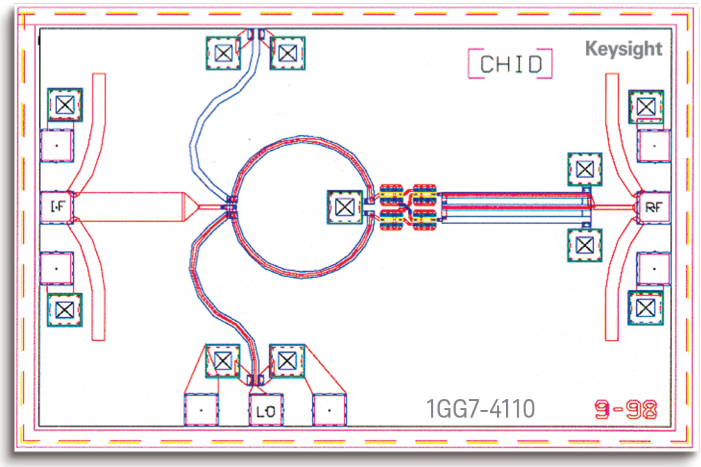
Keysight 1GG7-4110
40 GHz Double Balanced Mixer

Data Sheet



Features

- Frequency range:
  20 to 43.2 GHz LO
  20 to 40 GHz RF
  DC to 20.7 GHz IF
- Conversion loss:
  Typically <10 dB
- Isolation:
  LO-RF: 40 dB
  LO-IF: 30 dB
  RF-IF: 25 dB

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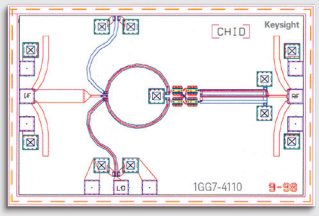
Description

The 1GG7-4110 is a double balanced ring-diode mixer capable of operation from 20 to 43.2 GHz on the LO, 20 to 40 GHz on the RF, and DC to 20.7 GHz on the IF port. The design is optimized for maximum LO-RF isolation and good conversion efficiency over broad frequency ranges. The mixer is fabricated in Keysight Technologies, Inc.'s GaAs process.



- Chip size: 1540 x 1030 µm (60.6 x 40.6 mils)
- Chip size tolerance: ±10 µm (±0.4 mils)
- Chip thickness: 127 ±15 µm (5.0 ±0.6 mils)
- Pad dimensions: 70 x 70 µm (2.8 x 2.8 mils)

Absolute maximum ratings[1]

Symbol	Parameters/conditions	Min.	Max.	Units
I_{dc}	DC current, RF, LO and IF ports	–20	+20	mA
P_{in}	RF input power, any port		23	dBm
T_{op}	Operating temperature	–55	+100	°C
T_{st}	Storage temperature	–65	+165	°C
T_{max}	Max assembly temperature		+200	°C
ESD	Electrostatic discharge @ IF port (human body model)	–1000	+1000	Volts

1. Operation in excess of any one of these may result in permanent damage to this device. T_A = 25 °C except for T_{op}, T_{st}, and T_{max}.

DC specifications/physical properties

(T_A = 25 °C)

Symbol	Parameters/conditions	Min.	Typ.	Max.	Units
$V(f)_{IF}$	IF port voltage @ 200 µA DC, no LO drive		0.62		Volts

RF specifications

(T_A = 25 °C, Z_0 = 50 Ω, LO drive level = 16 dBm nominal, RF input power level = –8 dBm nominal)

