

# BLF4G20LS-130

UHF power LDMOS transistor

Rev. 01 — 1 June 2007

Product data sheet

## 1. Product profile

### 1.1 General description

130 W LDMOS power transistor for base station applications at frequencies from 1800 MHz to 2000 MHz.

**Table 1. Typical performance**

$T_{case} = 25\text{ }^{\circ}\text{C}$ ;  $I_{Dq} = 900\text{ mA}$ ; unless otherwise specified; in a class-AB production test circuit.

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L</sub> (W)	P <sub>L(AV)</sub> (W)	G <sub>p</sub> (dB)	$\eta_D$ (%)	ACPR <sub>400</sub> (dBc)	ACPR <sub>600</sub> (dBc)	EVM <sub>rms</sub> (%)	IMD3 (dBc)
CW	1930 to 1990	28	130	-	14.5	50	-	-	-	-
GSM EDGE	1930 to 1990	28	-	60	14.8	36	-62 <sup>[1]</sup>	-73 <sup>[1]</sup>	2.1	-
2-tone	1930 to 1990	28	-	65	14.6	38.5	-	-	-	-30

[1] ACPR<sub>400</sub> and ACPR<sub>600</sub> at 30 kHz resolution bandwidth.

#### CAUTION



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

### 1.2 Features

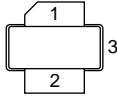
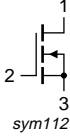
- Typical GSM EDGE performance at frequencies of 1990 MHz, a supply voltage of 28 V and an  $I_{Dq}$  of 900 mA:
  - ◆ Average output power = 60 W
  - ◆ Power gain = 14.8 dB
  - ◆ Efficiency = 36 %
  - ◆ ACPR<sub>400</sub> = -62 dBc
  - ◆ ACPR<sub>600</sub> = -73 dBc
  - ◆ EVM<sub>rms</sub> = 2.1 %
- Easy power control
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1800 MHz to 2000 MHz)
- Internally matched for ease of use

**1.3 Applications**

- RF power amplifiers for GSM, GSM EDGE and CDMA base stations and multi carrier applications in the 1800 MHz to 2000 MHz frequency range.

**2. Pinning information**

**Table 2. Pinning**

Pin	Description	Simplified outline	Symbol
1	drain		 sym112
2	gate		
3	source		

[1] Connected to flange

**3. Ordering information**

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BLF4G20LS-130	-	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	Conditions	Min	Max	Unit
$V_{DS}$	drain-source voltage		-	65	V
$V_{GS}$	gate-source voltage		-0.5	+15	V
$I_D$	drain current		-	15	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Max	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C};$ $P_L = 50\text{ W}$	0.49	0.58	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	$V_{GS} = 0\text{ V}; I_D = 2.1\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 230\text{ mA}$	2.5	2.9	3.5	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 900\text{ mA}$	2.65	3.15	3.65	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 6\text{ V};$ $V_{DS} = 10\text{ V}$	35	42	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 15\text{ V}; V_{DS} = 0\text{ V}$	-	-	420	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 7.5\text{ A}$	-	11	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 6\text{ V};$ $I_D = 7.5\text{ A}$	-	0.065	-	$\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V};$ $f = 1\text{ MHz}$	-	3	-	pF

