# BLF644P

Broadband power LDMOS transistor

Rev. 3 — 1 September 2015



## 1. Product profile

## 1.1 General description

A 70 W LDMOS RF power transistor for broadcast transmitter, communications and industrial applications. The transistor is suitable for the frequency range HF to 1300 MHz. The excellent ruggedness and broadband performance of this device makes it ideal for digital applications.

### Table 1. Typical performance

RF performance at  $T_{case} = 25 \ ^{\circ}C$  in a common source test circuit.

Test signal	f	V <sub>DS</sub>	PL	G <sub>p</sub>	η <sub>D</sub>	IMD
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)
CW, class-A	860	32	100	23	65	-
CW pulsed, class-AB	860	32	100	23.5	66	-
2-tone, class-AB	860	32	45	23	50	-25
	860	32	30	24	40	-35

## **1.2 Features and benefits**

- 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 1300 MHz frequency range
- Industrial applications in the HF to 1300 MHz frequency range
- Broadcast transmitters

# 2. Pinning information

Pin	Description	Simplified o	utline Graphic symbol
1	drain1		
2	drain2		
3	gate1		
4	gate2	3 4	
5	source	[1]	aaa-005775

[1] Connected to flange.

# 3. Ordering information

#### Table 3. Ordering information

Type number	Packag	Package				
	Name	Description	Version			
BLF644P	-	flanged LDMOST ceramic package; 2 mounting holes; 4 leads	SOT1228A			

## 4. Limiting values

#### Table 4. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>DS</sub>	drain-source voltage		-	65	V
V <sub>GS</sub>	gate-source voltage		-0.5	+11	V
T <sub>stg</sub>	storage temperature		-65	+150	°C
Tj	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	Тур	Unit
R <sub>th(j-c)</sub>	thermal resistance from junction to case	$T_{case}$ = 80 °C; $P_L$ = 90 W	[ <u>1</u> ] 0.75	K/W

[1] R<sub>th(j-c)</sub> is measured under RF conditions.

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# 6. Characteristics

 $T_i = 25 \ ^{\circ}C$ ; per section unless otherwise specified.

Symbol	Parameter	Conditions	Min	Тур	Max	Unit
V <sub>(BR)DSS</sub>	drain-source breakdown voltage	V <sub>GS</sub> = 0 V; I <sub>D</sub> = 0.5 mA	65	-	-	V
V <sub>GS(th)</sub>	gate-source threshold voltage	V <sub>DS</sub> = 32 V; I <sub>D</sub> = 50 mA	1.4	1.9	2.4	V
V <sub>GSq</sub>	gate-source quiescent voltage	V <sub>DS</sub> = 32 V; I <sub>Dq</sub> = 250 mA	1.5	2.0	2.5	V
I <sub>DSS</sub>	drain leakage current	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 32 V	-	-	1.4	μA
I <sub>DSX</sub>	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75 V;$ $V_{DS} = 10 V$	-	9.0	-	A
I <sub>GSS</sub>	gate leakage current	V <sub>GS</sub> = ±10 V; V <sub>DS</sub> = 0 V	-	-	140	nA
g <sub>fs</sub>	forward transconductance	V <sub>DS</sub> = 10 V; I <sub>D</sub> = 2.5 A	-	3.3	-	S
R <sub>DS(on)</sub>	drain-source on-state resistance	V <sub>GS</sub> = V <sub>GS(th)</sub> + 3.75 V; I <sub>D</sub> = 1.75 A	-	300	-	mΩ

#### Table 7. AC characteristics

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

Symbol	Parameter	Conditions	Min	Тур	Мах	Unit
C <sub>iss</sub>	input capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 32 V; f = 1 MHz	-	39	-	pF
C <sub>oss</sub>	output capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 32 V; f = 1 MHz	-	15	-	pF
C <sub>rs</sub>	feedback capacitance	V <sub>GS</sub> = 0 V; V <sub>DS</sub> = 32 V; f = 1 MHz	-	0.84	-	pF

#### Table 8. RF characteristics

Test signal: CW pulsed, class-AB; f = 860 MHz; RF performance at  $V_{DS} = 32 \text{ V}$ ;  $I_{Dq} = 200 \text{ mA}$ ;  $T_{case} = 25 \text{ °C}$ ; unless otherwise specified; in a class-AB production test circuit.

