



August 1995

54F/74F280 9-Bit Parity Generator/Checker

General Description

The 'F280 is a high-speed parity generator/checker that accepts nine bits of input data and detects whether an even or an odd number of these inputs is HIGH. If an even number of inputs is HIGH, the Sum Even output is HIGH. If an odd number is HIGH, the Sum Even output is LOW. The Sum Odd output is the complement of the Sum Even output.

Features

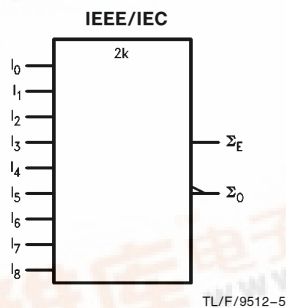
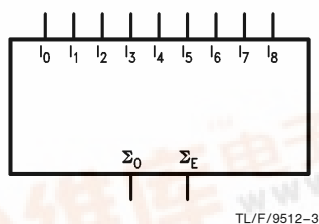
- Guaranteed 4000V minimum ESD protection

| Commercial | Military | Package Number | Package Description |
|-------------------|-------------------|----------------|---|
| 74F280PC | | N14A | 14-Lead (0.300" Wide) Molded Dual-In-Line |
| | 54F280DM (Note 2) | J14A | 14-Lead Ceramic Dual-In-Line |
| 74F280SC (Note 1) | | M14A | 14-Lead (0.150" Wide) Molded Small Outline, JEDEC |
| 74F280SJ (Note 1) | | M14D | 14-Lead (0.300" Wide) Molded Small Outline, EIAJ |
| | 54F280FM (Note 2) | W14B | 14-Lead Cerpack |
| | 54F280LM (Note 2) | E20A | 20-Lead Ceramic Leadless Chip Carrier, Type C |

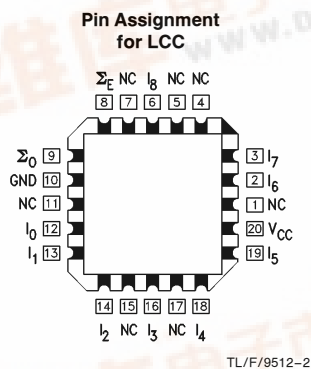
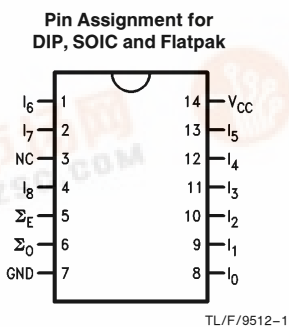
Note 1: Devices also available in 13" reel. Use suffix = SCX and SJX.

Note 2: Military grade device with environmental and burn-in processing. Use suffix = DMQB, FMQB and LMQB.

Logic Symbols



Connection Diagrams



TRI-STATE® is a registered trademark of National Semiconductor Corporation.



