

SPDT 10W/50W_{peak} Power Switch 500 MHz to 12.0 GHz

Features

- Full integrated solution, single $V_{DD}=2.6...5.25$ V
- Frequency Range 500 MHz to 12.0 GHz
- 10 W CW Power, 50 W_p Peak Power
- Highest pulse power in the industry
- No sudden voltage breakdown compared to SOI
- Low insertion loss:
0.3 dB @ 1.0 GHz
0.5 dB @ 8.0 GHz
0.8 dB @ 12.0 GHz
- High isolation:
20 dB @ 10.0 GHz
- Switch time = 50 ns, no power derating
- Low power consumption, less than 1 mW
- No need to supply negative voltages

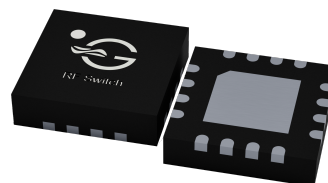


Figure 1: TSX221K in 3.0 x 3.0 mm² QFN 16-pin package.

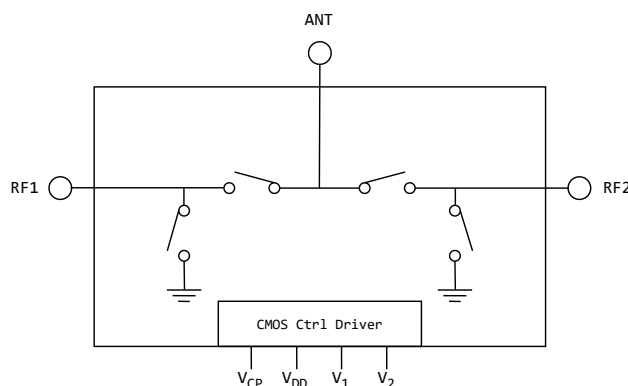


Figure 2: TSX221K functional diagram

Applications

- X-band Radar
- C-band Radar
- Cellular infrastructure
- Satellite terminals
- Datalinks

General Description

The TSX221K is a X-band fully integrated Single Pole Dual Throw (SPDT) switch designed for high power switching applications based on GaN technology. The TSX221K covers 500 MHz to 12.0 GHz bandwidth and provides low insertion loss, high isolation, and high linearity within a small package size. The TSX221K is a 10 W CW with peak power capability of 50 W_p, switch suitable for applications requiring low insertion loss, high isolation, and high linearity. TSX221 utilizes standard single $V_{DD}=2.6...5.25$ V, no extra negative voltage needed, neither high voltages.

The TSX221K is packaged into a compact Quad Flat No lead (QFN) 3.0x3.0 mm² 16 leads plastic package.



RoHS/Reach/Halogen free



Absolute Maximum Ratings

Table 1: Absolute Maximum Ratings $T_A = +25^{\circ}\text{C}$ unless otherwise specified¹.

Parameter	Symbol	Value	Unit
Electrical Ratings			
Power Supply Voltage	V_{DD}	5.5	V
Storage Temperature Range	T_{st}	-55...+125	$^{\circ}\text{C}$
Operating Temperature Range	T_{op}	-40...+85	$^{\circ}\text{C}$
Maximum Junction Temperature	T_j	+140	$^{\circ}\text{C}$
Maximum RF CW input power	RFx/ANT	41	dBm
Maximum RF peak input power, 1% duty cycle, 10 μs pulse	RFx/ANT	47.5	dBm
Thermal Ratings			
Thermal Resistance (junction-to-case) – Bottom side	$R_{\theta jc}$	25	$^{\circ}\text{C/W}$
Thermal Resistance (junction-to-top)	$R_{\theta jt}$	39	$^{\circ}\text{C/W}$
Soldering Temperature	T_{solder}	+260	$^{\circ}\text{C}$
ESD Ratings			
Human Body Model (HBM)	Level 1B	500...<1000	V
Charged Device Model (CDM)	Level C3	≥ 1000	V
Moisture Rating			
Moisture Sensitivity Level	MSL	1	

¹ Maximum ratings are absolute ratings. Exposure to absolute maximum rating conditions for extended periods may affect device reliability and can cause permanent damage to the device. Exceeding one or a combination of the absolute maximum ratings may cause permanent and irreversible damage to the device and/or to surrounding circuit. Functional operation of the device is not implied in any conditions above those indicated in the Electrical Specifications section.



