

BLA6G1011-200R; BLA6G1011L(S)-200RG

Power LDMOS transistor

Rev. 6 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

200 W LDMOS power transistor for avionics applications at frequencies from 1030 MHz to 1090 MHz.

Table 1. Test information

Typical RF performance at $T_{case} = 25\text{ }^{\circ}\text{C}$.

Test signal	f (MHz)	V _{DS} (V)	P _L (W)	G _p (dB)	η _D (%)	t _r (ns)	t _f (ns)
Typical RF performance in a class-AB production test circuit for SOT502A							
pulsed RF	1030 to 1090	28	200	20	65	10	6
Typical RF performance in a Gullwing application for SOT502C and SOT502D							
pulsed RF	1030 to 1090	28	200	20	65	15	6

1.2 Features and benefits

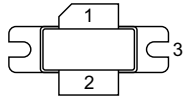
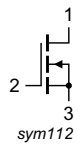
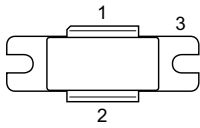
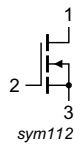
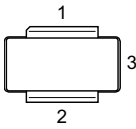
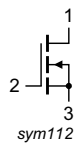
- Typical pulsed RF performance at frequencies from 1030 MHz to 1090 MHz, a supply voltage of 28 V and an I_{DQ} of 100 mA:
 - ◆ Output power = 200 W
 - ◆ Power gain = 20 dB
 - ◆ Efficiency = 65 %
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1030 MHz to 1090 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- Avionics transmitter applications in the 1030 MHz to 1090 MHz frequency range.

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BLA6G1011-200R (SOT502A)			
1	drain		 sym112
2	gate		
3	source ^[1]		
BLA6G1011L-200RG (SOT502D)			
1	drain		 sym112
2	gate		
3	source ^[1]		
BLA6G1011LS-200RG (SOT502C)			
1	drain		 sym112
2	gate		
3	source ^[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLA6G1011-200R	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT502A
BLA6G1011L-200RG	-	eared flanged ceramic package; 2 mounting holes; 2 leads	SOT502D
BLA6G1011LS-200RG	-	earless flanged ceramic package; 2 leads	SOT502C

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	+13	V
I_D	drain current		-	49	A
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		-	225	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Type	Typ	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_{case} = 25\text{ }^{\circ}\text{C};$ $t_p = 50\text{ }\mu\text{s};$ $\delta = 2\text{ }\%$	BLA6G1011-200R	0.085	K/W
			BLA6G1011L-200RG	0.065	K/W
			BLA6G1011LS-200RG	0.065	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	$V_{GS} = 0\text{ V}; I_D = 0.9\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 270\text{ mA}$	1.4	2.0	2.4	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 28\text{ V};$ $I_D = 1620\text{ mA}$	1.7	2.2	2.7	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	4.2	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$	40	48	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	420	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 9.45\text{ A}$	11	18	26	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 9.45\text{ A}$	0.012	0.07	0.093	Ω
C_{rs}	feedback capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V};$ $f = 1\text{ MHz}$	-	3	-	pF

Table 7. RF characteristics

Test signal: Pulsed RF; $t_p = 50\text{ }\mu\text{s}; \delta = 2\text{ }\%$; $V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}; T_{case} = 25\text{ }^{\circ}\text{C};$ unless otherwise specified; in a class-AB production test circuit for straight leads.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
P_L	output power		200	-	-	W
G_p	power gain	$P_L = 200\text{ W}$	18	20	-	dB
RL_{in}	input return loss	$P_L = 200\text{ W}$	-	-10	-8	dB
η_D	drain efficiency	$P_L = 200\text{ W}$	58	65	-	%
t_r	rise time	$P_L = 200\text{ W}$	-	10	20	ns
t_f	fall time	$P_L = 200\text{ W}$	-	6	20	ns

