BLF8G19LS-170BV

Power LDMOS transistor

Rev. 4 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

170 W LDMOS power transistor with improved video bandwidth for base station applications at frequencies from 1800 MHz to 1990 MHz.

Table 1. Typical performance

Typical RF performance at T_{case} = 25 °C in a common source class-AB production test circuit.

Test signal	f	I_{Dq}	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(mA)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA [1]	1930 to 1990	1300	32	60	18.0	32	–31
1-carrier W-CDMA [2]	1805 to 1880	1300	28	33	19.8	29	–40

[1] Test signal: 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz.

[2] Test signal: 3GPP test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF.

1.2 Features and benefits

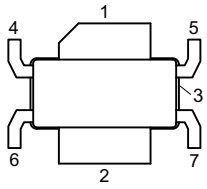
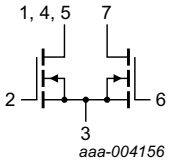
- Excellent ruggedness
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Decoupling leads to enable improved video bandwidth (100 MHz typical)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Integrated current sense
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifier for W-CDMA base stations and multi carrier applications in the 1800 MHz to 1990 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source [1]		
4,5	video decoupling		
6	sense gate		
7	sense drain		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G19LS-170BV	-	earless flanged LDMOST ceramic package; 6 leads	SOT1120B

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
$V_{GS(sense)}$	sense gate-source voltage		−0.5	+9	V
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature	[1]	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability, for details refer to the on-line MTF calculator.

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 55 W	0.27	K/W

6. Characteristics

Table 6. DC 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 = 2.16 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 216 mA	1.5	1.9	2.3	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	4.5	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	40	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	450	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 10.8 A	-	16	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 7.56 A	-	0.06	-	Ω
I_{Dq}	quiescent drain current	main transistor: V_{DS} = 32 V sense transistor: I_{DS} = 23.4 mA; V_{DS} = 30.4 V	1175	1300	1425	mA

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; f_1 = 1937.5 MHz; f_2 = 1962.5 MHz; f_3 = 1982.5 MHz; f_4 = 1987.5 MHz; RF performance at V_{DS} = 32 V; I_{Dq} = 1300 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	$P_{L(AV)}$ = 60 W	17.3	18.0	20.2	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 60 W	-	−13	−7	dB
η_D	drain efficiency	$P_{L(AV)}$ = 60 W	28	32	-	%
$ACPR_{5M}$	adjacent channel power ratio (5 MHz)	$P_{L(AV)}$ = 60 W	-	−31	−28	dBc

7. Test information

7.1 Ruggedness in class-AB operation

The BLF8G19LS-170BV is capable to withstand a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 32 V; I_{Dq} = 1300 mA; P_L = 214 W (CW); f = 1930 MHz and also under the following conditions: V_{DS} = 28 V; I_{Dq} = 1300 mA; P_L = 170 W (CW); f = 1805 MHz.

7.2 Impedance information

Table 8. Typical impedance

I_{Dq} = 1300 mA; main transistor V_{DS} = 32 V.

f	Z_S[1]	Z_L[1]
(MHz)	(Ω)	(Ω)
1930	1.8 – j3.4	1.1 – j2.8
1960	1.8 – j3.4	1.1 – j2.8
1990	1.9 – j4.0	1.0 – j2.8

[1] Z_S and Z_L defined in Figure 1.

