

BLS6G3135-120; BLS6G3135S-120

LDMOS S-Band radar power transistor

Rev. 01 — 14 August 2007

Preliminary data sheet

1. Product profile

1.1 General description

120 W LDMOS power transistor intended for radar applications in the 3.1 GHz to 3.5 GHz range.

Table 1. Typical performance

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

Mode of operation	f (GHz)	V _{DS} (V)	P _L (W)	G _p (dB)	η_D (%)	t _r (ns)	t _f (ns)
pulsed RF	3.1 to 3.5	32	120	11	43	20	6

CAUTION



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

1.2 Features

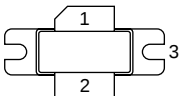
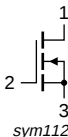
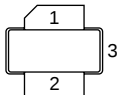
- Typical pulsed RF performance at a frequency of 3.1 GHz to 3.5 GHz, a supply voltage of 32 V, an I_{DQ} of 100 mA, a t_p of up to 300 μs with δ of 10 %:
 - ◆ Output power = 120 W
 - ◆ Gain = 11 dB
 - ◆ Efficiency = 43 %
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (3.1 GHz to 3.5 GHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding restriction of hazardous substances (RoHS)

1.3 Applications

- S-Band power amplifiers for radar applications in the 3.1 GHz to 3.5 GHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
BLS6G3135-120 (SOT502A)			
1	drain		 sym112
2	gate		
3	source		
BLS6G3135S-120 (SOT502B)			
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLS6G3135-120	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A
BLS6G3135S-120	-	earless flanged LDMOST 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	-	60	V
V_{GS}	gate-source voltage	-0.5	+13	V
I_D	drain current	-	7.2	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	Max	Unit
$Z_{th(j-mb)}$	transient thermal impedance from junction to mounting base	$T_{case} = 85\text{ }^{\circ}\text{C}; P_L = 120\text{ W}$			
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ }\%$	0.29	0.40	K/W
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ }\%$	0.30	0.41	K/W

6. Characteristics

Table 6. 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	$V_{GS} = 0\text{ V}; I_D = 0.5\text{ mA}$	60	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 180\text{ mA}$	1.4	1.8	2.3	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	5	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	27	33	-	A
I_{GSS}	gate leakage current	$V_{GS} = 8.3\text{ V}; V_{DS} = 0\text{ V}$	-	-	450	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 9\text{ A}$	-	13	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 6.3\text{ A}$	-	0.085	0.160	Ω

7. Application information

Table 7. Application information

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
P_L	output power		-	120	-	W
V_{CC}	supply voltage	$P_L = 120\text{ W}$	-	-	32	V
G_p	power gain	$P_L = 120\text{ W}$	9.5	11	-	dB
IRL	input return loss	$P_L = 120\text{ W}$	6	10	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	$P_L = 120\text{ W}$	-	130	-	W
η_D	drain efficiency	$P_L = 120\text{ W}$	39	43	-	%
t_r	rise time	$P_L = 120\text{ W}$	-	20	50	ns
t_f	fall time	$P_L = 120\text{ W}$	-	6	50	ns

Table 8. Typical impedance

f	Z _S	Z _L
GHz	Ω	Ω
3.1	2.7 – j5.4	5.9 – j5.9
3.2	3.3 – j4.7	4.5 – j6.2
3.3	4.2 – j4.4	3.5 – j6.0
3.4	5.2 – j4.8	2.7 – j5.6
3.5	5.7 – j6.2	2.0 – j5.2

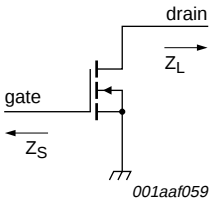
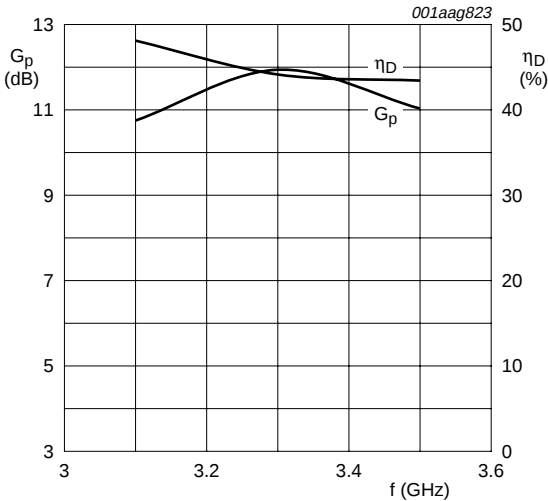


