



## 20 Watt GaN Power Amplifier with Integrated Heatsink and Cooling fan, 4400 MHz to 4900 MHz, Class AB, C-Band, 30% Efficiency, 28V, SMA

### TECHNICAL DATA SHEET

PE15A5080

The PE15A5080 is a Class AB high power amplifier with an integrated Heatsink/Cooling Fan assembly that operates in C-Band from 4400 MHz to 4900 MHz and generates 20 Watts of CW RF power and 2 Watts of linear power with 4% EVM @ 33 dBm. The module utilizes the latest Gallium Nitride (GaN) semiconductor technology with 15% to 30% power added efficiency. The amplifier package design features a small form factor <10in3 that's ideal for size, weight, and power (SWaP) constrained applications used in broadband RF telemetry, tactical communication, electronic warfare, and unmanned aircraft systems, as well as software defined radios. Impressive typical performance includes 48 dB of linear gain, 2.0:1 VSWR, +44 dBm third order intercept point, and low harmonic suppression of -25 dBc. Additionally with a nominal 0 dBm (1 mW) RF input power, the amplifier can provide 43 dB of gain and near-constant envelope waveforms. Operating voltage is +28 Vdc with 3.6A of DC current. Additional features include overvoltage protection, reverse voltage protection, and logic on/off control. The rugged Mil-Grade assembly supports female SMA RF input/output connectors and a micro-D 9 pin socket command control connector with an accessory cable assembly included. The integrated heatsink with cooling fan operates at +28Vdc and includes an accessory cable with banana plugs. The operating baseplate temperature range is -40°C to +85°C and the unit is guaranteed to withstand up to 95% relative humidity, altitude levels up to 30,000 ft, and random vibration and shock profiles (see chart below). Pasternak also offers an accessory Harmonic filter option, model PEHFL0001 that can be used at the output of the power amplifier. This lowpass RF filter has low insertion loss with power handling up to 50W and specifically designed to reduce harmonics at the output of transmitters operating at up through C-Band and offers rejection levels of greater than 20 dB from 8 GHz to 10 GHz. The filter is offered in a miniature SMA connectorized package.

#### Features

- 20W GaN High Power Amplifier
- Integrated Heatsink/Cooling Fan Assembly
- L Band Class AB Design
- Frequency Range: 4.4 to 4.9 GHz
- 48 dB linear Gain
- Input VSWR: 2:0:1
- +44 dBm IP3
- 2 Watts Linear, 4% EVM @ 33 dbm
- PAE: 15% to 30%
- Small Form Factor Rugged Mil-Grade Package
- 50 Ohm Design
- Female SMA RF Connectors
- +28Vdc @ 3.6A DC current
- -40°C to +85°C Operating Baseplate Temperature
- Harmonic Filter Accessory Option

#### Applications

- Broadband RF Telemetry
- RF Communications Systems
- Electronic Warfare - Airborne Electronic Attack
- Unmanned Aircraft Systems (UAS)
- Unmanned Ground Vehicles (UGV), Software Defined Radios
- Data Links
- Transmitters
- Test & Measurement
- Telecom Infrastructure

#### Electrical Specifications (TA = +25°C, DC Voltage = 28Volts, DC Current = 3.6A)

Description	Minimum	Typical	Maximum	Units
Frequency Range	4.4		4.9	GHz
Small Signal Gain		48		dB
Gain Flatness		±5		dB
Input Power (CW)		+0		dBm
Pout at Sat.	20			Watts
Efficiency (PAE)		25		%
Output Power at 1 dB Compression Point		+33		dBm
Output 3rd Order Intercept Point		+44		dBm

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Output Mismatch		10:1	
2nd Harmonics		-25	dBc
3rd Harmonics		-25	dBc
Impedance (Input)	50		Ohms
Impedance (Output)	50		Ohms
Input VSWR	2:1		
Switching Speed for On/Off Switch Gate		2	usec
Operating DC Voltage	27	28	32
Operating DC Current		3.6	A
Quiescent Current Biased (RF Enable On)		850	mA
Quiescent Current Unbiased (RF Enable Floating)		10	mA
Operating Temperature Range	-40		+85 °C

