

# BLF6G21-10G

Power LDMOS transistor

Rev. 02 — 11 December 2009

Product data sheet

## 1. Product profile

### 1.1 General description

10 W LDMOS power transistor for base station applications at frequencies from HF to 2200 MHz

**Table 1. Typical performance**

$I_{DQ} = 100 \text{ mA}$ ;  $T_{case} = 25^\circ\text{C}$  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	2110 to 2170	28	0.7	18.5	15	-50 <sup>[1]</sup>
1-carrier W-CDMA	2110 to 2170	28	2	19.3	31	-39 <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 2110 MHz and 2170 MHz, a supply voltage of 28 V and an  $I_{DQ}$  of 100 mA:
  - ◆ Average output power = 0.7 W
  - ◆ Gain = 18.5 dB
  - ◆ Efficiency = 15 %
  - ◆ ACPR = -50 dBc
- Typical 1-carrier W-CDMA performance at frequencies of 2110 MHz and 2170 MHz, a supply voltage of 28 V and an  $I_{DQ}$  of 100 mA:
  - ◆ Average output power = 2 W
  - ◆ Gain = 19.3 dB
  - ◆ Efficiency = 31 %
  - ◆ ACPR = -39 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency

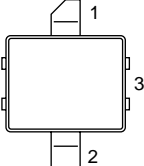
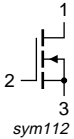
- Excellent thermal stability
- No internal matching for broadband operation
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

**1.3 Applications**

- RF power amplifiers for GSM, PHS, EDGE, CDMA and W-CDMA base stations and multi carrier applications in the HF to 2200 MHz frequency range
- Broadcast drivers

**2. Pinning information**

**Table 2. Pinning**

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source		

[1] Connected to flange.

**3. Ordering information**

**Table 3. Ordering information**

Type number	Package		
	Name	Description	Version
BLF6G21-10G	-	ceramic surface-mounted package; 2 leads	SOT538A

**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
$T_j$	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	$T_{case} = 80\text{ °C}$ ; $P_{L(AV)} = 11\text{ W}$	[1] 3.2	K/W

[1] Thermal resistance is determined under specified RF operating conditions

## 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	$V_{GS} = 0\text{ V}$ ; $I_D = 0.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 18\text{ mA}$	1.4	1.9	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	3.1	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	150	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 0.9\text{ A}$	-	0.5	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 0.625\text{ A}$	-	0.4	-	$\Omega$
$C_{rs}$	feedback capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$ ; $f = 1\text{ MHz}$	-	0.5	-	pF

## 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;  $f_1 = 2112.5\text{ MHz}$ ;  $f_2 = 2117.5\text{ MHz}$ ;  $f_3 = 2162.5\text{ MHz}$ ;  $f_4 = 2167.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ;  $T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 0.7\text{ W}$	-	18.5	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 0.7\text{ W}$	-	15	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 0.7\text{ W}$	-	-50	-	dBc

