

# BLF6G22-180PN; BLF6G22LS-180PN

Power LDMOS transistor

Rev. 04 — 4 March 2010

Product data sheet

## 1. Product profile

### 1.1 General description

180 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 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)	$V_{DS}$ (V)	$P_{L(AV)}$ (W)	$G_p$ (dB)	$\eta_D$ (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	32	50	17.5	27.5	-35 <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 and benefits

- Typical 2-carrier W-CDMA performance at frequencies of 2110 MHz and 2170 MHz, a supply voltage of 32 V and an  $I_{DQ}$  of 1600 mA:
  - ◆ Average output power = 50 W
  - ◆ Power gain = 17.5 dB (typ)
  - ◆ Efficiency = 27.5 %
  - ◆ ACPR = -35 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Internally matched for ease of use
- Qualified up to a supply voltage of 32 V



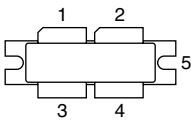
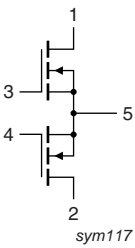
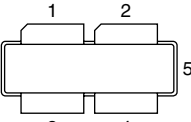
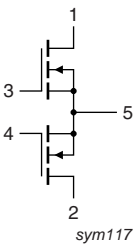
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

## 1.3 Applications

- RF power amplifiers for W-CDMA base stations and multicarrier applications in the 2000 MHz to 2200 MHz frequency range

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Symbol
<b>BLF6G22-180PN (SOT539A)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		
<b>BLF6G22LS-180PN (SOT539B)</b>			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BLF6G22-180PN	-	flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads	SOT539A
BLF6G22LS-180PN	-	earless flanged balanced LDMOST ceramic package; 4 leads	SOT539B

## 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
$T_{stg}$	storage temperature		-65	+150	°C
$T_{case}$	case temperature		-	150	°C
$T_j$	junction temperature		-	225	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Type	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C};$ $P_{L(AV)} = 50\text{ W}$	BLF6G22-180PN	0.45	K/W
			BLF6G22LS-180PN	0.38	K/W

## 6. Characteristics

**Table 6. Characteristics**

$T_j = 25\text{ °C}$  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	$V_{DS} = 10\text{ V}; I_D = 144\text{ mA}$	1.575	1.9	2.3	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 32\text{ V}; I_D = 800\text{ mA}$	1.725	2.1	2.45	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$				
		$V_{DS} = 28\text{ V}$	-	-	3	μA
		$V_{DS} = 60\text{ V}$	-	-	5	μA
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $V_{DS} = 10\text{ V}$	-	25	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	300	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 7.2\text{ A}$	-	10	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V};$ $I_D = 5\text{ A}$	-	0.1	0.165	Ω

**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 to 64 PDPCH;  $f_1 = 2112.5$  MHz;  $f_2 = 2117.5$  MHz;  $f_3 = 2162.5$  MHz;  $f_4 = 2167.5$  MHz; RF performance at  $V_{DS} = 32$  V;  $I_{Dq} = 1600$  mA;  $T_{case} = 25$  °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 50$ W	16.3	17.5	18.7	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 50$ W	-	-10	-6.5	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 50$ W	25	27.5	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 50$ W	-	-35	-33	dBc

