

## ***Packing Considerations (Methods, Materials and Recycling)***

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### **ABSTRACT**

All NSC commercial devices are prepared, inspected and packed to insure proper physical support and protection during handling, transportation and shipment. Assembled devices are packed in one or more of the following container forms, a) immediate, b) intermediate, and c) outer or shipping containers. An example of each container form is illustrated below.

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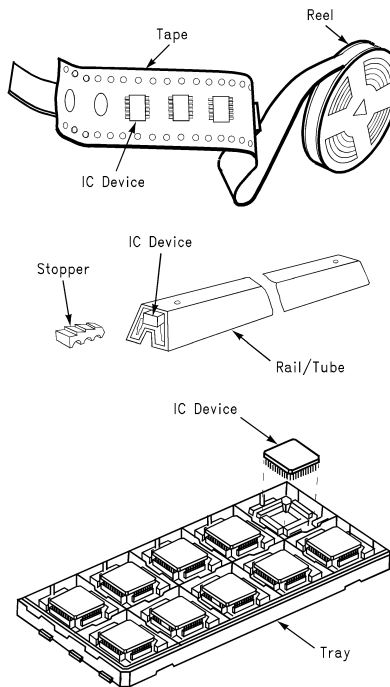
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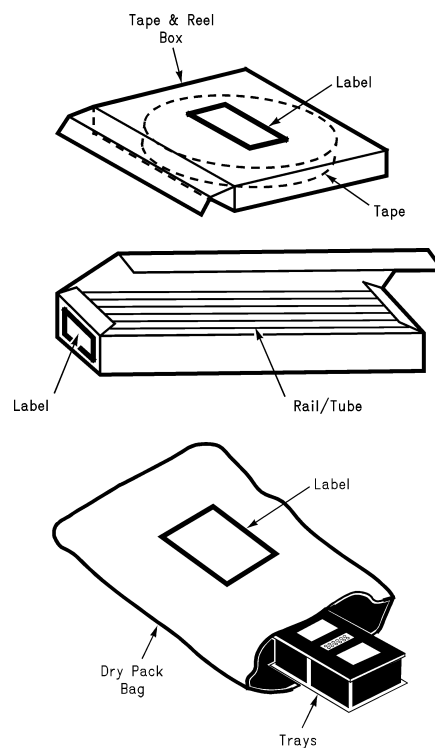
## 1 Transport Media

All NSC commercial devices are prepared, inspected and packed to insure proper physical support and protection during handling, transportation and shipment. Assembled devices are packed in one or more of the following container forms, a) immediate, b) intermediate, and c) outer or shipping containers. An example of each container form is illustrated below.

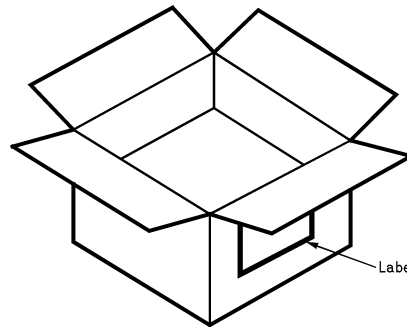
### 1.1 IMMEDIATE CONTAINER



### 1.2 INTERMEDIATE CONTAINER



### 1.3 OUTER/SHIPPING CONTAINER



Methods of immediate container packing include proper insertion of devices or components into plastic molded trays and rails/tubes, proper mounting of components onto tape and reel, or proper placement in corrugated cartons. The immediate containers are then packed into intermediate containers (plastic bags or corrugated boxes/cartons) with specified quantities of trays, rails/tubes or tape and reels. Outer/shipping containers are then fully or partial packed with intermediate boxes to meet order quantity requirements and to further insure protection from transportation hazards, additional dunnage filler material is required to fill voids inside the intermediate and outer/shipping containers.

## 2 General Packing Requirements

NSC packing methods and materials are designed based on the following considerations:

- — Optimum protection to the products—it must provide adequate protection from handling (electrostatic discharge) and transportation hazards;
- — Ease of handling—it should be easy to assemble, load and unload products in and from it; and
- — Impacts to the environment—it shall be reusable and recyclable.

## 3 Levels of Product Packing

### 3.1 IMMEDIATE CONTAINER

The first level of product packing is the immediate container. The type of immediate container used varies with the product or component being packed. In addition, the immediate container design and material depend on the fragility, size and profile of the product. There are four basic primary types of immediate containers used by NSC; plastic rails/tubes, plastic trays, tape and reel, and corrugated and chipboard boxes.

A) Rails/tubes are basically made of acrylic or polyvinyl chloride (PVC) plastic. The electrical properties of the material are altered by either intrinsically adding carbon fillers, and/or topically coating with antistatic solution. Plastic rails/tubes are non-bakeable. Refer to [Table 1](#) for package types using rail/tube as primary container, and for information on material and recyclability.

