MXD8530

SP3T Switch for 0.1～3G Application

General Description

The MXD8530 is a Single Pole, Triple-Throw (SP3T) antenna switch. The high linearity performance and low insertion loss achieved by the MXD8530 make it an ideal choice for main/diversity switching commonly used in LTE-based handsets, data cards, and tablets that use antenna diversity solutions. The symmetric port designs provide flexibility in signal routing for both receive diversity and higher power WCDMA/FDD, and WLANs transmit/receive applications.

Switching is controlled by two CMOS/TTL-compatible control voltage inputs (V1 and V2). Depending on the logic voltage level applied to the control pins, the ANT pin is connected to one of five switched RF outputs (RF1 to RF2) using a low insertion loss path, while the paths between the ANT pin and the other RF pins are in a high isolation state. No external blocking capacitors are required on the RF paths unless VDC is externally applied.

The MXD8530 is manufactured in a compact, 12-pin 2.0 x 2.0 mm, Quad Flat No-Lead (QFN) 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

- WCDMA band and mode switching
- Antenna switch for multimode systems
- 802.11 b/g/n WLANs

Features

- Broadband frequency range: 0.1 to 3.0 GHz
- Low insertion loss: 0.45 dB typical @ 2.5 GHz
- High isolation: >30 dB @ 2.5 GHz
- No external DC blocking capacitors requires
- Small QFN (12-pin, 2.0 x 2.0 mm) package

