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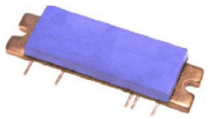
XD010-24S-D2F(Y)

1930MHz to 1990MHz CLASS A/AB 12W CDMA DRIVER AMPLIFIER



RFMD Green, RoHS Compliant, Pb-Free (Y Part Number)
Package: D

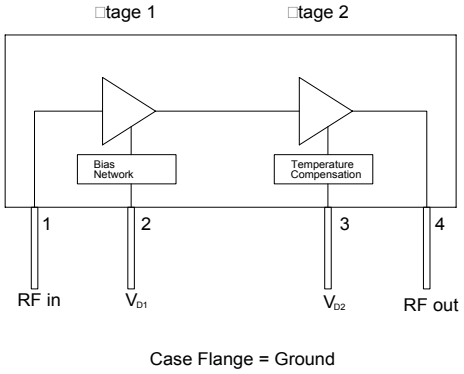
Product Description

RFMD's XD010-24S-D2F 12W power module is a robust 2-Stage Class A/AB amplifier module for use in the driver stages of CDMA RF power amplifiers. The power transistors are fabricated using RFMD's latest, high performance LDMOS process. This unit operates from a single voltage and has internal temperature compensation of the bias voltage to ensure stable performance over the full temperature range. It is internally matched to 50Ω.

Optimum Technology Matching® Applied

- ☐ GaAs HBT
- ☐ GaAs MESFET
- ☐ InGaP HBT
- ☐ SiGe BiCMOS
- ☐ Si BiCMOS
- ☐ SiGe HBT
- ☐ GaAs pHEMT
- ☐ Si CMOS
- ☐ Si BJT
- ☐ GaN HEMT
- ☐ InP HBT
- ☐ RF MEMS
- ✓ LDMOS

Functional Block Diagram



Case Flange = Ground

Features

- Available in RoHS Compliant Packaging
- 50Ω RF Impedance
- 12W output P_{1dB}
- Single Supply Operation: Nominally 28V
- High Gain: 28dB at 1960MHz
- High Efficiency: 26% at 1960MHz
- Advanced, XeMOS II LDMOS FETS
- Temperature Compensation

Applications

- Base Station PA Driver
- Repeater
- CDMA
- GSM/EDGE

Parameter	Specification			Unit	Condition
	Min.	Typ.	Max.		
Frequency of Operation	1930		1990	MHz	
Output Power at 1dB Compression	10	12		W	
Gain	26	28		dB	1W Output Power
Peak to Peak Gain Variation		0.4	1.0	dB	1930MHz to 1990MHz
Drain Efficiency	20	26		%	10W CW Output
		12		%	2W CDMA (Single Carrier IS-95, 9 Ch Fwd)
		6.5		%	1W CDMA (Single Carrier IS-95, 9 Ch Fwd)
Input Return Loss	10	14		dB	1W Output Power, 1930MHz to 1990MHz
ACPR at 1W CDMA Power Output		-58		dB	Single Carrier IS-95, 9 Ch FWD, Offset=750KHz, ACPR Integrated Bandwidth
ALT-1 at 2W CDMA		-70		dB	Single Carrier IS-95, 9 Ch FWD, Offset=1980KHz, ACPR Integrated Bandwidth
Third Order IMD	-27	-32		dBc	10W PEP (Two Tone; 1MHz)
Signal Delay from Pin 1 to Pin 5		2.9		nS	
Deviation from Linear Phase (Peak to Peak)		0.5		Deg	
Thermal Resistance Stage 1 (Junction to Case)		11		°C/W	
Thermal Resistance Stage 2 (Junction to Case)		4		°C/W	

Test Conditions: $Z_{IN}=Z_{OUT}=50\Omega$ $V_{DD}=28.0V$ $I_{DQ1}=230mA$ $I_{DQ2}=150mA$ $T_{FLANGE}=25°C$

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Absolute Maximum Ratings

Parameter	Rating	Unit
1st Stage Bias Voltage (V_{D1})	35	V
2nd Stage Bias Voltage (V_{D2})	35	V
RF Input Power	+20	dBm
Load Impedance for Continuous Operation Without Damage	5:1	VSWR
Output Device Channel Temperature	+200	°C
Operating Temperature Range	-20 to +90	°C
Storage Temperature Range	-40 to +100	°C
ESD Rating - Human Body Model, JEDEC Document - JESD22-A114-B	8000	V
MTTF - 85°C Leadframe, 200°C Channel	1.2×10^6	Hours