**Table 1. Plastic Rail/Tube and Stopper Requirements**

Package Type	Rail		Stopper			Recyclability
	Material	Code/Symbol <sup>(1)</sup>	Type	Material	Code/Symbol <sup>(1)</sup>	
DIP's						
Plastic	Polyvinylchloride	03/PVC	Pin	Polyamide (Nylon)	07/PA	Yes
Ceramic	Polyvinylchloride	03/PVC	Pin	Polyamide (Nylon)	07/PA	Yes
Sidebrazed	Polyvinylchloride	03/PVC	Pin	Polyamide (Nylon)	07/PA	Yes

<sup>(1)</sup> ISO 1043-1 International Standards—Plastic Symbols. SAE J1344 Marking of Plastic Parts. ASTM D 1972–91 Standard Practice for Generic Marking of Plastic Products. DIN 6120, German Recycling Systems, RESY for paperbased and VGK for plastic packing materials.

**Table 1. Plastic Rail/Tube and Stopper Requirements (continued)**

Package Type	Rail		Stopper			Recyclability
	Material	Code/Symbol <sup>(1)</sup>	Type	Material	Code/Symbol <sup>(1)</sup>	
Cerpack	Polyvinylchloride	03/PVC	Pin	Polyamide (Nylon)	07/PA	Yes
Flatpack	Polyvinylchloride	03/PVC	Pin	Polyamide (Nylon)	07/PA	Yes
TO-220/263	Polyvinylchloride	03/PVC	Pin	Polyamide (Nylon)	07/PA	Yes
TapePak	Polyvinylchloride	03/PVC	Plug	Krayton (Rubber)	07/SBR	Yes
PLCC	Polyvinylchloride	03/PVC	Plug	Polyvinylchloride	03/PVC	Yes
SOP/SSOP/TSSOP	Polyvinylchloride	03/PVC	Plug	Polyvinylchloride	03/PVC	Yes

B) Plastic trays are categorized as injection molded and vacuum formed. Molded plastic trays are generally static dissipative and are mostly bakeable (125+ degrees C.). Vacuum formed are conductive and non-bakeable. [Table 2](#) shows those package types with plastic trays as primary immediate containers, and also shows material and recyclability information.

**Table 2. Plastic Tray and Strap Material Requirements**

Package Type	Tray			Strap	
	Material	Code/Symbol <sup>(1)</sup>	Recyclability	Material Code/Symbol <sup>(1)</sup>	Recyclability
PQFP/MQFP/ BGA/MQUAD CPGA & PPGA (higher leadcount)	Polarylsulfone	07/PAS	Yes	Polypropylene Strap 05/PP	Yes
LCC/ Cerquad/ LDCC/ CPGA & PPGA (lower leadcount)					

<sup>(1)</sup> 150 1043-1 International Standards—Plastic Symbols. SAE J1344 Marking of Plastic Parts. ASTM D 1972–91 Standard Practice for Generic Marking of Plastic Products. DIN 6120, German Recycling Systems, RESY for paperbased and VGK for plastic packing materials.

Tape and reel is a multi-part immediate container system. The reel is made of polystyrene (PS) plastic material and typically coated with antistatic solution. Plastic reels are mostly used on surface mounts and larger packages. Smaller packages such as "TO-92" use chipboard reels and usually are larger in diameter than the plastic reels. The tape inside the chipboard reel is paper based and consists of 2 layers with adhesive in between where the package or device is held in place. The embossed carrier tape for the plastic reel is made of either polyvinylchloride (PVC) or polystyrene (PS) plastic material and intrinsically conductive. The laminated cover tape is made of polyester (PET) and polyethylene (PE) layers, and due to the laminated construction the cover tape is not considered recyclable. Refer to [Table 3](#) for packages with tape & reel as primary immediate container, and corresponding material and recyclability information.

**Table 3. Tape and Reel Requirements**

Package Type	Reel		Cover Tape		Carrier Tape		Recyclability <sup>(1)</sup>
	Material	Code/Symbol <sup>(1)</sup>	Material	Code/Symbol <sup>(1)</sup>	Material	Code/Symbol <sup>(1)</sup>	
SC70/SOT-23/ SOT-223/ Mini- SOP/ CSP	Poly- styrene	06/PS	Polyester/ Polyeth- ylene laminant	06/PS	Poly- styrene	06/PS	Reel & Carrier Tape: Yes Cover Tape: No

<sup>(1)</sup> 150 1043-1 International Standards—Plastic Symbols. SAE J1344 Marking of Plastic Parts. ASTM D 1972–91 Standard Practice for Generic Marking of Plastic Products. DIN 6120, German Recycling Systems, RESY for paperbased and VGK for plastic packing materials.

D) Corrugated boxes/cartons are generally constructed with fibreboard facings and a fluted medium in between the facings. Chipboard containers comprised of just one fibreboard facing. Facings and fluted medium are kraft (brown) paperboards. Most corrugated boxes used as immediate containers are usually single wall construction. Refer to [Table 4](#) for corrugated boxes material and recyclability information.

