BLF6G22-180PN

Power LDMOS transistor

Rev. 02 — 23 April 2008 **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 °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)	η_D (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	32	50	17.5	27.5	–35[1]

[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 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)

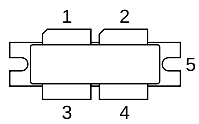
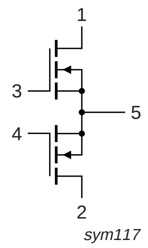
founded by Philips

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	Graphic symbol
1	drain1		
2	drain2		
3	gate1		
4	gate2		
5	source [1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

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

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	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	T_{case} = 80 °C; $P_{L(AV)}$ = 50 W	0.45	K/W

6. Characteristics

Table 6. Characteristics

T_j = 25 °C per section; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 0.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 144 mA	1.575	1.9	2.3	V
V_{GSq}	gate-source quiescent voltage	V_{DS} = 32 V; I_D = 800 mA	1.725	2.1	2.45	V
I_{DSS}	drain leakage current	V_{GS} = 0 V				
		V_{DS} = 28 V	-	-	3	μA
		V_{DS} = 60 V	-	-	5	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	25	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	300	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 7.2 A	-	10	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 5 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
η_D	drain efficiency	$P_{L(AV)}$ = 50 W	25	27.5	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 50 W	-	–35	–33	dBc

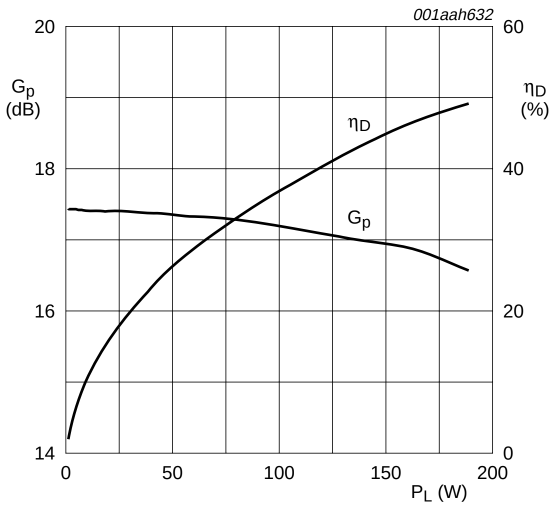
Table 8. Application information

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

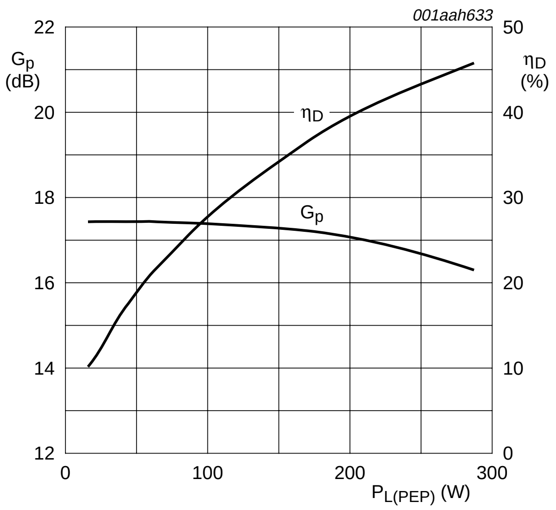
7.1 Ruggedness in class-AB operation

The BLF6G22-180PN is 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.



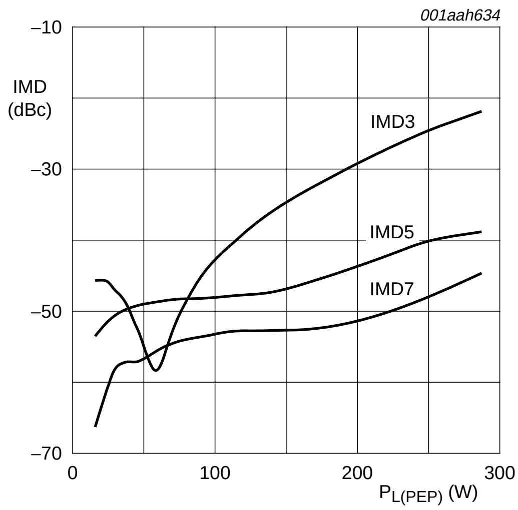
V_{DS} = 32 V; I_{Dq} = 1600 mA; f = 2170 MHz.

