FM1022 619 to 5925 MHz DPDT SWITCH

Features

- Broadband frequency range: 619 to 5925MHz
- GPIO interface
- RoHS compliant package
- Compact 1.1mm x 1.5mm x 0.45mm QFN 10-pin package, MSL1

Applications

- 2G/3G/4G/5G antenna swapping

Description

- The FM1022 is a CMOS, Silicon-On-Insulator (SOI) double-pole, double-throw (DPDT) switch. The switch provides high linearity performance, low insertion loss and high isolation.
- Switching is controlled by one control voltage pin, VCTL. Depending on the logic voltage level applied to this pin, the RF1 and RF2 pins connect to one of the two other RF3 and RF4 pins through a low insertion loss path, while maintaining a high isolation path to the alternate port, ANT. No external DC blocking capacitors are required on the RF path as long as no DC voltage is applied externally.
- The FM1022 DPDT switch is provided in a QFN 10- pin, 1.1mm x 1.5mm x 0.45mm package. The functional block diagram and the pin configuration are shown in Figure 1. Signal pin assignments and functional pin descriptions are provided in Table 1.

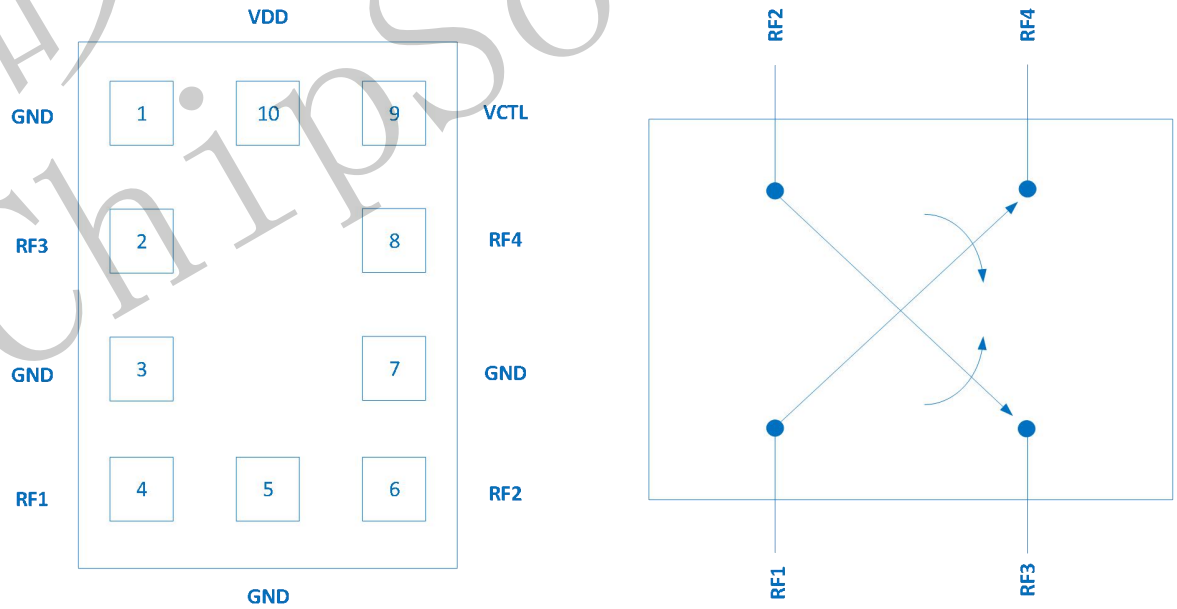

Figure 1. Functional Block and Pin Diagram

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Function Characteristics

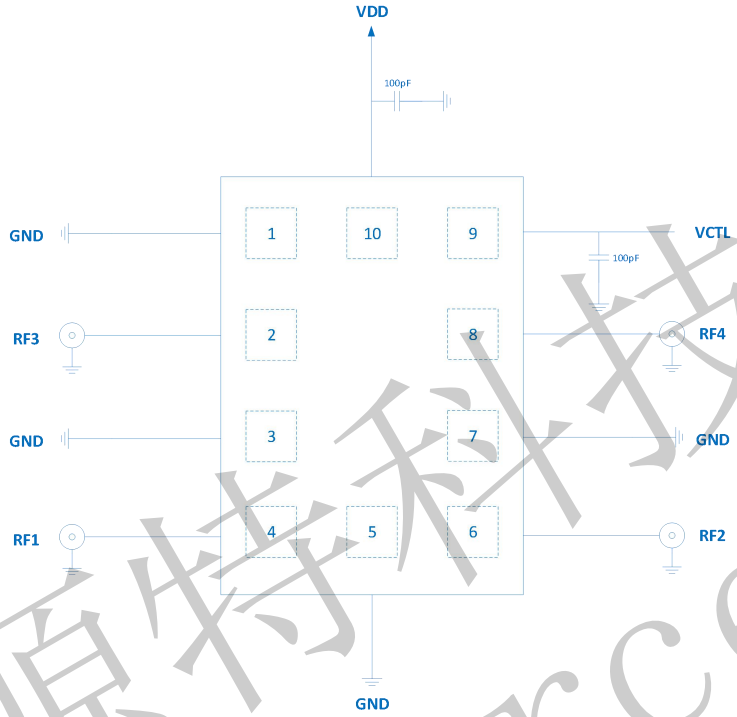


Figure 2. Application Circuit

Table 1. Pin Descriptions

No.	Name	Description	No.	Name	Description
1	GND	Ground	6	RF2	RF Port2
2	RF3	RF Port3	7	GND	Ground
3	GND	Ground	8	RF4	RF Port4
4	RF1	RF Port1	9	VCTL	Control Voltage Pin
5	GND	Ground	10	VDD	DC Power Supply

Table 2. VCTL Truth Table for RF Channel Operating Modes

VCTL	RF Channel Operating Mode
Low	RF1 to RF3 On, RF2 to RF4 On
High	RF1 to RF4 On, RF2 to RF3 On

Electrical Characteristics

Table 3. Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Condition
DC Supply Voltage	V_{DD}	1.6	4.2	V	T_A=25℃
Control Pin Voltage	V_{CTL}	1.6	3.0	V	T_A=25℃
Max RF Input Power	P_{INMAX}		37	dBm	20% DC, VSWR=1:1, T_A=25°C
Humidity Grade Level	MSL	MSL1			
Device Operating Temperature	T_{OP}	-30	85	℃	
