

# BLF178P

Power LDMOS transistor

Rev. 1 — 5 April 2011

Objective data sheet

## 1. Product profile

### 1.1 General description

A 1200 W LDMOS power transistor for broadcast applications and industrial applications in the HF to 110 MHz band.

Table 1. Application information

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)
CW	108	50	1000	26	75
pulsed RF	108	50	1200	26	75

#### CAUTION



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

### 1.2 Features and benefits

- Typical pulsed performance at frequency of 108 MHz, a supply voltage of 50 V and an I<sub>DQ</sub> of 40 mA, a t<sub>p</sub> of 100 μs with δ of 20 %:
  - ◆ Output power = 1200 W
  - ◆ Power gain = 26 dB
  - ◆ Efficiency = 75 %
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (10 MHz to 108 MHz)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

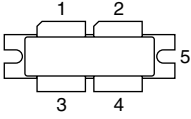
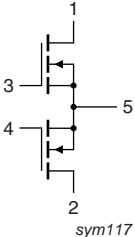
### 1.3 Applications

- Industrial, scientific and medical applications
- FM transmitter applications



## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BLF178P	-	flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads	SOT539A

## 4. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

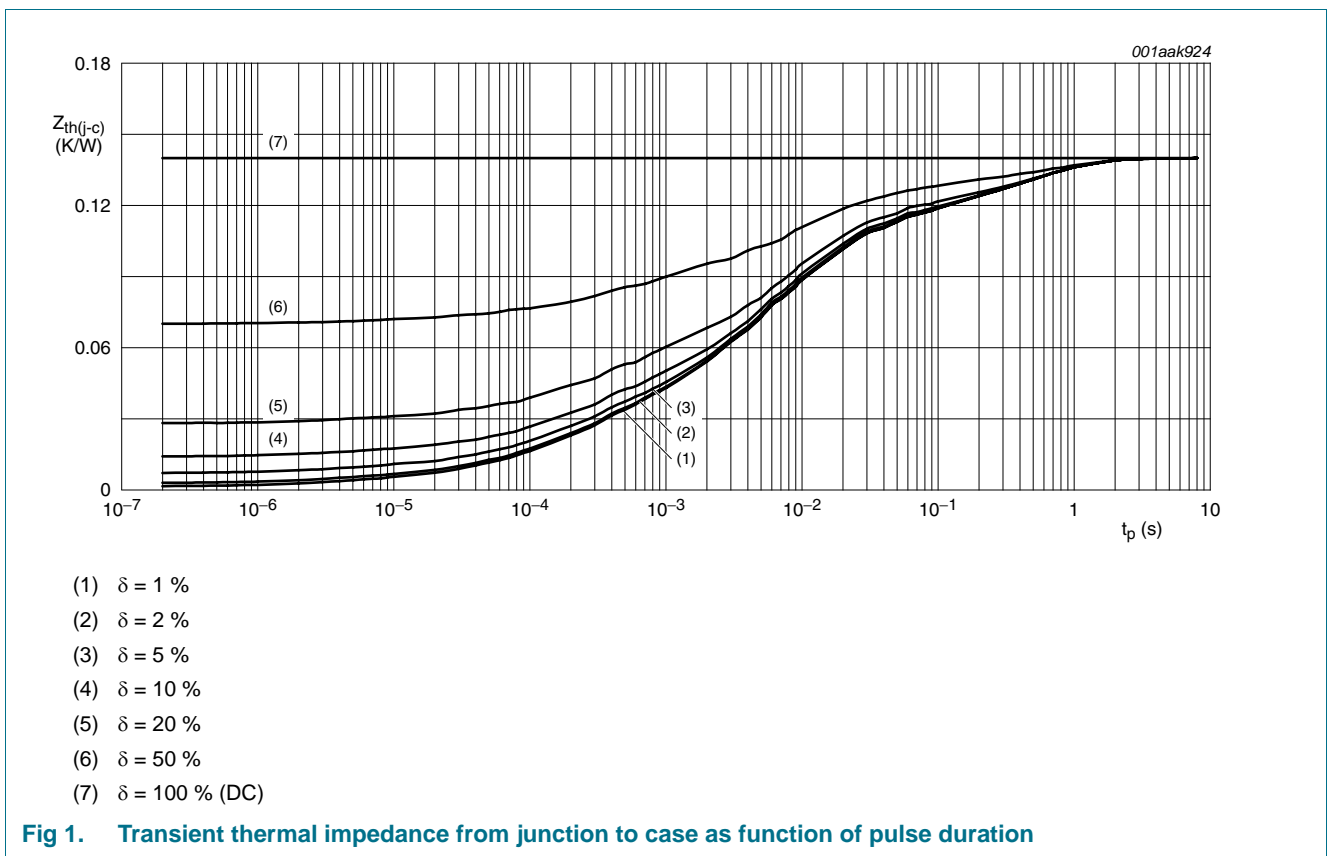
Symbol	Parameter	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage		-	110	V
$V_{GS}$	gate-source voltage		-0.5	+11	V
$I_D$	drain current		-	88	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	225	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_j = 150\text{ °C}$	[1][2] 0.14	K/W
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_j = 150\text{ °C}; t_p = 100\text{ }\mu\text{s}; \delta = 20\%$	[3] 0.04	K/W