Functional Block Diagram and Pin Function

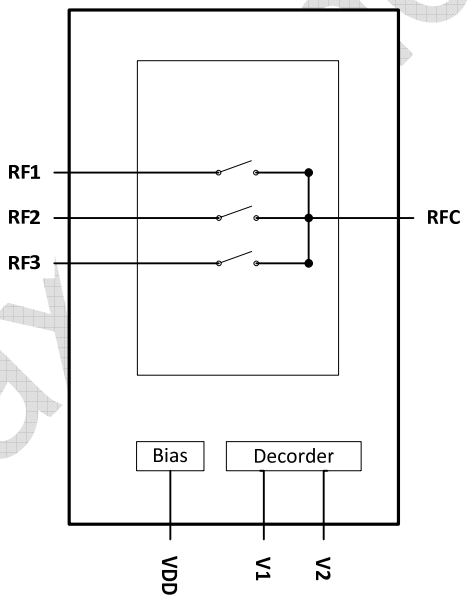


Figure 1. Functional Block Diagram

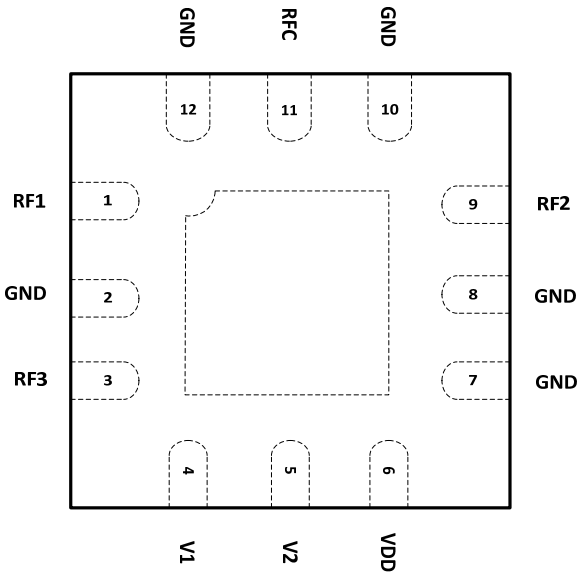


Figure 2. Pin Diagram

Application Circuit

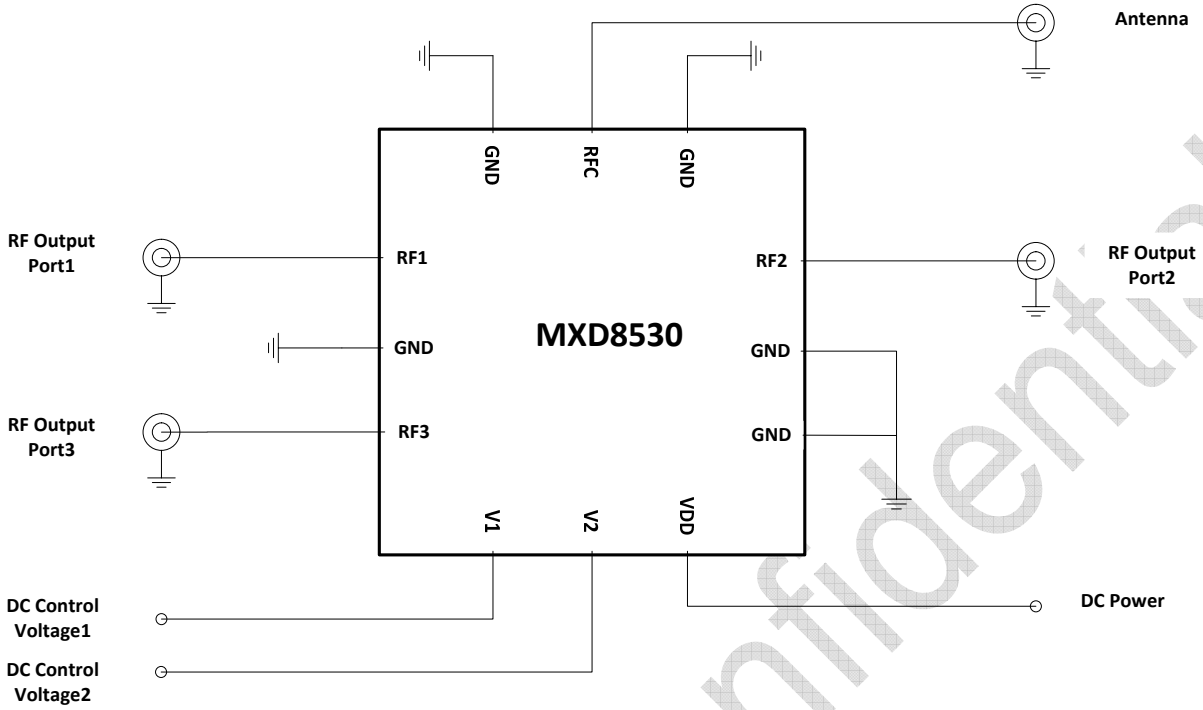


Figure 3. MXD8530 Evaluation Board Schematic

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	RF1	RF I/O path 1	7	GND	Ground
2	GND	Ground	8	GND	Ground
3	RF3	RF I/O path 3	9	RF2	RF I/O path 2
4	V1	DC control voltage 1	10	GND	Ground
5	V2	DC control voltage 2	11	RFC	RF common port
6	VDD	DC supply	12	GND	Ground

Note: Bottom ground paddles must be connected to ground.

Table 2. Truth Table

Control pins		Switched RF Outputs		
V1	**V2**	**RF1**	**RF2**	**RF3**
0	0	Shutdown		
0	1	**Insertion Loss**	Isolation	Isolation
1	0	Isolation	**Insertion Loss**	Isolation
1	1	Isolation	Isolation	**Insertion Loss**

Note: "1" = 1.0 V to 3.30 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	VDD	2.0	2.8	3.0	V
Switch Control Voltage (H)	V_H	1.0	1.8	3.0	V
Switch Control Voltage (L)	V_L	0	0	0.3	V

Specifications

Table 4. Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition (Note 2)
		Min.	Typical	Max.		
DC Specifications						
Supply voltage	VDD	2.0	2.8	3.0	V	
Supply current	IDD		83		µA	
Control current	ICTL		2		µA	VCTL = 1.8 V
Shutdown mode supply current	IOFF		5		µA	V1/2/3 = 1.8 V, VDD = 3 V
Turn-on switching time	Ton		2		µs	50% of final control voltage to 90% of final RF power, switching between RF1/2/3
RF Specifications						
Insertion loss (RFC pin to RF1/2/3 pins)	IL		0.35 0.40 0.45	0.40 0.50 0.55	dB dB dB	0.8 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 3.0 GHz
Isolation (RFC pin to RF1/2/3 pins)	ISO	38 29 26	45 36 33		dB dB dB	0.8 to 1.0 GHz 1.0 to 2.2 GHz 2.2 to 3.0 GHz
Input return loss (RFC pin to RF1/2/3 pins)	RL		-20		dB	0.8 to 3.0 GHz
Second harmonics (RFC pin to RF1/2/3 pins)	2fo		+85		dBc	PIN = +20 dBm, 0.1 to 3.0 GHz
Third harmonics (RFC pin to RF1/2/3 pins)	3fo		+85		dBc	PIN = +20 dBm, 0.1 to 3.0 GHz
0.1 dB Compression Point (ANT pin to RF1/2/3 pins)	$P_{0.1dB}$		+36		dBm	0.1 GHz to 3 GHz
3rd Order Input Intercept Point	IIP3	+65	+70		dBm	@ 3.0 GHz, PIN = +20 dBm, Δf = 1 MHz

