DATA SHEET

ISO13316: DC to 6 GHz Hermetic GaAs IC SPST Non-Reflective Switch

Features

- Wideband frequency range: DC to 6 GHz
- Isolation: 50 dB @ 2 GHz
- Low Loss: 0.8 dB @ 6 GHz
- RF1 reflective / RF2 non-reflective
- High reliability Class B and S screening available

Description

The ISO13316 is a GaAs pHEMT non-reflective, high-performance, low-loss switch.

The ISO13316 uses hermetic surface-mount technology (SMT) for defense and satellite applications.

The device can be supplied and tested to the screening requirements of MIL-PRF-38535 Class B and S, in addition to the required QCI.

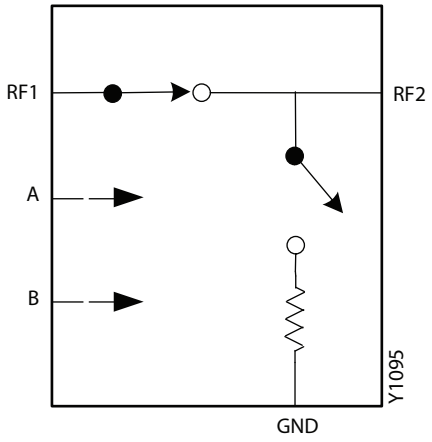

Figure 1. ISO13316 Block Diagram

A functional block diagram of the ISO13316 is shown in Figure 1. The ISO13316 device package and pinout are shown in Figure 2. Pin assignments and signal descriptions are shown in Table 1.

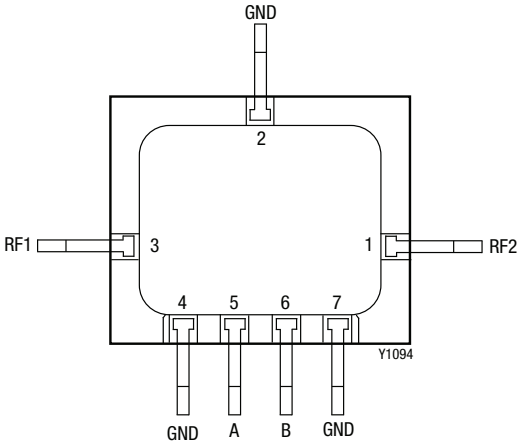

Figure 2. ISO13316 Pinout (Top View)

Table 1. ISO13316 Pin Descriptions

Pin	Name	Description
1	RF2	RF port 2
2	GND	Ground
3	RF1	RF port 1
4	GND	Ground
5	A	Control voltage A
6	B	Control voltage B
7	GND	Ground

Electrical and Mechanical Specifications

The absolute maximum ratings of the ISO13316 are provided in Table 2. Electrical specifications are provided in Table 3. The truth table is shown in Table 4.

Typical performance characteristics of the ISO13316 are illustrated in Figures 3 through 8.

Table 2. ISO13316 Absolute Maximum Ratings (Note 1)

Parameter	Minimum	Maximum	Units
Control voltages (A and B)	–7.5	+1.0	V
RF input power		+30	dBm
Storage temperature	–65	+150	°C
Operating case temperature	–55	+125	°C
Junction temperature		+150	°C
Operating frequency	0.03	6.00	GHz

Note 1: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

***CAUTION**: Although this device is designed to be as robust as possible, electrostatic discharge (ESD) can damage this device. This device must be protected at all times from ESD. Static charges may easily produce potentials of several kilovolts on the human body or equipment, which can discharge without detection. Industry-standard ESD precautions should be used at all times.*

Table 3. ISO13316 Electrical Specifications (Note 1) (1 of 2)
(V_{CTL} = 0 V/–5 V, T_A = +25 °C, P_{INPUT} = 0 dBm, Z_0 = 50 Ω, Unless Otherwise Noted)

Parameter	Test Condition	Frequency	Min	Typical	Max	Units
Insertion loss	DC to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz			0.50 0.60 0.75 0.78	0.80 0.90 1.05 1.10	dB dB dB dB
RF1/RF2 return loss (ON state)	DC to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz			24 18 14 14		dB dB dB dB
RF2 return loss (OFF state)	DC to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz			24 18 14 14		dB dB dB dB
Isolation	DC to 2.0 GHz 2.0 to 3.0 GHz 3.0 to 4.0 GHz 4.0 to 6.0 GHz		50 45 38 27	57 51 43 30		dB dB dB dB

Table 3. ISO13316 Electrical Specifications (Note 1) (2 of 2)
(V_{CTL} = 0 V/–5 V, T_A = +25 °C, P_{INPUT} = 0 dBm, Z_0 = 50 Ω, Unless Otherwise Noted)

Parameter	Test Condition	Frequency	Min	Typical	Max	Units
Switching characteristics	10% RF envelope to 90% RF envelope 90% RF envelope to 10% RF envelope			5		ns
	50% VCTL to 90% RF envelope 50% VCTL to 10% RF envelope			15		ns
	Video feed-through			40		mV
Input power for 1 dB compression	CW	0.5 GHz to 4.5 GHz		+25		dBm
Input power for 0.1 dB compression	CW	0.5 GHz to 4.5 GHz		+24		dBm
Intermodulation intercept point (IP3)	Two tone input power = +13 dBm per tone, 1 MHz spacing	0.5 GHz to 3.5 GHz		+46		dBm
Control voltages	VCTL Low VCTL High		–0.2 –3		0 –5	V V
Control currents	VCTL Low VCTL High			5 100	20	µA µA

Note 1: Performance is guaranteed only under the conditions listed in this table.

