

# BLF6G10-45

## Power LDMOS transistor

Rev. 01 — 3 February 2009

Product data sheet

## 1. Product profile

### 1.1 General description

45 W LDMOS power transistor for base station applications at frequencies from 800 MHz to 1000 MHz.

**Table 1. Typical performance**

RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$  in a common source class-AB production test circuit.

Mode of operation	f (MHz)	V <sub>DS</sub> (V)	P <sub>L(AV)</sub> (W)	G <sub>p</sub> (dB)	η <sub>D</sub> (%)	ACPR (dBc)
2-carrier W-CDMA	920 to 960	28	1.0	22.5	7.8	-48.5 <sup>[1]</sup>

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7.5 dB at 0.01 % probability on CCDF per carrier; carrier spacing 5 MHz

### CAUTION



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

### 1.2 Features

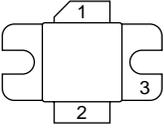
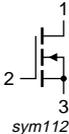
- Typical 2-carrier W-CDMA performance at frequencies of 920 MHz and 960 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 350 mA:
  - ◆ Average output power = 1.0 W
  - ◆ Gain = 22.5 dB
  - ◆ Efficiency = 7.8 %
  - ◆ ACPR = -48.5 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (800 MHz to 1000 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding restriction of hazardous substances (RoHS)

### 1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 800 MHz to 1000 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
BLF6G10-45	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT608A

## 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		-	13	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	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_L = 12.5\text{ W}$	1.7	K/W

## 6. Characteristics

**Table 6. Characteristics**

$T_j = 25\text{ }^\circ\text{C}$  per section; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 72\text{ mA}$	1.35	1.9	2.35	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 430\text{ mA}$	1.7	2.15	2.7	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	12.5	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	140	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 3.6\text{ A}$	-	5	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 2.52\text{ A}$	-	0.2	-	$\Omega$

## 7. Application information

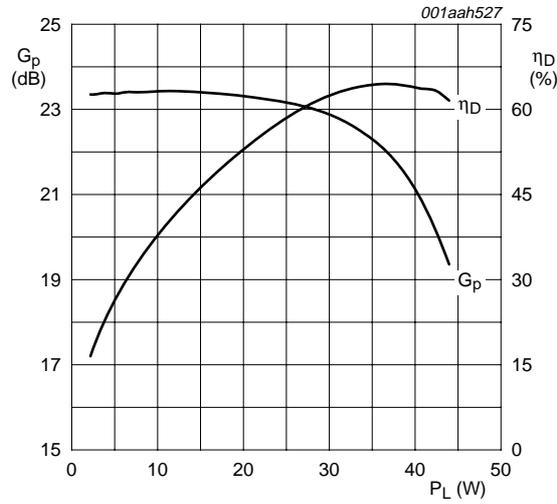
**Table 7. Application information**

Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH;  $f_1 = 922.5\text{ MHz}; f_2 = 927.5\text{ MHz}; f_3 = 952.5\text{ MHz}; f_4 = 957.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 350\text{ mA}; T_{case} = 25\text{ }^\circ\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 1.0\text{ W}$	21	22.5	23.9	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 1.0\text{ W}$	8	13	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 1.0\text{ W}$	6.9	7.8	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 1.0\text{ W}$	-	-48.5	-45.5	dBc

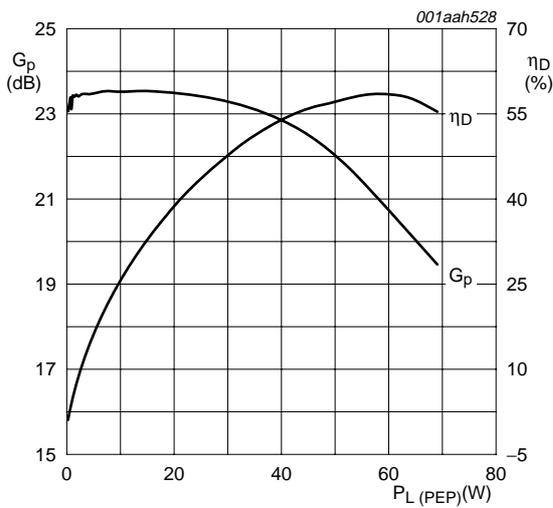
### 7.1 Ruggedness in class-AB operation

The BLF6G10-45 is capable of withstanding a load mismatch corresponding to  $VSWR = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 350\text{ mA}; P_L = 35\text{ W (CW)}; f = 960\text{ MHz}$ .



