

# DC-DC Converter (-30V, -3A)

## RSQ030P03

### ●Features

- 1) Low On-resistance.(90mΩ at 4.5V)
- 2) High Power Package.
- 3) High speed switching.
- 4) Low voltage drive.(4.5V)

### ●Applications

DC-DC converter

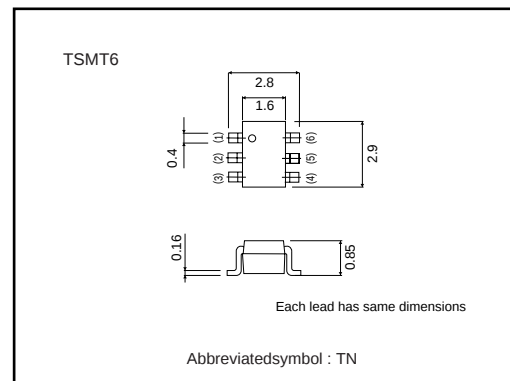
### ●Structure

Silicon P-channel  
MOSFET

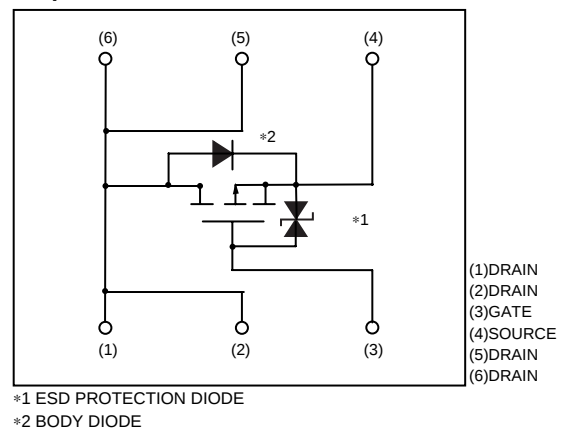
### ●Packaging specifications

| Type      | Package                      | Taping |
|-----------|------------------------------|--------|
|           | Code                         | TR     |
|           | Basic ordering unit (pieces) | 3000   |
| RSQ030P03 |                              | ○      |

### ●External dimensions (Units : mm)



### ●Equivalent circuit



## Transistor

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

| Parameter                      |            | Symbol           | Limits   | Unit             |
|--------------------------------|------------|------------------|----------|------------------|
| Drain-source voltage           |            | V <sub>DSS</sub> | −30      | V                |
| Gate-source voltage            |            | V <sub>GSS</sub> | ±20      | V                |
| Drain current                  | Continuous | I <sub>D</sub>   | ±3       | A                |
|                                | Pulsed     | I <sub>DP</sub>  | ±12      | A * <sup>1</sup> |
| Source current<br>(Body diode) | Continuous | I <sub>S</sub>   | −1       | A                |
|                                | Pulsed     | I <sub>SP</sub>  | −4       | A * <sup>1</sup> |
| Total power dissipation        |            | P <sub>D</sub>   | 1.25     | W* <sup>2</sup>  |
| Channel temperature            |            | T <sub>ch</sub>  | 150      | °C               |
| Range of Storage temperature   |            | T <sub>stg</sub> | −55~+150 | °C               |

