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2SK970

Silicon N-Channel MOS FET

Application

High speed power switching

Features

- Low on-resistance
- High speed switching
- Low drive current
- 4 V gate drive device
  – Can be driven from 5 V source
- Suitable for motor drive, DC-DC converter, power switch and solenoid drive

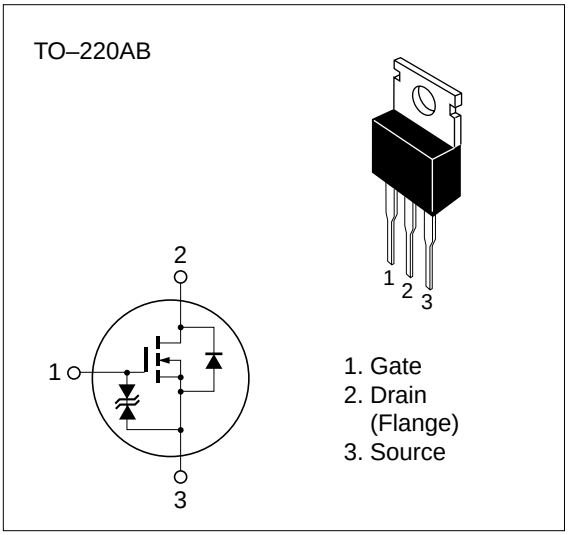

Table 1 Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	60	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	10	A
Drain peak current	$I_{D(pulse)}$*	40	A
Body to drain diode reverse drain current	I_{DR}	10	A
Channel dissipation	Pch**	30	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

* PW ≤ 10 µs, duty cycle ≤ 1 %
** Value at T_C = 25 °C

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Table 2 Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	250	µA	V_{DS} = 50 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.0	V	I_D = 1 mA, V_{DS} = 10 V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.12	0.15	Ω	I_D = 5 A, V_{GS} = 10 V *
			0.17	0.22		I_D = 5 A, V_{GS} = 4 V *
Forward transfer admittance	$\|y_{fs}\|$	3.5	6.0	—	S	I_D = 5 A, V_{DS} = 10 V *
Input capacitance	Ciss	—	400	—	pF	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz
Output capacitance	Coss	—	220	—	pF	
Reverse transfer capacitance	Crss	—	60	—	pF	
Turn-on delay time	$t_{d(on)}$	—	5	—	ns	I_D = 5 A, V_{GS} = 10 V, R_L = 6 Ω
Rise time	t_r	—	55	—	ns	
Turn-off delay time	$t_{d(off)}$	—	140	—	ns	
Fall time	t_f	—	90	—	ns	
Body to drain diode forward voltage	V_{DF}	—	1.2	—	V	I_F = 10 A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	125	—	ns	I_F = 10 A, V_{GS} = 0, di_F/dt = 50 A/µs

* Pulse Test

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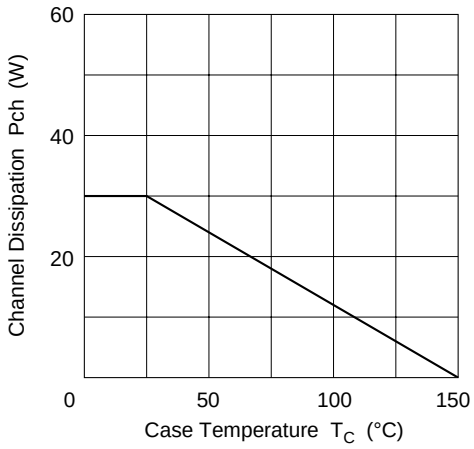
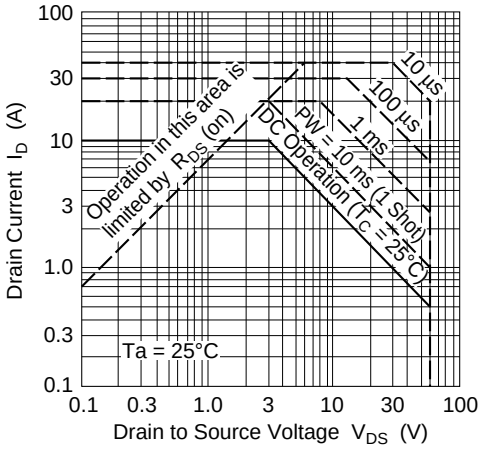
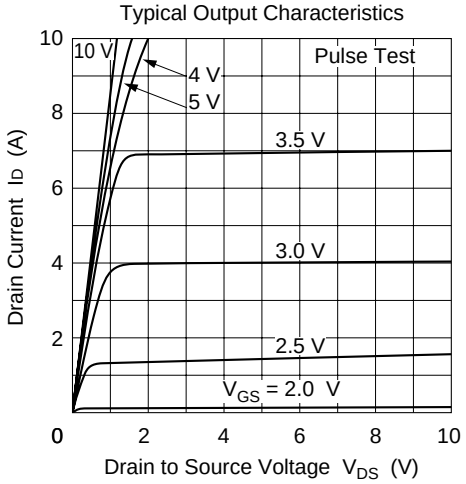
Power vs. Temperature Derating