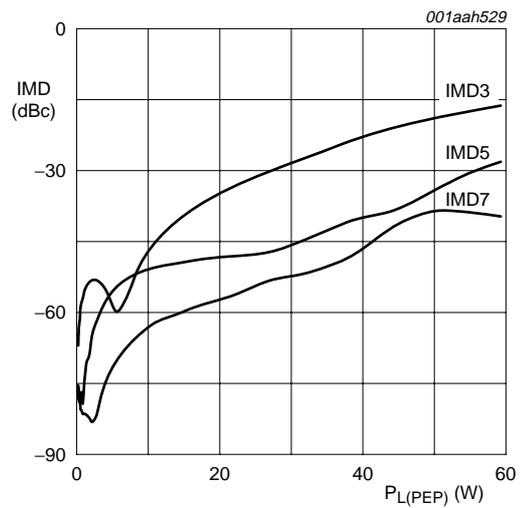
V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 350 mA; f = 960 MHz.

**Fig 1. One-tone CW power gain and drain efficiency as functions of load power; typical values**



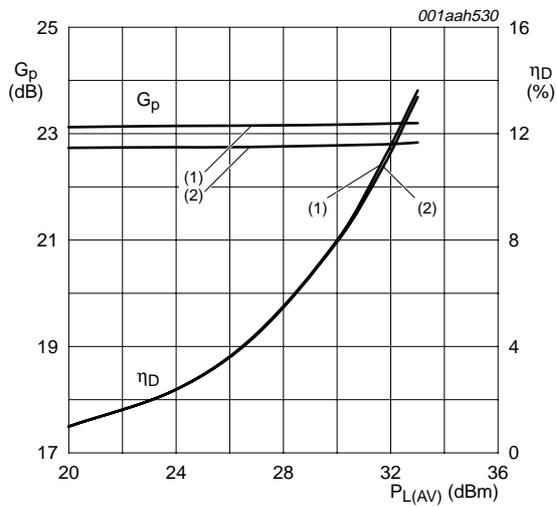
V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 350 mA; f<sub>1</sub> = 960 MHz;  
f<sub>2</sub> = 960.1 MHz.

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



V<sub>DS</sub> = 28 V; I<sub>Dq</sub> = 350 mA; f<sub>1</sub> = 960 MHz;  
f<sub>2</sub> = 960.1 MHz.

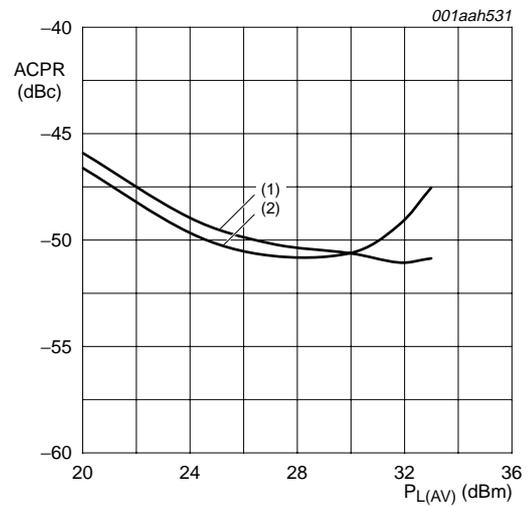
**Fig 3. Intermodulation distortion as a function of peak envelope load power; typical values**



$V_{DS} = 28$  V;  $I_{DQ} = 350$  mA;  $f_1 = 952.5$  MHz;  
 $f_2 = 957.5$  MHz; carrier spacing 5 MHz.

