

# BLS7G3135LS-200

## LDMOS S-band radar power transistor

Rev. 2 — 23 September 2013

Product data sheet

## 1. Product profile

### 1.1 General description

200 W LDMOS power transistor for S-band radar applications in the frequency range from 3100 MHz to 3500 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ °C}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ;  $I_{Dq} = 100\text{ mA}$ ; in a class-AB production test circuit.

Test signal	f (GHz)	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	3.1	32	200	12	48	8	6
	3.3	32	200	12	46	8	6
	3.5	32	200	12	43	8	6

### 1.2 Features and benefits

- High efficiency
- Excellent ruggedness
- Designed for broadband operation
- Excellent thermal stability
- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Internally matched for ease of use (input and output)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

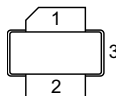
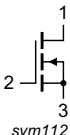
### 1.3 Applications

- S-band radar applications in the frequency range 3100 MHz to 3500 MHz



## 2. Pinning information

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	drain		 sym112
2	gate		
3	source <a href="#">[1]</a>		

[1] Connected to flange.

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BLS7G3135LS-200	-	earless flanged ceramic package; 2 leads	SOT502B

## 4. Limiting values

**Table 4. Limiting values**

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

Symbol	Parameter	Min	Max	Unit
$V_{DS}$	drain-source voltage	-	65	V
$V_{GS}$	gate-source voltage	-0.5	+13	V
$T_{stg}$	storage temperature	-65	+150	°C
$T_j$	junction temperature <a href="#">[1]</a>	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability.

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-mb)}$	transient thermal impedance from junction to mounting base	$T_{case} = 85\text{ °C}; P_L = 200\text{ W}$		
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ }\%$	0.147	K/W
		$t_p = 200\text{ }\mu\text{s}; \delta = 20\text{ }\%$	0.162	K/W
		$t_p = 500\text{ }\mu\text{s}; \delta = 20\text{ }\%$	0.186	K/W

## 6. Characteristics

**Table 6. DC 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	$V_{GS} = 0\text{ V}; I_D = 2.7\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 270\text{ mA}$	1.5	1.9	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	4.2	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$	-	51	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	420	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 2.7\text{ A}$	-	2.34	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$	-	0.06	-	$\Omega$

**Table 7. RF characteristics**

Test signal: pulsed RF;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ; RF performance at  $V_{DS} = 32\text{ V}$ ;  $I_{DQ} = 100\text{ mA}$ ;  $T_{case} = 25\text{ }^\circ\text{C}$ ; unless otherwise specified, in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_L = 200\text{ W}$	8.8	12	-	dB
$RL_{in}$	input return loss	$P_L = 200\text{ W}$	-	-8	-4	dB
$\eta_D$	drain efficiency	$P_L = 200\text{ W}$	38	43	-	%
$P_{droop(pulse)}$	pulse droop power	$P_L = 200\text{ W}$	-	0.1	0.25	dB
$t_r$	rise time	$P_L = 200\text{ W}$	-	8	50	ns
$t_f$	fall time	$P_L = 200\text{ W}$	-	6	50	ns

## 7. Test information

### 7.1 Ruggedness in class-AB operation

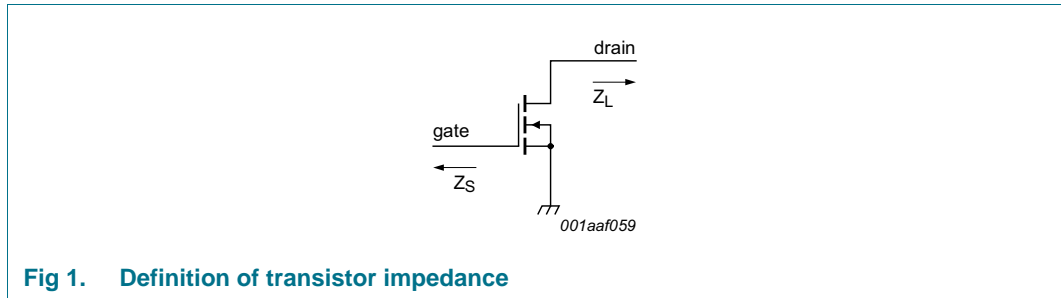
The BLS7G3135LS-200 is capable of withstanding a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 32\text{ V}$ ;  $I_{DQ} = 100\text{ mA}$ ;  $P_L = 200\text{ W}$ ;  $f = 3100\text{ MHz}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\%$ .

