

Power MOSFET

■ GENERAL DESCRIPTION

The XP135A1145SR is an N-channel/P-channel Power MOS FET with low on-state resistance and ultra high-speed switching characteristics.

Two FET devices are built-into the one package.

Because high-speed switching is possible, the IC can be efficiently set thereby saving energy.

The small SOP-8 package makes high density mounting possible.

■ APPLICATIONS

- Notebook PCs
- Cellular and portable phones
- On-board power supplies

■ FEATURES

Low On-State Resistance (Nch) : $R_{ds(on)} = 0.033\Omega @ V_{gs} = 10V$

: $R_{ds(on)} = 0.045\Omega @ V_{gs} = 4.5V$

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

: $R_{ds(on)} = 0.110\Omega @ V_{gs} = -4.5V$

Ultra High-Speed Switching

Driving Voltage : 4.5V (Nch) : -4.5V (Pch)

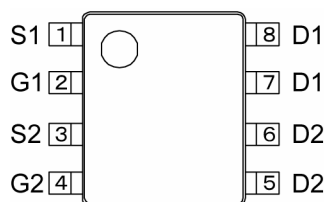
N-Channel/P-channel Power MOSFET

DMOS Structure

Two FET Devices Built-in

Package : SOP-8

■ PIN CONFIGURATION

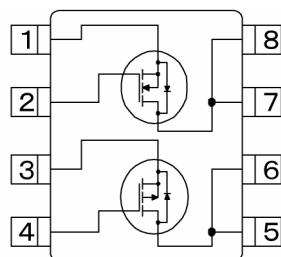


SOP-8
(TOP VIEW)

■ PIN ASSIGNMENT

PIN NUMBER	PIN NAME	FUNCTION
1	S1	Source (Nch)
2	G1	Gate (Nch)
3	S2	Source (Pch)
4	G2	Gate (Pch)
5~6	D2	Drain (Pch)
7~8	D1	Drain (Nch)

■ EQUIVALENT CIRCUIT



N-channel/P-channel MOSFET
(2 devices built-in)

■ ABSOLUTE MAXIMUM RATINGS

$T_a = 25^\circ C$

PARAMETER	SYMBOL	RATINGS		UNITS
		Nch	Pch	
Drain-Source Voltage	V_{ds}	30	-30	V
Gate-Source Voltage	V_{gs}	± 20	± 20	V
Drain Current (DC)	I_d	6	-4	A
Drain Current (Pulse)	I_{dp}	20	-16	A
Reverse Drain Current	I_{dr}	6	-4	A
Channel Power Dissipation *	P_d	2		W
Channel Temperature	T_{ch}	150		$^\circ C$
Storage Temperature Range	T_{stg}	-55~150		$^\circ C$

* When implemented on a glass epoxy PCB

ELECTRICAL CHARACTERISTICS

DC Characteristics (N-channel Power MOSFET)

Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Drain Cut-Off Current	Idss	Vds = 30V, Vgs = 0V	-	-	10	μA
Gate-Source Leak Current	Igss	Vgs = ±20V, Vds = 0V	-	-	±1	μA
Gate-Source Cut-Off Voltage	Vgs(off)	Id = 1mA, Vds = 10V	1.0	-	2.5	V
Drain-Source On-State Resistance *1	Rds(on)	Id = 3A, Vgs = 10V	-	0.026	0.033	Ω
		Id = 3A, Vgs = 4.5V	-	0.035	0.045	Ω
Forward Transfer Admittance *1	Yfs	Id = 3A, Vds = 10V	-	12	-	S
Body Drain Diode Forward Voltage	Vf	If = 6A, Vgs = 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	Ciss	Vds = 10V, Vgs = 0V f = 1MHz	-	620	-	pF
Output Capacitance	Coss		-	350	-	pF
Feedback Capacitance	Crss		-	120	-	pF

Switching Characteristics

Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	td (on)	Vgs = 5V, Id = 3A Vdd = 10V	-	15	-	ns
Rise Time	tr		-	20	-	ns
Turn-Off Delay Time	td (off)		-	30	-	ns
Fall Time	tf		-	10	-	ns

