

### D Band: 140-164GHz IQ Mixer, Both up and down converter

2022-1-13

#### Description:



AT-IQHM-140164 is an up and down sub-harmonics mixer integrated with X6 frequency multiplier on LO Chain. RF frequency from 140-164GHz and IF inputs with I+/I- Q+/Q- is IQ port and can range from DC to 6GHz.

The mixer has high image rejection, low input/output return loss and flat conversion response. It's suitable for D band point to point communication, instrumentation, sensing, security and high resolution imaging applications.

For more information, please visit [www.atmicrowave.com](http://www.atmicrowave.com)

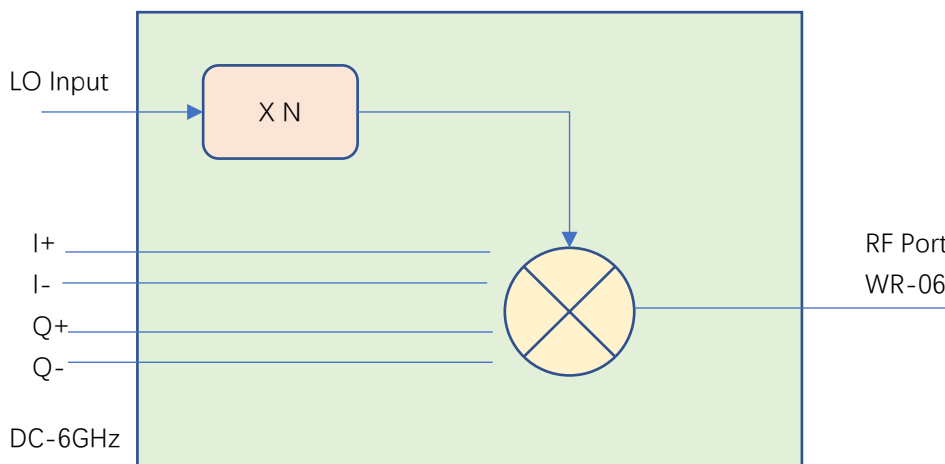
#### Feature

- ✓ RF: 140-164GHz
- ✓ LO: 11.6-13.65GHz
- ✓ IF: DC-6GHz
- ✓ Low Conversion Loss
- ✓ Low LO power requirement

#### Application

- ✓ D band Imaging
- ✓ FOD (Foreigner Objects Debris)
- ✓ Test Equipment
- ✓ ROF (RF Over Fiber)
- ✓ Radar System

#### Diagram Block





# AT-IQHM-140164

140-164GHz IQ Mixer

## Mechanical Information

Parameter	Description
RF Port	WR-06
LO Port	SMA Female
IF Port	SMA Female
Weight	To be added
Dimension	See outline

## Absolute Maximum Ratings Table

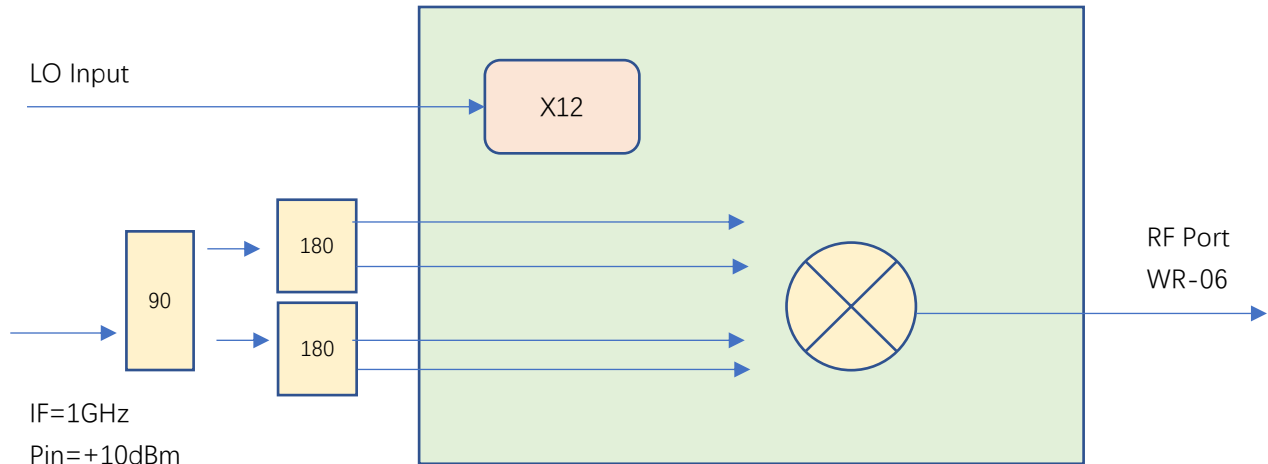
Parameter	Value
IF Power/ch	+7dBm
RF Port	+3dBm
LO Port	+15dBm
Operating Temperature	0 to +50C
Storage Temperature	-55 to +125C

