

# BLA6H0912-500

LDMOS avionics radar power transistor

Rev. 01 — 5 March 2009

Objective data sheet

## 1. Product profile

### 1.1 General description

500 W LDMOS power transistor intended for avionics transmitter applications in the 960 MHz to 1215 MHz range such as Mode-S, TCAS, JTIDS, DME and TACAN.

**Table 1. Test information**

Typical RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$ ;  $t_p = 128\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ ;  $I_{Dq} = 100\text{ mA}$ ; in a class-AB production test circuit.

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	$\eta_D$ (%)	t <sub>r</sub> (ns)	t <sub>f</sub> (ns)
pulsed RF	960 to 1200	50	500	17	50	20	6

#### CAUTION



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

### 1.2 Features

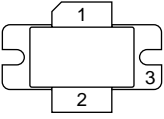
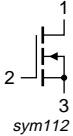
- Typical pulsed RF performance at a frequency of 960 MHz to 1215 MHz, a supply voltage of 50 V, an  $I_{Dq}$  of 100 mA, a  $t_p$  of 128  $\mu\text{s}$  with  $\delta$  of 10 %:
  - ◆ Output power = 500 W
  - ◆ Power gain = 17 dB
  - ◆ Efficiency = 50 %
- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (960 MHz to 1215 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding restriction of hazardous substances (RoHS)

**1.3 Applications**

- L-band power amplifiers for radar applications in the 1.2 GHz to 1.4 GHz frequency range

**2. Pinning information**

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic 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
BLA6H0912-500	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT634A

**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		-	100	V
$V_{GS}$	gate-source voltage		0.5	13	V
$I_D$	drain current		-	54	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	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_{case} = 85\text{ °C}; P_L = 500\text{ W}$		
		$t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ %}$	<tbd>	K/W
		$t_p = 200\text{ }\mu\text{s}; \delta = 10\text{ %}$	<tbd>	K/W
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ %}$	<tbd>	K/W
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ %}$	<tbd>	K/W

## 6. Characteristics

**Table 6. DC characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 2.7\text{ mA}$	100	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 270\text{ mA}$	1.3	1.8	2.2	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$	-	-	1.1	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	48	54	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	110	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 270\text{ mA}$	<td>	<td>	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 9.5\text{ A}$	-	67	120	$\text{m}\Omega$

**Table 7. RF characteristics**

Mode of operation: pulsed RF;  $t_p = 128\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ; RF performance at  $V_{DS} = 50\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ;  
 $T_{case} = 25^\circ\text{C}$ ; unless otherwise specified, in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_L$	output power		500	-	-	W
$V_{CC}$	supply voltage	$P_L = 500\text{ W}$	-	-	50	V
$G_p$	power gain	$P_L = 500\text{ W}$	15	17	-	dB
$RL_{in}$	input return loss	$P_L = 500\text{ W}$	-	10	-	dB
$\eta_D$	drain efficiency	$P_L = 500\text{ W}$	45	50	-	%
$P_{\text{droop(pulse)}}$	pulse droop power	$P_L = 500\text{ W}$	-	0	0.3	dB
$t_r$	rise time	$P_L = 500\text{ W}$	-	20	50	ns
$t_f$	fall time	$P_L = 500\text{ W}$	-	6	50	ns

### 6.1 Ruggedness in class-AB operation

The BLA6H0912-500 is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 50\text{ V}$ ;  
 $I_{Dq} = 100\text{ mA}$ ;  $P_L = 500\text{ W}$ ;  $t_p = 128\text{ }\mu\text{s}$ ;  $\delta = 10\%$ .

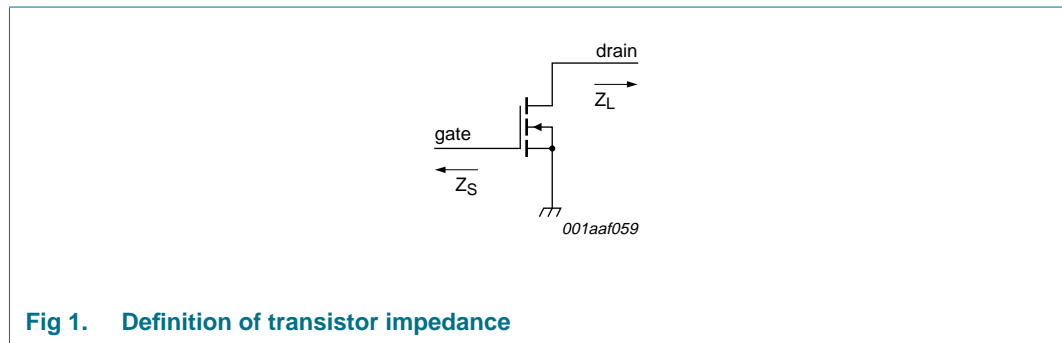
## 7. Application information

### 7.1 Impedance information

**Table 8. Typical impedance**

*Typical values per section unless otherwise specified.*

<b>f</b> <b>GHz</b>	<b>Z<sub>S</sub></b> <b>Ω</b>	<b>Z<sub>L</sub></b> <b>Ω</b>
960	0.75 – j0.94	1.43 – j0.95
1030	0.91 – j1.08	1.29 – j0.95
1060	1.00 – j1.13	1.23 – j0.96
1090	1.10 – j1.18	1.17 – j0.99
1215	1.71 – j1.20	0.96 – j1.16



