

|                     |               |
|---------------------|---------------|
| $V_{DSS}$           | 1200V         |
| $R_{DS(on)}$ (Typ.) | 450m $\Omega$ |
| $I_D$               | 10A           |
| $P_D$               | 85W           |

### ●Features

- 1) Low on-resistance
- 2) Fast switching speed
- 3) Fast reverse recovery
- 4) Easy to parallel
- 5) Simple to drive
- 6) Pb-free lead plating ; RoHS compliant

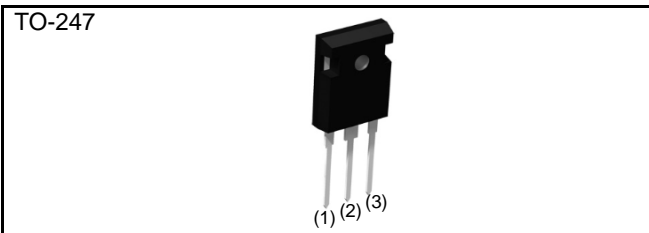
### ●Application

- Solar inverters
- DC/DC converters
- Switch mode power supplies
- Induction heating
- Motor drives

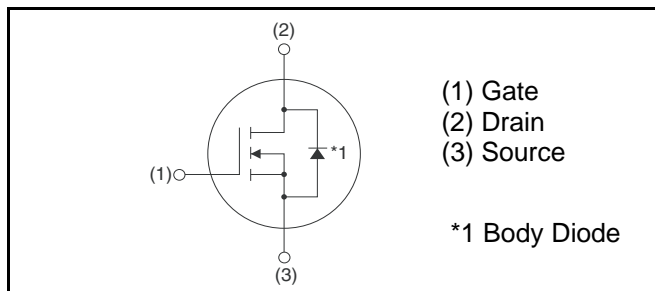
### ●Absolute maximum ratings (Ta = 25°C)

| Parameter                                      | Symbol                    | Value       | Unit |   |
|--|---------------------------|-------------|------|---|
| Drain - Source voltage                         | $V_{DSS}$                 | 1200        | V    |   |
| Continuous drain current                       | $T_c = 25^\circ\text{C}$  | $I_D^{*1}$  | 10   | A |
|  | $T_c = 100^\circ\text{C}$ | $I_D^{*1}$  | 7    | A |
| Pulsed drain current                           | $I_{D,pulse}^{*2}$        | 25          | A    |   |
| Gate - Source voltage                          | $V_{GSS}$                 | -6 to 22    | V    |   |
| Power dissipation ( $T_c = 25^\circ\text{C}$ ) | $P_D$                     | 85          | W    |   |
| Junction temperature                           | $T_j$                     | 175         | °C   |   |
| Range of storage temperature                   | $T_{stg}$                 | -55 to +175 | °C   |   |

### ●Outline



### ●Inner circuit



### ●Packaging specifications

| Type | Packaging                 | Tube      |
|------|---------------------------|-----------|
|      | Reel size (mm)            | -         |
|      | Tape width (mm)           | -         |
|      | Basic ordering unit (pcs) | 30        |
|      | Packing code              | C         |
|      | Marking                   | SCT2450KE |

### ●Thermal resistance

| Parameter                                    | Symbol     | Values |      |      | Unit |
|--|------------|--------|------|------|------|
|  |            | Min.   | Typ. | Max. |      |
| Thermal resistance, junction - case          | $R_{thJC}$ | -      | 1.36 | 1.77 | °C/W |
| Thermal resistance, junction - ambient       | $R_{thJA}$ | -      | -    | 50   | °C/W |
| Soldering temperature, wavesoldering for 10s | $T_{sold}$ | -      | -    | 265  | °C   |

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

| Parameter                                   | Symbol            | Conditions  | Values |      |      | Unit          |
|---|-------------------|---|--------|------|------|---------------|
|   |                   |   | Min.   | Typ. | Max. |               |
| Drain - Source breakdown voltage            | $V_{(BR)DSS}$     | $V_{GS} = 0V, I_D = 1mA$                                  | 1200   | -    | -    | V             |
| Zero gate voltage drain current             | $I_{DSS}$         | $V_{DS} = 1200V, V_{GS} = 0V$<br>$T_j = 25^\circ\text{C}$ | -      | 1    | 10   | $\mu\text{A}$ |
|   |                   | $T_j = 150^\circ\text{C}$                                 | -      | 2    | -    |               |
| Gate - Source leakage current               | $I_{GSS+}$        | $V_{GS} = +22V, V_{DS} = 0V$                              | -      | -    | 100  | nA            |
| Gate - Source leakage current               | $I_{GSS-}$        | $V_{GS} = -6V, V_{DS} = 0V$                               | -      | -    | -100 | nA            |
| Gate threshold voltage                      | $V_{GS(th)}$      | $V_{DS} = V_{GS}, I_D = 0.9mA$                            | 1.6    | -    | 4.0  | V             |
| Static drain - source on - state resistance | $R_{DS(on)}^{*3}$ | $V_{GS} = 18V, I_D = 3A$<br>$T_j = 25^\circ\text{C}$      | -      | 450  | 585  | $m\Omega$     |
|   |                   | $T_j = 125^\circ\text{C}$                                 | -      | 610  | -    |               |
| Gate input resistance                       | $R_G$             | $f = 1MHz, \text{open drain}$                             | -      | 25   | -    | $\Omega$      |

