

# BD7682FJ-EVK-301 BOARD QUICK START GUIDE

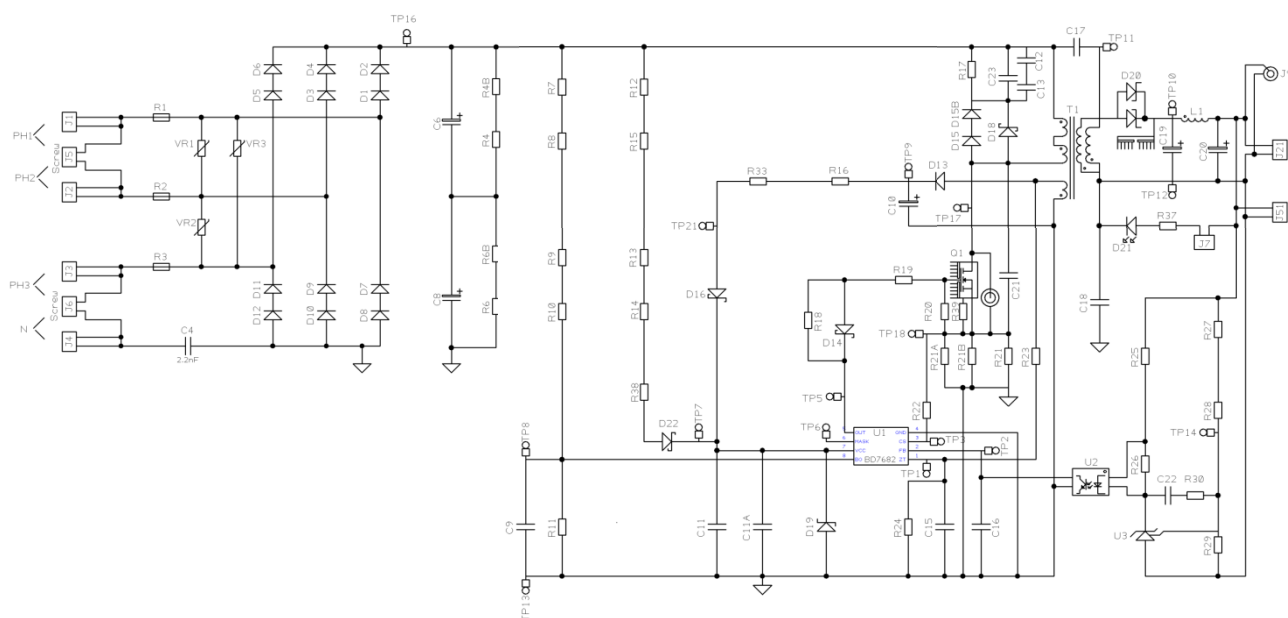


**1-1700V SiC MOSFET SCT2H12NZ**

**2- Quasi Resonant Controller BD7682FJ-LB**

**Board Dimensions 80mmx80mm**

Param.	Description	Value
$V_{IN}$	Input voltage	210...480 V <sub>AC</sub> 300...to 900 V <sub>DC</sub>
	Output voltage	12 V <sub>DC</sub> ± 3%
$P_{OUT}$	Output power	30 W @ $V_{IN.MIN}$ 40 W @ $V_{IN.MAX}$
	Switching frequency	90..120 kHz



## Important information before connecting and powering the board:

- Check carefully that the input voltages are within the maximum input range in table 1.
- Double check the cabling before powering the board.
- This board is protected against overload and short circuit.
- Avoid any imperfect connection that can create sparks
- Check the isolation class and section of the cables.
- Apply all appropriate checks and precautions for use of a high voltage board.
- Refer to the notice at the end of this document for proper usage of this board.
- Only use in a technical environment by professionals trained to safely manage high voltage boards.
- This board is only for evaluation purposes and it's not guaranteed for prolonged usage or usage in any final product

