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# LET9120

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

Preliminary data

### Features

- Excellent thermal stability
- Common source configuration push-pull
- $P_{OUT} = 120\text{ W}$  with 18 dB gain @ 860 MHz
- BeO-free package

### Description

The LET9120 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 1.6 GHz.

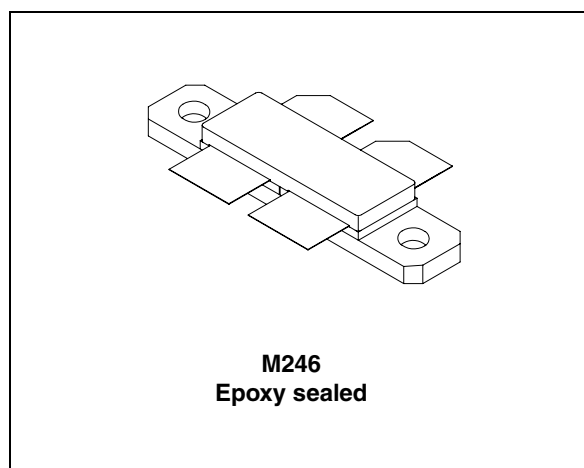


Figure 1. Pin connection

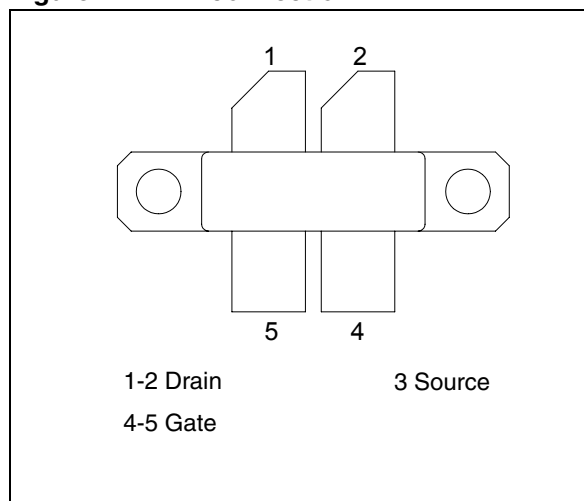


Table 1. Device summary

Order code	Package	Branding
LET9120	M246	LET9120

# Contents

<b>1</b>	<b>Electrical data</b> .....	<b>3</b>
1.1	Maximum ratings .....	3
1.2	Thermal data .....	3
<b>2</b>	<b>Electrical characteristics</b> .....	<b>4</b>
2.1	Static .....	4
2.2	Dynamic .....	4
<b>3</b>	<b>Typical performance</b> .....	<b>5</b>
<b>4</b>	<b>Test circuit</b> .....	<b>6</b>
<b>5</b>	<b>Package mechanical data</b> .....	<b>8</b>
<b>6</b>	<b>Revision history</b> .....	<b>10</b>

# 1 Electrical data

## 1.1 Maximum ratings

$T_{CASE} = 25\text{ °C}$

**Table 2. Absolute maximum ratings**

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	18	A
$P_{DISS}$	Power dissipation (@ $T_C = 70\text{ °C}$ )	200	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

Electrical characteristics

LET9120

## 2 Electrical characteristics

T<sub>CASE</sub> = + 25 °C

### 2.1 Static

Table 4. Static (per section)

Symbol	Test conditions		Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0 V	I <sub>DS</sub> = 10 mA	80			V
I <sub>DSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V			1	μA
I <sub>GSS</sub>	V <sub>GS</sub> = 5 V	V <sub>DS</sub> = 0 V			1	μA
V <sub>GS(Q)</sub>	V <sub>DS</sub> = 28 V	I <sub>D</sub> = 100 mA	2.0		5.0	V
V <sub>DS(ON)</sub>	V <sub>GS</sub> = 10 V	I <sub>D</sub> = 3 A		0.9	1.2	V
G <sub>FS</sub>	V <sub>DS</sub> = 10 V	I <sub>D</sub> = 3 A	2.5			mho
C <sub>ISS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V		58		pF
C <sub>OSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V		30		pF
C <sub>RSS</sub>	V <sub>GS</sub> = 0 V	V <sub>DS</sub> = 28 V		0.7		pF

