

BLF884P; BLF884PS

UHF power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

A 350 W LDMOS RF power transistor for broadcast transmitter applications and industrial applications. The excellent ruggedness of this device makes it ideal for digital and analog transmitter applications.

Table 1. Application information

RF performance at $V_{DS} = 50$ V unless otherwise specified.

Mode of operation	f (MHz)	$P_{L(AV)}$ (W)	$P_{L(M)}$ (W)	G_p (dB)	η_D (%)	IMD3 (dBc)	IMD _{shldr} (dBc)	PAR (dB)
RF performance in a common source 860 MHz narrowband test circuit								
2-tone, class-AB	$f_1 = 860$; $f_2 = 860.1$	150	-	21	46	-32	-	-
DVB-T (8k OFDM)	858	70	-	21	33	-	-31 ^[1]	8.2 ^[2]
RF performance in a common source 470 MHz to 860 MHz broadband test circuit								
DVB-T (8k OFDM)	858	70	-	20	32	-	-32 ^[1]	8.0 ^[2]

[1] Measured [dBc] with delta marker at 4.3 MHz from center frequency.

[2] PAR (of output signal) at 0.01 % probability on CCDF; PAR of input signal = 9.5 dB at 0.01 % probability on CCDF.

1.2 Features and benefits

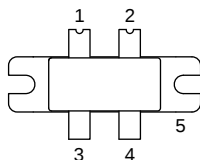
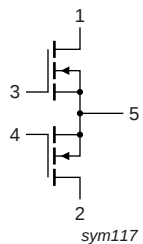
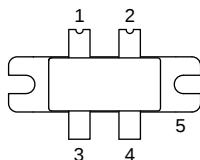
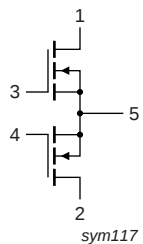
- Excellent ruggedness
- Optimum thermal behavior and reliability, $R_{th(j-c)} = 0.22$ K/W
- High power gain
- High efficiency
- Designed for broadband operation (470 MHz to 860 MHz)
- Internal input matching for high gain and optimum broadband operation
- Excellent reliability
- Easy power control
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

1.3 Applications

- Communication transmitter applications in the UHF band
- Industrial applications in the UHF band

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BLF884P (SOT1121A)			
1	drain1		
2	drain2		
3	gate1		
4	gate2		
5	source		
BLF884PS (SOT1121B)			
1	drain1		
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
BLF884P	-	flanged LDMOST ceramic package; 2 mounting holes; 4 leads	SOT1121A
BLF884PS	-	earless flanged LDMOST 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		-	104	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	$T_{case} = 80\text{ °C}$; $P_{L(AV)} = 70\text{ W}$	[1] 0.22	K/W

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

6. 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	$V_{GS} = 0\text{ V}$; $I_D = 1.2\text{ mA}$	[1] 104	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$; $I_D = 120\text{ mA}$	[1] 1.4	1.9	2.4	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$	-	-	1.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$	-	19	-	A
I_{GSS}	gate leakage current	$V_{GS} = 10\text{ V}$; $V_{DS} = 0\text{ V}$	-	-	140	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 4.25\text{ A}$	[1] -	240	-	m Ω
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$; $f = 1\text{ MHz}$	[2] -	105	-	pF
C_{oss}	output capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$; $f = 1\text{ MHz}$	-	34	-	pF
C_{rss}	reverse transfer capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 50\text{ V}$; $f = 1\text{ MHz}$	-	0.7	-	pF

[1] I_D is the drain current.

[2] Capacitance values without internal matching.

Table 7. RF characteristics

RF characteristics in Ampleon production narrowband test circuit; $T_{case} = 25\text{ °C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
2-Tone, class-AB						
V_{DS}	drain-source voltage		-	50	-	V
I_{Dq}	quiescent drain current		[1] -	0.65	-	A
$P_{L(AV)}$	average output power	$f_1 = 860\text{ MHz}$; $f_2 = 860.1\text{ MHz}$	150	-	-	W
G_p	power gain	$f_1 = 860\text{ MHz}$; $f_2 = 860.1\text{ MHz}$	20	21	-	dB
η_D	drain efficiency	$f_1 = 860\text{ MHz}$; $f_2 = 860.1\text{ MHz}$	42	46	-	%
IMD3	third-order intermodulation distortion	$f_1 = 860\text{ MHz}$; $f_2 = 860.1\text{ MHz}$	-	-32	-28	dBc

