

- ◆ P-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance: **0.11Ω MAX**
- ◆ Ultra High-Speed Switching
- ◆ SOP-8 Package
- ◆ Two FET Devices built-in

### General Description

The XP134A02A1SR is a 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
- Li-ion battery systems

### Features

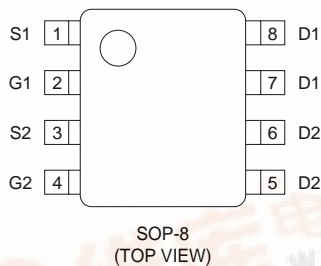
**Low on-state resistance:**  $R_{ds(on)}=0.11\Omega(V_{gs}=-4.5V)$   
 $R_{ds(on)}=0.2\Omega(V_{gs}=-2.5V)$

**Ultra high-speed switching**

**Operational Voltage:** -2.5V

**High density mounting:** SOP-8

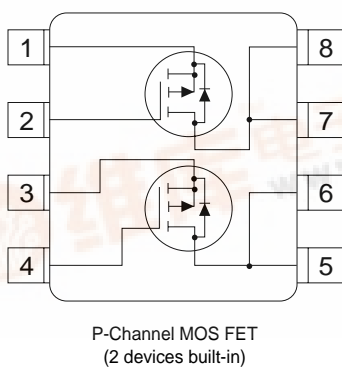
### Pin Configuration



### Pin Assignment

PIN NUMBER	PIN NAME	FUNCTION
1	S1	Source
2	G1	Gate
3	S2	Source
4	G2	Gate
5-6	D2	Drain
7-8	D1	Drain

### Equivalent Circuit



### Absolute Maximum Ratings

Ta=25°C

PARAMETER	SYMBOL	RATINGS	UNITS
Drain-Source Voltage	Vdss	-20	V
Gate-Source Voltage	Vgss	±12	V
Drain Current (DC)	Id	-4	A
Drain Current (Pulse)	Idp	-12	A
Reverse Drain Current	Idr	-4	A
Continuous Channel Power Dissipation (note)	Pd	2	W
Channel Temperature	Tch	150	°C
Storage Temperature	Tstg	-55~150	°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=±12V, Vds=0V			±1	μA
Gate-Source Cut-off Voltage	Vgs(off)	Id=-1mA, Vds=-10V	-0.5		-1.2	V
Drain-Source On-state Resistance (note)	Rds(on)	Id=-2A, Vgs=-4.5V		0.08	0.11	Ω
		Id=-2A, Vgs=-2.5V		0.14	0.2	Ω
Forward Transfer Admittance (note)	Yfs	Id=-2A, Vds=-10V		5.5		S
Body Drain Diode Forward Voltage	Vf	If=-4A, 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		800		pF
Output Capacitance	Coss			550		pF
Feedback Capacitance	Crss			200		pF

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#### Switching characteristics

Ta=25°C

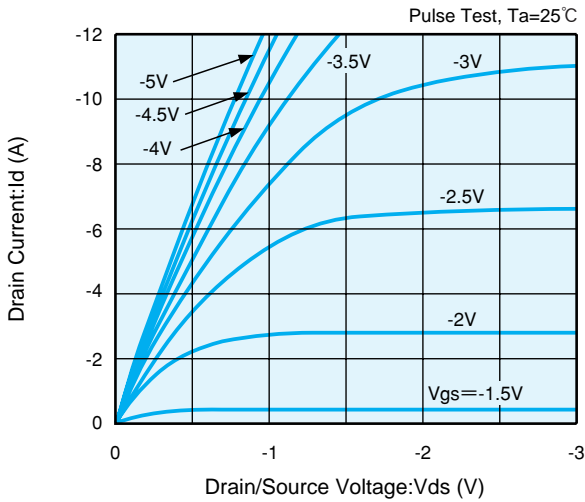
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Turn-on Delay Time	td (on)	Vgs=-5V, Id=-2A Vdd=-10V		15		ns	
Rise Time	tr			25		ns	
Turn-off Delay Time	td (off)				30		ns
Fall Time	tf				15		ns

#### Thermal characteristics

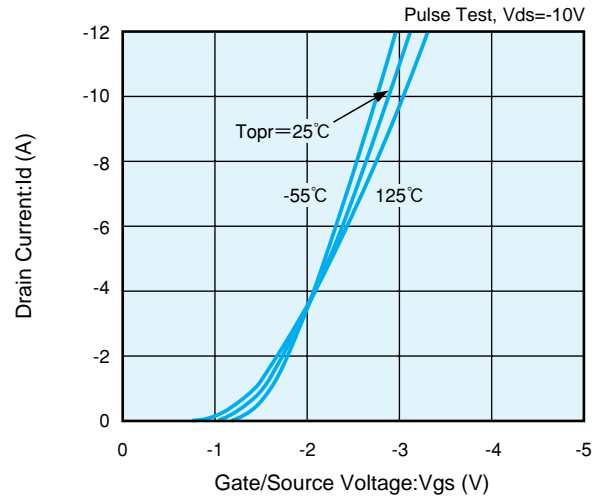
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Thermal Resistance (channel-surroundings)	Rth (ch-a)	Implement on a glass epoxy resin PCB		62.5		°C/W

## Electrical Characteristics

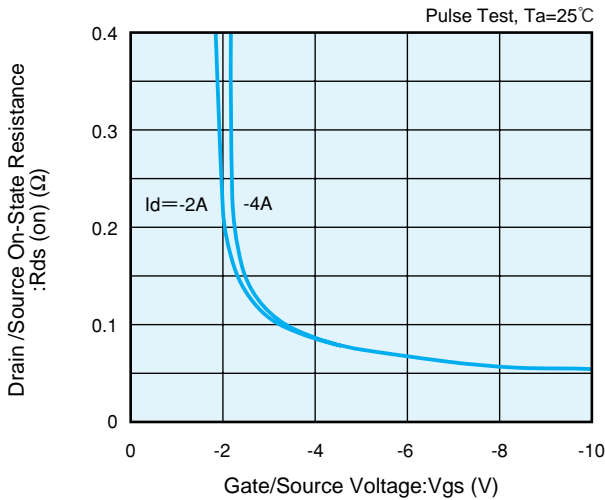
Drain Current vs. Drain /Source Voltage



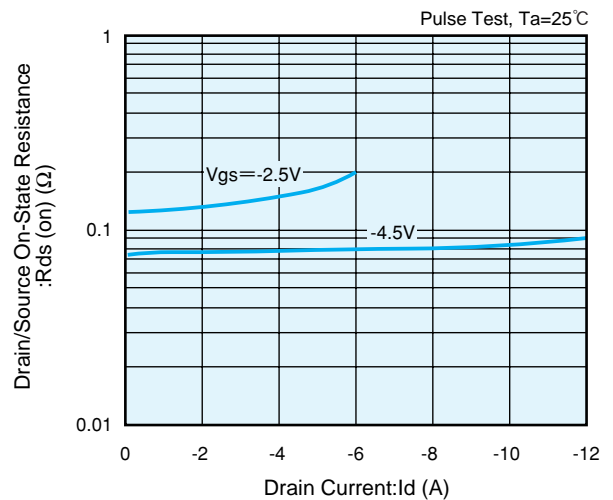
Drain Current vs. Gate/Source Voltage



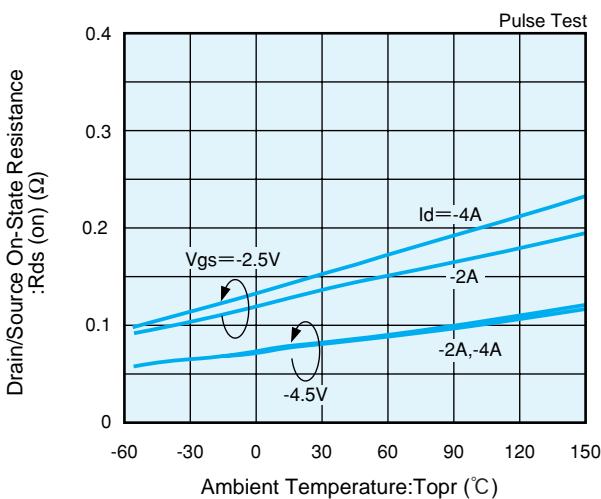
Drain/Source On-State Resistance vs. Gate/Source Voltage



