

## Power MOSFET

### ■ GENERAL DESCRIPTION

The XP161A1355PR-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.

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** :  $R_{ds(on)} = 0.05\Omega @ V_{gs} = 4.5V$   
:  $R_{ds(on)} = 0.07\Omega @ V_{gs} = 2.5V$   
:  $R_{ds(on)} = 0.15\Omega @ V_{gs} = 1.5V$

**Ultra High-Speed Switching**

**Gate Protect Diode Built-in**

**Driving Voltage** : 1.5V

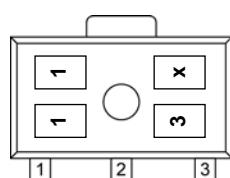
**N-Channel Power MOSFET**

**DMOS Structure**

**Small Package** : SOT-89

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

### ■ PIN CONFIGURATION/ MARKING



G : Gate  
S : Source  
D : Drain

SOT-89  
(TOP VIEW)

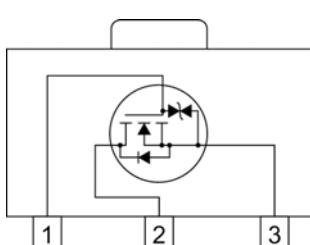
\* x represents production lot number.

### ■ PRODUCT NAME

PRODUCT NAME	PACKAGE	ORDER UNIT
XP161A1355PR	SOT-89	1,000/Reel
XP161A1355PR-G <sup>(*)</sup>	SOT-89	1,000/Reel

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

### ■ EQUIVALENT CIRCUIT



N-channel MOSFET  
(1 device built-in)

### ■ ABSOLUTE MAXIMUM RATINGS

T<sub>a</sub> = 25°C

PARAMETER	SYMBOL	RATINGS	UNITS
Drain-Source Voltage	V <sub>dss</sub>	20	V
Gate-Source Voltage	V <sub>gss</sub>	±8	V
Drain Current (DC)	I <sub>d</sub>	4	A
Drain Current (Pulse)	I <sub>dp</sub>	16	A
Reverse Drain Current	I <sub>dr</sub>	4	A
Channel Power Dissipation *	P <sub>d</sub>	2	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

\* When implemented on a ceramic PCB

## ■ ELECTRICAL CHARACTERISTICS

### DC Characteristics

T<sub>a</sub> = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Drain Cut-Off Current	Idss	V <sub>ds</sub> =20V, V <sub>gs</sub> = 0V	-	-	10	μ A
Gate-Source Leak Current	I <sub>gss</sub>	V <sub>gs</sub> = ±8V, V <sub>ds</sub> = 0V	-	-	±10	μ A
Gate-Source Cut-Off Voltage	V <sub>gs(off)</sub>	I <sub>d</sub> = 1mA, V <sub>ds</sub> = 10V	0.5	-	1.2	V
Drain-Source On-State Resistance *1	R <sub>ds(on)</sub>	I <sub>d</sub> = 2A, V <sub>gs</sub> = 4.5V	-	0.037	0.050	Ω
		I <sub>d</sub> = 2A, V <sub>gs</sub> = 2.5V	-	0.05	0.07	Ω
		I <sub>d</sub> = 0.5A, V <sub>gs</sub> = 1.5V	-	0.1	0.15	Ω
Forward Transfer Admittance *1	Y <sub>fs</sub>	I <sub>d</sub> = 2A, V <sub>ds</sub> = 10V	-	10	-	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

T<sub>a</sub> = 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	-	390	-	pF
Output Capacitance	C <sub>oss</sub>		-	210	-	pF
Feedback Capacitance	C <sub>rss</sub>		-	90	-	pF

