EVM User's Guide: DRV8374S-29EVM, DRV8374H-29EVM, DRV8374-23EVM, DRV8378S-29EVM, DRV8378H-29EVM, DRV8378-23EVM

DRV8374 and DRV8378 Evaluation Module

Description

The DRV8374 and DRV8378 evaluation modules (EVM) are integrated driver IC evaluation modules for three-phase motor driver applications and provide single-chip power stage design for customers driving 4.5V to 35V (DRV8374) and 4.5V to 65V (DRV8378) brushless DC motors.

Get Started

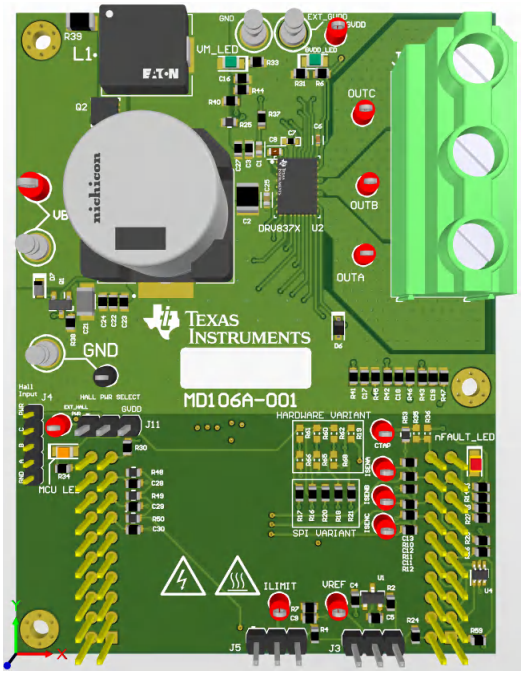
1. Order the applicable variant of DRV874EVM or DRV8378EVM (see Table 2-1) and LAUNCHXLF280049C
2. Download the comprehensive reference design files from the DRV8376EVM tool page
3. Refer to the DRV8374 and DRV8378 Three-Phase Integrated FET Motor Driver datasheet or refer to E2E.ti.com for questions and support

1 Features

- 4.5V to 65V operating voltage and 16A peak current capability (DRV8378EVM)
- 4.5V to 35V operating voltage and 40A peak current capability (DRV8374EVM)
- GVDD regulator
- Integrated CSAs for three-phase low-side current measurement
- Supply and fault LEDs
- C2000™ (LAUNCHXL-F280049C) sensored trapezoidal firmware available

Applications

- Automotive HVAC control & HMI module
- Brushless-DC (BLDC) Motor Modules
- Home printer
- HVAC motor control
- Mobile robot motor control
- Multifunction printer



Board Image

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2 Evaluation Module Overview

2.1 Introduction

This document is designed to be used as a startup guide to the DRV8374EVM and DRV8378EVM and LAUNCHXL-F280049C designs and is provided with the DRV8374EVM and DRV8378EVM as a supplement to the DRV8374 and DRV8378 Three-Phase Integrated FET Motor Driver datasheet. This document is intended for the engineers involved in the design, implementation, and validation of DRV8374 and DRV8378 and TMS320F280049C reference software.

The scope of this document is to provide the user with a guide to evaluate the DRV8374 and DRV8378 device with a TMS320F280049C isolated board. This document explains the hardware connections required between boards and external motor and supplies. When the hardware connections are complete, the user is required to download the necessary tools and software to spin a motor.

The reference software is composed of GUIComposer software with sensored trapezoidal algorithm for BLDC motor control.

CAUTION

The DRV8374EVM and DRV8378EVM are designed to be evaluated only with the LAUNCHXL-F280049C MCU PCB, which must be ordered separately.

WARNING

Voltages exceeding the standard EVM ratings as specified on the datasheet can cause personal injury, electrical shock hazard, damage the EVM, or a combination.

Additionally, do not leave power connections to the EVM connected while not in operation.

WARNING

	**Hot surface**	Contact can cause burns. Do not touch.

WARNING

	**High Voltage**	For safety, use of isolated test equipment with overvoltage and overcurrent protection is highly recommended. Electric shock is possible when connecting board to live wire. The board must be handled with care by a professional.

2.2 Kit Contents

Item	Description	Quantity
DRV8374EVM or DRV8378EVM	PCB	1
Box	Cardboard box	1
Label	Standard label	1
Foam	Antistatic foam	2
Literature	EVM disclaimers	1

2.3 Specification

Table 2-1 for the voltage a current capability of each EVM to prevent damage to both the IC and the EVM, confirm that these voltage and current specifications are not exceeded.

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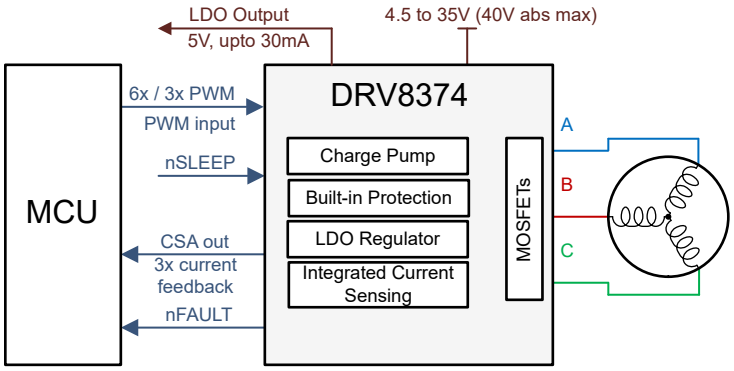


Figure 2-1. Simplified Schematic for DRV8374H/S

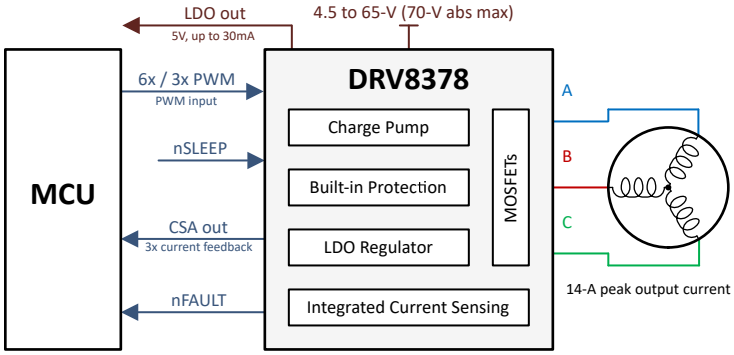


Figure 2-2. Simplified Schematic for DRV8378H/S

2.4 Device Information

The DRV8374 and DRV8378 integrates three half-H bridges, has a very low RDS(ON) to enable high power drive capability, and allows customers to drive 4.5V to 35V (DRV8374) and 4.5V to 65V (DRV8378) brushless-DC motors. Table 2-1 shows the device variants and specifications.

Current is sensed using an integrated current sensing feature which eliminates the need for external sense resistors. Power management features with integrated LDO generate the necessary voltage rails for the device and can be used to power external circuits.

The DRV8374 and DRV8378 can drive a PWM frequency up to 200kHz. The control scheme is highly configurable through hardware pins or register settings ranging from motor current limiting behavior to fault response.

Table 2-1. EVM Variants

EVM	Device	Package	Voltage	Peak Current	RDSon (HS + LS)	Interface
DRV8374S-29EVM	DRV8374S	29-pin VQFN (7 × 5mm)	4.5V – 35V	40A	17mΩ	SPI
DRV8374H-29EVM	DRV8374H	29-pin VQFN (7 × 5mm)				Hardware
DRV8374H-23EVM	DRV8374H	23-pin VQFN (6 × 4mm)				Hardware
DRV8378S-29EVM	DRV8378S	29-pin VQFN (7 × 5mm)	4.5V – 60V	16A	58mΩ	SPI
DRV8378H-29EVM	DRV8378H	29-pin VQFN (7 × 5mm)				Hardware
DRV8378H-23EVM	DRV8378H	23-pin VQFN (6 × 4mm)				Hardware

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3 Hardware

The following section describes the EVM hardware and connections to the external supply, hall sensors, PC through USB, and motor. Figure 2-1 shows device ratings for each EVM variant. Figure 2-1 and Figure 2-2 show the major blocks of the DRV8374 and DRV8378 devices

3.1 Hardware Connections Overview – DRV8363-Q1EVM and LAUNCHXL-F280049C

The following section describes the EVM hardware and connections to the external supply, hall sensors, PC through the USB, and motor.