6.1 Ruggedness in class-AB operation

The BLA6G1011-200R, BLA6G1011L-200RG and BLA6G1011LS-200RG are enhanced rugged devices and are capable of withstanding a load mismatch corresponding to $V_{SWR} = 10 : 1$ through all phases under the following conditions: $t_p = 50\text{ }\mu\text{s}; \delta = 2\text{ }\%$; $V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}; P_L = 200\text{ W}; f = 1030\text{ MHz to }1090\text{ MHz}.$

7. Application information

7.1 Impedance information

Table 8. Typical impedance
Typical values unless otherwise specified.

f (MHz)	Z_S (Ω)	Z_L (Ω)
BLA6G1011-200R		
1030	0.57 – j0.94	0.80 – j0.68
1060	0.70 – j1.13	0.84 – j0.52
1090	0.80 – j1.53	0.86 – j0.35
BLA6G1011L-200RG and BLA6G1011LS-200RG		
1030	0.69 – j2.18	0.84 – j0.59
1060	0.86 – j2.36	0.85 – j0.73
1090	1.12 – j2.54	0.86 – j0.87

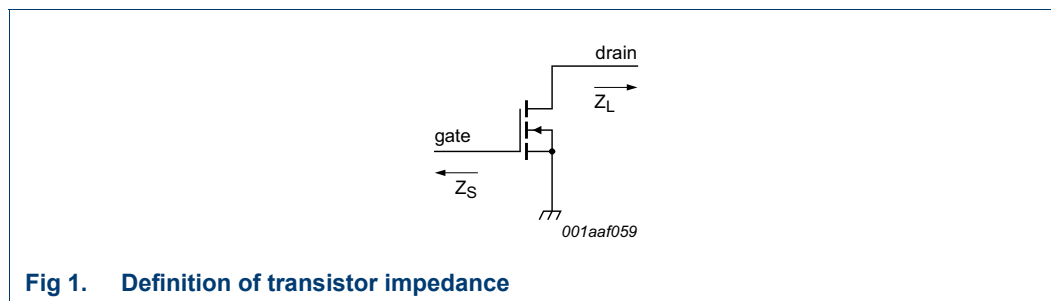
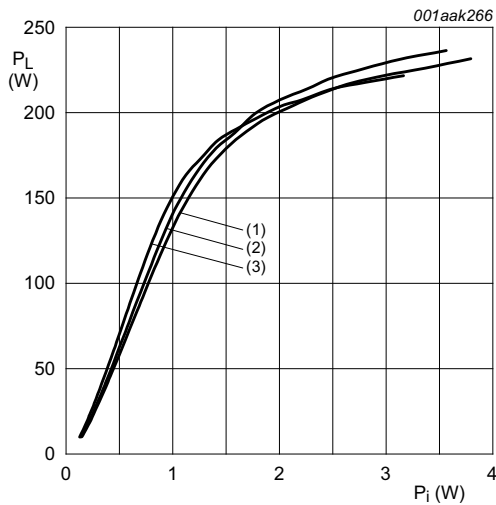


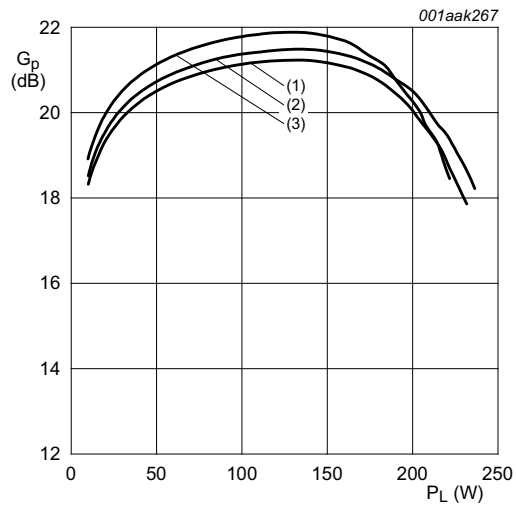
Fig 1. Definition of transistor impedance

