# STD17NF03L
# STD17NF03L-1

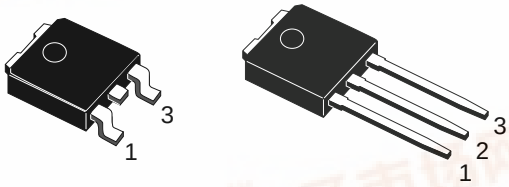
## N-CHANNEL 30V - 0.038Ω - 17A - DPAK/IPAK
## STripFET™II MOSFET

**Table 1: General Features**

| TYPE | $V_{DSS}$ | $R_{DS(on)}$ | $I_D$ |
|---|---|---|---|
| STD17NF03L | 30 V | < 0.05 Ω | 17 A |
| STD17NF03L-1 | 30 V | < 0.05 Ω | 17 A |

- TYPICAL $R_{DS}$(on) = 0.038Ω
- EXCEPTIONAL dv/dt CAPABILITY
- LOW GATE CHARGE AT 100°C
- APPLICATION ORIENTED CHARACTERIZATION
- 100% AVALANCHE TESTED

**Figure 1: Package**

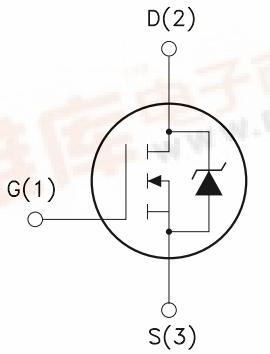



DPAK IPAK

### DESCRIPTION

This MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalance characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

**Figure 2: Internal Schematic Diagram**




### APPLICATIONS

- DC-DC & DC-AC CONVERTERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- HIGH CURRENT, HIGH SPEED SWITCHING
- SOLENOID AND RELAY DRIVERS
- AUTOMOTIVE ENVIRONMENT

**Table 2: Order Codes**

| SALES TYPE | MARKING | PACKAGE | PACKAGING |
|---|---|---|---|
| STD17NF03LT4 | D17NF03L@ | DPAK | TAPE & REEL |
| STD17NF03L-1 | D17NF03L@ | IPAK | TUBE |

**Table 3: Absolute Maximum ratings**

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DS}$ | Drain-source Voltage ($V_{GS}$ = 0) | 30 | V |
| $V_{DGR}$ | Drain-gate Voltage ($R_{GS}$ = 20 kΩ) | 30 | V |
| $V_{GS}$ | Gate- source Voltage | ±16 | V |
| $I_D$ | Drain Current (continuous) at $T_C$ = 25°C | 17 | A |
| $I_D$ | Drain Current (continuous) at $T_C$ = 100°C | 12 | A |
| $I_{DM}$ (●) | Drain Current (pulsed) | 68 | A |
| $P_{TOT}$ | Total Dissipation at $T_C$ = 25°C | 30 | W |
| | Derating Factor | 0.2 | W/°C |
| dv/dt (1) | Peak Diode Recovery voltage slope | 7 | V/ns |
| $E_{AS}$ (2) | Single Pulse Avalanche Energy | 200 | mJ |
| $T_{stg}$ | Storage Temperature | –55 to 175 | °C |
| $T_j$ | Operating Junction Temperature | 175 | °C |

(1) $I_{SD}$ ≤ 17A, di/dt ≤ 300A/µs, $V_{DD}$ ≤ $V_{(BR)DSS}$, $T_j$ ≤ $T_{JMAX.}$.
(2) Starting $T_j$=25°C, $I_D$=8.5A, $V_{DD}$=15V
(●) Pulse width limited by safe operating area

**Table 4: Thermal Data**

| | | | |
|---|---|---|---|
| Rthj-case | Thermal Resistance Junction-case Max | 5.0 | °C/W |
| Rthj-amb | Thermal Resistance Junction-ambient Max | 100 | °C/W |
| $T_l$ | Maximum Lead Temperature For Soldering Purpose | 275 | °C |

