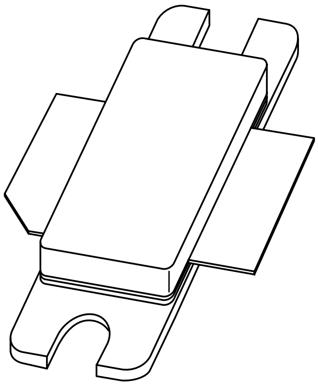
DATA SHEET



BLL1214-250
L-band radar LDMOS transistor

Product specification
Supersedes data of 2002 Aug 06

2003 Aug 29

Philips
Semiconductors

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L-band radar LDMOS transistor — BLL1214-250

FEATURES

- High power gain
- Easy power control
- Excellent ruggedness
- Source on mounting base eliminates DC isolators, reducing common mode inductance.

APPLICATIONS

- L-band radar applications in the 1200 to 1400 MHz frequency range.

DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS transistor encapsulated in a 2-lead flange package (SOT502A) with a ceramic cap. The common source is connected to the flange.

PINNING - SOT502A

PIN	DESCRIPTION
1	drain
2	gate
3	source, connected to flange

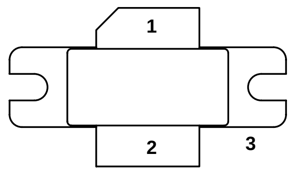


Fig.1 Simplified outline.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_p (dB)	η_D (%)	pulse droop (dB)	t_r (ns)	t_f (ns)
Pulsed class-AB; t_p = 1 ms; δ = 10%	1200 to 1400	36	150	250	>12	>42	<0.6	<100	<100

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	75	V
V_{GS}	gate-source voltage		–	±22	V
P_{tot}	total power dissipation	$T_h \leq 70$ °C; t_p = 1 ms; δ = 10%	–	400	W
T_{stg}	storage temperature		–65	150	°C
T_j	junction temperature		–	200	°C

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$Z_{th\ j-h}$	thermal impedance from junction to heatsink	T_h = 25 °C, note 1	0.17	K/W
$Z_{th\ j-h}$	thermal impedance from junction to heatsink	T_h = 25 °C, note 2	0.32	K/W

Notes

1. Thermal resistance is determined under RF operating conditions; t_p = 100 μs, δ = 10%.
2. Thermal resistance is determined under RF operating conditions; t_p = 1 ms, δ = 10%.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 3 mA	75	–	–	V
V_{GSth}	gate-source threshold voltage	V_{DS} = 10 V; I_D = 300 mA	4	–	5	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 36 V	–	–	1	μA
I_{DSX}	on-state drain current	V_{GS} = V_{GSth} + 9 V; V_{DS} = 10 V	45	–	–	A
I_{GSS}	gate leakage current	V_{GS} = ±20 V; V_{DS} = 0	–	–	1	μA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 10 A	–	9	–	S
R_{DSon}	drain-source on-state resistance	V_{GS} = 9 V; I_D = 10 A	–	60	–	mΩ

APPLICATION INFORMATION

RF performance in a common source class-AB circuit. T_h = 25 °C; $Z_{th\ mb-h}$ = 0.25 K/W, unless otherwise specified.

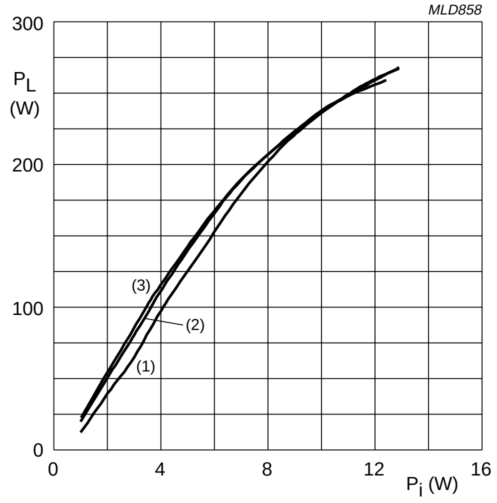
MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_p (dB)	η_D (%)	pulse droop (dB)	t_r (ns)	t_f (ns)
Pulsed class-AB; t_p = 1 ms; δ = 10%	1200 to 1400	36	150	250	>12	>42	<0.6	<100	<100

Ruggedness in class-AB operation

The BLL1214-250 is capable of withstanding a load mismatch corresponding to VSWR = 3 : 1 through all phases under the following conditions: V_{DS} = 36 V; frequency from 1200 MHz to 1400 MHz at rated load power.

