Hottech Semiconductor

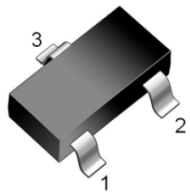
HABT3904(NPN)

SWITCHING TRANSISTOR

REPLACEMENT TYPE : MMBT3904

FEATURES

- NPN Silicon Epitaxial Planar Transistor
- for switching and amplifier applications.
- Complement to HABT3906(PNP)



SOT-23 MARKING : 1AM

1: BASE 2: EMITTER 3: COLLECTOR

MAXIMUM RATINGS (T_A =25°C 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 Junction to Ambient	$R_{\theta JA}$	625	°C
Junction Temperature	T_J	150	°C
Storage Temperature	T_{stg}	-55to+150	°C

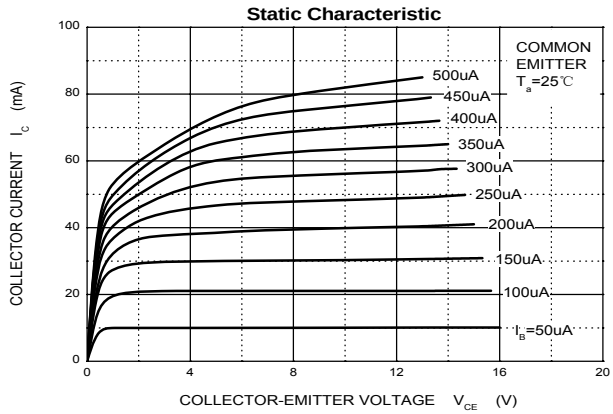
ELECTRICAL CHARACTERISTICS (T_A =25°C unless otherwise noted)

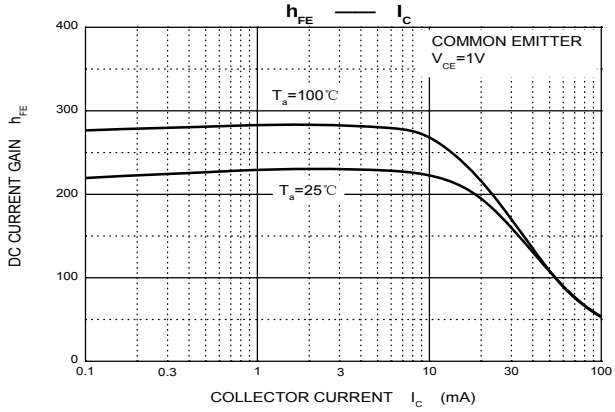
Parameter	Symbol	Test conditions	Min	Max	Unit
Collector-Base Breakdown Voltage	V_{CBO}	I_C= 10mA , I_E=0	60		v
Collector-Emitter Breakdown Voltage	V_{CEO}	I_C= 1mA , I_B=0	40		v
Emitter-base Breakdown Voltage	V_{EBO}	I_E=10μA , I_C=0	6		v
Collector Cut-off Current	I_{CBO}	V_{CB}=60V , I_E=0		0.1	μA
Collector Cut-off Current	I_{CEO}	V_{CE}=30V , $V_{BE(off)}$=3V		50	μA
Emitter Cut-off Current	I_{EBO}	V_{EB}=5V , I_C=0		0.1	μA
DC Current Gain	$h_{FE(1)}$	V_{CE}=1V , I_C=10mA	100	300	
DC Current Gain	$h_{FE(2)}$	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}=-0.5V		35	nS
Rise Time	t_r	I_C=10mA , I_{B1}=-IB2=1.0mA		35	nS
Storage Time	t_s	V_{CC}=3V , I_C=10mA,		200	nS
Fall Time	t_f	I_{B1}=-I_{B2}=1mA		50	nS

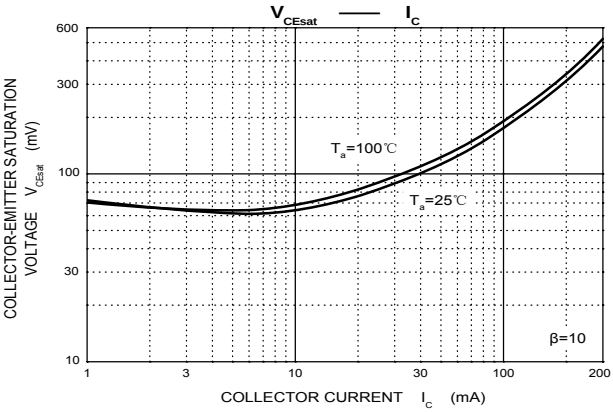
CLASSIFICATION OF h_{FE}

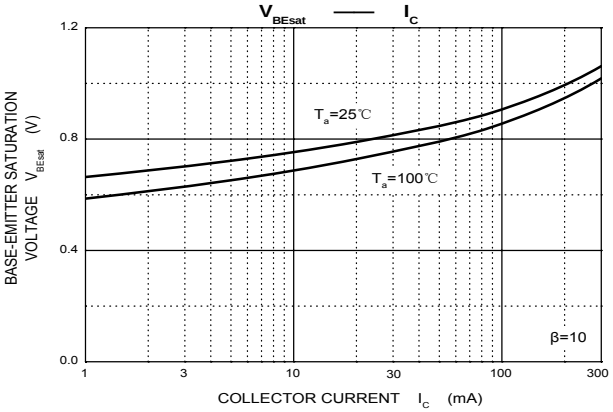
Rank	O	Y	G
Range	120-200	200-300	300-400

