

MC10EL04, MC100EL04

5V ECL 2-Input AND/NAND

The MC10EL/100EL04 is a 2-input AND/NAND gate. The device is functionally equivalent to the E104 device with higher performance capabilities. With propagation delays and output transition times significantly faster than the E104, the EL04 is ideally suited for those applications which require the ultimate in AC performance.

The 100 Series contains temperature compensation.

Features

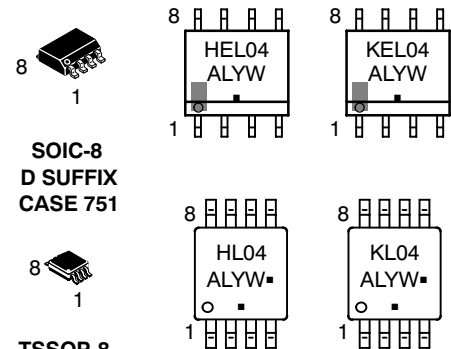
- 240 ps Propagation Delay
- ESD Protection: > 1 kV Human Body Model, > 100 V Machine Model
- PECL Mode Operating Range: $V_{CC} = 4.2\text{ V}$ to 5.7 V with $V_{EE} = 0\text{ V}$
- NECL Mode Operating Range: $V_{CC} = 0\text{ V}$ with $V_{EE} = -4.2\text{ V}$ to -5.7 V
- Internal Input Pulldown Resistors
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level 1
For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL 94 V-0 @ 0.125, Oxygen Index 28 to 34
- Transistor Count = 45 devices
- Pb-Free Packages are Available



ON Semiconductor®

<http://onsemi.com>

MARKING DIAGRAMS*



**SOIC-8
D SUFFIX
CASE 751**

**TSSOP-8
DT SUFFIX
CASE 948R**

H = MC10 L = Wafer Lot
K = MC100 Y = Year
A = Assembly Location W = Work Week
 ■ = Pb-Free Package

(Note: Microdot may be in either location)

*For additional marking information, refer to Application Note AND8002/D.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 7 of this data sheet.

MC10EL04, MC100EL04

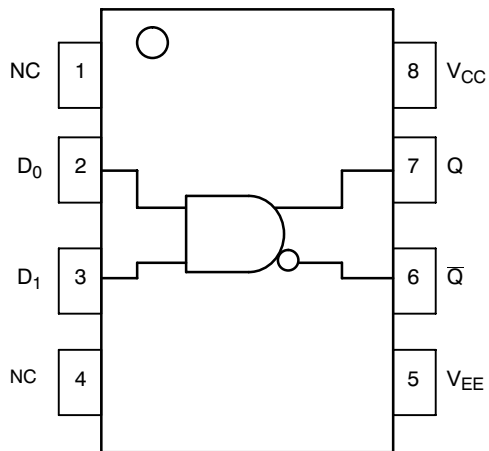


Figure 1. Logic Diagram and Pinout

Table 1. PIN DESCRIPTION

PIN	FUNCTION
D ₀ , D ₁	ECL Data Inputs
Q, \bar{Q}	ECL Data Outputs
V _{CC}	Positive Supply
V _{EE}	Negative Supply
NC	No Connect

MC10EL04, MC100EL04

Table 2. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Units
V _{CC}	PECL Mode Power Supply	V _{EE} = 0 V		8	V
V _{EE}	NECL Mode Power Supply	V _{CC} = 0 V		-8	V
V _I	PECL Mode Input Voltage	V _{EE} = 0 V	V _I ≤ V _{CC}	6	V
	NECL Mode Input Voltage	V _{CC} = 0 V	V _I ≥ V _{EE}	-6	V
I _{out}	Output Current	Continuous Surge		50	mA
				100	
T _A	Operating Temperature Range			-40 to +85	°C
T _{stg}	Storage Temperature Range			-65 to +150	°C
θ _{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm	SOIC-8	190	°C/W
		500 lfpm	SOIC-8	130	°C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	SOIC-8	41 to 44	°C/W
θ _{JA}	Thermal Resistance (Junction-to-Ambient)	0 lfpm	TSSOP-8	185	°C/W
		500 lfpm	TSSOP-8	140	°C/W
θ _{JC}	Thermal Resistance (Junction-to-Case)	Standard Board	TSSOP-8	41 to 44 ± 5%	°C/W
T _{sol}	Wave Solder	Pb	<2 to 3 sec @ 248°C	265	°C
		Pb-Free	<2 to 3 sec @ 260°C	265	

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.

