

## PUB4701

## Silicon N-Channel Power F-MOS FET

## ■ Features

- Avalanche energy capacity guaranteed
- High-speed switching
- Low ON-resistance
- No secondary breakdown
- Low-voltage drive

## ■ Applications

- Contactless relay
- Driving circuit for a solenoid
- Driving circuit for a motor
- Control equipment
- Switching power supply

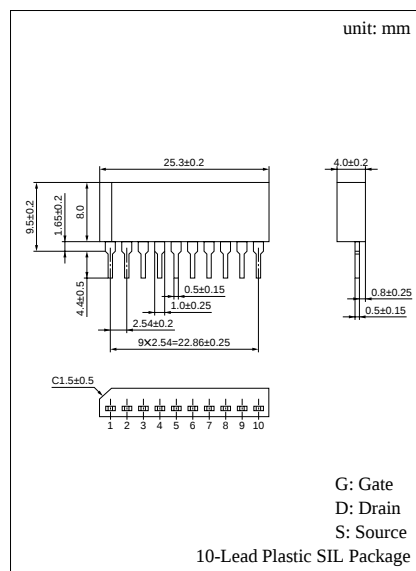
■ Absolute Maximum Ratings ( $T_C = 25^\circ\text{C}$ )

| Parameter                         | Symbol                   | Ratings         | Unit             |
|-----------------------------------|--------------------------|-----------------|------------------|
| Drain to Source breakdown voltage | $V_{DSS}$                | 150             | V                |
| Gate to Source voltage            | $V_{GSS}$                | $\pm 20$        | V                |
| Drain current                     | DC                       | $I_D$           | A                |
|                                   | Pulse                    | $I_{DP}$        | A                |
| Avalanche energy capacity         | $EAS^*$                  | 22.5            | mJ               |
| Allowable power dissipation       | $T_C = 25^\circ\text{C}$ | $P_D$           | 15               |
|                                   | $T_a = 25^\circ\text{C}$ |                 | 3.5              |
| Channel temperature               | $T_{ch}$                 | 150             | $^\circ\text{C}$ |
| Storage temperature               | $T_{stg}$                | $-55$ to $+150$ | $^\circ\text{C}$ |

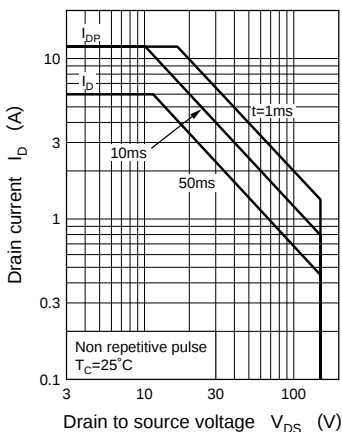
\*  $L = 5\text{mH}$ ,  $I_L = 3\text{A}$ , 1 pulse

■ Electrical Characteristics ( $T_C = 25^\circ\text{C}$ )

