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Ampleon

## 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

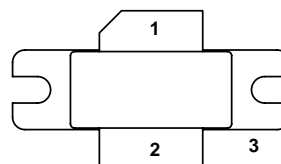
- L-band radar applications in the 1200 to 1400 MHz frequency range.

## 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



Top view

MBK394

Fig.1 Simplified outline.

## QUICK REFERENCE DATA

RF performance at  $T_h = 25\text{ °C}$  in a common source test circuit.

MODE OF OPERATION	f (MHz)	$V_{DS}$ (V)	$I_{DQ}$ (mA)	$P_L$ (W)	$G_p$ (dB)	$\eta_D$ (%)	pulse droop (dB)	$t_r$ (ns)	$t_f$ (ns)
Pulsed class-AB; $t_p = 1\text{ ms}$ ; $\delta = 10\%$	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		–	$\pm 22$	V
$P_{tot}$	total power dissipation	$T_h \leq 70\text{ °C}$ ; $t_p = 1\text{ ms}$ ; $\delta = 10\%$	–	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.

## L-band radar LDMOS transistor

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## THERMAL CHARACTERISTICS

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

## Notes

1. Thermal resistance is determined under RF operating conditions;  $t_p = 100\ \mu\text{s}$ ,  $\delta = 10\%$ .
2. Thermal resistance is determined under RF operating conditions;  $t_p = 1\ \text{ms}$ ,  $\delta = 10\%$ .

## CHARACTERISTICS

$T_j = 25\ ^\circ\text{C}$  unless otherwise specified.

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

## APPLICATION INFORMATION

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

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

## Ruggedness in class-AB operation

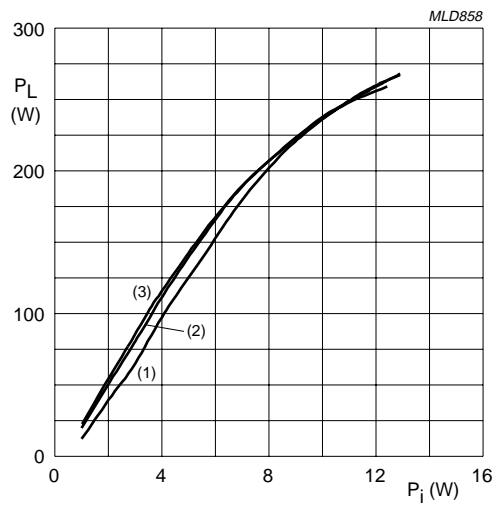
The BLL1214-250 is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 3 : 1$  through all phases under the following conditions:  $V_{DS} = 36\ \text{V}$ ; frequency from 1200 MHz to 1400 MHz at rated load power.

## Typical impedance

FREQUENCY (GHz)	$Z_S$ ( $\Omega$ )	$Z_L$ ( $\Omega$ )
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	$2.7 - j\ 1.8$	$0.6 - j\ 0.4$

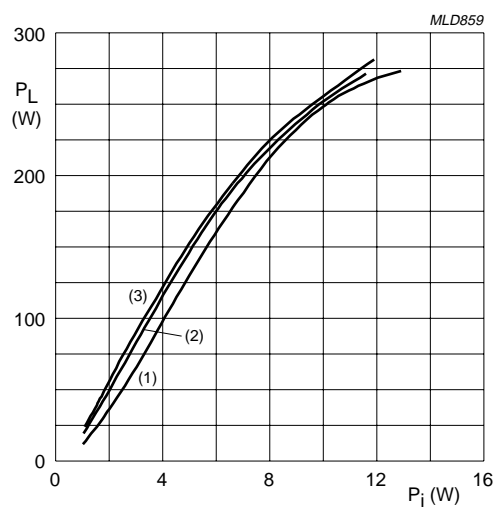
## L-band radar LDMOS transistor

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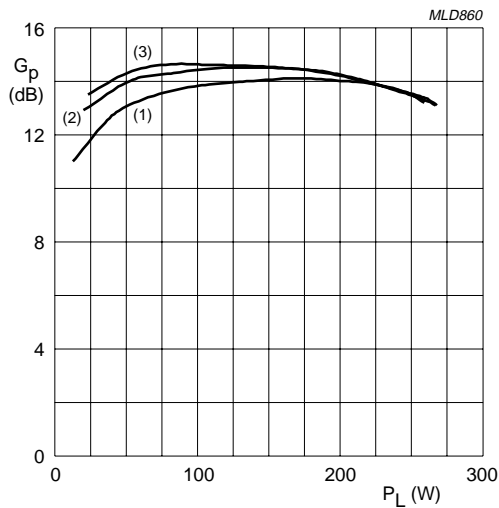
(1)  $f = 1.2$  GHz. (2)  $f = 1.3$  GHz. (3)  $f = 1.4$  GHz.  
 $t_p = 1$  ms;  $\delta = 10\%$ .

