

Keysight TC627P

GaAs Integrated 0.01-26.5 GHz Directional Detector Packaged

HMMC-5634-BLK (Waffle Pack)

HMMC-5634-TR1 (Tape & Reel)

Data Sheet

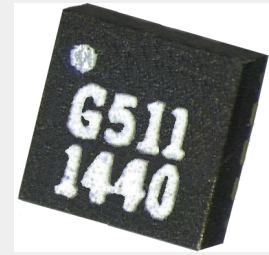


Features

- Frequency Range:
0.01 to 26.5 GHz
- Return Loss:
> 12 dB Typical
- Insertion Loss:
< 1.7 dB Typical
- Sensitivity:
> 21 mV/mW Typical
- Max. Input Power:
30 dBm @ 70°C
3:1 Source VSWR
9:1 Load SWR
- Negative Detector Polarity
- RoHS Compliant and Compatible
- 2mm x 2mm Surface Mount QFN
Package

Description

The TC627P is a high power, low-loss, directional detector with a capacitor and resistors on an integrated diode chip. It is fabricated using the MB6A process. An external DC blocking capacitor is required in the RF_{IN} and RF_{OUT} 50Ω lines if there is DC voltage on these lines.



Package Type:
16-Lead Quad Flat - No Leads
(SMT QFN)

Package Dimensions:
2.0 x 2.0 mm (0.079 x 0.079 in)

Package Thickness:
0.85 ± 0.10 mm (0.033 ± 0.0039 in)

Lead Pitch:
0.40 mm (0.016 in)

Lead Width:
0.20 mm (0.008 in)

Absolute Maximum Ratings^[1]

Symbol	Parameters/conditions	Minimum	Maximum	Units
P_{IN}	RF Input Power ^[2]		30	dBm
T_{bs} ^[3]	Package Backside Temperature	-40	+70	°C
T_{stg}	Storage Temperature	-65	150	°C
T_{assy} ^[4]	Max Solder Reflow Temperature (max. 3 cycles @ 30 sec./cycle)		260	°C

1. Operation in excess of any one of these ratings may result in permanent damage to this device.
2. 3:1 source SWR and 9:1 load SWR, see Figure 6.
3. Operates safely into 3:1 source SWR and 9:1 load SWR of arbitrary phases at 30 dBm power
4. Refer to JEDEC J-STD-020D for detailed reflow profile, three reflows maximum.

DC Specifications^[1]

Symbol	Parameters/conditions	Min	Typical	Max	Units
Sens	Sensitivity		21		mV/mW
R_V	Video Resistance		1.5		k Ω
R_2	R_2 at 20 mA (includes trace resistance)		5.6		Ω
R_3	R_3 at 5 mA		50		Ω
R_4	R_4 at 5 mA		500		Ω
R_{DC}	Resistance DET2 to grounded RF OUT with all other pads open		8.5		k Ω

1. $T_A = 25^\circ\text{C}$, $Z_0 = 50\Omega$

RF Specifications^[1]

Symbol	Parameters/conditions	Minimum	Typical	Maximum	Units
BW	Operating Bandwidth	0.01		26.5	GHz
S_{21}	Insertion Loss		1.5		dB
S_{11}, S_{22}	Return Loss		15		dB

1. $T_A = 25^\circ\text{C}$, $Z_0 = 50\Omega$

ESD Limits

Symbol	Parameters/conditions	Minimum	Maximum	Units
CDM ^[1]	Electrostatic Discharge @ RF _{IN/OUT}	-500	+500	Volts

1. Charged Device Model

Applications

Leveling (ALC Loop) at medium to high power levels.

For best directivity down to 10 MHz, use “DET2” pad. For less noise in ALC loop, use “DET1”.