**CABLING:****3 Phase AC connections:**

210/480Vac

3 Phase

Phase 1 —

Phase 2 —

Phase 3 —

Neutral —

12Vdc To Load + —

Volt Ref To Load - —

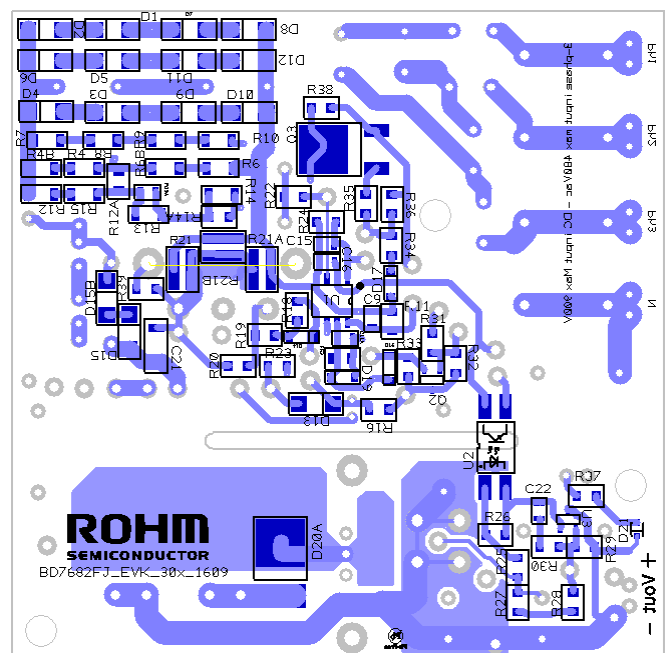
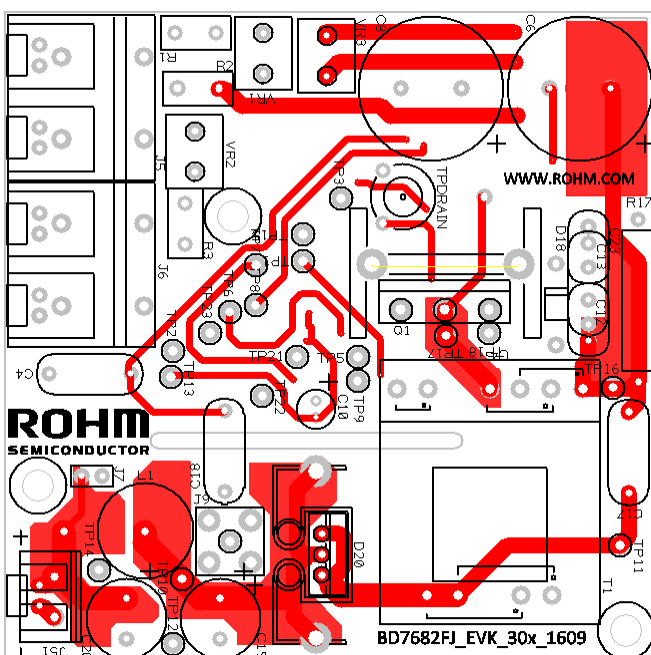
**HV DC connections:**

