LET9045F

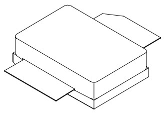
RF power transistor from the LdmoST family of n-channel enhancement-mode lateral MOSFETs

Features

- Excellent thermal stability
- Common source configuration
- POUT = 45 W with 18.5 dB gain @ 960 MHz
- BeO free package
- In compliance with the 2002/95/EC european directive

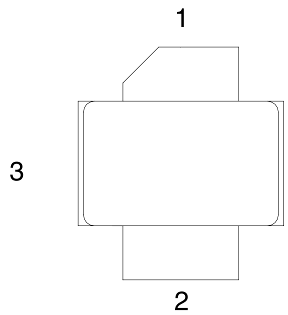
Description

The LET9045F 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 1.0 GHz. The LET9045F is designed for high gain and broadband performance operating in common source mode at 28 V. It is ideal for base station applications requiring high linearity.



M250
epoxy sealed

Figure 1. Pin out



1. Drain
2. Gate
3. Source

Table 1. Device summary

Order code	Package	Branding
LET9045F	M250	LET9045F

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 to +15	V
I_D	Drain current	9	A
P_{DISS}	Power dissipation (@ T_C = 70 °C)	108	W
T_J	Max. operating junction temperature	200	°C
T_{STG}	Storage temperature	-65 to +150	°C

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{th(JC)}$	Junction-case thermal resistance	1.2	°C/W

2 Electrical characteristics

$T_C = 25\ °C$

Table 4. Static

Symbol	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	$V_{GS} = 0$ V; $I_{DS} = 10$ mA	80			V
I_{DSS}	$V_{GS} = 0$ V; $V_{DS} = 28$ V			1	µA
I_{GSS}	$V_{GS} = 20$ V; $V_{DS} = 0$ V			1	µA
$V_{GS(Q)}$	$V_{DS} = 28$ V; $I_D = 300$ mA	2.0		5.0	V
$V_{DS(ON)}$	$V_{GS} = 10$ V; $I_D = 3$ A		0.9	1.2	V
G_{FS}	$V_{DS} = 10$ V; $I_D = 3$ A	2.5			mho
C_{ISS}	$V_{GS} = 0$ V; $V_{DS} = 28$ V; f = 1 MHz		58		pF
C_{OSS}	$V_{GS} = 0$ V; $V_{DS} = 28$ V; f = 1 MHz		29		pF
C_{RSS}	$V_{GS} = 0$ V; $V_{DS} = 28$ V; f = 1 MHz		0.8		pF

Table 5. Dynamic

Symbol	Test conditions	Min.	Typ.	Max.	Unit
P_{OUT}	$V_{DD} = 28$ V; $I_{DQ} = 300$ mA; $P_{IN} = 1$ W; f = 960 MHz	45	59		W
G_{PS}	$V_{DD} = 28$ V; $I_{DQ} = 300$ mA; $P_{IN} = 1$ W; f = 960 MHz	16.5	17.7		dB
h_D	$V_{DD} = 28$ V; $I_{DQ} = 300$ mA; $P_{IN} = 1$ W; f = 960 MHz	60	65		%
Load mismatch	$V_{DD} = 28$ V; $I_{DQ} = 300$ mA; $P_{IN} = 1$ W; f = 960 MHz All phase angles	10:1			VSWR

3 Impedance data

Figure 2. Impedance data

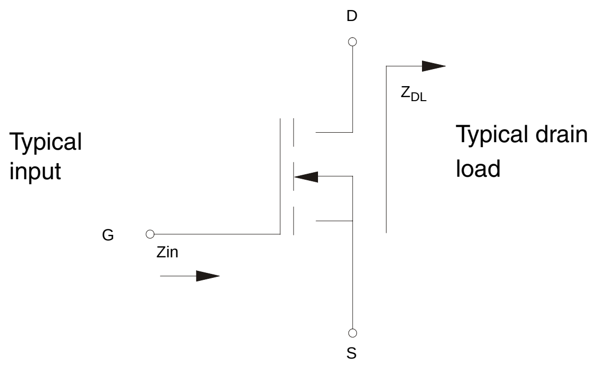


Table 6. Impedance data

Frequency	Z_{IN} (Ω)	Z_{DL} (Ω)
920	0.8 - j 0.08	5.3 + j 0.63
945	0.7 - j 0.4	5 + j 1.5
960	0.6 - j 0.6	4.7 + j 2

