

| | |
|--------------------|------|
| V_{DSS} | 30V |
| $R_{DS(on)}(Max.)$ | 27mΩ |
| I_D | ±7A |
| P_D | 2W |

●Features

- 1) Low on - resistance.
- 2) High Power Package (HSMT8).
- 3) Pb-free lead plating ; RoHS compliant.
- 4) Halogen Free.

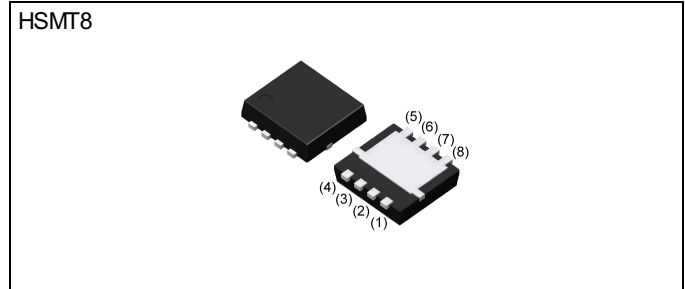
●Application

Switching

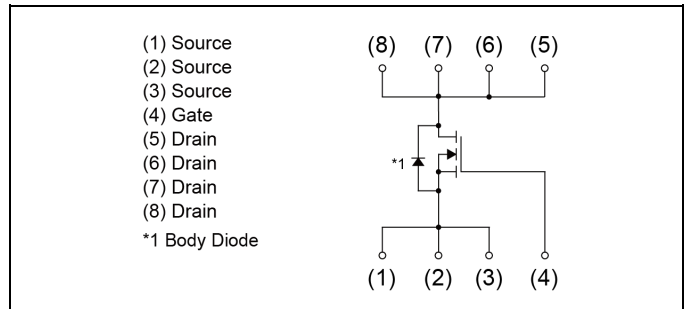
●Absolute maximum ratings ($T_a = 25^{\circ}C$)

| Parameter | Symbol | Value | Unit |
|------------------------------|--------------------|-------------|------|
| Drain - Source voltage | V_{DSS} | 30 | V |
| Continuous drain current | I_D | ±7 | A |
| Pulsed drain current | $I_{D,pulse}^{*1}$ | ±28 | A |
| Gate - Source voltage | V_{GSS} | ±20 | V |
| Power dissipation | P_D^{*2} | 2 | W |
| Junction temperature | T_j | 150 | °C |
| Range of storage temperature | T_{stg} | -55 to +150 | °C |

●Outline



●Inner circuit



●Packaging specifications

| Type | Packing | Embossed Tape |
|------|---------------------------|---------------|
| | Reel size (mm) | 330 |
| | Tape width (mm) | 12 |
| | Basic ordering unit (pcs) | 3000 |
| | Taping code | TB |
| | Marking | E070BN |

● Thermal resistance

| Parameter | Symbol | Values | | | Unit |
|--|-----------------|--------|------|------|------|
| | | Min. | Typ. | Max. | |
| Thermal resistance, junction - ambient | R_{thJA}^{*2} | - | 62.5 | - | °C/W |

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

| Parameter | Symbol | Conditions | Values | | | Unit |
|--|---|---|--------|------|------|-------|
| | | | Min. | Typ. | Max. | |
| Drain - Source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = 1mA$ | 30 | - | - | V |
| Breakdown voltage temperature coefficient | $\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$ | $I_D = 1mA$ referenced to 25°C | - | 21 | - | mV/°C |
| Zero gate voltage drain current | I_{DSS} | $V_{DS} = 30V, V_{GS} = 0V$ | - | - | 1 | μA |
| Gate - Source leakage current | I_{GSS} | $V_{GS} = \pm 20V, V_{DS} = 0V$ | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS} = 10V, I_D = 1mA$ | 1.0 | - | 2.5 | V |
| Gate threshold voltage temperature coefficient | $\frac{\Delta V_{GS(th)}}{\Delta T_j}$ | $I_D = 1mA$ referenced to 25°C | - | -3 | - | mV/°C |
| Static drain - source on - state resistance | $R_{DS(on)}^{*3}$ | $V_{GS} = 10V, I_D = 7A$ | - | 20 | 27 | mΩ |
| | | $V_{GS} = 4.5V, I_D = 7A$ | - | 29 | 39 | |
| Gate input resistance | R_G | | - | 3.3 | - | Ω |
| Transconductance | g_{fs}^{*3} | $V_{DS} = 5V, I_D = 7A$ | 4 | - | - | S |

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

*2 Mounted on a ceramic board (30×30×0.8mm)

