WANGFENG ELECTRON

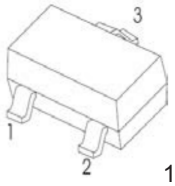
旺峰电子

2N3904

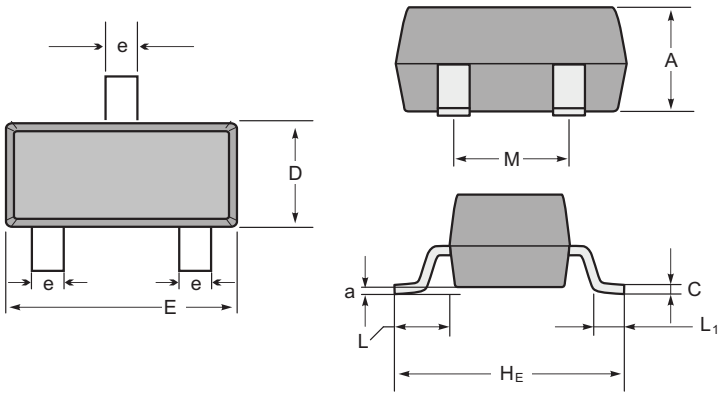
NPN TRANSISTOR

FEATURES

- Complementary to MMBT3906



1.BASE
2.EMITTER
3.COLLECTOR



SOT-23 mechanical data

UNIT		A	C	D	E	H_E	e	M	L	L_1	a
mm	max	1.1	0.15	1.4	3.0	2.6	0.5	1.95	0.55 (ref)	0.36 (ref)	0.0
	min	0.9	0.08	1.2	2.8	2.2	0.3	1.7			0.15
mil	max	43	6	55	118	102	20	77	22 (ref)	14 (ref)	0.0
	min	35	3	47	110	87	12	67			6

Marking

Type number	Marking code
2N3904	1AM

MAXIMUM RATINGS (Ta=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Collector–Base Voltage	V_{CBO}	60	V
Collector–Emitter Voltage	V_{CEO}	40	V
Emitter–Base Voltage	V_{EBO}	6	V
Collector Current — Continuous	I_C	200	mA
Collector Power Dissipation	P_C	200	mW
Thermal Resistance From Junction To Ambient	R_{thJA}	625	℃/W
Operation Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	℃

2N3904

CLASSIFICATION OF h_{FE}

HFE	100-300	
Rank	L	H
Range	100-200	200-300

ELECTRICAL CHARACTERISTICS (TA = 25°C unless otherwise noted.)

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	I_C = 10uA, I_E = 0	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	I_C = 1 mA, I_B = 0	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	I_E = 10uA, I_C = 0	6			V
Collector cut-off current	I_{CEX}	V_{CE} = 30V, $V_{BE(off)}$ =3V			50	nA
Collector cut-off current	I_{CBO}	V_{CB} = 60V, I_E = 0			100	nA
Emitter cut-off current	I_{EBO}	V_{EB} = 5V, I_C =0			100	nA
DC current gain	h_{FE1}	V_{CE} = 1V, I_C=10mA	100		300	
	h_{FE2}	V_{CE} = 1V, I_C = 50mA	60			
	h_{FE3}	V_{CE} = 1V, I_C = 100mA	30			
Collector-emitter saturation voltage	$V_{CE(sat)}$	I_C = 50mA, I_B = 5mA			0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	I_C = 50mA, I_B = 5mA			0.95	V
Transition frequency	f_T	V_{CE} = 20V, I_C = 10mA, f=100MHz	300			MHZ
Delay time	t_d	V_{CC}=3V,$V_{BE(off)}$=-0.5V I_C=10mA,I_{B1}=1mA			35	ns
Rise time	t_r				35	ns
Storage time	t_s	V_{CC} = 3V, I_C = 10mA I_{B1}=I_{B2}=1mA			200	ns
Fall time	t_f				50	ns

RATING AND CHARACTERISTIC CURVES (2N3904)

