Document Number: KT34844AUG
Rev. 1.0, 7/2010

KIT34844AEPEVBE Evaluation Board

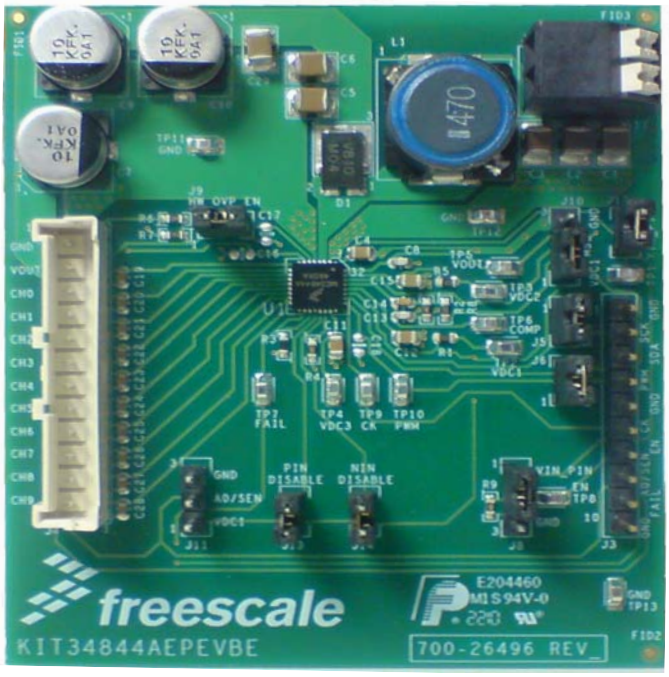


Figure 1. KIT34844A Image

Table of Contents

1 Kit Contents / Packing List

- Evaluation Board - KIT34844AEPEVBE
- Cable for LED board connection

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 EVB Introduction

This EVB is intended to show the functionality and features of the MC34844A device under specific operation parameters.

The MC34844A device is a high efficiency LED driver for use in backlighting LCD displays applications from 10” to 20”+. This demo board operates from a supply voltage of 24V and drives up to 160 LEDs in 10 parallel strings.

The dimming control can be done through an external PWM signal or using the I2C/SMBUS interface.

3.1 EVB Operation Parameters

- Input Voltage (Vin) = 24V +/- 10%
- LED Load = 16 Leds x 10 Channels
- Expected Output Voltage (Vout) = around 47V
- Duty Cycle = All range.
- PWM Minimum Pulse Width = 400ns
- LED Current = 60mA
- HW OVP = 53V
- Boost Frequency = 330KHz (Typ)
- PWM Freq= 200 Hz to 25KHz (5V), or 100% Duty Cycle
- Master Mode

3.2 EVB Features

- Compact design 2.5in x 2.7in
- Two layer board, 1oz copper.
- Placement on Top only.
- Low noise design for power ground (PGND) and digital ground (DGND)
- Top layer placement and routing for better thermal dissipation on bottom
- Header for LED board connection
- Test points on all main signals for easy evaluation
- Push in terminal block for input voltage supply
- Headers and jumpers for signals configurations

3.3 MC34844A Features

- Input voltage of 7V to 28V
- Output Voltage up to 60V, with auto Vout selection
- 2.5A integrated boost
- Up to 80mA LED current per channel
- 330KHz Boost frequency (Default)
- 90% efficiency (DC:DC)
- 10-channel current mirror with ±2% current matching
- I2C/SM-bus interface
- 8-bit programmable current DAC
- PWM frequency programmable or synchronizes from 110 Hz to 27 KHz
- User programmable OVP
- LED failure detection and OTP/OCP/UVLO lockout
- 32-Ld 5x5x0.8mm TQFN Pb-Free packaging

4 Required Equipment

4.1 Hardware Requirements

- Power Supply (up to 30V @ 3A)
- LED Board (KITLEDBKLT16EVBE preferred)
- 12 conductor cable. Used for LED board connection (CH0-CH9, GND, VOUT).
- PWM signal generator or I2C/SMBUS interface

