

**FEATURES**

- 700 MHz To 20 GHz
- Compensation for Temperature Drift
- Voltage Regulators for Improved Stability
- 16 Bit Tuning Resolution

**APPLICATIONS**

EW, ECM Systems  
Simulators

**DESCRIPTION**

Micro Lambda *MLOB, MLOS, MLXB, MLXS and MLXS-T Series* YIG Oscillators are available with integrated serial driver circuits. These 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 peak performance. Alignment and compensation with the particular YIG oscillator can be maximized down to the component level.

All drivers in this series provide input voltage regulators, reverse voltage/dataline protection and compensation circuits to improve frequency drift. All voltages required by the YIG oscillator, except the heater inputs, are supplied by the voltage regulators.



COMMERCIAL SERIAL DRIVERS	.7-20 GHz YTOs, MS & MF SERIES
DRIVER INPUT & RESPONSE	SPECIFICATION ( -40 to +85 deg. C )

Tuning Command	Start Word (all 0's) = Lowest Frequency 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 $\pm 10$ MHz. (residual FM is 100 kHz Pk-Pk)
<b>Main Driver Inputs</b>	
Supply Voltage & Current	+15 V $\pm$ .5 V @ Oscillator Tuning Current +50 mA, Max. -15 V $\pm$ .5 V @ 50 mA, (Plus Oscillator -5 Vdc Current if any) Max.
Supply Voltage Pushing	$\pm 100$ kHz, Max. @ $\pm .5$ Vdc (2-3000 kHz)
Supply Voltage Ripple	10 mV Ripple Pk-Pk from 2kHz to 3 MHz
Ground	Chassis Ground
YIG Heater Voltage & Current	+24 Vdc $\pm 4$ Vdc @ 300 mA surge for 2 seconds, 25 mA steady state Polarity independent : $\pm 12$ Vdc or $\pm 15$ Vdc acceptable
Digital Interface	The MLWI digital driver interface is a standard 3-wire connection compatible with SPI/QSPI/MICROWIRE interfaces. 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.

