

# MAIA-009992-000000

**COBHAM**

Dual S-Band 100W Transmit / Receive Module (TRM) 3.1 to 3.5 GHz

2011 Datasheet v1 Prelim

The most important thing we build is trust

## Description

The Cobham MAL Ltd. Dual S-Band 100W Tx/Rx Module is designed to operate in active Phased Array Radar systems.

It utilises a 40V supply to drive the 100W LDMOS amplifier, which operates in class AB, with local storage capacitance to supply the peak currents for 100us pulse lengths at duty cycles up to 20%.

A circulator provides the duplexer function with a T/R switch to protect the receiver from reflected power.

The 6 BIT phase shifter and attenuator are positioned in the common arm so are available in transmit and receive. They are controlled with parallel TTL logic derived from a FPGA that is driven by a 3-wire serial data stream.

## Features

- Minimum 100W Output Power per channel using high efficiency LDMOS transistors
- Low receiver noise figure <3.3dB @ +55°C
- Up to 100µs Pulse Width, 20% Duty Cycle
- 6 BIT phase and attenuation control
- Independent control of each channel
- Large Internal Storage Capacitance for Optimum Pulse Shape
- Integral power supply sequencing and conditioning
- Integral digital control and messaging logic
- European Manufacture



## Applications

The Cobham MAL Ltd. Dual S-Band 100W Tx/Rx Module is designed to operate in ground based active Phased Array Radar systems. It is configured to be suitable for mounting in the antenna array, directly behind the antenna element.

Control of the digital phase and amplitude trimmers is by parallel TTL logic derived from an internal FPGA, as is the T/R switch control.

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## RF Performance

Parameter	Performance
Frequency	3.1 – 3.5GHz
Peak Output Power @ 20% duty cycle	>100W
Output Power stability over freq	±0.8dB
Transmit input power level	0dBm
Pulse Width	2 – 100µS
Duty cycle	Up to 20%
Pulse droop	0.5dB Max
Pulse Rise & Fall time	< 100ns
TX Input VSWR	1.5:1
RX Input VSWR	2:1
Receiver Gain (reference state)	27dB nom.
Rx Gain variation with Freq/Temp	1dB (Freq) ; ±1dB (Temp) (see Note 1)
Receiver output 1dB compression	+4dBm
Receiver Isolation in RX 'OFF' state	60dB min
Isolation between Receiver channels	50dB min
Out of Band Rejection of Receiver :	
At 2700 and 3900 MHz	30dB min
DC to 2000 MHz	50dB min
4.5 GHz to 10 GHz	50dB min
Rx Noise Figure	<3dB
Digital phase shifter	6 BIT, LSB = 5.625°, RMS phase error < 4°
Digital attenuator	6 BIT, LSB = 0.5 dB, RMS error < 1 dB
Tx/Rx switching time	200ns
Supply Voltages	+40V
Supply Current	5A Max. Average Power 20% Duty Cycle (Both channels in transmit)

## Mechanical

Mass	< 1Kg
Dimensions	200mm x 90mm x 34.5mm
RF connectors	Blind Mate (Male)
DC and Signal Connector	D-type

## Environmental

Operating Temperature	-20°C to +55°C (see Note 1)
Storage Temperature	-30°C to +70°C
Damp Heat	+40°C, RH > 95%

