



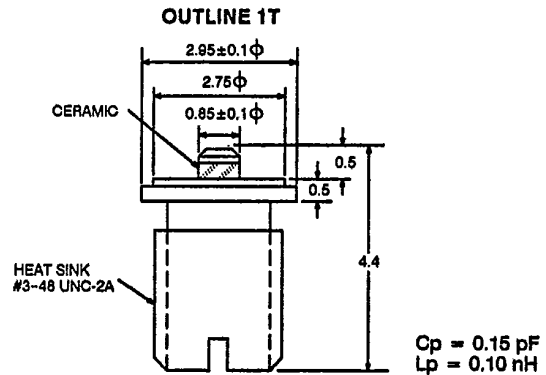
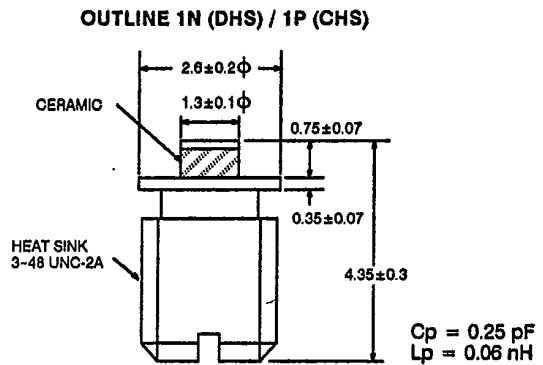
SILICON CW IMPATT DIODE

ND8 SERIES

FEATURES

- HIGH POWER OUTPUT AND WIDE FREQUENCY SELECTION
  - 3.50 W at 8 GHz
  - 3.00 W at 11 GHz
  - 2.20 W at 15 GHz
  - 1.20 W at 20 GHz
  - 0.70 W at 30 GHz
  - 0.40 W at 40 GHz
  - 0.20 W at 60 GHz
  - 0.10 W at 80 GHz
  - 0.05 W at 94 GHz
- HIGH EFFICIENCY
  - 12% at 8 GHz
  - 4% at 94 GHz
- SILICON SINGLE DRIFT REGION (SDR) AND DOUBLE DRIFT REGION (DDR)
- DIAMOND HEAT SINKS (DHS) COPPER HEAT SINKS (CHS)
- HIGH RELIABILITY FOR INDUSTRIAL AND MILITARY APPLICATIONS

OUTLINE DIMENSIONS (Units in mm)

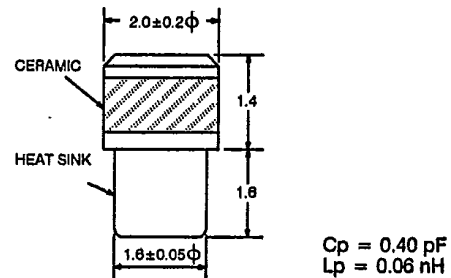


DESCRIPTION AND APPLICATIONS

The NEC CW IMPATT diode series includes a broad spectrum of diodes from low cost SDR with CHS to high power DDR with DHS types covering the 6 GHz to 100 GHz microwave region. The single drift region (SDR) IMPATT diode is a flat profile P<sup>+</sup>NN<sup>+</sup> epitaxial mesa with an integral heat sink, and the double drift region (DDR) diode is a flat profile P<sup>+</sup>PNN<sup>+</sup> integral heat sink epitaxial mesa structure.

Applications are IMPATT amplifiers and oscillators for industrial, space, and military systems. These include point to point communications, radar, radiometers, jammers, fuses, DME, speed detectors, intrusion alarms, beacons, and height finders. Reliability screening is available upon request.

OUTLINE 5H (DHS) / 5G (CHS)



Note: Heatsinks are Anodes

**ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25°C)**

SYMBOLS	IMPATT TYPE		PARAMETERS	UNITS	RATINGS		RATINGS
	DDR	SDR			(250-T <sub>C</sub> )/R <sub>TH</sub> (μ-C)	(200-T <sub>C</sub> )/R <sub>TH</sub> (μ-C)	
P <sub>T</sub>			Total Power Dissipation	W			
T <sub>OP</sub>			Operating Temperature	°C	-65 to +250		-65 to +200
T <sub>STG</sub>			Storage Temperature	°C	-65 to +200		-65 to +200
T <sub>SDR</sub>			Soldering Temperature	°C	230 for 10 sec.		230 for 10 sec.
ΔT <sub>J(AVE)</sub>			Average Junction Temperature Rise	°C	250		200