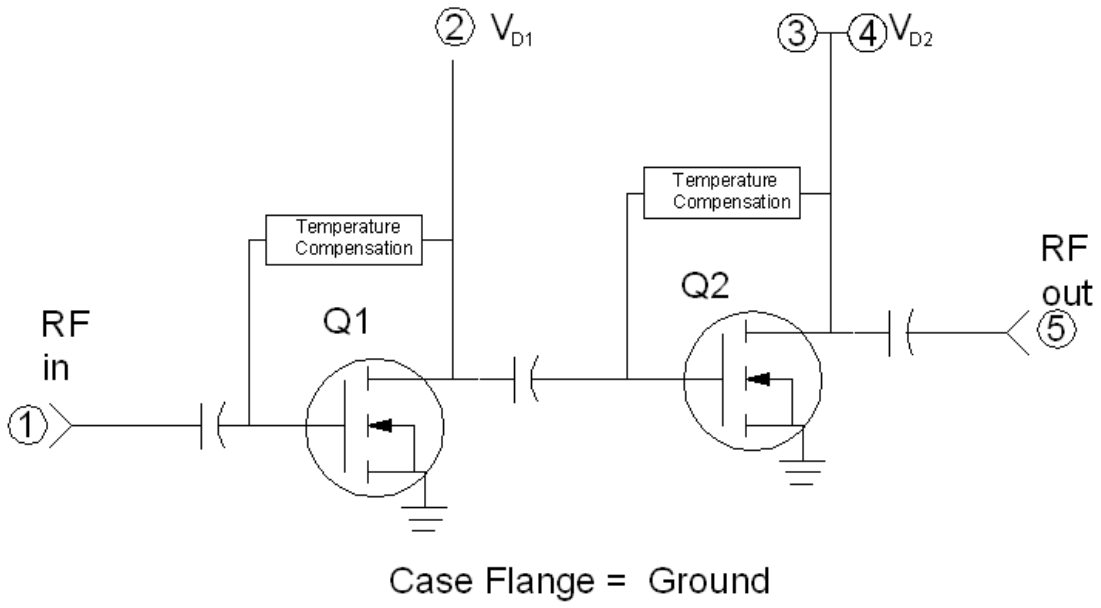
Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation, the device voltage and current must not exceed the maximum operating values specified in the table on page one.

Caution! ESD sensitive device.

Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability. Specified typical performance or functional operation of the device under Absolute Maximum Rating conditions is not implied.

RoHS status based on EUDirective2002/95/EC (at time of this document revision).

Simplified Device Schematic



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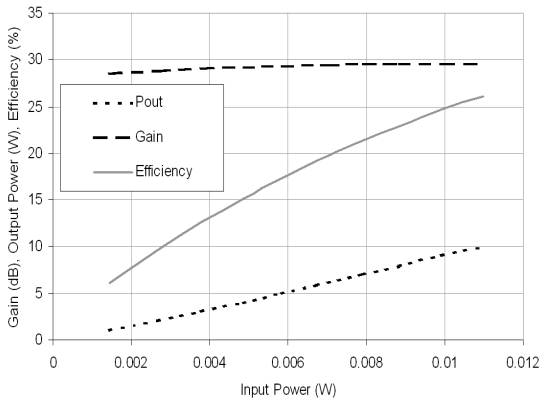
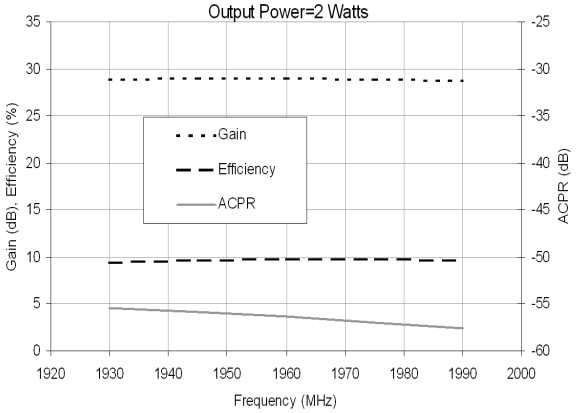
Typical Performance Curves

