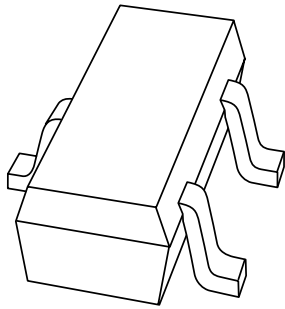


DATA SHEET



BFR93AT NPN 5 GHz wideband transistor

Preliminary specification

1999 Oct 19

NPN 5 GHz wideband transistor

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FEATURES

- High power gain
- Gold metallization ensures excellent reliability
- SOT416 (SC75) package.

APPLICATIONS

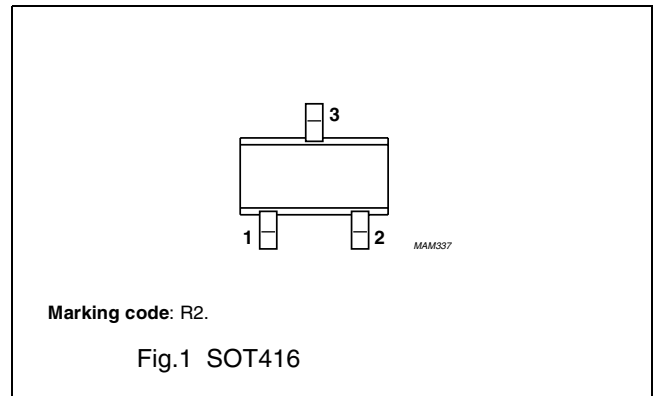
It is designed for use in RF amplifiers, mixers and oscillators with signal frequencies up to 1 GHz.

DESCRIPTION

Silicon NPN transistor encapsulated in a plastic SOT416 (SC75) package. The BFR93AT uses the same crystal as the SOT23 version, BFR93A.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	–	–	15	V
V_{CEO}	collector-emitter voltage	open base	–	–	12	V
I_C	collector current (DC)		–	–	35	mA
P_{tot}	total power dissipation	up to $T_s = 93\text{ °C}$; note 1	–	–	300	mW
h_{FE}	DC current gain	$I_C = 30\text{ mA}$; $V_{CE} = 5\text{ V}$	40	90	–	
C_{re}	feedback capacitance	$I_C = 0$; $V_{CE} = 5\text{ V}$; $f = 1\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	0.6	–	pF
f_T	transition frequency	$I_C = 30\text{ mA}$; $V_{CE} = 5\text{ V}$; $f = 500\text{ MHz}$	4	5	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 30\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	13	–	dB
		$I_C = 30\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 2\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	8	–	dB
F	noise figure	$I_C = 5\text{ mA}$; $V_{CE} = 8\text{ V}$; $f = 1\text{ GHz}$; $\Gamma_s = \Gamma_{opt}$	–	1.5	–	dB
T_j	junction temperature		–	–	150	°C

Note

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

NPN 5 GHz wideband transistor

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LIMITING VALUES

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

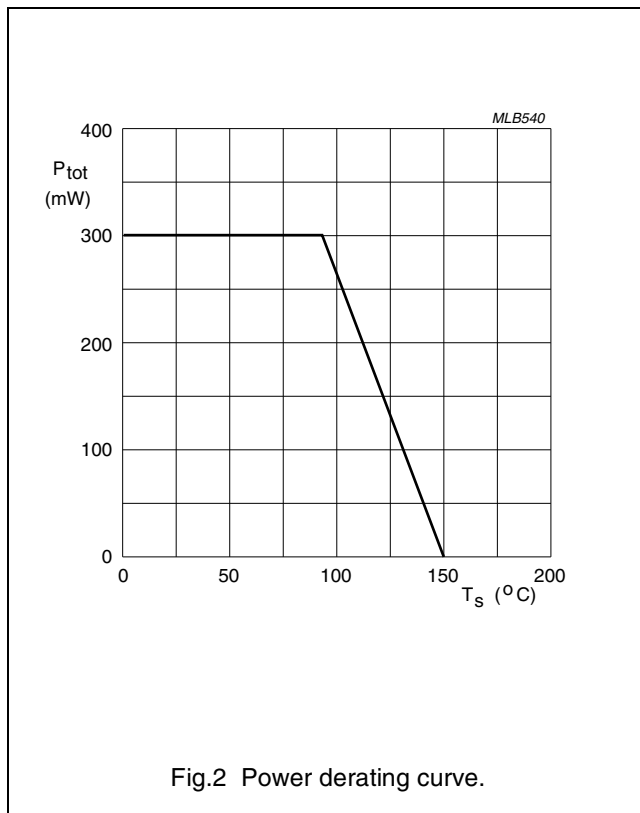
SYMBOL	PARAMETER	CONDITION	MIN.	MAX.	UNIT
V _{CBO}	collector-base voltage	open emitter	–	15	V
V _{CEO}	collector-emitter voltage	open base	–	12	V
V _{EBO}	emitter-base voltage	open collector	–	2	V
I _C	collector current (DC)		–	35	mA
P _{tot}	total power dissipation	up to T _s = 93 °C; see Fig.2; note 1	–	300	mW
T _{stg}	storage temperature		–65	+150	°C
T _j	junction temperature		–	150	°C

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITION	VALUE	UNIT
R _{th j-s}	thermal resistance from junction to soldering point	up to T _s = 93 °C; note 1	190	K/W

