

# BLF6G10L-260PRN; BLF6G10LS-260PRN

Power LDMOS transistor

Rev. 2 — 12 July 2013

Product data sheet

## 1. Product profile

### 1.1 General description

260 W LDMOS power transistor for base station applications at frequencies from 700 MHz to 1000 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ °C}$  in a 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	40	22.0	26.5	-39 <sup>[1]</sup>

[1] Test signal: 3GPP test model 1; 1 to 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 920 MHz and 960 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 1800 mA:
  - ◆ Average output power = 40 W
  - ◆ Power gain = 22.0 dB
  - ◆ Efficiency = 26.5 %
  - ◆ ACPR = -39 dBc
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (700 MHz to 1000 MHz)
- Internally matched for ease of use
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

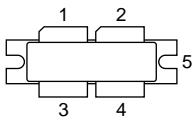
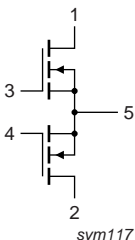
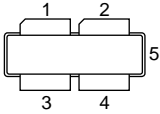
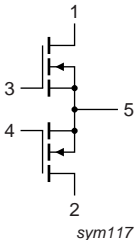


### 1.3 Applications

- RF power amplifiers for GSM, GSM EDGE, W-CDMA and CDMA base stations and multi carrier applications in the 700 MHz to 1000 MHz frequency range

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BLF6G10L-260PRN (SOT539A)			
1	drain1		
2	drain2		
3	gate1		
4	gate2		
5	source		
BLF6G10LS-260PRN (SOT539B)			
1	drain1		
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G10L-260PRN	-	flanged balanced LDMOST ceramic package; 2 mounting holes; 4 leads	SOT539A
BLF6G10LS-260PRN	-	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
$I_D$	drain current		-	64	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

**Table 5. Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$ ; $P_L = 40\text{ W}$	0.28	K/W

## 6. Characteristics

**Table 6. Characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 1.8\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 180\text{ mA}$	1.4	1.9	2.4	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 28\text{ V}$ ; $I_D = 1000\text{ mA}$	1.45	2.1	2.55	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$	-	-	2.8	μA
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	24.1	30	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	280	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 9\text{ A}$	7.02	12	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 6.3\text{ A}$	0.053	0.1	0.165	Ω

## 7. Application information

**Table 7. 2-carrier W-CDMA Application information**

Class-AB production test circuit; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 DPCH;  $f_1 = 917.5\text{ MHz}$ ;  $f_2 = 922.5\text{ MHz}$ ;  $f_3 = 957.5\text{ MHz}$ ;  $f_4 = 962.5\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1800\text{ mA}$ ;  $T_{case} = 25\text{ °C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	40	-	W
$G_p$	power gain	$P_{L(AV)} = 40\text{ W}$	19.8	22.0	-	dB

**Table 7. 2-carrier W-CDMA Application information ...continued**

Class-AB production test circuit; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 DPCH;  $f_1 = 917.5$  MHz;  $f_2 = 922.5$  MHz;  $f_3 = 957.5$  MHz;  $f_4 = 962.5$  MHz; RF performance at  $V_{DS} = 28$  V;  $I_{DQ} = 1800$  mA;  $T_{case} = 25$  °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$RL_{in}$	input return loss	$P_{L(AV)} = 40$ W	-	-10.0	-6.0	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 40$ W	25.0	26.5	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 40$ W	-	-39	-35	dBc

**Table 8. 1 carrier W-CDMA Application information**

Class-AB production test circuit; PAR 7.5 dB at 0.01 % probability on CCDF; 3 GPP test model 1; 1 to 64 DPCH;  $f_1 = 960$  MHz; RF performance at  $V_{DS} = 28$  V;  $I_{DQ} = 1800$  mA;  $T_{case} = 25$  °C; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$PAR_0$	output peak-to-average ratio	$PL(AV) = 125$ W at 0.01 % probability on CCDF	3.8	4.3	-	dB

## 7.1 Ruggedness in class-AB operation

The BLF6G10L-260PRN and BLF6G10L-260PRN are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28$  V;  $I_{DQ} = 1800$  mA;  $P_L = 260$  W (CW);  $f = 920$  MHz to 960 MHz.