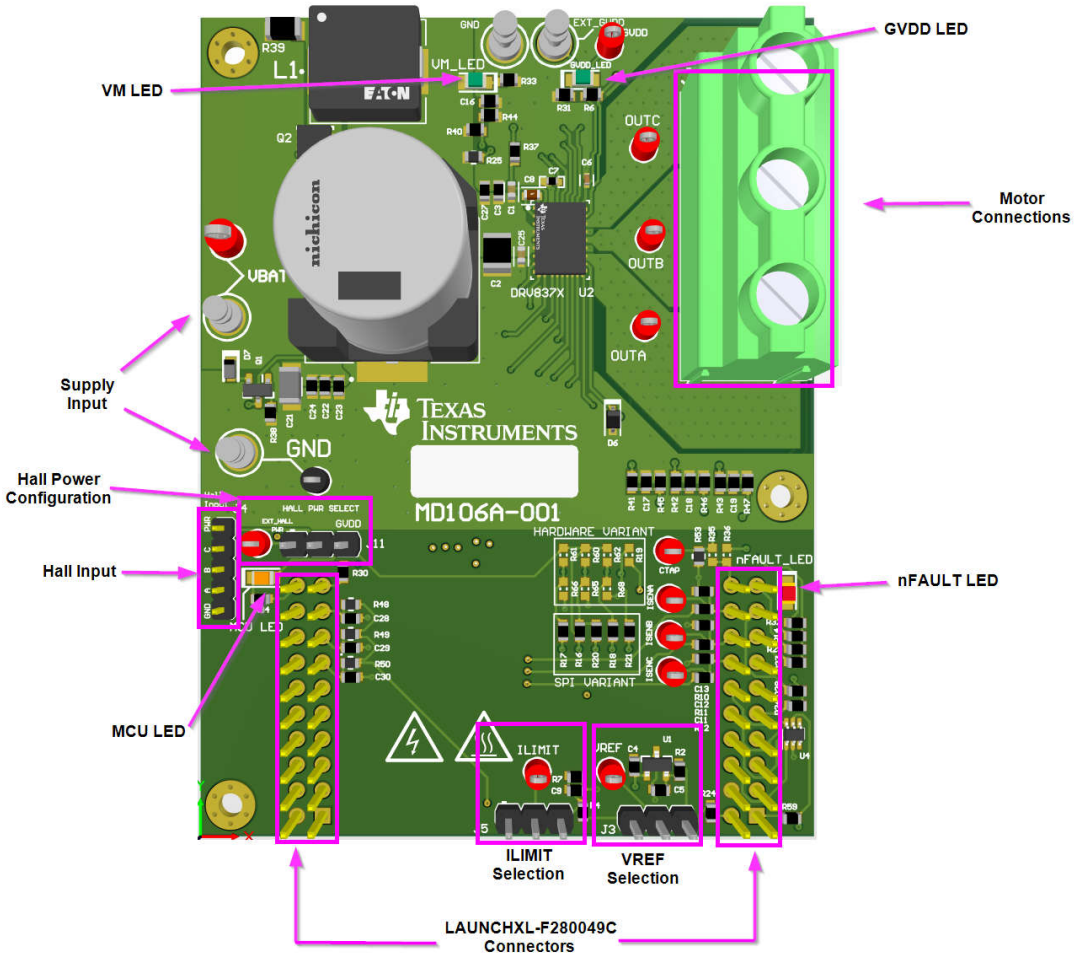


Figure 3-1. LAUNCHXL-F280049C Connection Overview on DRV837x EVM

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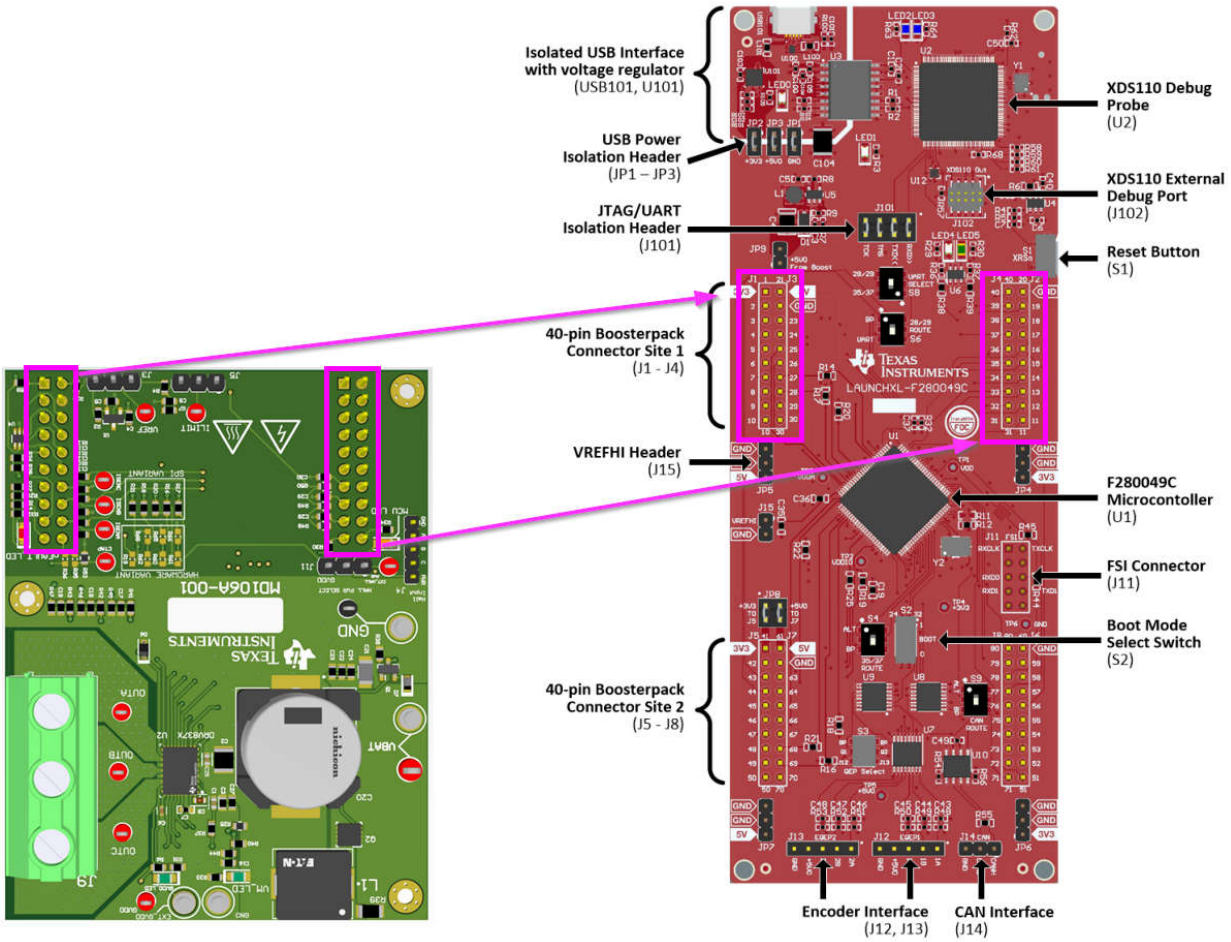


Figure 3-2. LAUNCHXL-F280049C Attachment

Attach the DRV837x EVM to the LAUNCHXL-F280049C as seen in Figure 3-2 and Figure 3-3

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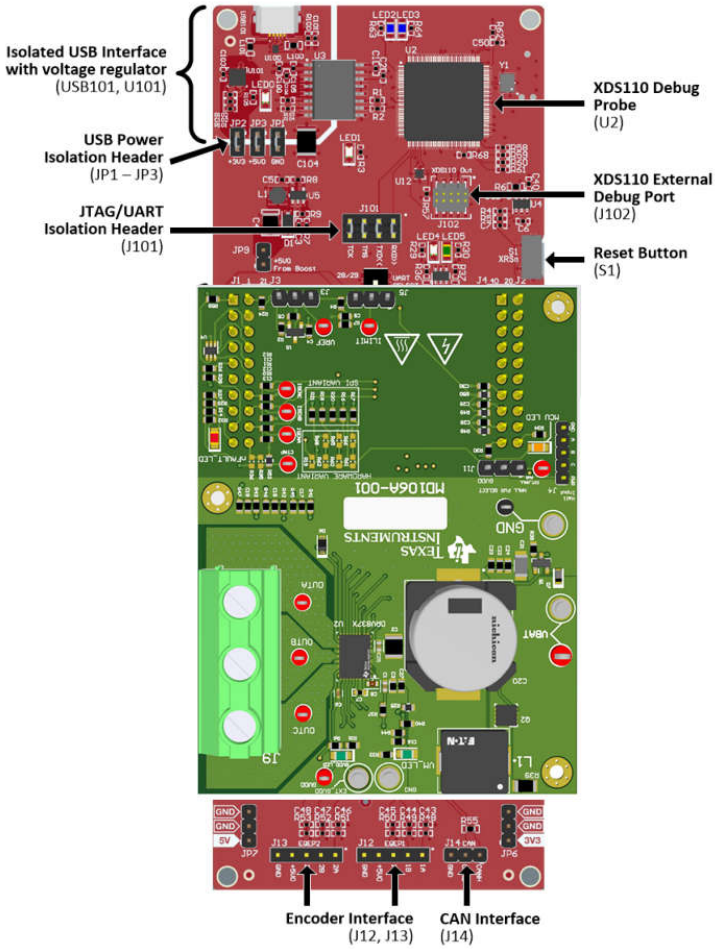


Figure 3-3. After Attaching LaunchPad

Supply power to the VBAT and GND terminals as seen in Figure 3-4. Table 2-1 lists the EVM variants to help select the correct supply voltage.

