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PRODUCTS

DESIGN

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## Device Marking Conventions

- QUALITY NETWORK HOME

- QUALITY SYSTEM

- NSQS
- Reliability Programs
- F.A. Program
- Change Management
- 8D Process
- Statistical Bin Limits
- Maverick Lot Prevention
- FMEA
- Quality Manual (pdf)
- Device Analysis Request

- CERTIFICATIONS

- ISO/TS16949/STACK
- Military QML
- Green Project

- PRODUCT QUALITY INFORMATION

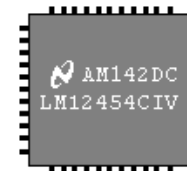
### Overview

National Semiconductor marks devices sold in order to provide device identification and manufacturing traceability information. The method of presenting the information marked on the device is dependent on the size of the device package and the area available for marking as well as the nature and specifications of the device.

The information presented here describes the majority of the device marking a customer will observe. Specific package marking is given on a device by device basis in our [Price & Availability](#) section of this web site.

The links below discuss general marking conventions to help understand device markings similar to those in the examples to the right.

- Special Codes
- Standard First Line Manufacturing Information
- Small Component First Line Manufacturing Info
- Typical Device Descriptions (Second Line)
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Special Codes

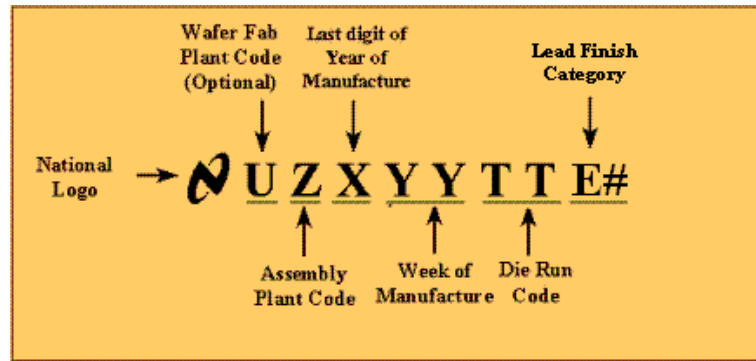
Actual Top Mark content may vary from the web definition. The Special Codes below are decoded to the actual characters for part marking. National may use specific characters to better identify it's products, for example "DD" Die Step Rev, this may consist of 1 or 2 "C" or "AA" reference in the part marking. Another example, "BBBBB" is a 5 digit Die Revision Number may be decoded as "43ABE" for the actual characters.

- [NS = Standard NS Logo](#)
- [U = Wafer Fab Code](#)
- [Z = Assembly Plant Code](#)
- [X = 1-Datecode or + PLUS SIGN For "ES" Engineering Samples](#)
- [XY = 2-Digit Datecode](#)
- [XYY = 3-Digit Datecode](#)
- [XXYY = 4-Digit Datecode](#)
- [TT = 2-Digit D/Run](#)
- [E# = Lead Finish Category \\* \(E0 - E7 per JESD97\)](#)
- [BBBBB = Five Digit Dierun Code](#)
- [DD = 1 or 2 Digit Diestep Rev](#)
- [SS = Wafer Sort Code](#)
- [C = Copyright Symbol C Within a Circle](#)
- [M = M Inscribed Within A Circle](#)
- [> = ESD Symbol](#)
- [EP = Enhanced Plastic Identification](#)
- [A = Inspection Lot Number](#)
- [DIE-RUN-## = 10 Digit Wafer Lot/Die Run Number](#)
- [I = Micro SMD Pin 1 Designator](#)
- [V = Micro SMD 1-Digit D/Run or + plus sign for "ES" Engineering Sample](#)

\* - If space permits

Standard First Line Manufacturing Information

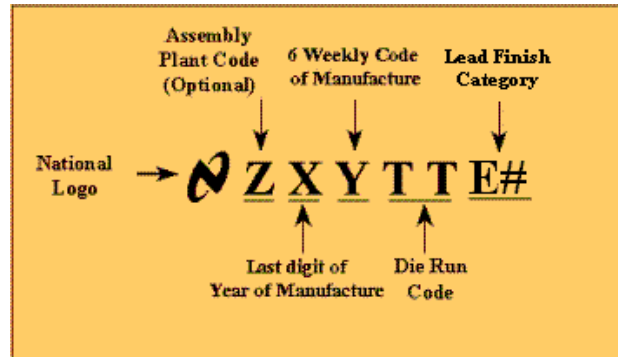
The first line of device marking provides manufacturing information as shown in the schematic below.



