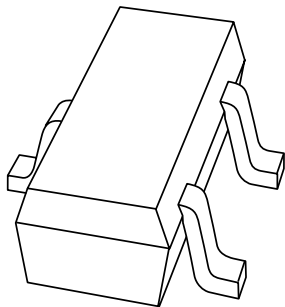


# DATA SHEET



## **PRF949** UHF wideband transistor

Product specification  
Supersedes data of 1999 Nov 02

2000 Apr 03

## UHF wideband transistor

PRF949

## FEATURES

- Small size
- Low noise
- Low distortion
- High gain
- Gold metallization ensures excellent reliability.

## APPLICATIONS

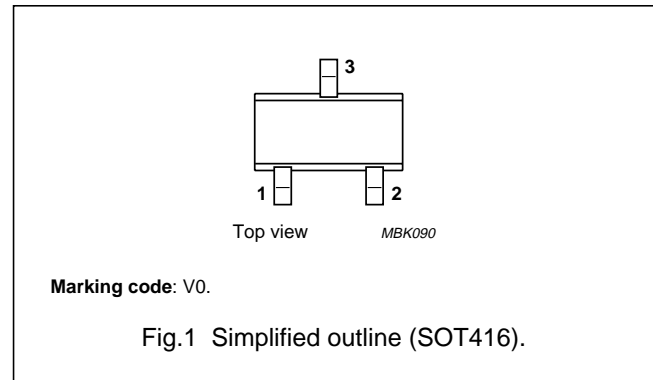
- Communication and instrumentation systems.

## DESCRIPTION

Silicon NPN transistor in a surface mount 3-pin SOT416 (SC-75) package. The transistor is primarily intended for wideband applications in the GHz range in the RF front end of analog and digital cellular telephones, cordless phones, radar detectors, pagers and satellite TV-tuners.

## PINNING SOT416 (SC-75)

PIN	DESCRIPTION
1	base
2	emitter
3	collector



## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$C_{re}$	feedback capacitance	$I_C = 0$ ; $V_{CB} = 6$ V; $f = 1$ MHz	–	0.3	–	pF
$f_T$	transition frequency	$I_C = 15$ mA; $V_{CE} = 6$ V; $f_m = 1$ GHz	7	9	–	GHz
$G_{UM}$	maximum unilateral power gain	$I_C = 15$ mA; $V_{CE} = 6$ V; $T_{amb} = 25$ °C; $f = 1$ GHz	–	16	–	dB
NF	noise figure	$\Gamma_S = \Gamma_{opt}$ ; $I_C = 5$ mA; $V_{CE} = 6$ V; $f = 1$ GHz	–	1.5	2.5	dB
$P_{tot}$	total power dissipation	$T_s = 75$ °C; note 1	–	–	150	mW
$R_{th\ j-s}$	thermal resistance from junction to soldering point		–	–	500	K/W

## Note

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

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**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
$V_{CEO}$	collector-emitter voltage	open base	–	10	V
$V_{EBO}$	emitter-base voltage	open collector	–	1.5	V
$I_C$	collector current (DC)		–	50	mA
$I_{C(AV)}$	average collector current		–	50	mA
$P_{tot}$	total power dissipation	$T_s = 75\text{ °C}$ ; note 1	–	150	mW
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	150	°C

**Note**

- $T_s$  is the temperature at the soldering point of the collector pin.

