# N-Channel Power MOSFET

500V, 4A, 2.7Ω

## FEATURES

- 100% UIS and $R_g$ tested
- Advanced planar process
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

## KEY PERFORMANCE PARAMETERS

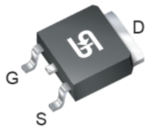
| PARAMETER | VALUE | UNIT |
|---|---|---|
| $V_{DS}$ | 500 | V |
| $R_{DS(on)}$ (max) | 2.7 | Ω |
| $Q_g$ | 12 | nC |

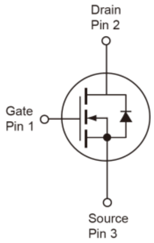
## APPLICATIONS

- AC/DC LED Lighting
- Power Supply
- Charger

Pb-Free
RoHS COMPLIANT
HALOGEN FREE

**TO-252 (DPAK)**





**Notes:** MSL 3 (Moisture Sensitivity Level) per J-STD-020

## ABSOLUTE MAXIMUM RATINGS ($T_A$ = 25°C unless otherwise noted)

| PARAMETER | | SYMBOL | Limit | UNIT |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | 500 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current (Note 1) | $T_C$ = 25°C | $I_D$ | 4 | A |
| | $T_C$ = 100°C | | 2.5 | |
| Pulsed Drain Current (Note 2) | | $I_{DM}$ | 16 | A |
| Total Power Dissipation @ $T_C$ = 25°C | | $P_{DTOT}$ | 83 | W |
| Single Pulse Avalanche Energy (Note 3) | | $E_{AS}$ | 78.4 | mJ |
| Single Pulse Avalanche Current (Note 3) | | $I_{AS}$ | 2.8 | A |
| Operating Junction and Storage Temperature Range | | $T_J$, $T_{STG}$ | - 55 to +150 | °C |

## THERMAL PERFORMANCE

| PARAMETER | SYMBOL | Limit | UNIT |
|---|---|---|---|
| Junction to Case Thermal Resistance | $R_{ΘJC}$ | 1.5 | °C/W |
| Junction to Ambient Thermal Resistance | $R_{ΘJA}$ | 62 | °C/W |

**Thermal Performance Note:** $R_{ΘJA}$ is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins. $R_{ΘJA}$ is guaranteed by design while $R_{ΘCA}$ is determined by the user's board design. $R_{ΘJA}$ shown below for single device operation on FR-4 PCB in still air.

## ELECTRICAL SPECIFICATIONS ($T_A$ = 25°C unless otherwise noted)

| PARAMETER | CONDITIONS | SYMBOL | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 250µA | $BV_{DSS}$ | 500 | -- | -- | V |
| Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250µA | $V_{GS(TH)}$ | 2 | 2.2 | 3 | V |
| Gate Body Leakage | $V_{GS}$ = ±20V, $V_{DS}$ = 0V | $I_{GSS}$ | -- | -- | ±100 | nA |
| Zero Gate Voltage Drain Current | $V_{DS}$ = 500V, $V_{GS}$ = 0V | $I_{DSS}$ | -- | -- | 1 | µA |
| Drain-Source On-State Resistance **(Note 4)** | $V_{GS}$ = 10V, $I_D$ =1.7A | $R_{DS(on)}$ | -- | 2.4 | 2.7 | Ω |
| **Dynamic (Note 5)** | | | | | | |
| Total Gate Charge | $V_{DS}$ = 400V, $I_D$ = 3.4A, $V_{GS}$ = 10V | $Q_g$ | -- | 12 | -- | nC |
| Gate-Source Charge | | $Q_{gs}$ | -- | 2.2 | -- | |
| Gate-Drain Charge | | $Q_{gd}$ | -- | 4.4 | -- | |
| Input Capacitance | $V_{DS}$ = 50V, $V_{GS}$ = 0V, f = 1.0MHz | $C_{iss}$ | -- | 453 | -- | pF |
| Output Capacitance | | $C_{oss}$ | -- | 27 | -- | |
| Reverse Transfer Capacitance | | $C_{rss}$ | -- | 1 | -- | |
| Gate Resistance | f = 1.0MHz | $R_g$ | -- | 2.6 | 5.2 | Ω |
| **Switching (Note 6)** | | | | | | |
| Turn-On Delay Time | $V_{DD}$ = 250V, $R_G$ = 5Ω, $I_D$ = 3.4A, $V_{GS}$ = 10V | $t_{d(on)}$ | -- | 5.4 | -- | ns |
| Turn-On Rise Time | | $t_r$ | -- | 18.4 | -- | |
| Turn-Off Delay Time | | $t_{d(off)}$ | -- | 12.4 | -- | |
| Turn-Off Fall Time | | $t_f$ | -- | 19.6 | -- | |
| **Source-Drain Diode** | | | | | | |
| Forward Voltage (Note 4) | $I_S$ = 3.4A, $V_{GS}$ = 0V | $V_{SD}$ | -- | -- | 1.3 | V |
| Reverse Recovery Time | $I_S$ = 3.4A<br>$dI_F/dt$ = 100A/µs | $t_{rr}$ | -- | 233 | -- | ns |
| Reverse Recovery Charge | | $Q_{rr}$ | -- | 0.84 | -- | µC |

