
2SK1949(L), 2SK1949(S)

Silicon N-Channel MOS FET

HITACHI

November 1996

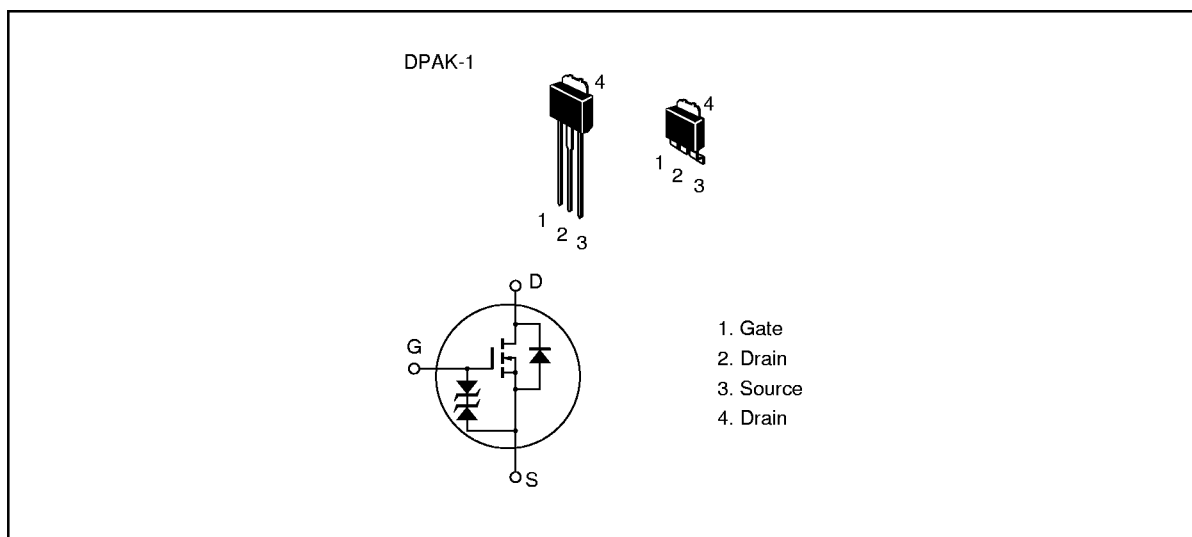
Application

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 Switching regulator, DC - DC converter
- Avalanche ratings

Outline



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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	5	A
Drain peak current	$I_{D(pulse)}^{*1}$	20	A
Body to drain diode reverse drain current	I_{DR}	5	A
Avalanche current	I_{AP}^{*3}	5	A
Avalanche energy	E_{AR}^{*3}	2.1	mJ
Channel dissipation	P_{ch}^{*2}	20	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

- Notes
1. $PW \leq 10 \mu s$, duty cycle $\leq 1 \%$
 2. Value at $T_c = 25^\circ C$
 3. Value at $T_{ch} = 25^\circ C$, $R_g \geq 50 \Omega$

