

# BLS6G3135-20; BLS6G3135S-20

LDMOS S-Band radar power transistor

Rev. 01 — 7 March 2007

Objective data sheet

## 1. Product profile

### 1.1 General description

20 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  $T_{case} = 25\text{ }^{\circ}\text{C}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\%$ ;  $I_{Dq} = 50\text{ mA}$ ; in a class-AB production test circuit.

Mode of operation	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 to 3.5	32	20	15.5	45	20	10

#### CAUTION



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

### 1.2 Features

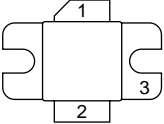
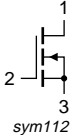
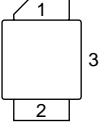
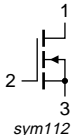
- Typical pulsed RF performance at a frequency of 3.1 GHz to 3.5 GHz, a supply voltage of 32 V, an  $I_{Dq}$  of 50 mA, a  $t_p$  of 300  $\mu\text{s}$  and a  $\delta$  of 10 %:
  - ◆ Output power = 20 W
  - ◆ Power gain = 15.5 dB
  - ◆ Efficiency = 45 %
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (3.1 GHz to 3.5 GHz)
- Internally matched for ease of use

### 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
<b>BLS6G3135-20 (SOT608A)</b>			
1	drain		 sym112
2	gate		
3	source		
<b>BLS6G3135S-20 (SOT608B)</b>			
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange

## 3. Ordering information

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BLS6G3135-20	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT608A
BLS6G3135S-20	-	ceramic earless flanged package; 2 leads	SOT608B

## 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		-	60	V
$V_{GS}$	gate-source voltage		-0.5	+13	V
$I_D$	drain current		-	2.1	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
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 20\text{ W}$			
		$t_p = 100\text{ }\mu\text{s}; \delta = 20\text{ %}$	0.76	0.92	K/W
		$t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ %}$	0.79	0.95	K/W

## 6. Characteristics

**Table 6. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.5\text{ mA}$	60	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 40\text{ mA}$	1.4	2	2.4	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	6	8.2	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 8.3\text{ V}; V_{DS} = 0\text{ V}$	-	-	150	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 1.4\text{ A}$	-	2.8	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 1.4\text{ A}$	-	0.37	0.58	$\Omega$

## 7. Application information

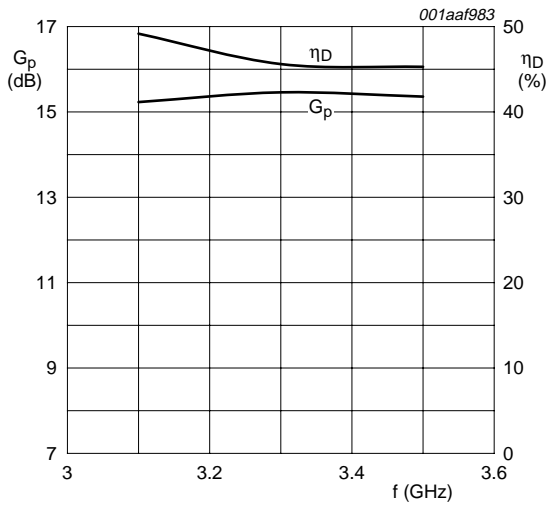
**Table 7. Application information**

Mode of operation: pulsed RF;  $t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ %}$ ; RF performance at  $V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}$ ;  $T_{case} = 25\text{ °C}$ ; unless otherwise specified, in a class-AB production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_L$	output power		-	20	-	W
$V_{CC}$	supply voltage	$P_L = 20\text{ W}$	-	-	32	V
$G_p$	power gain	$P_L = 20\text{ W}$	12	15.5	-	dB
$\eta_D$	drain efficiency	$P_L = 20\text{ W}$	40	45	-	%
$t_r$	rise time	$P_L = 20\text{ W}$	-	20	50	ns
$t_f$	fall time	$P_L = 20\text{ W}$	-	10	50	ns

