Virginia Diodes, Inc.

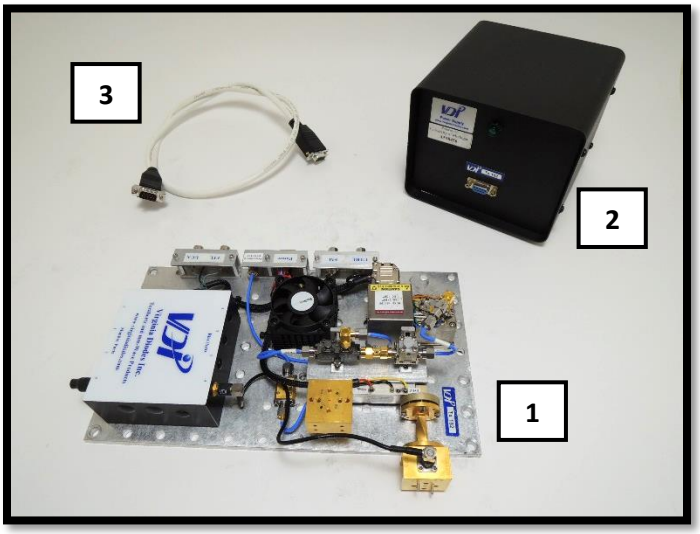
USER GUIDE

75-170 GHz Modular Tx

1 Product Overview

Product Name (Quantity)	Serial Number(s)	Order No.	Date / Initials
75-170 GHz Modular Transmitter (Tx) (1)	Tx 182	11328	04/30/2012 KSF
		RHN112513MIC	12/04/2013 PJD
		RJP022020UMI	03/16/2020 PJD

Product Description: This VDI product includes one 75-170 GHz modular transmitter. This product was returned on RMA# RJP022020UMI for repair of the WR10 doubler.



No.	Part Description
1	Tx 182
2	VDI Custom Power Supply
3	DC Power Cable
4	AC Power Cable*

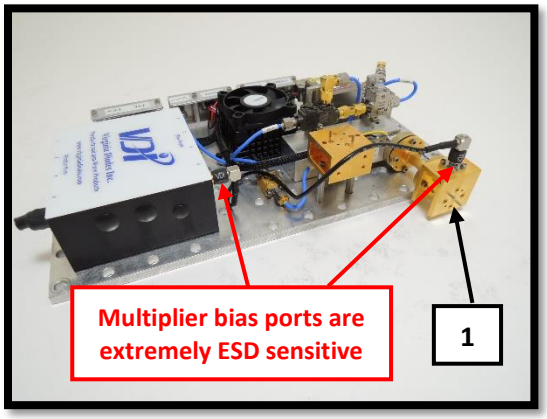
* Not pictured. Item remained with customer during repair.

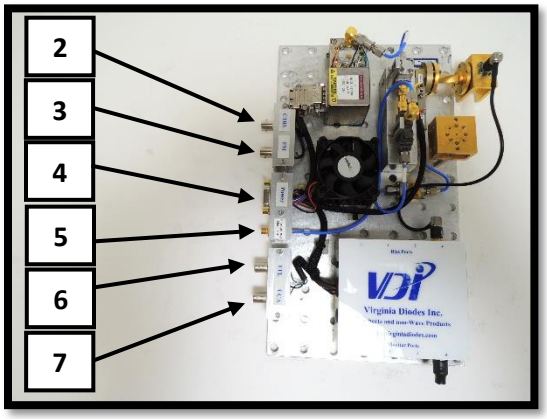
Figure 1: Product photograph and listing is shown.

2 Warning and Caution Statements

WARNING AND CAUTION STATEMENTS	
WARNING	This product can be permanently damaged by Electrostatic Discharge (ESD). It is recommended that engineers and technicians wear a special grounded wrist strap when handling this component. In addition, the work environment around the component should be well grounded.
WARNING	Opening the blocks, parts, or components will damage the internal components. VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer.
CAUTION	VDI assumes the customer is familiar with microwave, millimeter wave, and VDI products. The user and customer are expected to understand all safety guidelines, health hazards, and general advisories that may exist and are associated with the use of this device. VDI is not responsible for any human hazards that may exist or may occur while using this device.