*3 Pulsed

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

| Parameter | Symbol | Conditions | Values | | | Unit |
|------------------------------|-------------------|------------------------------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Input capacitance | C_{iss} | $V_{GS} = 0V$ | - | 410 | - | pF |
| Output capacitance | C_{oss} | $V_{DS} = 15V$ | - | 50 | - | |
| Reverse transfer capacitance | C_{rss} | $f = 1\text{MHz}$ | - | 40 | - | |
| Turn - on delay time | $t_{d(on)}^{*3}$ | $V_{DD} \approx 15V, V_{GS} = 10V$ | - | 6 | - | ns |
| Rise time | t_r^{*3} | $I_D = 3.5A$ | - | 8 | - | |
| Turn - off delay time | $t_{d(off)}^{*3}$ | $R_L = 4.29\Omega$ | - | 23 | - | |
| Fall time | t_f^{*3} | $R_G = 10\Omega$ | - | 5 | - | |

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

| Parameter | Symbol | Conditions | | Values | | | Unit |
|----------------------|---------------|------------------------------------|-----------------|--------|------|------|------|
| | | | | Min. | Typ. | Max. | |
| Total gate charge | Q_g^{*3} | $V_{DD} \approx 15V$ $I_D = 7A$ | $V_{GS} = 10V$ | - | 8.9 | - | nC |
| Gate - Source charge | Q_{gs}^{*3} | | $V_{GS} = 4.5V$ | - | 4.6 | - | |
| Gate - Drain charge | Q_{gd}^{*3} | | $V_{GS} = 4.5V$ | - | 1.9 | - | |
| | | | | - | 1.4 | - | |

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

| Parameter | Symbol | Conditions | Values | | | Unit |
|---------------------------------------|---------------|----------------------------|--------|------|------|------|
| | | | Min. | Typ. | Max. | |
| Body diode continuous forward current | I_S | $T_a = 25^\circ\text{C}$ | - | - | 1.67 | A |
| Body diode pulse current | I_{SP}^{*1} | | - | - | 28 | |
| Forward voltage | V_{SD}^{*3} | $V_{GS} = 0V, I_S = 1.67A$ | - | - | 1.2 | V |

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve



Fig.2 Maximum Safe Operating Area

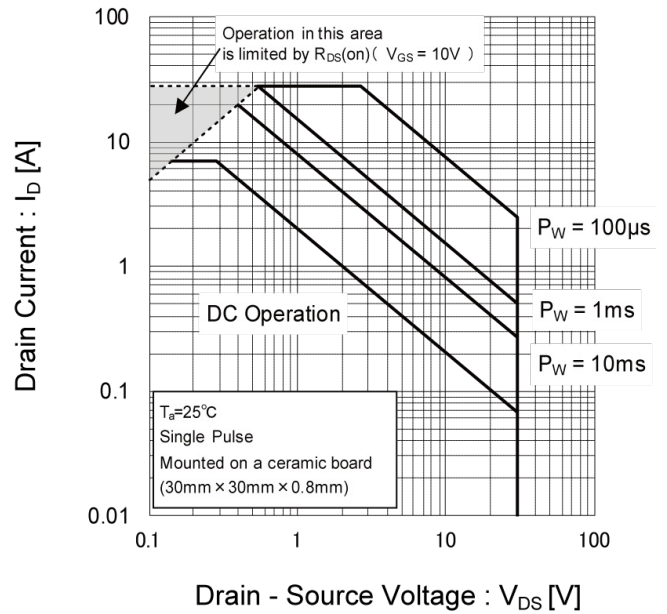


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

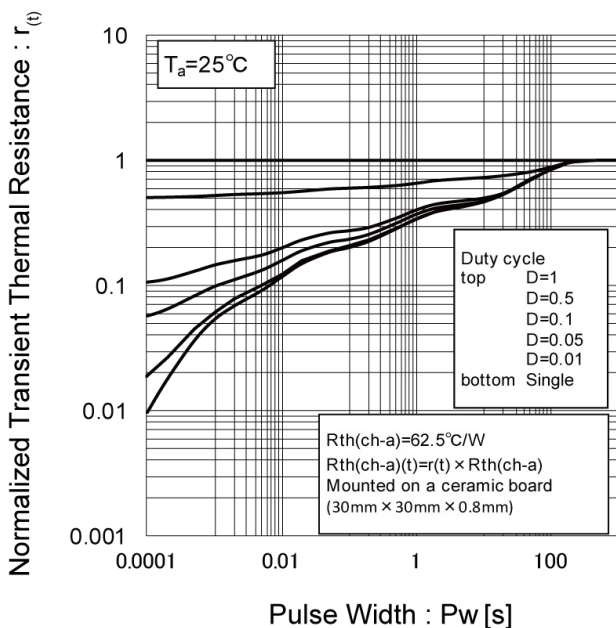
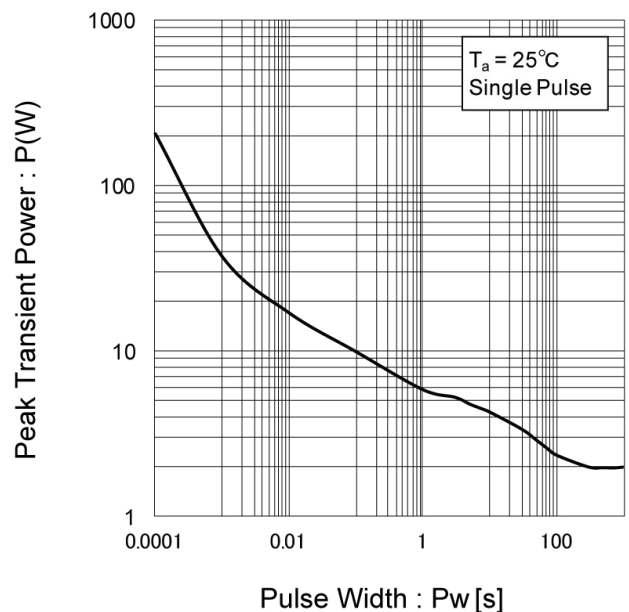