## Notes:

1. Datasheet may be changed according to update of MMIC, Raw materials , process, and so on.
2. This data is only for reference, not for guaranteed specifications.
3. Please contact AT Microwave team to make sure you have the most current data.



### Electrical Specifications-Up Converter



Tx Test Set-up, IF=1GHz, Input=0dBm/ch

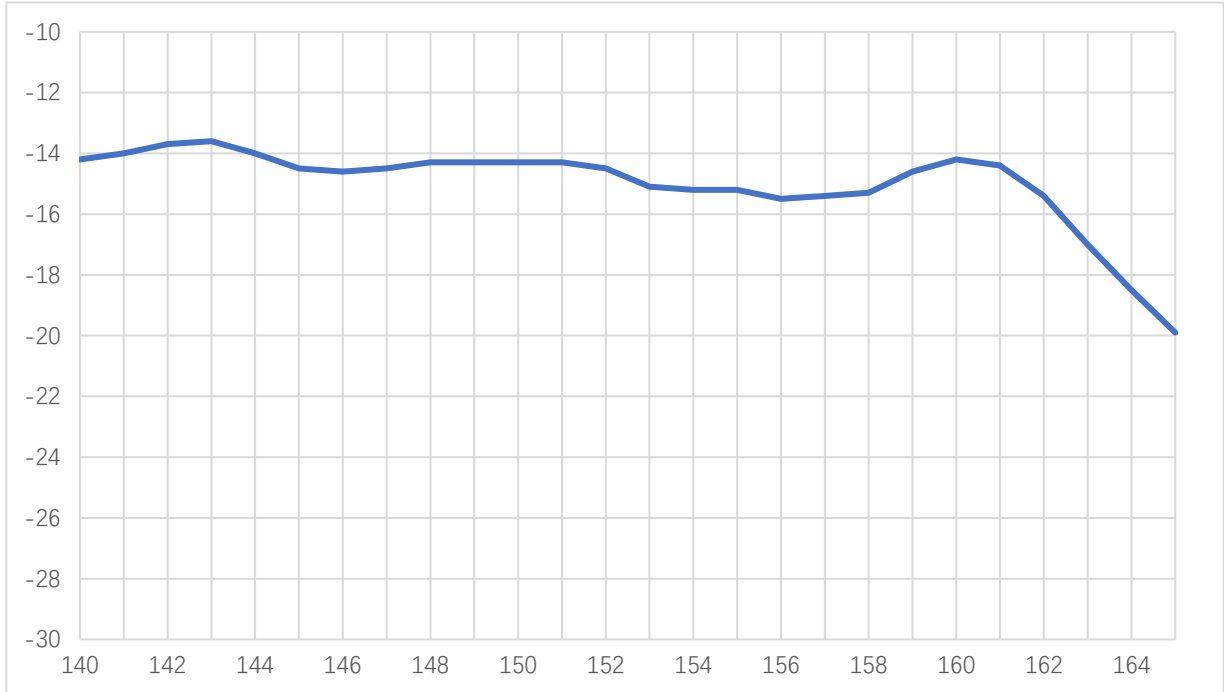
Parameter	Min	Typical	Max
RF		140-164 GHz	
LO		11.6-13.65 GHz	
LO Driver	+3dBm	+5 dBm	+10
LO AMC (Amplified Multiplier Chain)		X12	
IF Range		DC-6 GHz	
Input P1dB		-8dBm/ch	
Band Side Rejection, No calibration (Note1)		-15dBc	
12XLO to RF Isolation. LO=+5dBm No calibration (Note2)	-20dBc	-30dBc	
12XLO Power Leakage to RF Port No calibration (Note2)		-25dBm	-18dBm
Temp Spec		25C	

Note 1: Adjust I/Q Balance for better band side rejection.

