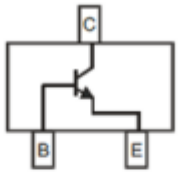
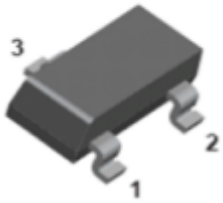
NPN General Purpose Amplifier





SOT-23

Features

- Moisture sensitivity level 1
- Halogen free and RoHS compliant
- Surface mount package ideally suited for automatic insertion

Application

- Signal amplification
- Switching circuit

Mechanical data

- **Package**: SOT-23
- **Terminals**: Tin plated leads, solderable per J-STD-002 and JESD22-B102

■ **Maximum Ratings** (T_a=25℃ Unless otherwise specified)

Item	Symbol	Unit	Conditions	Value
Device marking code				1AM
Collector-base voltage	V_{CBO}	V	I_C=10μA,I_E=0	60
Collector-emitter voltage	V_{CEO}	V	I_C =1mA,I_B=0	40
Emitter-base voltage	V_{EBO}	V	I_E=10μA,I_C=0	6
Collector current	I_C	mA		200
Power dissipation	P_D	mW		350
Junction temperature	T_J	℃		-55 to +150
Storage temperature	T_{STG}	℃		-55 to +150

■ Electrical Characteristics (Ta=25℃ Unless otherwise specified)

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	$V_{(BR)CBO}$	V	I_C=10μA,I_E=0	60		
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	V	I_C =1mA,I_B=0	40		
Emitter-base breakdown voltage	$V_{(BR)EBO}$	V	I_E=10μA,I_C=0	6		
Collector-base cut-off current	I_{CBO}	nA	V_{CB}=60V			50
Collector-emitter cut-off current	I_{CEX}	nA	V_{CE}=30V,V_{EB}=3V			50
DC current gain	h_{FE1}		V_{CE}=1V,I_C=0.1mA	40		
	h_{FE2}		V_{CE}=1V,I_C=1mA	70		
	h_{FE3}		V_{CE}=1V,I_C=10mA	100		300
	h_{FE4}		V_{CE}=1V,I_C=50mA	60		
	h_{FE5}		V_{CE}=1V,I_C=100mA	30		
Collector-emitter saturation voltage	$V_{CE(sat)1}$	V	I_C=10mA,I_B=1mA			0.2
	$V_{CE(sat)2}$	V	I_C=50mA,I_B=5mA			0.3
Base-emitter saturation voltage	$V_{BE(sat)1}$	V	I_C=10mA,I_B=1mA	0.65		0.85
	$V_{BE(sat)2}$	V	I_C=50mA,I_B=5mA			0.95
Transition frequency	f_T	MHz	V_{CE}=20V,I_C=10mA,f=100MHz	300		
Delay time	td	ns	V_{CC}=3V, I_C=10mA, V_{BE}=0.5V, I_{B1}=1mA		35	
Rise time	tr	ns			35	
Storage time	ts	ns	V_{CC}=3V, I_C=10mA, I_{B1}=-I_{B2}=1mA		200	
Fall time	tf	ns			50	
Collector-base output capacitance	Cob	pF	V_{CB}=5V,I_E=0,f=1MHz			4
Emitter-base intput capacitance	Cib	pF	V_{EB}=0.5V,I_C=0,f=1MHz			8

■ Thermal Characteristics

Parameter	Symbol	Unit	Value
Thermal resistance, junction-to-ambient	$R_{\theta J-A}$(1)	℃/W	357
Thermal resistance, junction-to-case	$R_{\theta J-C}$(1)	℃/W	286

Note:

（1）Device mounted on PCB, single-sided copper， with standard footprint

■Characteristics

Fig 1：Static Characteristics

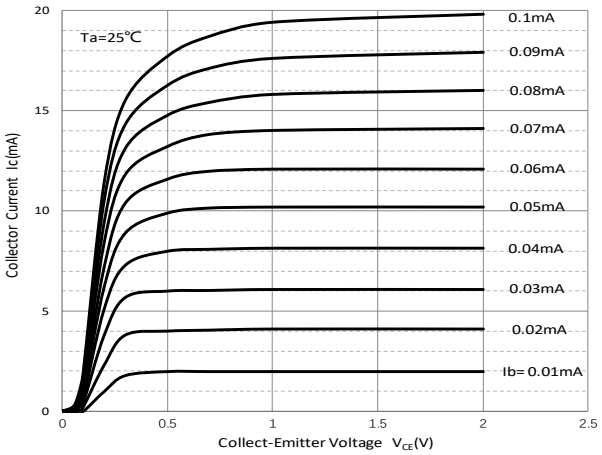


Fig 2：DC Current Gain

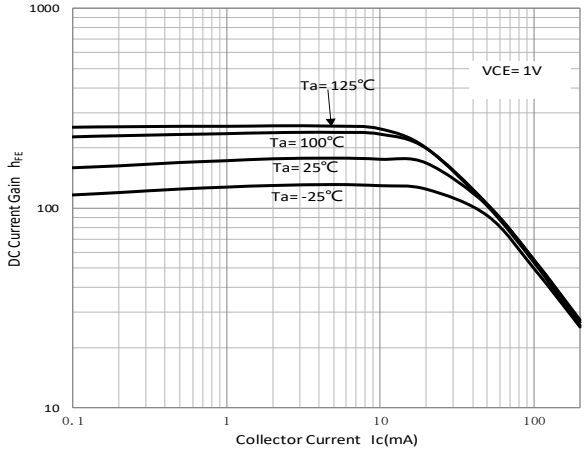


Fig 3：Collector-Emitter Saturation Voltage

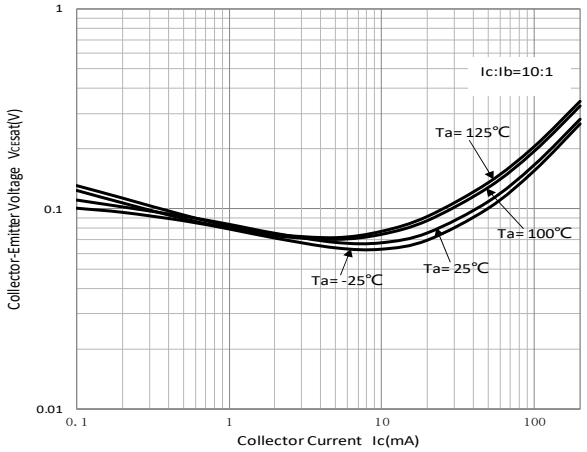


Fig 4：Base-Emitter Saturation Voltage

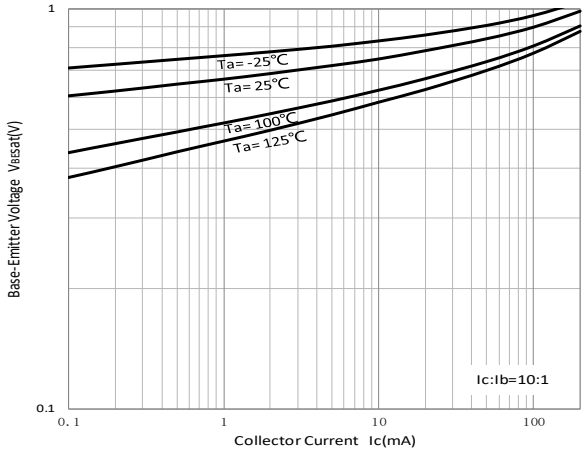


Fig 5：Base-Emitter On Voltage

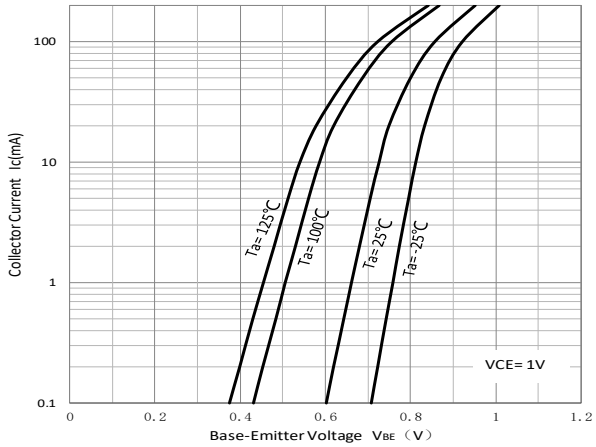
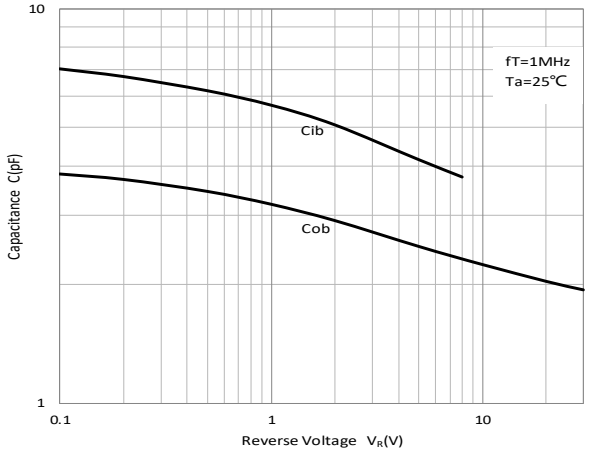
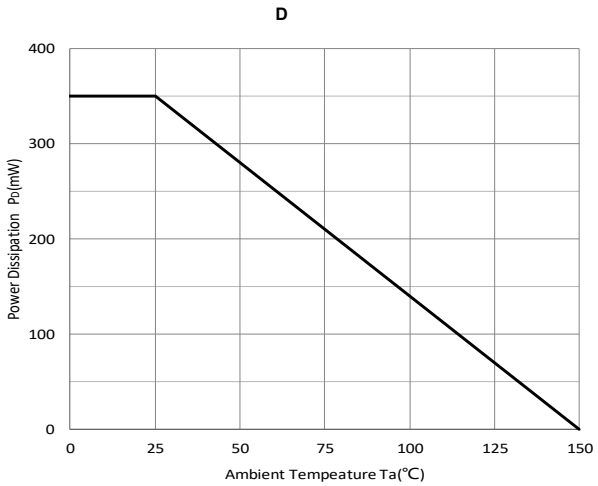


Fig 6：Cob/Cib-V_{CB}/V_{EB}

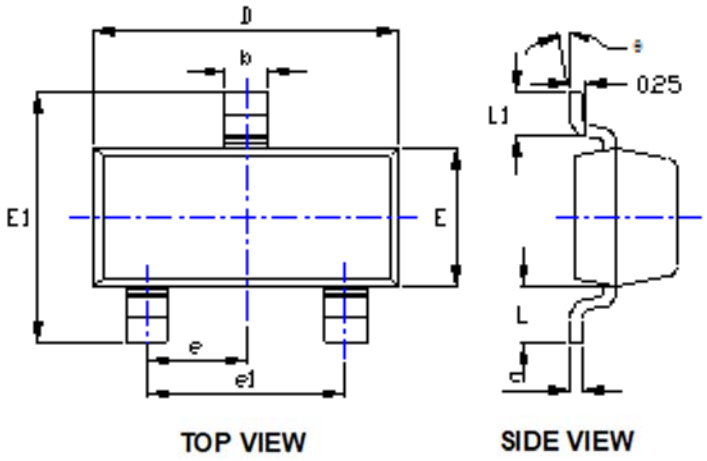



D
400
300
200
100
0
Power Dissipation Pᴅ(mW)
0
25
50
75
100
125
150
Ambient Tempeature Ta(℃)

■Ordering Information

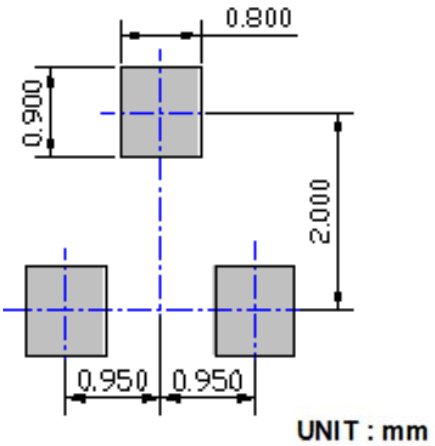
Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMBT3904	F2	Approximate 0.008	3000	30000	120000	7” reel
MMBT3904	F4	Approximate 0.008	10000	/	210000	13” reel

■ Outline Dimensions



DIMENSIONS				
SYMBOL	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.035	0.045	0.900	1.150
A1	0.000	0.004	0.000	0.100
A2	0.035	0.041	0.900	1.050
b	0.012	0.020	0.300	0.500
c	0.004	0.008	0.100	0.200
D	0.110	0.118	2.800	3.000
E	0.047	0.055	1.200	1.400
E1	0.089	0.100	2.250	2.550
e	0.037TYP		0.950TYP	
e1	0.071	0.079	1.800	2.000
L	0.022REF		0.550REF	
L1	0.012	0.020	0.300	0.500
θ	0°	8°	0°	8°

■ Suggested Pad Layout



Notice

All products, product specifications and data are subject to change without notice to improve reliability, function or design or otherwise. Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in STARSEA's terms and conditions of sale for such products, STARSEA assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of STARSEA products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.