



**THE DATASHEET OF  
BLS7G2730LS-200PU**



# BLS7G2730L-200P; BLS7G2730LS-200P

LDMOS S-band radar power transistor

Rev. 4 — 1 September 2015

AMPLEON

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 2700 MHz to 3000 MHz.

**Table 1. Typical performance**  
Typical RF performance at  $T_{case} = 25\text{ °C}$ .

Test signal	f (GHz)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)	t <sub>r</sub> (ns)	t <sub>f</sub> (ns)
<b>Class-AB production test circuit</b>							
pulsed RF <a href="#">[1]</a>	2.7 to 3.0	32	200	12	48	8	5
<b>Application circuit</b>							
pulsed RF <a href="#">[2]</a>	2.7 to 3.0	32	220	12.5	50	20	6
pulsed RF <a href="#">[3]</a>	2.9 to 3.1	32	220	12.5	50	20	6

[1]  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ;  $I_{Dq} = 100\text{ mA}$

[2]  $t_p = 3000\text{ }\mu\text{s}$ ;  $\delta = 20\%$ ;  $I_{Dq} = 50\text{ mA}$

[3]  $t_p = 500\text{ }\mu\text{s}$ ;  $\delta = 20\%$ ;  $I_{Dq} = 50\text{ mA}$

### 1.2 Features and benefits

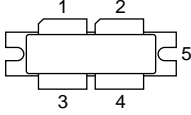
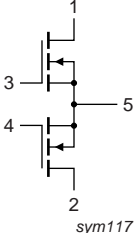
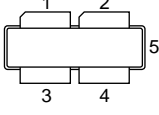
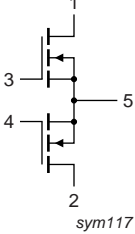
- High efficiency
- Excellent ruggedness
- Designed for broadband operation
- Excellent thermal stability
- Easy power control
- Integrated ESD protection
- High flexibility with respect to pulse formats
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of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

### 1.3 Applications

- S-band radar applications in the frequency range 2700 MHz to 3000 MHz

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLS7G2730L-200P (SOT539A)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		
<b>BLS7G2730LS-200P (SOT539B)</b>			
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
BLS7G2730L-200P	-	flanged balanced ceramic package; 2 mounting holes; 4 leads	SOT539A
BLS7G2730LS-200P	-	earless flanged balanced ceramic package; 4 leads	SOT539B

## 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	[1] -	225	°C

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

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_{case} = 85\text{ °C}; P_L = 200\text{ W}$		
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ \%}$	0.13	K/W
		$t_p = 3000\text{ }\mu\text{s}; \delta = 20\text{ \%}$	0.19	K/W

## 6. Characteristics

**Table 6. DC characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 1.2\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 120\text{ mA}$	1.5	1.9	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	2.8	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	22.5	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	280	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 0.12\text{ A}$	-	1	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 4.2\text{ A}$	-	0.13	-	$\Omega$

**Table 7. RF characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_L = 200\text{ W}$	9.8	12	-	dB
$RL_{in}$	input return loss	$P_L = 200\text{ W}$	-	-10	-6	dB
$\eta_D$	drain efficiency	$P_L = 200\text{ W}$	43	48	-	%
$P_{droop(pulse)}$	pulse droop power	$P_L = 200\text{ W}$	-	0	0.25	dB
$t_r$	rise time	$P_L = 200\text{ W}$	-	8	50	ns
$t_f$	fall time	$P_L = 200\text{ W}$	-	5	50	ns

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLS7G2730L-200P and BLS7G2730LS-200P are capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under following conditions:  $V_{DS} = 32\text{ V}; I_{Dq} = 100\text{ mA}; P_L = 200\text{ W}; f = 2700\text{ MHz}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ \%}$