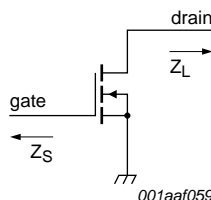
## 7.2 Impedance information

**Table 9. Typical impedance per section**

$I_{DQ} = 950$  mA; main transistor  $V_{DS} = 28$  V

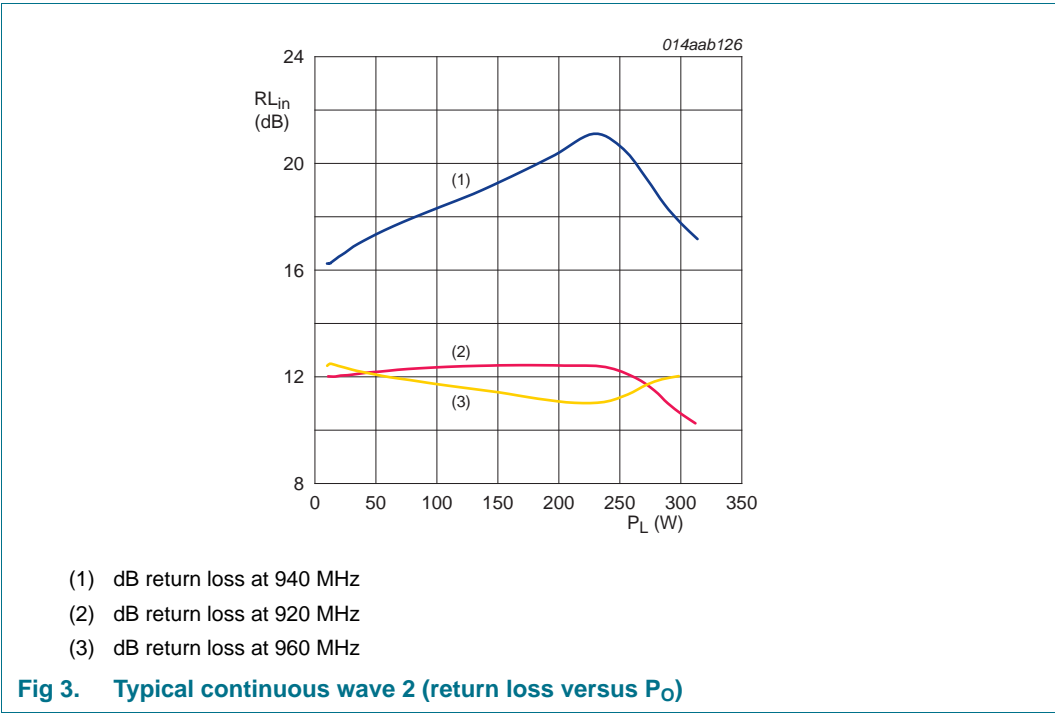
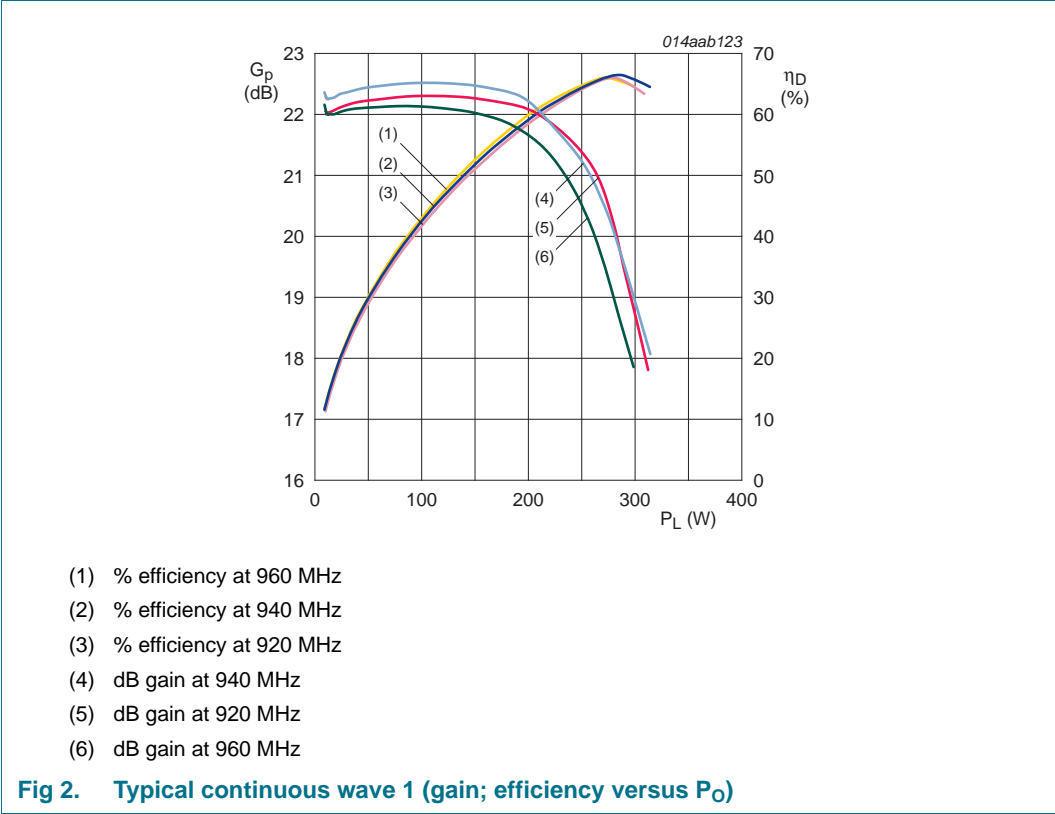
f MHz	$Z_S$ [1] $\Omega$	$Z_L$ [1] $\Omega$
920	$0.7 - j1.0$	$1.4 + j0.6$
940	$1.1 - j1.3$	$1.2 + j0.5$
960	$1.0 - j1.6$	$1.2 + j0.3$

