

## NTE123AP Silicon NPN Transistor Audio Amplifier, Switch (Compl to NTE159)

Absolute Maximum Ratings:	
Collector-Emitter Voltage, V <sub>CEO</sub>	40V
Collector-Base Voltage, V <sub>CB</sub>	60V
Emitter-Base Voltage, V <sub>EB</sub>	6V
Continuous Collector Current, I <sub>C</sub>	600mA
Total Device Dissipation (T <sub>A</sub> = +25°C), P <sub>D</sub>	625mW
Derate Above 25°C	
Total Device Dissipation (T <sub>C</sub> = +25°C), P <sub>D</sub>	1.5W
Derate Above 25°C	12mW/°C
Operating Junction Temperature Range, T <sub>J</sub>	–55° to +150°C
Storage Temperature Range, T <sub>stq</sub>	–55° to +150°C
Thermal Resistance, Junction to Case, RthJC	83.3°C/W
Thermal Resistance, Junction to Ambient, R <sub>th IA</sub>	200°C/W

## **<u>Electrical Characteristics:</u>** $(T_A = +25^{\circ}C \text{ unless otherwise specified})$

Parameter	Symbol	Test Conditions	Min	Тур	Max	Unit			
OFF Characteristics									
Collector-Emitter Breakdown Voltage	V <sub>(BR)CEO</sub>	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0, Note 1	40	_	_	V			
Collector-Base Breakdown Voltage	V <sub>(BR)CBO</sub>	I <sub>C</sub> = 0.1mA, I <sub>E</sub> = 0	60	_	_	V			
Emitter-Base Breakdown Voltage	V <sub>(BR)EBO</sub>	I <sub>E</sub> = 0.1mA, I <sub>C</sub> = 0	6	_	_	V			
Collector Cutoff Current	I <sub>CEV</sub>	V <sub>CE</sub> = 35V, V <sub>EB(off)</sub> = 0.4V	_	_	0.1	μΑ			
Base Cutoff Current	I <sub>BEV</sub>	V <sub>CE</sub> = 35V, V <sub>EB(off)</sub> = 0.4V	_	_	0.1	μΑ			
ON Characteristics (Note 1)									
DC Current Gain	h <sub>FE</sub>	V <sub>CE</sub> = 1V, I <sub>C</sub> = 0.1mA	20	_	_				
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 1mA	40	_	_				
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 10mA	80	_	_				
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 150mA	100	_	300				
		V <sub>CE</sub> = 1V, I <sub>C</sub> = 500mA	40	_	_				

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

## Electrical Characteristics (Cont'd):(TA = +25°C unless otherwise specified)ParameterSymbolTest ConditionsMin

Parameter	Symbol	Test Conditions	Min	Тур	Max	Unit				
ON Characteristics (Note 1) (Cont'd)										
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA	_	-	0.4	V				
		I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA	_	-	0.75	V				
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	I <sub>C</sub> = 150mA, I <sub>B</sub> = 15mA	0.75	_	0.95	V				
		I <sub>C</sub> = 500mA, I <sub>B</sub> = 50mA	_	_	1.2	V				
Small-Signal Characteristics										
Current Gain-Bandwidth Product	f <sub>T</sub>	I <sub>C</sub> = 20mA, V <sub>CE</sub> = 10V, f = 100MHz	250	-	-	MHz				
Collector-Base Capacitance	C <sub>cb</sub>	$V_{CB} = 5V, I_{E} = 0, f = 100kHz$	_	-	6.5	pF				
Emitter-Base Capacitance	C <sub>eb</sub>	$V_{CB} = 0.5V, I_{C} = 0, f = 100kHz$	_	-	30	pF				
Input Impedance	h <sub>ie</sub>	$I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	1.0	_	15	kΩ				
Voltage Feedback Ratio	h <sub>re</sub>	$I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	0.1	_	8.0	x 10 <sup>-6</sup>				
Small-Signal Current Gain	h <sub>fe</sub>	$I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	40	_	500					
Output Admittance	h <sub>oe</sub>	$I_C = 1$ mA, $V_{CE} = 10$ V, $f = 1$ kHz	1.0	-	30	μmhos				
Switching Characteristics										
Delay Time	t <sub>d</sub>	$V_{CC} = 30V, V_{EB(off)} = 2V,$ $I_{C} = 150mA, I_{B1} = 15mA$	_	-	15	ns				
Rise Time	t <sub>r</sub>		-	-	20	ns				
Storage Time	ts	$V_{CC} = 30V, I_C = 150mA,$ $I_{B1} = I_{B2} = 15mA$	_	-	225	ns				
Fall Time	t <sub>f</sub>		-	_	30	ns				

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

