

FEATURES

- **HIGH CUTOFF FREQUENCY:**
 $f_{c-6} = 250$ GHz ND3048
 $f_{c-6} = 270$ GHz ND3138(1)
- **HIGH RELIABILITY**
- **LOW COST**
- **WIDEBAND SELECTION: 2-15 GHz**
- **ULTRA HIGH CAPACITANCE RATIO:**
 $C_{j0}/C_{j-25} \geq 15$ ND3050

APPLICATIONS

- **TUNING**
- **MULTIPLIER CIRCUITS**
- **MODULATOR**

COLOR MARKINGS

Part Number	(A)	(B)
ND3048	YELLOW	RED
ND3049	YELLOW	BLUE
ND3050	YELLOW	BLACK
ND3138 (1)	GREEN	RED
ND3138 (2)	GREEN	BLUE

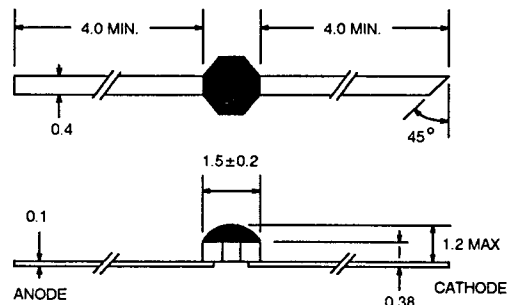
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage	V	25
I _F	Forward Current	mA	10
P _D	Power Dissipation ¹	W	0.2
P _D	Power Dissipation ²	W	0.5
T _{STG}	Storage Temperature	°C	-65 to +175
T _J	Junction Temperature	°C	175
T _{SDR}	Soldering Temperature ³	°C	230

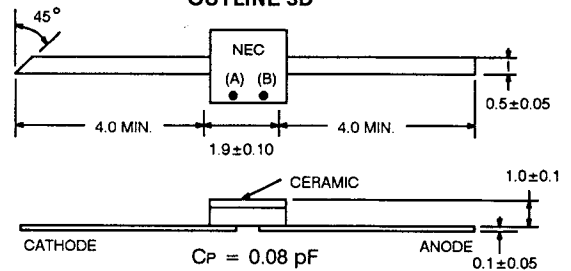
1. ND3048, ND3049, ND3050
2. ND3138(1), ND3138(2)
3. Within 10 Seconds

OUTLINE DIMENSIONS (Units in mm)