Symbol	Parameters/conditions	Min.	Typ.	Max.	Units
Ce_10ghz	Conversion loss, LO = 32 GHz, RF = 22 GHz, IF=10 GHz		8.2	9.5	dB
Ce_20.5ghz	Conversion loss, LO = 42.5 GHz, RF = 22 GHz, IF = 20.5 GHz		8	9.5	dB
Ce_2ghz	Conversion loss, LO = 32 GHz, RF = 30 GHz, IF = 2 GHz		7	9.5	dB
LO_IF30	L–I isolation, LO = 30 GHz	25	29		dB
LO_IF40	L–I isolation, LO = 40 GHz	25	32		dB
LO-RF	LO–RF isolation, LO 20 to 46 GHz, 16 dBm nominally		40		dB
LO-IF	LO–IF isolation, LO 20 to 46 GHz 16 dBm nominally		24		dB
RF_IF22	RF–IF isolation, LO 32 GHz, RF 22 GHz	20	24		dB
RF_IF30	RF–IF isolation, LO 32 GHz, RF 30 GHz	20	24		dB
Spur12ghz	2R–L spur @ 12 GHz, L = 32 GHz, R = 22 GHz	40	50		dBc
Spur2ghz	3R–2L spur @ 2 GHz, L = 32 GHz, R = 22 GHz	40	56		dBc
Spur8ghz	4R–3L spur @ 8 GHz, L = 32 GHz, R = 22 GHz	50	59		dBc
Tempco	Conversion loss temperature coefficient, LO = 32 GHz, RF = 30 GHz, IF = 2 GHz		–0.0042		dB/°C

Applications

The 1GG7-4110 can be used in instrumentation, communications, radar, ECM, EW, and many other systems requiring frequency conversion. It can also be used for bi-phase modulation and phase detection.

Assembly Techniques

Die attach should be done with conductive epoxy. Gold thermosonic bonding is recommended for all bonds. The top and bottom metallization is gold.

GaAs MMICs are ESD sensitive. ESD preventive measures must be employed in all aspects of storage, handling, and assembly.

MMIC ESD precautions, handling considerations, die attach and bonding methods are critical factors in successful GaAs MMIC performance and reliability.

Keysight's, *GaAs MMIC ESD, Die Attach and Bonding Guidelines - Application Note* (5991-3484EN) provides basic information on these subjects.

