

- ◆ N-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance : 0.1Ω (max)
- ◆ Ultra High-Speed Switching
- ◆ Gate Protect Diode Built-in
- ◆ SOT - 23 Package

- Applications
 - Notebook PCs
 - Cellular and portable phones
 - On - board power supplies
 - Li - ion battery systems

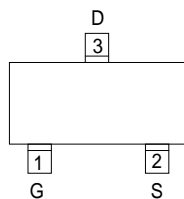
■ General Description

The XP151A12A2MR is a N-Channel Power MOS FET with low on state resistance and ultra high-speed switching characteristics. Because high-speed switching is possible, the IC can be efficiently set thereby saving energy. In order to counter static, a gate protect diode is built-in. The small SOT-23 package makes high density mounting possible.

■ Features

- Low on-state resistance** : $R_{ds(on)} = 0.1\Omega$ ($V_{gs} = 4.5V$)
 $R_{ds(on)} = 0.16\Omega$ ($V_{gs} = 2.5V$)
- Ultra high-speed switching**
- Gate Protect Diode Built-in**
- Operational Voltage** : 2.5V
- High density mounting** : SOT - 23

■ Pin Configuration

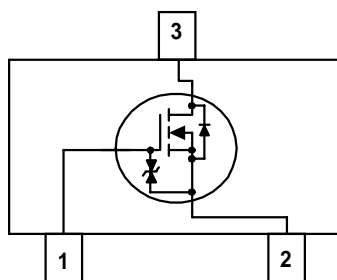


SOT - 23 Top View

■ Pin Assignment

| PIN NUMBER | PIN NAME | FUNCTION |
|------------|----------|----------|
| 1 | G | Gate |
| 2 | S | Source |
| 3 | D | Drain |

■ Equivalent Circuit



N - Channel MOS FET
(1 device built-in)

■ Absolute Maximum Ratings

| $T_a = 25^\circ\text{C}$ | | | |
|---|-----------|------------|------------------|
| PARAMETER | SYMBOL | RATINGS | UNITS |
| Drain - Source Voltage | V_{dss} | 20 | V |
| Gate - Source Voltage | V_{gss} | ± 12 | V |
| Drain Current (DC) | I_d | 1 | A |
| Drain Current (Pulse) | I_{dp} | 4 | A |
| Reverse Drain Current | I_{dr} | 1 | A |
| Continuous Channel Power Dissipation (note) | P_d | 0.5 | W |
| Channel Temperature | T_{ch} | 150 | $^\circ\text{C}$ |
| Storage Temperature | T_{stg} | -55 to 150 | $^\circ\text{C}$ |

(note) : When implemented on a ceramic PCB

■ Electrical Characteristics

DC characteristics

Ta=25°C

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|------------|------------------------|-----|-------|------|-------|
| Drain Cut-off Current | Idss | Vds = 20 , Vgs = 0V | | | 10 | μA |
| Gate-Source Leakage Current | Igss | Vgs = ± 12 , Vds = 0V | | | ± 10 | μA |
| Gate-Source Cut-off Voltage | Vgs (off) | Id = 1mA , Vds = 10V | 0.7 | | 1.4 | V |
| Drain-Source On-state Resistance (note) | Rds (on) | Id = 0.5A , Vgs = 4.5V | | 0.075 | 0.1 | Ω |
| | | Id = 0.5A , Vgs = 2.5V | | 0.12 | 0.16 | Ω |
| Forward Transfer Admittance (note) | Yfs | Id = 0.5A , Vds = 10V | | 3.3 | | S |
| Body Drain Diode Forward Voltage | Vf | If = 1A , Vgs = 0V | | 0.8 | 1.1 | V |

(note) : Effective during pulse test.

Dynamic characteristics

Ta=25°C

| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|----------------------|--------|-----------------------------------|-----|-----|-----|-------|
| Input Capacitance | Ciss | Vds = 10V , Vgs = 0V f = 1 MHz | | 180 | | pF |
| Output Capacitance | Coss | | | 120 | | pF |
| Feedback Capacitance | Crss | | | 45 | | pF |

Switching characteristics

Ta=25°C

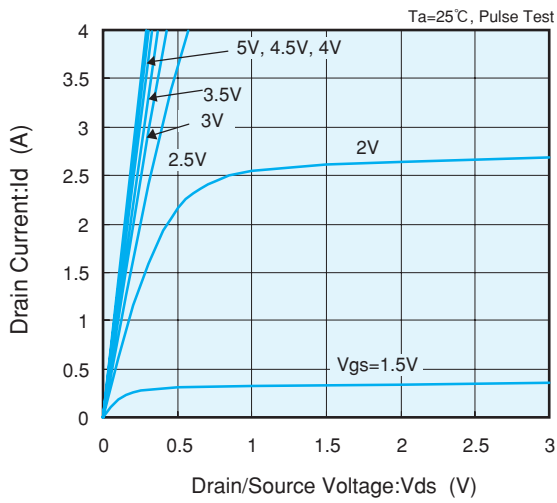
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|---------------------|------------|-----------------------------------|-----|-----|-----|-------|
| Turn-on Delay Time | td (on) | Vgs = 5V , Id = 0.5A Vdd = 10V | | 10 | | ns |
| Rise Time | tr | | | 15 | | ns |
| Turn-off Delay Time | td (off) | | | 50 | | ns |
| Fall Time | tf | | | 45 | | ns |

