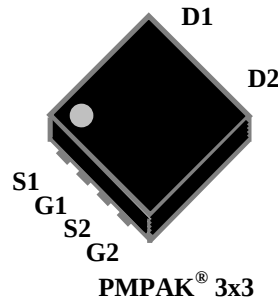




N AND P-CHANNEL ENHANCEMENT

MODE POWER MOSFET

- ▼ Simple Drive Requirement
- ▼ Good Thermal Performance
- ▼ Fast Switching Performance
- ▼ RoHS Compliant & Halogen-Free

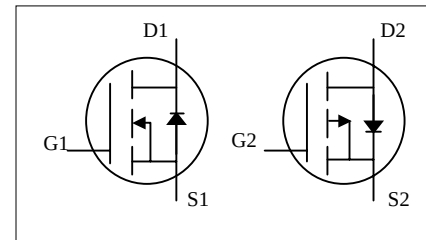


|      |              |              |
|------|--------------|--------------|
| N-CH | $BV_{DSS}$   | 30V          |
|      | $R_{DS(ON)}$ | 20m $\Omega$ |
|      | $I_D^3$      | 8.7A         |
| P-CH | $BV_{DSS}$   | -30V         |
|      | $R_{DS(ON)}$ | 45m $\Omega$ |
|      | $I_D^3$      | -6.1A        |

## Description

XP3700 series are innovative design and silicon process technology to achieve the lowest possible on-resistance and fast switching performance. It provides the designer with an extreme efficient device for use in a wide range of power applications.

The PMPAK<sup>®</sup> 3x3 package is special for voltage conversion application using standard infrared reflow technique with the backside heat sink to achieve the good thermal performance.



## Absolute Maximum Ratings@T<sub>j</sub>=25°C(unless otherwise specified)

| Symbol                     | Parameter                                   | Rating     |           | Units |
|----------------------------|---------------------------------------------|------------|-----------|-------|
|                            |                                             | N-channel  | P-channel |       |
| $V_{DS}$                   | Drain-Source Voltage                        | 30         | -30       | V     |
| $V_{GS}$                   | Gate-Source Voltage                         | +20        | +20       | V     |
| $I_D@T_A=25^\circ\text{C}$ | Drain Current <sup>3</sup> , $V_{GS}$ @ 10V | 8.7        | -6.1      | A     |
| $I_D@T_A=70^\circ\text{C}$ | Drain Current <sup>3</sup> , $V_{GS}$ @ 10V | 6.9        | -4.9      | A     |
| $I_{DM}$                   | Pulsed Drain Current <sup>1</sup>           | 20         | -20       | A     |
| $P_D@T_A=25^\circ\text{C}$ | Total Power Dissipation                     | 2.5        |           | W     |
| $T_{STG}$                  | Storage Temperature Range                   | -55 to 150 |           | °C    |
| $T_J$                      | Operating Junction Temperature Range        | -55 to 150 |           | °C    |

## Thermal Data

| Symbol | Parameter                                                 | Value | Unit |
|--------|-----------------------------------------------------------|-------|------|
| Rthj-c | Maximum Thermal Resistance, Junction-case                 | 8     | °C/W |
| Rthj-a | Maximum Thermal Resistance, Junction-ambient <sup>3</sup> | 50    | °C/W |

**N-CH Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)**

| Symbol              | Parameter                                      | Test Conditions                                        | Min. | Typ. | Max. | Units |
|---------------------|------------------------------------------------|--------------------------------------------------------|------|------|------|-------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA             | 30   | -    | -    | V     |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =8A               | -    | -    | 20   | mΩ    |
|                     |                                                | V <sub>GS</sub> =4.5V, I <sub>D</sub> =4A              | -    | -    | 35   | mΩ    |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =1mA | 1.4  | -    | 2.5  | V     |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =8A                | -    | 23   | -    | S     |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V              | -    | -    | 10   | uA    |
| I <sub>GSS</sub>    | Gate-Source Leakage                            | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V             | -    | -    | ±100 | nA    |
| Q <sub>g</sub>      | Total Gate Charge                              | I <sub>D</sub> =4A                                     | -    | 5    | 8    | nC    |
| Q <sub>gs</sub>     | Gate-Source Charge                             | V <sub>DS</sub> =15V                                   | -    | 1.8  | -    | nC    |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                   | V <sub>GS</sub> =4.5V                                  | -    | 1.8  | -    | nC    |
| t <sub>d(on)</sub>  | Turn-on Delay Time                             | V <sub>DS</sub> =15V                                   | -    | 7    | -    | ns    |
| t <sub>r</sub>      | Rise Time                                      | I <sub>D</sub> =1A                                     | -    | 10   | -    | ns    |
| t <sub>d(off)</sub> | Turn-off Delay Time                            | R <sub>G</sub> =6Ω                                     | -    | 19   | -    | ns    |
| t <sub>f</sub>      | Fall Time                                      | V <sub>GS</sub> =10V                                   | -    | 4    | -    | ns    |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>GS</sub> =0V                                    | -    | 550  | 880  | pF    |
| C <sub>oss</sub>    | Output Capacitance                             | V <sub>DS</sub> =15V                                   | -    | 90   | -    | pF    |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   | f=1.0MHz                                               | -    | 60   | -    | pF    |

