MXD8529

0.1-3.0GHz SPDT Antenna Tuning Switch

General Description

The MXD8529 is a CMOS silicon-on-insulator (SOI), single-pole, double-throw (SPDT) switch. The high linearity and ruggedness performance and extremely low insertion loss makes the device an ideal choice for GSM/WCDMA/LTE handset antenna tuning application.

The MXD8529 SPDT switch is provided in a compact 1.385mm x 1.485mm x 0.45mm 8-lead LGA package. A functional block diagram is shown in Figure 1. The pin configuration and package are shown in Figure 2. Signal pin assignments and functional pin descriptions are provided in Table 1.

Applications

- GSM/WCDMA/LTE band and mode switching
- Antenna tuning switch

Features

- Broadband frequency range: 0.1 to 3.0 GHz
- Low insertion 0.30dB @ 2.7 GHz
- High P0.1dB of 38dBm
- Positive low voltage control: VC = 1.0 to 3.0 V, VDD = 2.5 to 3.0 V, Small, LGA (8-pin, 1.385mm x 1.485mm x 0.45mm) package

Functional Block Diagram and Pin Function

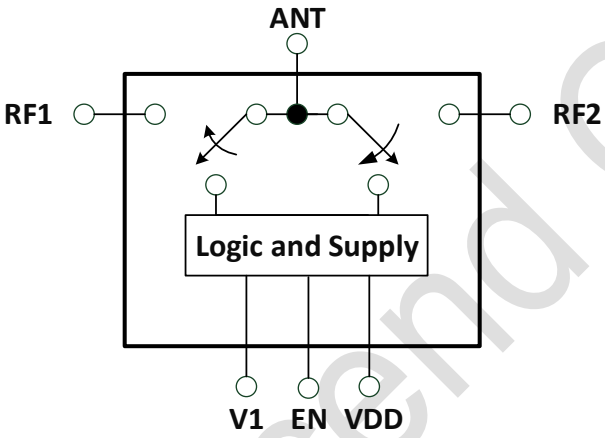


Figure 1.Functional Block Diagram

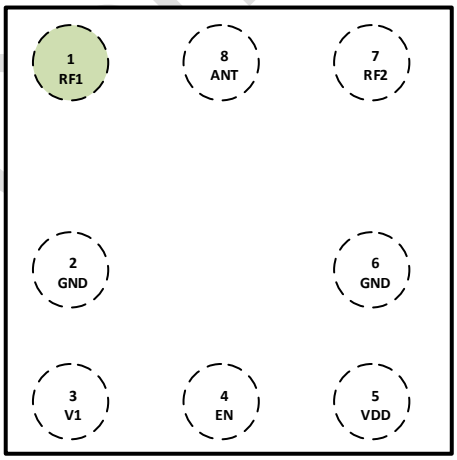


Figure 2.Pin-out (Top View)

