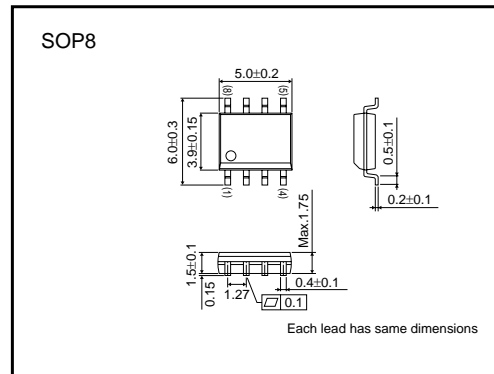Transistors

Switching

SP8M3

● **Features**

1) Low on-resistance.

2) Built-in G-S Protection Diode.

3) Small and Surface Mount Package (SOP8).

● **Application**

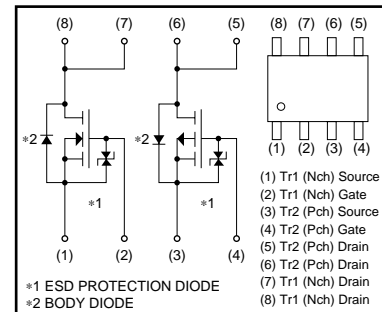Power switching, DC / DC converter.

● **External dimensions** (Unit : mm)

SOP8

5.0±0.2
6.0±0.3
3.9±0.15
0.5±0.1
0.2±0.1
Max.1.75
1.5±0.1
0.15
1.27
0.4±0.1
0.1

Each lead has same dimensions

● **Absolute maximum ratings** (Ta=25°C)

Parameter		Symbol	Limits		Unit
			Nchannel	Pchannel	
Drain-source voltage		V_{DSS}	30	−30	V
Gate-source voltage		V_{GSS}	20	−20	V
Drain current	Continuous	I_D	±5.0	±4.5	A
	Pulsed	I_{DP}	±20	±18	A *1
Source current (Body diode)	Continuous	I_S	1.6	−1.6	A
	Pulsed	I_{SP}	20	−18	A *1
Total power dissipation		P_D	2		W *2
Channel temperature		Tch	150		°C
Storage temperature		Tstg	−55 to +150		°C

*1 Pw≤10μs, Duty cycle≤1%
*2 MOUNTED ON A CERAMIC BOARD.

● **Equivalent circuit**

(8) (7) (6) (5)   (8) (7) (6) (5)

*2   *2

*1   *1

(1) (2) (3) (4)   (1) (2) (3) (4)

(1) Tr1 (Nch) Source
(2) Tr1 (Nch) Gate
(3) Tr2 (Pch) Source
(4) Tr2 (Pch) Gate
(5) Tr2 (Pch) Drain
(6) Tr2 (Pch) Drain
(7) Tr1 (Nch) Drain
(8) Tr1 (Nch) Drain

*1 ESD PROTECTION DIODE
*2 BODY DIODE

*A protection diode is included between the gate and the source terminals to protect the diode against static electricity when the product is in use. Use the protection circuit when the fixed voltages are exceeded.

● **Thermal resistance** (Ta=25°C)

Parameter	Symbol	Limits	Unit
Channel to ambient	Rth (ch-a)	62.5	°C / W *

*MOUNTED ON A CERAMIC BOARD.

