



Is Now Part of



ON Semiconductor®

To learn more about ON Semiconductor, please visit our website at
www.onsemi.com

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

74LVX138 Low Voltage 1-of-8 Decoder/Demultiplexer

General Description

The LVX138 is a high-speed 1-of-8 decoder/demultiplexer. This device is ideally suited for high-speed bipolar memory chip select address decoding. The multiple input enables allow parallel expansion to a 1-of-24 decoder using just three LVX138 devices or a 1-of-32 decoder using four LVX138 devices and one inverter.

Features

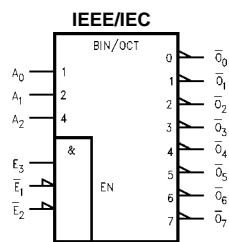
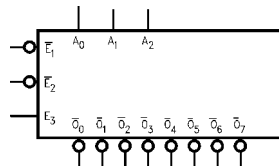
- Input voltage level translation from 5V to 3V
- Ideal for low power/low noise 3.3V applications
- Guaranteed simultaneous switching noise level and dynamic threshold performance

Ordering Code:

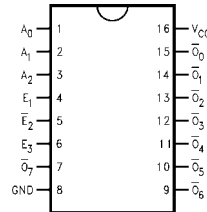
Order Number	Package Number	Package Description
74LVX138M	M16A	16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
74LVX138SJ	M16D	16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide
74LVX138MTC	MTC16	16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

Devices also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.

Logic Symbols



Connection Diagram



Pin Descriptions

Pin Names	Description
A ₀ -A ₂	Address Inputs
\bar{E}_1 - \bar{E}_2	Enable Inputs
E ₃	Enable Input
\bar{O}_0 - \bar{O}_7	Outputs

Functional Description

The LVX138 high-speed 1-of-8 decoder/demultiplexer accepts three binary weighted inputs (A_0, A_1, A_2) and, when enabled, provides eight mutually exclusive active-LOW outputs ($\bar{O}_0-\bar{O}_7$). The LVX138 features three Enable inputs, two active-LOW (\bar{E}_1, \bar{E}_2) and one active-HIGH (E_3).

All outputs will be HIGH unless \bar{E}_1 and \bar{E}_2 are LOW and E_3 is HIGH.

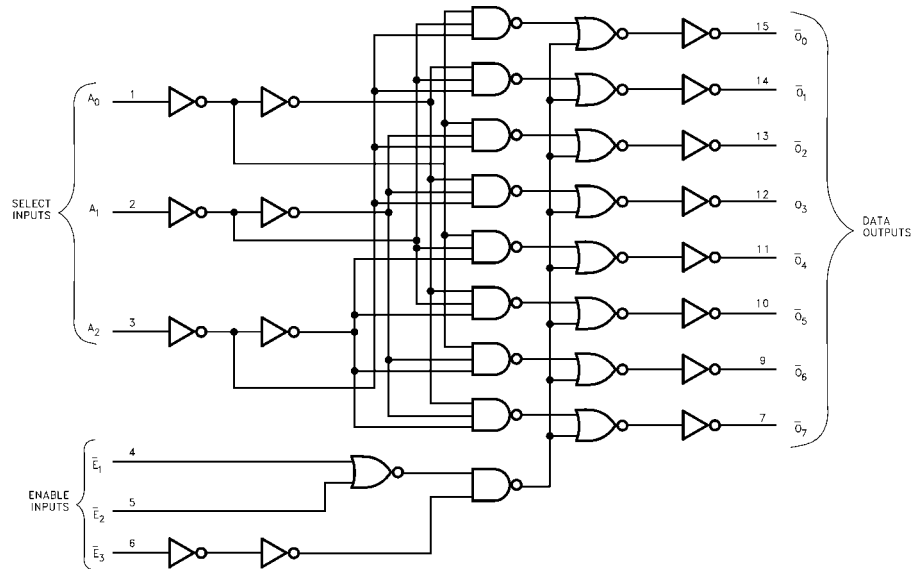
The LVX138 can be used as an 8-output demultiplexer by using one of the active LOW Enable inputs as the data input and the other Enable inputs as strobes. The Enable inputs which are not used must be permanently tied to their appropriate active-HIGH or active-LOW state.

