

|                    |               |
|--------------------|---------------|
| $V_{DSS}$          | -100V         |
| $R_{DS(on)}(Max.)$ | 200m $\Omega$ |
| $I_D$              | $\pm 13A$     |
| $P_D$              | 20W           |

## ●Features

- 1) Low on - resistance
- 2) Fast switching speed
- 3) Drive circuits can be simple
- 4) Parallel use is easy
- 5) Pb-free lead plating ; RoHS compliant
- 6) AEC-Q101 Qualified

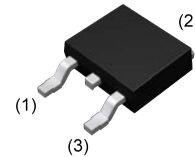
## ●Application

Switching

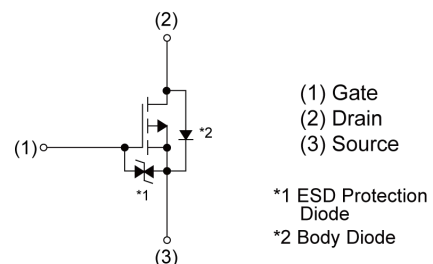
## ●Outline

DPAK

TO-252



## ●Inner circuit



## ●Packaging specifications

| Type | Packing         | Embossed Tape |
|------|-----------------|---------------|
|      | Reel size (mm)  | 330           |
|      | Tape width (mm) | 16            |
|      | Quantity (pcs)  | 2500          |
|      | Taping code     | TL            |
|      | Marking         | RD3P130SP     |

## ●Absolute maximum ratings ( $T_a = 25^\circ C$ , unless otherwise specified)

| Parameter                                        | Symbol        | Value       | Unit       |
|--------------------------------------------------|---------------|-------------|------------|
| Drain - Source voltage                           | $V_{DSS}$     | -100        | V          |
| Continuous drain current                         | $I_D^{*1}$    | $\pm 13$    | A          |
| Pulsed drain current                             | $I_{DP}^{*2}$ | $\pm 52$    | A          |
| Gate - Source voltage                            | $V_{GSS}$     | $\pm 20$    | V          |
| Power dissipation                                | $P_D^{*3}$    | 20          | W          |
| Junction temperature                             | $T_j$         | 150         | $^\circ C$ |
| Operating junction and storage temperature range | $T_{stg}$     | -55 to +150 | $^\circ C$ |

## ● Thermal resistance

| Parameter                           | Symbol          | Values |      |      | Unit |
|-------------------------------------|-----------------|--------|------|------|------|
|                                     |                 | Min.   | Typ. | Max. |      |
| Thermal resistance, junction - case | $R_{thJC}^{*3}$ | -      | -    | 6.25 | °C/W |

● Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

| Parameter                                      | Symbol                                  | Conditions                                       | Values |       |      | Unit  |
|------------------------------------------------|-----------------------------------------|--------------------------------------------------|--------|-------|------|-------|
|                                                |                                         |                                                  | Min.   | Typ.  | Max. |       |
| Drain - Source breakdown voltage               | $V_{(BR)DSS}$                           | $V_{GS} = 0V, I_D = -1mA$                        | -100   | -     | -    | V     |
| Breakdown voltage temperature coefficient      | $\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$ | $I_D = -1mA$<br>referenced to $25^\circ\text{C}$ | -      | -91.3 | -    | mV/°C |
| Zero gate voltage drain current                | $I_{DSS}$                               | $V_{DS} = -100V, V_{GS} = 0V$                    | -      | -     | -1   | μA    |
| Gate - Source leakage current                  | $I_{GSS}$                               | $V_{GS} = \pm 20V, V_{DS} = 0V$                  | -      | -     | ±10  | μA    |
| Gate threshold voltage                         | $V_{GS(th)}$                            | $V_{DS} = -10V, I_D = -1mA$                      | -1.0   | -     | -2.5 | V     |
| Gate threshold voltage temperature coefficient | $\frac{\Delta V_{GS(th)}}{\Delta T_j}$  | $I_D = -1mA$<br>referenced to $25^\circ\text{C}$ | -      | 3.0   | -    | mV/°C |
| Static drain - source on - state resistance    | $R_{DS(on)}^{*4}$                       | $V_{GS} = -10V, I_D = -6.5A$                     | -      | 135   | 200  | mΩ    |
|                                                |                                         | $V_{GS} = -4.5V, I_D = -6.5A$                    | -      | 150   | 220  |       |
|                                                |                                         | $V_{GS} = -4.0V, I_D = -6.5A$                    | -      | 155   | 230  |       |
| Gate resistance                                | $R_G$                                   | $f = 1MHz, \text{open drain}$                    | -      | 6.0   | -    | Ω     |
| Forward Transfer Admittance                    | $ Y_{fs} ^{*4}$                         | $V_{DS} = -10V, I_D = -13A$                      | 10     | -     | -    | S     |

\*1 Limited only by maximum temperature allowed.