## 7. Application information

**Table 7. Application information**

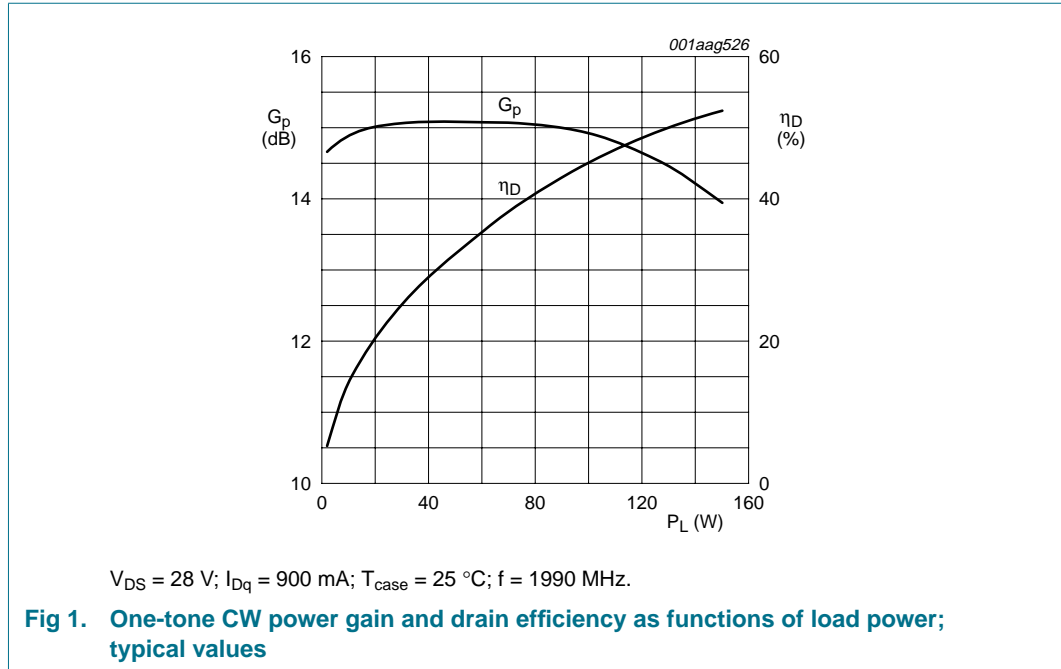
Mode of operation: 2-tone (200 kHz tone spacing);  $f_1 = 1930\text{ MHz}; f_2 = 1990\text{ MHz}; V_{DS} = 28\text{ V};$   
 $I_{Dq} = 900\text{ mA}; T_{case} = 25\text{ °C};$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(PEP)} = 130\text{ W}$	13	14.6	-	dB
$RL_{in}$	input return loss	$P_{L(PEP)} = 130\text{ W}$	-	-10	-7	dB
$\eta_D$	drain efficiency	$P_{L(PEP)} = 130\text{ W}$	34.5	38.5	-	%
IMD3	third order intermodulation distortion	$P_{L(PEP)} = 130\text{ W}$	-	-30	-27	dBc
IMD5	fifth order intermodulation distortion	$P_{L(PEP)} = 130\text{ W}$	-	-39.5	-35.5	dBc
IMD7	seventh order intermodulation distortion	$P_{L(PEP)} = 130\text{ W}$	-	-58.5	-54	dBc

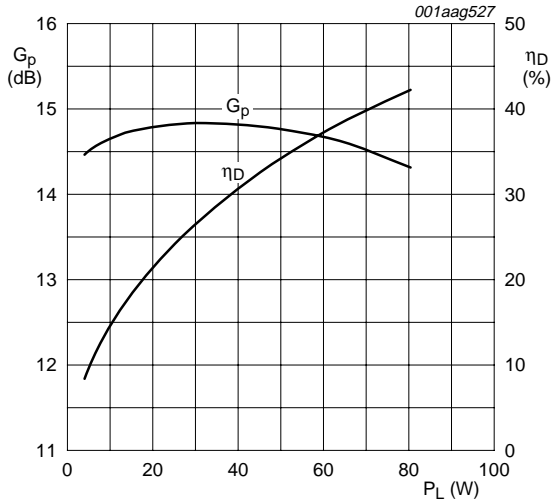
### 7.1 Ruggedness in class-AB operation

The BLF4G20LS-130 is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V};$   
 $I_{Dq} = 900\text{ mA}; P_L = 130\text{ W (CW)}; f = 1990\text{ MHz}.$