Electrical Specifications

Table 2: Electrical Specifications $T_A = +25^{\circ}\text{C}$; $V_{DD} = +3.3\text{V}$; 50Ω Source/Load.

Parameter	Condition	Minimum	Typical	Maximum	Unit
Operating frequency	f	0.5		12.0	GHz
Insertion loss ANT – RFx	500MHz		0.30		dB
	1.0GHz		0.30		dB
	3.0GHz		0.30		dB
	5.0GHz		0.40		dB
	8.0GHz		0.60		dB
	10.0GHz		0.50		dB
	12.0GHz		0.80		dB
Isolation ANT – RFx	500MHz		30		dB
	1.0GHz		25		dB
	3.0GHz		20		dB
	5.0GHz		18		dB
	8.0GHz		20		dB
	10.0GHz		20		dB
	12.0GHz		15		dB
Return Loss ANT – RFx	500MHz		-25		dB
	1.0GHz		-22		dB
	3.0GHz		-25		dB
	5.0GHz		-17		dB
	8.0GHz		-15		dB
	10.0GHz		-15		dB
	12.0GHz		-13		dB



Table 3: Electrical Specifications $T_A = +25^{\circ}\text{C}$; $V_{DD} = +3.3\text{V}$; 50Ω Source/Load.

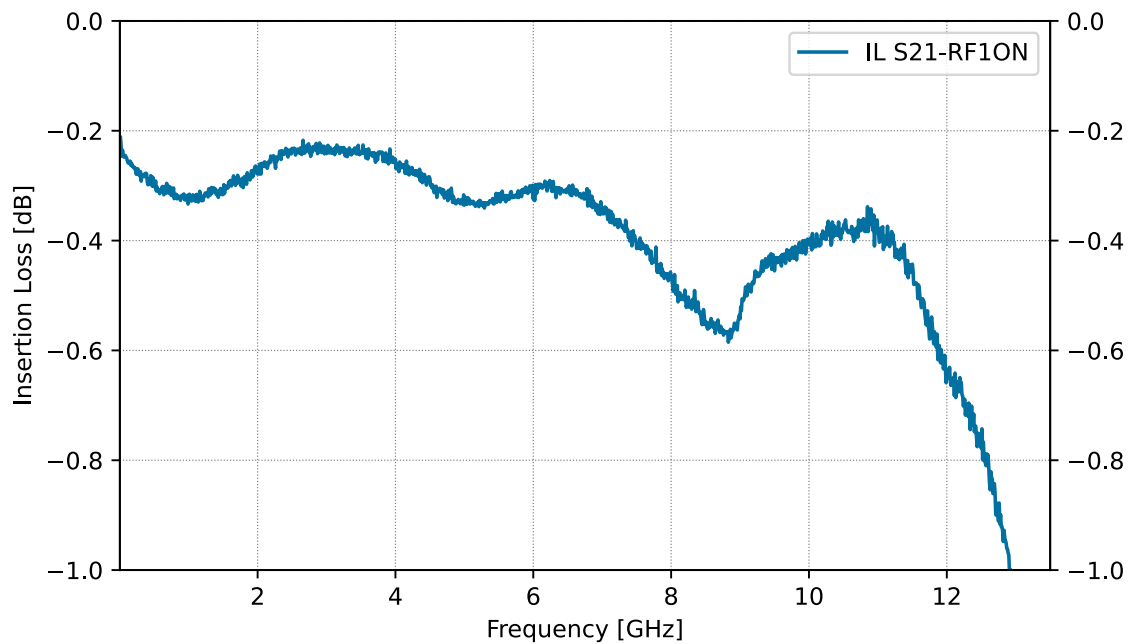
Parameter	Condition	Minimum	Typical	Maximum	Unit
Operating frequency	f	0.5		12.0	GHz
Harmonic Distortion					
H_2	800MHz, $P_{in} = 40\text{dBm}$		tbd		dBc
H_3	800MHz, $P_{in} = 40\text{dBm}$		tbd		dBc
IIP3	800MHz		tbd		dBm
Power and Compression point					
P_{maxCW}	Max RF CW Power		40		dBm
P_{maxpeak}	Max RF Peak Power 1% duty cycle		47		dBm
Noise					
CP switching noise	RBW=1kHz		-140		dBm
Switching Time					
t_{ON}^1	Switch ON time		50		ns
t_{OFF}^1	Switch OFF time		50		ns
t_{RISE}	Switch RISE time		40		ns
t_{FALL}	Switch FALL time		40		ns
$t_{\text{startup}}, C_{\text{VCP}} = 1\text{nF}$	startup time		0.8		ms
Power Supply, DC					
Control voltage	Power Supply V_{DD}	2.6	3.3	5.25	V
	All control pins high, V_{ih}	1.0	3.3	5.25	V
	All control pins low, V_{il}	-0.3	0	0.5	V
Control current	All control pins high, I_{ih}			7.5	μA
	All control pins low, I_{il}		0		μA
Current consumption	I_{DD} , active mode (V_{DD} on)		220		μA