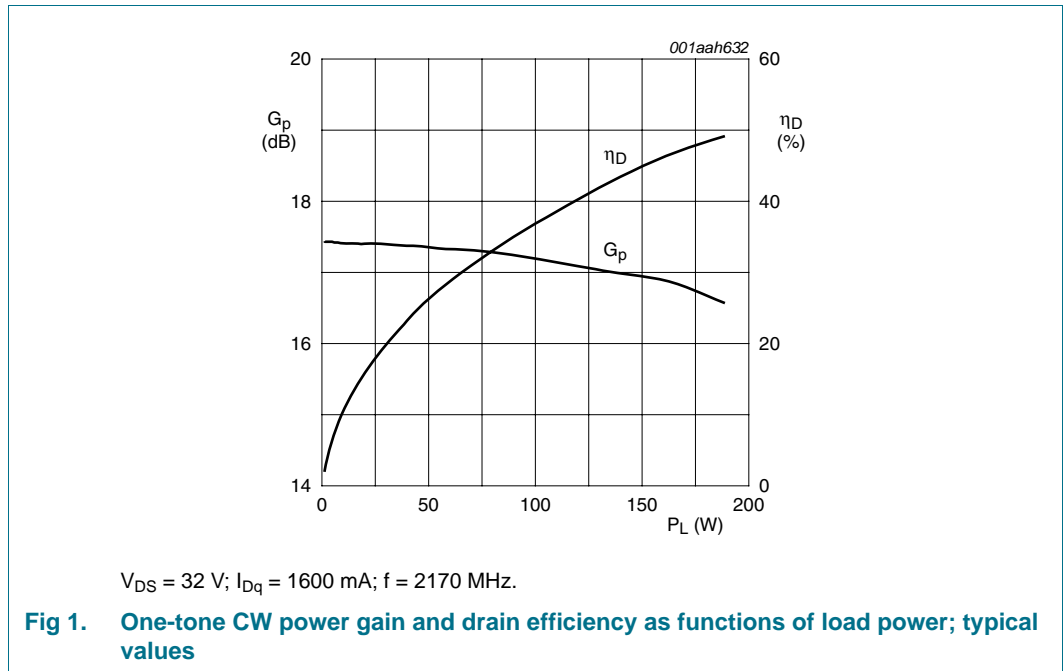
**Table 8. Application information**

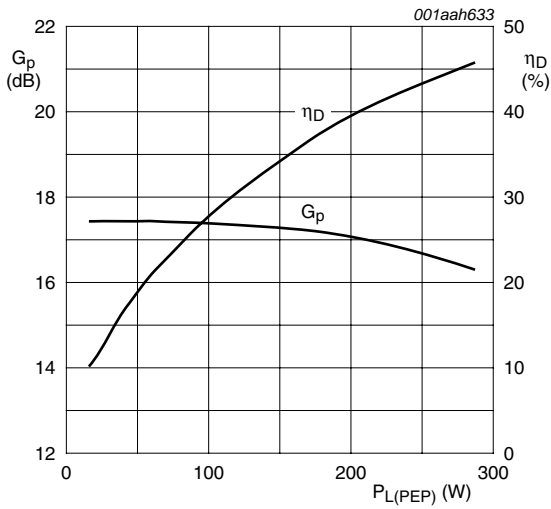
Mode of operation: 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 PDPCH;  $f_1 = 2162.5$  MHz;  $f_2 = 2167.5$  MHz; RF performance at  $V_{DS} = 32$  V;  $I_{Dq} = 1600$  mA;  $T_{case} = 25$  °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$PAR_O$	output peak-to-average ratio	$P_{L(AV)} = 115$ W; at 0.01 % probability on CCDF	4.05	4.5	-	dB

**7.1 Ruggedness in class-AB operation**

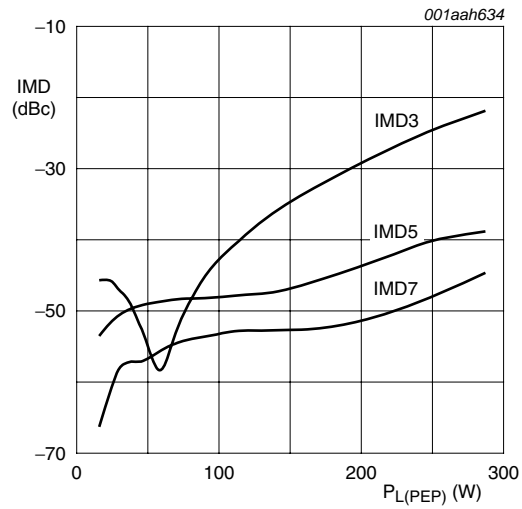
The BLF6G22-180PN and BLF6G22LS-180PN are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28$  V;  $I_{Dq} = 1600$  mA;  $P_L = 180$  W (CW);  $f = 2170$  MHz.





