

## Solid State Power Amplifier 18GHz~45GHz



### Features

- Solid State Power Amplifier
- Gain: 50dB Typical
- Output Power: +42dBm Typical

### Typical Applications

- Wireless Infrastructure
- Test and Measurement
- Military and Aerospace

Electrical Specifications,  $T_A = +25^{\circ}\text{C}$ ,  $V_{CC} = +24\text{V}$

Parameter	Min.	Typ.	Max.	Units
Frequency Range	18 – 45			GHz
Gain		50		dB
Gain Flatness		±5		dB
Gain Variation Over Temperature (-45 ~ +85)		+/- 5		dB
Input Return Loss		12		dB
Output Return Loss		15		dB
Output Power for 1 dB Compression (P1dB)		40		dBm
Saturated Output Power (Psat)		42		dBm
Supply Voltage	15	24	38	V
Supply Current (+15V) ( 12 AWG Wires required)		11	20	A
Supply Current (+24V)		7	14	A
Supply Current (+36V)		4.5	8	A
Isolation S12		-		dB
Input Max Power (No damage)	Psat – Gain			dBm
Weight	2.8/1.3			lbs/kg
Impedance	50			Ohms
Input / Output Connectors	RFLUPA18G45G32CDE - 2.40mm (Female)			
	RFLUPA18G45G32CDK - 2.92mm (Female)			
Finish	Nickel Plated			
Material	Aluminum / Copper			

\* P1dB, P3dB and Psat power testing signal: 200µs pulse width with 10% duty cycle.

\* For average CW power testing or increased duty cycle, a 5dB back off from Psat is required unless water/oil cooling system is applied.

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Absolute Maximum Ratings	
Supply Voltage	+38 VDC
RF Input Power (RFIN) Pin_max = Psat - Gainsat	Psat - Gain

Note: Maximum RF input power is set to assure safety of amplifier. Input power may be increased at own risk to achieve full power of amplifier. Please reference gain and power curves.

Biasing Up Procedure	
Step 1	Connect Ground Pin
Step 2	Connect input and output with 50 Ohm source/load. ( in band VSWR<1.9:1 or >10dB return loss)
Step 3	Connect VDC
Power OFF Procedure	
Step 1	Turn off VDC
Step 2	Remove RF connection
Step 3	Remove Ground.

### Environmental Specifications and Test Standards

Parameter	Description
Operational Temperature	-45°C~+55°C (Case Temperature less than +85°C)
Storage Temperature	-50°C~+125°C
Thermal Shock	-45°C → +85°C (5 Cycles / 10 hours)
Random Vibration	MIL-STD-202G Table 214-I, Test Condition Letter C 1.5 Hours Per Axis
High Temperature Burn In	Temperature +85°C for 72 Hours
Shock	1. Weight >20g, 50g half sine wave for 11ms, Speed variation 3.44m/s 2. Weight <=20g, 100g Half sine wave for 6ms, Speed variation 3.75m/s 3. Total 18 times (6 directions, 3 repetitions per direction).
Altitude	Standard: 30,000 Ft (Epoxy Sealed Controlled Environment) Optional: Hermetically Sealed (60,000 ft. 1.0 PSI min)
Hermetically Sealed (Optional)	MIL-STD-883 (For Hermetically Sealed Units)

Note: The operating temperature for the unit is specified at the package base. It is the user's responsibility to ensure the part is in an environment capable of maintaining the temperature within the specified limits

Ordering Information	
Part No.	Description
RFLUPA18G45G32CDE	18GHz~45GHz Power Amplifier with 2.4mm Female Connector
RFLUPA18G45G32CDK	18GHz~45GHz Power Amplifier with 2.92mm Female Connector

### Amplifier Use

Ensure that the amplifier input and output ports are safely terminated into a proper 50 ohm load before turning on the power. Never operate the amplifier without a load. A proper 50 ohm load is defined as a load with impedance less than 1.9:1 or return loss larger than 10dB relative to 50 Ohm within the specified operating band width.

