2SK1947

Silicon N-Channel MOS FET

HITACHI

Application

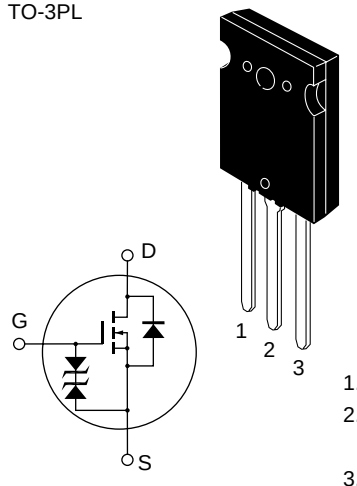
High speed power switching

Features

- Low on-resistance
- High speed switching
- Low Drive Current
- Built-In Fast Recovery Diode (t_{rr} = 140 ns)
- Suitable for Switching regulator, Motor Control

Outline

TO-3PL



1. Gate
2. Drain (Flange)
3. Source

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Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	250	V
Gate to source voltage	V_{GSS}	±30	V
Drain current	I_D	50	A
Drain peak current	$I_{D(pulse)}$*[1]	200	A
Body to drain diode reverse drain current	I_{DR}	50	A
Channel dissipation	Pch*[2]	200	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes 1. PW ≤ 10 µs, duty cycle ≤ 1 %
2. Value at Tc = 25 °C

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Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	250	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±30	—	—	V	I_G = ±100 µA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	µA	V_{GS} = ±25 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	250	µA	V_{DS} = 200 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	2.0	—	3.0	V	I_D = 1 mA, V_{DS} = 10 V
Static drain to source on state resistance	$R_{DS(on)}$	—	0.047	0.06	Ω	I_D = 25 A V_{GS} = 10 V*[1]
Forward transfer admittance	$\|y_{fs}\|$	20	30	—	S	I_D = 25 A V_{DS} = 10 V*[1]
Input capacitance	Ciss	—	5810	—	pF	V_{DS} = 10 V
Output capacitance	Coss	—	2360	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	270	—	pF	f = 1 MHz
Turn-on delay time	$t_{d(on)}$	—	75	—	ns	I_D = 25 A
Rise time	t_r	—	270	—	ns	V_{GS} = 10 V
Turn-off delay time	$t_{d(off)}$	—	420	—	ns	R_L = 1.2 Ω
Fall time	t_f	—	200	—	ns	
Body to drain diode forward voltage	V_{DF}	—	1.2	—	V	I_F = 50 A, V_{GS} = 0
Body to drain diode reverse recovery time	t_{rr}	—	140	—	ns	I_F = 50 A, V_{GS} = 0, di_F / dt = 100 A / µs