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



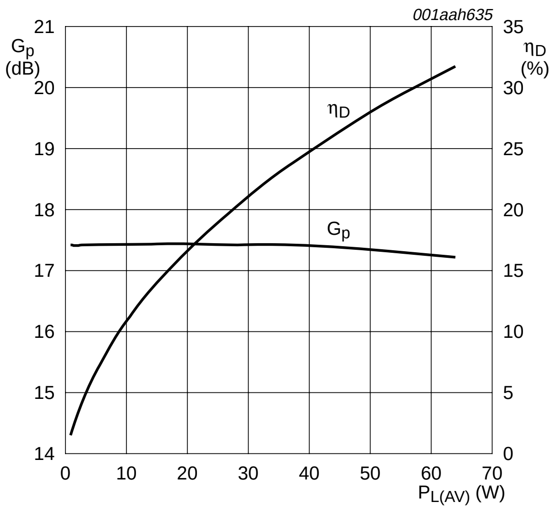
V_{DS} = 32 V; I_{Dq} = 1600 mA; f_1 = 2170 MHz; f_2 = 2170.1 MHz.

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



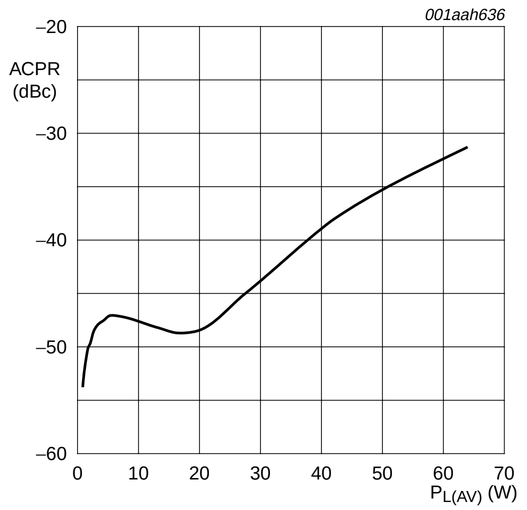
V_{DS} = 32 V; I_{Dq} = 1600 mA; f_1 = 2170 MHz; f_2 = 2170.1 MHz.

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



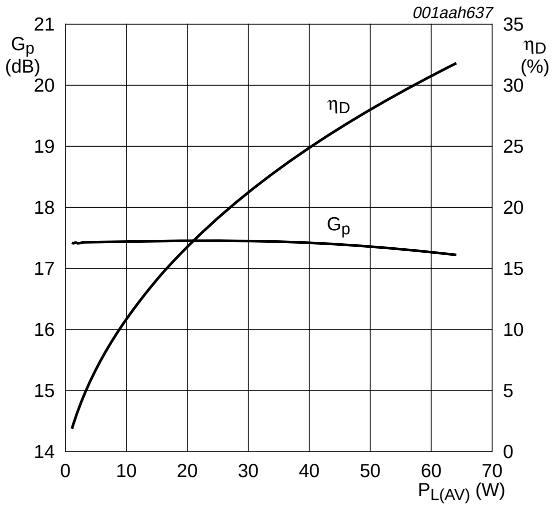
V_{DS} = 32 V; I_{Dq} = 1600 mA; f_1 = 2162.5 MHz;
f_2 = 2167.5 MHz; carrier spacing 5 MHz.

