

VHF push-pull power MOS transistor

BLF245C

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FEATURES

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

DESCRIPTION

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

The transistor is encapsulated in a balanced 8 lead, SOT161 flange envelope, with a ceramic cap. All leads are isolated from the flange.

PINNING - SOT161

PIN	DESCRIPTION
1	source
2	source
3	drain 1
4	gate 1
5	drain 2
6	gate 2
7	source
8	source

PIN CONFIGURATION

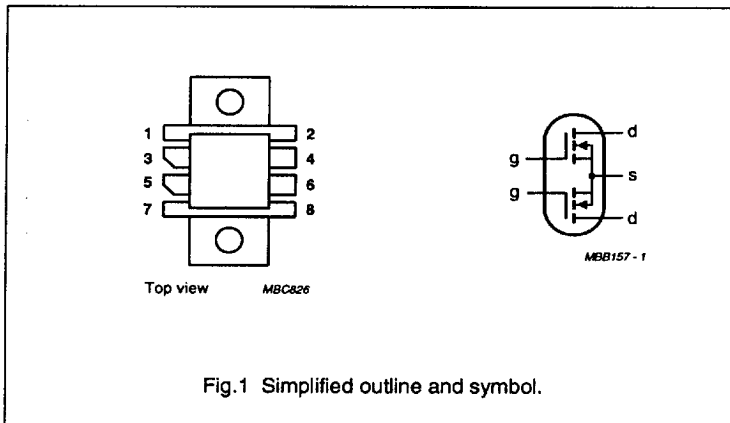


Fig.1 Simplified outline and symbol.

CAUTION

The device is supplied in an antistatic package. The gate-source input must be protected against static charge during transport and handling.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is 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 $T_n = 25^\circ\text{C}$ in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	28	30	≥ 16	≥ 55

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LIMITING VALUES

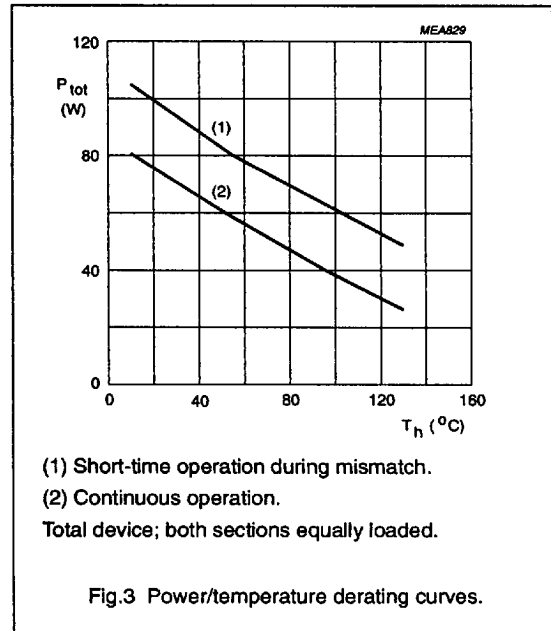
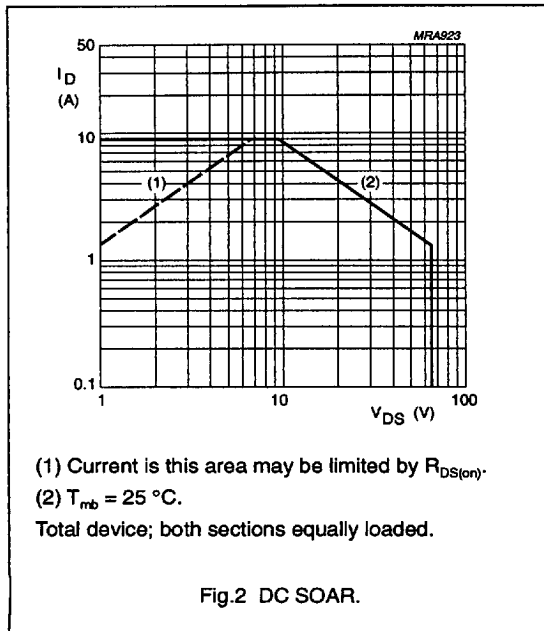
In accordance with the Absolute Maximum System (IEC 134).

