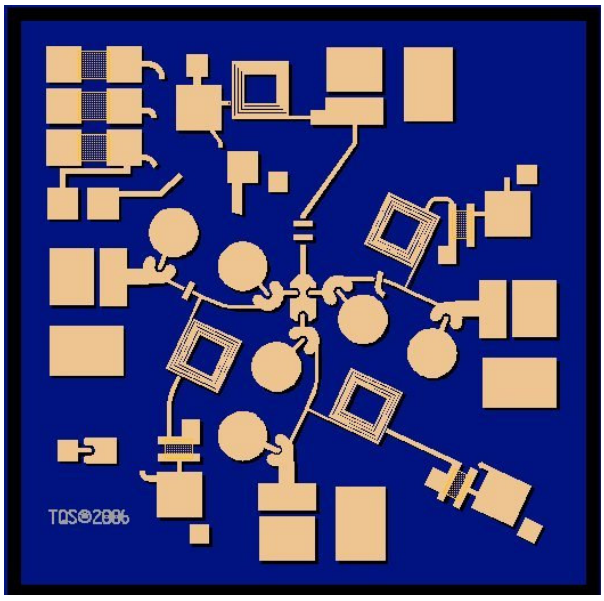
4 - 18 GHz VPIN SPDT Switch

TGS2313



Key Features

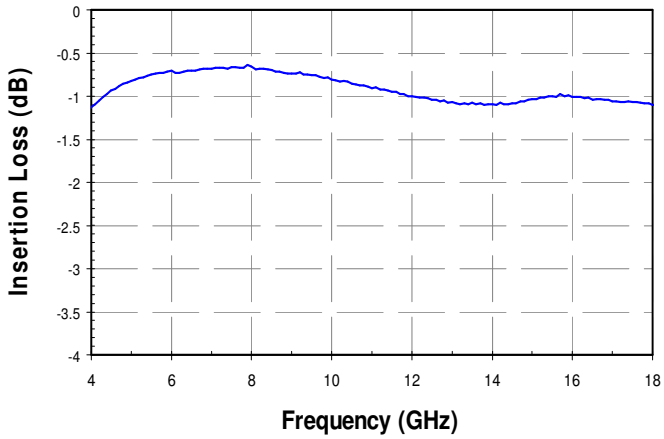
- 4-18 GHz High Isolation SP3T
- 1.0 dB Typical Insertion Loss
- 35 dB Nominal Isolation
- 12 dB Typical Return Loss
- On-Chip Bias Network
- DC blocked at RF ports
- Chip dimensions: 2.16 x 2.16 x 0.10 mm (0.085 x 0.085 x 0.004 in)

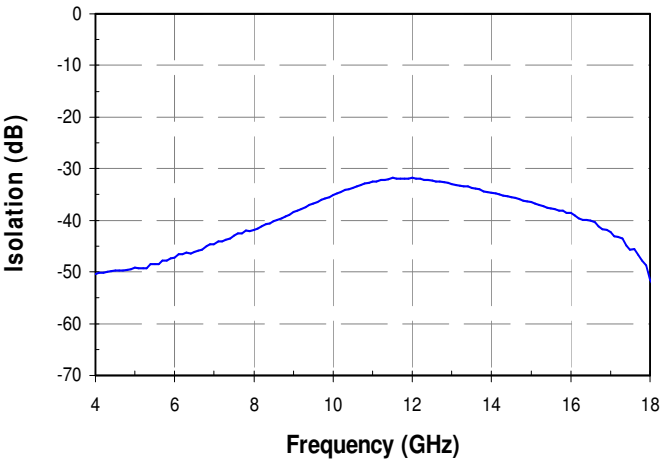
Primary Applications

- EW Receivers
- Radar
- Communications Systems

Measured Fixtured Data

Icontrol = ± 20mA





Product Description

The TriQuint TGS2313 is a 4-18 GHz Single Pole Triple Throw (SP3T) Switch. This part is designed using TriQuint's proven standard VPIN production process.

The TGS2313 provides a nominal 1.0 dB insertion loss, 12 dB return loss, and 35 dB isolation.

