



***Pearl2 PowerGEM[®] Module
(for use with AGIGARAM[®] DDR4 NVDIMM)***

Advanced Datasheet

AGIG9832-001JCA

Agiga Tech, Inc Confidential Information

Copyright © 2021 by AgigA Tech, Inc. All rights reserved.

AgigA Tech, Inc. owns all right, title and interest in the property and products described herein, unless otherwise indicated. No part of this document may be translated to another language or produced or transmitted in any form or by any information storage and retrieval system without written permission from AgigA Tech, Inc.

AGIGA TECH, INC, MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, OTHER THAN COMPLIANCE WITH THE APPLICABLE AGIGA TECH SPECIFICATION SHEET FOR THE PRODUCT AT THE TIME OF DELIVERY. IN NO EVENT SHALL AGIGA TECH BE LIABLE FOR ANY INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES AS A RESULT OF THE PRODUCT'S PERFORMANCE OR FAILURE TO MEET ANY ASPECT OF SUCH SPECIFICATION.

AGIGA TECH PRODUCTS ARE NOT DESIGNED OR INTENDED FOR USE IN LIFE SUPPORT APPLIANCES, DEVICES OR SYSTEMS WHERE A MALFUNCTION OF AN AGIGA TECH DEVICE COULD RESULT IN A PERSONAL INJURY OR LOSS OF LIFE. CUSTOMERS USING OR SELLING AGIGA TECH DEVICES FOR USE IN SUCH APPLICATIONS DO SO AT THEIR OWN RISK AND AGREE TO FULLY INDEMNIFY AGIGA TECH FOR ANY DAMAGES RESULTING FROM SUCH IMPROPER USE OR SALE.

Information contained herein is presented only as a guide for the applications of AgigA Tech products. AgigA Tech does not warrant this product to be free of claims of patent infringement by any third party and disclaims any warranty or indemnification against patent infringement. No responsibility is assumed by AgigA Tech for any patent infringement resulting from use of its products by themselves or in combination with any other products. No license is hereby granted by implication or otherwise under any patent or patent rights of AgigA Tech or others.

AgigA Tech, Inc. software and related documentation are available only under the terms of the AgigA Tech Software License Agreement.

Trademarks

AgigA Tech, AGIGARAM, PowerGEM and the AgigA logo are registered trademarks, and AGIGACAP and AGIGASAFE are trademarks of AgigA Tech, Inc. All other brand names, product names, trademarks, and registered trademarks are the property of their respective owners.

AgigA Tech, Inc. reserves the right to change or modify the information contained herein without notice. It is the customer's responsibility to ensure receipt of the most recent revision of the document. Contact AgigA Tech or visit our web site at www.agigatech.com.

AgigA Tech, Inc.

An Infineon Technologies Company
12230 World Trade Dr., Suite 200
San Diego CA 92128
E-mail: info@agigatech.com
<http://www.agigatech.com/>

Revision History

Document Control No.	Revision Date	Description of Changes
01	06/27/19	Initial Release
02	09/15/20	Updated log to IFX version Updated mechanical drawings Added screw and standoff section Updated block diagram Updated Capacitor Voltage and Capacitor Charge Current Added "ADVANCED" watermark

ADVANCED

1. Product Overview

The Pearl2 PowerGEM® (AGIGA9832-001JCA) is an advanced power module intended for use with an Agiga Tech DDR4 NVDIMM-N module (or another 3rd party DDR4 NVDIMM module incorporating the Agiga Controller or Universal PowerGEM Protocol). Pearl2 PowerGEMs have a single connector and utilize an ultrathin hybrid supercapacitor enabling a small form factor design while also providing the same long-term reliability as the EDLC Ultracapacitor-based PowerGEM families.

The single 6-pin connector connects via a cable to a supported DDR4 NVDIMM-N. Pearl2 takes 12 volts in provided over the NVDIMM-N edge connector and supplies a regulated output voltage to the NVDIMM during power fail operations. No other external system connections are required.

The PowerGEM uses a hybrid supercapacitor for energy storage because they offer high power density, quick charge time and long cycle life. The Pearl2 PowerGEM architecture is shown in Figure 1 below.

