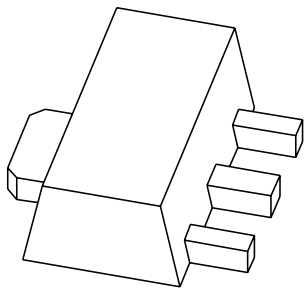


DATA SHEET



BFQ540 NPN wideband transistor

Product specification
Supersedes data of 1998 Aug 27

2000 May 23

NPN wideband transistor

BFQ540

FEATURES

- High gain
- High output voltage
- Low noise
- Gold metallization ensures excellent reliability
- Low thermal resistance.

APPLICATIONS

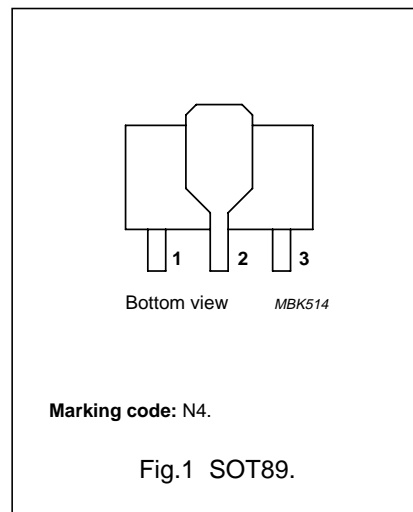
- VHF, UHF and CATV amplifiers.

DESCRIPTION

NPN wideband transistor in a SOT89 plastic package.

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	–	15	V
V_{EBO}	collector-base voltage	open collector	–	–	2	V
I_C	collector current (DC)		–	–	120	mA
P_{tot}	total power dissipation	$T_s \leq 60\text{ °C}$; note 1	–	–	1.2	W
h_{FE}	DC current gain	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $T_j = 25\text{ °C}$	100	120	250	
f_T	transition frequency	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	9	–	GHz
$ S_{21} ^2$	insertion power gain	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	12	13	–	dB
F	noise figure	$I_C = 40\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 900\text{ MHz}$; $\Gamma_S = \Gamma_{opt}$	–	1.9	2.4	dB