## MS-SERIES — CONT.

### YIG Tuned Oscillators with Serial Drivers

#### 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.

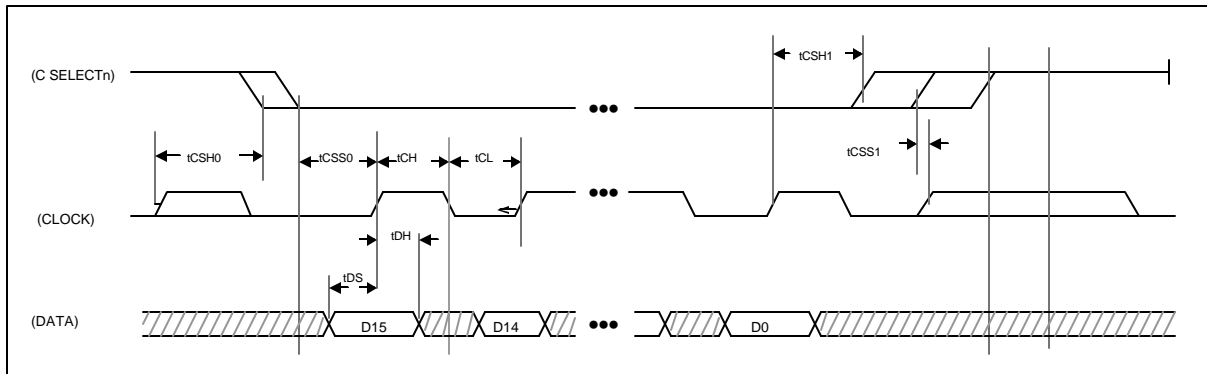


Figure 1. Timing Diagram

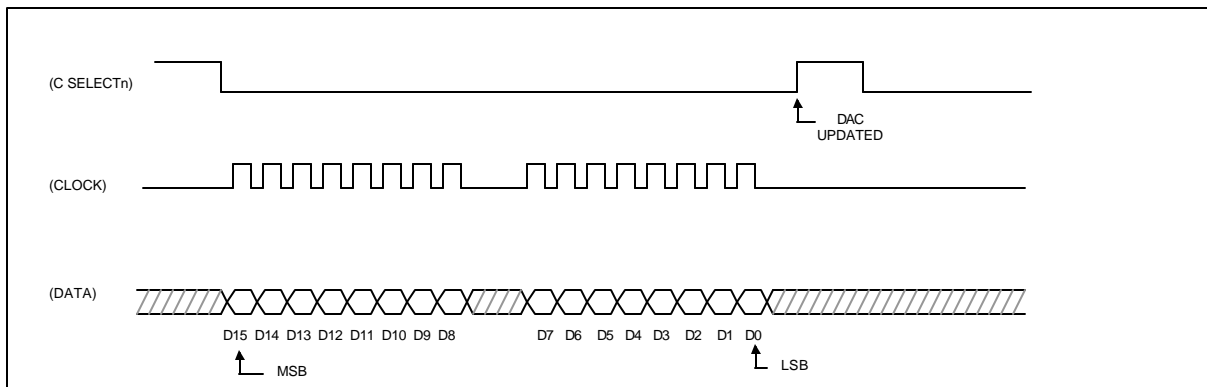


Figure 2. 3-Wire Interface Timing Diagram

#### 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

## MS SERIES – CONTINUED

### FM Coil Driver (MF Option)

Voltage	+/- 10V
Current @ Max. Deviation	+/- 100 mA
Input Impedance	1 k Ohms
Sensitivity (Note 1)	+/- 2.5 MHz/V
Frequency Deviation	+/- 25 MHz

Note: 1. Sensitivity Adjustment Available. Sensitivity Stated is Average Over Frequency Range.

### 1.25" Cube YIG Oscillators with Positive Input Serial Drivers ( -40° C to +85° C )

Model Number	Frequency GHz	Accuracy ( MHz ) *	Current +15 V (mA)	Current -15 V (mA)	Outline Drawing	Outline Drawing (MF Option)
<b>Octave Bands</b>						
MLOB-0102MS	1-2	+/- 3	200	50	11-124	11-125
MLOB-0204MS	2-4	+/- 6	300	50	11-124	11-125
MLOB-0408MS	4-8	+/- 8	550	50	11-124	11-125
MLOB-0812MS	8-12.4	+/- 12	780	50	11-124	11-125
MLOB-1218MS	12-18	+/- 14	1050	50	11-124	11-125
<b>Multi-Octave Bands</b>						
MLOB-0702MS	.7-2	+/- 6	250	50	11-124	11-125
MLOB-0704MS	.7-4	+/- 8	350	50	11-124	11-125
MLOB-0306MS	3-6	+/- 6	450	50	11-124	11-125
MLOB-0208MS	2-8	+/- 12	550	50	11-124	11-125
MLOB-0212MS	2-12.4	+/- 15	780	100	11-124	11-125
MLOB-0310MS	3.5-10.5	+/- 15	675	100	11-124	11-125
MLOB-0412MS	4-12.4	+/- 15	780	100	11-124	11-125
MLOB-0716MS	7-16	+/- 18	900	50	11-124	11-125
MLXB-0618MS	6-18	+/- 25	1050	100	11-124	11-125
MLOB-0818MS	8-18	+/- 18	1050	50	11-124	11-125
MLXB-0820MS	8-20	+/- 30	1175	50	11-124	11-125
MLOB-0820MS	8-20	+/- 30	1175	50	11-124	11-125

### Cylindrical YIG Oscillators with Positive Input Serial Drivers ( -40° C to +85° C )

Model Number	Frequency GHz	Accuracy ( MHz ) *	Current +15 V (mA)	Current -15 V (mA)	Outline Drawing	Outline Drawing (MF Option)
<b>Octave Bands</b>						
MLOS-0102MS	1-2	+/- 3	200	50	11-129	11-128
MLOS-0204MS	2-4	+/- 6	300	50	11-129	11-128
MLOS-0408MS	4-8	+/- 8	550	50	11-129	11-128
MLOS-0812MS	8-12.4	+/- 12	780	50	11-127	11-118
MLOS-1218MS	12-18	+/- 14	1050	500	11-127	11-118

