

# Switching (30V, 7A)

## RDS070N03

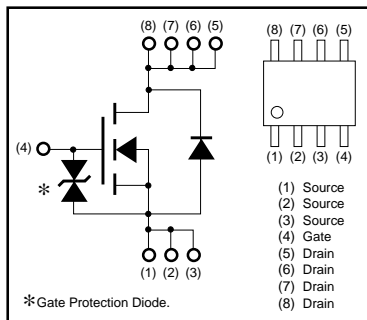
### ●Features

- 1) Low Qg.
- 2) Low on-resistance.
- 3) Excellent resistance to damage from static electricity.

### ●Structure

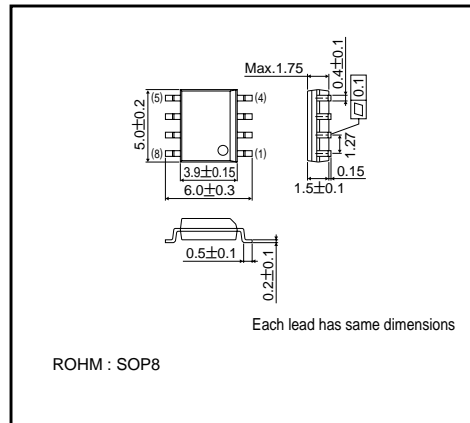
Silicon N-channel  
MOS FET

### ●Equivalent circuit



\* 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 a protection circuit when the fixed voltage are exceeded.

### ●External dimensions (Units : mm)



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

Parameter	Symbol	Limits	Unit	
Drain-Source Voltage	$V_{DSS}$	30	V	
Gate-Source Voltage	$V_{GSS}$	±20	V	
Drain Current	Continuous	$I_D$	7	A
	Pulsed	$I_{DP}^*$	28	A
Reverse Drain Current	Continuous	$I_{DR}$	7	A
	Pulsed	$I_{DRP}^*$	28	A
Source Current (Body Diode)	Continuous	$I_S$	1.6	A
	Pulsed	$I_{SP}^*$	6.4	A
Total Power Dissipation (Tc=25°C)	$P_D$	2.5	W	
Channel Temperature	$T_{ch}$	150	°C	
Storage Temperature	$T_{stg}$	-55~+150	°C	

\* $P_w \leq 10 \mu s$ , Duty cycle  $\leq 1\%$

## Transistors

## ● Thermal resistance (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Channel to Ambient	Rth(ch-A)	62.5	°C/W

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Gate-Source Leakage	I <sub>GSS</sub>	–	–	±10	μA	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	30	–	–	V	I <sub>D</sub> =1mA, V <sub>GS</sub> =0V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	–	–	10	μA	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V
Gate Threshold Voltage	V <sub>GS(th)</sub>	1.0	–	2.5	V	V <sub>DS</sub> =10V, I <sub>D</sub> =1mA
Static Drain-Source On-State Resistance	R <sub>DS(on)</sub> *	–	23	–	mΩ	I <sub>D</sub> =7A, V <sub>GS</sub> =10V
		–	38	–		I <sub>D</sub> =7A, V <sub>GS</sub> =4.5V
		–	47	–		I <sub>D</sub> =7A, V <sub>GS</sub> =4.0V
Forward Transfer Admittance	I <sub>Yfs</sub> I*	5	–	–	S	I <sub>D</sub> =7A, V <sub>DS</sub> =10V
Input Capacitance	C <sub>iss</sub>	–	470	–	pF	V <sub>DS</sub> =10V
Output Capacitance	C <sub>oss</sub>	–	260	–	pF	V <sub>GS</sub> =0V
Reverse Transfer Capacitance	C <sub>rss</sub>	–	105	–	pF	f=1MHz
Turn-On Delay Time	t <sub>d(on)</sub> *	–	10	–	ns	I <sub>D</sub> =3.5A, V <sub>DD</sub> =15V
Rise Time	t <sub>r</sub> *	–	14	–	ns	V <sub>GS</sub> =10V
Turn-Off Delay Time	t <sub>d(off)</sub> *	–	35	–	ns	R <sub>L</sub> =4.3Ω
Fall Time	t <sub>f</sub> *	–	12	–	ns	R <sub>GS</sub> =10Ω
Total Gate Charge	Q <sub>g</sub> *	–	14	28	nC	V <sub>DD</sub> =15V
Gate-Source Charge	Q <sub>gs</sub> *	–	2	–	nC	V <sub>GS</sub> =10V
Gate-Drain Charge	Q <sub>gd</sub> *	–	4	–	nC	I <sub>D</sub> =7A

\*Pulsed

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Forward Voltage	V <sub>SD</sub> *	–	–	1.5	V	I <sub>S</sub> =6.4A, V <sub>GS</sub> =0V
Reverse Recovery Time	t <sub>rr</sub> *	–	46	–	ns	I <sub>DR</sub> =5.2A, V <sub>GS</sub> =0V
Reverse Recovery Charge	Q <sub>rr</sub> *	–	46	–	nC	di/dt=100A/μs

