

HX11022-LGA Ultra Low Insertion Loss DPDT Transfer

Description

The HX11022-LGA is a DPDT (Double-Pole Double-Throw) switch specifically designed for multi-mode broadband LTE/5G NR cellular applications, operating within a frequency range of 100 MHz to 6.0 GHz. Its RF performance has been optimized to achieve low insertion loss and high linearity, thereby meeting the stringent requirements set forth by all LTE/5G NR standards.

Integrating both a DPDT switch and a GPIO controller on a single SOI chip, the HX11022-LGA demonstrates low insertion loss across every TRx path while maintaining high isolation and minimal harmonics. Furthermore, it delivers exceptional linearity performance that is well-suited for LTE/5G NR applications. The internal decoder facilitates convenient GPIO connections and supports digital control signals. The SOI architecture employed in the HX11022-LGA eliminates the need for external DC blocking capacitors, resulting in cost savings and reduced PCB space.

Encapsulated in a compact 1.1 mm x 1.5 mm, 10-pin LGA package with a low profile of just 0.54 mm, this product complies with RoHS regulations and is halogen-free.

The HX11022-LGA is rated at Moisture Sensitivity Level 3 (MSL3) at temperatures up to 260°C according to JEDEC J-STD-020 standards.

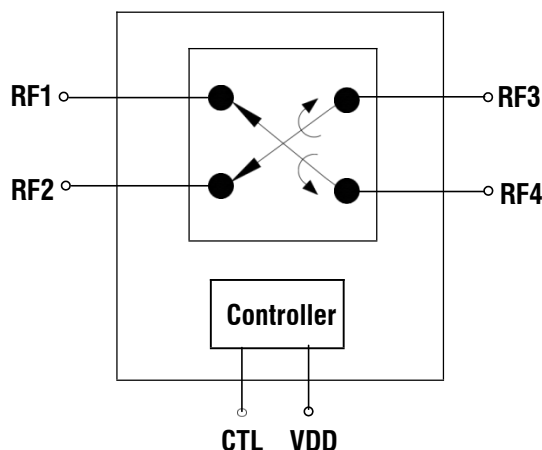
Features

- ★ Broadband Performance Suitable for All Cellular Modulation Schemes up to 6GHz
- ★ Advanced SOI process
- ★ Excellent linearity
- ★ GPIO interface
- ★ Ultra small LGA footprint, 1.1mm x 1.5mm x 0.54mm, 10- pin
- ★ ESD Class 1C
- ★ Green product

Application

- ★ Cellular Handset Applications
- ★ Cellular Modems and USB Devices
- ★ Multi-Mode GSM, EDGE, WCDMA, LTE and 5G NR Applications

Block Diagram



Absolute Maximum Ratings

Parameter	Rating	Unit
Supply Voltage(V _{DD})	6	V
Digital Control Voltage(V _{CTL})	3.5	V
RF Input Power(V _{DD} = 1.8V)	38	dBm
RF Input Power(V _{DD} = 2.8V)	39	dBm
RF Input Power(12.5% duty cycle, V _{DD} = 1.8V)	39	dBm
RF Input Power(12.5% duty cycle, V _{DD} = 2.8V)	41	dBm
Operating Temperature	-40 to 90	°C
Storage Temperature	-55 to 150	°C
ESD-Human Body Mode (HBM)	-1 to 1	kV



ESD Caution

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

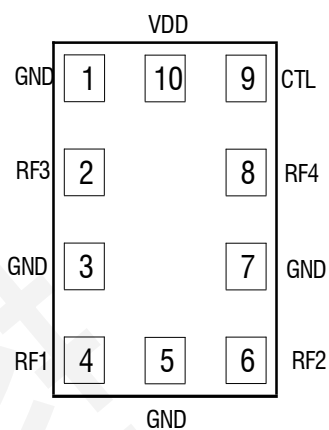
Recommended Operating Conditions

Parameter	Symbol	Condition	Minimum	Typical	Maximum	Unit
Supply Voltage	V _{DD}		1.7	2.8	5.5	V
Supply Current	I _{DD}			65	85	μA
Control Voltage	V _{CTL}	High Low	1.35 0	1.8	3.3 0.4	V
Control Current	I _{CTL}			2	10	μA
Operating Case Temperature	T _c		-40	25	85	°C

