EVAL-DCLINK-DPT

Evaluation board description and getting started guide

About this document

Scope and purpose

This user guide is intended to introduce and provide an overview of the double pulse capacitor evaluation board EVAL-DCLINK-DPT including the safety discharge functionality.

The EVAL-DCLINK-DPT board is designed with EiceDRIVER™ gate driver IC and CoolSiC™ 1200 V MOSFET in the TO263-7 package, to provide “of-the-shelf” decoupling capacitance for double pulse testing and enable easy evaluation of Infineon discrete power transistors and gate drivers. This board is designed to work with the modular evaluation platform from Infineon.

This user guide presents only key features of the EVAL-DCLINK-DPT evaluation board.

Intended audience

This document is intended for all technical specialists who want to evaluate the functionality, performance, and features of Infineon power semiconductors and gate drivers. The evaluation board is intended to be used under laboratory conditions only by trained specialists.

Evaluation Board

This board is to be used during the design-in process for evaluating and measuring characteristic curves, and for checking datasheet specifications.

Note: *PCB and auxiliary circuits are NOT optimized for final customer design.*

Note: *While the board comes with a high voltage indicating LED, this function should only be used as an indication and should not be relied on for assessing the presence of dangerous voltages on the board. Proper high voltage safety measures shall still be followed when working*

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Safety precautions

Note: *Please note the following warnings regarding the hazards associated with development systems.*

Table 1 Safety precautions

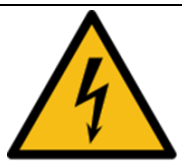	**Warning:** *The DC link potential of this board is up to 900 VDC. When measuring voltage waveforms by oscilloscope, high voltage differential probes must be used. Failure to do so may result in personal injury or death.*
	**Warning***: The evaluation board contains DC bus capacitors which take time to discharge after removal of the main supply. Before working on the drive system, wait five minutes for capacitors to discharge to safe voltage levels. Failure to do so may result in personal injury or death. Darkened display LEDs are not an indication that capacitors have discharged to safe voltage levels.*
	**Warning:** *Remove or disconnect power from the drive before you disconnect or reconnect wires, or perform maintenance work. Wait five minutes after removing power to discharge the bus capacitors. Do not attempt to service the drive until the bus capacitors have discharged to zero. Failure to do so may result in personal injury or death.*
	**Caution:** *Only personnel familiar with the drive, power electronics and associated machinery should plan, install, commission and subsequently service the system. Failure to comply may result in personal injury and/or equipment damage.*
	**Caution:** *The evaluation board contains parts and assemblies sensitive to electrostatic discharge (ESD). Electrostatic control precautions are required when installing, testing, servicing or repairing the assembly. Component damage may result if ESD control procedures are not followed. If you are not familiar with electrostatic control procedures, refer to the applicable ESD protection handbooks and guidelines.*
	**Caution:** *A drive that is incorrectly applied or installed can lead to component damage or reduction in product lifetime. Wiring or application errors such as undersizing the motor, supplying an incorrect or inadequate AC supply, or excessive ambient temperatures may result in system malfunction.*
	**Caution:** *The evaluation board is shipped with packing materials that need to be removed prior to installation. Failure to remove all packing materials that are unnecessary for system installation may result in overheating or abnormal operating conditions.*

Table of contents

1 The board at a glance

The EVAL-DCLINK-DPT evaluation board is designed to be used in combination with other board from modular evaluation boards, to evaluate Infineon power transistors, such as: CoolSiC™ 1200 V SiC Trench MOSFETs, together with EiceDRIVER™ gate driver ICs in a half -bridge configuration. For more information please visit modular evaluation platform webpage.

The evaluation board is shown in Figure 1.

The board has a size of 220 × 120 × 50 mm^3. As the board was designed for non-continuous evaluation, such as double-pulse testing, special consideration should be taken regarding the current capabilities of the power tracks and to ensure proper cooling.

The board is designed in a way that after DC power supply disconnect, auxiliary circuitry will discharge energy from the capacitors.

