HIGH VOLTAGE MEDIUM CURRENT DRIVER ARRAYS

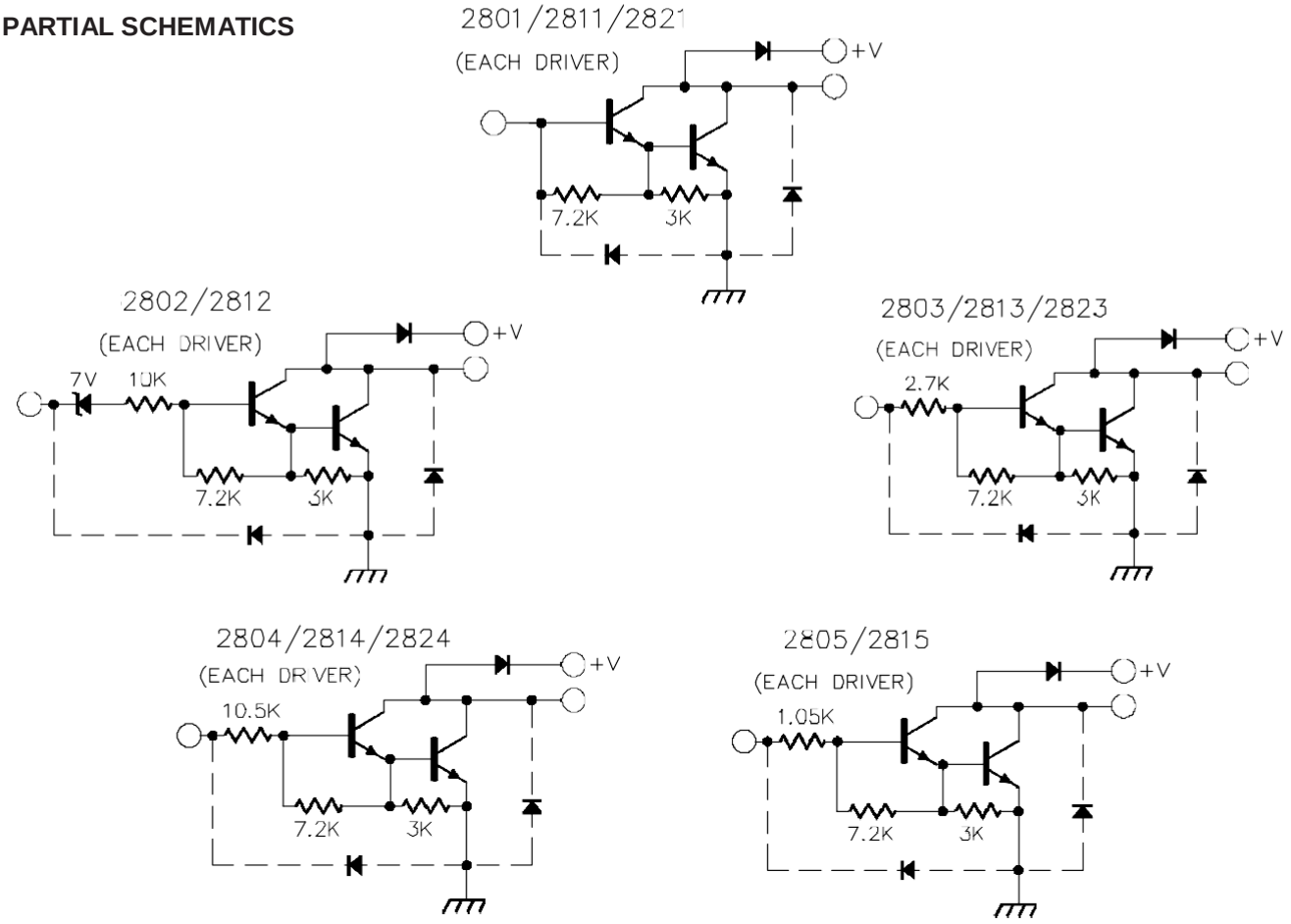
The HT2800 series integrates eight NPN Darlington pairs with internal suppression diodes to drive lamps, relays, and solenoids in many military, aerospace, and industrial applications that require severe environments. All units feature open collector outputs with greater than 50V breakdown voltages combined with 500mA current carrying capabilities. Five different input configurations provide optimized designs for interfacing with DTL, TTL, PMOS, or CMOS drive signals. These devices are designed to operate from -55°C to 125°C ambient temperature in a 18-pin dual in-line ceramic (J) package and 20-pin leadless chip carrier (LCC).