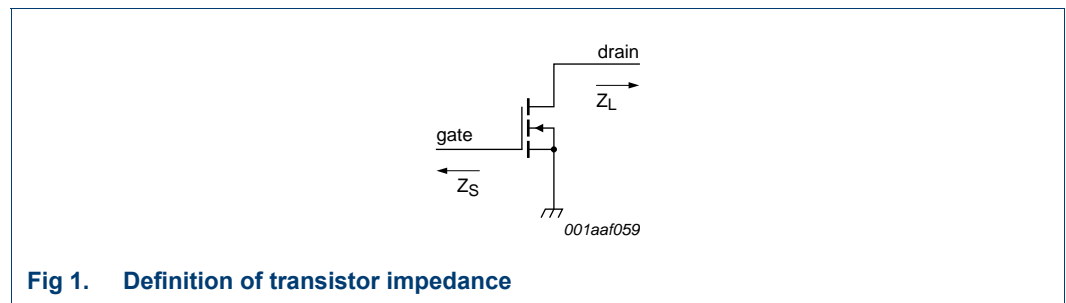
7.2 Impedance information

Table 8. Typical impedance

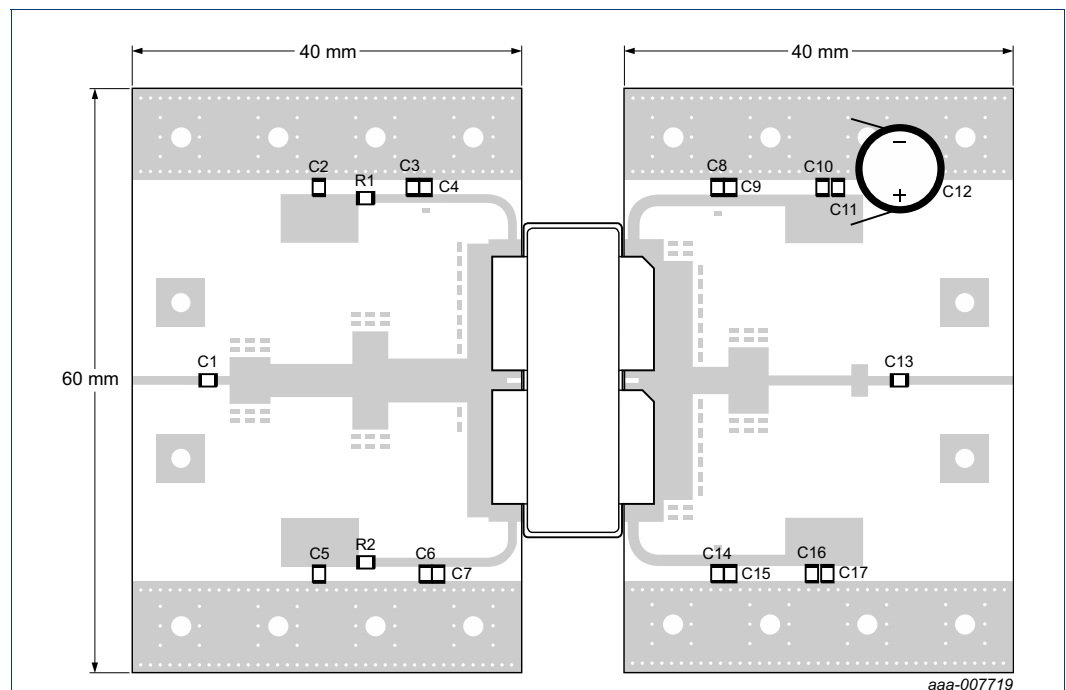
Measured load-pull data half device;  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ .

f (MHz)	$Z_S$ [1] ( $\Omega$ )	$Z_L$ [1] ( $\Omega$ )
2700	2.0 – j5.8	3.7 – j6.4
2800	1.6 – j5.9	3.8 – j6.9
2900	2.6 – j6.2	3.8 – j6.9
3000	3.4 – j6.0	3.7 – j6.4

[1]  $Z_S$  and  $Z_L$  defined in Figure 1.



7.3 Production test circuit



Printed-Circuit Board (PCB): Arlon TC600 with a thickness of 0.64 mm.

See Table 9 for a list of components.

Fig 2. Component layout for a class-AB production test circuit

**Table 9. List of components test circuit**

See [Figure 2](#).

