

4V Drive Nch+Nch MOSFET

SP8K31

●Structure

Silicon N-channel
MOSFET

●Features

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

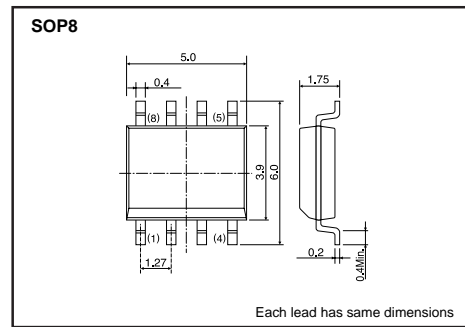
●Applications

Switching

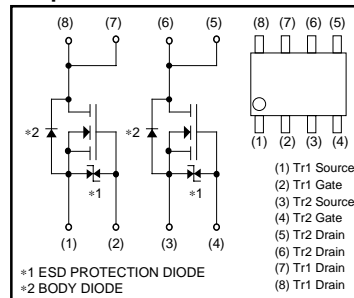
●Packaging dimensions

Type	Package	Taping
	Code	TB
	Basic ordering unit (pieces)	2500
SP8K31		○

●Dimensions (Unit : mm)



●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 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_{DS}	60	V
Gate-source voltage	V_{GS}	± 20	V
Drain current	Continuous	I_D	± 3.5 A
	Pulsed	I_{DP} *1	± 14 A
Source current (Body diode)	Continuous	I_S	1.0 A
	Pulsed	I_{SP} *1	14 A
Total power dissipation	P_D *2	2.0	W
Channel temperature	T_{ch}	150	°C
Range of storage temperature	T_{stg}	-55 to +150	°C

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

*2 Mounted on a ceramic board.

Transistor

●Electrical characteristics (Ta=25°C)

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 20V, V_{DS} = 0V$
Drain-source breakdown voltage	$V_{(BR) DSS}$	60	—	—	V	$I_D = 1mA, V_{GS} = 0V$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 60V, V_{GS} = 0V$
Gate threshold voltage	$V_{GS(th)}$	1.0	—	2.5	V	$V_{DS} = 10V, I_D = 1mA$
Static drain-source on-state resistance	$R_{DS(on)}^*$	—	85	120	m Ω	$I_D = 3.5A, V_{GS} = 10V$
		—	100	140	m Ω	$I_D = 3.5A, V_{GS} = 4.5V$
		—	105	150	m Ω	$I_D = 3.5A, V_{GS} = 4.0V$
Forward transfer admittance	$ Y_{fs} ^*$	2.5	—	—	S	$V_{DS} = 10V, I_D = 3.5A$
Input capacitance	C_{iss}	—	250	—	pF	$V_{DS} = 10V$
Output capacitance	C_{oss}	—	60	—	pF	$V_{GS} = 0V$
Reverse transfer capacitance	C_{rss}	—	30	—	pF	$f = 1MHz$
Turn-on delay time	$t_{d(on)}^*$	—	7	—	ns	$V_{DD} = 30V$
Rise time	t_r^*	—	14	—	ns	$I_D = 1.8A$
Turn-off delay time	$t_{d(off)}^*$	—	25	—	ns	$V_{GS} = 10V$
Fall time	t_f^*	—	7	—	ns	$R_L = 17\Omega$
Total gate charge	Q_g^*	—	3.7	5.2	nC	$V_{DD} = 30V, V_{GS} = 5V$
Gate-source charge	Q_{gs}^*	—	1.2	—	nC	$I_D = 3.5A$
Gate-drain charge	Q_{gd}^*	—	1.2	—	nC	$R_L = 8.6\Omega, R_G = 10\Omega$

*Pulsed

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

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

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{SD}^*	—	—	1.2	V	$I_S = 3.5A, V_{GS} = 0V$

*Pulsed

Transistor

●Electrical characteristic curves

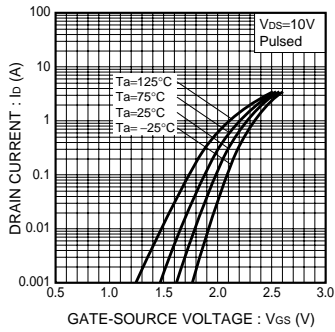


Fig.1 Typical Transfer Characteristics

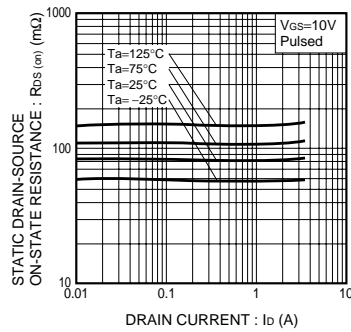


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current(I)

