

BLF647P; BLF647PS

Broadband power LDMOS transistor

Rev. 1 — 3 August 2012

Objective data sheet

1. Product profile

1.1 General description

A 200 W LDMOS RF power transistor for broadcast transmitter and industrial applications. The transistor is suitable for the frequency range HF to 1500 MHz. The excellent ruggedness and broadband performance of this device makes it ideal for digital applications.

Table 1. Application information

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

Test signal	f (MHz)	V_{DS} (V)	$P_{L(AV)}$ (W)	$P_{L(M)}$ (W)	G_p (dB)	η_D (%)	IMD3 (dBc)
Pulsed, class-B	1300	32	-	200	18	70	-
CW, class-B	1300	32	200	-	18	70	-
2-tone, class-AB	$f_1 = 1299.95$; $f_2 = 1300.05$	32	75	-	19	48	-31

1.2 Features and benefits

- Pulsed performance at 1300 MHz, a V_{DS} of 32 V and an $I_{Dq} = 0.01\text{ A}$:
 - ◆ Peak output power = 200 W
 - ◆ Power gain = 18 dB
 - ◆ Drain efficiency = 70 %
- CW performance at 1300 MHz, a V_{DS} of 32 V and an $I_{Dq} = 0.01\text{ A}$:
 - ◆ Average output power = 200 W
 - ◆ Power gain = 18 dB
 - ◆ Drain efficiency = 70 %
- 2-tone performance at 1300 MHz, a V_{DS} of 32 V and an $I_{Dq} = 0.7\text{ A}$:
 - ◆ Average output power = 75 W
 - ◆ Power gain = 19 dB
 - ◆ Drain efficiency = 48 %
 - ◆ Intermodulation distortion = -31 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)

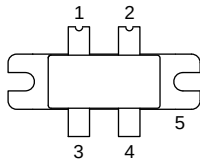
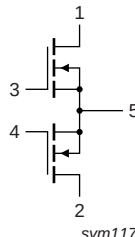
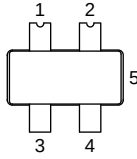
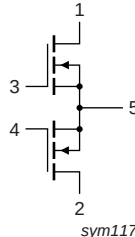


1.3 Applications

- Communication transmitter applications in the HF to 1500 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
BLF647P (SOT1121A)			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		
BLF647PS (SOT1121B)			
1	drain1		 sym117
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF647P	-	flanged LDMOST ceramic package; 2 mounting holes; 4 leads	SOT1121A
BLF647PS	-	earless flanged ceramic package; 4 leads	SOT1121B

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	$T_{case} = 80\text{ °C}$; $P_L = 200\text{ W}$	[1] 0.32	K/W

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

6. Characteristics

6.1 DC characteristics

Table 6. DC characteristics

$T_j = 25\text{ °C}$; per section unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$; $I_D = 0.5\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 32\text{ V}$; $I_D = 50\text{ mA}$	1.4	1.9	2.4	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 32\text{ V}$; $I_{Dq} = 250\text{ mA}$	1.5	2.0	2.5	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}$; $V_{DS} = 32\text{ V}$	-	-	1.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$	20	22	-	A
I_{GSS}	gate leakage current	$V_{GS} = \pm 10\text{ V}$; $V_{DS} = 0\text{ V}$	-	-	50	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 1.75\text{ A}$	-	140	-	mΩ

6.2 AC characteristics

Table 7. AC characteristics

$T_j = 25\text{ °C}$; per section unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 32\text{ V}$; $f = 1\text{ MHz}$	-	78	-	pF
C_{oss}	output capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 32\text{ V}$; $f = 1\text{ MHz}$	-	30	-	pF
C_{rs}	feedback capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 32\text{ V}$; $f = 1\text{ MHz}$	-	1.3	-	pF

6.3 RF characteristics

Table 8. RF characteristics

Test signal: CW; $f = 1300$ MHz; RF performance at $V_{DS} = 32$ V; $I_{DQ} = 10$ 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	$P_L = 200$ W	17	18	-	dB
η_D	drain efficiency	$P_L = 200$ W	66	70	-	%

6.4 Ruggedness in class-AB operation

The BLF647P and the BLF647PS are 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.