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### Small Component First Line Manufacturing Information

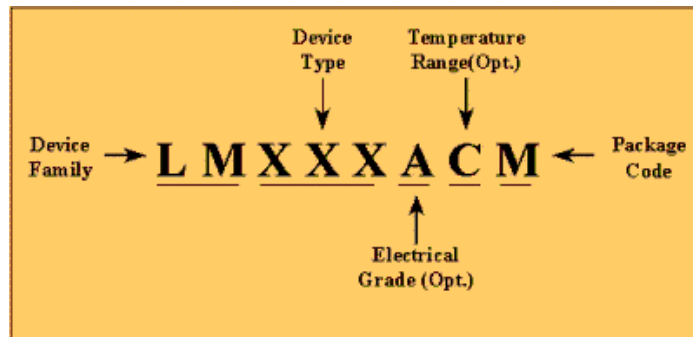
On smaller packages, such as SOICs, 8-lead MDIPs, and 20-lead PLCCs, the information is encoded somewhat differently to accommodate the smaller area available as shown in the schematic below.

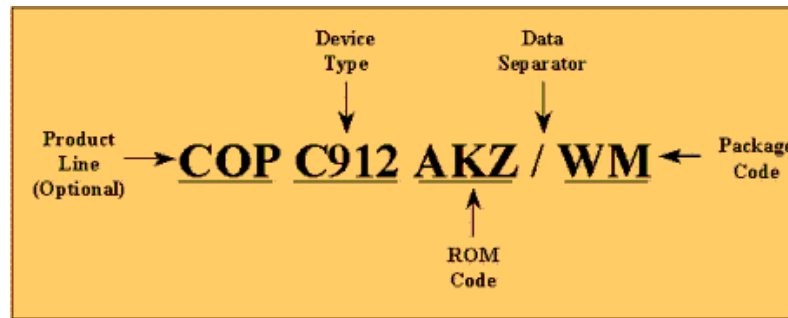


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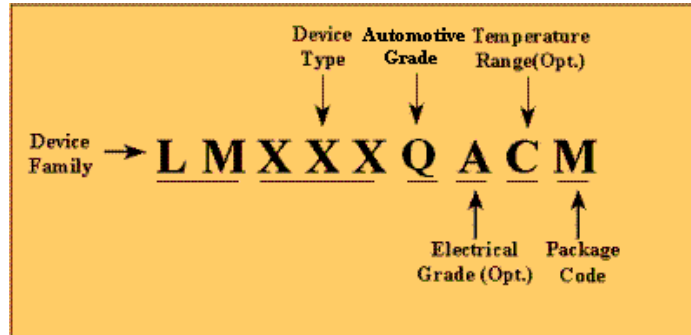
### Typical Device Descriptions (Second Line)

The second line of marking describes the specific circuit in the package. The schematics below show information shown for typical parts as well as programmable devices.





Automotive Grade products will have a unique NSID. The letter "Q" will be added to the standard commercial product marking of the NSID. See schematics below.



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#### Optional Third and Fourth Line Information

Depending on the device, package size, and customer, additional information might appear in a third or fourth line of marking information. Information that might appear on these lines include:

- Continuation of device identification (if too long for the second line)
- "Stampoff" number as required by specific customer request and specification
- Notice(s) related to copyright (©) or trademarks (™, ®)

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#### Very Small Component Marking

Certain very small packages, such as SOT-23, SOT-223, SC70, and SC90, are too small to contain all the information discussed above. Device identification marking is assigned differently and can be found in the Availability, Models, Samples & Pricing section of each device's Part Number link from the [Master Selection Guide](#). Other date code information, which would be typically found in the "first line" marking, is identified on the container labels.

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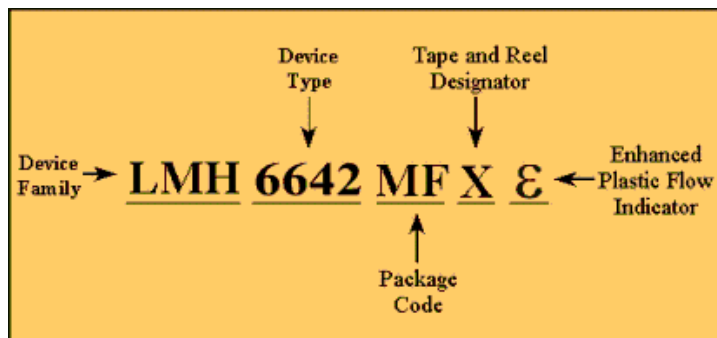
#### Mil/Aero Marking

Top marking information for National's Mil/Aero Products. [Mil/Aero Marking Guide](#) (pdf 63KB).

