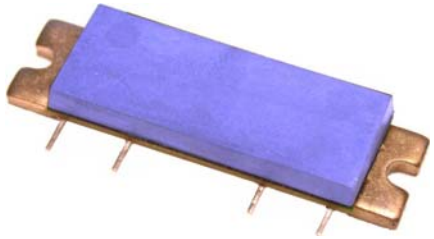
XD010-04S-D4F
XD010-04S-D4FY

RoHS Compliant & Green Package

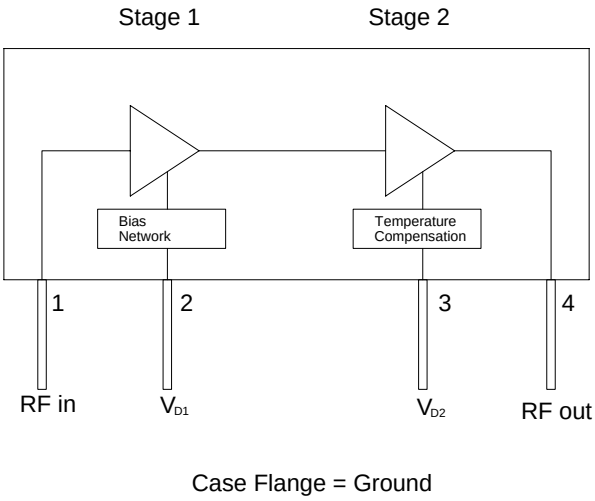
350-600 MHz Class AB
12W Power Amplifier Module



Product Description

Sirenza Microdevices' **XD010-04S-D4F** 12W power module is a robust broadband 2-stage Class A/AB amplifier, suitable for use as a power amplifier driver or output stage. The power transistors are fabricated using Sirenza's latest, high performance LDMOS process. It is a drop-in, no-tune, solution for high power applications requiring high efficiency, excellent linearity, and unit-to-unit repeatability. Internal bias current compensation ensures stable performance over a wide temperature range. It is internally matched to 50 ohms.

Functional Block Diagram



Case Flange = Ground

Product Features

- **Available in RoHS compliant packaging**
- **50 Ω RF impedance**
- **12W Output P_{1dB}**
- **Single Supply Operation : Nominally 28V**
- **High Gain: 32 dB at 450 MHz**
- **High Efficiency: 30% at 450 MHz**
- **Robust 8000V ESD (HBM), Class 3B**
- **XeMOS II LDMOS FETS**
- **Temperature Compensation**

Applications

- **DTV**
- **Public Service**
- **Wireless Infrastructure**
- **Military Communications**

Key Specifications

Symbol	Parameter	Unit	Min.	Typ.	Max.
Frequency	Frequency of Operation	MHz	350	-	600
P_{1dB}	Output Power at 1dB Compression, 450MHz	W	-	12	-
Gain	Gain at 10W Output Power, 450MHz	dB	30	32	-
Gain Flatness	Peak to Peak Gain Variation, 350 - 600MHz	dB	-	1.0	2.0
IRL	Input Return Loss 1W Output Power, 350 - 600MHz	dB	10	15	-
Efficiency	Drain Efficiency at 10W CW, 350-600MHz	%	26	30	-
Linearity	3rd Order IMD at 10W PEP (Two Tone), 450MHz & 451MHz	dBc	-	-32	-28
Delay	Signal Delay from Pin 1 to Pin 4	nS	-	2.5	-
Phase Linearity	Deviation from Linear Phase (Peak to Peak)	Deg	-	0.5	-
Frequency	Frequency of Operation	MHz	350	-	600
$R_{TH, j-l}$	Thermal Resistance Stage 1 (Junction-to-Case)	ºC/W		11	
$R_{TH, j-2}$	Thermal Resistance Stage 2 (Junction-to-Case)	ºC/W		4	

Test Conditions $Z_{in} = Z_{out} = 50\Omega$, $V_{DD} = 28.0V$, $I_{DQ1} = 230$ mA, $I_{DQ2} = 150$ mA, $T_{Flange} = 25ºC$