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



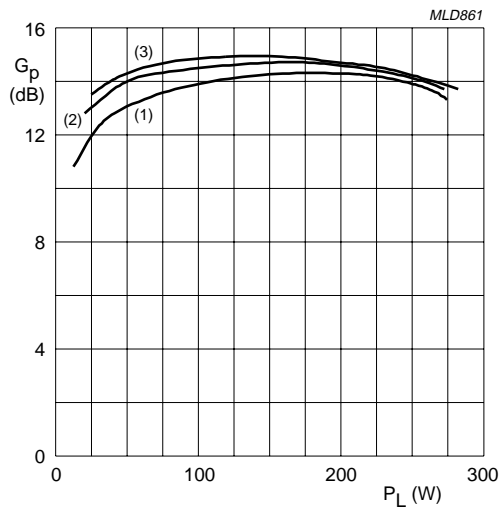
(1)  $f = 1.2$  GHz. (2)  $f = 1.3$  GHz. (3)  $f = 1.4$  GHz.  
 $t_p = 100$   $\mu$ s;  $\delta = 10\%$ .

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;  $\delta = 10\%$ .

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.  
 $t_p = 100$   $\mu$ s;  $\delta = 10\%$ .

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

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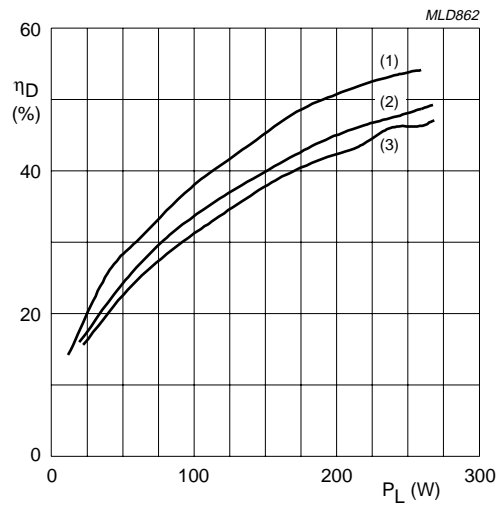


Fig.6 Efficiency as function of load power; typical values.

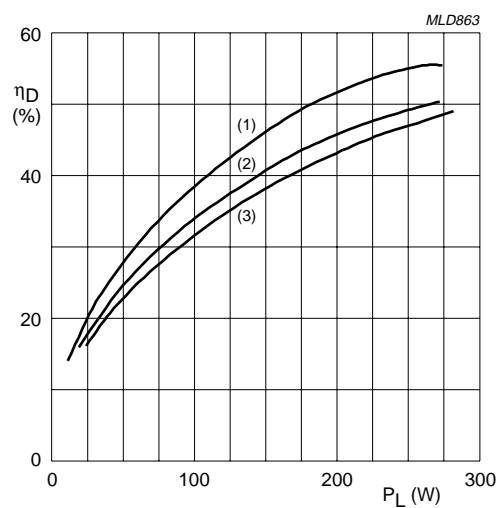


Fig.7 Efficiency as function of load power; typical values.

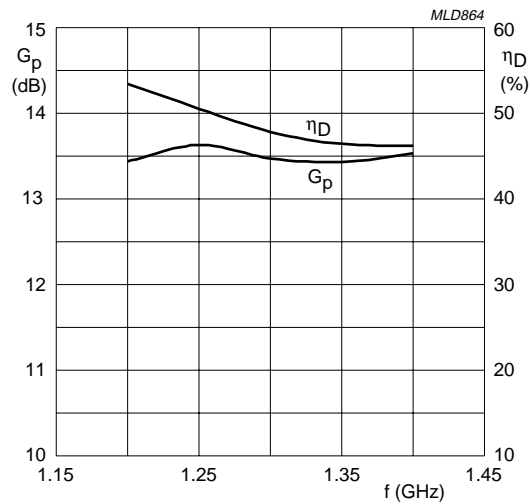


Fig.8 Power gain and drain efficiency as functions of frequency; typical values.