RoHS Compliance

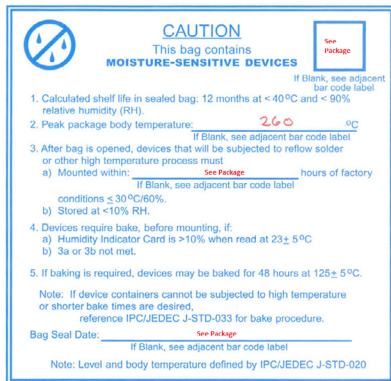
This part is RoHS compliant, meeting the requirements of the EU Restriction of Hazardous Substances Directive 2002/95/EC, commonly known as RoHS. Six substances are regulated: lead, mercury, cadmium, chromium VI (hexavalent chromium), polybrominated biphenyls (PBB), and polybrominated biphenyl ethers (PBDE). RoHS compliance requires that any residual concentration of these substances is below the Directive’s maximum concentration values (MCV): cadmium 100ppm by weight and all others 1000ppm by weight.



Moisture Compatibility

Injection mold components like the TC627P in QFN are moisture-sensitive. The product is tested to the Moisture and Reflow Sensitivity Level 3 as per IPC/Jedec J-STD-020 and must be mounted within 168 hours of opening the shipping container. Store and handle parts for reflow and for rework per IPC/Jedec J-STD-033B. An example of the moisture sensitivity label is shown in Figure 1.

Figure 1. Moisture Sensitivity Label



Tape and Reel

The TC627P is available in tape and reel format to facilitate automatic pick and place manufacturing. See Figure 8.

ESD Handling Precautions

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

Agilent application note #54, “GaAs MMIC ESD, Die Attach and Bonding Guidelines” provides basic information on these subjects.