Note to the Limiting values and Thermal characteristics

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



NPN 5 GHz wideband transistor

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CHARACTERISTICS

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

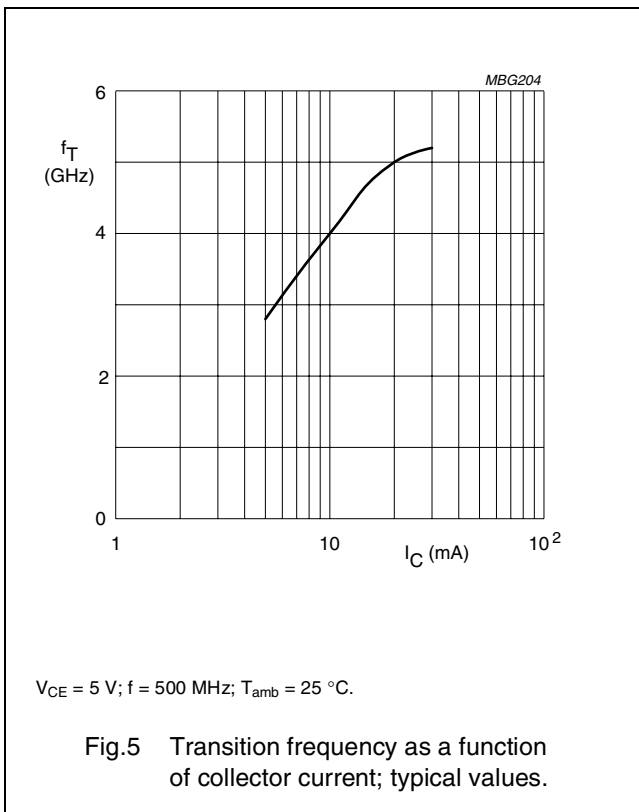
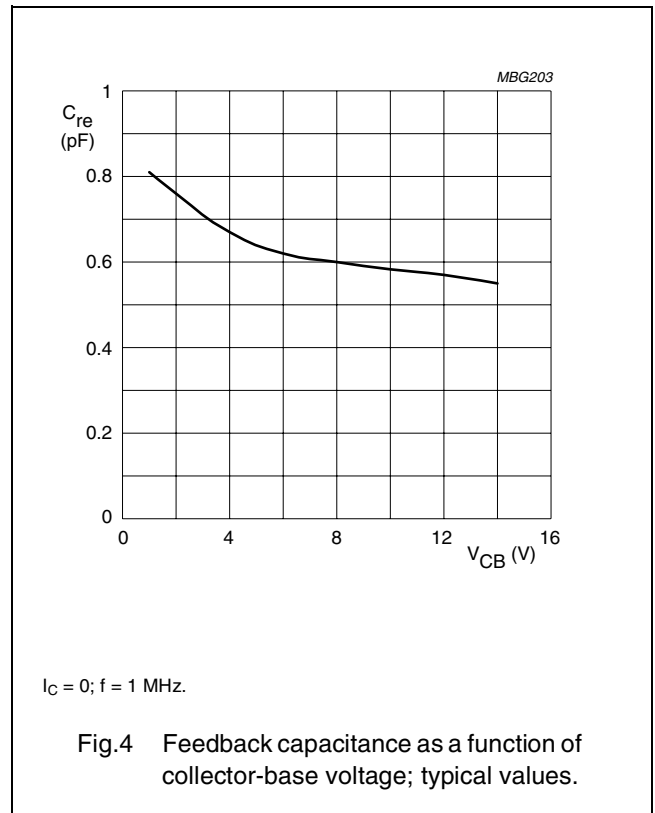
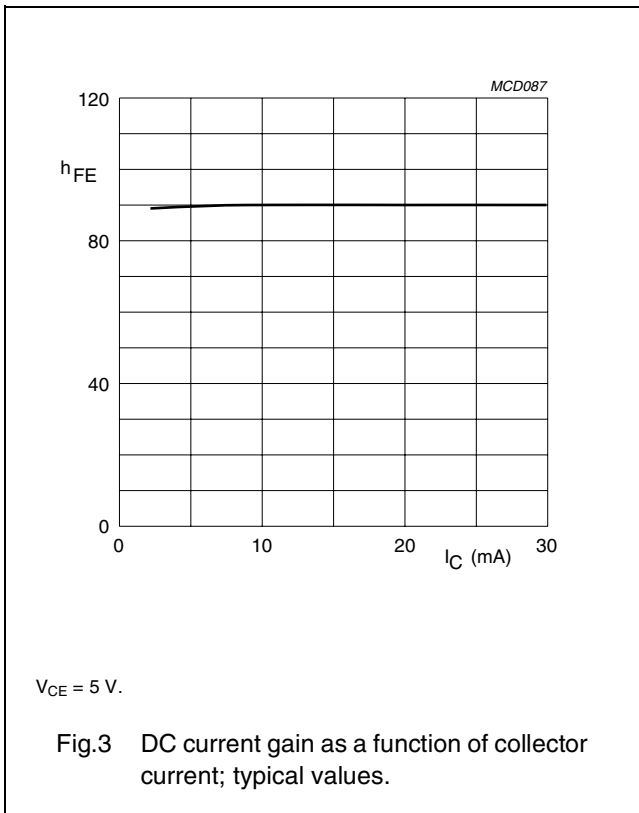
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{CBO}	collector leakage current	$I_E = 0; V_{CB} = 5\text{ V}$	–	–	50	nA
h_{FE}	DC current gain	$I_C = 30\text{ mA}; V_{CE} = 5\text{ V}$	40	90	–	
C_c	collector capacitance	$I_E = I_E = 0; V_{CB} = 5\text{ V}; f = 1\text{ MHz}$	–	0.7	–	pF
C_e	emitter capacitance	$I_C = I_C = 0; V_{EB} = 0.5\text{ V}; f = 1\text{ MHz}$	–	2.3	–	pF
C_{re}	feedback capacitance	$I_C = 0; V_{CE} = 5\text{ V}; f = 1\text{ MHz}$	–	0.6	–	pF
f_T	transition frequency	$I_C = 30\text{ mA}; V_{CE} = 5\text{ V}; f = 500\text{ MHz}$	4	5	–	GHz
G_{UM}	maximum unilateral power gain; note 1	$I_C = 30\text{ mA}; V_{CE} = 8\text{ V}; f = 1\text{ GHz}; T_{amb} = 25\text{ °C}$	–	13	–	dB
		$I_C = 30\text{ mA}; V_{CE} = 8\text{ V}; f = 2\text{ GHz}; T_{amb} = 25\text{ °C}$	–	8	–	dB
F	noise figure	$I_C = 5\text{ mA}; V_{CE} = 8\text{ V}; f = 1\text{ GHz}; \Gamma_s = \Gamma_{opt}$	–	1.5	–	dB
		$I_C = 5\text{ mA}; V_{CE} = 8\text{ V}; f = 2\text{ GHz}; \Gamma_s = \Gamma_{opt}$	–	2.1	–	dB

Note

1. G_{UM} is the maximum unilateral power gain, assuming s_{12} is zero and $G_{UM} = 10 \log \frac{|s_{21}|^2}{(1 - |s_{11}|^2)(1 - |s_{22}|^2)}$ dB.

