



STB95NF03

N-CHANNEL 30V - 0.0065 Ω - 95A D²PAK STripFET™ II POWER MOSFET

| TYPE | V _{DSS} | R _{DS(on)} | I _D |
|-----------|------------------|---------------------|----------------|
| STB95NF03 | 30 V | <0.007 Ω | 80 A |

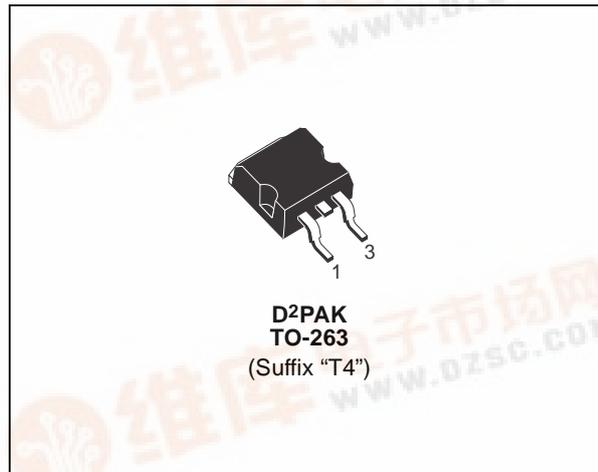
- TYPICAL R_{DS(on)} = 0.0065 Ω
- STANDARD THRESHOLD DRIVE
- 100% AVALANCHE TESTED
- SURFACE-MOUNTING D²PAK (TO-263) POWER PACKAGE IN TUBE (NO SUFFIX) OR IN TAPE & REEL (SUFFIX "T4")

DESCRIPTION

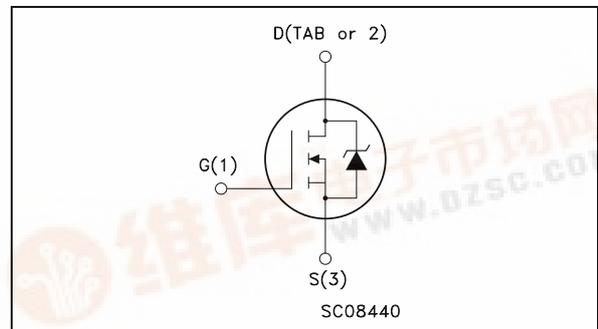
This Power MOSFET is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- DC-DC & DC-AC CONVERTERS
- SOLENOID AND RELAY DRIVERS



INTERNAL SCHEMATIC DIAGRAM



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 | ± 20 | V |
| I _D (*) | Drain Current (continuous) at T _C = 25°C | 80 | A |
| I _D | Drain Current (continuous) at T _C = 100°C | 80 | A |
| I _{DM} (•) | Drain Current (pulsed) | 320 | A |
| P _{tot} | Total Dissipation at T _C = 25°C | 150 | W |
| | Derating Factor | 1 | W/°C |
| dv/dt (1) | Peak Diode Recovery voltage slope | 3.0 | V/ns |
| EAS (2) | Single Pulse Avalanche Energy | 720 | mJ |
| T _{stg} | Storage Temperature | -55 to 175 | °C |
| T _j | Operating Junction Temperature | | |

(•) Pulse width limited by safe operating area.

(*) Current Limited by Package

(1) I_{SD} ≤ 95A, di/dt ≤ 150A/μs, V_{DD} ≤ V(BR)DSS, T_j ≤ T_{JMAX}.