### 2.2 Dynamic

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P <sub>OUT</sub>	V <sub>DD</sub> = 32 V I <sub>DQ</sub> = 400 mA P <sub>IN</sub> = 2.5 W	120	150		W
G <sub>PS</sub>	V <sub>DD</sub> = 32 V I <sub>DQ</sub> = 400 mA P <sub>OUT</sub> = 150 W	16	18	-	dB
η <sub>D</sub>	V <sub>DD</sub> = 32 V I <sub>DQ</sub> = 400 mA P <sub>OUT</sub> = 150 W	60	70		%
Load Mismatch	V <sub>DD</sub> = 32 V I <sub>DQ</sub> = 400 mA P <sub>OUT</sub> = 160 W @ 860 MHz All phase angles		20:1		VSWR

Table 6. Impedance data

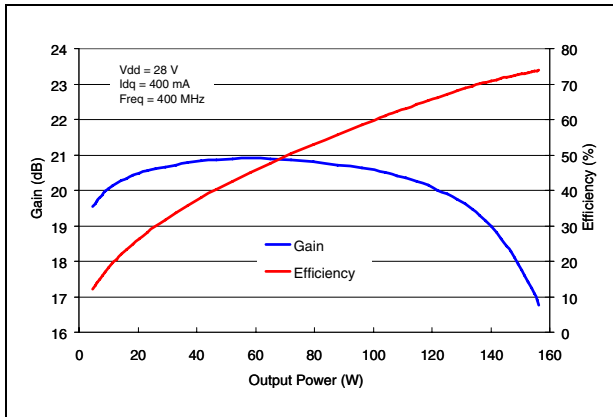
Frequency Mhz	Z source Ω (As measured in the circuit gate to gate)	Z load Ω (As measured in the circuit drain to drain)
860	1.5 + j 2.2	6.2 + j 5.2

LET9120

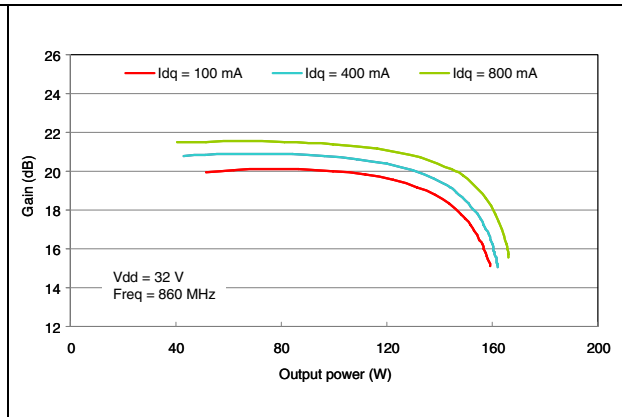
Typical performance

### 3 Typical performance

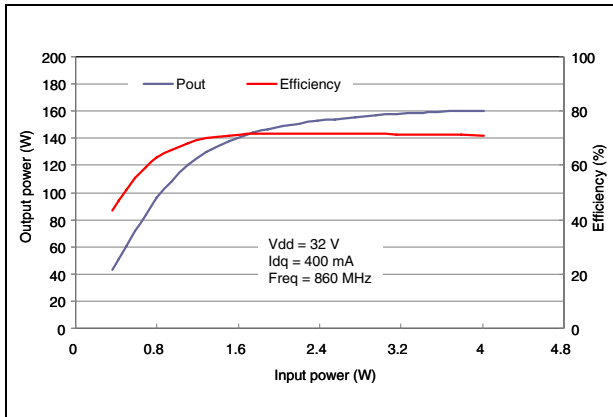
**Figure 2. Gain & efficiency vs. output power**



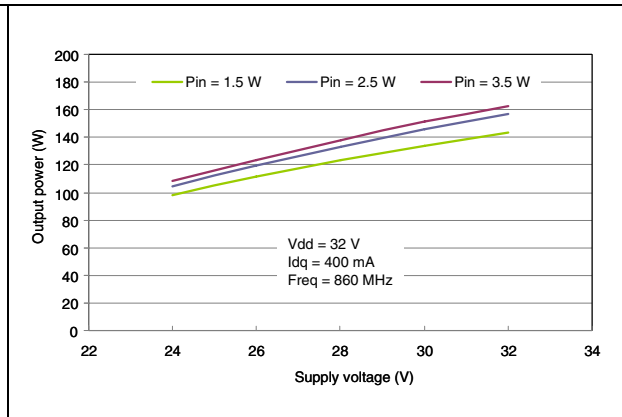
**Figure 3. Gain vs. output power & bias current**



