PASTERNACK
an INFINITE brand

C-Band GaN BiDirectional Amplifier, 4.4 GHz to 5.1 GHz 10W Psat, 20% Efficiency, 2 usec Switching, 10dB Tx Gain, Manual T/R Control, SMA

TECHNICAL DATA SHEET PE15B5005

The PE15B5005 is a Class AB high power Bi-Directional Amplifier that operates in C-Band from 4400 MHz to 5100 MHz. This amplifier generates 10 Watts typical Psat RF output power to boost performance of datalinks and transmitters. The module utilizes the latest Gallium Nitride (GaN) semiconductor technology with 20% power efficiency. The package design features a small form factor that's ideal for size, weight, and power (SWaP) constrained applications used in broadband RF telemetry, tactical communication, electronic warfare, and unmanned aircraft and ground systems, as well as software defined radios. Impressive typical performance includes 10 dB of transmit gain, 10 dB of receive gain, 2 µsec switching speed, and low harmonic suppression of -20 dBc. Additionally, with a nominal +30 dBm (1 Watt) RF input power, the amplifier can provide 10 dB of gain from 4.4 to 5.1 GHz for continuous wave (CW) and near-constant envelope waveforms. Operating voltage is +28 Vdc with 1.75A of DC current. Additional features include manual T/R control, single power supply, and overvoltage protection. For TTL logic on/off control, transmit mode uses 0V or ground, and receive mode uses N/C or +3.3V. 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 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 PE15B5005 bidirectional power amplifier. This lowpass RF filter covers 2.5 to 6 GHz 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

- Bi-Directional GaN High Power Amplifier
- 10W Psat Output Power
- C Band Class AB Design
- Frequency Range: 4.4 GHz to 4.9 GHz
- 10 dB Transmit Gain
- 10 dB Receive Gain
- Manual T/R Control
- Switching Speed 2 usec
- PAE: 20%
- Small Form Factor Rugged Mil-Grade Package
- 50 Ohm Design
- Female SMA RF Connectors
- +28Vdc @ 1.75A DC Current
- +3.3V TTL Logic Control
- -40°C to +85°C Operating Baseplate Temperature
- Output Harmonic Filter Accessory Option

Applications

- Unmanned Aircraft (UAS) Group 2 &3
- Unmanned Ground Vehicles (UGV)
- RF Telemetry
- RF Communications Systems
- Software Defined Radios
- Data Links
- Transmitters
- Test & Measurement
- Telecom Infrastructure

Electrical Specifications (TA = +25°C, DC Voltage = 28Volts DC Current = 1.75A)

Transmit

Description	Minimum	Typical	Maximum	Units
Frequency Range	4.4		5.1	GHz
Psat Output Power*	8	10		Watts
2nd Harmonics			-20	dBc
3rd Harmonics			-20	dBc
Operating DC Voltage	27	28	32	Volts
Current Draw		1.75		A

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Phone: (866) 727-8376 or (949) 261-1920 • **Fax:** (949) 261-7451
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Quiescent Current (biased)	400		mA
Switching Time	2		uSec
Efficiency	20		%
Output Mismatch VSWR		10:1	
Input VSWR	2:1		

*+30 dBm Input Power

Receive

Description	Minimum	Typical	Maximum	Units
1 dB Compression Point		+18		dBm
3rd Order Intercept Point		+27		dBm
Maximum RF Input Power		+5*		dBm
Gain		10		dB
Gain Flatness		±1		dB
Noise Figure		3		dB
Current Draw		45		mA

*Input Receive Protection (Limiter)

Protections

Receive Protection (Limiter)

Parameter	Rating	Unit
Max Device Voltage	32	V
Max Device Current	2.2	A
Max RF Input Power @ ANT Port, Z_L = 50 Ω	+30	dBm
Max RF Input Power @ XCVR Port, Z_L = 50 Ω	+35	dBm
Max Operating Temperature (ambient)	60	°C
Max Operating Temperature (baseplate)	85	°C
Max Storage Temperature	100	°C

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

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Mechanical Specifications

Size

Length	3.57 in [90.68 mm]
Width	2.57 in [65.28 mm]
Height	0.5 in [12.7 mm]
Weight	0.35 lbs [158.76 g]
RF Connector (Input)	SMA Female
RF Connector (Output)	SMA Female
DC Connector	Micro-D, 9-Pin Socket