ROHM

Transistors

N-ch

●**Electrical characteristics** (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Gate-source leakage	I_{GSS}	–	–	10	μA	V_{GS}=20V, V_{DS}=0V	
Drain-source breakdown voltage	$V_{(BR)DSS}$	30	–	–	V	I_D=1mA, V_{GS}=0V	
Zero gate voltage drain current	I_{DSS}	–	–	1	μA	V_{DS}=30V, V_{GS}=0V	
Gate threshold voltage	$V_{GS(th)}$	1.0	–	2.5	V	V_{DS}=10V, I_D=1mA	
Static drain-source on-state resistance	$R_{DS(on)}$	–	36	51	mΩ	I_D=5.0A, V_{GS}=10V	*
		–	52	73		I_D=5.0A, V_{GS}=4.5V	*
		–	58	82		I_D=5.0A, V_{GS}=4V	*
Forward transfer admittance	$|Y_{fs}|$	3.0	–	–	S	I_D=5.0A, V_{DS}=10V	*
Input capacitance	C_{iss}	–	230	–	pF	V_{DS}=10V	
Output capacitance	C_{oss}	–	80	–	pF	V_{GS}=0V	
Reverse transfer capacitance	C_{rss}	–	50	–	pF	f=1MHz	
Turn-on delay time	$t_{d(on)}$	–	6	–	ns	I_D=2.5A, $V_{DD}≒$15V	*
Rise time	t_r	–	8	–	ns	V_{GS}=10V	*
Turn-off delay time	$t_{d(off)}$	–	22	–	ns	R_L=6.0Ω	*
Fall time	t_f	–	5	–	ns	R_G=10Ω	*
Total gate charge	Q_g	–	3.9	5.5	nC	$V_{DD}≒$15V	*
Gate-source charge	Q_{gs}	–	1.1	–	nC	V_{GS}=5V	*
Gate-drain charge	Q_{gd}	–	1.4	–	nC	I_D=5.0A	*

∗Pulsed

●**Body diode characteristics (Source-Drain Characteristics)** (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Forward voltage	V_{SD}	–	–	1.2	V	I_S=6.4A, V_{GS}=0V	*

∗Pulsed

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Transistors

P-ch

● **Electrical characteristics** (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Gate-source leakage	I_{GSS}	–	–	–10	µA	V_{GS}= –20V, V_{DS}=0V	
Drain-source breakdown voltage	$V_{(BR)DSS}$	–30	–	–	V	I_D= –1mA, V_{GS}=0V	
Zero gate voltage drain current	I_{DSS}	–	–	–1	µA	V_{DS}=–30V, V_{GS}=0V	
Gate threshold voltage	$V_{GS(th)}$	–1.0	–	–2.5	V	V_{DS}= –10V, I_D= –1mA	
Static drain-source on-state resistance	$R_{DS(on)}$	–	40	56	mΩ	I_D= –4.5A, V_{GS}= –10V	*
		–	57	80		I_D= –2.5A, V_{GS}= –4.5V	*
		–	65	90		I_D= –2.5A, V_{GS}= –4.0V	*
Forward transfer admittance	$|Y_{fs}|$	3.5	–	–	S	I_D= –2.5A, V_{DS}= –10V	*
Input capacitance	C_{iss}	–	850	–	pF	V_{DS}= –10V	
Output capacitance	C_{oss}	–	190	–	pF	V_{GS}=0V	
Reverse transfer capacitance	C_{rss}	–	120	–	pF	f=1MHz	
Turn-on delay time	$t_{d(on)}$	–	10	–	ns	I_D= –2.5A, V_{DD}≒ –15V	*
Rise time	t_r	–	25	–	ns	V_{GS}= –10V	*
Turn-off delay time	$t_{d(off)}$	–	60	–	ns	R_L=6.0Ω	*
Fall time	t_f	–	25	–	ns	R_G=10Ω	*
Total gate charge	Q_g	–	8.5	–	nC	V_{DD}≒ –15V	*
Gate-source charge	Q_{gs}	–	2.5	–	nC	V_{GS}= –5V	*
Gate-drain charge	Q_{gd}	–	3.0	–	nC	I_D= –4.5A	*

∗Pulsed

● **Body diode characteristics (Source-Drain Characteristics)** (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions	
Forward voltage	V_{SD}	–	–	–1.2	V	I_S= –1.6A, V_{GS}=0V	*

∗Pulsed

N-ch

●**Electrical characteristic curves**

Fig.1 Typical Capacitance
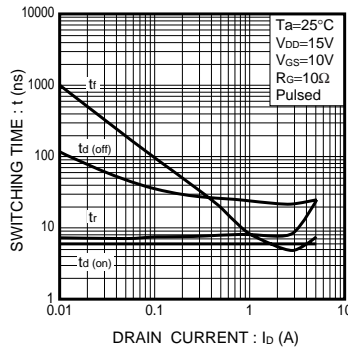vs. Drain-Source Voltage