Note

1. T_s is the temperature at the soldering point of the collector pin.

NPN wideband transistor

BFQ540

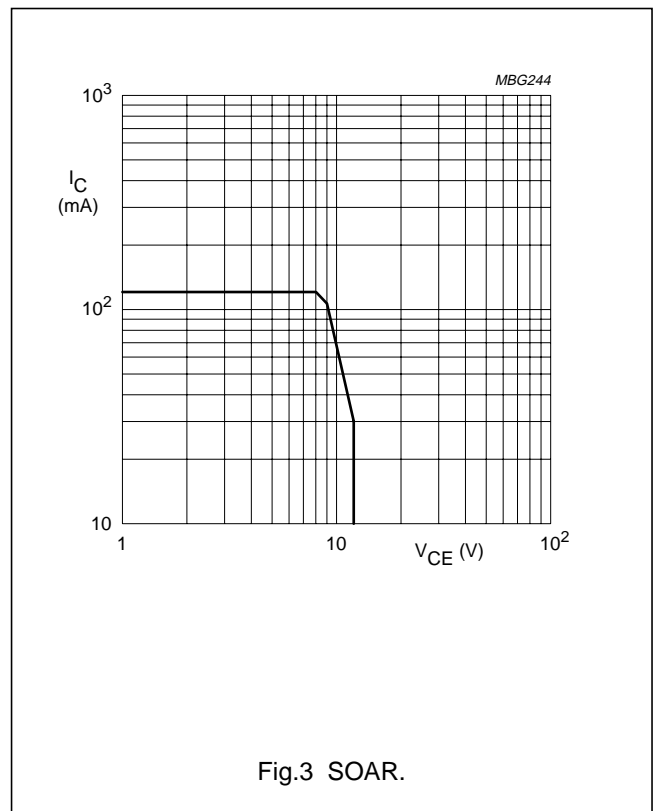
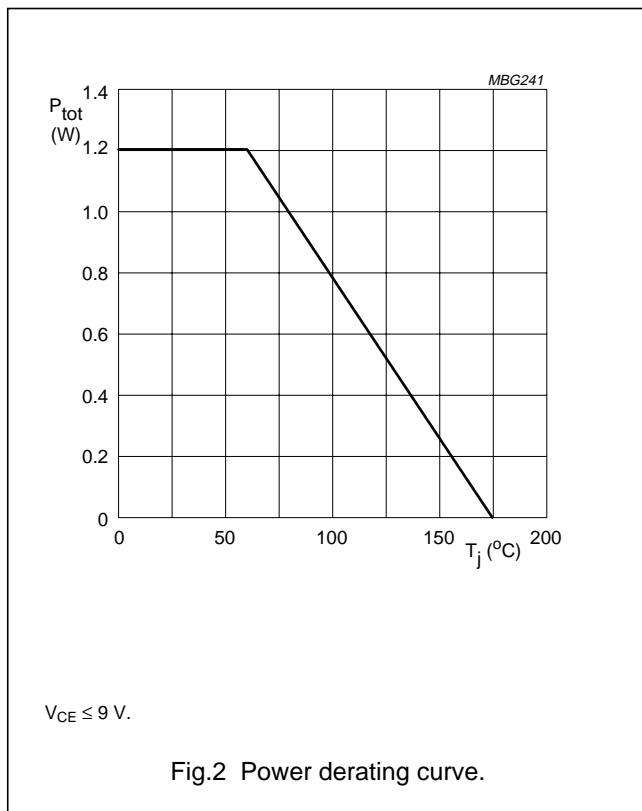
LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	2	V
I_C	collector current (DC)		–	120	mA
P_{tot}	total power dissipation	$T_s \leq 60\text{ }^\circ\text{C}$	–	1.2	W
T_{stg}	storage temperature		–65	+150	$^\circ\text{C}$
T_j	operating junction temperature		–	175	$^\circ\text{C}$

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	$T_s \leq 60\text{ }^\circ\text{C}; P_{tot} = 1.2\text{ W}$	95	K/W



