Eval-1ED3321MC12N

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 gate driver evaluation board Eval-1ED3321MC12N with the 1ED3321MC12N gate driver ICs, including the functionality, adjustment possibilities and key features of the Infineon EiceDRIVER™ 1ED3321MC12N gate driver IC family.

The Eval-1ED3321MC12N board is designed to evaluate the functionalities and capabilities of 1ED3321MC12N gate driver ICs.

This user guide presents only selected key features of the gate driver, and the datasheet should be consulted to ensure the full functionality and flexibility of the 1ED3321MC12N gate driver and Eval-1ED3321MC12N.

Intended audience

This document is intended for all technical specialists who want to evaluate the functionality, performance and features of 1ED3321MC12N gate driver ICs. The evaluation board is intended to be used under laboratory conditions only by trained specialists.

It is a prerequisite to read the datasheet of the 1ED3321MC12N to become familiar with the parameters of the gate driver.

It is highly recommended to have an EiceDRIVER™ Eval-PSIR2085 power supply board to provide an isolated power supply to the Eval-1ED3321MC12N evaluation board from a single power supply rail.

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.

Important notice

“Evaluation Boards and Reference Boards” shall mean products embedded on a printed circuit board (PCB) for demonstration and/or evaluation purposes, which include, without limitation, demonstration, reference and evaluation boards, kits and design (collectively referred to as “Reference Board”).

Environmental conditions have been considered in the design of the Evaluation Boards and Reference Boards provided by Infineon Technologies. The design of the Evaluation Boards and Reference Boards has been tested by Infineon Technologies only as described in this document. The design is not qualified in terms of safety requirements, manufacturing and operation over the entire operating temperature range or lifetime.

The Evaluation Boards and Reference Boards provided by Infineon Technologies are subject to functional testing only under typical load conditions. Evaluation Boards and Reference Boards are not subject to the same procedures as regular products regarding returned material analysis (RMA), process change notification (PCN) and product discontinuation (PD).

Evaluation Boards and Reference Boards are not commercialized products, and are solely intended for evaluation and testing purposes. In particular, they shall not be used for reliability testing or production. The Evaluation Boards and Reference Boards may therefore not comply with CE or similar standards (including but not limited to the EMC Directive 2004/EC/108 and the EMC Act) and may not fulfill other requirements of the country in which they are operated by the customer. The customer shall ensure that all Evaluation Boards and Reference Boards will be handled in a way which is compliant with the relevant requirements and standards of the country in which they are operated.

The Evaluation Boards and Reference Boards as well as the information provided in this document are addressed only to qualified and skilled technical staff, for laboratory usage, and shall be used and managed according to the terms and conditions set forth in this document and in other related documentation supplied with the respective Evaluation Board or Reference Board.

It is the responsibility of the customer’s technical departments to evaluate the suitability of the Evaluation Boards and Reference Boards for the intended application, and to evaluate the completeness and correctness of the information provided in this document with respect to such application.

The customer is obliged to ensure that the use of the Evaluation Boards and Reference Boards does not cause any harm to persons or third party property.
The Evaluation Boards and Reference Boards and any information in this document is provided "as is" and Infineon Technologies disclaims any warranties, express or implied, including but not limited to warranties of non-infringement of third party rights and implied warranties of fitness for any purpose, or for merchantability.

Infineon Technologies shall not be responsible for any damages resulting from the use of the Evaluation Boards and Reference Boards and/or from any information provided in this document. The customer is obliged to defend, indemnify and hold Infineon Technologies harmless from and against any claims or damages arising out of or resulting from any use thereof.

Infineon Technologies reserves the right to modify this document and/or any information provided herein at any time without further notice.

Safety precautions

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

Table 1 Safety precautions

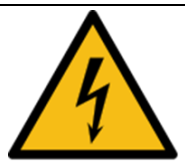	**Warning:** *The DC link potential of this board is up to 900 VDC. When measuring voltage waveforms by oscilloscope, high voltage differential probes must be used. Failure to do so may result in personal injury or death.*
	**Warning***: The evaluation or reference board contains DC bus capacitors which 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 or reference 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.*

Table of contents

1 The board at a glance

The Eval-1ED3321MC12N evaluation board was designed to be used by design engineers to evaluate the 1ED3321MC12N EiceDRIVER™ isolated gate driver IC in a half-bridge configuration. The evaluation board can be used to evaluate other ICs from the EiceDRIVER™ 1ED332xMC12N family by swapping the two gate driver ICs.

The board comes with two Infineon TRENCHSTOP™ IGBT4 IKW40N120H3 power transistors, as seen in Figure 1. The switches can be substitutedby any other desired switches, such as Infineon IGBTs, CoolSiC™ or CoolMOS™ transistors.

Details about the EiceDRIVER™ 1ED3321MC12N can be found on our product pages at *https://www.infineon.com/gdisolated* or by using the product search.

The board has a size of 85 × 55 × 28 mm^3 without any power switches assembled. As the board was designed for non-continuous evaluation, such as double-pulse testing, special consideration should be taken regarding the power track's current capabilities and to ensure proper cooling of the power switches. It is also recommended to add additional high-voltage decoupling capacitors at the high-voltage input.

The board is designed to be be supplied using an EiceDRIVER™ Eval-PSIR2085 power supply board, which offers 2 galvanically isolated power rails for the switch side of the gate driver ICs and a supply rail for the primary side of the gate driver ICs. **It is highly recommended to include an EiceDRIVER™ Eval-PSIR2085 in your initial order.**

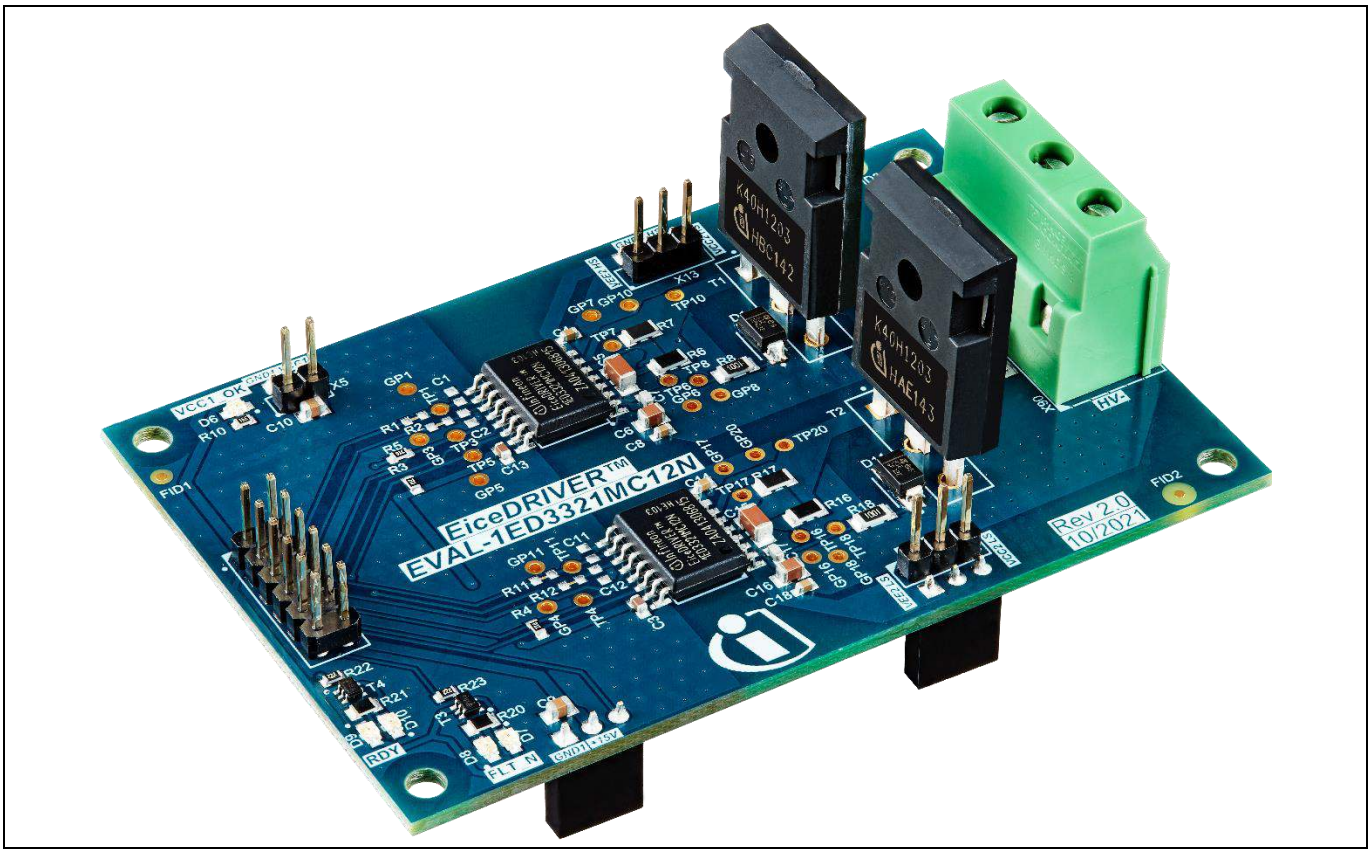

Figure 1 Eval-1ED3321MC12N evaluation board

1.1 Scope of supply

The delivery contains the evaluation board Eval-1ED3321MC12N only.

