

10W Broadband SP3T

FEATURES

- Low insertion loss
 - 0.35dB @ 1GHz
- High isolation
 - 37dB @ 1GHz
- High linear power handling
- No external DC blocking capacitors on RF lines
- Versatile 2.6-5.25V power supply
- All RF OFF mode

APPLICATIONS

- Private Mobile Radio handsets
- Public safety handsets
- Cellular infrastructure
- Small cells
- LTE relays and microcells
- Satellite terminals

DESCRIPTION

The TS7232K is a symmetrical reflective Single Pole Three Throws (SP3T) switch designed for broadband, high power switching applications. Its broadband behavior from DC to 4GHz frequencies makes the TS7232K an excellent switch for all the applications requiring low insertion loss, high isolation and high linearity within a small package size.

The TS7232K is packaged into a compact Quad Flat No lead (QFN) 3x3mm 16 leads plastic package.

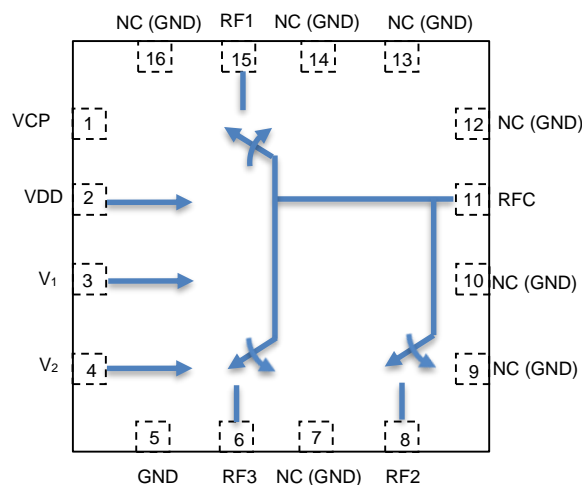


Figure 1: Functional Block Diagram (top view)

ORDERING INFORMATION

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
TS7232K	QFN 3 mm x 3 mm	Tape and Reel	3000	TS7232KMTRPBF

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	RF3	RF throw 3
7	NC	This pin is not connected to internal circuit. Connect to PCB ground plane if needed (e.g. coplanar access line)
8	RF2	RF throw 2
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 +85	°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
0	0	RFC-RF1
0	1	RFC-RF2
1	0	RFC-RF3
1	1	All OFF Mode

The switch can be operated with only 2 control lines V1 and V2. There is an internal pull-down to ground on the V1 and V2 control pins: default switch state at start-up without any control voltage applied will be RFC-RF1 on.

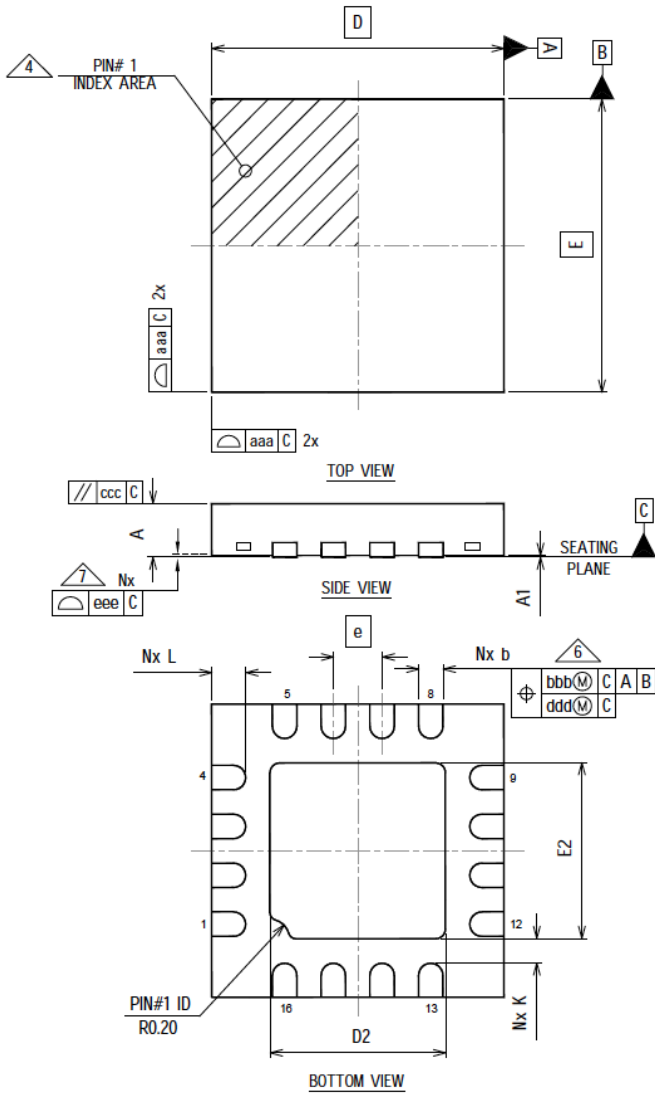
ELECTRICAL SPECIFICATIONS

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

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Operating frequency		10		4000	MHz
Insertion loss	1GHz		0.35		dB
	2GHz		0.45		
	4GHz		0.9		
Isolation RFC-RFx	1GHz		42		dB
	2GHz		32		
	4GHz		22		
Return Loss RFC, RFx	1GHz		25		dB
	2GHz		25		
	4GHz		15		
Harmonic distortion					
H2	900MHz, Pin=35dBm		-41		dBm
H3	900MHz, Pin=35dBm		-44		dBm
IIP3	1GHz		70		dBm
P0.1dB	1GHz	40			dBm
Switching time	50% ctrl to 10/90% of the RF value is settled		2.5		μs
Control voltage	Power Supply VDD	2.6	3.3	5.25	V
	V ₁ , V ₂ ctrl pins V _{ih}	0.67*VDD	VDD	VDD+0.3	V
	All Control pins 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		225		μA

Note 1: No external DC blocking capacitors required on the RF terminals unless DC voltage is applied on an RF terminal.

