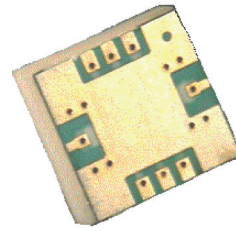


# AMMP-6545

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



## Data Sheet



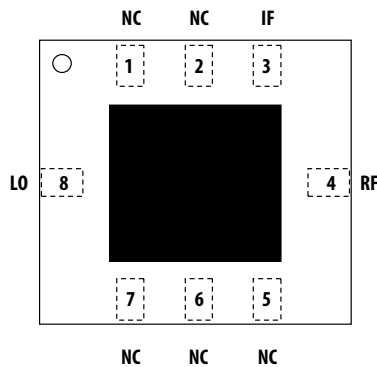
### Description

Avago's AMMP-6545 is an easy-to-use broadband sub-harmonic mixer, with the LO injected at half the frequency of that required by a conventional mixer. 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

### Performance

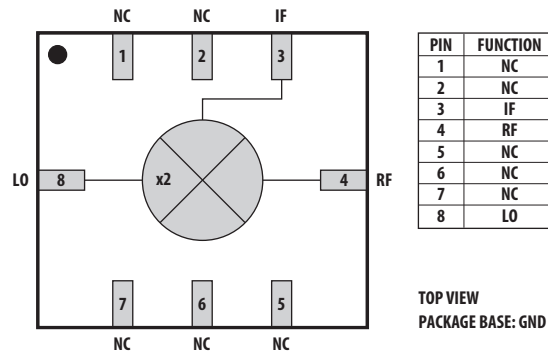
#### Typical 18-30 GHz

- Conversion Loss : 11 dB
- IIP3 : +11 dBm
- 2LO-R Leakage : -45 dBm
- 2LO-I Leakage : -60 dBm

#### Typical 30-40 GHz

- Conversion Loss : 13 dB
- IIP3 : +12 dBm
- 2LO-R Leakage : -40 dBm
- 2LO-I Leakage : -55 dBm

### Functional Block Diagram



**Attention: Observe precautions for handling electrostatic sensitive devices.**

ESD Machine Model (Class A) : 30V  
ESD Human Body Model (Class 0) : 100V  
Refer to Avago Technologies 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**

TA=25°C, Zo=50 Ω, LO=+15dBm, IF=2GHz

Parameter	RF=18-30GHz, LO=9-15GHz			RF=30-40GHz, LO=15-20GHz			Unit	Comment
	Min	Typ	Max	Min	Typ	Max		
Conversion Loss, CL <sup>[1]</sup>		11	12		13		dB	
Input Third Order Intercept, IIP3 <sup>[1]</sup> RF: 18-24GHz	10.5	11			12		dBm	
Input Third Order Intercept, IIP3 <sup>[1]</sup> RF: 24-30GHz	8.5	11			12		dBm	
2LO-R Leakage, 2LO-R		-45	-40		-40		dBm	
2LO-I Leakage, 2LO-I		-60	-50		-55		dBm	
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 upconverter configuration

All tested parameters are guaranteed with the following measurement accuracy:

RF=18-24 GHz: ±0.8 dBm for RF-leakage, ±2.5 dBm for IF-leakage, ±1.2dB for Conversion Loss, ±0.5 dBm for IIP3

RF=24-30 GHz: ±0.8 dBm for RF-leakage, ±4.0 dBm for IF-leakage, ±0.6 dB for Conversion Loss, ±0.5 dBm for IIP3

**Table 2. Recommended Operating Range**

1. Ambient operational temperature TA = 25°C unless otherwise noted.
2. Channel-to-backside Thermal Resistance (Tchannel (Tc) = 34°C) as measured using infrared microscopy. Thermal Resistance at backside temperature (Tb) = 25°C calculated from measured data.

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	
Min Ambient Operating Temp, Tmin	-55			°C	
Max Ambient Operating Temp, Tmax			+125	°C	

## Absolute Minimum and Maximum Ratings

**Table 3. Minimum and Maximum Ratings**

Pin	Min.	Max.	Unit	Comments
RF CW Input Power, Pin		25	dB	
Storage Temperature, Tstg	-65	+150	°C	
Maximum Assembly Temperature, Tmax		260	°C	20 second maximum

Notes:

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

# AMMP-6545 Typical Performance

( $T_A = 25^\circ\text{C}$ ,  $Z_{in} = Z_{out} = 50 \Omega$ , IF Freq = 2 GHz, LO Power = +15 dBm unless noted)