¹ This switching time is complete switching time. Many industry solutions require external biasing and control circuitry, which is not taken into account in switching time. TSX221K switching time definition includes time of the internal biasing and control circuitry.

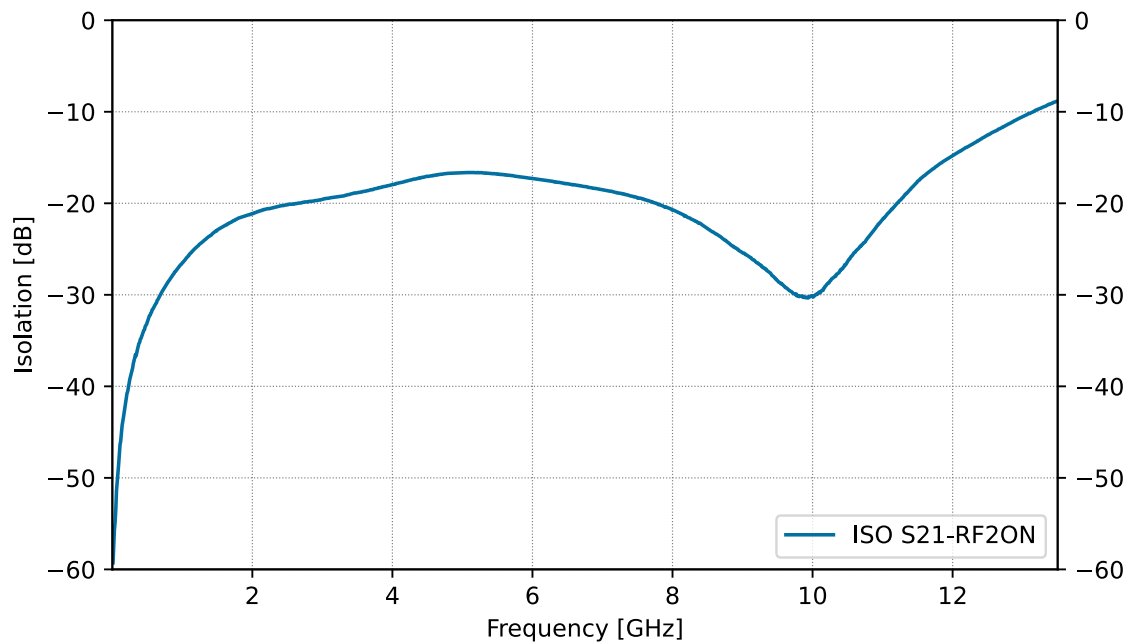


Measured Electrical Performance

Typical sample in room temperature $T_A = +25^{\circ}\text{C}$; $V_{DD} = +3.3\text{V}$; 50Ω Source/Load.



Insertion loss of ANT to RFx.



Isolation of ANT to RFx.



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Customer samples will be available in Q4/2025.

TSX221K Product Page

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Latest version of TSX221K product brief is available for download: [TSX221K Product Brief](#)
[TSX221K Datasheet](#) link will provide datasheet, once datasheet is available, expected during Q4/2025.

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Tagore Product Brochure and links to all available datasheets is available for download
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Changelog

Table 4: Changelog

Date	Revision	Notes
09/19/2025	0.1	Product Brief Published