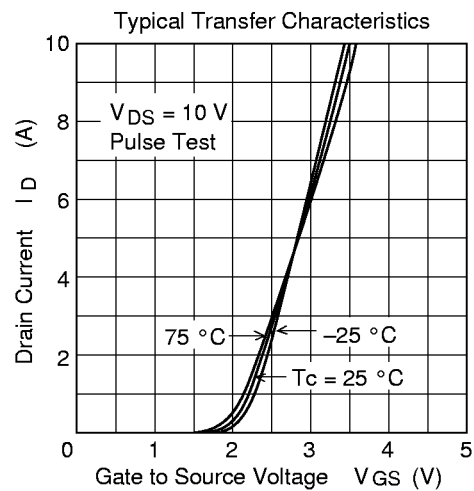
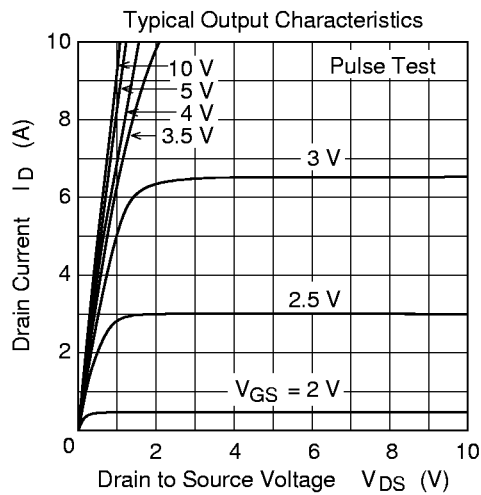
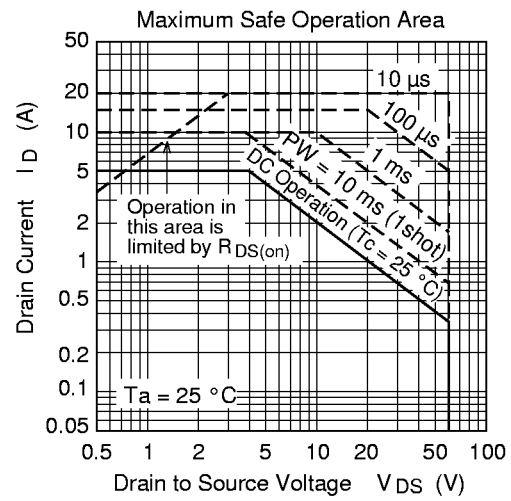
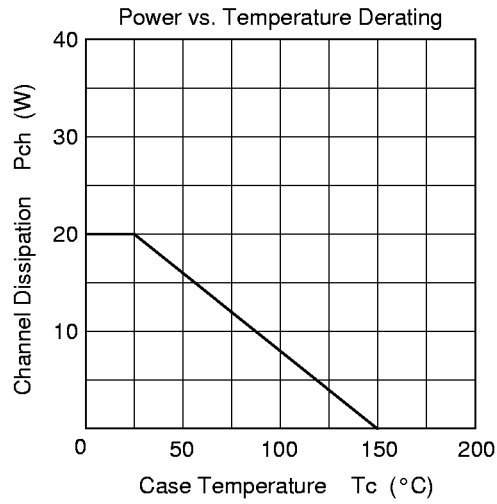
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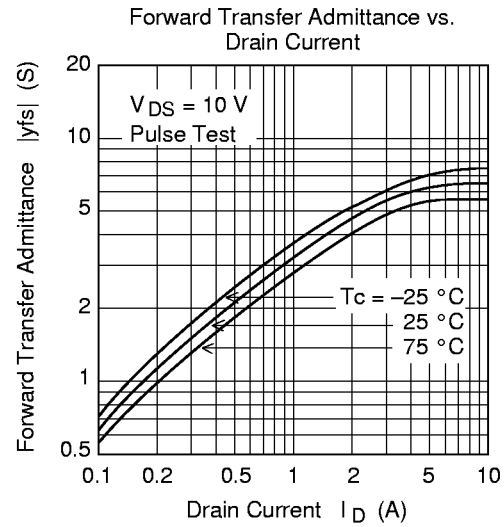
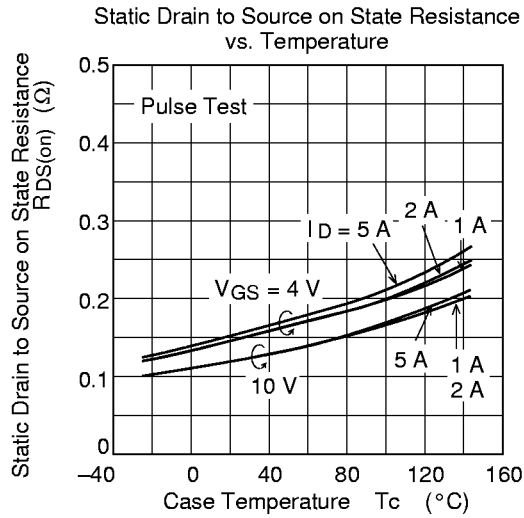
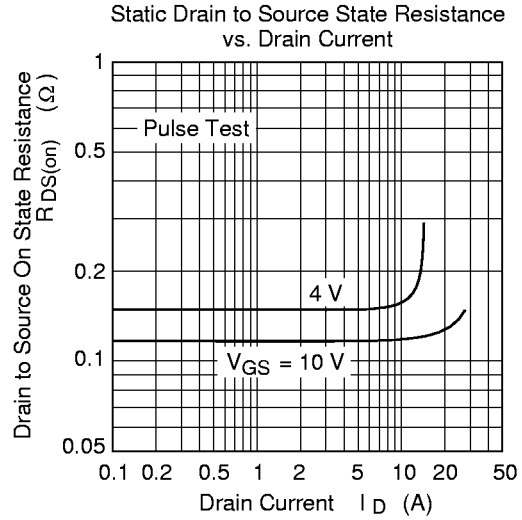
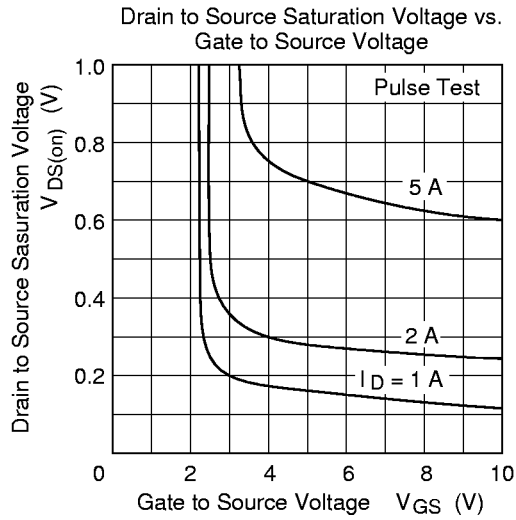
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	100	μA	$V_{DS} = 50 \text{ V}$, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.25	V	$I_D = 1 \text{ mA}$, $V_{DS} = 10 \text{ V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.12	0.15	Ω	$I_D = 3 \text{ A}$ $V_{GS} = 10 \text{ V}^{*1}$
		—	0.15	0.2	Ω	$I_D = 3 \text{ A}$ $V_{GS} = 4 \text{ V}^{*1}$
Forward transfer admittance	$ y_{fs} $	3	5.5	—	S	$I_D = 3 \text{ A}$ $V_{DS} = 10 \text{ V}^{*1}$
Input capacitance	C_{iss}	—	390	—	pF	$V_{DS} = 10 \text{ V}$ $V_{GS} = 0$ $f = 1 \text{ MHz}$
Output capacitance	C_{oss}	—	190	—	pF	
Reverse transfer capacitance	C_{rss}	—	45	—	pF	
Turn-on delay time	$t_{d(on)}$	—	10	—	ns	$I_D = 3 \text{ A}$ $V_{GS} = 10 \text{ V}$ $R_L = 10 \text{ }\Omega$
Rise time	t_r	—	42	—	ns	
Turn-off delay time	$t_{d(off)}$	—	90	—	ns	
Fall time	t_f	—	55	—	ns	
Body to drain diode forward voltage	V_{DF}	—	1.0	—	V	$I_F = 5 \text{ A}$, $V_{GS} = 0$
Body to drain diode reverse recovery time	t_{rr}	—	60	—	ns	$I_F = 5 \text{ A}$, $V_{GS} = 0$, $diF / dt = 50 \text{ A} / \mu\text{s}$