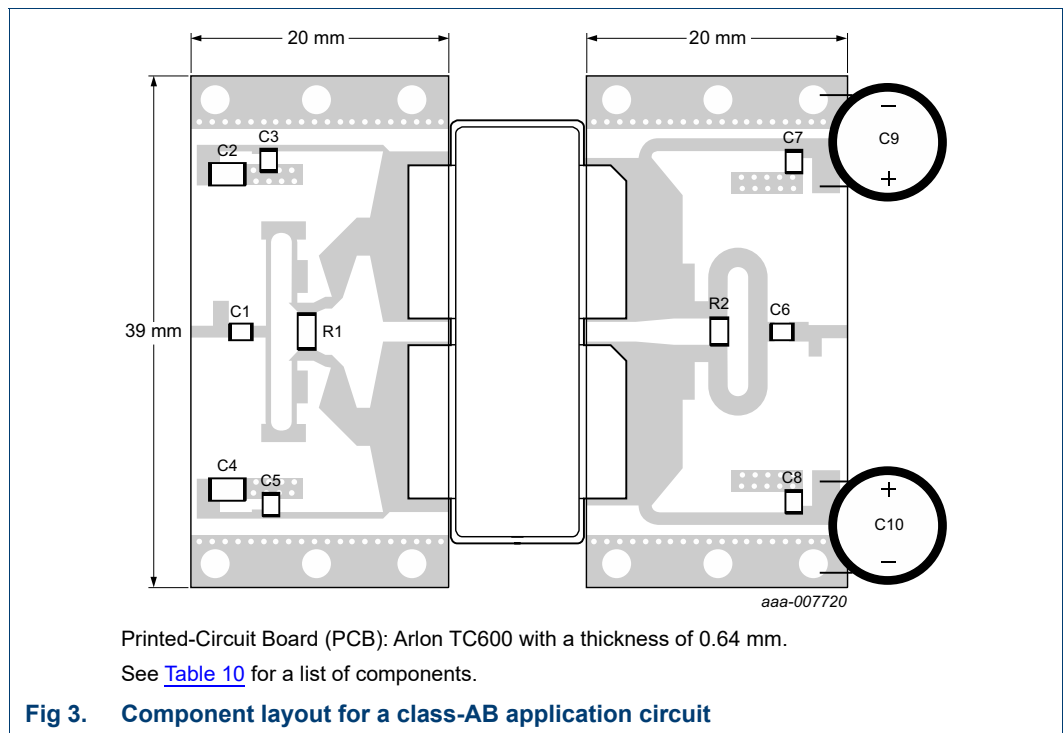
Component	Description	Value	Remarks
C1, C3, C6, C9, C13, C15	multilayer ceramic chip capacitor	18 pF	[1] ATC600F
C2, C5, C10, C16	multilayer ceramic chip capacitor	1 μF	[2]
C4, C7, C8, C14	multilayer ceramic chip capacitor	12 pF	[1] ATC600F
C11, C17	multilayer ceramic chip capacitor	10 μF	[2]
C12	electrolytic capacitor	2200 μF, 63 V	
R1, R2	chip resistor	9.1 Ω	[3]

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

[2] Murata or capacitor of same quality.

[3] Vishay Dale or capacitor of same quality.

### 7.4 Application circuit



**Table 10. List of components application circuit**

See [Figure 2](#).

Component	Description	Value	Remarks
C1, C3, C5, C6, C7, C8	multilayer ceramic chip capacitor	12 pF	[1] ATC600F
C2, C4	multilayer ceramic chip capacitor	1 μF	[2]
C9, C10	electrolytic capacitor	2200 μF, 50 V	
R1, R2	chip resistor	50 Ω	[3]

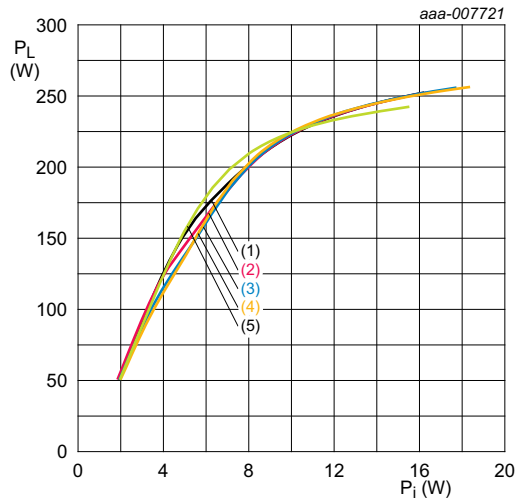
[1] American Technical Ceramics type 600F or capacitor of same quality.

