

MDS140L

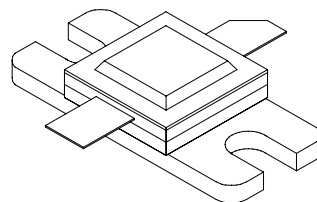
140 Watts, 50 Volts

Pulsed Avionics 1030 to 1090 MHz

GENERAL DESCRIPTION

The **MDS140L** is a high power COMMON BASE bipolar transistor. It is designed for MODE-S ELM systems in the frequency band 1030-1090 MHz. The device has gold thin-film metallization and diffused ballasting for proven highest MTTF. The transistor includes input and output prematch for broadband capability. Low thermal resistance package reduces junction temperature, extends life.

CASE OUTLINE 55AW Style 1 (Common Base)



ABSOLUTE MAXIMUM RATINGS

Power Dissipation

Device Dissipation @25°C (P_d) 500 W (At rated pulse condition)

Voltage and Current

Collector to Base Voltage (BV_{CES}) 70 V

Emitter to Base Voltage (BV_{EBO}) 3.0 V

Collector Current (I_C) 12 A

Temperatures

Storage Temperature -65 to +150 °C

Operating Junction Temperature +200 °C

ELECTRICAL CHARACTERISTICS @ 25°C

SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
I_{EBO}	Emitter to Base Leakage	$V_{EB} = 3.0$ V			4.5	mA
BV_{CBO}	Collector to Base Breakdown	$I_C = 20$ mA	70			V
BV_{CES}	Collector to Emitter Breakdown	$I_C = 20$ mA	70			V
I_{CES}	Collector to Emitter Leakage	$V_{CE} = 50.0$ V			3.0	mA
h_{FE}	DC – Current Gain	$I_C = 1$ A, $V_{CE} = 5$ V	20			-
$\theta_{jc}^{1,2}$	Thermal Resistance			0.15		°C/W

FUNCTIONAL CHARACTERISTICS @ 25°C

SYMBOL	CHARACTERISTICS	TEST CONDITIONS	MIN	TYP	MAX	UNITS
P_{out}	Power Out	F = 1030/1090 MHz $V_{CC} = 50$ V $P_{in} = 15.7$ W ELM Burst: 32us(On), 18us(Off), N=48, Period=23ms	140			W
P_{in}	Power Input				15.7	W
G_p	Power Gain		9.5			dB
η_c	Collector Efficiency		50			%
P_d	Pulse Droop				0.5	dB
T_r^{-1}	Rise Time				100	ns
ψ	Load Mismatch				2:1	-

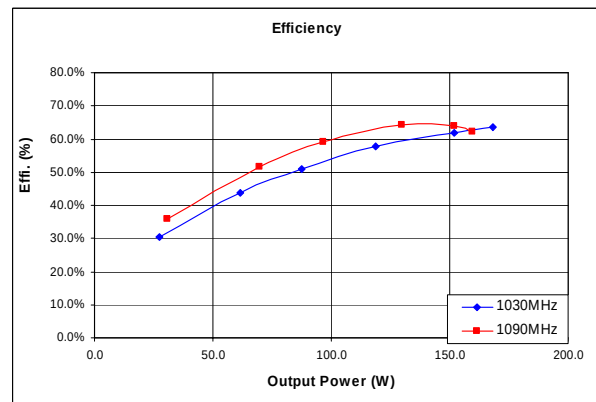
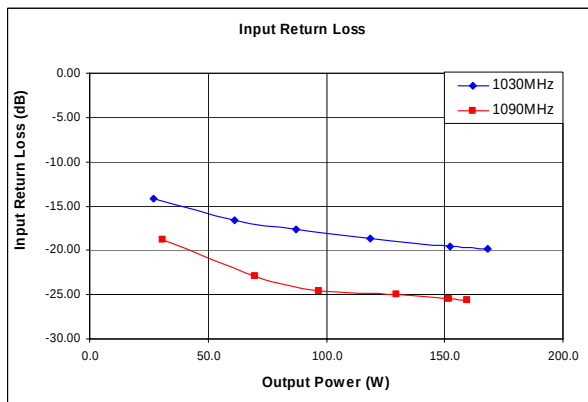
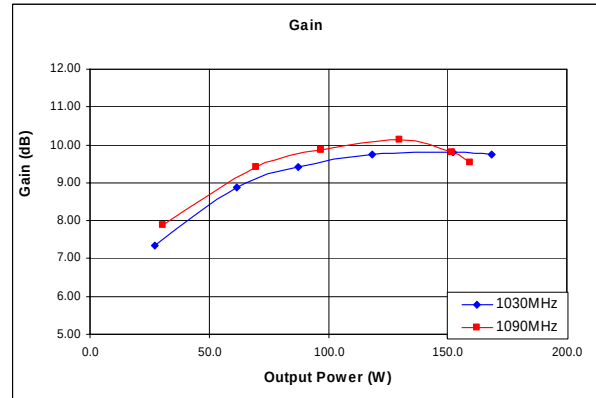
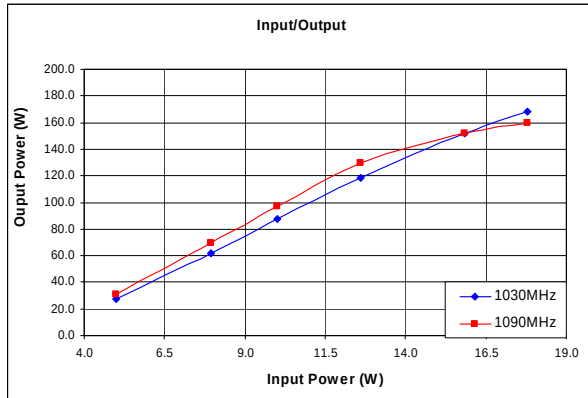
NOTES: 1. At rated output power, pulse conditions and MSC fixture

