BLF8G22LS-140

Power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

140 W LDMOS power transistor for base station applications at frequencies from 2000 MHz to 2200 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 (MHz)	I_{Dq} (mA)	V_{DS} (V)	$P_{L(AV)}$ (W)	G_p (dB)	η_D (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	900	28	33	18.5	32.5	−31[1]

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

1.2 Features and benefits

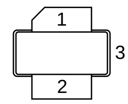
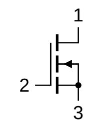
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for broadband operation (2000 MHz to 2200 MHz)
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 2000 MHz to 2200 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description		Simplified outline	Graphic symbol
1	drain			 sym112
2	gate			
3	source	[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G22LS-140	-	earless flanged ceramic package; 2 leads	SOT502B

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	[1]	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability.

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 = 33 W	0.265	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 = 1.53 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 153 mA	1.5	1.9	2.3	V
V_{GSq}	gate-source quiescent voltage	V_{DS} = 28 V; I_D = 900 mA	1.7	2.0	2.5	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	4.2	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	29.1	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	420	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 153 mA	-	1.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 5.355 A	-	0.1	-	Ω

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on the CCDF; carrier spacing 5 MHz; 3GPP test model 1; 1 - 64 DPCH; f_1 = 2112.5 MHz; f_2 = 2117.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 900 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	$P_{L(AV)}$ = 33 W	17.3	18.5	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 33 W	29	32.5	-	%
RL_{in}	input return loss	$P_{L(AV)}$ = 33 W	-	−10	−6	dB
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 33 W	-	−31	−27	dBc

7. Test information

7.1 Ruggedness in class-AB operation

The BLF8G22LS-140 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} = 900 mA; P_L = 140 W (CW); f = 2110 MHz.

7.2 Impedance information

Table 8. Typical impedance

Measured load-pull data; I_{Dq} = 900 mA; V_{DS} = 28 V.

f (MHz)	Z_S [1] (Ω)	Z_L [1] (Ω)
2210	1.66 – j4.54	1.50 – j3.12
2140	1.87 – j4.70	1.50 – j3.12
2170	2.61 – j5.48	1.50 – j3.12

[1] Z_S and Z_L defined in Figure 1.

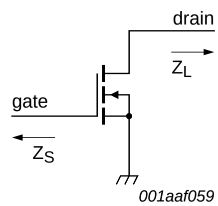
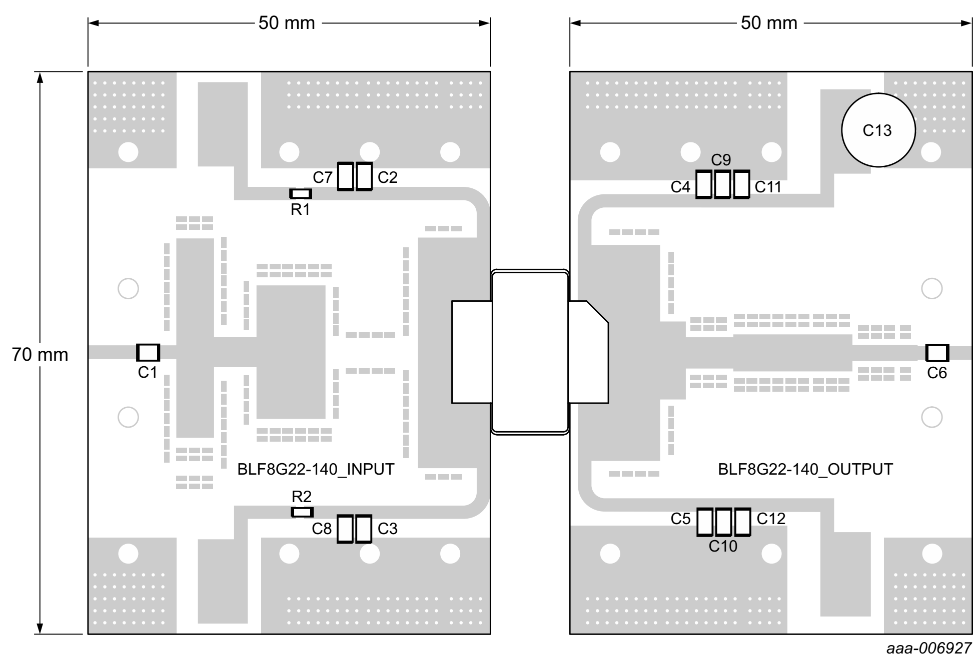


Fig 1. Definition of transistor impedance

7.3 Test circuit



Printed-Circuit Board (PCB): Rogers 4350B; ε_r = 3.66; 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.

