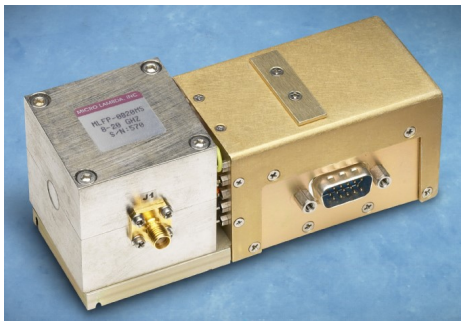
# MICRO LAMBDA WIRELESS, INC.

## YIG TUNED FILTERS WITH MILITARY SERIAL DRIVERS MS SERIES



## FEATURES

- 500 MHz to 50 GHz
- Compensation for Temperature Drift
- Low-Profile Package
- Input Regulators for Improved Stability
  - Versus Power Supply Variations
- 16 Bit Tuning Resolution

## DESCRIPTION

MICRO LAMBDA YIG Filters, model types MLFP Series, MLFR-Series, MLFRD-Series and MLUN-Series are available with integrated serial driver circuits.

MICRO LAMBDA drivers eliminate the need for customers to design or develop their own driver circuits and sophisticated test and alignment procedures. Integrating a driver at MICRO LAMBDA's factory ensures that peak performance will be achieved at the time of manufacture. Alignment and compensation with the particular YIG filter can be maximized down to the component level.

All drivers in this series provide input voltage regulators, and compensation circuits to improve frequency drift.

## STANDARD POSITIVE INPUT SERIAL DRIVER SELECTION GUIDE: MS SERIES

**MILITARY SERIAL DRIVERS**

| DRIVER INPUT & RESPONSE | SPECIFICATION ( -40 to +85 deg. C ) |
|---|---|
| Tuning Command | Start Word (all 0's) = Lowest Frequency<br>Stop Word (all 1's) = Highest Frequency |
| Tuning Resolution | 16 BIT Positive Logic (Fmax-Fmin)/65,535 Bit Resolution |
| Tuning Accuracy (excluding hysteresis) | See Table |
| Tuning Speed | 5 mS for 1 GHz step to within ±10 MHz. |
| **Main Driver Inputs** | |
| Supply Voltage & Current | +15 V ± .5 V @ Filter Tuning Current +50 mA, Max.<br>-15 V ± .5 V @ 50 mA |
| Supply Voltage Pushing | ± 100 kHz, Max. @ ± .5 Vdc |
| Supply Voltage Ripple | 10 mV Ripple Pk-Pk from 2 kHz to 3 MHz |
| Ground | Chassis Ground |
| YIG Heater Voltage & Current | +24 Vdc ±4 Vdc @ 300 - 750 mA surge for 2 seconds, 100 - 150 mA steady state depending on filter type.<br>Polarity independent : ±12 Vdc or ±15 Vdc acceptable |
| Digital Interface | The MLWI digital driver interface is a standard 3-wire connection compatable with SPI/QSPI/MICROWIRE interfaces. The 3-wire serial interface will operate in a 5V or 3.3V logic system. The chip-select input (CSELECTn) frames the serial data loading at the data input pin (DATA). Immediately following CSELECTn's high-to-low transition, the data is shifted synchronously and latched into the input register on the rising edge of the serial-clock input (CLOCK). After 16 data bits have been loaded into the serial input register, it transfers its contents to the DAC latch on CSELECTn's low-to-high transition (Figure 2). Note that if CSELECTn does not remain low during the entire 16 CLOCK cycles, data will be corrupted. In this case, reload the DAC latch with a new 16-bit word. |

### Power-On Reset

The MLWI digital driver has a power-on reset circuit to set the DAC's output to OV(F-min) in unipolar mode when VDD is first applied. This ensures that unwanted DAC output voltages will not occur immediately following a system power-up, such as after power loss.

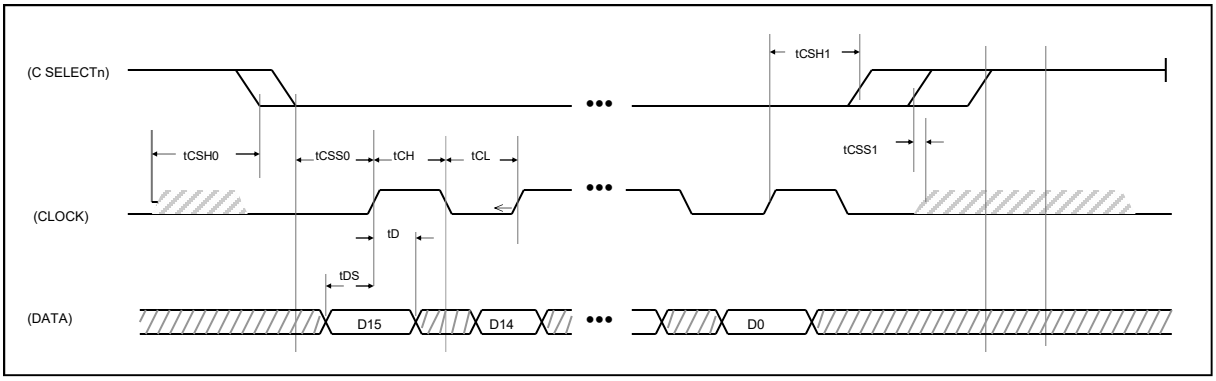



Figure 1. Timing Diagram

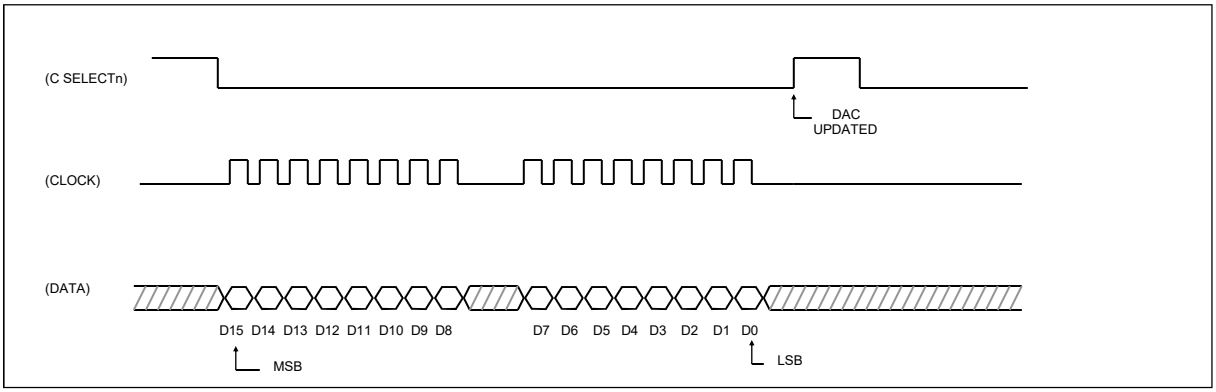



Figure 2. 3-Wire Interface Timing Diagram

## TIMING CHARACTERISTICS

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| CLOCK Frequency | fCLK | | | | 10 | MHz |
| CLOCK Pulse Width High | tCH | | 45 | | | ns |
| CLOCK Pulse Width Low | tCL | | 45 | | | ns |
| CSn Low to CLOCK High Setup | tCSS0 | | 45 | | | ns |
| CSn High to CLOCK High Setup | tCSS1 | | 45 | | | ns |
| CLOCK High to CSn Low Hold | tCSH0 | | 30 | | | ns |
| CLOCK High to CSn High Hold | tCSH1 | | 45 | | | ns |
| DATA to CLOCK High Setup | tDS | | 40 | | | ns |
| DATA to CLOCK High Hold | tDH | | 0 | | | ns |
| VDD High to CSn Low (power-up delay) | | | | 20 | | µs |

