

# BLF6G15LS-250PBRN

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

250 W LDMOS power transistor for base station applications at frequencies from 1450 MHz to 1550 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	1476 to 1511	28	60	18.5	34.0	-30 [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.

### 1.2 Features and benefits

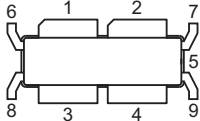
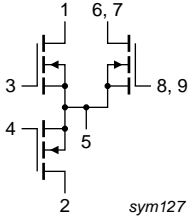
- Typical 2-carrier W-CDMA performance at frequencies of 1476 MHz and 1511 MHz, a supply voltage of 28 V and an I<sub>DQ</sub> of 1410 mA:
  - ◆ Average output power = 60 W
  - ◆ Power gain = 18.5 dB
  - ◆ Efficiency = 34.0 %
  - ◆ ACPR = -30 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1450 MHz to 1550 MHz)
- Internally matched for ease of use
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC
- Integrated current sense

### 1.3 Applications

- RF power amplifiers for GSM, GSM EDGE, CDMA and W-CDMA and multi carrier applications in the 1450 MHz to 1550 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		
6, 7	sense drain		
8, 9	sense gate		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G15LS-250PBRN	-	earless flanged LDMOST ceramic package; 8 leads	SOT1110B

## 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	+11	V
$I_D$	drain current		-	64	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C
$T_{case}$	case temperature	[1]	-	150	°C

[1] Continuous use at maximum temperature will affect MTTF.

## 5. Recommended operating conditions

Table 5. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
$T_{case}$	case temperature		-40	+125	°C

## 6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ }^{\circ}\text{C}$ ; $P_L = 60\text{ W}$ (CW)	0.29	K/W

## 7. Characteristics

Table 7. Characteristics

$T_j = 25\text{ }^{\circ}\text{C}$  per section; unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 1.8\text{ mA}$	65	75	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 180\text{ mA}$	1.4	1.8	2.4	V
$I_{Dq}$	quiescent drain current	sense transistor: $I_{DS} = 20.1\text{ mA}$ ; $V_{DS} = 12\text{ V}$ main transistor: $V_{DS} = 28\text{ V}$	1.31	1.41	1.51	A
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 28\text{ V}$	-	-	2.8	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	25.3	29	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	280	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}$ ; $I_D = 9\text{ A}$	8.1	12.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 6.3\text{ A}$	0.03	0.1	0.16	$\Omega$

## 8. Application information

Table 8. RF performance

Mode of operation: 2-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH;  $f_1 = 1473.4\text{ MHz}$ ;  $f_2 = 1478.4\text{ MHz}$ ;  $f_3 = 1508.4\text{ MHz}$ ;  $f_4 = 1513.4\text{ MHz}$ ; RF performance at  $V_{DS} = 28\text{ V}$ ;  $I_{Dq} = 1410\text{ mA}$ ;  $T_{case} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	60	-	W
$G_p$	power gain	$P_{L(AV)} = 60\text{ W}$	16.5	18.5	-	dB
$RL_{in}$	input return loss	$P_{L(AV)} = 60\text{ W}$	-	-11	-7	dB
$\eta_D$	drain efficiency	$P_{L(AV)} = 60\text{ W}$	31	34	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 60\text{ W}$	-	-30	-27	dBc

**Table 9. PAR performance**  
*Mode of operation; 1-carrier W-CDMA; PAR 7.5 dB at 0.01 % probability on CCDF;  
3GPP test model 1; 64 DPCH;  $f_1 = 1510.9$  MHz; RF performance at  $V_{DS} = 28$  V;  $I_{Dq} = 1410$  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	$P_{L(AV)} = 120$ W at 0.01 % probability on CCDF	3.4	4.2	-	dB

