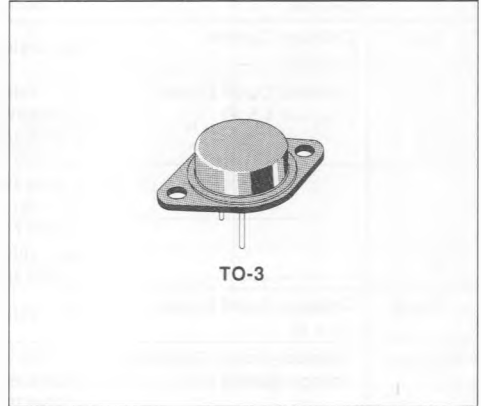


## MEDIUM POWER LINEAR AND SWITCHING APPLICATIONS

### DESCRIPTION

The 2N5301/2/3, are silicon epitaxial-base NPN transistors in Jedec TO-3 metal case. They are intended for power amplifier and switching circuits. The complementary PNP types are the 2N4398/99 and 2N5745 respectively.



### INTERNAL SCHEMATIC DIAGRAMS



### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	PNP	2N5301	2N5302	2N5303	Unit
		NPN	2N4398	2N4399	2N5745	
$V_{CEO}$	Collector-emitter Voltage ( $I_B = 0$ )		40	60	80	V
$V_{CBO}$	Collector-base Voltage ( $I_E = 0$ )		40	60	80	V
$V_{EBO}$	Emitter-base Voltage ( $I_C = 0$ )		5	5	5	V
$I_C$	Collector Current		30	30	20	A
$I_{CM}$	Collector Peak Current		50			A
$I_B$	Base Current		7.5			A
$P_{TOT}$	Total Power Dissipation at $T_{case} \leq 25^\circ C$		200			W
$T_{stg}$	Storage Temperature		- 65 to 200			$^\circ C$
$T_J$	Junction Temperature		200			$^\circ C$

For PNP types voltage and current values are negative.

## THERMAL DATA

$R_{th\ j-case}$	Thermal Resistance Junction-case	Max	0.875	°C/W
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ELECTRICAL CHARACTERISTICS ( $T_{case} = 25\text{ °C}$  unless otherwise specified)