## Bandpass Filters with Positive Input Serial Drivers ( -40º C to +85º C )

| Model Number | # Stages | Frequency GHz | 3 dB Bandwidth (MHz) | Accuracy (MHz) * | Current +15V (mA) | Current -15V (mA) | Outline Drawing |
|---|---|---|---|---|---|---|---|
| MLFP-20520MS | 2 | .5 to 2.0 | 20 | +/- 20 | 350 | 50 | 21-078 |
| MLFP-22018MS | 2 | 2.0 to 18.0 | 25 | +/- 32 | 1050 | 50 | 21-078 |
| MLFP-22026MS | 2 | 2.0 to 26.5 | 20 | +/- 50 | 1200 | 50 | 21-082 |
| MLFP-40520MS | 4 | 0.5 to 2.0 | 20 | +/- 20 | 350 | 50 | 21-078 |
| MLFP-42008MS | 4 | 2.0 to 8.0 | 20 | +/- 28 | 550 | 50 | 21-078 |
| MLFP-42018MS | 4 | 2.0 to 18.0 | 40 | +/- 32 | 1050 | 50 | 21-078 |
| MLFP-42026MS | 4 | 2.0 to 26.5 | 25 | +/- 50 | 1200 | 50 | 21-082 |
| MLFP-43040MS | 4 | 3.0 to 40.0 | 30 | +/- 65 | 1450 | 50 | 21-131 |
| MLFP-43044MS | 4 | 3.0 to 44.0 | 30 | +/- 75 | 1550 | 50 | 21-131 |
| MLFP-43050MS | 4 | 3.0 to 50.0 | 30 | +/- 105 | 2100 | 50 | 21-154 |
| MLFP-46018MS | 4 | 6.0 to 18.0 | 100 | +/- 30 | 1050 | 50 | 21-078 |
| MLFP-47040MS | 4 | 7.0 to 40.0 | 35 | +/- 65 | 1450 | 50 | 21-131 |
| MLFP-48018MS | 4 | 8.0 to 18.0 | 400 | +/- 60 | 1050 | 50 | 21-078 |
| MLFP-41840MS | 4 | 18.0 to 40.0 | 50 | +/- 65 | 1450 | 50 | 21-131 |
| MLFP-62018MS | 6 | 2.0 to 18.0 | 40 | +/- 32 | 1050 | 50 | 21-079 |
| MLFP-62026MS | 6 | 2.0 to 26.5 | 30 | +/- 50 | 1350 | 50 | 21-069 |
| MLFP-66018MS | 6 | 6.0 to 18.0 | 100 | +/- 30 | 1050 | 50 | 21-079 |
| MLFP-68018MS | 6 | 8.0 to 18.0 | 500 | +/- 50 | 1050 | 50 | 21-079 |
| MLFP-70520MS | 7 | 0.5 to 2.0 | 20 | +/- 20 | 350 | 50 | 21-079 |
| MLFP-72018MS | 7 | 2.0 to 18.0 | 40 | +/- 50 | 1050 | 50 | 21-079 |
| MLFP-72026MS | 7 | 2.0 to 26.5 | 30 | +/- 65 | 1350 | 50 | 21-069 |
| MLFP-76018MS | 7 | 6.0 to 18.0 | 500 | +/- 60 | 1050 | 50 | 21-079 |
| MLFP-76018LMS | 7-L | 6.0 to 18.0 | 500 | +/- 60 | 1050 | 50 | 21-079 |
| MLFP-78018LMS | 7-L | 8.0 to 18.0 | 500 | +/- 60 | 1050 | 50 | 21-079 |
| MLFP-78020MS | 7 | 8.0 to 20.0 | 500 | +/- 60 | 1150 | 50 | 21-079 |
| MLFP-78020LMS | 7-L | 8.0 to 20.0 | 500 | +/- 60 | 1150 | 50 | 21-079 |

* Accuracy includes frequency drift and linearity errors over the temperature range.

## Band Reject Filters with Positive Input Serial Drivers ( -40º C to +85º C )

| Model Number | Frequency GHz | 3 dB Bandwidth (MHz) | 40 dB Bandwidth | Accuracy ( MHz ) * | Current +15 V (mA) | Current -15 V (mA) | Outline Drawing |
|---|---|---|---|---|---|---|---|
| MLFR-0102MS | 1.0 to 2.0 | 100 | 10 | +/- 10 | 250 | 50 | 21-070 |
| MLFR-0204MS | 2.0 to 4.0 | 125 | 15 | +/- 12 | 350 | 50 | 21-070 |
| MLFR-0408MS | 4.0 to 8.0 | 150 | 20 | +/- 15 | 550 | 50 | 21-070 |
| MLFR-0812MS | 8.0 to 12.4 | 150 | 25 | +/- 17 | 750 | 50 | 21-070 |
| MLFR-1218MS | 12.4 to 18.0 | 150 | 25 | +/- 23 | 1050 | 50 | 21-070 |
| MLFR-0502MS | .50 to 2.0 | 150 | 5 @ 30dB | +/- 12 | 250 | 50 | 21-070 |
| MLFR-0206MS | 2.0 to 6.0 | 150 | 20 | +/- 16 | 450 | 50 | 21-070 |
| MLFR-0208MS | 2.0 to 8.0 | 150 | 15 | +/- 18 | 550 | 50 | 21-070 |
| MLFR-0212MS | 2.0 to 12.0 | 150 | 10 | +/- 20 | 750 | 50 | 21-070 |
| MLFR-0218MS | 2.0 to 18.0 | 150 | 10 | +/- 30 | 1050 | 50 | 21-070 |
| MLFR-0220MS | 2.0 to 20.0 | 150 | 5 | +/- 30 | 1050 | 50 | 21-070 |
| MLFR-0418MS | 4.0 to 18.0 | 150 | 10 | +/- 27 | 1050 | 50 | 21-070 |
| MLFR-160418MS | 4.0 to 18.0 | 150 | 25 | +/- 27 | 1050 | 50 | 21-070 |
| MLFR-0618MS | 6.0 to 18.0 | 150 | 25 | +/- 27 | 1050 | 50 | 21-070 |
| MLFR-160618MS | 6.0 to 18.0 | 150 | 25 | +/- 27 | 1050 | 50 | 21-070 |
| MLFR-0818MS | 8.0 to 18.0 | 150 | 35 | +/- 27 | 1050 | 50 | 21-070 |
| MLFR-160818MS | 8.0 to 18.0 | 150 | 35 | +/- 27 | 1050 | 50 | 21-070 |

