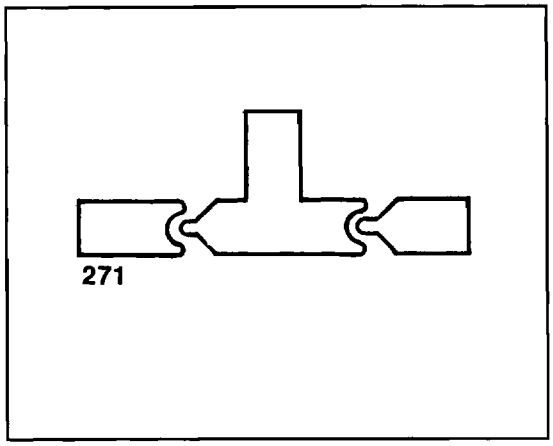
Schottky Barrier Packaged and Beam-Lead TEEs

For Balanced Mixers up to 18 GHz



Description

Each Schottky barrier beam-lead TEE consists of two closely matched diodes connected in the classic TEE configuration. The diodes are formed monolithically to assure close matching of electrical characteristics such as capacitance, forward voltage and series resistance. The silicon that originally connected the diodes in slice form is etched away so that each diode in the configuration is in beam-lead form. The beam-lead construction assures minimum junction capacitance, minimum connecting lead inductance and permits the interconnection of the diodes into TEEs at the wafer level.

Features

- **SMALL PHYSICAL SIZE FOR MICROSTRIP MOUNTING**
- **HIGH RELIABILITY**
- **CLOSELY MATCHED JUNCTIONS FOR HIGH ISOLATION**
- **THREE DIODE BARRIER HEIGHTS ARE AVAILABLE ON REQUEST**
- **DEVICES 100% TESTED**
- **MINIMUM PARASITICS FOR BROADBAND DESIGNS**

Three barrier levels are available for various levels of local oscillator drive power. The L series features a low barrier for applications which have low available local oscillator power. Both medium barrier (M series) and high barrier (H series) devices are available for applications with higher drive levels. The RF and local oscillator frequencies can range up to 18 GHz with selection of an appropriate junction capacitance. Each series is available in three case styles which are compatible with microstrip assembly techniques. The 270 case style is hermetically sealed and should be used in either harsh environments or very high reliability situations. The 272 case style is a low cost enclosure close to the physical size of the 270 case style. The 271 case style, specially designed for maximum bandwidth, features unpackaged diodes arranged in the TEE configuration. The case style 1000 is the smallest stripline package and has the lowest parasitic capacitance and inductance.

Specifications @ $T_A = 25°C$

Schottky Beam-Lead TEEs

Model[6,7] Number	Barrier Height	Frequency Band	Maximum[1] Junction Capacitance C_j (pF)	Maximum[1] Junction Capacitance Difference ΔC_j (pF)	Maximum[2] Resistance R_T (Ohms)	Nominal[3] Forward Voltage Vf (Volts)	Maximum[3] Forward Voltage Match Vf (Volts)	Nominal Noise Figure NF (dB)	Minimum[5] Breakdown Voltage (Volts)
MA4E201L	Low	S	.50	.10	7	.250	.015	6.0	2.0
MA4E204L	Low	C-X	.35	.10	10	.270	.015	6.5	2.0
MA4E207L	Low	Ku	.20	.05	12	.300	.015	7.5	2.0
MA4E201M	Medium	S	.50	.10	7	.350	.015	6.0	3.0
MA4E204M	Medium	C-X	.35	.10	10	.370	.015	6.5	3.0
MA4E207M	Medium	Ku	.20	.05	12	.400	.015	7.5	3.0
MA4E201H	High	S	.50	.10	7	.550	.015	6.0	5.0
MA4E204H	High	C-X	.35	.10	10	.570	.015	6.5	5.0
MA4E207H	High	Ku	.20	.05	12	.600	.015	7.5	5.0

NOTES:

1. C_j and ΔC_j are measured at V_R = 0 volts and F = 1.0 MHz.
2. V_F is measured at I_F = 1.0 mA.
3. Series resistance, R_S, is determined by subtracting the junction resistance, R_j, from the measured value of 10 mA dynamic (slope) resistance, R_T:

   $R_S = R_T - R_j$ Ohms

   Junction resistance is computed from the following equation:

   $R_j = 26/IF$ ohms
   IF = 10 mA
   IF is the forward bias current in mA.
4. Noise figure measurements are performed on packaged diodes sampled from every lot of beam lead Schottky material. The noise figure specified is the maximum limit for lot approval. The test conditions are as follows:

   LO Power = 1.0 mW (low and medium barrier, 2.0 mW for high barrier)
   LO Frequency = 3.06 GHz (S-band), 9.375 GHz (X-band), 16.00 GHz (Ku-band)
   IF = 30 MHz
   NF_{IF} = 1.5 dB
5. Voltage breakdown is measured at Ir = 10 μA.
6. The standard case styles for the Schottky Beam-Lead Tees are 270, 271, 272 and 1000.
7. To order parts specify the package as a suffix, i.e., MA4E201L-270 is a S-Band Low Barrier Tee in ODS-270.