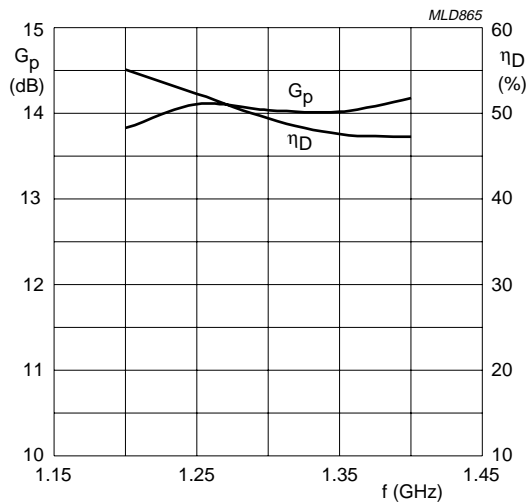
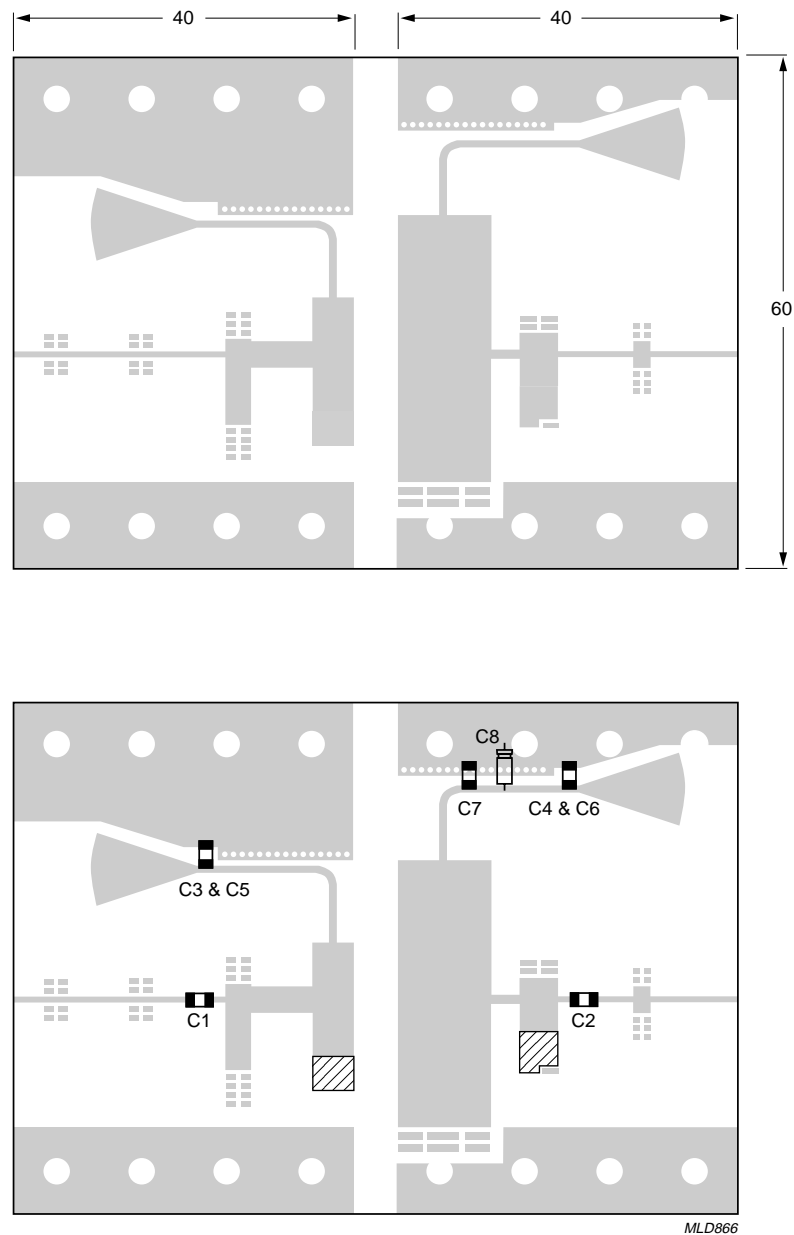


Fig.9 Power gain and drain efficiency as functions of frequency; typical values.