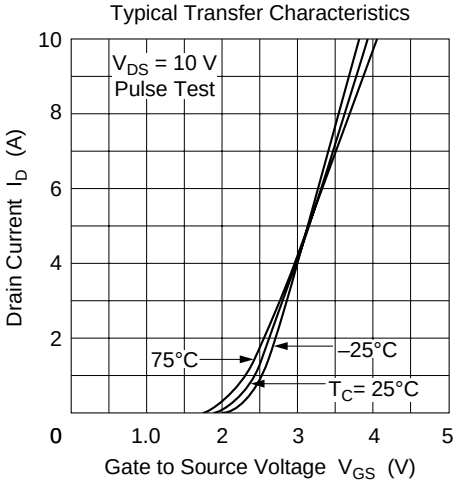
Maximum Safe Operation Area



Typical Output Characteristics



Typical Transfer Characteristics



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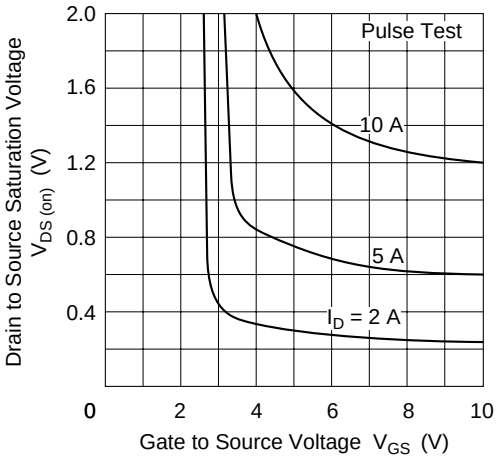
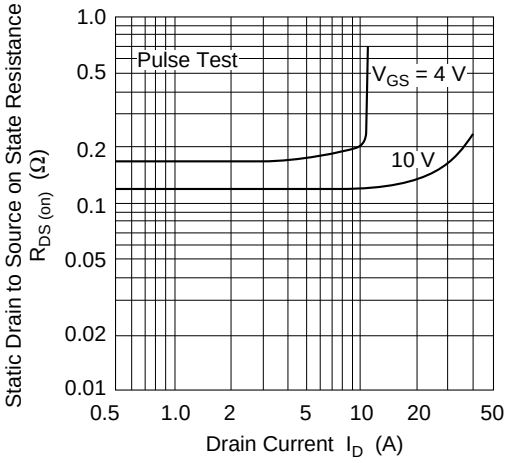
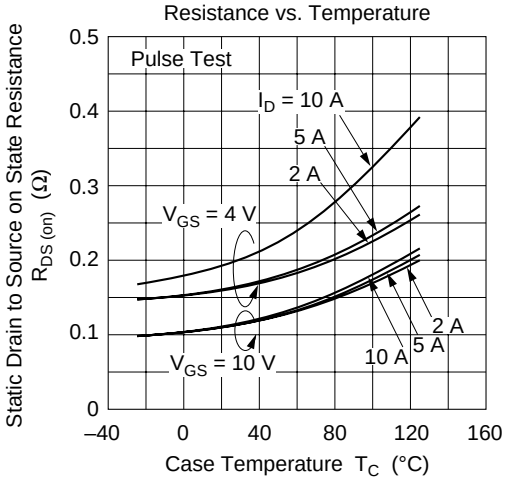
Drain to Source Saturation Voltage vs. Gate to Source Voltage