\*1 Pw≤10μs, Duty cycle≤1%

\*2 Mounted on a ceramic board

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

| Parameter                               | Symbol                | Min. | Typ. | Max. | Unit | Conditions                                                                                                             |
|-----------------------------------------|-----------------------|------|------|------|------|------------------------------------------------------------------------------------------------------------------------|
| Gate-source leakage                     | I <sub>GSS</sub>      | −    | −    | ±10  | μA   | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                             |
| Drain-source breakdown voltage          | V <sub>(BR)DSS</sub>  | −30  | −    | −    | V    | I <sub>D</sub> =−1mA, V <sub>GS</sub> =0V                                                                              |
| Zero gate voltage drain current         | I <sub>DSS</sub>      | −    | −    | −1   | μA   | V <sub>DS</sub> =−30V, V <sub>GS</sub> =0V                                                                             |
| Gate threshold voltage                  | V <sub>GS(th)</sub>   | −1.0 | −    | −2.5 | V    | V <sub>DS</sub> =−10V, I <sub>D</sub> =−1mA                                                                            |
| Static drain-source on-state resistance | R <sub>DS(on)</sub> * | −    | 60   | 80   | mΩ   | I <sub>D</sub> =−3A, V <sub>GS</sub> =−10V                                                                             |
|                                         |                       | −    | 90   | 125  | mΩ   | I <sub>D</sub> =−3A, V <sub>GS</sub> =−4.5V                                                                            |
|                                         |                       | −    | 100  | 140  | mΩ   | I <sub>D</sub> =−1.5A, V <sub>GS</sub> =−4.0V                                                                          |
| Foward transfer admittance              | Y <sub>fs</sub>   *   | 1.5  | −    | −    | S    | V <sub>DS</sub> =−10V, I <sub>D</sub> =−1.5A                                                                           |
| Input capacitance                       | C <sub>iss</sub>      | −    | 440  | −    | pF   | V <sub>DS</sub> =−10V, V <sub>GS</sub> =0V<br>f=1MHz                                                                   |
| Output capacitance                      | C <sub>oss</sub>      | −    | 110  | −    | pF   |                                                                                                                        |
| Reverse transfer capacitance            | C <sub>rss</sub>      | −    | 80   | −    | pF   |                                                                                                                        |
| Turn-on delay time                      | t <sub>d(on)</sub> *  | −    | 10   | −    | ns   | I <sub>D</sub> =−1.5A<br>V <sub>DD</sub> ≐−15V<br>V <sub>GS</sub> =−10V<br>R <sub>L</sub> =10Ω<br>R <sub>GS</sub> =10Ω |
| Rise time                               | t <sub>r</sub> *      | −    | 13   | −    | ns   |                                                                                                                        |
| Turn-off delay time                     | t <sub>d(off)</sub> * | −    | 40   | −    | ns   |                                                                                                                        |
| Fall time                               | t <sub>f</sub> *      | −    | 12   | −    | ns   |                                                                                                                        |
| Total gate charge                       | Q <sub>g</sub>        | −    | 6.0  | −    | nC   | V <sub>DD</sub> ≐−15V<br>V <sub>GS</sub> =−5V<br>I <sub>D</sub> =−3A                                                   |
| Gate-source charge                      | Q <sub>gs</sub>       | −    | 1.6  | −    | nC   |                                                                                                                        |
| Gate-drain charge                       | Q <sub>gd</sub>       | −    | 2.0  | −    | nC   |                                                                                                                        |

\*PULSED

Body diode characteristics (source-drain characteristics)

|                 |                 |   |   |      |   |                                          |
|-----------------|-----------------|---|---|------|---|------------------------------------------|
| Forward voltage | V <sub>SD</sub> | − | − | −1.2 | V | I <sub>S</sub> =−1A, V <sub>GS</sub> =0V |
|-----------------|-----------------|---|---|------|---|------------------------------------------|

