

# 10V Drive Nch MOSFET

## RCD075N20

### ● Structure

Silicon N-channel MOSFET

### ● Features

- 1) Low on-resistance.
- 2) High-speed switching.
- 3) Wide range of SOA.
- 4) Drive circuits can be simple.
- 5) Parallel use is easy.

### ● Application

Switching

### ● Packaging specifications

| Type      | Package                      | Taping |
|-----------|------------------------------|--------|
|           | Code                         | TL     |
|           | Basic ordering unit (pieces) | 2500   |
| RCD075N20 |                              | ○      |

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

| Parameter                    | Symbol      | Limits      | Unit |   |
|------------------------------|-------------|-------------|------|---|
| Drain-source voltage         | $V_{DSS}$   | 200         | V    |   |
| Gate-source voltage          | $V_{GSS}$   | ±30         | V    |   |
| Drain current                | Continuous  | $I_D$ *3    | ±7.5 | A |
|                              | Pulsed      | $I_{DP}$ *1 | ±30  | A |
| Source current (Body Diode)  | Continuous  | $I_S$ *3    | 7.5  | A |
|                              | Pulsed      | $I_{SP}$ *1 | 30   | A |
| Avalanche current            | $I_{AS}$ *2 | 3.75        | A    |   |
| Avalanche energy             | $E_{AS}$ *2 | 4.13        | mJ   |   |
| Power dissipation            | $P_D$ *4    | 20          | W    |   |
| Channel temperature          | $T_{ch}$    | 150         | °C   |   |
| Range of storage temperature | $T_{stg}$   | -55 to +150 | °C   |   |

\*1  $P_w \leq 10 \mu s$ , Duty cycle  $\leq 1\%$

\*2  $L = 500 \mu H$ ,  $V_{DB} = 50V$ ,  $R_G = 25 \Omega$ ,  $T_{ch} = 25^\circ C$

\*3 Limited only by maximum channel temperature allowed.

\*4  $T_C = 25^\circ C$

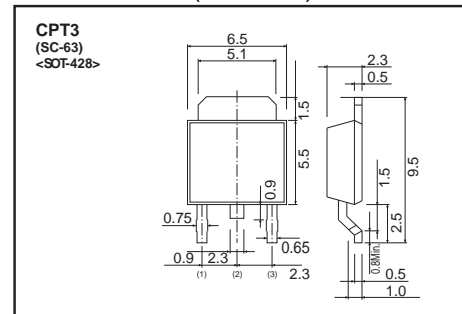
### ● Thermal resistance

| Parameter       | Symbol           | Limits | Unit   |
|-----------------|------------------|--------|--------|
| Channel to Case | $R_{th}(ch-c)$ * | 6.25   | °C / W |

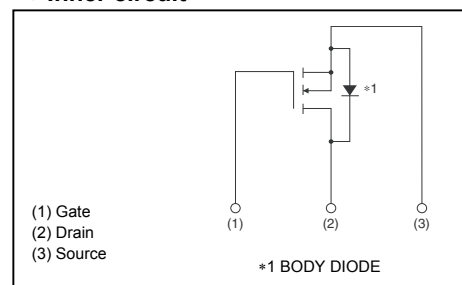
\*  $T_C = 25^\circ C$

\* Limited only by maximum channel temperature allowed.

### ● Dimensions (Unit : mm)



### ● Inner circuit



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

| Parameter                               | Symbol         | Min. | Typ. | Max.      | Unit       | Conditions                      |
|---|----------------|------|------|-----------|------------|---------------------------------|
| Gate-source leakage                     | $I_{GSS}$      | -    | -    | $\pm 100$ | nA         | $V_{GS}=\pm 30V, V_{DS}=0V$     |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$  | 200  | -    | -         | V          | $I_D=1mA, V_{GS}=0V$            |
| Zero gate voltage drain current         | $I_{DSS}$      | -    | -    | 10        | $\mu A$    | $V_{DS}=200V, V_{GS}=0V$        |
| Gate threshold voltage                  | $V_{GS(th)}$   | 3.25 | -    | 5.25      | V          | $V_{DS}=10V, I_D=1mA$           |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | -    | 250  | 325       | m $\Omega$ | $I_D=3.75A, V_{GS}=10V$         |
| Forward transfer admittance             | $ Y_{fs} ^*$   | 1.5  | 3.0  | -         | S          | $V_{DS}=10V, I_D=3.75A$         |
| Input capacitance                       | $C_{iss}$      | -    | 755  | -         | pF         | $V_{DS}=25V$                    |
| Output capacitance                      | $C_{oss}$      | -    | 55   | -         | pF         | $V_{GS}=0V$                     |
| Reverse transfer capacitance            | $C_{rss}$      | -    | 25   | -         | pF         | $f=1MHz$                        |
| Turn-on delay time                      | $t_{d(on)}^*$  | -    | 20   | -         | ns         | $V_{DD}\approx 100V, I_D=3.75A$ |
| Rise time                               | $t_r^*$        | -    | 22   | -         | ns         | $V_{GS}=10V$                    |
| Turn-off delay time                     | $t_{d(off)}^*$ | -    | 24   | -         | ns         | $R_L=26.67\Omega$               |
| Fall time                               | $t_f^*$        | -    | 12   | -         | ns         | $R_G=10\Omega$                  |
| Total gate charge                       | $Q_g^*$        | -    | 15   | -         | nC         | $V_{DD}\approx 100V, I_D=7.5A$  |
| Gate-source charge                      | $Q_{gs}^*$     | -    | 6    | -         | nC         | $V_{GS}=10V$                    |
| Gate-drain charge                       | $Q_{gd}^*$     | -    | 6    | -         | nC         |                                 |

