



# LET9150

## RF power transistor from the LdmoST family of n-channel enhancement-mode lateral MOSFETs

### Features

- Excellent thermal stability
- Common source configuration push-pull
- $P_{OUT} = 150\text{ W}$  with 20 dB gain @ 860 MHz
- BeO-free package

### Description

The LET9150 is a common source n-channel enhancement-mode lateral field-effect RF power transistor designed for broadband commercial and industrial applications at frequencies up to 2 GHz.

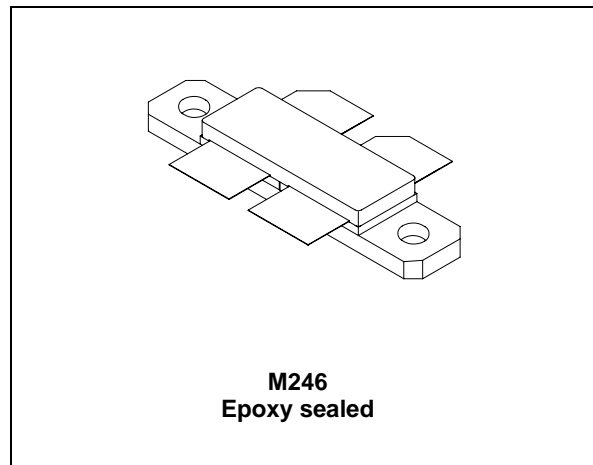


Figure 1. Pin connection

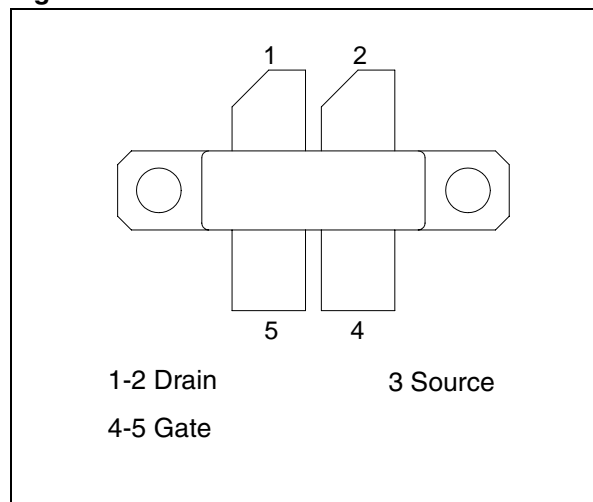


Table 1. Device summary

Order code	Package	Branding
LET9150	M246	LET9150

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# 1 Electrical data

## 1.1 Maximum ratings

Table 2. Absolute maximum ratings ( $T_{CASE} = 25\text{ °C}$ )

Symbol	Parameter	Value	Unit
$V_{(BR)DSS}$	Drain-source voltage	80	V
$V_{GS}$	Gate-source voltage	- 0.5 / + 15	V
$I_D$	Drain current	20	A
$P_{DISS}$	Power dissipation	269	W
$T_J$	Max. operating junction temperature	200	°C
$T_{STG}$	Storage temperature	-65 to +150	°C

## 1.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thJC}$	Junction - case thermal resistance	0.65	°C/W

## 2 Electrical characteristics

$$T_{CASE} = +25\text{ }^{\circ}\text{C}$$

### 2.1 Static

**Table 4. Static (per section)**

Symbol	Test conditions		Min	Typ	Max	Unit
$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}$	$I_{DS} = 1\text{ mA}$	80			V
$I_{DSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 28\text{ V}$			1	$\mu\text{A}$
$I_{GSS}$	$V_{GS} = 5\text{ V}$	$V_{DS} = 0\text{ V}$			1	$\mu\text{A}$
$V_{GS(Q)}$	$V_{DS} = 28\text{ V}$	$I_D = 600\text{ mA}$	2.0		5.0	V
$V_{DS(ON)}$	$V_{GS} = 10\text{ V}$	$I_D = 3\text{ A}$		0.7	0.9	V
$G_{FS}$	$V_{DS} = 10\text{ V}$	$I_D = 3\text{ A}$	2.5			mho
$C_{ISS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 32\text{ V}$		68		pF
$C_{OSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 32\text{ V}$		33		pF
$C_{RSS}$	$V_{GS} = 0\text{ V}$	$V_{DS} = 32\text{ V}$		0.65		pF

