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4V Drive Nch + Nch MOSFET

MP6K31

● Structure

Silicon N-channel MOSFET

● Features

- 1) Built-in G-S Protection Diode.
- 2) Small Surface Mount Package (MPT6).
- 3) Low voltage drive. (4V)

● Application

Switching

● Packaging specifications

Type	Package	Taping
	Code	TR
	Basic ordering unit (pieces)	1000
MP6K31		○

● Absolute maximum ratings (Ta = 25°C)

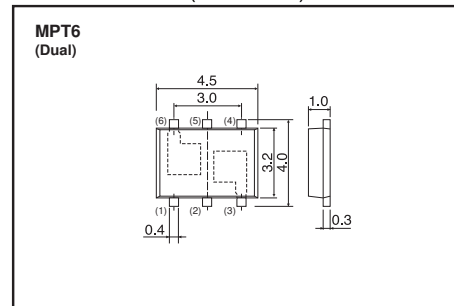
<It is the same ratings for Tr1 and Tr2.>

Parameter	Symbol	Limits	Unit
Drain-source voltage	V_{DSS}	60	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	Continuous	I_D	± 2 A
	Pulsed	I_{DP}^{*1}	± 8 A
Source current (Body Diode)	Continuous	I_S	1.2 A
	Pulsed	I_{SP}^{*1}	8 A
Power dissipation	P_D^{*2}	2.0	W / TOTAL
		1.4	W / ELEMENT
Channel temperature	Tch	150	°C
Range of storage temperature	Tstg	-55 to +150	°C

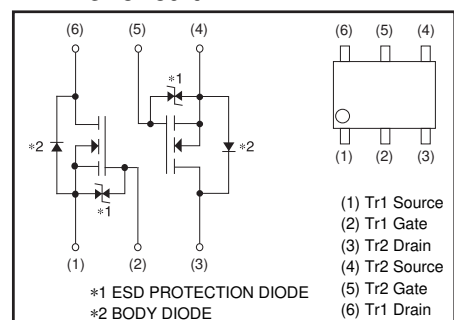
*1 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$

*2 Mounted on a ceramic board.

● Dimensions (Unit : mm)



● Inner circuit



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

<It is the same characteristics for 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	$R_{DS(on)}^*$	-	210	290	mΩ	$I_D=2A, V_{GS}=10V$
		-	240	330		$I_D=2A, V_{GS}=4.5V$
		-	255	350		$I_D=2A, V_{GS}=4.0V$
Forward transfer admittance	$ Y_{fs} ^*$	1.4	-	-	S	$I_D=2A, V_{DS}=10V$
Input capacitance	C_{iss}	-	110	-	pF	$V_{DS}=10V$
Output capacitance	C_{oss}	-	28	-	pF	$V_{GS}=0V$
Reverse transfer capacitance	C_{rss}	-	12	-	pF	$f=1MHz$
Turn-on delay time	$t_{d(on)}^*$	-	6	-	ns	$I_D=1A, V_{DD}=30V$
Rise time	t_r^*	-	10	-	ns	$V_{GS}=10V$
Turn-off delay time	$t_{d(off)}^*$	-	20	-	ns	$R_L=30\Omega$
Fall time	t_f^*	-	9	-	ns	$R_G=10\Omega$
Total gate charge	Q_g^*	-	2.0	-	nC	$I_D=2A, V_{DD}=30V$
Gate-source charge	Q_{gs}^*	-	0.8	-	nC	$V_{GS}=5V$
Gate-drain charge	Q_{gd}^*	-	0.4	-	nC	