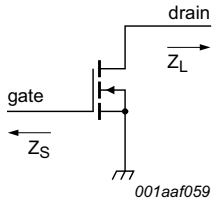
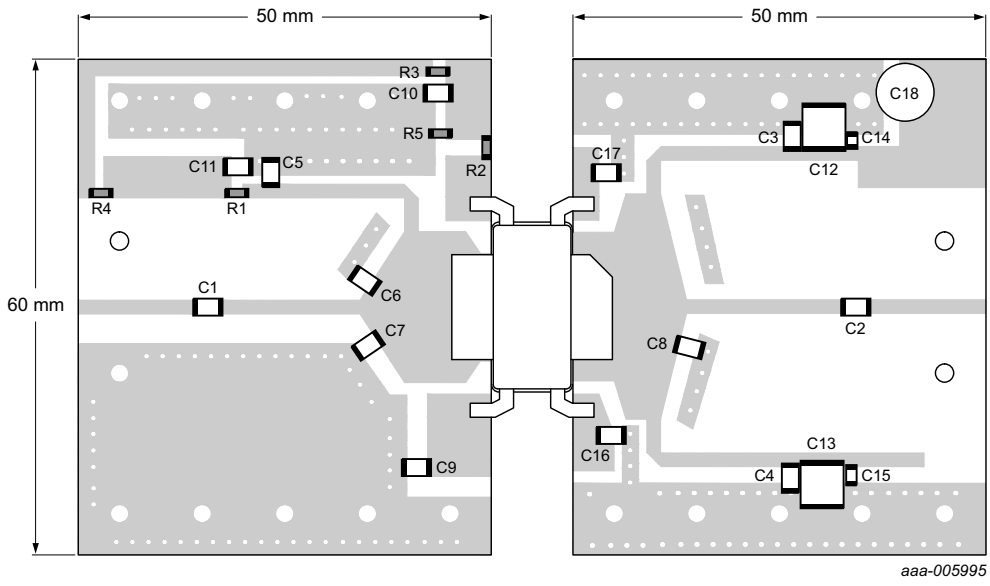


Fig 1. Definition of transistor impedance

7.3 VBW in class-AB operation

The BLF8G19LS-170BV shows 100 MHz (typical) video bandwidth in a class-AB test circuit in the 1900 MHz band at V_{DS} = 32 V and I_{Dq} = 1.3 A.

7.4 Test circuit



Printed-Circuit Board (PCB): Taconic RF35; ε_r = 3.5; thickness = 0.765 mm; thickness copper plating = 35 μm.

See Table 9 for a list of components.

Fig 2. Component layout for class-AB production test circuit

Table 9. List of components

For test circuit see Figure 2.

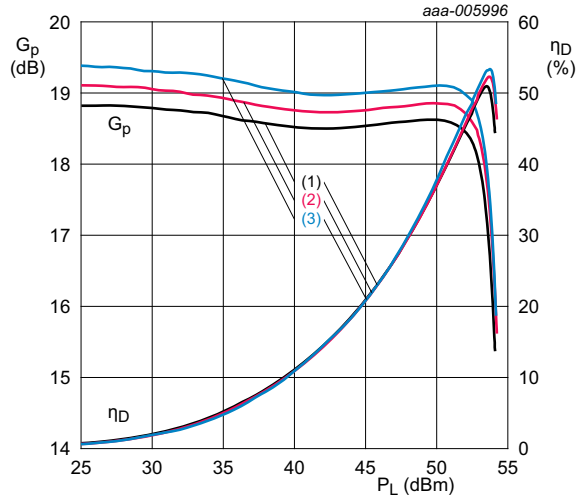
Component	Description	Value	Remarks
C1, C2, C3, C4, C5	multilayer ceramic chip capacitor	10 pF [1]	ATC100B
C6, C8	multilayer ceramic chip capacitor	0.1 pF [1]	ATC100B
C7	multilayer ceramic chip capacitor	0.2 pF [1]	ATC100B
C9, C10	multilayer ceramic chip capacitor	120 pF [1]	ATC100B
C11, C16, C17	multilayer ceramic chip capacitor	4.7 μF, 50 V [2]	Murata
C12, C13	multilayer ceramic chip capacitor	10 μF, 50 V [2]	Murata
C14, C15	multilayer ceramic chip capacitor	1 μF, 50 V [2]	Murata
C18	electrolytic capacitor	470 μF, 63 V	
R1	SMD resistor	4.7 Ω	Philips 1206
R2	SMD resistor	470 Ω	Philips 1206
R3	SMD resistor	820 Ω	Philips 1206
R4	SMD resistor	12 Ω	Philips 1206
R5	SMD resistor	2200 Ω	Philips 1206

[1] American Technical Ceramics type 100B or capacitor of same quality.

