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 mA; T_{case} = 25 °C in a common source class-AB production test circuit.

Mode of operation	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA	2110 to 2170	28	0.7	18.5	15	–50[1]
1-carrier W-CDMA	2110 to 2170	28	2	19.3	31	–39[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 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

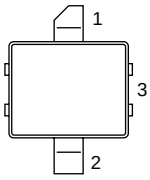
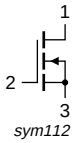
- Excellent thermal stability
- No internal matching for broadband operation
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

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]		

[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 °C; $P_{L(AV)}$ = 11 W	[1]	3.2	K/W

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

6. Characteristics

Table 6. Characteristics

T_j = 25 °C 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 = 18 mA	1.4	1.9	2.4	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.5	µA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	3.1	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	150	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 0.9 A	-	0.5	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 0.625 A	-	0.4	-	Ω
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 28 V; f = 1 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 MHz; f_2 = 2117.5 MHz; f_3 = 2162.5 MHz; f_4 = 2167.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 100 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	$P_{L(AV)}$ = 0.7 W	-	18.5	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 0.7 W	-	15	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 0.7 W	-	–50	-	dBc

Table 8. Application information

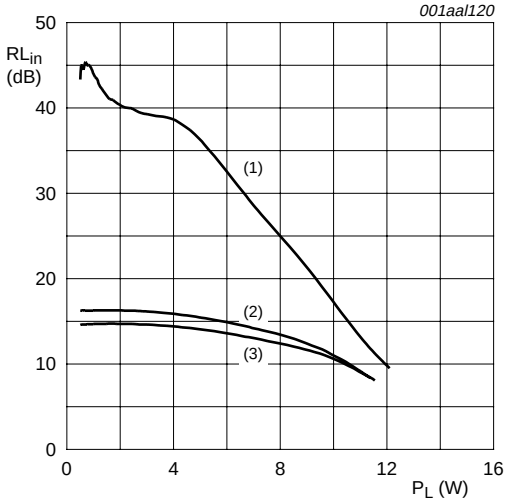
Mode of operation: 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; f_1 = 2112.5 MHz; f_2 = 2167.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 100 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

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

7.1 Ruggedness in class-AB operation

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

7.2 CW



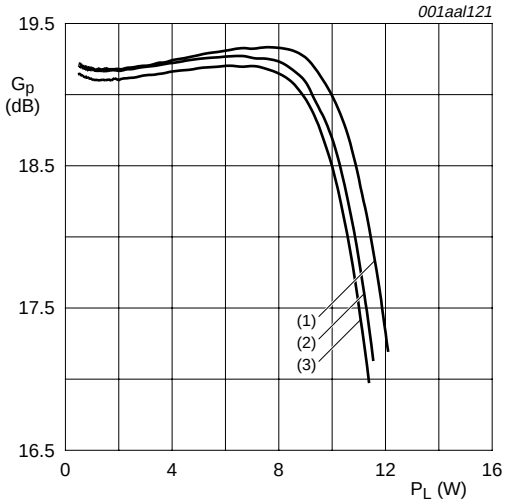
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 1. CW input return loss as a function of load power; typical values



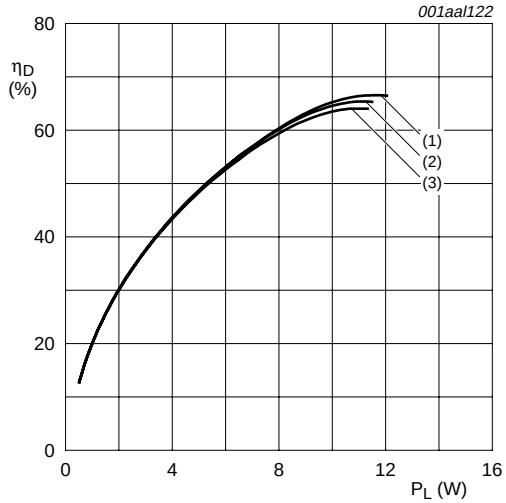
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 2. CW power gain as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 100 mA.