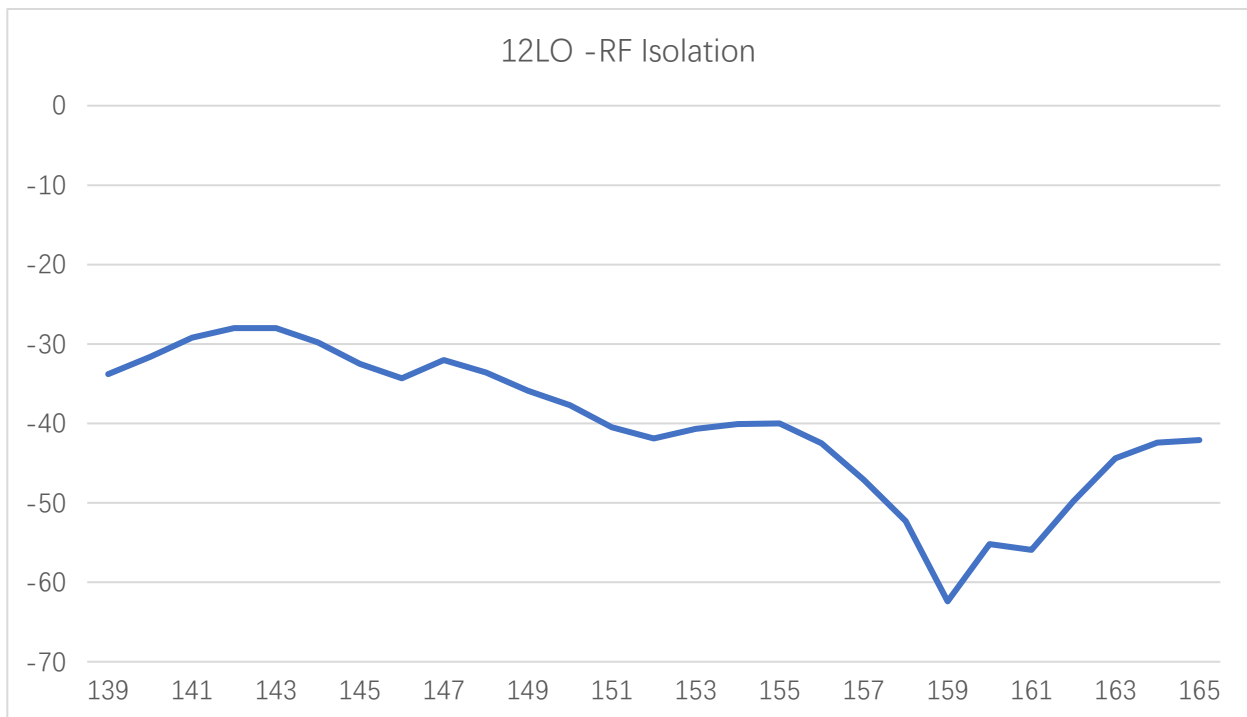
Note 2: No calibration. Apply DC offset to I+/-, Q+/- for better LO cancellation;

Note 3: All test data are not calibration is not specified.





