

## Power MOSFET

## ■ GENERAL DESCRIPTION

The XP161A11A1PR 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. A gate protect diode is built-in to prevent static damage. The small SOT-89 package makes high density mounting possible.

## ■ APPLICATIONS

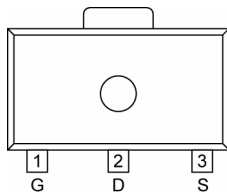
- Notebook PCs
- Cellular and portable phones
- On-board power supplies
- Li-ion battery systems

## ■ FEATURES

**Low On-State Resistance** :  $R_{ds(on)}=0.065\Omega @ V_{gs}=10V$   
:  $R_{ds(on)}=0.105\Omega @ V_{gs}=4.5V$

**Ultra High-Speed Switching**  
**Gate Protect Diode Built-in**  
**Driving Voltage** : 4.5V  
**N-Channel Power MOSFET**  
**DMOS Structure**  
**Small Package** : SOT-89

## ■ PIN CONFIGURATION

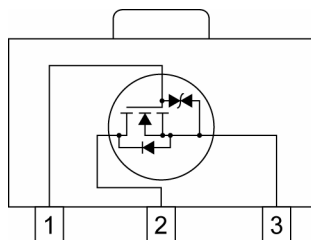


SOT-89  
(TOP VIEW)

## ■ PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTION
1	G	Gate
2	D	Drain
3	S	Source

## ■ 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)	$I_d$	4	A
Drain Current (Pulse)	$I_{dp}$	16	A
Reverse Drain Current	$I_{dr}$	4	A
Channel Power Dissipation *	$P_d$	2	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~150	$^\circ\text{C}$

\* 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> =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	-	-	±10	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*1	R <sub>ds(on)</sub>	I <sub>d</sub> = 2A, V <sub>gs</sub> = 10V	-	0.05	0.065	Ω
		I <sub>d</sub> = 2A, V <sub>gs</sub> = 4.5V	-	0.075	0.105	Ω
Forward Transfer Admittance *1	Y <sub>fs</sub>	I <sub>d</sub> = 2A, V <sub>ds</sub> = 10V	-	5.5	-	S
Body Drain Diode Forward Voltage	V <sub>f</sub>	I <sub>f</sub> = 4A, V <sub>gs</sub> = 0V	-	0.85	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	-	270	-	pF
Output Capacitance	C <sub>oss</sub>		-	150	-	pF
Feedback Capacitance	C <sub>rss</sub>		-	55	-	pF

### Switching Characteristics

Ta = 25°C

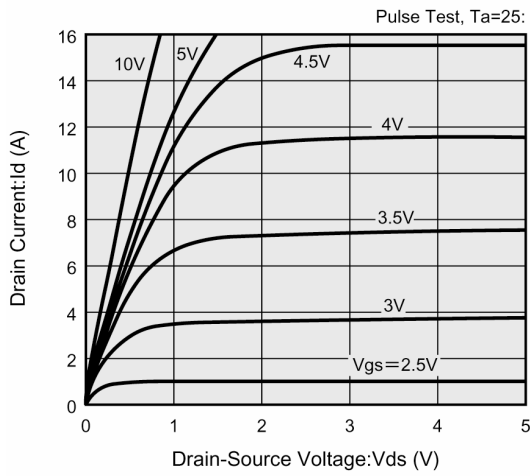
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	t <sub>d (on)</sub>	V <sub>gs</sub> = 5V, I <sub>d</sub> =2A V <sub>dd</sub> = 10V	-	10	-	ns
Rise Time	t <sub>r</sub>		-	15	-	ns
Turn-Off Delay Time	t <sub>d (off)</sub>		-	35	-	ns
Fall Time	t <sub>f</sub>		-	15	-	ns

### Thermal Characteristics

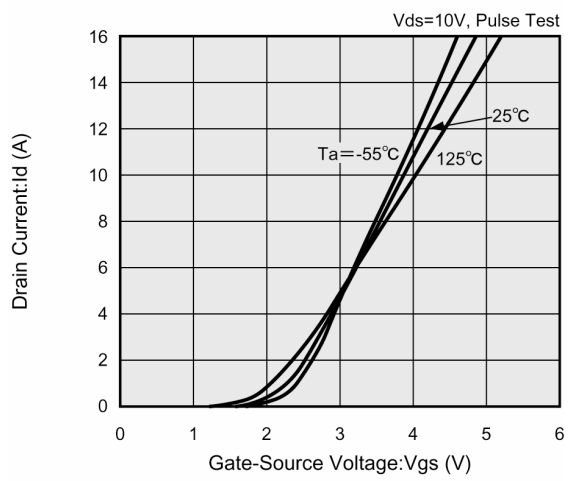
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal Resistance (Channel-Ambience)	R <sub>th (ch-a)</sub>	Implement on a ceramic PCB	-	62.5	-	°C/W