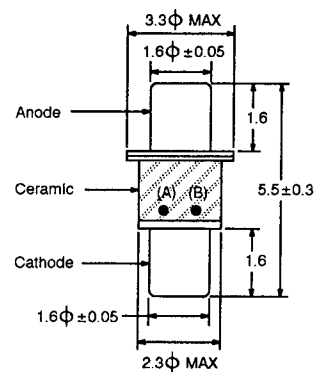
OUTLINE 3A



OUTLINE 3D



OUTLINE 5E



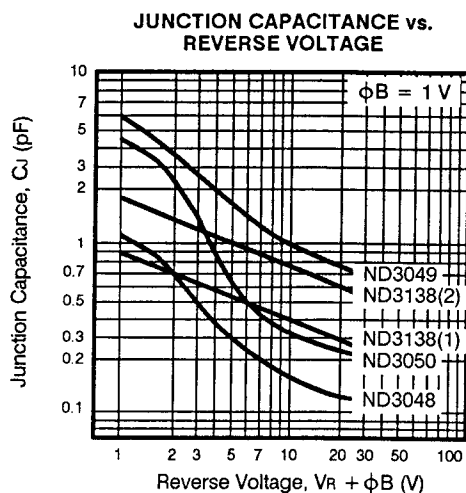
C_P = 0.22 pF

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

PART NUMBER PACKAGE OUTLINE			ND3048 3A, 3D, 5E			ND3049 3A, 3D, 5E			ND3050 3A, 3D, 5E			ND3138(1) 3A, 3D, 5E			ND3138(2) 3A, 3D, 5E		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
V_R	Reverse Voltage at $I_R = 10 \mu\text{A}$	V	25			25			25			25			25		
I_R	Reverse Current at $V_R = 23 \text{ V}$	ηA			100			100			100			100			100
V_F	Forward Voltage at $I_F = 10 \text{ mA}$	V			1.4			1.4			1.4			1.4			1.4
C_{J0}	Junction Capacitance at $V_R = 0, f = 1 \text{ MHz}$	pF	0.7	1.1	1.5	4	6	8				0.6	0.9	1.2	1.2	1.8	2.4
C_{J-4}	Junction Capacitance at $V_R = 4 \text{ V}, f = 1 \text{ MHz}$	pF							0.45	0.60	0.75						
C_{J0}/C_{J-6}	Capacitance Ratio at $V_R = 0, V_R = 6 \text{ V}, f = 1 \text{ MHz}$											1.8	2.2		1.8	2.2	
C_{J0}/C_{J-25}	Capacitance Ratio at $V_R = 0, V_R = 25 \text{ V}, f = 1 \text{ MHz}$		5	8		5	8		15	20							
f_c-6^*	Cutoff Frequency at $V_R = 6 \text{ V}, f = 20 \text{ GHz}$	GHz		250			80			220			270			170	
$Q-6$	$V_R = 6 \text{ V}, f = 50 \text{ MHz}$			5000			1600			4400			5400			3400	

*Harrison Method

TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



FEATURES

- HIGH CUTOFF FREQUENCY
- LARGE CAPACITANCE VARIATION
- SMALL PARASITIC REACTANCE
- SMALL PACKAGE
- HIGH RELIABILITY

APPLICATIONS

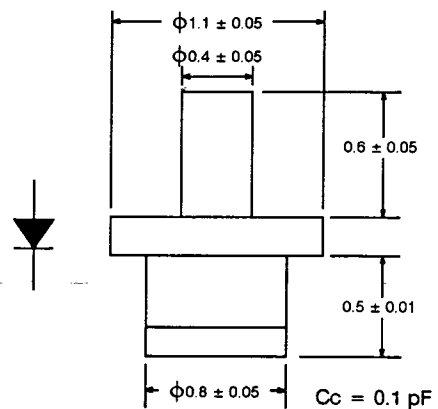
- PARAMETRIC AMPLIFIER
- HETERODYNE TRANSMITTING MIXER

DESCRIPTION AND APPLICATIONS

The ND3101-5M is a GaAs epitaxial Schottky barrier varactor diode especially designed for low noise parametric amplifiers. This diode has a Schottky barrier structure in place of the conventional p-n junction, therefore it has higher cutoff frequency and greater capacitance variation. By using this diode for parametric amplification, extremely low noise temperature can be achieved with lower pumping power.

OUTLINE DIMENSIONS (Units in mm)

OUTLINE 5M



ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage	V	6
V _{RM}	Peak Reverse Voltage	V	6.5
I _F	Forward Current	mA	50
I _{FM}	Peak Forward Current	mA	100
T _J	Junction Temperature	°C	-269 to +150
T _{STG}	Storage Temperature	°C	-269 to +150