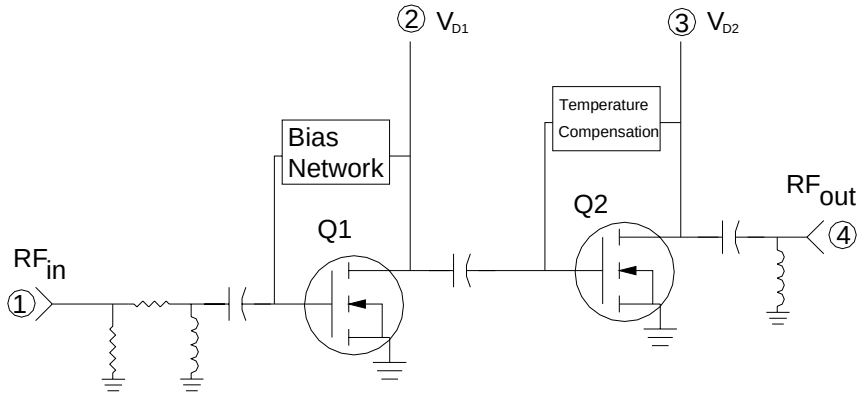
Quality Specifications

Parameter		Unit	Typical
ESD Rating	Human Body Model, JEDEC Document - JESD22-A114-B	V	8000
MTTF	85°C Leadframe, 200°C Channel	Hours	1.2×10^6

Pin Description

Pin #	Function	Description
1	RF Input	Module RF input. This pin is internally connected to DC ground. Do not apply DC voltages to the RF leads. Care must be taken to protect against video transients that may damage the active devices.
2	V_{D1}	This is the drain voltage for the first stage. Nominally +28Vdc
3	V_{D2}	This is the drain voltage for the 2nd stage of the amplifier module. The 2nd stage gate bias is temperature compensated to maintain constant quiescent drain current over the operating temperature range. See Note 1.
4	RF Output	Module RF output. This pin is internally connected to DC ground. Do not apply DC voltages to the RF leads. 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 in application note AN-060 on Sirenza's web site.

Simplified Device Schematic



Case Flange = Ground

Absolute Maximum Ratings

Parameters	Value	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	ºC
Operating Temperature Range	-20 to +90	ºC
Storage Temperature Range	-40 to +100	ºC

Operation of this device beyond any one of these limits may cause permanent damage. For reliable continuous operation see typical setup values specified in the table on page one.

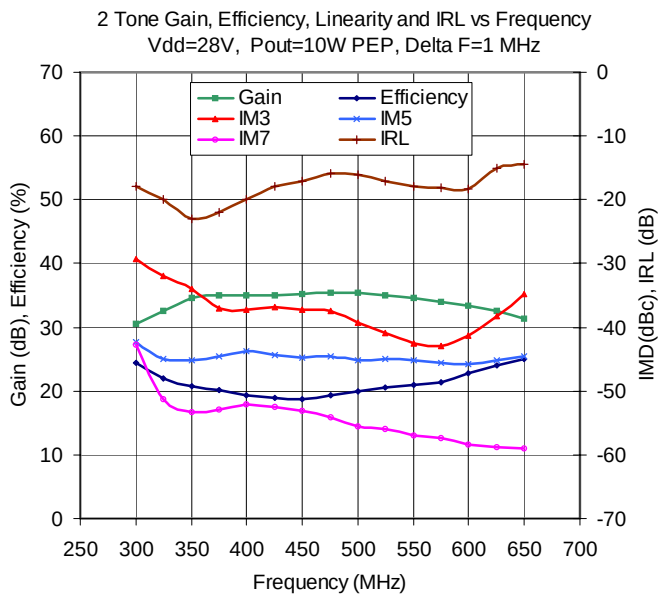
Note 1:
The internally generated gate voltage is thermally compensated to maintain constant quiescent current over the temperature range listed in the data sheet. No compensation is provided for gain changes with temperature. This can only be accomplished with AGC external to the module.

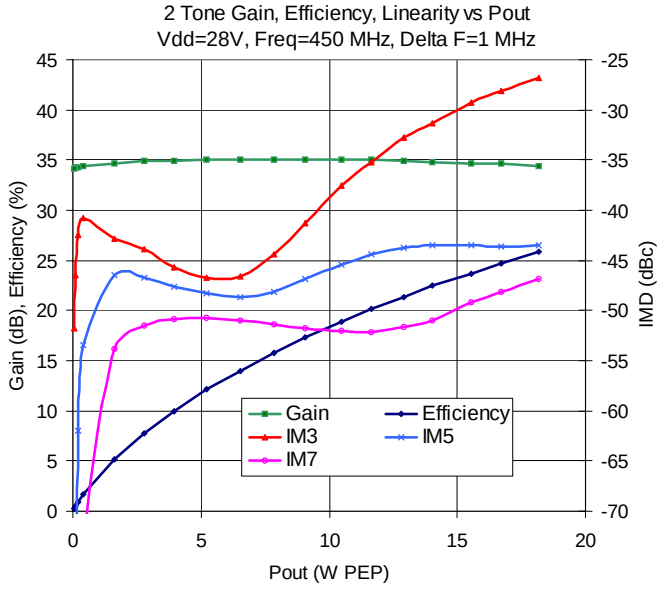
Note 2:
Internal RF decoupling is included on all bias leads. No additional bypass elements are required, however some applications may require energy storage on the drain leads to accommodate time-varying waveforms.