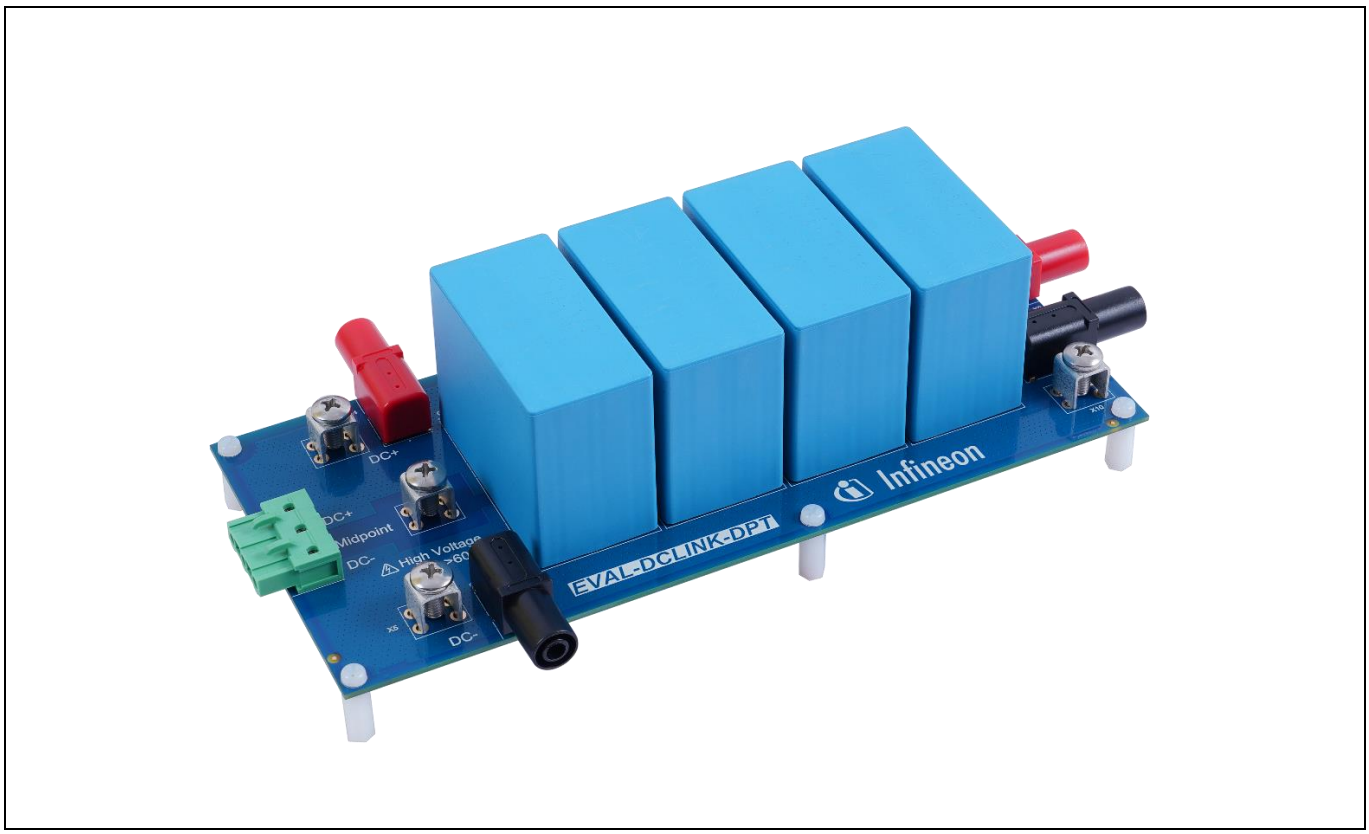

Figure 1 EVAL-DCLINK-DPT evaluation board

1.1 Scope of supply

The delivery contains:

- The evaluation board EVAL-DCLINK-DPT.

1.2 Block diagram

Figure 2 shows the block diagram of the EVAL-DCLINK-DPT evaluation board.

