Freescale Semiconductor
User's Guide

Document Number: KT34704AUG
Rev. 1, 6/2008

KIT34704AEPEVBE 8-Channel Evaluation Board

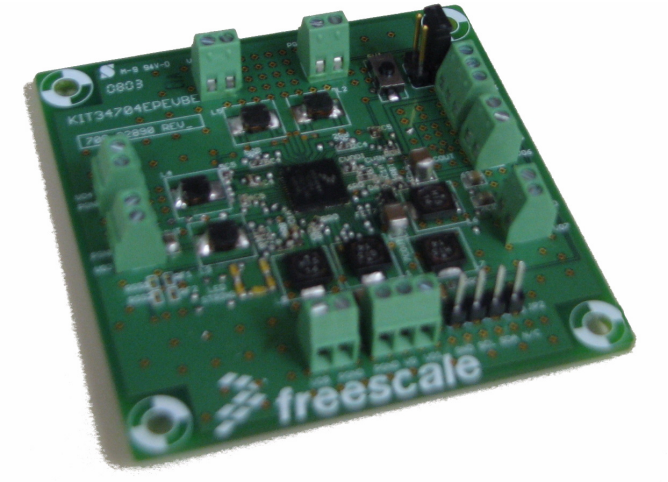


Table of Contents

freescale™ semiconductor

1 Kit Contents / Packing List

- KIT34704AEPEVBE
- KITUSBI2CEVME - USB to I^2C bridge board for controlling PMIC
- USB A-B Cable
- 4-pin female to female I^2C communication cable
- CD34704A

2 Important Notice

Freescale provides the enclosed product(s) under the following conditions:

This evaluation kit is intended for use of ENGINEERING DEVELOPMENT OR EVALUATION PURPOSES ONLY. It is provided as a sample IC pre-soldered to a printed circuit board to make it easier to access inputs, outputs, and supply terminals. This EVB may be used with any development system or other source of I/O signals by simply connecting it to the host MCU or computer board via off-the-shelf cables. This EVB is not a Reference Design and is not intended to represent a final design recommendation for any particular application. Final device in an application will be heavily dependent on proper printed circuit board layout and heat sinking design as well as attention to supply filtering, transient suppression, and I/O signal quality.

The goods provided may not be complete in terms of required design, marketing, and or manufacturing related protective considerations, including product safety measures typically found in the end product incorporating the goods. Due to the open construction of the product, it is the user's responsibility to take any and all appropriate precautions with regard to electrostatic discharge. In order to minimize risks associated with the customers applications, adequate design and operating safeguards must be provided by the customer to minimize inherent or procedural hazards. For any safety concerns, contact Freescale sales and technical support services.

Should this evaluation kit not meet the specifications indicated in the kit, it may be returned within 30 days from the date of delivery and will be replaced by a new kit.

Freescale reserves the right to make changes without further notice to any products herein. Freescale makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Freescale assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. “Typical” parameters can and do vary in different applications and actual performance may vary over time. All operating parameters, including “Typical”, must be validated for each customer application by customer’s technical experts.

Freescale does not convey any license under its patent rights nor the rights of others. Freescale products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Freescale product could create a situation where personal injury or death may occur.

Should Buyer purchase or use Freescale products for any such unintended or unauthorized application, Buyer shall indemnify and hold Freescale and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Freescale was negligent regarding the design or manufacture of the part.Freescale™ and the Freescale logo are trademarks of Freescale Semiconductor, Inc. All other product or service names are the property of their respective owners.

3 Introduction

This Evaluation Board demonstrates the capability of the MC34704A as a multi-channel power management IC (PMIC) meant to address power management needs for various multimedia application microprocessors. It provides 8 independent voltages through a terminal block connector for an easier out-of-the-box evaluation. A single terminal block connector for input power supply allows the user to supply the board with either a external DC power supply or a Li-Ion battery to fully evaluate the performance accordingly.

The KIT34704AEPEVBE has the ability to program the switching frequency of regulators 1 through 5 as well as the default soft start timing for all regulators during startup by changing few external components. All other features can be programmed via I^2C communication using a standard 100mils 4-pin header to communicate with either the USB-I^2C bridge included in this package or with any other I^2C communication device preferred by the user.

3.1 EVB Features

- Input voltage operation range from 2.7V to 5.5V
- 8 independent output voltages, accessible through terminal blocks.
- Capable to be programmed via I^2C
- On/Off push button
- Programable Switching frequency for REG1-5 by changing external components
- Programable default soft start for all regulators by changing external components
- 100mils 4-pin standard header connector for I^2C communication
- Small Board Size (6.2cm x 6.2cm)

3.2 MC34704A Device Description/Features

- Input voltage operation range from 2.7 to 5.5V
- 8 -DC/DC switching regulators with +/-2% output voltage accuracy
- Capable of operating at up to 2.0 MHz switching frequency I^2C programmability
- Output under voltage and over voltage detection for each regulator
- Over current limit detection and short circuit protection for each regulator
- Thermal limit detection for each regulator, except REG7
- Integrated Compensation for REG1, REG3, REG6 and REG8
- 5μA maximum shutdown current (All regulators are off, 5.5V VIN)
- True Cut-off on all of the boost and buck-boost regulators.

3.3 USB to I²C Board Features

- Provides an LED for USB Power Status and JB8 Communication Status
- “B” type USB interface connector
- 4 pin connector for the I²C Interface (SDA, SCL, 5V and GND)
- I²C Level Shifter IC to allow communication with 5V or 3.3V devices
- For more information please refer to KITUSBI2CEVME Documentation

4 Required Equipment

Minimum required equipment:

- Power supply (Select One):
  - 2.7V to 5.5V
  - 1 cell Li/Ion/Polymer (2.7 to 4.2V)
  - 5.0V USB supply or AC wall adapter
- USB enabled Computer with Windows XP or higher.
- CD contains a Graphical User Interface (GUI) allowing control of all PMIC Features through I^2C communication.