\*2  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$

\*3  $T_c = 25^\circ\text{C}$

\*4 Pulsed

**●Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

| Parameter                    | Symbol            | Conditions                           | Values |      |      | Unit |
|------------------------------|-------------------|--------------------------------------|--------|------|------|------|
|                              |                   |                                      | Min.   | Typ. | Max. |      |
| Input capacitance            | $C_{iss}$         | $V_{GS} = 0V$                        | -      | 2400 | -    | pF   |
| Output capacitance           | $C_{oss}$         | $V_{DS} = -25V$                      | -      | 100  | -    |      |
| Reverse transfer capacitance | $C_{rss}$         | $f = 1\text{MHz}$                    | -      | 65   | -    |      |
| Turn - on delay time         | $t_{d(on)}^{*4}$  | $V_{DD} \approx -50V, V_{GS} = -10V$ | -      | 20   | -    | ns   |
| Rise time                    | $t_r^{*4}$        | $I_D = -6.5A$                        | -      | 25   | -    |      |
| Turn - off delay time        | $t_{d(off)}^{*4}$ | $R_L \approx 7.68\Omega$             | -      | 70   | -    |      |
| Fall time                    | $t_f^{*4}$        | $R_G = 10\Omega$                     | -      | 60   | -    |      |

**●Gate charge characteristics** ( $T_a = 25^\circ\text{C}$ )

| Parameter            | Symbol        | Conditions                                                 | Values |      |      | Unit |
|----------------------|---------------|------------------------------------------------------------|--------|------|------|------|
|                      |               |                                                            | Min.   | Typ. | Max. |      |
| Total gate charge    | $Q_g^{*4}$    | $V_{DD} \approx -50V,$<br>$I_D = -13A,$<br>$V_{GS} = -10V$ | -      | 40   | -    | nC   |
| Gate - Source charge | $Q_{gs}^{*4}$ |                                                            | -      | 6    | -    |      |
| Gate - Drain charge  | $Q_{gd}^{*4}$ |                                                            | -      | 6    | -    |      |

**●Body diode electrical characteristics** (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

| Parameter                  | Symbol        | Conditions                | Values |      |      | Unit |
|----------------------------|---------------|---------------------------|--------|------|------|------|
|                            |               |                           | Min.   | Typ. | Max. |      |
| Continuous forward current | $I_S^{*1}$    | $T_a = 25^\circ\text{C}$  | -      | -    | -13  | A    |
| Pulse forward current      | $I_{SP}^{*2}$ |                           | -      | -    | -52  | A    |
| Forward voltage            | $V_{SD}^{*4}$ | $V_{GS} = 0V, I_S = -13A$ | -      | -    | -1.2 | V    |