Logic Truth Table for Operation Modes

MODE	CTL
RF1-RF3; RF2-RF4	0
RF1-RF4; RF2-RF3	1

Pin-Out



Top View

Pin Definitions

Pin	Name	Description
1	GND	Ground
2	RF3	RF Port3
3	GND	Ground
4	RF1	RF Port1
5	GND	Ground
6	RF2	RF Port2
7	GND	Ground
8	RF4	RF Port4
9	CTL	Control logic signal
10	VDD	Supply Voltage

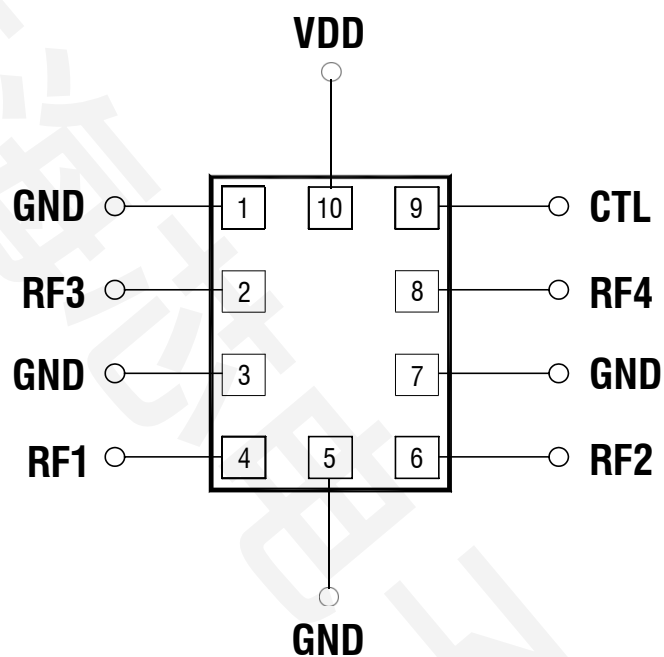
TRX Electrical Specifications(Test Condition $V_{DD} = 1.8\text{ V}$, $P_{IN} = 0\text{ dBm}$, $T_c = 25^\circ\text{C}$, 50Ω , unless otherwise specified)

Parameter	Condition	Minimum	Typical	Maximum	Unit
Frequency		600		6000	MHz
Insertion Loss, RF1/RF2 to RF3/RF4	600 MHz to 960 MHz		0.33	0.4	dB
	1700 MHz to 2200 MHz		0.35	0.45	
	2300 MHz to 2700 MHz		0.38	0.48	
	3300 MHz to 4200 MHz		0.46	0.55	
	4400 MHz to 5000 MHz		0.56	0.75	
	5000 MHz to 6000 MHz		0.69	1.1	
Isolation, RF1/RF2 to RF3/RF4	600 MHz to 960 MHz	28	33		dB
	1700 MHz to 2200 MHz	23	28		
	2300 MHz to 2700 MHz	20	25		
	3300 MHz to 4200 MHz	17	22		
	4400 MHz to 5000 MHz	16	20		
	5000 MHz to 6000 MHz	15	19		
VSWR, RF1/RF2 to RF3/RF4	600 MHz to 960 MHz		1.06 :1	1.4 :1	
	1700 MHz to 2200 MHz		1.13 :1	1.5 :1	
	2300 MHz to 2700 MHz		1.20 :1	1.6 :1	
	3300 MHz to 4200 MHz		1.23 :1	1.7 :1	
	4400 MHz to 5000 MHz		1.28 :1	1.8 :1	
	5000 MHz to 6000 MHz		1.32 :1	2.0 :1	
Harmonics	$f_o = 777 - 787\text{MHz}$; $P_{IN} = 26\text{dBm}$; CW	$3f_o$ (B13)	-70	-65	dBm
	$f_o = 880 - 915\text{MHz}$; $P_{IN} = 26\text{dBm}$; CW	$2f_o$ (B8)	-70	-65	
		$3f_o$ (B8)	-70	-65	
	$f_o = 824 - 915\text{MHz}$; $P_{IN} = 35\text{dBm}$; CW	$2f_o$ (GSM 850/900)	-50	-45	
		$3f_o$ (GSM 850/900)	-50	-45	
	$f_o = 1710 - 1910\text{MHz}$; $P_{IN} = 33\text{dBm}$; CW	$2f_o$ (GSM DCS/PCS)	-55	-50	
		$3f_o$ (GSM DCS/PCS)	-55	-50	
IMD2			TBD		
IMD3			TBD		
Switching On/Off Time	50% CTL to 90/10% RF		1.7	2	μs
Switching Rise/Fall Time	10/90% RF to 90/10% RF		0.3	0.5	μs