[2] Murata or capacitor of same quality.

[3] Vishay Dale or capacitor of same quality.

7.5 Graphical data

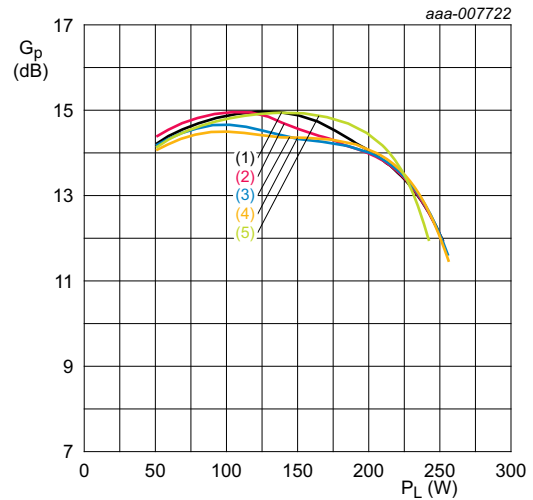
7.5.1 Test circuit



$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

- (1)  $f = 2700\text{ MHz}$
- (2)  $f = 2800\text{ MHz}$
- (3)  $f = 2850\text{ MHz}$
- (4)  $f = 2900\text{ MHz}$
- (5)  $f = 3000\text{ MHz}$

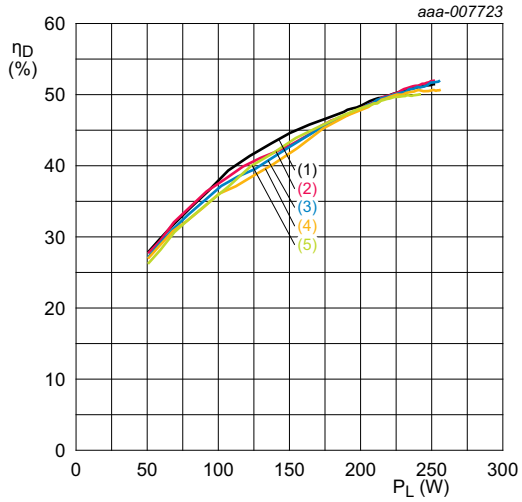
Fig 4. Output power as a function of input power; typical values



$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

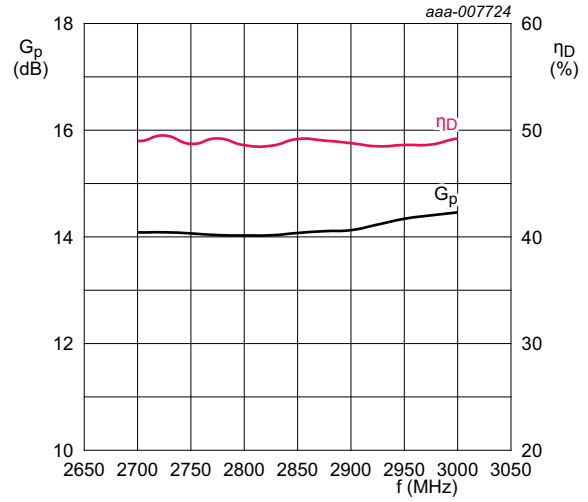
- (1)  $f = 2700\text{ MHz}$
- (2)  $f = 2800\text{ MHz}$
- (3)  $f = 2850\text{ MHz}$
- (4)  $f = 2900\text{ MHz}$
- (5)  $f = 3000\text{ MHz}$