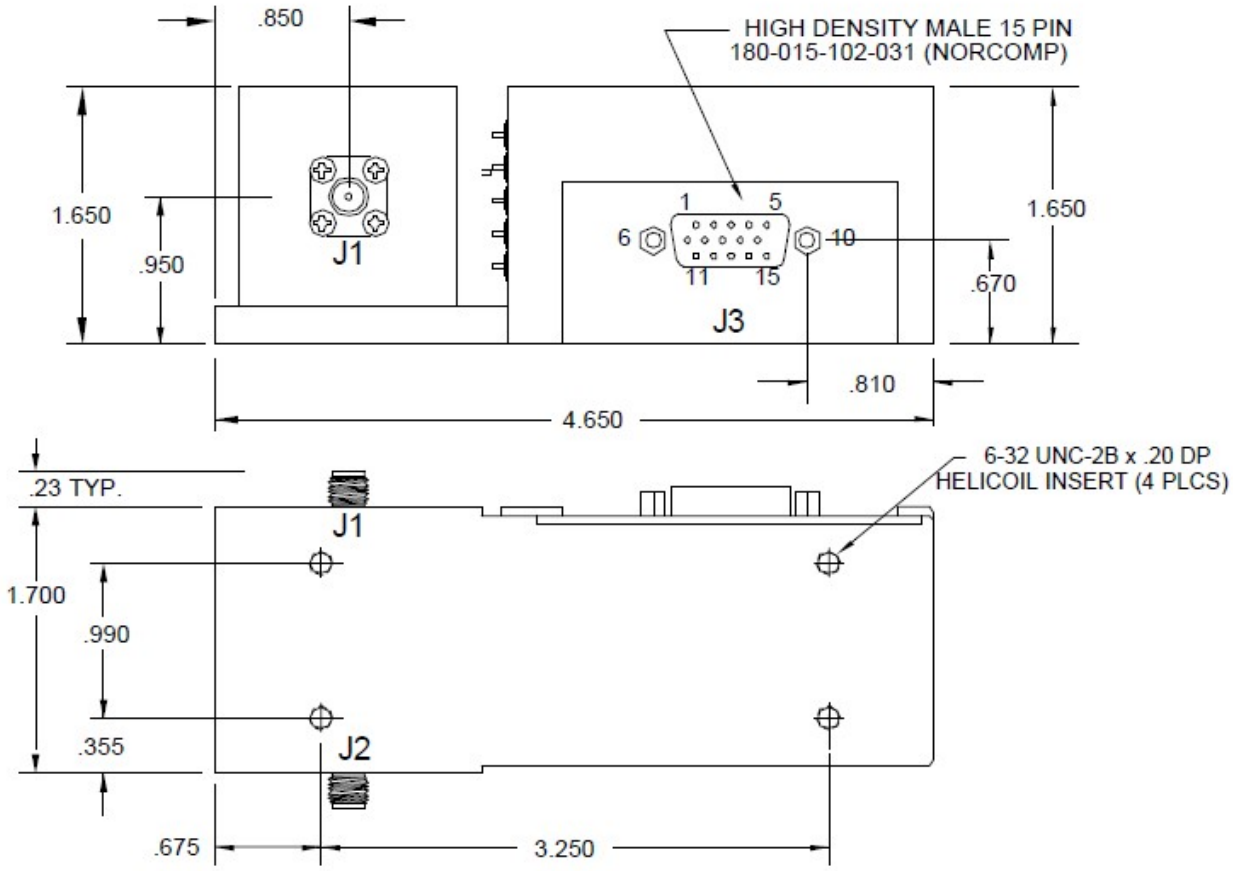
## Dual Channel Band Reject Filters with Positive Input Serial Drivers ( -40º C to +85º C )

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| MLFRD-0206MS | 2.0 to 6.0 | 120 | 5 | +/- 16 | 450 | 50 | 21-113 |
| MLFRD-0208MS | 2.0 to 8.0 | 120 | 5 | +/- 18 | 550 | 50 | 21-113 |
| MLFRD-0618MS | 6.0 to 18.0 | 100 | 15 | +/- 27 | 1050 | 50 | 21-113 |
| MLFRD-0818MS | 8.0 to 18.0 | 100 | 15 | +/- 27 | 1050 | 50 | 21-113 |

## Ultra Notch Band Reject Filters with Positive Input Serial Drivers ( -40º C to +85º C )

| Model Number | Frequency GHz | 3 dB Bandwidth (MHz) | 60 dB Bandwidth | Accuracy ( MHz ) * | Current +15 V (mA) | Current -15 V (mA) | Outline Drawing |
|---|---|---|---|---|---|---|---|
| MLUN-0305MS | .35 to .52 | 50 | 4 @ 30dB | +/- 8 | 100 | 50 | 21-147 |
| MLUN-0502MS | .50 to 2.0 | 80 | 5 @ 40dB | +/- 10 | 250 | 50 | 21-147 |
| MLUN-0206MS | 2.0 to 6.0 | 120 | 17 | +/- 16 | 450 | 50 | 21-147 |
| MLUN-0618MS | 6.0 to 18.0 | 175 | 35 | +/- 27 | 1050 | 50 | 21-146 |
| MLUN-0218MS | 2.0 to 18.0 | 175 | 5 | +/- 30 | 1050 | 50 | 21-146 |

* Accuracy includes frequency drift and linearity errors over the temperature range.




NOTES :

1. - DIMENSIONS ARE IN INCHES
2. - SUPPLY & GROUND WIRES = 20-22 GAUGE
   ALL OTHER WIRES = 24-26 GAUGE
3. - THERMAL COMPOUND REQUIRED BETWEEN
   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPPLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS ± DECIMALS .xx ± .020 .xxx ± .005 ANGLES ±

WEIGHT: 20 oz.

FINISH:

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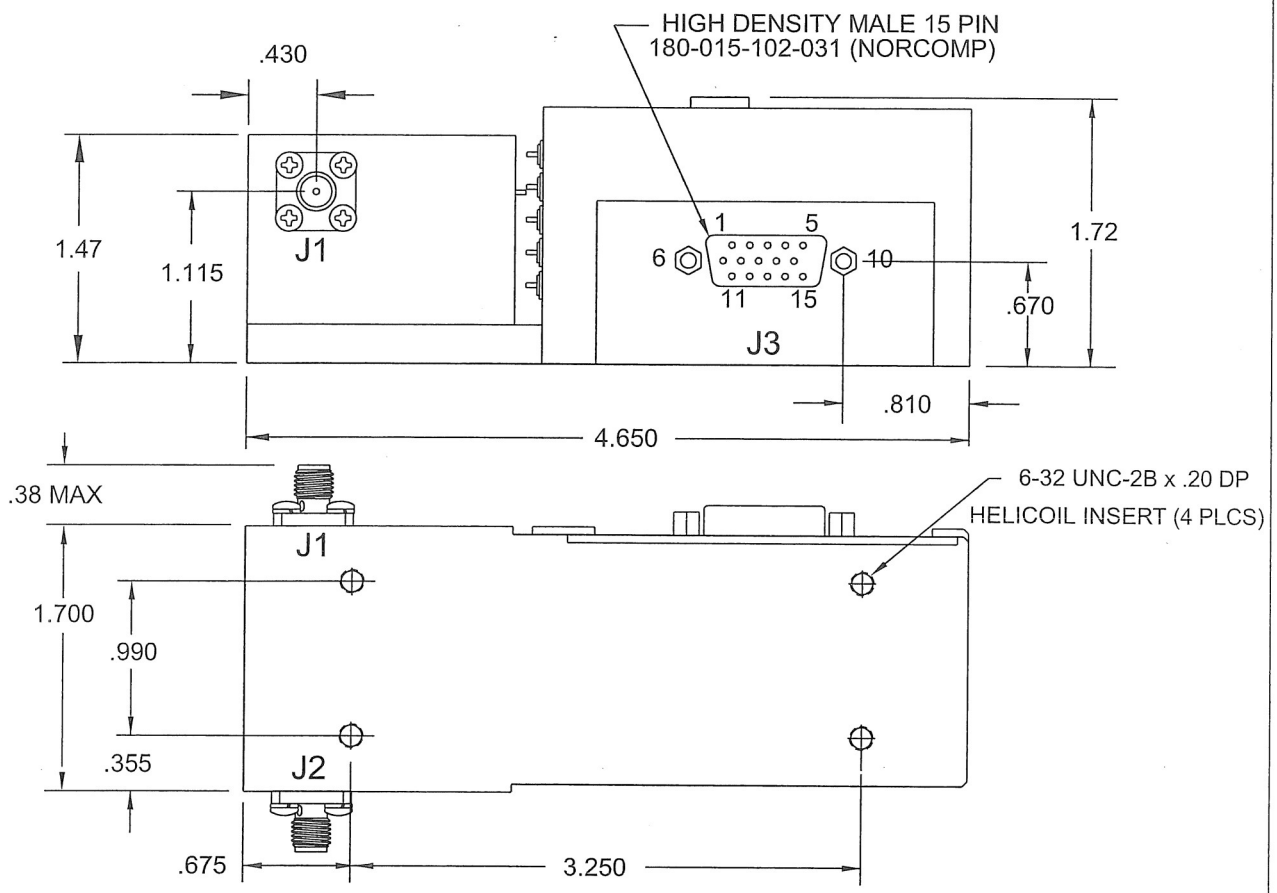
CONTRACT NO.

| APPROVALS | DATE |
|---|---|
| DRAWN N.NGUYEN | 5/25/04 |
| ENGR. | |
| MANUF. | |
| Q.A. | |

MICRO LAMBDA WIRELESS, INC.