Fig 1. Definition of transistor impedance

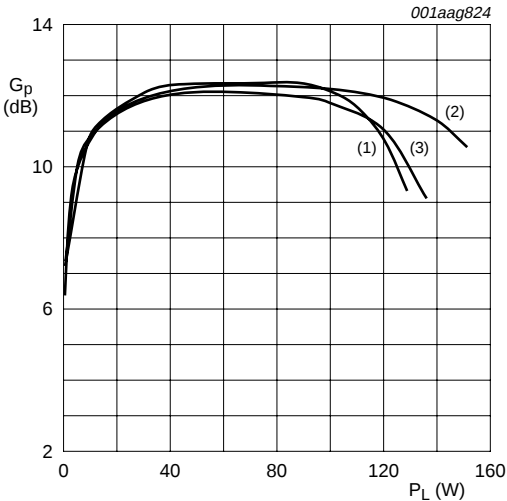
7.1 Ruggedness in class-AB operation

The BLS6G3135-120 and BLS6G3135S-120 are capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions: V_{DS} = 32 V; I_{Dq} = 100 mA; P_L = 120 W; t_p = 300 μs; δ = 10 %.



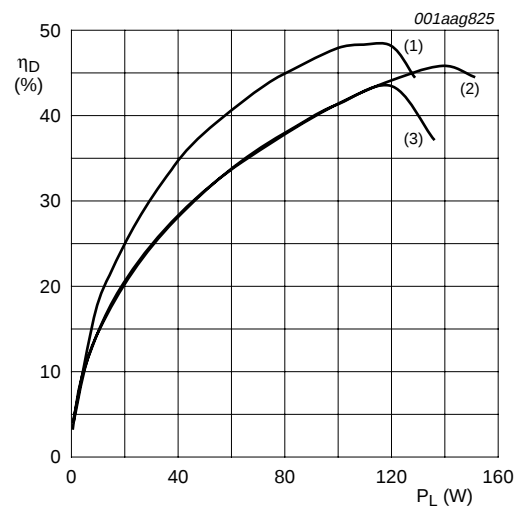
V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %;
P_L = 120 W.

Fig 2. Power gain and drain efficiency as functions of frequency; typical values



(1) f = 3.1 GHz.
(2) f = 3.3 GHz.
(3) f = 3.5 GHz.
V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 300 μs; δ = 10 %.

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



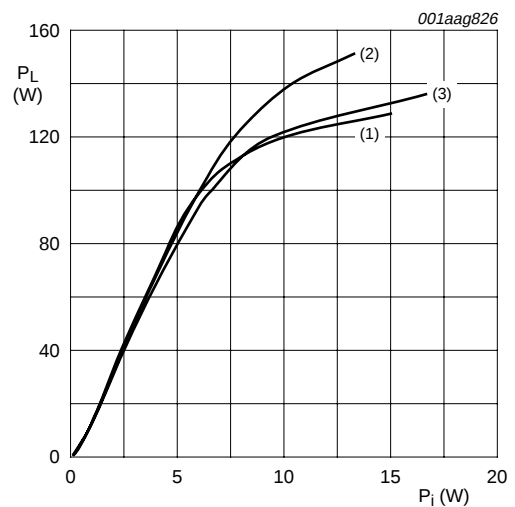
(1) $f = 3.1$ GHz.

(2) $f = 3.3$ GHz.

(3) $f = 3.5$ GHz.

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

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



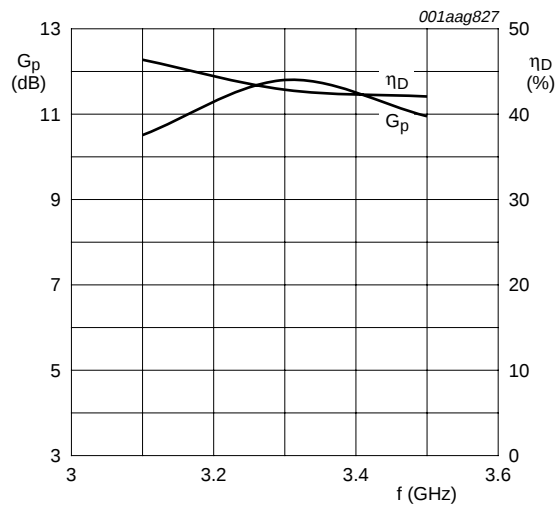
(1) $f = 3.1$ GHz.

