

# N+P-Channel Enhancement Mode MOSFET

## 1. Product Information

### Features

Advanced trench technology  
 Excellent  $R_{DS(ON)}$   
 Low gate charge

### Applications

Wireless charging  
 Boost driver  
 Brushless motor

### Quick reference

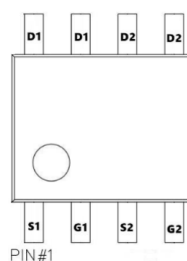
$V_{DS} \geq 40V$ ,  $I_D \leq 9.8A$   
 $R_{DS(ON)} \leq 26m\Omega$  @  $V_{GS} = 10V$  (Type:17.5 m $\Omega$ )  
 $V_{DS} \geq -40V$ ,  $I_D \leq -7.5A$   
 $R_{DS(ON)} \leq 45m\Omega$  @  $V_{GS} = 10V$  (Type:38 m $\Omega$ )

### Pin Description

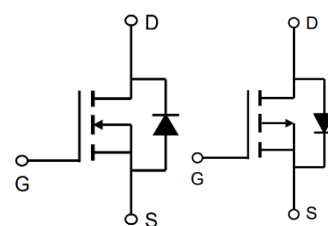
| Pin | Description | Pin | Description |
|-----|-------------|-----|-------------|
| 1   | Source(S1)  | 3   | Source(S1)  |
| 2   | Gate(G1)    | 4   | Gate(G1)    |
| 7,8 | Drain(D)    | 5,6 | Drain(D)    |

### Simplified Outline

### Symbol



Top View  
SOP-8



### Package Marking and Ordering Information

| Product Name | Package | Marking        | Reel Size            | Tape width | Quantity |
|--------------|---------|----------------|----------------------|------------|----------|
| KJ4718S      | SOP-8   | 4718<br>YWWXXX | YWWXXX:<br>Date Code |            | 3000     |

## 2. Absolute Maximum Ratings (TC=25°C unless otherwise noted)

| Symbol                 | Parameter                                             | Rating     |            | Units |
|------------------------|-------------------------------------------------------|------------|------------|-------|
|                        |                                                       | N-Ch       | P-Ch       |       |
| $V_{DS}$               | Drain-Source Voltage                                  | 40         | -40        | V     |
| $V_{GS}$               | Gate-Source Voltage                                   | $\pm 20$   | $\pm 20$   | V     |
| $I_{D@T_A=25^\circ C}$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 9.8        | -7.5       | A     |
| $I_{D@T_A=70^\circ C}$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 5.2        | -4.8       | A     |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                     | 23         | -22        | A     |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>            | 16.2       | 39         | mJ    |
| $I_{AS}$               | Avalanche Current                                     | 18         | -28        | A     |
| $P_D@T_A=25^\circ C$   | Total Power Dissipation <sup>4</sup>                  | 1.67       | 1.67       | W     |
| $T_{STG}$              | Storage Temperature Range                             | -55 to 150 | -55 to 150 | °C    |
| $T_J$                  | Operating Junction Temperature Range                  | -55 to 150 | -55 to 150 | °C    |
| $R_{\theta JA}$        | Thermal Resistance Junction-Ambient <sup>1</sup>      | 75         |            | °C/W  |
| $R_{\theta JC}$        | Thermal Resistance Junction-Case <sup>1</sup>         | 30         |            | °C/W  |