**ELECTRICAL CHARACTERISTICS** ($T_{CASE}$ =25°C UNLESS OTHERWISE SPECIFIED)

**Table 5: Off**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-source Breakdown Voltage | $I_D$ = 250 µA, $V_{GS}$ = 0 | 30 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current ($V_{GS}$ = 0) | $V_{DS}$ = Max Rating | | | 1 | µA |
| | | $V_{DS}$= Max Rating, $T_C$= 125°C | | | 10 | µA |
| $I_{GSS}$ | Gate-body Leakage Current ($V_{DS}$ = 0) | $V_{GS}$ = ±16V | | | ±100 | nA |

**Table 6: On**

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA | 1 | 1.5 | 2.2 | V |
| $R_{DS(on)}$ | Static Drain-source On Resistance | $V_{GS}$ = 10V, $I_D$ = 8.5 A | | 0.038 | 0.05 | Ω |
| | | $V_{GS}$ = 5 V, $I_D$ = 8.5 A | | 0.045 | 0.06 | Ω |

## ELECTRICAL CHARACTERISTICS (CONTINUED)

### Table 7: Dynamic

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $g_{fs}$ (1) | Forward Transconductance | $V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D$ =8.5A | | 12 | | S |
| $C_{iss}$<br>$C_{oss}$<br>$C_{rss}$ | Input Capacitance<br>Output Capacitance<br>Reverse Transfer Capacitance | $V_{DS}$ = 25V, f = 1 MHz, $V_{GS}$ = 0 | | 320<br>155<br>28 | | pF<br>pF<br>pF |

### Table 8: Switching On

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(on)}$<br>$t_r$ | Turn-on Delay Time<br>Rise Time | $V_{DD}$ = 15V, $I_D$ = 8.5A<br>$R_G$ = 4.7Ω $V_{GS}$ = 5V<br>(see Figure 16) | | 11<br>100 | | ns<br>ns |
| $Q_g$<br>$Q_{gs}$<br>$Q_{gd}$ | Total Gate Charge<br>Gate-Source Charge<br>Gate-Drain Charge | $V_{DD}$ = 24V, $I_D$ = 17A,<br>$V_{GS}$ = 5V | | 4.8<br>2.25<br>1.7 | 6.5 | nC<br>nC<br>nC |

### Table 9: Switching Off

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $t_{d(off)}$<br>$t_f$ | Turn-off-Delay Time<br>Fall Time | $V_{DD}$ = 15V, $I_D$ = 8.5A,<br>$R_G$=4.7Ω, $V_{GS}$ = 5V<br>(see Figure 16) | | 25<br>22 | | ns<br>ns |
| $t_{r(off)}$<br>$t_f$<br>$t_c$ | Off-voltage Rise Time<br>Fall Time<br>Cross-over Time | Vclamp =24V, $I_D$ =17A<br>$R_G$=4.7Ω, $V_{GS}$ = 5V<br>(see Figure 17) | | 22<br>55<br>75 | | ns<br>ns<br>ns |

### Table 10: Source Drain Diode

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{SD}$ | Source-drain Current | | | | 22 | A |
| $I_{SDM}$ (2) | Source-drain Current (pulsed) | | | | 88 | A |
| $V_{SD}$ (1) | Forward On Voltage | $I_{SD}$ = 17A, $V_{GS}$ = 0 | | | 1.5 | V |
| $t_{rr}$<br>$Q_{rr}$<br>$I_{RRM}$ | Reverse Recovery Time<br>Reverse Recovery Charge<br>Reverse Recovery Current | $I_{SD}$ = 17A, di/dt = 100A/µs,<br>$V_{DD}$ = 15V, $T_j$ = 150°C<br>(see test circuit, Figure 5) | | 28<br>18<br>1.3 | | ns<br>nC<br>A |

(1) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(2) Pulse width limited by safe operating area.

