

ANTREX Electronics

Electronic Components Sourcing Information

Product Reference Information

Part Number: BFR505T,115
Manufacturer: NXP USA Inc.
Package: SC-75, SOT-416
Availability: Please confirm with sales

Product Page:

<https://antrexco.com/product/details/nxp-usa-inc/bfr505t-115.html>

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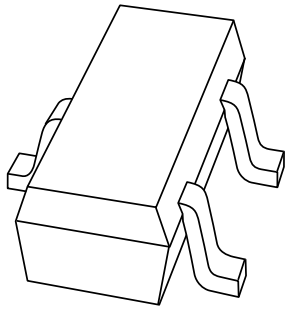
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Note:

This PDF includes an ANTREX product reference cover page.

The original manufacturer datasheet follows from the next page.

DATA SHEET



BFR505T

NPN 9 GHz wideband transistor

Product specification
Supersedes data of 2000 Mar 14

2000 May 17



NPN 9 GHz wideband transistor

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FEATURES

- Low current consumption
- High power gain
- Low noise figure
- High transition frequency
- Gold metallization ensures excellent reliability
- SOT416 (SC-75) package.

DESCRIPTION

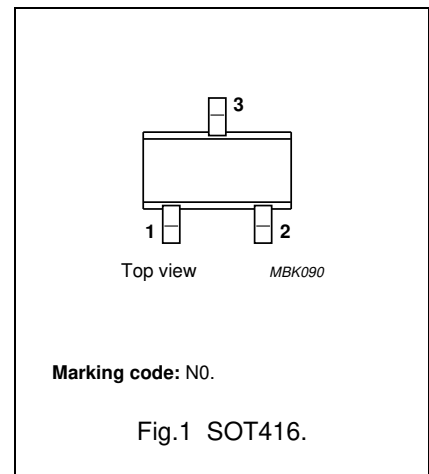
NPN transistor in a plastic SOT416 (SC-75) package.

PINNING

PIN	DESCRIPTION
1	base
2	emitter
3	collector

APPLICATIONS

Low power amplifiers, oscillators and mixers particularly in RF portable communication equipment (cellular phones, cordless phones and pagers) up to 2 GHz.



QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CB0}	collector-base voltage	open emitter	–	–	20	V
V_{CES}	collector-emitter voltage	$R_{BE} = 0$	–	–	15	V
I_C	DC collector current		–	–	18	mA
P_{tot}	total power dissipation	$T_s \leq 75\text{ °C}$; note 1	–	–	150	mW
h_{FE}	DC current gain	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $T_j = 25\text{ °C}$	60	120	250	
f_T	transition frequency	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 1\text{ GHz}$; $T_{amb} = 25\text{ °C}$	–	9	–	GHz
G_{UM}	maximum unilateral power gain	$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	17	–	dB
F	noise figure	$I_C = 1.25\text{ mA}$; $V_{CE} = 6\text{ V}$; $f = 900\text{ MHz}$; $T_{amb} = 25\text{ °C}$	–	1.2	1.7	dB

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CB0}	collector-base voltage	open emitter	–	20	V
V_{CE}	collector-emitter voltage	$R_{BE} = 0$	–	15	V
V_{EBO}	emitter-base voltage	open collector	–	2.5	V
I_C	DC collector current		–	18	mA
P_{tot}	total power dissipation	$T_s \leq 75\text{ °C}$; note 1	–	150	mW
T_{stg}	storage temperature		–65	+150	°C
T_j	junction temperature		–	150	°C

