HUIYEE ELECTRONIC

Approved by:
Checked by:
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SPECIFICATION

PRODUCT: NPN 9.0GHz wideband transistor

MODEL: MAQ540 S OT89

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FEATURES

- High gain
- High output voltage
- Low noise
- Gold metallization ensures excellent reliability
- Low thermal resistance.

APPLICATIONS

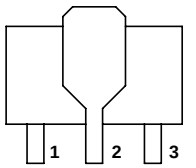
- VHF, UHF and CATV amplifiers.

DESCRIPTION

NPN wideband dual transistor in a plastic SOT89 package.

PINNING

PIN	DESCRIPTION
1	emitter
2	collector
3	base



Bottom view MBK514

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	60	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 figur	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.

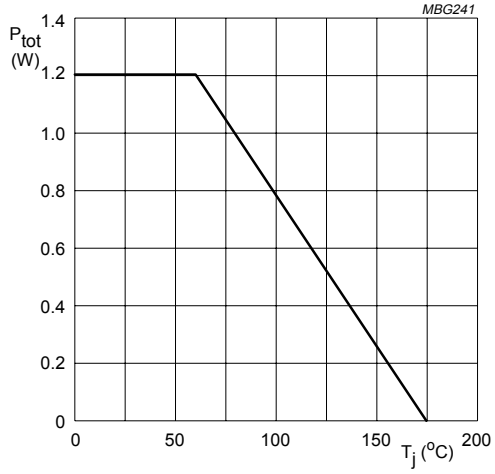
LIMITING VALUES

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

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.

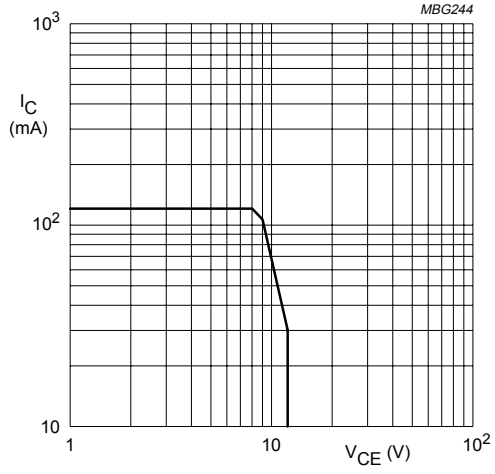


Fig.3 SOAR.

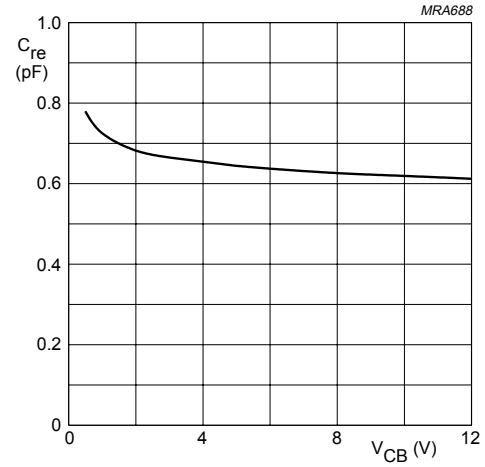
CHARACTERISTICS

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	60	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 figur	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; $\Gamma_S = \Gamma_{opt}$	–	1.9	2.4	dB

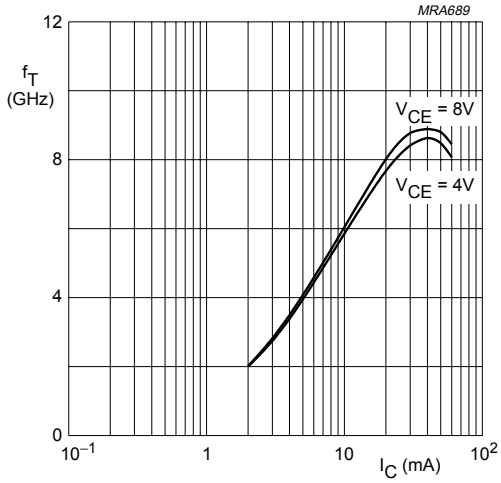
Notes

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.



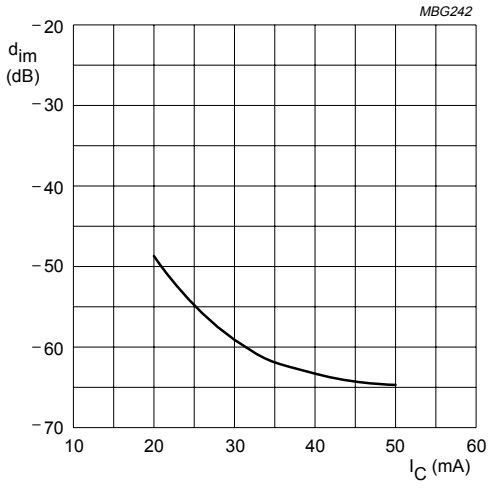
I_C = 0; f = 1 MHz.

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



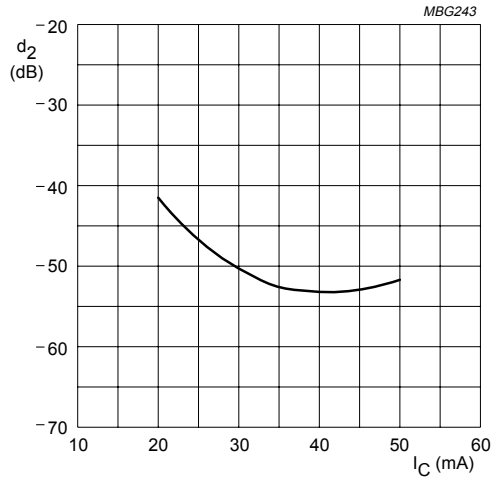
f = 1 GHz; T_{amb} = 25 °C.

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.