5 EVB Setup Configuration Diagram

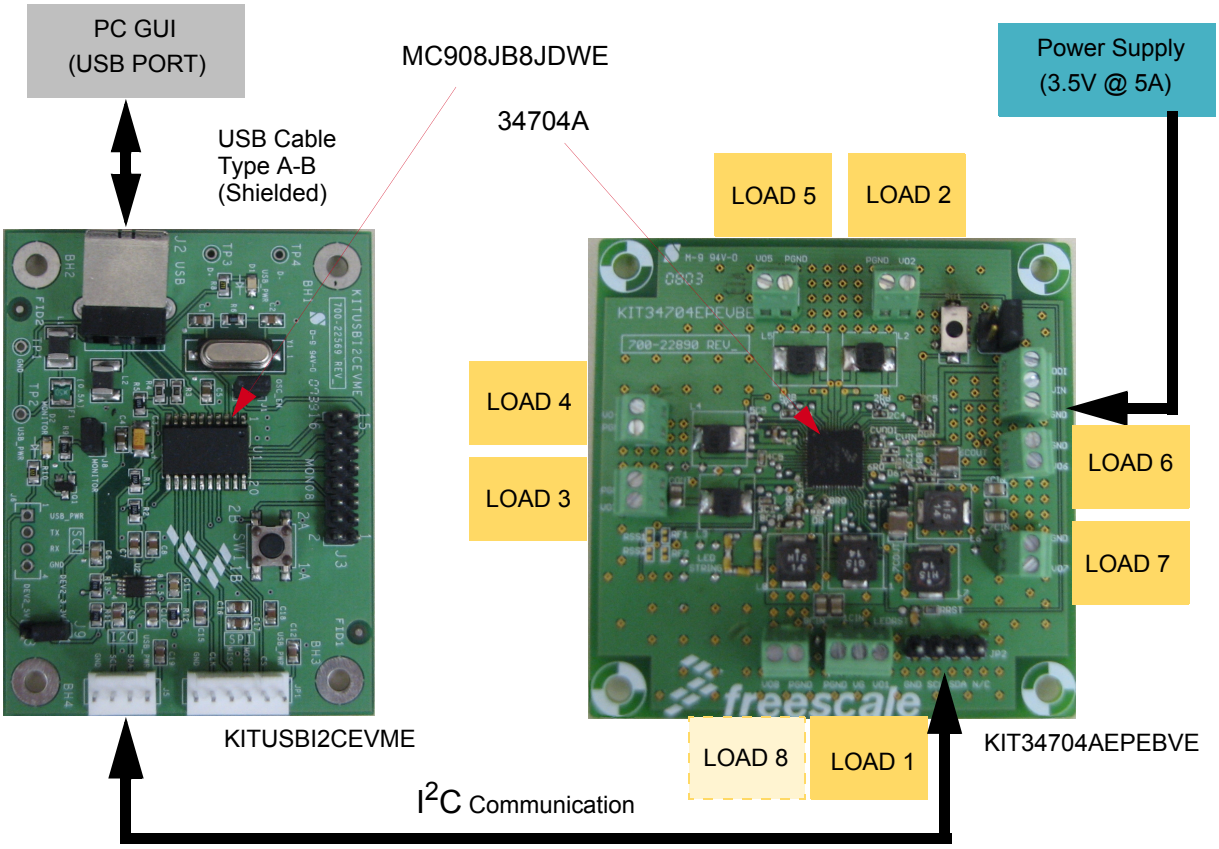


Figure 1. EVB Setup Configuration Diagram

6 KIT34704AEPEVBE Schematic

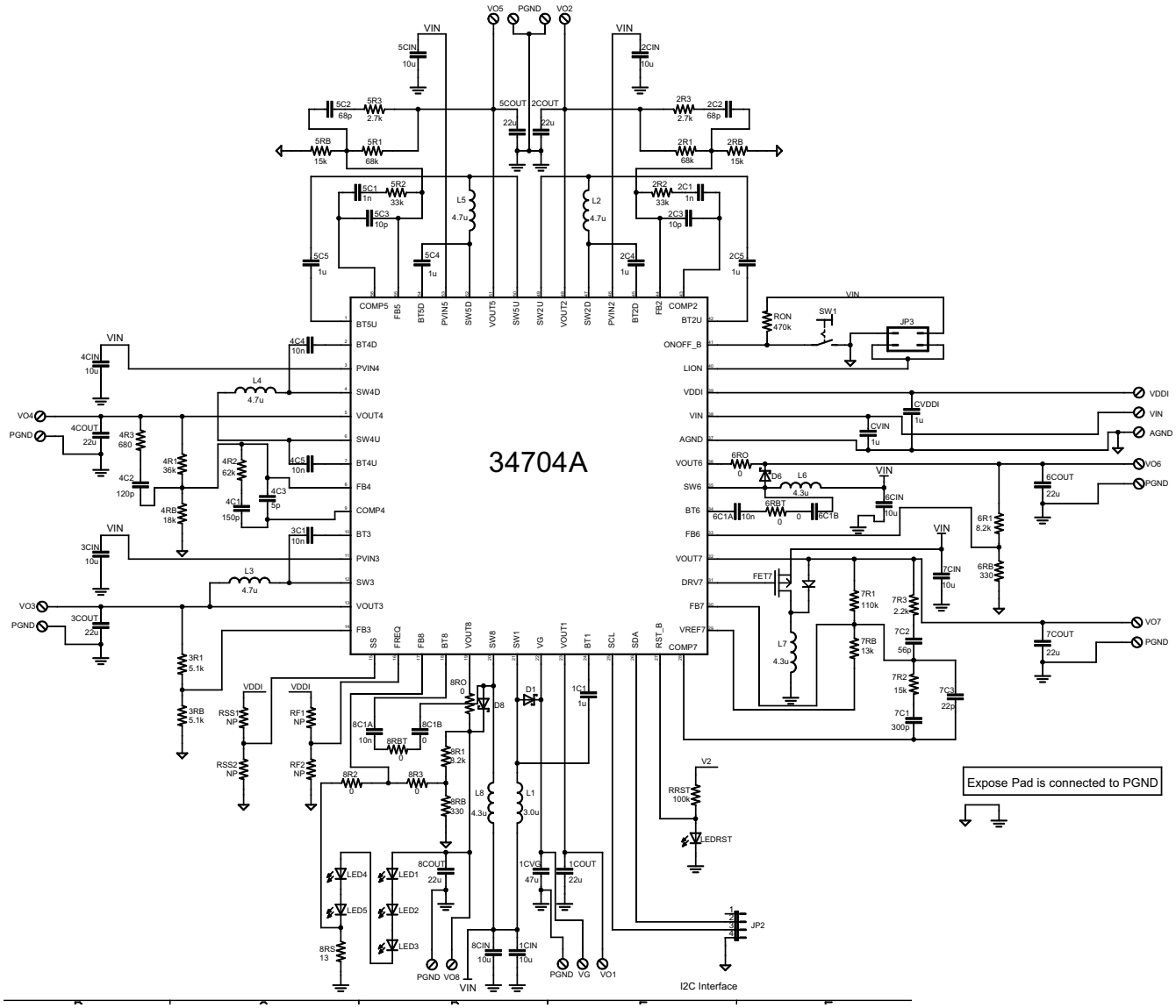


Figure 2. KIT34704AEPEVBE Schematic

7 KITUSBI2CEVME Schematic

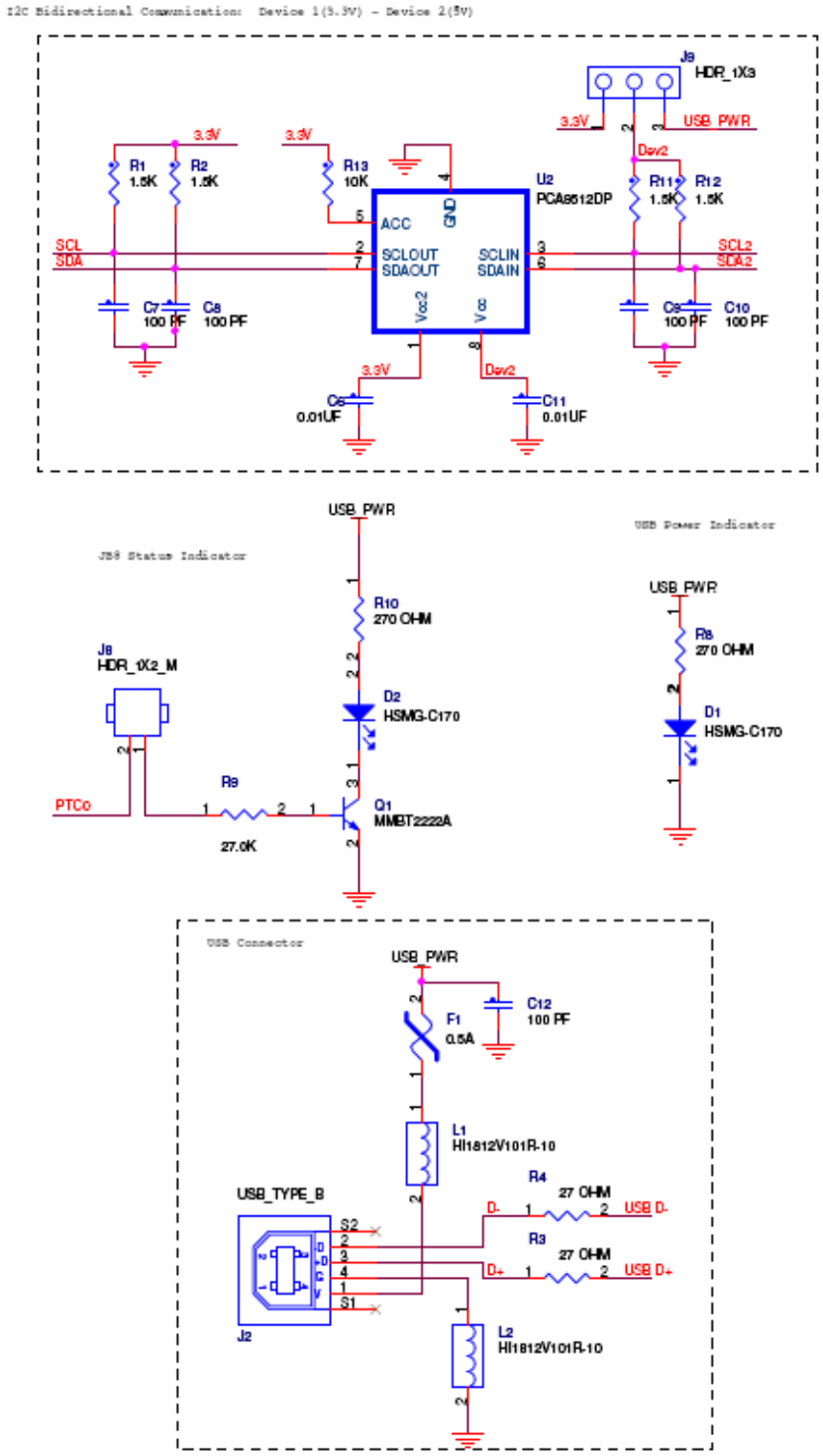


Figure 3. KITUSBI2CEVME Schematic 1

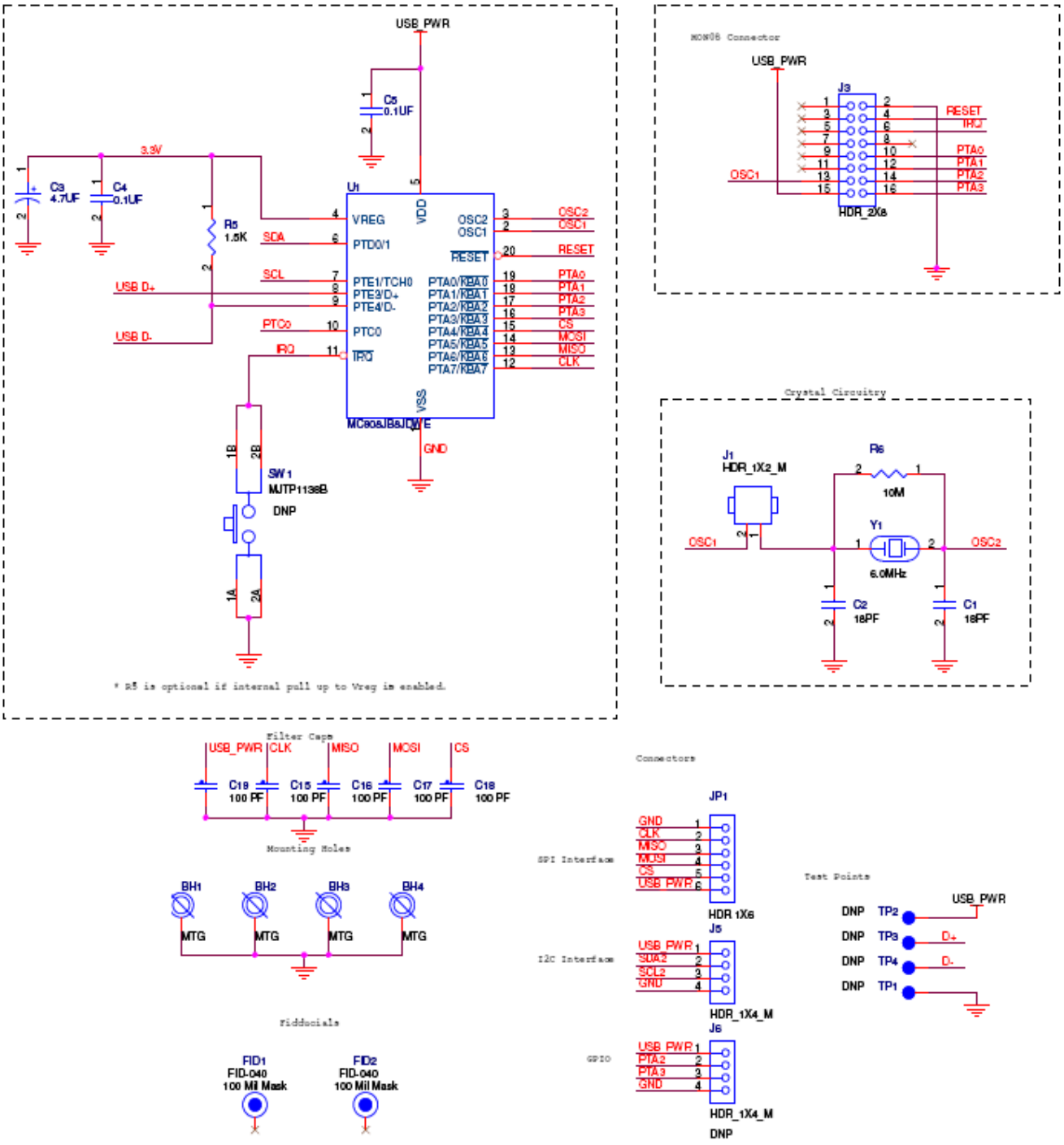


Figure 4. KITUSBI2CEVME Schematic 2

8 KIT34704AEPEVBE - Using Hardware

The KIT34704AEPEVBE operates with a single power supply from 2.7 to 5.5V and is controlled via I^2C with the help of an USB-I^2C bridge. Applying Input power supply will start up the VG regulator, set switching frequency and soft start and finally turn on REG2, REG3 and REG4 in stand alone mode, all other features can only be controlled via I^2C.

8.1 Jumper Connections

Use a jumper on J3 to connect pins 3-4 vertically to set LION to VIN.

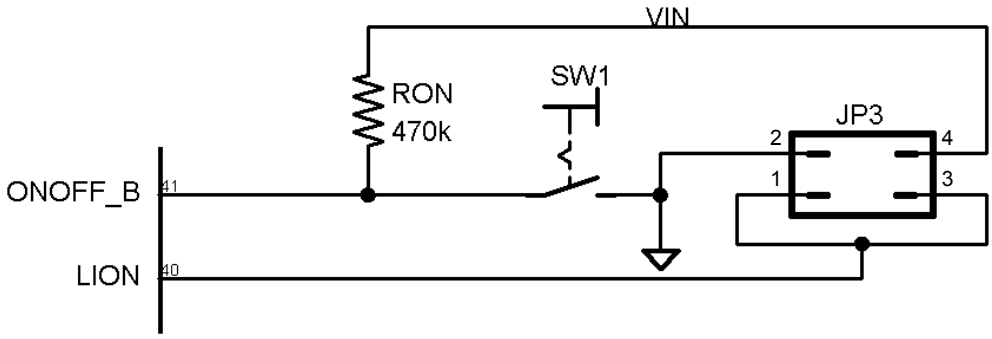


Figure 5. LION set to VIN

Pin 2,3 and 4 of JP2 corresponds to SDA,SCL, and GND signals respectively of the I^2C communication, connect to the USB-I^2C bridge for programming.

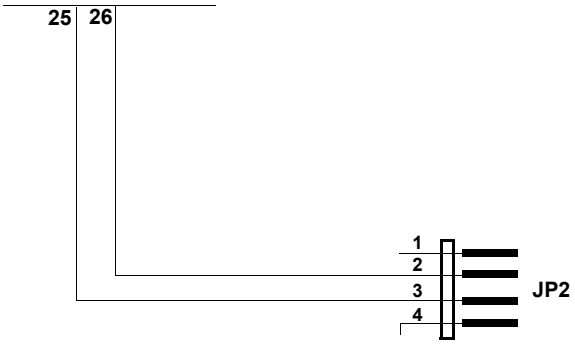


Figure 6. I^2C Communication connector

8.2 Input/Output power supply terminal blocks

A three-pin terminal block serves as the input terminal for the main power between 2.7 and 5.5V to operate the KIT34704AEPEVBE, as well as providing access to the reference voltage VDDI generated by the MC34704A to supply configuration voltages.

Regulator 1 uses a three-pin terminal block to provide GND reference and VO1 output at 5V with a maximum current capability of 500mA. It also provide access to the internal Gate voltage VG for monitoring purposes

Regulator 2 through 8 use a two-pin terminal block to provide each GND reference and VOx respectively. To learn how to configure the output voltage on each regulator, please refer to the MC34704 datasheet that can be found at www.freescale.com

The following diagram shows each of the terminals and its respective output voltage identificator.

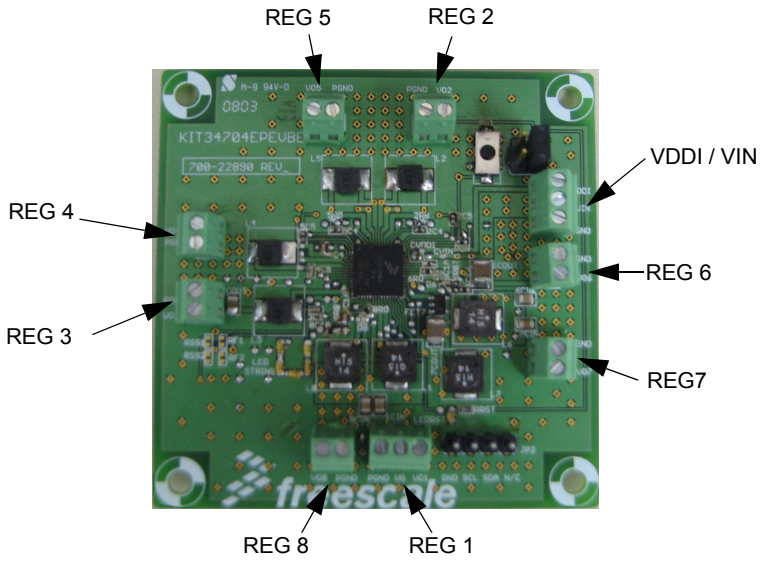


Figure 7. Input/Output terminal blocks

8.3 Starting up the KIT34704AEPEVBE

To Start working with the KIT34704AEPEVBE, provide an input voltage between 2.7V and 5.5V connecting the (+) probe to the VIN terminal and the (-) probe to the GDN terminal on the Input power terminal block. Turn on the power supply and the LEDRST should turn on.

At this moment the three stand alone regulators (REG2, REG3 and REG4) should be providing pre-configured output voltage. To operate the rest of the MC34704A functions, it is necessary to use I^2C communication.

Section 11 will discuss how to interact with the KIT34704AEPEVBE using the Graphical User Interface developed by freescale to fully operate the MC34704A.

9 KITUSBI2CEVME - Using Hardware

The KITUSBI2CEVME Demo Board provides a way of communicating a PC with KIT34704EPEVBE or any device that uses I^2C or SPI communication protocols.

9.1 Jumper Connections

9.1.1 J9

It is used to set the pull-up voltage of the I^2C communication device.

