

## 65W Peak Power Broadband SPDT

### FEATURES

- Low insertion loss
  - 0.45dB @ 1GHz
- High isolation
  - 40dB @ 1GHz
- High peak power handling
- No external DC blocking capacitors on RF lines
- Versatile 2.6-5.25V power supply

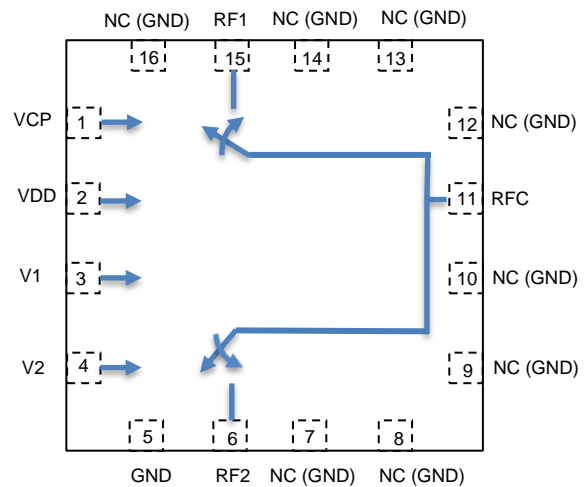
### APPLICATIONS

- TDD Cellular infrastructure
- LTE relays and microcells

### DESCRIPTION

The TS7322K is a symmetrical reflective single pole dual throw (SPDT) switch designed for broadband, high peak power switching applications. Its broadband behavior from 30MHz to 4GHz frequencies makes the TS7322K an excellent switch for all the applications requiring low insertion loss, high isolation and high linearity within a small package size.

The TS7322K is packaged into a compact Quad Flat No lead (QFN) 3x3mm 16 leads plastic package.



**Figure 1:** Functional Block Diagram (top view)

### ORDERING INFORMATION

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
TS7322K	QFN 3 mm x 3 mm	Tape and Reel	3000	TS7322KMTRPBF

## PIN DESCRIPTION

PIN NUMBER	PIN NAME	DESCRIPTION
1	VCP	Input Pin. Connecting a SMD Capacitor (or capacitor in parallel with high value resistor) between this pin and ground enable faster switching time
2	VDD	DC power supply
3	V1	Switch control input 1
4	V2	Switch control input 2
5	GND	Ground
6	RF2	RF throw 2
7	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
8	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
9	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
10	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
11	RFC	RF Common port
12	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
13	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
14	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
15	RF1	RF throw 1
16	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)

The backside ground slug of the package must be grounded directly to the ground plane to ensure proper operation

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNITS
Power supply voltage	VDD	2.6 to 5.5	V
Storage temperature Range	T <sub>st</sub>	-55 to +125	°C
Operating Temperature Range	T <sub>op</sub>	-40 to +105	°C
RF Input Power CW 450MHz-4GHz (25degC)	RFx	43	dBm
RF Input Power CW <450MHz (25degC)	RFx	42.5	dBm

Exceeding one or a combination of the Absolute Maximum Ratings conditions may cause permanent damage to the device.

## SWITCH TRUTH TABLE

V2	V1	RF PATH
1	0	All OFF state
0	0	RFC-RF1
0	1	RFC-RF2

**Note:** VDD should be applied first before V1 and V2.

There is an internal pull-down to ground on the V2 control pin: this pin can be left floating when the all OFF state is not used.

There is an internal pull-down to ground on the V1 control pin: default switch state at start-up without any control voltage applied will be RFC-RF1 on.

## ELECTRICAL SPECIFICATIONS

Temperature=25°C, VDD=2.7V, 50Ω source and load conditions

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Operating frequency		30		4000	MHz
Insertion loss	800MHz		0.42		dB
	1.95GHz		0.55		
	2.7GHz		0.65		
	4GHz		0.8		
Isolation RFC-RFx	800MHz		43		dB
	1.95GHz		33		
	2.7GHz		27		
	4GHz		23		
Return Loss RFC, RFx	800MHz		23		dB
	1.95GHz		25		
	2.7GHz		22		
	4GHz		18		
Harmonic distortion					
H2	800MHz, Pin=35dBm		-49		dBm
H3	800MHz, Pin=35dBm		-50		dBm
IIP3	800MHz		73		dBm
P0.1dB <sup>1</sup>	450MHz – 4000MHz CW signal		44		dBm
P0.1dB <sup>1</sup>	<450MHz CW signal		43		dBm
P0.1dB Peak <sup>2</sup>	800MHz Pulsed Signal		48		dBm
Enhanced Switching Time	50% ctrl to 0.1dB of max RF power. C1=1nF (refer to figure 5 schematic)		2.5		μs
Control voltage	Power Supply VDD	2.6	3.3	5.25	V
	V1, V2 ctrl pin V <sub>ih</sub>	0.67*VDD	VDD	VDD+0.3	V
	All control pin V <sub>il</sub>	-0.3		0.3*VDD	V
Control current	I <sub>il</sub> , V1 or V2 ctrl voltage =0.3*VDD		0		μA
	I <sub>ih</sub> , V1 or V2 ctrl voltage = VDD			7.5	μA
Current consumption	Active mode (VDD On)		225		μA

