Silicon PIN Diode Switch Element

MSWSE-040-10
Rev. V2

Features

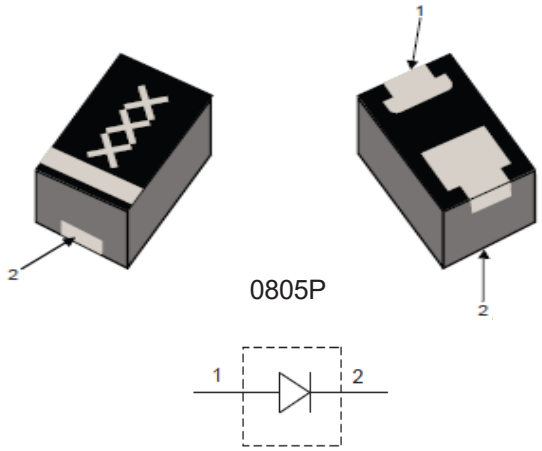
- Supports up to 40 W Power
- Low Insertion Loss, 0.25 dB up to 2.7 GHz
- Medium Isolation, 11 dB up to 2.7 GHz
- RoHS* Compliant

Applications

- ISM

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°C

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

* Restrictions on Hazardous Substances, compliant to current RoHS EU directive.

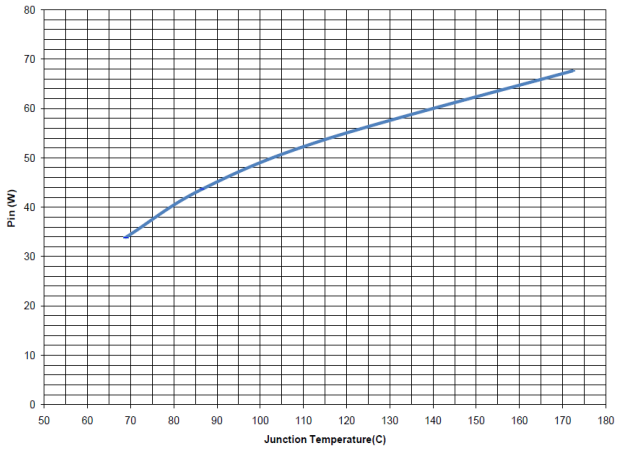
Absolute Maximum Ratings[1,2]