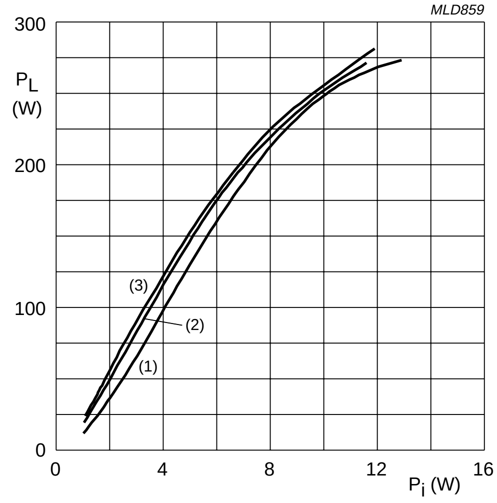
Typical impedance

FREQUENCY (GHZ)	Z_S (Ω)	Z_L (Ω)
1.20	1.3 – j 2.8	1.1 – j 0.9
1.25	1.9 – j 2.9	1.0 – j 0.5
1.30	4.6 – j 2.9	0.8 – j 0.2
1.35	5.7 – j 0.3	0.7 – j 0.3
1.40	2.7 – j 1.8	0.6 – j 0.4



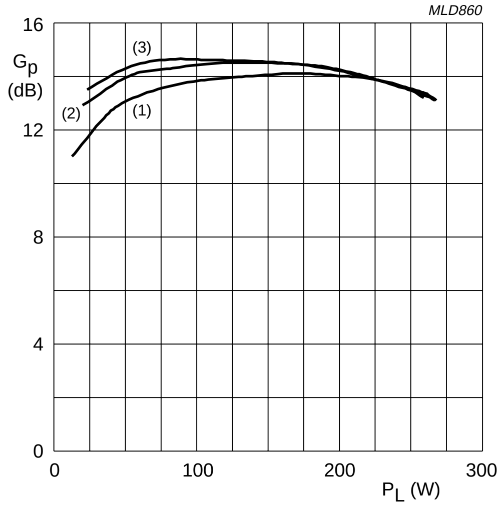
(1) f = 1.2 GHz. (2) f = 1.3 GHz. (3) f = 1.4 GHz.
t_p = 1 ms; δ = 10%.

Fig.2 Load power as function of input power; typical values.



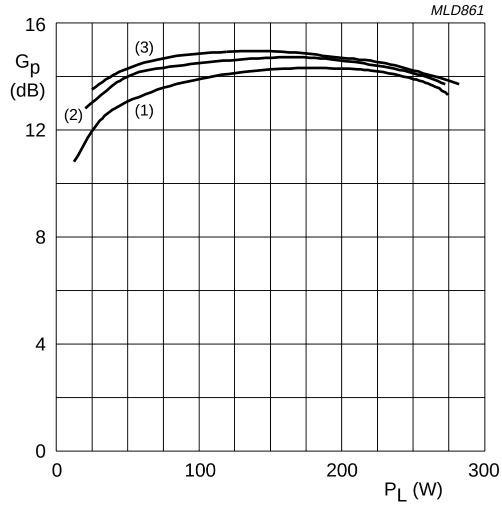
(1) f = 1.2 GHz. (2) f = 1.3 GHz. (3) f = 1.4 GHz.
t_p = 100 µs; δ = 10%.

Fig.3 Load power as function of input power; typical values.



(1) f = 1.2 GHz. (2) f = 1.3 GHz. (3) f = 1.4 GHz.
t_p = 1 ms; δ = 10%.