### Switching Characteristics

T<sub>a</sub> = 25°C

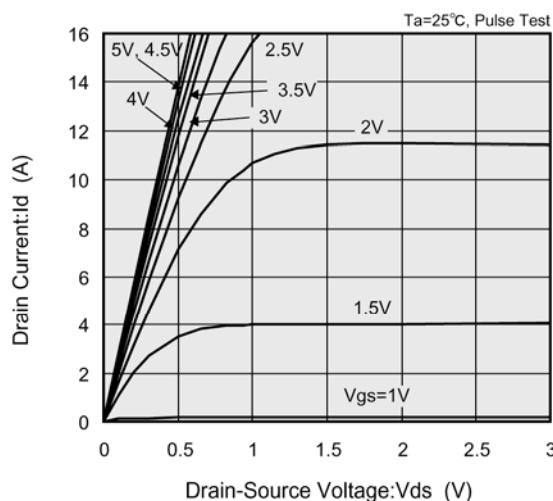
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	t <sub>d</sub> (on)	V <sub>gs</sub> = 5V, I <sub>d</sub> =2A V <sub>dd</sub> = 10V	-	10	-	ns
Rise Time	t <sub>r</sub>		-	15	-	ns
Turn-Off Delay Time	t <sub>d</sub> (off)		-	85	-	ns
Fall Time	t <sub>f</sub>		-	45	-	ns

### Thermal Characteristics

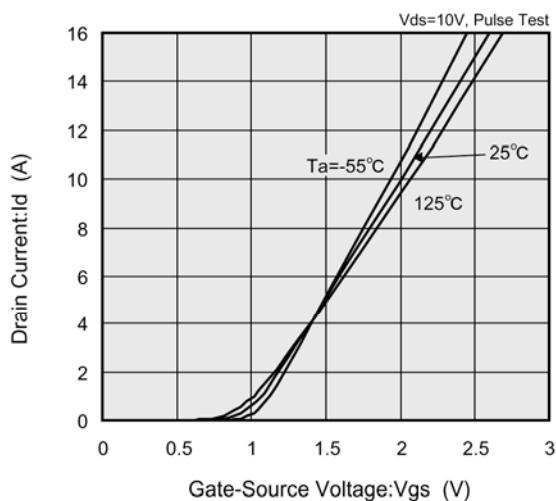
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Thermal Resistance (Channel-Ambience)	R <sub>th</sub> (ch-a)	Implement on a ceramic PCB	-	62.5	-	°C/W

## ■ TYPICAL PERFORMANCE CHARACTERISTICS

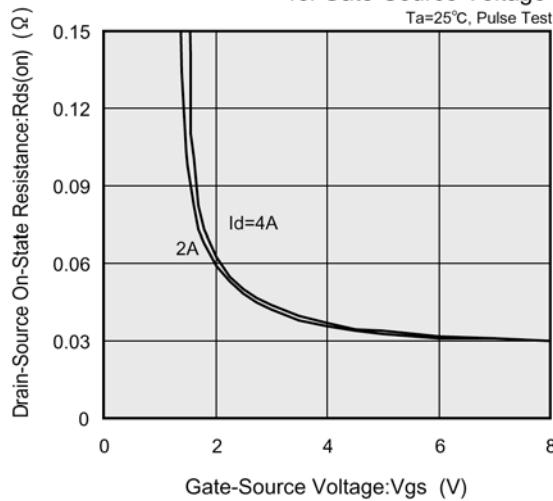
(1) Drain Current vs. Drain-Source Voltage



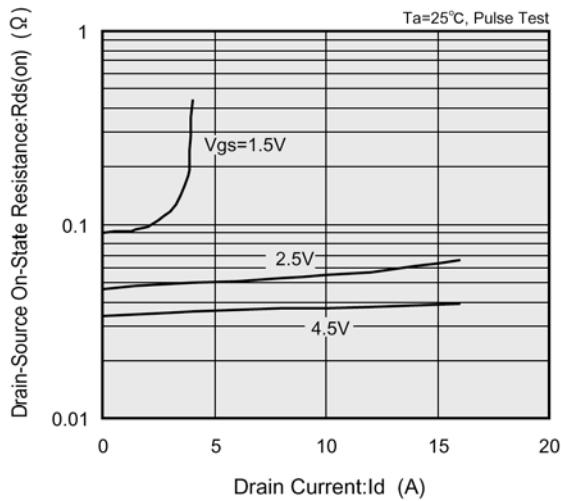
(2) Drain Current vs. Gate-Source Voltage



