

FEATURES

- LOW, MEDIUM, & LONG LIFETIMES
- LOW SERIES RESISTANCE & CAPACITANCE
- HIGH RELIABILITY

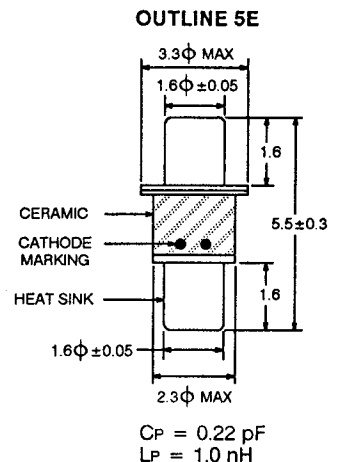
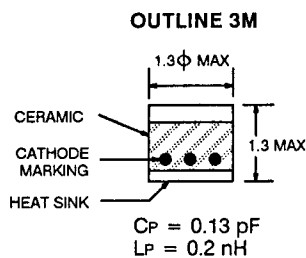
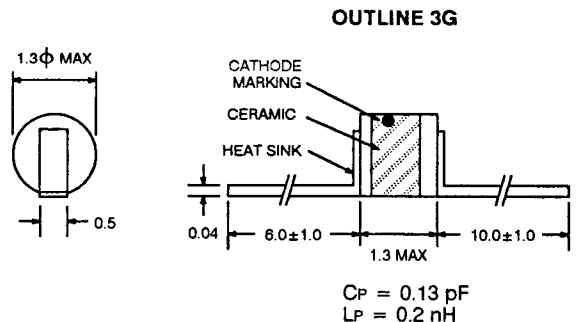
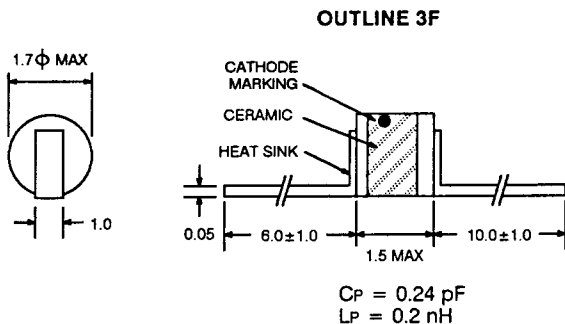
DESCRIPTION AND APPLICATIONS

PIN diodes are characterized by current controlled, variable resistors. The ND6000 microwave PIN diode series includes diodes for VHF through 90 GHz. Applications include AGC, attenuator, modulator, switch and phase shifter circuits.

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage ND6261, 71, 81, ND6361, 71 ND6461, 71 ND6481, ND6651, 61	V V V	100 60 30
V _{RM}	Peak Reverse Voltage ND6261, 71, 81, ND6361, 71 ND6461, 71 ND6481, ND6651, 61	V V V	110 65 33
I _F	Forward Current	mA	50
I _{FM}	Peak Forward Current ND6261, 71, 81, ND6361, 71, ND6461, 71, 81 ND6651, 61	mA mA	150 100
P _T	Total Power Dissipation (T _c = 25°C) ND6261, 71, 81, ND6481 ND6361, 71 ND6461, 71, ND6651, 61	W W W	1 0.4 0.5
T _{STG}	Storage Temperature	°C	-65 to +175
T _J	Junction Temperature	°C	175
T _{SDR}	Soldering Temperature	°C	230

OUTLINE DIMENSIONS (Units in mm)



*All dimensions are typical unless noted.

PERFORMANCE SPECIFICATIONS (T_A = 25°C)

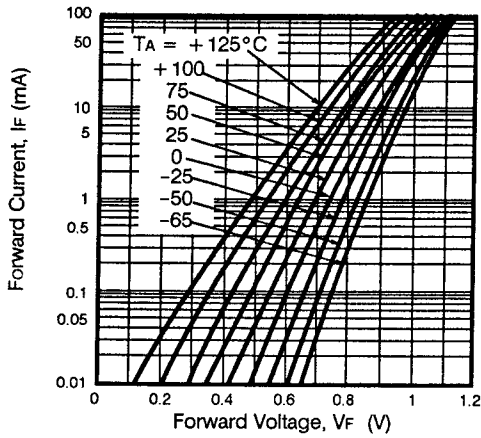
PART NUMBER AND PACKAGE OUTLINE	EIAJ ¹ PART NUMBER	CATHODE MARKING	POLARITY OF HEATSINK	BREAKDOWN VOLTAGE		FORWARD VOLTAGE		TOTAL CAPACITANCE ²			SERIES RESISTANCE			HIGH RESISTANCE			REVERSE RECOVERY TIME (ns)	LIFE TIME (ns)	POWER DISSIPATION (W)		
				IR (μA)	BV (V)	IF (mA)	VF (V)	VR (V)	CT (pF)	IF (mA)	RS (Ω)	IF (μA)	RH (KΩ)	MIN	TYP	MAX				TYP	MAX
LONG LIFETIME																					
ND6361-3F	1SV36	RED-RED	CATHODE	10	100	50	1.1	50	50	0.40	0.60	10	6	8	10	10	2	2.5	1000	2000	0.40
ND6371-5E	1SV37	ORANGE-PURPLE	CATHODE	10	100	50	1.1	50	50	0.40	0.60	10	6	8	10	10	2	2.5	1000	2000	0.40
MEDIUM LIFETIME																					
ND6261-3F	1SV26	GREEN	CATHODE	10	100	50	1	50	50	0.30	0.35	10	1.6	2.5	3.6	10	0.30	0.40	300	500	1
ND6271-5E	1SV27	RED-PURPLE	CATHODE	10	100	50	1	50	50	0.30	0.35	10	1.6	2.5	3.6	10	0.30	0.40	300	500	1
ND6281-3G	1SV28	BLACK-ORANGE	CATHODE	10	100	50	1	50	50	0.20	0.25	10	1.6	2.5	3.6	10	0.30	0.40	300	500	1
LOW LIFETIME																					
ND6461-3G	1SV46	YELLOW	CATHODE	10	60	50	1	10	10	0.23	0.33	10		1		10		0.1	80	120	0.5
ND6471-5E	1SV47	YELLOW-PURPLE	CATHODE	10	60	50	1	10	10	0.32	0.42	10		1		10		0.1	80	120	0.5
FAST SWITCHING																					
ND6481-5E	1SV48	YELLOW	CATHODE	10	30	50	1	10	10	0.40	0.58	10		0.8		10		0.1	30	60	1
ND6651-3M	1SV65	YELLOW-GRAY	CATHODE	10	30	50	1	10	10	0.22	0.31	10		0.8		10		0.1	30	60	0.5
ND6661-3M	1SV66	YELLOW-GRAY-RED	CATHODE	10	30	50	1	10	10	0.22	0.31	10		0.8		10		0.1	30	60	0.5

