

## Power MOSFET

### ■ GENERAL DESCRIPTION

The XP131A1715SR is an N-channel Power MOSFET 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 SOP-8 package makes high density mounting possible

### ■ APPLICATIONS

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

### ■ FEATURES

**Low On-State Resistance** :  $R_{ds(on)} = 0.012 \Omega$  ( $V_{gs} = 4.5V$ )  
:  $R_{ds(on)} = 0.015 \Omega$  ( $V_{gs} = 2.5V$ )  
:  $R_{ds(on)} = 0.025 \Omega$  ( $V_{gs} = 1.5V$ )

**Ultra High-Speed Switching**

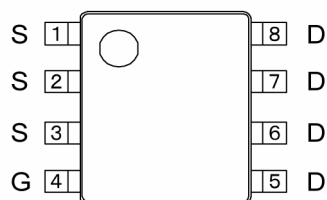
**Driving Voltage** : 1.5V

**N-Channel Power MOSFET**

**DMOS Structure**

**Package** : SOP-8

### ■ PIN CONFIGURATION

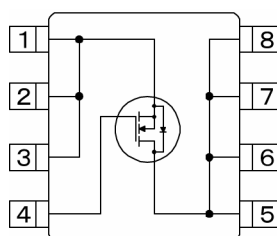


SOP-8  
(TOP VIEW)

### ■ PIN ASSIGNMENT

| PIN NUMBER | PIN NAME | FUNCTION |
|------------|----------|----------|
| 1~3        | S        | Source   |
| 4          | G        | Gate     |
| 5~8        | D        | Drain    |

### ■ EQUIVALENT CIRCUIT



N-channel MOSFET  
(1 device built-in)

### ■ ABSOLUTE MAXIMUM RATINGS

$T_a = 25^\circ C$

| PARAMETER                   | SYMBOL    | RATINGS | UNITS      |
|-----------------------------|-----------|---------|------------|
| Drain-Source Voltage        | $V_{ds}$  | 20      | V          |
| Gate-Source Voltage         | $V_{gs}$  | $\pm 8$ | V          |
| Drain Current (DC)          | $I_d$     | 10      | A          |
| Drain Current (Pulse)       | $I_{dp}$  | 40      | A          |
| Reverse Drain Current       | $I_{dr}$  | 10      | A          |
| Channel Power Dissipation * | $P_d$     | 2.5     | W          |
| Channel Temperature         | $T_{ch}$  | 150     | $^\circ C$ |
| Storage Temperature Range   | $T_{stg}$ | -55~150 | $^\circ C$ |

\* 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 Leak Current           | Igss     | Vgs=±8V, Vds=0V   | -    | -     | ±1    | μA    |
| Gate-Source Cut-Off Voltage        | Vgs(off) | Id=1mA, Vds=10V   | 0.5  | -     | 1.2   | V     |
| Drain-Source On-State Resistance * | Rds(on)  | Id=5A, Vgs=4.5V   | -    | 0.009 | 0.012 | Ω     |
|                                    |          | Id=5A, Vgs=2.5V   | -    | 0.011 | 0.015 | Ω     |
|                                    |          | Id=1.5A, Vgs=1.5V | -    | 0.017 | 0.025 | Ω     |
| Forward Transfer Admittance*       | Yfs      | Id=5A, Vds=10V    | -    | 34    | -     | S     |
| Body Drain Diode Forward Voltage   | Vf       | If=10A, Vgs=0V    | -    | 0.8   | 1.1   | V     |

\* 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 | -    | 2000 | -    | pF    |
| Output Capacitance   | Coss   |                           | -    | 1000 | -    | pF    |
| Feedback Capacitance | Crss   |                           | -    | 450  | -    | pF    |

