

High Voltage, High Current Darlington Transistor Arrays

The seven NPN Darlington connected transistors in these arrays are well suited for driving lamps, relays, or printer hammers in a variety of industrial and consumer applications. Their high breakdown voltage and internal suppression diodes insure freedom from problems associated with inductive loads. Peak inrush currents to 500 mA permit them to drive incandescent lamps. The HT1413A with a 2.7 kΩ series input resistor is well suited for systems utilizing a 5.0 V TTL or CMOS Logic.

Features

- Pb-Free Packages are Available*
- NCV Prefix for Automotive and Other Applications Requiring Site and Control Changes

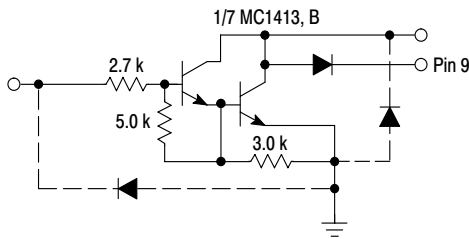


Figure 1. Representative Schematic Diagram

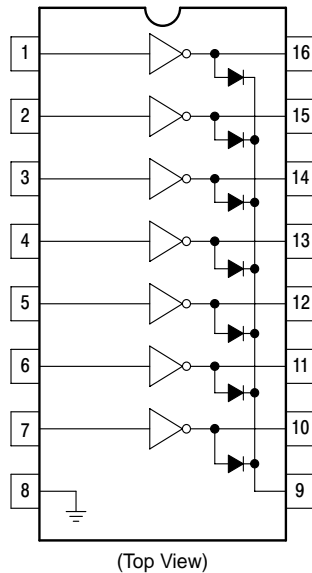
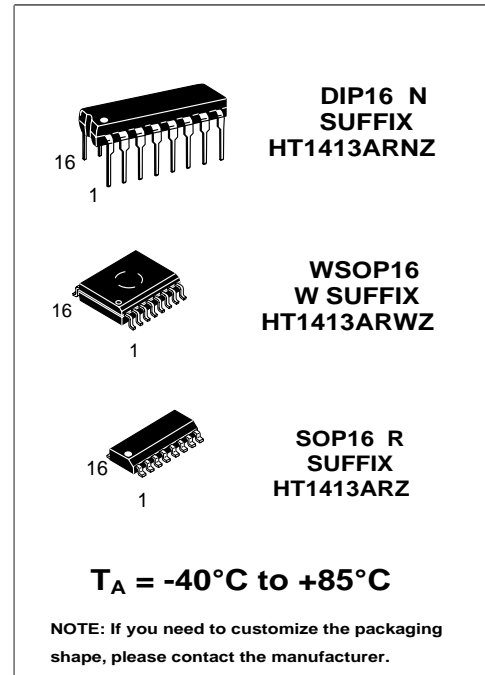


Figure 2. PIN CONNECTIONS



MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, and rating apply to any one device in the package, unless otherwise noted.)