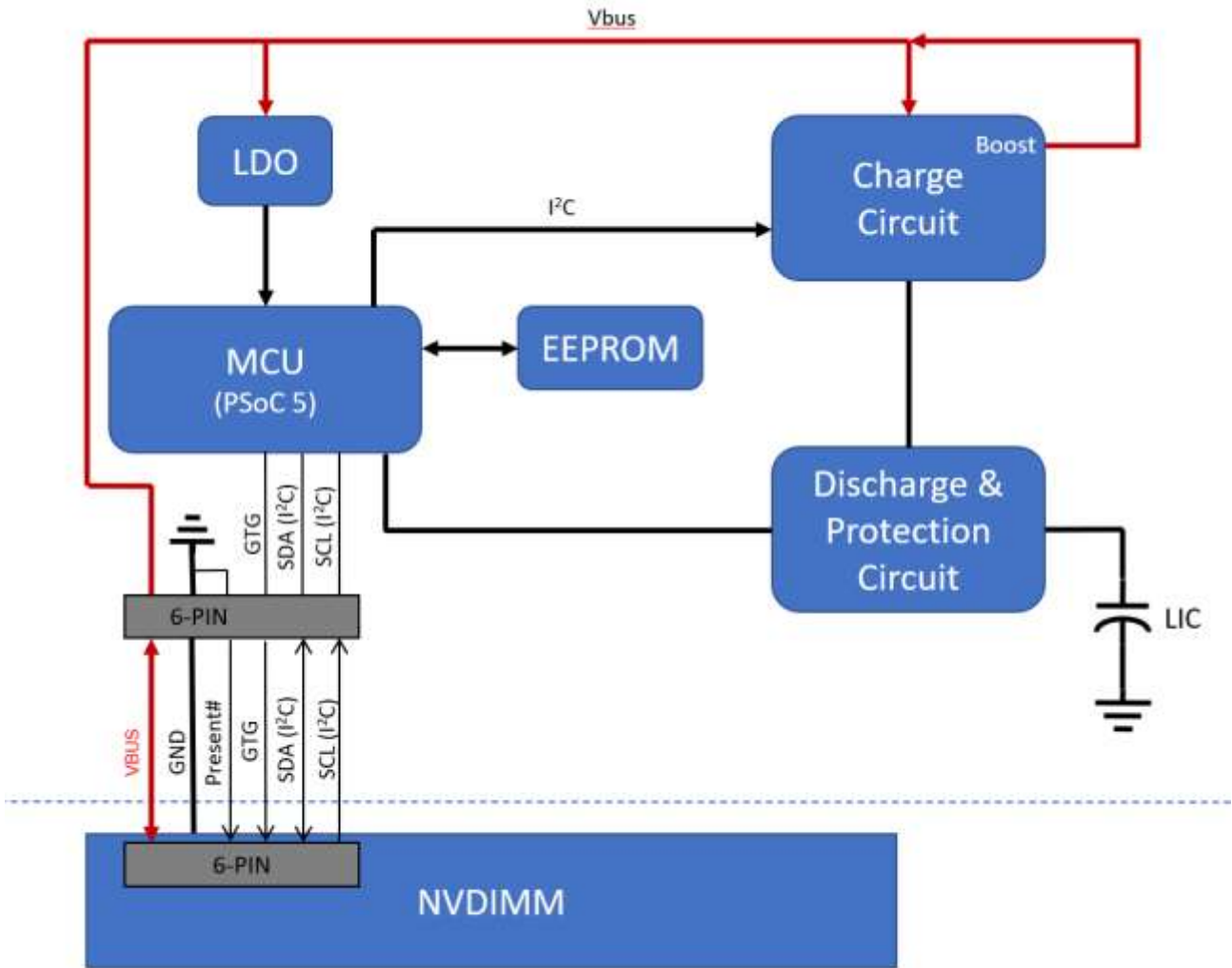


Figure 1. Simplified Pearl2 PowerGEM Block Diagram

2. Key Features

- Hybrid supercapacitor module
- One 355mm cable included (additional cable lengths are available for purchase separately)
- Provides back-up power to NVDIMM during SAVE operation in the event of system power loss
- Compatible with AGIGARAM DDR4 NVDIMMs or other 3rd party DDR4 NVDIMMs using the AgigA Controller (please contact AgigA for compatibility requirements)
- Real-time health monitoring and logging
- Safe online supercap measurement (never taken offline during normal operation)
- Hybrid supercap charged from 12V pins over DIMM interface
- Max charge current up to 2.2A to minimize charge time
- Energy Rating: 650J@25°C
- Operating Life*: 5 years @ 50°C
- Product Weight: 25g
- REACH and RoHS compliant
- UL/cUL/CB/CE compliant

* Typical, can be tailored to specific system requirements

3. Reference Documents

The Pearl2 PowerGEM is compatible with AGIGARAM DDR4 NVDIMM-Ns or other 3rd party DDR4 NVDIMM-Ns using the AgigA Controller or Universal PowerGEM Protocol. See the relevant Datasheets and Universal PowerGEM System Spec for details.

