

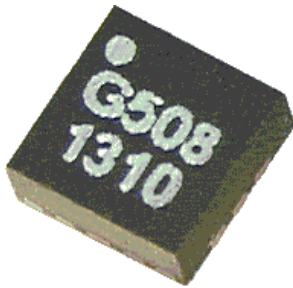


Keysight TC626P, DC - 26.5 GHz, Integrated GaAs Diode Packaged Limiter

Data Sheet

HMMC-5636-BLK (Waffle Pack)

HMMC-5636-TR1 (Tape & Reel)



Package Type: 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 (0.035 ± 0.0039 in)
Lead Pitch: 0.40 mm (0.016 in)
Lead Width: 0.20 mm (0.008 in)

Features

- Insertion Loss:
0.15 dB Typ. @ 9 GHz
0.6 dB Typ. @ 20 GHz
- Port Match:
 S_{11} and S_{22} : < 11.5 dB Typ.
- P_{-1dB} :
28 dBm Typ. @ 9GHz
26 dBm Typ. @ 20 GHz
- Distortion:
SHI: > 100 dBm Typ.
THI: +44 dBm Typ. @ 9 GHz
TOI: +45 dBm Typ. @ 9 GHz
+43 dBm Typ. @ 20 GHz

Description

The TC626P is a 26.5 GHz Packaged GaAs integrated diode limiter that can be used to protect sensitive RF circuits from excess RF power, DC transients and ESD. The circuit contains Planar-Doped-Barrier (PDB) diodes with integrated matching networks and is fabricated with the MB6A integrated diode process. The barrier height of each diode element and the number of diode elements in each "stack" are optimized for low distortion when $P_{in} < 15$ dBm, while limiting transmitted power when $P_{in} > 25$ dBm. The 1GG5-4208 is available in a 2mm x 2mm Quad Flat - No Leads (QFN) SMT package to preserve BW performance and save space on densely populated PC Board designs.

Absolute Maximum Ratings^[1]

Symbol	Parameters/Conditions	Min.	Max.	Units
P_{cont}	Max. Continuous RF Input Power: <10 GHz		2	W
P_{cont}	Max. Continuous RF Input Power: 10-26.5 GHz		1.4	W
T_j	Junction Temperature		150	°C
T_{bs}	Package Backside Temperature		75	°C
T_{stg}	Storage Temperature	-65	+150	°C
$T_{assy}^{[2]}$	Maximum Solder Reflow Temp. (max. 3 cycles @ 30 sec./cycle)		+260	°C

1. Operation in excess of any one of these conditions may result in permanent damage to this component.
2. Refer to JEDEC J-STD-020D for detailed reflow profile, 3 reflows max.

DC Specifications

(T_A=25°C, unless otherwise listed)

Symbol	Parameter/Conditions	Min.	Typ.	Max.	Units
V _{f1A}	Forward Voltage @ 1mA RF In/Out Pad to GND Pad of Adjacent Diode Stack	4.8	5.3	5.9	V
V _{f1B}	Forward Voltage @ 1mA RF In/Out Pad to GND Pad of Center Diode Stack	4.5	5	5.6	V
R _{sA}	Series Resistance RF In/Out Pad to GND Pad of Adjacent Diode Stack	35	47.5	53	Ω
R _{sB}	Series Resistance RF In/Out Pad to GND Pad of Center Diode Stack	20	30	35	Ω

Typical RF Performance

(T_A=25°C, unless otherwise listed)

Symbol	Parameter/Conditions	Min.	Typ.	Max.	Units
IL	Insertion Loss	3 GHz	0.2		dB
		9 GHz	0.3		dB
		20 GHz	0.6		dB
RL	Return Loss	DC-26.5 GHz	>20		dB
P _{-1dB}	Incident Power @ 1 dB Gain Compression	3 GHz	27		dBm
		9 GHz	26.5		dBm
		20 GHz	25		dBm
SHI	Second Harmonic Intercept	3 GHz	>100		dBm
		9 GHz	>100		dBm
THI	Third Harmonic Intercept	3 GHz	50		dBm
		9 GHz	44		dBm
TOI	Third Order Intercept	3 GHz	49		dBm
		9 GHz	45		dBm
		20 GHz	43		dBm
P _{burnout}	Continuous RF Burnout	3 GHz	>10		W
		15 GHz	>5		W