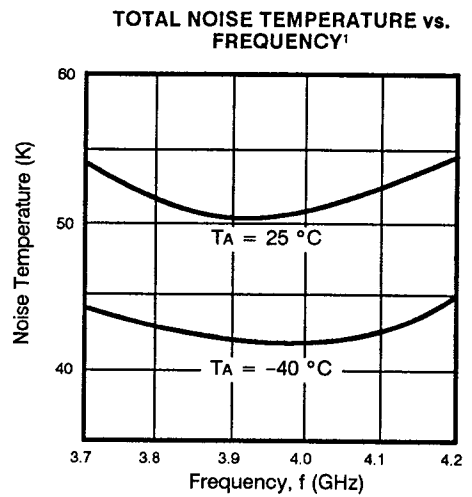
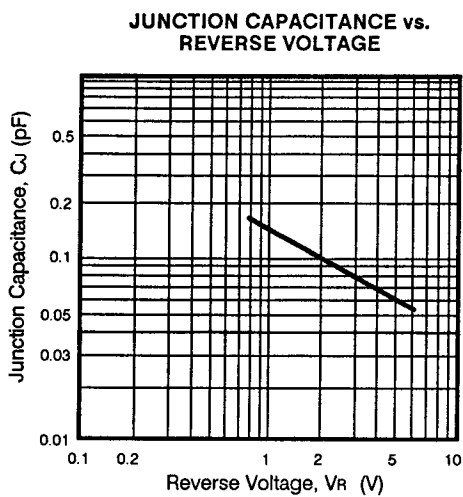
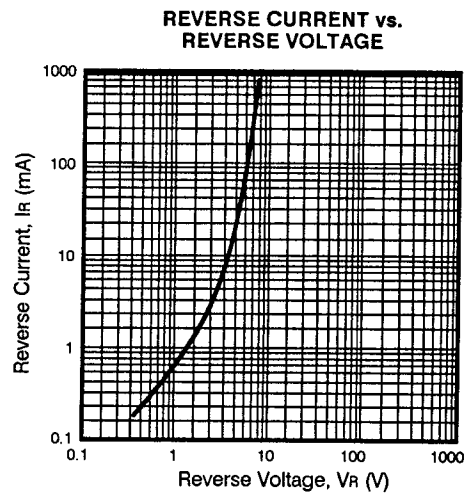
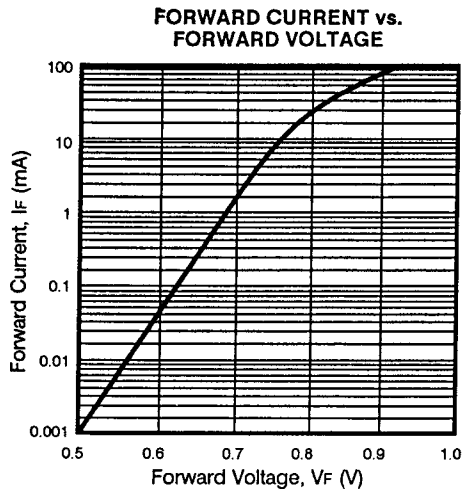
ELECTRICAL CHARACTERISTICS (TA = 25°C)

PART NUMBER PACKAGE OUTLINE			ND3101-5M 5M		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
V _R	Reverse Voltage, I _R = 1 μA	V	5	6	
V _F	Forward Voltage, I _F = 50 mA	V			1
C _{J0}	Junction Capacitance at f = 1 MHz, V _R = 0 V	pF	0.10	0.15	0.22
N	$N = \frac{C_{J0} - C_{J5}}{C_{J0}}$		0.5	0.6	
f _c	Cutoff Frequency at f _{MAX} , V _R = 0 V	GHz	600		

Note:

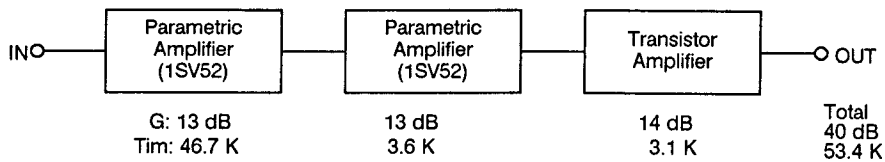
1. C_{J0} = Junction Capacitance measured at f = 1 MHz, V_R = 0 V.
C_{J5} = Junction Capacitance measured at f = 1 MHz, V_R = 5 V.

TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)



Note:

1. Circuit configuration for measurement.



G: GAIN

T_{im} : Each stage contribution temp. max in band.