Unit Loading/Fan Out

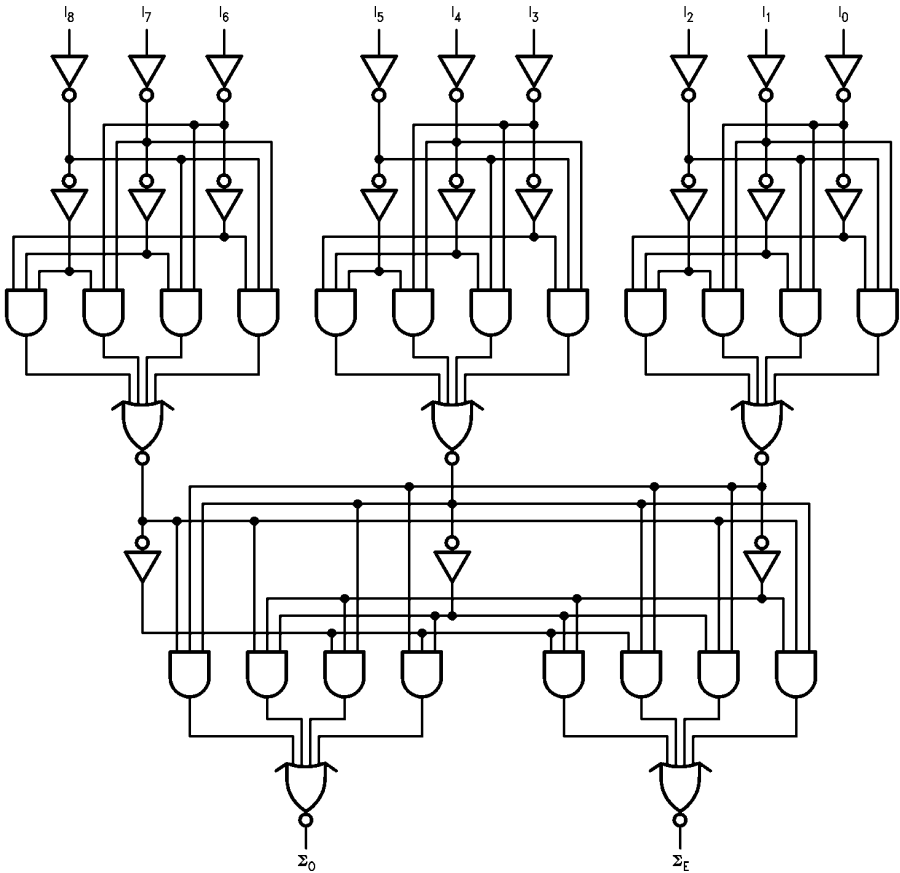
| Pin Names | Description | 54F/74F | |
|------------|--------------------|------------------|---|
| | | U.L. HIGH/LOW | Input I_{IH}/I_{IL} Output I_{OH}/I_{OL} |
| I_0-I_8 | Data Inputs | 1.0/1.0 | $20\ \mu\text{A}/-0.6\ \text{mA}$ |
| Σ_O | Odd Parity Output | 50/33.3 | $-1\ \text{mA}/20\ \text{mA}$ |
| Σ_E | Even Parity Output | 50/33.3 | $-1\ \text{mA}/20\ \text{mA}$ |

Truth Table

| Number of HIGH Inputs I_0-I_8 | Outputs | |
|---------------------------------------|-----------------------|----------------------|
| | $\Sigma\ \text{Even}$ | $\Sigma\ \text{Odd}$ |
| 0, 2, 4, 6, 8 | H | L |
| 1, 3, 5, 7, 9 | L | H |

H = HIGH Voltage Level
L = LOW Voltage Level

Logic Diagram



TL/F/9512-4

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)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

| | |
|---|--------------------------------------|
| Storage Temperature | −65°C to +150°C |
| Ambient Temperature under Bias | −55°C to +125°C |
| Junction Temperature under Bias | −55°C to +175°C |
| Plastic | −55°C to +150°C |
| V _{CC} Pin Potential to Ground Pin | −0.5V to +7.0V |
| Input Voltage (Note 2) | −0.5V to +7.0V |
| Input Current (Note 2) | −30 mA to +5.0 mA |
| Voltage Applied to Output in HIGH State (with V _{CC} = 0V) | |
| Standard Output | −0.5V to V _{CC} |
| TRI-STATE® Output | −0.5V to +5.5V |
| Current Applied to Output in LOW State (Max) | twice the rated I _{OL} (mA) |
| ESD Last Passing Voltage (Min) | 4000V |

Note 1: Absolute maximum ratings are values beyond which the device may be damaged or have its useful life impaired. Functional operation under these conditions is not implied.

Note 2: Either voltage limit or current limit is sufficient to protect inputs.

Recommended Operating Conditions

| | |
|------------------------------|-----------------|
| Free Air Ambient Temperature | |
| Military | −55°C to +125°C |
| Commercial | 0°C to +70°C |
| Supply Voltage | |
| Military | +4.5V to +5.5V |
| Commercial | +4.5V to +5.5V |