[1]  $Z_S$  and  $Z_L$  defined in [Figure 1](#).

**Fig 1. Definition of transistor impedance**

7.3 Typical powersweep

7.3.1 CW



7.3.2 IS95

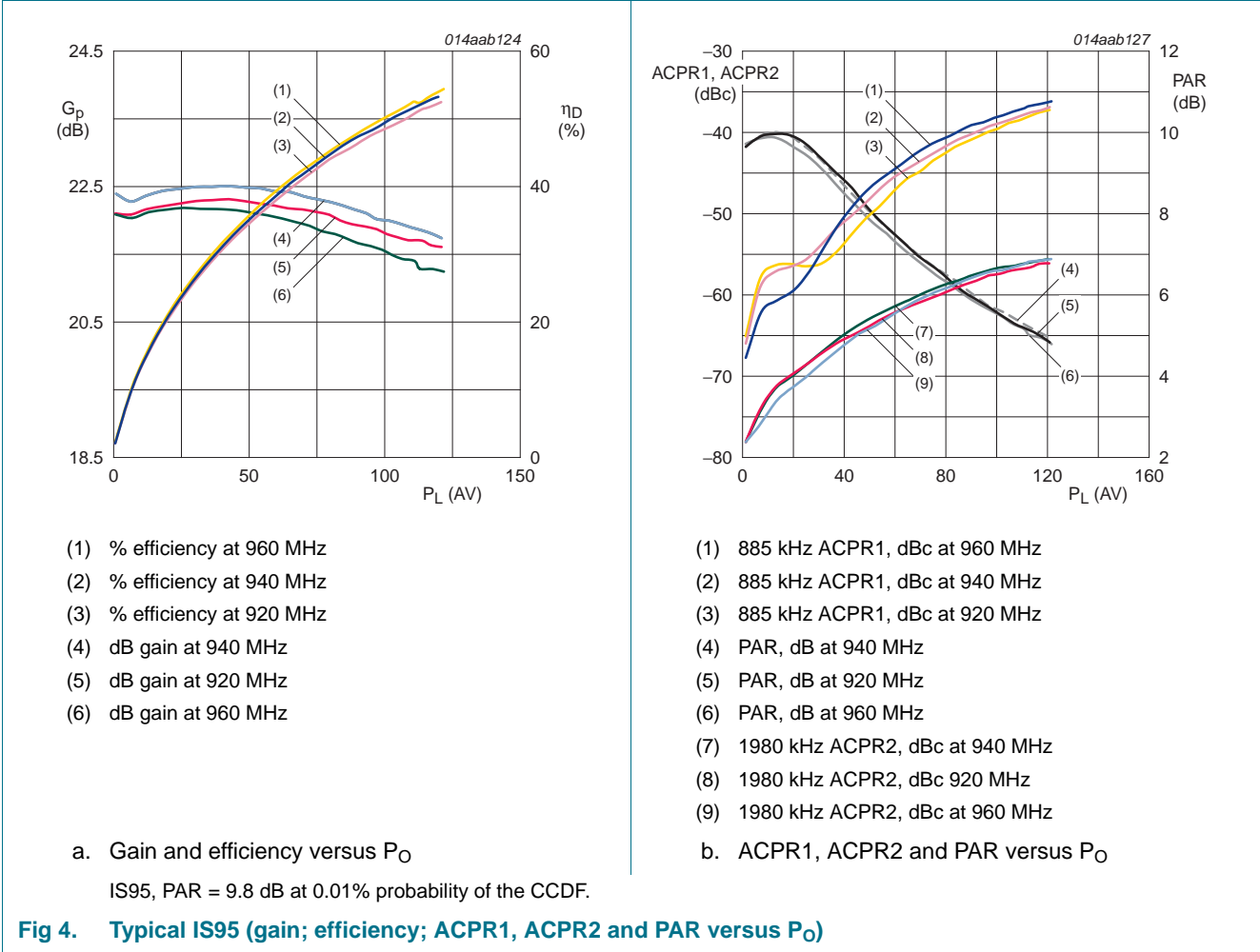
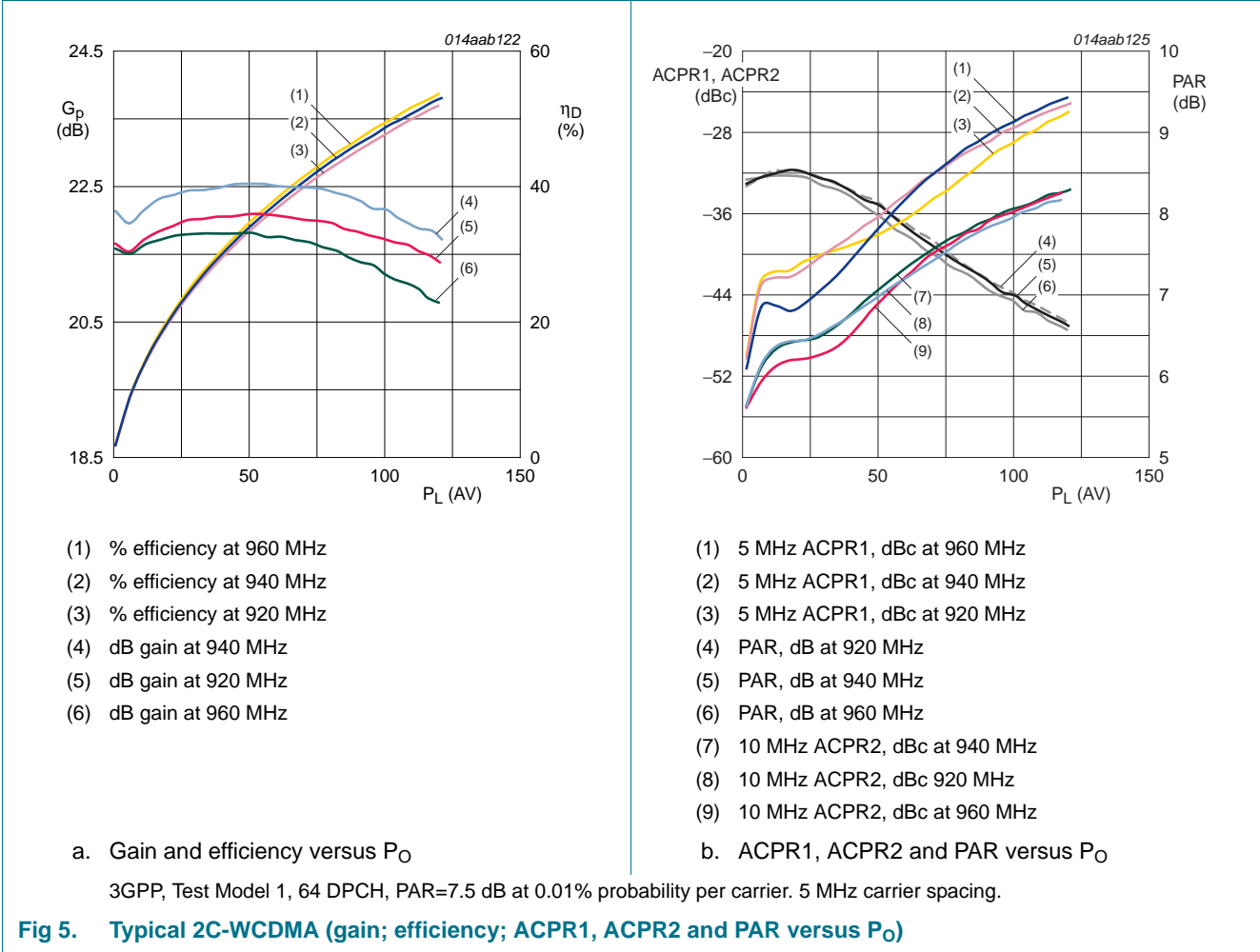