- Pins 1 & 2 (Pin 3 open): set the I^2C pull-up resistors at 3.3V
- Pins 2 & 3 (Pin 1 open): set the I^2C pull-up resistors at 5V
- Pin header open: Leave the I^2C pull-up resistors open. The slave device should pull up SCL2 and SDA2 signals to a voltage of 3.3V or 5V

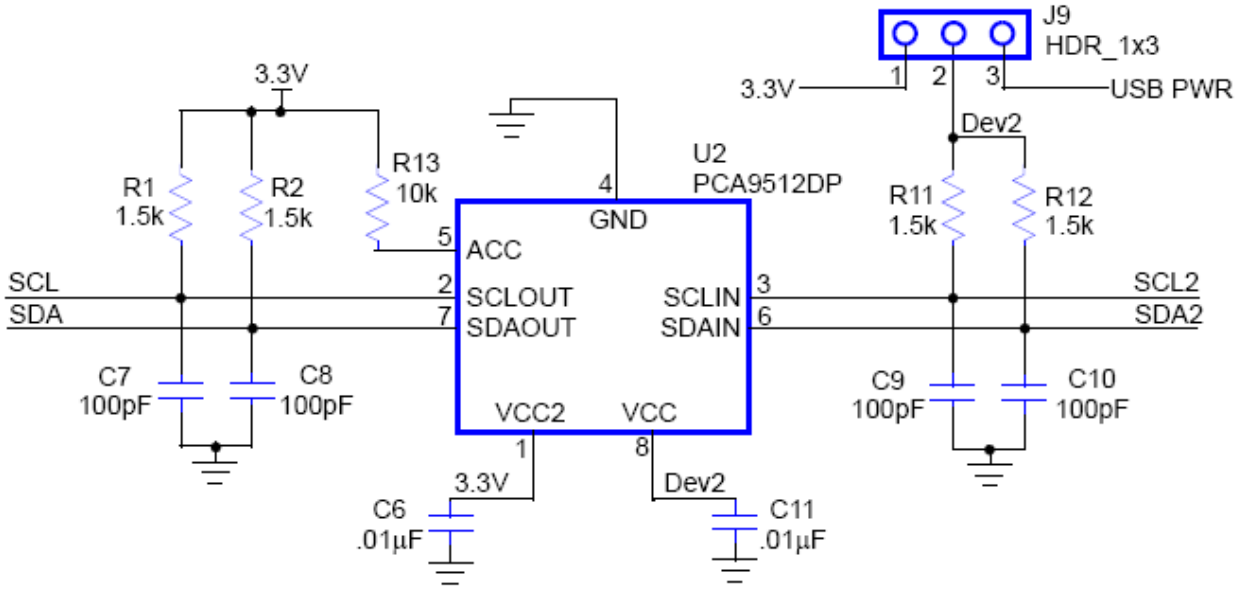


Figure 8. I^2C Pull-up configuration

7

9.1.2 J8

This jumper is to enable the status indicator LED. The LED is ON when any operation is being performed by the MCU.

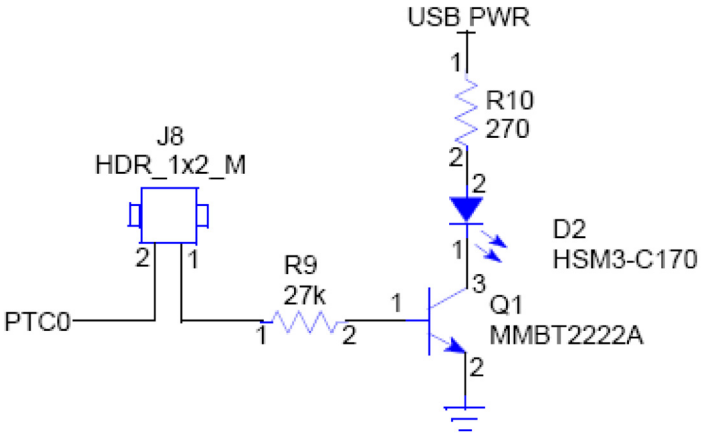


Figure 9. JB8 Status Indicator

9.1.3 J1

The J1 jumper should be disconnected only while JB8 is being programmed. Since the MCU is already programmed, J1 should be connected all the time, so the board operates properly. It is not recommended to program the JB8 due to pre loaded program will be erased and it will not longer operate correctly.

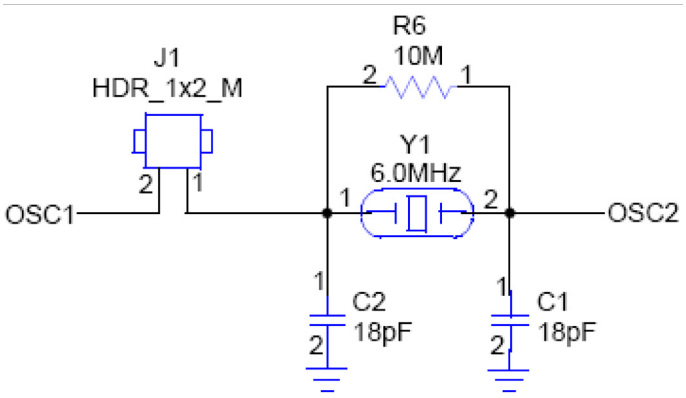


Figure 10. Crystal Circuitry

10 KIT34704EPEVBE Graphical User Interface

A graphical user interface has been developed to allow the user to fully interact with the KIT34704AEPEVBE using a Windows XP based computer.

10.1 Installing the KIT34704A GUI and KITUSBI2CEVME driver

Before connecting the KITUSBI2CEVME, install the Graphical User interface by double clicking into the Setup.exe file provided on the CD included with the kit; follow the instructions until the software is fully installed. Microsoft Frameworks 2.0 is required, if it is not previously installed the software will perform this installation prior to the MC34704A GUI software.

Connect the KITUSBI2CEVME to the USB port on the host computer for the first time, and the PC will try to recognize the USB device; when the driver selection window appears select the option “Install from a list or specific Location”.

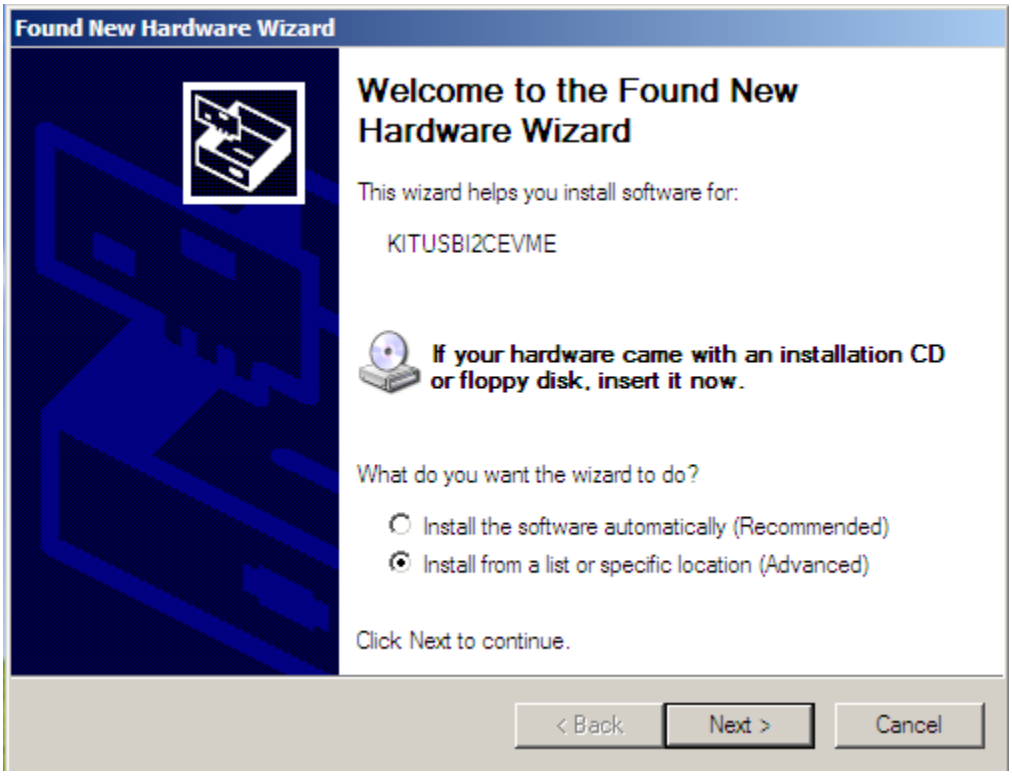


Figure 11. KITUSBI2CEVME Driver installation Window.

In the next window browse the path where you installed the KIT34704GUI and click Next. At this time, the Computer should recognize the KITUSBI2CEVME board and be ready to use the Graphical User Interface to control the KIT34704xEPEVBE

10.1.1 Working with KIT34704A Graphical User Interface

The Graphical User Interface (GUI) allows the user to program all I^2C features by using a friendly interface as well as modifying the register table manually for advance users. To launch the GUI application, select the application icon from the Freescale folder in the Start menu as it is shown in the picture below.

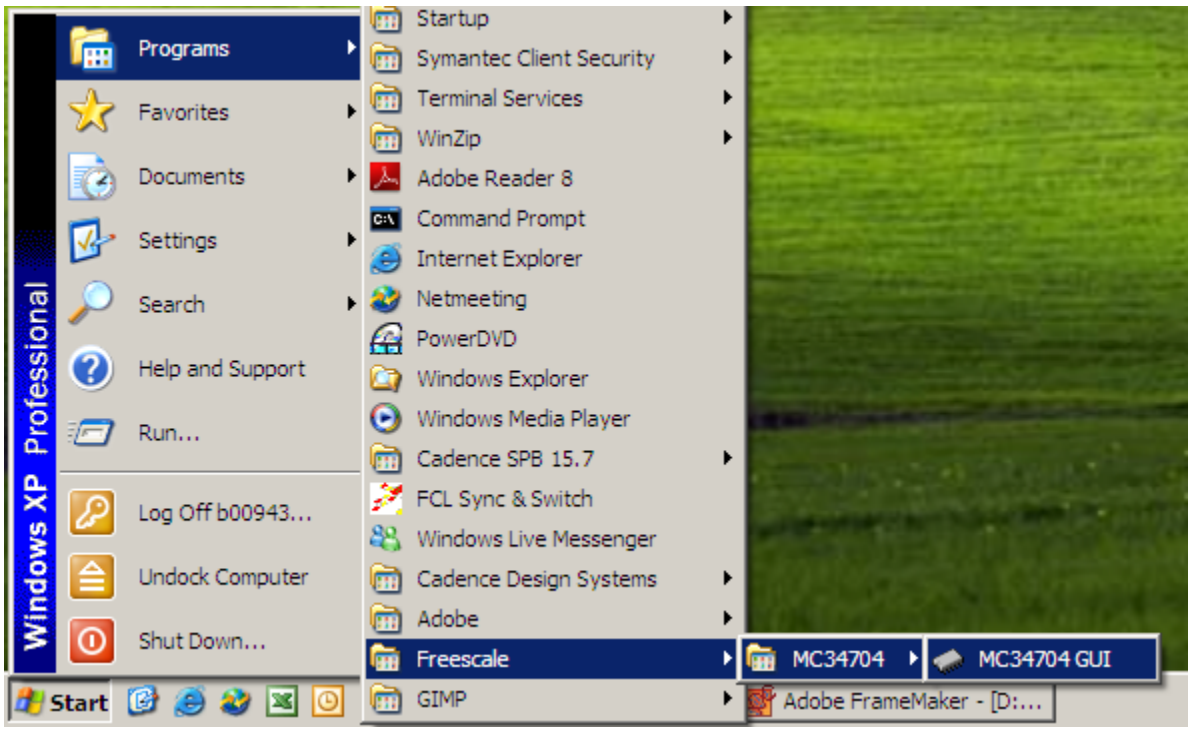


Figure 12. Launching the GUI application

The following is a list of al buttons and their description:

- ***General configurations***
  a) ***Device general ON/OFF button:*** Allows the user to make a software OFF instruction by setting the SHTD flag. When a software shutdown is done, to turn the device back ON, first clear the SHTD bit by Pressing this button ON, and then do a hardware turn ON with a falling edge on the ONOFF terminal.
  b) ***GRPC/E Power Sequencing:*** allows to change the power sequencing for regulators 5, 6 and 7, please refer to I^2C register section on Datasheet for more details on how this works.
  c) ***Shutdown Hold time:*** Program the waiting time for a shutdown after the Hardware shutdown push button is pressed.
  d) ***REG6/7/8 FSW:*** program the internal FSW2 that serve as switching frequency for regulator 6, 7 and 8.

e) ***5/8 channel enable button*****:** This buttons allows the configuration for either the MC34704A (8 channel) or the MC34704B (5 channel) Evaluation Kit.

- **Group B**

f) ***REGx DVS:*** dynamic voltage scaling to modify the output voltage on each regulator up to +-20%.

g) ***REGx over/under voltage response:*** setting the “Set flag on OV/UV” or “Sdown on OV/UV” option allows to turn on a fault flag only or completely shutdown the GRPB respectively when an over voltage or under voltage is present on one of the Regulator that belong to this group.

- ***Group A***

h) ***REG1 DVS:*** dynamic voltage scaling to modify the output voltage on each regulator up to +-20%.

i) ***REG1 over/under voltage response:*** setting the “Set flag on OV/UV” or “Sdown on OV/UV” option allows to turn on a fault flag only or shutdown the GRPA respectively when an over voltage or under voltage is present on REG1.

j) ***REG1 ON/OFF button:*** turns on/off regulator 1.

- ***Group C/E***

k) ***REGx DVS:*** dynamic voltage scaling to modify the output voltage on each regulator up to +-20%.

l) ***REGx Soft Start:*** Allows to independently control the soft start for each one of the regulators included in this group.

m) ***REGx over/under voltage response:*** setting the “Set flag on OV/UV” or “Sdown on OV/UV” option allows to turn on a fault flag only or completely shutdown the Group E/C, respectively, when an over voltage or under voltage is present on one of the Regulator that belong to this group.

n) ***Group E ON/OFF button:*** turns on/off REG5 when its set to turn on independently.

o) ***Group C ON/OFF button:*** If REG5 is set to turn on independently, this button only controls the on/off state of REG6 and REG7. If REG5 is set to turn on together with REG6 and 7, this button control the on/off state of all three regulators following the previously set power on sequence.