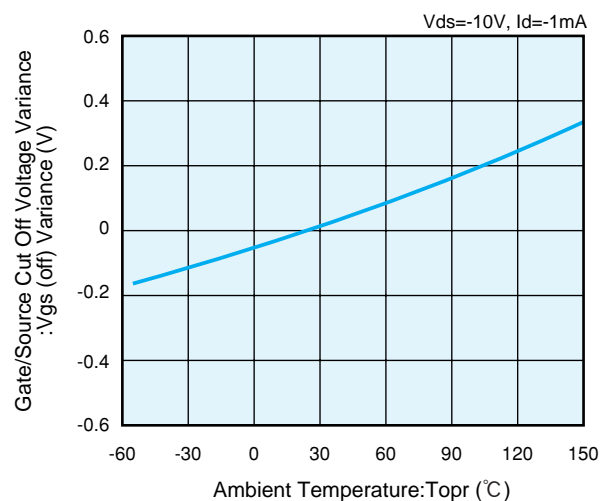
Drain/Source On-State Resistance vs. Drain Current



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

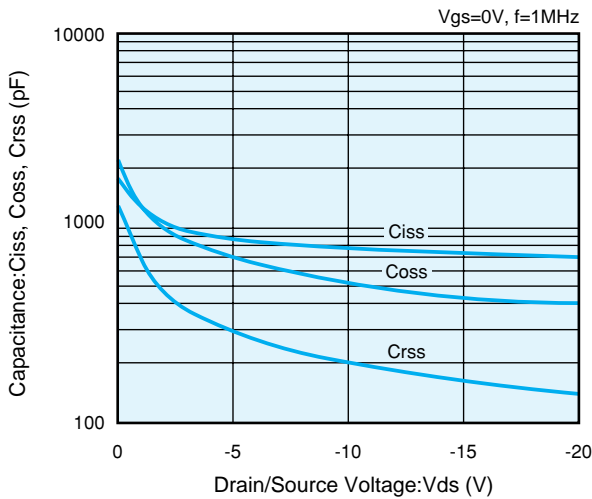


Gate/Source Cut Off Voltage Variance vs. Ambient Temp.

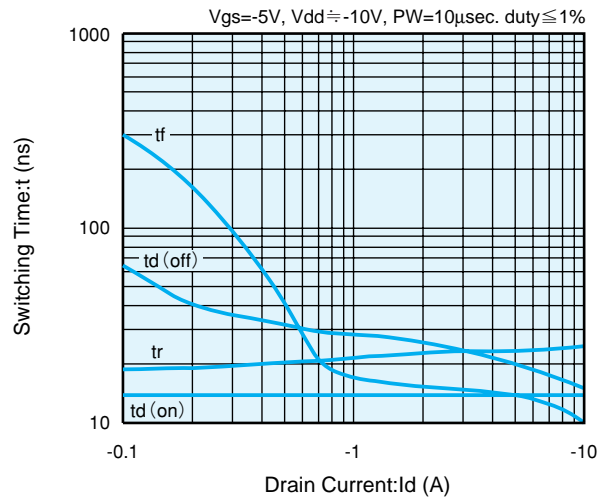


### Electrical Characteristics

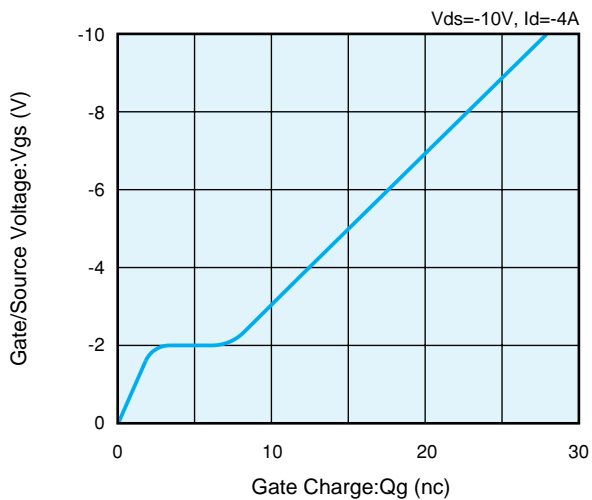
Drain/Source Voltage vs. Capacitance



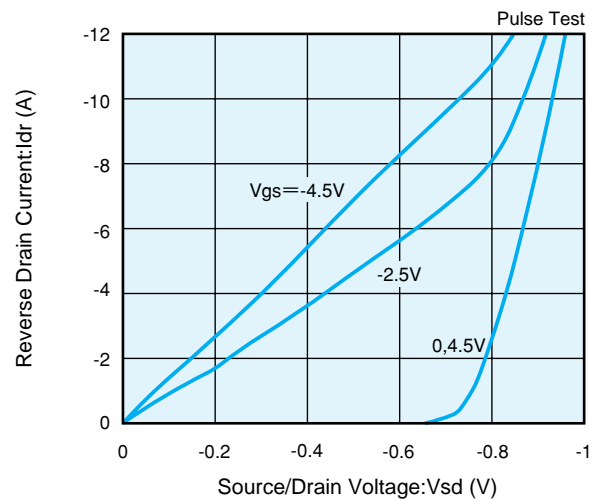
Switching Time vs. Drain Current



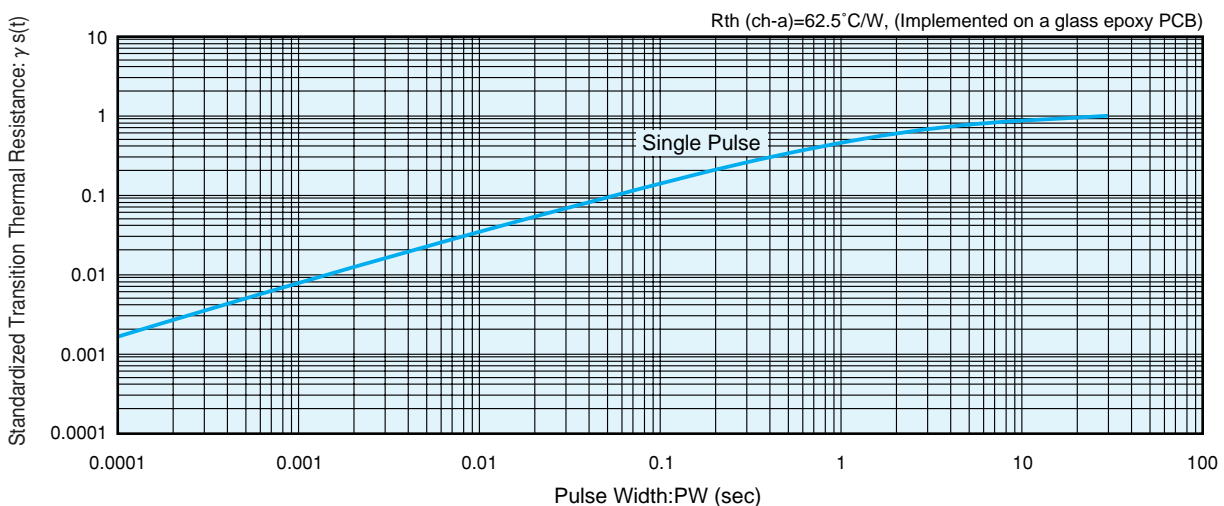
Gate/Source Voltage vs. Gate Charge



Reverse Drain Current vs. Source/Drain Voltage



Standardized Transition Thermal Resistance vs. Pulse Width



- ◆ P-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance:  $0.11\Omega$  MAX
- ◆ Ultra High-Speed Switching
- ◆ SOP-8 Package
- ◆ Two FET Devices built-in

