

65W Peak Power Broadband SPDT

FEATURES

- Low insertion loss
 - 0.35dB @ 1GHz
- High isolation
 - 45dB @ 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 DC to 6GHz 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.

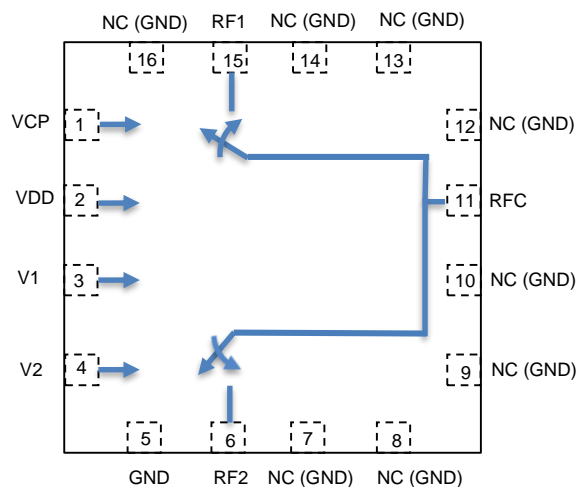


Figure 1: Functional Block Diagram (top view)

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 _{st}	-55 to +125	°C
Operating Temperature Range	T _{op}	-40 to +105	°C

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

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.

If All OFF state is not used, then the switch can be operated with single control line V1.

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

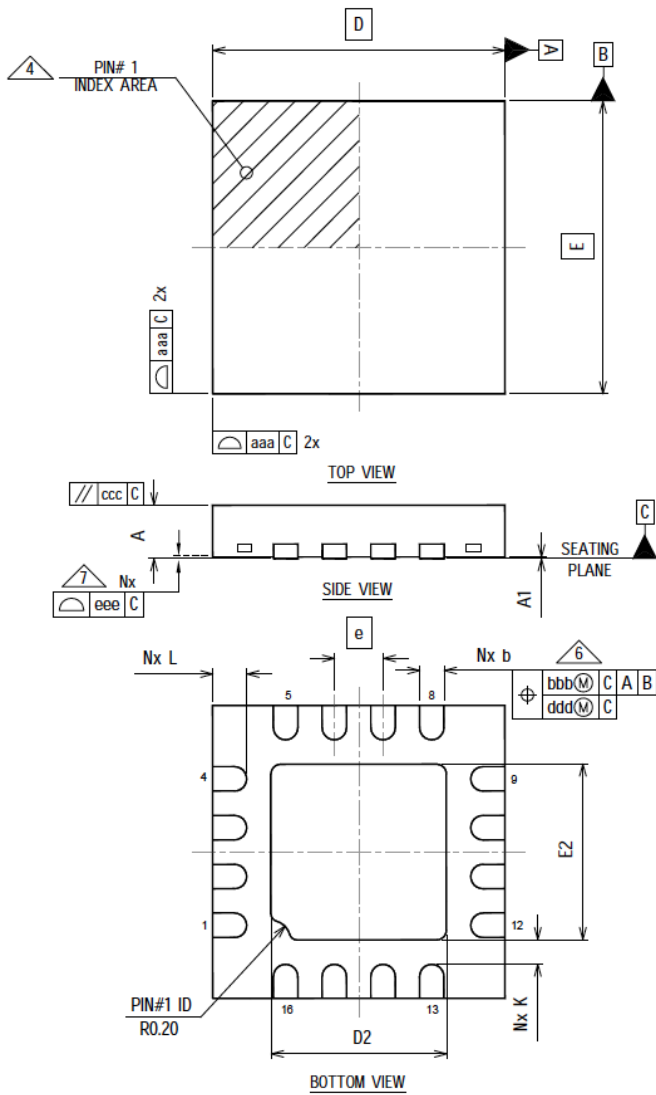
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Operating frequency		10		3800	MHz
Insertion loss	700MHz		0.35		dB
	2.6GHz		0.5		
	3.8GHz		0.6		
Isolation RFC-RFx	700MHz		45		dB
	2.6GHz		30		
	3.8GHz		25		
Return Loss RFC, RFX	700MHz		31		dB
	2.6GHz		17		
	3.8GHz		20		
Harmonic distortion					
H2	900MHz, Pin=35dBm		-40		dBm
H3	900MHz, Pin=35dBm		-45		dBm
IIP3	1GHz		70		dBm
P0.1dB ¹	2.6GHz CW signal	43	44		dBm
P0.1dB Peak ²	2.6GHz Pulsed Signal	48	49		dBm
Enhanced Switching Time	50% ctrl to 0.1dB of max RF power. C1=1nF R1=5MΩ (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 _{ih}	0.67*VDD	VDD	VDD+0.3	V
	All control pin V _{il}	-0.3		0.3*VDD	V
Control current	I _{il} , V1 or V2 ctrl voltage =0.3*VDD		0		μA
	I _{ih} , 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. Although the switch can be operated safely at this level of power, reliability in time is not guaranteed in P0.1dB operating condition.