FEATURES

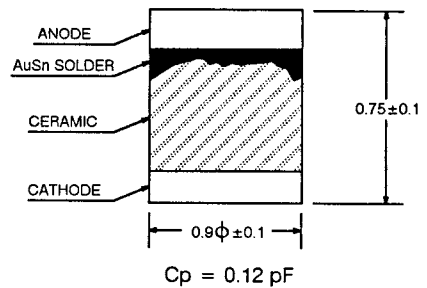
- **LOW CONVERSION LOSS:** $L_c = 7.5$ dB TYP at $f = 20$ GHz to 40 GHz, $P_{IN} = +16$ dBm
- **HIGH CUTOFF FREQUENCY:** $f_c = 300$ GHz TYP
- **LOW THERMAL RESISTANCE:**
 $R_{TH(\mu-C)} = 500^\circ\text{C/W MAX}$
- **SMALL SIZE**
- **HIGH RELIABILITY**

DESCRIPTION

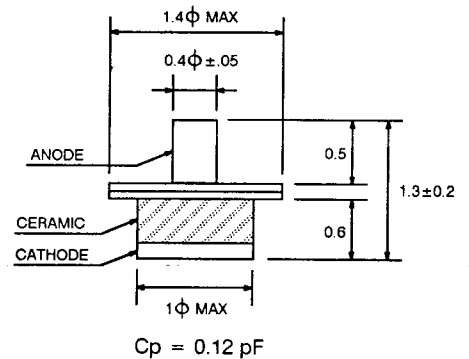
These GaAs Varactor Diodes are especially designed for millimeter wave multiplier applications such as a doubler from 20 GHz to 40 GHz. These diodes feature low conversion loss, high cutoff frequency, low thermal resistance, small size and high reliability. They are available in three package types: 5S, 5M and 5N.

OUTLINE DIMENSIONS (Units in mm)

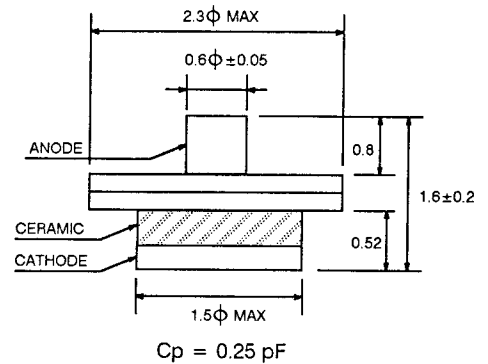
OUTLINE 5S



OUTLINE 5M



OUTLINE 5N



ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage	V	15
P _D	Power Dissipation	mW	200
T _{OP}	Operating Temperature	°C	-65 to +125
T _{STG}	Storage Temperature	°C	-65 to +125
T _{SDR}	Soldering Temperature	°C	+230*

*One time within 10 seconds.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V_R	Reverse Voltage at $I_R = 10 \mu\text{A}$	V	15		
I_R	Reverse Current at $V_R = +11 \text{ V}$	nA			10
V_F	Forward Voltage at $I_F = 10 \text{ mA}$	V			1.3
C_{j0}	Junction Capacitance at $V_R = 0 \text{ V}$, $f = 1 \text{ MHz}$	pF	0.15	0.20	0.25
$R_{TH} (\mu\text{-C})$	Thermal Resistance: Small Signal Method $I_{OP} = 5 \text{ mA}$ f (high) = 5 MHz, f (low) = 30 Hz	$^\circ\text{C/W}$			500
f_{c0}	Cutoff Frequency* at $V_R = 0 \text{ V}$, $f = 20 \text{ GHz}$	GHz	90	110	
f_{c-4}	Cutoff Frequency* at $V_R = 4 \text{ V}$, $f = 20 \text{ GHz}$	GHz	260	300	
L_C	Conversion Loss as a doubler, $f_{IN} = 20 \text{ GHz}$, at $P_{IN} = +16 \text{ dBm}$	dB		7.5	

