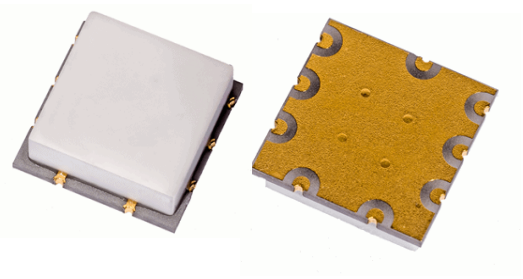
KS114-52

SP4T 50W Switch
0.02 – 2.0 GHz

KCB SOLUTIONS
THE HIGHEST STANDARD IN RF

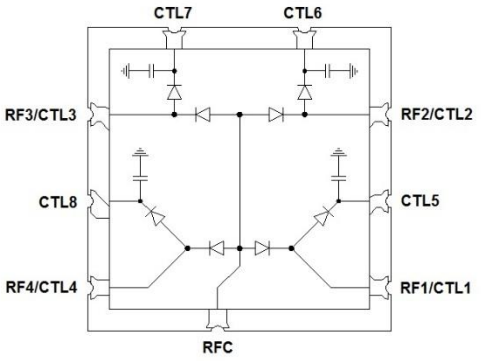
Description

The KS114-52 is a SP4T PIN switch that offers high power handling and low insertion loss in a compact surface mount package. Built on a highly thermally conductive Aluminum Nitride (AlN) substrate, this switch is ideal for high performance commercial and military applications where low loss combined with high adjacent port isolation is required. In addition, the thick copper under metal provides superior loss performance as well as higher bias current handling than traditional metallization schemes. High power diodes have been chosen to provide the optimum blend of loss, isolation and harmonic performance.



Features

- ❑ High Power Series-Shunt PIN Diode Design
- ❑ Broadband operation from 0.02 – 2.0 GHz
- ❑ Surface Mount 7mm QFN-style Leadless Package
- ❑ Rugged Aluminum Nitride Carrier with Thick Copper Traces



Applications

- ❑ Microwave Radios
- ❑ Military Radios
- ❑ VSAT
- ❑ Telecom Infrastructure
- ❑ Test Equipment

Electrical Characteristics (+25°C)

Parameter	Conditions	Min.	Typical	Max.	Units
Insertion Loss	0.02 – 0.5 GHz 0.5 – 1.0 GHz 1.0 – 2.0 GHz		0.30 0.50 0.75	0.50 0.75 1.10	dB dB dB
Isolation	0.02 – 2.0 GHz	37	45		dB
Return Loss	0.02 – 0.5 GHz 0.5 – 1.0 GHz 1.0 – 2.0 GHz		20.8 17.7 17.7	17.7 15.6 15.6	dB dB dB

Truth Table / Control Voltages (I_{CTL}= 20mA – 100mA, V_{RB} = 25V – 100V)

CTL1	CTL2	CTL3	CTL4	CTL5	CTL6	CTL7	CTL8	RFC-RF1	RFC-RF2	RFC-RF3	RFC-RF4
$-I_{CTL}$	$+V_{RB}$	$+V_{RB}$	$+V_{RB}$	$+V_{RB}$	$-I_{CTL}$	$-I_{CTL}$	$-I_{CT}$	Low Loss	Isolation	Isolation	Isolation
$+V_{RB}$	$-I_{CTL}$	$+V_{RB}$	$+V_{RB}$	$-I_{CTL}$	$+V_{RB}$	$-I_{CTL}$	$-I_{CT}$	Isolation	Low Loss	Isolation	Isolation
$+V_{RB}$	$+V_{RB}$	$-I_{CTL}$	$+V_{RB}$	$-I_{CTL}$	$-I_{CTL}$	$+V_{RB}$	$-I_{CT}$	Isolation	Isolation	Low Loss	Isolation
$+V_{RB}$	$+V_{RB}$	$+V_{RB}$	$-I_{CTL}$	$-I_{CTL}$	$-I_{CTL}$	$-I_{CTL}$	$+V_{RB}$	Isolation	Isolation	Isolation	Low Loss

V_{RB} Must be greater than the worst case RF voltage excursion to maintain a reverse bias on the series diode.