**Table 4. Corrugated Boxes/Cartons and Dunnage (Void Filler) Requirements**

Package Type	Pack Method		Container Type	Recyclability
	Material	Code/Symbol <sup>(1)</sup>	Primary Immediate (IMM) Intermediate (INT) Outer or Shipping (SHP)	
TO-46/18	Corrugated BOX (E070)	Resy	INT	Yes
TO-39/53, TO-5/72, TO-96/100, TO-202 (3L), TO-226/237, TO-92, TO-8	Corrugated Box (E070)	Resy	IMM	Yes
All Packages	Corrugated	Resy	INT and SHP	Yes
All Packages	Polyethylene	04/PE	Dunnage (void filler)	Yes

<sup>(1)</sup> ISO 1043-1 International Standards—Plastic Symbols. SAE J1344 Marking of Plastic Parts. ASTM D1972–91 Standard Practice for Generic Marking of Plastic Products. DIN 6120, German Recycling Systems, RESY for paperbased and VGK for plastic packing materials.

### 3.2 INTERMEDIATE CONTAINERS

The second level of product packing is the intermediate container. Three types of intermediate containers are used. They are conductive or static shielding plastic bags, moisture barrier bag and corrugated cartons. Conductive bags are usually opaque and made of low-density polyethylene plastic material (LD PE). Static Shielding (S/S) bags are made of two laminated layers of static dissipative polyethylene sheets and a metalized film in between them. Moisture barrier bag (MBB) are used as intermediate container for moisture sensitive products. Its construction is similar to that of the S/S bag except with an extra layer of polyester (PET) sheet which altogether provide a very low moisture vapor transmission rate (mvtr). For corrugated cartons, see explanation in paragraph D) and [Table 4](#) above. Refer to the following [Table 5](#) for Conductive, Static Shielding and Moisture Barrier Bags Requirements.

**Table 5. Conductive and Static Shielding Bag Requirements**

Package Type	Container Type	Material	Code/Symbol <sup>(1)</sup>	Recyclability
All products packed in rails	Conductive Bag	Low Density Polyethylene	04/PE-LD	Yes
TO-18/46	Static Shielding Bag	Metalized Polyethylene	N/A	No
Tapepak 40&84L, PLCC 32L & up, SOP/ TSOP/ TSSOP/ SSOP (higher leadcount) PQFP/ MQFP/ TQFP/ MQUAD/ PBGA, TO-220/263 (surface mount)	Moisture Barrier Bag	Polyethylene/ Aluminum/ Polyester Laminate	N/A	No

<sup>(1)</sup> ISO 1043-1 International Standards—Plastic Symbols. SAE J1344 Marking of Plastic Parts. ASTM D1972–91 Standard Practice for Generic Marking of Plastic Products. DIN 6120, German Recycling Systems, RESY for paperbased and VGK for plastic packing materials

### 3.3 OUTER/SHIPPING CONTAINERS

The third level of product packing is the outer/shipping carton. It is made of corrugated material consisting of inner and outer fibreboard facings and a fluted medium in between these facings. Most common shipping carton style is the regular slotted container (RSC) design. It can be single, double or tripe wall construction depending on the total weight of the products being transported or shipped. Refer to [Table 4](#) for corrugated material and recyclability information.

### 3.4 OTHER PACKING MATERIALS

Additional dunnage and void filler materials are required to fill voids inside the intermediate and/or shipping containers. The use of dunnage is necessary when packing non full intermediate or shipping container quantities. This is to prevent unnecessary movement of products inside the partially filled container(s). Most common dunnage or void filler material used is the antistatic bubble sheet. It is made of low density polyethylene plastic sheet. Refer to [Table 4](#) for material and recyclability information.

## 4 Packing Material Recycling Information

Majority of the product packing used at NSC are of recyclable materials. Those in the exception list are the ones made of either metalized or laminated plastics such as the static shielding, moisture barrier bags and cover tape. Recycling can be accomplished in 2 ways, a) collection of pre-consumer or post-consumer packing materials, regrinding and mixing into same plastic resins to manufacture new packing material; and b) collection of post-consumer or used packing material, reprocessing them (cleaning, mechanical/ dimensional/electrical inspections) for reuse.

Recycling services of packing materials such as plastic molded trays, plastic reels and others are available through the following companies listed below. It is strongly recommended to contact these companies to obtain specific information regarding their recycling requirements and process, information on their representatives other than what is listed below or those outside of U.S.A.

Recycler		Packing Material
1)	The SemiCycle Fondation	Plastic Molded (JEDEC) Trays, Plastic Reels
	2111 Kramer Lane	
	Austin, Texas 78758	
	Tel. No. (512) 339 - 4229	
	Fax. No. (512) 339 - 8121	
	Website: <a href="http://www.semicycle.org">www.semicycle.org</a>	
2)	Micro Plastics Inc.	Plastic Molded (Jedec) Trays, Plastic Reels
	3420 W Whitton Avenue	
	Phoenix, Arizona 85017	
	Tel. No. (602)278-4545	
	Fax. No. (602)278-4477	
3)	Ecological Technologies, Inc.	Plastic Molded (Jedec) Trays
	3281 Keller Street	
	Santa Clara, CA. 95054	
	Tel. No. (408)988-2050	
	Fax. No. (408)988-4009	
	Website: <a href="http://www.eco-tech.com">www.eco-tech.com</a>	

### 4.1 Immediate Container Pack Methods

The following tables identify the primary and secondary or alternate, immediate pack methods offered by National Semiconductor. A secondary or alternate immediate container pack method is identified where applicable.