## ●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve



Fig.2 Maximum Safe Operating Area

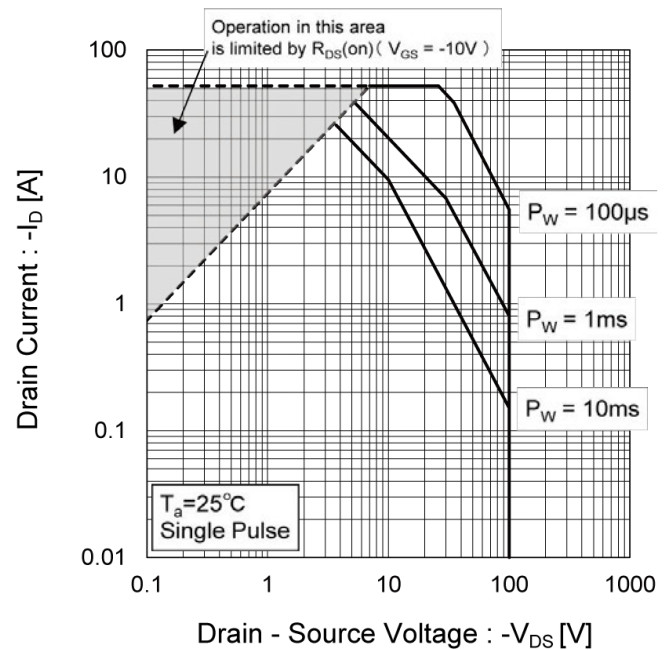


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

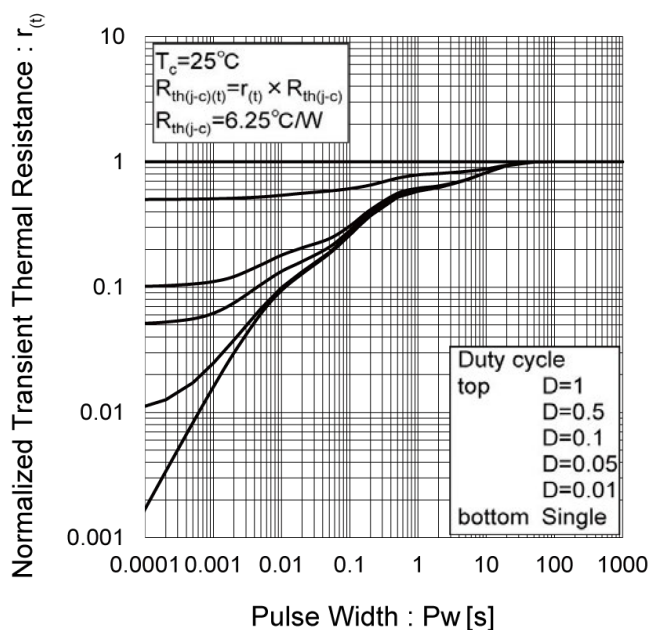
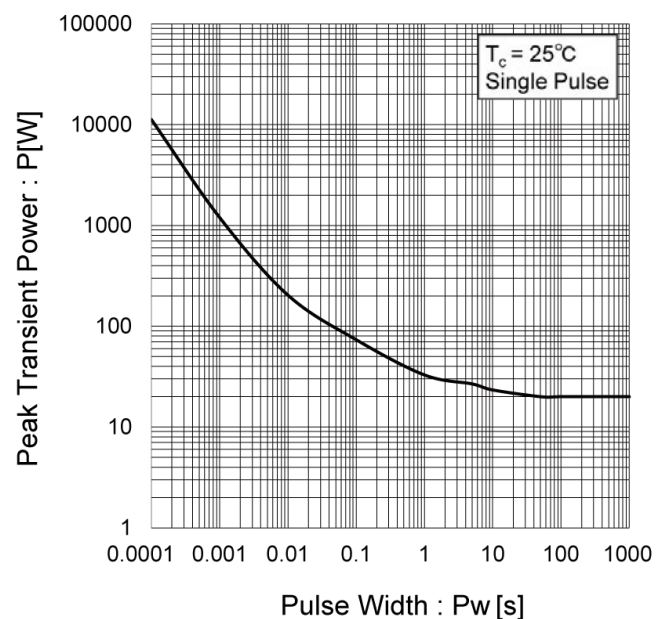


Fig.4 Single Pulse Maximum Power dissipation



## ●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

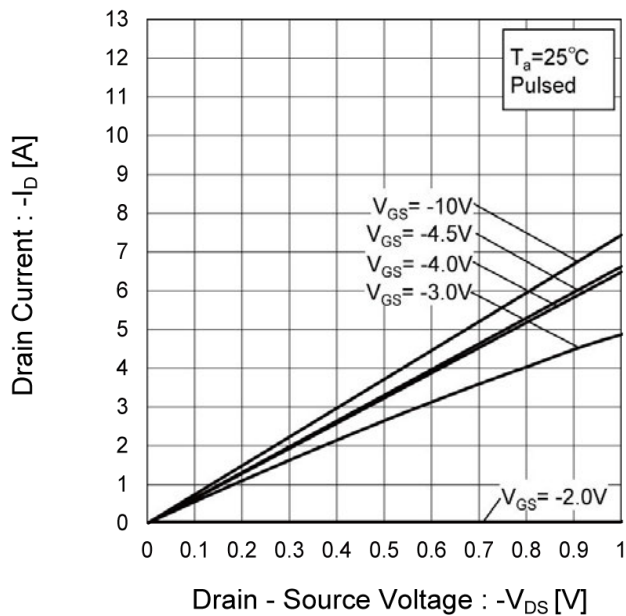


Fig.6 Typical Output Characteristics(II)

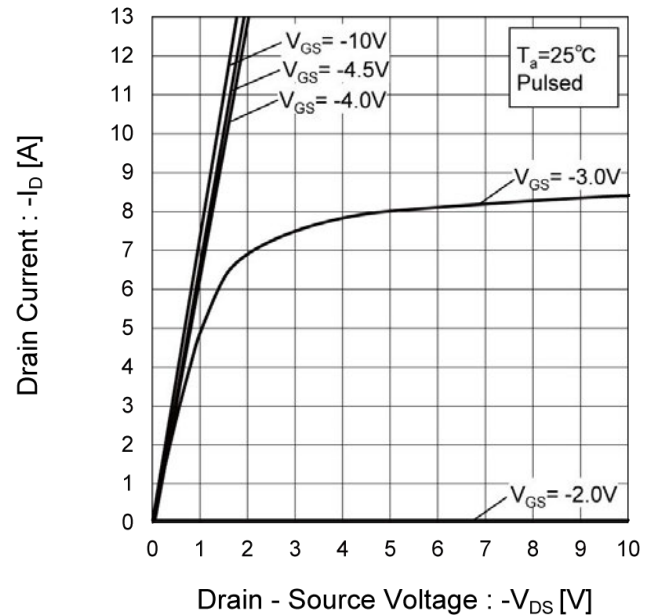
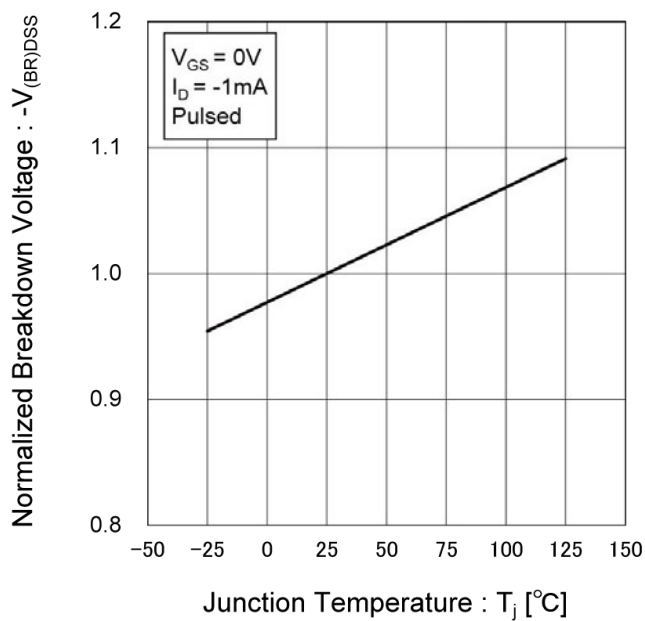


