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AMMP-6546

18 to 40 GHz GaAs MMIC Sub-Harmonic Mixer
In SMT Package

Data Sheet

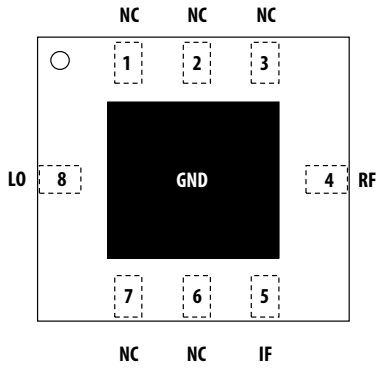
Description

Avago's AMMP-6546 is an easy-to-use broadband sub-harmonic mixer, with the LO injected at half of the frequency of that required by a conventional mixer. AMMP-6546 is similar to AMMP-6545 except that the layout is a mirror image designed to ease integration into transmitter or receiver designs. The MMIC includes an 180° balanced diode based mixer. The MMIC is fabricated using PHEMT technology. The surface mount package allows elimination of "chip & wire" assembly for lower cost. This MMIC is a cost effective alternative to multi-chip solution that have higher loss and complex assembly.

Applications

- Microwave radio systems
- Satellite VSAT, DBS up/down link
- LMDS & Pt-Pt mmW long haul
- Broadband wireless access (including 802.16 and 802.20 WiMax)
- WLL and MMDS loops

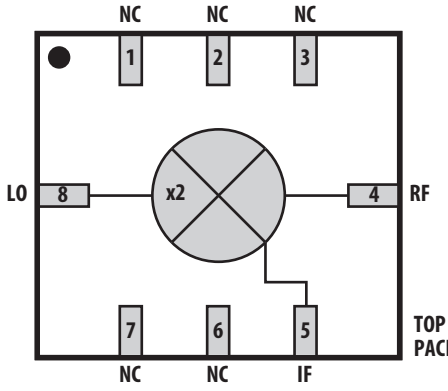
Package Diagram



Features

- RF Frequency : 18-40 GHz
- LO Frequency : 9-20 GHz
- IF Frequency : DC-3.5 GHz
- 5x5 mm Surface Mount Package
- Suitable for Up and Down Conversion
- Diode Mixer
- **Typical Performance at RF= 21GHz**
  Conversion Loss : 11 dB
  IIP3 : +12 dBm
  2LO-R Leakage : -44 dBm
  2LO-I Leakage : -61 dBm
- **Typical Performance at RF= 23GHz**
  Conversion Loss : 10 dB
  IIP3 : +11.7 dBm
  2LO-R Leakage : -40 dBm
  2LO-I Leakage : -64 dBm
- **Typical Performance at RF= 26GHz**
  Conversion Loss : 11 dB
  IIP3 : +11.8 dBm
  2LO-R Leakage : -42 dBm
  2LO-I Leakage : -60 dBm

Functional Block Diagram



PIN	FUNCTION
1	NC
2	NC
3	NC
4	RF
5	IF
6	NC
7	NC
8	LO

Attention: Observe precautions for handling electrostatic sensitive devices.
ESD Machine Model (Class A) : 30V
ESD Human Body Model (Class 0) :100V
Refer to Avago Application Note A004R: Electrostatic Discharge, Damage and Control.

Note: MSL Rating - Level 2A

Electrical Specifications

1. Small/Large -signal data measured in a fully de-embedded test fixture form TA = 25°C.
2. Pre-assembly into package performance verified 100% on-wafer.
3. This final package part performance is verified by a functional test correlated to actual performance at one or more frequencies.
4. Specifications are derived from measurements in a 50 Ω test environment. Aspects of the amplifier performance may be improved over a more narrow bandwidth by application of additional conjugate, linearity, or low noise (Γopt) matching.
5. NF is measure on-wafer. Additional bond wires (-0.2nH) at Input could improve NF at some frequencies.