**Table 6. Immediate pack method(s) for Metal Quad Flatpack (Mquad) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
ACC80A	TRAY	66		
ACE100A	TRAY	66		
AFA196A	TRAY	21		
AFB132A	TRAY	36		
ALE128A	TRAY	66		

**Table 6. Immediate pack method(s) for Metal Quad Flatpack (Mquad) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
AUL160A	TRAY	24		
AUW208A	TRAY	24		
AUY144A	TRAY	24		
AUZ120A	TRAY	24		
AWA240A	TRAY	24		
AYC304A	TRAY	12		

**Table 7. Immediate pack method(s) for Ceramic Sidebrazed Dual-In-Line (SB) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
D08C	RAIL/TUBE	35		
D14D	RAIL/TUBE	25		
D16C	RAIL/TUBE	20		
D16D	RAIL/TUBE	18		
D18A	RAIL/TUBE	20		
D20A	RAIL/TUBE	18		
D20B	RAIL/TUBE	18		
D20CQ	RAIL/TUBE	18		
D22C	RAIL/TUBE	17		
D22D	RAIL/TUBE	17		
D24C	RAIL/TUBE	15		
D24CQ	RAIL/TUBE	15		
D24D	RAIL/TUBE	15		
D24I	RAIL/TUBE	15		
D24J	RAIL/TUBE	15		
D24K	RAIL/TUBE	15		
D24L	RAIL/TUBE	15		
D28C	RAIL/TUBE	13		
D28D	RAIL/TUBE	13		
D28F	RAIL/TUBE	13		
D28G	RAIL/TUBE	13		
D28H	RAIL/TUBE	13		
D28JQ	RAIL/TUBE	13		
D40C	RAIL/TUBE	9		
D40J	RAIL/TUBE	9		
D40KQ	RAIL/TUBE	9		
D48A	RAIL/TUBE	7		
D52A	RAIL/TUBE	7		

**Table 8. Immediate pack method(s) for Ceramic Leadless Chip Carrier (LCC) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
EA20B	RAIL/TUBE	50		
EA028C	TRAY	100		
EA48B	TRAY	25		



**Table 8. Immediate pack method(s) for Ceramic Leadless Chip Carrier (LCC) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
E20A	RAIL/TUBE	50		
E24B	TRAY	25		
E28A	TRAY	25		
E28B	TRAY	25		
E32A	RAIL/TUBE	35		
E32B	RAIL/TUBE	35		
E32C	RAIL/TUBE	35		
E40A	RAIL/TUBE	35		
E44A	RAIL/TUBE	25		
E48A	TRAY	25		
E68B	TRAY	48		
E68C	TRAY	48		
E84A	TRAY	42		
E84B	TRAY	42		

**Table 9. Immediate pack method(s) for Ceramic Leaded Chip Carrier (LDCC) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
EL28A	TRAY	96		
EL44A	TRAY	80		
EL44B	TRAY	80		
EL44C	TRAY	80		
EL68A	TRAY	44		
EL68B	TRAY	44		
EL68C	TRAY	44		
EL84A	TRAY	38		
EL132A	TRAY	12		
EL132B	TRAY	12		
EL132C	TRAY	20		
EL172B	TRAY	12		
EL172D	TRAY	12		
EL256A	TRAY	12		
E24B	TRAY	25		
E44A	TRAY	25		
E68B	TRAY	48		
E84B	TRAY	42		

**Table 10. Immediate pack method(s) for Metal Can Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
G12B	BOX	250	TRAY	20
H02A	BULK	100	TRAY	50
H03A	BULK	500	TRAY	100
H03B	BULK	500	TRAY	100
H03C	BOX	100	TRAY	100

**Table 10. Immediate pack method(s) for Metal Can Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
H03E	BOX	100	TRAY	100
H03G	BULK	500	TRAY	100
H03H	BULK	100	TRAY	50
H03J	BOX	1800	TRAY	100
H04A	BOX	500	TRAY	100
H04C	BOX	100	TRAY	100
H04D	BULK/BAG	1		
H06C	BOX	500	TRAY	100
H08A	BOX	500	TRAY	100
H08B	BOX	500	TRAY	100
H08C	BOX	500	TRAY	100
H08D	BOX	500	TRAY	100
H10C	BOX	500	TRAY	100
H10D	BOX	500	TRAY	100
H10E	BOX	500	TRAY	100
H10F	BOX	500	TRAY	100
H10G	BOX	500	TRAY	100
KC02A	TRAY	50		
KC02B	TRAY	50		
KA04B	TRAY	50		
KA15A	TRAY	50		
K02A	TRAY	50		
K02B	TRAY	50		
K02C	TRAY	50		
K04A	TRAY	50		
K08A	TRAY	50		

**Table 11. Immediate pack method(s) for Ceramic Quad Flatpack (CQFP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
EL28B	TRAY	30		
EL64A	TRAY	20		
EL116A	TRAY	12		
EL128A	TRAY	12		
EL132E	CARRIER/TRAY	12		
EL132F	TRAY	36		
EL152A	TRAY	12		
EL164A	TRAY	12		
EL172C	CARRIER/TRAY	12		
EL172E	TRAY	12		
EL304A	BOX	30		