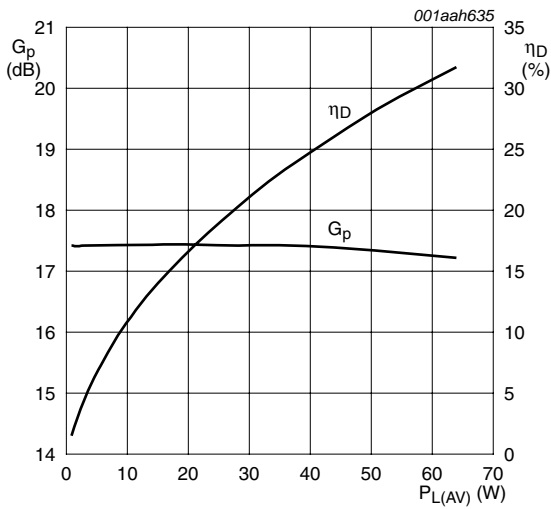
$V_{DS} = 32$  V;  $I_{Dq} = 1600$  mA;  $f_1 = 2170$  MHz;  $f_2 = 2170.1$  MHz.

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



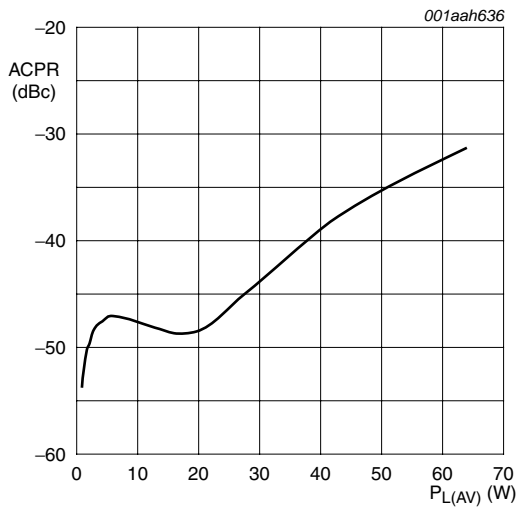
$V_{DS} = 32$  V;  $I_{Dq} = 1600$  mA;  $f_1 = 2170$  MHz;  $f_2 = 2170.1$  MHz.

**Fig 3. Two-tone intermodulation distortion as a function of peak envelope load power; typical values**



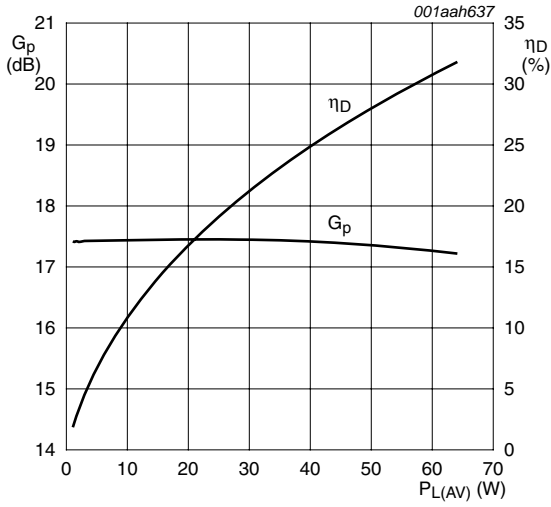
$V_{DS} = 32$  V;  $I_{Dq} = 1600$  mA;  $f_1 = 2162.5$  MHz;  $f_2 = 2167.5$  MHz; carrier spacing 5 MHz.

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



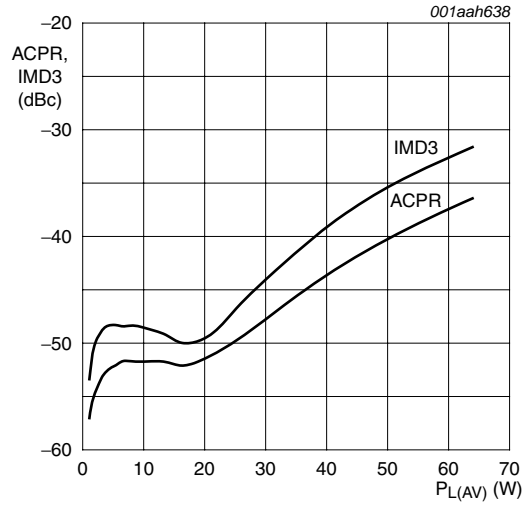
$V_{DS} = 32$  V;  $I_{Dq} = 1600$  mA;  $f_1 = 2162.5$  MHz;  $f_2 = 2167.5$  MHz; carrier spacing 5 MHz.

