

# XP133A0245SR



## Power MOS FET

- ◆N-Channel Power MOS FET
- ◆DMOS Structure
- ◆Low On-State Resistance:  $0.045\Omega$  (max)
- ◆Ultra High-Speed Switching
- ◆SOP-8 Package
- ◆Two FET Devices Built-in

### General Description

The XP133A0245SR is an N-Channel Power MOS FET 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

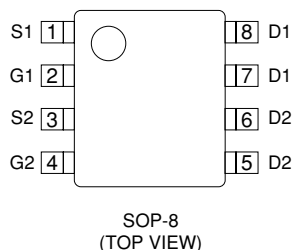
**Low on-state resistance** :  $R_{ds(on)}=0.045\Omega$  ( $V_{gs}=4.5V$ )  
:  $R_{ds(on)}=0.060\Omega$  ( $V_{gs}=2.5V$ )  
:  $R_{ds(on)}=0.1\Omega$  ( $V_{gs}=1.5V$ )

**Ultra high-speed switching**

**Operational Voltage** : 1.5V

**High density mounting** : SOP-8

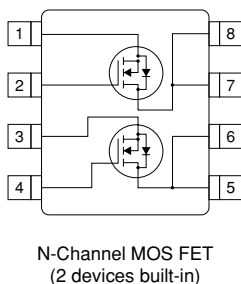
### Pin Configuration



### 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                        | $V_{ds}$  | 20      | V                |
| Gate-Source Voltage                         | $V_{gs}$  | $\pm 8$ | V                |
| Drain Current (DC)                          | $I_d$     | 5       | A                |
| Drain Current (Pulse)                       | $I_{dp}$  | 15      | A                |
| Reverse Drain Current                       | $I_{dr}$  | 5       | A                |
| Continuous Channel Power Dissipation (note) | $P_d$     | 2       | 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 |     |       | ±1    | μA      |
| Gate-Source Cut-off Voltage             | Vgs(off) | Id=1mA, Vds=10V | 0.5 |       | 1.2   | V       |
| Drain-Source On-state Resistance (note) | Rds(on)  | Id=3A, Vgs=4.5V |     | 0.035 | 0.045 | Ω       |
|                                         |          | Id=3A, Vgs=2.5V |     | 0.047 | 0.06  | Ω       |
|                                         |          | Id=1A, Vgs=1.5V |     | 0.078 | 0.1   | Ω       |
| Forward Transfer Admittance (note)      | Yfs      | Id=3A, Vds=10V  |     | 12    |       | S       |
| Body Drain Diode Forward Voltage        | Vf       | If=5A, Vgs=0V   |     | 0.85  | 1.1   | V       |

Note: Effective during pulse test.

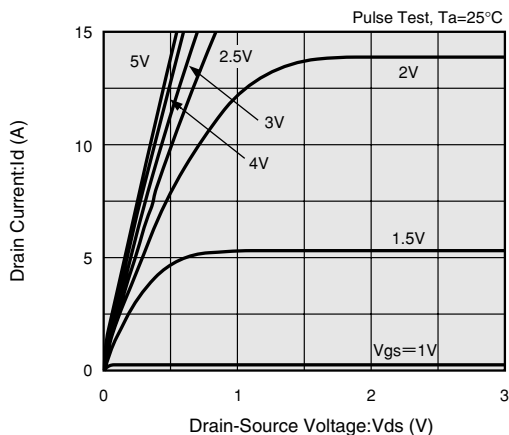
| Dynamic Characteristics |        |                           |     |     |     | Ta=25°C |
|-------------------------|--------|---------------------------|-----|-----|-----|---------|
| PARAMETER               | SYMBOL | CONDITIONS                | MIN | TYP | MAX | UNITS   |
| Input Capacitance       | Ciss   | Vds=10V, Vgs=0V<br>f=1MHz |     | 880 |     | pF      |
| Output Capacitance      | Coss   |                           |     | 460 |     | pF      |
| Feedback Capacitance    | Crss   |                           |     | 150 |     | 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 |     | 10  |     | ns      |
| Rise Time                 | tr       |                          |     | 15  |     | ns      |
| Turn-off Delay Time       | td (off) |                          |     | 65  |     | ns      |
| Fall Time                 | tf       |                          |     | 10  |     | ns      |