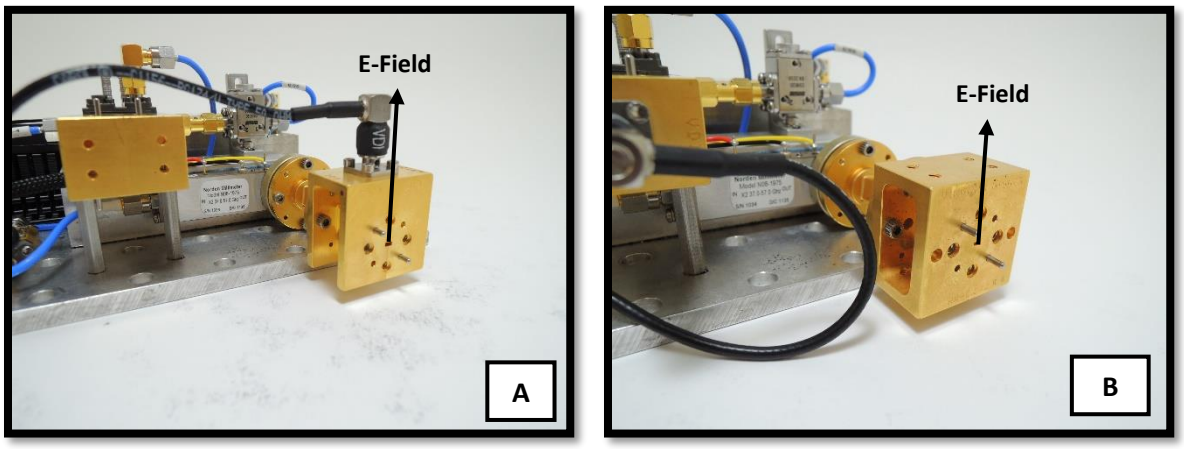
3 Product Specifications





Description		Specification	Connector
RF Output [1]	Frequency Range	See Figure 3	See Figure 3
YIG Control Voltage [2]	Voltage Tuning Range	1.1-5.1V**	BNC(f)
	Sensitivity	~1.2GHz/V	
Frequency Modulation [3]	Voltage Tuning Range	±10V**	BNC(f)
	Sensitivity	±2.5MHz/V	
DC Input [4]	Compatible with VDI Custom Power Supply	-	9-PIN DSUB
Frequency Monitor [5]	Frequency Range	9.37-14.17GHz	SMA(f)
Amplitude Modulation [6]	TTL/AM Input	~0V = On, ~5V = Off, up to ~300Hz	BNC(f)
RF Attenuation [7]	User Controlled Attenuation	0-5V*	BNC(f)
YIG Oscillator	Stability over 0-65 °C	~1000ppm	--
	Phase Noise at 100kHz offset	<-120 dBc/Hz	

Figure 2: General product specifications are shown for the Tx.
**See Section 5 for actual system performance.*
***Exceeding limit will damage the device.*



Configuration	Multiplier Output	Output Frequency	Output Power (Typical)	Multiplication Factor	Output Flange
A	WR10X2	75-110 GHz	8 mW*	8	WR10, UG-387/U-M
B	WR6.5X3	115-170 GHz	4 mW*	12	WR6.5, UG-387/U-M

Figure 3: Modular system configuration details are shown.
**See Section 5 for actual system performance.*

4 General Operating Procedures and Guidelines

VDI assumes the customer is familiar with VDI products, and VDI is not responsible for the warranty or guaranty of products damaged as a result of improper handling, testing, biasing, or use by customer. VDI offers the following general guidelines for using these products and recommends the customer contact VDI at (434) 297-3257 for assistance if needed. The following procedures are a quick guide for turning on and off the product. In each case the individual steps must be followed in the proper sequence to avoid damaging critical components.