- **Eight NPN Darlington pairs**
- **Collector currents to 600mA**
- **Output voltages from 50V to 95V**
- **Internal clamping diodes for inductive loads**
- **DTL, TTL, PMOS, or CMOS compatible inputs**
- **Hermetic ceramic package**

HIGH RELIABILITY FEATURES

- ♦ **Available to MIL-STD-883 and DESC SMD**
- ♦ **MIL-M38510/14106BVA - JAN2801J**
- ♦ **MIL-M38510/14107BVA - JAN2802J**
- ♦ **MIL-M38510/14108BVA - JAN2803J**
- ♦ **MIL-M38510/14109BVA - JAN2804J**
- ♦ **Radiation data available**
- ♦ **LMI level "S" processing available**

PARTIAL SCHEMATICS



ABSOLUTE MAXIMUM RATINGS (Note 1)

Output Voltage, V_{CE}
(HT2800, 2810 series) 50V
(HT2820 series) 95V
Input Voltage, V_{IN}
(HT2802,3,4 series) 30V
Continuous Input Current, I_{IN} 25mA

Note 1. Values beyond which damage may occur.

Continuous Collector Current, I_C
(HT2800, 2820) 500mA
(HT2810) 600mA
Operating Junction Temperature
Hermetic (J, L Packages) ..... 150°C
Plastic (N Package) ..... 150°C
Storage Temperature Range ..... -65°C to 150°C
Lead Temperature (Soldering 10 sec.) ..... 300°C

THERMAL DATA

J Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 25°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 70°C/W
N Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 30°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 60°C/W
L Package:
Thermal Resistance-Junction to Case, θ_{JC} ..... 35°C/W
Thermal Resistance-Junction to Ambient, θ_{JA} ..... 120°C/W

Note A. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.
Note B. The above numbers for θ_{JC} are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The θ_{JA} numbers are meant to be guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

RECOMMENDED OPERATING CONDITIONS (Note 2)

Output Voltage, V_{CE}
HT2800, HT2820 series 50V
HT2810 series 95V

Note 2. Range over which the device is functional.

Peak Collector Current, I_C
HT2800, HT2820 series 350mA
HT2810 series 500mA
Operating Ambient Temperature Range ..... -55°C to 125°C

SELECTION GUIDE

Device	V_{CE} Max	I_C Max	Logic Inputs
HT2801	50V	500mA	General Purpose PMOS, CMOS
HT2802	50V	500mA	14V-25V PMOS
HT2803	50V	500mA	5V TTL, CMOS
HT2804	50V	500mA	6V-15V CMOS, PMOS
HT2811	50V	600mA	General Purpose PMOS, CMOS
HT2812	50V	600mA	14V-25V PMOS

Device	V_{CE} Max	I_C Max	Logic Inputs
HT2813	50V	600mA	5V TTL, CMOS
HT2814	50V	600mA	6V-15V CMOS, PMOS
HT2815	50V	600mA	High Output TTL
HT2821	95V	500mA	General Purpose PMOS, CMOS
HT2823	95V	500mA	5V TTL, CMOS
HT2824	95V	500mA	6V-15V CMOS, PMOS

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, these specifications apply over the operating ambient temperatures of -55°C ≤ T_A ≤ 125°C. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