The TGS2313 integrates DC blocking capacitors on all ports and includes decoupled DC bias pads to reduce the number of off-chip components.

The part is ideally suited for EW receivers, radar, and communication systems.

Evaluation Boards are available upon request.

Lead-free and RoHS compliant.

Note: This device is early in the characterization process prior to finalizing all electrical specifications. Specifications are subject to change without notice.

TriQuint Semiconductor Texas: www.triquint.com Phone (972)994-8465 Fax (972)994-8504 Info-mmw@tqs.com

TABLE I
MAXIMUM RATINGS

Symbol	Parameter 1/	Value	Notes
V^+	Positive Supply Voltage	+3 V	2/, 3/
V^-	Negative Supply Voltage	-3 V	
I^+	Positive Supply Current (Quiescent)	22 mA	2/ 3/
P_{IN}	Input Continuous Wave Power	24 dBm	3/
P_D	Power Dissipated	0.45 W	3/4/
T_M	Mounting Temperature (30 Seconds)	320 ^{0}C	
T_{STG}	Storage Temperature	-65 to 150 ^{0}C	

1/ These ratings represent the maximum operable values for this device.

2/ V^+_{max} and I^+_{max} are both per bias pad.

3/ Combinations of supply voltage, supply current, input power, and output power shall not exceed P_D.

4/ When operated at this bias condition with a base plate temperature of 70 ^{0}C, the median life is reduced to TBD hours.

TABLE II
FUNCTION TABLE

STATE	RF-A	RF-B	RF-C	Icontrol-A	Icontrol-B	Icontrol-C
1	Low-Loss	Isolated	Isolated	+20 mA	-20mA	-20mA
2	Isolated	Low-Loss	Isolated	-20mA	+20 mA	-20mA
3	Isolated	Isolated	Low-Loss	-20mA	-20mA	+20 mA

TABLE III
DC PROBE TABLE
(T_A = 25 °C, Nominal)

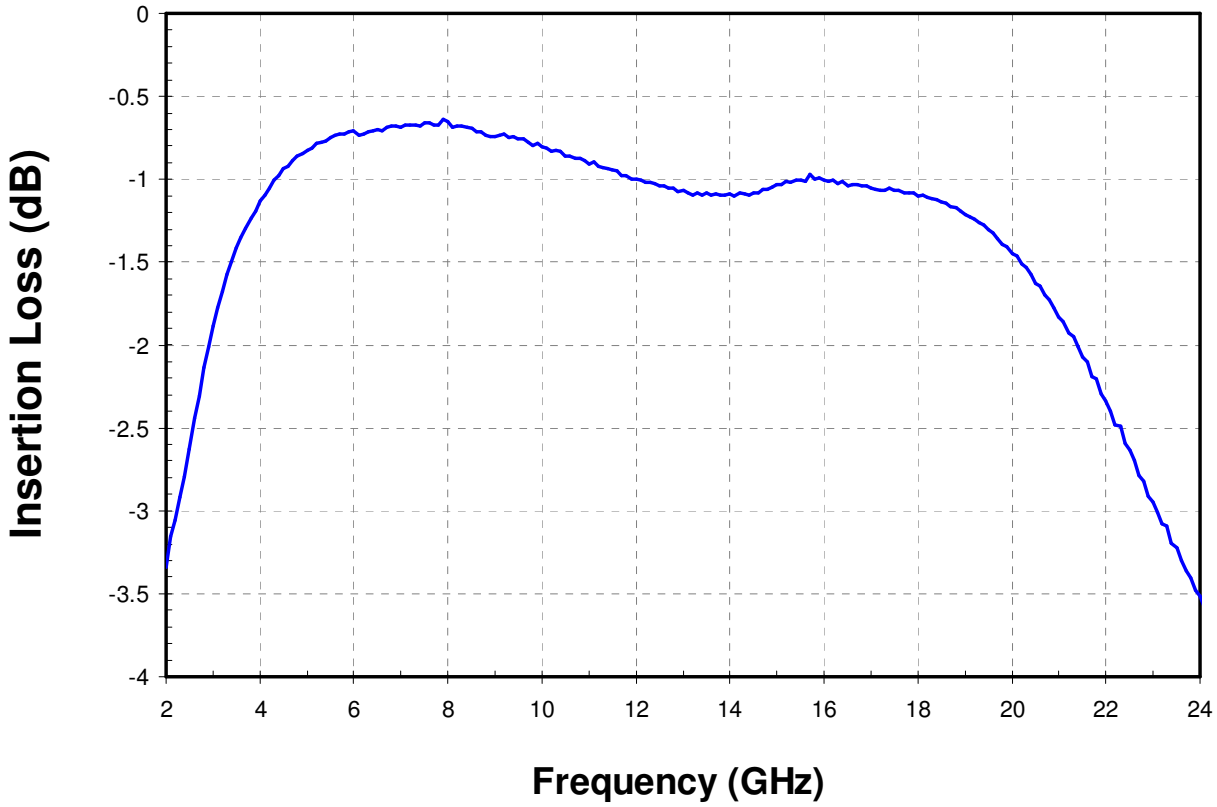
SYMBOL	PARAMETER	TYPICAL	UNITS
R_F @ I_F = 10-20mA	Forward On-Resistance	3	Ω
B_R @ I_R = 10 µA	Breakdown Voltage	-40	V