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Dimensions in mm.

Hatched area indicates standard tuning.

The components are situated on one side of the copper-clad Rogers Duroid 6010 printed-circuit board ( $\epsilon_r = 10.2$ , thickness = 0.64 mm).

The other side is unetched and serves as a ground plane.

Fig.10 Component layout.

## L-band radar LDMOS transistor

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**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 $\mu$ F; 100 V	

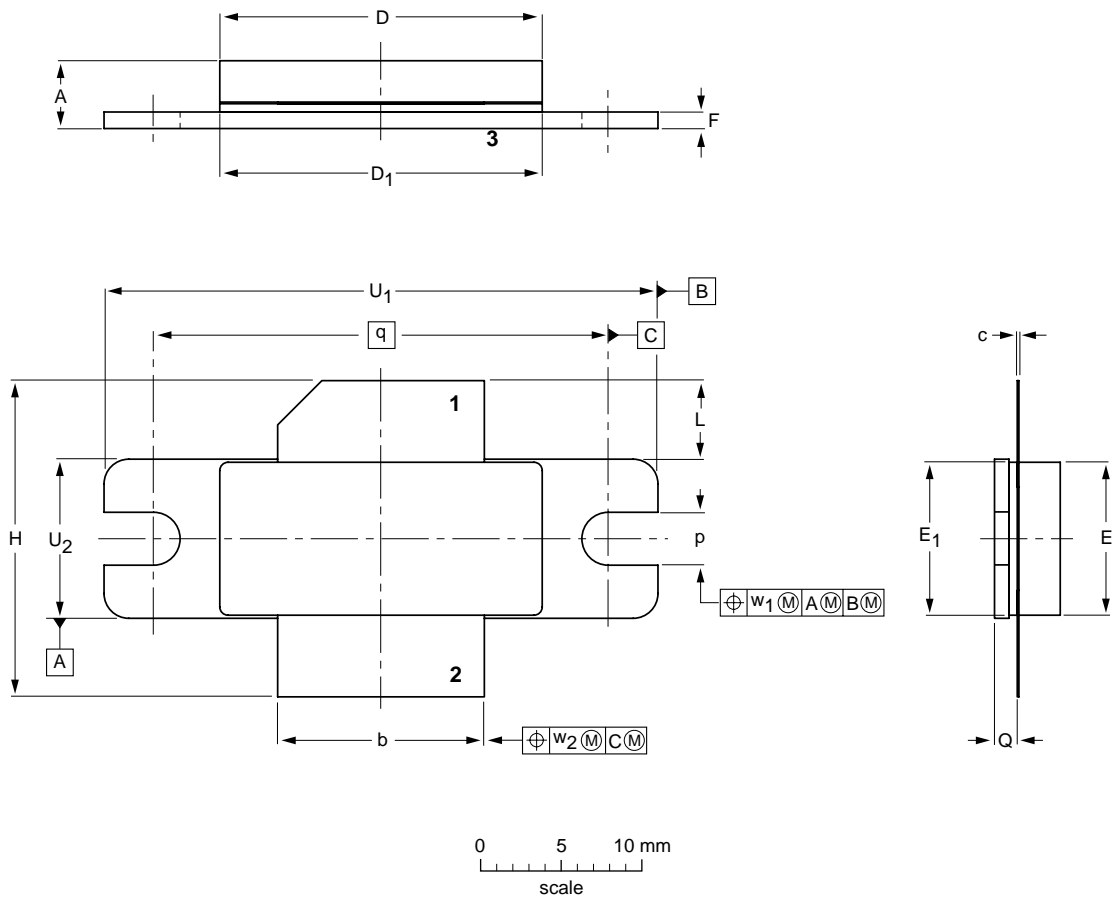
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PACKAGE OUTLINE

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 <sub>1</sub>	E	E <sub>1</sub>	F	H	L	p	Q	q	U <sub>1</sub>	U <sub>2</sub>	w <sub>1</sub>	w <sub>2</sub>
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						<del>99-12-28</del> 03-01-10



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## DATA SHEET STATUS

LEVEL	DATA SHEET STATUS <sup>(1)</sup>	PRODUCT STATUS <sup>(2)(3)</sup>	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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