NEC®

GaAs BEAM LEAD SCHOTTKY BARRIER DIODE

ND5558-00

FEATURES

- EXTREMELY LOW TERMINAL CAPACITANCE
- PASSIVATED CONSTRUCTION
- HIGH BARRIER
- LOW SERIES RESISTANCE
- HIGH RELIABILITY

DESCRIPTION AND APPLICATIONS

The ND5558 is a beam lead Schottky diode which employs a glass layer to decrease fringing capacitance. This diode has a high barrier, low series resistance and excellent dynamic range for frequencies through the millimeter range. Applications are mixers, modulators, samplers and detectors.

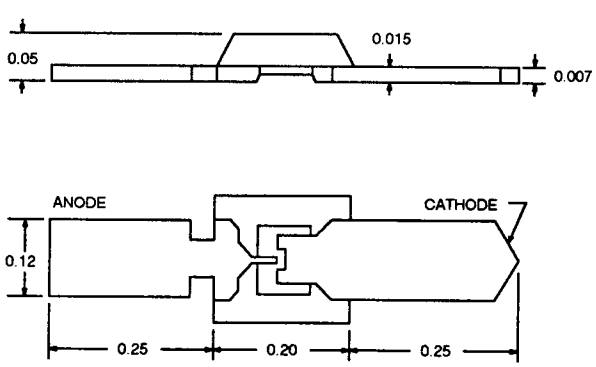
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_R	Reverse Voltage	V	4
V_{RM}	Peak Reverse Voltage	V	4.4
I_F	Forward Current	mA	20
I_{FM}	Peak Forward Current	mA	20
T_{STG}	Storage Temperature	°C	-65 to +150
T_{OP}	Operating Temperature	°C	-30 to +125
S_P	Minimum Lead Pull	gM	2
T_{SDR}	Maximum Soldering Temperature	°C	240° for 10 Sec.
P_T*	Total Power Dissipation	mW	250

*Derate linearly to zero at the maximum T_{OP}.

OUTLINE DIMENSIONS (Units in mm)

ND5558-00 (CHIP)

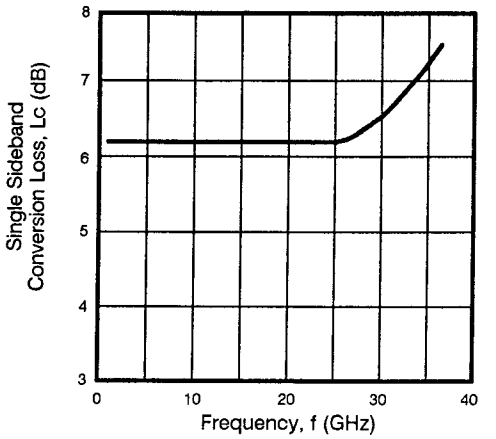


ELECTRICAL CHARACTERISTICS (T_A = 25°C)

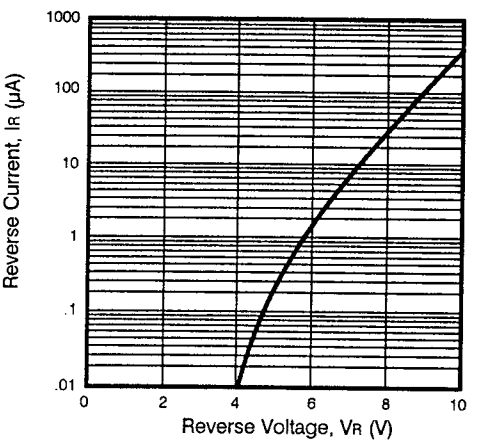
PART NUMBER / PACKAGE OUTLINE			ND5558-00 00 (CHIP)		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
f_{LO}	L.O. Test Frequency	GHz		9.375	
L_C	Conversion Loss at f_{IF} = 30 MHz, R_{DC} = 0 Ω	dB		5	6
P_{LO}	L.O. Test Frequency	mW		2	
B_V	Breakdown Voltage at I_R = 10 μA	V	4	5	
V_F	Forward Voltage at I_F = 20 mA	V		.85	1
C_T	Total Capacitance at V_R = 0 V, f = 1 MHz	pF		0.07	0.12
Tss	Tangential Sensitivity at f = 10 GHz, I_F = 20 μA, R_L = 100 kΩ, R_A = 500 Ω, BW = 2 MHz	-dBm		56	
γ	Voltage Sensitivity	mA/μW		4	
NF	Noise Figure at f = 9.375 GHz, P_{LO} = 2 mW, N_{IF} = 1.5 dB	dB		5	6

TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

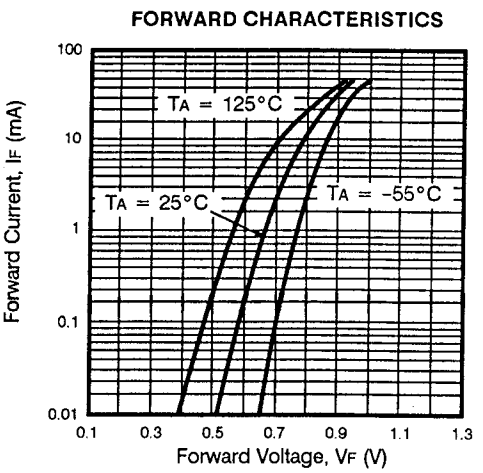
SINGLE SIDEBAND CONVERSION LOSS



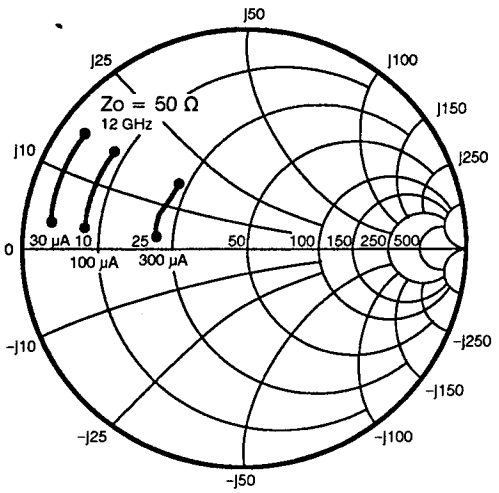
REVERSE CHARACTERISTICS



FORWARD CHARACTERISTICS



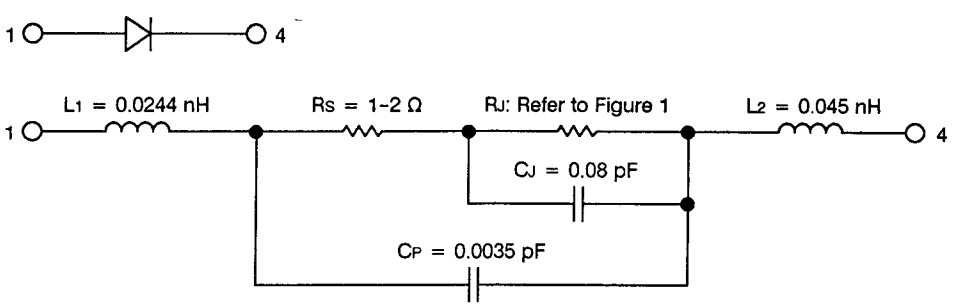
ADMITTANCE CHARACTERISTICS vs. FREQUENCY



f GHz	IREV		
	30 µA S11	100 µA S11	300 µA S11
1	.06+.07j	.16+.06j	.42+.04j
2	.06+.13j	.16+.13j	.42+.13j
4	.06+.18j	.16+.18j	.42+.18j
8	.06+.27j	.16+.26j	.44+.24j
12	.06+.33j	.17+.32j	.46+.31j

*Zo = 50 Ω

EQUIVALENT CIRCUIT



L_1, L_2: Series inductance in lead wire.
R_S: Series resistance
C_J: Junction capacitance
C_P: Package capacitance
R_J: Junction resistance, that is referred to in Figure 1.
ex) V_F = 0.7 V, I_F = 3 mA → R_J = 233 Ω

ASSEMBLY PROCEDURE

HANDLING

It is recommended that a sufficiently small vacuum needle (ϕ 150 μm) be used to pick up the diode. In case of handling with tweezers, please take care not to damage beam leads or edge of chip.

MOUNTING AND BONDING

Thermal compression bonding is recommended for mounting. An example of assembly on Au metallized alumina substrate is shown as follows:

1. Place alumina substrate on heating block and heat to 240° ± 10°C in N_2 gas atmosphere.
2. Locate ND5558-00 on alumina substrate as shown in Figure 1.
3. Bond cathode lead first with a sapphire wedge as shown in Figure 4 (wedge load: 50 to 100 g). Two bonding points are recommended on the edge of each lead (see Figure 2). Recommended bonding time is 3 to 5 seconds at each point. Do not use excessive pressure or a wedge that is too sharp.
4. Next, bond anode lead using same conditions as for cathode bonding (see Figure 3).
5. Remove alumina substrate from the heat block after bonding has been completed.