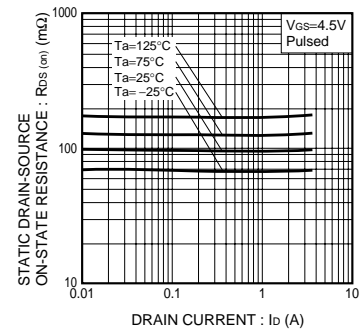


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current(II)

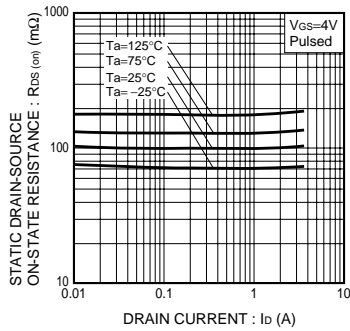


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current(III)

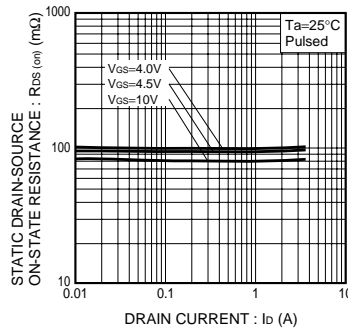


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current(IV)

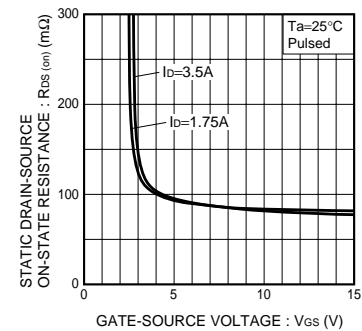


Fig.6 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

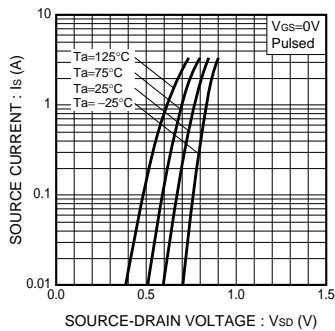


Fig.7 Source Current vs. Source-Drain Voltage

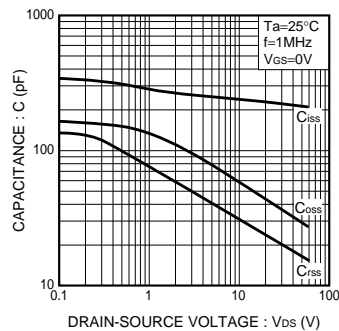


Fig.8 Typical Capacitance vs. Drain-Source Voltage

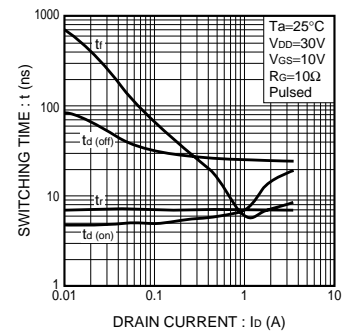


Fig.9 Switching Characteristics

Transistor

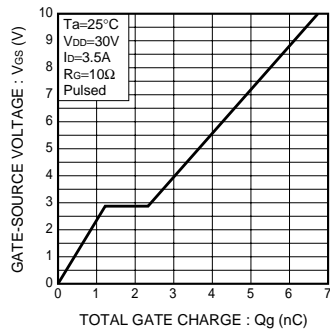


Fig.10 Dynamic Input Characteristics

●Measurement circuits

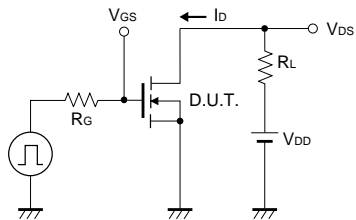


Fig.11 Switching Time Test Circuit

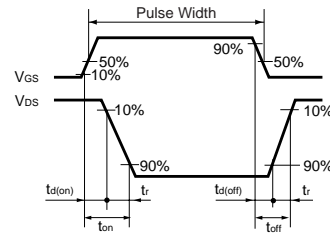


Fig.12 Switching Time Waveforms

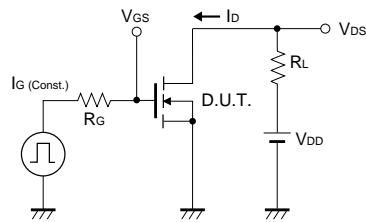


Fig.13 Gate Charge Test Circuit

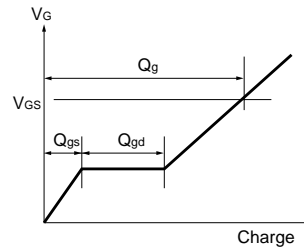


Fig.14 Gate Charge Waveform

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