4. Electrical Characteristics

These numbers are based on the default voltage configuration for a Pearl2

Parameter	Symbol	Conditions	Min	Typ	Max	Units
INPUT CHARACTERISTICS						
Input Voltage Range	V_I	Over I_O range	10.2	12	13.8	V
Input Supply Current	$I_{S(VIN)}$	$V_{IN} = 12V$	-	-	1	A
OUTPUT CHARACTERISTICS						
Output Voltage Range	V_{out}	$V_{IN} = 0V$. Pearl2 supply voltage during NVDIMM backup.	4.75	5.0	5.25	V
Maximum Output Current Per Port	$I_{out-max}$	$V_{IN} = 0V$. Pearl2 supply current during NVDIMM backup.	-	-	1	A
CAPACITOR/ENERGY CHARACTERISTICS						
Capacitor Voltage	V_{CAP}	$V_{IN} = 12V$: Max V_{CAP} after fully charged state $V_{IN} = 0V$: Cap Voltage will drop to 2.5V and then shutoff to protect the cell (FW may shutoff before it drops down to 2.5V if it detects that there is no save operation triggered)	2.5	-	3.7	V
Capacitor Charge Current	I_{CAP}	Charge current is adjusted to meet max Input Supply Current and minimize charge time	-	-	2.2	A
Initial Effective Capacitance	C_{INIT}	This value is the result of a capacitance measurement commanded over I2C at time of manufacture at RT.	500			F
End of Life Effective Capacitance	C_{EOL}	This value is 70% of Initial Effective Capacitance at RT.	350			F
End Of Life Joules	$J_{EOL-USEABLE}$	Based on CEOL after 5 years at rated temp of 10°C and 25°C	450 @ 10°C 650 @ 25°C			J
Charge Time	T_{CHG}	Charge V_{cap} from 2.5V to 3.6V	900			sec

Max V_{CAP} after fully charged state, during health check, the capacitor voltage is raised for a short duration above the nominal operating voltage. This patented feature is to ensure that there is sufficient energy to complete a backup even when a capacitance measurement is in progress.

	MIN	TYP	MAX	Notes
Operating Temperature	10°C	25°C	50°C	
Storage Temperature	-25°C		+65°C	1, 2

[1] After 1000 hours storage, at 65°C without load, the PowerGEM shall meet the specified lifetime requirements. To minimize degradation, AgigA Tech suggests that the PowerGEM modules be stored in a temperature and humidity-controlled environment with the following conditions: Temperature: 20°C ~40°C, Humidity: <RH75%

[2] If storage temp is held at 20°C, it is recommended that the PowerGEM is recharged to the operating voltage after 2 years; If storage temp is held at 40°C or above, it is recommended that the PowerGEM is recharged to the operating voltage after 0.5 years.