7.2 RF performance



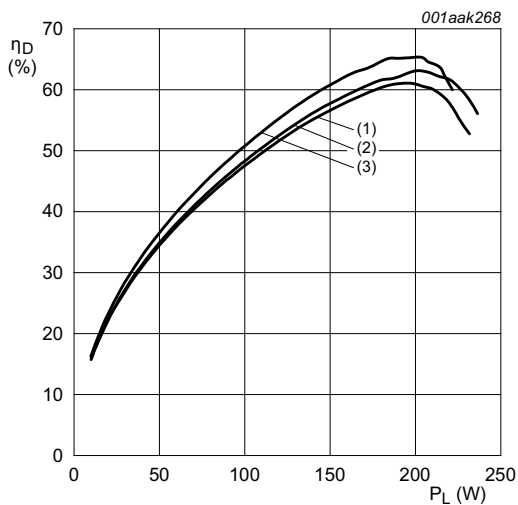
$V_{DS} = 28\text{ V}$; $t_p = 50\ \mu\text{s}$; $\delta = 2\%$; $I_{Dq} = 100\text{ mA}$.
 (1) $f = 1030\text{ MHz}$
 (2) $f = 1060\text{ MHz}$
 (3) $f = 1090\text{ MHz}$

Fig 2. Output power as a function of input power; typical values



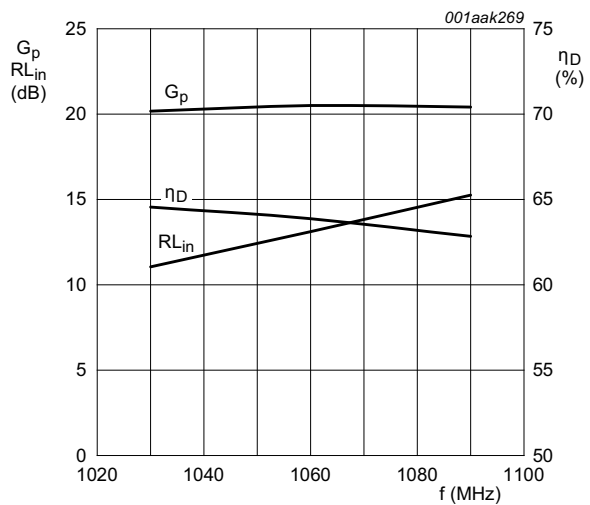
$V_{DS} = 28\text{ V}$; $t_p = 50\ \mu\text{s}$; $\delta = 2\%$; $I_{Dq} = 100\text{ mA}$.
 (1) $f = 1030\text{ MHz}$
 (2) $f = 1060\text{ MHz}$
 (3) $f = 1090\text{ MHz}$

Fig 3. Power gain as a function of output power; typical values



$V_{DS} = 28\text{ V}$; $t_p = 50\ \mu\text{s}$; $\delta = 2\%$; $I_{Dq} = 100\text{ mA}$.
 (1) $f = 1030\text{ MHz}$
 (2) $f = 1060\text{ MHz}$
 (3) $f = 1090\text{ MHz}$

Fig 4. Drain efficiency as a function of output power; typical values



$P_L = 200\text{ W}$; $V_{DS} = 28\text{ V}$; $t_p = 50\ \mu\text{s}$; $\delta = 2\%$; $I_{Dq} = 100\text{ mA}$.

Fig 5. Power gain, input return loss and drain efficiency as function of frequency; typical values