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

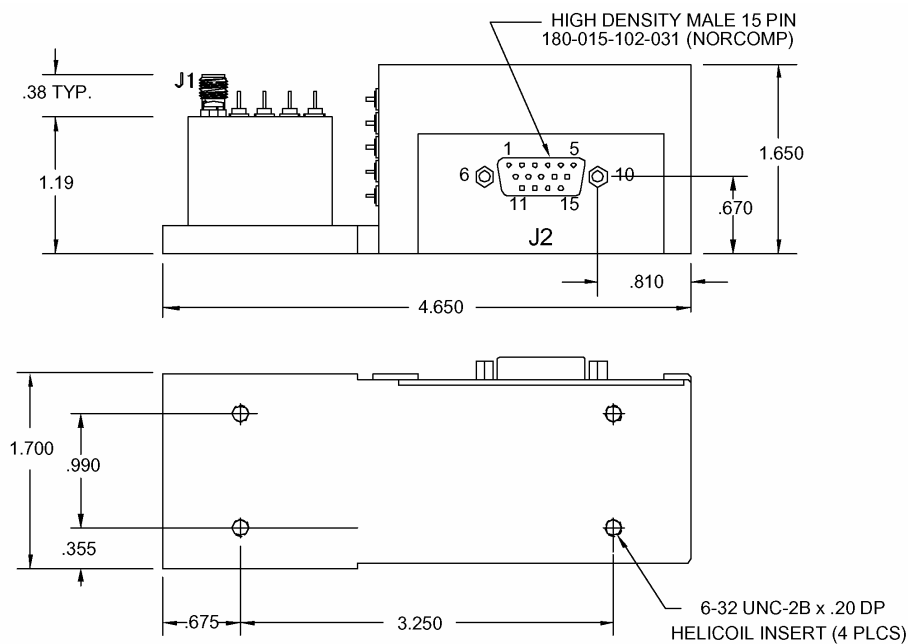
## MS SERIES – CONTINUED

### Cylindrical YIG Oscillators with Positive Input Serial Drivers ( -40° C to +85° C )

Model Number	Frequency GHz	Accuracy ( MHz) *	Current +15 V (mA)	Current -15 V (mA)	Outline Drawing	Outline Drawing (MF Option)
<b>Multi-Octave Bands</b>						
MLOS-0702MS	.7-2	+/- 6	250	50	11-129	11-128
MLOS-0704MS	.7-4	+/- 8	350	50	11-129	11-128
MLOS-0306MS	3-6	+/- 6	450	50	11-129	11-128
MLOS-0208MS	2-8	+/- 12	550	50	11-129	11-128
MLOS-0310MS	3.5-10.5	+/- 15	675	100	11-129	11-128
MLOS-0212MS	2-12.4	+/- 15	780	100	11-129	11-128
MLOS-0412MS	4-12.4	+/- 15	780	100	11-129	11-128
MLOS-0716MS	7-16	+/- 18	900	50	11-127	11-118
MLXS-0618MS	6-18	+/- 25	1050	100	11-127	11-118
MLOS-0818MS	8-18	+/- 18	1050	50	11-127	11-118
MLOS-0820MS	8-20	+/- 30	1175	50	11-127	11-118
MLXS-0820MS	8-20	+/- 30	1175	50	11-127	11-118
MLXS-0218MS	2-18	+/- 35	1150	100	11-127	11-118
MLXS-0218TMS	2-18	+/- 35	1150	100	11-126	11-115
MLXS-0220MS	2-20	+/- 35	1175	100	11-127	11-118
MLXS-0220TMS	2-20	+/- 35	1175	100	11-126	11-115