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



**Figure 5. Output power vs. drain supply voltage**



## 4 Test circuit

Figure 6. Test circuit schematic - 860 MHz

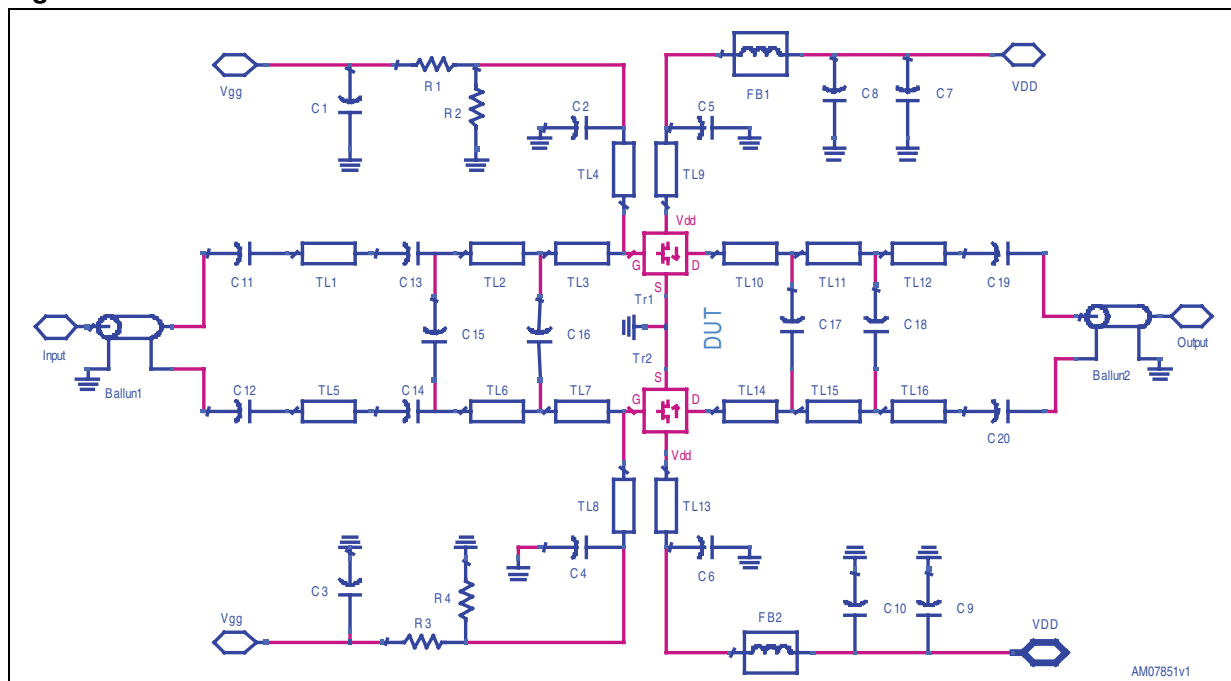


Table 7. Circuit component list

Item	Q.ty	Part number	Vender	Description
R1, R3	2	CR1206-8W-130JB	VENKEL	13 Ω, 1/8 W surface mount chip resistor
R2, R4	2	CR1206-8W-122JB	VENKEL	1.2 kΩ, 1/8 W surface mount chip resistor
R5, R6	2	CR1206-8W-250JB	VENKEL	25 Ω, 1/8 W surface mount chip resistor
B1, B2	2	2743021447	FAIR-RITE CORP	Surface mount EMI shield bead
C1, C3, C7, C9	4			100 μF, 63 V electrolytic capacitor
C2, C4, C5, C6	4	ATC100B910XXXX	ATC	91 pF chip capacitor
C8, C10	2	C1812X7R501-104KNE	VENKEL	0.1 F 500 V surface mount ceramic chip capacitor
C11, C12	2	ATC100B620XXXX	ATC	62 pF chip capacitor
C13, C14	2	ATC100B151XXXX	ATC	150 pF chip capacitor
C15	1	ATC100B110XXXX	ATC	11 pF chip capacitor
C16	1	ATC100B7R5XXXX	ATC	7.5 pF chip capacitor
C17	1	ATC100B1R1XXXX	ATC	1.1 pF chip capacitor
C18	1	27291PC	JOHANSON	0.8 - 8 pF giga trim variable capacitor

