

DATA SHEET

BFQ67W

NPN 8 GHz wideband transistor

Product specification

September 1995



NPN 8 GHz wideband transistor

BFQ67W

FEATURES

- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability
- SOT323 envelope.

PINNING

PIN	DESCRIPTION
Code: V2	
1	base
2	emitter
3	collector

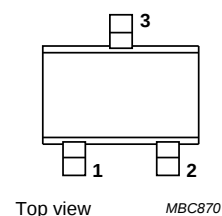


Fig.1 SOT323.

DESCRIPTION

NPN transistor in a plastic SOT323 envelope.

It is designed for wideband applications such as satellite TV tuners and RF portable communications equipment up to 2 GHz.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	—	—	20	V
V_{CEO}	collector-emitter voltage	open base	—	—	10	V
I_C	DC collector current		—	—	50	mA
P_{tot}	total power dissipation	up to $T_s = 118\text{ °C}$; note 1	—	—	300	mW
h_{FE}	DC current gain	$I_C = 15\text{ mA}$; $V_{CE} = 5\text{ V}$; $T_j = 25\text{ °C}$	60	100	—	
f_T	transition frequency	$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	—	8	—	GHz
G_{UM}	maximum unilateral power gain	$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	—	13	—	dB
F	noise figure	$I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$	—	1.3	—	dB

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	—	20	V
V_{CEO}	collector-emitter voltage	open base	—	10	V
V_{EBO}	emitter-base voltage	open collector	—	2.5	V
I_C	DC collector current		—	50	mA
P_{tot}	total power dissipation	up to $T_s = 118\text{ °C}$; note 1	—	300	mW
T_{stg}	storage temperature		−65	150	°C
T_j	junction temperature		—	175	°C

Note

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

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THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j-s}$	thermal resistance from junction to soldering point	up to $T_s = 118\text{ °C}$; note 1	190 K/W

Note

- T_s is the temperature at the soldering point of the collector tab.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector cut-off current	$I_E = 0$; $V_{CB} = 5\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 15\text{ mA}$; $V_{CE} = 5\text{ V}$	60	100	–	
C_c	collector capacitance	$I_E = I_E = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$	–	0.7	–	pF
C_e	emitter capacitance	$I_C = I_C = 0$; $V_{EB} = 0.5\text{ V}$; $f = 1\text{ MHz}$	–	1.3	–	pF
C_{re}	feedback capacitance	$I_C = 0$; $V_{CB} = 8\text{ V}$; $f = 1\text{ MHz}$	–	0.5	–	pF
f_T	transition frequency	$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	8	–	GHz
G_{UM}	maximum unilateral power gain (note 1)	$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	13	–	dB
		$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	8	–	dB
F	noise figure	$\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$	–	1.3	–	dB
		$\Gamma_s = \Gamma_{opt}$; $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$	–	2	–	dB
		$\Gamma_s = \Gamma_{opt}$; $I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$	–	2.2	–	dB
		$I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $Z_S = 60\text{ }\Omega$	–	2.5	–	dB
		$\Gamma_s = \Gamma_{opt}$; $I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$	–	2.7	–	dB
		$I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $Z_S = 60\text{ }\Omega$	–	3	–	dB

Note

- G_{UM} is the maximum unilateral power gain, assuming S_{12} is zero and

$$G_{UM} = 10 \log \frac{|S_{21}|^2}{(1 - |S_{11}|^2)(1 - |S_{22}|^2)} \text{ dB.}$$

