Part Number: **ILD1012S500HV**

Integra

TECHNOLOGIES, INC.

Avionics DME Band RF Power LDMOS FET

The high power transistor part number ILD1012S500HV 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 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 *TYPICAL DATA* *TYPICAL DATA* *TYPICAL DATA*

Vd=50V
Idq= 40mA
Pulse= 10us-1%

Lot/SN:	f (MHz)	Pi (W)	Id (A)	RL (dB)	Po (W)	Nd' (%)	G (dB)	dG (dB)	Drp (dB)	VSWR 20|1
D4938-9	1025	***13***	22.8	20	**538**	**57.2**	**16.17**		0.05	P
	1090	***13***	24.8	10.5	**541**	**52.0**	**16.19**	0.06	0.03	P
	1150	***13***	25.6	12	**533**	**49.4**	**16.13**		0.01	P

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FAX: 310-606-0865

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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±5°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±5°C
100%	Drain Leakage Current	I_{DSS}		50	µA	V_{DS} = 50V, V_{GS} = 0V, T_F = 25±5°C
100%	Gate Threshold Voltage	V_{GSTH2}	2.5	10	V	I_D = 40mA, T_F = 25±5°C

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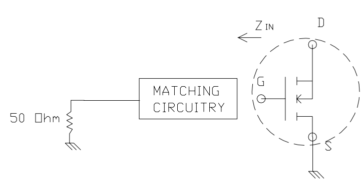
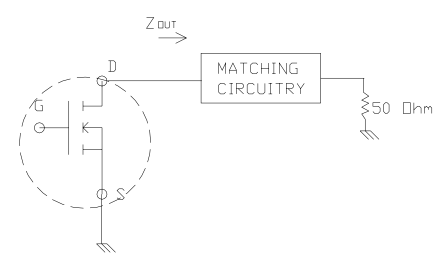
RF ELECTRICAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	9		dB	V_{DD}=50V, P_{IN}=13W, Pulse=10µs, 1%, T_F=25±5°C, F=F1, I_{DQ}=40mA.
BD	Maximum Overdrive	$P_{IN(MAX)}$	--	17	W	V_{DD}=50V, Pulse=10µs, 1%, T_F=25±5°C, F=F1, I_{DQ}=40mA.
100%	Power Gain	G_P	15.85	17.85	dB	V_{DD}=50V, P_{IN}=13W, Pulse=10µs, 1%, T_F=25±5ºC, F=F1, I_{DQ}=40mA.
100%	Output Power	P_{OUT}	500	792	W	V_{DD}=50V, P_{IN}=13W, Pulse=10µs, 1%, T_F=25±5ºC, F=F1, I_{DQ}=40mA.
100%	Drain Efficiency	N'_d	45		%	V_{DD}=50V, P_{IN}=13W, Pulse=10µs, 1%, T_F=25±5°C, F=F1, I_{DQ}=40mA.
100%	Pulse Amplitude Droop	D	-0.5	+0.5	dB	V_{DD}=50V, P_{IN}=13W, Pulse=10µs, 1%, T_F=25±5°C, F=F1, I_{DQ}=40mA.
100%	Stability into 2:1 VSWR	VSWR-S		2:1	--	V_{DD}=50V, P_{IN}=13W, Pulse=10µs, 1%, T_F=25±5°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}=13W, Pulse=10µs, 1%, T_F=25±5°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}=13W, Pulse=10µs, 1%, T_F=25±5°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 = 10µs, 1%					
Note 3	T_F = Device flange temperature.					
Note 4	Screen 'BD' = parameter qualified By Design.					

RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

Frequency (MHz)	Z_{IF} (Ω)	Z_{OF} (Ω)
1025	1.26 –j0.70	1.48 –j1.11
1090	0.96 –j0.25	1.40 –j0.80
1150	0.83 –j0.01	1.36 –j0.72
Impedance Definition		