5 KIT34844A Setup Configuration Diagram

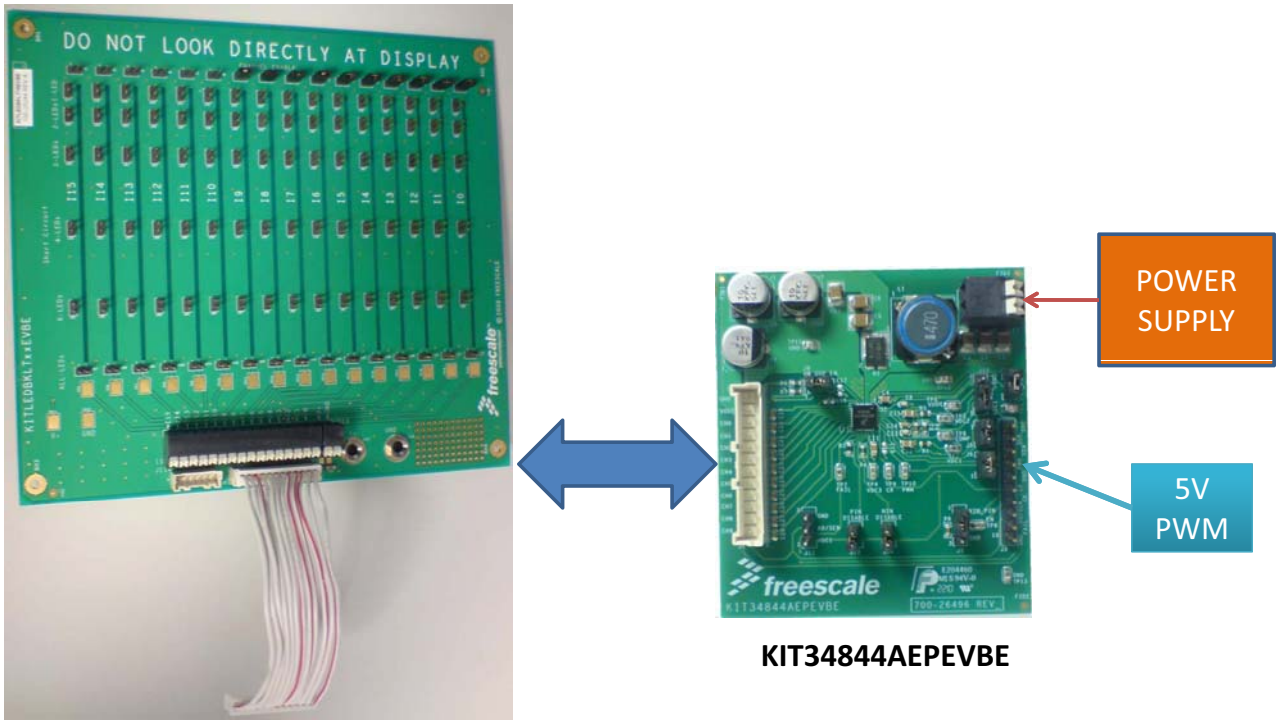


Figure 1. KIT34844A Setup Configuration Diagram

6 KIT34844A Schematic

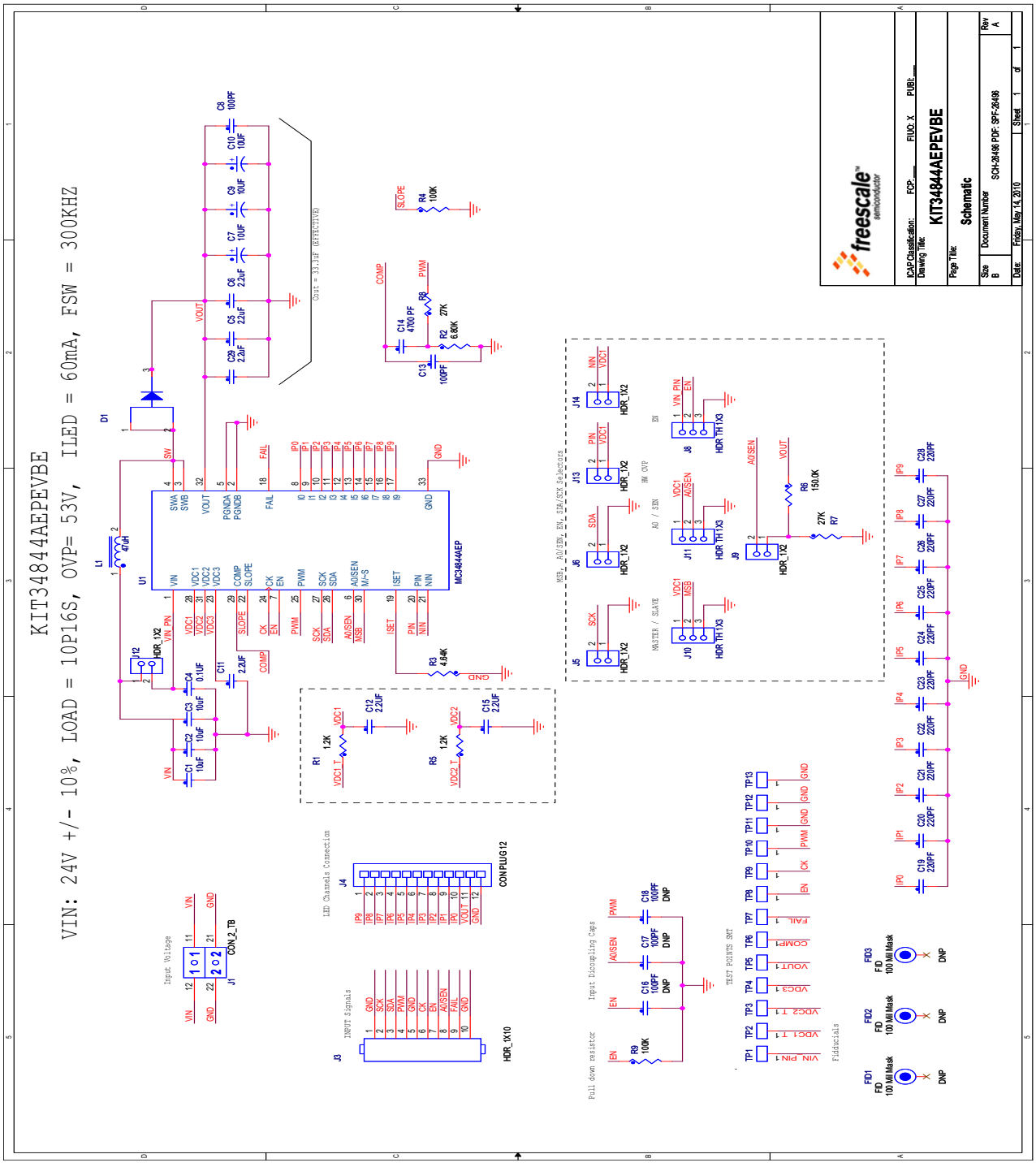


Figure 2. KIT34844A Schematic

7 Using Demo Board

7.1 Demo Board Jumper Connections

JUMPER CONNECTION	FUNCTION	DESCRIPTION
J12	Device supply	This jumper connects the input supply of the device (VIN pin) to the main supply of the board
J9	Hardware OVP Enable	This jumper connects the A0/SEN pin to a resistor divider to enable the hardware OVP setting. This jumper and the corresponding OVP resistors should be used for manual mode operation. Note: J11 must be disconnected. Note2: If this jumper is not connected the default internal OVP will be set (65V)
J11	I2C programming enable	J11(1-2) connects A0/SEN pin to VDC1 to enable I2C programming. J11(2-3) connects A0/SEN pin to GND to disable I2C programming.
J5, J6	SDA and SCK pins to GND	These two jumpers connect SDA and SCK to GND for Manual Mode.
J8	Device Enable	J8(1-2) connects EN pin to VIN pin for enabling the device. J8(2-3) connects EN pin to GND for disabling the device.