Notes:

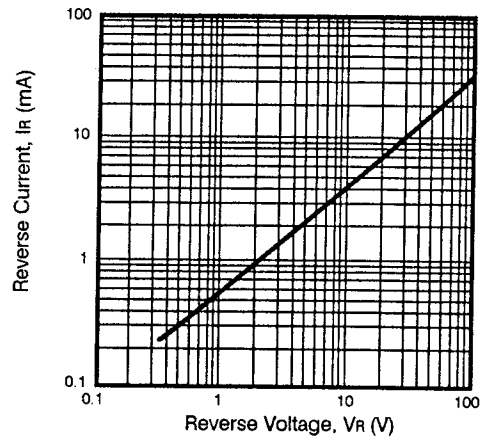
1. Electronic Industrial Association of Japan.
2. Includes Package Capacitance.
3. T_C = 25°C.

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

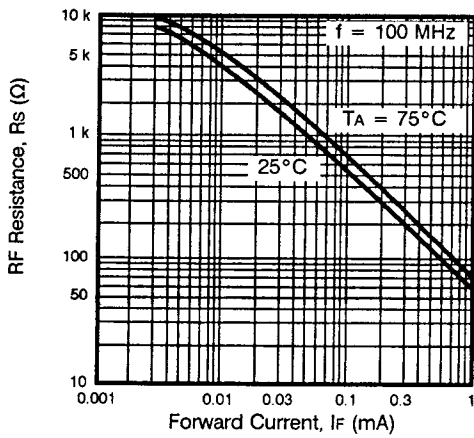
ND6361, ND6371
FORWARD CURRENT
vs. FORWARD VOLTAGE



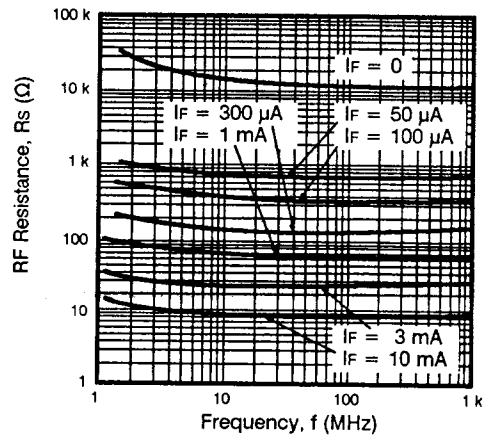
ND6361, ND6371
REVERSE CURRENT
vs. REVERSE VOLTAGE



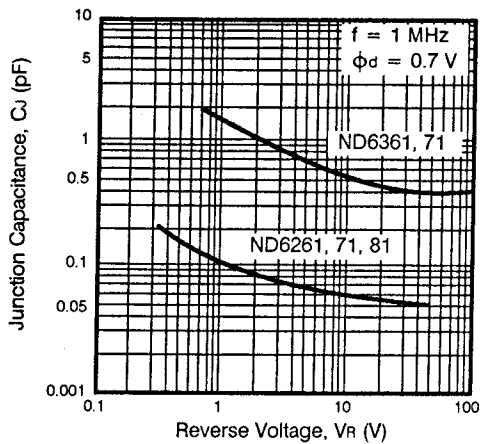
ND6361, ND6371
RF RESISTANCE
vs. FORWARD CURRENT



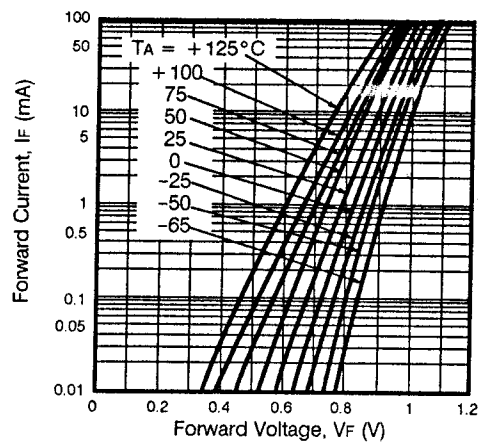
ND6361, ND6371
RF RESISTANCE vs. FREQUENCY



ND6361, 71, ND6261, 71, 81
JUNCTION CAPACITANCE
vs. REVERSE VOLTAGE



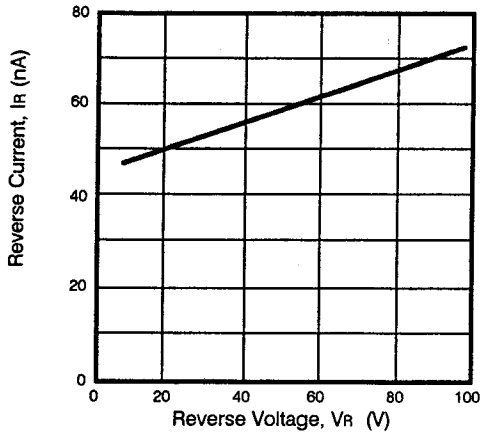
ND6261, 71, 81
REVERSE CURRENT
vs. REVERSE VOLTAGE



