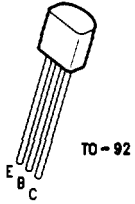
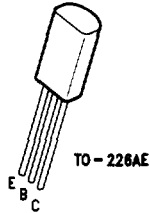
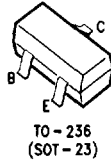


**MPSA13**


TL/G/10100-1

**MPSW13**


TL/G/10100-4

**MMBTA13**


TL/G/10100-5

**NPN Darlington Transistor**
**Electrical Characteristics**  $T_A = 25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Min	Max	Units
<b>OFF CHARACTERISTICS</b>				
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage ( $I_C = 100 \mu\text{Adc}$ , $I_B = 0$ )	30		Vdc
$I_{CBO}$	Collector Cutoff Current ( $V_{CB} = 30 \text{ Vdc}$ , $I_E = 0$ )		100	nAdc
$I_{EBO}$	Emitter Cutoff Current ( $V_{EB} = 10 \text{ Vdc}$ , $I_C = 0$ )		100	nAdc
<b>ON CHARACTERISTICS (Note 1)</b>				
$h_{FE}$	DC Current Gain ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ ) ( $I_C = 100 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )	5000 10,000		
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ( $I_C = 100 \text{ mAdc}$ , $I_B = 0.1 \text{ mAdc}$ )		1.5	Vdc
$V_{BE(on)}$	Base-Emitter On Voltage ( $I_C = 100 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ )		2.0	Vdc
<b>SMALL-SIGNAL CHARACTERISTICS</b>				
$f_T$	Current-Gain—Bandwidth Product, (Note 2) ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	125		MHz

**Note 1:** Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

**Note 2:**  $f_T = |h_{fe}| \times f_{test}$ .

**Note 3:** For characteristics curves, see Process 05.