### General Description

The XP134A11A1SR is a 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
- Li-ion battery systems

### Features

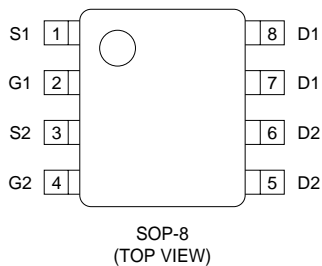
**Low on-state resistance:**  $R_{ds(on)}=0.065\Omega(V_{gs}=-10V)$   
 $R_{ds(on)}=0.11\Omega(V_{gs}=-4.5V)$

**Ultra high-speed switching**

**Operational Voltage:** -4.5V

**High density mounting:** SOP-8

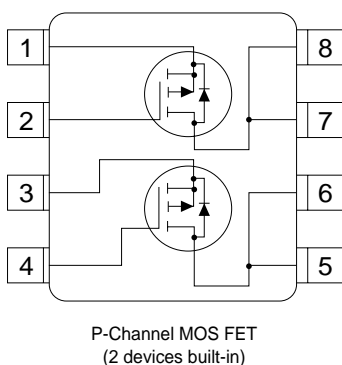
### Pin Configuration



### Pin Assignment

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

### Equivalent Circuit



### 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
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=-30V, Vgs=0V			-10	μA
Gate-Source Leakage 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 (note)	Rds(on)	Id=-2A, Vgs=-10V		0.055	0.065	Ω
		Id=-2A, Vgs=-4.5V		0.09	0.11	Ω
Forward Transfer Admittance (note)	Yfs	Id=-2A, Vds=-10V		5		S
Body Drain Diode Forward Voltage	Vf	If=-4A, 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		680		pF
Output Capacitance	Coss			450		pF
Feedback Capacitance	Crss			170		pF

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#### Switching characteristics

Ta=25°C

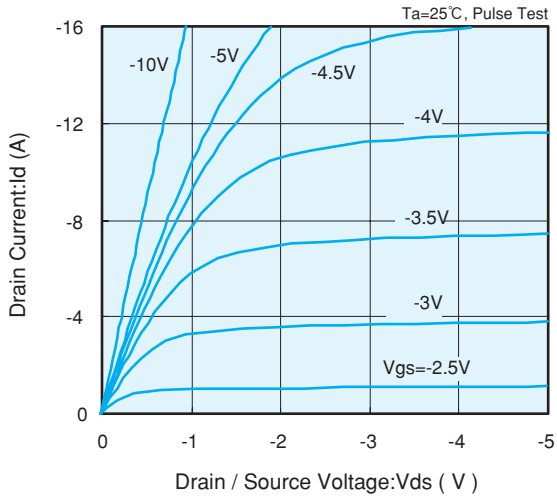
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Turn-on Delay Time	td (on)	Vgs=-5V, Id=-2A Vdd=-10V		15		ns	
Rise Time	tr			20		ns	
Turn-off Delay Time	td (off)				30		ns
Fall Time	tf				20		ns

#### Thermal characteristics

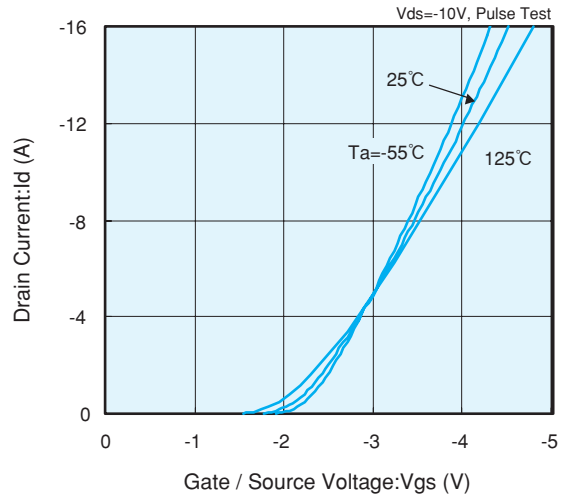
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Thermal Resistance (channel-surroundings)	Rth (ch-a)	Implement on a glass epoxy resin PCB		62.5		°C/W

## Electrical Characteristics

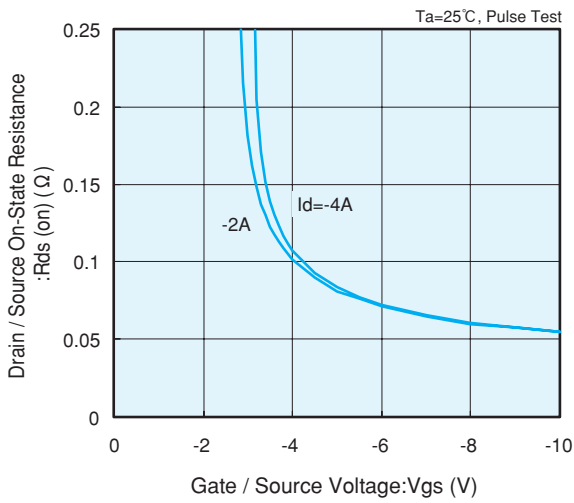
Drain Current Vs. Drain / Source Voltage



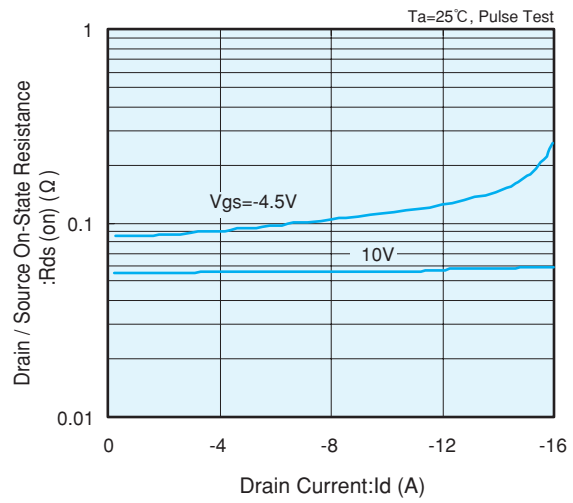
Drain Current Vs. Gate / Source Voltage



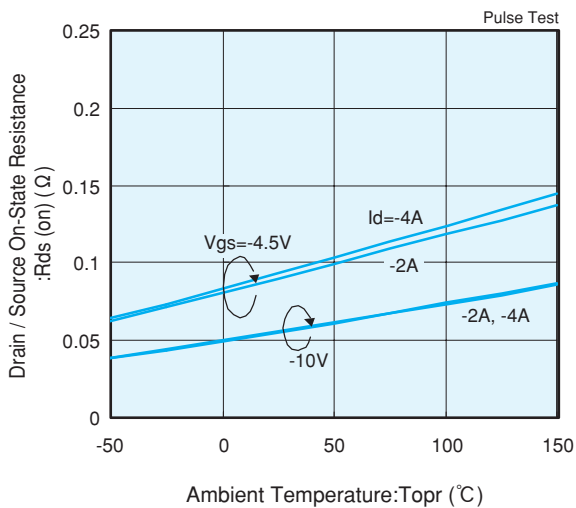
Drain / Source On-State Resistance Vs. Gate / Source Voltage