Application Circuit

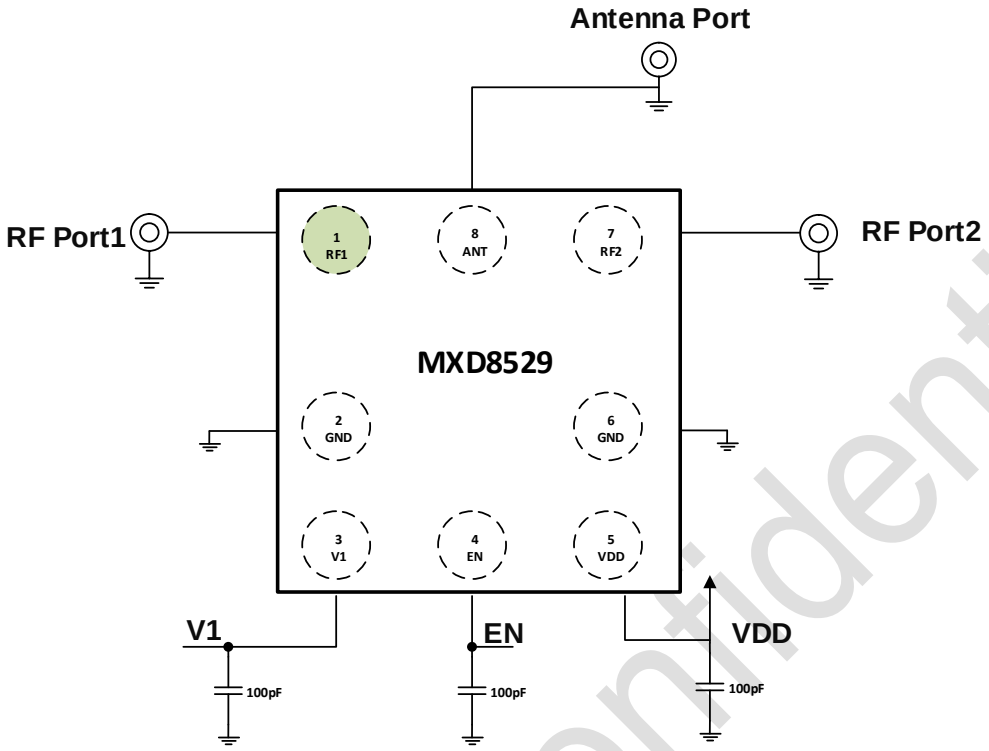


Figure 3. MXD8529 Application Circuit

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	RF1	RF port 1	5	VDD	DC power supply
2	GND	Ground	6	GND	Ground
3	V1	DC control voltage	7	RF2	RF port 2
4	EN	DC control voltage	8	ANT	Antenna port

Truth Table

Table 2.

Active Path	EN	V1
ANT to RF1	1	0
ANT to RF2	1	1
OFF	0	1
Low Power Mode	0	0

Note: "1" = 1.0 V to 3.00 V. "0" = –0 V to +0.3 V.

Recommended Operation Range

Table 3.

Parameters	Symbol	Min	Typ	Max	Units
Operation Frequency	f1	0.1	-	3.0	GHz
Power supply	V_{DD}	2.5	2.8	3.0	V
Switch Control Voltage High	V_{CTL_H}	1.0	1.8	3.0	V
Switch Control Voltage Low	V_{CTL_L}	0	0	0.3	V

Specifications

Table 4.Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition
		Min.	Typical	Max.		
DC Specifications						
Control voltage: Low High	 V_{CTL_L} V_{CTL_H}	 0 1.0	 0 1.8	 0.3 3.0	 V V	
Supply voltage	V_{DD}	2.5	2.8	3.0	V	
Supply current	I_{DD}		35		μA	V_{DD} = 2.8 V
Control current	I_{CTL}		1		μA	V_{CTL}= 1.8 V
RF Specifications						
Insertion loss	IL		0.20 0.25 0.30		dB dB dB	0.8 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 3.0 GHz
Isolation	ISO	25 20 15	30 22 17		dB dB dB	0.8 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 3.0 GHz
Return loss	$\|S_{11}\|$		22		dB	0.8 to 3.0 GHz
Input 0.1 dB compression point	$P_{0.1dB}$		+38		dBm	0.8 to 3.0 GHz, ANT to RF1 and RF2
Maximum RF operating voltage	V_{PK}		36		V	25% duty cycle, OFF state, 0.8 to 3.0 GHz
On Resistance (RF1/2 to ANT)	Ron		1.25	1.35	Ω	Switch on Path
OFF Capacitance (RF1/2 to ANT)	Coff		170	190	fF	Switch off Path
Off Resistance (RF1/2 to ANT)	RoffRF		58		kΩ	Switch off Path
Switching on time			2		μs	50% VCTL to 90% RF
Switching off time			2		μs	50% VCTL to 10% RF
Startup time			3		μs	Power off state to any RF switch state