Fig 4. Typical IS95 (gain; efficiency; ACPR1, ACPR2 and PAR versus  $P_O$ )

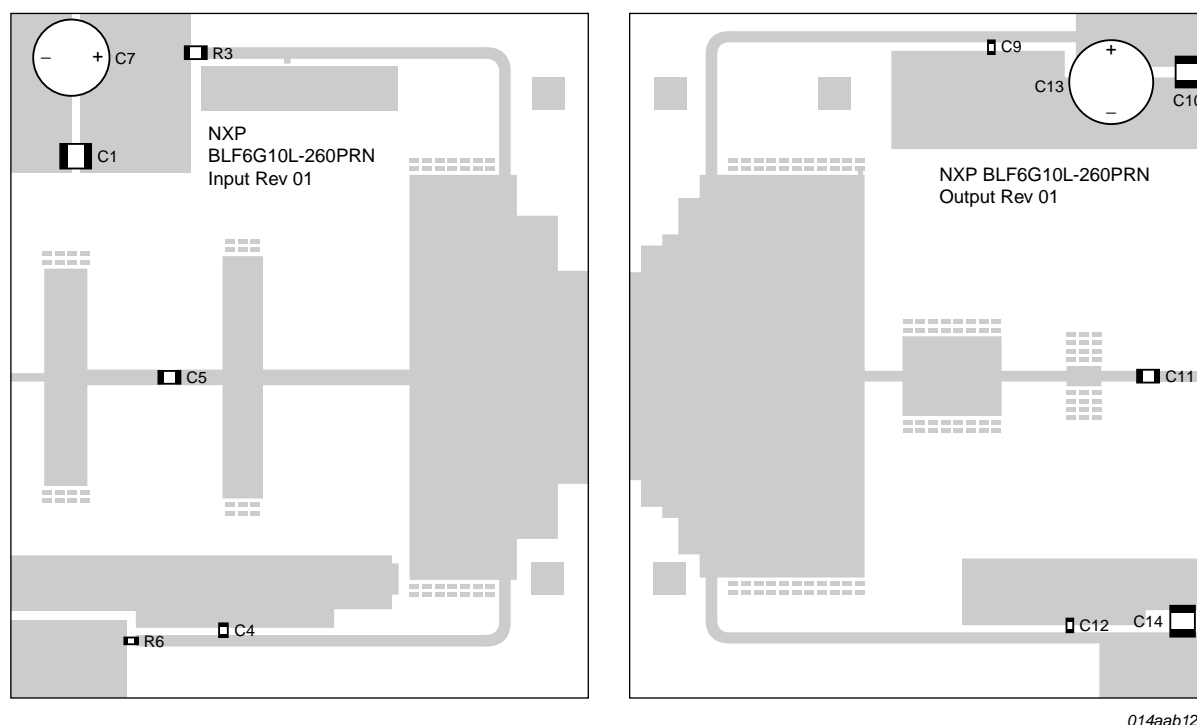
7.3.3 2C-WCDMA (5 MHz spacing)



## 8. Test information

### 8.1 Test circuit

[Figure 6](#) shows the PCB test circuit layout



014aab129

The above layout shows the test circuit used to measure the devices in production. The RF Power and Base-Station group can provide a more appropriate application demonstration for specific customer needs.

