# 10V Drive Nch MOSFET

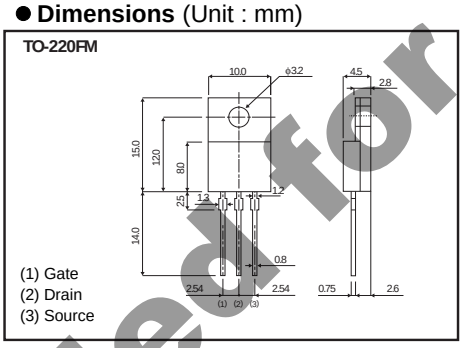
## R5016FNX

### ● Structure
Silicon N-channel MOSFET

### ● Features
1) Low on-resistance.
2) Low input capacitance.
3) High ESD.

### ● Application
Switching

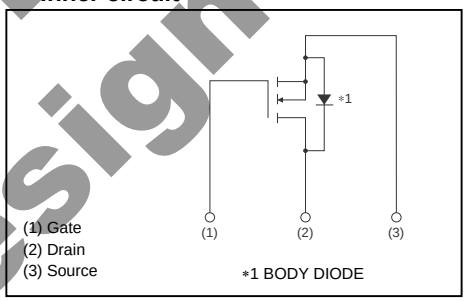
### ● Dimensions (Unit : mm)




### ● Packaging specifications

| | | |
|---|---|---|
| Type | Package | Bulk |
| | Code | - |
| | Basic ordering unit (pieces) | 500 |
| R5016FNX | | ○ |

### ● Inner circuit




### ● Absolute maximum ratings (Ta = 25°C)

| Parameter | | Symbol | Limits | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DSS}$ | 500 | V |
| Gate-source voltage | | $V_{GSS}$ | ±30 | V |
| Drain current | Continuous | $I_D$ *3 | ±16 | A |
| | Pulsed | $I_{DP}$ *1 | ±64 | A |
| Source current (Body Diode) | Continuous | $I_S$ *3 | 16 | A |
| | Pulsed | $I_{SP}$ *1 | 64 | A |
| Avalanche current | | $I_{AS}$ *2 | 8 | A |
| Avalanche energy | | $E_{AS}$ *2 | 17.1 | mJ |
| Power dissipation | | $P_D$ *4 | 50 | W |
| Channel temperature | | $T_{ch}$ | 150 | °C |
| Range of storage temperature | | $T_{stg}$ | −55 to +150 | °C |

*1 Pw≤10μs, Duty cycle≤1%

*2 L ≒ 500μH, $V_{DD}$=50V, $R_G$=25Ω, $T_{ch}$=25°C

*3 Limited only by maximum channel temperature allowed.

*4 $T_C$=25°C

### ● Thermal resistance

| Parameter | Symbol | Limits | Unit |
|---|---|---|---|
| Channel to Case | $R_{th\ (ch-c)}$ * | 2.5 | °C / W |

* $T_C$=25°C

● **Electrical characteristics** (Ta = 25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | - | - | ±100 | nA | $V_{GS}$=±30V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | 500 | - | - | V | $I_D$=1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | - | - | 100 | μA | $V_{DS}$=500V, $V_{GS}$=0V |
| Gate threshold voltage | $V_{GS\ (th)}$ | 3.0 | - | 5.0 | V | $V_{DS}$=10V, $I_D$=1mA |
| Static drain-source on-state resistance | $R_{DS\ (on)}$* | - | 0.25 | 0.325 | Ω | $I_D$=8A, $V_{GS}$=10V |
| Forward transfer admittance | $\|Y_{fs}\|$* | 6.2 | 11 | - | S | $V_{DS}$=10V, $I_D$=8A |
| Input capacitance | $C_{iss}$ | - | 1700 | - | pF | $V_{DS}$=25V |
| Output capacitance | $C_{oss}$ | - | 1000 | - | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | - | 35 | - | pF | f=1MHz |
| Turn-on delay time | $t_{d(on)}$* | - | 35 | - | ns | $V_{DD}$≒250V, $I_D$=8.0A |
| Rise time | $t_r$ * | - | 60 | - | ns | $V_{GS}$=10V |
| Turn-off delay time | $t_{d(off)}$* | - | 110 | - | ns | $R_L$=31.25Ω |
| Fall time | $t_f$ * | - | 35 | - | ns | $R_G$=10Ω |
| Total gate charge | $Q_g$ * | - | 46 | - | nC | $V_{DD}$≒250V |
| Gate-source charge | $Q_{gs}$ * | - | 11 | - | nC | $I_D$=8.0A |
| Gate-drain charge | $Q_{gd}$ * | - | 19 | - | nC | $V_{GS}$=10V |