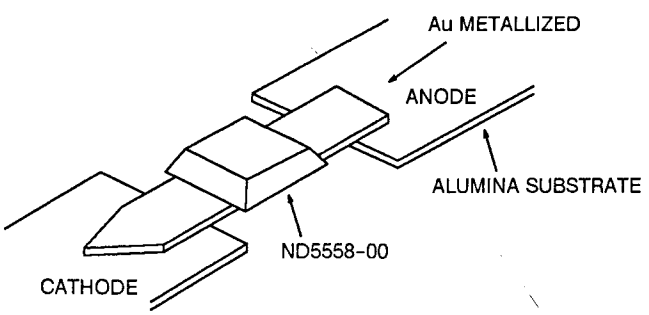


FIGURE 1

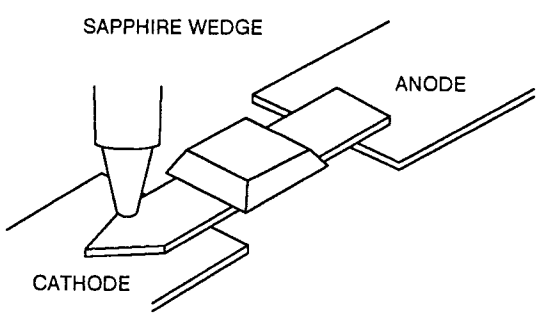


FIGURE 2

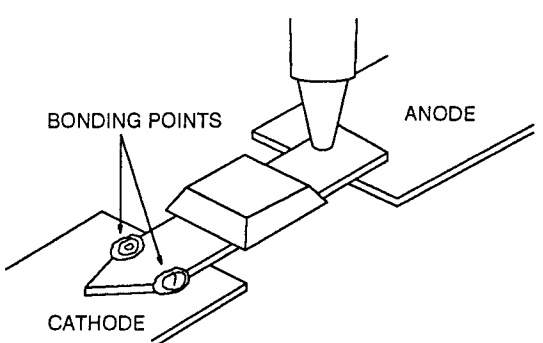


FIGURE 3

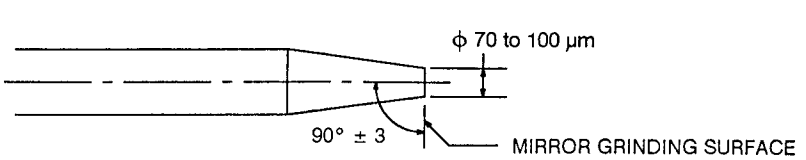


FIGURE 4 WEDGE CONFIGURATION
MATERIAL: SAPPHIRE

NEC®

GaAs SCHOTTKY BARRIER DIODE ARRAY

ND587 SERIES

FEATURES

- MONOLITHIC ARRAYS
- WIDEBAND OPERATION
- SMALL SIZE
- LOW COST

DESCRIPTION AND APPLICATIONS

The ND587 Gallium Arsenide Epitaxial Schottky Barrier Diode series is especially designed for broadband microwave mixer circuit applications. The ND587T is a dual type diode used for single balanced mixers and the ND587R is a quad ring type for double balanced mixers. This series in a monolithic form provides excellent performance, reliability and uniformity for use in low cost, large volume applications.

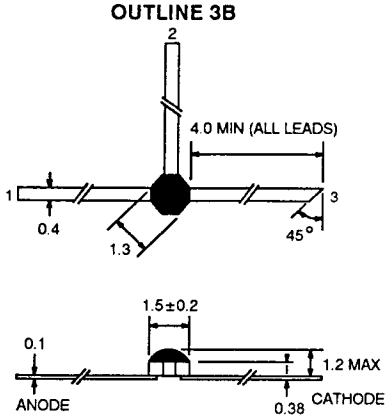
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_R	Reverse Voltage	V	4
V_{RM}	Peak Reverse Voltage	V	4.4
I_F	Forward Current	mA	50
I_{FM}	Peak Forward Current	mA	150
T_J	Junction Temperature	°C	150
T_{STG}	Storage Temperature	°C	-65 to +150
T_{SDR}	Soldering Temperature	°C	230*
P_D	DC Power Dissipation	mW/Junction	75

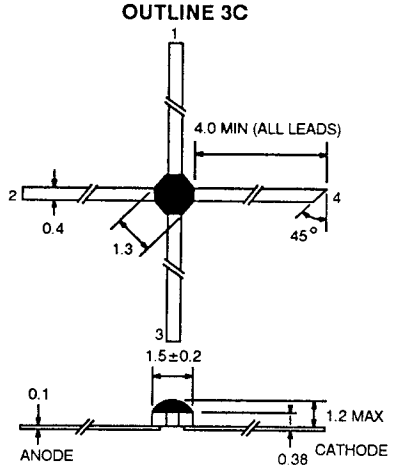
*One time within 10 seconds.

