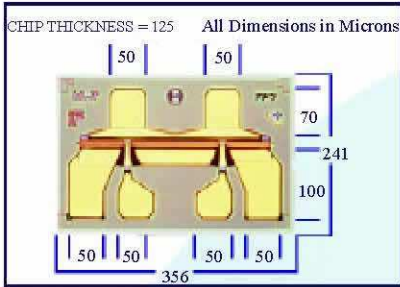


# MwT-LP7

Ultra - Low Phase Noise device up to 31 GHz



DOWNLOAD ADDITIONAL DATA WWW.MWTINC.COM



## FEATURES

- Ultra - Low Phase Noise for Oscillator Applications up to 31 GHz
- Also Excellent for Broadband Gain and Medium Power Applications
- +20 dBm Output Power at 12 GHz
- 0.3 Micron Refractory Metal/Gold Gate
- 250 Micron Gate Width
- Choice of Chip and Two Package Types

## DESCRIPTION

The MwT-LP7 is a low phase noise GaAs MESFET device with nominal quarter-micron gate length and 250-micron gate width. With deep understanding on the physical origins of phase noise, the device is built by using a unique proprietary technology to minimize the phase noise. This device is particularly attractive to oscillator applications requiring ultra-low phase noise up to 31 GHz or amplifiers requiring low residue noise in the 500 MHz to 26 GHz frequency range. A 17.5 GHz DRO using this device achieved phase noise power density as low as -119 dBc/Hz at 100 kHz off set with ample output power of +15dBm. The device is equally effective for either wideband (e.g. 6 to 18 GHz) or narrow-band applications. The chip is produced using MwT's reliable metal system and all devices from each wafer are screened to insure reliability. All chips are passivated using MwT's patented "Diamond-Like Carbon" process for increased durability. Designers can use MwT's unique BIN selection feature to choose devices from narrow Idss ranges, insuring consistent circuit operation.

## DC SPECIFICATIONS AT Ta = 25°C

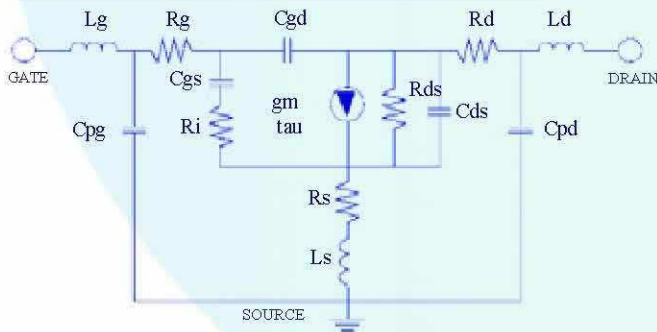
SYMBOL	PARAM. & CONDITIONS	UNITS	MIN	TYP	MAX
<b>IDSS</b>	Saturated Drain Current Vds= 3.0 V VGS=0.0 V	mA	38	98	
<b>Gm</b>	Transconductance Vds= 3.0 V VGS=0.0 V	mS	36	45	
<b>Vp</b>	Pinch-off Voltage Vds= 3.0 V IDS=1.0 mA	V		-1.5	-4.5
<b>BVGSO</b>	Gate-to-Source Breakdown Volt. Igs= 0.4 mA	V	-5.0	-8.0	
<b>BVGDO</b>	Gate-to-Drain Breakdown Volt. Igd= 0.4 mA	V	-6.0	-8.0	
<b>Rth</b>	Thermal Resistance MwT-LP7 Chip, Resistance MwT-LP770, LP773	°C/W		180	380*

\*Overall Rth depends on case mounting.

## RF SPECIFICATIONS AT Ta = 25°C

SYMBOL	PARAMETERS AND CONDITIONS	FREQ	UNITS	MIN	TYP
<b>P1dB</b>	Output Power at 1 dB Compression VDS= 5.0 V Idss= 0.6 IDS=40mA	12 GHz	dBm	18.0	20.0
<b>SSG</b>	Small Signal Gain VDS= 5.0 V Idss= 0.6 IDS=40mA	12 GHz	dB	10.0	11.0
<b>NFOpt</b>	Optimum Noise Figure VDS= 3.0V IDS= 15mA	12 GHz	dB		2.0
<b>GA</b>	Gain at Optimum Noise Figure VDS= 3.0V IDS= 15mA	12 GHz	dB		8.0
<b>IDSS</b>	Recommended IDSS Range for Optimum P1dB		mA		50-86

