

## Avionics DME Band RF Power LDMOS FET

The high power transistor part number ILD1012M500HV is designed for Avionics DME systems operating at 1025-1150MHz. Operating at 10µs, 1% pulse conditions this LDMOS FET device supplies a minimum of 500 watts of power across the instantaneous operating bandwidth of 1025-1150MHz. All devices are 100% screened for large signal RF parameters.



### Silicon LDMOS FET

- High Power Gain
- Superior thermal stability

### Class AB Operation

- Gate biased to  $I_{DQ} = 40 \text{ mA}$

### Configuration

- Common Source

### Gold Metal

- Maximum Reliability

### Package

- Thermally enhanced
- Pb-free and RoHS-compliant

### Epoxy Sealed Lid

- Gross Leak Qualified

### RF Test Fixture

- Broadband
- Matched to 50 ohms
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning required

### TYPICAL DATA

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Lot/SN	F (MHz)	Pi (W)	Id (A)	RL (dBc)	Po (W)	Nd (%)	Nd' (%)	G (dBc)	Droop (dB)	VSWR 3:1
50020590-1	1025	14	22.47	12	523	46.6	49.5	15.72	-0.14	S
	1090	14	22.47	11.6	528	47.0	50.0	15.77	-0.12	S
	1150	14	21.2	12	470	44.3	47.3	15.26	-0.14	S

Note:  $I_{dq}=40\text{mA}$ , Pulse=100us-3%

Nd = Drain Efficiency (excluding bias current)

Nd' = Drain Efficiency (excluding bias current)

**MAXIMUM RATINGS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Drain-Source Voltage	$V_{DS}$	--	70	V	--
BD	Gate-Source Voltage	$V_{GS}$	--	20	V	--
BD	Storage Temperature Range	$T_{STG}$	-55	+200	°C	--
BD	Operating Junction Temperature Range	$T_J$	-55	+200	°C	--
Note	Screen 'BD' = parameter qualified By Design.					

**THERMAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Thermal Resistance	$R_{TH(JC)}$	--	TBD	°C/W	$V_D=50V, I_{DQ}=40mA, T_F=25\pm 5^\circ C, P_{OUT}=500W$
Note	Screen 'BD' = parameter qualified By Design.					

**PROCESSING SPECIFICATIONS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	DC Wafer Probe	--	--	--	--	Per Integra specification.
Q1	Wafer DC and RF Qualification	--	--	--	--	Per Integra specification.
LM	Wire Bond Strength	--	--	--	--	Line monitor per Integra specification.
100%	Pre-cap visual inspection	--	--	--	--	Per Integra specification
100%	Gross leak test	--	--	--	--	MIL-STD-750D, Method 1071, Test Condition C
Note	Screen 'Q1' = parameter is qualified by assembly and test of 3 pieces minimum per wafer.					
Note	Screen 'LM' = parameter is qualified by assembly line monitor.					

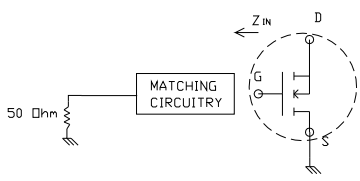
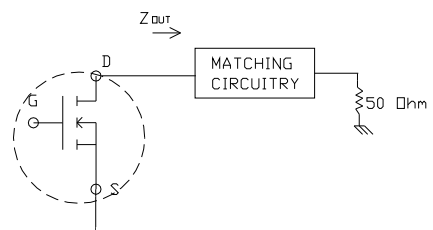
**DC ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Drain-Source Breakdown Voltage	$BV_{DSS}$	100		V	$I_D = 40mA, V_{GS} = 0V, T_F = 25\pm 5^\circ C$
100%	Drain Leakage Current	$I_{DSS}$		50	μA	$V_{DS} = 50V, V_{GS} = 0V, T_F = 25\pm 5^\circ C$
100%	Gate Threshold Voltage	$V_{GSTH2}$	2.5	10	V	$I_D = 40mA, T_F = 25\pm 5^\circ C$

