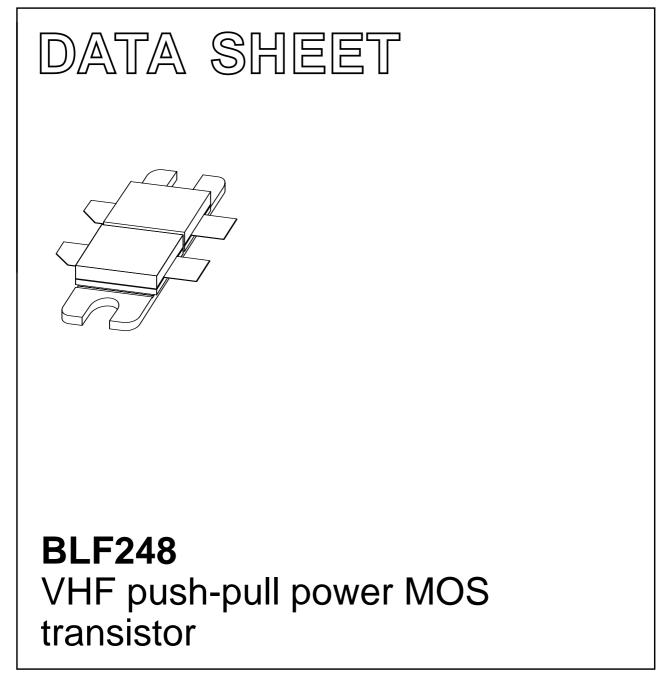
DISCRETE SEMICONDUCTORS



Product specification Supersedes data of 1997 Dec 17 2003 Sep 02



BLF248

FEATURES

- High power gain
- · Easy power control
- Good thermal stability
- Gold metallization ensures excellent reliability.

DESCRIPTION

Dual push-pull silicon N-channel enhancement mode vertical D-MOS transistor, designed for large signal amplifier applications in the VHF frequency range.

The transistor is encapsulated in a 4-lead SOT262 A1 balanced flange package, with two ceramic caps. The mounting flange provides the common source connection for the transistors.

PINNING - SOT262 A1

PIN	DESCRIPTION			
1	drain 1			
2	drain 2			
3	gate 1			
4	gate 2			
5	source			

PIN CONFIGURATION

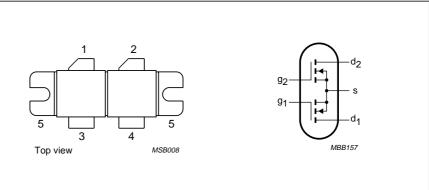


Fig.1 Simplified outline and symbol.

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A, and SNW-FQ-302B.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO discs are not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

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

MODE OF OPERATION	f (MHz)	V _{DS} (V)	P _L (W)	G _p (dB)	η _D (%)
class-AB	225	28	300	>10	>55
	175	28	300	typ. 13	typ. 67

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LIMITING VALUES

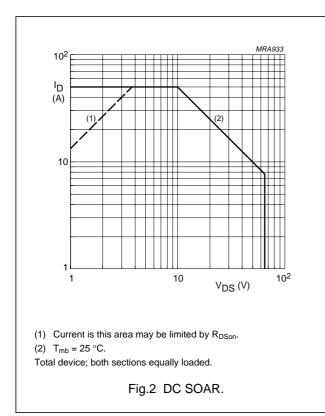
In accordance with the Absolute Maximum System (IEC 60134).

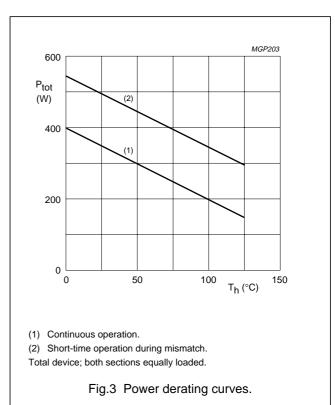
Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{DS}	drain-source voltage		_	65	V
V _{GS}	gate-source voltage		_	±20	V
I _D	drain current (DC)		—	25	А
P _{tot}	total power dissipation	$T_{mb} \le 25$ °C total device; both sections equally loaded	-	500	W
T _{stg}	storage temperature		-65	150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
R _{th j-mb}	thermal resistance from junction to mounting base	total device; both sections equally loaded.	0.35	K/W
R _{th mb-h}	thermal resistance from mounting base to heatsink	total device; both sections equally loaded.	0.15	K/W