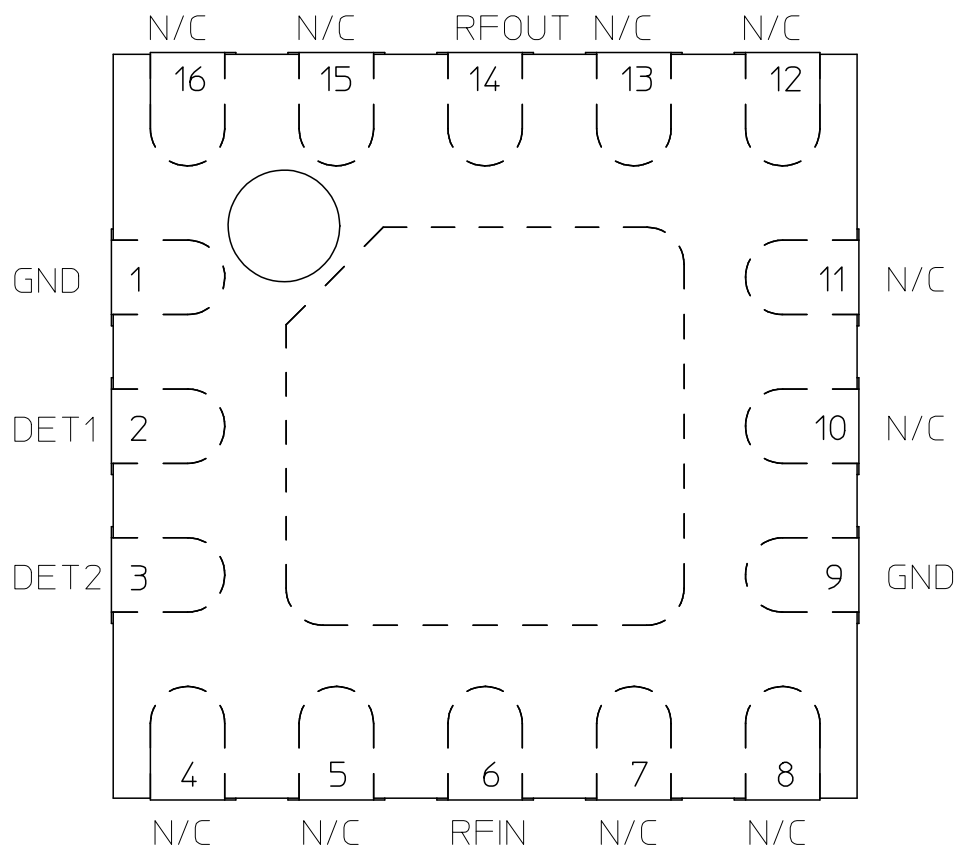


Figure 2. Pin-out Diagram

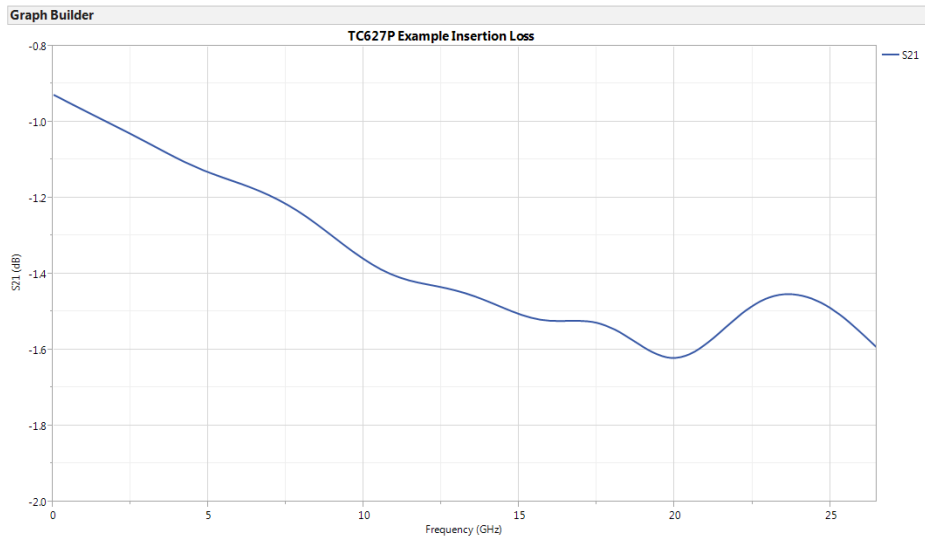


Figure 3. Insertion Loss

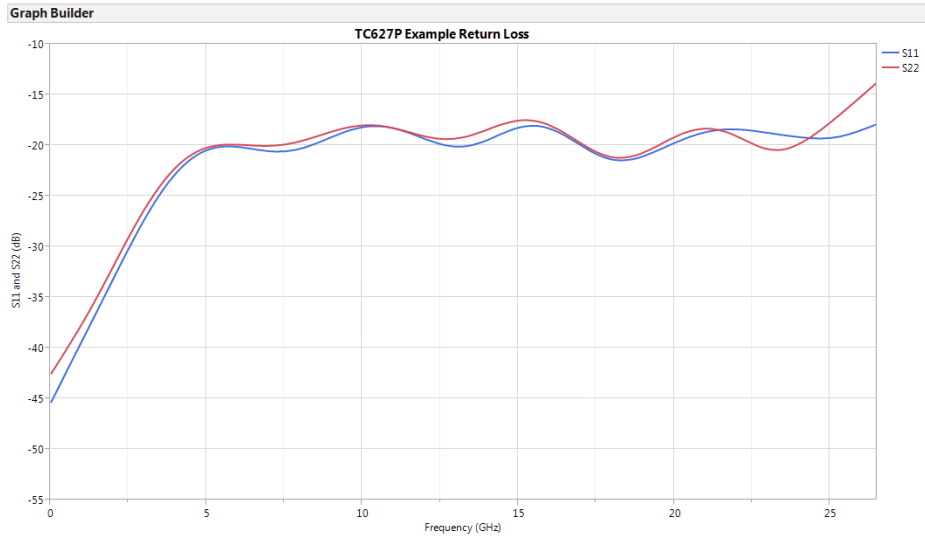


Figure 4. Return Loss

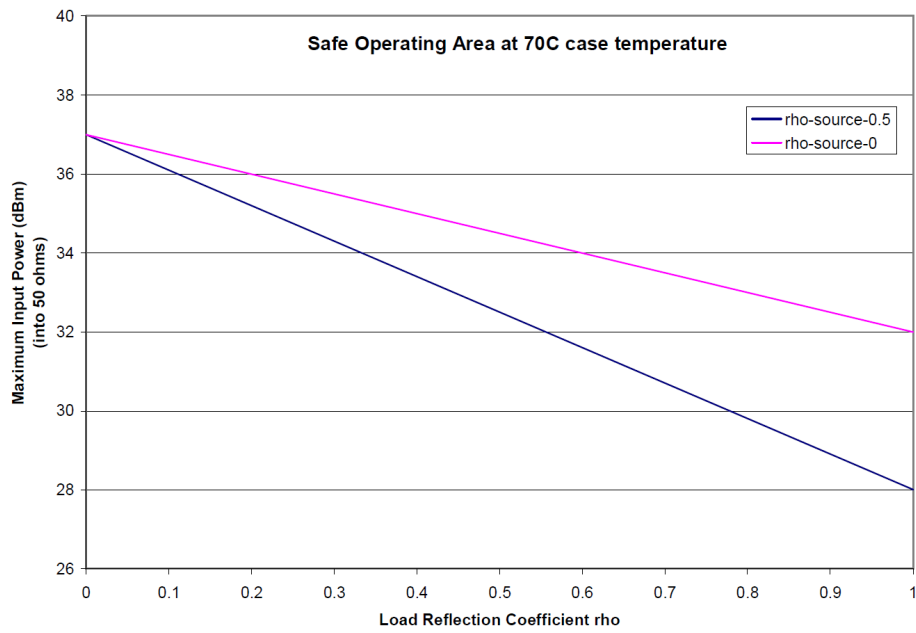


Figure 5. Safe Operating Region and Maximum Input Power vs. Source and Load Match, $T_A = 70^\circ\text{C}$.