Rating	Symbol	Value	Unit
Output Voltage	V_O	50	V
Input Voltage	V_I	30	V
Collector Current – Continuous	I_C	500	mA
Base Current – Continuous	I_B	25	mA
Operating Ambient Temperature Range	T_A	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$
Junction Temperature	T_J	150	$^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient Case 648, P Suffix Case 751B, D Suffix	$R_{\theta JA}$	67 100	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case Case 648, P Suffix Case 751B, D Suffix	$R_{\theta JC}$	22 20	$^\circ\text{C/W}$
Electrostatic Discharge Sensitivity (ESD) Human Body Model (HBM) Machine Model (MM) Charged Device Model (CDM)	ESD	2000 400 1500	V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Output Leakage Current ($V_O = 50\text{ V}$, $T_A = +85^\circ\text{C}$) ($V_O = 50\text{ V}$, $T_A = +25^\circ\text{C}$)	All Types All Types	I_{CEX}	– –	– –	100 50	μA
Collector–Emitter Saturation Voltage ($I_C = 350\text{ mA}$, $I_B = 500\ \mu\text{A}$) ($I_C = 200\text{ mA}$, $I_B = 350\ \mu\text{A}$) ($I_C = 100\text{ mA}$, $I_B = 250\ \mu\text{A}$)	All Types All Types All Types	$V_{\text{CE(sat)}}$	– – –	1.1 0.95 0.85	1.6 1.3 1.1	V
Input Current – On Condition ($V_I = 3.85\text{ V}$)	HT1413A	$I_{\text{I(on)}}$	–	0.93	1.35	mA
Input Voltage – On Condition ($V_{\text{CE}} = 2.0\text{ V}$, $I_C = 200\text{ mA}$) ($V_{\text{CE}} = 2.0\text{ V}$, $I_C = 250\text{ mA}$) ($V_{\text{CE}} = 2.0\text{ V}$, $I_C = 300\text{ mA}$)	HT1413A	$V_{\text{I(on)}}$	– – –	– – –	2.4 2.7 3.0	V
Input Current – Off Condition ($I_C = 500\ \mu\text{A}$, $T_A = 85^\circ\text{C}$)	All Types	$I_{\text{I(off)}}$	50	100	–	μA
DC Current Gain ($V_{\text{CE}} = 2.0\text{ V}$, $I_C = 350\text{ mA}$)		h_{FE}	1000	–	–	–
Input Capacitance		C_{I}	–	15	30	pF
Turn–On Delay Time (50% E_{I} to 50% E_{O})		t_{on}	–	0.25	1.0	μs
Turn–Off Delay Time (50% E_{I} to 50% E_{O})		t_{off}	–	0.25	1.0	μs
Clamp Diode Leakage Current ($V_{\text{R}} = 50\text{ V}$)	$T_A = +25^\circ\text{C}$ $T_A = +85^\circ\text{C}$	I_{R}	– –	– –	50 100	μA
Clamp Diode Forward Voltage ($I_{\text{F}} = 350\text{ mA}$)		V_{F}	–	1.5	2.0	V

NOTE: NCV1413B $T_{\text{low}} = -40^\circ\text{C}$, $T_{\text{high}} = +125^\circ\text{C}$. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