HT2801 thru HT2804

Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
				Min.	Typ.	Max.	
Output Leakage Current (I_{CEX})	All		V_{CE} = 50V			100	µA
	HT2802		V_{CE} = 50V, V_{IN} = 6V			500	µA
	HT2804		V_{CE} = 50V, V_{IN} = 1V			500	µA
Collector - Emitter ($V_{CE(SAT)}$)	All	$T_A = T_{MIN}$	I_C = 350mA, I_B = 850µA		1.6	1.8	V
		$T_A = T_{MIN}$	I_C = 200mA, I_B = 550µA		1.3	1.5	V
		$T_A = T_{MIN}$	I_C = 100mA, I_B = 350µA		1.1	1.3	V
		T_A = 25°C	I_C = 350mA, I_B = 500µA		1.25	1.6	V
		T_A = 25°C	I_C = 200mA, I_B = 350µA		1.1	1.3	V
		T_A = 25°C	I_C = 100mA, I_B = 250µA		0.9	1.1	V
		$T_A = T_{MAX}$	I_C = 350mA, I_B = 500µA		1.6	1.8	V
		$T_A = T_{MAX}$	I_C = 200mA, I_B = 350µA		1.3	1.5	V
		$T_A = T_{MAX}$	I_C = 100mA, I_B = 250µA		1.1	1.3	V
Input Current ($I_{IN(ON)}$)	HT2802		V_{IN} = 17V	480	850	1300	µA
	HT2803		V_{IN} = 3.85V	650	930	1350	µA
	HT2804		V_{IN} = 5V	240	350	500	µA
			V_{IN} = 12V	650	1000	1450	µA
($I_{IN(OFF)}$)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
Input Voltage ($V_{IN(ON)}$)	HT2802	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			18	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			13	V
	HT2803	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			3.3	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 250mA			3.6	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			3.9	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			2.4	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 250mA			2.7	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			3.0	V
	HT2804	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 125mA			6.0	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			8.0	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 275mA			10	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			12	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 125mA			5.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			6.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 275mA			7.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			8.0	V
D-C Forward Current	HT2801	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA	500			
Transfer Ratio (h_{FE})		T_A = 25°C	V_{CE} = 2V, I_C = 350mA	1000			
Input Capacitance (C_{IN}) (Note 3)	All	T_A = 25°C			15	25	pF
Turn-On Delay (TPLH)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Turn-Off Delay (TPHL)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Clamp Diode Leakage Current (I_R)	All		V_R = 50V			50	µA
Clamp Diode Forward Voltage (V_F)	All		I_F = 350mA		1.7	2.0	V

Note 3. These parameters, although guaranteed, are not tested in production.

ELECTRICAL CHARACTERISTICS (continued)

HT2811 thru HT2815

Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
				Min.	Typ.	Max.	
Output Leakage Current (I_{CEX})	All		V_{CE} = 50V			100	µA
	HT2812		V_{CE} = 50V, V_{IN} = 6V			500	µA
	HT2814		V_{CE} = 50V, V_{IN} = 1V			500	µA
Collector - Emitter ($V_{CE(SAT)}$)	All	$T_A = T_{MIN}$	I_C = 500mA, I_B = 1100µA		1.8	2.1	V
		$T_A = T_{MIN}$	I_C = 350mA, I_B = 850µA		1.6	1.8	V
		$T_A = T_{MIN}$	I_C = 200mA, I_B = 550µA		1.3	1.5	V
		T_A = 25°C	I_C = 500mA, I_B = 600µA		1.7	1.9	V
		T_A = 25°C	I_C = 350mA, I_B = 500µA		1.25	1.6	V
		T_A = 25°C	I_C = 200mA, I_B = 350µA		1.1	1.3	V
		$T_A = T_{MAX}$	I_C = 500mA, I_B = 600µA		1.8	2.1	V
		$T_A = T_{MAX}$	I_C = 350mA, I_B = 500µA		1.6	1.8	V
		$T_A = T_{MAX}$	I_C = 200mA, I_B = 350µA		1.3	1.5	V
Input Current ($I_{IN(ON)}$)	HT2812		V_{IN} = 17V	480	850	1300	µA
	HT2813		V_{IN} = 3.85V	650	930	1350	µA
	HT2814		V_{IN} = 5V	240	350	500	µA
			V_{IN} = 12V	650	1000	1450	µA
	HT2815		V_{IN} = 3V	1180	1500	2400	µA
($I_{IN(OFF)}$)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
Input Voltage ($V_{IN(ON)}$)	HT2812	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			23.5	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			17	V
	HT2813	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 250mA			3.6	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			3.9	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			6.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 250mA			2.7	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			3.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			3.5	V
	HT2814	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 275mA			10	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			12	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			17	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 275mA			7.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			8.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			9.5	V
	HT2815	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			3.0	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			3.5	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			2.4	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			2.6	V
D-C Forward Current	HT2811	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA	450			
Transfer Ratio (h_{FE})		T_A = 25°C	V_{CE} = 2V, I_C = 500mA	900			
Input Capacitance (C_{IN}) (Note 3)	All	T_A = 25°C			15	25	pF
Turn-On Delay (TPLH)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Turn-Off Delay (TPHL)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Clamp Diode Leakage Current (I_R)	All		V_R = 50V			50	µA
Clamp Diode Forward Voltage (V_F)	All		I_F = 350mA		1.7	2.0	V
			I_F = 500mA			2.5	V

Note 3. These parameters, although guaranteed, are not tested in production.

