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 k Ω 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



ON Semiconductor®

http://onsemi.com



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.

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

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

Rating	Symbol	Value	Unit
Output Voltage	Vo	50	V
Input Voltage	VI	30	V
Collector Current – Continuous	۱ _C	500	mA
Base Current – Continuous	Ι _Β	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	TJ	150	°C
Thermal Resistance, Junction-to-Ambient Case 648, P Suffix Case 751B, D Suffix	R _{θJA}	67 100	°C/W
Thermal Resistance, Junction–to–Case Case 648, P Suffix Case 751B, D Suffix	R _{θJC}	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.

Characteristic		Symbol	Min	Тур	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	μΑ
Collector–Emitter Saturation Voltage ($I_C = 350 \text{ mA}, I_B = 500 \mu A$) ($I_C = 200 \text{ mA}, I_B = 350 \mu A$) ($I_C = 100 \text{ mA}, I_B = 250 \mu A$)	All Types All Types All Types	V _{CE(sat)}	- - -	1.1 0.95 0.85	1.6 1.3 1.1	V
Input Current – On Condition $(V_1 = 3.85 V)$	MC1413, B	I _{I(on)}	-	0.93	1.35	mA
Input Voltage – On Condition $(V_{CE} = 2.0 \text{ V}, I_C = 200 \text{ mA})$ $(V_{CE} = 2.0 \text{ V}, I_C = 250 \text{ mA})$ $(V_{CE} = 2.0 \text{ V}, I_C = 300 \text{ mA})$	MC1413, B MC1413, B MC1413, B	V _{I(on)}	- - -	- - -	2.4 2.7 3.0	V
Input Current – Off Condition ($I_C = 500 \ \mu A, T_A = 85^{\circ}C$)	All Types	I _{I(off)}	50	100	-	μΑ
DC Current Gain $(V_{CE} = 2.0 \text{ V}, I_C = 350 \text{ mA})$		h _{FE}	1000	-	-	-
Input Capacitance		Cl	-	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 _R = 50 V)	T _A = +25°C T _A = +85°C	Ι _R	_ _	-	50 100	μΑ
Clamp Diode Forward Voltage (I _F = 350 mA)		VF	-	1.5	2.0	V

ELECTRICAL CHARACTERISTICS (T_A = 25°C, unless otherwise noted)

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 – $T_A = 25^{\circ}C$







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

MARKING DIAGRAMS





SOIC-16 D SUFFIX CASE 751B

16	16	16
<u>A A A A A A A A</u>	<u>, A A A A A A A</u>	<u> </u>
MC1413DG AWLYWW	MC1413BDG AWLYWW	NCV1413BDG AWLYWW
<u> </u>	<u>, , , , , , , , , , , , , , , , , , , </u>	<u> </u>

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



🕀 0.010 🕅 C A 🕅 B 🕅

STYLE 1: STYLE 2: PIN 1. COMMON DRAIN CATHODE CATHODE PIN 1. 2. 2. з. CATHODE 3. COMMON DRAIN COMMON DRAIN 4. 5. CATHODE 4. CATHODE 5. 6. CATHODE 6. COMMON DRAIN 7. CATHODE 7. COMMON DRAIN CATHODE COMMON DRAIN 8. 9. 8. 9. ANODE GATE 10. ANODE 10. SOURCE ANODE ANODE 11. 12. GATE SOURCE 11. 12. 13. ANODE 13. GATE 14. 15. ANODE ANODE 14. 15. SOURCE GATE 16. ANODE 16. SOURCE

SIDE VIEW

NOTE 6



NOTES:

- 1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994. 2
- 3.
- DIMENSIONING AND TOLERANGURA PER ASIME 114.300, 1994. CONTROLLING DIMENSION: INCHES. DIMENSIONS A, A1 AND L ARE MEASURED WITH THE PACK-AGE SEATED IN JEDEC SEATING PLANE GAUGE GS-3. DIMENSIONS D, D1 AND E1 DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS. MOLD FLASH OR PROTRUSIONS ARE NOT TO EXCEED 0.10 INCH. 4.
- DIMENSION E IS MEASURED AT A POINT 0.015 BELOW DATUM PLANE H WITH THE LEADS CONSTRAINED PERPENDICULAR 5. TO DATUM C.
- DIMENSION 6B IS MEASURED AT THE LEAD TIPS WITH THE LEADS UNCONSTRAINED. DATUM PLANE H IS COINCIDENT WITH THE BOTTOM OF THE 6.
- 7
- LEADS, WHERE THE LEADS EXIT THE BODY. PACKAGE CONTOUR IS OPTIONAL (ROUNDED OR SQUARE 8 CORNERS).

	INC		MILLIMETERS		
DIM			MIN	MAX	
	IVITIN		IVITIN		
Α		0.210		5.33	
A1	0.015		0.38		
A2	0.115	0.195	2.92	4.95	
b	0.014	0.022	0.35	0.56	
b2	0.060 TYP		1.52 TYP		
С	0.008	0.014	0.20	0.36	
D	0.735	0.775	18.67	19.69	
D1	0.005		0.13		
Е	0.300	0.325	7.62	8.26	
E1	0.240	0.280	6.10	7.11	
е	0.100 BSC		2.54 BSC		
eВ		0.430		10.92	
L	0.115	0.150	2.92	3.81	
Μ		10°		10°	

GENERIC **MARKING DIAGRAM***

16 <u> </u>	1
XXXXXXXXXXXXXX	
• XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	
O AWLYYWWG	
1 00000000	Ţ

XXXXX = Specific Device Code

- = Assembly Location
- WL = Wafer Lot

А

- YY = Year
- WW = Work Week
- G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot " .", may or may not be present.

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DIMENSIONS: MILLIMETERS

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