**PERFORMANCE SPECIFICATIONS (T<sub>A</sub> = 25°C)**

SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	ND8P08-5G 1ST11 5G SDR COPPER		ND8S08-5H 1ST15 5H SDR DIAMOND		ND8U08W-5H 1ST20 5H DDR DIAMOND		ND8O11-5G 1ST12 5G SDR COPPER		ND8R11-5H 1ST16 5H SDR DIAMOND		ND8T11W-5H 1ST21 5H DDR DIAMOND				
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
f	Frequency Range <sup>2</sup>	GHz	6	8	9	6	8	9	6	8	9	6	8	9	6	8	9
P <sub>OUT</sub>	Power Output	W	1	1.2		2	2.2		3.5	4		1.6	1.8		0.7	0.8	
η	Efficiency	%		7.6			8			12			7.8			7.1	
V <sub>OP</sub>	Operating Voltage	V		120	135		125	140		170	180		95	105		85	95
I <sub>OP</sub>	Operating Current	mA		130	150		220	260		190	200		240	260		140	160
BV	Breakdown Voltage, I <sub>R</sub> = 1 mA	V		95			95			135			70			70	
C <sub>J(BV-1)</sub>	Junction Capacitance, V <sub>R</sub> = BV-1	pF		0.45			0.50			0.40			0.65			0.55	
R <sub>TH(μ-C)</sub>	Thermal Resistance	°C/W		10			6			6			6			14	

Notes:

1. Electronic Industrial Association of Japan.
2. ΔT<sub>J(AVE)</sub> = (V<sub>OP</sub> x I<sub>OP</sub> - P<sub>OUT</sub>) / R<sub>TH(μ-A)</sub>



**ND8 SERIES**

**PERFORMANCE SPECIFICATIONS (T<sub>A</sub> = 25°C)**

SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	ND8N15-5G 1ST13 5G SDR COPPER		ND8P15-5H 1ST17 5H SDR DIAMOND		ND8S15W-1N, 5H 1ST22 1N, 5H DDR DIAMOND		ND8M20-5G 1ST14 5G SDR COPPER		ND8O20-5H 1ST18 5H SDR DIAMOND		ND8P20W-5H 1ST23 5H DDR DIAMOND			
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP
f	Frequency Range <sup>2</sup>	GHz	12	15	189	12	15	18	12	15	18	12	15	18	20	25
P <sub>out</sub>	Power Output	W	0.5	0.7		1	1.2		2.2	2.5		0.3	0.4		0.7	0.8
η	Efficiency	%		7.1			7.5			11			5			6.9
V <sub>op</sub>	Operating Voltage	V		65	73		70	80		100	110		50	55		50
I <sub>op</sub>	Operating Current	mA		150	170		230	260		230	250		160	180		230
BV	Breakdown Voltage, I <sub>r</sub> = 1 mA	V		52			52			80			38			38
C <sub>j</sub> (BV-1)	Junction Capacitance, V <sub>r</sub> = BV-1	pF		0.45			0.55			0.40			0.40			0.45
R <sub>th</sub> (J-C)	Thermal Resistance	°C/W		108			9			9			23			12

**Notes:**

1. Electronic Industrial Association of Japan.
2. ΔT<sub>J(AVE)</sub> = (V<sub>op</sub> × I<sub>op</sub> - P<sub>out</sub>) (R<sub>th</sub>(J-A))

SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	ND8M30-1N 1N SDR DIAMOND		ND8O30W-1N 1N DDR DIAMOND		ND8N40W-1N 1N DDR DIAMOND		ND8L60W-1T 1T DDR DIAMOND		ND8J80W-1T 1T DDR DIAMOND		ND8C96W-1T 1T DDR DIAMOND			
			MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP
f	Frequency Range <sup>2</sup>	GHz	25	30	35	25	30	35	35	40	50	70	80	87	96	100
P <sub>out</sub>	Power Output	W	0.30	0.35		0.70	0.80		0.40	0.50		0.10	0.15		0.05	0.06
η	Efficiency	%		6.5			10			8			4.5			4
V <sub>op</sub>	Operating Voltage	V		40			55	60		54	55		21	23		20
I <sub>op</sub>	Operating Current	mA		135		145	170			115	180		160	200		100
BV	Breakdown Voltage, I <sub>r</sub> = 1 mA	V		32		45		42		25			16			15
C <sub>j</sub> (BV-1)	Junction Capacitance, V <sub>r</sub> = BV-1	pF		0.25		0.25		0.20		0.20			0.15			0.10
R <sub>th</sub> (J-C)	Thermal Resistance	°C/W		30		25		35		40			60			80