**3. N-Channel Electrical Characteristics** (T<sub>J</sub>=25°C, unless otherwise noted)

| Symbol                 | Parameter                                      | Conditions                                                                             | Min. | Typ.  | Max. | Unit  |
|------------------------|------------------------------------------------|----------------------------------------------------------------------------------------|------|-------|------|-------|
| BVDSS                  | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                             | 40   | ---   | ---  | V     |
| ΔBVDSS/ΔT <sub>J</sub> | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA                                                 | ---  | 0.034 | ---  | V/°C  |
| RDS(ON)                | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =5A                                               | ---  | 17.5  | 26   | mΩ    |
|                        |                                                | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A                                              | ---  | 25.0  | 35   |       |
| VGS(th)                | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                               | 1.0  | ---   | 2.5  | V     |
| ΔVGS(th)               | VGS(th) Temperature Coefficient                |                                                                                        | ---  | -4.56 | ---  | mV/°C |
| IDSS                   | Drain-Source Leakage Current                   | V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                        | ---  | ---   | 1    | uA    |
|                        |                                                | V <sub>DS</sub> =32V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                        | ---  | ---   | 5    |       |
| IGSS                   | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                             | ---  | ---   | ±100 | nA    |
| gfs                    | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =5A                                                | ---  | 14    | ---  | S     |
| R <sub>g</sub>         | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                       | ---  | 2.6   | ---  | Ω     |
| Q <sub>g</sub>         | Total Gate Charge (4.5V)                       | V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A                        | ---  | 5.5   | ---  | nC    |
| Q <sub>gs</sub>        | Gate-Source Charge                             |                                                                                        | ---  | 1.25  | ---  |       |
| Q <sub>gd</sub>        | Gate-Drain Charge                              |                                                                                        | ---  | 2.5   | ---  |       |
| Td(on)                 | Turn-On Delay Time                             | V <sub>DD</sub> =20V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω<br>I <sub>D</sub> =1A | ---  | 8.9   | ---  | ns    |
| T <sub>r</sub>         | Rise Time                                      |                                                                                        | ---  | 2.2   | ---  |       |
| Td(off)                | Turn-Off Delay Time                            |                                                                                        | ---  | 41    | ---  |       |
| T <sub>f</sub>         | Fall Time                                      |                                                                                        | ---  | 2.7   | ---  |       |
| C <sub>iss</sub>       | Input Capacitance                              | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                      | ---  | 593   | ---  | pF    |
| C <sub>oss</sub>       | Output Capacitance                             |                                                                                        | ---  | 76    | ---  |       |
| Crss                   | Reverse Transfer Capacitance                   |                                                                                        | ---  | 56    | ---  |       |
| I <sub>S</sub>         | Continuous Source Current <sup>1,5</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current                                      | ---  | ---   | 6.1  | A     |
| ISM                    | Pulsed Source Current <sup>2,5</sup>           |                                                                                        | ---  | ---   | 23   | A     |
| VSD                    | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C                          | ---  | ---   | 1.2  | V     |

**Note :**

- 1、The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2、The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3、The EAS data shows Max. rating. The test condition is VDD=25V, VGS=10V, L=0.1mH, IAS=17.8A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as ID and IDM, in real applications, should be limited by total power dissipation

