PAC5556AEVK3 Evaluation Module User's Guide

Overview

Qorvo's PAC5556AEVK3 development platform is a complete hardware solution enabling users not only to evaluate the PAC5556A device, but also develop power applications revolving around this powerful and versatile ARM® Cortex®-M4F based microcontroller. The module contains a PAC5556A Power Application Controller® (MCU) and all the necessary circuitry to properly energize the MCU and its internal peripherals once power is applied. The PAC5556AEVK3 features new GaN power switches as offered by Cambridge GaN Devices ICeGaN power transistor. ICeGaN HEMT power transistors enjoy from easy to drive MOSFET compatible gate drive, integrated Miller Clamp and integrated current sense function, eliminating the need for expensive and bulky, separate current sense resistors.

To aid in the application development, the PAC5556AEVK3 offers access to each and every one of the PAC5556A device's signals by means of a series of male header connectors.

The PAC5556AEVK3 also contains access to an external USB to UART module enabling users to connect the evaluation module to a PC computer through a conventional Virtual COM Port which can then be used in the communication efforts by taking advantage of the PAC5556A's UART interface. Graphical User Interface (GUI) software suites can be employed to externally control particular application features.

Finally, the PAC5556AEVK3 module gives access to the PAC5556A's SWD and JTAG ports allowing users to both program the application into the device's FLASH memory, as well as debug the application in real time. The provided 4 pin connector is compatible with a decent variety of SWD based debugger/programmer modules, widely available. In parallel, a MIPI20 connector is made available that provides SWD, JTAG and TRACE functionality, greatly expanding the existent debugging capabilities.

Qorvo's PAC5556AEVK3 evaluation kit consists of the following:

- PAC5556AEVK3 evaluation module
- PAC5556AEVK3 User's Guide
- Schematics, BOM and Layout Drawings

