

# Transistors

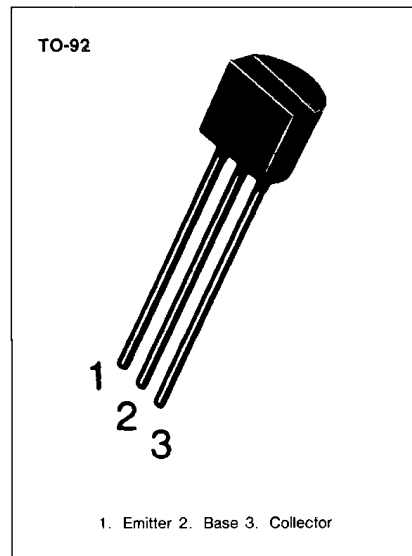
## 2N4402

### GENERAL PURPOSE TRANSISTOR

- Collector-Emitter Voltage:  $V_{CE0} = 40V$
- Collector Dissipation:  $P_c (max) = 625mW$

### ABSOLUTE MAXIMUM RATINGS ( $T_a = 25^\circ C$ )

Characteristic	Symbol	Rating	Unit
Collector-Base Voltage	$V_{CBO}$	-40	V
Collector-Emitter Voltage	$V_{CEO}$	-40	V
Emitter-Base Voltage	$V_{EBO}$	-5	V
Collector Current	$I_c$	-600	mA
Collector Dissipation	$P_c$	625	mW
Junction Temperature	$T_j$	150	$^\circ C$
Storage Temperature	$T_{stg}$	-55 ~ 150	$^\circ C$



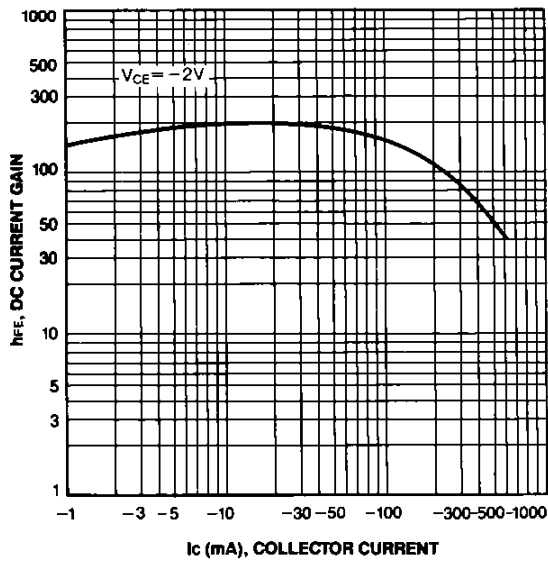
### ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ C$ )

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
Collector-Base Breakdown Voltage	$BV_{CBO}$	$I_C = -100\mu A, I_E = 0$	-40			V
* Collector-Emitter Breakdown Voltage	$BV_{CEO}$	$I_C = -1mA, I_B = 0$	-40			V
Emitter-Base Breakdown Voltage	$BV_{EBO}$	$I_E = -100\mu A, I_C = 0$	-5			V
Collector Cut-off Current	$I_{CEX}$	$V_{CE} = -35V, V_{EB} = -0.4V$			-100	nA
Base Cut-off Current	$I_{BEV}$	$V_{CE} = -35V, V_{EB} = -0.4V$			-100	nA
* DC Current Gain	$h_{FE}$	$V_{CE} = -1V, I_C = -0.1mA$ $V_{CE} = -1V, I_C = -1mA$		30		
		$V_{CE} = -1V, I_C = -10mA$		50		
		* $V_{CE} = -2V, I_C = -150mA$		50	150	
				100	300	
		* $V_{CE} = -2V, I_C = -500mA$		20		
* Collector-Emitter Saturation Voltage	$V_{CE (sat)}$	$I_C = -150mA, I_B = -15mA$ $I_C = -500mA, I_B = -50mA$			-0.4 -0.75	V V
* Base-Emitter Saturation Voltage	$V_{BE (sat)}$	$I_C = -150mA, I_B = -15mA$ $I_C = -500mA, I_B = -50mA$	-0.75		-0.95 -1.3	V V
Collector-Base Capacitance	$C_{CB}$	$V_{CB} = -10V, I_E = 0, f = 140KHz$			8.5	pF
Current Gain Bandwidth Product	$f_T$	$V_{CE} = -10V, I_C = -20mA$ $f = 100MHz$	150			MHz
Turn On Time	$t_{ON}$	$V_{CC} = -30V, V_{BE} = -2V$ $I_C = -150mA, I_{B1} = -15mA$			35	ns
Turn Off Time	$t_{OFF}$	$V_{CC} = -30V, I_C = -150mA$ $I_{B1} = I_{B2} = -15mA$			255	ns