**Notes:**

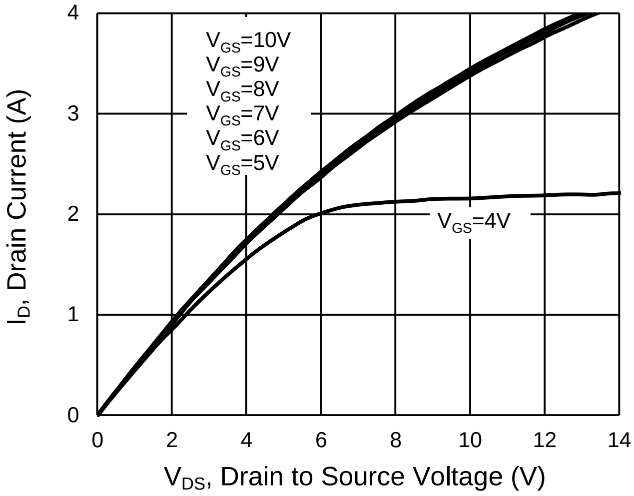
1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3. L = 20mH, $I_{AS}$ = 2.8A, $V_{DD}$ = 50V, $R_G$ = 25Ω, Starting $T_J$ = 25°C
4. Pulse test: PW ≤ 300µs, duty cycle ≤ 2%
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

## ORDERING INFORMATION

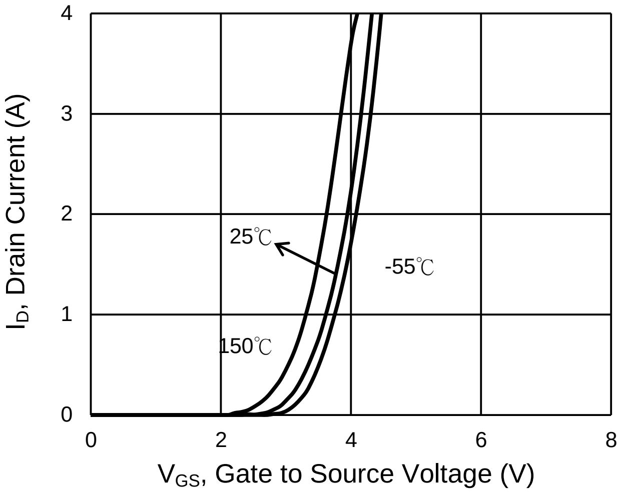
| PART NO. | PACKAGE | PACKING |
|---|---|---|
| TSM4NC50CP ROG | TO-252 (DPAK) | 2,500pcs / 13” Reel |

## CHARACTERISTICS CURVES

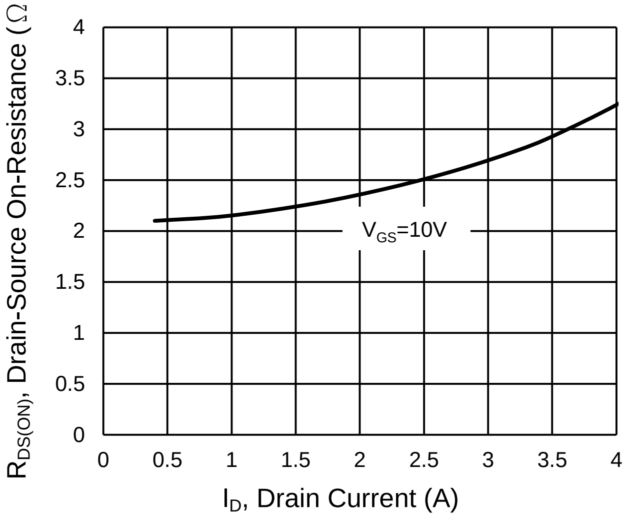
($T_A$ = 25°C unless otherwise noted)