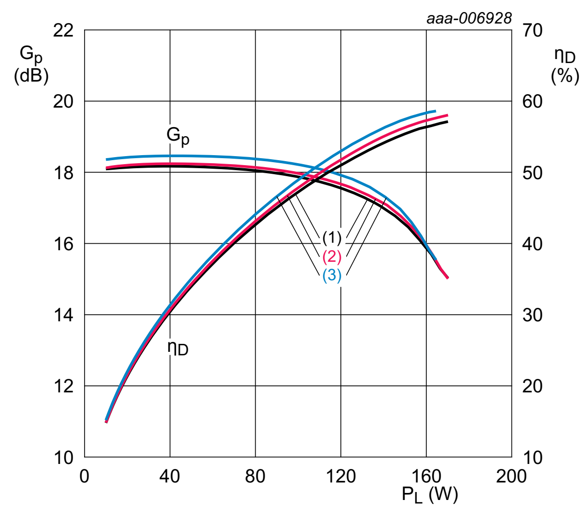
Component	Description	Value		Remarks
C1, C2, C3, C4, C5, C6	multilayer ceramic chip capacitor	9.7 pF	[1]	ATC800B
C7, C8, C9, C10	multilayer ceramic chip capacitor	1 μF	[2]	Murata
C11, C12	multilayer ceramic chip capacitor	10 μF	[2]	Murata
C13	electrolytic capacitor	470 μF, 63 V		
R1, R2	chip resistor	6.2 Ω		Vishay Dale SMD 0805

[1] American Technical Ceramics type 800B or capacitor of same quality.

[2] Murata or capacitor of same quality.

7.4 Graphical data

7.4.1 1-Tone CW



V_{DS} = 28 V; I_{Dq} = 900 mA.

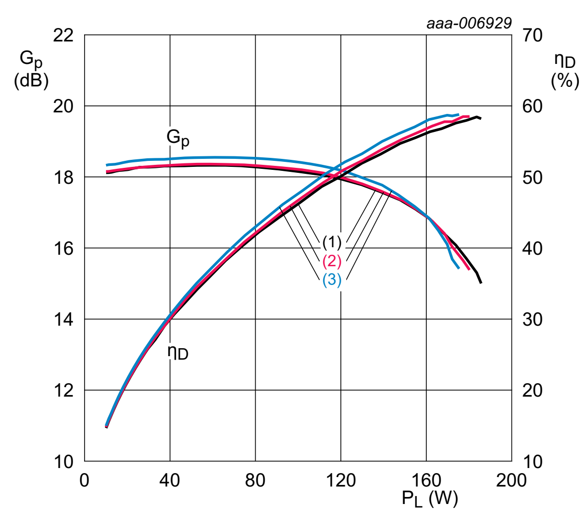
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

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

7.4.2 CW pulsed



V_{DS} = 28 V; I_{Dq} = 900 mA; t_p = 100 μs; δ = 10 %.