\*Pulsed

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

| Parameter       | Symbol     | Min. | Typ. | Max. | Unit | Conditions            |
|-----------------|------------|------|------|------|------|-----------------------|
| Forward Voltage | $V_{SD}^*$ | -    | -    | 1.5  | V    | $I_s=7.5A, V_{GS}=0V$ |

\*Pulsed

●Electrical characteristic curves (Ta=25°C)

Fig.1 Typical Output Characteristics ( I )

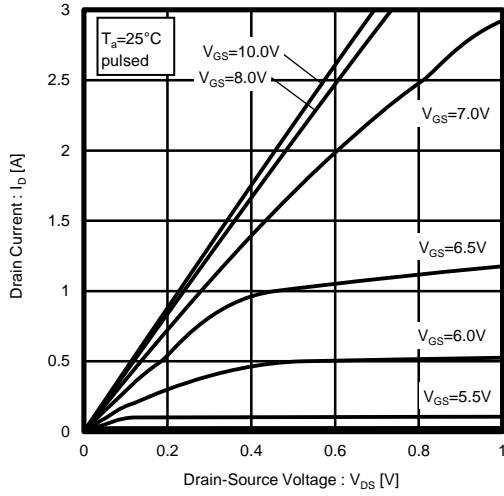


Fig.2 Typical Output Characteristics ( II )