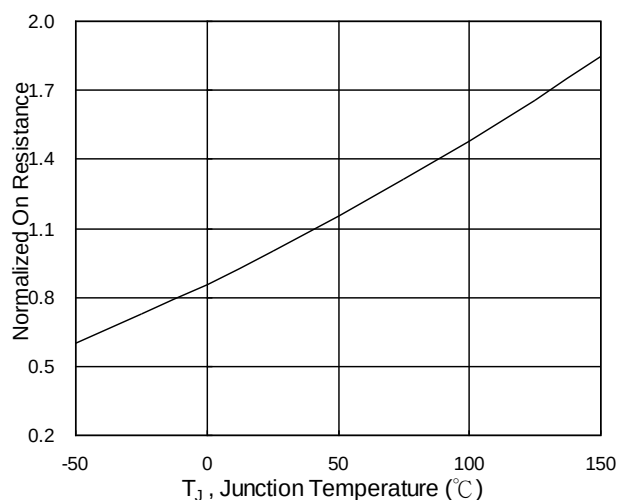
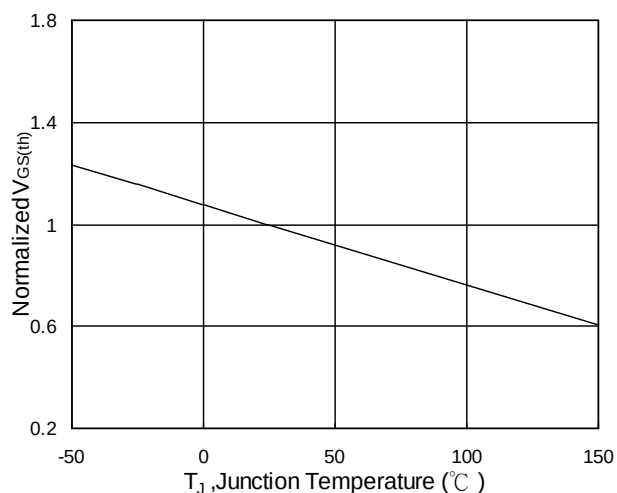
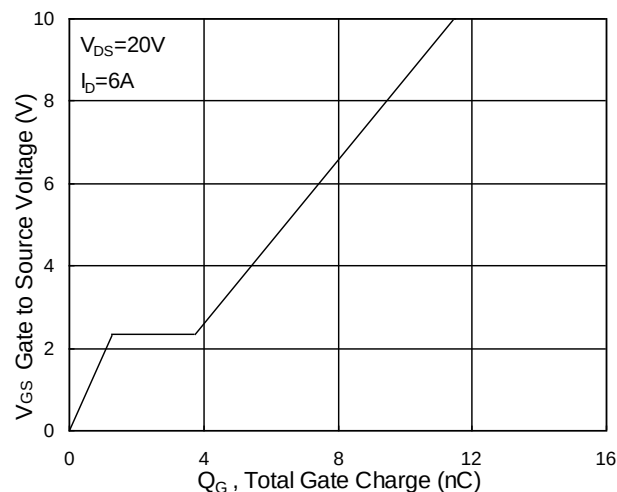
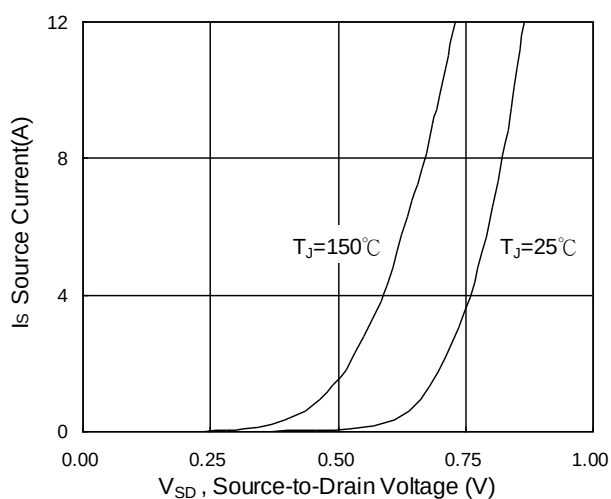
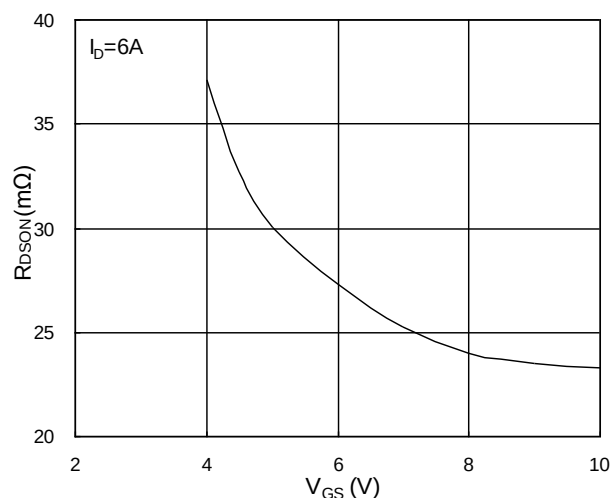
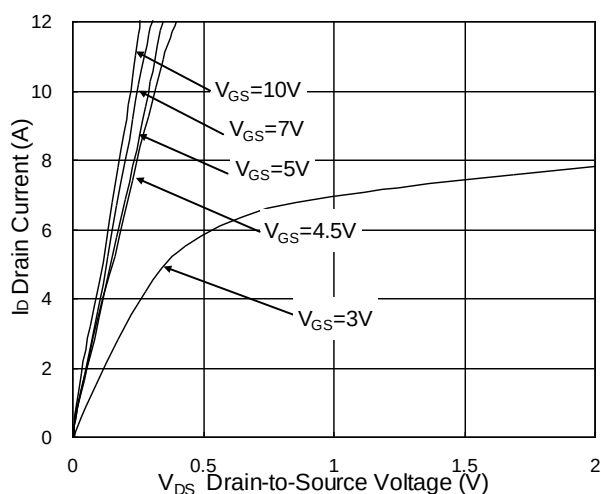
## P-Channel Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)