**Source-Drain Diode**

| Symbol          | Parameter                       | Test Conditions                         | Min. | Typ. | Max. | Units |
|-----------------|---------------------------------|-----------------------------------------|------|------|------|-------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =2A, V <sub>GS</sub> =0V | -    | -    | 1.2  | V     |
| t <sub>rr</sub> | Reverse Recovery Time           | I <sub>S</sub> =8A, V <sub>GS</sub> =0V | -    | 10   | -    | ns    |
| Q <sub>rr</sub> | Reverse Recovery Charge         | dI/dt=100A/μs                           | -    | 3    | -    | nC    |

**P-CH Electrical Characteristics@T<sub>j</sub>=25°C(unless otherwise specified)**

| Symbol              | Parameter                                      | Test Conditions                                           | Min. | Typ. | Max. | Unit |
|---------------------|------------------------------------------------|-----------------------------------------------------------|------|------|------|------|
| BV <sub>DSS</sub>   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA               | -30  | -    | -    | V    |
| R <sub>DS(ON)</sub> | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A                | -    | -    | 45   | mΩ   |
|                     |                                                | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A               | -    | -    | 85   | mΩ   |
| V <sub>GS(th)</sub> | Gate Threshold Voltage                         | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250uA | -1   | -    | -2.5 | V    |
| g <sub>fs</sub>     | Forward Transconductance                       | V <sub>DS</sub> =-5V, I <sub>D</sub> =-6A                 | -    | 9    | -    | S    |
| I <sub>DSS</sub>    | Drain-Source Leakage Current                   | V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V                | -    | -    | -10  | uA   |
| I <sub>GSS</sub>    | Gate-Source Leakage                            | V <sub>GS</sub> =+20V, V <sub>DS</sub> =0V                | -    | -    | +100 | nA   |
| Q <sub>g</sub>      | Total Gate Charge                              | I <sub>D</sub> =-3A                                       | -    | 6    | 9.6  | nC   |
| Q <sub>gs</sub>     | Gate-Source Charge                             | V <sub>DS</sub> =-15V                                     | -    | 1.8  | -    | nC   |
| Q <sub>gd</sub>     | Gate-Drain ("Miller") Charge                   | V <sub>GS</sub> =-4.5V                                    | -    | 2.1  | -    | nC   |
| t <sub>d(on)</sub>  | Turn-on Delay Time                             | V <sub>DS</sub> =-15V                                     | -    | 10   | -    | ns   |
| t <sub>r</sub>      | Rise Time                                      | I <sub>D</sub> =-1A                                       | -    | 11   | -    | ns   |
| t <sub>d(off)</sub> | Turn-off Delay Time                            | R <sub>G</sub> =6Ω                                        | -    | 30   | -    | ns   |
| t <sub>f</sub>      | Fall Time                                      | V <sub>GS</sub> =-10V                                     | -    | 14   | -    | ns   |
| C <sub>iss</sub>    | Input Capacitance                              | V <sub>GS</sub> =0V                                       | -    | 610  | 976  | pF   |
| C <sub>oss</sub>    | Output Capacitance                             | V <sub>DS</sub> =-15V                                     | -    | 100  | -    | pF   |
| C <sub>rss</sub>    | Reverse Transfer Capacitance                   | f=1.0MHz                                                  | -    | 70   | -    | pF   |