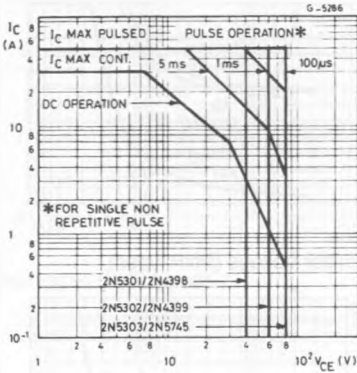
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{EBO}$	Emitter Cutoff Current ( $I_C = 0$ )	$V_{EB} = 5\text{ V}$			5	mA
$I_{CBO}$	Collector Current ( $I_E = 0$ )	$V_{CB} = \text{rated } V_{CBO}$			1	mA
$I_{CEV}$	Collector Cutoff Current ( $V_{BE} = -1.5\text{ V}$ )	$V_{CE} = \text{rated } V_{CEO}$ for <b>2N4398/99, 2N5745</b> for <b>2N5301/2/3</b> $V_{CE} = 30\text{ V}$ $T_{case} = 150\text{ °C}$ for <b>2N4398/99</b> $V_{CE} = 80\text{ V}$ $T_{case} = 150\text{ °C}$ for <b>2N5745</b> $V_{CE} = \text{rated } V_{CEO}$ $T_{case} = 150\text{ °C}$ for <b>2N5301/2/3</b>			5 1 10 10 10	mA mA mA mA mA
$I_{CEO}$	Collector Cutoff Current ( $I_B = 0$ )	$V_{CE} = \text{rated } V_{CEO}$			5	mA
$V_{CEO(sus)}^*$	Collector-emitter Sustaining Voltage ( $I_B = 0$ )	$I_C = 200\text{ mA}$ for <b>2N4398, 2N5301</b> for <b>2N4399, 2N5302</b> for <b>2N5745, 2N5303</b>	40 60 80			V V V
$h_{FE}^*$	DC Current Gain	$I_C = 1\text{ A}$ $V_{CE} = 2\text{ V}$ for <b>2N5745, 2N5303</b> $I_C = 10\text{ A}$ $V_{CE} = 2\text{ V}$ $I_C = 20\text{ A}$ $V_{CE} = 2\text{ V}$ for <b>2N4398/99, 2N5301/2</b> $I_C = 15\text{ A}$ $V_{CE} = 2\text{ V}$ $I_C = 30\text{ A}$ $V_{CE} = 4\text{ V}$	40 15 5 15 5		60 60	
$V_{CE(sat)}^*$	Collector-emitter Saturation Voltage	$I_C = 10\text{ A}$ $I_B = 1\text{ A}$ for <b>2N4398/99, 2N5301/2</b> for <b>2N5745, 2N5303</b> $I_C = 15\text{ A}$ $I_B = 1.5\text{ A}$ for <b>2N4398/99, 2N5301/2</b> for <b>2N5745, 2N5303</b> $I_C = 20\text{ A}$ $I_B = 2\text{ A}$ for <b>2N4398/99, 2N5301/2</b> $I_C = 20\text{ A}$ $I_B = 4\text{ A}$ for <b>2N5745, 2N5303</b> $I_C = 30\text{ A}$ $I_B = 6\text{ A}$ for <b>2N4398/99, 2N5301/2</b>			0.75 1 1 1.5 2 2 4	V V V V V V V
$V_{BE(sat)}^*$	Base-emitter Saturation Voltage	$I_C = 10\text{ A}$ $I_B = 1\text{ A}$ $I_C = 15\text{ A}$ $I_B = 1.5\text{ A}$ for <b>2N4398/99, 2N5301/2</b> for <b>2N5745, 2N5303</b> $I_C = 20\text{ A}$ $I_B = 2\text{ A}$ for <b>2N4398/99, 2N5301/2</b> $I_C = 20\text{ A}$ $I_C = 4\text{ A}$ for <b>2N5745, 2N5303</b>			1.7 1.8 2 2.5 2.5	V V V V V

**ELECTRICAL CHARACTERISTICS** (continued)

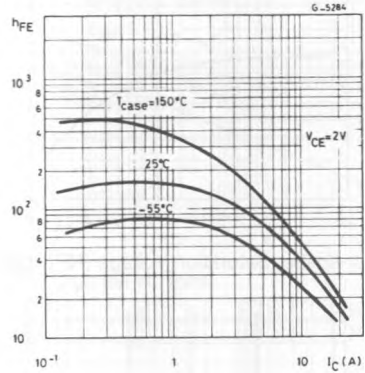
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{BE}^*$	Base-emitter Voltage	$I_C = 10\text{ A}$ $V_{CE} = 2\text{ V}$ for <b>2N5745, 2N5303</b> $I_C = 15\text{ A}$ $V_{CE} = 2\text{ V}$ for <b>2N4398/99, 2N5301/2</b> $I_C = 20\text{ A}$ $V_{CE} = 4\text{ V}$ for <b>2N5745, 2N5303</b> $I_C = 30\text{ A}$ $V_{CE} = 4\text{ V}$ for <b>2N4398/99, 2N5301/3</b>			1.5 1.7 2.5 3	V V V V
$f_T$	Transition Frequency	$I_C = 1\text{ A}$ $V_{CE} = 10\text{ V}$ $f = 1\text{ MHz}$ for <b>2N4398/99, 2N5301/2</b> for <b>2N5745, 2N5303</b>	4 2			MHz MHz
$h_{ie}$	Small Signal Current Gain	$I_C = 1\text{ A}$ $V_{CE} = 10\text{ A}$ $f = 1\text{ KHz}$	40			
$t_r$	Rise Time				1	$\mu\text{S}$
$t_s$	Storage Time	$V_{CC} = 30\text{ V}$ $I_C = 10\text{ A}$ $I_{B1} = -I_{B2} = 1\text{ A}$			2	$\mu\text{S}$
$t_f$	Fall Time				1	$\mu\text{S}$

\* Pulsed : pulse duration = 300 $\mu\text{s}$ , duty cycle < 2%.  
For PNP types voltage and current values are negative.