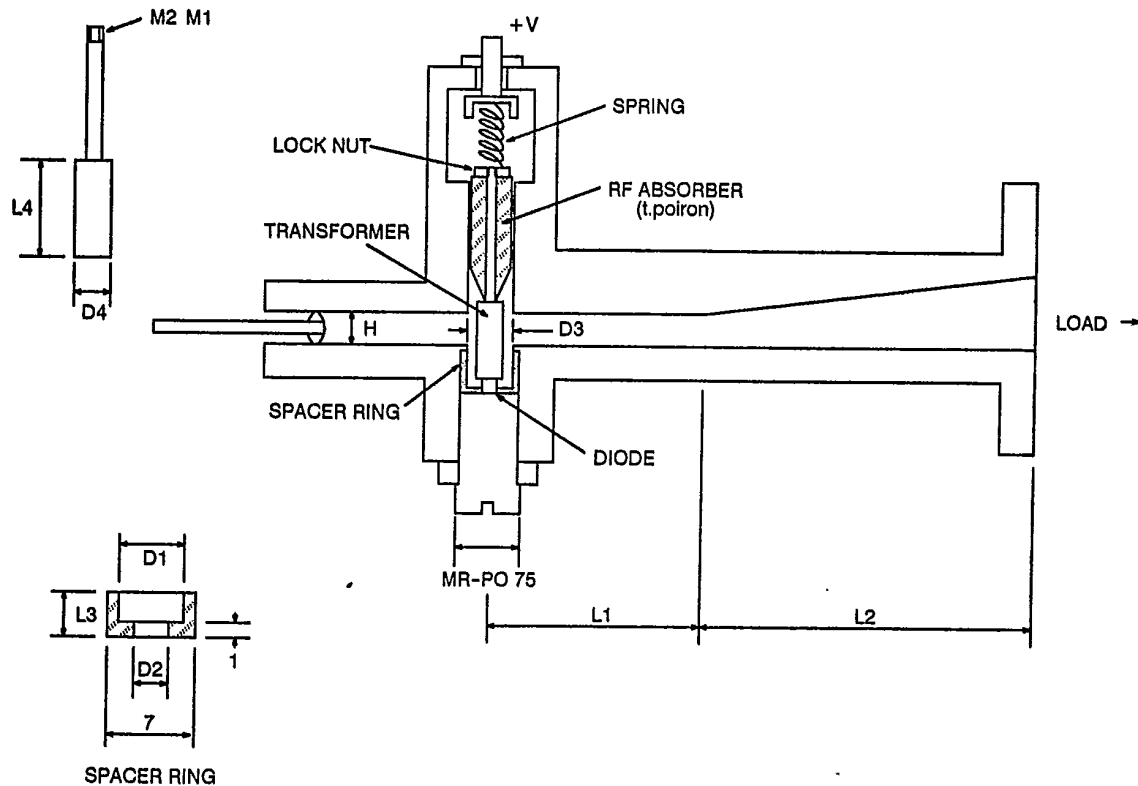
**Notes:**

1. Electronic Industrial Association of Japan.
2. ΔT<sub>J(AVE)</sub> = (V<sub>op</sub> × I<sub>op</sub> - P<sub>out</sub>) (R<sub>th</sub>(J-A))