5. LED Functional Description

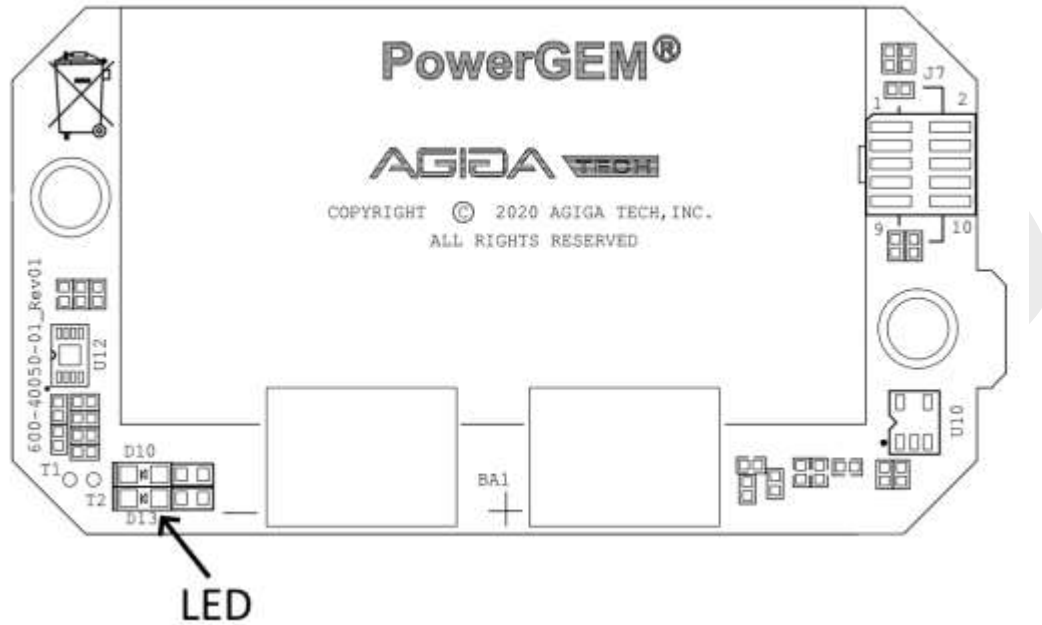


Figure 2. LED Location

LED	Behavior	Description
LED Green	Quick blinking	Caps are charging
	Slow blinking	Caps are discharging
	On	Caps are fully charged
LED Yellow	On	Indicates Failure

6. Pin Layout

Pinout for the 6-pin Master and Shared connectors to the NVDIMM:

Pin	Signal
1	NVDIMM_IIC_SCL
2	NVDIMM_IIC_SDA
3	PRESENT#
4	GTG
5	GND
6	VBUS

7. Pin Description

Signal Name	Signal Type	Pin Number	Pin Description
NVDIMM_IIC_SCL	Input	1	NVDIMM I2C slave interface, clock
NVDIMM_IIC_SDA	Input/Output	2	NVDIMM I2C slave interface, data I/O
PRESENT#	Output	3	The NVDIMM can read this signal to determine if the PowerGEM is present; Reading a low voltage level means PowerGEM is connected, reading a high voltage level means PowerGEM is not connected.
GTG	Output	4	Active High signal indicating that PowerGEM is operational, fully charged and ready to supply power to NVDIMM for a save operation during a Power failure.
GND	Power	5	Ground
VBUS	Power	6	This is a multifunction pin that provides 12V power from the host to the PowerGEM during normal operation and provides capacitor output voltage from the hybrid supercapacitor to the NVDIMM when there is a power loss scenario.

