



MXD8641H

SP4T Switch for 2G/3G/4G Application



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General Description

The MXD8641H is a SOI SP4T switch suitable for GSM/LTE/UMTS/CDMA transmit and receive applications. The MXD8641H features very low insertion loss, high isolation and excellent linearity performance down to 1.0V control voltage at high frequency up to 2.7GHz. In addition, this switch is able to handle high power signals up to 36dBm. The MXD8641H has internal ESD protection devices to achieve excellent ESD performances. No DC Blocking capacitors are required for all RF ports unless DC is biased externally. And the compact QFN-14L 2mmx2mmx0.55mm package is adopted.

Applications

- 2G/3G/4G TRX applications
- Cellular modems and USB Devices

Features

- Excellent insertion loss and isolation performance
 - 0.5 dB Insertion Loss at 2.7GHz
 - 25 dB Isolation at 2.7GHz
- Multi-Band operation 100MHz to 3000MHz
- P0.1dB of 36dBm
- Compact 2mm x 2mm in QFN-14 package
- No DC blocking capacitors required (unless external DC is applied to the RF ports)

Functional Block Diagram and Pin Function

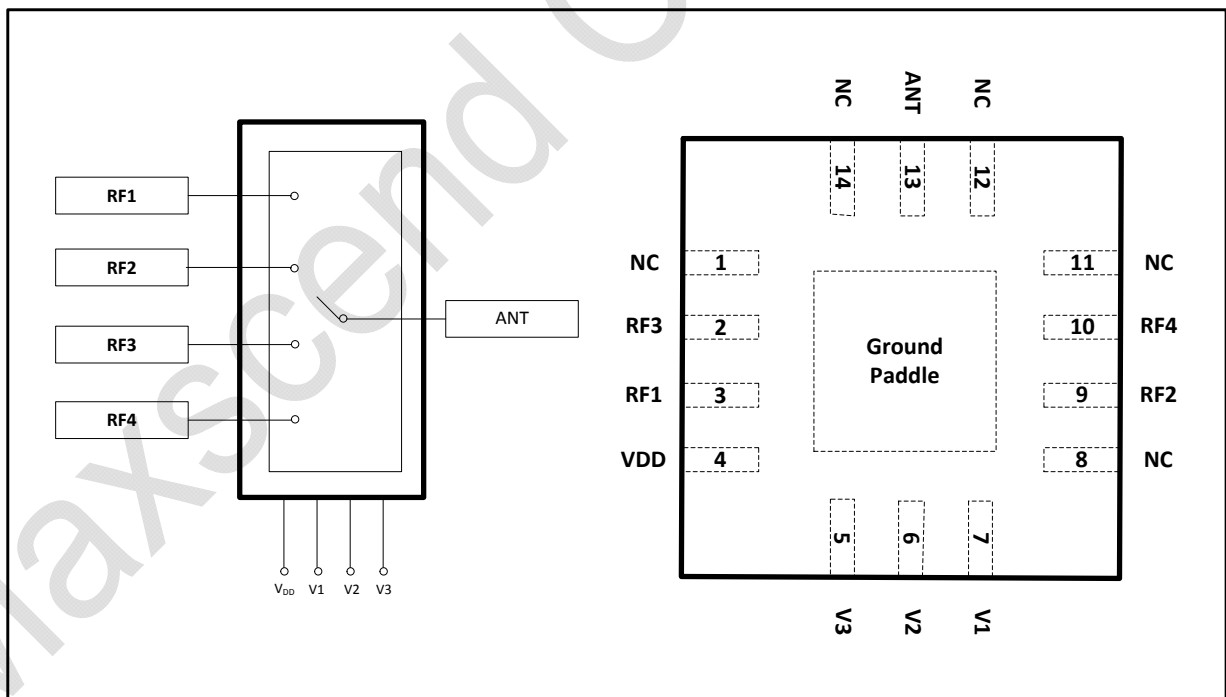


Figure 1 Functional Block Diagram and Pinout (Top View)

