

## Power MOSFET

## ■ GENERAL DESCRIPTION

The XP151A12A2MR-G 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** :  $R_{ds(on)} = 0.1 \Omega @ V_{gs} = 4.5V$   
 :  $R_{ds(on)} = 0.16 \Omega @ V_{gs} = 2.5V$

**Ultra High-Speed Switching**

**Gate Protect Diode Built-in**

**Driving Voltage** : 2.5V

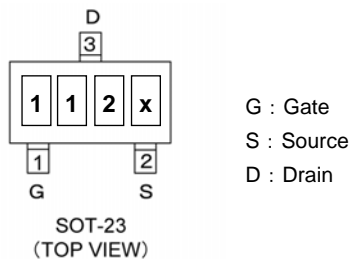
**N-Channel Power MOSFET**

**DMOS Structure**

**Small Package** : SOT-23

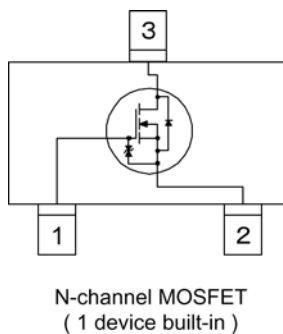
**Environmentally Friendly** : EU RoHS Compliant, Pb Free

## ■ PIN CONFIGURATION/MARKING



\* x represents production lot number.

## ■ EQUIVALENT CIRCUIT



## ■ PRODUCT NAMES

PRODUCTS	PACKAGE	ORDER UNIT
XP151A12A2MR	SOT-23	3,000/Reel
XP151A12A2MR-G <sup>(*)</sup>	SOT-23	3,000/Reel

<sup>(\*)</sup> The "-G" suffix denotes Halogen and Antimony free as well as being fully RoHS compliant.

## ■ ABSOLUTE MAXIMUM RATINGS

$T_a = 25^\circ C$			
PARAMETER	SYMBOL	RATINGS	UNITS
Drain - Source Voltage	$V_{dss}$	20	V
Gate - Source Voltage	$V_{gss}$	$\pm 12$	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	$T_{stg}$	-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	I <sub>dss</sub>	V <sub>ds</sub> = 20V, V <sub>gs</sub> = 0V	-	-	10	μA
Gate-Source Leak Current	I <sub>gss</sub>	V <sub>gs</sub> = ±12V, V <sub>ds</sub> = 0V	-	-	±10	μA
Gate-Source Cut-Off Voltage	V <sub>gs(off)</sub>	I <sub>d</sub> = 1mA, V <sub>ds</sub> = 10V	0.7	-	1.4	V
Drain-Source On-State Resistance *1	R <sub>ds(on)</sub>	I <sub>d</sub> = 0.5A, V <sub>gs</sub> = 4.5V	-	0.075	0.1	Ω
		I <sub>d</sub> = 0.5A, V <sub>gs</sub> = 2.5V	-	0.120	0.160	Ω
Forward Transfer Admittance *1	Y <sub>fs</sub>	I <sub>d</sub> = 0.5A, V <sub>ds</sub> = 10V	-	3.3	-	S
Body Drain Diode Forward Voltage	V <sub>f</sub>	I <sub>f</sub> = 1A, V <sub>gs</sub> = 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	C <sub>iss</sub>	V <sub>ds</sub> = 10V, V <sub>gs</sub> =0V f= 1MHz	-	180	-	pF
Output Capacitance	C <sub>oss</sub>		-	120	-	pF
Feedback Capacitance	C <sub>rss</sub>		-	45	-	pF