**THERMAL CHARACTERISTICS**

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

## UHF wideband transistor

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**CHARACTERISTICS**

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

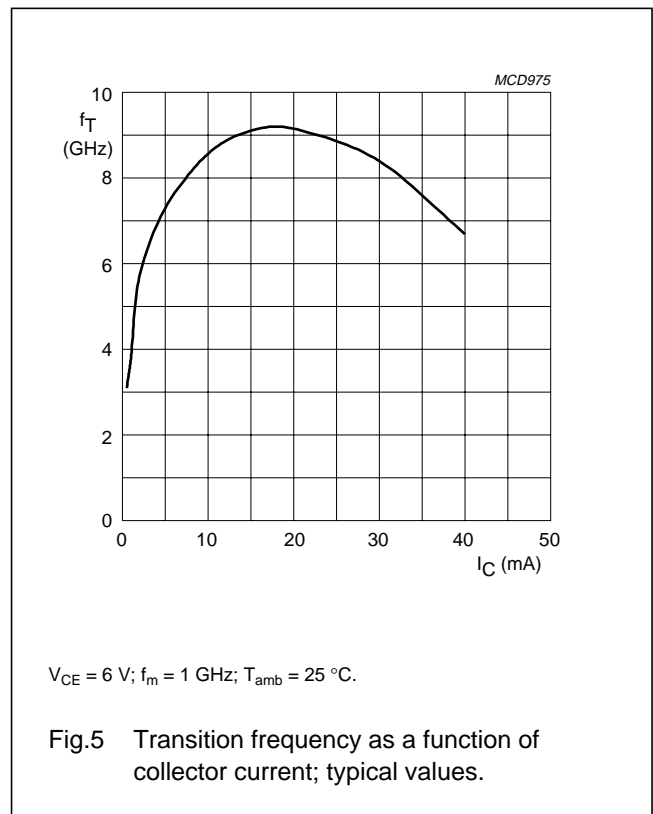
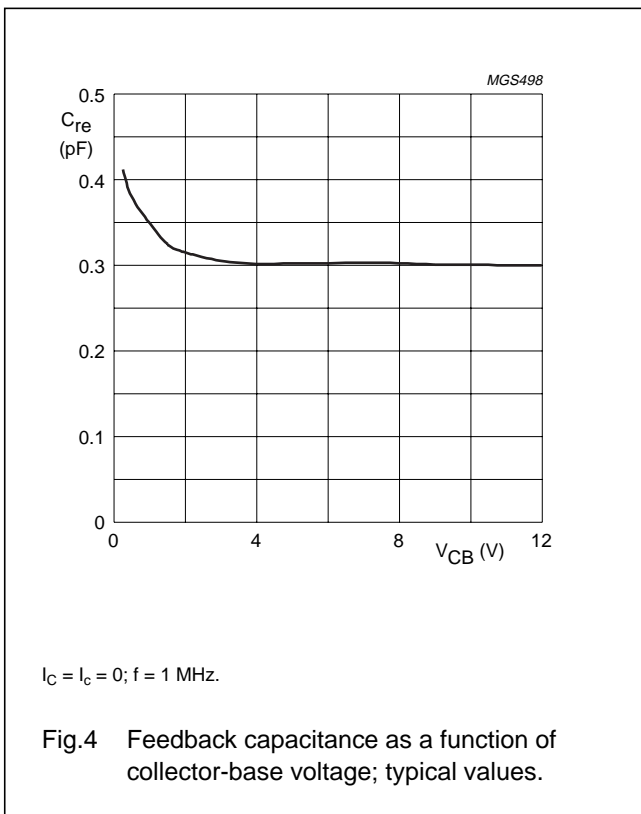
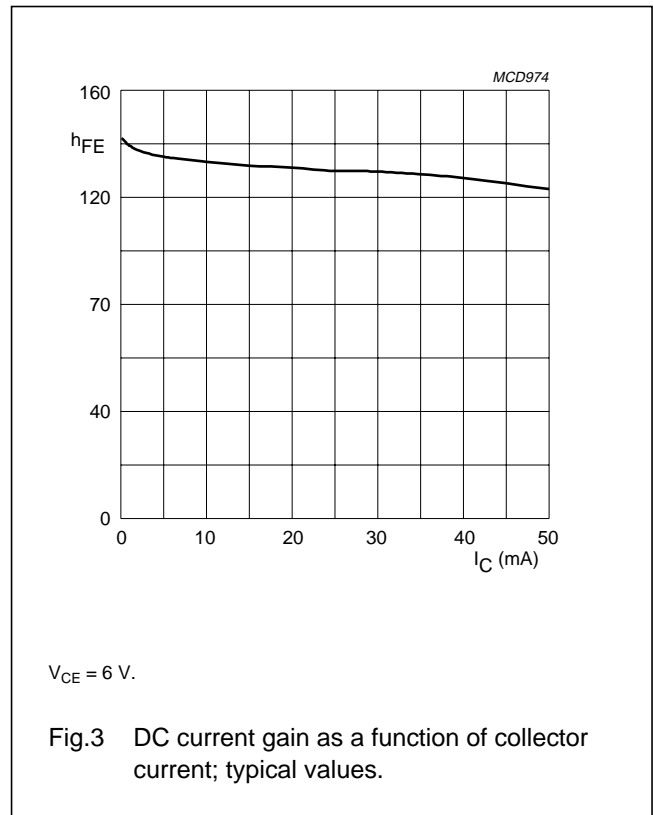
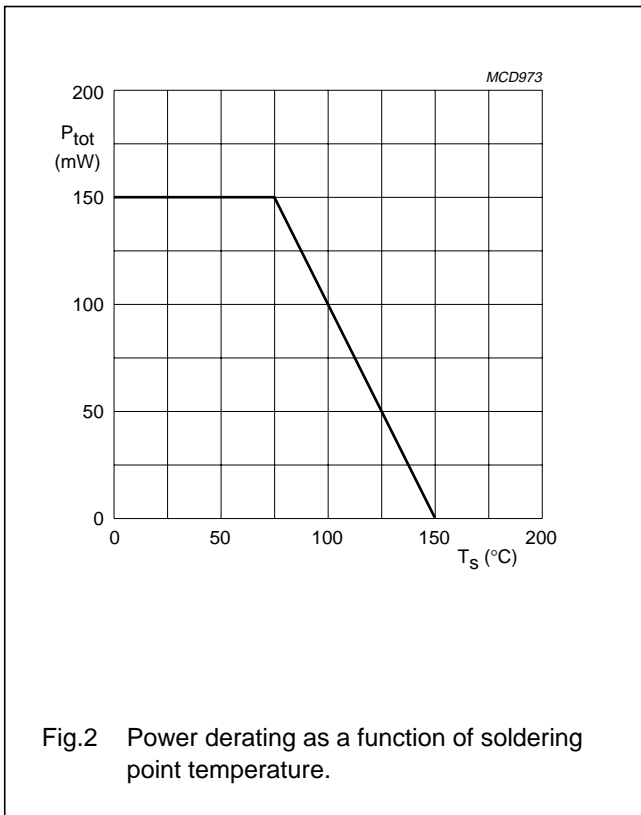
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
<b>DC characteristics</b>						
$V_{(BR)CBO}$	collector-base breakdown voltage	$I_C = 100\ \mu\text{A}; I_E = 0$	20	–	–	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	$I_C = 100\ \mu\text{A}; I_B = 0$	10	–	–	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	$I_E = 10\ \mu\text{A}; I_C = 0$	1.5	–	–	V
$V_{BEF}$	forward base-emitter voltage	$I_E = 25\ \text{mA}$	–	–	1.05	V
$I_{CBO}$	collector-base leakage current	$V_{CB} = 10\ \text{V}; I_E = 0$	–	–	100	nA
$I_{EBO}$	emitter-base leakage current	$V_{EB} = 1\ \text{V}; I_C = 0$	–	–	100	nA
$h_{FE}$	DC current gain	$I_C = 5\ \text{mA}; V_{CE} = 6\ \text{V}$	100	150	200	
		$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}$	–	150	–	
<b>AC characteristics</b>						
$C_{re}$	feedback capacitance	$I_C = 0; V_{CB} = 6\ \text{V}; f = 1\ \text{MHz}$	–	0.3	–	pF
$f_T$	transition frequency	$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; f_m = 1\ \text{GHz}$	7	9	–	GHz
$ S_{21} ^2$	insertion gain	$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; f = 1\ \text{GHz}$	13	15	–	dB
$G_{UM}$	maximum unilateral power gain; note 1	$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; T_{amb} = 25\text{ °C}; f = 1\ \text{GHz}$	–	16	–	dB
		$I_C = 15\ \text{mA}; V_{CE} = 6\ \text{V}; T_{amb} = 25\text{ °C}; f = 2\ \text{GHz}$	–	10	–	dB
NF	noise figure	$\Gamma_S = \Gamma_{opt}; I_C = 5\ \text{mA}; V_{CE} = 6\ \text{V}; f = 1\ \text{GHz}$	–	1.5	2.5	dB
		$\Gamma_S = \Gamma_{opt}; I_C = 5\ \text{mA}; V_{CE} = 6\ \text{V}; f = 2\ \text{GHz}$	–	2.1	–	dB