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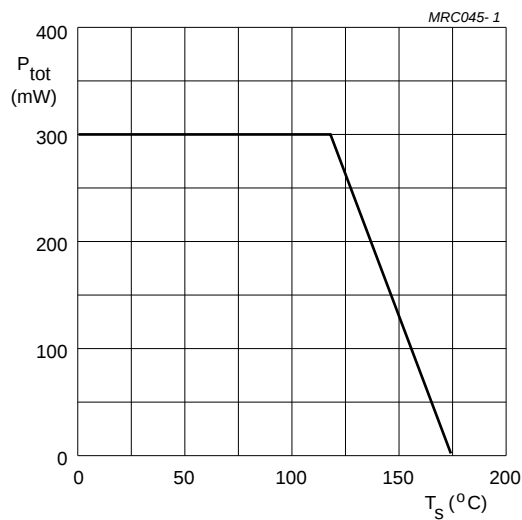
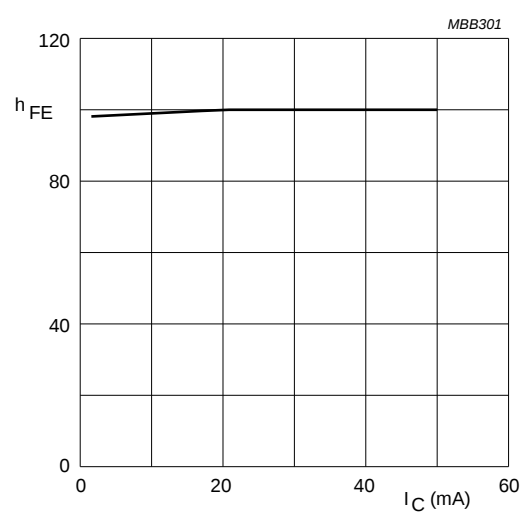
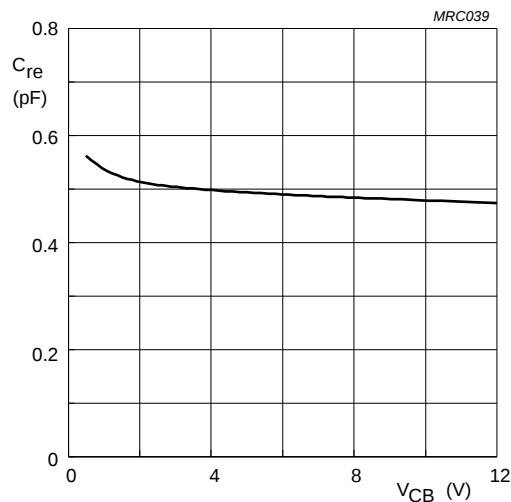


Fig.2 Power derating curve.



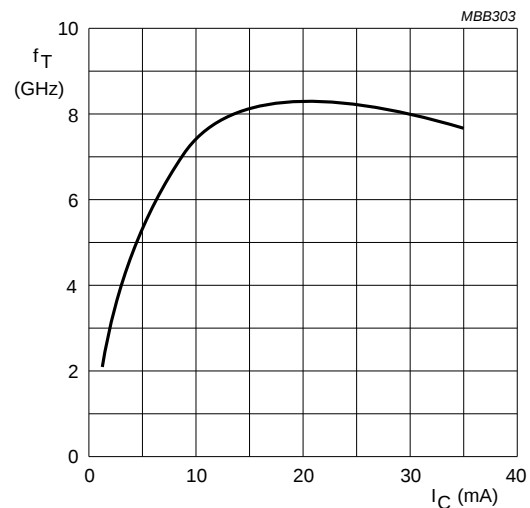
$V_{CE} = 5\text{ V}$; $T_j = 25\text{ °C}$.

Fig.3 DC current gain as a function of collector current.