#### Power Supply Requirements

Power supply must be able to provide adequate current for the amplifier. Power supply should be able to provide 1.5 times the typical current or 1.2 times the maximum current (whichever is greater).

In most cases, RF - Lambda amplifiers will withstand severe mismatches without damage. However, operation with poor loads is discouraged. If prolonged operation with poor or unknown loads is expected, an external device such as an isolator or circulator should be used to protect the amplifier.

Ensure that the power is off when connecting or disconnecting the input or output of the amp.

Prevent overdriving the amplifier. Do not exceed the recommended input power level.

Adequate heat-sinking required for RF amplifier modules. Please inquire.

Amplifiers do not contain Thermal protection, Reverse DC polarity or Over voltage protection with the exception of a few models. Please inquire.

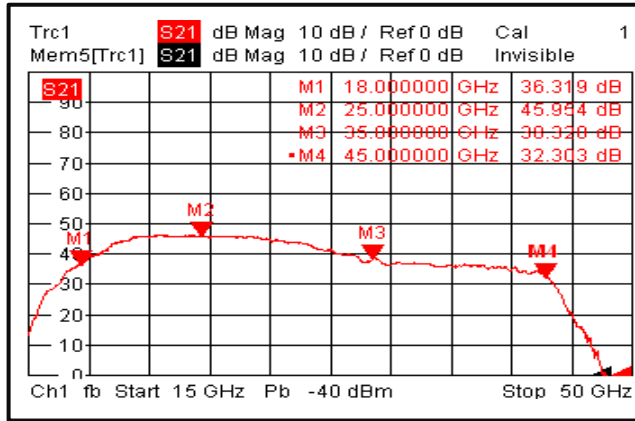
Proper electrostatic discharge (ESD) precautions are recommended to avoid performance degradation or loss of functionality.

#### What is not covered with warranty?

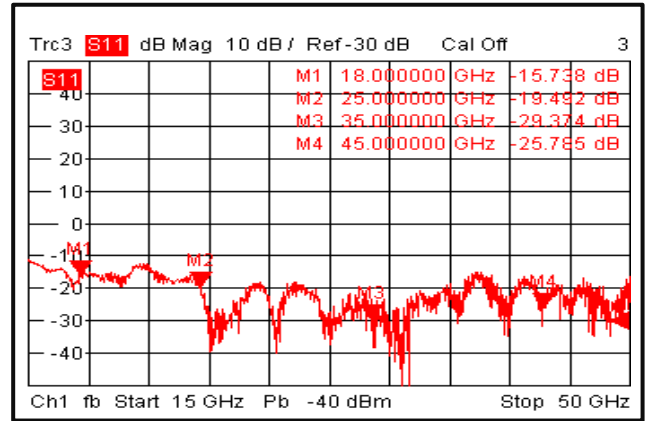
Each RF - Lambda amplifier will go through power and temperature stress testing. Since the die, ICs or MMICs are fragile, these are not covered by warranty. Any damage to these will NOT be free to repair.