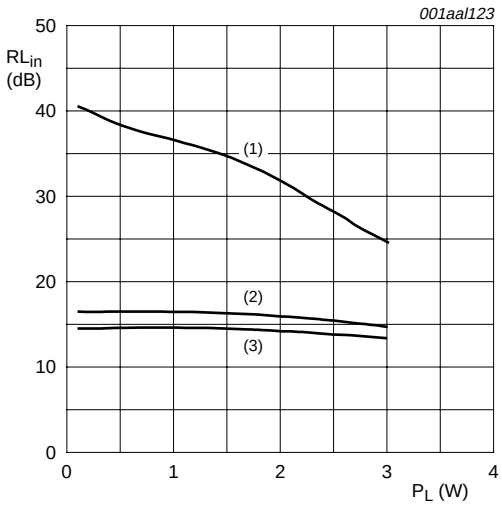
(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 3. CW drain efficiency as a function of load power; typical values

7.3 1-carrier W-CDMA



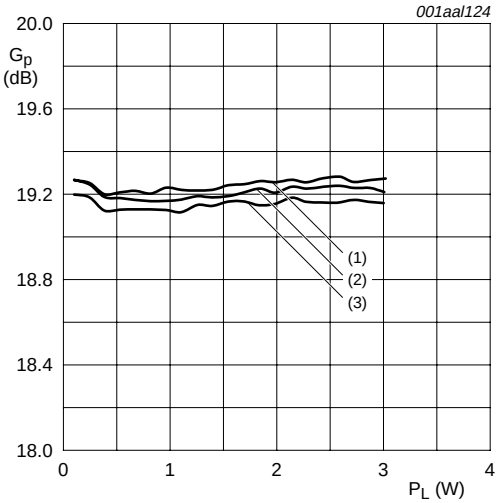
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 4. 1-carrier W-CDMA input return loss as a function of load power; typical values



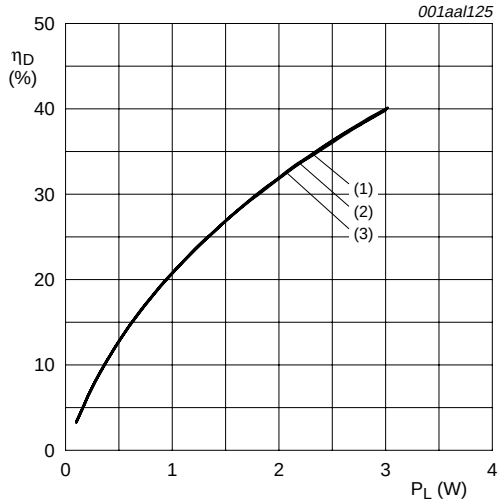
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 5. 1-carrier W-CDMA power gain as a function of load power; typical values



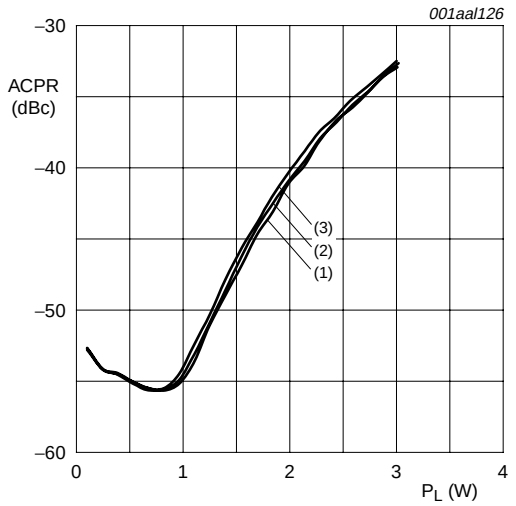
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 6. 1-carrier W-CDMA drain efficiency as a function of load power; typical values



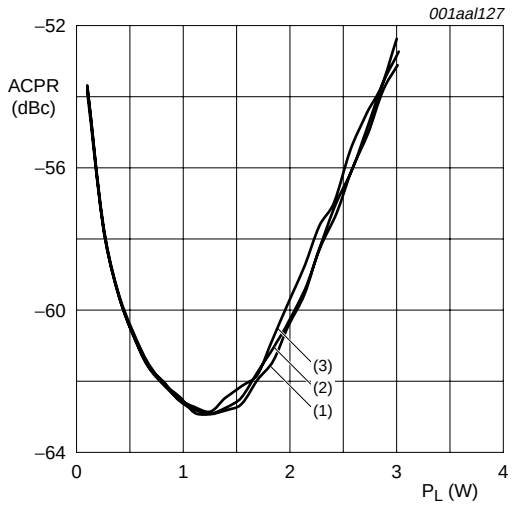
V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 5 MHz.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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



V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 10 MHz.

