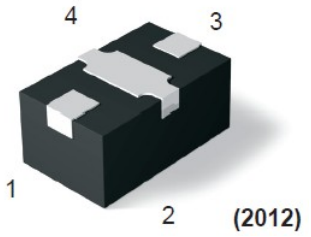
MSWSH-020-30

PIN Diode Shunt Switch Element

Rev. V1

Features

- Supports up to 20 W Power when Cold Switched
- Low Insertion Loss: 0.25 dB to 2.7 GHz
- High Isolation: 31 dB to 2.7 GHz
- RoHS* Compliant

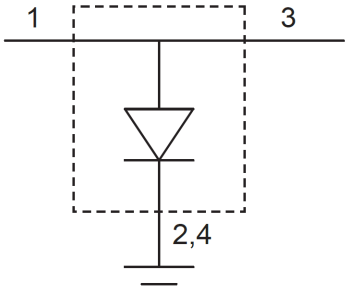


Description

A broadband, high linearity, medium power shunt switch element in a 1.9 x 1.1 mm DFN package.

This device is designed for WiMax, Wibro, WLAN, TD-SCDMA and other wireless infrastructure applications. It is also suited for 0.1 ~ 6 GHz applications with up to 20 watts of power.

Pin Out / Schematic



Ordering Information

Part Number	Package
MSWSH-020-30	3000 piece reel

Electrical Specifications: T_A = +25°C

Parameter	Test Conditions	Units	Min.	Typ.	Max.
Breakdown Voltage (V_B)	I_R = 10 µA	V	100	—	—
Junction Capacitance (C_J)	V_R = 10 V, 1 MHz	pF	—	0.13	—
Series Resistance (R_S)	I_F = 50 mA, 500 MHz	Ω	—	0.6	0.9
I-Region (W)	I-Layer	µm	—	15	—
Insertion Loss (I_L)	V_R = 10 V 2.3 - 2.7 GHz 6.0 GHz	dB	—	0.25 0.35	0.35 0.45
Isolation (I_{SO})	I_F = 50 mA 2.3 - 2.7 GHz 6.0 GHz	dB	26 25	31 27	—
Input Return Loss (R_L)	V_R = 10 V 2.3 - 2.7 GHz 6.0 GHz	dB	15 10	19 14	—
Minority Carrier Lifetime (T_L)	I_F = 10 mA, I_R = 10 mA, @ 50%	ns	—	600	—

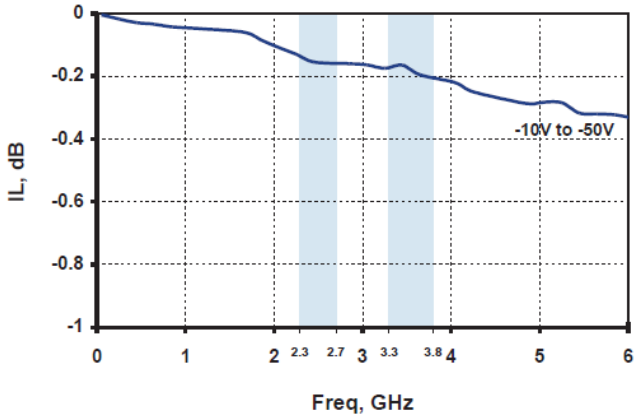
* Restrictions on Hazardous Substances, European Union Directive 2011/65/EU.

Absolute Maximum Ratings

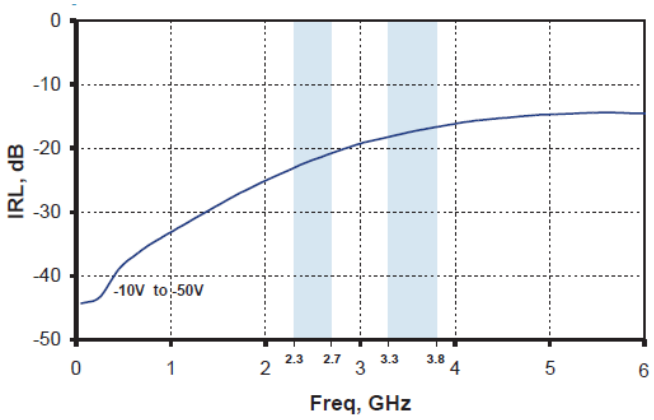
Parameter	Absolute Maximum
Breakdown Voltage	100 V
Forward Current	100 mA
Thermal Resistance	30°C/W
Junction Temperature	+175°C
Storage Temperature	-65°C to +150°C
Assembly Temperature	+260°C Per JEDEC STD-J-20C