### Switching Characteristics

Ta = 25°C

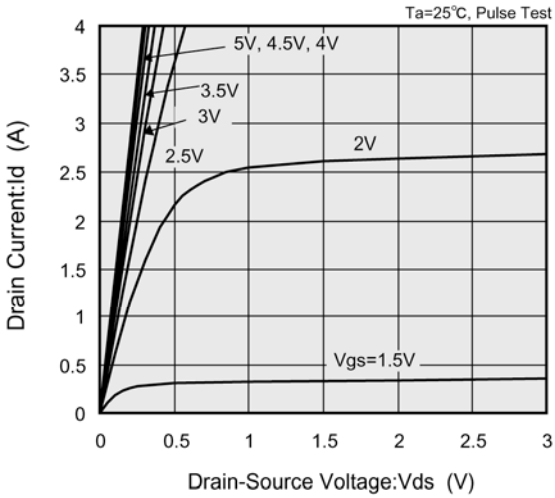
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	t <sub>d (on)</sub>	V <sub>gs</sub> = 5V, I <sub>d</sub> = 0.5A V <sub>dd</sub> = 10V	-	10	-	ns
Rise Time	t <sub>r</sub>		-	15	-	ns
Turn-Off Delay Time	t <sub>d (off)</sub>		-	50	-	ns
Fall Time	t <sub>f</sub>		-	45	-	ns

### Thermal Characteristics

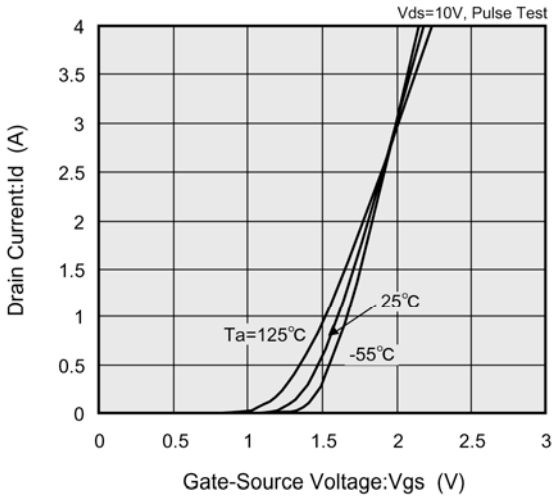
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal Resistance (Channel-Ambience)	R <sub>th (ch-a)</sub>	Implement on a ceramic PCB	-	250	-	°C/W

# TYPICAL PERFORMANCE CHARACTERISTICS

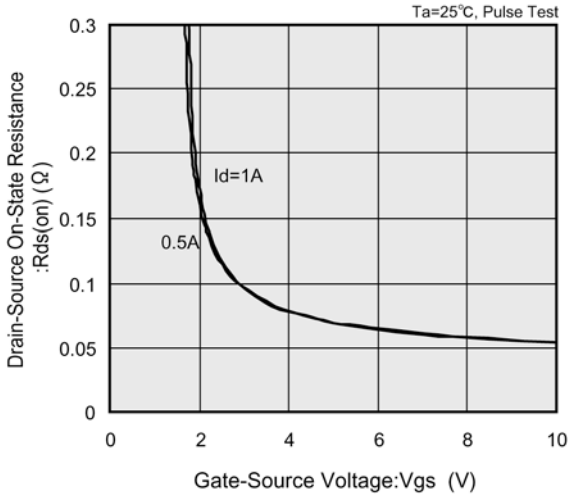
(1) Drain Current vs. Drain-Source Voltage



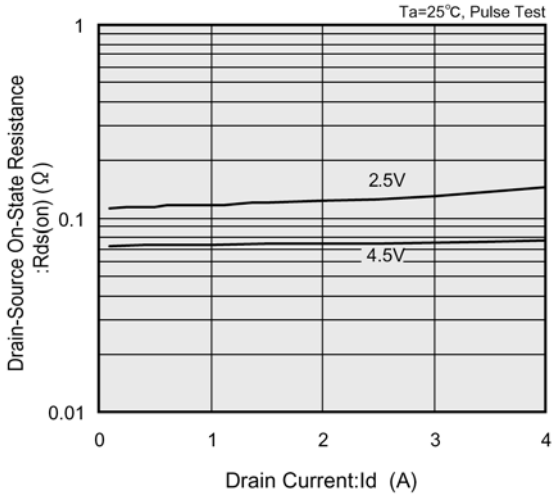
(2) Drain Current vs. Gate-Source Voltage