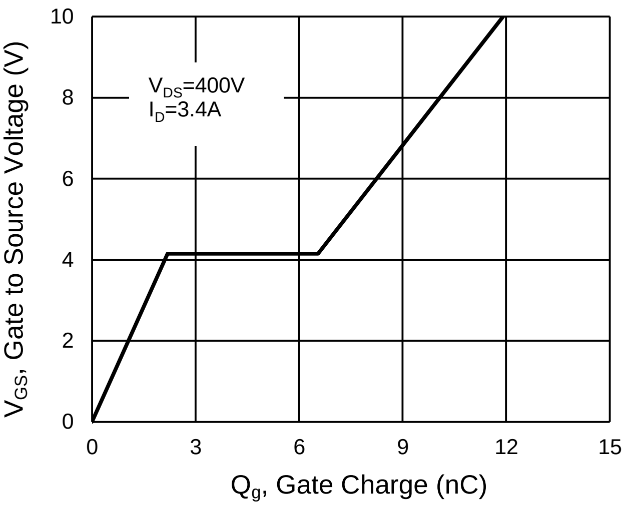
**Output Characteristics**



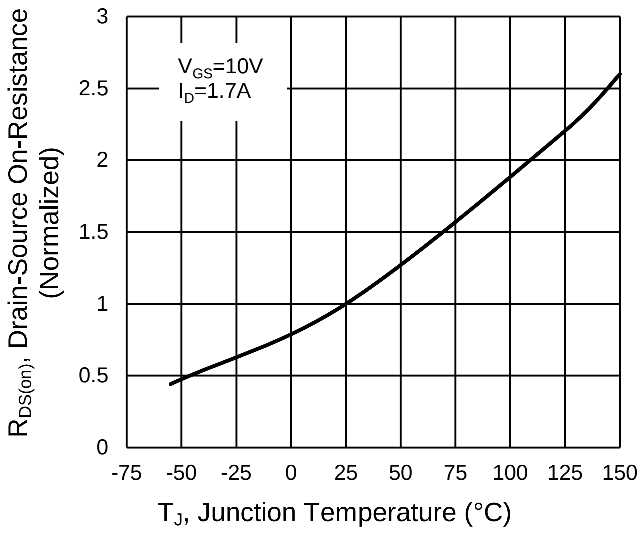
**Transfer Characteristics**



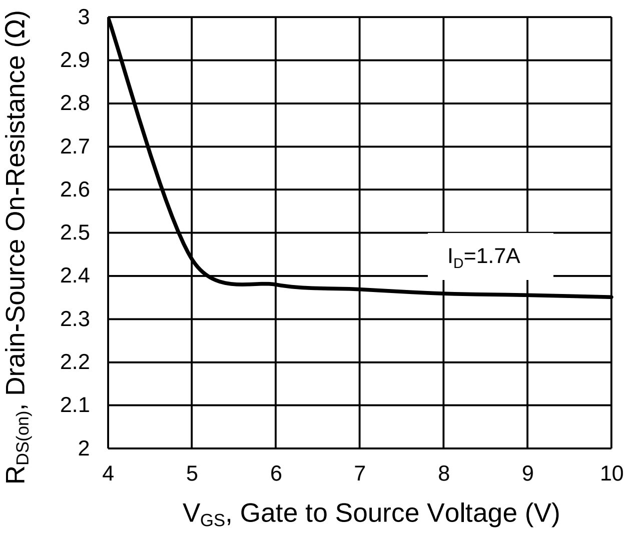
**On-Resistance vs. Drain Current**



**Gate-Source Voltage vs. Gate Charge**



**On-Resistance vs. Junction