## TYPICAL PERFORMANCE CHARACTERISTICS

(1) Drain Current vs. Drain-Source Voltage



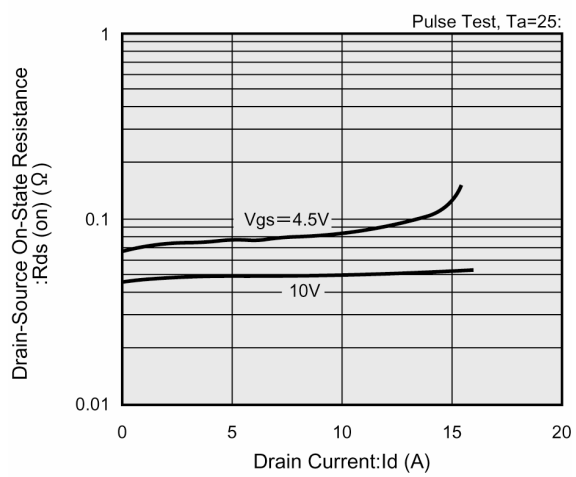
(2) Drain Current vs. Gate-Source Voltage



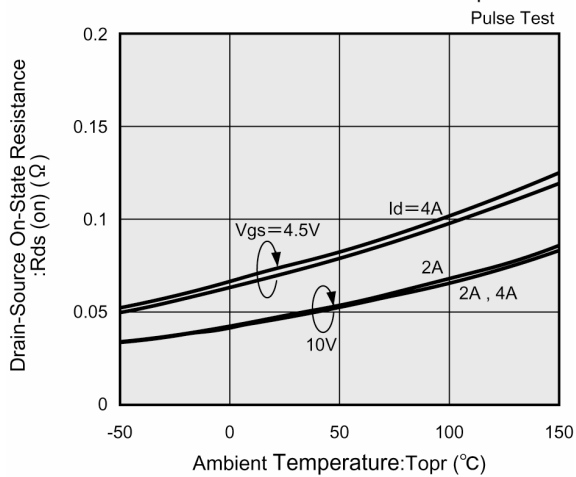
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



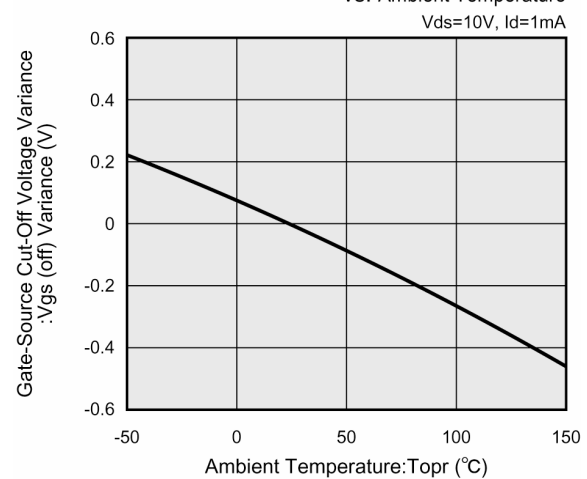
(4) Drain-Source On-State Resistance vs. Drain Current



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

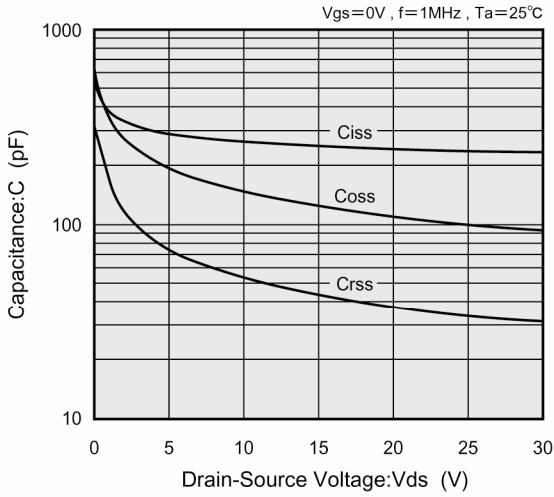


(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature

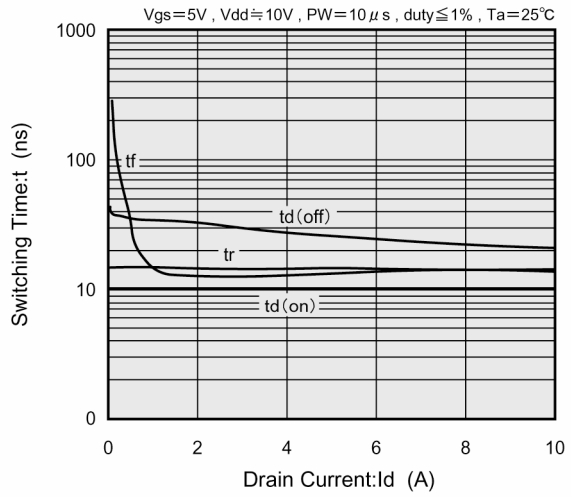


## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

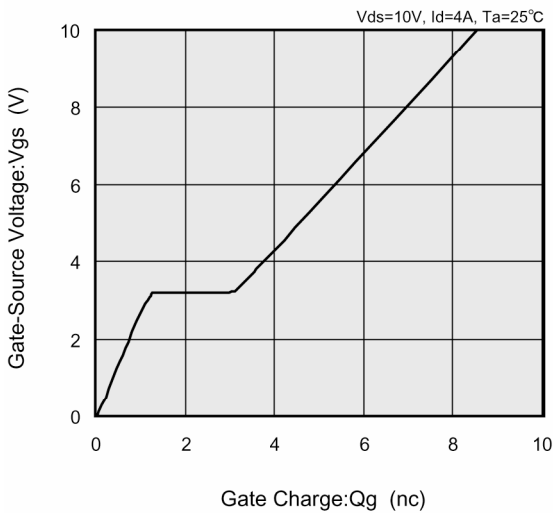
(7) Capacitance vs. Drain-Source Voltage



