

BLA1011-300

Avionics LDMOS transistors

Rev. 01 — 3 April 2007

Product data sheet

1. Product profile

1.1 General description

300 W LDMOS pulsed power transistor for TCAS and IFF applications at frequencies from 1030 MHz to 1090 MHz.

Table 1. Typical performance

RF performance at $T_{case} = 25\text{ }^{\circ}\text{C}$ in a common source class-AB production test circuit; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\text{ }\%$.

Mode of operation	f (MHz)	I_{Dq} (mA)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
Pulsed class-AB	1030 to 1090	150	32	300	16.5	57

CAUTION



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

1.2 Features

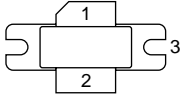
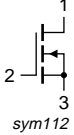
- Typical performance at frequencies between 1030 MHz and 1090 MHz, a supply voltage of 32 V, an I_{Dq} of 150 mA, a t_p of 50 μs and a δ of 2 %:
 - ◆ Output power = 300 W
 - ◆ Power gain = 16.5 dB (typ)
 - ◆ Efficiency = 57 % (typ)
- Easy power control
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for operation in 1030 MHz to 1090 MHz band
- Internally matched for ease of use

1.3 Applications

- RF power amplifiers for Avionics applications in the 1030 MHz to 1090 MHz frequency band

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
1	drain		 sym112
2	gate		
3	source		

[1] connected to flange

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLA1011-300	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT957A

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		-	65	V
V_{GS}	gate-source voltage		-0.5	+15	V
I_D	drain current		-	15	A
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		-	200	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Max	Unit
$Z_{th(j-h)}$	transient thermal impedance from junction to heatsink	$T_{case} = 25\text{ °C}$; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$; $P_L = 300\text{ W}$	0.1	0.15	K/W

6. Characteristics

Table 6. Characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 3.75\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 20\text{ V}; I_D = 375\text{ mA}$	5.2	5.6	6.2	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 32\text{ V}; I_D = 150\text{ mA}$	-	5.48	-	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 32\text{ V}$	-	-	3.3	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 6\text{ V}; V_{DS} = 10\text{ V}$	50	63	73	A
I_{GSS}	gate leakage current	$V_{GS} = 13\text{ V}; V_{DS} = 0\text{ V}$	-	-	60	nA
g_{fs}	forward transconductance	$V_{DS} = 20\text{ V}; I_D = 24\text{ A}$	-	15	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 6\text{ V}; I_D = 13.5\text{ A}$	-	55	80	$\text{m}\Omega$

7. Application information

Table 7. Application information

Mode of operation: Pulsed RF; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\text{ }\%$; $V_{DS} = 32\text{ V}$; $I_{Dq} = 150\text{ mA}$; $T_{case} = 25\text{ }^\circ\text{C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
P_L	output power		300	-	-	W
G_p	power gain	$P_L = 300\text{ W}$	15	16.5	-	dB
RL_{in}	input return loss	$P_L = 300\text{ W}$	-	10	-	dB
η_D	drain efficiency	$P_L = 300\text{ W}$	52	57	-	%
t_r	rise time	$P_L = 300\text{ W}$	-	30	50	ns
t_f	fall time	$P_L = 300\text{ W}$	-	5	50	ns
$P_{\text{droop(pulse)}}$	pulse droop power	$P_L = 300\text{ W}$	-	0	0.2	dB

Table 8. Typical impedance

f MHz	Z _S Ω	Z _L Ω
1030	4.25 – j3.57	1.27 – j0.33
1060	4.24 – j3.56	1.04 – j0.41
1090	4.47 – j3.71	0.91 – j0.60

