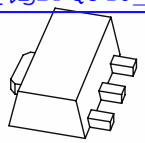

BFQ540

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

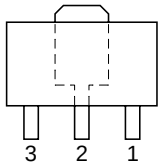
- VHF, UHF and CATV amplifiers.

DESCRIPTION

NPN wideband transistor in a SOT89 plastic package.

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



Marking code: N4.

Fig.1 SOT89.

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	$T_s \leq 60$ °C; note 1	–	–	1.2	W
h_{FE}	DC current gain	I_C = 40 mA; V_{CE} = 8 V; T_j = 25 °C	100	120	250	
f_T	transition frequency	I_C = 40 mA; V_{CE} = 8 V; f = 1 GHz; T_{amb} = 25 °C	–	9	–	GHz
$\lvert s_{21}\rvert^2$	insertion power gain	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; T_{amb} = 25 °C	12	13	–	dB
F	noise figure	I_C = 40 mA; V_{CE} = 8 V; f = 900 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

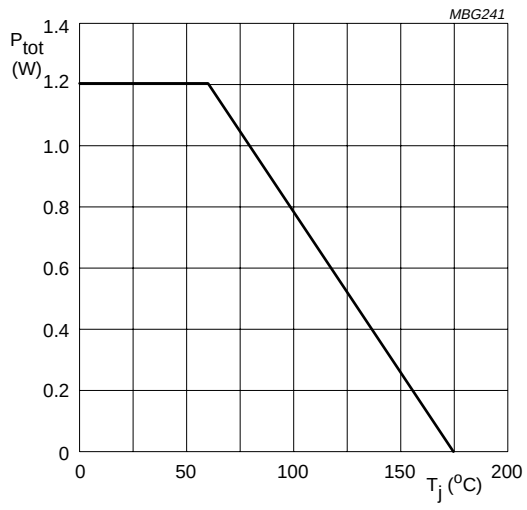
LIMITING VALUES

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	$T_s \leq 60$ °C	–	1.2	W
T_{stg}	storage temperature		–65	+150	°C
T_j	operating junction temperature		–	175	°C

THERMAL CHARACTERISTICS

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



$V_{CE} \leq 9$ V.

Fig.2 Power derating curve.

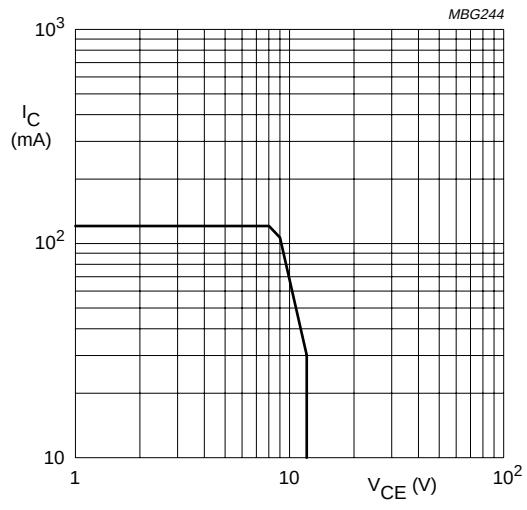


Fig.3 SOAR.

