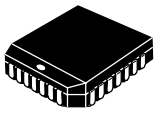
MC10E175, MC100E175

5V ECL 9-Bit Latch With Parity

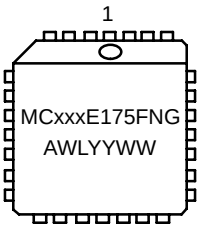
ON Semiconductor®

http://onsemi.com



PLCC−28
FN SUFFIX
CASE 776

MARKING DIAGRAM*



xxx	= 10 or 100
A	= Assembly Location
WL	= Wafer Lot
YY	= Year
WW	= Work Week
G	= Pb−Free Package

*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 6 of this data sheet.

Description

The MC10E/100E175 is a 9-bit latch. It also features a tenth latched output, ODDPAR, which is formed as the odd parity of the nine data inputs (ODDPAR is HIGH if an odd number of the inputs are HIGH).

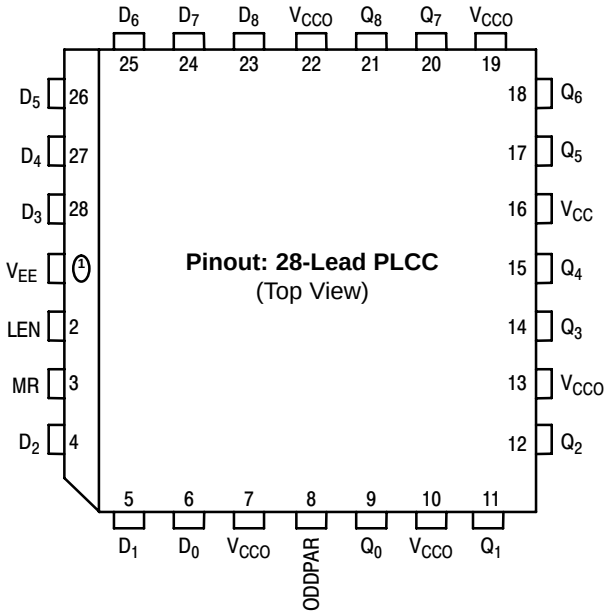
The E175 can also be used to generate byte parity by using D8 as the parity-type select (L = even parity, H = odd parity), and using ODDPAR as the byte parity output.

The LEN pin latches the data when asserted with a logical high and makes the latch transparent when placed at a logic low level.

Features

- 9-Bit Latch
- Parity Detection/Generation
- 800 ps Max. D to Output
- Reset
- PECL Mode Operating Range: V_{CC} = 4.2 V to 5.5 V with V_{EE} = 0 V
- NECL Mode Operating Range: V_{CC} = 0 V with V_{EE} = −4.2 V to −5.5 V
- Internal Input 50 kΩ Pulldown Resistors
- ESD Protection: Human Body Model; > 2 kV,
  Machine Model; > 200 V
  Charged Device MOdel; > 2 kV
- Meets or Exceeds JEDEC Spec EIA/JESD78 IC Latchup Test
- Moisture Sensitivity Level:
  Pb = 1
  Pb−Free = 3
  For Additional Information, see Application Note AND8003/D
- Flammability Rating: UL 94 V−0 @ 0.125 in, Oxygen Index: 28 to 34
- Transistor Count = 416 devices
- Pb−Free Packages are Available*

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



* All V_{CC} and V_{CCO} pins are tied together on the die.

Warning: All V_{CC}, V_{CCO}, and V_{EE} pins must be externally connected to Power Supply to guarantee proper operation.