**Table 12. Immediate pack method(s) for Ceramic Flatpack (CerPac) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
F14C	CARRIER/RAIL	19		
F16B	CARRIER/RAIL	19		
F16C	CARRIER/RAIL	19		
F18A	CARRIER/RAIL	19		
F18B	CARRIER/RAIL	19		
F20A	CARRIER/RAIL	19		
F24C	CARRIER/RAIL	15		
F24D	CARRIER/RAIL	15		
F28A	CARRIER/RAIL	15		
F28B	CARRIER/RAIL	15		
F28C	TRAY	30		
F30A	CARRIER/RAIL	15		
F40A	CARRIER/RAIL	12		
F132A	TRAY	36		
WA80A	TRAY	84		
WA80AQ	TRAY	64		
WG28A	RAIL/TUBE	23		
W10A	CARRIER/RAIL	19		
W14B	CARRIER/RAIL	19		
W14C	CARRIER/RAIL	19		
W20A	CARRIER/RAIL	19		
W24B	CARRIER/RAIL	14		
W24C	CARRIER/RAIL	15		
W24D	CARRIER/RAIL	15		
W28A	CARRIER/RAIL	15		
W28B	CARRIER/RAIL	15		
W28C	CARRIER/RAIL	15		
W144B	TRAY	12		
W160A	TRAY	12		
W208A	TRAY	12		

**Table 13. Immediate pack method(s) for Ceramic Dual-In-Line (Cerdip) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
J08A	RAIL/TUBE	40		
J14A	RAIL/TUBE	25		
J16A	RAIL/TUBE	25		
J18A	RAIL/TUBE	20		
J20A	RAIL/TUBE	20		
J24A	RAIL/TUBE	14		
J24AQ	RAIL/TUBE	14		
J24E	RAIL/TUBE	15		
J24F	RAIL/TUBE	15		
J28A	RAIL/TUBE	12		
J28A-Q	RAIL/TUBE	12		
J32AQ	RAIL/TUBE	11		

**Table 13. Immediate pack method(s) for Ceramic Dual-In-Line (Cerdip) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
J40A	RAIL/TUBE	9		
J40AQ	RAIL/TUBE	9		
J40BQ	RAIL/TUBE	9		
HY08A	RAIL/TUBE	40		
HY16A	RAIL/TUBE	15		

**Table 14. Immediate pack method(s) for Ceramic Small Outline Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MC16A	RAIL/TUBE	45		
MC20A	RAIL/TUBE	36		
MC20B	RAIL/TUBE	36		
MC24A	RAIL/TUBE	30		
MC28A	RAIL/TUBE	26		
MC28B	RAIL/TUBE	26		

**Table 15. Immediate pack method(s) for Molded Plastic SC-70 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MAA05A	TAPE N REEL	3000	TAPE N REEL	250
MAA06A	TAPE N REEL	3000	TAPE N REEL	250

**Table 16. Immediate pack method(s) for Molded Plastic SOT-23 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MF03A	TAPE N REEL	3000	TAPE N REEL	1000
MF05A	TAPE N REEL	3000	TAPE N REEL	1000
MF06A	TAPE N REEL	3000	TAPE N REEL	1000

**Table 17. Immediate pack method(s) for Molded Plastic SOT-223 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MP04A	TAPE N REEL	2000	TAPE N REEL	1000
MP05A	TAPE N REEL	1000	TAPE N REEL	2000

**Table 18. Immediate pack method(s) for Molded Plastic Small Outline (SOP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
LA08A	RAIL/TUBE	90	TAPE N REEL	2000
MA08D	TAPE N REEL	3500	TAPE N REEL	250
MA28A	RAIL/TUBE	25		
MUA08A	TAPE N REEL	3500	TAPE N REEL	250
M08A	RAIL/TUBE	95	TAPE N REEL	2500

**Table 18. Immediate pack method(s) for Molded Plastic Small Outline (SOP) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
M14A	RAIL/TUBE	55	TAPE N REEL	2500
M14B	RAIL/TUBE	50	TAPE N REEL	1000
M14D	RAIL/TUBE	47	TAPE N REEL	2000
M16A	RAIL/TUBE	48	TAPE N REEL	2500
M16B	RAIL/TUBE	45	TAPE N REEL	1000
M16D	RAIL/TUBE	47	TAPE N REEL	2000
M20B	RAIL/TUBE	36	TAPE N REEL	1000
M20D	RAIL/TUBE	38	TAPE N REEL	2000
M24B	RAIL/TUBE	30	TAPE N REEL	1000
M24D	RAIL/TUBE	32	TAPE N REEL	2000
M28B	RAIL/TUBE	26	TAPE N REEL	1000
M40A	RAIL/TUBE	30		

