MwT - 4
26 GHz Low Noise GaAs FET

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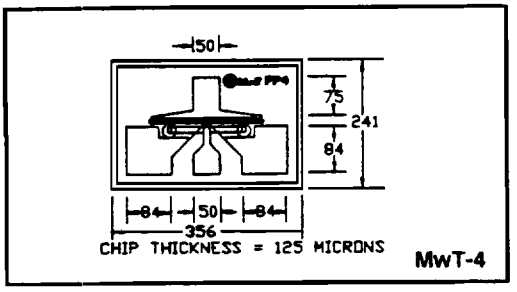


FEATURES

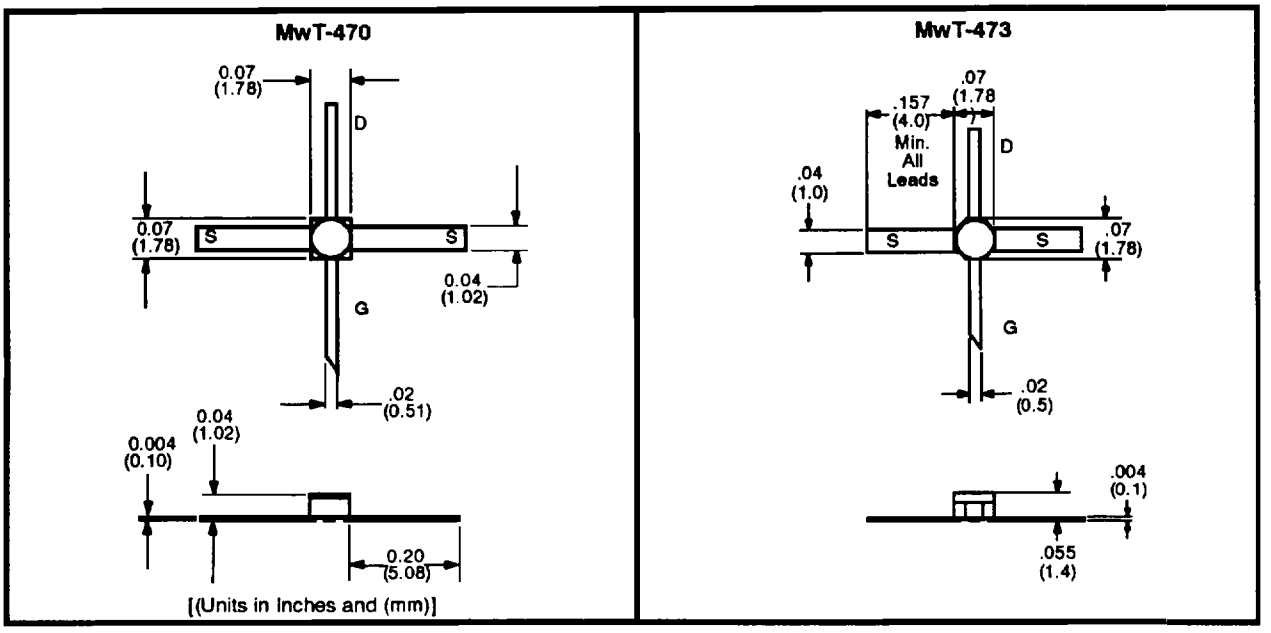
- 1.5 dB NOISE FIGURE AT 12 GHZ
- HIGH ASSOCIATED GAIN
- 0.3 MICRON REFRACTORY METAL / GOLD GATE
- 180 MICRON GATE WIDTH
- CHOICE OF CHIP AND TWO PACKAGE TYPES

DESCRIPTION

The MwT-4 is a GaAs MESFET device whose nominal quarter-micron gate length and 180 micron gate width make it ideally suited to applications requiring low noise figure and high-gain in the 500 MHz to 26 GHz frequency range. The straight gate geometry of the MwT-4 makes it equally effective for either wideband (ex. 6 to 18 GHz) or narrow-band applications. The chip is produced using MwT's reliable metal system and all devices are screened to insure reliability. All chips are passivated using MwT's patented "Diamond-Like Carbon" process for durability with no degradation in performance. Designers can use MwT's unique BIN selection feature to choose devices from narrow Idss ranges, insuring consistent circuit operation.

