

- ◆ N-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance:  $0.09\Omega$  MAX
- ◆ Ultra High-Speed Switching
- ◆ SOT-89 Package

### General Description

The XP161A0390PR is a N-Channel Power MOS FET 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 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:**  $R_{ds(on)}=0.09\Omega(V_{gs}=4.5V)$   
 $R_{ds(on)}=0.13\Omega(V_{gs}=2.5V)$   
 $R_{ds(on)}=0.3\Omega(V_{gs}=1.5V)$

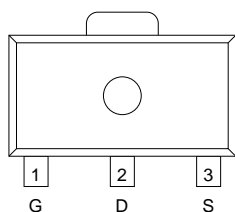
**Ultra high-speed switching**

**Operational Voltage:** 1.5V

**High density mounting:** SOT-89

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### Pin Configuration

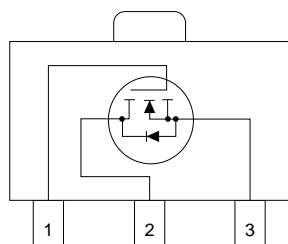


SOT-89  
(TOP VIEW)

### Pin Assignment

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

### Equivalent Circuit



N-Channel MOS FET  
(1 device built-in)

### Absolute Maximum Ratings

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

PARAMETER	SYMBOL	RATINGS	UNITS
Drain-Source Voltage	$V_{dss}$	20	V
Gate-Source Voltage	$V_{gss}$	$\pm 8$	V
Drain Current (DC)	$I_d$	3	A
Drain Current (Pulse)	$I_{dp}$	9	A
Reverse Drain Current	$I_{dr}$	3	A
Continuous Channel Power Dissipation (note)	$P_d$	2	W
Channel Temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55~150	$^\circ\text{C}$

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	Idss	Vds=20V, Vgs=0V			10	μA
Gate-Source Leakage Current	Igss	Vgs=±8V, Vds=0V			±10	μA
Gate-Source Cut-off Voltage	Vgs(off)	Id=1mA, Vds=10V	0.5			V
Drain-Source On-state Resistance (note)	Rds(on)	Id=1.5A, Vgs=4.5V		0.07	0.09	Ω
		Id=1.5A, Vgs=2.5V		0.1	0.13	Ω
		Id=1.5A, Vgs=1.5V		0.17	0.3	Ω
Forward Transfer Admittance (note)	Yfs	Id=1.5A, Vds=10V		6		S
Body Drain Diode Forward Voltage	Vf	If=3A, Vgs=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	Ciss	Vds=10V, Vgs=0V f=1MHz		380		pF
Output Capacitance	Coss			170		pF
Feedback Capacitance	Crss			60		pF

### Switching characteristics

Ta=25°C

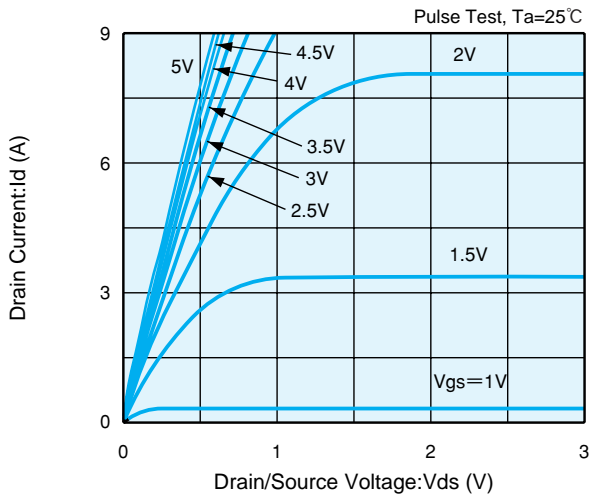
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Turn-on Delay Time	td (on)	Vgs=5V, Id=1.5A Vdd=10V		10		ns
Rise Time	tr			15		ns
Turn-off Delay Time	td (off)			70		ns
Fall Time	tf			40		ns

### Thermal characteristics

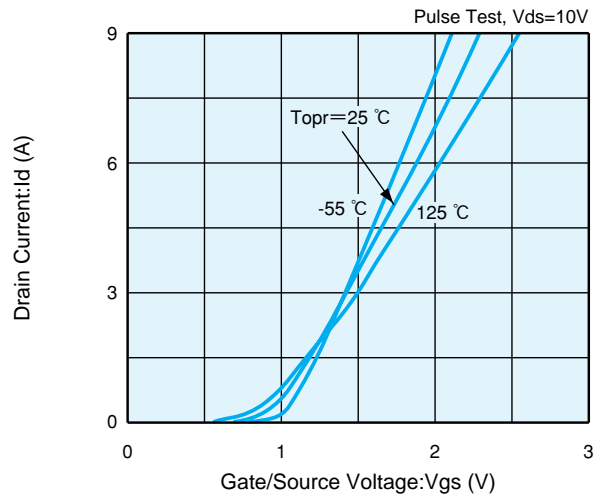
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Thermal Resistance (channel-surroundings)	Rth (ch-a)	Implement on a glass epoxy resin PCB		62.5		°C/W