8.1 Ruggedness in class-AB operation

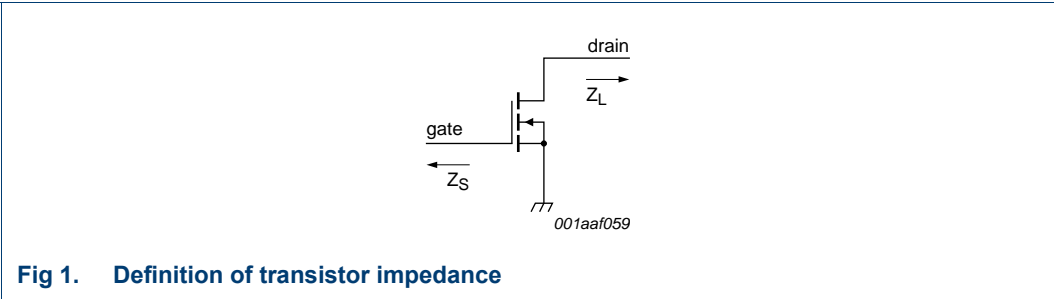
The BLF6G15LS-250PBRN is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28$  V;  $I_{Dq} = 1410$  mA;  $P_L = 200$  W;  $f = 1475$  MHz.

8.2 Impedance information

**Table 10. Typical impedance per section**  
 *$I_{Dq} = 950$  mA; main transistor  $V_{DS} = 28$  V*

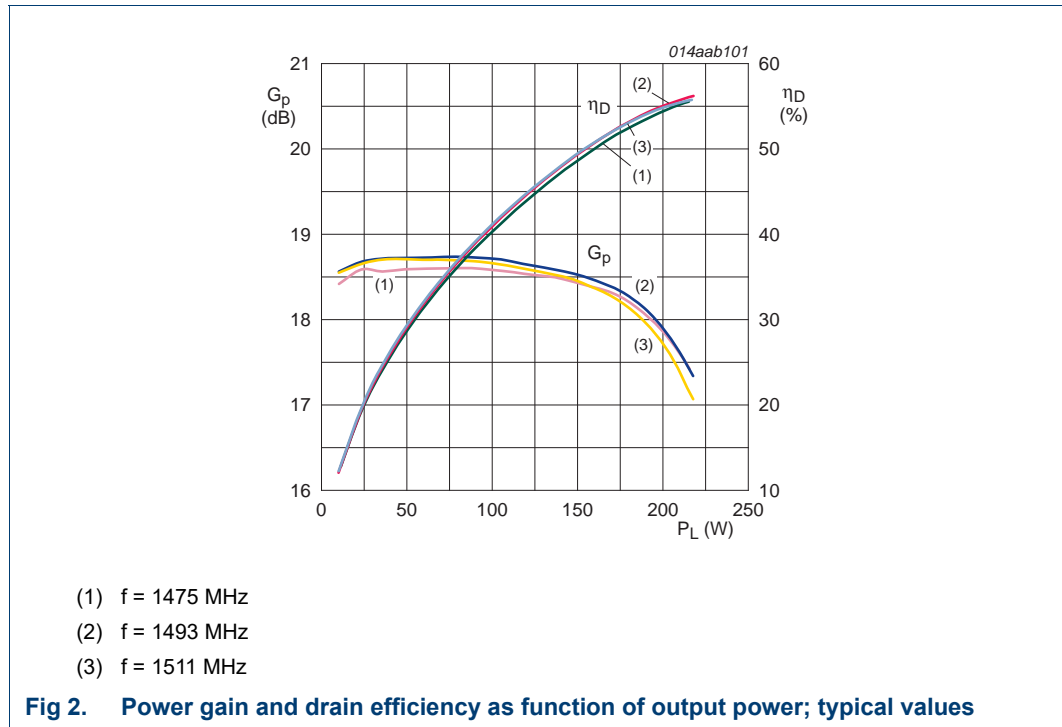
f (MHz)	$Z_S$ <sup>[1]</sup> (Ω)	$Z_L$ <sup>[1]</sup> (Ω)
1480	1.1 – j2.8	2.3 – j3.2
1510	1.3 – j2.8	2.1 – j2.8