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



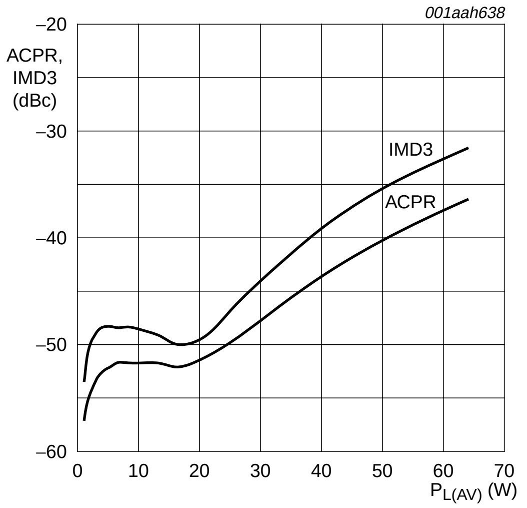
V_{DS} = 32 V; I_{Dq} = 1600 mA; f_1 = 2162.5 MHz;
f_2 = 2167.5 MHz; carrier spacing 5 MHz.

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



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

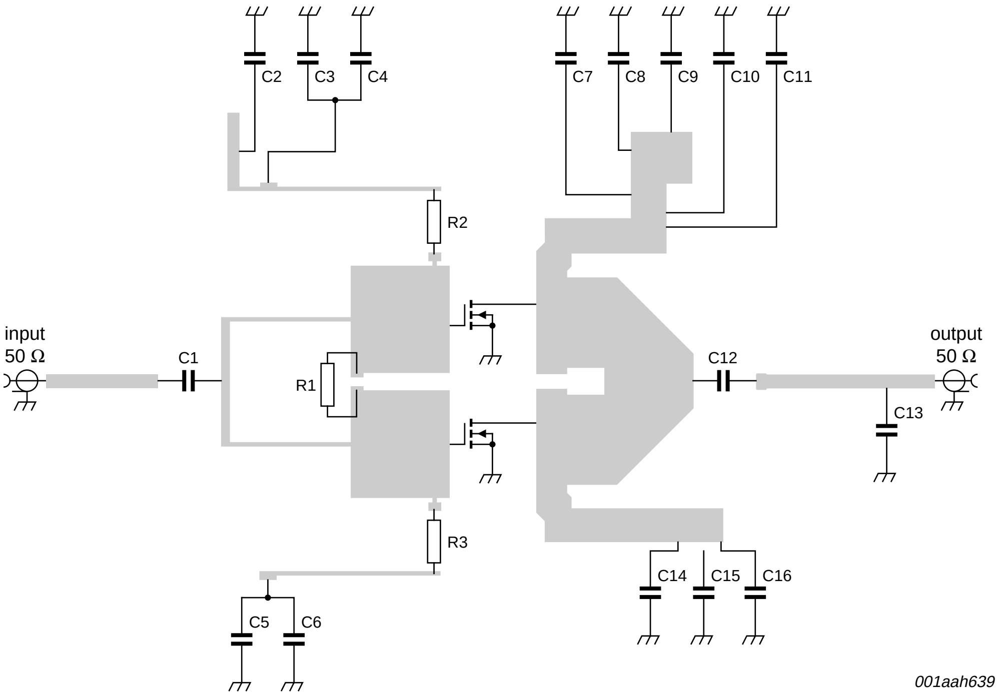
Fig 6. 2-carrier W-CDMA power gain and drain efficiency as functions of average load power; typical values



