



MXD8651

SP5T Switch for Receive Diversity

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General Description

The MXD8651 is a low loss, high isolation SP5T switch with performance optimized for receive diversity routing applications.

The MXD8651 is compatible with +1.0V control logic, which is a key requirement for most cellular transceivers. This part is packaged in a compact 2mm x 2mm x 0.55 mm, 14-pin, QFN package which allows for a small solution size with no need for external DC blocking capacitors (when no external DC is applied to the device ports).

Features

- Excellent insertion loss and isolation performance
 - 0.5 dB Typical Insertion Loss, Band 7
 - 25 dB typical Isolation, Band 7
- Multi-Band operation 700MHz to 2700MHz
- GPIO compatible to 1.8V Typ (1.0V min)
- Power handling +30dBm
- Compact 2mm x 2mm x 0.55 mm, in QFN package , MSL1
- No DC blocking capacitors required (unless external DC is applied to the RF ports)

Applications

- Cellular Handset Applications
- Cellular modems and USB Devices
- Multi-mode GSM/Edge/WCDMA applications
- LTE applications

Functional Block Diagram and Pin Function

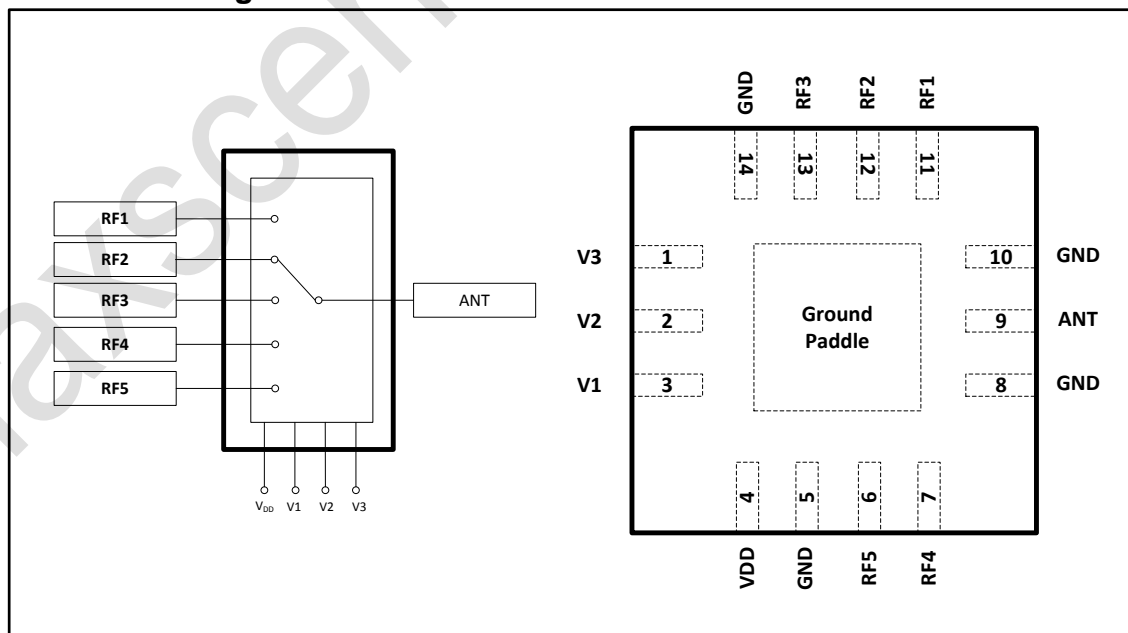


Figure 1. Functional Block Diagram and Pinout (Top View)