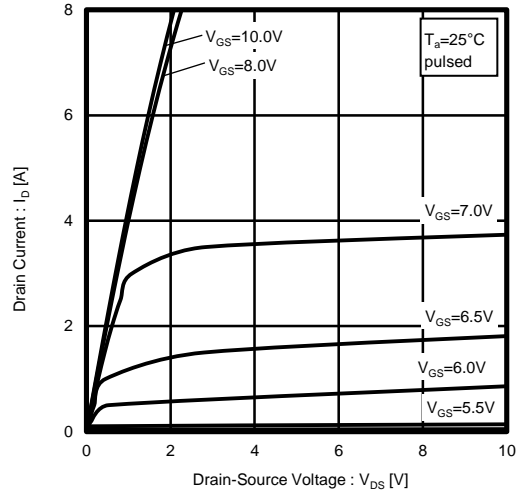


Fig.3 Typical Transfer Characteristics

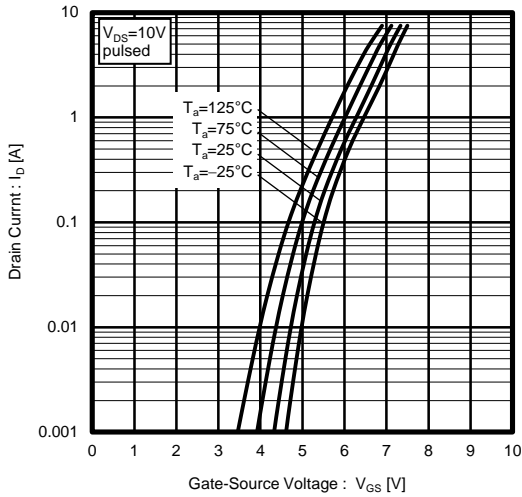


Fig.4 Gate Threshold Voltage vs. Channel Temperature

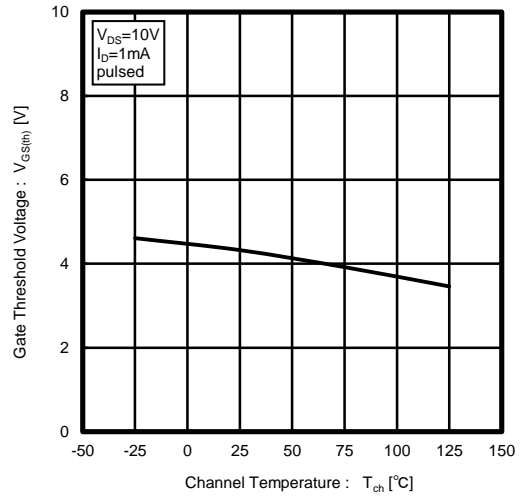


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

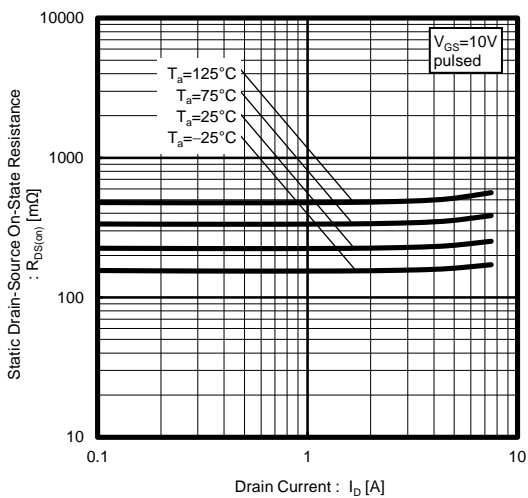


Fig.6 Static Drain-Source On-State Resistance vs. Channel Temperature

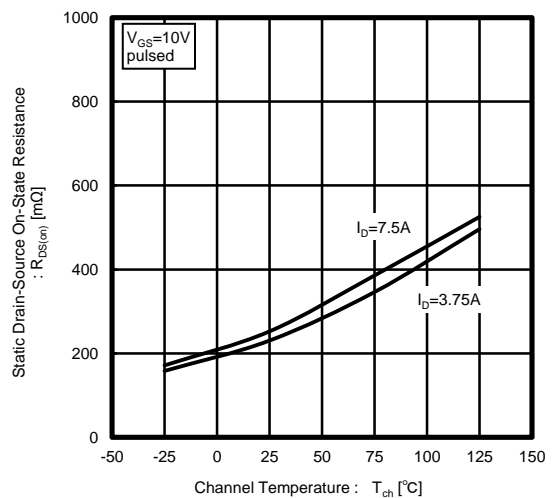


Fig.7 Forward Transfer Admittance vs. Drain Current

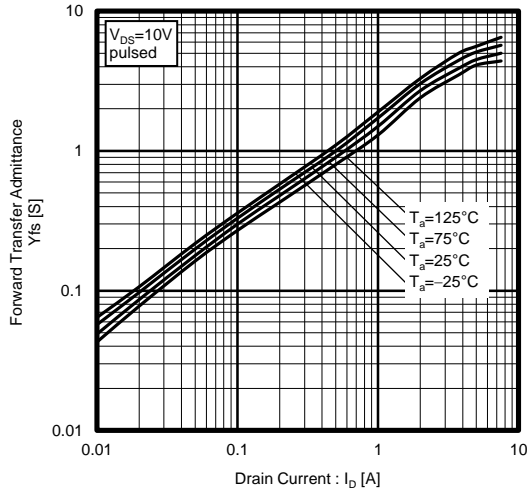


Fig.8 Source Current vs. Source-Drain Voltage

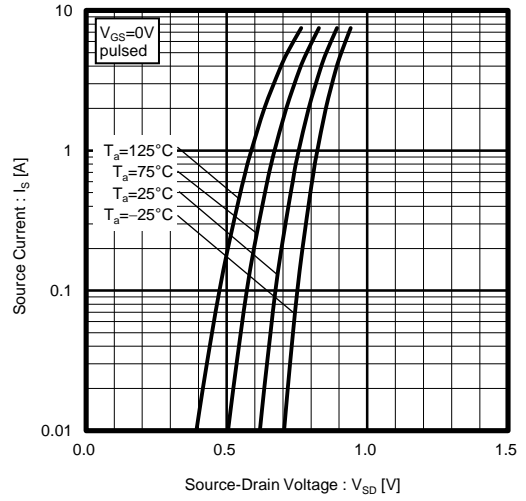


Fig.9 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

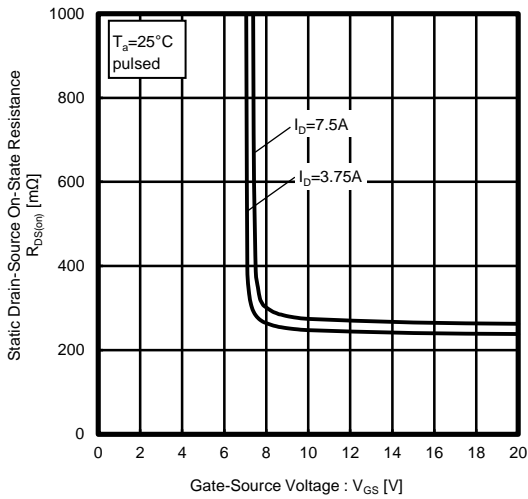


Fig.10 Switching Characteristics