(2) $f = 3.3$ GHz.

(3) $f = 3.5$ GHz.

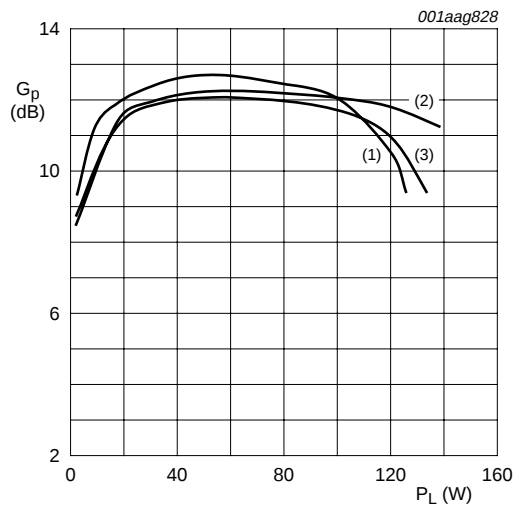
$V_{DS} = 32$ V; $I_{DQ} = 100$ mA; $t_p = 300$ μ s; $\delta = 10$ %.

Fig 5. Load power as a function of input power; typical values



$V_{DS} = 32$ V; $I_{DQ} = 100$ mA; $t_p = 100$ μ s; $\delta = 20$ %; $P_L = 120$ W.

Fig 6. Power gain and drain efficiency as functions of frequency; typical values



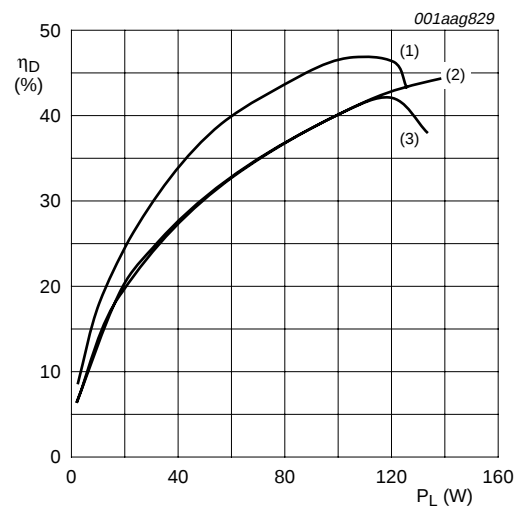
(1) $f = 3.1$ GHz.

(2) $f = 3.3$ GHz.

(3) $f = 3.5$ GHz.

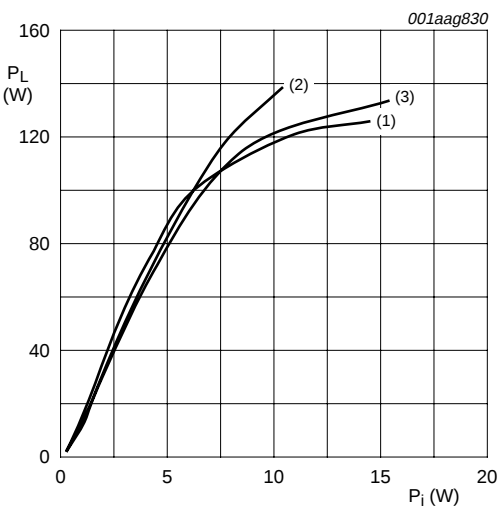
$V_{DS} = 32$ V; $I_{DQ} = 100$ mA; $t_p = 100$ μ s; $\delta = 20$ %.

Fig 7. Power gain as a function of load power; typical values



(1) $f = 3.1$ GHz.
(2) $f = 3.3$ GHz.
(3) $f = 3.5$ GHz.
 $V_{DS} = 32$ V; $I_{DQ} = 100$ mA; $t_p = 100$ μ s; $\delta = 20$ %.