Application Circuit

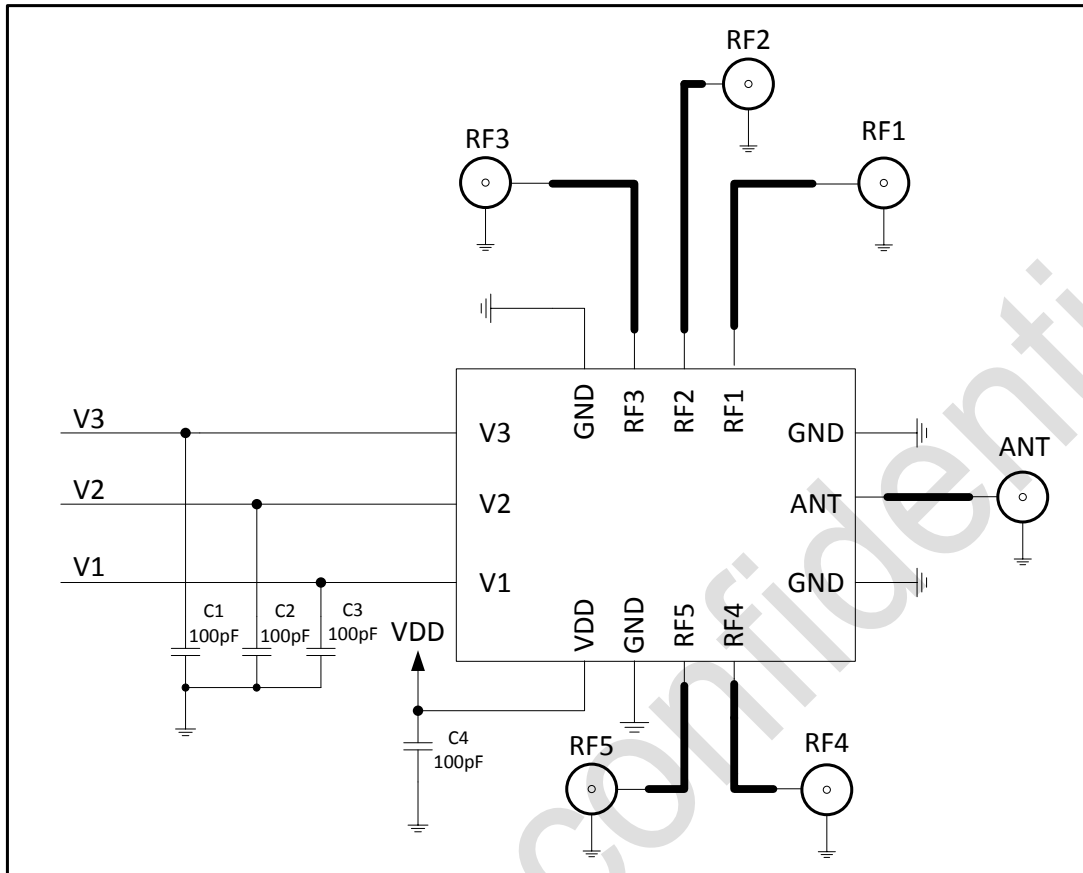


Figure 2. MXD8651 Evaluation Board Schematic

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	V3	Control Logic #3	8	GND	Ground
2	V2	Control Logic #2	9	ANT	Antenna
3	V1	Control Logic #1	10	GND	Ground
4	V _{DD}	Power supply	11	RF1	RF port1
5	GND	Ground	12	RF2	RF port2
6	RF5	RF port5	13	RF3	RF port3
7	RF4	RF port4	14	GND	Ground
Ground Paddle	GND	Ground			

Note: Bottom ground paddles must be connected to ground.

Truth Table

Table 2.

Control pins			Switched RF Outputs				
V1	V2	V3	RF1	RF2	RF3	RF4	RF5
1	0	0	Insertion Loss	Isolation	Isolation	Isolation	Isolation
0	1	0	Isolation	Insertion Loss	Isolation	Isolation	Isolation
1	1	0	Isolation	Isolation	Insertion Loss	Isolation	Isolation
0	0	1	Isolation	Isolation	Isolation	Insertion Loss	Isolation
1	0	1	Isolation	Isolation	Isolation	Isolation	Insertion Loss

Note: "1" = 1.0 V to 3.0 V. "0" = 0 V to 0.3 V. Insertion loss in the V1/2/3 = 110 state is 3dB lower than typical insertion loss with only one arm "on".

Recommended Operation Range
Table 3. Recommended Operation Condition

Parameters	Symbol	Min	Typ	Max	Units
Operation Frequency	f1	0.1	-	3.0	GHz
Power supply	V _{DD}	2.5	2.8	3.3	V
Switch Control Voltage High	V _H	1.0	1.8	3.0	V
Switch Control Voltage Low	V _L	0	0	0.3	V