**7.2 One-tone CW**

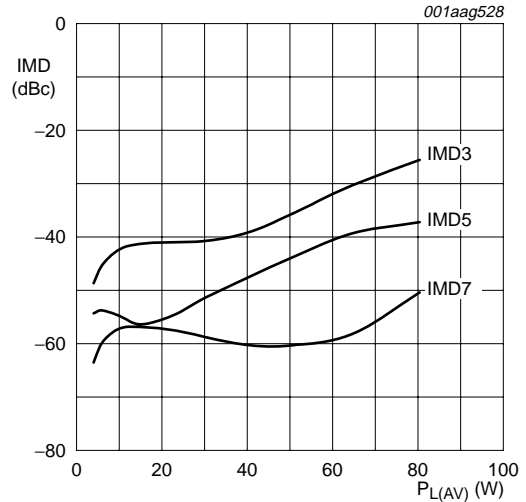


**7.3 Two-tone CW**



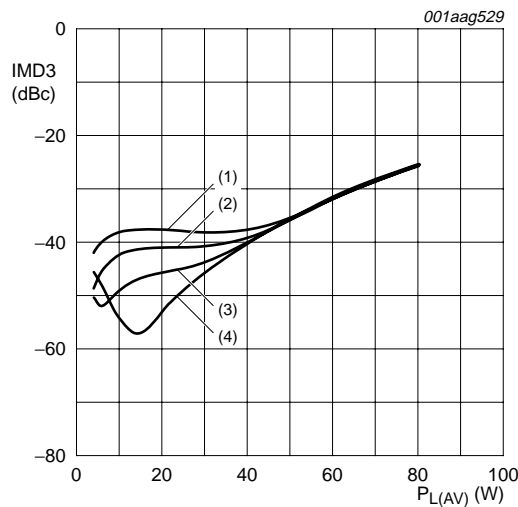
$V_{DS} = 28$  V;  $I_{Dq} = 900$  mA;  $T_{case} = 25$  °C;  
 $f = 1990$  MHz.

**Fig 2. Two-tone CW power gain and drain efficiency as functions of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 900$  mA;  $T_{case} = 25$  °C;  
 $f = 1990$  MHz.

**Fig 3. Intermodulation distortion as a function of average load power; typical values**

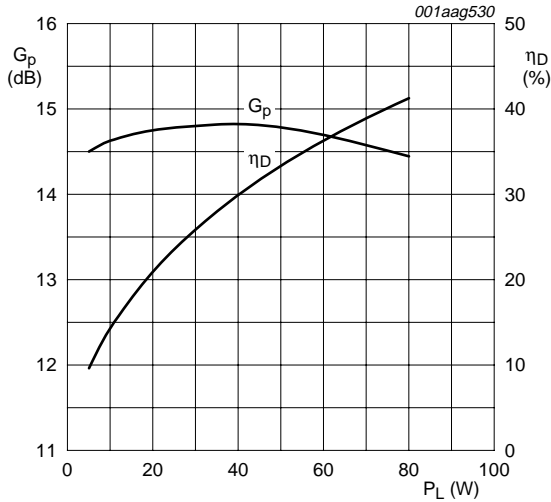


$V_{DS} = 28$  V;  $T_{case} = 25$  °C;  $f = 1990$  MHz.

- (1)  $I_{Dq} = 800$  mA.
- (2)  $I_{Dq} = 900$  mA.
- (3)  $I_{Dq} = 1000$  mA.
- (4)  $I_{Dq} = 1100$  mA.

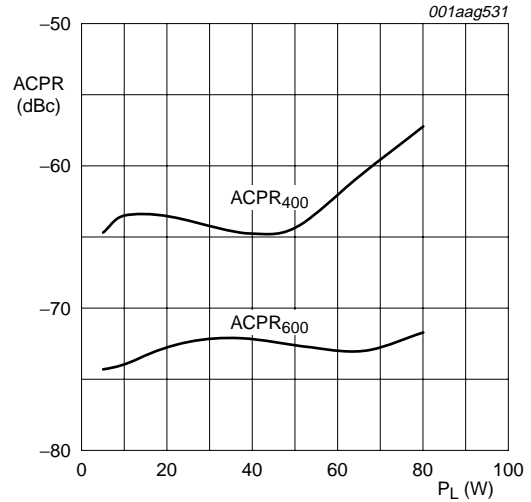
**Fig 4. Third order intermodulation distortion as function of average load power; typical values**