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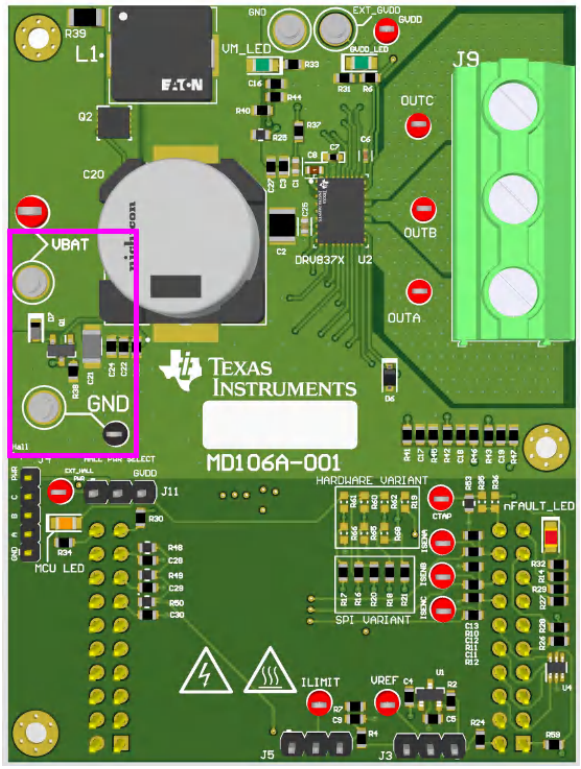


Figure 3-4. EVM Power Supply Input

WARNING

To minimize the risk of potential shock hazard and personal injury, remove all power connections and interfaces to the DRV837xEVM when not in use.

Once the EVM and LaunchPad™ are connected to each other and connected to a power supply open the EVM GUI found on dev.ti.com



Figure 3-5. LaunchPad GUI

The GUI allows users to control the EVM, monitor faults, spin a motor, and configure SPI settings (for SPI variants).

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4 Hardware Design Files

4.1 Schematics

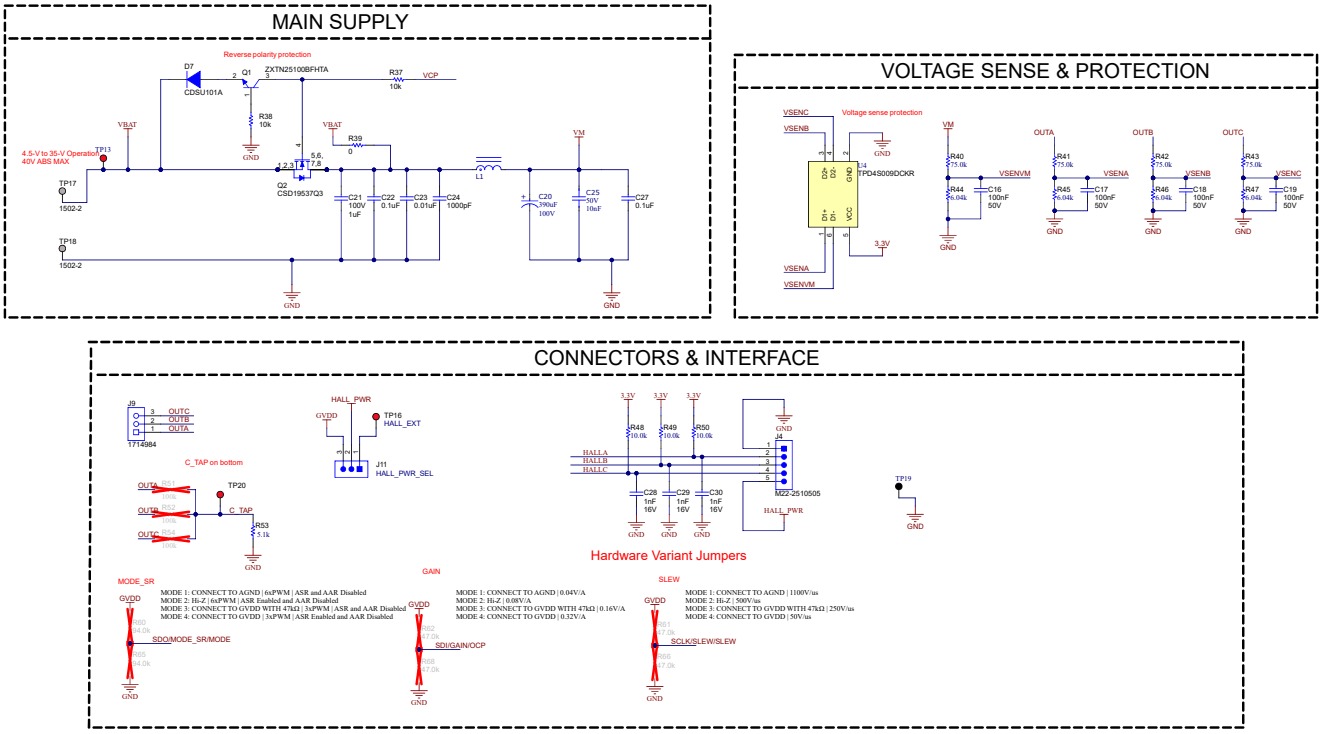


Figure 4-1. Main Supply, Voltage Sense and Protection, and Connectors and Interface

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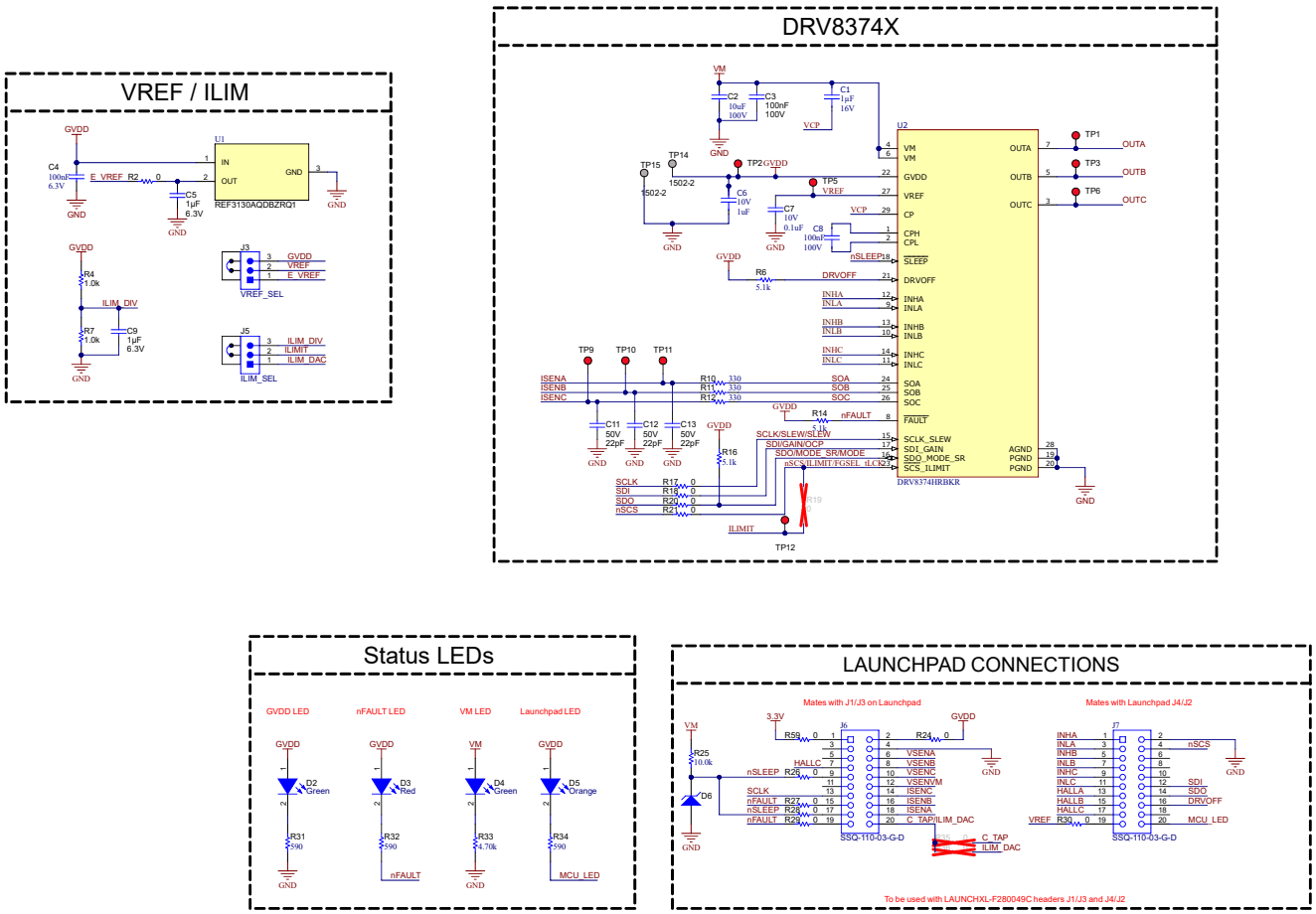