Applications

The TC626P can be used as an RF limiter, a Reverse Power Protection (RPP) device, and as an ESD and DC transient protector. As a limiter, the incident power at 1 dB gain compression (P-1dB) is 26.5 dBm at 9 GHz and drops to 25 dBm at 20 GHz. As an ESD protection device, the TC626 can protect ESD sensitive components, the degree of protection depending on the protected components characteristics. ESD damage level for the TC626 by itself is greater than 6 kV (measured with an IEC801-2, 150 pF, 330 ohm contact ESD generator).

Assembly Techniques

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

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

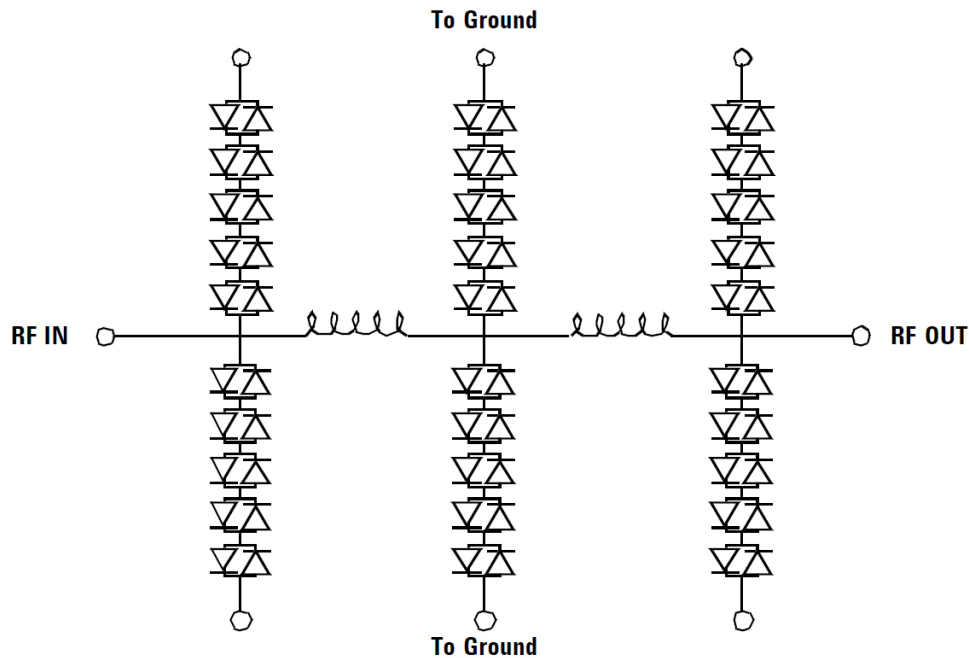


Figure 1. TC626P Schematic

Injection mold components like the TC626P in QFN are moisture-sensitive. The product is tested to the Moisture and Reflow Sensitivity Level 5 as per IPC/Jedec J-STD-020 and must be mounted within 24 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 2.

Tape and Reel

The TC626P is available in tape and reel format to facilitate automatic pick and place manufacturing. See Figure 5.

RoHS Compliance

The TC626P limiter is RoHS Compliant. This means the component meets the requirements of the European Parliament and the Council of the European Union "Restriction of Hazardous Substances" Directive

2002/95/EC, commonly known as "RoHS". The six regulated substances are lead, mercury, cadmium, chromium VI (hexavalent), polybrom-

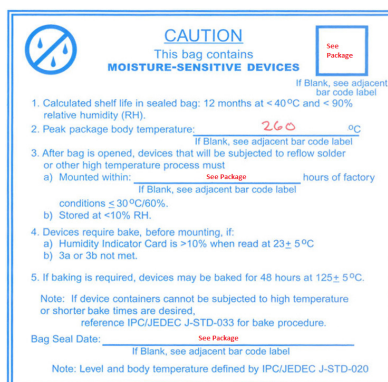


Figure 2. Moisture Sensitivity Label

minated biphenyls (PBB) and polybrominated biphenyl ethers (PBDE). RoHS compliance implies that any residual concentration of these substances is below the RoHS Directive's maximum concentration values (MVC); being less than 1000 ppm by weight for all substances

except for cadmium which is less than 100 ppm by weight.