Pout vs Frequency, IF Pin=0dBm/ch



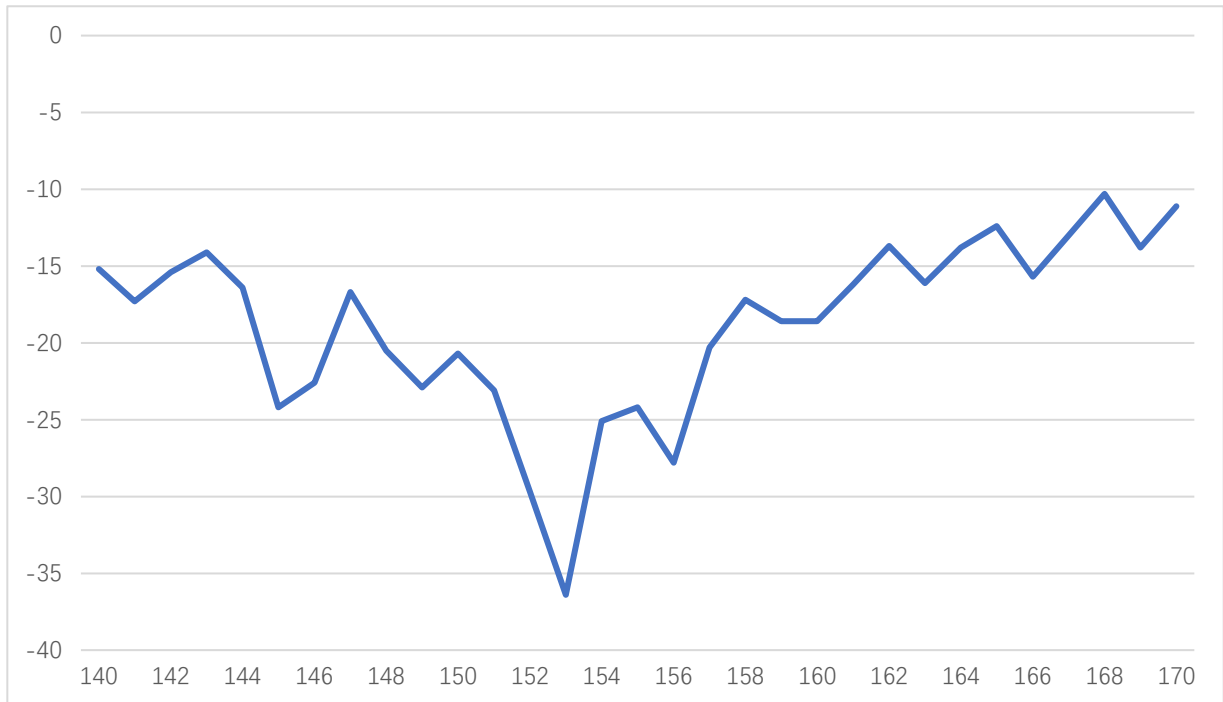
12XLO-RF Isolation, LO=+5dBm





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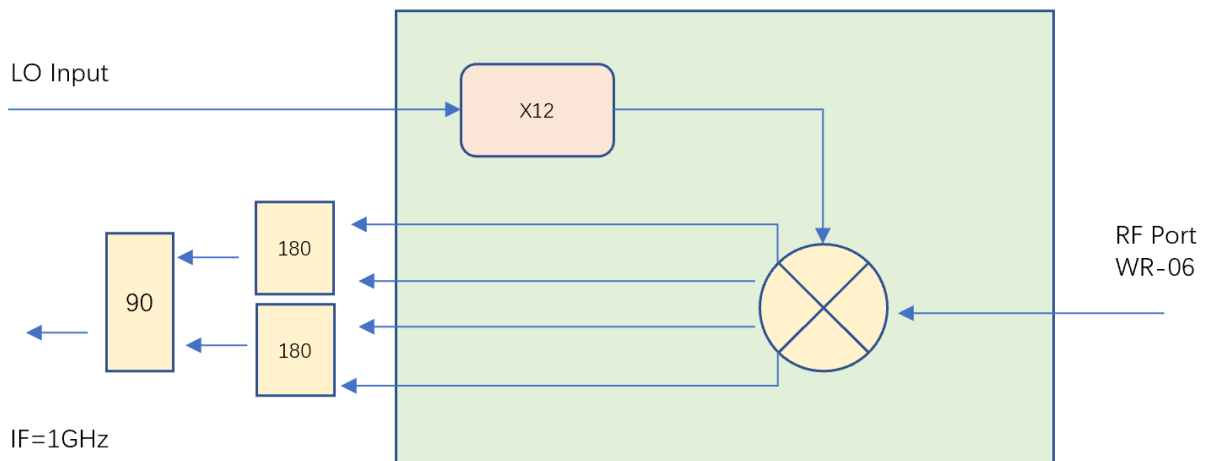


