

# BLA1011-2

Avionics LDMOS transistor

Rev. 6 — 6 May 2013

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

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (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

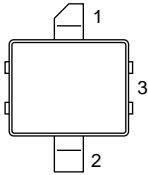
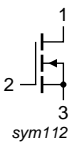
- High power gain
- Easy power control
- Excellent ruggedness
- Source on mounting base eliminates DC isolators, reducing common mode inductance.

### 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  $\mu\text{m}$  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	-	$\Omega$
$C_{is}$	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.

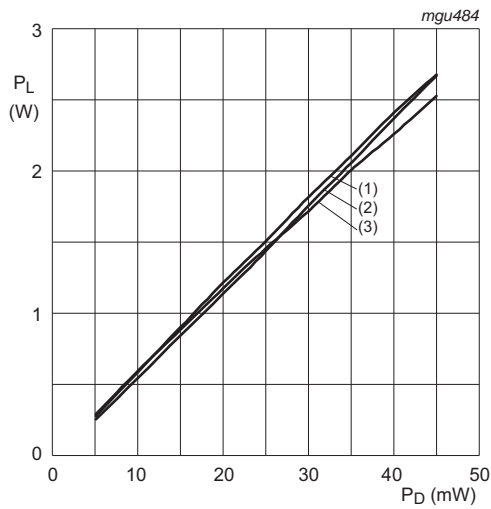
Mode of operation	f	$V_{DS}$	$I_{DQ}$	$P_L$	$G_p$	$t_r$	$t_f$	Pulse droop
	(MHz)	(V)	(mA)	(W)	(dB)	(ns)	(ns)	(dB)
Pulsed class-AB; $t_p = 50\text{ }\mu\text{s}; \delta = 2\%$	1030 to 1090	36	50	2	>16	<15	<15	<0.5

### 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**

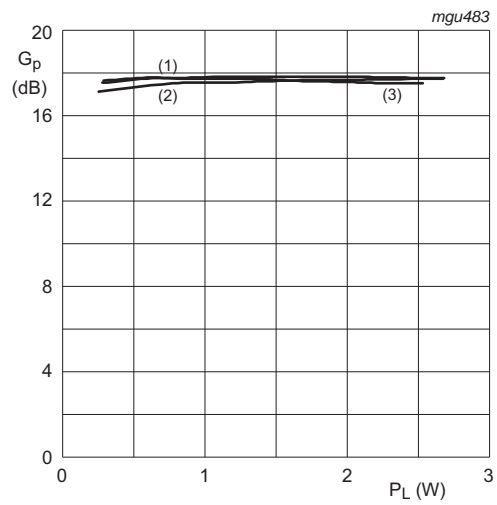
Frequency (MHz)	$Z_S$ ( $\Omega$ )	$Z_L$ ( $\Omega$ )
1030	$1.51 + j\ 11.76$	$6.9 + j\ 5$
1060	$1.51 + j\ 11.26$	$6.7 + j\ 5.9$
1090	$1.52 + j\ 10.77$	$5.1 + j\ 6.6$



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

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

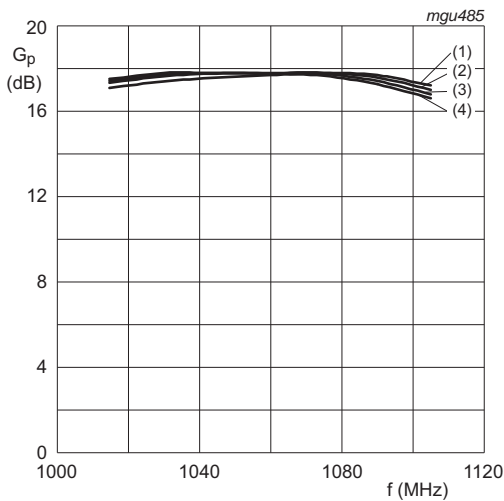
**Fig 1. Load power as a function of drive power; typical values.**