**●Electrical characteristics (T<sub>a</sub> = 25°C)**

| Parameter                                    | Symbol                         | Conditions   | Values |      |      | Unit |
|--|--------------------------------|--|--------|------|------|------|
|  |                                |  | Min.   | Typ. | Max. |      |
| Transconductance                             | $g_{fs}^{*3}$                  | V <sub>DS</sub> = 10V, I <sub>D</sub> = 3A                                       | -      | 1.0  | -    | S    |
| Input capacitance                            | C <sub>iss</sub>               | V <sub>GS</sub> = 0V   | -      | 463  | -    | pF   |
| Output capacitance                           | C <sub>oss</sub>               | V <sub>DS</sub> = 800V   | -      | 21   | -    |      |
| Reverse transfer capacitance                 | C <sub>rss</sub>               | f = 1MHz   | -      | 4    | -    |      |
| Effective output capacitance, energy related | C <sub>o(er)</sub>             | V <sub>GS</sub> = 0V<br>V <sub>DS</sub> = 0V to 500V                             | -      | 31   | -    | pF   |
| Turn - on delay time                         | $t_{d(on)}^{*3}$               | V <sub>DD</sub> = 400V, V <sub>GS</sub> = 18V                                    | -      | 19   | -    | ns   |
| Rise time                                    | $t_r^{*3}$                     | I <sub>D</sub> = 3A  | -      | 17   | -    |      |
| Turn - off delay time                        | $t_{d(off)}^{*3}$              | R <sub>L</sub> = 133Ω  | -      | 38   | -    |      |
| Fall time                                    | $t_f^{*3}$                     | R <sub>G</sub> = 0Ω  | -      | 34   | -    |      |
| Turn - on switching loss                     | E <sub>on</sub> <sup>*3</sup>  | V <sub>DD</sub> = 600V, I <sub>D</sub> =3A<br>V <sub>GS</sub> = 18V/0V           | -      | 47   | -    | μJ   |
| Turn - off switching loss                    | E <sub>off</sub> <sup>*3</sup> | R <sub>G</sub> = 0Ω, L=500μH<br>*E <sub>on</sub> includes diode reverse recovery | -      | 17   | -    |      |

**●Gate Charge characteristics (T<sub>a</sub> = 25°C)**

| Parameter            | Symbol                        | Conditions                                  | Values |      |      | Unit |
|----------------------|-------------------------------|---|--------|------|------|------|
|                      |                               |   | Min.   | Typ. | Max. |      |
| Total gate charge    | Q <sub>g</sub> <sup>*3</sup>  | V <sub>DD</sub> = 400V                      | -      | 27   | -    | nC   |
| Gate - Source charge | Q <sub>gs</sub> <sup>*3</sup> | I <sub>D</sub> = 3A                         | -      | 7    | -    |      |
| Gate - Drain charge  | Q <sub>gd</sub> <sup>*3</sup> | V <sub>GS</sub> = 18V                       | -      | 9    | -    |      |
| Gate plateau voltage | V <sub>(plateau)</sub>        | V <sub>DD</sub> = 400V, I <sub>D</sub> = 3A | -      | 10.5 | -    | V    |

\*1 Limited only by maximum temperature allowed.

\*2 PW ≤ 10μs, Duty cycle ≤ 1%

\*3 Pulsed

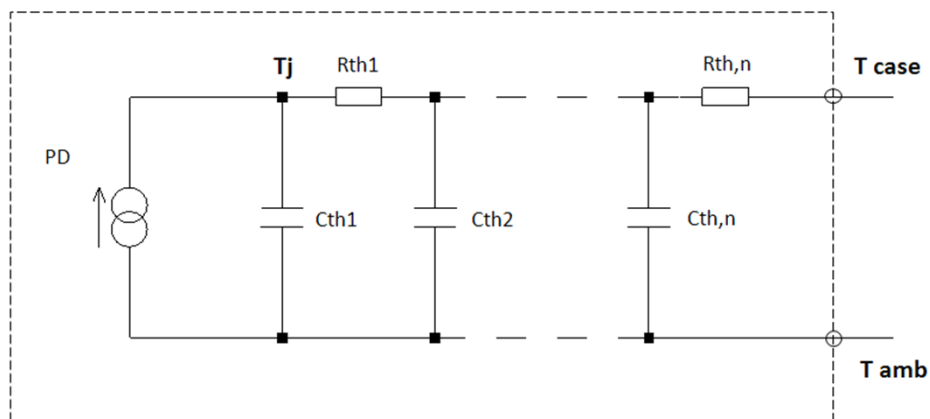
●Body diode electrical characteristics (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

| Parameter                                 | Symbol         | Conditions  | Values |      |      | Unit |
|---|----------------|---|--------|------|------|------|
|   |                |   | Min.   | Typ. | Max. |      |
| Inverse diode continuous, forward current | $I_S^{*1}$     | $T_C = 25^\circ\text{C}$  | -      | -    | 10   | A    |
| Inverse diode direct current, pulsed      | $I_{SM}^{*2}$  |   | -      | -    | 25   | A    |
| Forward voltage                           | $V_{SD}^{*3}$  | $V_{GS} = 0\text{V}, I_S = 3\text{A}$                                     | -      | 4.3  | -    | V    |
| Reverse recovery time                     | $t_{rr}^{*3}$  | $I_F = 3\text{A}, V_R = 400\text{V}$<br>$di/dt = 110\text{A}/\mu\text{s}$ | -      | 19   | -    | ns   |
| Reverse recovery charge                   | $Q_{rr}^{*3}$  |   | -      | 13   | -    | nC   |
| Peak reverse recovery current             | $I_{rrm}^{*3}$ |   | -      | 1.4  | -    | A    |

●Typical Transient Thermal Characteristics

| Symbol    | Value | Unit |
|-----------|-------|------|
| $R_{th1}$ | 230m  | K/W  |
| $R_{th2}$ | 687m  |      |
| $R_{th3}$ | 441m  |      |

| Symbol    | Value     | Unit |
|-----------|-----------|------|
| $C_{th1}$ | 219 $\mu$ | Ws/K |
| $C_{th2}$ | 1.29m     |      |
| $C_{th3}$ | 13.1m     |      |



