

## Power MOSFET

### ■ GENERAL DESCRIPTION

The XP133A1145SR is an N-channel Power MOSFET with low on-state resistance and ultra high-speed switching characteristics.

Two FET devices are built into the one package.

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** :  $R_{ds(on)}=0.033\ \Omega$  ( $V_{gs}=10V$ )  
:  $R_{ds(on)}=0.045\ \Omega$  ( $V_{gs}=4.5V$ )

**Ultra High-Speed Switching**

**Driving Voltage** : 4.5V

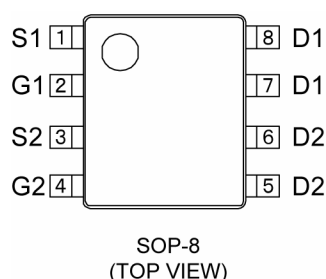
**N-Channel Power MOSFET**

**DMOS Structure**

**Two FET Devices Built-in**

**Package** : SOP-8

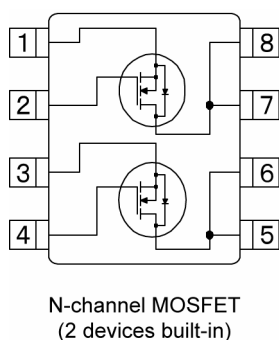
### ■ PIN CONFIGURATION



### ■ PIN ASSIGNMENT

| PIN NUMBER | PIN NAME | FUNCTION |
|------------|----------|----------|
| 1          | S1       | Source   |
| 2          | G1       | Gate     |
| 3          | S2       | Source   |
| 4          | G2       | Gate     |
| 5~6        | D2       | Drain    |
| 7~8        | D1       | Drain    |

### ■ EQUIVALENT CIRCUIT



### ■ ABSOLUTE MAXIMUM RATINGS

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

| PARAMETER                   | SYMBOL    | RATINGS  | UNITS            |
|-----------------------------|-----------|----------|------------------|
| Drain-Source Voltage        | $V_{dss}$ | 30       | V                |
| Gate-Source Voltage         | $V_{gss}$ | $\pm 20$ | V                |
| Drain Current (DC)          | $I_d$     | 6        | A                |
| Drain Current (Pulse)       | $I_{dp}$  | 20       | A                |
| Reverse Drain Current       | $I_{dr}$  | 6        | A                |
| Channel Power Dissipation * | $P_d$     | 2        | W                |
| Channel Temperature         | $T_{ch}$  | 150      | $^\circ\text{C}$ |
| Storage Temperature Range   | $T_{stg}$ | -55~150  | $^\circ\text{C}$ |

\* 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=30V, Vgs=0V  | -    | -     | 10    | μA    |
| Gate-Source Leak Current           | Igss     | Vgs=±20V, Vds=0V | -    | -     | ±1    | μA    |
| Gate-Source Cut-Off Voltage        | Vgs(off) | Id=1mA, Vds=10V  | 1.0  | -     | 2.5   | V     |
| Drain-Source On-State Resistance * | Rds(on)  | Id=3A, Vgs=10V   | -    | 0.026 | 0.033 | Ω     |
|                                    |          | Id=3A, Vgs=4.5V  | -    | 0.035 | 0.045 | Ω     |
| Forward Transfer Admittance *      | Yfs      | Id=3A, Vds=10V   | -    | 12    | -     | S     |
| Body Drain Diode Forward Voltage   | Vf       | If=6A, Vgs=0V    | -    | 0.85  | 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 | -    | 620  | -    | pF    |
| Output Capacitance   | Coss   |                           | -    | 350  | -    | pF    |
| Feedback Capacitance | Crss   |                           | -    | 120  | -    | pF    |