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

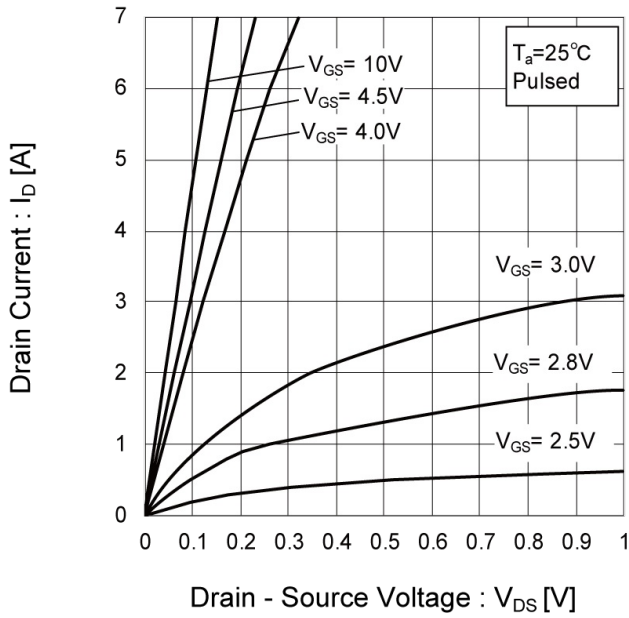


Fig.6 Typical Output Characteristics(II)

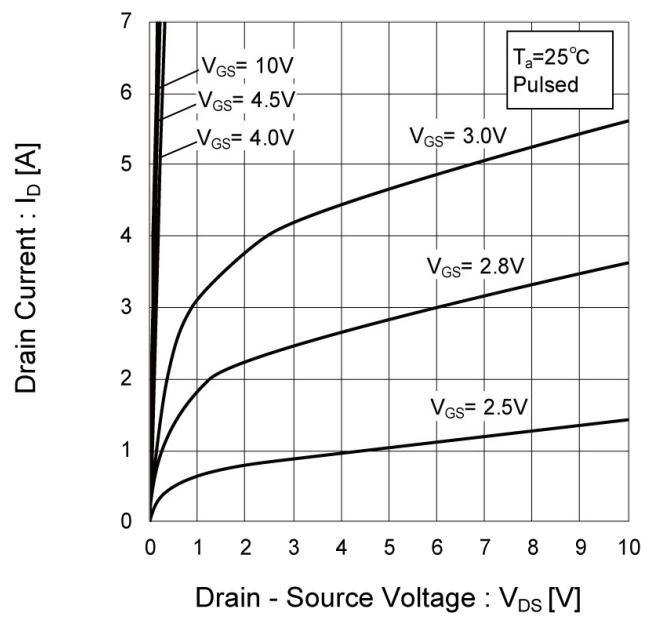
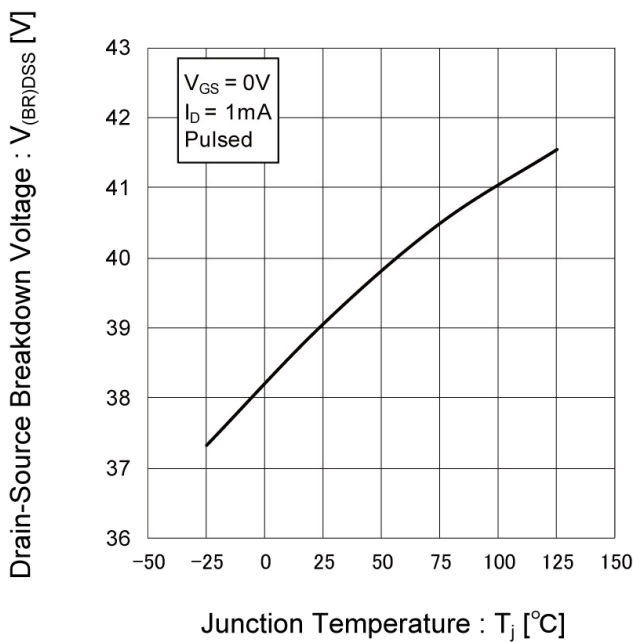