(2) Starting T_j = 25 °C, I_D = 47.5A, V_{DD} = 25V

THERMAL DATA

| | | | | |
|----------------|--|-----|------|------|
| Rthj-case | Thermal Resistance Junction-case | Max | 1 | °C/W |
| Rthj-amb | Thermal Resistance Junction-ambient | Max | 62.5 | °C/W |
| T _l | Maximum Lead Temperature For Soldering Purpose | | 300 | °C |

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

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 V _{DS} = Max Rating T _C = 125°C | | | 1 10 | μA μA |
| I _{GSS} | Gate-body Leakage Current (V _{DS} = 0) | V _{GS} = ± 20 V | | | ±100 | nA |

ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---------------------|-----------------------------------|---|------|--------|--------|------|
| V _{GS(th)} | Gate Threshold Voltage | V _{DS} = V _{GS} I _D = 250 μA | 2 | | 4 | V |
| R _{DS(on)} | Static Drain-source On Resistance | V _{GS} = 10 V I _D = 45 A | | 0.0065 | 0.0070 | Ω |

DYNAMIC

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--|---|---|------|--------------------|------|----------------|
| g _{fs} (*) | Forward Transconductance | V _{DS} = 15 V I _D = 45 A | | 50 | | S |
| C _{iss} C _{oss} C _{rss} | Input Capacitance Output Capacitance Reverse Transfer Capacitance | V _{DS} = 25V f = 1 MHz V _{GS} = 0 | | 2450 880 170 | | pF pF pF |

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ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON (*)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|--|--|------|----------------|------|----------------|
| $t_{d(on)}$ t_r | Turn-on Time Rise Time | $V_{DD} = 15\text{ V}$ $I_D = 47.5\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ | | 20 195 | | ns ns |
| Q_g Q_{gs} Q_{gd} | Total Gate Charge Gate-Source Charge Gate-Drain Charge | $V_{DD}=15\text{V}$ $I_D=95\text{A}$ $V_{GS}=10\text{V}$ | | 59 18 21 | 70 | nC nC nC |

SWITCHING OFF(*)

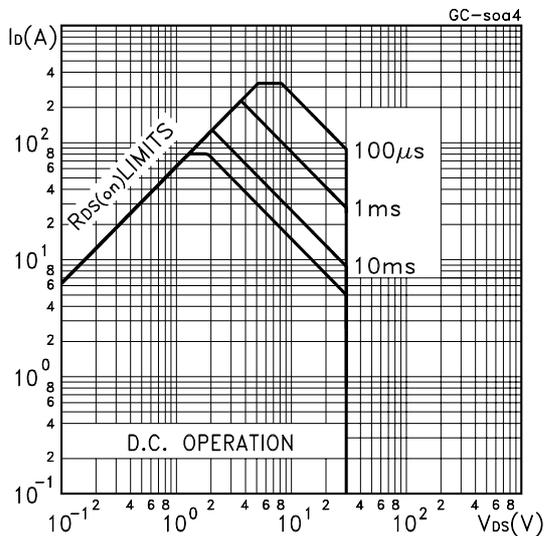
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------|----------------------------------|--|------|----------|------|----------|
| $t_{d(off)}$ t_f | Turn-off Delay Time Fall Time | $V_{DD} = 20\text{ V}$ $I_D = 47.5\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ | | 35 35 | | ns ns |

SOURCE DRAIN DIODE(*)

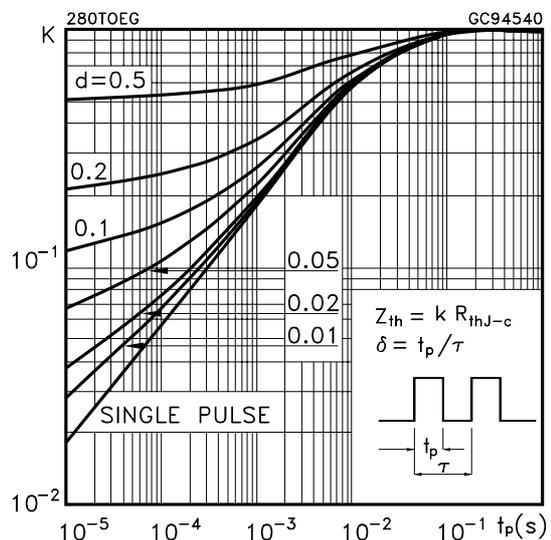
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|-----------------------------------|--|--|------|----------------|-----------|---------------|
| I_{SD} $I_{SDM} (*)$ | Source-drain Current Source-drain Current (pulsed) | | | | 95 320 | A A |
| $V_{SD} (*)$ | Forward On Voltage | $I_{SD} = 95\text{ A}$ $V_{GS} = 0$ | | | 1.3 | V |
| t_{rr} Q_{rr} I_{RRM} | Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current | $I_{SD} = 95\text{ A}$ $di/dt = 100\text{A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$ $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5) | | 60 120 4 | | ns nC A |