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CHARACTERISTICS

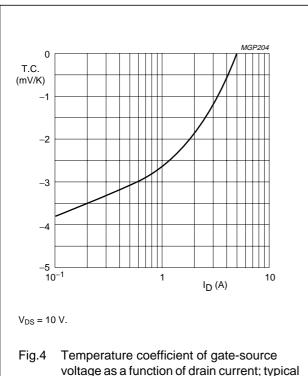
 $T_i = 25 \ ^{\circ}C$ unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per section		•	•	•	•	
V _{(BR)DSS}	drain-source breakdown voltage	V _{GS} = 0; I _D = 100 mA	65	-	-	V
I _{DSS}	drain-source leakage current	V _{GS} = 0; V _{DS} = 28 V	-	-	5	mA
I _{GSS}	gate-source leakage current	$V_{GS} = \pm 20 \text{ V}; V_{DS} = 0$	-	-	1	μA
V _{GSth}	gate-source threshold voltage	I _D = 100 mA; V _{DS} = 10 V	2	-	4.5	V
ΔV_{GS}	gate-source voltage difference of both transistor sections	$I_D = 100 \text{ mA}; V_{DS} = 10 \text{ V}$	-	-	100	mV
g fs	forward transconductance	I _D = 8 A; V _{DS} = 10 V	5	7.5	-	S
g _{fs1} /g _{fs2}	forward transconductance ratio of both transistor sections	I _D = 8 A; V _{DS} = 10 V	0.9	-	1.1	
R _{DSon}	drain-source on-state resistance	I _D = 8 A; V _{GS} = 10 V	-	0.1	0.15	Ω
I _{DSX}	on-state drain current	V _{GS} = 10 V; V _{DS} = 10 V	-	37	-	А
C _{is}	input capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	_	500	-	pF
C _{os}	output capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	-	360	-	pF
C _{rs}	feedback capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	-	46	-	pF

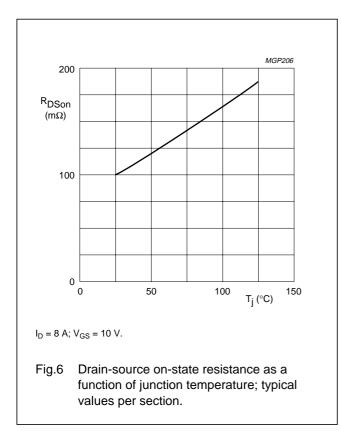
V_{GS} group indicator

GROUP	LIMITS (V)		GROUP	LIMITS (V)		
	MIN.	MAX.		MIN.	MAX.	
А	2.0	2.1	0	3.3	3.4	
В	2.1	2.2	Р	3.4	3.5	
С	2.2	2.3	Q	3.5	3.6	
D	2.3	2.4	R	3.6	3.7	
E	2.4	2.5	S	3.7	3.8	
F	2.5	2.6	Т	3.8	3.9	
G	2.6	2.7	U	3.9	4.0	
Н	2.7	2.8	V	4.0	4.1	
J	2.8	2.9	W	4.1	4.2	
К	2.9	3.0	Х	4.2	4.3	
L	3.0	3.1	Y	4.3	4.4	
М	3.1	3.2	Z	4.4	4.5	
N	3.2	3.3				

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voltage as a function of drain current; typical values per section.



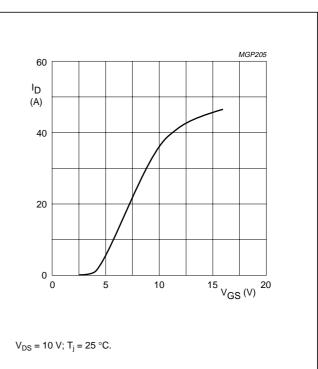
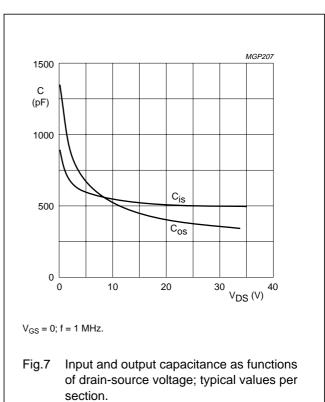


Fig.5 Drain current as a function of gate-source voltage; typical values per section.



