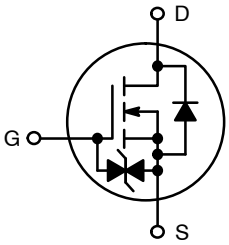
# MOSFET – Power, N-Channel, SUPERFET® III

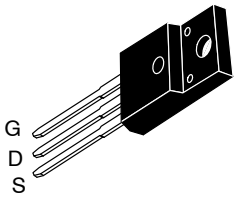
## 800 V, 450 mΩ, 11 A

# NTPF450N80S3Z

| $V_{(BR)DSS}$ | $R_{DS(ON)}$ MAX | $I_D$ MAX |
|---|---|---|
| 800 V | 450 mΩ @ $V_{GS}$ = 10 V | 11 A |

**N−CHANNEL MOSFET**




**TO−220 FULLPAK**
**CASE 221D−03**

### Description

800 V SUPERFET III MOSFET is **onsemi**'s high performance MOSFET family offering 800 V breakdown voltage.

New 800 V SUPERFET III MOSFET which is optimized for primary switch of flyback converter, enables lower switching losses and case temperature without sacrificing EMI performance thanks to its optimized design. In addition, internal Zener Diode significantly improves ESD capability.

This new family of 800 V SUPERFET III MOSFET enables to make more efficient, compact, cooler and more robust applications because of its remarkable performance in switching power applications such as Laptop adapter, Audio, Lighting, ATX power and industrial power supplies.

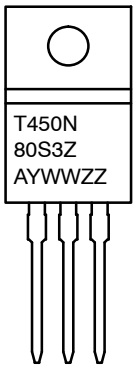
### Features

- Typ. $R_{DS(on)}$ = 380 mΩ
- Ultra Low Gate Charge (Typ. Qg = 19.3 nC)
- Low Stored Energy in Output Capacitance (Eoss = 2.2 μJ @ 400 V)
- 100% Avalanche Tested
- ESD Improved Capability with Zener Diode
- RoHS Compliant

### Applications

- Adapters / Chargers
- LED Lighting
- AUX Power
- Audio
- Industrial Power

**MARKING DIAGRAM**




| | |
|---|---|
| T450N80S3Z | = Specific Device Code |
| A | = Assembly Location |
| YWW | = Data Code (Year & Week) |
| ZZ | = Assembly Lot |

**ORDERING INFORMATION**

See detailed ordering and shipping information on page 2 of this data sheet.

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**MAXIMUM RATINGS** ($T_J$ = 25°C unless otherwise noted)

| Symbol | Parameter | | Value | Unit |
|---|---|---|---|---|
| $V_{DSS}$ | Drain−to−Source Voltage | | 800 | V |
| $V_{GS}$ | Gate−to−Source Voltage | DC | ±20 | V |
| | | AC (f > 1 Hz) | ±30 | V |
| $I_D$ | Drain Current | Continuous ($T_C$ = 25°C) | 11* | A |
| | | Continuous ($T_C$ = 100°C) | 7* | A |
| $I_{DM}$ | Drain Current | Pulsed (Note 1) | 25* | A |
| $E_{AS}$ | Single Pulsed Avalanche Energy (Note 2) | | 32 | mJ |
| $I_{AS}$ | Avalanche Current (Note 2) | | 1.55 | A |
| $E_{AR}$ | Repetitive Avalanche Energy (Note 1) | | 0.295 | mJ |
| dv/dt | MOSFET dv/dt | | 100 | V/ns |
| | Peak Diode Recovery dv/dt (Note 3) | | 10 | V/ns |
| $P_D$ | Power Dissipation | $T_C$ = 25°C | 29.5 | W |
| | | Derate above 25°C | 0.236 | W/°C |
| $T_J$, $T_{stg}$ | Operating Junction and Storage Temperature Range | | −55 to +150 | °C |
| $T_L$ | Lead Temperature for Soldering Purposes (1/8″ from Case for 10 seconds) | | 260 | °C |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

*Drain current limited by maximum junction temperature

1. Repetitive rating: pulse−width limited by maximum junction temperature.
2. $I_{AS}$ = 1.55 A, $R_G$ = 25 Ω, starting $T_J$ = 25°C.
3. $I_{SD}$ ≤ 2.75 A, di/dt ≤ 200 A/μs, $V_{DD}$ ≤ 400 V, starting $T_J$ = 25°C.