ESD and 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.

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

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

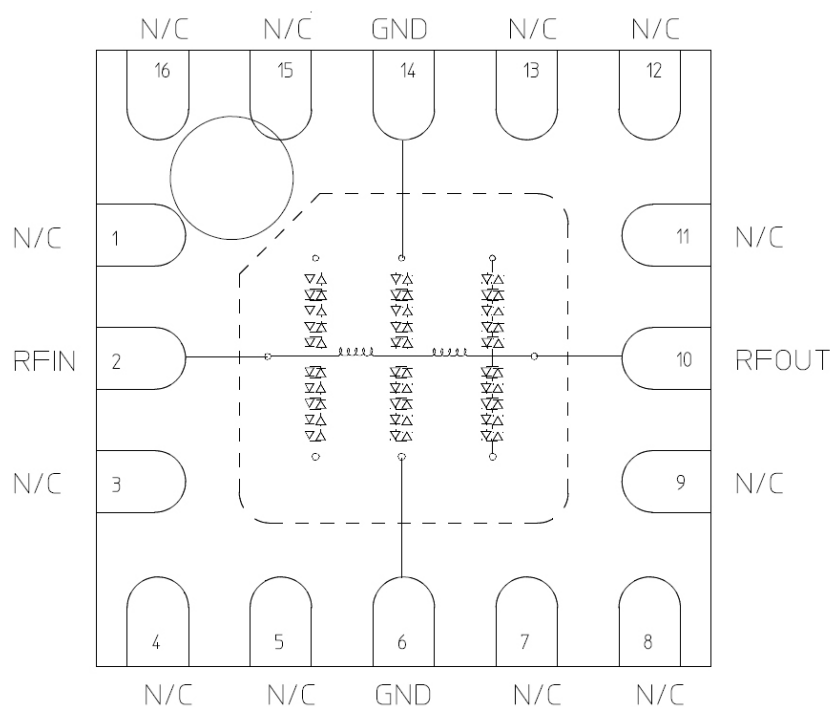


Figure 3. TC626P Pin-Out Diagram

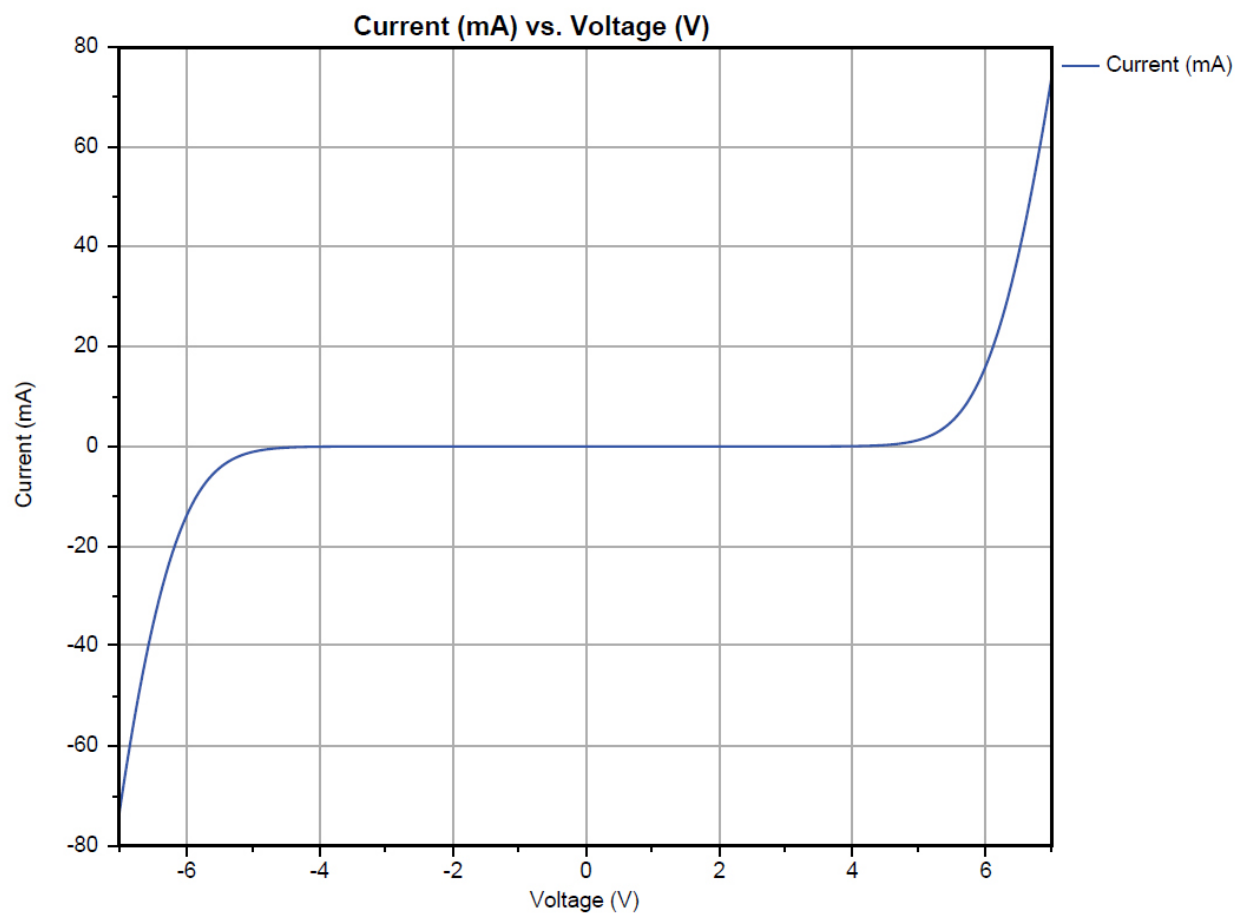


Figure 4. Current vs Voltage