*1.4" BPF WITH 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 21 - 078 | |

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   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPPLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

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TOLERANCE ARE :
FRACTIONS ± DECIMALS .xx ±.020 .xxx ±.005 ANGLES ±

WEIGHT 20 oz.

FINISH

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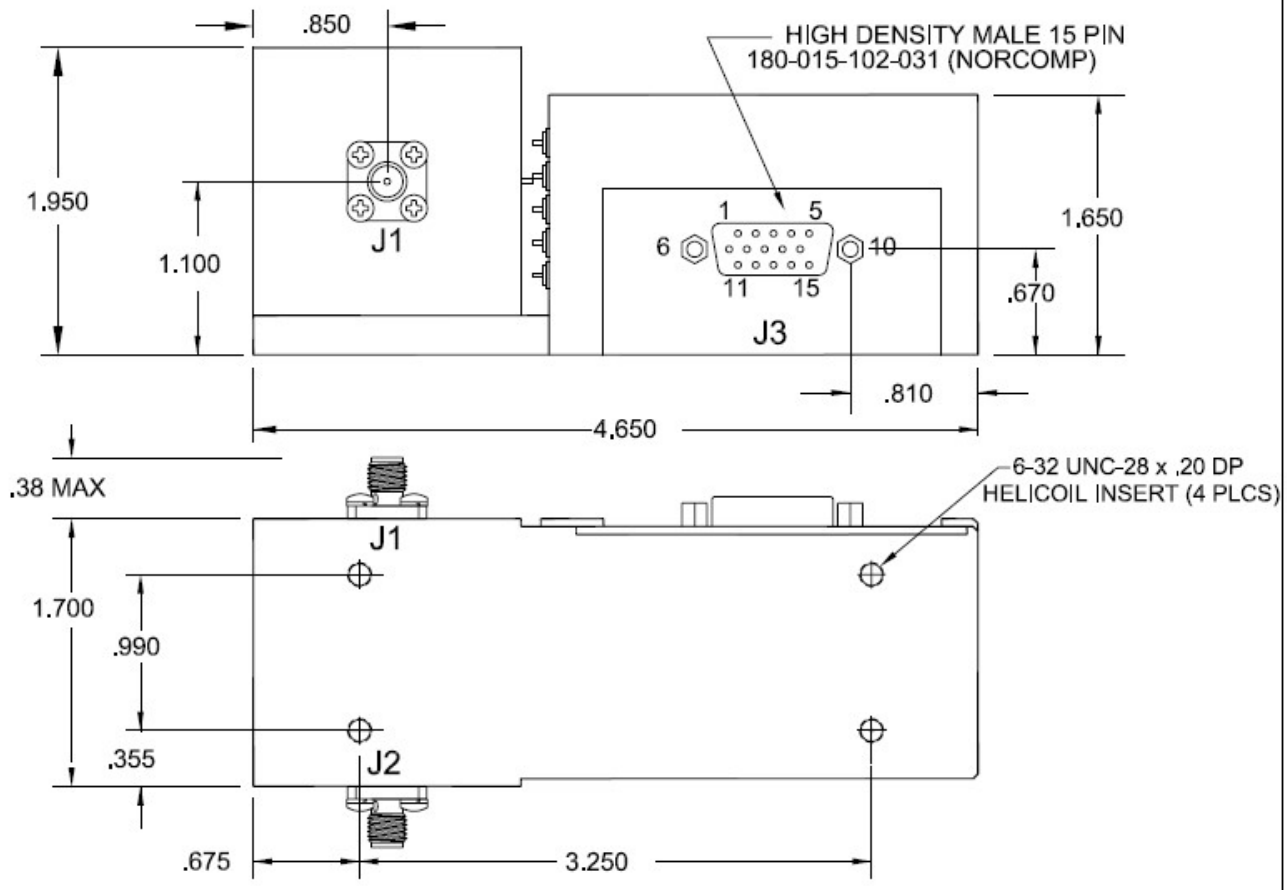
UNCONTROLED DRAWING:
SUBJECT TO CHANGE WITHOUT NOTICE

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | N.NGUYEN | 8/14/13 |
| ENGR. | DS | 8/14/13 |
| MANUF. | | |
| Q.A. | | |

MICRO LAMBDA WIRELESS, INC.

*1.7" X 1.2" BPF WITH 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 21 - 079 | B |

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3. - THERMAL COMPOUND REQUIRED BETWEEN
   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPLLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

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TOLERANCE ARE:
FRACTIONS ± DECIMALS .xx ±.020 .xxx ±.005 ANGLES ±
WEIGHT 20 oz.
FINISH
DO NOT SCALE DRAWING

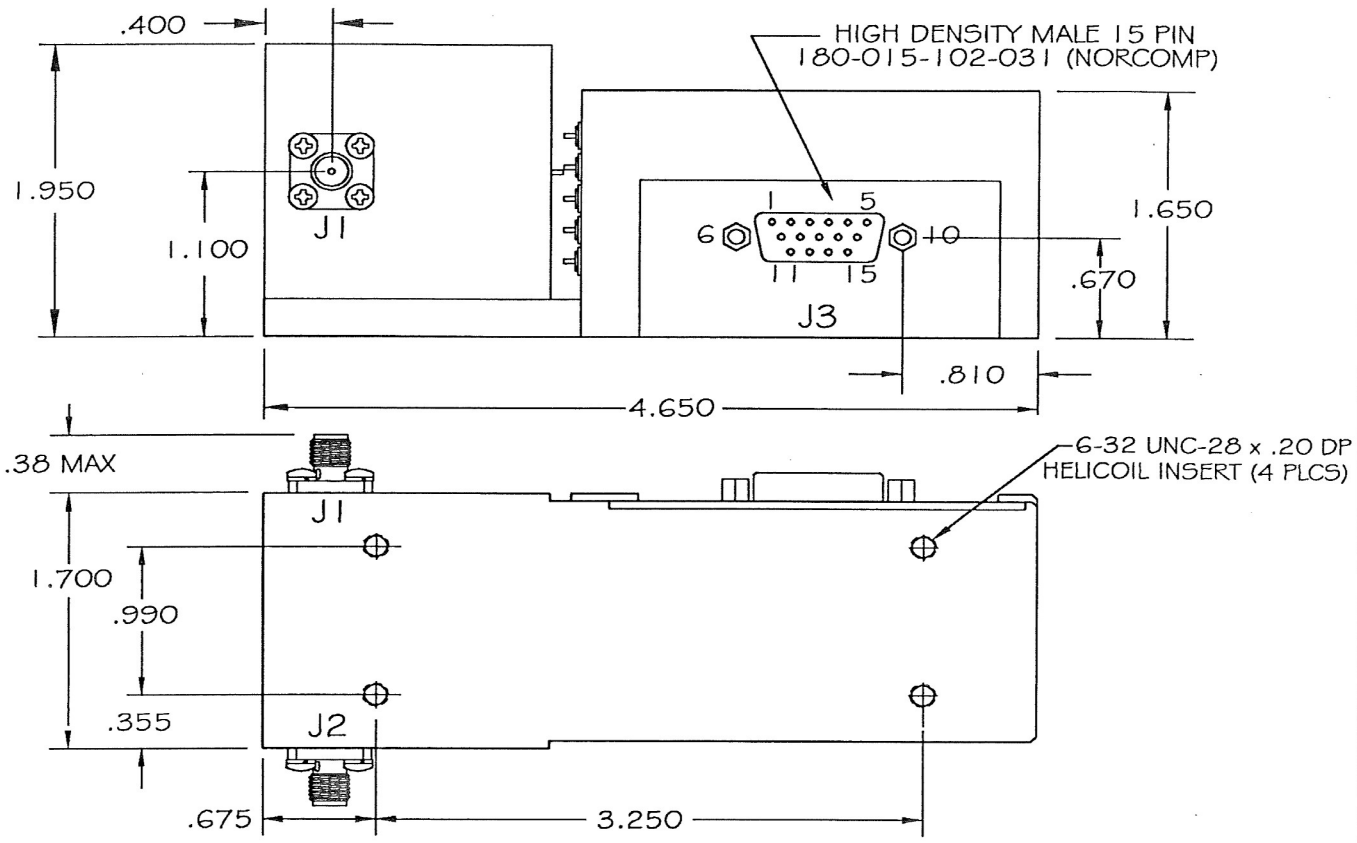
CONTRACT NO.