Low side band Rejection



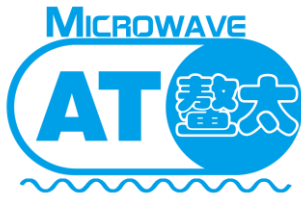
### Electrical Specifications-Down-Converter

Parameter	Min	Typical	Max
RF		140-164 GHz	
LO		11.6-13.65 GHz	
LO Driver	+3dBm	+5 dBm	+10
LO AMC (Amplified Multiplier Chain)		X12	
IF Range		DC-6 GHz	
Conversion Loss	-30dB	-24 dB/ch	
Imaging Rejection Rx Test		-15 dBc	
Temp Spec		25C	



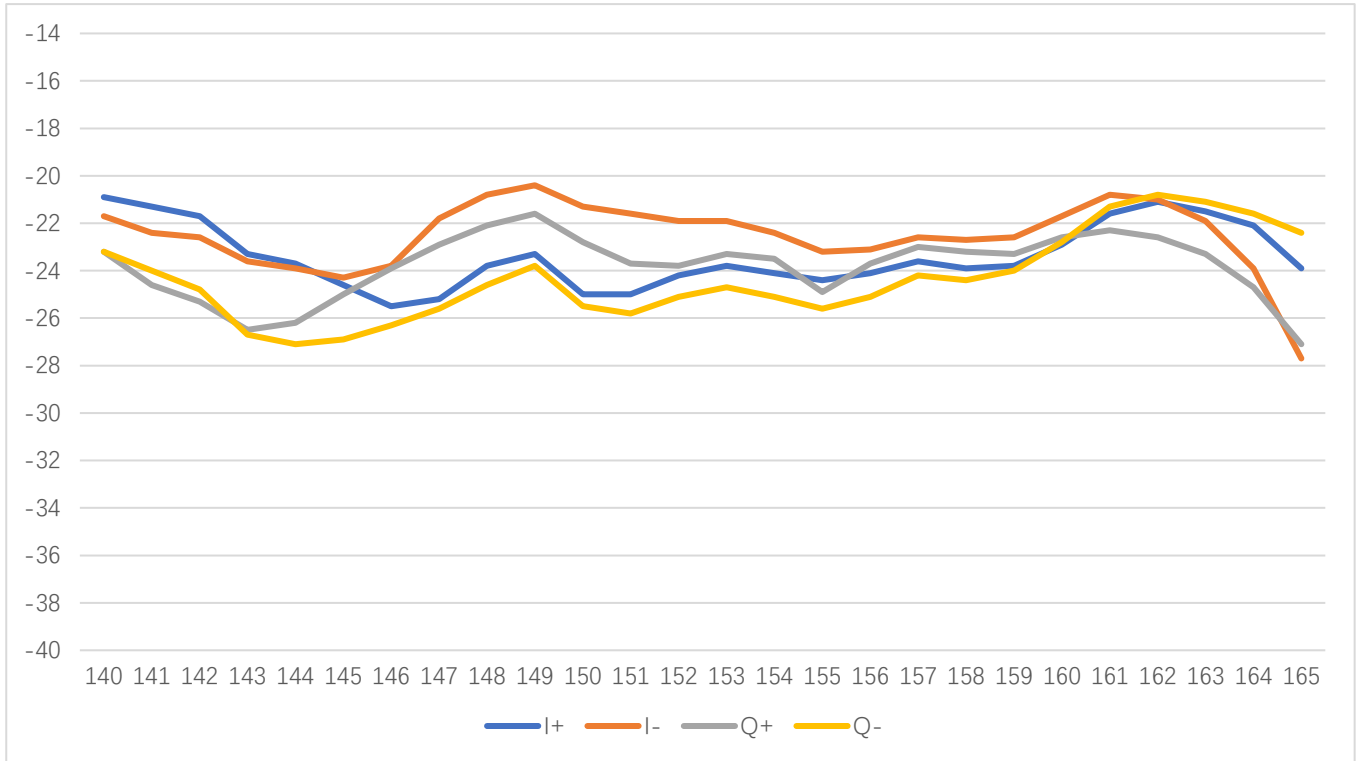
Rx Test Set-up, IF=1GHz, RF input=-20dBm