Device Storage Temperature	T_{STG}	-40	125	℃	
Electrostatic Discharge(All Pins)	$V_{ESD(HBM)}$	1000		V	Human Body Model
	$V_{ESD(CDM)}$	500		V	Charged Device Model

NOTICE: Exposure to maximum rating conditions for extended periods may reduce device reliability. There is no damage to device with only one parameter set at the limit and all other parameters set at or below their nominal value. Exceeding any of the limits listed here may result in permanent damage to the device.

Table 4. Recommended Operating Conditions

Parameter	Symbol	MIN	TYP	MAX	Unit
Operating Frequency	F_0	617		5925	MHz
DC Supply Voltage	V_{DD}	2.40	2.85	3.60	V
Control Voltage High	V_{CTLH}	1.35	1.80	2.70	V
Control Voltage Low	V_{CTLL}	0	0	0.3	V

Table 5. Nominal Operating Parameters

Parameter	Symbol	Specification			Unit	Condition
		MIN	TYP	MAX		
Normal Condition	V_{DD}=2.85V, V_{CTLH}=1.8V, V_{CTLL}=0V, P_{IN}=0dBm, Z_O=50Ω, T_A=25℃, Unless Otherwise Stated					
DC Characteristics						
VDD Supply Voltage	V_{DD}	2.40	2.85	3.60	V	
VDD Supply Current	I_{DD}		90	200	μA	
Control Logic Voltage	V_{CTLH}	1.35	1.80	2.70	V	
Control Current	I_{CTL}		5	8	μA	
Switch Time	T_{SW}		2.0	3.0	μs	50% VCTL to 90% of RF
Turn On Time	T_{ON}		10	20	μs	50% VDD to 90% RF
RF Characteristics						
Insertion Loss	IL		0.45	0.55	dB	F_0=617 to 960MHz
			0.50	0.55	dB	F_0=960 to 2170MHz
			0.55	0.65	dB	F_0=2170 to 2700MHz
			0.75	0.85	dB	F_0=3300 to 3800MHz
			0.80	0.90	dB	F_0=3800 to 4200MHz
			0.90	1.00	dB	F_0=4400 to 5000MHz
			1.10	1.40	dB	F_0=5150 to 5925MHz
Isolation (One Port On, Another Port Off)	ISO	35	40		dB	F_0=617 to 960MHz
		30	34		dB	F_0=960 to 2170MHz
		31	33		dB	F_0=2170 to 2700MHz
		30	32		dB	F_0=3300 to 3800MHz
		29	31		dB	F_0=3800 to 4200MHz
		28	30		dB	F_0=4400 to 5000MHz
		20	28		dB	F_0=5150 to 5925MHz
Harmonics	$2F_0$		-58	-48	dBm	F_0=850/900MHz@35dBm
	$3F_0$		-55	-55	dBm	F_0=850/900MHz@35dBm
	$2F_0$		-65	-55	dBm	F_0=1800/1900MHz@33dBm
	$3F_0$		-55	-50	dBm	F_0=1800/1900MHz@33dBm
	$2F_0$		-70	-65	dBm	F_0=617 to 2700MHz@26dBm

