
<td>R82,R99,R100,R104</td>
<td>RES 5.1KOHM 5% 1/16W 0402</td>
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<td>61</td>
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<td>RES 36KOHM 5% 1/16W 0402</td>
<td>Generic</td>
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<td>62</td>
<td>R89</td>
<td>RES 2m OHM 1% 1/4W 1206</td>
<td>Vishay</td>
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<td>63</td>
<td>R90,R91,R92,R93</td>
<td>RES 5.1KOHM 1/4W 1206</td>
<td>Generic</td>
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<tr>
<td>64</td>
<td>R101</td>
<td>RES 0OHM 5% 1/16W 0402</td>
<td>Generic</td>
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<td>65</td>
<td>T1</td>
<td>PA1005.100NL 20A 1:100</td>
<td>Pulse</td>
<td>1</td>
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<tr>
<td>66</td>
<td>T3</td>
<td>AUX TRANSFORMER</td>
<td>BSER9-77</td>
<td>Jinchuan</td>
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<tr>
<td>67</td>
<td>T4</td>
<td>MAIN TRANSFORMER</td>
<td>BEQ-25</td>
<td>Jinchuan</td>
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<tr>
<td>68</td>
<td>U3,U4</td>
<td>iCoupler</td>
<td>ADuM3210</td>
<td>ADI</td>
<td>2</td>
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<tr>
<td>69</td>
<td>U6</td>
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<td>ADI</td>
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<td>70</td>
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<td>ADP3634</td>
<td>ADI</td>
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<td>71</td>
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<td>72</td>
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<td>LDO</td>
<td>ADP1720ARMZ-3.3-R7</td>
<td>ADI</td>
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</table>
PCB Layout

Figure 27   Top view of Board
## BOARD SETTING

Input Voltage = 48 V  
N1 = 5  
N2 = 4  
R (CS2) = 2.07 mOhm  
I (load) = 6 A  
R1 = 34 KOhm  
R2 = 2 KOhm  
C3 = 0.001 uF  
C4 = 0.001 uF  
N1 (CS1) = 1  
N2 (CS1) = 100  
R (CS1) = 10 Ohm  
ESR (L1) = 5 mOhm  
L1 = 14 uH  
C1 = 13.2 uF  
ESR (C1) = 1 mOhm  
ESR (L2) = 0 mOhm  
L2 = 0 uH  
C2 = 240 uF  
ESR (C2) = 35 mOhm  
R (Normal-Mode) (Load) = 3 Ohm  
R (Light-Load-Mode) (Load) = 36 Ohm  
Cap Across R1 & R2 = 0 "(1 = Yes: 0 = No)"  
Topology = 4 (0 = Full Bridge: 1 = Half Bridge: 2 = Two Switch Forward: 3 = Interleaved Two Switch Forward: 4 = Active Clamp Forward: 5 = Resonant Mode: 6 = Custom)  
Switches / Diodes = 1 (0 = Switches: 1 = Diodes)  
High Side / Low Side Sense (CS2) = 0 (1 = High-Side: 0 = Low-Side Sense)  
Second LC Stage = 1 (1 = Yes: 0 = No)  
CS1 Input Type = 0 (1 = AC: 0 = DC)  
R3 = 0 KOhm  
R4 = 0 KOhm  
PWM Main = 1 (0 = OUTA: 1 = OUTB: 2 = OUTC: 3 = OUTD: 4 = SR1: 5 = SR2: 6 = OUTAUX)
REGISTER SETTING