- ***Group D***

p) ***REG8 DVS:*** dynamic voltage scaling to modify the output voltage on REG8 up to +-20% when voltage mode control is set.

q) ***REG8 Soft Start:*** Allows to independently control the soft start for REG8.

r) ***REG8 control mode:*** when set to “Volt” it uses a standard voltage divider to set the output voltage. when set to “Curr” it uses Rsens at the end of a LED string to set the desired current flowing through the LED string.

s) ***REG8 over/under voltage response:*** setting the “Set flag on OV/UV” or “Sdown on OV/UV” option allows to turn on a fault flag only or shuts down the GRPD,

respectively, when an over voltage or under voltage is present on one of the Regulator that belong to this group.

t) ***REG8 Current scaling:*** Allows to select a fraction of the maximum current flowing through the LED string when the current mode control is selected.

u) ***REG8 ON/OFF button:*** turns on/off regulator 8.

- ***Special Registers***

v) ***REG3 fine voltage Scaling:*** allows to dynamically modify the output voltage on Regulator 3 in 0.5% variation steps.

w) ***REG7 Independent ON/OFF:*** allow to turn on Regulator 7 independently without having to turn on all Regulators on GRPC. REG7 features can still be configured using the boxes in Regulator 7 section.

- ***Operating Buttons***

x) ***Real time configuration Button:*** start an infinite read/write cycle to allow the user to modify the registers and observe changes in real time.

y) ***Stop Button:*** Stop the real time cycle.

z) ***Read Button:*** Read all registers once in order to debug for latched flags.

aa) ***Write Button:*** write the register configurations Once, changes to the features do not have effect until next write cycle is done.

ab) ***Register Table button***: shows the Register table, where the user can manually configure the registers. Before configuring the Register table manually, please refer to the Datasheet to learn full operation of each one of the Register

ac) ***Help button:*** Show the brief operating procedure for the GUI.

- ***Fault Indicators***
  - TSD: Thermal Shutdown Flag
  - SCF: Short Circuit Flag
  - OVF: Over voltage Flag
  - UVF: Under Voltage Flag
  - ILIM: Over current Flag
  - DVS: Dynamic voltage Scaling flag

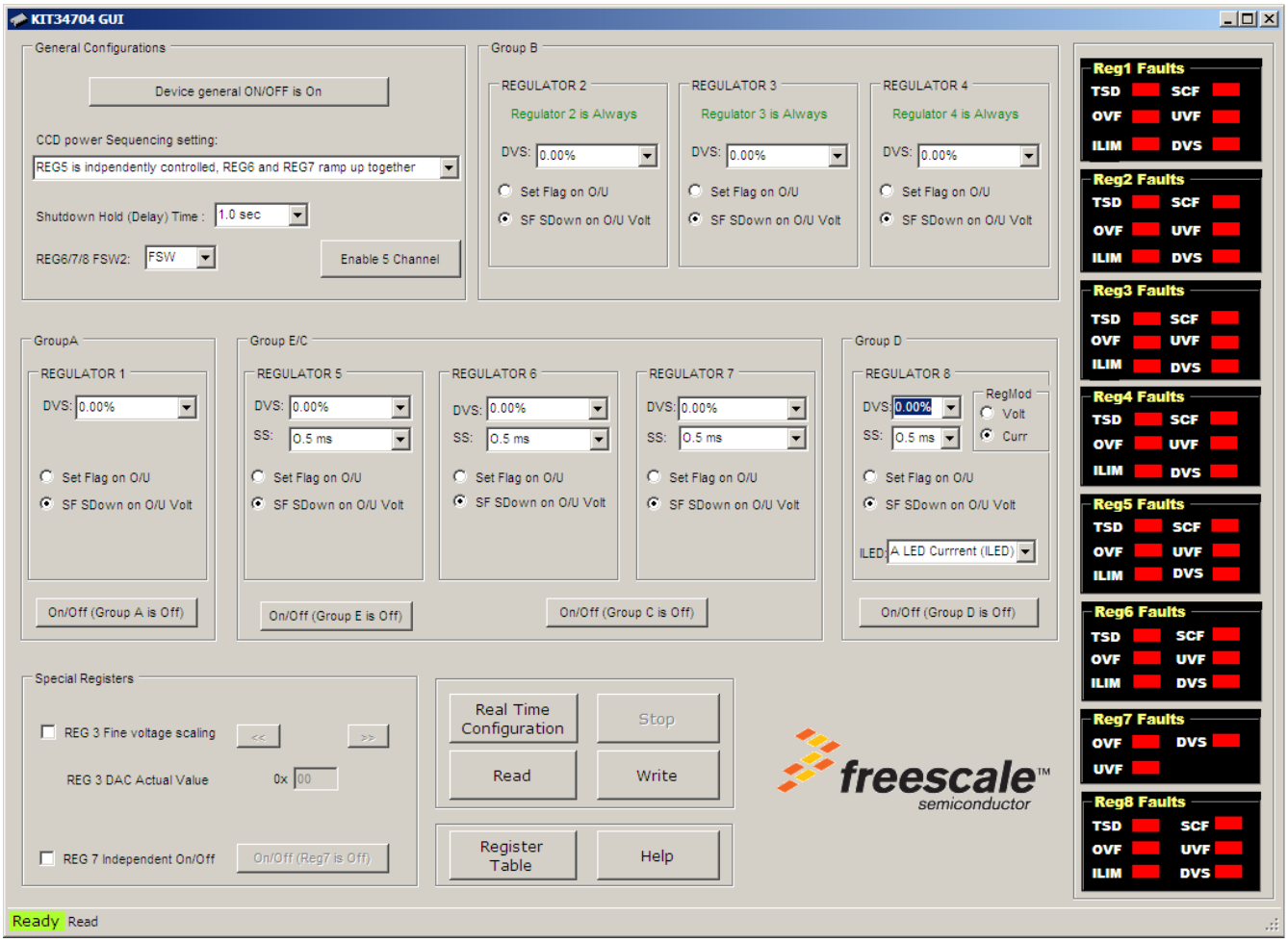


Figure 13. MC34704 GUI Main Screen.

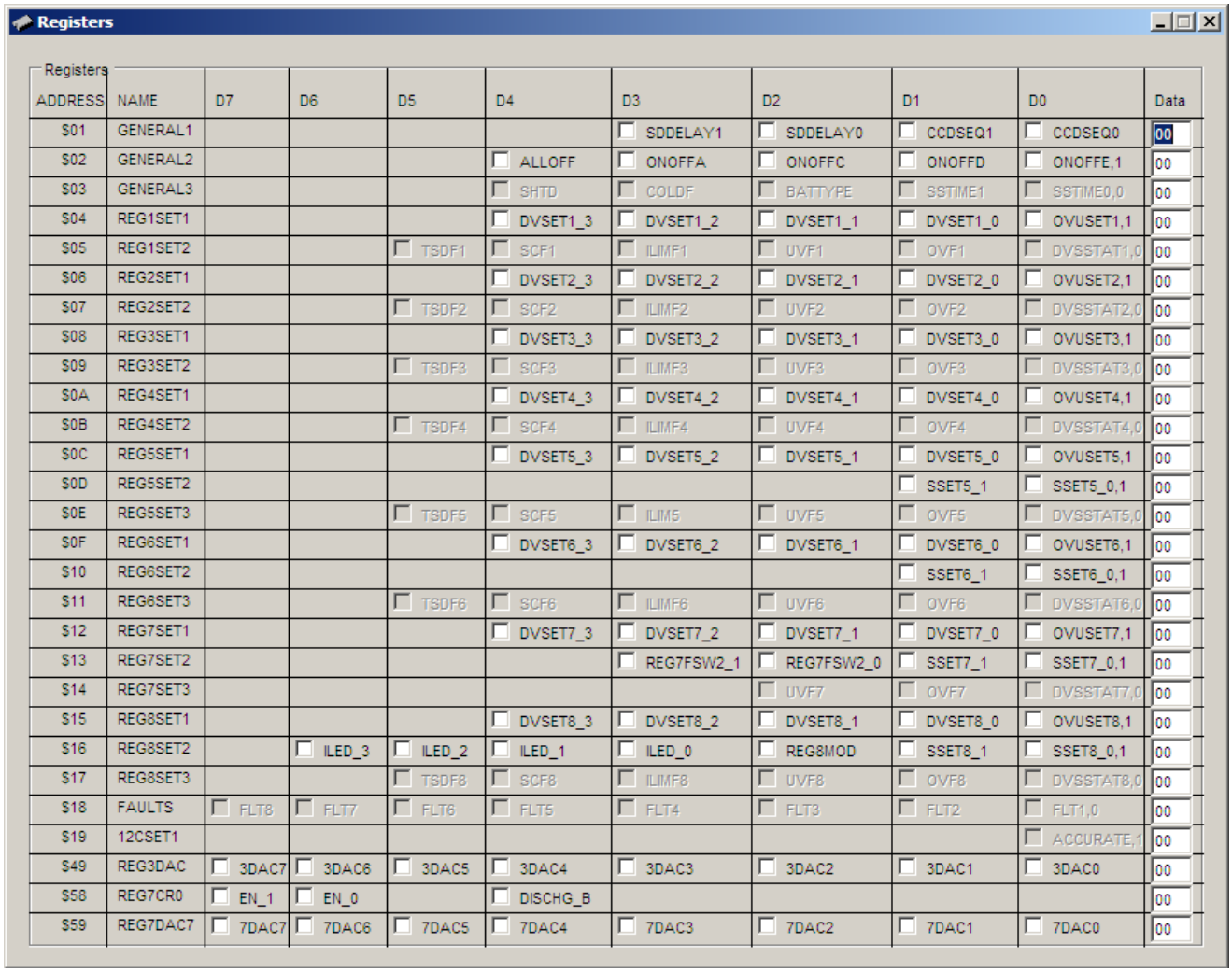


Figure 14. MC34704 GUI Register Table Window.