Input DC Voltage+ —

Input DC Voltage - —

12Vdc To Load + —

Volt Ref To Load - —

**LAYOUT**

# BILL OF MATERIAL

Position Name	Value	Description	Manufacturer	Manufacturer's Code	Mounted
<b>C4, C17, C18, C23</b>	---	----	----	---	<b>No</b>
<b>C6, C8</b>	100 uF	Electrolytic capacitor 450V 7.5mm pitch 18mm diameter	NICHICON	UCY2W101MHD	<b>Yes</b>
<b>C9, C15</b>	47 pF	Ceramic capacitor 0805 10% 50V COG	WURTH	885012007055	<b>Yes</b>
<b>C10</b>	22 uF	Electrolytic capacitor 50V 2mm pitch 5mm diameter	WURTH	860040672001	<b>Yes</b>
<b>C11</b>	2.2 uF	Ceramic capacitor 0805 35V X7R	TDK	C2012X7R1V225K085AC	<b>Yes</b>
<b>C11A, C22</b>	100nF	Ceramic capacitor 0805 50V X7R	WURTH	885012207098	<b>Yes</b>
<b>C12, C13</b>	2.2 nF	Ceramic capacitor 1kV 5mm pitch 8.5mm diameter	TDK	CK45-B3AD222KYNNA	<b>Yes</b>
<b>C16</b>	2.2 nF	Ceramic capacitor 0805 50V X7R	WURTH	885012207088	<b>Yes</b>
<b>C19, C20</b>	470 uF	Electrolytic Aluminium capacitor 35V 5mm pitch 10mm diameter	WURTH	860080575017	<b>Yes</b>
<b>C21</b>	---	----	----	---	<b>No</b>
<b>D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12</b>	1A 1000V	Rectifier Diode S1M Vishay	VISHAY	S1M-E3/61T	<b>Yes</b>
<b>D13</b>	---	Fast Diode 400V 1A	ROHM	RF101L4S	<b>Yes</b>
<b>D14, D16</b>	---	Schottky Diode 60V 1A	ROHM	RB160M-60	<b>Yes</b>
<b>D15, D15B</b>	---	----	----	---	<b>No</b>
<b>D17</b>	---	Zener Diode 20V 1W	ROHM	KDZVTR20B	<b>No</b>
<b>D18</b>	---	Ultrafast Diode 1200V 1A	STM	STTH112RL	<b>Yes</b>
<b>D19</b>	---	Zener Diode 24V 1W	ROHM	KDZVTR24B	<b>Yes</b>
<b>D20</b>	---	Schottky Barrier Diode 200V 30A	SANGDEST	MBRF30200CT	<b>Yes</b>
<b>D20B</b>	---	----	----	---	<b>No</b>
<b>D21</b>	---	SML-A12P8T Side LED Green 20mA	ROHM	SML-A12P8T	<b>Yes</b>
<b>D22</b>	0 Ohm	Resistor 0805 footprint	ROHM	MCR10EZPJ000	<b>Yes</b>
<b>D22 (ASC)</b>	---	Schottky Diode 60V 1A	ROHM	RB160M-60	<b>No</b>
<b>H1</b>	---	Heatsink for TO220 Transistor	AAVID	574602B03700G	<b>Yes</b>
<b>H2</b>	---	Heatsink for TO247 Transistor	OHMITE	WA-T247-101E	<b>No</b>
<b>J5, J6</b>	---	Connector pitch 10.16mm 2 pins	Wurth	691 219 610 002	<b>Yes</b>
<b>J7</b>	---	Header connector male pitch 2.54mm	3M	961102-6404-AR	<b>Yes</b>
<b>J21</b>	---	Connector pitch 5mm 2 pins	Wurth	691102710002	<b>Yes</b>
<b>Q1</b>	---	1700V 3.7A SIC MOSFET	ROHM	SCT2H12NZ	<b>Yes</b>
<b>Q2</b>	---	NPN transistor 50V 0.5A	ROHM	2SD1484KT146R	<b>No</b>
<b>Q3</b>	---	500V 800mA Normally on MOSFET	IXYS	IXTY08N50D2	<b>No</b>
<b>R1, R2, R3</b>	3.15 A	Fuse 250V	Littelfuse	4001315	<b>Yes</b>

