

## NTE196 (NPN) & NTE197 (PNP) Silicon Complementary Transistors Audio Power Output and Medium Power Switching

### **Description:**

The NTE196 (NPN) and NTE197 (PNP) are silicon complementary transistors in a TO220 type package designed for use in general purpose amplifier and switching applications.

### **Features:**

- DC Current Gain Specified to 7 Amps:  $h_{FE} = 2.3 \text{ Min @ } I_C = 7A$
- Collector–Emitter Sustaining Voltage:  $V_{CEO(sus)} = 70V \text{ Min}$
- High Current–Gain Bandwidth Product:  
 $f_T = 4\text{MHz Min @ } I_C = 500\text{mA (NTE196)}$   
 $= 10\text{MHz Min @ } I_C = 500\text{mA (NTE197)}$

### **Absolute Maximum Ratings:**

Collector–Emitter Voltage, $V_{CEO}$ .....	70V
Collector–Base Voltage, $V_{CB}$ .....	80V
Emitter–Base Voltage, $V_{EB}$ .....	5V
Collector Current, $I_C$	
Continuous .....	7A
Peak .....	10A
Base Current, $I_B$ .....	3A
Total Power Dissipation ( $T_C = +25^\circ\text{C}$ ), $P_D$ .....	40W
Derate Above $25^\circ\text{C}$ .....	0.32W/ $^\circ\text{C}$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+150^\circ\text{C}$
Storage Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+150^\circ\text{C}$
Thermal Resistance, Junction–to–Case, $R_{thJC}$ .....	3.125 $^\circ\text{C/W}$

### **Electrical Characteristics:** ( $T_C = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b>						
Collector–Emitter Sustaining Voltage	$V_{CEO(sus)}$	$I_C = 100\text{mA}, I_B = 0$ , Note 1	70	–	–	V
Collector Cutoff Current	$I_{CEO}$	$V_{CE} = 60\text{V}, I_B = 0$	–	–	1.0	mA
		$V_{CE} = 80\text{V}, V_{EB(off)} = 1.5\text{V}$	–	–	100	$\mu\text{A}$
	$V_{CE} = 80\text{V}, V_{EB(off)} = 1.5\text{V}, T_C = +150^\circ\text{C}$	–	–	2.0	mA	
Emitter Cutoff Current	$I_{EBO}$	$V_{BE} = 5\text{V}, I_C = 0$	–	–	1.0	mA

Note 1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

**Electrical Characteristics (Cont'd):** ( $T_C = +25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>ON Characteristics</b> (Note 1)						
DC Current Gain	$h_{FE}$	$I_C = 2\text{A}, V_{CE} = 4\text{V}$	30	–	150	
		$I_C = 7\text{A}, V_{CE} = 4\text{V}$	2.3	–	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 7\text{A}, I_B = 3\text{A}$	–	–	3.5	V
Base–Emitter ON Voltage	$V_{BE(on)}$	$I_C = 7\text{A}, V_{CE} = 4\text{V}$	–	–	3.0	V
<b>Dynamic Characteristics</b>						
Current–Gain Bandwidth Product NTE196 NTE197	$f_T$	$I_C = 500\text{mA}, V_{CE} = 4\text{V}, f_{test} = 1\text{MHz},$ Note 2	4	–	–	MHz
			10	–	–	MHz
Output Capacitance	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$	–	–	250	pF
Small–Signal Current Gain	$h_{fe}$	$I_C = 500\text{mA}, V_{CE} = 4\text{V}, f = 50\text{kHz}$	20	–	–	

Note 1. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

Note 2.  $f_T = |h_{fe}| \cdot f_{test}$