DC Electrical Characteristics

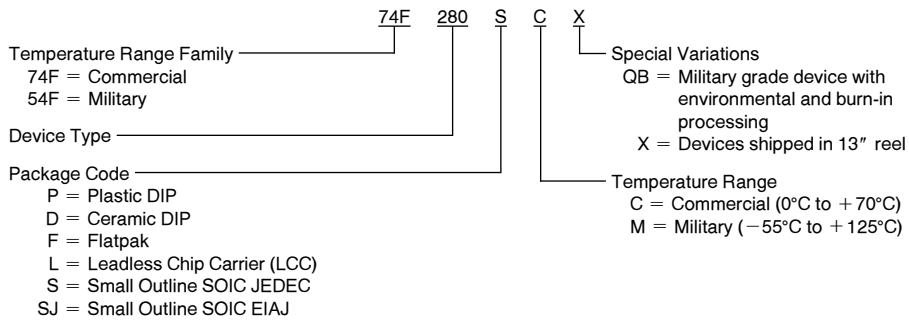
| Symbol | Parameter | 54F/74F | | | Units | V _{CC} | Conditions |
|------------------|-----------------------------------|--|-------------------|-------------|-------|-----------------|---|
| | | Min | Typ | Max | | | |
| V _{IH} | Input HIGH Voltage | 2.0 | | | V | | Recognized as a HIGH Signal |
| V _{IL} | Input LOW Voltage | | | 0.8 | V | | Recognized as a LOW Signal |
| V _{CD} | Input Clamp Diode Voltage | | | −1.2 | V | Min | I _{IN} = −18 mA |
| V _{OH} | Output HIGH Voltage | 54F 10% V _{CC} 74F 10% V _{CC} 74F 5% V _{CC} | 2.5 2.5 2.7 | | V | Min | I _{OH} = −1 mA I _{OH} = −1 mA I _{OH} = −1 mA |
| V _{OL} | Output LOW Voltage | 54F 10% V _{CC} 74F 10% V _{CC} | | 0.5 0.5 | V | Min | I _{OL} = 20 mA I _{OL} = 20 mA |
| I _{IH} | Input HIGH Current | 54F 74F | | 20.0 5.0 | μA | Max | V _{IN} = 2.7V |
| I _{BVI} | Input HIGH Current Breakdown Test | 54F 74F | | 100 7.0 | μA | Max | V _{IN} = 7.0V |
| I _{CEX} | Output HIGH Leakage Current | 54F 74F | | 250 50 | μA | Max | V _{OUT} = V _{CC} |
| V _{ID} | Input Leakage Test | 74F | 4.75 | | V | 0.0 | I _{ID} = 1.9 μA All Other Pins Grounded |
| I _{OD} | Output Leakage Circuit Current | 74F | | 3.75 | μA | 0.0 | V _{IOD} = 150 mV All Other Pins Grounded |
| I _{IL} | Input LOW Current | | | −0.6 | mA | Max | V _{IN} = 0.5V |
| I _{OS} | Output Short-Circuit Current | | −60 | −150 | mA | Max | V _{OUT} = 0V |
| I _{CCH} | Power Supply Current | | 25 | 38 | mA | Max | V _O = HIGH |

