



# BFQ540

NPN wideband transistor

Rev. 04 — 25 September 2007

Product data sheet

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NXP Semiconductors

# NPN wideband transistor

# BFQ540

### FEATURES

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

### APPLICATIONS

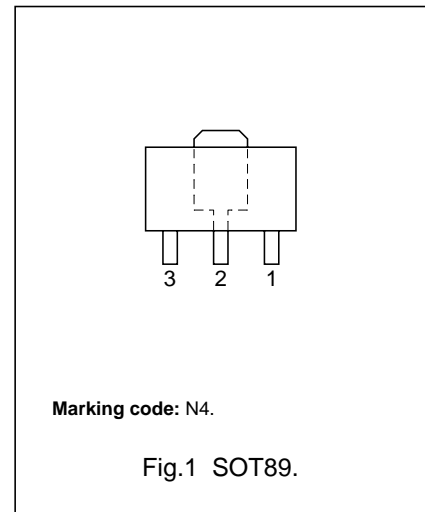
- VHF, UHF and CATV amplifiers.

### 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

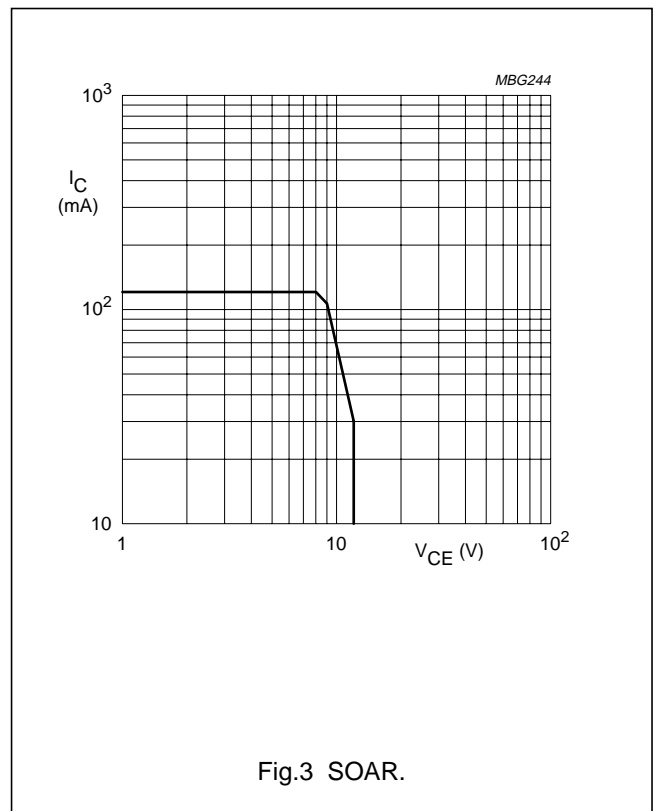
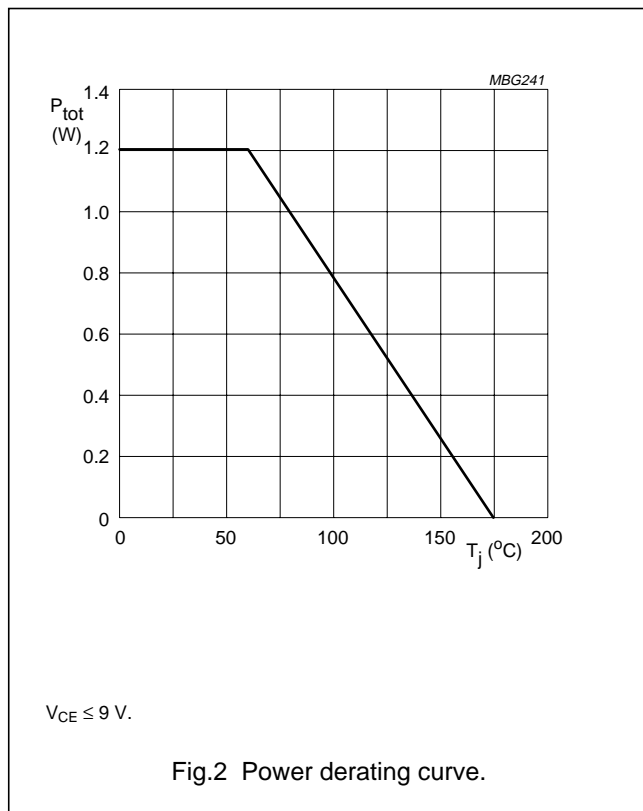
**LIMITING VALUES**

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.