**7.4 GSM EDGE**



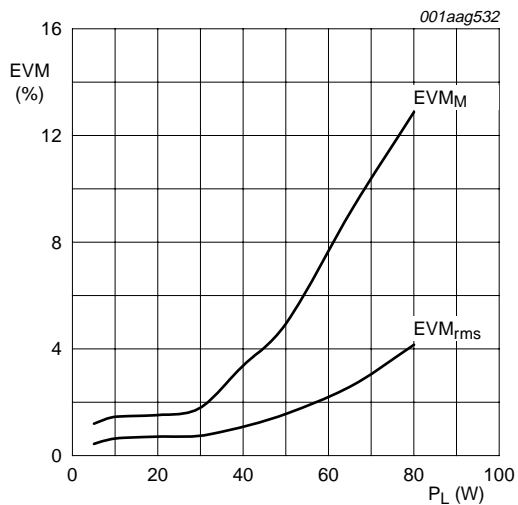
$V_{DS} = 28$  V;  $I_{Dq} = 900$  mA;  $T_{case} = 25$  °C;  
 $f = 1990$  MHz.

**Fig 5. GSM EDGE power gain and drain efficiency as functions of load power; typical values**



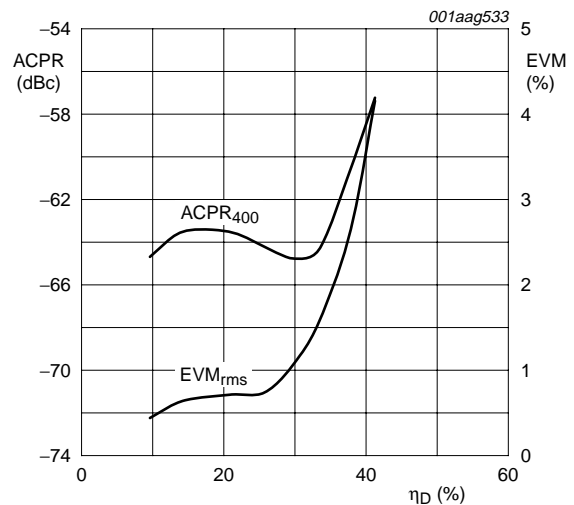
$V_{DS} = 28$  V;  $I_{Dq} = 900$  mA;  $T_{case} = 25$  °C;  
 $f = 1990$  MHz.

**Fig 6. GSM EDGE ACPR at 400 kHz and at 600 kHz as functions of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 850$  mA;  $T_{case} = 25$  °C;  
 $f = 960$  MHz.