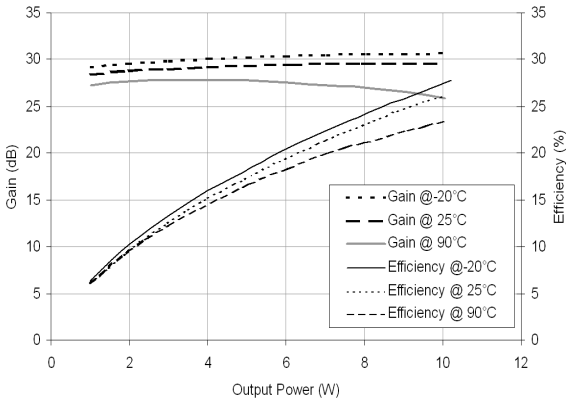
Gain, Output Power and Efficiency vs. Input Power
Freq=1960 MHz, Vdd=28 V, T_{Flange}= 25°C



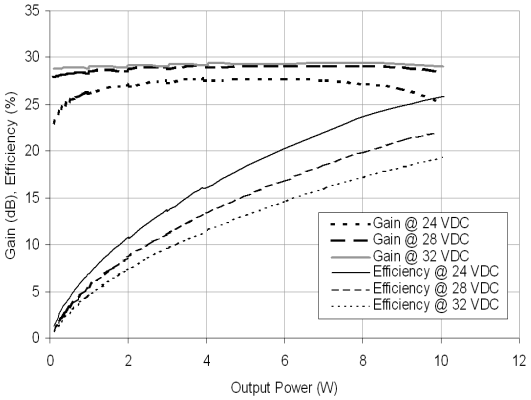
Gain, Efficiency and ACPR vs. Frequency
Freq=1960 MHz, Vdd=28 V, T_{Flange}= 25°C
Output Power=2 Watts



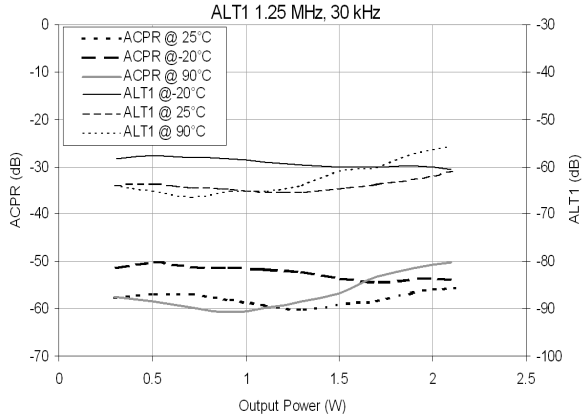
Gain and Efficiency vs. Output Power and Temperature
Freq=1960 MHz, Vdd=28 V, T_{Flange}=-20°C, 25°C, 90°C



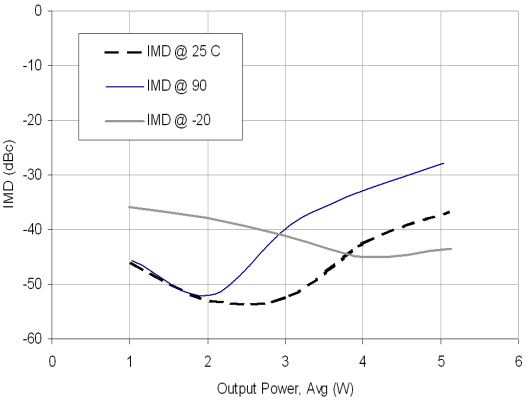
Gain and Efficiency vs. Output Power and Voltage
Freq=1960 MHz, Vdd=24V, 28 V, 32 V T_{Flange}= 25°C



ACPR and ALT1 vs. Output Power and Temperature
Freq=1960 MHz IS-95 Vdd=28 V, T_{Flange}=-20°C, 25°C, 90°C
ACPR 885 kHz, 30 kHz
ALT1 1.25 MHz, 30 kHz



Two Tone IMD vs. Output Power and Temperature
Freq=1960, 1961 MHz, Vdd=28 V, T_{Flange}=-20°C, 25°C, 90°C