4.1 Required Operating Procedures

- DO NOT exceed damage limits listed in Figure 2.
- DO NOT apply any external biases to the system.
- DO NOT tamper with black bias cable. Multiplier bias connections are extremely ESD sensitive.
- Turn the VDI Custom Power Supply off before changing configurations.

Failure to follow these procedures will damage or destroy the device.

4.2 Additional Guidelines, Limitations, and Recommendations

- The Tx is shipped with reusable dust covers attached. Remove before operation.
- The UCA and TTL inputs default to +0V (full power) with no connection.
- Use provided standoffs to mount unused modular multiplier.

4.3 Turn-On Procedure

1. The user and test bench must be properly grounded and protected against ESD.
2. With the VDI Custom Power Supply turned off, make all necessary connections (i.e. AC cable, DC cable).
3. Turn on the VDI Custom Power Supply.
4. Apply the YIG control voltage that corresponds to the desired YIG frequency [See Figure 6] and monitor the RF output.
    a. For Amplitude Modulation: use TTL Mod. port (~0V = On, ~5V = Off, up to 300Hz)
    b. For RF Attenuation: use UCA port (0-5V) – See Figures 7 and 8.
    c. For Frequency Modulation: use FM port (See Figure 2)

4.4 Turn-Off Procedure

1. The user and test bench must be properly grounded and protected against ESD.
2. Turn off the VDI Custom Power Supply.
3. After completing turn-off procedures described above, it is now safe to turn off all other equipment on user test bench.

Contact VDI with questions or concerns regarding operational procedures and limitations.

5 Product Performance

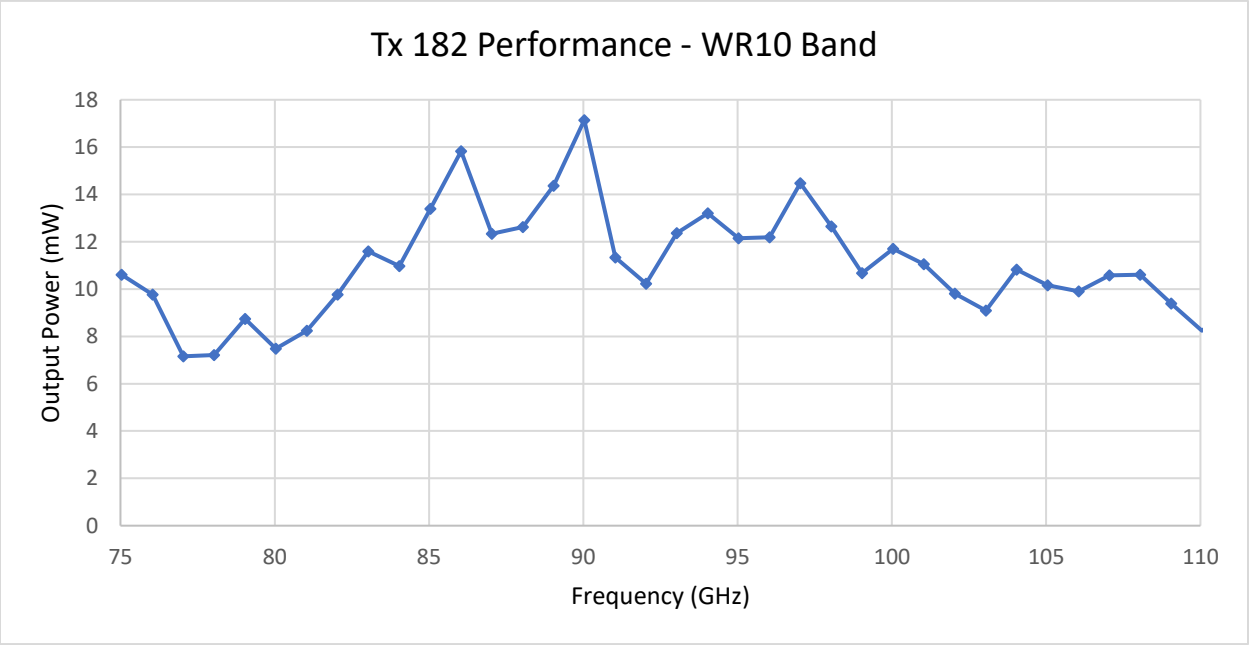


Figure 4: The product performance (maximum output power versus output frequency) is shown for the Tx in configuration A. Power measurements were made using an Erickson Power Meter.