J13	PIN function disable	This jumper disables the positive input analog current control by connecting the PIN pin to VDC1
J14	NIN function disable	This jumper disables the negative input analog current control by connecting the NIN pin to VDC1
J10	Master/Slave mode	J10(1-2) configure the part in Master Mode J10(2-3) configure the part in Slave Mode Note: For more information about this two modes please refer to the data sheet.
J3	Control Header	Please refer to “Control Header (J3)” section

Table 1: Jumper Connections

Note: Jumpers J11 & J9 can not be used at the same time.

For more details about operation modes and PIN and NIN functions please refer to the data sheet.

7.2 Control Header (J3)

PIN NUMBER	SIGNAL
1	GND
2	SCK (I2C communication)
3	SDA (I2C Communication)
4	PWM (Dimming control)
5	GND
6	CK (Clock frequency for synchronization in Slave mode)
7	EN (Device Enable)
8	A0/SEN (I2C Enable or HW OVP control)
9	FAIL (FAIL monitoring pin)
10	GND

NOTE: Jumpers related to these signals must be removed prior to applying any external signal.

7.3 Start up Sequence in MANUAL MODE (Default)

1. Make sure the following jumpers are connected: J5, J6, J8(1-2), J9, J10(1-2), J12, J13, J14.
2. Set the power supply to 24V with a minimum current limit of 3A
3. Turn off power supply and connect it to the Demo board through J1
4. Set a 5V PWM signal on the function generator (200Hz - 25KHz).
   For 3.3V signal R8 and R2 should be changed to 18Kohm and 8.2Kohm correspondingly.
5. Turn off the function generator and connect this PWM signal to J3 (pin #4). Make sure the GND of this source is also connected to the board. For 100% Duty cycle, connect a 5V supply instead.
6. Connect LED board “KITLEDBKLT16EVBE”
7. Turn on power supply
8. Turn on PWM generator or apply 5V to the PWM pin. All LEDs should light up.

This board is set up to work in Manual Mode by default.

For I2C communication J5 and J6 must be disconnected. Please refer to the data sheet to make the respective changes and jumper configuration based on application needs.

8 LED Load Board Configuration (10 Channels x 16 LEDs)

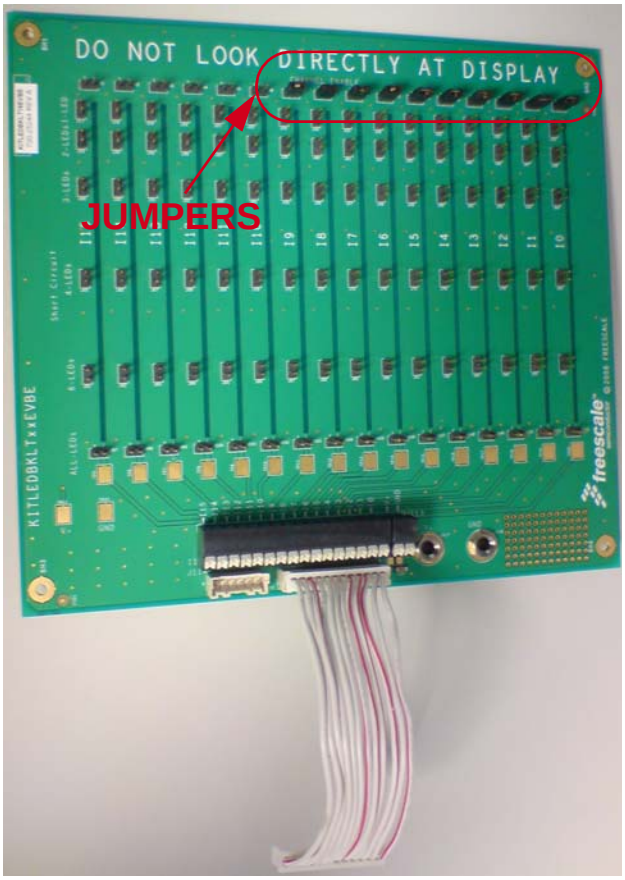


Figure 3. LED Load Board

Jumper Function:

- *Top horizontal jumpers*: Channel strings enable.

Please verify that jumpers J8 to J16 are the only ones connected.

- *Bottom horizontal jumpers*: Connect LED channel to the voltage at the boost.

DO NOT CONNECT THESE JUMPERS, LED channels can be damaged.

- *Vertical jumpers*: Short circuit LEDs.

9 Board Layout

9.1 Top Layer (x1)

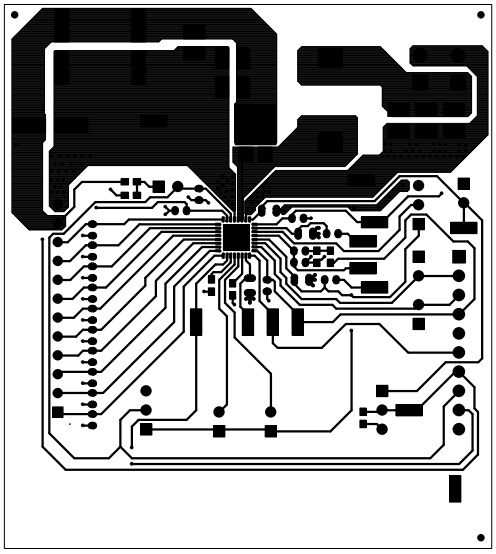


Figure 4. Top Layer (x1)

9.2 Bottom Layer (x2)

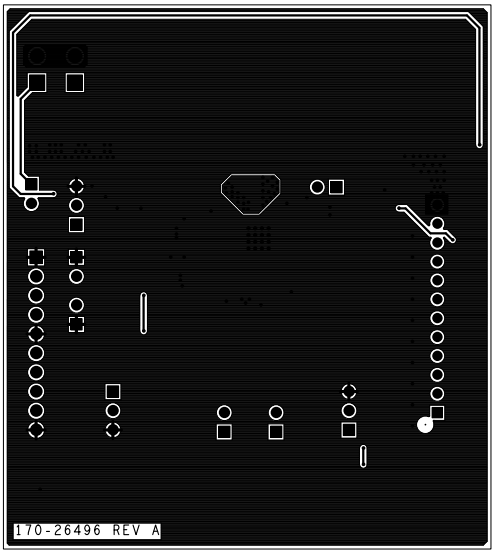


Figure 5. Bottom Layer (x1)

9.3 Silk Screen Top (x1)

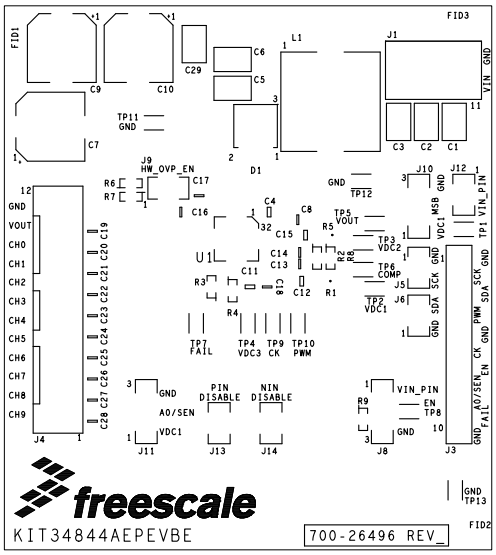


Figure 6. Silk Screen Top (x1)

