

M A T181T

This item can replace **BFR181T**

Approved by:
Checked by:
Issued by:

SPECIFICATION

PRODUCT: NPN 8GHz wideband transistor

MODEL: M A T181 SOT523

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MICROWAVE CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Transition Frequency	$f_T(1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	5	7	—	GHz
	$f_T(2)$	$V_{CE} = 3\text{ V}, I_C = 10\text{ mA}$	7	10	—	
Insertion Gain	$ S_{21e} ^2(1)$	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA},$ $f = 2\text{ GHz}$	—	5.5	—	dB
	$ S_{21e} ^2(2)$	$V_{CE} = 3\text{ V}, I_C = 20\text{ mA},$ $f = 2\text{ GHz}$	6	8	—	
Noise Figure	NF (1)	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA},$ $f = 2\text{ GHz}$	—	1.7	3	dB
	NF (2)	$V_{CE} = 3\text{ V}, I_C = 7\text{ mA},$ $f = 2\text{ GHz}$	—	1.4	2.2	

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Collector Cut-off Current	I_{CBO}	$V_{CB} = 5\text{ V}, I_E = 0$	—	—	0.1	μA
Emitter Cut-off Current	I_{EBO}	$V_{EB} = 1\text{ V}, I_C = 0$	—	—	1	μA
DC Current Gain	h_{FE}	$V_{CE} = 1\text{ V}, I_C = 5\text{ mA}$	80	—	160	—
Reverse Transfer Capacitance	C_{re}	$V_{CB} = 1\text{ V}, I_E = 0, f = 1\text{ MHz}$ (Note)	—	0.75	1.1	pF

(Note) : C_{re} is measured by 3 terminal method with capacitance bridge.

CAUTION

This device electrostatic sensitivity. Please handle with caution.

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Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified.

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC characteristics (verified by random sampling)					
Transition frequency $I_C = 10\text{ mA}$, $V_{CE} = 8\text{ V}$, $f = 500\text{ MHz}$	f_T	6	8	-	GHz
Collector-base capacitance $V_{CB} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{cb}	-	0.26	0.4	pF
Collector-emitter capacitance $V_{CE} = 10\text{ V}$, $f = 1\text{ MHz}$	C_{ce}	-	0.17	-	
Emitter-base capacitance $V_{EB} = 0.5\text{ V}$, $f = 1\text{ MHz}$	C_{eb}	-	0.3	-	
Noise figure $I_C = 2\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	F	-	1.45 1.8	-	dB
Power gain, maximum stable ¹⁾ $I_C = 5\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 900\text{ MHz}$	G_{ms}	-	19.5	-	
Power gain, maximum available ²⁾ $I_C = 5\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$, $f = 1.8\text{ GHz}$	G_{ma}	-	13.5	-	
Transducer gain $I_C = 5\text{ mA}$, $V_{CE} = 8\text{ V}$, $Z_S = Z_L = 50\Omega$, $f = 900\text{ MHz}$ $f = 1.8\text{ GHz}$	$ S_{21e} ^2$	-	15.5 10.5	-	

