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

Description:

The NTE38 (PNP) and NTE175 (NPN) complementary silicon transistors are 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:

- 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° to $+200^\circ C$
Storage Junction Temperature Range, T_{stg}	-65° 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
OFF Characteristics (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
ON Characteristics (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
Dynamic Characteristics						
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
Second Breakdown						
Second Breakdown Collector Current NTE38	I_{Sb}	$t = 1\text{ s (Non-Repetitive), } V_{CE} = 40\text{ V}$	875	-	-	mA
NTE175		$V_{CE} = 100\text{ V}$	350	-	-	mA
Switching Characteristics						
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	$V_{CC} = 200\text{ V, } I_C = 1\text{ A}$ $I_{B1} = 100\text{ mA, } R_L = 200\Omega$ $I_{B1} = I_{B2} = 100\text{ mA}$	-	-	3.0	$\mu\text{ s}$
Storage Time	t_s		-	-	4.0	$\mu\text{ s}$
Fall Time	t_f		-	-	3.0	$\mu\text{ s}$