OUTLINE DIMENSIONS (Units in mm)

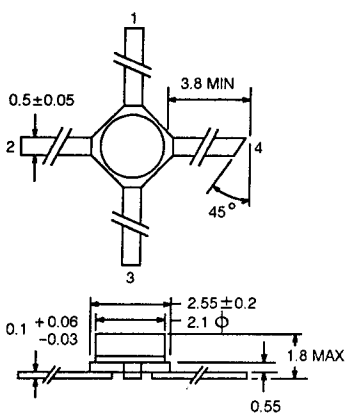
OUTLINE 3B



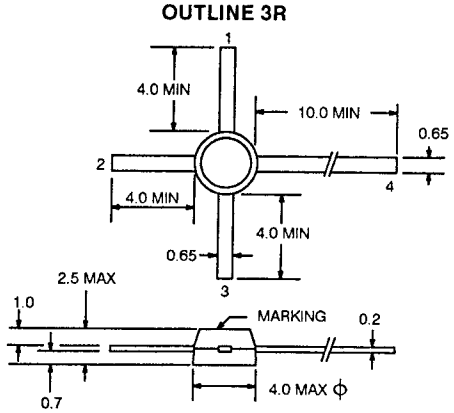
OUTLINE 3C



OUTLINE 3P

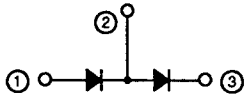


OUTLINE 3R

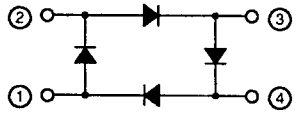


CONFIGURATIONS (Pin Connections)

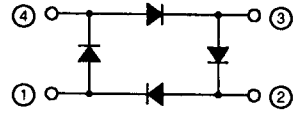
ND587T-3B



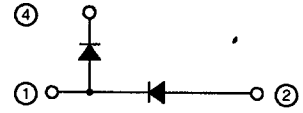
ND587R-3C



ND587R-3P
ND587R-3R



ND587T-3P
ND587T-3R

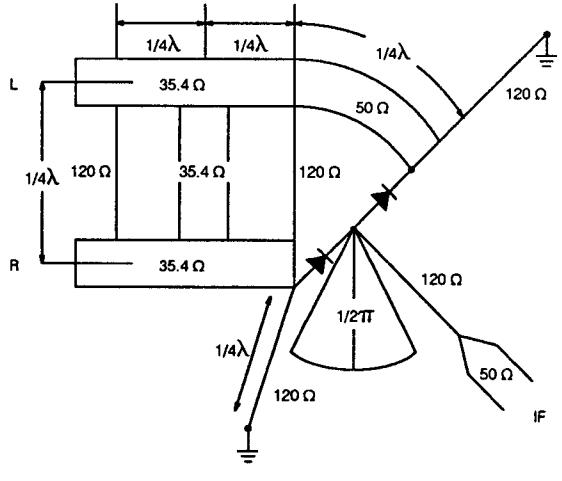


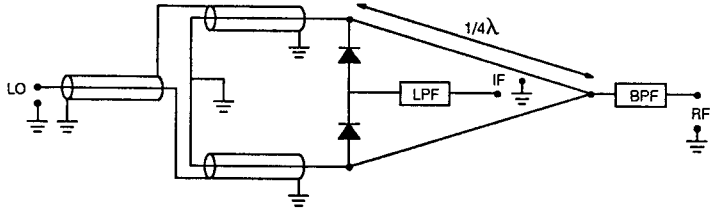
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

