

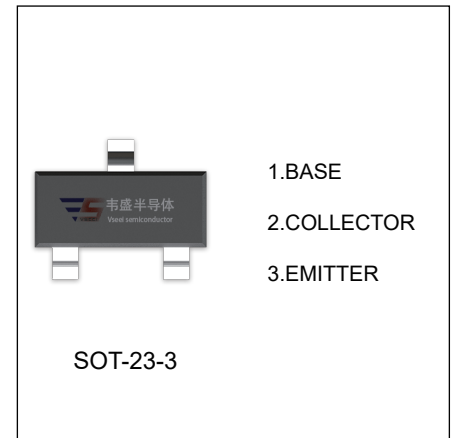
# MMBT4401 TRANSISTOR (NPN)

## FEATURES

- Switching Transistor

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

Symbol	Parameter	Value	Unit
$V_{CB0}$	Collector-Base Voltage	60	V
$V_{CE0}$	Collector-Emitter Voltage	40	V
$V_{EB0}$	Emitter-Base Voltage	6	V
$I_C$	Collector Current	600	mA
$P_C$	Collector Power Dissipation	300	mW
$R_{\theta JA}$	Thermal Resistance From Junction To Ambient	417	$^{\circ}\text{C}/\text{W}$
$T_J, T_{stg}$	Operation Junction and Storage Temperature Range	-55~+150	$^{\circ}\text{C}$



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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C=100\mu\text{A}, I_E=0$	60			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=1\text{mA}, I_B=0$	40			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=100\mu\text{A}, I_C=0$	6			V
Collector cut-off current	$I_{CBO}$	$V_{CB}=50\text{V}, I_E=0$			0.1	$\mu\text{A}$
Collector cut-off current	$I_{CEX}$	$V_{CE}=35\text{V}, V_{EB}=0.4\text{V}$			0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB}=5\text{V}, I_C=0$			0.1	$\mu\text{A}$
DC current gain	$h_{FE1}$	$V_{CE}=1\text{V}, I_C=0.1\text{mA}$	20			
	$h_{FE2}$	$V_{CE}=1\text{V}, I_C=1\text{mA}$	40			
	$h_{FE3}$	$V_{CE}=1\text{V}, I_C=10\text{mA}$	80			
	$h_{FE4}$	$V_{CE}=1\text{V}, I_C=150\text{mA}$	100		300	
	$h_{FE5}$	$V_{CE}=2\text{V}, I_C=500\text{mA}$	40			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$			0.4	V
		$I_C=500\text{mA}, I_B=50\text{mA}$			0.75	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$			0.95	V
		$I_C=500\text{mA}, I_B=50\text{mA}$			1.2	V
Transition frequency	$f_T$	$V_{CE}=10\text{V}, I_C=20\text{mA}, f=100\text{MHz}$	250			MHz
Delay time	$t_d$	$V_{CC}=30\text{V}, V_{BE(off)}=-2\text{V}$			15	ns
Rise time	$t_r$	$I_C=150\text{mA}, I_{B1}=15\text{mA}$			20	ns
Storage time	$t_s$	$V_{CC}=30\text{V}, I_C=150\text{mA}$			225	ns
Fall time	$t_f$	$I_{B1}=I_{B2}=15\text{mA}$			60	ns

### Static Characteristic

