

## TO-220 Plastic-Encapsulate Transistors

### MJE13005

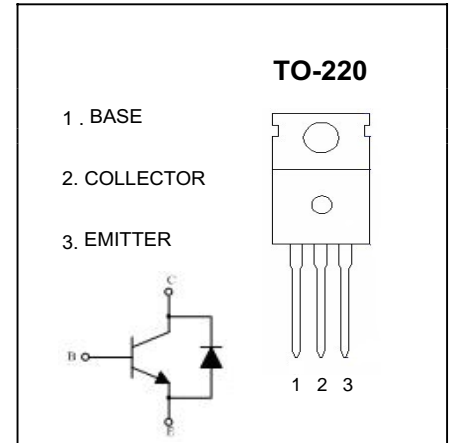
TRANSISTOR (NPN)

#### FEATURES

- Power switching applications
- Good high temperature
- Low saturation voltage
- High speed switching

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

Symbol	Parameter	Value	Unit
$V_{CB0}$	Collector-Base Voltage	700	V
$V_{CEO}$	Collector-Emitter Voltage	420	V
$V_{EBO}$	Emitter-Base Voltage	9	V
$I_C$	Collector Current -Continuous	4	A
$P_C$	Collector Power Dissipation	2	W
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	62.5	$^\circ\text{C}/\text{W}$
$T_j$	Junction Temperature	150	$^\circ\text{C}$
$T_{stg}$	Storage Temperature	-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	$V_{(BR)CBO}$	$I_C=1\text{mA}, I_E=0$	700			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C=10\text{mA}, I_B=0$	420			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E=1\text{mA}, I_C=0$	9			V
Collector cut-off current	$I_{CBO}$	$V_{CB}=700\text{V}, I_E=0$			50	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE}=400\text{V}, I_B=0$			50	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB}=7\text{V}, I_C=0$			50	$\mu\text{A}$
DC current gain	$h_{FE(1)}$	$V_{CE}=5\text{V}, I_C=1\text{A}$	10		40	
	$h_{FE(2)}$	$V_{CE}=5\text{V}, I_C=200\text{mA}$	10		60	
	$h_{FE(3)}$	$V_{CE}=5\text{V}, I_C=10\text{mA}$	5			
	$h_{FE(4)}$	$V_{CE}=5\text{V}, I_C=4\text{A}$	8		40	
Collector-emitter saturation voltage	$V_{CE(sat)(1)}$	$I_C=1\text{A}, I_B=0.2\text{A}$			0.3	V
	$V_{CE(sat)(2)}$	$I_C=2\text{A}, I_B=0.4\text{A}$	A B	0.15 0.25	0.28 0.35	V
	$V_{CE(sat)(3)}$	$I_C=4\text{A}, I_B=1\text{A}$			0.8	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C=2\text{A}, I_B=0.5\text{A}$			1.6	V
Diode forward voltage	$V_{FEC}$	$I_C=2\text{A}$			2	V
Transition frequency	$f_T$	$V_{CE}=10\text{V}, I_C=0.5\text{A}, f=1\text{MHz}$	5			MHz
Rise time	$t_r$	$I_C=250\text{mA}$			0.5	$\mu\text{s}$
Storage time	$t_s$	$I_C=250\text{mA}$	2.0		4.0	
Fall time	$t_f$	$I_C=250\text{mA}$			0.5	

#### CLASSIFICATION of $h_{FE(2)}$

Range	10~15	15~20	20~25	25~30	30~35	35~40	40~45	45~50	50~55	55~60
-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------

#### CLASSIFICATION of $t_s(\mu\text{s})$

Rank	A1	A2	B1	B2
Range	2.0-2.5	2.5-3.0	3.0-3.5	3.5-4.0