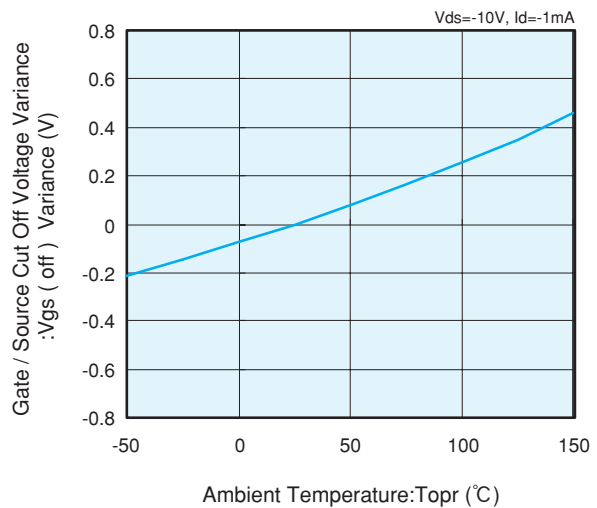
Drain / Source On-State Resistance Vs. Drain Current



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

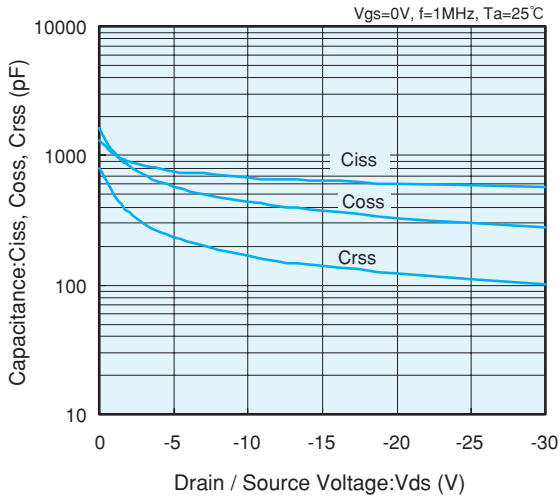


Gate / Source Cut Off Voltage Variance Vs. Ambient Temp.

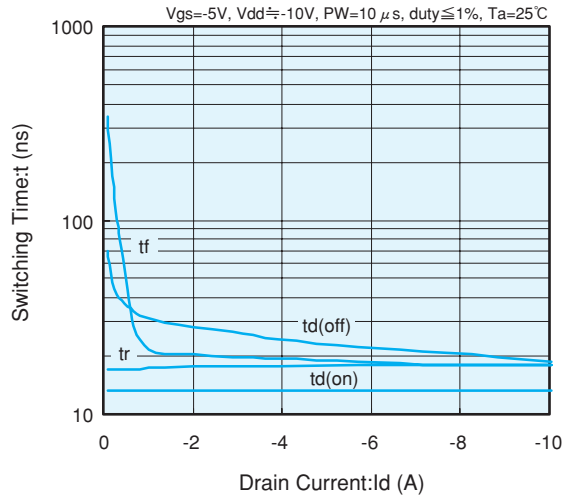


### Electrical Characteristics

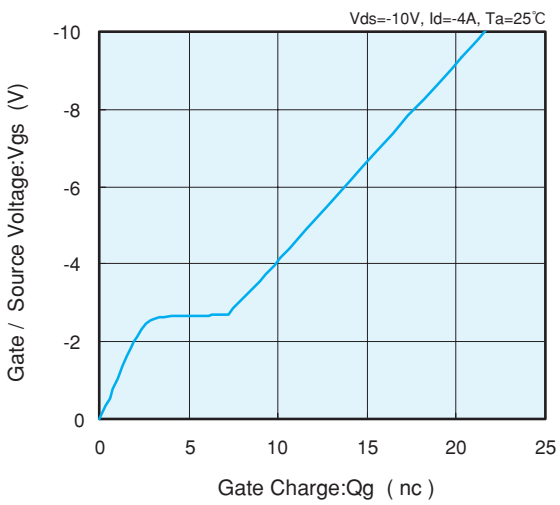
Drain / Source Voltage Vs. Capacitance



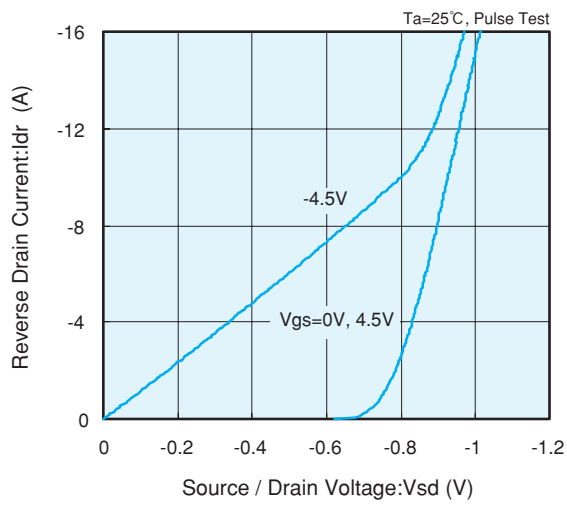
Switching Time Vs. Drain Current



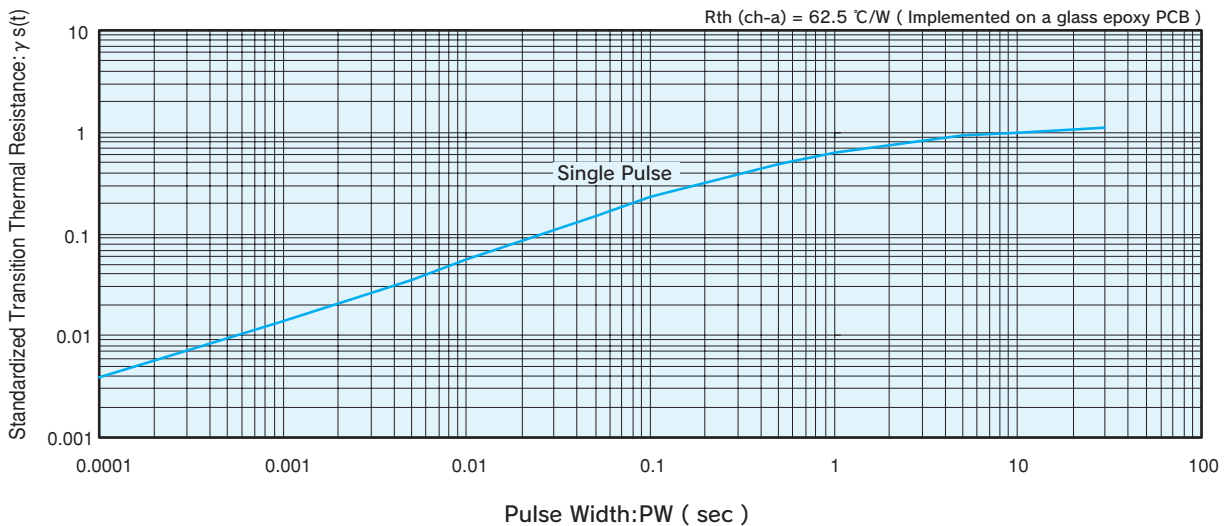
Gate / Source Voltage Vs. Gate Charge



Reverse Drain Current Vs. Source / Drain Voltage



Standardized Transition Thermal Resistance Vs. Pulse Width





# XP134A1275SR

## Power MOS FET

- ◆ P-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance :  $0.075\Omega$  (max)
- ◆ Ultra High-Speed Switching
- ◆ SOP - 8 Package
- ◆ 2 FET Devices Built-in

### Applications

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

### General Description

The XP134A1275SR is a 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.