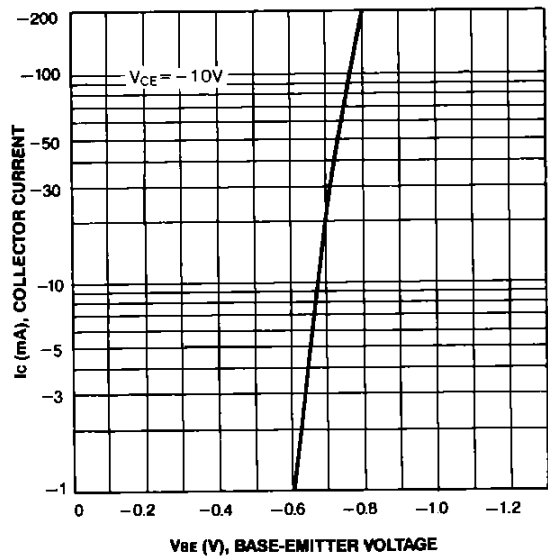
\*Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$



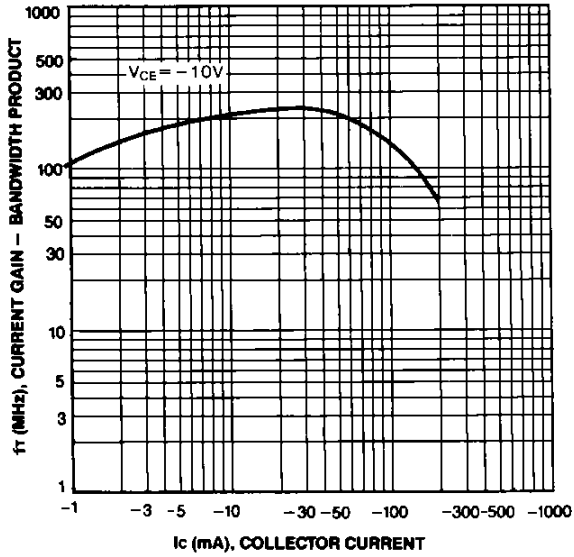
### DC CURRENT GAIN



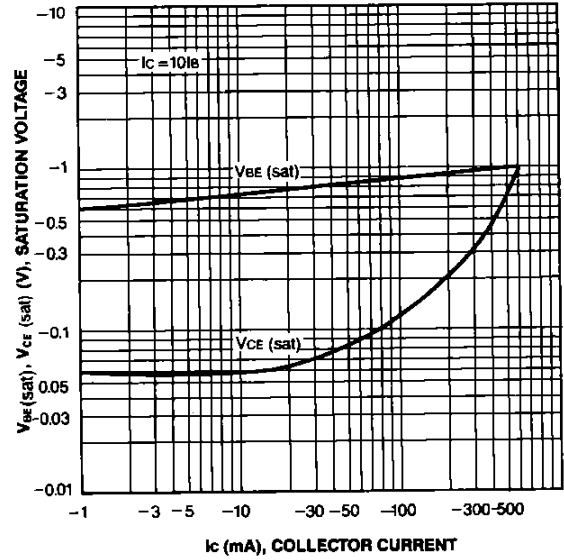
### BASE-EMITTER ON VOLTAGE



### CURRENT GAIN-BANDWIDTH PRODUCT



### BASE-EMITTER SATURATION VOLTAGE COLLECTOR-EMITTER SATURATION VOLTAGE



### COLLECTOR-BASE CAPACITANCE