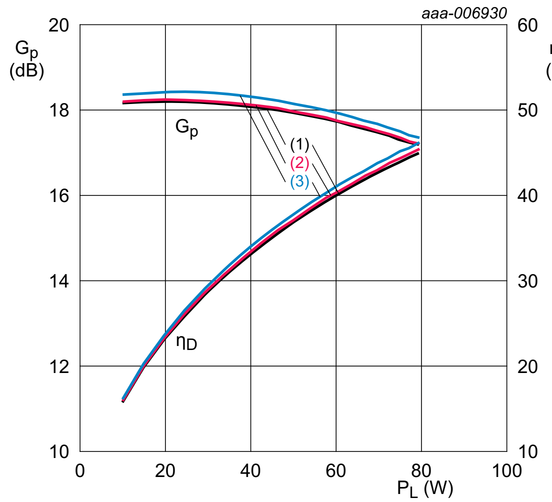
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 4. Power gain and drain efficiency as function of output power; typical values

7.4.3 1-Carrier W-CDMA



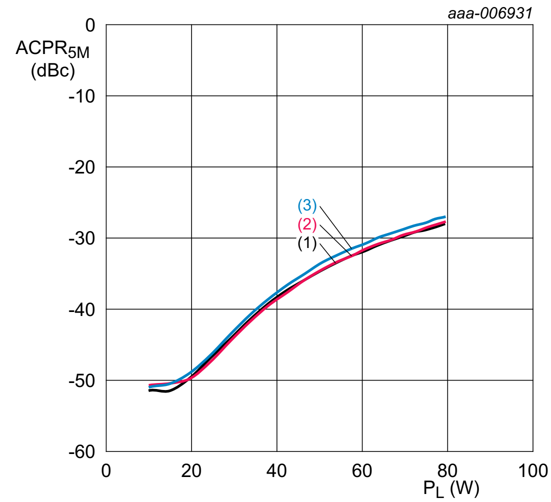
V_{DS} = 28 V; I_{Dq} = 900 mA.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

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



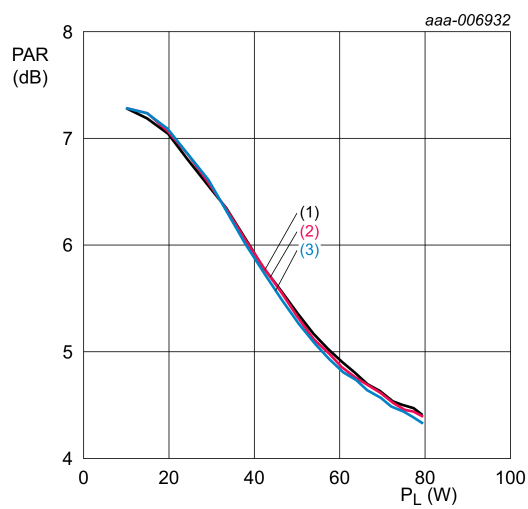
V_{DS} = 28 V; I_{Dq} = 900 mA.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

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



V_{DS} = 28 V; I_{Dq} = 900 mA.

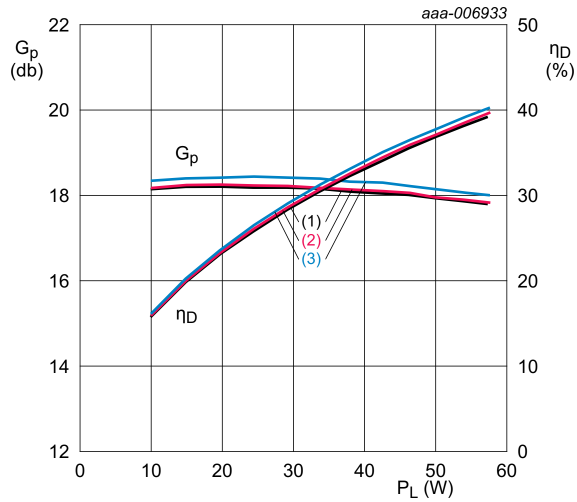
(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

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

7.4.4 2-Carrier W-CDMA



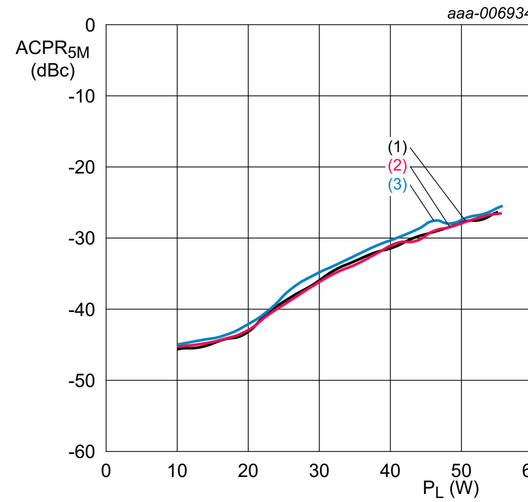
V_{DS} = 28 V; I_{Dq} = 900 mA.