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

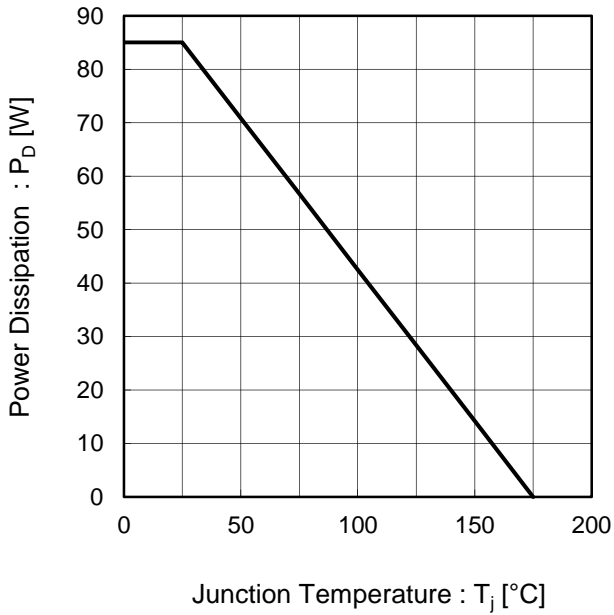


Fig.2 Maximum Safe Operating Area

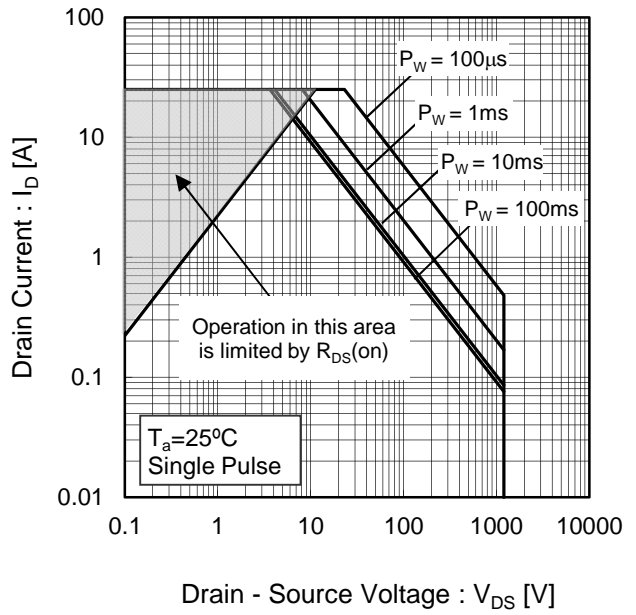
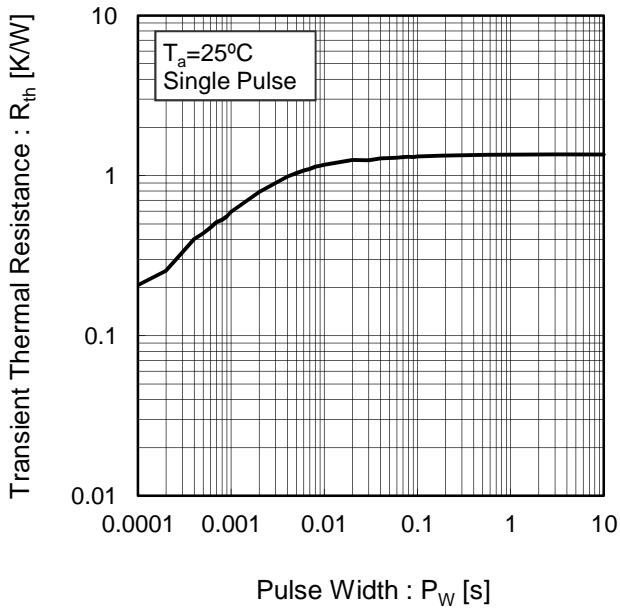


Fig.3 Typical Transient Thermal Resistance vs. Pulse Width



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

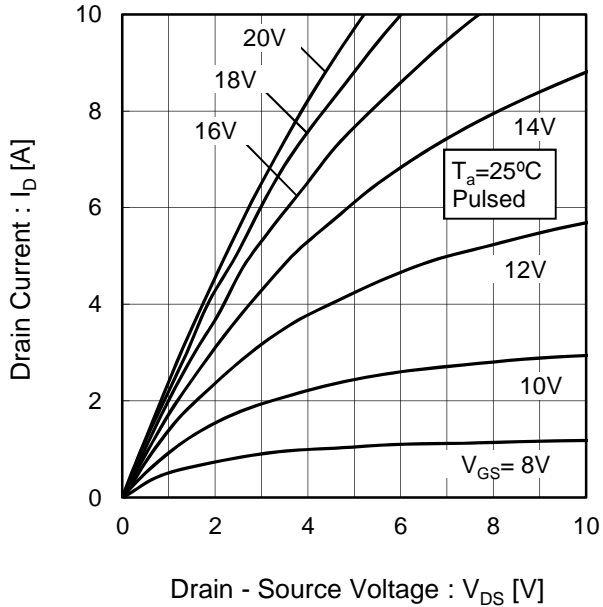


Fig.5 Typical Output Characteristics(II)

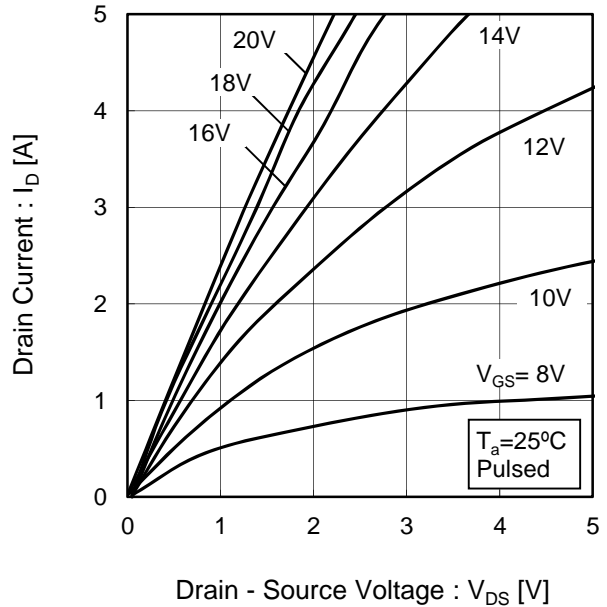


Fig.6  $T_j = 150^\circ\text{C}$  Typical Output Characteristics(I)

