

## FEATURES

Power dissipation

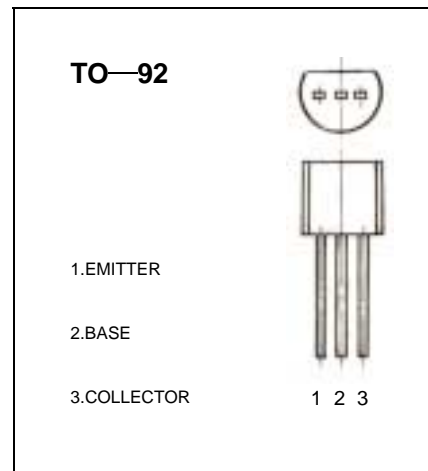
$$P_{CM} : 0.625 \text{ W (Tamb=25}^{\circ}\text{C)}$$

Collector current

$$I_{CM} : -0.5 \text{ A}$$

Collector-base voltage

$$V_{(BR)CBO} : -40 \text{ V}$$



## ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -100 \mu A, I_E = 0$	-40			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -0.1 \text{ mA}, I_B = 0$	-20			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = -100 \mu A, I_C = 0$	-5			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = -40 \text{ V}, I_E = 0$			-0.1	$\mu A$
Collector cut-off current	$I_{CEO}$	$V_{CE} = -20 \text{ V}, I_B = 0$			-0.2	$\mu A$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -5 \text{ V}, I_C = 0$			-0.1	$\mu A$
DC current gain(note)	$H_{FE(1)}$	$V_{CE} = -1 \text{ V}, I_C = -50 \text{ mA}$	64		300	
	$H_{FE(2)}$	$V_{CE} = -1 \text{ V}, I_C = -500 \text{ mA}$	40			
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -500 \text{ mA}, I_B = -50 \text{ mA}$			-0.6	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = -500 \text{ mA}, I_B = -50 \text{ mA}$			-1.2	V
Base-emitter voltage	$V_{EB}$	$I_E = -100 \text{ mA}$			-1.4	V
Transition frequency	$f_T$	$V_{CE} = -6 \text{ V}, I_C = -20 \text{ mA}$ $f = 30 \text{ MHz}$	150			MHz

## CLASSIFICATION OF $H_{FE(1)}$

Rank	D	E	F	G	H	I
Range	64-91	78-112	96-135	112-166	144-202	190-300



9013

## NPN SILICON TRANSISTOR

### FEATURES

特 征

Power dissipation (最大耗散功率)  
 $P_{CM} : 0.625 \text{ W (Tamb=25}^{\circ}\text{C)}$   
Collector current (最大集电极电流)  
 $I_{CM} : 0.5 \text{ A}$   
Collector-base voltage (集电极--基极击穿电压)  
 $V_{(BR)CBO} : 45 \text{ V}$

TO—92

1.EMITTER  
发射极  
2.BASE  
基极  
3.COLLECTOR  
集电极



### ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)

电 特 性 (环境温度 除 非 另 有 规 定)

Parameter 参 数	Symbol 符 号	Test conditions 测 试 条 件	MIN 最小值	TYP 典型值	MAX 最大值	UNIT 单位
Collector-base breakdown voltage 集电极--基极击穿电压	$V_{(BR)CBO}$	$I_C = 100 \mu\text{A}, I_E = 0$	45			V
Collector-emitter breakdown voltage 集电极--发射极击穿电压	$V_{(BR)CEO}$	$I_C = 0.1 \text{ mA}, I_B = 0$	25			V
Emitter-base breakdown voltage 发射极--基极击穿电压	$V_{(BR)EBO}$	$I_E = 100 \mu\text{A}, I_C = 0$	5			V
Collector cut-off current 集电极--基极截止电流	$I_{CBO}$	$V_{CB} = 40 \text{ V}, I_E = 0$			0.1	$\mu\text{A}$
Collector cut-off current 集电极--发射极截止电流	$I_{CEO}$	$V_{CE} = 20 \text{ V}, I_B = 0$			0.1	$\mu\text{A}$
Emitter cut-off current 发射极--基极截止电流	$I_{EBO}$	$V_{EB} = 5 \text{ V}, I_C = 0$			0.1	$\mu\text{A}$
DC current gain(note) 直流电流增益	$H_{FE(1)}$	$V_{CE} = 1 \text{ V}, I_C = 50 \text{ mA}$	64		300	
	$H_{FE(2)}$	$V_{CE} = 1 \text{ V}, I_C = 500 \text{ mA}$	40			
Collector-emitter saturation voltage 集电极--发射极饱和压降	$V_{CE(sat)}$	$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$			0.6	V
Base-emitter saturation voltage 基极--发射极饱和压降	$V_{BE(sat)}$	$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$			1.2	V
Base-emitter voltage 基极--发射极正向电压	$V_{BE}$	$I_E = 100 \text{ mA}$			1.4	V
Transition frequency 特征频率	$f_T$	$V_{CE} = 6 \text{ V}, I_C = 20 \text{ mA}$ $f = 30 \text{ MHz}$	150			MHz