(1) f = 2110 MHz

(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 8. Power gain and drain efficiency as function of output power; typical values



V_{DS} = 28 V; I_{Dq} = 900 mA.

(1) f = 2110 MHz

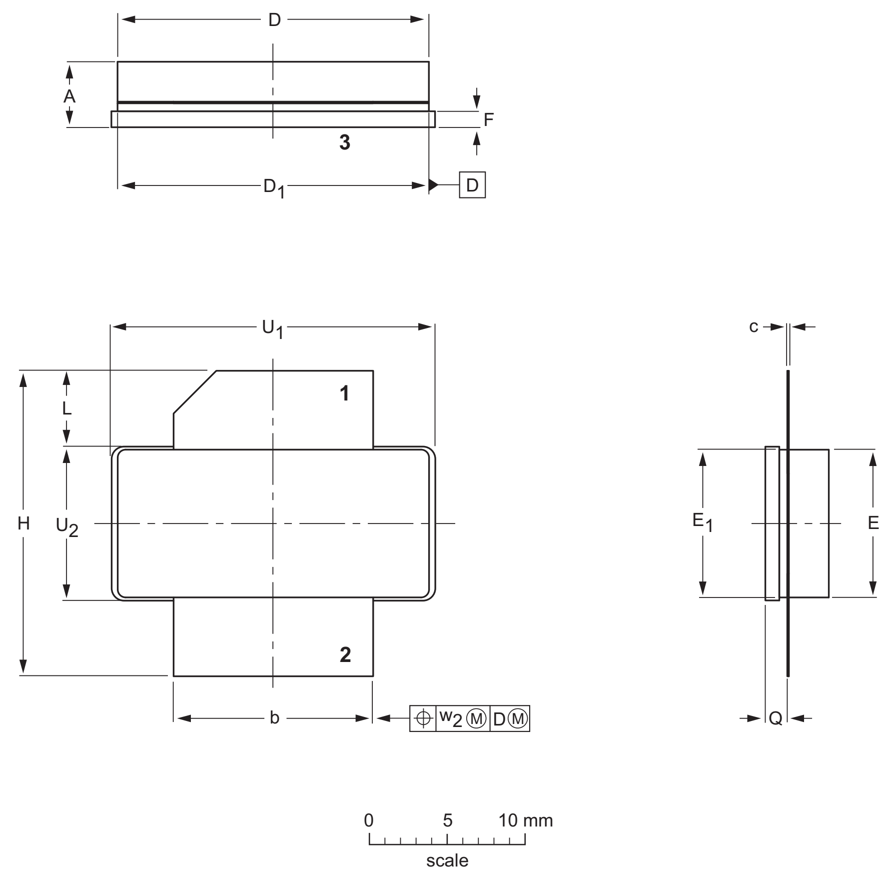
(2) f = 2140 MHz

(3) f = 2170 MHz

Fig 9. Adjacent channel power ratio (5MHz) as a function of output power; typical values

8. Package outline

Earless flanged ceramic package; 2 leads **SOT502B**



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

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	Q	U_1	U_2	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	1.70 1.45	20.70 20.45	9.91 9.65	0.25
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.067 0.057	0.815 0.805	0.390 0.380	0.010

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502B						~~07-05-09~~ 12-05-02

Fig 10. Package outline SOT502B

9. Handling information

CAUTION

This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

10. 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
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF8G22LS-140#3	20150901	Product data sheet		BLF8G22LS-140 v.2
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.			
BLF8G22LS-140 v.2	20130410	Product data sheet	-	BLF8G22LS-140 v.1
BLF8G22LS-140 v.1	20120925	Objective data sheet	-	-

12. Legal information

12.1 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.ampleon.com.

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