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

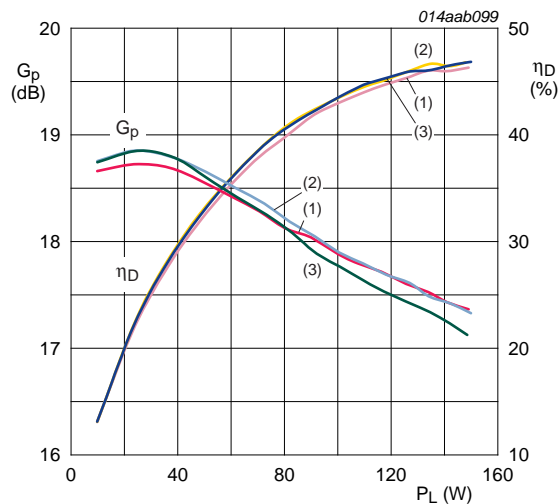


## 8.3 Graphs

### 8.3.1 CW



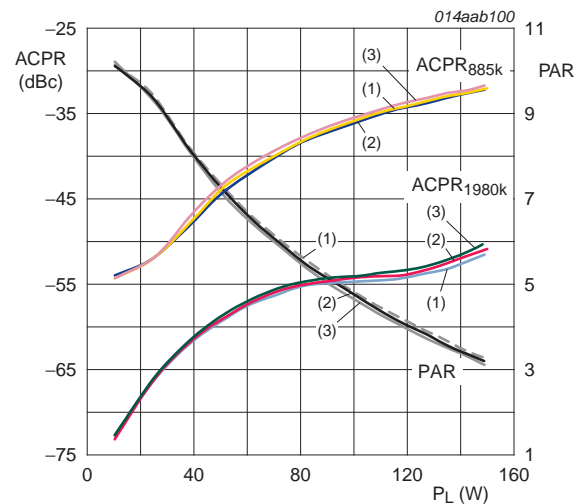
### 8.3.2 IS-95



IS-95: PAR = 9.8 dB at 0.01 % probability of the CCDF.

- (1)  $f = 1475$  MHz
- (2)  $f = 1493$  MHz
- (3)  $f = 1511$  MHz

**Fig 3. Power gain and drain efficiency as function of output power; typical values**



IS-95: PAR = 9.8 dB at 0.01 % probability of the CCDF.

- (1)  $f = 1475$  MHz
- (2)  $f = 1493$  MHz
- (3)  $f = 1511$  MHz

**Fig 4. Adjacent channel power ratio and peak-to-average power ratio as function of output power; typical values**

### 8.3.3 2-Carrier W-CDMA (5 MHz spacing)

RF performance sweep with 2-carrier W-CDMA is unavailable for the BLF6G15LS-250PBRN. The typical 2-carrier W-CDMA sweep of the BLF6G15L-250PBRN can be found in its data sheet.