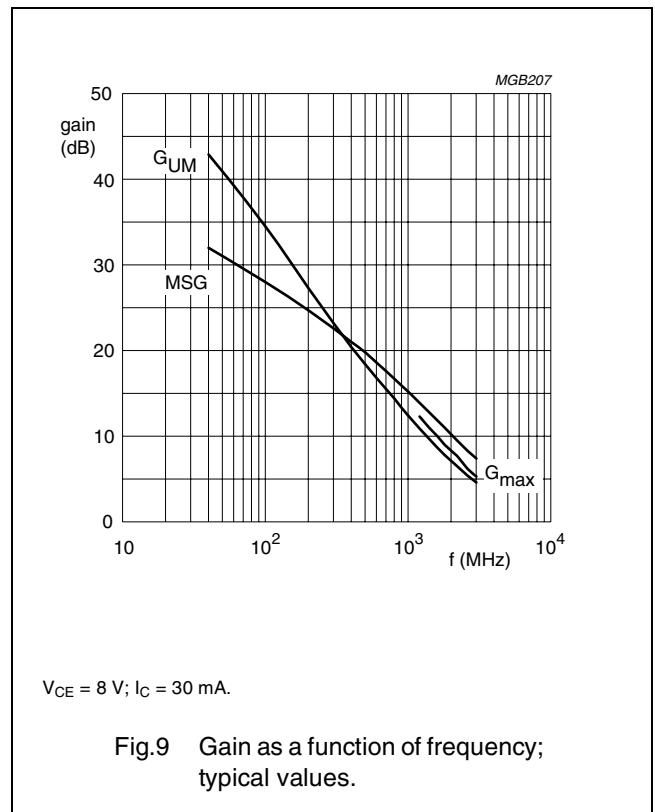
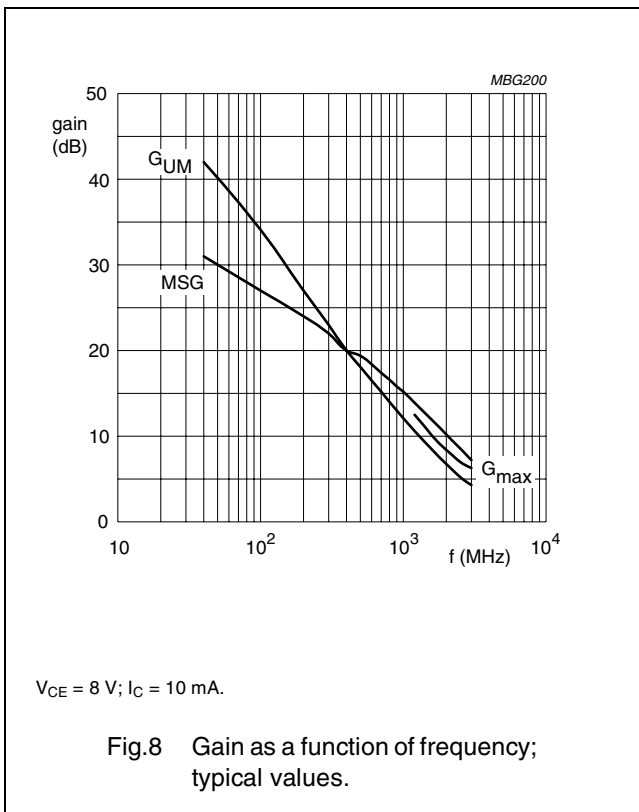
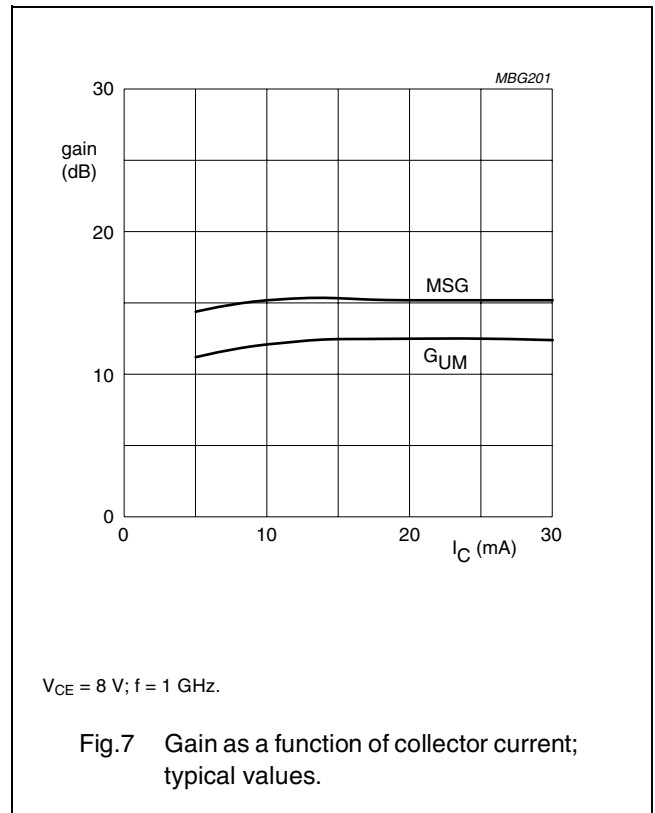
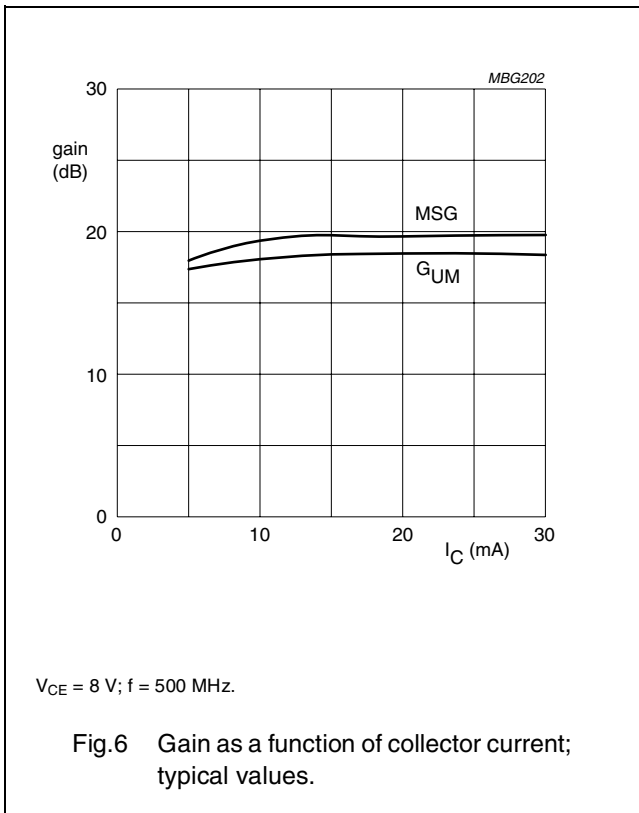
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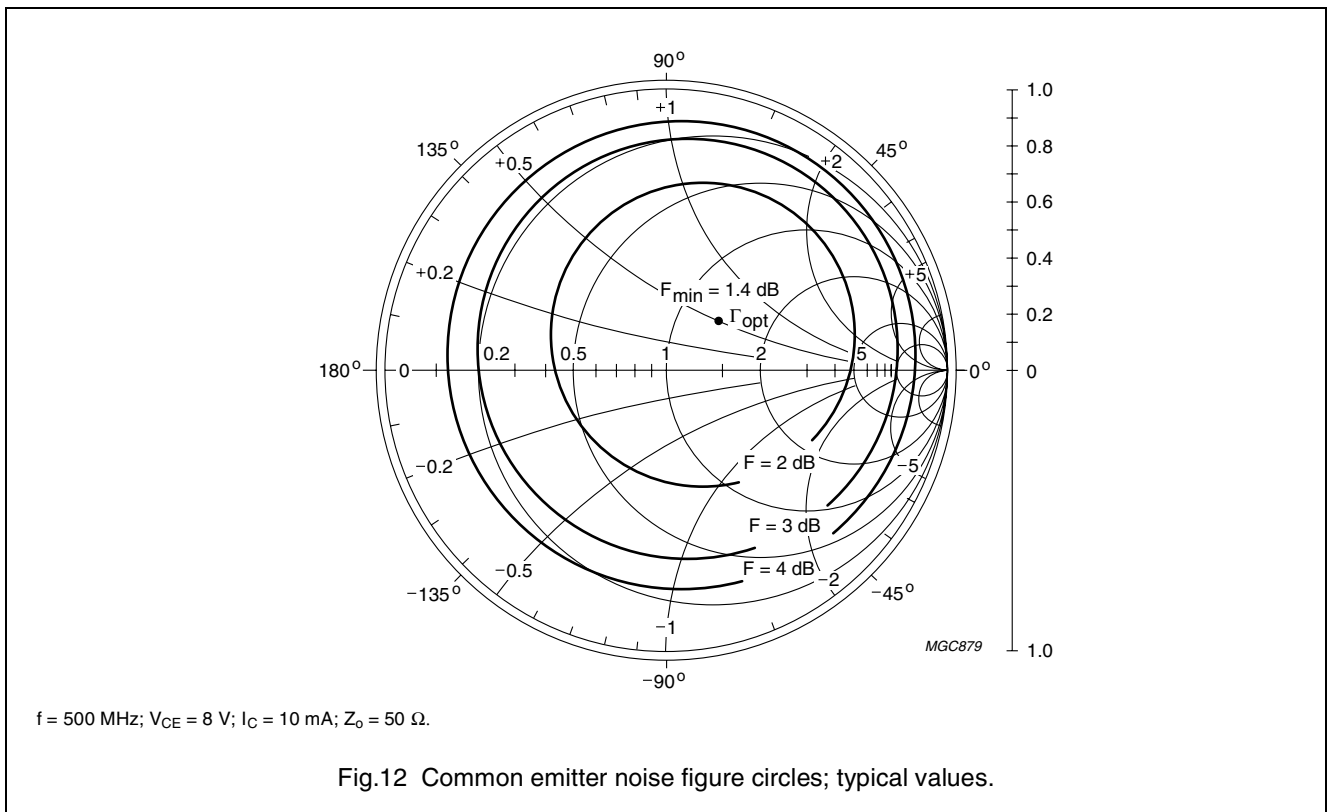