1.2 Block diagram

Figure 2 shows the block diagram of the Eval-1ED3321MC12N evaluation board.

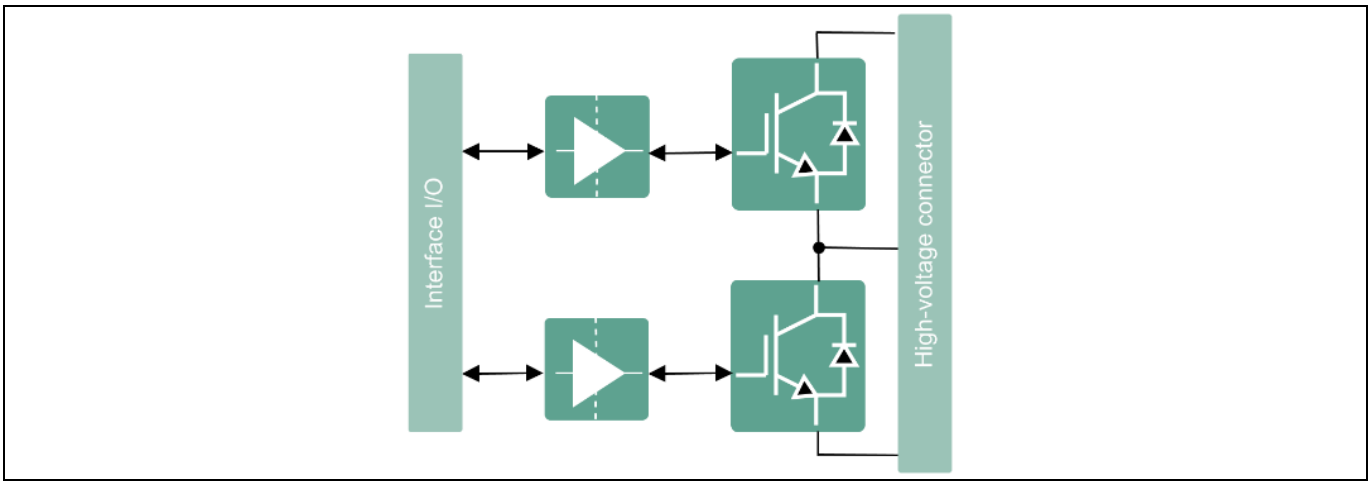

Figure 2 Eval-1ED3321MC12N evaluation board block diagram

1.3 Main features

The Eval-1ED3321MC12N is an evaluation board for the 1ED3321MC12N gate driver ICs. It was designed in a half-bridge configuration with a 900 V maximum blocking capability across the power terminals. The board is designed for easy measurement and configuration of the gate driver parameters, and the main features of the board and gate driver include:

- 40 V absolute maximum output supply voltage
- Up to +6 A / -8.5 A typical output current
- Separate source and sink output for optimized gate driving
- DESAT short-circuit protection
- Soft-off turn-off option
- Active Miller clamp function
- Active shutdown
- High common-mode transient immunity CMTI > 300 kV/µs
- 85 ns typical propagation delay
- Tight IC-to-IC propagation delay matching
- 3.3 V and 5 V input supply voltage
- DSO-16 wide body package with 8 mm creepage
- Gate driver safety certification:
    - UL 1577 recognized with $V_{ISO,test}$ = 6840 V (rms) for 1 s, V_{ISO} = 5700 V (rms) for 60 s
    - IEC 60747-17/VDE 0884-11 approval (pending) with V_{IORM} = 1.767 kV (peak, reinforced)
- Infineon TRENCHSTOP™ IGBT4 IKW40N120H3 power transistors

1.4 Board parameters and technical data

The absolute maximum ratings are summarized in Table 2.

Table 2 Absolute maximum ratings

Parameter/Pin	Symbol	Conditions/Notes	Value	Unit
Isolated power supply input voltage	+15V	Referenced to SGND. To be used only with Eval-PSIR2085	-0.3 … 20	V
Primary side supply voltage	VCC1	Referenced to SGND	-0.3 … 7	V
Positive input for low side gate driver	INP_L	Referenced to SGND	-0.3 … 7	V
Positive input for high side gate driver	INP_P	Referenced to SGND	-0.3 … 7	V
Ready status output for both gate drivers	RDY	Referenced to SGND	-0.3 … 7	V
Fault output for both gate drivers	FLT_N	Referenced to SGND	-0.3 … 7	V
Reset input for both gate drivers	RST_N	Referenced to SGND	-0.3 … 7	V
Reserved	.res	Reserved for future use		
DC-link voltage	HV+	Referenced to GND power terminal. Limited by component ratings and design clearances. For voltages above 42 V, special safety measures should be taken	-0.2 … 900	V
Secondary side positive supply voltages	VCC2H/ VCC2L	Referenced to VEE2H/VEE2L. Not to be used with Eval-PSIR2085	-0.3 … 40	V
Secondary side negative supply voltages	VEE2H/ VEE2L	Referenced to GND2H/GND2L. Not to be used with Eval-PSIR2085	-40 … 0.3	V
Phase peak current	I_{out}		30	A
	t_{pulse}	Maximum ON pulse length for double-pulse tests. Power dissipation should be considered	100	µs
	f_{sw}	Maximum switching frequency for continuous operation. Power dissipation should be considered	100	kHz

The recommended operating conditions are summarized in Table 3.

Table 3 Recommended operating conditions and supply for 3.3 V

Parameter/Pin	Symbol	Conditions/Notes	Value			Unit
			Min.	Typ.	Max	
Isolated power supply input voltage	+15V	Referenced to SGND. To be used only with Eval-PSIR2085	15	15.5	16	V
Primary side supply voltage	VCC1	Referenced to SGND	3.2	3.3	3.5	V
Positive input for low side gate driver	INP_L	Referenced to SGND	-0.1	*VCC1*	*VCC1*+0.1	V
Positive input for high side gate driver	INP_P	Referenced to SGND	-0.1	*VCC1*	*VCC1*+0.1	V
Ready status output for	RDY	Referenced to SGND	-0.1	*VCC1*	*VCC1*+0.1	V

Parameter/Pin	Symbol	Conditions/Notes	Value			Unit
			Min.	Typ.	Max	
both gate drivers						
Fault output for both gate drivers	FLT_N	Referenced to SGND	-0.1	*VCC1*	*VCC1*+0.1	V
Reset input for both gate drivers	RST_N	Referenced to SGND	-0.1	*VCC1*	*VCC1*+0.1	V
Reserved	.res	Reserved for future use	-	-	-	-
DC-link voltage	HV+	Referenced to GND power terminal. Limited by component ratings and design clearances. For voltages above 42 V, special safety measures should be taken	25	-	800	V
Secondary side positive supply voltages	VCC2H/ VCC2L	Referenced to VEE2H/VEE2L. Not to be used with Eval-PSIR2085	12	17	20	V
Secondary side ground reference supply voltages	GND2H/ GND2L	Referenced to VEE2H/VEE2L. Not to be used with Eval-PSIR2085	0	7.5	15	V

2 System and functional description

2.1 Getting started

The Eval-1ED3321MC12N is optimized to be used with both 5 V and 3.3 V VCC1 primary side supply voltage. The threshold values for the primary-side input signals are always proportional to the VCC1 supply voltage.