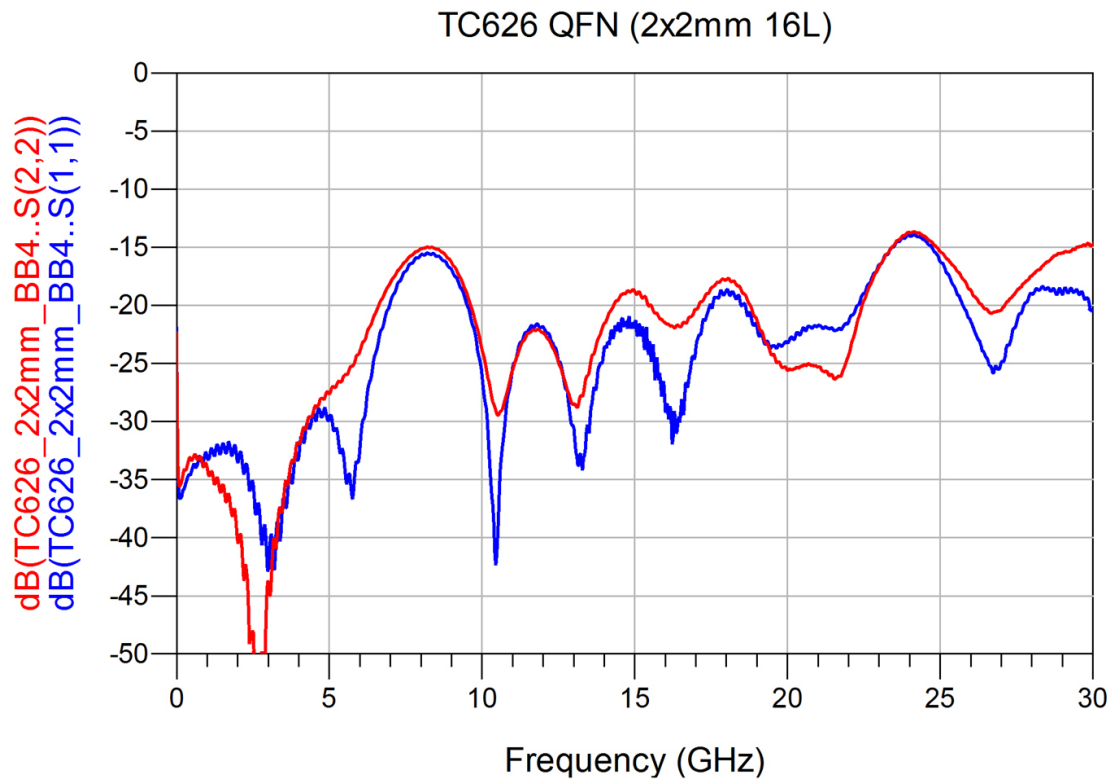


Figure 5. Return Loss vs. Frequency

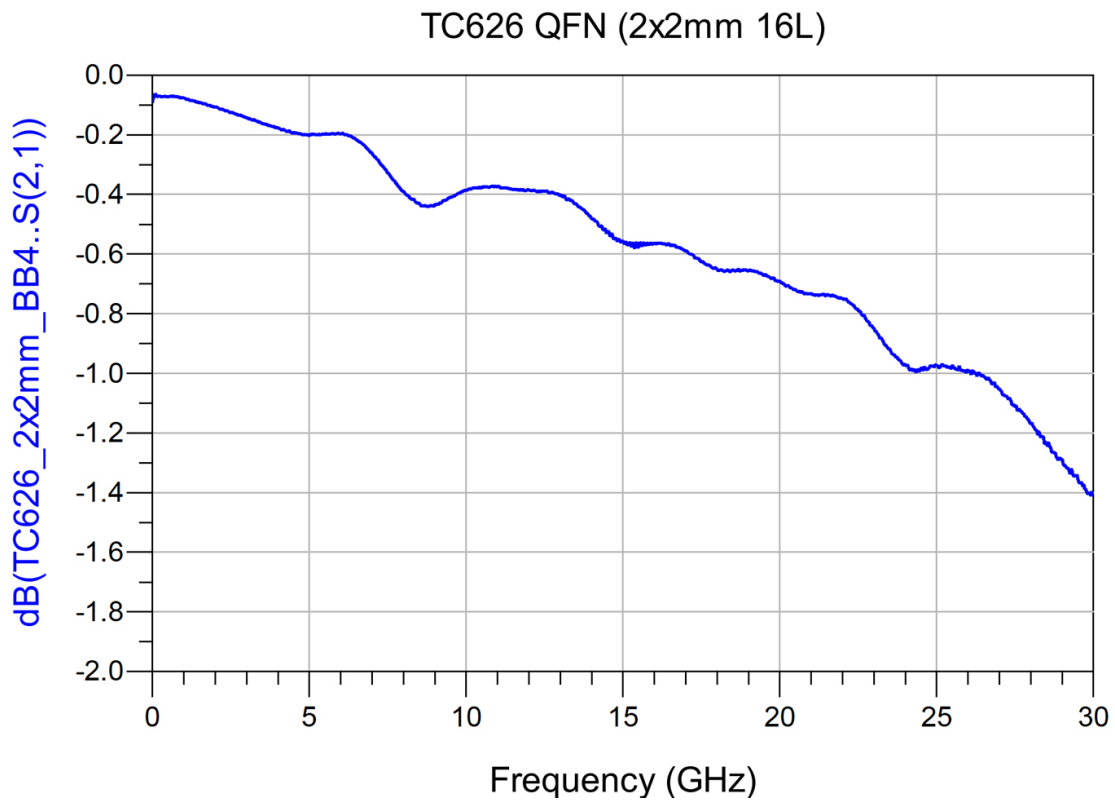


Figure 6. Insertion Loss vs. Frequency