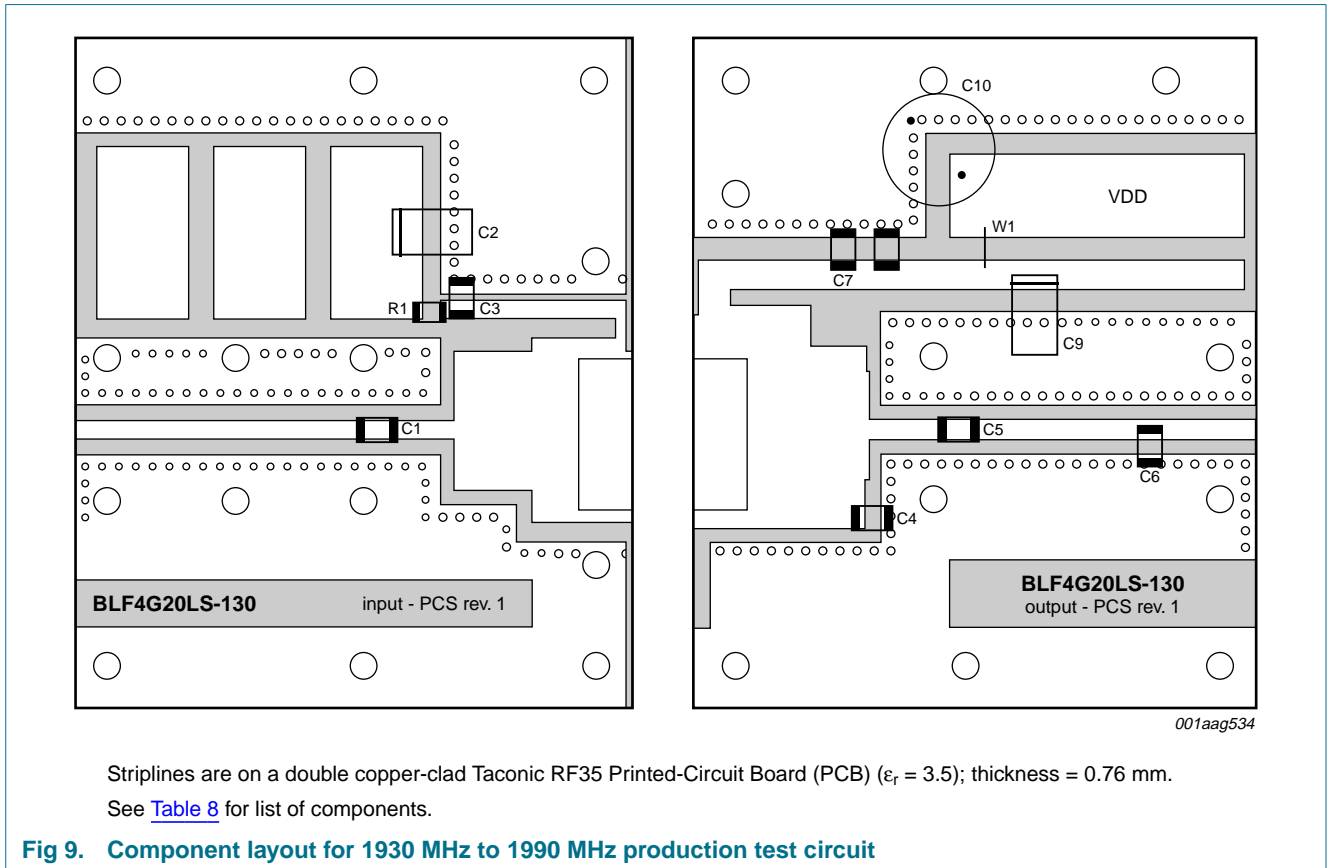
**Fig 7. GSM EDGE rms EVM and peak EVM as functions of load power; typical values**



$V_{DS} = 28$  V;  $I_{Dq} = 850$  mA;  $T_{case} = 25$  °C;  
 $f = 960$  MHz.

**Fig 8. GSM EDGE ACPR and rms EVM as functions of drain efficiency; typical values**

**8. Test information**



**Table 8. List of components (see [Figure 9](#))**

Component	Description	Value	Dimensions	Remarks
C1, C3, C5, C7	chip capacitor	11 pF	[1]	
C2, C9	tantalum capacitor	10 $\mu$ F		
C4	chip capacitor	0.8 pF	[1]	
C6	chip capacitor	0.1 pF	[1]	
C8	American Technical Ceramics (ATC) chip capacitor	1 $\mu$ F		1812X7R105KL2AB
C10	Philips electrolytic capacitor	220 $\mu$ F; 35 V		
R1	Philips chip resistor	5.1 $\Omega$	0603	
W1	hand made wire		5 mm	