It is recommended to use the board with the EiceDRIVER™ Eval-PSIR2085 isolated power supply board. For a nominal input voltage, +15V, of 15.5 V, the EiceDRIVER™ Eval-PSIR2085 isolated power supply will provide a bipolar +15 V/-7.5 V supply voltage for the secondary sides for both high-side and low-side gate drivers.

Note: In case separate power supplies will be used for the secondary side, EiceDRIVER™ Eval-PSIR2085 does not have to be connected, and the board can be supplied using connector X5 for the primary-side supply voltage, VCC1, and connectors X3 and X13 for the secondary-sides power voltages: VCC2H/VCC2L, GND2H/GND2L, VEE2H/VEE2L.

2.1.1 Prerequisites

- EiceDRIVER™ Eval-PSIR2085 isolated power supply board
- Assembled external high-voltage decoupling capacitor (100 µF) across the high-voltage power terminals: X90-1 (HV+) and X90-3 (HV-)
- Low-voltage power supply for supplying primary-side power supply circuit, capable of supplying 15 V, 100 mA (+15V, SGND)
- Suitable function generator for double-pulse pattern generation
- High-voltage power supply for supplying the power stage between X90-1 (HV+) and X90-3 (HV-)
- A suitable inductive load for double-pulse testing

2.1.2 Power-up sequence

Note: It is assumed that the board will be used with the EiceDRIVER™ Eval-PSIR2085 isolated power supply board.

1. Connect Eval-1ED3321MC12N to the EiceDRIVER™ Eval-PSIR2085 isolated power supply board.
2. Connect the double-pulse pattern generator to the Eval-1ED3321MC12N input pin. For evaluating the low-side switching capability, connect the patter generator to INP_L and SGND and short INP_H to SGND. For evaluation of the high-side switching capability, connect the pattern generator to INP_H and SGND and short INP_L to SGND.
3. Connect one end of the inductive load to terminal X90-2 (PHASE) and the other end, depending on the double-pulse test requirements, to either X90-1 (HV+) for the low side testing or X90-3 (HV-) for the high side testing.
4. Supply the isolated power supply input voltage at connector X1-12 (+15V) and X1-9 (SGND) with +15.5 V and ground.
5. The green LED D6 (VCC1_OK) will turn on to signal the primary-side supply voltage is present.
6. The green LED D10 (RDY) will turn on to signal that the gate driver internal communication is working as expected, that both primary and secondary power supplies are present and above the UVLO levels, and that the gate driver is operating as expected.
7. The green LED D7 (FLT_N) will turn on to signal that the gate driver is not registering any fault.
8. Connect the high-voltage power supply to the connector X90-1 (HV+) and X90-3 (HV-).

The board is now ready for double-pulse evaluation.

2.2 Example: Normal operation

Figure 3 shows the Eval-1ED3321MC12N in a typical double-pulse test of the low side IGBT. The evaluation board was supplied using the EiceDRIVER™ Eval-PSIR2085 isolated power supply board. The IGBTs gates were driven with +15 V and -7.5 V. The board was supplied with 600 V between terminals X90-1 (HV+) and X90-3 (HV-). A 200 µH load inductor was connected in parallel with the high side IGBT, between terminals X90-1 (HV+) and X90-2 (PHASE).

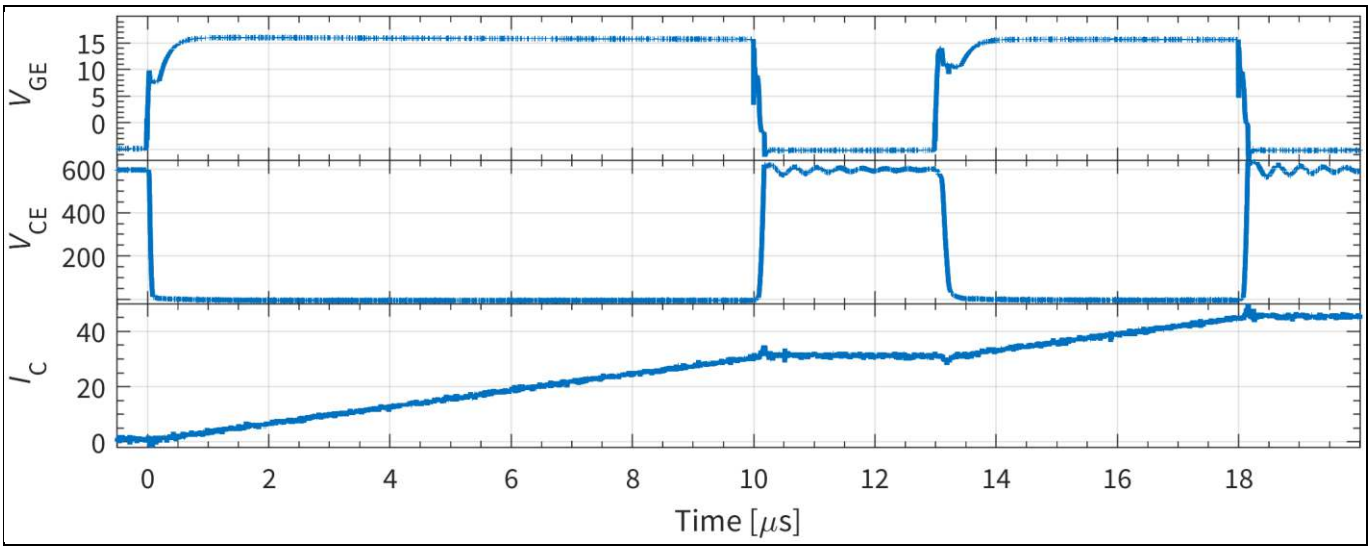

Figure 3 Eval-1ED3321MC12N – Double-pulse test of the low side IGBT with a 200 µH load

2.3 Example: Short-circuit turn-off

Figure 4 shows the Eval-1ED3321MC12N in a type I short-circuit transient. The board was supplied with a 600 V DC-link between terminals X90-1 (HV+) and X90-3 (HV-). A short-circuit was created in parallel to the high side IGBT by placing a jumper between terminal X90-1 (HV+) and X90-2 (PHASE).

As the low side transistor was turned on, it directly went into deasaturation as can be observed in Figure 4. The current increased up to 150 A. After the DESAT leading-edge blanking time elapsed, the internal clamp released the DESAT pin, and the DESAT capacitor started charging. Once the DESAT pin voltage surpassed the desaturation reference level, $V_{DESATth}$, desaturation is detected and the internal circuitry starts to initiate a turn-off.

Because the 1ED3321MC12N isolated gate driver IC has a soft-off function, the gate current is controlled in order to limit the turn-off overshoot on the collector-emitter voltage, V_{CE}.

Afterwards the 1ED3321MC12N gate driver IC will go into fault mode, ignoring further input PWM signals. By design, the FLT pins are connected together on the Eval-1ED3321MC12N, so that in case one of the gate driver ICs detects a fault, it will pull the FLT pin of the other gate driver, effectively disabling operation of both gate drivers until the fault is reset by the microcontroller.