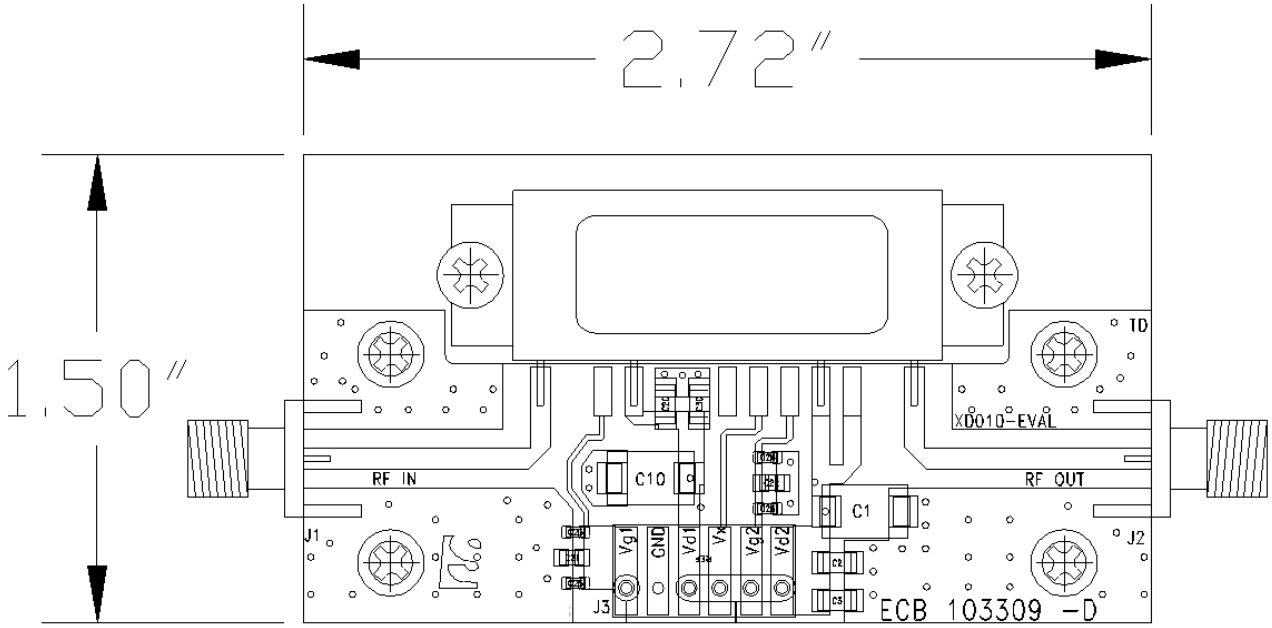
Pin	Function	Description
1	RFIN	Module RF input. Care must be taken to protect against video transients that may damage the active devices.
2	VD1	This is the bias feed for the first stage of the amplifier module. The gate bias is temperature compensated to maintain constant current over the operating temperature range. See Note 1.
3, 4	VD2	This is the bias feed for the second stage of the amplifier module. The gate bias is temperature compensated to maintain constant current over the operating temperature range. See Note 1.
5	RFOUT	Module RF output. Care must be taken to protect against video transients that may damage the active devices.
Flange	GND	Exposed area on the bottom side of the package needs to be mechanically attached to the ground plane of the board for optimum thermal and RF performance. See mounting instructions for recommendation

Note 1: The internally generated gate voltage is thermally compensated to maintain constant quiescent current over the temperature range listed in the data sheet. No compensation is provided for gain changes with temperature. This can only be accomplished with AGC external to the module.

Note 2: Internal RF decoupling is included on all bias leads. No additional bypass elements are required, however some applications may require energy storage on the drain leads to accommodate time-varying waveforms.

Note 3: This module was designed to have its leads hand soldered to an adjacent PCB. The maximum soldering iron tip temperature should not exceed 700° F, and the soldering iron tip should not be in direct contact with the lead for longer than 10 seconds. Refer to app note AN060 (www.RFMD.com) for further installation instructions.

Test Board Layout



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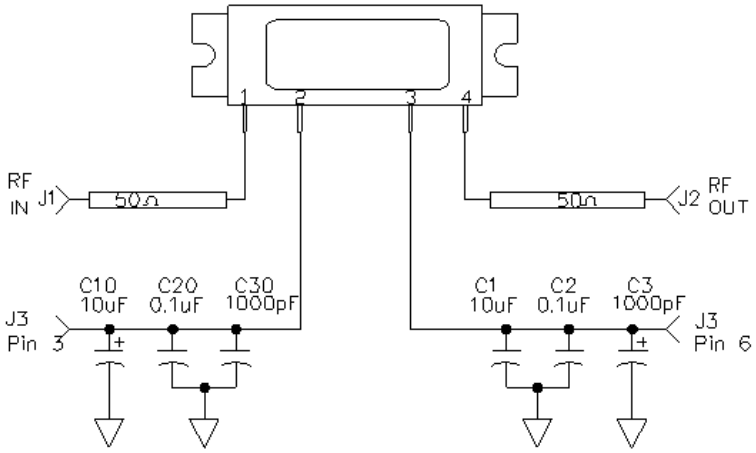
Test Board Schematic with module connections shown