**Note**

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

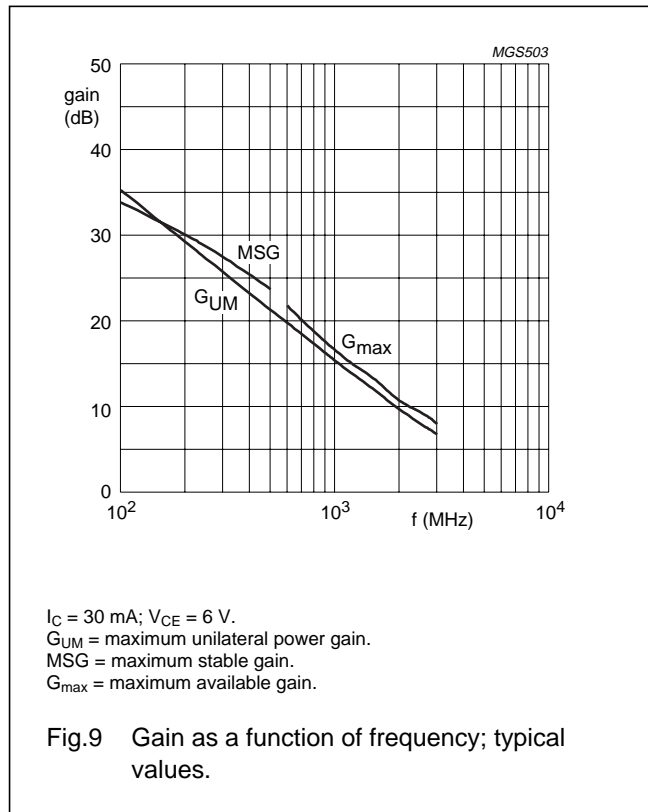
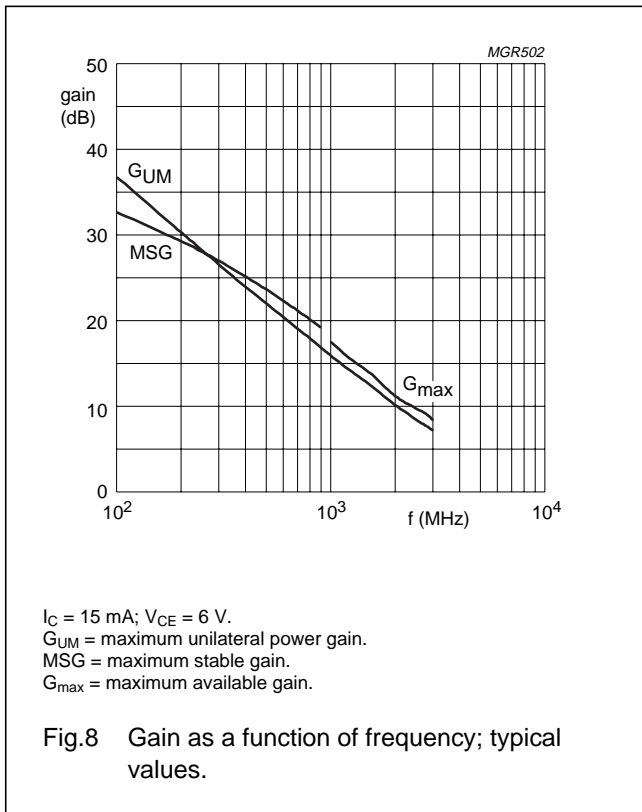
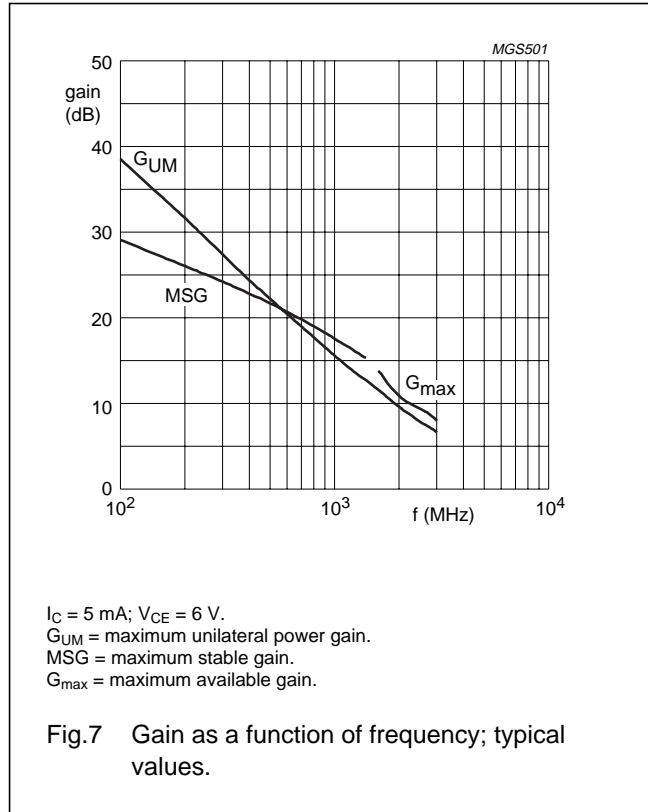
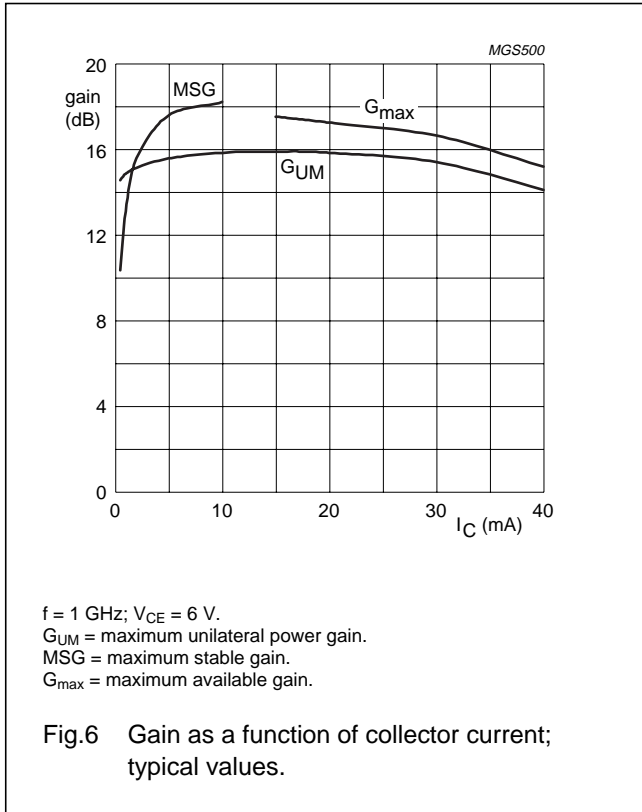
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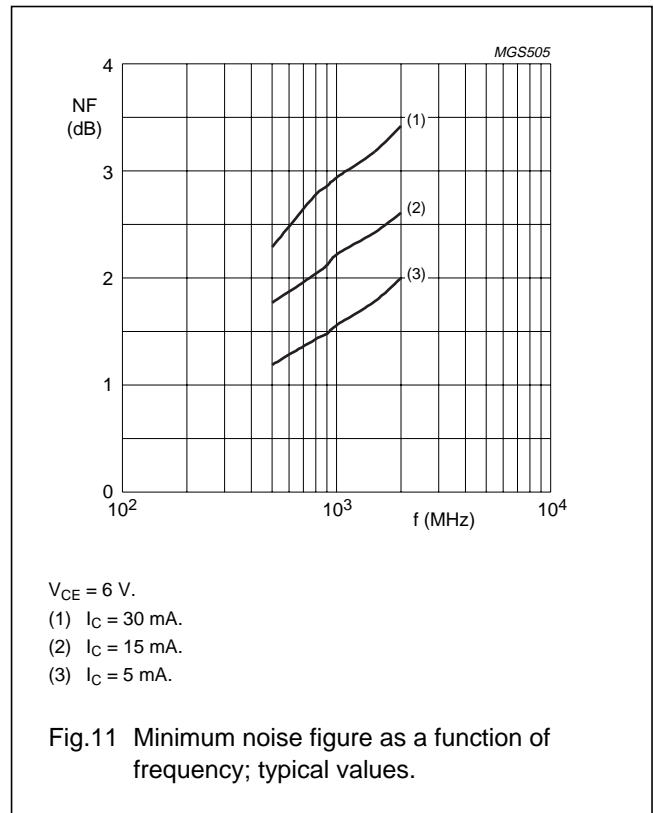
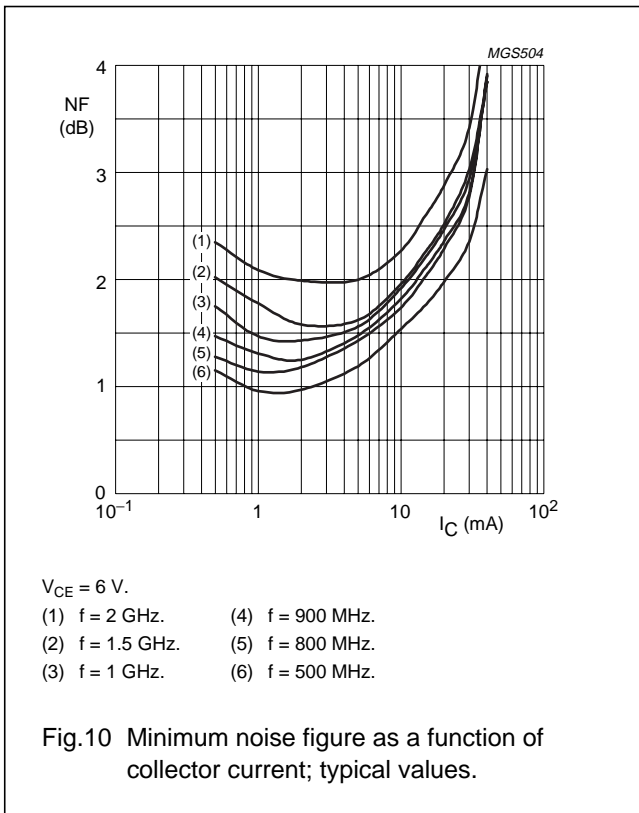
UHF wideband transistor