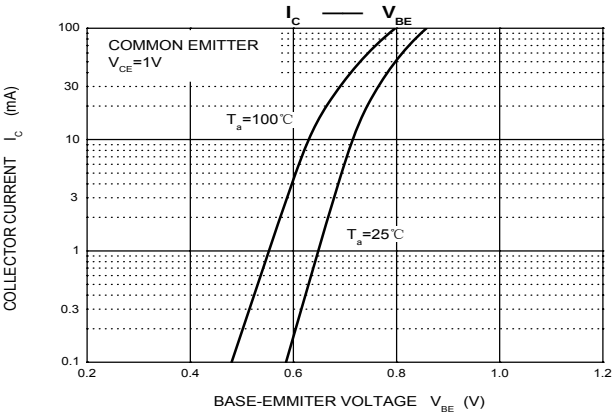
Typical Characteristics

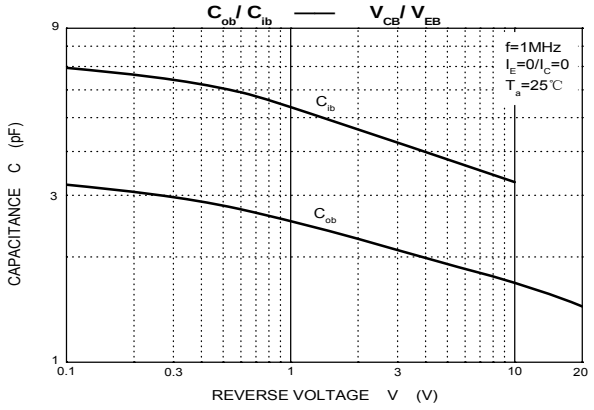


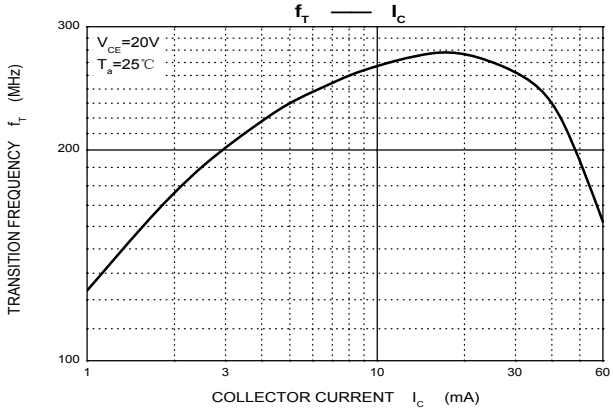


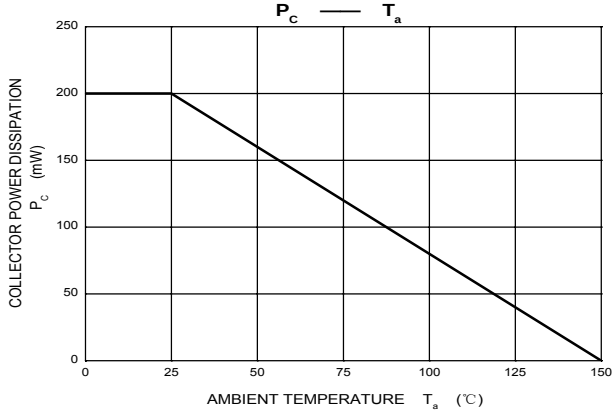




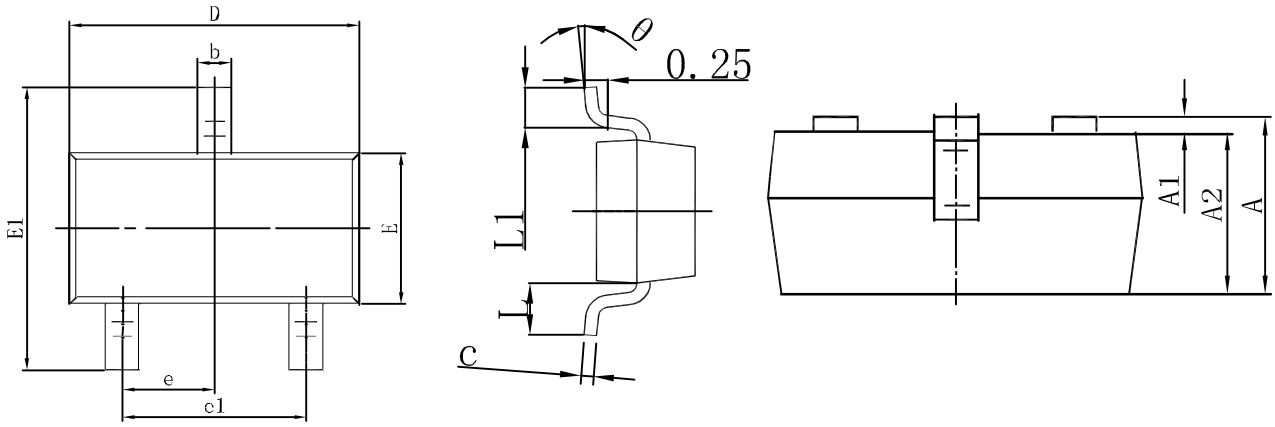






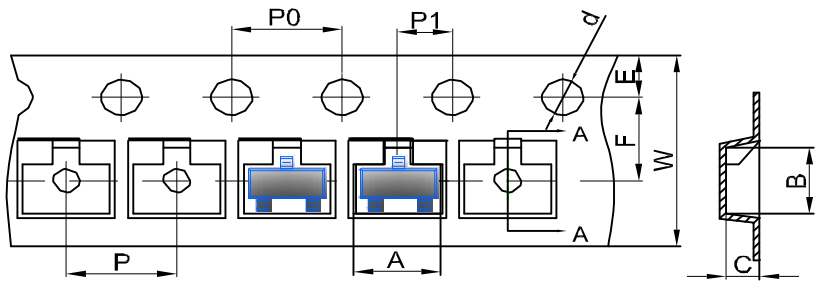


Typical Characteristics



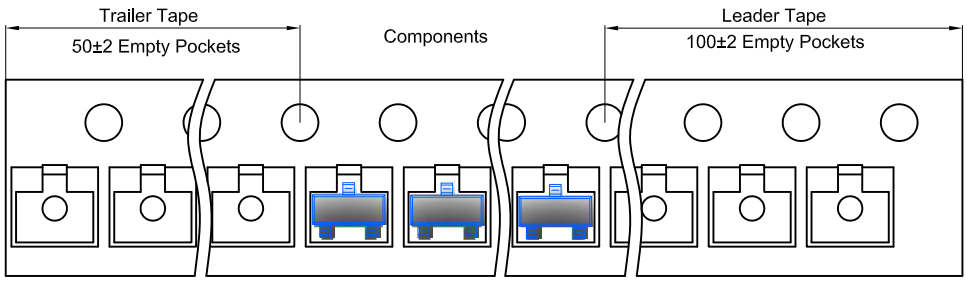
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

SOT-23 Embossed Carrier Tape