Table 7. RF characteristics ...continued

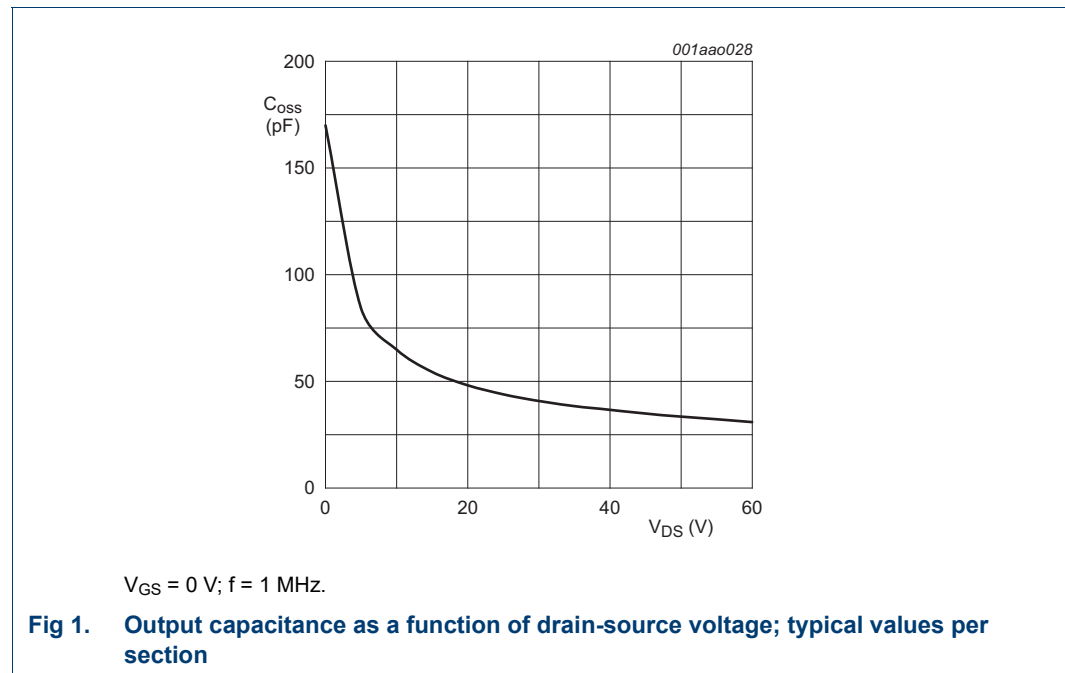
RF characteristics in Ampleon production narrowband test circuit; $T_{case} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
DVB-T (8k OFDM), class-AB						
V_{DS}	drain-source voltage		-	50	-	V
I_{Dq}	quiescent drain current		[1]	-	0.65	A
$P_{L(AV)}$	average output power	$f = 858\text{ MHz}$	70	-	-	W
G_p	power gain	$f = 858\text{ MHz}$	20	21	-	dB
η_D	drain efficiency	$f = 858\text{ MHz}$	30	33	-	%
IMD_{shldr}	intermodulation distortion shoulder	$f = 858\text{ MHz}$	[2]	-	-31	dBc
PAR	peak-to-average ratio	$f = 858\text{ MHz}$	[3]	-	8.2	dB

[1] I_{dq} for total device

[2] Measured [dBc] with delta marker at 4.3 MHz from center frequency.

[3] PAR (of output signal) at 0.01 % probability on CCDF; PAR of input signal = 9.5 dB at 0.01 % probability on CCDF.



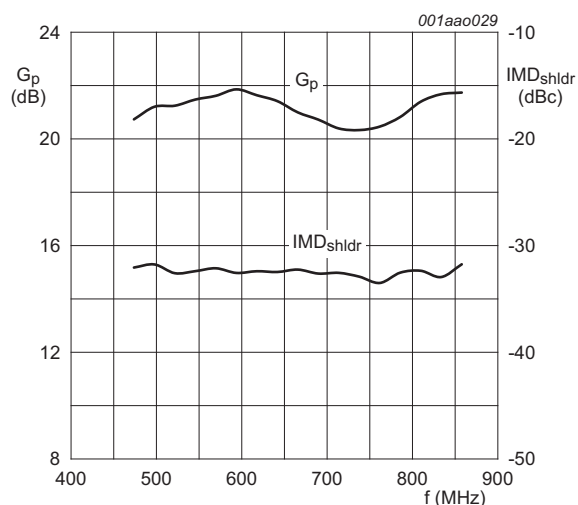
6.1 Ruggedness in class-AB operation

The BLF884P and BLF884PS are capable of withstanding a load mismatch corresponding to VSWR of $\geq 40 : 1$ through all phases under the following conditions: $V_{DS} = 50\text{ V}$; $f = 860\text{ MHz}$ at rated power.