### 2.2 Dynamic

**Table 5. Dynamic**

Symbol	Test conditions		Min	Typ	Max	Unit
$P_{OUT}$	$V_{DD} = 32\text{ V}$	$I_{DQ} = 600\text{ mA}$ $f = 860\text{ MHz}$ $P_{IN} = 2.5\text{ W}$	150	175		W
$G_{PS}$	$V_{DD} = 32\text{ V}$	$I_{DQ} = 600\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 860\text{ MHz}$	18	20	-	dB
$\eta_D$	$V_{DD} = 32\text{ V}$	$I_{DQ} = 600\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 860\text{ MHz}$	60	69		%
RTL	$V_{DD} = 32\text{ V}$	$I_{DQ} = 600\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 860\text{ MHz}$		12		dB
Load Mismatch	$V_{DD} = 32\text{ V}$	$I_{DQ} = 600\text{ mA}$ $P_{OUT} = 150\text{ W}$ $f = 860\text{ MHz}$ all phase angles			20:1	VSWR

### 3 Impedance data

Figure 2. Impedance data

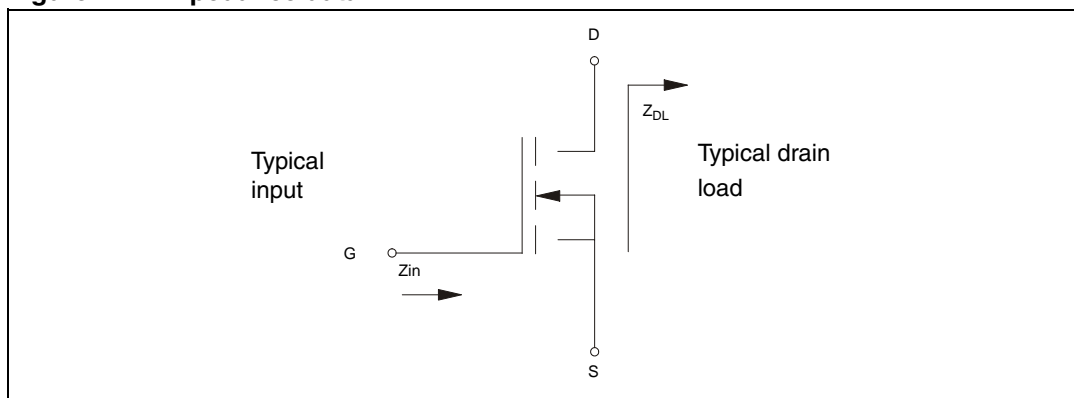
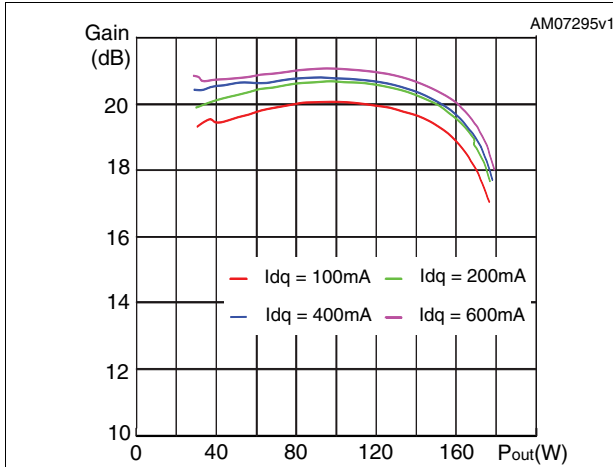