**Fig 6. Input and output test circuit PCBs'**

### 8.2 Bill of materials (B.O.M.)

The following Bill of materials ([Table 10](#)) shows a list of all the components needed to build the RF test circuit.

**Table 10. Bill of materials**

Component	Description	Type	Value	Code number	Remarks
	base plate				see mechanical drawing.
	input PCB				see PCB info.
	output PCB				see PCB info.
	15 × bolt M2				brass (nickel plated)
	15 × washer M2				brass (nickel plated)
	4 × contact block		12 × 4 mm		brass (milled)
	rubber O-ring	Viton	17 × 1 mm		
	conductive elastomer ("silver" rubber)	Chomerics	35 × 1 mm (2x)	CHO-SEAL 1273	



Table 10. Bill of materials ...continued

Component	Description	Type	Value	Code number	Remarks
C4, C5, C9, C11, C12	multilayer ceramic chip capacitor	ATC 800B	100 pF		
	multilayer ceramic chip capacitor				
C1, C10, C14	multilayer ceramic chip capacitor	TDK	10 $\mu$ F		
C7, C13	electrolytic capacitor		470 $\mu$ F		
R3, R6	chip resistor	Philips 0603	10 $\Omega$		
	copper foil strip				needed for tuning
	standard components:				
	N-connector male	13N-50-057/1			Suhner
	N-connector female	23N-50-057/1			Suhner
	4 $\times$ bolt M3		12 mm		chromium nickle steel
	4 $\times$ spring washer M3				chromium nickle steel
	DC-connector 8 pin male	8140-115			Souriau (Farnell)
	2 $\times$ DC-connector 2 pin male	8140-12			Souriau (Farnell)
	2 $\times$ bolt M3		30 mm		chromium nickle steel
	2 $\times$ washer M3				chromium nickle steel
	solid copper wire (diam. 1 mm)		30 mm		
	flexible copper wire	SIMX-F	0.75 mm <sup>2</sup>		silicon isolated
	4 $\times$ cable isolator (diam. 3 mm)	P/H30X15WE		1922.000.10134	
	4 $\times$ cable isolator (diam. 2 mm)	P/H20X10WE		1922.000.10033	