AC Electrical Characteristics

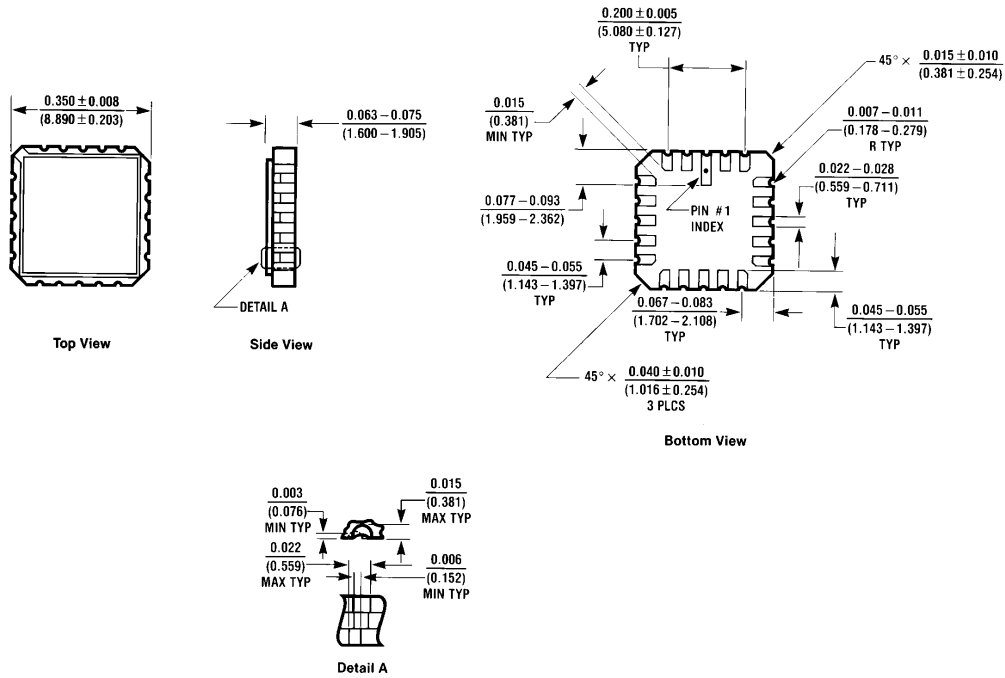
| Symbol | Parameter | 74F | | | 54F | | 74F | | Units |
|------------------|----------------------------------|---|------|------|--|------|--|------|-------|
| | | T _A = +25°C V _{CC} = +5.0V C _L = 50 pF | | | T _A , V _{CC} = Mil C _L = 50 pF | | T _A , V _{CC} = Com C _L = 50 pF | | |
| | | Min | Typ | Max | Min | Max | Min | Max | |
| t _{PLH} | Propagation Delay | 6.5 | 10.0 | 15.0 | 6.5 | 20.0 | 6.5 | 16.0 | ns |
| t _{PHL} | I _n to Σ _E | 6.5 | 11.0 | 16.0 | 6.5 | 21.0 | 6.5 | 17.0 | |
| t _{PLH} | Propagation Delay | 6.0 | 10.0 | 15.0 | 5.0 | 20.0 | 6.0 | 16.0 | ns |
| t _{PHL} | I _n to Σ _O | 6.5 | 11.0 | 16.0 | 6.5 | 21.0 | 6.5 | 17.0 | |

Ordering Information

The device number is used to form part of a simplified purchasing code where the package type and temperature range are defined as follows:



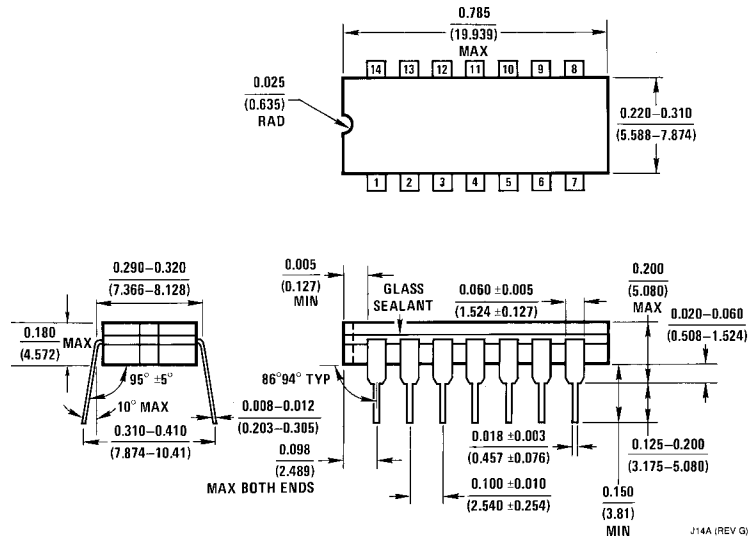
Physical Dimensions inches (millimeters)