*Sampling basis of LTPD 10% (n = 22, accept; 0 reject; 1)

FEATURES

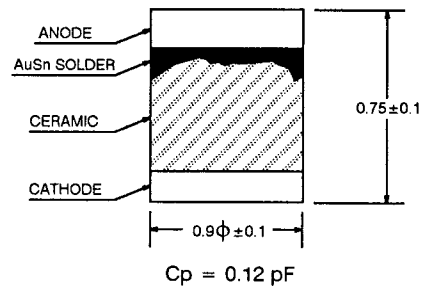
- **LOW CONVERSION LOSS:** $L_c = 5$ dB TYP at $f = 10$ GHz to 20 GHz
- **HIGH CUTOFF FREQUENCY:** $f_c = 240$ GHz TYP
- **LOW THERMAL RESISTANCE:**
 $R_{TH (J-C)} = 400$ °C/W MAX
- **SMALL SIZE**
- **HIGH RELIABILITY**

DESCRIPTION

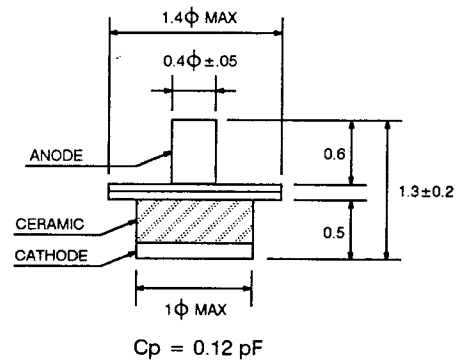
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OUTLINE DIMENSIONS (Units in mm)

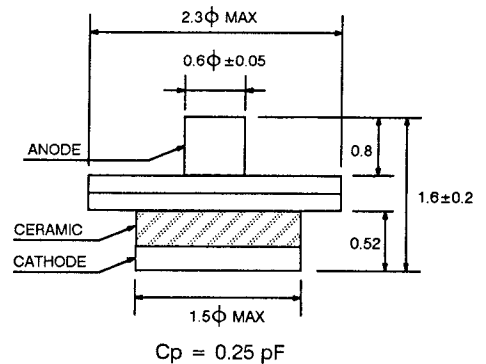
OUTLINE 5S



OUTLINE 5M



OUTLINE 5N



ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage	V	22
P _D	Power Dissipation	mW	300
T _{OP}	Operating Temperature	°C	-65 to +125
T _{STG}	Storage Temperature	°C	-65 to +125
T _{SDR}	Soldering Temperature	°C	+230*

*One time within 10 seconds.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

SYMBOLS	PARAMETERS	UNITS	MIN	TYP	MAX
V_R	Reverse Voltage at $I_R = 10 \mu\text{A}$	V	22		
I_R	Reverse Current at $V_R = 11 \text{V}$	nA			10
V_F	Forward Voltage at $I_F = 10 \text{mA}$	V			1.3
C_{j0}	Junction Capacitance at $V_R = 0 \text{V}$, $f = 1 \text{MHz}$	pF	0.30	0.35	0.40
$R_{TH (J-C)}$	Thermal Resistance: Small Signal Method $I_{OP} = 5 \text{mA}$ f (high) = 5 MHz, f (low) = 30 Hz	$^\circ\text{C/W}$			400
f_{c0}	Cutoff Frequency* at $V_R = 0 \text{V}$, $f = 20 \text{GHz}$	GHz	70	90	
f_{c-4}	Cutoff Frequency* at $V_R = 4 \text{V}$, $f = 20 \text{GHz}$	GHz	200	240	
L_c	Conversion Loss at $f = 10$ to 20GHz (doubler) at $P_{IN} = +21 \text{dBm}$	dB		5	

*Sampling basis of LTPD 10% (n = 22, accept 0, reject 1)