RF SPECIFICATIONS AT Ta = 25°C

				MwT-4GN MwT-470GN MWT-473GN			MwT-4SN MwT-470SN MwT-473SN			MwT-4LN MwT-470LN MwT-473LN		
SYMBOL	PARAMETERS AND CONDITIONS	FREQ	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
NF opt	Optimum Noise Figure VDS = 3.0 V IDS = 10 mA	12 GHz	dB		2.0	2.5		1.7	2.0		1.5	1.8
GA	Associated Gain at NF opt VDS= 3.0V IDS= 10 mA	12 GHz	dB		8.5		7.5	8.5		8.0	9.0	
P1dB	Output Power at 1dB Compression VDS= 4.5 V IDS= 0.6 Idss	12 GHz	dBm		12.0		14.0	15.0		13.0	14.0	



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DC SPECIFICATIONS AT Ta = 25 °C

SYMBOL	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
Idss	Saturated Drain Current Vds = 3.0 V VGS = 0.0 V	mA	18		66
Gm	Transconductance Vds = 3.0 V VGS = 0.0 V	mS	27	35	
Vp	Pinch-off Voltage Vds = 3.0 V IDS = 1.0 mA	V		-1.5	- 4.0
BV_{GSO}	Gate-to-Source Breakdown Voltage Igs = -0.2 mA, Igd = 0	V	-5.0	-8.0	
BV_{GDO}	Gate-to-Drain Breakdown Voltage Igd = -0.2 mA, Igs = 0	V	-6.0	-8.0	
Rth	Thermal Resistance MwT-4 Chip MwT-470, 473	°C/W			250 460*

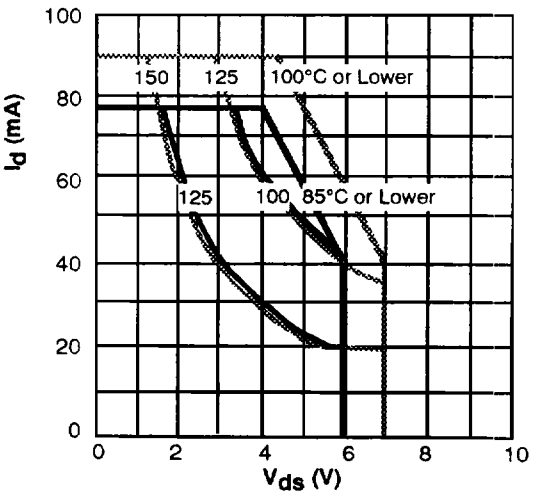
*** Overall Rth depends on case mounting**

MAXIMUM RATINGS AT Ta = 25 ° C

SYMBOL	PARAMETER	UNITS	CONT MAX[1]	ABSOLUTE MAX[2]
VDS	Drain to Source Voltage	V	See Safe Operating Limits	
Tch	Channel Temperature	°C	+150	+175
Tst	Storage Temperature	°C	-65 to +150	+175
Pin	RF Input Power	mW	90	180

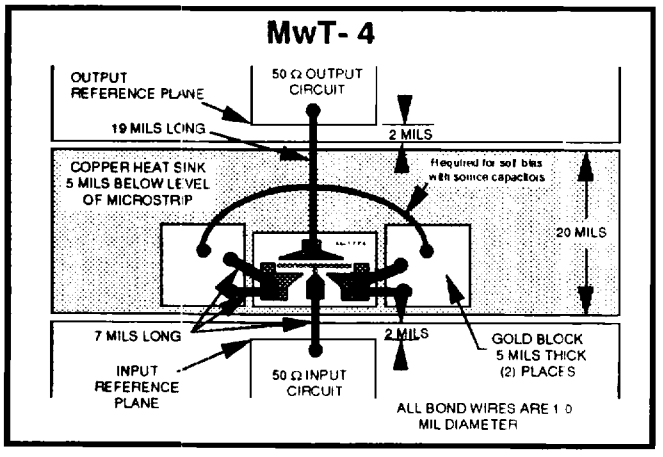
NOTES: 1. Exceeding any one of these limits in continuous operation may reduce the mean-time-to-failure below the design goals.
2. Exceeding any one of these limits may cause permanent damage.

SAFE OPERATING LIMITS
vs. Case Temperature

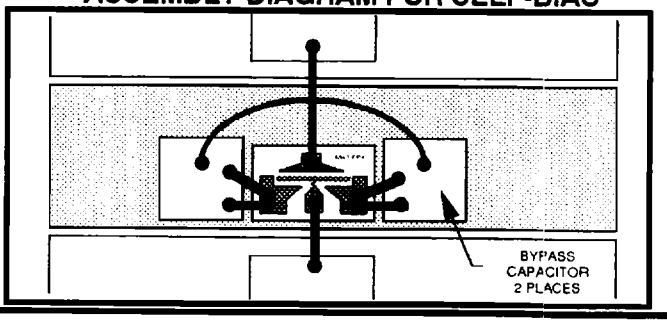


RECOMMENDED ASSEMBLY CONFIGURATION

Shown below is the assembly and bonding configuration used for S-Parameter measurements of the MwT-4 Chip and is recommended for optimum performance. For self-bias applications the gold blocks may be replaced by capacitors. An additional interconnecting bond would then be required. Contact MwT for additional applications information.