**Source-Drain Diode**

| Symbol          | Parameter                       | Test Conditions                          | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------------|------------------------------------------|------|------|------|------|
| V <sub>SD</sub> | Forward On Voltage <sup>2</sup> | I <sub>S</sub> =-2A, V <sub>GS</sub> =0V | -    | -    | -1.2 | V    |
| t <sub>rr</sub> | Reverse Recovery Time           | I <sub>S</sub> =-6A, V <sub>GS</sub> =0V | -    | 12   | -    | ns   |
| Q <sub>rr</sub> | Reverse Recovery Charge         | dI/dt=-100A/μs                           | -    | 4    | -    | nC   |

**Notes:**

- 1.Pulse width limited by Max. junction temperature.
- 2.Pulse test
- 3.Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board, t ≤10sec, 90°C/W at steady state.

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

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### N-Channel

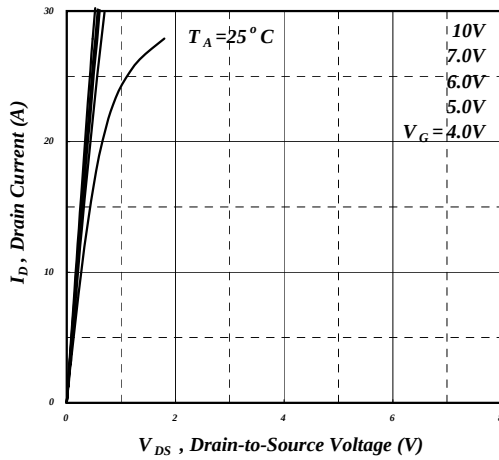


Fig 1. Typical Output Characteristics

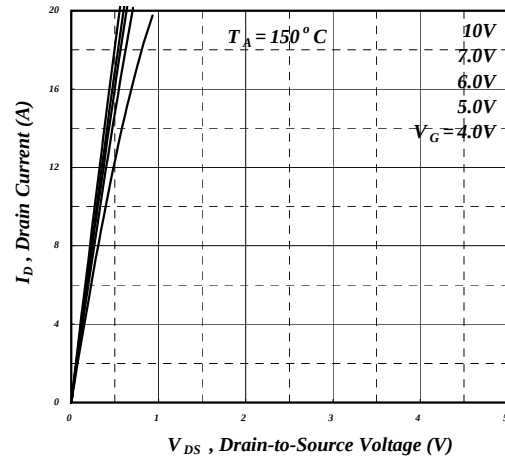


Fig 2. Typical Output Characteristics

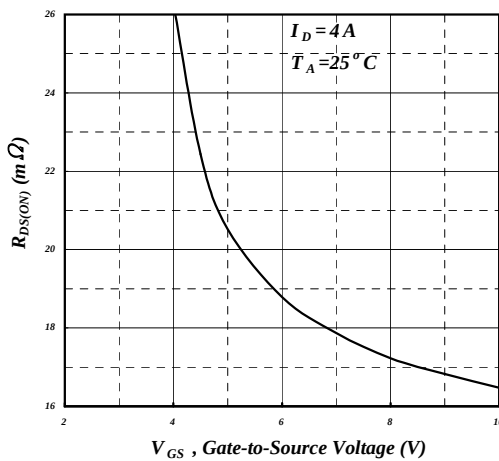


Fig 3. On-Resistance v.s. Gate Voltage

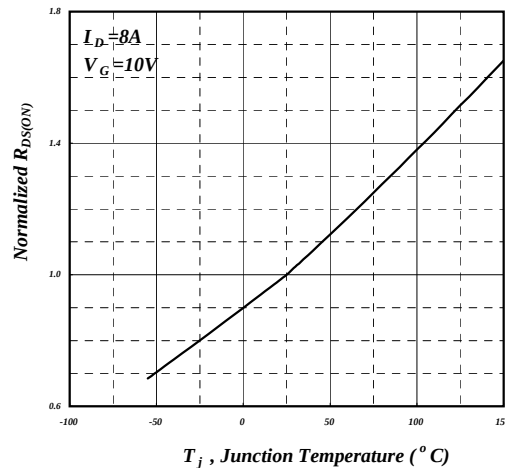


Fig 4. Normalized On-Resistance v.s. Junction Temperature

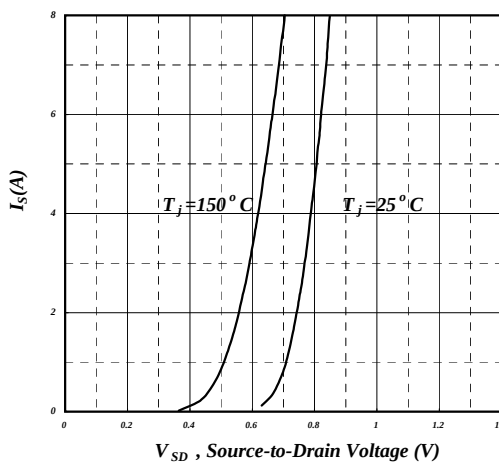


Fig 5. Forward Characteristic of Reverse Diode

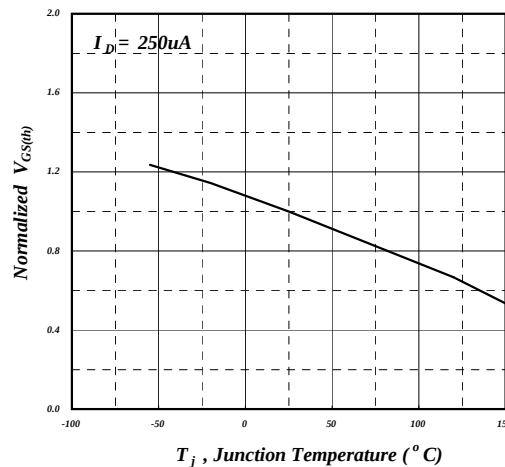
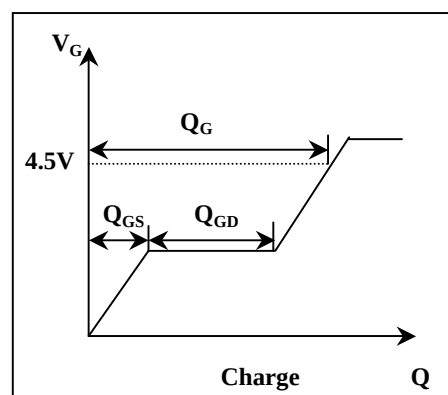
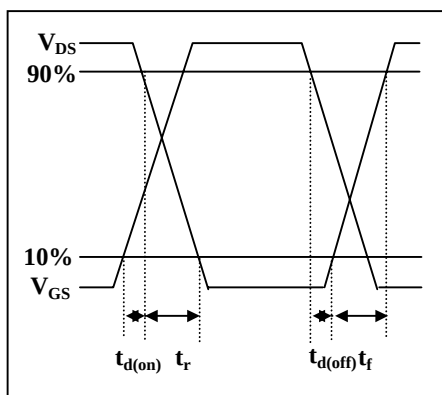
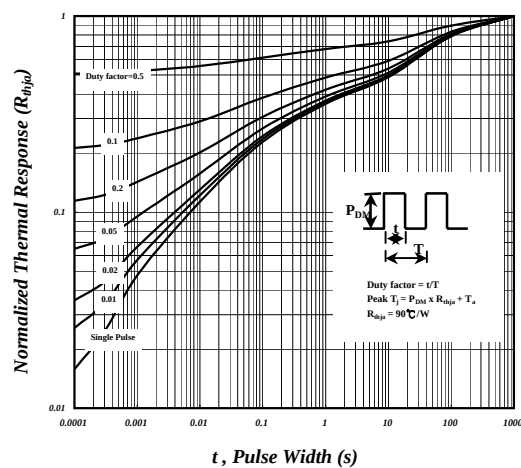
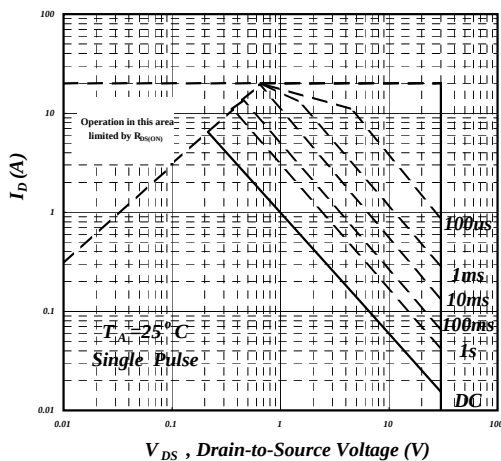
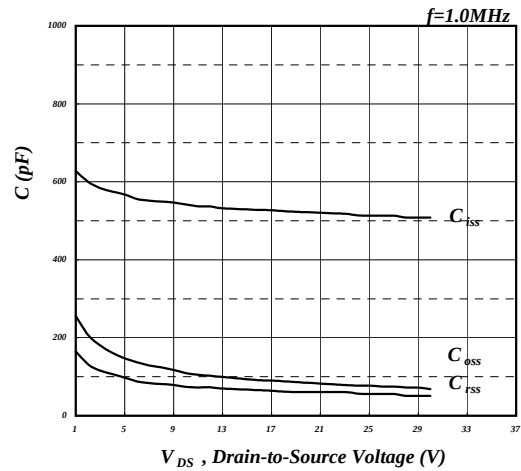
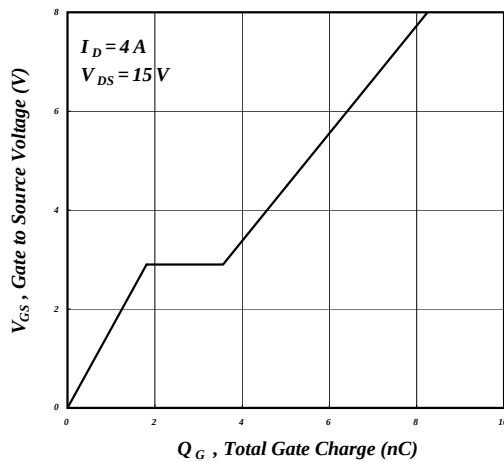