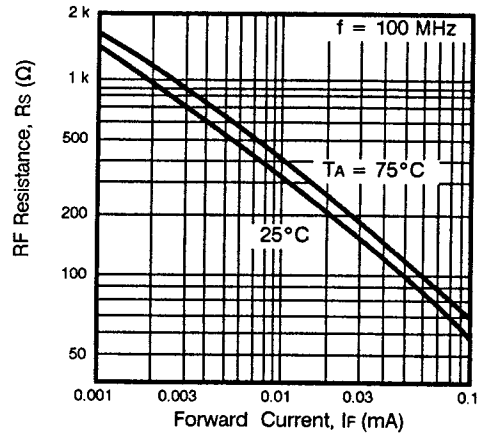
ND6000 SERIES

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

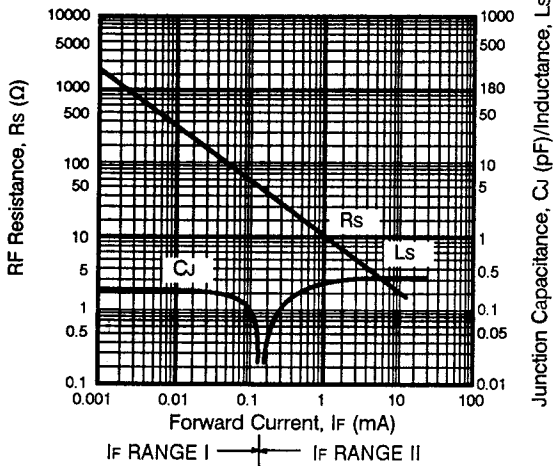
ND6261, 71, 81
REVERSE CURRENT
vs. REVERSE VOLTAGE



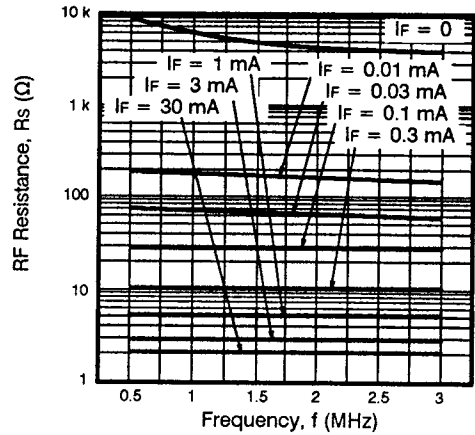
ND6261, 71, 81
RF RESISTANCE
vs. FORWARD CURRENT



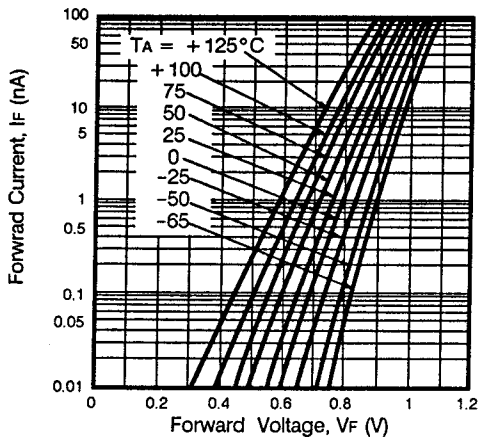
ND6261, 71, 81
RF RESISTANCE, JUNCTION
CAPACITANCE AND INDUCTANCE
vs. FORWARD CURRENT



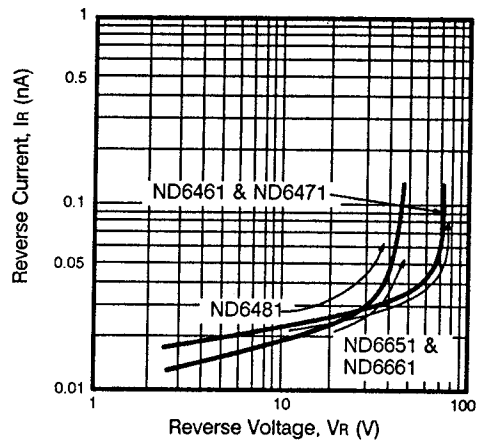
ND6261, 71, 81
RF RESISTANCE vs. FREQUENCY



ND6461, ND6471
FORWARD CURRENT
vs. FORWARD VOLTAGE

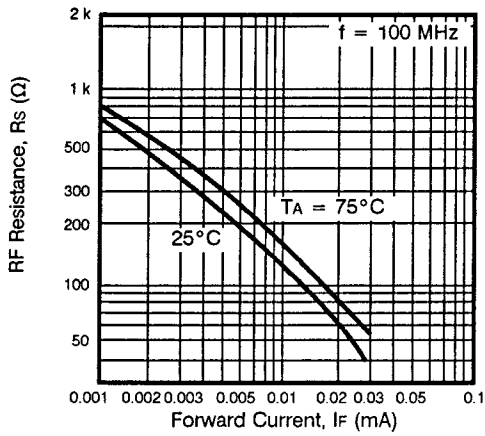


ND6461, 71, 81, ND6651, 61
REVERSE CURRENT
vs. REVERSE VOLTAGE

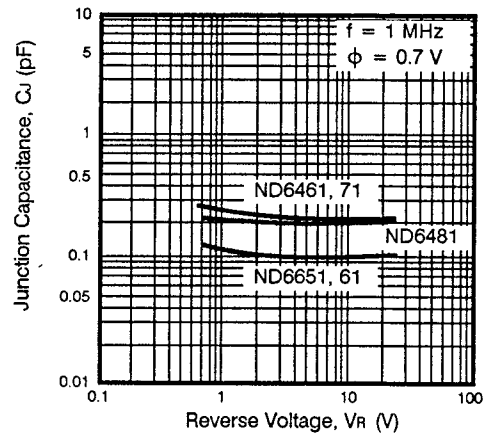


TYPICAL PERFORMANCE CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

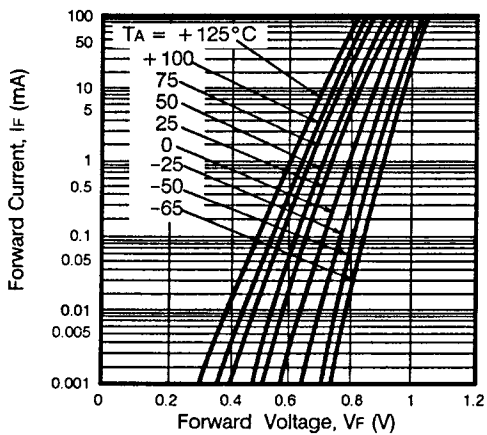
ND6461, 71
RF RESISTANCE
vs. FORWARD CURRENT