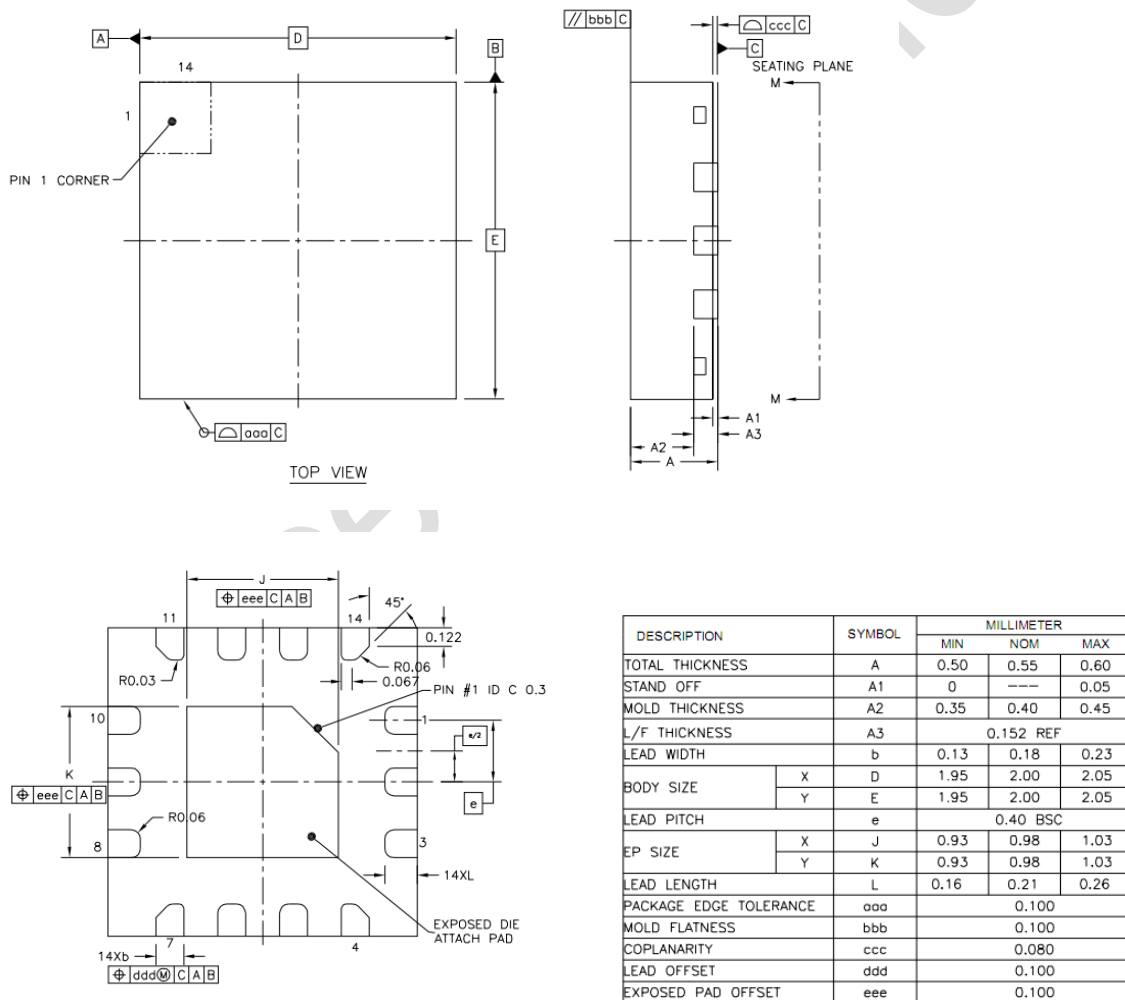
Specifications
Table 4. Electrical Specifications

Parameter	Symbol	Specification			Units	Test Condition (Note 2)	
		Min.	Typical	Max.			
DC Specifications							
Supply voltage	V _{DD}	2.5	2.8	3.3	V		
Supply current	I _{DD}		50	90	μA	Active mode	
Control voltage:						V _{DD} must be > V _{CTL} at all times	
High	V _{CTL_H}	1.0		3.0	V		
Low	V _{CTL_L}	0		0.3	V		
Control current	I _{CTL}			5	μA		
Switching Speed, on RF to another			2	5	μs	10% to 90% RF	
Turn-on time	t _{on}		5	10	μs	Time from V _{DD} =0V to part ON and RF at 90%	
RF Specifications							
Insertion Loss							
Insertion Loss TRx - ANT	IL		0.40		dB	704MHz to 787MHz	
			0.40		dB	815MHz to 960MHz	
			0.50		dB	1710MHz to 1980MHz	
			0.50		dB	2110MHz to 2170MHz	
			0.55		dB	2300MHz to 2690MHz	
Isolation							
Isolated TRx ports - ANT	ISO	45			dB	704MHz to 787MHz	
		45			dB	815MHz to 960MHz	
		35			dB	1710MHz to 1980MHz	
		30			dB	2110MHz to 2170MHz	
		25			dB	2300MHz to 2690MHz	
Harmonics (Pin =+16 dBm)							
Low Band, 2fo			-110		dBc	Pin = +16dBm, 50ohms, fo=824MHz	
Low Band, 3fo			-105		dBc	Pin = +16dBm, 50ohms, fo=824MHz	
High Band, 2fo	2fo 3fo		-105		dBc	Pin = +16dBm, 50ohms, fo=1980MHz	
High Band, 3fo			-100		dBc	Pin = +16dBm, 50ohms, fo=1980MHz	
High Band, 2fo			-100		dBc	Pin = +16dBm, 50ohms, fo=2570MHz	
High Band, 3fo			-100		dBc	Pin = +16dBm, 50ohms, fo=2570MHz	
VSWR				1.1	1.5		704-2690MHz

