

Tucana 94^{GHz} Radar

TU-WTR-FP100 Radar Module

Fully integrated stand-alone millimetre-wave FMCW Radar

Overview

The TU-WTR-FP100 radar module is a fully integrated stand-alone millimetre-wave FMCW radar front end module designed for radar sensors and security systems. A digital input is provided for control of the FMCW sweep characteristics/baseband receive gain and the only output is a baseband beat frequency signal, the frequency of which is proportional to distance. The standard RF transmit power is 40mW with an option for 10mW. Operating at a centre frequency of 94GHz, this module has substantial advantages over ~76GHz systems, taking advantage of the low atmospheric attenuation 'window'. It is especially suited to low visibility navigation such as helicopter brownouts and marine fog environments.

The module contains Arralis Tucana monolithic millimetre wave P-HEMT integrated circuits with separate power and microwave baseband boards with integrated swept local oscillator and frequency references. Advantages include low frequency inputs, WR10 connections, single rail power supplies and integration simplicity.



Applications

- Integrated Self Contained Module
- 92-96GHz Frequency Range
- High Output Power
- FMCW Operation
- Built-in FMCW sweep generation



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Specification Overview

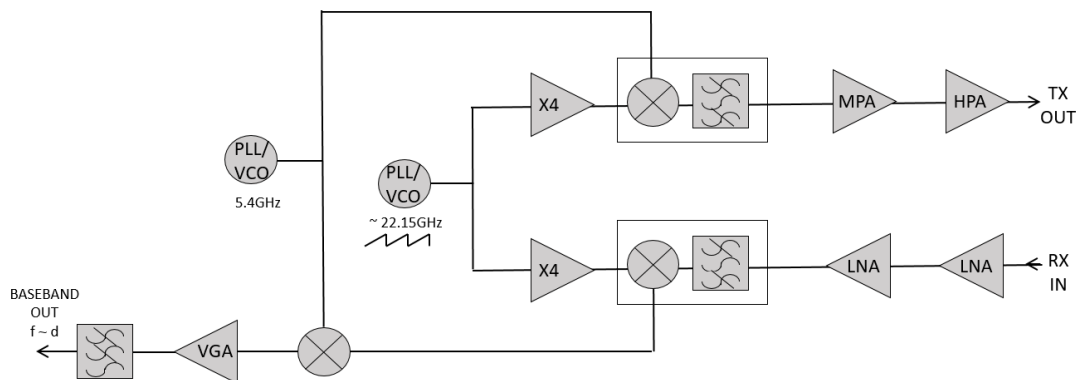
Parameter	Min.	Typ.	Max.	Units	Comment
TX Frequency	92		96	GHz	
LO Frequency	21.65		22.65	GHz	internal sweep generation Digitally controllable
IF Input Frequency		5.4		GHz	Internally generated
Sweep Time		1		ms	Digitally controllable
TX Output Power		16		dBm	
RX Noise Figure		3		dB	
DC Input		11.6-20		V	
Power Consumption		12.7		W	
Unit LO / IF Connectors SMA					Internally Supplied
Baseband Connectors		Digital Connector [M8-male-A coded] Beat Frequency Connector [SMA-female]			External Connector
TX/RX Connectors		WR10 Waveguide			External Connector

Options

*only under certain conditions

- 01 Reduced Transmitted Power (10dBm)
- 02 Integrated Horn Antennas (25 dBi gain, 9° horizontal/vertical beamwidth)
- 03 Circulator (Single TX / RX Port)*

Simplified Schematic Diagram



Preliminary Performance Data (Base Unit Design)