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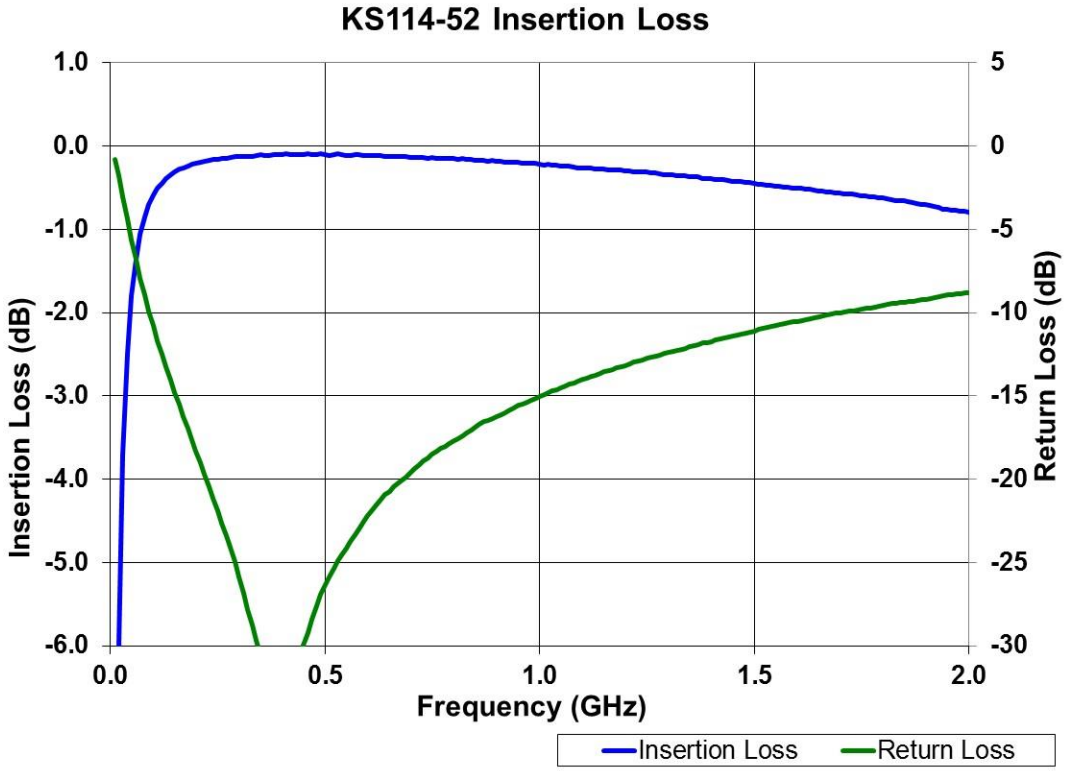
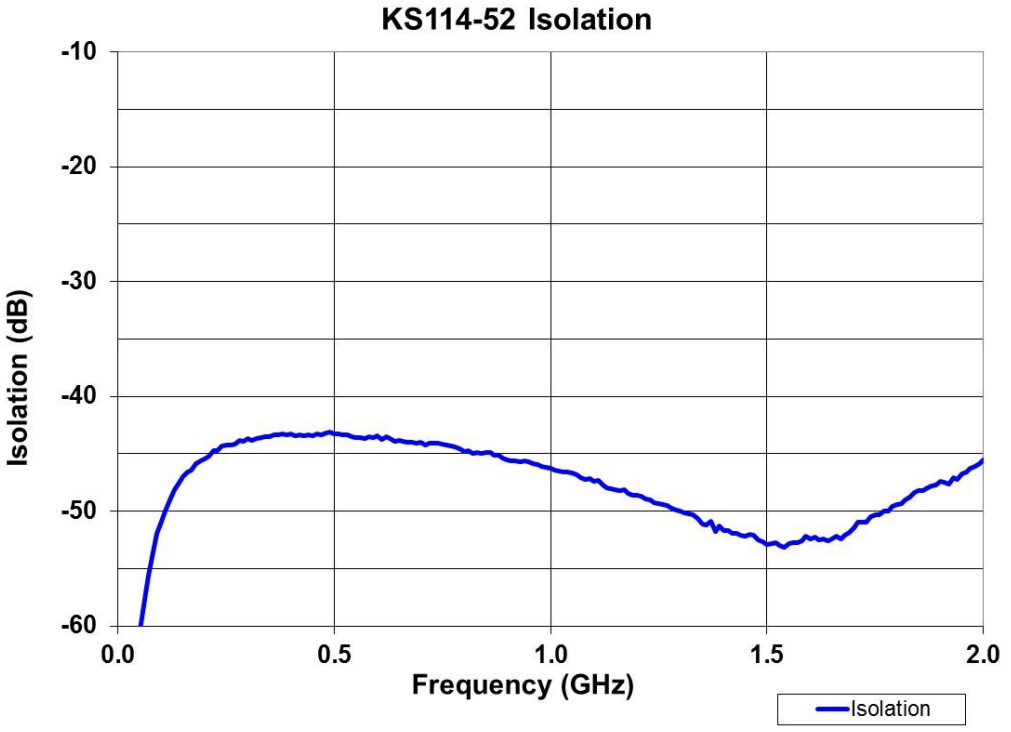
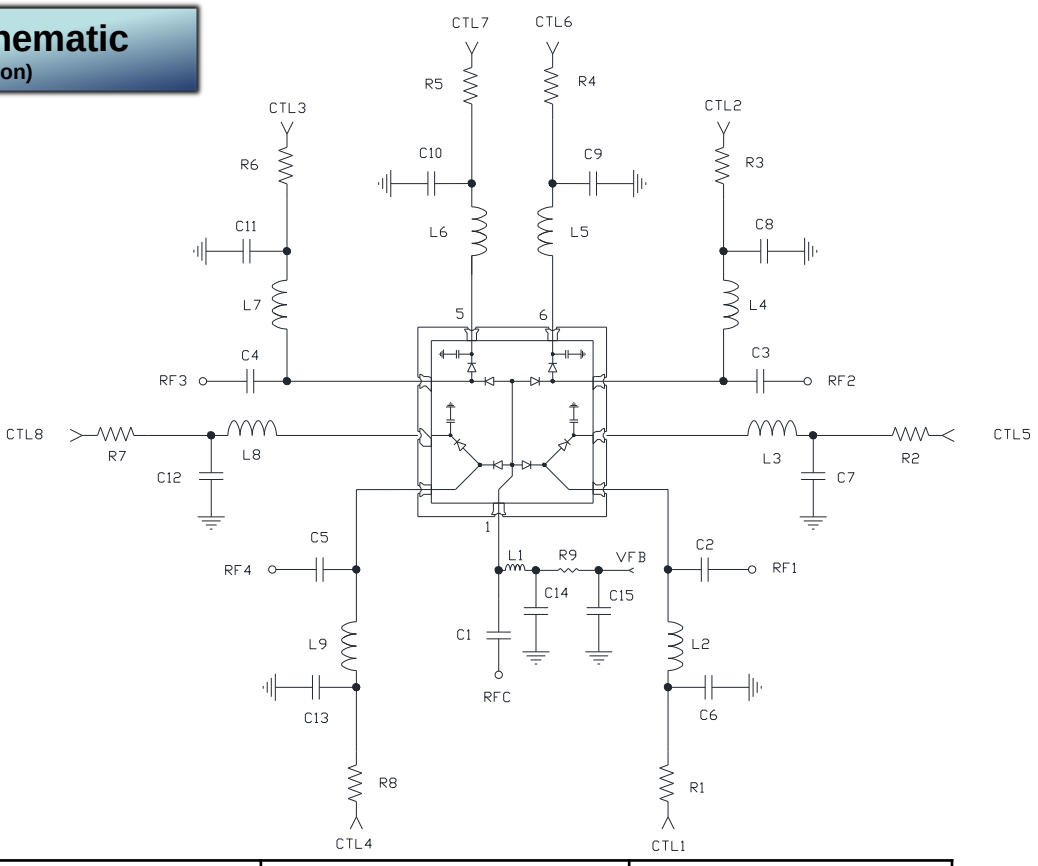
Typical Performance(+25°C)





