

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

## MMBT3904LP(MS)

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### Product specification

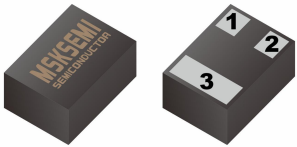
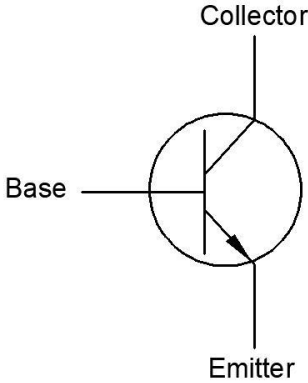

## Features

- Low profile package
- Ideal for automated placement
- Low saturation voltages
- High voltage capability
- High Stability and High Reliability
- RoHS Compliant

## Applications

- amplifying signal
- Electronic switch
- Oscillating circuit
- Variable resistance
- Lighting applications

## Appearance & Symbol

PACKAGE OUTLINE	Pin Configuration	Marking
 <p>1: Base 2: Emitter 3: Collector</p>		
DFN1006-3		

**Absolute Maximum Ratings (T=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	$I_C$	0.2	A
Power Dissipation	$P_D$	0.3	W
Operating Junction temperature	$T_J$	-55 to +150	°C
Storage Temperature Range	$T_{STG}$	-55 to +150	°C