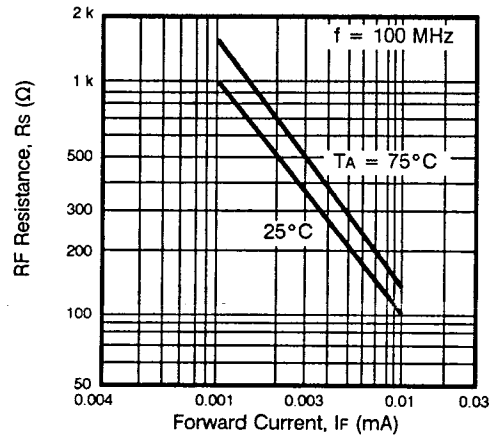
ND6461, 71, ND6481, ND6651, 61
JUNCTION CAPACITANCE
vs. REVERSE VOLTAGE



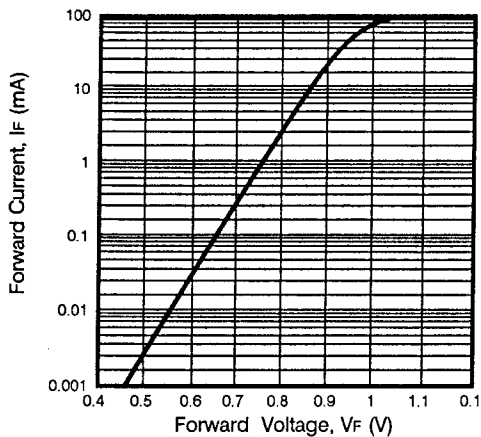
ND6481
FORWARD CURRENT
vs. FORWARD VOLTAGE



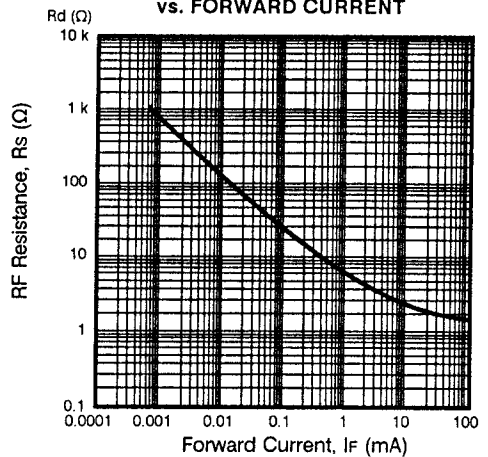
ND6481
RF RESISTANCE
vs. FORWARD CURRENT



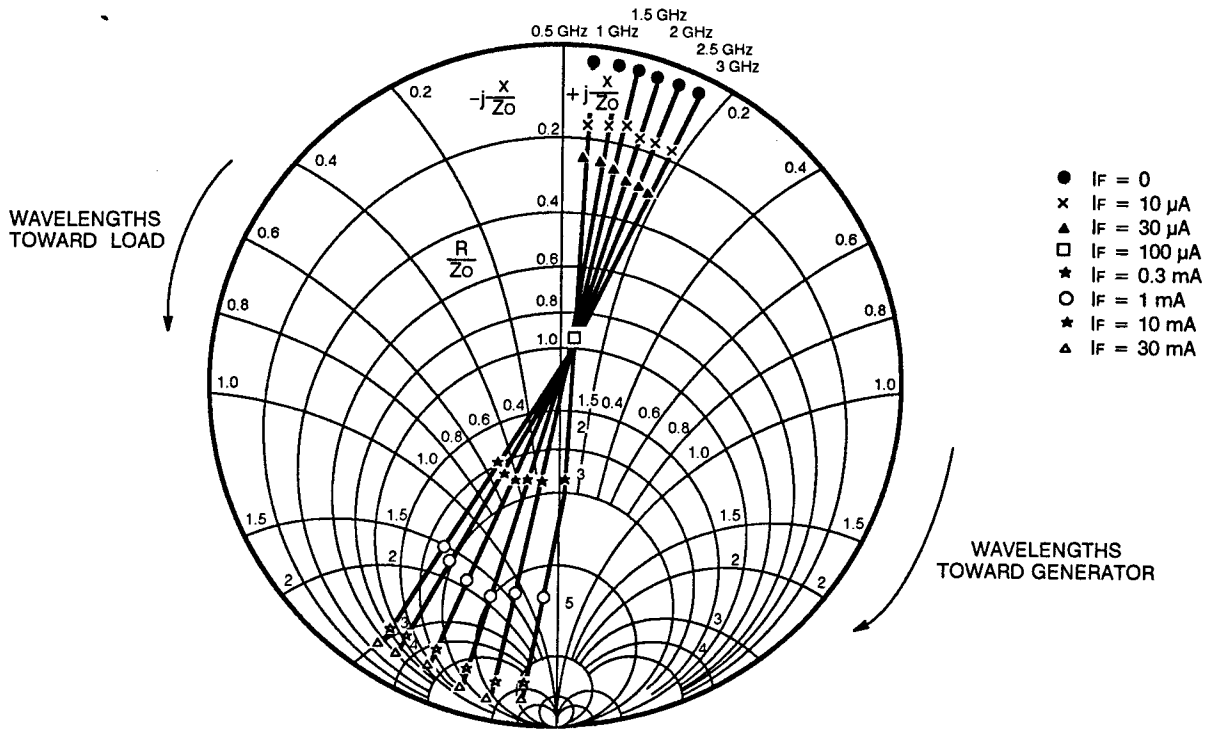
ND6651, ND6661
FORWARD CURRENT
vs. FORWARD VOLTAGE



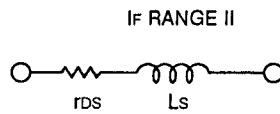
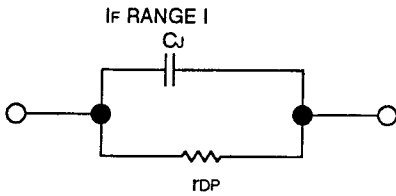
ND6651, ND6661
RF RESISTANCE
vs. FORWARD CURRENT



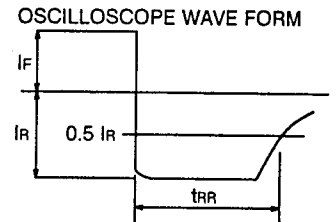
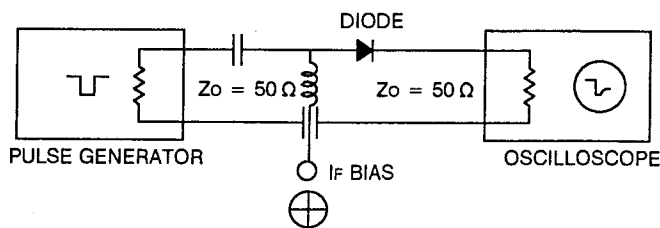
TYPICAL ADMITTANCE CHARACTERISTICS (T_A = 25°C)