9. Package outline

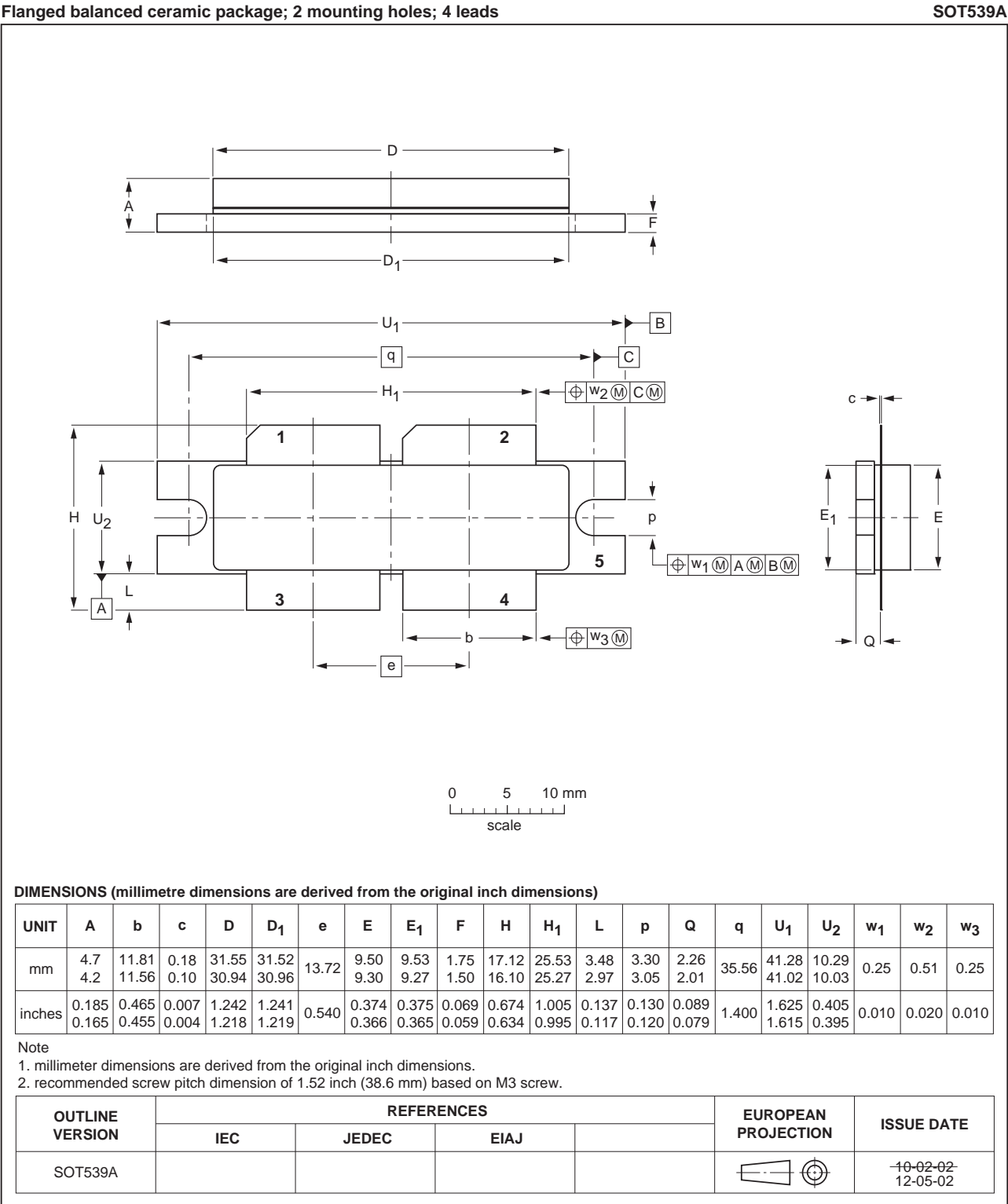
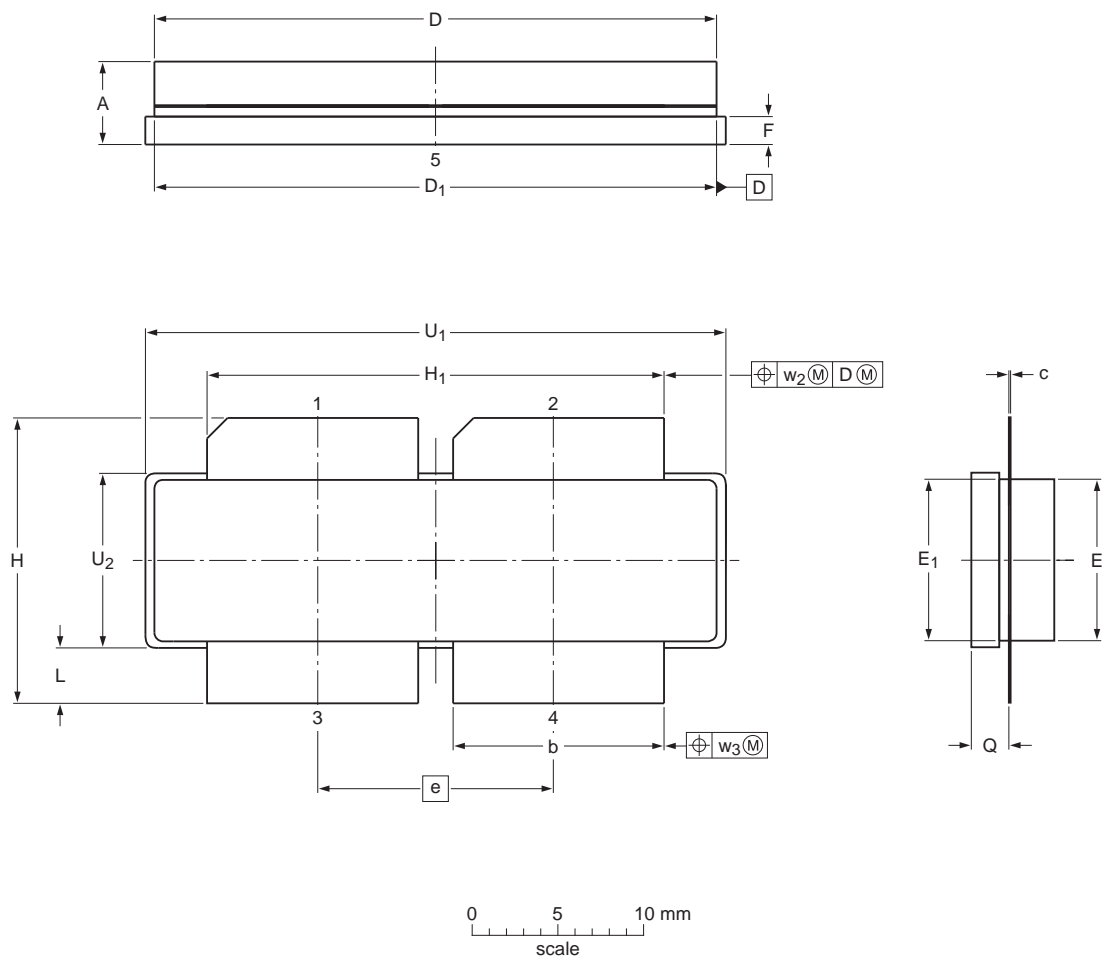