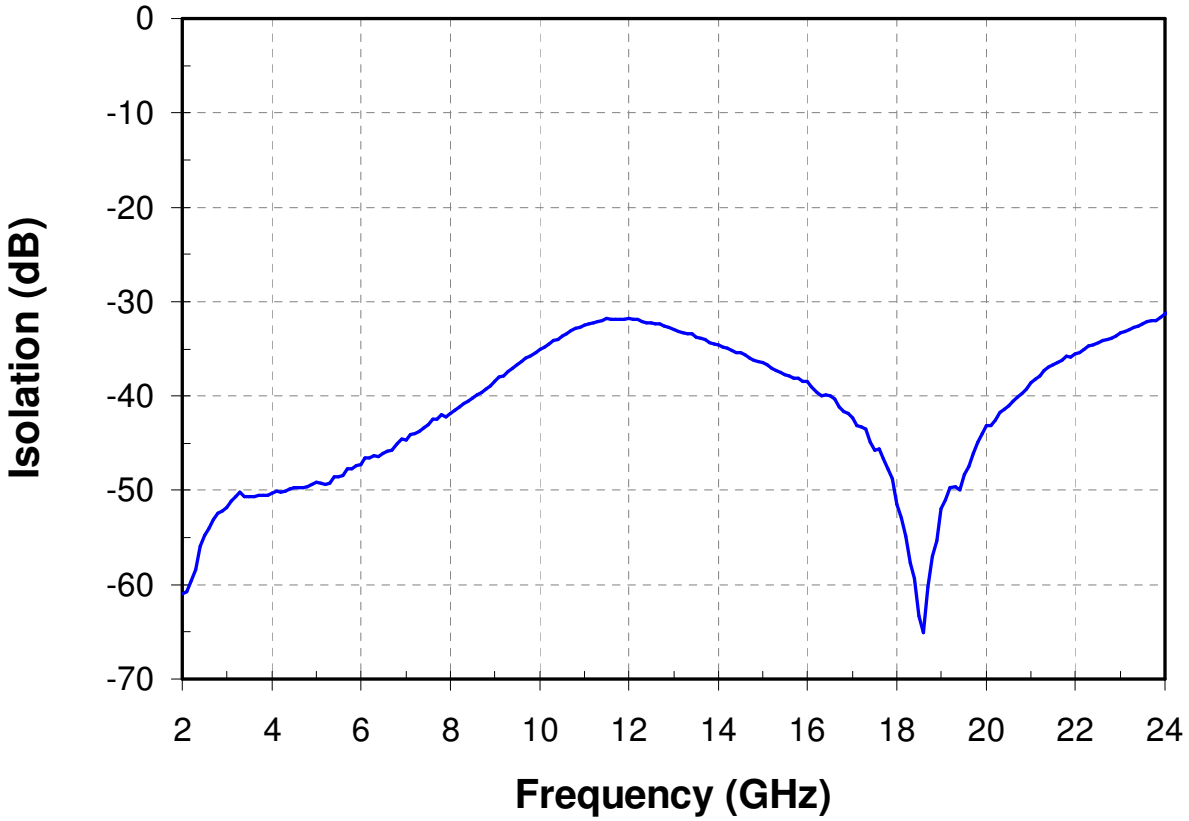
TABLE IV
RF CHARACTERIZATION TABLE
(T_A = 25 °C, Nominal)
Icontrol = ± 20mA