**Table 19. Immediate pack method(s) for Molded Plastic Shrink Small Outline (SSOP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MEB36	RAIL/TUBE	30		
MEB44	RAIL/TUBE	26		
MEC34	RAIL/TUBE	26	TAPE N REEL	1000
MQA16	RAIL/TUBE	94	TAPE N REEL	2500
MQA20	RAIL/TUBE	54	TAPE N REEL	2500
MQA24	RAIL/TUBE	54	TAPE N REEL	2500
MSA20	RAIL/TUBE	66	TAPE N REEL	2000
MSA24	RAIL/TUBE	58	TAPE N REEL	2000
MSA28	RAIL/TUBE	47	TAPE N REEL	2000
MSC14	TAPE N REEL	2000		
MSC16	TAPE N REEL	2000		
MSC20	TAPE N REEL	2000		
MS40A	RAIL/TUBE	34	TAPE N REEL	1000
MS48A	RAIL/TUBE	29	TAPE N REEL	1000
MS56A	RAIL/TUBE	25	TAPE N REEL	1000

**Table 20. Immediate pack method(s) for Molded Plastic Thin Shrink Small Outline (TSSOP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MTA20	TRAY	150	TAPE N REEL	2500
MTC08	RAIL/TUBE	100	TAPE N REEL	2500
MTC14	RAIL/TUBE	94	TAPE N REEL	2500
MTC16	RAIL/TUBE	94	TAPE N REEL	2500
MTC20	RAIL/TUBE	73	TAPE N REEL	2500
MTC24	RAIL/TUBE	61	TAPE N REEL	2500
MTC28	RAIL/TUBE	48	TAPE N REEL	2500
MTD48	RAIL/TUBE	38	TAPE N REEL	1000
MTD56	RAIL/TUBE	34	TAPE N REEL	1000
MTD64	RAIL/TUBE	28	TAPE N REEL	1000

**Table 20. Immediate pack method(s) for Molded Plastic Thin Shrink Small Outline (TSSOP) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MTE28	RAIL/TUBE	49		
MXA20A	RAIL/TUBE	73	TAPE N REEL	2500
MXA28A	RAIL/TUBE	48	TAPE N REEL	2500

**Table 21. Immediate pack method(s) for Molded Plastic Thin Small Outline (TSOP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
MBH32A	TRAY	156		
MDA44	TRAY	135	TAPE N REEL	1000
MDB44	TRAY	135		

**Table 22. Immediate pack method(s) for Plastic Molded Dual-In-Line (Mdip) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
NA24F	RAIL/TUBE	12		
NA24G	RAIL/TUBE	15		
NA28F	RAIL/TUBE	13		
NA32A	RAIL/TUBE	11		
NA40A	RAIL/TUBE	9		
N08D	RAIL/TUBE	40		
N08E	RAIL/TUBE	40		
N10A	RAIL/TUBE	30		
N14A	RAIL/TUBE	25		
N14B	RAIL/TUBE	25		
N16A	RAIL/TUBE	20		
N16E	RAIL/TUBE	25		
N16F	RAIL/TUBE	20		
N16G	RAIL/TUBE	20		
N18A	RAIL/TUBE	20		
N20A	RAIL/TUBE	18		
N20B	RAIL/TUBE	18		
N22A	RAIL/TUBE	15		
N22B	RAIL/TUBE	15		
N24A	RAIL/TUBE	15		
N24A-Q	RAIL/TUBE	15		
N24C	RAIL/TUBE	15		
N24D	RAIL/TUBE	15		
N24E	RAIL/TUBE	15		
N28B	RAIL/TUBE	13		
N28C	RAIL/TUBE	13		
N40A	RAIL/TUBE	9		
N48A	RAIL/TUBE	7		

**Table 23. Immediate pack method(s) for Plastic Molded TO-202 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
P03A	BULK	300		
P03B	BULK	300		
P03C	BULK	300		
P03D	BULK	300		
P03E	BULK	300		
P03F	BULK	300		
P03G	BULK	300		
P03H	BULK	300		
P03J	BULK	300		
P03K	BOX	300		
P04A	RAIL	45	BULK	300
P11A	RAIL	16		

**Table 24. Immediate pack method(s) for Plastic Molded TO-226/237 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
RC03A	BOX	1500		
RC03B	BOX	1500		
RC03C	BOX	1500		
R03A	BOX	1800		
R03B	BOX	1800		
R03C	BOX	1800		
R03D	BOX	1800		

**Table 25. Immediate pack method(s) for Laminate Plastic Chip Scale (CSP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
SLB16A	TAPE N REEL	2500		
SLB20A	TAPE N REEL	2500		
SLB24A	TAPE N REEL	2500		

**Table 26. Immediate pack method(s) for Wafer Level Chip Scale (CSP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
SWA08A	TAPE N REEL	3000	TAPE N REEL	250

**Table 27. Immediate pack method(s) for Plastic Molded TO-220/263 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
TA02A	RAIL/TUBE	45		
TA03A	RAIL/TUBE	45		
TA03F	RAIL/TUBE	45		
TA03D	RAIL/TUBE	45	TAPE N REEL	500
TA03G	RAIL/TUBE	45	TAPE N REEL	500