7. Package outline

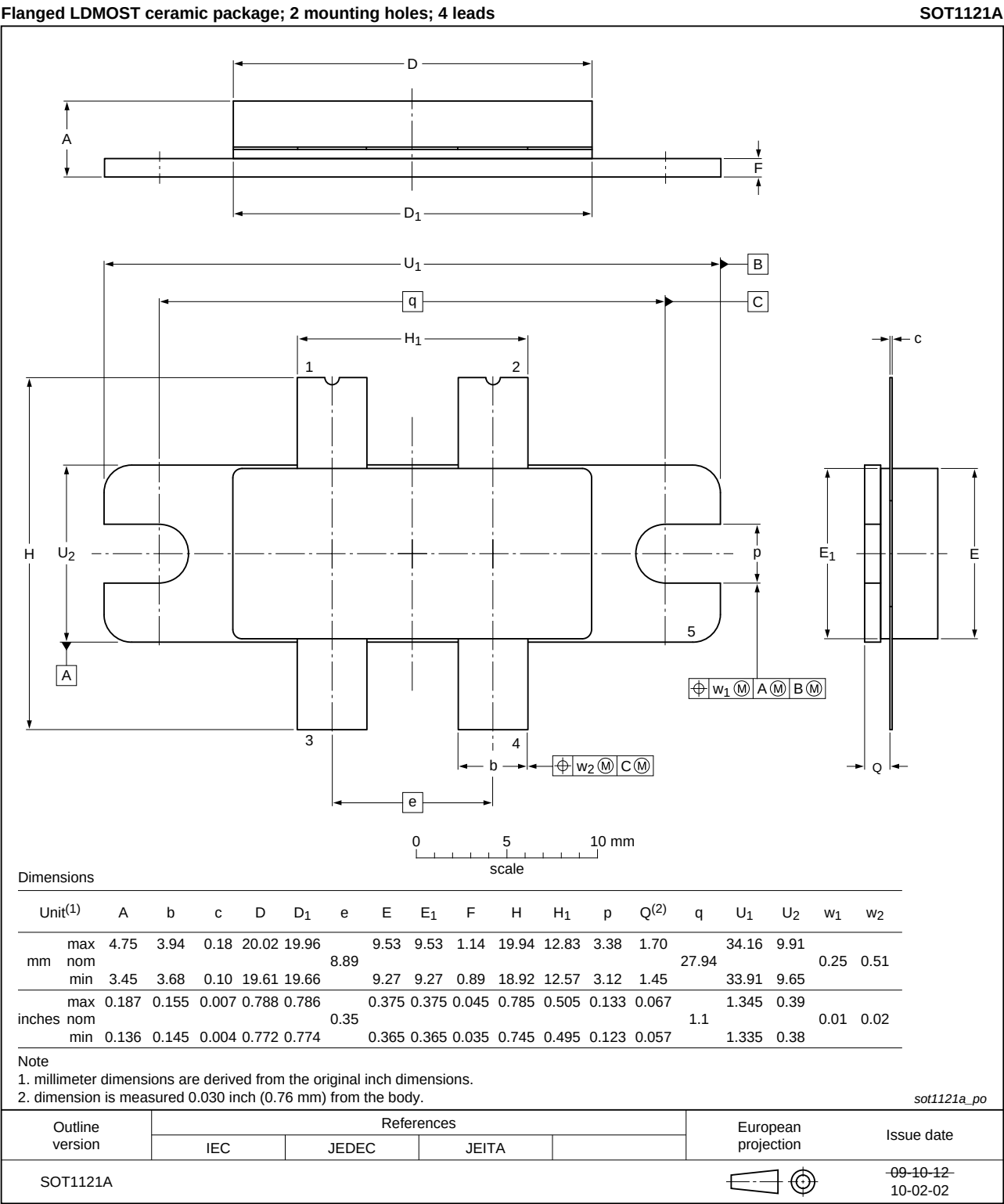
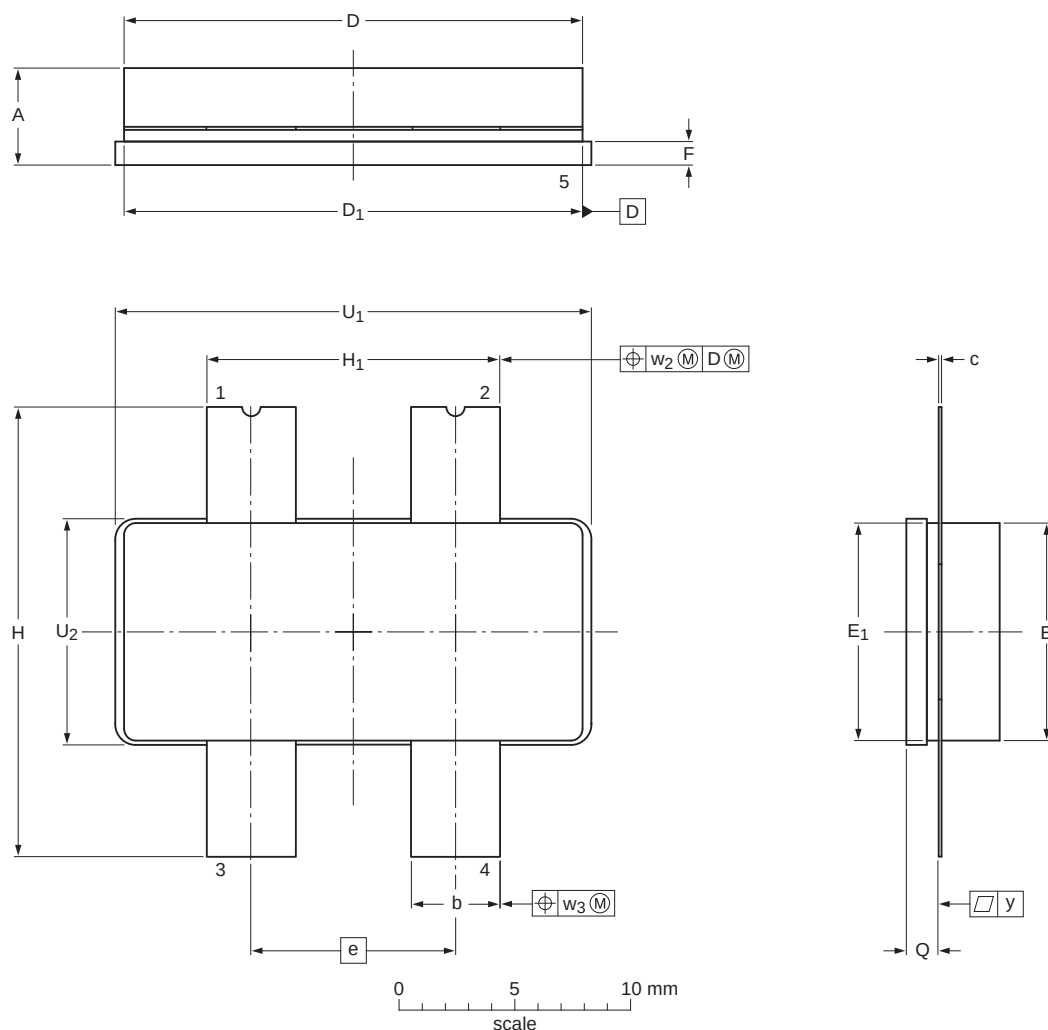