11 KIT34704AEPEVBE Board Layout

11.1 Assembly Layer Top

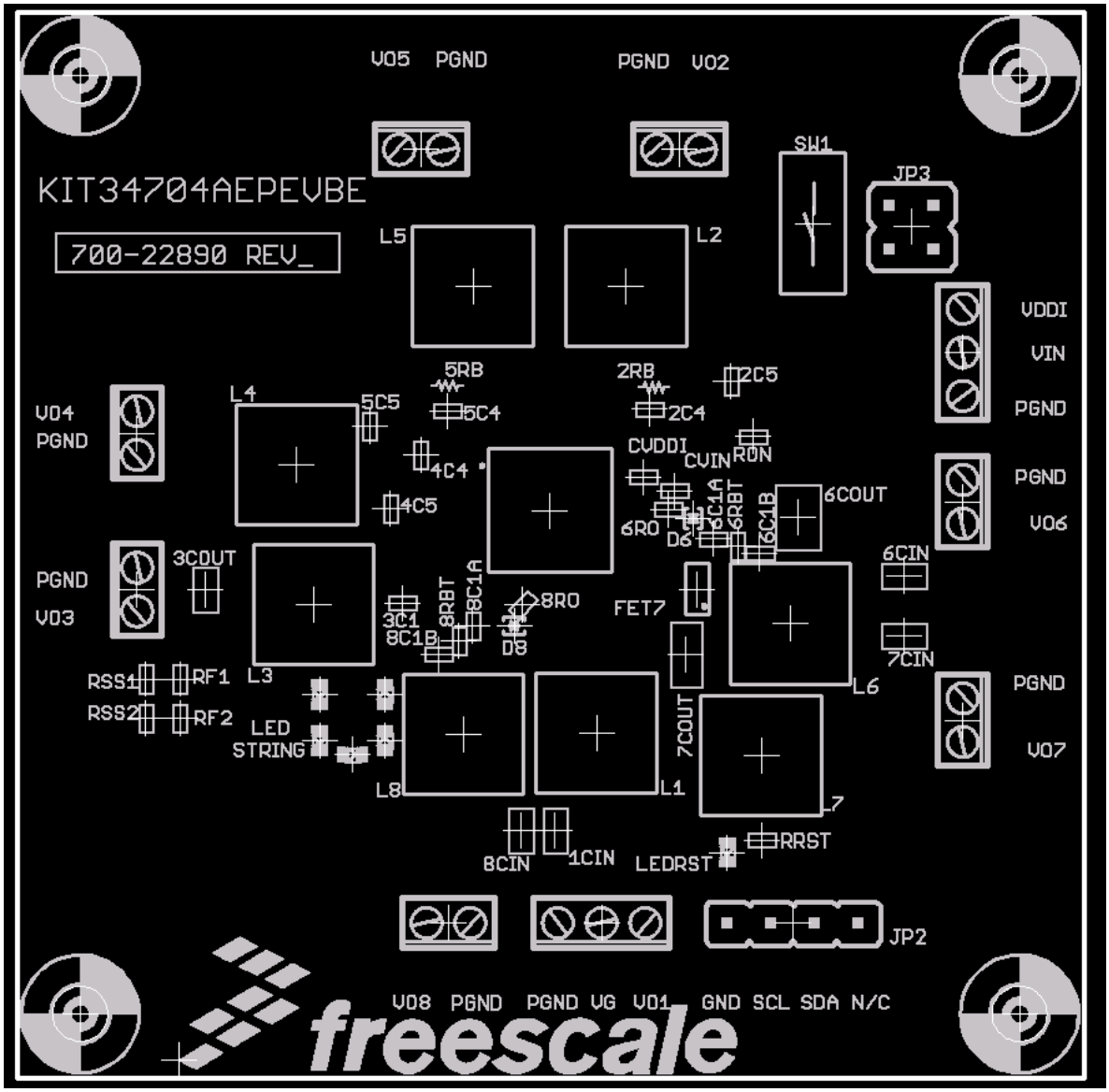


Figure 15. KIT34704AEPEVBE Assembly Layer Top

11.2 Assembly Layer Bottom

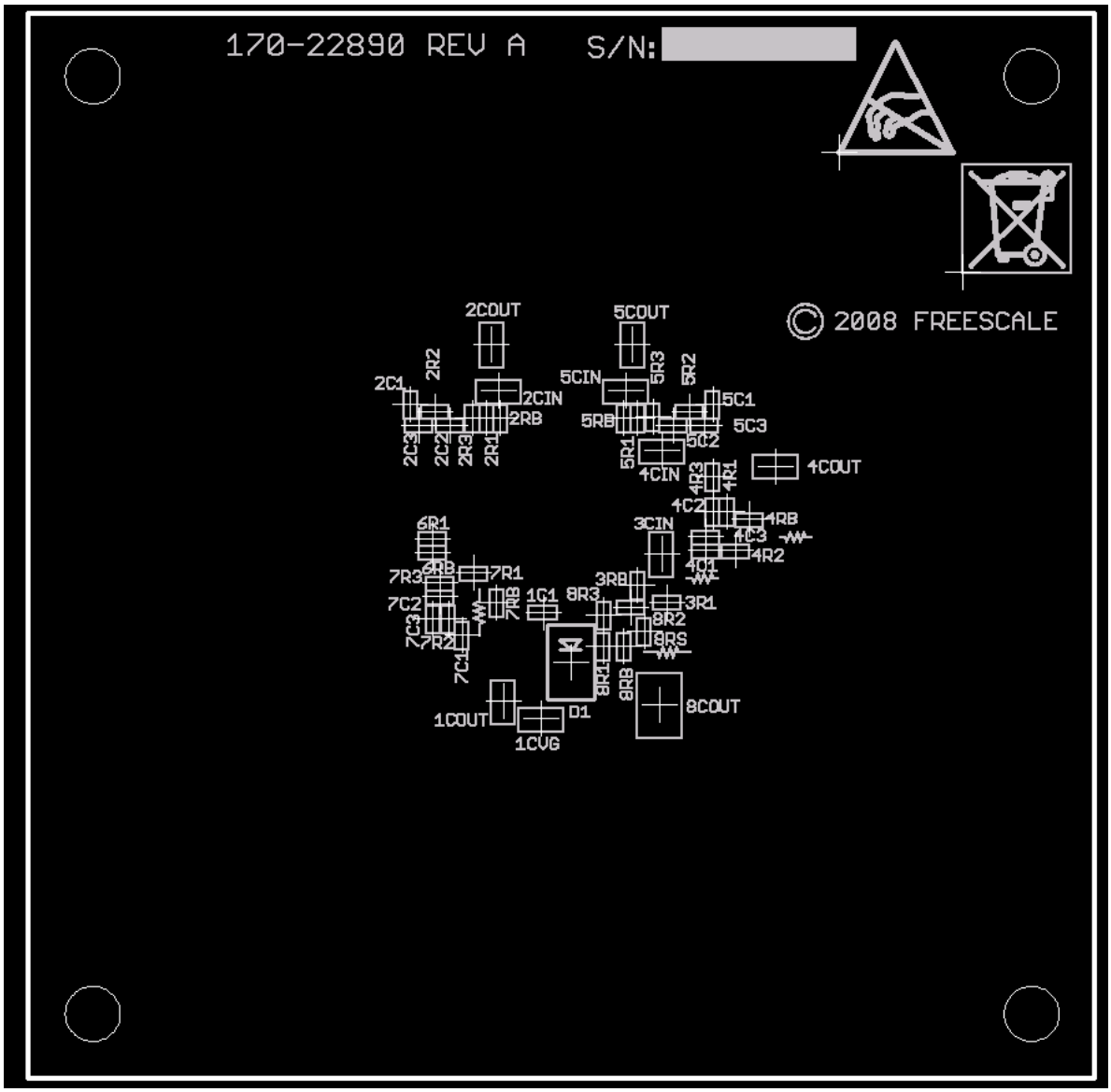


Figure 16. KIT34704AEPEVBE Assembly Layer Bottom

11.3 Top Layer Routing

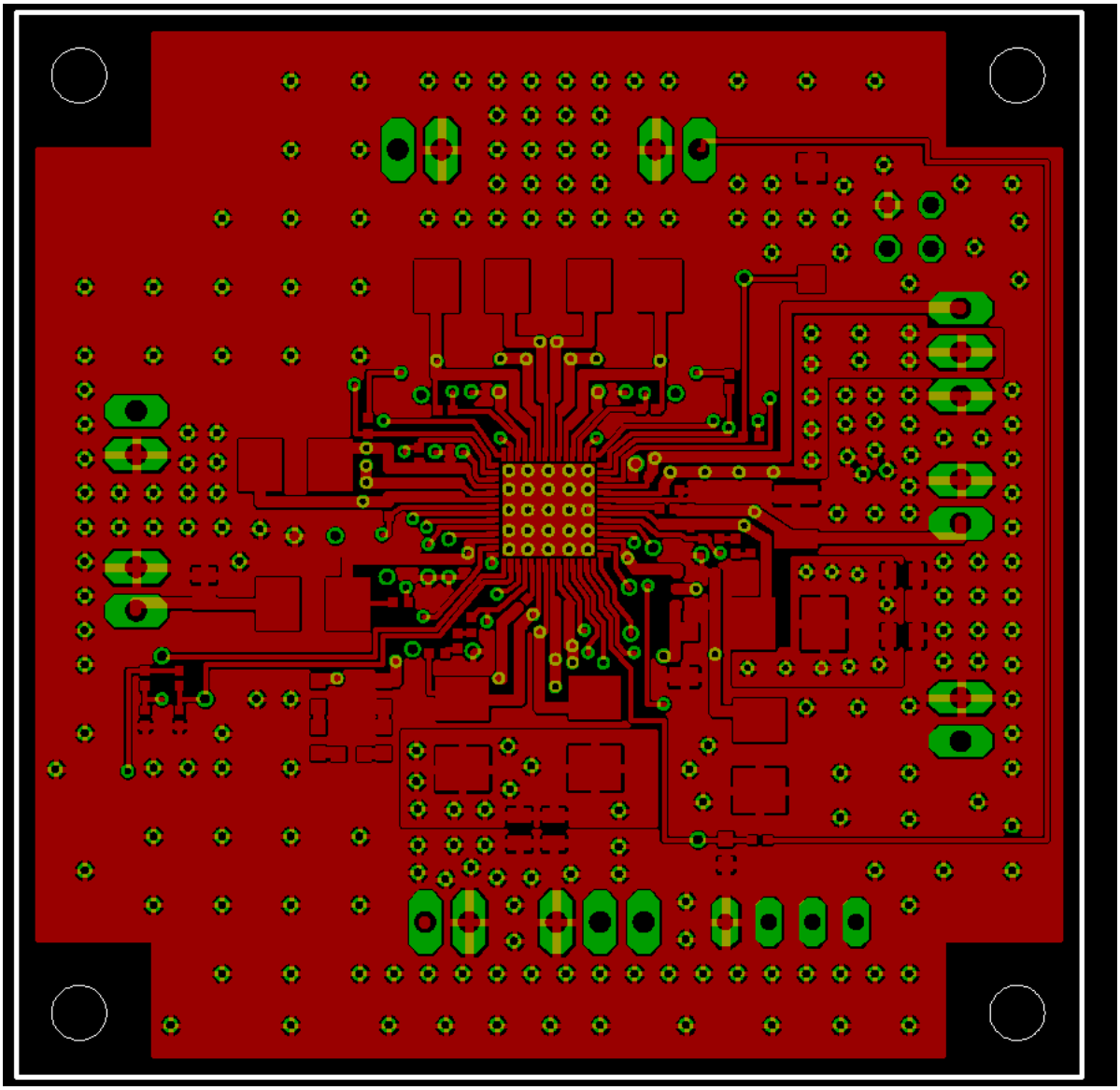


Figure 17. KIT34704AEPEVBE Top Layer Routing

11.4 Inner Layer 1 Routing

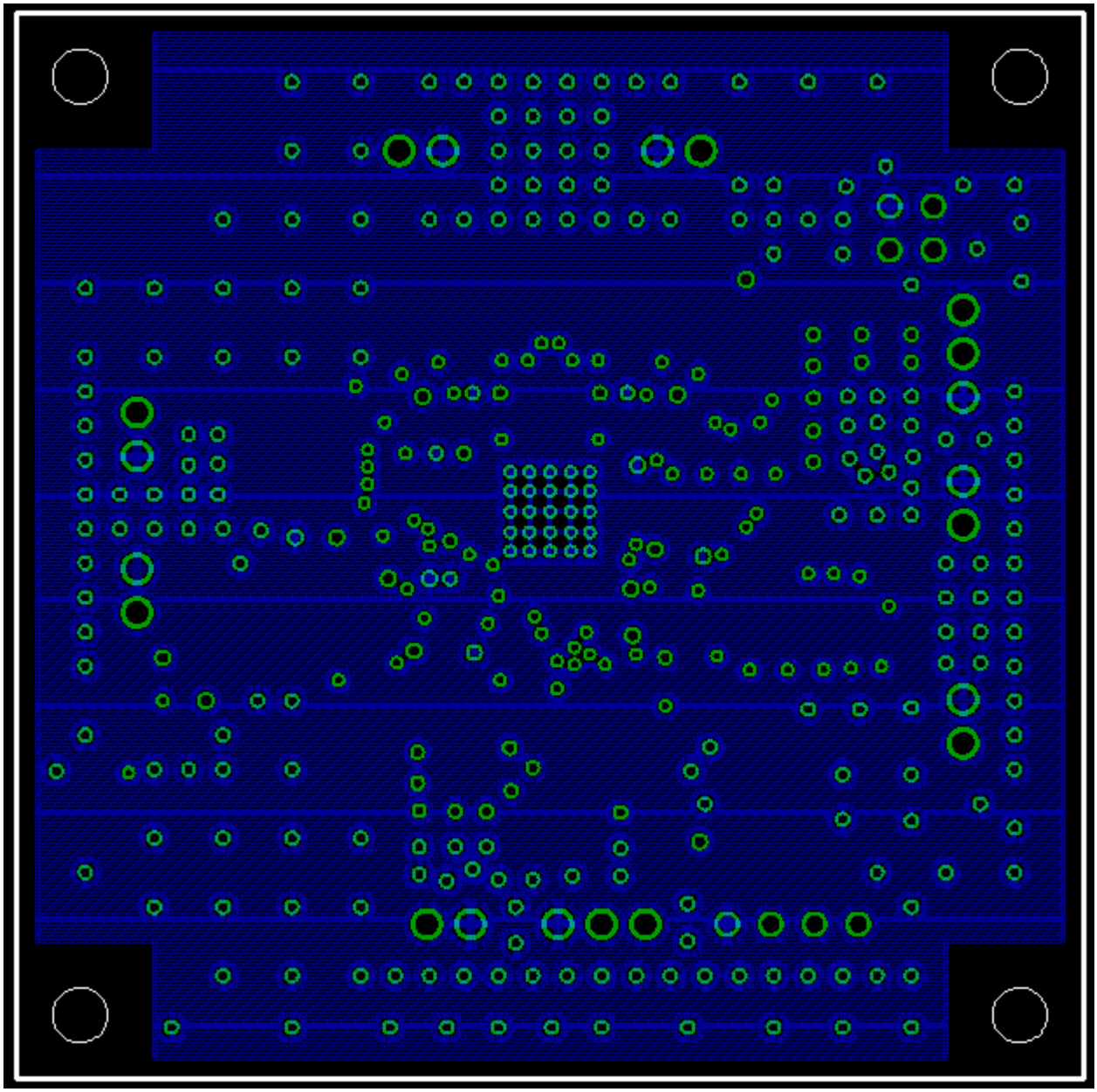


