LET9150

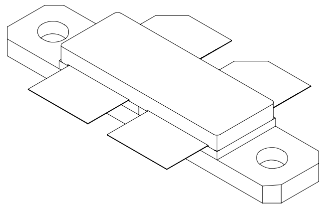
RF power transistor from the LdmoST family of n-channel enhancement-mode lateral MOSFETs

Features

- Excellent thermal stability
- Common source configuration push-pull
- P_{OUT} = 150 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.



M246
Epoxy sealed

Figure 1. Pin connection

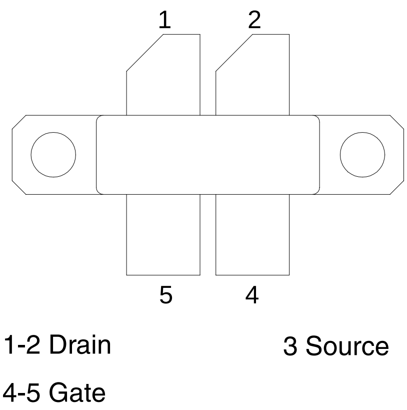


Table 1. Device summary

Order code	Package	Branding
LET9150	M246	LET9150

Contents

1 Electrical data

1.1 Maximum ratings

Table 2. Absolute maximum ratings (T_{CASE} = 25 °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 °C

2.1 Static

Table 4. Static (per section)

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

2.2 Dynamic

Table 5. Dynamic

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

3 Impedance data

Figure 2. Impedance data

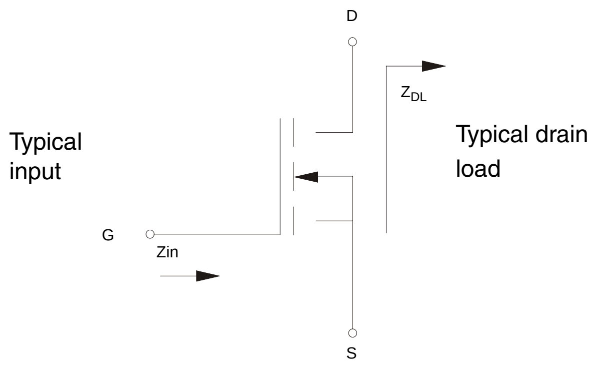


Table 6. Impedance data

Frequency MHz	Z source (Ω)	Z load (Ω)
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

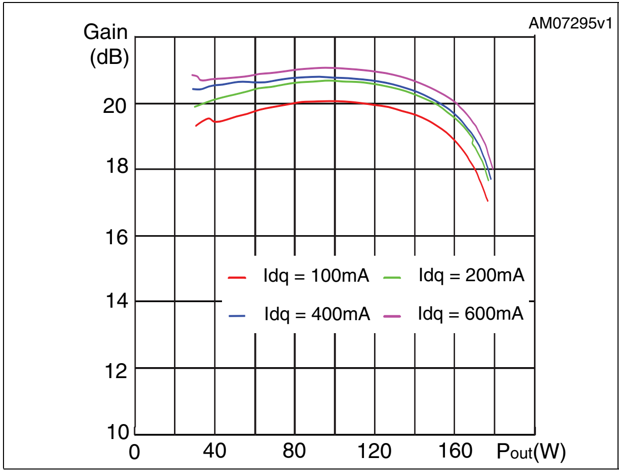


Figure 4. Output power and efficiency vs input power

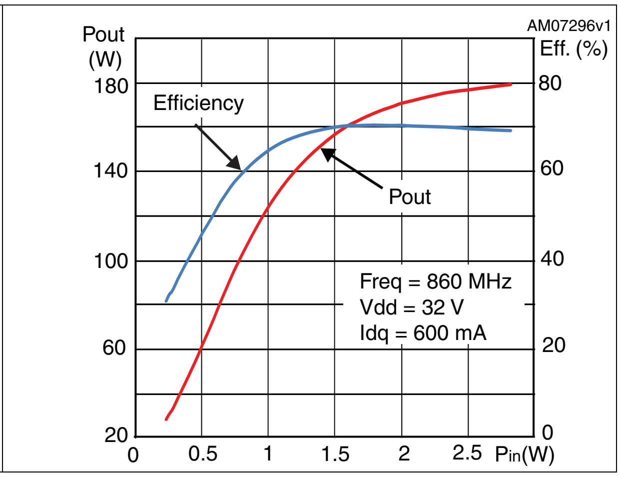


Figure 5. Gain and efficiency vs output power @ f= 860 MHz, Vdd = 32 V, Idq= 600 mA