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.
 (*) Pulse width limited by T_{jmax}

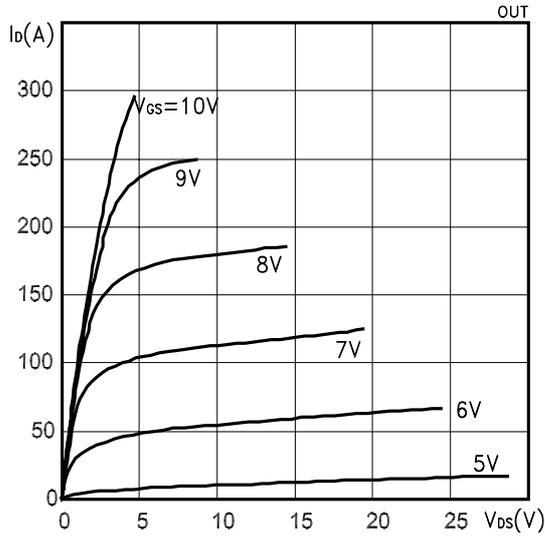
Safe Operating Area



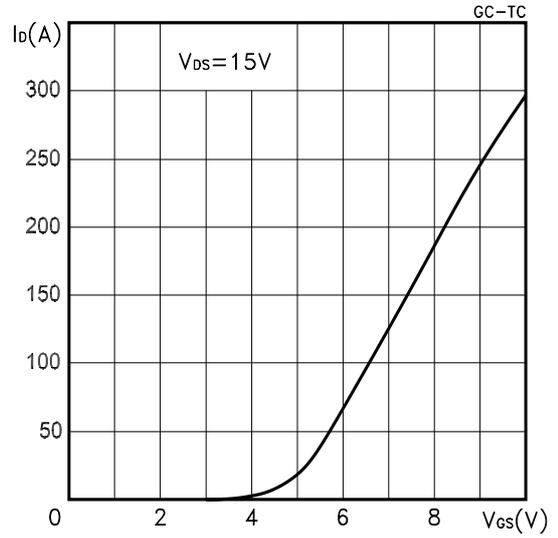
Thermal Impedance



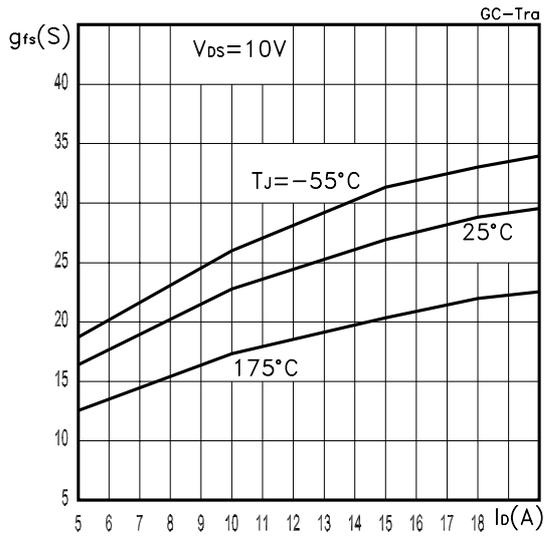