| APPROVALS | DATE |
|---|---|
| DRAWN N.NGUYEN | 7/29/04 |
| ENGR. | |
| MANUF. | |
| Q.A. | |

MICRO LAMBDA WIRELESS, INC.

*1.7" BPF W/ 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 21 - 082 | |

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| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPLLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

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WEIGHT 20 oz.

FINISH

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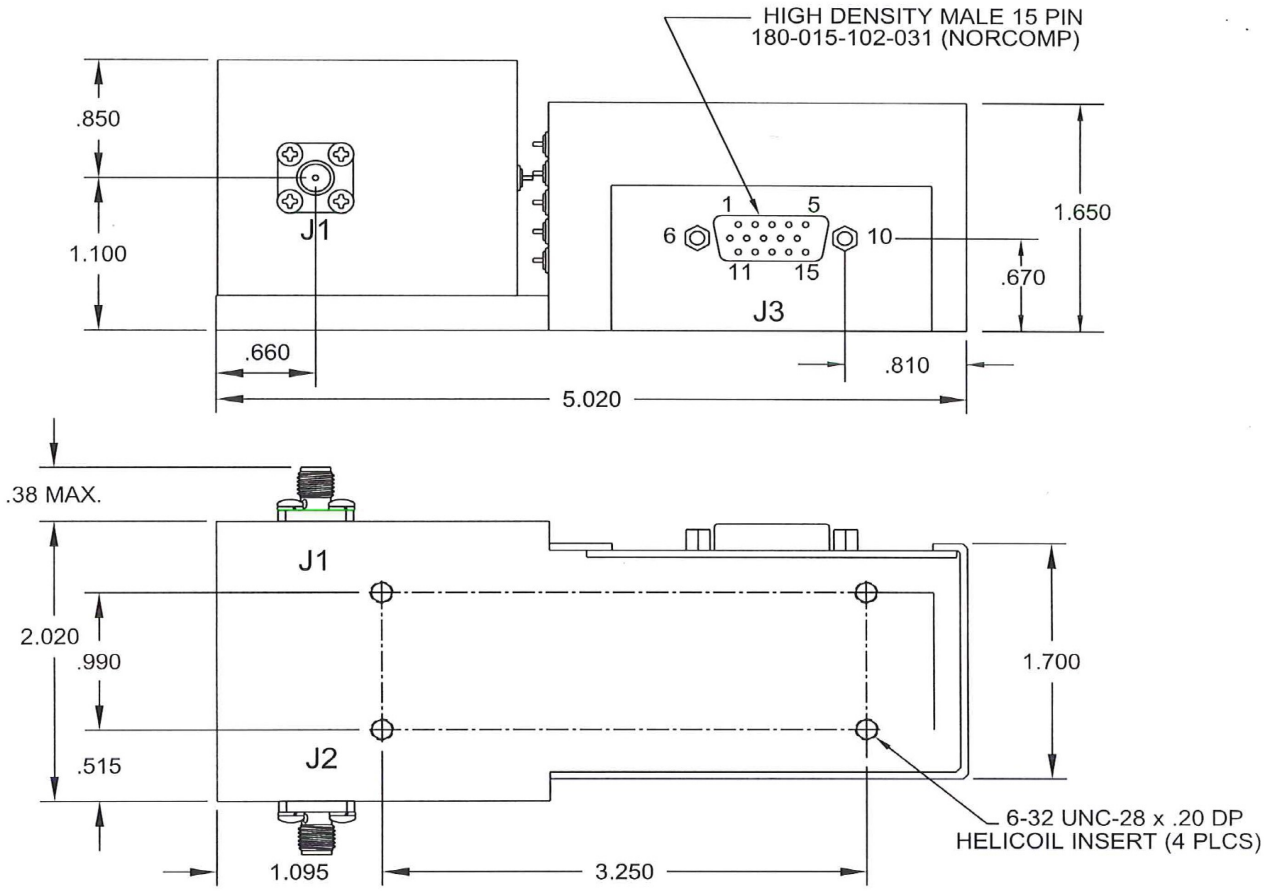
CONTRACT NO.

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | N.NGUYEN | 4/25/03 |
| ENGR | | 4/25/03 |
| MANUF | | |
| Q.A. | | |

MICRO LAMBDA WIRELESS, INC.

*1.7" BPF (OFFSET CONN.) W/MILITARY 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV. |
|---|---|---|---|
| | ORN63 | 21 - 069 | |

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   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | K-CON. FEMALE | THD | RF IN |
| J2 | K-CON. FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPPLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 * | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS DECIMALS ANGLES
.xx ± .020
.xxx ± .005

WEIGHT 20 oz.