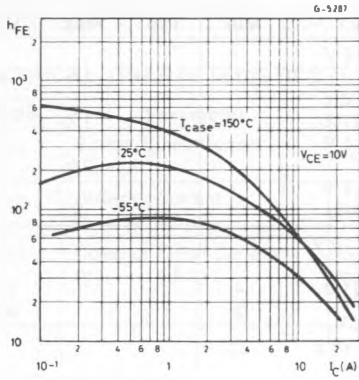
**Safe Operating Areas.**



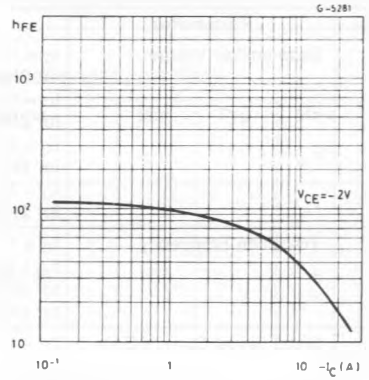
**DC Current Gain (NPN types).**



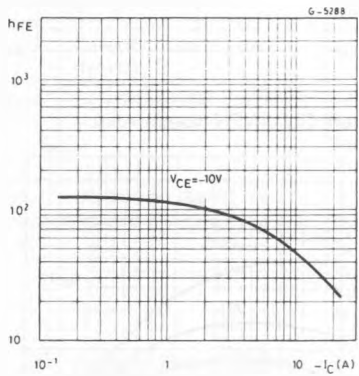
DC Current Gain (NPN types).



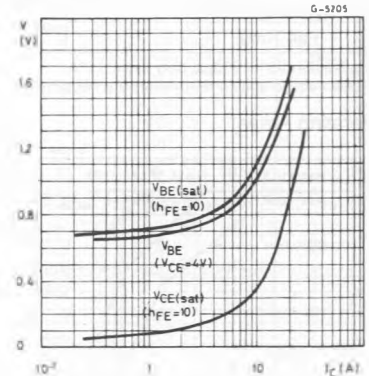
DC Current Gain (PNP types).



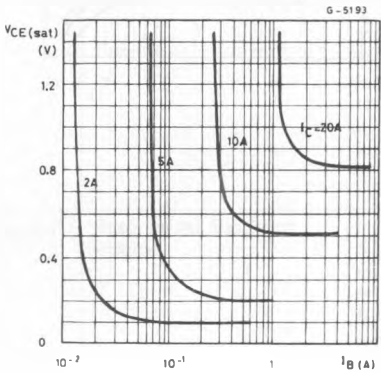
DC Current Gain (PNP types).



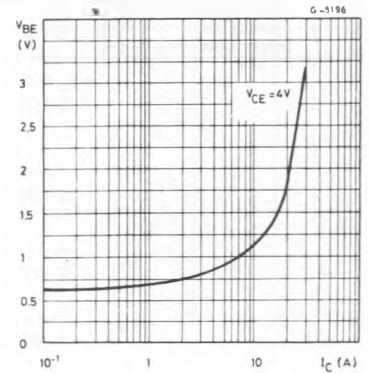
Saturation Voltage (NPN types).



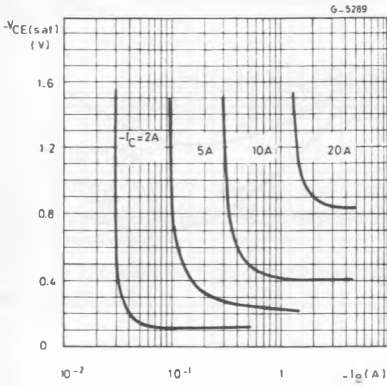
Collector-emitter Saturation Voltage (NPN types).