**Table 8. Application information**

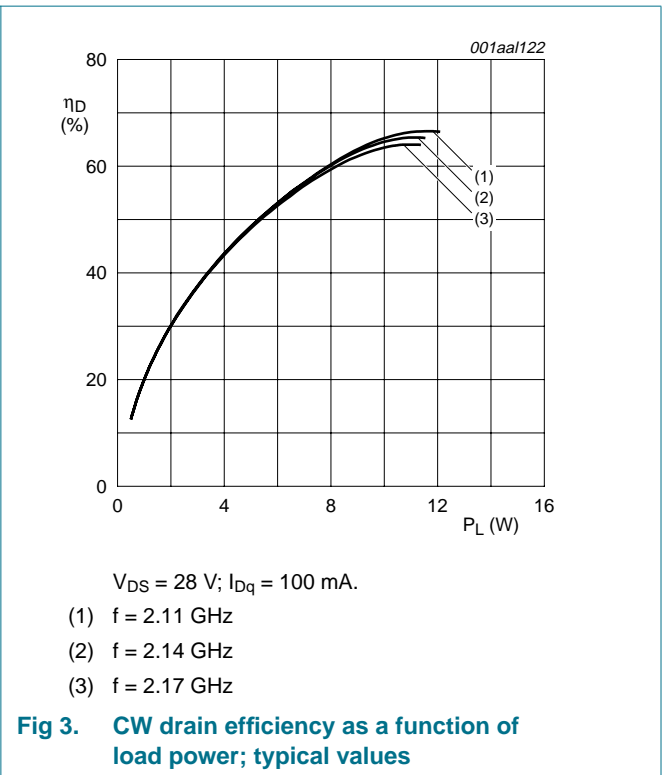
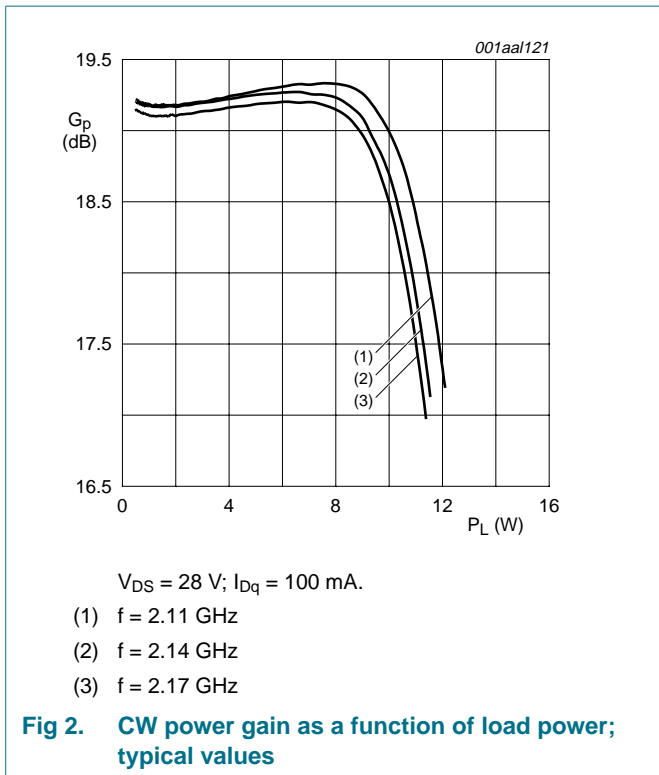
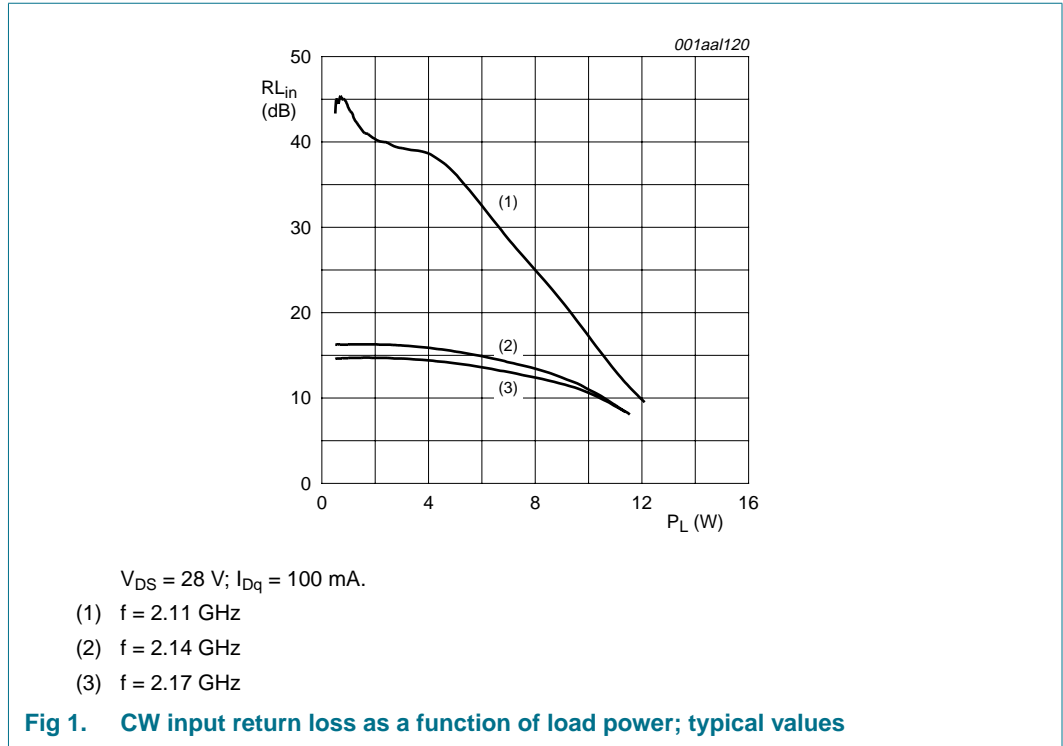
Mode of operation: 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH;  $f_1 = 2112.5\text{ MHz}$ ;  $f_2 = 2167.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ;  $T_{case} = 25\text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_{L(AV)} = 2\text{ W}$	17.3	19.3	-	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 2\text{ W}$	29	31	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 2\text{ W}$	-	-39	-36	dBc