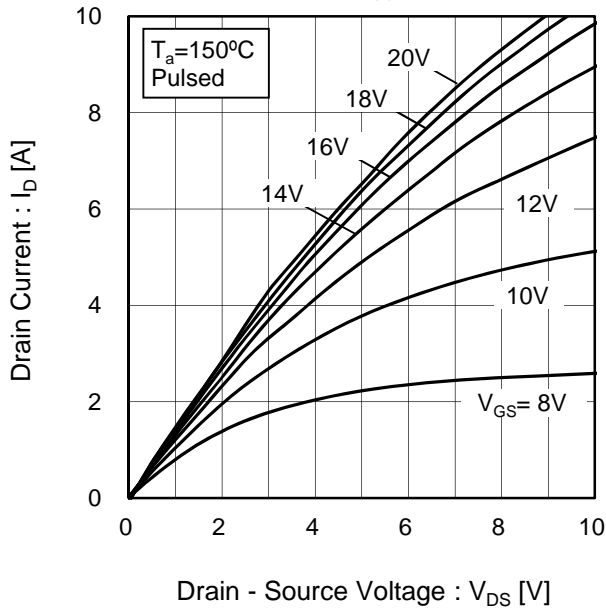
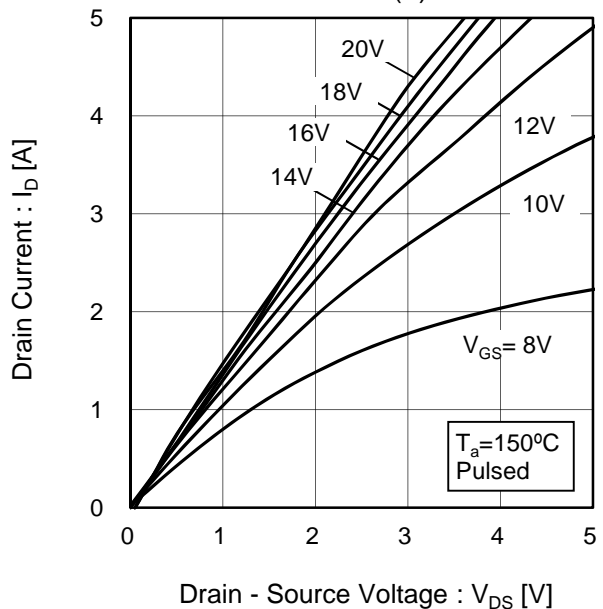


Fig.7  $T_j = 150^\circ\text{C}$  Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics (I)

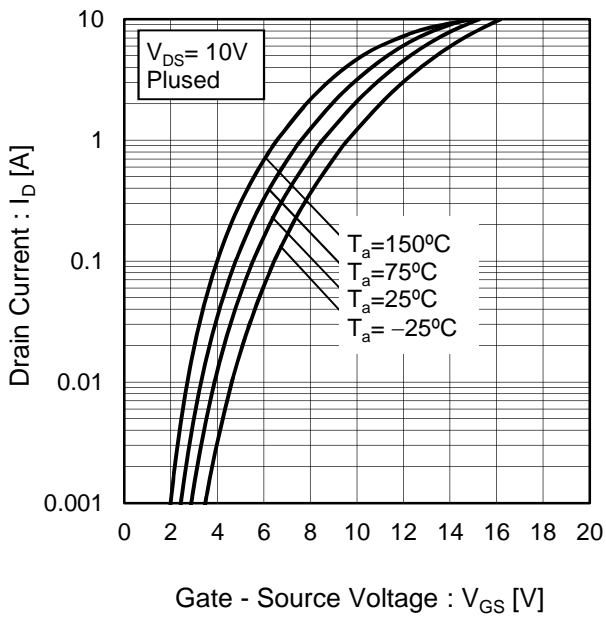


Fig.9 Typical Transfer Characteristics (II)

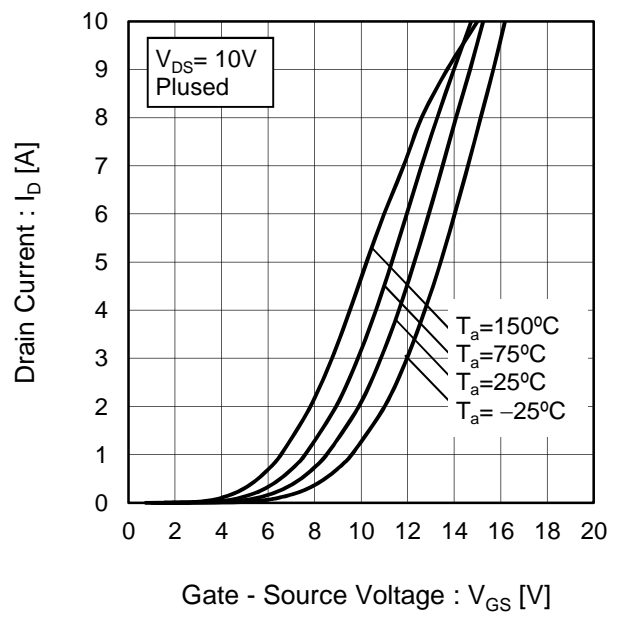


Fig.10 Gate Threshold Voltage vs. Junction Temperature

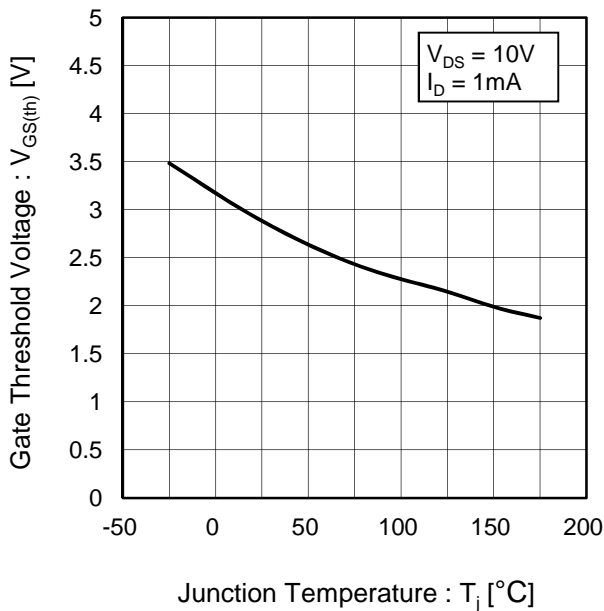
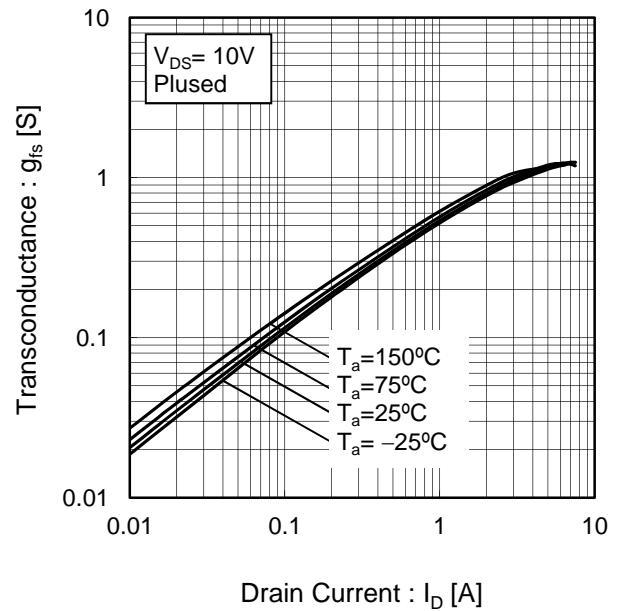