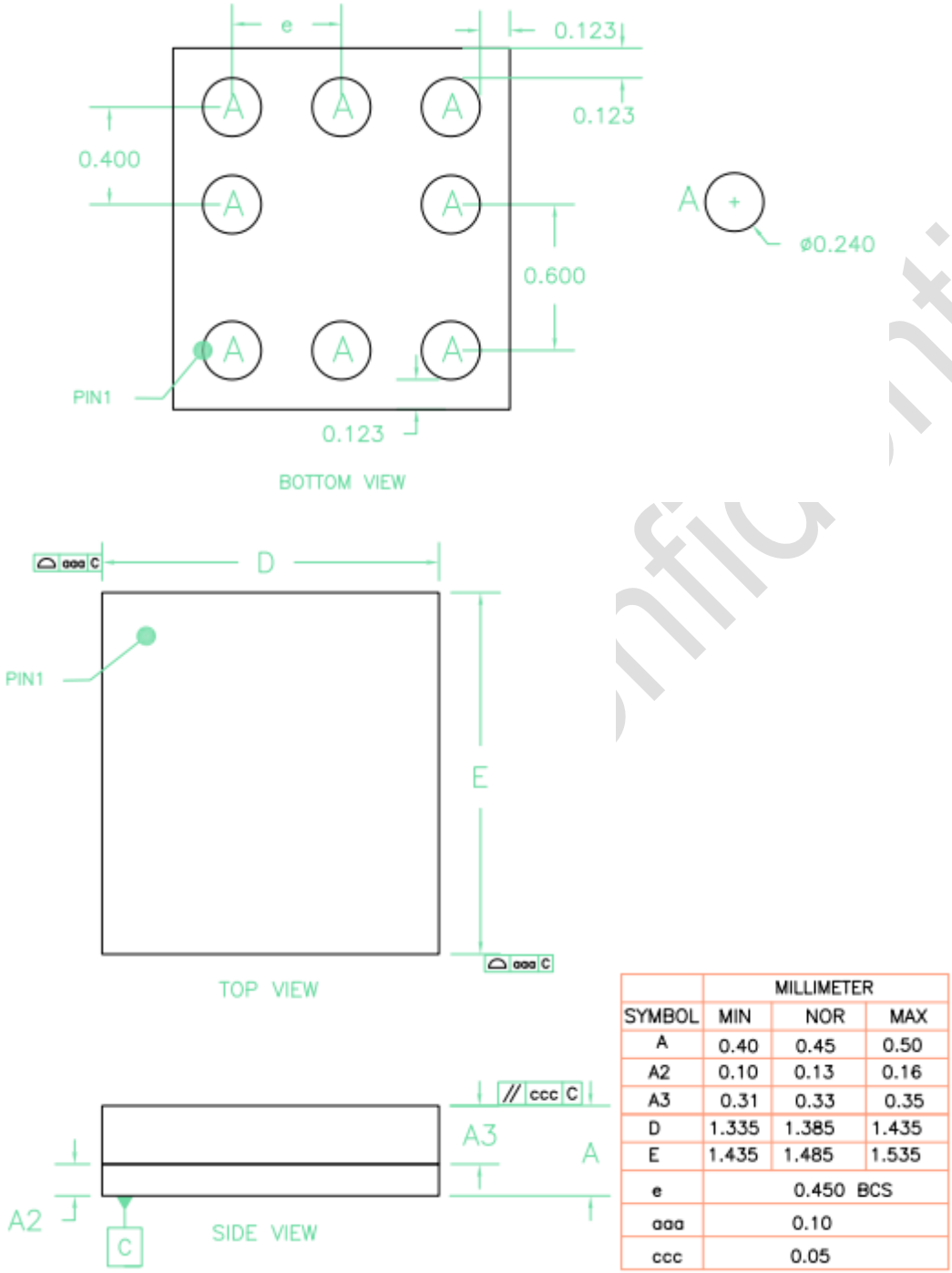
Absolute Maximum Ratings

Table 5. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V_{DD}	+2.5	+3.3	V
Digital control voltage	V_{CTL}	0	+3.0	V
RF input power	P_{IN}		+41	dBm
Operating temperature	T_{OP}	–30	+85	℃
Storage temperature	T_{STG}	–55	+150	℃
Peak RF operation voltage, 25% duty cycle, OFF state, f=700MHz to 2690MHz, V_{DD} =2.8V, V_{CTL} =1.8V	V_{RFPEAK}		41	V
Electrostatic Discharge Human body model (HBM), Class 1C Machine Model (MM), Class A Charged device model (CDM), Class III	 ESD_HBM ESD_MM ESD_CDM		 1000 100 500	 V

Note: 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.