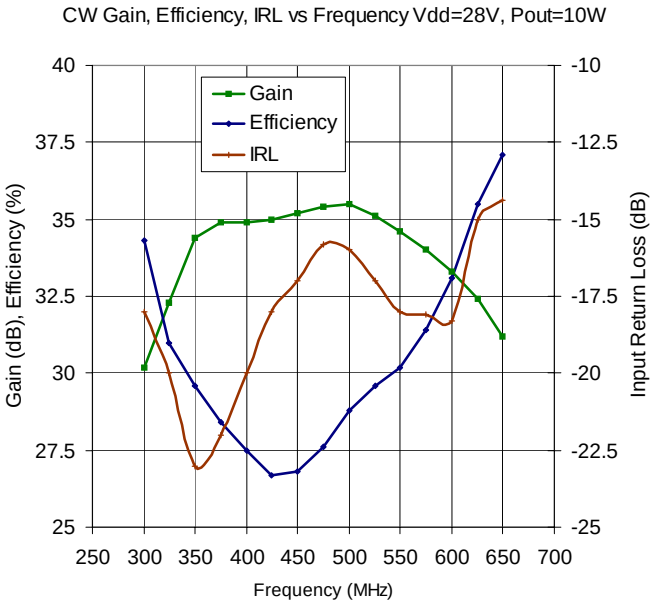
Note 3:
This module was designed to have its leads hand soldered to an adjacent PCB. The maximum soldering iron tip temperature should not exceed 700° F, and the soldering iron tip should not be in direct contact with the lead for longer than 10 seconds. Refer to app note AN060 (www.sirenza.com) for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

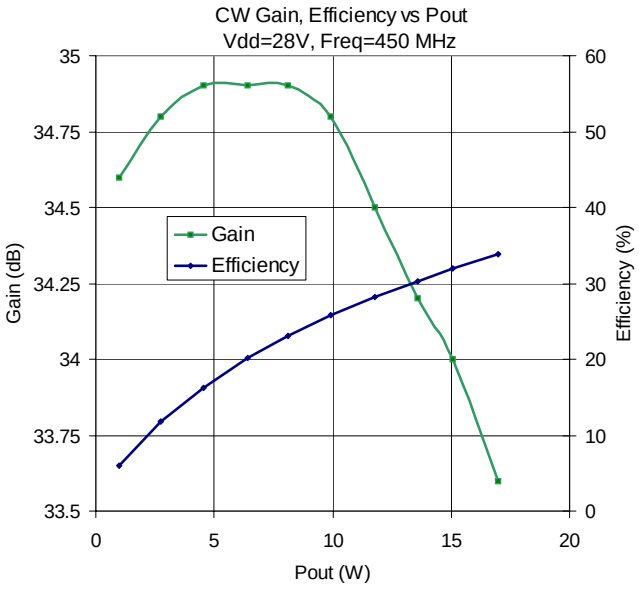
Caution: ESD Sensitive
Appropriate precaution in handling, packaging and testing devices must be observed.