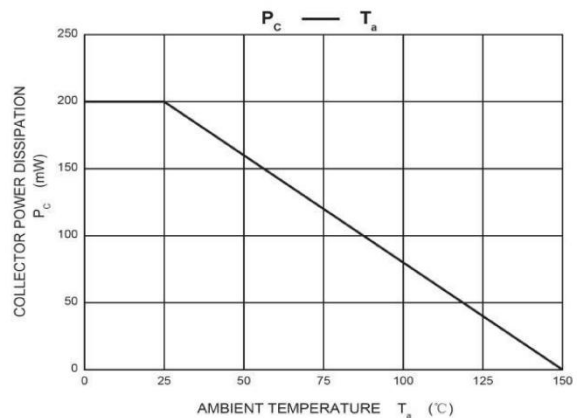
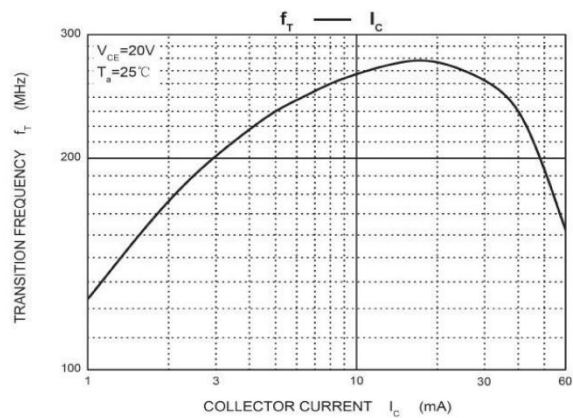
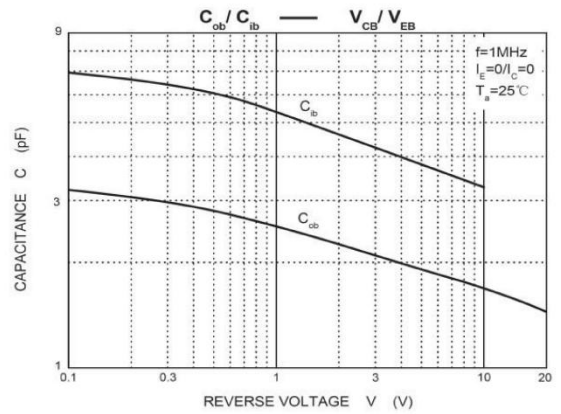
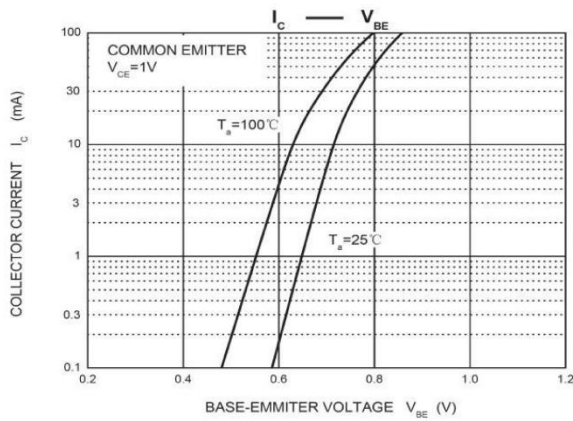
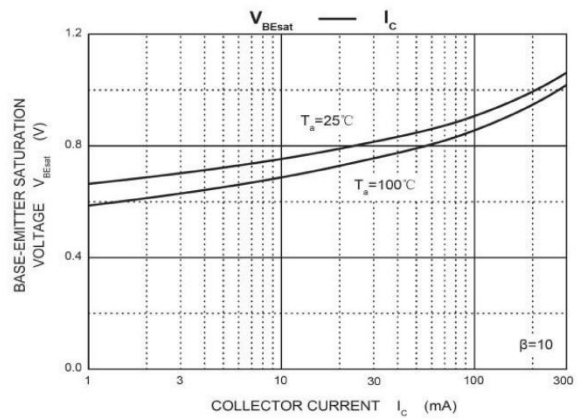
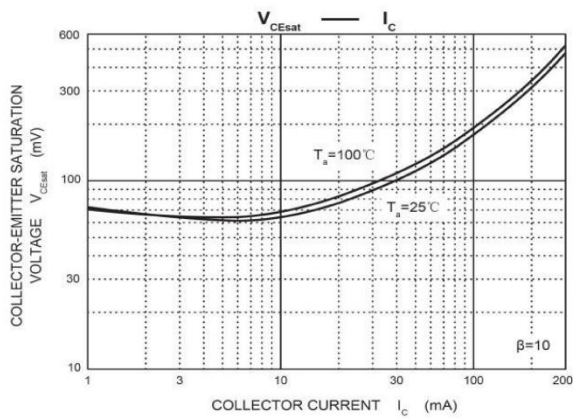
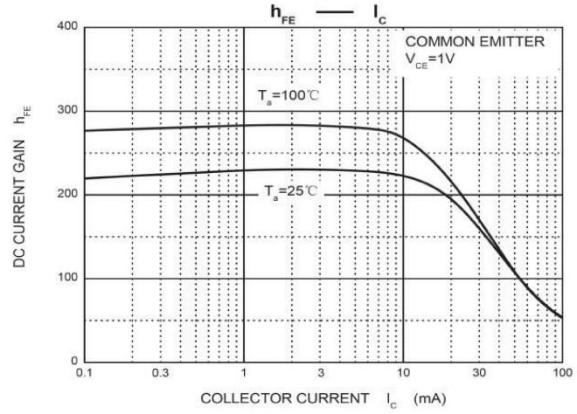
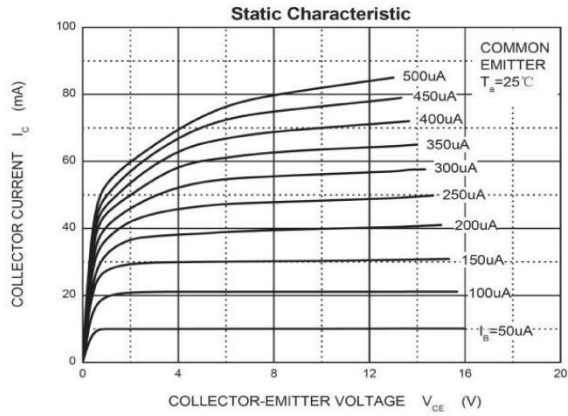
**Electrical Characteristics (T=25°C unless otherwise noted)**