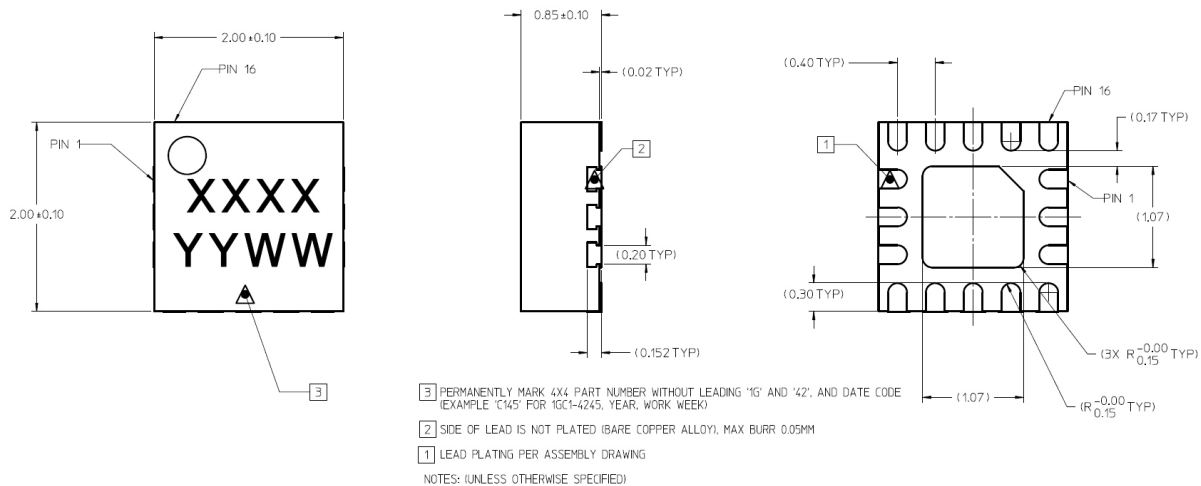


Figure 7. TC626P Package Dimensions

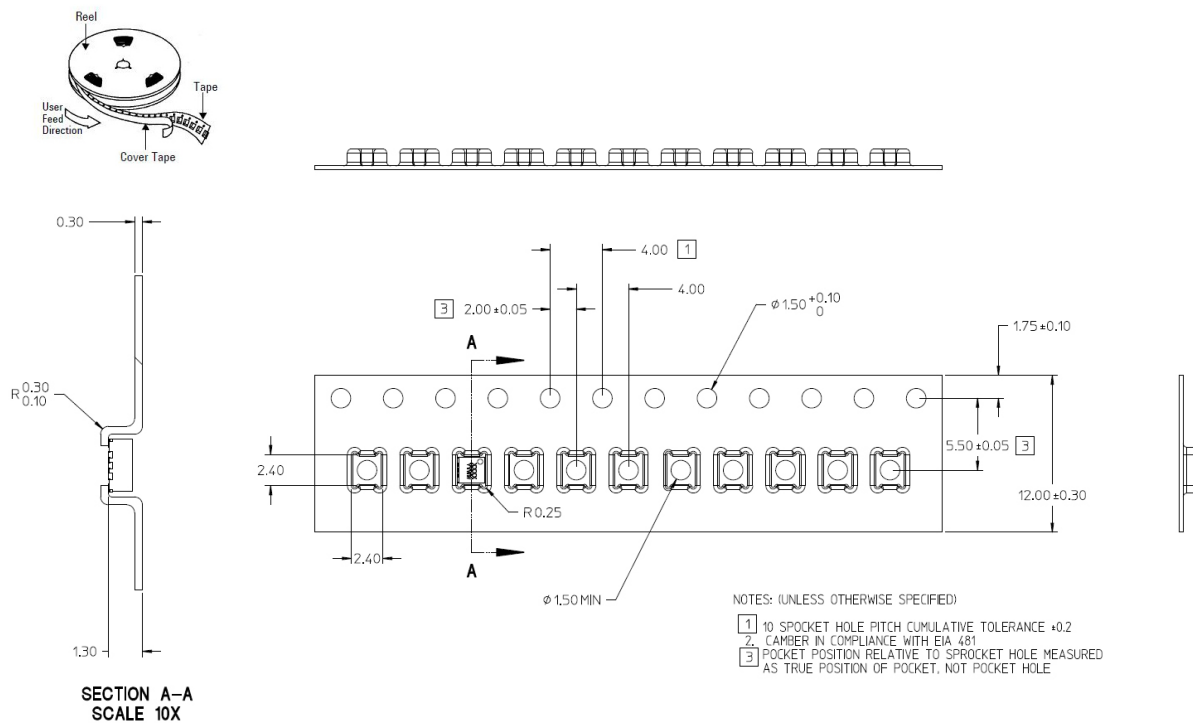


Figure 8. TC626P Tape in Reel