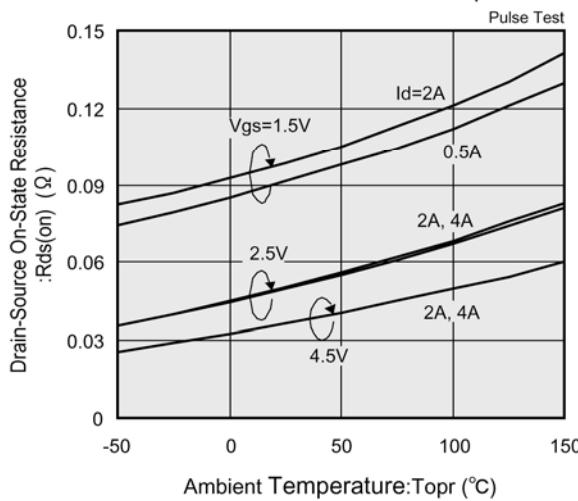
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



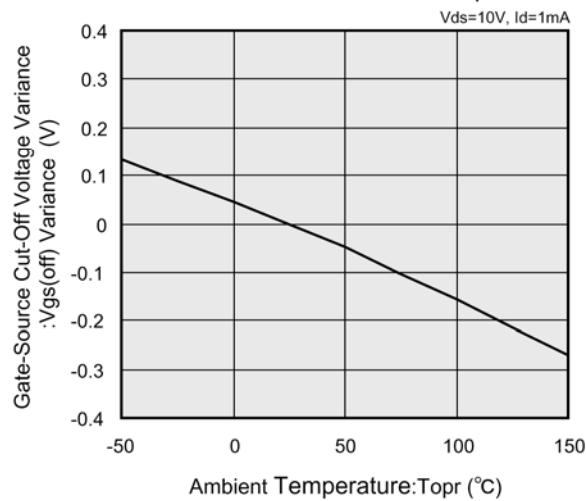
(4) Drain-Source On-State Resistance vs. Drain Current