Parameter	Symbol	Test conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	$V_{CBO}$	$I_C=10\mu A, I_E=0$	60			V
Collector-Emitter Breakdown Voltage	$V_{CER}$	$I_C=1mA, I_B=0$	40			V
Emitter-Base Breakdown Voltage	$V_{EBO}$	$I_E=10\mu A, I_C=0$	6			V
Collector Cut-Off Current	$I_{CBO}$	$V_{CB}=60V, I_E=0$			100	nA
Collector Cut-Off Current	$I_{CEX}$	$V_{CE}=30V, V_{EB(off)}=3V$			50	nA
Emitter Cut-Off Current	$I_{EBO}$	$V_{EB}=5V, I_C=0$			100	nA
DC current gain	$h_{FE}$	$V_{CE}=1V, I_C=0.1mA$	40			
		$V_{CE}=1V, I_C=1mA$	70			
		$V_{CE}=1V, I_C=10mA$	100		300	
		$V_{CE}=1V, I_C=50mA$	60			
		$V_{CE}=1V, I_C=100mA$	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	$t_d$	$V_{CC}=3V, I_C=10mA, V_{BE(off)}=-0.5V, I_{B1}=1mA$		35		
Rise time	$t_r$			35		ns
Storage time	$t_s$	$V_{CC}=3V, I_C=10mA, I_{B1}=I_{B2}=1mA$		200		us
Fall time	$t_f$			50		ns

**Classification of  $h_{FE}$** 

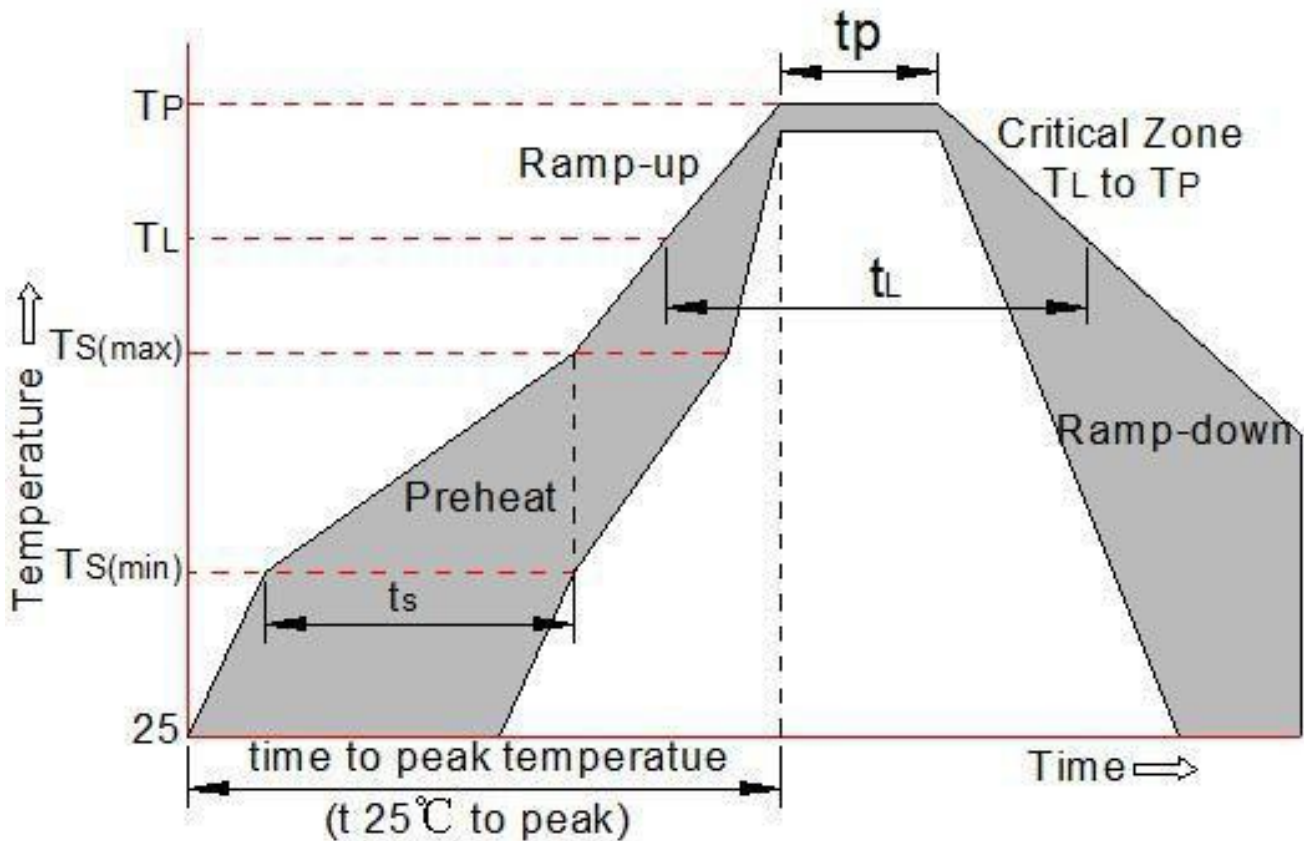
Range	100-300
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Typical Characteristics