Note 1. Pulse Test

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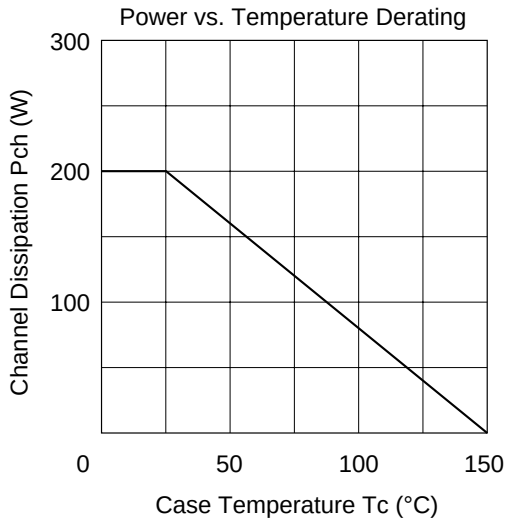
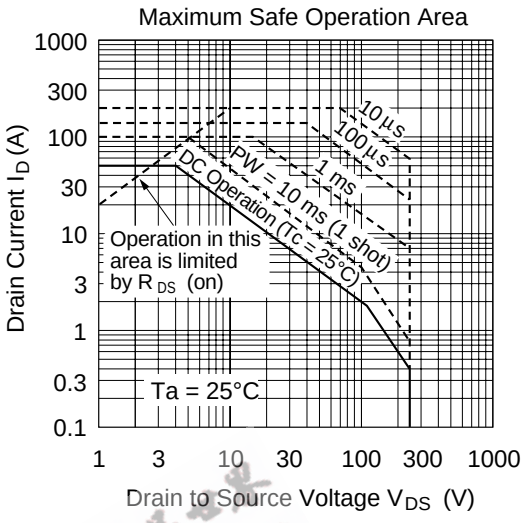
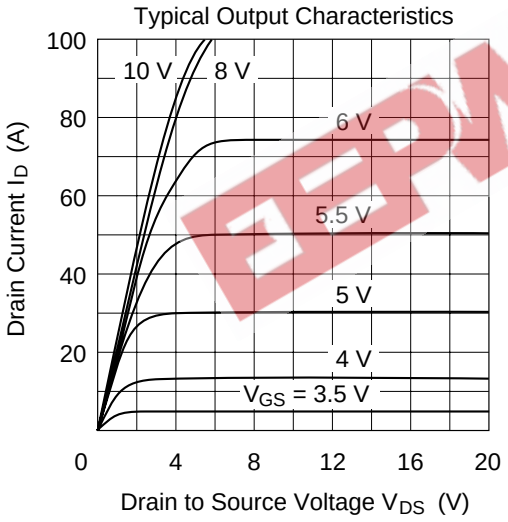
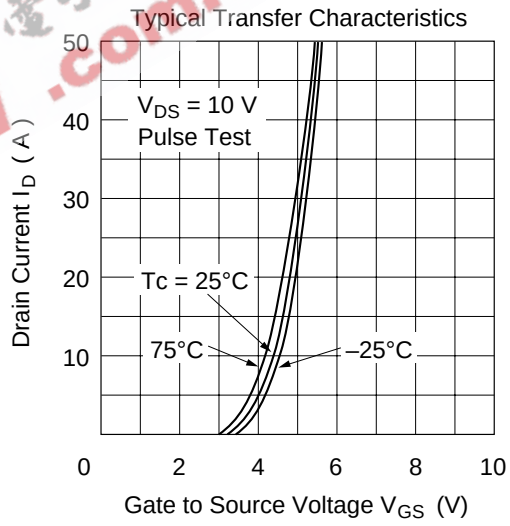

Power vs. Temperature Derating
Channel Dissipation Pch (W)
300
200
100
0
50
100
150
Case Temperature Tc (°C)


Maximum Safe Operation Area
Drain Current I_D (A)
1000
300
100
30
10
3
1
0.3
0.1
10 µs
100 µs
1 ms
PW = 10 ms (1 shot)
DC Operation (Tc = 25°C)
Operation in this area is limited by R_{DS} (on)
Ta = 25°C
1
3
10
30
100
300
1000
Drain to Source Voltage V_{DS} (V)


Typical Output Characteristics
Drain Current I_D (A)
100
80
60
40
20
10 V
8 V
6 V
5.5 V
5 V
4 V
V_{GS} = 3.5 V
0
4
8
12
16
20
Drain to Source Voltage V_{DS} (V)


Typical Transfer Characteristics
Drain Current I_D (A)
50
40
30
20
10
V_{DS} = 10 V
Pulse Test
Tc = 25°C
75°C
–25°C
0
2
4
6
8
10
Gate to Source Voltage V_{GS} (V)

