

# XP133A1330SR



## Power MOS FET

- ◆N-Channel Power MOS FET
- ◆DMOS Structure
- ◆Low On-State Resistance : 0.03Ω (max)
- ◆Ultra High-Speed Switching
- ◆SOP-8 Package
- ◆Two FET Devices Built-in

### General Description

The XP133A1330SR 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

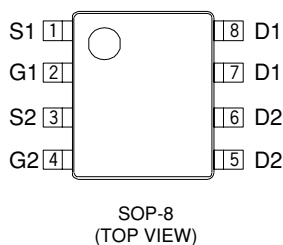
**Low on-state resistance** : Rds (on) = 0.03Ω ( Vgs = 4.5V )  
 : Rds (on) = 0.04Ω ( Vgs = 2.5V )  
 : Rds (on) = 0.07Ω ( Vgs = 1.5V )

**Ultra high-speed switching**

**Operational Voltage** : 1.5V

**High density mounting** : SOP-8

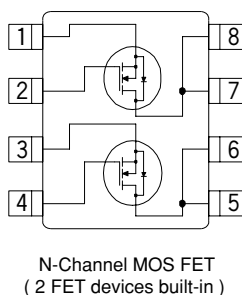
### Pin Configuration



### 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

| Ta=25°C                                     |        |            |       |
|---|--------|------------|-------|
| PARAMETER                                   | SYMBOL | RATINGS    | UNITS |
| Drain - Source Voltage                      | Vdss   | 20         | V     |
| Gate - Source Voltage                       | Vgss   | ± 8        | V     |
| Drain Current (DC)                          | Id     | 6          | A     |
| Drain Current (Pulse)                       | Idp    | 20         | A     |
| Reverse Drain Current                       | Idr    | 6          | A     |
| Continuous Channel Power Dissipation (note) | Pd     | 2          | W     |
| Channel Temperature                         | Tch    | 150        | °C    |
| Storage Temperature                         | Tstg   | - 55 ~ 150 | °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                        | I <sub>dss</sub>       | V <sub>ds</sub> = 20V , V <sub>gs</sub> = 0V |     |       | 10   | μA    |
| Gate-Source Leakage Current                  | I <sub>gss</sub>       | V <sub>gs</sub> = ±8V , V <sub>ds</sub> = 0V |     |       | ±1   | μA    |
| Gate-Source Cut-off Voltage                  | V <sub>gs (off)</sub>  | I <sub>d</sub> = 1mA , V <sub>ds</sub> = 10V | 0.5 |       | 1.2  | V     |
| Drain-Source On-state Resistance<br>( note ) | R <sub>ds ( on )</sub> | I <sub>d</sub> = 3A , V <sub>gs</sub> = 4.5V |     | 0.025 | 0.03 | Ω     |
|  |                        | I <sub>d</sub> = 3A , V <sub>gs</sub> = 2.5V |     | 0.03  | 0.04 | Ω     |
|  |                        | I <sub>d</sub> = 1A , V <sub>gs</sub> = 1.5V |     | 0.045 | 0.07 | Ω     |
| Forward Transfer Admittance<br>( note )      | Y <sub>fs</sub>        | I <sub>d</sub> = 3A , V <sub>ds</sub> = 10V  |     | 20    |      | S     |
| Body Drain Diode<br>Forward Voltage          | V <sub>f</sub>         | I <sub>f</sub> = 6A , V <sub>gs</sub> = 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    | C <sub>iss</sub> | V <sub>ds</sub> = 10V , V <sub>gs</sub> = 0V<br>f = 1 MHz |     | 950 |     | pF    |
| Output Capacitance   | C <sub>oss</sub> |   |     | 430 |     | pF    |
| Feedback Capacitance | C <sub>rss</sub> |   |     | 180 |     | pF    |

### Switching Characteristics

Ta=25°C

| PARAMETER           | SYMBOL                 | CONDITIONS  | MIN | TYP | MAX | UNITS |    |
|---------------------|------------------------|---|-----|-----|-----|-------|----|
| Turn-on Delay Time  | t <sub>d ( on )</sub>  | V <sub>gs</sub> = 5V , I <sub>d</sub> = 3A<br>V <sub>dd</sub> = 10V |     | 15  |     | ns    |    |
| Rise Time           | t <sub>r</sub>         |   |     | 20  |     | ns    |    |
| Turn-off Delay Time | t <sub>d ( off )</sub> |   |     |     | 80  |       | ns |
| Fall Time           | t <sub>f</sub>         |   |     |     | 15  |       | ns |