**THERMAL CHARACTERISTICS**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance, Junction−to−Case, Max. | 4.23 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction−to−Ambient, Max. | 62.5 | |

**PACKAGE MARKING AND ORDERING INFORMATION**

| Part Number | Top Marking | Package | Packing Method | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|---|
| NTPF450N80S3Z | T450N80S3Z | TO−220F | Tube | N/A | N/A | 1000 Units |



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## ELECTRICAL CHARACTERISTICS

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| $BV_{DSS}$ | Drain−to−Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 1 mA, $T_J$ = 25°C | 800 | – | – | V |
| | | $V_{GS}$ = 0 V, $I_D$ = 1 mA, $T_J$ = 150°C | 900 | – | – | V |
| $\Delta BV_{DSS}/\Delta T_J$ | Drain−to−Source Breakdown Voltage Temperature Coefficient | $I_D$ = 1 mA, Reference to 25°C | – | 1.1 | – | V/°C |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ = 800 V, $V_{GS}$ = 0 V | – | – | 1 | μA |
| | | $V_{DS}$ = 640 V, $T_C$ = 125°C | – | 0.8 | – | |
| $I_{GSS}$ | Gate−to−Source Leakage Current | $V_{GS}$ = ±20 V, $V_{DS}$ = 0 V | – | – | ±1 | μA |
| **ON CHARACTERISTICS** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 0.24 mA | 2.2 | – | 3.8 | V |
| $R_{DS(on)}$ | Static Drain−to−Source On Resistance | $V_{GS}$ = 10 V, $I_D$ = 5.5 A | – | 380 | 450 | mΩ |
| $g_{FS}$ | Forward Transconductance | $V_{DS}$ = 20 V, $I_D$ = 5.5 A | – | 11.8 | – | S |
| **DYNAMIC CHARACTERISTICS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_D$ = 400 V, $V_{GS}$ = 0 V, f = 250 kHz | – | 885 | – | pF |
| $C_{oss}$ | Output Capacitance | | – | 15 | – | |
| $C_{oss(eff.)}$ | Effective Output Capacitance | $V_{DS}$ = 0 V to 400 V, $V_{GS}$ = 0 V | – | 188 | – | |
| $C_{oss(er.)}$ | Energy Related Output Capacitance | | – | 27 | – | |
| $Q_{g(tot)}$ | Total Gate Charge at 10 V | $V_{DS}$ = 400 V, $I_D$ = 5.5 A, $V_{GS}$ = 10 V (Note 4) | – | 19.3 | – | nC |
| $Q_{gs}$ | Gate−to−Source Charge | | – | 4.2 | – | |
| $Q_{gd}$ | Gate−to−Drain “Miller” Charge | | – | 6.6 | – | |
| ESR | Equivalent Series Resistance | f = 1 MHz | – | 4.0 | – | Ω |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DD}$ = 400 V, $I_D$ = 5.5 A, $V_{GS}$ = 10 V, $R_G$ = 4.7 Ω (Note 4) | – | 13.3 | – | ns |
| $t_r$ | Turn−On Rise Time | | – | 6.7 | – | |
| $t_{d(off)}$ | Turn-Off Delay Time | | – | 44.3 | – | |
| $t_f$ | Turn-Off Fall Time | | – | 4.6 | – | |
| **SOURCE−TO−DRAIN DIODE CHARACTERISTICS** | | | | | | |
| $I_S$ | Maximum Continuous Source−to−Drain Diode Forward Current | | – | – | 11 | A |
| $I_{SM}$ | Maximum Pulsed Source−to−Drain Diode Forward Current | | – | – | 25 | A |
| $V_{SD}$ | Source−to−Drain Diode Forward Voltage | $V_{GS}$ = 0 V, $I_{SD}$ = 5.5 A | – | – | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $V_{GS}$ = 0 V, $I_{SD}$ = 2.75 A, $di_F/dt$ = 100 A/μs | – | 170 | – | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | – | 1.5 | – | μC |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. Essentially independent of operating temperature typical characteristics.