- [1]  $T_j$  is the junction temperature.
- [2]  $R_{th(j-c)}$  is measured under RF conditions.
- [3] See [Figure 1](#).



## 6. Characteristics

**Table 6. DC characteristics**

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

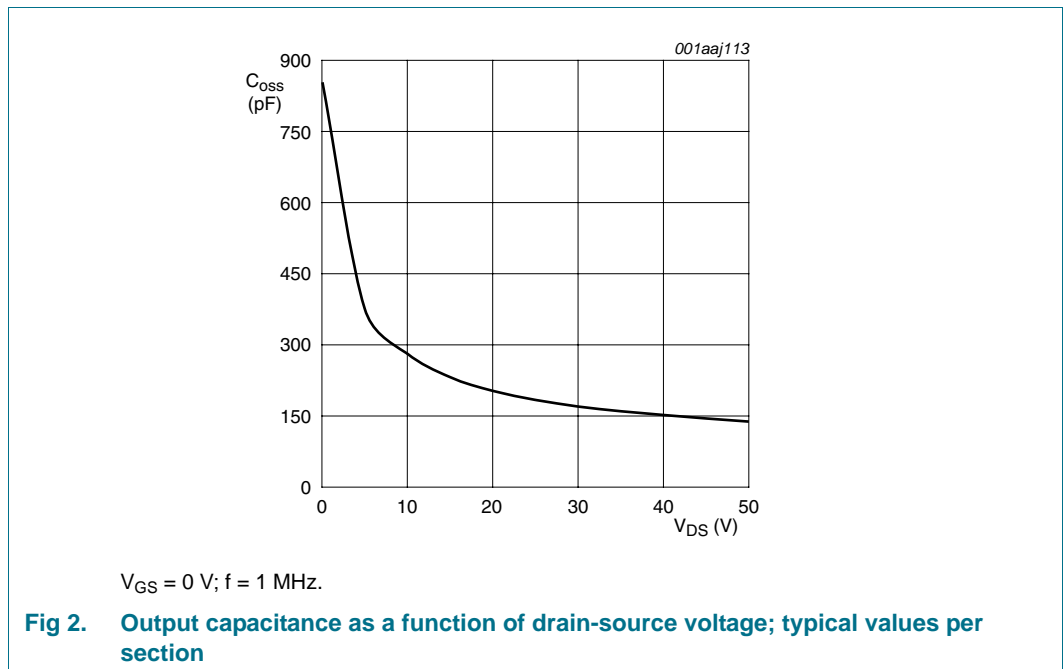
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 2.5\text{ mA}$	110	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 500\text{ mA}$	1.25	1.7	2.25	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 50\text{ V}; I_D = 20\text{ mA}$	0.8	1.3	1.8	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}$	-	-	2.8	$\mu\text{A}$

**Table 6. DC characteristics ...continued**  
 $T_j = 25\text{ }^\circ\text{C}$ ; per section unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	58	70	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	280	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 16.66\text{ A}$	-	0.07	-	$\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	3	-	pF
$C_{iss}$	input capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	403	-	pF
$C_{oss}$	output capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	138	-	pF

**Table 7. RF characteristics**  
 Mode of operation: pulsed RF;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 20\text{ }\%$ ;  $f = 108\text{ MHz}$ ; RF performance at  $V_{DS} = 50\text{ V}$ ;  
 $I_{Dq} = 40\text{ mA}$ ;  $T_{case} = 25\text{ }^\circ\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_L = 1200\text{ W}$	<td>	26	<td>	dB
$RL_{in}$	input return loss	$P_L = 1200\text{ W}$	<td>	<td>	-	dB
$\eta_D$	drain efficiency	$P_L = 1200\text{ W}$	<td>	75	-	%