Typical Performance Curves

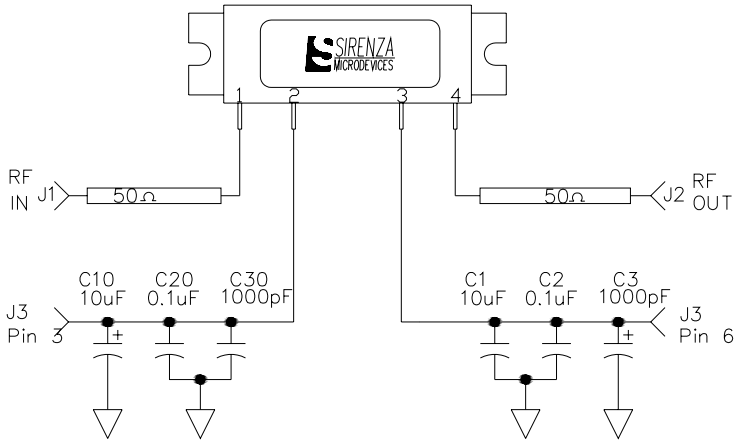








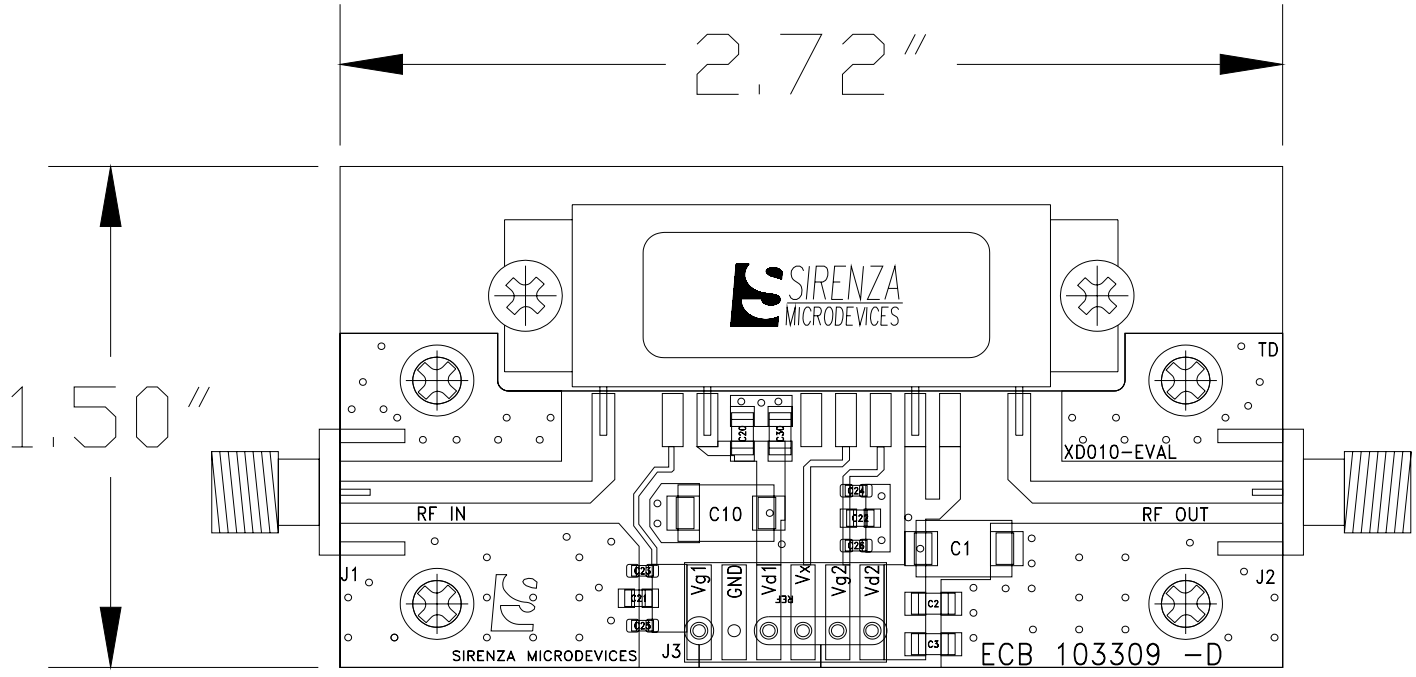
Test Board Schematic with module connections shown