Note

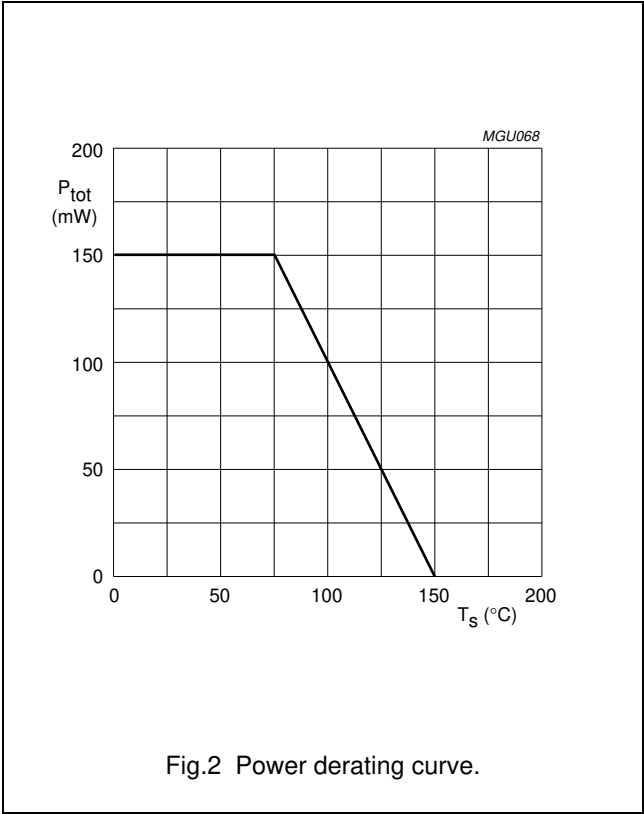
1. T_s is the temperature at the soldering point of the collector pin.

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THERMAL RESISTANCE

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-s}$	thermal resistance from junction to soldering point	500	K/W



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CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I _{CBO}	collector cut-off current	I _E = 0; V _{CB} = 6 V	–	–	50	nA
h _{FE}	DC current gain	I _C = 5 mA; V _{CE} = 6 V	60	120	250	
C _c	collector capacitance	I _E = i _e = 0; V _{CB} = 6 V; f = 1 MHz	–	0.4	–	pF
C _e	emitter capacitance	I _C = i _c = 0; V _{EB} = 0.5 V; f = 1 MHz	–	0.4	–	pF
C _{re}	feedback capacitance	I _C = 0; V _{CB} = 6 V; f = 1 MHz	–	0.3	–	pF
f _T	transition frequency	I _C = 5 mA; V _{CE} = 6 V; f = 1 GHz; T _{amb} = 25 °C	–	9	–	GHz
G _{UM}	maximum unilateral power gain; note 1	I _C = 5 mA; V _{CE} = 6 V; T _{amb} = 25 °C; f = 900 MHz	–	17	–	dB
		f = 2 GHz	–	10	–	dB
S ₂₁ ²	insertion power gain	I _C = 5 mA; V _{CE} = 6 V; f = 900 MHz; T _{amb} = 25 °C	13	14	–	dB
F	noise figure	Γ _s = Γ _{opt} ; I _C = 1.25 mA; V _{CE} = 6 V; f = 900 MHz; T _{amb} = 25 °C	–	1.2	1.7	dB
		Γ _s = Γ _{opt} ; I _C = 5 mA; V _{CE} = 6 V; f = 900 MHz; T _{amb} = 25 °C	–	1.6	2.1	dB
		Γ _s = Γ _{opt} ; I _C = 1.25 mA; V _{CE} = 6 V; f = 2 GHz; T _{amb} = 25 °C	–	1.9	–	dB
P _{L1}	output power at 1 dB gain compression	I _C = 5 mA; V _{CE} = 6 V; R _L = 50 Ω; f = 900 MHz; T _{amb} = 25 °C	–	4	–	dBm
ITO	third-order intercept point	note 2	–	10	–	dBm

Notes

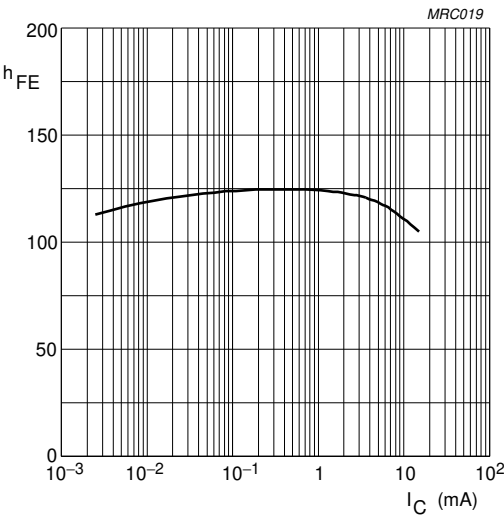
1. G_{UM} is the maximum unilateral power gain, assuming S₁₂ is zero and

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

2. I_C = 5 mA; V_{CE} = 6 V; R_L = 50 Ω; f = 900 MHz; T_{amb} = 25 °C; f_p = 900 MHz; f_q = 902 MHz; measured at f_(2p-q) = 898 MHz and at f_(2q-p) = 904 MHz.