NPN wideband transistor

BFQ540

CHARACTERISTICS

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

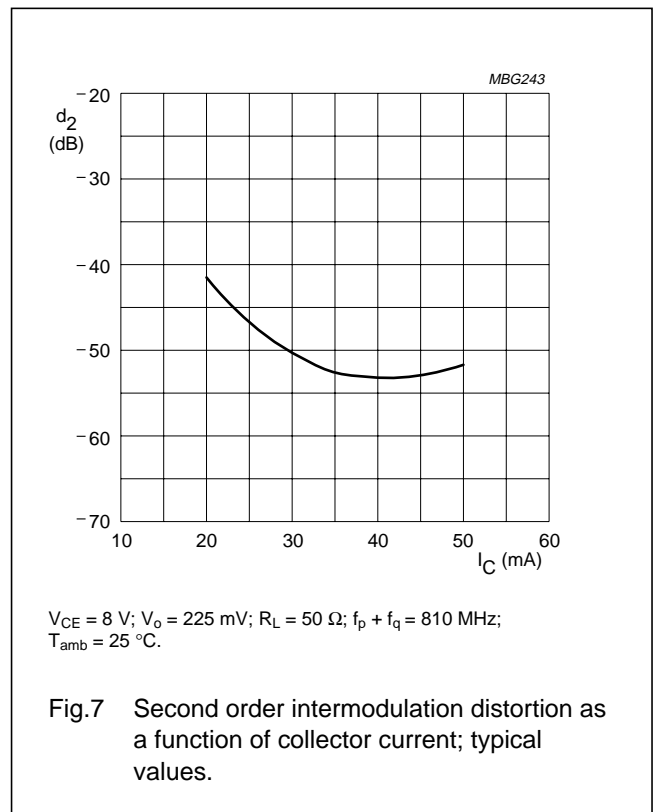
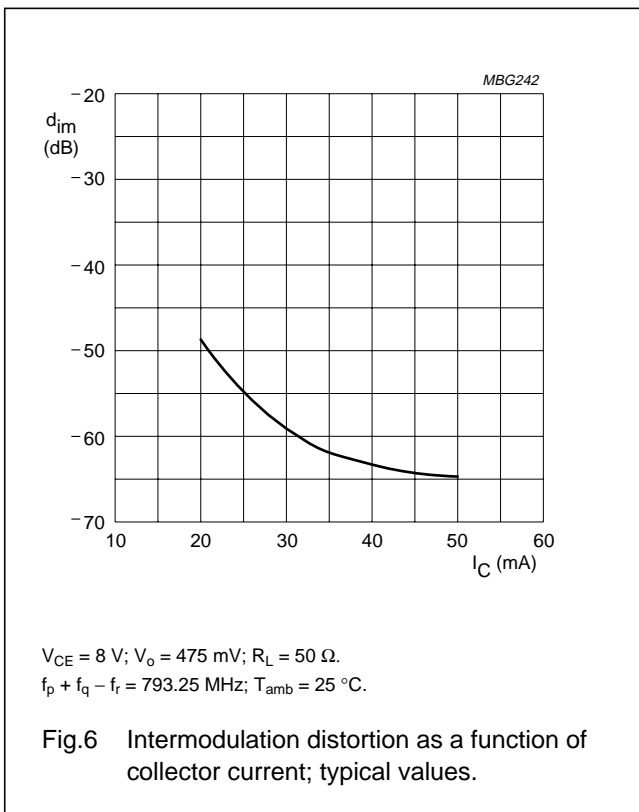
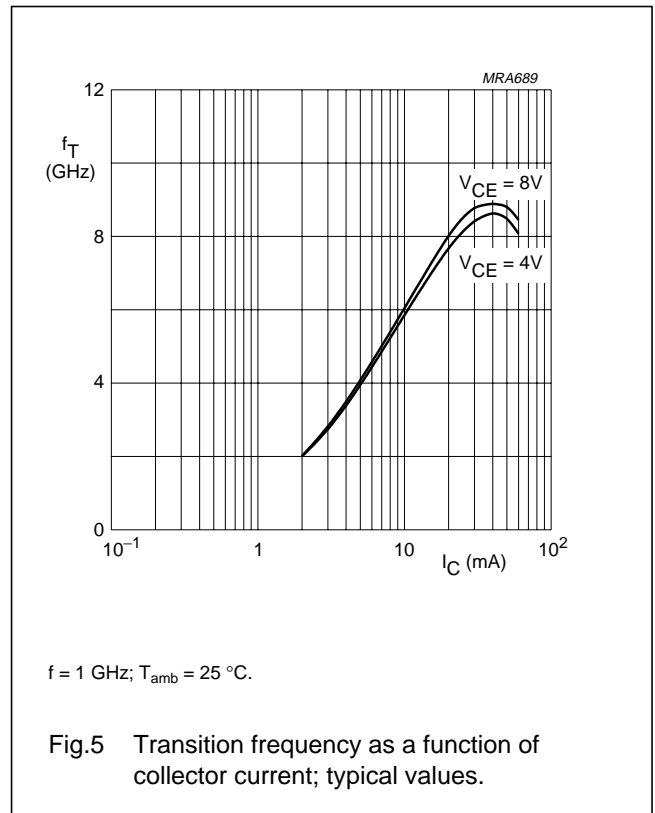
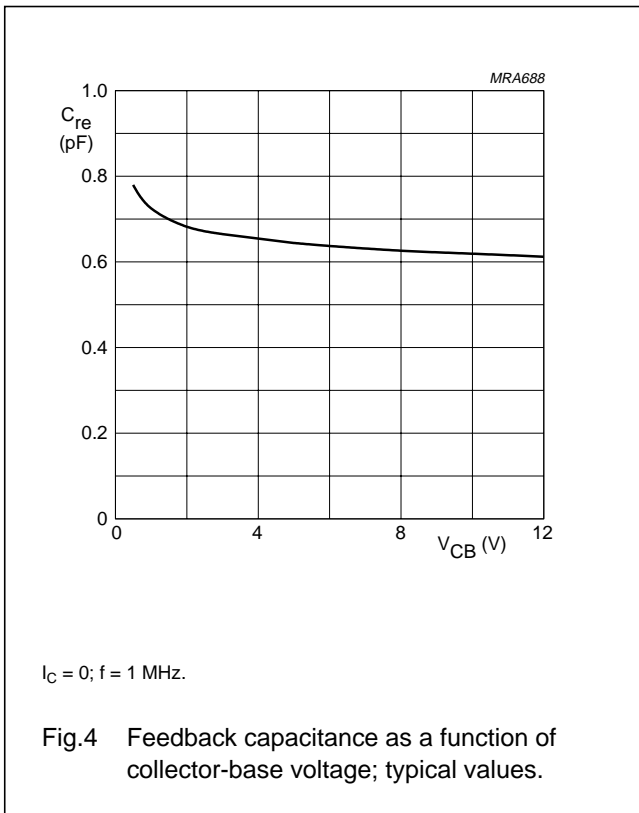
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 10\ \mu\text{A}$; $I_E = 0$	20	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$R_{BE} = 0$; $I_C = 40\ \mu\text{A}$	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\ \mu\text{A}$; $I_C = 0$	2	–	–	V
I_{CBO}	collector-base leakage current	$V_{CB} = 8\ \text{V}$; $I_E = 0$	–	–	50	nA
I_{EBO}	emitter-base leakage current	$V_{CB} = 1\ \text{V}$; $I_C = 0$	–	–	200	nA
h_{FE}	DC current gain	$I_C = 40\ \text{mA}$; $V_{CE} = 8\ \text{V}$	100	120	250	
f_T	transition frequency	$I_C = 40\ \text{mA}$; $V_{CE} = 8\ \text{V}$; $f_m = 1\ \text{GHz}$	–	9	–	GHz
C_e	emitter capacitance	$I_C = I_e = 0$; $V_{EB} = 0.5\ \text{V}$; $f = 1\ \text{MHz}$	–	2	–	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CE} = 8\ \text{V}$; $f = 1\ \text{MHz}$	–	0.9	–	pF
$ S_{21} ^2$	insertion power gain	$I_C = 40\ \text{mA}$; $V_{CE} = 8\ \text{V}$; $f = 900\ \text{MHz}$; $T_{amb} = 25\text{ °C}$	12	13	–	dB
V_o	output voltage	note 1	–	500	–	mV
		note 2	–	350	–	mV
d_2	second order intermodulation distortion	note 3	–	–	–53	dB
F	noise figure	$I_C = 40\ \text{mA}$; $V_{CE} = 8\ \text{V}$; $f = 900\ \text{MHz}$; $\Gamma_S = \Gamma_{opt}$	–	1.9	2.4	dB