Thermal characteristics

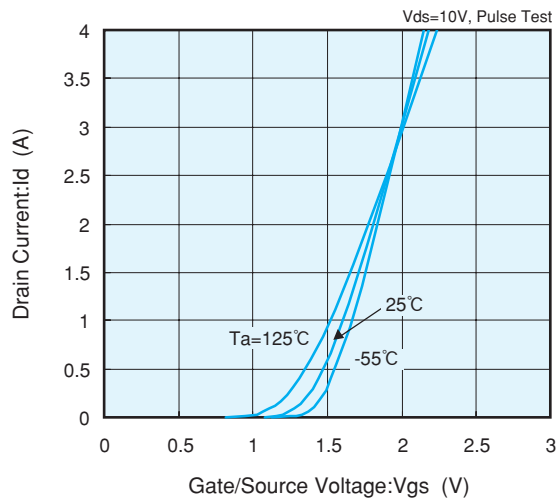
| PARAMETER | SYMBOL | CONDITIONS | MIN | TYP | MAX | UNITS |
|--|----------------|-------------------------------|-----|-----|-----|--------|
| Thermal Resistance (channel - surroundings) | Rth (ch - a) | Implement on a ceramic PCB | | 250 | | °C / W |

XP151A12A2MR Electrical Characteristics

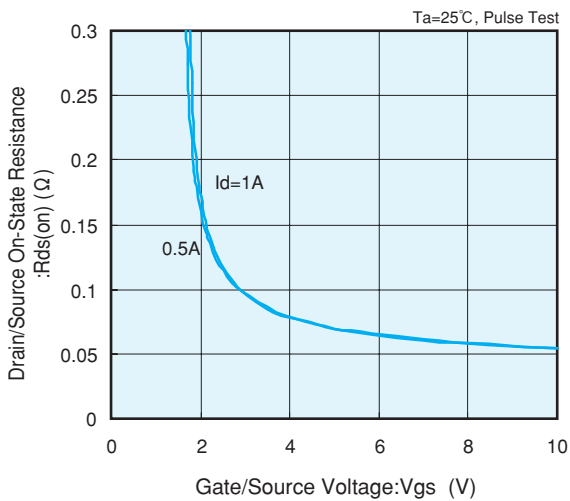
Drain Current vs. Drain/Source Voltage



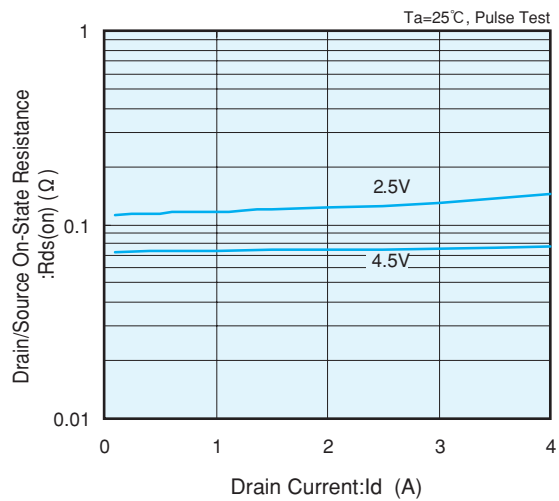
Drain Current vs. Gate/Source Voltage



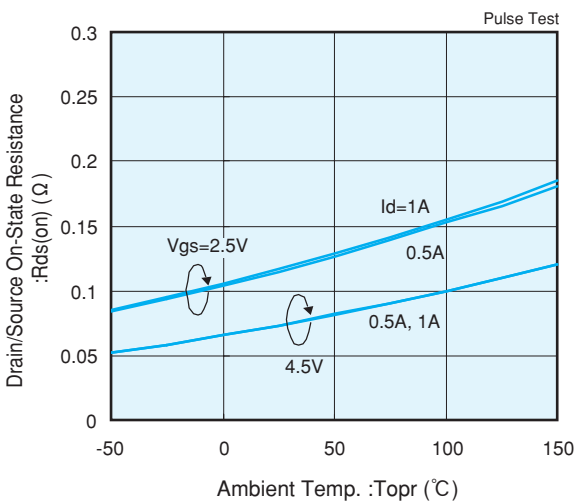
Drain/Source On-State Resistance vs. Gate/Source Voltage