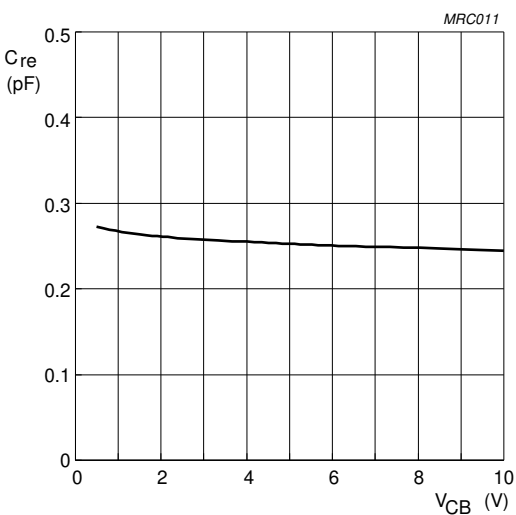
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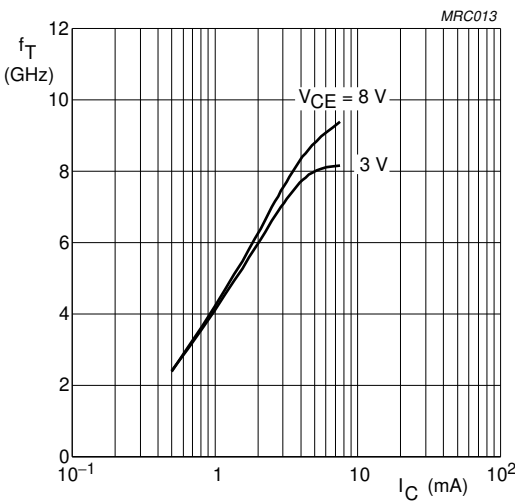
$V_{CE} = 6$ V; $T_j = 25$ °C.

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



$I_C = 0$; $f = 1$ MHz.