Table 1. RF Electrical Characteristics [1,2]

TA=25°C, Zo=50 Ω, LO=+15dBm, IF=2GHz

	RF=21GHz, LO=11.5GHz			RF=23GHz, LO=12.5GHz			RF=26GHz, LO=14GHz			
Parameter	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
Conversion Loss, CL		11	12		10	12		11	12	dB
Input Third Order Intercept, IIP3	11	12		10.5	11.7		8.5	11.8		dB
2LO-R Leakage, 2LO-R		-44	-35		-40	-35		-42	-30	dBm
2LO-I Leakage, 2LO-I		-61	-52.5		-64	-51.7		-60	-54	dBm
	RF=18-30GHz, LO=9-15GHz			**RF=30-40GHz, LO=15-20GHz**						
L-R Leakage, L-R		-30			-35					dB
L-I Leakage, L-I		-35			-30					dB

Note:
1. Production RF tested at 21, 23 and 26 GHz in up-converter configuration at Low Side LO.
2. All tested parameters are guaranteed with the following measurement accuracy:
   RF=21GHz: ±1 dBm for RF-leakage, ±2.0 dBm for IF-leakage, ±0.5dB for Conversion Loss, ±0.5 dBm for IIP3
   RF=23GHz: ±1 dBm for RF-leakage, ±2.5 dBm for IF-leakage, ±0.5dB for Conversion Loss, ±0.5 dBm for IIP3
   RF=26GHz: ±1 dBm for RF-leakage, ±2.5 dBm for IF-leakage, ±0.5dB for Conversion Loss, ±0.5 dBm for IIP3

Table 2. Recommended Operating Range

1. Ambient operational temperature TA = 25°C unless otherwise noted.

Parameter	Min.	Typical	Max.	Unit	Comments
RF Frequency, RFfreq	18		40	GHz	
LO Frequency, LOfreq	9		20	GHz	
IF Frequency, IFfreq	DC		3.5	GHz	
LO Power, LO	+12	+15	+22	dBm	

Absolute Minimum and Maximum Ratings

Table 3. Minimum and Maximum Ratings

Parameter	Min.	Max.	Unit	Comments
RF CW Input Power, Pin		+25	dB	
Storage Temperature, Tstg	-65	+150	°C	
Maximum Assembly Temperature, Tmax		300	°C	60 second maximum

Notes:
1. Operation in excess of any one of these conditions may result in permanent damage to this device.

AMMP-6546 Typical Performance Curves

(T_A = +25°C, Zin=Zout=50Ω, IF Freq = 2GHz, LO Power = +15dBm unless noted)

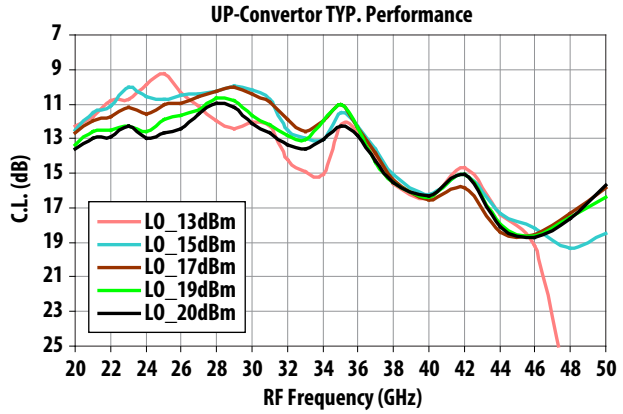


Figure 1. Up-conversion loss at LO = +13 to +20 dBm (high side LO)

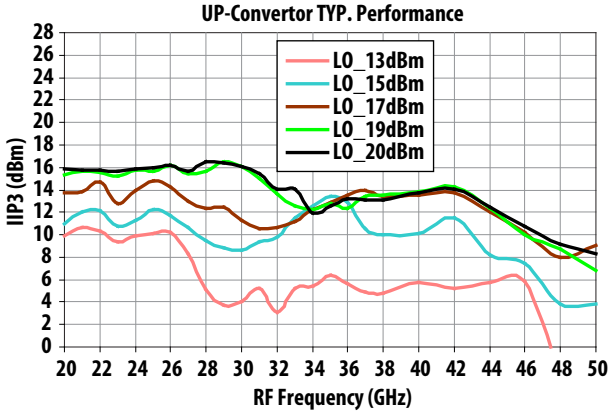


Figure 2. Up-conversion IIP3 at LO = +13 to +20 dBm (high side LO)