Figure 18. KIT34704AEPEVBE Inner Layer 1 Routing

11.5 Inner Layer 2 Routing

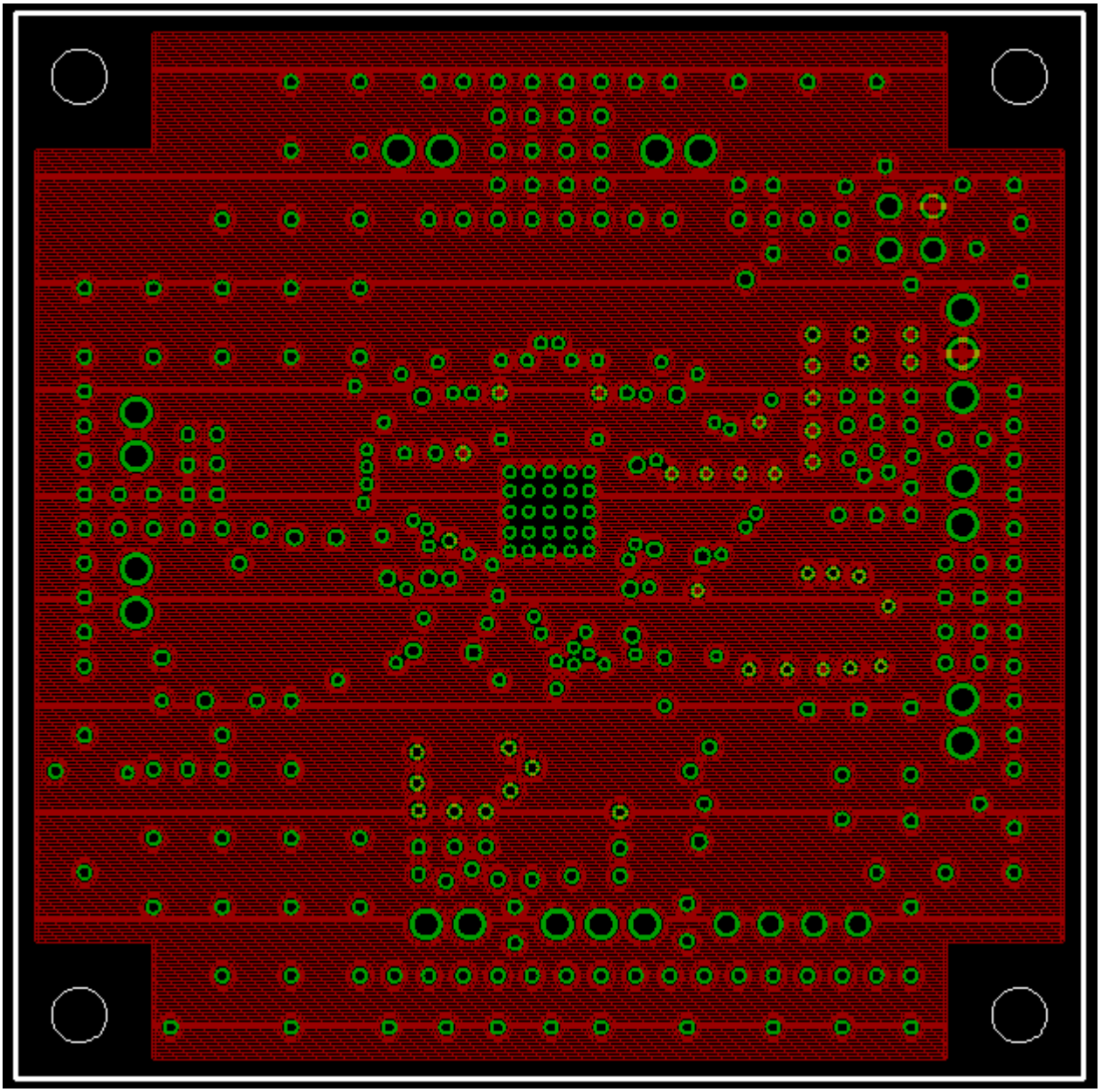


Figure 19. KIT34704AEPEVBE Inner Layer 2 Routing

11.6 Bottom Layer Routing

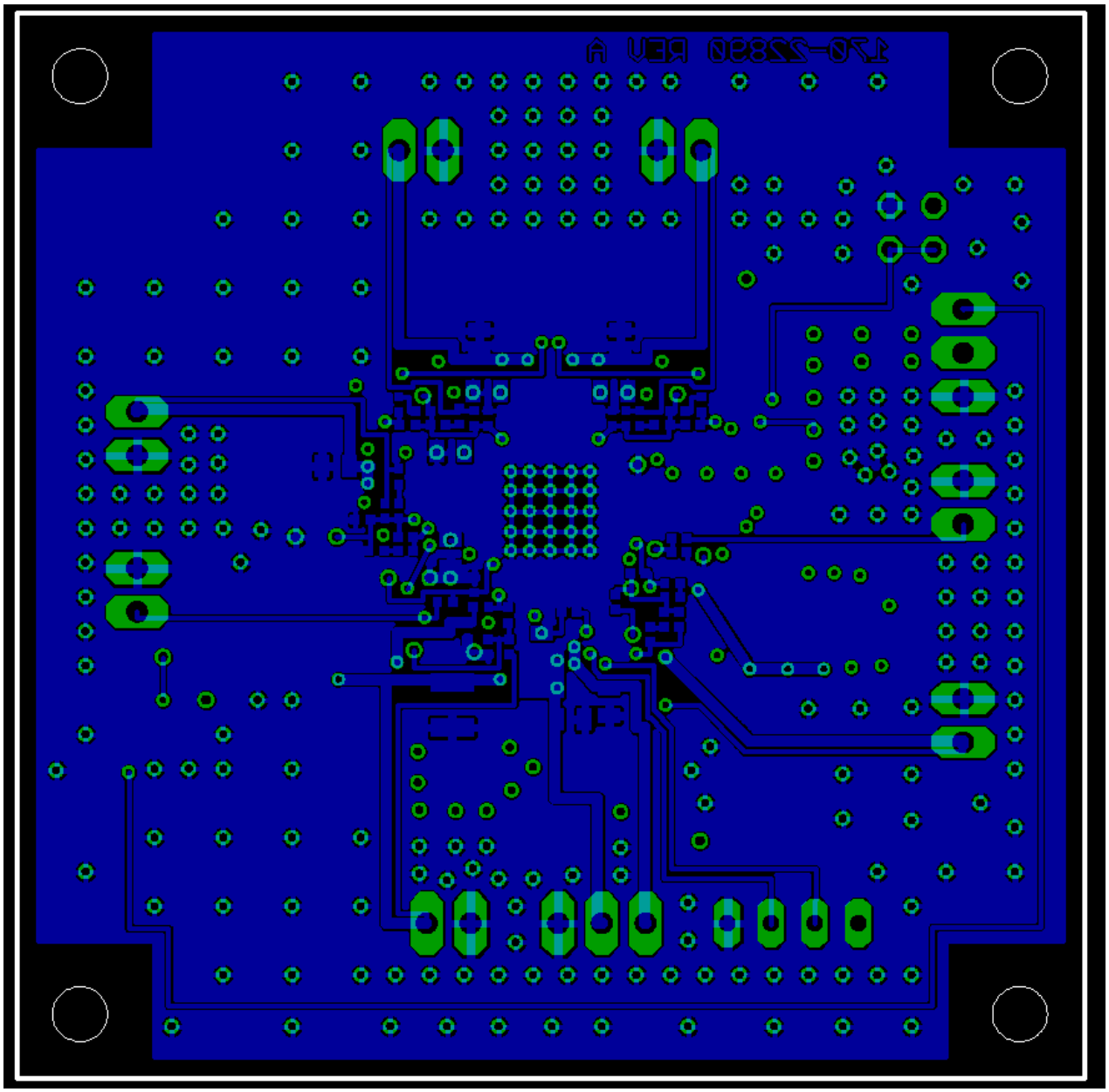


Figure 20. KIT34704AEPEVBE Bottom Layer Routing

11.7 Fabrication Drawing

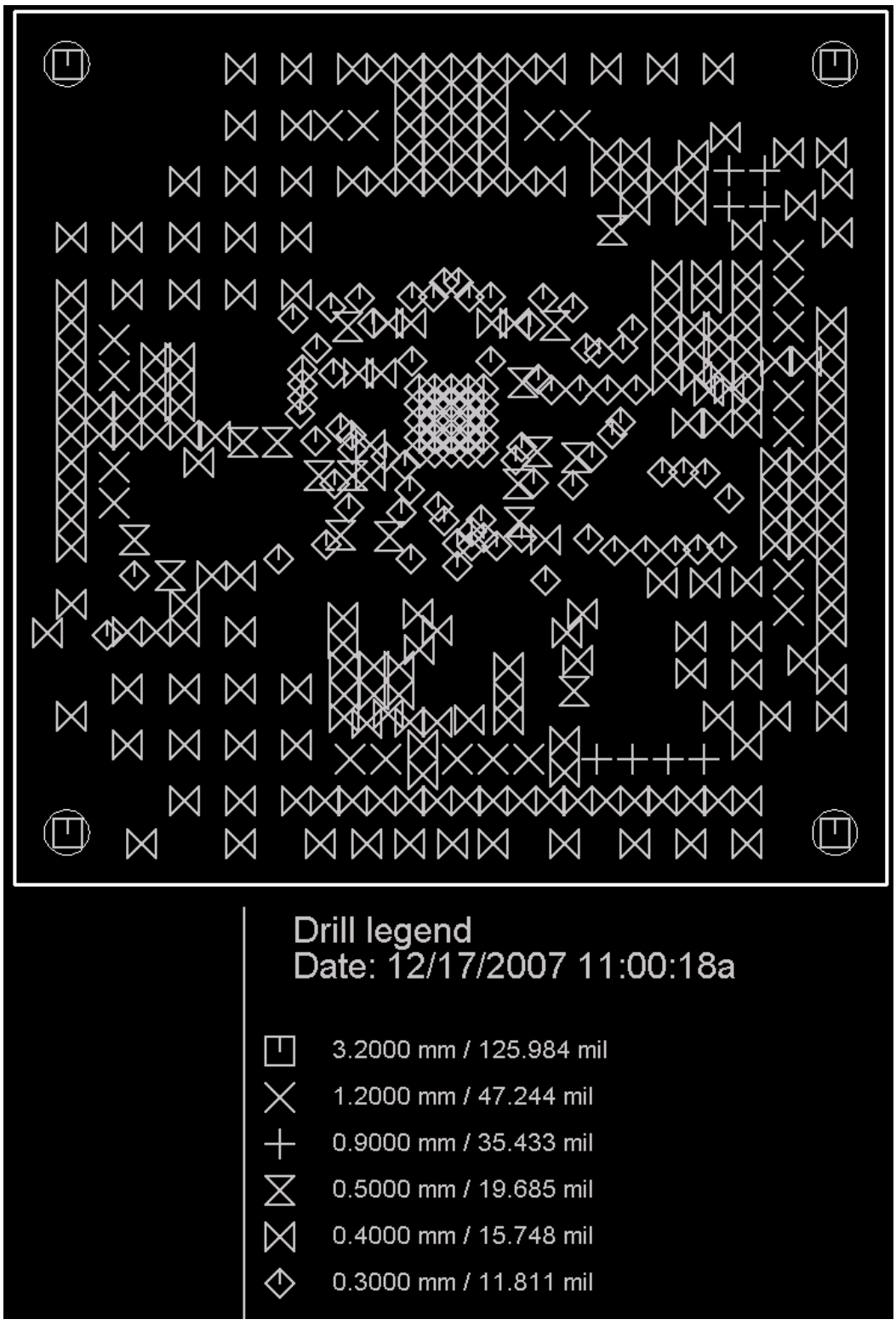


Figure 21. KIT34704AEPEVBE Fabrication Drawing

11.8 Drill Location

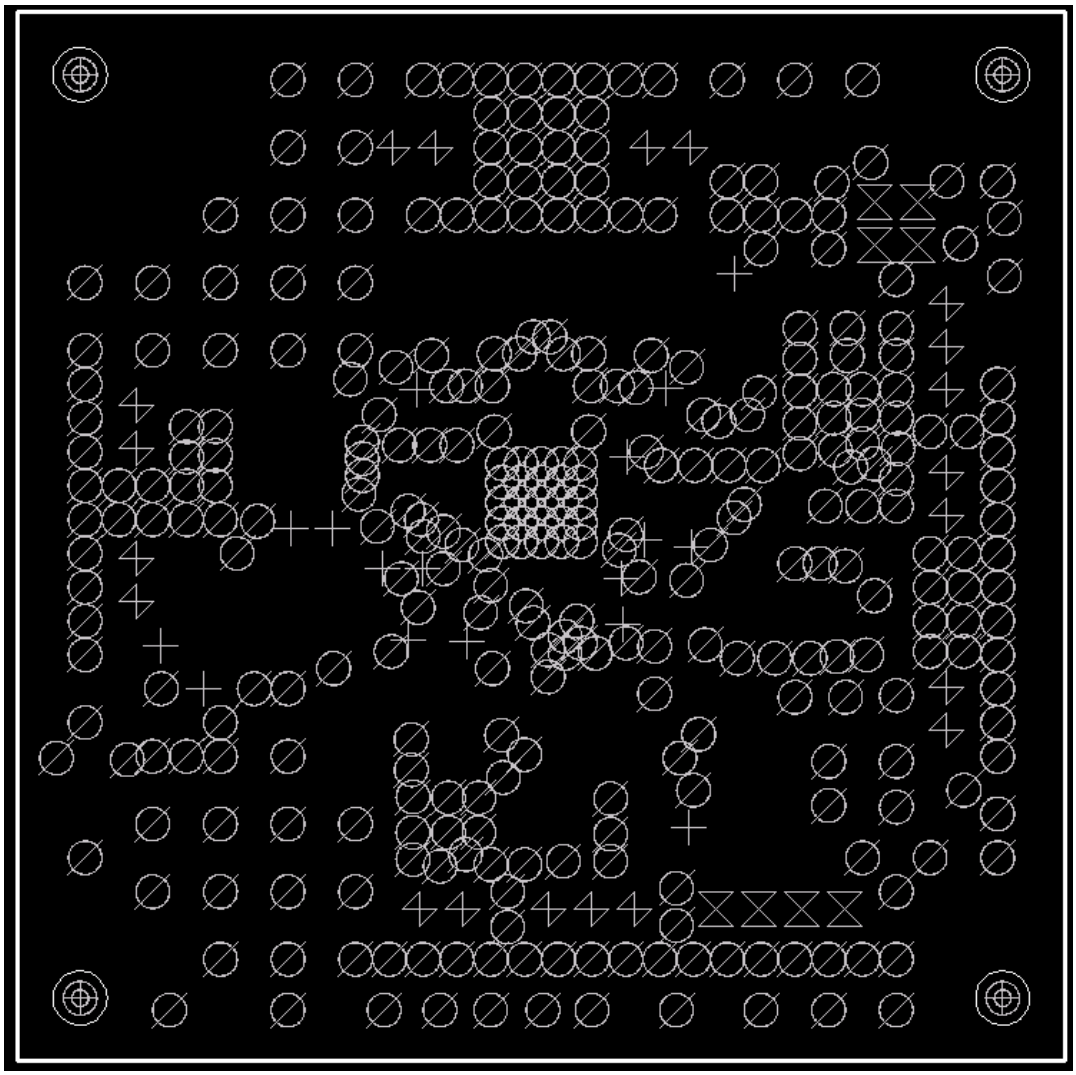