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

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



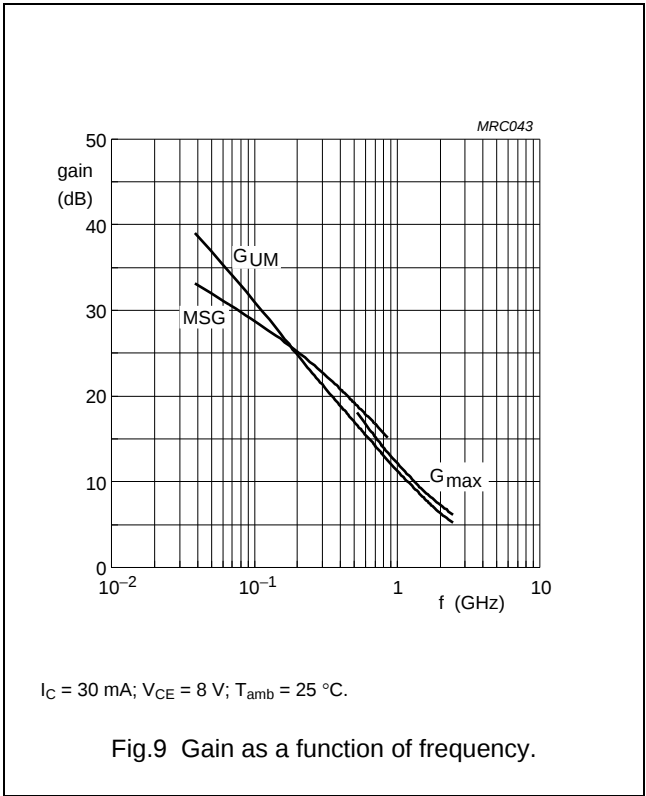
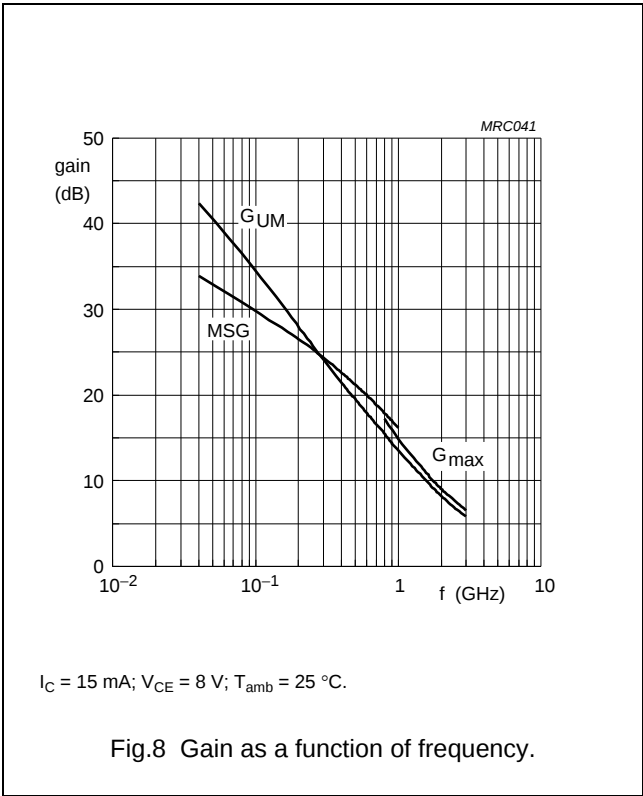
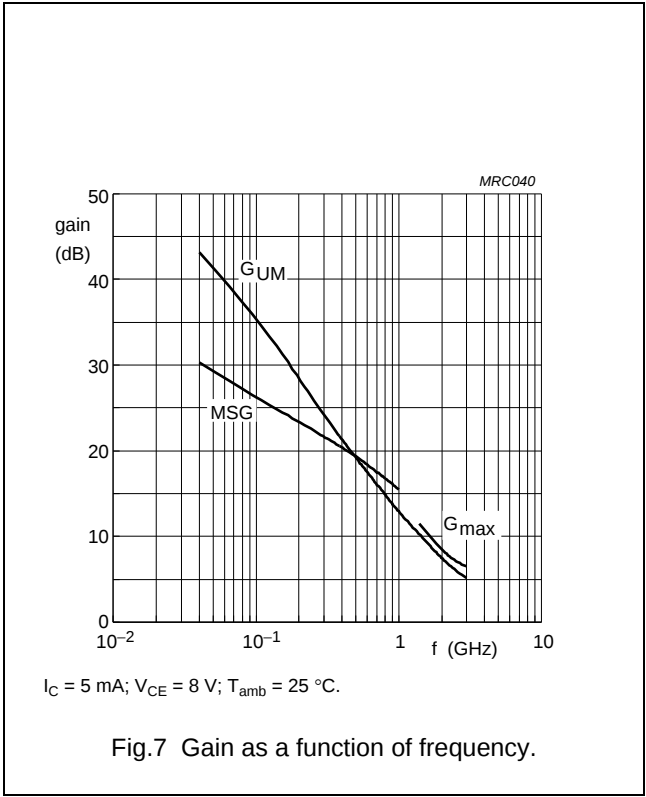
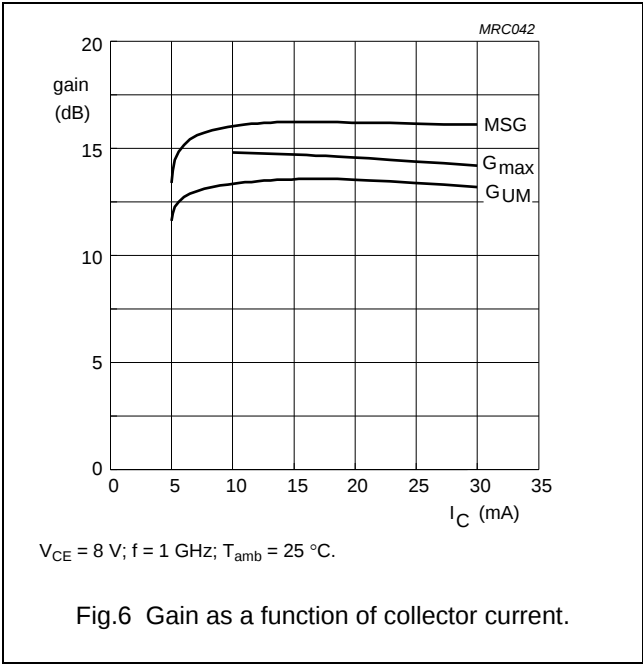
$V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$.