**Table 27. Immediate pack method(s) for Plastic Molded TO-220/263 Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
TA03H	RAIL/TUBE	45		
TA05A	RAIL/TUBE	45	TAPE N REEL	500
TA05B	RAIL/TUBE	45		
TA05D	RAIL/TUBE	45	TAPE N REEL	500
TA07A	RAIL/TUBE	45		
TA07B	RAIL/TUBE	45		
TA07D	RAIL/TUBE	45		
TA11A	RAIL/TUBE	20		
TA11B	RAIL/TUBE	20		
TA11C	RAIL/TUBE	20		
TA11D	RAIL/TUBE	20		
TA11E	RAIL/TUBE	23		
TA12A	RAIL/TUBE	13		
TA15A	RAIL/TUBE	20		
TA15B	RAIL/TUBE	20		
TA15C	RAIL/TUBE	20		
TA15D	RAIL/TUBE	23		
TA23A	RAIL/TUBE	15		
TA9A	RAIL/TUBE	45		
TD03B	RAIL/TUBE	75	TAPE N REEL	500
TF11A	RAIL/TUBE	20		
TF11B	RAIL/TUBE	20		
TF15A	RAIL/TUBE	20		
TF15B	RAIL/TUBE	20		
TS11A	RAIL/TUBE	22		
TS11B	RAIL/TUBE	22	TAPE N REEL	500
TS15B	RAIL/TUBE	22	TAPE N REEL	500
TS3A	RAIL/TUBE	45		
TS3B	RAIL/TUBE	45	TAPE N REEL	500
TS5A	RAIL/TUBE	45		
TS5B	RAIL/TUBE	45	TAPE N REEL	500
TS7A	RAIL/TUBE	45	TAPE N REEL	500
TS7B	RAIL/TUBE	45	TAPE N REEL	500
TS9A	RAIL/TUBE	45	TAPE N REEL	500
T03A	RAIL/TUBE	45		
T03B	RAIL/TUBE	45		
T03D	RAIL/TUBE	45		
T03F	RAIL/TUBE	45	TAPE N REEL	500
T05A	RAIL/TUBE	45		
T05B	RAIL/TUBE	45		
T05D	RAIL/TUBE	45		
T05E	RAIL/TUBE	45		
T05F	RAIL/TUBE	45		



**Table 28. Immediate pack method(s) for Plastic Molded Tape Pak (TP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
TP40A	RAIL/TUBE	25	RAIL/TUBE	100
TP84A	RAIL/TUBE	12	RAIL/TUBE	100

**Table 29. Immediate pack method(s) for Plastic Molded Pin Grid Array (PPGA) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
UP68A	TRAY	42		
UP68B	TRAY	42		
UP84A	TRAY	35		
UP84B	TRAY	35		
UP124A	TRAY	30		
UP144A	TRAY	20		
UP175A	TRAY	20		
UP302A	TRAY	20		

**Table 30. Immediate pack method(s) for Ceramic Pin Grid Array (CPGA) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
UA65A	TRAY	42		
UA101A	TRAY	20		
UA225A	TRAY	12		
UA296A	TRAY	10		
UA302A	TRAY	12		
UA319A	TRAY	12		
UA320A	TRAY	10		
U109A	TRAY	25		
U120B	TRAY	25		
U120C	TRAY	30		
U121A	TRAY	30		
U124A	TRAY	30		
U124C	TRAY	30		
U132A	TRAY	30		
U132B	TRAY	30		
U143A	TRAY	20		
U143B	TRAY	20		
U144A	TRAY	20		
U149A	TRAY	20		
U156A	TRAY	20		
U156B	TRAY	20		
U169A	TRAY	12		
U169B	TRAY	12		
U172A	TRAY	20		
U172B	TRAY	20		
U173A	TRAY	20		
U175A	TRAY	20		

**Table 30. Immediate pack method(s) for Ceramic Pin Grid Array (CPGA) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
U180A	TRAY	20		
U223A	TRAY	20		
U224A	TRAY	20		
U257A	TRAY	12		
U259A	TRAY	12		
U299A	TRAY	12		
U301A	TRAY	12		
U303A	TRAY	12		
U323A	TRAY	12		
U44A	TRAY	80		
U68A	TRAY	42		
U68B	TRAY	42		
U68C	TRAY	42		
U68D	TRAY	42		
U68E	TRAY	42		
U68F	TRAY	42		
U68G	TRAY	42		
U75A	TRAY	35		
U84A	TRAY	42		
U84B	TRAY	42		
U84C	TRAY	25		
U84D	TRAY	25		
U84E	TRAY	35		
U99A	TRAY	25		

**Table 31. Immediate pack method(s) for Plastic Molded Ball Grid Array (PBGA) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
UBA169A	TRAY	60		
UBA225A	TRAY	40		
UBA225B	TRAY	40		
UBD316A	TRAY	40		
UCA313	TRAY	24		
UCA313A	TRAY	24		
UCB388A	TRAY	24		
UCC352A	TRAY	24		
UCH352B	TRAY	24		
UDB168A	TRAY	60		
UDC208A	TRAY	60		

**Table 32. Immediate pack method(s) for Plastic Molded Quad Flatpack (PQFP/MQFP/TQFP) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
VBE32A	TRAY	250	TAPE N REEL	1000