8. Mechanical

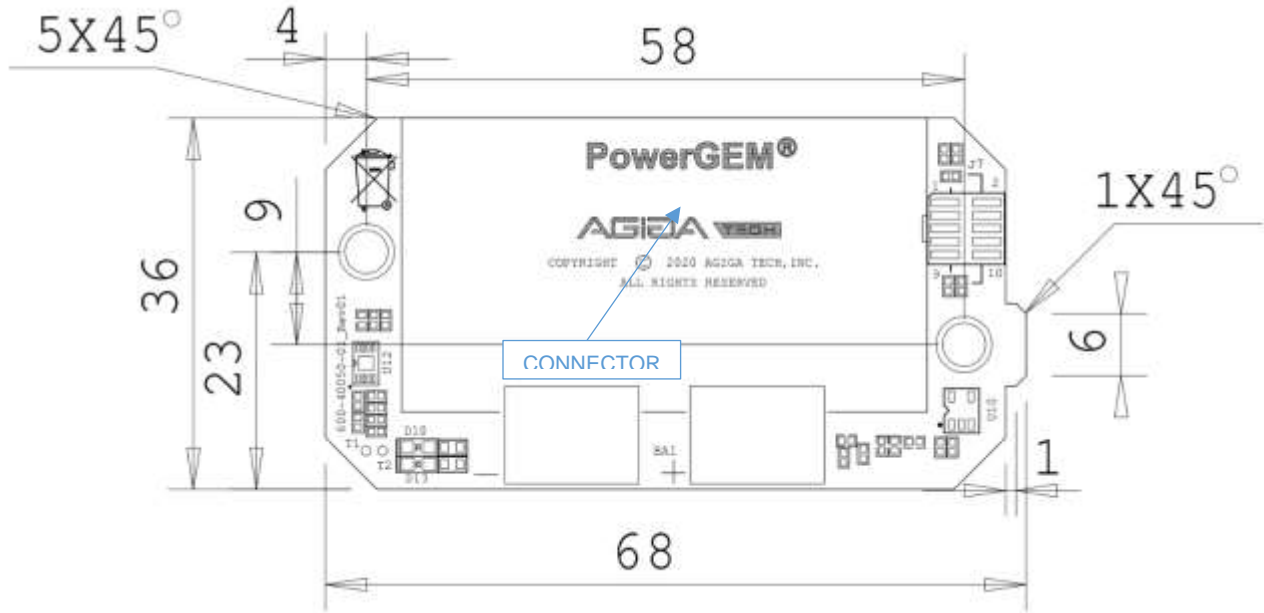


Figure 3. Mechanical Drawing (Top)



Figure 4. Mechanical Drawing (Bottom)

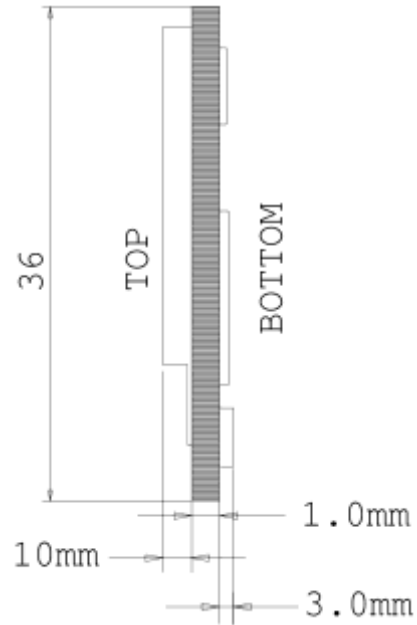


Figure 5. Mechanical Drawing (Side)

NOTE: All units are in “mm” unless otherwise specified.

9. Cable Spec

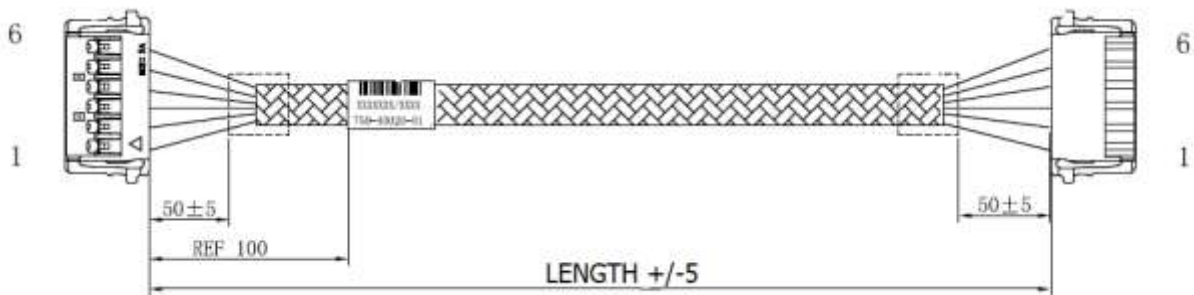
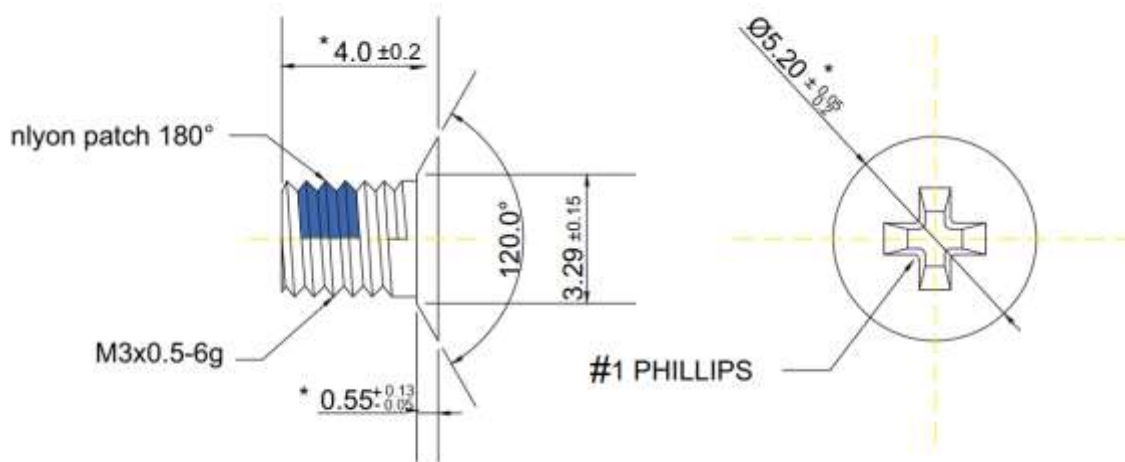