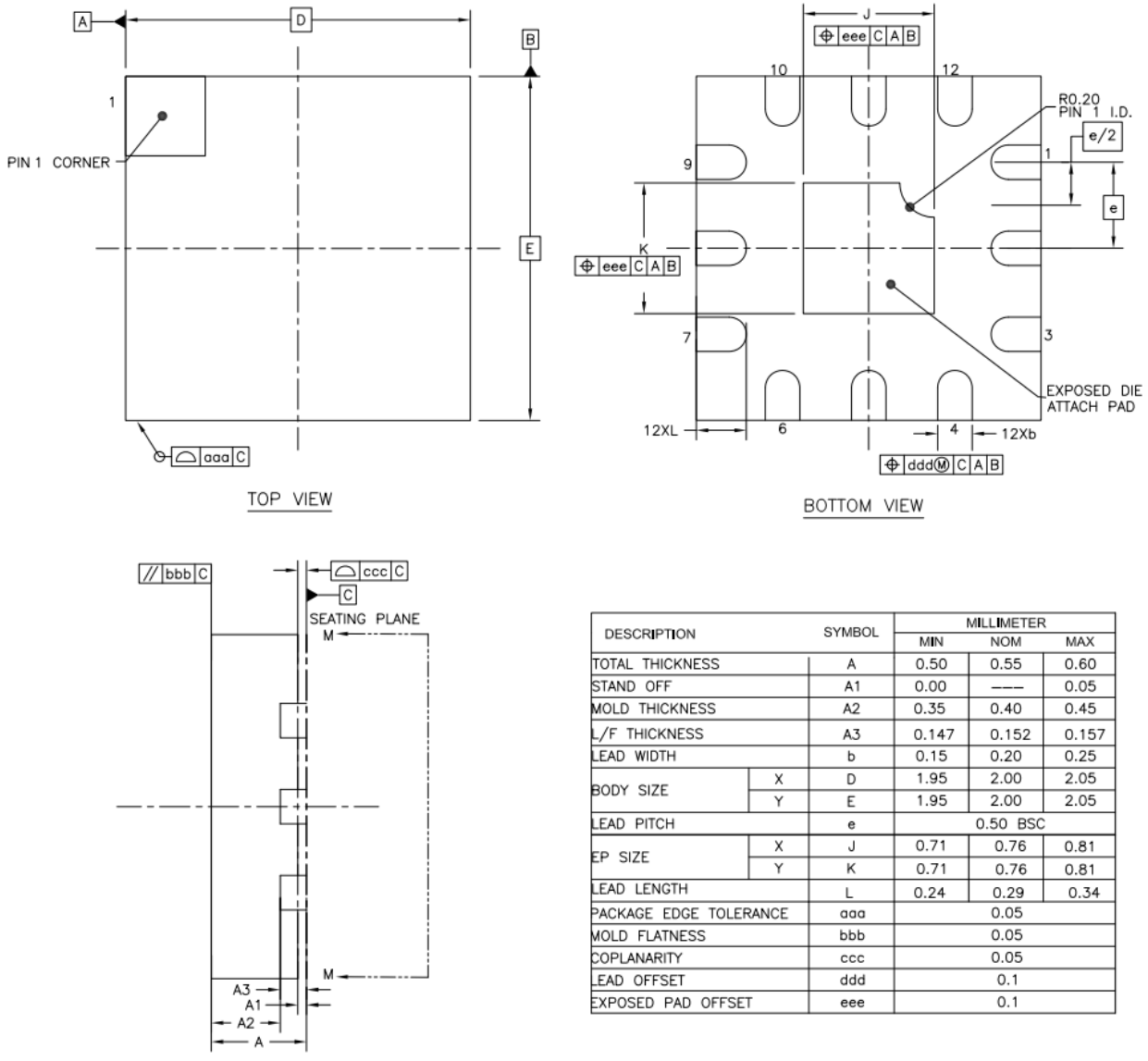
Absolute Maximum Ratings

Table 5. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V_{DD}	+2.5	+3.0	V
Control voltage (V1 and V2)	V_{CTL}	-0.5	+3.0	V
RF input power (RF1 to RF3)	P_{IN}		+36	dBm
Operating temperature	T_{OP}	-40	+85	℃
Storage temperature	T_{STG}	-55	+150	℃
Human Body Mode	HBM		1000	V
Machine Mode	MM		100	V
Charged Device Mode	CDM		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