Application Circuit

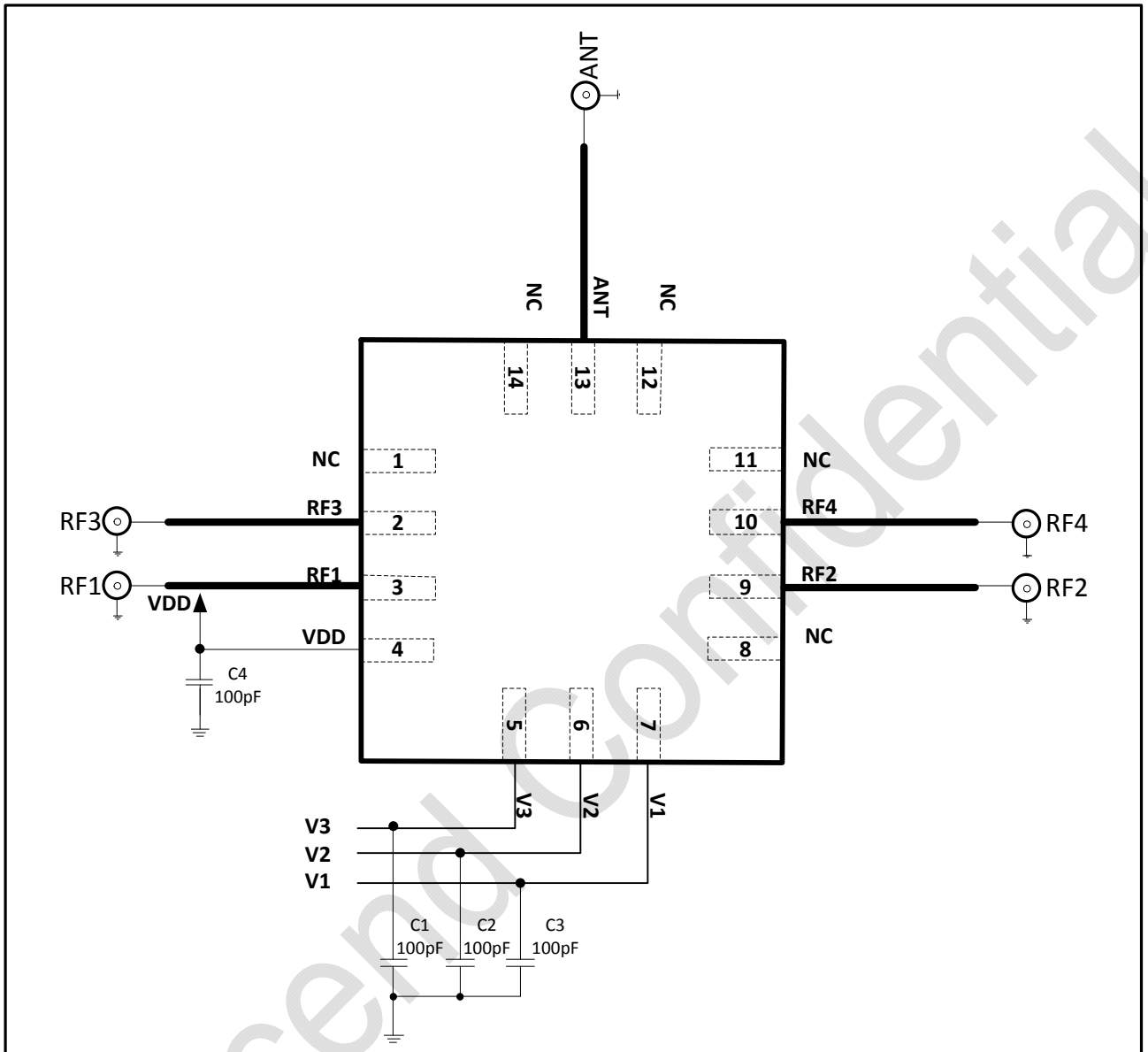


Figure 2 MXD8641H Evaluation Board Schematic

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	NC	No connection	8	NC	No connection
2	RF3	RF port3	9	RF2	RF port2
3	RF1	RF port1	10	RF4	RF port4
4	V _{DD}	Power supply	11	NC	No connection
5	V3	Control logic 3#	12	NC	No connection
6	V2	Control logic 2#	13	ANT	Antenna port
7	V1	Control logic 1#	14	NC	No connection
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
0	0	0	Insertion Loss	Isolation	Isolation	Isolation
0	0	1	Isolation	Insertion Loss	Isolation	Isolation
0	1	0	Isolation	Isolation	Insertion Loss	Isolation
0	1	1	Isolation	Isolation	Isolation	Insertion Loss

Note: "1" = 1.0 V to 3.0 V. "0" = 0 V to 0.3 V.