FINISH

DO NOT SCALE DRAWING

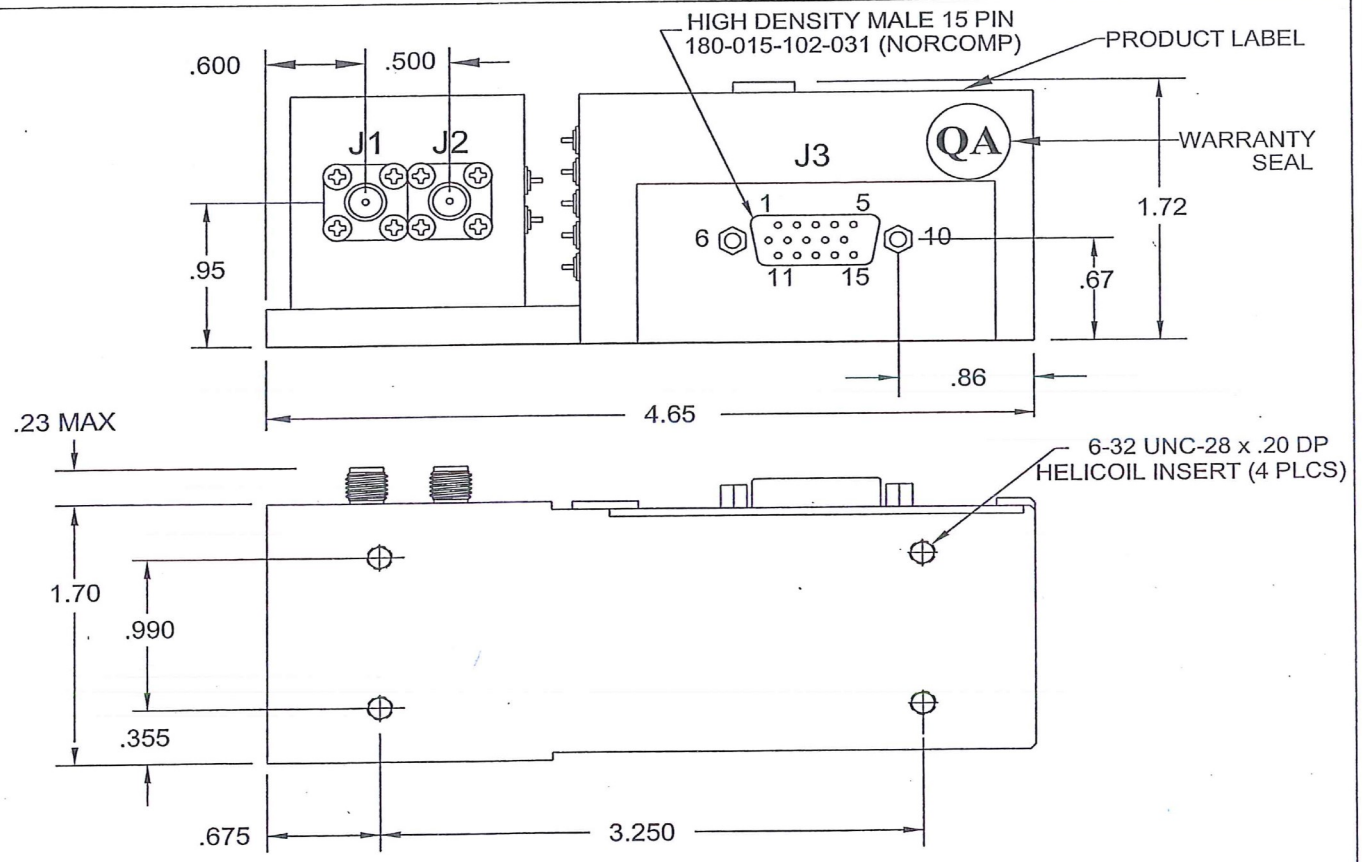
CONTRACT NO.

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | N.NGUYEN | 12/17/13 |
| ENGR. | DS | 12/17/13 |
| MANUF. | | |
| Q.A. | | |

MICRO LAMBDA WIRELESS, INC.

*BPF (2.0"X1.7") >26.5 GHz; 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV |
|---|---|---|---|
| | 0RN63 | 99 - 0021 - 131 | |




NOTES :

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| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPLLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS ± | DECIMALS .XX ±.02, .XXX ±.010 | ANGLES ±

WEIGHT: 20 oz.

FINISH

DO NOT SCALE DRAWING

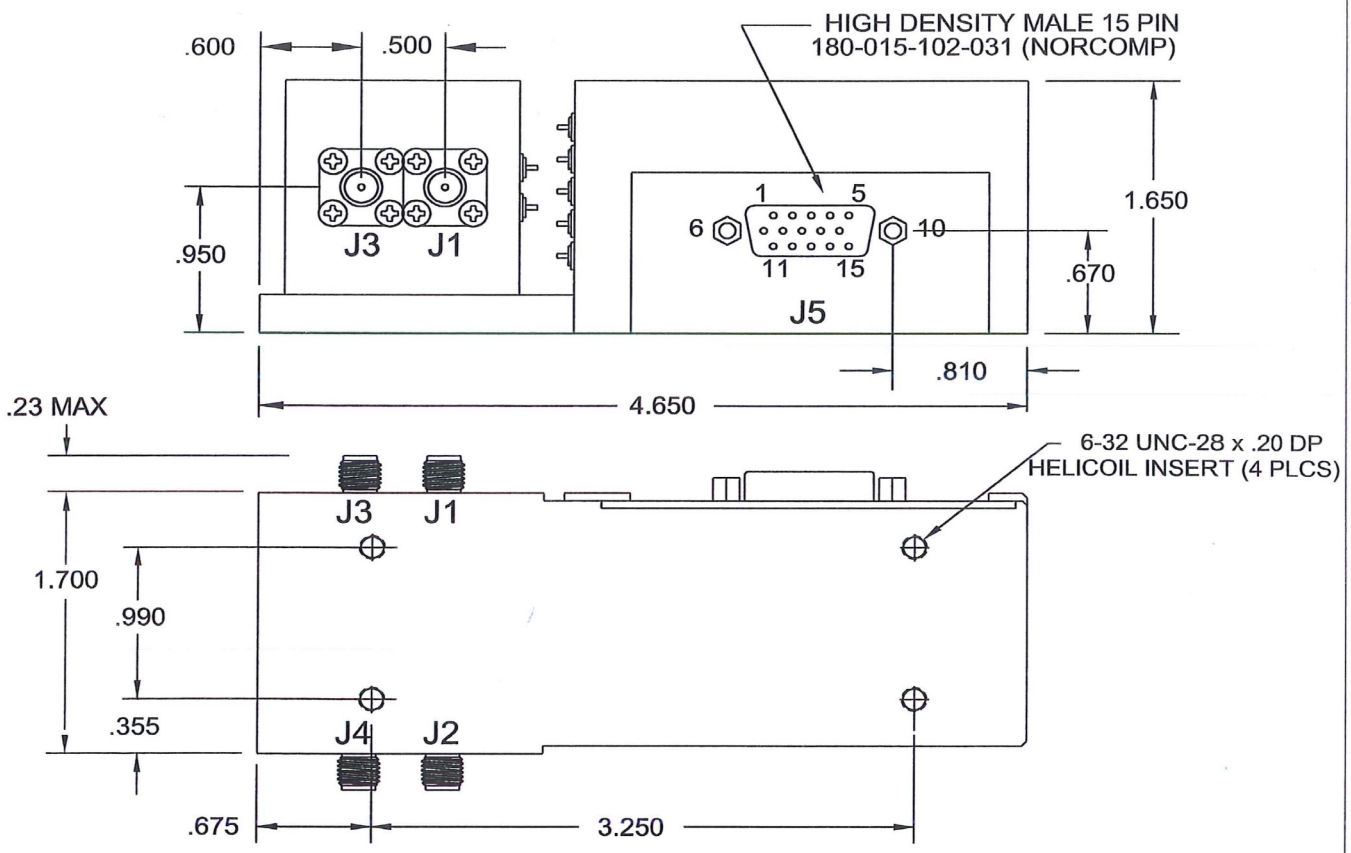
CONTRACT NO.

| APPROVALS | DATE |
|---|---|
| DRAWN N.NGUYEN | 8/16/11 |
| ENGR. DS | 8/16/11 |
| MANUF. | |
| Q.A. | |

MICRO LAMBDA WIRELESS, INC.

*1.4" BRF WITH 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 99 - 0021 - 070 | C |




NOTES :

1. - DIMENSIONS ARE IN INCHES
2. - SUPPLY & GROUND WIRES = 20-22 GAUGE
   ALL OTHER WIRES = 24-26 GAUGE
3. - THERMAL COMPOUND REQUIRED BETWEEN
   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |
| J3 | SMA FEMALE | THD | RF IN |
| J4 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J5 | DB15 MALE | 1 | CLOCK |
| J5 | DB15 MALE | 2 | DATA |
| J5 | DB15 MALE | 3 | C SELECT N |
| J5 | DB15 MALE | 4 | GROUND |
| J5 | DB15 MALE | 5 | - V SUPLLY |
| J5 | DB15 MALE | 6 | + V SUPPLY |
| J5 | DB15 MALE | 7 | HEATER 1 |
| J5 | DB15 MALE | 8 | HEATER 2 |
| J5 | DB15 MALE | 9 | N/C |
| J5 | DB15 MALE | 10 | N/C |
| J5 | DB15 MALE | 11 | N/C |
| J5 | DB15 MALE | 12 | N/C |
| J5 | DB15 MALE | 13 | N/C |
| J5 | DB15 MALE | 14 | N/C |
| J5 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS : DECIMALS .xx ±.020 .xxx ±.005 ANGLES :

WEIGHT 20 oz.