4 Typical performances

Figure 3. Gain vs output power and bias current, freq = 960 MHz, Vdd = 28 V

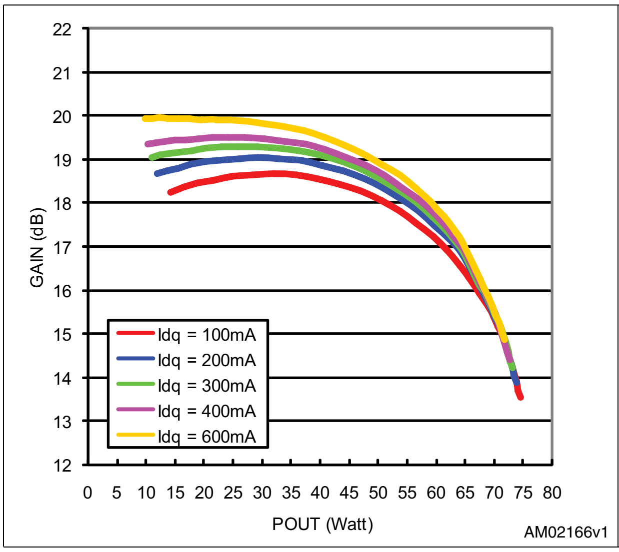


Figure 4. Gain and efficiency vs output power, freq = 960 MHz, Vdd = 28 V, Idq = 300 mA

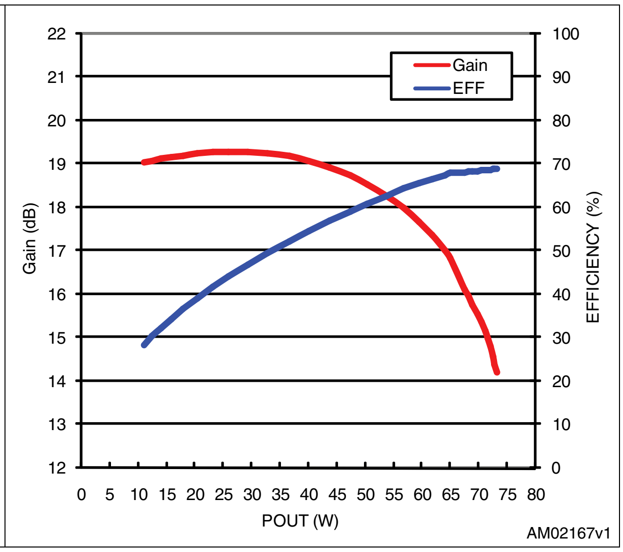
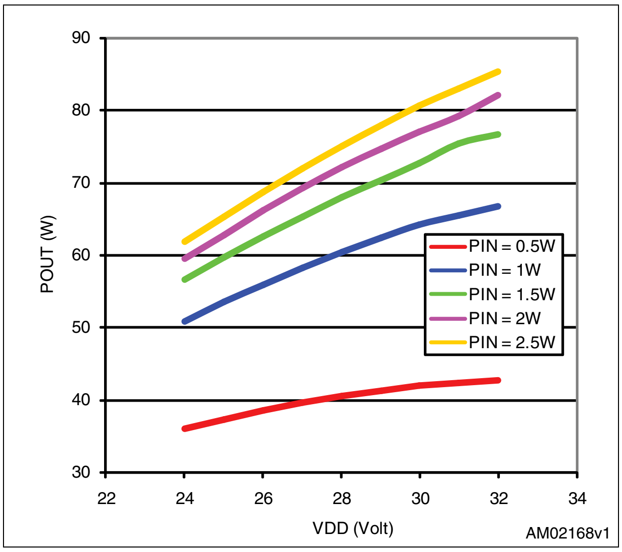