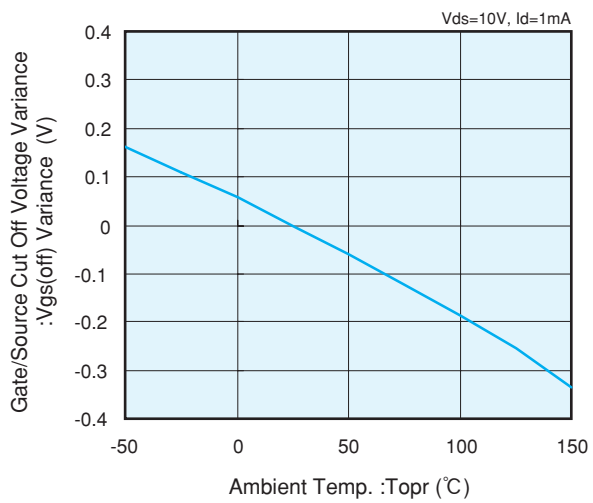
Drain/Source On-State Resistance vs. Drain Current



Drain/Source On-State Resistance vs. Ambient Temp.



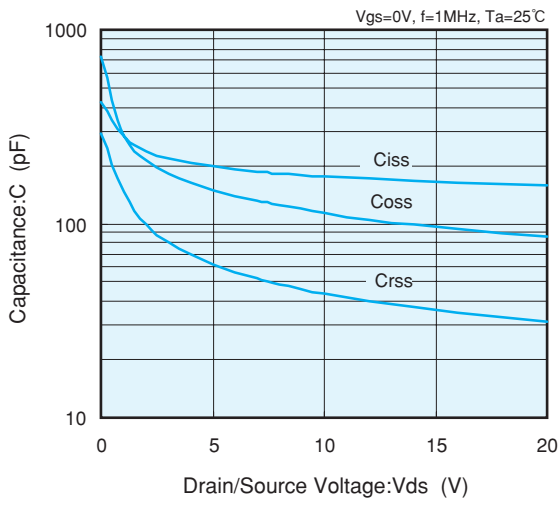
Gate/Source Cut Off Voltage Variance vs. Ambient Temp.



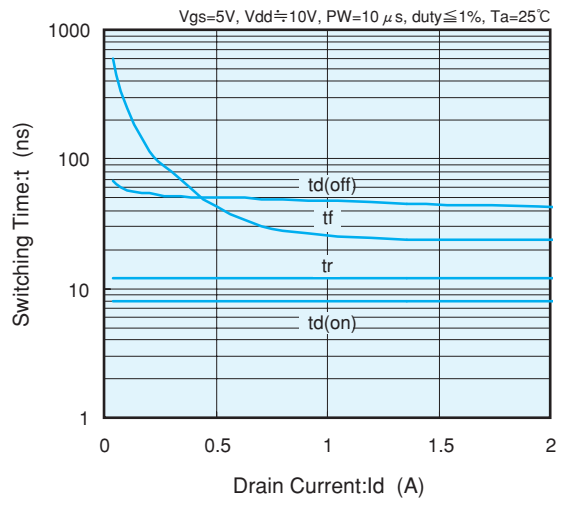
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■ XP151A12A2MR Electrical Characteristics

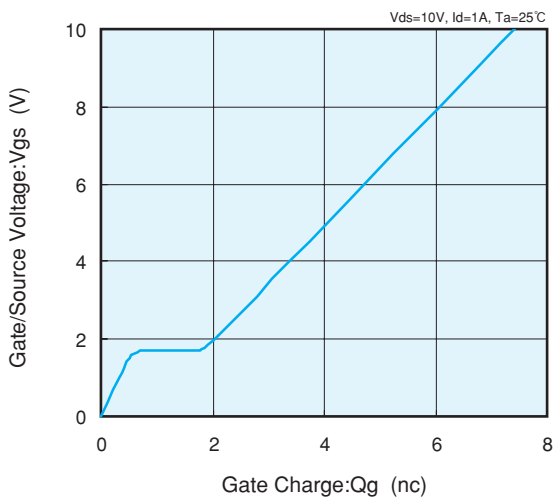
Capacitance vs. Drain/Source Voltage



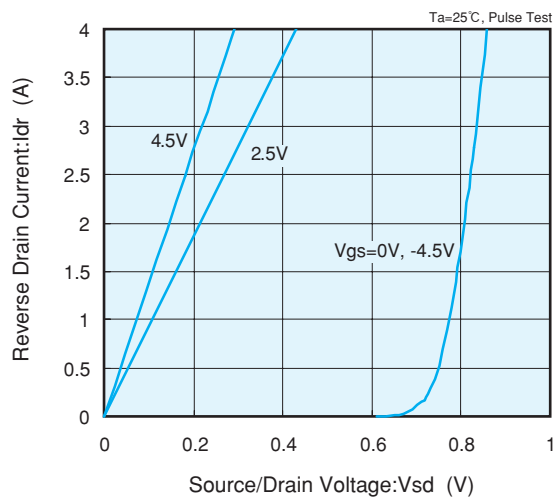
Switching Time vs. Drain Current



Gate/Source Voltage vs. Gate Charge



Reverse Drain Current vs. Source/Drain Voltage



Standardized Transition Thermal Resistance vs. Pulse Width