FINISH

DO NOT SCALE DRAWING

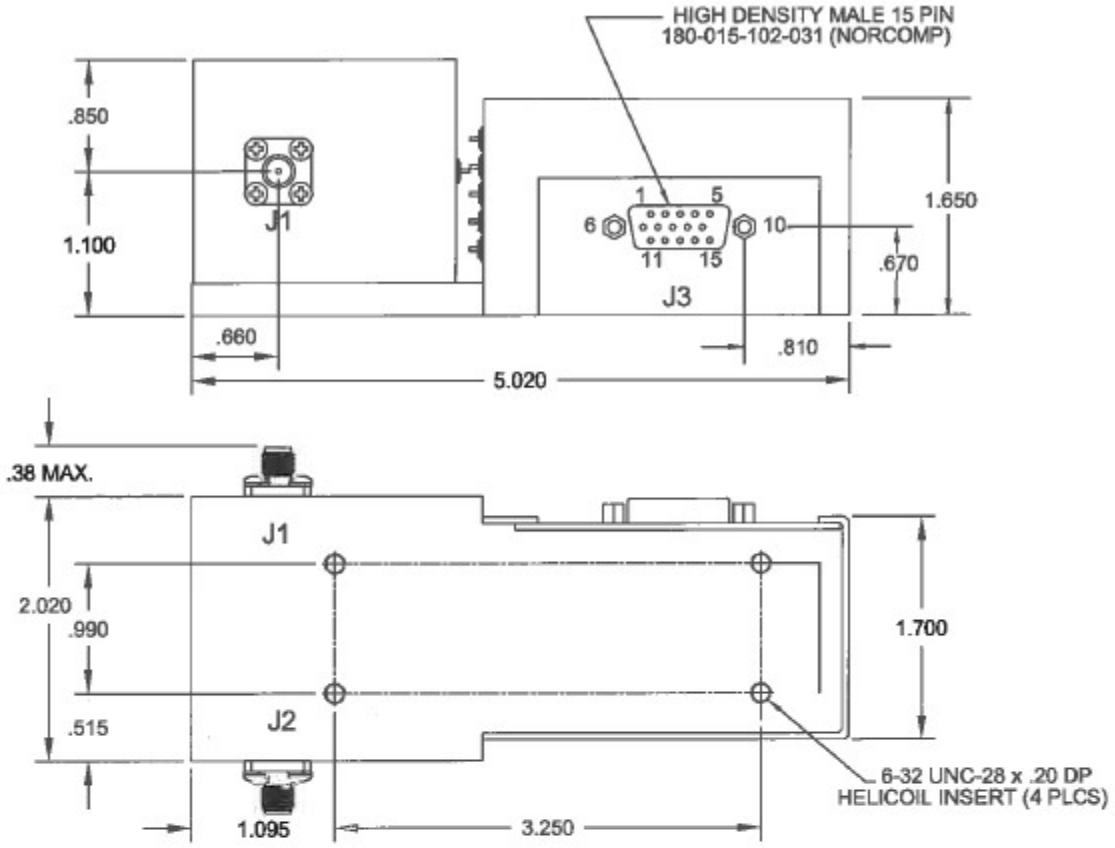
CONTRACT NO.

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | N.NGUYEN | 11/11/08 |
| ENGR. | DS | 11/11/08 |
| MANUF. | | |
| Q.A. | | |

MICRO LAMBDA WIRELESS, INC.

*1.4" DUAL BRF WITH 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV |
|---|---|---|---|
| | 0RN63 | 21 - 113 | |




NOTES :

1. - DIMENSIONS ARE IN INCHES
2. - SUPPLY & GROUND WIRES = 20-22 GAUGE
   ALL OTHER WIRES = 24-26 GAUGE
3. - THERMAL COMPOUND REQUIRED BETWEEN
   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | V-CON.(2.4MM) FEMALE | THD | RF IN |
| J2 | V-CON.(2.4MM) FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPPLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 * | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS ± DECIMALS ± ANGLES
.xx ±.020
.xxx ±.005

WEIGHT 20 oz.

FINISH

DO NOT SCALE DRAWING

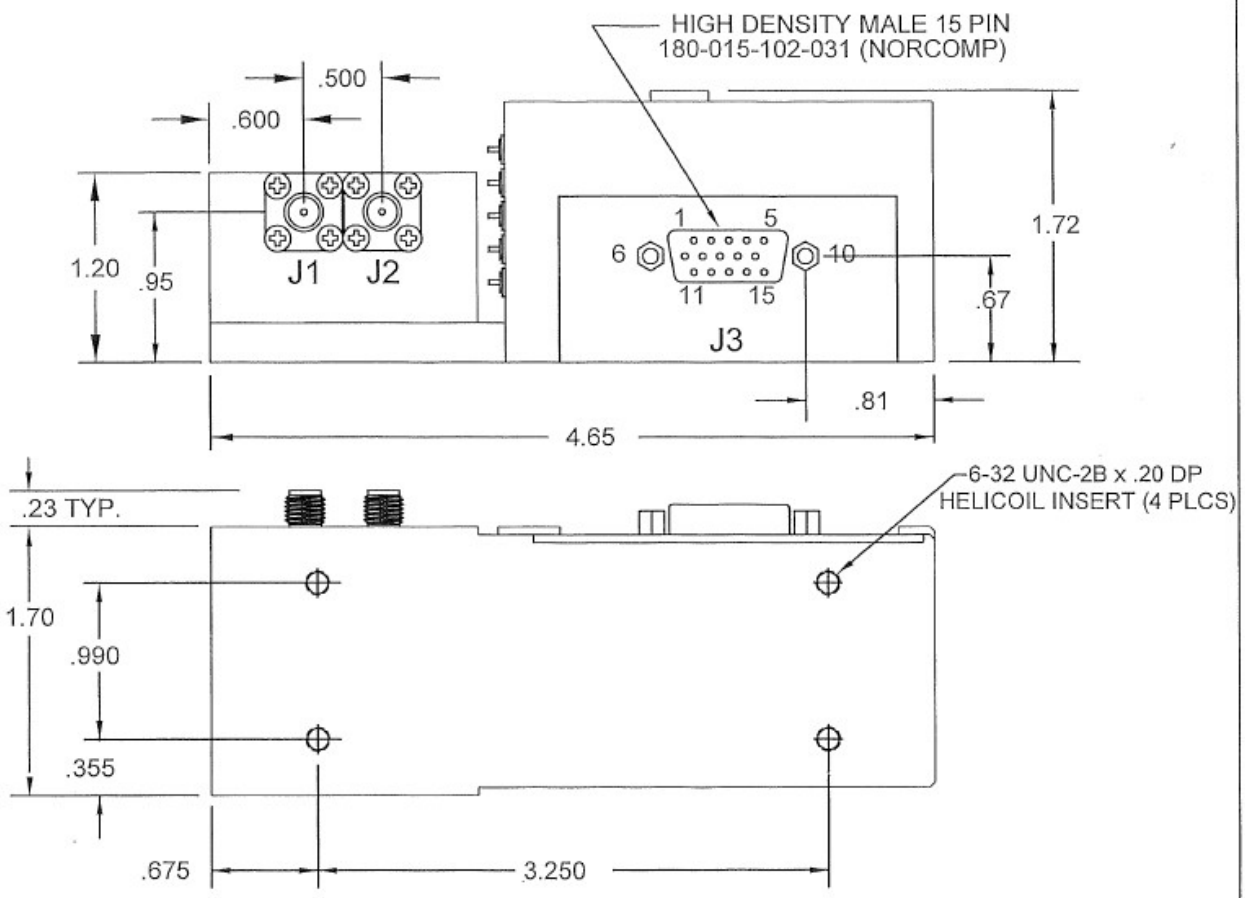
CONTRACT NO.

| APPROVALS | DATE |
|---|---|
| DRAWN N.NGUYEN | 9/28/18 |
| ENG'L DS | 9/28/18 |
| MANUF. | |
| Q.A. | |

MICRO LAMBDA WIRELESS, INC.