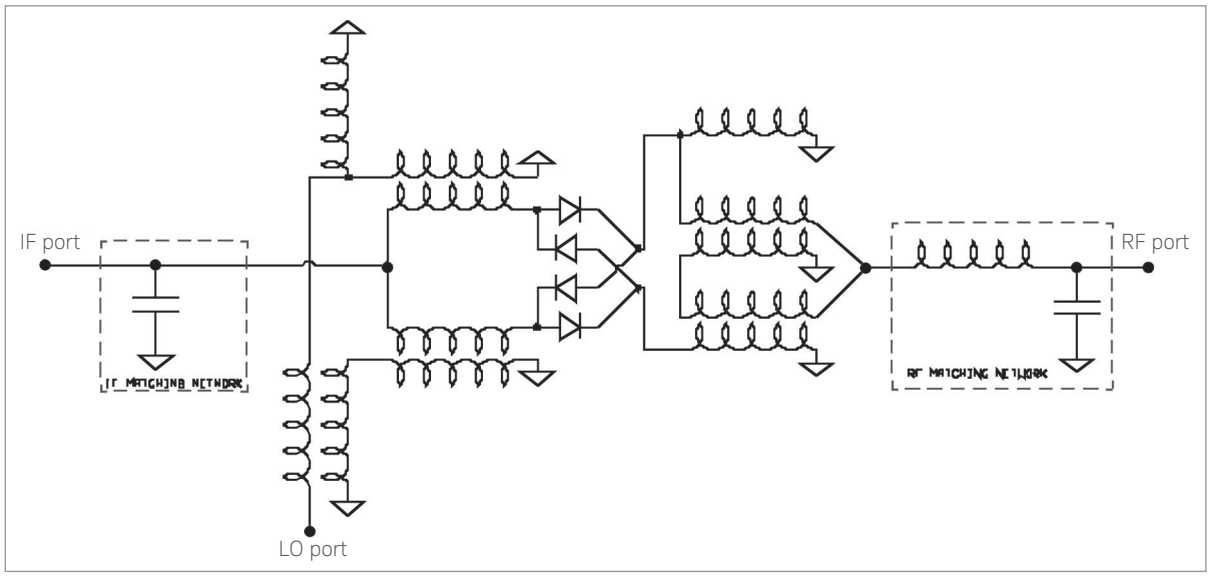


Figure 1. 1GG7-4110 simplified schematic

Supplemental Data

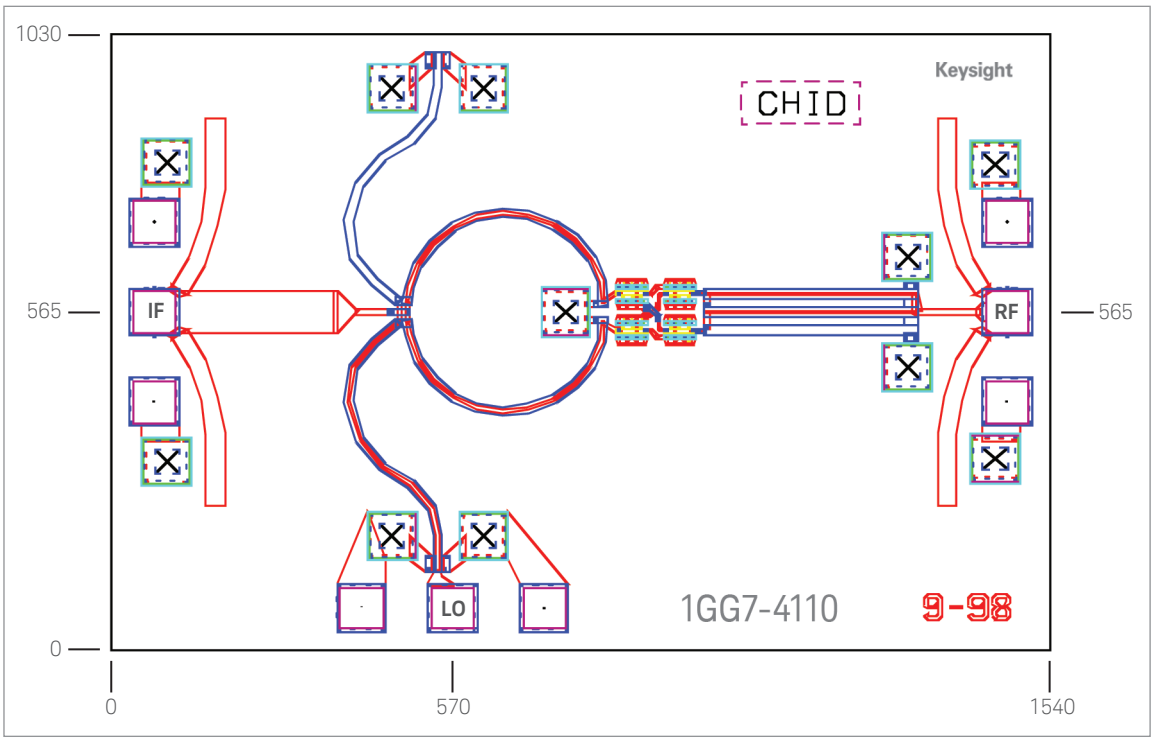


Figure 2. 1GG7-4110 bonding pad positions (shown in micrometers). Centers of bonding pads nominally in 70 µm from edge of substrate.

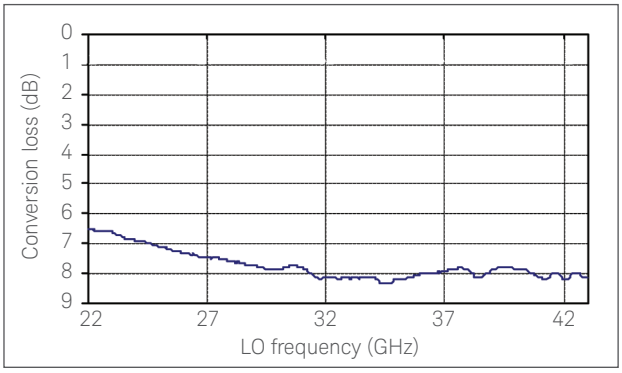


Figure 3. 1GG7-4110 conversion loss with RF frequency = 22 GHz (LO drive = 16 dBm)