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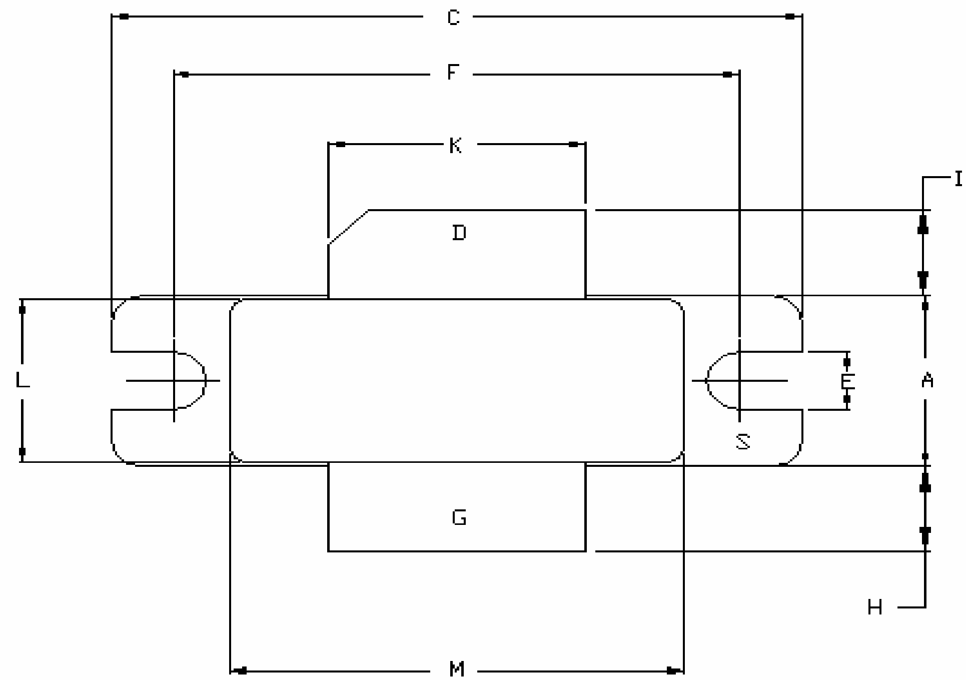
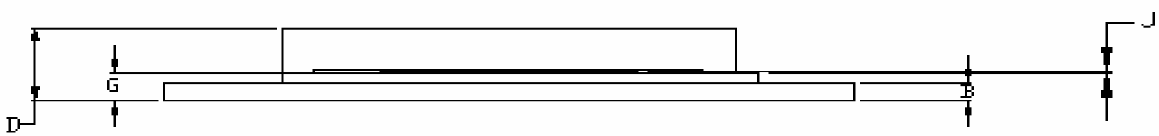
PACKAGE DIMENSIONAL OUTLINE DRAWING



DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.380	0.390	9.65	99.0
B	0.035	0.045	0.88	1.14
C	1.335	1.345	33.90	34.16
D	0.127	0.157	3.22	3.98
E	0.123	0.133	3.12	3.37
F	1.095	1.105	27.81	28.0
G	0.057	0.067	1.44	1.70
H	0.170	0.210	4.32	5.33
I	0.170	0.210	4.32	5.33
J	0.049	0.075	1.24	1.90
K	0.495	0.505	12.57	12.82
L	0.364	0.374	9.24	9.49
M	0.875	0.885	22.22	22.47

PIN SCHEDULE	
D	DRAIN
S	SOURCE
G	GATE



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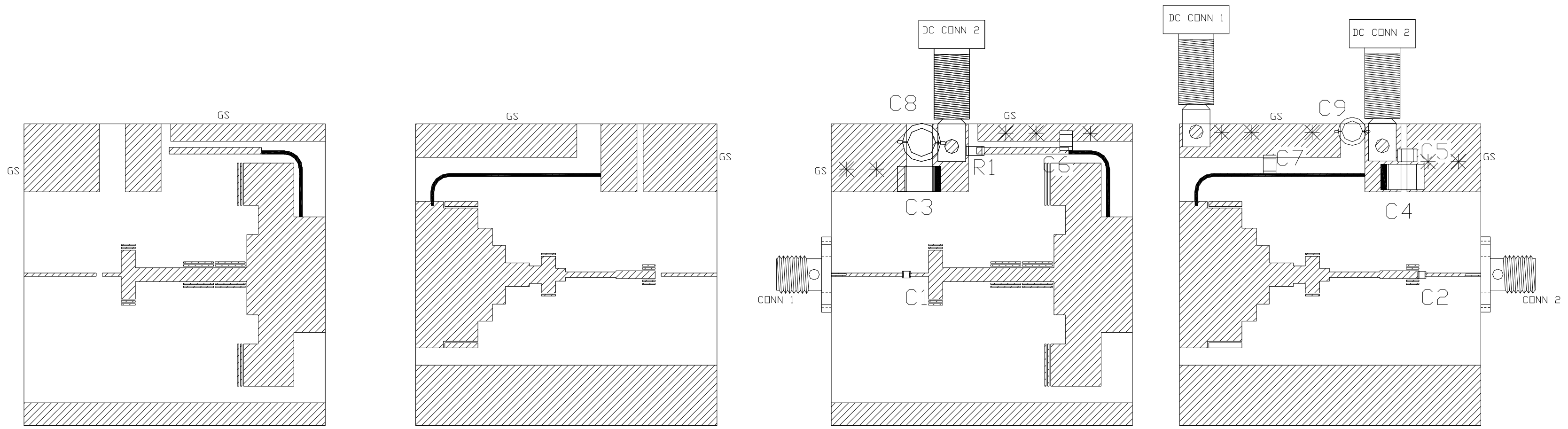
RF TEST FIXTURE – ASSEMBLY AND PARTS LIST



