

Silicon PIN Diode Switch Element

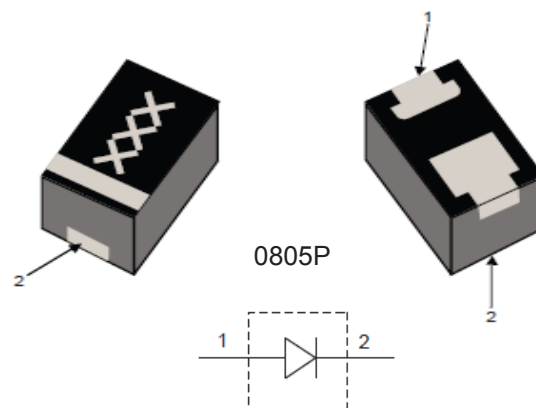
Rev. V1

Features

- Supports up to 40 W Power
- Low Insertion Loss, 0.25 dB up to 2.7 GHz
- Medium Isolation, 11 dB up to 2.7 GHz
- RoHS* Compliant

Description

A broadband, high linearity, medium power series switch element in a 2.0 x 1.3 mm QFN package. This device is designed for WiMax, Wibro, WLAN, TD-SCDMA and other wireless infrastructure applications. It is also suited for 0.1 ~ 3 GHz applications with up to 40 watts of power.

Electrical Specifications: $T_A = +25^\circ\text{C}$

Parameter	Test Conditions	Min.	Typ.	Max.	Units
Breakdown Voltage	$I_R = 10 \mu\text{A}$	250	—	—	V
Forward Voltage	$I_F = 50 \text{ mA}$	—	900	—	mV
Junction Capacitance	$V_R = -50 \text{ V}$, 1 MHz	—	0.12	—	pF
Series Resistance	$I_F = 10 \text{ mA}$, 500 MHz $I_F = 50 \text{ mA}$, 500 MHz	—	2.0 0.6	— 1.4	Ω
Lifetime	$I_F = 10 \text{ mA}$, $I_R = 6 \text{ mA}$, 50%	—	700	—	ns
I-Region	I-Layer	—	40	—	μs
Insertion Loss	$I_F = 50 \text{ mA}$, 2.025 GHz $I_F = 50 \text{ mA}$, 2.3 - 2.7 GHz	—	0.12 0.25	0.20 0.35	dB
Input Return Loss	$I_F = 50 \text{ mA}$, 2.025 GHz $I_F = 50 \text{ mA}$, 2.3 - 2.7 GHz	15 15	25 20	—	dB
Isolation	$V_R = 10 \text{ V}$, 2.025 GHz $V_R = 10 \text{ V}$, 2.3 - 2.7 GHz	10 9	14 11	—	dB

* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

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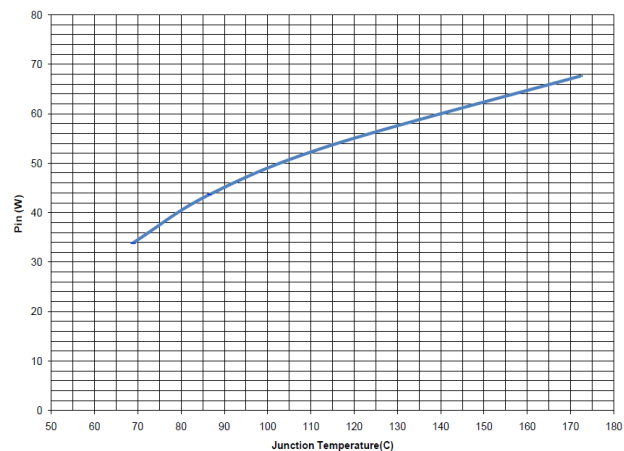
Absolute Maximum Ratings^{1,2}

Parameter	Absolute Maximum
Breakdown Voltage	250 V
Forward Current	100 mA
Thermal Resistance	20°C/W
Junction Temperature	+175°C
Storage Temperature	-55°C to +150°C
Solder Temperature	+260°C per JEDEC STD-J-20C

- Exceeding any one or combination of these limits may cause permanent damage to this device.
- MACOM does not recommend sustained operation near these survivability limits.