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

### N-Channel



### P-Channel

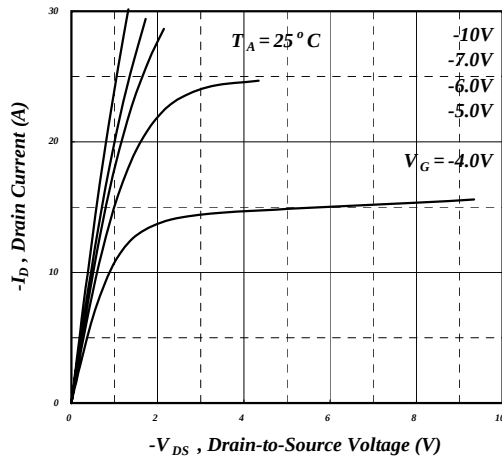


Fig 1. Typical Output Characteristics

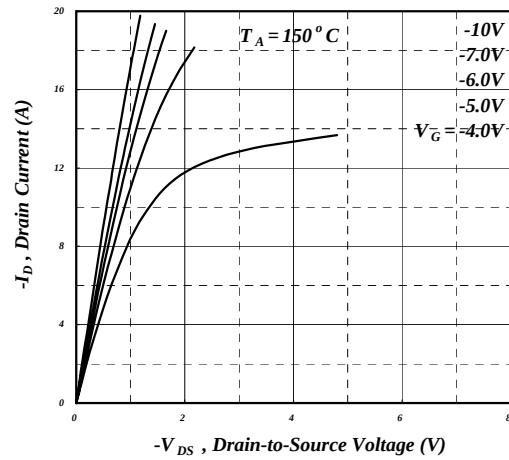


Fig 2. Typical Output Characteristics

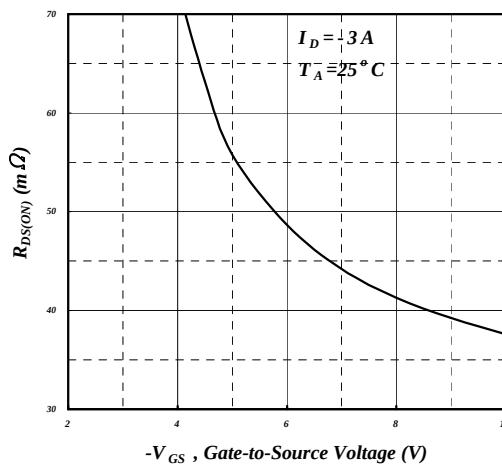


Fig 3. On-Resistance v.s. Gate Voltage

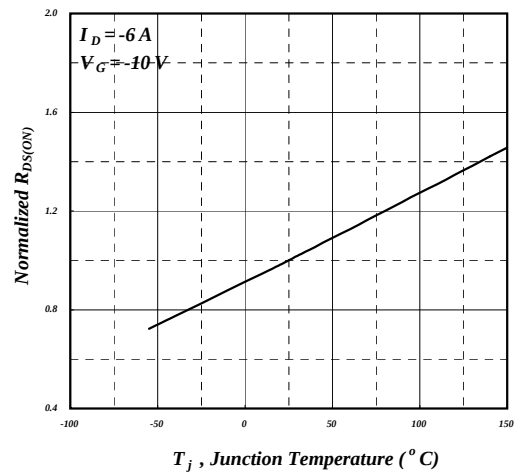


Fig 4. Normalized On-Resistance v.s. Junction Temperature

