

BLA9H0912L-250(G); BLA9H0912LS-250(G)

LDMOS avionics power transistor

Rev. 1 — 14 June 2019

AMPLEON

Product data sheet

1. Product profile

1.1 General description

250 W LDMOS power transistor for avionics applications in the frequency range from 960 MHz to 1215 MHz.

Table 1. Typical information

Typical RF performance at $T_{case} = 25\text{ °C}$; $t_p = 50\text{ }\mu\text{s}$; $\delta = 2\%$; $I_{DQ} = 100\text{ mA}$; in a class-AB demo circuit.

Test signal	f	V _{DS}	P _L	G _p	η_D
	(MHz)	(V)	(W)	(dB)	(%)
pulsed RF	1030	50	250	22	60

1.2 Features and benefits

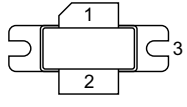
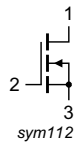
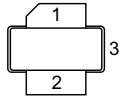
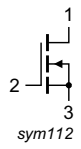
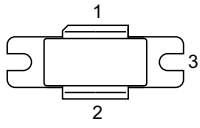
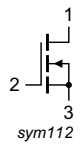
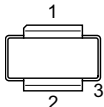
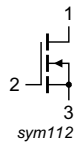
- High efficiency
- Excellent ruggedness
- Designed for avionics band operation
- Excellent thermal stability
- Easy power control
- Integrated dual sided ESD protection enables excellent off-state isolation
- High flexibility with respect to pulse formats
- Internally matched for ease of use
- For RoHS compliance see the product details on the Ampleon website

1.3 Applications

- Avionics transmitter applications in the frequency range from 960 MHz to 1215 MHz

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BLA9H0912L-250 (SOT502A)			
1	drain		
2	gate		
3	source ^[1]		
BLA9H0912LS-250 (SOT502B)			
1	drain		
2	gate		
3	source ^[1]		
BLA9H0912L-250G (SOT502F)			
1	drain		
2	gate		
3	source ^[1]		
BLA9H0912LS-250G (SOT502E)			
1	drain		
2	gate		
3	source ^[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BLA9H0912L-250	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT502A
BLA9H0912LS-250	-	earless flanged ceramic package; 2 leads	SOT502B
BLA9H0912L-250G	-	eared flanged ceramic package; 2 leads; 2 mounting holes	SOT502F
BLA9H0912LS-250G	-	earless flanged ceramic package; 2 leads	SOT502E

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		-	106	V
V_{GS}	gate-source voltage		-6	+11	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, for details refer to the online MTF calculator.

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	$T_{case} = 85\text{ °C}; P_L = 250\text{ W}$		
		$t_p = 32\text{ }\mu\text{s}; \delta = 2\%$	0.086	K/W
		$t_p = 10\text{ }\mu\text{s}; \delta = 10\%$	0.102	K/W
		$t_p = 64\text{ }\mu\text{s}; \delta = 1\%$	0.105	K/W
		$t_p = 2.4\text{ ms}; \delta = 6.4\%$	0.380	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	$V_{GS} = 0\text{ V}; I_D = 2\text{ mA}$	106	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 200\text{ mA}$	1.5	2.0	2.5	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}$	-	-	1.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	30	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	140	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 200\text{ mA}$	-	1.83	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 7\text{ A}$	-	0.110	-	Ω

Table 7. RF characteristics

Test signal: pulsed RF; $f = 1030\text{ MHz}; t_p = 50\text{ }\mu\text{s}; \delta = 2\%$; RF performance at $V_{DS} = 50\text{ V}; I_{Dq} = 100\text{ mA}; T_{case} = 25\text{ °C}$; unless otherwise specified, in a class-AB production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_L = 250\text{ W}$	20.8	22	-	dB
η_D	drain efficiency	$P_L = 250\text{ W}$	56	60	-	%