## Transistor

## ●Electrical characteristic curves

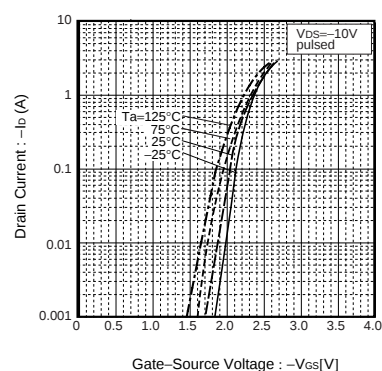


Fig.1 Typical Transfer Characteristics

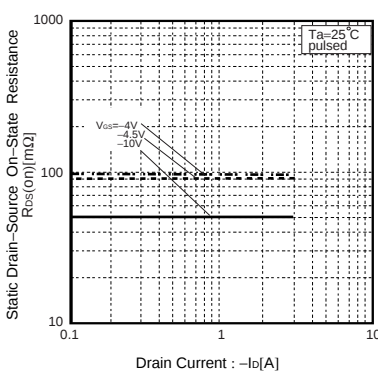


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

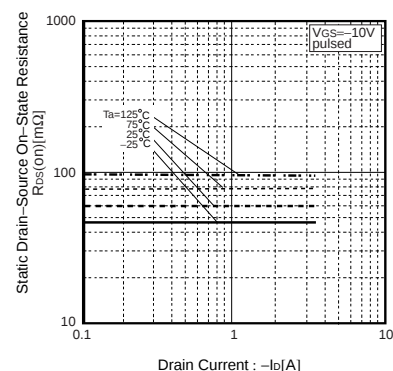


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

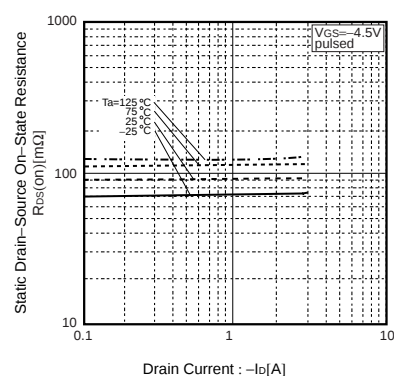


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

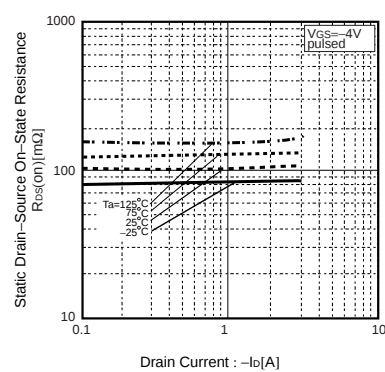


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

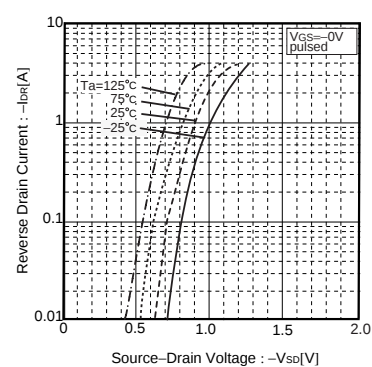


Fig.6 Reverse Drain Current vs. Source-Drain Voltage

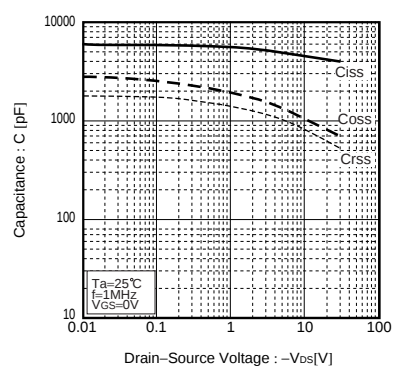


Fig.7 Typical Capacitance vs. Drain-Source Voltage

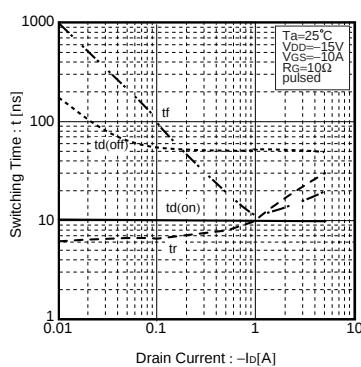


Fig.8 Switching Characteristics

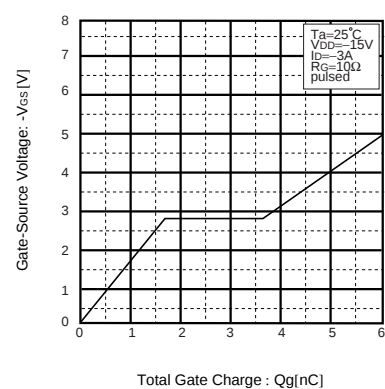


Fig.9 Dynamic Input Characteristics

## Transistor

## ●Measurement circuits

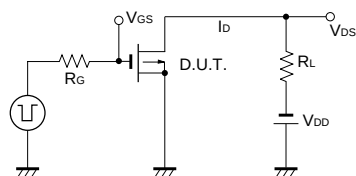


Fig.10 Switching Time Measurement Circuit

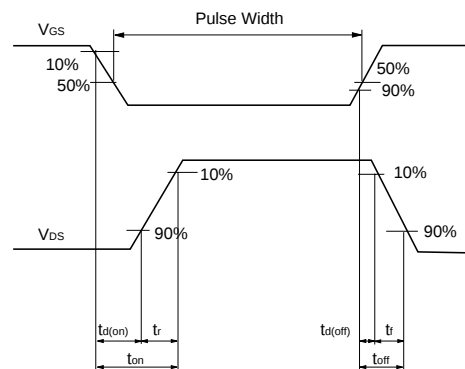


Fig.11 Switching Waveforms

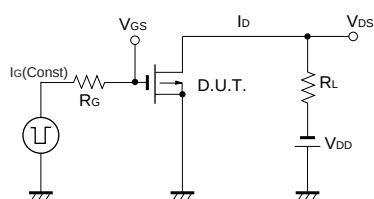


Fig.12 Gate Charge Measurement Circuit

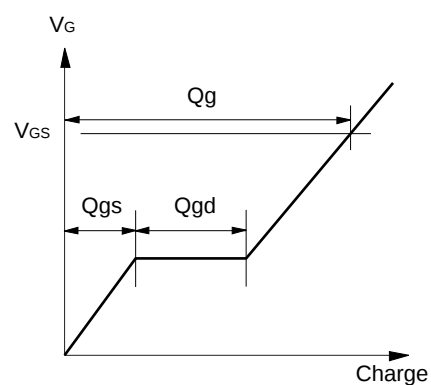


Fig.13 Gate Charge Waveforms

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