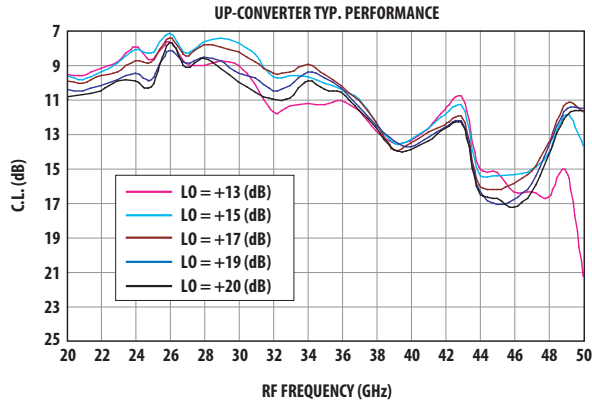


Figure 1. Up-conversion loss at LO = +13 to +20 dBm (high side LO)

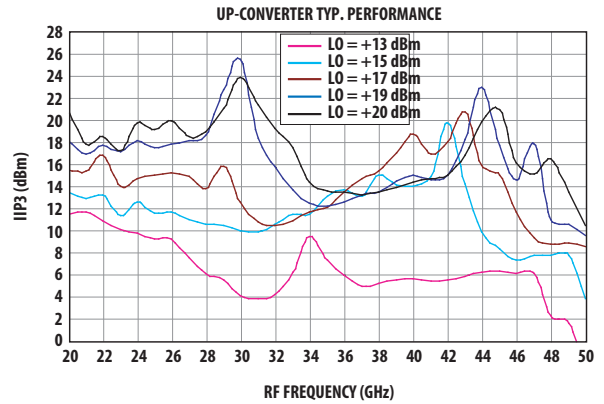


Figure 2. Up-conversion IIP3 at LO = +13 to +20 dBm (high side LO)

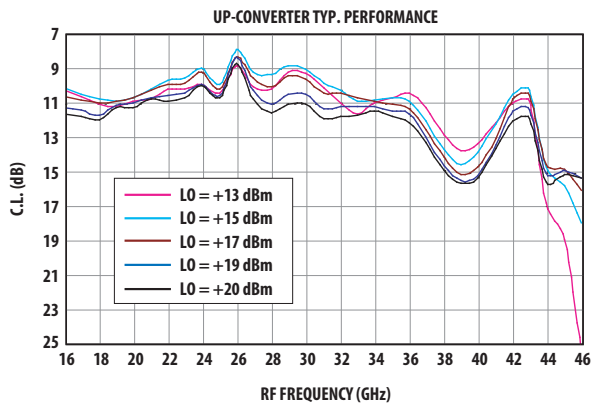


Figure 3. Up-conversion loss at LO = +13 to +20 dBm (low side LO)

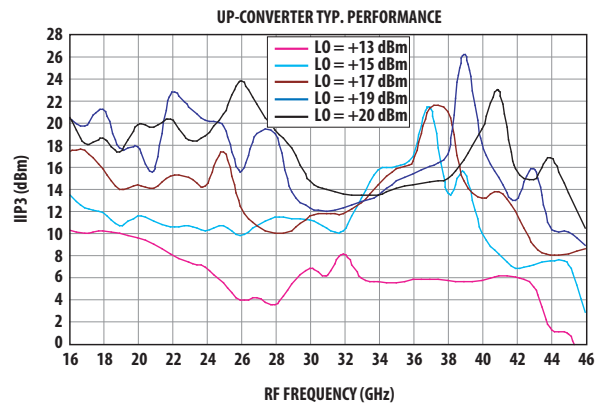


Figure 4. Up-conversion IIP3 at LO = +13 to +20 dBm (low side LO)

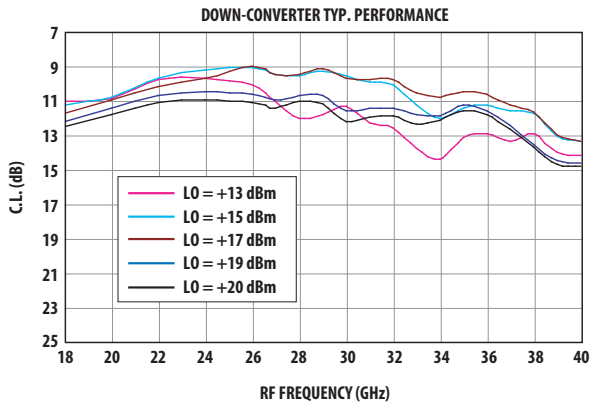


Figure 5. Down-conversion loss at LO = +13 to +20 dB (low side LO)