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## TYPICAL CHARACTERISTICS

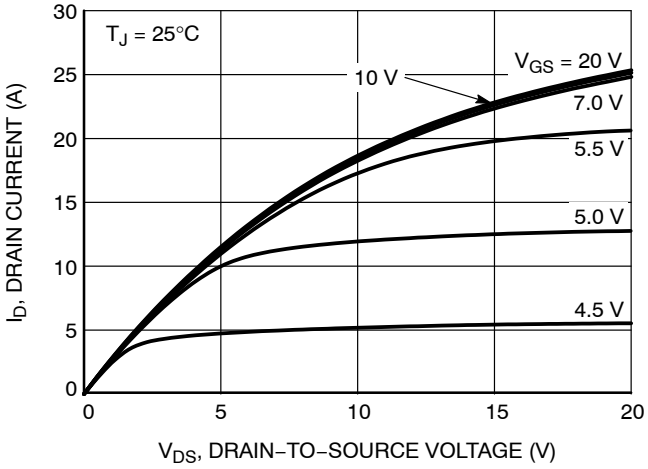



**Figure 1. On−Region Characteristics**

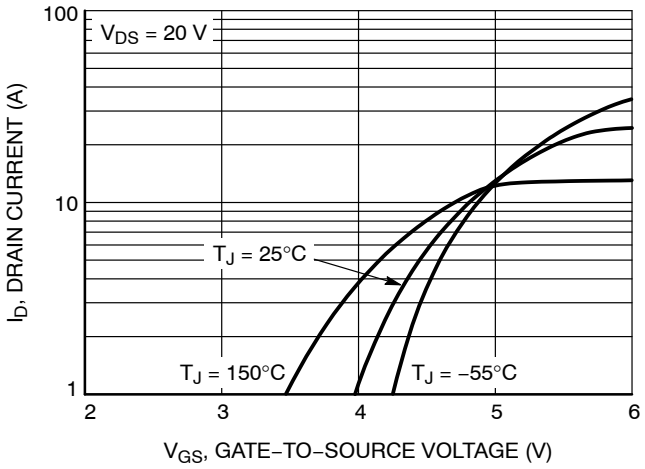



**Figure 2. Transfer Characteristics**

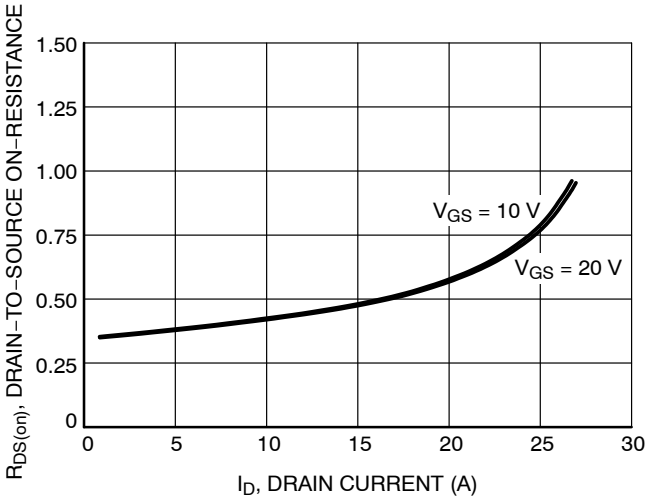



**Figure 3. On Resistance vs. Drain Current**

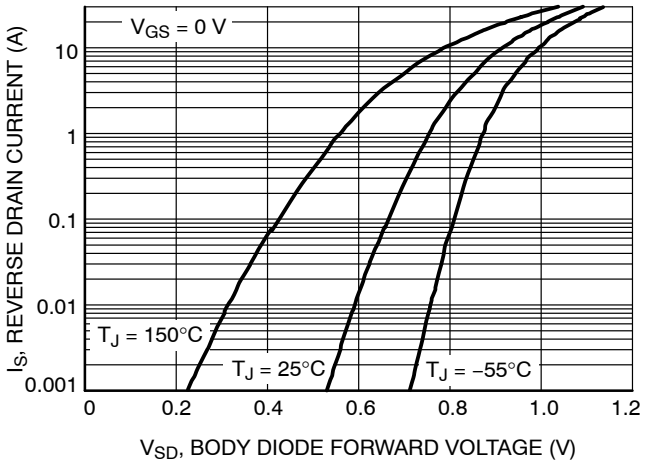



