

# S-Band DTRM (Dual Transmitter and Receiver Module)

## Overview

The S-Band DTRM from Mistral is a Dual Transmitter and Receiver Module with a GaN based Power Amplifier. The GaN based Power Amplifier helps reduce the size and complexity of the overall amplifier module while ensuring increased efficiency and high-power operation of a radar system.

Transmit/Receive Modules (TRM) form the basic building blocks in an Active Phased Array Radar System. It consists of MMIC Amplifiers, RF Power devices and Digital Control circuitry. Each TRM consists of a Transmit chain, Receive chain, circulator, digital controller and a DC power conditioning block.

Dual T/R Modules (DTRM) consists of two identical T/R chains having two independent TX OUT/RX IN antenna connectors and a common TX IN/RX OUT connector further optimizing the size and efficiency of the radar system. Input drive power to the Transmit chain and return signals from receive chains is managed through a power divider/combiner.

The S-Band DTRM from Mistral comprises of three separate cards:

- ▶ Receiver card
- ▶ Transmitter card
- ▶ Digital card

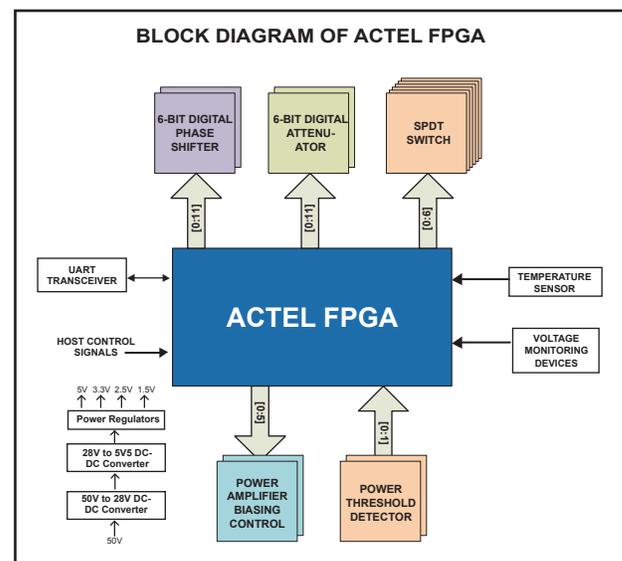
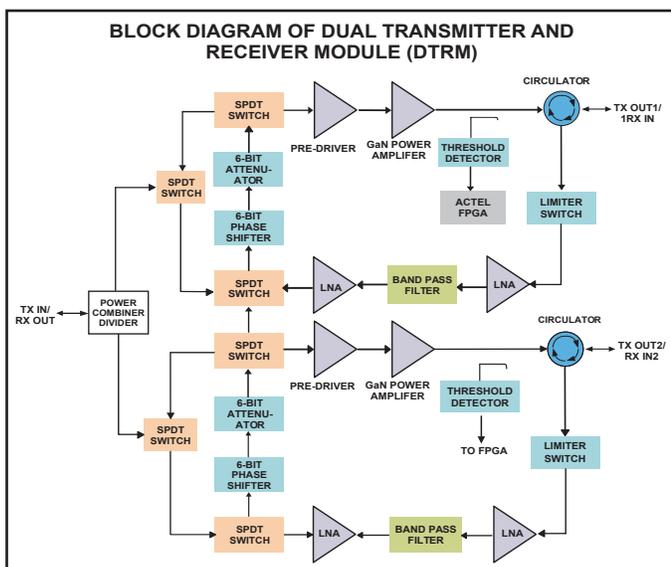


The Receiver Card consists of a Limiter, Digital Phase Shifter, Digital Attenuator, Low Noise Amplifiers (LNA) and Band Pass Filter (BPF). The Limiter is used to protect the receiver chain from high power reflection from the Transmitter path. The Digital Phase shifter and Digital Attenuator acts as the common path for both receiver and transmitter paths using RF switches. Phase shifter and digital attenuator are used to set the phase and amplitude values of the TR module in both the receive and transmit paths for beam formation.

The Transmitter Card consists of a Pre-Driver, GaN power Amplifier and Power Detector Sections. The Power Detector Section is used to detect the transmitter power level and can be monitored by FPGA.

The Digital card consists of a Power supply card and a Smart-Fusion FPGA from Actel. It is configured to receive data from host controller and configure the Attenuators and Phase shifters. It also controls the biasing of GaN Amplifiers. The digital card can also be configured / programmed remotely.

The Transceiver board consumes less than 2W of power and operates from batteries of 9 to 18V (rechargeable and not rechargeable).



## Receiver Features

- ▶ Frequency Range is 3.1GHz to 3.5GHz
- ▶ 20dB±1dB Receiver Chain gain
- ▶ 3.5dB Noise Figure
- ▶ 30dB Isolation between Receiver Channels
- ▶ 6-Bit Digital Phase Shifter = 3600 (with ±5.6250 variation)
- ▶ 6-Bit Digital Attenuator = 31.5dB (with 0.5dB variation)
- ▶ 60dB Receiver Isolation at Rx path between OFF/ON State
- ▶ +0dBm Output Receiver Power

## Transmitter Features

- ▶ 100Watt Transmit Output Power
- ▶ 10% Duty Cycle
- ▶ 100usec Pulse width
- ▶ +2dBm Input Power
- ▶ ≤0.5dB Power Droop
- ▶ ≤200nsec Rise/Fall Time
- ▶ 40dBc Harmonic Rejection
- ▶ 100Watt Receiver Input Power Protection

## Digital Card Features

- ▶ ACTEL Smart Fusion SOC

- ▶ Host command control
- ▶ Voltage and Temperature Monitoring
- ▶ Remote Programmability
- ▶ Custom UART Protocol
- ▶ GaN Bias sequencing

## Mechanical Details

- ▶ Dimension(in mm): 220x93x33
- ▶ Weight: <1000 Grams
- ▶ Board to Board RF Connectors: Catcher's Mitt SMT type
- ▶ RF Connectors: BMA Female Type
- ▶ Power Supply and Control : D-Sub Connectors

## Deliverables

- ▶ DTRM Unit
- ▶ VHDL source codes
- ▶ Command Control Software
- ▶ User Manual

## Ordering

For ordering information please email us at [sales@mistralsolutions.com](mailto:sales@mistralsolutions.com) or call +1-408-705-2240 for USA and +91-80-3091-2600 for rest of the world.

## About Mistral

Mistral is a technology design and systems engineering company providing end-to-end solutions for product design and application deployment. Mistral focuses in two business domains: Product Engineering Services and Defense & Homeland Security. Mistral provides total solutions for a given requirement, which may include hardware board design, embedded software development, FPGA design, systems integration and customized turnkey solutions.

Mistral's strategic partnerships with leading technology companies help provide customers with a comprehensive package of end-to-end solutions.

Mistral Solutions is a Platinum Member of Texas Instrument Design Network offering development platforms, reference designs and services in the area of software & hardware design, development and consulting on various TI DSPs platform.



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