Performance: Over temperature, Z0 = 50Ω, VCC = +40 VDC

Note 1: Baseplate temperature held to 35°C ± 5°C

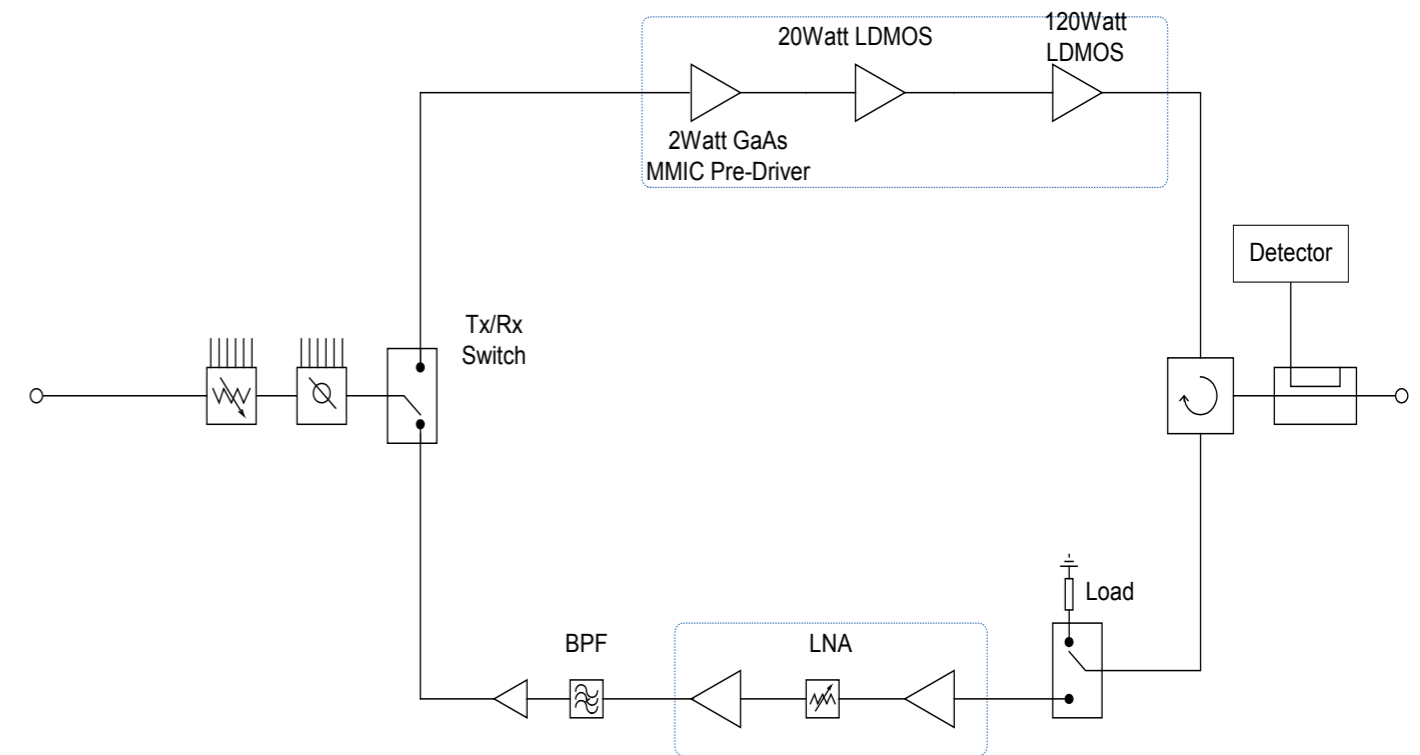
## Typical Performance

### Absolute Maximum Ratings

Base-plate Temperature	-20°C to +55°C
Input Power at Tx I/P Port	+5dBm @ 100µS Pulse Width, 20% Duty
Supply Voltage	+45V