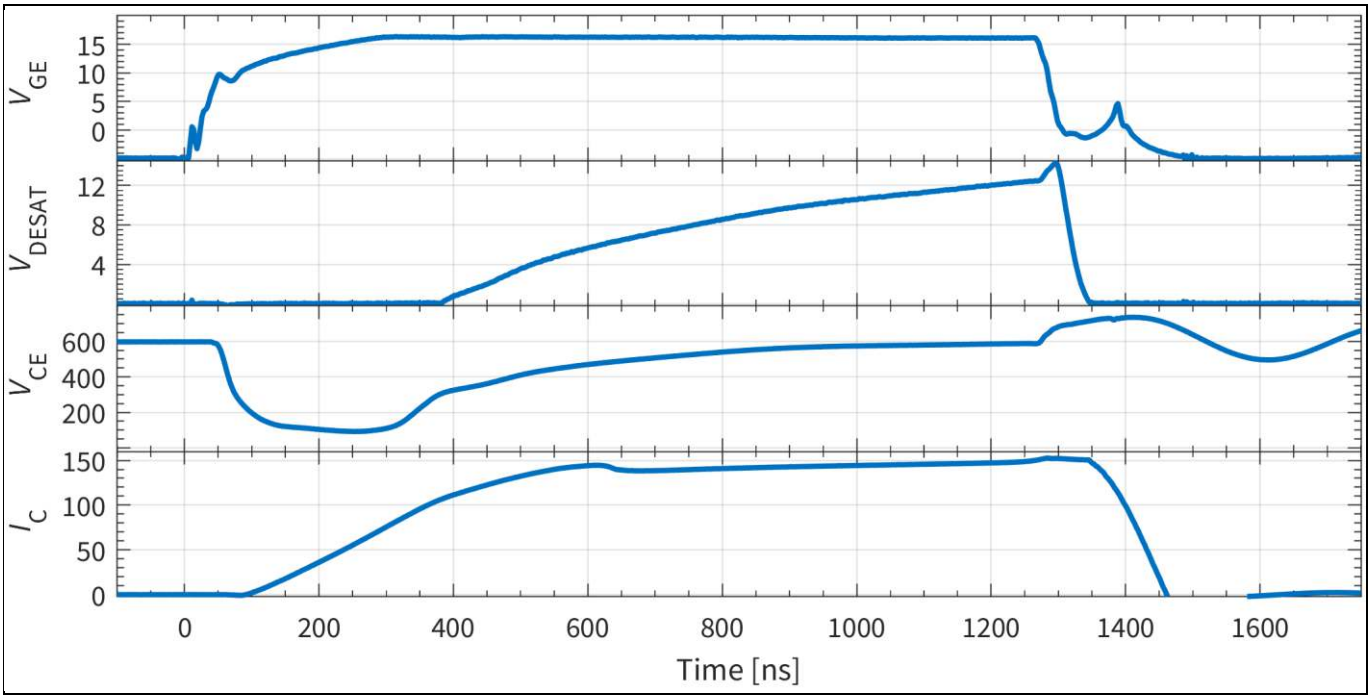

Figure 4 Eval-1ED3321MC12N – Turn-off of Type I short-circuit

2.4 Example: Short-circuit turn-off with CoolSiC™ MOSFETs and default configuration

The Eval-1ED3321MC12N was reconfigured to be used with SiC MOSFETs. The Infineon TRENCHSTOP™ IGBT4 IKW40N120H3 power transistors were desoldered and replaced with Infineon CoolSiC™ IMW120R045M1 MOSFETs. The Eval-PSIR2085 isolated power supply was adjusted, so that the secondary sides of the gate driver ICs were supplied with +15 V/-2 V, in order to correctly drive the gate of the SiC MOSFETs. Similarly, as before, the board DC-link was supplied with 400 V between terminals X90-1 (HV+) and X90-3 (HV-). A short-circuit was created in parallel to the high side CoolSiC™ by placing a jumper between terminal X90-1 (HV+) and X90-2 (PHASE).

Figure 5 shows the low side transistor turning on directly into a type I short-circuit. The transistor goes into saturation with the current rising up to 250 A. Similar to before, when the leading-edge blanking time elapses, the DESAT pin voltage starts increasing, and once it surpasses the desaturation reference level, $V_{DESATth}$, desaturation is detected and the internal circuitry starts to initiate a turn-off.

When the CoolSiC™ turns-off and the current reaches zero in approximately 2.1 µs, the protection is adequate for the CoolSiC™ IMW120R045M1 MOSFET, which is rated for 3 µs short-circuit withstand time capability.

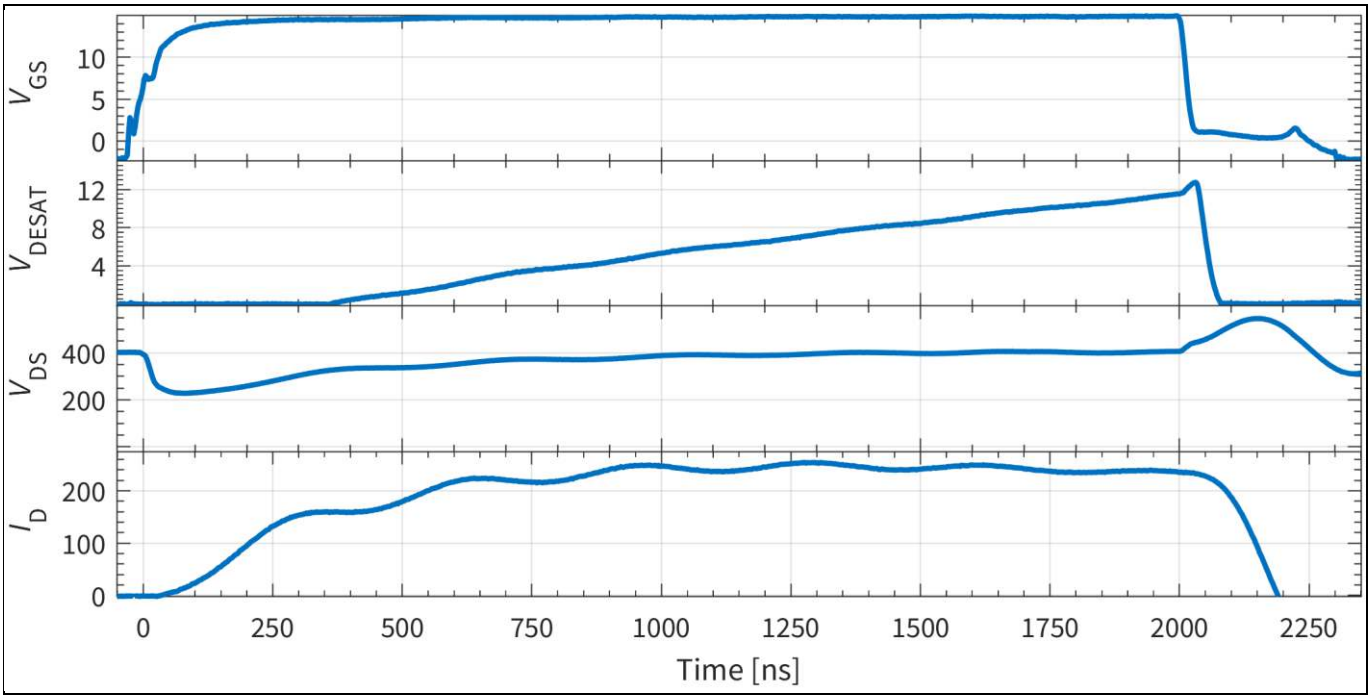

Figure 5 **Eval-1ED3321MC12N – Turn-off of Type I short-circuit with CoolSiC™ and default board configuration**

2.5 Example: Short-circuit turn-off with CoolSiC™ MOSFETs without desaturation capacitor

In the previous example, a 2.2 µs short-circuit protection time was achieved. If the desaturation protection time needs to be faster, the desaturation capacitor can be reduced or completely removed. Here, we must note that there will always be a parasitic capacitance component due to the layout and the parasitics of the other components connected to the DESAT pin of the gate driver.

C7 and C17 are the desaturation capacitors for the high and low side, repsecitvely. By removing them, the DESAT short-circuit protection time is reduced to a minimum allowed by the circuit.

Figure 6 shows the low-side transistor turning on directly into a type I short-circuit. The transistor goes into saturation with the current rising up to 250 A. As previously described, the leading-edge blanking time elapses and the desat pin voltage starts increasing. As there is no desaturation capacitor to be charged, the voltage rises much faster up to the desaturation reference level, $V_{DESATth}$ and the protection mechanism is activated.

In this case, the short circuit is detected and turned off in approximately 1.2 µs.