Schottky Beam Lead Reverse TEEs

Model[6,7] Number	Barrier Height	Frequency Band	Maximum[1] Junction Capacitance C_j (pF)	Maximum[1] Junction Capacitance Difference ΔC_j (pF)	Maximum[2] Resistance R_T (Ohms)	Nominal[3] Forward Voltage Vf (Volts)	Maximum[3] Forward Voltage Match Vf (Volts)	Nominal Noise Figure NF (dB)	Minimum[5] Breakdown Voltage (Volts)
MA4E974L	Low	S	.50	.10	7	.250	.015	6.0	2.0
MA4E975L	Low	C-X	.35	.10	10	.270	.015	6.5	2.0
MA4E976L	Low	Ku	.20	.05	12	.300	.015	7.5	2.0
MA4E974M	Medium	S	.50	.10	7	.250	.015	6.0	3.0
MA4E975M	Medium	C-X	.35	.10	10	.270	.015	6.5	3.0
MA4E976M	Medium	Ku	.20	.05	12	.300	.015	7.5	3.0
MA4E974H	High	S	.50	.10	7	.250	.015	6.0	4.0
MA4E975H	High	C-X	.35	.10	10	.270	.015	6.5	4.0
MA4E976H	High	Ku	.20	.05	12	.300	.015	7.5	4.0

NOTES:

1. C_j and ΔC_j are measured at V_R = 0 volts and F = 1.0 MHz.
2. V_F is measured at I_F = 1.0 mA.
3. Series resistance, R_S, is determined by subtracting the junction resistance, R_j, from the measured value of 10 mA dynamic (slope) resistance, R_T:

   $R_S = R_T - R_j$ Ohms

   Junction resistance is computed from the following equation:

   $R_j = 26/IF$ ohms
   IF = 10 mA
   IF is the forward bias current in mA.
4. Noise figure measurements are performed on packaged diodes sampled from every lot of beam lead Schottky material. The noise figure specified is the maximum limit for lot approval. The test conditions are as follows:

   LO Power = 1.0 mW (low and medium barrier, 2.0 mW for high barrier)
   LO Frequency = 3.06 GHz (S-band), 9.375 GHz (X-band), 16.00 GHz (Ku-band)
   IF = 30 MHz
   NF_{IF} = 1.5 dB
5. Voltage breakdown is measured at Ir = 10 μA.
6. The standard case style for the Reverse Tee series of diodes is case style 1012. Reverse tee diodes available in case styles 270, 272, 1000 and 1012.
7. To order parts specify the package as a suffix, i.e., MA4E974L-270 is a S-Band Low Barrier Tee in ODS-270.

Specifications @ $T_A = 25°C$ (Cont'd)

Schottky Beam Lead Common Cathode TEEs

Model[6,7] Number	Barrier Height	Frequency Band	Maximum[1] Junction Capacitance C_j (pF)	Maximum[1] Junction Capacitance Difference ΔC_j (pF)	Maximum[2] Resistance R_T (Ohms)	Nominal[3] Forward Voltage Vf (Volts)	Maximum[3] Forward Voltage Match Vf (Volts)	Nominal Noise Figure NF (dB)	Minimum[5] Breakdown Voltage (Volts)
MA4E977L	Low	S	.50	.10	7	.250	.015	6.0	2.0
MA4E978L	Low	C-X	.35	.10	10	.270	.015	6.5	2.0
MA4E979L	Low	Ku	.20	.05	12	.300	.015	7.5	2.0
MA4E977M	Medium	S	.50	.10	7	.250	.015	6.0	3.0
MA4E978M	Medium	C-X	.35	.10	10	.270	.015	6.5	3.0
MA4E979M	Medium	Ku	.20	.05	12	.300	.015	7.5	3.0
MA4E977H	High	S	.50	.10	7	.250	.015	6.0	4.0
MA4E978H	High	C-X	.35	.10	10	.270	.015	6.5	4.0
MA4E979H	High	Ku	.20	.05	12	.300	.015	7.5	4.0

NOTES:

1. C_j and ΔC_j are measured at $V_R = 0$ volts and F = 1.0 MHz.
2. V_F is measured at $I_F = 1.0$ mA.
3. Series S=resistance, R_S, is determined by subtracting the junction resistance, R_j, from the measured value of 10 mA dynamic (slope) resistance, R_T:

   $R_S = R_T - R_j$ Ohms

   Junction resistance is computed from the following equation:

   $R_j = 26/IF$ ohms
   IF = 10 mA
   IF is the forward bias current in mA.

4. Noise figure measurements are performed on packaged diodes sampled from every lot of beam lead Schottky material. The noise figure specified is the maximum limit for lot approval. The test conditions are as follows:

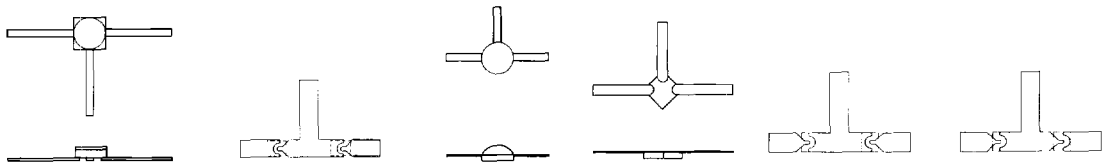
   LO Power = 1.0 mW (low and medium barrier, 2.0 mW for high barrier)
   LO Frequency = 3.06 GHz (S-band), 9.375 GHz (X-band), 16.00 GHz (Ku-band)
   IF = 30 MHz
   NF_{IF} = 1.5 dB

5. Voltage breakdown is measured at Ir = 10 μA.
6. The standard case style for the Beam Lead Schottky Common Cathode is case style 1011. Schottky common cathode is available in case styles 270, 272, 1000 and 1011.
7. To order parts specify the package as a suffix, i.e., MA4E977L-270 is a S-Band Low Barrier Tee in ODS-270.

MAXIMUM RATINGS

Operating and Storage Temperature Range	−65° to +150°C
Maximum Power Dissipation (derate linearly to zero allowable dissipation at 150°C	75 mW/junction
Soldering Temperature	235°C for 10 sec.
Beam Strength	2g (Case Style 271, 968, 1011, 1012)

Case Styles



270 271 272 1000 1011 1012