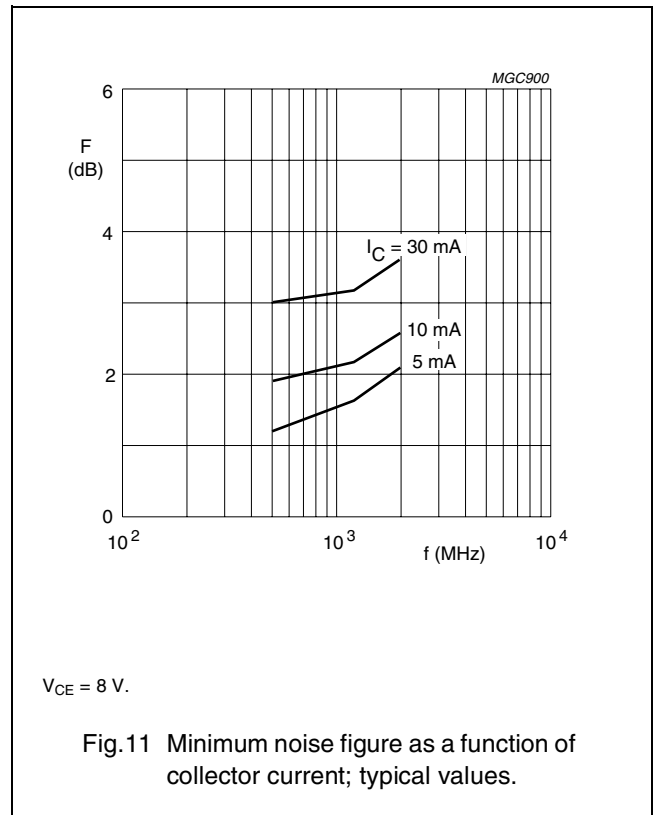
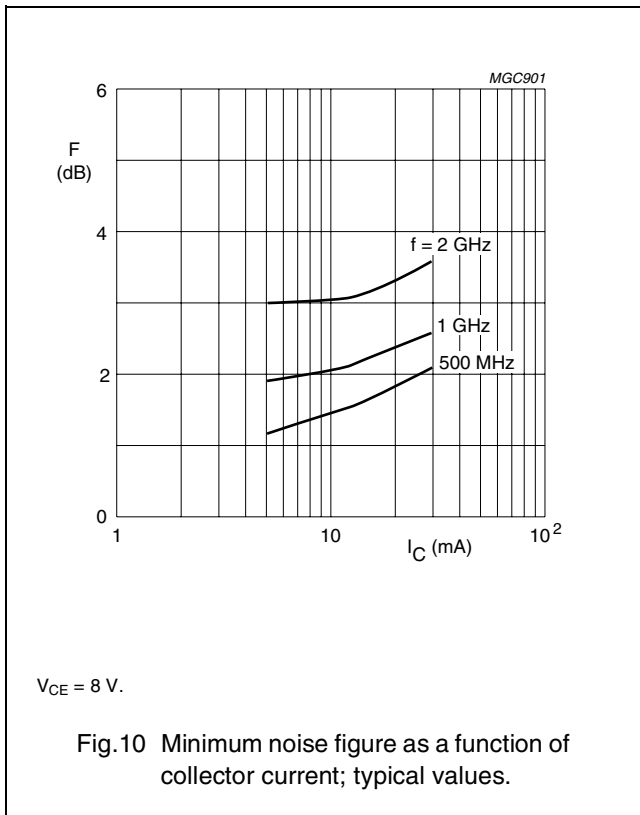
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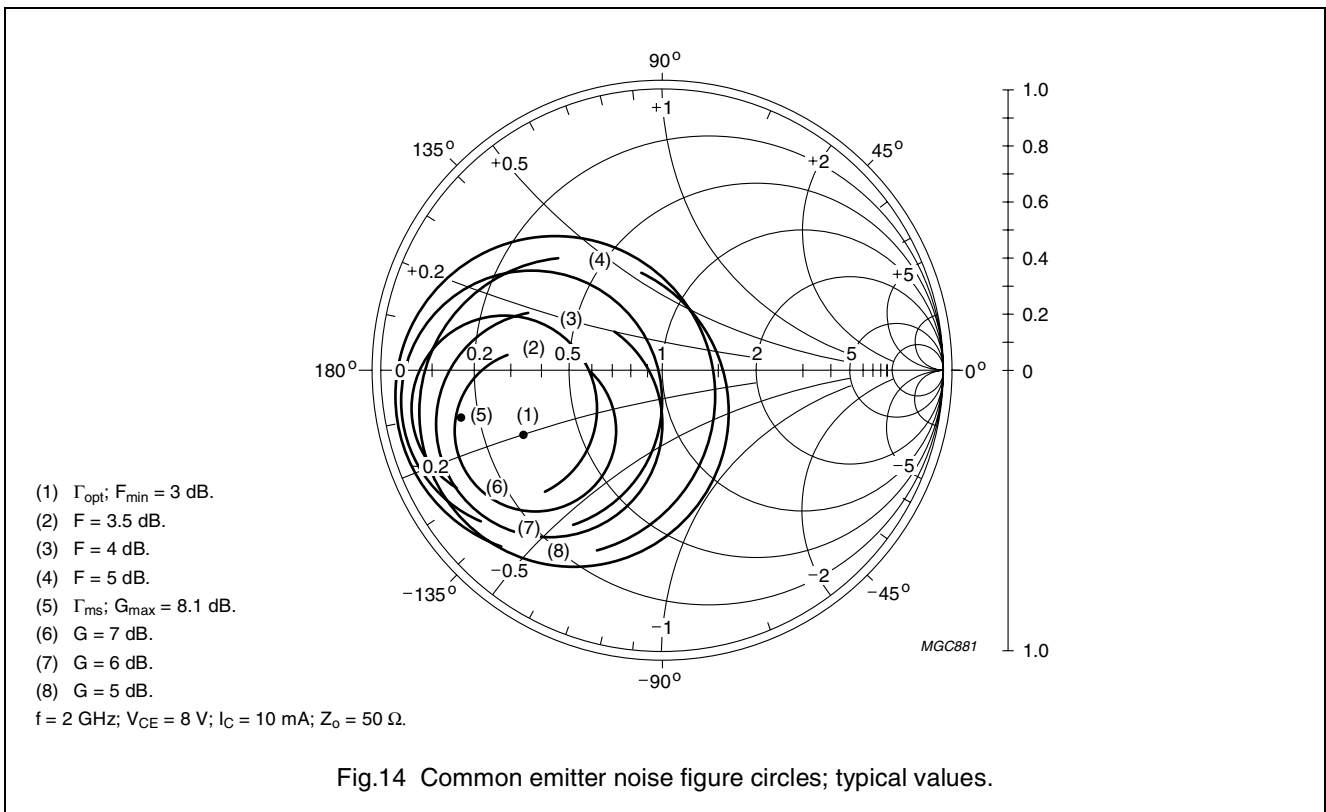
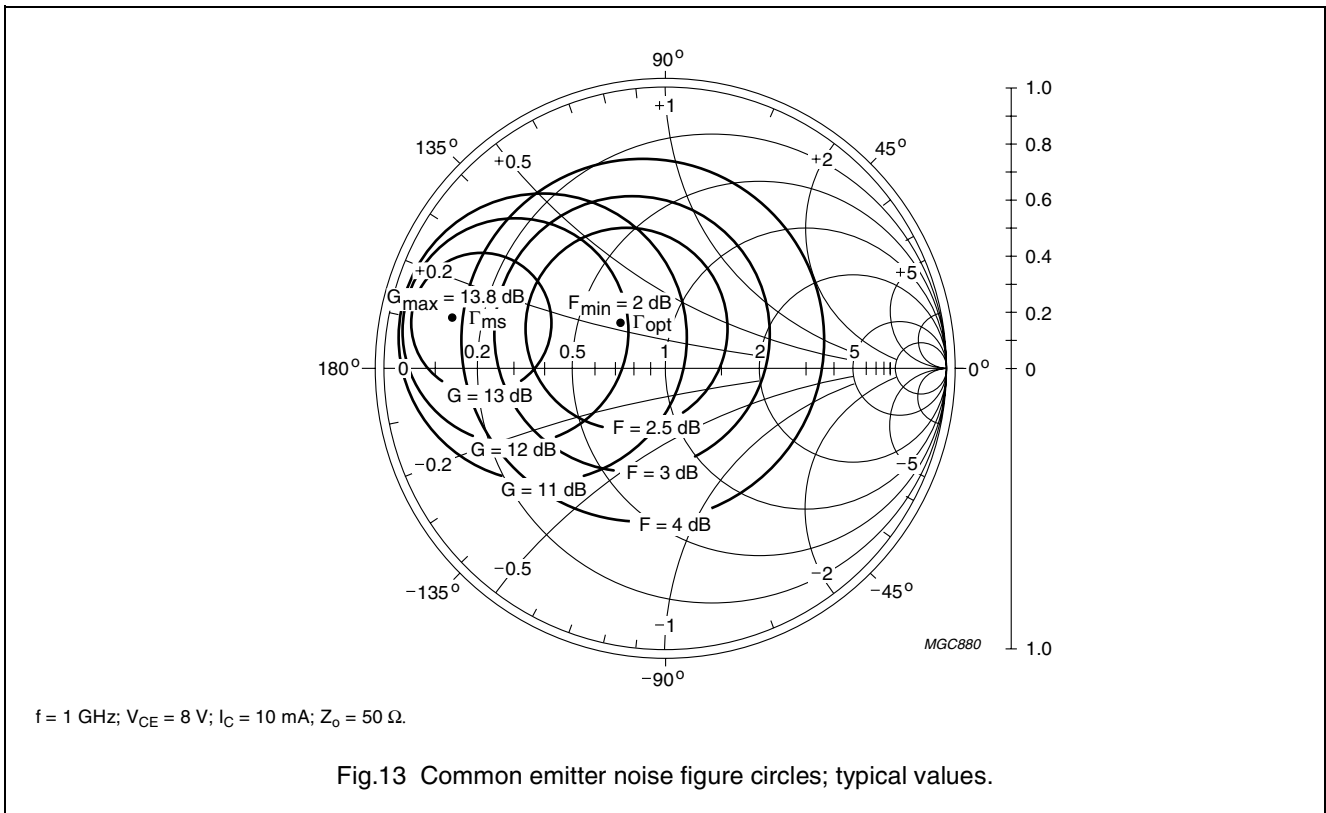