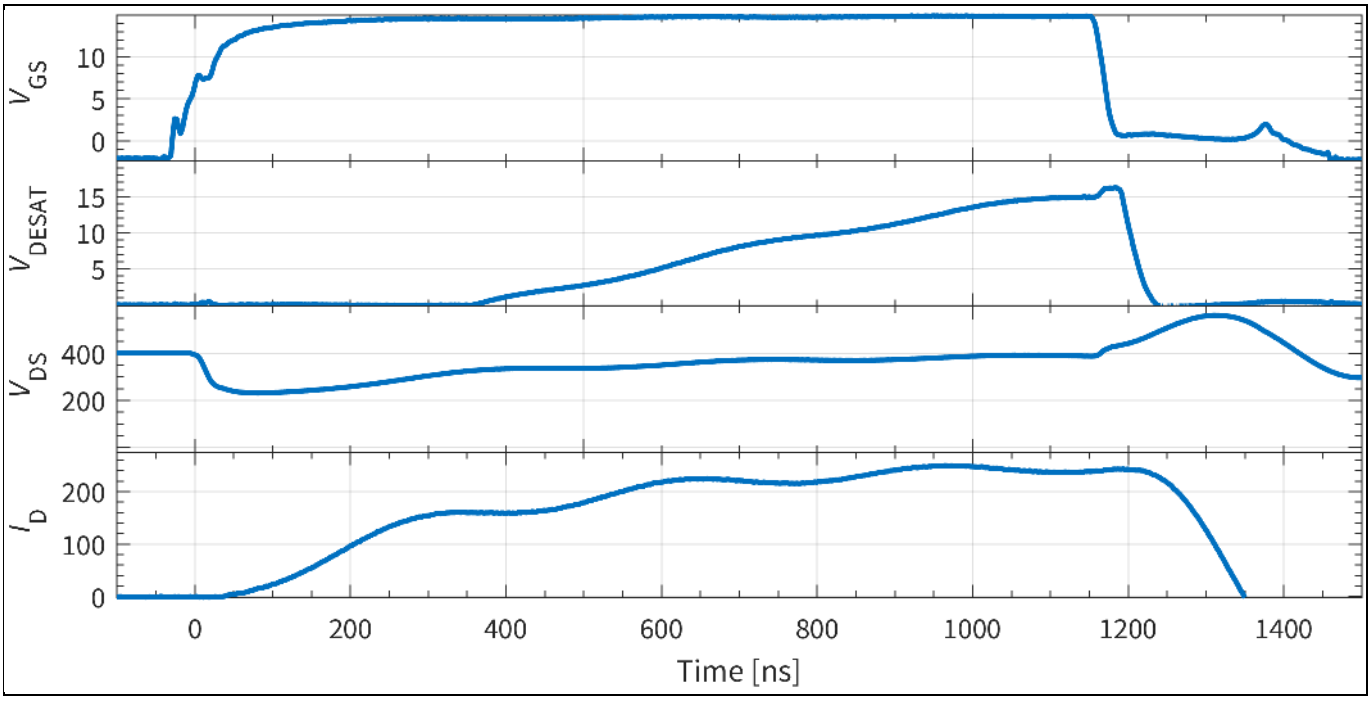

Figure 6 **Eval-1ED3321MC12N – Turn-off of Type I short-circuit with CoolSiC™ without desaturation capacitor**

2.6 Example: Short-circuit turn-off with CoolSiC™ MOSFETs with overdrive circuit for DESAT charge circuit

In the rare cases when even reducing the desaturation capacitance is not sufficient, the desaturation detection circuit can be overdriven by external circuitry. The Eval-1ED3321MC12N PCB was designed with such a circuit that was left unassembled.

Figure 7 shows the overdrive circuit for the DESAT circuit. The circuit shown here performs two functions:

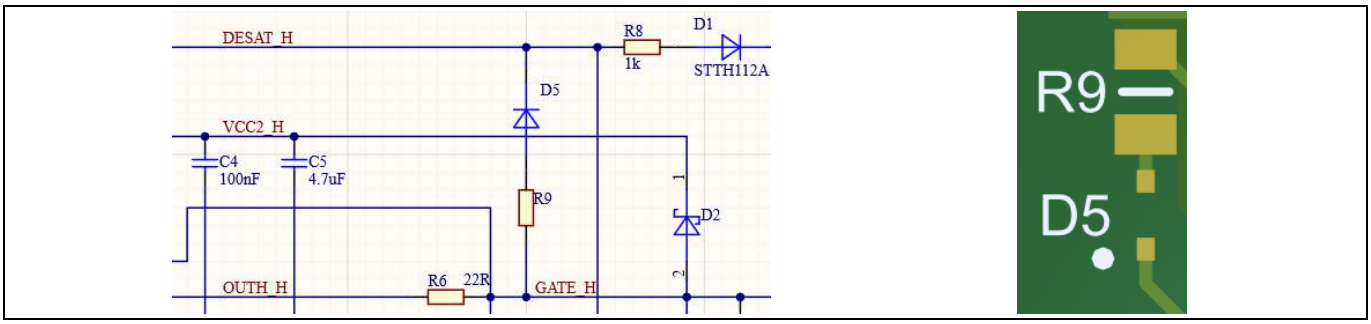

Figure 7 **DESAT pin overdrive circuit**

First, it increases the DESAT-pin charging current. Besides the internal 500 µA internal current source, current will also flow from the transistor gate terminal via R9 and D5 for the high side or R19 and D15 for the low side. The value of the resistor connected to the gate voltage will determine the extra charge current flowing to the DESAT-pin. D5 and D15 are there to ensure that during turn-off, no current flows from the DESAT pin into the gate path. The increased current will decrease the DESAT reaction time.

Secondly, the steady state voltage at the DESAT pin is increased. This is because R9 forms a resistive voltage divider with R8 in steady state for the high side (simiarly, R19 and R18 for the low side). This reduces even further the reaction time of the DESAT circuit.

In this example, the diodes D5 and D15 are populated with a 60 V SOD 523 diode, and the resistors R9 and R19 with a 3 kΩ resistor.

Figure 8 shows the results of the type I short-circuit on the low side transistor with the above-mentioned modifications.

As can be observed, the protection circuit reacts in this case, and the device is turned off in approximately 800 ns.

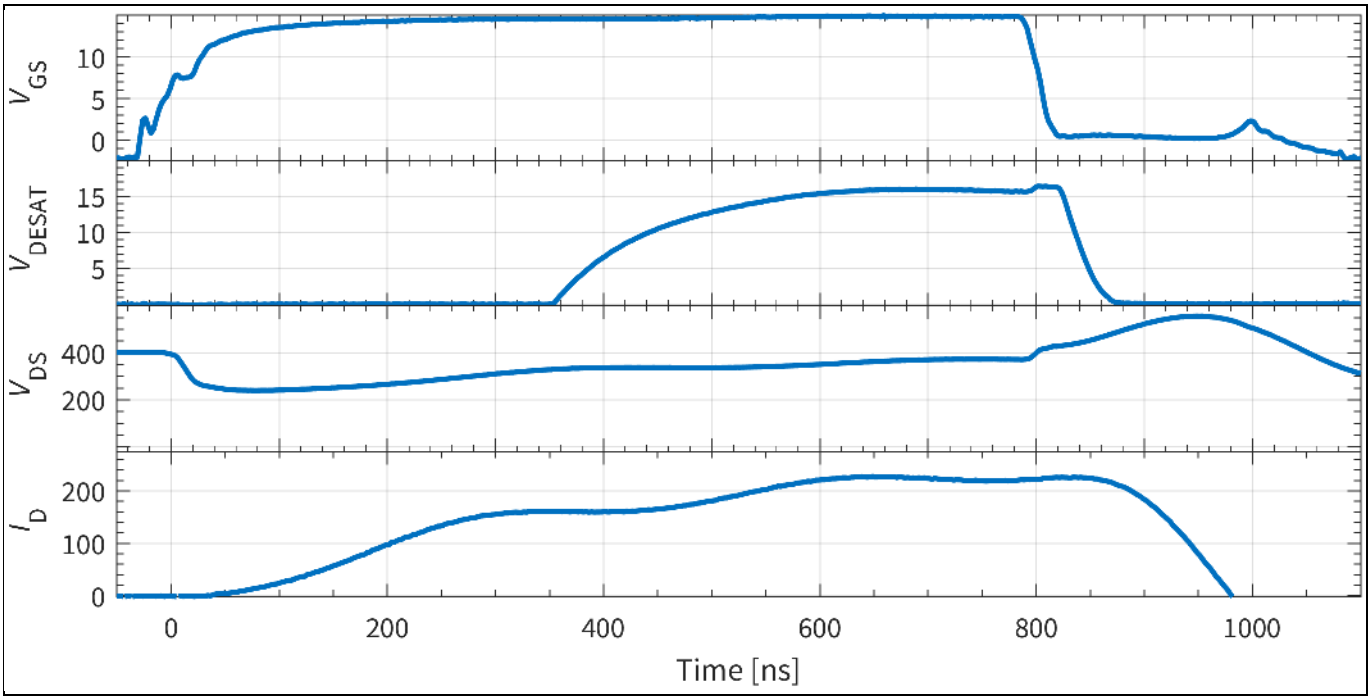

Figure 8 Eval-1ED3321MC12N – Turn-off of Type I short-circuit with CoolSiC™ without desaturation capacitor, 60 V SOD523 for D5 and D15 and 3 kΩ for R9 and R19

3 System design

The Eval-1ED3321MC12N evaluation board is designed to evaluate the EiceDRIVER™ 1ED332xMC12N family gate driver ICs. To support the customer in getting started with the design, the schematics, Gerber data and Altium project files can be found on the Infineon homepage.