COMPONENT	DESCRIPTION
DUT	TRANSISTOR #ILD1012S500HV, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #RO 3010 10.2, 0.25" 1oz. Cu
C1, C2	CHIP CAPACITOR ATC100A-39pF
C3, C4	TANTALUM AVX 4.7uF, 50V ESR=0.3ohms
C5	CERAMIC CHIP CAPACITOR ATC100B-1000pF 250V
C6, C7	CHIP CAPACITOR ATC100B 47pF
C8, C9	ELECTOLYTIC CAPACITOR 68uF/63V
C10	STORAGE CAPACITOR 4700uF / 50V
R1	CHIP RESISTOR 1206-300ohms
GS (10 PLACES)	GROUND SHIM, COPPER, TH=0.001"
CONN 1, CONN 2	SMA CONNECTOR, OS #2052-5636-02
INPUT PC BOARD CARRIER	2 INCH BRAASS-07 (2.0")
OUTPUT PC BOARD CARRIER	2 INCH BRASS-07 (2.0")
TRANSISTOR CARRIER	2 INCH COPPER-22
TRANSISTOR CLAMP	NORLY CLAMP-08
ALUMINUM HEATSINK	2 INCH HEATSINK-11
DC CONN 1	BANANA, JACK BLACK (GROUND)
DC CONN 2	BANANA, JACK RED (2 PLACES)
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

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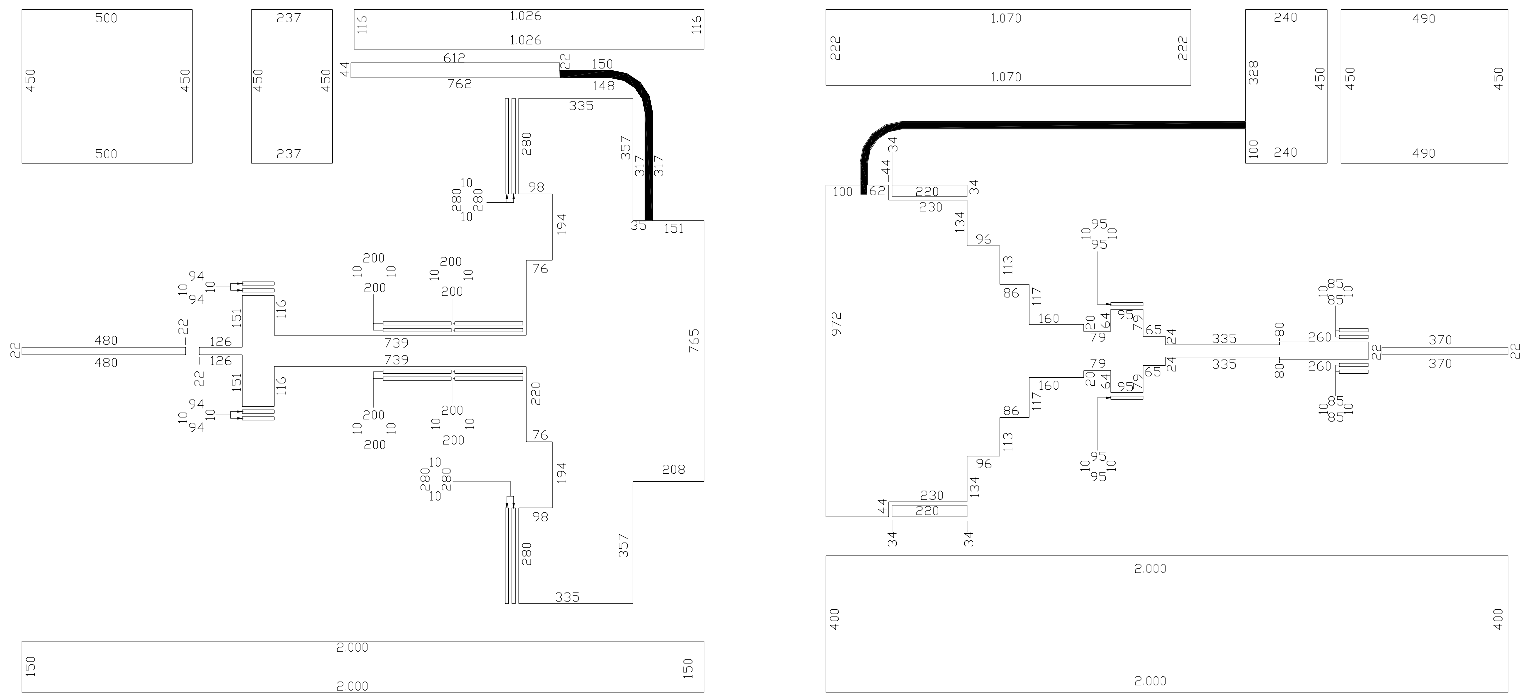
RF TEST FIXTURE – CIRCUIT DIMENSIONS IN MILS