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UHF wideband transistor

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UHF wideband transistor

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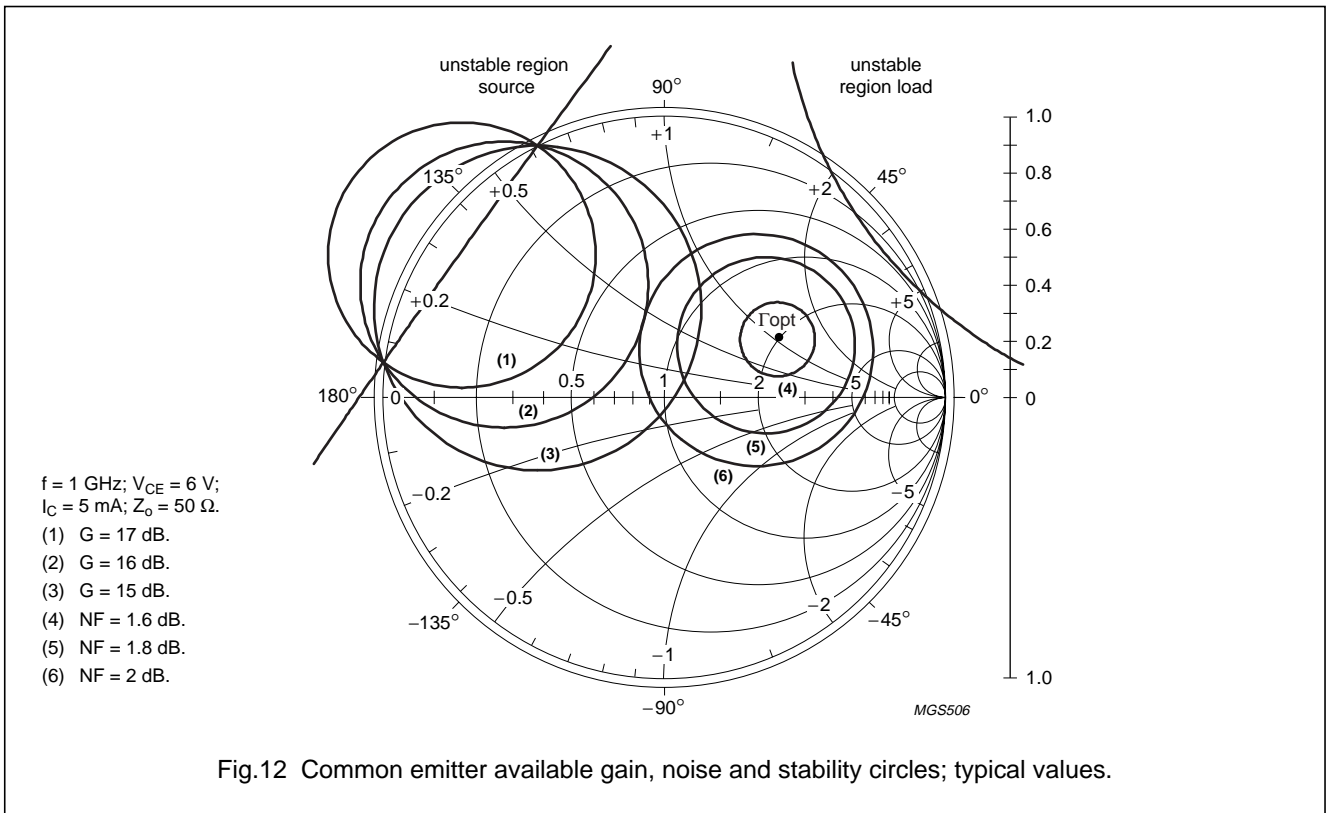


Fig.12 Common emitter available gain, noise and stability circles; typical values.

