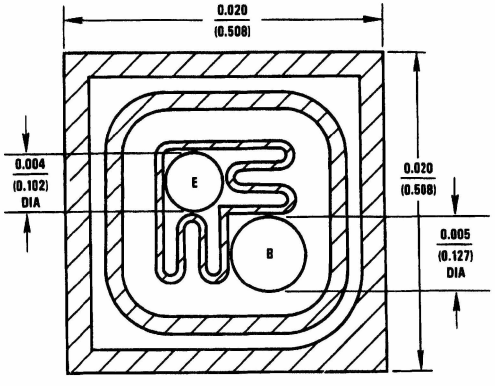
National Semiconductor

# Process 16
# NPN High Voltage




TL/G/10034–19

## DESCRIPTION

Process 16 is a non-overlay, double-diffused, silicon epitaxial device. Complement to Process 74.

## APPLICATION

This device was designed for general purpose high voltage amplifiers and gas discharge display driving.

## PRINCIPAL DEVICE TYPES

**TO-92 EBC:** 2N5551

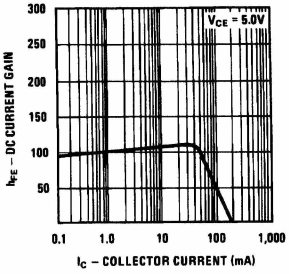
**TO-236:** MMBT5551

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C)

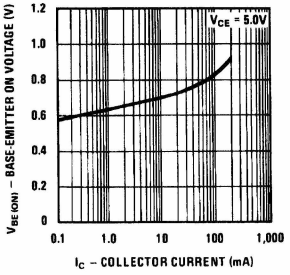
| Symbol | Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| $BV_{CEO}$ | $I_C$ = 1.0 mA | 120 | | | V |
| $BV_{CBO}$ | $I_C$ = 10 μA | 140 | | | V |
| $BV_{EBO}$ | $I_E$ = 10 μA | 6 | | | V |
| $I_{CBO}$ | $V_{CB}$ = 100V | | | 100 | nA |
| $I_{EBO}$ | $V_{EB}$ = 4.0V | | | 100 | nA |
| $h_{FE}$ | $I_C$ = 1.0 mA, $V_{CE}$ = 5.0V<br>$I_C$ = 10 mA, $V_{CE}$ = 5.0V<br>$I_C$ = 50 mA, $V_{CE}$ = 5.0V | 40<br>50<br>20 | 120 | 300 | |
| $V_{CE(SAT)}$ | $I_C$ = 10 mA, $I_B$ = 1.0 mA<br>$I_C$ = 50 mA, $I_B$ = 5.0 mA | | | 0.15<br>0.30 | V<br>V |
| $V_{BE(SAT)}$ | $I_C$ = 10 mA, $I_B$ = 1.0 mA<br>$I_C$ = 50 mA, $I_B$ = 5 mA | | | 0.90<br>1.2 | V<br>V |
| $f_T$ | $I_C$ = 10 mA, $V_{CE}$ = 10V, f = 100 MHz | 100 | 220 | | MHz |
| $C_{ob}$ | $V_{CB}$ = 10V, f = 1 MHz | | 3.0 | 5.0 | pF |
| $C_{ib}$ | $V_{EB}$ = 0.5V, f = 1 MHz | | | 30 | pF |
| $P_{D(max)}$<br>TO-92<br>TO-236 | <br>$T_A$ = 25°C<br>$T_C$ = 25°C | <br>600<br>350 | | | <br>mW<br>mW |

# Process 16

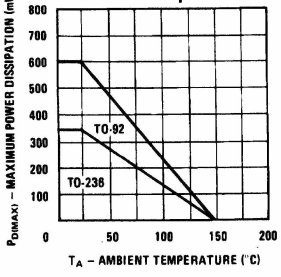
### DC Current Gain vs Collector Current



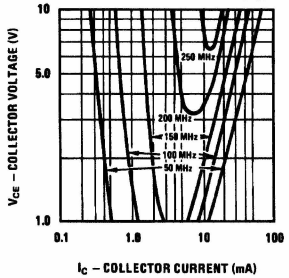

### Base-Emitter ON Voltage vs Collector Current



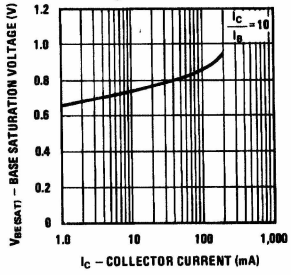

### Maximum Power Dissipation vs Ambient Temperature



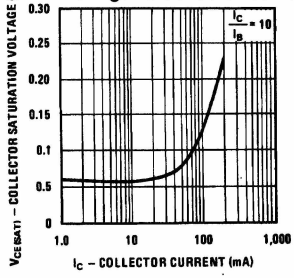

### Contours of Constant Gain Bandwidth Product ($f_T$)



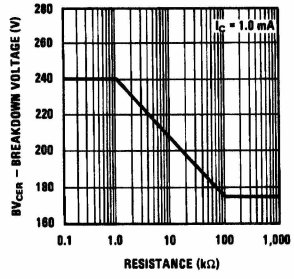

### Base-Emitter Saturation Voltage vs Collector Current



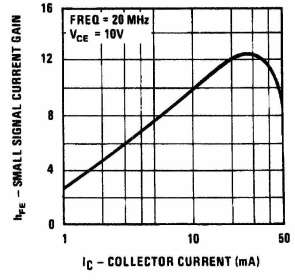

### Collector-Emitter Saturation Voltage vs Collector Current



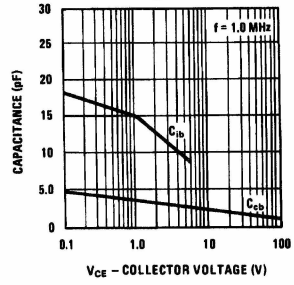

### Collector-Emitter Breakdown Voltage with Resistance Between Emitter-Base




### Small Signal Current Gain vs Collector Current




### Input and Output Capacitance vs Reverse Bias Voltage




TL/G/10034–20