**Fig 5. 2-carrier W-CDMA adjacent channel power ratio as function of average load power; typical values**



$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 1600\text{ mA}$ ;  $f_1 = 2157.5\text{ MHz}$ ;  $f_2 = 2167.5\text{ MHz}$ ; carrier spacing 10 MHz.

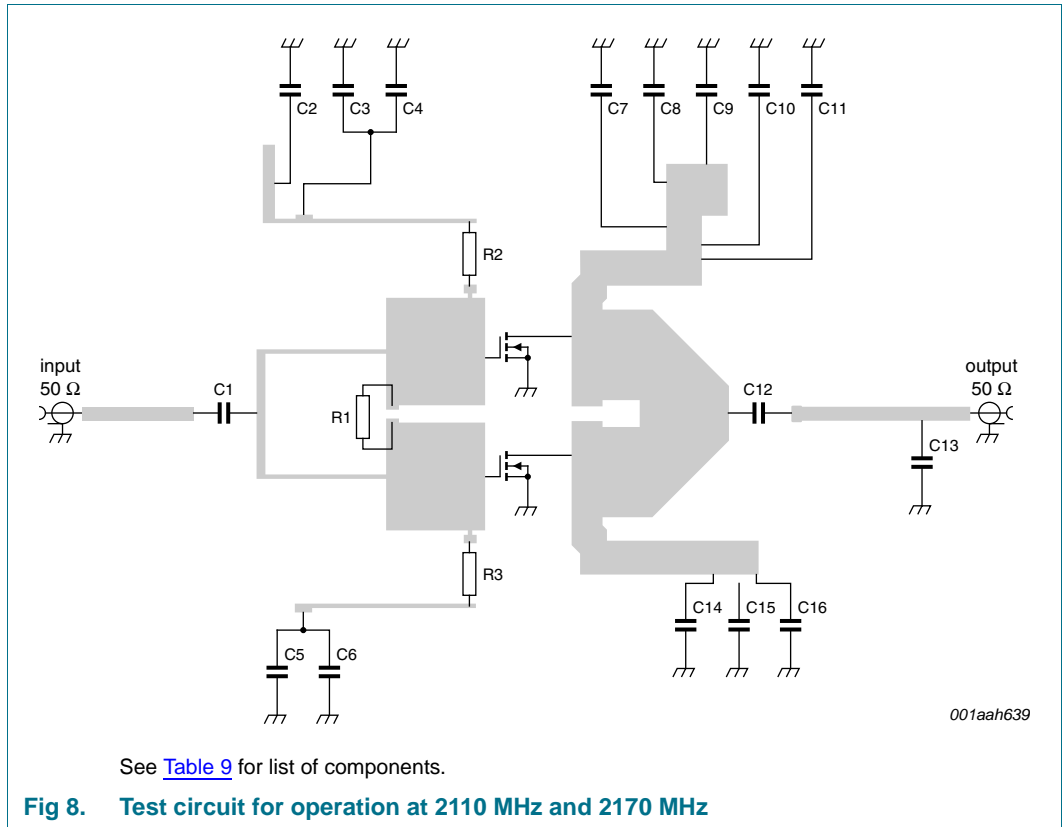
**Fig 6. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values**