7. Application information

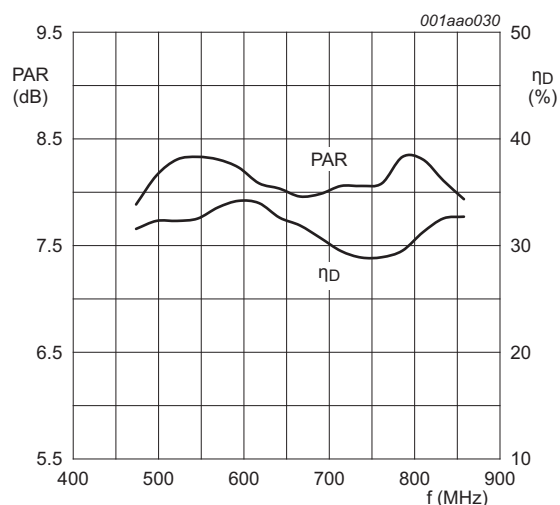
7.1 Broadband RF figures

7.1.1 DVB-T



$P_{L(AV)} = 70$ W; $V_{DS} = 50$ V; $I_{DQ} = 0.65$ A; measured in a common source broadband test circuit as described in [Section 8](#).

Fig 2. DVB-T power gain and intermodulation distortion shoulder as function of frequency; typical values



$P_{L(AV)} = 70$ W; $V_{DS} = 50$ V; $I_{DQ} = 0.65$ A; measured in a common source broadband test circuit as described in [Section 8](#).

Fig 3. DVB-T peak-to-average ratio and drain efficiency as function of frequency; typical values

7.2 Impedance information

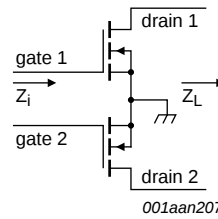


Fig 4. Definition of transistor impedance

Table 8. Typical push-pull impedance

Simulated Z_i and Z_L device impedance; impedance info at $V_{DS} = 50$ V and $P_{L(AV)} = 70$ W (DVB-T).

f MHz	Z_i Ω	Z_L Ω
300	0.984 – j3.485	8.315 + j1.246
325	1.009 – j2.805	8.236 + j1.328
350	1.038 – j2.185	8.153 + j1.406
375	1.071 – j1.614	8.066 + j1.479
400	1.107 – j1.080	7.975 + j1.547
425	1.147 – j0.574	7.880 + j1.610
450	1.193 – j0.092	7.782 + j1.667
475	1.243 + j0.373	7.682 + j1.720
500	1.300 + j0.826	7.579 + j1.767
525	1.364 + j1.270	7.474 + j1.809
550	1.436 + j1.708	7.367 + j1.846
575	1.517 + j2.144	7.258 + j1.877
600	1.609 + j2.581	7.149 + j1.903
625	1.714 + j3.022	7.038 + j1.925
650	1.834 + j3.469	6.927 + j1.941
675	1.971 + j3.925	6.815 + j1.952
700	2.129 + j4.394	6.703 + j1.958
725	2.313 + j4.879	6.591 + j1.960
750	2.528 + j5.382	6.480 + j1.956
775	2.781 + j5.907	6.368 + j1.949
800	3.081 + j6.458	6.258 + j1.937
825	3.441 + j7.038	6.148 + j1.921
850	3.875 + j7.648	6.040 + j1.901
875	4.404 + j8.291	5.932 + j1.877
900	5.057 + j8.964	5.825 + j1.849
925	5.870 + j9.659	5.720 + j1.818
950	6.892 + j10.358	5.616 + j1.783
975	8.186 + j11.019	5.514 + j1.745
1000	9.829 + j11.566	5.413 + j1.704

8. Test information

Table 9. List of components

For test circuit, see [Figure 5](#) and [Figure 6](#).