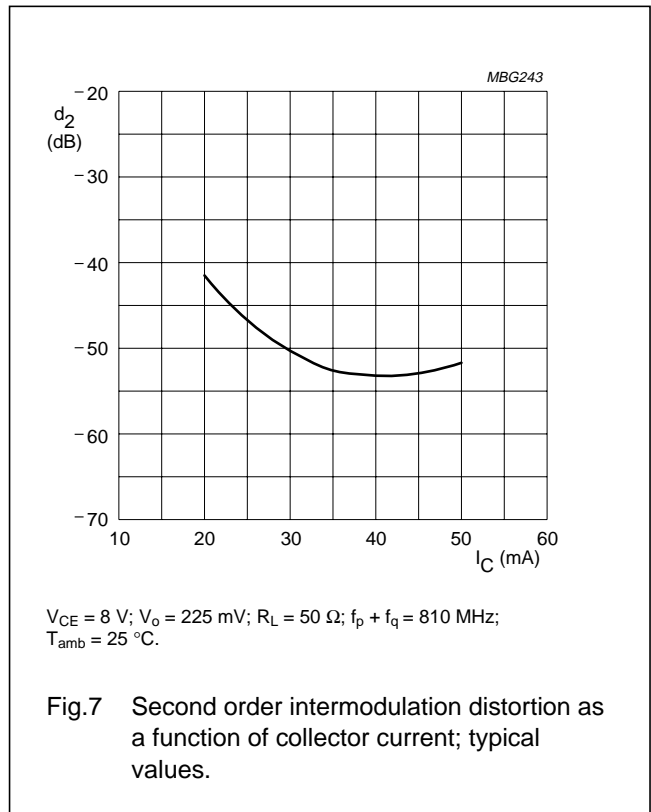
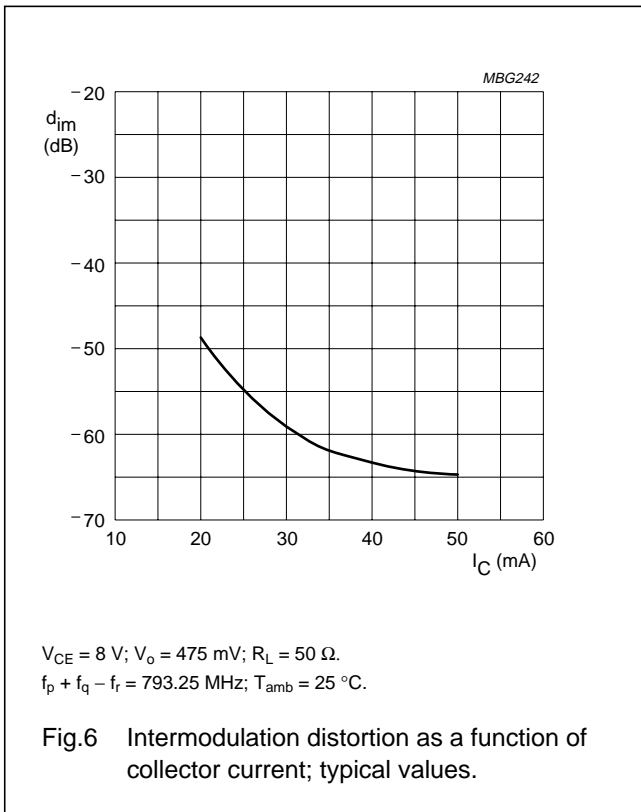
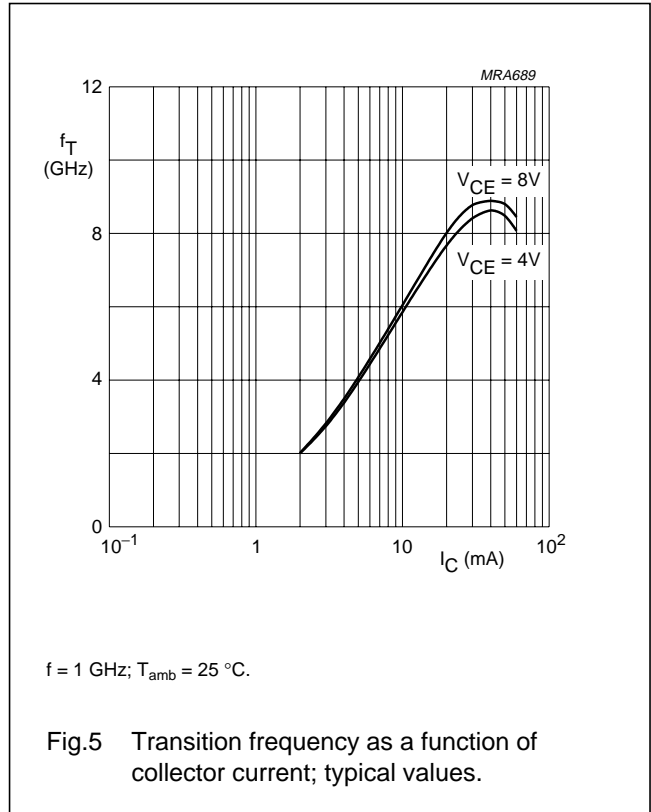
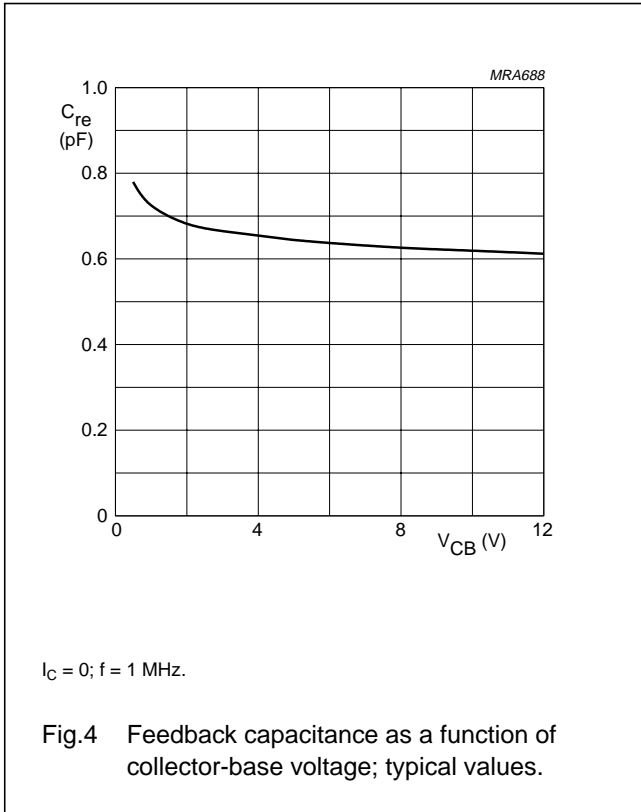
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; $I_C = 10\text{ }\mu\text{A}$ ; $I_E = 0$	20	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	$R_{BE} = 0$ ; $I_C = 40\text{ }\mu\text{A}$	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 100\text{ }\mu\text{A}$ ; $I_C = 0$	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);  $V_{CE} = 8\text{ V}$ ;  $I_C = 40\text{ mA}$ ;  $R_L = 50\text{ }\Omega$ ;  
 $V_p = V_o$ ;  $V_q = V_o - 6\text{ dB}$ ;  $V_r = V_o - 6\text{ dB}$ ;  
 $f_p = 795.25\text{ MHz}$ ;  $f_q = 803.25\text{ MHz}$ ;  $f_r = 805.5\text{ MHz}$ ;  
measured at  $f_p + f_q - f_r = 793.25\text{ MHz}$ .
- $d_{im} = -60\text{ dB}$  (DIN 45004B);  $I_C = 40\text{ mA}$ ;  $V_{CE} = 8\text{ V}$ ;  $R_L = 50\text{ }\Omega$ ;  
 $V_p = V_q = V_o$ ;  $f_p = 806\text{ MHz}$ ;  $f_q = 810\text{ MHz}$ ;  
measured at  $2f_p - f_q = 802\text{ MHz}$ .
- $I_C = 40\text{ mA}$ ;  $V_{CE} = 8\text{ V}$ ;  $R_L = 50\text{ }\Omega$ ;  
 $V_p = V_q = 225\text{ mV}$ ;  $f_p = 250\text{ MHz}$ ;  $f_q = 560\text{ MHz}$ ;  
measured at  $f_p + f_q = 810\text{ MHz}$ .