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

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

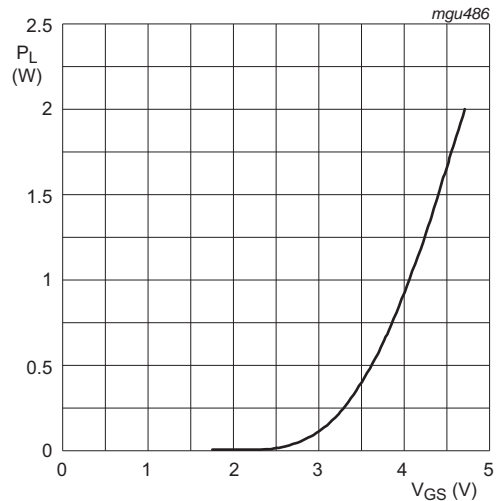
**Fig 2. Power gain as a function of load power; typical values.**



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

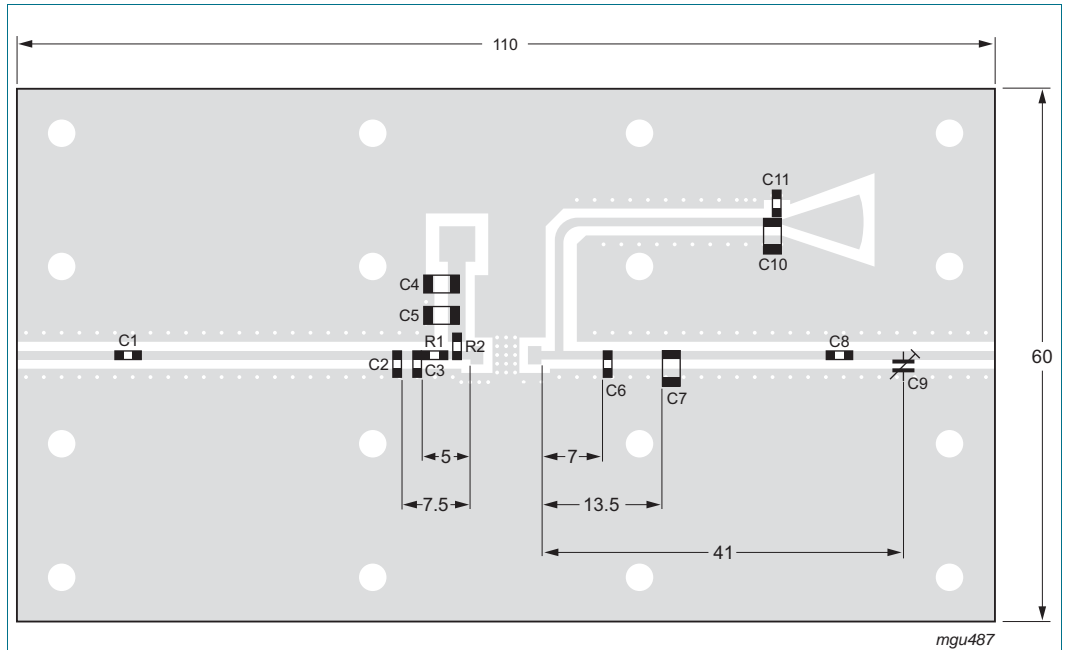
- (1)  $P_L = 1\text{ W}$ .
- (2)  $P_L = 2\text{ W}$ .
- (3)  $P_L = 3\text{ W}$ .
- (4)  $P_L = 4\text{ W}$ .

**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.**



Dimensions in mm.

The components are situated on one side of the Rogers 6006 printed-circuit board (thickness = 0.64 mm;  $\epsilon_r = 6.2$ ), the other side is unetched and serves as a ground plane. Earth connections from the component side to the ground plane are made by through-metallization.