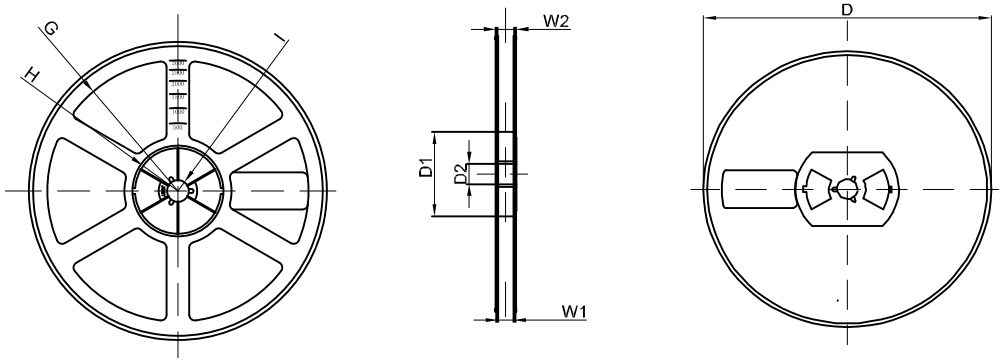


	DIMENSIONS ARE IN MILLIMETER									
TYPE	A	B	C	d	E	F	P0	P	P1	W
SOT-23	3.15	2.77	1.22	φ1.50	1.75	3.50	4.00	4.00	2.00	8.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

SOT-23 Tape Leader and Traller



SOT-23 Reel



	DIMENSIONS ARE IN MILLIMETER							
REEL OPTION	D	D1	D2	G	H	I	W1	W2
7” DIA	φ178	54.40	13.00	R78	R25.60	R6.50	9.50	12.30
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1