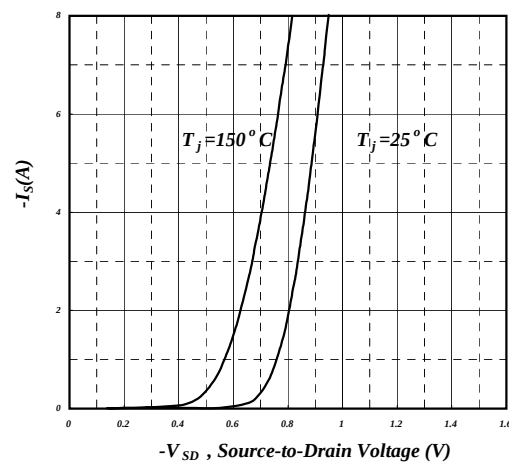


Fig 5. Forward Characteristic of Reverse Diode

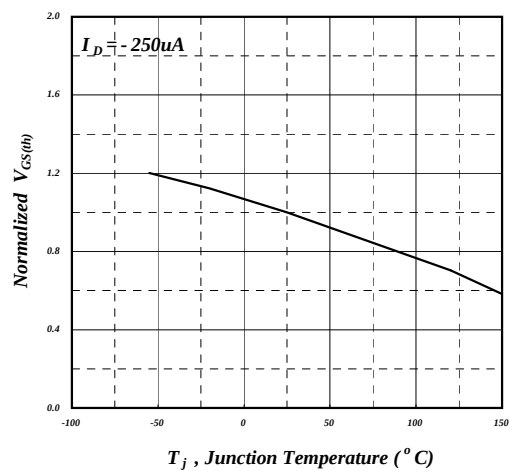


Fig 6. Gate Threshold Voltage v.s. Junction Temperature

### P-Channel

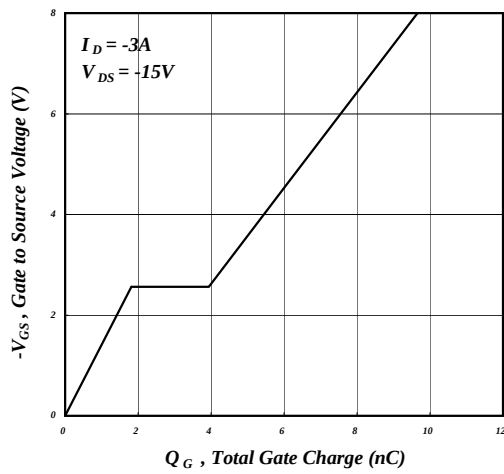


Fig 7. Gate Charge Characteristics

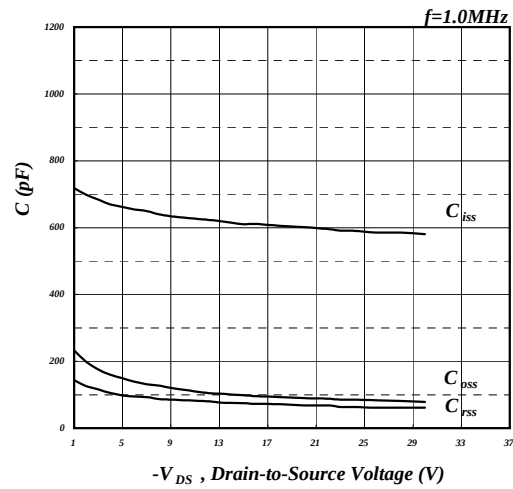


Fig 8. Typical Capacitance Characteristics