## 9. Test information

**Table 11. List of components**

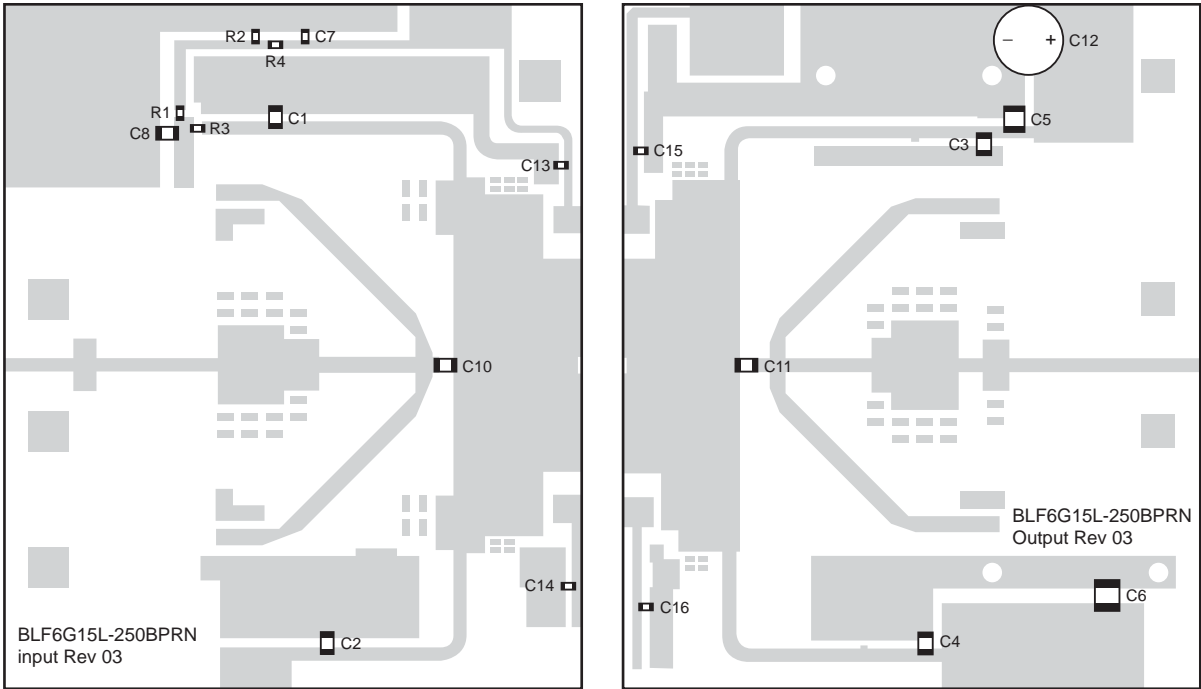
See [Figure 5](#) for component layout.

Component	Description	Value	Remarks
C1, C2, C3, C4	multi layer ceramic chip capacitor	100 pF	[1]
C5, C6	multi layer ceramic chip capacitor	10 $\mu$ F	[2]
C7	multi layer ceramic chip capacitor	10 nF	[2] on input gate line as shown
C8	multi layer ceramic chip capacitor	100 nF	[2]
C10	multi layer ceramic chip capacitor	2.4 pF	[1]
C11	multi layer ceramic chip capacitor	3.6 pF	[3]
C12	electrolytic capacitor	470 $\mu$ F; 63 V	
C13, C14, C15, C16	multi layer ceramic chip capacitor	33 pF	[3]
R1	chip resistor	3.9 k $\Omega$	Philips 0603

Table 11. List of components ...continued  
See Figure 5 for component layout.

Component	Description	Value	Remarks
R2	chip resistor	2.2 kΩ	Philips 0603
R3	chip resistor	10 Ω	Philips 0603
R4	chip resistor	0 Ω	Philips 0603

- [1] American Technical Ceramics type 800B or capacitor of same quality.  
[2] TDK or capacitor of same quality.  
[3] American Technical Ceramics type 100B or capacitor of same quality.



014aab104

Printed-Circuit Board (PCB): Taconic RF-35A2;  $\epsilon_r = 3.5$  F/m; thickness = 0.762 mm; thickness copper plating = 35  $\mu\text{m}$ .  
The vias can be as a reference to place components.  
The above layout shows the test circuit used to measure the devices in production. A more appropriate application demonstration for specific customer needs can be provided.  
See Table 11 for list of components.