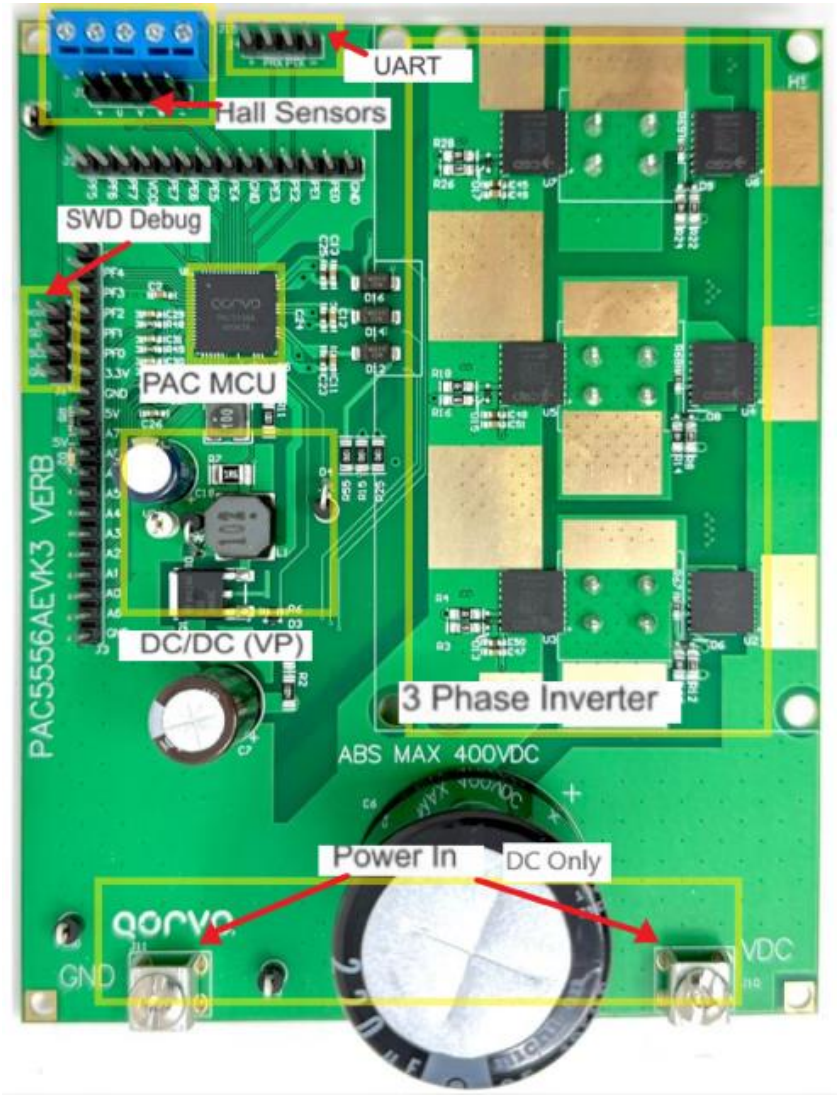


Figure 1: PAC5556AEVK3 Block Diagram

Solution Benefits:

- Ideal for High Voltage (90VDC to 450VDC Abs Max) general purpose power applications and controllers
- Single-IC PAC5556A with PWM outputs, ADC inputs, I2C, UART, SPI and GPIO.
- Gate driving for up to three half H Bridge (tri phase) inverter.
- Advanced J-Scope from SEGGER with combination of JLINK debugger can be used for real time debugging.
- Hall Sensor Interface for sensored applications.
- Current and Voltage sensing for sensorless applications.
- Schematics, BOM, Layout drawings available.
- This EVK can support up to 800W without heat-sink.

The following sections provide information about the hardware features of Qorvo's PAC5556AEVK3 turnkey solution.

PAC5556AEVK3 RESOURCES

Pinout and Signal Connectivity

The following diagram shows the male header pinout for the PAC5556AEVK3 evaluation module, as seen from above:

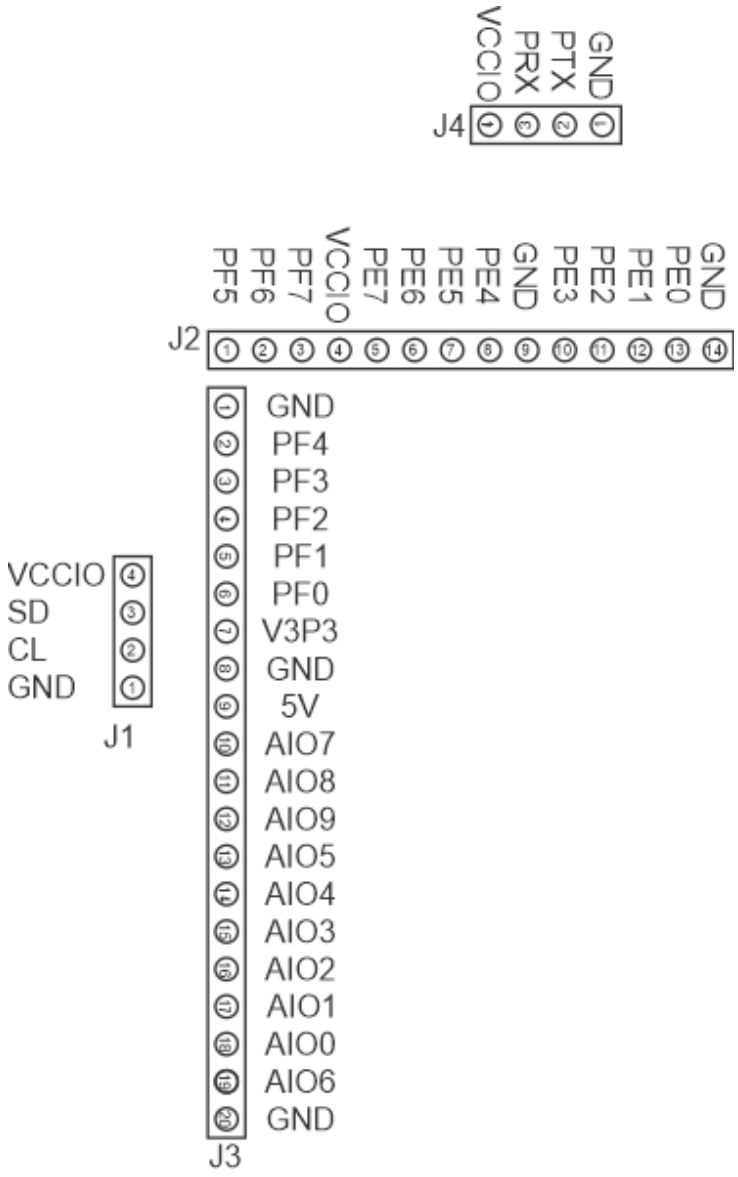


Figure 2 PAC5556AEVK3 Headers and Test Stakes Pinout

Power Input

Power to the PAC5556AEVK3 evaluation module can be applied to the J6 three position terminal block connector. Power to the PAC5556AEVK3 evaluation module should not exceed 450VDC Abs Max.

The PAC5556AEVK3 is optimized to operate with voltages ranging from 90VDC to 400VDC Nominal. When the rectified input voltage (VM) goes above around 85 VDC, the system's High Voltage Buck Converter is powered up and the device exits UVLO protection. At this time all subsystems, including internal voltage regulators, analog front end and microcontroller, are enabled.

LED's

When an operational voltage is applied, LED D2 will light up. This is the LED which notifies VSYS (5V) rail is up and running. VP (15V gate drive), 3.3V (for analog circuitry) and 1.2V (for CPU core) regulators will also be operating at this point in time. Module is ready for use.

The following table shows the provided LED and its associated diagnostic function.

LED	Description
D2	VSYS (5V). Light up when the PAC5556A device is successfully powered up by VM.

SWD Debugging

Connector J1 offers access to the PAC5556A SWD port lines.

J1 Pin	Terminal	Description
1	+	VCCIO (3.3V)
2	SD	SWD Serial Data (PF1)
3	CL	SWD Serial Clock (PF0)
4	-	GND (System Ground)

JTAG Serial Communications

Connector J4 offers access to the PAC5556A UART port lines.

J4 Pin	Terminal	Description
1	+	VCCIO (default is 5V)
2	RX	MCU Receive Line (PE3)
3	TX	MCU Transmit Line (PE2)
4	-	GND (System Ground)

Hall Sensor

Terminal Block J15 offers access to the PAC5556A resources on PORTE utilized for hall sensor based commutation. Mimicking the same signal structure, 0.100" spacing header J5 offers quick access to the hall sensor inputs.

J15/J5 Pin	Terminal	Description
1	+	VCCIO (3.3V)
2	Hall Sensor U	PORTE4
3	Hall Sensor V	PORTE5
4	Hall Sensor W	PORTE6
5	GND	GND (System Ground)

PAC5556AEVK3 SETUP

The setup for the PAC5556AEVK3 evaluation module requires up to four simple connections.

1. Connect the 3 Phase BLDC/PMSM motor via space tab connectors PHASE U, PHASE V and PHASE W.
2. If Serial Communications are desired, connect the USB to UART module 4 pin connection to J4.
3. For debugging/programming, connect a suitable USB SWD module to J1 by using a standard 4 wire cable.
4. Connect rectified DC voltage to screw terminals VM and GND.
5. **NOTE**: Due to the high voltage nature of this board, it is highly recommended for all connections to be made prior to applying power. Once DC input voltage goes above 85VDC, the PAC5556A's Multi Mode Power Manager will be engaged and the VSYS (5V) regulator will be enabled. This event will result in LED D2 lighting up.