*Pulsed

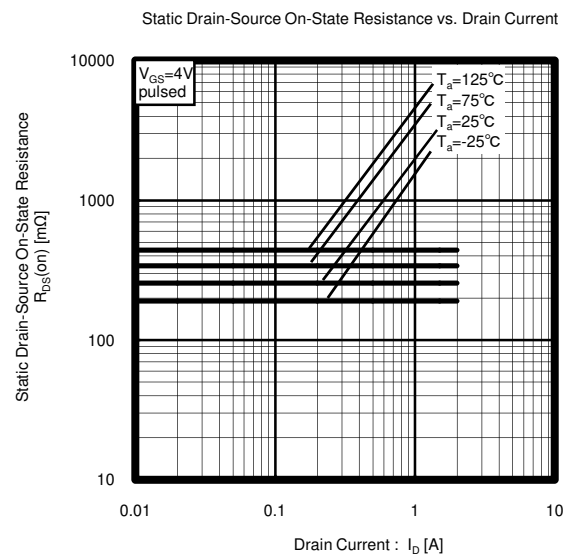
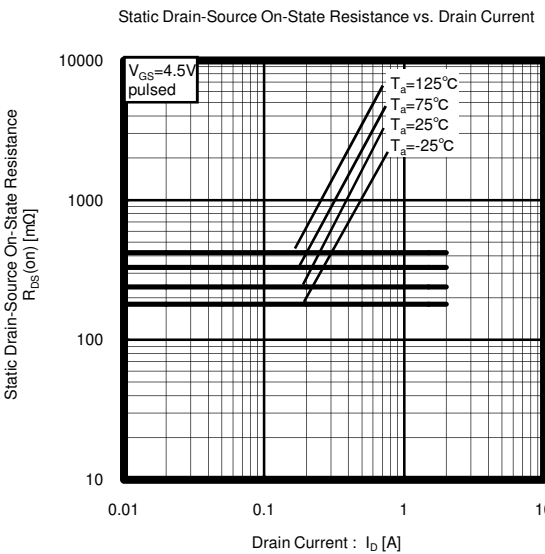
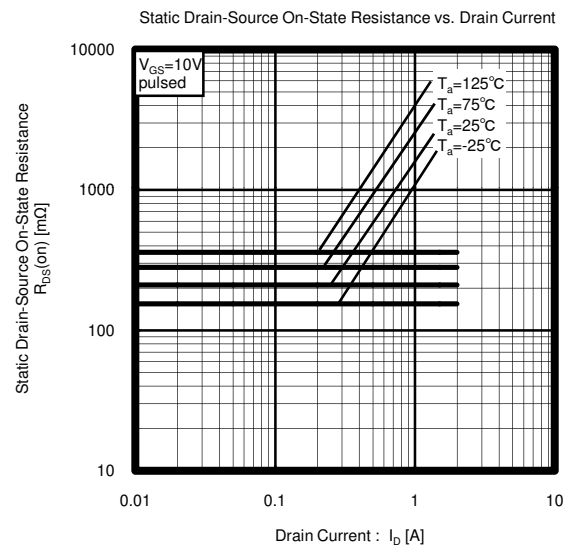
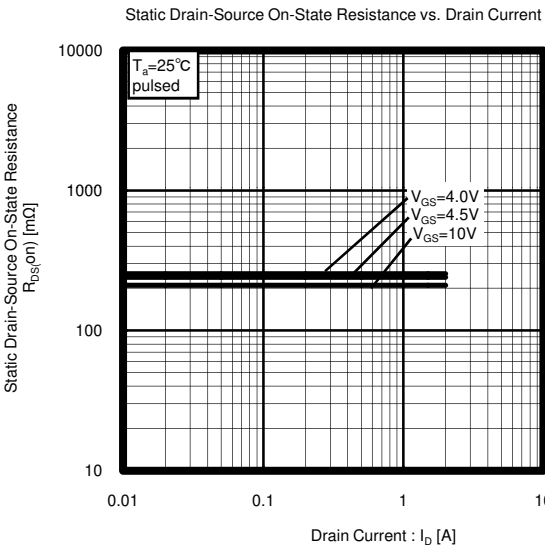
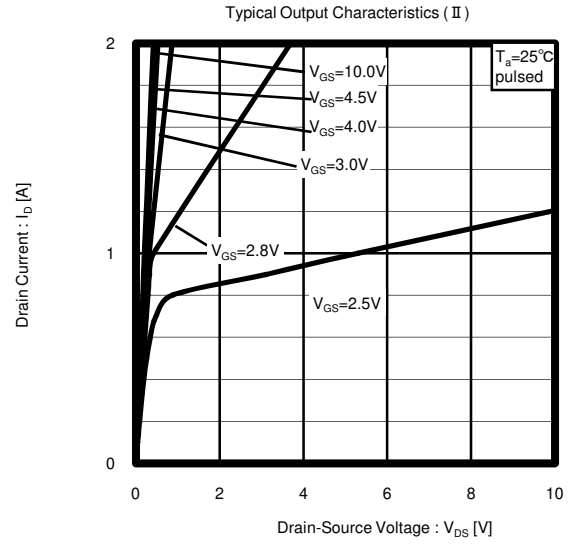
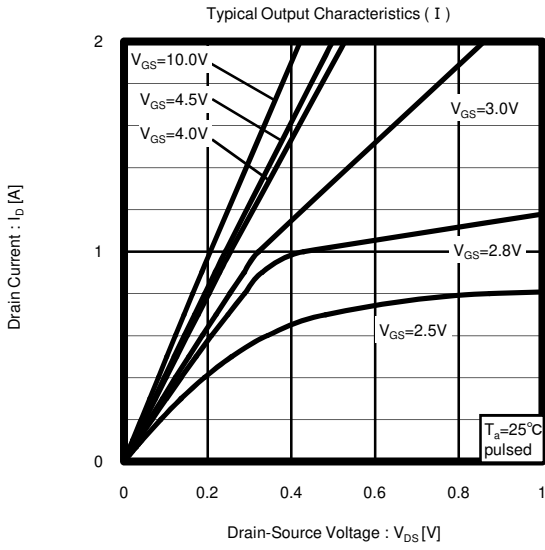
● **Body diode characteristics** (Source-Drain) (Ta = 25°C)

