



MXD8642

SP4T Switch for 3G/4G Application

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General Description

The MXD8642 is a SOI SP4T switch suitable for LTE/UMTS/CDMA application. The MXD8642 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 MXD8642 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-12L 1.8mm × 1.8mm × 0.55mm package is adopted.

Applications

- LTE,UMTS,CDMA application
- General Purpose Switching applications

Features

- Low voltage logic control:1.8V typical
- Low insertion loss:
0.35dB @ 0.9GHz
0.40dB @ 1.9GHz
0.45dB @ 2.7GHz
- P0.1dB 36dBm
- Ultra small package,
QFN-12L (1.8mm × 1.8mm × 0.55mm)

Functional Block Diagram and Pin Function

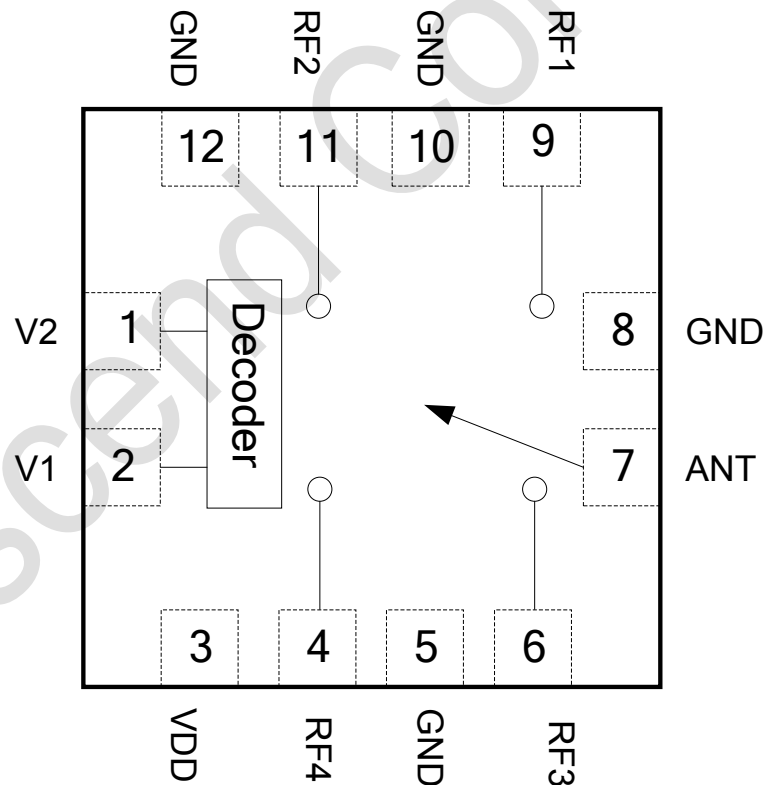


Figure 1 Functional Block Diagram and pin out

Application Circuit

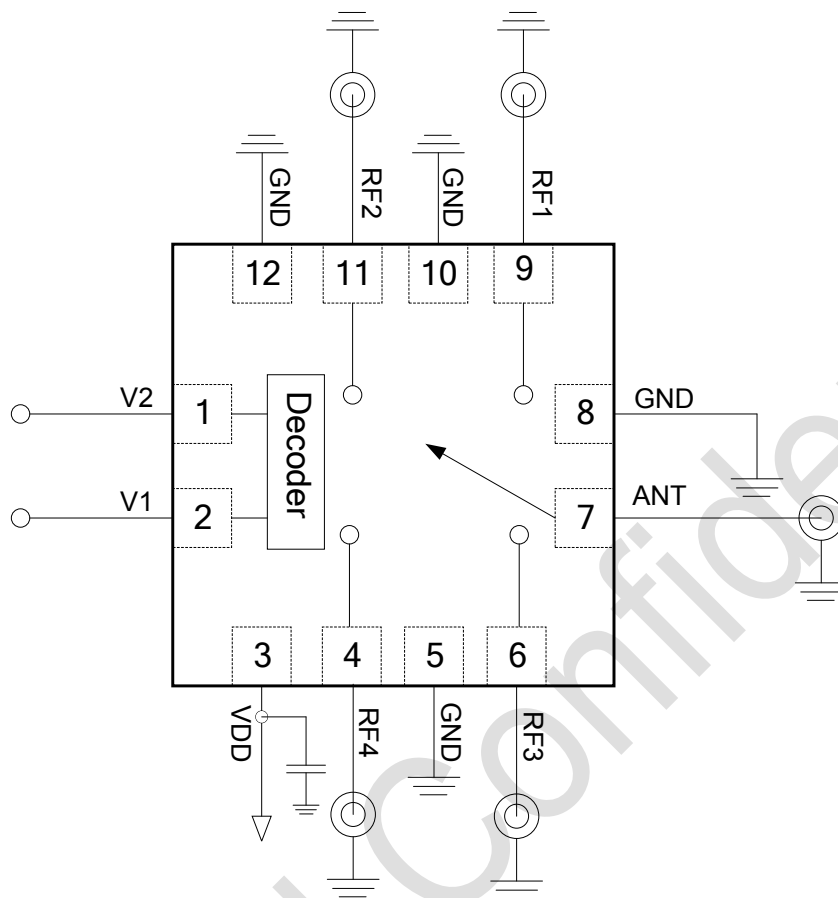


Figure 2 MXD8642 Pin Diagram

Table 1. Pin Description

Pin No.	Name	Description	Pin No.	Name	Description
1	V2	Control Logic #2	7	ANT	RF signal in Antenna
2	V1	Control Logic #1	8	GND	RF and DC Ground
3	VDD	Power Supply	9	RF1	RF Input / Output
4	RF4	RF Input / Output	10	GND	RF and DC Ground
