

HX1638-Q 0.1-3.0GHz SP8T Switch for Diversity Applications

Description

The HX1638-Q is a SP8T (single-pole eight-throw) antenna switch module designed for multimode broadband cellular applications, supporting UMTS, TD-SCDMA, and LTE from 100MHz to 3.0GHz. It features optimized RF performance with low insertion loss and harmonics to meet stringent 3G/LTE standards.

No external DC blocking capacitors are needed as long as no DC voltage is applied on any RF path. The HX1638-Q integrates a SP8T switch and GPIO controller on a single SOI chip, providing 8 symmetrical RF ports for versatile operation in different modes.

Low insertion loss is maintained across all paths from the antenna port to any RF port, with high isolation between opposite and adjacent paths. Additionally, it achieves excellent linearity performance suitable for 3G and LTE applications. The internal decoder facilitates convenient GPIO connections and supports digital control signals.

Encapsulated in a compact 2mm x 2mm QFN package with a low profile of 0.525mm, this product is RoHS-compliant and halogen-free. The HX1638-Q has a Moisture Sensitivity Level of MSL1 at 260° C per JEDEC J-STD-020.

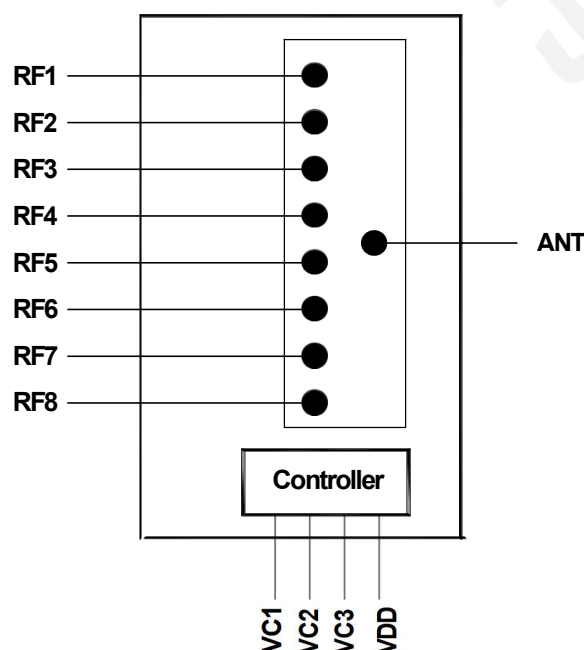
Features

- ★ Broadband support 0.1-3.0GHz
- ★ Compatible with UMTS, TD-SCDMA, and LTE
- ★ Advanced SOI process
- ★ Low insertion loss
- ★ Excellent linearity
- ★ 8 symmetrical ports
- ★ GPIO control interface
- ★ Ultra small QFN footprint, 2mm x 2mm x 0.525mm, 14-pin
- ★ Green product
- ★ ESD Class 1C

Application

- ★ UMTS/TD-SCDMA/LTE Cellular handsets and data cards
- ★ Diversity for UMTS/LTE

Block Diagram



Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage(VDD)	4.5	V
Control Voltage(VC1,VC2, VC3)	3	V
RF Input Power	34	dBm
Operating Temperature	-40 to 90	° C
Storage Temperature	-55 to 150	° C
ESD-Human Body Mode(HBM)	-1.5 to 1.5	kV



ESD Caution

Appropriate precautions in handling, packaging and testing devices must be observed.

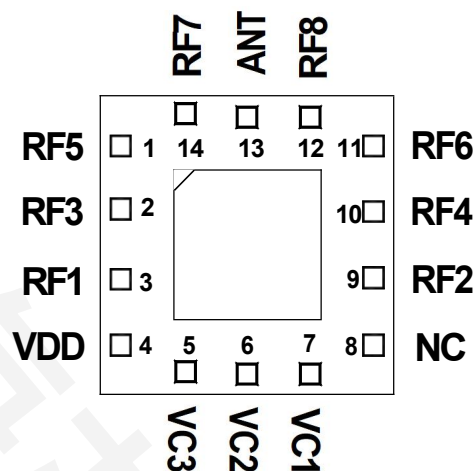
Recommended Operating

Parameter	Symbol	Condition	Minimum	Typical	Maximum	Unit
Supply Voltage	VDD		2.0	3.0	3.5	V
Supply Current	IDD			60	90	μA
Control Voltage(VC1,VC2, VC3)	VC	High Low	1.3	1.8 0	2.8 0.5	V
Control Current	ICTRL			2	5	μA