Fig.7 Breakdown Voltage vs. Junction Temperature



● Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

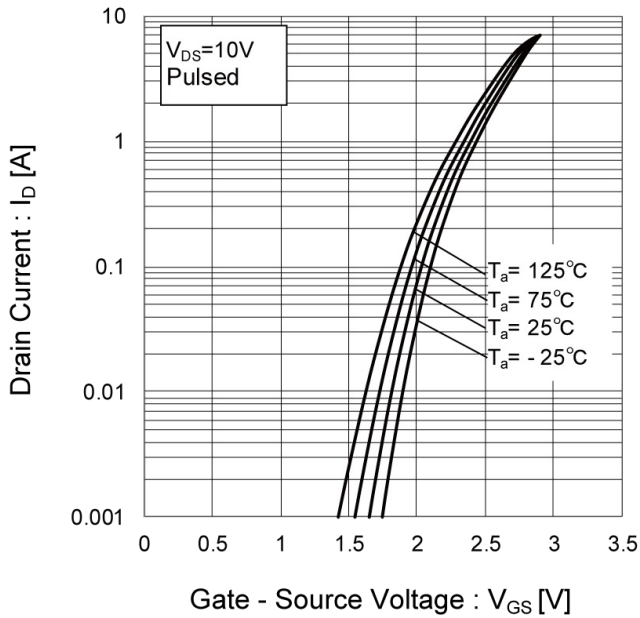


Fig.9 Gate Threshold Voltage vs. Junction Temperature

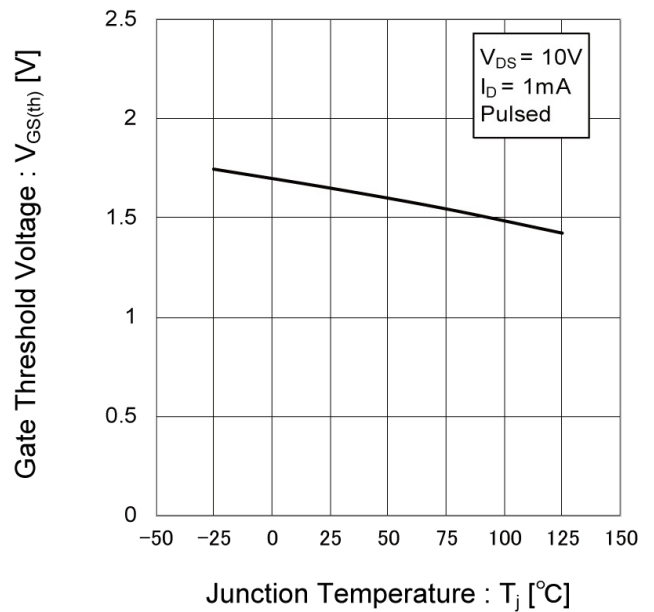
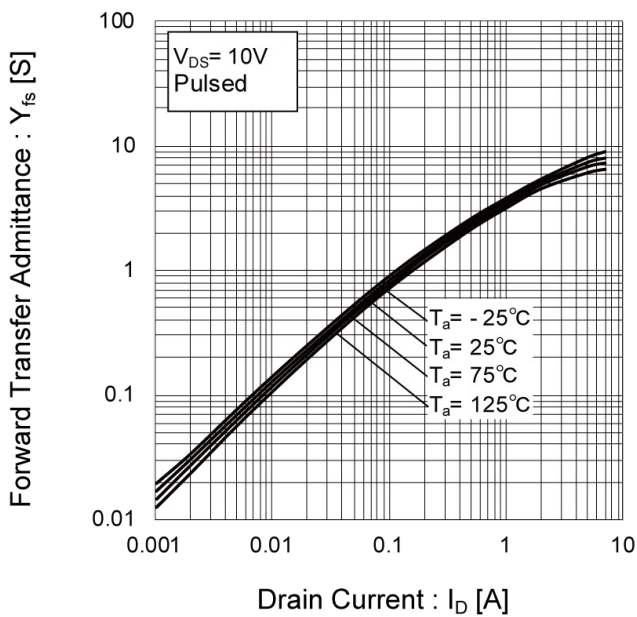