**Typical Performance Plots**

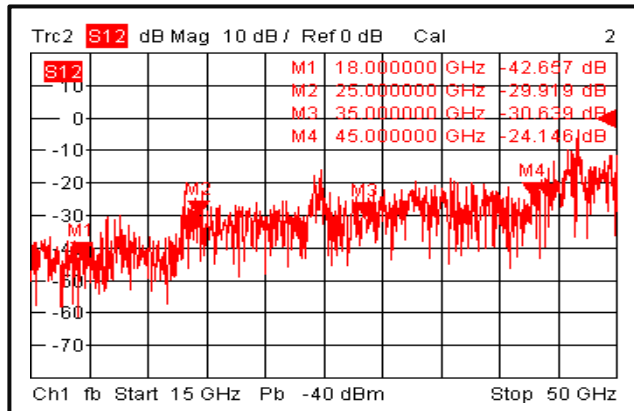
**Gain**



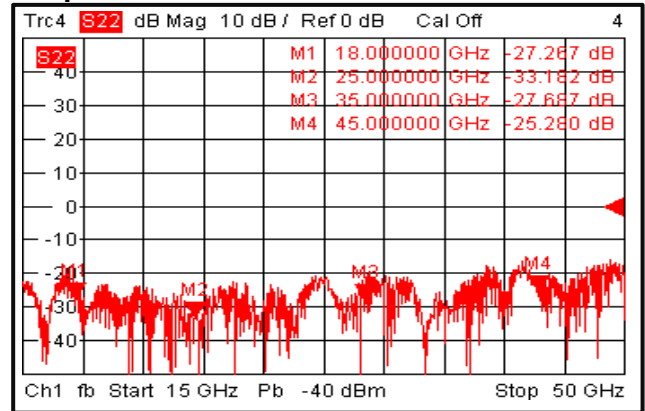
**Input Return Loss**



**Isolation**



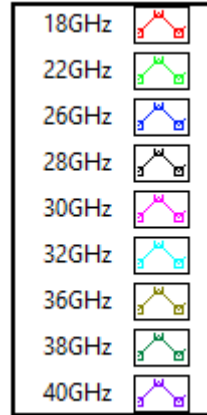
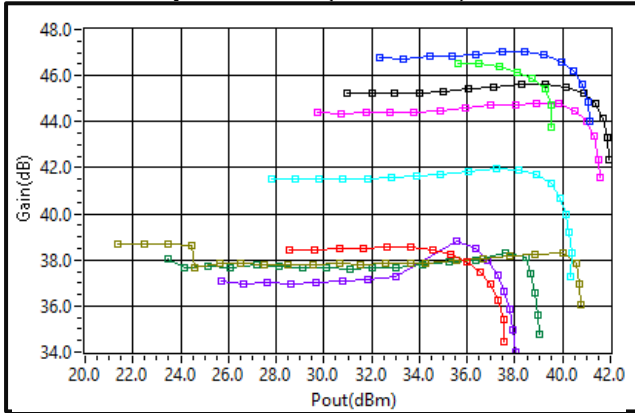
**Output Return Loss**



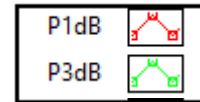
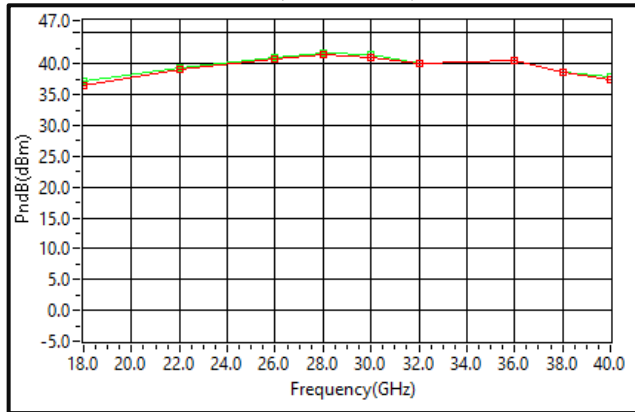
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Note: Input/output return loss measurements include attenuators to protect equipment