### Switching Characteristics

Ta = 25°C

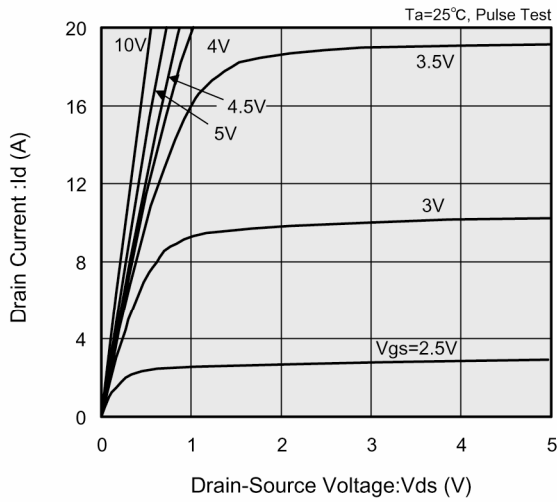
| PARAMETER           | SYMBOL   | CONDITIONS               | MIN. | TYP. | MAX. | UNITS |
|---------------------|----------|--------------------------|------|------|------|-------|
| Turn-On Delay Time  | td (on)  | Vgs=5V, Id=3A<br>Vdd=10V | -    | 15   | -    | ns    |
| Rise Time           | tr       |                          | -    | 20   | -    | ns    |
| Turn-Off Delay Time | td (off) |                          | -    | 30   | -    | ns    |
| Fall Time           | tf       |                          | -    | 10   | -    | ns    |

### Thermal Characteristics

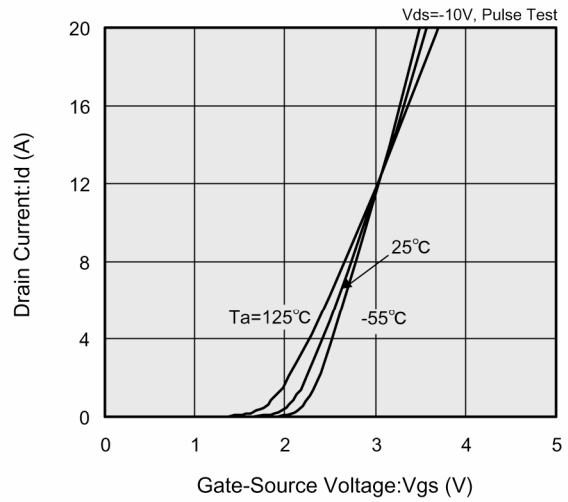
| PARAMETER                             | SYMBOL     | CONDITIONS                           | MIN. | TYP. | MAX. | UNITS |
|---------------------------------------|------------|--------------------------------------|------|------|------|-------|
| Thermal Resistance (Channel-Ambience) | Rth (ch-a) | Implement on a glass epoxy resin PCB | -    | 62.5 | -    | °C/W  |

## TYPICAL PERFORMANCE CHARACTERISTICS

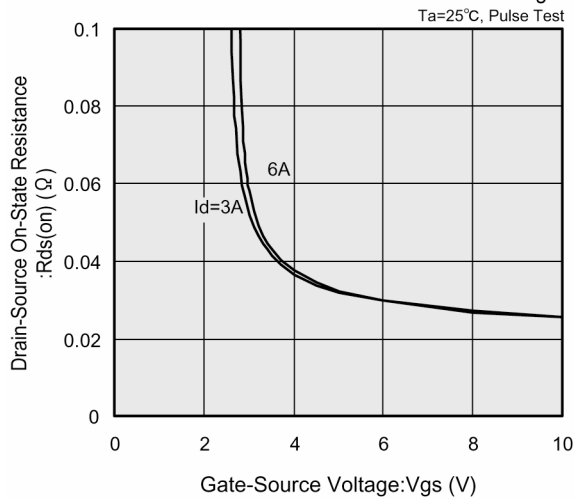
(1) Drain Current vs. Drain-Source Voltage



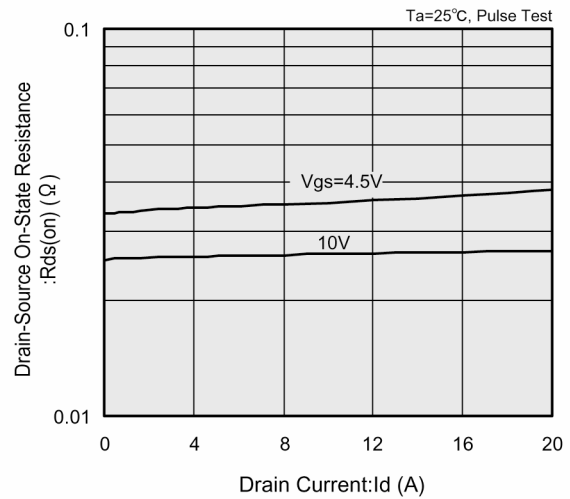
(2) Drain Current vs. Gate-Source Voltage