Fig.10 Transconductance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve



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

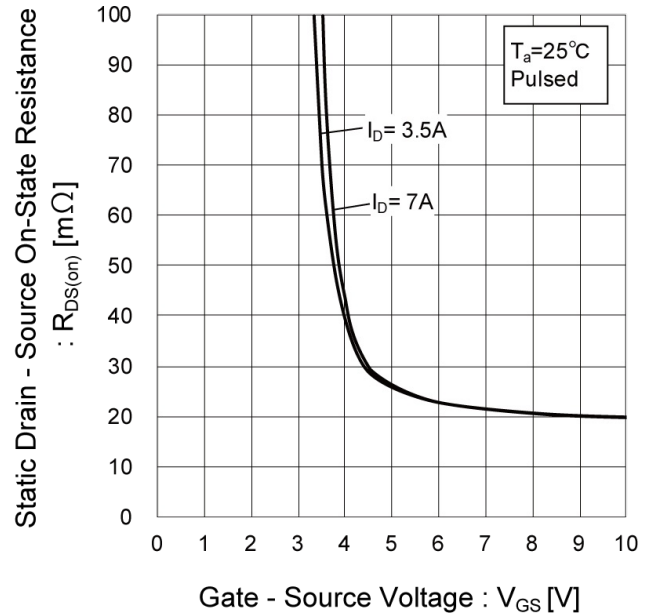
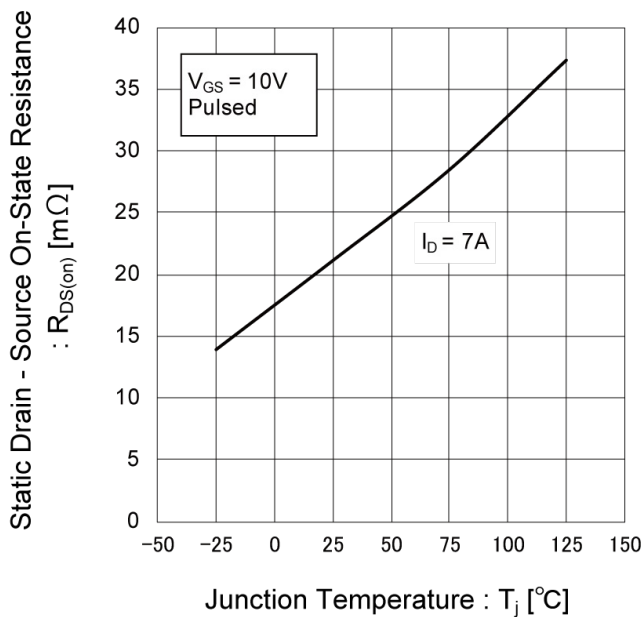


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● Electrical characteristic curves