Table 7. RF characteristics ...continued

Test signal: pulsed RF; $f = 1030$ MHz; $t_p = 50$ μ s; $\delta = 2$ %; RF performance at $V_{DS} = 50$ V; $I_{Dq} = 100$ mA; $T_{case} = 25$ °C; unless otherwise specified, in a class-AB production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
RL_{in}	input return loss	$P_L = 250$ W	-	-10	-	dB
$P_{droop(pulse)}$	pulse droop power	$P_L = 250$ W	-	0.2	0.5	dB
$P_{L(1dB)}$	output power at 1 dB gain compression		-	275	-	W

7. Test information

7.1 Ruggedness in class-AB operation

The BLA9H0912L-250, BLA9H0912LS-250, BLA9H0912L-250G and BLA9H0912LS-250G are capable of withstanding a load mismatch corresponding to $VSWR = 20 : 1$ through all phases under the following conditions: $V_{DS} = 50$ V; $I_{Dq} = 100$ mA; $P_L = 250$ W; $t_p = 50$ μ s; $\delta = 2$ %.

7.2 Impedance information

Table 8. Typical impedance

f (MHz)	Z_S [1] (Ω)	Z_L [1] (Ω)
950	0.810 - j2.723	1.613 - j1.368
1000	1.487 - j3.026	1.517 - j1.573
1050	2.382 - j2.804	1.474 - j2.081
1100	3.085 - j2.265	1.666 - j2.222
1150	2.974 - j1.273	1.897 - j2.759
1200	1.161 - j2.520	2.273 - j3.636

[1] Z_S and Z_L defined in [Figure 1](#).

