BLF642

Broadband power LDMOS transistor

Rev. 3 — 1 September 2015 **Product data sheet**

AMPLEON

1. Product profile

1.1 General description

A 35 W LDMOS RF power transistor for broadcast transmitter and industrial applications. The transistor is suitable for the frequency range HF to 1400 MHz. The excellent ruggedness and broadband performance of this device makes it ideal for digital applications.

Table 1. Typical performance

RF performance at T_h = 25 °C in a common source test circuit.

Mode of operation	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)	IMD (dBc)
CW, class-AB	1300	32	35	19	63	-
2-tone, class-AB	1300	32	17.5	19	48	–28

1.2 Features and benefits

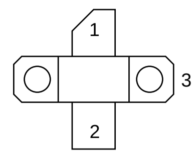
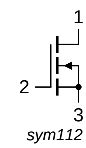
- CW performance at 1300 MHz, a drain-source voltage V_{DS} of 32 V and a quiescent drain current I_{Dq} = 0.2 A :
  - Average output power = 35 W
  - Power gain = 19 dB
  - Drain efficiency = 63 %
- 2-tone performance at 1300 MHz, a drain-source voltage V_{DS} of 32 V and a quiescent drain current I_{Dq} = 0.2 A :
  - Average output power = 17.5 W
  - Power gain = 19 dB
  - Drain efficiency = 48 %
  - Intermodulation distortion = –28 dBc
- Integrated ESD protection
- Excellent ruggedness
- High power gain
- High efficiency
- Excellent reliability
- Easy power control
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- Communication transmitter applications in the HF to 1400 MHz frequency range
- Industrial applications in the HF to 1400 MHz frequency range

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
BLF642	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT467C

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
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
$R_{th(j-c)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 35 W	[1]	1.6	K/W

[1] $R_{th(j-c)}$ is measured under RF conditions.

6. Characteristics

Table 6. Characteristics per section

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} = 32 V; I_D = 50 mA	1.4	1.9	2.4	V
V_{GSq}	gate-source quiescent voltage	V_{DS} = 32 V; I_{Dq} = 250 mA	1.5	2.0	2.5	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 32 V	-	-	1.4	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	8.0	9.0	-	A
I_{GSS}	gate leakage current	V_{GS} = ±10 V; V_{DS} = 0 V	-	-	50	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 2.5 A	-	3.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 1.75 A	-	300	-	mΩ
C_{iss}	input capacitance	V_{GS} = 0 V; V_{DS} = 32 V; f = 1 MHz	-	39	-	pF
C_{oss}	output capacitance	V_{GS} = 0 V; V_{DS} = 32 V; f = 1 MHz	-	15	-	pF
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 32 V; f = 1 MHz	-	0.84	-	pF

7. Application information

Table 7. RF performance in a common-source class-AB circuit

T_h = 25 °C; I_{Dq} = 0.2 A.

Mode of operation	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-AB	1300	32	35	> 18	> 59

7.1 Ruggedness in class-AB operation

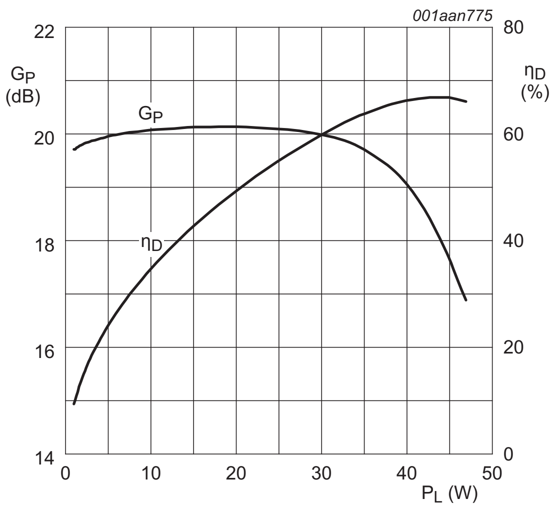
The BLF642 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 32 V; f = 1300 MHz at rated load power.

8. Test information

8.1 RF performance

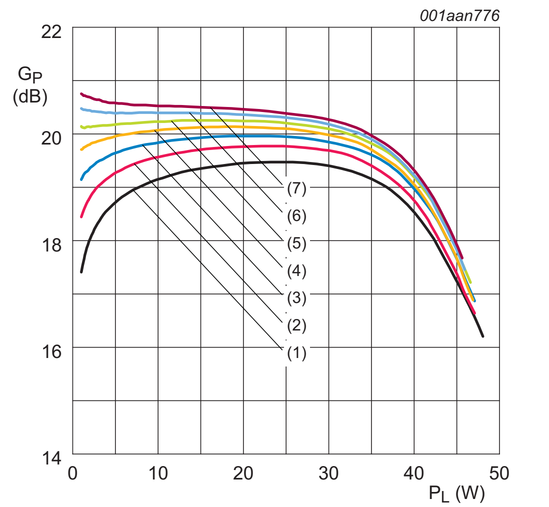
The following figures are measured in a class-AB production test circuit.