Fig.7 Breakdown Voltage vs. Junction Temperature



## ●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

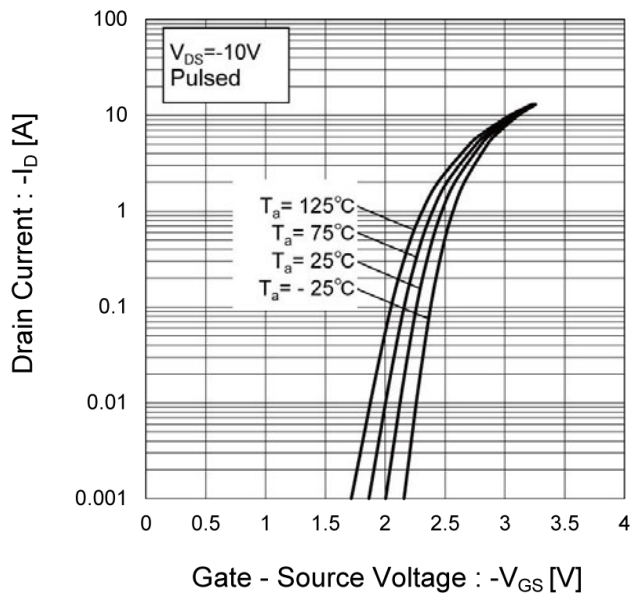


Fig.9 Gate Threshold Voltage vs. Junction Temperature

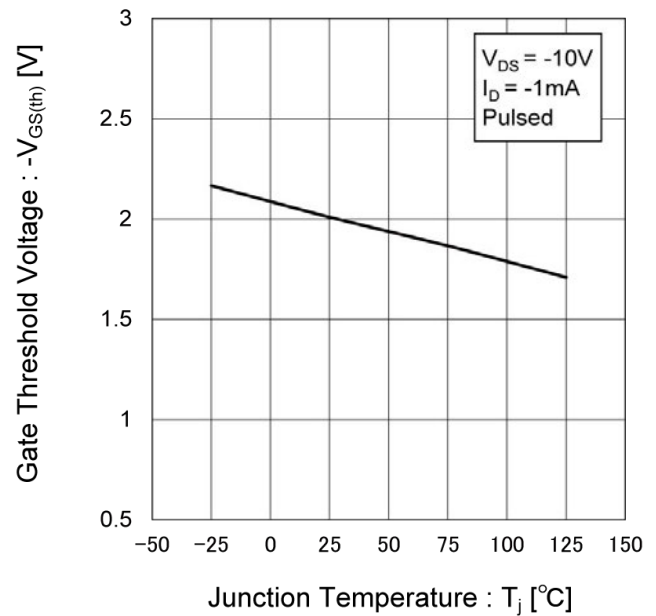
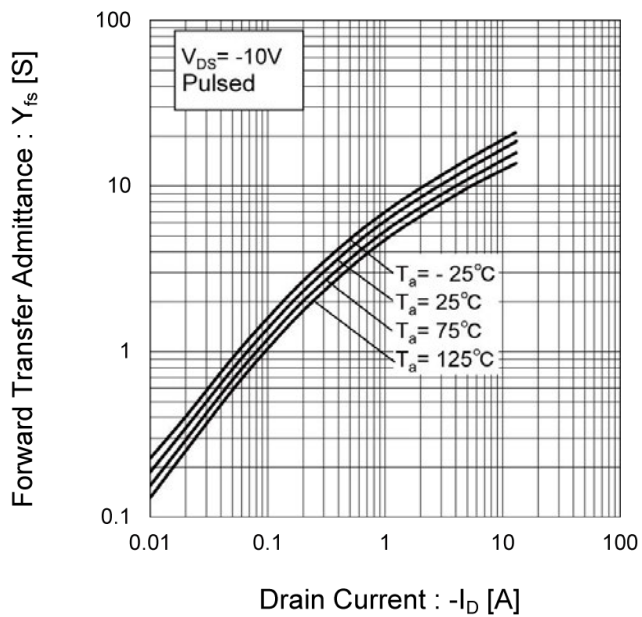