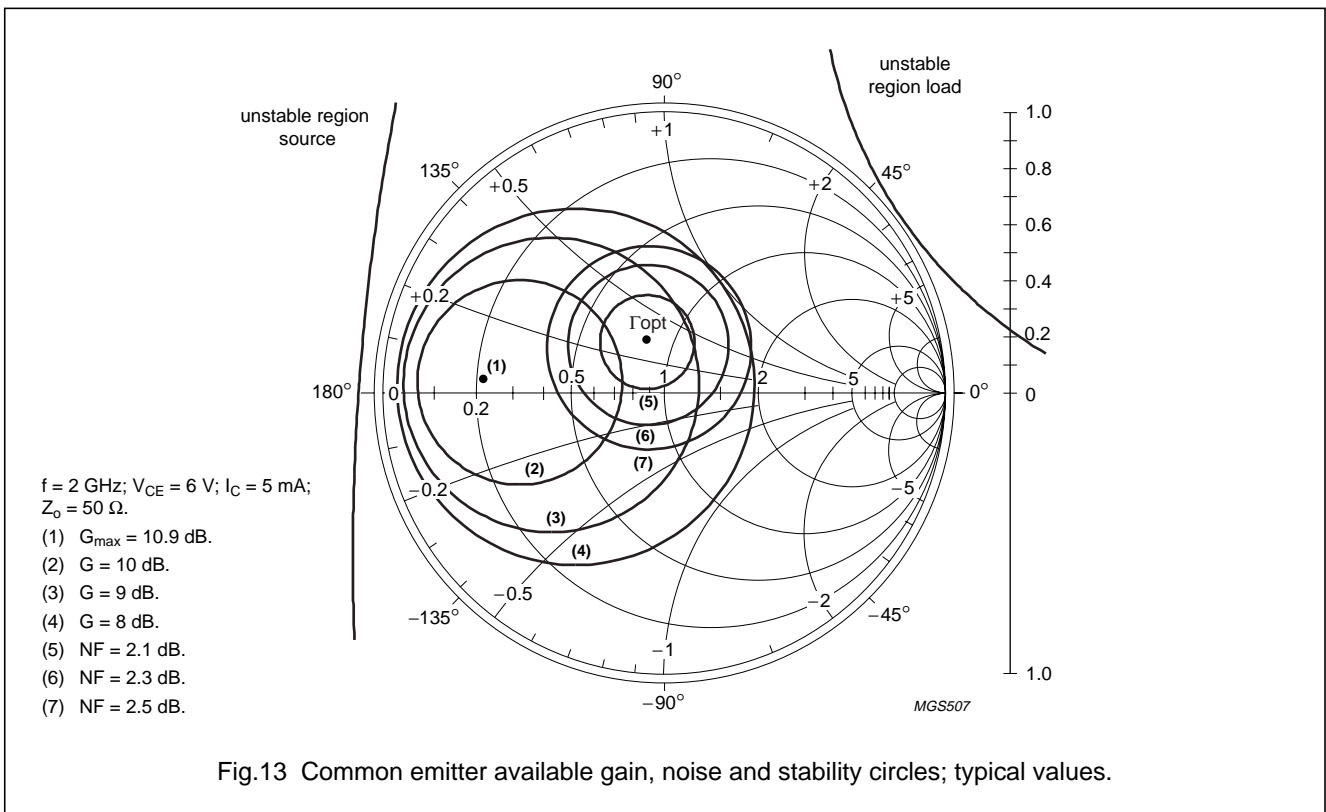
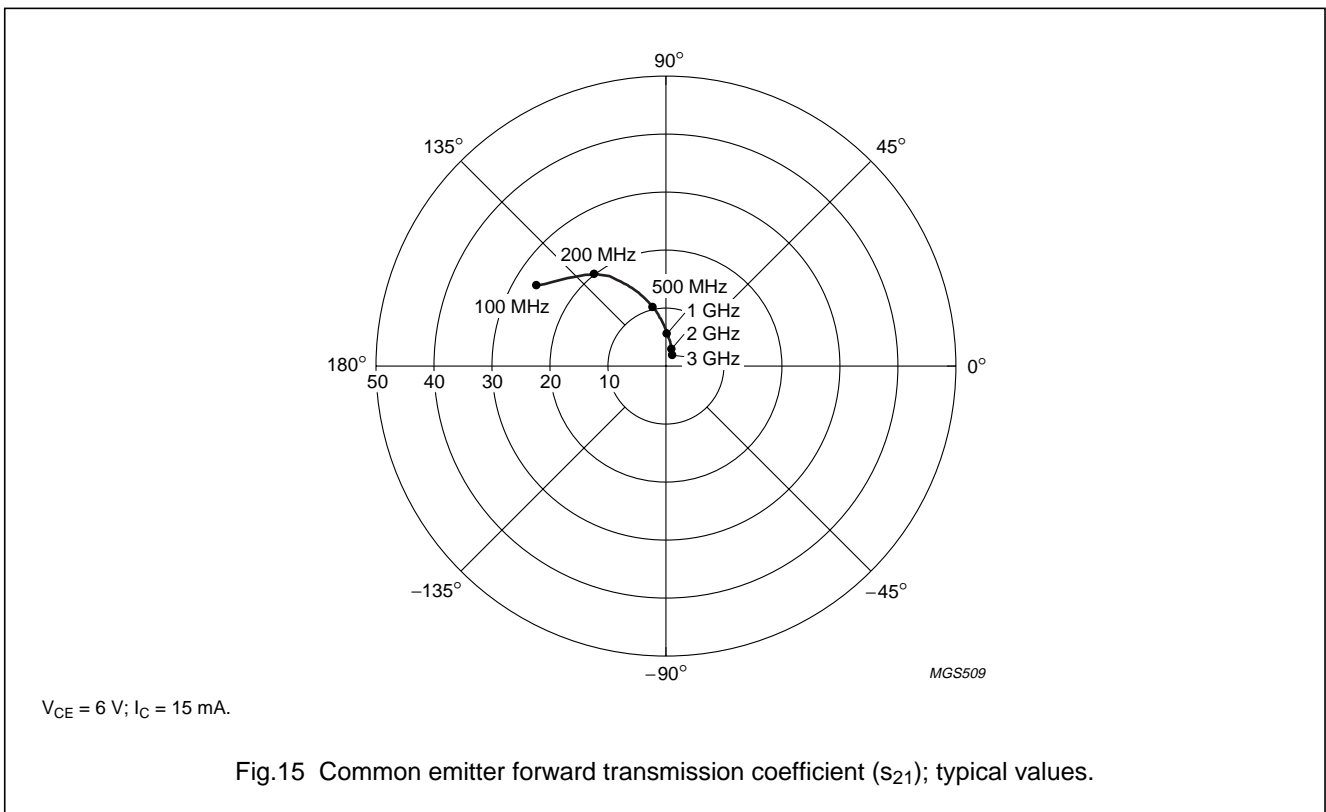