7.3 Application circuit

Remark: For BLA6G1011-200R with straight leads

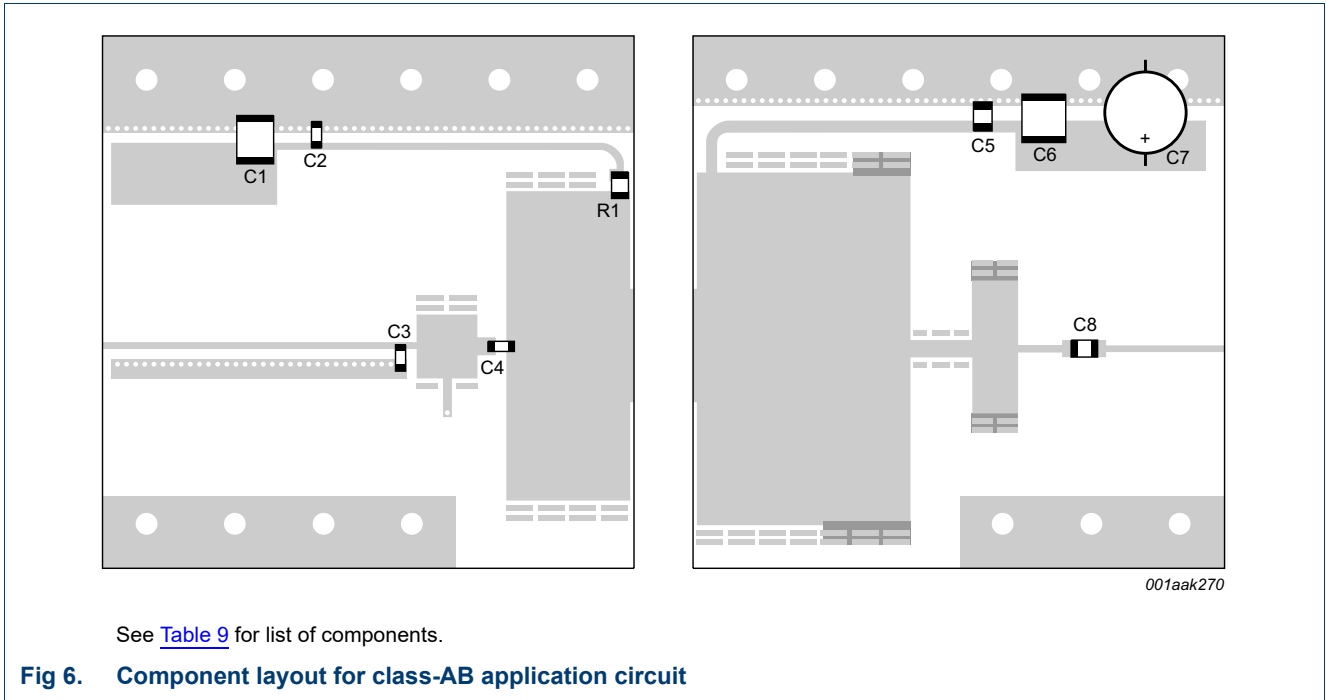


Table 9. List of components

See [Figure 6](#).

Striplines are on a Rogers Duroid 6006 Printed-Circuit Board (PCB); $\epsilon_r = 6.15$ F/m; thickness = 0.64 mm

Component	Description	Value	Remarks
C1, C6	multilayer ceramic chip capacitor	10 μ F	TDK
C2	multilayer ceramic chip capacitor	68 pF	[1]
C3	multilayer ceramic chip capacitor	1.5 pF	[1]
C4	multilayer ceramic chip capacitor	3.9 pF	[1]
C5, C8	multilayer ceramic chip capacitor	30 pF	[2]
C7	electrolytic capacitor	470 μ F; 63 V	
R1	SMD resistor	12 Ω	SMD 1206

[1] American Technical Ceramics type 100A or capacitor of same quality.

[2] American Technical Ceramics type 100B or capacitor of same quality.