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

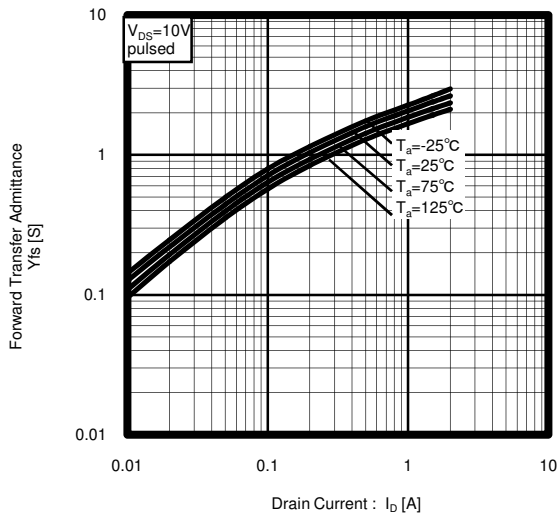
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward Voltage	V_{SD}^*	-	-	1.2	V	$I_S=1.2A, V_{GS}=0V$

*Pulsed

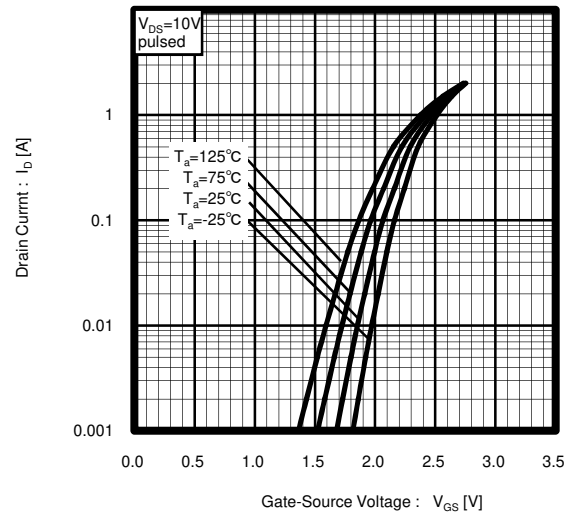
● Electrical characteristic curves (Ta = 25°C)