Absolute Maximum Ratings
Table 5. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V_{DD}	2.5	+3.3	V
Control voltage (V1, V2, and V3)	V_{CTL}	0	+3.0	V
RF input power (RF1 to RF5)	P_{IN}		+30	dBm
Operating temperature	T_{OP}	-20	+85	°C
Storage temperature	T_{STG}	-40	+125	°C
Electrostatic Discharge, Human Body Model (HBM), Class 1C	ESD		1000	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

Figure 3. package outline dimension

Marking Specification

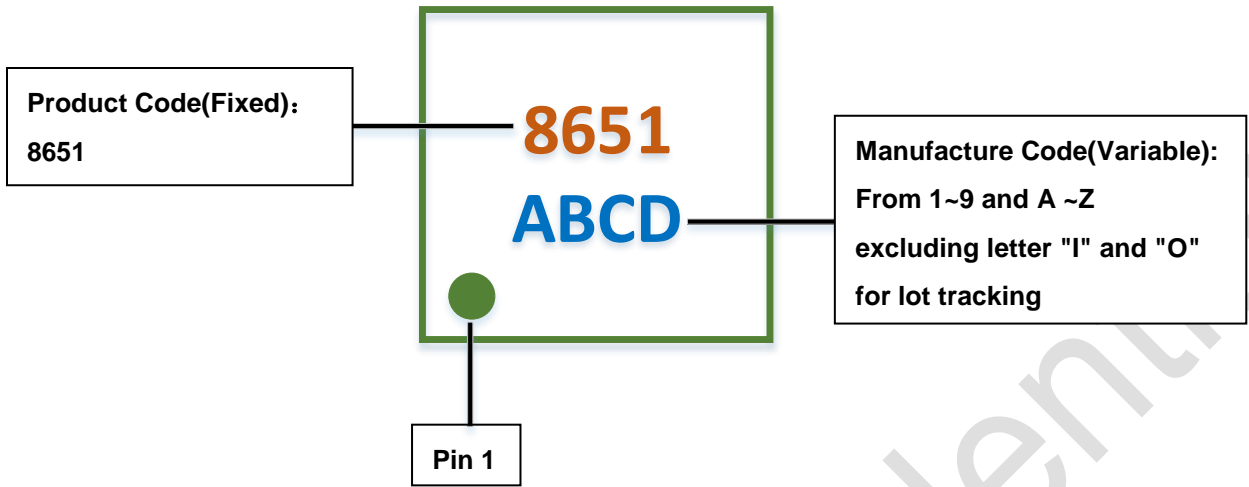


Figure 4. Marking specification (Top View)