| Symbol                 | Parameter                                      | Conditions                                                                                 | Min. | Typ.  | Max. | Unit  |
|------------------------|------------------------------------------------|--------------------------------------------------------------------------------------------|------|-------|------|-------|
| BVDSS                  | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA                                                | -40  | ---   | ---  | V     |
| ΔBVDSS/ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient      | Reference to 25°C, I <sub>D</sub> =-1mA                                                    | ---  | -0.02 | ---  | V/°C  |
| RDS(ON)                | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A                                                 | ---  | 38    | 45   | mΩ    |
|                        |                                                | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A                                                | ---  | 48    | 60   |       |
| VGS(th)                | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA                                  | -1.0 | ---   | -2.5 | V     |
| ΔVGS(th)               | V <sub>GS(th)</sub> Temperature Coefficient    |                                                                                            | ---  | 3.72  | ---  | mV/°C |
| IDSS                   | Drain-Source Leakage Current                   | V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                           | ---  | ---   | 1    | uA    |
|                        |                                                | V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                           | ---  | ---   | 5    |       |
| IGSS                   | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                 | ---  | ---   | ±100 | nA    |
| gfs                    | Forward Transconductance                       | V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A                                                  | ---  | 13    | ---  | S     |
| Q <sub>g</sub>         | Total Gate Charge (-4.5V)                      | V <sub>DS</sub> =-20V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A                         | ---  | 11.5  | ---  | nC    |
| Q <sub>gs</sub>        | Gate-Source Charge                             |                                                                                            | ---  | 3.5   | ---  |       |
| Q <sub>gd</sub>        | Gate-Drain Charge                              |                                                                                            | ---  | 3.3   | ---  |       |
| Td(on)                 | Turn-On Delay Time                             | V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω,<br>I <sub>D</sub> =-1A | ---  | 22    | ---  | ns    |
| T <sub>r</sub>         | Rise Time                                      |                                                                                            | ---  | 15.7  | ---  |       |
| Td(off)                | Turn-Off Delay Time                            |                                                                                            | ---  | 59    | ---  |       |
| T <sub>f</sub>         | Fall Time                                      |                                                                                            | ---  | 5.5   | ---  |       |
| C <sub>iss</sub>       | Input Capacitance                              | V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz                                         | ---  | 1415  | ---  | pF    |
| C <sub>oss</sub>       | Output Capacitance                             |                                                                                            | ---  | 134   | ---  |       |
| Crss                   | Reverse Transfer Capacitance                   |                                                                                            | ---  | 102   | ---  |       |
| I <sub>S</sub>         | Continuous Source Current <sup>1,5</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current                                          | ---  | ---   | -6   | A     |
| ISM                    | Pulsed Source Current <sup>2,5</sup>           |                                                                                            | ---  | ---   | -22  | A     |
| VSD                    | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C                             | ---  | ---   | -1.2 | V     |

### Note :

- 1、The data tested by surface mounted on a 1 inch2 FR-4 board with 20Z copper.
- 2、The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、The EAS data shows Max. rating . The test condition is VDD=-25V,VGS=-10V,L=0.1mH,IAS=-27.2A
- 4、The power dissipation is limited by 150°C junction temperature
- 5、The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