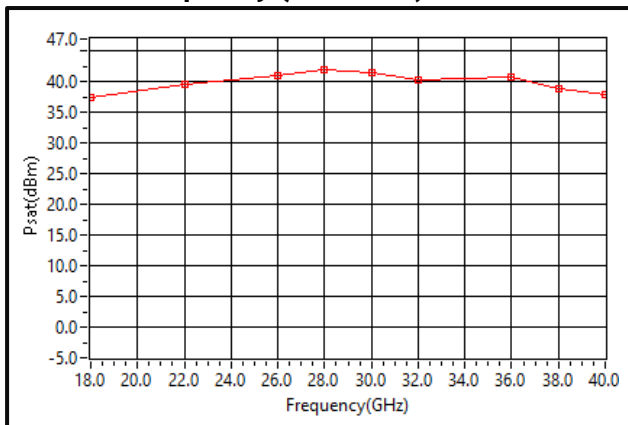
**Gain vs. Output Power (18-40GHz)**



**P1dB vs. Frequency (18-40GHz)**

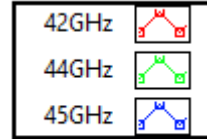
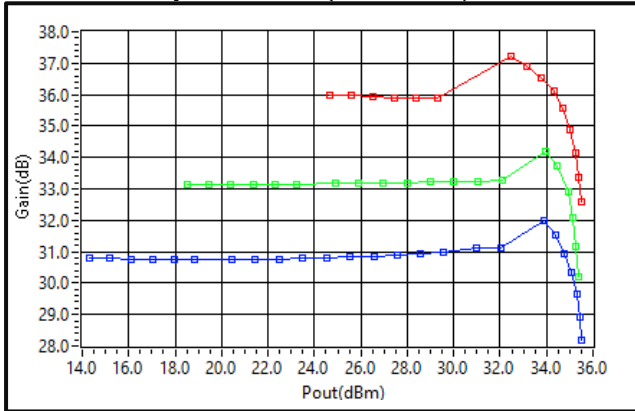


**P7dB vs. Frequency (18-40GHz)**

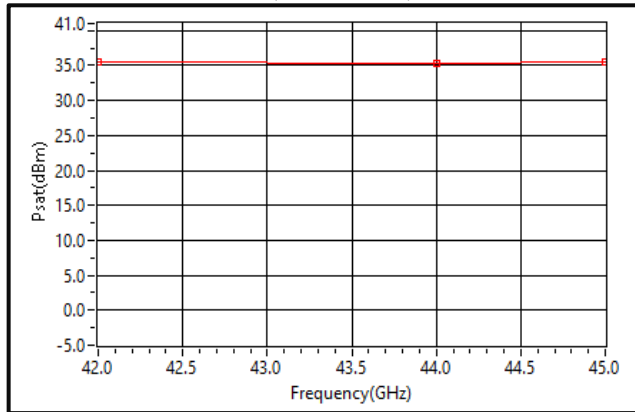


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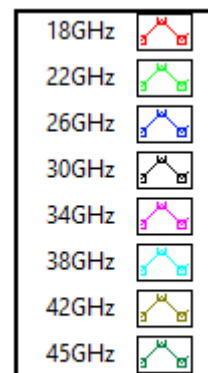
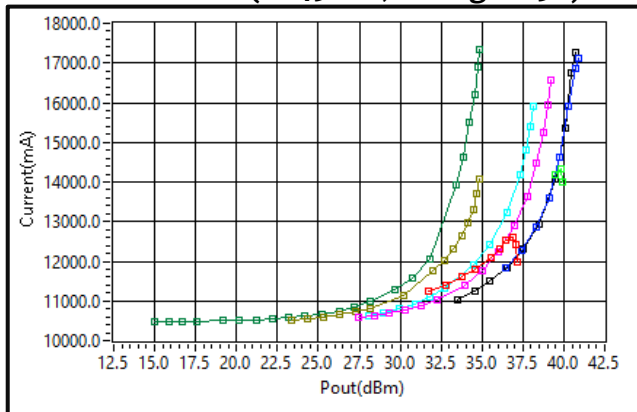
**Gain vs. Output Power (42-45GHz)**



**Psat vs. Frequency (42-45GHz)**

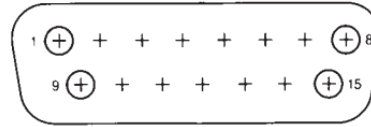


**Current vs. Pout (18-45GHz, Voltage +15V)**



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**Protection Connector Table:**