Tape and Reel Dimensions

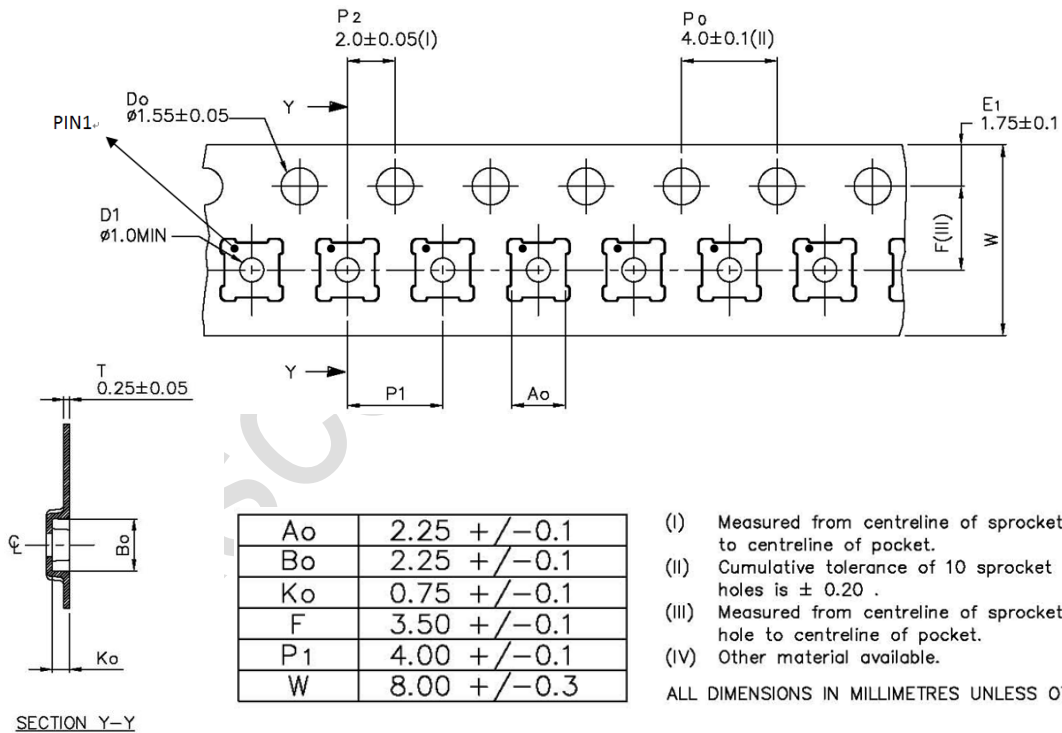


Figure 5. Tape and reel dimensions

Reflow Chart

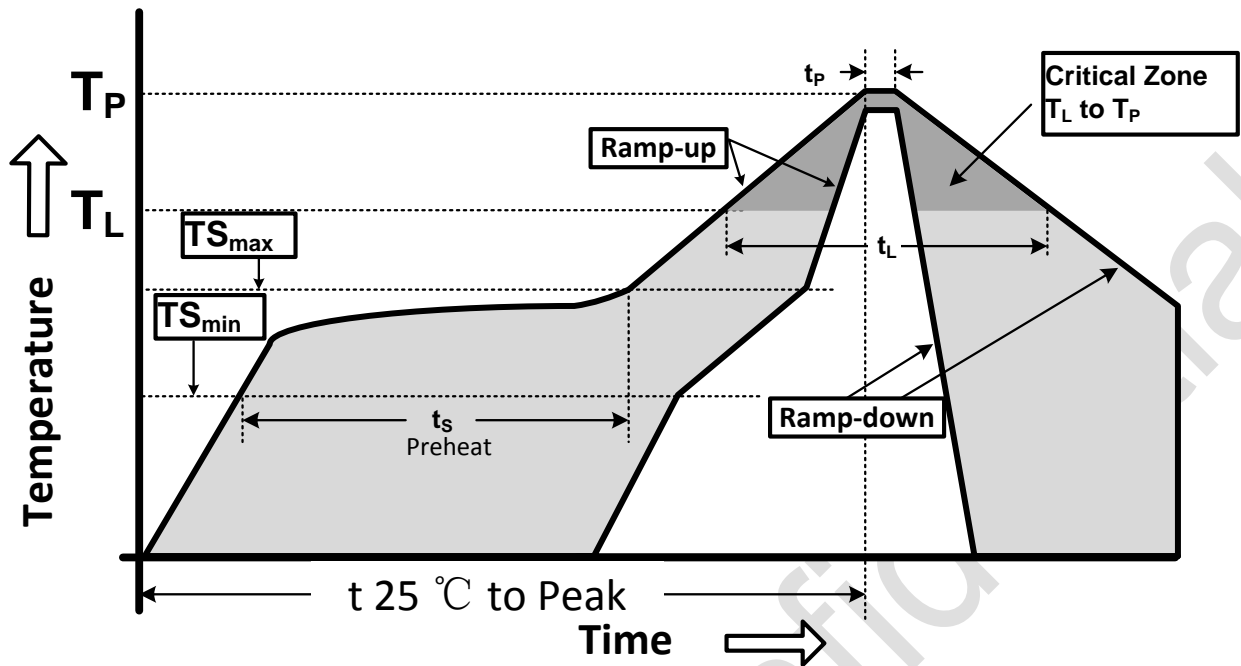


Figure 6. Recommended Lead-Free Reflow Profile

Table 6. Reflow condition

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