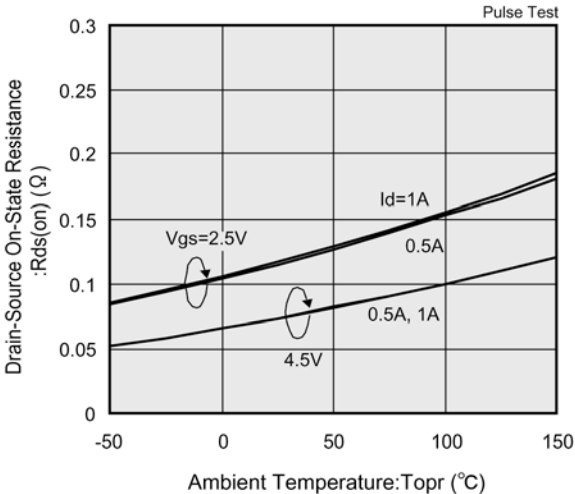
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



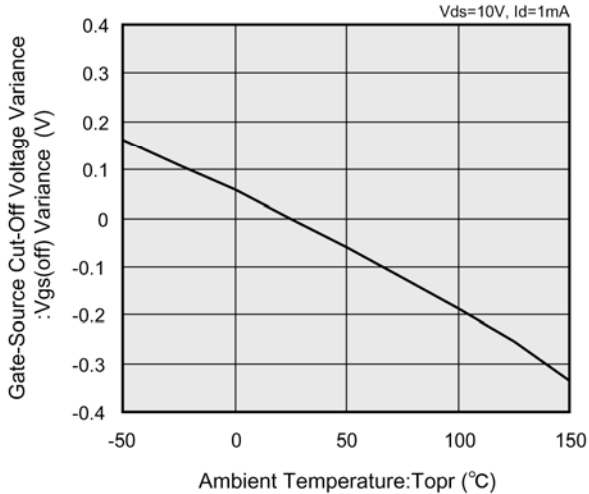
(4) Drain-Source On-State Resistance vs. Drain Current