**Figure 4. Diode Forward Voltage vs. Current**

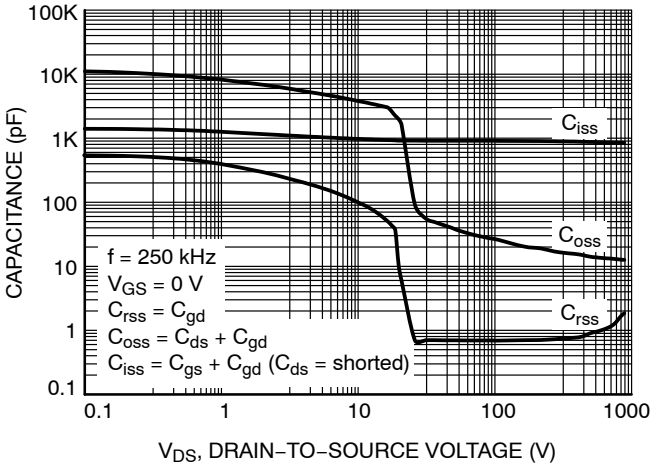



**Figure 5. Capacitance Characteristics**

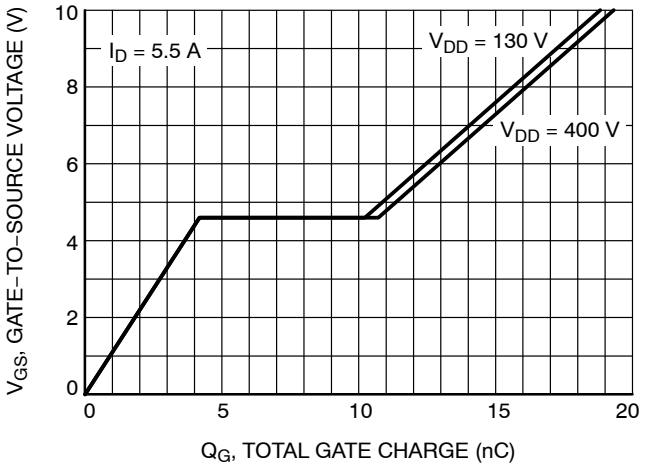



**Figure 6. Gate Charge Characteristics**



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## TYPICAL CHARACTERISTICS

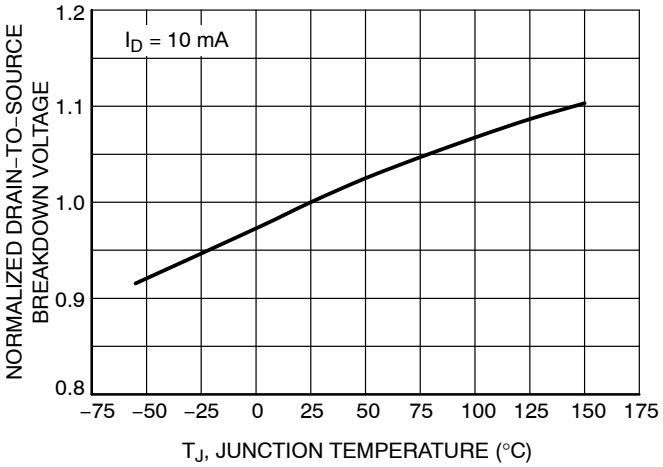



**Figure 7. Normalized $BV_{DSS}$ vs. Temperature**

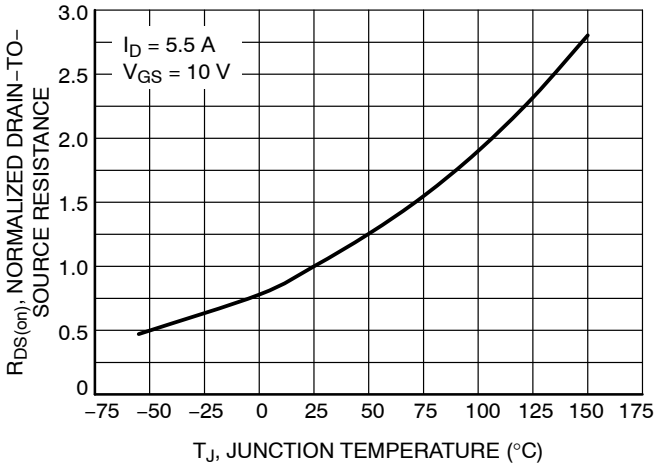