Performance by Frequency

Description	F1	F2	F3	Units
Frequency Condition	4.4	4.65	4.9	GHz
Output Power @ 1dB Compression, Typ	33	32	30	dBm
Small Signal Gain, Typ (@-30 dBm Input)	48	48	45	dB

Absolute Maximum Rating

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	6	A
Max RF Input Power, $Z_L = 50 \Omega$	15	dBm
Max Operating Temperature (ambient)	55	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	85	°C



ESD Sensitive Material,  
Transport material in  
Approved ESD bags.  
Handle only in approved  
ESD Workstation.

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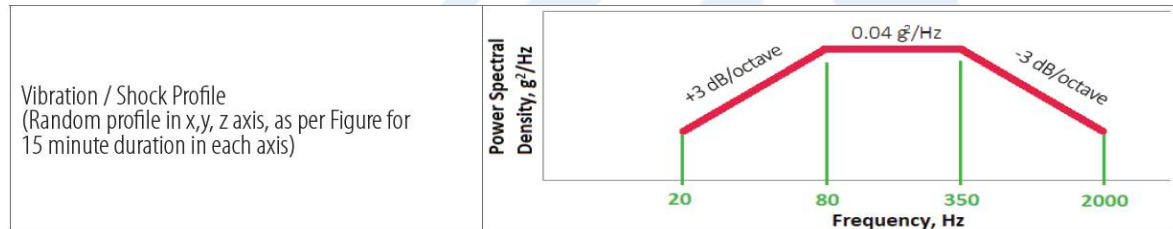
PE15A5080

**Mechanical Specifications**

**Size**

Length	4.5 in [114.3 mm]
Width	3.5 in [88.9 mm]
Height	0.61 in [15.49 mm]
Weight	1.8 lbs [816.47 g]
Input Connector	SMA Female
Output Connector	SMA Female
Bias Connector	9-Pin Micro-D Socket

**Environmental Specifications**



**Temperature**

Operating Range	-40 to +85 deg C
Storage Range	-55 to +85 deg C
Humidity	95% Non-Condensing
Altitude	MIL-STD-810F Method 5004

**Compliance Certifications** (see [product page](#) for current document)

**Plotted and Other Data**

Notes:

- Values at +25 °C, sea level

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**Amplifier Power-up Precautions**

- 1.) Confirm that proper ESD precautions and controls are always in place before handling any Amplifier module.
- 2.) Confirm adequate thermal management is in place to effectively dissipate heat away from the Amplifier package. The Amplifier operational baseplate temperature must be within the operational temperature range stated in the Amplifier datasheet. Depending on the design and thermal requirements, using a heatsink with cooling fan is always recommended for safe reliable operation. A heat sink without a cooling fan may also be used. Damage caused from overheating will void the warranty.
- 3.) Confirm adequate system grounding is established. The DC power supply and Amplifier must have a common ground in order to operate properly.
- 4.) Power Amplifiers may require additional DC Current when initially powered-up. Depending on the design, the input current draw could range from an additional 10% to 100% above the maximum rated DC current of the Amplifier. This varies based on product part number.
- 5.) Confirm the DC power supply, if limited, is set to allow for additional start-up current that's rated for the Power Amplifier.
- 6.) Confirm the system is designed and calibrated for 50 ohms. Any impedance mismatch may cause performance issues.
- 7.) Perform a CALIBRATION (if required) with the loads before connecting the Amplifier to the Network Analyzer to ensure proper performance.
- 8.) Use a fixed attenuator between the signal source and input port of the Amplifier to optimize the input VSWR match.
- 9.) Confirm the input power level at the input port of the amplifier does not exceed the maximum rated limit for input power (as stated in the Amplifier datasheet).  
 $P_{in}$  for Small Signal Gain = P1dB-SSG-10 dB  
 $P_{in}$  for P1dB = P1dB-SSG+1 dB
- 10.) Confirm the Network Analyzer is always connected to the Amplifier first before DC power is applied to the Amplifier.
- 11.) As long as the input and output ports of the amplifier are connected to a 50Ohm load and RF signal power is applied, the Amplifier can be powered up with DC voltage.
- 12.) Confirm the Amplifier output load is matched for a 50 Ohm impedance and will not exceed the maximum rated VSWR or Return Loss limit for the Amplifier. Exceeding the maximum rated VSWR or Return Loss limit will result in reflected signal power that could damage the Amplifier and void the warranty.
- 13.) **Power Amplifier connected to an Antenna for signal transmission** - It's strongly recommended to use a high power fixed attenuator pad or an Isolator between the output port of the Amplifier and input port to the antenna. Any reflected signal power due to impedance mismatch will likely damage the Amplifier and void the warranty.
- 14.) The attenuator or isolator used at the output port of the Amplifier must be rated to handle the output power level and operational frequency band of the amplifier.

