

# 2SK3150(L), 2SK3150(S)

Silicon N Channel MOS FET  
High Speed Power Switching

# HITACHI

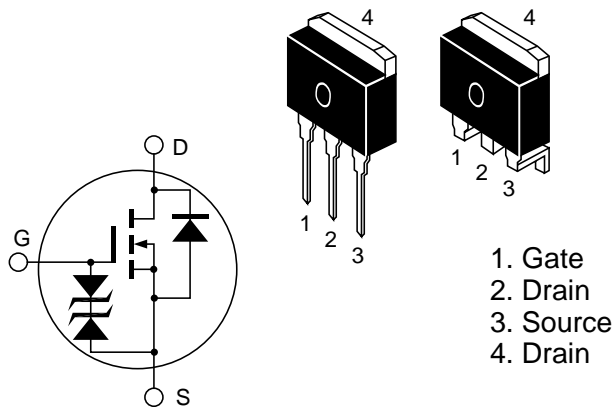
ADE-208-750A (Z)  
2nd. Edition  
February 1999

## Features

- Low on-resistance  
 $R_{DS} = 45 \text{ m}\Omega$  typ.
- High speed switching
- 4 V gate drive device can be driven from 5 V source

## Outline

LDBPAK



## Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	100	V
Gate to source voltage	$V_{GSS}$	±20	V
Drain current	$I_D$	20	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	60	A
Body-drain diode reverse drain current	$I_{DR}$	20	A
Avalanche current	$I_{AP}$ <sup>Note3</sup>	20	A
Avalanche energy	$E_{AR}$ <sup>Note3</sup>	40	mJ
Channel dissipation	$P_{ch}$ <sup>Note2</sup>	50	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	-55 to +150	°C