Fig 1. Package outline SOT1121A

Earless flanged ceramic package; 4 leads

SOT1121B



Dimensions

Unit ⁽¹⁾		A	b	c	D	D ₁	e	E	E ₁	F	H	H ₁	Q	U ₁	U ₂	w ₂	w ₃	y
mm	max	4.75	3.94	0.18	20.02	19.96	8.89	9.53	9.53	1.14	19.94	12.83	1.70	20.70	9.91	0.51	0.25	0.25
	nom min	3.45	3.68	0.08	19.61	19.66		9.27	9.27	0.89	18.92	12.57	1.45	20.45	9.65			
inches	max	0.187	0.155	0.007	0.788	0.786	0.35	0.375	0.375	0.045	0.785	0.505	0.067	0.815	0.39	0.02	0.01	0.01
	nom min	0.136	0.145	0.003	0.772	0.774		0.365	0.365	0.035	0.745	0.495	0.057	0.805	0.38			

Note

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

sot1121b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1121B						09-12-14 12-06-07

Fig 2. Package outline SOT1121B

8. Abbreviations

Table 9. Abbreviations

Acronym	Description
CW	Continuous Waveform
ESD	ElectroStatic Discharge
HF	High Frequency
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
VSWR	Voltage Standing-Wave Ratio

9. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF647P_BLF647PS v.1	20120803	Objective data sheet	-	-

10. Legal information

10.1 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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