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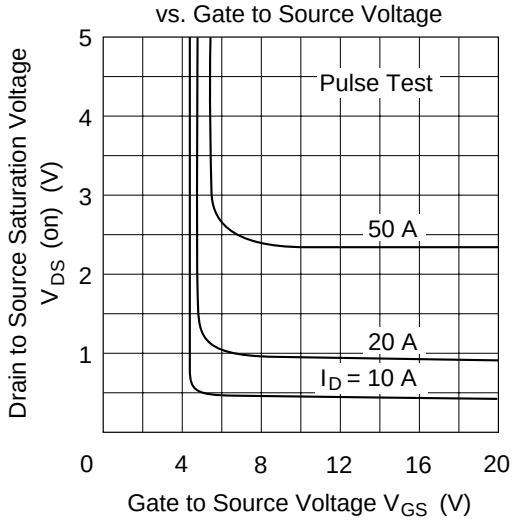
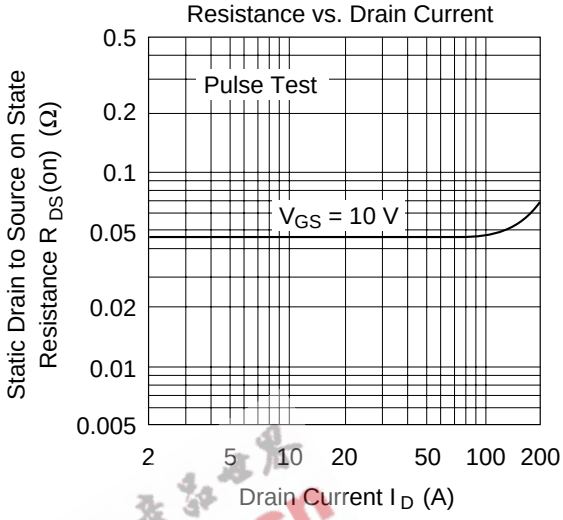
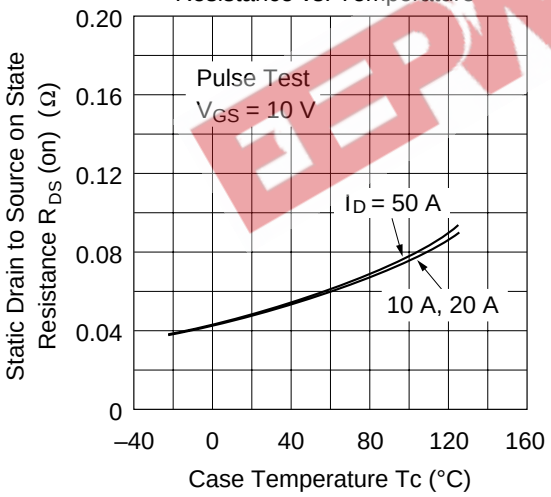
Drain to Source Saturation Voltage vs. Gate to Source Voltage



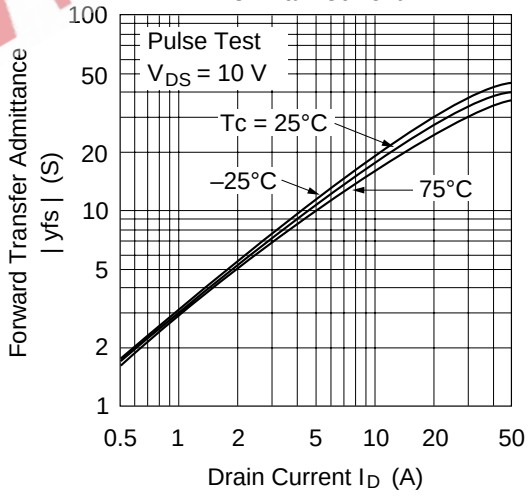
Static Drain to Source on State Resistance vs. Drain Current