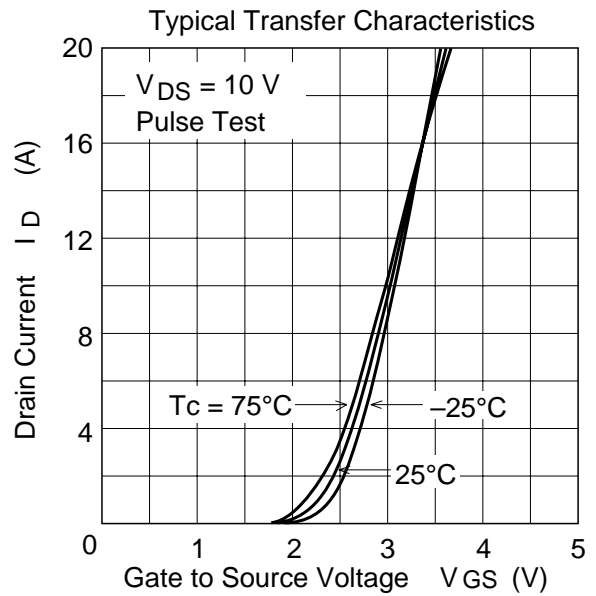
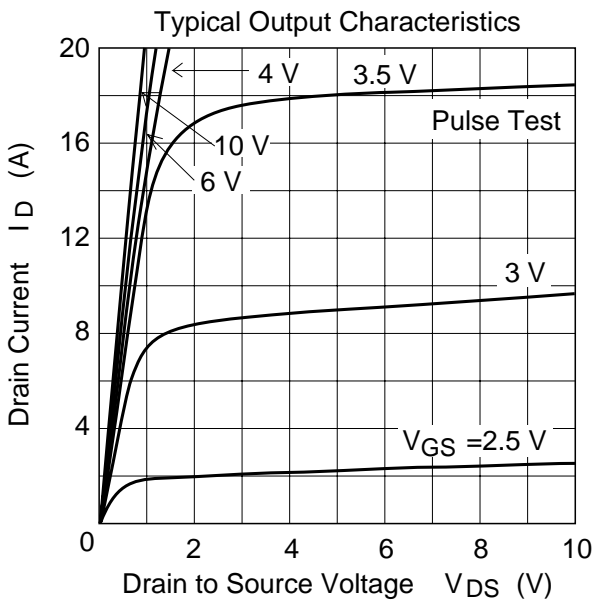
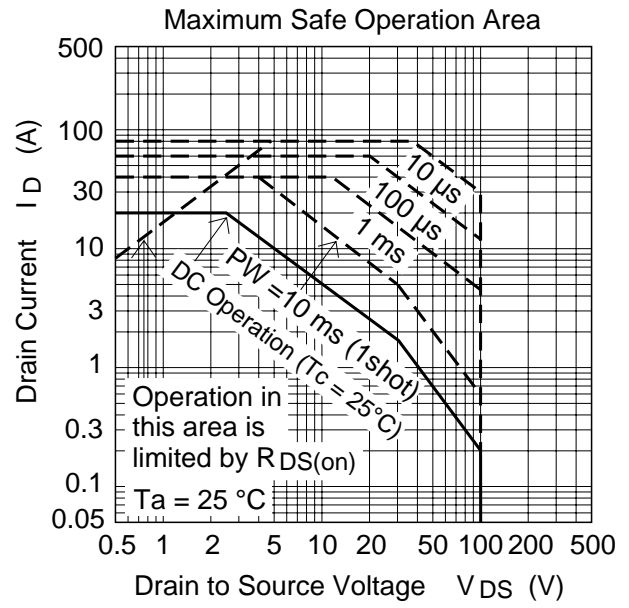
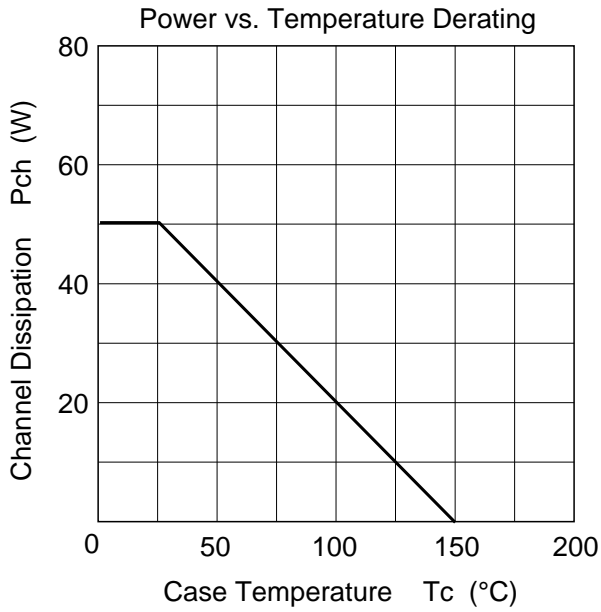
Note: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$   
 2. Value at  $T_c = 25^\circ C$   
 3. Value at  $T_{ch} = 25^\circ C$ ,  $R_g \geq 50 \Omega$

## Electrical Characteristics (Ta = 25°C)

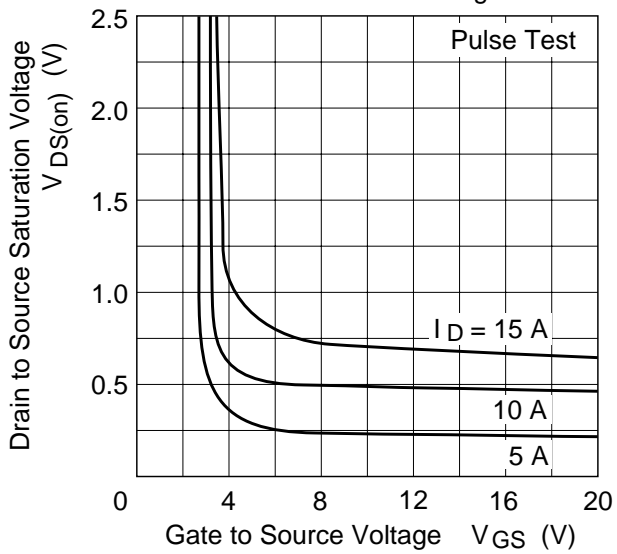
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	100	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	$I_G = \pm 100 \mu A$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	±10	μA	$V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	μA	$V_{DS} = 100 \text{ V}$ , $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.0	—	2.5	V	$I_D = 1 \text{ mA}$ , $V_{DS} = 10 \text{ V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	45	60	mΩ	$I_D = 10 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	65	85	mΩ	$I_D = 10 \text{ A}$ , $V_{GS} = 4 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	8.5	15	—	S	$I_D = 10 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	900	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	$C_{oss}$	—	400	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	210	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	$I_D = 10 \text{ A}$ , $V_{GS} = 10 \text{ V}$
Rise time	$t_r$	—	120	—	ns	$R_L = 3 \Omega$
Turn-off delay time	$t_{d(off)}$	—	200	—	ns	
Fall time	$t_f$	—	150	—	ns	
Body-drain diode forward voltage	$V_{DF}$	—	0.9	—	V	$I_F = 20 \text{ A}$ , $V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	90	—	ns	$I_F = 20 \text{ A}$ , $V_{GS} = 0$ $di_F/dt = 50 \text{ A}/\mu s$