DESCRIPTION		SYMBOL	MILLIMETER		
			MIN	NOM	MAX
TOTAL THICKNESS		A	0.50	0.55	0.60
STAND OFF		A1	0.00	----	0.05
MOLD THICKNESS		A2	0.35	0.40	0.45
L/F THICKNESS		A3	0.147	0.152	0.157
LEAD WIDTH		b	0.15	0.20	0.25
BODY SIZE	X	D	1.95	2.00	2.05
	Y	E	1.95	2.00	2.05
LEAD PITCH		e	0.50 BSC		
EP SIZE	X	J	0.71	0.76	0.81
	Y	K	0.71	0.76	0.81
LEAD LENGTH		L	0.24	0.29	0.34
PACKAGE EDGE TOLERANCE		aaa	0.05		
MOLD FLATNESS		bbb	0.05		
COPLANARITY		ccc	0.05		
LEAD OFFSET		ddd	0.1		
EXPOSED PAD OFFSET		eee	0.1		

Figure 4. package outline dimension

Reflow Chart

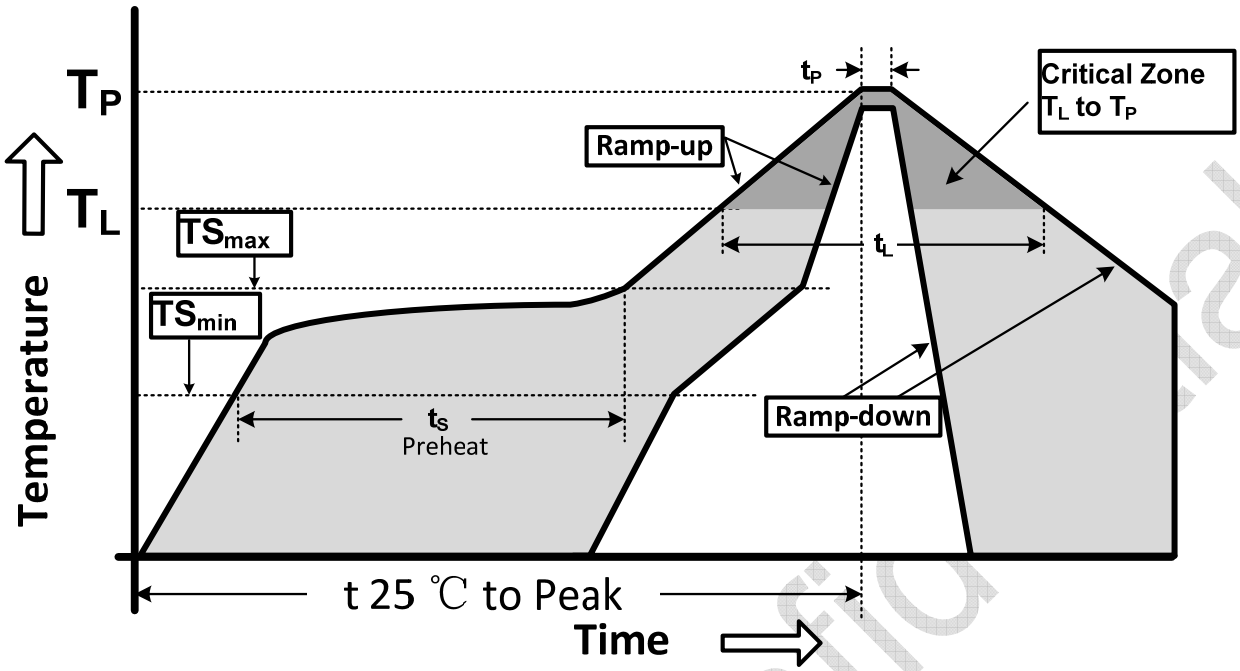


Figure 5. Recommended Lead-Free Reflow Profile

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.