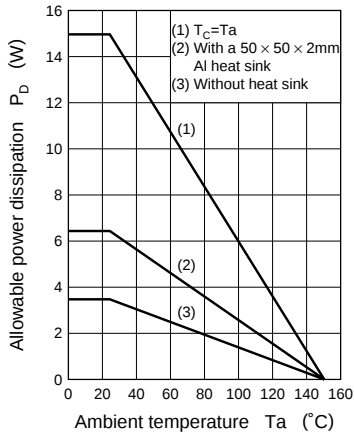
| Parameter                                    | Symbol        | Conditions                                                                               | min | typ  | max     | Unit          |
|----------------------------------------------|---------------|------------------------------------------------------------------------------------------|-----|------|---------|---------------|
| Drain to Source cut-off current              | $I_{DSS}$     | $V_{DS} = 120\text{V}$ , $V_{GS} = 0$                                                    |     |      | 10      | $\mu\text{A}$ |
| Gate to Source leakage current               | $I_{GSS}$     | $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0$                                                 |     |      | $\pm 1$ | $\mu\text{A}$ |
| Drain to Source breakdown voltage            | $V_{DSS}$     | $I_D = 1\text{mA}$ , $V_{GS} = 0$                                                        | 150 |      |         | V             |
| Gate threshold voltage                       | $V_{th}$      | $V_{DS} = 10\text{V}$ , $I_D = 1\text{mA}$                                               | 1   |      | 2.5     | V             |
| Drain to Source ON-resistance                | $R_{DS(on)1}$ | $V_{GS} = 10\text{V}$ , $I_D = 3\text{A}$                                                |     | 0.42 | 0.6     | $\Omega$      |
|                                              | $R_{DS(on)2}$ | $V_{GS} = 4\text{V}$ , $I_D = 3\text{A}$                                                 |     | 0.5  | 0.7     | $\Omega$      |
| Forward transfer admittance                  | $ Y_{fs} $    | $V_{DS} = 10\text{V}$ , $I_D = 3\text{A}$                                                | 3   | 5.3  |         | S             |
| Diode forward voltage                        | $V_{DSF}$     | $I_{DR} = 3\text{A}$ , $V_{GS} = 0$                                                      |     |      | -1.7    | V             |
| Input capacitance (Common Source)            | $C_{iss}$     | $V_{DS} = 10\text{V}$ , $V_{GS} = 0$ , $f = 1\text{MHz}$                                 |     | 620  |         | pF            |
| Output capacitance (Common Source)           | $C_{oss}$     |                                                                                          |     | 120  |         | pF            |
| Reverse transfer capacitance (Common Source) | $C_{rss}$     |                                                                                          |     | 35   |         | pF            |
| Turn-on time (delay time)                    | $t_{d(on)}$   | $V_{GS} = 10\text{V}$ , $I_D = 3\text{A}$<br>$V_{DD} = 100\text{V}$ , $R_L = 33.3\Omega$ |     | 10   |         | ns            |
| Rise time                                    | $t_r$         |                                                                                          |     | 30   |         | ns            |
| Fall time                                    | $t_f$         |                                                                                          |     | 85   |         | ns            |
| Turn-off time (delay time)                   | $t_{d(off)}$  |                                                                                          |     | 290  |         | ns            |



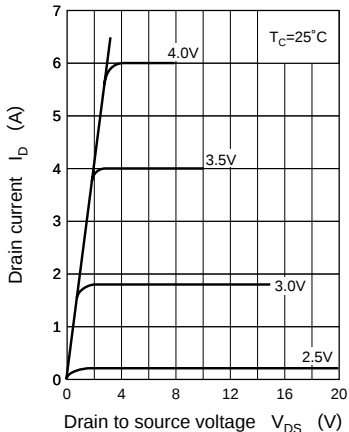
Area of safe operation (ASO)



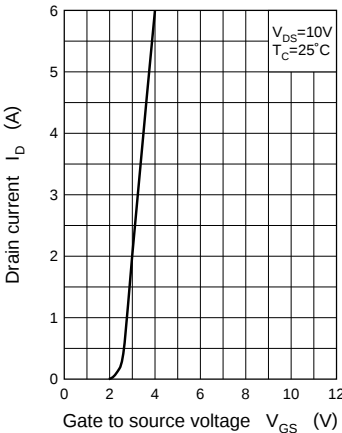
$P_D - T_a$



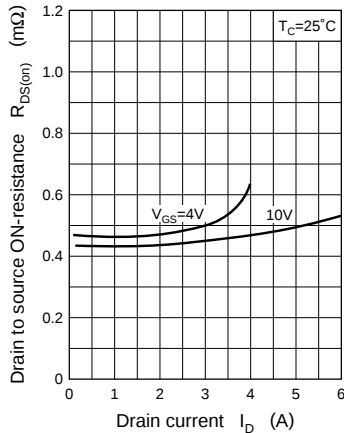
$I_D - V_{DS}$



$I_D - V_{GS}$



$R_{DS(on)} - I_D$



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