ASSEMBLY DIAGRAM FOR SELF-BIAS



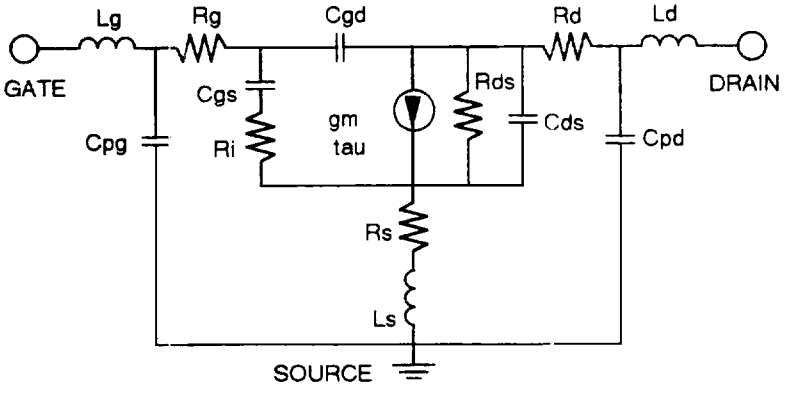
MwT-4.2 3/94

TYPICAL COMMON SOURCE SCATTERING PARAMETERS

MwT-4 CHIP: VDS = 4.5 V, IDS = 0.5 IDSS = 18 mA

FREQUENCY (GHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
1.00	.99	-11.8	3.13	169.6	.01	82.8	.74	-5.3
2.00	.99	-23.4	3.08	159.3	.03	75.8	.74	-10.5
3.00	.97	-34.7	3.01	149.2	.04	68.9	.72	-15.6
4.00	.95	- 45.5	2.92	139.5	.05	62.5	.70	-20.5
5.00	.93	-55.9	2.81	130.2	.06	56.4	.68	-25.2
6.00	.90	-65.8	2.69	121.2	.07	50.7	.66	-29.8
7.00	.88	-75.1	2.58	112.7	.08	45.4	.64	-34.2
8.00	.86	-83.8	2.46	104.6	.09	40.5	.62	-38.5
9.00	.83	-92.1	2.35	96.8	.10	35.9	.59	-42.8
10.00	.81	-99.8	2.24	89.3	.10	31.7	.57	-47.2
12.00	.78	-113.9	2.05	75.2	.11	24.0	.53	-56.1
14.00	.75	-126.5	1.88	61.9	.12	17.2	.49	-65.6
16.00	.73	-137.7	1.74	49.3	.12	10.9	.45	-76.7
18.00	.71	-147.9	1.61	37.2	.12	5.2	.41	-89.3
20.00	.70	-157.0	1.49	25.3	.13	-0.3	.38	-103.8
22.00	.69	-165.4	1.39	13.8	.13	-5.6	.36	-120.5
24.00	.68	-173.0	1.29	2.5	.13	-10.6	.36	-138.9
26.00	.68	-180.0	1.20	- 8.7	.13	-15.6	.37	-157.8

DEVICE EQUIVALENT CIRCUIT MODEL



PARAMETER		VALUE
Gate Bond Wire Inductance	Lg	.11 nH
Gate Pad Capacitance	Cpg	.07 pF
Gate Resistance	Rg	.13 Ω
Gate-Source Capacitance	Cgs	.22 pF
Channel Resistance	Ri	10.8 Ω
Gate-Drain Capacitance	Cgd	.02 pF
Transconductance	gm	44 mS
Transit time	tau	2.66 psec
Source Resistance	Rs	4.08Ω
Source Inductance	Ls	.03 nH
Drain-Source Resistance	Rds	283 Ω
Drain-Source Capacitance	Cds	.054 pF
Drain Resistance	Rd	6.99 Ω
Drain Pad Capacitance	Cpd	.04 pF
Drain Inductance	Ld	.27 nH

BIN SELECTION

Every MwT-4 wafer produced is 100% DC probed, binned by Idss in 3 ma increments, and sample devices are evaluated for RF performance. Users may select devices from 16 Idss bins to insure consistent matched performance in the circuit. Availability in three visual grades insures the most economical solution for the application.

