Microsemi 1200V NPT IGBTs

March 2013
# Microsemi IGBT Product Line

## Switching Frequency Ranges

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Frequency Ranges (kHz, hard switched)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600V</td>
<td>Field Stop, Thunderbolt® NPT, Thunderbolt® High Speed NPT, Power MOS 8™ PT</td>
</tr>
<tr>
<td>900V</td>
<td>Power MOS 8™ PT</td>
</tr>
<tr>
<td>1200V</td>
<td>Field Stop, Fast NPT, Power MOS 7™ PT, Thunderbolt® NPT, Power MOS 8™ NPT (NEW!)</td>
</tr>
</tbody>
</table>

Note: Frequency ranges shown are typical for a 50A IGBT. Refer to product data sheet max frequency vs. current graph for more information.
1200V NPT IGBTs
Microsemi Power MOS 8™ Technology

The New NPT IGBT Benchmark
*Microsemi Power MOS 8™*

**Fast**
Switching speeds up to 100 kHz!

**Efficient**
13% - 60% lower switching losses than competitors’ IGBTs

**Low Cost Solution**
Microsemi’s new NPT IGBTs can replace 1000V to 1200V MOSFETs in applications up to 100 KHz at lower costs

**Product Family**
- 25A to 85A discrete IGBTs
- Up to 600A modules
## 1200V NPT IGBTs
Microsemi Power MOS 8™ Technology

### IGBT package styles
- D³ PAK
- TO-247
- T-MAX™
- TO-264
- ISOTOP® (SOT-227)
- Modules

### IGBT package options
- Single (IGBT only)
- Combi (IGBT and diode)
- Modules
1200V NPT IGBTs
Microsemi Power MOS 8™ Technology

Discretes and Modules

Features
- Fast switching speeds up to 100 kHz
- Low switching energy losses
- Short Circuit Withstand Time Rated (SCWT)

Benefits
- Improved System Efficiency
- Lower Temperature / Cooler Operation
- Lower cost solution vs. MOSFET up to 100kHz
- Higher Reliability
- Easy to Parallel
1200V NPT IGBTs
Microsemi Power MOS 8™ Technology vs. Competition

Comparison of new Microsemi 1200V NPT IGBT with major competitors

NPT-IGBT 1200V \( E_{TOT} @ 125^\circ C \) vs \( V_{sat} \) (rated currents) for 30 - 50 Amps

Switching Losses (\( uJ/cm^2 \)) @ 125°C
Conduction Losses (\( V \)) @ 25°C

Lower is better

Microsemi APT40GR120B

Competitor B
Competitor A

Discretes and Modules

Power Matters
Markets, Applications, and Customers

Markets
- Solar inverters
- Fast chargers for electric vehicles
- Lasers
- MRI and X-ray
- UPS

Applications
- Switch Mode Power Supplies (SMPS)
- 1200V applications
- 1kW to 10kW of power
- 20kHz to 100kHz high speed switching without the cost of MOSFETs

Customers
- Product designers who value high efficiency
- Product designers who value high reliability
- Product designers who value low cost (designing in NPT IGBT over MOSFET)
Customer Case Study
IGBTs for MRI Gradient Amplifier

Application
Medical: MRI Gradient Amplifier (20kHz Inverter)

Design Goal
Improve system efficiency with new generation IGBT

Customer Options
• Microsemi 1200V NPT IGBT 85A
• Competitor's Trench Field Stop IGBT

Customer Solution
Microsemi's New 1200V NPT IGBT!

Microsemi Advantages
• 6% lower total power loss
• Low $E_{off}$ and $E_{on2}$ for fast switching
• Optimized trade-off of $V_{ce(on)}$ and $E_{off}$
• Optimized trade-off of $Q_{rr}$ and $V_F$
# 1200V NPT IGBTs
Microsemi Power MOS 8™ Product Line

<table>
<thead>
<tr>
<th>BVces</th>
<th>Vce(on)</th>
<th>Ic2</th>
<th>Part Number</th>
<th>Package Style</th>
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<tr>
<td>Volts</td>
<td>Typ 25°C</td>
<td>100°C</td>
<td>50 kHz</td>
<td>80 kHz</td>
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* Ic2 for ISOTOP® packages measured at 70 °C for 1200V NPT IGBTs
**Combis available with Microsemi’s new Ultra Soft FRED
Thank You!