

Transistor

# 4V Drive Nch+Nch MOSFET

## SP8K24

**●Structure**

Silicon N-channel  
MOSFET

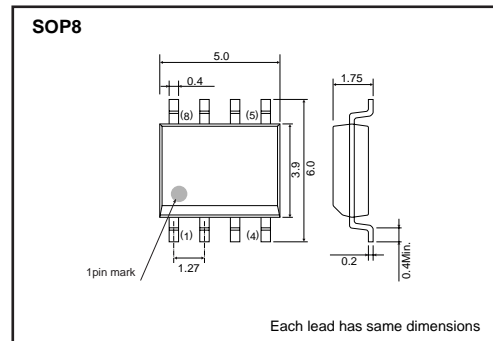
**●Features**

- 1) Built-in G-S Protection Diode.
- 2) Small and Surface Mount Package (SOP8).

**●Applications**

Power switching , DC / DC converter , Inverter

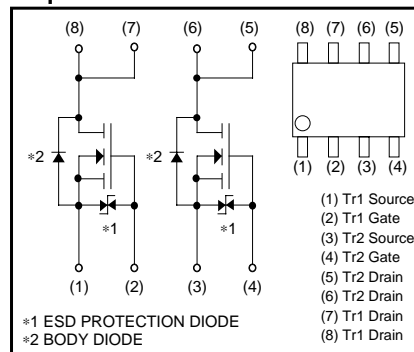
**●Dimensions (Unit : mm)**



**●Packaging dimensions**

Type	Package	Taping
	Code	TB
	Basic ordering unit (pieces)	2500
SP8K24		○

**●Equivalent circuit**



\*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.

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

<It is the same ratings for the Tr1 and Tr2.>

Parameter	Symbol	Limits	Unit
Drain-source voltage	$V_{DSS}$	45	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	Continuous	$I_D$	$\pm 6.0$ A
	Pulsed	$I_{DP}$ *1	$\pm 24$ A
Source current (Body diode)	Continuous	$I_S$	1 A
	Pulsed	$I_{SP}$ *1	24 A
Total power dissipation	$P_D$ *2	2	W / TOTAL
		1.4	W / ELEMENT
Channel temperature	$T_{ch}$	150	°C
Range of Storage temperature	$T_{stg}$	-55 to +150	°C

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

\*2 Mounted on a ceramic board

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

&lt;It is the same characteristics for the Tr1 and Tr2.&gt;

Parameter	Symbol	Min.	Typ.	Max.	Unit	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>	45	–	–	V	I <sub>D</sub> = 1mA, V <sub>GS</sub> =0V
Zero gate voltage drain current	I <sub>DSS</sub>	–	–	1	μA	V <sub>DS</sub> = 45V, 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> *	–	18	25	mΩ	I <sub>D</sub> = 6.0A, V <sub>GS</sub> = 10V
		–	24	34	mΩ	I <sub>D</sub> = 6.0A, V <sub>GS</sub> = 4.5V
		–	26	37	mΩ	I <sub>D</sub> = 6.0A, V <sub>GS</sub> = 4.0V
Forward transfer admittance	Y <sub>fs</sub>   *	6.0	–	–	S	V <sub>DS</sub> = 10V, I <sub>D</sub> = 6.0A
Input capacitance	C <sub>iss</sub>	–	1400	–	pF	V <sub>DS</sub> = 10V
Output capacitance	C <sub>oss</sub>	–	310	–	pF	V <sub>GS</sub> =0V
Reverse transfer capacitance	C <sub>rss</sub>	–	175	–	pF	f=1MHz
Turn-on delay time	t <sub>d (on)</sub> *	–	19	–	ns	V <sub>DD</sub> ≐ 25V I <sub>D</sub> = 3.0A V <sub>GS</sub> = 10V
Rise time	t <sub>r</sub> *	–	30	–	ns	R <sub>L</sub> = 8Ω R <sub>G</sub> =10Ω
Turn-off delay time	t <sub>d (off)</sub> *	–	72	–	ns	
Fall time	t <sub>f</sub> *	–	27	–	ns	
Total gate charge	Q <sub>g</sub> *	–	15.4	21.6	nC	V <sub>DD</sub> ≐ 25V, V <sub>GS</sub> = 5V
Gate-source charge	Q <sub>gs</sub> *	–	3.7	–	nC	I <sub>D</sub> = 6.0A
Gate-drain charge	Q <sub>gd</sub> *	–	6.5	–	nC	R <sub>L</sub> = 4Ω, R <sub>G</sub> = 10Ω

\*Pulsed

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

&lt;It is the same characteristics for the Tr1 and Tr2.&gt;

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Forward voltage	V <sub>SD</sub> *	–	–	1.2	V	I <sub>S</sub> =6.0A/V <sub>GS</sub> =0V

\* pulsed

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●Electrical characteristic curves

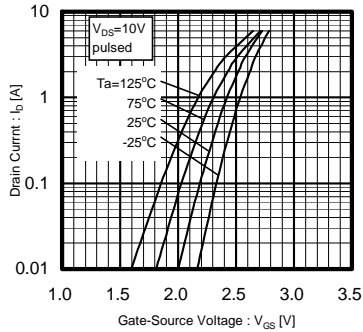


Fig.1 Typical Transfer Characteristics

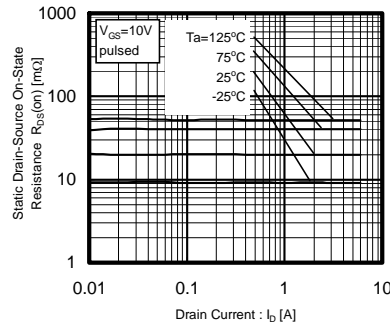


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current (1)