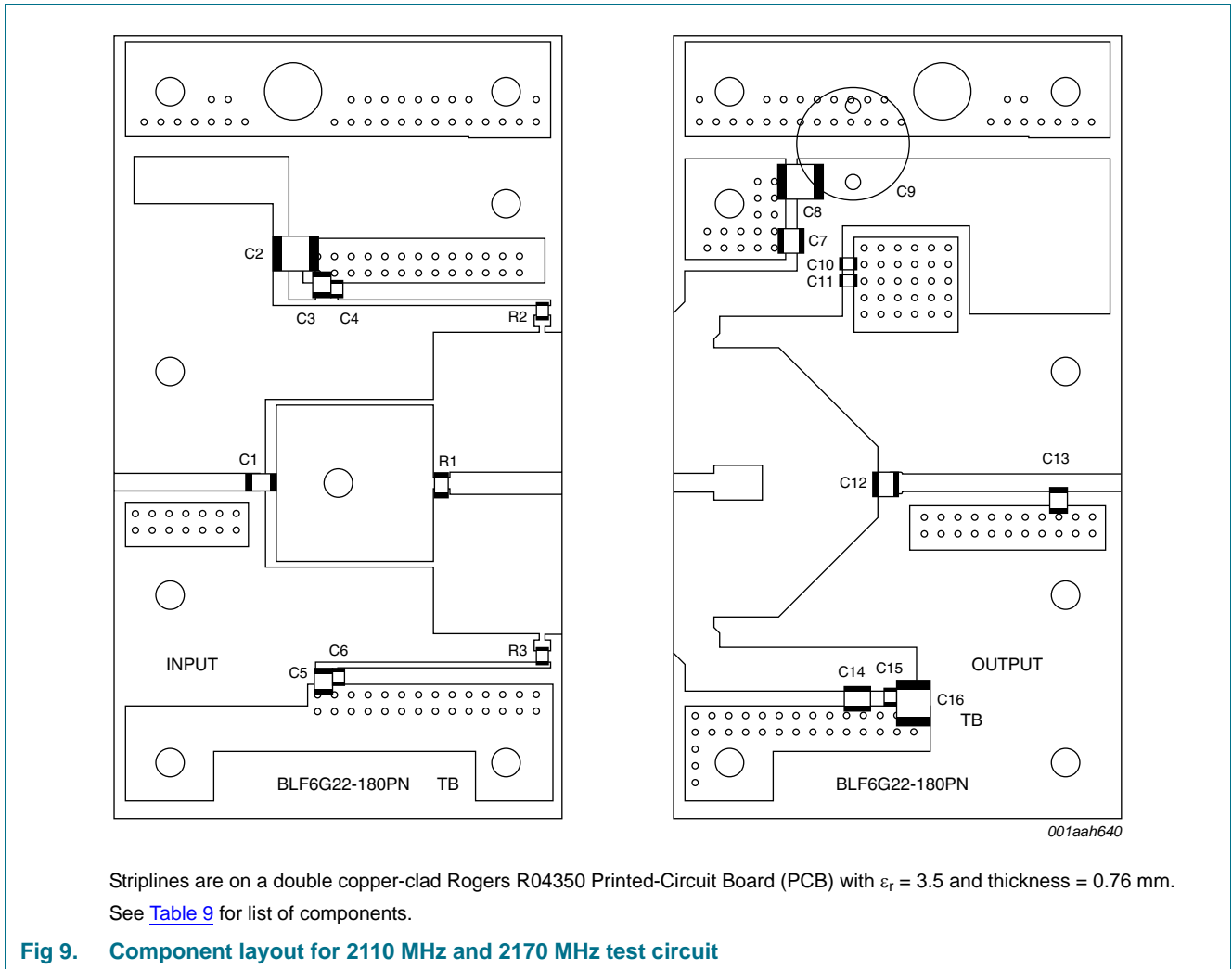


$V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 1600\text{ mA}$ ;  $f_1 = 2157.5\text{ MHz}$ ;  $f_2 = 2167.5\text{ MHz}$ ; carrier spacing 10 MHz.

**Fig 7. 2-carrier W-CDMA adjacent channel power ratio and third order intermodulation distortion as functions of average load power; typical values**

## 8. Test information





**Table 9. List of components**

For test circuit, see [Figure 8](#) and [Figure 9](#).

Component	Description	Value	Remarks
C1, C3, C5	ATC multilayer ceramic chip capacitor	10 pF	[1]
C2, C8, C16	TDK multilayer ceramic chip capacitor	4.7 $\mu$ F	
C4, C6	TDK multilayer ceramic chip capacitor	220 nF	
C7, C14	ATC multilayer ceramic chip capacitor	10 pF	[2]
C9	electrolytic capacitor	220 $\mu$ F; 63 V	
C10, C11, C15	Murata ceramic chip capacitor	100 nF	
C12	ATC multilayer ceramic chip capacitor	15 pF	[2]
C13	ATC multilayer ceramic chip capacitor	0.3 pF	[1]
R1	chip resistor	33 $\Omega$	
R2, R3	chip resistor	5.6 $\Omega$	

[1] American technical ceramics type 100B or capacitor of same quality.

[2] American technical ceramics type 180R or capacitor of same quality.