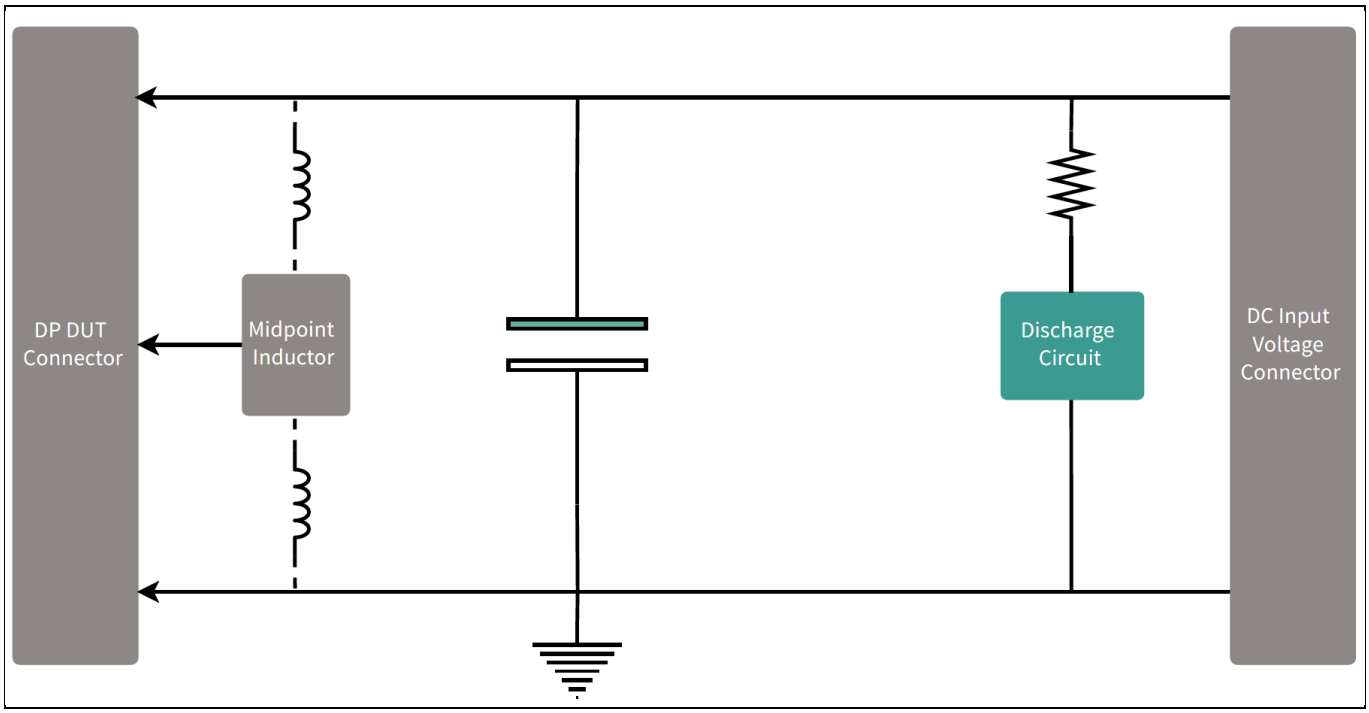

Figure 2 EVAL-DCLINK-DPT evaluation board block diagram

1.3 Main features

The EVAL-DCLINK-DPT is an evaluation board designed to interface different double pulse boards and provide a DC-link voltage up to 800 V across DC+ and DC- terminals. The board is designed for easy measurement and exchange of the DUT boards. The main features of the board include:

- Withstands bus voltage up to 800V
- Active Discharge Circuit
- Visual Safety Indication
- Interconnection with different gate driver and package boards
- Breakout connections for load inductor

2 System and functional description

2.1 Getting started

The EVAL-DCLINK-DPT is optimized to be used with 800 V voltage for the input supply side. The board also has a discharge circuit that dissipated energy from the capacitor bank.

It is recommended to use the board with the regulated DC laboratory supply.

2.1.1 Power-up sequence with external supply voltages

1. Connect the EVAL-DCLINK-DPT board with a double pulse DUT board, such as Eval-1ED3142MC12H-SiC or Eval-1ED3144MC12H-QDPAK or any other board from the modular evaluation platform, via X1 connector as shown in Figure 3.
2. Connect one end of the inductive load to terminal X2 and the other end, depending on the double-pulse test requirements, to either X3 / X4 (DC+) for the low-side testing or X5 / X6 (DC-) for the high-side testing.
3. Connect the positive terminal of the laboratory DC power supply to the X8 / X9 terminal and negative terminal of the DC power supply to the X10 / X11 terminal.
4. Set desired voltage (800 V max) on the DC power supply and turn on the power supply.
5. After turning on the power supply, charging of the EVAL-DCLINK-DPT will start and the red LED will turn on when the voltage rises above 60 V.
6. When the evaluation is over, turn off DC power supply. Discharging sequence will start and LED will turn off when the voltage falls below 60 V. Figure 4 shows the LED status a) when it's safe to handle the board without danger and b) when the capacitors are charged and high voltage is present.

Note: Should the EVAL-DCLINK-DPT be used with an additional external discharge circuit, the discharge functionality must be EVAL-DCLINK-DPT disabled. Close J1 to disable active discharge circuit.

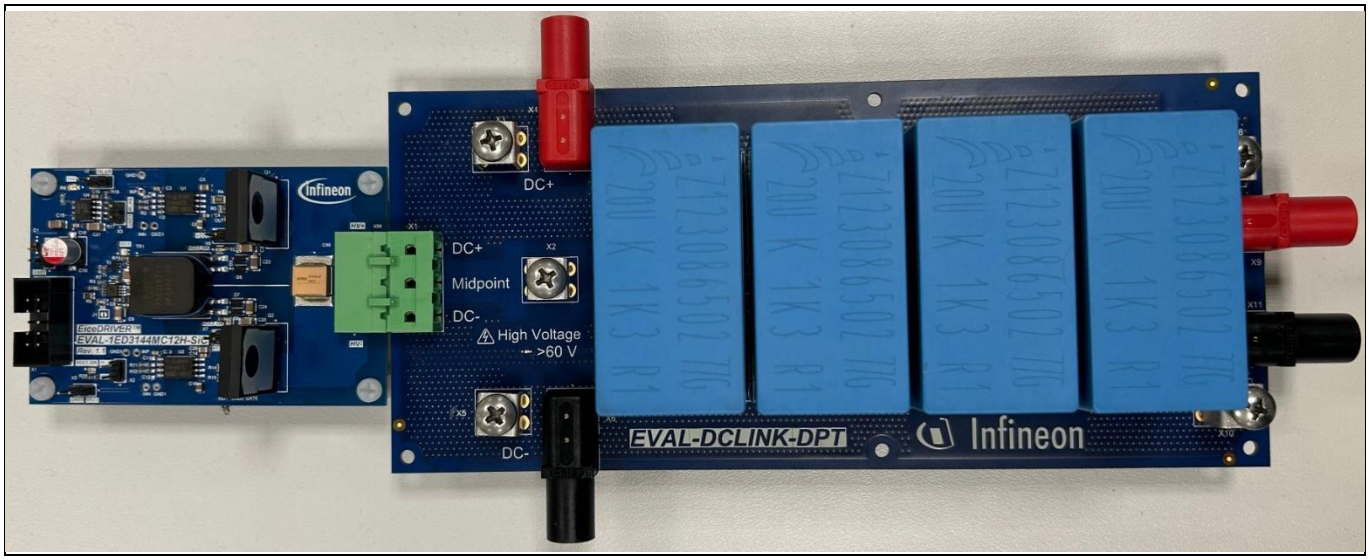

Figure 3 EVAL-DCLINK-DPT connection with double pulse DUT board EVAL-1ED3144MC12H-SIC

a) b)