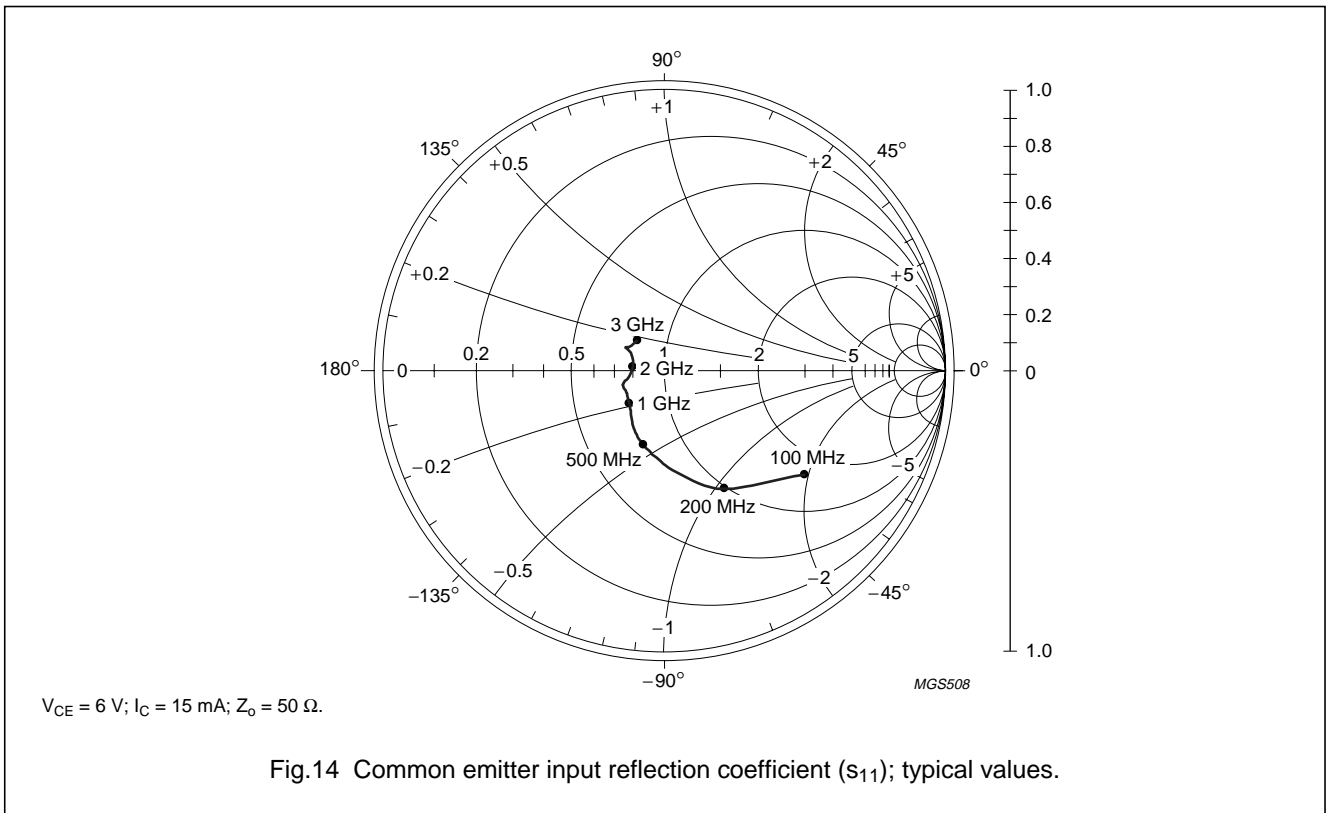