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



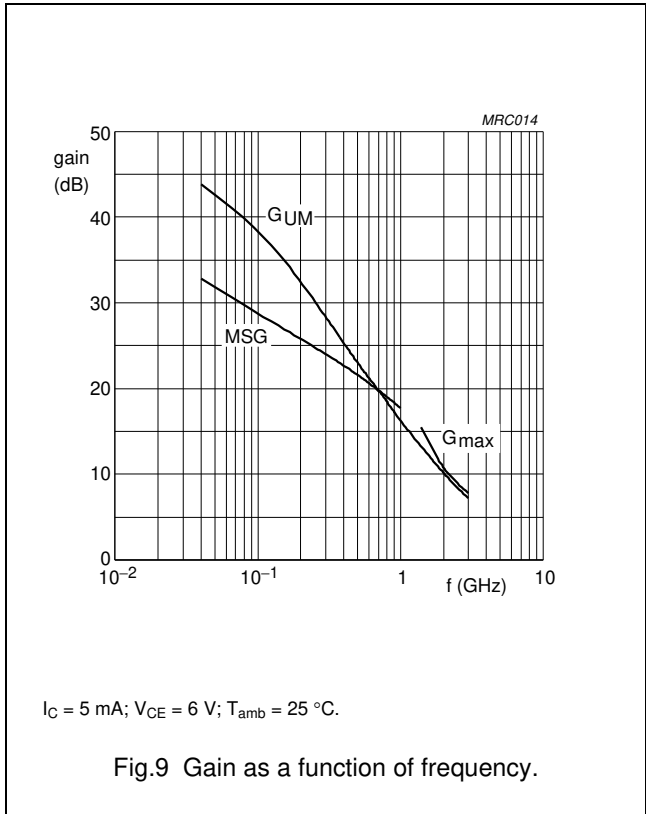
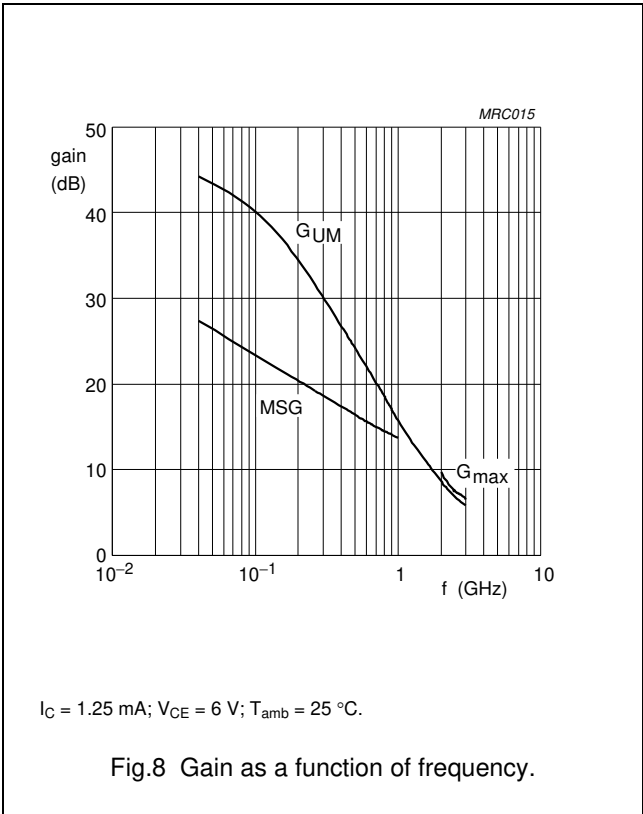
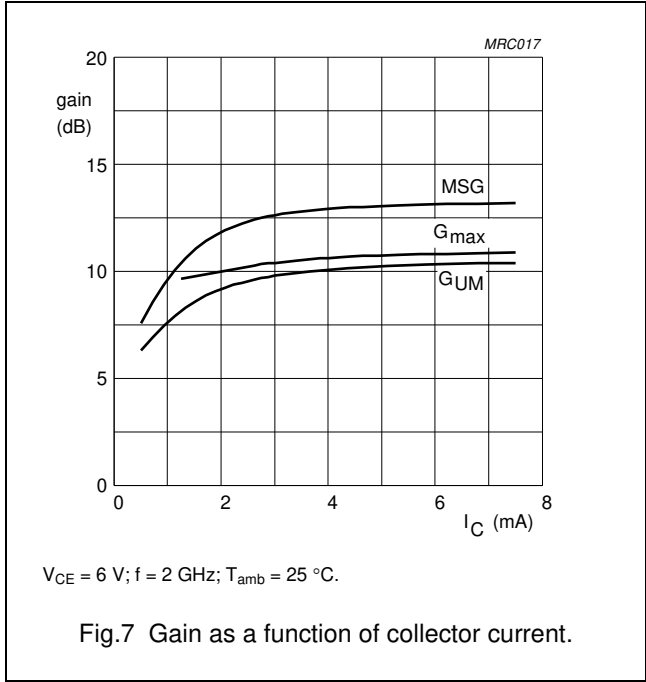
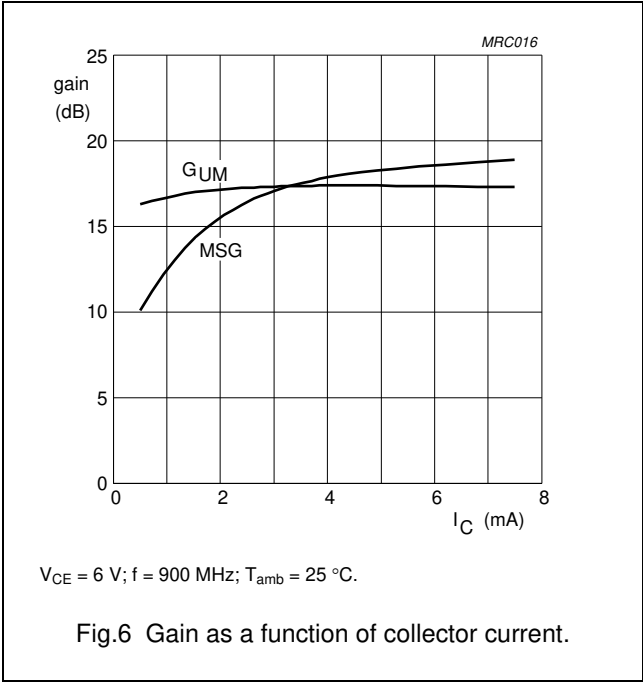
$f = 1$ GHz; $T_{amb} = 25$ °C.