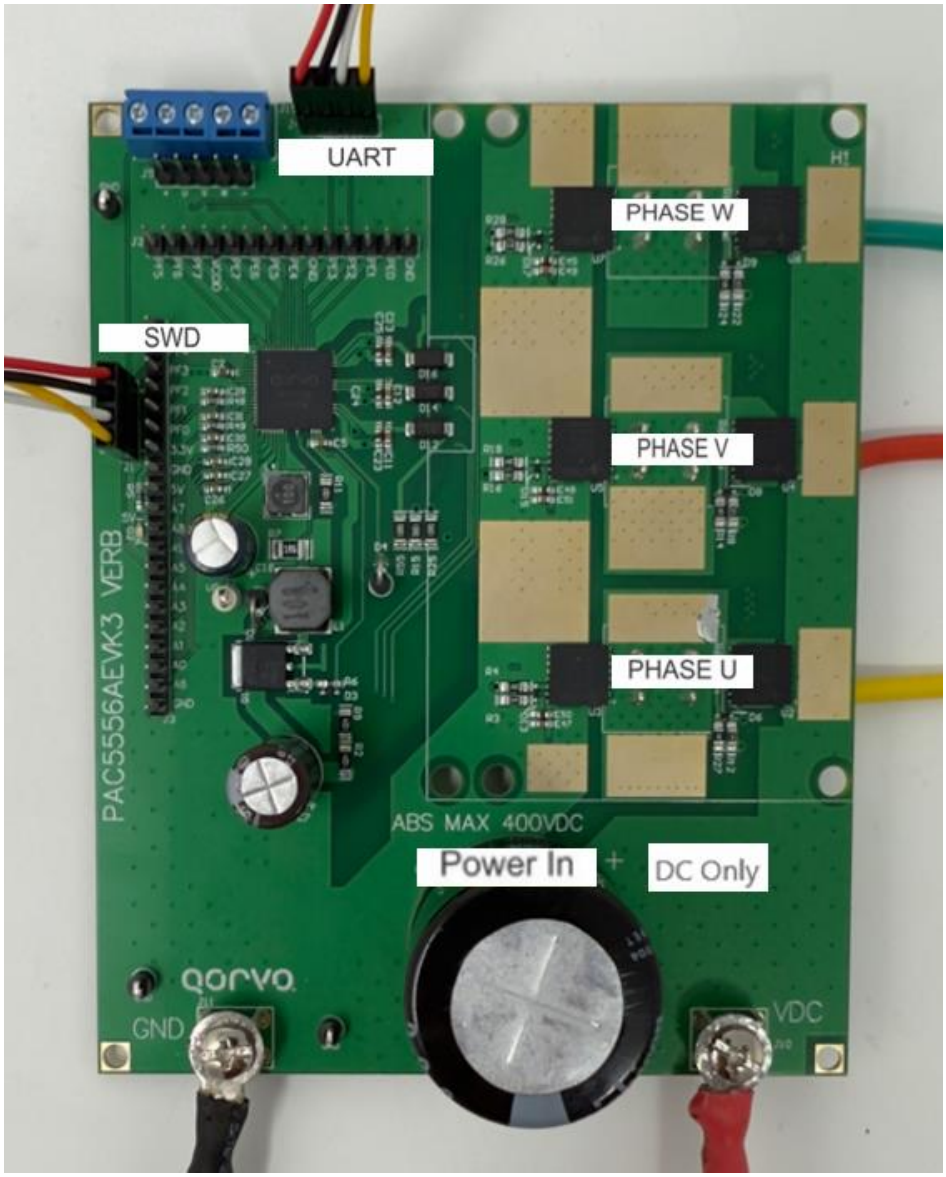
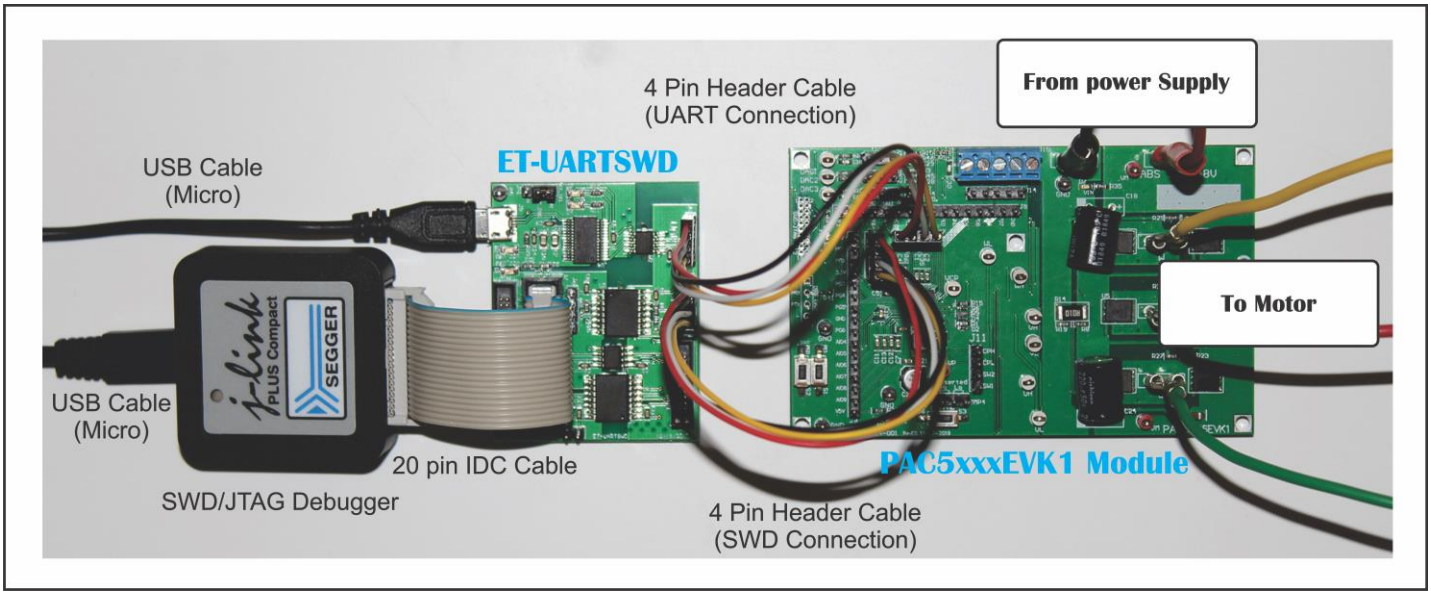