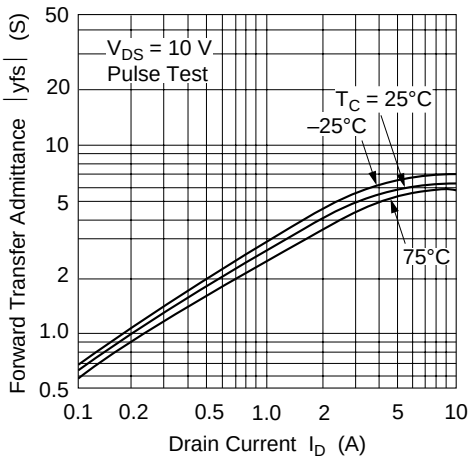
Static Drain to Source on State Resistance vs. Drain Current



Static Drain to Source on State Resistance vs. Temperature



Forward Transfer Admittance vs. Drain Current



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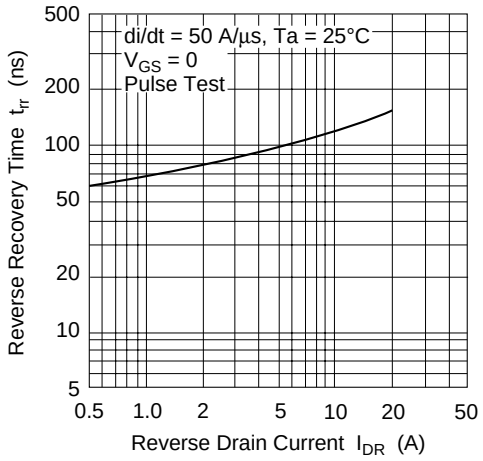
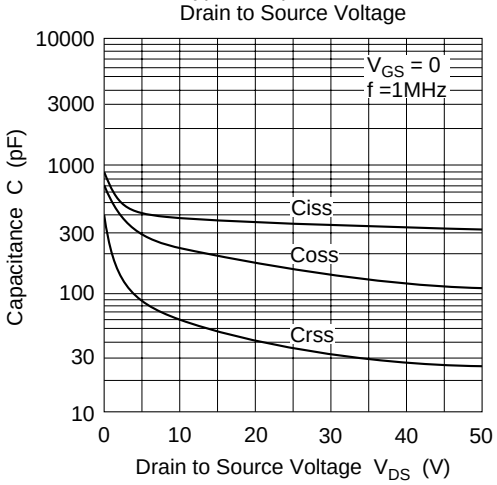
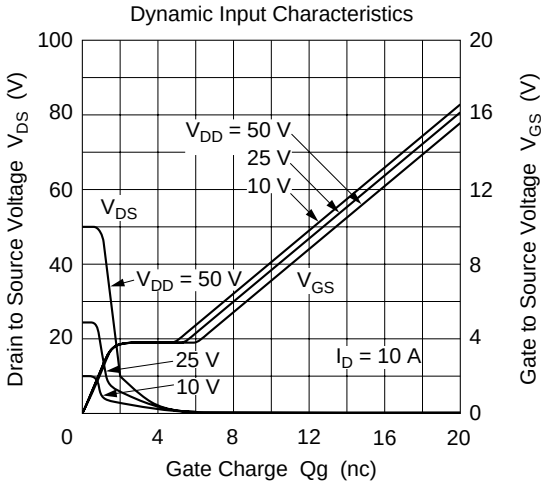
Body to Drain Diode Reverse Recovery Time



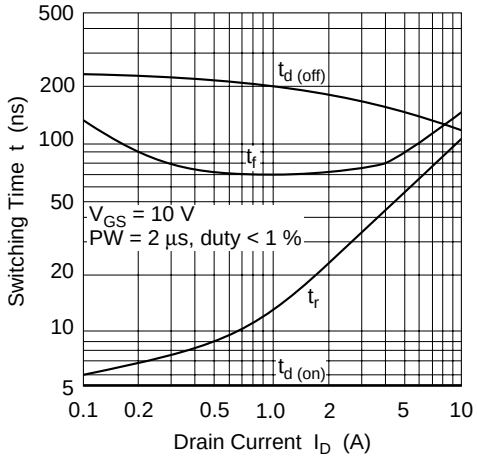
Typical Capacitance vs. Drain to Source Voltage