## 4. N-Channel Typical Characteristics



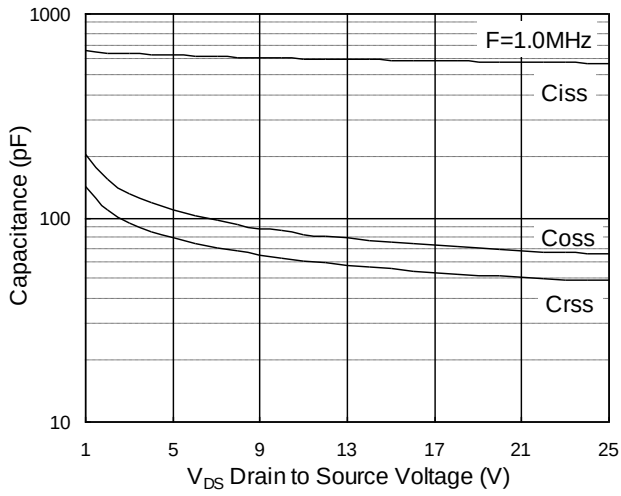


Fig.7 Capacitance

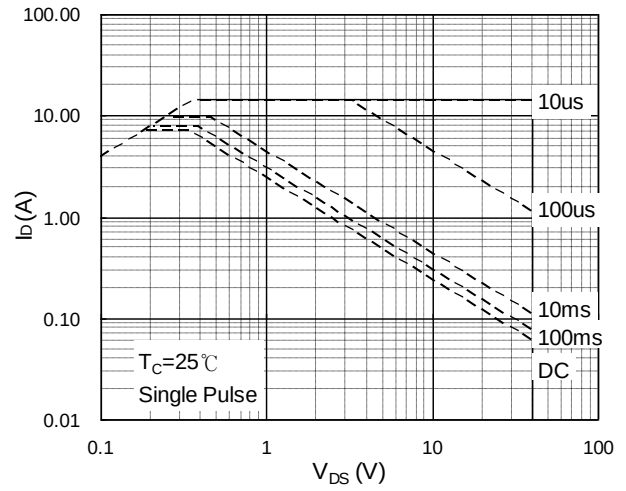


Fig.8 Safe Operating Area

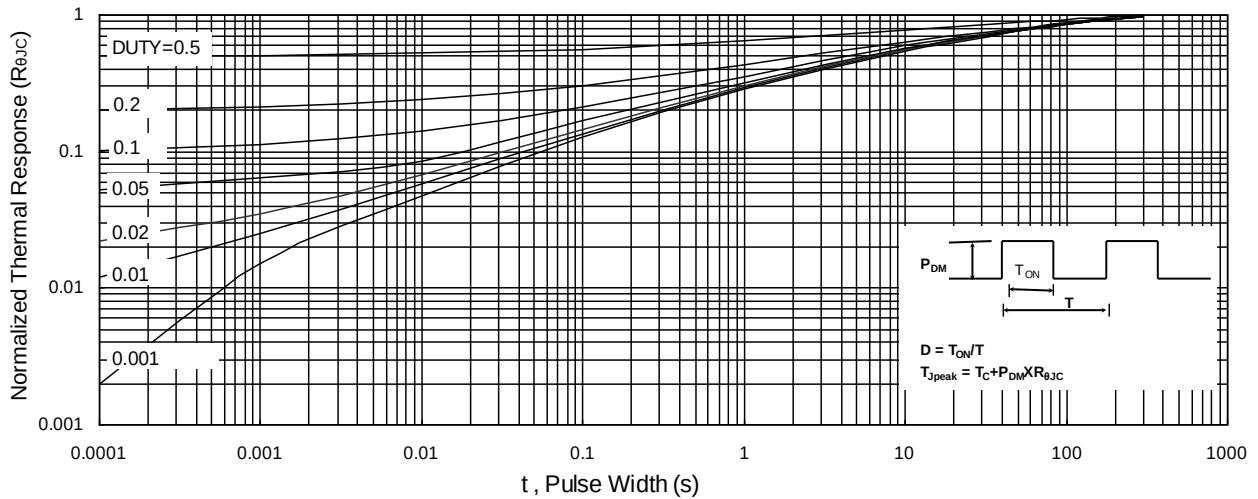


Fig.9 Normalized Maximum Transient Thermal Impedance