**Fig 1. Definition of transistor impedance**

8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT634A

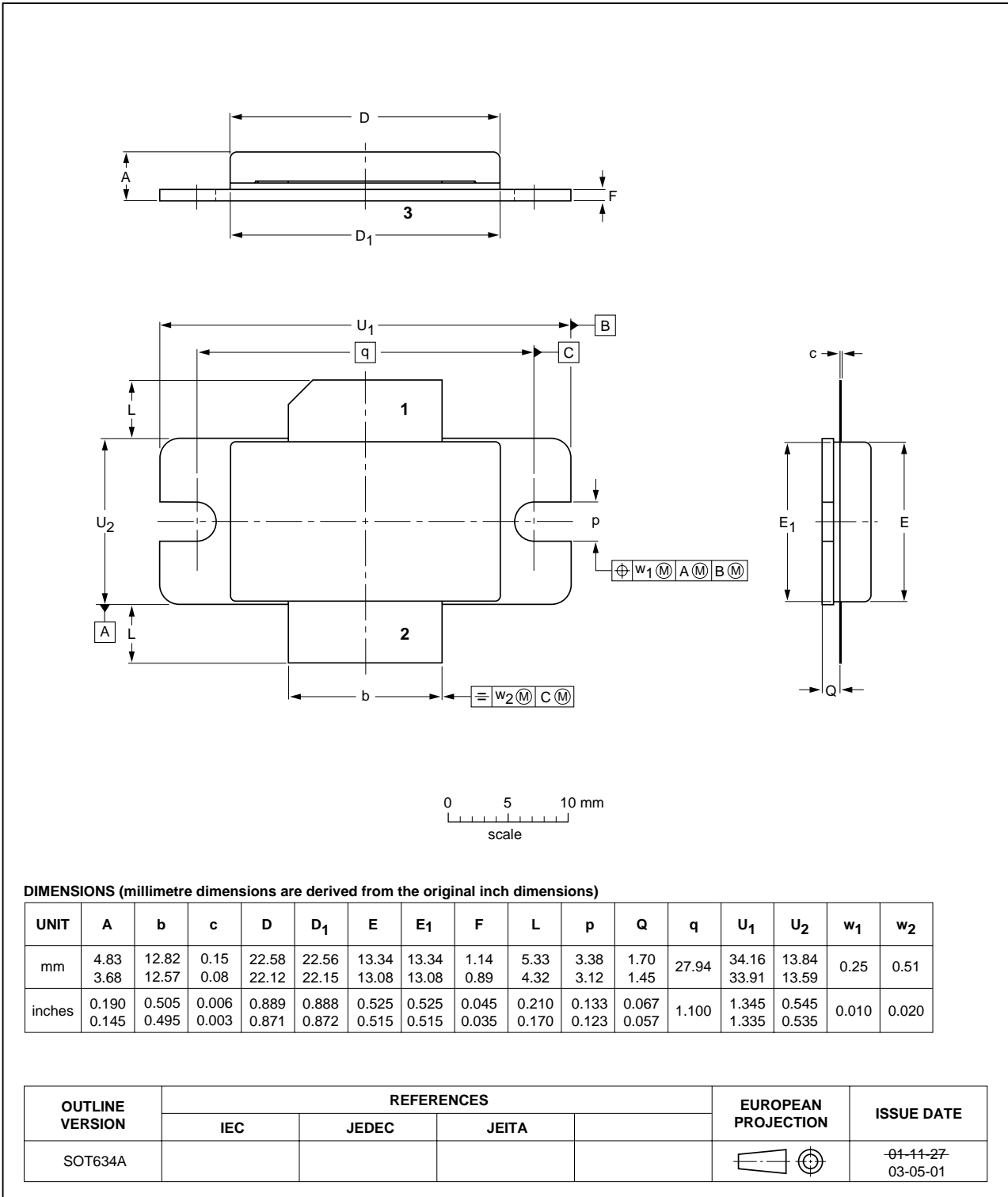


Fig 2. Package outline SOT634A

## 9. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
DME	Distance Measuring Equipment
JTIDS	Joint Tactical Information Distribution System
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
Mode-S	Mode Select
RF	Radio Frequency
TACAN	TACTical Air Navigation
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
BLA6H0912-500_1	20090305	Objective data sheet	-	-

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

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