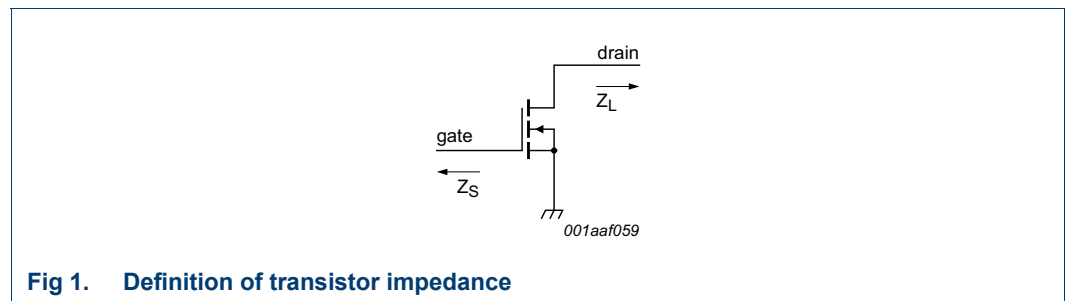


Fig 1. Definition of transistor impedance

7.3 Test circuit

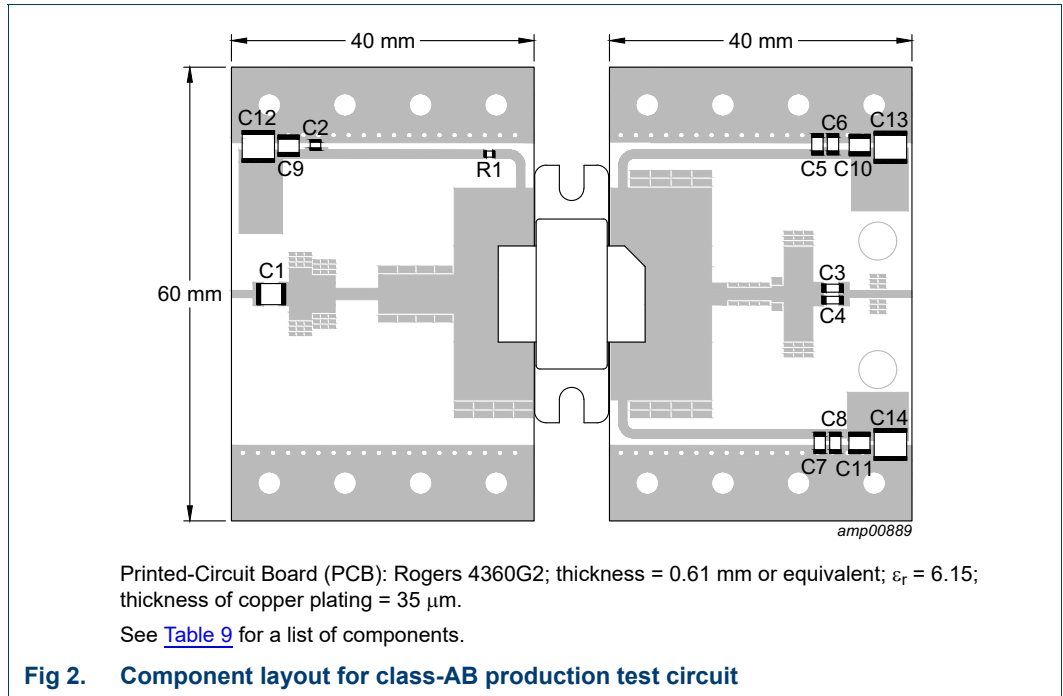