Environmental Specifications

Vibration Amplitude	4 Hz - 15 Hz	A	0.024	0.030	0.036	in
	16 Hz - 25 Hz	A	0.016	0.020	0.024	in
	26 Hz - 33 Hz	A	0.008	0.010	0.012	in
Shock Peak Acceleration (Functional Shock)				30 g for 15 ms		
				20 g for 20 ms		

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Temperature	
Operating Range	-40 to +85 deg C
Storage Range	-60 to +100 deg C
Humidity	95%
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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TECHNICAL DATA SHEET PE15B5005

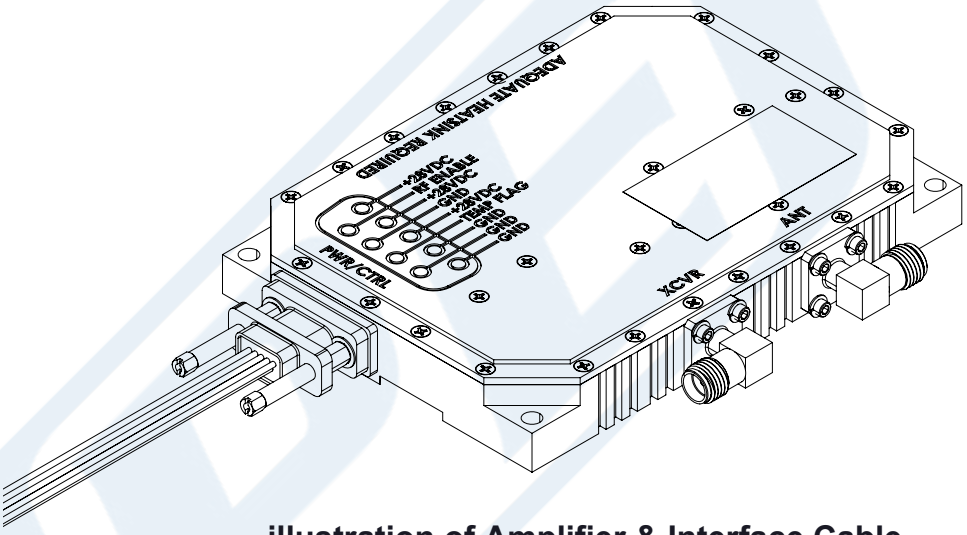

illustration of Amplifier & Interface Cable

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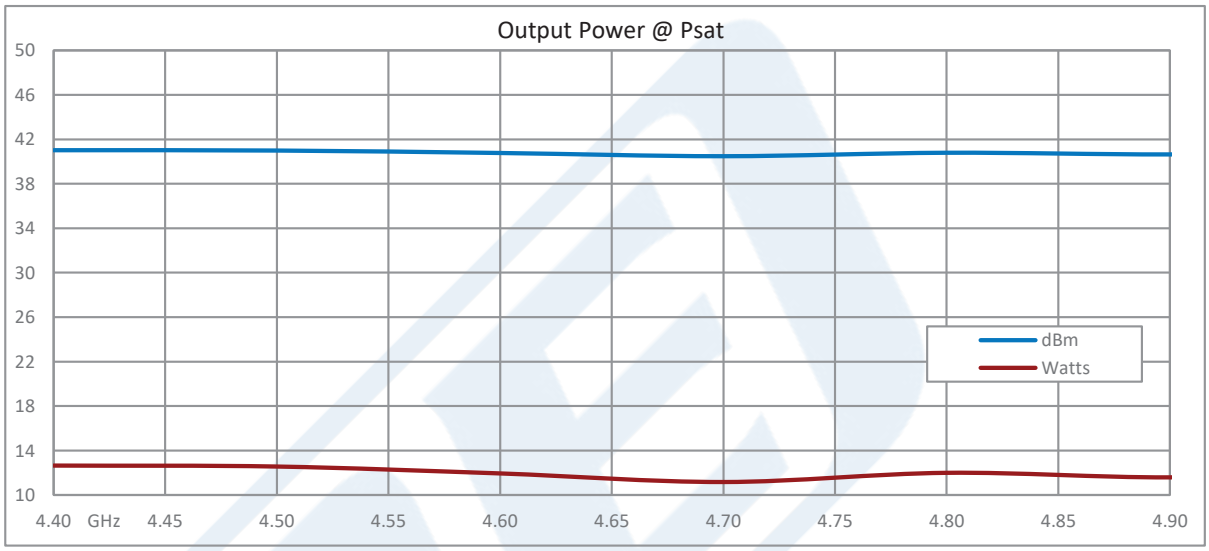
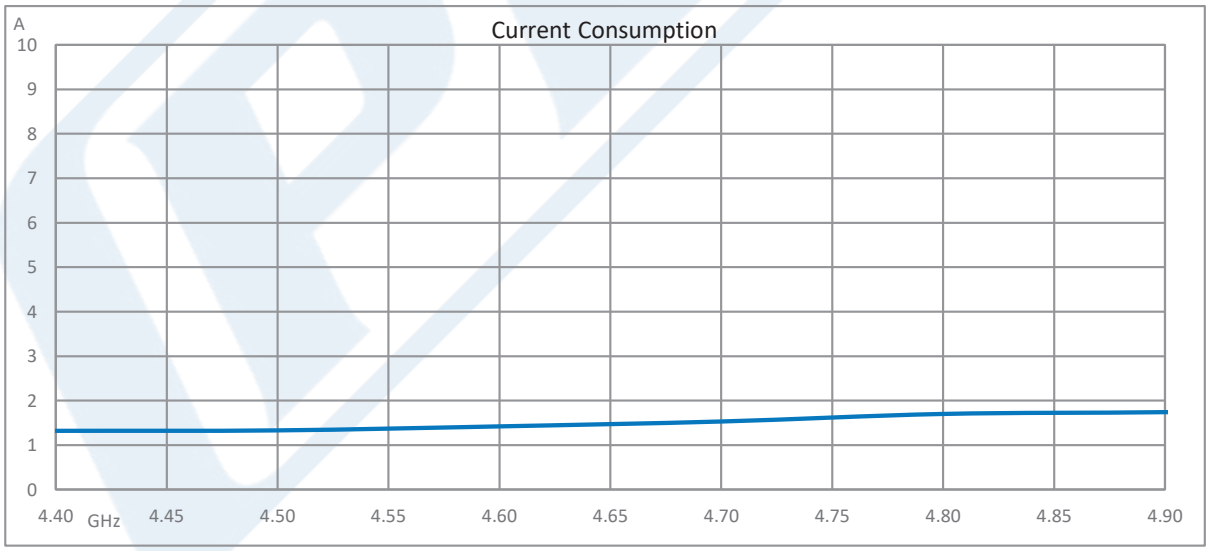
Typical Performance Data





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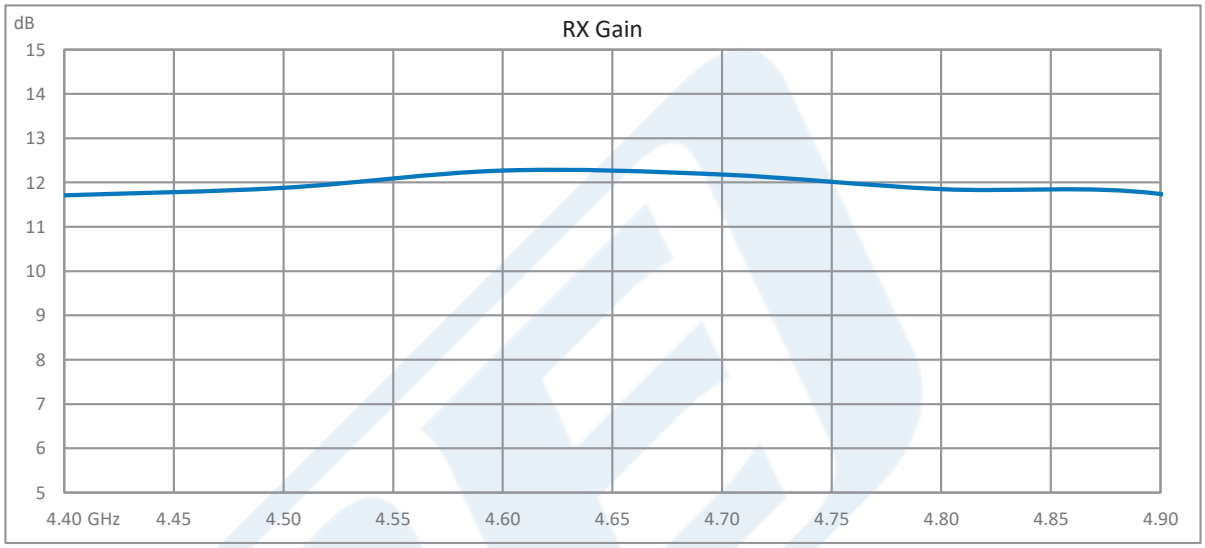