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This footprint is optimized for 10 mil Rogers 4350
layer1 - 2 microstrip with a width of 20 mils.

Vias must be filled and plated over VIPPO
recommend 7.9 mil FHS (no solder mask)

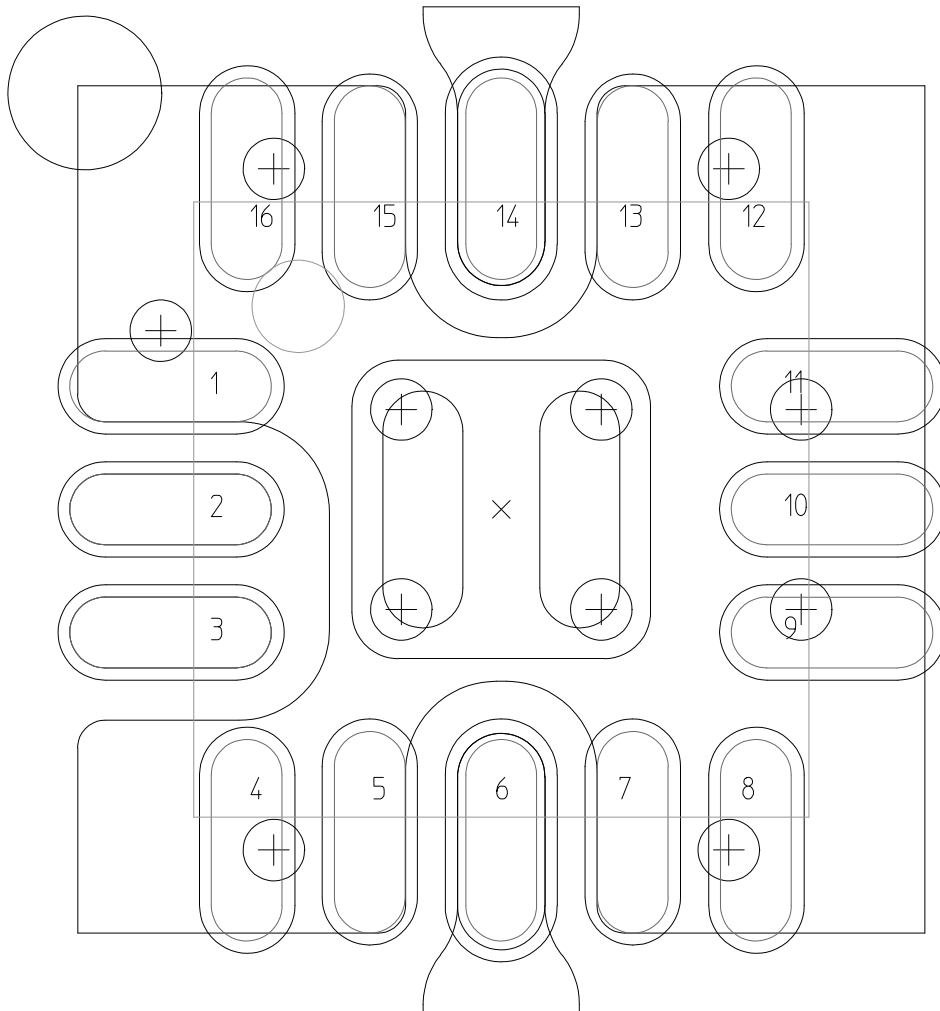
Use grounded 'area filled' copper on opposite side
of the board for proper heatsinking.