Figure 4-2. IC, VREF/ILIMT, Status LEDs, and LaunchPad™ Connections

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4.2 PCB Layouts

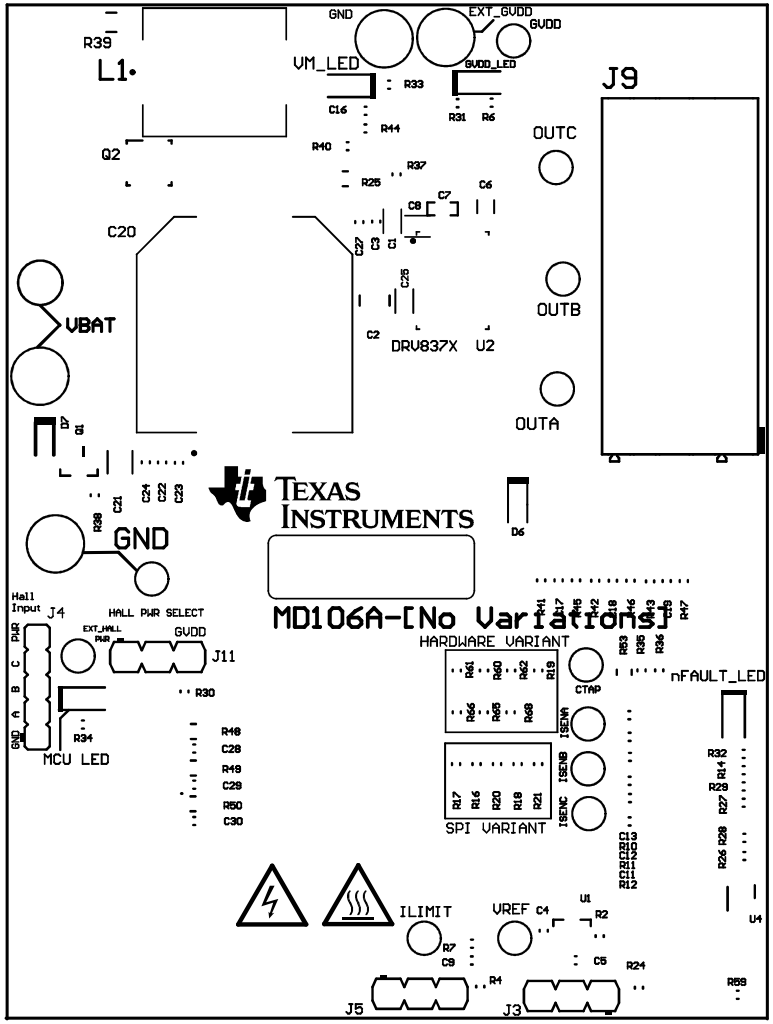


Figure 4-3. Top Overlay

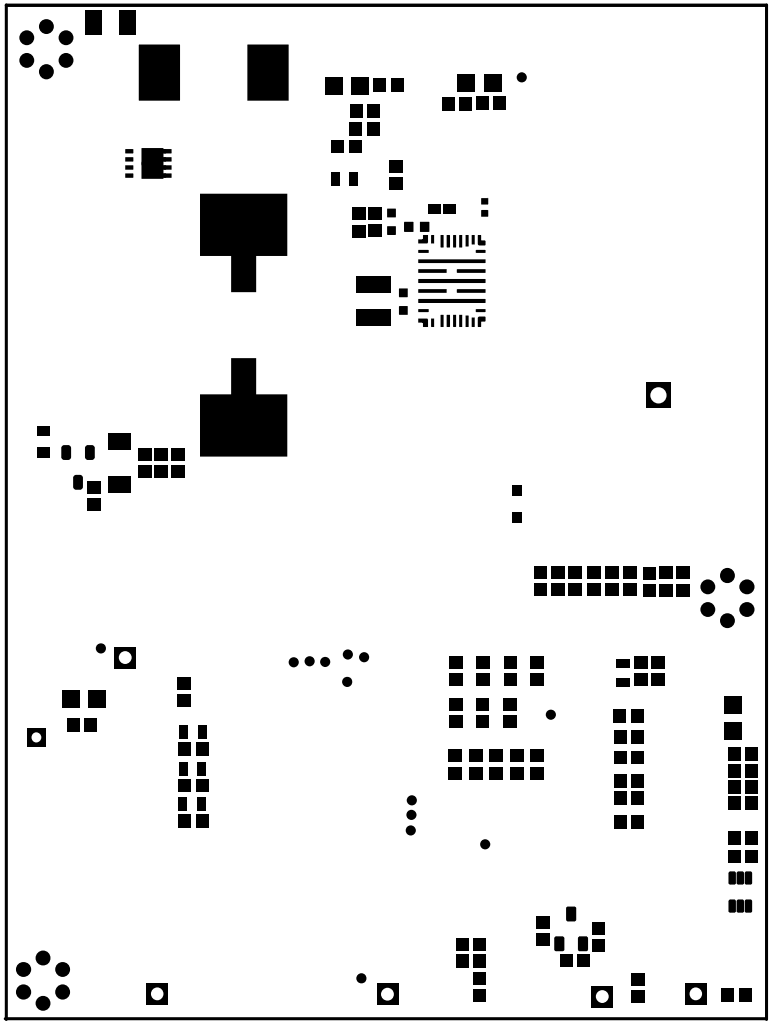


Figure 4-4. Top Paste

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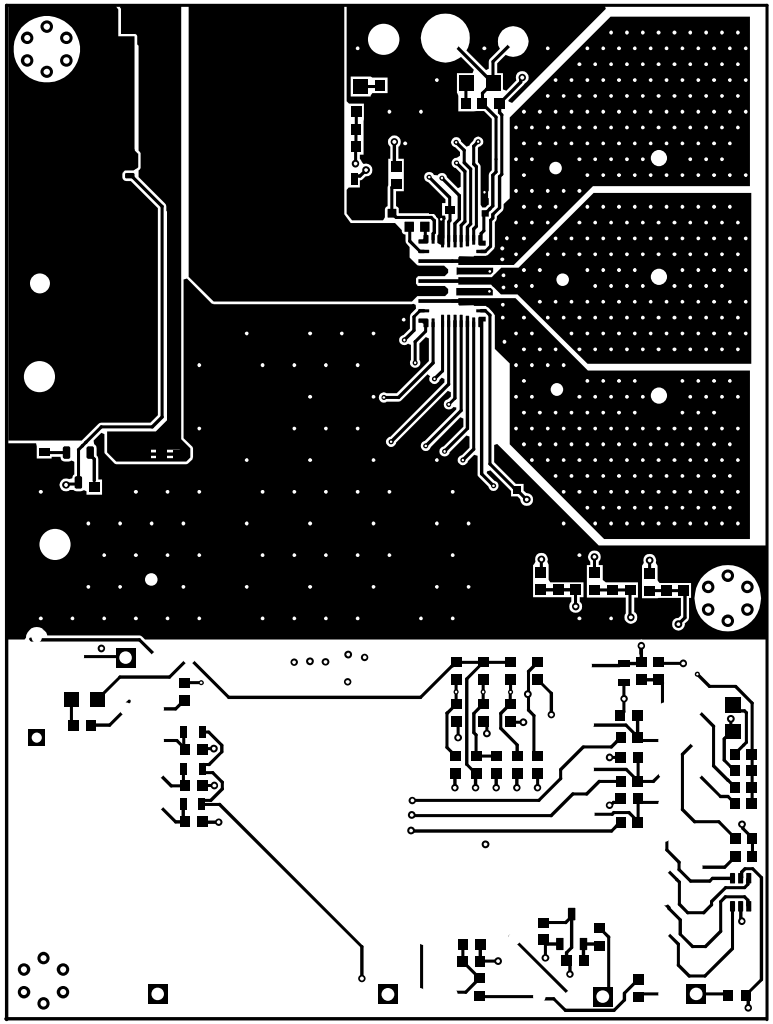