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

Outline Drawing: 11-124



**NOTES :**

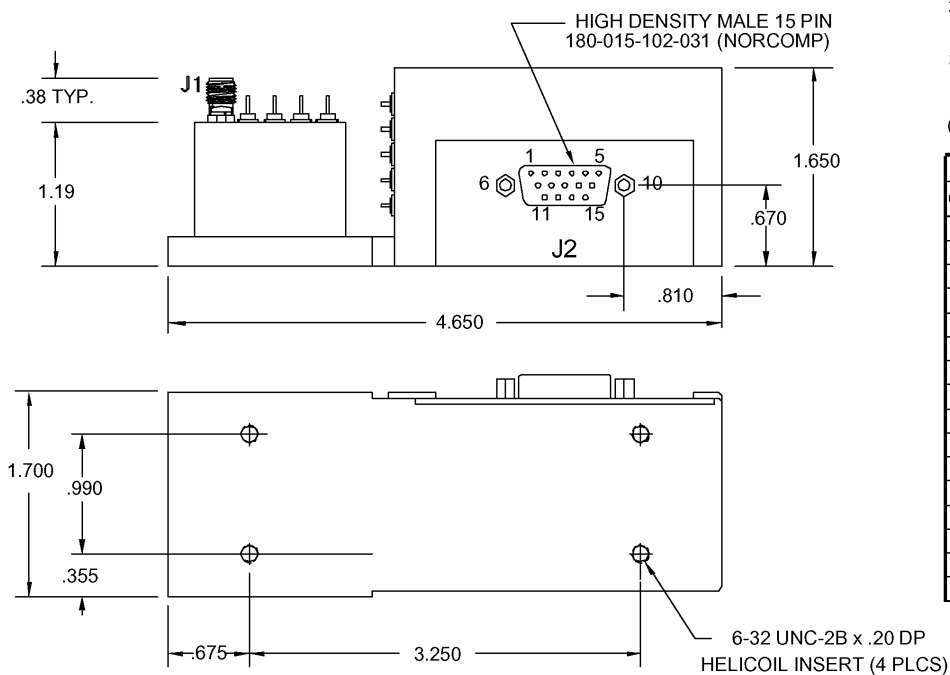
- 1. - DIMENSIONS ARE IN INCHES
  - 2. - SUPPLY & GROUND WIRES = 20-22 GAUGE  
ALL OTHER WIRES = 24-26 GAUGE
  - 3. - THERMAL COMPOUND REQUIRED BETWEEN  
BASE PLATE AND MOUNTING SURFACE
- (\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	+ FM
J2	DB15 MALE	10	- FM
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-125



**NOTES :**

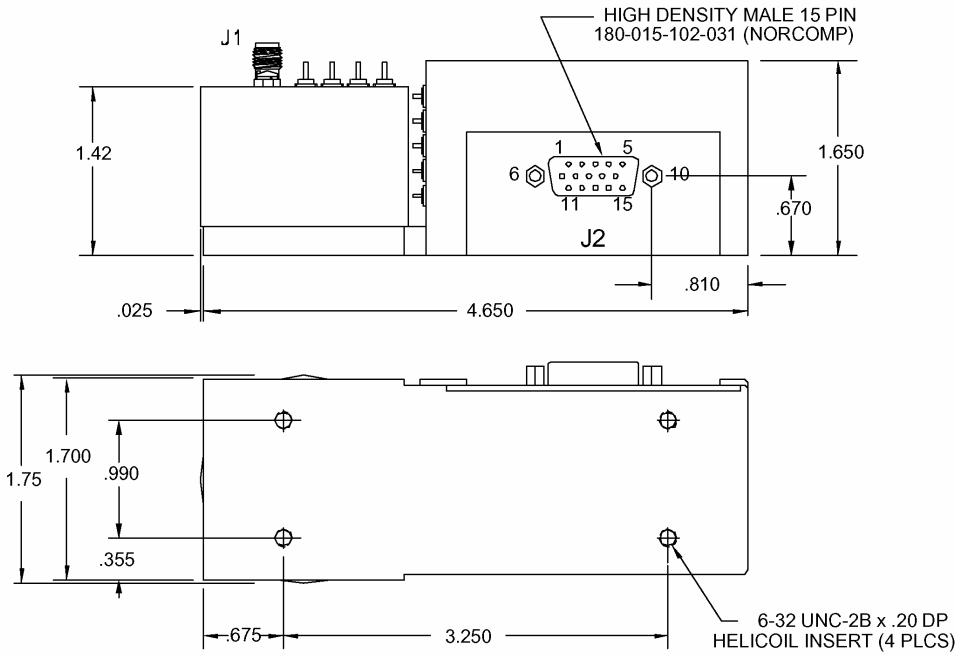
- 1. - DIMENSIONS ARE IN INCHES
  - 2. - SUPPLY & GROUND WIRES = 20-22 GAUGE  
ALL OTHER WIRES = 24-26 GAUGE
  - 3. - THERMAL COMPOUND REQUIRED BETWEEN  
BASE PLATE AND MOUNTING SURFACE
- (\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	±10V FM CONTROL
J2	DB15 MALE	10	FM COMMON
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-129