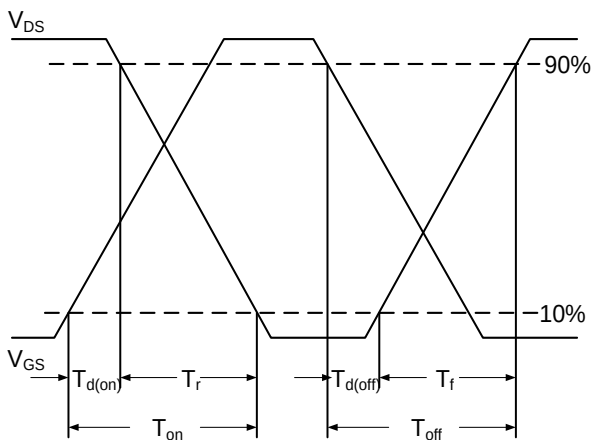


Fig.10 Switching Time Waveform

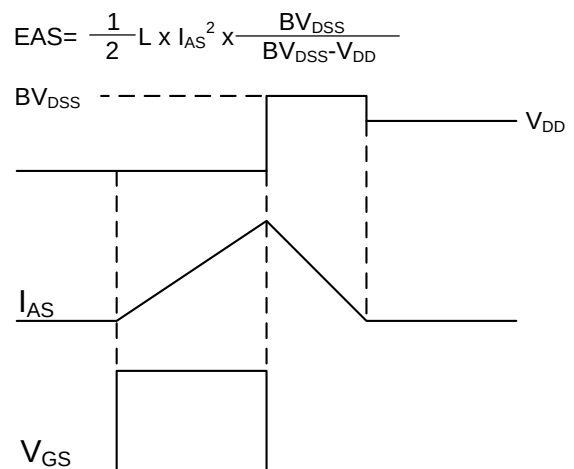
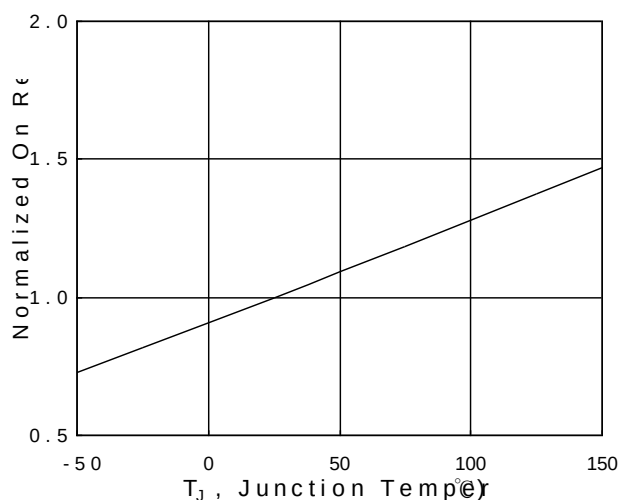
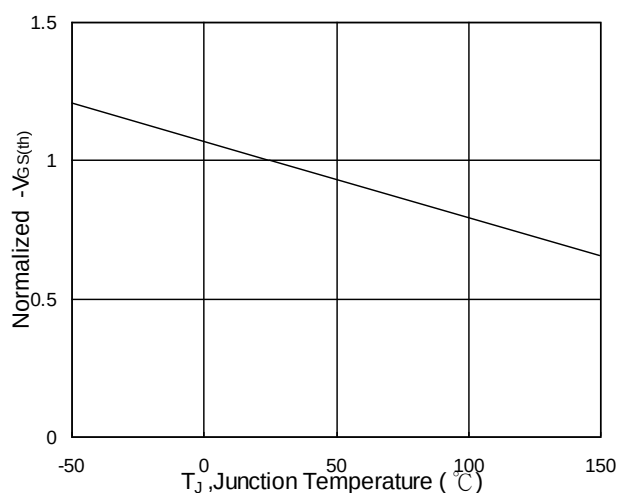
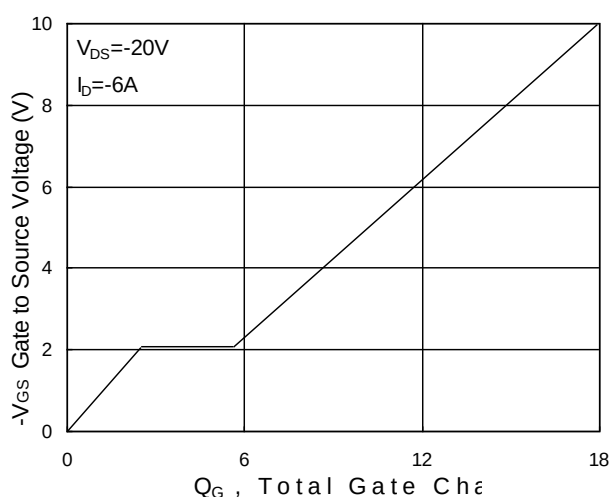
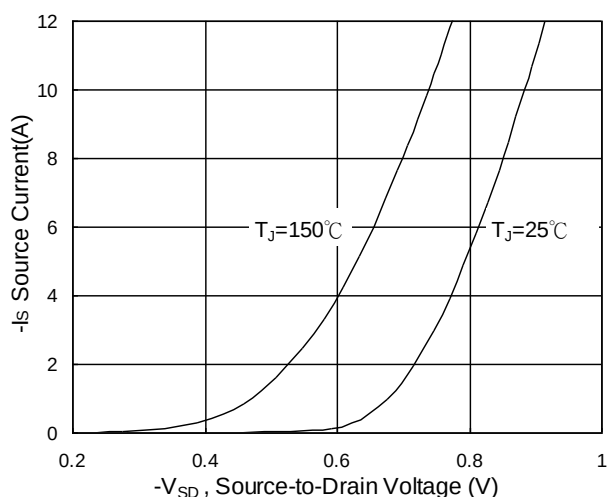