Figure 4-5. Top Layer

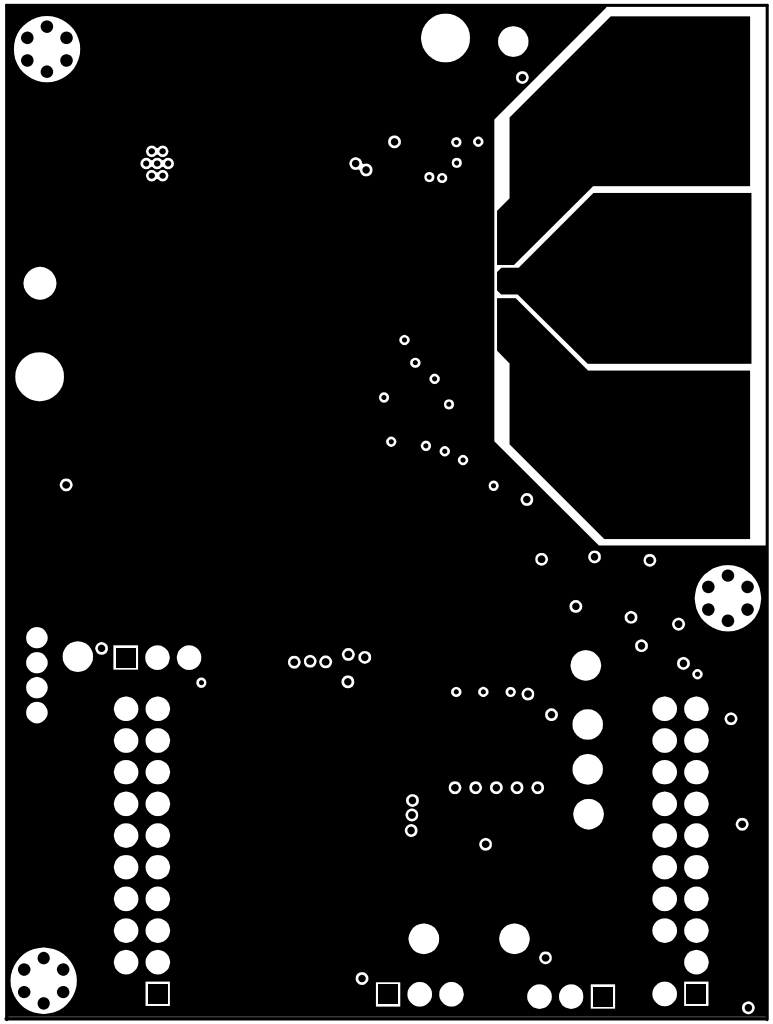


Figure 4-6. Ground Layer

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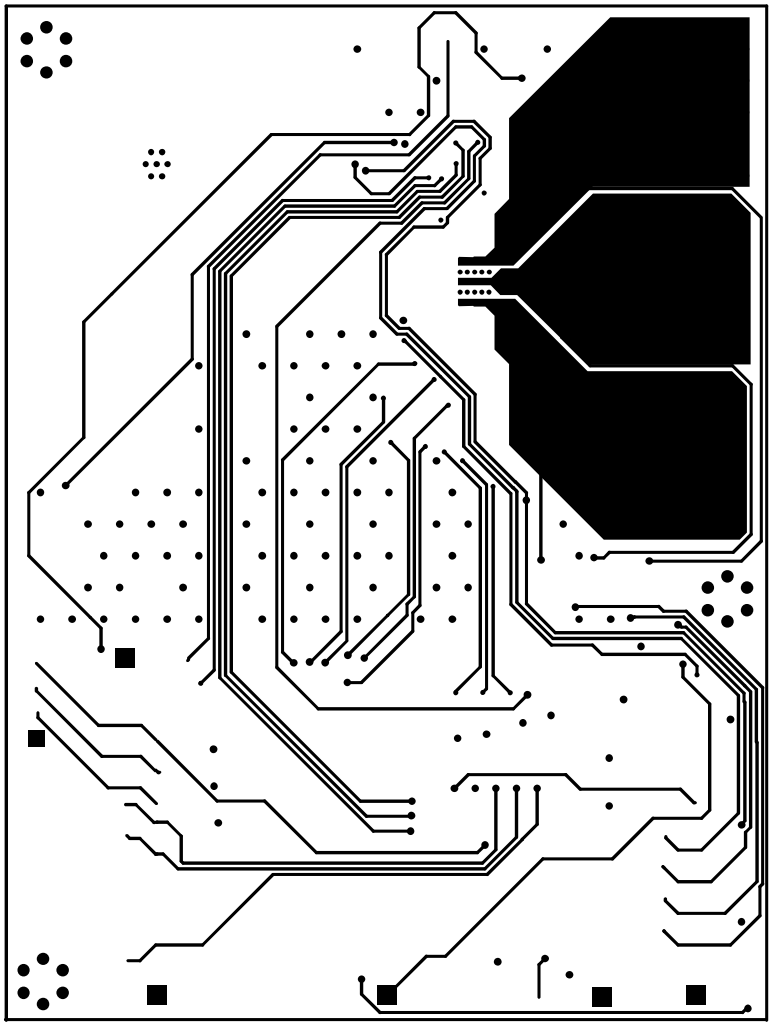