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

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

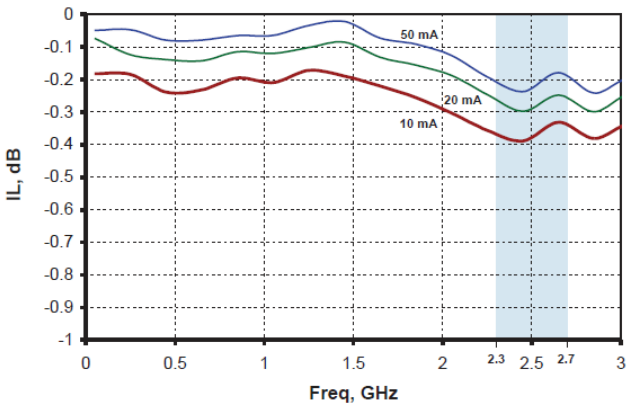
Junction Temperature vs. Input Power

Backside of Board T_A = 25°C, Board Thickness 62 mils

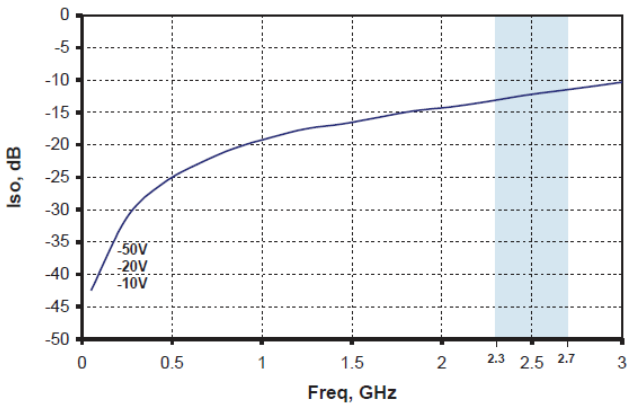


Typical RF Performance Curves @ +25°C

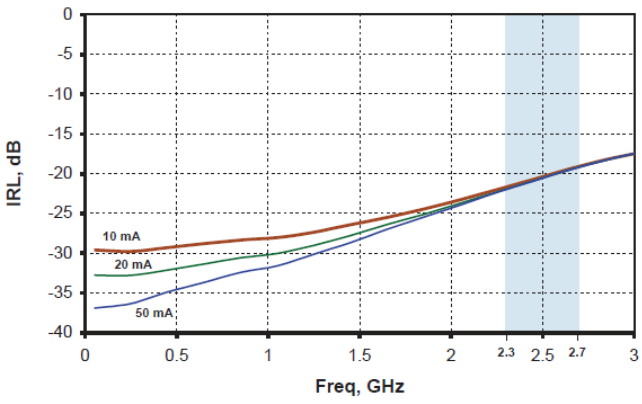
Insertion Loss



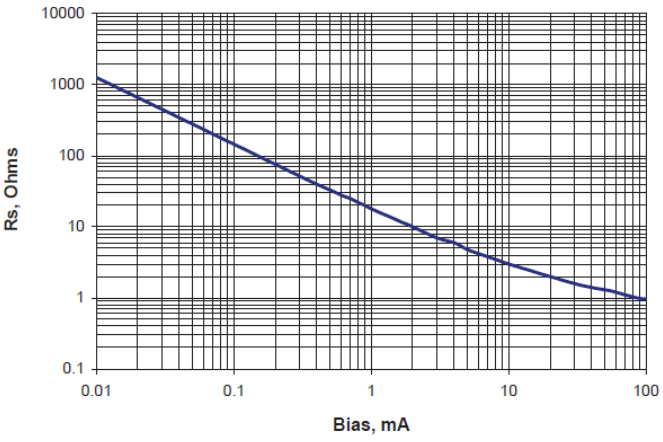
Isolation



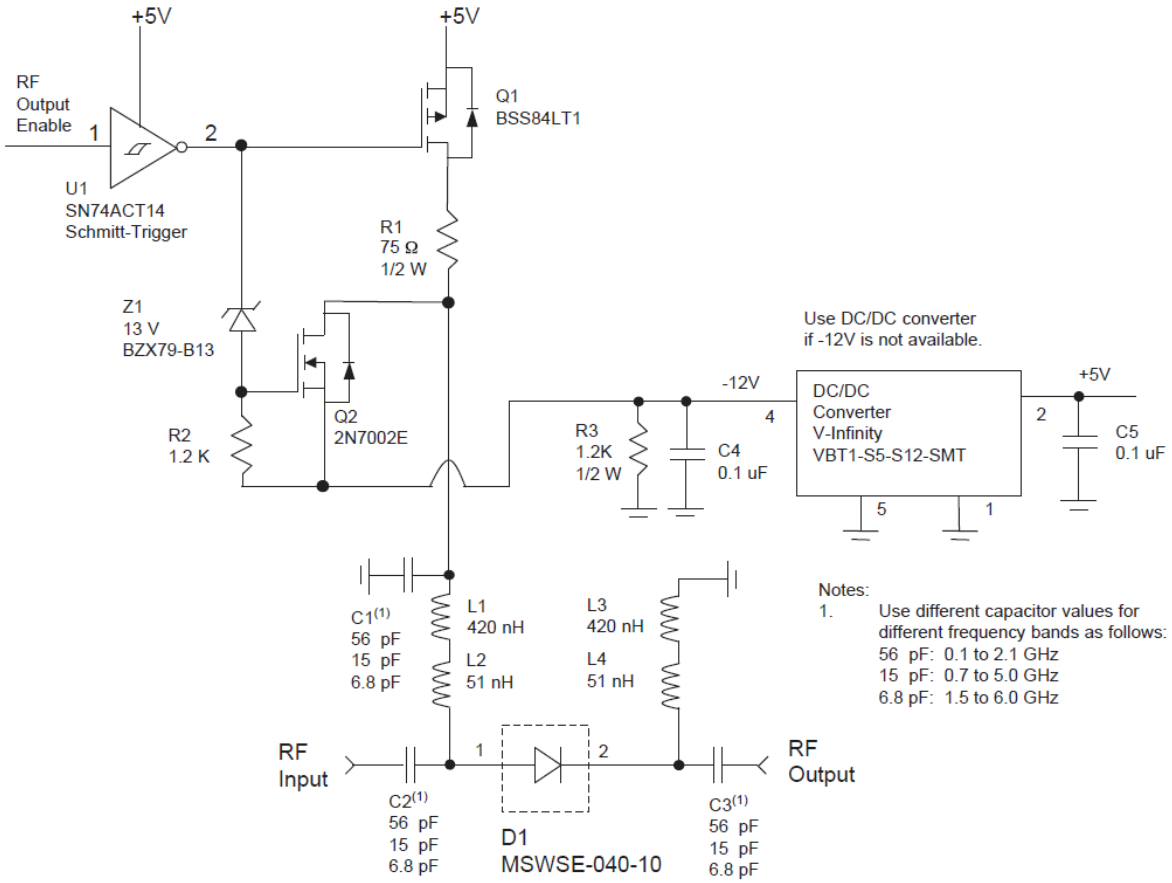
Input Return Loss



Series Resistance vs. Current, 500 MHz



Bias Schematic (0.1 - 3.0 GHz)