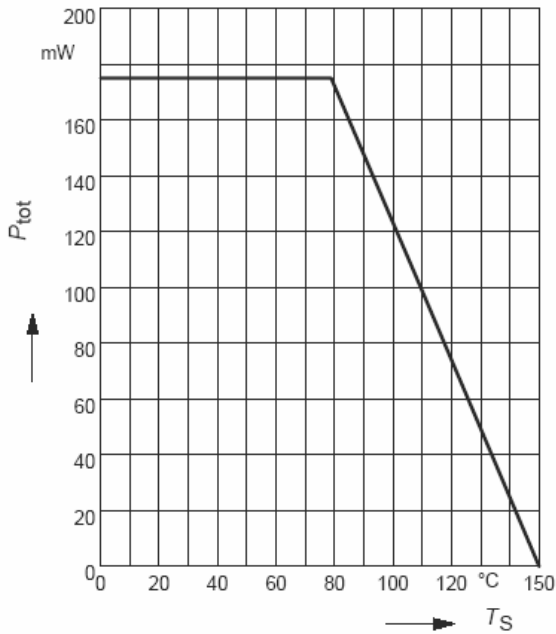
$$^1G_{ms} = |S_{21} / S_{12}|$$

$$^2G_{ma} = |S_{21} / S_{12}| (k - (k^2 - 1)^{1/2})$$

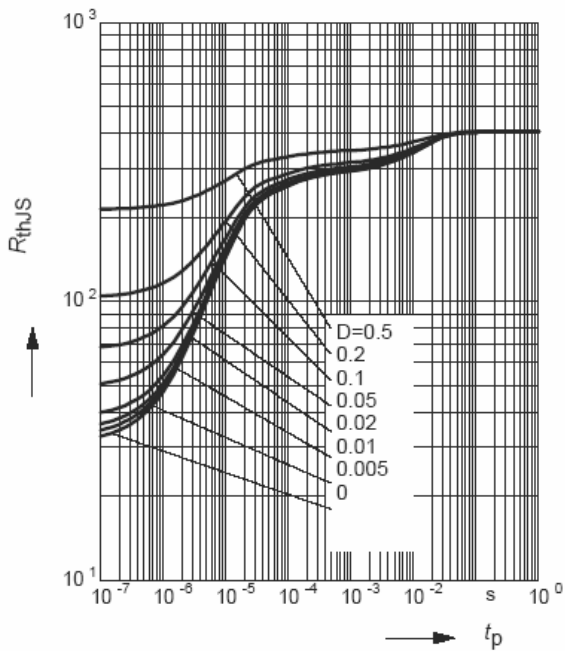
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Total power dissipation $P_{tot} = f(T_S)$