Test Board Bill of Materials

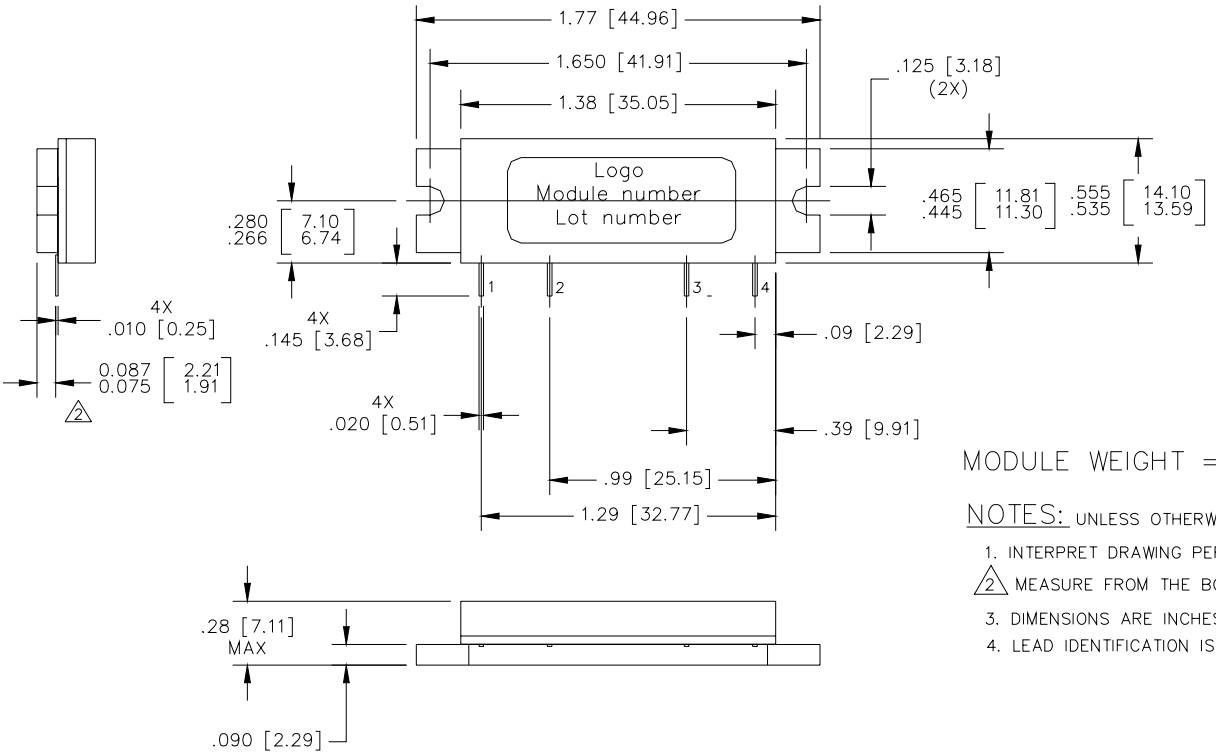
Component	Description	Manufacturer
PCB	Rogers 4350, ε_r=3.5 Thickness=30mils	Rogers
J1, J2	SMA, RF, Panel Mount Tab W / Flange	Johnson
J3	MTA Post Header, 6 Pin, Rect-angle, Polarized, Surface Mount	AMP
C1, C10	Cap, 10μF, 35V, 10%, Tant, Elect, D	Kemet
C2, C20	Cap, 0.1μF, 100V, 10%, 1206	Johanson
C3,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

Test Board Layout



To receive Gerber files, DXF drawings, a detailed BOM, and assembly recommendations for the test board with fixture, contact applications support at support@sirenza.com. Data sheet for evaluation circuit (XD010-EVAL) available from Sirenza website.

Package Outline Drawing

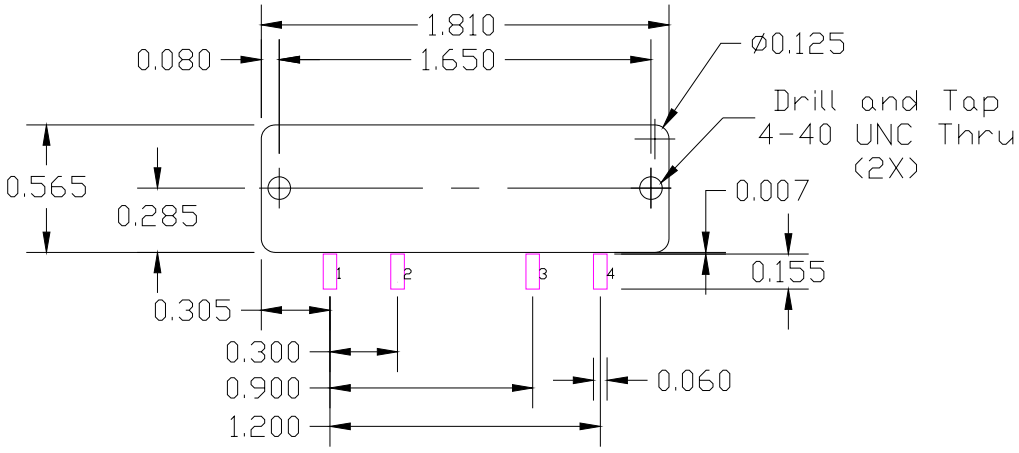


MODULE WEIGHT = 12gm Nominal

NOTES: UNLESS OTHERWISE SPECIFIED

1. INTERPRET DRAWING PER ANSI Y14.5.
2. MEASURE FROM THE BOTTOM OF THE LEADS.
3. DIMENSIONS ARE INCHES [MM].
4. LEAD IDENTIFICATION IS FOR REFERENCE ONLY.

Recommended PCB Cutout and Landing Pads for the D4F Package



Note 3: Dimensions are in inches

Refer to Application note AN-060 “Installation Instructions for XD Module Series” for additional mounting info. App note availbale at at www.sirenza.com