Fig.13 Common emitter available gain, noise and stability circles; typical values.



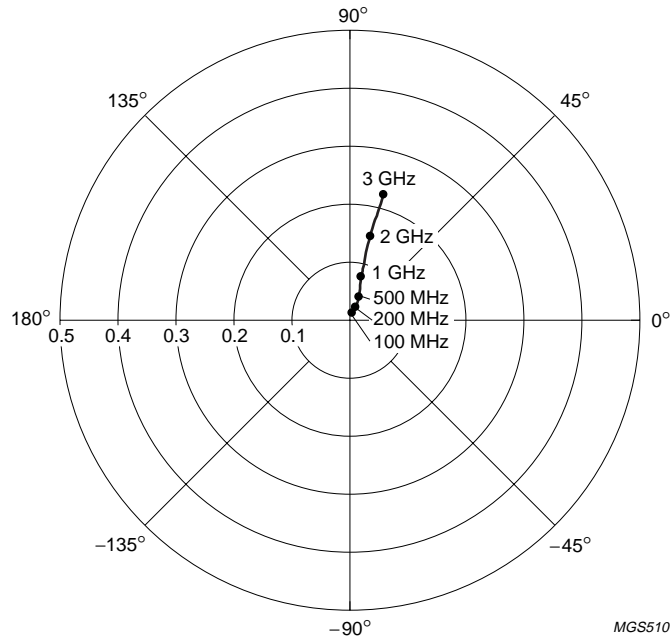
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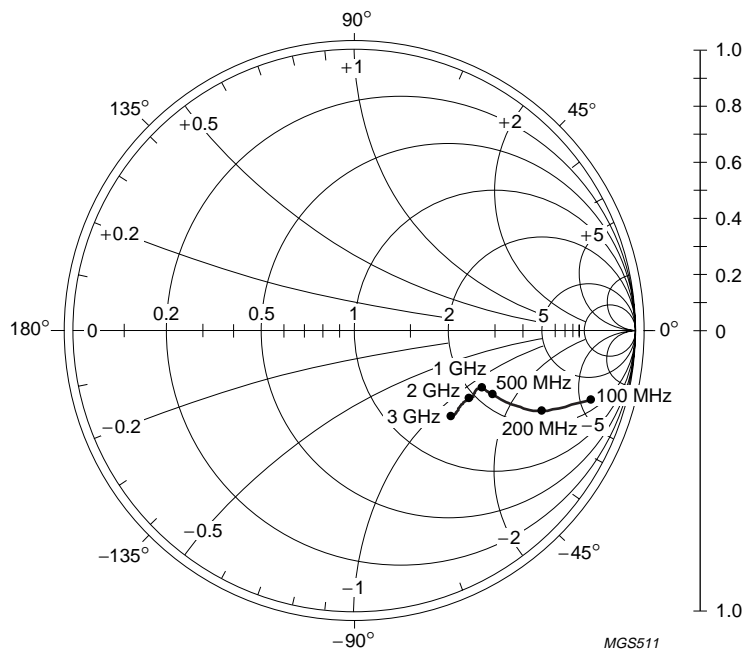
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$V_{CE} = 6\text{ V}; I_C = 15\text{ mA}$ .

