



### DESCRIPTION

CP Clare's TD Series of gas discharge microwave noise tubes and TN Series of gas discharge microwave noise sources are the element in a microwave RF system that allows accurate measurements of the noise figure of the receiver or its components. The requirements of a device used for making such noise figure measurements include broad bandwidth inherent in the active element, stability, ease of operation, and long life. In general, the range of usefulness of these noise sources permits measurements of noise figures from about 2 to 30dB. The PS-237 through PS-240 current-regulated power supplies can be used to operate many of the noise sources described herein.

### FEATURES

- Excess noise ratios (ENR): up to 20dB
- Broad bandwidth
- Excellent long term stability
- Life up to 20,000 hours
- AC, DC, or pulsed operation

### APPLICATIONS

- Noise figure measurement

### SPECIFICATION RANGES

Parameter	Range	Units
Frequency	0.2 - 220.0	GHz
ENR	8.8 - 20.1	dB
Operating Current	30 - 250	mA
Starting Voltage	0.9 - 7.0	kV

(See detailed specifications for more data. Contact CP Clare for TD and TN part numbers or for other requirements not listed.)

# MICROWAVE NOISE TUBES & NOISE SOURCES

## TD/TN Series

### TD SERIES GAS DISCHARGE NOISE SOURCE TUBES with Filamentary or Hollow Cathodes

All characteristics at 25°C.

FREQUENCY RANGE (GHz)	BAND	WAVE-GUIDE	PART # / EIA TYPE NUMBER	PACKAGE OUTLINE	MOUNT TYPE	RECOMMENDED MODE OF OPERATION <sup>(1)</sup>	MINIMUM STARTING VOLTAGE SPIKE (kV)	DC ANODE STARTING CURRENT (mA)	TUBE DROP (VDC)	TUBE-IN MOUNT ENR (dB)
1.12-1.70 (1.20-1.40 only)	L	WR-650	TD-21/6881	1	90°H	DC	4.0	250	65	15.20 <sup>(2)</sup>
			TD-29/7101	1a	90°H	AC,DC	4.5	250	130	18.00 <sup>(2)</sup>
			TD-33/7147	1a	90°H	AC,DC	4.0	250	75	15.20 <sup>(2)</sup>
			TD-49	1	90°H	pulse	4.0	200	125	15.20 <sup>(2)</sup>
			TD-62/7992	1	90°H	DC	4.5	250	~145	18.00 <sup>(2)</sup>
			TD-75	1	90°H	pulse	4.5	200	235	18.00 <sup>(2)</sup>
			TD-91	special	10°E	DC	7.0	250	230	15.20 <sup>(2)</sup>
2.60-3.95	S	WR-284	TD-12/6358	2	10°E	DC	2.7	250	80	15.20
			TD-22/6782	special	90°H	AC,DC	2.0	250	45	8.85
			TD-31	2a	10°E	AC,DC	2.7	250	90	15.20
			TD-32	2a	10°E	AC,DC	2.7	250	170	17.80
			TD-34/7148	2	10°E	DC	2.7	250	160	17.75
			TD-38/8151	2	10°E	pulse	3.3	200	145	15.27
			TD-56/8286	2	10°E	pulse	3.5	200	265	17.90
			TD-82	special	90°E	DC	0.9	75	55	18
3.30-4.90	S	WR-229	TD-24	special	10°E	AC,DC	2.5	250	60	15.30
			TD-30	special	10°E	AC,DC	2.5	250	110	1
3.95-5.85	C(G)	WR-187	TD-10/6356	3	10°E	DC	3.1	250	70	15.32
			TD-39/7999	3	10°E	pulse	3.5	175	140	15.50
			TD-43/8287	3	10°E	pulse	3.5	175	210	17.85
			TD-48/7989	3	10°E	DC	2.7	250	135	17.70
			TD-83	special	90°E	DC	0.9	100	55	18.90
5.85-8.20	X(J)	WR-137	TD-10/6356	3	10°E	DC	3.1	250	75	15.65
			TD-39/7999	3	10°E	pulse	3.5	175	140	15.50
			TD-43/8287	3	10°E	pulse	3.5	175	210	17.90
			TD-48/7989	3	10°E	DC	2.7	250	135	17.75
			TD-67/8288	3	15°E	pulse	3.5	150	225	18.00
8.20-12.40	X	WR-90	TD-11/6357	4	10°E	DC	2.7	200	75	15.60
			TD-23/6882	4	10°E	DC	2.7	200	115	18.00
			TD-40/8152	4	10°E	pulse	3.3	175	125	15.60
			TD-44/7988	4	10°E	pulse	3.5	175	205	18.00
			TD-58/8293	4	10°E	pulse	3.5	175	208	17.75
			TD-72/8059	4	10°E	pulse	3.3	175	133	15.56
			TD-73	special	90°E	DC	0.9	100	54	14.50
			TD-93B	special	90°E	pulse	0.9	100	165	14.50
TD-114	special	10°E	DC	1.5	200	90	15.30			
12.40-18.00	Ku	WR-62	TD-18/6684	5	10°E	DC	2.7	200	70	15.80
			TD-41/8030	5	10°E	pulse	3.3	175	130	15.85
			TD-46	special	20°E	AC,DC	~1.2	100	35	15.20 <sup>(2)</sup>
			TD-54/7991	5	10°E	DC	2.7	200	130	18.00
			TD-55/8290	5	10°E	pulse	3.5	175	230	17.85
			TD-92	5	10°E	pulse	3.5	175	125	15.65
18.00-26.50	K	WR-42	TD-13/6359	6	10°E	pulse	2.7	200	68	15.90
			TD-42/8031	6	10°E	DC	3.3	175	125	16.00
			TD-50/7990	6	10°E	pulse	2.7	200	157	18.05
			TD-51/8291	6	10°E	DC	3.5	175	260	17.90
			TD-81	special	10°E	DC	3.3	150	148	16.15
26.50-40.00	Ka	WR-28	TD-76/7993	special	10°E	DC	2.7	125	130	16.0
			TD-77/8292	special	10°E	pulse	3.0	100	175	16.0