$w_{GP20} \\ f_{G} \\ f_{G} \\ f_{D} \\ f_{Q} \\ f$

APPLICATION INFORMATION FOR CLASS-AB OPERATION

 T_{h} = 25 °C; $R_{th\ mb-h}$ = 0.15 K/W, unless otherwise specified.

RF performance in a linear amplifier in a common source class-AB circuit.

 R_{GS} = 536 Ω per section; optimum load impedance per section = 0.79 – j0.11 Ω .

MODE OF OPERATION	f (MHz)	V _{DS} (V)	P _L (W)	G _p (dB)	ղը (%)
class-AB	225	28	300	>10 typ. 11.5	>55 typ. 65
	175	28	300	typ. 13	typ. 67

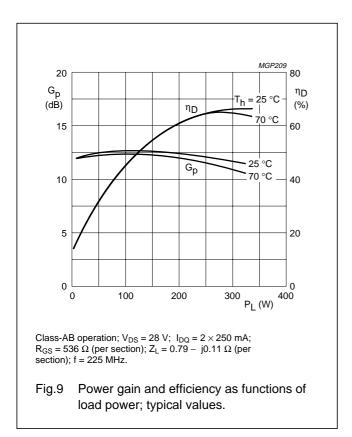
Ruggedness in class-AB operation

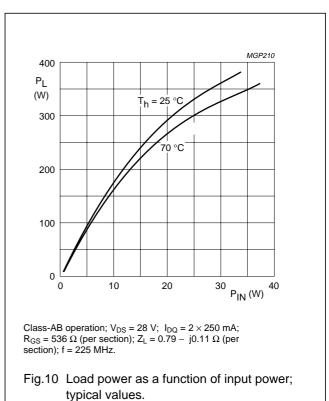
The BLF248 is capable of withstanding a load mismatch corresponding to VSWR = 50 through all phases under the following conditions:

 V_{DS} = 28 V; f = 225 MHz at rated output power.