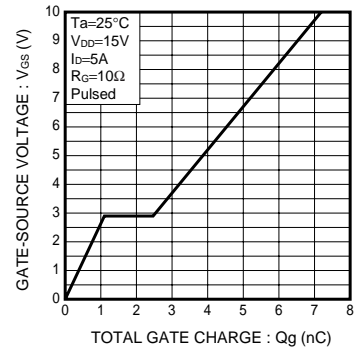Fig.2 Switching Characteristics
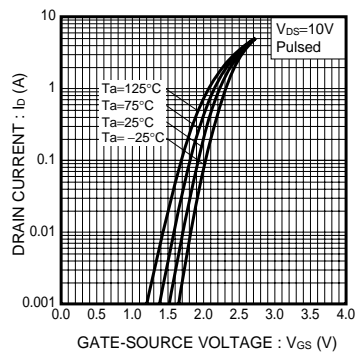

Fig.3 Dynamic Input Characteristics

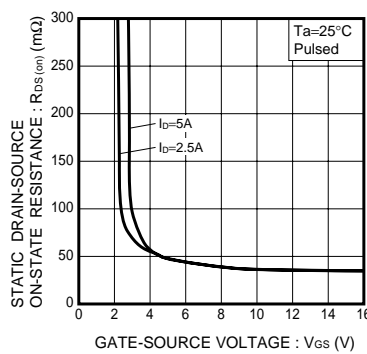Fig.4 Typical Transfer Characteristics

Fig.5 Static Drain-Source
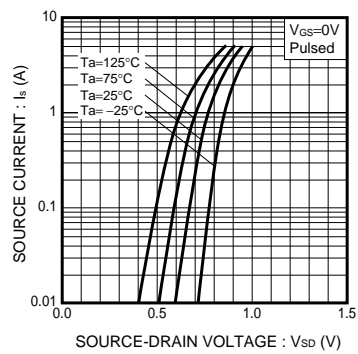On-State Resistance vs.
Gate-Source Voltage
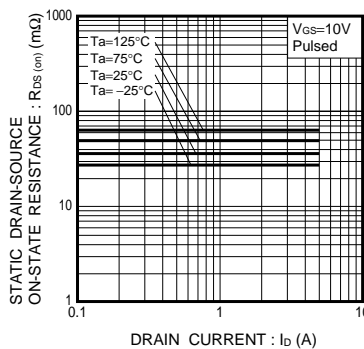