NPN wideband transistor BFQ540

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

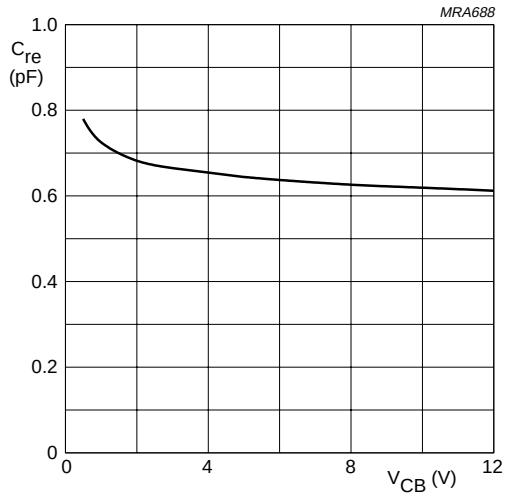
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	open emitter; I_C = 10 μA; I_E = 0	20	–	–	V
$V_{(BR)CES}$	collector-emitter breakdown voltage	R_{BE} = 0; I_C = 40 μA	15	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 100 μA; I_C = 0	2	–	–	V
I_{CBO}	collector-base leakage current	V_{CB} = 8 V; I_E = 0	–	–	50	nA
I_{EBO}	emitter-base leakage current	V_{CB} = 1 V; I_C = 0	–	–	200	nA
h_{FE}	DC current gain	I_C = 40 mA; V_{CE} = 8 V	100	120	250	
f_T	transition frequency	I_C = 40 mA; V_{CE} = 8 V; f_m = 1 GHz	–	9	–	GHz
C_e	emitter capacitance	I_C = i_e = 0; V_{EB} = 0.5 V; f = 1 MHz	–	2	–	pF
C_{re}	feedback capacitance	I_C = 0; V_{CE} = 8 V; f = 1 MHz	–	0.9	–	pF
$\lvert s_{21}\rvert^2$	insertion power gain	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; T_{amb} = 25 °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 mA; V_{CE} = 8 V; f = 900 MHz; $\Gamma_S = \Gamma_{opt}$	–	1.9	2.4	dB

Notes

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

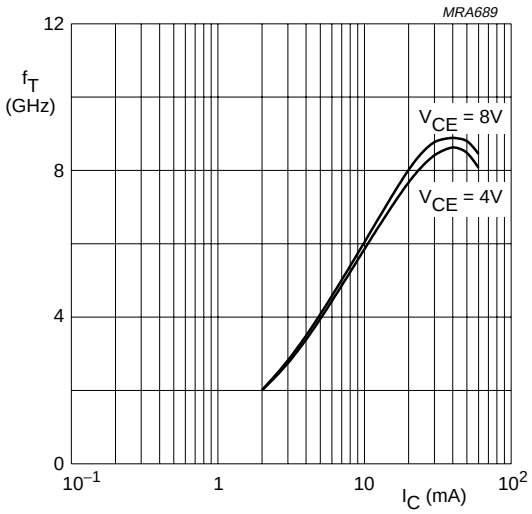
NPN wideband transistor

BFQ540



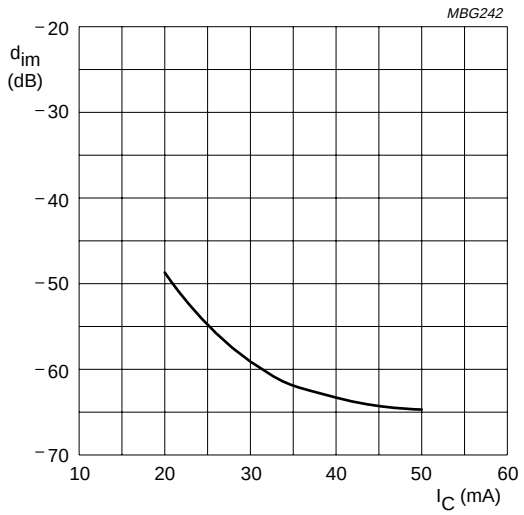
I_C = 0; f = 1 MHz.

Fig.4 Feedback capacitance as a function of collector-base voltage; typical values.



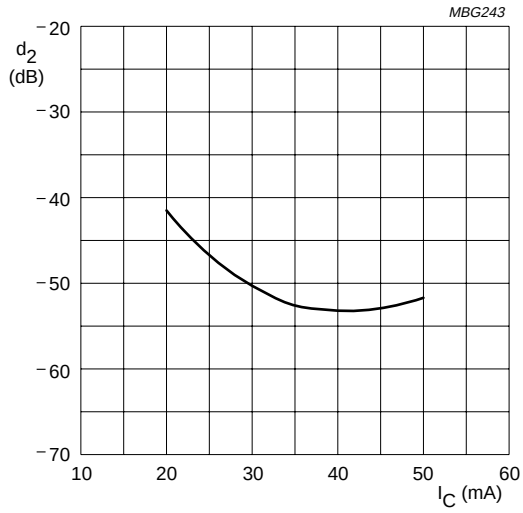
f = 1 GHz; T_{amb} = 25 °C.