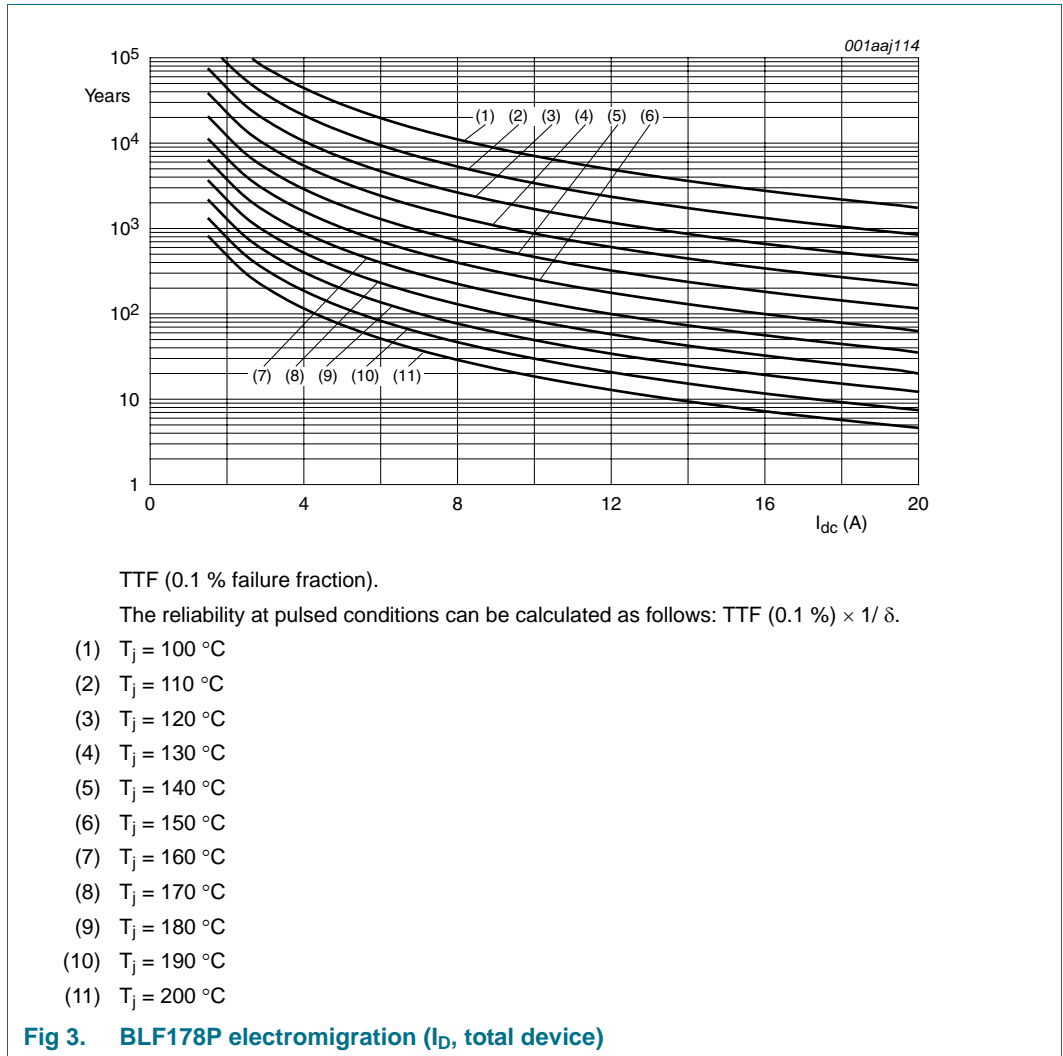


### 6.1 Ruggedness in class-AB operation

The BLF178P is capable of withstanding a load mismatch corresponding to  $VSWR = 13 : 1$  through all phases under the following conditions:  $V_{DS} = 50\text{ V}$ ;  
 $I_{Dq} = 40\text{ mA}$ ;  $P_L = 1200\text{ W}$  pulsed;  $f = 108\text{ MHz}$ .