9.4 Silk Screen Bottom (x1)

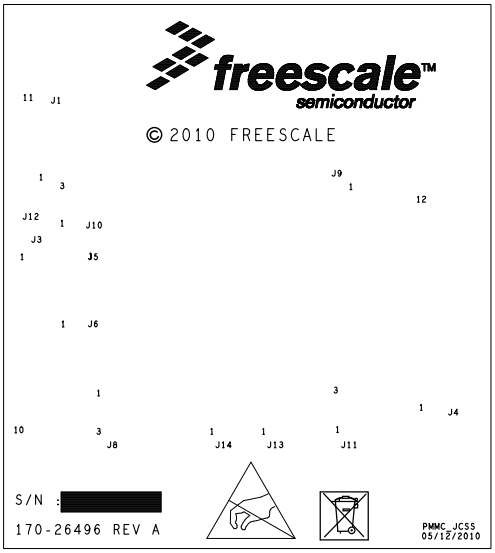


Figure 7. Silk Screen Bottom(x1)

9.5 Assembly Top (x1)

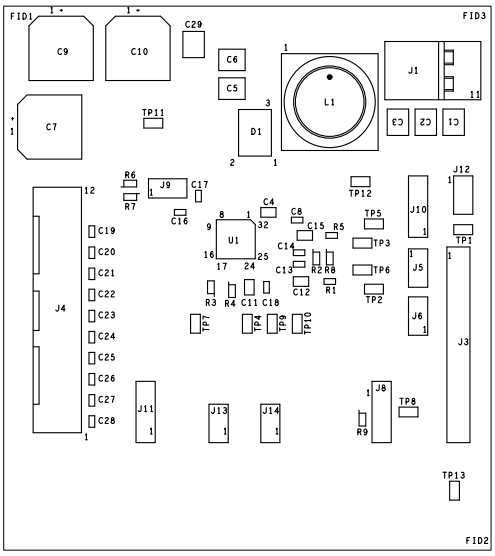
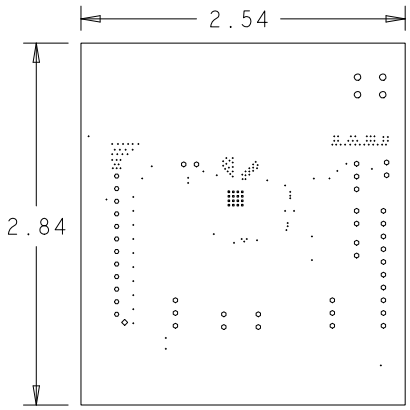


Figure 8. Assembly Top (x1)

9.6 Drill Chart (x0.7)



DRILL CHART: TOP to BOTTOM				
ALL UNITS ARE IN MILS				
FIGURE	SIZE	TOLERANCE	PLATED	QTY
·	10.0	+2.0/-2.0	PLATED	126
•	12.0	+2.0/-2.0	PLATED	16
○	35.0	+2.0/-2.0	PLATED	12
○	40.0	+3.0/-3.0	PLATED	31
○	47.0	+3.0/-3.0	PLATED	4
◇	47.0	+2.0/-2.0	NON-PLATED	1

Figure 9. Drill Chart (x0.7)