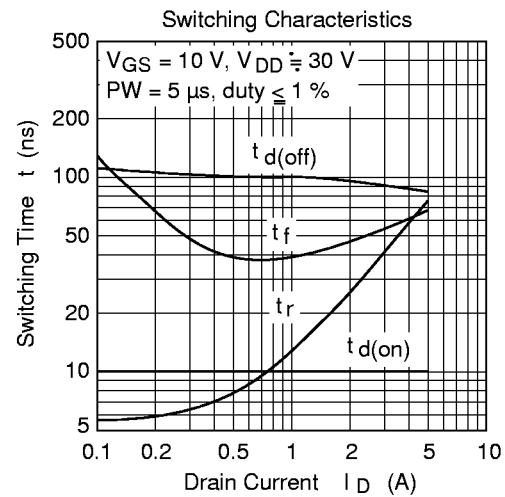
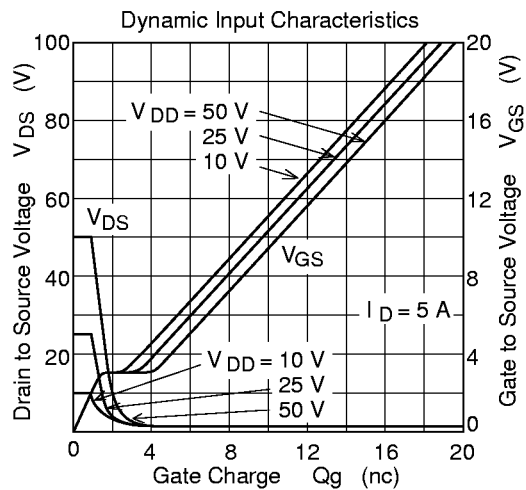
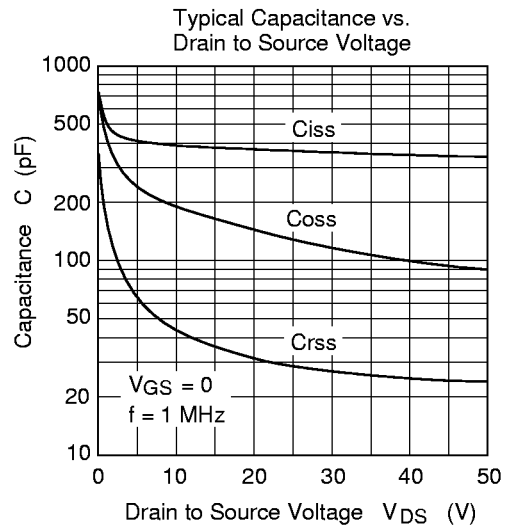
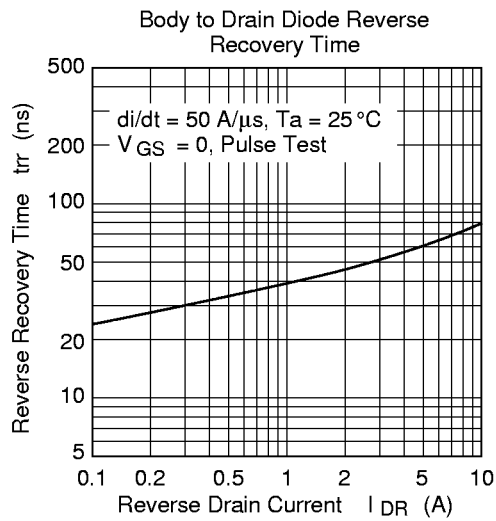
Note 1. Pulse Test