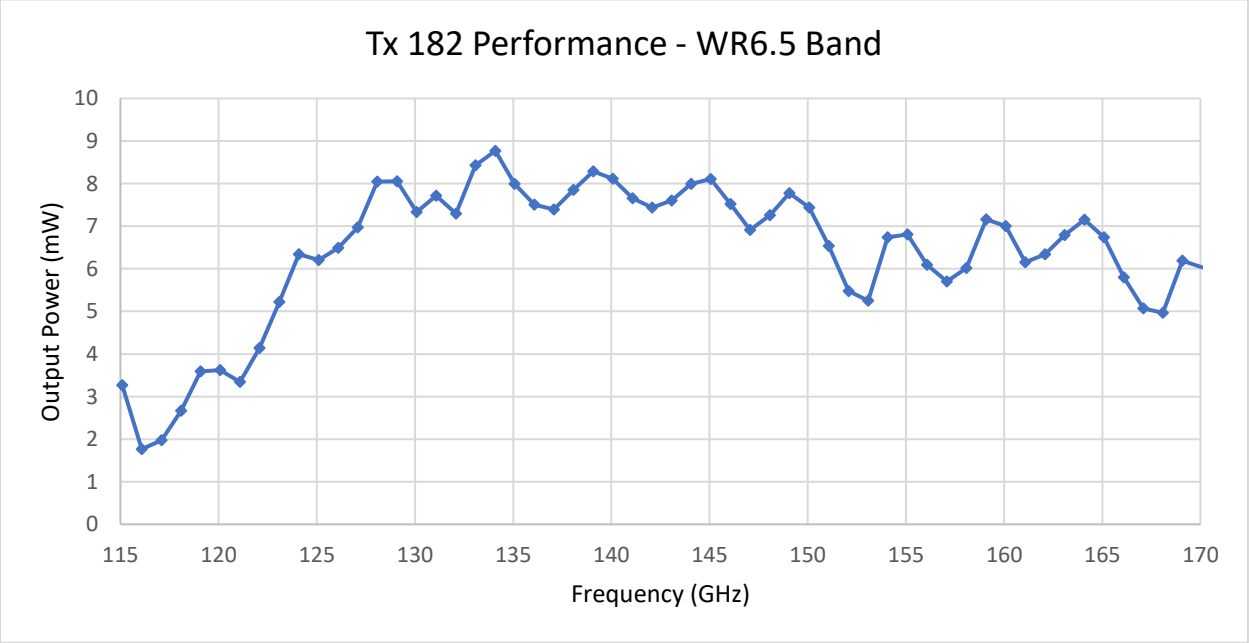


Figure 5: The product performance (maximum output power versus output frequency) is shown for the Tx in configuration B. Power measurements were made using an Erickson Power Meter.