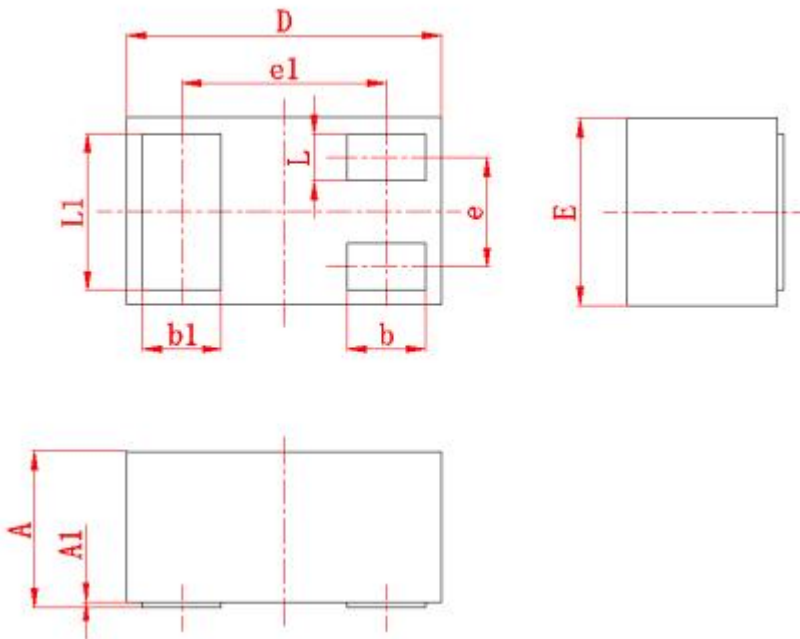


Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ( $T_{s(min)}$ )	+150°C
	-Temperature Max( $T_{s(max)}$ )	+200°C
	-Time (Min to Max) ( $t_s$ )	60-180 secs.
Average ramp up rate (Liquid us Temp ( $T_L$ ) to peak)		3°C/sec. Max
$T_{s(max)}$ to $T_L$ - Ramp-up Rate		3°C/sec. Max
Reflow	-Temperature( $T_L$ ) (Liquid us)	+217°C
	-Temperature( $t_L$ )	60-150 secs.
Peak Temp ( $T_p$ )		+260(+0/-5)°C
Time within 5°C of actual Peak Temp ( $t_p$ )		30 secs. Max
Ramp-down Rate		6°C/sec. Max
Time 25°C to Peak Temp ( $T_p$ )		8 min. Max
Do not exceed		+260°C

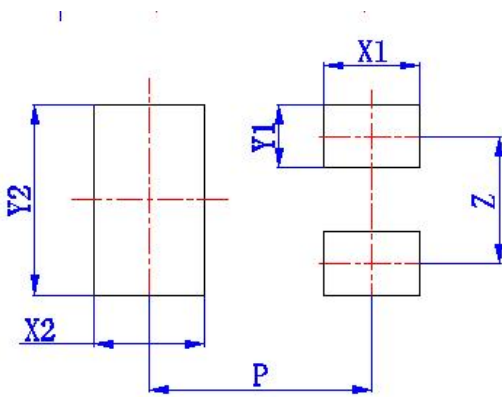


Package mechanical data



Symbol	Millimeters	
	min	max
A	0.4	0.5
A1	0	0.05
D	0.9	1.1
E	0.55	0.65
e	(0.35)	
e1	(0.65)	
b	0.2	0.3
b1	0.2	0.3
L	0.1	0.2
L1	0.45	0.55

Suggested Land Pattern



Symbol	Dimension in Millimeters
	typ
X1	(0.3)
X2	(0.35)
Y1	(0.2)
Y2	(0.6)
Z	(0.4)
P	(0.7)

REEL SPECIFICATION

P/N	PKG	QTY
MMBT3904LP(MS)	DFN1006-3	10000

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