- (1)  $f = 955$  MHz  
 (2)  $f = 925$  MHz

**Fig 4. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values**



$V_{DS} = 28$  V;  $I_{DQ} = 350$  mA;  $f_1 = 952.5$  MHz;  
 $f_2 = 957.5$  MHz; carrier spacing 5 MHz.

- (1)  $f = 955$  MHz  
 (2)  $f = 925$  MHz

**Fig 5. 2-carrier W-CDMA adjacent channel power ratio, low frequency range as functions of average load power; typical values**

## 8. Test information

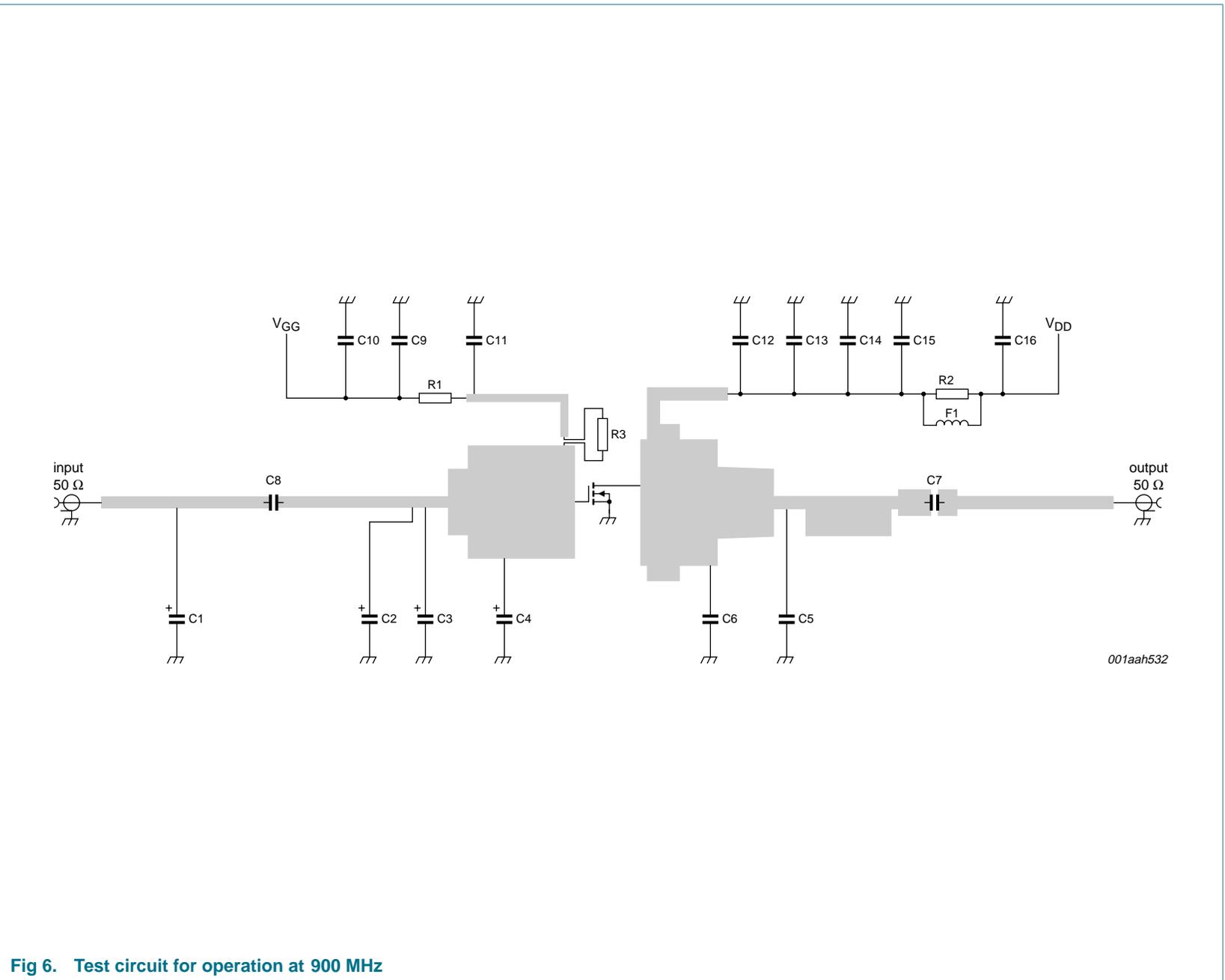
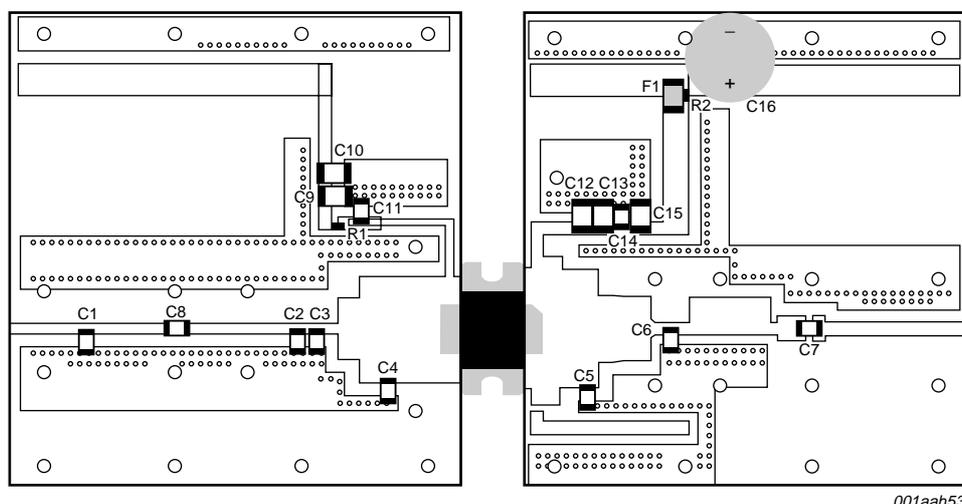