Position Name	Value	Description	Manufacturer	Manufacturer's Code	Mounted
<b>R4, R4B, R6, R6B, R7, R8, R9, R10</b>	470kOhm	Resistor 1206 footprint	ROHM	MCR18ERTF4703	<b>Yes</b>
<b>R11</b>	10kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF1002	<b>Yes</b>
<b>R12A, R13A, R14A, R35, R39</b>	0 Ohm	Resistor 0805 footprint	ROHM	MCR10EZPJ000	<b>No</b>
<b>R16</b>	4.7kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF4701	<b>Yes</b>
<b>R17</b>	330kOhm	Resistor 2W V	VISHAY	PR02000203303JR500	<b>Yes</b>
<b>R18</b>	100 Ohm	Resistor 0805 footprint	ROHM	MCR10ERTF1000	<b>Yes</b>
<b>R19</b>	10 Ohm	Resistor 0805 footprint	ROHM	MCR10ERTF10R0	<b>Yes</b>
<b>R20</b>	47kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF4702	<b>Yes</b>
<b>R21, R21A</b>	3 Ohm	Resistor footprint 1020 Wide	ROHM	LTR50UZPF3R00	<b>Yes</b>
<b>R21B</b>	6.8 Ohm	Resistor footprint 1020 Wide	ROHM	LTR50UZPF6R80	<b>Yes</b>
<b>R22, R38</b>	0 Ohm	Resistor 0805 footprint	ROHM	MCR10EZPJ000	<b>Yes</b>
<b>R23</b>	120kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF1203	<b>Yes</b>
<b>R24, R30</b>	12kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF1202	<b>Yes</b>
<b>R25</b>	300 Ohm	Resistor 0805 footprint	ROHM	MCR10ERTF3000	<b>Yes</b>
<b>R26, R37</b>	1kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF1001	<b>Yes</b>
<b>R27</b>	15kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF1502	<b>Yes</b>
<b>R28</b>	180kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF1803	<b>Yes</b>
<b>R29</b>	51kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF5102	<b>Yes</b>
<b>R31</b>	---	----	----	---	<b>No</b>
<b>R34</b>	4.7kOhm	Resistor 0805 footprint	ROHM	MCR10ERTF4701	<b>No</b>
<b>R36</b>	10kOhm	Res 0805 footprint	ROHM	MCR10ERTF1002	<b>No</b>
<b>T1</b>	---	FLyback Transformer	WURTH	750316318	<b>Yes</b>
<b>U1</b>	---	ACDC flyback driver for SIC MOSFET	ROHM	BD7682	<b>Yes</b>
<b>U2</b>	---	5kV Optocoupler	SHARP	PC817XNNIP0F	<b>Yes</b>
<b>U3</b>	---	Voltage reference 2.49V	TI	TL431AIDBZR	<b>Yes</b>

## TEST POINTS:

Test Point	Signal***
<b>TP1</b>	<b>Controller ZT pin</b>
<b>TP2</b>	<b>Controller FB pin</b>
<b>TP5</b>	<b>Controller OUT pin</b>
<b>TP7</b>	<b>Controller V<sub>CC</sub> pin</b>
<b>TP8</b>	<b>Controller Brown-out pin</b>
<b>TP10</b>	<b>Board V<sub>OUT</sub></b>
<b>TP11</b>	<b>Trafo sec. terminal</b>
<b>TP13</b>	<b>Controller GND pin</b>
<b>TP16</b>	<b>Input voltage V<sub>IN</sub></b>
<b>TP18</b>	<b>Controller CS pin</b>

\*\*\* Use instruments and probes with correct voltage rates

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## ■<High Voltage Safety Precautions>

◇ Read all safety precautions before use

Please note that this document covers only the BD7682FJ & SCT2H12NZ evaluation board (BD7682FJ-EVK-301) and its functions. For additional information, please refer to the datasheet.

**To ensure safe operation, please carefully read all precautions before handling the evaluation board**



Depending on the configuration of the board and voltages used,

**Potentially lethal voltages may be generated.**

Therefore, please make sure to read and observe all safety precautions described in the red box below.

### Before Use

- [1] Verify that the parts/components are not damaged or missing (i.e. due to the drops).
- [2] Check that there are no conductive foreign objects on the board.
- [3] Be careful when performing soldering on the module and/or evaluation board to ensure that solder splash does not occur.
- [4] Check that there is no condensation or water droplets on the circuit board.

### During Use

- [5] Be careful to not allow conductive objects to come into contact with the board.
- [6] **Brief accidental contact or even bringing your hand close to the board may result in discharge and lead to severe injury or death.**  
**Therefore, DO NOT touch the board with your bare hands or bring them too close to the board.**  
In addition, as mentioned above please exercise extreme caution when using conductive tools such as tweezers and screwdrivers.
- [7] If used under conditions beyond its rated voltage, it may cause defects such as short-circuit or, depending on the circumstances, explosion or other permanent damages.
- [8] Be sure to wear insulated gloves when handling is required during operation.

### After Use

- [9] The ROHM Evaluation Board contains the circuits which store the high voltage. Since it stores the charges even after the connected power circuits are cut, please discharge the electricity after using it, and please deal with it after confirming such electric discharge.
- [10] Protect against electric shocks by wearing insulated gloves when handling.

This evaluation board is intended for use only in research and development facilities and should be handled **only by qualified personnel familiar with all safety and operating procedures.**

We recommend carrying out operation in a safe environment that includes the use of high voltage signage at all entrances, safety interlocks, and protective glasses.