\*Pulsed

Transistors

● Electrical characteristic curves

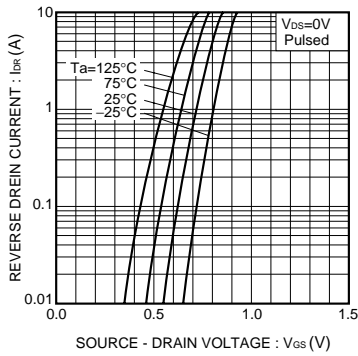


Fig.1 Reverse Drain Current vs. Source-Drain Voltage

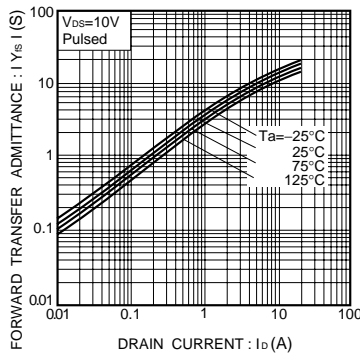


Fig.2 Forward Transfer Admittance vs. Drain Current

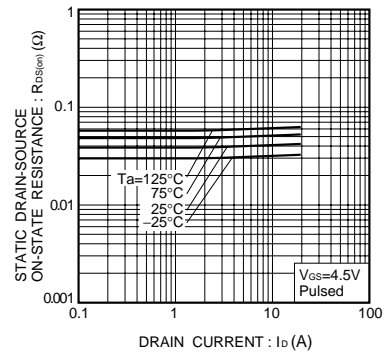


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (I)

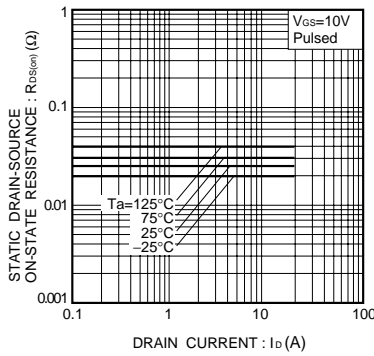


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (II)

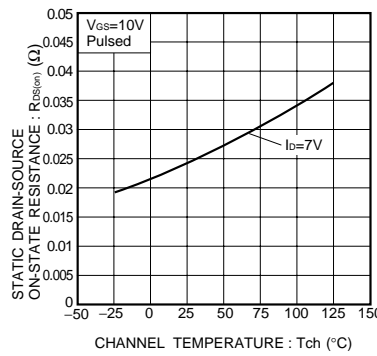


Fig.5 Static Drain-Source On-State Resistance vs. Channel Temperature

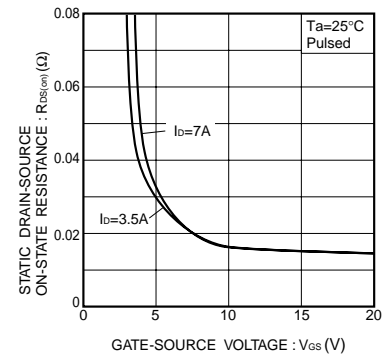


Fig.6 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

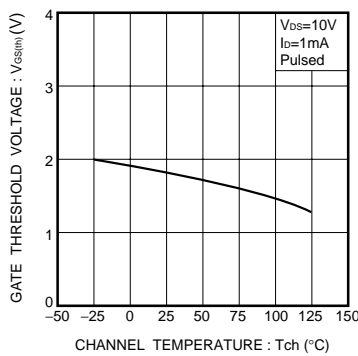


Fig.7 Gate Threshold Voltage vs. Channel Temperature

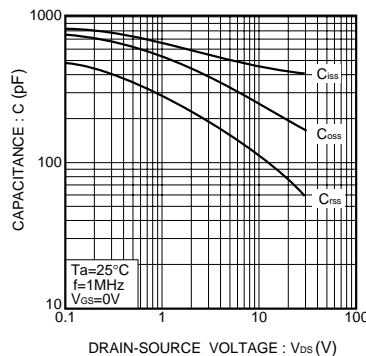


Fig.8 Typical Capacitance vs. Drain-Source Voltage

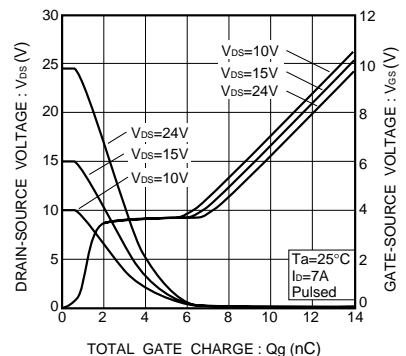


Fig.9 Dynamic Input Characteristics

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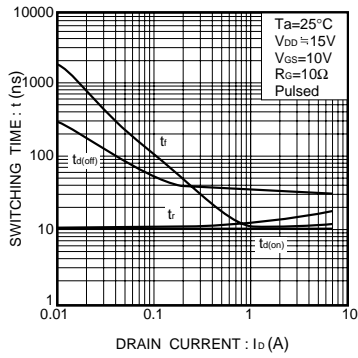


Fig.10 Switching Characteristics

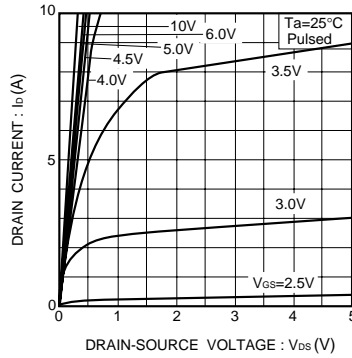


Fig.11 Typical Output Characteristics

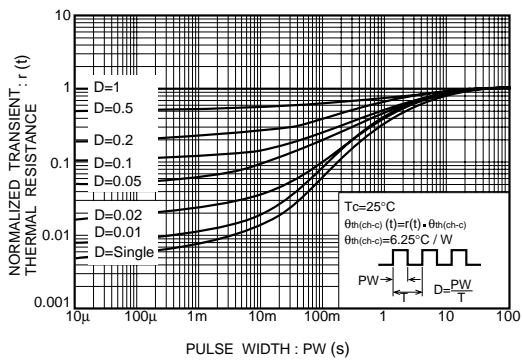


Fig.12 Normalized Transient Thermal Resistance vs. Pulse Width