**TEST OSCILLATOR DIMENSIONS**

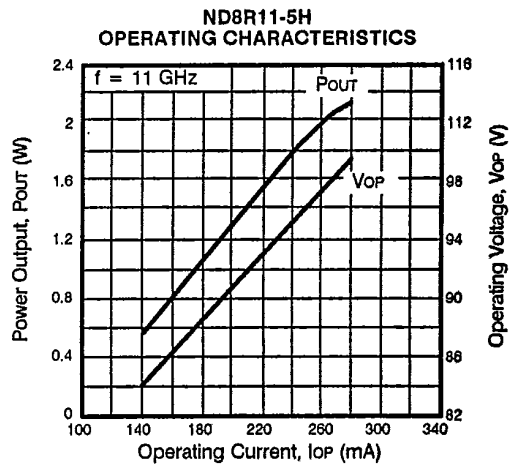
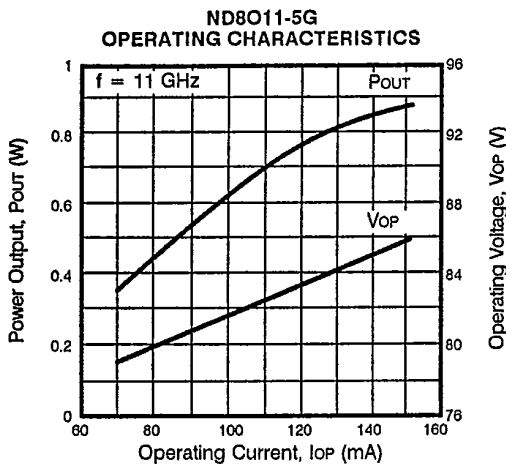
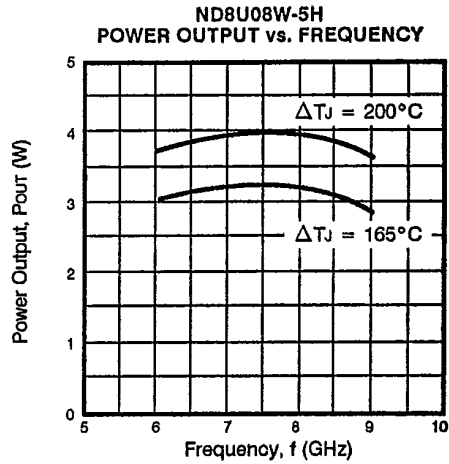
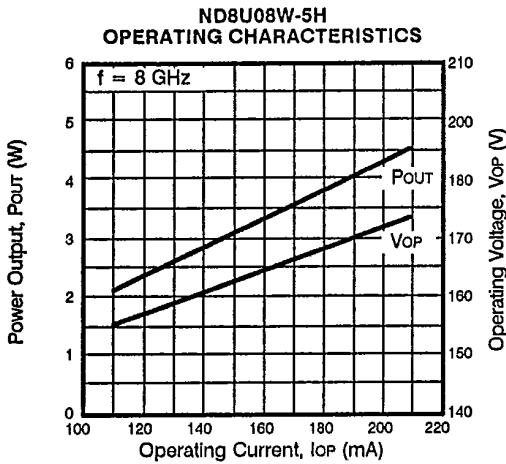
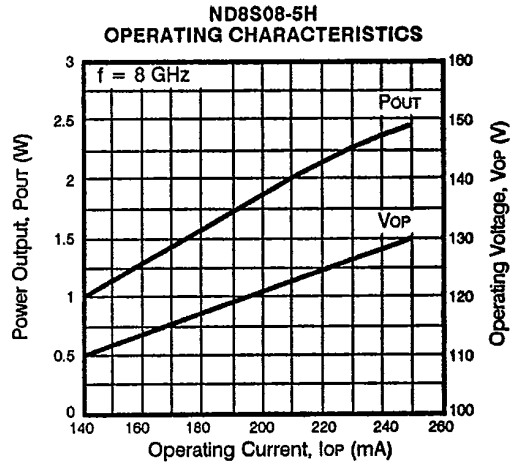
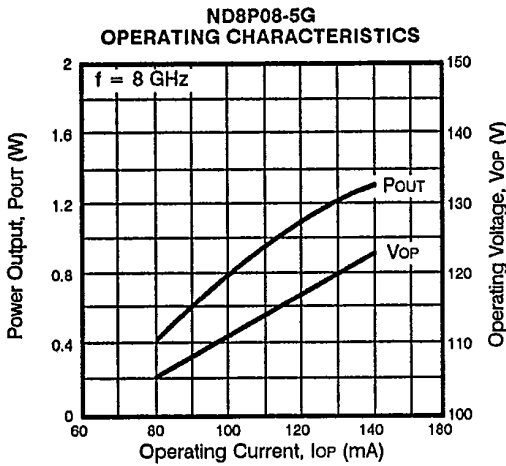
FREQUENCY	WAVEGUIDE	L1	L2	L3	L4	D1	D2	D3	D4	H
6-6 GHz	WR-159	$n\lambda g/2$	$n\lambda g$	15-5	25-18	6.5	4	6.5	6-5	6
7-8.2 GHz	WR-137	$n\lambda g/2$	$n\lambda g$	13-4	20-10	6.5	3.8	6.5	6-5	5
8-10 GHz	WR-112	$n\lambda g/2$	$n\lambda g$	10-3	16-9	6.4	3.6	6.4	6-5	4
10-12.4 GHz	WR-90	$n\lambda g/2$	$n\lambda g$	8-2	12-8	6	3.4	6	4.6-5	3
12-14 GHz	WR-75	$n\lambda g/2$	$n\lambda g$	7-1.5	10-5	5.5	3.4	5.5	4.4-4	2
13-18 GHz	WR-62	$n\lambda g/2$	$n\lambda g$	6-1.5	8-3.6	5	3	5	4-3.6	1.5
17-22 GHz	WR-51	$n\lambda g/2$	$n\lambda g$	6-1	6-3.6	4	2.4	4	3.4-2.8	1
22-33 GHz	WR-34	$n\lambda g/2$	$n\lambda g$	4-0.5	6-2.5	3.1	2.4	3.1	2.5-2	1
27-40 GHz	WR-28	$n\lambda g/2$	$n\lambda g$	2-0.5	5-2.5	3.1	1.2	3.1	2.5-2	1

