



650 V GaN HEMT Power Stage BM3G005MUV-EVK-003

<High Voltage Safety Precautions>

◇ Read all safety precautions before use

Please note that this document covers only the **BM3G005MUV** evaluation board (BM3G005MUV-EVK-003) 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.

650V GaN HEMT Power Stage

BM3G005UV Evaluation Board

BM3G005MUV-EVK-003

General Description

The BM3G005MUV-EVK-003 evaluation board consists of the BM3G005MUV (GaN FET (650 V 50 mΩ), integrated driver and protection circuit) and A board on which peripheral components are mounted.

This IC is designed to adapt major exist controllers, so that it also can be used to replace the traditional discrete power switches, such as super junction MOSFET



Figure 1. BM3G005MUV-EVK-003

Performance Specification

Electrical characteristic

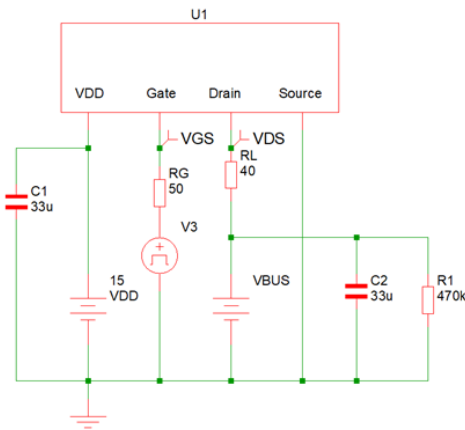
Not guarantee the characteristics is representative value.

Unless otherwise specified $V_{DD} = 15\text{ V}$ $V_{BUS}=200\text{ V}$, $T_j = 25\text{ }^{\circ}\text{C}$

Parameter	Symbol	Min	Typ	Max	Units	Conditions
Power Supply Voltage Range	V_{DD}	6.83	15	35	V	
Drain Voltage Range	V_{DRAIN}	-	-	650	V	
VDD Quiescent Current	I_{ON2}	-	0.18	0.24	mA	$V_{IN}=0\text{ V}$
Positive-going Input Threshold	V_{IN_POS}	2.35	2.70	3.05	V	
Negative-going Input Threshold	V_{IN_NEG}	0.87	1.20	1.53	V	
Turn-on Slew Rate	SR_{ON1}		22		V/ns	
Operating Temperature	Top	-40	+25	+105	$^{\circ}\text{C}$	

(Note 1) Adjust the operating time so that surface temperature of no component exceeds 105 °C

Measurement Circuits



Operation Procedure

1 Necessary Equipment

- (1) DC power supply (400 VDC, 100 W or more)
- (2) DC power supply (30 VDC, 10 W or more)
- (3) Oscilloscope
- (4) Oscillator

2 Connect to Each Equipment

- (1) Preset the DC supply 1 to 200 V and turn off the DC supply output.
- (2) Preset the DC supply 2 to 15 V and turn off the DC supply output.
- (3) Turn off the oscillator output.
- (4) As shown in the connection diagram, connect the evaluation board to each measuring instrument and DC supply.
- (5) Turn on the output of DC supply 1 and DC supply 2, and turn on the output of the oscillator.
- (6) Check the voltage on the D and G pins

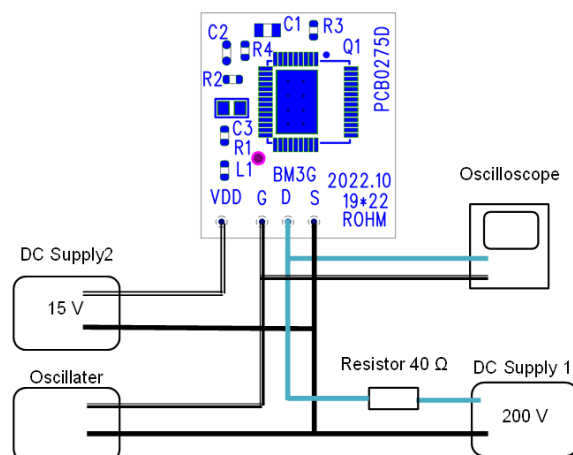


Figure 3. Diagram of How to Connect

Schematics

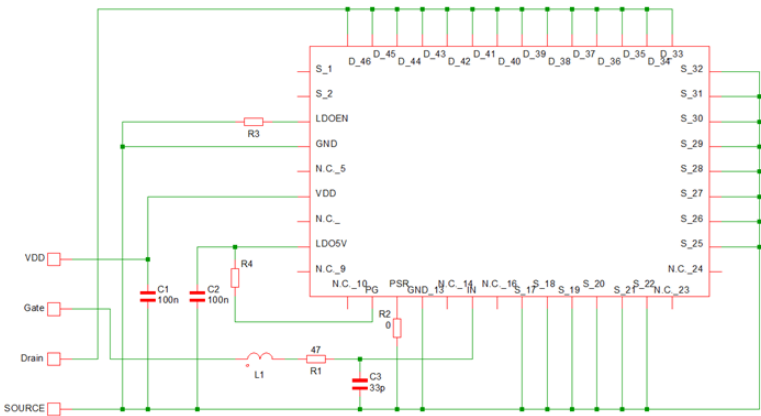


Figure 3. BM3G005MUV-EVK-003 Schematics

Parts List

Item	Specification	Parts Name	Manufacurer
C1	0.1 μF,50 V	GRM188R72A104KA35D	MURATA
C2	0.1 μF,50 V	GRM188R72A104KA35D	MURATA
C3	33 pF,50 V	GCM1885C2A330JA16D	MURATA
IC1	Rdson 50 mΩ,650 V	BM3G005MUV	ROHM
L1	600Ω at 100MHz	BLM18AG601SN1D	MURATA
R1	47 Ω	MCR03EZPJ470	ROHM
R2	0 Ω	MCR03EZPJ000	ROHM
R3	0 Ω	MCR03EZPJ000	ROHM
R4		Non-Mounted	
PCB		PCB0275D	SIGNAS

Materials may be changed without notifying.