**Fig 5. Printed-circuit board for class-AB test circuit.**

## 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 $\Omega$ (2 in parallel)
R2	SMD resistor	22 $\Omega$

[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

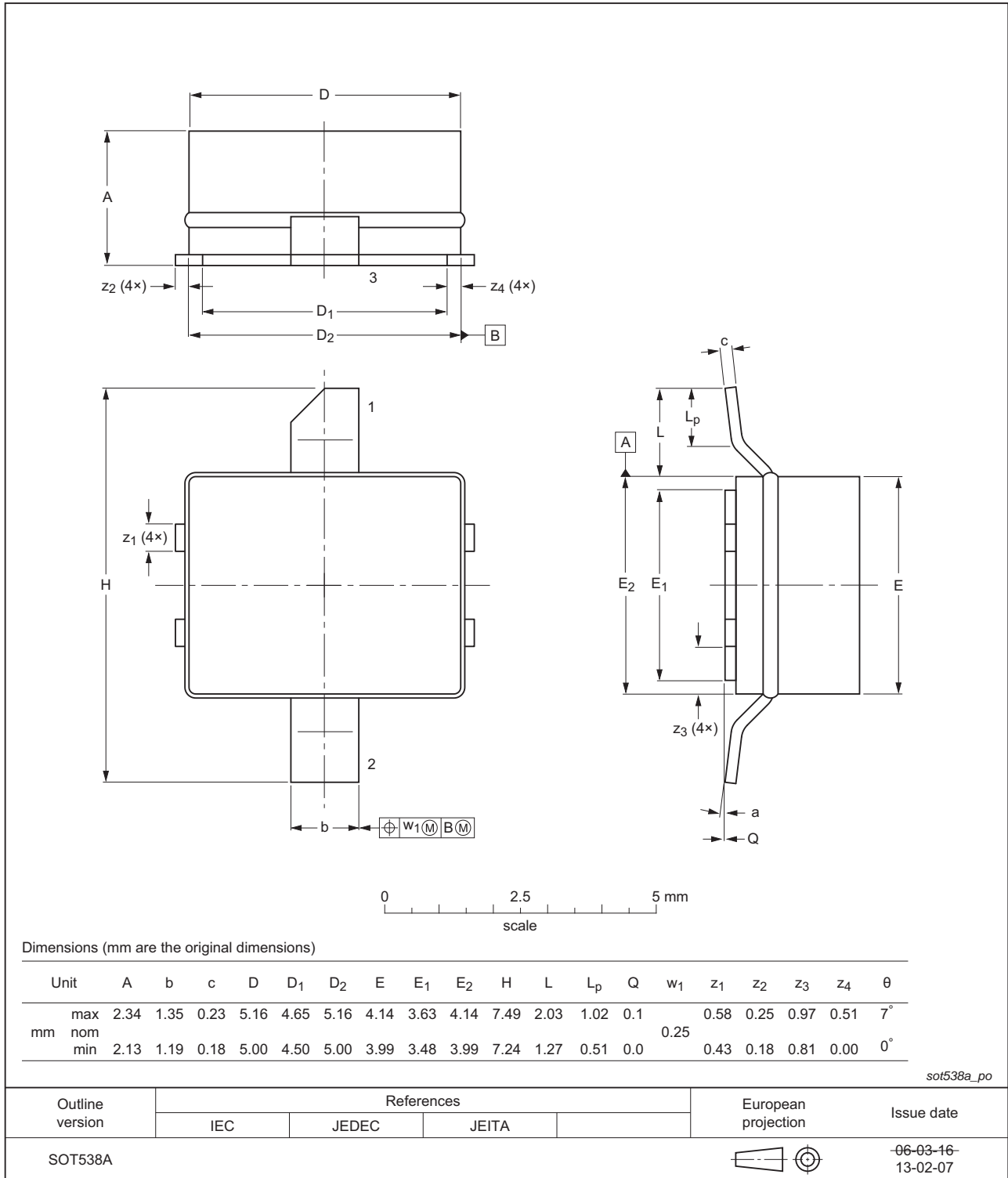


Fig 6. Package outline SOT538A

## 10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLA1011-2 v.6	20130506	Product data sheet	-	BLA1011-2 v.5
Modifications:		<ul style="list-style-type: none"><li>• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li><li>• Legal texts have been adapted to the new company name where appropriate.</li><li>• Package outline drawings have been updated to the latest version.</li></ul>		
BLA1011-2 v.5	20031119	Product specification	-	BLA1011-2 v.4

## 11. Legal information

### 11.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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