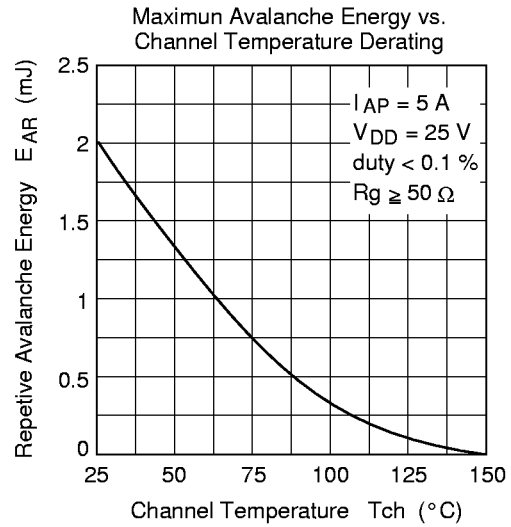
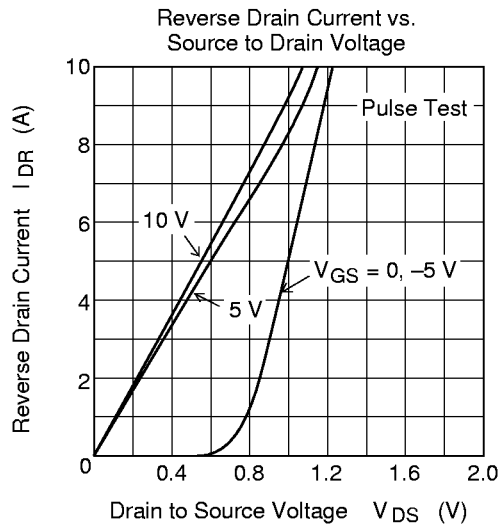
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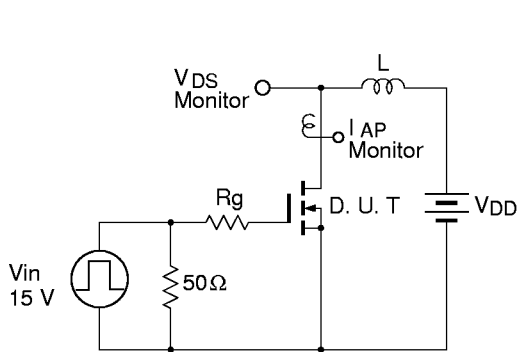