Table 6. Impedance data

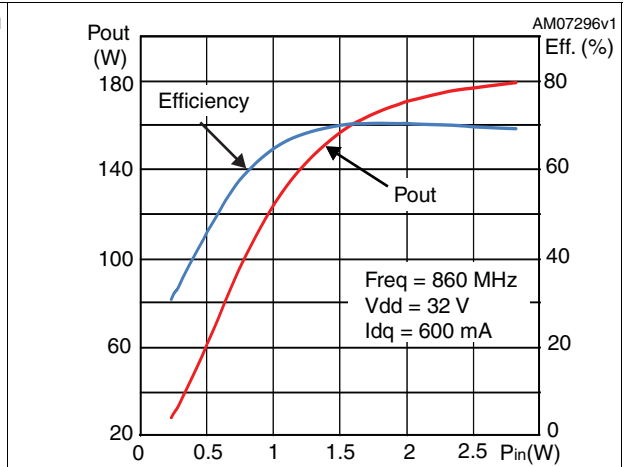
Frequency MHz	Z source ( $\Omega$ )	Z load ( $\Omega$ )
860	$0.8 - j 1.3$	$4.8 - j 2.4$

# 4 Typical performances

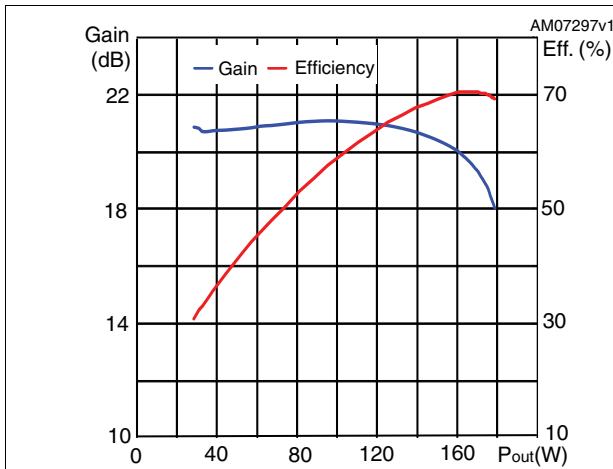
**Figure 3. Gain vs output power and bias current @ f= 860 MHz, Vdd = 32 V**



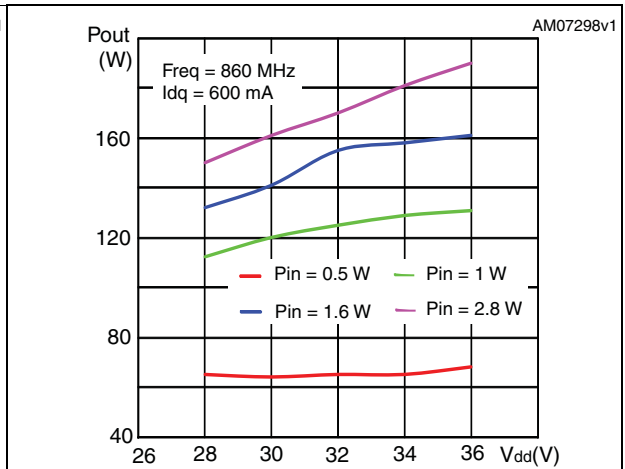
**Figure 4. Output power and efficiency vs input power**