### Features

**Low on-state resistance** :  $R_{ds(on)} = 0.075\Omega$  (  $V_{gs} = -4.5V$  )

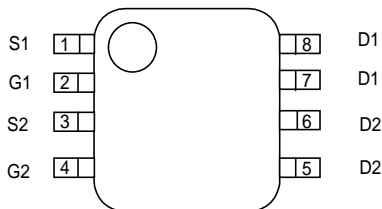
$R_{ds(on)} = 0.115\Omega$  (  $V_{gs} = -2.5V$  )

**Ultra high-speed switching**

**Operational Voltage** :  $-2.5V$

**High density mounting** : SOP - 8

### Pin Configuration

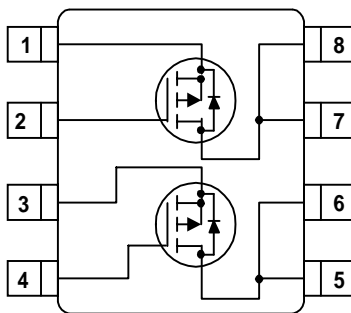


SOP - 8 Top View

### Pin Assignment

PIN NUMBER	PIN NAME	FUNCTION
1	S1	Source
2	G1	Gate
3	S2	Source
4	G2	Gate
5 - 6	D2	Drain
7 - 8	D1	Drain

### Equivalent Circuit



P - Channel MOS FET  
( 2 devices built-in )

### Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	Ta=25°C
			UNITS
Drain - Source Voltage	V <sub>dss</sub>	- 20	V
Gate - Source Voltage	V <sub>gss</sub>	± 12	V
Drain Current (DC)	I <sub>d</sub>	- 4.5	A
Drain Current (Pulse)	I <sub>dp</sub>	- 18	A
Reverse Drain Current	I <sub>dr</sub>	- 4.5	A
Continuous Channel Power Dissipation (note)	P <sub>d</sub>	2	W
Channel Temperature	T <sub>ch</sub>	150	°C
Storage Temperature	T <sub>stg</sub>	- 55 to 150	°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 = - 20 , Vgs = 0V			- 10	μA
Gate-Source Leakage Current	Igss	Vgs = ± 12 , Vds = 0V			± 1	μA
Gate-Source Cut-off Voltage	Vgs ( off )	Id = -1mA , Vds = - 10V	- 0.5		- 1.2	V
Drain-Source On-state Resistance ( note )	Rds ( on )	Id = - 2.5A , Vgs = - 4.5V		0.062	0.075	Ω
		Id = - 2.5A , Vgs = - 2.5V		0.095	0.115	Ω
Forward Transfer Admittance ( note )	Yfs	Id = - 2.5A , Vds = - 10V		7.5		S
Body Drain Diode Forward Voltage	Vf	If = - 4.5A , 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 = 1 MHz		770		pF
Output Capacitance	Coss			440		pF
Feedback Capacitance	Crss			190		pF

#### Switching characteristics

Ta=25°C

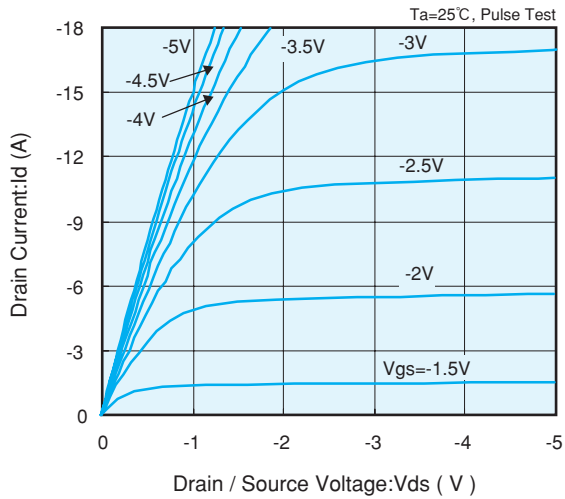
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Turn-on Delay Time	td ( on )	Vgs = - 5V , Id = - 2.5A Vdd = - 10V		15		ns
Rise Time	tr			20		ns
Turn-off Delay Time	td ( off )			55		ns
Fall Time	tf			30		ns

#### Thermal characteristics

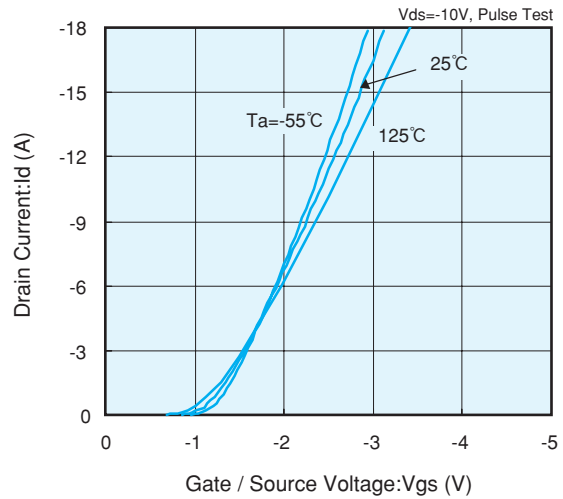
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Thermal Resistance ( channel - surroundings )	Rth ( ch - a )	Implement on a glass epoxy resin PCB		62.5		°C / W

## Electrical Characteristics

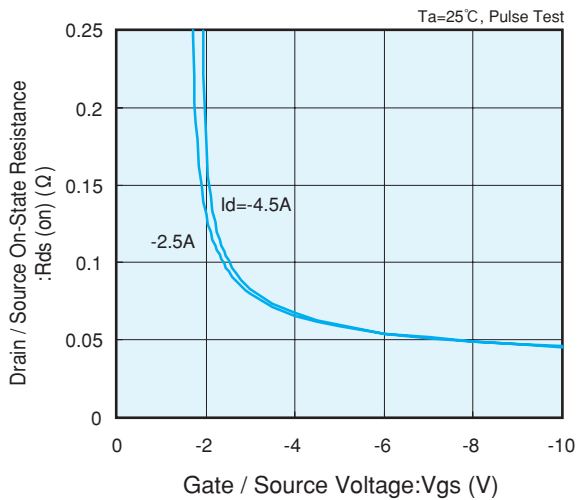
Drain Current Vs. Drain / Source Voltage