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

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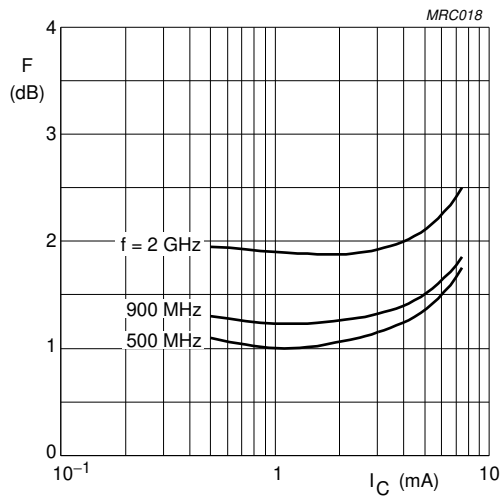
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In Figs 6 to 9, G_{UM} = maximum unilateral power gain; MSG = maximum stable gain; G_{max} = maximum available gain.



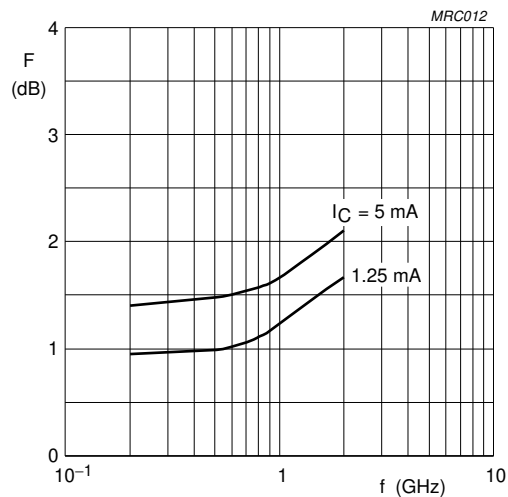
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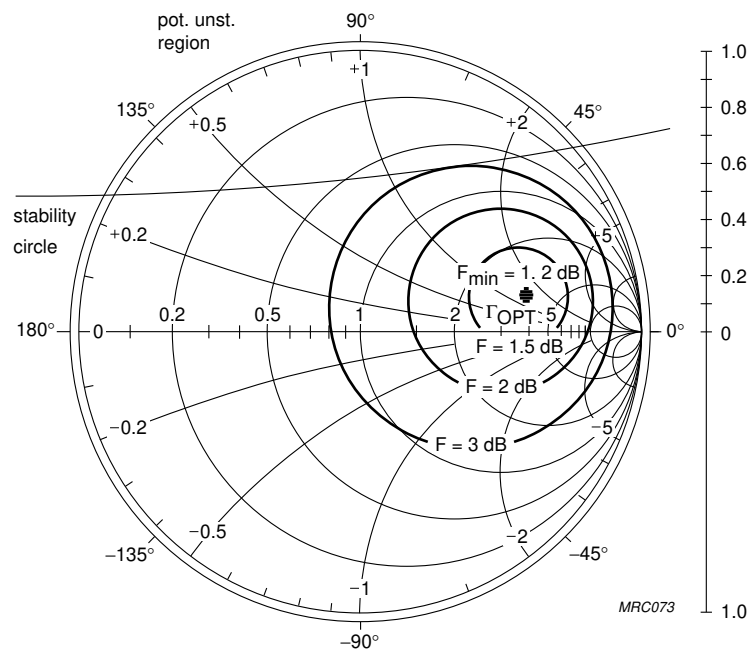
$V_{CE} = 6$ V; $T_{amb} = 25$ °C.

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



$V_{CE} = 6$ V; $T_{amb} = 25$ °C.

Fig.11 Minimum noise figure as a function of frequency.



$I_C = 1.25$ mA; $V_{CE} = 6$ V;
 $f = 900$ MHz; $Z_0 = 50$ Ω .