### 7.2 Impedance information

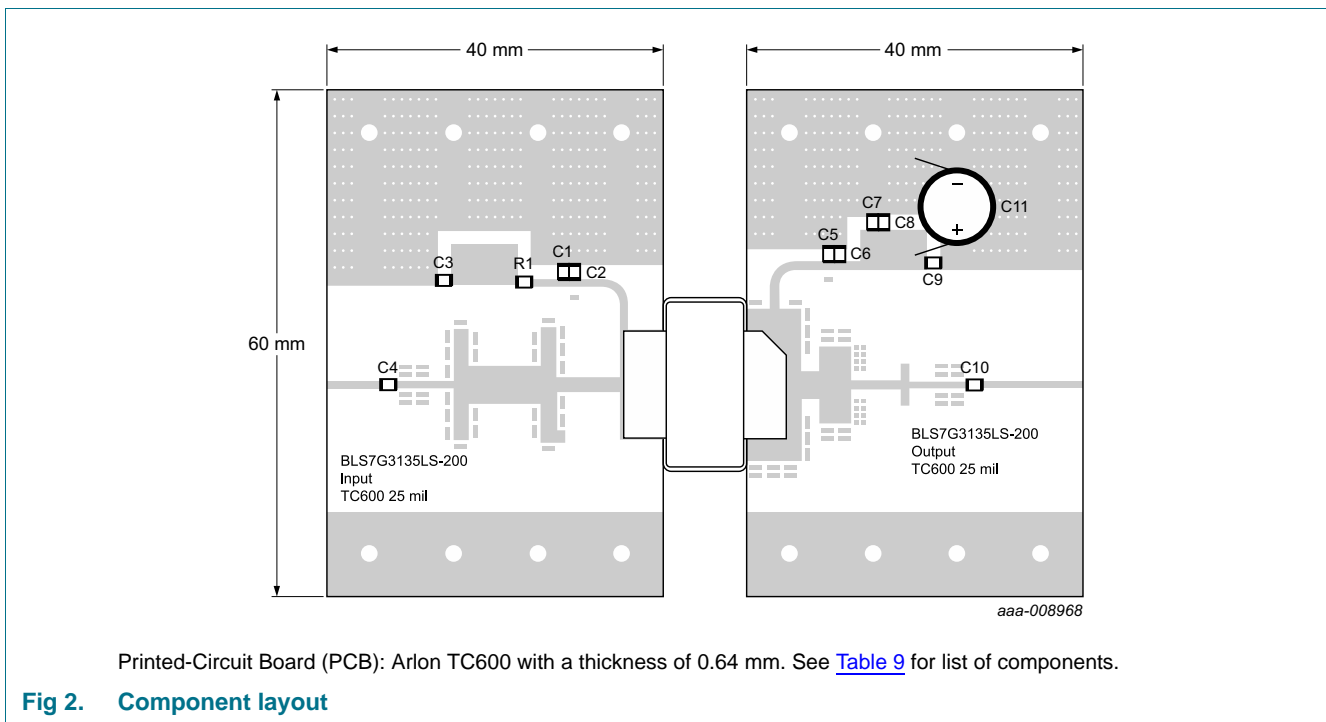
**Table 8. Typical impedance**

Measured load pull data;  $V_{DS} = 32\text{ V}$ ;  $I_{DQ} = 100\text{ mA}$ ; typical values unless otherwise specified.

f (MHz)	$Z_S$ ( $\Omega$ )	$Z_L$ ( $\Omega$ )
3100	0.9 – j4.3	5.3 – j1.6
3200	1.3 – j4.9	4.8 – j1.5
3300	1.7 – j5.5	4.6 – j1.9
3400	2.4 – j6.4	4.0 – j2.1
3500	4.1 – j6.9	4.0 – j2.1



**7.3 Test circuit information**



**Table 9. List of components**  
See [Figure 2](#) for component layout.

Component	Description	Value	Remarks
C1, C4, C4, C10	multilayer ceramic chip capacitor	15 pF	[1] ATC600F
C2, C5	multilayer ceramic chip capacitor	10 pF	[1] ATC600F
C3, C9	multilayer ceramic chip capacitor	0.1 μF	[2] TDK
C7	multilayer ceramic chip capacitor	1 μF	[3] Murata
C8	multilayer ceramic chip capacitor	10 μF	[3] Murata
C11	electrolytic capacitor	2200 μF, 63 V	
R1	chip resistor	9.1 Ω	[4] SMD 0805

