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Analysis of IC Identification Codes and Package Structures

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Abstract

Integrated circuit identification is an important aspect of electronic servicing and component management. Information such as prefixes, suffixes, package categories, and manufacturing date codes helps technicians recognize the specifications and origin of semiconductor devices. These markings assist in selecting compatible replacements, understanding operating limits, and improving maintenance accuracy. This paper discusses various IC identification methods and highlights their significance in troubleshooting, repair, and electronic equipment maintenance.

Keywords: Integrated Circuit, Semiconductor Device, IC Identification, Package Type, Prefix Codes, Date Codes, Electronic Repair, Maintenance Engineering. Identification.

1 IC Prefixes and Types of Packaging

Integrated circuits (ICs) are identified using specific numbering systems and manufacturer prefixes. These prefixes help technicians and engineers recognize the origin, type, and package style of an IC. Proper understanding of IC markings is important during troubleshooting, replacement, and maintenance of electronic circuits.

Different semiconductor companies use unique alphabetic prefixes before the IC number. Even when two ICs perform the same function, their prefixes may vary according to the manufacturer. Knowledge of these coding systems helps avoid confusion while selecting equivalent components.

IC packaging also plays an important role in electronic hardware design. Packages differ in pin arrangement, mounting style, size, and heat dissipation capability. Common package types include Dual Inline Package (DIP), Small Outline Integrated Circuit (SOIC), Quad Flat Package (QFP), and Ball Grid Array (BGA).

2 IC Prefixes

The following table shows some commonly used IC prefixes and their manufacturers.

Table 1: Common IC Prefixes and Manufacturers

Prefix	Manufacturer
ACF, AY, GIC, GP	General Instrument (GI)
AD, CAV, HAS	Analog Devices
ADC, DM, DS, LF	National Semiconductor
LFT, LH, LM, NH	National Semiconductor (NSC)
AH	Optical Electronics Inc.
AM	Advanced Micro Devices (AMD)
AN	Panasonic

3 Types of IC Packaging

IC packages are designed to protect the semiconductor chip and provide electrical connections to external circuits. Different applications require different packaging styles.

- **DIP (Dual Inline Package):** Common through-hole package with two parallel rows of pins.
- **SOIC (Small Outline IC):** Surface-mount package used in compact electronic devices.
- **QFP (Quad Flat Package):** IC package with leads on all four sides.
- **BGA (Ball Grid Array):** High-density package using solder balls for connections.

4 Applications

Understanding IC prefixes and packaging types is useful in:

- Electronic equipment servicing
- PCB design and assembly
- Component replacement
- Troubleshooting and maintenance
- Semiconductor identification

5 Additional IC Prefixes and Manufacturers

Different semiconductor manufacturers use unique prefixes to identify their integrated circuits. These prefixes help technicians recognize the origin and category of electronic components during maintenance and replacement activities.

The identification of IC prefixes simplifies electronic component selection and troubleshooting. Proper knowledge of manufacturer codes helps in choosing compatible replacements and improves reliability during electronic system maintenance.

Table 2: Additional IC Prefixes and Corresponding Manufacturers

Prefix	Manufacturer
Bt	Brooktree
BX, CX	Sony
C, I, i	Intel
CA, CD, CDP	GE/RCA
CA, TDC, MPY, THC, TMC, CM, HV	TRW Supertex
CLC	Comlinear
CMP, DAC, MAT, OP, PM, REF, SSS	Precision Monolithics
CY	Cypress
D, DF, DG, SI	Siliconix
DS	Dallas Semiconductor
EF, ET, MK, SFC, TDF, TS	Thomson/Mostek
EP, EPM, PL	Altera
F, μA , μL , Unx	Fairchild/NSC
FSS, ZLD	Ferranti
GA	Gazelle
GAL	Lattice
GEL	GE
HA, HI	Harris
HA, HD, HG, HL, HM, HN	Hitachi
HADC, HDAC	Honeywell
HEP, MC, MCC, MCM, MEC, MM, MWM	Motorola
ICH, ICL, ICM, IM	GE/Intersil
IDT	Integrated Device Technology
IMS	Inmos
INA, ISO, OPA, PWR	Burr-Brown
IR	Sharp
ITT, MIC	ITT
KA	Samsung
L	SGS
L, LD	Siliconix, Siltronics
L, UC	Unitrode
LA, LC	Sanyo
LS	LSI Computer Systems
LT, LTC, LTZ	Linear Technology Corp.
M	Mitsubishi
MA	Analog Systems, Marconi
MAX	Maxim
MB	Fujitsu
MCS	MOS Technology

6 Extended List of IC Prefixes and Manufacturers

Integrated circuit manufacturers use standardized prefixes to identify their semiconductor devices. These prefixes assist engineers and technicians in recognizing the source and family of electronic components during servicing and replacement operations.