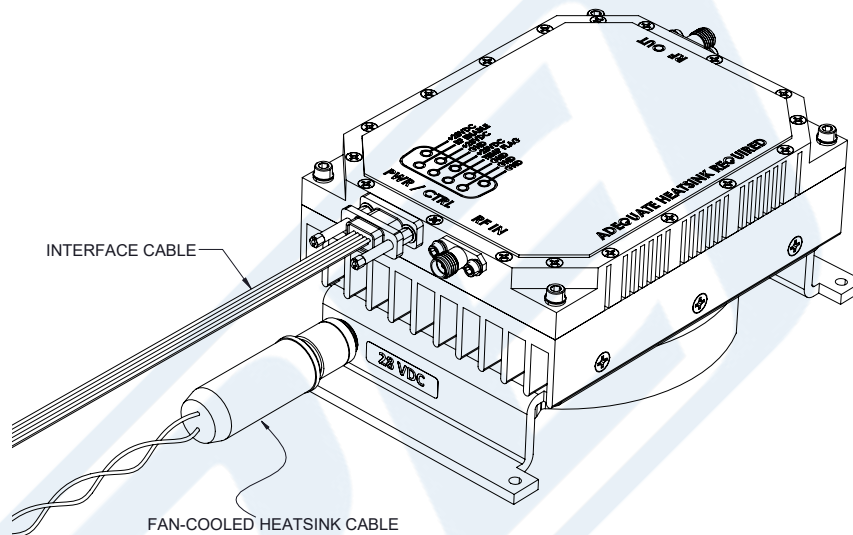
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**illustration of Amplifier & Heatsink.**

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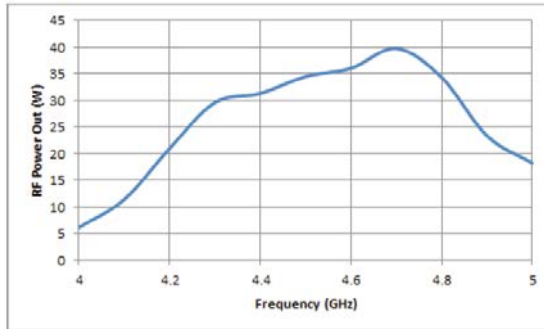
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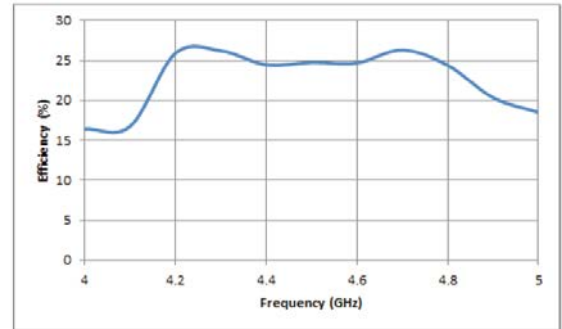
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Typical Performance Data