Note: 4. Pulse test

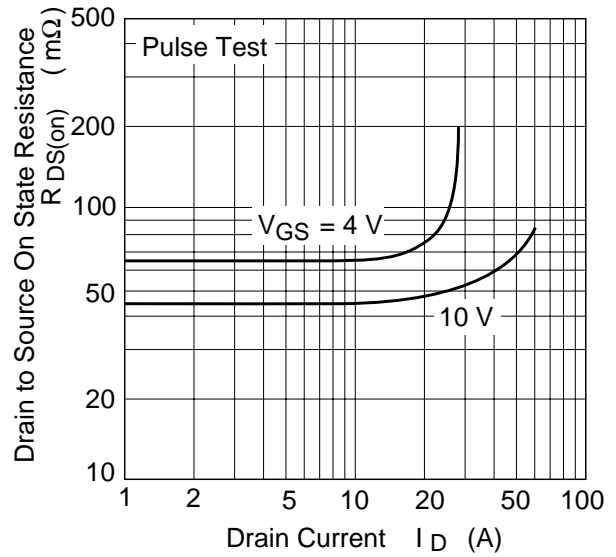
Main Characteristics



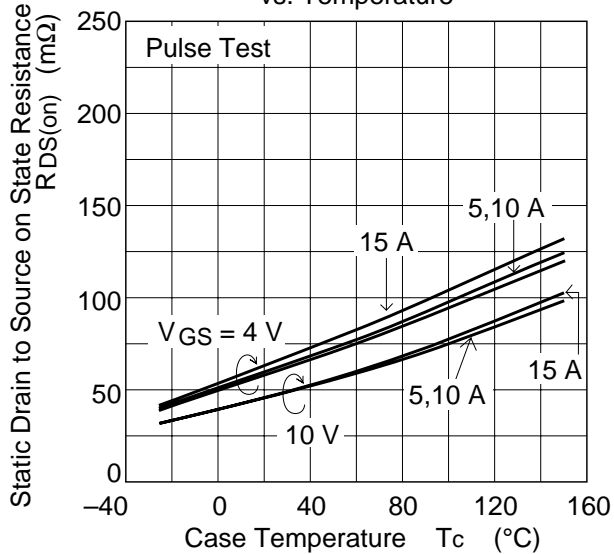
Drain to Source Saturation Voltage vs. Gate to Source Voltage



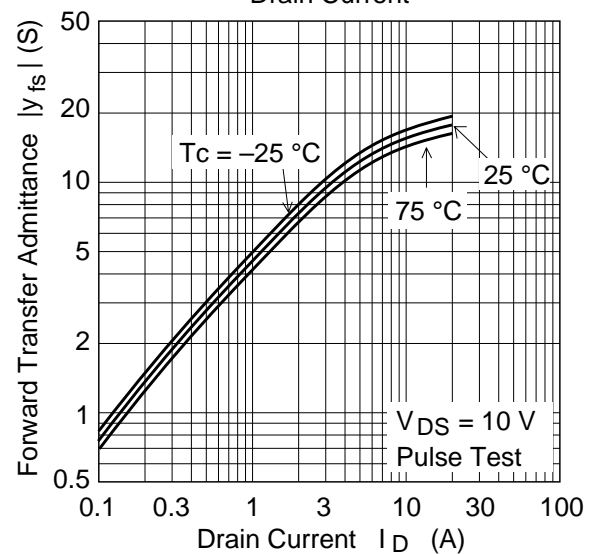
Static Drain to Source on State Resistance vs. Drain Current