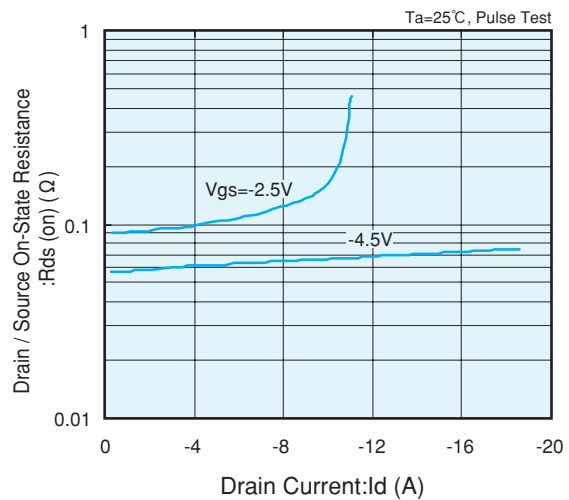
Drain Current Vs. Gate / Source Voltage



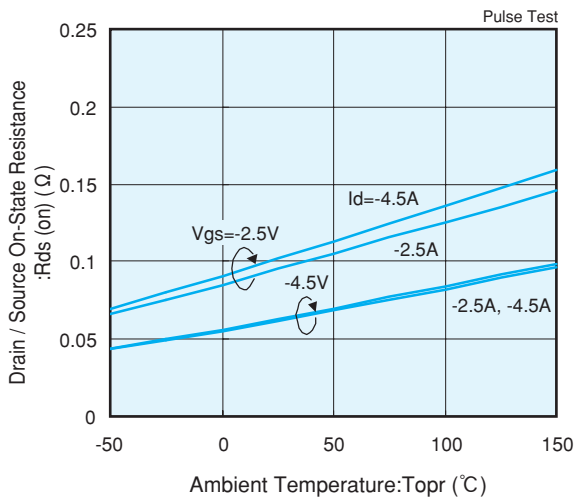
Drain / Source On-State Resistance Vs. Gate / Source Voltage



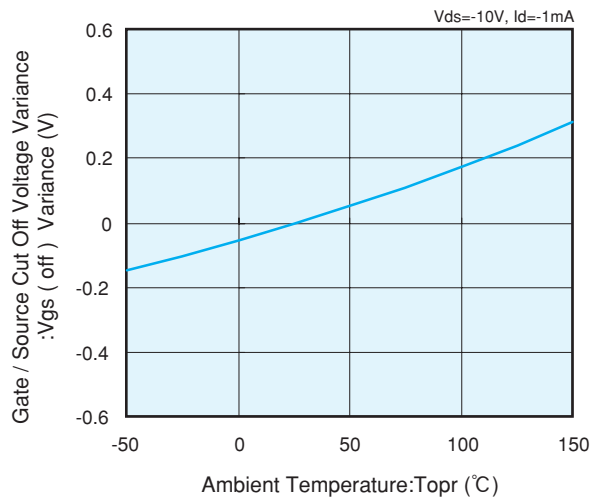
Drain / Source On-State Resistance Vs. Drain Current



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

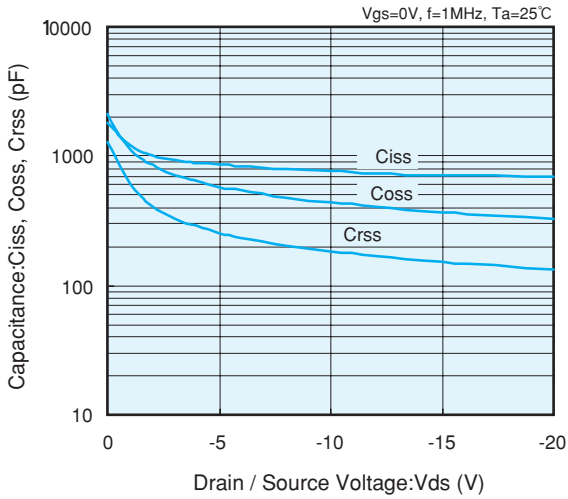


Gate / Source Cut Off Voltage Variance Vs. Ambient Temp.