Fig.5 Transition frequency as a function of collector current.

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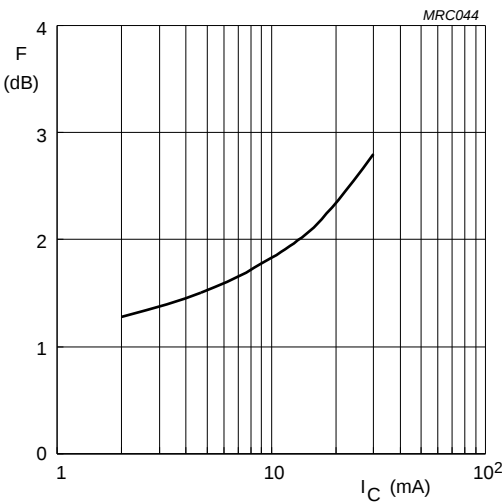
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In Figs 6 to 9, G_{UM} = maximum unilateral power gain; MSG = maximum stable gain; G_{max} = maximum available gain.



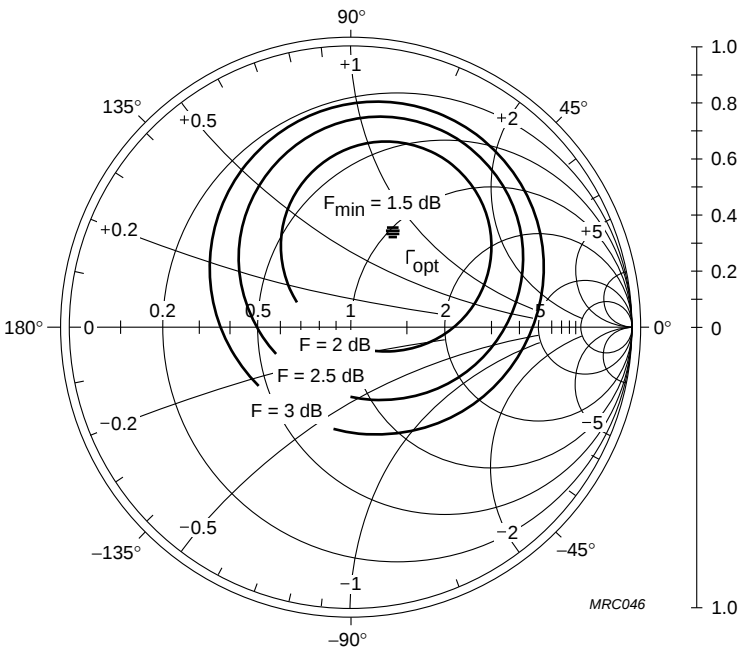
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$V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$.

Fig.10 Minimum noise figure as a function of collector current.

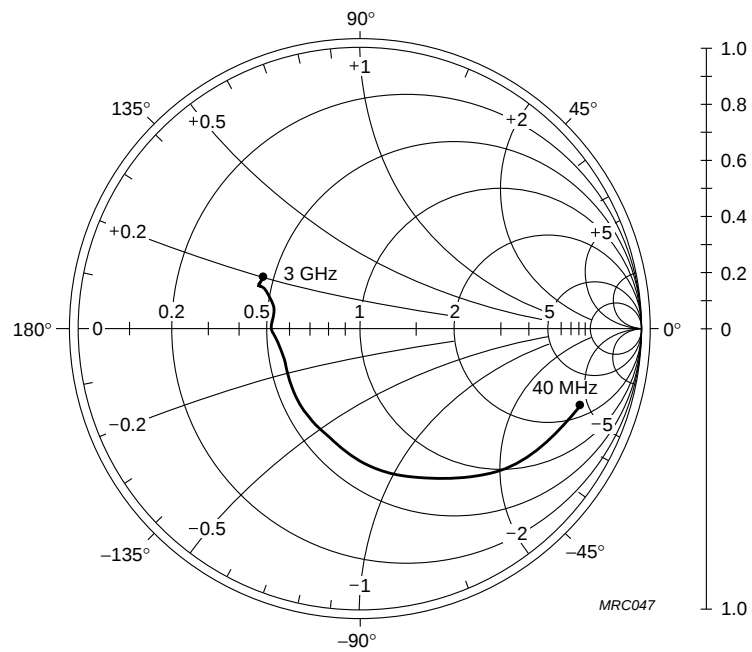


$I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$;
 $f = 1\text{ GHz}$; $Z_0 = 50\ \Omega$.