**Figure 5. Gain and efficiency vs output power @ f= 860 MHz, Vdd = 32 V, Idq= 600 mA**



**Figure 6. Output power vs drain supply voltage**



# 5 Test circuit

Figure 7. Test circuit schematic

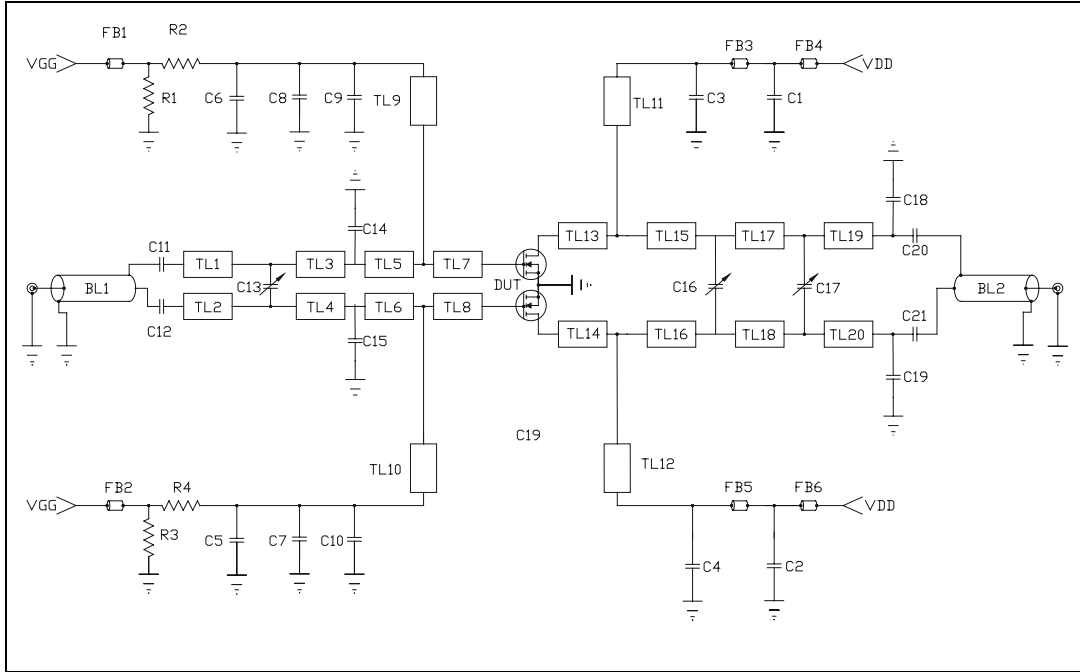


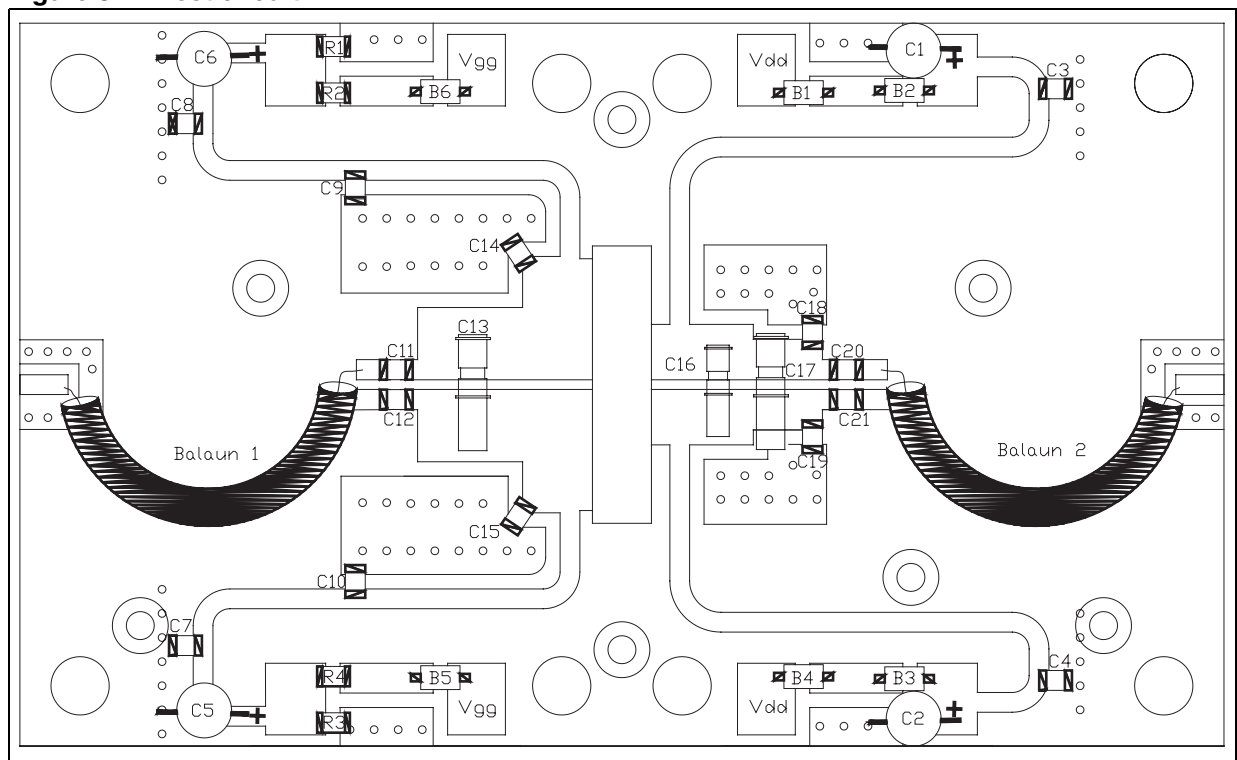
Table 7. Test circuit component part list