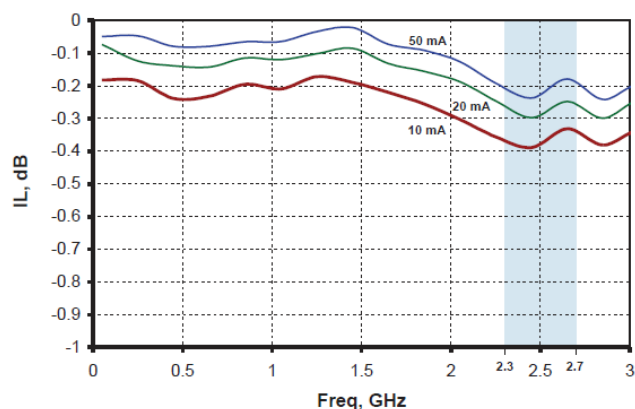
Junction Temperature vs. Input Power

Backside of Board $T_A = 25^\circ\text{C}$, Board Thickness 62 mils

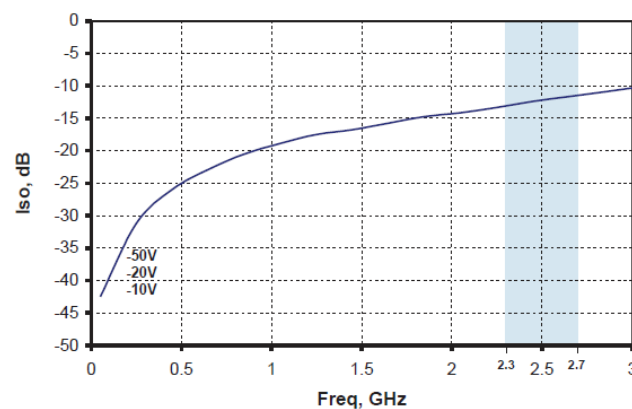


Typical RF Performance Curves @ +25°C

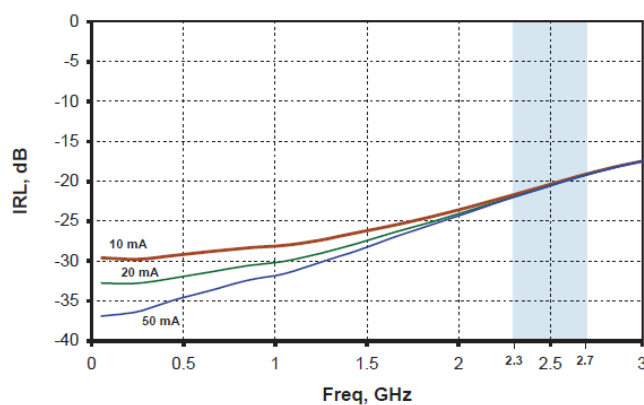
Insertion Loss



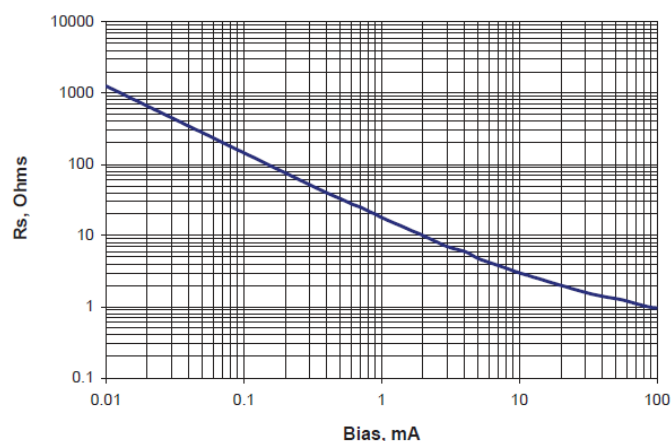
Isolation



Input Return Loss



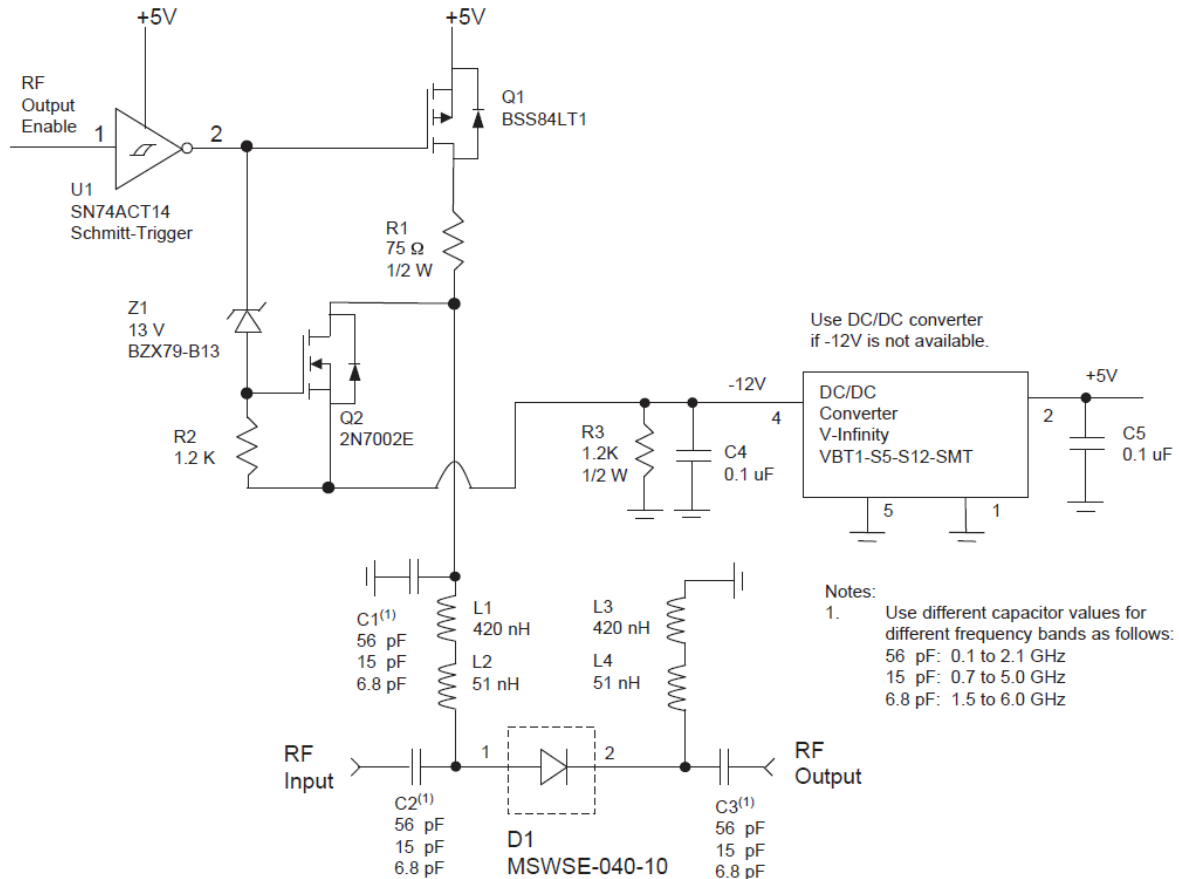
Series Resistance vs. Current, 500 MHz



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Bias Schematic (0.1 - 3.0 GHz)



Parts List

Component	Description	Manufacturer	Manufacturer part #
R1	75Ω, 1/2W, 1210 chip resistor	KOA Speer	RK73B2ETTD750J
R2	1.2KΩ, 1/10W, 603 chip resistor	KOA Speer	RK73B1JTDD122J