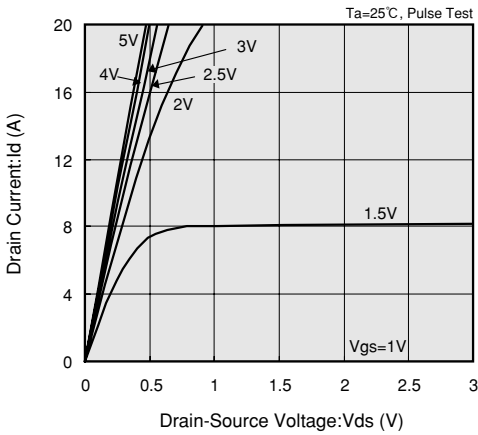
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### Thermal Characteristics

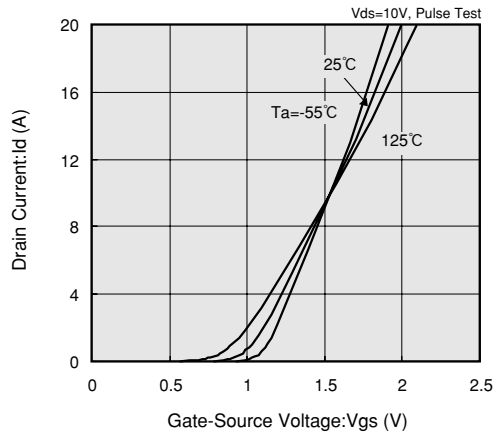
| PARAMETER                                  | SYMBOL                   | CONDITIONS                              | MIN | TYP  | MAX | UNITS  |
|--|--------------------------|---|-----|------|-----|--------|
| Thermal Resistance<br>( channel-ambience ) | R <sub>th ( ch-a )</sub> | Implement on a glass epoxy<br>resin PCB |     | 62.5 |     | °C / W |

## Typical Performance Characteristics

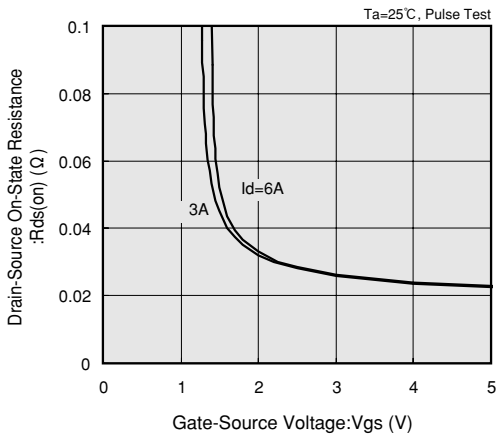
DRAIN CURRENT vs. DRAIN-SOURCE VOLTAGE



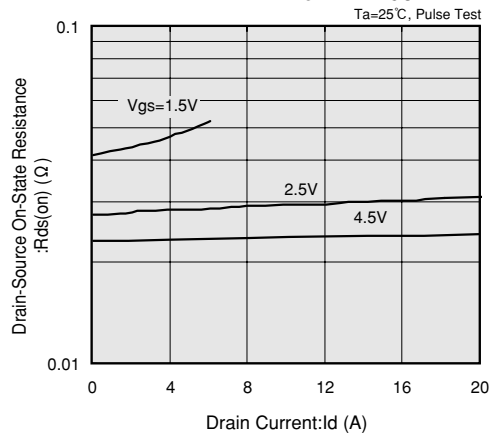
DRAIN CURRENT vs. GATE-SOURCE VOLTAGE



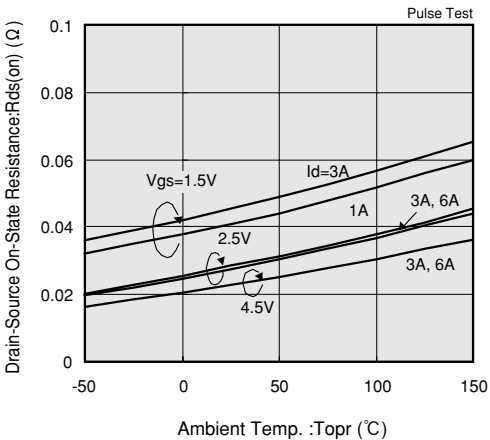
DRAIN-SOURCE ON-STATE RESISTANCE vs. GATE-SOURCE VOLTAGE