## 7. Application information

### 7.1 Reliability



### 8. Package outline

Flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads

SOT539A

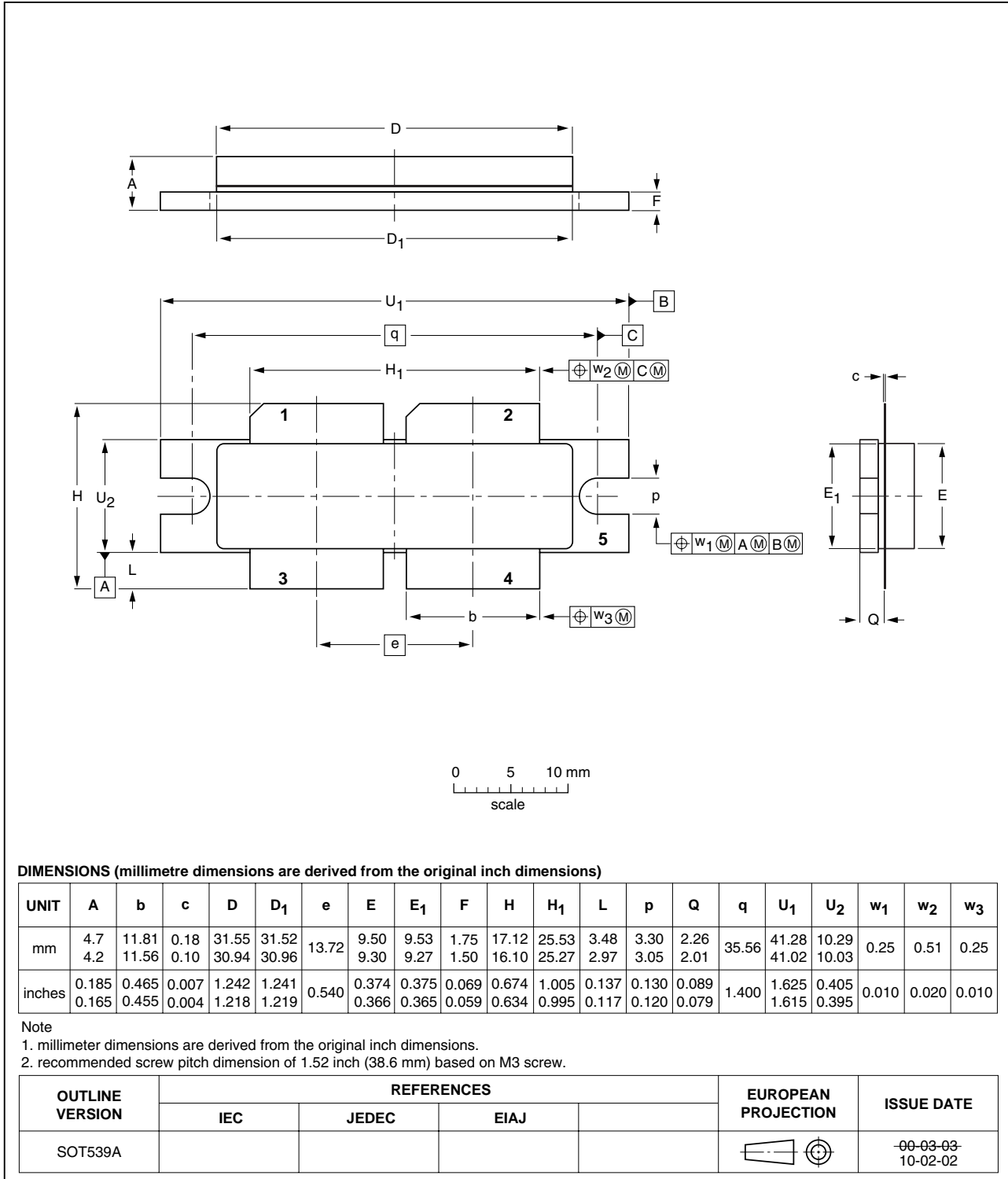


Fig 4. Package outline SOT539A

## 9. Abbreviations

**Table 8. Abbreviations**

Acronym	Description
CW	Continuous Wave
FM	Frequency Modulation
HF	High Frequency
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
RF	Radio Frequency
TTF	Time To Failure
VSWR	Voltage Standing-Wave Ratio

## 10. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF178P v.1	20110405	Objective data sheet	-	-

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### 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.

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

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