*Pulsed

●**Body diode characteristics** (Source-Drain)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Forward voltage | $V_{SD}$ * | - | - | 1.5 | V | $I_S$=16A, $V_{GS}$=0V |
| Reverse recovery time | $t_{rr}$* | 75 | 100 | 125 | ns | $I_S$=16A, $V_{GS}$=0V<br>di/dt=100A/μs |

*Pulsed

## ●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics (Ⅰ)

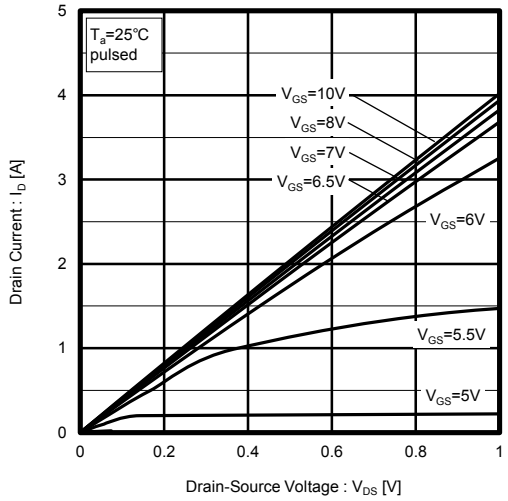



FIg.2 Typical Output Characteristics (Ⅱ)