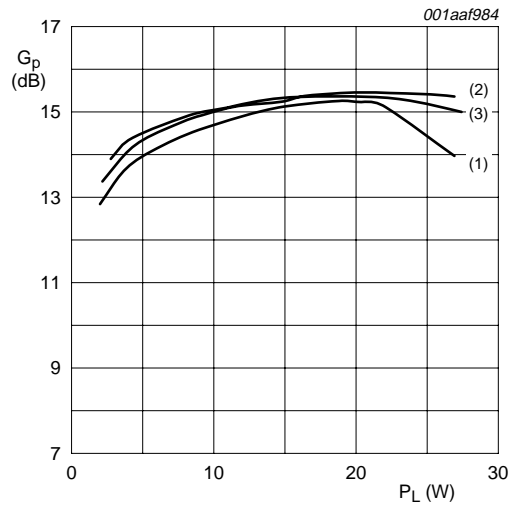
### 7.1 Ruggedness in class-AB operation

The BLS6G3135-20 and BLS6G3135S-20 are capable of withstanding a load mismatch corresponding to  $V_{SWR} = 5 : 1$  through all phases under the following conditions:  $V_{DS} = 32\text{ V}; I_{Dq} = 50\text{ mA}; P_L = 20\text{ W}; t_p = 300\text{ }\mu\text{s}; \delta = 10\text{ %}$ .



$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ ;  
 $P_L = 20\text{ W}$ .

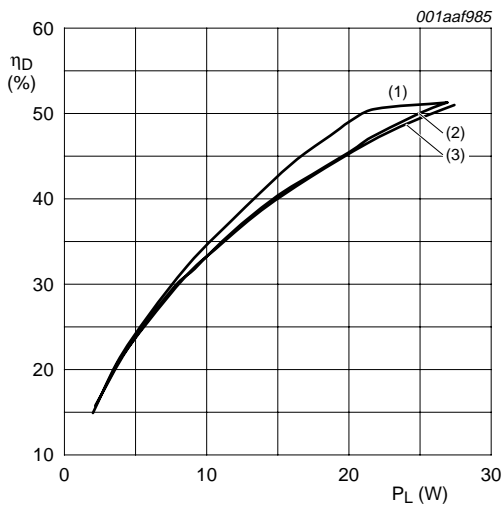
**Fig 1. Power gain and drain efficiency as functions of frequency; typical values**



- (1)  $f = 3.1\text{ GHz}$ .
- (2)  $f = 3.3\text{ GHz}$ .
- (3)  $f = 3.5\text{ GHz}$ .

$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

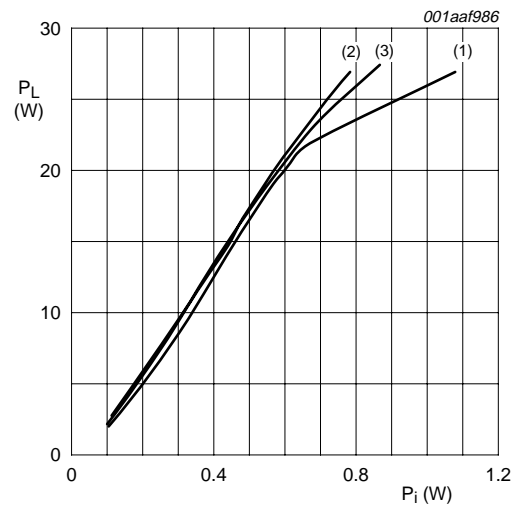
**Fig 2. Power gain as a function of load power; typical values**



- (1)  $f = 3.1\text{ GHz}$ .
- (2)  $f = 3.3\text{ GHz}$ .
- (3)  $f = 3.5\text{ GHz}$ .

$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

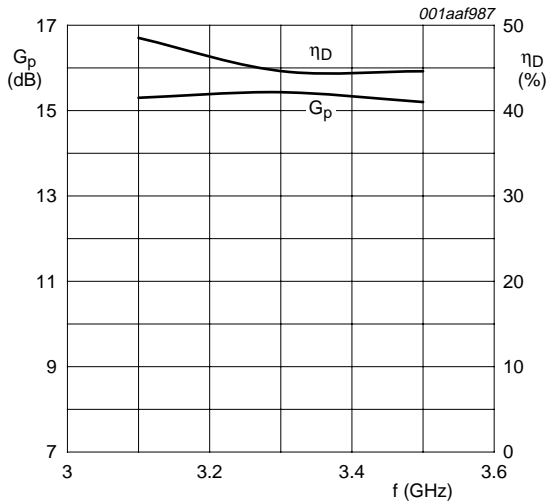
**Fig 3. Efficiency as a function of power load; typical values**



- (1)  $f = 3.1\text{ GHz}$ .
- (2)  $f = 3.3\text{ GHz}$ .
- (3)  $f = 3.5\text{ GHz}$ .