PARAMETER	THROUGH PATH IDENTIFICATION	TEST CONDITION	NOMINAL	UNITS
Insertion Loss	RF Input to RF Output A	f = 4 – 18 GHz	1.0	dB
Isolation	RF Input to RF Output B RF Input to RF Output C	f = 4 – 18 GHz	35	dB
Input Return Loss	RF Input to RF Output A RF Input to RF Output B RF Input to RF Output C	f = 4 – 18 GHz	12	dB
Output Return Loss	RF Input to RF Output A RF Input to RF Output B RF Input to RF Output C	f = 4 – 18 GHz	12	dB

Measured Fixtured Data

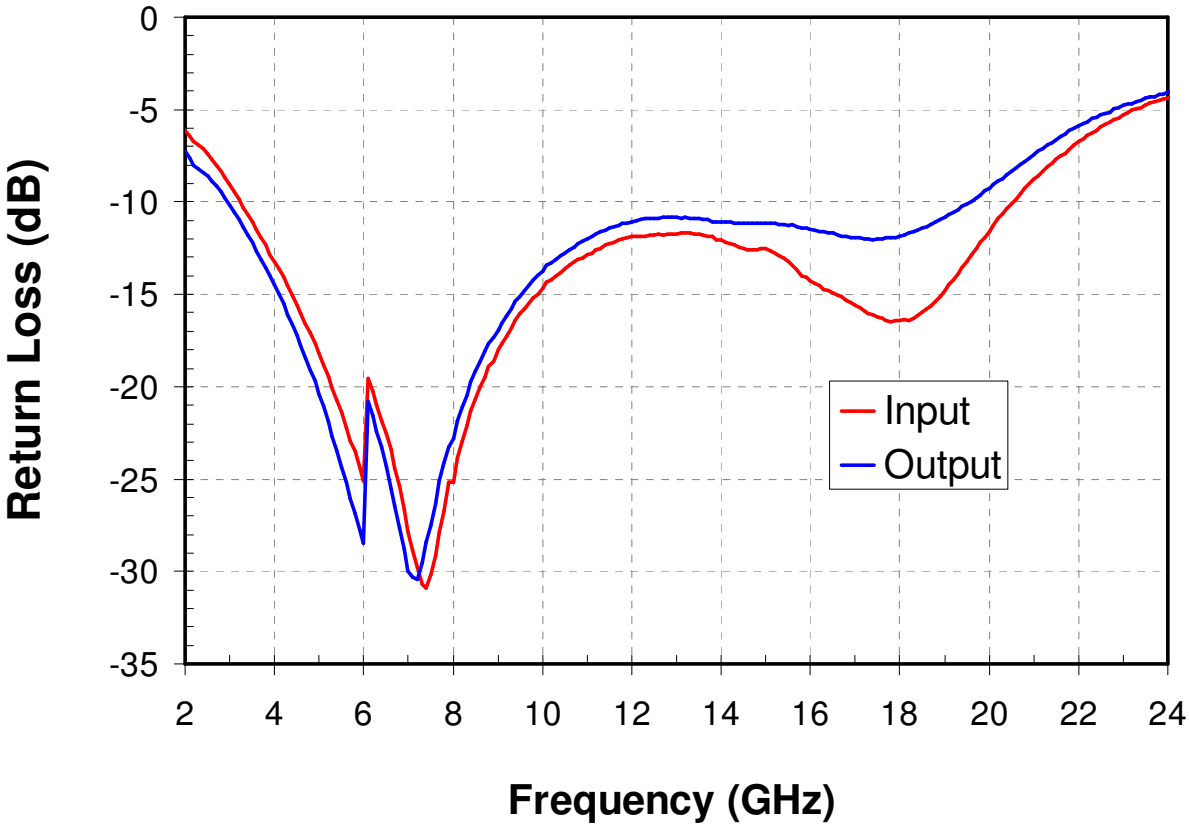
Bias Conditions: Icontrol =± 20 mA

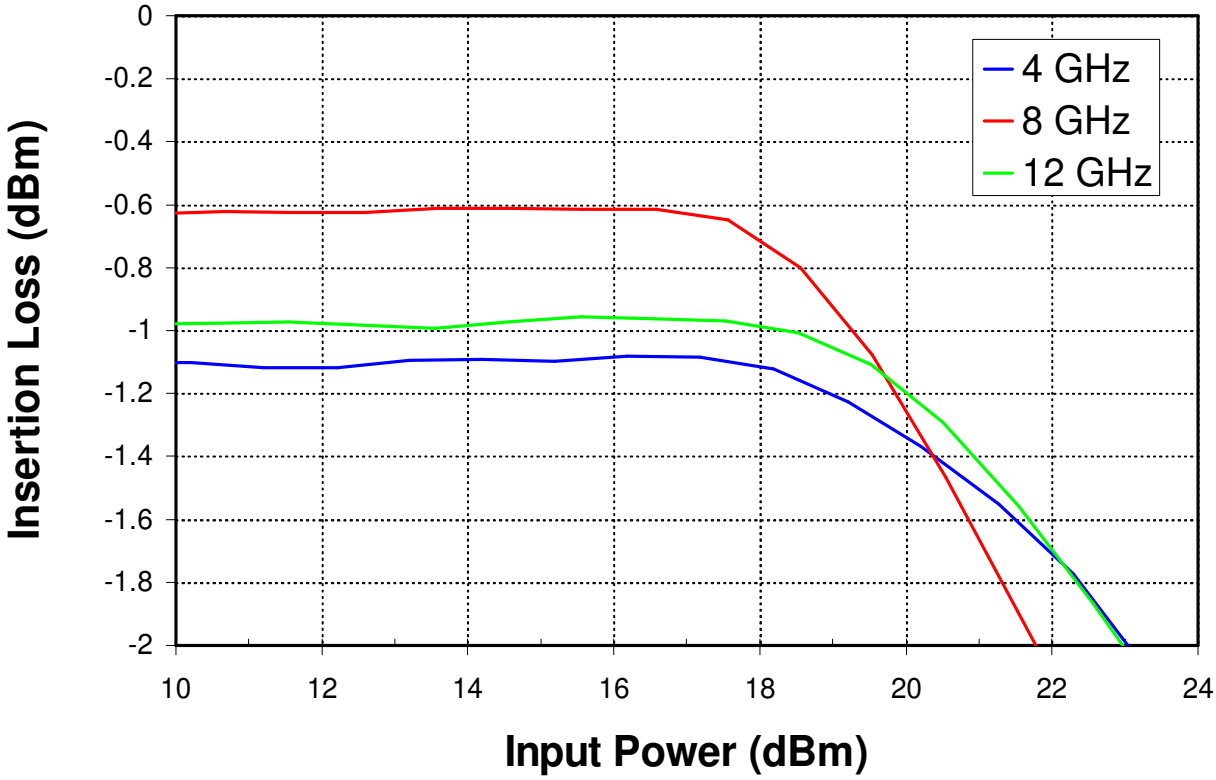