Item	Qty.	Part number	Vender	Description
R1, R3	2	CR1206-8W-130JB	VENKEL	1.2 K $\Omega$ , 1/8 W surface mount chip resistor
R2,R4	2	CR1206-8W-122JB	VENKEL	13 $\Omega$ , 1/8 W surface mount chip resistor
FB1,2,3,4,4,6	2	2743021447	FAIR-RITE CORP	Surface mount EMI sheild bead
C1,C2,C5,C6	4			100 $\mu$ F, 63 V electrolytic capacitor
C3,C4,C7,C8	4	ATC100B200XXXX	ATC	20 pF chip capacitor
C9,C10	2	ATC200B203MW	ATC	20000 pF chip capacitor
C11, C12	2	ATC100B510XXXX	ATC	51 pF chip capacitor
C13,17	2	27291PC	JOHANSON	0.8-8 pF giga trim variable capacitor
C14,15	2	ATC100B130XXXX	ATC	13 pF chip capacitor
C16	1		JOHANSON	0.6-4.5 pF giga trim variable capacitor
C18,19	1	ATC100B1R3XXXX	ATC	1.3 pF chip capacitor
C20,C21	1	ATC100B180XXXX	ATC	18 pF chip capacitor
B1,B2	2	EZ 141	HUBER-SUHNER	BALUN , 50 $\Omega$ SUCOFORM, OD 0.141. 2.37 LG coaxial cable or equivalent
TL21, TL22	2			L= 0.200in [5.08mm] W=0.082in [2.08mm]

Table 7. Test circuit component part list (continued)

Item	Qty.	Part number	Vender	Description
TL1, TL2	2			L= 0.229in [5.81mm] W=0.300in [7.62mm]
TL3, TL4	2			L= 0.207in [5.27mm] W=0.300in [7.62mm]
TL5, TL6	2			L= 0.156in [3.96mm] W=0.503in [12.76mm]
TL7, TL8	2			L= 0.134in [3.41mm] W=0.503in [12.76mm]
TL9, TL10, TL11, TL12	4			L= 2.37in [60.19mm] W=0.082in [2.08mm]
TL13, TL14	2			L= 0.077in [1.94mm] W=0.230in [5.84mm]
TL15, TL16	2			L= 0.200in [5.08mm] W=0.230in [5.84mm]
TL17, TL18	2			L= 0.235in [5.96mm] W=0.230in [5.84mm]
TL17, TL19	2			L= 0.287in [7.29mm] W=0.168in [4.27mm]
Board 3X5	1		Rogers Corp	Er=2.55 t=0.0026in h=0.030in