*BPF (2.0"X1.7") 50 GHz; 16 BIT SERIAL DRIVER*

| SIZE | CAGE No. | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 99 - 0021 - 154 | A |




**NOTES :**

1. - DIMENSIONS ARE IN INCHES
2. - SUPPLY & GROUND WIRES = 20-22 GAUGE
   ALL OTHER WIRES = 24-26 GAUGE
3. - THERMAL COMPOUND REQUIRED BETWEEN
   BASE PLATE AND MOUNTING SURFACE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPPLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS DECIMALS ANGLES
.xx ± .02
.xxx ± .010

WEIGHT 20 oz.

FINISH

DO NOT SCALE DRAWING

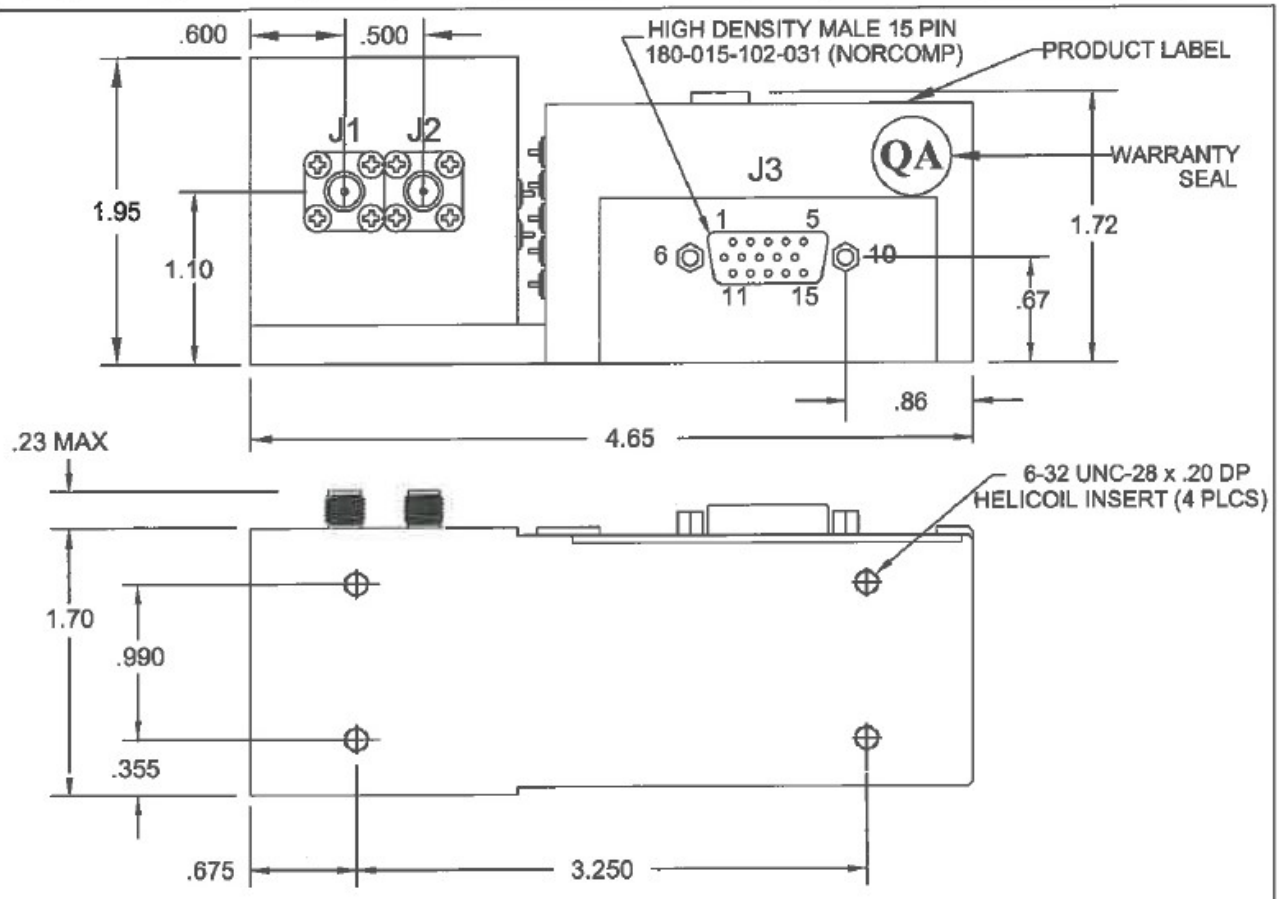
CONTRACT NO.

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | N.NGUYEN | 01/26/2021 |
| ENGR. | | 01/25/21 |
| MANUF. | | |
| Q.A. | | |

MICRO LAMBDA WIRELESS, INC.

*ULTRA NOTCH LB BRF(1.7"X .95") WITH 16 BIT SERIAL DRIVER*

| SIZE | CAGE No | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 99 - 0021 - 147 | C |




NOTES :

1. - DIMENSIONS ARE IN INCHES
2. - SUPPLY & GROUND WIRES = 20-22 GAUGE
   ALL OTHER WIRES = 24-26 GAUGE

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J1 | SMA FEMALE | THD | RF IN |
| J2 | SMA FEMALE | THD | RF OUT |

| CONNECTIONS | | | |
|---|---|---|---|
| CONN. | TYPE | PIN # | FUNCTION |
| J3 | DB15 MALE | 1 | CLOCK |
| J3 | DB15 MALE | 2 | DATA |
| J3 | DB15 MALE | 3 | C SELECT N |
| J3 | DB15 MALE | 4 | GROUND |
| J3 | DB15 MALE | 5 | - V SUPLLY |
| J3 | DB15 MALE | 6 | + V SUPPLY |
| J3 | DB15 MALE | 7 | HEATER 1 |
| J3 | DB15 MALE | 8 | HEATER 2 |
| J3 | DB15 MALE | 9 | N/C |
| J3 | DB15 MALE | 10 | N/C |
| J3 | DB15 MALE | 11 | N/C |
| J3 | DB15 MALE | 12 | N/C |
| J3 | DB15 MALE | 13 | N/C |
| J3 | DB15 MALE | 14 | N/C |
| J3 | DB15 MALE | 15 | N/C |

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCE ARE :
FRACTIONS ± DECIMALS .XX ±.02 .XXX ±.010 ANGLES ±
WEIGHT 20 oz.
FINISH
DO NOT SCALE DRAWING

CONTRACT NO.

| APPROVALS | | DATE |
|---|---|---|
| DRAWN | N.NGUYEN | 6/09/16 |
| ENGR. | DS | 6/9/16 |
| MANUF. | | |
| Q.A. | | |

MICRO LAMBDA WIRELESS, INC.

*1.7" BRF WITH 16 BIT SERIAL DRIVER*

| SIZE | CAGE No. | DWG. NO. | REV. |
|---|---|---|---|
| | 0RN63 | 99 - 0021 - 146 | |