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

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

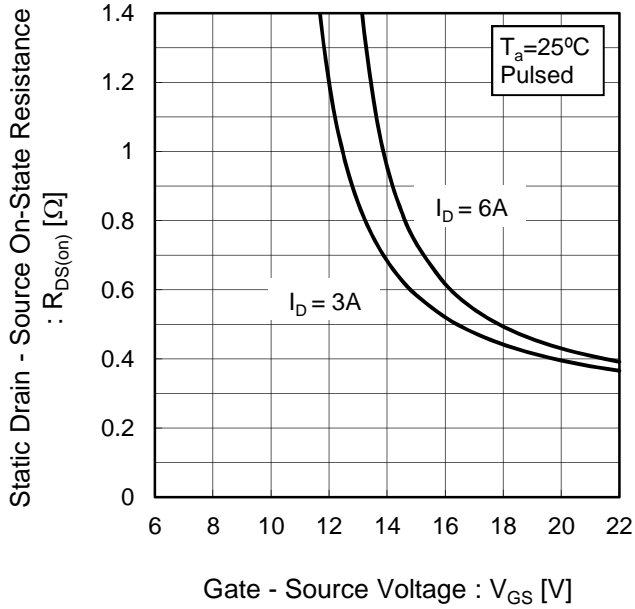


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

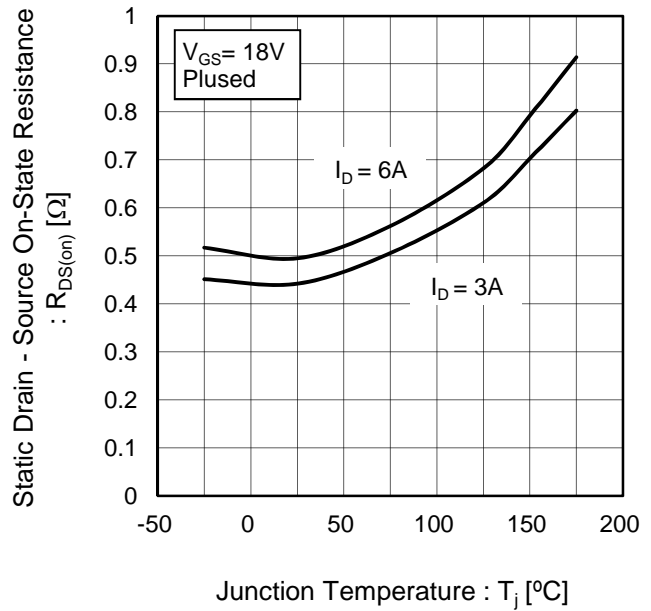
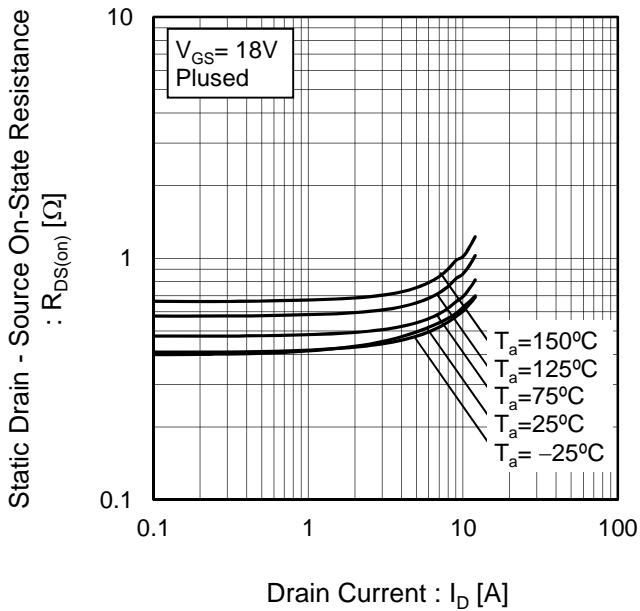