Fig 5. Power gain as a function of output power; typical values



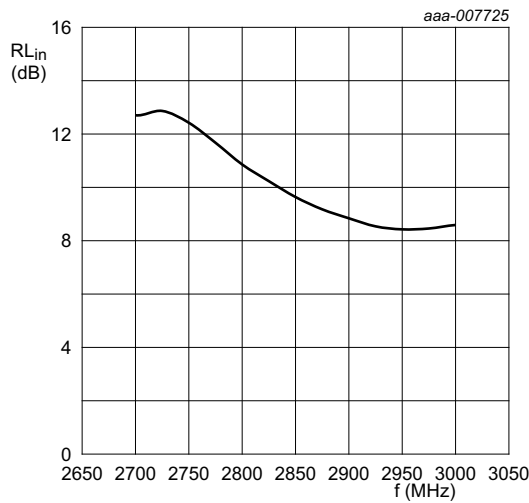
$V_{DS} = 32\text{ V}; I_{Dq} = 100\text{ mA}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $f = 2700\text{ MHz}$   
 (2)  $f = 2800\text{ MHz}$   
 (3)  $f = 2850\text{ MHz}$   
 (4)  $f = 2900\text{ MHz}$   
 (5)  $f = 3000\text{ MHz}$

**Fig 6. Drain efficiency as a function of output power; typical values**



$V_{DS} = 32\text{ V}; P_L = 200\text{ W}; I_{Dq} = 100\text{ mA}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .

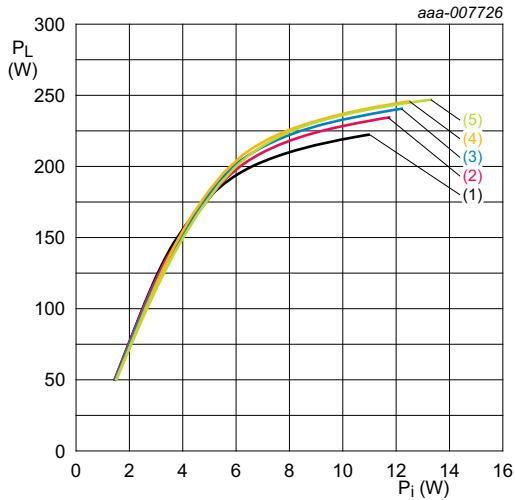
**Fig 7. Power gain and drain efficiency as function of frequency; typical values**



$V_{DS} = 32\text{ V}; P_L = 200\text{ W}; I_{Dq} = 100\text{ mA}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .

**Fig 8. Input return loss as a function of frequency; typical values**

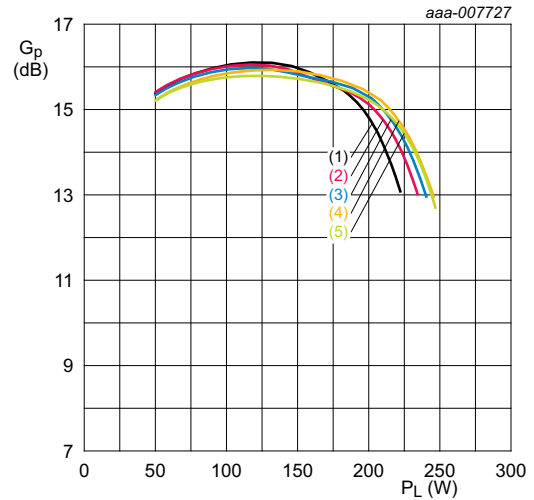
7.5.2 Application circuit



$V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}; t_p = 3000\ \mu\text{s}; \delta = 20\ \%$ .

- (1)  $f = 2700\text{ MHz}$
- (2)  $f = 2800\text{ MHz}$
- (3)  $f = 2850\text{ MHz}$
- (4)  $f = 2900\text{ MHz}$
- (5)  $f = 3000\text{ MHz}$

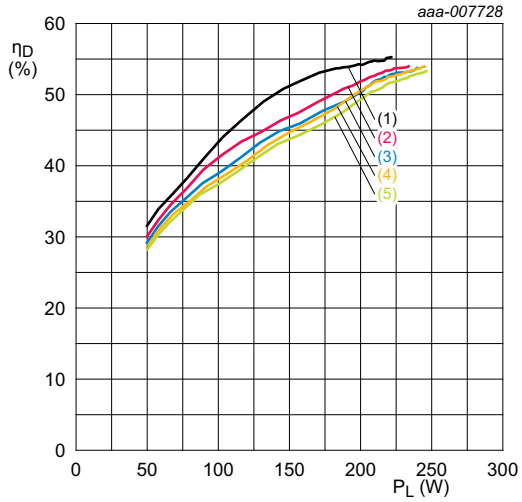
**Fig 9. Output power as a function of input power; typical values**



$V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}; t_p = 3000\ \mu\text{s}; \delta = 20\ \%$ .