ND6261, 71, 81
 f = 0.5 to 3 GHz
 Automatic Network Analyzer
 Model 8542A (Hewlett Packard)



SWITCHING TIME MEASURING CIRCUIT

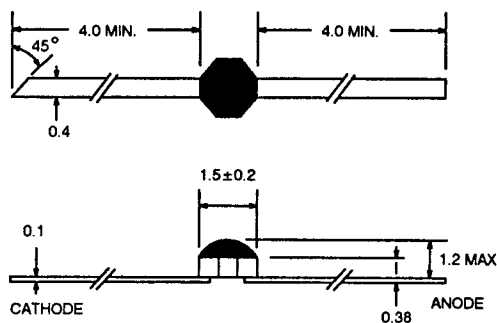


FEATURES

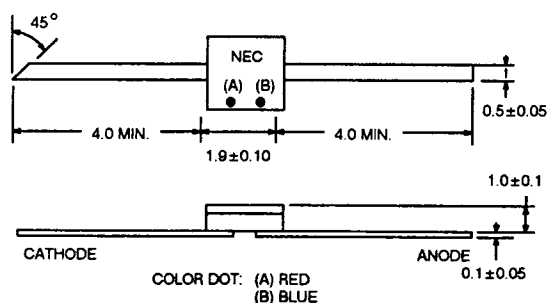
- LOW DRIVING POWER
- WIDE RF RESISTANCE RANGE
- SMALL SIZE
- LOW COST

OUTLINE DIMENSIONS (Units in mm)

OUTLINE 3A*



OUTLINE 3D



COLOR DOT: (A) RED
(B) BLUE

ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage	V	100
V _{RM}	Peak Reverse Voltage	V	110
I _F	Forward Current	mA	50
I _{FM}	Peak Forward Current	mA	150
P _D	Power Dissipation	W	1
T _J	Junction Temperature	°C	+175
T _{STG}	Storage Temperature	°C	-65 to +175
T _{SDR}	Soldering Temperature	°C	+230*

*One time within 10 seconds.

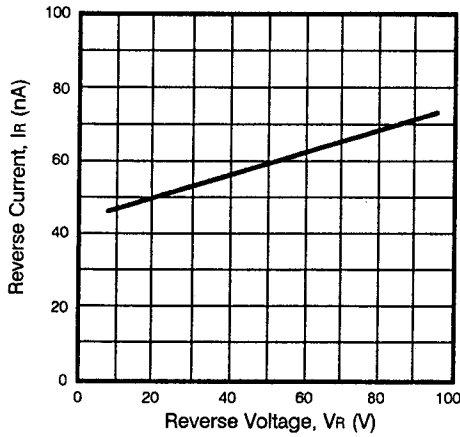
*Moisture resistance of 3A package diode is about 500 Hr HHT (85°C, 85%), because 3A package has small mold potting structure. If you need hermetic package diode, 3D package is suitable.

ELECTRICAL CHARACTERISTICS (TA = 25°C)

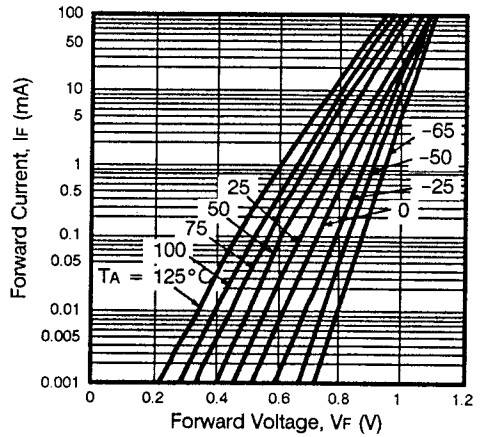
PART NUMBER PACKAGE OUTLINE			ND6281-3A 3A			ND6281-3D 3D		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
V _F	Forward Voltage at I _F = 50 mA	V			1			1
V _R	Reverse Voltage at I _R = 10 μA	V	100			100		
I _R	Reverse Current at V _R = 81 V	μA			0.5			0.5
C _T	Terminal Capacitance at f = 1 MHz, V _R = 6 V	pF			0.28			0.25
t _{RR}	Reverse Recovery Time at I _F = 10 mA, I _R = 50 mA, 0.5 • I _R Recovery	ns			100			100
r _{DS}	RF Resistance at f = 1.7 GHz, I _F = 10 mA	Ω		2			2	
r _{DP}	RF Resistance at f = 1.7 GHz, I _F = 10 μA	Ω		300			300	

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

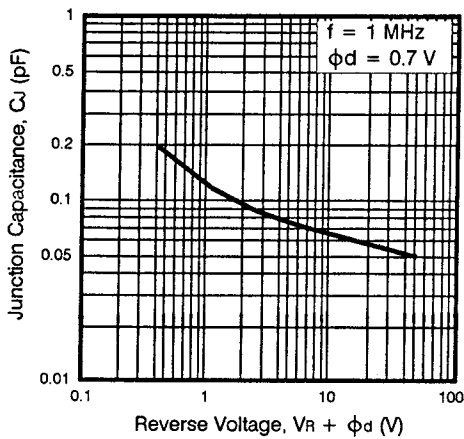
REVERSE CURRENT vs. FORWARD VOLTAGE



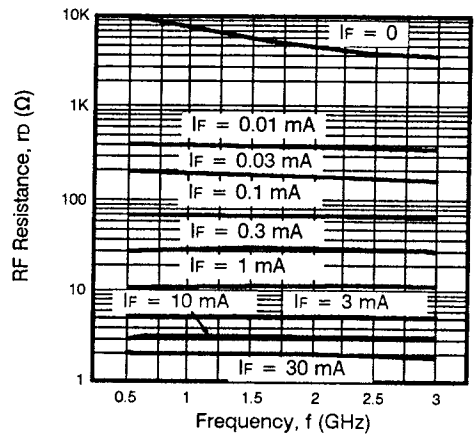
FORWARD CURRENT vs. FORWARD VOLTAGE



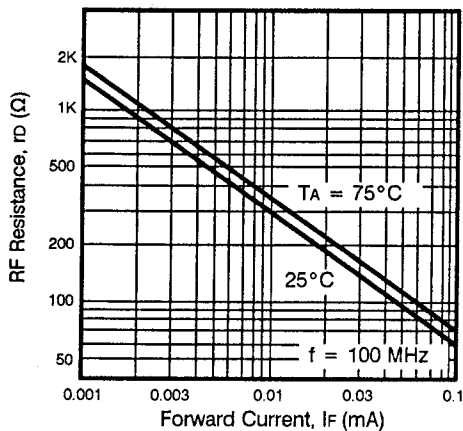
JUNCTION CAPACITANCE vs. REVERSE VOLTAGE