**Figure 8. On−Resistance Variation vs. Temperature**

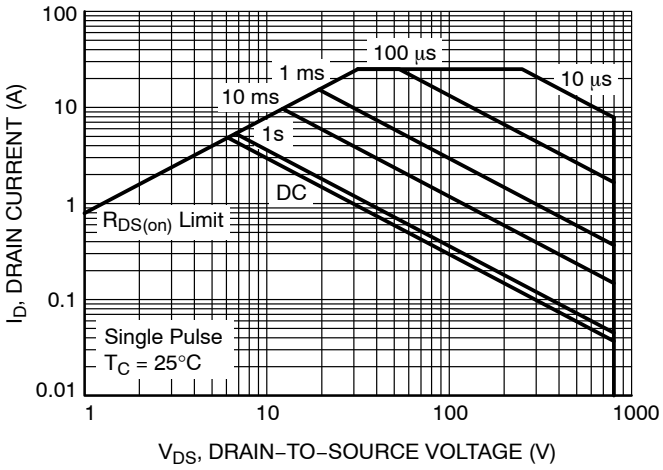



**Figure 9. Safe Operating Area**

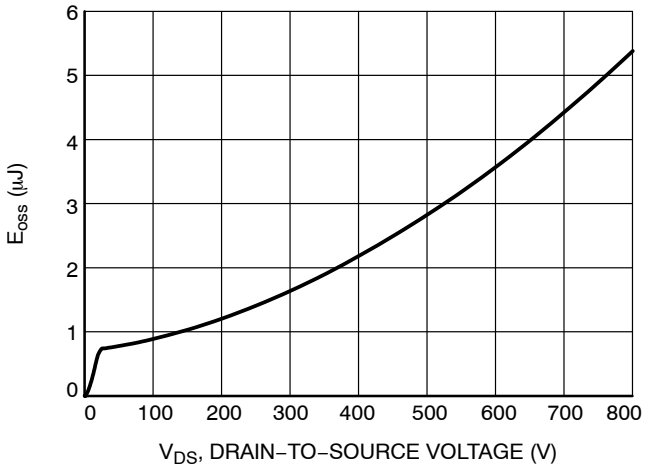



**Figure 10. $E_{oss}$ vs. Drain−to−Source Voltage**

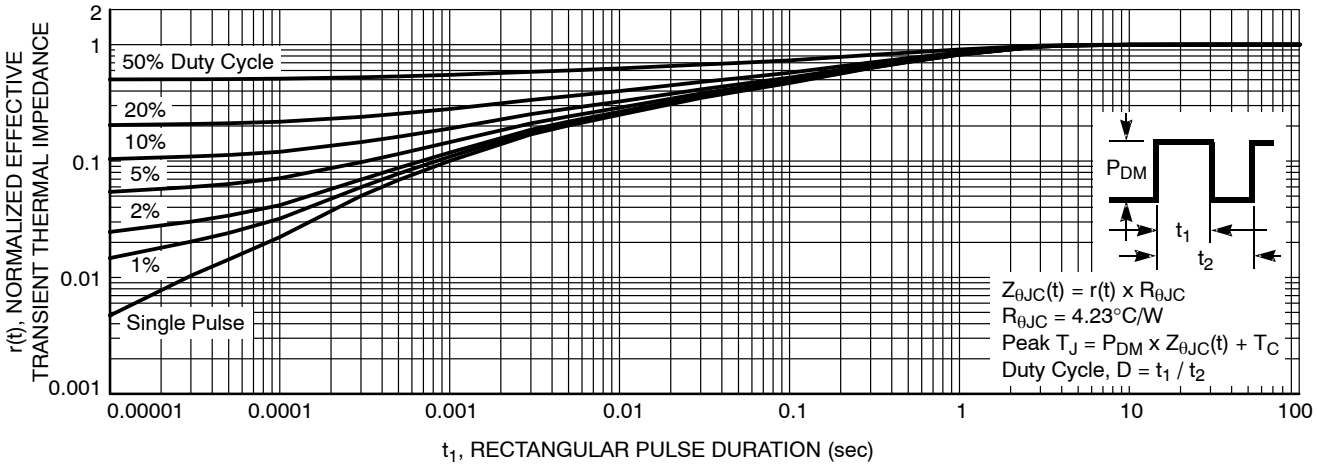



**Figure 11. Transient Thermal Impedance**



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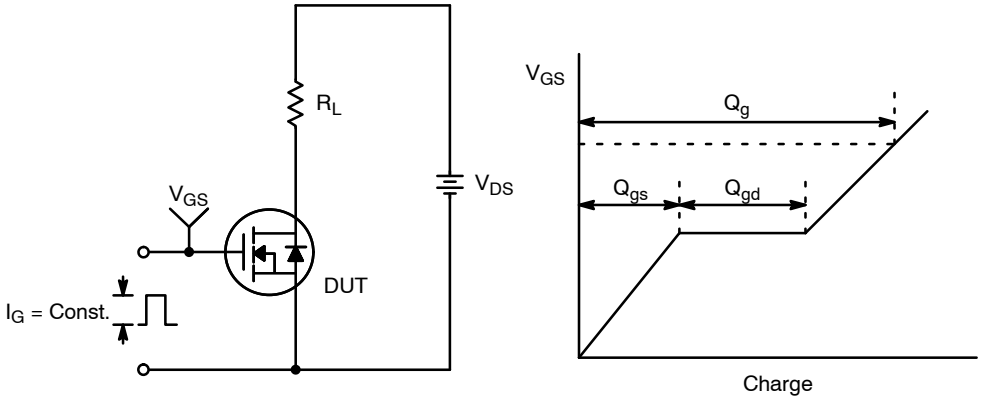