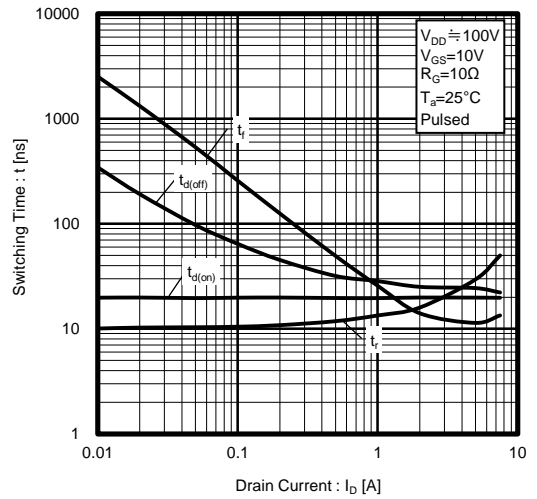


Fig.11 Dynamic Input Characteristics

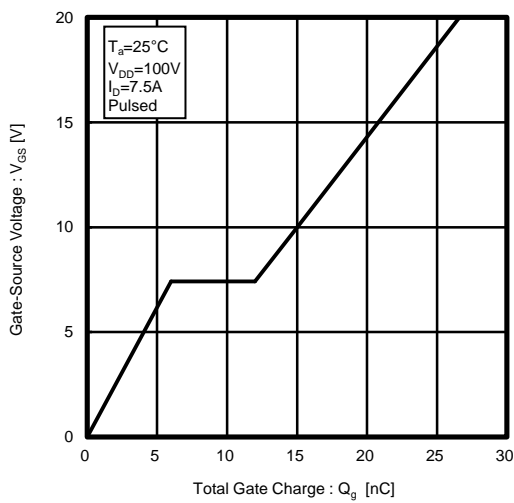
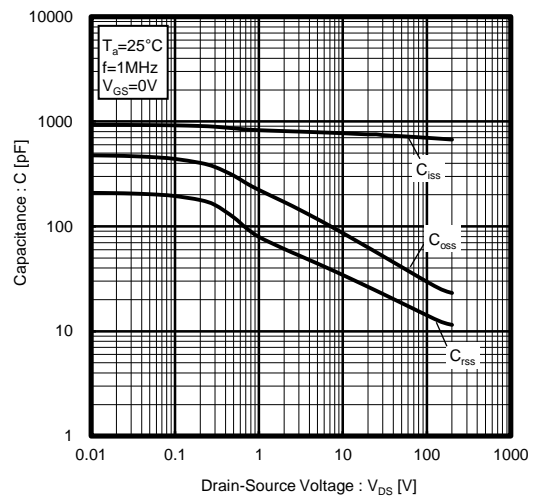


Fig.12 Typical Capacitance vs. Drain-Source Voltage



● Measurement circuits

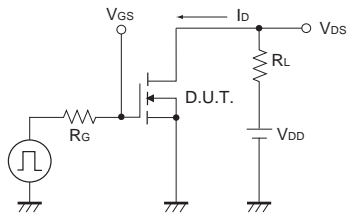


Fig.1-1 Switching Time Measurement Circuit

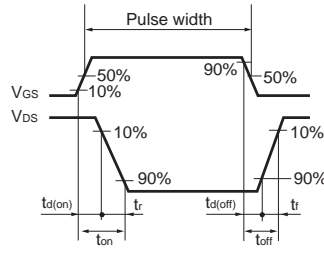


Fig.1-2 Switching Waveforms

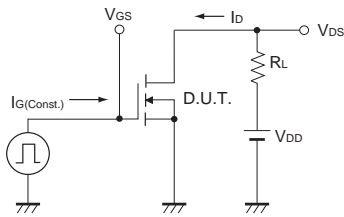


Fig.2-1 Gate Charge Measurement Circuit

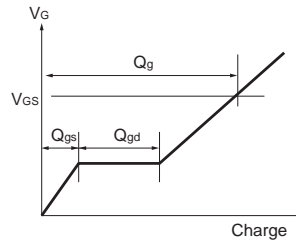


Fig.2-2 Gate Charge Waveform

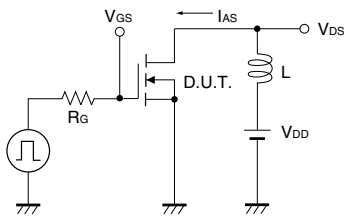


Fig.3-1 Avalanche Measurement Circuit

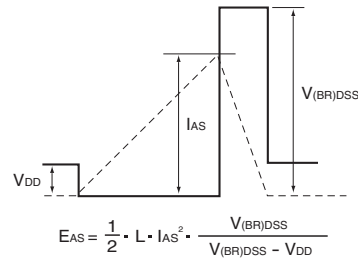


Fig.3-2 Avalanche Waveform

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