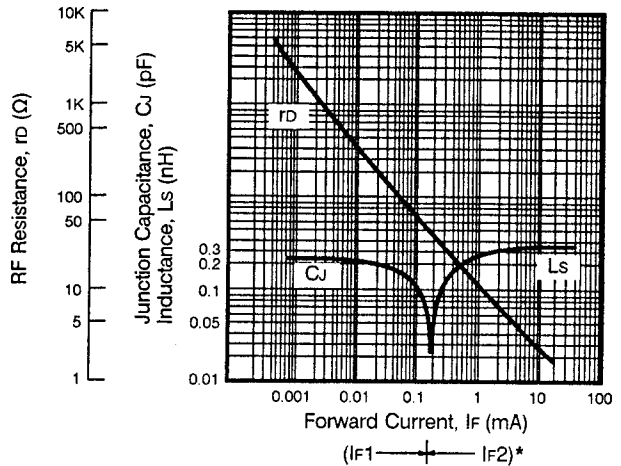
RF RESISTANCE vs. FREQUENCY



RF RESISTANCE vs. FORWARD CURRENT

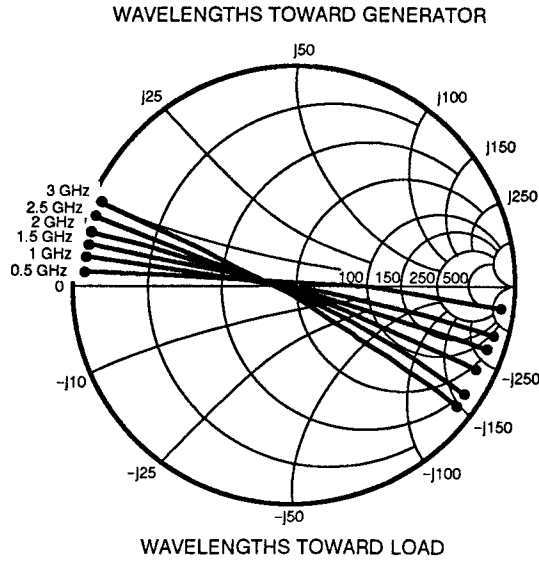


RF RESISTANCE, JUNCTION CAPACITANCE AND INDUCTANCE vs. FORWARD CURRENT



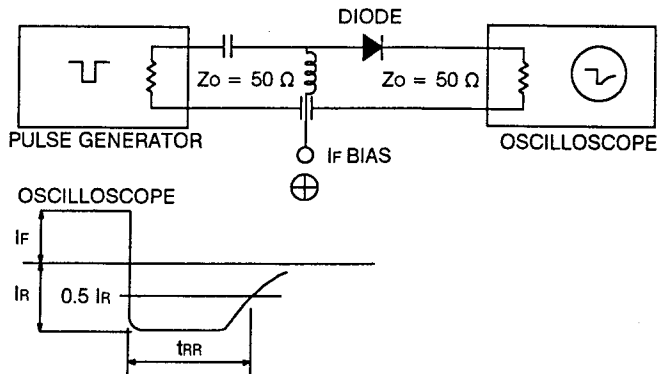
*See note on back page.

TYPICAL SCATTERING PARAMETERS

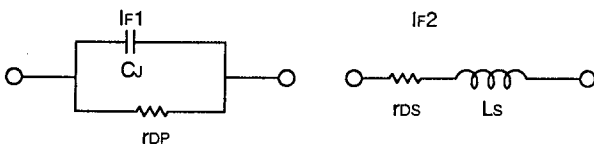


f = 0.5 to 3 GHz
Automatic Network Analyzer
Model 8542A (HP)
ADMITTANCE PLOT

REVERSE RECOVERY TIME MEASUREMENT CIRCUIT



Note:



FEATURES

- **LOW DISTORTION:** ($IM_3 = 75$ dB)
- **WIDE RF RESISTANCE RANGE:** (30 dB)
- **P TYPE BASE**
- **SMALL SIZE**
- **LOW COST**

DESCRIPTION AND APPLICATIONS

Pin Diodes are characterized by current controlled, variable resistors. The ND6361 PIN diode is designed for use in C-Band applications such as: automatic gain control circuits, attenuators, RF limiters and switches. The device is available in two packages versions, ND6361-3A and ND6361-3D.

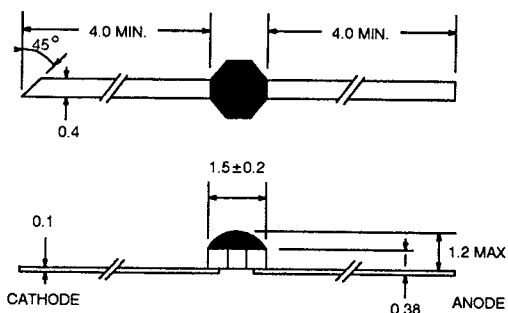
ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _R	Reverse Voltage	V	100
V _{RM}	Peak Reverse Voltage	V	110
I _F	Forward Current	mA	50
I _{FM}	Peak Forward Current	mA	150
P _D	Power Dissipation	W	0.4
T _J	Junction Temperature	°C	+175
T _{STG}	Storage Temperature	°C	-65 to +175
T _{SDR}	Soldering Temperature	°C	230*

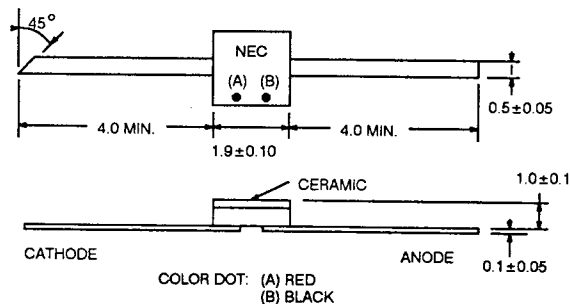
*One time within 10 seconds.