Typical Performance Curves

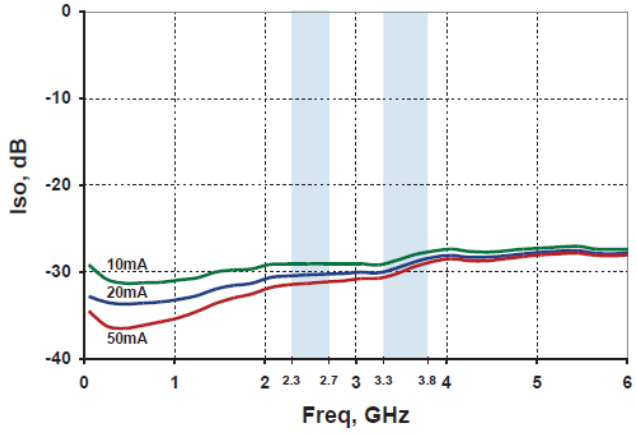
Insertion Loss



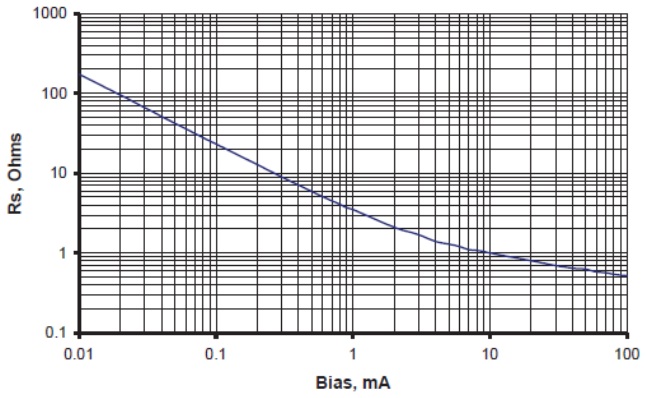
Input Return Loss



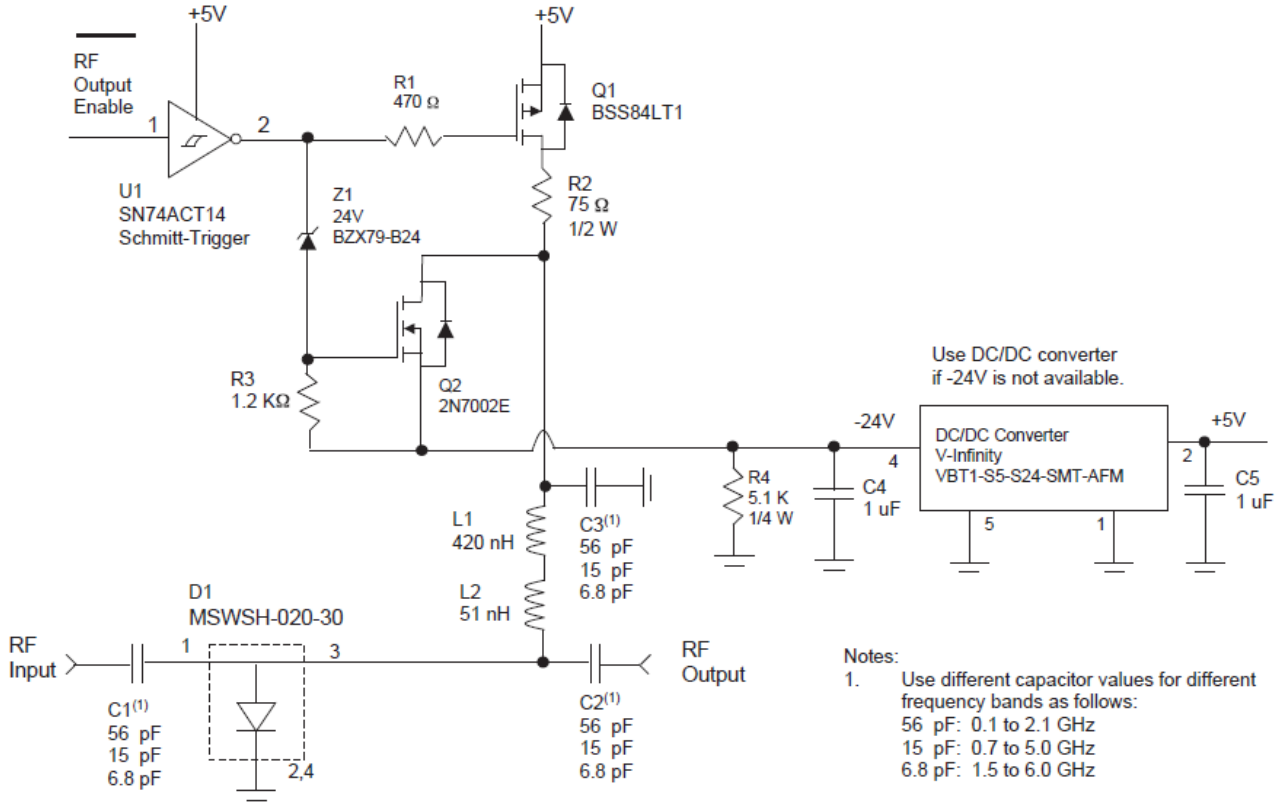
Isolation



Series Resistance vs. Current, 500 MHz



Bias Schematic (0.1 - 6 GHz)

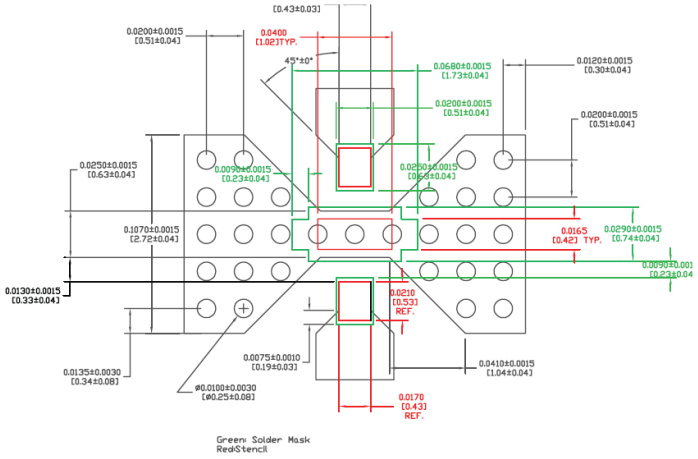


Parts List

Component	Description	Manufacture	Manufacture Part #
R1	470 Ω, 1/10 W, 0603 chip resistor	KOA Speer	RK73B1JTTD471J
R2	75 Ω, 1/2 W, 1210 chip resistor	KOA Speer	RK73B2ETTD750J
R3	1.2 KΩ, 1/10 W, 0603 chip resistor	KOA Speer	RK73B1JTTD122J
R4	5.1 KΩ, 1/4 W, 1206 chip resistor	KOA Speer	RK73B2BTTD512J
