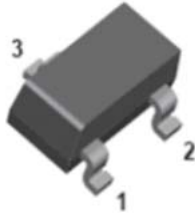
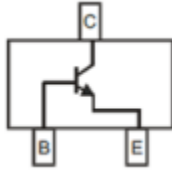


NPN Transistor



SOT-23-3L

Features

- Moisture sensitivity level 1
- Halogen free and RoHS compliant
- Surface mount package ideally suited for automatic insertion
- Epoxy meets UL-94 V-0 flammability rating

Application

- Signal amplification
- Switching circuit

Mechanical data

- **Package:** SOT-23-3L
- **Terminals:** Tin plated leads, solderable per J-STD-002 and JESD22-B102

■ Maximum Ratings ($T_a=25^{\circ}\text{C}$ Unless otherwise specified)

Item	Symbol	Unit	Conditions	Value
Device marking code				1P
Collector-base voltage	V_{CBO}	V	$I_C=10\mu\text{A}, I_E=0$	75
Collector-emitter voltage	V_{CEO}	V	$I_C=10\text{mA}, I_B=0$	40
Emitter-base voltage	V_{EBO}	V	$I_E=10\mu\text{A}, I_C=0$	6
Collector current	I_C	mA		600
Power dissipation	P_D	mW		500
Junction temperature	T_J	$^{\circ}\text{C}$		-55 to +150
Storage temperature	T_{STG}	$^{\circ}\text{C}$		-55 to +150



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■ Electrical Characteristics (T_a=25°C Unless otherwise specified)

Item	Symbol	Unit	Conditions	Min	Typ	Max
Collector-base breakdown voltage	V _{(BR)CBO}	V	I _C =10μA, I _E =0	75		
Collector-emitter breakdown voltage	V _{(BR)CEO}	V	I _C =10mA, 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			100
Emitter-base cut-off current	I _{EBO}	nA	V _{EB} =3V			100
Collector-emitter cut-off current	I _{CEX}	nA	V _{CE} =60V, V _{EB} =3V			10
DC current gain	h _{FE1}		V _{CE} =10V, I _C =0.1mA	35		
	h _{FE2}		V _{CE} =10V, I _C =1mA	50		
	h _{FE3}		V _{CE} =10V, I _C =10mA	80		
	h _{FE4}		V _{CE} =10V, I _C =150mA	100		300
	h _{FE5}		V _{CE} =10V, I _C =150mA	50		
	h _{FE6}		V _{CE} =10V, I _C =500mA	40		
Collector-emitter saturation voltage	V _{CE(sat)}	V	I _C =150mA, I _B =15mA			0.3
Base-emitter saturation voltage	V _{BE(sat)}	V	I _C =150mA, I _B =15mA	0.6		1.2
Transition frequency	f _T	MHz	V _{CE} =20V, I _C =20mA, f=100MHz	300		
Delay time	td	ns	V _{CC} =30V, I _C =150mA, V _{BE(off)} =-0.5V, I _{B1} =15mA			15
Rise time	tr	ns				25
Storage time	ts	ns	V _{CC} =30V, I _C =150mA, I _{B1} =-I _{B2} =15mA			225
Fall time	tf	ns				60

■ Thermal Characteristics

Parameter	Symbol	Unit	Min	Typ	Max
Thermal resistance, junction-to-ambient	R _{θJ-A} ⁽¹⁾	°C/W			250
Thermal resistance, junction-to-case	R _{θJ-C} ⁽¹⁾	°C/W			200

Note:

