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NTE102 (PNP) & NTE103 (NPN) Germanium Complementary Transistors Power Output, Driver TO-5 / TO-39 Type Package

Description:

The NTE102 (PNP) and NTE103 (NPN) are Germanium complementary transistors designed for medium-speed saturated switching applications.

Features:

- Low Collector-Emitter Saturation Voltage:
 $V_{CE(sat)} = 200\text{mV Max @ } I_C = 24\text{mA}$
- High Emitter-Base Breakdown Voltage:
 $V_{(BR)EBO} = 12\text{V Min @ } I_E = 20\mu\text{A}$

Absolute Maximum Ratings:

Collector-Base Voltage, V_{CBO}	25V
Collector-Emitter Voltage, V_{CES}	24V
Emitter-Base Voltage, V_{EBO}	12V
Continuous Collector Current, I_C	150mA
Emitter Current, I_E	100mA
Total Device Dissipation ($T_A = +25^\circ\text{C}$), P_D	150mW
Derate Above $+25^\circ$	2mW/ $^\circ\text{C}$
Total Device Dissipation ($T_C = +25^\circ\text{C}$), P_D	300mW
Derate Above $+25^\circ$	4mW/ $^\circ\text{C}$
Operating Junction Temperature Range, T_J	-65° to $+100^\circ\text{C}$
Storage Junction Temperature Range, T_{stg}	-65° to $+100^\circ\text{C}$

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	$I_C = 20\mu\text{A}, I_E = 0$	25	—	—	V
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	$I_E = 20\mu\text{A}, I_C = 0$	12	—	—	V
Punch-Through Voltage	V_{PT}	$V_{EBfl} = 1\text{V}$, Note 1	24	—	—	V
Collector Cutoff Current	I_{CBO}	$V_{CB} = 12\text{V}, I_E = 0$	—	0.8	5.0	μA
		$V_{CB} = 12\text{V}, I_E = 0, T_A = +80^\circ\text{C}$	—	20	90	μA
Emitter Cutoff Current	I_{EBO}	$V_{EB} = 2.5\text{V}, I_C = 0$	—	0.5	2.5	μA

Note 1. V_{PT} is determined by measuring the Emitter-Base floating potential V_{EBfl} , using a voltmeter with 11M Ω minimum input impedance. The Collector-Base Voltage, V_{CB} , is increased until $V_{EBfl} = 1\text{V}$; this value of $V_{CB} = (V_{PT} + 1)$.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
ON Characteristics						
DC Current Gain	h_{FE}	$V_{CE} = 150\text{mV}, I_C = 12\text{mA}$	30	80	–	
		$V_{CE} = 200\text{mV}, I_C = 24\text{mA}$	24	90	–	
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C = 12\text{mA}, I_B = 0.4\text{mA}$	–	0.09	0.15	V
		$I_C = 24\text{mA}, I_B = 1\text{mA}$	–	0.09	0.20	V
Base–Emitter Voltage	V_{BE}	$I_C = 12\text{mA}, I_B = 0.4\text{mA}$	–	0.27	0.35	V
		$I_C = 24\text{mA}, I_B = 1\text{mA}$	–	0.30	0.40	V
Small–Signal Characteristics						
Alpha Cutoff Frequency	f_{hfb}	$V_{CB} = 6\text{V}, I_E = 1\text{mA}$	4	25	–	MHz
Output Capacitance	C_{ob}	$V_{CB} = 6\text{V}, I_E = 1\text{mA}, f = 1\text{MHz}$	–	8	20	pF
Input Impedance	h_{ie}	$V_{CE} = 6\text{V}, I_E = 1\text{mA}, f = 1\text{MHz}$	–	3.6	–	k Ω
Voltage Feedback Ratio	h_{re}		–	8	–	$\times 10^{-4}$
Small–Signal Current Gain	h_{fe}		–	135	–	
Output Admittance	h_{oe}		–	50	–	μmhos
Switching Characteristics						
Delay Time	t_d		–	0.07	–	μs
Rise Time	t_r		–	0.12	–	μs
Storage Time	t_s		–	0.20	–	μs
Fall Time	t_f		–	0.10	–	μs
Stored Base Charge	Q_{sb}		–	300	1400	pC