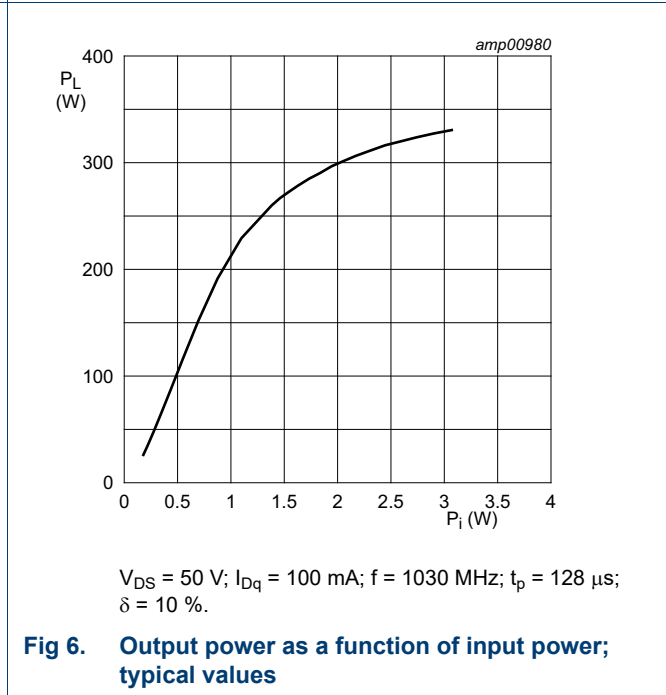
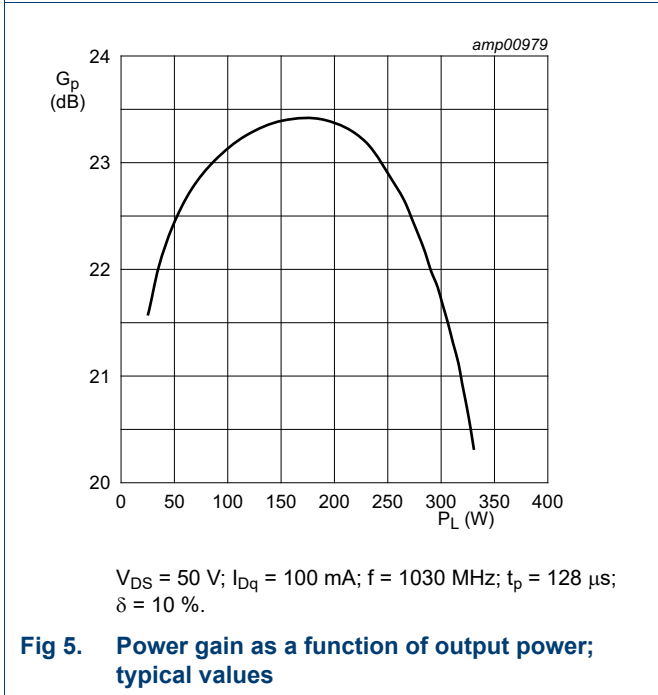
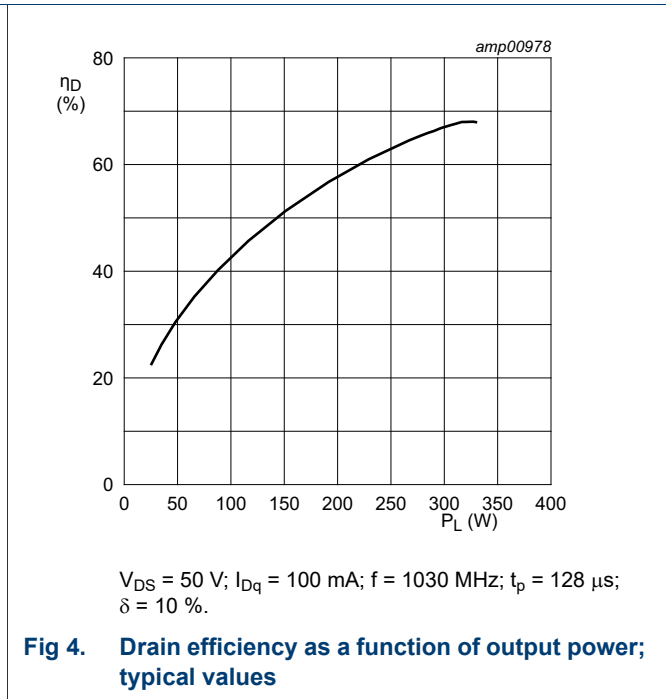
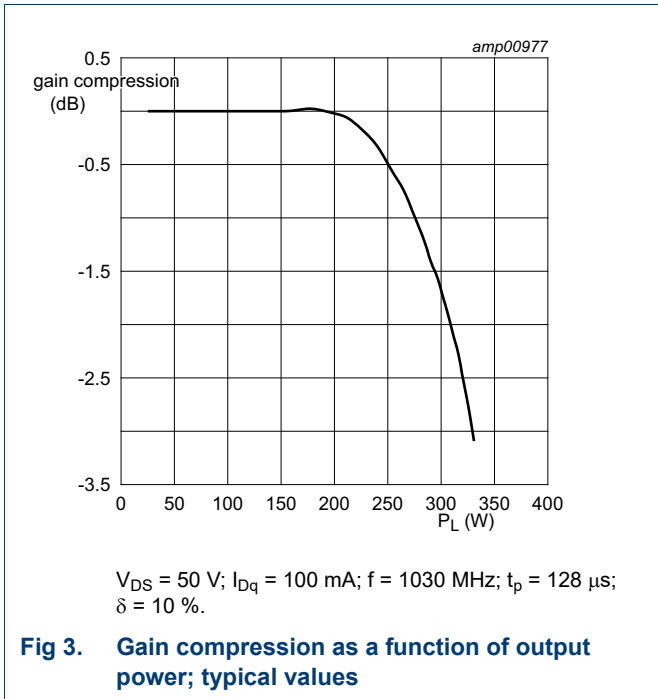