Figure 1. 28−Lead Pinout Assignment

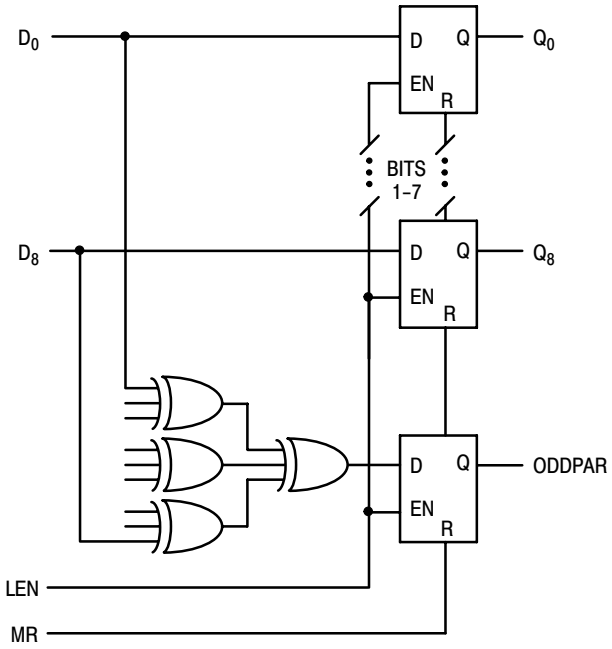


Figure 2. Logic Diagram

Table 1. PIN DESCRIPTION

PIN	FUNCTION
D_0 − D_8	ECL Data Inputs
LEN	ECL Latch Enable
MR	ECL Master Reset
Q_0 − Q_8	ECL Data Outputs
ODDPAR	ECL Parity Output
V_{CC}, V_{CCO}	Positive Supply
V_{EE}	Negative Supply
NC	No Connect

Table 2. FUNCTION TABLE

D	EN	MR	Q	ODDPAR
H	L	L	H	H if odd no. of Dn HIGH
L	L	L	L	H if odd no. of Dn HIGH
X	H	L	Q_0	Q_0
X	X	H	L	L

Table 3. MAXIMUM RATINGS

Symbol	Parameter	Condition 1	Condition 2	Rating	Unit
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 NECL Mode Input Voltage	V_{EE} = 0 V V_{CC} = 0 V	$V_I \le V_{CC}$ $V_I \ge V_{EE}$	6 −6	V V
I_{out}	Output Current	Continuous Surge		50 100	mA mA
T_A	Operating Temperature Range			0 to +85	°C
T_{stg}	Storage Temperature Range			−65 to +150	°C
θ_{JA}	Thermal Resistance (Junction−to−Ambient)	0 lfpm 500 lfpm	PLCC−28 PLCC−28	63.5 43.5	°C/W °C/W
θ_{JC}	Thermal Resistance (Junction−to−Case)	Standard Board	PLCC−28	22 to 26	°C/W
T_{sol}	Wave Solder Pb Pb−Free			265 265	°C

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 4. 10E SERIES PECL DC CHARACTERISTICS V_{CCx} = 5.0 V, V_{EE} = 0.0 V (Note 1)

		0°C			25°C			85°C			
Symbol	Characteristic	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Unit
I_{EE}	Power Supply Current		94	113		94	113		94	113	mA
I_{EE}	Power Supply Current		110	132		110	132		110	132	mA
V_{OH}	Output HIGH Voltage (Note 2)	3980	4070	4160	4020	4105	4190	4090	4185	4280	mV
V_{OL}	Output LOW Voltage (Note 2)	3050	3210	3370	3050	3210	3370	3050	3227	3405	mV
V_{IH}	Input HIGH Voltage	3830	3995	4160	3870	4030	4190	3940	4110	4280	mV
V_{IL}	Input LOW Voltage	3050	3285	3520	3050	3285	3520	3050	3302	3555	mV
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.3	0.2		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.

1. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary −0.46 V / +0.06 V.
2. Outputs are terminated through a 50 Ω resistor to V_{CC} − 2.0 V.

Table 5. 10E SERIES NECL DC CHARACTERISTICS V_{CCx} = 0.0 V; V_{EE} = −5.0 V (Note 3)

		0°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
I_{EE}	Power Supply Current		110	132		110	132		110	132	mA
V_{OH}	Output HIGH Voltage (Note 4)	−1020	−930	−840	−980	−895	−810	−910	−815	−720	mV
V_{OL}	Output LOW Voltage (Note 4)	−1950	−1790	−1630	−1950	−1790	−1630	−1950	−1773	−1595	mV
V_{IH}	Input HIGH Voltage	−1170	−1005	−840	−1130	−970	−810	−1060	−890	−720	mV
V_{IL}	Input LOW Voltage	−1950	−1715	−1480	−1950	−1715	−1480	−1950	−1698	−1445	mV
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.065		0.3	0.2		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 −0.46 V / +0.06 V.
4. Outputs are terminated through a 50 Ω resistor to V_{CC} − 2.0 V.

