

## Power MOSFET

### ■ GENERAL DESCRIPTION

The XP131A1520SR 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.

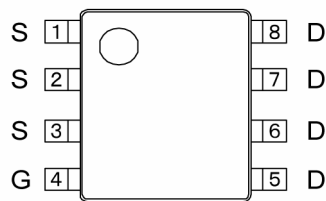
### ■ APPLICATIONS

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

### ■ FEATURES

- Low On-State Resistance** :  $R_{ds(on)}=0.015(V_{gs}=10V)$   
 :  $R_{ds(on)}=0.02\Omega (V_{gs}=4.5V)$
- Ultra High-Speed Switching**
- Driving Voltage** : 4.5V
- N-Channel Power MOSFET**
- DMOS Structure**
- Package** : SOP-8

### ■ PIN CONFIGURATION

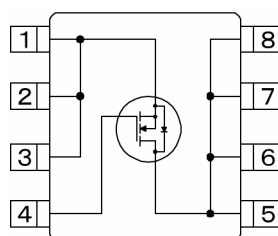


SOP-8  
(TOP VIEW)

### ■ 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

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

PARAMETER	SYMBOL	RATINGS	UNITS
Drain-Source Voltage	$V_{dss}$	30	V
Gate-Source Voltage	$V_{gss}$	$\pm 20$	V
Drain Current (DC)	$I_d$	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	$^\circ\text{C}$
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	I <sub>dss</sub>	V <sub>ds</sub> =30V, V <sub>gs</sub> =0V	-	-	10	μA
Gate-Source Leak Current	I <sub>gss</sub>	V <sub>gs</sub> =±20V, 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	1.0	-	2.5	V
Drain-Source On-State Resistance *	R <sub>ds(on)</sub>	I <sub>d</sub> =5A, V <sub>gs</sub> =10V	-	0.012	0.015	Ω
		I <sub>d</sub> =5A, V <sub>gs</sub> =4.5V	-	0.016	0.020	Ω
Forward Transfer Admittance *	Y <sub>fs</sub>	I <sub>d</sub> =5A, V <sub>ds</sub> =10V	-	20	-	S
Body Drain Diode Forward Voltage	V <sub>f</sub>	I <sub>f</sub> =10A, V <sub>gs</sub> =0V	-	0.8	1.1	V

\* 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 f=1MHz	-	1370	-	pF
Output Capacitance	C <sub>oss</sub>		-	740	-	pF
Feedback Capacitance	C <sub>rss</sub>		-	280	-	pF

### Switching Characteristics

Ta = 25°C

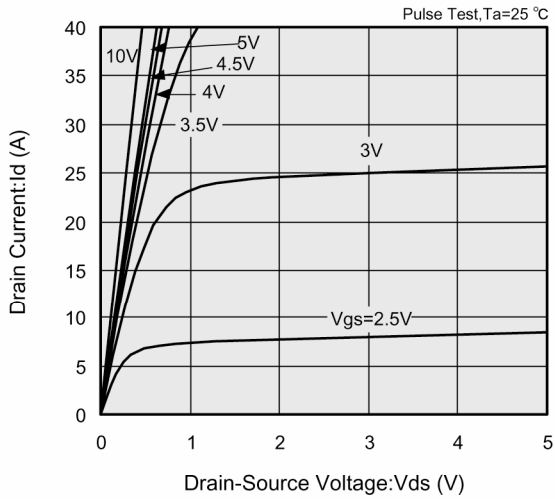
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	t <sub>d (on)</sub>	V <sub>gs</sub> =5V, I <sub>d</sub> =5A V <sub>dd</sub> =10V	-	20	-	ns
Rise Time	t <sub>r</sub>		-	25	-	ns
Turn-Off Delay Time	t <sub>d (off)</sub>		-	40	-	ns
Fall Time	t <sub>f</sub>		-	20	-	ns

### Thermal Characteristics

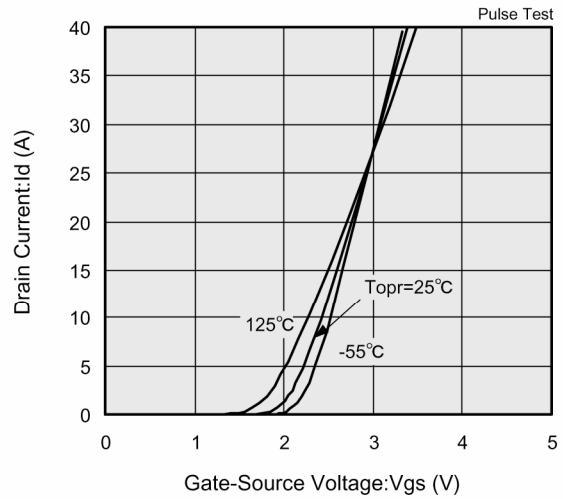
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal Resistance (Channel-Ambience)	R <sub>th (ch-a)</sub>	Implement on a glass epoxy resin PCB	-	50	-	°C/W