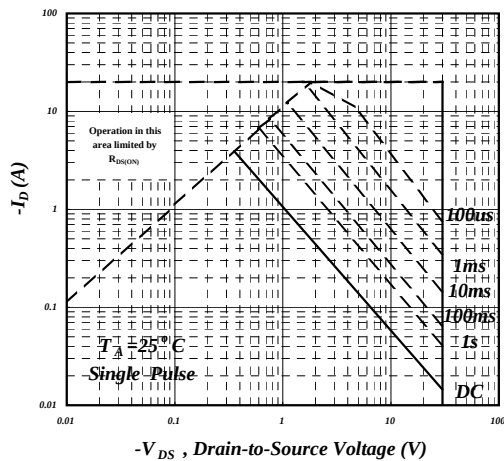


Fig 9. Maximum Safe Operating Area

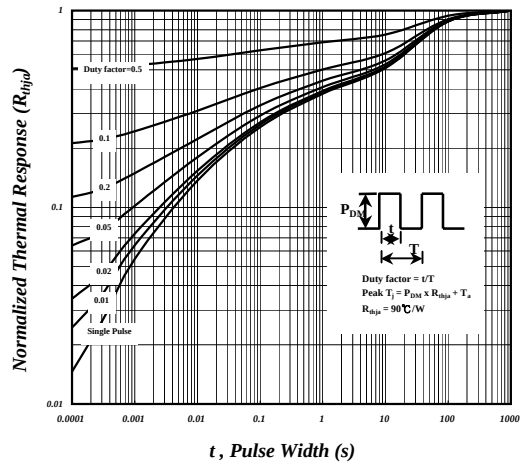


Fig 10. Effective Transient Thermal Impedance

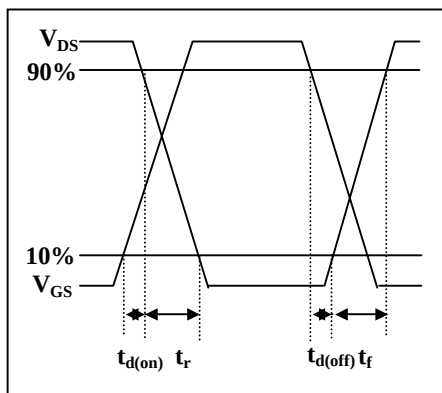


Fig 11. Switching Time Waveform

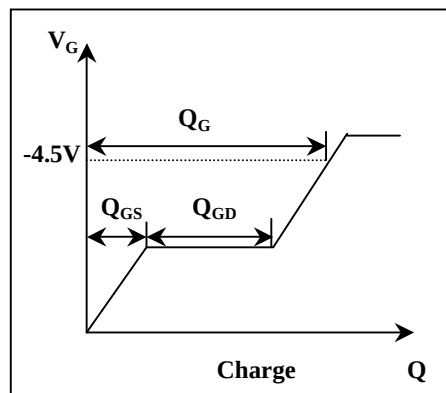
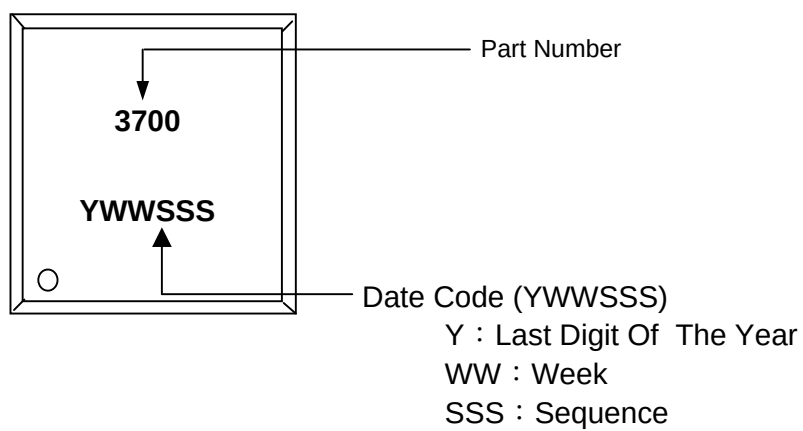


Fig 12. Gate Charge Waveform

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