	$3F_0$		-80	-65	dBm	F_0=617 to 2700MHz@26dBm
	$2F_0$		-75	-60	dBm	F_0=3300 to 3800MHz@26dBm
	$3F_0$		-80	-65	dBm	F_0=3300 to 3800MHz@26dBm

Marking Specifications

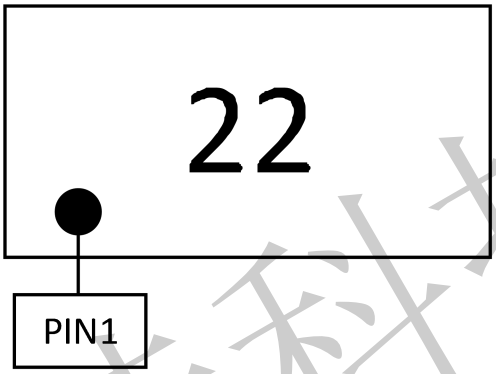
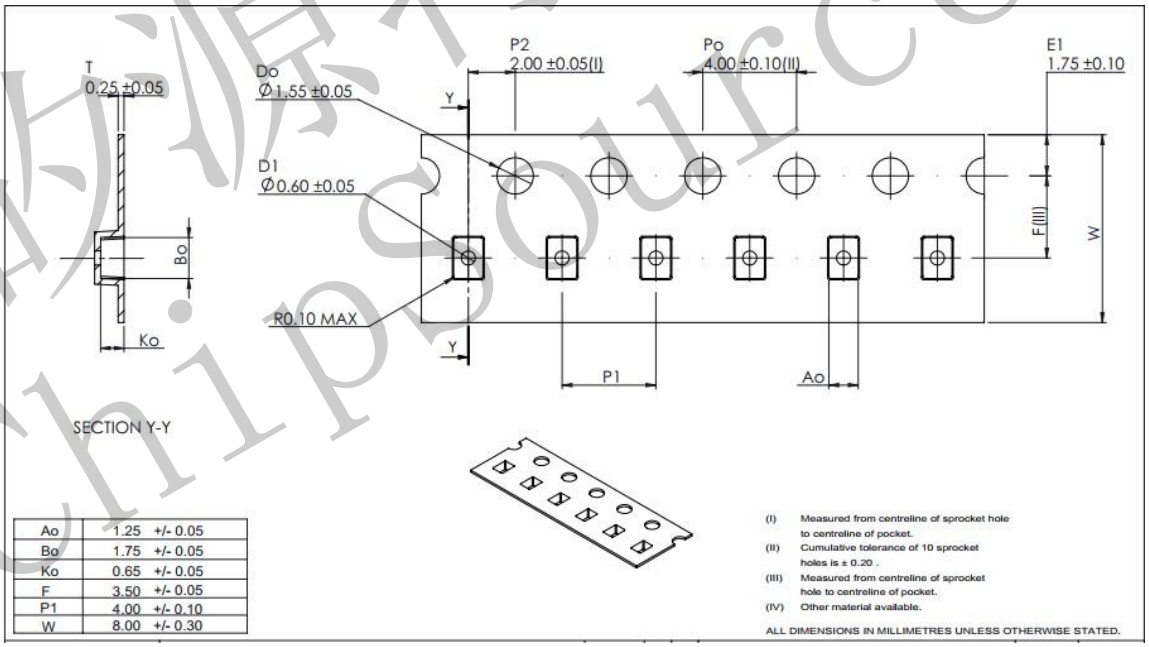


Figure 3. Marking Specifications (Top View)

Tape and Reel Dimensions



Ao	1.25 +/- 0.05
Bo	1.75 +/- 0.05
Ko	0.65 +/- 0.05
F	3.50 +/- 0.05
P1	4.00 +/- 0.10
W	8.00 +/- 0.30

Figure 4. Tape and Reel Dimensions

Table 6. Reflow Chart Parameters

Reflow Profile	Parameter
Preheat Temperature(TS_{MIN} to TS_{MAX})	150℃ to 200℃
Preheat Time(t_s)	60 to 180 Seconds
Ramp-Up Rate(TS_{MAX} to T_P)	3℃/s MAX
Time Above T_L 217℃(t_L)	60 to 150 Seconds
Peak Temperature（T_P）	260℃
Time within 5℃ of Peak Temperature(t_P)	20 to 40 Seconds
Ramp-Down Rate(TS_{MAX} to T_P)	6℃/s MAX
Time for 25℃ to Peak Temperature($t_{25\text{-}TP}$)	8 Minutes MAX

ESD Sensitivity

Integrated circuits are ESD sensitive and can be damaged by static electric charge. Proper ESD protection techniques should be applied when devices are operating.

RoHS Compliant

This product does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), and is considered RoHS compliant.