Table 6. 100E SERIES PECL DC CHARACTERISTICS V_{CCx} = 5.0 V; V_{EE} = 0.0 V (Note 5)

		0°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
I_{EE}	Power Supply Current		110	132		110	132		127	152	mA
V_{OH}	Output HIGH Voltage (Note 6)	3975	4050	4120	3975	4050	4120	3975	4050	4120	mV
V_{OL}	Output LOW Voltage (Note 6)	3190	3295	3380	3190	3255	3380	3190	3260	3380	mV
V_{IH}	Input HIGH Voltage	3835	3975	4120	3835	3975	4120	3835	3975	4120	mV
V_{IL}	Input LOW Voltage	3190	3355	3525	3190	3355	3525	3190	3355	3525	mV
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		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 −0.46 V / +0.8 V.
6. Outputs are terminated through a 50 Ω resistor to V_{CC} − 2.0 V.

Table 7. 100E SERIES NECL DC CHARACTERISTICS V_{CCx} = 0 V; V_{EE} = −5.0 V (Note 7)

		0°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
I_{EE}	Power Supply Current		110	132		110	132		127	152	mA
V_{OH}	Output HIGH Voltage (Note 8)	−1025	−950	−880	−1025	−950	−880	−1025	−950	−880	mV
V_{OL}	Output LOW Voltage (Note 8)	−1810	−1705	−1620	−1810	−1745	−1620	−1810	−1740	−1620	mV
V_{IH}	Input HIGH Voltage	−1165	−1025	−880	−1165	−1025	−880	−1165	−1025	−880	mV
V_{IL}	Input LOW Voltage	−1810	−1645	−1475	−1810	−1645	−1475	−1810	−1645	−1475	mV
I_{IH}	Input HIGH Current			150			150			150	μA
I_{IL}	Input LOW Current	0.5	0.3		0.5	0.25		0.5	0.2		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.

7. Input and output parameters vary 1:1 with V_{CC}. V_{EE} can vary −0.46 V / +0.8 V.
8. Outputs are terminated through a 50 Ω resistor to V_{CC} − 2.0 V.

Table 8. AC CHARACTERISTICS V_{CCx} = 5.0 V; V_{EE} = 0.0 V or V_{CCx} = 0.0 V; V_{EE} = −5.0 V (Note 9)

		0°C			25°C			85°C			
Symbol	**Characteristic**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Min**	**Typ**	**Max**	**Unit**
f_{MAX}	Maximum Toggle Frequency	700	1100		700	1100		700	1100		MHz
t_{PLH}	Propagation Delay to Output										ps
t_{PHL}	D to Q	550	800	975	550	800	975	550	800	975	
	D to ODDPAR	950	1400	1600	950	1400	1600	950	1400	1600	
	LEN to Q	525	800	975	525	800	975	525	800	975	
	LEN to ODDPAR	525	800	975	525	800	975	525	800	975	
	MR to Q(t_{PHL})	525	800	975	525	800	975	525	800	975	
	MR to ODDPAR(t_{PHL})	525	800	975	525	800	975	525	800	975	
t_s	Setup Time										ps
	D (Q)	275	100		275			275			
	D (ODDPAR)	900	700		900			900			
t_h	Hold Time										ps
	D (Q)	175	−100		175			175			
	D (ODDPAR)	− 300	− 70		− 300			− 300			
t_{RR}	Reset Recovery Time	850	600		850	600		850	600		ps
t_{SKEW}	Within-Device Skew (Note 10)										ps
	LEN, MR		75			75			75		
	D to Q		75			75			75		
	D to ODDPAR		200			200			200		
t_{JITTER}	Random Clock Jitter (RMS)		< 1			< 1			< 1		ps
t_r	Rise/Fall Times										ps
t_f	(20 - 80%)	300	500	800	300	500	800	300	500	800	

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.