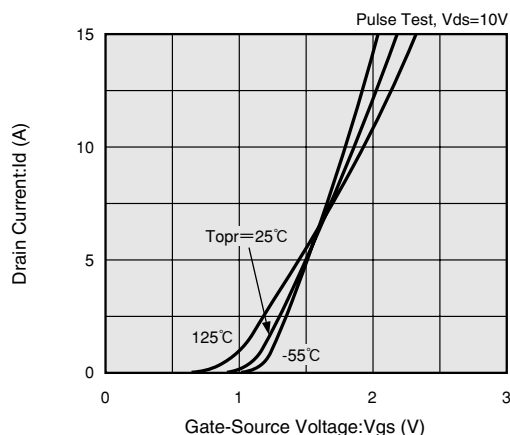
| Thermal Characteristics               |            |                                      |     |      |     |       |
|---------------------------------------|------------|--------------------------------------|-----|------|-----|-------|
| PARAMETER                             | SYMBOL     | CONDITIONS                           | 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

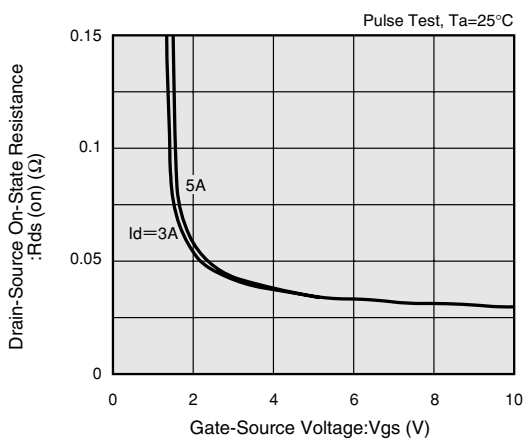
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



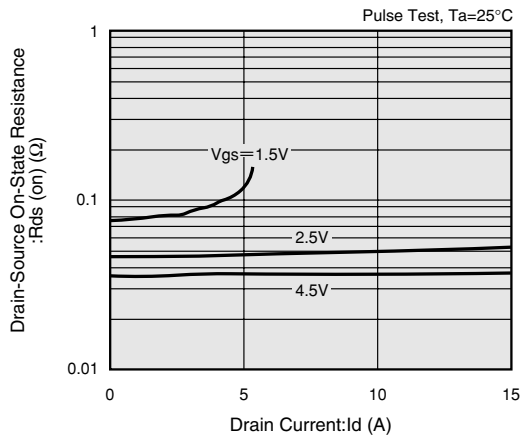
DRAIN CURRENT vs. GATE-SOURCE VOLTAGE



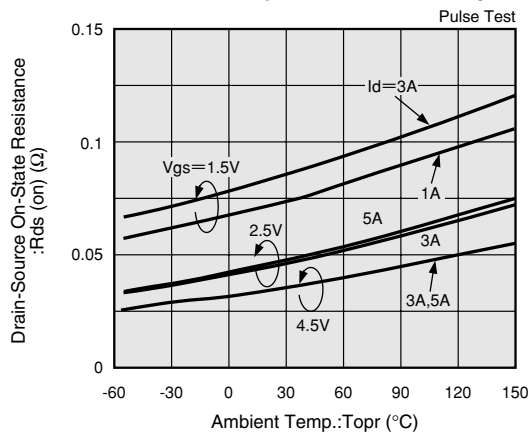
DRAIN-SOURCE ON-STATE RESISTANCE vs. GATE-SOURCE VOLTAGE