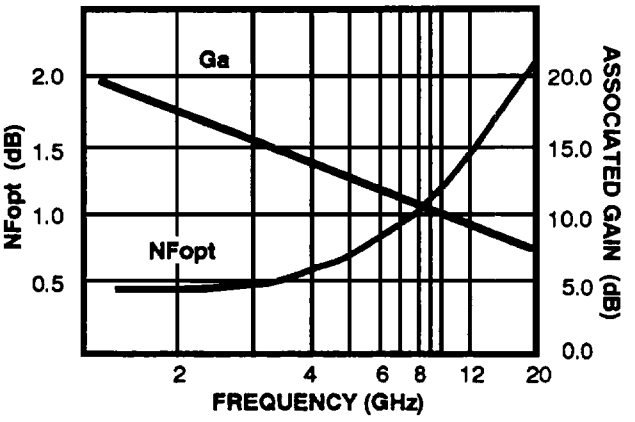
BIN #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
IDSS (mA)	18-21	21-24	24-27	27-30	30-33	33-36	36-39	39-42	42-45	45-48	48-51	51-54	54-57	57-60	60-63	63-66

TYPICAL NOISE PARAMETERS

MwT-4LN Chip: VDS = 3.0 V, IDS = 10 mA

FREQUENCY MHz	NF MIN dB	GAMMA OPT MAG	GAMMA OPT ANGLE	Rn/50
1.00	0.38	0.95	4.5	0.94
2.00	0.40	0.90	15.5	0.83
4.00	0.64	0.76	31.4	0.53
6.00	0.86	0.64	48.0	0.43
8.00	1.07	0.54	66.1	0.38
12.00	1.47	0.42	107.1	0.32
16.00	1.83	0.40	148.7	0.29
18.00	2.00	0.42	166.4	0.28
20.00	2.16	0.46	-178.5	0.26

NOISE FIGURE AND
ASSOCIATED GAIN VS. FREQUENCY



TYPICAL COMMON SOURCE SCATTERING PARAMETERS

MwT-473: VDS = 4.0 V, IDS = 0.5 IDSS = 22 mA

FREQUENCY (GHz)	S11 MAG	S11 ANG	S21 MAG	S21 ANG	S12 MAG	S12 ANG	S22 MAG	S22 ANG
1.00	.97	-23.1	2.86	160.2	.01	73.3	.79	-15.5
2.00	.91	-41.4	2.50	144.1	.03	58.8	.76	-28.3
3.00	.86	-54.2	2.20	131.8	.03	62.3	.74	-38.2
4.00	.81	-65.2	2.14	121.6	.05	47.6	.70	-47.8
5.00	.74	-72.9	2.14	114.3	.04	39.2	.66	-53.5
6.00	.69	-88.3	2.16	101.8	.06	58.5	.63	-63.5
8.00	.58	-135.6	2.33	79.0	.07	13.6	.49	-85.5
10.00	.68	-172.9	2.16	51.7	.05	-6.4	.45	-114.4
12.00	.76	171.0	1.94	34.0	.03	9.8	.49	-142.1
14.00	.72	151.0	1.73	-0.2	.05	-2.1	.60	-168.4
16.00	.57	116.8	1.62	-27.7	.07	-0.6	.76	176.8
18.00	.63	70.1	1.83	-66.4	.10	1.5	.84	161.8

MwT-470: VDS = 3.0 V, IDS = 0.5 IDSS = 12 mA

FREQUENCY (GHz)	S11 MAG	S11 ANG	S21 MAG	S21 ANG	S12 MAG	S12 ANG	S22 MAG	S22 ANG
1.00	.98	-19.1	2.5	158.2	.02	73.4	.80	-14.2
2.00	.93	-34.7	2.22	140.8	.03	56.0	.78	-25.2
3.00	.87	-47.3	1.98	128.0	.04	56.0	.76	-32.9
4.00	.81	-57.9	1.82	119.4	.06	70.6	.74	-38.4
5.00	.77	-70.1	1.82	111.3	.07	34.6	.70	-43.5
6.00	.72	-82.8	1.83	102.4	.08	28.9	.65	-49.4
7.00	.66	-100.1	1.92	90.4	.09	22.0	.57	-57.9
8.00	.62	-119.8	1.93	78.9	.11	6.0	.47	-67.6
9.00	.62	-142.2	1.82	67.2	.08	-16.1	.41	-90.4
10.00	.62	-153.7	1.84	51.2	.09	-2.5	.38	-105.8
11.00	.69	-167.3	1.69	40.5	.08	-16.5	.42	-126.0
12.00	.74	-178.7	1.62	30.8	.06	-17.6	.49	-137.9
13.00	.82	170.3	1.52	18.4	.08	-10.8	.55	-151.4
14.00	.90	159.0	1.60	15.4	.09	-29.4	.56	-164.2