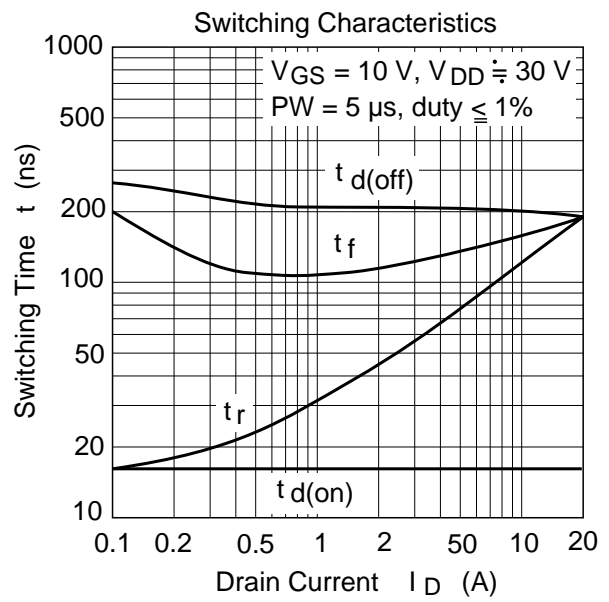
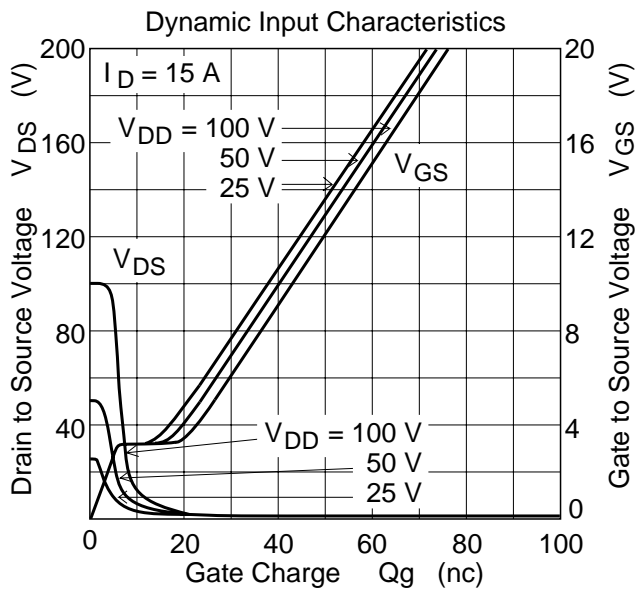
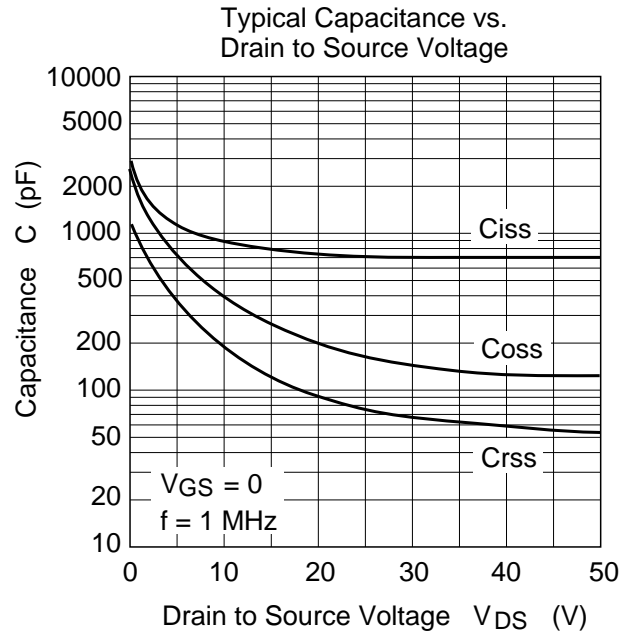
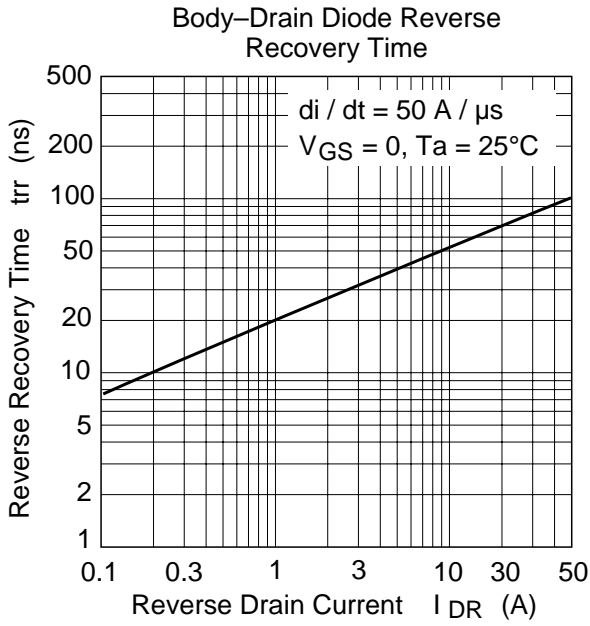