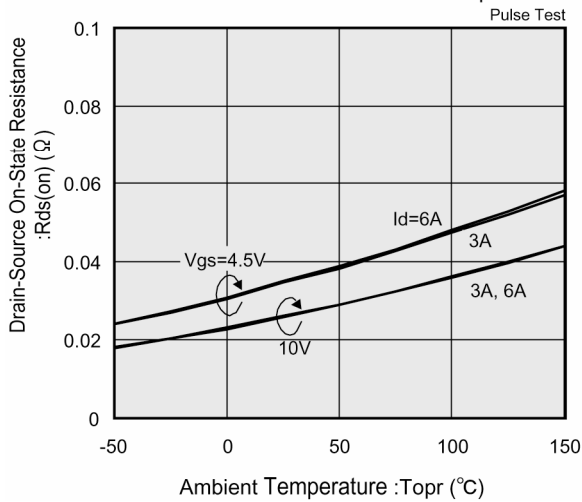
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



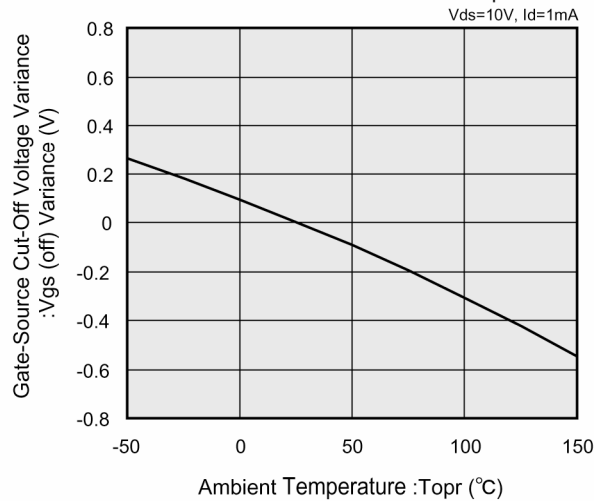
(4) Drain-Source On-State Resistance vs. Drain Current