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current





●Electrical characteristic curves

Fig.15 Typical Capacitance vs. Drain - Source Voltage

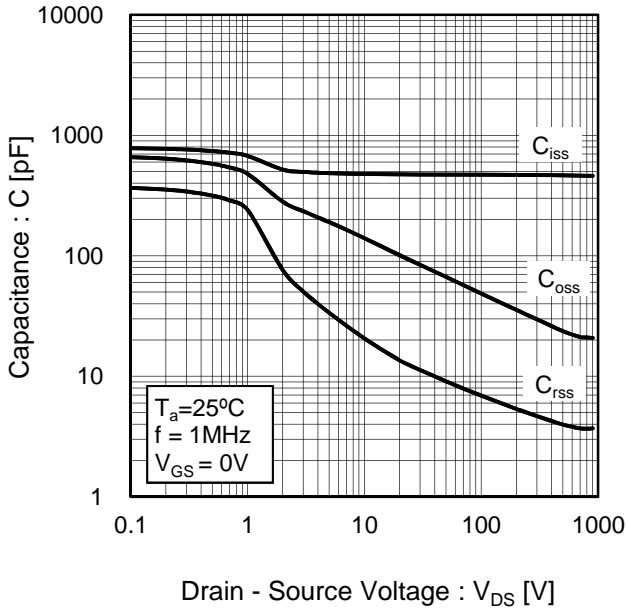


Fig.16 Coss Stored Energy

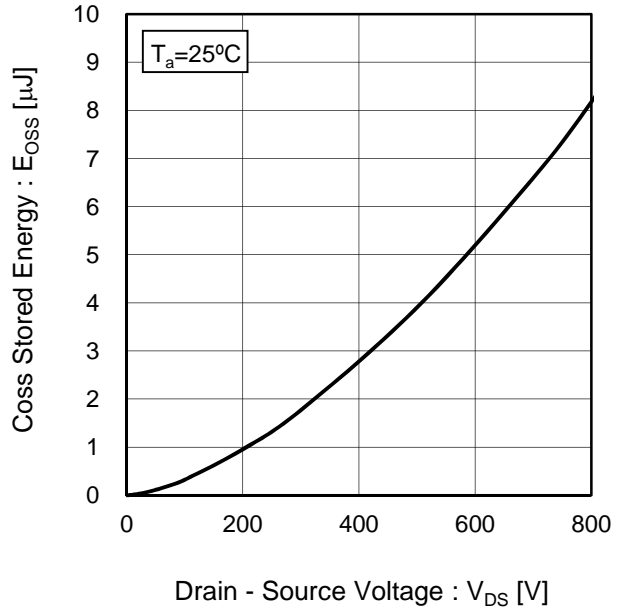


Fig.17 Switching Characteristics

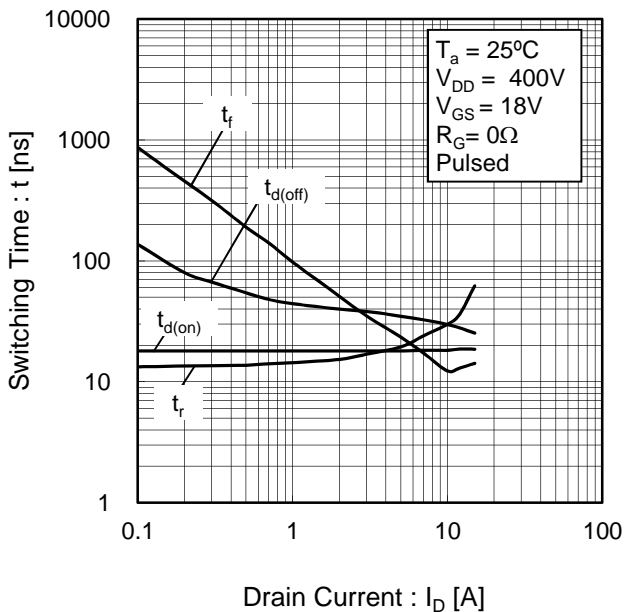
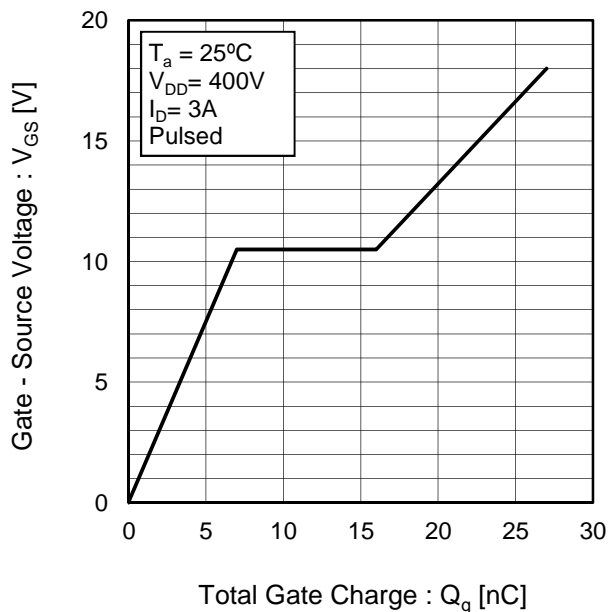


Fig.18 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.19 Typical Switching Loss vs. Drain - Source Voltage