Fig 6. Test circuit for operation at 900 MHz



The striplines are on a double copper-clad Taconic RF35 Printed-Circuit Board (PCB) with  $\epsilon_r = 3.5$  and thickness = 0.76 mm.

See [Table 8](#) for list of components.

**Fig 7. Component layout for 920 MHz and 960 MHz test circuit for 2-carrier W-CDMA**

**Table 8. List of components (see [Figure 6](#) and [Figure 7](#)).**

All capacitors should be soldered vertically.

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	3.0 pF	[1]
C2	multilayer ceramic chip capacitor	1 pF	[1]
C3	multilayer ceramic chip capacitor	6.2 pF	[1]
C4	multilayer ceramic chip capacitor	2 pF	[1]
C5	multilayer ceramic chip capacitor	1.0 pF	[1]
C6	multilayer ceramic chip capacitor	6.8 pF	[1]
C7	multilayer ceramic chip capacitor	6.8 pF	[1]
C8, C11, C14	multilayer ceramic chip capacitor	68 pF	[1]
C9, C10, C12, C13	multilayer ceramic chip capacitor	330 nF; 50 V	[2]
C15	multilayer ceramic chip capacitor	4.5 $\mu$ F; 50 V	[2]
C16	Electrolytic capacitor	220 $\mu$ F	
F1	Ferrite SMD bead	-	Ferroxcube BDS 3/3/8.9-4S2 or equivalent
Q3	BLF6G10-45	-	
R1	SMD resistor	4.7 $\Omega$ ; 0.1 W	
R2	SMD resistor	6.8 $\Omega$ ; 0.1 W	