Logic Truth Table for Operation Modes

MODE	VC1	VC2	VC3
RF1	0	0	0
RF2	0	0	1
RF3	0	1	0
RF4	0	1	1
RF5	1	0	0
RF6	1	0	1
RF7	1	1	0
RF8	1	1	1

Pin-Out



Pin Definitions

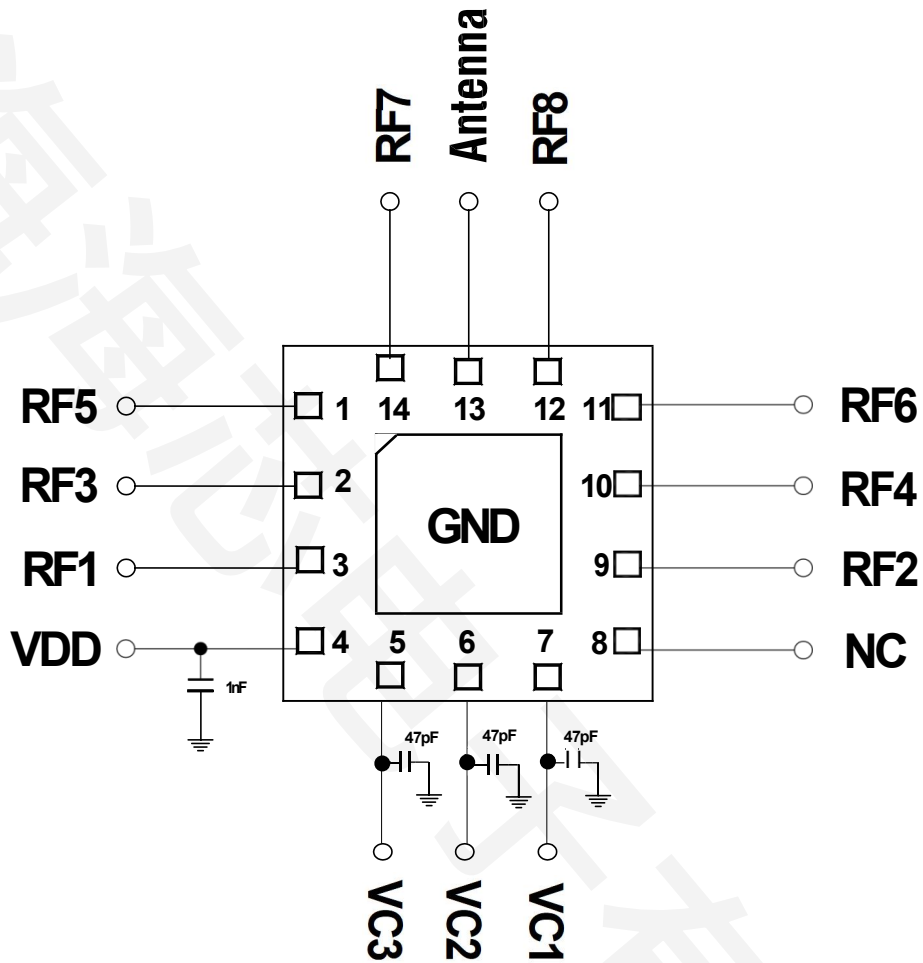
Pin	Name	Description
1	RF5	RF Port
2	RF3	RF Port
3	RF1	RF Port
4	VDD	Supply Voltage
5	VC3	Control logic signal
6	VC2	Control logic signal
7	VC1	Control logic signal
8	NC	Not connected
9	RF2	RF Port
10	RF4	RF Port
11	RF6	RF Port
12	RF8	RF Port
13	ANT	Antenna port
14	RF7	RF Port

UMTS/TD-SCDMA/LTE RF Electrical Specifications

(Test Condition $V_{DD} = 2.8V$, $VC1/VC2/VC3 = 1.8V/0V$, $P_{IN} = 0dBm$, $T_c = 25^\circ C$, 50Ω , unless otherwise specified)