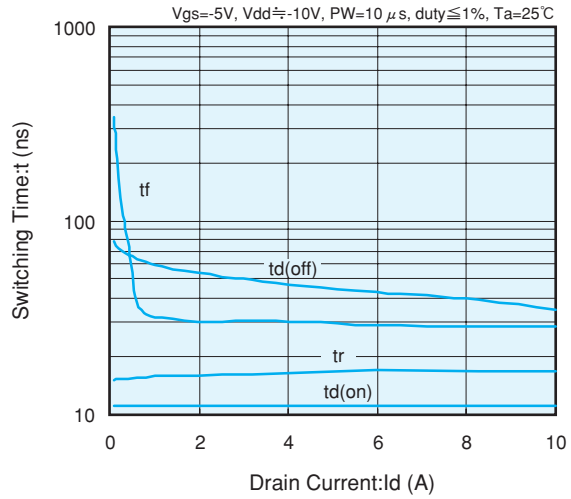


### Electrical Characteristics

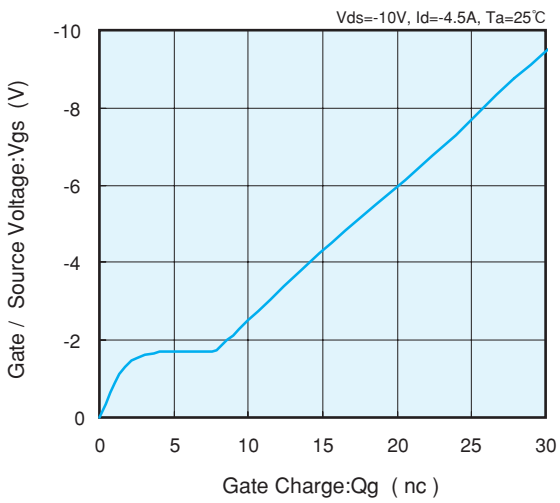
Drain / Source Voltage Vs. Capacitance



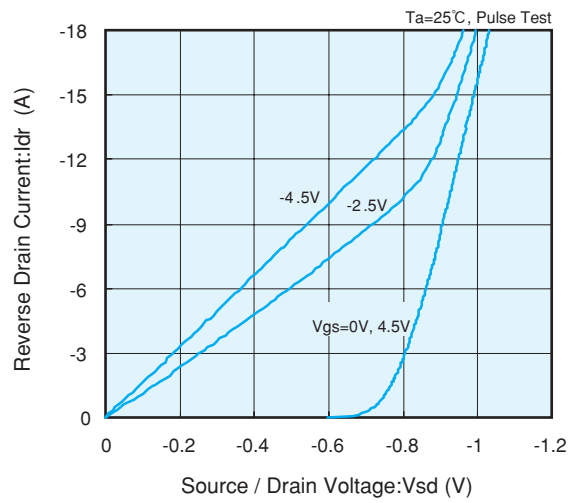
Switching Time Vs. Drain Current



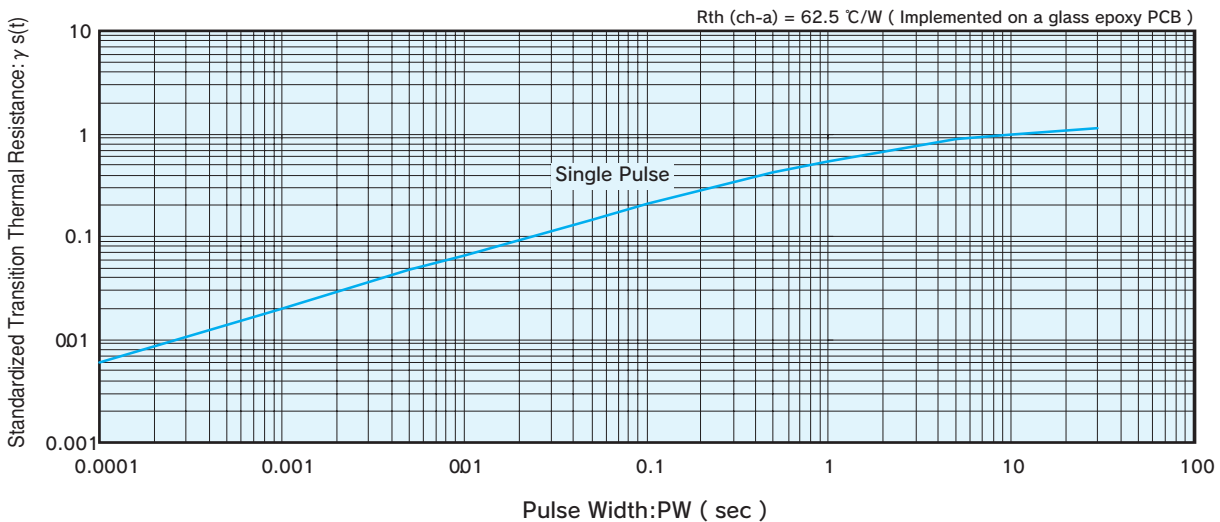
Gate / Source Voltage Vs. Gate Charge



Reverse Drain Current Vs. Source / Drain Voltage



Standardized Transition Thermal Resistance Vs. Pulse Width



# XP135A1145SR

## Power MOS FET

- ◆ N-Channel/P-Channel Power MOS FET
- ◆ DMOS Structure
- ◆ Low On-State Resistance : 0.045Ω max (Nch)  
0.110Ω max (Pch)
- ◆ Ultra High-Speed Switching
- ◆ SOP - 8 Package
- ◆ Two FET Devices Built-in

### General Description

The XP135A1145SR is a 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) :

$$R_{ds(on)} = 0.033\Omega \quad (V_{gs} = 10V)$$

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

#### Low on-state resistance (Pch) :

$$R_{ds(on)} = 0.065\Omega \quad (V_{gs} = -10V)$$

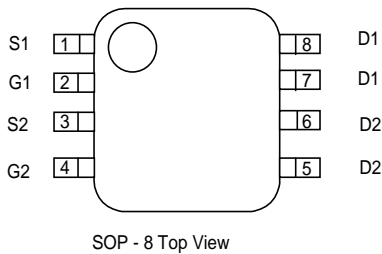
$$R_{ds(on)} = 0.110\Omega \quad (V_{gs} = -4.5V)$$

#### Ultra high-speed switching

**Operational Voltage** : 4.5V (Nch) : -4.5V (Pch)

**High density mounting** : SOP - 8

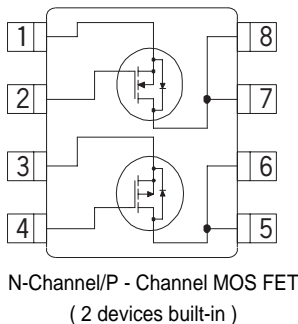
### Pin Configuration



### 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



### Absolute Maximum Ratings

Ta=25°C

PARAMETER	SYMBOL	RATINGS		UNITS
		Nch	Pch	
Drain - Source Voltage	V <sub>dss</sub>	30	- 30	V
Gate - Source Voltage	V <sub>gss</sub>	±20	±20	V
Drain Current (DC)	I <sub>d</sub>	6	- 4	A
Drain Current (Pulse)	I <sub>dp</sub>	20	- 16	A
Reverse Drain Current	I <sub>dr</sub>	6	- 4	A
Continuous Channel Power Dissipation (note)	P <sub>d</sub>	2		W
Channel Temperature	T <sub>ch</sub>	150		°C
Storage Temperature	T <sub>stg</sub>	- 55 to 150		°C

( note ) : When implemented on a glass epoxy PCB

### Electrical Characteristics

#### DC characteristics (P-Channel Power MOS FET)

Ta=25°C

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Drain Cut-off Current	Idss	Vds = - 30 , Vgs = 0V			- 10	μA
Gate-Source Leakage Current	Igss	Vgs = ± 20 , Vds = 0V			± 1	μA
Gate-Source Cut-off Voltage	Vgs ( off )	Id = -1mA , Vds = -10V	- 1		- 2.5	V
Drain-Source On-state Resistance ( note )	Rds ( on )	Id = - 2A , Vgs = -10V		0.055	0.065	Ω
		Id = - 2A , Vgs = - 4.5V		0.09	0.11	Ω
Forward Transfer Admittance ( note )	Yfs	Id = - 2A , Vds = - 10V		5		S
Body Drain Diode Forward Voltage	Vf	If = - 4A , 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 = 1 MHz		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 - surroundings )	Rth ( ch - a )	Implement on a glass epoxy resin PCB		62.5		°C / W

## ■ Electrical Characteristics

### DC characteristics (N-Channel Power MOS FET)

Ta=25°C

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

### Switching characteristics

Ta=25°C

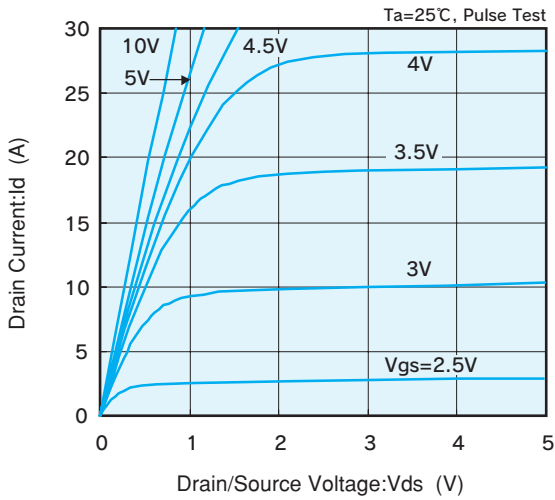
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Turn-on Delay Time	td ( on )	Vgs = 5V , Id = 3A Vdd = 10V		15		ns
Rise Time	tr			20		ns
Turn-off Delay Time	td ( off )			30		ns
Fall Time	tf			10		ns

### Thermal characteristics

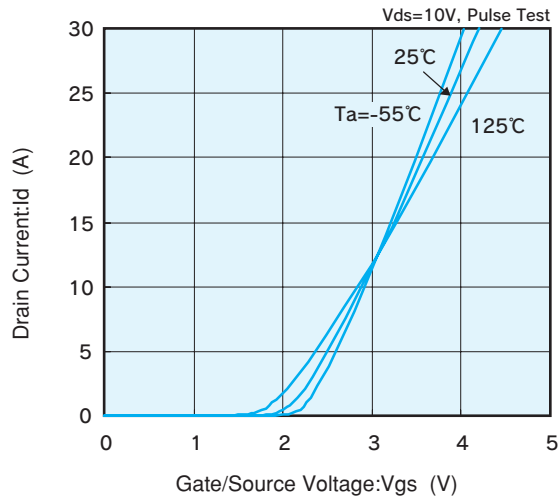
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS
Thermal Resistance ( channel - surroundings )	Rth ( ch - a )	Implement on a glass epoxy resin PCB		62.5		°C / W