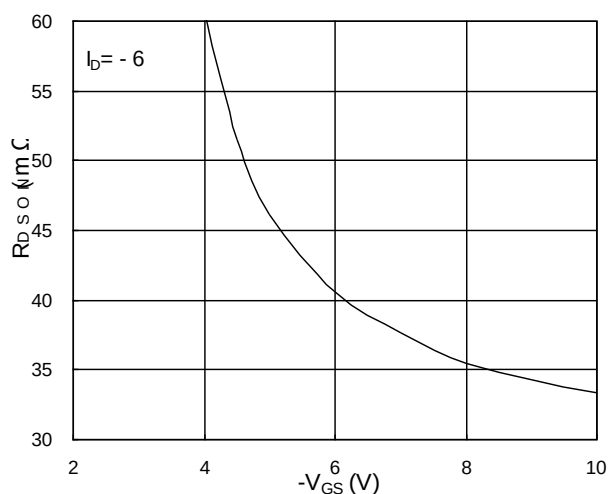
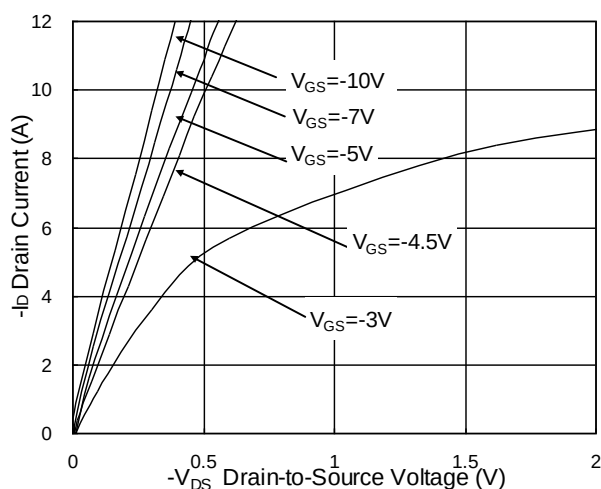
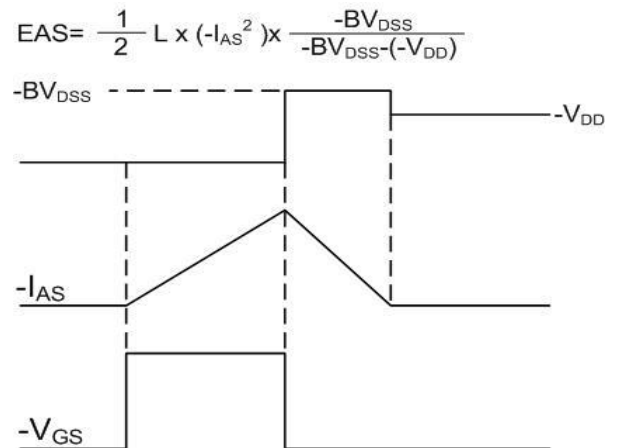
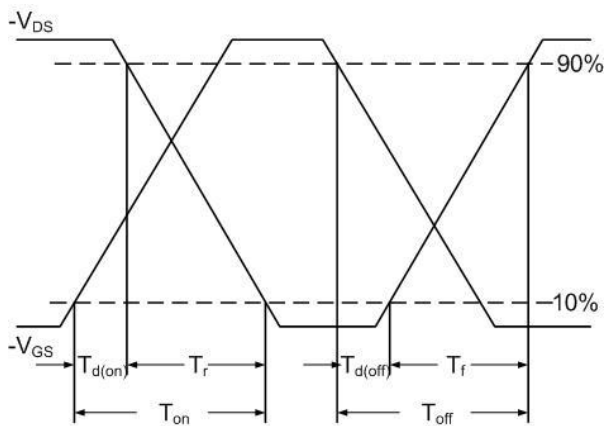
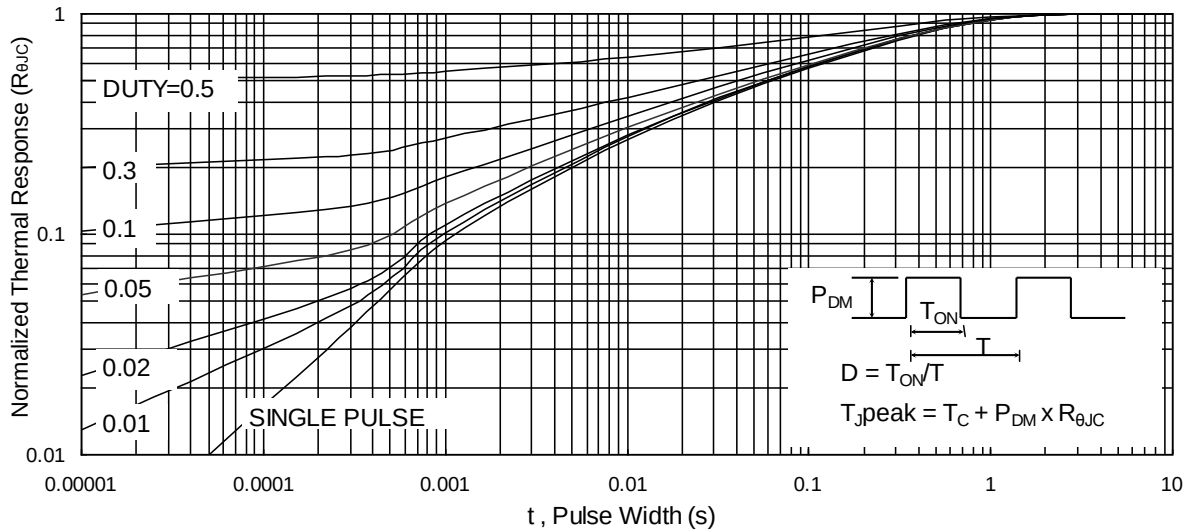
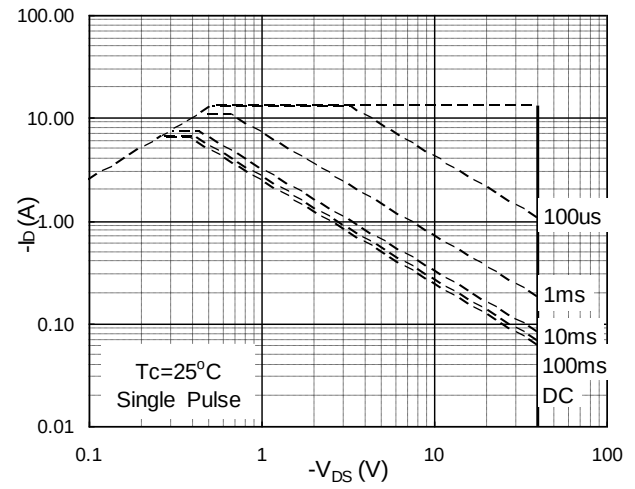
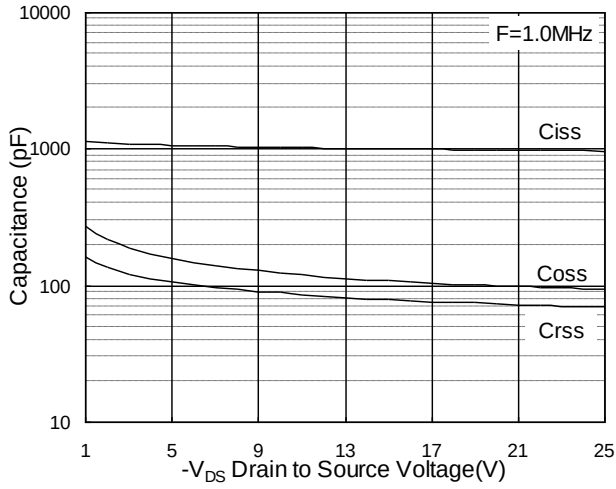