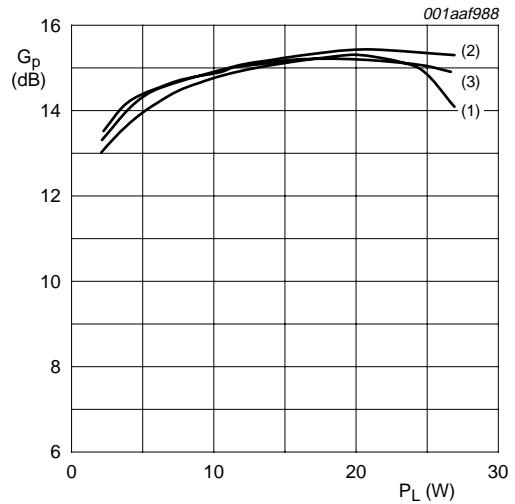
$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 300\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$ .

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



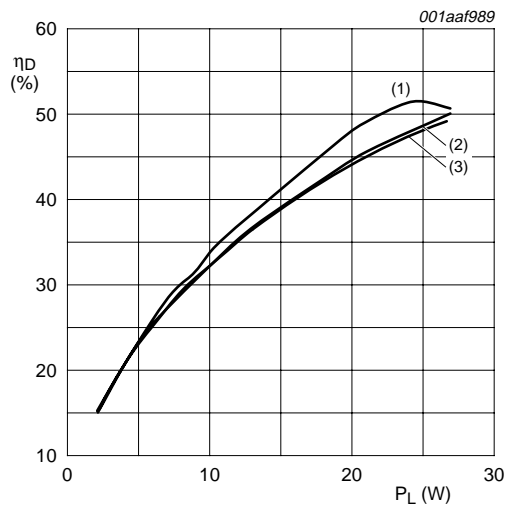
$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ;  $t_p = 50\text{ }\mu\text{s}$ ;  $\delta = 20\text{ }\%$ ;  
 $P_L = 20\text{ W}$ .

**Fig 5. Power gain and drain efficiency as functions of frequency; typical values**



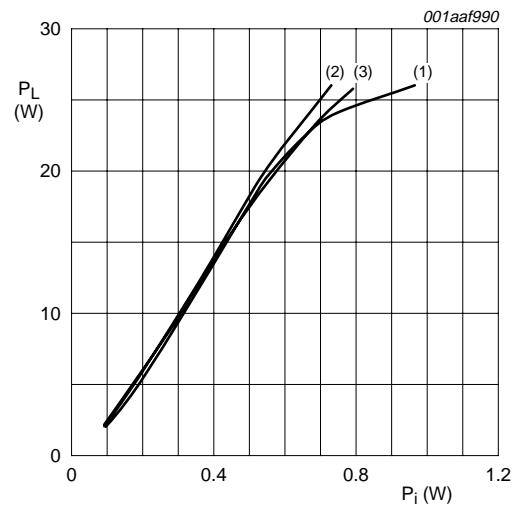
(1)  $f = 3.1\text{ GHz}$ .  
 (2)  $f = 3.3\text{ GHz}$ .  
 (3)  $f = 3.5\text{ GHz}$ .  
 $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 20\text{ }\%$ .

**Fig 6. Power gain as a function of load power; typical values**



(1)  $f = 3.1\text{ GHz}$ .  
 (2)  $f = 3.3\text{ GHz}$ .  
 (3)  $f = 3.5\text{ GHz}$ .  
 $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 20\text{ }\%$ .

**Fig 7. Efficiency as a function of power load; typical values**



(1)  $f = 3.1\text{ GHz}$ .  
 (2)  $f = 3.3\text{ GHz}$ .  
 (3)  $f = 3.5\text{ GHz}$ .  
 $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 50\text{ mA}$ ;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 20\text{ }\%$ .