Temperature**

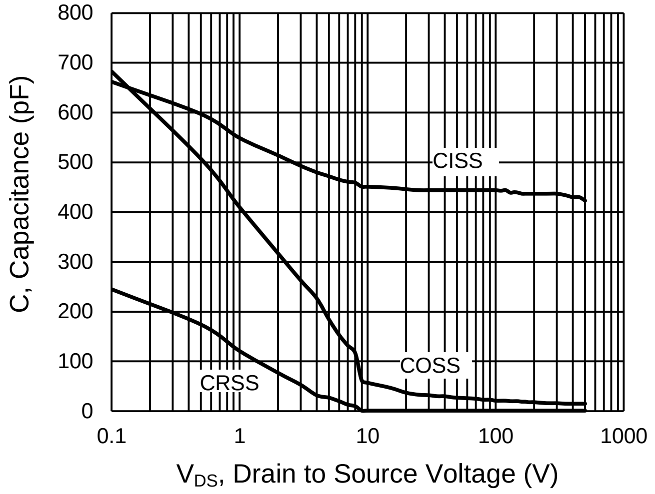


**On-Resistance vs. Gate-Source Voltage**

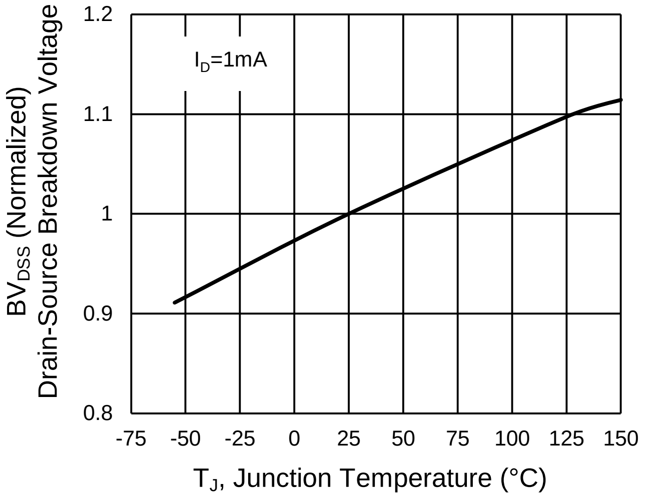
## CHARACTERISTICS CURVES

(T$_A$ = 25°C unless otherwise noted)

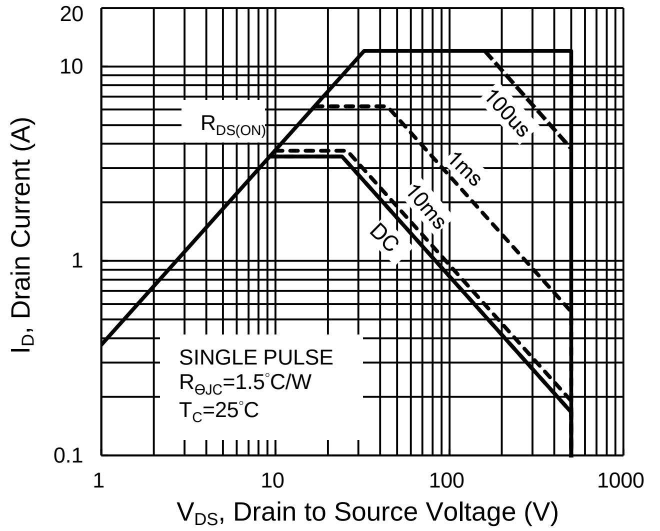
**Capacitance vs. Drain-Source Voltage**