Table 4. Truth Table

Control Input		Signal Path State
A	**B**	**RF1 to RF2**
High	Low	ON
Low	High	OFF

Typical Performance Characteristics

(PIN = 0 dBm, Z0 = 50 Ω, Unless Otherwise Noted)

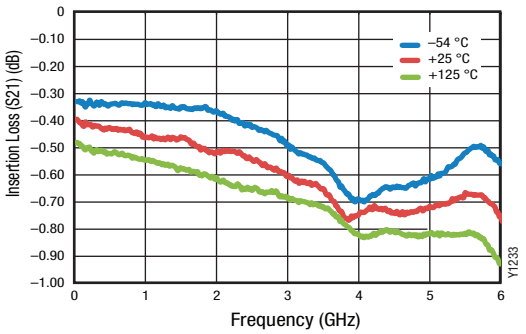

Figure 3. Typical Insertion Loss (S21)

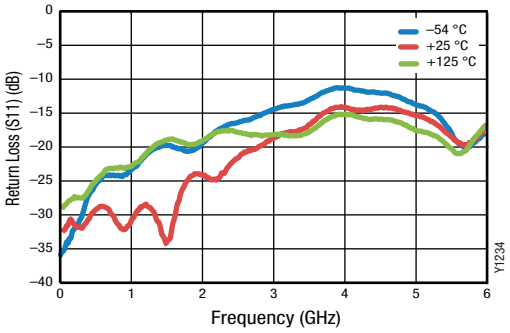

Figure 4. Typical J1 Return Loss (Insertion Loss State – S11)

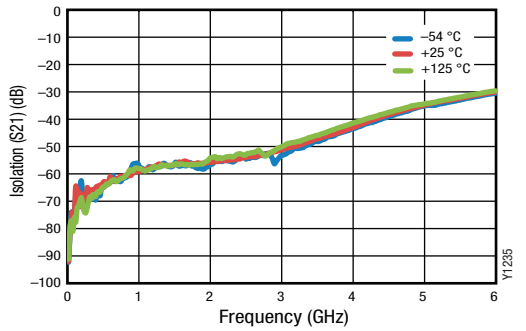

Figure 5. Typical Isolation (S21)

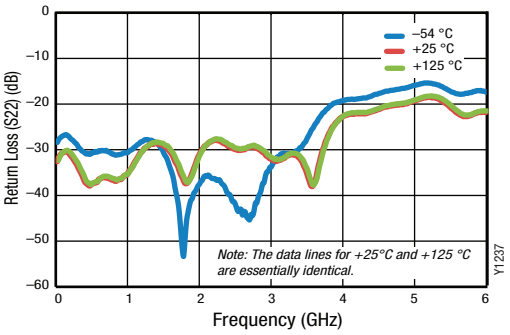

Figure 6. Typical J2 Return Loss (Isolation State – S22)

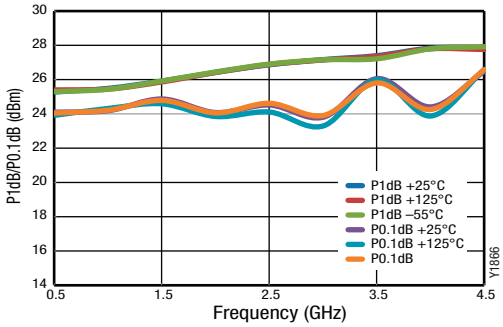

Figure 7. P1dB (0.1dB) v Frequency v Temperature

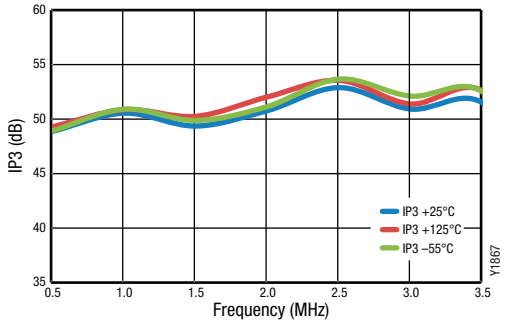

Figure 8. IP3 v Frequency (0.5 to 3.5 GHz) v Temperature

Evaluation Board Description

The ISO13316 Evaluation Board is used to test the performance of the ISO13316 switch. A schematic of the Evaluation Board is shown in Figure 7. An assembly drawing for the Evaluation Board is shown in Figure 8.

Package Dimensions

Package dimensions for the ISO13316 are shown in Figure 9.