Figure 4 LED status a) safe to handle and b) DANGER High Voltage present

3 System design

The EVAL-DCLINK-DPT evaluation board is designed as an accessory for the modular evaluation platform from Infineon Technologies. It is designed to interface with double pulse boards, from the same platform, featuring different gate driver ICs and CoolSiC™ MOSFETs in various packages. For debugging and circuit understanding, the schematics, Gerber data and Altium project files can be found on the evaluation board homepage.

3.1 Schematics

The schematics of the evaluation board is shown below.

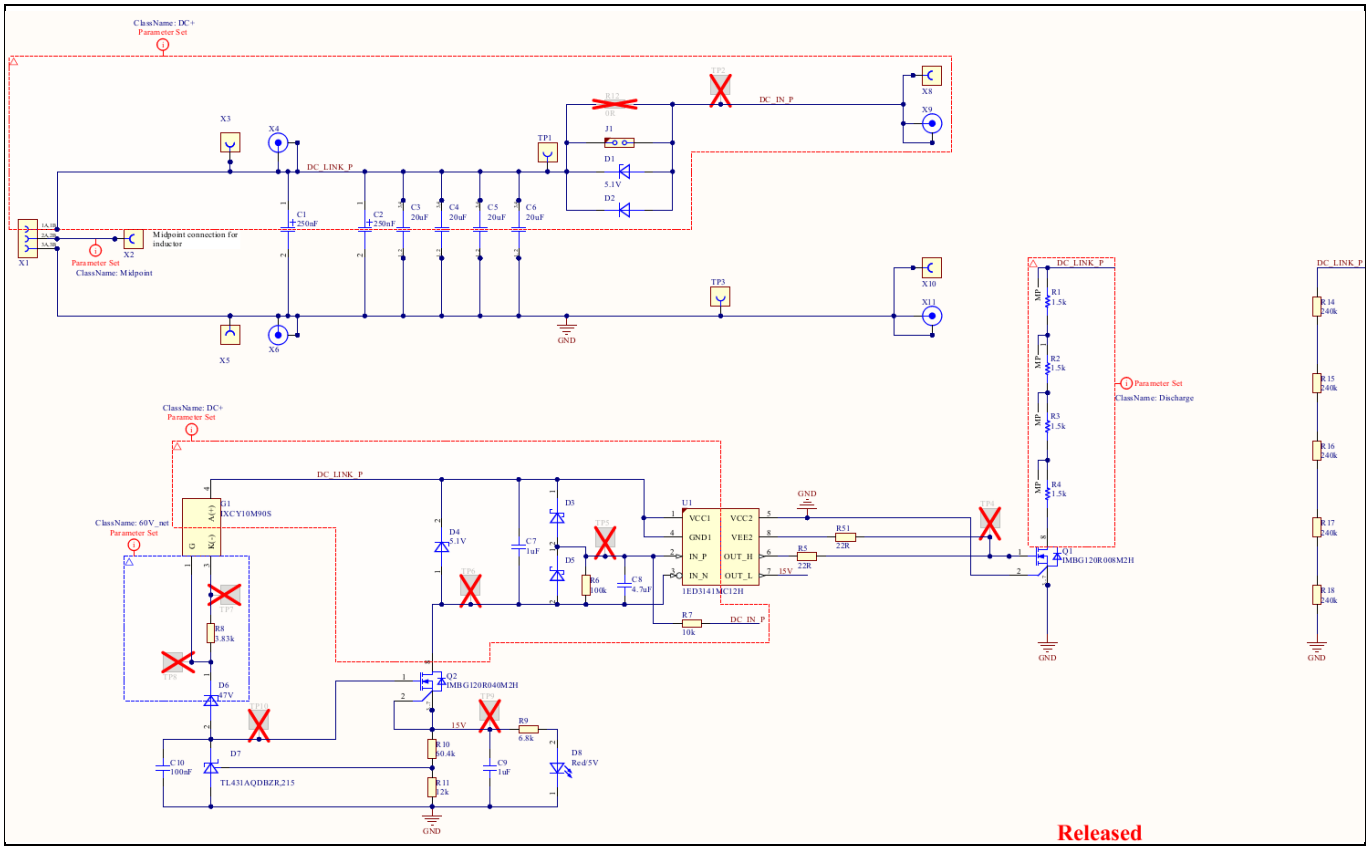

Figure 5 Circuit schematic

3.2 Layout

The evaluation board EVAL-DCLINK-DPT uses a four-layer PCB with 70 µm copper thickness. The top and the bottom view of the PCB layout as well as the copper layers of the PCB are shown in the Figures, 6 to 11.