## Schematic

Note: Only a Single Channel Shown

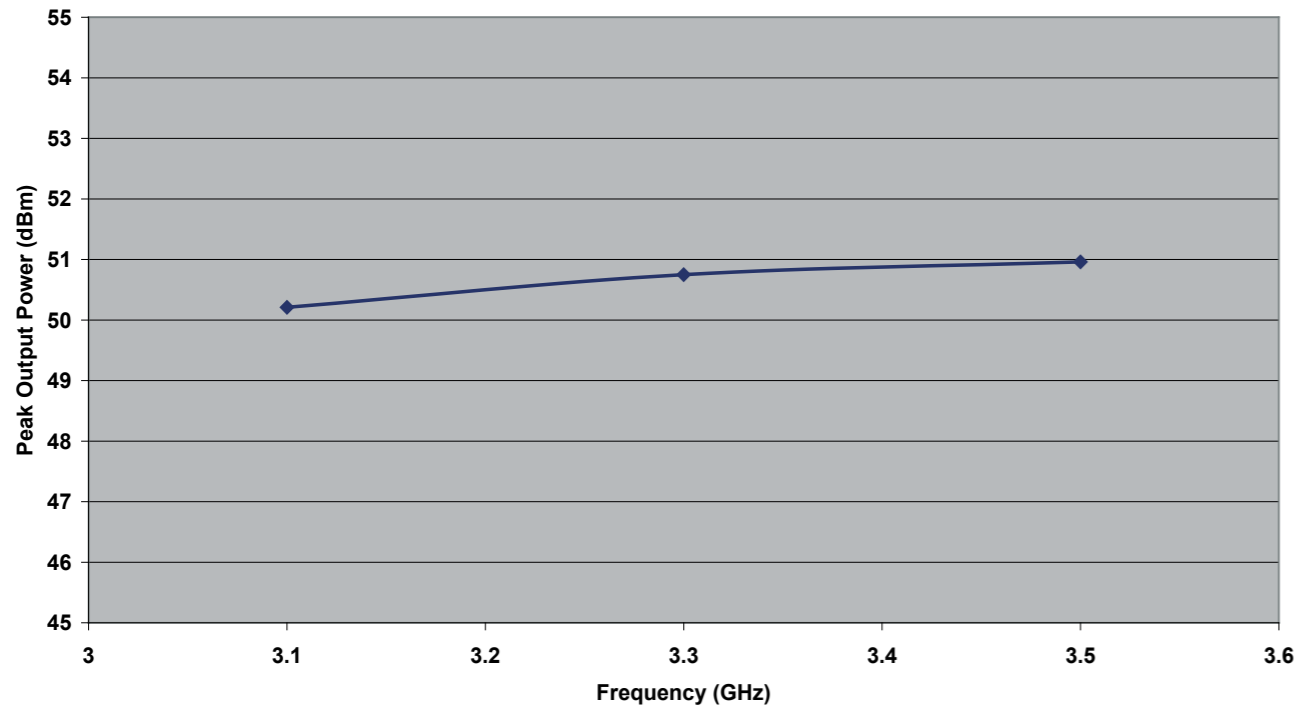


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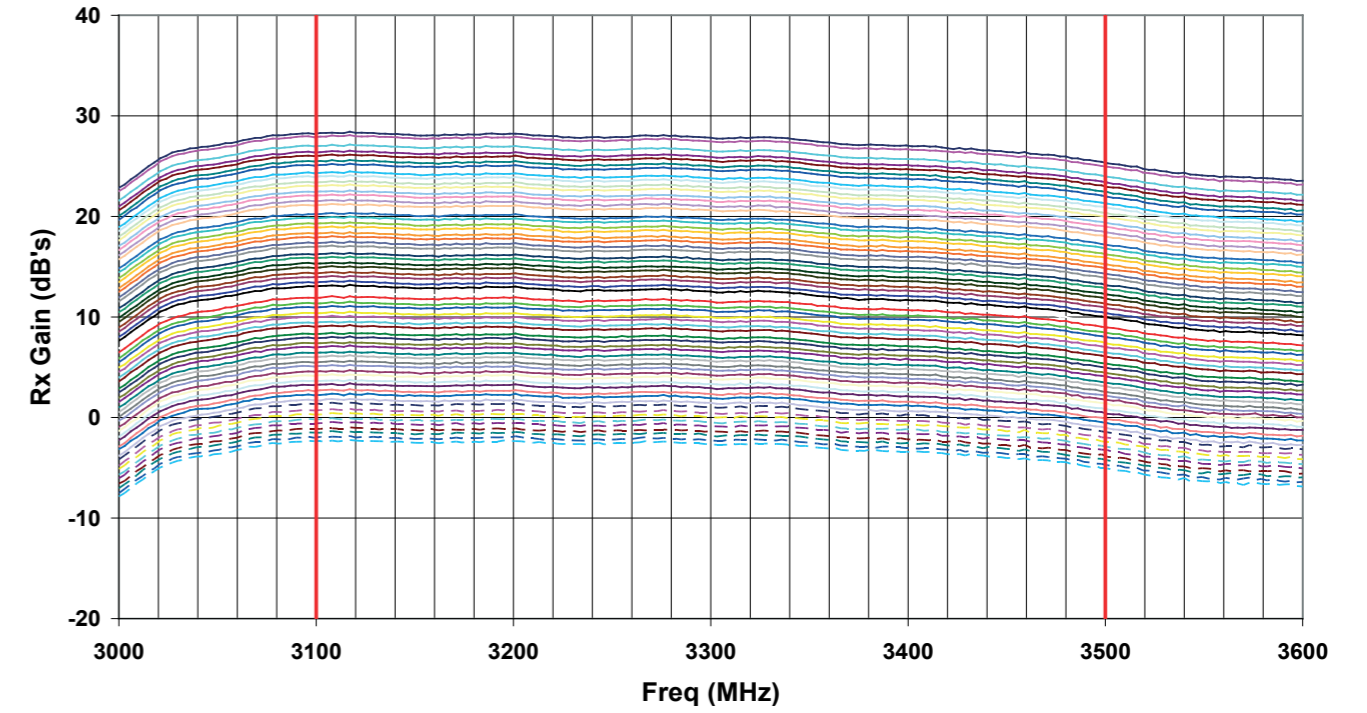