OUTLINE DIMENSIONS (Units in mm)

OUTLINE 3A*



OUTLINE 3D



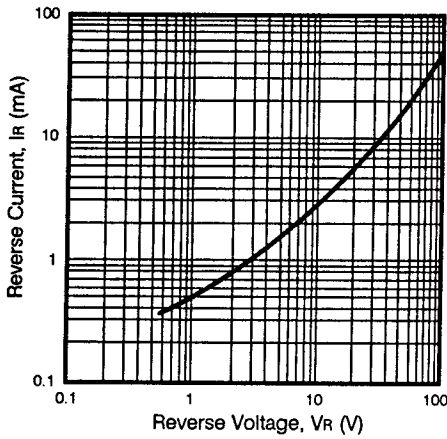
*Moisture resistance of 3A package diode is about 500 hr HHT (85°C, 85%), because 3A package has small mold potting structure. If you need a hermetic package diode, 3D package is recommended.

ELECTRICAL CHARACTERISTICS (TA = 25°C)

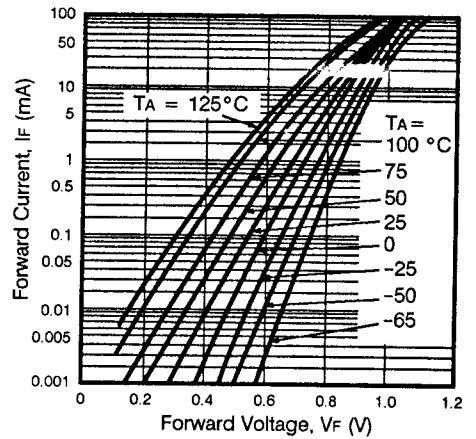
PART NUMBER PACKAGE OUTLINE			ND6361-3A 3A			ND6361-3D 3D		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
V _F	Forward Voltage at I _F = 50 mA	V		0.95	1.1		0.95	1.1
V _R	Reverse Voltage at I _R = 10 μA	V	100			100		
C _T	Terminal Capacitance at f = 1 MHz, V _R = 50 V	pF		0.43	0.63		0.4	0.6
t _{RR}	Reverse Recovery Time at I _F = 10 mA, I _R = 16 μA, 0.5 • I _R recovery	μs		1			1	
τ	Life Time at I _F = 10 mA, I _R = 16 μA	μs		2			2	
r _{DS}	RF Resistance at I _F = 10 mA, f = 100 MHz	Ω		8	10		8	10
r _{DP}	RF Resistance at I _F = 10 μA, f = 100 MHz	kΩ	2	4		2	4	

TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)

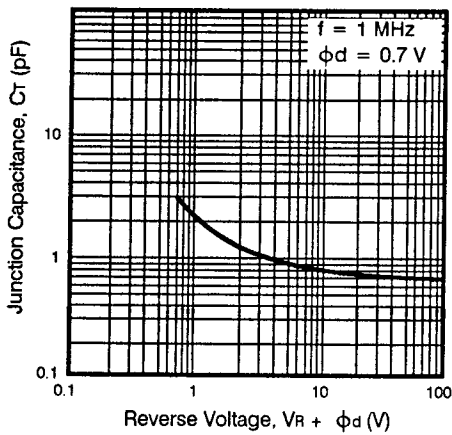
REVERSE CURRENT vs. REVERSE VOLTAGE



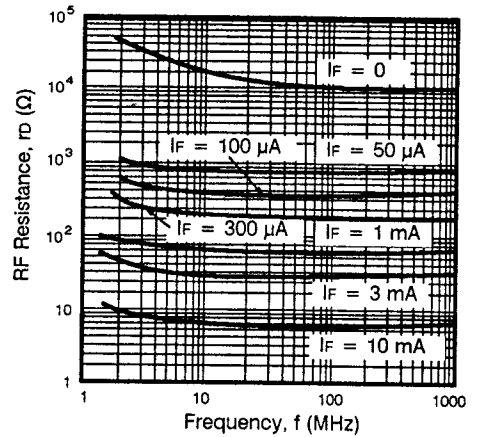
FORWARD CURRENT vs. FORWARD VOLTAGE



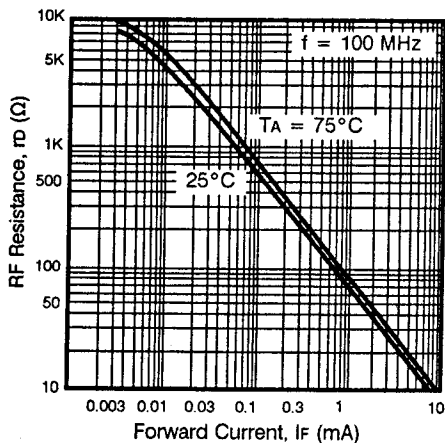
JUNCTION CAPACITANCE vs. REVERSE VOLTAGE