Fig.12 Noise circle.

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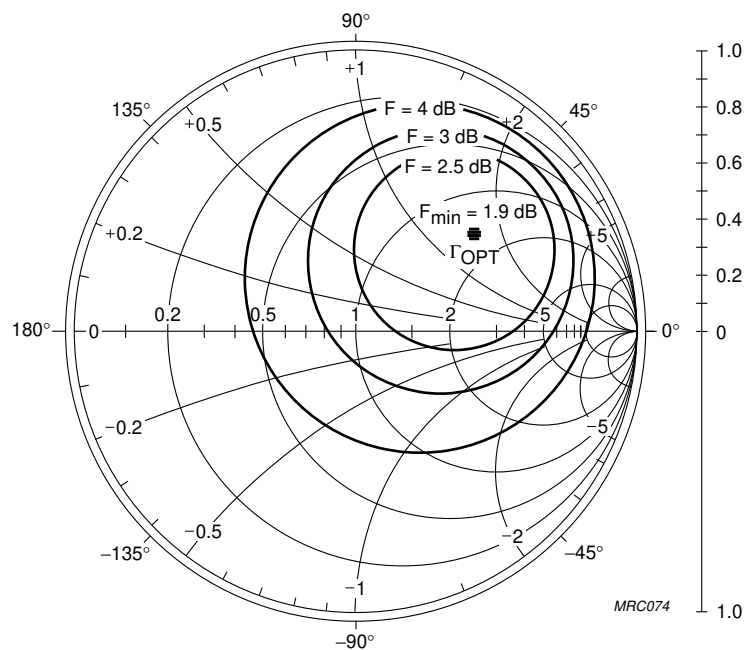
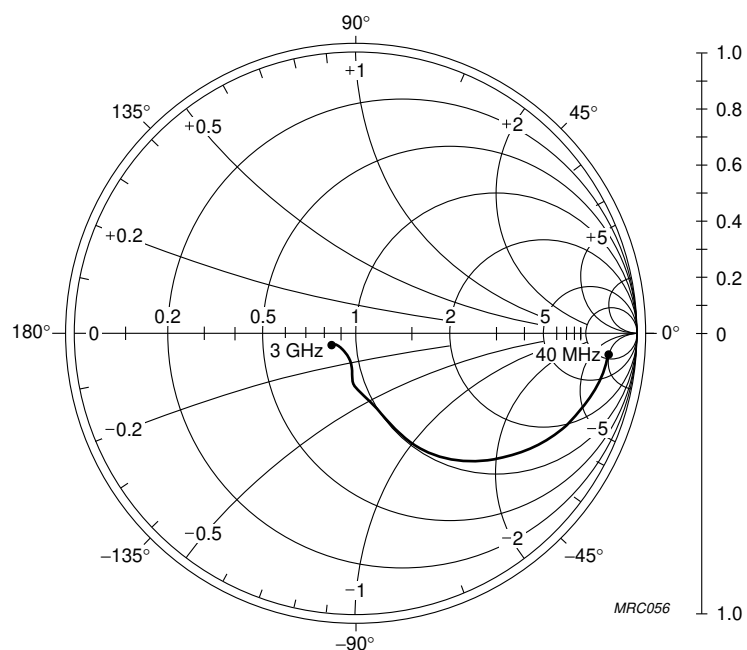
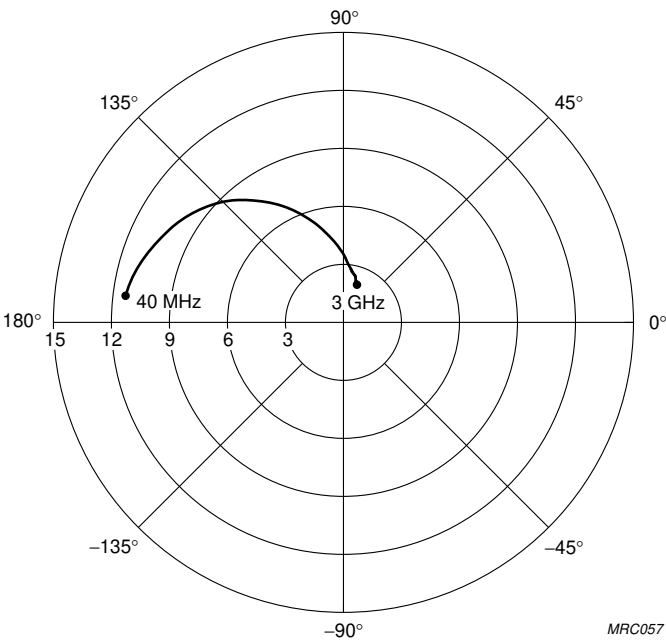


Fig.13 Noise circle.