TYPICAL PERFORMANCE CURVES – $T_A = 25^\circ\text{C}$

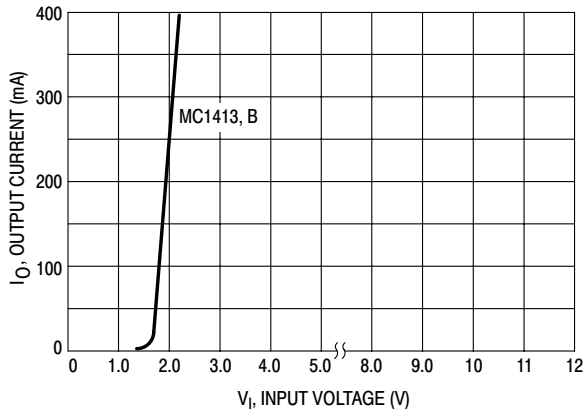


Figure 3. Output Current versus Input Voltage

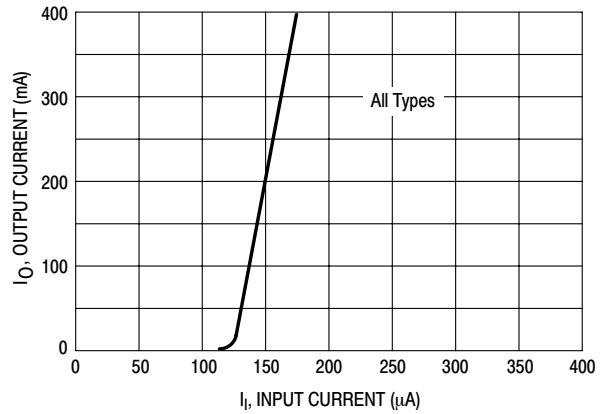


Figure 4. Output Current versus Input Current

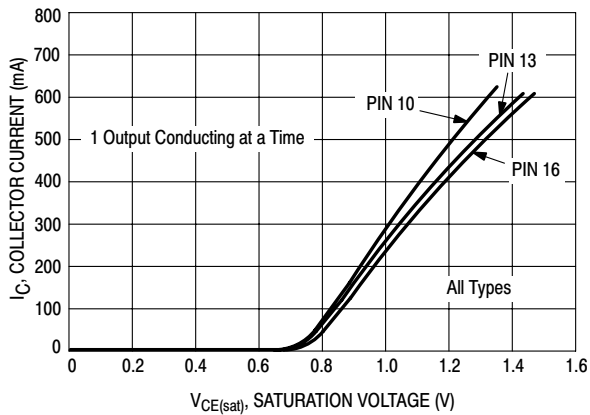


Figure 5. Typical Output Characteristics

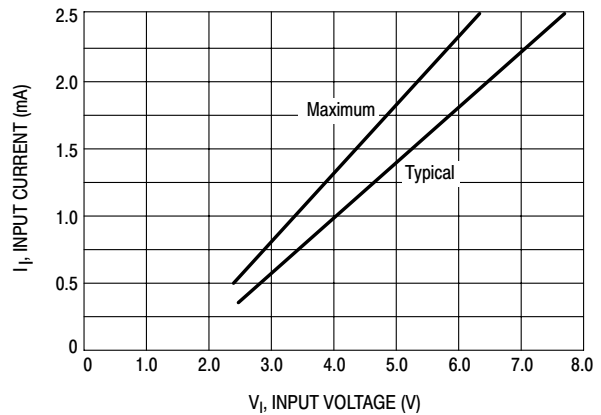


Figure 6. Input Characteristics – MC1413, B

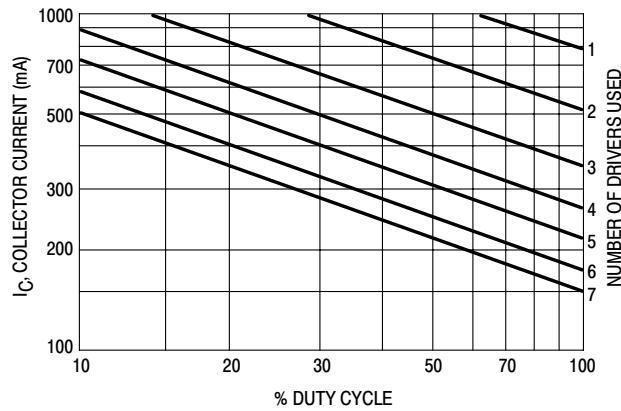
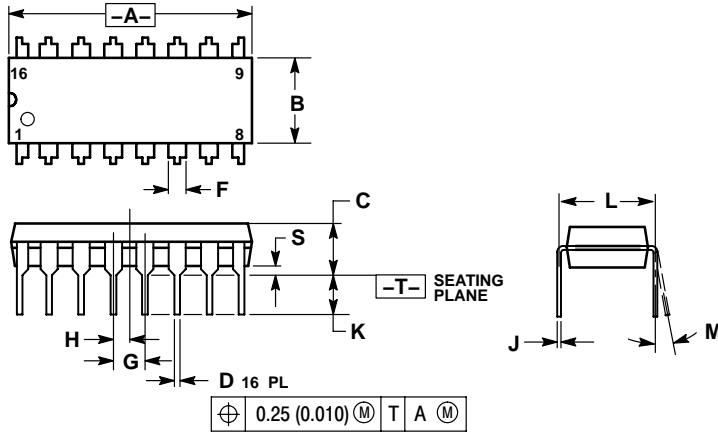


Figure 7. Maximum Collector Current
versus Duty Cycle
(and Number of Drivers in Use)

PACKAGE DIMENSIONS

PDIP-16
P SUFFIX
 CASE 648-08
 ISSUE T

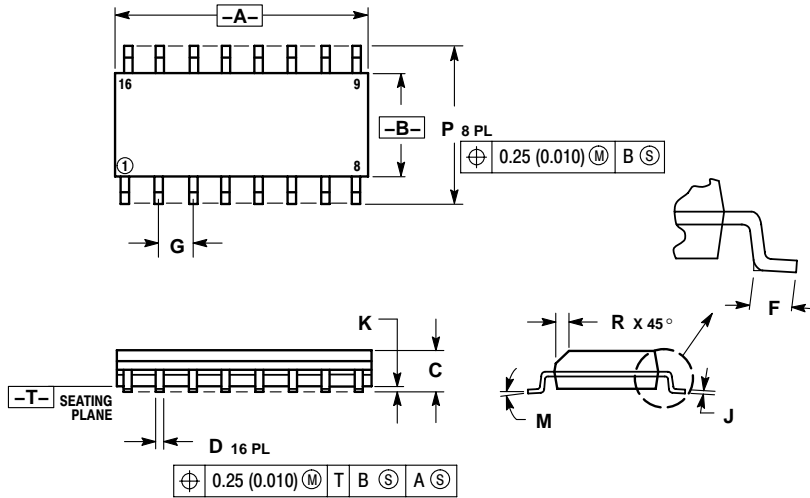

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

PACKAGE DIMENSIONS

SOIC-16
D SUFFIX
CASE 751B-05
ISSUE J



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
 4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
 5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019