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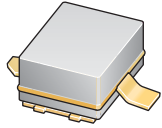
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BLA1011-2

Avionics LDMOS transistor

Rev. 7 — 1 September 2015

AMMPLION

Product data sheet

1. Product profile

1.1 General description

Silicon N-channel enhancement mode LDMOS transistor encapsulated in a 2-lead flangeless package (SOT538A) with a ceramic cap. The common source is connected to the mounting base.

Table 1. Typical performance

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

Mode of operation	f (MHz)	V _{DS} (V)	P _L (W)	G _p (dB)
Pulsed class-AB; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$	1030 to 1090	36	2	>16

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features and benefits

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

1.3 Applications

- Avionics applications in the 1030 to 1090 MHz frequency range.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source, connected to mounting base		

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BLA1011-2	-	ceramic surface mounted package; 2 leads	SOT538A

4. Limiting values

Table 4. 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		-	± 15	V
I_D	drain current (DC)		-	2.2	A
P_{tot}	total power dissipation	$T_h \leq 25\text{ °C}$		10	W
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		-	200	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-mb)}$	thermal impedance from junction to mounting base		[1] 1	K/W
$R_{th(mb-h)}$	thermal resistance from mounting base to heatsink		[2] 6.5	K/W

[1] Thermal impedance is determined under RF operating conditions with pulsed bias and $T_h = 25\text{ °C}$.

[2] Typical value for mounting on PCB with 32 0.4 mm thermal vias with 20 μm tin plating and thermal compound between PCB and heatsink.

6. Characteristics

Table 6. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0$; $I_D = 0.2\text{ mA}$	75	-	-	V
V_{GSth}	gate-source threshold voltage	$V_{DS} = 10\text{ V}$; $I_D = 20\text{ mA}$	2	-	5	V
I_{DSS}	drain-source leakage current	$V_{GS} = 0$; $V_{DS} = 26\text{ V}$	-	-	0.1	mA
I_{DSX}	on-state drain current	$V_{GS} = V_{GSth} + 9\text{ V}$; $V_{DS} = 10\text{ V}$	2.8	-	-	A
I_{GSS}	gate leakage current	$V_{GS} = \pm 15\text{ V}$; $V_{DS} = 0$	-	-	40	nA

Table 6. Characteristics ...continued
 $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 0.75\text{ A}$	-	0.5	-	S
R_{DSon}	drain-source on-state resistance	$V_{GS} = 10\text{ V}; I_D = 0.75\text{ A}$	-	1.2	-	Ω
C_{is}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 26\text{ V}; f = 1\text{ MHz}$	-	11	-	pF
C_{os}	output capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 26\text{ V}; f = 1\text{ MHz}$	-	9	-	pF
C_{rs}	feedback capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 26\text{ V}; f = 1\text{ MHz}$	-	0.5	-	pF

7. Application information

Table 7. RF performance in a common source class-AB circuit
 $T_h = 25\text{ }^\circ\text{C}; R_{th\ mb-h} = 6.5\text{ K/W}$ unless otherwise specified.

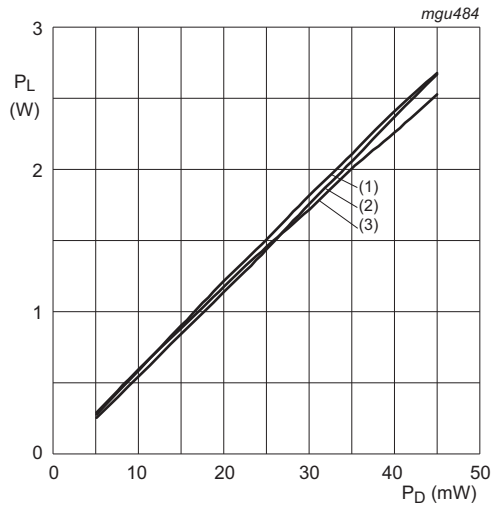
Mode of operation	f	V_{DS}	I_{DQ}	P_L	G_p	t_r	t_f	Pulse droop
	(MHz)	(V)	(mA)	(W)	(dB)	(ns)	(ns)	(dB)
Pulsed class-AB; $t_p = 50\text{ }\mu\text{s}; \delta = 2\%$	1030 to 1090	36	50	2	>16	<15	<15	<0.5

7.1 Ruggedness in class-AB operation

The BLA1011-2 is capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the operating conditions.