Fig.1 Static characteristics

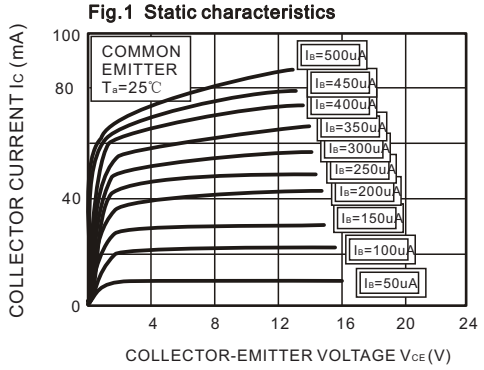


Fig.2 P_C —— T_a

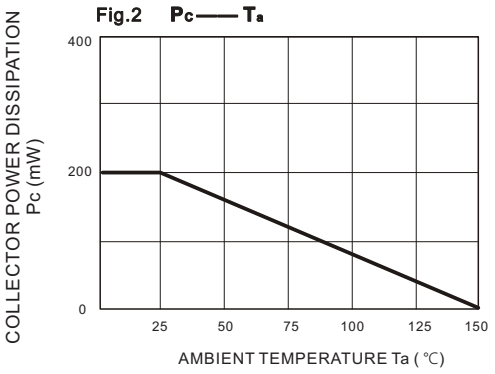


Fig.3 C_{ob} / C_{ib} —— V_{CB} / V_{EB}

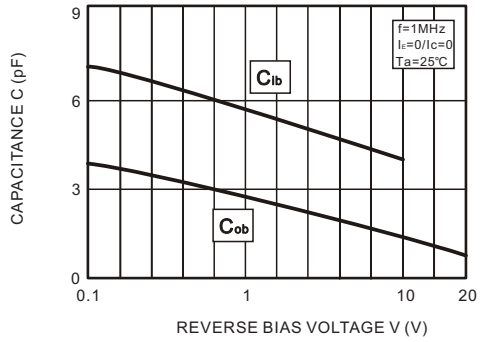


Fig.4 V_{CEsat} —— I_C

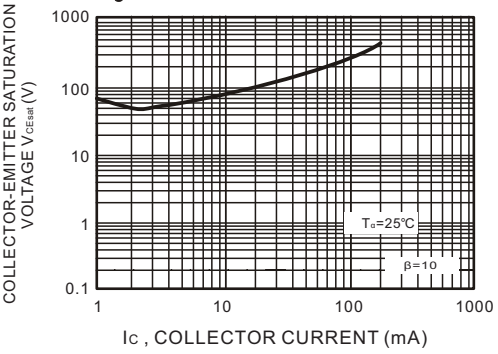


Fig.5 h_{FE}--I_C

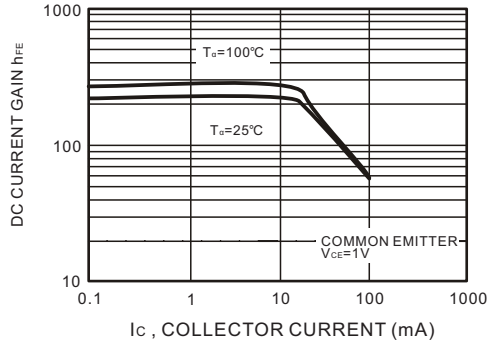


Fig.6 V_{BEsat} —— I_C

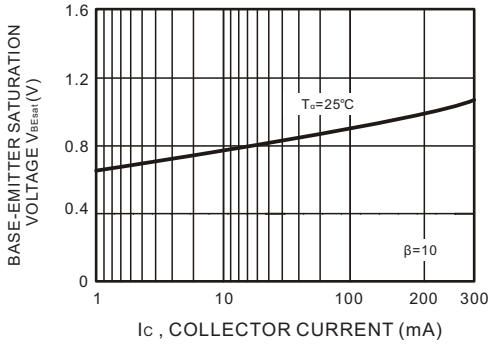


Fig.7 I_C —— V_{BE}

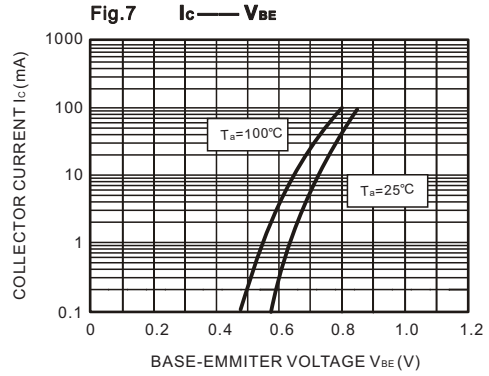


Fig.8 f_T ——I_C