Truth Table

Inputs						Outputs							
\bar{E}_1	\bar{E}_2	E_3	A_0	A_1	A_2	\bar{O}_0	\bar{O}_1	\bar{O}_2	\bar{O}_3	\bar{O}_4	\bar{O}_5	\bar{O}_6	\bar{O}_7
H	X	X	X	X	X	H	H	H	H	H	H	H	H
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	L	X	X	X	H	H	H	H	H	H	H	H
L	L	H	L	L	L	L	H	H	H	H	H	H	H
L	L	H	H	L	L	H	L	H	H	H	H	H	H
L	L	H	L	H	L	H	H	L	H	H	H	H	H
L	L	H	H	H	L	H	H	H	L	H	H	H	H
L	L	H	L	L	H	H	H	H	H	L	H	H	H
L	L	H	H	L	H	H	H	H	H	H	L	H	H
L	L	H	L	H	H	H	H	H	H	H	H	L	H
L	L	H	H	H	H	H	H	H	H	H	H	H	L

H = HIGH Voltage Level
L = LOW Voltage Level
X = Immaterial

Logic Diagram



Please note that this diagram is provided only for the understanding of logic operations and should not be used to estimate propagation delays.

Absolute Maximum Ratings (Note 1)

Supply Voltage (V_{CC})	-0.5V to +7.0V
DC Input Diode Current (I_{IK})	-20 mA
$V_I = -0.5V$	-20 mA
DC Input Voltage (V_I)	-0.5V to 7V
DC Output Diode Current (I_{OK})	-20 mA
$V_O = -0.5V$	-20 mA
$V_O = V_{CC} + 0.5V$	+20 mA
DC Output Voltage (V_O)	-0.5V to $V_{CC} + 0.5V$
DC Output Source or Sink Current (I_O)	± 25 mA
DC V_{CC} or Ground Current (I_{CC} or I_{GND})	± 75 mA
Storage Temperature (T_{STG})	-65°C to +150°C
Power Dissipation	180 mW

Recommended Operating Conditions (Note 2)

Supply Voltage (V_{CC})	2.0V to 3.6V
Input Voltage (V_I)	0V to 5.5V
Output Voltage (V_O)	0V to V_{CC}
Operating Temperature (T_A)	-40°C to +85°C
Input Rise and Fall Time ($\Delta t/\Delta V$)	0 ns/V to 100 ns/V

Note 1: The "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum ratings. The "Recommended Operating Conditions" table will define the conditions for actual device operation.

Note 2: Unused inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC}	$T_A = +25^\circ\text{C}$			$T_A = -40^\circ\text{C to } +85^\circ\text{C}$		Units	Conditions
			Min	Typ	Max	Min	Max		
V_{IH}	HIGH Level Input Voltage	2.0	1.5			1.5		V	
		3.0	2.0			2.0			
		3.6	2.4			2.4			
V_{IL}	LOW Level Input Voltage	2.0			0.5		0.5	V	
		3.0			0.8		0.8		
		3.6			0.8		0.8		
V_{OH}	HIGH Level Output Voltage	2.0	1.9	2.0		1.9		V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -50 \mu\text{A}$ $I_{OH} = -4 \text{mA}$
		3.0	2.9	3.0		2.9			
		3.0	2.58			2.48			
V_{OL}	LOW Level Output Voltage	2.0		0.0	0.1		0.1	V	$V_{IN} = V_{IL}$ or V_{IH} $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 50 \mu\text{A}$ $I_{OL} = 4 \text{mA}$
		3.0		0.0	0.1		0.1		
		3.0			0.36		0.44		
I_{IN}	Input Leakage Current	3.6			± 0.1		± 1.0	μA	$V_{IN} = 5.5V$ or GND
I_{CC}	Quiescent Supply Current	3.6			4.0		40.0	μA	$V_{IN} = V_{CC}$ or GND