**Figure 3: Safe Operating Area**

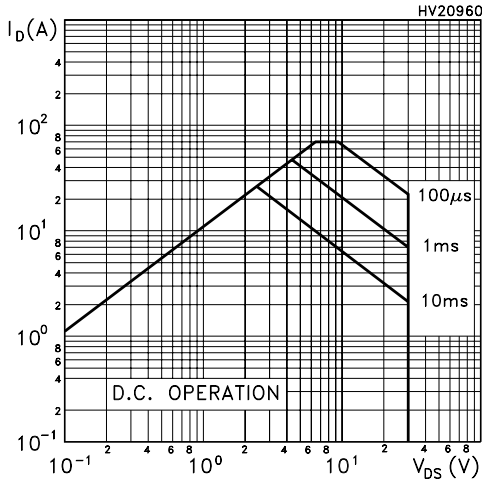



**Figure 4: Output Characteristics**

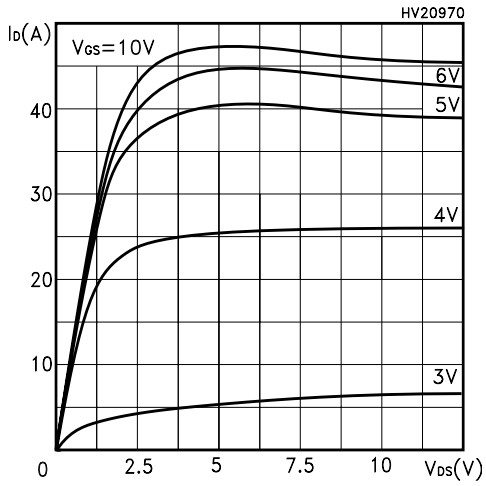



**Figure 5: Transconductance**

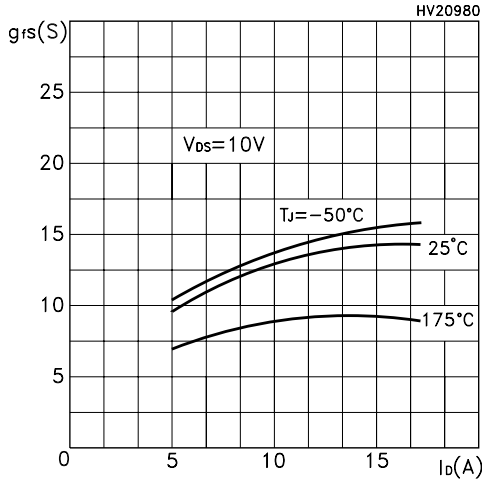



**Figure 6: Thermal Impedance**

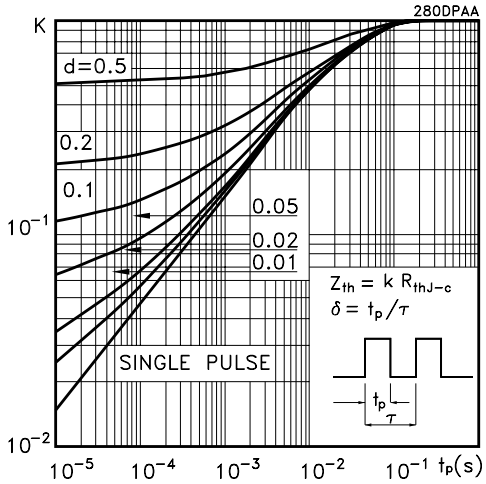



**Figure 7: Transfer Characteristics**

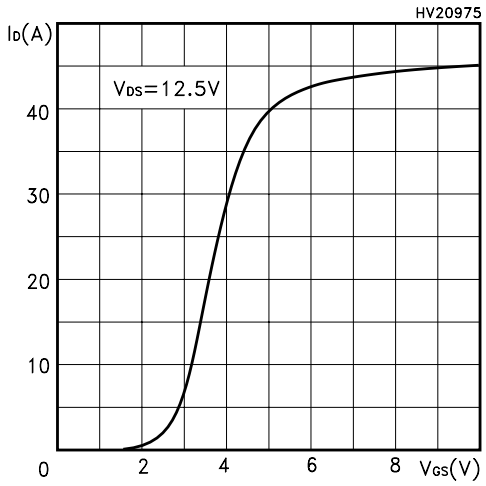