Use 'area fill' copper (grounded if possible)
on inner layers for additional heatsinking

Interconnect layers using ground vias at maximum density
around the perimeter of the part for additional heatsinking.

FOR FOOTPRINTS COMPATIBLE WITH OTHER LAYOUT
TOOLS, CONTACT HFTC APPLICATIONS.

Figure 6. Footprint Diagram



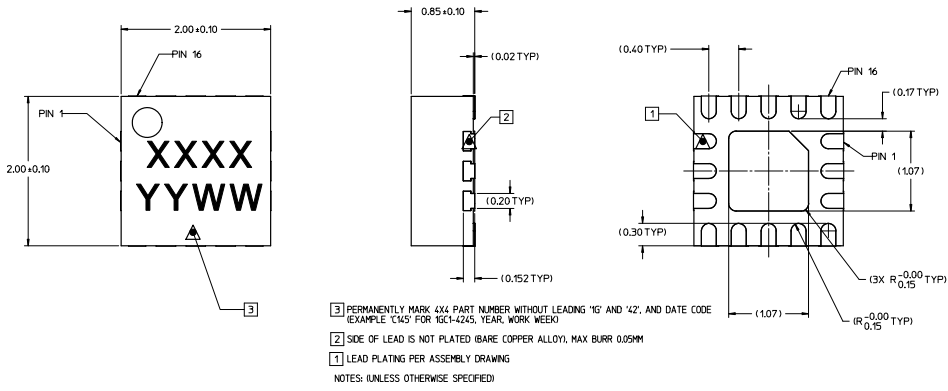


Figure 7. Dimension Drawing (mm)

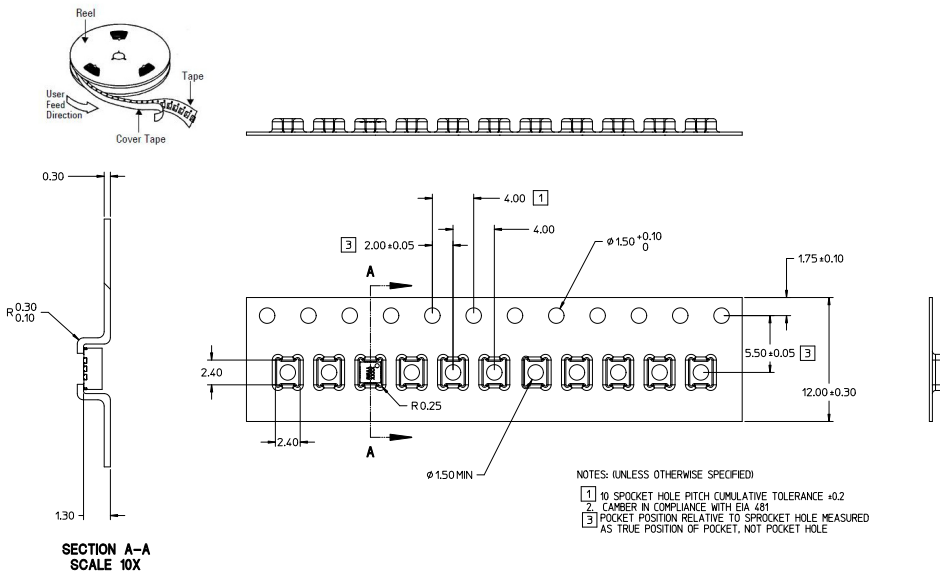


Figure 8. Tape and Reel Information

This data sheet contains a variety of typical and guaranteed performance data. The information supplied should not be interpreted as a complete list of circuit specifications. Customers considering the use of this, or other Keysight GaAs ICs, for their design should obtain the current production specifications from Keysight. In this data sheet the term typical refers to the 50th percentile performance.