Table 7. Output power vs supply voltage freq = 960 MHz, Vdd = 28 V, Idq = 300 mA



5 Test circuit

Figure 5. Test circuit

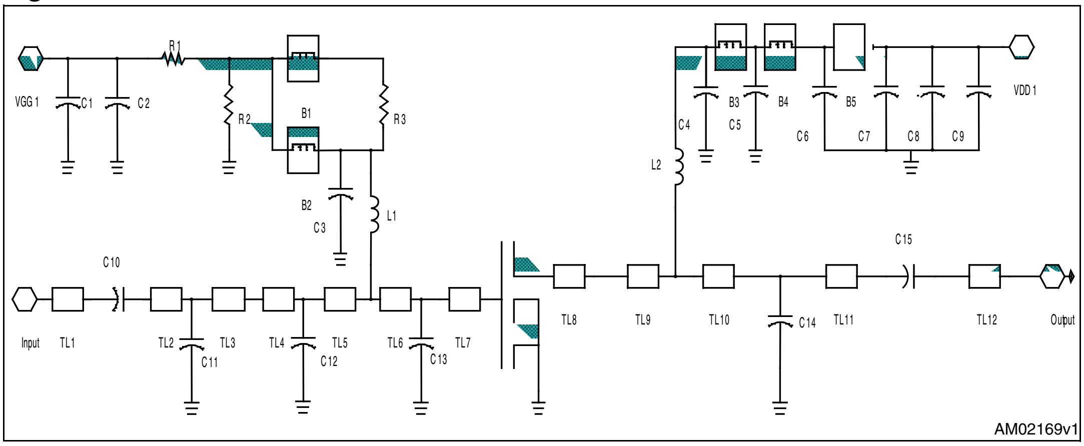


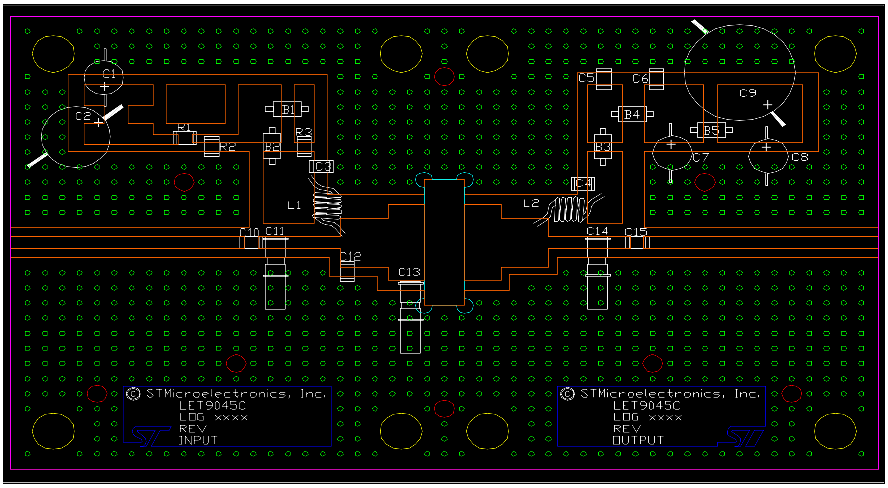
Table 8. LET9045F components list

Item	Qty	Part number	Vendor	Description
R1, R2	2	CR1206-8W-112JB	VENKEL	1.1 kΩ 1/8W surface mount chip resistor
R3	1	CR1206-8W-100JB	VENKEL	10 Ω 1/8W surface mount chip resistor
Coil	2		BELDEN	Inductor 5 turns air WOUND#20AWG ID =0.130 in (3.3 mm) bylon coated
B1,B2,B3,B4,B5	5	2743021447	FAIR-RITE CORP	Surface mount EMI sheild bead
C1,C7, C8	3	T491D106K035AT	Kemet	10 µF 35 V tantalum capacitors
C2	1			100 µF 63 V electrolytic capacitor
C3, C4, C10, C15	4	ATC100B470XXXX	ATC	47 pF chip capacitor
C5, C6	2	ATC200B393MW	ATC	39000 pF chip capacitor
C9	1			330 uF 50 V electrolytic capacitor
C11, C13, C14	3	27291PC	Johanson	0.8-8 pF giga trim variable capacitor
C12	1	ATC100B110XXXX	ATC	11 pF chip capacitor
TL1				L = 1.350in [34.29 mm] W = 0.082in [02.08 mm]
TL2				L = 0.144in [3.65 mm] W = 0.082in [02.08 mm]
TL3				L = 0.311in [7.91 mm] W = 0.082in [02.08 mm]
TL4				L = 00.82in [2.09 mm] W = 0.323in [08.21 mm]
TL5				L = 0.194 in [4.94 mm] W = 0.323in [08.21 mm]