**LET9120**

**Test circuit**

**Table 7. Circuit component list (continued)**

Item	Q.ty	Part number	Vender	Description
C19, C20	2	ATC100B101XXXX	ATC	100 pF chip capacitor
TL1, TL5				L= 0.250in [6.35mm] W=0.214in [5.44mm]
TL2, TL6				L= 0.182in [4.62mm] W=0.284in [7.21mm]
TL3, TL7				L= 0.318in [8.08mm] W=0.284in [7.21mm]
TL4, TL8, TL9, TL13				L= 2.37in [60.19mm] W=0.082in [2.08mm]
TL10, TL14				L= 0.314in [7.97mm] W=0.230in [5.84mm]
TL11, TL15				L= 0.460in [11.68mm] W=0.230in [5.84mm]
TL12, TL16				L= 0.280in [7.11mm] W=0.230in [5.84mm]
Board 3X5	1		Rogers Corp	Er=2.55 t=0.0026in h=0.030in



## 5 Package mechanical data

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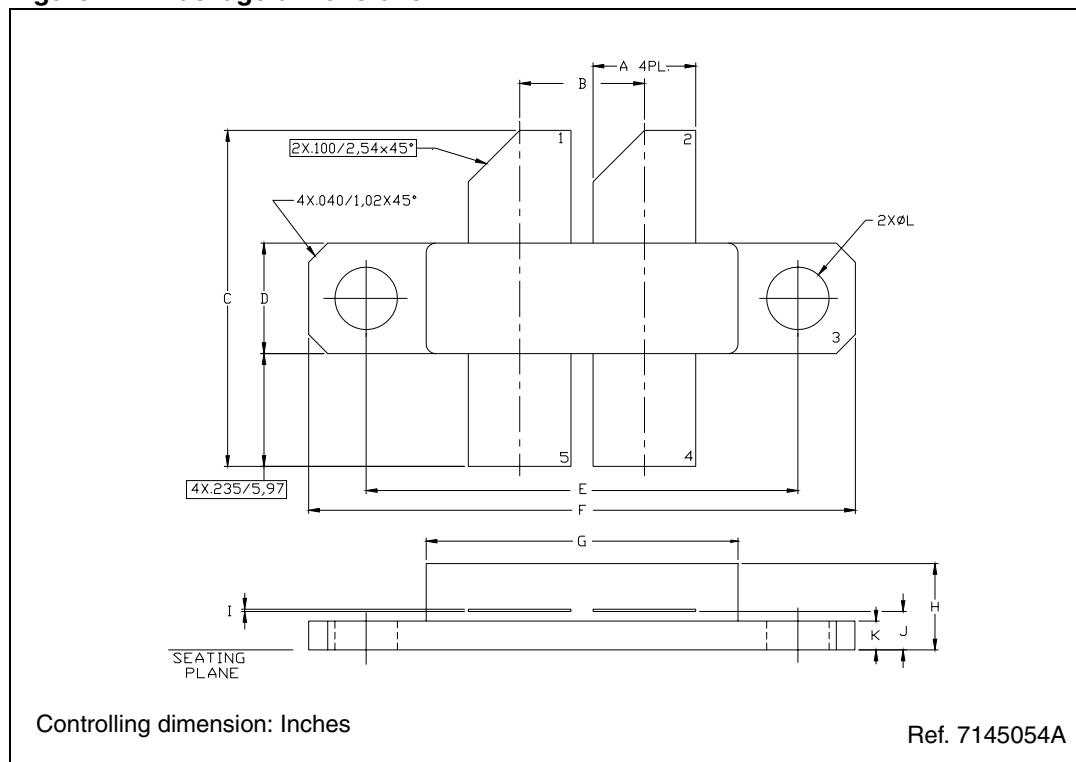
LET9120

Package mechanical data

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 7. Package dimensions



## 6 Revision history

**Table 9. Document revision history**

Date	Revision	Changes
10-Mar-2009	1	First Issue.
22-Jul-2009	2	Updated document's title.
18-Nov-2009	3	Updated $V_{GS}$ in <a href="#">Table 2</a> .
11-Feb-2010	4	Changed test condition for $V_{(BR)DSS}$ in <a href="#">Table 4: Static (per section)</a> .
22-Oct-2010	5	Added: <a href="#">Typical performance on page 5</a> and <a href="#">Test circuit on page 6</a> .

## LET9120

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