**Figure 8: Static Drain-source On Resistance**

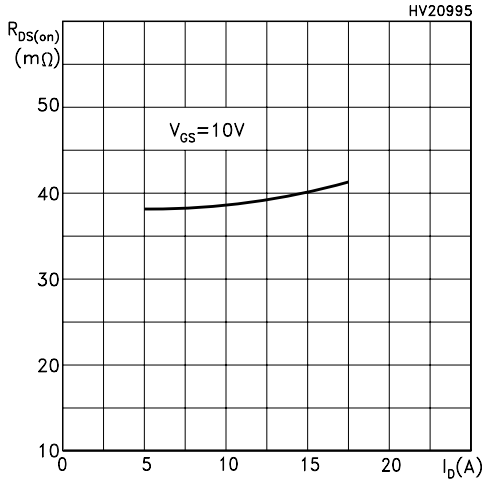


**Figure 9: Gate Charge vs Gate-source Voltage**

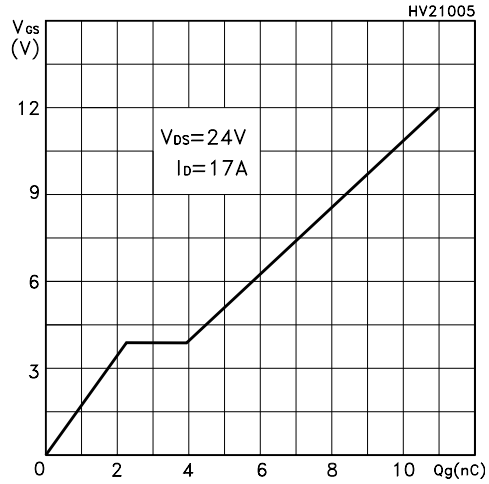



**Figure 10: Normalized Gate Thereshold Voltage vs Temperature**

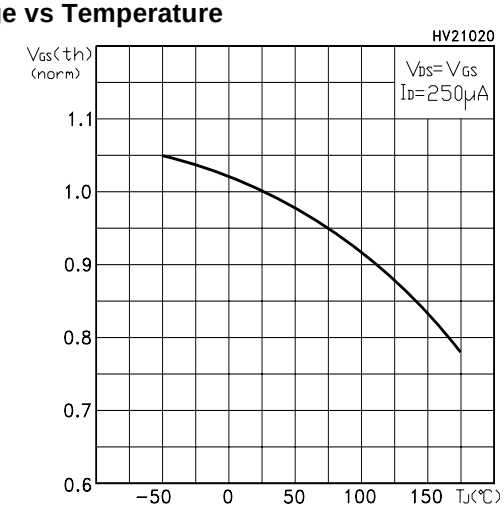



**Figure 11: Source-Drain Diode Forward Characteristics**

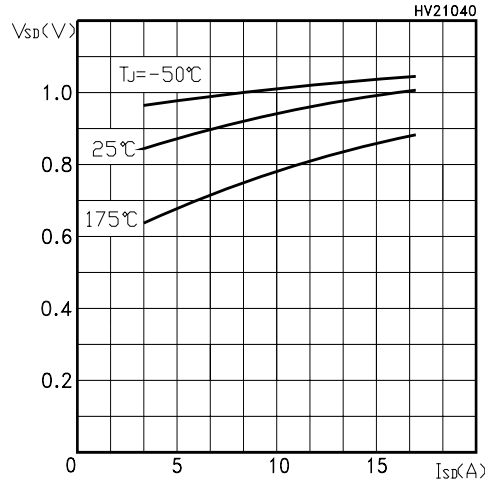