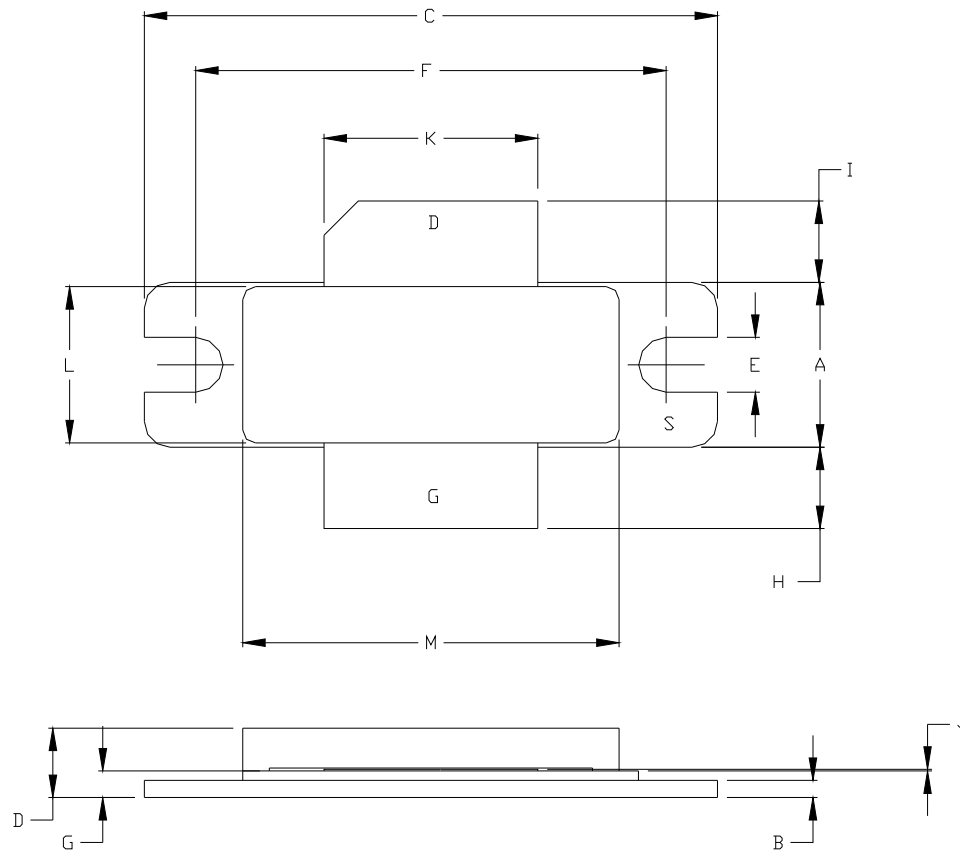
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	8	18	dB	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=10\mu s, 1\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$
BD	Maximum Overdrive	$P_{IN(MAX)}$	14	--	W	$V_{DD}=50V, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$
100%	Power Gain	$G_P$	14.8	16.3	dB	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$
100%	Output Power	$P_{OUT}$	420	597	W	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$
100%	Drain Efficiency	$\eta'_d$	42		%	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$
100%	Pulse Amplitude Droop	D	-0.5	+0.5	dB	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$
100%	Stability into 2:1 VSWR	VSWR-S		3:1	--	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$ Rotate 2:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse.
BD	Load Mismatch Tolerance	LMT		20:1	--	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$ Rotate 20:1 output VSWR through 360° phase. Survival.
BD	Pulse Risetime	RT		60	ns	$V_{DD}=50V, P_{IN}=14W, \text{Pulse}=100\mu s, 3\%, T_F=25\pm 5^\circ C, F=F1, I_{DQ}=40mA.$ Measure between 10% and 90% detected power points.
Note 1	F1 = 1025-1090-1150 MHz.					
Note 2	Pulse format = 100µs, 3%					
Note 3	$T_F$ = Device flange temperature.					
Note 4	Screen 'BD' = parameter qualified By Design.					