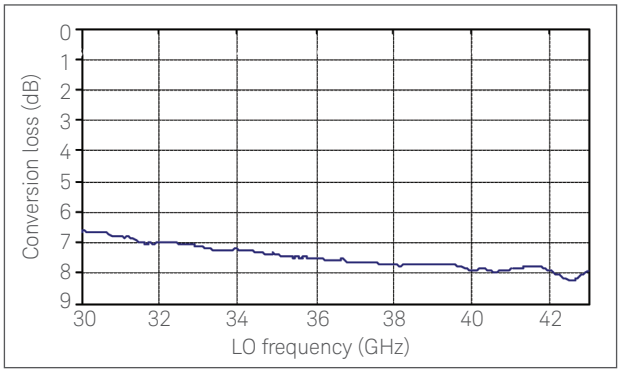


Figure 4. 1GG7-4110 conversion loss with RF frequency = 30 GHz (LO drive = 16 dBm)

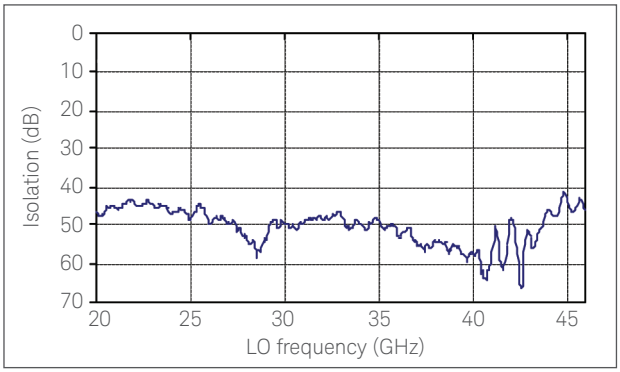


Figure 5. 1GG7-4110 LO-RF isolation (LO drive = 16 dBm)

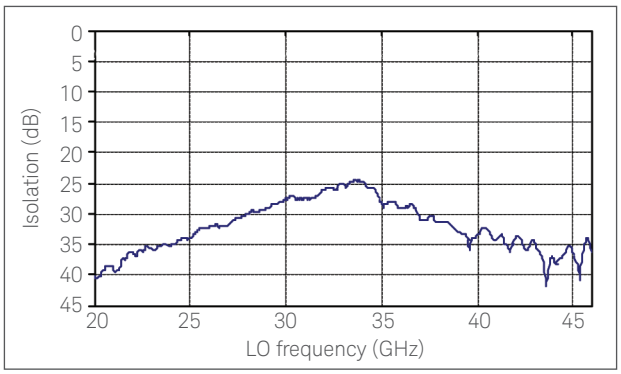


Figure 6. 1GG7-4110 LO-IF isolation (LO drive = 16 dBm)

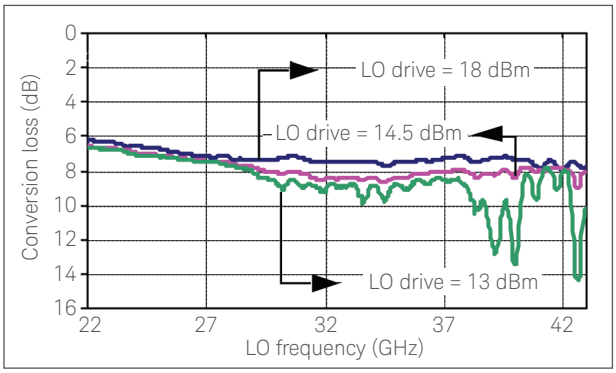


Figure 7. 1GG7-4110 conversion loss for various LO drive levels (RF frequency = 22 GHz)

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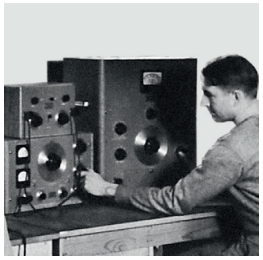

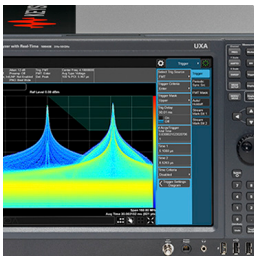

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The product described in this data sheet is RoHS Compliant. See RoHS Compliance section for more details.

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