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## Enhanced Plastic

National's Enhanced Plastic (EP) Products are for system requirements which dictate an upgrade from standard commercial off the shelf product (COTS), but don't need the additional requirements associated with QML systems. EP products give customers the means to facilitate their internal qualification of COTS devices, by making available: extended temperature ranges, qualification data, reliability data and baseline control, and more. Additional information can be found by [clicking here](#).



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## Additional Marking

With the wide range of product produced by National Semiconductor, additional marking is sometimes needed to indicate a different level of performance or to identify specific functionality. For example, some marks that might occur after the package code or die run code might include the following:

- Special reliability processing (/A+)
- Processing to MIL-STD-883C (/883)
- Indication of adjustable output device (-ADJ)
- Indication of output voltage level (-5.0)
- Indication of operation frequency (-33)
- Marketing status code (ES)
- Other information as discussed above

As always, the best source for final confirmation of marking interpretation is to review the information available in the [Master Selection Guide](#).

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## Wafer Fab Plant Codes

The following table list single letter codes for National Semiconductor's wafer fabrication plants. Letters that don't appear on this list indicate wafer fabrication at one of National Semiconductor's approved sub-contractors.

Code	Fab Location
E	Arlington, TX
H	Greenock, UK
J	Greenock, UK
V	South Portland, ME
X	Arlington, TX

Code	Foundries
2	Taiwan
4	Taiwan
6	Taiwan
7	Taiwan
9	Taiwan
D	Italy
G	Taiwan
I	France
K	Taiwan
M	USA
N	Israel
P	China
Q	China
R	Taiwan
S	China
U	Taiwan
W	USA

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### Assembly Plant Codes

The following table list single letter codes for National Semiconductor's device assembly plants. Letters that don't appear on this list indicate device assembly at another of National Semiconductor's approved sub-contractors.

Code	Assembly Location
F	Santa Clara, CA
M	Malacca, Malaysia
S	Singapore
C	China
L	Taiwan (Sub-con)
R	Malaysia (Sub-con)
O	Taiwan (Sub-con)

Code	Assembly Location
A	Philippines (Sub-con)
K	Hong Kong (Sub-con)
N	Malaysia (Sub-con)
J	Japan (Sub-con)
E	Korea (Sub-con)
P	Malaysia (Sub-con)
H	Philippines (Sub-con)

Q	China (Sub-con)
G	China (Sub-con)
U	China (Sub-con)
B	Thailand (Sub-con)
V	Malaysia (Sub-con)

T	Taiwan (Sub-con)
Y	Malaysia (Sub-con)
X	USA (Sub-con)
I	Taiwan (Sub-con)
Z	U.S.A (Sub-con)

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Date of Manufacture Codes

Unit Date Code:

The unit date code markings are in 4 digits, 3 digits, 2 digits or single digit formats. The 4 digit date code is used mainly for mil-aero devices. The 3 digit date codes is used for standard commercial devices where the package marking surface is large enough to have all the required marking information. The 2 digit and the single digit date codes are used on small packages where the marking surface is limited.

Commercial parts:

The custom commercial parts have weekly date code where the date code changes weekly according to the calendar week. The standard commercial parts plus all small packages have 6 weekly date codes where the date code changes every 6 weeks. Even though the date codes change every 6 weeks, using the NSID, the date code and the die run code, the exact date of production start can be traced using National's on-line traceability system.

The 6-weekly date codes are as below.

2011	2010	2009	2008
XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X
1106 106 11 A	1006 006 01 S	0906 906 91 J	0806 806 81 A
1112 112 12 B	1012 012 02 T	0912 912 92 K	0812 812 82 B
1118 118 13 C	1018 018 03 U	0918 918 93 L	0818 818 83 C
1124 124 14 D	1024 024 04 V	0924 924 94 M	0824 824 84 D
1130 130 15 E	1030 030 05 W	0930 930 95 N	0830 830 85 E
1136 136 16 F	1036 036 06 X	0936 936 96 6	0836 836 86 F
1142 142 17 G	1042 042 07 Y	0942 942 97 P	0842 842 87 G
1148 148 18 H	1048 048 08 Z	0948 948 98 8	0848 848 88 H
1152 152 19 9	1052 052 09 =	0952 952 99 R	0852 852 89 9

2007	2006	2005	2004
XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X
0706 706 71 S	0606 606 61 J	0506 506 51 A	0406 406 41 S