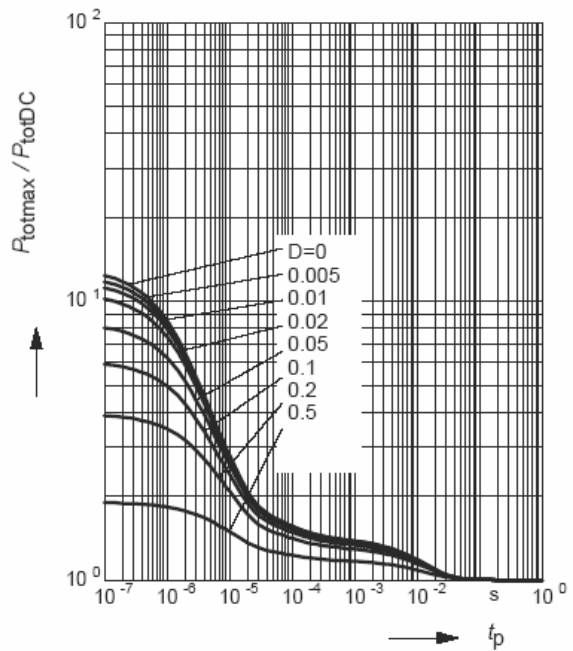


Permissible Pulse Load $R_{thJS} = f(t_p)$



Permissible Pulse Load

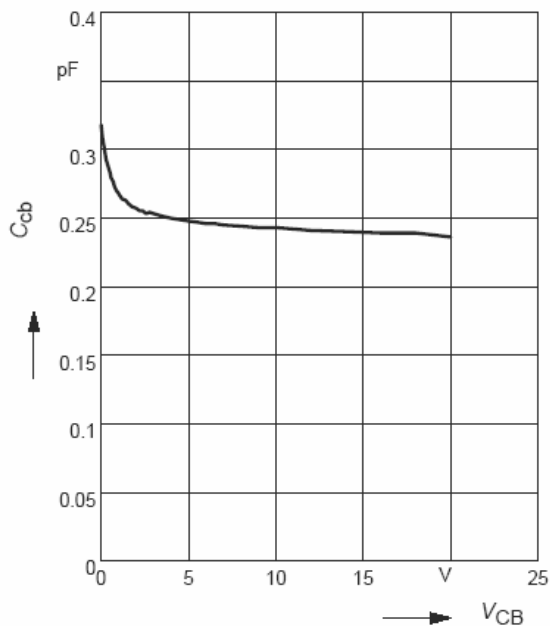
$P_{totmax}/P_{totDC} = f(t_p)$



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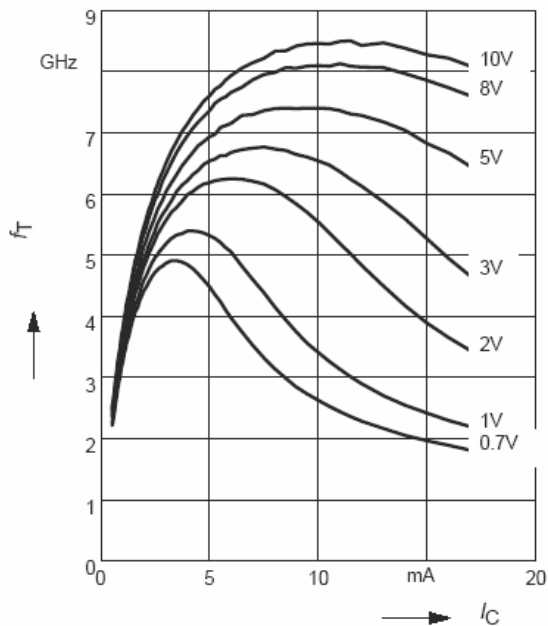
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Collector-base capacitance $C_{cb} = f(V_{CB})$
 $f = 1\text{MHz}$

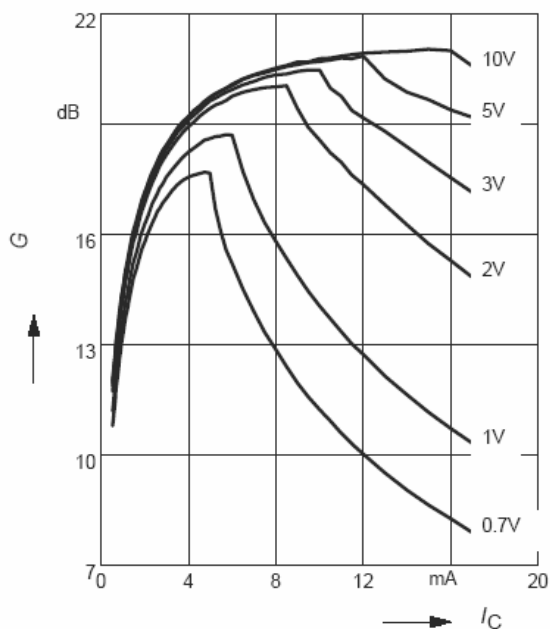


Transition frequency $f_T = f(I_C)$

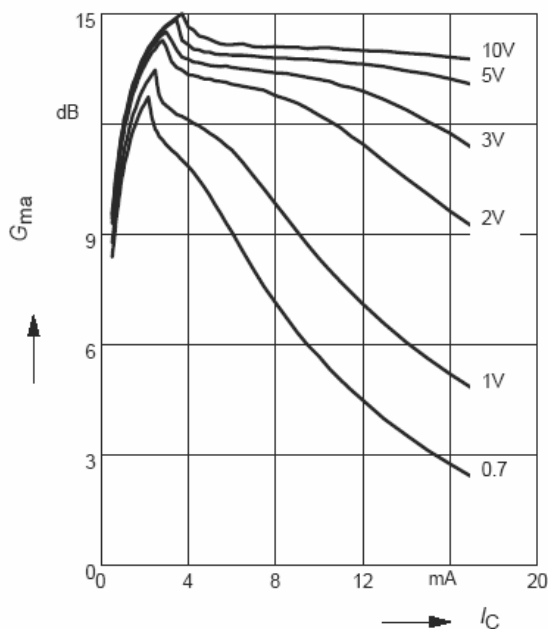
$V_{CE} = \text{Parameter}$



Power Gain $G_{ma}, G_{ms} = f(I_C)$
 $f = 0.9\text{GHz}$
 $V_{CE} = \text{Parameter}$



Power Gain $G_{ma}, G_{ms} = f(I_C)$
 $f = 1.8\text{GHz}$
 $V_{CE} = \text{Parameter}$