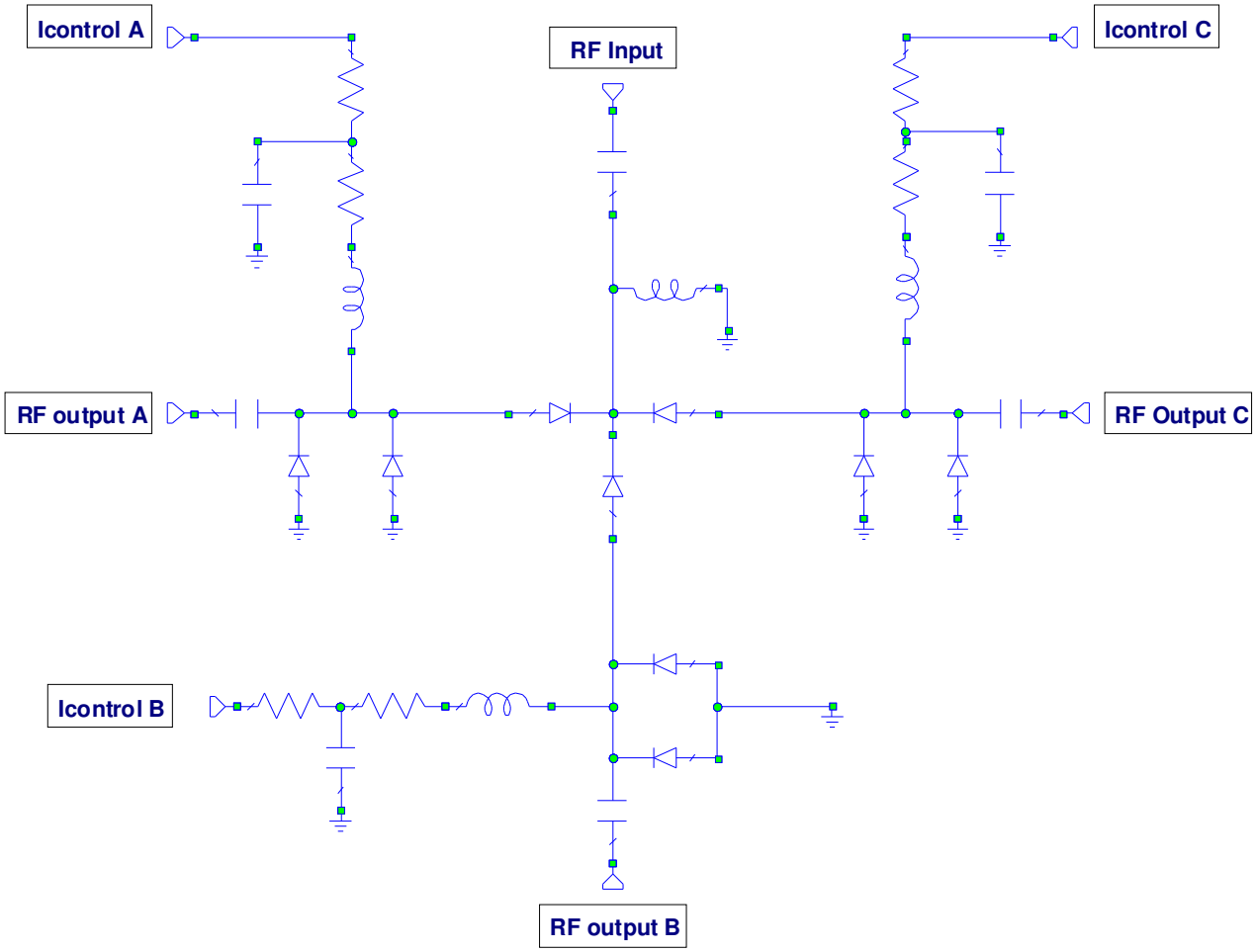
Measured Fixtured Data

Bias Conditions: Icontrol =± 20 mA

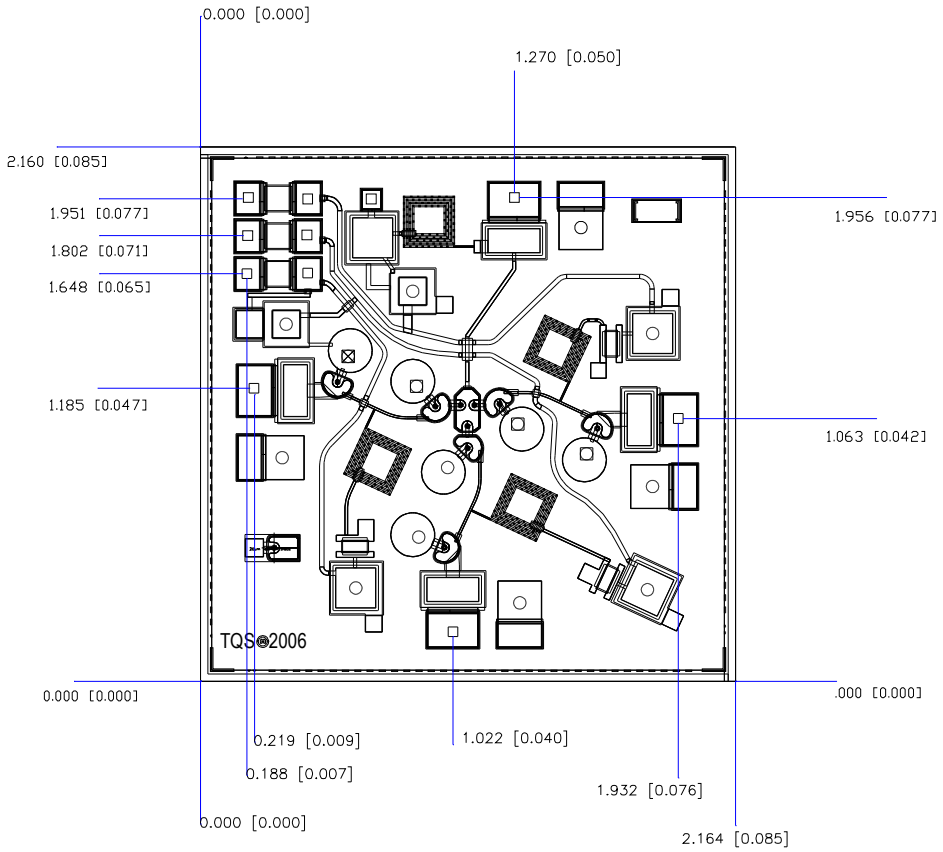




Equivalent Schematic



Mechanical Drawing

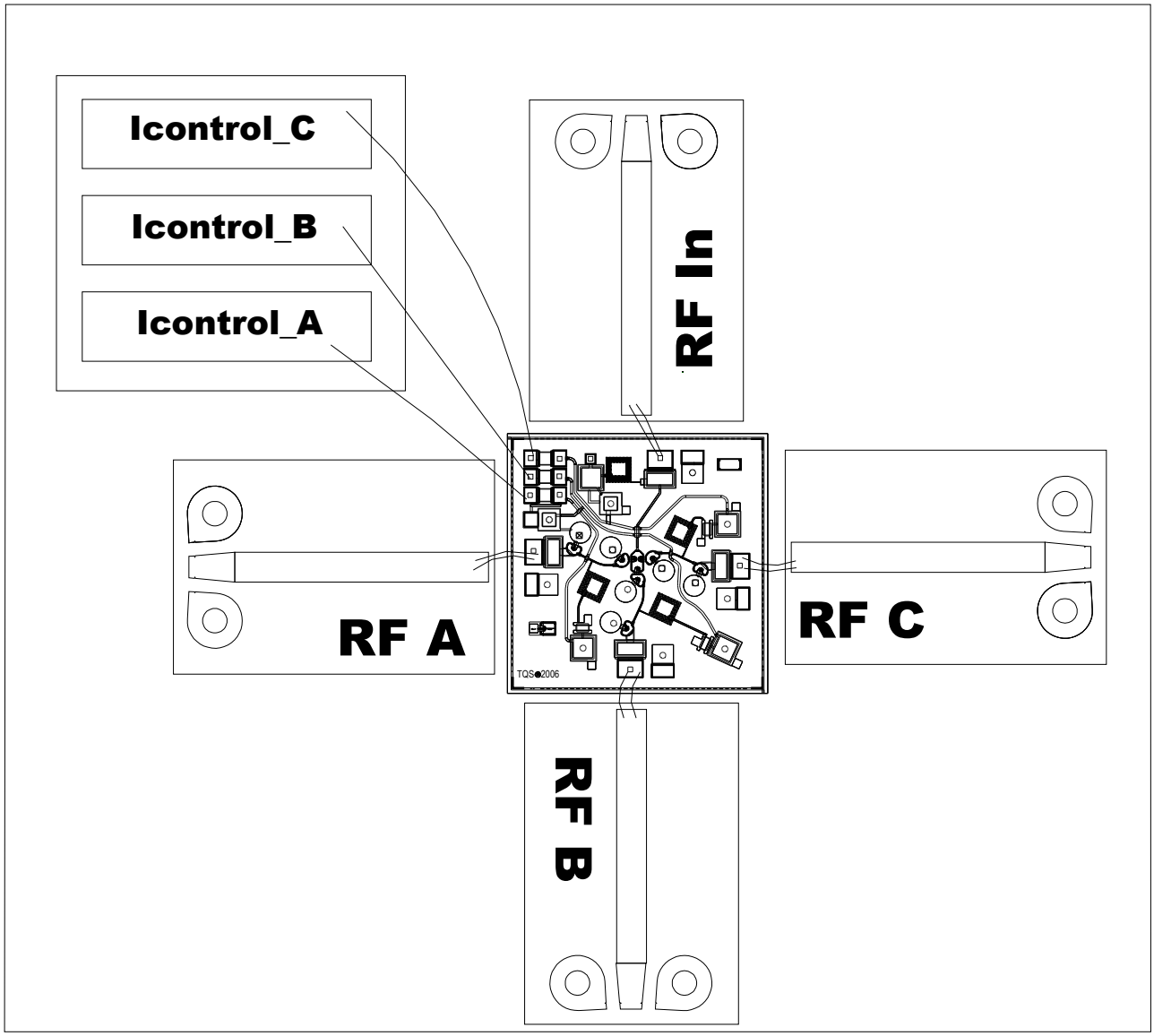


Units: millimeters (inches)
Thickness: 0.100 (0.004)
Chip edge to bond pad dimensions are shown to center of bond pad
Chip size tolerance: +/− 0.051 (0.002)

GND IS BACKSIDE OF MMIC

Bond pad #1	(Vc)	0.114 x 0.142 (0.004 x 0.006)
Bond pad #2	(Vb)	0.114 x 0.142 (0.004 x 0.006)
Bond pad #3	(Va)	0.114 x 0.142 (0.004 x 0.006)
Bond pad #4	(RF Output A)	0.152 x 0.218 (0.006 x 0.009)