Thermal Characteristics

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

■ ELECTRICAL CHARACTERISTICS (Continued)

DC Characteristics (P-channel Power MOSFET)

Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Drain Cut-Off Current	Idss	Vds= -30V, Vgs= 0V	-	-	-10	μA
Gate-Source Leak Current	Igss	Vgs=±20V, Vds= 0V	-	-	±1	μA
Gate-Source Cut-Off Voltage	Vgs(off)	Id= -1mA, Vds= -10V	-1.0	-	-2.5	V
Drain-Source On-state Resistance *1	Rds(on)	Id= -2A, Vgs= -10V	-	0.055	0.065	Ω
		Id= -2A, Vgs= -4.5V	-	0.09	0.11	Ω
Forward Transfer Admittance *1	Yfs	Id= -2A, Vds= -10V	-	5	-	S
Body Drain Diode Forward Voltage	Vf	If= -4A, Vgs= 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	Ciss	Vds= -10V, Vgs= 0V f= 1MHz	-	680	-	pF
Output Capacitance	Coss		-	450	-	pF
Feedback Capacitance	Crss		-	170	-	pF

Switching Characteristics

Ta = 25°C

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNITS
Turn-On Delay Time	td (on)	Vgs= -5V, Id= -2A Vdd= -10V	-	15	-	ns
Rise Time	tr		-	20	-	ns
Turn-Off Delay Time	td (off)		-	30	-	ns
Fall Time	tf		-	20	-	ns

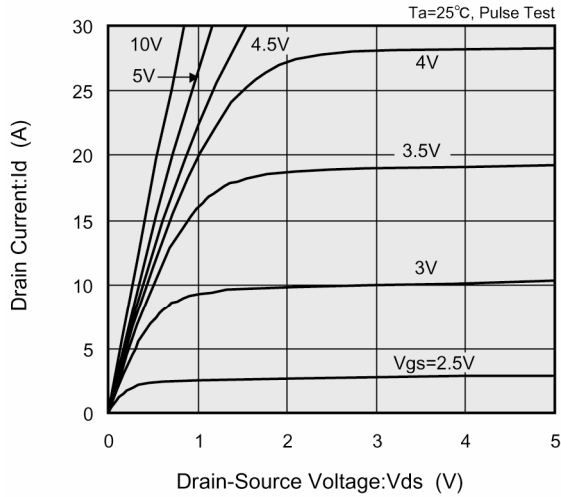
Thermal Characteristics

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

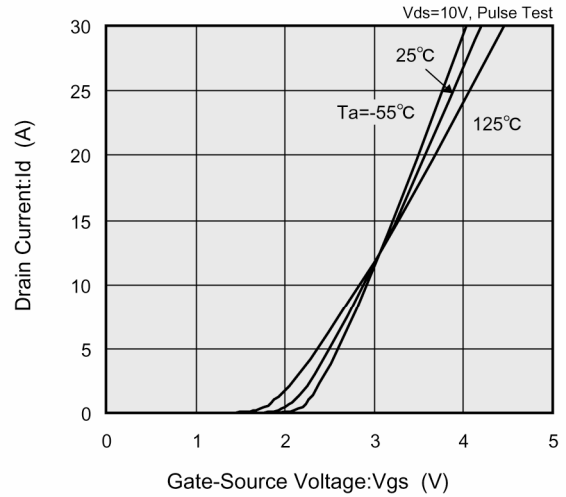
TYPICAL PERFORMANCE CHARACTERISTICS

N-channel Power MOSFET

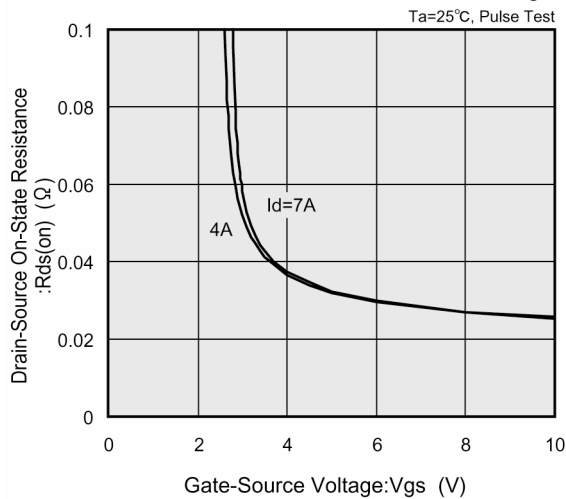
(1) Drain Current vs. Drain-Source Voltage