TRX Electrical Specifications(Test Condition $V_{DD} = 2.8\text{ V}$, $P_{IN} = 0\text{ dBm}$, $T_c = 25^\circ\text{C}$, 50Ω , unless otherwise specified)

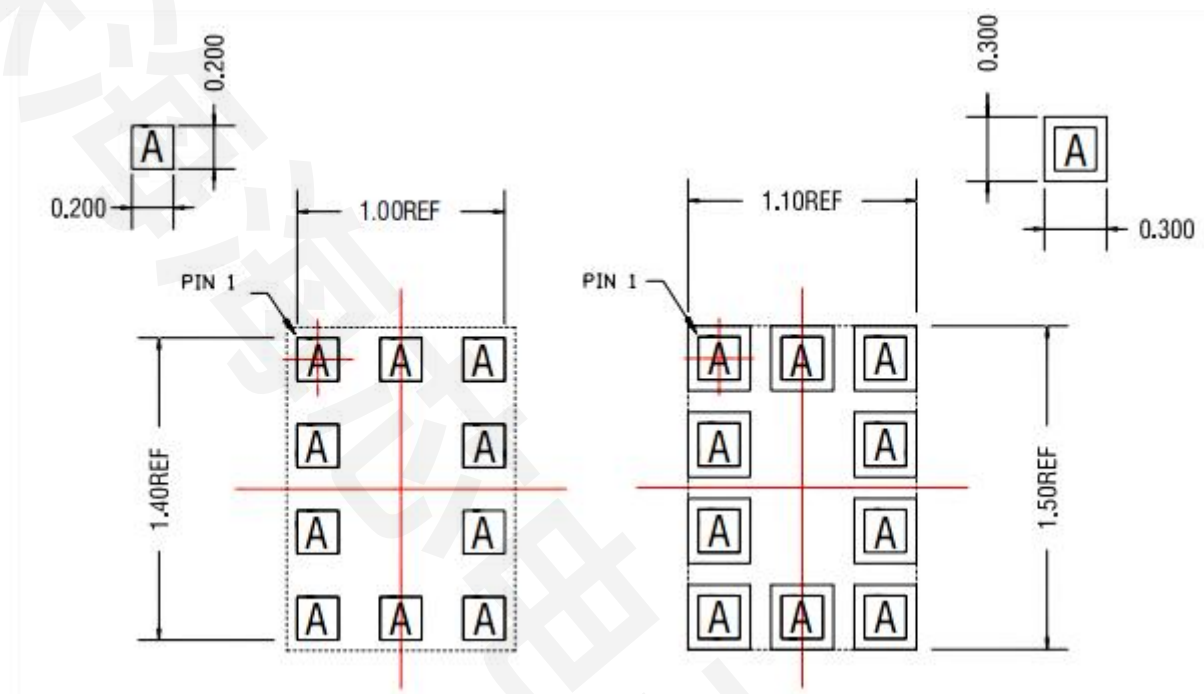
Parameter	Condition		Minimum	Typical	Maximum	Unit
Frequency			600		6000	MHz
Insertion Loss, RF1/RF2 to RF3/RF4	600 MHz to 960 MHz			0.28	0.4	dB
	1700 MHz to 2200 MHz			0.30	0.45	
	2300 MHz to 2700 MHz			0.32	0.48	
	3300 MHz to 4200 MHz			0.40	0.55	
	4400 MHz to 5000 MHz			0.49	0.75	
	5000 MHz to 6000 MHz			0.62	0.9	
Isolation, RF1/RF2 to RF3/RF4	600 MHz to 960 MHz		28	33		dB
	1700 MHz to 2200 MHz		23	27		
	2300 MHz to 2700 MHz		20	25		
	3300 MHz to 4200 MHz		17	22		
	4400 MHz to 5000 MHz		16	20		
	5000 MHz to 6000 MHz		15	19		
VSWR, RF1/RF2 to RF3/RF4	600 MHz to 960 MHz			1.06 :1	1.3 :1	
	1700 MHz to 2200 MHz			1.13 :1	1.4 :1	
	2300 MHz to 2700 MHz			1.20 :1	1.5 :1	
	3300 MHz to 4200 MHz			1.23 :1	1.6 :1	
	4400 MHz to 5000 MHz			1.28 :1	1.7 :1	
	5000 MHz to 6000 MHz			1.32 :1	1.9 :1	
Harmonics	$f_o = 777 - 787\text{MHz}$; $P_{IN} = 26\text{dBm}$; CW	$3f_o$ (B13)		-78	-75	dBm
		$2f_o$ (B8)		-76	-72	
		$3f_o$ (B8)		-83	-75	
	$f_o = 824 - 915\text{MHz}$; $P_{IN} = 35\text{dBm}$; CW	$2f_o$ (GSM 850/900)		-60	-55	
		$3f_o$ (GSM 850/900)		-55	-50	
	$f_o = 1710 - 1910\text{MHz}$; $P_{IN} = 33\text{dBm}$; CW	$2f_o$ (GSM DCS/PCS)		-60	-55	
		$3f_o$ (GSM DCS/PCS)		-60	-55	
IMD2				TBD		
IMD3				TBD		
Switching On/Off Time	50% CTL to 90/10% RF			1.5	2	μs
Switching Rise/Fall Time	10/90% RF to 90/10% RF			0.3	0.5	μs