Application Schematic

(0.05 – 2 GHz, 50W Operation)



Location	Value	Part Number	Mfr
C1-C5	1000pF, 250V	C1608NP02E102J080AA	TDK
C6-C13	47pF, 250V	600S470JT250XT	ATC
R1, R3, R6, R8, R9	22 Ohms, 1/4W	ERJ-PA3F22R0V	Panasonic
R2, R4, R5, R7	4.7K Ohms, 3W	35224K7JT	TE Connectivity
L1-L9	180 nH	0603HP-R18XGLW	Coilcraft

Application Truth Table / Control Voltages

VFB	CTL1	CTL2	CTL3	CTL4	CTL5	CTL6	CTL7	CTL8	RFC-RF1	RFC-RF2	RFC-RF3	RFC-RF4
3.3V	0V	100V	100V	100V	100V	0V	0V	0V	Low Loss	Isolation	Isolation	Isolation
3.3V	100V	0V	100V	100V	0V	100V	0V	0V	Isolation	Low Loss	Isolation	Isolation
3.3V	100V	100V	0V	100V	0V	0V	100V	0V	Isolation	Isolation	Low Loss	Isolation
3.3V	100V	100V	100V	0V	0V	0V	0V	100V	Isolation	Isolation	Isolation	Low Loss