Per transistor section unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		-	65	V
$\pm V_{GS}$	gate-source voltage		-	20	V
I_D	DC drain current		-	4.5	A
P_{tot}	total power dissipation	up to $T_{mb} = 25\text{ }^\circ\text{C}$; total device; both sections equally loaded	-	85	W
T_{stg}	storage temperature		-65	150	$^\circ\text{C}$
T_j	junction temperature		-	200	$^\circ\text{C}$

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-mb}$	thermal resistance from junction to mounting base	$T_{mb} = 25\text{ }^\circ\text{C}$; $P_{tot} = 85\text{ W}$; total device; both sections equally loaded	2.1 K/W
$R_{th\ mb-h}$	thermal resistance from mounting base to heatsink		0.25 K/W



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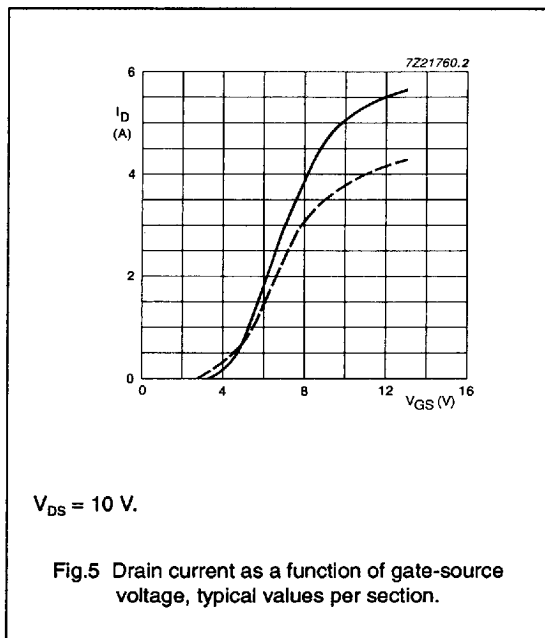
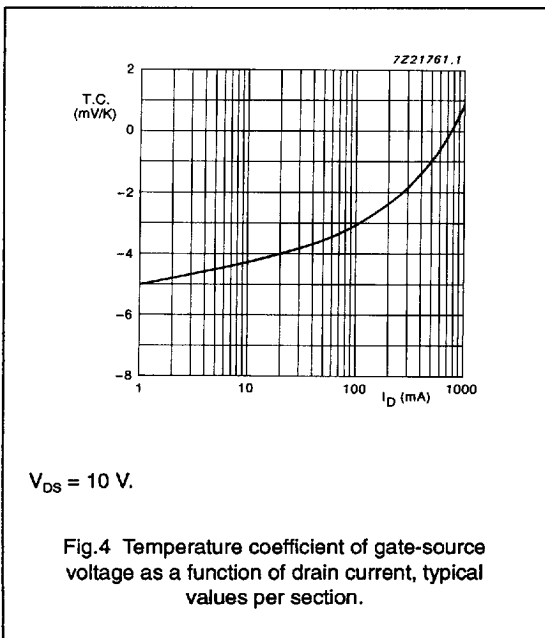
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CHARACTERISTICS (per section)

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{(BR)DSS}	drain-source breakdown voltage	I _D = 5 mA; V _{GS} = 0	65	-	-	V
I _{DSS}	drain-source leakage current	V _{GS} = 0; V _{DS} = 28 V	-	-	1	mA
I _{GSS}	gate-source leakage current	±V _{GS} = 20 V; V _{DS} = 0	-	-	1	µA
V _{GS(th)}	gate-source threshold voltage	I _D = 5 mA; V _{DS} = 10 V	2	-	4.5	V
g _{fs}	forward transconductance	I _D = 0.75 A; V _{DS} = 10 V	600	850	-	mS
		I _D = 1.5 A; V _{DS} = 10 V	900	-	-	mS
g _{fs1} /g _{fs2}	forward transconductance ratio of both sections	I _D = 1.5 A; V _{DS} = 10 V	0.9	-	1.1	
R _{DS(on)}	drain-source on-state resistance	I _D = 0.75 A; V _{GS} = 10 V	-	0.8	1.5	Ω
I _{DSX}	on-state drain current	V _{GS} = 10 V; V _{DS} = 10 V	-	5	-	A
C _{is}	input capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	-	60	65	pF
C _{os}	output capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	-	40	50	pF
C _{rs}	feedback capacitance	V _{GS} = 0; V _{DS} = 28 V; f = 1 MHz	-	4.5	8	pF