Output Characteristics



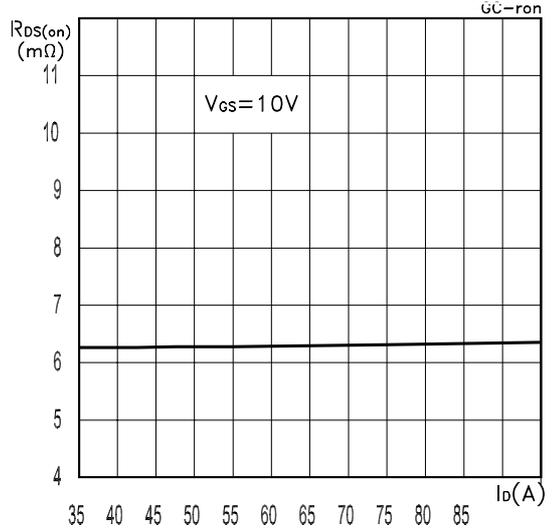
Transfer Characteristics



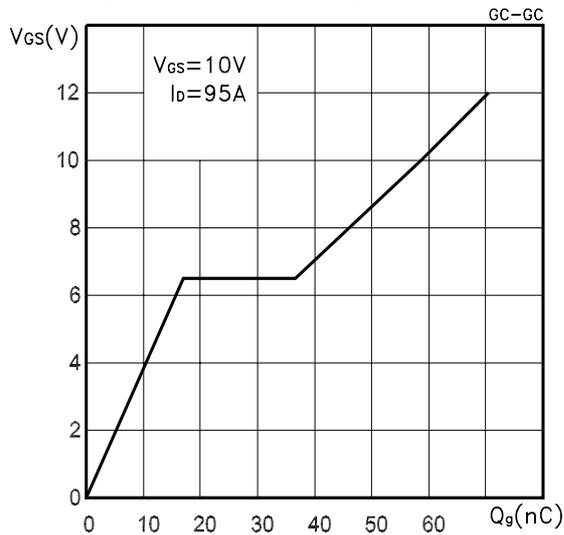
Transconductance



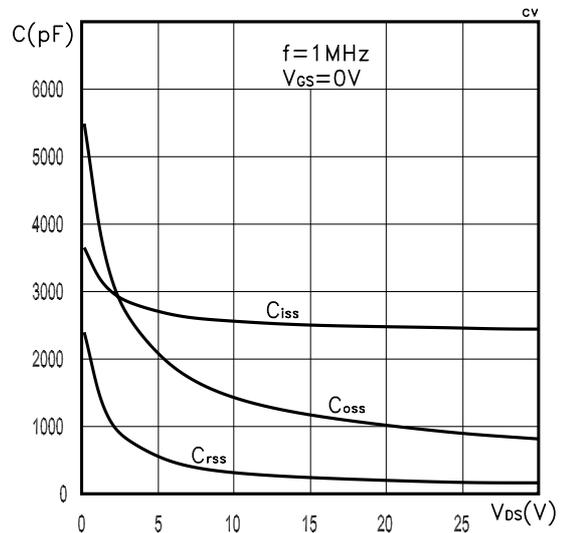
Static Drain-source On Resistance



Gate Charge vs Gate-source Voltage