Table 3. 10EL SERIES PECL DC CHARACTERISTICS V_{CC} = 5.0 V; V_{EE} = 0.0 V (Note 1)

Symbol	Characteristic	-40°C			25°C			85°C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I _{EE}	Power Supply Current		14	17		14	17		14	17	mA
V _{OH}	Output HIGH Voltage (Note 4)	3920	4010	4110	4020	4105	4190	4090	4185	4280	mV
V _{OL}	Output LOW Voltage (Note 2)	3050	3200	3350	3050	3210	3370	3050	3227	3405	mV
V _{IH}	Input HIGH Voltage	3770		4110	3870		4190	3940		4280	mV
V _{IL}	Input LOW Voltage	3050		3500	3050		3520	3050		3555	mV
I _{IH}	Input HIGH Current										μA
		D0		250			250			250	
		D1		150			150			150	
I _{IL}	Input LOW Current	0.5			0.5			0.3			μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

- Input and output parameters vary 1:1 with V_{CC}.
V_{EE} can vary +0.25 V / -0.5 V for +25°C and +85°C or V_{EE} can vary +0.06 V / -0.5 V for -40°C.
- Outputs are terminated through a 50 Ω resistor to V_{CC} - 2.0 V.

MC10EL04, MC100EL04

Table 4. 10EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 3)

Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		14	17		14	17		14	17	mA
V_{OH}	Output HIGH Voltage (Note 4)	- 1080	- 990	- 890	- 980	- 895	- 810	- 910	- 815	- 720	mV
V_{OL}	Output LOW Voltage (Note 4)	- 1950	- 1800	- 1650	- 1950	- 1790	- 1630	- 1950	- 1773	- 1595	mV
V_{IH}	Input HIGH Voltage	- 1230		- 890	- 1130		- 810	- 1060		- 720	mV
V_{IL}	Input LOW Voltage	- 1950		- 1500	- 1950		- 1480	- 1950		- 1445	mV
I_{IH}	Input HIGH Current D0 D1			250			250			250	μA
				150			150			150	
I_{IL}	Input LOW Current	0.5			0.5			0.3			μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

3. Input and output parameters vary 1:1 with V_{CC} .
 V_{EE} can vary +0.25 V / -0.5 V for +25°C and +85°C or V_{EE} can vary +0.06 V / -0.5 V for -40°C.
 4. Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

Table 5. 100EL SERIES PECL DC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ (Note 5)

Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		14	17		14	17		16	20	mA
V_{OH}	Output HIGH Voltage (Note 6)	3915	3995	4120	3975	4045	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 6)	3170	3305	3445	3190	3295	3380	3190	3295	3380	mV
V_{IH}	Input HIGH Voltage	3835		4120	3835		4120	3835		4120	mV
V_{IL}	Input LOW Voltage	3190		3525	3190		3525	3190		3525	mV
I_{IH}	Input HIGH Current D0 D1			250			250			250	μA
				150			150			150	
I_{IL}	Input LOW Current	0.5			0.5			0.5			μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfpm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

5. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.
 6. Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

MC10EL04, MC100EL04

Table 6. 100EL SERIES NECL DC CHARACTERISTICS $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 7)

Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
I_{EE}	Power Supply Current		14	17		14	17		16	20	mA
V_{OH}	Output HIGH Voltage (Note 8)	- 1085	- 1005	- 880	- 1025	- 955	- 880	- 1025	- 955	- 880	mV
V_{OL}	Output LOW Voltage (Note 8)	- 1830	- 1695	- 1555	- 1810	- 1705	- 1620	- 1810	- 1705	- 1620	mV
V_{IH}	Input HIGH Voltage	- 1165		- 880	- 1165		- 880	- 1165		- 880	mV
V_{IL}	Input LOW Voltage	- 1810		- 1475	- 1810		- 1475	- 1810		- 1475	mV
I_{IH}	Input HIGH Current D0 D1			250 150			250 150			250 150	μA
I_{IL}	Input LOW Current	0.5			0.5			0.5			μA

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

7. Input and output parameters vary 1:1 with V_{CC} . V_{EE} can vary +0.8 V / -0.5 V.

8. Outputs are terminated through a 50 Ω resistor to $V_{CC} - 2.0\text{ V}$.

Table 7. AC CHARACTERISTICS $V_{CC} = 5.0\text{ V}$; $V_{EE} = 0.0\text{ V}$ or $V_{CC} = 0.0\text{ V}$; $V_{EE} = -5.0\text{ V}$ (Note 9)