5	GND	RF and DC Ground	11	RF2	RF Input / Output
6	RF3	RF Input / Output	12	GND	RF and DC Ground

Table 2. Truth Table

V ₁	V ₂	Path
H	L	ANT-RF1
L	H	ANT-RF2
H	H	ANT-RF3
L	L	ANT-RF4

Absolute Maximum Ratings

Table 3. Maximum ratings

Parameters	Symbol	Minimum	Maximum	Units
Supply voltage	V _{DD}	+2.5	+3.0	V
Digital control voltage	V _{CTL}	0	+3.0	V
RF input power	P _{IN}		+36	dBm
Operating temperature	T _{OP}	-20	+85	°C
Storage temperature	T _{STG}	-55	+150	°C
Electrostatic Discharge Human body model (HBM), Class 1C	ESD_HBM		1000	V
Machine Model (MM), Class A	ESD_MM		100	
Charged device model (CDM), Class III	ESD_CDM		500	

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.

Recommended Operation Range

Table 4. 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
Supply current,	I _{DD}	-	50	70	μA
Control voltage – High	V _{CTLH}	1.0	1.8	V _{DD}	V
Control voltage – Low	V _{CTL}	0	0	0.3	V
Control current - High	I _{CTLH}			5	μA
Control current - Low	I _{CTL}			5	μA

Specifications
Table 5. Electrical Specifications

 Nominal conditions unless otherwise specified. $V_{DD} = 2.8\text{ V}$, $V_1 \& V_2 = 1.8\text{ V} / 0\text{ V}$, Temp = 25°C, 50Ω.