**Note 1:** P0.1dB is a Figure Of Merit.**Note 2:** 1% Duty Cycle, 10us pulse width**Note 3:** No external DC blocking capacitors required on the RF terminals unless DC voltage is applied on an RF terminal.

## PACKAGE INFORMATION

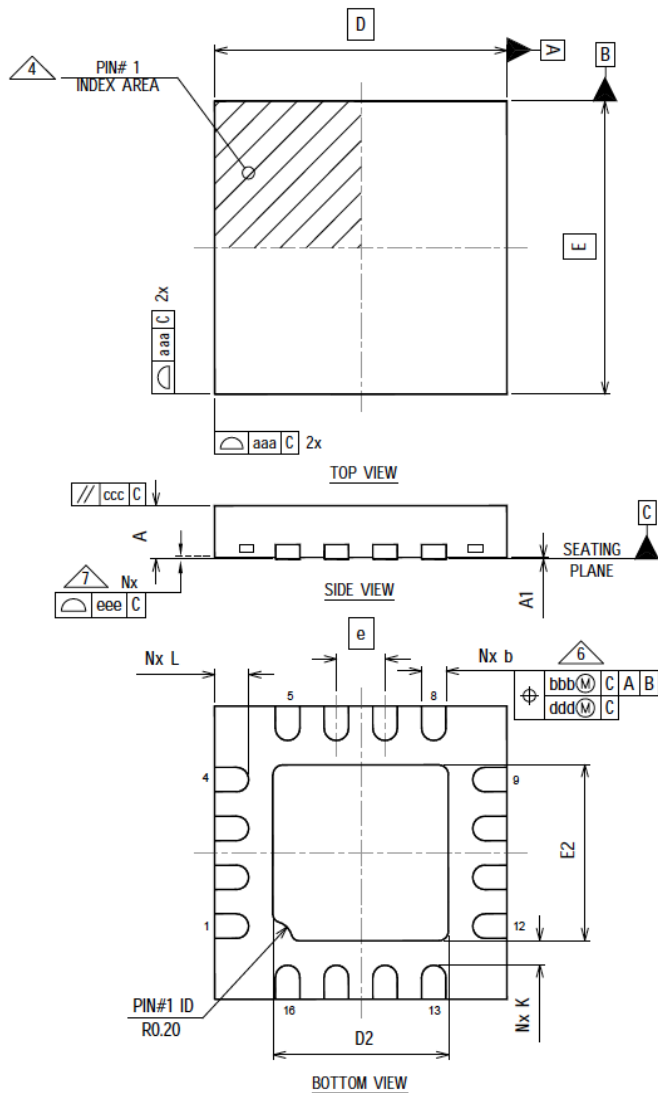
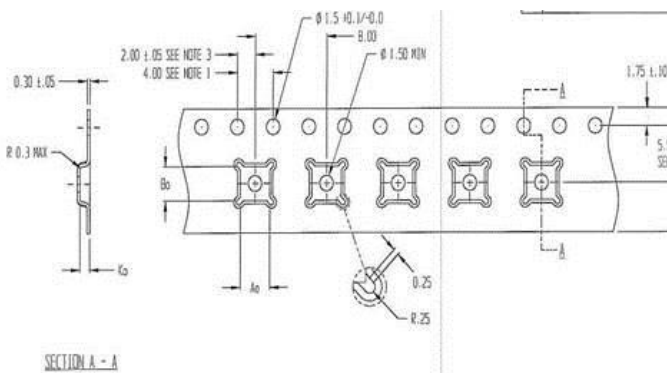