**COAXIAL-WAVEGUIDE TEST MOUNT**

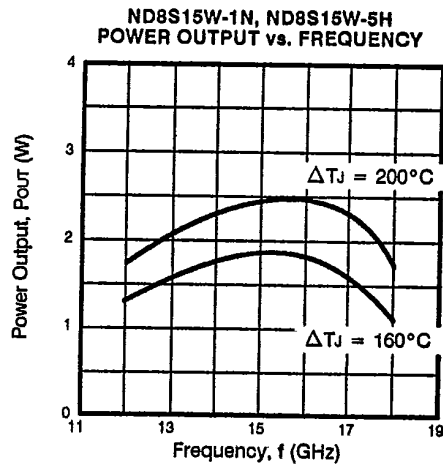
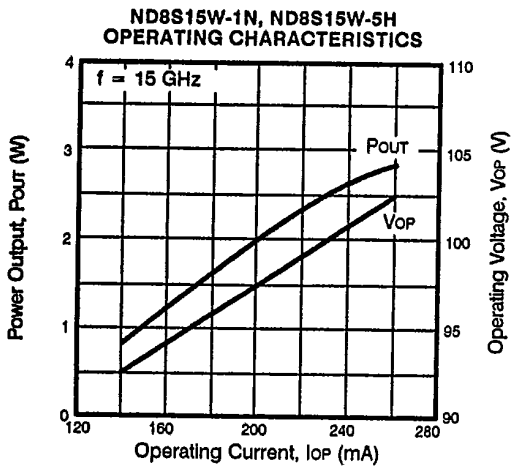
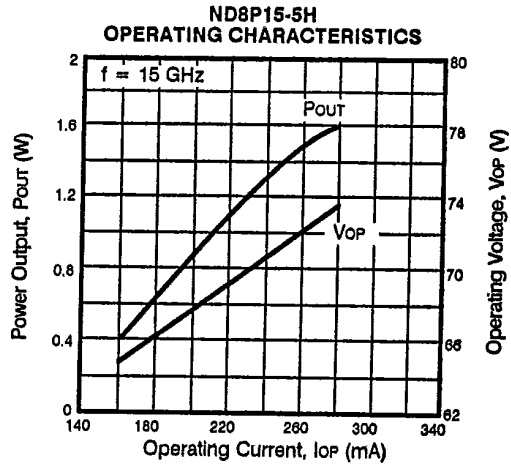
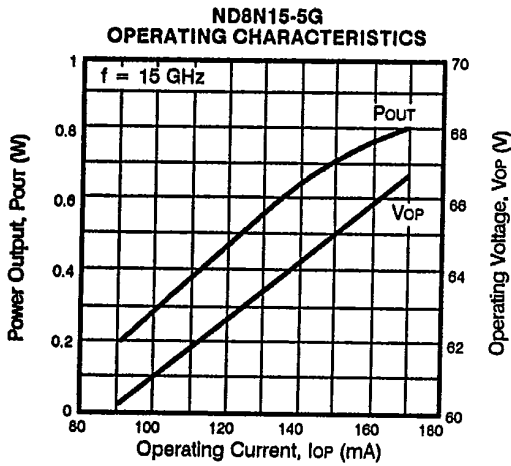
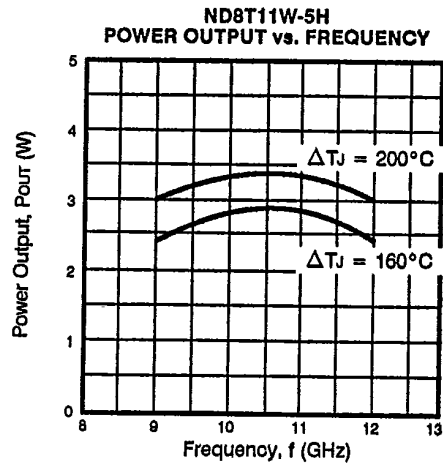
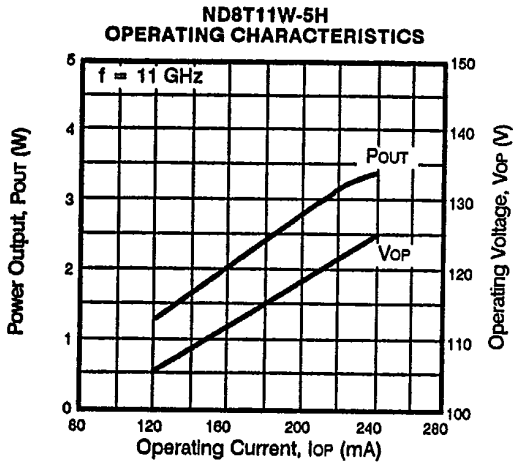