**Figure 12: Capacitance Variations**

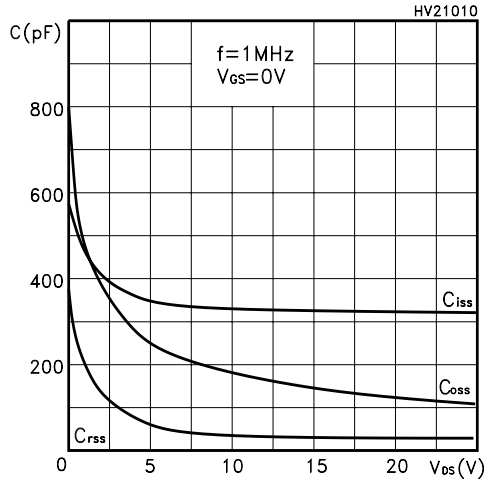



**Figure 13: Normalized On Resistance vs Temperature**

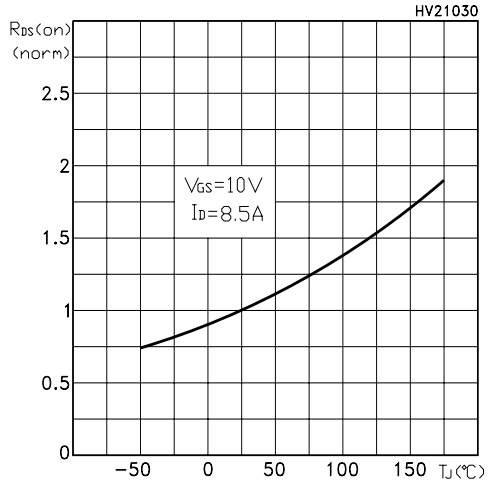



**Figure 14: Normalized Breakdown Voltage vs Temperature**

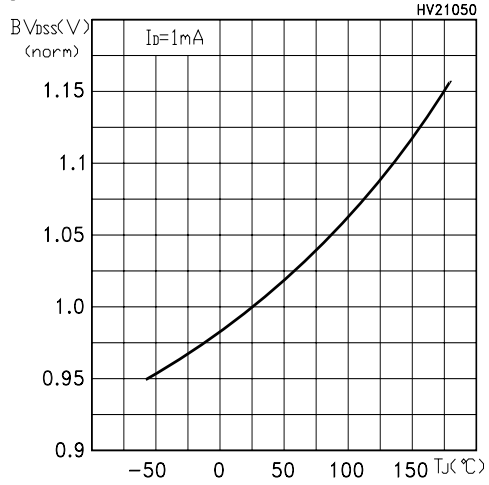


**Figure 15: Unclamped Inductive Load Test Circuit**

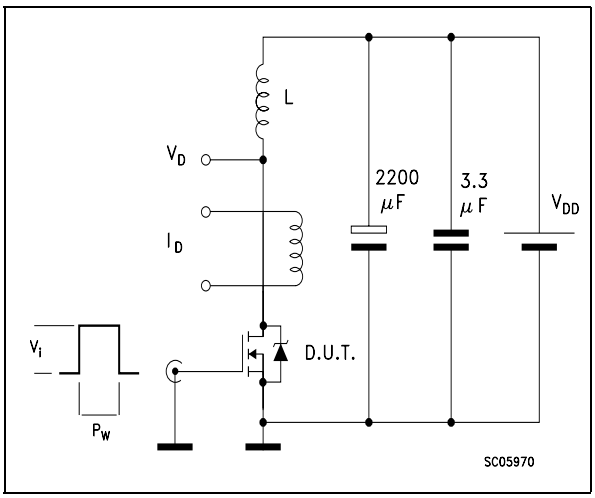