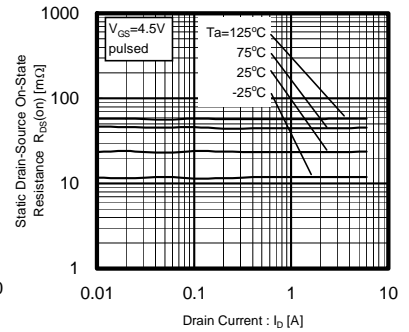


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current (2)

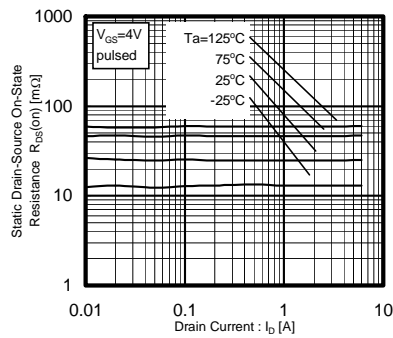


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current (3)

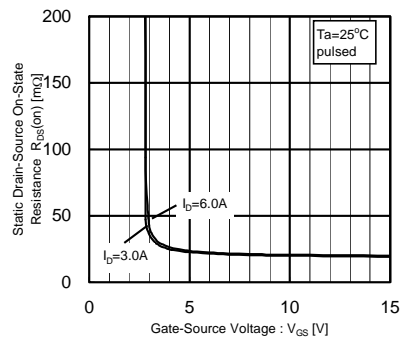


Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

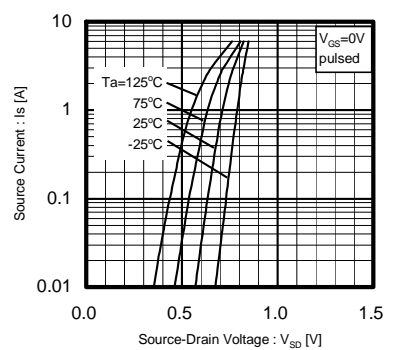


Fig.6 Source-Current vs. Source-Drain Voltage

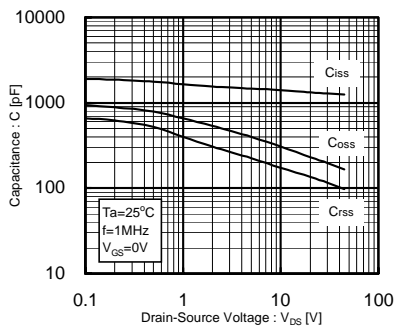


Fig.7 Typical capacitance vs. Source-Drain Voltage

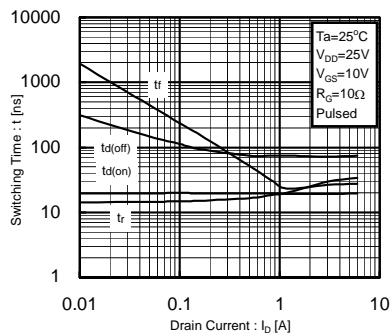


Fig.8 Switching Characteristics

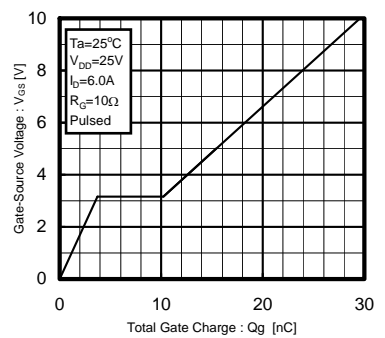


Fig.9 Dynamic Input Characteristics

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● Measurement circuits

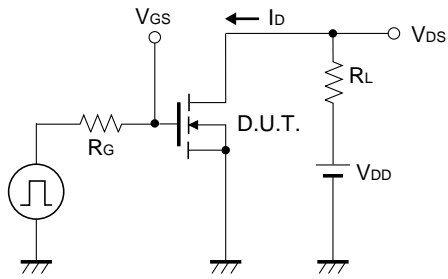


Fig.10 Switching Time Test Circuit

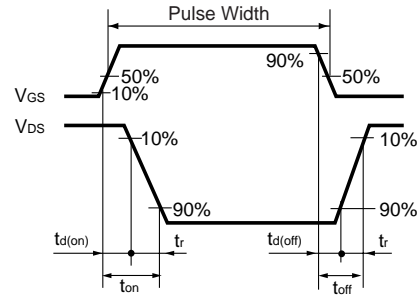


Fig.11 Switching Time Waveforms

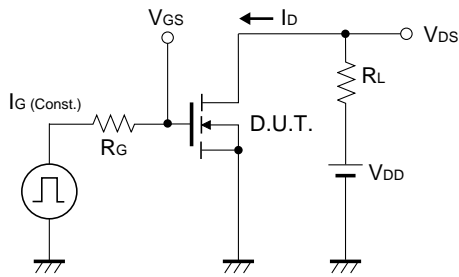


Fig.12 Gate Charge Test Circuit

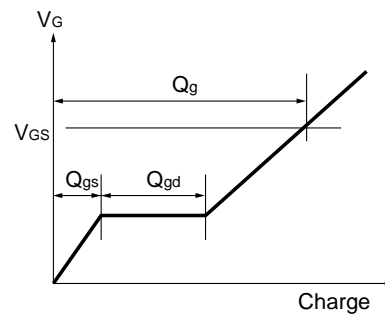


Fig.13 Gate Charge Waveform

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