<sup>(1)</sup>DC operation — cathode at one end only.

AC,DC operation — cathodes at both ends.

Pulse operation — cathode at one end specially designed for pulse operation. If the anode current during the "on" time of a square wave pulse (>100µs duration) is nominally the same as the rated DC anode current, the tube drop during this period will be approximately the same as the rated DC tube drop.

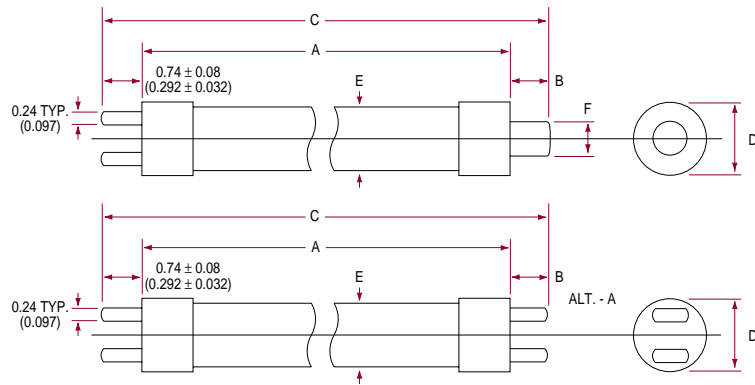
<sup>(2)</sup>Excess noise ratio of tube only.

### TD SERIES GAS DISCHARGE NOISE SOURCE TUBES with Indirectly-Heated Cathodes

All characteristics at 25°C.

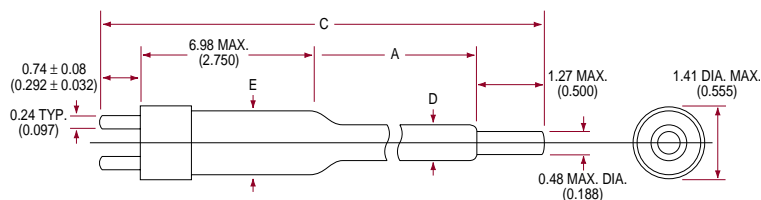
FREQUENCY RANGE (GHZ)	BAND	PART NUMBER/ EIA TYPE NUMBER	MINIMUM STARTING VOLTAGE SPIKE (kV)	DC ANODE CURRENT (mA)	TUBE DROP (VDC)	TUBE-IN-MOUNT ENR (dB)	USED IN MOUNT
3.4-3.6	S	TD-124	0.60	75	40	18.30	TN-65
2.9-3.1		TD-129	0.45	75	35	18.50	TN-71
2.7-2.9		TD-121	0.45	75	35	18.50	TN-72
8.2-12.4	X	TD-126	1.50	100	90	15.6	TN-130