C1,C2,C3[1]	56 pF, 250 VDC Capacitor, 0603 pkg	ATC	ATC600S560JT250XT
C1,C2,C3[1]	15 pF, 250 VDC Capacitor, 0603 pkg	ATC	ATC600S150JT250XT
C1,C2,C3[1]	6.8 pF, 250 VDC Capacitor, 0603 pkg	ATC	ATC600S6R8JT250XT
C4,C5	1 µF, 50 WVDC Capacitor, 1206 pkg	ATC	ATC1206Z5U105MT2AT
L1	420 nH, 340 mA, 700 MHz SRF Inductor	Coilcraft	0402AF-421XJLW
L2	51 nH, 330 mA, 2.3 GHz SRF, Inductor	Coilcraft	0402HP-51NXJLW
Q1	50 V, 130 mA, P-Channel MOSFET	ON SEMI	BSS84LT1
Q2	60 V, 310 mA, N-Channel MOSFET	ON SEMI	2N7002E
U1	Hex Schmitt-Trigger TTL Inverter	Texas Instruments	SN74ACT14
Z1	24 V, 2%, 500 mW Zener Diode	Philips	BZX79-B24
DC1	1 W, 5 V to 24 V DC/DC Converter	V-Infinity	VBT1-S5-S24-SMT-AFM