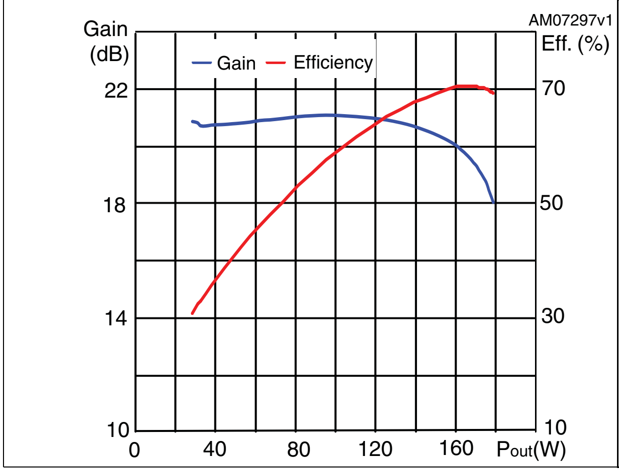
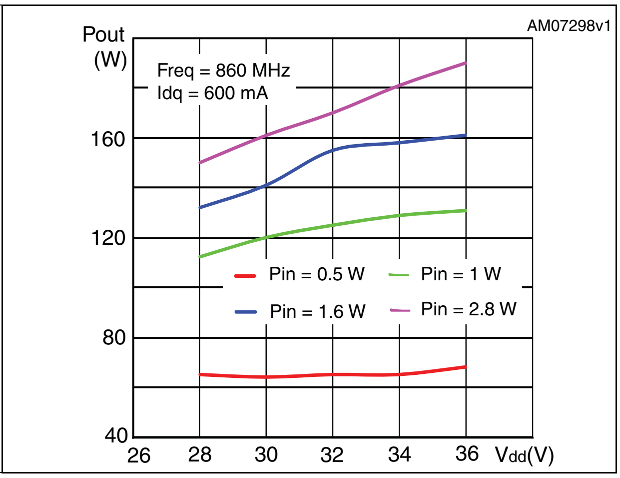