**Figure 16: Switching Times Test Circuit For Resistive Load**

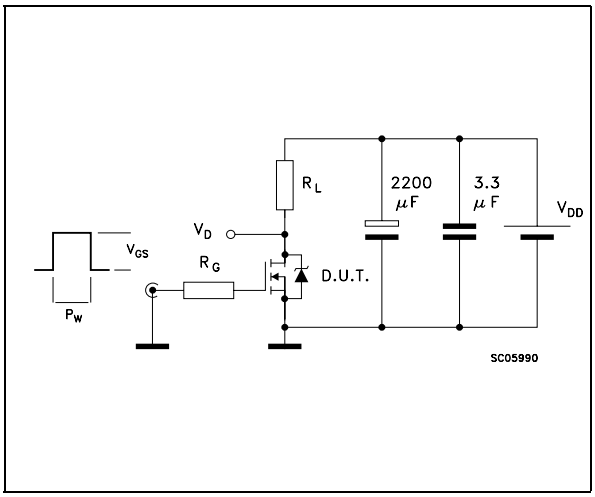



**Figure 17: Test Circuit For Inductive Load Switching and Diode Recovery Times**

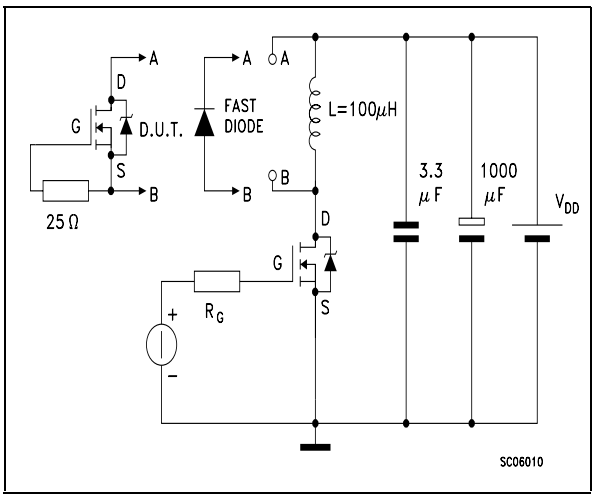



**Figure 18: Unclamped Inductive Wafeform**

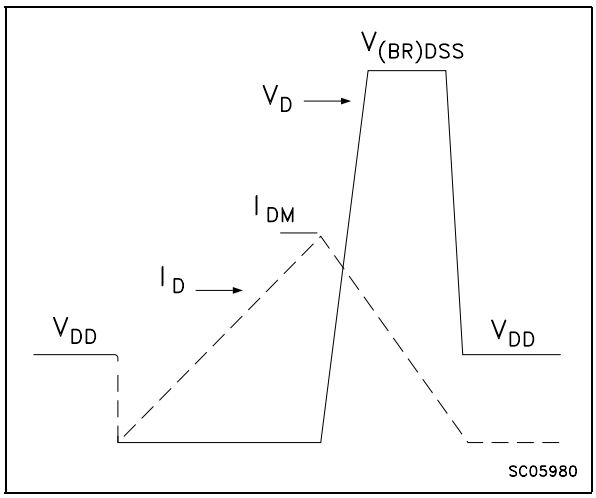
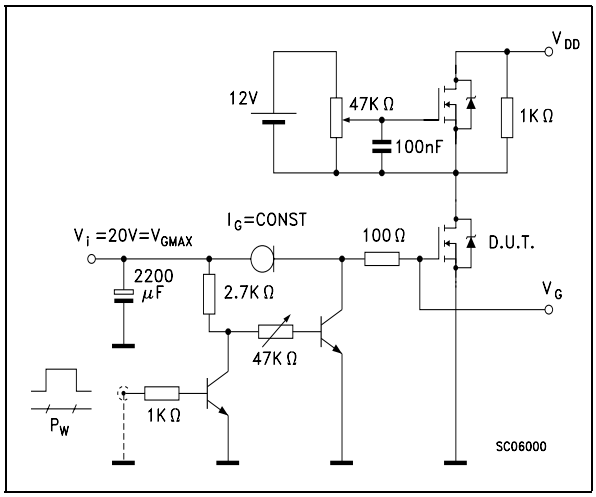
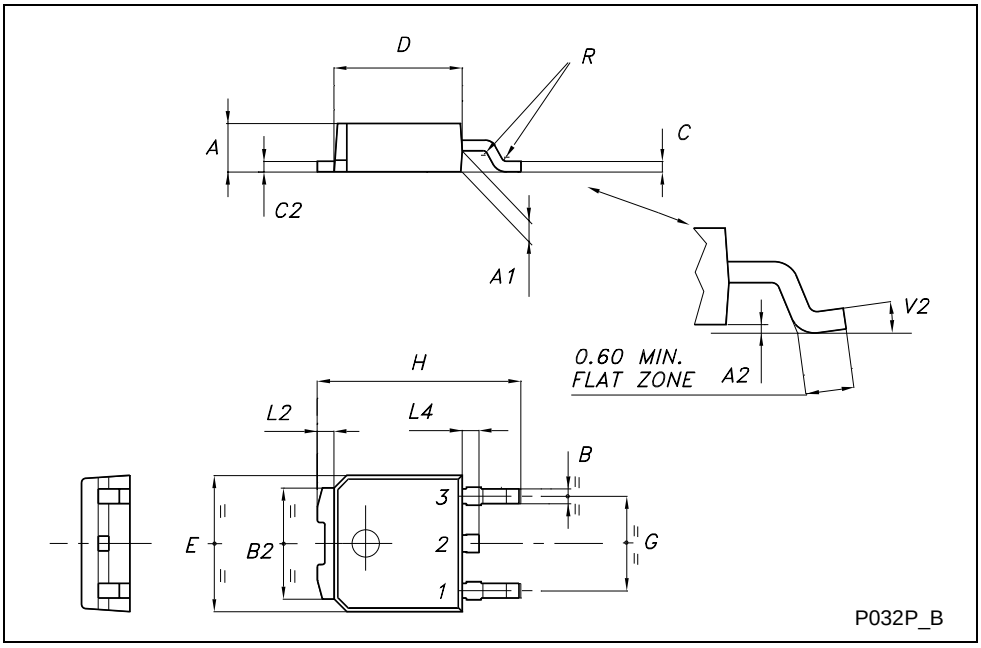