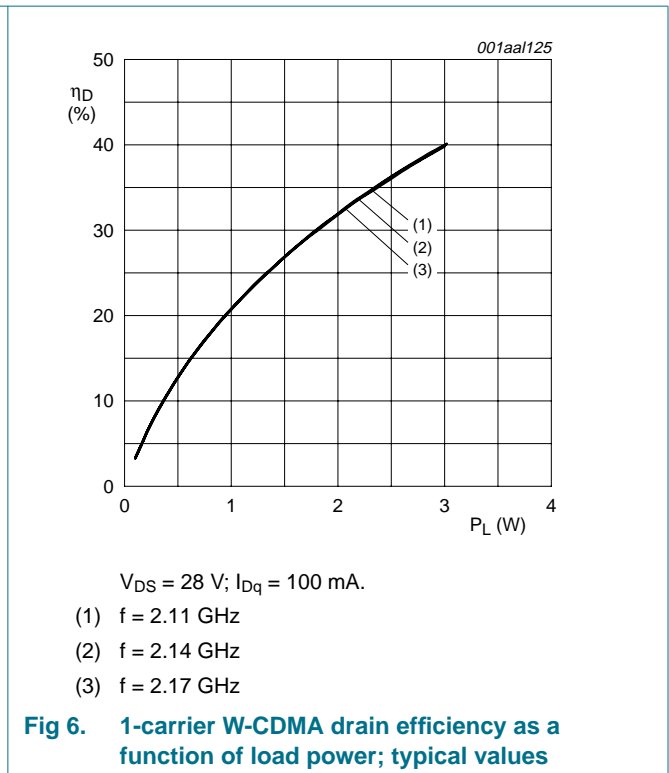
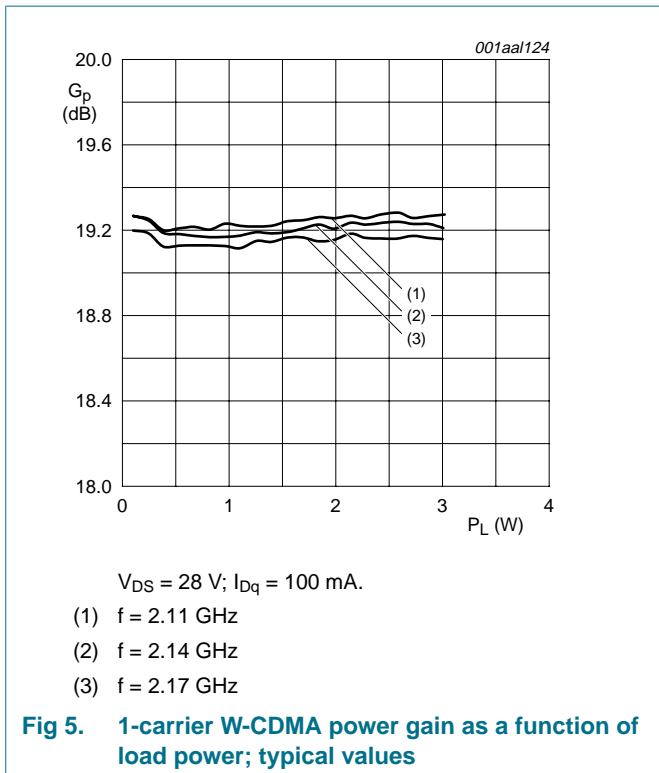
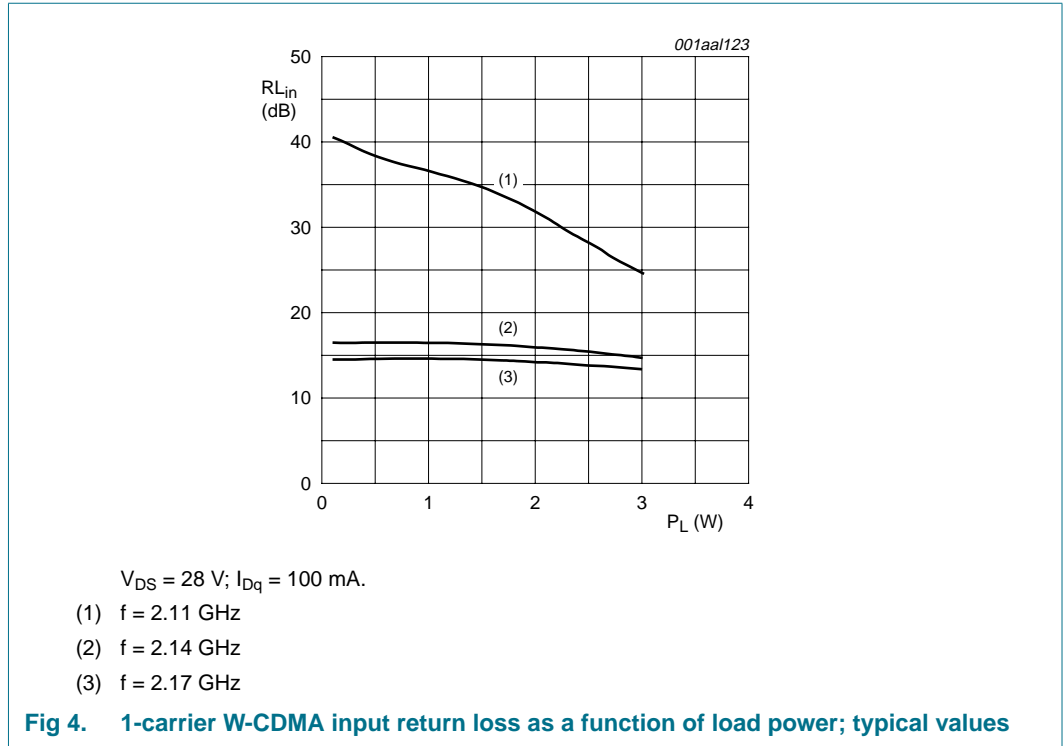
### 7.1 Ruggedness in class-AB operation