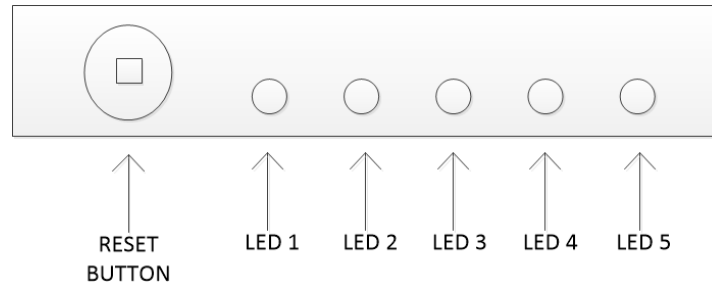


Pin #	Name	Function	Initial State	Description	Applied
1	Reset	Control		Resets PA when logic <u>LOW</u> is applied and released	Yes
2	Drain Disable	Control	LOW	Applying logic <u>HIGH</u> disables drains of amplifiers	Yes
3	Gate Disable	Control	LOW	Applying logic <u>HIGH</u> disables gates of amplifiers	Yes
4	RF IN Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when input signal is over limit	No
5	Temp Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when amplifier is driven over temperature	Yes
6	Current Over	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when drain current limit is reached	Yes
7	VDC	Power Supply	VDC	Supply Voltage (this pin is up to 5A, for high current applications please use the power connector, refer to page 9 of this datasheet)	Yes
8	VDC	Power Supply	VDC	Supply Voltage (this pin is up to 5A, for high current applications please use the power connector, refer to page 9 of this datasheet)	Yes
9	VSWR	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when output reflection is over limit	No
10	+5V	Power Supply	+5V	+5V DC is supplied for reference	Yes
11	GND	GND	GND	Ground	Yes
12	GND	GND	GND	Ground	Yes
13	GND	GND	GND	Ground	Yes
14	ID Imbalance	Indicator	LOW	Pin will be latched to logic <u>HIGH</u> when an imbalance in the drain current of the combining branches occurs	Yes
15	Temp Signal	Indicator		PA carrier case temperature is represented by voltage	Yes

HIGH/LOW voltages are standard TTL signals:  
0.0V-0.8V = LOW  
2V-5V = HIGH

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**Alarm Status Panel:**

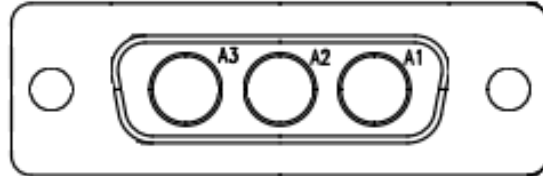


	Name	Function	Initial State	Description	Applied
	RESET	Control		Manual reset button to reset PA	Yes
LED 1	POWER	Indicator	RED Color	LED will light to <u>RED</u> color when supply power is applied	Yes
LED 2	RF IN	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when input signal is over limit *	No
LED 3	VSWR	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when output reflection is over limit *	No
LED 4	TEMP	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when driven over temperature *	Yes
LED 5	ID	Indicator	GREEN Color	PA will shut down and latch this LED to a <u>RED</u> color when an imbalance in the drain current of the combining branches occurs OR if a drain current limit is reached *	Yes

\*LED needs to be manually reset to initial state by pressing RESET button



Power Connector (Female, all dimensions are in mm):