ELECTRICAL CHARACTERISTICS (continued)

HT2821 thru HT2824

Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
				Min.	Typ.	Max.	
Output Leakage Current (I_{CEX})	All		V_{CE} = 95V			100	µA
	HT2824		V_{CE} = 95V, V_{IN} = 1V			500	µA
Collector - Emitter ($V_{CE(SAT)}$)	All	$T_A = T_{MIN}$	I_C = 350mA, I_B = 850µA		1.6	1.8	V
		$T_A = T_{MIN}$	I_C = 200mA, I_B = 550µA		1.3	1.5	V
		$T_A = T_{MIN}$	I_C = 100mA, I_B = 350µA		1.1	1.3	V
		T_A = 25°C	I_C = 350mA, I_B = 500µA		1.25	1.6	V
		T_A = 25°C	I_C = 200mA, I_B = 350µA		1.1	1.3	V
		T_A = 25°C	I_C = 100mA, I_B = 250µA		0.9	1.1	V
		$T_A = T_{MAX}$	I_C = 350mA, I_B = 500µA		1.6	1.8	V
		$T_A = T_{MAX}$	I_C = 200mA, I_B = 350µA		1.3	1.5	V
		$T_A = T_{MAX}$	I_C = 100mA, I_B = 250µA		1.1	1.3	V
Input Current ($I_{IN(ON)}$)	HT2823		V_{IN} = 3.85V	650	930	1350	µA
	HT2824		V_{IN} = 5V	240	350	500	µA
			V_{IN} = 12V	650	1000	1450	µA
($I_{IN(OFF)}$)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
Input Voltage ($V_{IN(ON)}$)		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			13	V
	HT2823	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			3.3	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 250mA			3.6	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			3.9	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			2.4	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 250mA			2.7	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			3.0	V
	HT2824	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 125mA			6.0	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			8.0	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 275mA			10	V
		$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			12	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 125mA			5.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			6.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 275mA			7.0	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			8.0	V
D-C Forward Current	HT2821	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA	500			
Transfer Ratio (h_{FE})		T_A = 25°C	V_{CE} = 2V, I_C = 350mA	1000			
Input Capacitance (C_{IN}) (Note 3)	All	T_A = 25°C			15	25	pF
Turn-On Delay (TPLH)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Turn-Off Delay (TPHL)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Clamp Diode Leakage Current (I_R)	All		V_R = 95V			50	µA
Clamp Diode Forward Voltage (V_F)	All		I_F = 350mA		1.7	2.0	V

Note 3. These parameters, although guaranteed, are not tested in production.