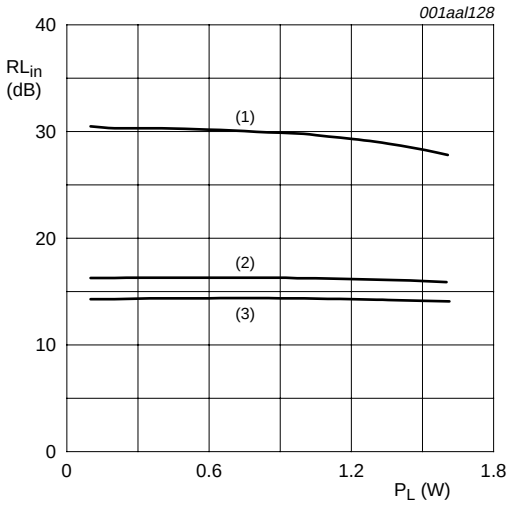
(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 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



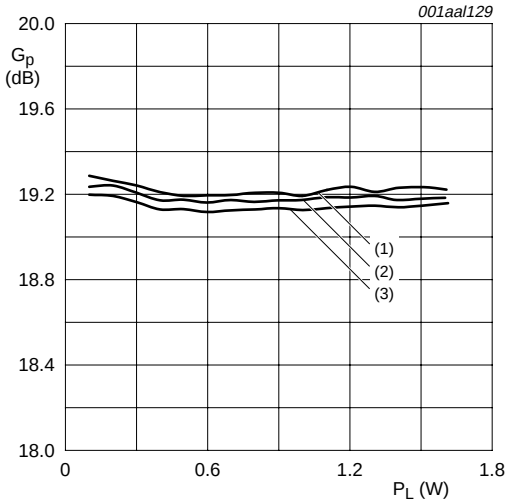
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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



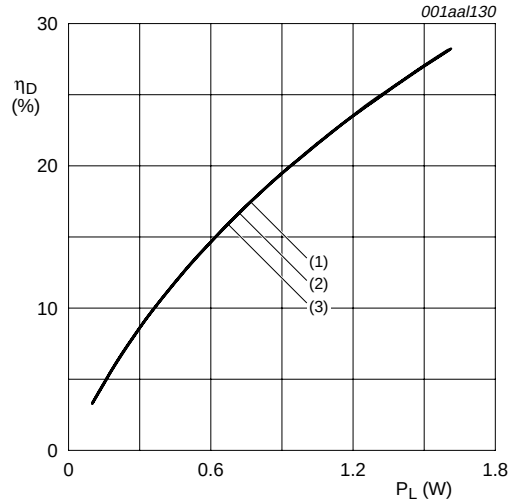
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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



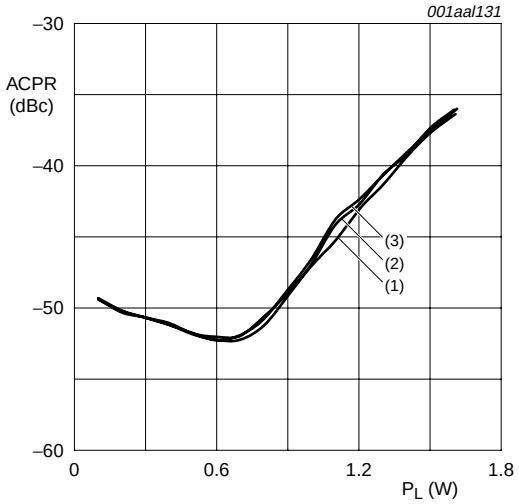
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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



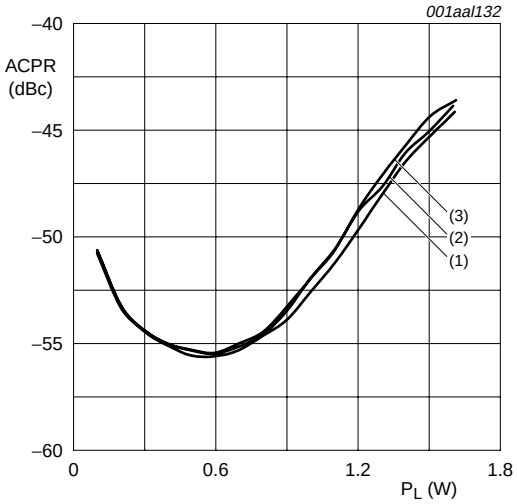
V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 5 MHz.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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



V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 10 MHz.