**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

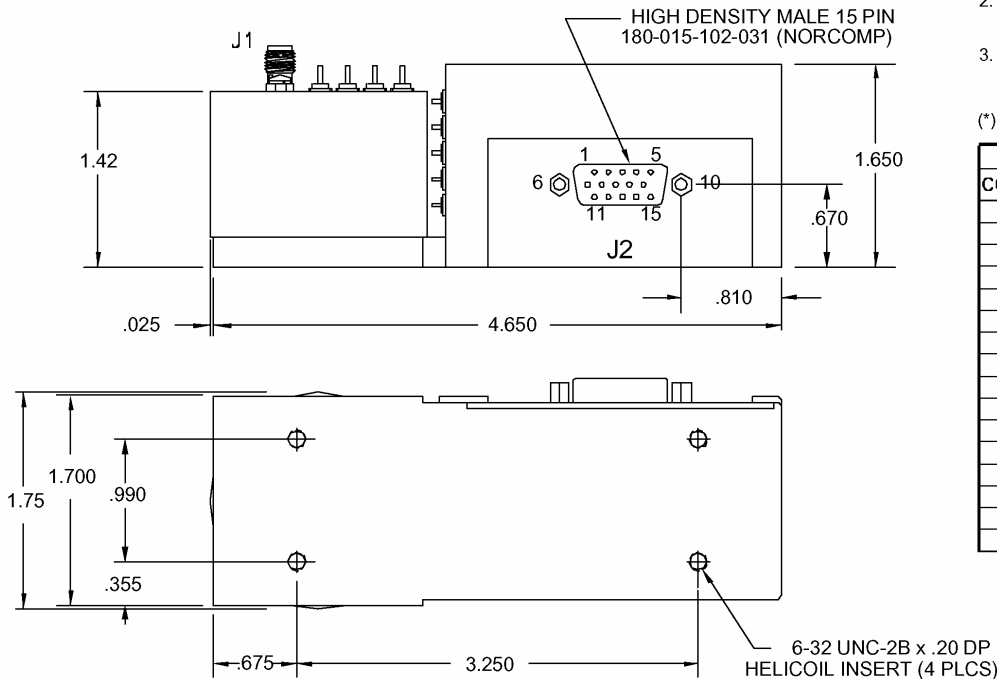
(\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	+ FM
J2	DB15 MALE	10	- FM
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-128



**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

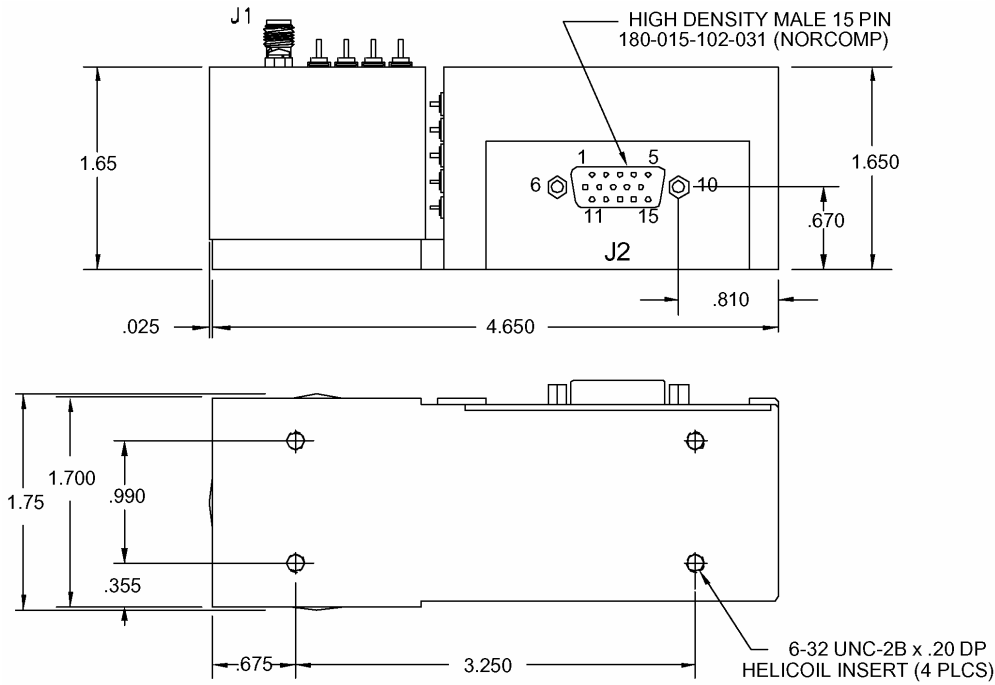
(\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	±10V FM CONTROL
J2	DB15 MALE	10	FM COMMON
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-127