1. 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

Printed Circuit Board Layout

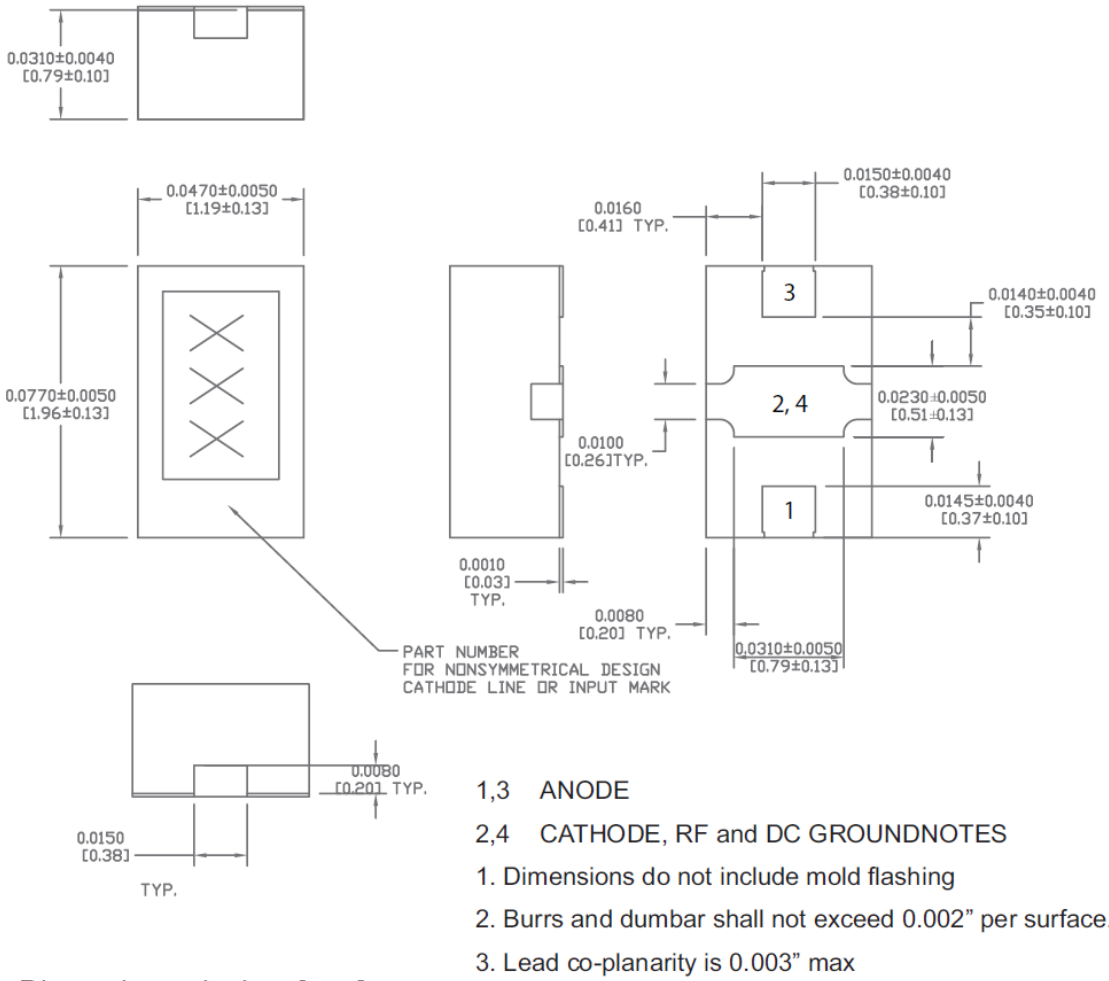


NOTE: If possible, use copper filled vias underneath pin 2 and 4 for better thermals; otherwise, use vias that are plated through, filled and plated over.

Solder mask should provide a 60 um clearance between copper pad and soldermask. Rounded pkg pads should have matching rounded solder mask openings.

Use circles or squares for the thermal land stencil such that only get 50% to 80% solder paste coverage.

Outline (2012)



1,3 ANODE

2,4 CATHODE, RF and DC GROUNDNOTES

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

Dimensions: inches [mm]