Fig.11 Noise circle.

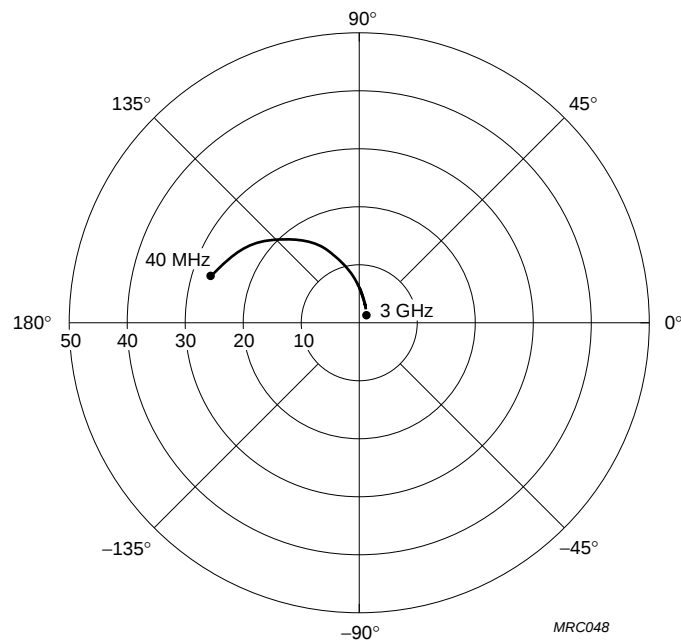
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$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $Z_0 = 50\ \Omega$.

Fig.12 Common emitter input reflection coefficient (S_{11}).

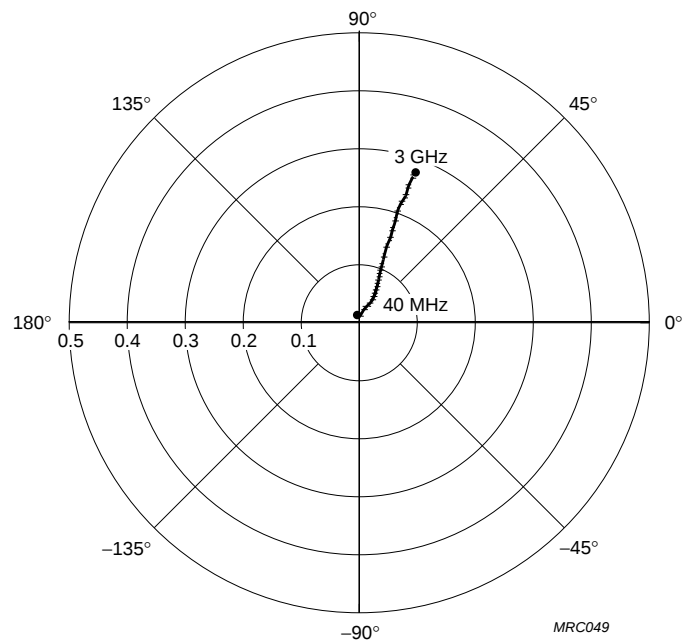


$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$.

Fig.13 Common emitter forward transmission coefficient (S_{21}).

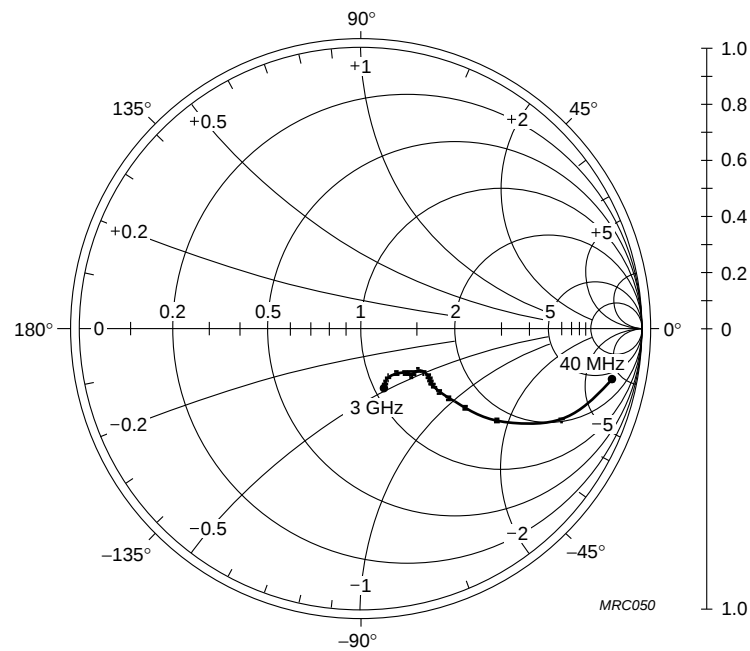
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$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$.