Figure 4-7. Power Layer

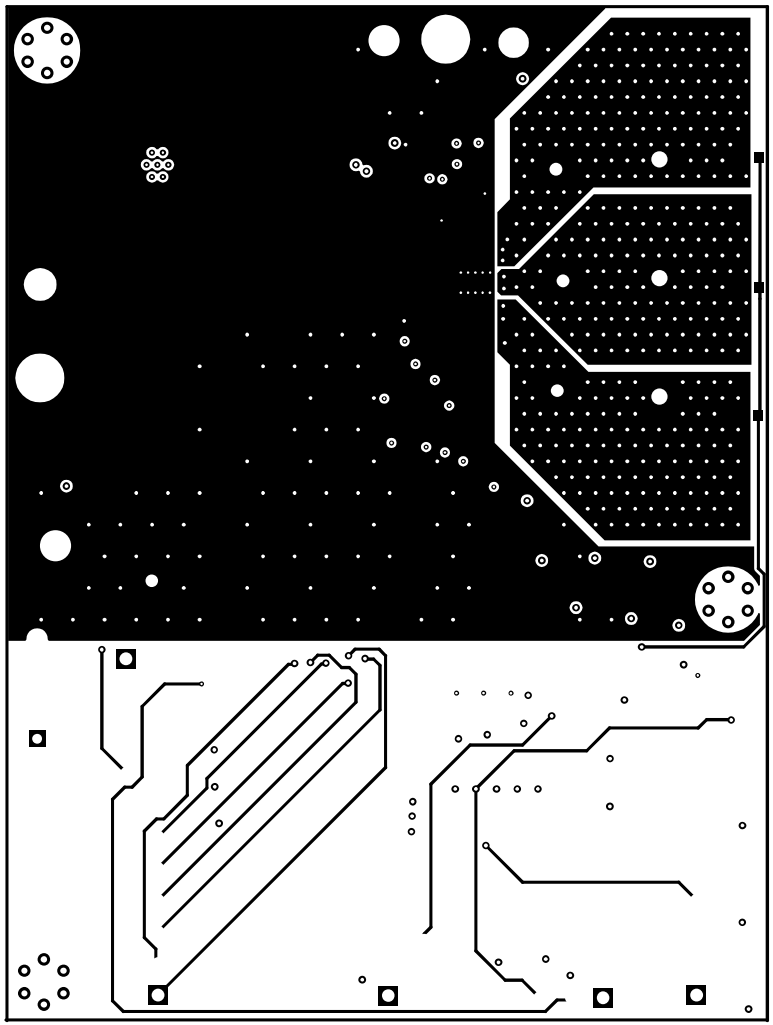


Figure 4-8. Bottom Layer

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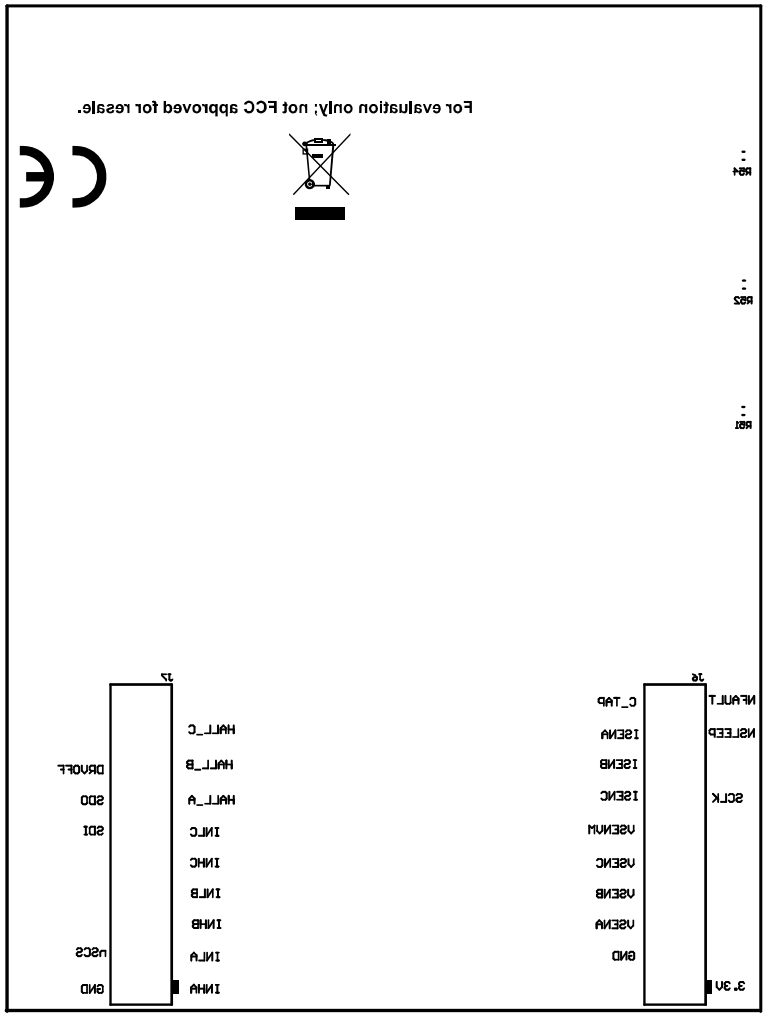


Figure 4-9. Bottom Overlay

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4.3 Bill of Materials (BOM)

Item Number	Designator	Quantity	Value	Part Number	Manufacturer	Description	Package Reference
1	!PCB1	1	MD106	Any	-	Printed Circuit Board	-
2	C1	1	1µF	CGA3E1X7R1C105M080AC	TDK	Cap Ceramic 1µF 16V X7R 20% Pad SMD 0603 +125°C Automotive T/R	0603
3	C2	1	10uF	GRM32ER71J106KA12L	MuRata™	CAP, CERM, 10µF, 63V, ± 10%, X7R, 1210	1210
4	C3	1	0.1uF	0603BB104KW101	Passive Plus	CAP, CERM, 0.1µF, 100V,± 10%, X7R, 0603	0603
5	C4	1	0.1uF	GRM188R70J104KA01D	MuRata	CAP, CERM, 0.1µF, 6.3V, ± 10%, X7R, 0603	0603
6	C5, C9	2	1uF	CL10B105KQ8NNNC	Samsung Electro-Mechanics	CAP, CERM, 1µF, 6.3V, ± 10%, X7R, 0603	0603
7	C6	1	1µF	GMC04X7R105K10NT	Cal-Chip Electronics	1µF ±10% 10V Ceramic Capacitor X7R 0402 (1005 Metric)	0402
8	C7	1	0.1uF	GRM155R71A104KA01D	MuRata	CAP, CERM, 0.1µF, 10V, ± 10%, X7R, 0402	0402
9	C8	1	100nF	CL10B104KC8NNNC	Samsung	Cap Ceramic 100nF 100V X7R ±10% Pad SMD 0603 +125°C T/R	0603
10	C11, C12, C13	3	22pF	CGA3E2C0G1H220J080AA	TDK	CAP, CERM, 22pF, 50V, ± 5%, C0G/NP0, AEC-Q200 Grade 1, 0603	0603
11	C16, C17, C18, C19	4	0.1uF	06035C104JAT2A	AVX	CAP, CERM, 0.1µF, 50V,± 5%, X7R, 0603	0603
12	C20	1	390µF	UCM2A391MNS1MS	Nichicon	390µF 100V Aluminum Electrolytic Capacitors Radial, Can - SMD 5000hrs at 105°C	SMT_CAP_17MM1_17MM1
13	C21	1	1uF	C3216X7R2A105K160AA	TDK	CAP, CERM, 1µF, 100V, ± 10%, X7R, 1206	1206
14	C22, C27	2	0.1uF	CGA3E3X7S2A104K080AB	TDK	CAP, CERM, 0.1µF, 100V, ± 10%, X7S, AEC-Q200 Grade 1, 0603	0603
15	C23	1	0.01uF	CGA3E2X7R2A103K080AA	TDK	CAP, CERM, 0.01µF, 100V, ± 10%, X7R, AEC-Q200 Grade 1, 0603	0603
16	C24	1	1000pF	CGA3E2X7R2A102K080AA	TDK	CAP, CERM, 1000pF, 100V, ± 10%, X7R, AEC-Q200 Grade 1, 0603	0603
17	C25	1	10nF	CGA3E2X7R1H103K080AE	TDK	Cap Ceramic 10nF 50V X7R 10% Pad SMD 0603 +125°C Automotive T/R	0603
18	C28, C29, C30	3	1000pF	8.85012E+11	Würth Elektronik™	CAP, CERM, 1000pF, 16V, ± 10%, X7R, 0603	0603
19	D2, D4	2	Green	LTST-C170KGKT	Lite-On	LED, Green, SMD	LED_0805
20	D3	1	Red	LTST-C170KRKT	Lite-On	LED, Red, SMD	LED_0805
21	D5	1	Orange	LTST-C170KFKT	Lite-On	LED, Orange, SMD	LED_0805
22	D6	1	3.3V	SZMM3Z3V3ST1G	ON Semiconductor	Diode, Zener, 3.3V, 300mW, AEC-Q101, SOD-323	SOD-323
23	D7	1	90V	CDSU101A	Comchip Technology	Diode, Switching, 90V, 0.1A, SOD-523F	SOD-523F