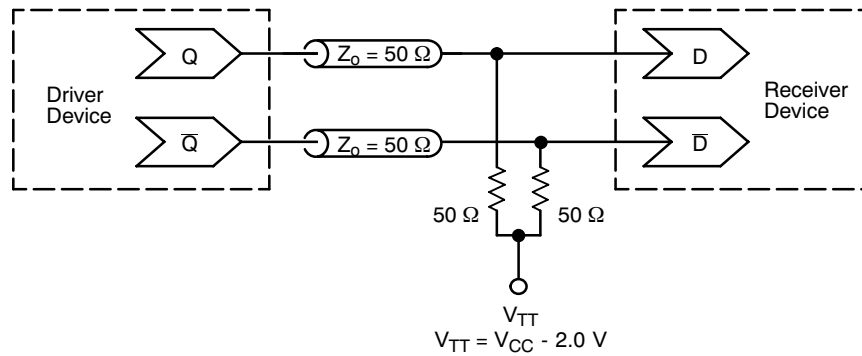
Symbol	Characteristic	-40 °C			25 °C			85 °C			Unit
		Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	
f_{max}	Maximum Toggle Frequency		TBD			TBD			TBD		GHz
t_{PLH} t_{PHL}	Propagation Delay to Output	70	235	410	130	240	370	155	265	395	ps
t_{JITTER}	Cycle-to-Cycle Jitter		TBD			TBD			TBD		ps
t_r t_f	Output Rise/Fall Times Q (20% - 80%)	100	225	350	100	225	350	100	225	350	ps

NOTE: Device will meet the specifications after thermal equilibrium has been established when mounted in a test socket or printed circuit board with maintained transverse airflow greater than 500 lfm. Electrical parameters are guaranteed only over the declared operating temperature range. Functional operation of the device exceeding these conditions is not implied. Device specification limit values are applied individually under normal operating conditions and not valid simultaneously.

9. 10 Series: V_{EE} can vary +0.25 V / -0.5 V for +25 °C and +85 °C. or V_{EE} can vary +0.06 V / -0.5 V for -40 °C.

100 Series: V_{EE} can vary +0.8 V / -0.5 V.

MC10EL04, MC100EL04



**Figure 2. Typical Termination for Output Driver and Device Evaluation
(See Application Note AND8020/D - Termination of ECL Logic Devices.)**

Resource Reference of Application Notes

- AN1405/D** - ECL Clock Distribution Techniques
- AN1406/D** - Designing with PECL (ECL at +5.0 V)
- AN1503/D** - ECLinPS™ I/O SPICE Modeling Kit
- AN1504/D** - Metastability and the ECLinPS Family
- AN1568/D** - Interfacing Between LVDS and ECL
- AN1672/D** - The ECL Translator Guide
- AND8001/D** - Odd Number Counters Design
- AND8002/D** - Marking and Date Codes
- AND8020/D** - Termination of ECL Logic Devices
- AND8066/D** - Interfacing with ECLinPS
- AND8090/D** - AC Characteristics of ECL Devices

MC10EL04, MC100EL04

ORDERING INFORMATION

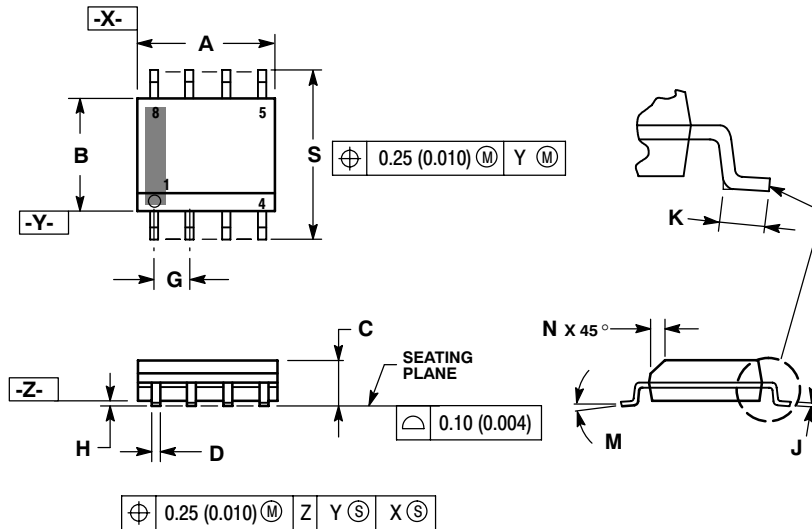
Device	Package	Shipping†
MC10EL04D	SOIC-8	98 Units / Rail
MC10EL04DG	SOIC-8 (Pb-Free)	98 Units / Rail
MC10EL04DR2	SOIC-8	2500 / Tape & Reel
MC10EL04DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC10EL04DT	TSSOP-8	100 Units / Rail
MC10EL04DTG	TSSOP-8 (Pb-Free)	100 Units / Rail
MC10EL04DTR2	TSSOP-8	2500 / Tape & Reel
MC10EL04DTR2G	TSSOP-8 (Pb-Free)	2500 / Tape & Reel
MC100EL04D	SOIC-8	98 Units / Rail
MC100EL04DG	SOIC-8 (Pb-Free)	98 Units / Rail
MC100EL04DR2	SOIC-8	2500 / Tape & Reel
MC100EL04DR2G	SOIC-8 (Pb-Free)	2500 / Tape & Reel
MC100EL04DT	TSSOP-8	100 Units / Rail
MC100EL04DTG	TSSOP-8 (Pb-Free)	100 Units / Rail
MC100EL04DTR2	TSSOP-8	2500 / Tape & Reel
MC100EL04DTR2G	TSSOP-8 (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.