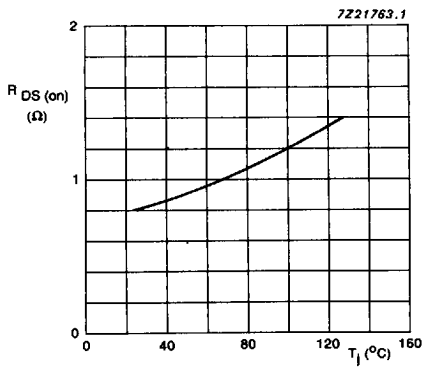


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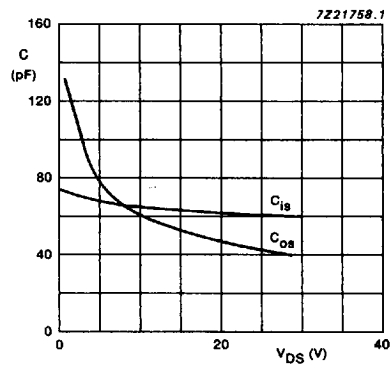
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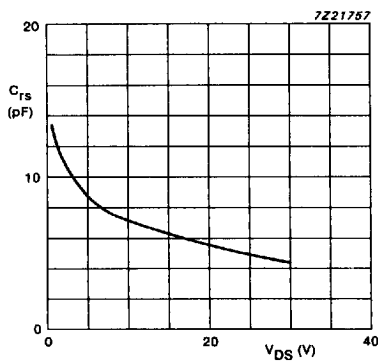
$I_D = 0.75 \text{ A}; V_{GS} = 10 \text{ V}.$

Fig.6 Drain-source on-state resistance as a function of junction temperature, typical values per section.



$V_{GS} = 0; f = 1 \text{ MHz}.$

Fig.7 Input and output capacitance as functions of drain-source voltage, typical values per section.



$V_{GS} = 0; f = 1 \text{ MHz}.$

Fig.8 Feedback capacitance as a function of drain-source voltage, typical values per section.

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APPLICATION INFORMATION FOR CLASS-B OPERATION

$T_h = 25\text{ }^\circ\text{C}$; $R_{th\text{ mb-h}} = 0.25\text{ K/W}$; unless otherwise specified.

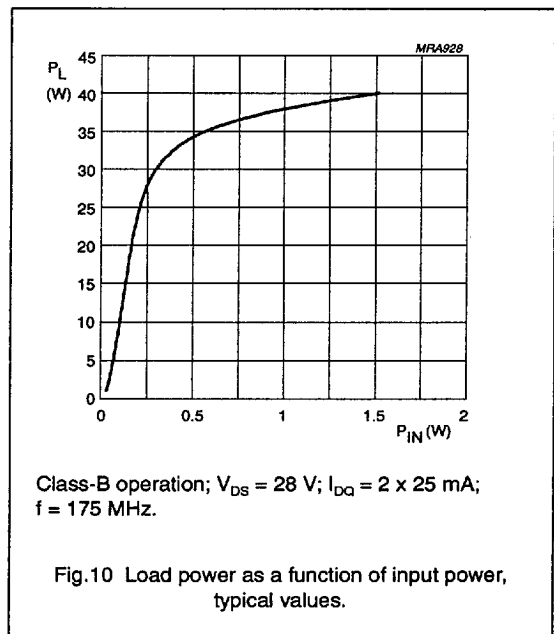
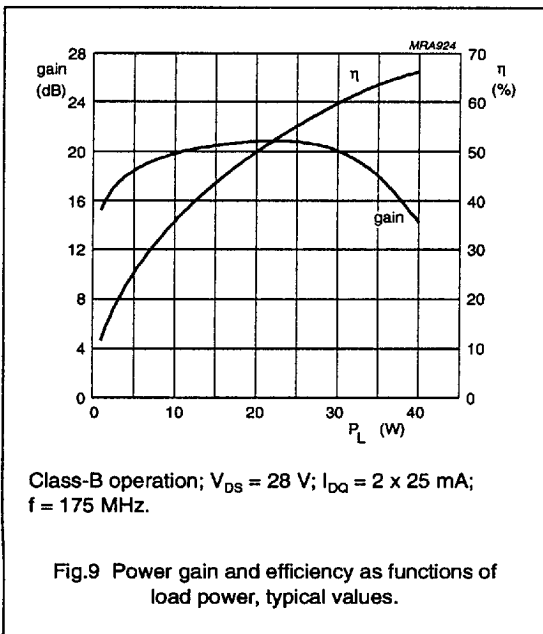
RF performance in a push-pull common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_p (dB)	η_D (%)
CW, class-B	175	28	2 x 25	30	≥ 16 typ. 20	≥ 55 typ. 60

Ruggedness in class-B operation

The BLF245C is capable of withstanding a load mismatch corresponding to VSWR = 50 through all phases, under the following conditions:

$V_{DS} = 28\text{ V}$, $f = 175\text{ MHz}$ at rated load power.