Figure 6. Cable Drawing

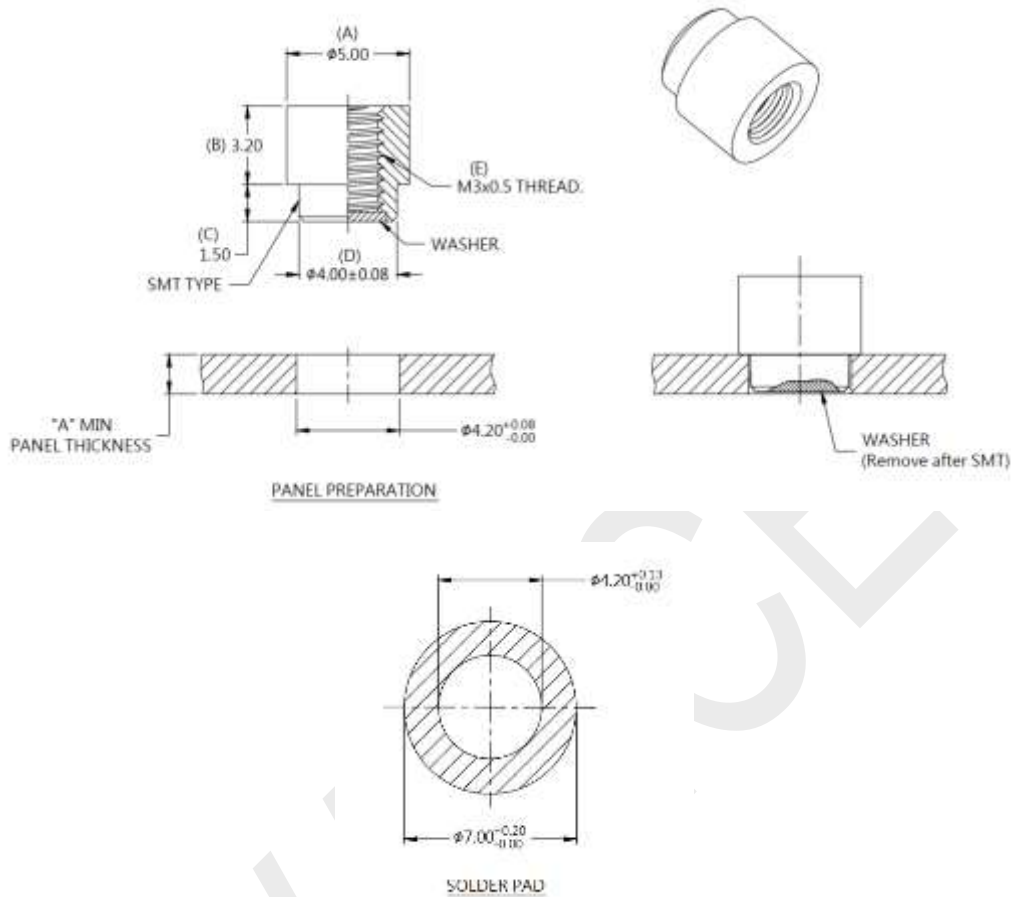
Length 355mm
Current rating 2.5A
Voltage rating 50V AC

10. Screw and Standoff Spec



NOTE: All units in "mm" unless otherwise specified.

Figure 7. Screw Drawing



NOTE: All units in “mm” unless otherwise specified.

Figure 8. Standoff Drawing

11. Ordering Part Numbers

PART NUMBER	DESCRIPTION	NVDIMM COMPATIBILITY*
AGIGA9832-001JCA	"Pearl2" PowerGEM - charge from 12V DIMM interface - 650 Joules rating @25°C for EOL - 355mm Cable Length (1)	River-16 16GB DDR4 NVDIMM (AGIGA8803-161BCA/BCB) River-32 32GB DDR4 NVDIMM (AGIGA8803-320BCA/BCB)

*Assumes AGIGARAM NVDIMM-Ns. 3rd party NVDIMM-N modules may have different power requirements.