**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

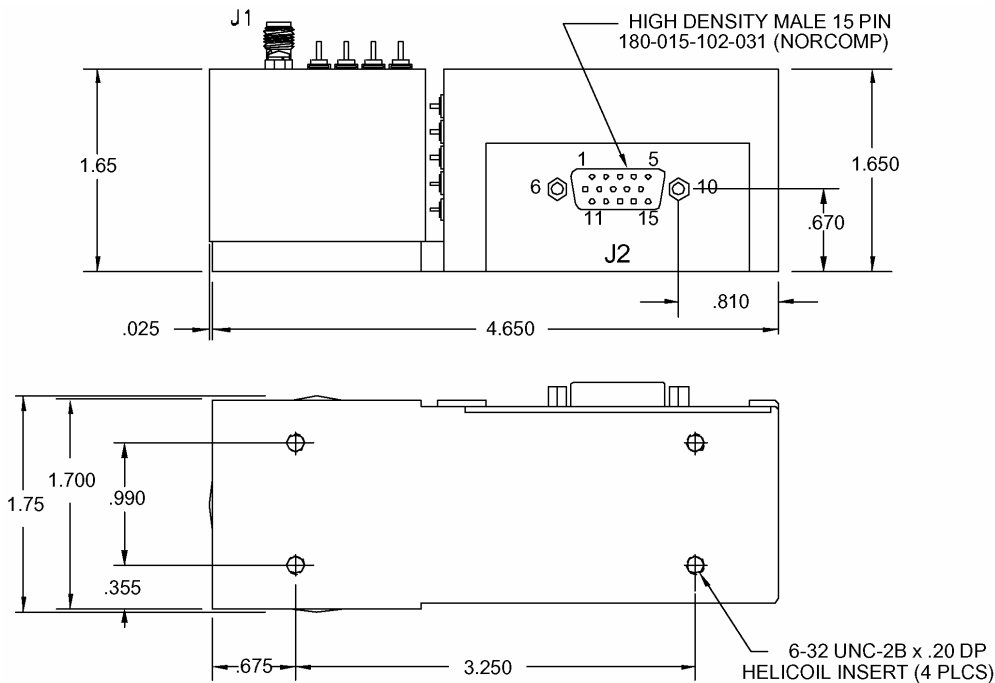
(\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	+ FM
J2	DB15 MALE	10	- FM
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-118



**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

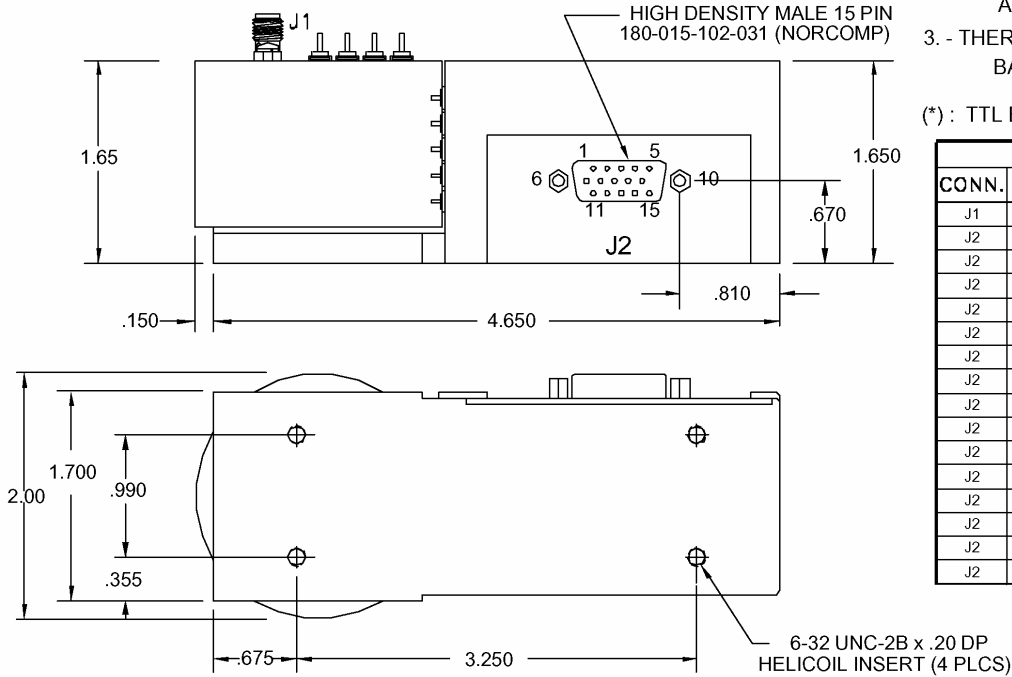
(\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	+/- 10V FM CONTROL
J2	DB15 MALE	10	FM COMMON
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-126