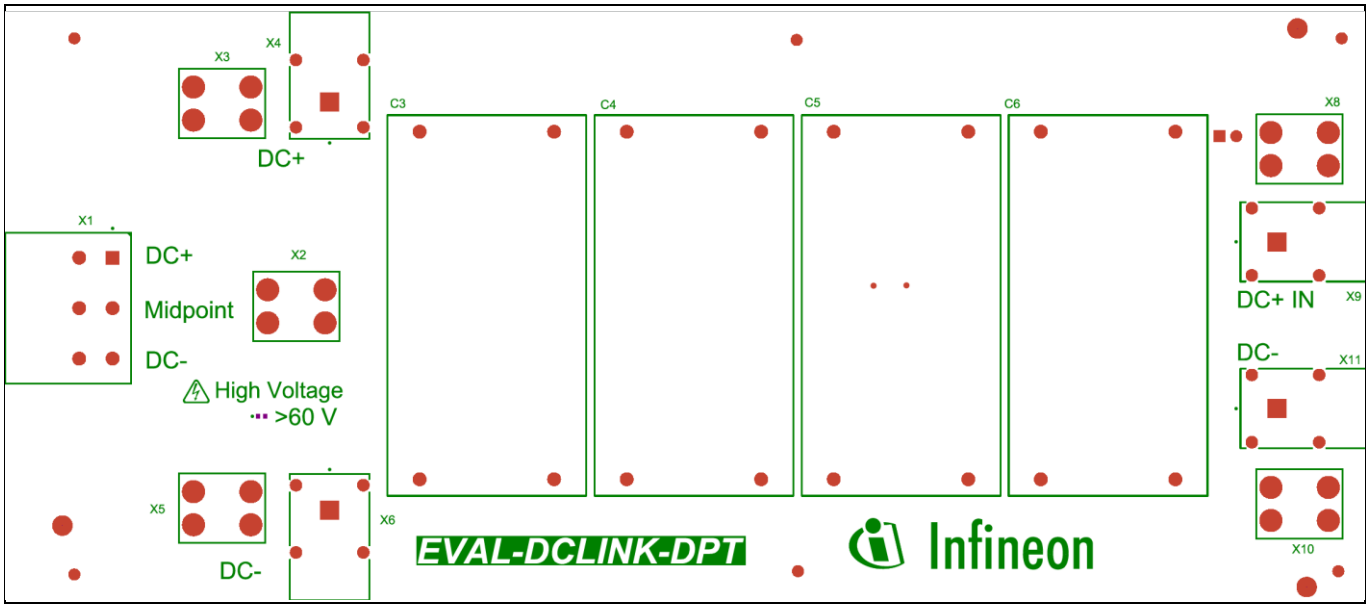

Figure 6 PCB top side

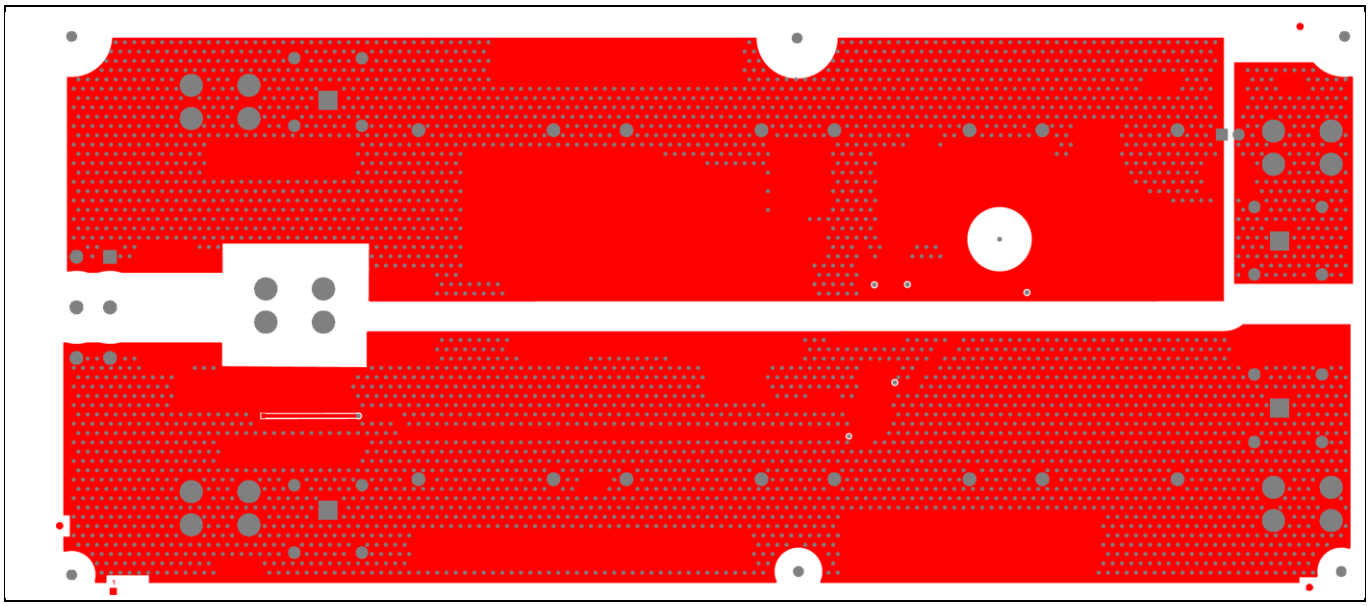

Figure 7 PCB top copper layer

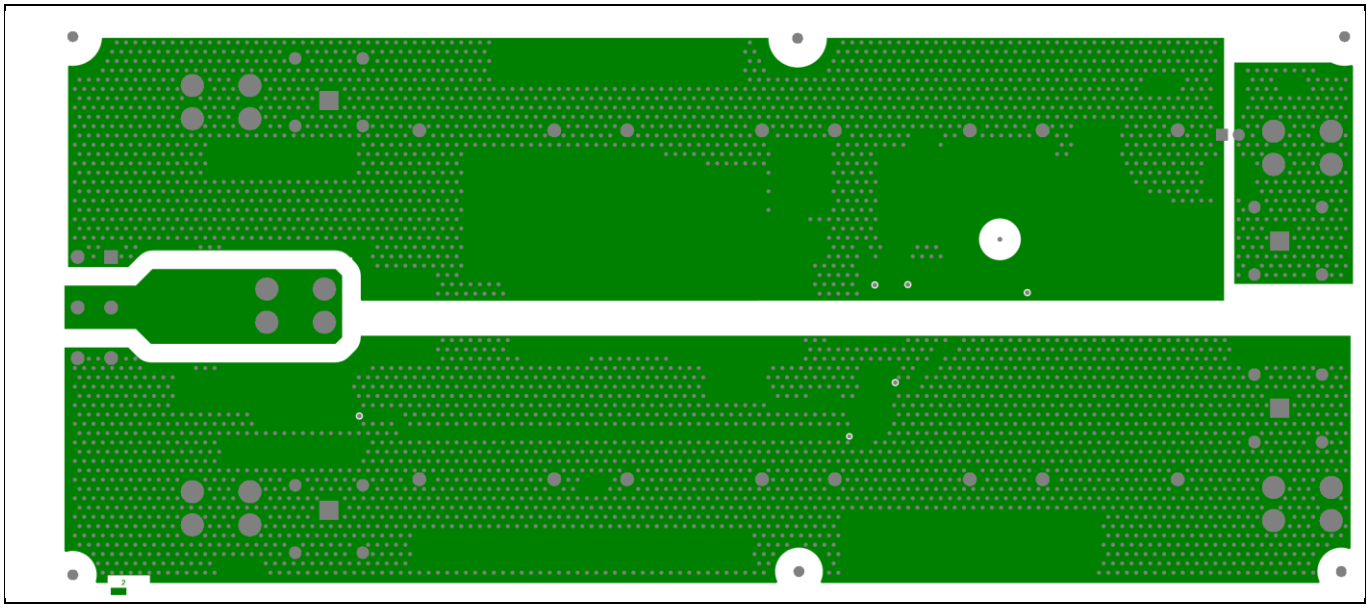

Figure 8 PCB bottom copper layer

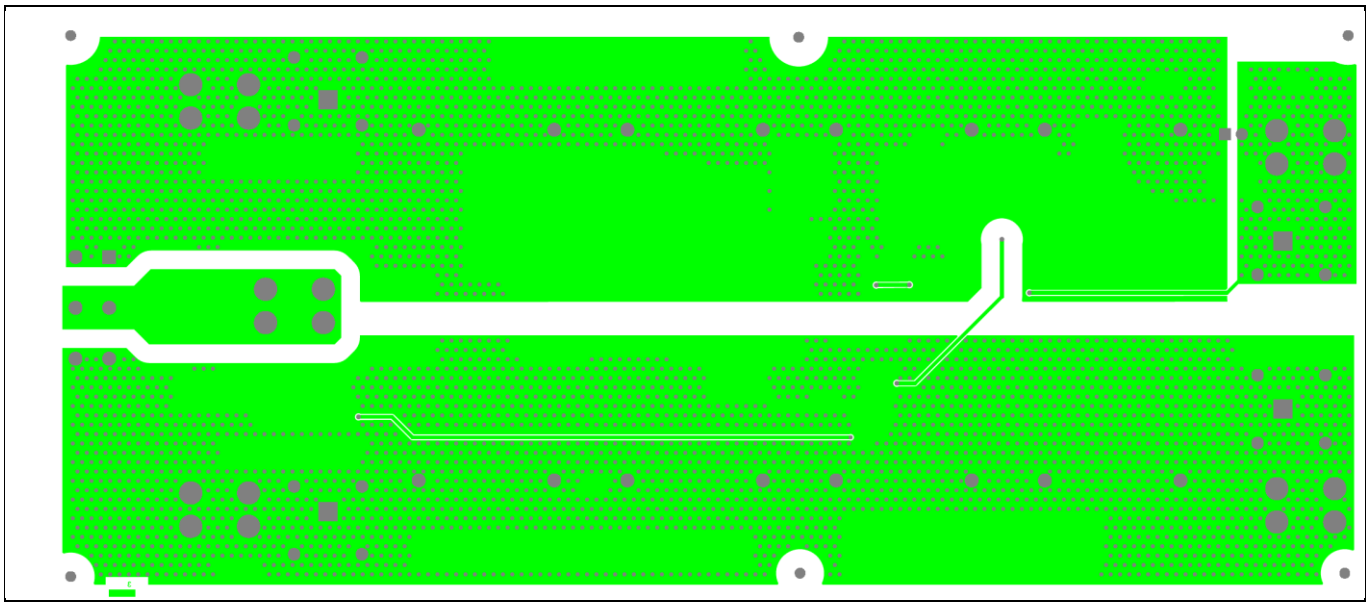

Figure 9 PCB bottom side

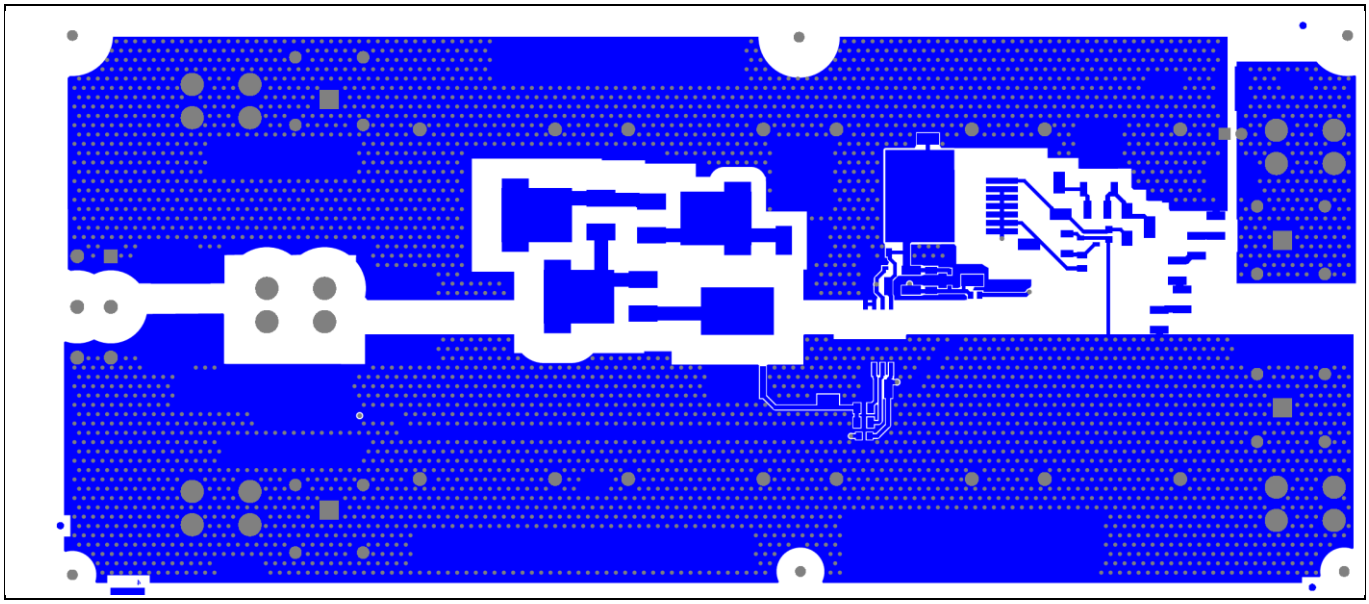

Figure 10 PCB bottom side

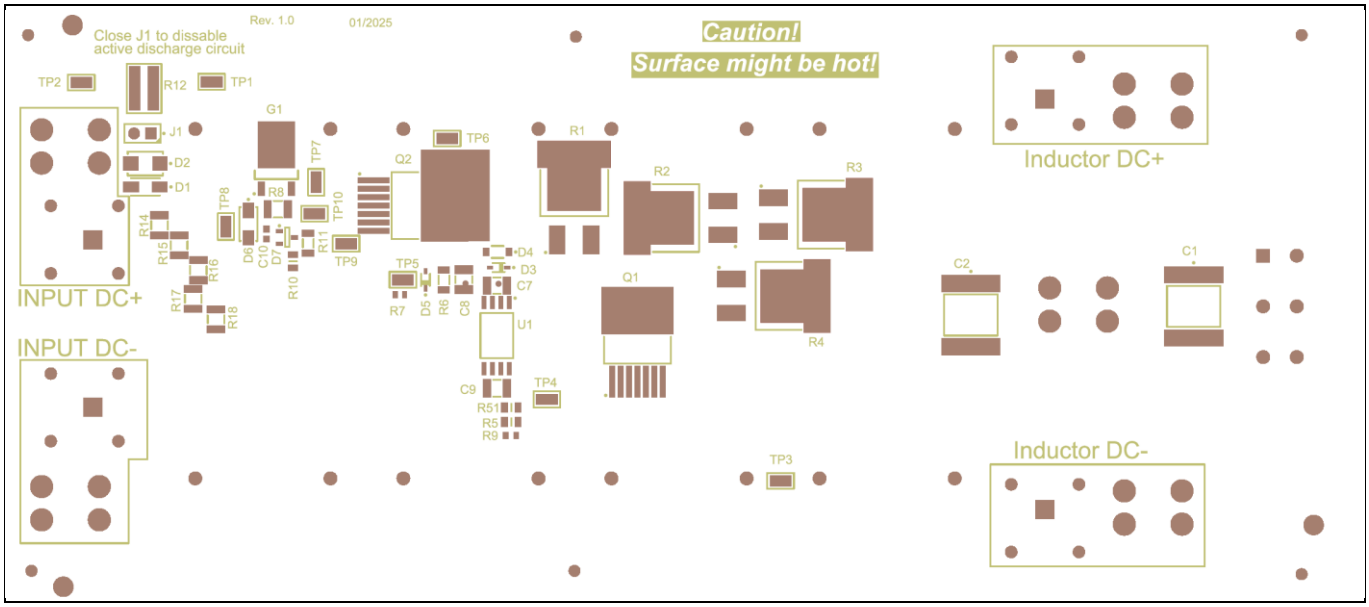

Figure 11 PCB bottom side

3.3 Bill of material

The complete bill of material is available on the download section of the evaluation board homepage.

Table 2 Bill of materials

Designator	Quantity	Manufacturer	Value	Supplier Part Number
C1, C2	2	TDK Corporation	250nF	871-B58031I9254M062
C3, C4, C5, C6	4	Epcos	20uF	871-B32778G1206K000
C7, C9	2	Kemet	1uF	80-C1210C105K5N
C8	1	Kemet	4.7uF	80-C1210C475M5R
C10	1	Wurth Elektronik	10nF	GRM188R72A103KA01