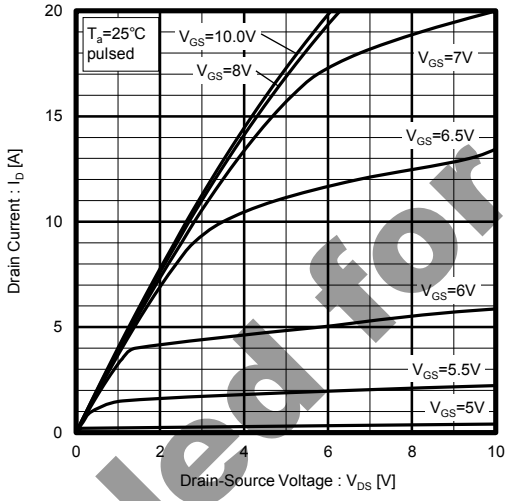



Fig.3 Typical Transfer Characteristics

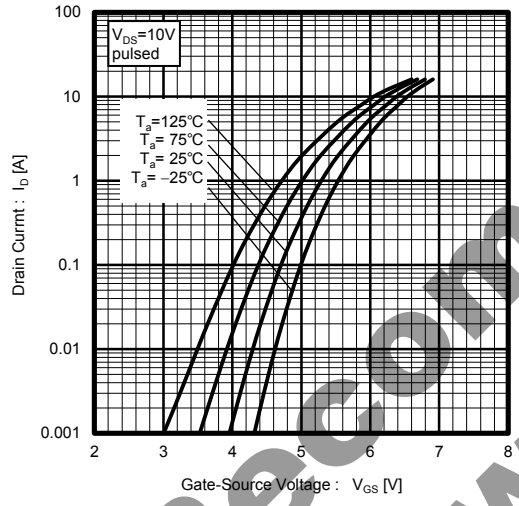



Fig.4 Gate Threshold Voltage vs. Channel Temperature

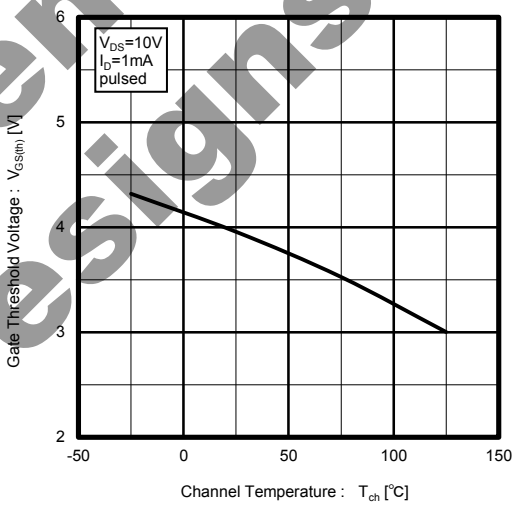



Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

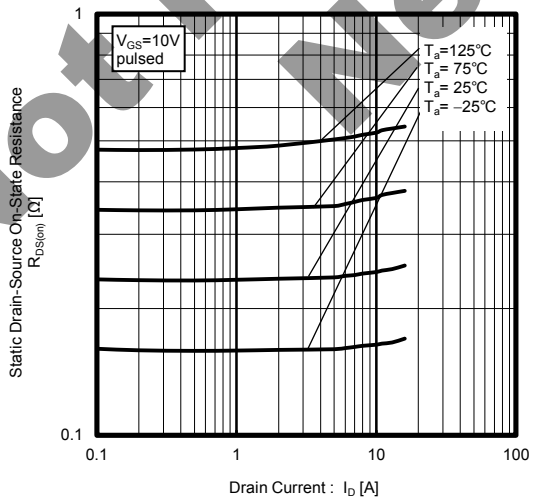



Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

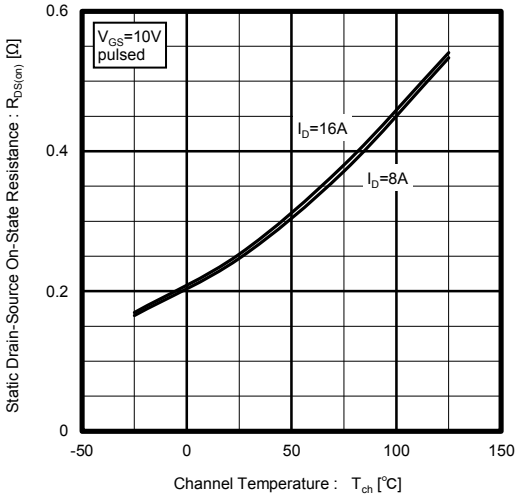


Fig.7 Forward Transfer Admittance vs. Drain Current

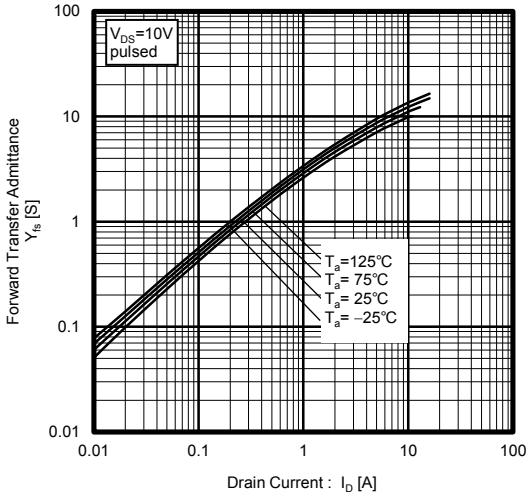



Fig.8 Source Current vs. Source-Drain Voltage

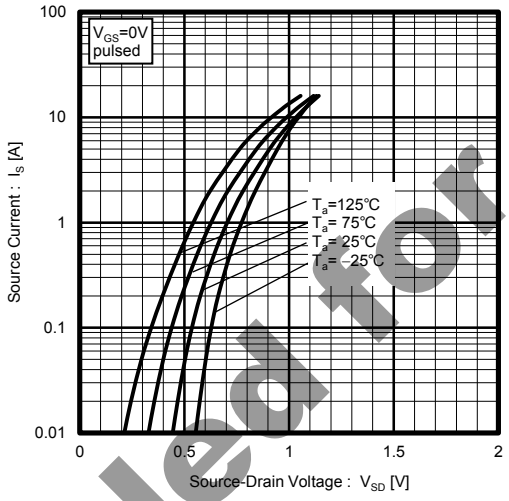



Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

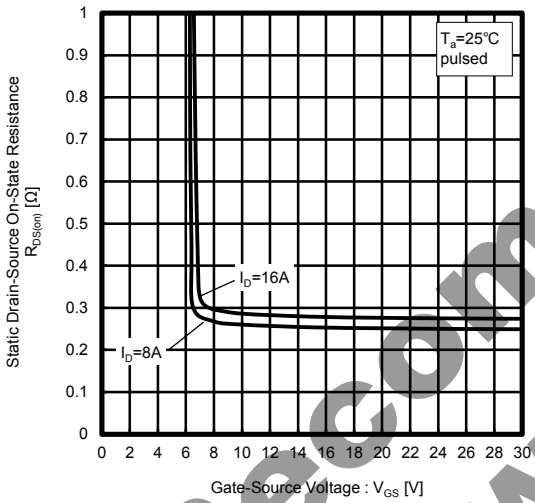



Fig.10 Switching Characteristics

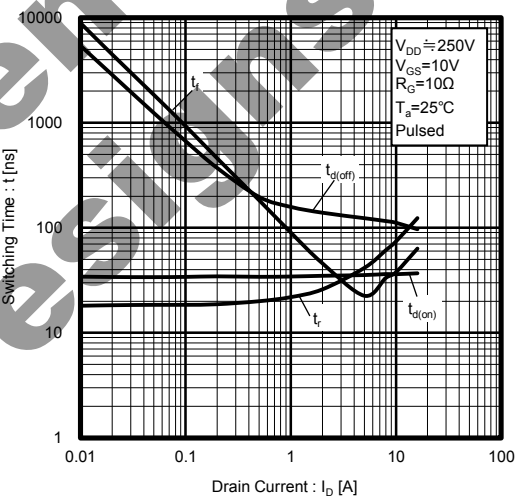



Fig.11 Dynamic Input Characteristics

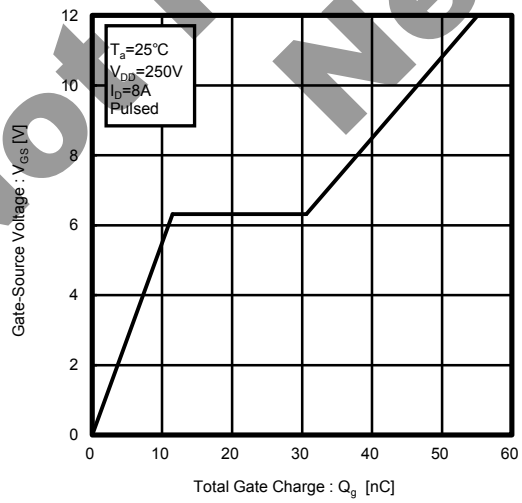



Fig.12 Typical Capacitance vs. Drain-Source Voltage

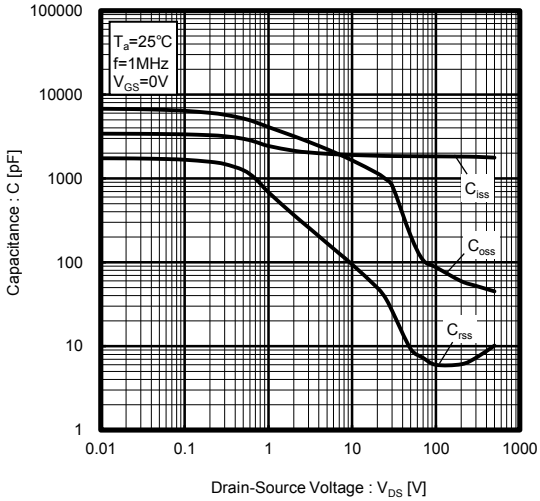


Fig.13 Normalized Transient Thermal Resistance v.s. Pulse Width

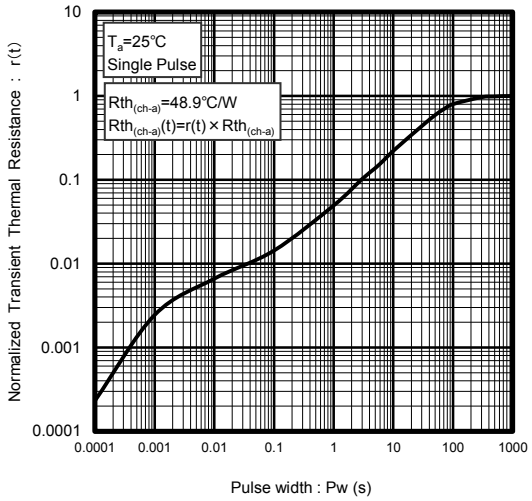



Fig.14 Maximum Safe Operating Area

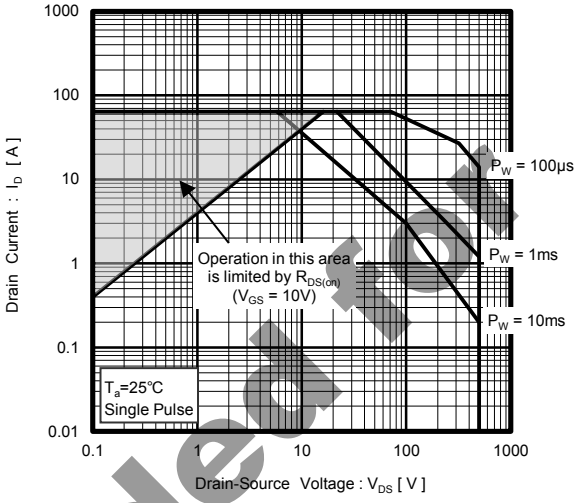
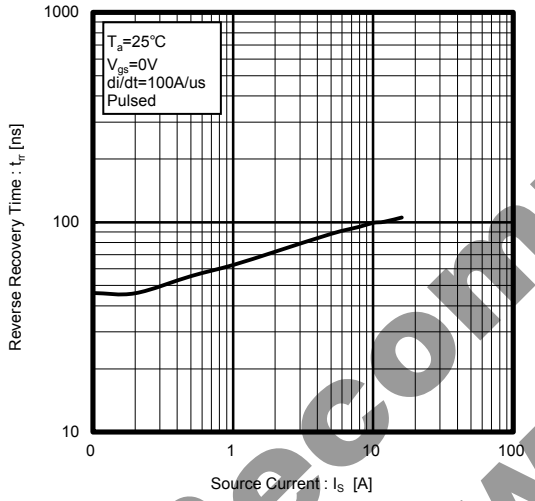