**ND8 SERIES**

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

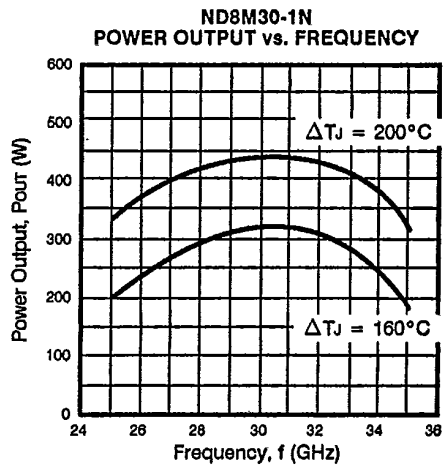
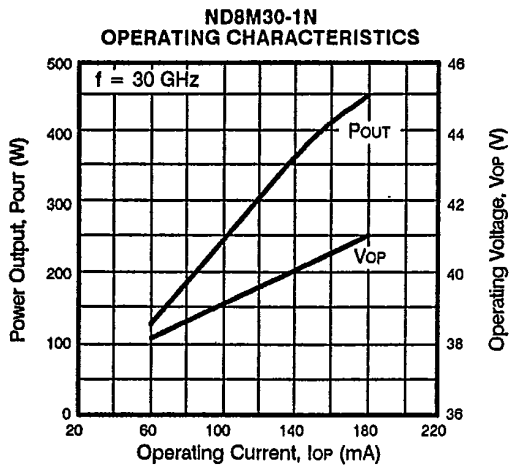
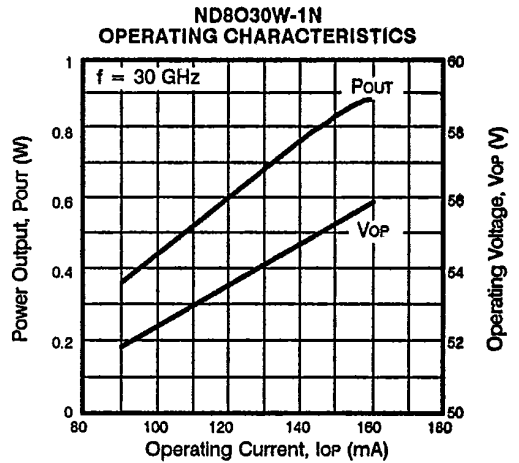
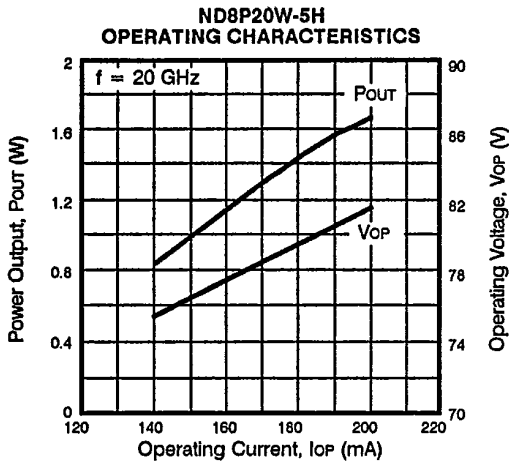
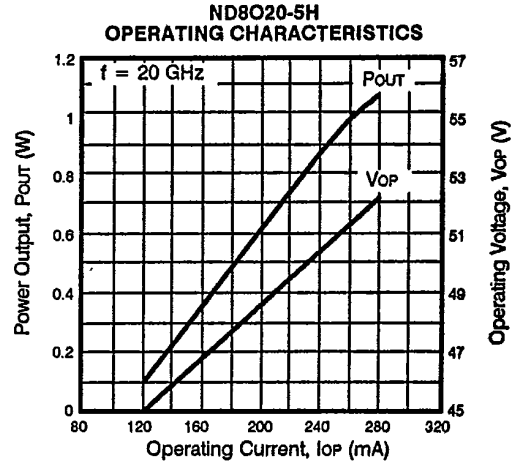
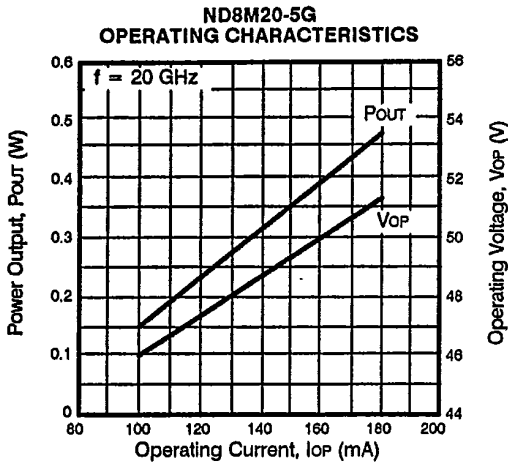


TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)

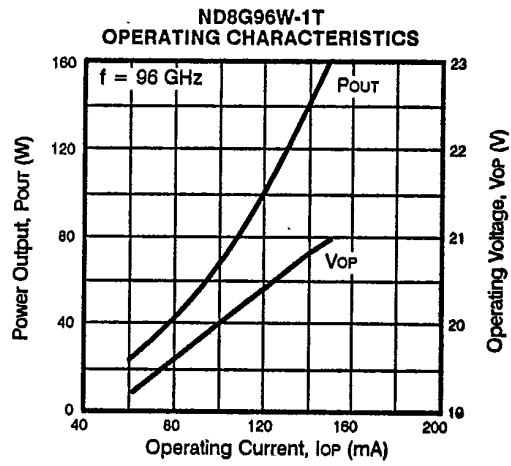
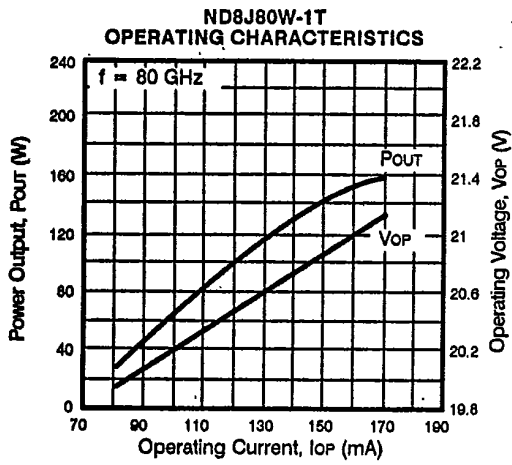
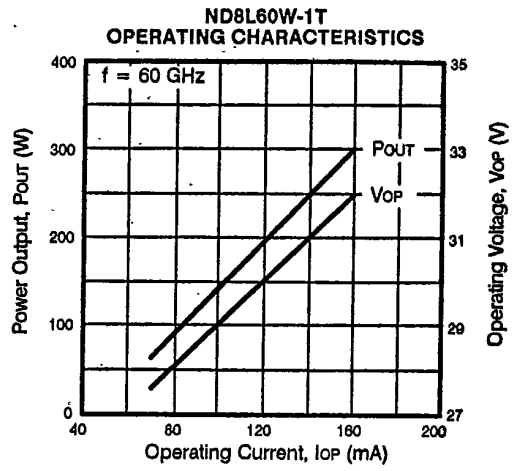
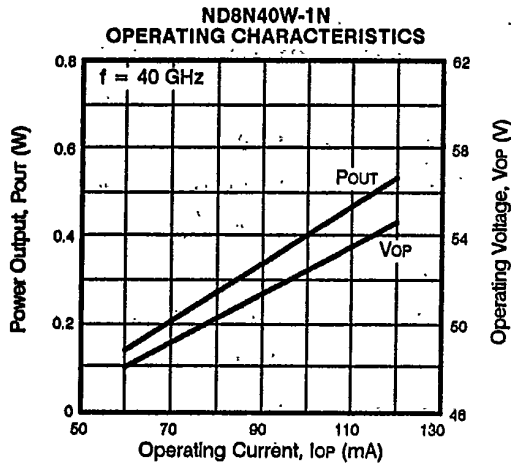