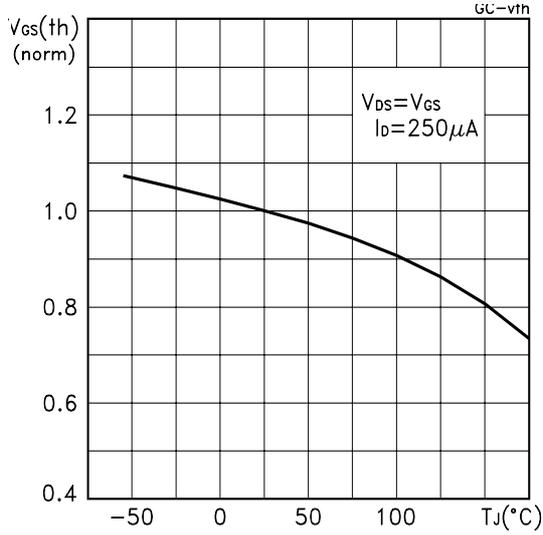


Capacitance Variations

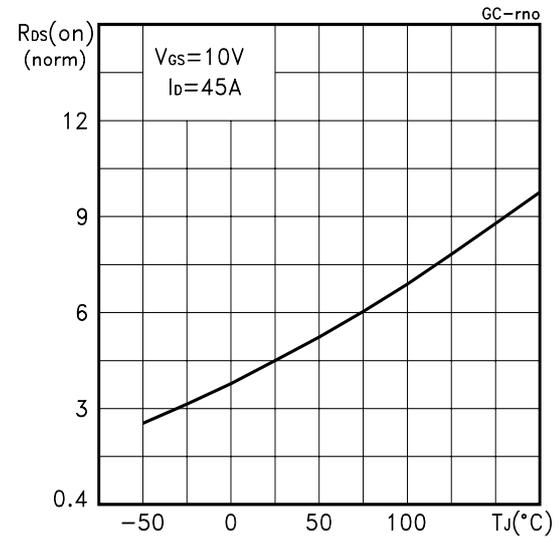


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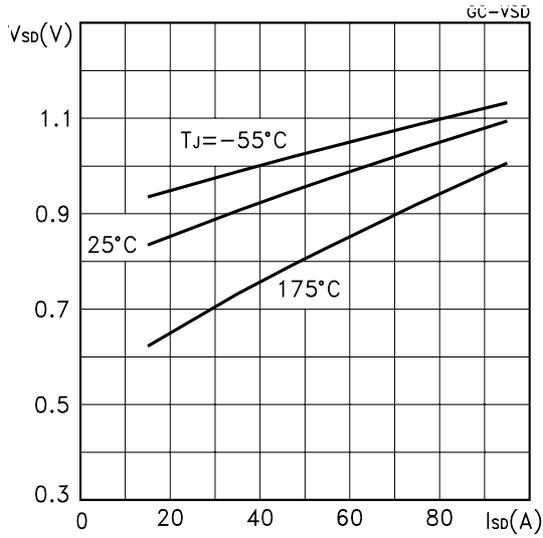
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.