8.1.1 1-Tone CW



V_{DS} = 32 V; I_{Dq} = 200 mA; f = 1300 MHz.

Fig 1. Power gain and drain efficiency as function of load power; typical values



V_{DS} = 32 V; f = 1300 MHz.

(1) I_{Dq} = 50 mA

(2) I_{Dq} = 100 mA

(3) I_{Dq} = 150 mA

(4) I_{Dq} = 200 mA

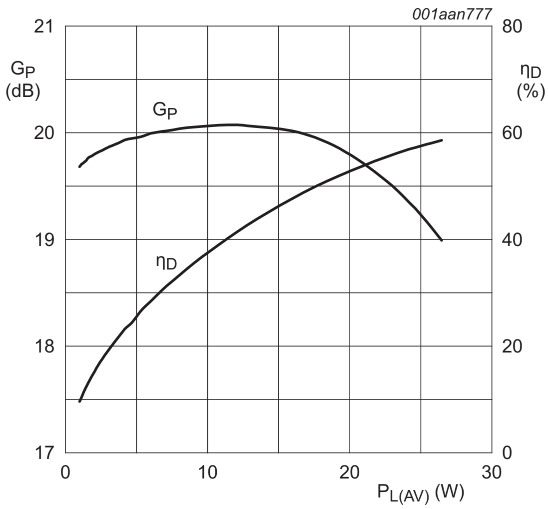
(5) I_{Dq} = 250 mA

(6) I_{Dq} = 300 mA

(7) I_{Dq} = 350 mA

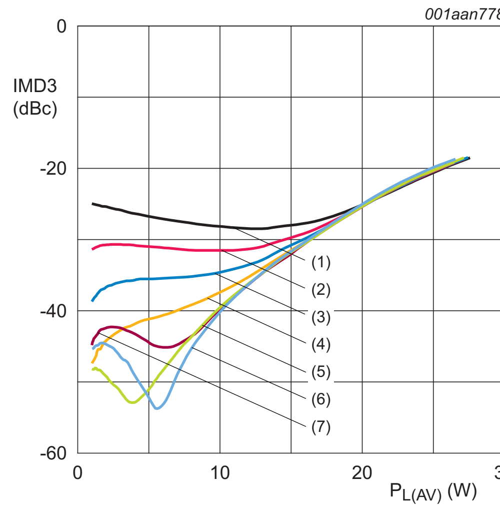
Fig 2. Power gain as a function of load power; typical values

8.1.2 2-Tone CW



V_{DS} = 32 V; I_{Dq} = 200 mA; f = 1300 MHz; carrier spacing = 100 kHz.

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

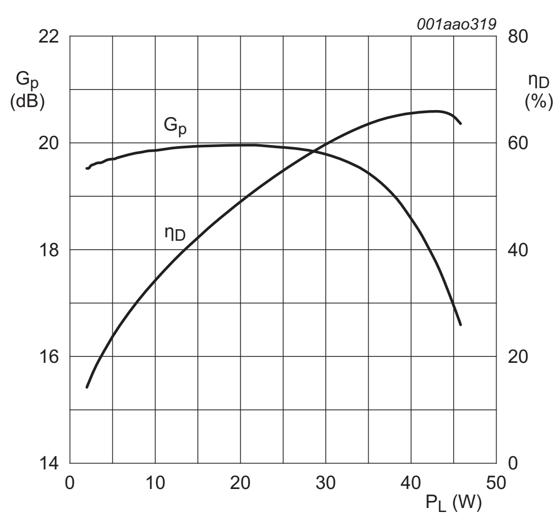


V_{DS} = 32 V; f = 1300 MHz; carrier spacing = 100 kHz.