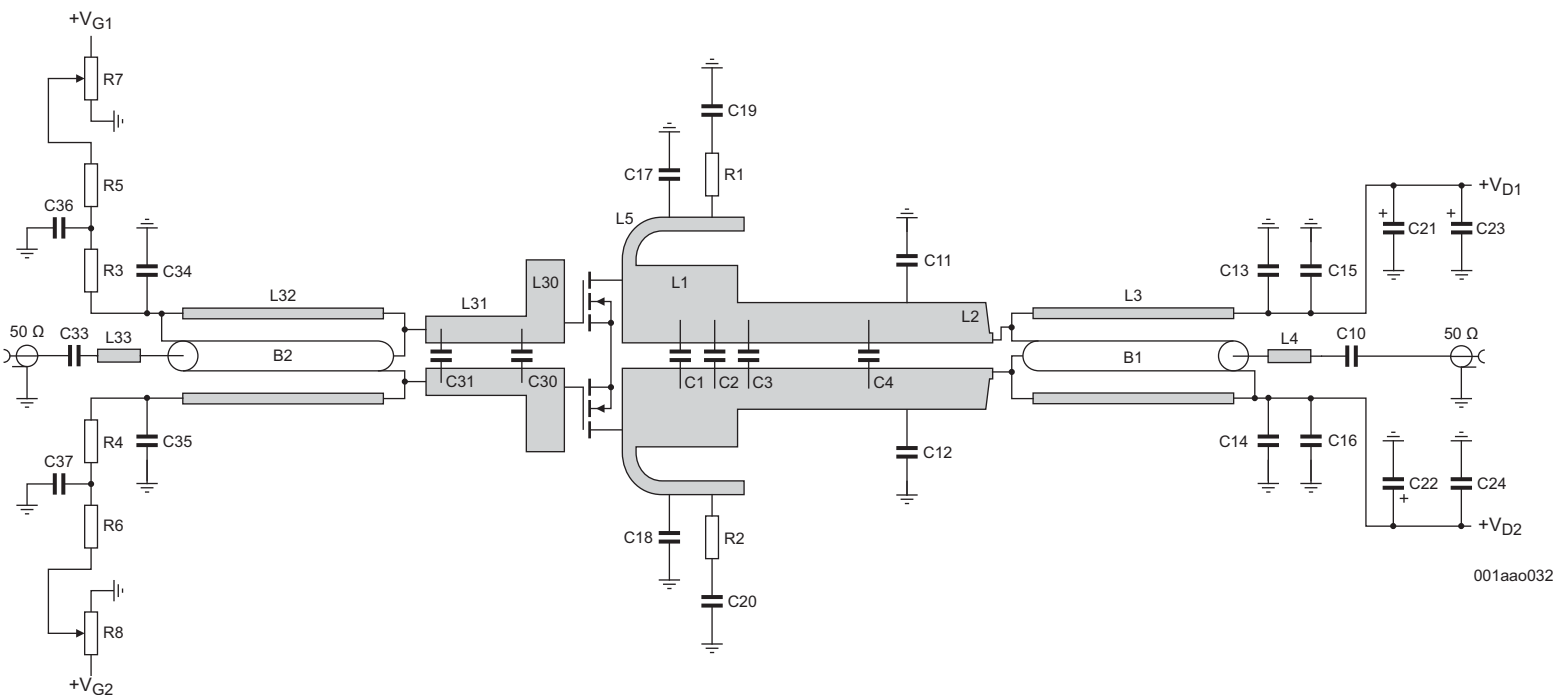
Component	Description	Value	Remarks
B1, B2	semi rigid coax	25 Ω ; 49.5 mm	UT-090C-25 (EZ 90-25)
C1, C2	multilayer ceramic chip capacitor	5.1 pF	[1]
C3	multilayer ceramic chip capacitor	6.8 pF	[1]
C4	multilayer ceramic chip capacitor	8.2 pF	[1]
C10, C13, C14	multilayer ceramic chip capacitor	100 pF	[2]
C11, C12	multilayer ceramic chip capacitor	10 pF	[1]
C15, C16	multilayer ceramic chip capacitor	4.7 μ F, 50 V	Kemet C1210X475K5RAC-TU or capacitor of same quality.
C17, C18, C23, C24	multilayer ceramic chip capacitor	100 pF	[1]
C19, C20	multilayer ceramic chip capacitor	10 μ F, 50 V	TDK C570X7R1H106KT000N or capacitor of same quality.
C21, C22	electrolytic capacitor	470 μ F; 63 V	
C30	multilayer ceramic chip capacitor	13 pF	[3]
C31	multilayer ceramic chip capacitor	2.2 pF	[3]
C33, C34, C35	multilayer ceramic chip capacitor	100 pF	[3]
C36, C37	multilayer ceramic chip capacitor	4.7 μ F, 50 V	TDK C4532X7R1E475MT020U or capacitor of same quality.
L1	microstrip	-	[4] (W $\times$ L) 15 mm $\times$ 13 mm
L2	microstrip	-	[4] (W $\times$ L) 5 mm $\times$ 26 mm
L3, L32	microstrip	-	[4] (W $\times$ L) 2 mm $\times$ 49.5 mm
L4	microstrip	-	[4] (W $\times$ L) 1.7 mm $\times$ 3.5 mm
L5	microstrip	-	[4] (W $\times$ L) 2 mm $\times$ 9.5 mm
L30	microstrip	-	[4] (W $\times$ L) 5 mm $\times$ 13 mm
L31	microstrip	-	[4] (W $\times$ L) 2 mm $\times$ 11 mm
L33	microstrip	-	[4] (W $\times$ L) 2 mm $\times$ 3 mm
R1, R2	wire resistor	10 Ω	
R3, R4	SMD resistor	5.6 Ω	0805
R5, R6	wire resistor	100 Ω	
R7, R8	potentiometer	10 k Ω	