Application Schematic



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

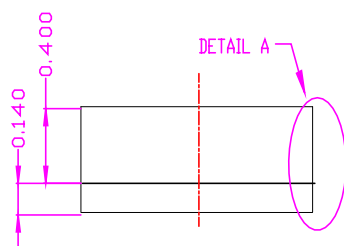
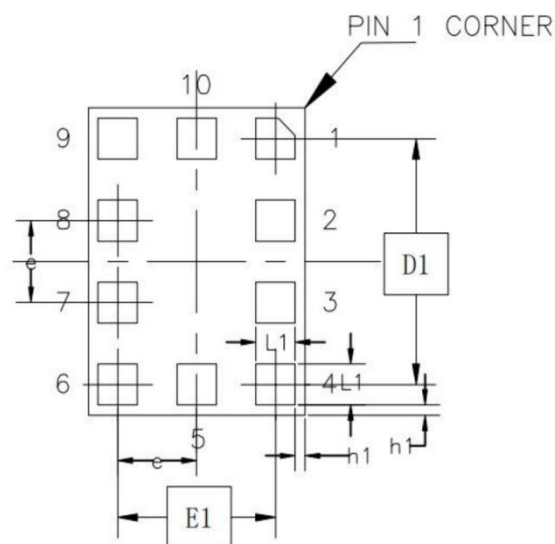
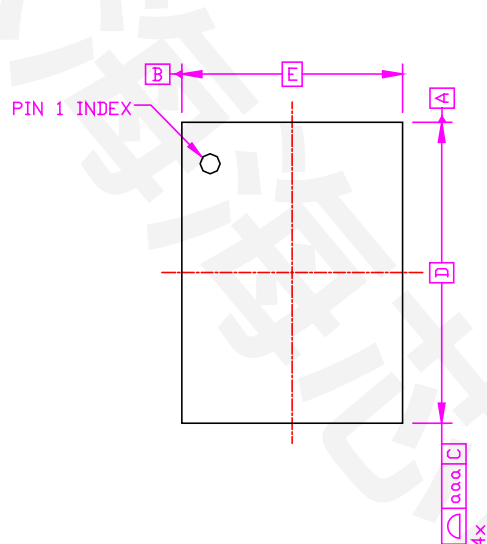
PCB Layout Footprint