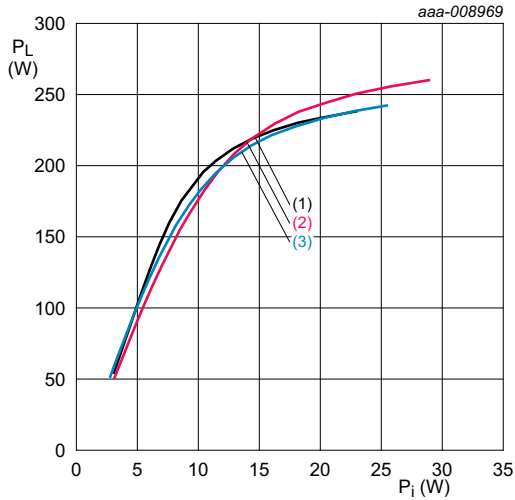
[1] American Technical Ceramics type 600F or capacitor of same quality.

[2] TDK or capacitor of same quality.

[3] Murata or capacitor of same quality.

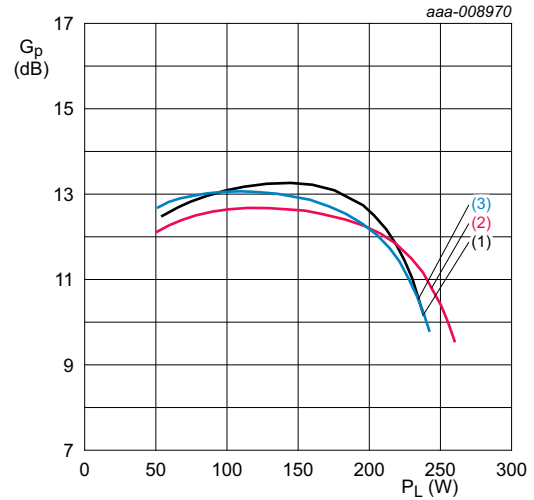
[4] Vishay Dale or resistor of same quality.

**7.4 Graphical data**



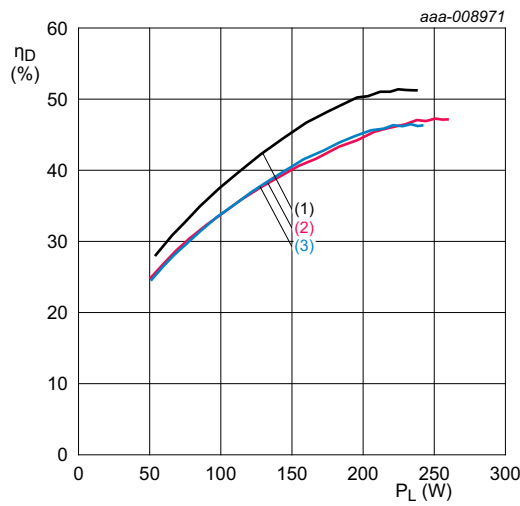
$V_{DS} = 32\text{ V}; I_{Dq} = 100\text{ mA}; \delta = 10\%; t_p = 300\ \mu\text{s}.$   
 (1)  $f = 3100\text{ MHz}$   
 (2)  $f = 3300\text{ MHz}$   
 (3)  $f = 3500\text{ MHz}$

**Fig 3. Output power as a function of input power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 100\text{ mA}; \delta = 10\%; t_p = 300\ \mu\text{s}.$   
 (1)  $f = 3100\text{ MHz}$   
 (2)  $f = 3300\text{ MHz}$   
 (3)  $f = 3500\text{ MHz}$

