

- ◆ N-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance:  $0.17\Omega$  MAX
- ◆ Ultra High-Speed Switching
- ◆ SOT-23 Package

### Applications

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

### General Description

The XP151A03A7MR 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. The small SOT-23 package makes high density mounting possible.

### Features

**Low on-state resistance:**  $R_{ds(on)}=0.17\Omega(V_{gs}=4.5V)$   
 $R_{ds(on)}=0.24\Omega(V_{gs}=2.5V)$   
 $R_{ds(on)}=0.5\Omega(V_{gs}=1.5V)$

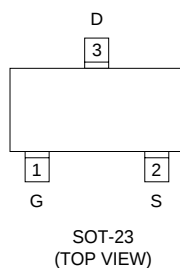
**Ultra high-speed switching**

**Operational Voltage:** 1.5V

**High density mounting:** SOT-23

7

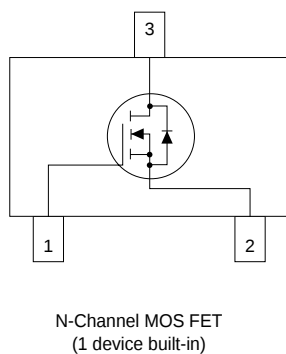
### Pin Configuration



### Pin Assignment

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

### Equivalent Circuit



### Absolute Maximum Ratings

$T_a=25^\circ\text{C}$

| PARAMETER                                   | SYMBOL    | RATINGS | UNITS            |
|---------------------------------------------|-----------|---------|------------------|
| Drain-Source Voltage                        | $V_{dss}$ | 20      | V                |
| Gate-Source Voltage                         | $V_{gss}$ | $\pm 8$ | V                |
| Drain Current (DC)                          | $I_d$     | 0.8     | A                |
| Drain Current (Pulse)                       | $I_{dp}$  | 2.5     | A                |
| Reverse Drain Current                       | $I_{dr}$  | 0.8     | A                |
| Continuous Channel Power Dissipation (note) | $P_d$     | 0.5     | W                |
| Channel Temperature                         | $T_{ch}$  | 150     | $^\circ\text{C}$ |
| Storage Temperature                         | $T_{stg}$ | -55~150 | $^\circ\text{C}$ |

Note: When implemented on a glass epoxy PCB

## Electrical Characteristics

### DC characteristics

Ta=25°C

| PARAMETER                               | SYMBOL   | CONDITIONS        | MIN | TYP  | MAX  | UNITS |
|-----------------------------------------|----------|-------------------|-----|------|------|-------|
| Drain Cut-off Current                   | Idss     | Vds=20V, Vgs=0V   |     |      | 10   | μA    |
| Gate-Source Leakage Current             | Igss     | Vgs=±8V, Vds=0V   |     |      | ±10  | μA    |
| Gate-Source Cut-off Voltage             | Vgs(off) | Id=1mA, Vds=10V   | 0.5 |      |      | V     |
| Drain-Source On-state Resistance (note) | Rds(on)  | Id=0.4A, Vgs=4.5V |     | 0.13 | 0.17 | Ω     |
|                                         |          | Id=0.4A, Vgs=2.5V |     | 0.18 | 0.24 | Ω     |
|                                         |          | Id=0.4A, Vgs=1.5V |     | 0.3  | 0.5  | Ω     |
| Forward Transfer Admittance (note)      | Yfs      | Id=0.4A, Vds=10V  |     | 3.5  |      | S     |
| Body Drain Diode Forward Voltage        | Vf       | If=0.8A, 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<br>f=1MHz |     | 220 |     | pF    |
| Output Capacitance   | Coss   |                           |     | 100 |     | pF    |
| Feedback Capacitance | Crss   |                           |     | 30  |     | pF    |

### Switching characteristics

Ta=25°C

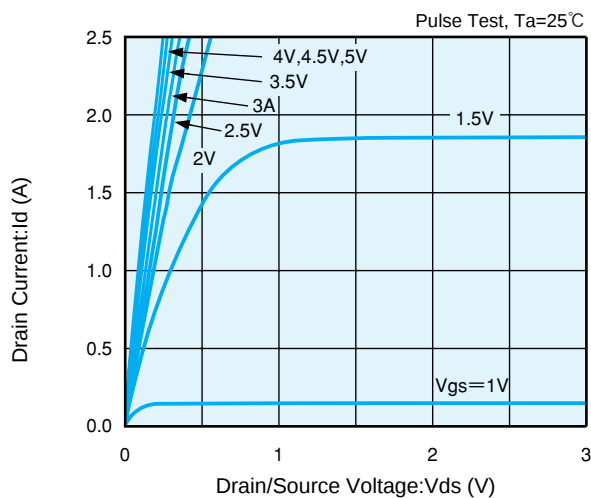
| PARAMETER           | SYMBOL   | CONDITIONS                 | MIN | TYP | MAX | UNITS |
|---------------------|----------|----------------------------|-----|-----|-----|-------|
| Turn-on Delay Time  | td (on)  | Vgs=5V, Id=0.4A<br>Vdd=10V |     | 10  |     | ns    |
| Rise Time           | tr       |                            |     | 15  |     | ns    |
| Turn-off Delay Time | td (off) |                            |     | 45  |     | ns    |
| Fall Time           | tf       |                            |     | 60  |     | ns    |