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

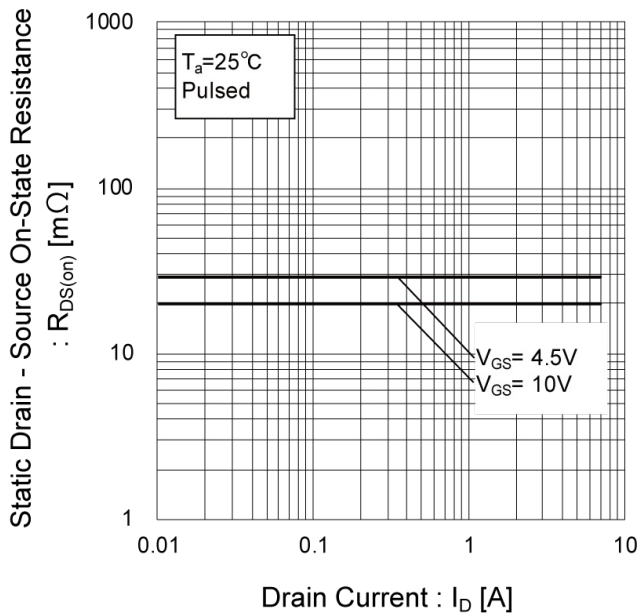


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

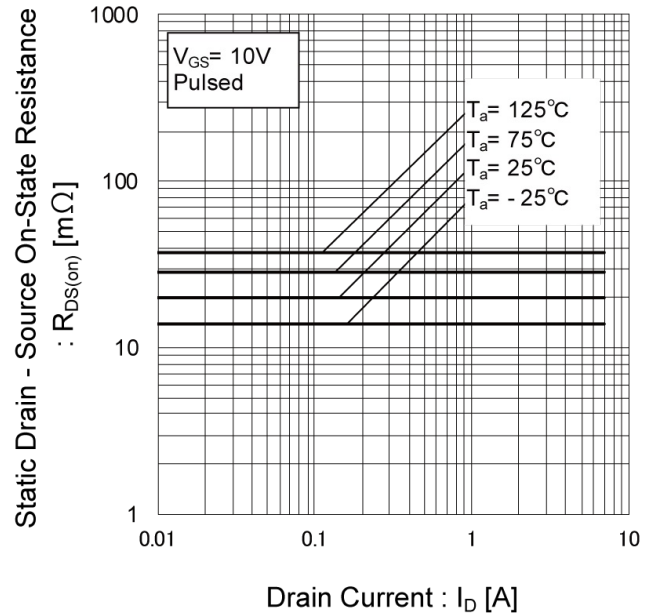
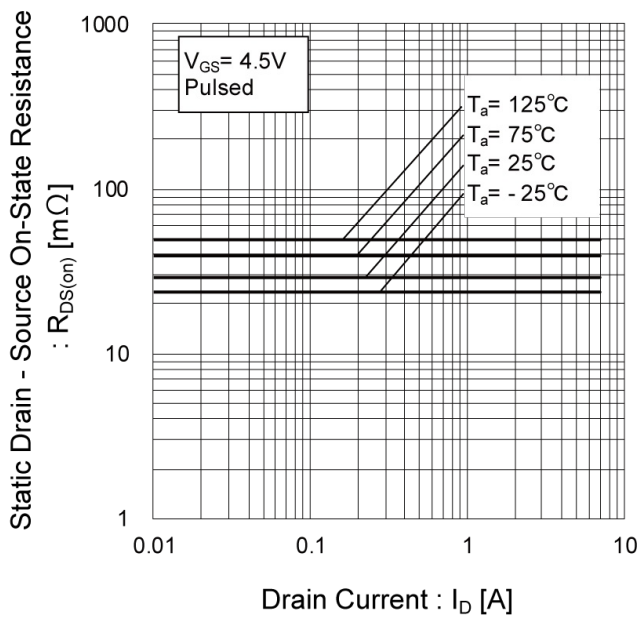


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)



●Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

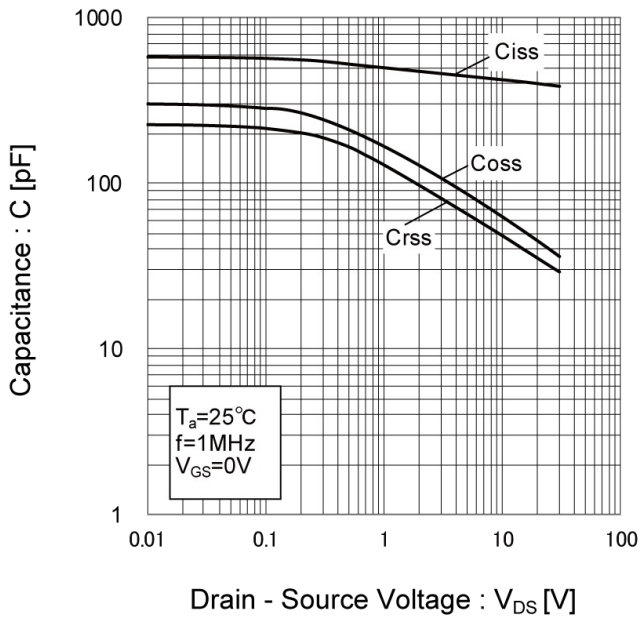


Fig.18 Switching Characteristics

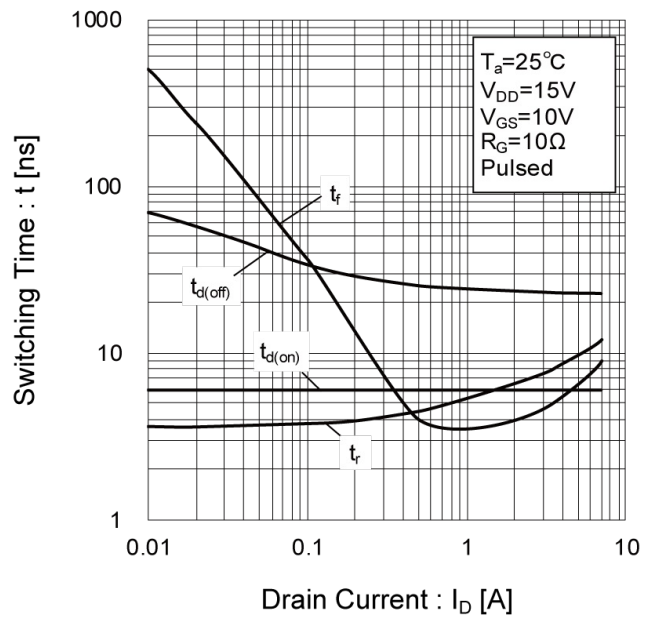


Fig.19 Dynamic Input Characteristics

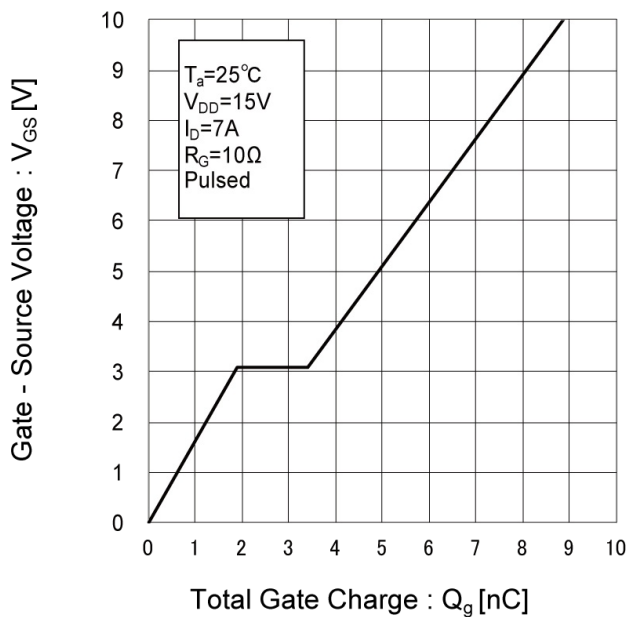
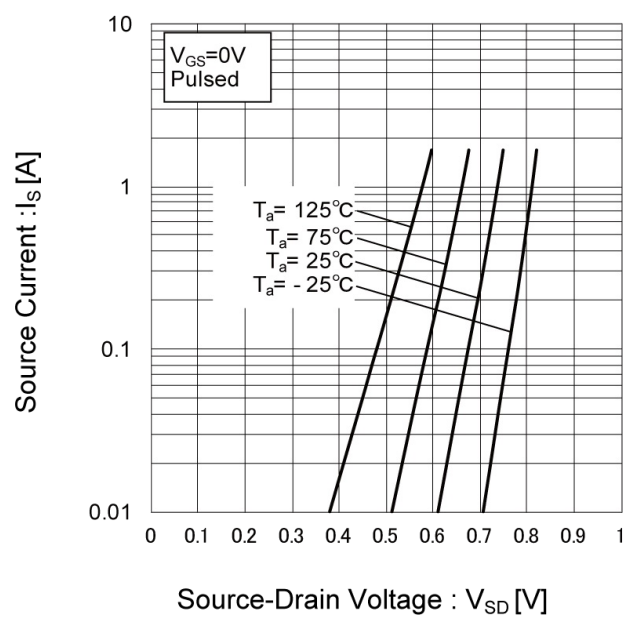


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

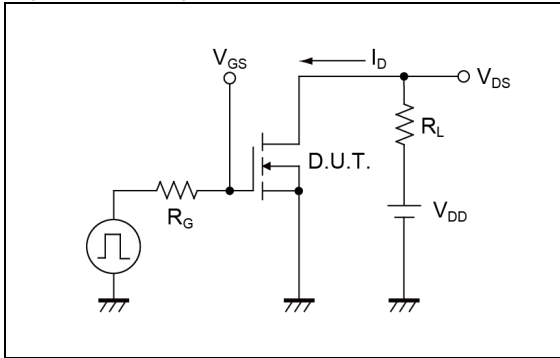


Fig.1-2 Switching Waveforms

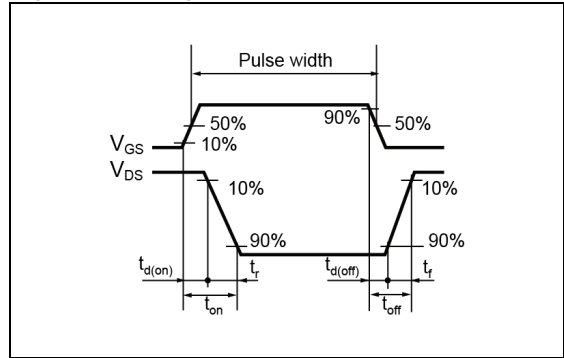


Fig.2-1 Gate Charge Measurement Circuit

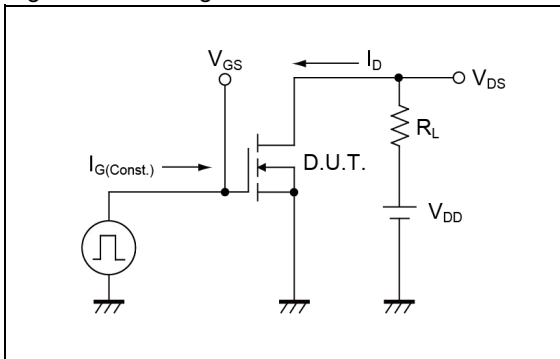
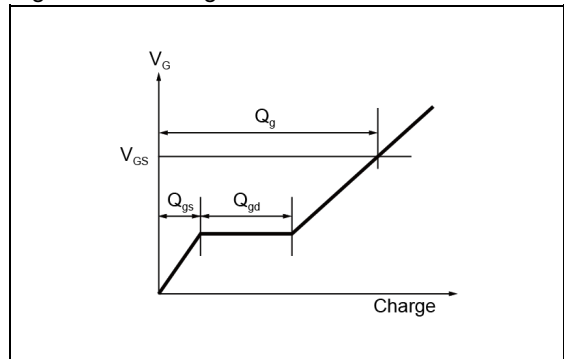