Fig.14 Common emitter reverse transmission coefficient (S_{12}).



$I_C = 15\text{ mA}$; $V_{CE} = 8\text{ V}$; $Z_0 = 50\text{ }\Omega$.

Fig.15 Common emitter output reflection coefficient (S_{22}).

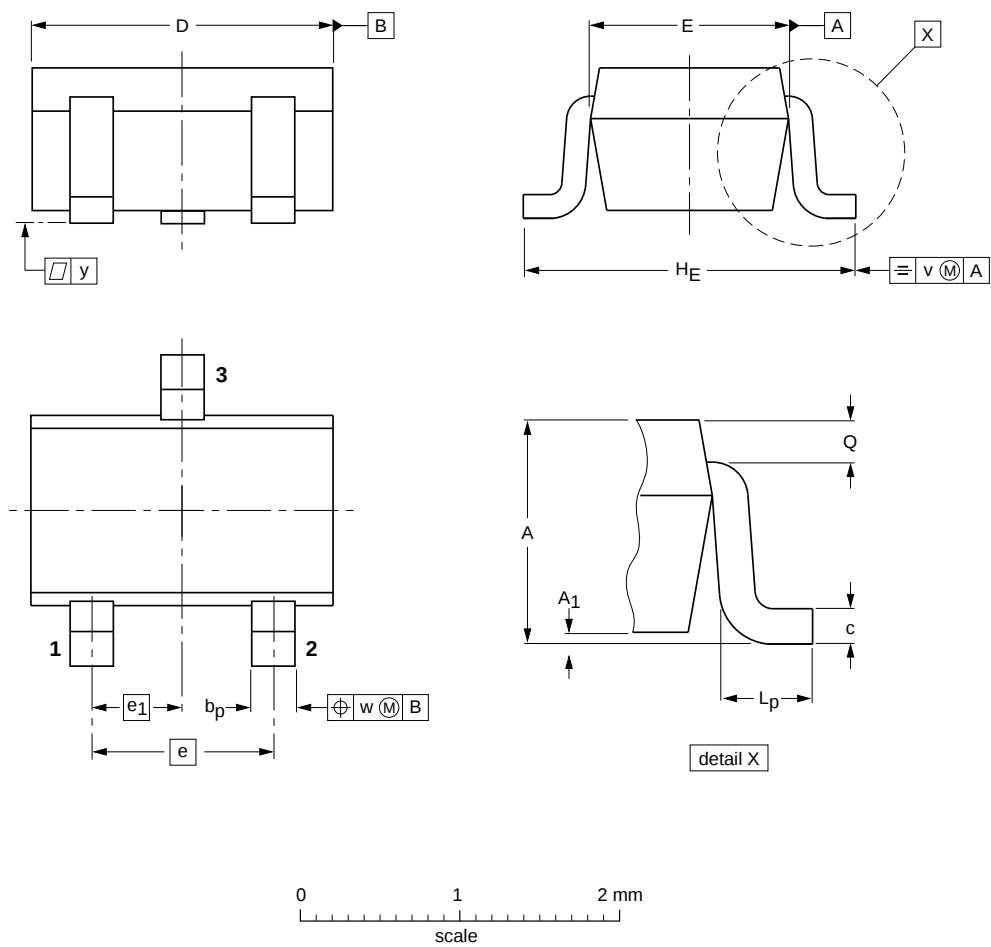
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PACKAGE OUTLINE

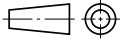
Plastic surface-mounted package; 3 leads

SOT323



DIMENSIONS (mm are the original dimensions)

UNIT	A	A ₁ max	b _p	c	D	E	e	e ₁	H _E	L _p	Q	v	w
mm	1.1 0.8	0.1	0.4 0.3	0.25 0.10	2.2 1.8	1.35 1.15	1.3	0.65	2.2 2.0	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT323			SC-70			04-11-04 06-03-16

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DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
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Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
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