

Plastic Packages

National Semiconductor offers a wide variety of plastic packages for through-hole and surface mount applications. Many of these plastic packages provide cost-effective solutions to achieving greater board density (surface-mount packages) and high performance. Plastic packages are extensively used in commercial applications.

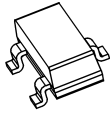
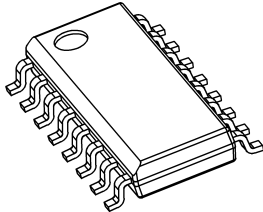
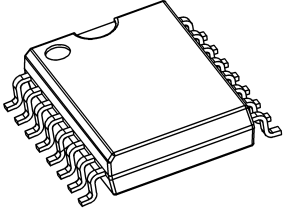
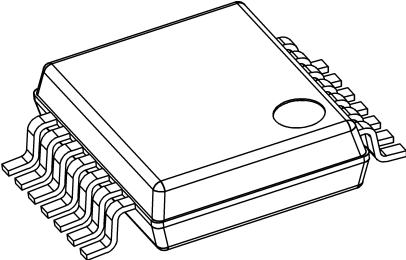
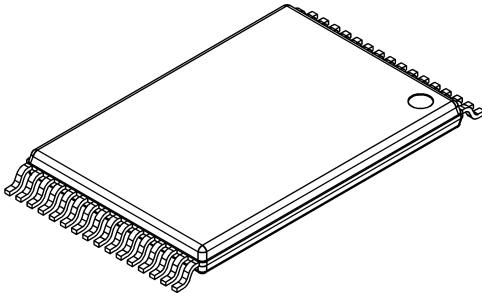
Today National offers molded plastic packages. The primary materials used in a plastic package are a leadframe, die attach material, bond wire, mold compound and a lead finish. In order to provide plastic package solutions which do not sacrifice reliability or functionality, National continues to improve on the materials used, whether focusing on leadframe composition for increased thermal conductivity or low stress mold compound used for large die applications or low moisture absorption mold compounds for improved reliability.

National offers through hole DIP configurations in the molded dual-in-line package (MDIP) style. Other through hole package styles include the plastic pin grid array (PPGA) packages and various plastic TOs.

Many plastic surface mount packages are offered by National. Various plastic TO packages are formed for surface mount application (TO-263). Dual-in-line packages such as the small outline package (SOP), the shrink small outline package (SSOP), the thin small outline package (TSOP) and the thin shrink small outline package (TSSOP) are available in lower lead counts. Applications requiring higher density and increased lead count use quad packages such as the plastic leaded chip carrier (PLCC), the plastic quad flatpak (PQFP) and the thin plastic quad pack package (TQFP).

Recent improvements in the surface mount packages include exposed pad thin packages for improved thermal and electrical performance. These packages have the same footprint as the standard thin packages. Other improvements include the introduction of the small body size packages such as the SOT-23, SOT-223 and the SC-70 package outlines

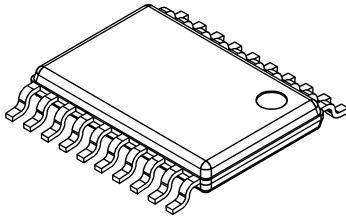
The following table provides configuration and characteristic data regarding each of the plastic package offered by National.

Package Configuration	Package Characteristics
<p data-bbox="370 170 711 226">Plastic Small Outline Transistor (SOT-23)</p> 	<ul data-bbox="889 195 1219 321" style="list-style-type: none"> • Surface Mount Package • Gull Wing Lead Configuration • Solder Plate Lead Finish • Molded Package
<p data-bbox="378 380 703 436">Plastic Small Outline Package (SOP)</p>  <p data-bbox="467 678 613 705">Narrow Body</p>  <p data-bbox="480 942 600 970">Wide Body</p>	<ul data-bbox="889 384 1518 604" style="list-style-type: none"> • Surface Mount Package • Gull Wing Lead Configuration • Solder Plate Lead Finish • Molded Package • EIAJ and JEDEC Package Styles • Footprint Compatible with Ceramic Small Outline Package (SOIC)
<p data-bbox="337 978 740 1035">Plastic Shrink Small Outline Package (SSOP)</p> 	<ul data-bbox="889 1062 1260 1220" style="list-style-type: none"> • Surface Mount Package • Gull Wing Lead Configuration • Solder Plate Lead Finish • Molded Package • EIAJ and JEDEC Package Styles
<p data-bbox="313 1339 768 1396">Plastic Thin Small Outline Package, Type I (TSOP)</p> 	<ul data-bbox="889 1434 1219 1591" style="list-style-type: none"> • Surface Mount Package • Gull Wing Lead Configuration • Solder Plate Lead Finish • Molded Package • EIAJ Package Style