Parameter	Sym	Specification			Units	Test Condition
		Min.	Typ	Max.		
Switching Time						
Start-up time	$t_{\text{start-up}}$	-	1	10	μs	50% V_{DD} to large signal fully compliant
ON Switching speed	T_{on}	-	1	5	μs	50% control to 90% RF ON
OFF Switching speed	T_{off}	-	1	5	μs	50% control to 90% RF ON
Supply current	I_{DD}	-	50	70	μA	$V_{DD} = 2.8\text{ V}$, $V_{CTL} = V_{CTL_H}$
RF Specifications						
Insertion loss 1/2/3/4	IL	-	0.35		dB	900 MHz
			0.40			1900 MHz
			0.45			2700 MHz
Isolation 1/2/3/4	ISO	35	40	-	dB	900 MHz
		30	35			1900 MHz
		25	28			2700 MHz
Pin at 0.1dB compression point	$P_{0.1dB}$	-	+36	-	dBm	0.7 GHz to 3 GHz
2 nd Harmonic	2f ₀	-	-80	-70	dBc	900MHz, +34dBm
3 rd Harmonic	3f ₀	-	-75	-70	dBc	900MHz, +34dBm
3rd intercept point1	IIP3(1)	+65	+70	-	dBm	829+849 MHz, Pin = +24dBm
3rd intercept point2	IIP3(2)	+63	+65			1870+1910 MHz, Pin = +24dBm