### CLASSIFICATION OF $H_{FE(1)}$ (分类)

Rank 档次	D	E	F	G	H	I
Range 范围	64-91	78-112	96-135	112-166	144-220	190-300



9014

## NPN SILICON TRANSISTOR

### FEATURES

Power dissipation

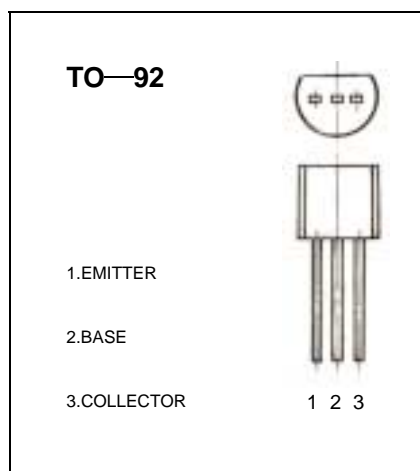
$P_{CM} : 0.4 \text{ W}$  ( $T_{amb}=25^{\circ}\text{C}$ )

Collector current

$I_{CM} : 0.1 \text{ A}$

Collector-base voltage

$V_{(BR)CBO} : 50 \text{ V}$



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

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100 \mu\text{A}$ , $I_E = 0$	50			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.1 \text{ mA}$ , $I_B = 0$	45			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 100 \mu\text{A}$ , $I_C = 0$	5			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = 50 \text{ V}$ , $I_E = 0$			0.1	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE} = 35 \text{ V}$ , $I_B = 0$			0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 3 \text{ V}$ , $I_C = 0$			0.1	$\mu\text{A}$
DC current gain(note)	$H_{FE(1)}$	$V_{CE} = 5 \text{ V}$ , $I_C = 1 \text{ mA}$	60		1000	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 100 \text{ mA}$ , $I_B = 5 \text{ mA}$			0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 100 \text{ mA}$ , $I_B = 5 \text{ mA}$			1	V
Transition frequency	$f_T$	$V_{CE} = 5 \text{ V}$ , $I_C = 10 \text{ mA}$ $f = 30 \text{ MHz}$	150			MHz

### CLASSIFICATION OF $H_{FE(1)}$

Rank	A	B	C	D
Range	60-150	100-300	200-600	400-1000



9015

## PNP SILICON TRANSISTOR

### FEATURES

Power dissipation

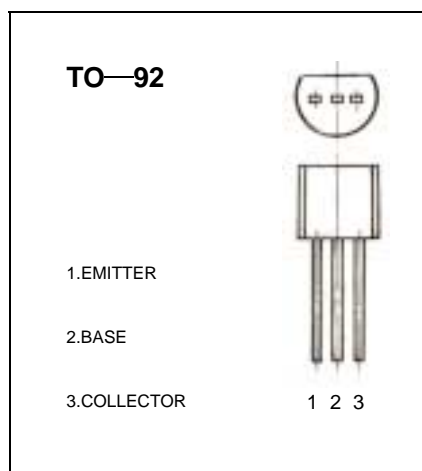
$P_{CM} : 0.45 \text{ W (Tamb=25}^{\circ}\text{C)}$