Table 8. LET9045F components list (continued)

Item	Qty	Part number	Vendor	Description
TL6				L = 0.059in [1.49 mm] W= 0.506in [12.85 mm]
TL7				L = 0.144in [3.65 mm] W = 0.506in [12.85 mm]
TL8				L = 0.208in [5.28 mm] W = 0.506in [12.85 mm]
TL9				L = 0.275in [6.98 mm] W = 0.323in [08.21 mm]
TL10				L = 0.210in [5.33 mm] W = 0.082in [02.08 mm]
TL11				L = 0.260in [6.60 mm] W = 0.082in [02.08 mm]
TL12				L = 1.350in [34.29 mm] W = 0.082in [02.08 mm]
Board 3X5	1		Rogers corp	Er=2.55 t=0.0026in h=0.030in

Figure 6. Circuit layout



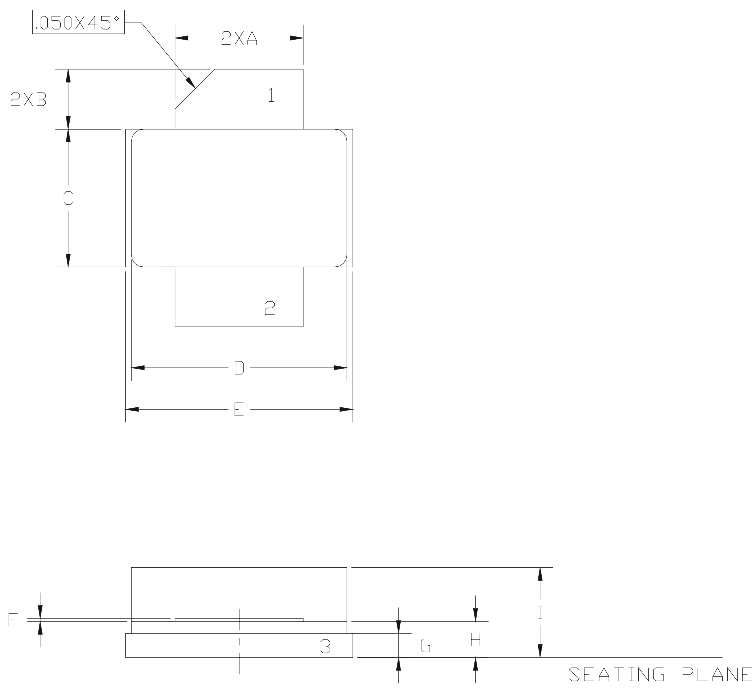
6 Package mechanical data

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 9. M250 (.230 x .360 2L N/HERM W/FLG) mechanical data

Dim.	mm.			Inch		
	Min	Typ	Max	Min	Typ	Max
A	5.21		5.71	0.205		0.225
B	2.16		2.92	0.085		0.115
C	5.59		6.09	0.220		0.240
D	8.89		9.40	0.350		0.370
E	9.40		9.91	0.370		0.390
F	0.11		0.15	0.004		0.006
G	0.89		1.14	0.035		0.045
H	1.45		1.70	0.057		0.067
I	2.67		3.94	0.105		0.155

Figure 7. Package dimensions



7 Revision history

Table 10. Document revision history

Date	Revision	Changes
02-Nov-2009	1	Initial release.
11-Feb-2010	2	Changed test condition for $V_{(BR)DSS}$ in *Table 4: Static*.