[1] American technical ceramics type 800B or capacitor of same quality.

[2] American technical ceramics type 180R or capacitor of same quality.

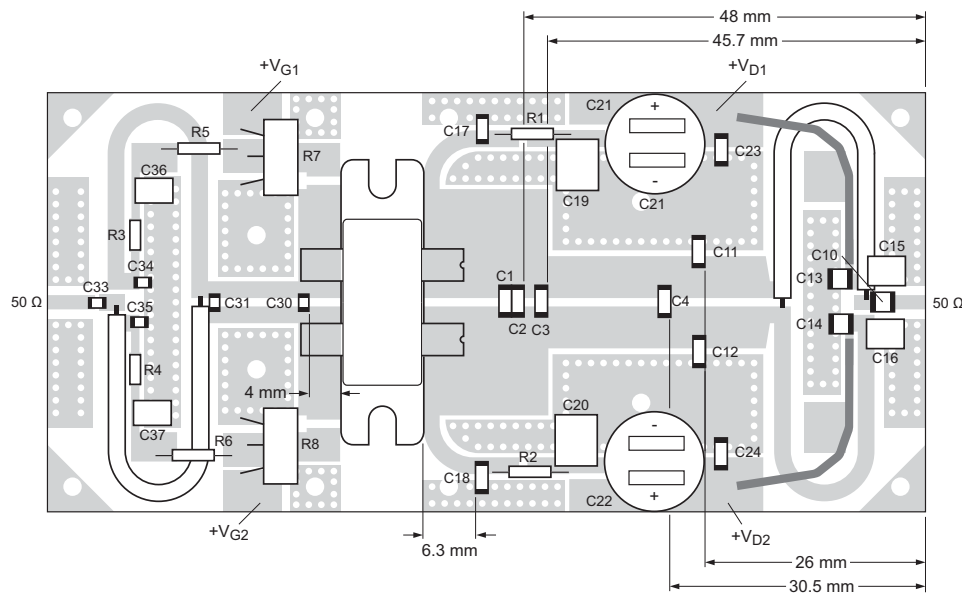
[3] American technical ceramics type 100A or capacitor of same quality.

[4] Printed-Circuit Board (PCB): Taconic RF35; ϵ_r = 3.5 F/m; height = 0.762 mm; Cu (top/bottom metallization); thickness copper plating = 35 μ m.



See [Table 9](#) for a list of components.

Fig 5. Class-AB common source broadband amplifier



aaa-001709

See [Table 9](#) for a list of components.