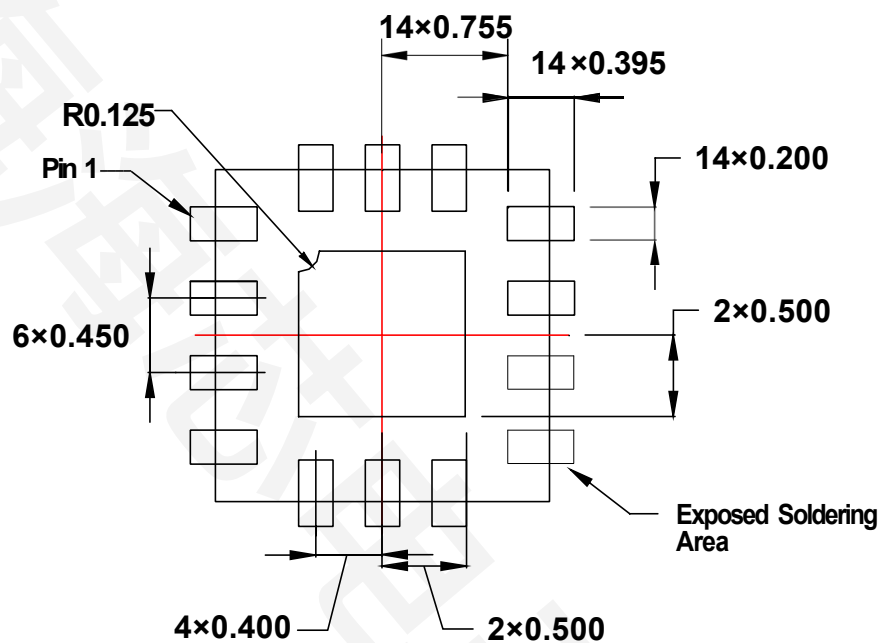
Parameter	Condition	Minimum	Typical	Maximum	Unit
Frequency	UMTS/LTE Band 5/8/12/13/14/17/20 UMTS/TD-SCDMA/LTE Band 1/2/3/4/34/39 LTE Band 7/38/40/41	698 1710 2300		960 2170 2690	MHz
Insertion Loss	698MHz to 960MHz 1710MHz to 2170MHz 2300MHz to 2690MHz		0.35 0.45 0.55	0.42 0.55 0.7	dB
Isolation	698MHz to 960MHz 1710MHz to 2170MHz 2300MHz to 2690MHz		33 26 21		dB
Harmonics	$P_{IN} = 26dBm$ 2f0 3f0		-68 -62		dBm
Switching Time	10% to 90% RF		2	5	μs

Application Schematic



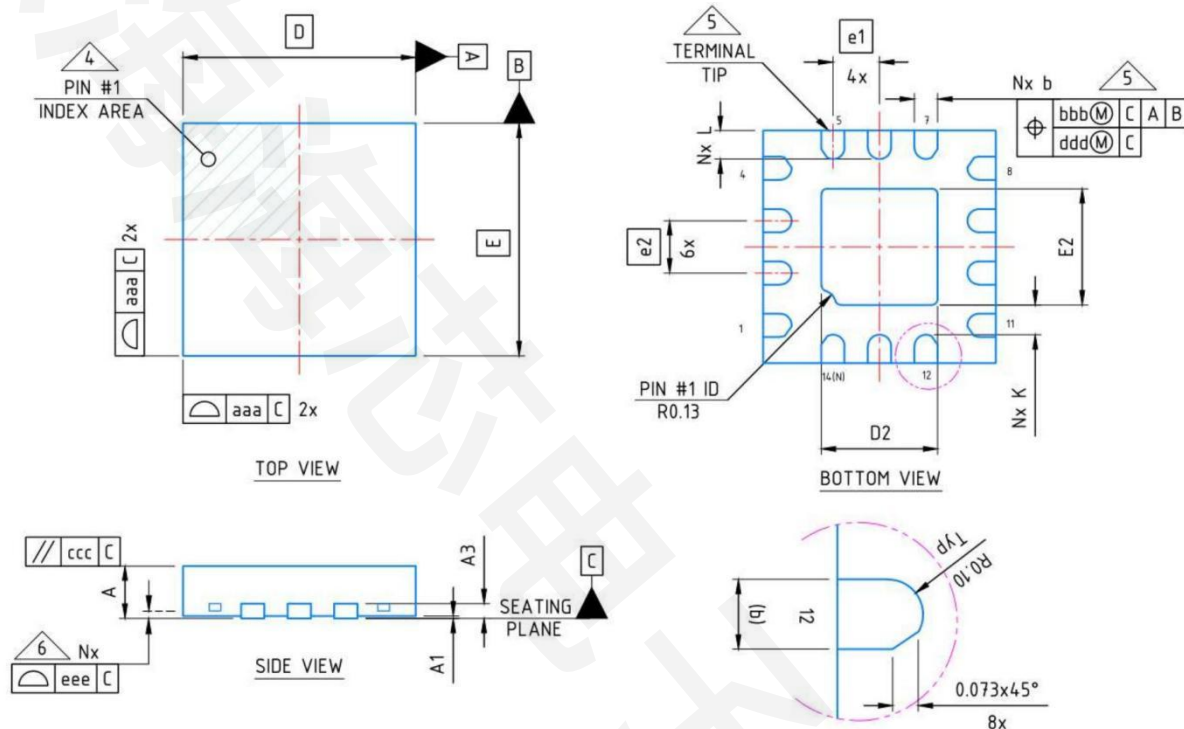
1. RF input and output are 50-Ohm microstrip.
2. Decoupling capacitors may be added for VDD & VC1/VC2/VC3 according to different applications.