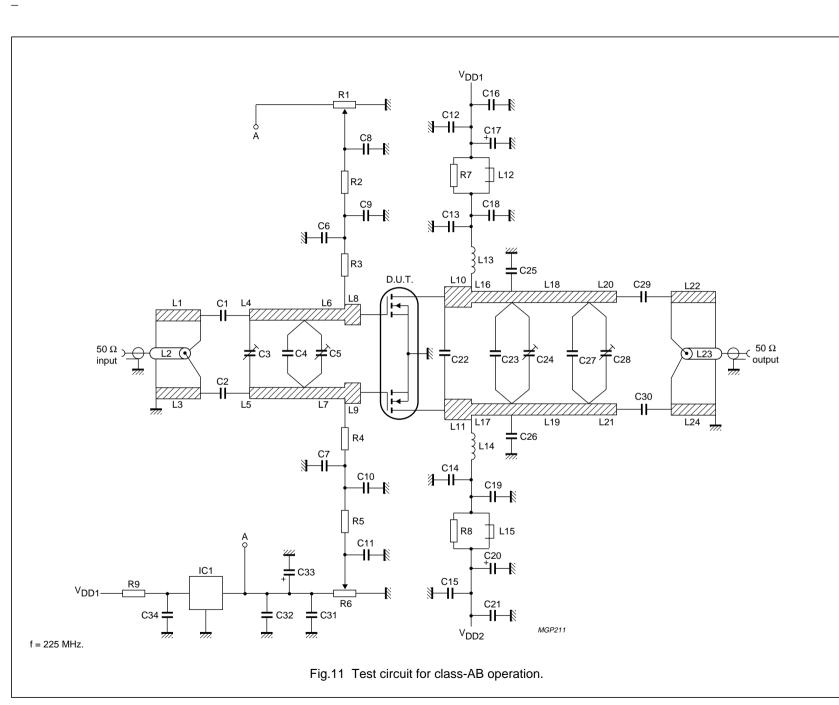
BLF248

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2003 Sep 02



VHF push-pull power MOS transistor

Product specification

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COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor; note 1	2 × 56 pF + 18 pF in parallel, 500 V		
C3	film dielectric trimmer	2 to 9 pF		2222 809 09005
C4	multilayer ceramic chip capacitor; note 1			
C5	film dielectric trimmer	5 to 60 pF		2222 809 08003
C6, C7, C9, C10, C12, C15, C31, C34	multilayer ceramic chip capacitor; note 1	1 nF, 500 V		
C8, C11, C16, C21, C32	multilayer ceramic chip capacitor	100 nF, 50 V		2222 852 47104
C13, C14, C18, C19	multilayer ceramic chip capacitor; note 1	510 pF, 500 V		
C17, C20, C33	electrolytic capacitor	10 μF, 63 V		
C22	multilayer ceramic chip capacitor; note 1	82 pF, 500 V		
C23	multilayer ceramic chip capacitor; note 1	10 pF + 30 pF in parallel, 500 V		
C24, C28	film dielectric trimmer	2 to 18 pF		2222 809 09006
C25, C26	multilayer ceramic chip capacitor; note 1	39 pF + 47 pF in parallel, 500 V		
C27	multilayer ceramic chip capacitor; note 1	18 pF, 500 V		
C29, C30	multilayer ceramic chip capacitor; note 1	$3 \times 100 \text{ pF}$ in parallel, 500 V		
L1, L3, L22, L24	stripline; note 2	50 Ω	$4.8 \times 80 \text{ mm}$	
L2, L23	semi-rigid cable; note 3	50 Ω	ext. dia. 3.6 mm ext. conductor length 80 mm	
L4, L5	stripline; note 2	43 Ω	$6 \times 32.5 \text{ mm}$	
L6, L7, L10, L11	stripline; note 2	43 Ω	$6 \times 10.5 \text{ mm}$	
L8, L9	stripline; note 2	43 Ω	$6 \times 3 \text{ mm}$	
L12, L15	grade 3B Ferroxcube wide-band HF choke	2 in parallel		4312 020 36642
L13, L14	2 turns enamelled 1.6 mm copper wire	25 nH	int. dia. 5 mm leads 2×7 mm space 2.5 mm	
L16, L17	stripline; notes 2 and 4	43 Ω	6 × 3 mm	
L18, L19	stripline; notes 2 and 4	43 Ω	6 x 35 mm	
L20, L21	stripline; notes 2 and 4	43 Ω	6 × 9 mm	
R1, R6	10 turns potentiometer	50 kΩ		
R2, R5	0.4 W metal film resistor	1 kΩ		

List of components class-AB test circuit; (see Figs 11 and 12)

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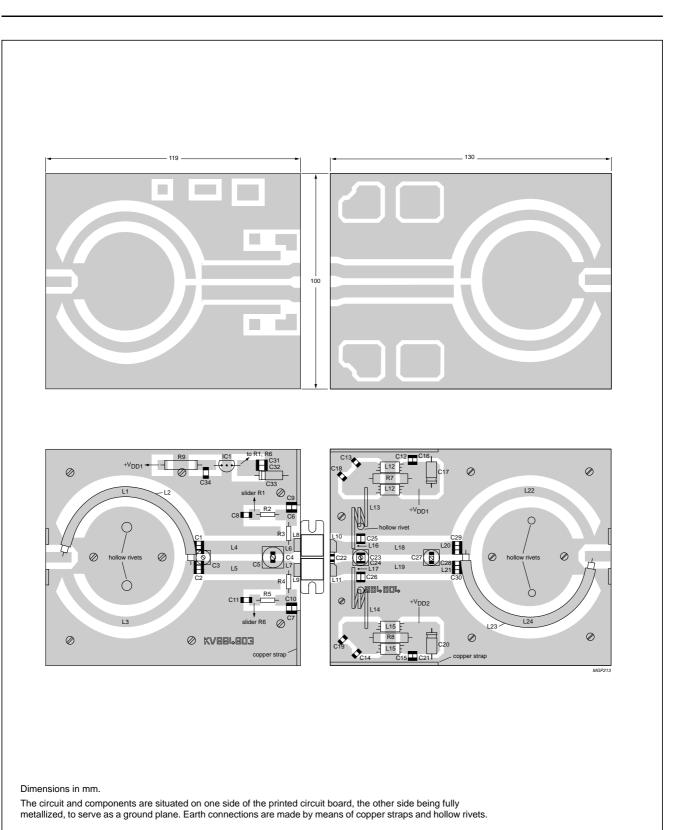
COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
R3, R4	0.4 W metal film resistor	536 Ω		
R7, R8	1 W metal film resistor	10 Ω ±5%		
R9	1 W metal film resistor	3.16 kΩ		
IC1	78L05 voltage regulator			