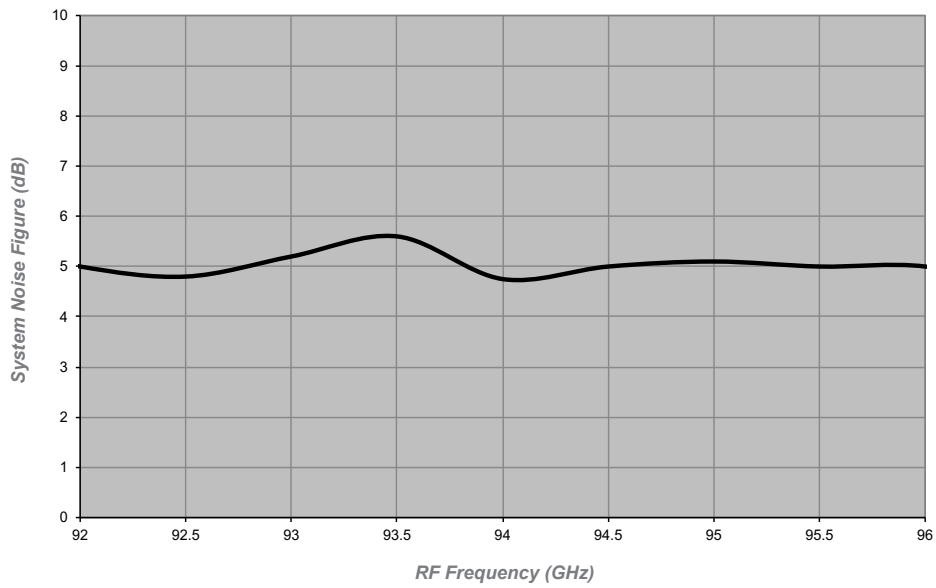


Figure 1
TU-WTX-FP100
System Noise Figure

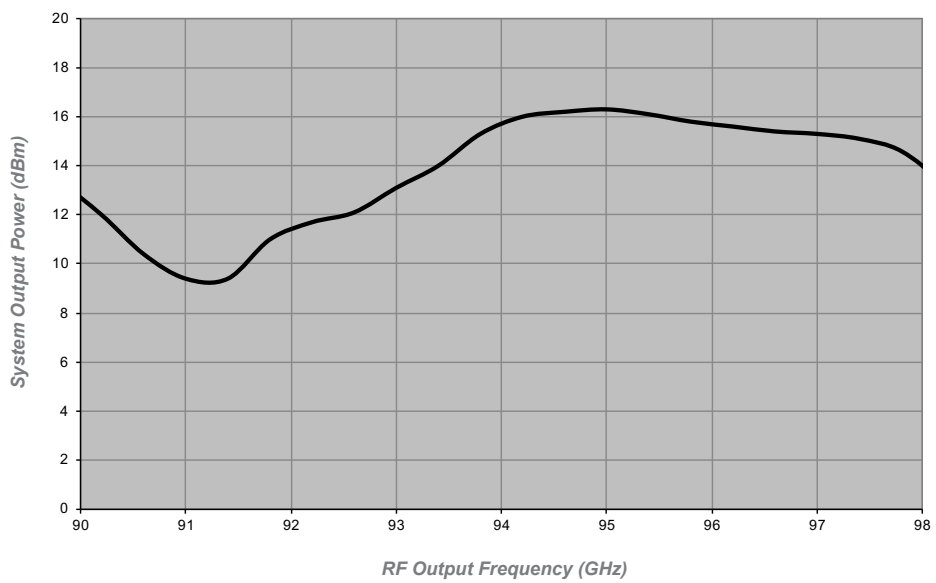


Figure 2
TU-WTX-FP100
System Output Power



Preliminary Performance Data (Base Unit Design)