Collector current

$I_{CM} : -0.1 \text{ A}$

Collector-base voltage

$V_{(BR)CBO} : -50 \text{ V}$



### ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = -100 \mu\text{A}, I_E = 0$	-50			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = -1 \text{ mA}, I_B = 0$	-45			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = -100 \mu\text{A}, I_C = 0$	-5			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = -50 \text{ V}, I_E = 0$			-0.05	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE} = -35 \text{ V}, I_B = 0$			-0.05	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = -5 \text{ V}, I_C = 0$			-0.05	$\mu\text{A}$
DC current gain(note)	$H_{FE(1)}$	$V_{CE} = -5 \text{ V}, I_C = -1 \text{ mA}$	60		1000	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = -100 \text{ mA}, I_B = -10 \text{ mA}$			-0.3	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = -100 \text{ mA}, I_B = -10 \text{ mA}$			-1	V
Transition frequency	$f_T$	$V_{CE} = -5 \text{ V}, I_C = -10 \text{ mA}$ $f = 30 \text{ MHz}$	150			MHz

### CLASSIFICATION OF $H_{FE(1)}$

Rank	A	B	C	D
Range	60-150	100-300	200-600	400-1000



9018

## NPN SILICON TRANSISTOR

### FEATURES

Power dissipation

$P_{CM} : 0.31 \text{ W (Tamb=25}^{\circ}\text{C)}$

Collector current

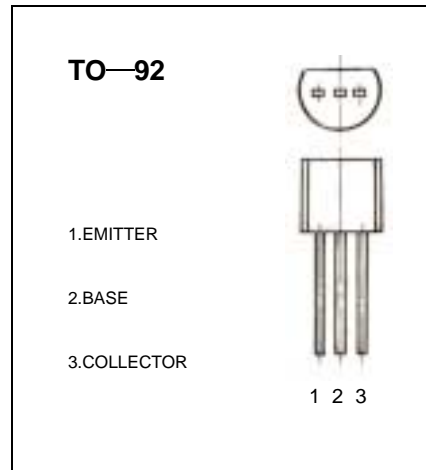
$I_{CM} : 0.05 \text{ A}$

Collector-base voltage

$V_{(BR)CBO} : 25 \text{ V}$

Operating and storage junction temperature range

$T_J, T_{stg} : -55^{\circ}\text{C to } +150^{\circ}\text{C}$



### ELECTRICAL CHARACTERISTICS (Tamb=25°C unless otherwise specified)

Parameter	Symbol	Test conditions	MIN	TYP	MAX	UNIT
Collector-base breakdown voltage	$V_{(BR)CBO}$	$I_C = 100 \mu\text{A}, I_E = 0$	25			V
Collector-emitter breakdown voltage	$V_{(BR)CEO}$	$I_C = 0.1 \text{ mA}, I_B = 0$	18			V
Emitter-base breakdown voltage	$V_{(BR)EBO}$	$I_E = 100 \mu\text{A}, I_C = 0$	4			V
Collector cut-off current	$I_{CBO}$	$V_{CB} = 20 \text{ V}, I_E = 0$			0.1	$\mu\text{A}$
Collector cut-off current	$I_{CEO}$	$V_{CE} = 15 \text{ V}, I_B = 0$			0.1	$\mu\text{A}$
Emitter cut-off current	$I_{EBO}$	$V_{EB} = 3 \text{ V}, I_C = 0$			0.1	$\mu\text{A}$
DC current gain	$H_{FE(1)}$	$V_{CE} = 5 \text{ V}, I_C = 1 \text{ mA}$	28		270	
Collector-emitter saturation voltage	$V_{CE(sat)}$	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$			0.5	V
Base-emitter saturation voltage	$V_{BE(sat)}$	$I_C = 10 \text{ mA}, I_B = 1 \text{ mA}$			1.4	V
Transition frequency	$f_T$	$V_{CE} = 5 \text{ V}, I_C = 5 \text{ mA}$ $f = 400 \text{ MHz}$	600			MHz

### CLASSIFICATION OF $H_{FE(1)}$

Rank	D	E	F	G	H	I	J
Range	28-45	39-60	54-80	72-108	97-146	132-198	180-270



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