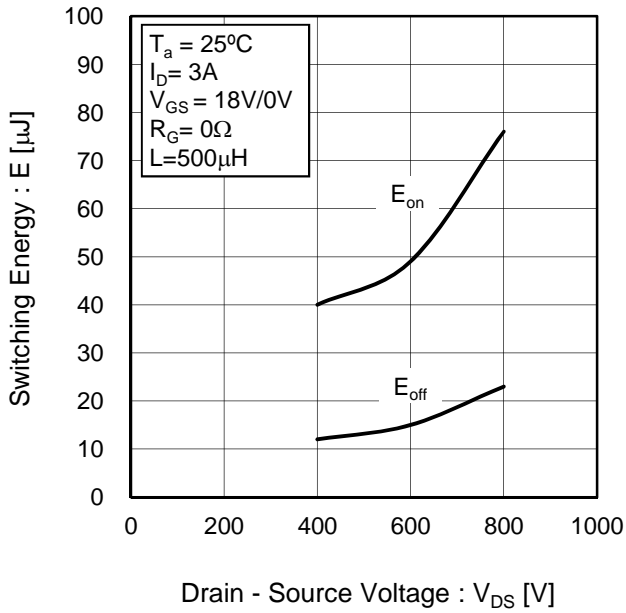


Fig.20 Typical Switching Loss vs. Drain Current

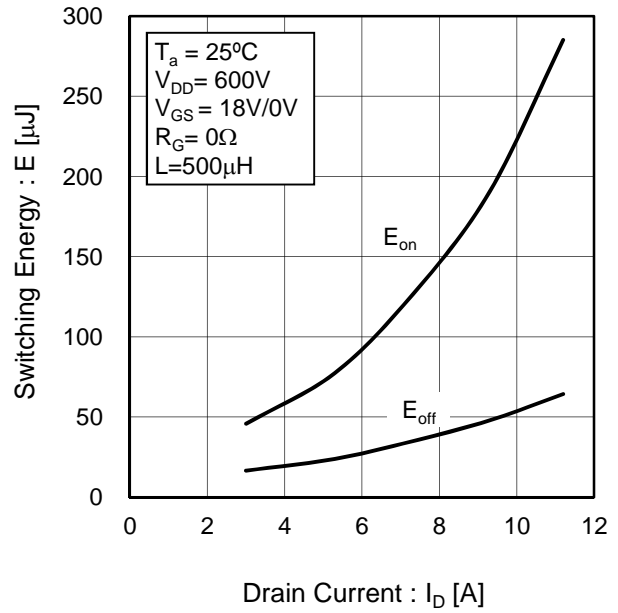
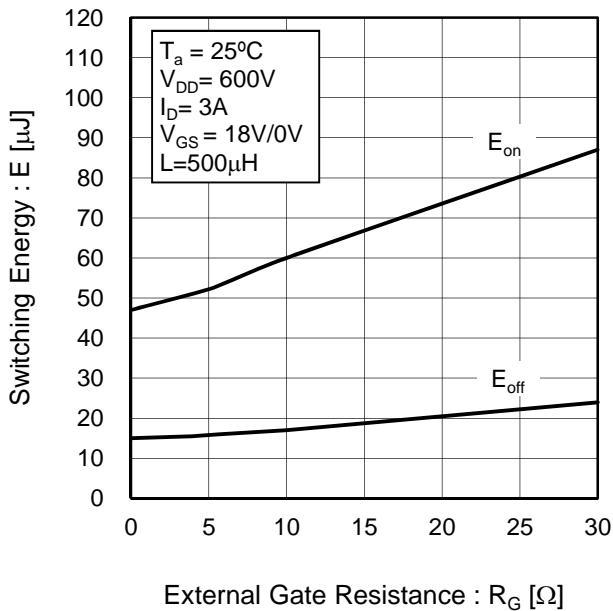


Fig.21 Typical Switching Loss vs. External Gate Resistance



●Electrical characteristic curves

Fig.22 Inverse Diode Forward Current vs. Source - Drain Voltage

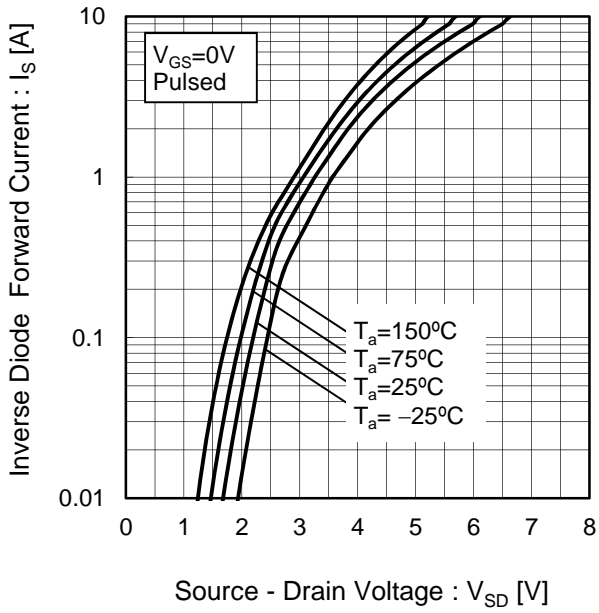
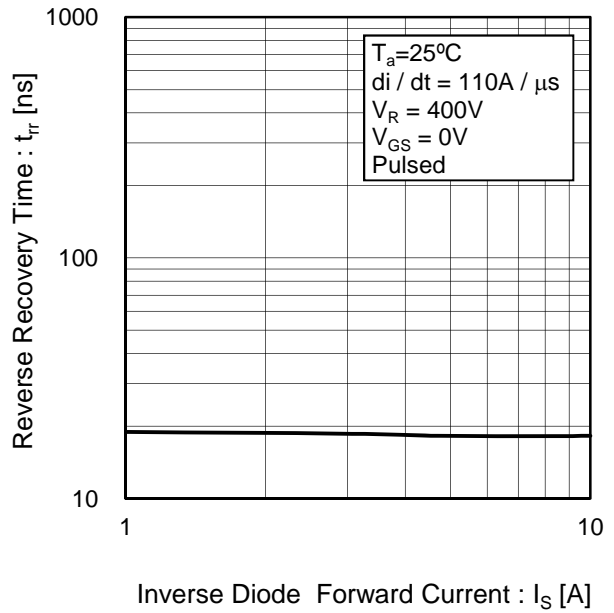