Fig.2-2 Gate Charge Waveform

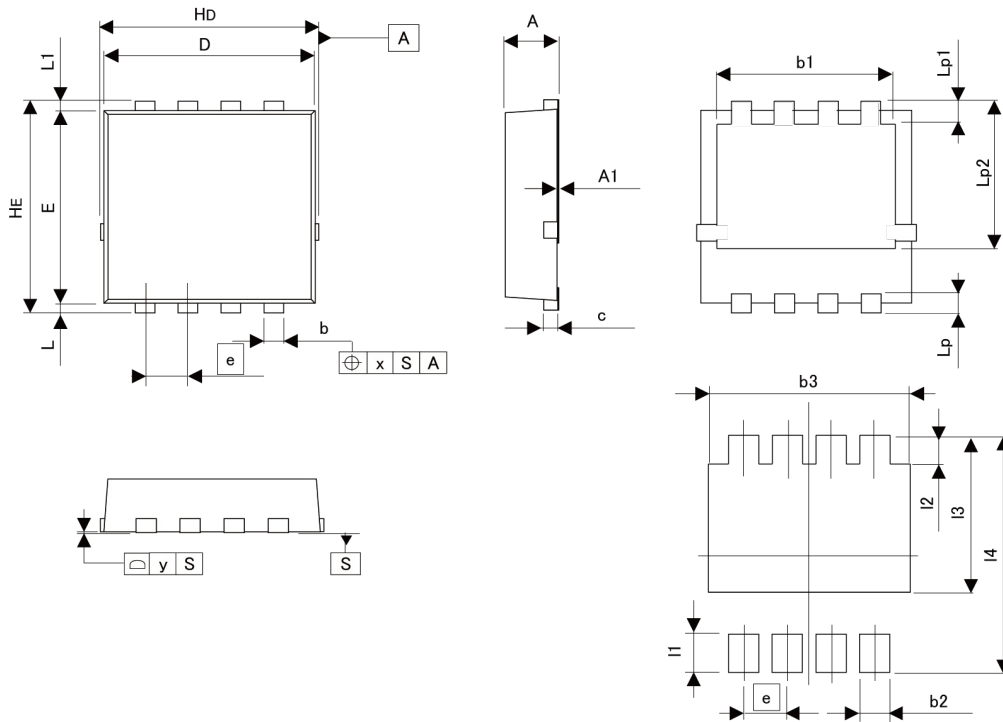


● Notice

This product might cause chip aging and breakdown under the large electrified environment. Please consider to design ESD protection circuit.

●Dimensions

HSMT8



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

| DIM | MILIMETERS | | INCHES | |
|-----|------------|------|--------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.70 | 0.90 | 0.028 | 0.035 |
| A1 | 0.00 | 0.05 | 0.000 | 0.002 |
| b | 0.27 | 0.37 | 0.011 | 0.015 |
| b1 | 2.50 | 2.70 | 0.098 | 0.106 |
| c | 0.10 | 0.30 | 0.004 | 0.012 |
| D | 3.10 | 3.30 | 0.122 | 0.130 |
| E | 2.90 | 3.10 | 0.114 | 0.122 |
| e | 0.65 | | 0.026 | |
| Hd | 3.20 | 3.40 | 0.126 | 0.134 |
| HE | 3.20 | 3.40 | 0.126 | 0.134 |
| L | 0.07 | 0.25 | 0.003 | 0.010 |
| L1 | 0.07 | 0.25 | 0.003 | 0.010 |
| Lp | 0.20 | 0.40 | 0.008 | 0.016 |
| Lp1 | 0.25 | 0.45 | 0.010 | 0.018 |
| Lp2 | 2.20 | 2.40 | 0.087 | 0.094 |
| x | - | 0.10 | - | 0.004 |
| y | - | 0.10 | - | 0.004 |

| DIM | MILIMETERS | | INCHES | |
|-----|------------|------|--------|-------|
| | MIN | MAX | MIN | MAX |
| b2 | - | 0.47 | - | 0.019 |
| b3 | - | 2.70 | - | 0.106 |
| I1 | - | 0.50 | - | 0.020 |
| I2 | - | 0.55 | - | 0.022 |
| I3 | - | 2.40 | - | 0.094 |
| I4 | - | 3.40 | - | 0.134 |

Dimension in mm/inches

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RQ3E070BN - Web Page

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| | |
|-----------------------------|-----------|
| Part Number | RQ3E070BN |
| Package | HSMT8 |
| Unit Quantity | 3000 |
| Minimum Package Quantity | 3000 |
| Packing Type | Taping |
| Constitution Materials List | inquiry |
| RoHS | Yes |