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

**9. Package outline**

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

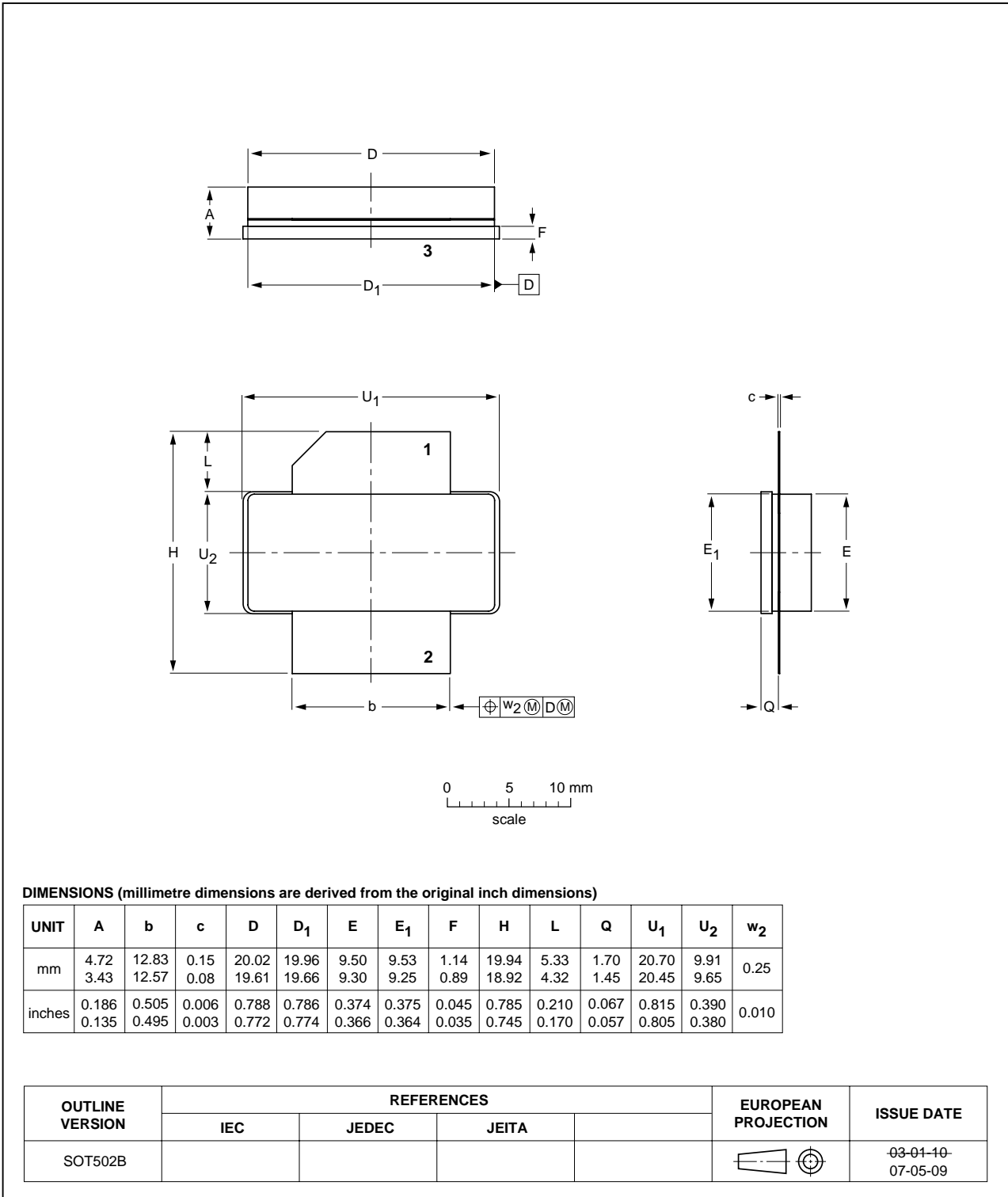


Fig 10. Package outline SOT502B



## 10. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
ACPR	Adjacent Channel Power Ratio
CDMA	Code Division Multiple Access
CW	Continuous Wave
EDGE	Enhanced Data rates for GSM Evolution
EVM	Error Vector Magnitude
GSM	Global System for Mobile communications
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
RF	Radio Frequency
RMS	Root Mean Square
VSWR	Voltage Standing Wave Ratio

## 11. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF4G20LS-130_1	20070601	Product data sheet	-	-

## 12. Legal information

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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.
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