Fig 5. Component layout

## 10. Package outline

Earless flanged LDMOST ceramic package; 8 leads

SOT1110B

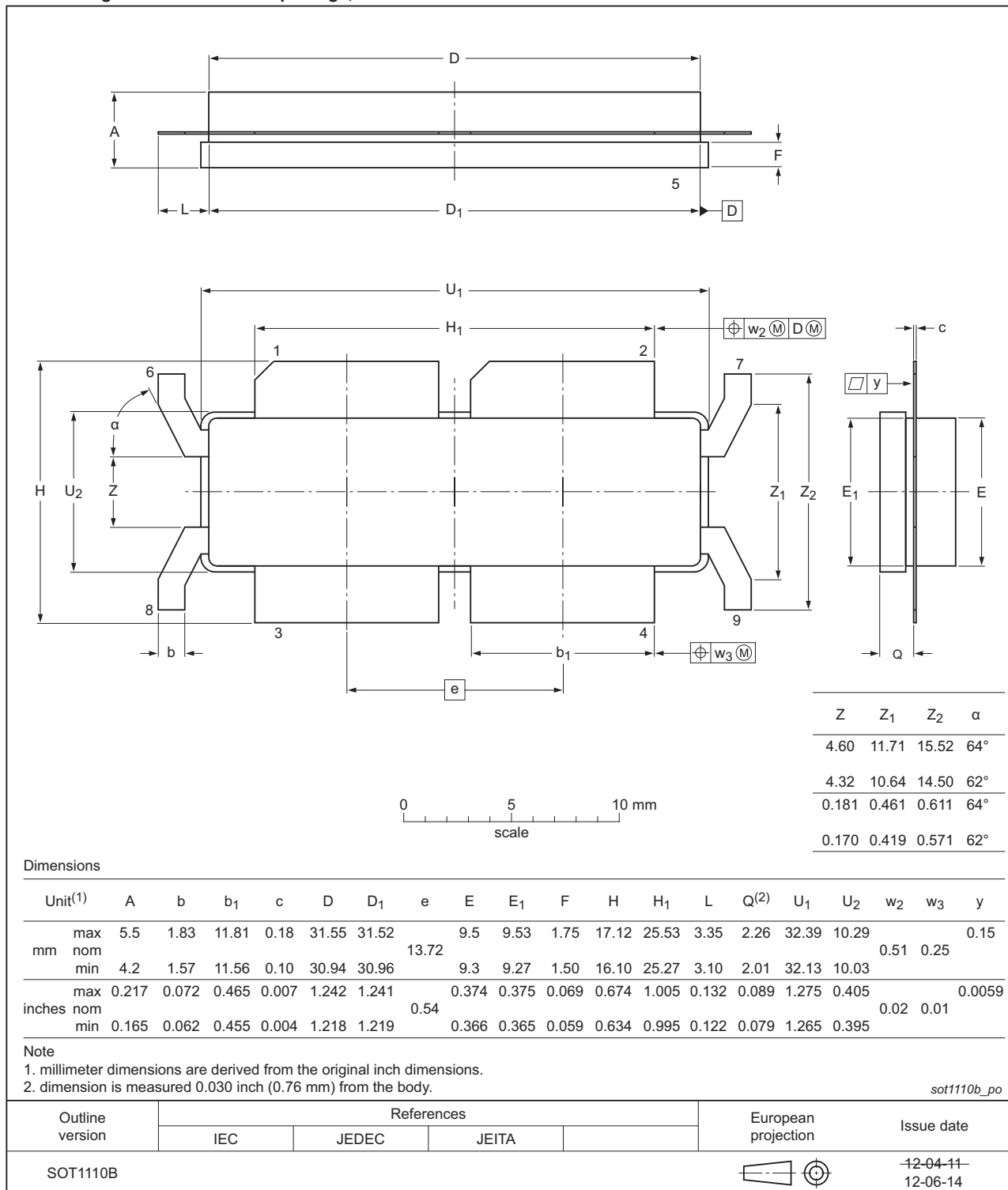


Fig 6. Package outline SOT1110B



## 11. Abbreviations

Table 12. Abbreviations

Acronym	Description
CCDF	Complementary Cumulative Distribution Function
CDMA	Code Division Multiple Access
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
EDGE	Enhanced Data rates for GSM Evolution
ESD	ElectroStatic Discharge
GSM	Global System for Mobile communications
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
MTTF	Mean Time To Failure
PAR	Peak-to-Average Ratio
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 12. Revision history

Table 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G15LS-250PBRN#3	20150901	Product data sheet	-	BLF6G15LS-250PBRN v.2
Modifications:	<ul style="list-style-type: none"> <li>The format of this document has been redesigned to comply with the new identity guidelines of Ampleon.</li> <li>Legal texts have been adapted to the new company name where appropriate.</li> </ul>			
BLF6G15LS-250PBRN v.2	20120718	Product data sheet	-	BLF6G15LS-250PBRN v.1
BLF6G15LS-250PBRN v.1	20120611	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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[2] The term 'short data sheet' is explained in section "Definitions".

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