## TYPICAL PERFORMANCE CHARACTERISTICS

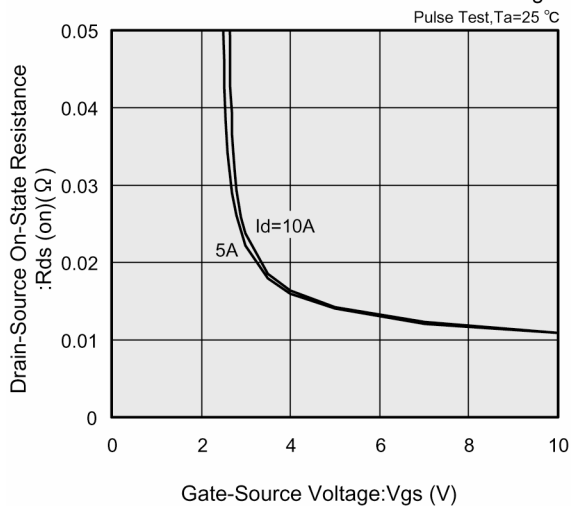
(1) Drain Current vs. Drain-Source Voltage



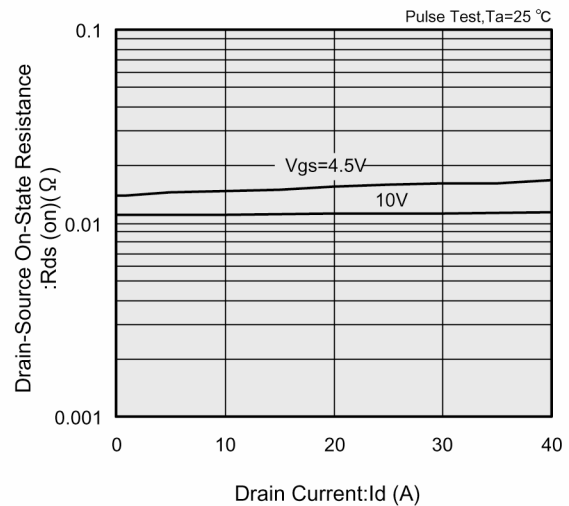
(2) Drain Current vs. Gate-Source Voltage



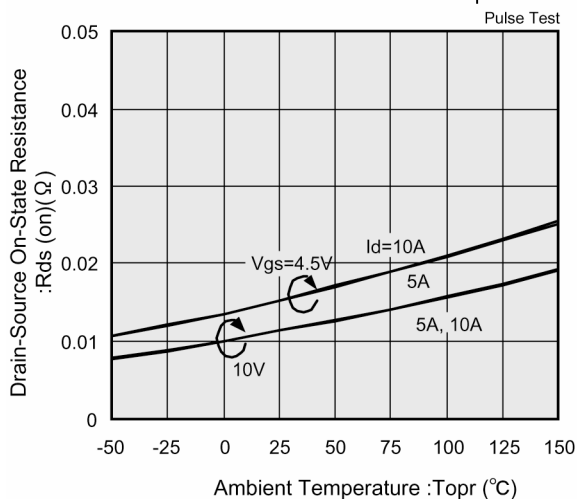
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



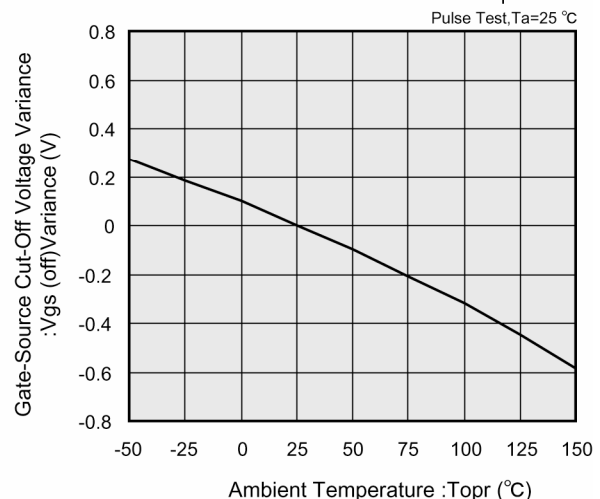
(4) Drain-Source On-State Resistance vs. Drain Current