Fig.10 Forward Transfer Admittance vs. Drain Current



# ●Electrical characteristic curves

Fig.11 Drain Current Derating Curve



Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

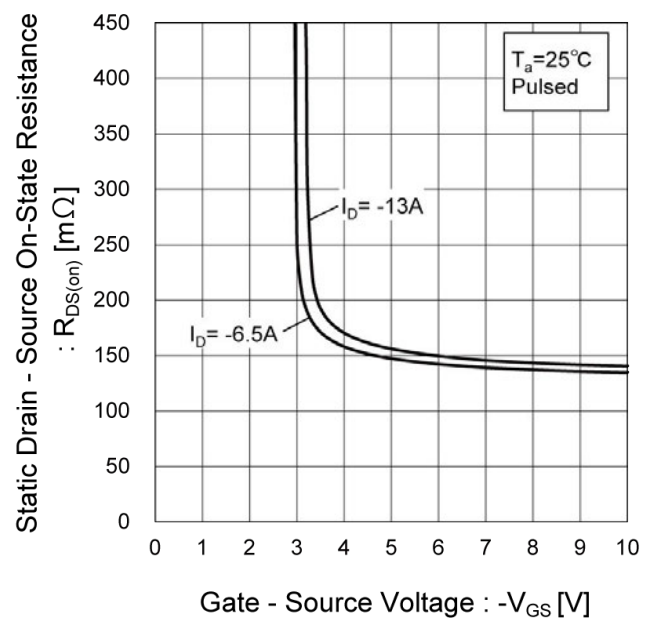
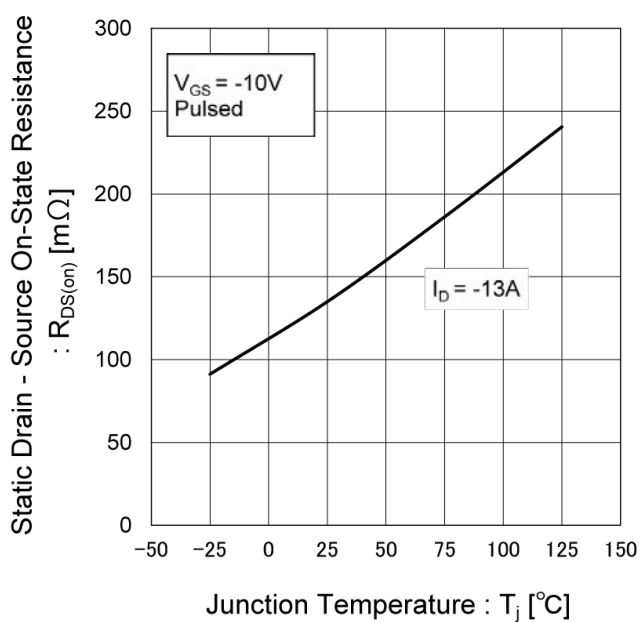


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



# ●Electrical characteristic curves

Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

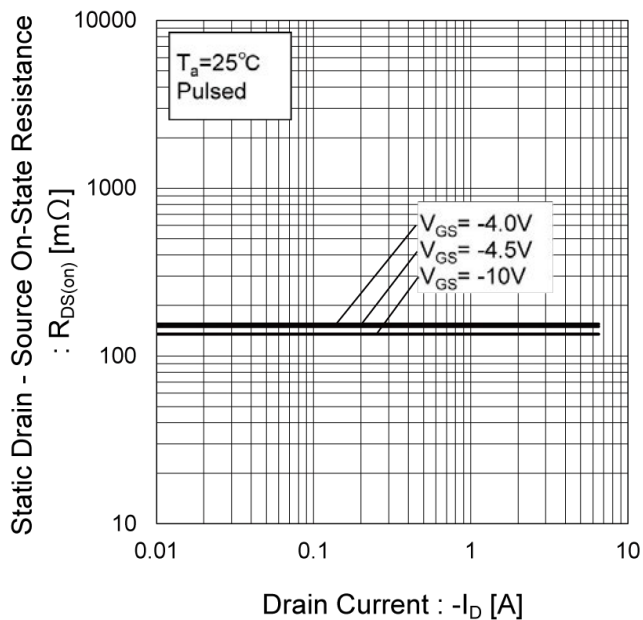


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

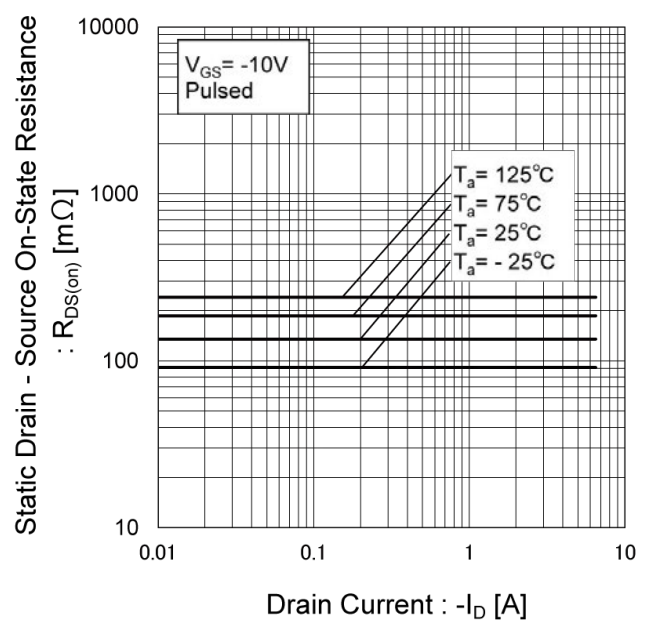


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)