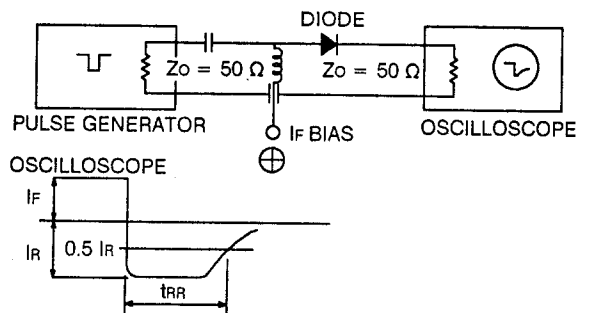
RF RESISTANCE vs. FREQUENCY



RF RESISTANCE vs. FORWARD CURRENT



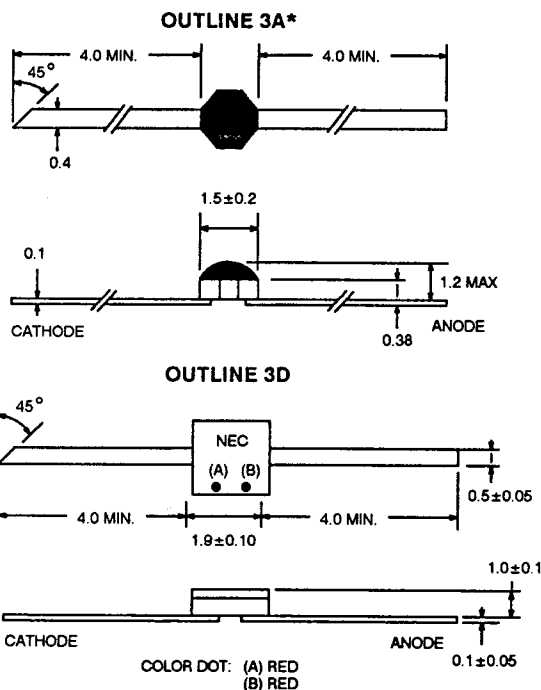
tRR MEASUREMENT CIRCUIT



FEATURES

- **BROAD BAND:** Up to K-Band
- **LOW LOSS**
- **HIGH SPEED SWITCHING:** Switching Speed = 0.5 ns
 $I_F/I_R = 2 \text{ mA}/100 \text{ mA}$
- **LOW DRIVING POWER:** $I_F \leq 2 \text{ mA}$
- **SMALL SIZE**
- **LOW COST**

OUTLINE DIMENSIONS (Units in mm)



*Moisture resistance of 3A package diode is about 500 Hr HHT (85°C, 85%), because 3A package has small mold potting structure. If you need hermetic package diode, 3D package is suitable.

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_R	Reverse Voltage	V	30
V_{RM}	Peak Reverse Voltage	V	33
I_F	Forward Current	mA	50
I_{FM}	Peak Forward Current	mA	100
P_D	Power Dissipation	W	0.5
T_J	Junction Temperature	°C	+175
T_{STG}	Storage Temperature	°C	-65 to +175
T_{SDR}	Soldering Temperature	°C	230*

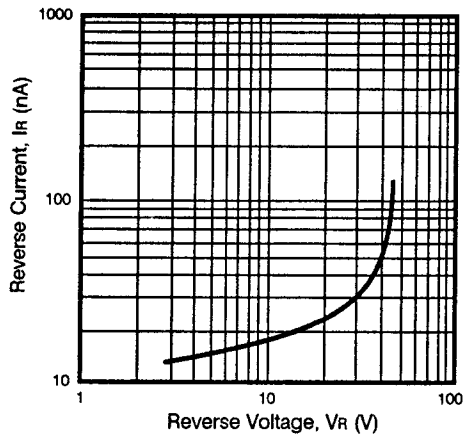
*One time within 10 seconds.

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

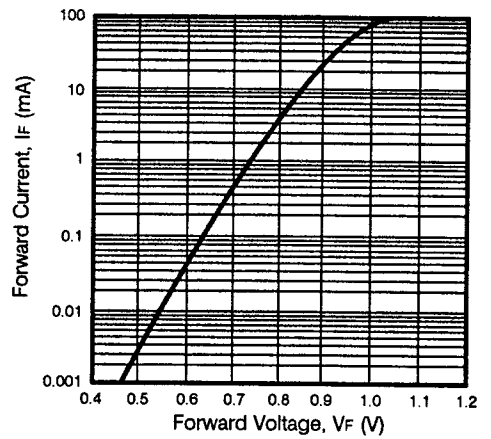
PART NUMBER PACKAGE OUTLINE			ND6651-3A 3A			ND6651-3D 3D		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX
V_F	Forward Voltage at $I_F = 50 \text{ mA}$	V		0.96	1		0.96	1
V_R	Reverse Voltage at $I_R = 10 \mu\text{A}$	V	30			30		
I_R	Reverse Current at $V_R = 20 \text{ V}$	nA			500			500
C_T	Terminal Capacitance at $f = 1 \text{ MHz}$, $V_R = 10 \text{ V}$ ND6651-3A ND6651-3D	pF pF			0.33			0.30
t_{RR}	Reverse Recovery Time at $I_F = 10 \text{ mA}$, $I_R = 6 \text{ mA}$, $0.5 \cdot I_R$ recovery	ns		30	60		30	60
τ	Life Time at $I_F = 10 \text{ mA}$, $I_R = 6 \text{ mA}$	ns		30	60		30	60
r_{DS}	RF Resistance at $I_F = 10 \text{ mA}$, $f = 100 \text{ MHz}$	Ω		2.5			2.5	
r_{DP}	RF Resistance at $I_F = 10 \mu\text{A}$, $f = 100 \text{ MHz}$	Ω		100			100	
L_I	Insertion Loss at $f = 20 \text{ GHz}$, $P_{IN} = 25 \text{ dBm}$	dB		0.90			0.90	

TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)

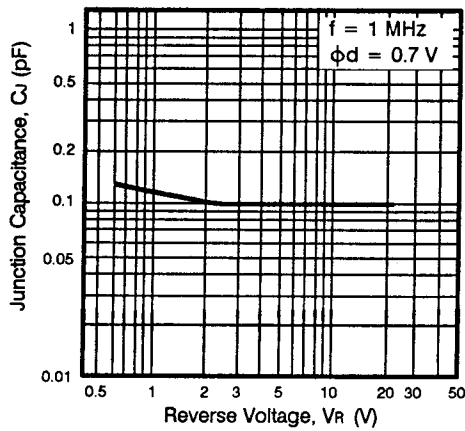
REVERSE CURRENT vs. REVERSE VOLTAGE



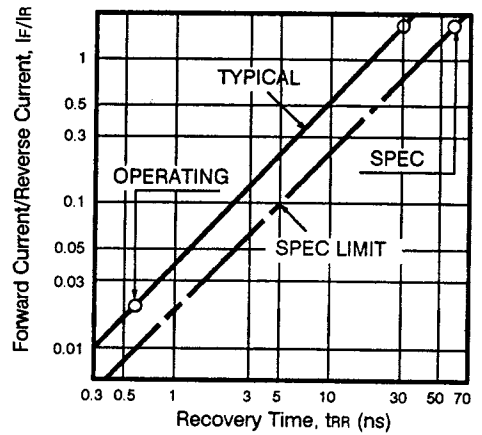
FORWARD CURRENT vs. FORWARD VOLTAGE



JUNCTION CAPACITANCE vs. REVERSE VOLTAGE



FORWARD CURRENT/REVERSE CURRENT vs. RECOVERY TIME



t_{RR} MEASUREMENT CIRCUIT