Figure 22. KIT34704AEPEVBE Drill Location

12 KITUSBI2CEVME Board Layout

12.1 Assembly Layer Top

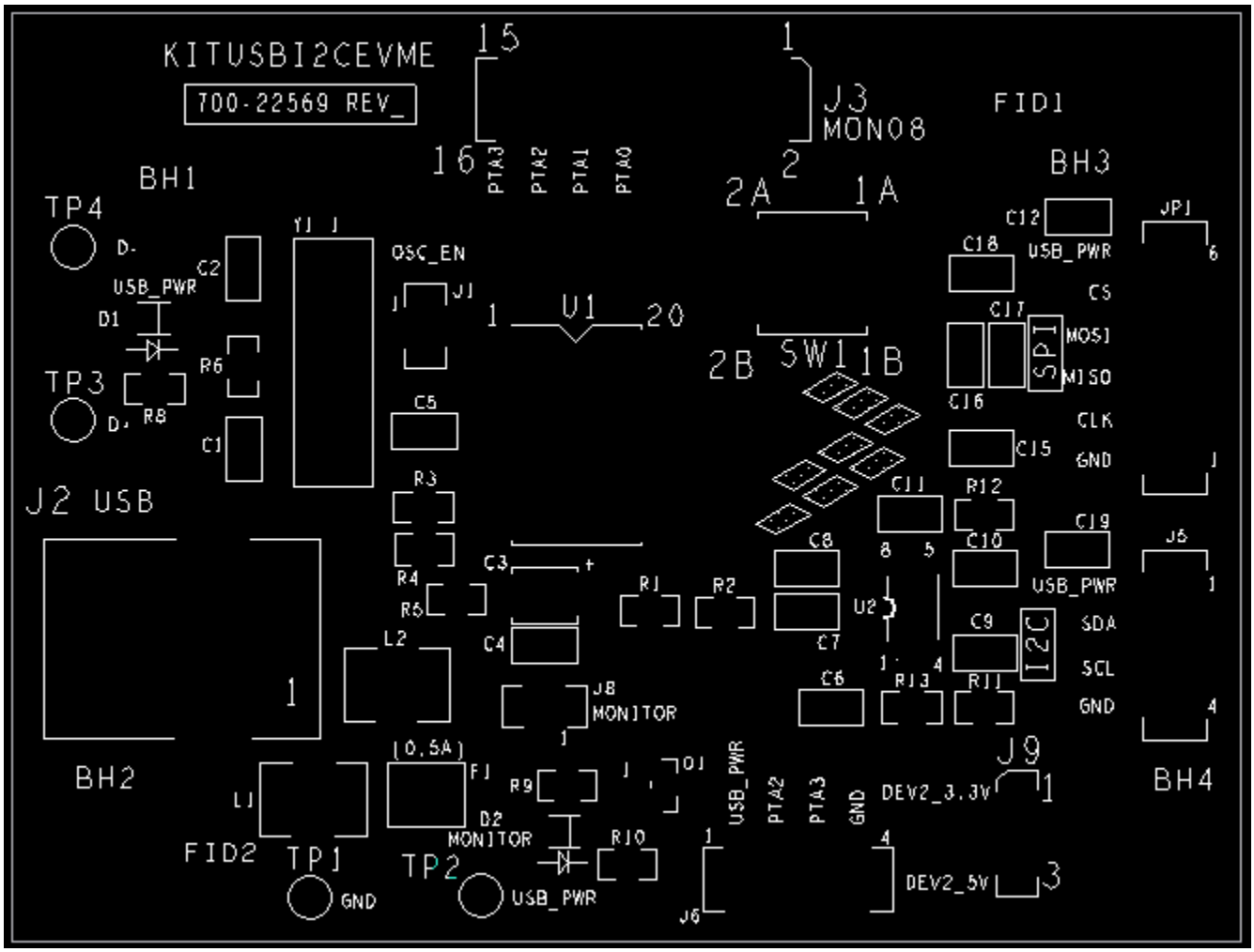


Figure 23. KITUSBI2CEVME Assembly Layer Top

12.2 Assembly Layer Bottom

Figure 24. KITUSBI2CEVME Assembly Layer Bottom

12.3 Top Layer Routing

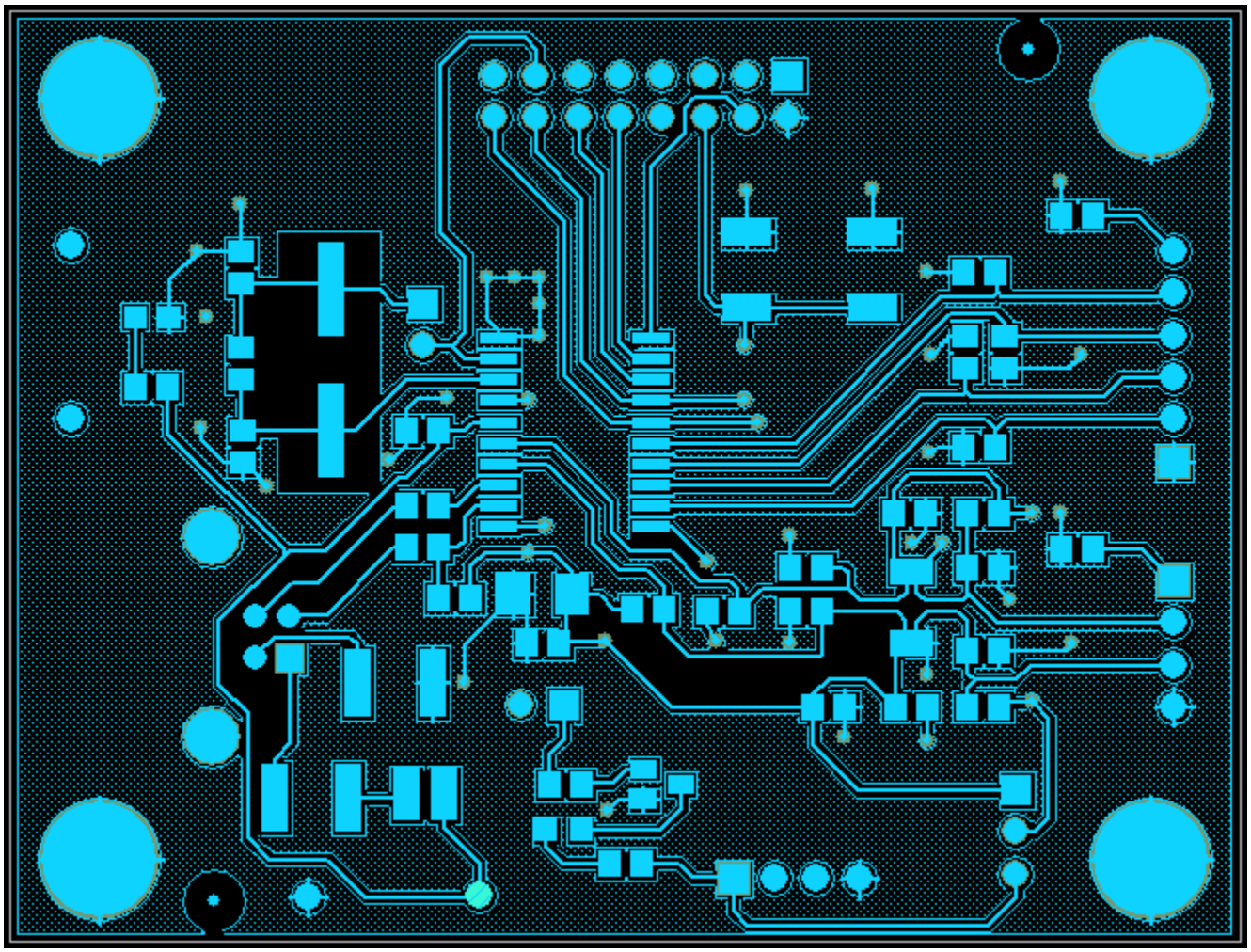


Figure 25. KITUSBI2CEVME Top Layer Routing

12.4 Bottom Layer Routing

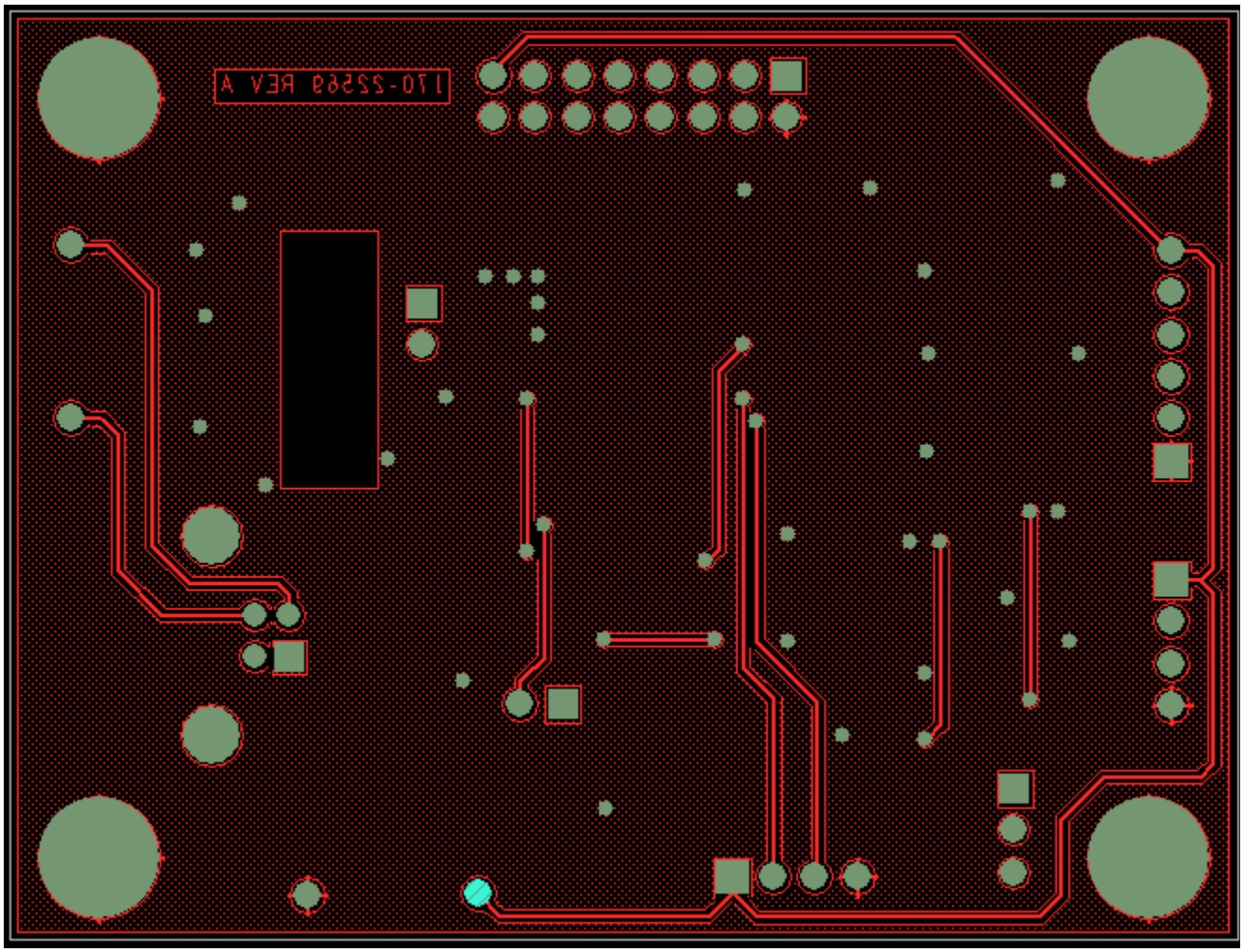
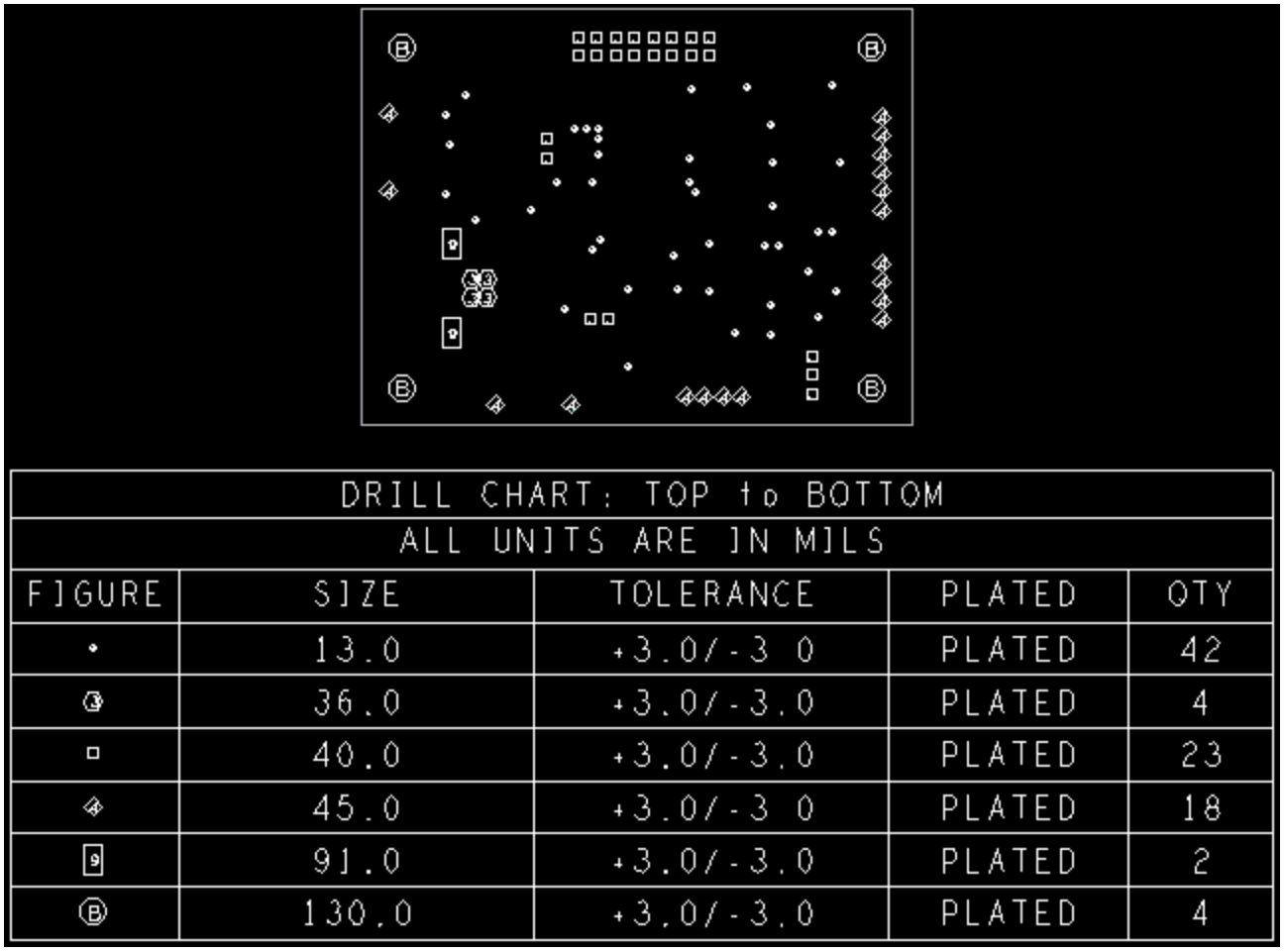