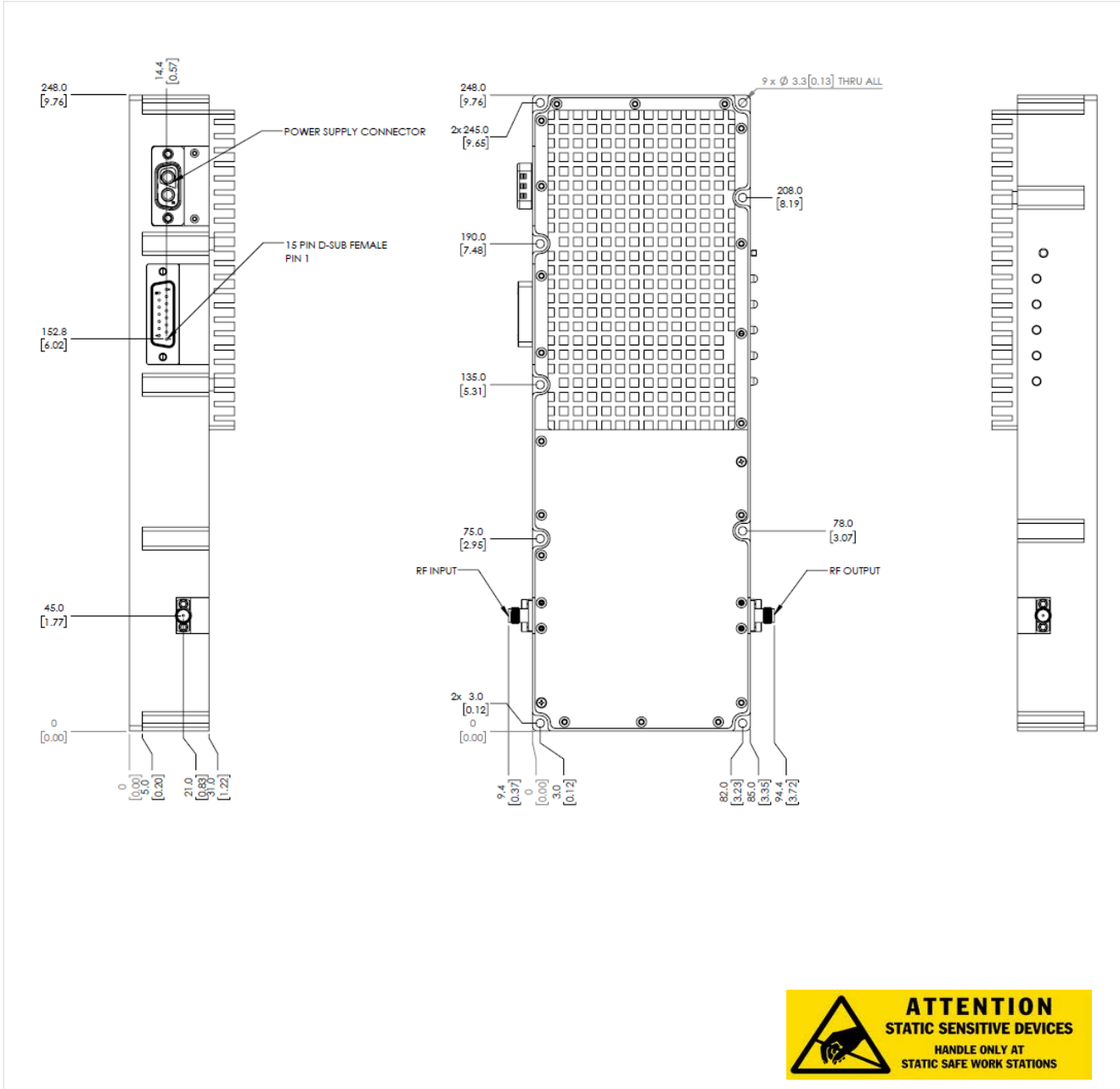


	Name	Function	Initial State	Description	Applied
A1	GND	GND	GND	GND (this pin is up to 20A)	Yes
A2	VDC	Power Supply	VDC	Supply Voltage (this pin is up to 20A)	Yes
A3	VDC	Power Supply	VDC	Supply Voltage (this pin is up to 20A)	Yes

12 AWG wire is required for high current applications.

**Outline Drawing:**

All Dimensions in mm [inches]



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**Important Notice**

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