Noise Characteristics (Note 3)

Symbol	Parameter	V_{CC} (V)	$T_A = 25^\circ\text{C}$		Units	C_L (pF)
			Typ	Limit		
V_{OLP}	Quiet Output Maximum Dynamic V_{OL}	3.3	0.3	0.5	V	50
V_{OLV}	Quiet Output Minimum Dynamic V_{OL}	3.3	-0.3	-0.5	V	50
V_{IHD}	Minimum HIGH Level Dynamic Input Voltage	3.3		2.0	V	50
V_{ILD}	Maximum LOW Level Dynamic Input Voltage	3.3		0.8	V	50

Note 3: Input $t_r = t_f = 3$ ns

AC Electrical Characteristics

Symbol	Parameter	V _{CC} (V)	T _A = +25°C			T _A = -40°C to +85°C		Units	CL (pF)
			Min	Typ	Max	Min	Max		
t _{PLH}	Propagation Delay Time A _n to \bar{O}_n	2.7	7.1	13.8	1.0	16.5	ns	15	
t _{PHL}			9.6	17.3	1.0	20.0		50	
		3.3 ± 0.3	5.5	8.8	1.0	10.5		15	
			8.0	12.3	1.0	14.0		50	
t _{PLH}	Propagation Delay Time \bar{E}_1 or \bar{E}_2 to \bar{O}_n	2.7	8.8	16.0	1.0	18.5	ns	15	
t _{PHL}			11.3	19.5	1.0	22.0		50	
		3.3 ± 0.3	6.9	10.4	1.0	11.5		15	
			9.4	13.9	1.0	15.0		50	
t _{PLH}	Propagation Delay Time E ₃ to \bar{O}_n	2.7	8.7	16.3	1.0	19.5	ns	15	
t _{PHL}			11.2	19.8	1.0	23.0		50	
		3.3 ± 0.3	6.8	10.6	1.0	12.5		15	
			9.3	14.1	1.0	16.0		50	
t _{OSLH}	Output to Output	2.7		1.5		1.5	ns	50	
t _{OSLH}	Skew (Note 4)	3.3		1.5		1.5			

Note 4: Parameter guaranteed by design. t_{OSLH} = |t_{PLHm} - t_{PLHn}|, t_{OSLH} = |t_{PHLm} - t_{PHLn}|

