NTE
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NTE2016/NTE2017/NTE2018/NTE2019/NTE2020
Integrated Circuit
8–Channel Darlington Array/Driver

Description:

Ideally suited for interfacing between low–level digital logic circuitry and high–power peripheral loads, the NTE2011 through NTE2015 are high–voltage, high–current Darlington arrays in an 18–Lead DIP type package and feature peak load current ratings to 600mA (NTE2016, NTE2019) or 750mA (NTE2017, NTE2018, NTE2020) for each of the eight drivers in each device. Under the proper conditions, high–power loads up to 4A at 50V (200W at 23% duty cycle) or 3.2A at 95V (304W at 33% duty cycle) can be controlled. Typical loads include relays, solenoids, stepping motors, multiplexed LED and incadescent displays, and heaters. All devices feature open collector outputs and integral diodes for inductive load transient suppression.

The NTE2016 is a general purpose array that may be used with standard bi–polar digital logic using external current limiting, or with most PMOS or CMOS directly. This device is pinned with outputs opposite inputs to facilitate printed wiring board layouts.

The NTE2017 is designed for use with 14V to 25V PMOS devices. Each input has a Zener diode and resistor in series to limit the input current to a safe value in that application. The Zener diode also gives this deVicee excellent noise immunity.

The NTE2018 has a 2.7kΩ series base resistor for each Darlington pair, allowing operation directly with TTL or CMOS operating at a supply voltage of 5V. This device will handle numerous interface needs – particularly those beyond the capabilities of standard logic buffers.

The NTE2019 has a 10.5kΩ series input resistor that permits operation directly from CMOS or PMOS outputs utilizing supply voltages of 6V to 15V. The required input current is below that of the NTE2018, while the required input voltage is less than that required by the NTE2017.

The NTE2020 is designed for use with standard TTL and Schottky TTL, with which higher output currents are required and loading of the logic output is not a concern. This device will sink a minimum of 350mA when driven from a “totem pole” logic output.

Absolute Maximum Ratings: (T_A = +25°C for any one Darlington pair unless otherwise specified)

Output Voltage, V_{CE} 50V
Input Voltage, V_{IN}
    NTE2017, NTE2018, NTE2019 . . . . . 30V
    NTE2020 . . . . . 15V
Continuous Collector Current. I_C
    NTE2016, NTE2019 . . . . . 500mA
    NTE2017, NTE2018, NTE2020 . . . . . 600mA
Continuous Base Current, I_B 25mA
Power Dissipation, P_D
    One Darlington Pair 1W
    Total Device (Note 1) 2.25W
Operating Ambient Temperature Range, T_A . . . . . –20° to +85°C
Storage Temperature Range, T_{stg} . . . . . –55° to +150°C

Note 1. Derate at the rate of 18.18mW/°C above +25°C.

Note 2. Under normal operating conditions, these devices will sustain 350mA per output with $V_{CE(sat)}$ = 1.6V at +50°C with a pulse width of 20ms and a duty cycle of 40%.

Electrical Characteristics: (T_A = +25° unless otherwise specified)

Parameter	Symbol	Device	Test Conditions	Min	Typ	Max	Unit
Output Leakage Current	I_{CEX}	All	V_{CE} = 50V, T_A = +25°C	–	–	50	µA
			V_{CE} = 50V, T_A = +70°C	–	–	100	µA
		NTE2017	V_{CE} = 50V, T_A = +70°C, V_{IN} = 6V	–	–	500	µA
		NTE2019	V_{CE} = 50V, T_A = +70°C, V_{IN} = 1V	–	–	500	µA
Collector–Emitter Saturation Voltage	$V_{CE(sat)}$	NTE2016 NTE2019	I_C = 100mA, I_B = 250µA	–	0.9	1.1	V
			I_C = 200mA, I_B = 350µA	–	1.1	1.3	V
			I_C = 350mA, I_B = 500µA	–	1.3	1.6	V
		NTE2017 NTE2018 NTE2020	I_C = 200mA, I_B = 350µA	–	1.1	1.3	V
			I_C = 350mA, I_B = 500µA	–	1.3	1.6	V
			I_C = 500mA, I_B = 600µA	–	1.7	1.9	V
Input Current	$I_{IN(ON)}$	NTE2017	V_{IN} = 17V	–	0.82	1.25	mA
		NTE2018	V_{IN} = 3.85V	–	0.93	1.35	mA
		NTE2019	V_{IN} = 5V	–	0.35	0.50	mA
			V_{IN} = 12V	–	1.0	1.45	mA
		NTE2020	V_{IN} = 3V	–	1.5	2.4	mA
	$I_{IN(OFF)}$	All	I_C = 500µA, T_A = +70°C	50	60	–	µA
Input Voltage	$V_{IN(ON)}$	NTE2017	V_{CE} = 2V, I_C = 500mA	–	–	17	V
		NTE2018	V_{CE} = 2V, I_C = 250mA	–	–	2.7	V
			V_{CE} = 2V, I_C = 300mA	–	–	3.0	V
			V_{CE} = 2V, I_C = 500mA	–	–	3.5	V
		NTE2019	V_{CE} = 2V, I_C = 125mA	–	–	5.0	V
			V_{CE} = 2V, I_C = 200mA	–	–	6.0	V
			V_{CE} = 2V, I_C = 275mA	–	–	7.0	V
			V_{CE} = 2V, I_C = 350mA	–	–	8.0	V
		NTE2020	V_{CE} = 2V, I_C = 350mA	–	–	2.6	V
DC Forward Current Transfer Ratio	h_{FE}	NTE2011	V_{CE} = 2V, I_C = 350mA	1000	–	–	
Input Capacitance	C_{IN}	All		–	15	25	pF
Turn–On Delay	t_{PLH}	All	0.5 E_{in} to 0.5 E_{out}	–	0.25	1.0	µs
Turn–Off Delay	t_{PHL}	All	0.5 E_{in} to 0.5 E_{out}	–	0.25	1.0	µs
Clamp Diode Leakage Current	I_R	All	V_R = 50V, T_A = +25°C	–	–	50	µA
			V_R = 50V, T_A = +70°C	–	–	100	µA
Clamp Diode Forward Voltage	V_F	All	I_F = 350mA	–	1.7	2.0	V
		NTE2017 NTE2018 NTE2020	I_F = 500mA	–	2.1	2.5	V

Pin Connection Diagram