RF Power Out

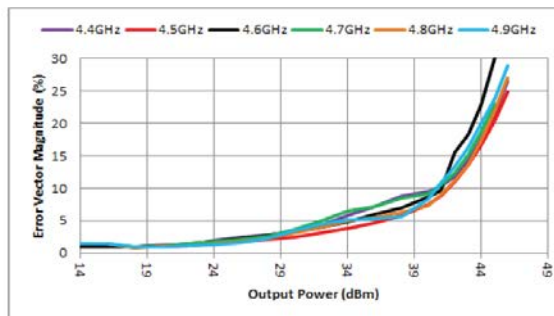


Efficiency



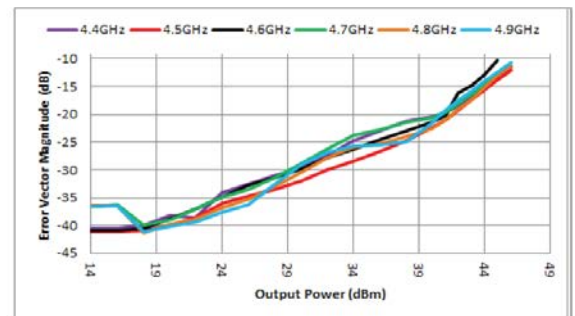
Error Vector Magnitude (%)

[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



Error Vector Magnitude (dB)

[Measured with 802.11g, 10 MHz BW, 16 QAM, 24 Mbps]



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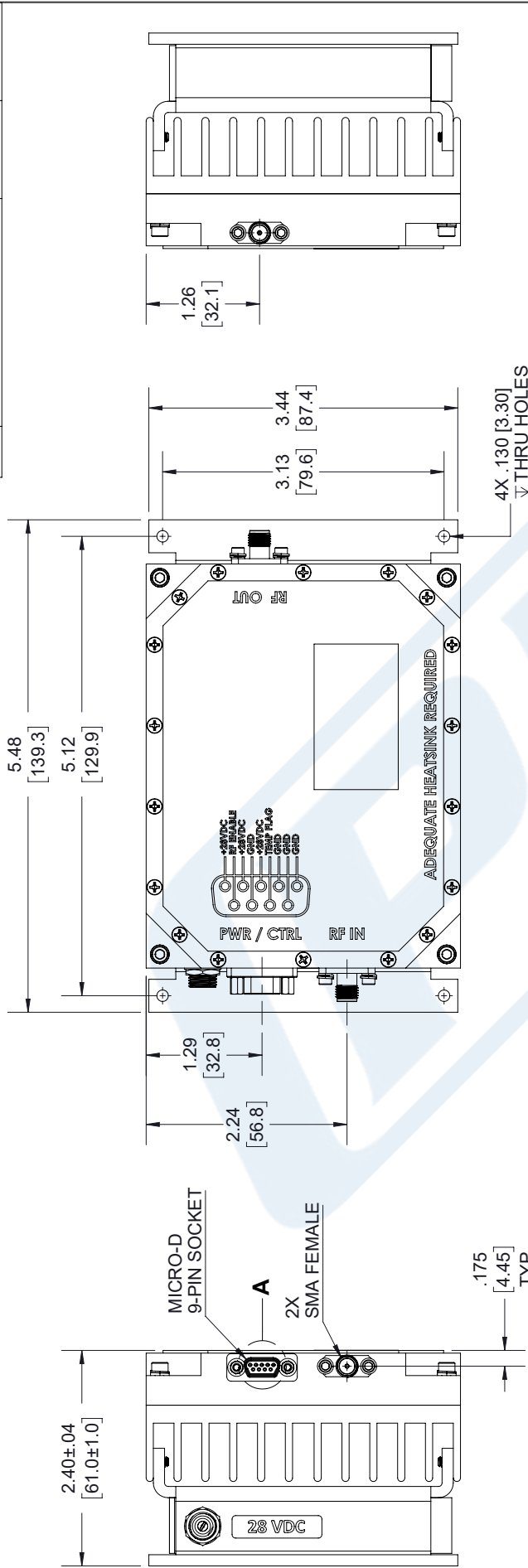
URL: <https://www.pasternack.com/48-db-gain-4.9-ghz-medium-power-high-gain-amplifier-sma-pe15a5080-p.aspx>