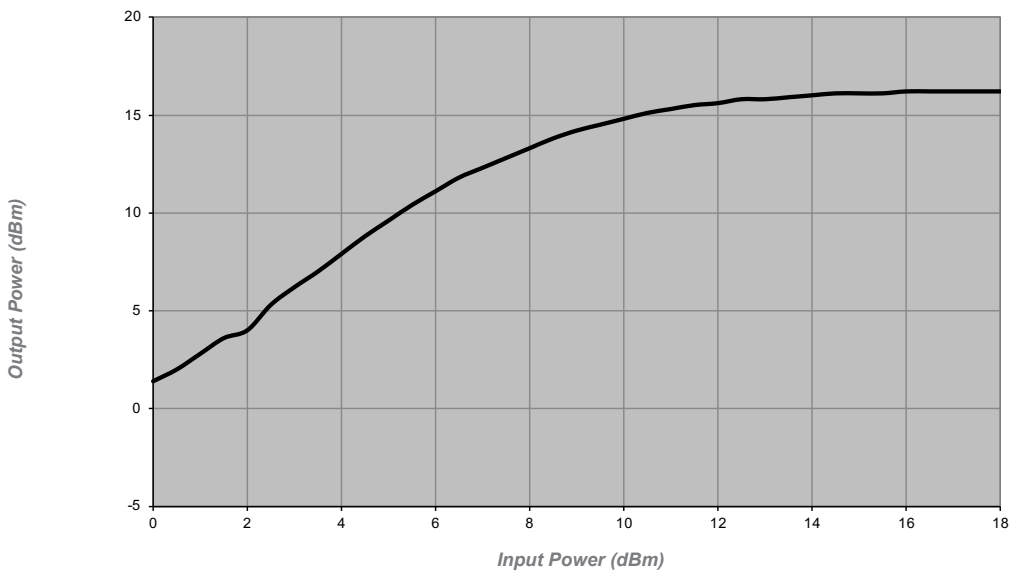


Figure 3
TU-WTX-FP100
Output Power Conversion at 95GHz

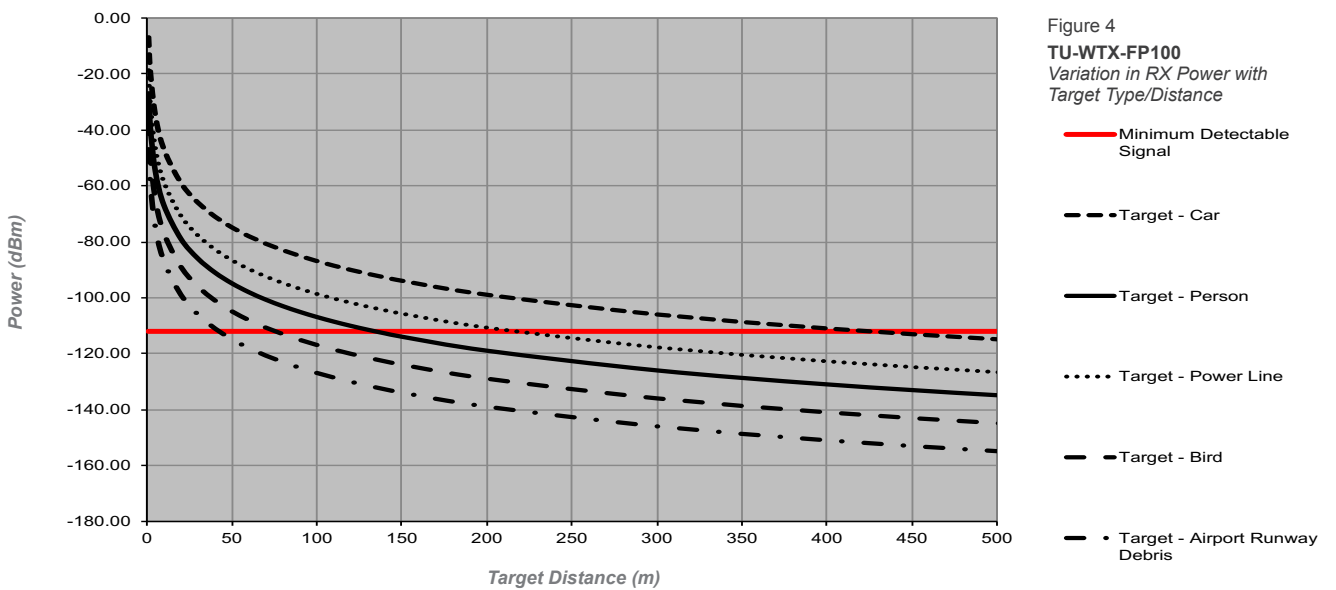


Figure 4
TU-WTX-FP100
Variation in RX Power with
Target Type/Distance

- Minimum Detectable Signal
- - - Target - Car
- Target - Person
- Target - Power Line
- · - Target - Bird
- · - Target - Airport Runway Debris

* Assumes that: (i) integrated horn antennas (with 25 dBi gain) are used, (ii) SNR of 12.5 dB is required for adequate target detection.



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