Recommended Operation Range

Table 3. Recommended Operation Condition

Parameters	Symbol	Min	Typ	Max	Units
Operation Frequency	f ₁	0.1	-	3.0	GHz
Power supply	V _{DD}	2.5	2.8	3.0	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	Test Condition (Note 2)	Min	Typical	Max	Units
DC Specifications						
Supply voltage	VDD		2.5	2.8	3.0	V
Supply current	IDD			40	60	uA
Control voltage: High Low	VCTL_H VCTL_L		1.35	1.80	3.0 0.3	V V
Control current	ICTL	VCTL = 1.8 V		0.5	1.0	μA
Switching Speed, on RF to another		10% to 90% RF		1	2	is
Turn-on time	t _{on}	Time from V _{DD} =0V to part ON and RF at 90%		5	10	is
RF Specifications						
Insertion loss (ANT pin to RF1/2/3/4 pins)	IL	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz		0.40 0.45 0.50	0.50 0.55 0.60	dB dB dB
Isolation (ANT pin to RF1/2/3/4 pins)	Iso	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz	35 28 22	40 33 25		dB dB dB
Input return loss (ANT pin to RF1/2/3/4 pins)	RL	0.1 to 1.0 GHz 1.0 to 2.0 GHz 2.0 to 2.7 GHz	20 18 15	25 22 20		dB dB dB
0.1 dB Compression Point (ANT pin to RF1/2/3/4 pins)	PO.1dB	0.1 GHz to 3.0 GHz		36		dBm

Absolute Maximum Ratings

Table 5. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V _{DD}	2.5	+3.0	V
Control voltage (V1, V2, and V3)	V _{CTL}	0	+3.0	V
RF input power (RF1 to RF4)	P _{IN}		+36	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