Notes

- $d_{im} = -60\ \text{dB}$ (DIN45004B); $V_{CE} = 8\ \text{V}$; $I_C = 40\ \text{mA}$; $R_L = 50\ \Omega$;
 $V_p = V_o$; $V_q = V_o - 6\ \text{dB}$; $V_r = V_o - 6\ \text{dB}$;
 $f_p = 795.25\ \text{MHz}$; $f_q = 803.25\ \text{MHz}$; $f_r = 805.5\ \text{MHz}$;
measured at $f_p + f_q - f_r = 793.25\ \text{MHz}$.
- $d_{im} = -60\ \text{dB}$ (DIN 45004B); $I_C = 40\ \text{mA}$; $V_{CE} = 8\ \text{V}$; $R_L = 50\ \Omega$;
 $V_p = V_q = V_o$; $f_p = 806\ \text{MHz}$; $f_q = 810\ \text{MHz}$;
measured at $2f_p - f_q = 802\ \text{MHz}$.
- $I_C = 40\ \text{mA}$; $V_{CE} = 8\ \text{V}$; $R_L = 50\ \Omega$;
 $V_p = V_q = 225\ \text{mV}$; $f_p = 250\ \text{MHz}$; $f_q = 560\ \text{MHz}$;
measured at $f_p + f_q = 810\ \text{MHz}$.

