MC1413, MC1413B, NCV1413B

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 MC1413, B 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

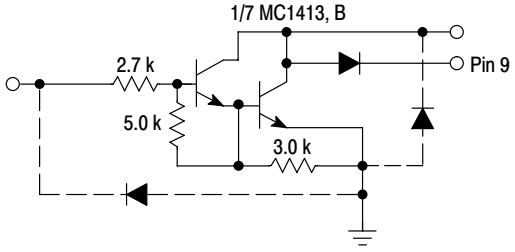
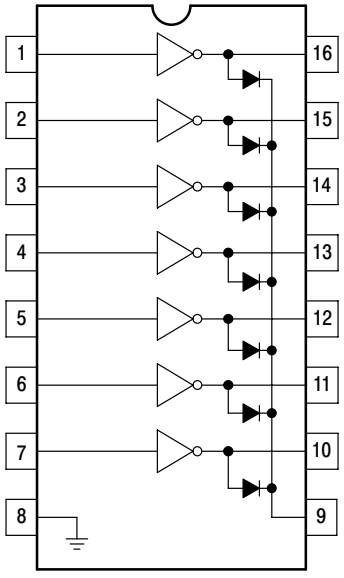


Figure 1. Representative Schematic Diagram



(Top View)

Figure 2. PIN CONNECTIONS

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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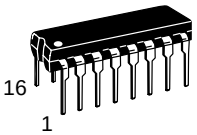
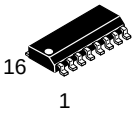


PDIP−16
P SUFFIX
CASE 648



SOIC−16
D SUFFIX
CASE 751B

ORDERING INFORMATION

Device	Package	Shipping†
MC1413D	SOIC−16	48 Units/Rail
MC1413DG	SOIC−16 (Pb−Free)	48 Units/Tube
MC1413DR2	SOIC−16	2500 Tape & Reel
MC1413DR2G	SOIC−16 (Pb−Free)	2500 Tape & Reel
MC1413P	PDIP−16	25 Units/Rail
MC1413PG	PDIP−16 (Pb−Free)	25 Units/Rail
MC1413BD	SOIC−16	48 Units/Rail
MC1413BDG	SOIC−16 (Pb−Free)	48 Units/Rail
MC1413BDR2	SOIC−16	2500 Tape & Reel
MC1413BDR2G	SOIC−16 (Pb−Free)	2500 Tape & Reel
MC1413BP	PDIP−16	25 Units/Rail
MC1413BPG	PDIP−16 (Pb−Free)	25 Units/Rail
NCV1413BDR2	SOIC−16	2500 Tape & Reel
NCV1413BDR2G	SOIC−16 (Pb−Free)	2500 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 5 of this data sheet.

MAXIMUM RATINGS (T_A = 25°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 MC1413 MC1413B NCV1413B	T_A	 −20 to +85 −40 to +85 −40 to +125	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C
Junction Temperature	T_J	150	°C
Thermal Resistance, Junction−to−Ambient Case 648, P Suffix Case 751B, D Suffix	$R_{\theta JA}$	 67 100	°C/W
Thermal Resistance, Junction−to−Case Case 648, P Suffix Case 751B, D Suffix	$R_{\theta JC}$	 22 20	°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°C, unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
Output Leakage Current		I_{CEX}				μA
(V_O = 50 V, T_A = +85°C)	All Types		−	−	100	
(V_O = 50 V, T_A = +25°C)	All Types		−	−	50	
Collector−Emitter Saturation Voltage		$V_{CE(sat)}$				V
(I_C = 350 mA, I_B = 500 μA)	All Types		−	1.1	1.6	
(I_C = 200 mA, I_B = 350 μA)	All Types		−	0.95	1.3	
(I_C = 100 mA, I_B = 250 μA)	All Types		−	0.85	1.1	
Input Current − On Condition		$I_{I(on)}$				mA
(V_I = 3.85 V)	MC1413, B		−	0.93	1.35	
Input Voltage − On Condition		$V_{I(on)}$				V
(V_{CE} = 2.0 V, I_C = 200 mA)	MC1413, B		−	−	2.4	
(V_{CE} = 2.0 V, I_C = 250 mA)	MC1413, B		−	−	2.7	
(V_{CE} = 2.0 V, I_C = 300 mA)	MC1413, B		−	−	3.0	
Input Current − Off Condition (I_C = 500 μA, T_A = 85°C)	All Types	$I_{I(off)}$	50	100	−	μA
DC Current Gain (V_{CE} = 2.0 V, I_C = 350 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	T_A = +25°C	I_R	−	−	50	μA
(V_R = 50 V)	T_A = +85°C		−	−	100	
Clamp Diode Forward Voltage (I_F = 350 mA)		V_F	−	1.5	2.0	V

NOTE: NCV1413B T_{low} = −40°C, T_{high} = +125°C. Guaranteed by design. NCV prefix is for automotive and other applications requiring site and change control.