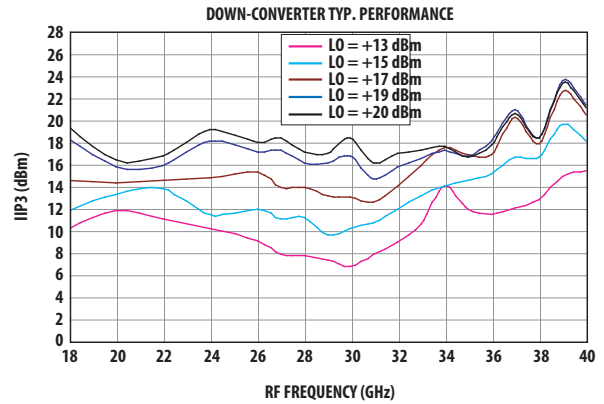


Figure 6. Down-conversion IIP3 at LO = +13 to +20 dBm (low side LO)

## AMMP-6545 Typical Performance

( $T_A = 25^\circ\text{C}$ ,  $Z_{in} = Z_{out} = 50 \Omega$ ), IF Freq = 2 GHz, LO Power = +15 dBm unless noted)

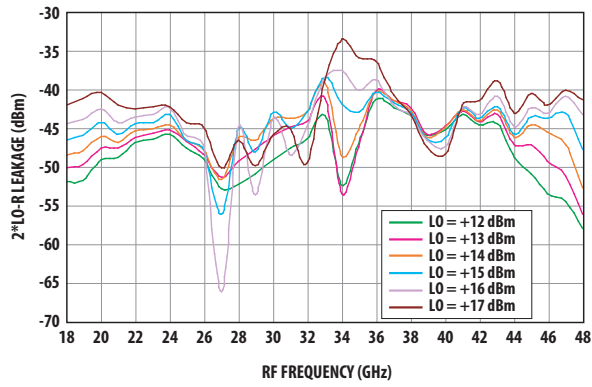


Figure 7. 2\*LO-R leakage at LO = +12 to +17 dBm

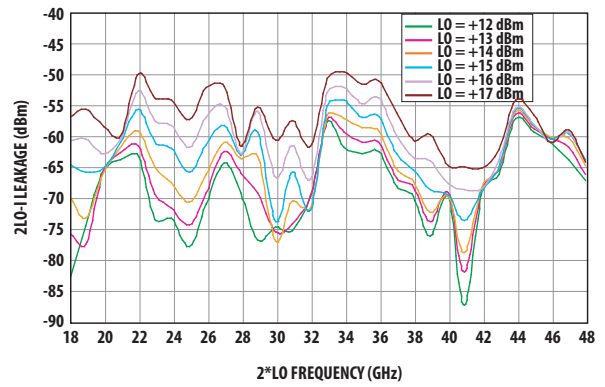


Figure 8. 2\*LO-I leakage at LO = +12 to +17 dBm

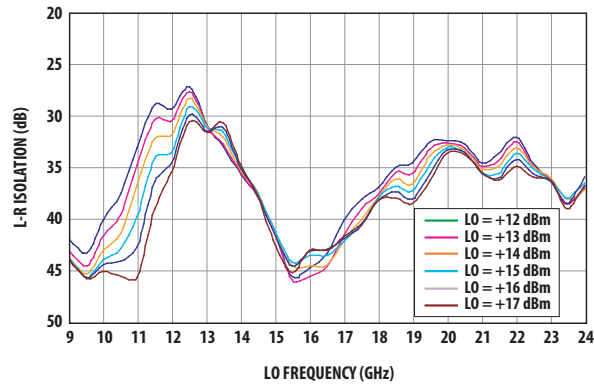


Figure 9. L-R isolation at LO = +12 to +17 dBm

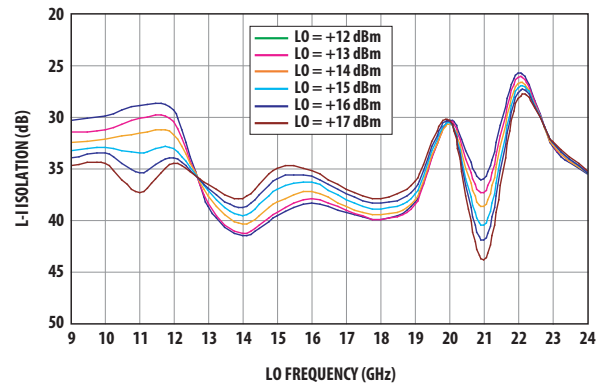


Figure 10. L-I isolation at LO = +12 to +17 dBm

## 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-6545 Part Number Ordering Information

Part Number	Devices per Container	Container
AMMP-6545-BLKG	10	Antistatic bag
AMMP-6545-TR1G	100	7" Reel
AMMP-6545-TR2G	500	7" Reel

For product information and a complete list of distributors, please go to our website: [www.avagotech.com](http://www.avagotech.com)

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