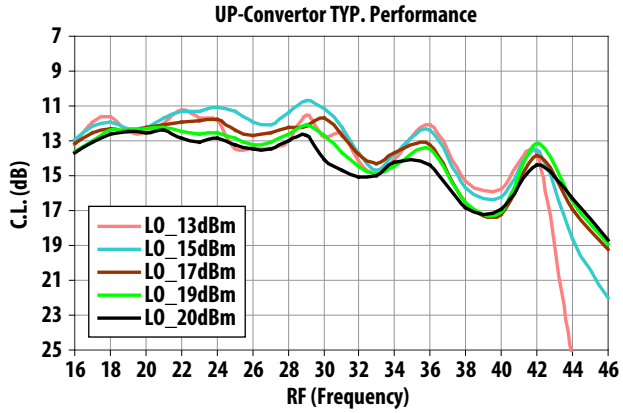


Figure 3. Up-conversion loss at LO = +13 to +20 dBm (low side LO)

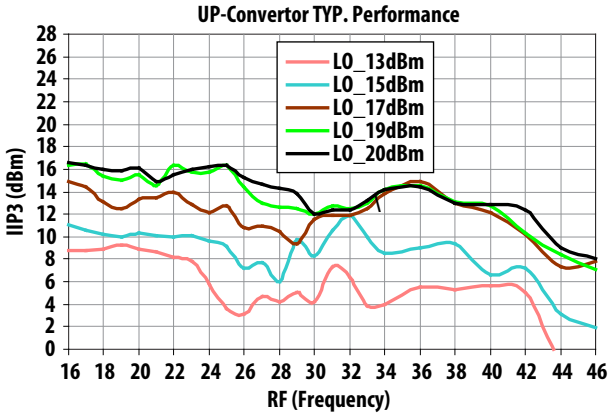


Figure 4. Up-conversion IIP3 at LO = +13 to +20 dBm (low side LO)

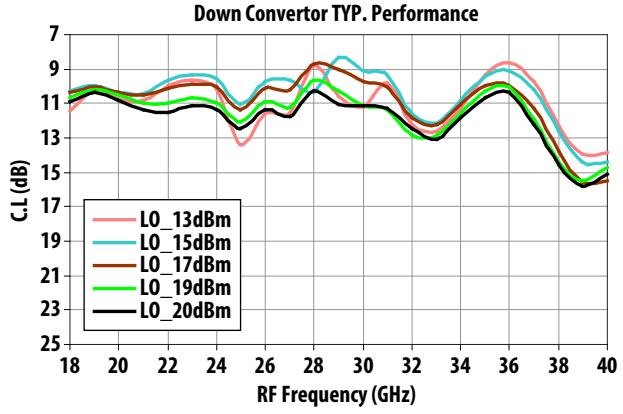


Figure 5. Down-conversion loss at LO = +13 to +20 dB (low side LO)

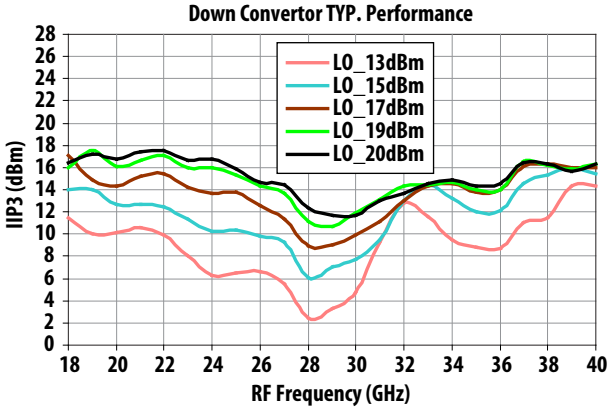


Figure 6. Down-conversion IIP3 at LO = +13 to +20 dBm (low side LO)

Notes:

1. Typical values were derived using limited samples during initial product characterization and may not be representative of the overall distribution.

AMMP-6546 Typical Performance Curves

(T_A = +25°C, Zin=Zout=50Ω, IF Freq = 2GHz, LO Power = +15dBm unless noted)