**9. Package outline**

Flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads

SOT539A

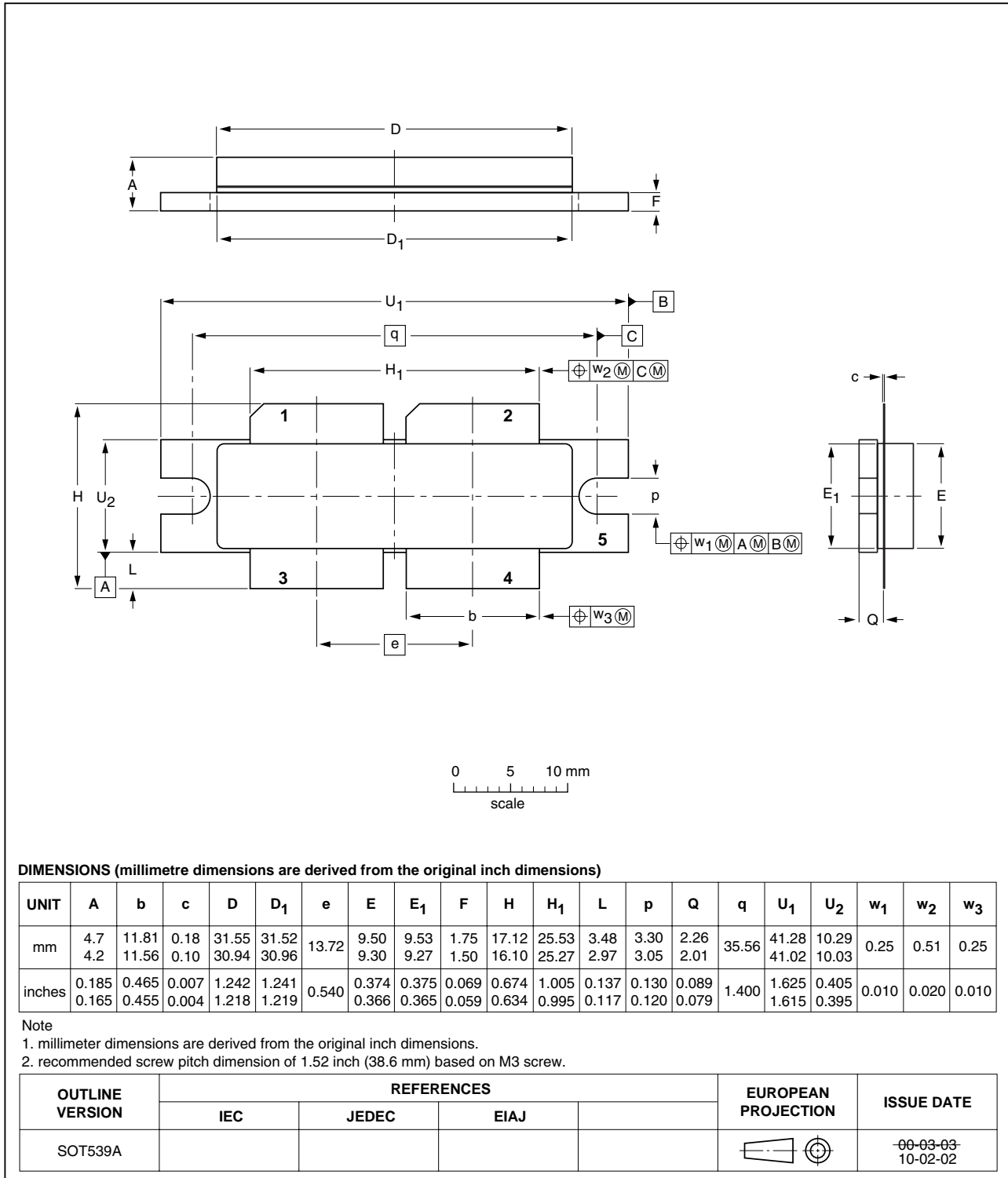


Fig 10. Package outline SOT539A

Earless flanged balanced LDMOST ceramic package; 4 leads

SOT539B

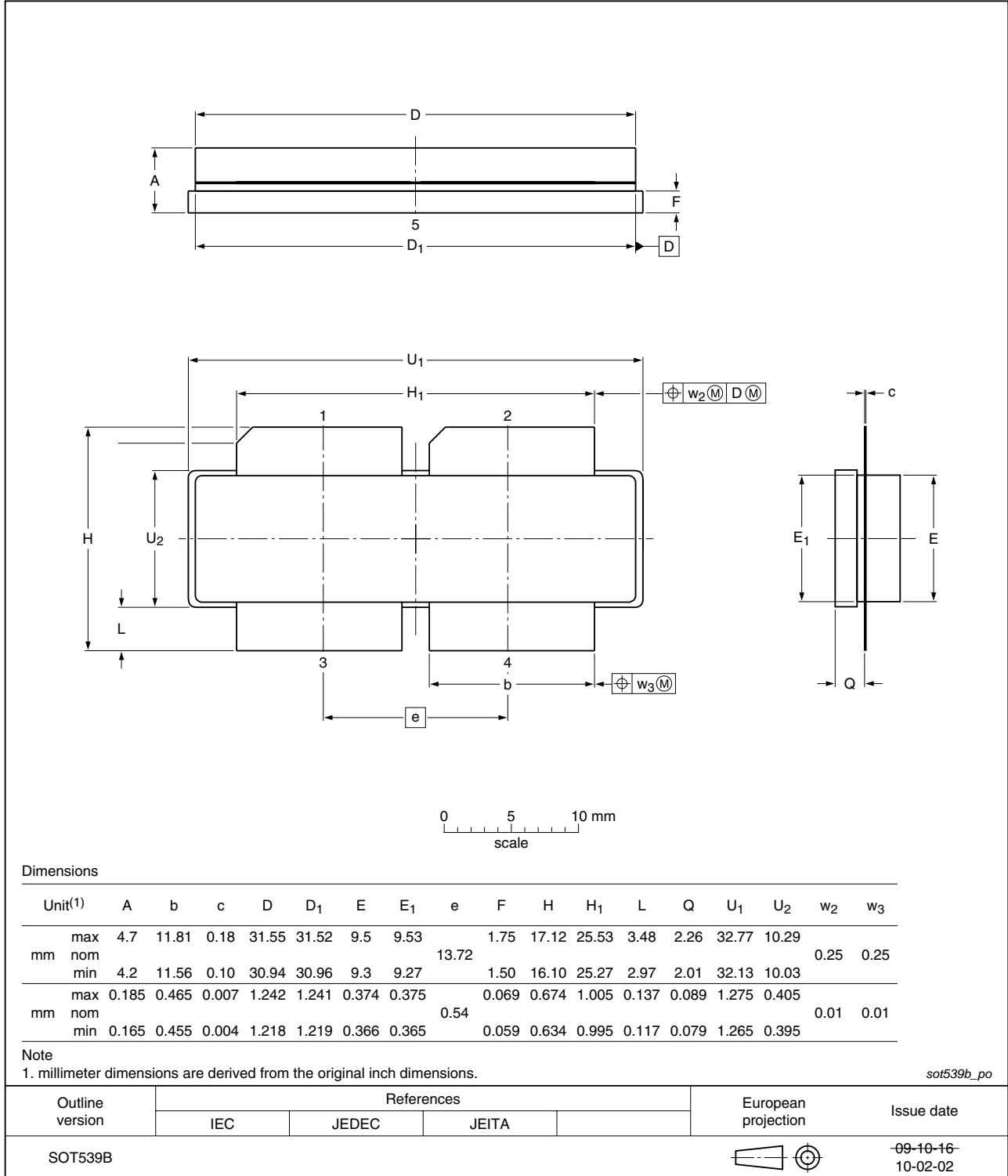


Fig 11. Package outline SOT539B

## 10. Abbreviations

**Table 10. Abbreviations**

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
IMD	InterModulation Distortion
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
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 11. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G22-180PN_22LS-180PN_4	20100304	Product data sheet	-	BLF6G22-180PN_22LS-180PN_3
Modifications:		<ul style="list-style-type: none"> <li>The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> <li>The status of this document has been changed to "Product data sheet".</li> </ul>		
BLF6G22-180PN_22LS-180PN_3	20091211	Objective data sheet	-	BLF6G22-180PN_2
BLF6G22-180PN_2	20080423	Product data sheet	-	BLF6G22-180PN_1
BLF6G22-180PN_1	20080221	Preliminary 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.

[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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