### Switching Characteristics

Ta = 25°C

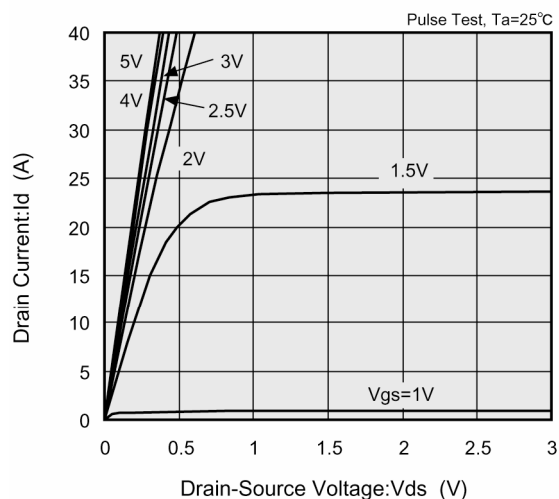
| PARAMETER           | SYMBOL   | CONDITIONS               | MIN. | TYP. | MAX. | UNITS |
|---------------------|----------|--------------------------|------|------|------|-------|
| Turn-On Delay Time  | td (on)  | Vgs=5V, Id=5A<br>Vdd=10V | -    | 15   | -    | ns    |
| Rise Time           | tr       |                          | -    | 25   | -    | ns    |
| Turn-Off Delay Time | td (off) |                          | -    | 95   | -    | ns    |
| Fall Time           | tf       |                          | -    | 15   | -    | ns    |

### Thermal Characteristics

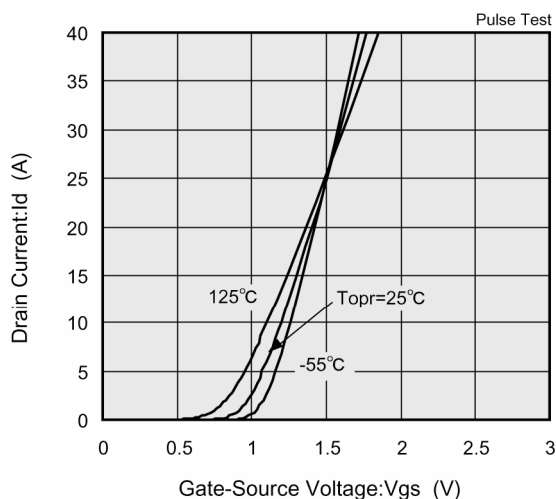
| PARAMETER                             | SYMBOL     | CONDITIONS                           | MIN. | TYP. | MAX. | UNITS |
|---------------------------------------|------------|--------------------------------------|------|------|------|-------|
| Thermal Resistance (Channel-Ambience) | Rth (ch-a) | Implement on a glass epoxy resin PCB | -    | 50   | -    | °C/W  |

## TYPICAL PERFORMANCE CHARACTERISTICS

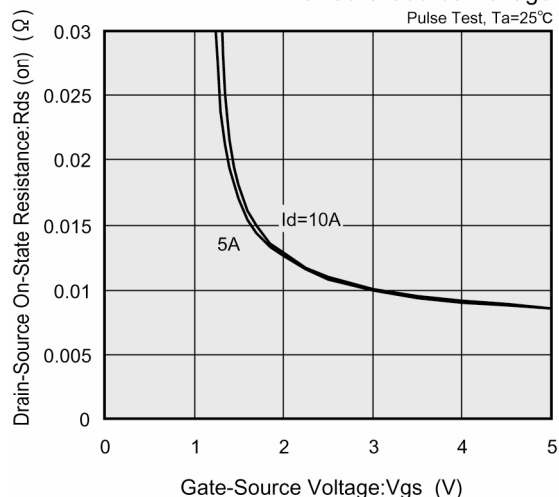
(1) Drain Current vs. Drain-Source Voltage



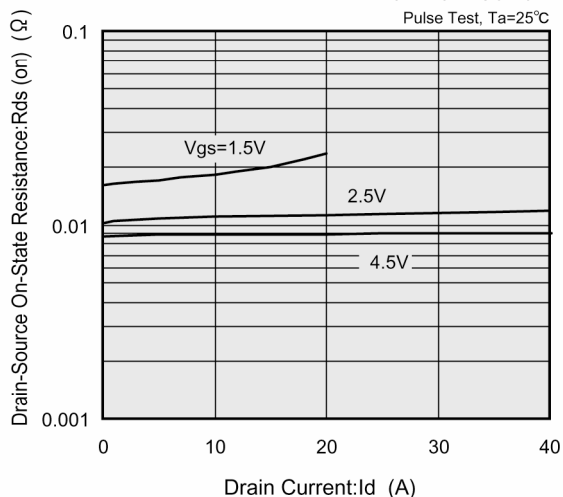
(2) Drain Current vs. Gate-Source Voltage