10 KIT34844A Bill of Material

Item	Qty	Part Reference	Value	Description	MFG Name	Manufacturer PN
1	3	C1-C3	10UF	CAP CER 10UF 35V 10% X7R 1210	MURATA	GRM32ER7YA106KA12L
2	1	C4	0.1UF	CAP CER 0.1UF 50V 5% X7R 0805	KEMET	C0805C104J5RACTU
3	3	C5,C6,C29	2.2uF	CAP CER 2.2UF 100V 10% X7R 1210	Murata	GRM32ER72A225KA35L
4	3	C7,C9,C10	10UF	CAP ALEL 10UF 80V 20% SMT	PANASONIC	EEEFK1K100P
5	2	C8,C13	100PF	CAP CER 100PF 50V 5% C0G 0603	AVX	06035A101JAT2A
6	3	C11,C12,C15	2.2UF	CAP CER 2.2UF 25V 10% X7R 0805	AVX	08053C225KAT2A
7	1	C14	4700 PF	CAP CER 4700PF 50V 5% X7R 0603	AVX	06035C472JAT2A
8	3	C16-C18	100PF	CAP CER 100PF 50V 5% C0G 0603	AVX	06035A101JAT2A
9	10	C19-C28	220PF	CAP CER 220PF 50V 10% X7R 0603	KEMET	C0603C221K5RAC
10	1	D1	SS5P10-M3/86A	DIODE SCH 5A 100V SMPC	VISHAY	SS5P10-M3/86A
11	3	FID1,FID2,FID3	FID	FIDUCIAL 060 MIL PAD	GENERIC	FID-040
12	1	J1	CON_2_TB	CON 1X2 TB TH 3.5MM SP 508H SN	Weidmuller	1885180000
13	1	J3	HDR_1X10	HDR 1X10 TH 100MIL SP 330H AU 120L	SULLINS	PBC10SAAN
14	1	J4	CON PLUG 12	CON 1X12 PLUG SHRD TH 2.5MM	JST MFG. CO	B12B-XASK-1N-A
15	6	J5,J6,J9,J12-J14	HDR_1X2	HDR 1X2 TH 100MIL SP 375H AU	TYCO	826629-2
16	3	J8,J10,J11	HDR TH 1X3	HDR 1X3 TH 100MIL SP 339H AU	SAMTEC	TSW-103-07-G-S
17	1	L1	47uH	IND FER 47UH@1KHZ 2.7A 20% SMT	TDK	SLF12575T-470M2R7-PF
18	2	R1,R5	1.2K	RES MF 1.2K 1/10W 1% 0603	KOA SPEER	RK73H1JTTD1201F
19	1	R2	6.80K	RES MF 6.80K 1/10W 1% 0603	KOA SPEER	RK73H1JTTD6801F
20	1	R3	4.64K	RES MF 4.64K 1/10W 1% 0603	KOA SPEER	RK73H1JTTD4641F
21	1	R4	100K	RES MF 100K 1/10W 5% 0603	BOURNS	CR0603-JW-104ELF
22	1	R6	150.0K	RES MF 150.0K 1/10W 1% 0603	KOA SPEER	RK73H1JTTD1503F
23	2	R7,R8	27K	RES MF 27.0K 1/10W 1% 0603	KOA SPEER	RK73H1JTTD2702F
24	1	R9	100K	RES MF 100K 1/10W 1% 0603	KOA SPEER	RK73H1JTTD1003F
25	13	TP1-TP13	TEST POINT	TEST POINT PIN 0.138X.059 SMT	NICOMATIC	C12000B
26	**1**	**U1**	**MC34844AEP**	**IC DRV LED 10 CHANNEL 7-28V QFN-32**	**FREESCALE**	**MC34844AEP**

Notes:

1. Freescale does not assume liability, endorse, or warrant components from external manufacturers that are referenced in circuit drawings or tables. While Freescale offers component recommendations in this configuration, it is the customer's responsibility to validate their application.
2. The manufacturer name and part number are suggested, however, the kit subcontractor may have substitued an equivalent device, approved by Freescale engineering.

11 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/MC34844.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 LED Drivers	www.freescale.com/webapp/sps/site/taxonomy.jsp?code=LEDBLDRIVER
Freescale Microcontroller	http://www.freescale.com/webapp/sps/site/prod_summary.jsp?code=S08SH&fsrch=1

12 Revision History

REVISION	DATE	DESCRIPTION OF CHANGES
1.0	7/2010	• 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 +1-303-675-2140
Fax: +1-303-675-2150
LDCForFreescaleSemiconductor@hibbertgroup.com

KT34844AUG
Rev. 1.0
7/2010