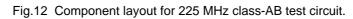
Notes

- 1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
- 2. L1, L3 to L11, L16 to L22 and L24 are micro-striplines on a double copper-clad printed-circuit board, with glass microfibre PTFE dielectric (ϵ_r = 2.2), thickness ¹/₁₆ inch, thickness of copper sheet 2 × 35 µm.
- 3. L2 and L23 are soldered on striplines L1 and L24 respectively.
- 4. A copper strap, thickness 0.8 mm, is soldered on striplines L16 to L21.

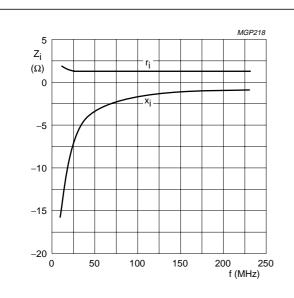
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VHF push-pull power MOS transistor



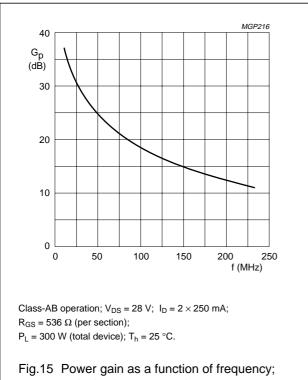


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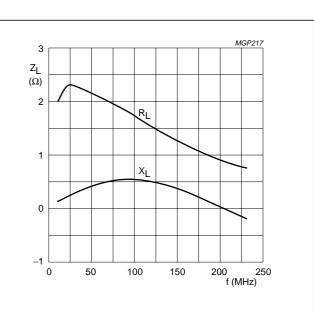


Class-AB operation; $V_{DS} = 28 \text{ V}$; $I_D = 2 \times 250 \text{ mA}$; $R_{GS} = 536 \Omega$ (per section); P_L = 300 W (total device); T_h = 25 °C.

Fig.13 Input impedance as a function of frequency (series components); typical values per section.



typical values per section.



Class-AB operation; $V_{DS} = 28 \text{ V}$; $I_D = 2 \times 250 \text{ mA}$; $R_{GS} = 536 \Omega$ (per section); P_L = 300 W (total device); T_h = 25 $^\circ C.$

Fig.14 Load impedance as a function of frequency (series components); typical values per section.

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BLF248 scattering parameters