### Electrical Characteristics (N-channel Power MOS FET)

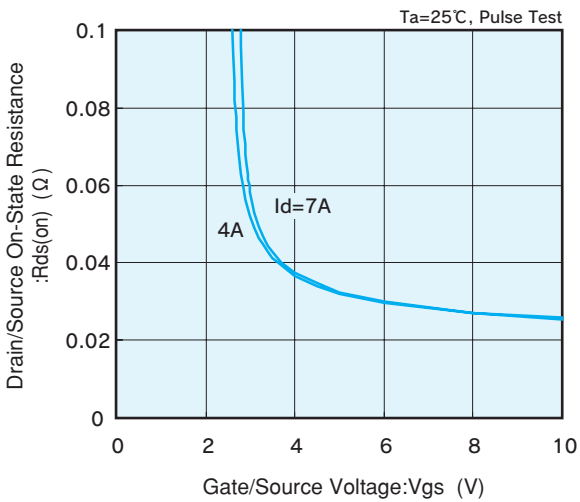
Drain Current vs. Drain/Source Voltage



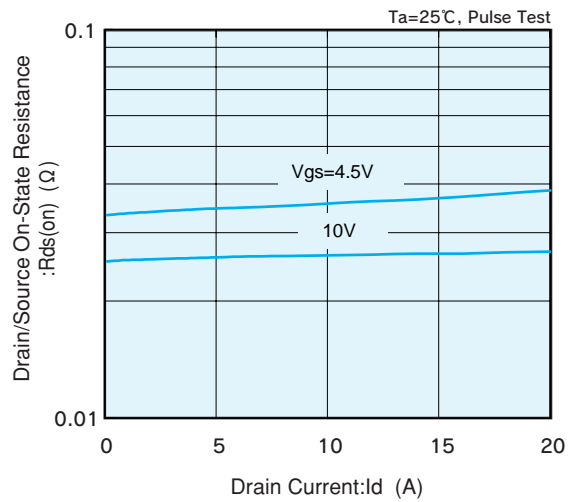
Drain Current vs. Gate/Source Voltage



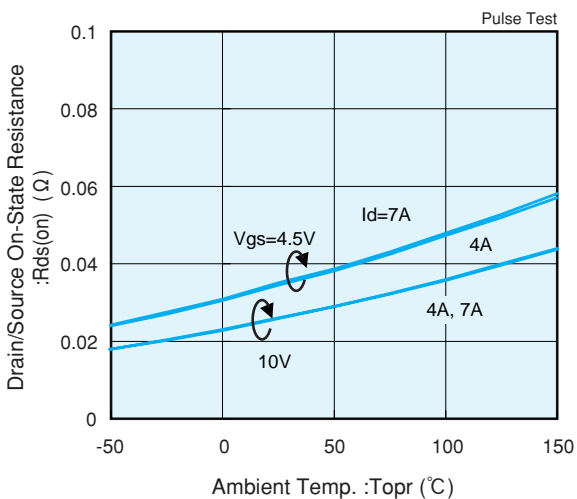
Drain/Source On-State Resistance vs. Gate/Source Voltage



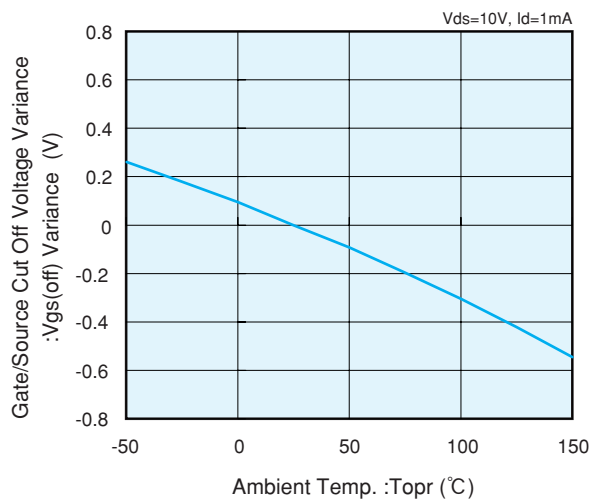
Drain/Source On-State Resistance vs. Drain Current



Drain/Source On-State Resistance vs. Ambient Temp



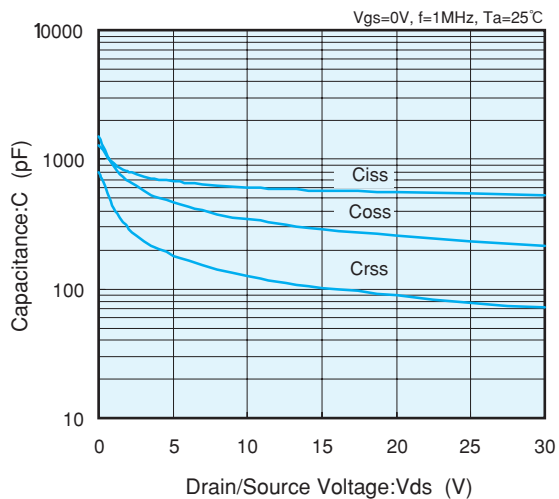
Gate/Source Cut Off Voltage Variance vs. Ambient Temp.



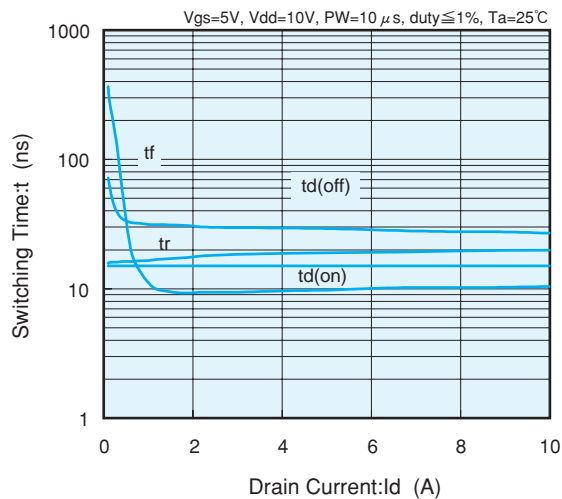


## Electrical Characteristics (N-channel Power MOS FET)

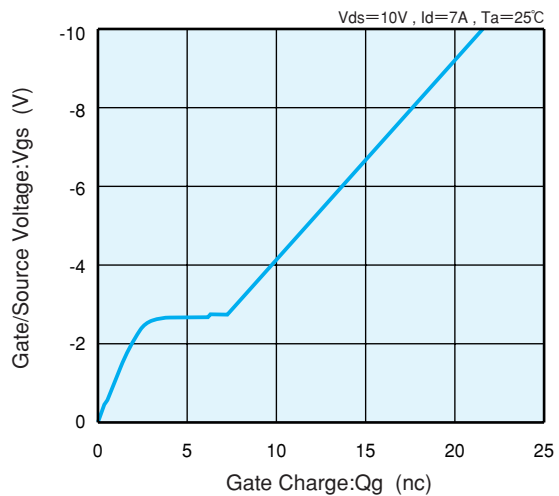
Capacitance vs. Drain/Source Voltage



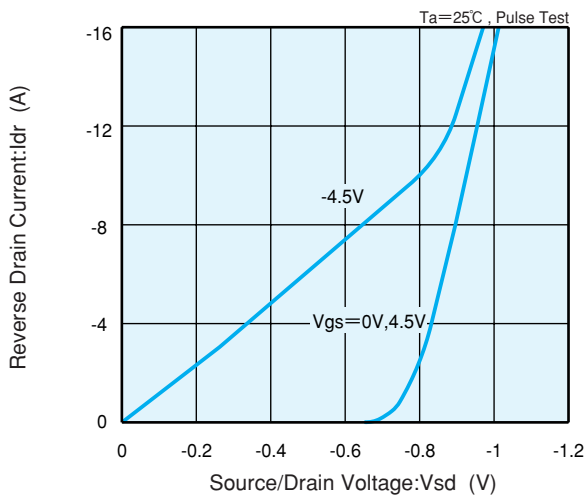
Switching Time vs. Drain Current



Gate/Source Voltage vs. Gate Charge



Reverse Drain Current vs. Source/Drain Voltage



Standardized Transition Thermal Resistance vs. Pulse Width