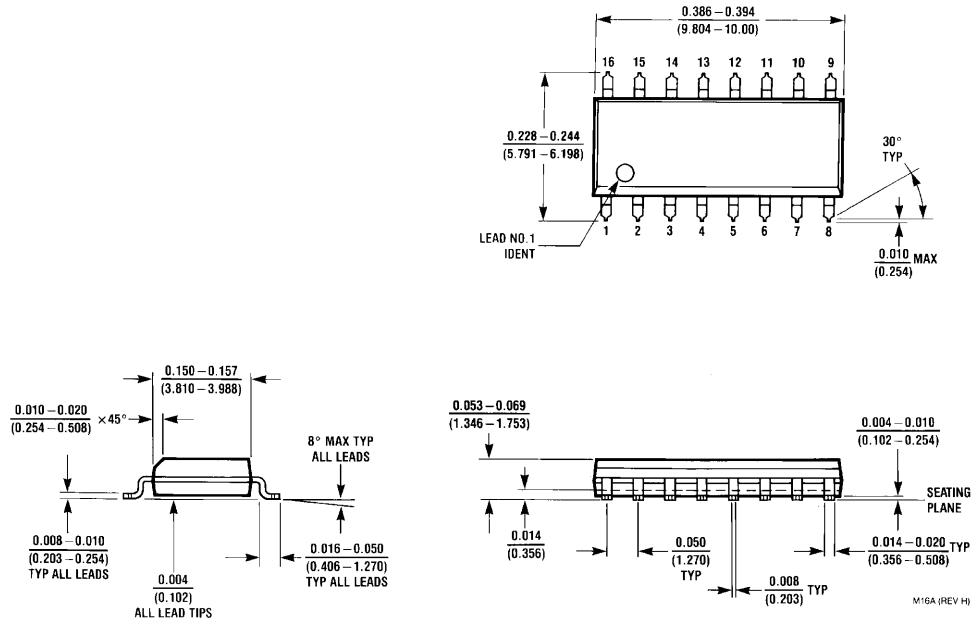
Capacitance

Symbol	Parameter	T _A = +25°C			T _A = -40°C to +85°C		Units
		Min	Typ	Max	Min	Max	
C _{IN}	Input Capacitance		4	10		10	pF
C _{PD}	Power Dissipation Capacitance (Note 5)		34				pF

Note 5: C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption without load.

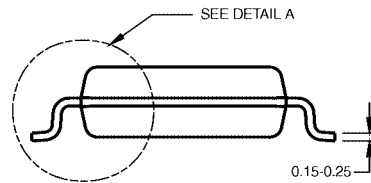
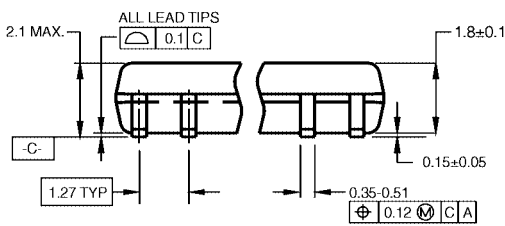
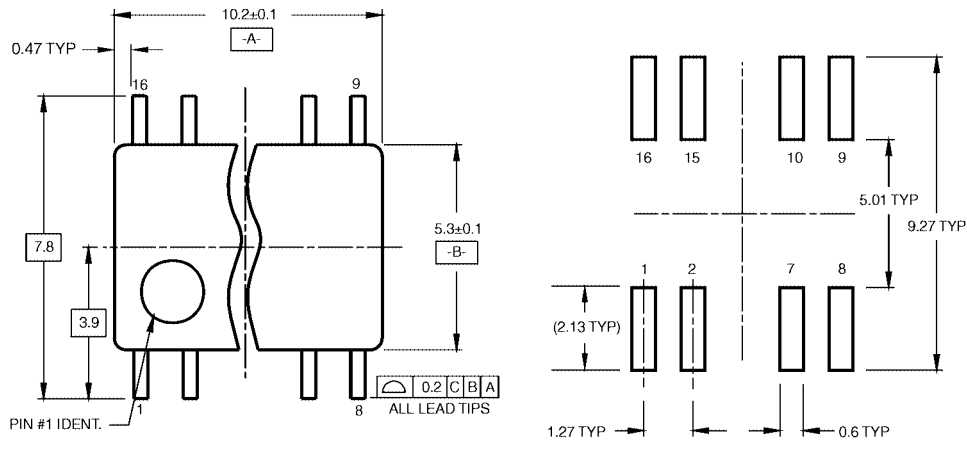
Average operating current can be obtained by the equation: C_{PD} × V_{CC} × I_N + I_{CC}

Physical Dimensions inches (millimeters) unless otherwise noted



**16-Lead Small Outline Integrated Circuit (SOIC), JEDEC MS-012, 0.150" Narrow
Package Number M16A**

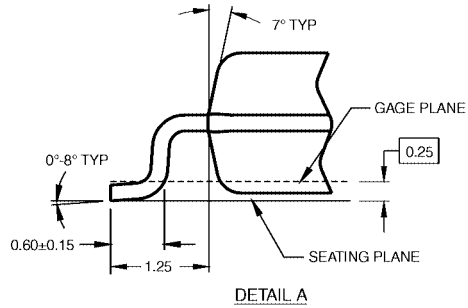
Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