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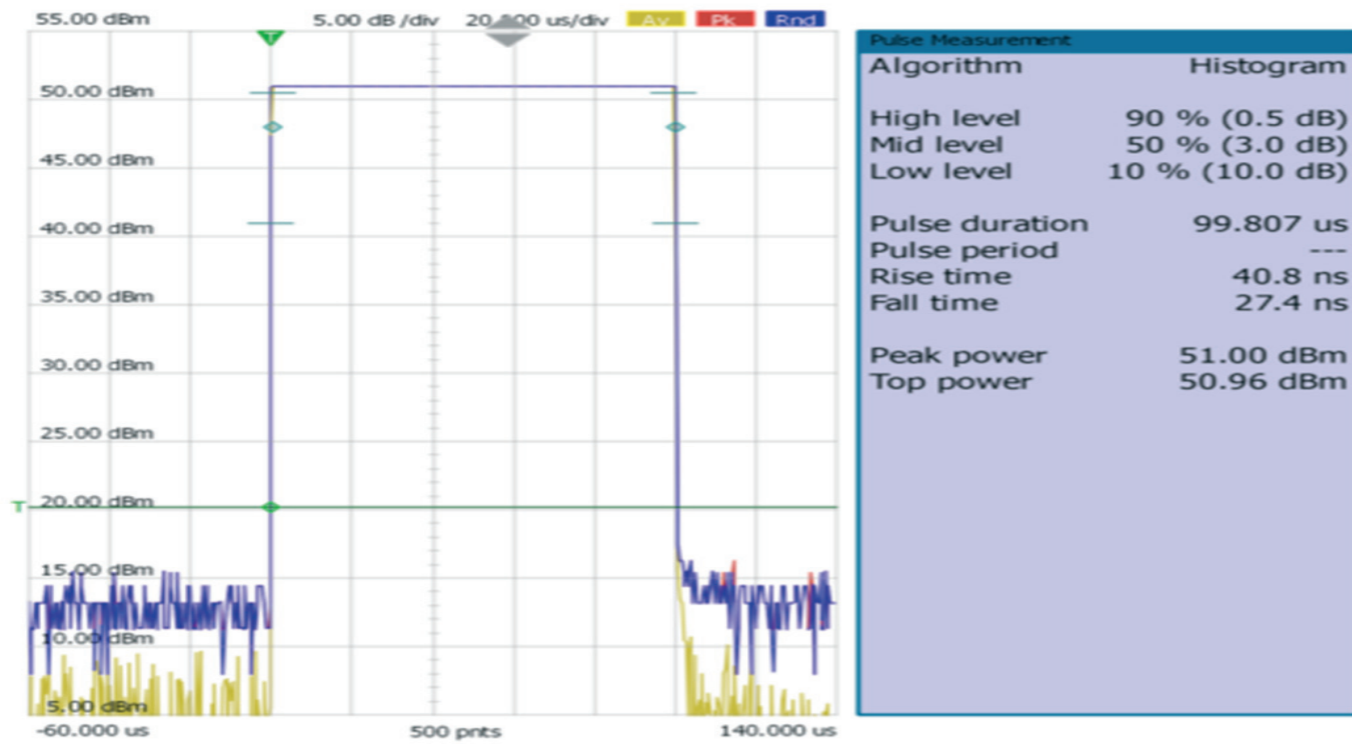
Typical Performance S-Band DTRM Tx Power