Fig.14 Common emitter input reflection coefficient (S_{11}).

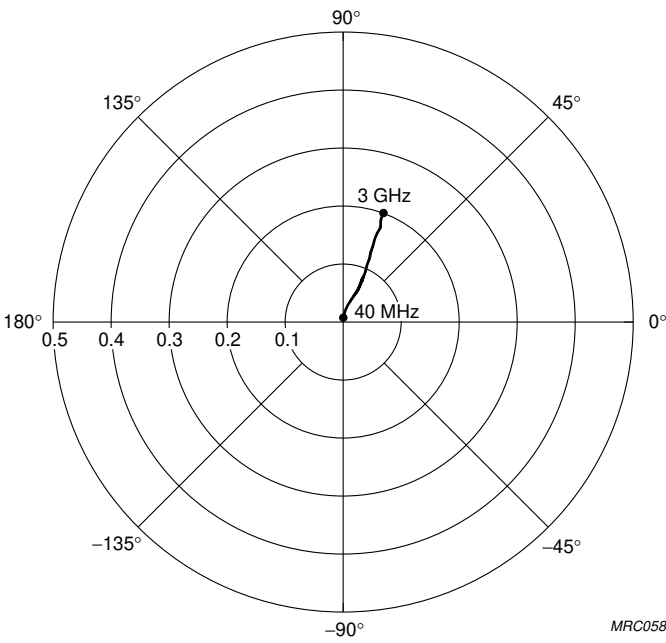
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$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$.

Fig.15 Common emitter forward transmission coefficient (S_{21}).

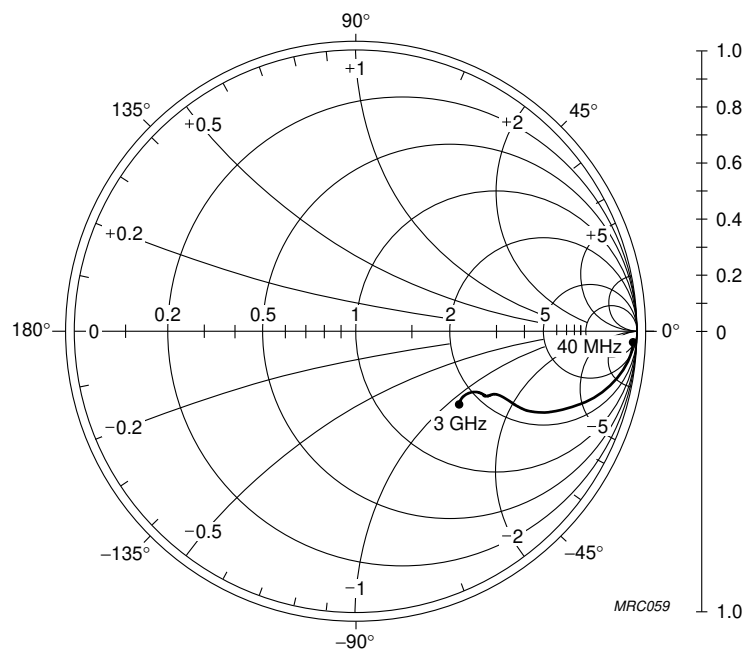


$I_C = 5\text{ mA}$; $V_{CE} = 6\text{ V}$.

Fig.16 Common emitter reverse transmission coefficient (S_{12}).

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$I_C = 5 \text{ mA}$; $V_{CE} = 6 \text{ V}$;
 $Z_0 = 50 \Omega$.

Fig.17 Common emitter output reflection coefficient (S_{22}).