Figure 2: Package drawings

Dimension Table				
Thickness Symbol	V			NOTE
	MINIMUM	NOMINAL	MAXIMUM	
A	0.80	0.90	1.00	
A1	0.00	0.02	0.05	
b	0.20	0.25	0.30	6
D	3.00 BSC			
E	3.00 BSC			
e	0.50 BSC			
D2	1.65	1.80	1.90	
E2	1.65	1.80	1.90	
K	0.20	---	---	
L	0.30	0.35	0.40	
aaa	0.05			
bbb	0.10			
ccc	0.10			
ddd	0.05			
eee	0.08			
N	16			3
ND	4			5
NE	4			5
NOTES	1, 2			
LF DWG NO.	B-3490			
REV.	1			

Figure 3: Tape drawing for 3x3mm packages  
A0=3.30, B0=3.30, K0=1.10

## EVALUATION KIT

The board consists of a 4 layer stack with 2 outer layers made of Rogers 4350B ( $\epsilon_r = 3.48$ ) and 2 inner layers of FR4 ( $\epsilon_r = 4.80$ ). The total thickness of the board is 62 mils (1.57mm). The inner layers provide a ground plane for the 50 $\Omega$  transmission lines. The thickness between signal and ground plane is 16mils. Each transmission line is designed using coplanar waveguide with ground plane (CPWG) model using a trace width of 32 mils (0.813mm), gap of 15 mils (0.381mm), and a metal thickness of 1.4mils (0.051mm).

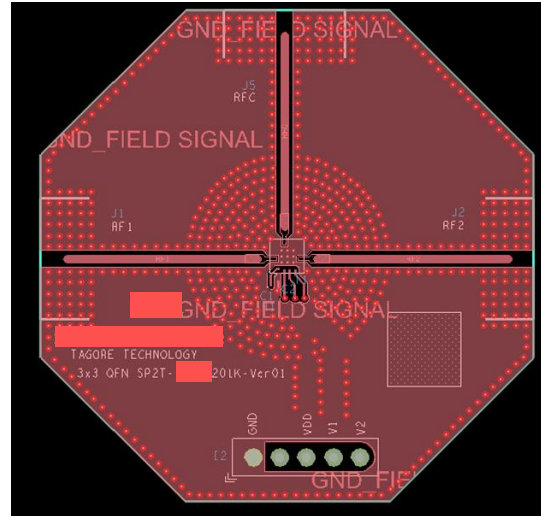


Figure 3: Evaluation board

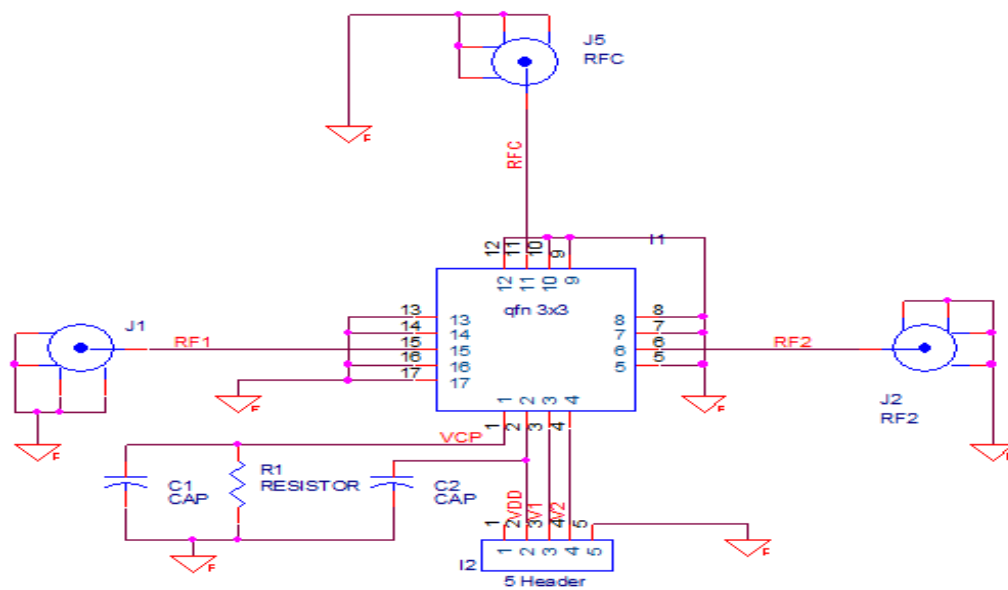


Figure 5: Evaluation board schematic

**QUALIFICATION INFORMATION†**

<b>Qualification Level</b>		Consumer	
<b>Moisture Sensitivity Level</b>		3x3 QFN	MSL1
	Human Body Model	Class 1A	
	Charged Device Model	NA	
<b>RoHS Compliant</b>		Yes	

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