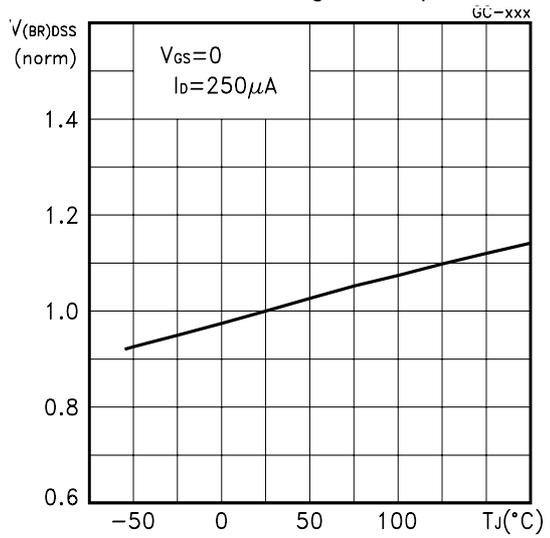


Fig. 1: Unclamped Inductive Load Test Circuit

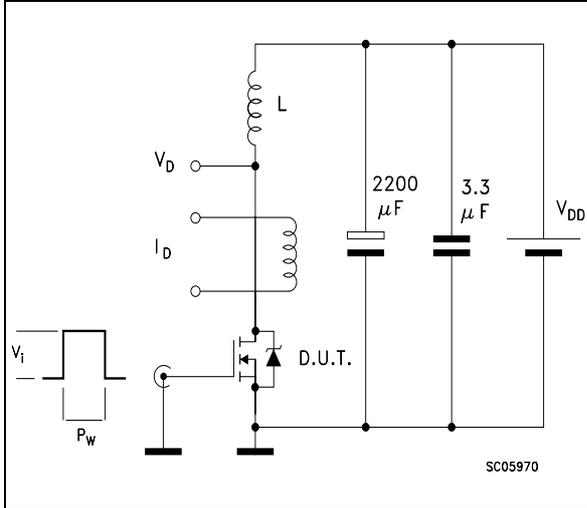


Fig. 2: Unclamped Inductive Waveform

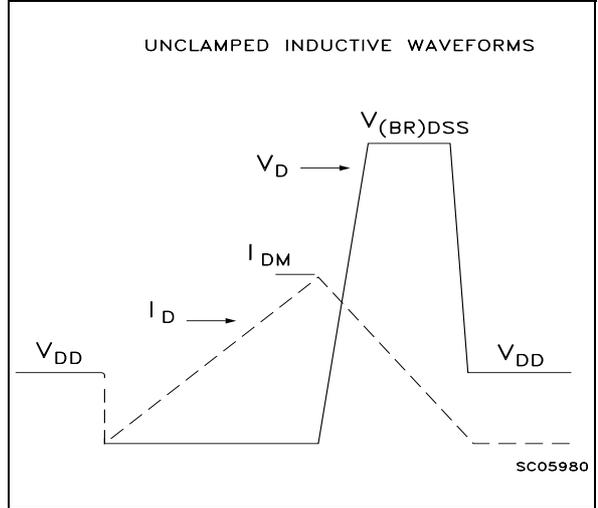