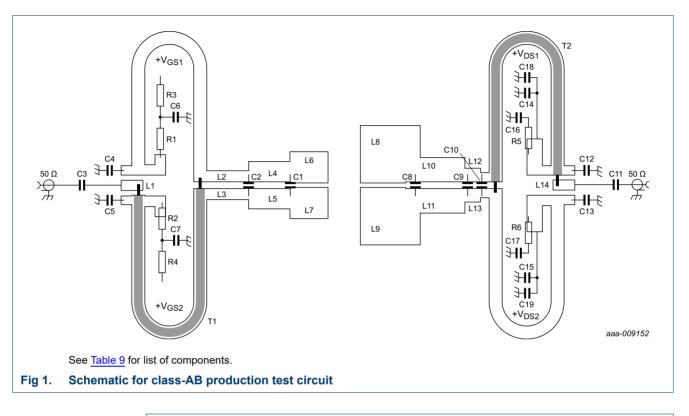
Symbol	Parameter	Conditions	Min	Тур	Max	Unit
G <sub>p</sub>	power gain	P <sub>L</sub> = 100 W	22.8	23.5	-	dB
η <sub>D</sub>	drain efficiency	P <sub>L</sub> = 100 W	62	66	-	%
RL <sub>in</sub>	input return loss	P <sub>L</sub> = 100 W	-	–15	-7	dBc

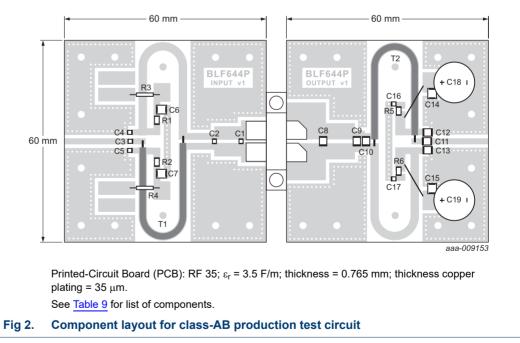
# 7. Test information

## 7.1 Ruggedness in class-AB operation

The BLF644P is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS}$  = 32 V; f = 860 MHz at rated load power.

## 7.2 Test circuit information





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# Table 9.List of componentsSee Figure 1 and Figure 2.

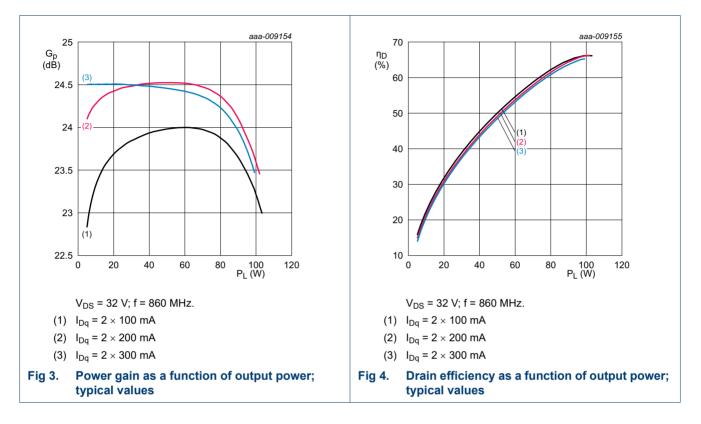
Component		Value	Remarks
-	-		Remarks
C1	multilayer ceramic chip capacitor	22 pF [1]	
C2	multilayer ceramic chip capacitor	8.2 pF [1]	
C3	multilayer ceramic chip capacitor	62 pF 🚺	
C4, C5	multilayer ceramic chip capacitor	51 pF [1]	
C6, C7, C14, C15	multilayer ceramic chip capacitor	4.7 μF, 50 V	
C8	multilayer ceramic chip capacitor	12 pF [2]	
C9	multilayer ceramic chip capacitor	5.1 pF [2]	
C10	multilayer ceramic chip capacitor	9.1 pF [2]	
C11	multilayer ceramic chip capacitor	75 pF [2]	
C12, C13	multilayer ceramic chip capacitor	62 pF [2]	
C16, C17	multilayer ceramic chip capacitor	100 pF [1]	
C18, C19	electrolytic capacitor	470 μF, 63 V	
L1	microstrip	-	(L $\times$ W) 4 mm $\times$ 1.7 mm
L2, L3	microstrip	-	(L $\times$ W) 8 mm $\times$ 2 mm
L4, L5	microstrip	-	(L $\times$ W) 8 mm $\times$ 4 mm
L6, L7	microstrip	-	(L $\times$ W) 7.4 mm $\times$ 6 mm
L8, L9	microstrip	-	(L $\times$ W) 11.1 mm $\times$ 11.6 mm
L10, L11	microstrip	-	(L $\times$ W) 8.6 mm $\times$ 4.9 mm
L12, L13	microstrip	-	(L $\times$ W) 3 mm $\times$ 2.7 mm
L14	microstrip	-	(L $\times$ W) 4 mm $\times$ 1.7 mm
R1, R2	multilayer ceramic chip capacitor	5.6 Ω	SMD 1206
R3, R4	multilayer ceramic chip capacitor	100 Ω	
R5, R6	multilayer ceramic chip capacitor	30 Ω	SMD 1206
T1, T2	Semi-rigid coaxial cable	25 Ω, 61 mm	UT-90C-25