Figure 7: PAC5556AEVK3 Evaluation Module Connections

TYPICAL PAC5XXXXEVK SETUP



NOTE IDE Debugger not included. EVK module will vary.

PAC5556AEVK3 INCLUDED COMPONENTS

X1

PAC5556AEVKx Module

X1

ET-UARTSWD Module

X2

4 pin header cable

X1

USB Cable

REVISION HISTORY

Revision	Description
Rev 1.0	Initial release
Rev 1.1	Rev B EVK updates info

Contact Information

For the latest specifications, additional product information, worldwide sales and distribution locations:

Web: www.qorvo.com

Tel: 1-844-890-8163

Email: customer.support@qorvo.com

Important Notice

The information contained herein is believed to be reliable; however, Qorvo makes no warranties regarding the information contained herein and assumes no responsibility or liability whatsoever for the use of the information contained herein. All information contained herein is subject to change without notice. Customers should obtain and verify the latest relevant information before placing orders for Qorvo products. The information contained herein or any use of such information does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other intellectual property rights, whether with regard to such information itself or anything described by such information. **THIS INFORMATION DOES NOT CONSTITUTE A WARRANTY WITH RESPECT TO THE PRODUCTS DESCRIBED HEREIN, AND QORVO HEREBY DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO SUCH PRODUCTS WHETHER EXPRESS OR IMPLIED BY LAW, COURSE OF DEALING, COURSE OF PERFORMANCE, USAGE OF TRADE OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

Without limiting the generality of the foregoing, Qorvo products are not warranted or authorized for use as critical components in medical, life-saving, or life-sustaining applications, or other applications where a failure would reasonably be expected to cause severe personal injury or death.