Figure 8. Test circuit





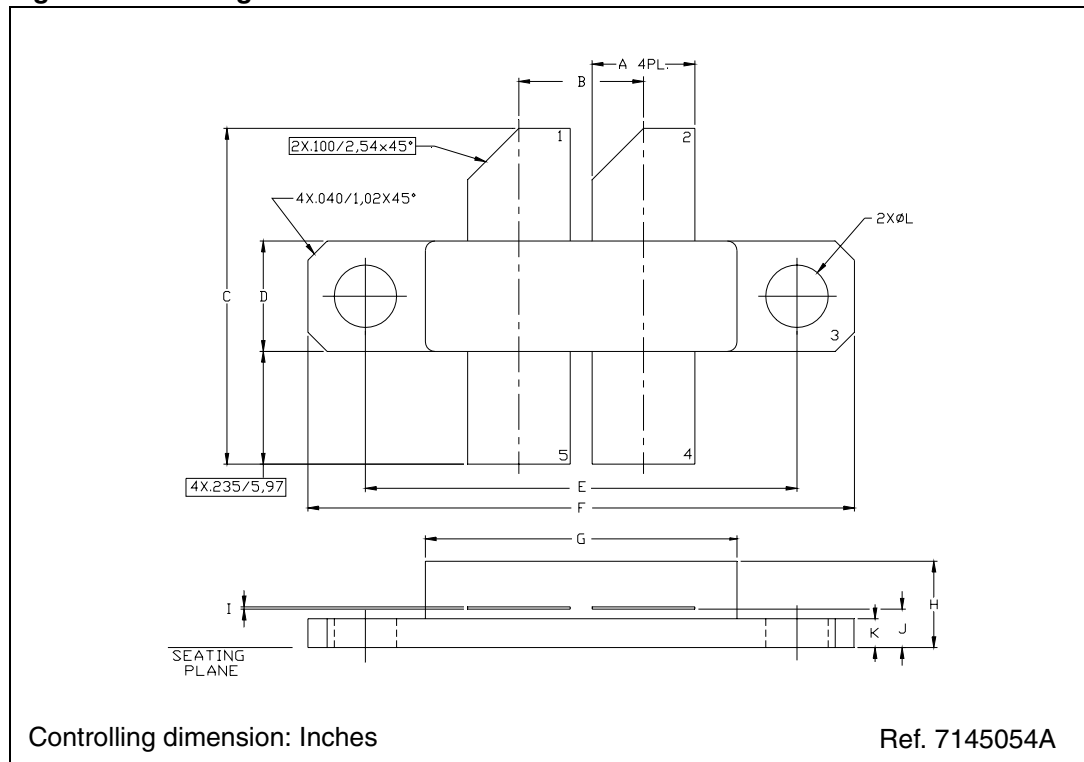
## 6 Package mechanical data

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**Table 8. M246 (0.230 x 0.650 WIDE 4/L BAL N/HERM W/FLG) mechanical data**

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A	5.33		5.59	0.210		0.220
B	6.48		6.73	0.255		0.265
C	17.27		18.29	0.680		0.720
D	5.72		5.97	0.225		0.235
E		22.86			.900	
F	28.83		29.08	1.135		1.145
G	16.26		16.76	0.640		0.660
H	4.19		5.08	0.165		0.200
I	0.08		0.15	0.003		0.006
J	1.83		2.24	0.072		0.088
K	1.40		1.65	0.055		0.065
L	3.18		3.43	0.125		0.135

**Figure 9. Package dimensions**



## 7 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
05-Oct-2009	1	First Issue.
18-Oct-2009	2	Updated $V_{GS}$ in <a href="#">Table 2</a> .
11-Feb-2010	3	Changed test condition for $V_{(BR)DSS}$ in <a href="#">Table 4: Static (per section)</a> .
29-Jun-2010	4	Added <a href="#">Section 3: Impedance data</a> and <a href="#">Section 4: Typical performances</a> . Updated <a href="#">Table 5</a> .
12-Jul-2010	5	Updated <a href="#">Figure 4: Output power and efficiency vs input power</a> and <a href="#">Figure 6: Output power vs drain supply voltage</a> .
22-Dec-2010	6	Inserted new <a href="#">Section 5: Test circuit</a> .

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