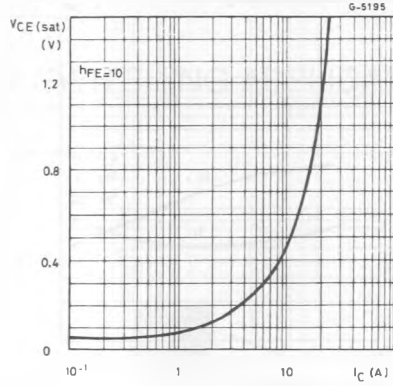
Base-emitter Voltage (PNP types).



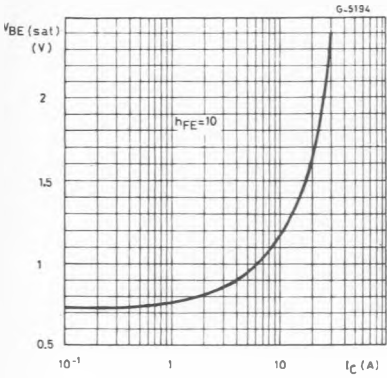
Collector-emitter Saturation Voltage (PNP types).



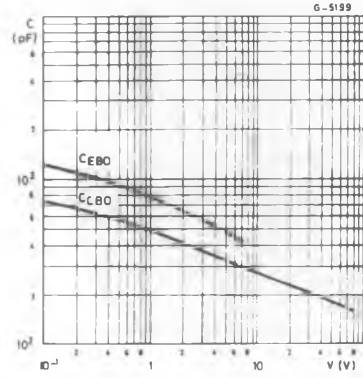
Collector-emitter Saturation Voltage (PNP types).



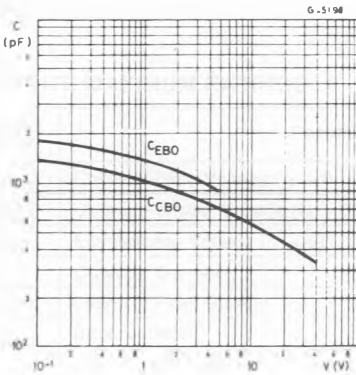
Base-emitter Saturation Voltage (PNP types).



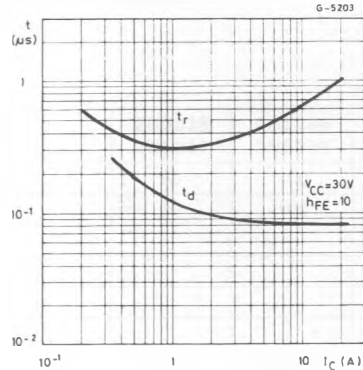
Capacitances (NPN types).



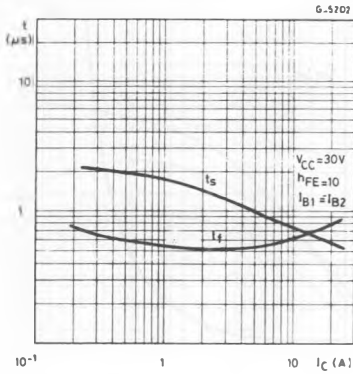
Capacitances (PNP types).



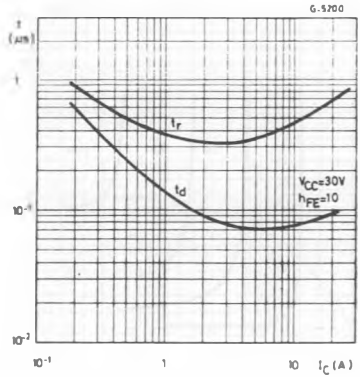
Turn-on Time (NPN types).



Turn-off Time (NPN types).



Turn-on Time (PNP types).



Turn-off Time (PNP types).