9. 10 Series: V_{EE} can vary −0.46 V / −0.06 V.
   100 Series: V_{EE} can vary −0.46 V / −0.8 V.
10. Within-device skew is defined as identical transitions on similar paths through a device.

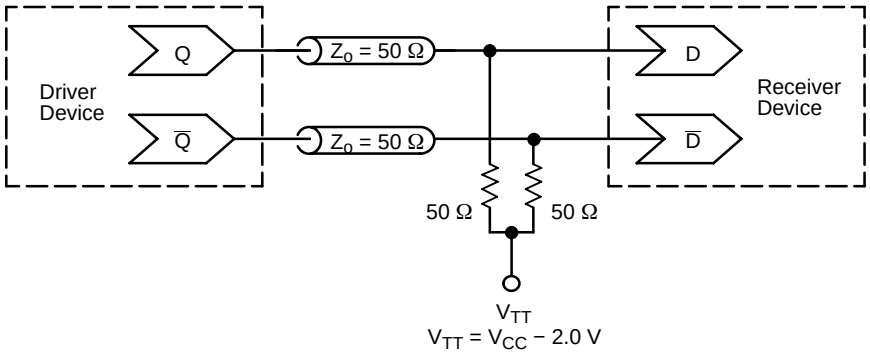


Figure 3. Typical Termination for Output Driver and Device Evaluation (See Application Note AND8020/D − Termination of ECL Logic Devices.)

ORDERING INFORMATION

Device	Package	Shipping†
MC10E175FN	PLCC−28	37 Units / Rail
MC10E175FNG	PLCC−28 (Pb−Free)	37 Units / Rail
MC10E175FNR2	PLCC−28	500 / Tape & Reel
MC10E175FNR2G	PLCC−28 (Pb−Free)	500 / Tape & Reel
MC100E175FN	PLCC−28	37 Units / Rail
MC100E175FNG	PLCC−28 (Pb−Free)	37 Units / Rail
MC100E175FNR2	PLCC−28	500 / Tape & Reel
MC100E175FNR2G	PLCC−28 (Pb−Free)	500 / 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.

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

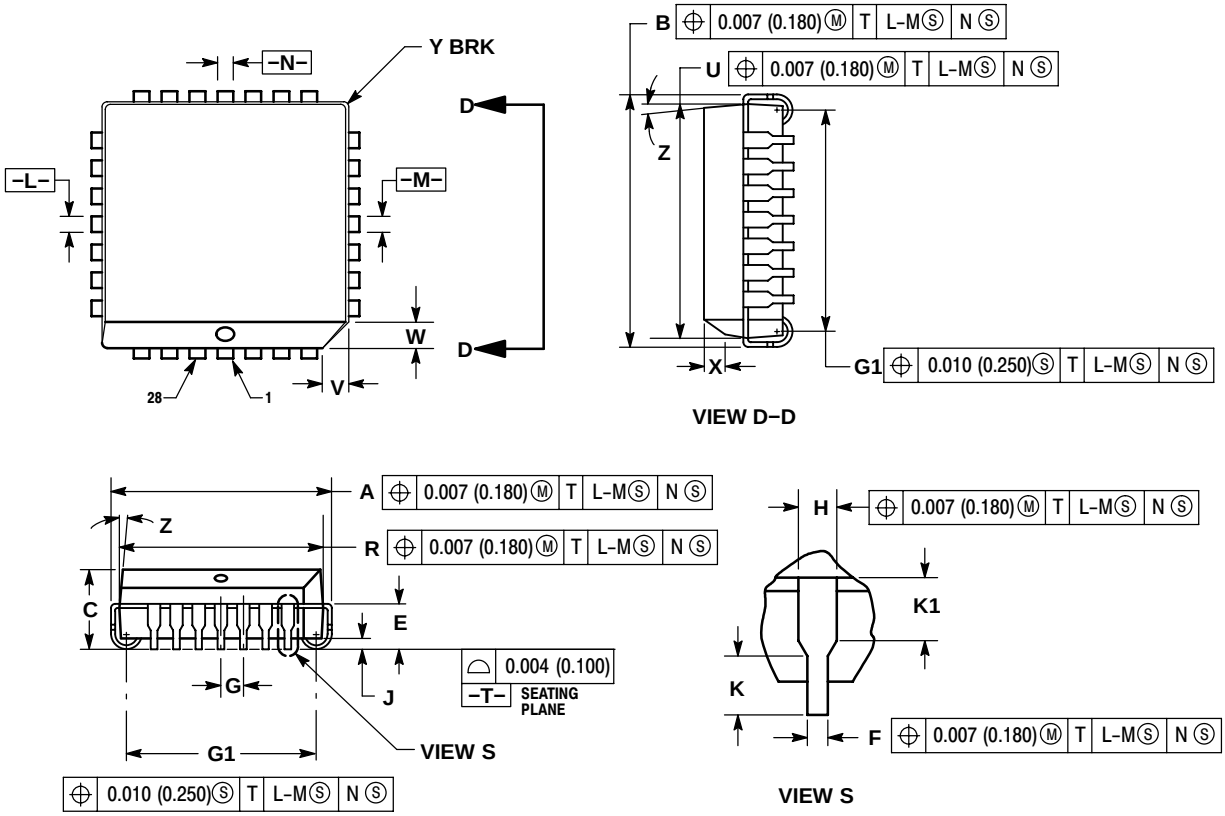
AND8020/D − Termination of ECL Logic Devices

