

# MIMOMAX TORNADO TRANSMITTER TUNE-UP PROCEDURE

## 1.1 OVERVIEW

All power calibration is done at maximum average output power of +24dBm. This is calibrated at manufacture to within +/-0.2dB.

Power is not required to be calibrated for changing to a lower power level as this algorithmically derived from the maximum power calibration.

The settable power range is 0 to +24dBm in 0.5dB steps. The tolerance of power across the settable range is defined by the tolerance of the power calibration at maximum. As such a +/-0.2dB tolerance at maximum power calibration will dictate a +/-0.2dB tolerance at any set power within 0 to +24dBm.

## 1.2 EQUIPMENT REQUIRED: POWER METER

For accurate measurement of average power from MiMOMax transmitters a thermistor bolometer type of power meter (e.g. HP435A or similar) is required. Other types of power meter may give inaccurate average power readings when used with MiMOMax transmitters, and may be suitable only for relative power measurement.

## 1.3 POWER CALIBRATION

Figure 1 shows the Tx Power Calibration page in the “Configuration and Control Monitoring System” (CCMS). The calibration method is easy to follow using the instruction panel on the right of the screen. In summary:-

- Read the power value and enter it into the Tx1 Measured Power text box
- Press Calibrate
- Once Tx1 is calibrated buttons will appear that allow you to re-calibrate Tx1. This is a good method of checking that the original calibration is accurate as the Tx will key up and allow you to measure the power. In addition a next button will appear that will allow you to calibrate channel 2 power. **Ensure** that your power meter is connected to channel 2 before selecting ‘Next’.
- On calibrating Tx2 and selecting ‘Done’ this will cause CCMS to exit the calibration menu and remove associated warnings.

The screenshot shows the 'Tx Power Calibration' page in the CCMS. The page has a header with the 'mimoMax wireless' logo and the tagline 'maximizing the potential of advanced wireless communications'. Below the header, there is a status bar showing 'TRN\_03.00.01 (RRU) No name set Link Inactive Mon Sep 29 09:56:54 UTC 2014'. The main content area is divided into three sections: 'Diagnostics', 'System', and 'Test Modes'. The 'Calibration' section is active, showing 'Tx1 Power Calibration' with a text box for 'Tx1 Measured Power [dBm]' and a 'Calibrate' button. The 'Current PG Cal' is 12000 and the 'Current duplexer loss [dB]' is 3. There is also an 'Abort' button. On the right side, there is a 'Tx Power Calibration' instruction panel with the following text: 'If your change in frequency has resulted in duplexer retuning then you will need to re-calibrate the TX output power. This calibration is performed at maximum settable power of +24dBm.' and a numbered list: '1. Please attach a power meter to channel 1 and enter the measured power value (dBm) in the field below' and '2. Press Calibrate to submit'.

Figure 1: Tx Power Calibration

## 1.4 POWER SETTING

The output power level can be set on the RF Tx and Rx page. Its range is between +0 to +24 dBm in 0.5dB steps. The power can be specified in either dBm or mW, by selecting either dBm or mW as the transmitter power unit.

The power cannot be set beyond a maximum of +24dBm (250mW) or below 0dBm (1mW).

The screenshot displays the MiMOMax wireless configuration web interface. At the top, the logo 'mimo Max wireless' is visible, along with the tagline 'maximizing the potential of advanced wireless communications'. The status bar shows 'TRN\_03.00.01 (NDL) Test\_Unit Link Inactive Mon Feb 17 00:04:27 UTC 2014'. The main content area is titled 'Configure RF Transmitter & Receiver' and is divided into two sections: 'Configure RF Transmitter & Receiver' and 'Advanced Configuration'. The 'Configure RF Transmitter & Receiver' section includes fields for Transmitter frequency (MHz) set to 952.025, Receiver frequency (MHz) set to 928.025, Transmitter power set to 24, Transmitter power unit set to dBm, and Duplexers set to Internal. The 'Advanced Configuration' section includes Tracking algorithm rate of adaptation set to Normal, Tracking algorithm adaptation delay set to Disabled, and Retrain detection time (ms) set to 50. There are 'Save' and 'Cancel' buttons. On the right, a sidebar titled 'RF Transmitter & Receiver' provides additional information: 'This MIMO radio has 2 transmitters and 2 receivers, operating on common Tx and Rx frequencies.' and 'Transmitter power can be set in dBm or mW with steps of 0.5. This is the average power level at each antenna connector.' Below this, a 'Save' note states: 'Save Allows to set power if the Transmitter Power field has been changed. Applies frequency retuning if one of the frequency fields for transmitter or receiver has been changed. Status bar will show if transmitters or/and receivers were OFF. Please follow further instructions on the page as they appear during the process.' The footer of the interface reads 'Copyright © 2014 MiMOMax Wireless Ltd.'.

Figure 2 Transmitter Power Setting