

# SOT-23 Plastic-Encapsulate Transistors

# Formosa MS

## MMBT3904 TRANSISTOR (NPN)

### FEATURES

- As complementary type, the PNP transistor MMBT3906 is Recommended
- Epitaxial planar die construction

### MARKING:1AM

### MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector-Base Voltage	60	V
$V_{CEO}$	Collector-Emitter Voltage	40	V
$V_{EBO}$	Emitter-Base Voltage	6	V
$I_C$	Collector Current -Continuous	0.2	A
$P_C$	Collector Power Dissipation	0.2	W
$T_J$	Junction Temperature	150	$^{\circ}\text{C}$
$T_{stg}$	Storage Temperature	-55-150	$^{\circ}\text{C}$

SOT-23



1. BASE
2. EMITTER
3. COLLECTOR

### ELECTRICAL CHARACTERISTICS ( $T_{amb}=25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=10\mu\text{A}, I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1\text{mA}, I_B=0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=10\mu\text{A}, I_C=0$	6			V
Collector cut-off current	$I_{CBO}$	$V_{CB}=60\text{V}, I_E=0$			0.1	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE}=30\text{V}, V_{BE(off)}=3\text{V}$			50	nA
Emitter cut-off current	$I_{EBO}$	$V_{EB}=5\text{V}, I_C=0$			0.1	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE}=1\text{V}, I_C=10\text{mA}$	100		400	
	$h_{FE(2)}$	$V_{CE}=1\text{V}, I_C=50\text{mA}$	60			
	$h_{FE(3)}$	$V_{CE}=1\text{V}, I_C=100\text{mA}$	30			
	$V_{CE(sat)}$	$I_C=50\text{mA}, I_B=5\text{mA}$			0.3	V
	$V_{BE(sat)}$	$I_C=50\text{mA}, I_B=5\text{mA}$			0.95	V
Transition frequency	$f_T$	$V_{CE}=20\text{V}, I_C=10\text{mA}, f=100\text{MHz}$	250			MHz
Delay time	$t_d$	$V_{CC}=3\text{V}, V_{BE}=-0.5\text{V}, I_C=10\text{mA}, I_{B1}=-I_{B2}=1\text{mA}$			35	nS
Rise time	$t_r$				35	nS
Storage time	$t_s$	$V_{CC}=3\text{V}, I_C=10\text{mA}, I_{B1}=-I_{B2}=1\text{mA}$			200	nS
Fall time	$t_f$				50	nS

### CLASSIFICATION OF $h_{FE1}$

Rank	O	Y	G
Range	100-200	200-300	300-400

# Typical Characteristics

# MMBT3904