TYPICAL PERFORMANCE CURVES − T_A = 25°C

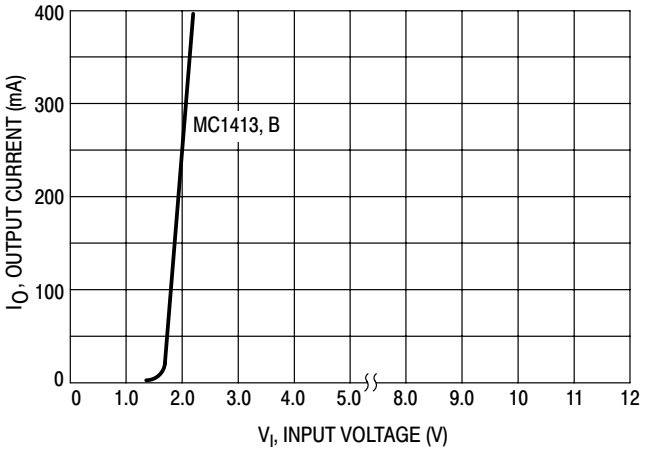


Figure 3. Output Current versus Input Voltage

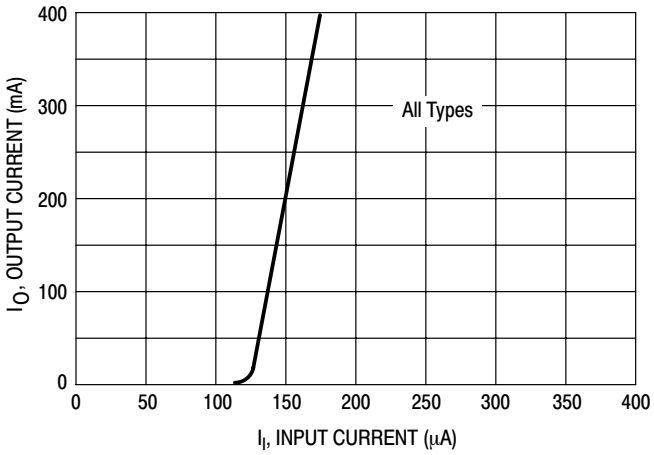


Figure 4. Output Current versus Input Current

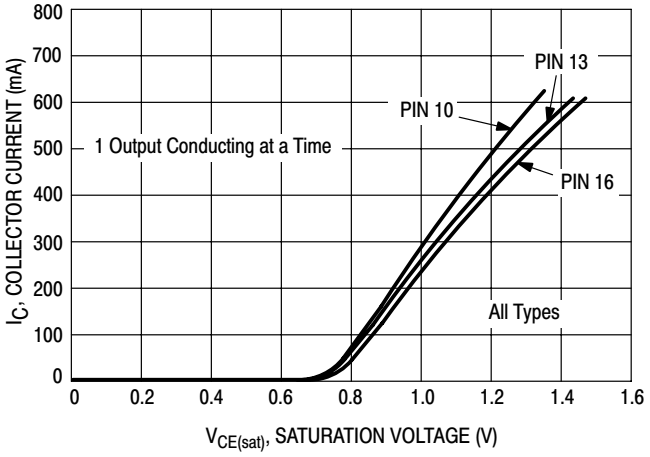


Figure 5. Typical Output Characteristics

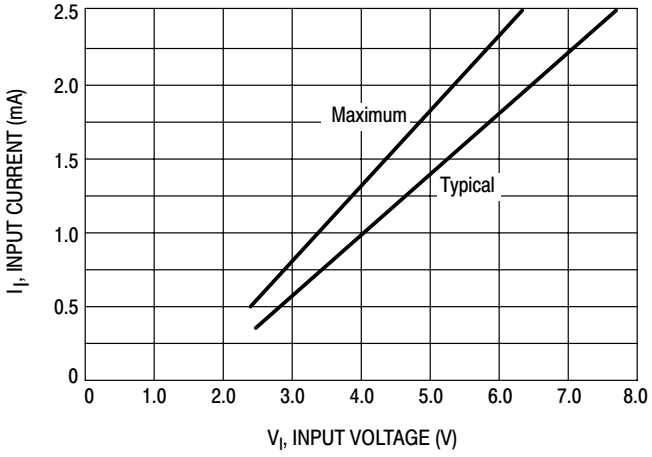


Figure 6. Input Characteristics − MC1413, B

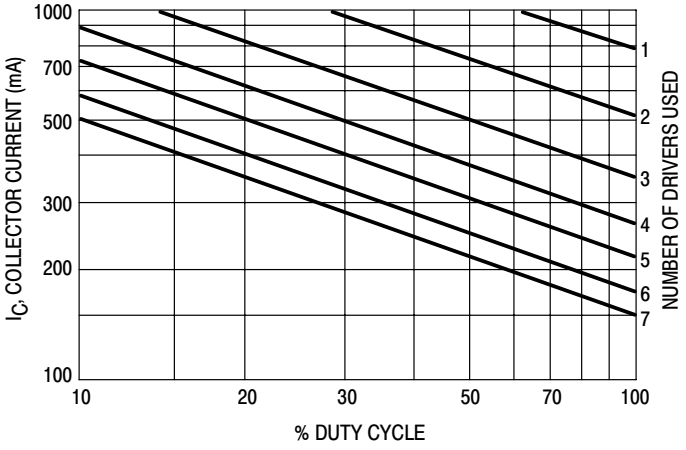
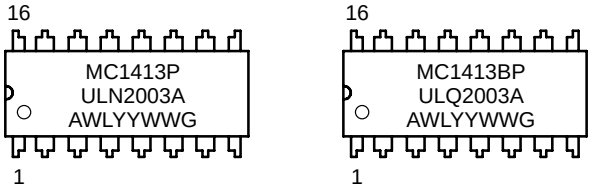


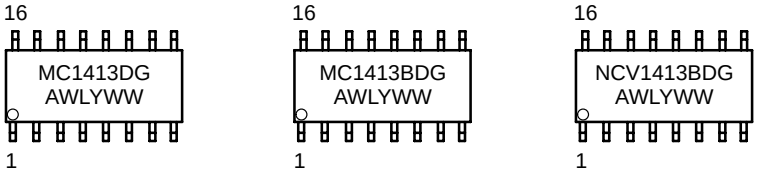
Figure 7. Maximum Collector Current versus Duty Cycle (and Number of Drivers in Use)