Figure 6. Output power vs drain supply voltage



5 Test circuit

Figure 7. Test circuit schematic

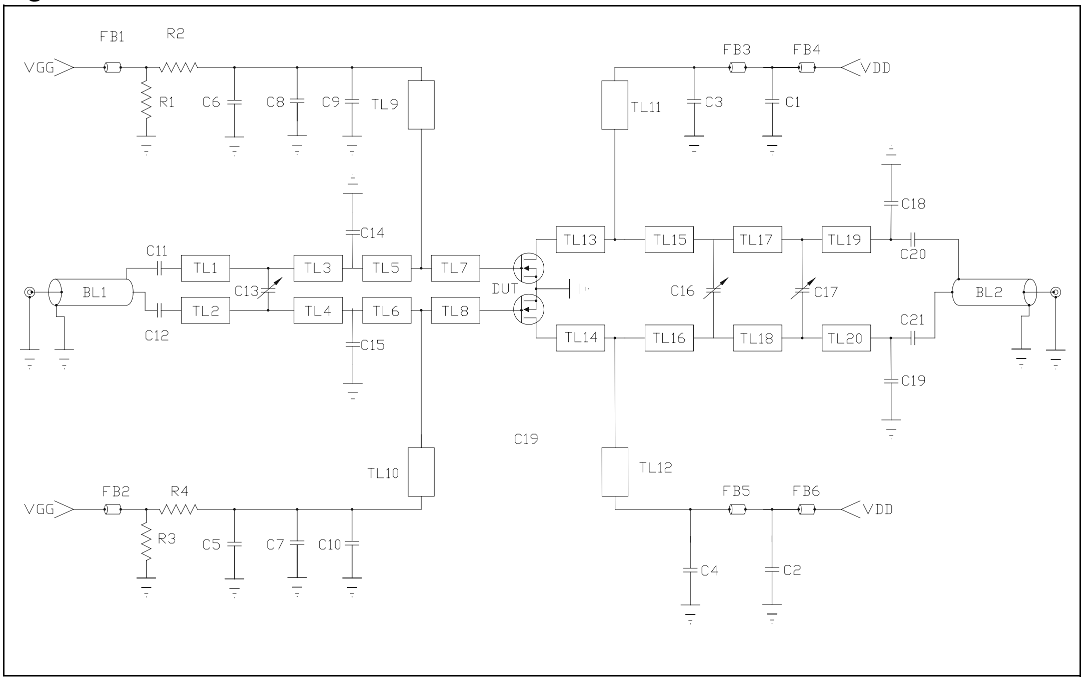


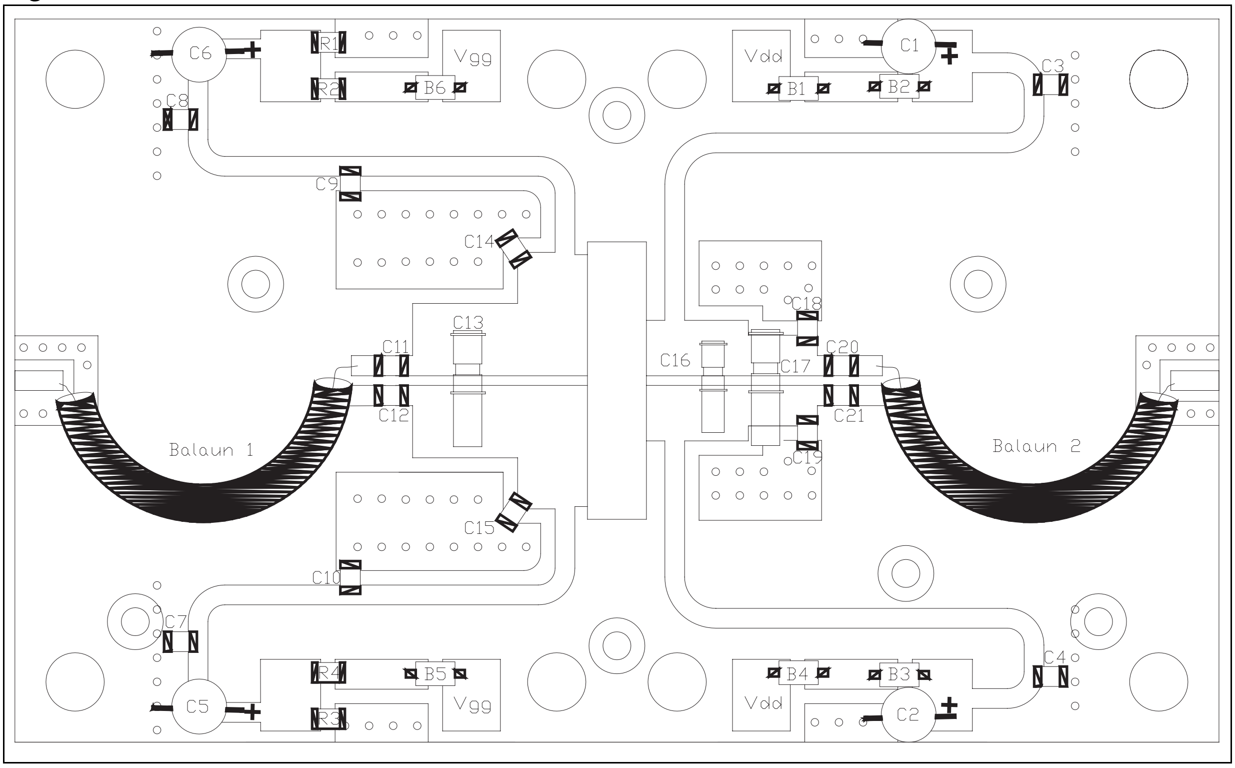
Table 7. Test circuit component part list

Item	Qty.	Part number	Vender	Description
R1, R3	2	CR1206-8W-130JB	VENKEL	1.2 KΩ, 1/8 W surface mount chip resistor
R2,R4	2	CR1206-8W-122JB	VENKEL	13 Ω, 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 µF, 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 Ω 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



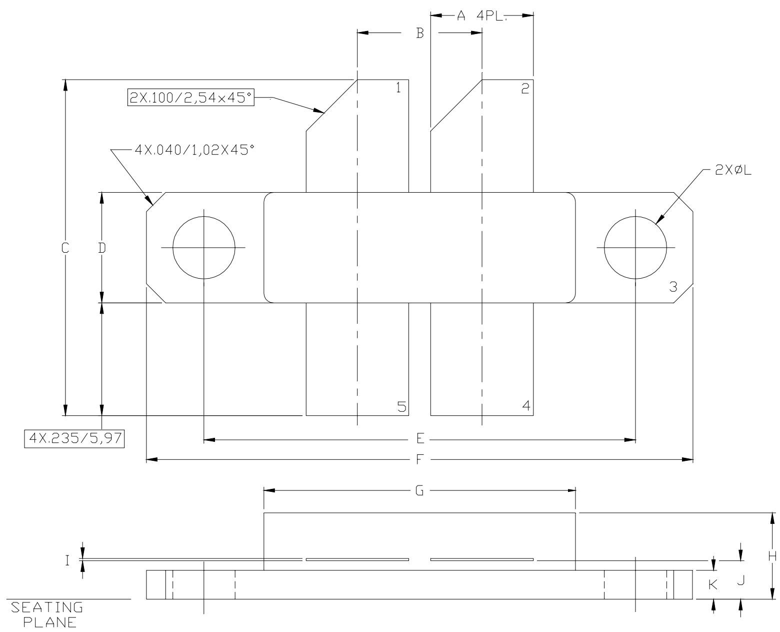
6 Package mechanical data

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

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



Controlling dimension: Inches

Ref. 7145054A

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 *Table 2*.
11-Feb-2010	3	Changed test condition for $V_{(BR)DSS}$ in *Table 4: Static (per section)*.
29-Jun-2010	4	Added *Section 3: Impedance data* and *Section 4: Typical performances*. Updated *Table 5*.
12-Jul-2010	5	Updated *Figure 4: Output power and efficiency vs input power* and *Figure 6: Output power vs drain supply voltage*.
22-Dec-2010	6	Inserted new *Section 5: Test circuit*.