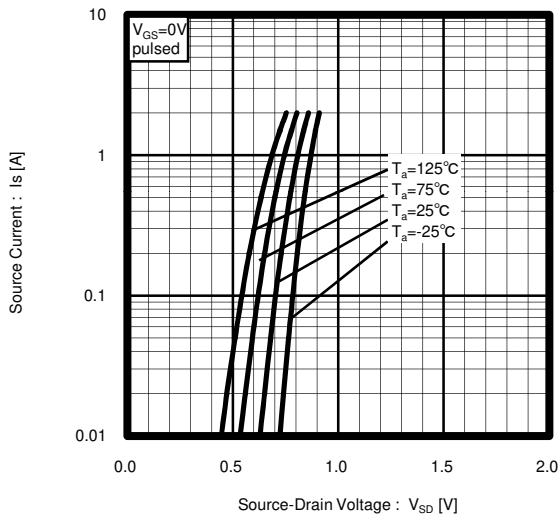
Forward Transfer Admittance vs. Drain Current



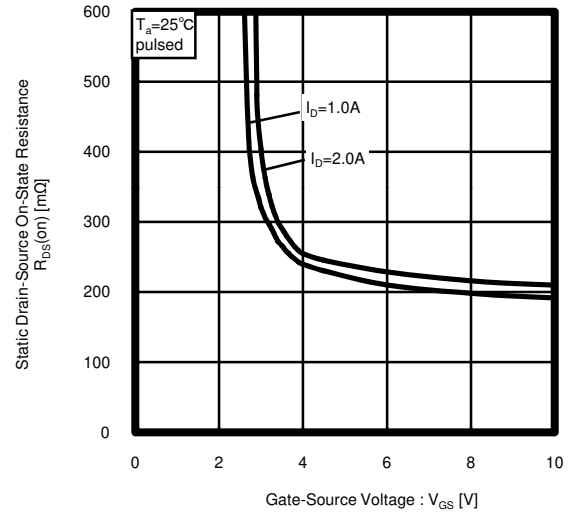
Typical Transfer Characteristics



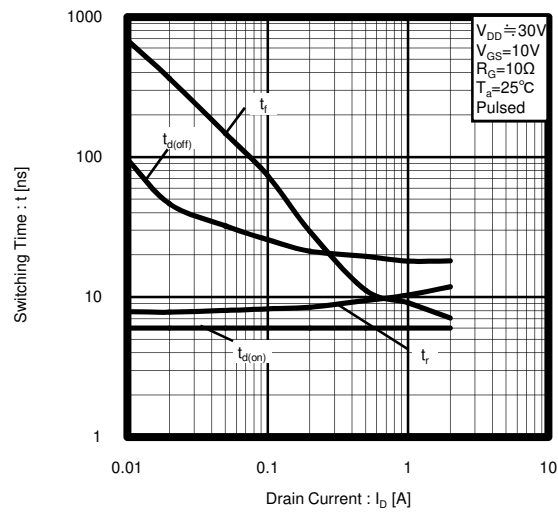
Source Current vs. Source-Drain Voltage



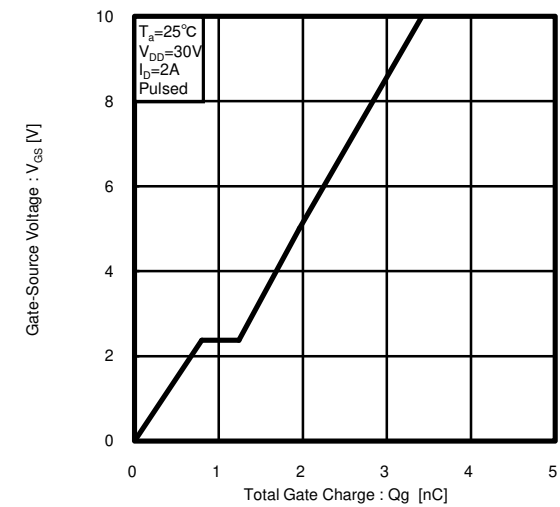
Static Drain-Source On-State Resistance vs. Gate-Source Voltage