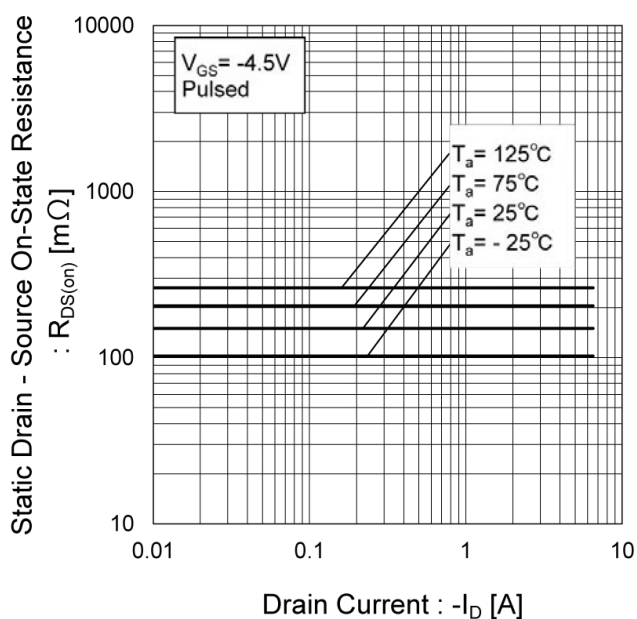
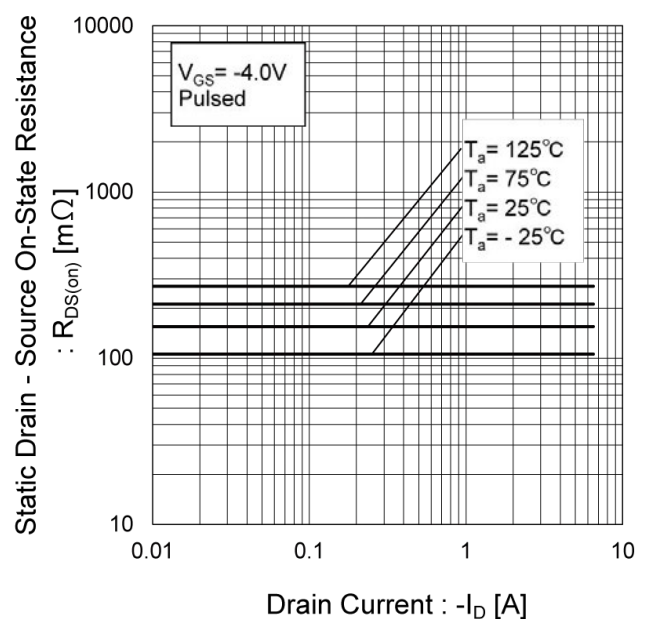


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(IV)