0712 712 72 T	0612 612 62 K	0512 512 52 B	0412 412 42 T
0718 718 73 U	0618 618 63 L	0518 518 53 C	0418 418 43 U
0724 724 74 V	0624 624 64 M	0524 524 54 D	0424 424 44 V
0730 730 75 W	0630 630 65 N	0530 530 55 E	0430 430 45 W
0736 736 76 X	0636 636 66 6	0536 536 56 F	0436 436 46 X
0742 742 77 Y	0642 642 67 P	0542 542 57 G	0442 442 47 Y
0748 748 78 Z	0648 648 68 8	0548 548 58 H	0448 448 48 Z
0752 752 79 =	0652 652 69 R	0552 552 59 9	0452 452 49 =
2003	2002	2001	2000
XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X
0306 306 31 J	0206 206 21 A	0106 106 11 S	0006 006 01 J
0312 312 32 K	0212 212 22 B	0112 112 12 T	0012 012 02 K
0318 318 33 L	0218 218 23 C	0118 118 13 U	0018 018 03 L
0324 324 34 M	0224 224 24 D	0124 124 14 V	0024 024 04 M
0330 330 35 N	0230 230 25 E	0130 130 15 W	0030 030 05 N
0336 336 36 O	0236 236 26 F	0136 136 16 X	0036 036 06 O
0342 342 37 P	0242 242 27 G	0142 142 17 Y	0042 042 07 P
0348 348 38 Q	0248 248 28 H	0148 148 18 Z	0048 048 08 Q
0352 352 39 R	0252 252 29 I	0152 152 19 =	0052 052 09 R
1999	1998	1997	1996
XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X	XXYY XYY XY X
9906 906 91 A	9806 806 81 S	9706 706 71 J	9606 606 61 A
9912 912 92 B	9812 812 82 T	9712 712 72 K	9612 612 62 B
9918 918 93 C	9818 818 83 U	9718 718 73 L	9618 618 63 C
9924 924 94 D	9824 824 84 V	9724 724 74 M	9624 624 64 D
9930 930 95 E	9830 830 85 W	9730 730 75 N	9630 630 65 E
9936 936 96 F	9836 836 86 X	9736 736 76 O	9636 636 66 F
9942 942 97 G	9842 842 87 Y	9742 742 77 P	9642 642 67 G
9948 948 98 H	9848 848 88 Z	9748 748 78 Q	9648 648 68 H
9952 952 99 I	9852 852 89 =	9752 752 79 R	9652 652 69 I



### Die Run Codes

The die run code is a two letter alpha code that is automatically assigned to each lot by an internal manufacturing system. In case of any problems with a device, this code facilitates backward traceability to manufacturing processes where containment and corrective actions can be defined. These actions, in turn, minimize, and eventually eliminate, any negative impact on customers.

### Device Families, Product Lines and Device Types

Basic device identification is usually provided in the second line of device marking. As indicated, the general form of the identification is a product line indicator along with a numeric description of the specific device. The table below lists a sampling of device family codes. A full listing of devices, organized by device family prefixes, can be found in the [Master Selection Guide](#).

Code	Product Family
ADC	Data Conversion
CGS	Clock Generation Support
COP	Control Oriented Processor
DAC	Data Conversion
DP	Local Area Network Products

Code	Product Family
DS	Interface Products
LM	Linear
LMX	Frequency Synthesizers / PLL
LP	Voltage Regulators
PC	PC Related Products

### Electrical Grade Information

When present, additional markings between the device identification characters and the package code represent device variations that can be thought of as "grade levels" of the product. These might represent:

- Improved precision
- An improved die revision
- Wider or more narrow specification range
- Accuracy vs temperature levels

The exact nature of the variations are defined in product datasheets which can be viewed via links in the [Master Selection Guide](#).

### Temperature Range Codes

The temperature range over which a device's operation is specified may vary over different versions of the basic device. In these cases, a temperature range code indicates the specified range. While the list below lists the most common ranges specified, customers are urged to confirm this data on the datasheets accessible from the product links in the Master Selection Guide.

- 0°C to +70°C (Code C)
- -40°C to +85°C (Code I)
- -55°C to +125°C (No code)

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### Packaging Codes

To meet customer needs, National Semiconductor offers its products in a wide variety of packaging options. The package options available for each device type can be viewed in the [Master Selection Guide](#). From the selection guide, links are available to obtain detailed information on each package type such as mechanical and thermal specifications.

A small sample of packaging codes found within the device description marking is given in the table below:

Code	Package
H	TO-5 / TO-46
J	CERDIP
M	SOP / SOIC
MX	SOP Tape & Reel
N	Molded DIP

Code	Package
S	TO-263
T	TO-220
U	Pin Grid Array
V	Plastic Chip Carrier (PCC)
VF	Quad Flat Pak (PQFP)

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### ROM Marking Codes

Products such as Single-Chip Microcontrollers use the same basic device with different on-board programming to achieve a wide-range of functionality. ROM code marking identifies a specific device according to the internal programming.

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