**Fig 4. Power gain as a function of output power; typical values**



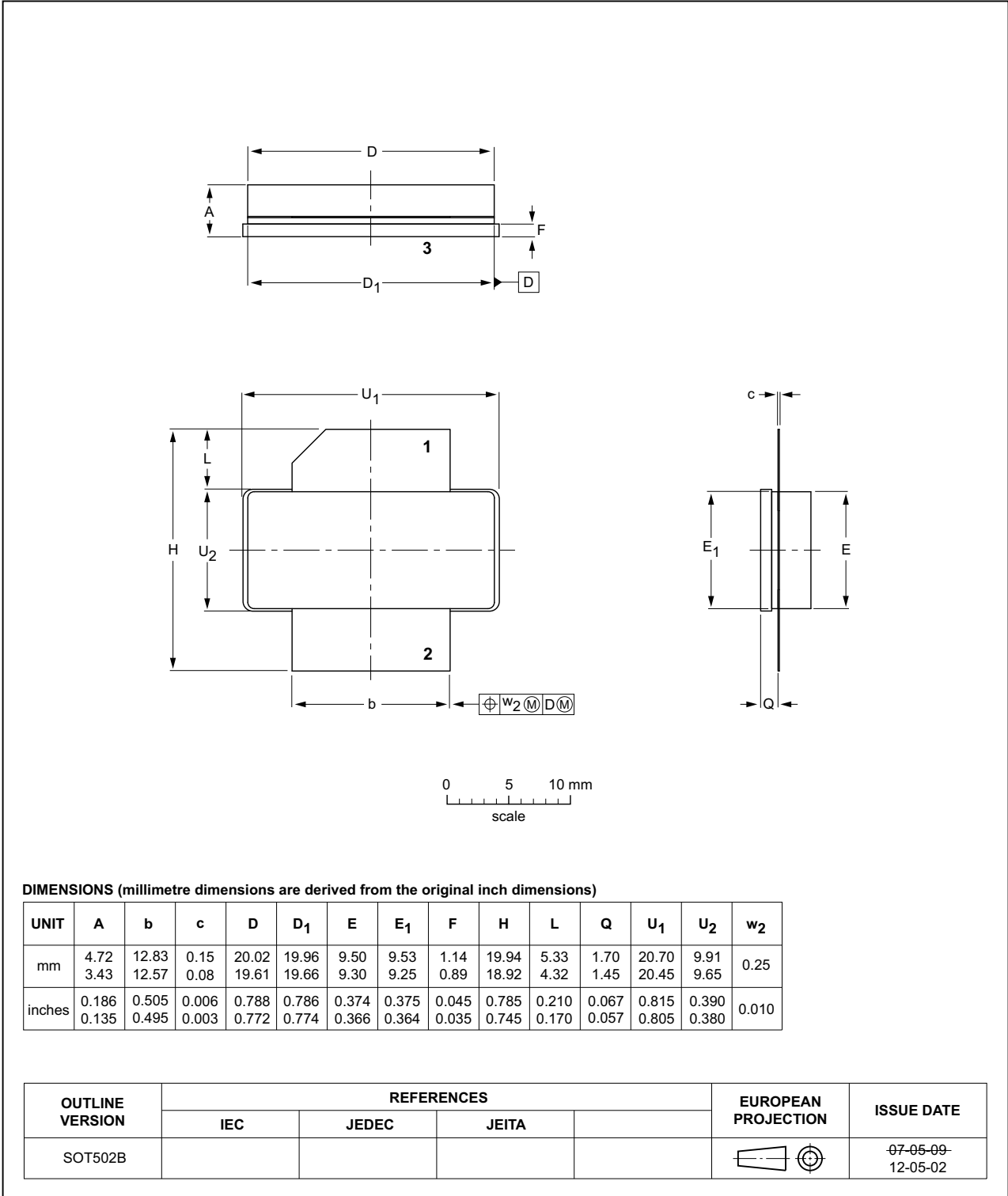
$V_{DS} = 32\text{ V}; I_{Dq} = 100\text{ mA}; \delta = 10\%; t_p = 300\ \mu\text{s}.$   
 (1)  $f = 3100\text{ MHz}$   
 (2)  $f = 3300\text{ MHz}$   
 (3)  $f = 3500\text{ MHz}$

**Fig 5. Drain efficiency as a function of output power; typical values**

**8. Package outline**

Earless flanged ceramic package; 2 leads

SOT502B



**Fig 6. Package outline SOT502B**

## 9. Handling information

### CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

## 10. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
S-band	Short wave band
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio

## 11. Revision history

**Table 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLS7G3135LS-200 v.2	20130923	Product data sheet	-	BLS7G3135LS-200 v.1
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Table 1 on page 1</a>: table updated.</li> <li>• <a href="#">Section 1.2 on page 1</a>: section updated.</li> <li>• <a href="#">Table 4 on page 2</a>: table note added.</li> <li>• <a href="#">Table 5 on page 2</a>: table updated.</li> <li>• <a href="#">Table 6 on page 3</a>: table updated.</li> <li>• <a href="#">Table 7 on page 3</a>: table updated.</li> <li>• <a href="#">Section 7 on page 3</a>: section added.</li> </ul>			
BLS7G3135LS-200 v.1	20121009	Objective data sheet	-	-

## 12. Legal information

### 12.1 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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