**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

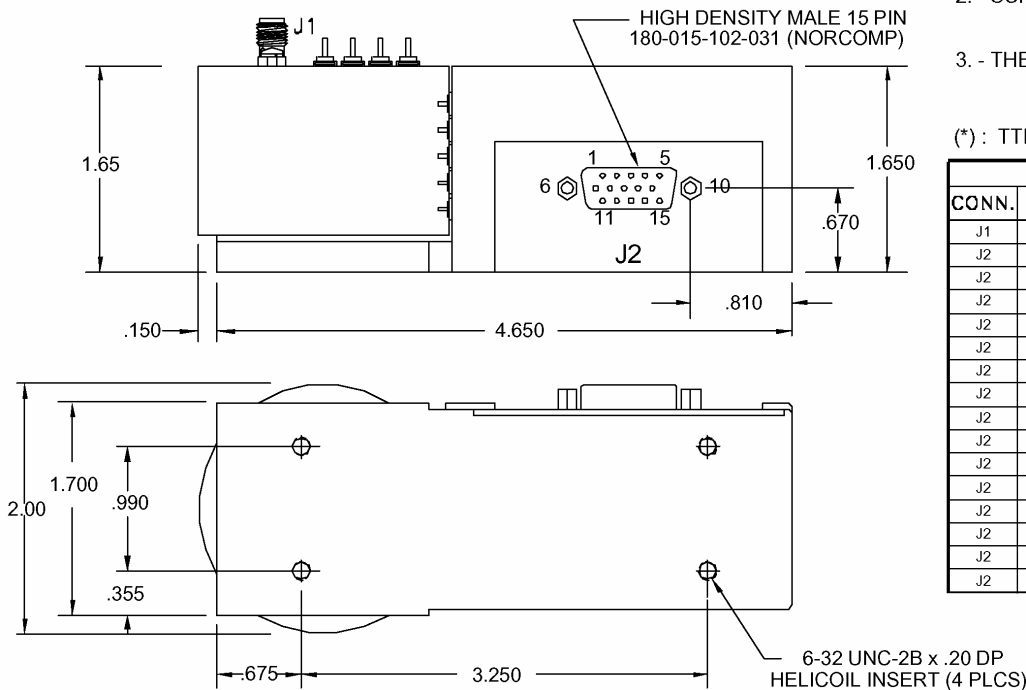
(\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	+ FM
J2	DB15 MALE	10	- FM
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.

Outline Drawing: 11-115



**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

(\*) : TTL BAND SEL. 0=8-Fmax ; 1=2-8 GHz

CONNECTIONS			
CONN.	TYPE	PIN #	FUNCTION
J1	SMA	THD	RF OUT
J2	DB15 MALE	1	CLOCK
J2	DB15 MALE	2	DATA
J2	DB15 MALE	3	C SELECT N
J2	DB15 MALE	4	GROUND
J2	DB15 MALE	5	- V SUPPLY
J2	DB15 MALE	6	+ V SUPPLY
J2	DB15 MALE	7	HEATER 1
J2	DB15 MALE	8	HEATER 2
J2	DB15 MALE	9	+/- 10V FM CONTROL
J2	DB15 MALE	10	FM COMMON
J2	DB15 MALE	11	TTL BAND SELECT (*)
J2	DB15 MALE	12	N/C
J2	DB15 MALE	13	N/C
J2	DB15 MALE	14	N/C
J2	DB15 MALE	15	N/C

(\*) REQUIRED FOR DUAL OSC. ONLY

Weight: 23 oz.