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

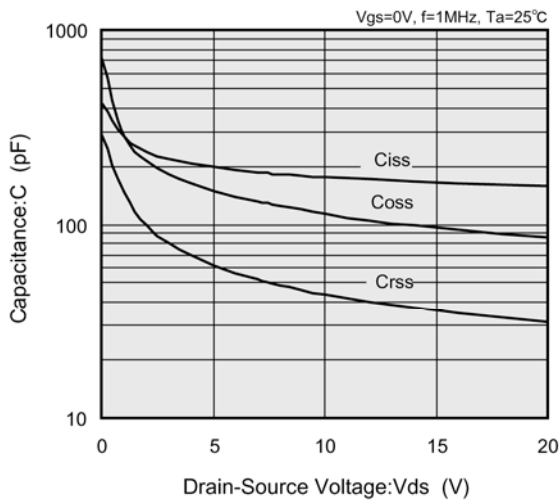


(6) Gate Source Cut-Off Voltage Variance vs. Ambient Temperature

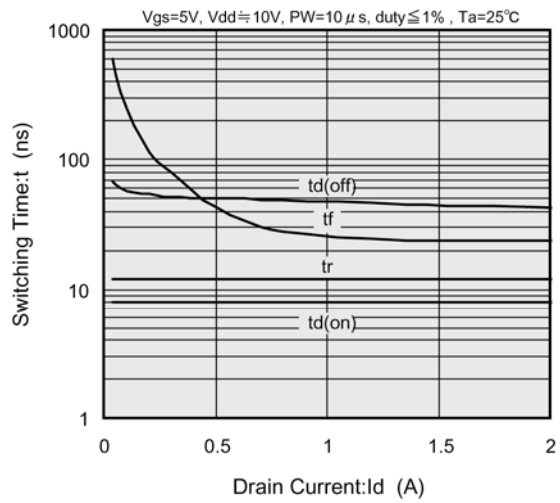


## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

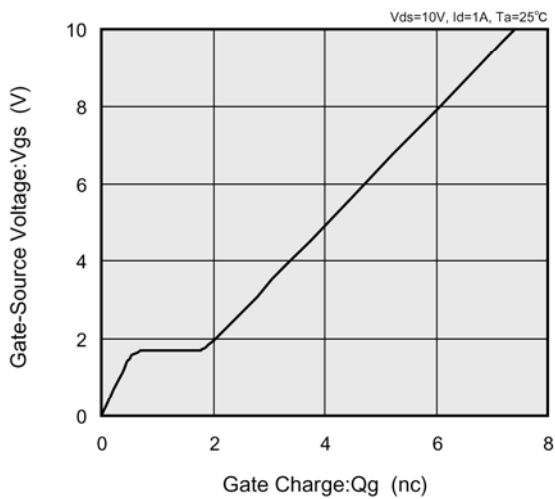
(7) Capacitance vs. Drain-Source Voltage



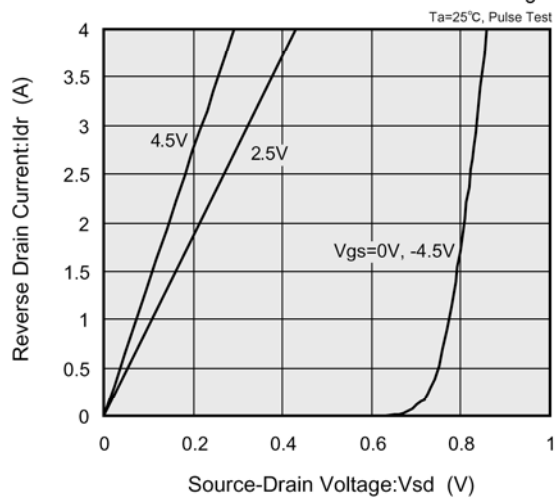
(8) Switching Time vs. Drain Current



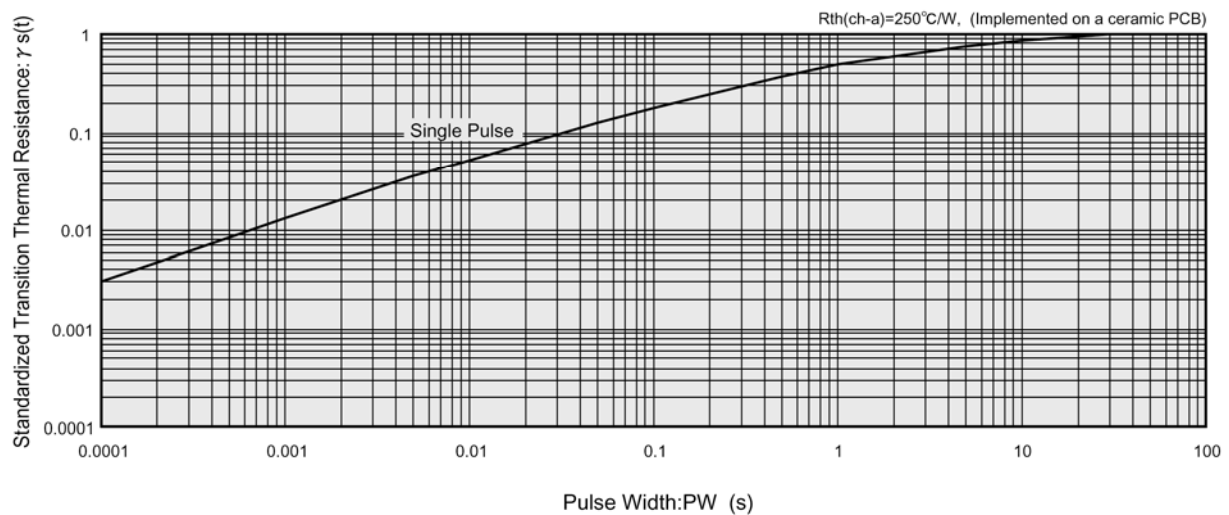
(9) Gate-Source Voltage vs. Gate Charge



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



(11) Standardized transition Thermal Resistance vs. Pulse Width



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