### OUTLINE DRAWINGS (Noise Source Tubes with Filamentary or Hollow Cathodes)



DIMENSION (INCHES)

OUTLINE NUMBER	A	B	C	D	E	F
1/1a <sup>(3)</sup>	various	0.500 max	14.625-15.000	1.350-1.435	1.475-1.550	0.188 max
2/2a <sup>(3)</sup>	16.937-17.437	0.310-0.360	17.625-18.000	0.990 max	0.975-1.050	0.305-0.325
3/3a <sup>(3)</sup>	13.875-14.375	0.270-0.320	14.375-15.000	0.555 max	0.547-0.579	0.245-0.265



DIMENSION (INCHES)

OUTLINE NUMBER	A	B	C	D	E	F
4	8.625 min	1.500 max	11.937-12.250	0.370-0.380	0.550 max	0.3804
5	7.375 min	1.250 max	10.875-11.250	0.235-0.265	0.500 max	0.2654
6	6.187 min	1.250 max	9.687-10.000	0.160-0.194	0.500 max	0.1944

<sup>(3)</sup>The "a" suffix indicates using the bi-pin termination depicted in the inset labeled "ALT.-A".

<sup>(4)</sup>The diameter of the tube shall not exceed this value over the length of the tube denoted in the figure by "B".

# MICROWAVE NOISE TUBES & NOISE SOURCES

## TD/TN Series

### TD SERIES GAS DISCHARGE NOISE SOURCE TUBES with Indirectly-Heated Cathodes<sup>(5)</sup>

All characteristics at 25°C.

BAND	PART NUMBER	FREQUENCY RANGE (GHz)	ENR (dB)	TUBE DROP (VDC)	DC ANODE CURRENT (mA)	MINIMUM STARTING VOLTAGE SPIKE (kV)	CIRCUIT LENGTH (INCHES)	MOUNTING	CIRCUIT
VHF	TN-46	0.2-0.25	18.5	200	30	1.5	15.50	Helical Coupling	7/8" coax
UHF	TN-47	0.56-0.64	20.3	325	50	2.0	16.5	Direct Coupling	7/8" coax
	TN-48	0.34-0.51	18.5	75		2.0	10.0	Helical Coupling	Type N
L	TN-51	1.0-2.0	20.1	200	50	1.9	8.94	Direct Coupling	7/8" coax
	TN-52	1.0-2.0	20.1	200	50	1.9	10.38	Direct Coupling	7/8" coax
	TN-54	1.0-2.0	20.5	200	50	1.9	17.31	Direct Coupling	Type N
	TN-55	1.25-1.55	20.1	200	50	1.9	9.56	Direct Coupling	7/8" coax
	TN-57	1.28-1.35	20.5	225	50	1.9	12.56	Direct Coupling	7/8" coax
S	TN-60	2.0-4.0	18.5	200	50	1.9	10.38	Direct Coupling	7/8" coax
	TN-64	2.7-2.9	18.5	35	60	0.45	3.75	90°E	RG-75/U
	TN-65	3.4-3.6	18.3	40	75	0.6	2.50	90°E	RG-75/U
	TN-71	2.9-3.1	18.5	35	75	0.45	3.63	90°E	RG-75/U
	TN-72	2.7-2.9	18.5	35	75	0.45	3.09	90°E	RG-75/U
	TN-73	2.7-2.9	18.5	35	75	0.45	3.09	90°E	RG-75/U
	TN-74	2.7-2.9	18.5	35	60	0.45	3.75	90°E	RG-75/U
	TN-75	3.1-3.5	18.3	40	75	0.6	2.63	90°E	RG-75/U
C	TN-76	5.3-6.0	18.5	60	150	0.7	2.00	90°E	RG-49/U
	TN-77	5.3-6.0	13.5	60	150	0.7	3.50	90°E	RG-49/U
	TN-78	5.45-5.82	18.5	60	150	0.7	2.75	90°E	RG-95/U
	TN-82	5.3-6.0	13.5	60	150	0.7	3.56	90°E	RG-49/U
H	TN-83	7.5-8.6	18.5	60	75	0.8	1.56	90°E	RG-51/U
	TN-84	7.5-8.6	15.0	55	100	0.8	2.50	90°E	RG-51/U
X	TN-94	8.9-9.1	18.5	50	60	0.95	1.63	90°E	RG-67/U
	TN-95	8.5-9.6	14.5	50	100	0.95	2.50	90°E	RG-67/U
	TN-97	8.5-9.6	18.5	50	75	0.95	1.63	90°E	RG-67/U
	TN-101	8.5-9.6	14.5	50	100	0.95	2.25	90°E	RG-52/U
	TN-124	8.2-12.4	12.5	50	50	1.00	2.50	90°E	RG-52/U
Ku(K)	TN-102	15.0-16.5	18.5	60	40	1.2	1.50	90°E	RG-67/U
	TN-103	12.4-18.0	18.5	140	50	2.0	7.50	0°E	RG-107/U
	TN-104	15.0-16.6	12.3	95	50	1.0	1.63	90°E	RG-91/U
	TN-128	12.0-14.0	13.5	50	50	1.0	2.00	90°E	RG-91/U
K(P)	TN-106	18.0-26.5	18.5	175	50	1.9	6.44	0°E	RG-66/U
	TN-125	22.0-23.0	12.5	65	50	1.5	2.25	90°E	RG-53/U
Ka(Q)	TN-107	26.5-40.0	18.0	140	40	2.5	5.13	0°E	RG-96/U
	TN-109	34.0-36.0	18.0	140	35	2.5	7.38	0°E	RG-96/U
	TN-126	31.0-32.0	13.3	75	50	1.5	2.25	90°E	RG-96/U
R	TN-111	50.0-75.0	18.0	230	30	2.5	4.63	0°E	RG-98/U