Table 8. Typical impedance values

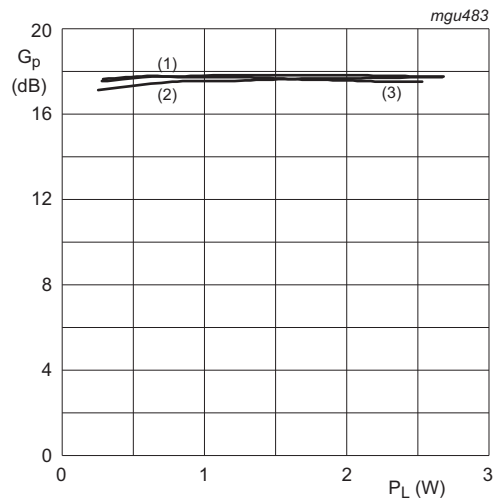
Frequency (MHz)	Z_S (Ω)	Z_L (Ω)
1030	$1.51 + j\ 11.76$	$6.9 + j\ 5$
1060	$1.51 + j\ 11.26$	$6.7 + j\ 5.9$
1090	$1.52 + j\ 10.77$	$5.1 + j\ 6.6$



$T_h = 25\text{ }^\circ\text{C}$; $V_{DS} = 36\text{ V}$; $I_{DQ} = 50\text{ mA}$; class-AB; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$.

- (1) $f = 1060\text{ MHz}$.
- (2) $f = 1030\text{ MHz}$.
- (3) $f = 1090\text{ MHz}$.

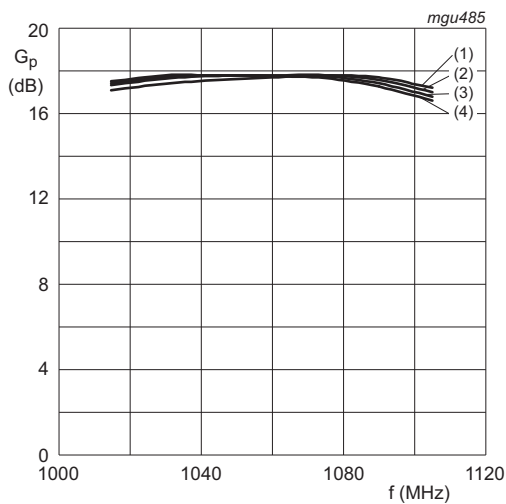
Fig 1. Load power as a function of drive power; typical values.



$T_h = 25\text{ }^\circ\text{C}$; $V_{DS} = 36\text{ V}$; $I_{DQ} = 50\text{ mA}$; class-AB; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$.

- (1) $f = 1060\text{ MHz}$.
- (2) $f = 1030\text{ MHz}$.
- (3) $f = 1090\text{ MHz}$.

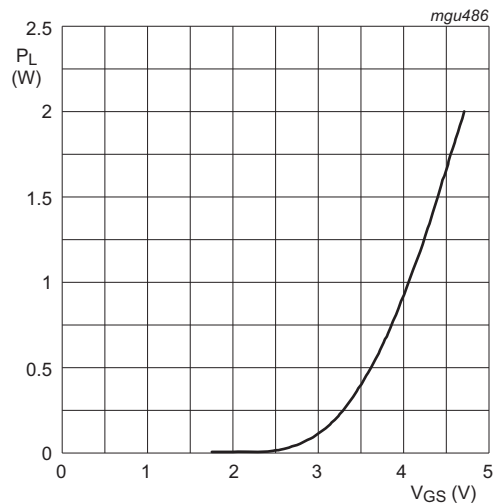
Fig 2. Power gain as a function of load power; typical values.



$T_h = 25\text{ }^\circ\text{C}$; $V_{DS} = 36\text{ V}$; $I_{DQ} = 50\text{ mA}$; class-AB; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$.