D1	1	ON Semiconductor	5.1V	863-1SMA5918BT3G
D2	1	STMicroelectronics	1.2kV	511-STTH212U
D3, D5	2	Infineon Technologies	40V	726-BAT165E6327HTSA1
D4	1	Vishay	5.1V	78-BZD27C5V1P-HE3-08
D6	1	Vishay	47V	78-SML4756AHE3_A/H
D7	1	Nexperia	TL431AQDBZR,215	771-TL431AQDBZR215
D8	1	Wurth Elektronik	Red/5V	710-150040RS73240
G1	1	IXYS Integrated Circuits Divison	IXCY10M90S	747-IXCY10M90S
J1	1	Samtec	TSW-102-08-G-S	TSW-102-08-G-S
Q1	1	Infineon Technologies	IMBG120R008M2H	726-IMBG120R008M2HXT
Q2	1	Infineon Technologies	IMBG120R040M2H	726-IMBG120R040M2HXT
R1, R2, R3, R4	4	Bourns	1.5k	652-PWR263S-35-1501F
R5, R51	2	Vishay	22R	CRCW080522R0FK
R6	1	Yageo	100k	603-AC1206JR-07100KL
R7	1	Vishay	10k	71-CRCW0603-10K-E3
R8	1	Vishay	3.3k	CRCW12103K30FK
R9	1	Yageo	6.8k	603-RC0603FR-076K8L
R10	1	Vishay	60.4k	CRCW12103K83FK
R11	1	Vishay	12k	CRCW120612K0FK
R14, R15, R16, R17, R18	5	Vishay	240k	CRCW1210240KFK