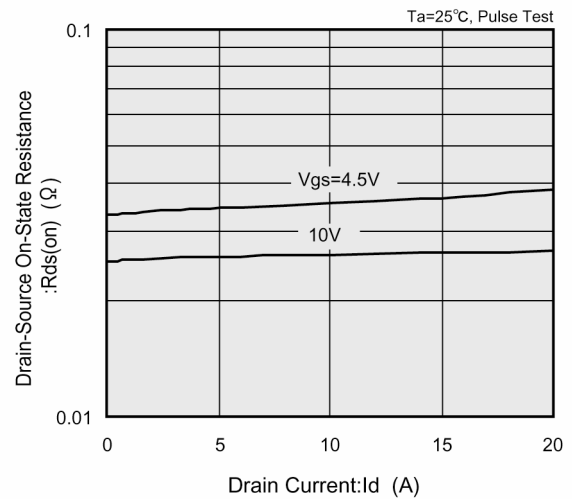
(2) Drain Current vs. Gate-Source Voltage



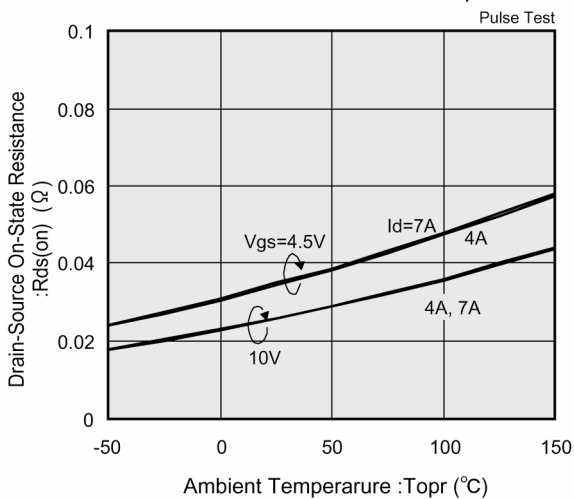
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



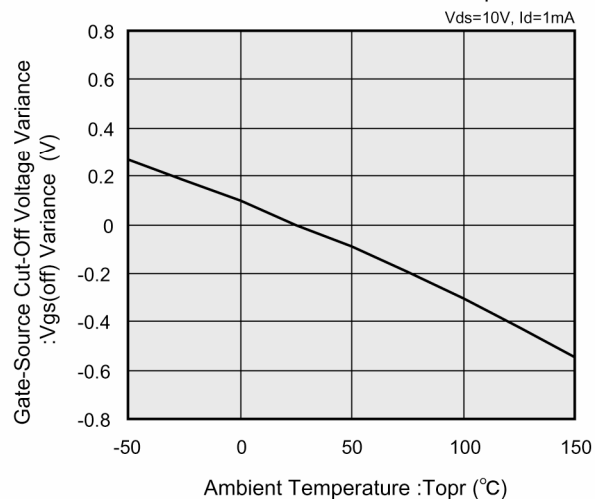
(4) Drain-Source On-State Resistance vs. Drain Current