### Thermal characteristics

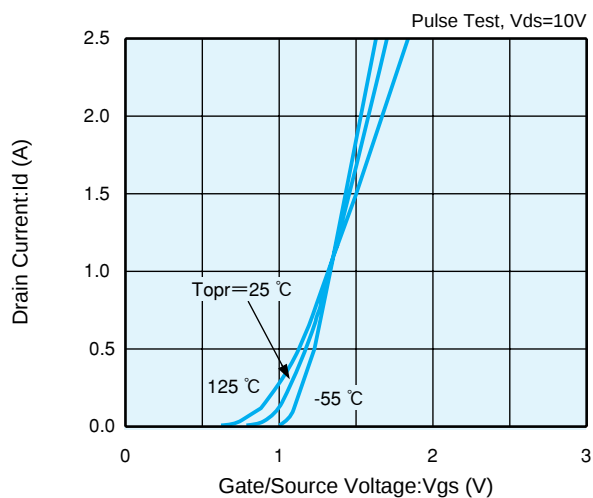
| PARAMETER                                 | SYMBOL     | CONDITIONS                           | MIN | TYP | MAX | UNITS |
|-------------------------------------------|------------|--------------------------------------|-----|-----|-----|-------|
| Thermal Resistance (channel-surroundings) | Rth (ch-a)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

### XP151A03A7MR Characteristics

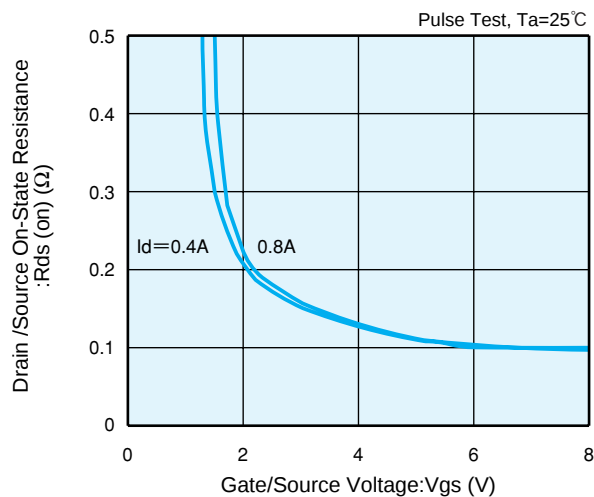
Drain Current vs. Drain /Source Voltage



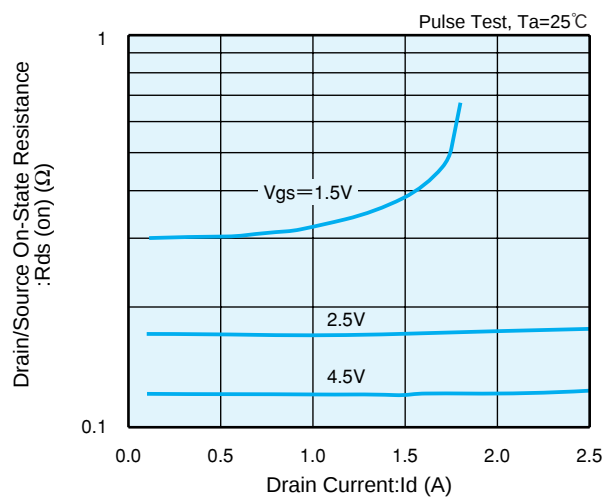
Drain Current vs. Gate/Source Voltage



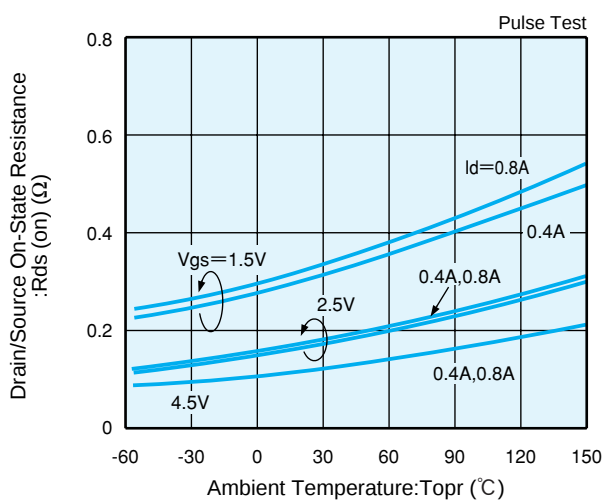
Drain/Source On-State Resistance vs. Gate/Source Voltage