Package Outline Dimension



	MILLIMETER		
SYMBOL	MIN	NOR	MAX
A	0.40	0.45	0.50
A2	0.10	0.13	0.16
A3	0.31	0.33	0.35
D	1.335	1.385	1.435
E	1.435	1.485	1.535
e	0.450 BCS		
aaa	0.10		
ccc	0.05		

Figure 4. Package outline dimension

Reflow Chart

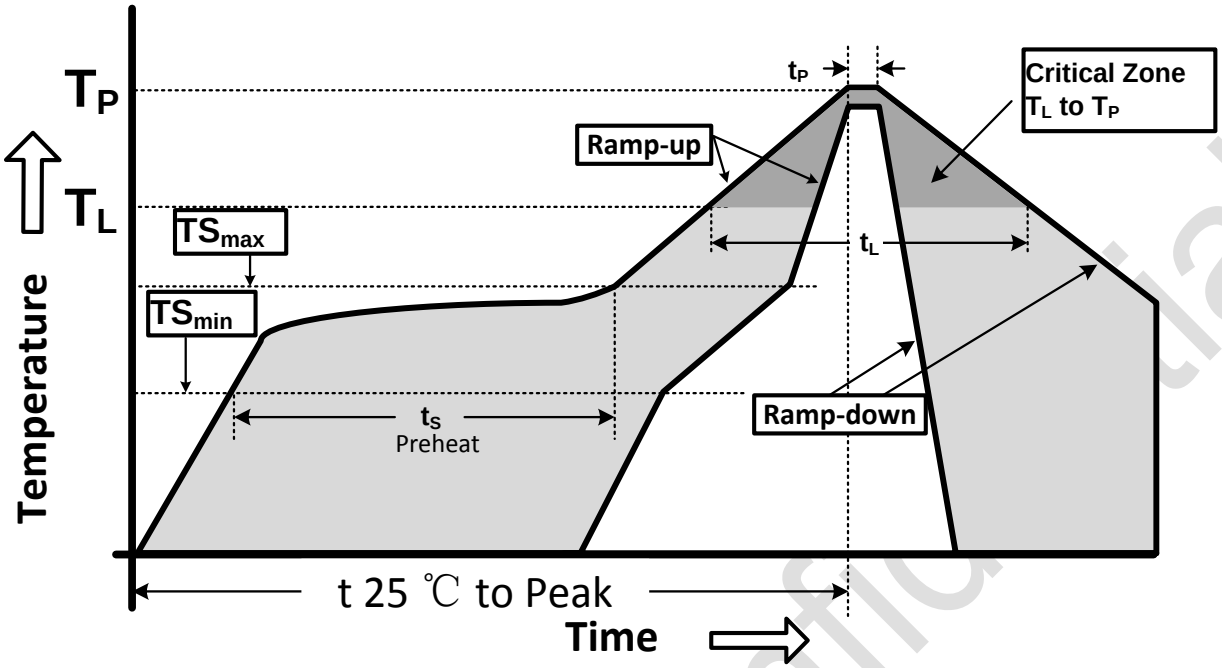


Figure 5. Recommended Lead-Free Reflow Profile

Table 6.

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate（TS_{max} to T_p）	3℃/second max.
Preheat temperature（TS_{min} to TS_{max}）	150℃ to 200℃
Preheat time（t_s）	60 - 180 seconds
Time above TL , 217℃（t_L）	60 - 150 seconds
Peak temperature（T_p）	260℃
Time within 5℃ of peak temperature(t_p)	20 - 40 seconds
Ramp-down rate	6℃/second max.
Time 25℃ to peak temperature	8 minutes max.

ESD Sensitivity

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

RoHS Compliant

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

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