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



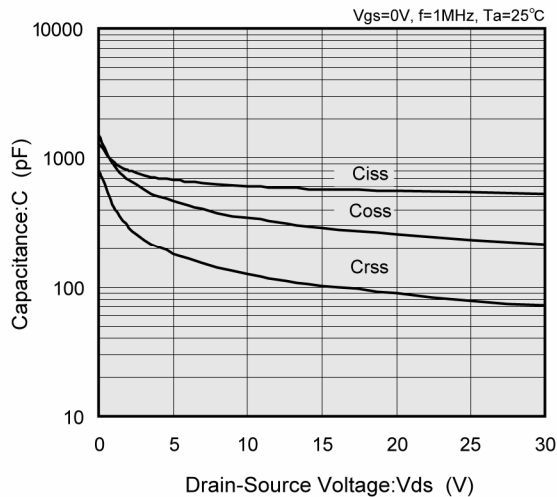
(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature



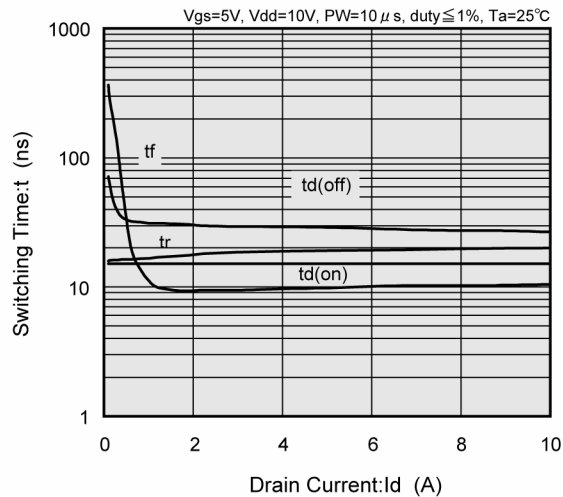
■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

● N-channel Power MOSFET(Continued)

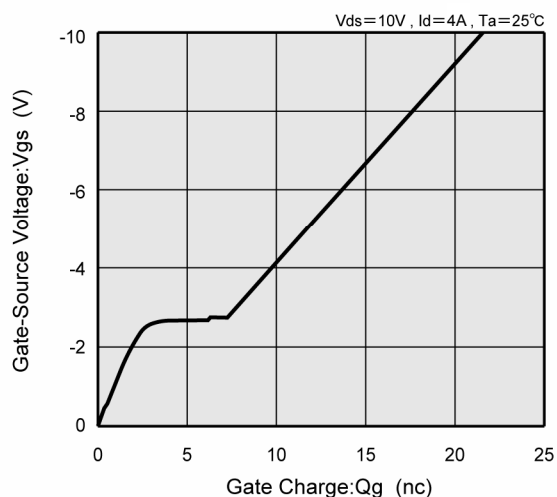
(7) Capacitance vs. Drain-Source Voltage



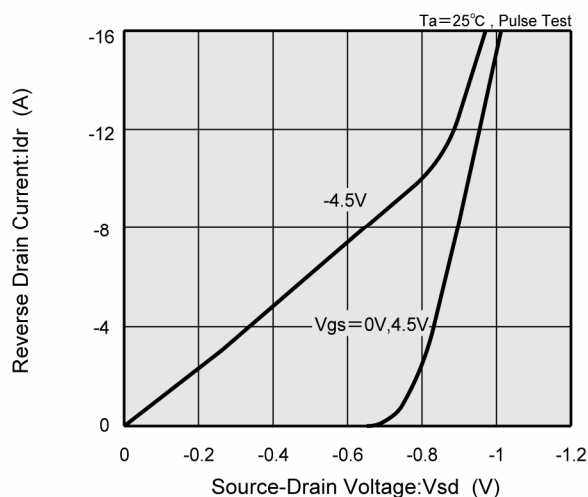
(8) Switching Time vs. Drain Current



(9) Gate-Source Voltage vs. Gate Charge



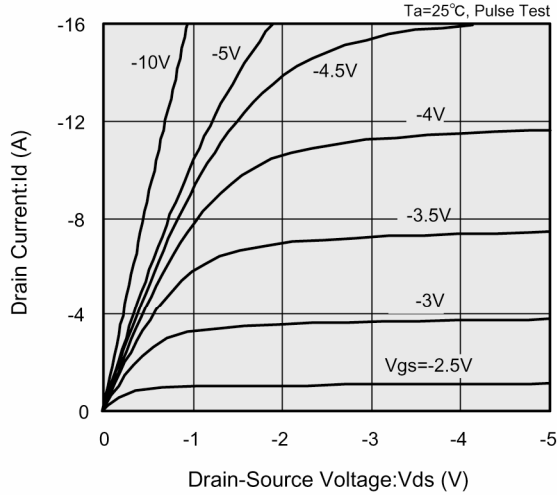
(10) Reverse Drain Current vs. Source-Drain Voltage