Reg(0h) = F8h - Fault Register 1
Reg(1h) = 0h - Fault Register 2
Reg(2h) = 4h - Fault Register 3
Reg(3h) = 44h - Fault Register 4
Reg(4h) = F8h - Latched Fault Register 1
Reg(5h) = 0h - Latched Fault Register 2
Reg(6h) = 4h - Latched Fault Register 3
Reg(7h) = 45h - Latched Fault Register 4
Reg(8h) = 33h - Fault Configuration Register 1
Reg(9h) = 3Fh - Fault Configuration Register 2
Reg(Ah) = F0h - Fault Configuration Register 3
Reg(Bh) = 0h - Fault Configuration Register 4
Reg(CH) = 0h - Fault Configuration Register 5
Reg(Dh) = 0h - Fault Configuration Register 6
Reg(Eh) = 81h - Flag Configuration
Reg(Fh) = 66h - Soft-Start Flag Blank
Reg(10h) = 0h - First Flag ID
Reg(11h) = FFh - Reserved
Reg(12h) = 0h - VS1 Value
Reg(13h) = 0h - CS1 Value
Reg(14h) = 0h - CS1 x VS1 Value
Reg(15h) = 0h - VS1 Voltage Value
Reg(16h) = 0h - VS2 Voltage Value
Reg(17h) = 148h - VS3 Voltage Value
Reg(18h) = 0h - CS2 Value
Reg(19h) = 0h - CS2 x VS3 Value
Reg(1Ah) = 4DE0h - RTD Temperature Value
Reg(1Bh) = FFh - Reserved
Reg(1Ch) = FFh - Reserved
Reg(1Dh) = 0h - Share Bus Value
Reg(1 Eh) = C0h - Modulation Value
Reg(1Fh) = FFh - Line Impedance Value
Reg(20h) = FFh - Reserved
Reg(21h) = 87h - CS1 Gain Trim
Reg(22h) = 2Ah - CS1 OCP Limit
Reg(23h) = 3Bh - CS2 Gain Trim
Reg(24h) = 10h - CS2 Offset Trim
Reg(25h) = 0h - CS2 Digital Trim
Reg(26h) = 3Ah - CS2 OCP Limit
Reg(27h) = 0h - CS1 and CS2 OCP Setting
Reg(28h) = 0h - VS Balance Gain Setting
Reg(29h) = 0h - Share Bus Bandwidth
Reg(2Ah) = 30h - Share Bus Setting
Reg(2Bh) = 1Bh - Temperature Trim
Reg(2Ch) = 62h - PSON/Soft Start Setting
Reg(2Dh) = 0h - Pin Polarity Setting
Reg(2Eh) = 12h - Modulation Limit
Reg(2Fh) = 0h - OTP Threshold
Reg(30h) = C0h - OrFET
Reg(31h) = A4h - VS3 Voltage Setting
Reg(32h) = 0h - VS1 Overvoltage Limit
Reg(33h) = Ah - VS3 Overvoltage Limit
Reg(34h) = 0h - VS1 Undervoltage Limit
Reg(35h) = 0h - Line Impedance Limit
Reg(36h) = 7h - Load Line Impedance
Reg(37h) = FFh - Reserved
Reg(38h) = CAh - VS1 Trim
Reg(39h) = 9h - VS2 Trim
Reg(3Ah) = CFh - VS3 Trim
Reg(3Bh) = 0h - Light Load Disable Setting
Reg(3Ch) = 5h - Silicon Revision ID
Reg(3Dh) = 41h - Manufacturer ID
Reg(3Eh) = 43h - Device ID
Reg(3Fh) = 10h - OUTAUX Switching Frequency Setting
Reg(40h) = 1Fh - PWM Switching Frequency Setting
Reg(41h) = 0h - PWM 1 Positive Edge Timing
Reg(42h) = 20h - PWM 1 Positive Edge Setting
Reg(43h) = 24h - PWM 1 Negative Edge Timing
Reg(44h) = 48h - PWM 1 Negative Edge Setting
Reg(45h) = 2h - PWM 2 Positive Edge Timing
Reg(46h) = 0h - PWM 2 Positive Edge Setting
Reg(47h) = 22h - PWM 2 Negative Edge Timing
Reg(48h) = 48h - PWM 2 Negative Edge Setting
Reg(49h) = 12h - PWM 3 Positive Edge Timing
Reg(4Ah) = 28h - PWM 3 Positive Edge Setting
Reg(4Bh) = 42h - PWM 3 Negative Edge Timing
Reg(4Ch) = E0h - PWM 3 Negative Edge Setting
Reg(4Dh) = 0h - PWM 4 Positive Edge Timing
Reg(4Eh) = 0h - PWM 4 Positive Edge Setting
Reg(4Fh) = 11h - PWM 4 Negative Edge Timing
Reg(50h) = 0h - PWM 4 Negative Edge Setting
Reg(51h) = 2h - SR 1 Positive Edge Timing
Reg(52h) = 70h - SR 1 Positive Edge Setting
Reg(53h) = 22h - SR 1 Negative Edge Timing
Reg(54h) = 88h - SR 1 Negative Edge Setting
Reg(55h) = 23h - SR 2 Positive Edge Timing
Reg(56h) = A8h - SR 2 Positive Edge Setting
Reg(57h) = 1h - SR 2 Negative Edge Timing
Reg(58h) = 20h - SR 2 Negative Edge Setting
Reg(59h) = 0h - PWM AUX Positive Edge Timing
Reg(5Ah) = 0h - PWM AUX Positive Edge Setting
Reg(5Bh) = 3Ah - PWM AUX Negative Edge Timing
Reg(5Ch) = F0h - PWM AUX Negative Edge Setting
Reg(5Dh) = 98h - PWM and SR Pin Disable Setting
Reg(5Eh) = 0h - Password Lock
Reg(5Fh) = 0h - Soft-Start Digital Filter LF Gain Setting
Reg(60h) = 7h - Normal Mode Digital Filter LF Gain Setting
Reg(61h) = F8h - Normal Mode Digital Filter Zero Setting
Reg(62h) = F7h - Normal Mode Digital Filter Pole Setting
Reg(63h) = 11h - Normal Mode Digital Filter HF Gain Setting
Reg(64h) = Eh - Light Load Digital Filter LF Gain Setting
Reg(65h) = D6h - Light Load Digital Filter Zero Setting
Reg(66h) = D5h - Light Load Digital Filter Pole Setting
Reg(67h) = 12h - Light Load Digital Filter HF Gain Setting
Reg(68h) = 0h - Dead Time Threshold
Reg(69h) = 0h - Dead Time 1
Reg(6Ah) = 0h - Dead Time 2
Reg(6Bh) = 0h - Dead Time 3
Reg(6Ch) = 0h - Dead Time 4
Reg(6Dh) = 0h - Dead Time 5
Reg(6Eh) = 0h - Dead Time 6
Reg(6Fh) = 0h - Dead Time 7
Reg(70h) = 14h -
Reg(71h) = B8 -
Reg(72h) = 53h -
Reg(73h) = 9h -
Reg(74h) = 0h -
Reg(75h) = FFh -
Reg(76h) = FFh -
Reg(77h) = 0h -
Reg(78h) = 0h -
Reg(79h) = 1Bh -
Reg(7Ah) = 2h -
Reg(7Bh) = FFh - Factory Default Settings
Reg(7Ch) = 1h - EEPROM X Address
Reg(7Dh) = 35h - EEPROM Y Address
Reg(7Eh) = 35h - EEPROM Register
Reg(7Fh) = FFh -
Reg(80h) = 35h -
Reg(81h) = 35h -
Reg(82h) = 35h -