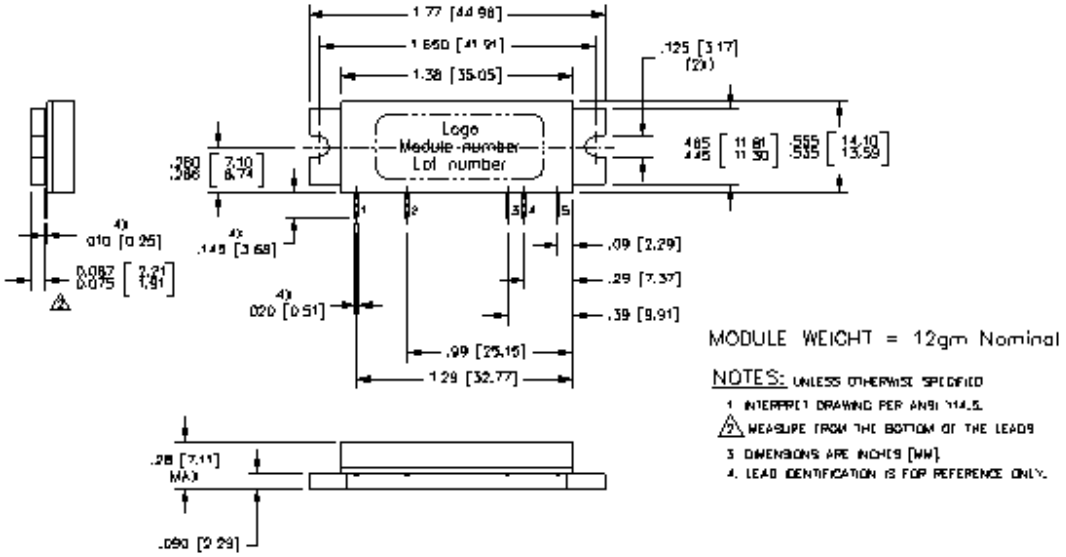


Test Board Bill of Materials

Component	Description	Manufacturer
PCB	Rogers 4350, ε_r=3.5, Thickness=30mils	Rogers
J1, J2	SMA, RF, Panel Mount Tab W / Flange	Johnson
J3	MTA Post Header, 6 Pin, Rectangle, Polarized, Surface Mount	AMP
C1, C10	Cap, 10μF, 35V, 10%, Tant, Elect, D	Kemet
C2, C20	Cap, 0.1μF, 100V, 10%, 1206	Johanson
C3, C30	Cap, 1000pF, 100V, 10%, 1206	Johanson
C25, C26	Cap, 68pF, 250V, 5%, 0603	ATC
C21, C22	Cap, 0.1mF, 100V, 10%, 0805	Panasonic
C23, C24	Cap, 1000pF, 100V, 10%, 0603	AVX
Mounting Screws	4-40 X 0.250"	Various

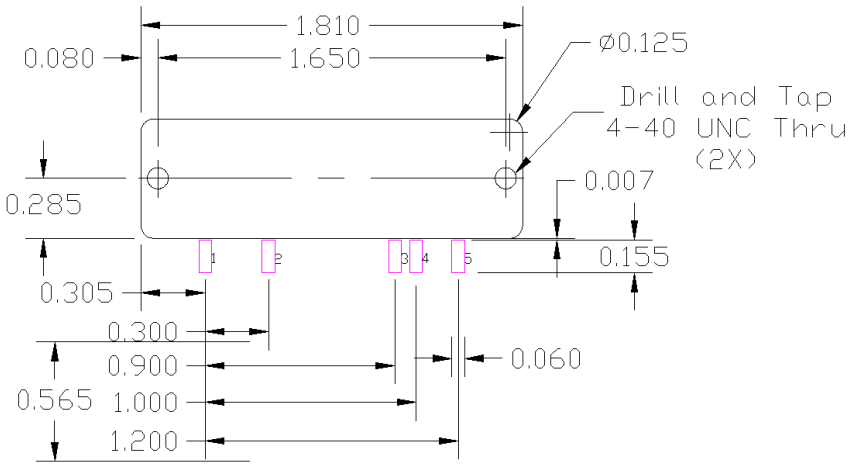
Package Outline Drawing

Dimensions in inches (millimeters)
Refer to drawing posted at www.rfmd.com for tolerances.



Recommended PCB Cutout and Landing Pads for the D2F Package

Dimensions in inches (millimeters)



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