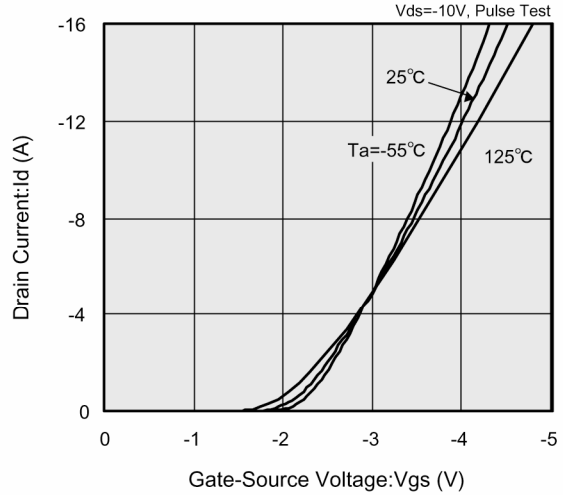
TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

P-channel Power MOSFET

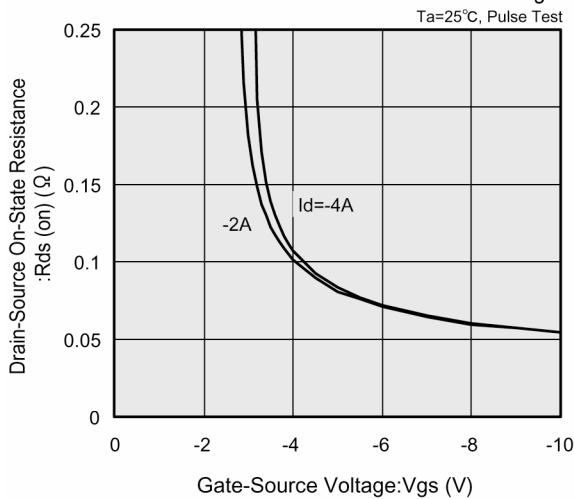
(1) Drain Current vs. Drain-Source Voltage



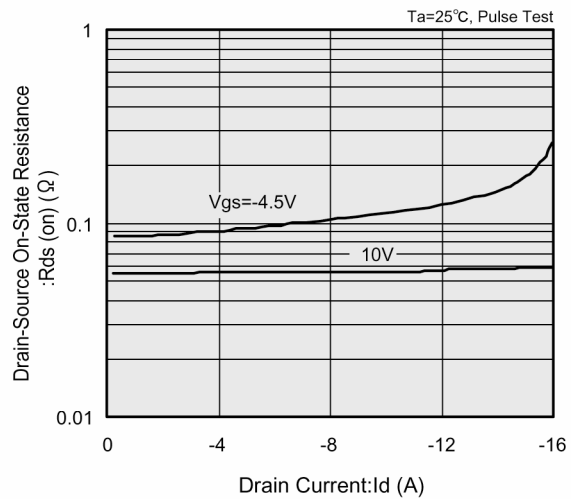
(2) Drain Current vs. Gate-Source Voltage



