

## Power MOSFET

## ■ GENERAL DESCRIPTION

The XP151A13A0MR 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. In order to counter static, a gate protect diode is built-in. The small SOT-23 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** :  $R_{ds(on)} = 0.1 \Omega @ V_{gs} = 4.5V$   
   :  $R_{ds(on)} = 0.14 \Omega @ V_{gs} = 2.5V$   
   :  $R_{ds(on)} = 0.25 \Omega @ V_{gs} = 1.5V$

**Ultra High-Speed Switching**

**Gate Protect Diode Built-in**

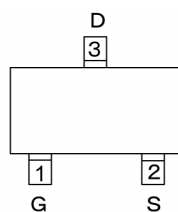
**Driving Voltage** : 1.5V

**N-Channel Power MOSFET**

**DMOS Structure**

**Small Package** : SOT-23

## ■ PIN CONFIGURATION

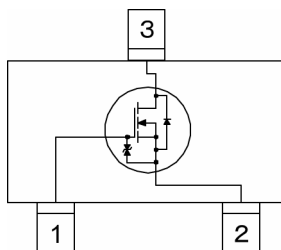


SOT-23  
(TOP VIEW)

## ■ PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTION
1	G	Gate
2	S	Source
3	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	$V_{dss}$	20	V
Gate - Source Voltage	$V_{gss}$	$\pm 8$	V
Drain Current (DC)	$I_d$	1	A
Drain Current (Pulse)	$I_{dp}$	4	A
Reverse Drain Current	$I_{dr}$	1	A
Channel Power Dissipation *	$P_d$	0.5	W
Channel Temperature	$T_{ch}$	150	$^\circ C$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ C$

\* When implemented on a ceramic 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	-	-	±10	μA
Gate-Source Cut-Off Voltage	Vgs(off)	Id= 1mA, Vds= 10V	0.5	-	1.2	V
Drain-Source On-State Resistance *1	Rds(on)	Id= 0.5A, Vgs= 4.5V	-	0.075	0.100	Ω
		Id= 0.5A, Vgs= 2.5V	-	0.10	0.14	Ω
		Id= 0.1A, Vgs= 1.5V	-	0.17	0.25	Ω
Forward Transfer Admittance *1	Yfs	Id= 0.5A, Vds= 10V	-	4.2	-	S
Body Drain Diode Forward Voltage	Vf	If= 1A, Vgs= 0V	-	0.8	1.1	V

\*1 Effective during pulse test.

### Dynamic Characteristics

Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Input Capacitance	Ciss	Vds= 10V, Vgs=0V f= 1MHz	-	220	-	pF
Output Capacitance	Coss		-	120	-	pF
Feedback Capacitance	Crss		-	45	-	pF

### Switching Characteristics

Ta = 25°C

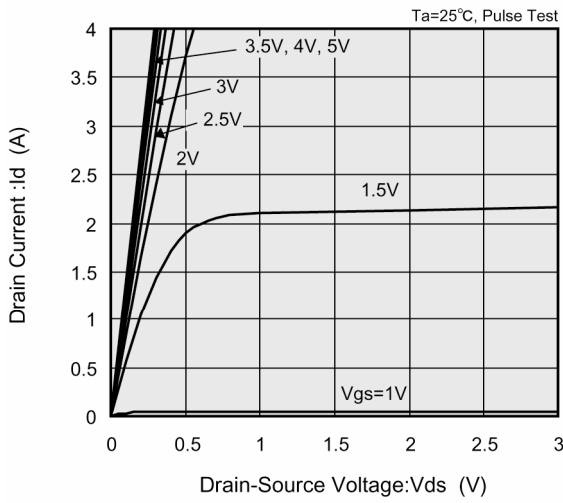
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	td (on)	Vgs= 5V, Id= 0.5A Vdd= 10V	-	10	-	ns
Rise Time	tr		-	15	-	ns
Turn-Off Delay Time	td (off)		-	75	-	ns
Fall Time	tf		-	65	-	ns

### Thermal Characteristics

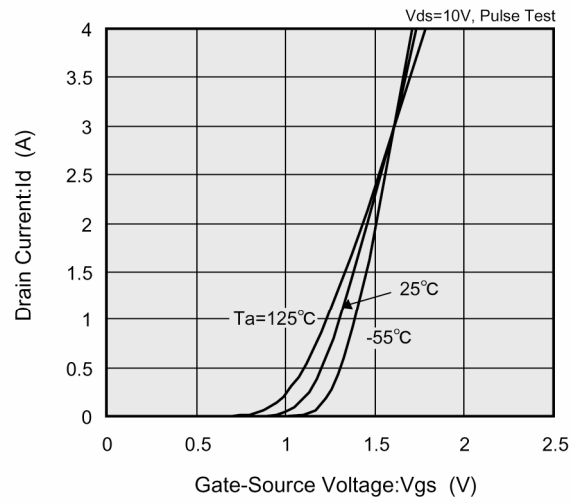
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal Resistance (Channel-Ambience)	Rth (ch-a)	Implement on a ceramic PCB	-	250	-	°C/W