**Table 32. Immediate pack method(s) for Plastic Molded Quad Flatpack (PQFP/MQFP/TQFP)  
Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
VBG48A	TRAY	250		
VBH48A	TRAY	250	TAPE N REEL	1000
VCC80A	TRAY	66		
VCE100A	TRAY	66		
VCG100A	TRAY	66		
VEF44A	TRAY	96		
VEG52A	TRAY	160	TAPE N REEL	1000
VEH64A	TRAY	160	TAPE N REEL	1000
VEJ44A	TRAY	160	TAPE N REEL	1000
VEV64A	TRAY	160	TAPE N REEL	1000
VF132A	TRAY	36		
VF196A	TRAY	21		
VGB52A	TRAY	96		
VGZ44A	TRAY	96	TAPE N REEL	1000
VHB80A	TRAY	119		
VHG80A	TRAY	119	TAPE N REEL	1000
VJC44A	TRAY	84		
VJD100A	TRAY	90		
VJE80A	TRAY	84		
VJG100A	TRAY	90		
VJH80A	TRAY	90		
VJK64A	TRAY	90		
VJL52A	TRAY	84		
VJM52A	TRAY	84		
VJP44A	TRAY	84		
VJQ64A	TRAY	84		
VJU100A	TRAY	84		
VJY128A	TRAY	90		
VJZ60A	TRAY	84	TAPE N REEL	500
VLA128A	TRAY	66		
VLC80B	TRAY	66		
VLG80A	TRAY	66		
VLJ100A	TRAY	66		
VLK100A	TRAY	66		
VLW128A	TRAY	66		
VNG144A	TRAY	60		
VPC176A	TRAY	40		
VQB120A	TRAY	24		
VQB160A	TRAY	24		
VQD120A	TRAY	24		
VQG160A	TRAY	24		
VQK208A	TRAY	24		
VQL160A	TRAY	24		
VQY144A	TRAY	24		
VQZ120A	TRAY	24		

**Table 32. Immediate pack method(s) for Plastic Molded Quad Flatpack (PQFP/MQFP/TQFP) Package (continued)**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
VUF208A	TRAY	24		
VUH208A	TRAY	36		
VUL160A	TRAY	24		
VUM208A	TRAY	24		
VUW208A	TRAY	24		
VUY144A	TRAY	24		
VUZ120A	TRAY	24		
VYC304A	TRAY	12		

**Table 33. Immediate pack method(s) for Plastic Molded Lead Chip Carrier (PLCC) Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
V20A	RAIL	40	TAPE N REEL	1000
V28A	RAIL	35	TAPE N REEL	750
V32A	RAIL	30	TAPE N REEL	750
V44A	RAIL	25	TAPE N REEL	500
V52A	RAIL	22	TAPE N REEL	500
V68A	RAIL	18	TAPE N REEL	250
V84A	RAIL	15	TAPE N REEL	250

**Table 34. Immediate pack method(s) for Plastic Molded TO-92 Package**

Package Marketing Outline Drawing	Primary Immediate Container		Secondary/Alternate Immediate Container	
	Method	Quantity	Method	Quantity
Z03A	BOX	1800	TAPE N REEL	2000
Z03B	BOX	1800	TAPE N REEL	2000
Z03C	BOX	1800	TAPE N REEL	2000
Z03D	BOX	1500	TAPE N REEL	2000
Z03E	BOX	1800	TAPE N REEL	2000
Z03G	BOX	1800	TAPE N REEL	2000
Z03J	BOX	1800	TAPE N REEL	2000

## 4.2 Labeling

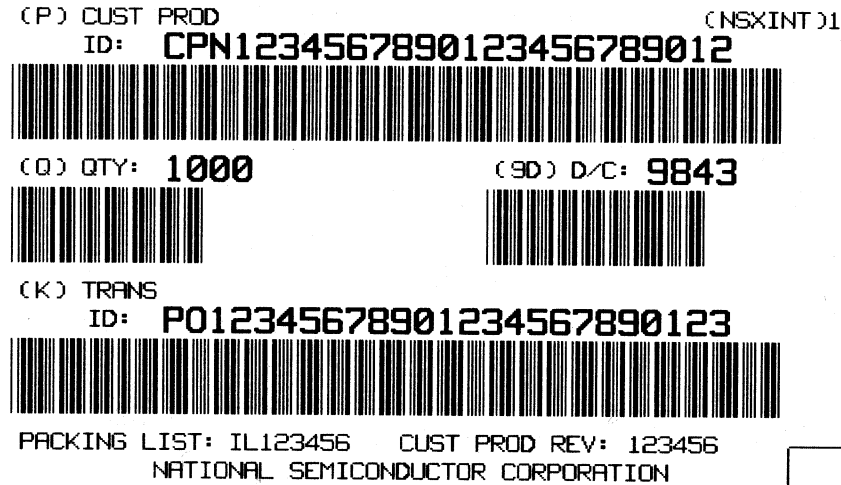
National Semiconductor offers 3 standard bar code labels; reel and intermediate container labels for Tape and Reel; intermediate container label other than for Tape and Reel; and outer/shipping container labels. The tape and reel, and intermediate container labels are National's own format while the outer/shipping container label is based on the EIA-556-A label standard.



NSC Standard Tape and Reel Label

This label is placed on the reel (immediate container) as well as on the intermediate box.

**Figure 1. NSC Standard Intermediate Container Label**



**Figure 2. NSC Standard Outer/Shipping Container Label**



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