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

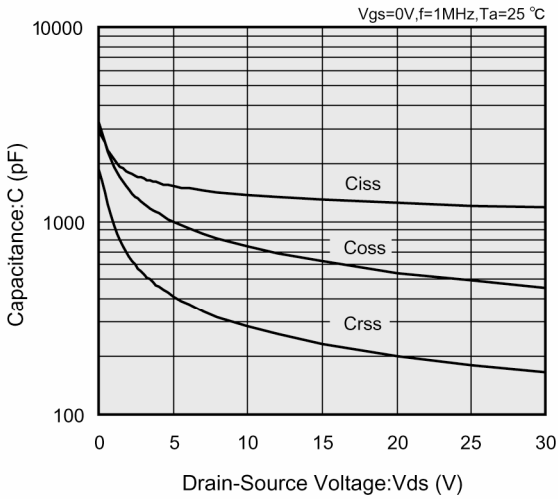


(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature

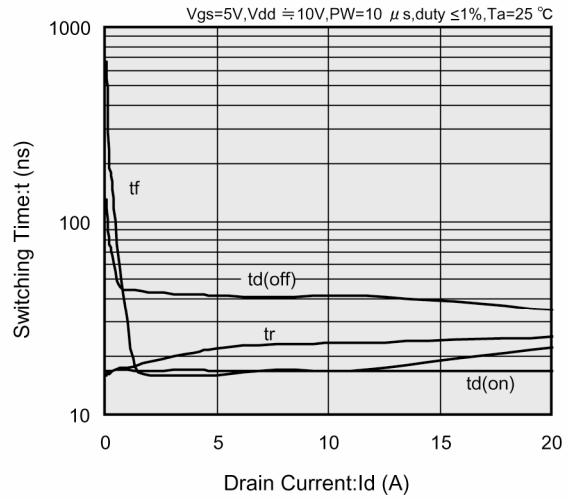


## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

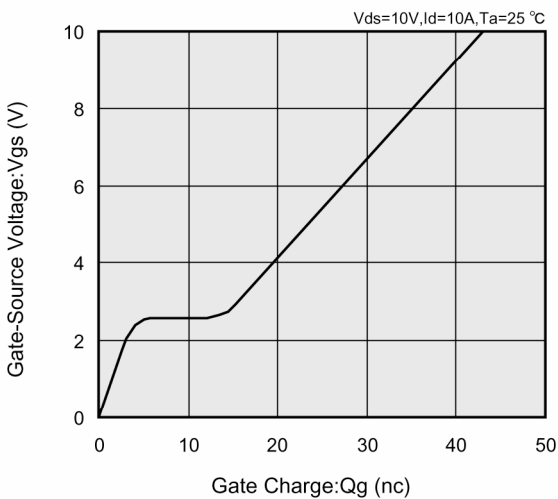
(7) Capacitance vs. Drain-Source Voltage



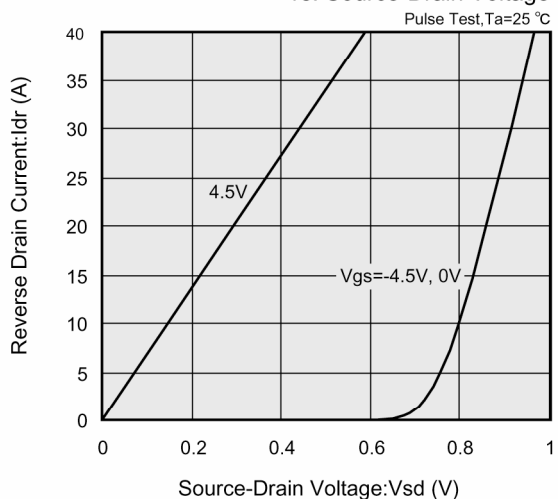
(8) Switching Time vs. Drain Current



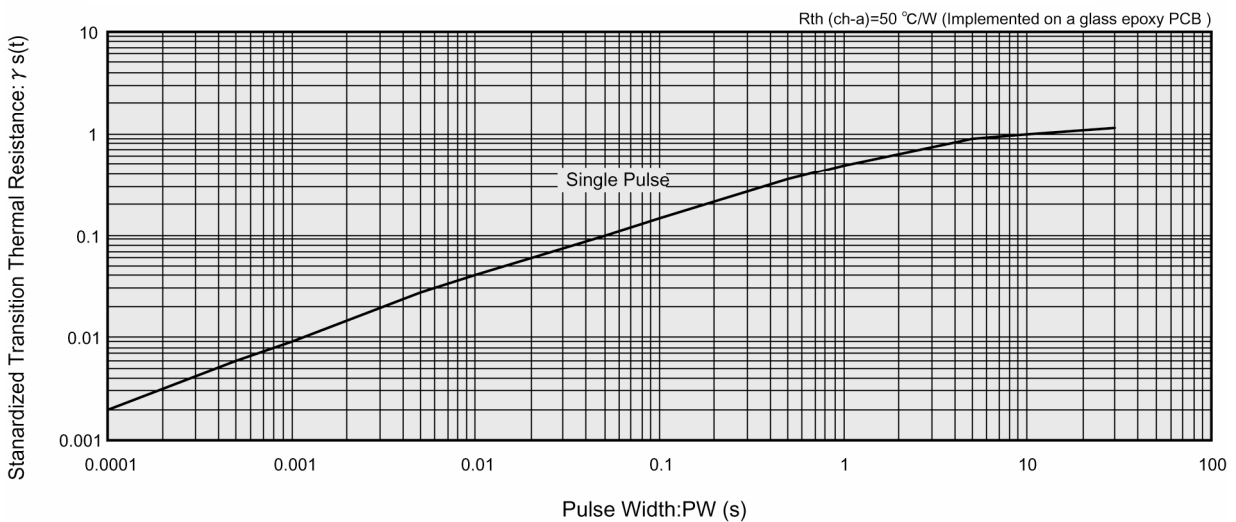
(9) Gate-Source Voltage vs. Gate Charge



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



(11) Standardized transition Thermal Resistance vs. Pulse Width



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