**Figure 19: Gate Charge Test Circuit**



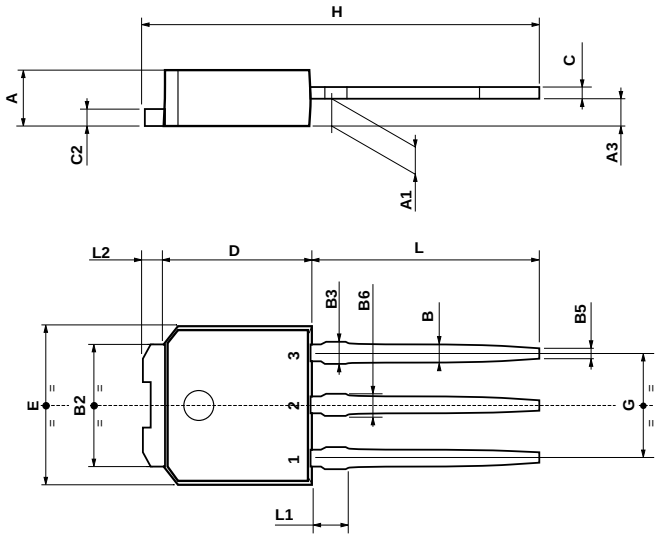
## TO-252 (DPAK) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.20 | | 2.40 | 0.087 | | 0.094 |
| A1 | 0.90 | | 1.10 | 0.035 | | 0.043 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.64 | | 0.90 | 0.025 | | 0.035 |
| B2 | 5.20 | | 5.40 | 0.204 | | 0.213 |
| C | 0.45 | | 0.60 | 0.018 | | 0.024 |
| C2 | 0.48 | | 0.60 | 0.019 | | 0.024 |
| D | 6.00 | | 6.20 | 0.236 | | 0.244 |
| E | 6.40 | | 6.60 | 0.252 | | 0.260 |
| G | 4.40 | | 4.60 | 0.173 | | 0.181 |
| H | 9.35 | | 10.10 | 0.368 | | 0.398 |
| L2 | | 0.8 | | | 0.031 | |
| L4 | 0.60 | | 1.00 | 0.024 | | 0.039 |
| V2 | $0^o$ | | $8^o$ | $0^o$ | | $0^o$ |



## TO-251 (IPAK) MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 2.2 | | 2.4 | 0.086 | | 0.094 |
| A1 | 0.9 | | 1.1 | 0.035 | | 0.043 |
| A3 | 0.7 | | 1.3 | 0.027 | | 0.051 |
| B | 0.64 | | 0.9 | 0.025 | | 0.031 |
| B2 | 5.2 | | 5.4 | 0.204 | | 0.212 |
| B3 | | | 0.85 | | | 0.033 |
| B5 | | 0.3 | | | 0.012 | |
| B6 | | | 0.95 | | | 0.037 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 0.48 | | 0.6 | 0.019 | | 0.023 |
| D | 6 | | 6.2 | 0.236 | | 0.244 |
| E | 6.4 | | 6.6 | 0.252 | | 0.260 |
| G | 4.4 | | 4.6 | 0.173 | | 0.181 |
| H | 15.9 | | 16.3 | 0.626 | | 0.641 |
| L | 9 | | 9.4 | 0.354 | | 0.370 |
| L1 | 0.8 | | 1.2 | 0.031 | | 0.047 |
| L2 | | 0.8 | 1 | | 0.031 | 0.039 |