Fig.23 Reverse Recovery Time vs. Inverse Diode Forward Current



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit



Fig.1-2 Switching Waveforms

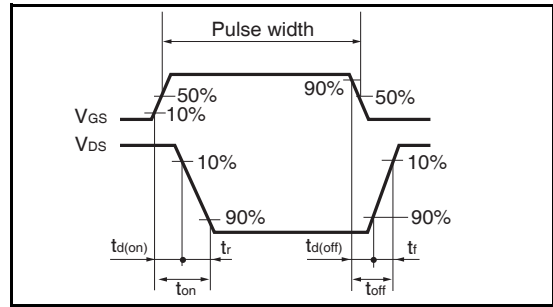


Fig.2-1 Gate Charge Measurement Circuit



Fig.2-2 Gate Charge Waveform

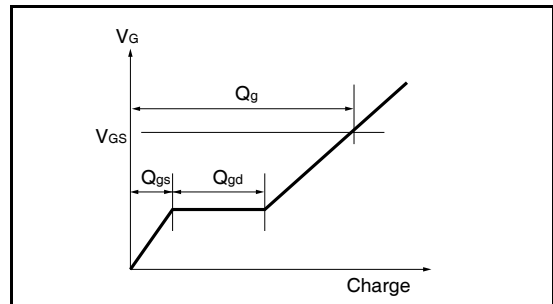


Fig.3-1 Switching Energy Measurement Circuit

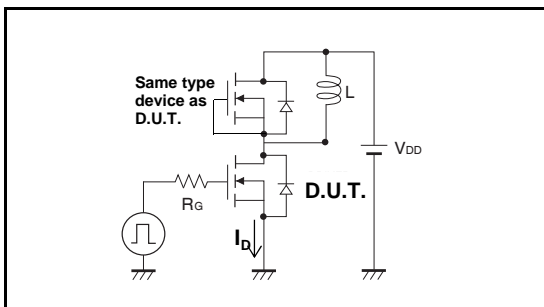


Fig.3-2 Switching Waveforms

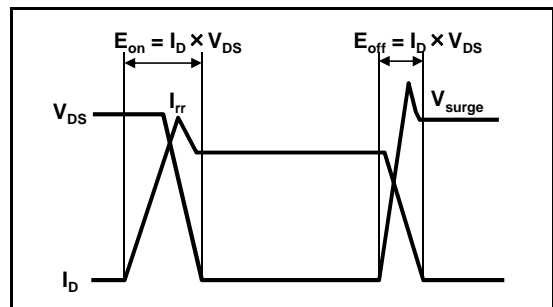


Fig.4-1 Reverse Recovery Time Measurement Circuit

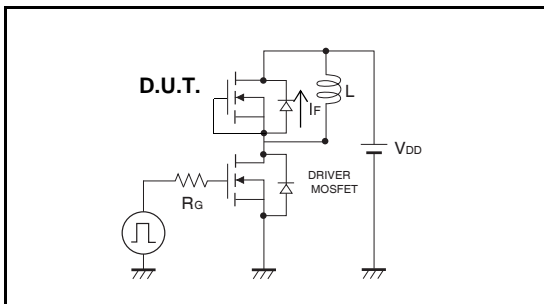
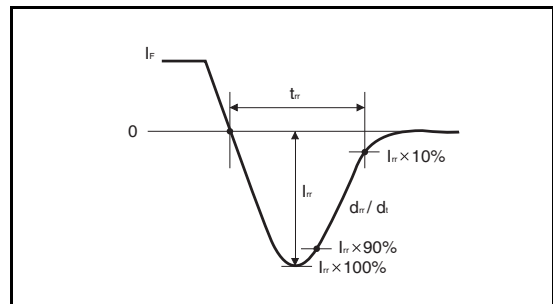
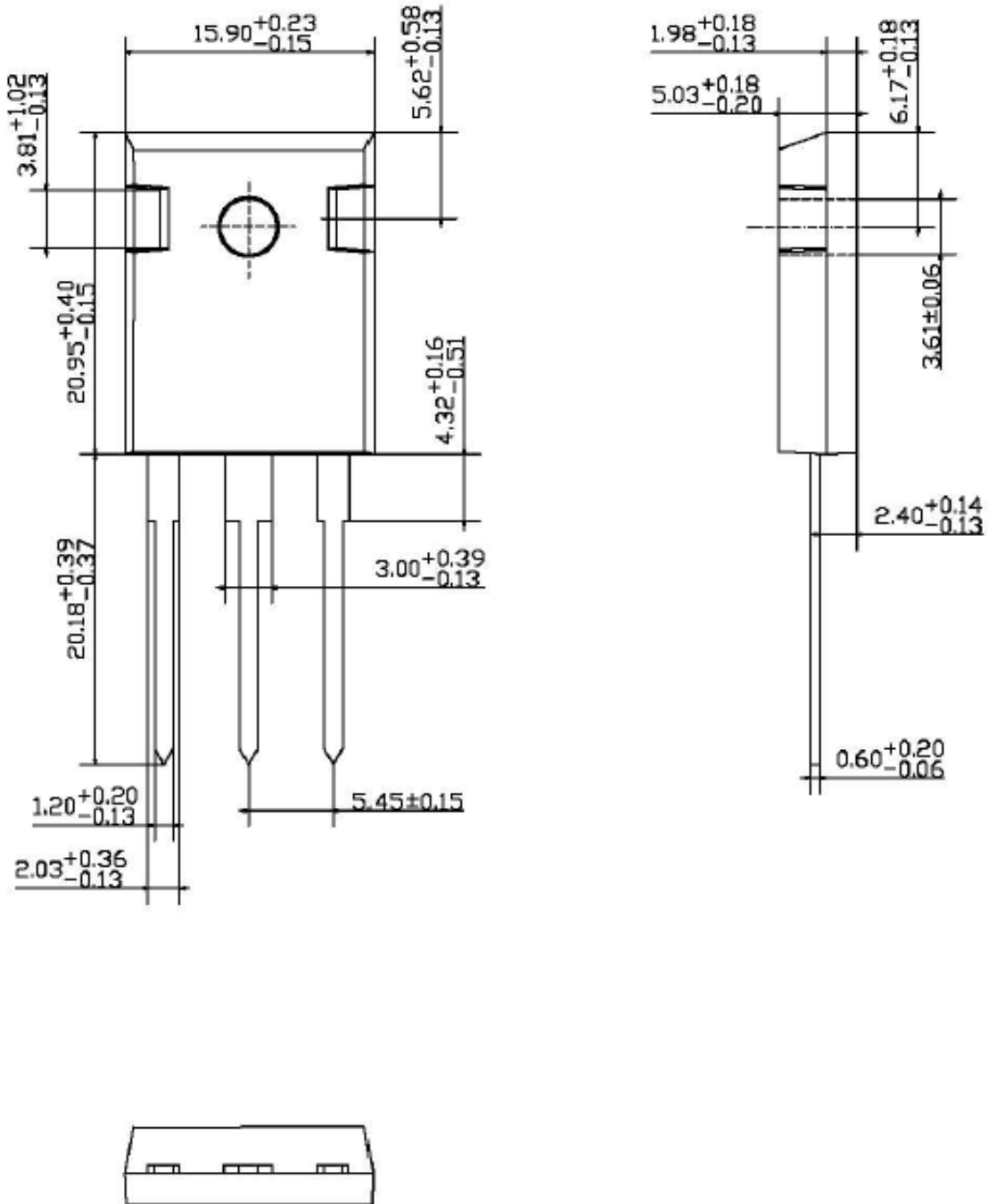


Fig.4-2 Reverse Recovery Waveform



●Dimensions (Unit : mm)

TO-247



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