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Item Number	Designator	Quantity	Value	Part Number	Manufacturer	Description	Package Reference
24	J3, J5, J11	3	-	68001-403HLF	FCI	Header, 2.54mm, 3x1, Tin, TH	Header, 2.54mm, 3x1, TH
25	J4	1	-	M22-2510505	Harwin®	Header, 2mm, 5x1, Gold, TH	Header, 2mm, 5x1, TH
26	J6, J7	2	-	SSQ-110-03G-D	Samtec®	Receptacle, 2.54mm, 10x2, Gold, TH	Receptacle, 2.54mm, 10x2, TH
27	J9	1	-	1714984	Phoenix Contact	Terminal Block, 3x1, 9.52MM, TH	Terminal Block, 3x1, 9.52mm, TH
28	L1	1	1µH	HCMA1104-1R0-R	Eaton	1µH Shielded Drum Core, Wirewound Inductor 18A 3.3mΩ Max	Nonstandard SMD2
29	LBL1	1	-	THT-14-423-10	Brady®	Thermal Transfer Printable Labels, 0.650" W × 0.200" H - 10,000 per roll	PCB Label 0.650 × 0.200 inch
30	Q1	1	100V	ZXTN25100BFHTA	Diodes Inc.	Transistor, NPN, 100V, 3A, AEC-Q101, SOT-23	SOT-23
31	Q2	1	100V	CSD19537Q3	Texas Instruments	MOSFET, N-CH, 100V, 50A, DQG0008A (VSON-CLIP-8)	DQG0008A
32	R2, R17, R18, R20, R21, R24, R26, R27, R28, R29, R30, R59	12	0	ERJ-3GEY0R00V	Panasonic®	RES, 0, 5%, 0.1W, AEC-Q200 Grade 0, 0603	0603
33	R4, R7	2	1.0k	RCA06031K00JNEA	Vishay®-Dale	RES, 1.0k, 5%, 0.1W, AEC-Q200 Grade 0, 0603	0603
34	R6, R14, R16	3	5.1k	CRCW06035K10JNEA	Vishay-Dale	RES, 5.1k, 5%, 0.1W, 0603	0603
35	R10, R11, R12	3	330	RG1608P-331-B-T5	Susumu Co Ltd	RES, 330, 0.1%, 0.1W, 0603	0603
36	R25, R48, R49, R50, R53	5	10.0k	TNPW060310K0BEEA	Vishay-Dale	RES, 10.0k, 0.1%, 0.1W, AEC-Q200 Grade 1, 0603	0603
37	R31, R32, R34	3	590	RC0603FR-07590RL	Yageo®	RES, 590, 1%, 0.1W, 0603	0603
38	R33	1	4.70k	RT0603BRD074K7L	Yageo America	RES, 4.70k, 0.1%, 0.1W, 0603	0603
39	R37, R38	2	10k	CRCW060310K0JNEA	Vishay-Dale	RES, 10k, 5%, 0.1W, AEC-Q200 Grade 0, 0603	0603
40	R39	1	0	RCA12060000ZSEA	Vishay-Dale	RES, 0, 5%, 0.25W, AEC-Q200 Grade 0, 1206	1206
41	R40, R41, R42, R43	4	75.0k	CRCW060375K0FKEA	Vishay-Dale	RES, 75.0k, 1%, 0.1W, AEC-Q200 Grade 0, 0603	0603
42	R44, R45, R46, R47	4	6.04k	RT0603DRE076K04L	Yageo America	RES, 6.04k, 0.5%, 0.1W, 0603	0603
43	SH-J2, SH-J3	2	1x2	SNT-100-BK-G	Samtec®	Shunt, 100mil, Gold plated, Black	Shunt
44	TP1, TP2, TP3, TP5, TP6, TP9, TP10, TP11, TP12, TP16, TP20	11	5000	-	Keystone	Test Point, Miniature, Red, TH	Red Miniature Testpoint
45	TP13	1	5005	-	Keystone	Test Point, Compact, Red, TH	Red Compact Testpoint
46	TP14, TP15, TP17, TP18	4	1502-2	-	Keystone	Terminal, Turret, TH, Double	Keystone1502-2

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Item Number	Designator	Quantity	Value	Part Number	Manufacturer	Description	Package Reference
47	TP19	1	5001	-	Keystone	Test Point, Miniature, Black, TH	Black Miniature Testpoint
48	U1	1	-	REF3130AQDBZRQ1	Texas Instruments	Automotive 20ppm/°C Max, 100µA, SOT23-3 Series Voltage Reference, DBZ0003A (SOT-23-3)	DBZ0003A
49	U2	1	-	DRV8374HRBKR	Texas Instruments	Three-Phase Integrated FET Motor Driver	VQFN29
50	U4	1	-	TPD4S009DCKR	Texas Instruments	4-Channel ESD Solution for High-Speed Differential Interface, DCK0006A (SOT-SC70-6)	DCK0006A
51	R19, R35, R36	0	0	ERJ-3GEY0R00V	Panasonic	RES, 0, 5%, 0.1W, AEC-Q200 Grade 0, 0603	0603
52	R51, R52, R54	0	100k	ERA-3AEB104V	Panasonic	RES, 100k, 0.1%, 0.1W, AEC-Q200 Grade 0, 0603	0603
53	R60, R61, R62, R65, R66, R68	0	47.0k	MCT0603MD4702DP500	Vishay/Beyschlag	RES, 47.0k, 0.5%, 0.15W, AEC-Q200 Grade 0, 0603	0603

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6 Revision History

NOTE: Page numbers for previous revisions may differ from page numbers in the current version.

DATE	REVISION	NOTES
September 2026	*	Initial Release

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1. *Delivery:* TI delivers TI evaluation boards, kits, or modules, including any accompanying demonstration software, components, and/or documentation which may be provided together or separately (collectively, an “EVM” or “EVMs”) to the User (“User”) in accordance with the terms set forth herein. User's acceptance of the EVM is expressly subject to the following terms.

   1.1 EVMs are intended solely for product or software developers for use in a research and development setting to facilitate feasibility evaluation, experimentation, or scientific analysis of TI semiconductors products. EVMs have no direct function and are not finished products. EVMs shall not be directly or indirectly assembled as a part or subassembly in any finished product. For clarification, any software or software tools provided with the EVM (“Software”) shall not be subject to the terms and conditions set forth herein but rather shall be subject to the applicable terms that accompany such Software

   1.2 EVMs are not intended for consumer or household use. EVMs may not be sold, sublicensed, leased, rented, loaned, assigned, or otherwise distributed for commercial purposes by Users, in whole or in part, or used in any finished product or production system.

2 *Limited Warranty and Related Remedies/Disclaimers*:

   2.1 These terms do not apply to Software. The warranty, if any, for Software is covered in the applicable Software License Agreement.

   2.2 TI warrants that the TI EVM will conform to TI's published specifications for ninety (90) days after the date TI delivers such EVM to User. Notwithstanding the foregoing, TI shall not be liable for a nonconforming EVM if (a) the nonconformity was caused by neglect, misuse or mistreatment by an entity other than TI, including improper installation or testing, or for any EVMs that have been altered or modified in any way by an entity other than TI, (b) the nonconformity resulted from User's design, specifications or instructions for such EVMs or improper system design, or (c) User has not paid on time. Testing and other quality control techniques are used to the extent TI deems necessary. TI does not test all parameters of each EVM. User's claims against TI under this Section 2 are void if User fails to notify TI of any apparent defects in the EVMs within ten (10) business days after delivery, or of any hidden defects with ten (10) business days after the defect has been detected.

   2.3 TI's sole liability shall be at its option to repair or replace EVMs that fail to conform to the warranty set forth above, or credit User's account for such EVM. TI's liability under this warranty shall be limited to EVMs that are returned during the warranty period to the address designated by TI and that are determined by TI not to conform to such warranty. If TI elects to repair or replace such EVM, TI shall have a reasonable time to repair such EVM or provide replacements. Repaired EVMs shall be warranted for the remainder of the original warranty period. Replaced EVMs shall be warranted for a new full ninety (90) day warranty period.

WARNING

Evaluation Kits are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems.

User shall operate the Evaluation Kit within TI’s recommended guidelines and any applicable legal or environmental requirements as well as reasonable and customary safeguards. Failure to set up and/or operate the Evaluation Kit within TI’s recommended guidelines may result in personal injury or death or property damage. Proper set up entails following TI’s instructions for electrical ratings of interface circuits such as input, output and electrical loads.

NOTE:

EXPOSURE TO ELECTROSTATIC DISCHARGE (ESD) MAY CAUSE DEGREDATION OR FAILURE OF THE EVALUATION KIT; TI RECOMMENDS STORAGE OF THE EVALUATION KIT IN A PROTECTIVE ESD BAG.

3 *Regulatory Notices:*

3.1 *United States*

3.1.1 *Notice applicable to EVMs not FCC-Approved:*

FCC NOTICE: This kit is designed to allow product developers to evaluate electronic components, circuitry, or software associated with the kit to determine whether to incorporate such items in a finished product and software developers to write software applications for use with the end product. This kit is not a finished product and when assembled may not be resold or otherwise marketed unless all required FCC equipment authorizations are first obtained. Operation is subject to the condition that this product not cause harmful interference to licensed radio stations and that this product accept harmful interference. Unless the assembled kit is designed to operate under part 15, part 18 or part 95 of this chapter, the operator of the kit must operate under the authority of an FCC license holder or must secure an experimental authorization under part 5 of this chapter.

3.1.2 *For EVMs annotated as FCC – FEDERAL COMMUNICATIONS COMMISSION Part 15 Compliant:*

CAUTION

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Interference Statement for Class A EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Interference Statement for Class B EVM devices

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help.*

3.2 *Canada*

3.2.1 *For EVMs issued with an Industry Canada Certificate of Conformance to RSS-210 or RSS-247*

Concerning EVMs Including Radio Transmitters:

This device complies with Industry Canada license-exempt RSSs. Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Concernant les EVMs avec appareils radio:

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Concerning EVMs Including Detachable Antennas:

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication. This radio transmitter has been approved by Industry Canada to operate with the antenna types listed in the user guide with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Concernant les EVMs avec antennes détachables

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante. Le présent émetteur radio a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés dans le manuel d'usage et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur

3.3 *Japan*

3.3.1 *Notice for EVMs delivered in Japan:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_01.page 日本国内に輸入される評価用キット、ボードについては、次のところをご覧ください。

https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-delivered-in-japan.html

3.3.2 *Notice for Users of EVMs Considered "Radio Frequency Products" in Japan:* EVMs entering Japan may not be certified by TI as conforming to Technical Regulations of Radio Law of Japan.

