



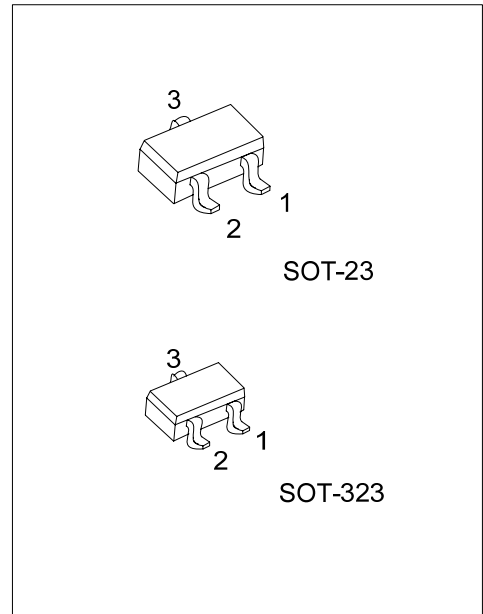
# MMBT3904

## NPN SILICON TRANSISTOR

### GENERAL PURPOSE APPLICATION

#### ■ FEATURES

- \* Collector-Emitter Voltage:  $V_{CEO}=40V$
- \* Collector Dissipation:  $P_D(MAX)=350mW$
- \* Complementary to UTC MMBT3906



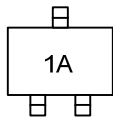
\*Pb-free plating product number: MMBT3904L

#### ■ ORDERING INFORMATION

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
MMBT3904-AE3-R	MMBT3904L-AE3-R	SOT-23	E	B	C	Tape Reel
MMBT3904-AL3-R	MMBT3904L-AL3-R	SOT-323	E	B	C	Tape Reel

<p>MMBT3904L-AE3-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Plating</p>	<p>(1) R: Tape Reel (2) AE3: SOT-23, AL3: SOT-323 (3) L: Lead Free Plating, Blank: Pb/Sn</p>
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#### ■ MARKING



■ ABSOLUTE MAXIMUM RATING (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Base Voltage	V <sub>CBO</sub>	60	V
Collector-Emitter Voltage	V <sub>CEO</sub>	40	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Collector Current	I <sub>C</sub>	200	mA
Collector Dissipation	P <sub>C</sub>	350	mW
Junction Temperature	T <sub>J</sub>	+150	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +150	°C

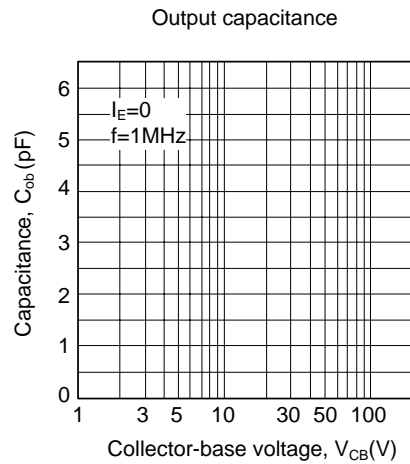
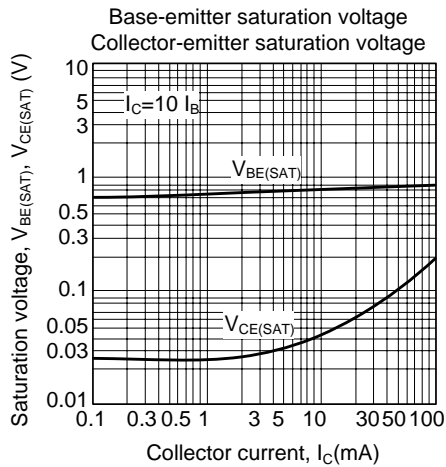
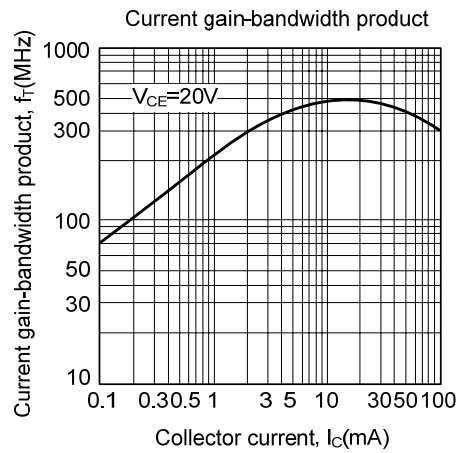
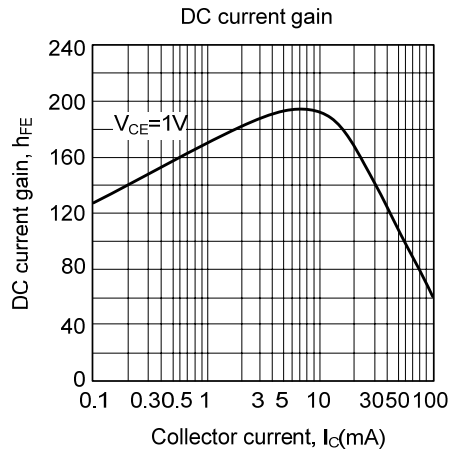
Note Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector Cut-off Current	I <sub>CEX</sub>	V <sub>CE</sub> =30V, V <sub>EB</sub> =3V			50	nA
Base Cut-off Current	I <sub>BL</sub>	V <sub>CE</sub> =30V, V <sub>EB</sub> =3V			50	nA
Collector-base breakdown voltage	V <sub>CBO</sub>	I <sub>C</sub> =10μA, I <sub>E</sub> =0	60			V
Collector-emitter breakdown voltage (note)	V <sub>CEO</sub>	I <sub>C</sub> =1mA, I <sub>B</sub> =0	40			V
Emitter-base breakdown voltage	V <sub>EBO</sub>	I <sub>E</sub> =10μA, I <sub>C</sub> =0	6			V
DC current gain (note)	h <sub>FE1</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =0.1mA	40			
	h <sub>FE2</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =1mA	70			
	h <sub>FE3</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =10mA	100		300	
	h <sub>FE4</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =50mA	60			
	h <sub>FE5</sub>	V <sub>CE</sub> =1V, I <sub>C</sub> =100mA	30			
Collector-emitter saturation voltage (note)	V <sub>CE(SAT)1</sub>	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA			0.2	V
	V <sub>CE(SAT)2</sub>	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA			0.3	V
Base-emitter saturation voltage (note)	V <sub>BE(SAT)1</sub>	I <sub>C</sub> =10mA, I <sub>B</sub> =1mA	0.65		0.85	V
	V <sub>BE(SAT)2</sub>	I <sub>C</sub> =50mA, I <sub>B</sub> =5mA			0.95	V
Current gain bandwidth product	f <sub>T</sub>	V <sub>CE</sub> =20V, I <sub>C</sub> =10mA, f=100MHz	300			MHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> =5V, I <sub>E</sub> =0, f=1MHz			4	pF
Turn on time	t <sub>ON</sub>	V <sub>CC</sub> =3V, V <sub>BE</sub> =0.5V, I <sub>C</sub> =10mA, I <sub>B1</sub> =1mA			70	ns
Turn off time	t <sub>OFF</sub>	I <sub>B1</sub> =I <sub>B2</sub> =1mA			250	ns

Note: Pulse test: PW≤300μs, Duty Cycle≤2%

### TYPICAL CHARACTERISTICS



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