Fig 8. Drain efficiency as a function of load power; typical values



(1) $f = 3.1$ GHz.
(2) $f = 3.3$ GHz.
(3) $f = 3.5$ GHz.
 $V_{DS} = 32$ V; $I_{DQ} = 100$ mA; $t_p = 100$ μ s; $\delta = 20$ %.

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

8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

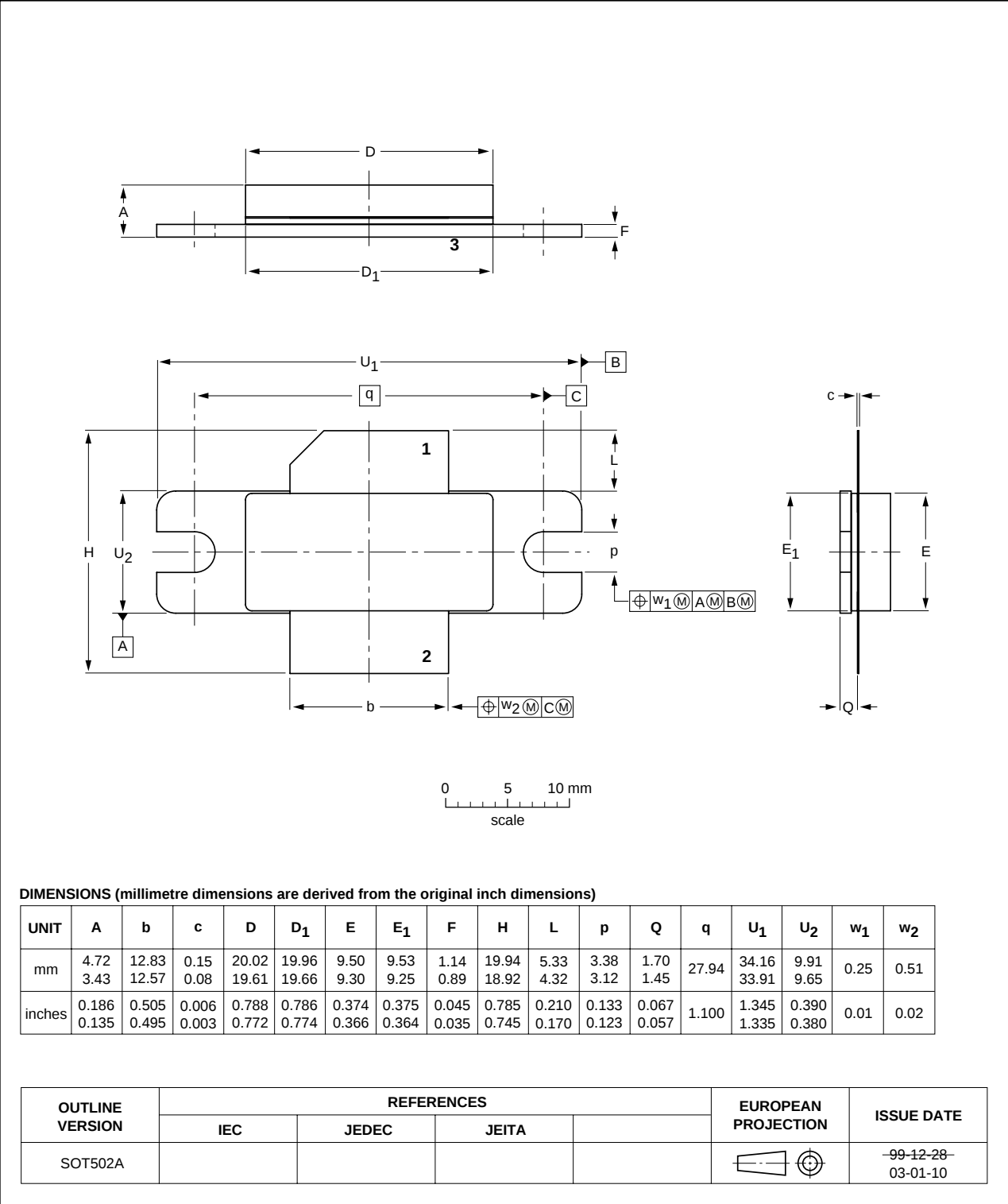


Fig 10. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

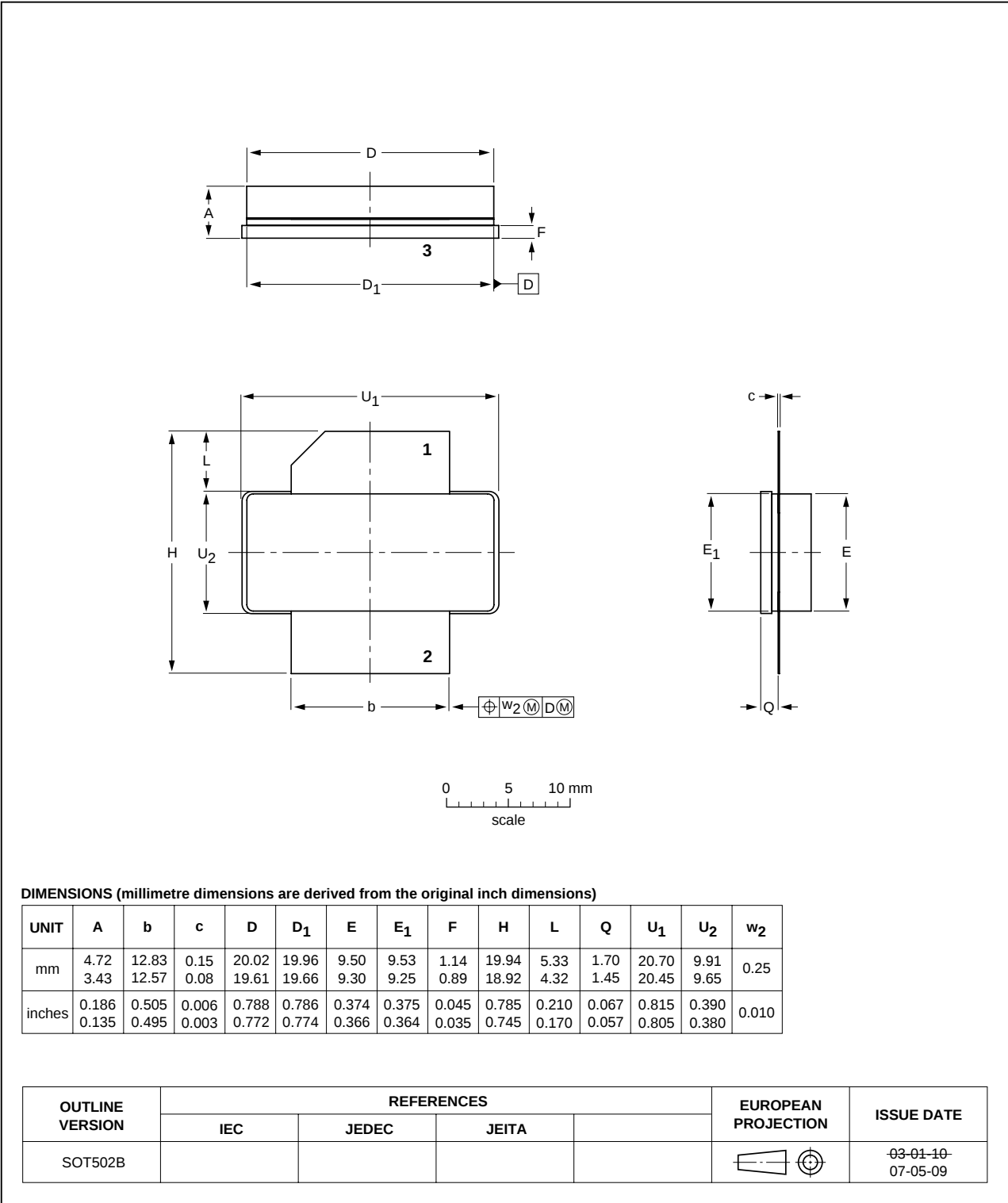


Fig 11. Package outline SOT502B

9. Abbreviations

Table 9. Abbreviations

Acronym	Description
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Lateral Diffused Metal-Oxide Semiconductor Transistor
RF	Radio Frequency
S-Band	Short wave Band
VSWR	Voltage Standing-Wave Ratio

10. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLS6G3135-120_6G3135S-120_1	20070814	Preliminary data sheet	-	-

11. Legal information

11.1 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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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