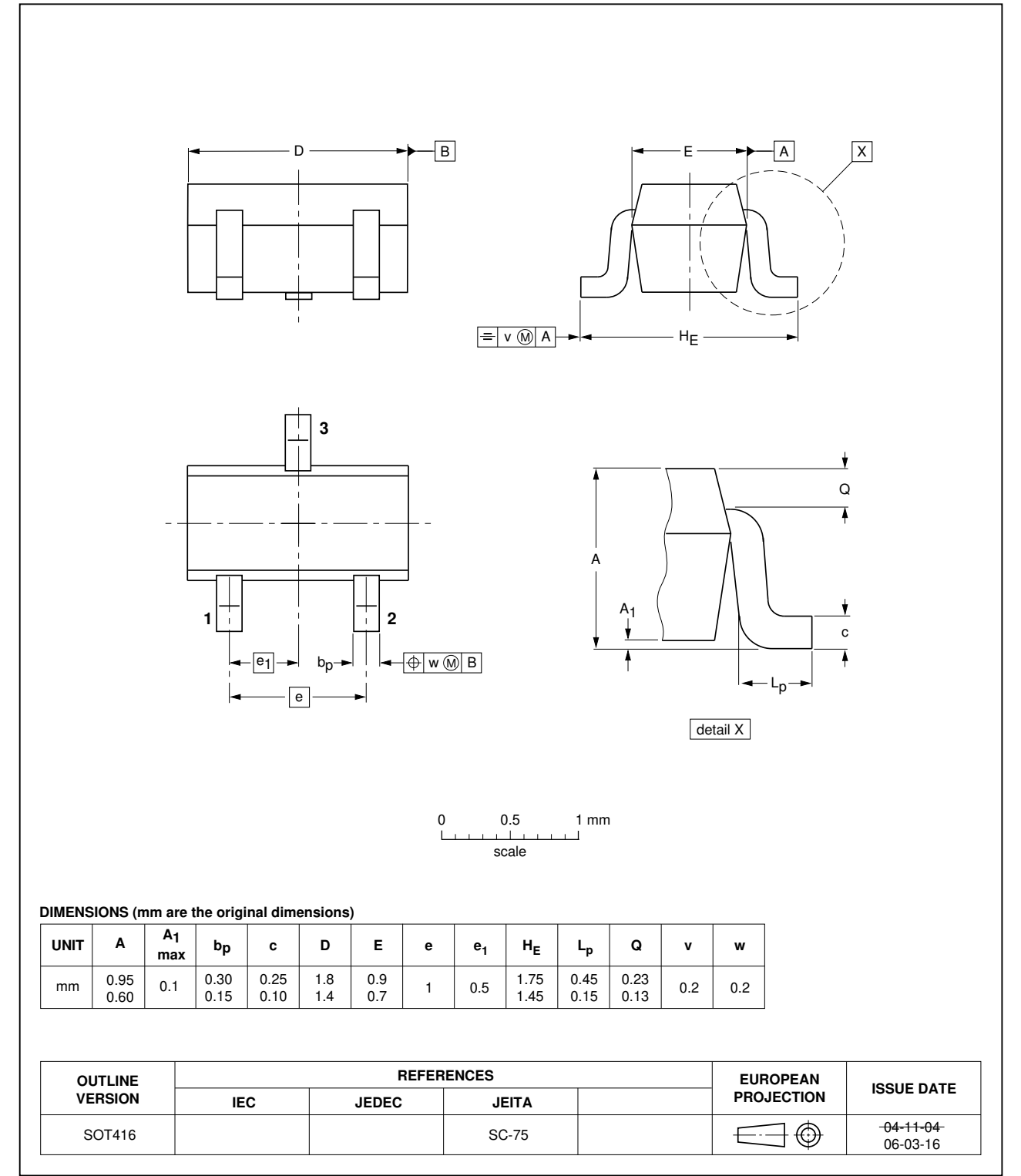
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PACKAGE OUTLINE

Plastic surface-mounted package; 3 leads

SOT416



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DATA SHEET STATUS

DOCUMENT STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾	DEFINITION
Objective data sheet	Development	This document contains data from the objective specification for product development.
Preliminary data sheet	Qualification	This document contains data from the preliminary specification.
Product data sheet	Production	This document contains the product specification.

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