Layout

Size: 19 mm x 22 mm

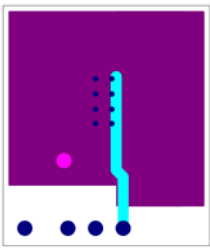
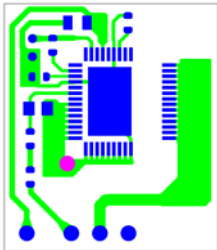


Figure 4. TOP Layout (Top view)

Figure5. BOTTOM Layout (Top view)

BM3G005MUV General Description

Features

Nano Cap™ Integrated Output Selectable 5 V LDO
 Long Time Support Product for Industrial Applications
 Wide Operating Range for VDD Pin Voltage
 Wide Operating Range for IN Pin Voltage
 Low VDD Quiescent and Operating Current
 Low Propagation Delay
 High dv/dt Immunity
 Adjustable Gate Drive Strength
 Power Good Signal Output
 VDD UVLO Protection
 Thermal Shutdown Protection

Key Specifications

- Power Supply Voltage Range
 - VDD pin: 6.83 V to 30 V
 - D pin: 650 V (Max)
 - IN pin: -0.6 V to +30 V
- VDD Operating Current @ 500 kHz: 2.2 mA (Typ)
- VDD Quiescent Current: 180 µA (Typ)
- Allowable Input Switching Frequency: 2 MHz (Max)
- Turn-on Delay Time: 14 ns (Typ)
- Turn-off Delay Time: 19 ns (Typ)
- Operating Temperature Range: -40 °C to +105 °C
- GaN HEMT D-S ON State Resistance: 50 mΩ (Typ)

Pin Configuration

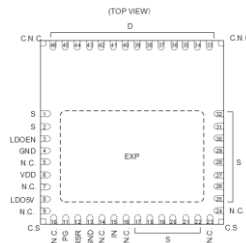


Figure 6. Pin Configuration

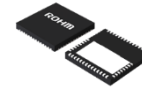
Package

W (Typ) x D (Typ) x H (Max)

VQFN046V8080

8.0 mm x 8.0 mm x 1.0 mm

pitch 0.5 mm



Pin Descriptions

Pin No.	Pin Name	I/O	Function
1,2,17-22,24-32	S	O	GaN HEMT SOURCE pin
3	LDOEN	I	LDO function enable /disable pin
4,13	GND	O	GND pin
5,7,9,10,14,16,23,24	N.C.	-	Non-connection
6	VDD	I	Power supply input pin
8	LDO5V	O	5V LDO output pin
11	PG	O	Power Good signal output pin
12	RSR	I	Gate drive strength adjustment pin
15	IN	I	Non-inverting gate drive input
33-46	D	I	GaN HEMT DRAIN pin
-	EXP	O	GaN HEMT SOURCE pin
-	C.S		Corner pin
-	C.N.C		Corner pin, Non-connection

Revision History

Date	Rev.	Changes
15.January.2025	001	New Release

Notice

- 1) The information contained in this document is intended to introduce ROHM Group (hereafter referred to as ROHM) products. When using ROHM products, please verify the latest specifications or datasheets before use.
- 2) ROHM products are designed and manufactured for use in general electronic equipment and applications (such as Audio Visual equipment, Office Automation equipment, telecommunication equipment, home appliances, amusement devices, etc.) or specified in the datasheets. Therefore, please contact the ROHM sales representative before using ROHM products in equipment or devices requiring extremely high reliability and whose failure or malfunction may cause danger or injury to human life or body or other serious damage (such as medical equipment, transportation, traffic, aircraft, spacecraft, nuclear power controllers, fuel control, automotive equipment including car accessories, etc. hereafter referred to as Specific Applications). Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses, or losses incurred by you or third parties arising from the use of ROHM Products for Specific Applications.
- 3) Electronic components, including semiconductors, can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against physical injury, and damage to any property, which a failure or malfunction of products may cause.
- 4) The information contained in this document, including application circuit examples and their constants, is intended to explain the standard operation and usage of ROHM products, and is not intended to guarantee, either explicitly or implicitly, the operation of the product in the actual equipment it will be used. As a result, you are solely responsible for it, and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses, or losses incurred by you or third parties arising from the use of such information.
- 5) When exporting ROHM products or technologies described in this document to other countries, you must abide by the procedures and provisions stipulated in all applicable export laws and regulations, such as the Foreign Exchange and Foreign Trade Act and the US Export Administration Regulations, and follow the necessary procedures in accordance with these provisions.
- 6) The technical information and data described in this document, including typical application circuits, are examples only and are not intended to guarantee to be free from infringement of third parties intellectual property or other rights. ROHM does not grant any license, express or implied, to implement, use, or exploit any intellectual property or other rights owned or controlled by ROHM or any third parties with respect to the information contained herein.
- 7) No part of this document may be reprinted or reproduced in any form by any means without the prior written consent of ROHM.
- 8) All information contained in this document is current as of the date of publication and subject to change without notice. Before purchasing or using ROHM products, please confirm the latest information with the ROHM sales representative.
- 9) ROHM does not warrant that the information contained herein is error-free. ROHM shall not be in any way responsible or liable for any damages, expenses, or losses incurred by you or third parties resulting from errors contained in this document.



Thank you for your accessing to ROHM product informations.
More detail product informations and catalogs are available, please contact us.

ROHM Customer Support System

<https://www.rohm.com/contactus>