PCB Layout Footprint



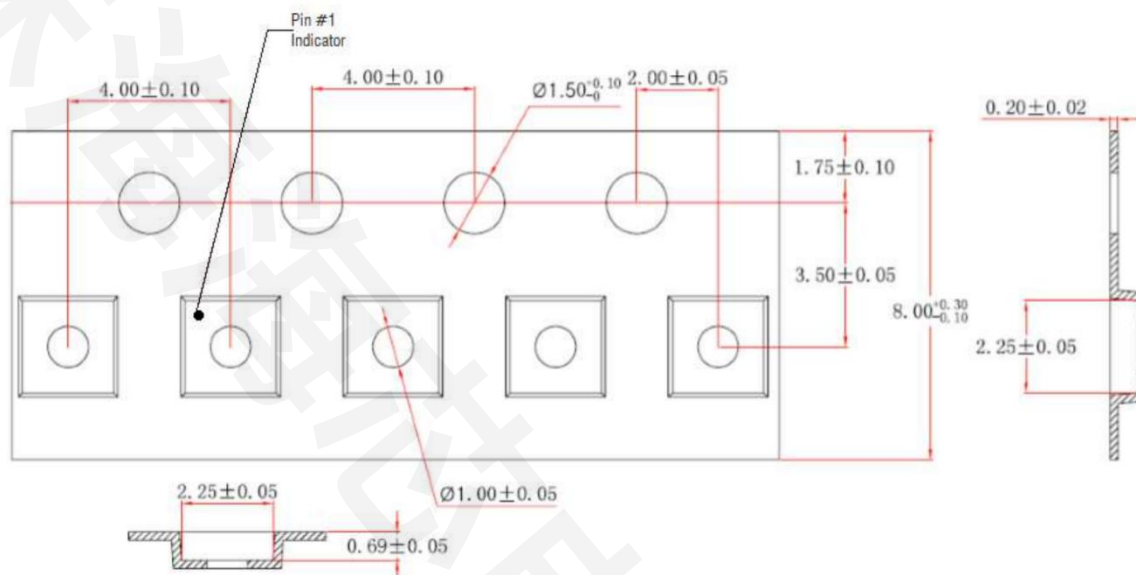
PCB Metal Top View

Package Dimensions



Dimension Table							
Thickness Symbol	X1			UT1			NOTE
	MINIMUM	NOMINAL	MAXIMUM	MINIMUM	NOMINAL	MAXIMUM	
A	0.41	0.45	0.50	0.50	---	0.55	8
A1	0.00	0.02	0.05	0.00	0.02	0.05	
A3	---	0.127 Ref.	---	---	0.127 Ref.	---	
b	0.15	0.20	0.25	0.15	0.20	0.25	5
D	2.00 BSC			2.00 BSC			
E	2.00 BSC			2.00 BSC			
e1	0.40 BSC			0.40 BSC			
e2	0.45 BSC			0.45 BSC			
D2	0.95	1.00	1.10	0.95	1.00	1.10	
E2	0.95	1.00	1.10	0.95	1.00	1.10	
K	0.20	---	---	0.20	---	---	
L	0.145	0.245	0.345				
aaa	0.05			0.05			
bbb	0.07			0.07			
ccc	0.10			0.10			
ddd	0.05			0.05			
eee	0.08			0.08			
N	14			14			3
ND	3			3			7
NE	4			4			7
NOTES	1, 2						
LF PART NO.	444289						
LF DWG. NO.	CARSEM-HDS-096A						

Packaging Information



Package Type	Unit Size	Max Reel Diameter	Type Width	Pocket Pitch	Reel Capacity
Tape and Reel	2mm x 2mm x 0.525mm	7 "	8mm	4mm	3000

Order Information

ORDER NUMBER	TEMPERATURE	PACKAGE DESCRIPTION	TYPE
HX1638-Q	-40° C ~ 90° C	14-Pin, 2mm x 2mm x 0.525mm QFN Module Halogen Free	Tape & Reel, 3000 pcs per Reel