Fig 6. Component layout for class-AB common source amplifier

9. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 4 leads

SOT1121A

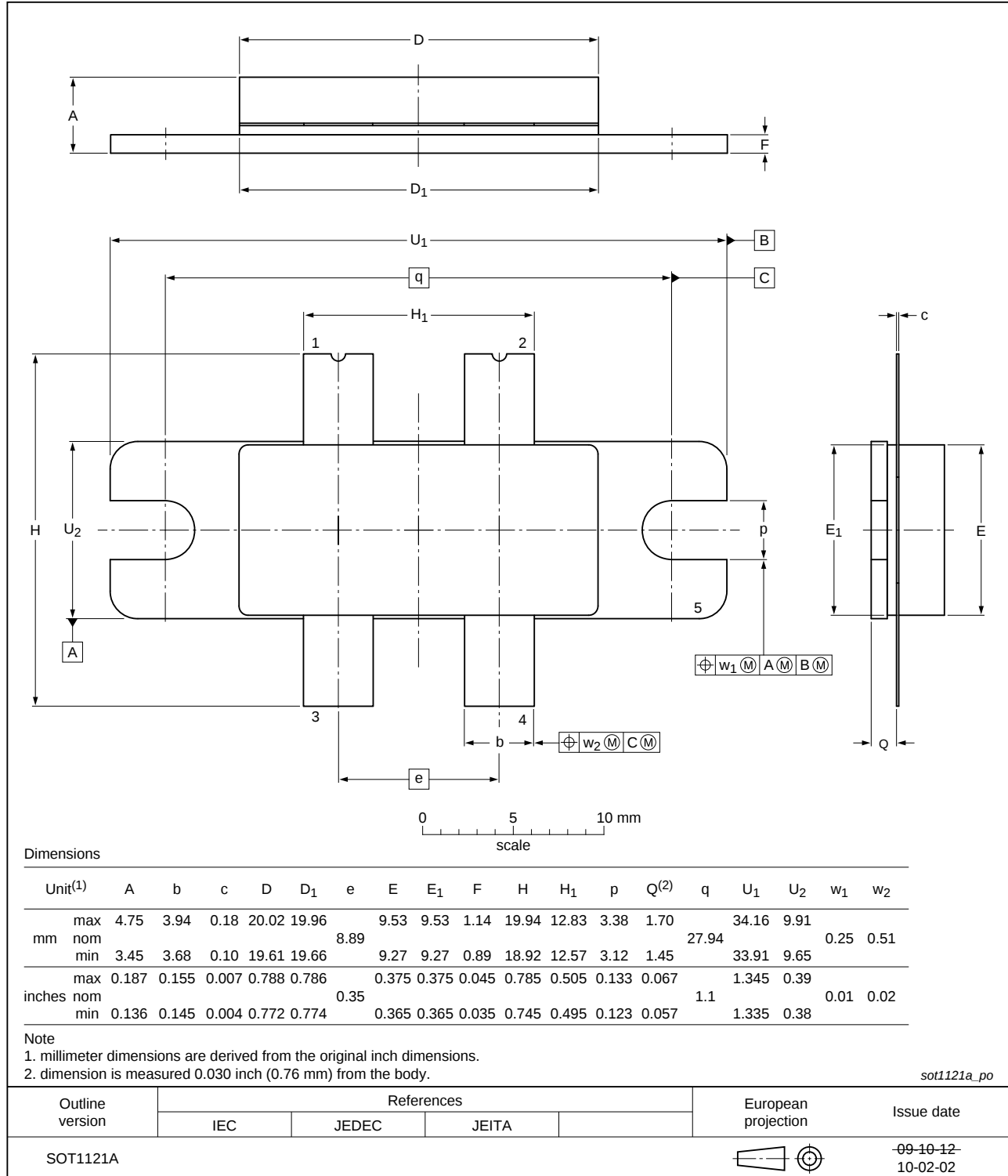
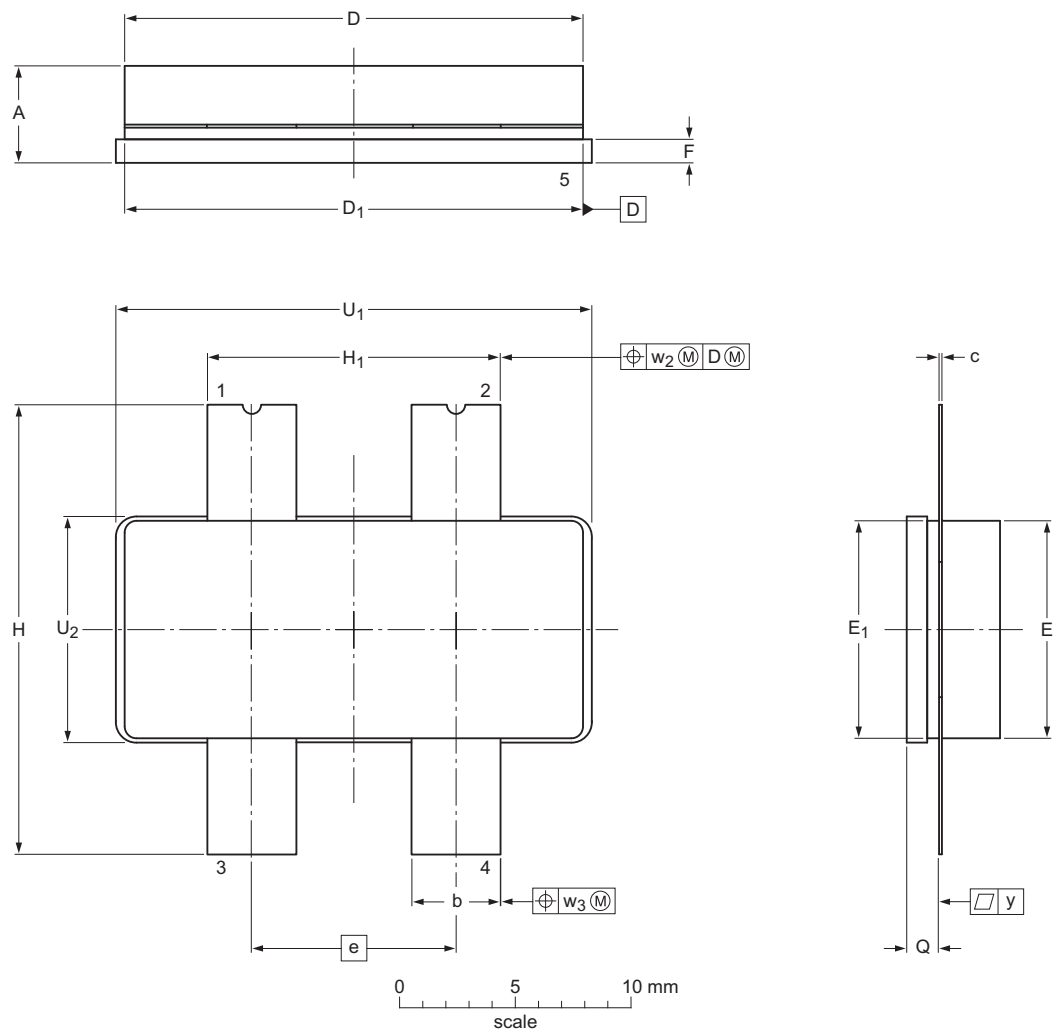