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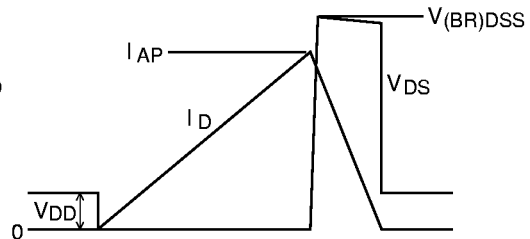




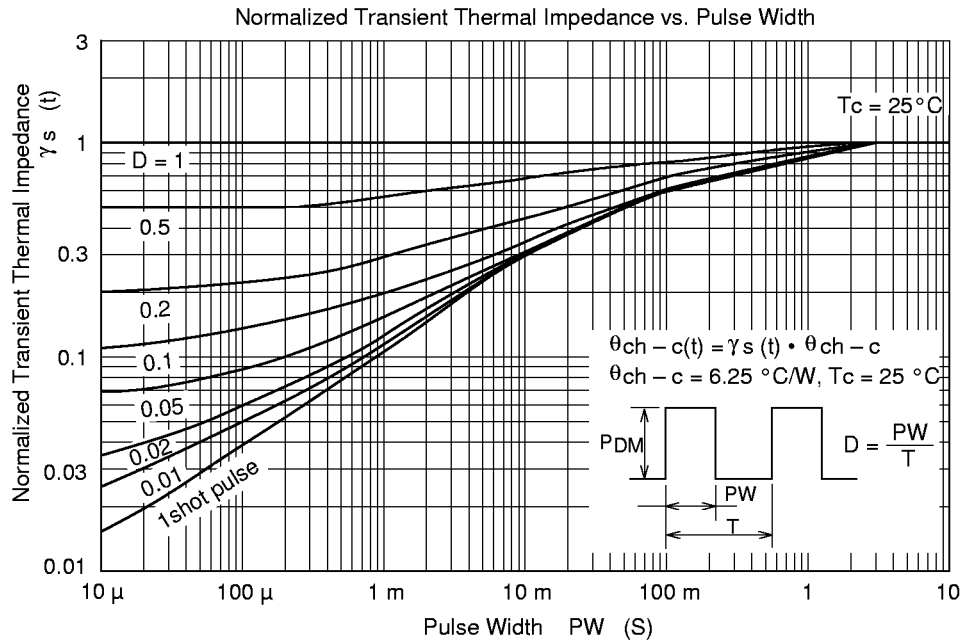
Avalanche Test Circuit and Waveform



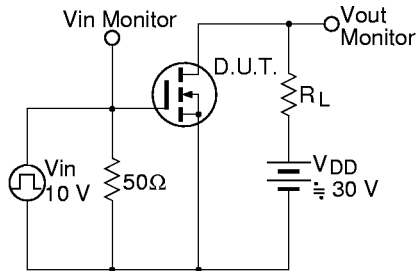
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



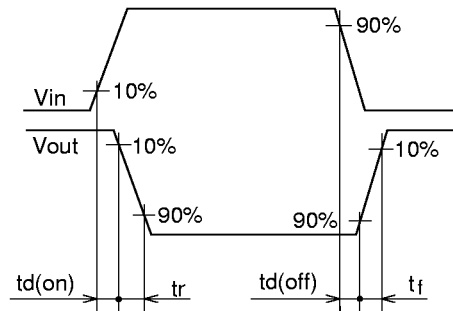
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Switching Time Test Circuit



Waveform



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