ROSA MWAVE SOLUTIONS

Product Brief

81-86 GHz Transmitter Module

TxM83WR12

General Description

The *TxM83WR12* was developed to satisfy the transmitter requirements of a complex (I/Q) modulation, micro-controller-based, Gigabit E-Band radio terminal.

A single *TxM83WR12* transmitter module, teamed with a single *RxM83WR12* receiver module and appropriate antennas, can serve as the complete RF section of a low-power Gigabit simplex radio.

A full-duplex FDD radio operating in the 71-76/81-86 bands can be realized by using one *TxM73WR12* Tx module, one *TxM83WR12* Tx module, one *RxM73WR12* Rx module, and one *RxM83WR12* Rx module with appropriate duplexers and antennas *(see Figure 2).*

For maximum operating range, a high power MMW amplifier can be easily attached to the *TxM83WR12* output interface (WR-12 with UG-387/U-compatible flange).

Key operational parameters are programmed via a 4-wire Serial Peripheral Interface (SPI).

Features

- Direct up-conversion to 81-86 GHz: >50 dB typ. LO suppression after calibration
- Differential I/Q inputs: support image rejection of 50 dB typ. with correction via the SPI (vs. 30 dB typ. without correction)
- SPI controls Tx On/Off, Tx output power adjust, selection of either output power or modulation envelope detected output, and temperature sensor output
- Tx output power (set to max.): 7 dBm (typ.)
- Low phase noise, internal VCO Local Oscillator
  - VCO tune input and divided-down output for connecting to external PLL circuitry
  - SSB phase noise (typ.):
    - -83 dBc/Hz @ 100 KHz offset
    - -105 dBc/Hz @ 1 MHz offset
    - -125 dBc/Hz @ 10 MHz offset
- Single voltage Bias: +6VDC @ 0.6A (typ.)