R3	1.2KΩ, 1/2W, 1210 chip resistor	KOA Speer	RK73B2ETTD122J
C1,C2,C3 ³	56pF, 250VDC Capacitor, 0603 pkg	ATC	ATC600S560JT250XT
C1,C2,C3 ³	15pF, 250VDC Capacitor, 0603 pkg	ATC	ATC600S150JT250XT
C1,C2,C3 ³	6.8pF, 250VDC Capacitor, 0603 pkg	ATC	ATC600S6R8JT250XT
C4,C5	0.1 μF, 50VDC Capacitor, 0805 pkg	ATC	ATC0805XR7104KT2AT
L1,L3	420nH, 340mA, 700MHz SRF Inductor	Coilcraft	0402AF-421XJLW
L2,L4	51nH, 330mA, 2.3GHz SRF, Inductor	Coilcraft	0402HP-51NXJLW
Q1	50V, 130mA, P-Channel MOSFET	ON SEMI	BSS84LT1
Q2	60V, 310mA, N-Channel MOSFET	ON SEMI	2N7002E
U1	Hex Schmitt-Trigger TTL Inverter	Texas Instruments	SN74ACT14
Z1	13V, 2%, 500mW Zener Diode	Philips	BZX79-B13
DC1	1W, 5V to 12V DC/DC Converter	V-Infinity	VBT1-S5-S12-SMT-AFM