Fig.15 Reverse Recovery Time vs. Source Current



● **Measurement circuits**

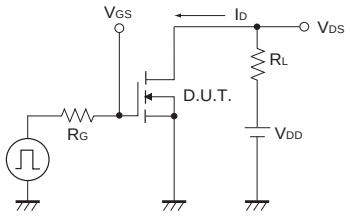



Fig.1-1 Switching Time Measurement Circuit

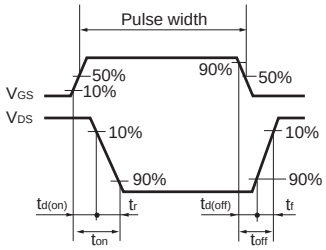



Fig.1-2 Switching Waveforms

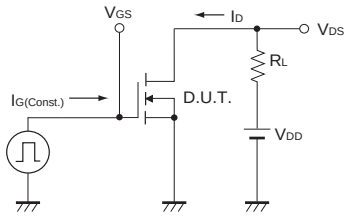



Fig.2-1 Gate Charge Measurement Circuit

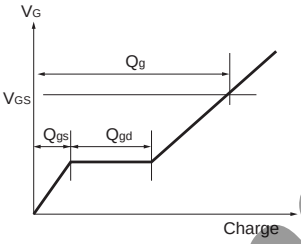



Fig.2-2 Gate Charge Waveform

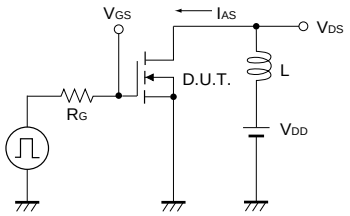



Fig.3-1 Avalanche Measurement Circuit

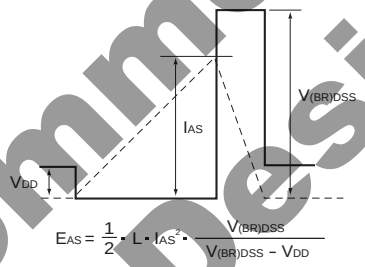



Fig.3-2 Avalanche Waveform

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