8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT502A

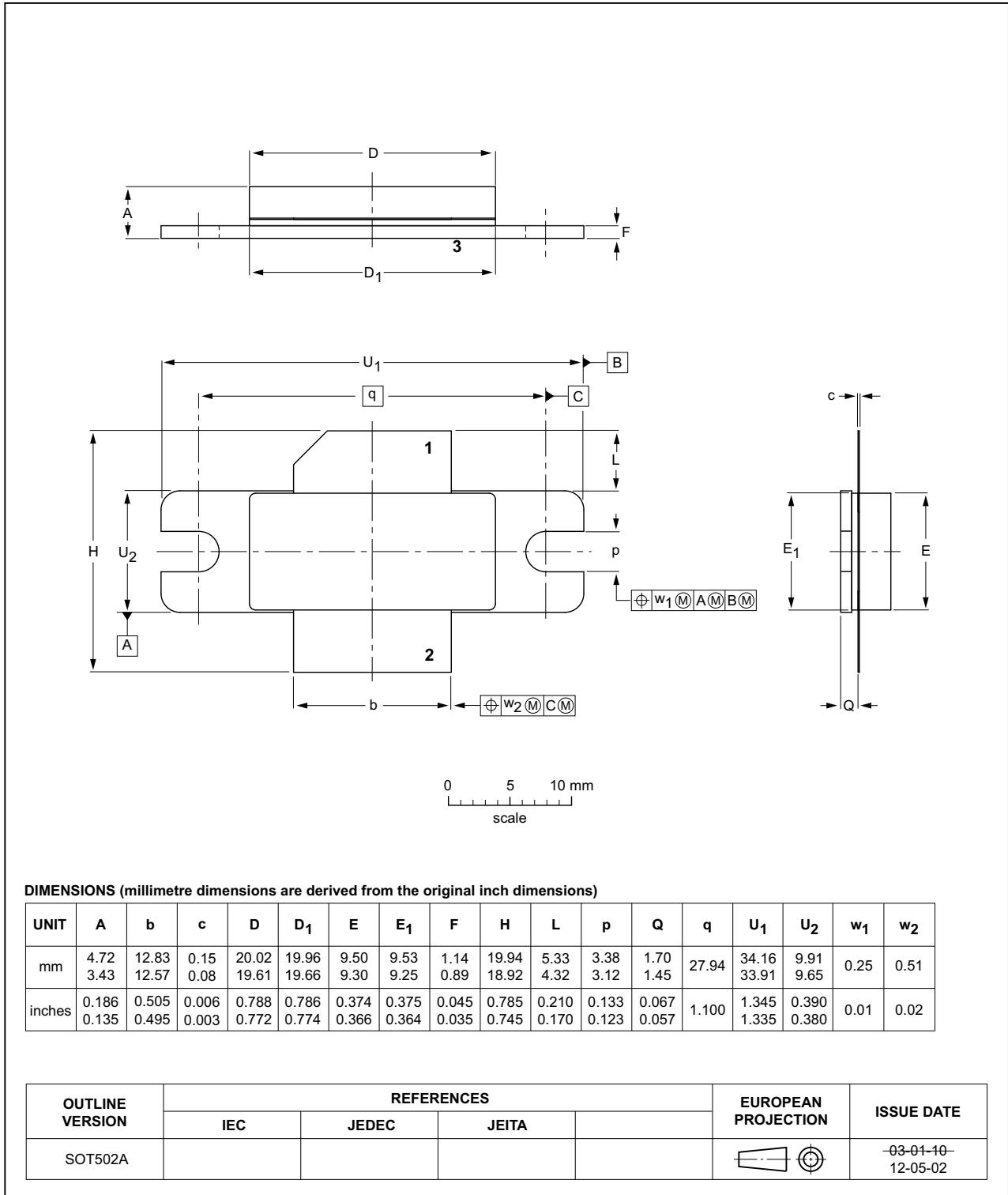


Fig 7. Package outline SOT502A

Earless flanged ceramic package; 2 leads

SOT502C

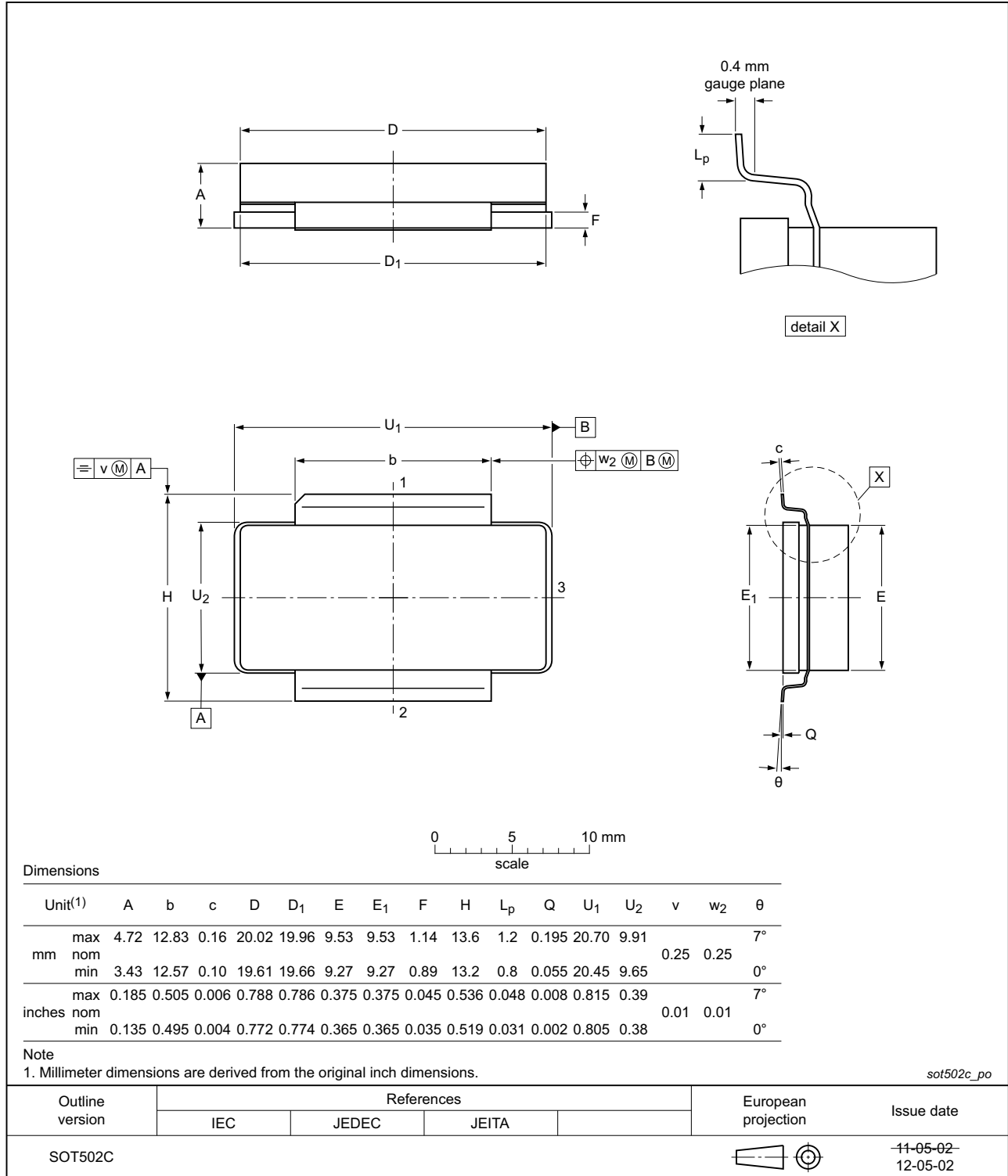


Fig 8. Package outline SOT502C

Eared flanged ceramic package; 2 leads; 2 mounting holes

SOT502D

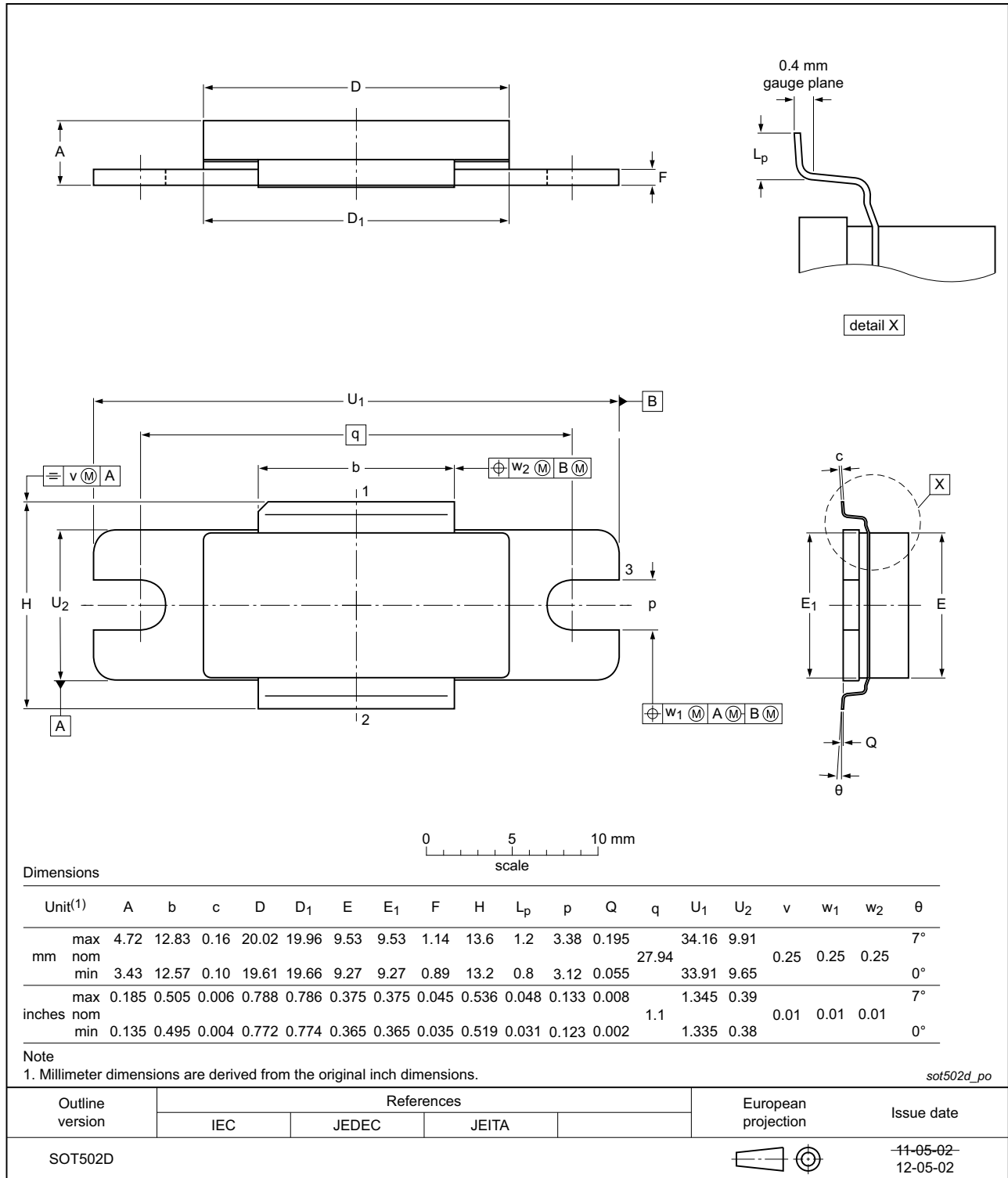



Fig 9. Package outline SOT502D

9. Handling information

CAUTION	
	<p>This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.</p> <p>Such precautions are described in the <i>ANSI/ESD S20.20</i>, <i>IEC/ST 61340-5</i>, <i>JESD625-A</i> or equivalent standards.</p>

10. Abbreviations

Table 10. Abbreviations

Acronym	Description
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
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
BLA6G1011-200R_L-200RG_LS-200RG#6	20150901	Product data sheet		BLA6G1011-200R v.5
Modifications:	<ul style="list-style-type: none"> The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. Legal texts have been adapted to the new company name where appropriate. 			
BLA6G1011-200R_L-200RG_LS-200RG v.5	20150317	Product data sheet		BLA6G1011-200R v.4
BLA6G1011-200R_L-200RG_LS-200RG v.4	20111109	Product data sheet		BLA6G1011-200R v.3
BLA6G1011-200R v.3	20100714	Product data sheet	-	-

12. Legal information

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Document status ^{[1][2]}	Product status ^[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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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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