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

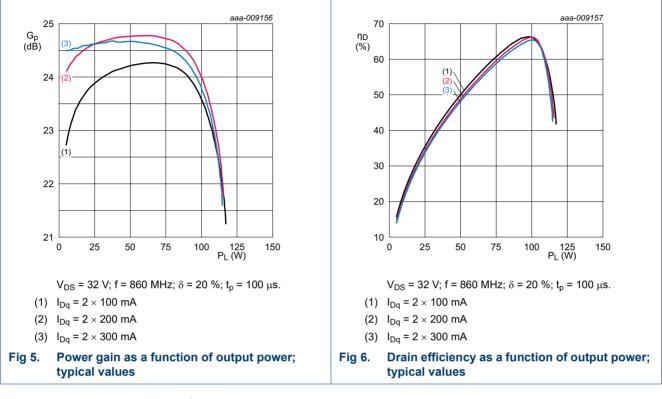
[2] American Technical Ceramics type 800B or capacitor of same quality.

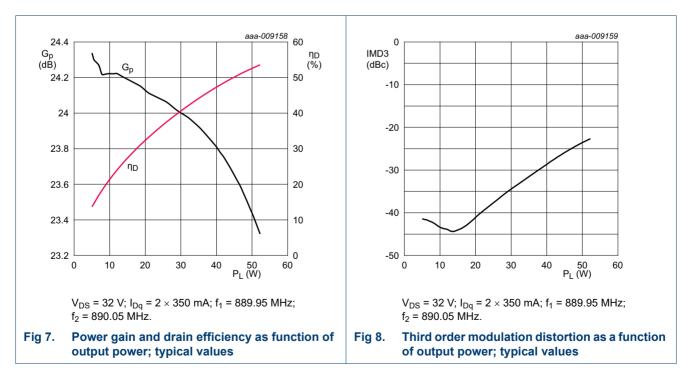
## 7.3 Graphical data

7.3.1 1-Tone CW



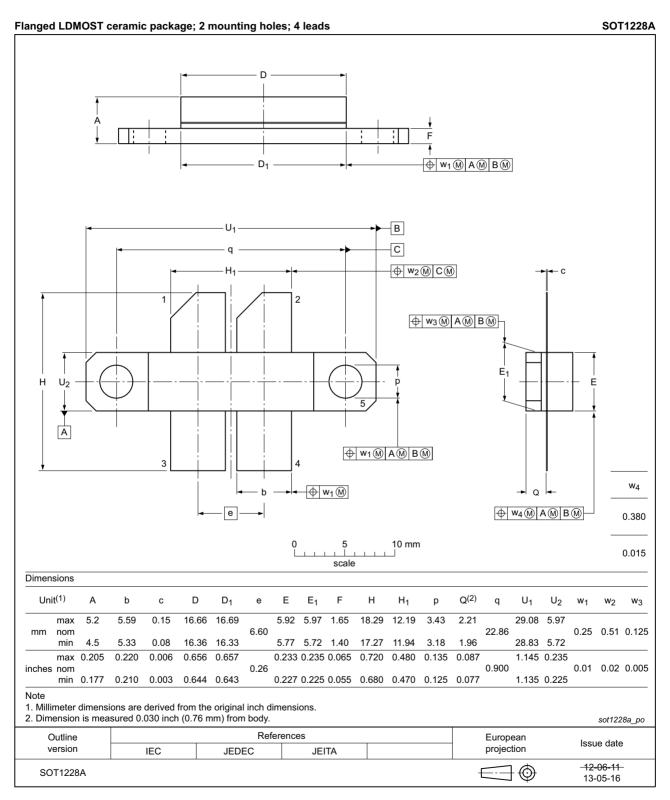
7.3.2 1-Tone pulsed





## 7.3.3 2-Tone CW

# 8. Package outline



### Fig 9. Package outline SOT1228A

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# 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		
CW	Continuous Wave		
ESD	ElectroStatic Discharge		
HF	High Frequency		
LDMOS	Laterally Diffused Metal Oxide Semiconductor		
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor		
MTF	Median Time to Failure		
SMD	Surface Mounted Device		
VSWR	Voltage Standing-Wave Ratio		

## 11. Revision history

### Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF644P#3	20150901	Product data sheet	-	BLF644P v.2
Modifications:	<ul> <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>			
BLF644P v.2	20140627	Product data sheet	-	BLF644P v.1
BLF644P v.1	20130611	Objective data sheet	-	-

# 12. Legal information

## 12.1 Data sheet status

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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