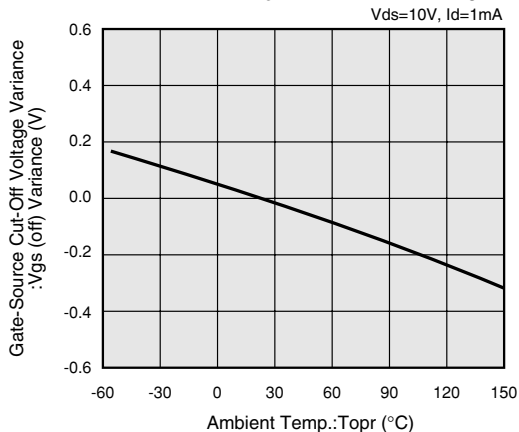
DRAIN-SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



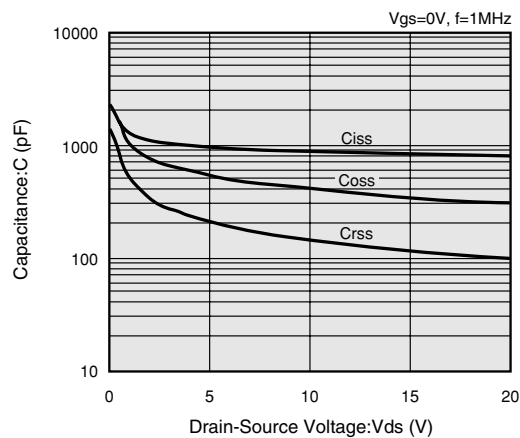
DRAIN-SOURCE ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



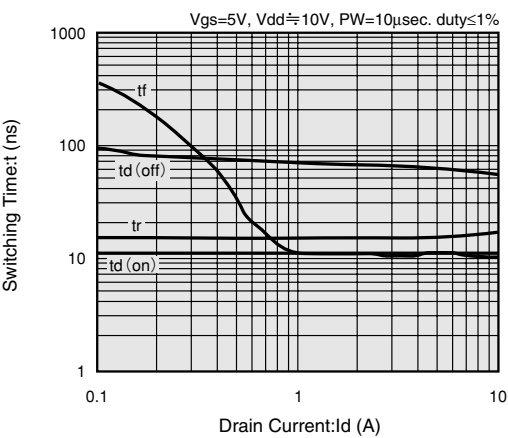
GATE-SOURCE CUT-OFF VOLTAGE VARIANCE vs. AMBIENT TEMPERATURE



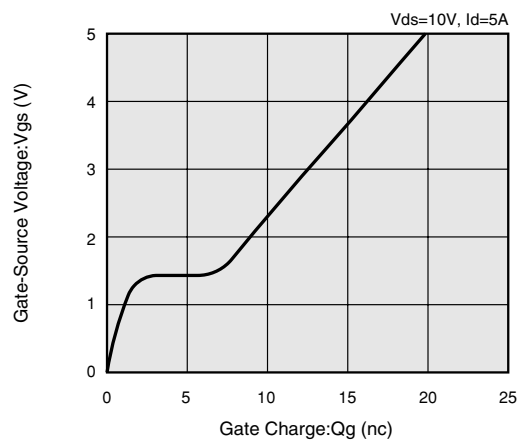
CAPACITANCE vs. DRAIN-SOURCE VOLTAGE



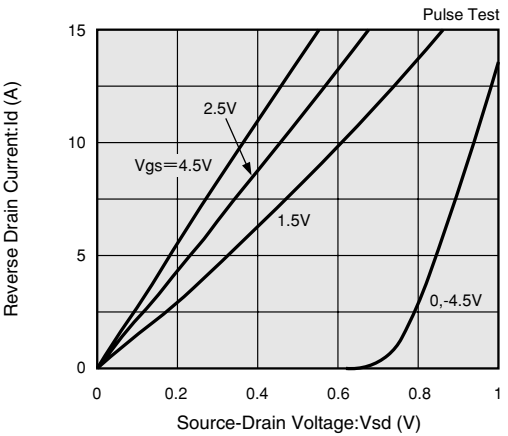
SWITCHING TIME vs. DRAIN CURRENT



GATE-SOURCE VOLTAGE vs. GATE CHARGE



REVERSE DRAIN CURRENT  
vs. SOURCE-DRAIN VOLTAGE



STANDARDIZED TRANSITION THERMAL RESISTANCE vs. PULSE WIDTH