## TYPICAL PERFORMANCE CHARACTERISTICS

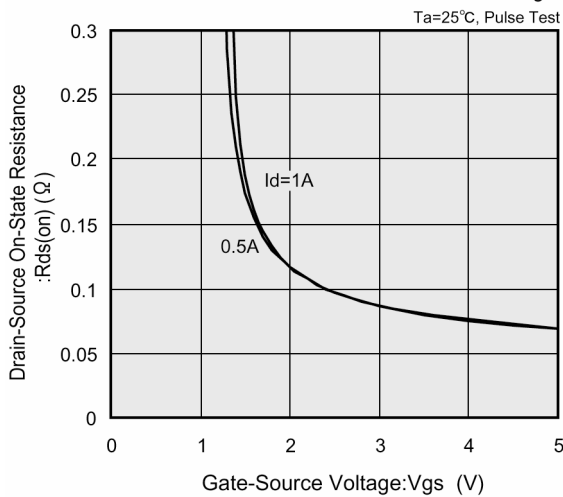
(1) Drain Current vs. Drain-Source Voltage



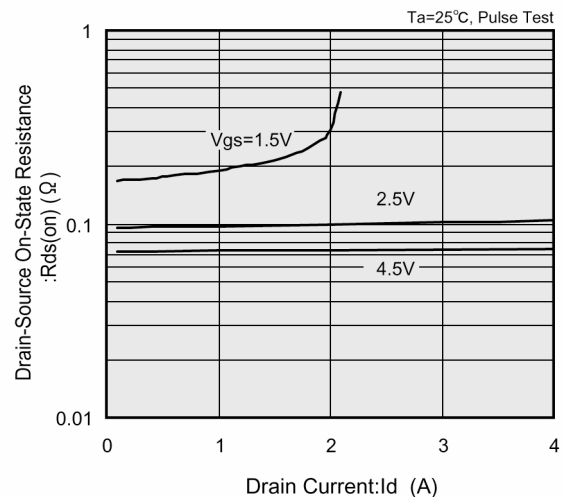
(2) Drain Current vs. Gate-Source Voltage



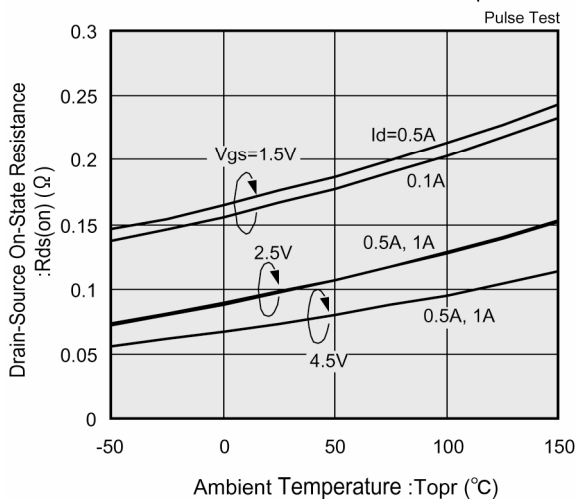
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



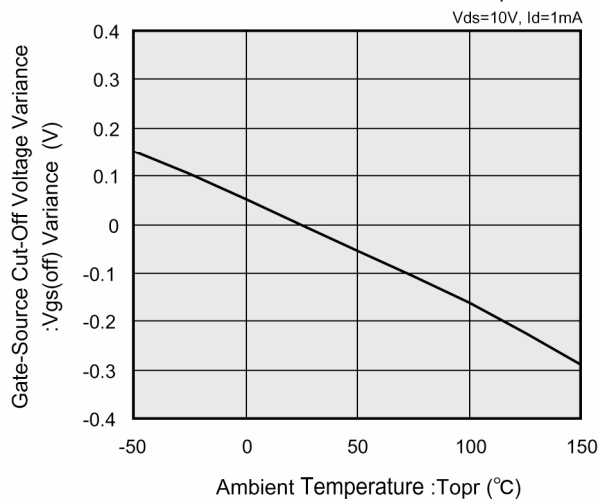
(4) Drain-Source On-State Resistance vs. Drain Current