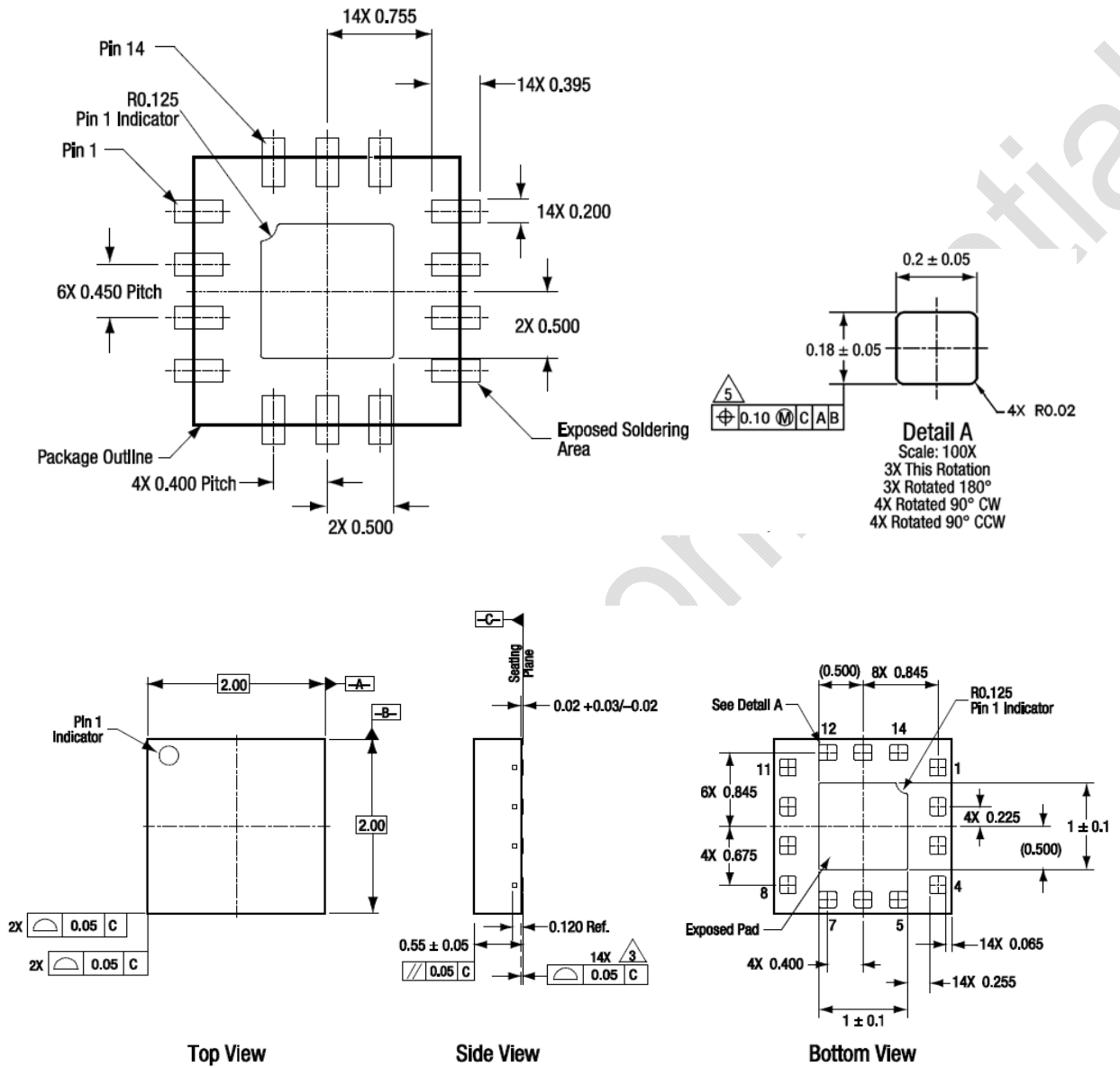


Figure 3 package outline dimension

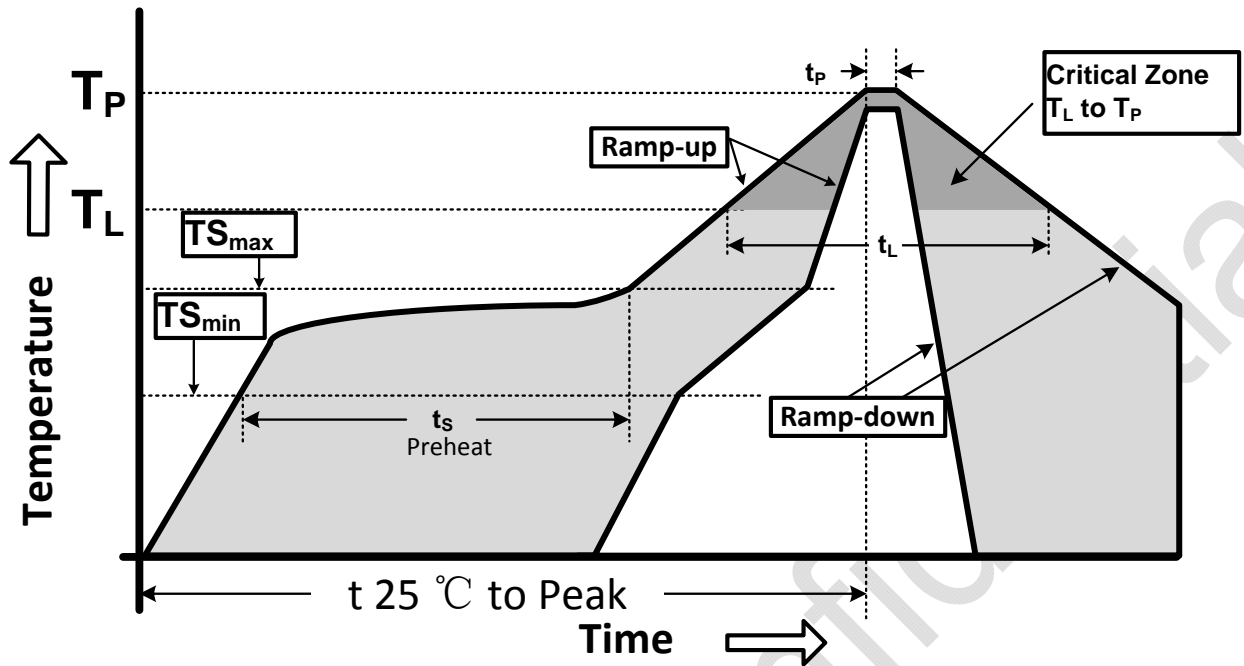
Reflow Chart


Figure 4 Recommended Lead-Free Reflow Profile

Table 6. Reflow condition

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate (TS_{max} to T_p)	3°C/second max.
Preheat temperature (TS_{min} to TS_{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.