### Electrical Characteristics

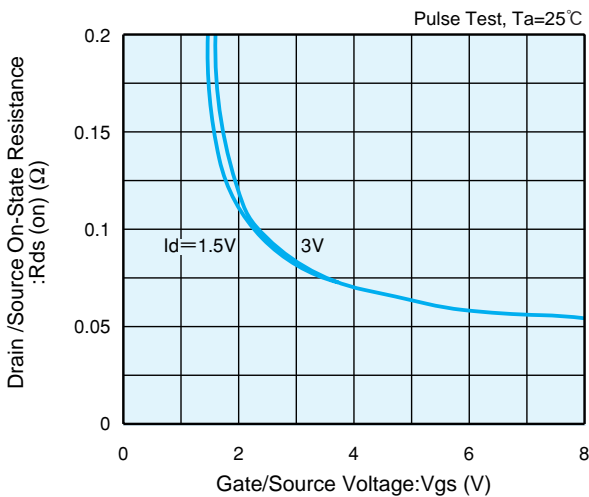
Drain Current vs. Drain /Source Voltage



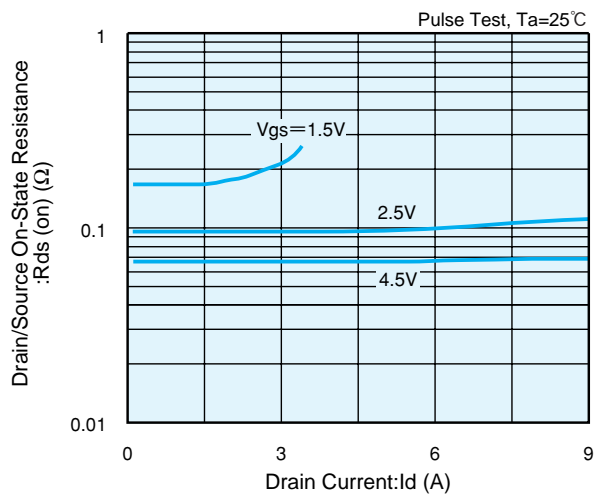
Drain Current vs. Gate/Source Voltage



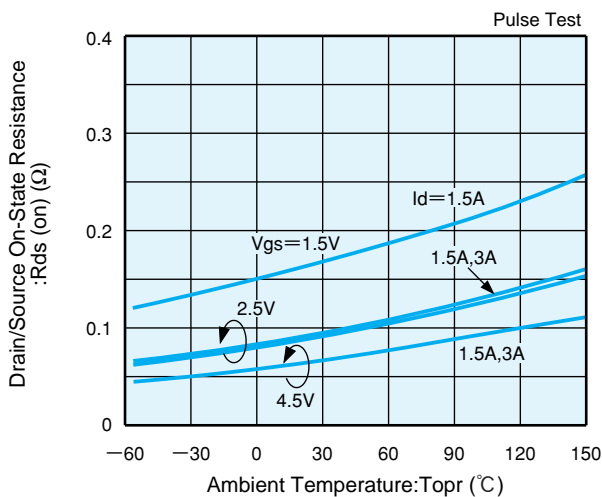
Drain/Source On-State Resistance vs. Gate/Source Voltage



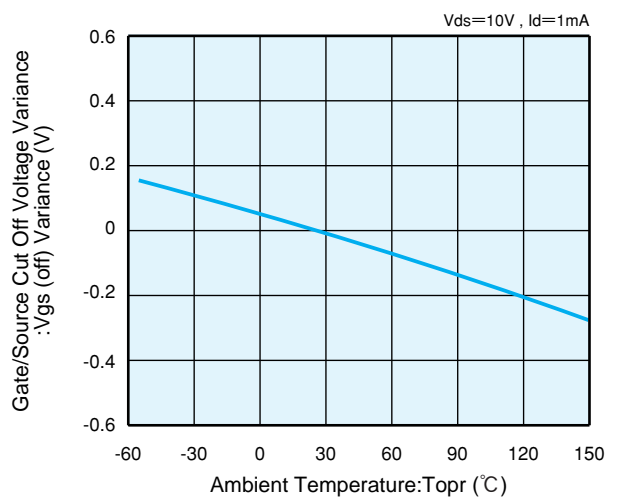
Drain/Source On-State Resistance vs. Drain Current



Drain/Source On-State Resistance vs. Ambient Temp.