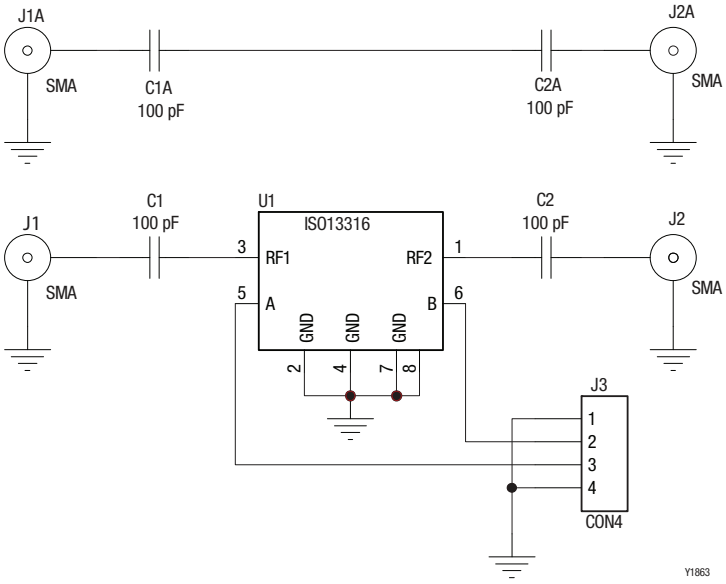

Figure 7. ISO13316 Evaluation Board

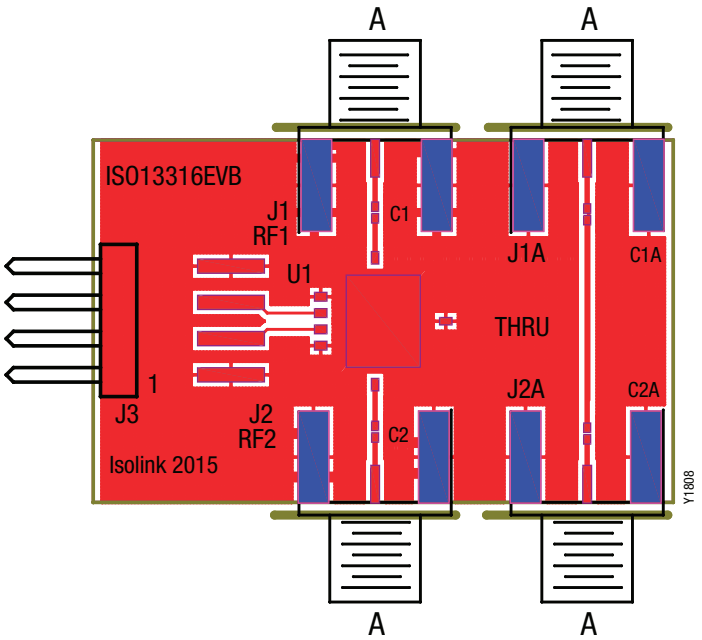

Figure 8. Evaluation Board Assembly Diagram

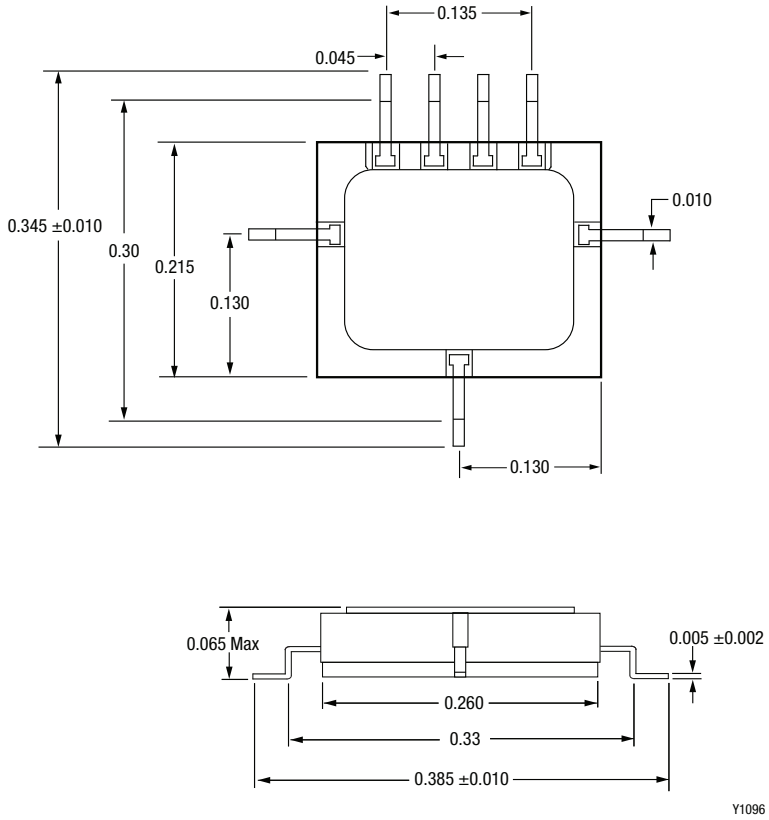

Figure 9. ISO13316 Package Dimensions

Ordering Information

Model Name	Manufacturing Part Number
ISO13316: DC to 6 GHz Low Loss SPST	ISO13316