Figure 26. KITUSBI2CEVME Bottom Layer Routing

12.5 Fabrication Drawing



DRILL CHART: TOP to BOTTOM				
ALL UNITS ARE IN MILS				
FIGURE	SIZE	TOLERANCE	PLATED	QTY
•	13.0	+3.0/-3.0	PLATED	42
◎	36.0	+3.0/-3.0	PLATED	4
□	40.0	+3.0/-3.0	PLATED	23
◈	45.0	+3.0/-3.0	PLATED	18
⊡	91.0	+3.0/-3.0	PLATED	2
Ⓑ	130.0	+3.0/-3.0	PLATED	4

Figure 27. KITUSBI2CEVME Fabrication Drawing

13 KIT34704AEPEVBE Bill of Material

Item	Qty	Schematic Label	Value	Description	Assy Opt
Capacitors					
1	8	1CIN, 2CIN, 3CIN, 4CIN, 5CIN, 6CIN,7CIN, 8CIN	10uF	CAP CERAMIC 10UF 10V X5R 0805	
2	1	1CVG	47uF	CAP CER 47UF 6.3V X5R 0805	
3	5	1COUT, 2COUT, 3COUT, 4COUT, 5COUT	22uF	CAP CER 22UF 10V X5R 0805	
4	3	6COUT, 7COUT, 8COUT	22uF	CAP CERAMIC 22UF 25V X5R 1210	
5	5	3C1, 4C4, 4C5, 6C1A,8C1A	10nF	CAP 10000PF 16V CERAMIC X7R 0402	
6	5	1C1, 2C4, 2C5,5C4, 5C5	1uF	CAP CERAMIC 1UF 10V X5R 0402	
7	1	4C3	5pF	CAP 5.0PF 50V CERAMIC 0402 SMD	
8	2	2C3, 5C3	10pF	CAP CERAMIC 10PF 50V NP0 0402	
9	1	4C2	120pF	CAP 120PF 50V CERAMIC 0402 SMD	
10	2	2C2, 5C2	68pF	CAP 68PF 50V CERAMIC 0402 SMD	
11	1	4C1	150pF	CAP 150PF 50V CERAMIC 0402 SMD	
12	2	2C1, 5C1	1nF	CAP 1000PF 50V CERAMIC X7R 0402	
13	1	7C1	330pF	CAP 330PF 50V CERAMIC X7R 0402	
14	1	7C2	56pF	CAP CERM 56PF 5% 50V NP0 0402	
15	1	7C3	22pF	CAP CERM 22PF 10% 50V NP0 0402	
16	2	CVIN, CVDDI	1uF	CAP CERAMIC 1UF 10V X5R 0402	
Resistors					
17	2	3R1, 3RB	5.1k	RES 5.1K OHM 1/16W 5% 0402 SMD	
18	3	2RB, 5RB, 7R2	15k	RES 15.0K OHM 1/16W 1% 0402 SMD	
19	1	4RB	18k	RES 18K OHM 1/16W 0.1% 0402 SMD	
20	2	6RB, 8RB	330	RES 330 OHM 1/16W 1% 0402 SMD	
21	1	8RS	13	RES 13.0 OHM 1/16W 1% 0402 SMD	
22	1	4R2	62k	RES 62K OHM 1/16W 0.1% 0402 SMD	
23	2	2R2, 5R2	33k	RES 33K OHM 1/16W 0.1% 0402 SMD	
24	2	2R1, 5R1	68K	RES 68.0K OHM 1/16W 1% 0402 SMD	
25	1	4R1	36k	RES 36K OHM 1/16W 0.1% 0402 SMD	
26	1	4R3	680	RES 680 OHM 1/16W 1% 0402 SMD	
27	2	2R3, 5R3	2.7k	RES 2.70K OHM 1/16W 1% 0402 SMD	
28	1	RONOFF	470k	RES 470K OHM 1/16W 5% 0402 SMD	
29	2	6R1, 8R1	8.2k	RES 8.20K OHM 1/16W 1% 0402 SMD	
30	1	7R1	110k	RES 110K OHM 1/16W 1% 0402 SMD	
31	1	7R3	2.2k	RES 2.20K OHM 1/16W 1% 0402 SMD	
32	1	7RB	13k	RES 13.0K OHM 1/16W 1% 0402 SMD	
33	1	RRST	1K	RES 1K OHM 1/16W 5% 0402 SMD	
34	7	8R0, 8R2, 6R0, 6RBT, 8RBT,6C1B,8C1B	0	RES 0.0 OHM 1/16W 5% 0402 SMD	

Item	Qty	Schematic Label	Value	Description	Assy Opt
35	1	8R3	0	RES 0.0 OHM 1/16W 5% 0402 SMD	DNP
36	2	RF1,RF2	10k	RES 10.0K OHM 1/16W 1% 0402 SMD	
37	2	RSS1,RSS2	10k	RES 10.0K OHM 1/16W 1% 0402 SMD	DNP
Inductors					
38	1	L1	3.2uH	INDUCTOR POWER SHIELD 3.2UH SMD	
39	4	L2, L3, L4, L5	4.7uH	INDUCTOR POWER SHIELD 4.7UH SMD	
40	3	L6, L7, L8	4.5uH	INDUCTOR POWER SHIELD 4.5UH SMD	
LEDs					
41	5	LED1, LED2, LED3, LED4, LED5	-	LED WHITE YELLOW LENS 0603 SMD	
42	1	LEDRST	-	LED 570NM GREEN WTR CLR 0603 SMD	
FETS and Diodes					
43	1	FET1	-	P-FET + Schottky Diode	
44	2	D6, D8	-	DIODE SCHOTTKY 30V200MA SSMINI2P	DNP
45	1	D1	-	DIODE SCHOTTKY 10V 1A POWER-MITE	
Push buttons, Jumpers and Connectors					
46	1	SW1	-	SWITCH TACT MINI 200GF SLV GWING	
47	2	JP1, JP3	-	Standard 0.1" spacing 2x2 Pin Header	
48	1	JP2	-	Standard 0.1" spacing 4x1 Pin Header	
49	2	VO1-VG, VIN-VDDI	-	CONN TERM BLOCK 2.54MM 3POS	
50	7	VO2, VO3, VO4, VO5, VO6, VO7, VO8	-	CONN TERM BLOCK 2.54MM 2POS	
Freescale IC					
51	1	MC34704A	-	IC VREG LIN 8-DCDC SWT 2.0MHZ VIN 2.7-5.5V QFN56	

14 KITUSBI2CEVME Bill of Material

Item	Qty	Reference	Part	Description	Assy Opt
1	4	BH1,BH2,BH3,BH4	MTG	MOUNTING HOLE 0.130 INCH	
2	2	C1,C2	18PF	CAP CER 18PF 100V 5% C0G 0805	
3	1	C3	4.7UF	CAP TANT 4.7UF 20V 10% -- 3528-21	
4	2	C4,C5	0.1UF	CAP CER 0.1UF 50V 20% Z5U 0805	
5	2	C6,C11	0.01UF	CAP CER 0.01UF 25V 10% X7R 0805	
6	10	C7,C8,C9,C10,C12,C15,C16,C17,C18,C19	100 PF	CAP CER 100PF 50V 5% C0G 0805	
7	2	D1,D2	HSMG-C170	LED GREEN SGL 2.2V 20MA 0805	
8	2	FID1,FID2	FID-040	FIDUCIAL 040 MIL PAD W/100 MIL SOL-DERMASK NO PART TO ORDER	
9	1	F1	0.5A	FUSE PLYSW 0.5A 13.2V SMT	
10	1	JP1	HDR 1X6	HDR 1X6 TH 100MIL CTR 340H AU	
11	2	J1,J8	HDR_1X2_M	HDR 1X2 TH 100MIL SP 340H SN	
12	1	J2	USB_TYPE_B	CON 4 USB B RA SKT SHLD TH -- AU	
13	1	J3	HDR_2X8	HDR 2X8 TH 100MIL CTR 330H AU	
14	1	J5	HDR_1X4_M	HDR 1X4 TH 100MIL SP 408H AU	
15	1	J6	HDR_1X4_M	HDR 1X4 TH 100MIL SP 408H AU	DNP
16	1	J9	HDR_1X3	HDR 1X3 TH 100MIL SP 374.01H AU	
17	2	L1,L2	HI1812V101R-10	IND FER 100 OHM@100MHZ 8A 25% SMD/1812	
18	1	Q1	MMBT2222A	TRAN NPN GEN SOT23 MMBT_NPN	
19	5	R1,R2,R5,R11,R12	1.5K	RES MF 1.5K 1/8W 1% 0805	
20	2	R3,R4	27 OHM	RES MF 27 OHM 1/8W 5% 0805	
21	1	R6	10M	RES MF 10M 1/8W 5% 0805	
22	2	R8,R10	270 OHM	RES MF 270 OHM 1/8W 5% 0805	
23	1	R9	27.0K	RES MF 27.0K 1/8W 1% 0805	
24	1	R13	10K	RES MF 10K 1/8W 5% 0805	
25	1	SW1	MJTP1138B	SW SPST PB MOM NO SMT 12V 50MA	DNP
26	4	TP1,TP2,TP3,TP4	TEST POINT BLACK	TEST POINT PIN 100 X .45 BLACK TH	DNP
27	1	U1	MC908JB8JDWE	IC MCU 8BIT 8K FLASH 3MHZ 4.0-5.5V SOIC20	
28	1	U2	PCA9512DP	IC LEVSHFT I2C/SMBUS BUFF 2.7-5.5 V 8TSSOP	
29	1	Y1	6.0MHz	XTAL 6MHZ -- -- SMT	

Jumpers should be connected to:
J1
J8
J9 (Pin 1 & 2)
J3 (Pin 11 & 13)This jumper must be connected after IC is programmed

15 References

Following are URLs where you can obtain information on other Freescale products and application solutions:

Description	URL
Data Sheet	www.freescale.com/files/analog/doc/data_sheet/MC34704.pdf
Freescale's Web Site	www.freescale.com
Freescale's Analog Web Site	www.freescale.com/analog
Freescale's Power Management Web Site	www.freescale.com/powermanagement
Freescale's Automotive Applications Web Site	www.freescale.com/automotive

16 Revision History

REVISION	DATE	DESCRIPTION OF CHANGES
1		• Initial Release

How to Reach Us:

Home Page:
www.freescale.com

Web Support:
http://www.freescale.com/support

USA/Europe or Locations Not Listed:
Freescale Semiconductor, Inc.
Technical Information Center, EL516
2100 East Elliot Road
Tempe, Arizona 85284
+1-800-521-6274 or +1-480-768-2130
www.freescale.com/support

Europe, Middle East, and Africa:
Freescale Halbleiter Deutschland GmbH
Technical Information Center
Schatzbogen 7
81829 Muenchen, Germany
+44 1296 380 456 (English)
+46 8 52200080 (English)
+49 89 92103 559 (German)
+33 1 69 35 48 48 (French)
www.freescale.com/support

Japan:
Freescale Semiconductor Japan Ltd.
Headquarters
ARCO Tower 15F
1-8-1, Shimo-Meguro, Meguro-ku,
Tokyo 153-0064
Japan
0120 191014 or +81 3 5437 9125
support.japan@freescale.com

Asia/Pacific:
Freescale Semiconductor China Ltd.
Exchange Building 23F
No. 118 Jianguo Road
Chaoyang District
Beijing 100022
China
+86 10 5879 8000
support.asia@freescale.com

For Literature Requests Only:
Freescale Semiconductor Literature Distribution Center
P.O. Box 5405
Denver, Colorado 80217
1-800-441-2447 or 303-675-2140
Fax: 303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

KT34704AUG
Rev. 1
6/2008

freescale™ semiconductor