Bond pad #5	(RF Output B)	0.218 x 0.152 (0.009 x 0.006)
Bond pad #6	(RF Output C)	0.152 x 0.218 (0.006 x 0.009)
Bond pad #7	(RF Input)	0.218 x 0.152 (0.009 x 0.006)

Assembly Drawing



Note:
± 20mA control lines (IControl_A, IControl_B, IControl_C) use on-chip resistors for diode current control.

GaAs MMIC devices are susceptible to damage from Electrostatic Discharge. Proper precautions should be observed during handling, assembly and test.

Assembly Process Notes

Reflow process assembly notes:

- Use AuSn (80/20) solder with limited exposure to temperatures at or above 300 °C for 30 sec.
- An alloy station or conveyor furnace with reducing atmosphere should be used.
- No fluxes should be utilized.
- Coefficient of thermal expansion matching is critical for long-term reliability.
- Devices must be stored in a dry nitrogen atmosphere.

Component placement and adhesive attachment assembly notes:

- Vacuum pencils and/or vacuum collets are the preferred method of pick up.
- Air bridges must be avoided during placement.
- The force impact is critical during auto placement.
- Organic attachment can be used in low-power applications.
- Curing should be done in a convection oven; proper exhaust is a safety concern.
- Microwave or radiant curing should not be used because of differential heating.
- Coefficient of thermal expansion matching is critical.

Interconnect process assembly notes:

- Thermosonic ball bonding is the preferred interconnect technique.
- Force, time, and ultrasonics are critical parameters.
- Aluminum wire should not be used.
- Discrete FET devices with small pad sizes should be bonded with 0.0007-inch wire.
- Maximum stage temperature is 200 °C.

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