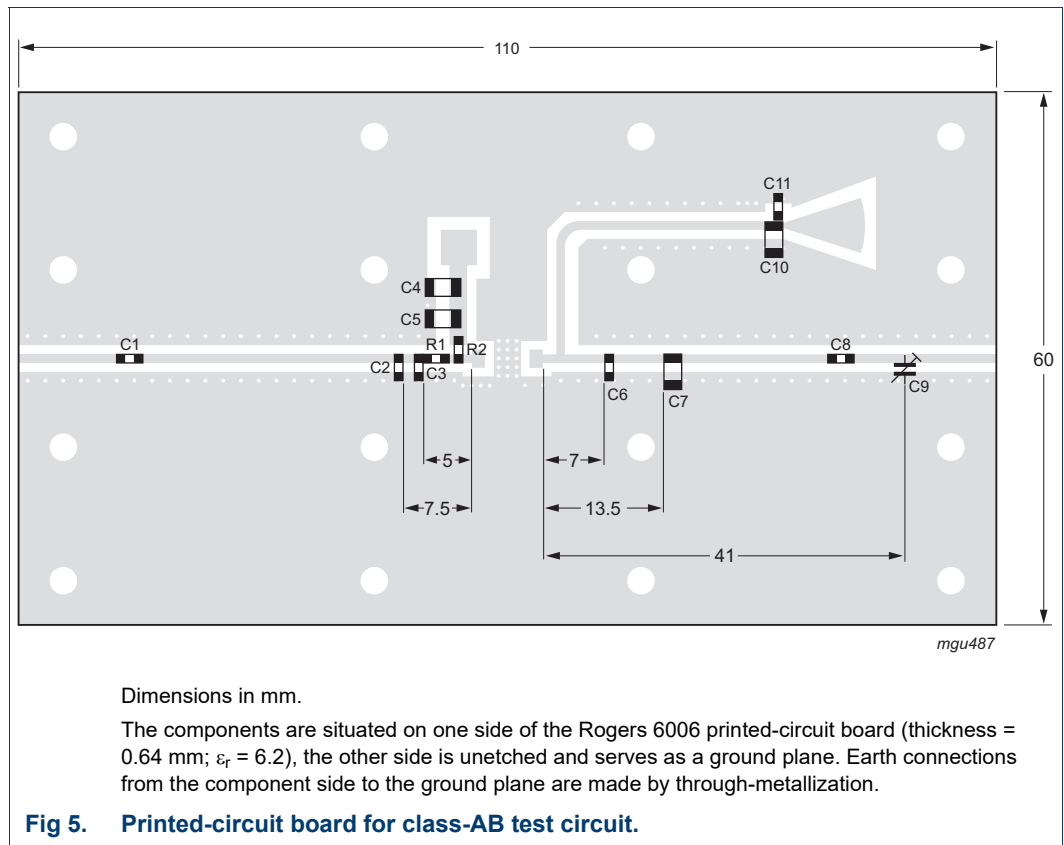
- (1) $P_L = 1\text{ W}$.
- (2) $P_L = 2\text{ W}$.
- (3) $P_L = 3\text{ W}$.
- (4) $P_L = 4\text{ W}$.

Fig 3. Power gain as a function of frequency; typical values.



$T_h = 25\text{ }^\circ\text{C}$; $V_{DS} = 36\text{ V}$; $I_{DQ} = 50\text{ mA}$; class-AB; $f = 1090\text{ MHz}$; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$.

Fig 4. Load power as a function of gate-source voltage; typical values.



8. Test information

Table 9. List of components for class-AB test circuit
(see [Figure 5](#))

Component	Description	Value
C1, C8	multilayer ceramic chip capacitor	[1] 56 pF
C2	multilayer ceramic chip capacitor	[1] 7.5 pF
C3	multilayer ceramic chip capacitor	[1] 1.8 pF
C4, C10	multilayer ceramic chip capacitor	[2] 20 nF
C5	multilayer ceramic chip capacitor	[3] 33 pF
C6	multilayer ceramic chip capacitor	[1] 5.6 pF
C7	multilayer ceramic chip capacitor	[3] 6.2 pF
C9	tekelec trimmer; type 37283	0.4 to 2.5 pF
C11	multilayer ceramic chip capacitor	[1] 33 pF
R1	SMD resistor	2.2 Ω (2 in parallel)
R2	SMD resistor	22 Ω

[1] American Technical Ceramics type 100A or capacitor of same quality.

[2] American Technical Ceramics type 200B or capacitor of same quality.

[3] American Technical Ceramics type 100B or capacitor of same quality.