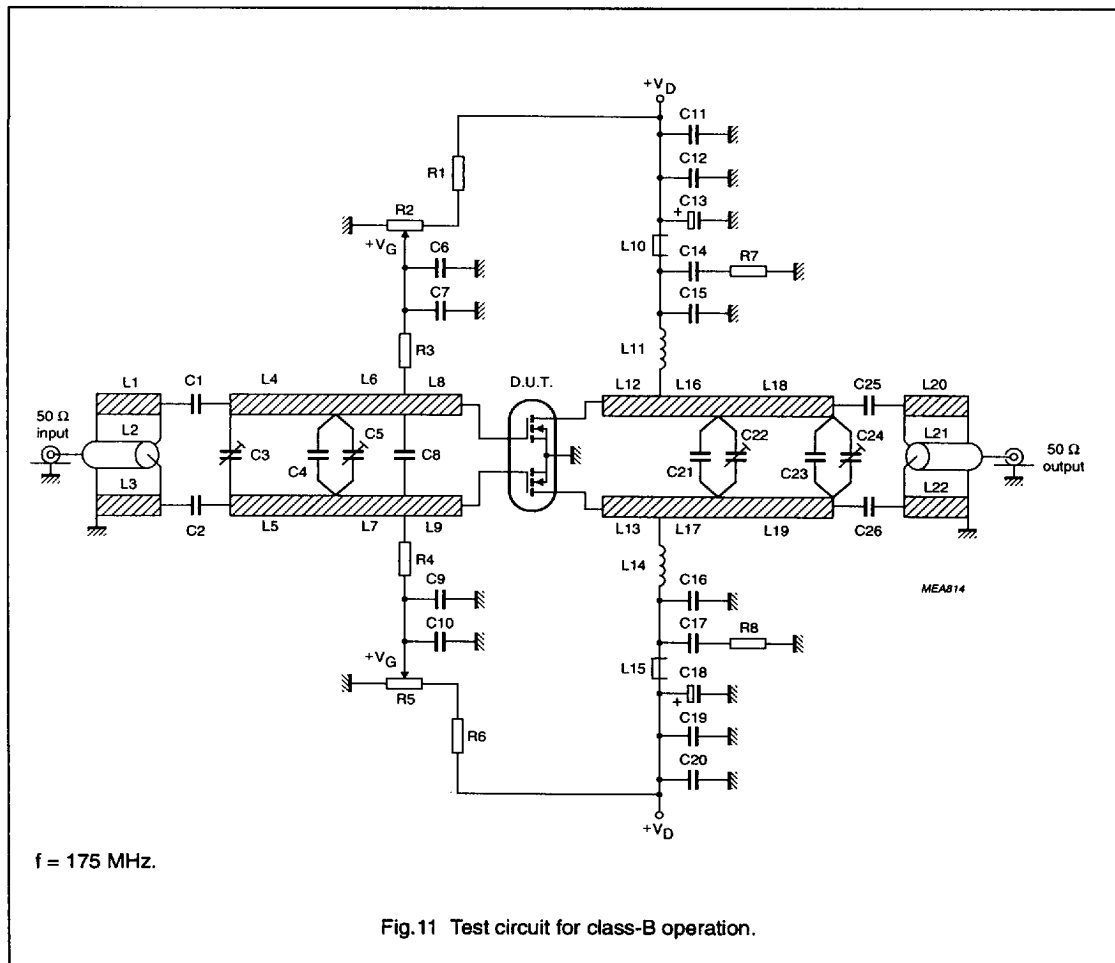


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List of components (class-B test circuit)

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2	multilayer ceramic chip capacitor (note 1)	270 pF		
C3, C5, C22, C24	film dielectric trimmer	5 to 60 pF		2222 809 08003
C4	multilayer ceramic chip capacitor (note 1)	110 pF		
C6, C10, C11, C14, C17, C20	multilayer ceramic chip capacitor	100 nF		2222 852 47104