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

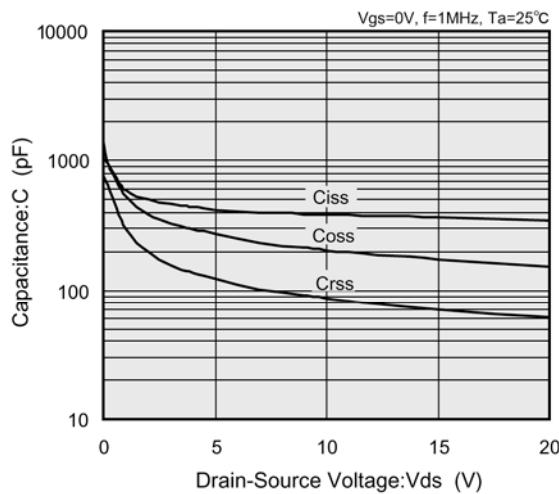


(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature

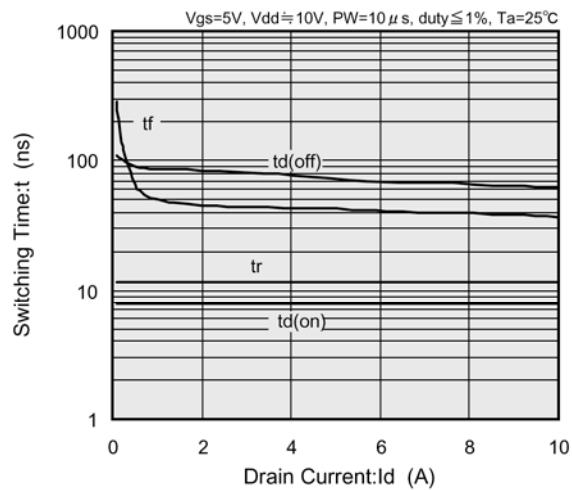


## ■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

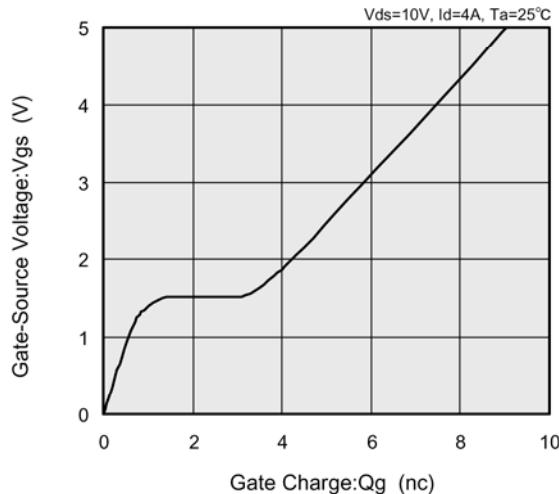
(7) Capacitance vs. Drain-Source Voltage



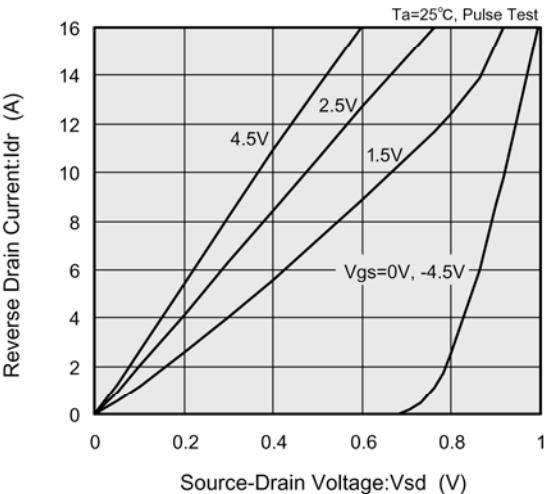
(8) Switching Time vs. Drain Current



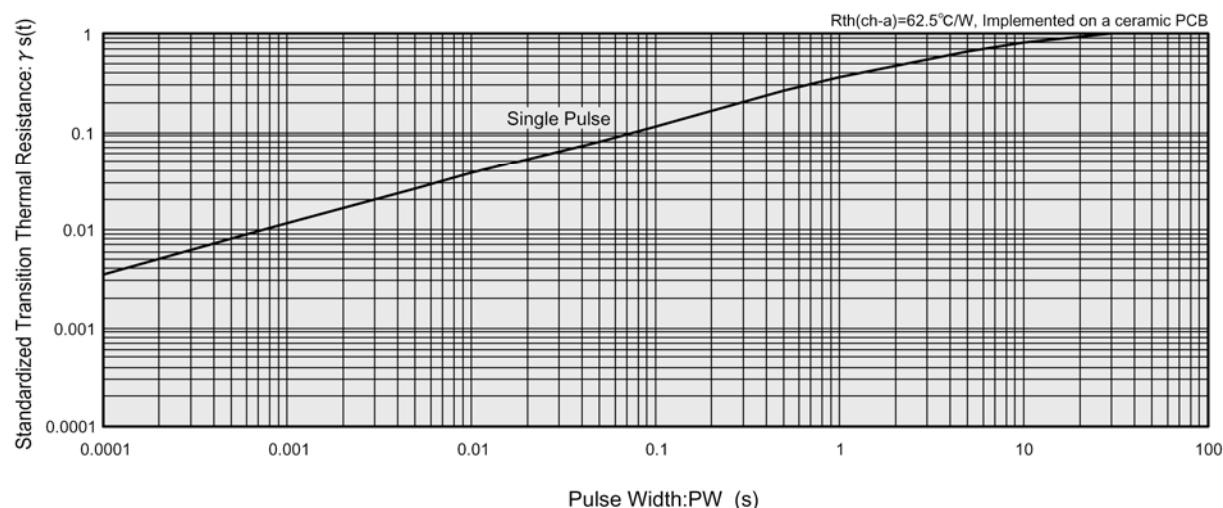
(9) Gate-Source Voltage vs. Gate Charge



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



(11) Standardized transition Thermal Resistance vs. Pulse Width



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