Fig 7. Package outline SOT1121A

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		9.53	9.53	1.14	19.94	12.83	1.70	20.70	9.91	0.51	0.25	0.25
	nom					8.89											
	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		0.375	0.375	0.045	0.785	0.505	0.067	0.815	0.39	0.02	0.01	0.01
	nom					0.35											
	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 8. Package outline SOT1121B

10. 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.

11. Abbreviations

Table 10. Abbreviations

Acronym	Description
CCDF	Complementary Cumulative Distribution Function
DVB	Digital Video Broadcast
DVB-T	Digital Video Broadcast - Terrestrial
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LDMOST	Laterally Diffused Metal-Oxide Semiconductor Transistor
OFDM	Orthogonal Frequency Division Multiplexing
PAR	Peak-to-Average power Ratio
RF	Radio Frequency
SMD	Surface Mounted Device
UHF	Ultra High Frequency
VSWR	Voltage Standing-Wave Ratio

12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF884P_BLF884PS#3	20150901	Product data sheet	-	BLF884P_BLF884PS 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.			
BLF884P_BLF884PS v.2	20111216	Product data sheet	-	BLF884P_BLF884PS v.1
BLF884P_BLF884PS v.1	20111013	Objective data sheet	-	-

13. Legal information

13.1 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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ICs with DVB-T or DVB-T2 functionality

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15. Contents

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