(1) I_{Dq} = 50 mA
(2) I_{Dq} = 100 mA
(3) I_{Dq} = 150 mA
(4) I_{Dq} = 200 mA
(5) I_{Dq} = 250 mA
(6) I_{Dq} = 300 mA
(7) I_{Dq} = 350 mA

Fig 4. Third order intermodulation distortion as a function of average load power; typical values

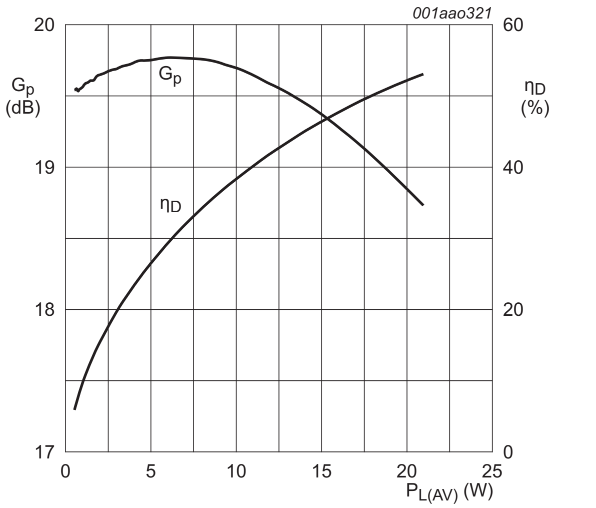
8.1.3 Pulsed CW



V_{DS} = 32 V; I_{Dq} = 200 mA; f = 1300 MHz

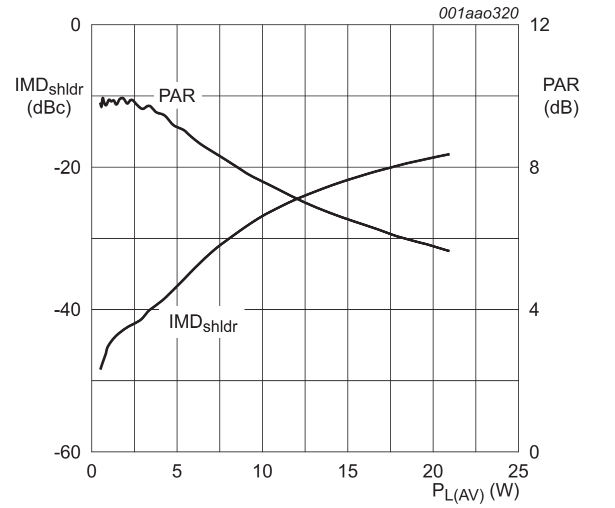
Fig 5. Power gain and drain efficiency as a function of average power; typical values

8.1.4 DVB-T



V_{DS} = 32 V; I_{Dq} = 200 mA; f = 1300 MHz.

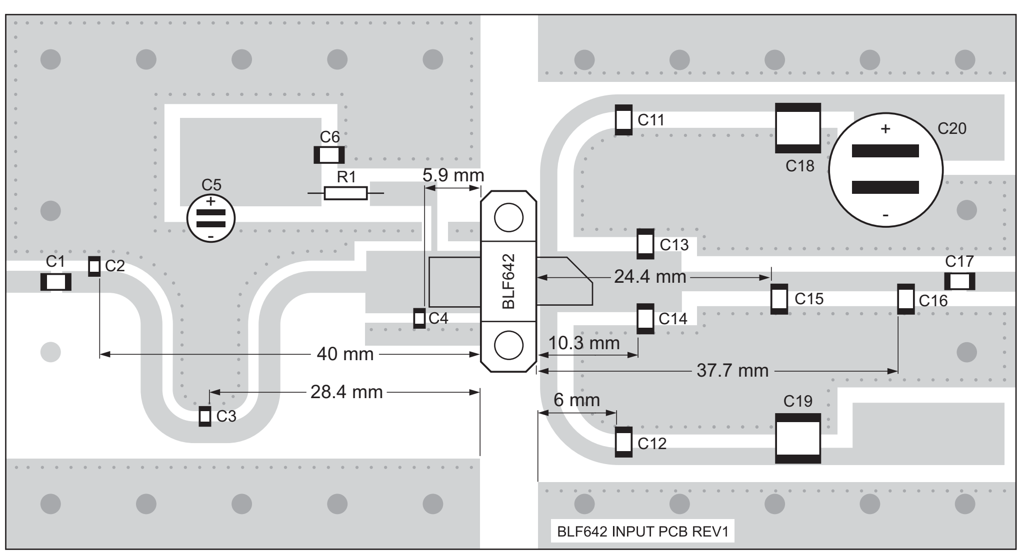
Fig 6. Power gain and drain efficiency as function of average load power; typical values



V_{DS} = 32 V; I_{Dq} = 200 mA; f = 1300 MHz.

Fig 7. PAR and IMD_{shldr} as function of average load power; typical values

8.2 Test circuit



See Table 8 for a list of components.

Fig 8. Component layout for class-AB amplifier

Table 8. List of components

For production test circuit, see Figure 8 .

Printed-Circuit Board (PCB): Rogers 5880; ε_r = 2.2; height = 0.762 mm; Copper (top/bottom metallization); thickness copper plating = 35 μm.

Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	22 pF	[1]
C2	multilayer ceramic chip capacitor	5.1 pF	[2]
C3	multilayer ceramic chip capacitor	4.3 pF	[2]
C4	multilayer ceramic chip capacitor	10 pF	[2]
C5	electrolytic chip capacitor	10 μF; 50 V	
C6	multilayer ceramic chip capacitor	22 nF	
C11, C12	multilayer ceramic chip capacitor	22 pF	[1]
C13, C14	multilayer ceramic chip capacitor	6.2 pF	[1]
C15	multilayer ceramic chip capacitor	4.3 pF	[1]
C16	multilayer ceramic chip capacitor	1.2 pF	[1]
C17	multilayer ceramic chip capacitor	22 pF	[1]
C18, C19	multilayer ceramic chip capacitor	10 μF	[3]
C20	electrolytic capacitor	470 μF; 63 V	
R1	wire resistor	100 Ω	

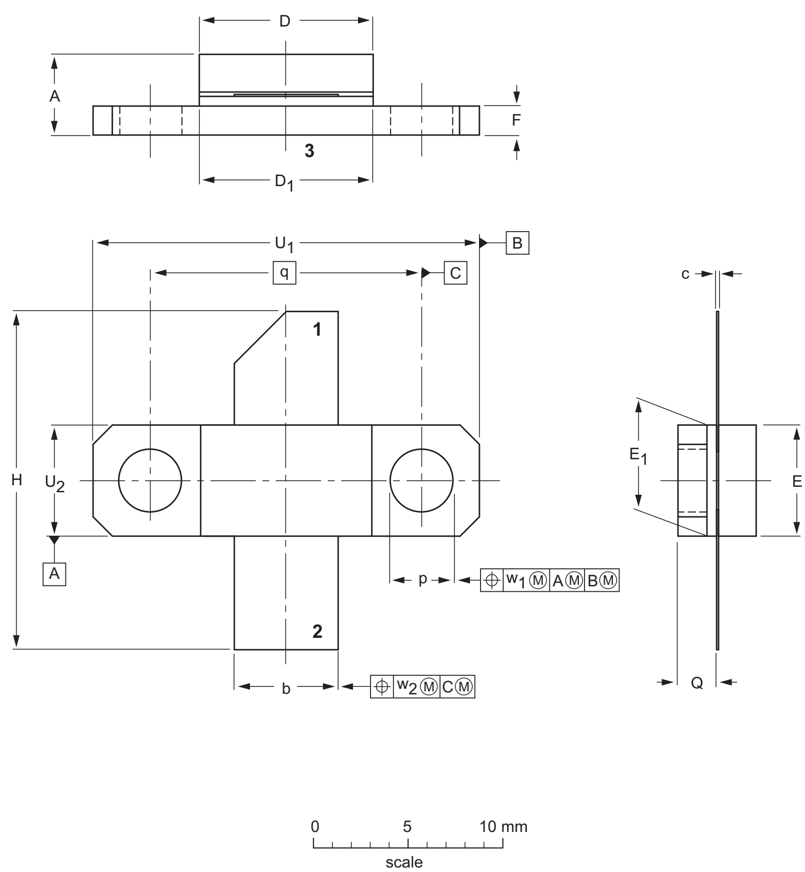
[1] American Technical Ceramics type 100B or capacitor of same quality.

[2] American Technical Ceramics type 100A or capacitor of same quality.

[3] TDK C570X7R1H106KT000N or capacitor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads **SOT467C**



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

UNIT	A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	4.67 3.94	5.59 5.33	0.15 0.10	9.25 9.04	9.27 9.02	5.92 5.77	5.97 5.72	1.65 1.40	18.54 17.02	3.43 3.18	2.21 1.96	14.27	20.45 20.19	5.97 5.72	0.25	0.51
inch	0.184 0.155	0.220 0.210	0.006 0.004	0.364 0.356	0.365 0.355	0.233 0.227	0.235 0.225	0.065 0.055	0.73 0.67	0.135 0.125	0.087 0.077	0.562	0.805 0.795	0.235 0.225	0.010	0.020

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT467C						~~99-12-28~~ 12-05-02

Fig 9. Package outline SOT467C

10. Abbreviations

Table 9. Abbreviations

Acronym	Description
CW	Continuous Waveform
DVB-T	Digital Video Broadcast - Terrestrial
ESD	ElectroStatic Discharge
HF	High Frequency
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

11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF642#3	20150901	Product data sheet	-	BLF642 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.			
BLF642 v.2	20110722	Product data sheet	-	BLF642 v.1
BLF642 v.1	20110308	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".

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14. Contents

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