Fig.11 Unclamped Inductive Waveform

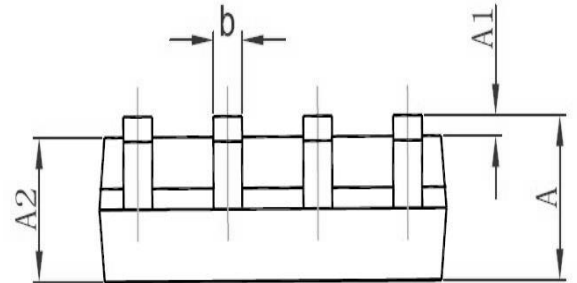
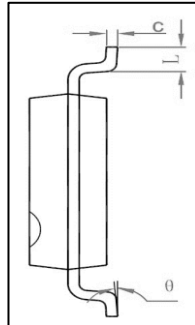
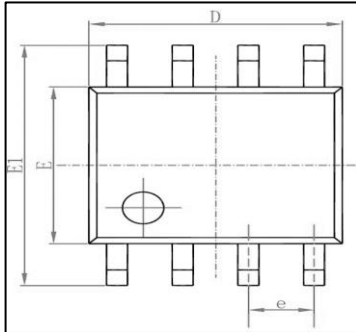
## P-Channel Typical Characteristics





## 5.Package Mechanical Data

SOP-8



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 1.350                     | 1.750 | 0.053                | 0.069 |
| A1     | 0.100                     | 0.250 | 0.004                | 0.010 |
| A2     | 1.350                     | 1.550 | 0.053                | 0.061 |
| b      | 0.330                     | 0.510 | 0.013                | 0.020 |
| c      | 0.170                     | 0.250 | 0.006                | 0.010 |
| D      | 4.700                     | 5.100 | 0.185                | 0.200 |
| E      | 3.800                     | 4.000 | 0.150                | 0.157 |
| E1     | 5.800                     | 6.200 | 0.228                | 0.244 |
| e      | 1.270 (BSC)               |       | 0.050 (BSC)          |       |
| L      | 0.400                     | 1.270 | 0.016                | 0.050 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