NPN wideband transistor

BFQ540



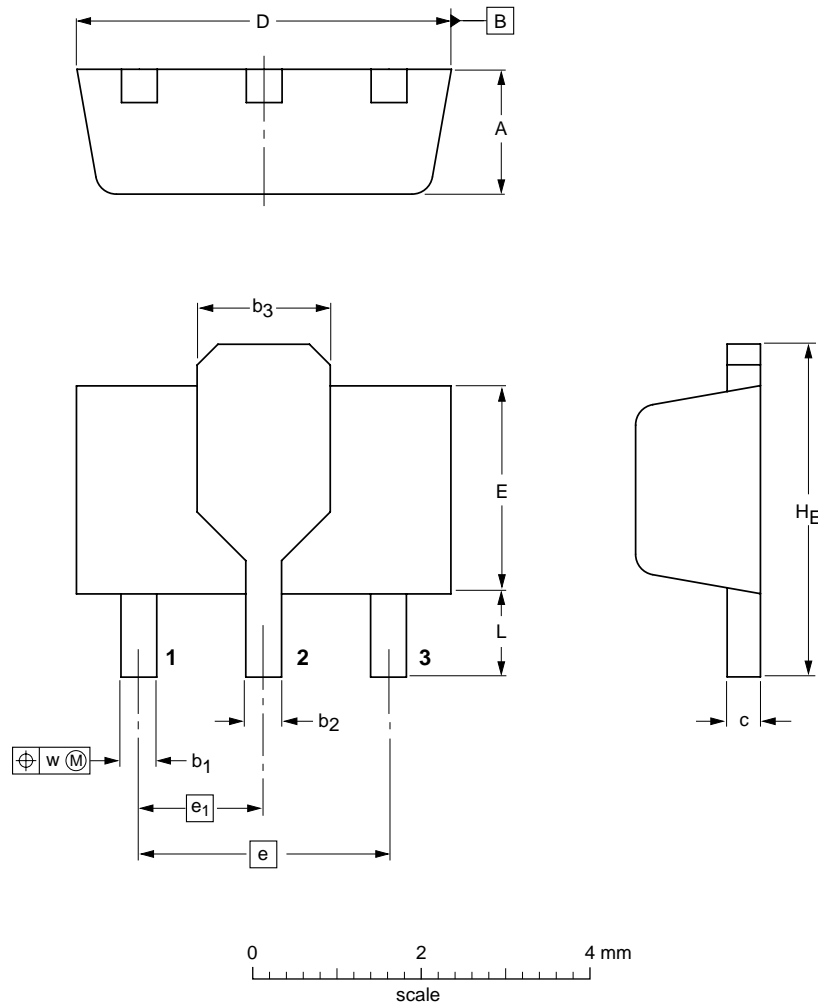
NPN wideband transistor

BFQ540

PACKAGE OUTLINE

Plastic surface mounted package; collector pad for good heat transfer; 3 leads

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	b ₁	b ₂	b ₃	c	D	E	e	e ₁	H _E	L min.	w
mm	1.6 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.37	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	0.8	0.13

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ		
SOT89		TO-243	SC-62		97-02-28 99-09-13

NPN wideband transistor

BFQ540

DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS ⁽¹⁾
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
Product specification	Production	This data sheet contains final specifications. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.

Note

1. Please consult the most recently issued data sheet before initiating or completing a design.

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