Fig.4 Power gain as function of load power; typical values.



(1) f = 1.2 GHz. (2) f = 1.3 GHz. (3) f = 1.4 GHz.
t_p = 100 µs; δ = 10%.

Fig.5 Power gain as function of load power; typical values.

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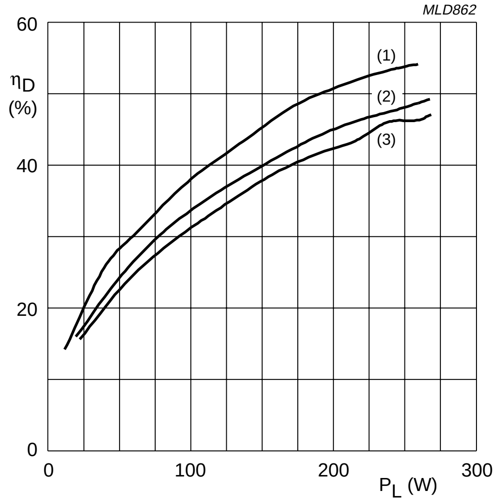
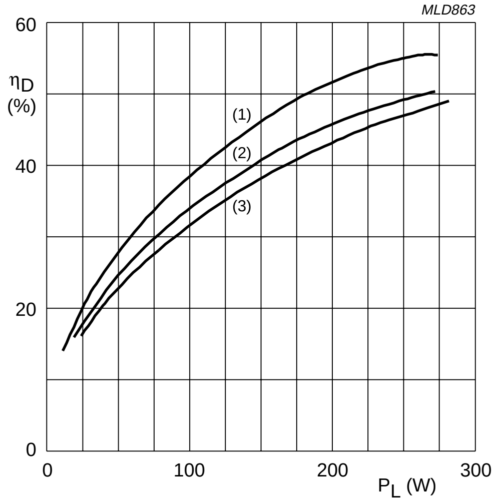


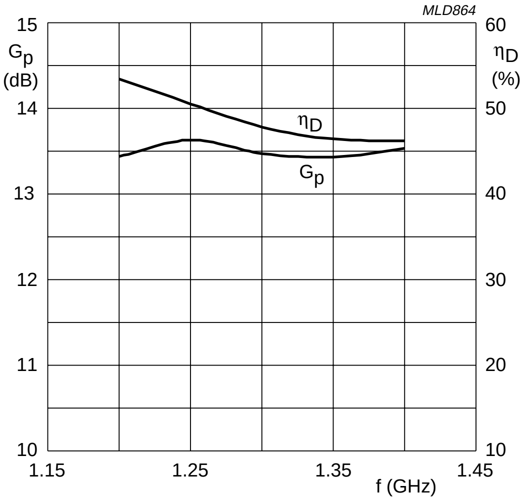
(1) f = 1.2 GHz. (2) f = 1.3 GHz. (3) f = 1.4 GHz.
t_p = 1 ms; δ = 10%.

Fig.6 Efficiency as function of load power; typical values.



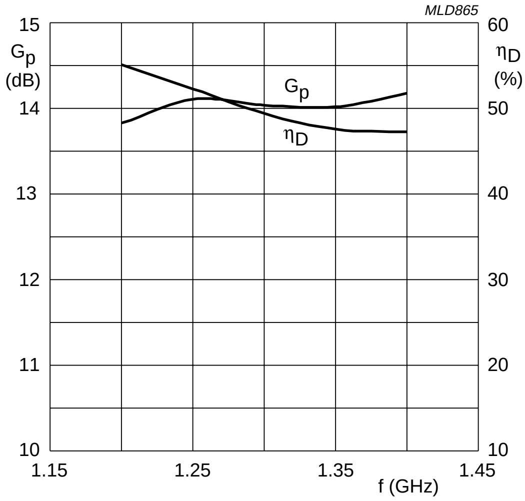
(1) f = 1.2 GHz. (2) f = 1.3 GHz. (3) f = 1.4 GHz.
t_p = 100 μs; δ = 10%.