[2] Murata or capacitor of same quality.

7.5 Graphs

7.5.1 CW pulse



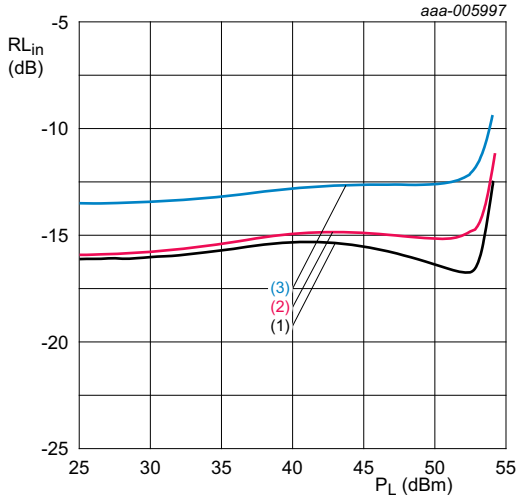
V_{DS} = 32 V; I_{Dq} = 1300 mA; t_p = 100 μs; δ = 10 %.

(1) f = 1935 MHz

(2) f = 1960 MHz

(3) f = 1985 MHz

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



V_{DS} = 32 V; I_{Dq} = 1300 mA; t_p = 100 μs; δ = 10 %.

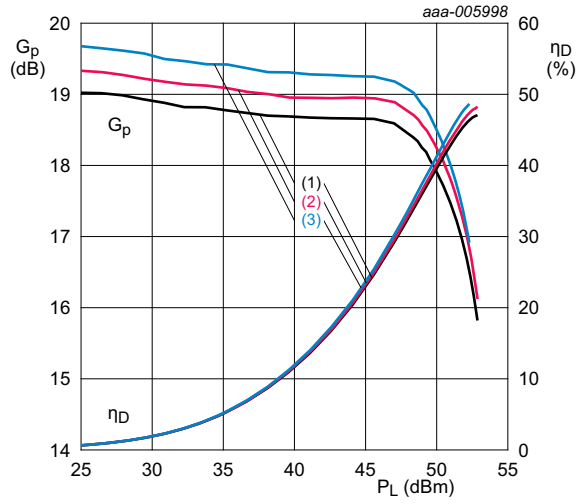
(1) f = 1935 MHz

(2) f = 1960 MHz

(3) f = 1985 MHz

Fig 4. Input return loss as a function of output power; typical values

7.5.2 2-Carrier W-CDMA



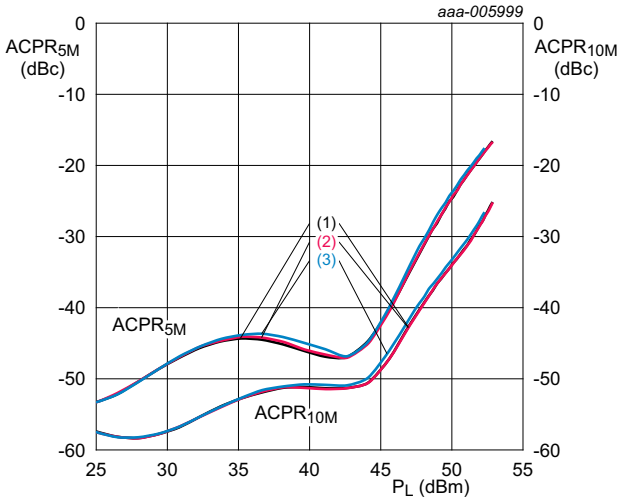
V_{DS} = 32 V; I_{Dq} = 1300 mA.