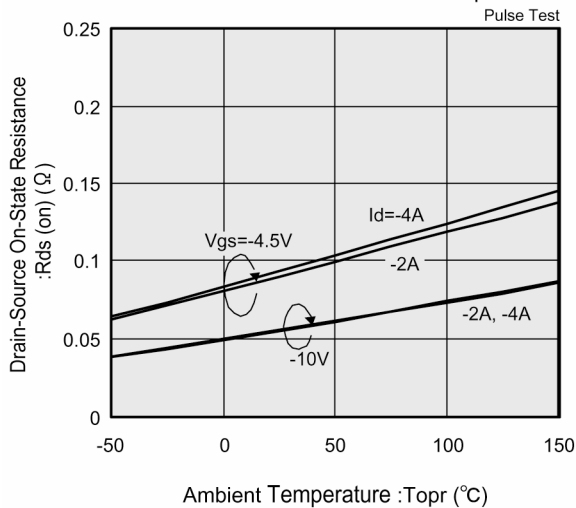
(3) Drain-Source On-State Resistance vs. Gate-Source Voltage



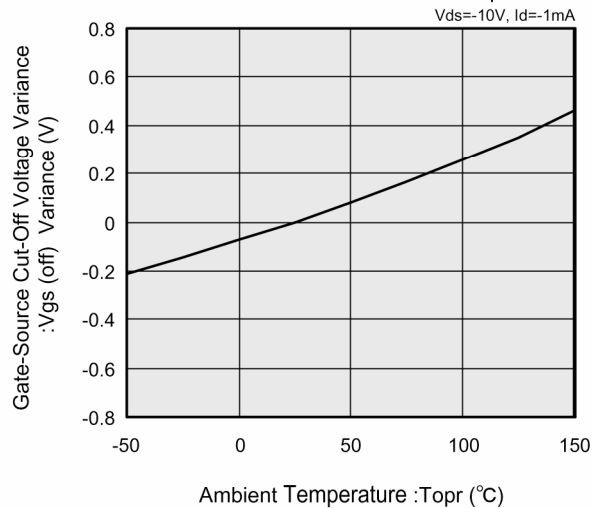
(4) Drain-Source On-State Resistance vs. Drain Current



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



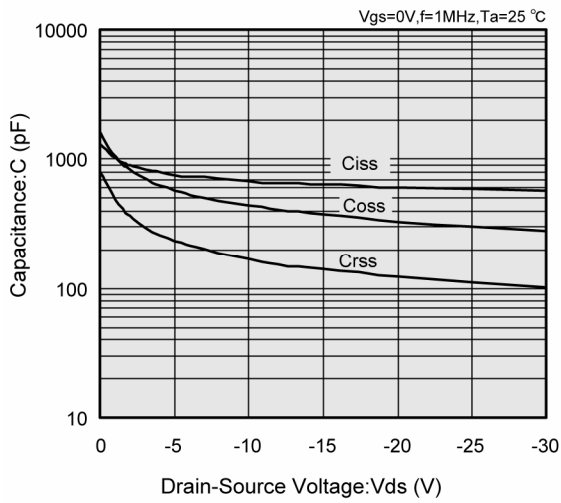
(6) Gate-Source Cut-Off Voltage Variance vs. Ambient Temperature



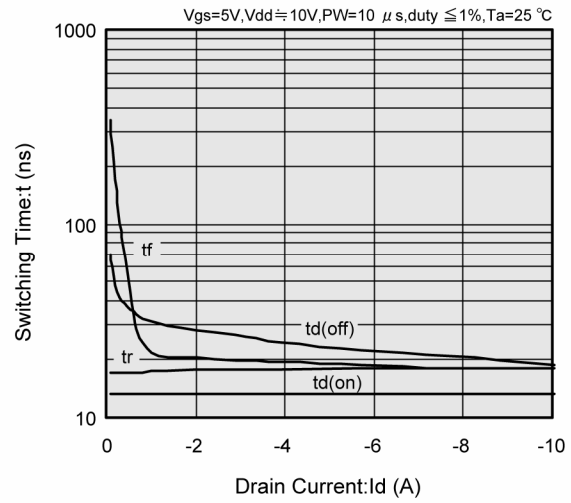
■ TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

● P-channel Power MOSFET (Continued)