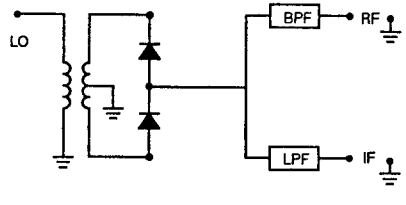
PART NUMBER / PACKAGE OUTLINE			ND587T-3B 3B			ND587R-3C 3C			ND587R-3P 3P			ND587T-3P 3P			ND587R-3R 3R			ND587T-3R 3R		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
V_{F1}	Forward Voltage at I_F = 50 mA	V			1			1			1			1			1			1
V_{F2}	Forward Voltage at I_F = 1 mA	V		0.67	0.8		0.67	0.8		0.67	0.8		0.67	0.8		0.67	0.8		0.67	0.8
ΔV_{F2}*	Forward Voltage at I_F = 1 mA	V			0.02			0.02			0.02			0.02			0.02			0.02
C_T**	Total Capacitance at V_R = 0, f = 1 MHz	pF		0.22	0.26		0.13	0.18		0.25	0.5		0.25	0.5		0.25	0.5		0.25	0.5
ΔC_T*	Total Capacitance at V_R = 0, f = 1 MHz	pF			0.05			0.05			0.2			0.2			0.2			0.2

*Difference of V_F, C_T
**Measurement Terminal: ① – ②, ② – ③ for ND587T-3B
① – ③, ② – ④ for ND587R-3C, ND587R-3P, ND587R-3R
① – ④, ① – ② for ND587T-3P, ND587T-3R

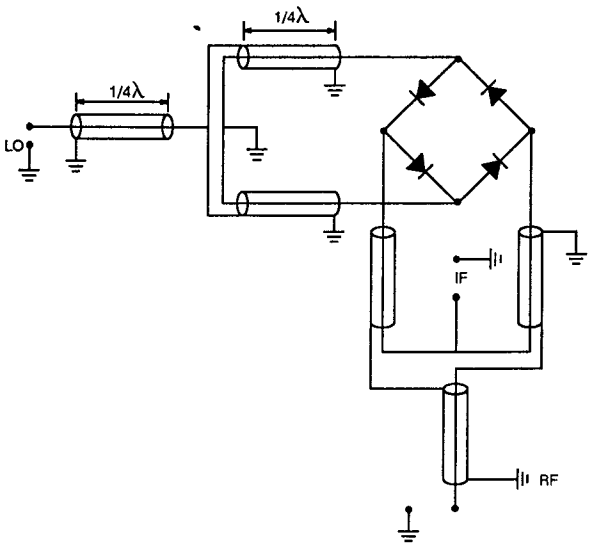
TYPICAL SINGLE BALANCED MIXERS

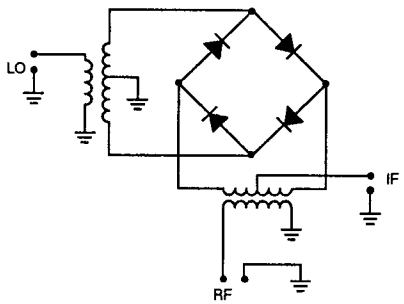






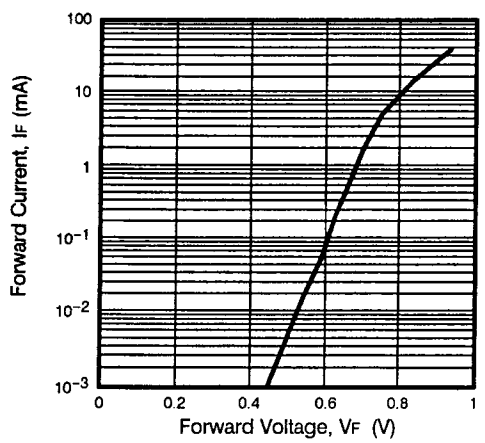
TYPICAL DOUBLE BALANCED MIXER CIRCUIT



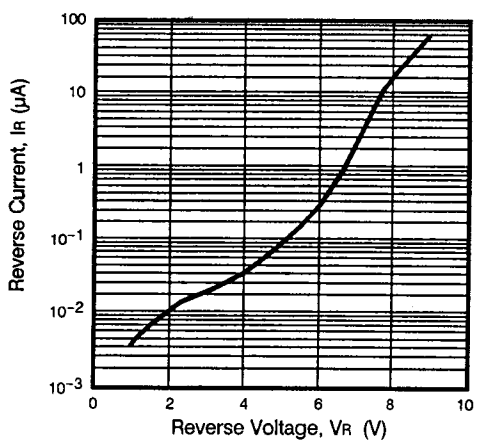


TYPICAL PERFORMANCE CHARACTERISTICS (T_A = 25°C)

FORWARD CURRENT vs. FORWARD VOLTAGE



REVERSE CURRENT vs. REVERSE VOLTAGE



TERMINAL CAPACITANCE vs. REVERSE VOLTAGE