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COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C8, C23	multilayer ceramic chip capacitor (note 1)	75 pF		
C7, C9	multilayer ceramic chip capacitor (note 1)	680 pF		
C12, C19	multilayer ceramic chip capacitor	10 nF		2222 852 47103
C13, C18	electrolytic capacitor	10 μ F, 63 V		2222 030 37688
C15, C16	multilayer ceramic chip capacitor (note 1)	100 pF		
C21	multilayer ceramic chip capacitor (note 1)	82 pF + 91 pF in parallel		
C25, C26	multilayer ceramic chip capacitor (note 1)	91 pF		
L1, L3, L20, L22	stripline (note 2)	55 Ω	length 111 mm width 2.5 mm	
L2, L21	semi-rigid cable (note 3)	50 Ω	length 111 mm ext. dia. 2.2 mm	
L4, L5	stripline (note 2)	51.5 Ω	length 31 mm width 2.8 mm	
L6, L7	stripline (note 2)	51.5 Ω	length 18 mm width 2.8 mm	
L8, L9	stripline (note 2)	51.5 Ω	length 5 mm width 2.8 mm	
L10, L15	grade 3B Ferroxcube wideband RF choke			4312 020 36642
L11, L14	4 turns enamelled 1 mm copper wire	70 nH	length 9 mm int. dia. 9 mm leads 2 x 5 mm	
L12, L13	stripline (note 2)	51.5 Ω	length 10 mm width 2.8 mm	
L16, L17	stripline (note 2)	51.5 Ω	length 26 mm width 2.8 mm	
L18, L19	stripline (note 2)	51.5 Ω	length 19 mm width 2.8 mm	
R1, R6	0.4 W metal film resistor	205 k Ω		2322 151 72054
R2, R5	10 turn potentiometer	50 k Ω		
R3, R4, R7, R8	0.4 W metal film resistor	10 Ω		2322 151 71009

Notes

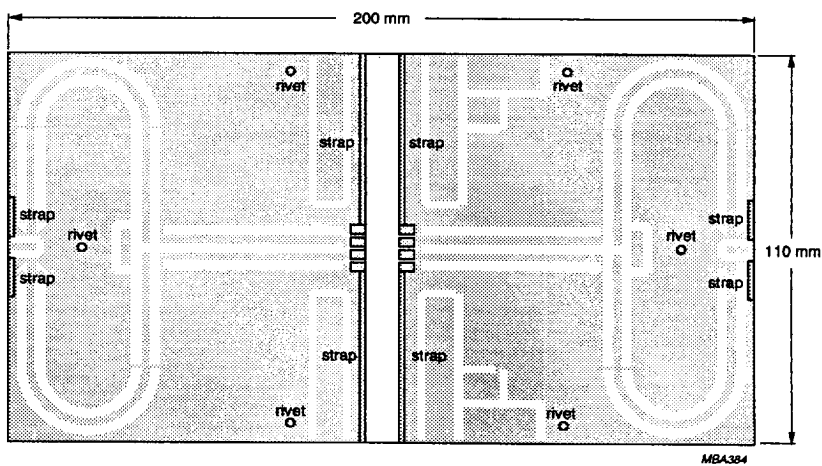
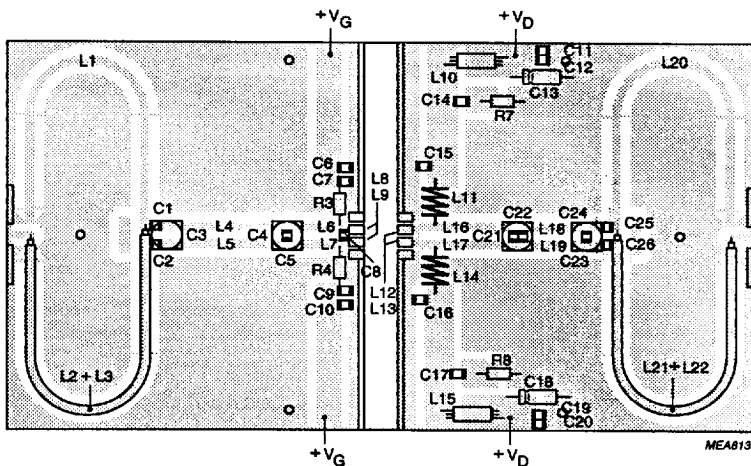
1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.
2. The striplines are on a double copper-clad printed circuit board, with epoxy fibre-glass dielectric ($\epsilon_r = 4.5$); thickness 1.57 mm.
3. Cables L2 and L21 are soldered to striplines L1 and L20 respectively.

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The circuit and components are situated on one side of the epoxy fibre-glass board, the other side being fully metallized to serve as a ground. Earth connections are made by means of copper straps and hollow rivets for a direct contact between the upper and lower sheets.

Fig.12 Component layout for 175 MHz class-B test circuit.

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