Package Outline Dimension

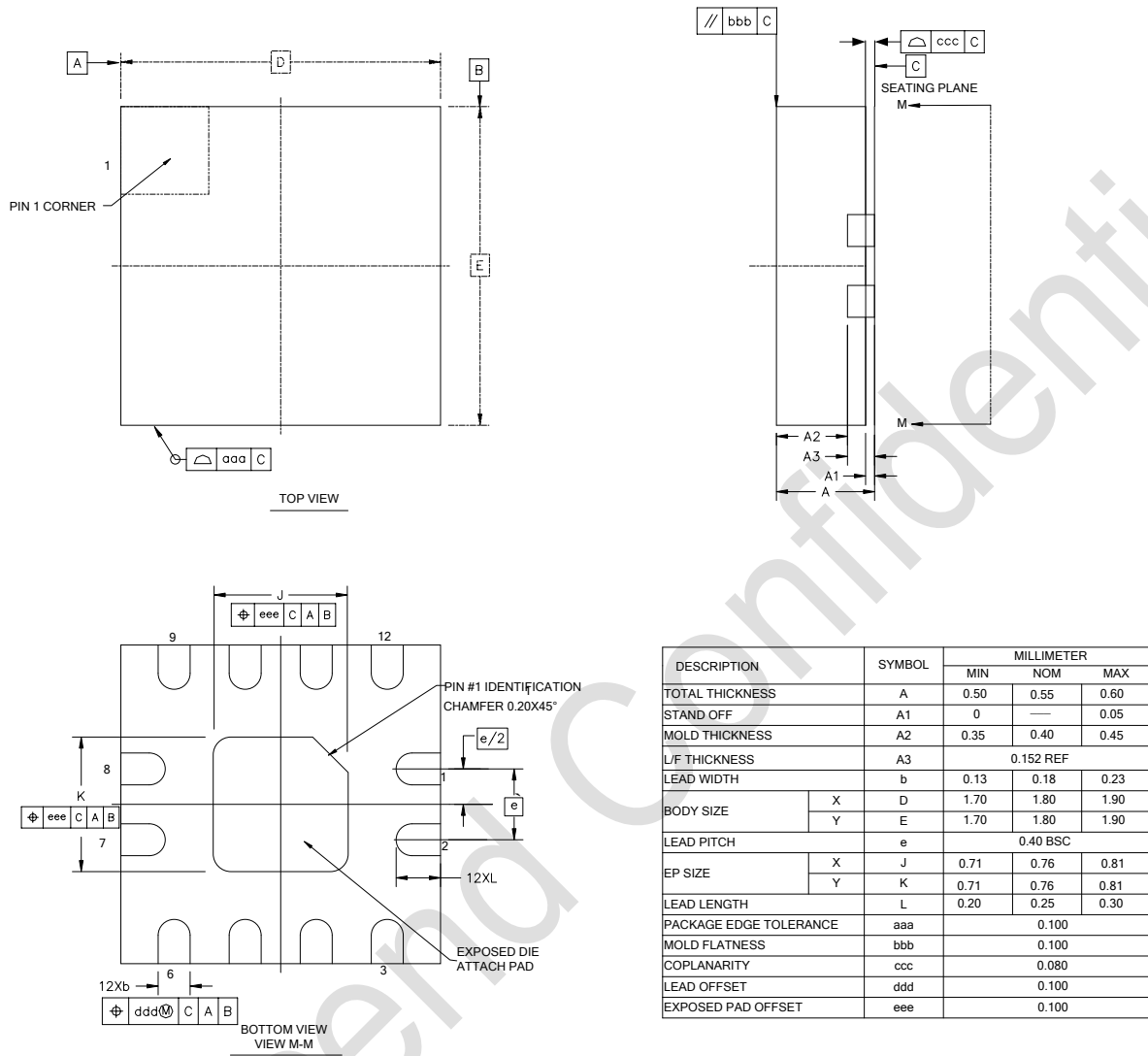


Figure 3 Package outline dimension

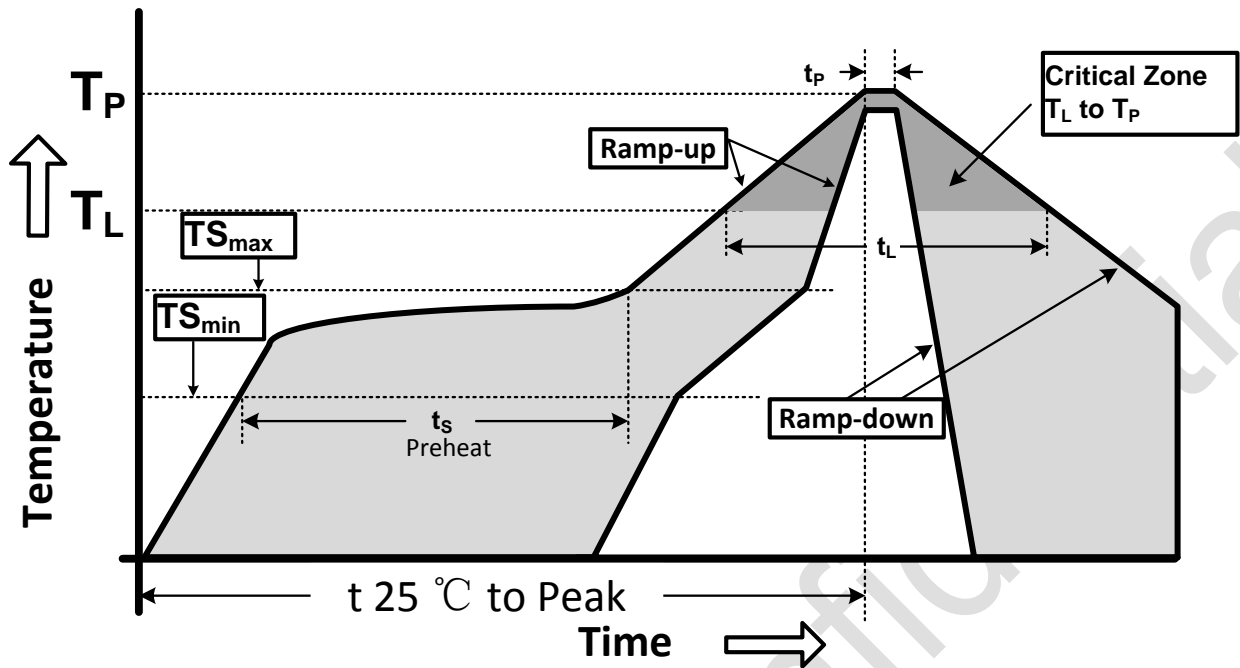
Reflow Chart


Figure 4 Recommended Lead-Free Reflow Profile

Table 6. Reflow condition

Profile Parameter	Lead-Free Assembly, Convection, IR/Convection
Ramp-up rate ($T_{S_{max}}$ 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.

1.2.4

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