(1) f = 1935 MHz

(2) f = 1960 MHz

(3) f = 1985 MHz

Fig 5. Power gain and drain efficiency as function of output power; typical values



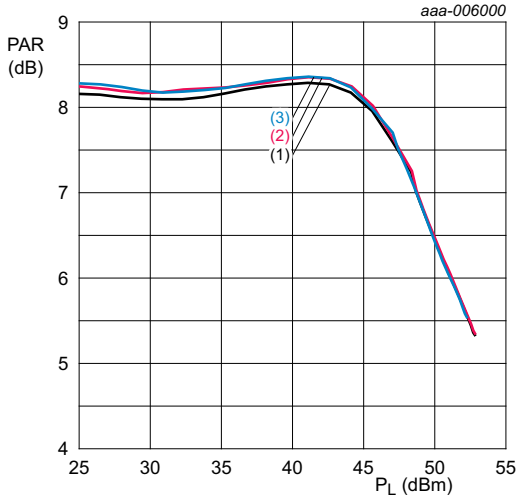
V_{DS} = 32 V; V_{GS} = 32 V

(1) f = 1935 MHz

(2) f = 1960 MHz

(3) f = 1985 MHz

Fig 6. Adjacent channel power ratio (5 MHz) and adjacent channel power ratio (10 MHz) as function of output power; typical values



V_{DS} = 32 V; I_{Dq} = 1300 mA.

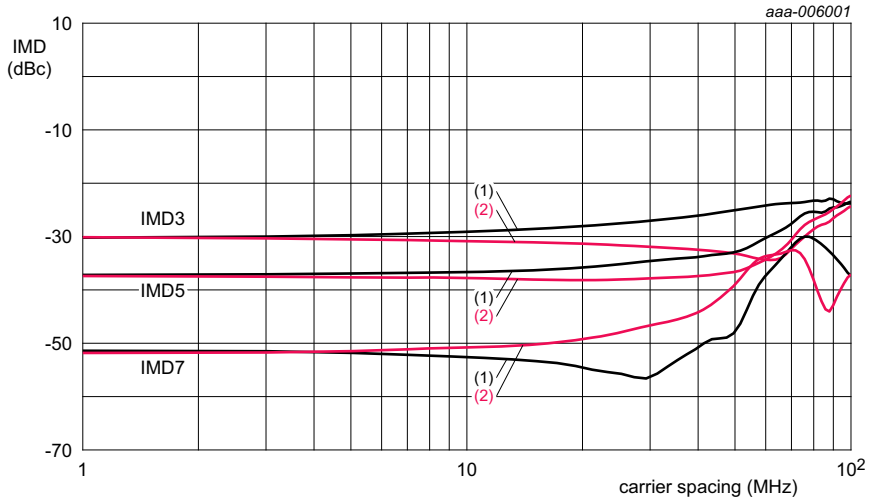
(1) f = 1935 MHz

(2) f = 1960 MHz

(3) f = 1985 MHz

Fig 7. Peak-to-average power ratio as a function of output power; typical values

7.5.3 2-Tone VBW



V_{DS} = 32 V; I_{Dq} = 1300 mA; f_c = 1960 MHz.