Static Drain to Source on State Resistance vs. Temperature



Forward Transfer Admittance vs. Drain Current



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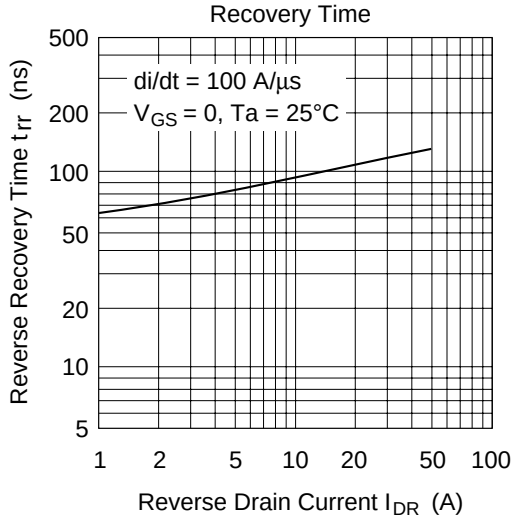
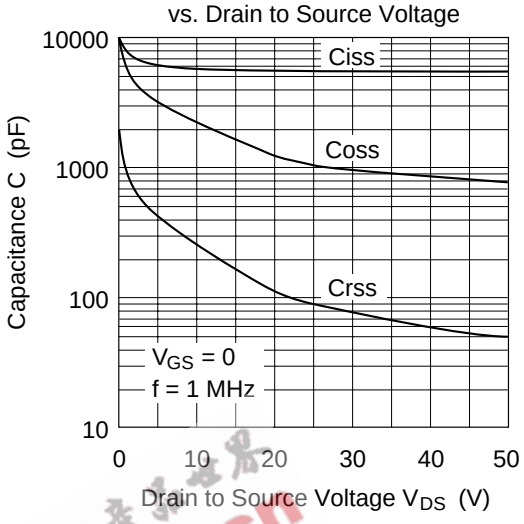
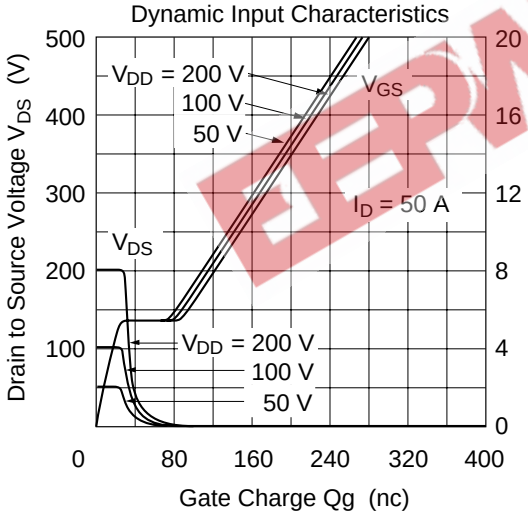
Body to Drain Diode Reverse Recovery Time



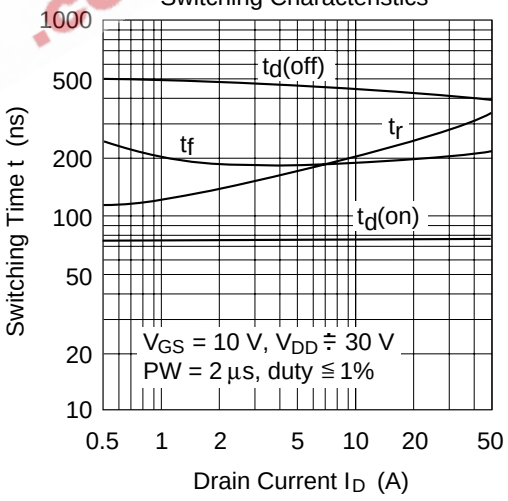
Typical Capacitance vs. Drain to Source Voltage