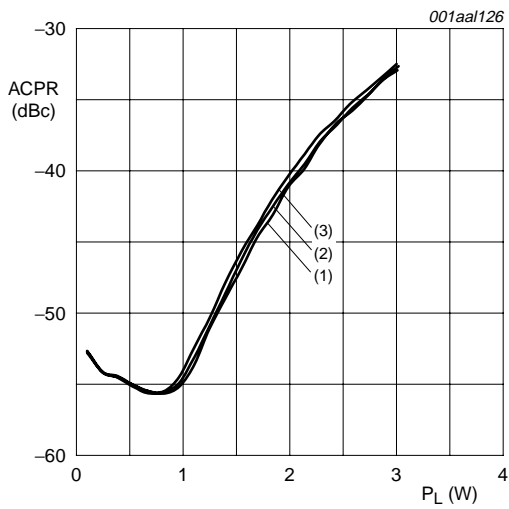
The BLF6G21-10G is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 28\text{ V}$ ;  $f = 2140\text{ MHz}$  at  $P_L = 10\text{ W}$ .

**7.2 CW**



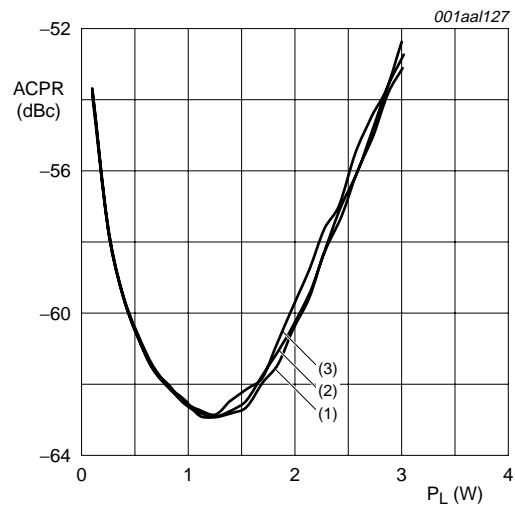
7.3 1-carrier W-CDMA





$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ; carrier spacing 5 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

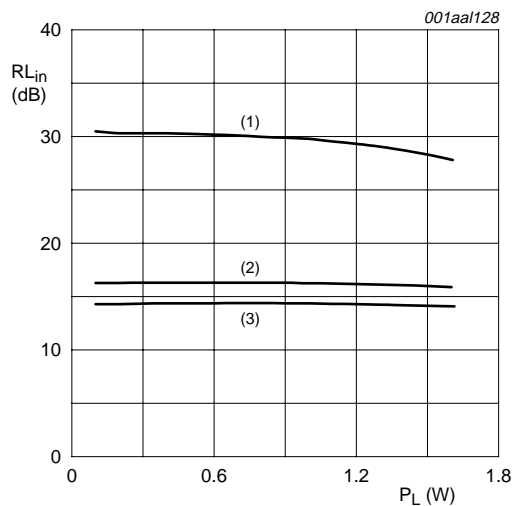
**Fig 7. 1-carrier W-CDMA adjacent channel power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ ; carrier spacing 10 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

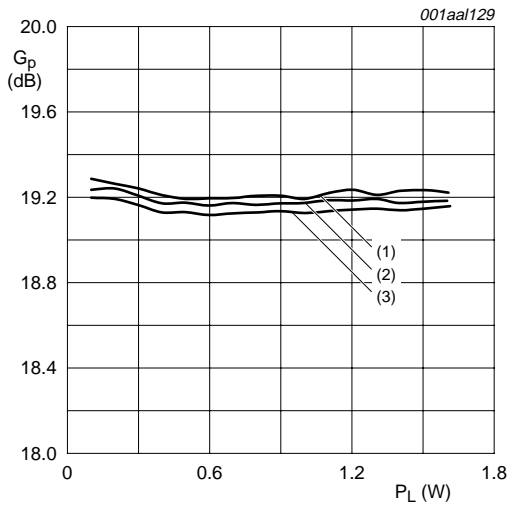
**Fig 8. 1-carrier W-CDMA adjacent channel power ratio as a function of load power; typical values**

**7.4 2-carrier W-CDMA**



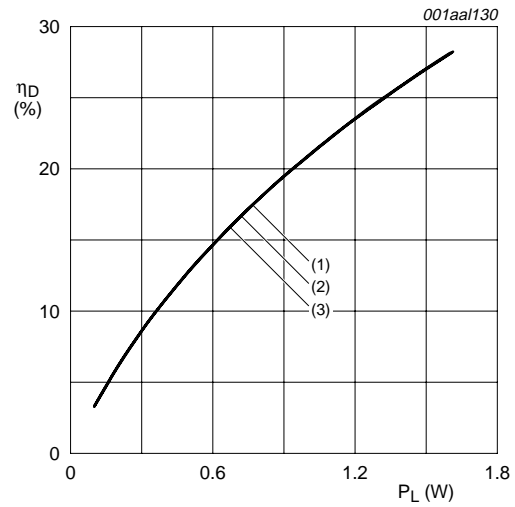
$V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 100\text{ mA}$ .  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 9. 2-carrier W-CDMA input return loss as a function of load power; typical values**