## ●Electrical characteristic curves

Fig.18 Typical Capacitance vs.  
Drain - Source Voltage

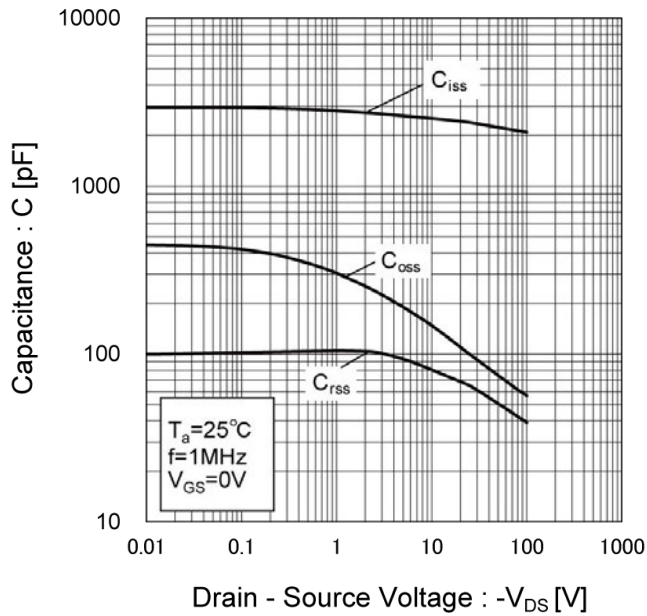


Fig.19 Switching Characteristics

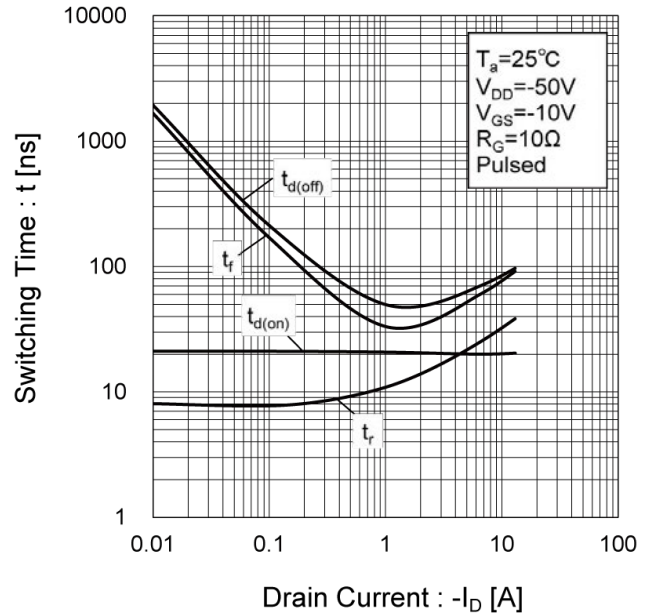


Fig.20 Dynamic Input Characteristics

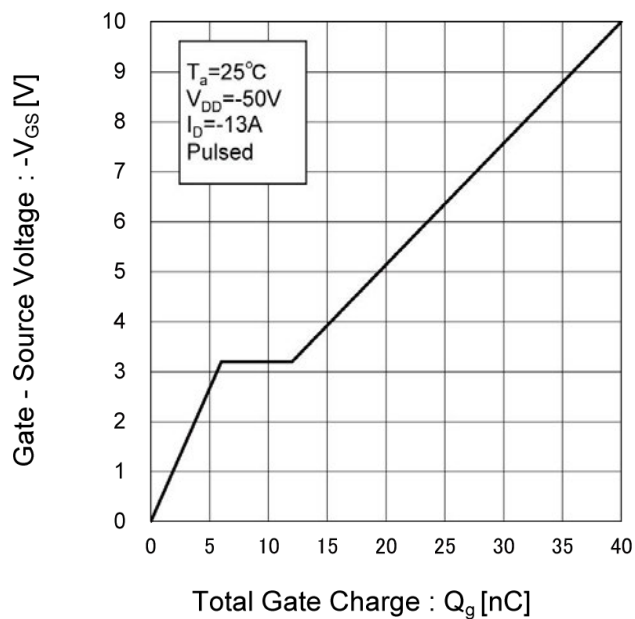
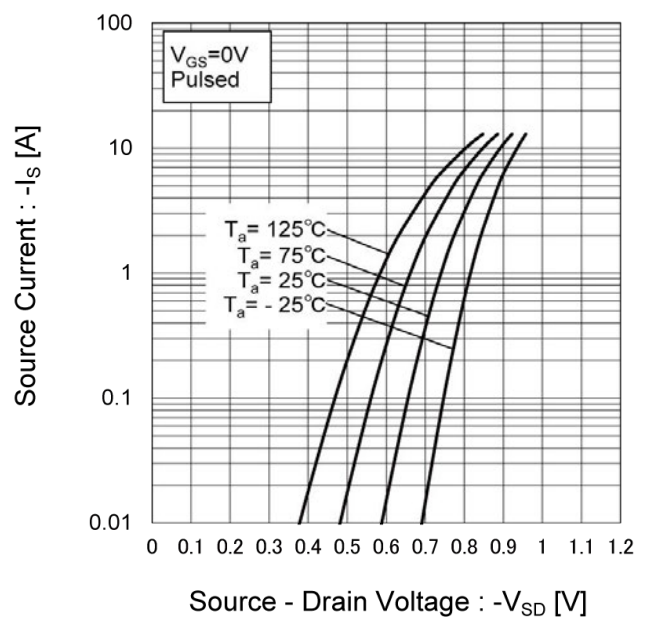


Fig.21 Source Current vs.  
Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