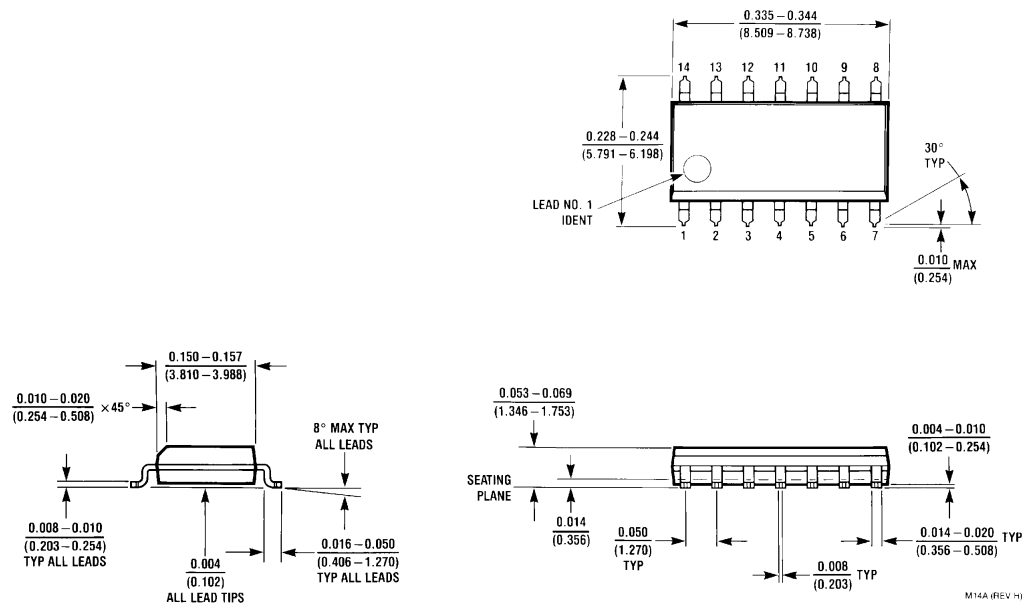
E20A (REV D)

**20-Lead Ceramic Leadless Chip Carrier (L)
NS Package Number E20A**

Physical Dimensions inches (millimeters) (Continued)