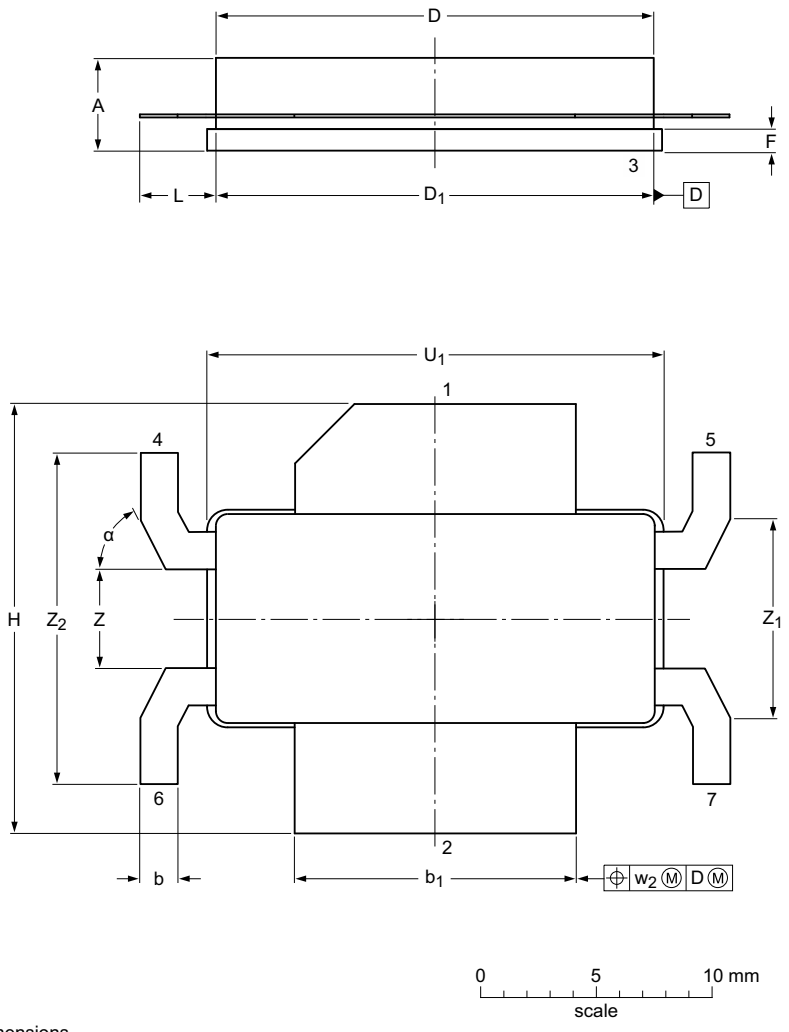
(1) low frequency component

(2) high frequency component

Fig 8. VBW capability in class-AB test circuit

8. Package outline

Earless flanged LDMOST ceramic package; 6 leads **SOT1120B**



Dimensions

Unit[1]		A	b	b1	c	D	D1	E	E1	F	H	L	Q[2]	U1	U2	w2	y	Z	Z1	Z2	α
mm	max	4.75	1.83	12.83	0.18	20.02	19.96	9.53	9.53	1.14	19.94	3.56	1.70	20.70	9.91		0.10	4.60	9.53	15.52	64°
	nom															0.51					
	min	3.45	1.57	12.57	0.10	19.61	19.66	9.27	9.25	0.89	18.92	3.30	1.45	20.45	9.65			4.32	8.71	14.50	60°
inches	max	0.187	0.072	0.505	0.007	0.788	0.786	0.375	0.375	0.045	0.785	0.140	0.067	0.815	0.39		0.004	0.181	0.375	0.611	64°
	nom															0.02					
	min	0.136	0.062	0.495	0.004	0.772	0.774	0.365	0.364	0.035	0.745	0.130	0.057	0.805	0.38			0.170	0.343	0.571	60°

Note
1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1120b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1120B						~~12-06-14~~ 13-10-21

Fig 9. Package outline SOT1120B

9. Abbreviations

Table 10. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor
MTF	Median Time to Failure
PAR	Peak-to-Average Ratio
VBW	Video BandWidth
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

10. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF8G19LS-170BV#4	20150901	Product data sheet		BLF8G19LS-170BV v.3
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. • Legal texts have been adapted to the new company name where appropriate.			
BLF8G19LS-170BV v.3	20150501	Product data sheet	-	BLF8G19LS-170BV v.2
BLF8G19LS-170BV v.2	20130328	Product data sheet	-	BLF8G19LS-170BV v.1
BLF8G19LS-170BV v.1	20130108	Preliminary 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".

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