2. ELM Burst Pulse: 32us(On), 18us(Off), N=48, Period=23ms

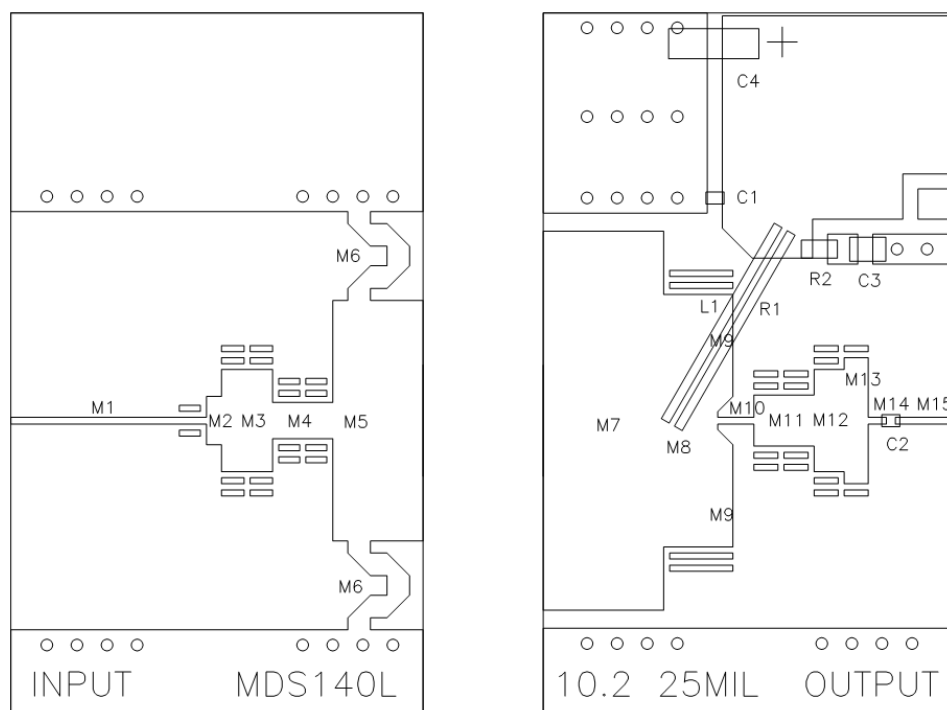
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Typical Performance (1030/1090 MHz)


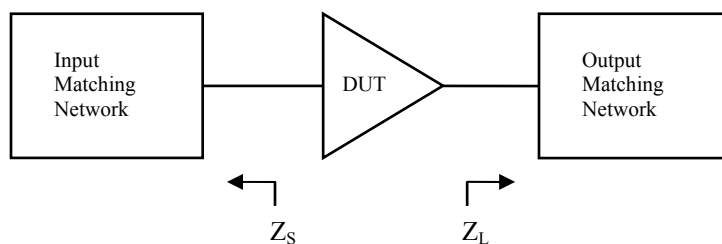
MDS140L Test Circuit Layout



MDS140L Test Circuit Component Designations and Values

Part	Description	Part	Description
C01, C02	100pF Chip Capacitor (ATC 600F)	C03	100nF Chip Capacitor (ATC 200B)
C04	2200uF, 63V Electrolytic Capacitor	L01	18 AWG, Length: 0.85"
R01	2.4Ω, 1/4W Radial Resistor, Length: 0.85"	R02	2.4Ω, 1/4W Chip Resistor
M01	22 x 650 mils (W x L)	M02	160 x 50 mils (W x L)
M03	340 x 170 mils (W x L)	M04	120 x 200 mils (W x L)
M05	800 x 300 mils (W x L)	M06	75 x 467 mils (W x L)
M07	1260 x 400 mils (W x L)	M08	840 x 180 mils (W x L)
M09	390/340 x 50 mils (W1/W2 x L)	M10	22 x 120 mils (W x L)
M11	170 x 200 mils (W x L)	M12	340 x 100 mils (W x L)
M13	420 x 80 mils (W x L)	M14	22 x 60 mils (W x L)
M15	22 x 220 mils (W x L)	PCB	Rogers RT6010.2, $\epsilon_r=10.2$, 25mils, 1oz

Typical Impedance Values



Frequency (MHz)	$Z_S (\Omega)$	$Z_L (\Omega)$
1030	$3.13 - j4.53$	$1.83 - j0.92$
1090	$2.58 - j3.45$	$1.37 - j1.12$

* $V_{CC} = 50V$, $P_{IN} = 15.7W$ $P_{OUT} > 140W$

* Pulse Format: $PW = 10\mu s$, $DF = 10\%$