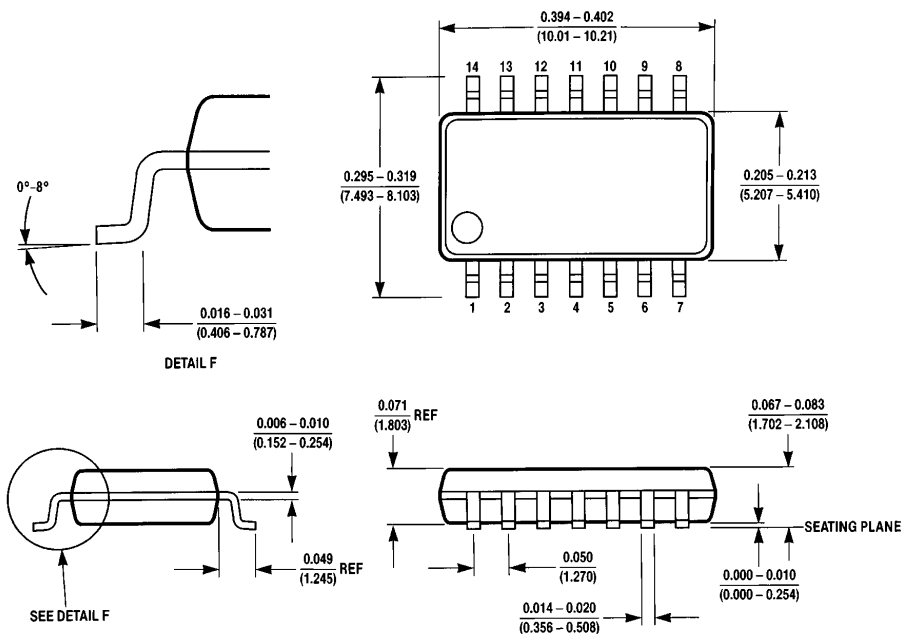


14-Lead Ceramic Dual-In-Line Package (D)
NS Package Number J14A



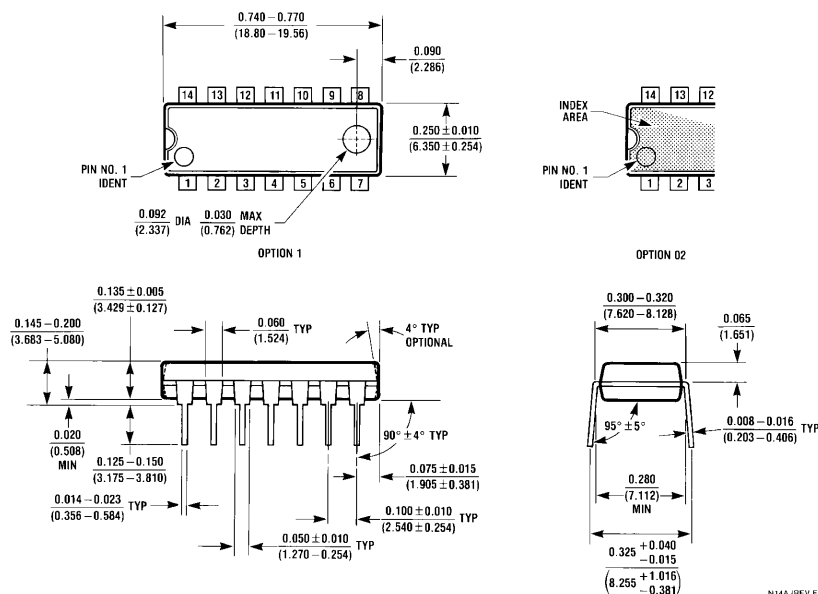
14-Lead (0.150" Wide) Molded Small Outline Package, JEDEC (S)
NS Package Number M14A

Physical Dimensions inches (millimeters) (Continued)



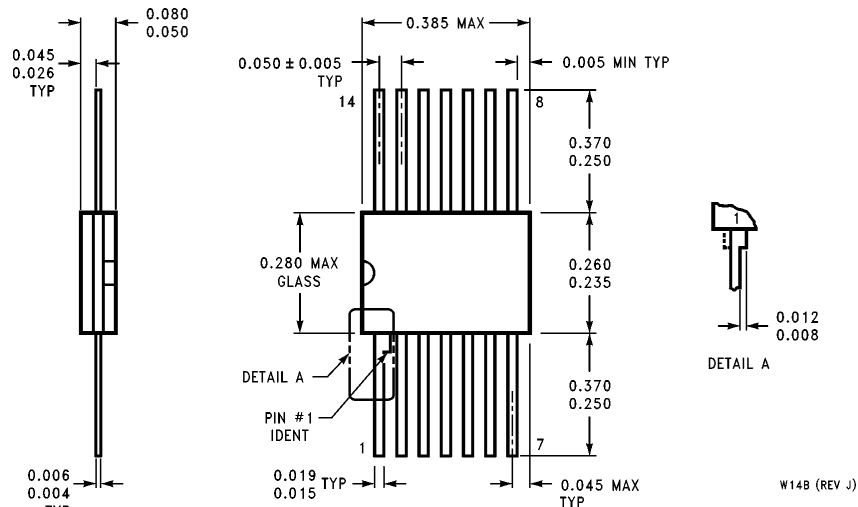
M14D (REV A)

14-Lead (0.300" Wide) Molded Small Outline Package, EIAJ (SJ)
NS Package Number M14D



N14A (REV F)

14-Lead (0.300" Wide) Molded Dual-In-Line Package (P)
NS Package Number N14A

Physical Dimensions inches (millimeters) (Continued)

14-Lead Ceramic Flatpak (F)
NS Package Number W14B

LIFE SUPPORT POLICY

NATIONAL'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 NATIONAL 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 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 is 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.



National Semiconductor Corporation
 1111 West Bardin Road
 Arlington, TX 76017
 Tel: 1(800) 272-9959
 Fax: 1(800) 737-7018

National Semiconductor Europe
 Fax: (+49) 0-180-530 85 86
 Email: cnjwge@tevm2.nsc.com
 Deutsch Tel: (+49) 0-180-530 85 85
 English Tel: (+49) 0-180-532 78 32
 Français Tel: (+49) 0-180-532 93 58
 Italiano Tel: (+49) 0-180-534 16 80

National Semiconductor Hong Kong Ltd.
 13th Floor, Straight Block,
 Ocean Centre, 5 Canton Rd.
 Tsimshatsui, Kowloon
 Hong Kong
 Tel: (852) 2737-1600
 Fax: (852) 2736-9960

National Semiconductor Japan Ltd.
 Tel: 81-043-299-2309
 Fax: 81-043-299-2408