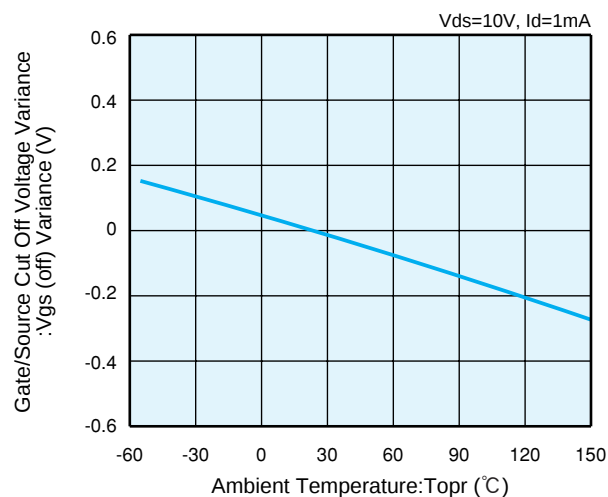
Drain/Source On-State Resistance vs. Drain Current



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

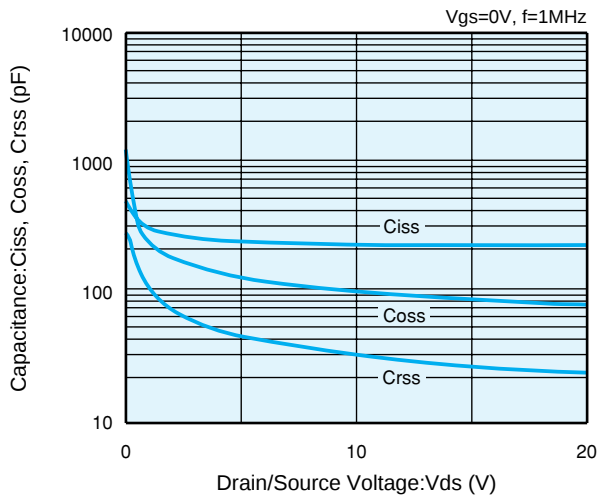


Gate/Source Cut Off Voltage Variance vs. Ambient Temp.

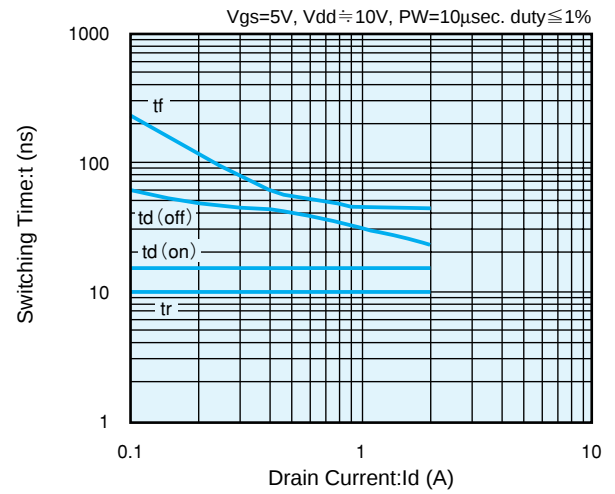


## XP151A03A7MR Characteristics

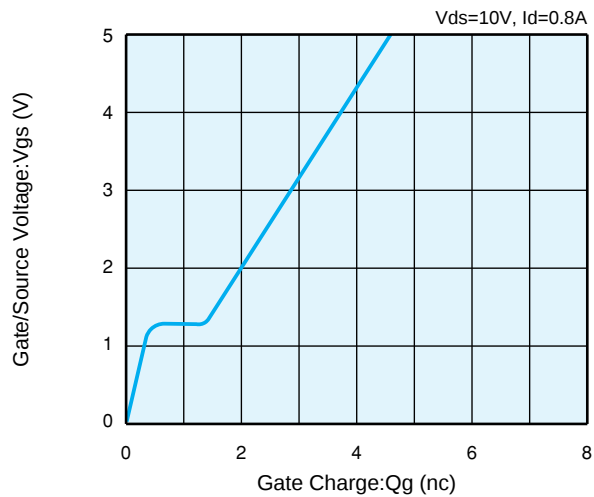
Drain/Source Voltage vs. Capacitance



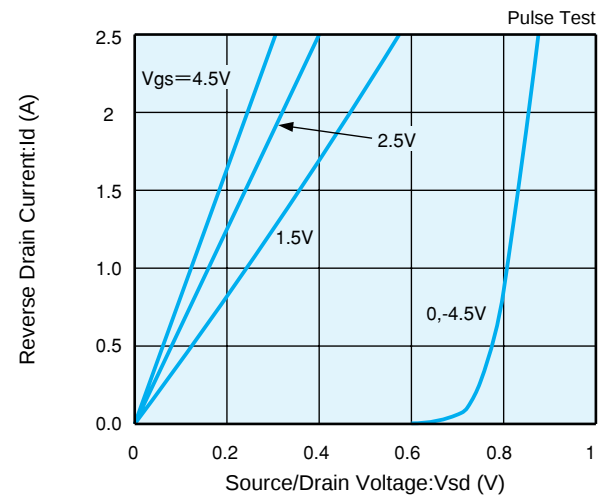
Switching Time vs. Drain Current



Gate/Source Voltage vs. Gate Charge



Reverse Drain Current vs. Source/Drain Voltage



Standardized Transition Thermal Resistance vs. Pulse Width