TP1, TP3	2	KOA Speer Electronics Inc.	RCWCTE	660-RCWCTE
U1	1	Infineon Technologies	1ED3142MC12H	1ED3142MC12HXUMA
X1	1	Phoenix Contact	1828689	651-1828689
X2, X3, X5, X8, X10	5	Keystone Electronics Corp.	8174	534-8174
X4, X9	2	Cliff ELectronics Component Linited	FCR7350R	FCR7350R

3.4 Connector details

General information about the connectors of the EVAL-DCLINK-DPT evaluation board is provided in this section.

Table 3 give details about the connections.

Table 3 High-voltage connectors

Connector / Pin	Symbol	Function
X1 (1)	DC+	Half-bridge DC+ connection
X1 (2)	Midpoint	Half-bridge midpoint connection
X1 (3)	DC-	Half-bridge DC- connection
X2	Midpoint	Inductor midpoint connection
X3	DC+	Half-bridge DC+ connection
X4	DC+	Half-bridge DC+ connection
X5	DC-	Half-bridge DC- connection
X6	DC-	Half-bridge DC- connection
X8	DC+ IN	Power supply DC+ connection
X9	DC+ IN	Power supply DC+ connection
X10	DC- IN	Power supply DC- connection
X11	DC- IN	Power supply DC- connection

3.5 Test points

The test points used on the board are summarized in the table below.

Table 4 Test points

Test point	Symbol	Signal measured	Ground reference for test point
TP1	DC_LINK_P	DC link positive	GND
TP2	DC_IN_P	DC input positive	GND
TP3	GND	Ground	-
TP4	OUTL	Discharge MOSFET gate driver out	GND
TP5	IN_N	Discharge MOSFET gate driver IN_N	GND
TP6	GND1	Ground	-
TP7	G1 K(-)	G1 cathode	GND
TP8	G1 G	G1 gate	GND
TP9	15V	15V	GND
TP10	Q2 G	Bias MOSFET gate	GND

4 References and appendices

4.1 References

[1] EVAL-1ED3144MC12H-SIC webpage

[2] 1ED3142MC12H webpage

[3] IMBG120R008M2H webpage

Revision history

Document version	Date	Description of changes
V1.0	2025-04-30	Initial release

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