Table 9. List of components

See [Figure 2](#) for component layout.

Component	Description	Value	Remarks
C1, C2	multilayer ceramic chip capacitor	200 pF	ATC 800B
C3, C4	multilayer ceramic chip capacitor	180 pF	ATC 800B
C5, C6, C7, C8	multilayer ceramic chip capacitor	75 pF	ATC 800B
C9, C10, C11	multilayer ceramic chip capacitor	1 nF	ATC 100B
C12, C13, C14	multilayer ceramic chip capacitor	4.7 μF , 100 V	GMR42 258K7S 475K 100 H53
R1	resistor	5.1 Ω	SMD 0603

7.4 Graphical data



8. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT502A

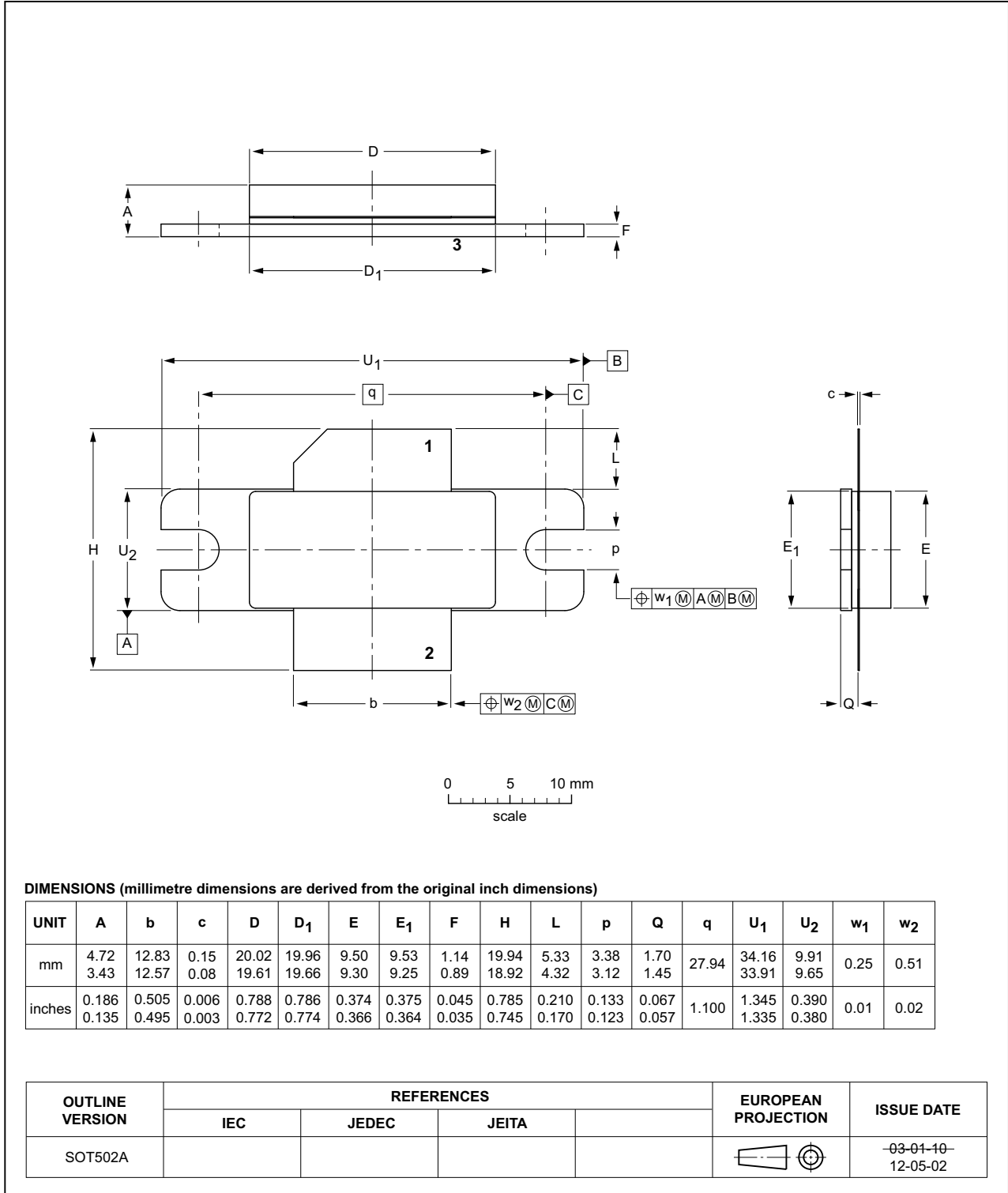


Fig 7. Package outline SOT502A

Earless flanged ceramic package; 2 leads

SOT502B

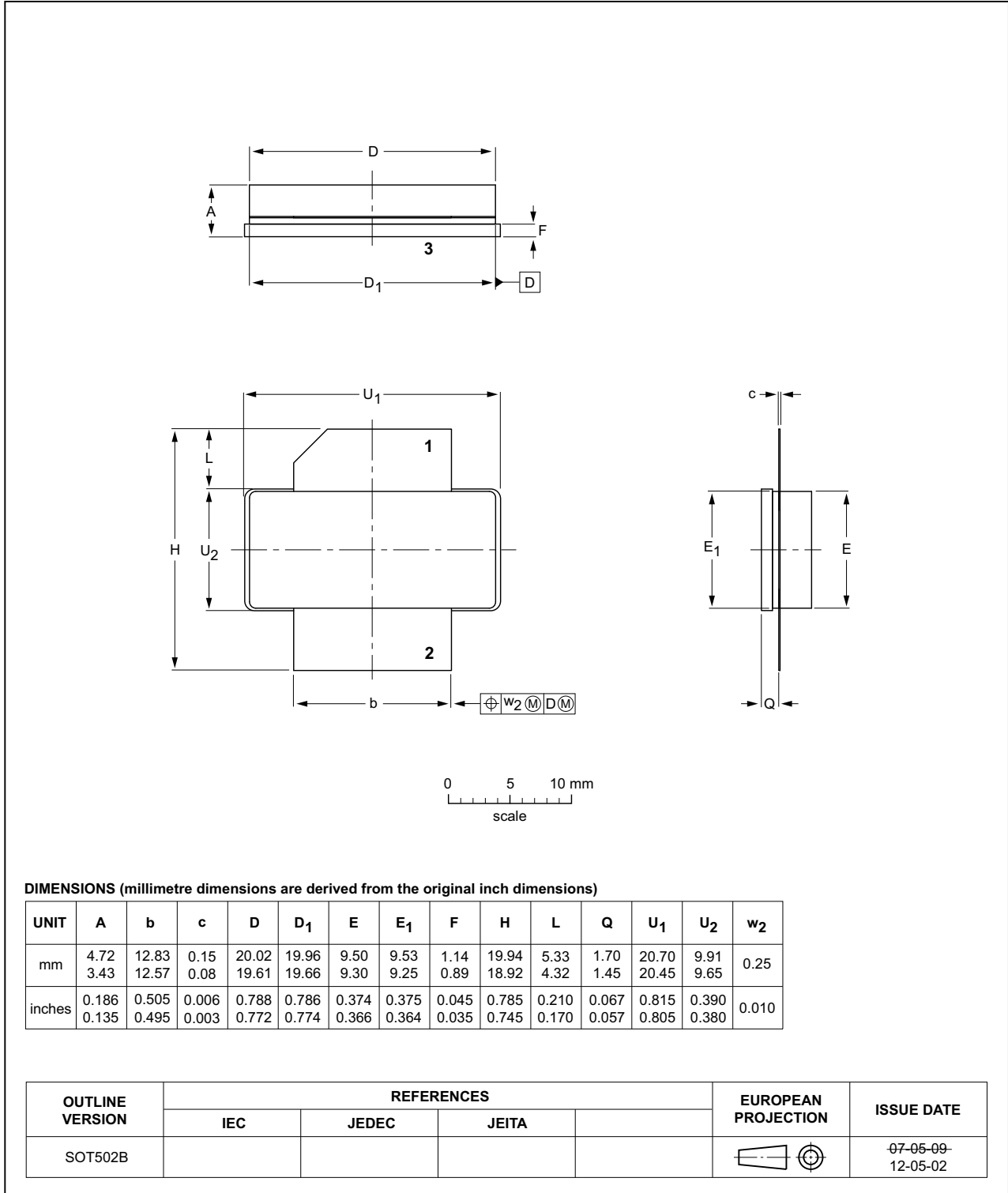


Fig 8. Package outline SOT502B

Earless flanged ceramic package; 2 leads

SOT502E

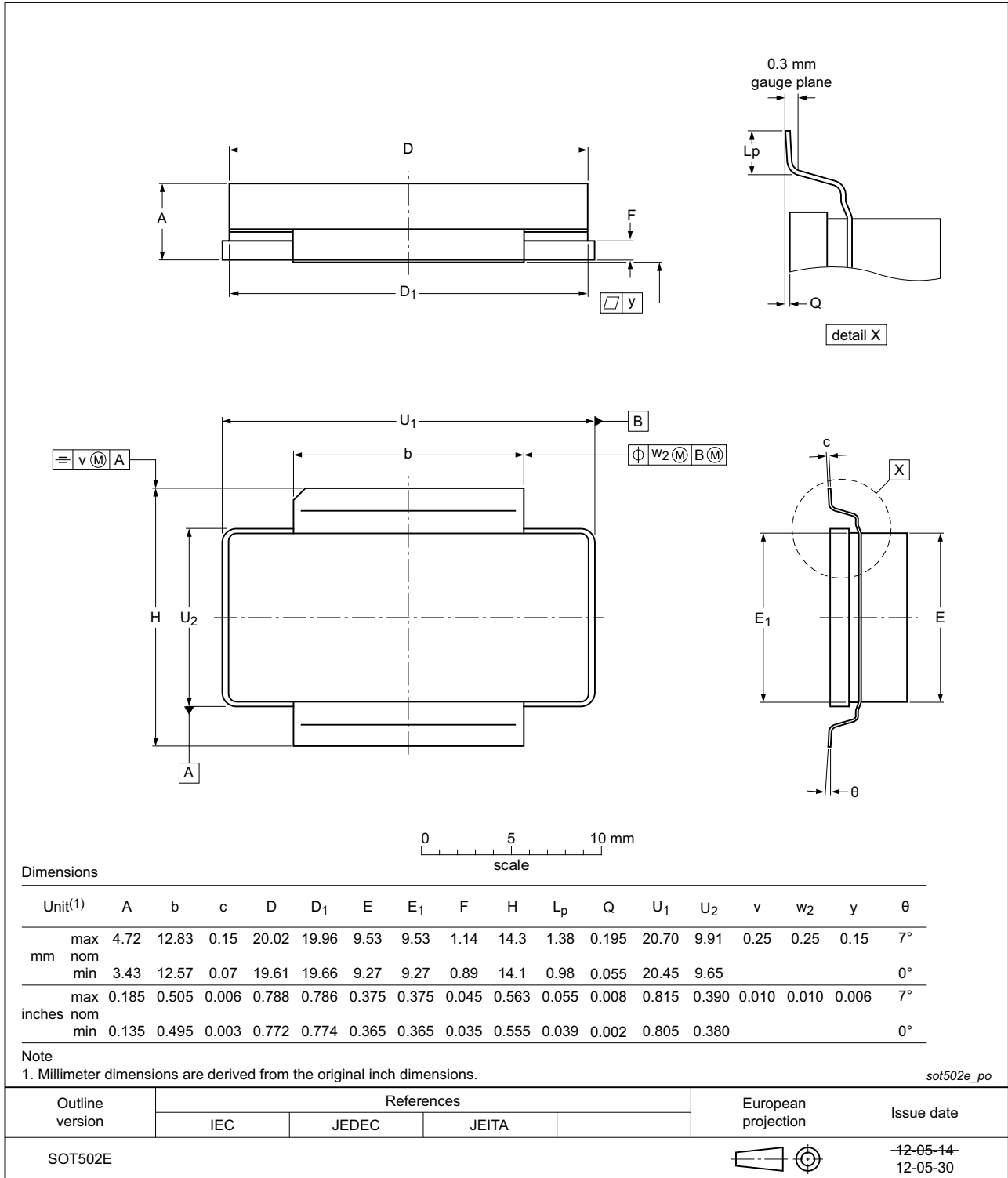


Fig 9. Package outline SOT502E

Eared flanged ceramic package; 2 leads; 2 mounting holes

SOT502F

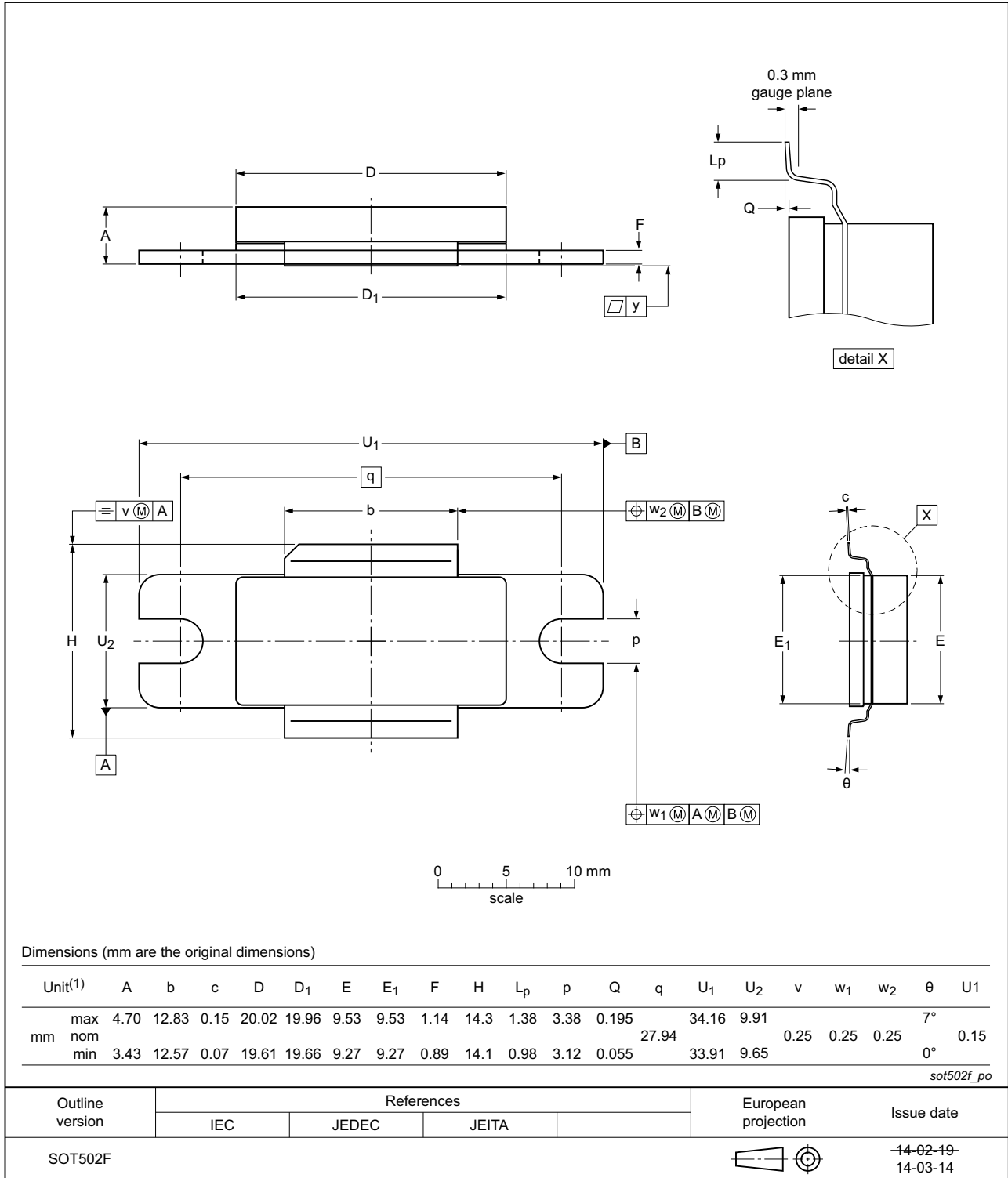


Fig 10. Package outline SOT502F

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.

Table 10. ESD sensitivity

ESD model	Class
Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002	C2A [1]
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	2 [2]

[1] CDM classification C2A is granted to any part that passes after exposure to an ESD pulse of 500 V.

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 V.

10. Abbreviations

Table 11. Abbreviations

Acronym	Description
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
RoHS	Restriction of Hazardous Substances
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio

11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLA9H0912L-250_LS-250_L-250G_LS-250G v.1	20190614	Product data sheet		-

12. Legal information

12.1 Data sheet status

Document status ^{[1][2]}	Product status ^[3]	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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