<sup>(5)</sup> CP Clare can usually refurbish noise sources (depending on condition of waveguide) and install replacement tubes.

### TD SERIES GAS DISCHARGE NOISE SOURCE TUBES with Filamentary Cathode Noise Tubes<sup>(5)</sup>

All characteristics at 25°C

WAVE-GUIDE	PART NUMBER (GHz)	FREQUENCY RANGE (dB)	APPROX. ENR (VDC)	TUBE DROP (mA)	DC ANODE CURRENT VOLTAGE SPIKE (kV)	MINIMUM STARTING	REPLACEMENT TUBE	MOUNTING MATE	FLANGE
WR-42	TN-170	18.0-26.5	15.0	170	120	2.0	TD-170	7°E	UG-595/U
WR-28	TN-162	26.5-40.0	15.4	170	120	2.0	TD-162	7°E	UG-599/U
WR-22	TN-172	33.0-50.0	15.4	170	120	2.0	TD-172	7°E	UG-599/U
WR-19	TN-163	40.0-60.0	15.4	170	120	2.0	TD-163	7°E	UG-385/U
WR-15	TN-164	50.0-75.0	15.0	170	120	2.0	TD-164	7°E	UG-385/U
WR-12	TN-171	60.0-90.0	15.0	210	100	2.5	TD-171	7°E	UG-385/U
WR-10	TN-165	75.0-110.0	14.2	225	75	3.0	TD-165	7°E	UG-385/U
WR-8	TN-167	90.0-140.0	13.0	225	75	3.0	TD-167	7°E	UG-385/U
WR-6	TN-166A	110.0-170.0	13.0	225	50	3.0	TD-166A	7°E	UG-385/U
WR-5	TN-173	140.0-220.0	9.0	225	50	3.0	TD-173	7°E	UG-385/U

<sup>(5)</sup> CP Clare can usually refurbish noise sources (depending on condition of waveguide) and install replacement tubes.

### NOISE SOURCE POWER SUPPLIES with Current Regulation

PART NUMBER	FOR NOISE TUBES <sup>(6)</sup>	AC INPUT	DC STARTING VOLTAGE (kV)	DC OPERATING CURRENT (mA)
PS-237	TN-162 thru TN-172 except TN-166A	115VAC, 60Hz	5.0	150
PS-238		220VAC, 50Hz	5.0	150
PS-239	TN-173, TN-166A	115VAC, 60Hz	5.0	120
PS-240		220VAC, 50Hz	5.0	75

<sup>(6)</sup> These power supplies, though designed for the TN-162 through TN-173, are capable of operating many other noise sources made by CP Clare.

### ORDERING INFORMATION

A complete part number is represented by the information in the Part Number column of the specification table.