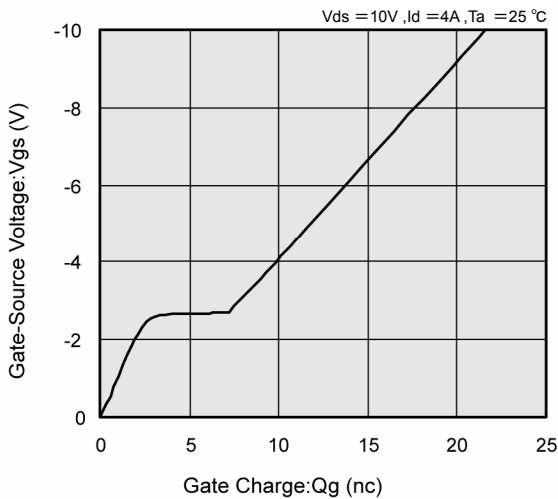
(7) Capacitance vs. Drain-Source Voltage



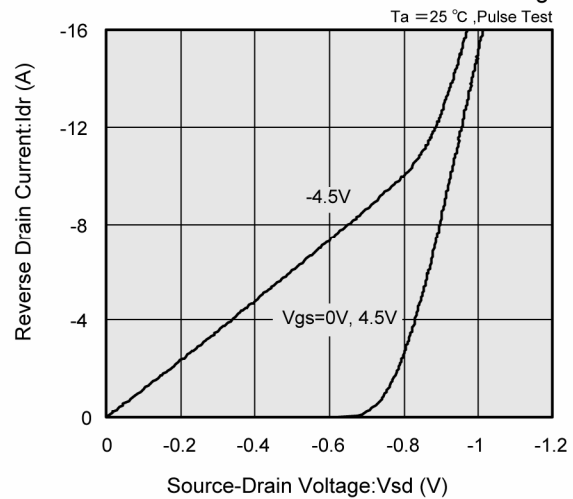
(8) Switching Time vs. Drain Current



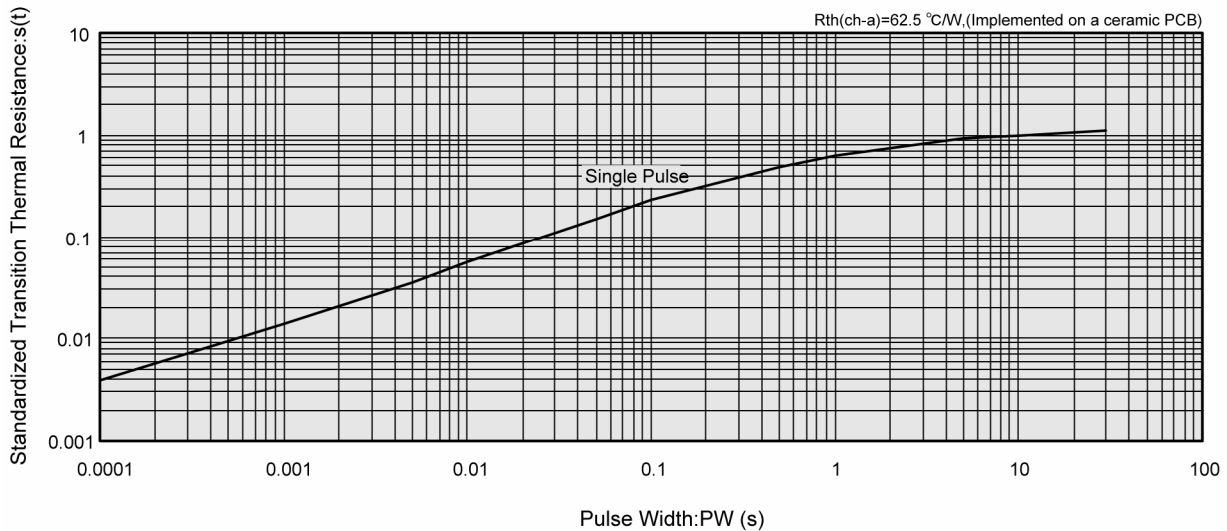
(9) Gate-Source Voltage vs. Gate Charge



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



(11) Standardized Transition Thermal Resistance vs. Pulse Width



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