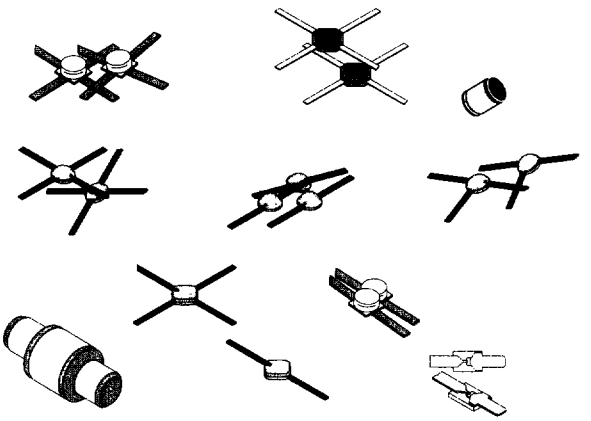
Alpha GaAs Schottky Barrier Mixer Diodes

CMK and DMK Series

Features

- Low Noise Figure (Low Series Resistance)
- Excellent Cutoff, Low Junction Capacitance
- Ideal for Image Enhancement Mixers
- Passivated Planar Construction for Reliability



5

Description

Alpha's series of gallium arsenide Schottky barrier diodes are available in beam–lead, chip and packaged forms for mixer applications through 100 GHz. They are designed for low junction capacitance as well as low series resistance and exhibit calculated cutoff frequencies in excess of 1,000 GHz.

Beamless beam–lead diodes are particularly well suited for MIC work. This design eliminates the problems associated with bonding to the junction, as is the case with a chip diode. A line of chip diodes is available for those who prefer to use chip and wire techniques for their MIC work. Capacitance ranges and series resistances on the beam–lead and chip diodes are comparable to those of their packaged counterparts.

Gallium arsenide diodes are particularly well suited for image enhancement mixer circuits due to their high cutoff frequency. Conversion loss for these diodes approaches the theoretical minimum of 3.0 dB (single sideband) in X–band and is significantly lower than silicon Schottky diodes at frequencies above 12 GHz.

Matched pairs of mixer diodes are used in suppressing noise origination in the local oscillator.

A typical V_f, v_s, I_f curve is plotted in Figure 1. Figure 2 shows a typical plot of Capacitance vs. Bias Voltage for Ku band diodes.

Noise figure and IF impedance as a function of local Oscillator Drive Level with DC bias is shown in Figure 3.

Electrical Specifications

Chip and Beam Lead Mixer Diodes

				Electrical Characteristics by Frequency Band			
Test	**Test Conditions**	**Units**		**Ku**	**K**	**Ka**	**mm**
V_F	1 mA	mV	Min	600	600	600	600
			Max	800	800	800	800
C_J	0V, 1 MHz	pF	Min	0.03			–
			Max	0.12	0.10	0.07	Note 1
R_S	10 mA	Ω	Max	6.0	6.0	6.0	8.0
V_B	10 μA	V	Min	3.0	3.0	3.0	3.0
NF (ssb)	LO = 7.0 mW N_{IF} = 1.0 dB	dB	Max	6.3	6.5	7.0	7.5

Chip and Beam Lead Mixer Diodes

Style	**Outline Number**	**Part Number**			
Beam–Lead Singles	468–011	DMK2605–000		DMK2606–000	DMK2791–000 DMK2784–000
Series Pair AntiParallel	529–012[2] 490–025	DMK2860–000 DMK2307–000			
Quad Rings	531–002[2]	DMK2862–000			

Packaged Mixer Diodes

		Beam Leads Non–Hermetic			
Singles	130–011 295–011 464–011	DMK3318–000 DMK3379–000			
Pairs	295–012 464–012 464–025	DMK3353–000			
Quads	295–002 464–002	DMK3354–000	DMK3386–000		
		Beam Leads Hermetic			
Singles Beam Lead	325–011 364–011 404–011				
Pairs	325–012 364–012 404–012	DMK3395–000			
Quads	325–002 364–002 404–002				
Hermetic P.L.C.	247–001 417–001	DMK5068–000		DMK4058–000	DMK3248–000

Matching Criteria:
Pairs: ΔV_F at 1 mA = 15 mV max. /Quads: ΔV_F at 1 mA = 20 mV max.

1. C_J DMK2791 = 0.07 pF Max, C_J DMK2784 = 0.040 pF Max.
2. Consult factory for package outline drawing (not available in outline drawing section).

ALPHA INDUSTRIES, INC. • 20 SYLVAN ROAD, WOBURN, MA 01801
TEL: (617) 935–5150 • FAX: (617) 824–4579

Typical Performance Data

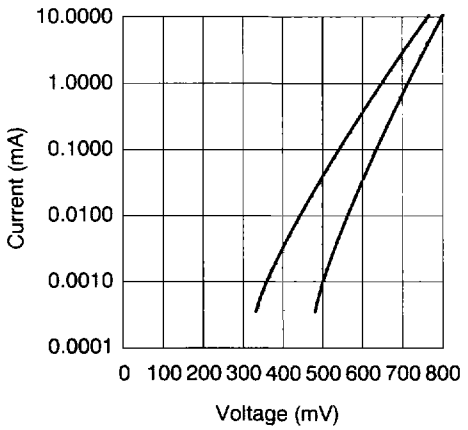


Figure 1. Forward DC Characteristic Curve Range – Voltage vs. Current

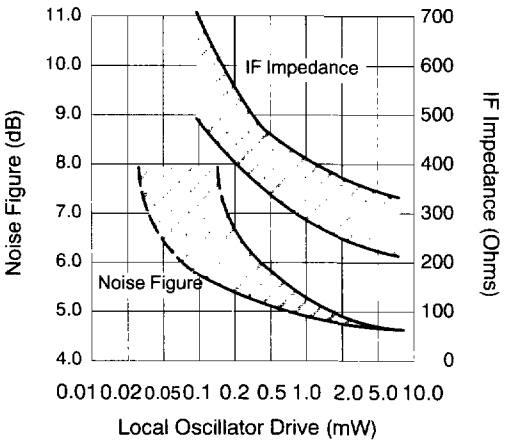


Figure 3. RF Parameters vs. Local Oscillator Drive Level

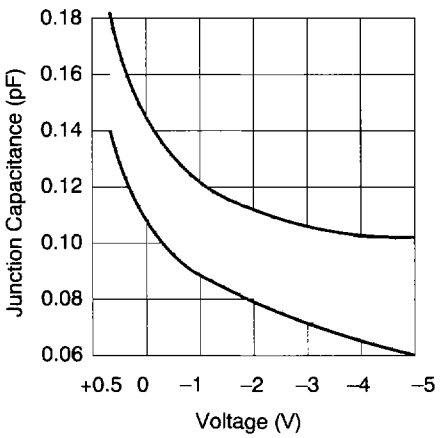


Figure 2. Junction Capacitance Range vs. Voltage

Maximum Ratings

Storage Temperature:	–65°C/+175°C
Operating Temperature:	–65°C/+150°C
Dissipated Power:	75 mW/Junction
Max Current:	50 mA
Reverse Voltage:	4.0 V

5