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

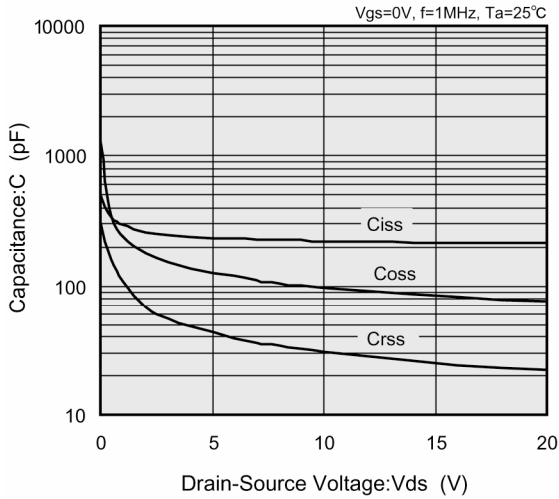


(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature

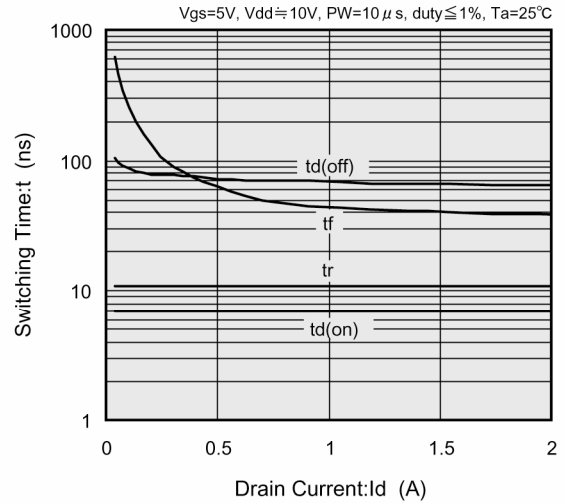


## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

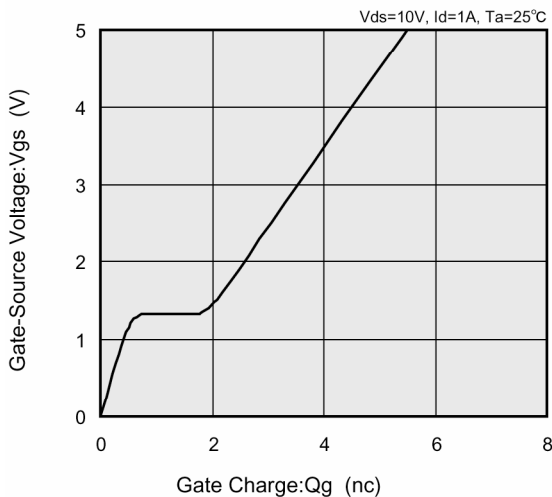
(7) Capacitance vs. Drain-Source Voltage



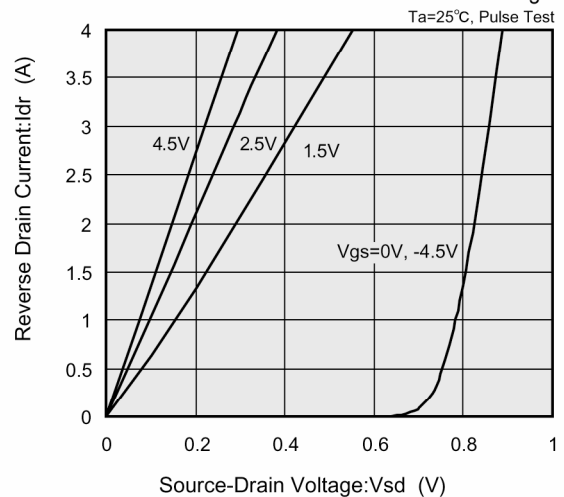
(8) Switching Time vs. Drain Current



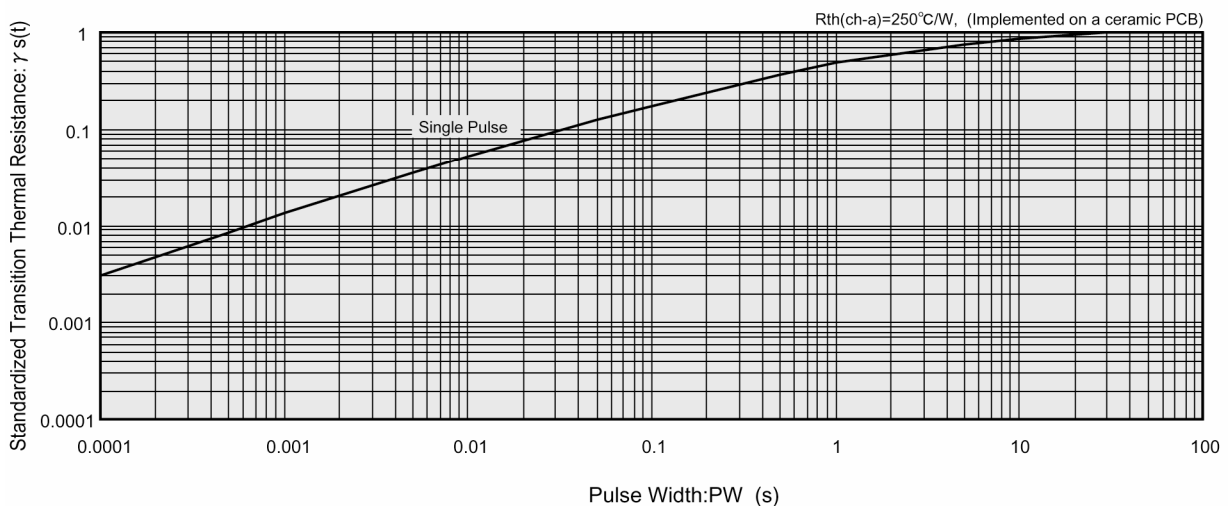
(9) Gate-Source Voltage vs. Gate Charge



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



(11) Standardized transition Thermal Resistance vs. Pulse Width



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