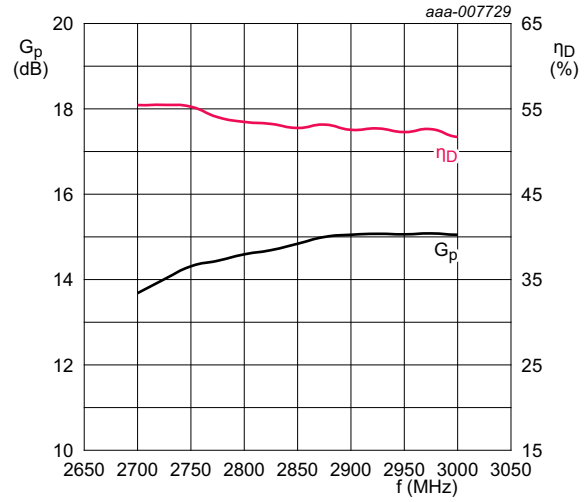
- (1)  $f = 2700\text{ MHz}$
- (2)  $f = 2800\text{ MHz}$
- (3)  $f = 2850\text{ MHz}$
- (4)  $f = 2900\text{ MHz}$
- (5)  $f = 3000\text{ MHz}$

**Fig 10. Power gain as a function of output power; typical values**



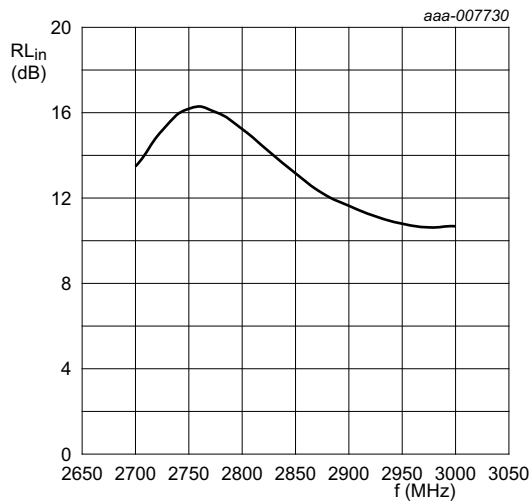
$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 3000\ \mu\text{s}$ ;  $\delta = 20\%$ .  
 (1)  $f = 2700\text{ MHz}$   
 (2)  $f = 2800\text{ MHz}$   
 (3)  $f = 2850\text{ MHz}$   
 (4)  $f = 2900\text{ MHz}$   
 (5)  $f = 3000\text{ MHz}$

**Fig 11. Drain efficiency as a function of output power; typical values**



$V_{DS} = 32\text{ V}$ ;  $P_L = 220\text{ W}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 3000\ \mu\text{s}$ ;  $\delta = 20\%$ .

**Fig 12. Power gain and drain efficiency as function of frequency; typical values**



$V_{DS} = 32\text{ V}$ ;  $P_L = 220\text{ W}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 3000\ \mu\text{s}$ ;  $\delta = 20\%$ .