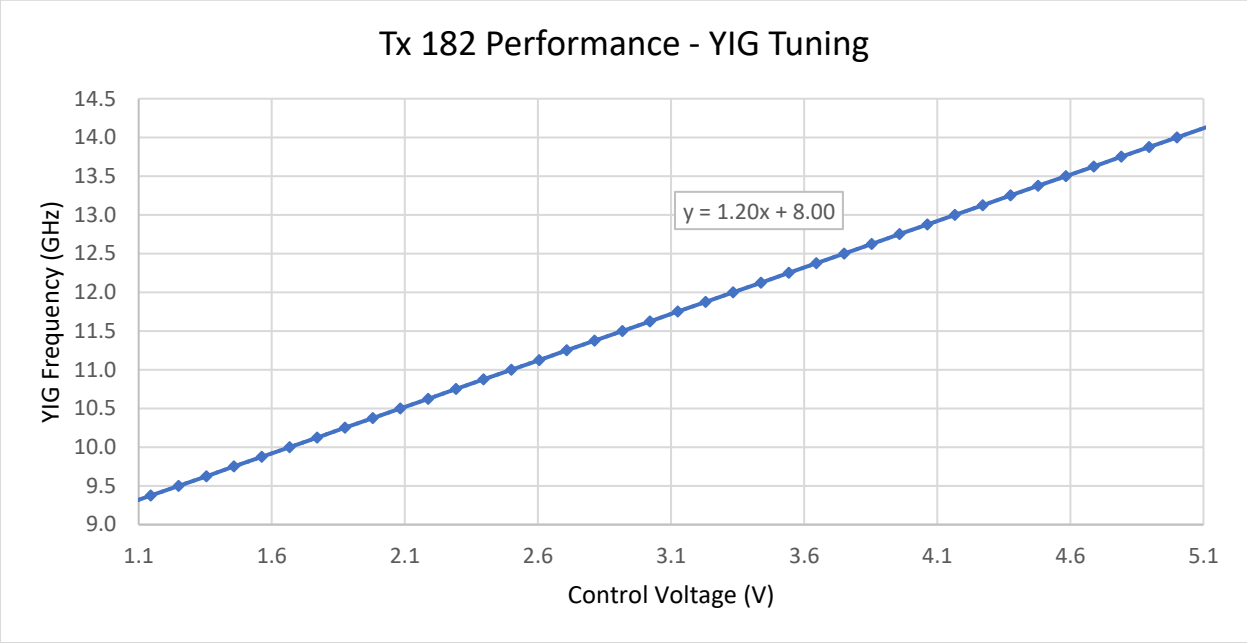


Figure 6: The product performance (monitor port frequency vs. YIG control voltage) is shown. Tx output frequency can be calculated by multiplying the monitor port frequency by the multiplication factor.

