

# MSKSEMI

SEMICONDUCTOR



ESD



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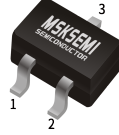
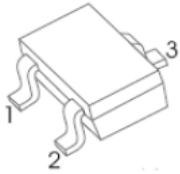
GDT



PLED

Product data sheet

## NPN Silicon Epitaxial Planar Transistor



for switching and amplifier applications

- 1. BASE
- 2. EMITTER
- 3. COLLECTOR

SOT-323

### Absolute Maximum Ratings ( $T_a = 25\text{ }^\circ\text{C}$ )

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	$I_C$	200	mA
Total Power Dissipation	$P_{tot}$	200	mW
Junction Temperature	$T_j$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	- 55 to + 150	$^\circ\text{C}$

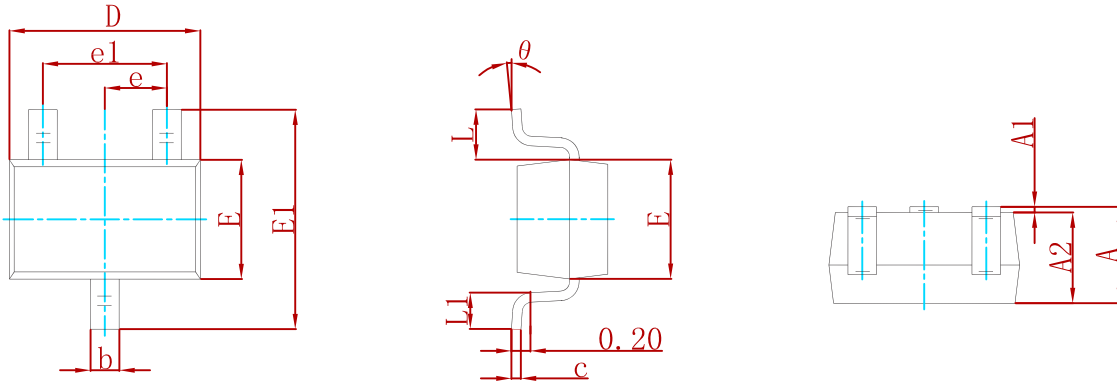
### CLASSIFICATION OF $h_{FE}$

<b>RANGE</b>	100-300
<b>MARKING</b>	<b>AM</b>

**Characteristics at  $T_a = 25\text{ }^\circ\text{C}$** 

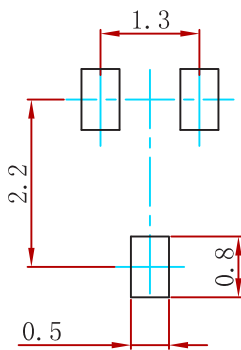
Parameter	Symbol	Min.	Max.	Unit
DC Current Gain				
at $V_{CE} = 1\text{ V}$ , $I_C = 0.1\text{ mA}$	$h_{FE}$	40	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 1\text{ mA}$	$h_{FE}$	70	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 10\text{ mA}$	$h_{FE}$	100	300	-
at $V_{CE} = 1\text{ V}$ , $I_C = 50\text{ mA}$	$h_{FE}$	60	-	-
at $V_{CE} = 1\text{ V}$ , $I_C = 100\text{ mA}$	$h_{FE}$	30	-	-
Collector Emitter Cutoff Current at $V_{CE} = 30\text{ V}$	$I_{CES}$	-	50	nA
Emitter Base Cutoff Current at $V_{EB} = 3\text{ V}$	$I_{EBO}$	-	50	nA
Collector Base Breakdown Voltage at $I_C = 10\text{ }\mu\text{A}$	$V_{(BR)CBO}$	60	-	V
Collector Emitter Breakdown Voltage at $I_C = 1\text{ mA}$	$V_{(BR)CEO}$	40	-	V
Emitter Base Breakdown Voltage at $I_E = 10\text{ }\mu\text{A}$	$V_{(BR)EBO}$	6	-	V
Collector Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$ at $I_C = 50\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{CE(sat)}$	- -	0.2 0.3	V
Base Emitter Saturation Voltage at $I_C = 10\text{ mA}$ , $I_B = 1\text{ mA}$ at $I_C = 50\text{ mA}$ , $I_B = 5\text{ mA}$	$V_{BE(sat)}$	0.65 -	0.85 0.95	V
Transition Frequency at $V_{CE} = 20\text{ V}$ , $-I_E = 10\text{ mA}$ , $f = 100\text{ MHz}$	$f_T$	300	-	MHz
Collector Output Capacitance at $V_{CB} = 10\text{ V}$ , $f = 100\text{ KHz}$	$C_{ob}$	-	4	pF
Delay Time at $V_{CC} = 3\text{ V}$ , $V_{BE(OFF)} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$	$t_d$	-	35	ns
Rise Time at $V_{CC} = 3\text{ V}$ , $V_{BE(OFF)} = 0.5\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = 1\text{ mA}$	$t_r$	-	35	ns
Storage Time at $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = -I_{B2} = 1\text{ mA}$	$t_{stg}$	-	200	ns
Fall Time at $V_{CC} = 3\text{ V}$ , $I_C = 10\text{ mA}$ , $I_{B1} = -I_{B2} = 1\text{ mA}$	$t_f$	-	50	ns

**PACKAGE MECHANICAL DATA**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.200	0.400	0.008	0.016
c	0.080	0.150	0.003	0.006
D	2.000	2.200	0.079	0.087
E	1.150	1.350	0.045	0.053
E1	2.150	2.450	0.085	0.096
e	0.650 TYP		0.026 TYP	
e1	1.200	1.400	0.047	0.055
L	0.525 REF		0.021 REF	
L1	0.260	0.460	0.010	0.018
θ	0°	8°	0°	8°

**Suggested Pad Layout**



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance: ±0.05mm.  
 3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

P/N	PKG	QTY
MMBT3904W	SOT-323	3000

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