The information contained in this document is accurate to the best of our knowledge and representative of the part described herein. It may be necessary to make modifications to the part and/or the documentation of the part, in order to implement improvements. Pasternack reserves the right to make such changes as required. Unless otherwise stated, all specifications are nominal. Pasternack does not make any representation or warranty regarding the suitability of the part described herein for any particular purpose, and Pasternack does not assume any liability arising out of the use of any part or documentation.

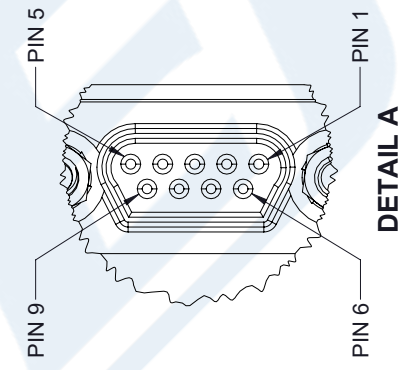
# PE15A5080 CAD Drawing

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REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	5/28/2020	T. GALLA



Pin #	I/O	Function
3,4,5	I	DC Power (+28 Volts)
1,2,6,8	I	Ground
7	0	Over Temperature Flag 0V = Temperature Fault +5V = No Fault
9	I	RF Enable 0V or GND = RF ON +5V or NC = RF OFF



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E-mail: sales@pasternack.com

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SCALE N/A

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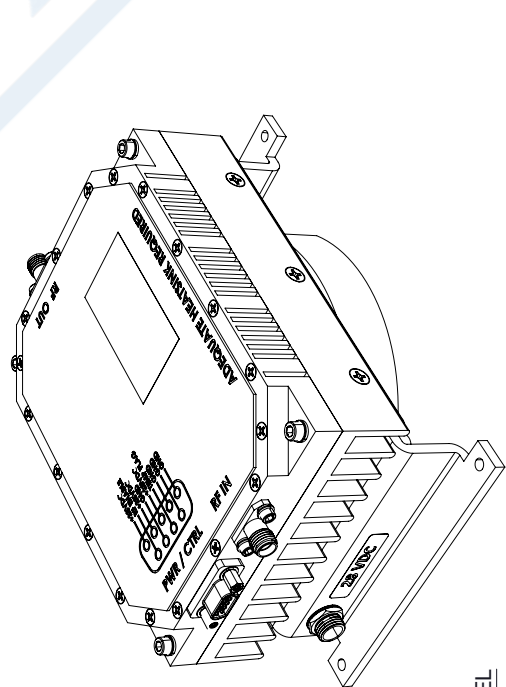
TOLERANCES:

.X = ±.2	[5.08]	FRACTIONS
.XX = ±.02	[.51]	± 1/32
.XXX = ±.005	[.13]	ANGLES ± 1°

CABLE LENGTH (L) TOLERANCES:

L ≤ 12	[305]	= +1 [25] / -0
12 [305]	< L ≤ 60 [1524]	= +2 [51] / -0
60 [1524]	< L ≤ 120 [3048]	= +4 [102] / -0
120 [3048]	< L ≤ 300 [7620]	= +6 [152] / -0
300 [7620]	< L =	+5% / L / -0

ALL DIMENSIONS SHOWN ARE FOR REFERENCE ONLY.