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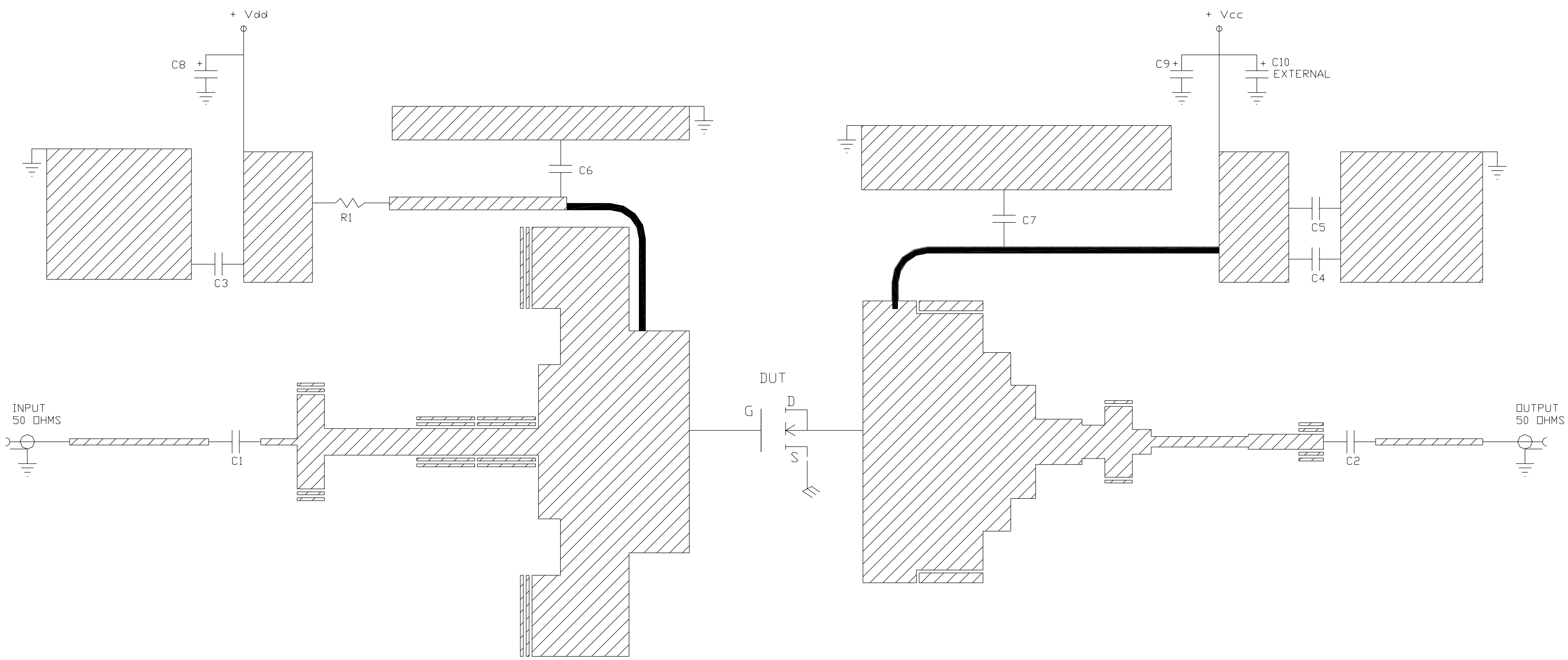
RF TEST FIXTURE – ELECTRICAL SCHEMATIC



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DEFINITIONS

Data Sheet Status	
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.

Maximum Ratings

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

Product and environmental safety - toxic materials

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.

DISCLAIMER

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