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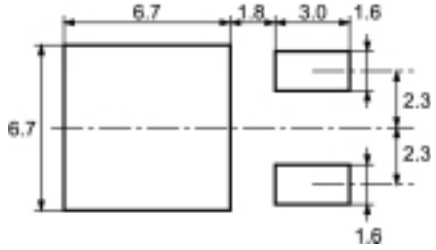
## DPAK FOOTPRINT




All dimensions are in millimeters

## TUBE SHIPMENT (no suffix)*

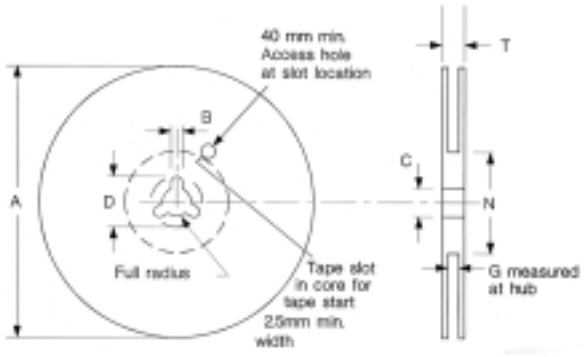

BASE QTY 75

BULK QTY 3000

Tube length 532 (±0.5)

All dimensions are in millimeters

## TAPE AND REEL SHIPMENT (suffix "T4")*



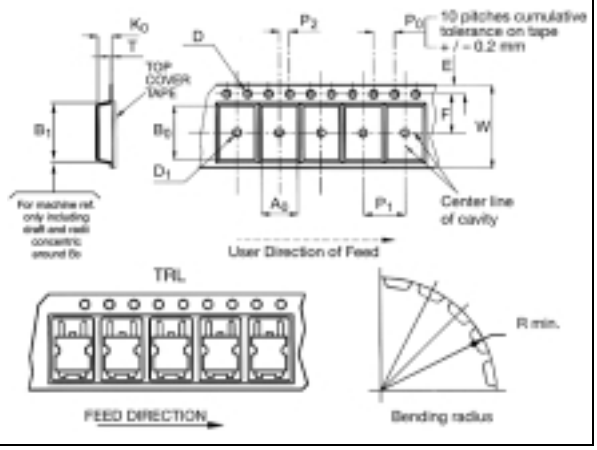

REEL MECHANICAL DATA

| DIM. | mm | | inch | |
|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. |
| A | | 330 | | 12.992 |
| B | 1.5 | | 0.059 | |
| C | 12.8 | 13.2 | 0.504 | 0.520 |
| D | 20.2 | | 0.795 | |
| G | 16.4 | 18.4 | 0.645 | 0.724 |
| N | 50 | | 1.968 | |
| T | | 22.4 | | 0.881 |

| BASE QTY | BULK QTY |
|---|---|
| 2500 | 2500 |

TAPE MECHANICAL DATA

| DIM. | mm | | inch | |
|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. |
| A0 | 6.8 | 7 | 0.267 | 0.275 |
| B0 | 10.4 | 10.6 | 0.409 | 0.417 |
| B1 | | 12.1 | | 0.476 |
| D | 1.5 | 1.6 | 0.059 | 0.063 |
| D1 | 1.5 | | 0.059 | |
| E | 1.65 | 1.85 | 0.065 | 0.073 |
| F | 7.4 | 7.6 | 0.291 | 0.299 |
| K0 | 2.55 | 2.75 | 0.100 | 0.108 |
| P0 | 3.9 | 4.1 | 0.153 | 0.161 |
| P1 | 7.9 | 8.1 | 0.311 | 0.319 |
| P2 | 1.9 | 2.1 | 0.075 | 0.082 |
| R | 40 | | 1.574 | |
| W | 15.7 | 16.3 | 0.618 | 0.641 |




* on sales type

**Table 11: Revision History**

| Date | Revision | Description of Changes |
|---|---|---|
| 08-June-2004 | 2 | New Stylesheet. Datasheet according to PCN DSG-TRA/04/532 |
| 19-Oct-2004 | 3 | Modified value in title |