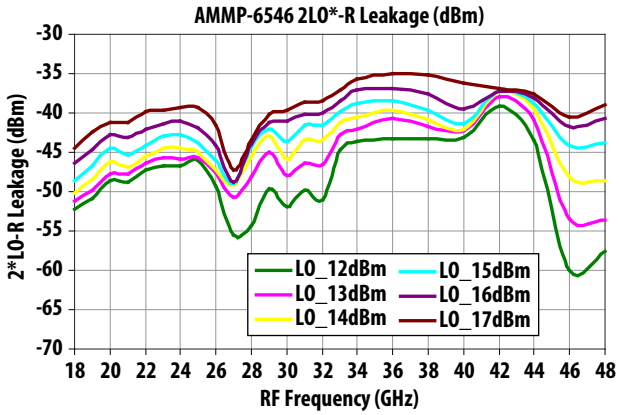


Figure 7. 2*LO-R leakage at LO = +12 to +17 dBm

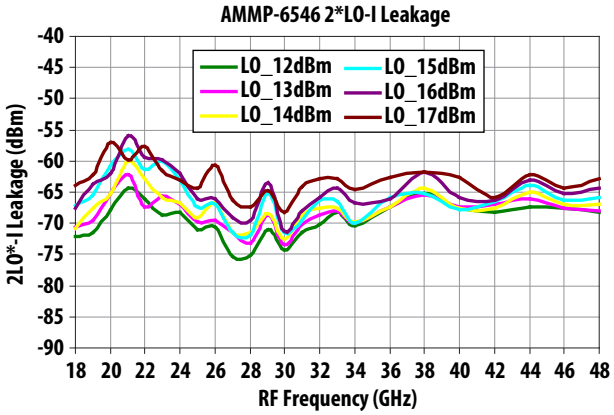


Figure 8. 2*LO-I leakage at LO = +12 to +17 dBm

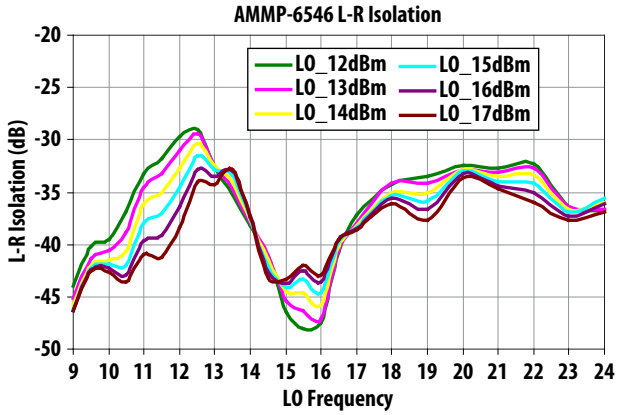


Figure 9. L-R isolation at LO = +12 to +17dBm

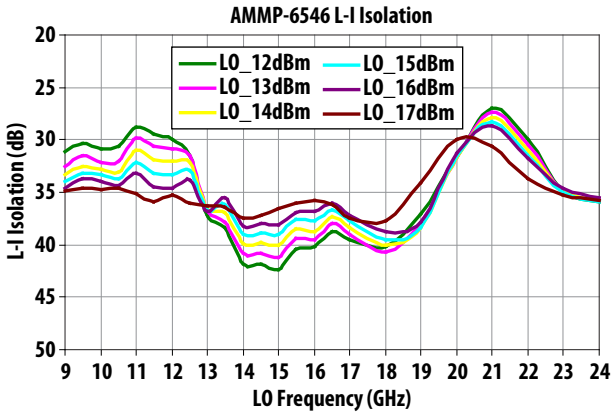


Figure 10. L-I isolation at LO = +12 to +17dBm

Notes:

1. Typical values were derived using limited samples during initial product characterization and may not be representative of the overall distribution.

AMMP-6546 Application and Usage

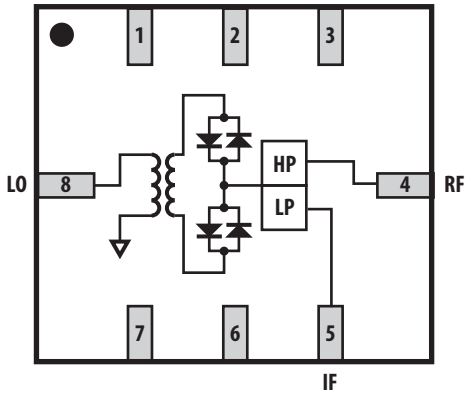


Figure 11. Simplified schematic of the mixer

Package Dimension, PCB Layout and Tape and Reel information

Please refer to Avago Technologies Application Note 5520, AMxP-xxxx production Assembly Process (Land Pattern A).

AMMP-6546 Part Number Ordering Information

Part Number	No. of Devices	Container
AMMP-6546-BLKG	10	antistatic bag
AMMP-6546-TR1G	100	7″ Reel
AMMP-6546-TR2G	500	7″ Reel

For product information and a complete list of distributors, please go to our web site: **www.avagotech.com**

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