Note 2: 1% Duty Cycle

Note 3: No external DC blocking capacitors required on the RF terminals unless DC voltage is applied on an RF terminal.

PACKAGE INFORMATION



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 2: Package drawings

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 Ω 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).

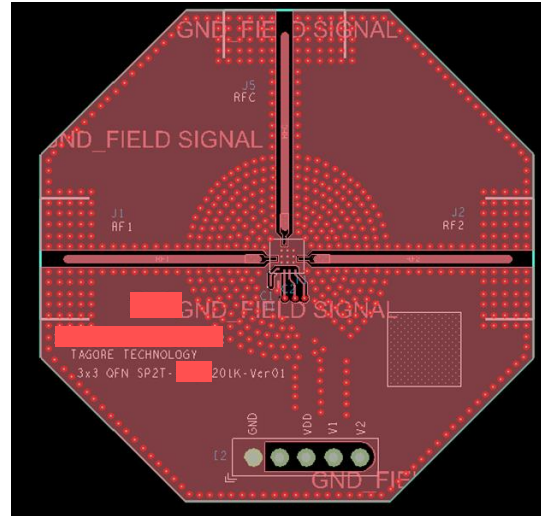


Figure 3: Evaluation board

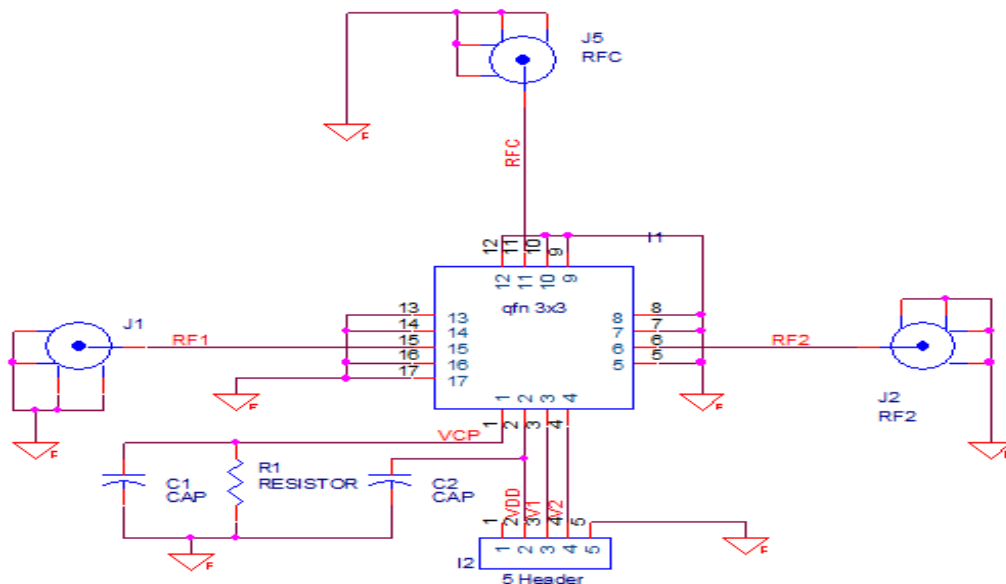


Figure 5: Evaluation board schematic

QUALIFICATION INFORMATION†

Qualification Level		Consumer	
Moisture Sensitivity Level		3x3 QFN	MSL1
ESD Immunity	Human Body Model	All RF pins	+/-250V
		VCP pin	+/-500V
		V1 Digital Input Pin	+/-1000V
	Charged Device Model	All pins	+/-1000V
RoHS Compliant		Yes	

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