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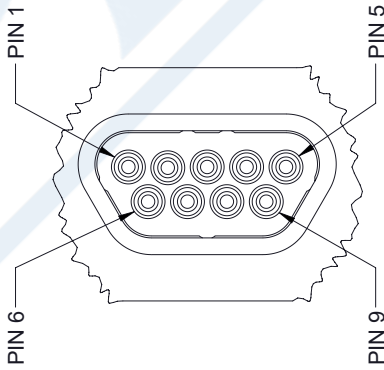
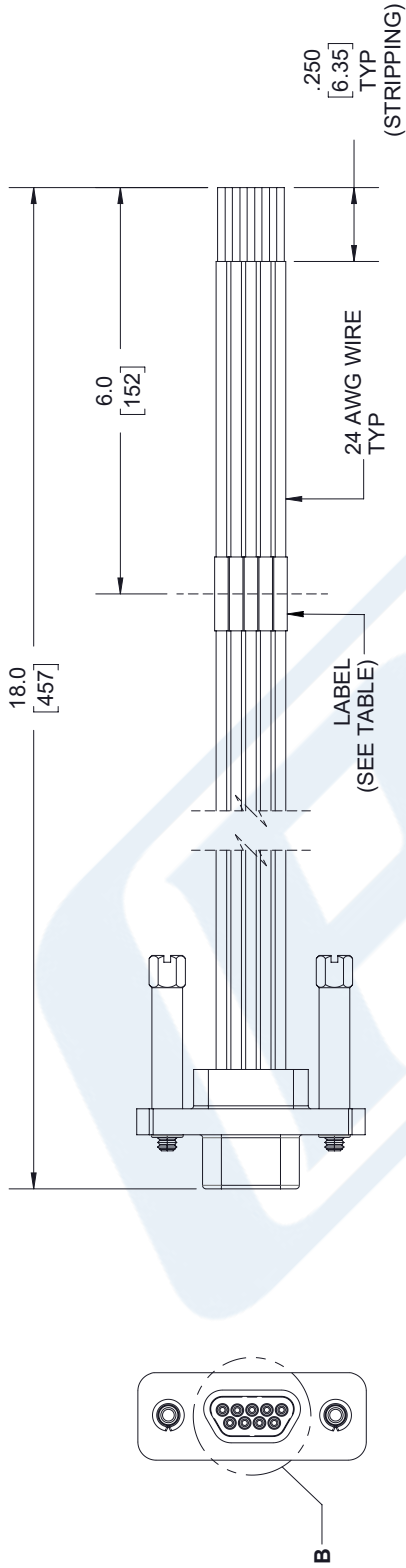
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## INTERFACE CABLE



Pin #	Wire Color	Label
1	Black	GND
2	Brown	GND
3	Red	+ 28V
4	Orange	+ 28V
5	Yellow	+ 28V
6	Green	GND
7	Blue	Temp Flag
8	Purple	GND
9	Gray	RF Enable

DETAIL B

UNLESS OTHERWISE SPECIFIED LEADING DIMENSIONS ARE INCHES DIMENSIONS IN [ ] ARE MILLIMETERS

TOLERANCES:  
 .X = ±.2 [5.08] FRACTIONS ± 1/32  
 .XX = ±.02 [.51] ANGLES ± 1°  
 .XXX = ±.005 [.13] CABLE LENGTH (L) TOLERANCES:  
 L ≤ 12 [305] = +1 [25] / -0  
 12 [305] < L ≤ 60 [1524] = +2 [51] / -0  
 60 [1524] < L ≤ 120 [3048] = +4 [102] / -0  
 120 [3048] < L ≤ 300 [7620] = +6 [152] / -0  
 300 [7620] < L = +5% / L / -0

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ITEM NO. PE15A5080  
DRAWN BY K.DANG  
CAGE CODE A 53919  
SCALE N/A  
SHEET 2 OF 4