Dynamic Input Characteristics



Switching Characteristics



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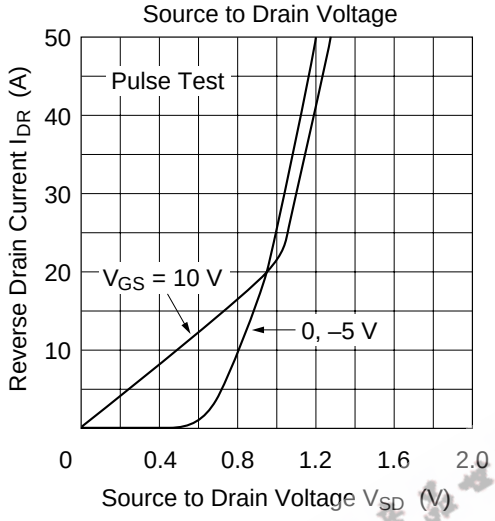
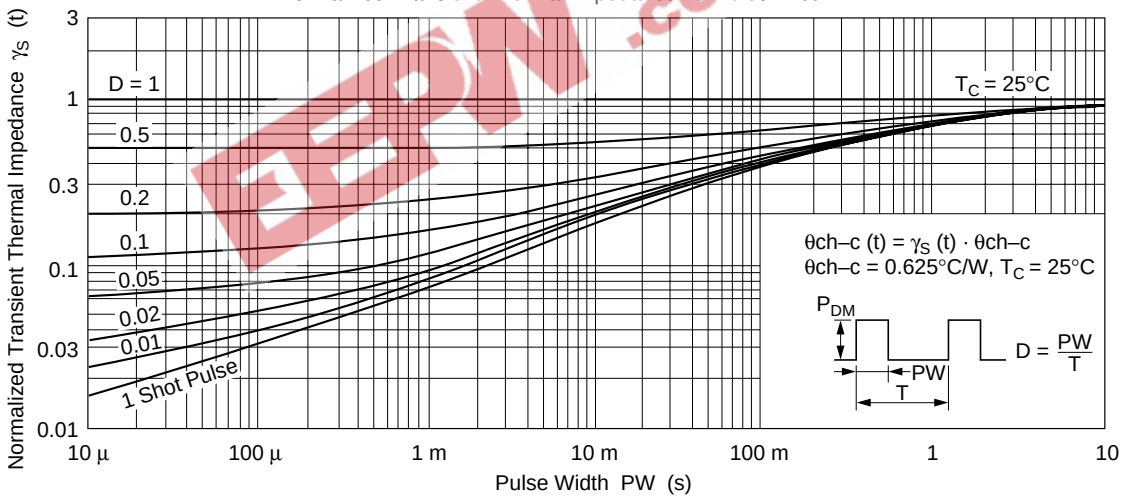
Reverse Drain Current vs.
Source to Drain Voltage



Normalized Transient Thermal Impedance vs. Pulse Width



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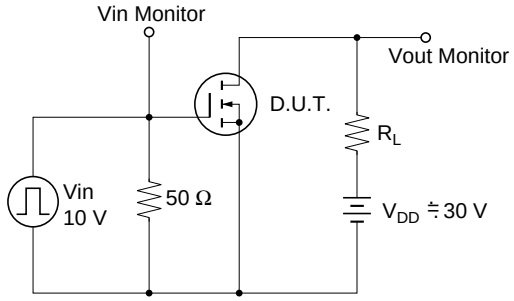
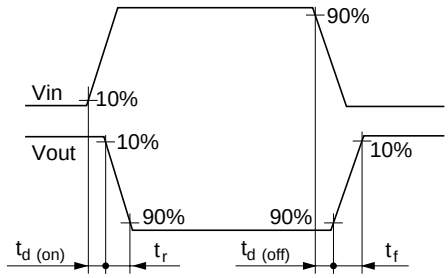
Switching Time Test Circuit



Waveforms



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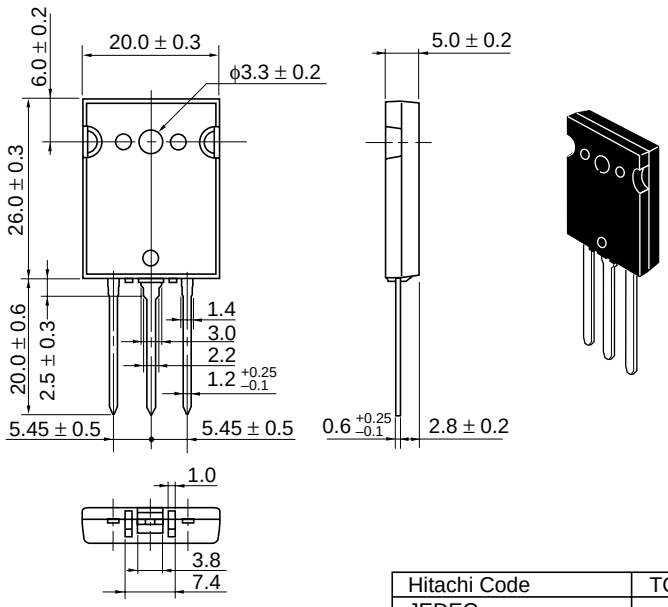
Unit: mm



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JEDEC	—
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Weight (reference value)	9.9 g

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