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## NTE38 (PNP) & NTE175 (NPN) Silicon Complementary Transistors High Voltage, Medium Power Switch TO66 Type Package

**Description:**

The NTE38 (PNP) and NTE175 (NPN) are complementary silicon transistors in a TO66 type package designed for high-speed switching and linear amplifier applications for high-voltage operational amplifiers, switching regulators, converters, inverters, deflection stages, and high fidelity amplifiers.

**Features:**

- TO66 Type Package
- Collector-Emitter Sustaining Voltage:  
     NTE38:  $V_{CEO(sus)} = 350V @ I_C = 200mA$   
     NTE175:  $V_{CEO(sus)} = 300V @ I_C = 200mA$
- Second Breakdown Collector Current:  
     NTE38  $I_{S/b} = 875mA @ V_{CE} = 40V$   
     NTE175  $I_{S/b} = 350mA @ V_{CE} = 100V$
- Usable DC Current Gain to 2.0Adc

**Absolute Maximum Ratings:**

Collector-Emitter Voltage, $V_{CEO}$	
NTE38 .....	350V
NTE175 .....	300V
Collector-Base Voltage, $V_{CB}$	
NTE38 .....	400V
NTE175 .....	500V
Emitter-Base Voltage, $V_{EB}$ .....	6Vdc
Collector Current, $I_C$	
Continuous .....	2A
Peak (Note 1) .....	5A
Base Current, $I_B$ .....	1A
Total Power Dissipation ( $T_C = +25^\circ C$ ), $P_D$ .....	35W
Derate above $25^\circ C$ .....	0.2W/ $^\circ C$
Operating Junction Temperature Range, $T_J$ .....	$-65^\circ$ to $+200^\circ C$
Storage Junction Temperature Range, $T_{stg}$ .....	$-65^\circ$ to $+200^\circ C$
Thermal Resistance, Junction to Case, $R_{\theta JC}$ .....	$5^\circ C/W$

Note 1. Pulse Test (NTE175 Only): Pulse Width = 5ms, Duty Cycle  $\leq$  10%.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF Characteristics</b> (Note 2)						
Collector–Emitter Sustaining Voltage NTE38	$V_{CEO(sus)}$	$I_C = 200\text{mA}, I_B = 0$	350	–	–	V
NTE175			300	–	–	V
Collector–Emitter Sustaining Voltage NTE38 Only	$V_{CEX(sus)}$	$I_C = 200\text{mA}, V_{BE} = -1.5\text{V}, L = 10\text{mH}$	400	–	–	V
	$V_{CER(sus)}$	$I_C = 200\text{mA}, I_B = 0, R_{BE} = 50\Omega$	375	–	–	V
Emitter–Base Breakdown Voltage NTE38 Only	$V_{EBO}$	$I_E = 0.5\text{mA}, I_C = 0$	6	–	–	V
Collector Cutoff Current	$I_{CEO}$	$V_{CE} = 150\text{V}, I_B = 0$	–	–	5	mA
Collector Cutoff Current NTE38	$I_{CEV}$	$V_{CE} = 250\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	0.5	mA
		$V_{CE} = 250\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = +100^\circ\text{C}$	–	–	5.0	mA
		$V_{CE} = 315\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	0.5	mA
		$V_{CE} = 315\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = +100^\circ\text{C}$	–	–	5.0	mA
		$V_{CE} = 360\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	0.5	mA
		$V_{CE} = 360\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = +100^\circ\text{C}$	–	–	5.0	mA
NTE175	$I_{CEX}$	$V_{CE} = 450\text{V}, V_{BE(off)} = 1.5\text{V}$	–	–	1.0	mA
		$V_{CE} = 300\text{V}, V_{BE(off)} = 1.5\text{V}, T_C = +150^\circ\text{C}$	–	–	3.0	mA
Emitter Cutoff Current	$I_{EBO}$	$V_{EB} = 6\text{V}, I_C = 0$	–	–	0.5	mA
<b>ON Characteristics</b> (Note 2)						
DC Current Gain NTE38	$h_{FE}$	$I_C = 1\text{A}, V_{CE} = 4\text{V}$	10	–	100	
NTE175		$I_C = 0.1\text{A}, V_{CE} = 10\text{V}$	40	–	–	
		$I_C = 1\text{A}, V_{CE} = 2\text{V}$	8	–	80	
		$I_C = 1\text{A}, V_{CE} = 10\text{V}$	25	–	100	
Collector–Emitter Saturation Voltage NTE38	$V_{CE(sat)}$	$I_C = 1\text{A}, I_B = 125\text{mA}$	–	–	2.0	V
NTE175			–	–	0.75	V
Base–Emitter Saturation Voltage NTE38	$V_{BE(sat)}$	$I_C = 1\text{A}, I_B = 125\text{mA}$	–	–	1.4	V
NTE175			$I_C = 1\text{A}, I_B = 100\text{mA}$	–	–	1.4
Base–Emitter ON Voltage NTE175 Only	$V_{BE(on)}$	$I_C = 1\text{A}, V_{CE} = 10\text{V}$	–	–	1.4	V
<b>Dynamic Characteristics</b>						
Current Gain –Bandwidth Product NTE38	$f_T$	$I_C = 200\text{mA}, V_{CE} = 10\text{V}, f_{test} = 5\text{MHz},$ Note 3	20	–	–	MHz
NTE175			15	–	–	MHz
Output Capacitance (NTE175 Only)	$C_{ob}$	$V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$	–	–	120	pF

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

Note 3.  $f_T = |h_{fe}| \cdot f_{test}$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit	
<b>Second Breakdown</b>							
Second Breakdown Collector Current NTE38	$I_{S/b}$	$t = 1\text{ s}$ (Non-Repetitive), $V_{CE} = 40\text{ V}$	875	-	-	mA	
NTE175		$V_{CE} = 100\text{ V}$	350	-	-	mA	
<b>Switching Characteristics</b>							
NTE38							
Rise Time	$t_r$	$V_{CC} = 200\text{ V}$ , $I_C = 1\text{ A}$ $I_{B1} = I_{B2} = 125\text{ mA}$	-	-	0.6	$\mu\text{s}$	
Storage Time	$t_s$		-	-	2.5	$\mu\text{s}$	
Fall Time	$t_f$		-	-	0.6	$\mu\text{s}$	
NTE175							
Rise Time	$t_r$	$V_{CC} = 200\text{ V}$ , $I_C = 1\text{ A}$	-	-	3.0	$\mu\text{s}$	
Storage Time	$t_s$		$I_{B1} = 100\text{ mA}$ , $R_L = 200\Omega$	-	-	4.0	$\mu\text{s}$
Fall Time	$t_f$		$I_{B1} = I_{B2} = 100\text{ mA}$	-	-	3.0	$\mu\text{s}$