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



■ Characteristics

Fig 1: Static Characteristics

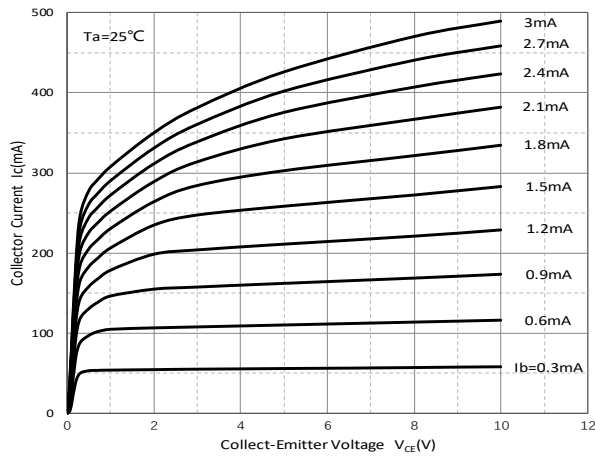


Fig 2: DC Current Gain

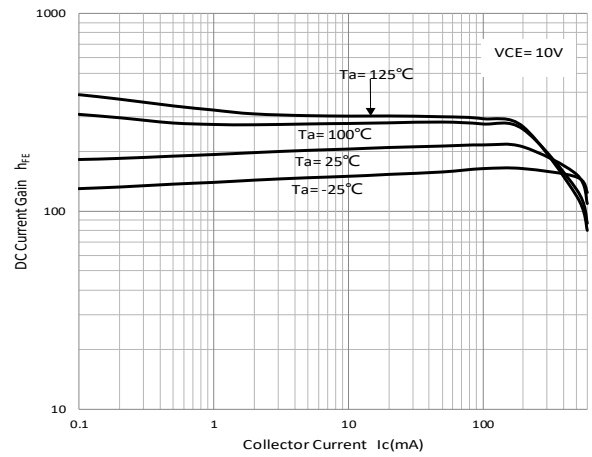


Fig 3: Collector-Emitter Saturation Voltage

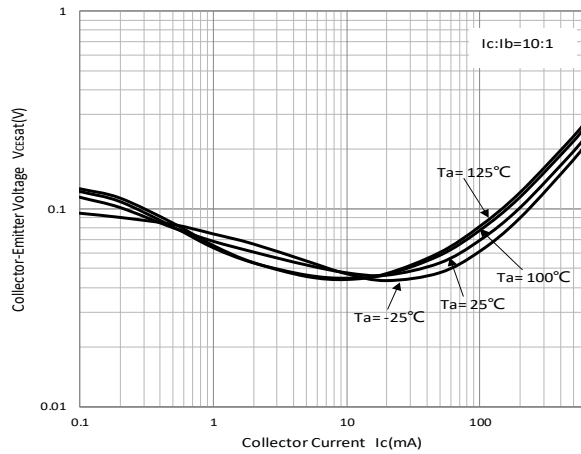


Fig 4: Base-Emitter Saturation Voltage

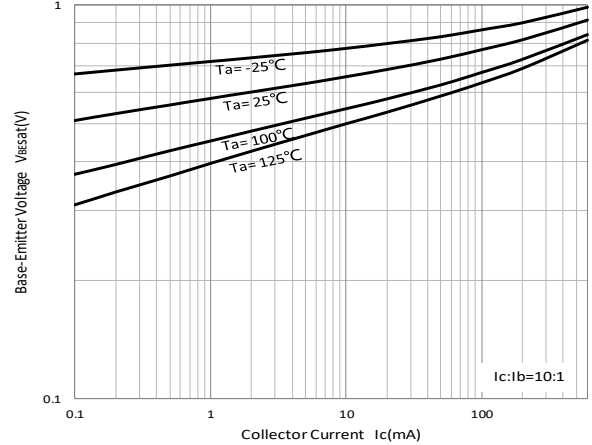


Fig 5: Base-Emitter On Voltage

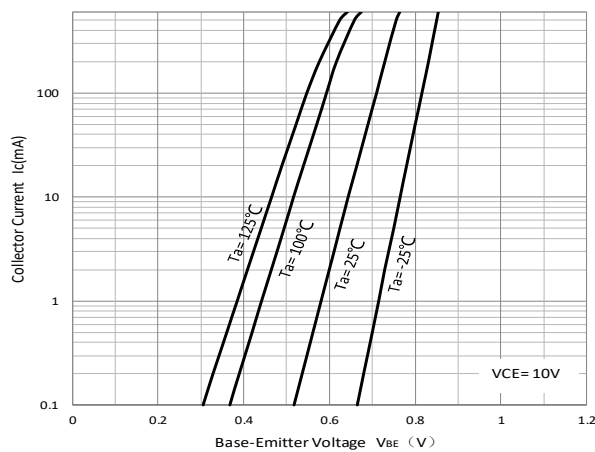
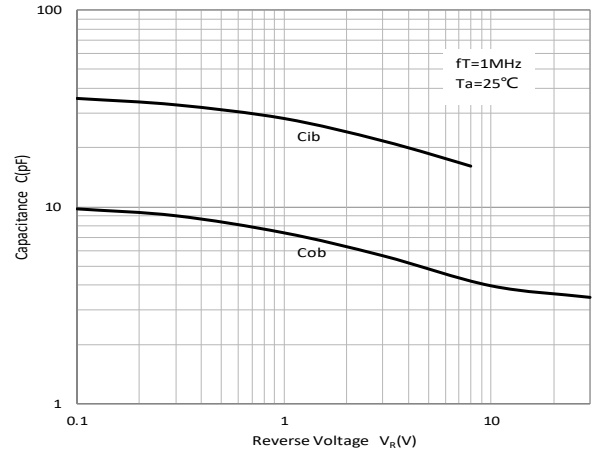