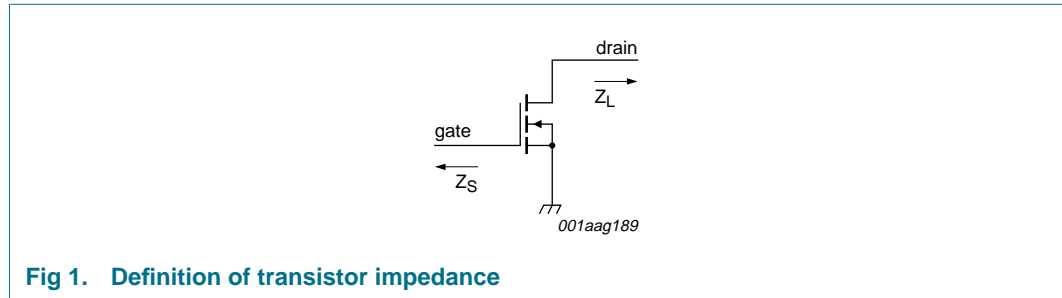
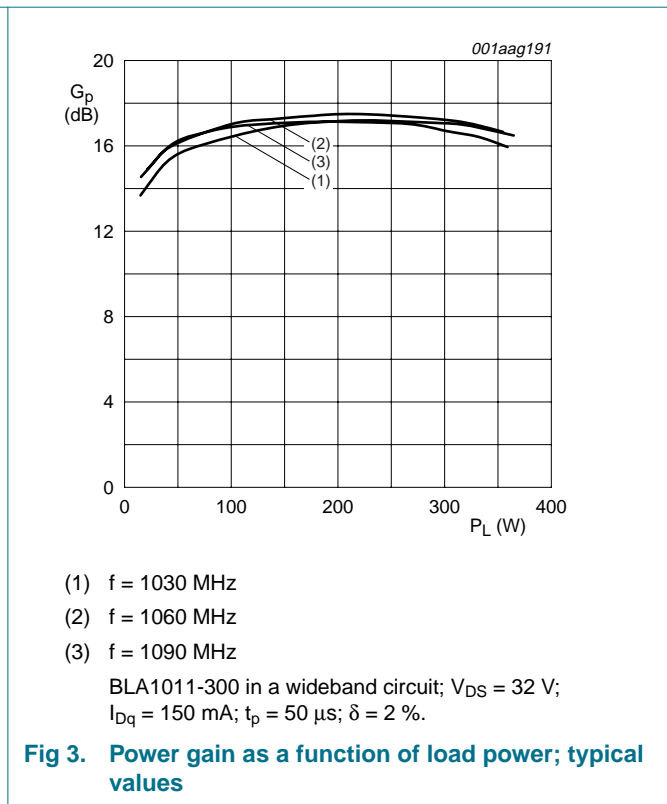
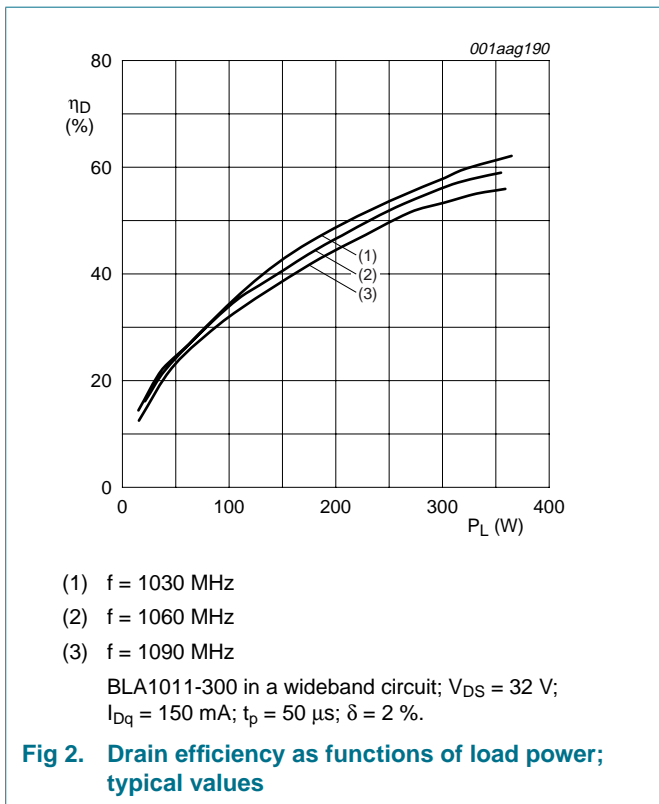
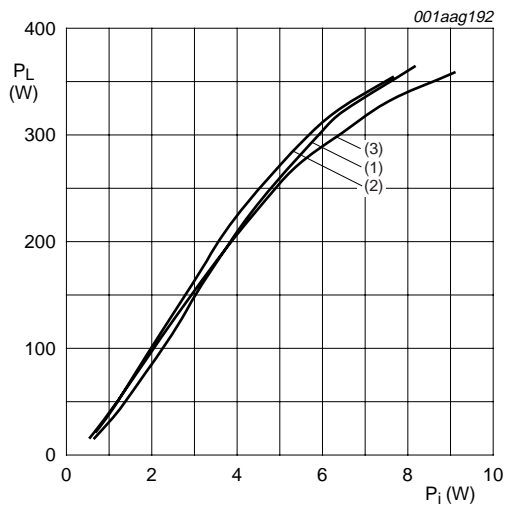


Fig 1. Definition of transistor impedance

7.1 Ruggedness in class-AB operation

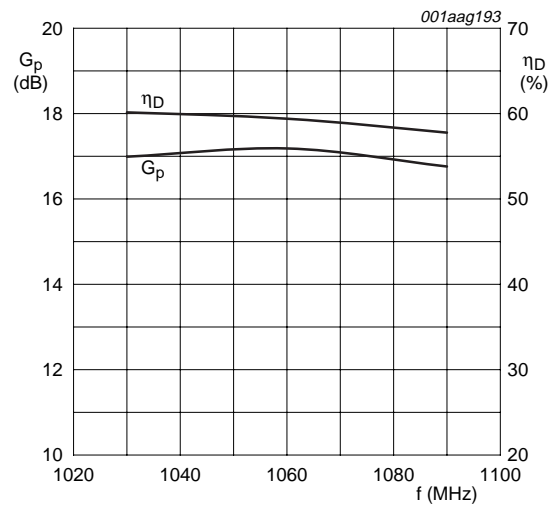
The BLA1011-300 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 32 V; I_{Dq} = 150 mA; P_L = 300 W; f = 1030 MHz to 1090 MHz.