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140-164GHz IQ Mixer



Conversion Loss /ch vs Frequency



### Application Note

Mixer is a three port component with RF, LO and IF ports. Normally, a mixer can be used both up and down converter application. Take up converter for example:

#### General Balance Mixer

For general balance mixer,  $RF = LO \pm IF$ . There will be both high end  $LO+IF$  and Low End  $LO-IF$ . Take for example,  $IF=2GHz$ ,  $LO=94GHz$ , so there will be  $92GHz$  and  $96GHz$  at RF port with same power level.

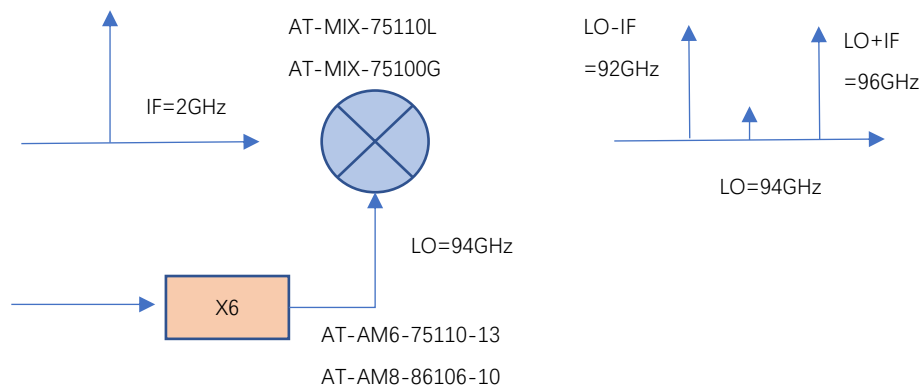


Figure A: General Balance Mixer with Both High and Low Side Output

#### IQ Mixer used as side suppression Mixer

When  $IF=2GHz$ , 90 degree hybrid is used at IF port, and IF applies to Input 1 Port of hybrid, you will have high end frequency  $RF=LO+IF=96GHz$ , while have side suppression (say  $-25dBc$ ) at Low end frequency  $92GHz$ .

When you need low end frequency  $92GHz$ , and make side suppression for high end frequency  $96GHz$ , just applies IF to Input 2 of the hybrid.

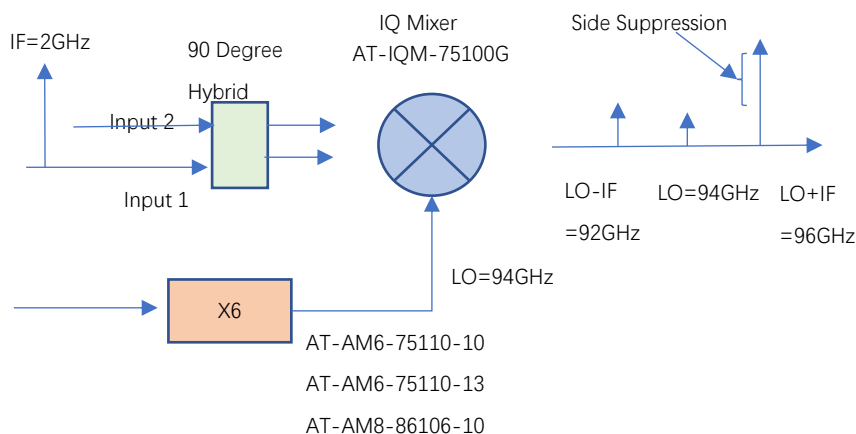


Figure B: IQ Mixer works as side suppression mixer





### Dimension (mm)