3.1 Schematics

The schematic of the evaluation board is shown below.

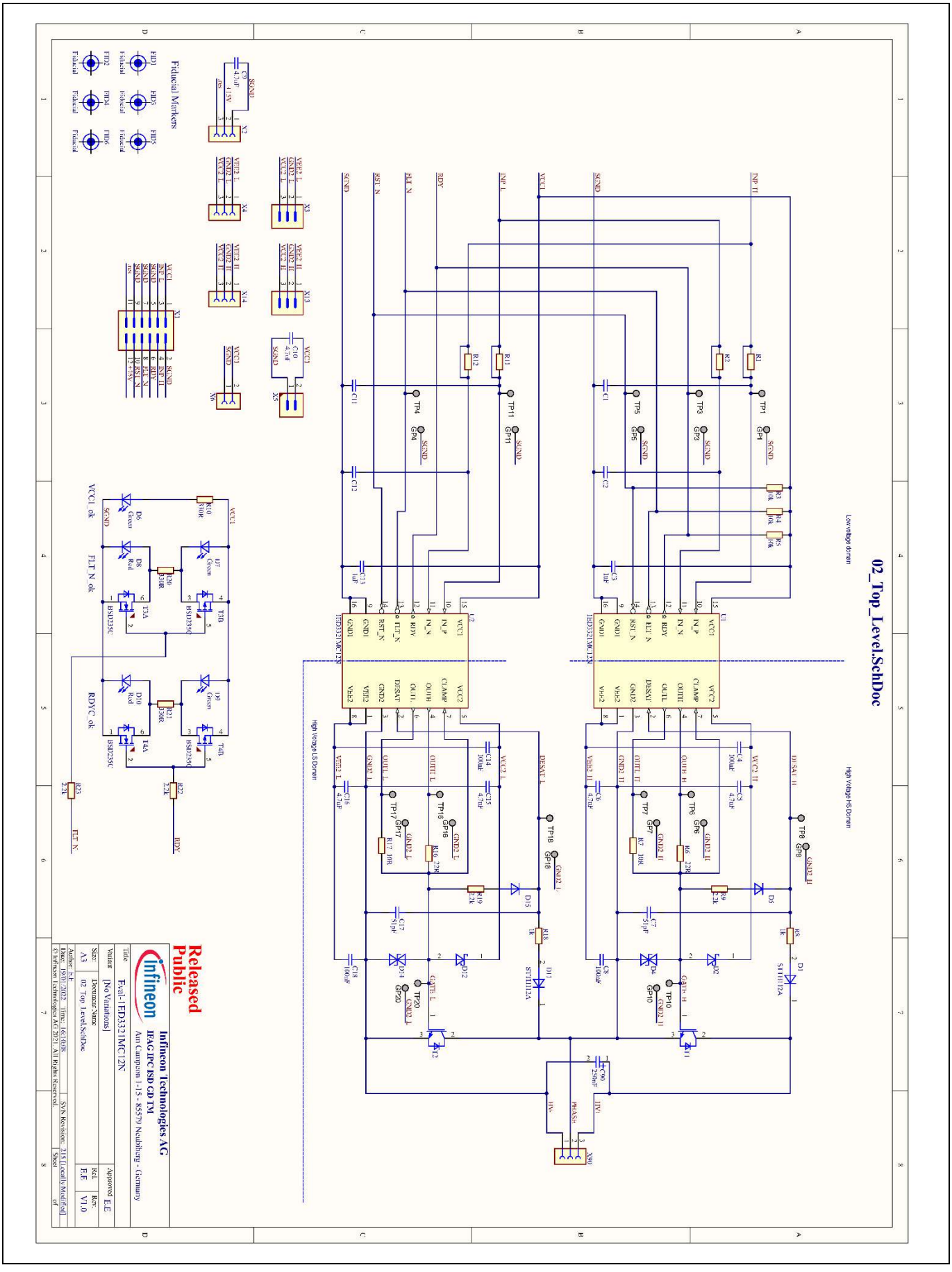

Figure 9 Eval-1ED3321MC12N - Schematic

3.2 Layout

The layout from this basic schematic is intended as a starting point for developing more complex application circuits. The evaluation board has a two-layer PCB. For orientation, the assembly diagram and the top and bottom layer are shown.