(1) f = 2.11 GHz

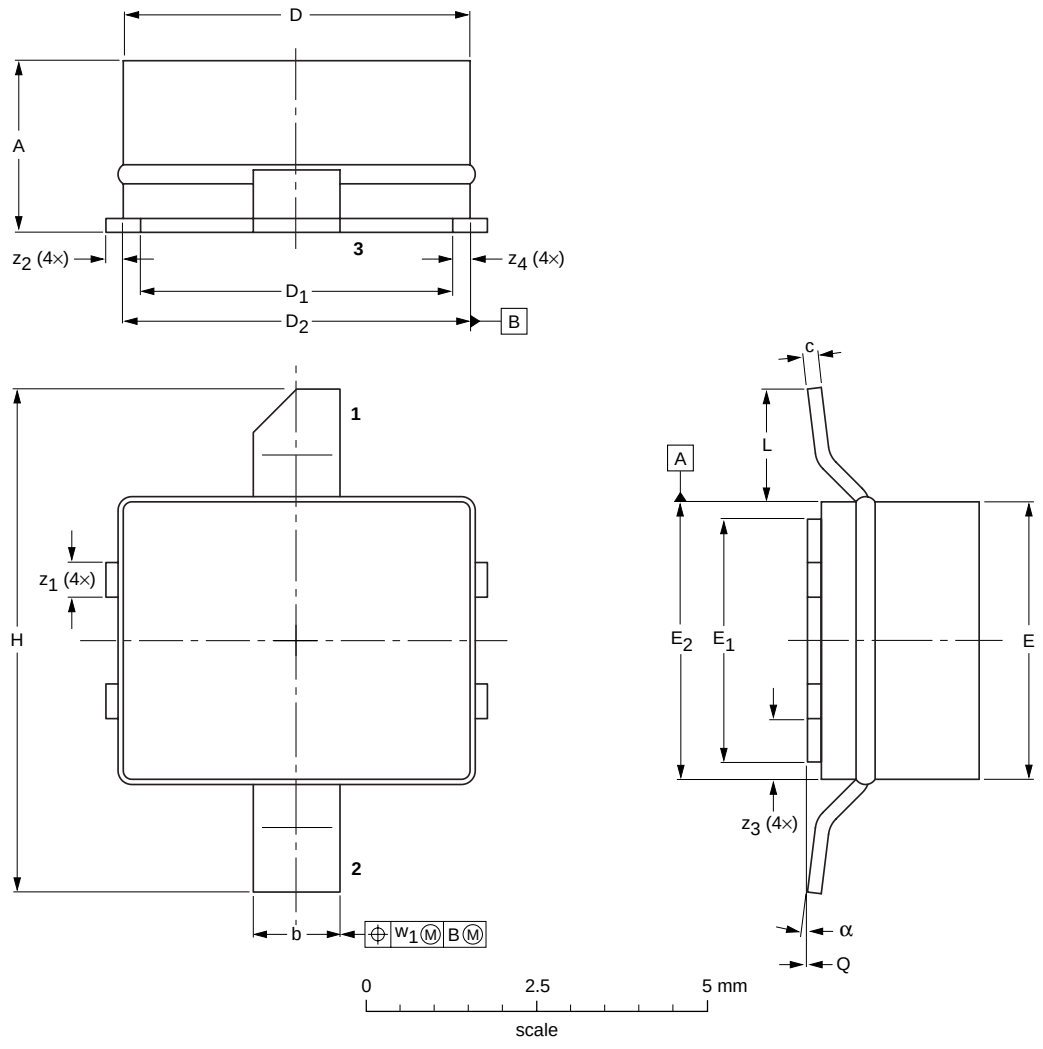
(2) f = 2.14 GHz

(3) f = 2.17 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**



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

UNIT	A	b	c	D	D_1	D_2	E	E_1	E_2	H	L	Q	w_1	z_1	z_2	z_3	z_4	α
mm	2.95 2.29	1.35 1.19	0.23 0.18	5.16 5.00	4.65 4.50	5.16 5.00	4.14 3.99	3.63 3.48	4.14 3.99	7.49 7.24	2.03 1.27	0.10 0.00	0.25	0.58 0.43	0.25 0.18	0.97 0.81	0.51 0.00	7° 0°
inches	0.116 0.090	0.053 0.047	0.009 0.007	0.203 0.197	0.183 0.177	0.203 0.197	0.163 0.157	0.143 0.137	0.163 0.157	0.295 0.285	0.080 0.050	0.004 0.000	0.010	0.023 0.017	0.010 0.007	0.038 0.032	0.020 0.000	7° 0°

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT538A						~~02-08-20~~ 06-03-16

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:	• Section 6 on page 3: added some values. • Table 7 on page 3: added some values. • Section 7.1 on page 3: added some values. • Section 7.2 on page 4: added CW powersweeps. • Section 7.3 on page 5: added 1-carrier W-CDMA powersweeps. • Section 7.4 on page 6: added 2-carrier W-CDMA powersweeps.			
BLF6G21-10G_1	20090511	Objective data sheet	-	-

11. Legal information

11.1 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.

[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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.nxp.com.

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13. Contents

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