**Fig 8. Load power as a function of input power; typical values**

**8. Package outline**

Flanged ceramic package; 2 mounting holes; 2 leads

SOT608A

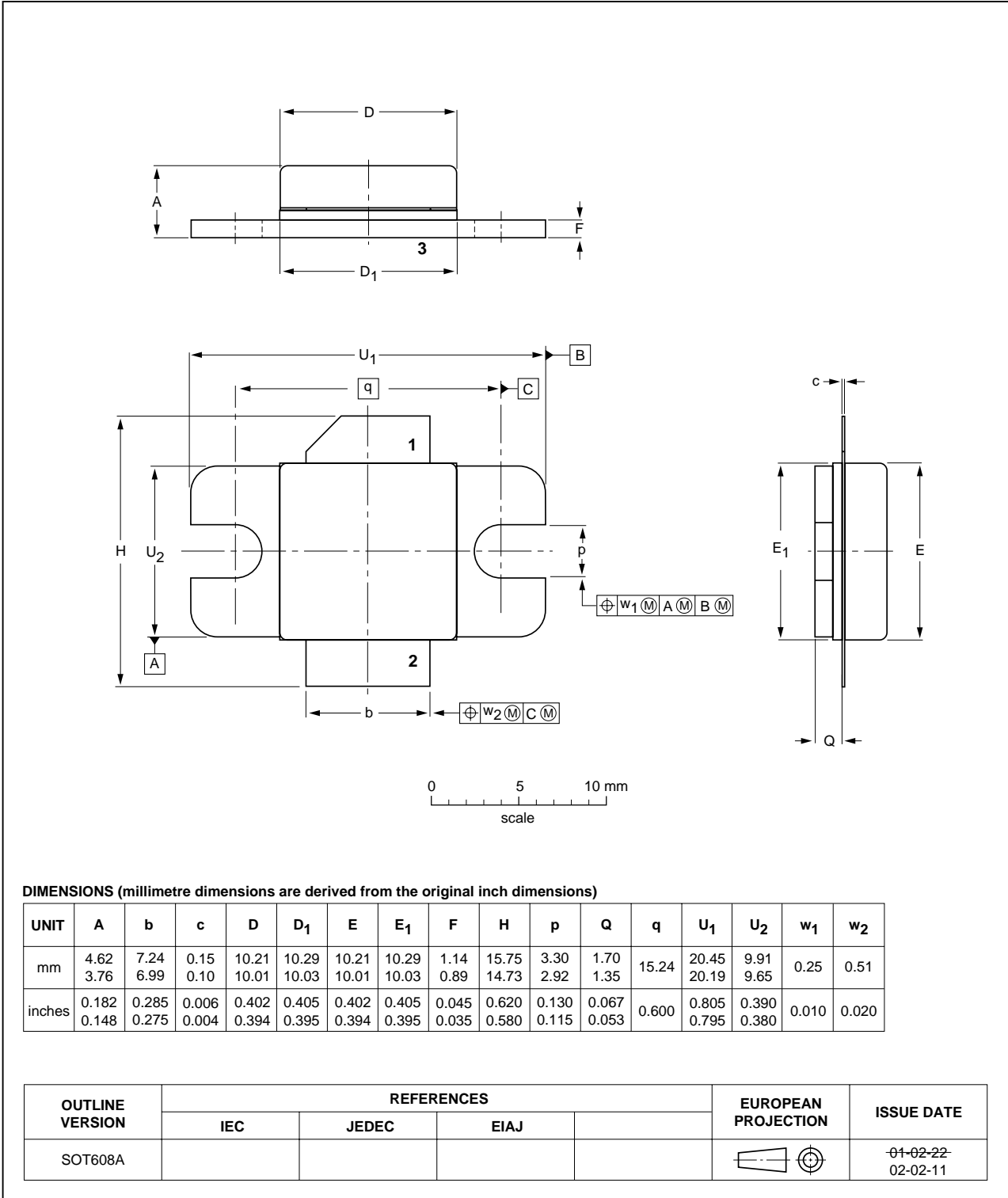


Fig 9. Package outline SOT608A

Ceramic earless flanged package; 2 leads

SOT608B

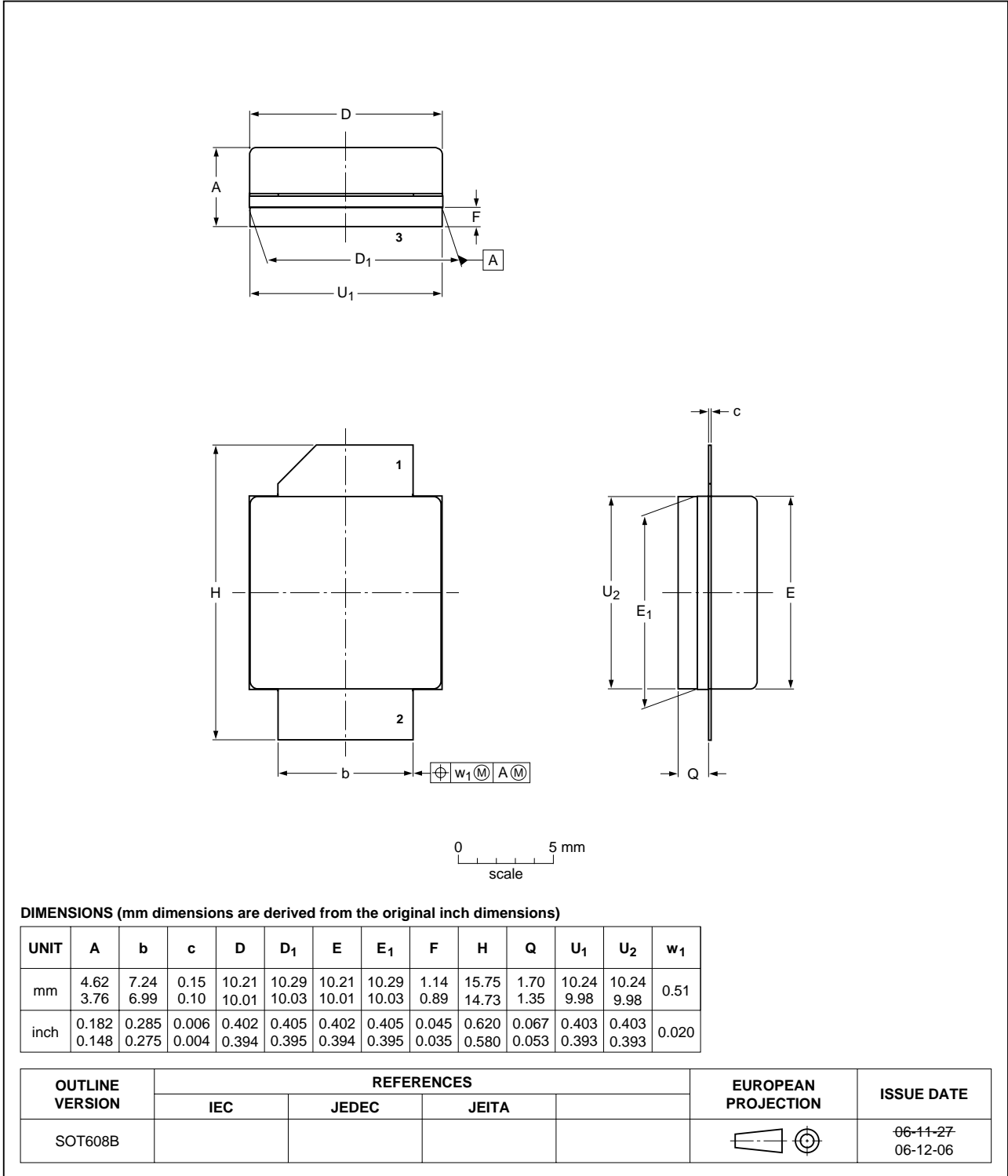


Fig 10. Package outline SOT608B

## 9. Abbreviations

**Table 8. Abbreviations**

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

## 10. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLS6G3135-20_6G3135S-20_1	20070307	Objective data sheet	-	-



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### 11.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
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[2] The term 'short data sheet' is explained in section "Definitions".

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Date of release: 7 March 2007

Document identifier: BLS6G3135-20\_6G3135S-20\_1