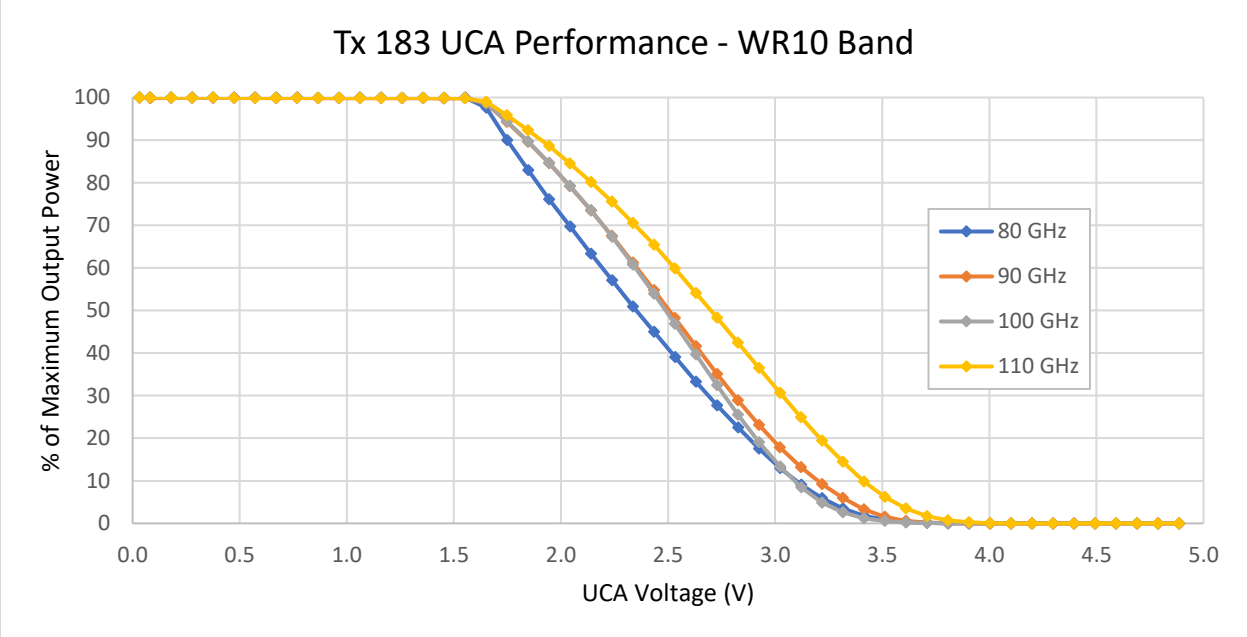


Figure 7: The product performance (percentage of maximum output power versus user-controlled attenuation input voltage) is shown for the Tx in configuration A.

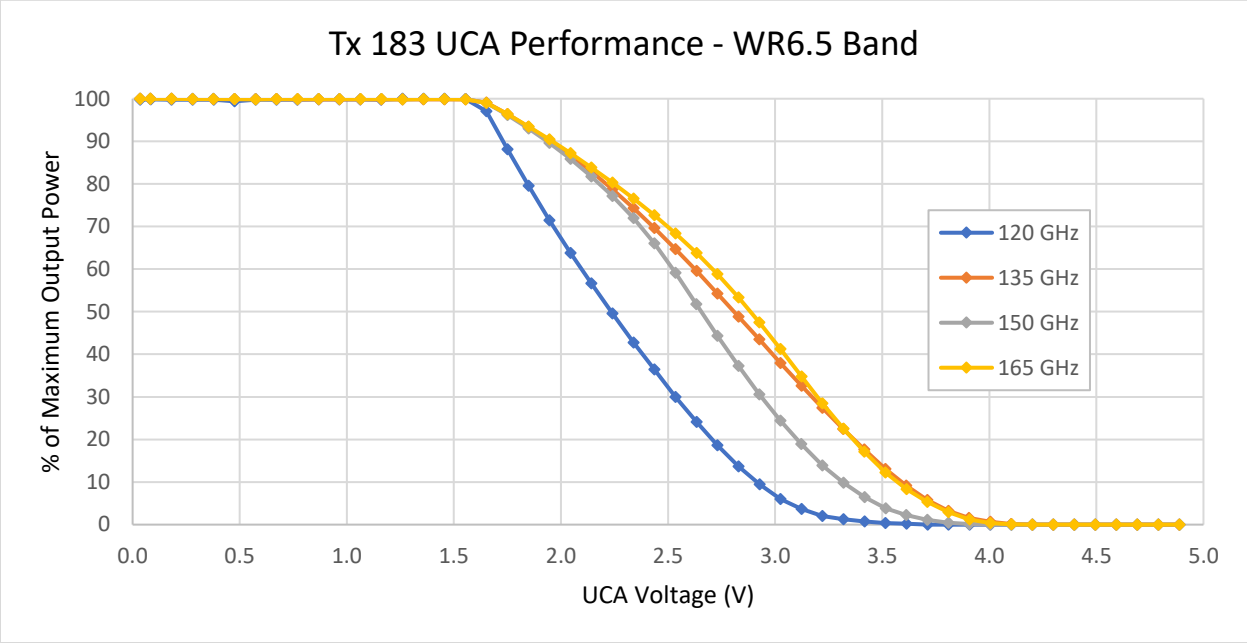


Figure 8: The product performance (percentage of maximum output power versus user-controlled attenuation input voltage) is shown for the Tx in configuration B.

Note: The UCA voltage reduces the amplifier output power. The data presented in this graph was measured by VDI under specific test conditions and is meant as a guide. The exact shape of the curves will vary significantly depending on the measurement conditions, including operating temperature, modulation rate, duty cycle, and load impedance. Also, for large attenuation values the multipliers can become under-pumped and may generate undesired harmonics at increased levels.

6 End of Document