**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (MHz)	$Z_{IF} (\Omega)$	$Z_{OF} (\Omega)$
1025	1.35 +j5.80	1.45 +j5.70
1090	0.85 +j5.70	1.40 +j5.40
1150	0.54 +j5.80	1.34 +j5.24
Impedance Definition		

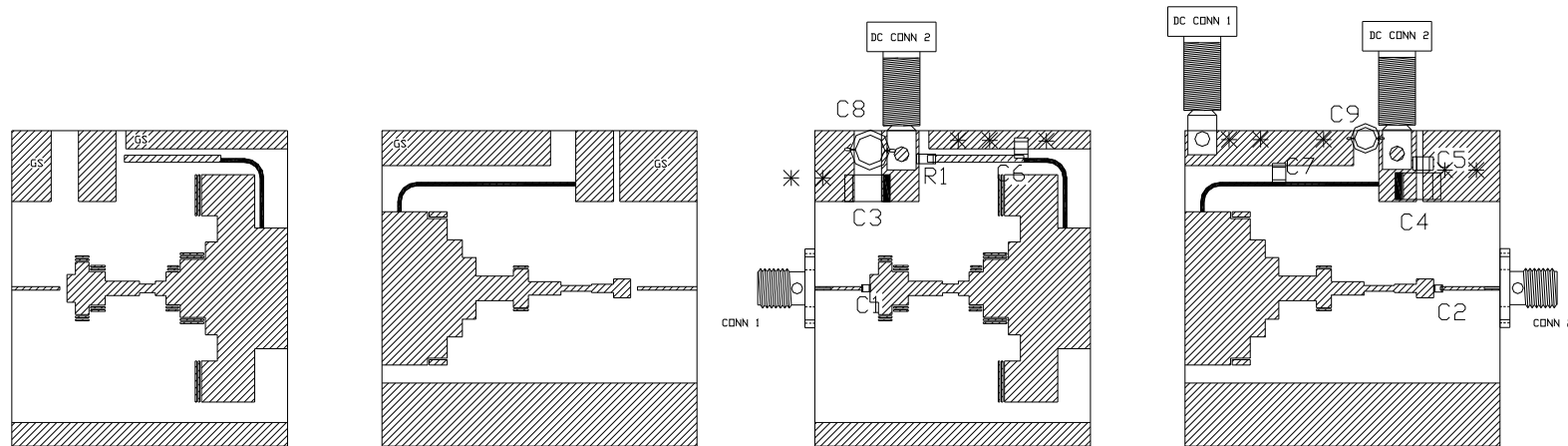
**PACKAGE DIMENSIONAL OUTLINE DRAWING**



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.380	0.390	9.65	9.91
B	0.035	0.045	0.89	1.14
C	1.335	1.345	33.90	34.16
D	0.147	0.177	3.73	4.50
E	0.123	0.133	3.12	3.37
F	1.095	1.105	27.81	28.06
G	0.055	0.065	1.397	1.651
H	0.170	0.210	4.32	5.33
I	0.170	0.210	4.32	5.33
J	0.003	0.006	0.08	0.15
K	0.495	0.505	12.57	12.82
L	0.364	0.374	9.24	9.49
M	0.772	0.788	19.60	20.01