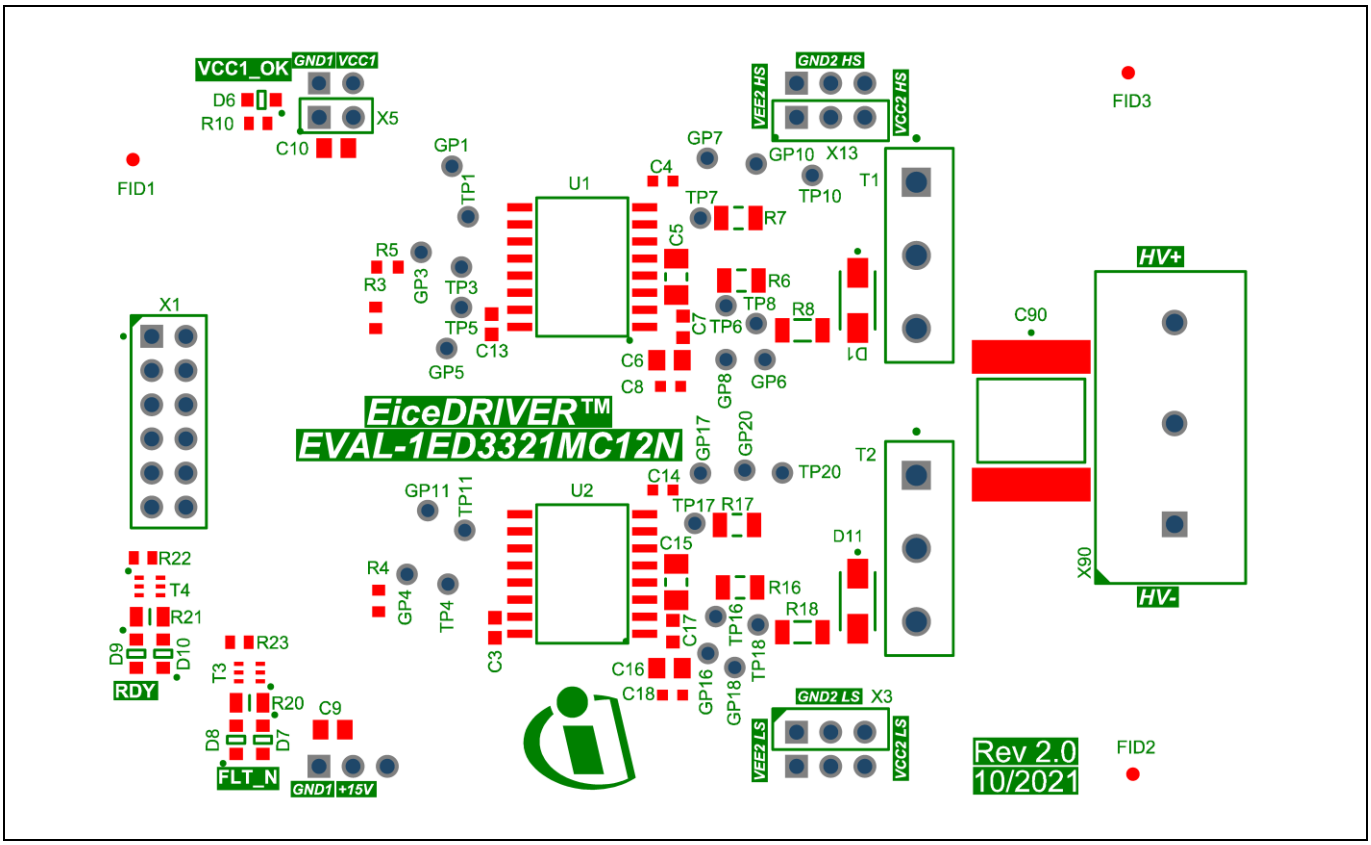

Figure 10 Eval-1ED3321MC12N – Assembly drawing top side

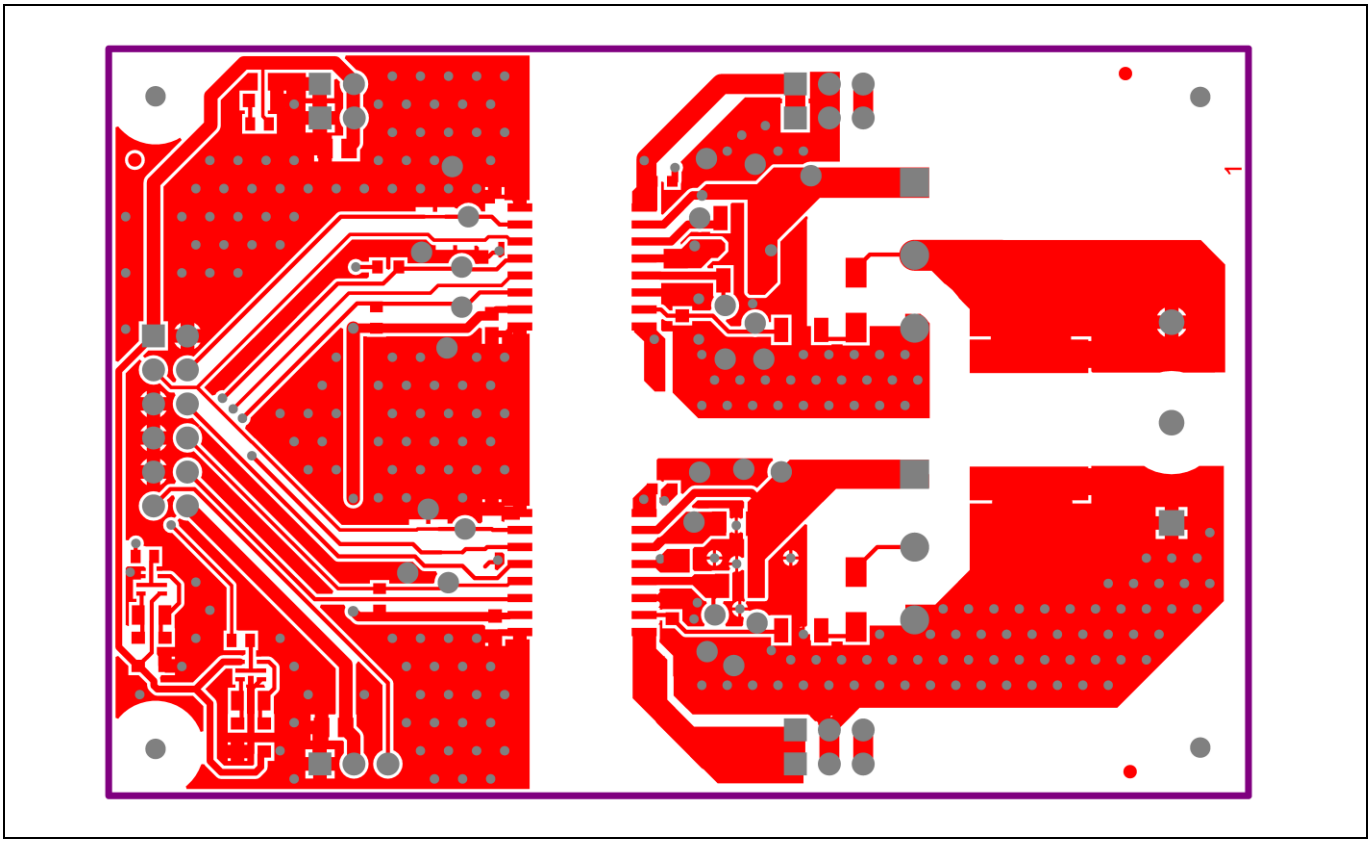

Figure 11 Eval-1ED3321MC12N – PCB top layer view

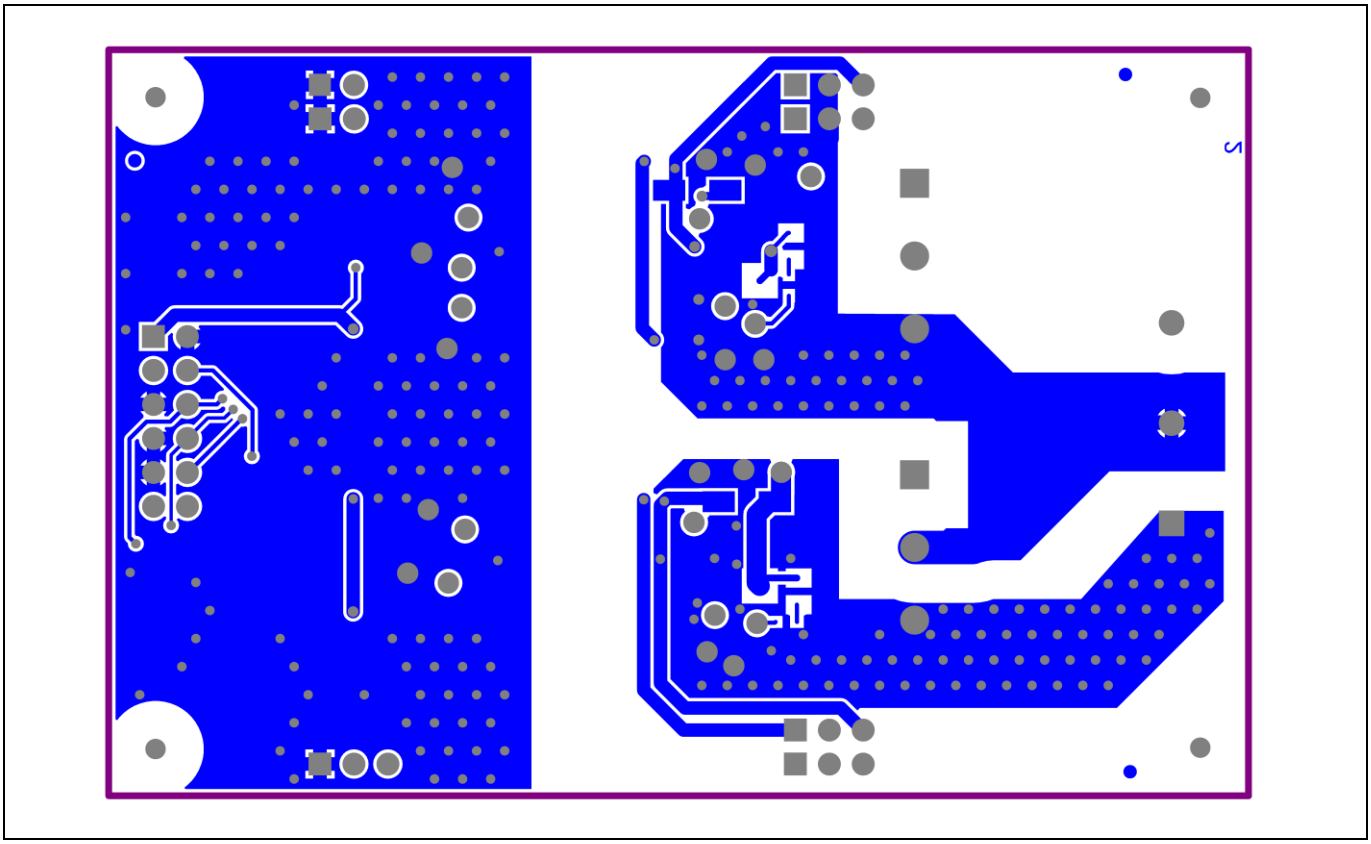

Figure 12 Eval-1ED3321MC12N – PCB bottom layer view

3.3 Bill of material

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

Table 4 Bill of materials

Designator	Quantity	Description	Manufacturer	Manufacturer P/N
C3, C13	2	1uF	Wurth Elektronik	885012206076
C4, C8, C14, C18	4	100nF	Wurth Elektronik	885012206095
C5, C15	2	4.7uF	TDK Corporation	CGA5L3X7R1H475K160AE
C6, C16	2	4.7uF	TDK Corporation	CGA4J1X7R1H475K125AE
C7, C17	2	51pF	MuRata	GCM1885C2A510JA16
C9, C10	2	4.7uF	Wurth Elektronik	885012107018
C90	1	250nF	TDK Corporation	B58031I9254M062
D1, D11	2	STTH112A	STMicroelectronics	STTH112A
D2, D12	2	STPS1L30A	STMicroelectronics	STPS1L30A
D6, D7, D9	3	Green	Wurth Elektronik	150080VS75000
D8, D10	2	Red	Wurth Elektronik	150080RS75000
R3, R4, R5	3	10k	Yageo	RC0603FR-0710KL
R6, R16	2	22R	Vishay	RCS120622R0FKEA
R7, R17	2	10R	Vishay	RCS120610R0FKEA
R8, R18	2	1k	Vishay	CRCW12061K00FK
R10	1	330R	Vishay	CRCW0603330RFK
R20, R21	2	330R	Vishay	CRCW0805330RFK
R22, R23	2	2.2k	Vishay	CRCW06032K20FK
T1, T2	2	IKW40N120H3	Infineon Technologies	IKW40N120H3
T3, T4	2	BSD235C	Infineon Technologies	BSD235C
U1, U2	2	1ED3321MC12N	Infineon Technologies	1ED3321MC12N
X1	1	TSW-106-07-L-D	Samtec	TSW-106-07-L-D
X2, X4, X14	3	SSW-103-01-G-S	Samtec	SSW-103-01-G-S
X3, X13	2	HTSW-103-07-G-S	Samtec	HTSW-103-07-G-S
X5	1	HTSW-102-07-G-S	Samtec	HTSW-102-07-G-S
X6	1	SSW-102-01-G-S	Samtec	SSW-102-01-G-S
X90	1	1731035	Phoenix Contact	1731035
C3, C13	2	1uF	Wurth Elektronik	885012206076
C4, C8, C14, C18	4	100nF	Wurth Elektronik	885012206095
C5, C15	2	4.7uF	TDK Corporation	CGA5L3X7R1H475K160AE
C6, C16	2	4.7uF	TDK Corporation	CGA4J1X7R1H475K125AE
C7, C17	2	51pF	MuRata	GCM1885C2A510JA16
C9, C10	2	4.7uF	Wurth Elektronik	885012107018
C90	1	250nF	TDK Corporation	B58031I9254M062
D1, D11	2	STTH112A	STMicroelectronics	STTH112A
D2, D12	2	STPS1L30A	STMicroelectronics	STPS1L30A
D6, D7, D9	3	Green	Wurth Elektronik	150080VS75000

3.4 Connector details

General information about the connectors of the Eval-1ED3321MC12N evaluation board is provided in this section.

Table 5 shows the connection of the high-voltage connector X90.

Table 5 High-voltage connector

PIN	Label	Function
X90 (1)	HV+	DC-link high-side connection
X90 (2)	PHASE	Half-bridge midpoint connection
X90 (3)	HV-	DC-link ground side connection

Table 6 shows the connections of the low voltage, input side connectors. This includes all four connectors, X1, X2, X5 and X6.

Table 6 Input side connectors pinout

PIN	Label	Function
X1 (1)	VCC1	Supply voltage for the input side of the gate drivers
X1(2)	SGND	Ground for the input side of the board
X1 (3)	INP_L	Noniverting input for the low side gate driver
X1 (4)	INP_H	Noniverting input for the high side gate driver
X1 (5)	SGND	Ground for the input side of the board
X1 (6)	RDY	Connection to both RDY pins of the gate driver ICs
X1 (7)	SGND	Ground for the input side of the board
X1 (8)	FLT_N	Connection to both FLT_N pins of the gate driver ICs
X1 (9)	SGND	Ground for the input side of the board
X1 (10)	RST_N	Connection to both RST_N pins of the gate driver ICs
X1 (11)	.res	Not used
X1 (12)	+15V	Supply voltage for the isolated power supply
X2 (1)	SGND	Ground for the input side of the board
X2 (2)	+15V	Supply voltage for the isolated power supply