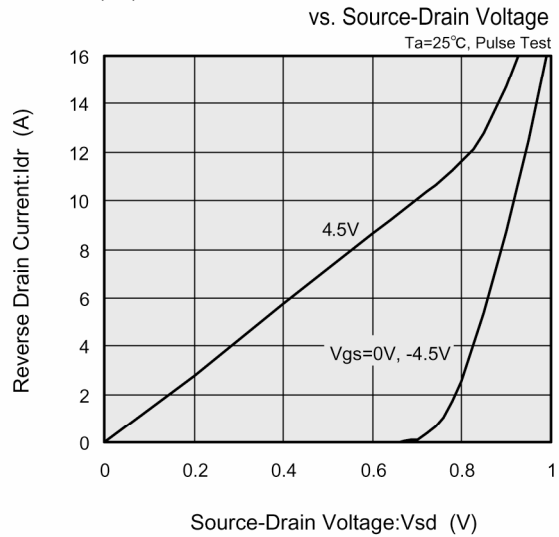
(8) Switching Time vs. Drain Current



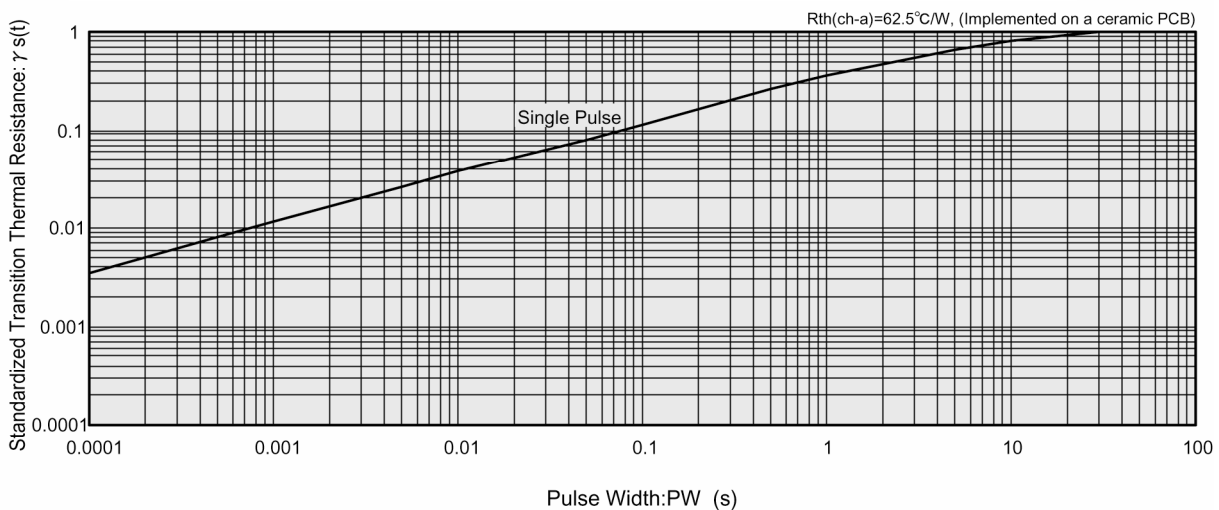
(9) Gate-Source Voltage vs. Gate Charge



(10) Reverse Drain Current



(11) Standardized transition Thermal Resistance vs. Pulse Width



1. The products and product specifications contained herein are subject to change without notice to improve performance characteristics. Consult us, or our representatives before use, to confirm that the information in this catalog is up to date.
2. We assume no responsibility for any infringement of patents, patent rights, or other rights arising from the use of any information and circuitry in this catalog.
3. Please ensure suitable shipping controls (including fail-safe designs and aging protection) are in force for equipment employing products listed in this catalog.
4. The products in this catalog are not developed, designed, or approved for use with such equipment whose failure of malfunction can be reasonably expected to directly endanger the life of, or cause significant injury to, the user.  
(e.g. Atomic energy; aerospace; transport; combustion and associated safety equipment thereof.)
5. Please use the products listed in this catalog within the specified ranges.  
Should you wish to use the products under conditions exceeding the specifications, please consult us or our representatives.
6. We assume no responsibility for damage or loss due to abnormal use.
7. All rights reserved. No part of this catalog may be copied or reproduced without the prior permission of Torex Semiconductor Ltd.

**TOREX SEMICONDUCTOR LTD.**