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

[2] TDK or capacitor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads

SOT608A

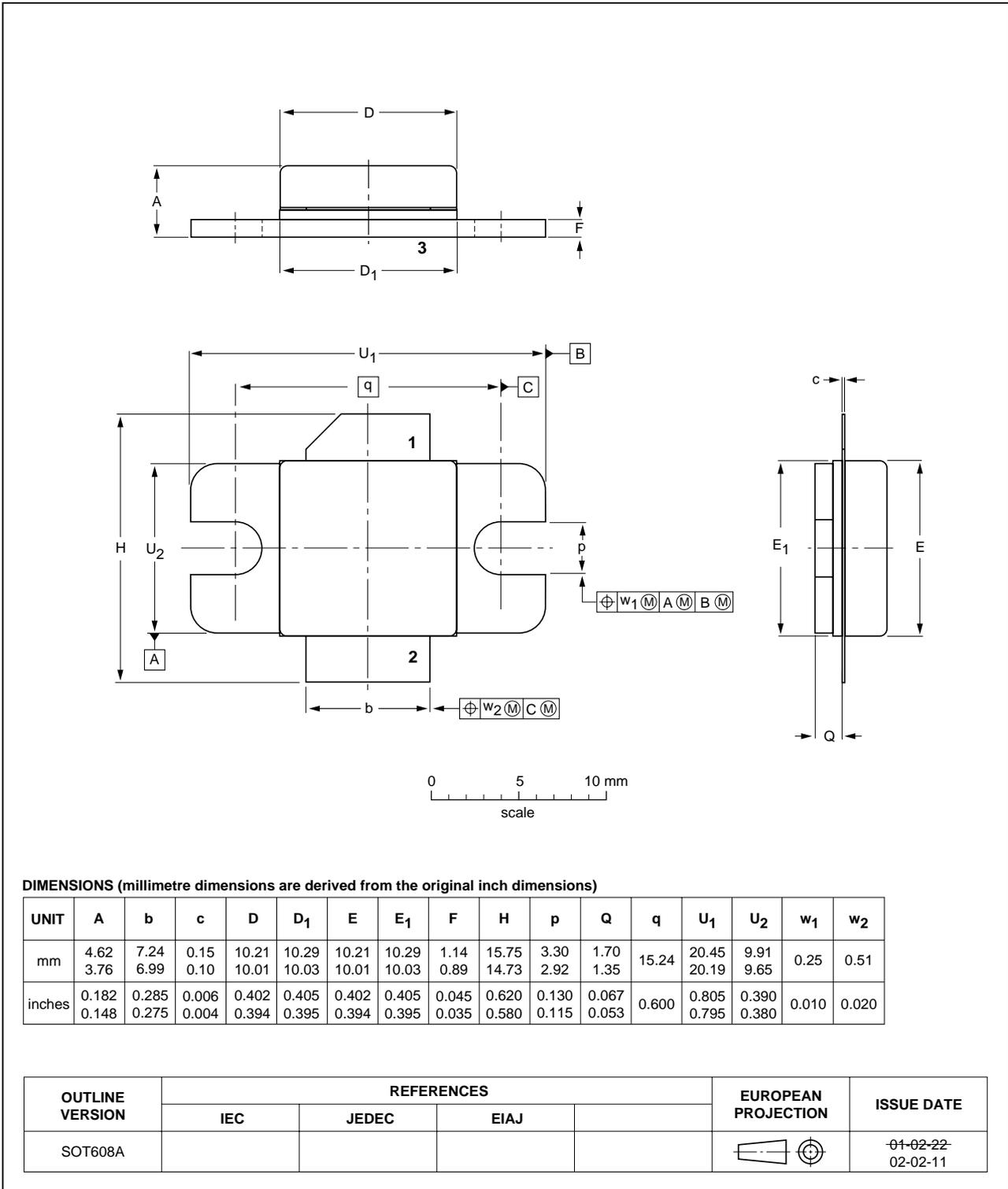


Fig 8. Package outline SOT608A

## 10. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Waveform
DPCH	Dedicated Physical CHannel
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average power Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
RF	Radio Frequency
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 11. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G10-45_1	20090203	Product data sheet	-	-

## 12. Legal information

### 12.1 Data sheet status

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.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

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