Schematic Notes:

1. CTL1-CTL8 should be chosen to maintain reverse bias through peak RF voltage excursions during the OFF state and to maintain proper forward bias current (ICTL) during ON state. See truth table.
2. DC blocking capacitors on RF lines should be large enough to provide low loss at the lowest operating frequency.
3. All inductors should be large enough to provide high impedances at the lowest operating frequency.
4. Bypass capacitors should be large enough to adequately filter supply noise from DC control lines

Absolute Maximum Ratings

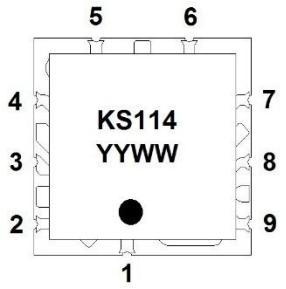
Characteristic	Min.	Max.	Units
Control Voltage/Reverse Voltage	-250	+250	Volts
RF Input Power		50	W(1)
Storage Temperature	-55	+150	˚C
Operating Temperature	-55	+85	˚C
Control Current		200	mA
Operating Frequency	0.02	2.0	GHz

Notes:

1. Max Base Plate Temp =+85˚C. For temperatures above +85˚C derate linearly to +150˚C using $P_{max} = 115.38 - 0.769 * T_{amb}$

Pinout

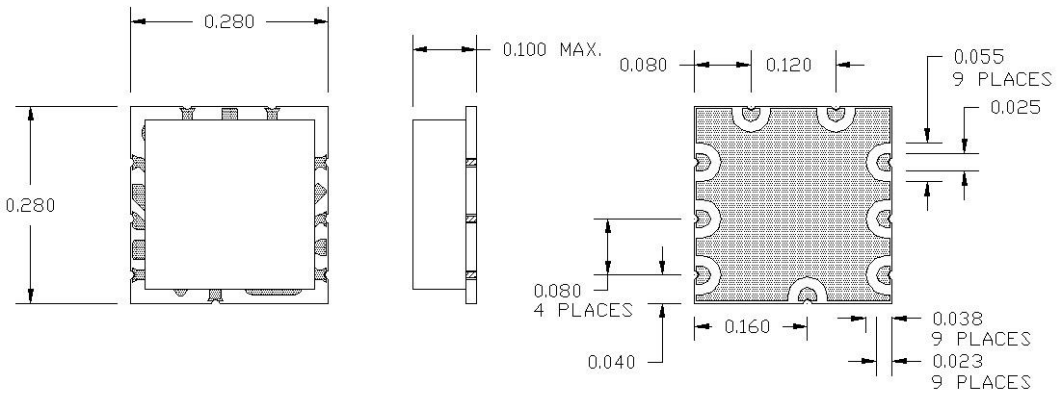
1	RFC
2	RF4/CTL4
3	CTL8
4	RF3/CTL3
5	CTL7
6	CTL6
7	RF2/CTL2
8	CTL5
9	RF1/CTL1



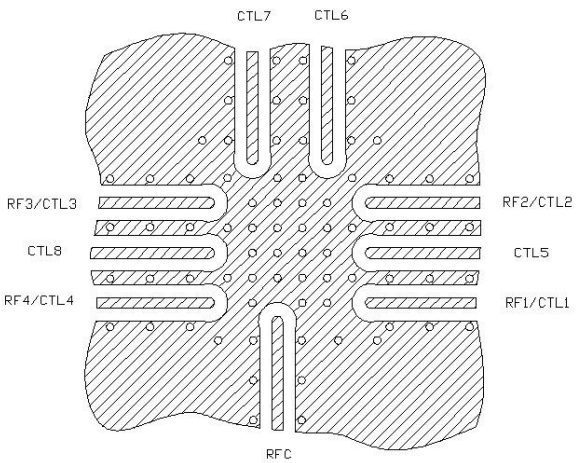
Electrostatic Sensitive Device. Proper ESD precaution should be used when handling device.

Outline Drawing

Dimensions are shown in inches.



Recommended Solder Layout



Notes:

1. Maximum reflow temperature: 265°C
2. Ground all unused ports.
3. Trace widths for Rogers© RO4003C material with 0.010" ground plane spacing.
4. DXF file available upon request.
5. Contact KCB Solutions for further guidance on device placement and attachment