Fig.6 Source Current vs.
Source-Drain Voltage

Fig.7 Static Drain-Source
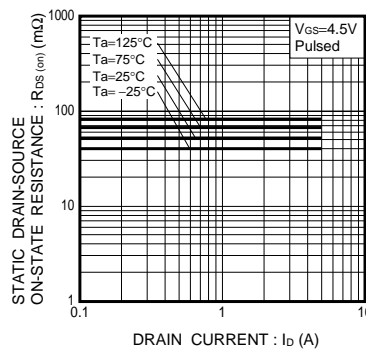On-State Resistance
vs. Drain Current (I)
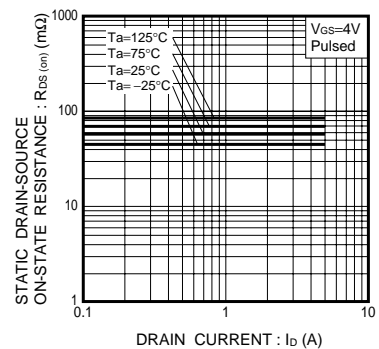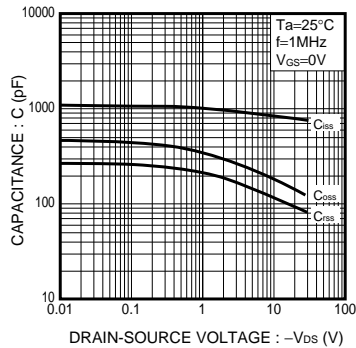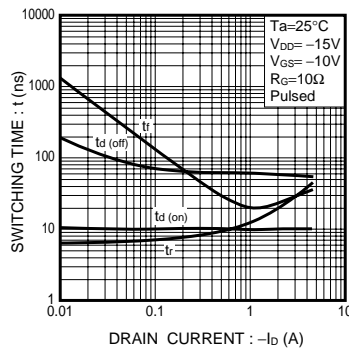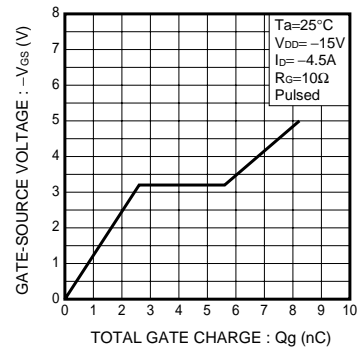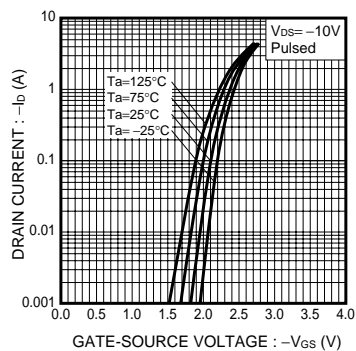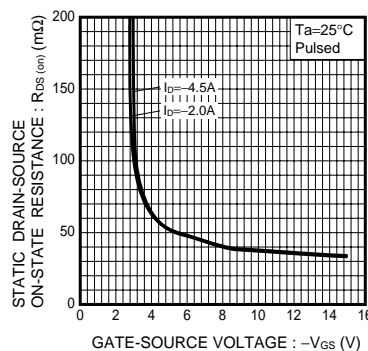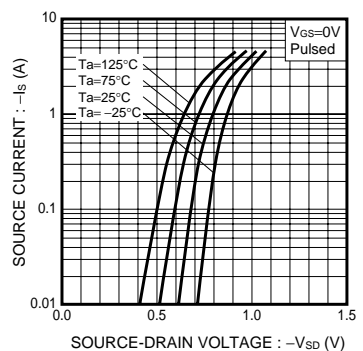

Fig.8 Static Drain-Source
On-State Resistance
vs. Drain Current (II)

Fig.9 Static Drain-Source
On-State Resistance
vs. Drain Current (III)

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●**Electrical characteristic curves**

Fig.1 Typical Capacitance
vs. Drain-Source Voltage

Fig.2 Switching Characteristics

Fig.3 Dynamic Input Characteristics

Fig.4 Typical Transfer Characteristics

Fig.5 Static Drain-Source
On-State Resistance vs.
Gate-Source Voltage

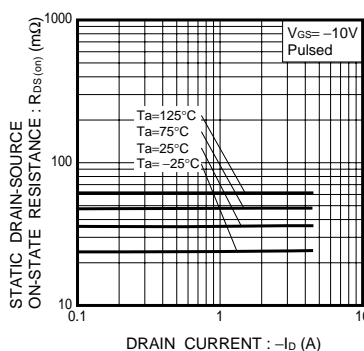Fig.6 Source Current vs.
Source-Drain Voltage

Fig.7 Static Drain-Source
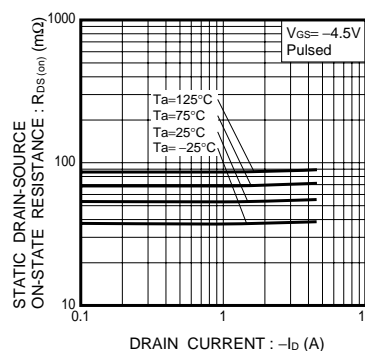On-State Resistance
vs. Drain Current (I)

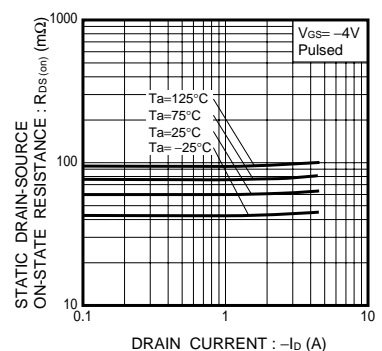Fig.8 Static Drain-Source
On-State Resistance
vs. Drain Current (II)

Fig.9 Static Drain-Source
On-State Resistance
vs. Drain Current (III)

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