MGS510

Fig.16 Common emitter reverse transmission coefficient ( $s_{12}$ ); typical values.



$V_{CE} = 6\text{ V}; I_C = 15\text{ mA}; Z_0 = 50\ \Omega$ .

MGS511

Fig.17 Common emitter output reflection coefficient ( $s_{22}$ ); typical values.

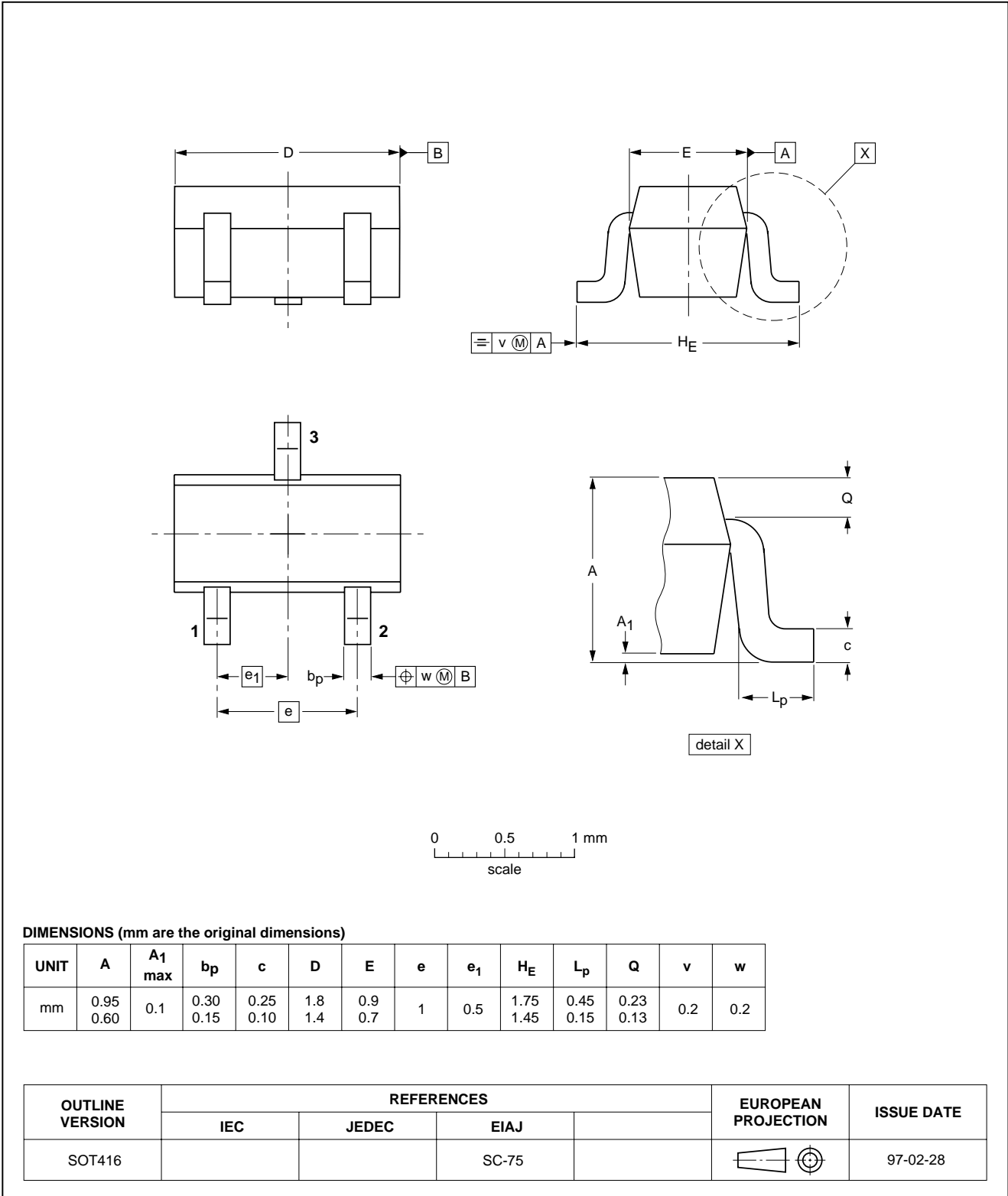
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PACKAGE OUTLINE

Plastic surface mounted package; 3 leads

SOT416



## UHF wideband transistor

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## DATA SHEET STATUS

DATA SHEET STATUS	PRODUCT STATUS	DEFINITIONS <sup>(1)</sup>
Objective specification	Development	This data sheet contains the design target or goal specifications for product development. Specification may change in any manner without notice.
Preliminary specification	Qualification	This data sheet contains preliminary data, and supplementary data will be published at a later date. Philips Semiconductors reserves the right to make changes at any time without notice in order to improve design and supply the best possible product.
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## Note

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**NOTES**

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