Fig.7 Efficiency as function of load power; typical values.



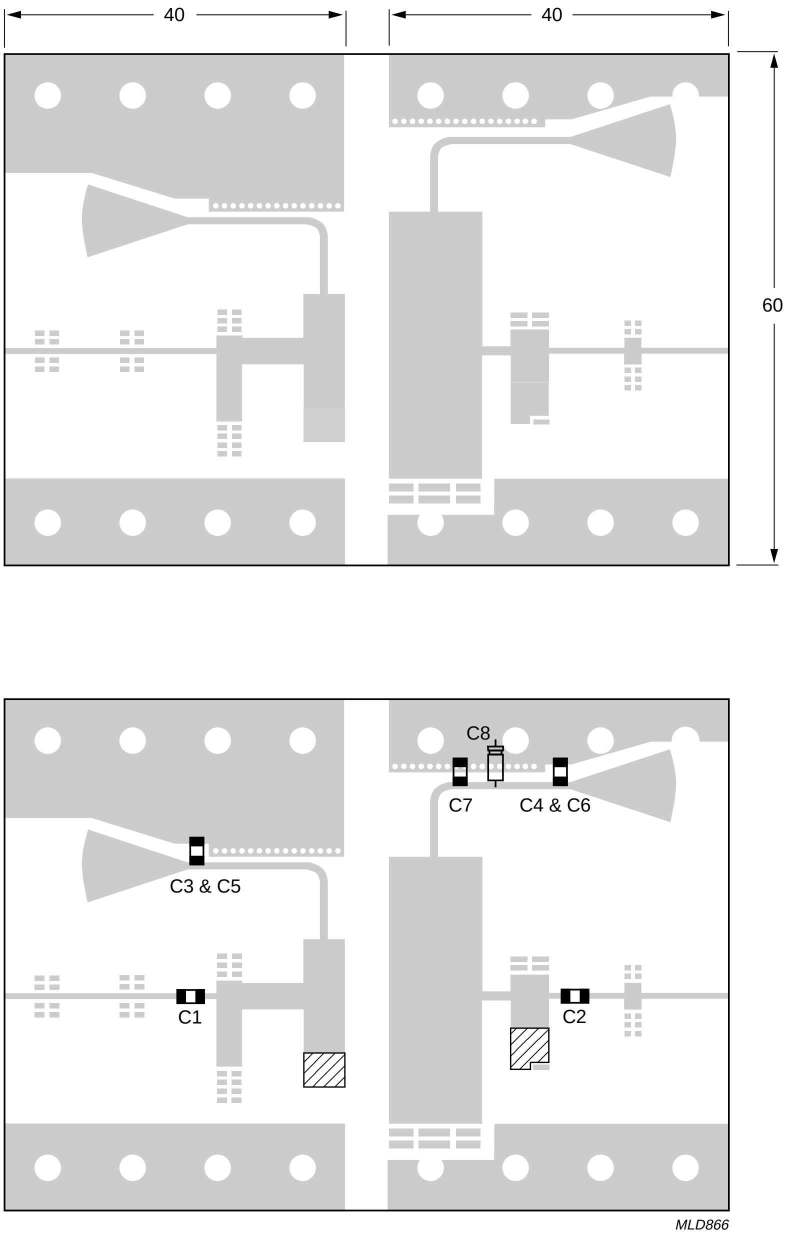
t_p = 1 ms; δ = 10%.

Fig.8 Power gain and drain efficiency as functions of frequency; typical values.



t_p = 100 μs; δ = 10%.

Fig.9 Power gain and drain efficiency as functions of frequency; typical values.



Dimensions in mm.

Hatched area indicates standard tuning.
The components are situated on one side of the copper-clad Rodgers Duroid 6010 printed-circuit board (ε_r = 10.2, thickness = 0.64 mm).
The other side is unetched and serves as a ground plane.