The study of IC prefixes helps in quick identification of semiconductor devices and simplifies electronic troubleshooting. Familiarity with these codes improves maintenance efficiency and reduces errors during component replacement.

7 Suffixes

Suffix letters in integrated circuits are used to specify the package style and operating temperature range of the device. Semiconductor manufacturers generally classify ICs into three temperature categories:

- **Military Grade:** $-55^{\circ}C$ to $+125^{\circ}C$
- **Industrial Grade:** $-25^{\circ}C$ to $+85^{\circ}C$
- **Commercial Grade:** $0^{\circ}C$ to $+70^{\circ}C$

Commercial-grade ICs are commonly used in indoor electronic applications where environmental conditions remain stable. Different manufacturers may use different suffix conventions for similar devices. Therefore, technicians should always verify the suffix details before selecting or ordering replacement components.

8 Date Codes

Most integrated circuits, transistors, and semiconductor devices carry a date code printed on the package. This code usually consists of four digits, where the first two digits represent the manufacturing year and the last two digits indicate the production week.

Date coding is useful for identifying the manufacturing period of electronic components. It helps maintenance engineers estimate component age and evaluate reliability during servicing activities. In some applications, especially where electrolytic capacitors or batteries are used, age information becomes important because such components have limited operational life.

When a batch of ICs shows repeated failure, it is advisable to avoid using components with the same manufacturing date code. Date markings can also assist in identifying the production period of electronic equipment during troubleshooting and maintenance work.

9 Importance in Electronic Maintenance

Understanding suffixes and date codes simplifies electronic servicing and component selection. These markings provide valuable technical information regarding operating conditions, reliability, compatibility, and manufacturing details of semiconductor devices.

Table 3: Extended IC Prefixes and Manufacturers

Prefix	Manufacturer
MIL	Microsystems International
ML, MN, SL, SP, TAB	Plessey
ML, MT	Mitel
MM	Teledyne-Amelco, Monolithic Memories
MN	Micro Networks
MP	Micro Power Systems
MSM	Oki
N, NE, PLS, S, SE, SP	Signetics
nnG	igabit Logic
NC	Nitron
PA	Apex
PAL	AMD/MMI
R	Rockwell
R, Ray, RC, RM	Raytheon
RD, RF, RM, RT, RU	EG & G Reticon
S	AMI
SFC	ESMF
SG	Silicon General
SN, TL, TLC, TMS	Texas Instruments (TI)
SS	Silicon Systems
T, TA, TC, TD, TMM, TMP	Toshiba
OM, PCD, PCF	AEG, Amperex, SGS
SAA, SAB, SAF	Siemens, Signetics
SCB, SCN, TAA, TBA, TCA, TDA, TEA	Telefunken
U	U
TML	Telmos
TP	Teledyne Philbrick
TPQ, UCN, UCS, UDN, UDS, UHP, ULN, ULS	Sprague
TSC	Teledyne Semiconductor
μ PB, μ PC, μ PD	NEC
V	Amtel
VA, VC	VTC
VT	VLSI Technology Inc. (VTI)
X	Xicor
XC	Xilinx
XR	Exar
Z	Zilog
ZN	Ferranti
5082-nnnn	Hewlett-Packard (HP)

10 Conclusion

IC prefixes, suffixes, package types, and date codes provide essential information about semiconductor devices. These identification markings help technicians and engineers recognize manufacturers, operating conditions, packaging styles, and manufacturing periods of integrated circuits. Proper understanding of these details improves troubleshooting accuracy, component replacement, and maintenance efficiency in electronic systems. Knowledge of IC coding standards also reduces the possibility of selecting incorrect devices during servicing and repair activities.

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