Fig. 3: Switching Times Test Circuits For Resistive Load

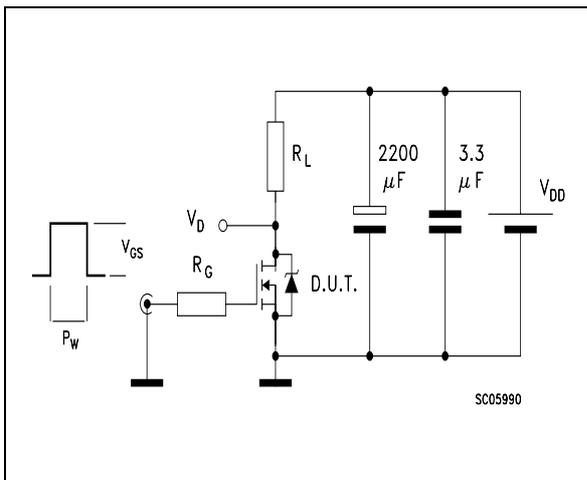


Fig. 4: Gate Charge test Circuit

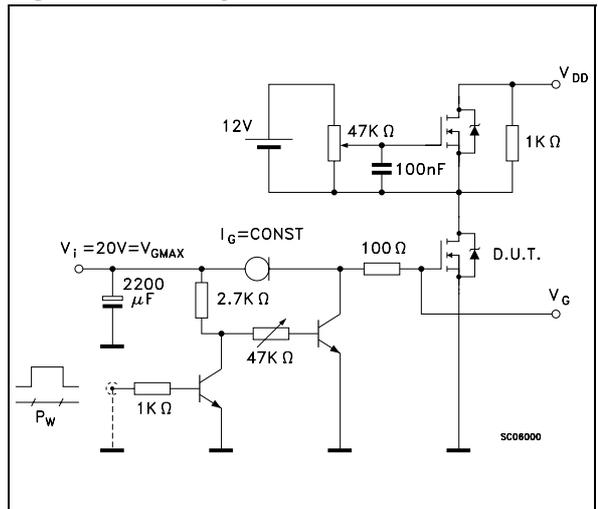
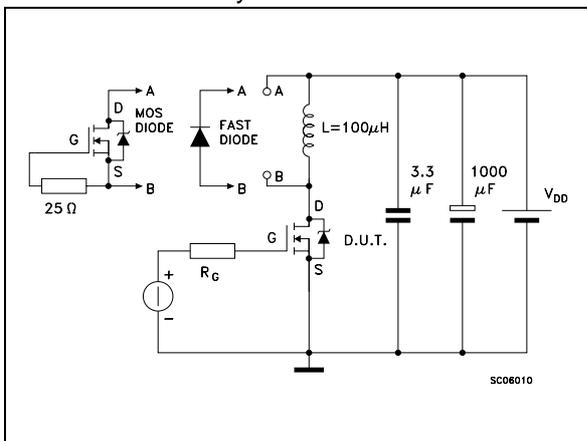
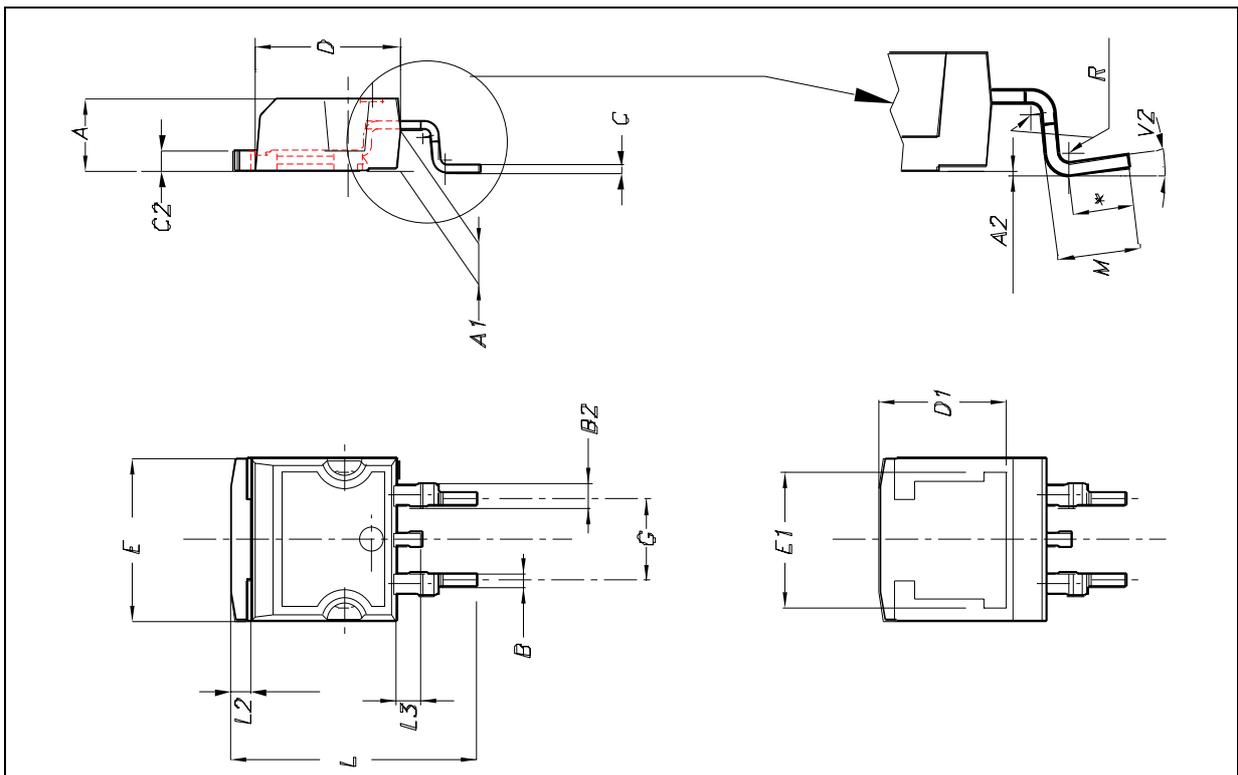