**ND8 SERIES**

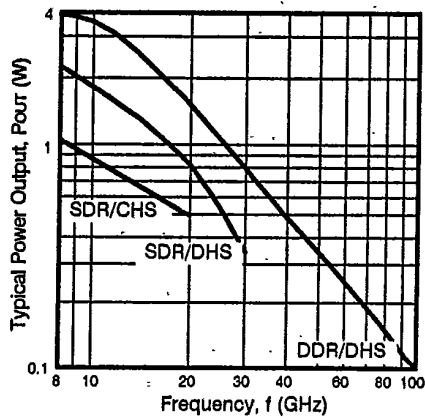
**TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)**



**TYPICAL PERFORMANCE CHARACTERISTICS (TA = 25°C)**



**CW IMPATT SELECTION GRAPH**





# Additional Diode Products

T-07-07

## SILICON SCHOTTKY BARRIER DIODES

SERIES	PART NUMBER	QUANTITY-CONFIGURATION	PACKAGE CODE	ABSOLUTE MAXIMUM RATINGS				ELECTRICAL CHARACTERISTICS				
				P <sub>T</sub> (mW)	I <sub>F</sub> (mA)	I <sub>F</sub> (mA)	T <sub>STG</sub> (C)	@I <sub>F</sub> (mA)	V <sub>F</sub> (mV)	DELTA	C <sub>T</sub> (pf)	DELTA
						PEAK				V <sub>F</sub> (mV)		C <sub>T</sub> (pf)
								MAX	MAX	MAX	MAX	
ND411	ND4116-2	pair-tee	4-pin MM	150	30		-55 to +125	1	230	10	1.2	0.2
ND412	ND4126-2	pair-tree	4-pin MM	150	35		-55 to +125	10	550	10	1.2	0.2
ND434	ND434G	quad-array	8-pin MF	200	50		-55 to +125	10	550	15	1.2	0.2
ND487	ND487C1-00	quad-cross	chip		50	150	-65 to +150	1	300	20		
	ND487C1-3P	quad-cross	3P	300	50	150	-65 to +150	1	300	20	1.0	0.1
	ND487C1-3R	quad-cross	3R	300	50	150	-65 to +150	1	300	20	1.2	0.2
	ND487C2-00	quad-cross	chip		50	150	-65 to +150	1	500	20		
	ND487C2-3P	quad-cross	3P	300	50	150	-65 to +150	1	500	20	1.0	0.1
	ND487C2-3R	quad-cross	3R	300	50	150	-65 to +150	1	500	20	1.2	0.2
	ND487R1-00	quad-ring	chip		50	150	-65 to +150	1	300	20		
	ND487R1-3P	quad-ring	3P	300	50	150	-65 to +150	1	300	20	1.0	0.1
	ND487R1-3R	quad-ring	3R	300	50	150	-65 to +150	1	300	20	1.2	0.2
	ND487R2-00	quad-ring	chip		50	150	-65 to +150	1	500	20		
	ND487R2-3P	quad-ring	3P	300	50	150	-65 to +150	1	500	20	1.0	0.1
ND487R2-3R	quad-ring	3R	300	50	150	-65 to +150	1	500	20	1.2	0.2	