If User uses EVMs in Japan, not certified to Technical Regulations of Radio Law of Japan, User is required to follow the instructions set forth by Radio Law of Japan, which includes, but is not limited to, the instructions below with respect to EVMs (which for the avoidance of doubt are stated strictly for convenience and should be verified by User):

1. Use EVMs in a shielded room or any other test facility as defined in the notification #173 issued by Ministry of Internal Affairs and Communications on March 28, 2006, based on Sub-section 1.1 of Article 6 of the Ministry's Rule for Enforcement of Radio Law of Japan,
2. Use EVMs only after User obtains the license of Test Radio Station as provided in Radio Law of Japan with respect to EVMs, or
3. Use of EVMs only after User obtains the Technical Regulations Conformity Certification as provided in Radio Law of Japan with respect to EVMs. Also, do not transfer EVMs, unless User gives the same notice above to the transferee. Please note that if User does not follow the instructions above, User will be subject to penalties of Radio Law of Japan.

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1. 電波法施行規則第6条第1項第1号に基づく平成18年3月28日総務省告示第173号で定められた電波暗室等の試験設備でご使用いただく。
2. 実験局の免許を取得後ご使用いただく。
3. 技術基準適合証明を取得後ご使用いただく。

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東京都新宿区西新宿 6 丁目 2 4 番 1 号

西新宿三井ビル

3.3.3 *Notice for EVMs for Power Line Communication:* Please see http://www.tij.co.jp/lsds/ti_ja/general/eStore/notice_02.page

電力線搬送波通信についての開発キットをお使いになる際の注意事項については、次のところをご覧ください。https://www.ti.com/ja-jp/legal/notice-for-evaluation-kits-for-power-line-communication.html

3.4 *European Union*

3.4.1 *For EVMs subject to EU Directive 2014/30/EU (Electromagnetic Compatibility Directive)*:

This is a class A product intended for use in environments other than domestic environments that are connected to a low-voltage power-supply network that supplies buildings used for domestic purposes. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

4 *EVM Use Restrictions and Warnings:*

4.1 EVMS ARE NOT FOR USE IN FUNCTIONAL SAFETY AND/OR SAFETY CRITICAL EVALUATIONS, INCLUDING BUT NOT LIMITED TO EVALUATIONS OF LIFE SUPPORT APPLICATIONS.

4.2 User must read and apply the user guide and other available documentation provided by TI regarding the EVM prior to handling or using the EVM, including without limitation any warning or restriction notices. The notices contain important safety information related to, for example, temperatures and voltages.

4.3 *Safety-Related Warnings and Restrictions:*

4.3.1 User shall operate the EVM within TI's recommended specifications and environmental considerations stated in the user guide, other available documentation provided by TI, and any other applicable requirements and employ reasonable and customary safeguards. Exceeding the specified performance ratings and specifications (including but not limited to input and output voltage, current, power, and environmental ranges) for the EVM may cause personal injury or death, or property damage. If there are questions concerning performance ratings and specifications, User should contact a TI field representative prior to connecting interface electronics including input power and intended loads. Any loads applied outside of the specified output range may also result in unintended and/or inaccurate operation and/or possible permanent damage to the EVM and/or interface electronics. Please consult the EVM user guide prior to connecting any load to the EVM output. If there is uncertainty as to the load specification, please contact a TI field representative. During normal operation, even with the inputs and outputs kept within the specified allowable ranges, some circuit components may have elevated case temperatures. These components include but are not limited to linear regulators, switching transistors, pass transistors, current sense resistors, and heat sinks, which can be identified using the information in the associated documentation. When working with the EVM, please be aware that the EVM may become very warm.

4.3.2 EVMs are intended solely for use by technically qualified, professional electronics experts who are familiar with the dangers and application risks associated with handling electrical mechanical components, systems, and subsystems. User assumes all responsibility and liability for proper and safe handling and use of the EVM by User or its employees, affiliates, contractors or designees. User assumes all responsibility and liability to ensure that any interfaces (electronic and/or mechanical) between the EVM and any human body are designed with suitable isolation and means to safely limit accessible leakage currents to minimize the risk of electrical shock hazard. User assumes all responsibility and liability for any improper or unsafe handling or use of the EVM by User or its employees, affiliates, contractors or designees.

4.4 User assumes all responsibility and liability to determine whether the EVM is subject to any applicable international, federal, state, or local laws and regulations related to User's handling and use of the EVM and, if applicable, User assumes all responsibility and liability for compliance in all respects with such laws and regulations. User assumes all responsibility and liability for proper disposal and recycling of the EVM consistent with all applicable international, federal, state, and local requirements.

5. *Accuracy of Information:* To the extent TI provides information on the availability and function of EVMs, TI attempts to be as accurate as possible. However, TI does not warrant the accuracy of EVM descriptions, EVM availability or other information on its websites as accurate, complete, reliable, current, or error-free.

6. *Disclaimers:*

6.1 EXCEPT AS SET FORTH ABOVE, EVMS AND ANY MATERIALS PROVIDED WITH THE EVM (INCLUDING, BUT NOT LIMITED TO, REFERENCE DESIGNS AND THE DESIGN OF THE EVM ITSELF) ARE PROVIDED "AS IS" AND "WITH ALL FAULTS." TI DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING SUCH ITEMS, INCLUDING BUT NOT LIMITED TO ANY EPIDEMIC FAILURE WARRANTY OR IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF ANY THIRD PARTY PATENTS, COPYRIGHTS, TRADE SECRETS OR OTHER INTELLECTUAL PROPERTY RIGHTS.

6.2 EXCEPT FOR THE LIMITED RIGHT TO USE THE EVM SET FORTH HEREIN, NOTHING IN THESE TERMS SHALL BE CONSTRUED AS GRANTING OR CONFERRING ANY RIGHTS BY LICENSE, PATENT, OR ANY OTHER INDUSTRIAL OR INTELLECTUAL PROPERTY RIGHT OF TI, ITS SUPPLIERS/LICENSORS OR ANY OTHER THIRD PARTY, TO USE THE EVM IN ANY FINISHED END-USER OR READY-TO-USE FINAL PRODUCT, OR FOR ANY INVENTION, DISCOVERY OR IMPROVEMENT, REGARDLESS OF WHEN MADE, CONCEIVED OR ACQUIRED.

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8. *Limitations on Damages and Liability:*

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   8.2 *Specific Limitations.* IN NO EVENT SHALL TI'S AGGREGATE LIABILITY FROM ANY USE OF AN EVM PROVIDED HEREUNDER, INCLUDING FROM ANY WARRANTY, INDEMITY OR OTHER OBLIGATION ARISING OUT OF OR IN CONNECTION WITH THESE TERMS, , EXCEED THE TOTAL AMOUNT PAID TO TI BY USER FOR THE PARTICULAR EVM(S) AT ISSUE DURING THE PRIOR TWELVE (12) MONTHS WITH RESPECT TO WHICH LOSSES OR DAMAGES ARE CLAIMED. THE EXISTENCE OF MORE THAN ONE CLAIM SHALL NOT ENLARGE OR EXTEND THIS LIMIT.

9. *Return Policy.* Except as otherwise provided, TI does not offer any refunds, returns, or exchanges. Furthermore, no return of EVM(s) will be accepted if the package has been opened and no return of the EVM(s) will be accepted if they are damaged or otherwise not in a resalable condition. If User feels it has been incorrectly charged for the EVM(s) it ordered or that delivery violates the applicable order, User should contact TI. All refunds will be made in full within thirty (30) working days from the return of the components(s), excluding any postage or packaging costs.

10. *Governing Law:* These terms and conditions shall be governed by and interpreted in accordance with the laws of the State of Texas, without reference to conflict-of-laws principles. User agrees that non-exclusive jurisdiction for any dispute arising out of or relating to these terms and conditions lies within courts located in the State of Texas and consents to venue in Dallas County, Texas. Notwithstanding the foregoing, any judgment may be enforced in any United States or foreign court, and TI may seek injunctive relief in any United States or foreign court.

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