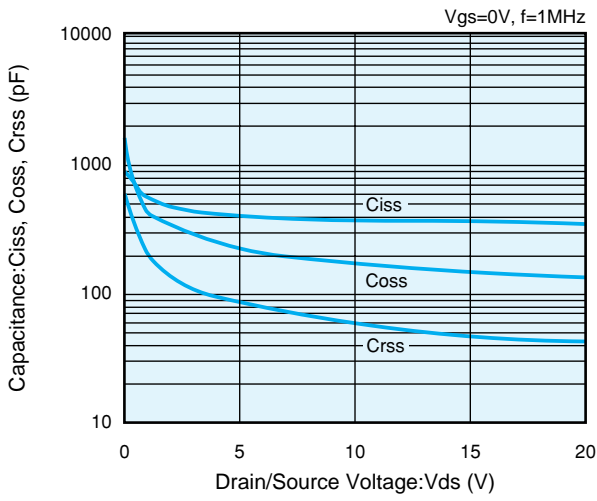
Gate/Source Cut Off Voltage Variance vs. Ambient Temp.



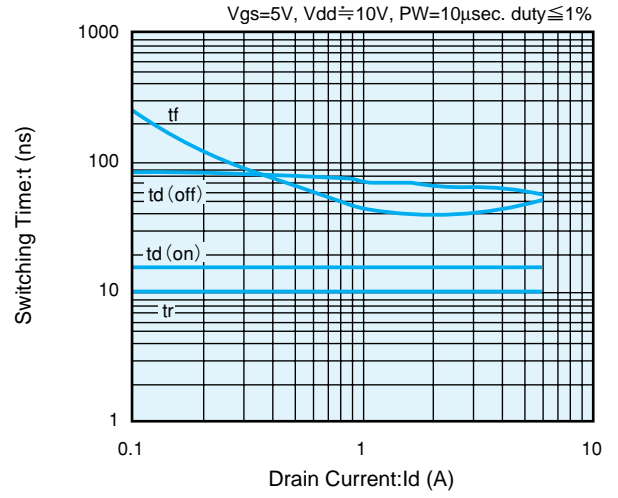
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## Electrical Characteristics

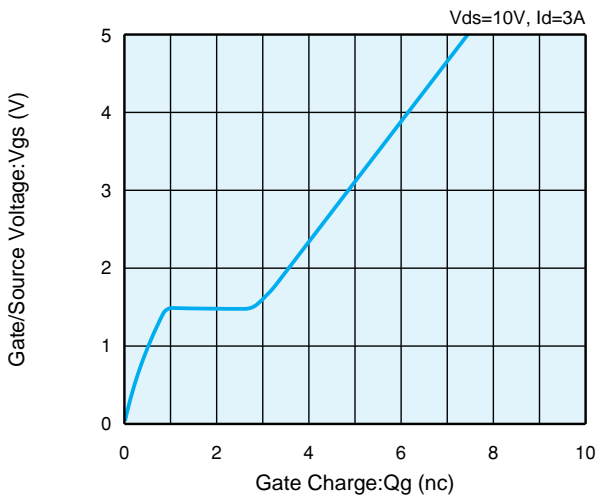
Drain/Source Voltage vs. Capacitance



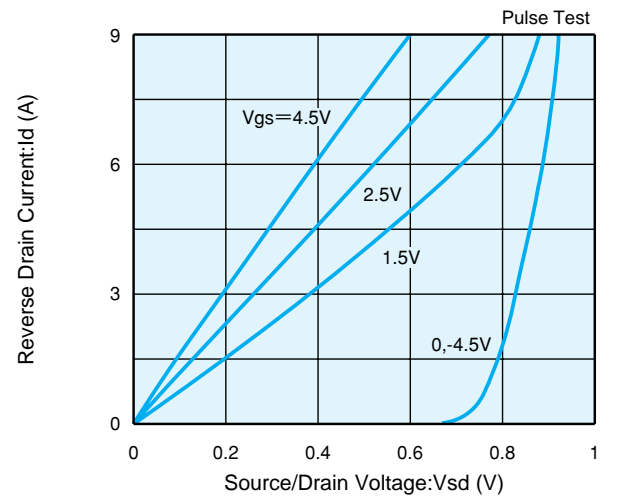
Switching Time vs. Drain Current



Gate/Source Voltage vs. Gate Charge



Reverse Drain Current vs. Source/Drain Voltage



Standardized Transition Thermal Resistance vs. Pulse Width