3. Use different capacitor values for different frequency bands as follows:

56 pF: 0.1 to 2.1 GHz

15 pF: 0.7 to 5.0 GHz

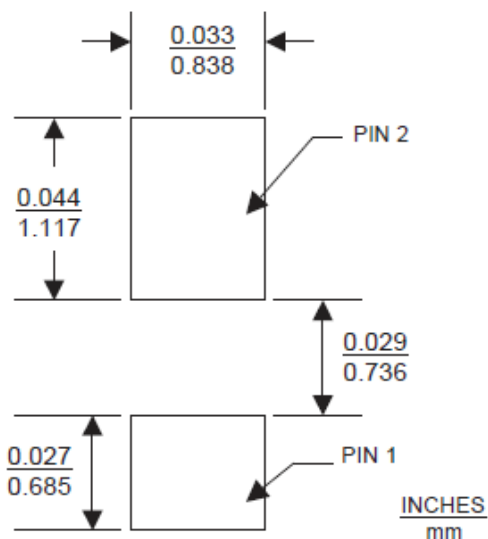
6.8 pF: 1.5 to 6.0 GHz

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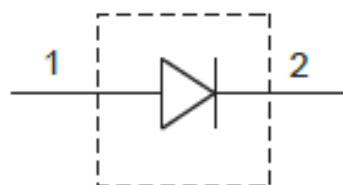
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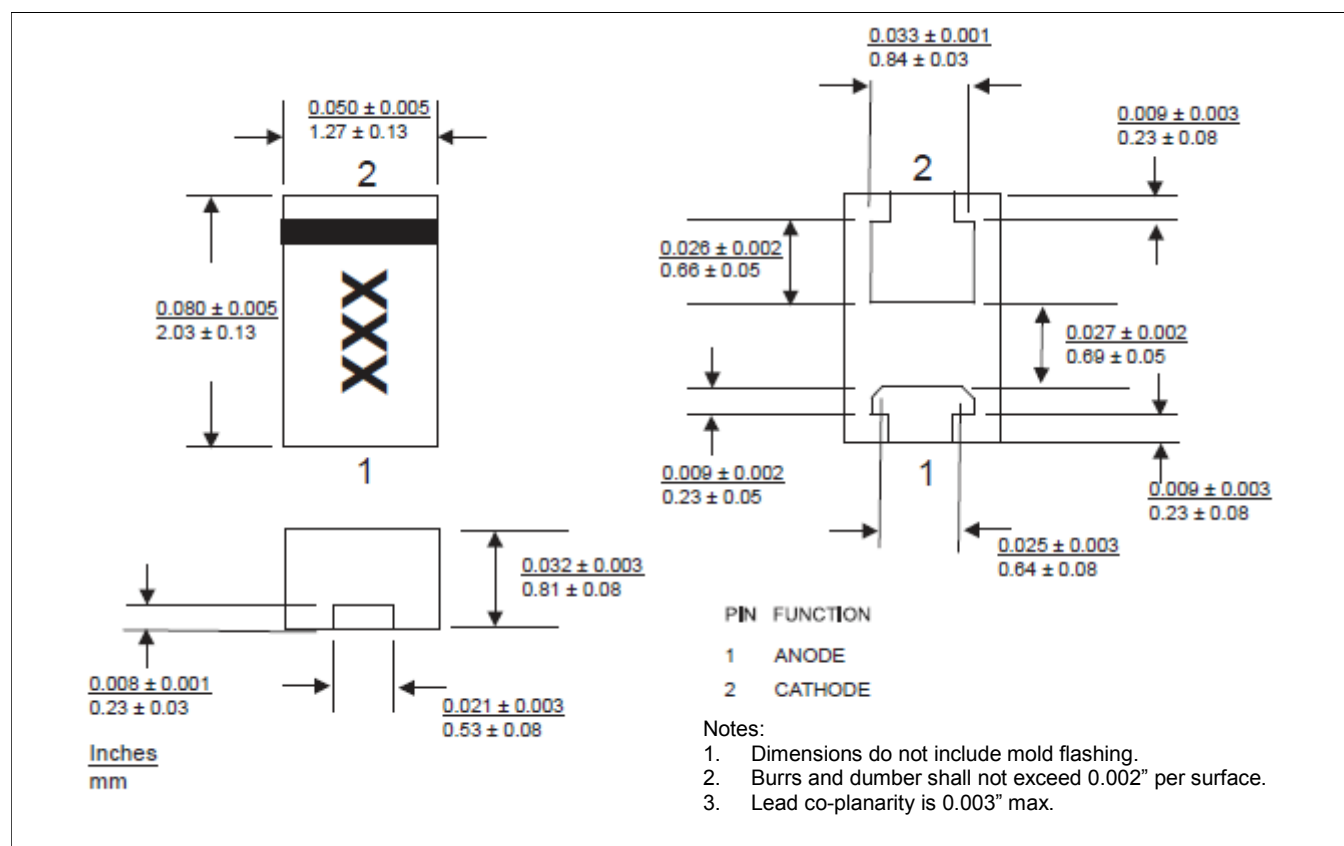
PCB Layout



Schematic



Outline (0805P)



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