**Fig 13. Input return loss as a function of frequency; typical values**

8. Package outline

Flanged balanced ceramic package; 2 mounting holes; 4 leads

SOT539A

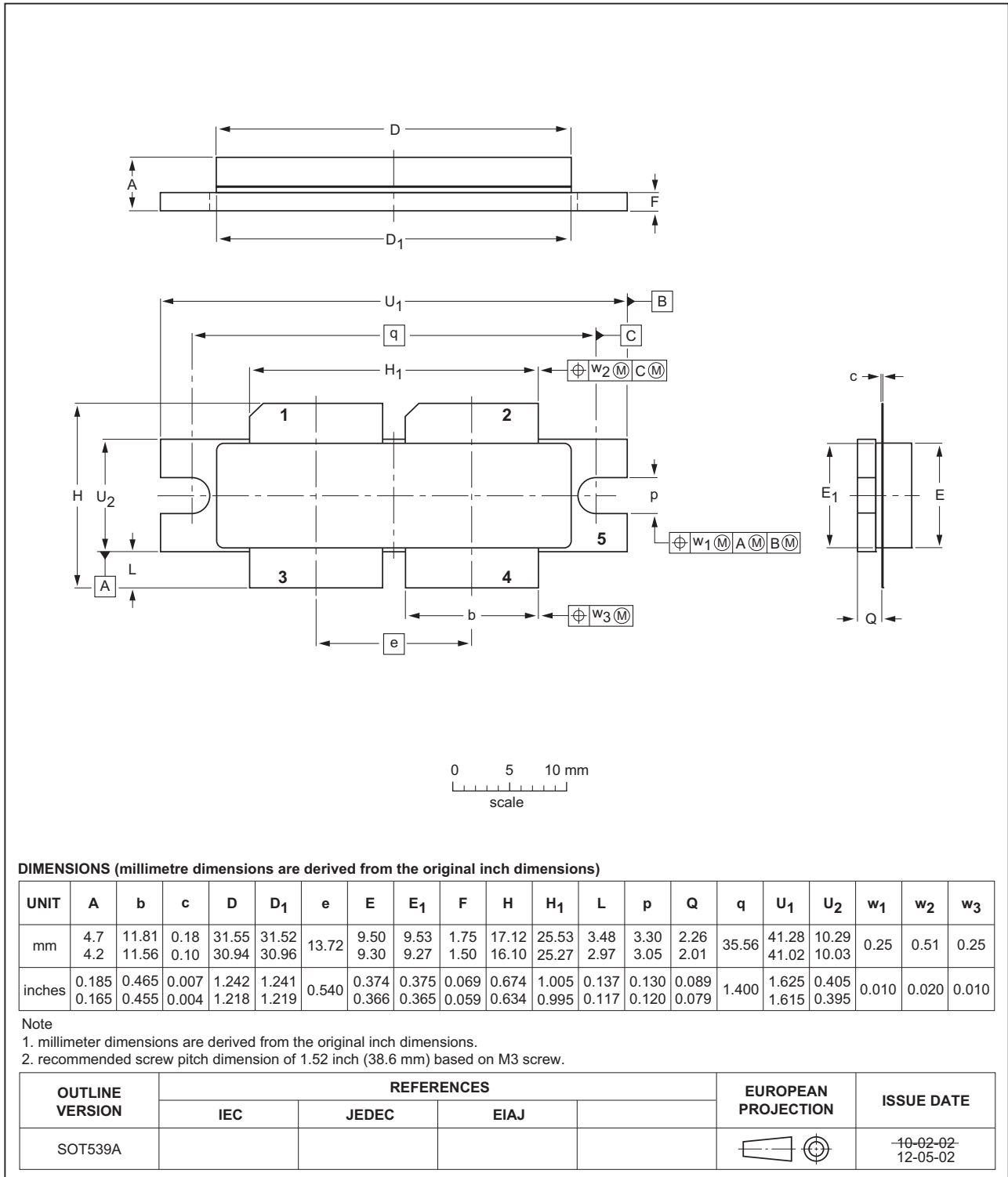


Fig 14. Package outline SOT539A

Earless flanged balanced ceramic package; 4 leads

SOT539B

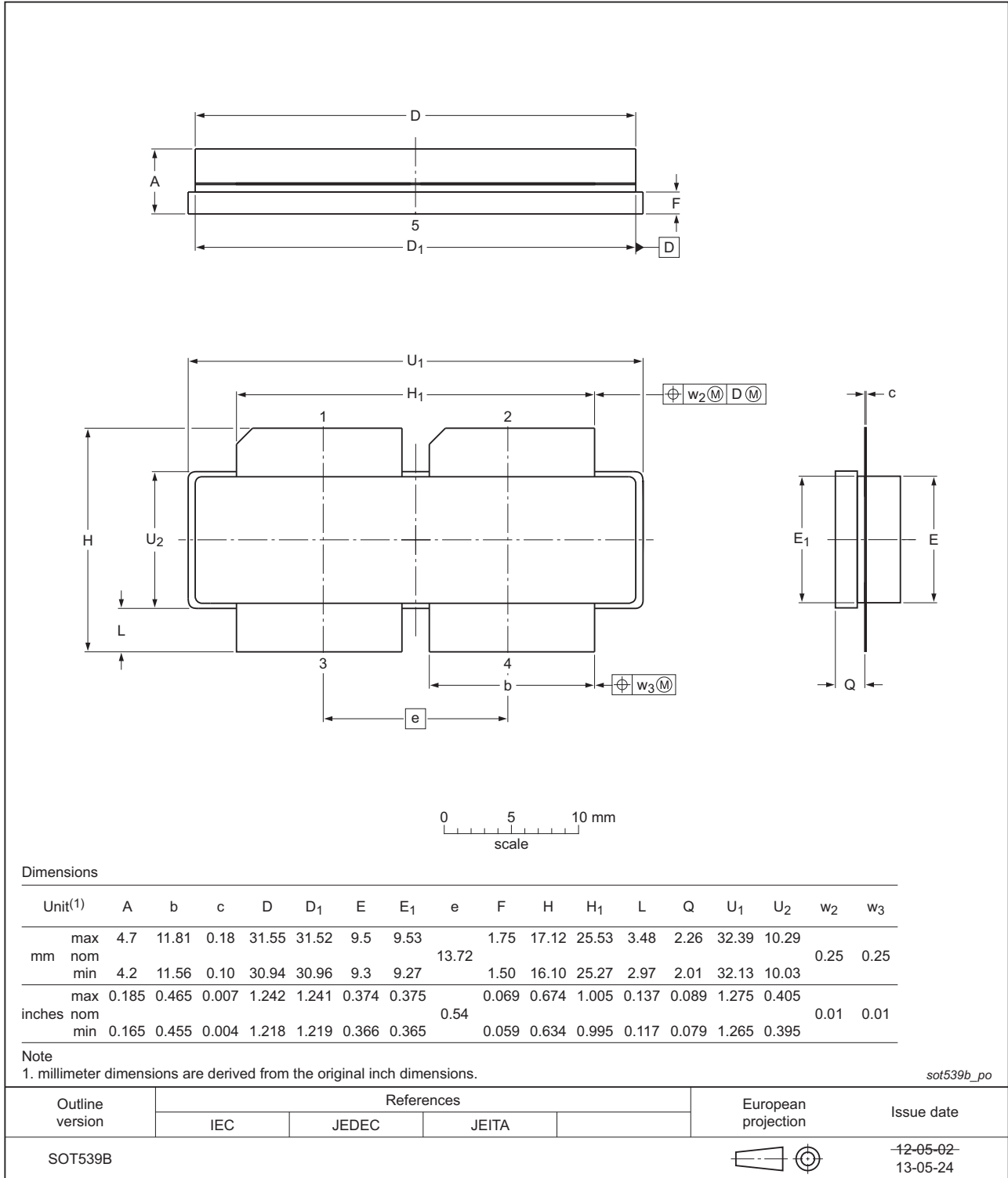


Fig 15. Package outline SOT539B

## 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 11. Abbreviations

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

## 11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLS7G2730S-200P_LS-200P#4	20150901	Product data sheet		BLS7G2730S-200P_LS-200P v.3
Modifications:		<ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>		
BLS7G2730S-200P_LS-200P v.3	20130712	Product data sheet	-	BLS7G2730S-200P_LS-200P v.2
BLS7G2730S-200P_LS-200P v.2	20130603	Product data sheet	-	BLS7G2730S-200P_LS-200P v.1
BLS7G2730S-200P_LS-200P v.1	20130129	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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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**14. Contents**

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Date of release: 1 September 2015

Document identifier: BLS7G2730L-200P\_LS-200P#4

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