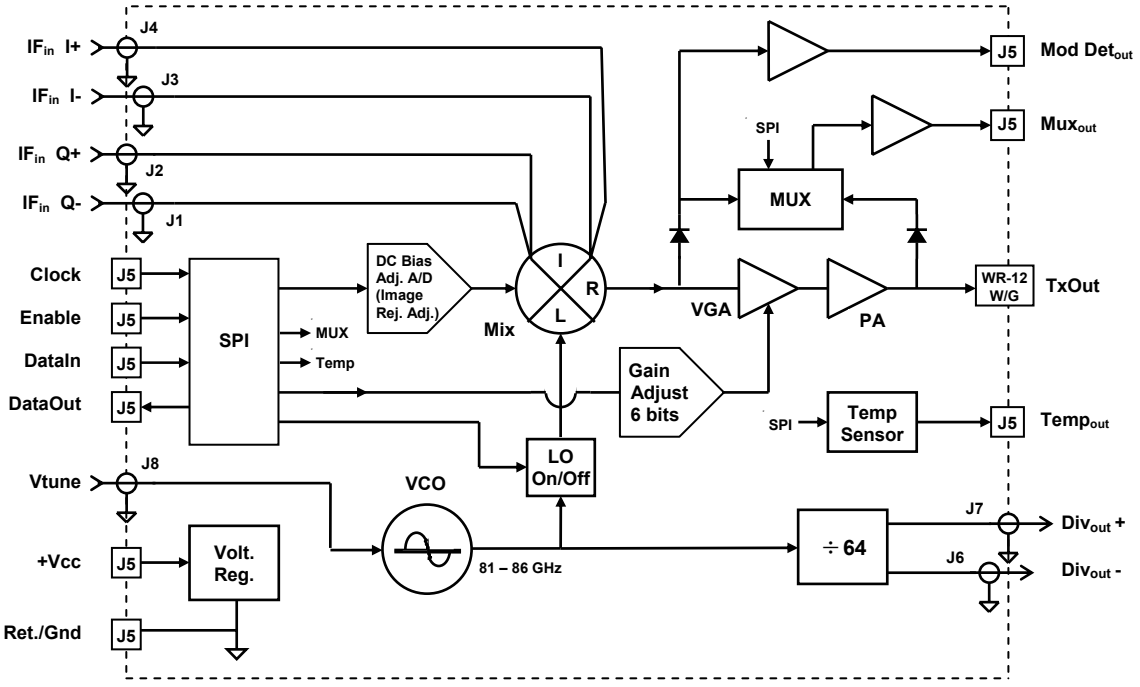

Figure 1 – TxM83WR12 Functional Block Diagram

Functional Characteristics		
Mnemonic	**Conn.**	**Description**
+Vcc	J5	DC bias input requirement: 6.0 VDC ± 5% @ 0.6A typ.
Vtune	J8	VCO tune voltage for 81-86 GHz output = 0.6 to 3.8V typ.
DataOut	J5	SPI data sequence from Transmitter; CMOS/TTL compatible
DataIn	J5	SPI data sequence to Transmitter; CMOS/TTL compatible
Enable	J5	SPI On/Off control signal to Transmitter; CMOS/TTL compatible
Clock	J5	SPI clock to Transmitter; CMOS/TTL compatible
IFin Q-	J1	Differential Quadrature-phase inputs; impedance: 100Ω differential (50Ω single-ended); bandwidth (each channel) = 500 MHz min./1 GHz typ. (AC-coupled).
IFin Q+	J2	
IFin I-	J3	Differential In-phase inputs; impedance: 100Ω differential (50Ω single-ended); bandwidth (each channel) = 500 MHz min./1 GHz typ. (AC-coupled).
IFin I+	J4	
Mod Det$_{out}$	J5	Wideband envelope tracking detection
Mux$_{out}$	J5	Narrow- or Wide-band detection (selectable via SPI); 20 dB range, 2 dB accuracy (typ.)
TxOut	W/G	From 81-86 GHz, with output power set to max. (via SPI): P-1dB = 7 dBm typ.; LO suppression >50 dB typ. achievable using SPI controllable adjustments plus *micro-controller executed calibration routine (not included with Tx Module)* ; 15 dB typ. output power control (via. SPI); WR-12 waveguide with UG387/U compatible flange
Temp$_{out}$	J5	Temperature sensor output (DC voltage)
Div$_{out}$ +	J7	Frequency ≈ 1.27 GHz to 1.34 GHz; impedance: 100Ω differential (50Ω single-ended); output (typ.) = -9 dBm differential (-12 dBm single-ended)
Div$_{out}$ -	J6	
Operating temperature range = -35 to 65 deg. C		
Storage temperature range = -40 to 75 deg. C		

Note – Differential signaling provides several performance improvements vs. single-ended signaling, including reduced radiated noise pickup, reduced 2nd order distortion products, and doubled signal amplitudes.

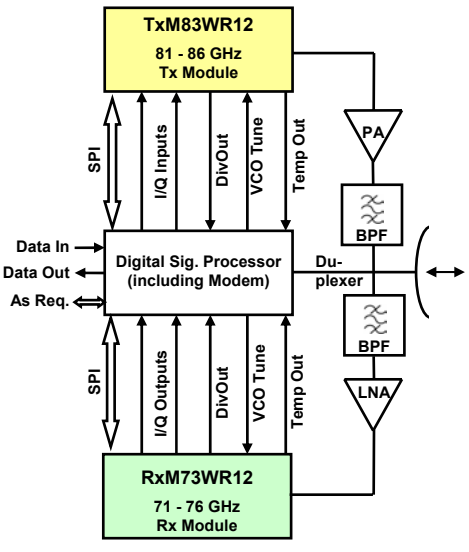

Figure 2 - Full-Duplex E-Band Radio Terminal Baseline Design

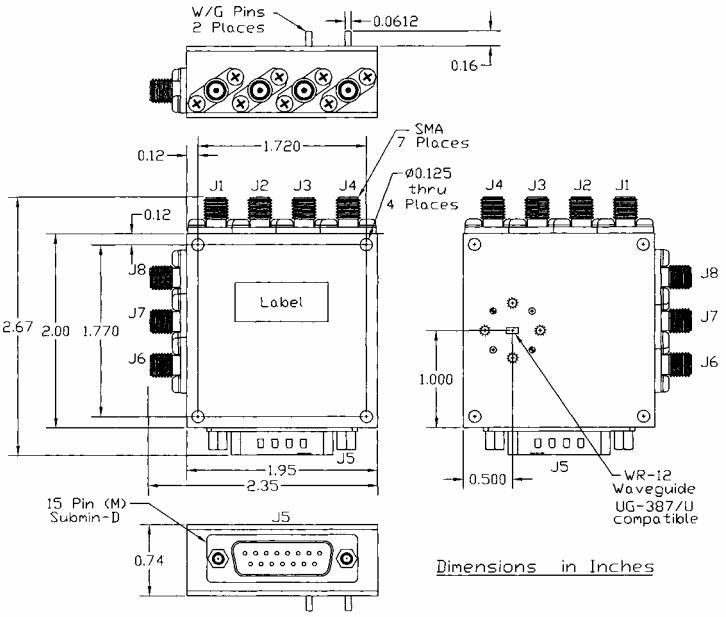

Figure 3 – TxM83WR12 Outline