Dynamic Input Characteristics



Switching Characteristics



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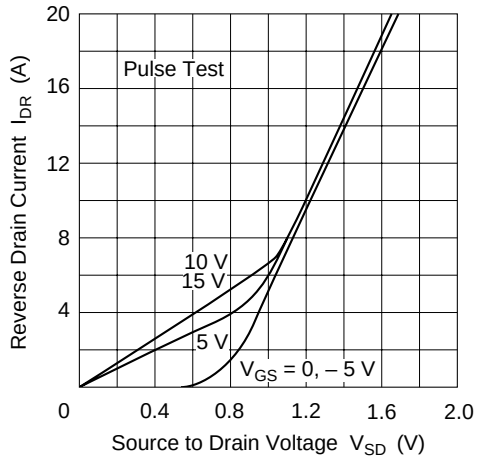
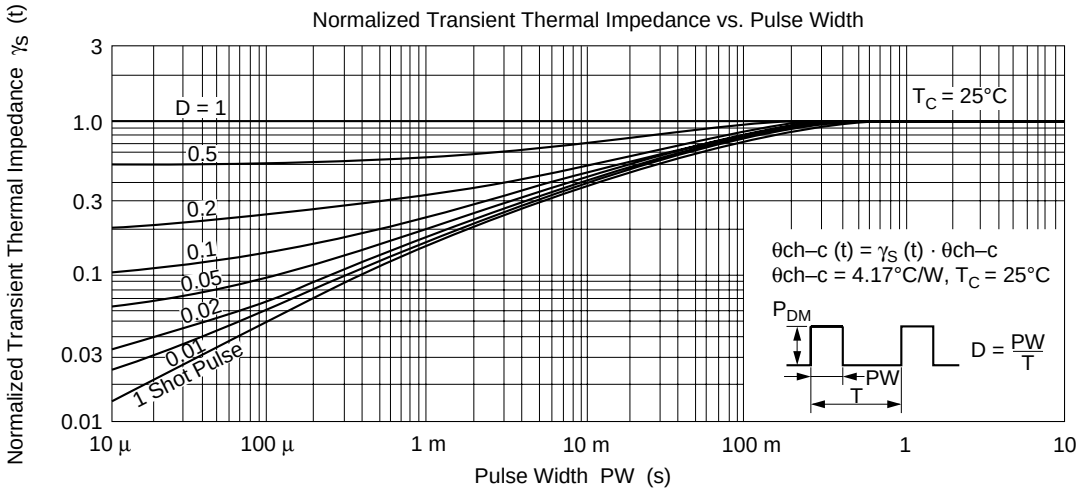
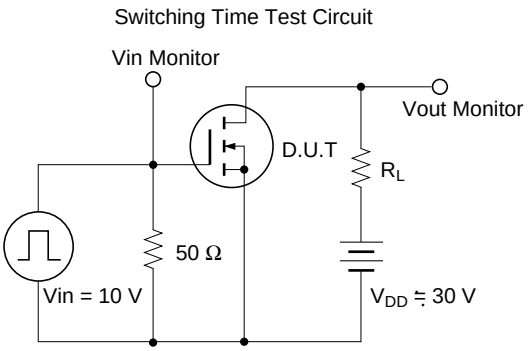
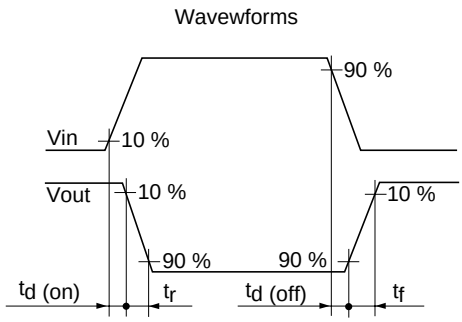
Reverse Drain Current vs.
Source to Drain Voltage



Normalized Transient Thermal Impedance vs. Pulse Width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