

## Process Highlights

- ▶ Die attach: 55  $\mu\text{m}$  thin die pick up capability
- ▶ Plating: 100% matte-Sn
- ▶ Roughened copper leadframe with selective Ag
- ▶ Interconnect: Cu clip technology for better thermal and electrical performance

## New Developments

- ▶ Wettable flank option available and well suited to the automotive market
- ▶ Package available with dual exposed heatsink options
- ▶ Thin wafer dicing with narrow saw streets

# PQFN

The PQFN (Power Quad Flat No-lead) is a highly efficient space saving package designed for a wide range of higher power applications. A “Smart Power” option in today’s power electronic world, the PQFN is a step above the standard low-power sawn QFN package, while being more flexible (IC control die integrated designs) than other power discrete packages.

This package features:

- ▶ Very low parasitics and inductances resulting in world class package level RDS(on)
- ▶ Outstanding EMI behavior and excellent thermal performance
- ▶ Space saving designs ranging from 3 x 3 mm to 8 x 8 mm
- ▶ Numerous multi-die, multi-clip with wire variations available
- ▶ Capable of supporting numerous GaN applications/solutions
- ▶ Green materials: Pb-free plating and halogen free mold compound

## Applications

PQFN is suitable for medium power applications, designed for low on-resistance and high-speed switching MOSFETs:

- ▶ Servers
- ▶ Portable electronic devices
- ▶ Notebook PCs
- ▶ Automotive
- ▶ Telecom
- ▶ Light Electric Vehicles (LEV)
- ▶ Battery management
- ▶ IoT

## Test Service

Amkor offers full turnkey business for all power products, with the capability to test various types of power devices including MOSFETs, bipolar transistors, IGBTs, diodes and regulator ICs/intelligent power devices

- ▶ Amkor power test systems:
  - ▷ ETS88
  - ▷ ETS364
  - ▷ ETS800
  - ▷ PowerTech (typically targeted for discrete solutions)
  - ▷ Test Capability examples:
    - » Static test (DC)
    - » Dynamic test (AC, Switching/Trr, Capacitance/Rg)
    - » Destruction test (Inductive load/VISUS, I Latch, Surge, Isolation/VIL)
    - » Thermal Resistance ( $\Delta\text{VDS}$ ,  $\Delta\text{mV}$ , etc.)
- ▶ Program generation/conversion
- ▶ Failure analysis
- ▶ Full complement of handling technology
- ▶ Integrated marking, vision inspection and tape & reel services

# PQFN

## Standard Materials

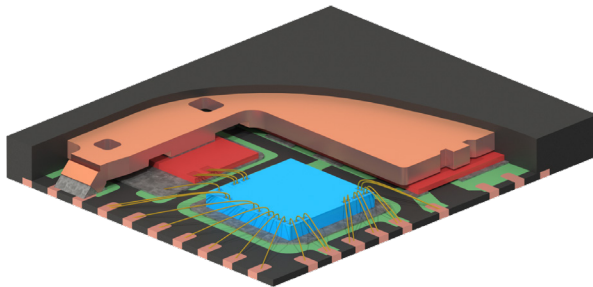
- ▶ Leadframe:
  - ▷ Roughened copper
  - ▷ PPF (pre-plated frame)
- ▶ Die attach:
  - ▷ Solder paste for Power MOSFETs and GaN
  - ▷ Epoxy or die attach film for IC control die
- ▶ Interconnect (3 options):
  - ▷ Copper clip
  - ▷ Multiple Cu wires
  - ▷ Multiple Au wires
- ▶ Mold compound:
  - ▷ Halogen free

## Shipping

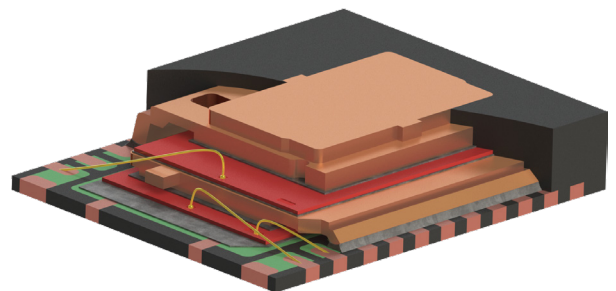
- ▶ Tape and reel packing
- ▶ Tray or canister
- ▶ Barcode packing label
- ▶ Drop ship

## Cross-section

PQFN Single Stack



PQFN Dual Stack



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