9. Package outline

Ceramic surface-mounted package; 2 leads

SOT538A

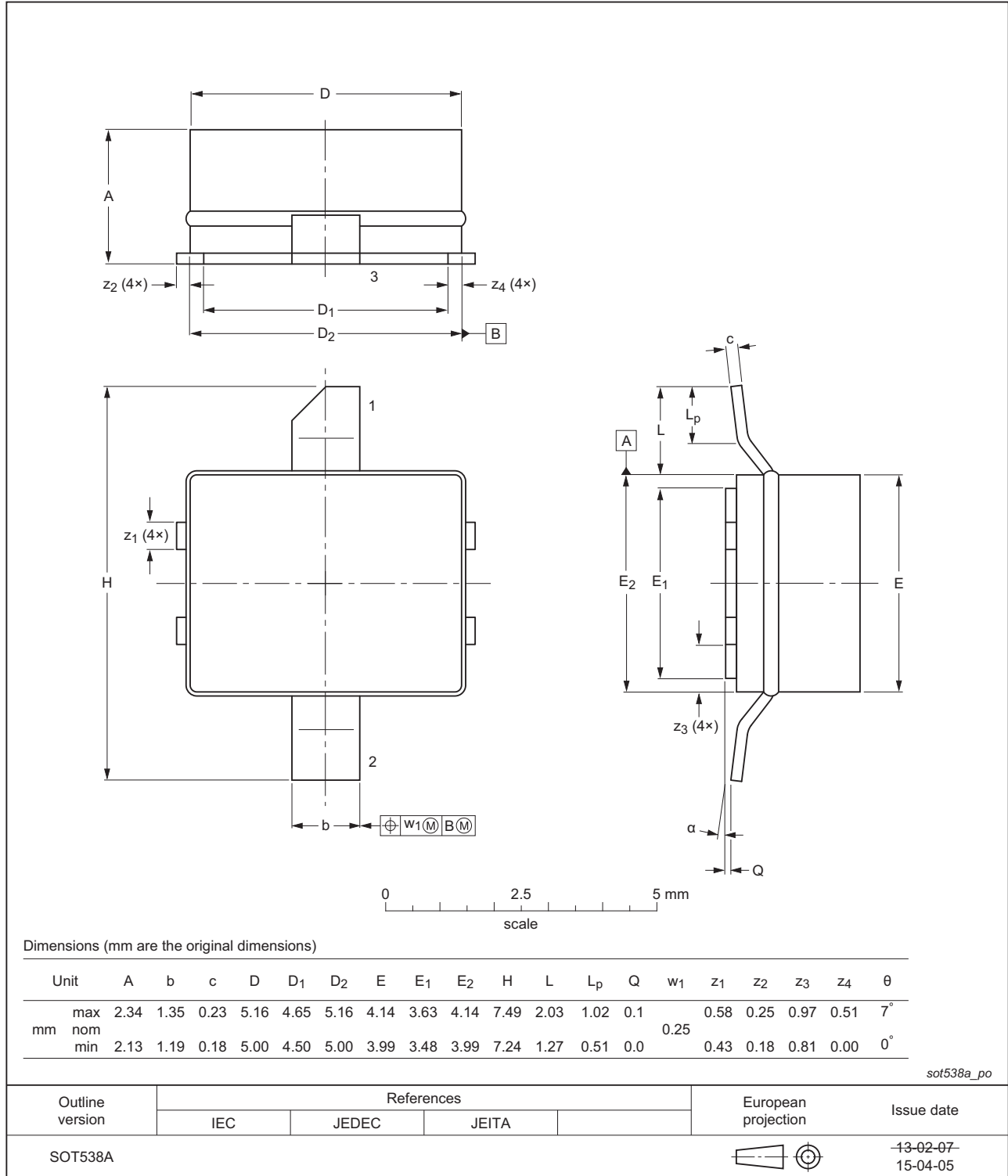


Fig 6. Package outline SOT538A

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLA1011-2#7	20150901	Product data sheet	-	BLA1011-2 v.6
Modifications:	<ul style="list-style-type: none">• The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.• Legal texts have been adapted to the new company name where appropriate.			
BLA1011-2 v.6	20130506	Product data sheet	-	BLA1011-2 v.5
BLA1011-2 v.5	20031119	Product specification	-	BLA1011-2 v.4

11. Legal information

11.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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13. Contents

1	Product profile	1
1.1	General description	1
1.2	Features and benefits	1
1.3	Applications	1
2	Pinning information	1
3	Ordering information	2
4	Limiting values	2
5	Thermal characteristics	2
6	Characteristics	2
7	Application information	3
7.1	Ruggedness in class-AB operation	3
8	Test information	5
9	Package outline	6
10	Revision history	7
11	Legal information	8
11.1	Data sheet status	8
11.2	Definitions	8
11.3	Disclaimers	8
11.4	Trademarks	9
12	Contact information	9
13	Contents	10

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