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URL: https://www.pasternack.com/high-power-bi-directional-amplifier-10-watts-5.1-ghz-sma-pe15b5005-p.aspx

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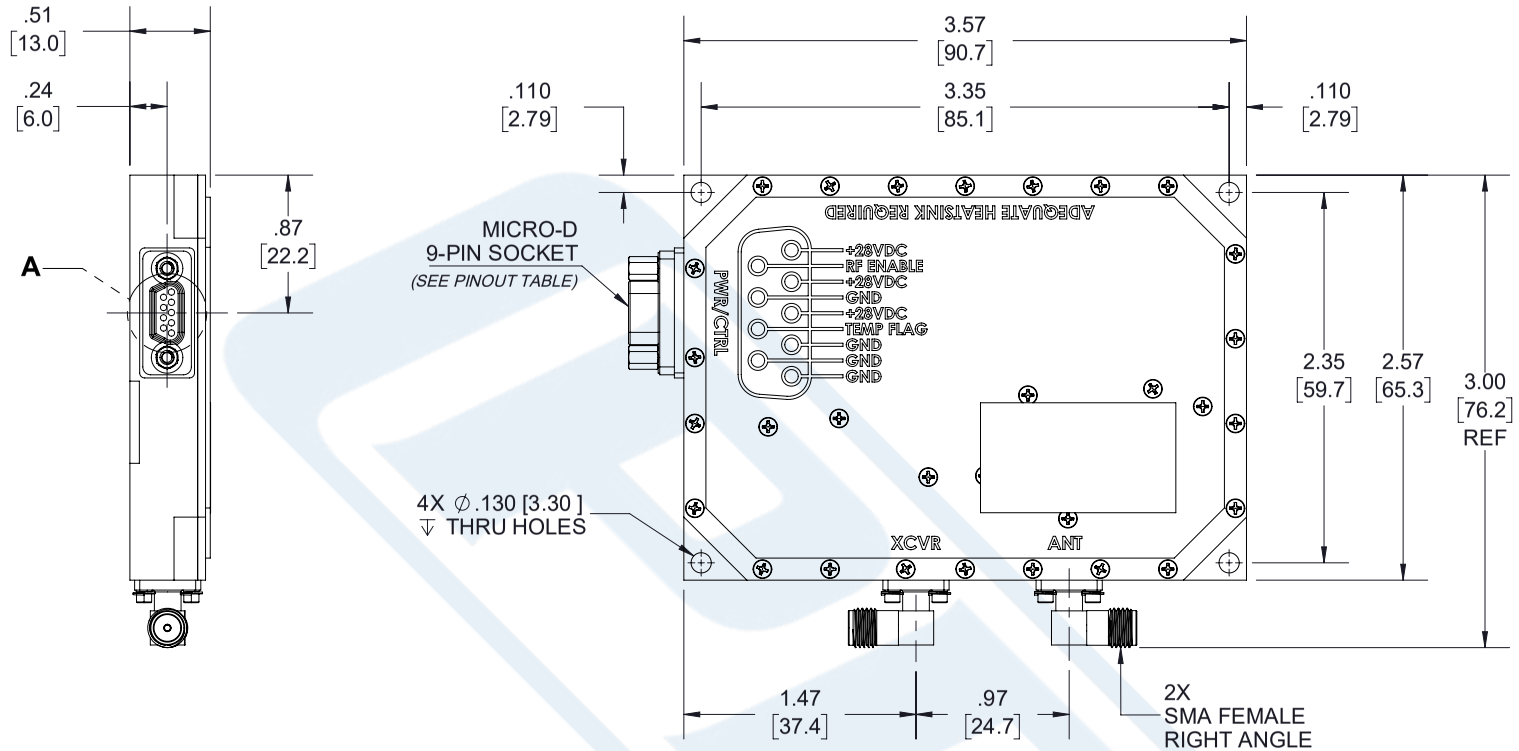
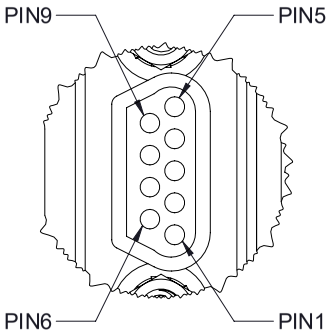
PE15B5005 CAD Drawing