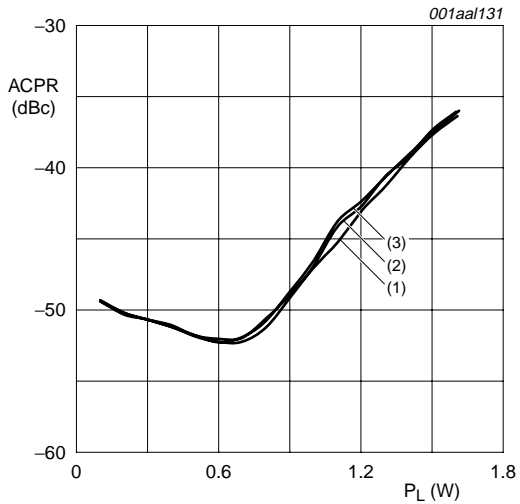
$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}.$   
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 10. 2-carrier W-CDMA power gain as a function of load power; typical values**



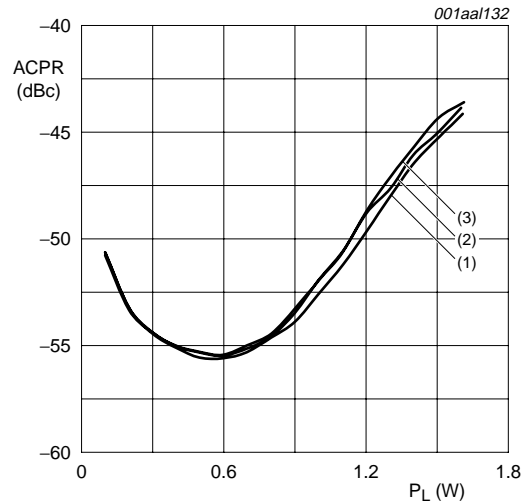
$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA}.$   
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 11. 2-carrier W-CDMA drain efficiency as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA};$  carrier spacing 5 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 12. 2-carrier W-CDMA adjacent channel power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 100\text{ mA};$  carrier spacing 10 MHz.  
 (1)  $f = 2.11\text{ GHz}$   
 (2)  $f = 2.14\text{ GHz}$   
 (3)  $f = 2.17\text{ GHz}$