MARKING DIAGRAMS

PDIP−16
P SUFFIX
CASE 648



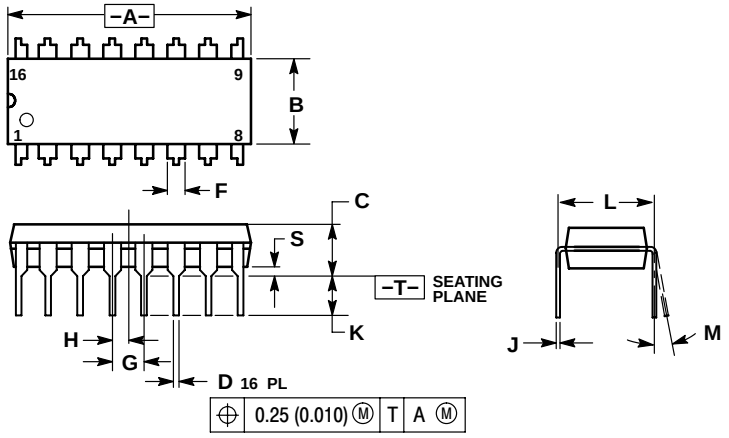
SOIC−16
D SUFFIX
CASE 751B



A = Assembly Location
WL = Wafer Lot
YY, Y = Year
WW = Work Week
G = Pb−Free Package

PACKAGE DIMENSIONS

PDIP−16
P SUFFIX
CASE 648−08
ISSUE T

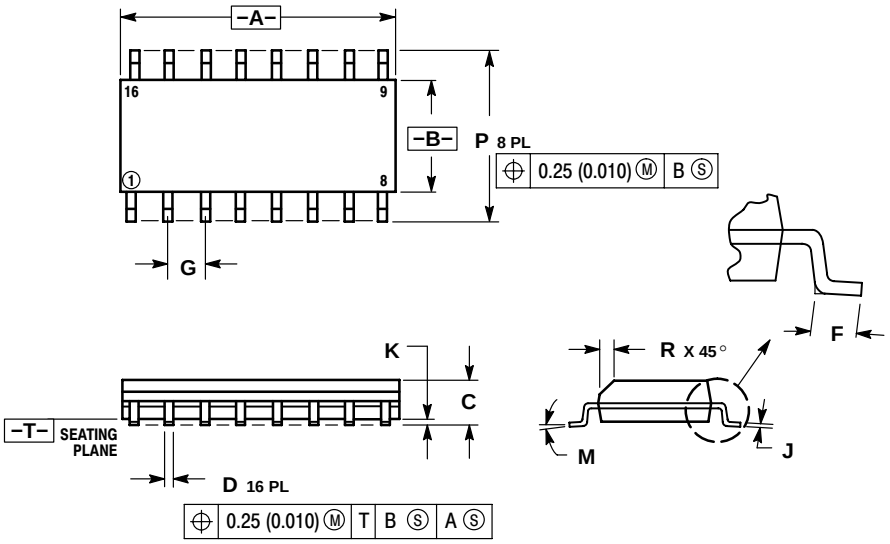


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	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.

	MILLIMETERS		INCHES	
DIM	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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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MC1413/D