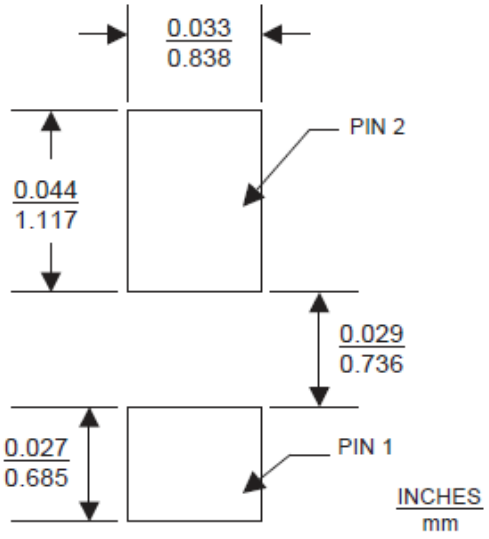


Parts List

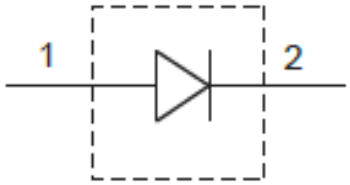
Component	Description	Manufacturer	Manufacturer part #
R1	75Ω, 1/2W, 1210 chip resistor	KOA Speer	RK73B2ETTD750J
R2	1.2KΩ, 1/10W, 603 chip resistor	KOA Speer	RK73B1JTTD122J
R3	1.2KΩ, 1/2W, 1210 chip resistor	KOA Speer	RK73B2ETTD122J
C1,C2,C3[3]	56pF, 250VDC Capacitor, 0603 pkg	ATC	ATC600S560JT250XT
C1,C2,C3[3]	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

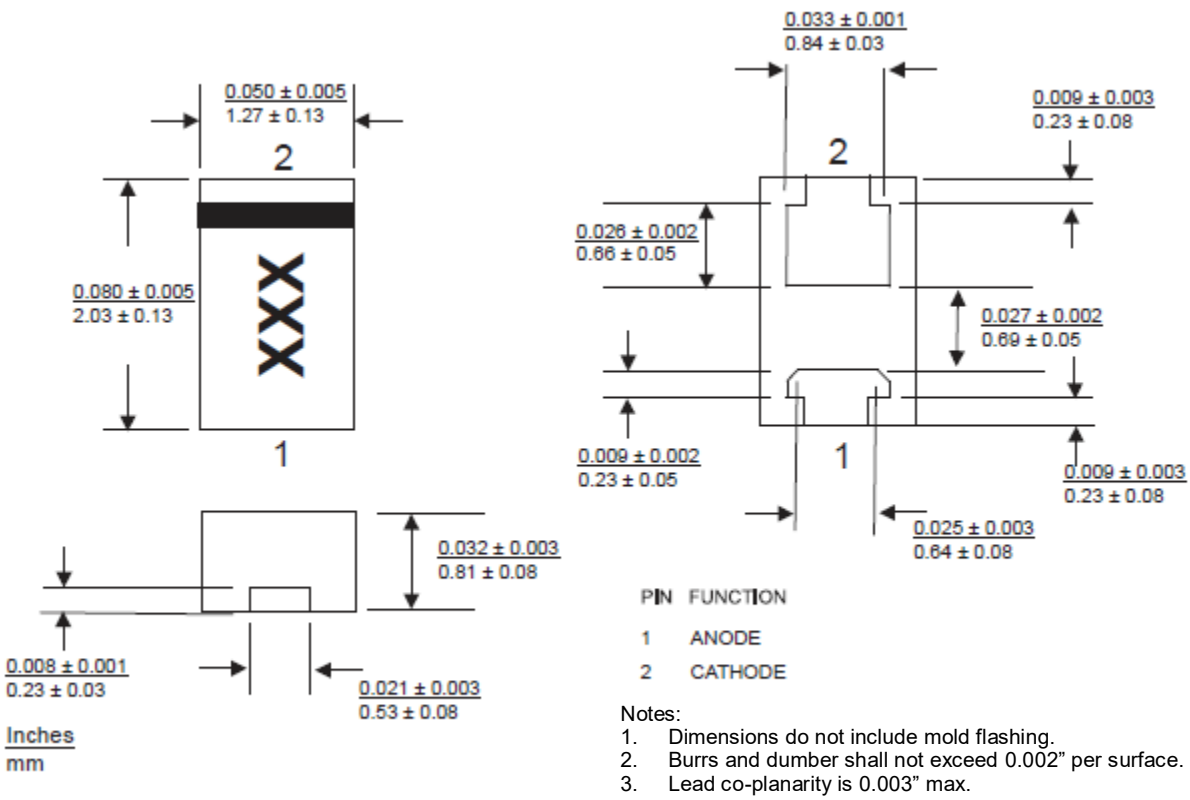
PCB Layout



Schematic



Outline (0805P)



Notes:
1. Dimensions do not include mold flashing.
2. Burrs and dumber shall not exceed 0.002” per surface.
3. Lead co-planarity is 0.003” max.

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