MC10EL04, MC100EL04

PACKAGE DIMENSIONS

SOIC-8 NB
CASE 751-07
ISSUE AH

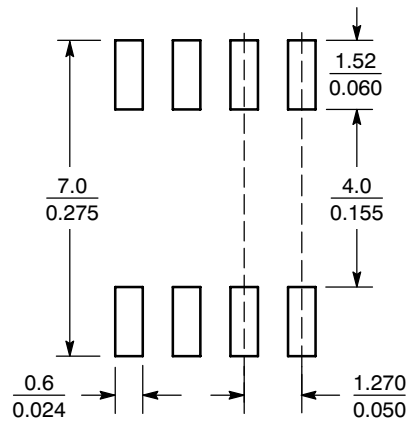


NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSION 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.
6. 751-01 THRU 751-06 ARE OBSOLETE. NEW STANDARD IS 751-07.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.80	5.00	0.189	0.197
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.053	0.069
D	0.33	0.51	0.013	0.020
G	1.27 BSC		0.050 BSC	
H	0.10	0.25	0.004	0.010
J	0.19	0.25	0.007	0.010
K	0.40	1.27	0.016	0.050
M	0°	8°	0°	8°
N	0.25	0.50	0.010	0.020
S	5.80	6.20	0.228	0.244

SOLDERING FOOTPRINT*



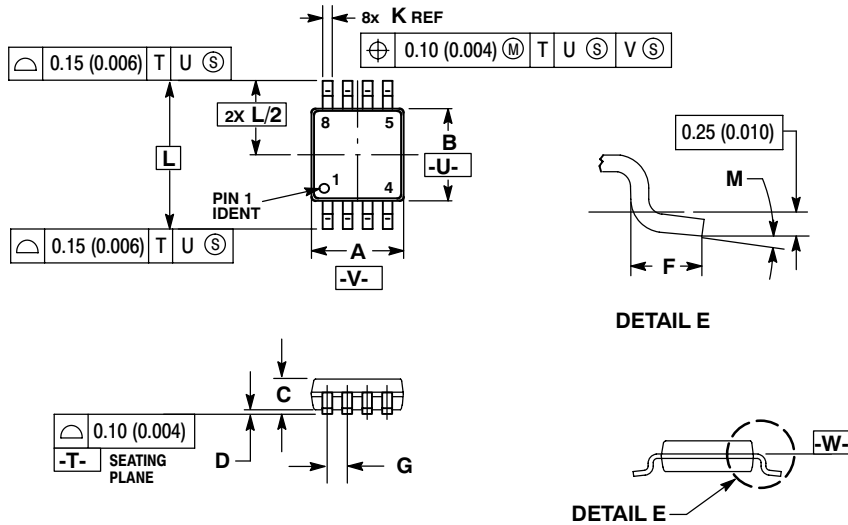
SCALE 6:1 (mm/inches)

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

MC10EL04, MC100EL04

PACKAGE DIMENSIONS


TSSOP-8
DT SUFFIX
PLASTIC TSSOP PACKAGE
CASE 948R-02
ISSUE A



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: MILLIMETER.
 3. DIMENSION A DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH OR GATE BURRS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
 4. DIMENSION B DOES NOT INCLUDE INTERLEAD FLASH OR PROTRUSION. INTERLEAD FLASH OR PROTRUSION SHALL NOT EXCEED 0.25 (0.010) PER SIDE.
 5. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
 6. DIMENSION A AND B ARE TO BE DETERMINED AT DATUM PLANE -W-.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.90	3.10	0.114	0.122
B	2.90	3.10	0.114	0.122
C	0.80	1.10	0.031	0.043
D	0.05	0.15	0.002	0.006
F	0.40	0.70	0.016	0.028
G	0.65 BSC		0.026 BSC	
K	0.25	0.40	0.010	0.016
L	4.90 BSC		0.193 BSC	
M	0°	6°	0°	6°

ECLinPS is a trademark of Semiconductor Components Industries, LLC (SCILLC).

ON Semiconductor and  are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800-282-9855 Toll Free
USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81-3-5773-3850

ON Semiconductor Website: www.onsemi.com
Order Literature: <http://www.onsemi.com/orderlit>
For additional information, please contact your local Sales Representative

MC10EL04/D