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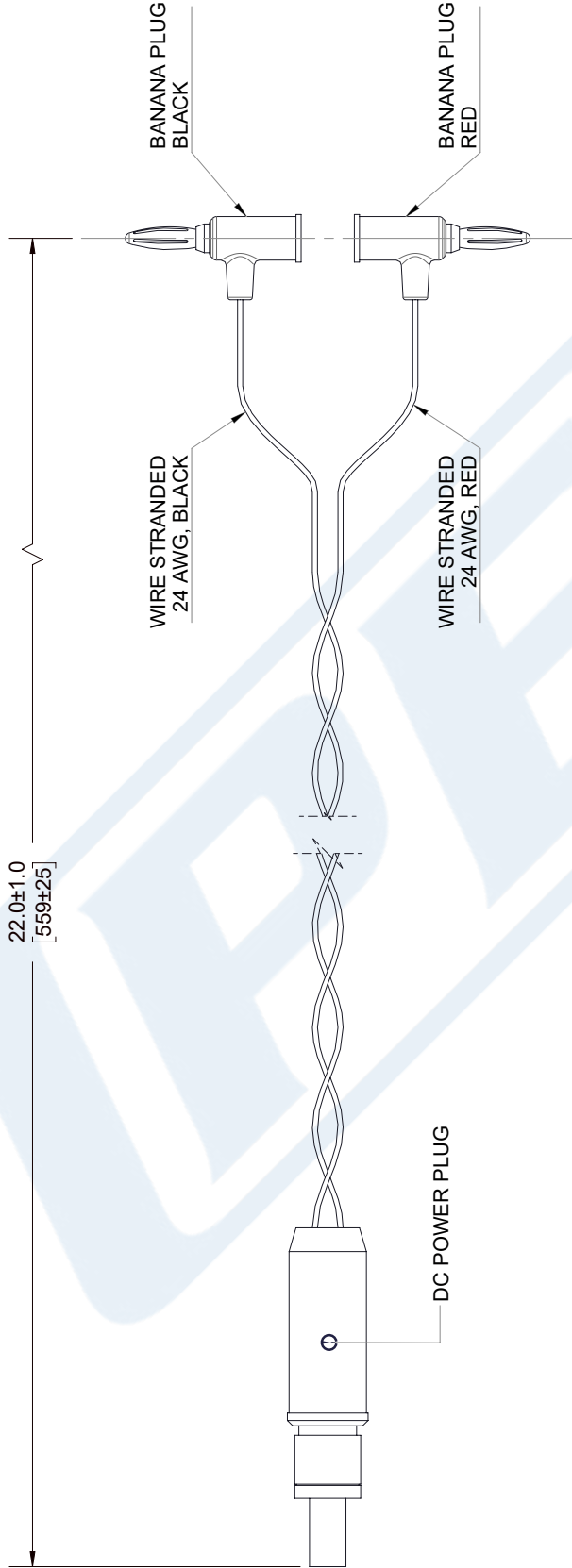
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## FAN-COOLED HEATSINK CABLE



UNLESS OTHERWISE SPECIFIED  
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DIMENSIONS IN [ ] ARE MILLIMETERS

**TOLERANCES:**

.X = ± .2	[5.08]	FRACTIONS
.XX = ± .02	[.51]	± 1/32
.XXX = ± .005	[.13]	ANGLES ± 1°

**CABLE LENGTH (L) TOLERANCES:**

L ≤ 12	[305]	= +1 [25] / -0
12 [305] < L ≤ 60	[1524]	= +2 [51] / -0
60 [1524] < L ≤ 120	[3048]	= +4 [102] / -0
120 [3048] < L ≤ 300	[7620]	= +6 [152] / -0
300 [7620] < L ≤ ∞		= +5% / L / -0

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SIZE: A CAGE CODE: 53919 DRAWN BY: K.DANG ITEM NO: PE15A5080

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