PACKAGE INFORMATION



Dimension Table				NOTE
Thickness Symbol	V			
	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

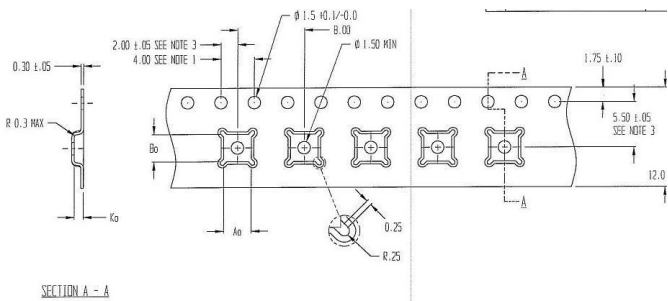


Figure 3: Tape drawing Ao=3.30, Bo=3.30, Ko=1.10

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 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).

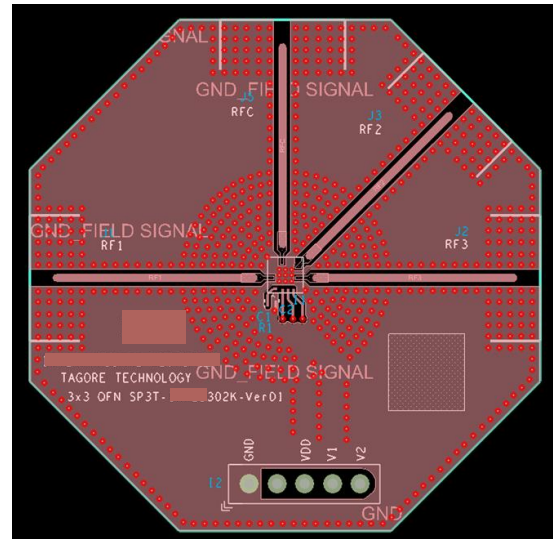


Figure 4: Evaluation board

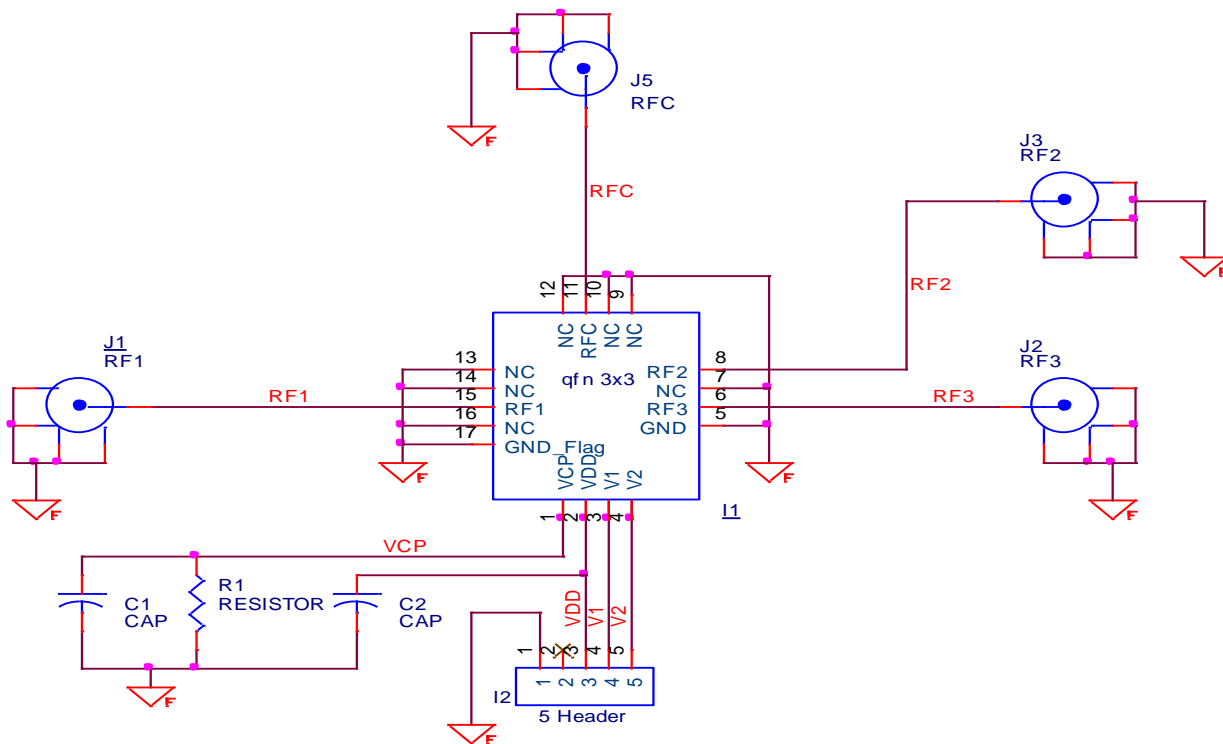


Figure 5: Evaluation board schematic

QUALIFICATION INFORMATION†

Qualification Level		Consumer	
Moisture Sensitivity Level		3x3 QFN	MSL1
	Human Body Model	Class TBD	
	Charged Device Model	+/- 1KV	
RoHS Compliant		Yes	

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For technical support, please contact Tagore Technology
support@tagoretech.com

WORLD HEADQUARTERS:
 5 East College Dr. Suite 200, Arlington Heights, IL 60004