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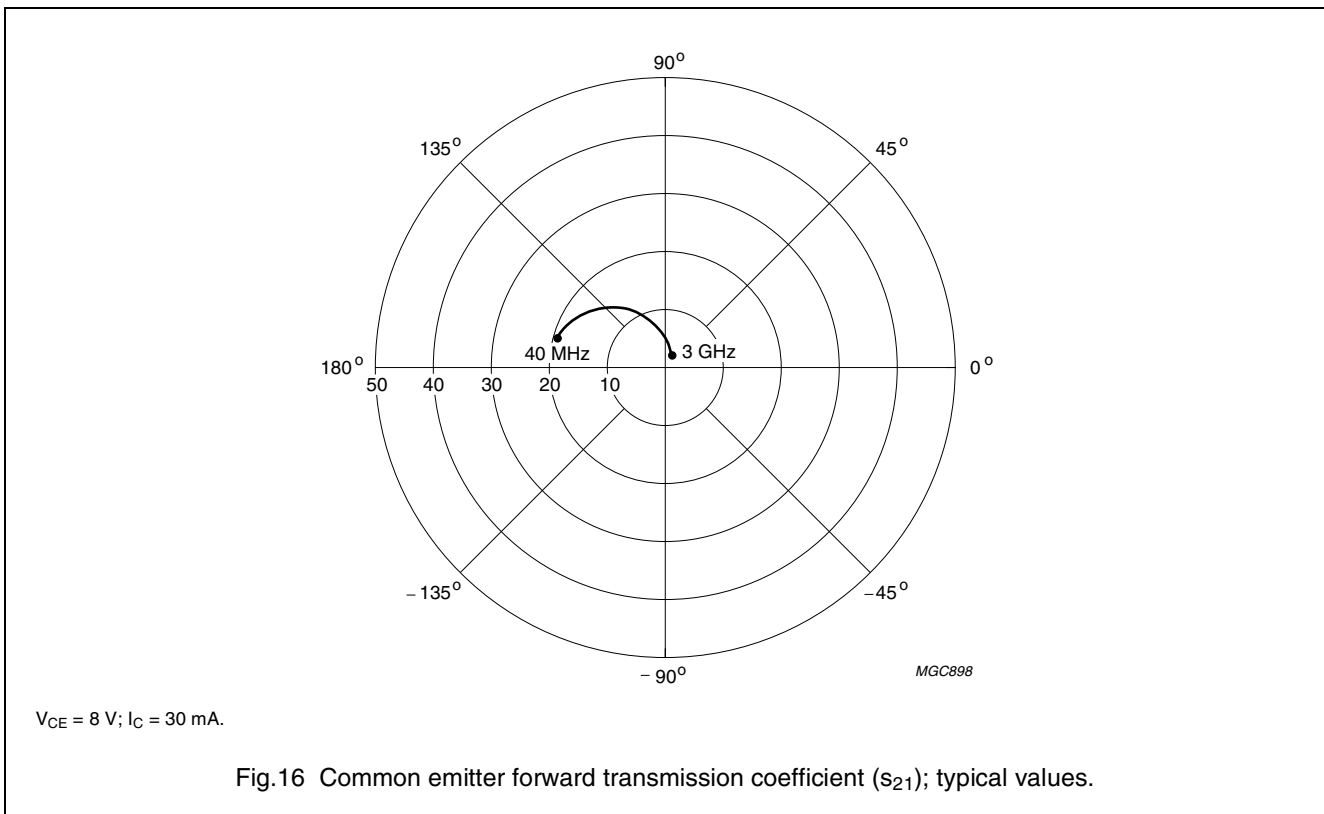
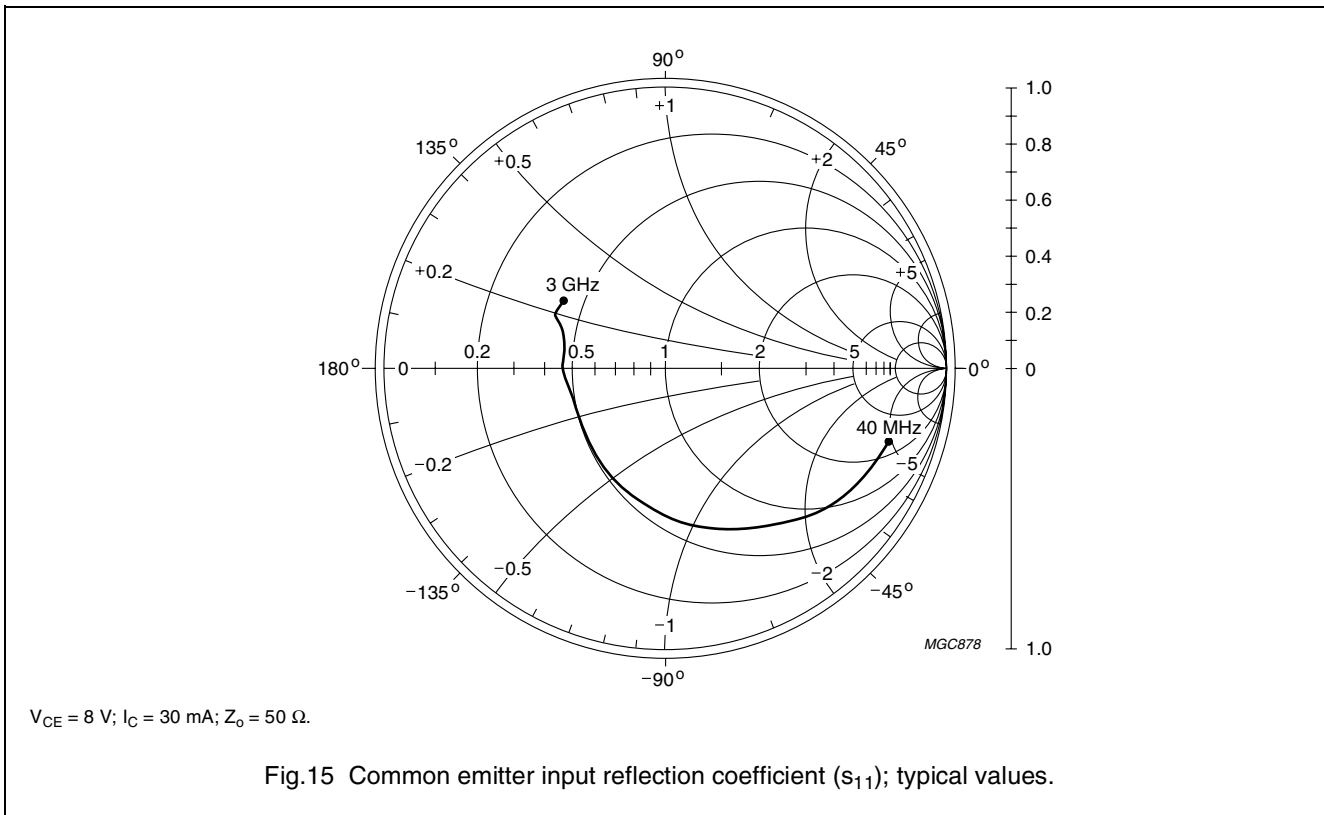
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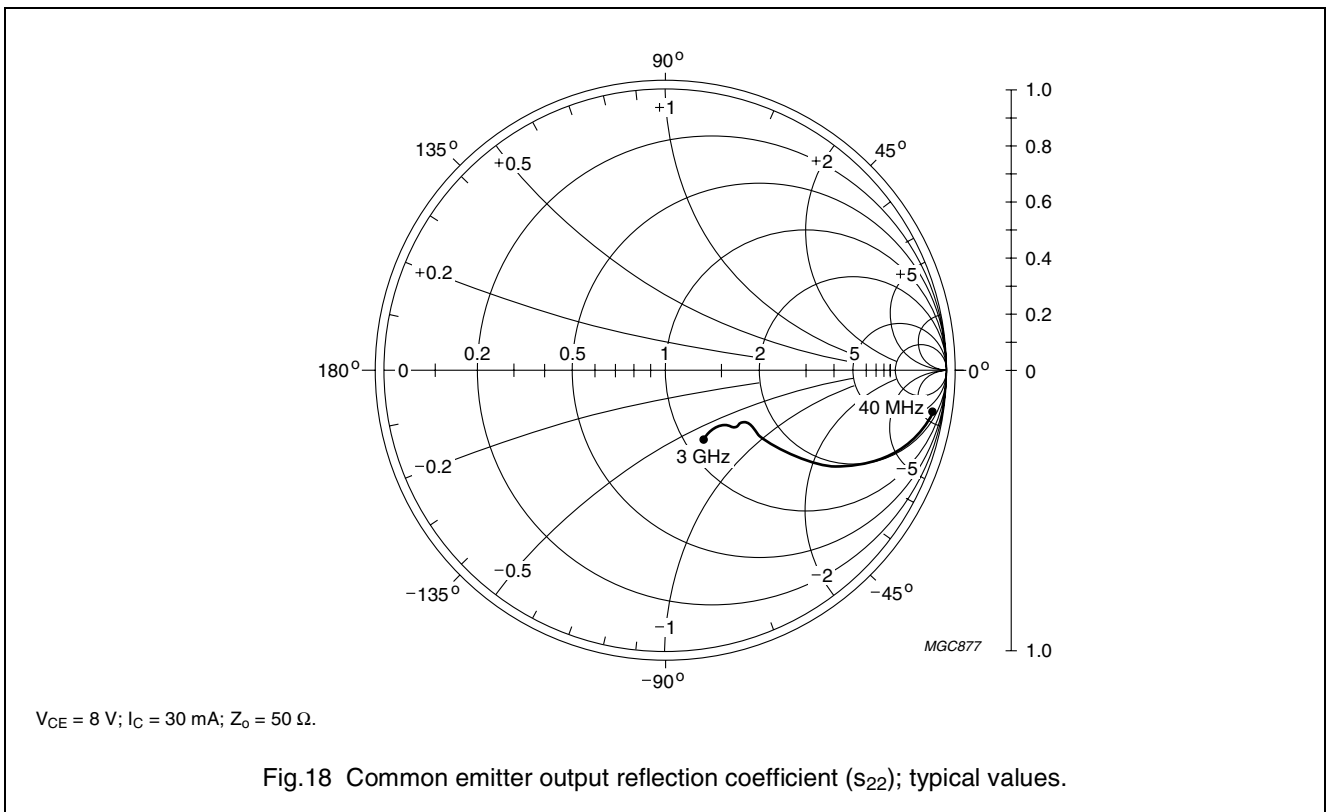
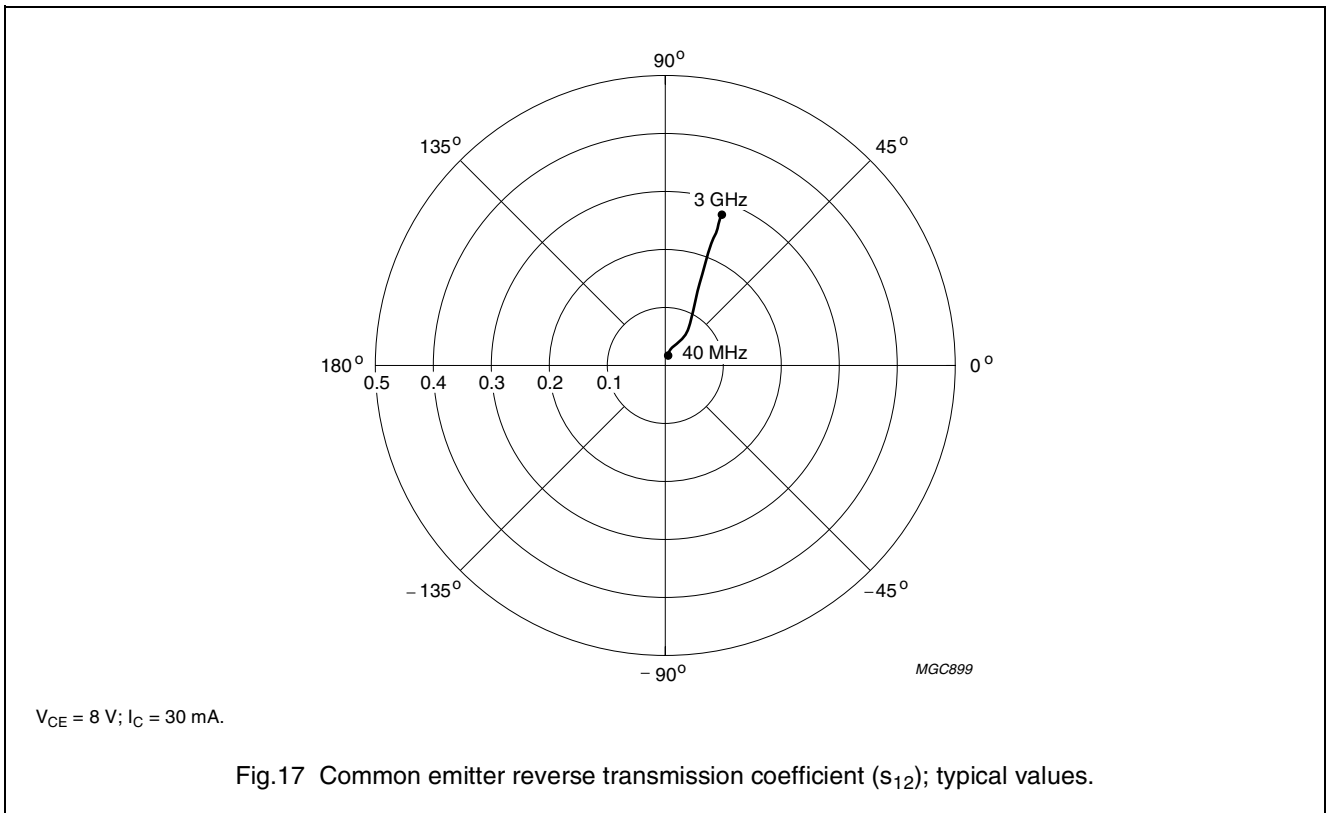