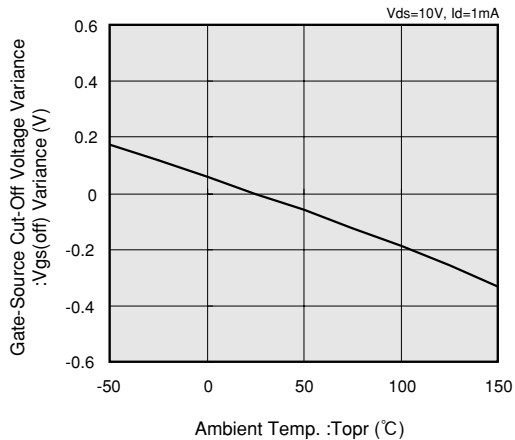
DRAIN-SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



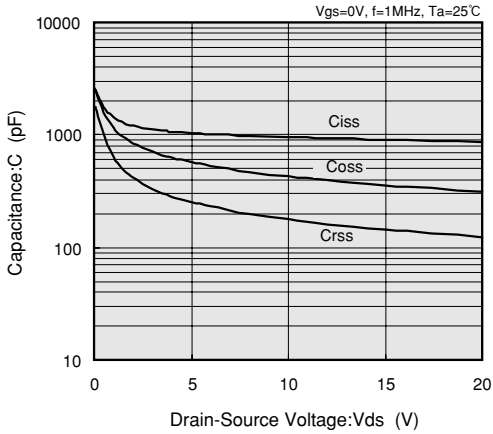
DRAIN-SOURCE ON-STATE RESISTANCE vs. AMBIENT TEMPERATURE



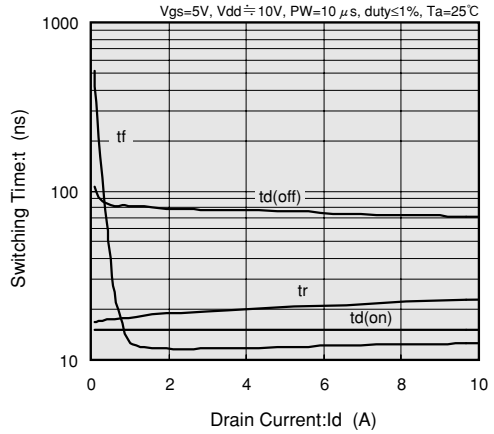
GATE-SOURCE CUT-OFF VOLTAGE VARIANCE vs. AMBIENT TEMPERATURE



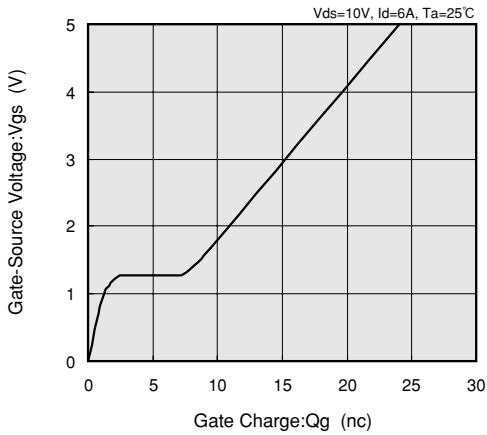
CAPACITANCE vs. DRAIN-SOURCE VOLTAGE



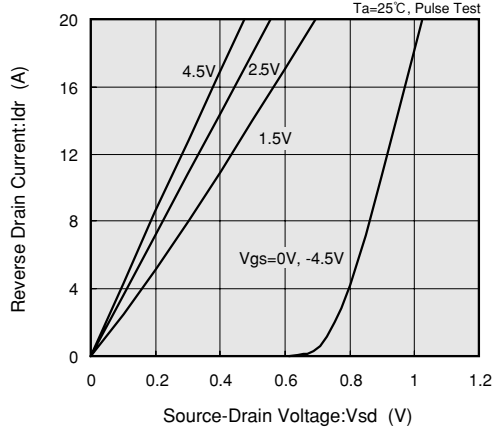
SWITCHING TIME vs. DRAIN CURRENT



GATE-SOURCE VOLTAGE vs. GATE CHARGE



REVERSE DRAIN CURRENT vs. SOURCE-DRAIN VOLTAGE



STANDARDIZED TRANSITION THERMAL RESISTANCE vs. PULSE WIDTH