## DEVICE EQUIVALENT CIRCUIT MODEL



PARAMETER	VALUE
Source Resistance	Rs 2.6 Ω
Source Inductance	Ls 0.025 nH
Drain-Source Resistance	Rds 230 Ω
Drain-Source Capacitance	Cds 0.07 pF
Drain Resistance	Rd 3.67 Ω
Drain Pad Capacitance	Cpd 0.027 pF
Drain Inductance	Ld 0.159 nH
Gate Bond Wire Inductance	Lg 0.89 nH
Gate Pad Capacitance	Cpg 0.05 pF
Gate Resistance	Rg 0.2 Ω
Gate-Source Capacitance	Cgs 0.314 pF
Channel Resistance	Ri 6.9 Ω
Gate-Drain Capacitance	Cgd 0.03 pF
Transconductance	gm 55 mS
Transit Time	tau 3.02 psec

## ORDERING INFORMATION

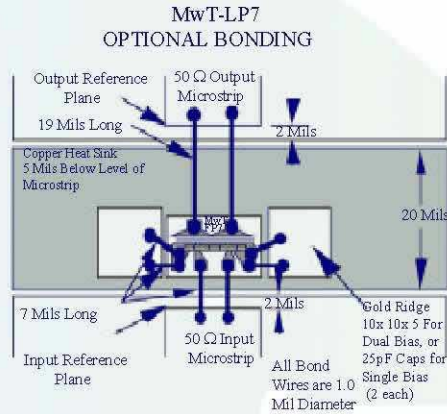
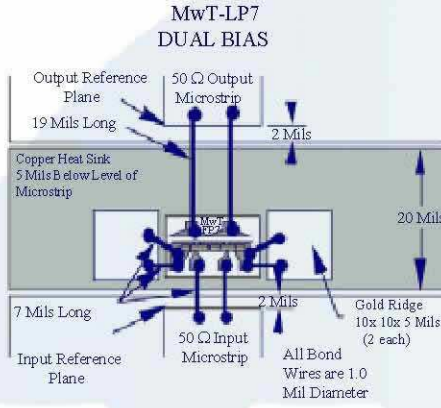
Chip	MwT-LP7
Package 70	MwT-LP770
Package 73	MwT-LP773

### NOTE:

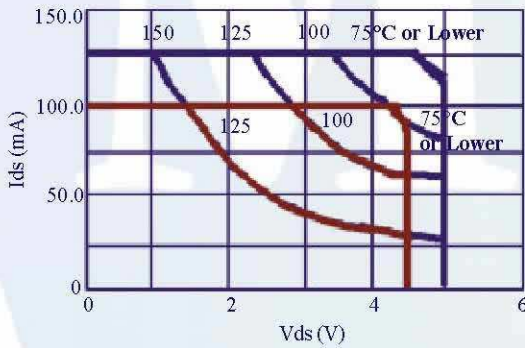
For Package information, please see supplementary application note from our website at [www.mwtinc.com](http://www.mwtinc.com). When placing order or inquiring, please specify BIN range, wafer no., if known, and screening level required.

# MwT-LP7

Ultra - Low Phase Noise device up to 31 GHz



SAFE OPERATING LIMITS vs. BACKSIDE CHIP



■ Absolute Maximum    ■ Continuous Maximum

## MAXIMUM RATINGS AT Ta = 25°C

SYMBOL	PARAMETER	UNITS	CONT MAX <sup>1</sup>	ABSOLUTE MAX <sup>2</sup>
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	80	120

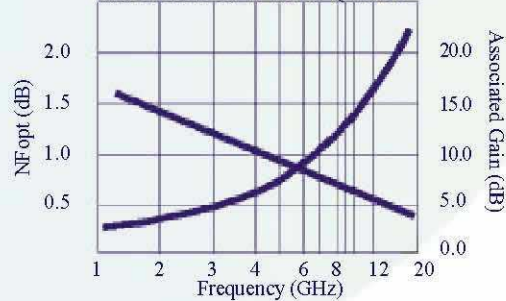
NOTES: 1. Exceeding any one of these limits in continuous operation may reduce the mean-time-to-failure below the design goals.  
2. Exceeding any one of these limits may cause permanent damage.

### TYPICAL NOISE PARAMETERS

MwT-A9LN Chip: VDS=3.0V IDS=35mA

FREQUENCY GHz	NF MIN dB	GAMMA OPT		Rn/50
		MAG	ANGLE	
2.00	0.29	0.68	27	0.188
4.00	0.56	0.49	57	0.182
8.00	1.06	0.41	114	0.165
12.00	1.5	0.49	149	0.152
16.00	1.89	0.55	168	0.143
18.00	2.1	0.58	175	0.14

### NOISE FIGURE AND ASSOCIATED GAIN VS. FREQUENCY



#### Bin Selection Guide

Bin No.	A	B	C	D	E
Ids	26	34	46	74	86
Range	34mA	46mA	74mA	86mA	98mA

### BIN ACCURACY STATEMENT

When placing order or inquiring, please specify BIN range, wafer no., if known, and screening level required.