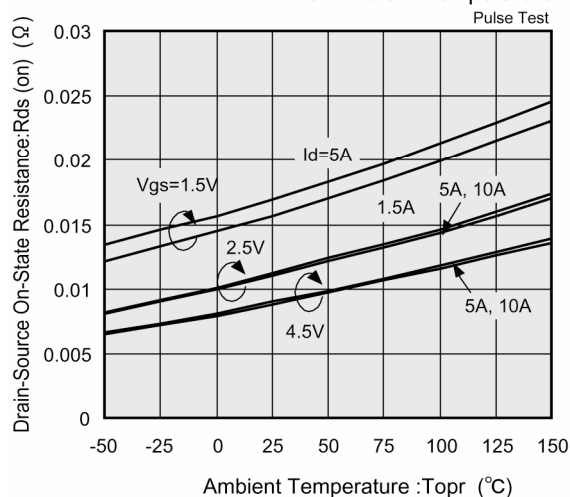
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



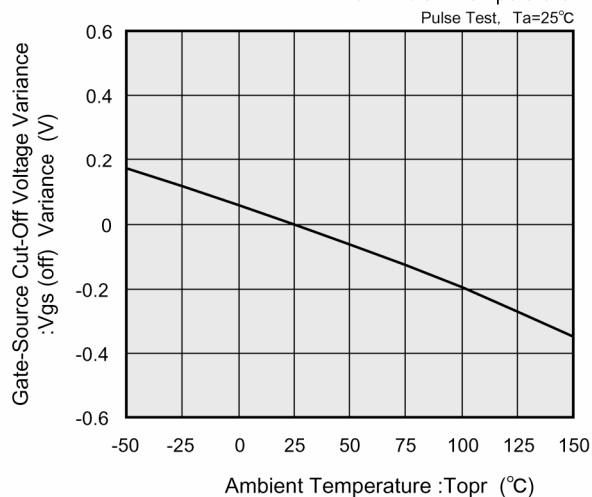
(4) Drain-Source On-State Resistance vs. Drain Current