DIMENSIONS ARE IN MILLIMETERS

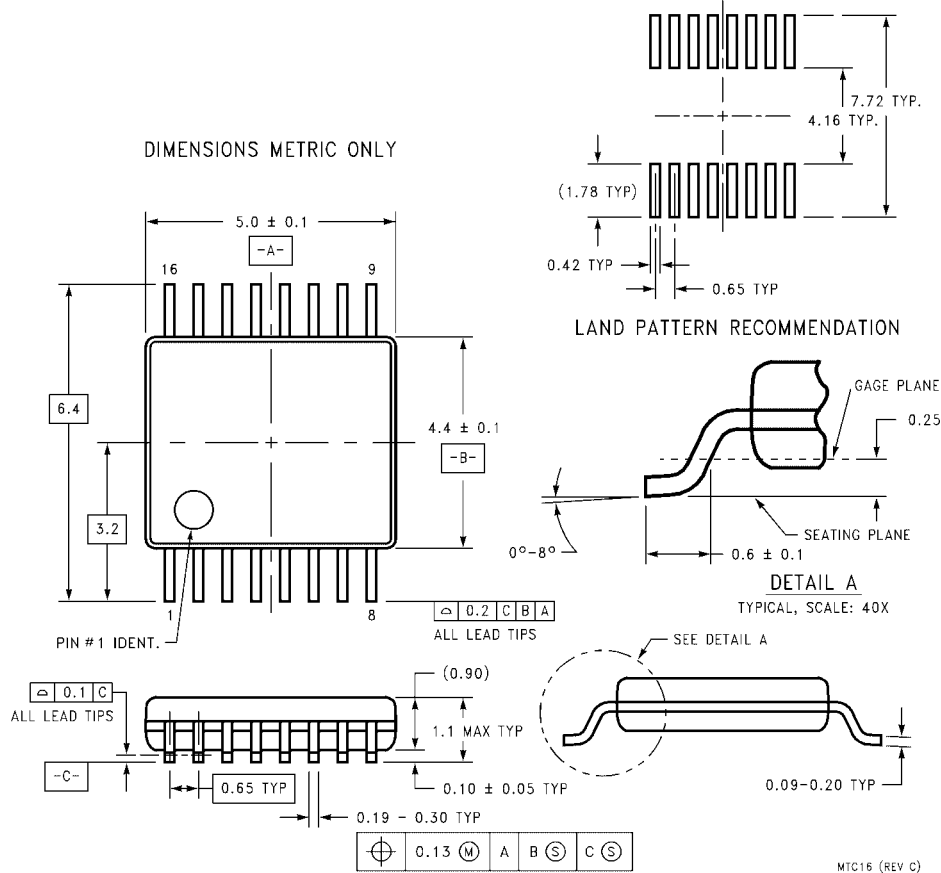
- NOTES:
 A. CONFORMS TO EIAJ EDR-7320 REGISTRATION, ESTABLISHED IN DECEMBER, 1998.
 B. DIMENSIONS ARE IN MILLIMETERS.
 C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.

M16DRevB1



16-Lead Small Outline Package (SOP), EIAJ TYPE II, 5.3mm Wide Package Number M16D

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



**16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC16**

Fairchild does not assume any responsibility for use of any circuitry described, no circuit patent licenses are implied and Fairchild reserves the right at any time without notice to change said circuitry and specifications.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT OF FAIRCHILD SEMICONDUCTOR CORPORATION. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

www.fairchildsemi.com

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor 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. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor 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. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor 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 ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor 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
19521 E. 32nd Pkwy, Aurora, Colorado 80011 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: 81-3-5817-1050

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