(1) $f = 1030$ MHz
 (2) $f = 1060$ MHz
 (3) $f = 1090$ MHz
 BLA1011-300 in a wideband circuit; $V_{DS} = 32$ V;
 $I_{Dq} = 150$ mA; $t_p = 50$ μ s; $\delta = 2$ %.

Fig 4. Load power as a function of input power; typical values



$V_{DS} = 32$ V; $I_{Dq} = 150$ mA; $t_p = 50$ μ s; $\delta = 2$ %.

Fig 5. Power gain and drain efficiency as functions of frequency; typical values

8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT957A

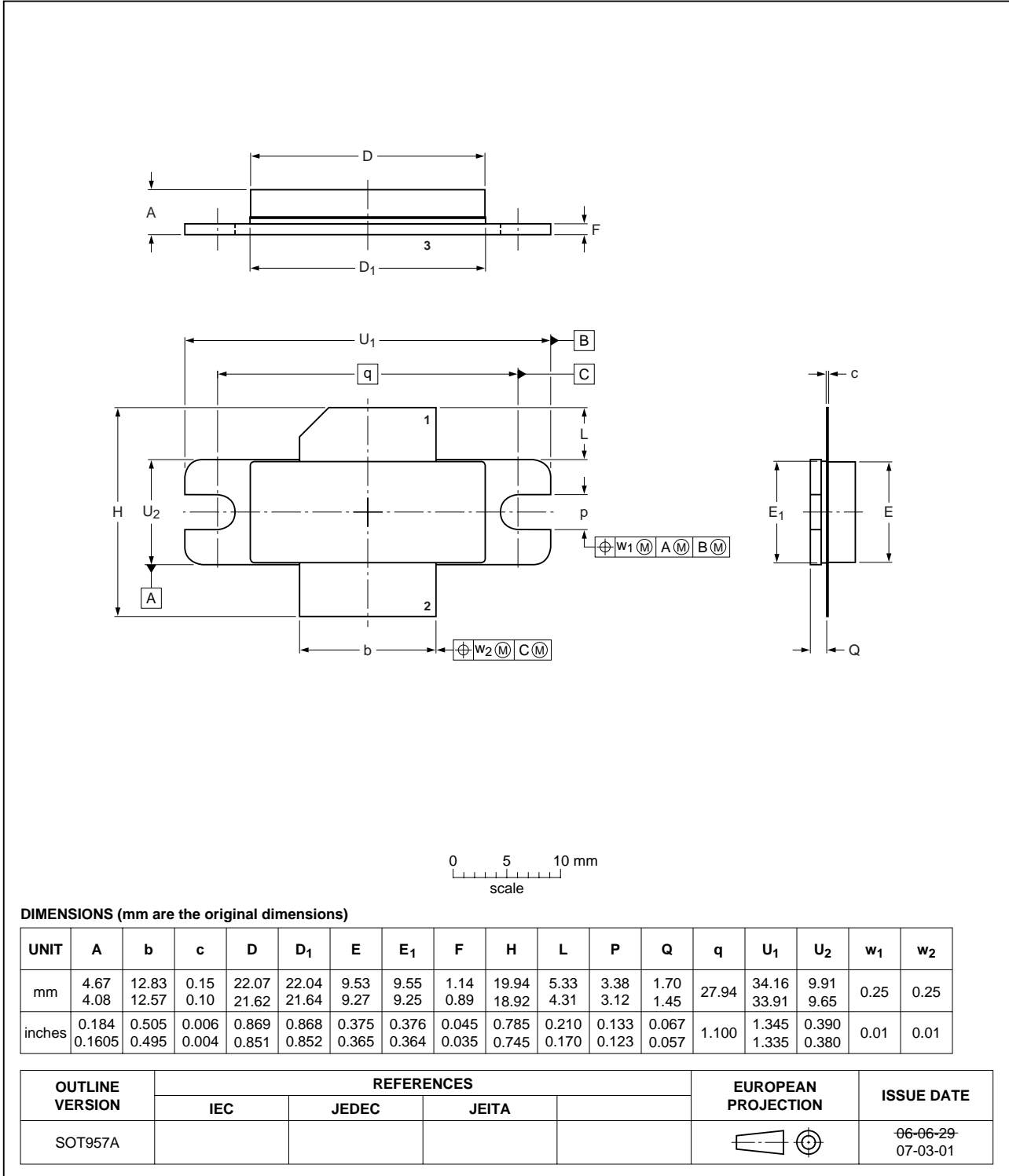


Fig 6. Package outline SOT957A

9. Abbreviations

Table 9. Abbreviations

Acronym	Description
IFF	Identification Friend or Foe
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
RF	Radio Frequency
TCAS	Traffic Collision Avoidance System
VSWR	Voltage Standing Wave Ratio

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLA1011-300_1	20070403	Product data sheet	-	-

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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL <http://www.nxp.com>.

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