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

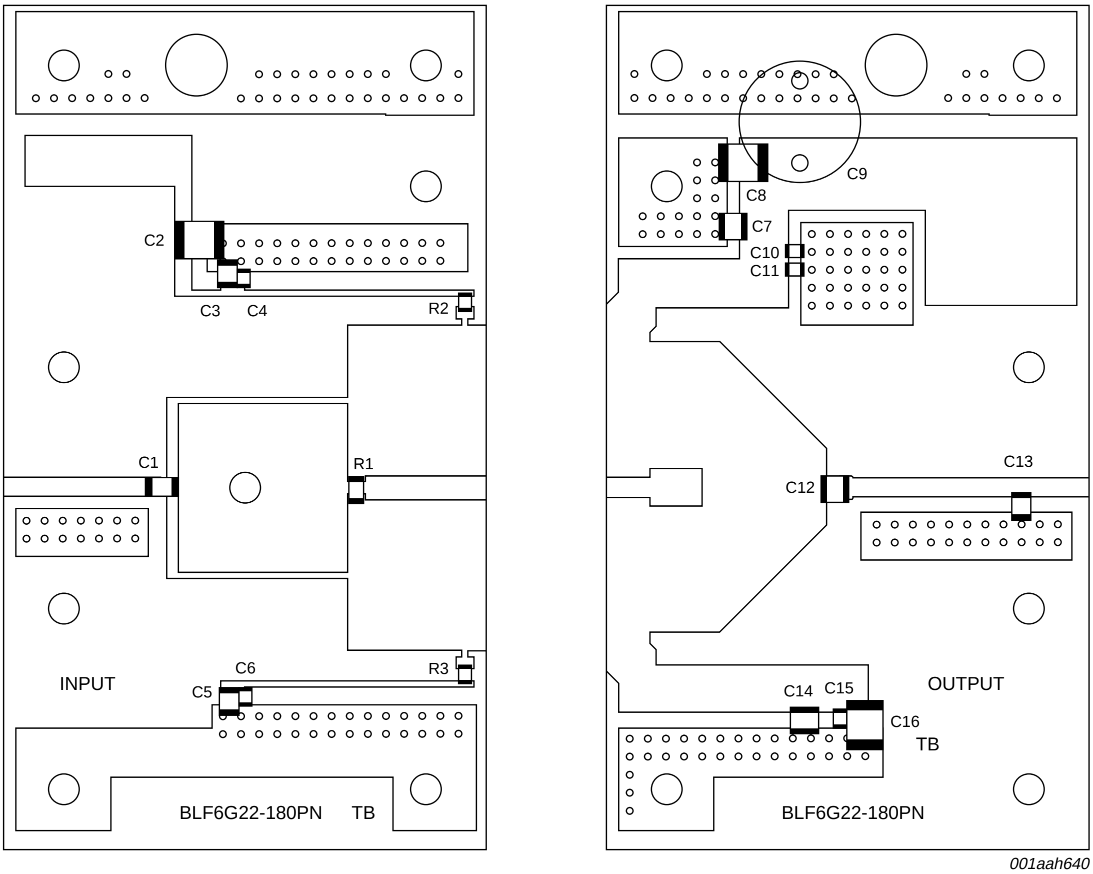
Fig 7. 2-carrier W-CDMA adjacent channel power ratio and third order intermodulation distortion as functions of average load power; typical values

8. Test information



See Table 9 for list of components.

Fig 8. Test circuit for operation at 2110 MHz and 2170 MHz



Striplines are on a double copper-clad Rogers R04350 Printed-Circuit Board (PCB) with ε_r = 3.5 and thickness = 0.76 mm.

See Table 9 for list of components.

Fig 9. Component layout for 2110 MHz and 2170 MHz test circuit

Table 9. List of components

For test circuit, see Figure 8 and Figure 9.