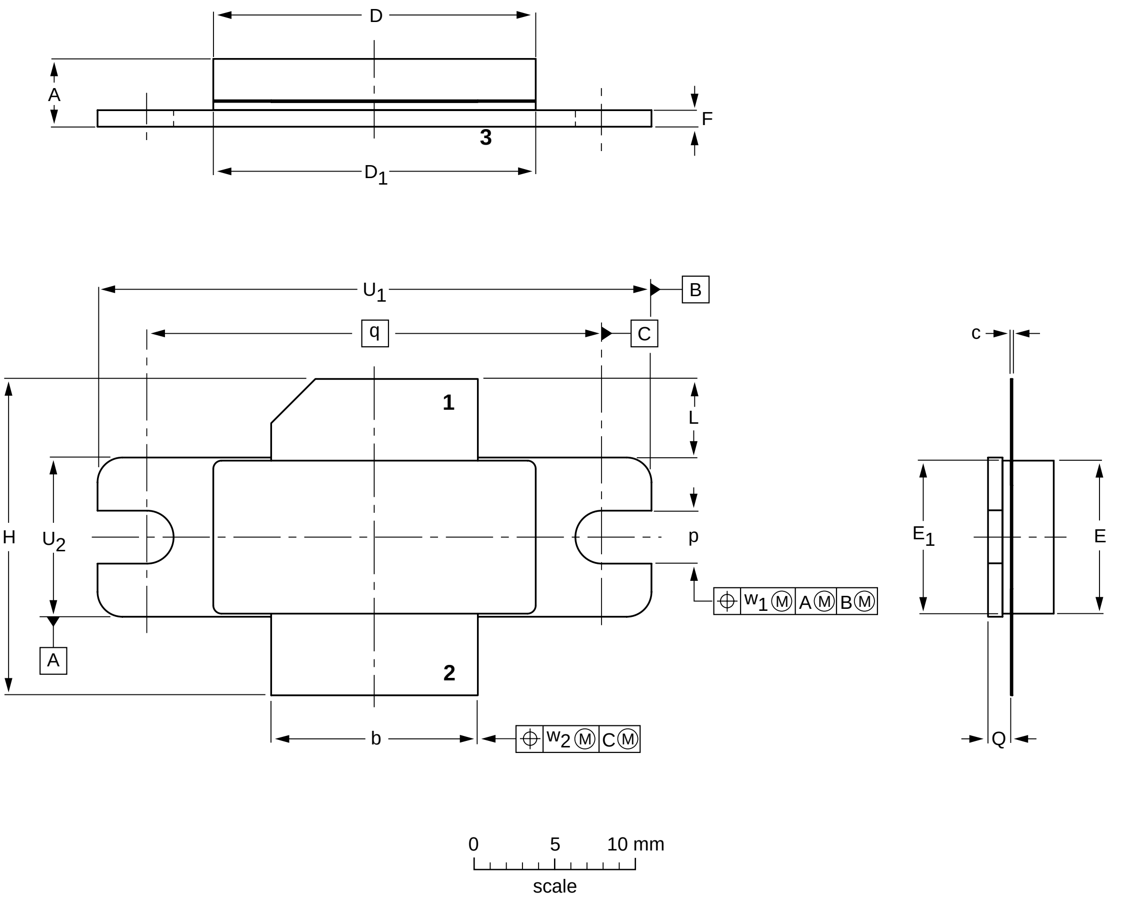
Fig.10 Component layout.

List of components (see Fig.10**)**

COMPONENT	DESCRIPTION	VALUE	CATALOGUE NO.
C1, C3	capacitor	39 pF	ATC100A
C2, C4	capacitor	47 pF	ATC100A
C5, C6	capacitor	20 nF	ATC200B
C7	capacitor	36 pF	ATC200B
C8	electrolytic capacitor	100 μF; 100 V	

PACKAGE OUTLINE

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads **SOT502A**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	p	Q	q	U_1	U_2	w_1	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	3.38 3.12	1.70 1.45	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.133 0.123	0.067 0.057	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502A						~~99-12-28~~ 03-01-10

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS(1)	PRODUCT STATUS(2)(3)	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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