**Figure 12. Gate Charge Test Circuit & Waveform**

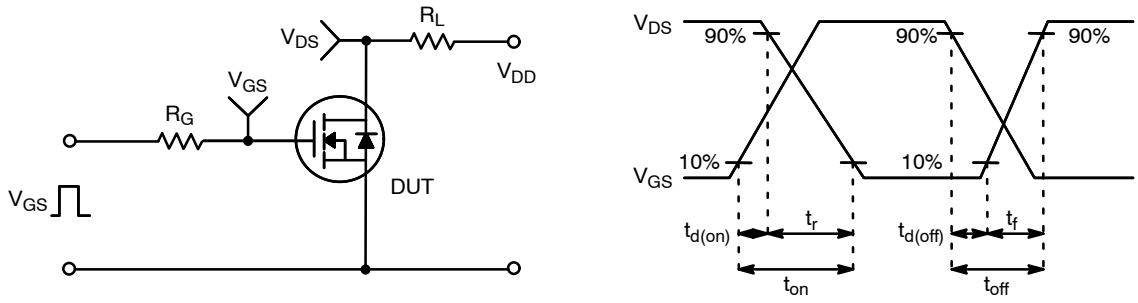



**Figure 13. Resistive Switching Test Circuit & Waveforms**

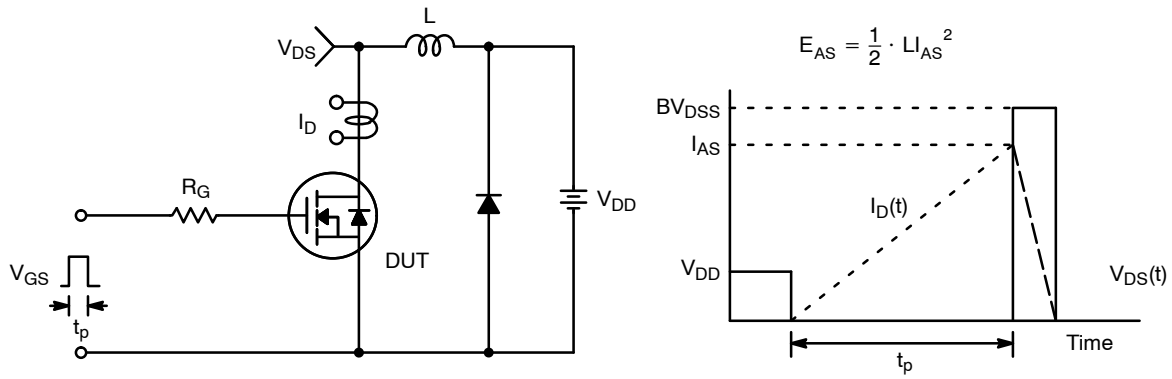



**Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms**



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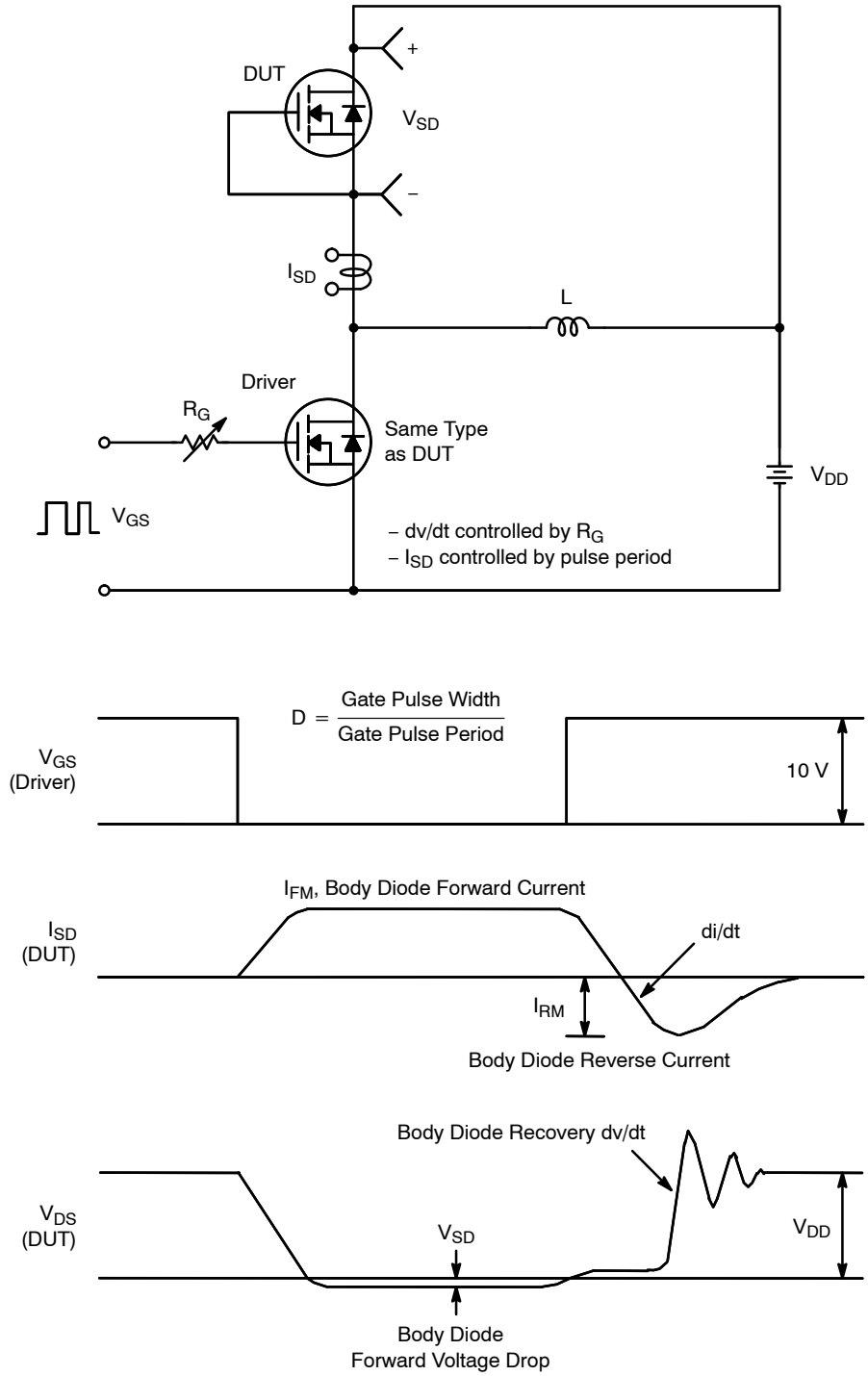
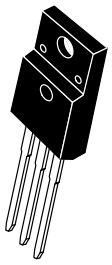



**Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms**

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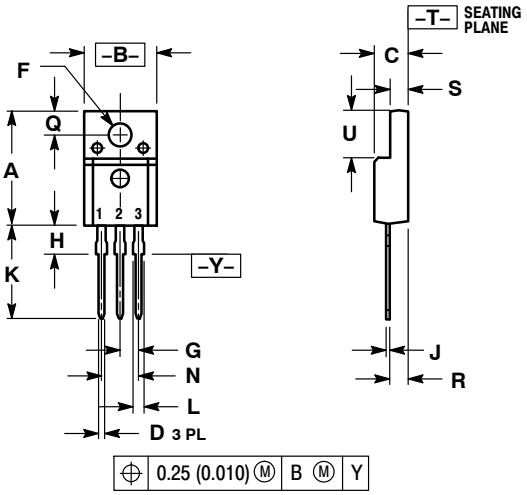
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SCALE 1:1

## TO−220 FULLPAK
CASE 221D−03
ISSUE K

DATE 27 FEB 2009




NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH
3. 221D−01 THRU 221D−02 OBSOLETE, NEW STANDARD 221D−03.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.617 | 0.635 | 15.67 | 16.12 |
| B | 0.392 | 0.419 | 9.96 | 10.63 |
| C | 0.177 | 0.193 | 4.50 | 4.90 |
| D | 0.024 | 0.039 | 0.60 | 1.00 |
| F | 0.116 | 0.129 | 2.95 | 3.28 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.118 | 0.135 | 3.00 | 3.43 |
| J | 0.018 | 0.025 | 0.45 | 0.63 |
| K | 0.503 | 0.541 | 12.78 | 13.73 |
| L | 0.048 | 0.058 | 1.23 | 1.47 |
| N | 0.200 BSC | | 5.08 BSC | |
| Q | 0.122 | 0.138 | 3.10 | 3.50 |
| R | 0.099 | 0.117 | 2.51 | 2.96 |
| S | 0.092 | 0.113 | 2.34 | 2.87 |
| U | 0.239 | 0.271 | 6.06 | 6.88 |

STYLE 1:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 2:
PIN 1. BASE
2. COLLECTOR
3. EMITTER

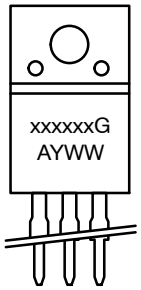
STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE

STYLE 4:
PIN 1. CATHODE
2. ANODE
3. CATHODE

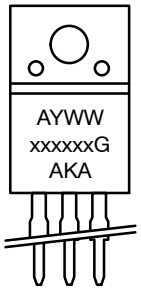
STYLE 5:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 6:
PIN 1. MT 1
2. MT 2
3. GATE

## MARKING DIAGRAMS




**Bipolar**




**Rectifier**

| | |
|---|---|
| xxxxxx | = Specific Device Code |
| G | = Pb−Free Package |
| A | = Assembly Location |
| Y | = Year |
| WW | = Work Week |

| | |
|---|---|
| A | = Assembly Location |
| Y | = Year |
| WW | = Work Week |
| xxxxxx | = Device Code |
| G | = Pb−Free Package |
| AKA | = Polarity Designator |

| | | |
|---|---|---|
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| **DESCRIPTION:** | **TO−220 FULLPAK** | **PAGE 1 OF 1** |

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**onsemi Website:** www.onsemi.com

**ONLINE SUPPORT**: www.onsemi.com/support
**For additional information, please contact your local Sales Representative at** www.onsemi.com/support/sales

ENTEGRECİ

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# Elektronik komponent tedarikinde Entegreci

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### Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

**www.entegreci.com**

### Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

**Kategorilere göz atın**

### Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

**Üreticileri görün**

### Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

**Teklif isteyin**

**www.entegreci.com** | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.