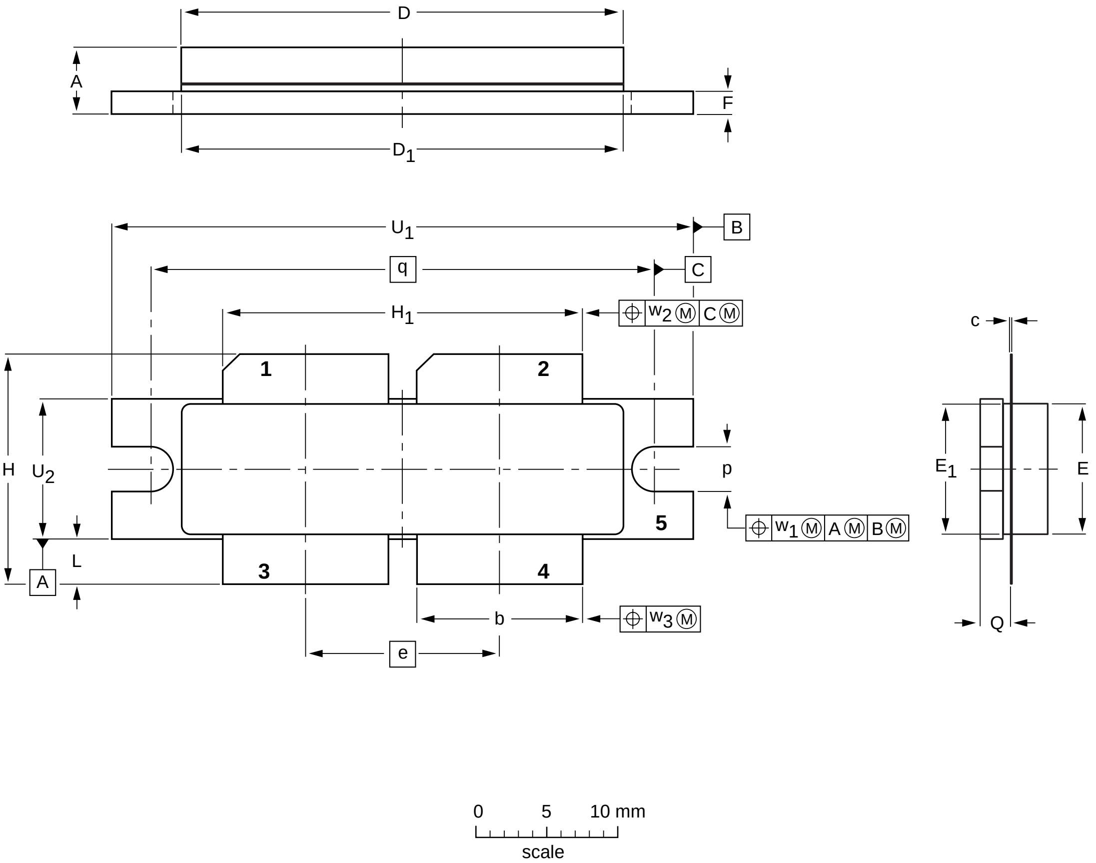
Component	Description	Value	Remarks
C1, C3, C5	ATC multilayer ceramic chip capacitor	10 pF	[1]
C2, C8, C16	TDK multilayer ceramic chip capacitor	4.7 µF	
C4, C6	TDK multilayer ceramic chip capacitor	220 nF	
C7, C14	ATC multilayer ceramic chip capacitor	10 pF	[2]
C9	electrolytic capacitor	220 µF; 63 V	
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 Ω	
R2, R3	chip resistor	5.6 Ω	

[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**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	e	E	E_1	F	H	H_1	L	p	Q	q	U_1	U_2	w_1	w_2	w_3
mm	5.33 3.96	11.81 11.56	0.15 0.08	31.55 30.94	31.52 30.96	13.72	9.50 9.30	9.53 9.27	1.75 1.50	17.12 16.10	25.53 25.27	3.73 2.72	3.30 3.05	2.31 2.01	35.56	41.28 41.02	10.29 10.03	0.25	0.51	0.25
inches	0.210 0.156	0.465 0.455	0.006 0.003	1.242 1.218	1.241 1.219	0.540	0.374 0.366	0.375 0.365	0.069 0.059	0.674 0.634	1.005 0.995	0.147 0.107	0.130 0.120	0.091 0.079	1.400	1.625 1.615	0.405 0.395	0.010	0.020	0.010

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT539A						~~99-12-28~~ 00-03-03

Fig 10. Package outline SOT539A

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_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[1][2]	Product status[3]	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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[2] The term 'short data sheet' is explained in section "Definitions".

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14. Contents

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