X2 (3)	-	Not used
X5 (1)	VCC1	Supply voltage for the input side of the gate drivers
X5 (2)	SGND	Ground for the input side of the board
X6 (1)	VCC1	Supply voltage for the input side of the gate drivers
X6 (2)	SGND	Ground for the input side of the board

Table 7 shows the connection of the low side supply connectors X3 and X4. This is used to supply the low side gate drive secondary side. If the EiceDRIVER™ Eval-PSIR2085 isolated power supply board is not used, VCC2, GND2, and VEE2 voltage can be supplied here by means of an isolated power supply that allows floating operation of the gate driver as per application.

Table 7 Low side gate driver IC -isolated secondary power supply

PIN	Label	Function
X13/X14 (1)	VEE2_L	Low side gate driver positive supply (VEE2_L) connection
X13/X14 (2)	GND2_L	Low side gate driver supply ground reference (GND2_L) connection
X13/X14 (3)	VCC2_L	Low side gate driver negative supply (VCC2_L) connection

Table 8 shows the connection of the high side supply connectors X13 and X14. This is used to supply the high-side gate drive secondary side. If the EiceDRIVER™ Eval-PSIR2085 isolated power supply board is not used,

VCC2, GND2, and VEE2 voltage can be supplied here by means of an isolated power supply that allows floating operation of the gate driver as per application.

Table 8 High side gate driver IC -isolated secondary power supply

PIN	Label	Function
X13/X14 (1)	VEE2_H	High-side gate driver positive supply (VEE2_H) connection
X13/X14 (2)	GND2_H	High-side gate driver supply ground reference (GND2_H) connection
X13/X14 (3)	VCC2_H	High-side gate driver negative supply (VCC2_H) connection

3.5 Test points

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

Table 9 Test points

Test point name	Signal measured	Ground reference for test point
TP1	INP_H	SGND
GP1	SGND	SGND
TP3	RDY	SGND
GP3	SGND	SGND
TP4	FLT_N	SGND
GP4	SGND	SGND
TP5	RST_N	SGND
GP5	SGND	SGND
TP11	INP_L	SGND
GP11	SGND	SGND
TP8	DESAT_H	GND2_H
GP8	GND2_H	GND2_H
TP6	OUTH_H	GND2_H
GP6	GND2_H	GND2_H
TP7	OUTL_H	GND2_H
GP7	GND2_H	GND2_H
TP10	GATE_H	GND2_H
GP10	GND2_H	GND2_H
TP18	DESAT_L	GND2_L
GP18	GND2_L	GND2_L
TP16	OUTH_L	GND2_L
GP16	GND2_L	GND2_L
TP17	OUTL_L	GND2_L
GP17	GND2_L	GND2_L
TP20	GATE_L	GND2_L
GP20	GND2_L	GND2_L

4 References and appendices

4.1 References

[1] Datasheet of Infineon EiceDRIVER™ 1ED3321MC12N

[2] User guide of EiceDRIVER™ Eval-PSIR2085

[3] Datasheet of Infineon IKW40N120H3

[4] Datasheet of Infineon IMW120R045M1

4.2 Ordering information

Base Part Number	Package	Standard Pack		Orderable Part Number
		Form	Quantity	
Eval-1ED3321MC12N	-	Boxed	1	EVAL1ED3321MC12NTOBO1
1ED3320MC12N	PG-DSO-16	TAPE & REEL	1000	1ED3320MC12NXUMA1
1ED3321MC12N	PG-DSO-16	TAPE & REEL	1000	1ED3321MC12NXUMA1
1ED3322MC12N	PG-DSO-16	TAPE & REEL	1000	1ED3322MC12NXUMA1
1ED3323MC12N	PG-DSO-16	TAPE & REEL	1000	1ED3323MC12NXUMA1
IKW40N120H3FKSA1	PG-TO247-3	Tube	240	IKW40N120H3FKSA1
EVAL-PSIR2085	-	Boxed	1	EVALPSIR2085TOBO1

Revision history

Document version	Date	Description of changes
V1.0	2022/01/10	Initial creation
V1.1	2022/01/21	Updated broken references
V1.2	2022/02/04	Updated links and images

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

Edition 2022-02-04

Published by

Infineon Technologies AG

81726 Munich, Germany

Do you have a question about this document?

Email: erratum@infineon.com

Document reference

UG2022-01

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.