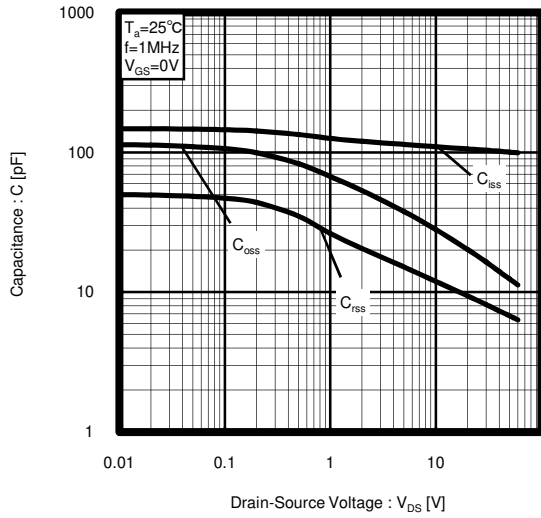
Switching Characteristics



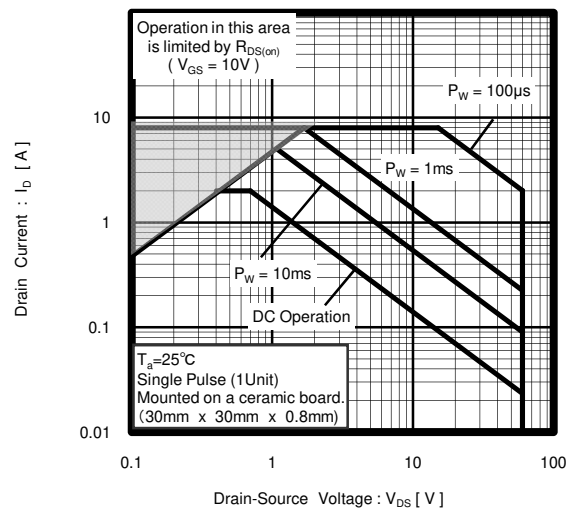
Dynamic Input Characteristics



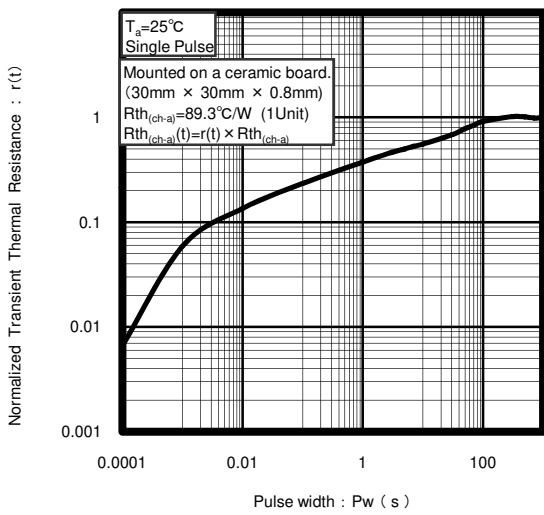
Typical Capacitance vs. Drain-Source Voltage



Maximum Safe Operating Area



Normalized Transient Thermal Resistance v.s. Pulse Width



● Measurement circuits

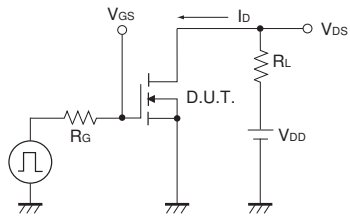


Fig.1-1 Switching time measurement circuit

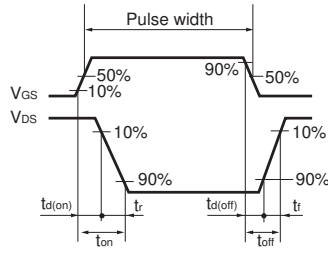


Fig.1-2 Switching waveforms

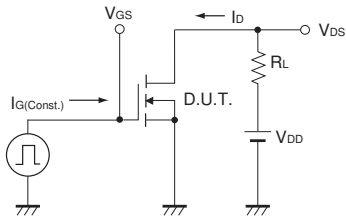


Fig.2-1 Gate charge measurement circuit

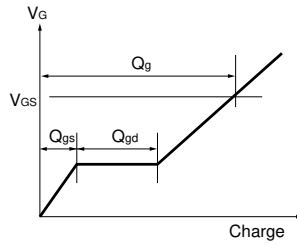


Fig.2-2 Gate Charge Waveform

Notes

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