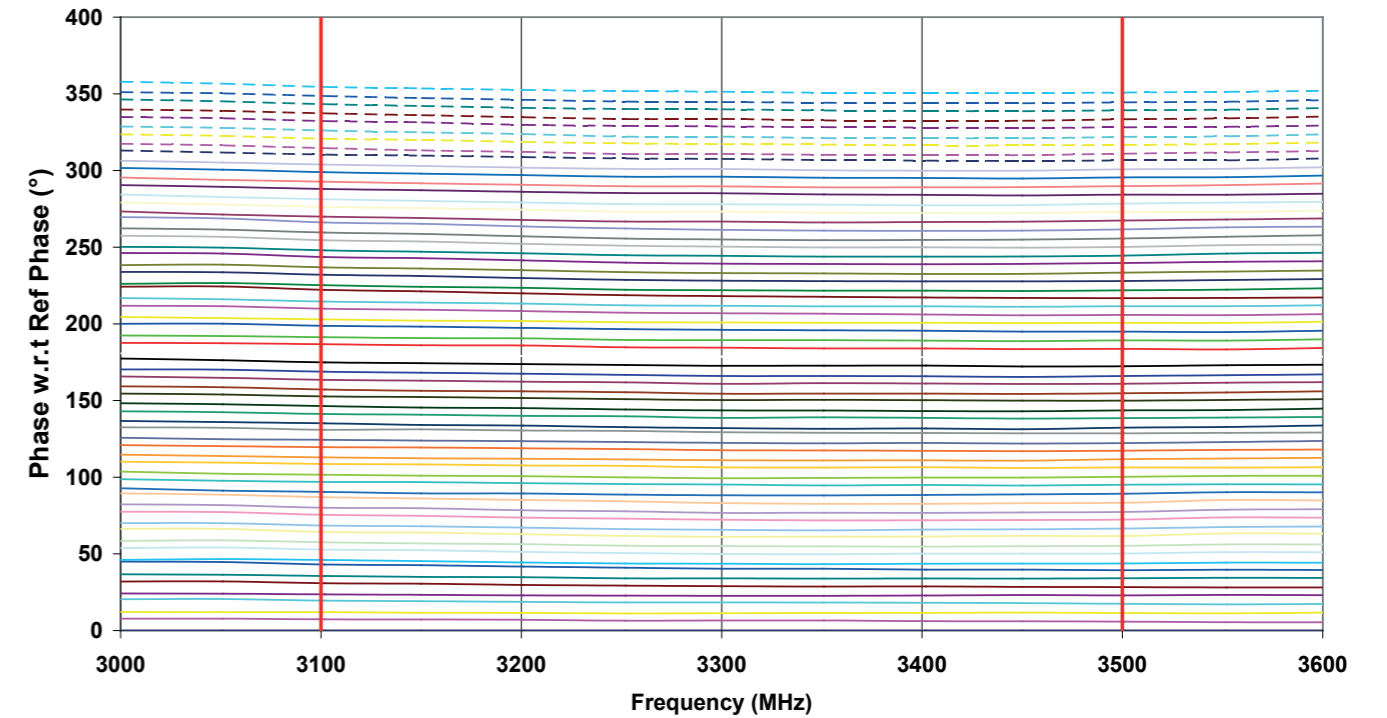
Typical Performance Rx Mode, Attenuation Variation at Ref. Phase for 64 States



S-Band DTRM Tx Output Pulse Shape, 100uS, 20% Duty Cycle



Rx Phase w.r.t Ref Phase at Reference Gain, 64 States





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