Package Configuration

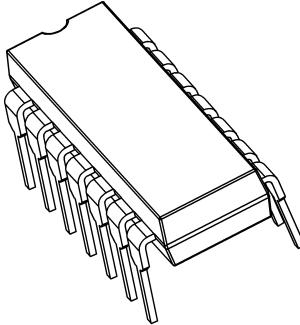
Package Characteristics

Plastic Thin Shrink Small Outline Package (TSSOP)



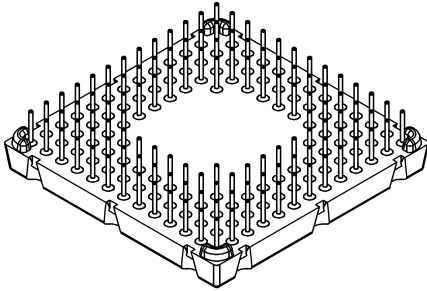
- Surface Mount Package
- Gull Wing Lead Configuration
- Solder Plate Lead Finish
- Molded Package
- EIAJ Package Styles

Molded Dual-In-Line Package (MDIP)



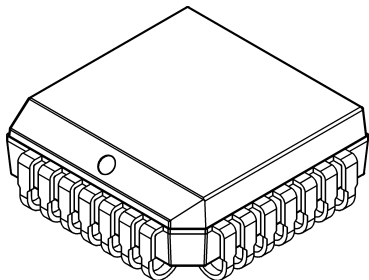
- Through Hole Package
- Solder Plate or Solder Dip Lead Finish
- Molded Package
- Footprint Compatible with Ceramic Sidebraced Dual-In-Line Package (SB and Cerdip)
- Can be Thermally Enhanced
- Half Lead Package Option

Plastic Pin Grid Array (PPGA)

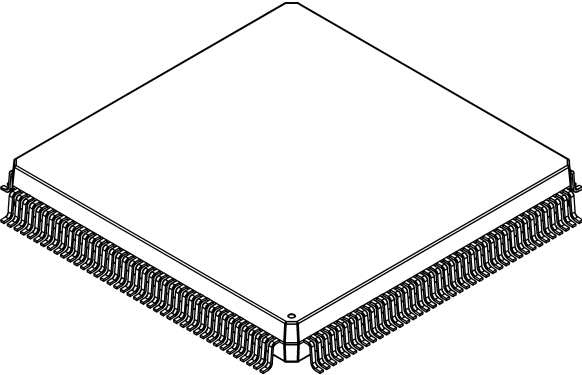
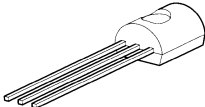
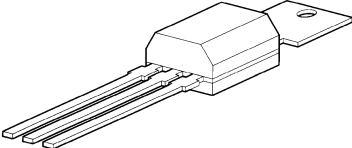
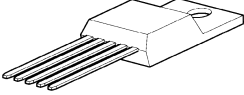
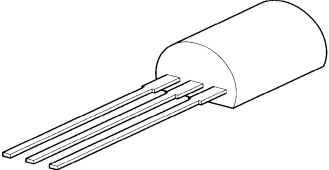
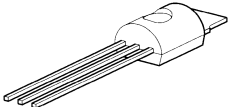


- Through Hole Package
- Solder DIP Lead Finish
- Molded Package
- Footprint Compatible CPGA

Plastic Leaded Chip Carrier (PLCC)



- Surface Mount Package
- J-Bend Lead Configuration
- Solder Plate Lead Finish
- Molded Package
- Footprint Compatible with Ceramic Leadless Chip Carrier (LCC) and Ceramic Quad J-Bend (CQJB)
- Can be Thermally Enhanced

Package Configuration	Package Characteristics
<p data-bbox="428 163 651 218" style="text-align: center;">Plastic Quad Flatpak (PQFP)</p> 	<ul style="list-style-type: none"> • Surface Mount Package • Gull Wing Lead Configuration • Solder Plate Lead Finish • Molded Package • Can be Thermally Enhanced • High Density Package Application
<p data-bbox="505 634 574 657" style="text-align: center;">TO-92</p> 	<ul style="list-style-type: none"> • Through Hole Package • Solder Plate Lead Finish • Molded Plastic Package
<p data-bbox="500 802 579 825" style="text-align: center;">TO-202</p> 	<ul style="list-style-type: none"> • Through Hole Package or Chassis Mounting • Solder Plate Lead Finish • Molded Plastic Package
<p data-bbox="500 1012 579 1035" style="text-align: center;">TO-220</p> 	<ul style="list-style-type: none"> • Through Hole Package or Chassis Mounting • Solder Plate Lead Finish • Molded Plastic Package • Designed with Heat Sink for High Power Applications
<p data-bbox="500 1190 579 1213" style="text-align: center;">TO-226</p> 	<ul style="list-style-type: none"> • Through Hole Package • Solder Plate Lead Finish • Molded Plastic Package
<p data-bbox="500 1417 579 1440" style="text-align: center;">TO-237</p> 	<ul style="list-style-type: none"> • Through Hole Package • Solder Plate Lead Finish • Molded Plastic Package

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