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

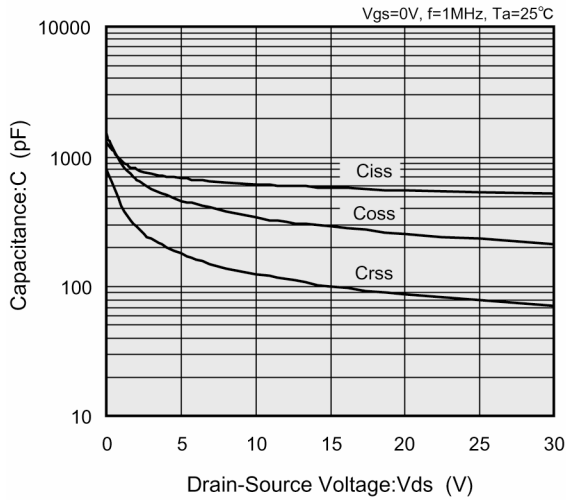


(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature

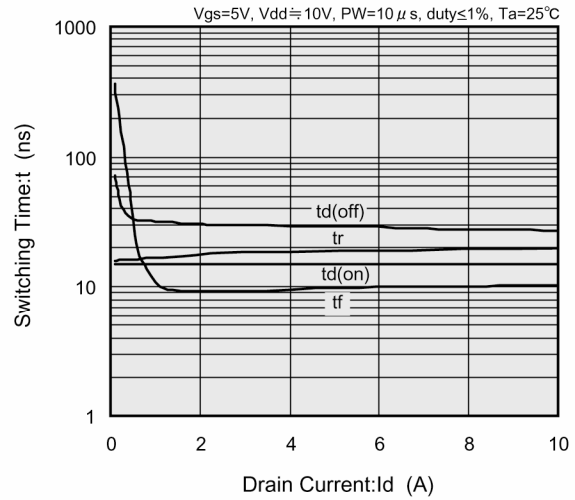


## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

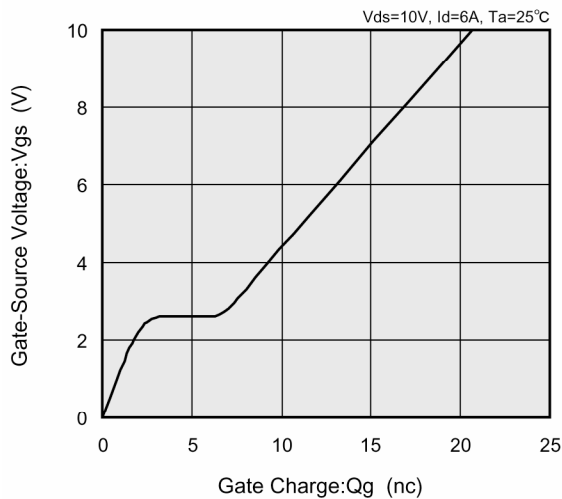
(7) Capacitance vs. Drain-Source Voltage



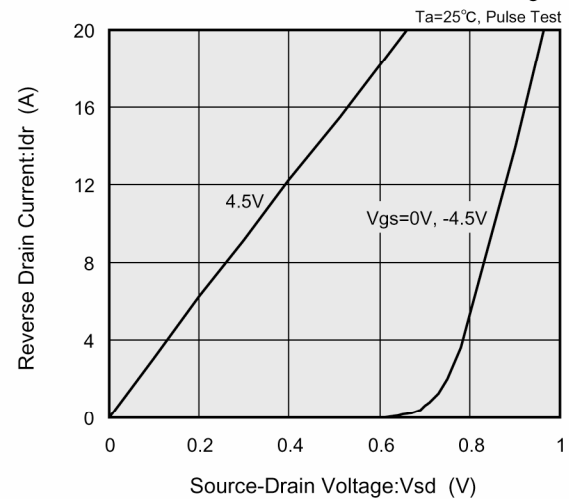
(8) Switching Time vs. Drain Current



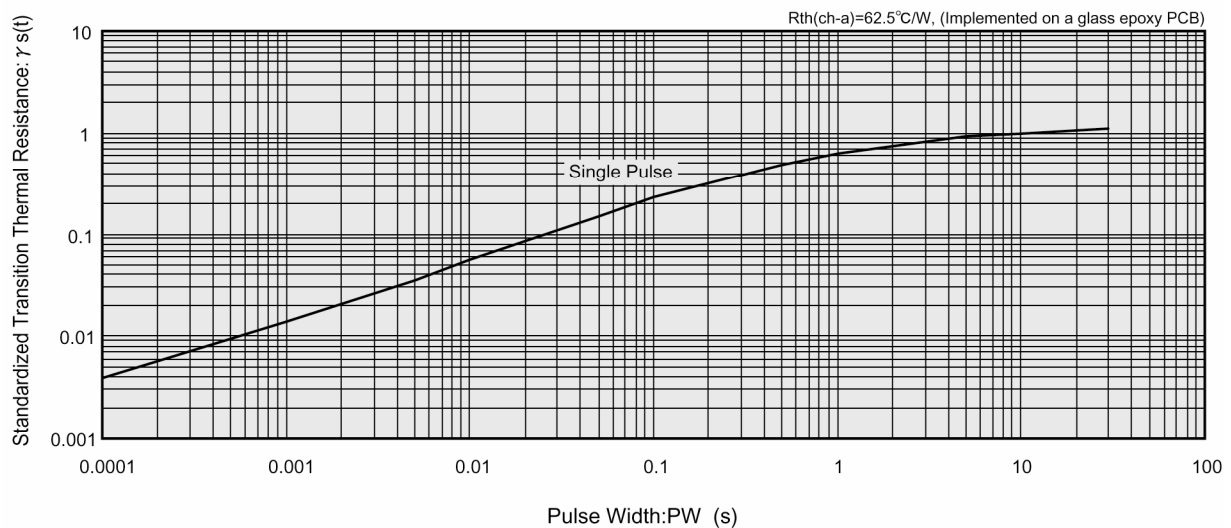
(9) Gate-Source Voltage vs. Gate Charge



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



(11) Standardized transition Thermal Resistance vs. Pulse Width



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