 $V_{DS} = 28 \text{ V}; I_D = 250 \text{ mA}; \text{ note } 1$

f (MHz)	s ₁₁		S	21	S	s ₁₂		S ₂₂	
	s ₁₁	$\angle \Phi$	s ₂₁	$\angle \Phi$	s ₁₂	$\angle \Phi$	s ₂₂	$\angle \Phi$	
5	0.85	-158.7	22.19	97.0	0.01	-1.4	0.90	168.9	
10	0.85	-168.6	11.27	88.5	0.01	20.7	0.85	174.2	
20	0.85	-173.2	5.51	79.0	0.01	18.2	0.83	178.2	
30	0.86	-174.1	3.57	72.0	0.02	8.2	0.83	-179.8	
40	0.87	-174.3	2.56	65.9	0.02	-0.2	0.83	-178.0	
50	0.88	-174.4	1.96	60.6	0.02	-7.2	0.85	-176.6	
60	0.89	-174.6	1.55	55.7	0.01	-13.1	0.86	-175.8	
70	0.90	-174.8	1.26	51.3	0.01	-17.8	0.87	-175.3	
80	0.91	-175.1	1.05	47.5	0.01	-21.6	0.89	-175.0	
90	0.92	-175.5	0.88	44.0	0.01	-24.6	0.90	-174.9	
100	0.93	-175.8	0.76	40.6	0.01	-27.0	0.91	-175.0	
125	0.95	-176.7	0.53	33.6	0.01	-30.2	0.93	-175.6	
150	0.96	-177.6	0.38	28.9	0.01	-28.2	0.94	-175.6	
175	0.97	-178.4	0.30	25.5	0.00	-21.2	0.96	-176.0	
200	0.97	-179.2	0.23	22.3	0.00	-5.3	0.97	-176.7	
250	0.98	179.4	0.16	18.6	0.00	47.5	0.98	-177.6	
300	0.98	178.2	0.11	17.2	0.01	71.9	0.98	-178.5	
350	0.98	177.1	0.08	16.7	0.01	78.0	0.99	-179.1	
400	0.99	176.2	0.07	18.9	0.01	84.9	0.99	-179.9	
450	0.99	175.2	0.05	21.7	0.01	88.1	0.99	179.6	
500	0.99	174.2	0.05	26.7	0.01	88.6	0.99	179.0	
600	0.99	172.3	0.04	38.3	0.02	89.4	1.00	177.9	
700	0.99	170.4	0.03	50.8	0.02	90.0	1.00	176.9	
800	0.99	168.6	0.03	63.7	0.03	91.0	1.00	176.0	
900	0.99	166.6	0.04	71.0	0.03	91.6	1.00	175.0	
1000	0.99	164.7	0.04	77.6	0.04	92.3	1.00	174.1	

Note

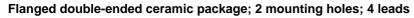
1. For more extensive s-parameters see internet:

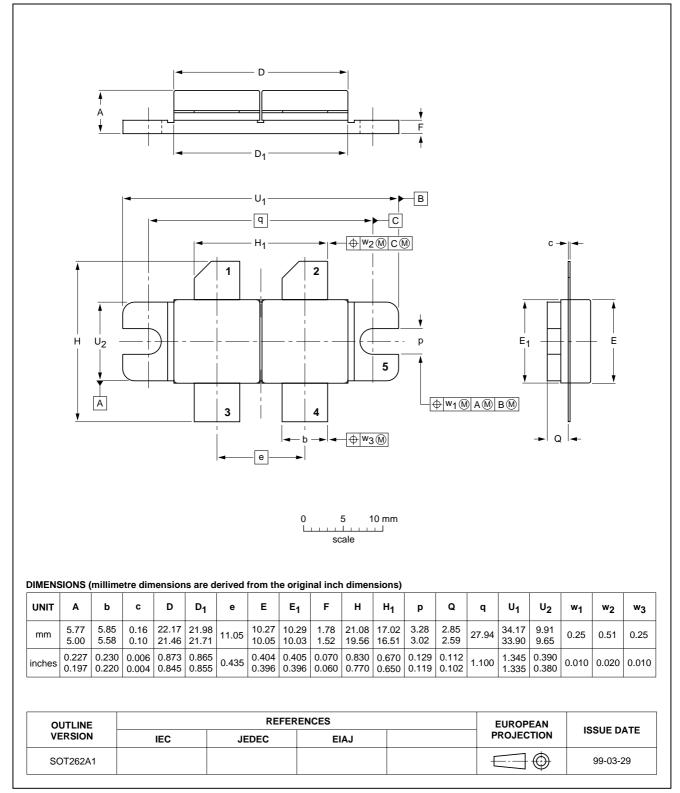
http://www.semiconductors.philips.com/markets/communications/wirelesscommunication/broadcast

BLF248

VHF push-pull power MOS transistor

PACKAGE OUTLINE





SOT262A1

BLF248

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
1	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
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Limiting values definition — Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 60134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.

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