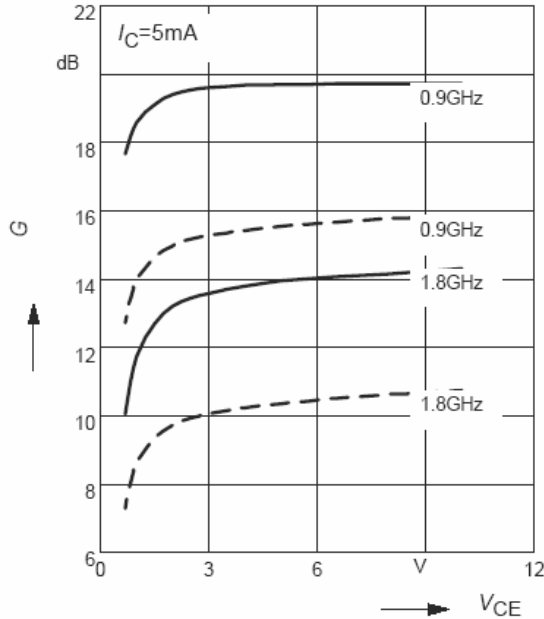
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Power Gain $G_{ma}, G_{ms} = f(V_{CE})$: _____

$|S_{21}|^2 = f(V_{CE})$: -----

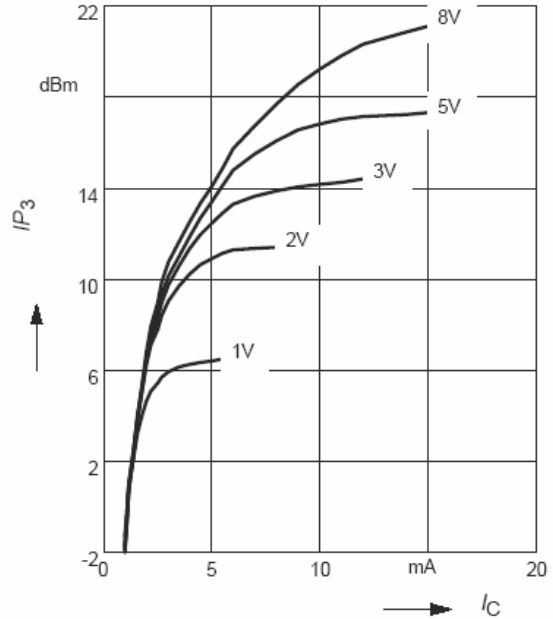
f = Parameter



Intermodulation Intercept Point $IP_3 = f(I_C)$

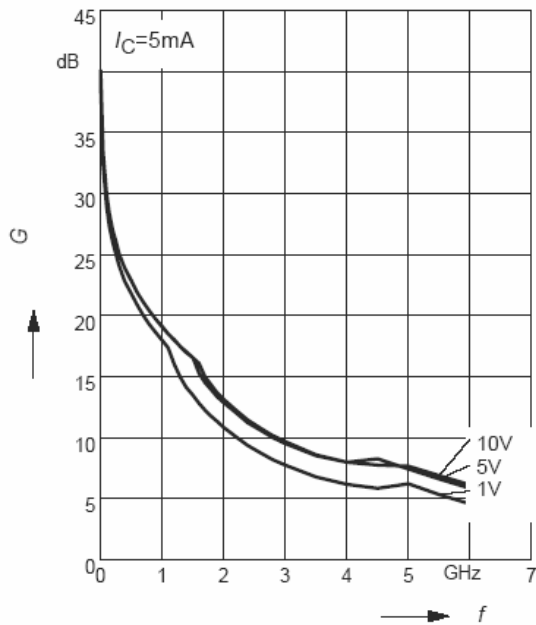
(3rd order, Output, $Z_S = Z_L = 50\Omega$)

V_{CE} = Parameter, $f = 900MHz$



Power Gain $G_{ma}, G_{ms} = f(f)$

V_{CE} = Parameter



Power Gain $|S_{21}|^2 = f(f)$

V_{CE} = Parameter