NPN wideband transistor

BFQ540



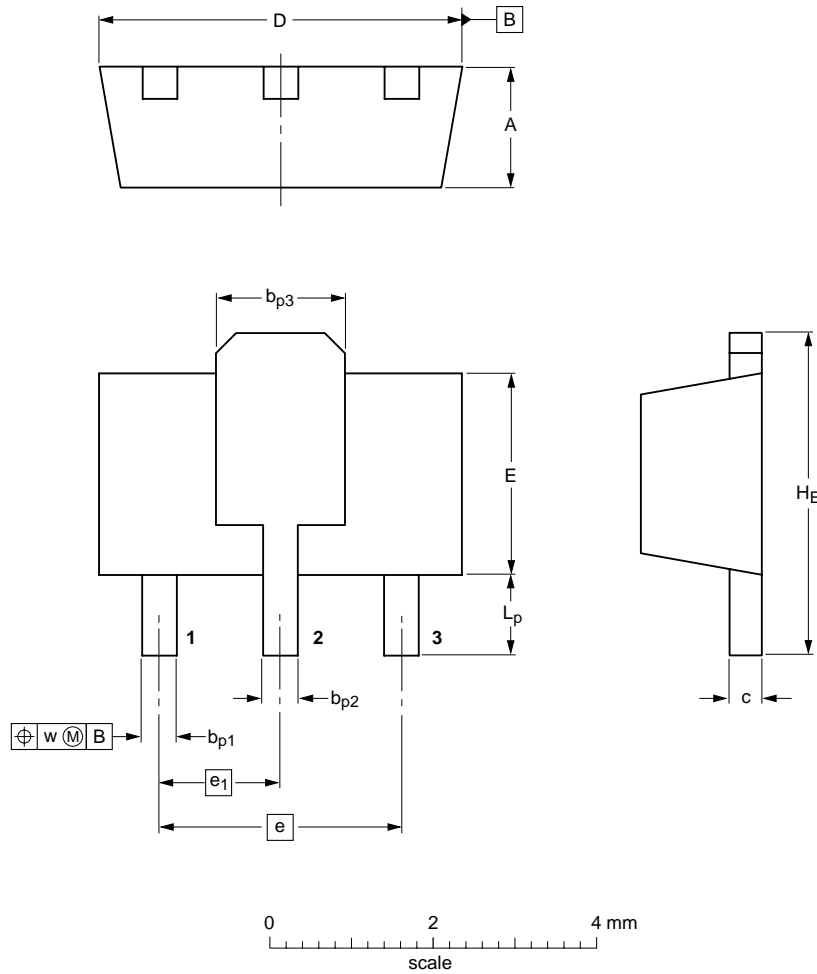
NPN wideband transistor

BFQ540

PACKAGE OUTLINE

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

SOT89



DIMENSIONS (mm are the original dimensions)

UNIT	A	$b_{p1}$	$b_{p2}$	$b_{p3}$	c	D	E	e	$e_1$	$H_E$	$L_p$	w
mm	1.6	0.48	0.53	1.8	0.44	4.6	2.6	3.0	1.5	4.25	1.2	0.13
	1.4	0.35	0.40	1.4	0.23	4.4	2.4					

OUTLINE VERSION	REFERENCES			EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA		
SOT89		TO-243	SC-62		06-03-16 06-08-29

## Legal information

### Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	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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## Revision history

### Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BFQ540_N_4	20070925	Product data sheet	-	BFQ540_3
Modifications:	• Fig. 1 and package outline updated			
BFQ540_3 (9397 750 07064)	20000523	Product specification	-	BFQ540_2
BFQ540_2 (9397 750 04296)	19980827	Product specification	-	BFQ540_1
BFQ540_1	19950904	Product specification	-	-

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