CHARACTERISTIC CURVES

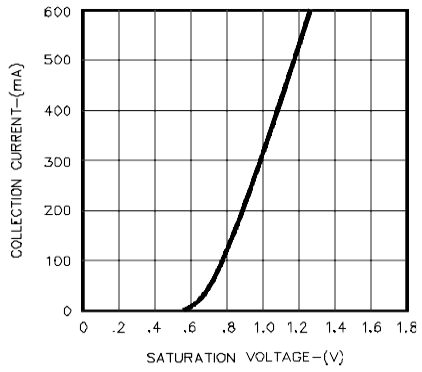


FIGURE 1.
OUTPUT CHARACTERISTICS

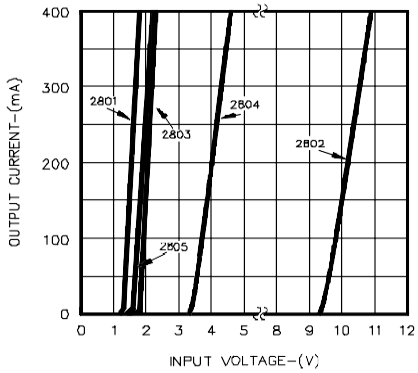


FIGURE 2.
OUTPUT CURRENT VS. INPUT VOLTAGE

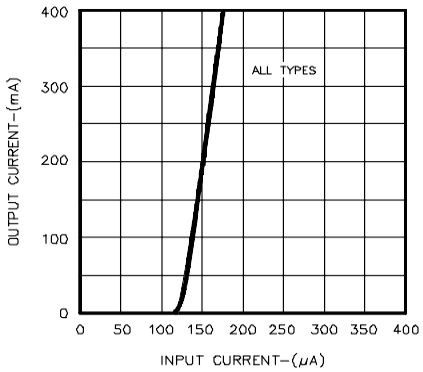


FIGURE 3.
OUTPUT CURRENT VS. INPUT CURRENT

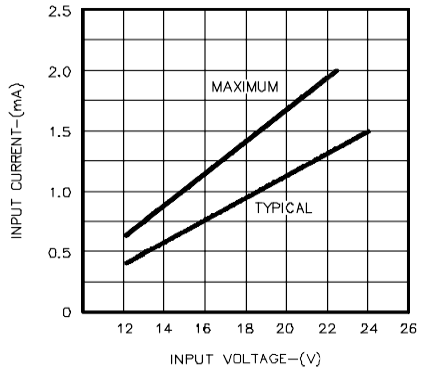


FIGURE 4.
INPUT CHARACTERISTICS - HT2802

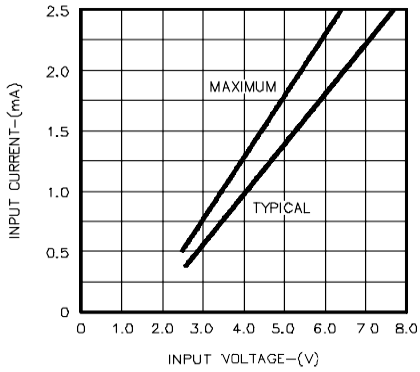


FIGURE 5.
INPUT CHARACTERISTICS - HT2803

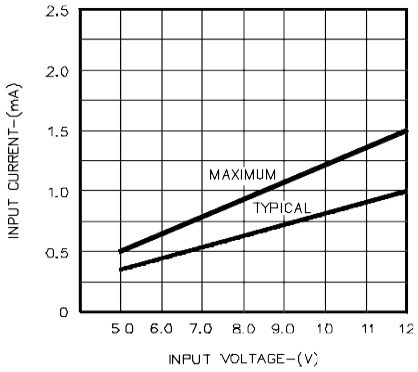


FIGURE 6.
INPUT CHARACTERISTICS - HT2804

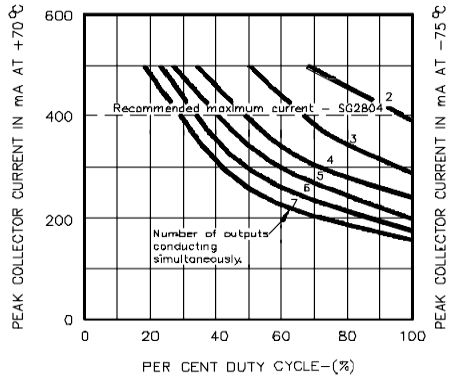
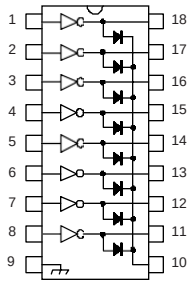
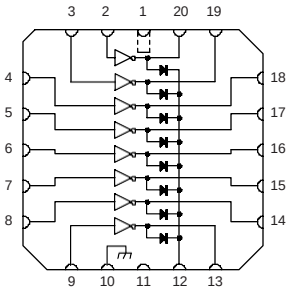


FIGURE 7.
PEAK COLLECTOR CURRENT VS. DUTY CYCLE

CONNECTION DIAGRAMS & ORDERING INFORMATION (See Notes Below)

Package	Part No. (Note 3)	Ambient Temperature Range	Connection Diagram
18-PIN CERAMIC DIP J - PACKAGE	HT28XXJ/883B JAN2801J JAN2802J JAN2803J JAN2804J HT2803J/DESC HT2821J/DESC HT2823J/DESC HT2824J/DESC HT28XXJ	-55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C	
18-PIN PLASTIC DIP N- PACKAGE	HT2803N HT2823N	0°C to 70°C 0°C to 70°C	
20-PIN CERAMIC LEADLESS CHIP CARRIER L- PACKAGE	HT28XXL/883B HT2803L/DESC HT2821L/DESC HT2823L/DESC HT2824L/DESC HT28XXL	-55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C	

Note 1. Contact factory for JAN and DESC product availability.
2. All parts are viewed from the top.
3. See Selection Guide for specific device types.