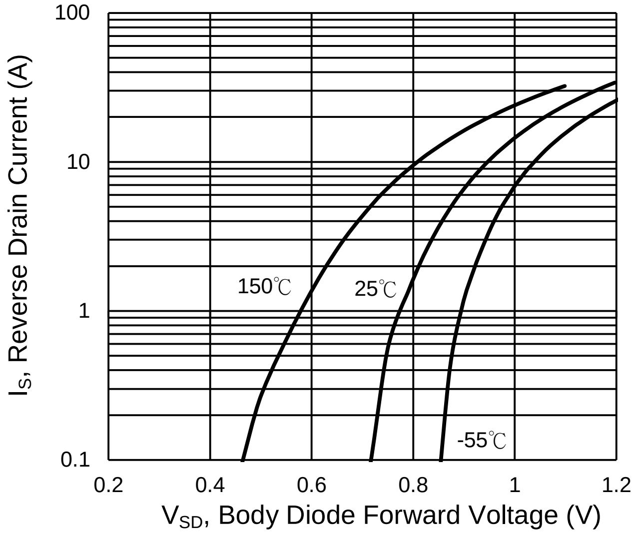
**BV$_{DSS}$ vs. Junction Temperature**



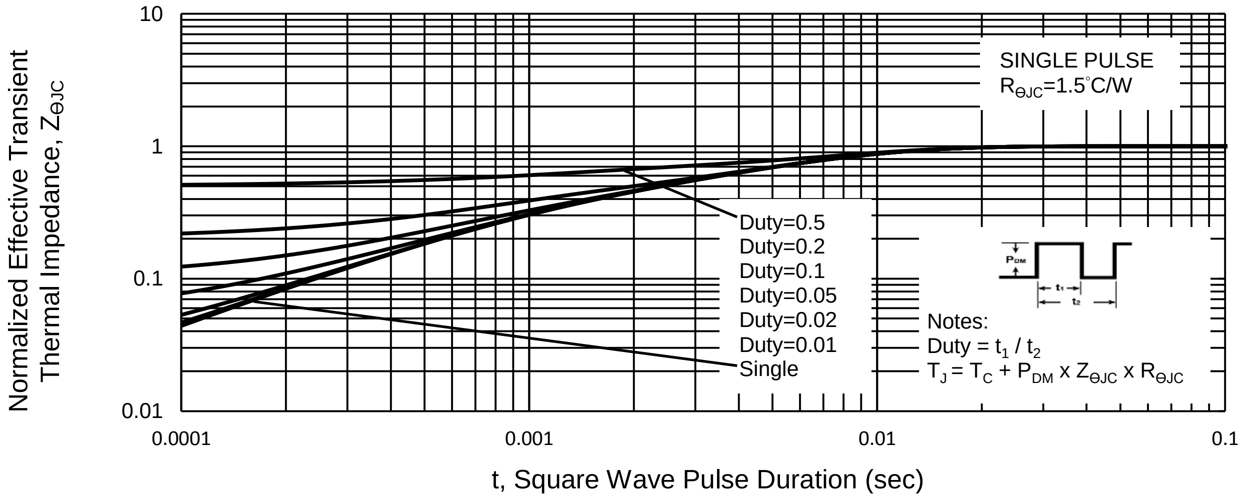
**Maximum Safe Operating Area, Junction-to-Case**



**Source-Drain Diode Forward Current vs. Voltage**

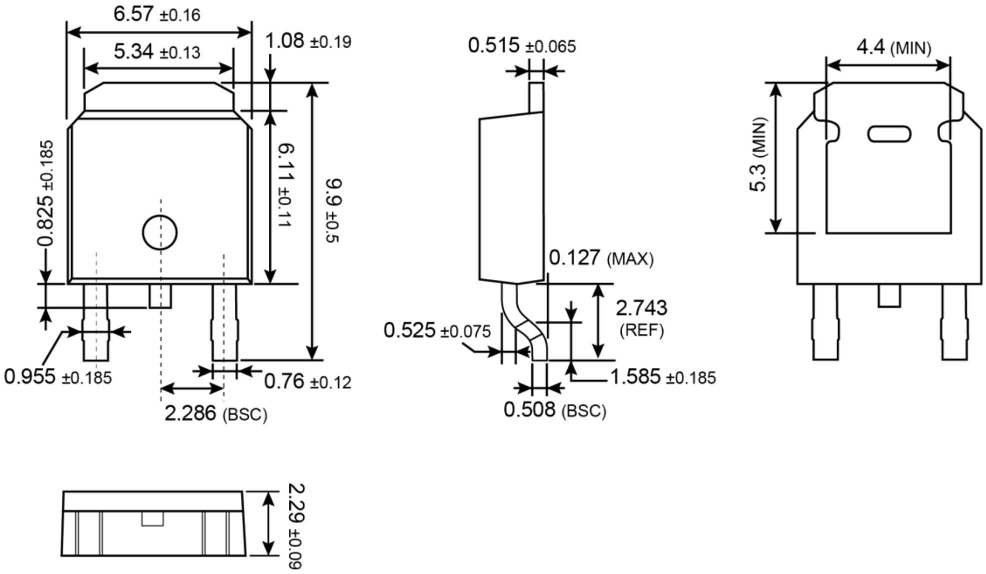


**Normalized Thermal Transient Impedance, Junction-to-Case**

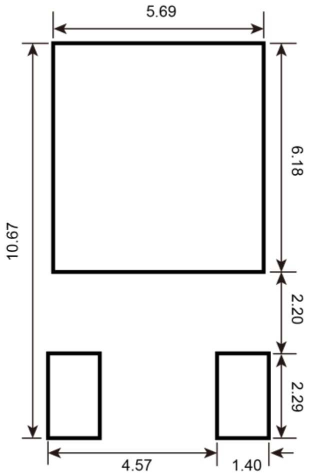


## PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

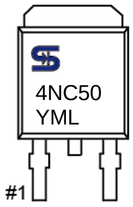
**TO-252**



## SUGGESTED PAD LAYOUT (Unit: Millimeters)



## MARKING DIAGRAM



**Y** = Year Code
**M** = Month Code
**O** =Jan **P** =Feb **Q** =Mar **R** =Apr
**S** =May **T** =Jun **U** =Jul **V** =Aug
**W** =Sep **X** =Oct **Y** =Nov **Z** =Dec
**L** = Lot Code (1~9, A~Z)

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- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)
**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.