**Fig 13. 2-carrier W-CDMA adjacent channel power ratio as a function of load power; typical values**

8. Package outline

Ceramic surface-mounted package; 2 leads

SOT538A

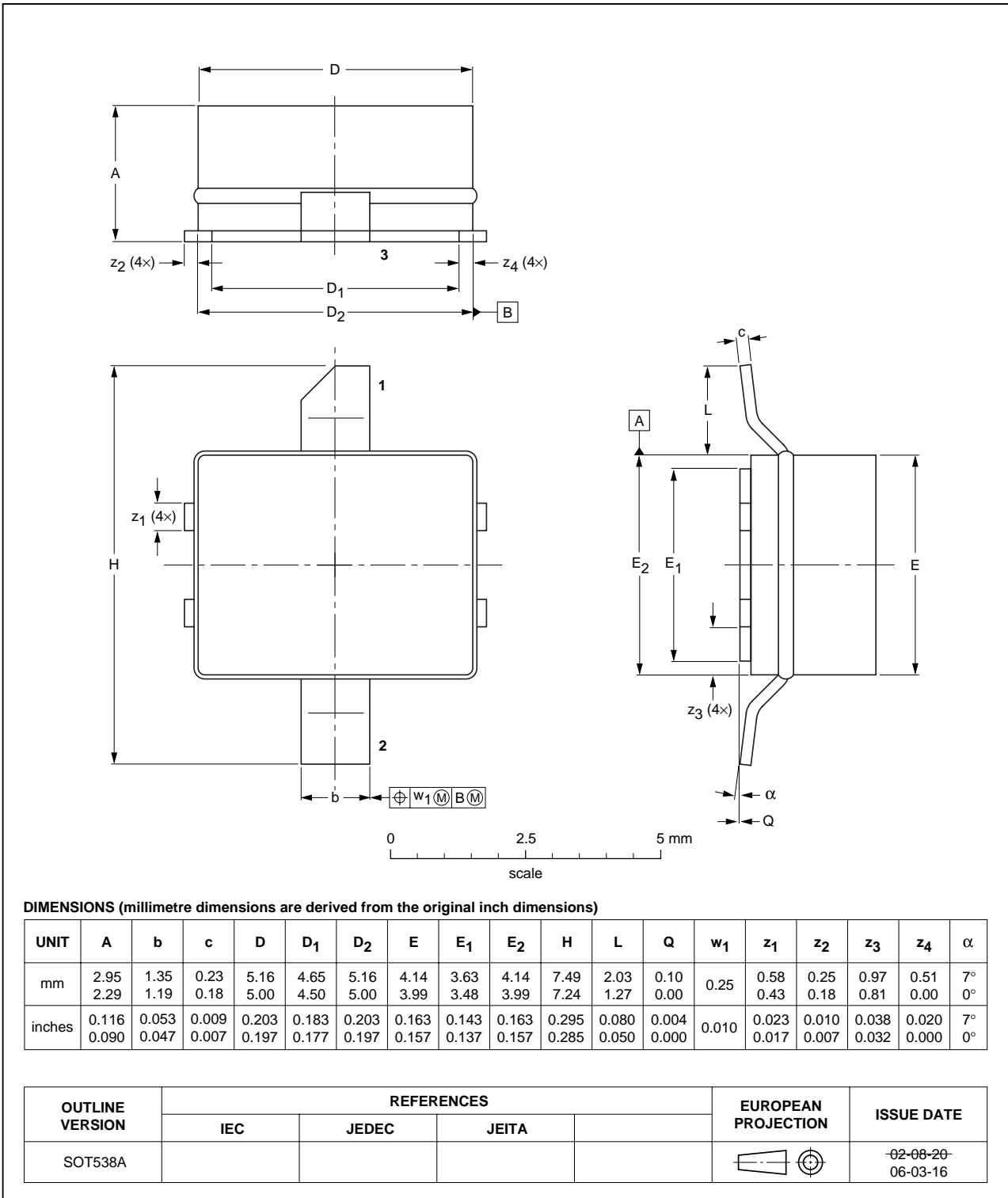


Fig 14. Package outline SOT538A



## 9. Abbreviations

**Table 9. Abbreviations**

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CDMA	Code Division Multiple Access
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
EDGE	Enhanced Data rates for GSM Evolution
GSM	Global System for Mobile communications
HF	High Frequency
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average power Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
PHS	Personal Handy-phone System
RF	Radio Frequency
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 10. Revision history

**Table 10. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G21-10G_2	20091211	Product data sheet	-	BLF6G21-10G_1
Modifications:	<ul style="list-style-type: none"> <li>• <a href="#">Section 6 on page 3</a>: added some values.</li> <li>• <a href="#">Table 7 on page 3</a>: added some values.</li> <li>• <a href="#">Section 7.1 on page 3</a>: added some values.</li> <li>• <a href="#">Section 7.2 on page 4</a>: added CW powersweeps.</li> <li>• <a href="#">Section 7.3 on page 5</a>: added 1-carrier W-CDMA powersweeps.</li> <li>• <a href="#">Section 7.4 on page 6</a>: added 2-carrier W-CDMA powersweeps.</li> </ul>			
BLF6G21-10G_1	20090511	Objective data sheet	-	-

## 11. Legal information

### 11.1 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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