Fig 7. Package outline SOT539A

Earless flanged balanced ceramic package; 4 leads

SOT539B



Dimensions																	
Unit <sup>(1)</sup>	A	b	c	D	D <sub>1</sub>	E	E <sub>1</sub>	e	F	H	H <sub>1</sub>	L	Q	U <sub>1</sub>	U <sub>2</sub>	w <sub>2</sub>	w <sub>3</sub>
mm	max	4.7	11.81	0.18	31.55	31.52	9.5	9.53	1.75	17.12	25.53	3.48	2.26	32.39	10.29	0.25	0.25
	nom							13.72									
inches	max	0.185	0.465	0.007	1.242	1.241	0.374	0.375	0.069	0.674	1.005	0.137	0.089	1.275	0.405	0.01	0.01
	nom							0.54									
	min	0.165	0.455	0.004	1.218	1.219	0.366	0.365	0.059	0.634	0.995	0.117	0.079	1.265	0.395		

Note  
1. millimeter dimensions are derived from the original inch dimensions. sot539b\_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT539B						12-05-02 13-05-24

Fig 8. Package outline SOT539B

## 10. Abbreviations

Table 11. 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
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
PAR	Peak-to-Average power Ratio
RF	Radio Frequency
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G10L-260PRN_LS-260PRN v.2	20130712	Product data sheet	-	BLF6G10L-260PRN_LS-260PRN v.1
Modifications:	<ul style="list-style-type: none"><li>The package outline <a href="#">Figure 8</a> is updated.</li><li>Translation disclaimer added to the legal text.</li></ul>			
BLF6G10L-260PRN_LS-260PRN v.1	20100812	Product data sheet	-	-

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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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## 14. Contents

<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features and benefits . . . . .	1
1.3	Applications . . . . .	2
<b>2</b>	<b>Pinning information</b> . . . . .	<b>2</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Limiting values</b> . . . . .	<b>3</b>
<b>5</b>	<b>Thermal characteristics</b> . . . . .	<b>3</b>
<b>6</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Application information</b> . . . . .	<b>3</b>
7.1	Ruggedness in class-AB operation . . . . .	4
7.2	Impedance information . . . . .	4
7.3	Typical powersweep . . . . .	5
7.3.1	CW . . . . .	5
7.3.2	IS95 . . . . .	6
7.3.3	2C-WCDMA (5 MHz spacing) . . . . .	7
<b>8</b>	<b>Test information</b> . . . . .	<b>8</b>
8.1	Test circuit . . . . .	8
8.2	Bill of materials (B.O.M.) . . . . .	8
<b>9</b>	<b>Package outline</b> . . . . .	<b>10</b>
<b>10</b>	<b>Abbreviations</b> . . . . .	<b>12</b>
<b>11</b>	<b>Revision history</b> . . . . .	<b>12</b>
<b>12</b>	<b>Legal information</b> . . . . .	<b>13</b>
12.1	Data sheet status . . . . .	13
12.2	Definitions . . . . .	13
12.3	Disclaimers . . . . .	13
12.4	Trademarks . . . . .	14
<b>13</b>	<b>Contact information</b> . . . . .	<b>14</b>
<b>14</b>	<b>Contents</b> . . . . .	<b>15</b>

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