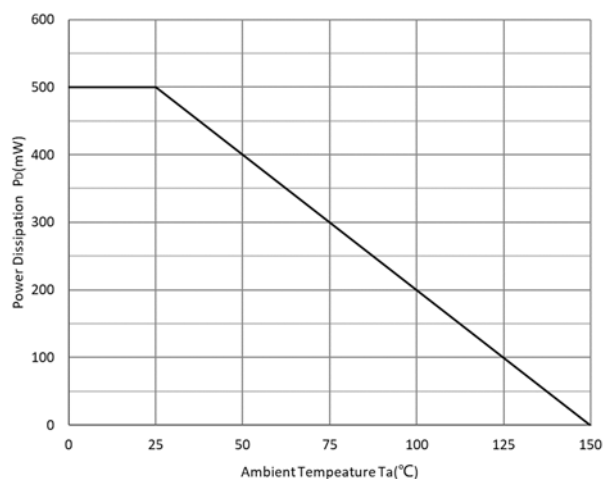
Fig 6: Cob/Cib-Vcb/Veb





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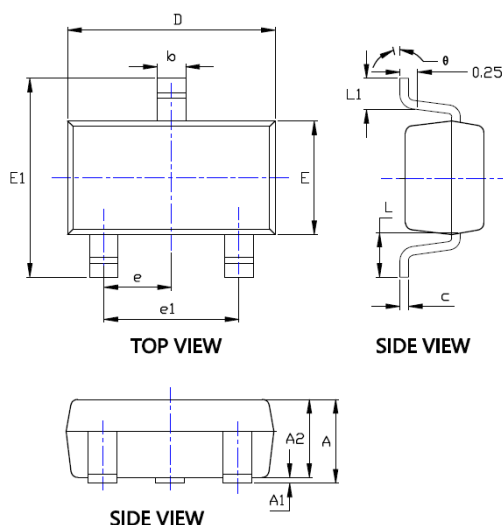
Fig 7: P_D - T_a Curve



■ Ordering Information

Preferred P/N	Packing code	Unit weight(g)	Minimum package(pcs)	Inner box quantity(pcs)	Outer carton quantity(pcs)	Delivery mode
MMBT2222AK	F2	Approximate 0.014	3000	30000	120000	7" reel

■ Outline Dimensions

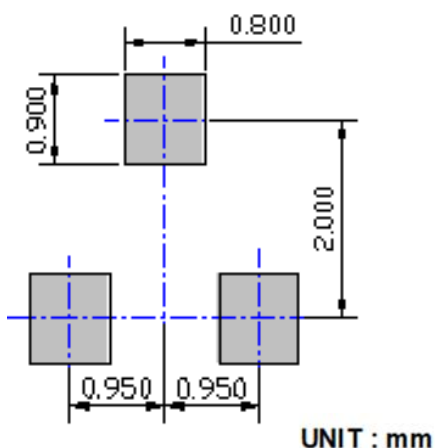


SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.041	0.049	1.050	1.250
A1	0.000	0.008	0.000	0.200
A2	0.041	0.045	1.050	1.150
b	0.012	0.020	0.300	0.500
c	0.004	0.008	0.100	0.200
D	0.111	0.119	2.820	3.020
E	0.059	0.067	1.500	1.700
E1	0.104	0.116	2.650	2.950
e	0.037TYP		0.950TYP	
e1	0.071	0.079	1.800	2.000
L	0.024REF		0.600REF	
L1	0.012	0.024	0.300	0.600
∅	0°	8°	0°	8°

Note:

- All dimensions are in millimeters (mm) unless otherwise specified.
[所有尺寸均以毫米为单位，除非另有说明]
- General tolerances: $\pm 0.10\text{mm}$ unless otherwise specified.
[通用公差为 $\pm 0.10\text{mm}$ ，除非另有说明]
- Dimensions and tolerances per ASME Y14.5M-2018.
[尺寸和公差遵循 ASME Y14.5M-2018 标准]
- All dimensions shown are exclusive of burrs and gate residues. Burrs and gate vestiges shall not exceed 0.15 mm in maximum.
[所有尺寸均不包括毛刺和浇口残留。毛刺与浇口残留的尺寸最大不得超过 0.15mm]
- Dimension b does not include dambar protrusion of max 0.100 mm per side.
[尺寸b不包括单边最大0.100 mm的中筋凸出部分]
- Dimensions D and E are the overall extreme outer dimensions of the mold compound. These dimensions exclude mold flash, lead flash, protrusions and burrs but include the maximum allowable mold mismatch.
[D和E是塑封体的外部极限尺寸，不包括包封溢料、内引线溢料、凸出部分以及胶体毛刺，但是包含了包封错位的最大尺寸]
- Formed leads shall be planar with respect to one another within a maximum of 0.076 mm relative to the seating plane.
[成型的管脚应为同一平面，共面性最大为0.1mm]

■ Suggested Pad Layout





MMBT2222AK

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