AND8066/D − Interfacing with ECLinPS

AND8090/D − AC Characteristics of ECL Devices

PACKAGE DIMENSIONS

PLCC−28
FN SUFFIX
PLASTIC PLCC PACKAGE
CASE 776−02
ISSUE E



NOTES:
1. DATUMS −L−, −M−, AND −N− DETERMINED WHERE TOP OF LEAD SHOULDER EXITS PLASTIC BODY AT MOLD PARTING LINE.
2. DIMENSION G1, TRUE POSITION TO BE MEASURED AT DATUM −T−, SEATING PLANE.
3. DIMENSIONS R AND U DO NOT INCLUDE MOLD FLASH. ALLOWABLE MOLD FLASH IS 0.010 (0.250) PER SIDE.
4. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
5. CONTROLLING DIMENSION: INCH.
6. THE PACKAGE TOP MAY BE SMALLER THAN THE PACKAGE BOTTOM BY UP TO 0.012 (0.300). DIMENSIONS R AND U ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY EXCLUSIVE OF MOLD FLASH, TIE BAR BURRS, GATE BURRS AND INTERLEAD FLASH, BUT INCLUDING ANY MISMATCH BETWEEN THE TOP AND BOTTOM OF THE PLASTIC BODY.
7. DIMENSION H DOES NOT INCLUDE DAMBAR PROTRUSION OR INTRUSION. THE DAMBAR PROTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE GREATER THAN 0.037 (0.940). THE DAMBAR INTRUSION(S) SHALL NOT CAUSE THE H DIMENSION TO BE SMALLER THAN 0.025 (0.635).

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.485	0.495	12.32	12.57
B	0.485	0.495	12.32	12.57
C	0.165	0.180	4.20	4.57
E	0.090	0.110	2.29	2.79
F	0.013	0.019	0.33	0.48
G	0.050 BSC		1.27 BSC	
H	0.026	0.032	0.66	0.81
J	0.020	---	0.51	---
K	0.025	---	0.64	---
R	0.450	0.456	11.43	11.58
U	0.450	0.456	11.43	11.58
V	0.042	0.048	1.07	1.21
W	0.042	0.048	1.07	1.21
X	0.042	0.056	1.07	1.42
Y	---	0.020	---	0.50
Z	2°	10°	2°	10°
G1	0.410	0.430	10.42	10.92
K1	0.040	---	1.02	---

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

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