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

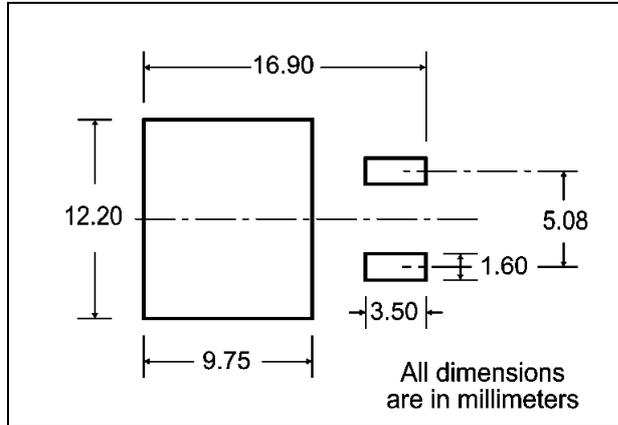


D²PAK MECHANICAL DATA

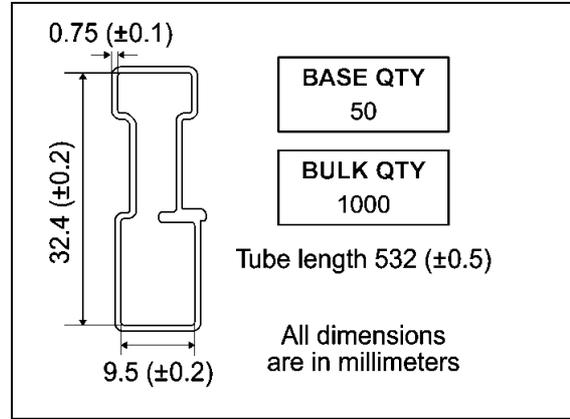
| DIM. | mm. | | | inch. | | |
|------|------|------|-------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | TYP. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| A1 | 2.49 | | 2.69 | 0.098 | | 0.106 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.7 | | 0.93 | 0.028 | | 0.037 |
| B2 | 1.14 | | 1.7 | 0.045 | | 0.067 |
| C | 0.45 | | 0.6 | 0.018 | | 0.024 |
| C2 | 1.21 | | 1.36 | 0.048 | | 0.054 |
| D | 8.95 | | 9.35 | 0.352 | | 0.368 |
| D1 | | 8 | | | 0.315 | |
| E | 10 | | 10.4 | 0.394 | | 0.409 |
| E1 | | 8.5 | | | 0.334 | |
| G | 4.88 | | 5.28 | 0.192 | | 0.208 |
| L | 15 | | 15.85 | 0.591 | | 0.624 |
| L2 | 1.27 | | 1.4 | 0.050 | | 0.055 |
| L3 | 1.4 | | 1.75 | 0.055 | | 0.069 |
| M | 2.4 | | 3.2 | 0.094 | | 0.126 |
| R | | 0.4 | | | 0.015 | |
| V2 | 0° | | 8° | 0° | | 8° |



D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



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 | 24.4 | 26.4 | 0.960 | 1.039 |
| N | 100 | | 3.937 | |
| T | | 30.4 | | 1.197 |

| BASE QTY | BULK QTY |
|----------|----------|
| 1000 | 1000 |

TAPE MECHANICAL DATA

| DIM. | mm | | inch | |
|------|------|------|--------|--------|
| | MIN. | MAX. | MIN. | MAX. |
| A0 | 10.5 | 10.7 | 0.413 | 0.421 |
| B0 | 15.7 | 15.9 | 0.618 | 0.626 |
| D | 1.5 | 1.6 | 0.059 | 0.063 |
| D1 | 1.59 | 1.61 | 0.062 | 0.063 |
| E | 1.65 | 1.85 | 0.065 | 0.073 |
| F | 11.4 | 11.6 | 0.449 | 0.456 |
| K0 | 4.8 | 5.0 | 0.189 | 0.197 |
| P0 | 3.9 | 4.1 | 0.153 | 0.161 |
| P1 | 11.9 | 12.1 | 0.468 | 0.476 |
| P2 | 1.9 | 2.1 | 0.075 | 0.082 |
| R | 50 | | 1.574 | |
| T | 0.25 | 0.35 | 0.0098 | 0.0137 |
| W | 23.7 | 24.3 | 0.933 | 0.956 |

* on sales type

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