C-Band GaN BiDirectional Amplifier, 4.4 GHz to 5.1 GHz 10W Psat, 20% Efficiency, 2 usec Switching, 10dB Tx Gain, Manual T/R Control, SMA

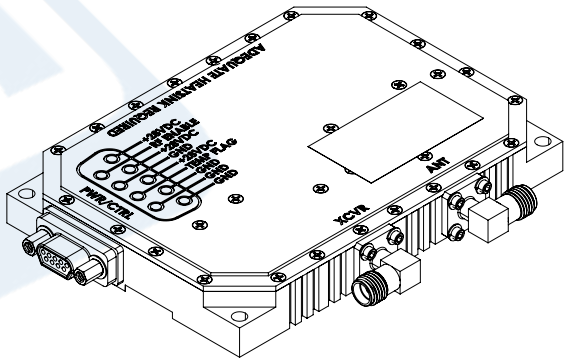
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
A	INITIAL RELEASE	5/28/2020	T.GALLA





DETAIL A

Pinout		
Pin #	**I/O**	**Function**
1,2,6,8	I	GND
3,4,5	I	DC Power (+28VDC)
7	0	Over Temperature Flag 0V = Temperature Fault + 5V = No Fault
9	I	T/R Control (+3.3V Logic) Manual Mode 0V or GND = TX NC or +3.3V = RX



LABEL

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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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THIRD-ANGLE PROJECTION

SHEET 1 OF 3
SCALE N/A

SIZE	CAGE CODE	DRAWN BY	ITEM NO.	REV
A	53919	K.DANG	PE15B5005	A

PE15B5005 CAD Drawing

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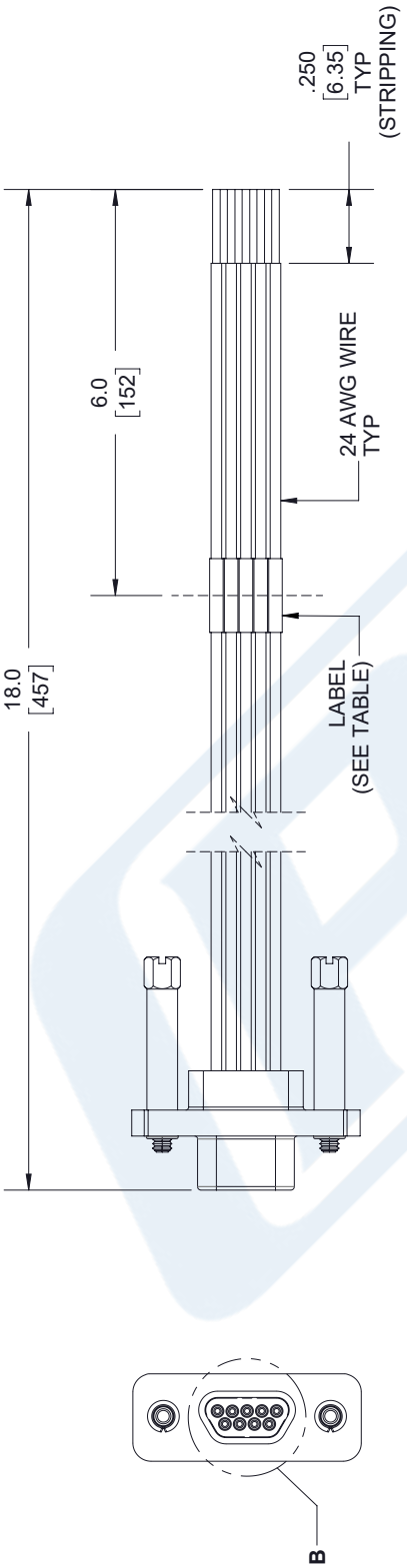
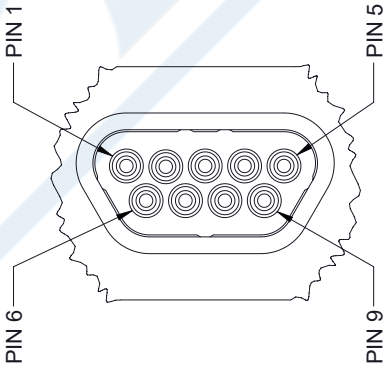
INTERFACE CABLE



Pinout

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	T/R Enable



DETAIL B

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THIRD-ANGLE PROJECTION

SIZE	CAGE CODE	DRAWN BY	ITEM NO.	REV
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SHEET 2 OF 3
SCALE N/A

T-Rev.D