PCB Metal Top View

PCB Soldermask Top View

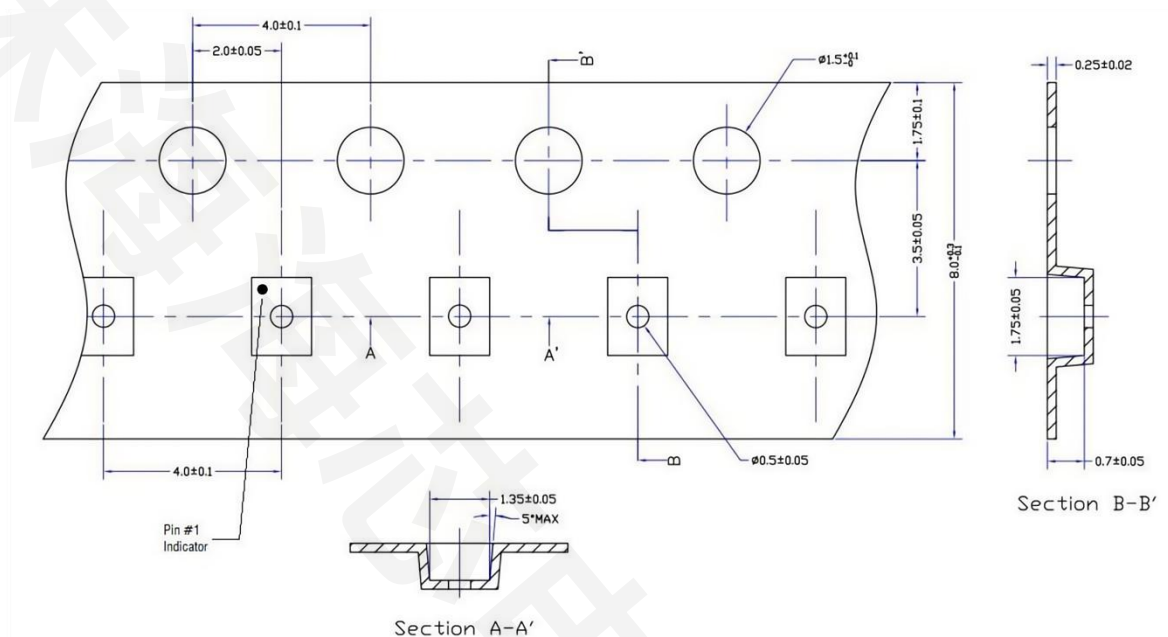
Package Dimensions



DIMENSIONAL REFERENCES			unit: mm
REF.	Min.	Nom.	Max.
A	0.48	0.54	0.60
b	0.15	0.20	0.25
L	0.15	0.20	0.25
D	1.45	1.50	1.55
E	1.05	1.10	1.15
D1	1.20 BSC		
E1	0.80 BSC		
ZD	0.15 BSC		
ZE	0.15 BSC		
e	0.40 BSC		
L1	0.00	0.05	0.10

DIMENSIONAL REFERENCES		unit: mm
REF.	TOLERANCE OF FORM AND POSITION	
aaa	0.10	
bbb	0.10	
ccc	0.10	
ddd	0.08	
eee	0.08	

Packaging Information



Package Type	Unit Size	Max Reel Diameter	Type Width	Pocket Pitch	Reel Capacity
Tape and Reel	1.1mm x 1.5mm x 0.54mm	7"	8mm	4mm	3000

Order Information

ORDER NUMBER	TEMPERATURE	PACKAGE DESCRIPTION	TYPE
HX11022-LGA	-40°C ~ 90°C	10-Pin, 1.1mm x 1.5mm x 0.54mm LGA Module Halogen Free	Tape & Reel, 3000 pcs per Reel