(5) Drain-Source On-State Resistance vs. Ambient Temperature

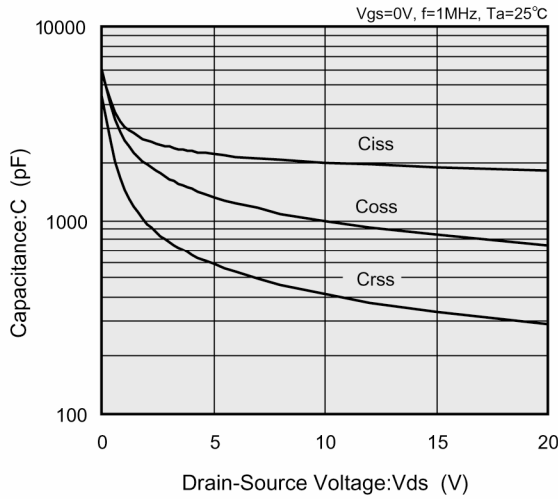


(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature

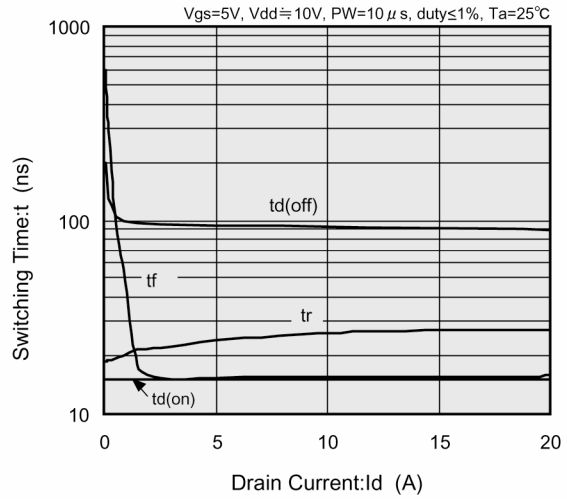


## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

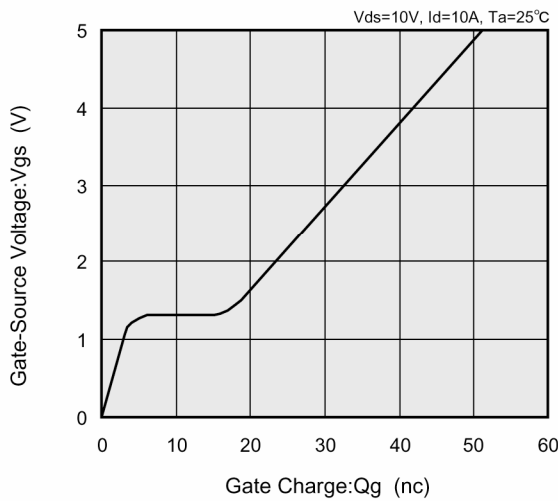
(7) Capacitance vs. Drain-Source Voltage



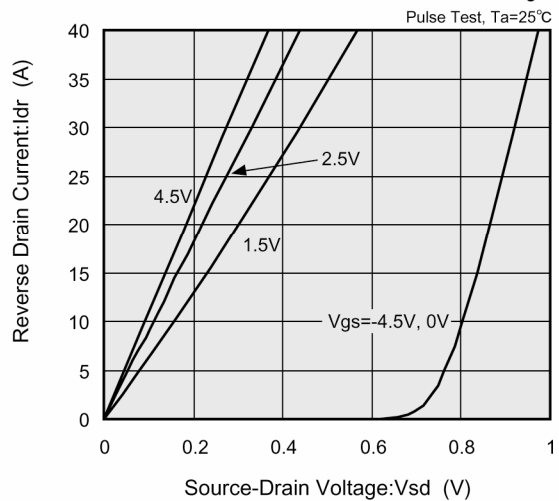
(8) Switching Time vs. Drain Current



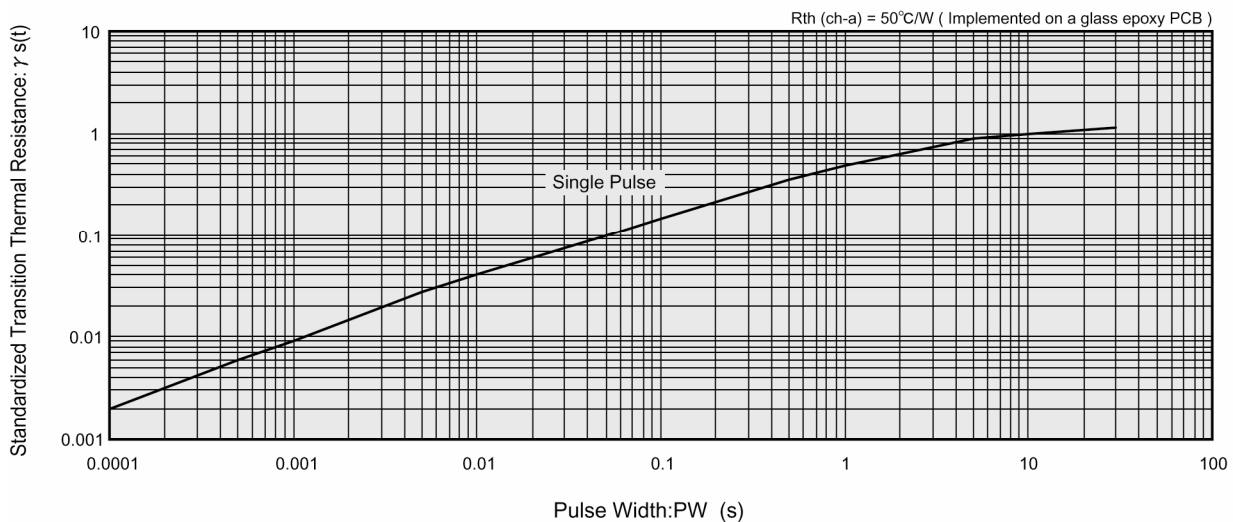
(9) Gate-Source Voltage vs. Gate Charge



(10) Reverse Drain Current vs. Source-Drain Voltage



(11) Standardized transition Thermal Resistance vs. Pulse Width



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