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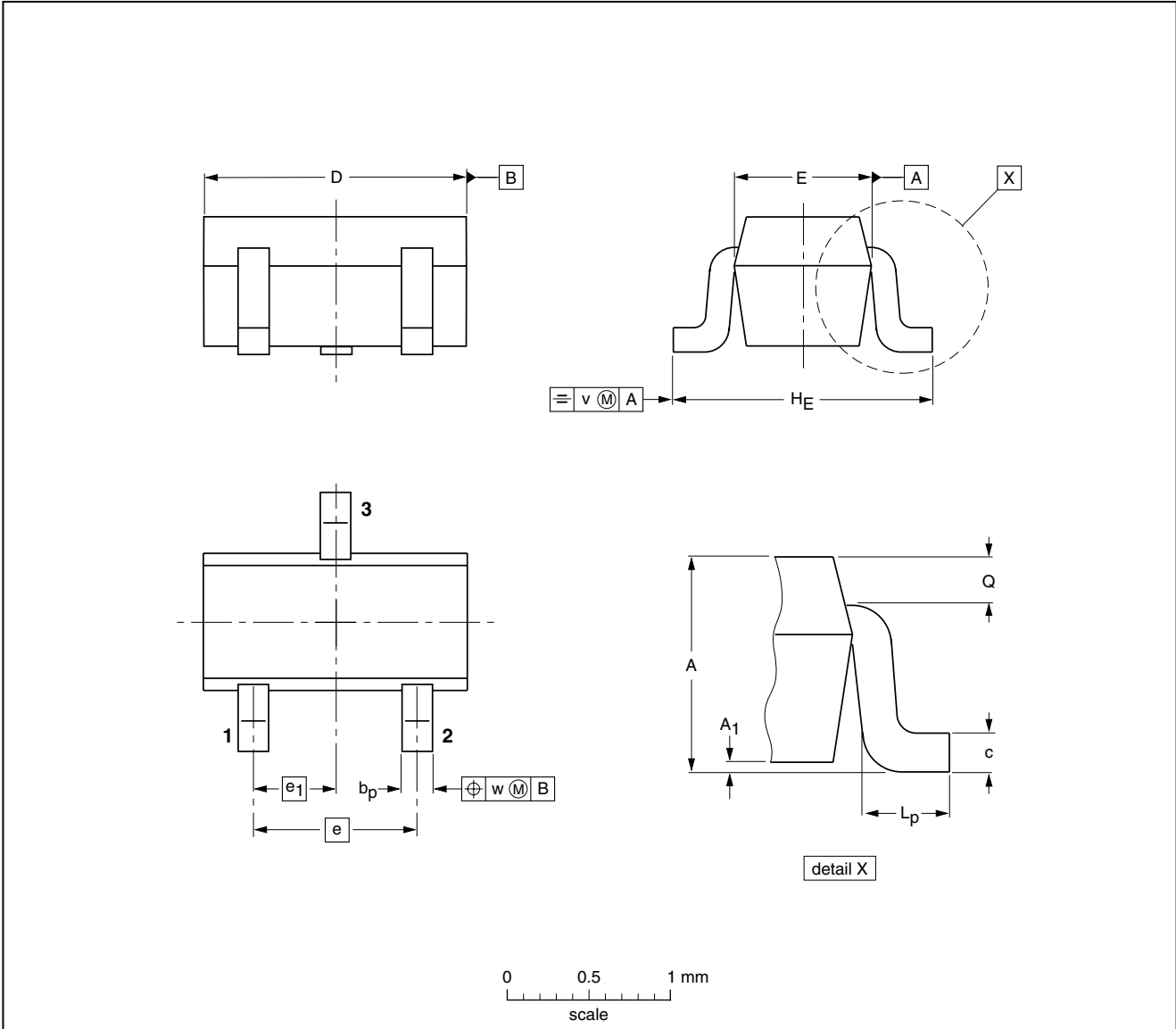
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT416



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	0.95 0.60	0.1	0.30 0.15	0.25 0.10	1.8 1.4	0.9 0.7	1	0.5	1.75 1.45	0.45 0.15	0.23 0.13	0.2	0.2

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT416			SC-75			97-02-28

NPN 5 GHz wideband transistor

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DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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budgetnum/ed/pp13

Date of release: 1999 Oct 19

Document order number: 9397 750 06526

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