Fig.5 Transition frequency as a function of collector current; typical values.



V_{CE} = 8 V; V_o = 475 mV; R_L = 50 Ω.
$f_p + f_q - f_r$ = 793.25 MHz; T_{amb} = 25 °C.

Fig.6 Intermodulation distortion as a function of collector current; typical values.



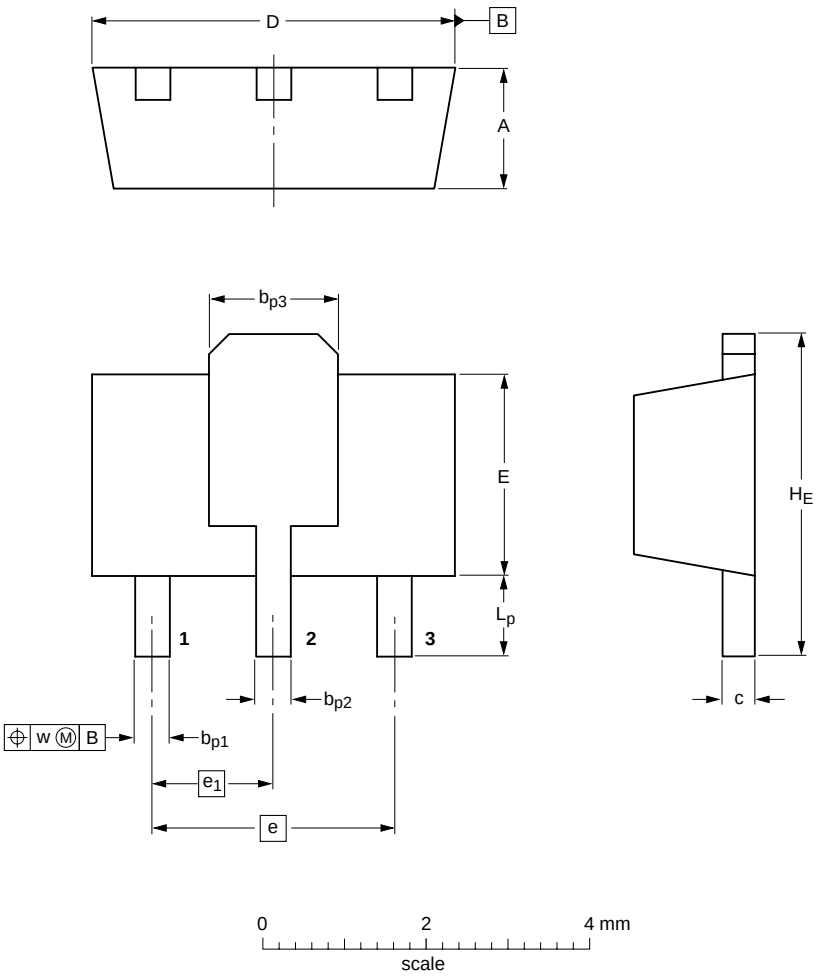
V_{CE} = 8 V; V_o = 225 mV; R_L = 50 Ω; $f_p + f_q$ = 810 MHz;
T_{amb} = 25 °C.

Fig.7 Second order intermodulation distortion as a function of collector current; typical values.

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 1.4	0.48 0.35	0.53 0.40	1.8 1.4	0.44 0.23	4.6 4.4	2.6 2.4	3.0	1.5	4.25 3.75	1.2 0.8	0.13

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

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Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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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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Date of release: 25 September 2007
Document identifier: BFQ540_N_4