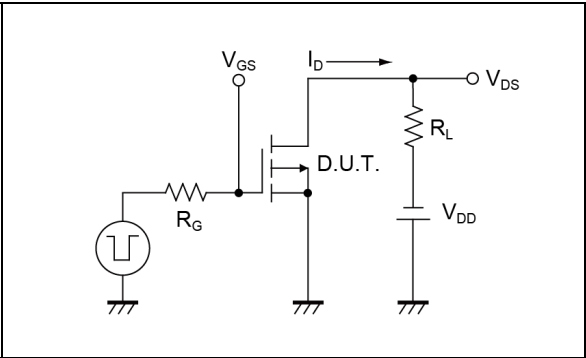


Fig.1-2 Switching Waveforms

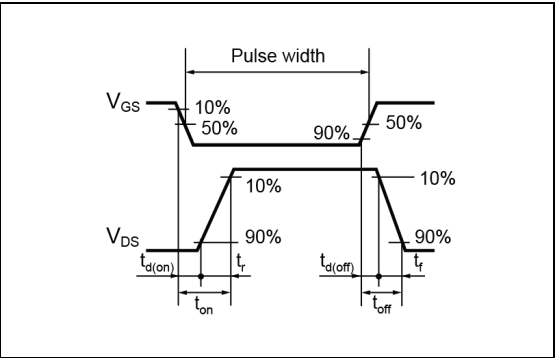


Fig.2-1 Gate Charge Measurement Circuit

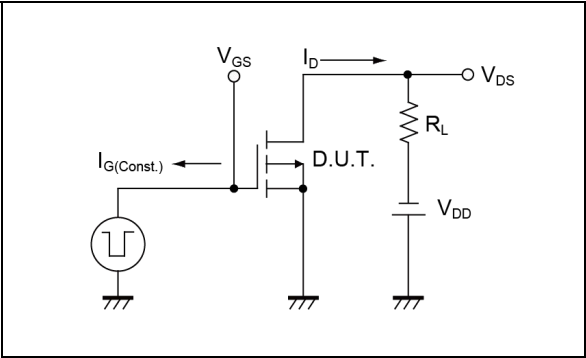
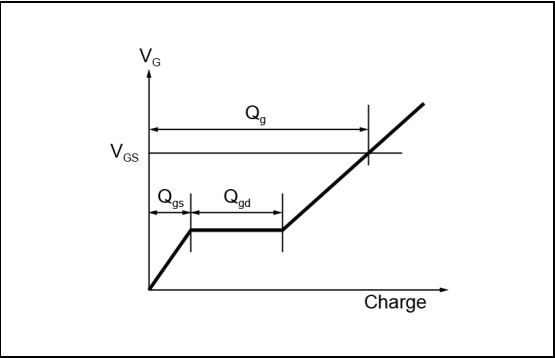


Fig.2-2 Gate Charge Waveform



# ●Dimensions



Pattern of terminal position areas  
[Not a recommended pattern of soldering pads]

| DIM | MILIMETERS |       | INCHES |       |
|-----|------------|-------|--------|-------|
|     | MIN        | MAX   | MIN    | MAX   |
| A   | 2.10       | 2.30  | 0.083  | 0.091 |
| A1  | 0.70       | 1.10  | 0.028  | 0.043 |
| b   | 0.65       | 0.85  | 0.026  | 0.033 |
| b1  | 5.10       | 5.40  | 0.201  | 0.213 |
| b2  | 5.10       |       | 0.201  |       |
| c   | 0.40       | 0.60  | 0.016  | 0.024 |
| c1  | 0.40       | 0.60  | 0.016  | 0.024 |
| D   | 6.40       | 6.80  | 0.252  | 0.268 |
| e   | 2.30       |       | 0.091  |       |
| E   | 6.00       | 6.40  | 0.236  | 0.252 |
| HE  | 9.50       | 10.50 | 0.374  | 0.413 |
| L   | 2.90       |       | 0.114  |       |
| L1  | 0.70       | 0.90  | 0.028  | 0.035 |
| L2  | 0.70       | 1.30  | 0.028  | 0.051 |
| L3  | 5.30       |       | 0.209  |       |
| x   | -          | 0.10  | -      | 0.004 |
| y   | -          | 0.10  | -      | 0.004 |

| DIM | MILIMETERS |       | INCHES |       |
|-----|------------|-------|--------|-------|
|     | MIN        | MAX   | MIN    | MAX   |
| b3  | -          | 1.10  | -      | 0.043 |
| b4  | -          | 5.40  | -      | 0.213 |
| I1  | -          | 2.90  | -      | 0.114 |
| I2  | -          | 5.50  | -      | 0.217 |
| I3  | -          | 10.50 | -      | 0.413 |

Dimension in mm/inches

# Notice

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1. If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment <sup>(Note 1)</sup>, aircraft/spacecraft, nuclear power controllers, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

| JAPAN     | USA       | EU         | CHINA     |
|-----------|-----------|------------|-----------|
| CLASS III | CLASS III | CLASS II b | CLASS III |
| CLASS IV  |           | CLASS III  |           |

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  - [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
  - [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
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  - [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
  - [f] Sealing or coating our Products with resin or other coating materials
  - [g] Use of our Products without cleaning residue of flux (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
  - [h] Use of the Products in places subject to dew condensation
4. The Products are not subject to radiation-proof design.
5. Please verify and confirm characteristics of the final or mounted products in using the Products.
6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse, is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
7. De-rate Power Dissipation depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction temperature.
8. Confirm that operation temperature is within the specified range described in the product specification.
9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

## Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
2. In principle, the reflow soldering method must be used on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

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1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.
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This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of ionizer, friction prevention and temperature / humidity control).

## Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
  - [a] the Products are exposed to sea winds or corrosive gases, including Cl<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [b] the temperature or humidity exceeds those recommended by ROHM
  - [c] the Products are exposed to direct sunshine or condensation
  - [d] the Products are exposed to high Electrostatic
2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.
3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.
4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

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Наши преимущества:

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- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
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- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



## JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,  
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



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