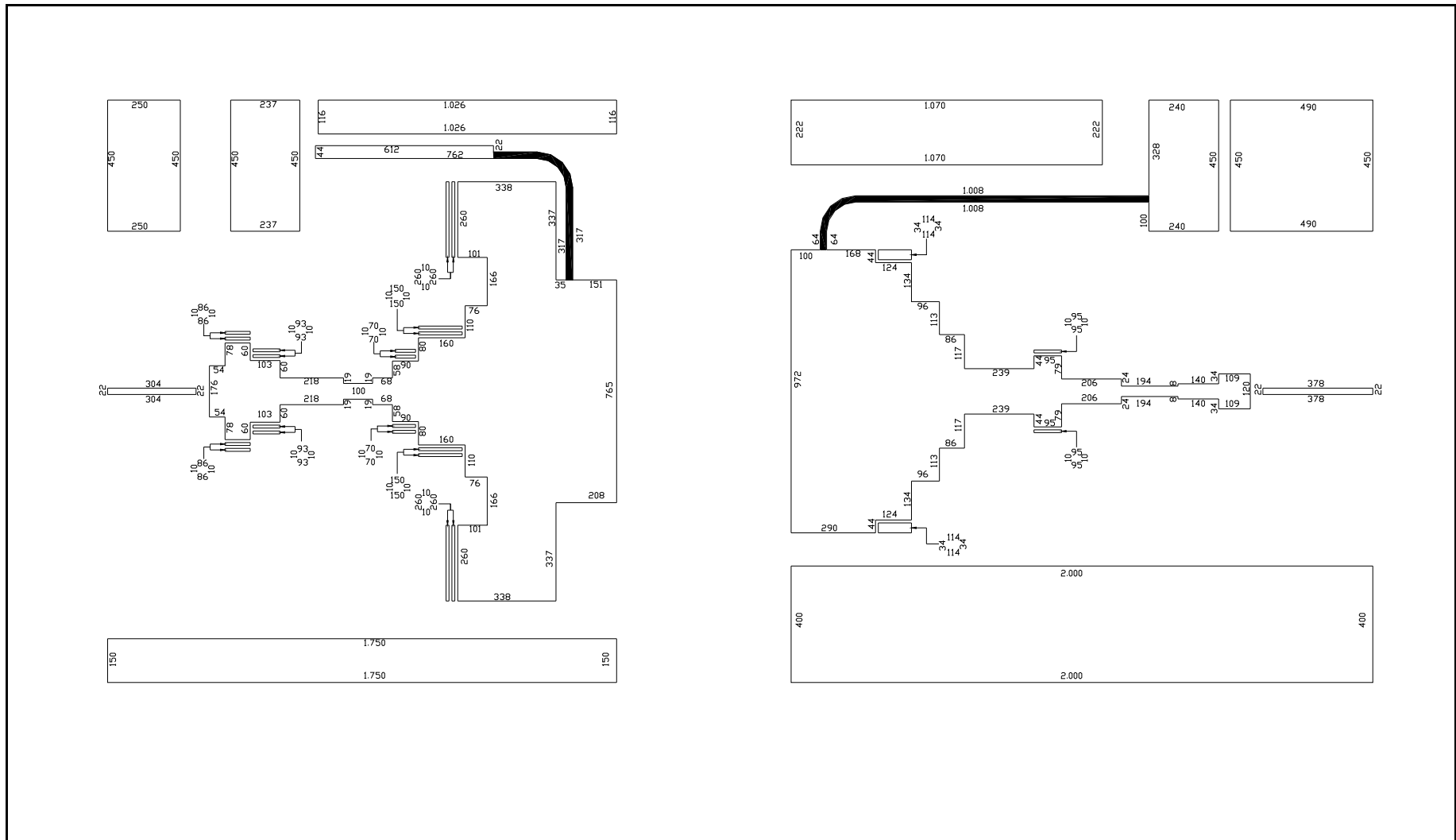
PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE

**RF TEST FIXTURE – ASSEMBLY AND PARTS LIST**

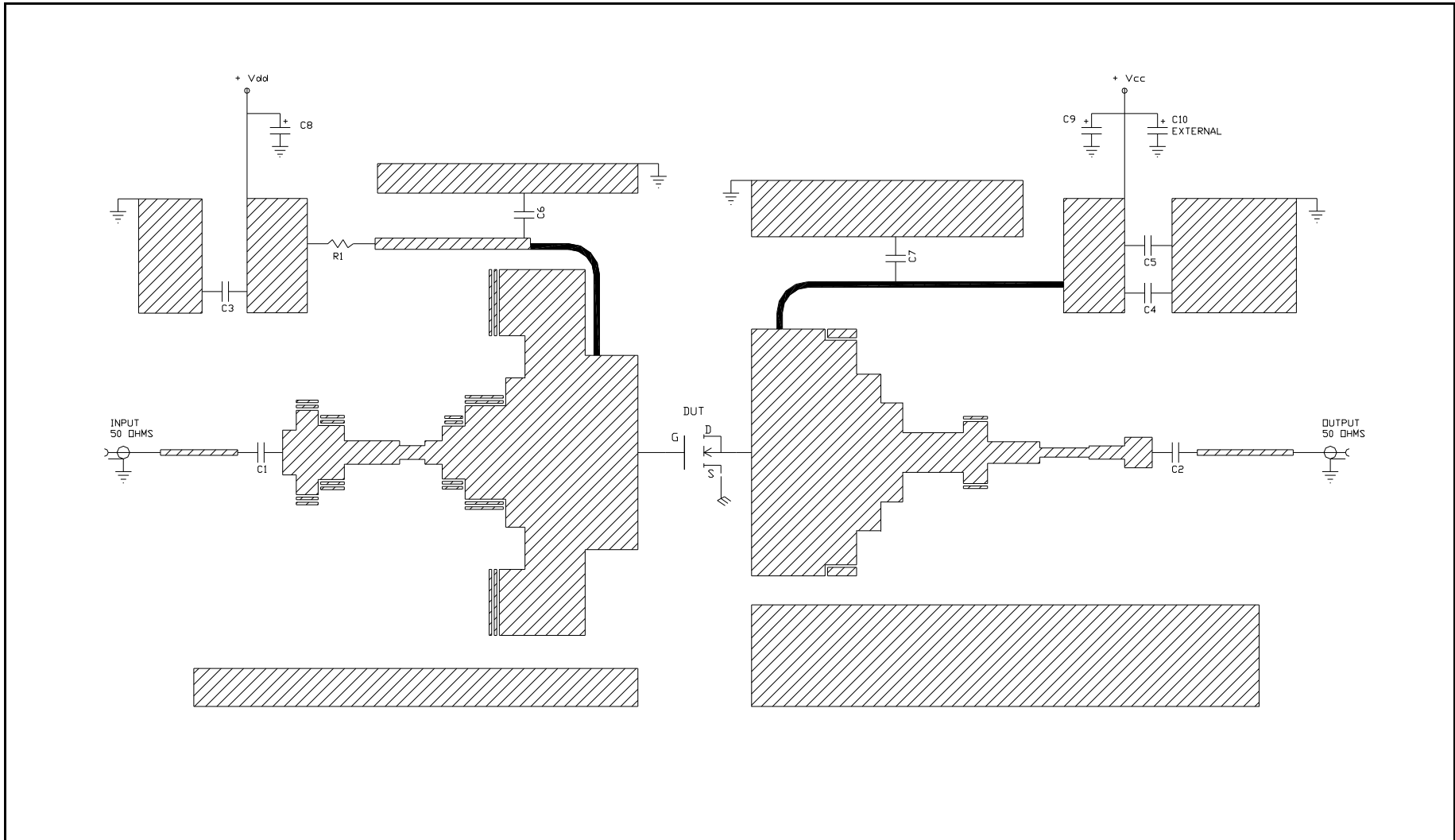


COMPONENT	DESCRIPTION
DUT	TRANSISTOR #ILD1012M500HV MOUNT HARD TO THE RIGHT
PC BOARD	REIGERS #RD3010 10.2 .025" 1oz Cu
C1, C2	CHIP CAPACITOR ATC100A - 39 pF
C3, C4	CHIP TANTALUM CAPACITOR AVX 4.7uF, 50V ESR = 0.3ohms
C5	CHIP CERAMIC CAPACITOR ATC100B - 1000pF 250V
C6, C7	CHIP CAPACITOR ATC100B - 47 pF
C8, C9	ELECT. CAPACITOR 68uF / 63V
C10 (NOT SHOWN)	ELECTROLYTIC CAPACITOR, 4700uF / 50V
R1	RESISTOR CHIP 1206 - 300 ohms
GS (*)	GROUND SHIM COPPER, TH=0.001"
CONN 1, CONN 2	SMA CONNECTOR, DS #2052-5636-02
INPUT PC BOARD CARRIER	2 INCH BRASS-06
OUTPUT PC BOARD CARRIER	2 INCH BRASS-07
TRANSISTOR CARRIER	2 INCH COPPER-22
TRANSISTOR CLAMP	NYLON CLAMP-08
ALUMINUM HEAT SINK	2 INCH HEATSINK-11
DC CONN 1	BANANA JACK, BLACK
DC CONN 2	BANANA JACK, RED
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

**RF TEST FIXTURE – CIRCUIT DIMENSIONS IN MILS**



**RF TEST FIXTURE – ELECTRICAL SCHEMATIC**



**DEFINITIONS**

<b>Data Sheet Status</b>	
Proposed Specification	This data sheet contains proposed specifications.
Preliminary Specification	This data sheet contains specifications based on preliminary measurements and data.
Product Specification	This data sheet contains final product specifications.
<b>Maximum Ratings</b>	
Stress above one or more of the maximum ratings may cause permanent damage to the device. These are maximum ratings only. Operation of the device at these or at any other conditions above those given in the characteristics sections of the specification is not implied. Exposure to maximum values for extended periods of time may affect device reliability.	

**WARNING**

<b>Product and environmental safety - toxic materials</b>
This product contains beryllium oxide. The product is entirely safe provided that the BeO base is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with general or domestic waste.

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