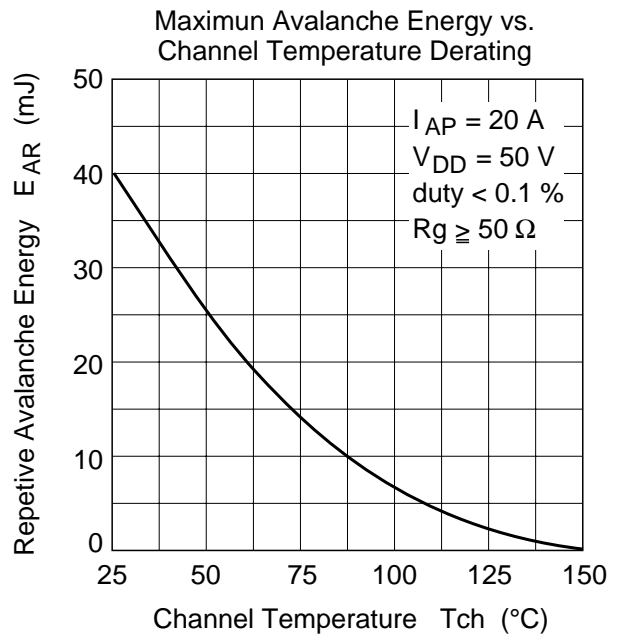
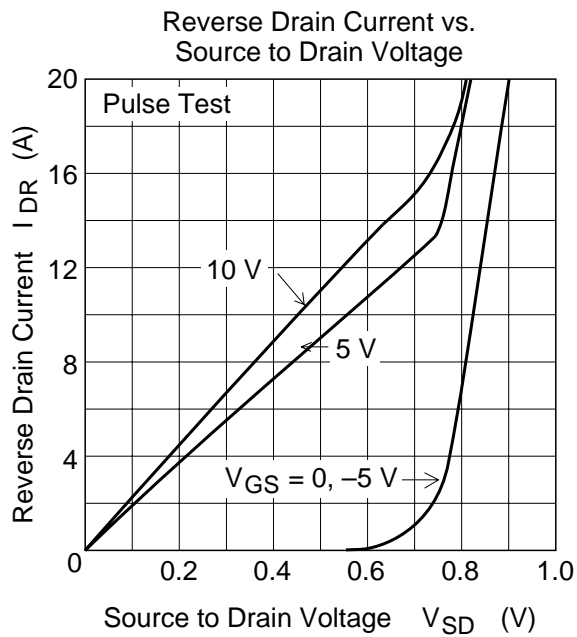
Static Drain to Source on State Resistance vs. Temperature



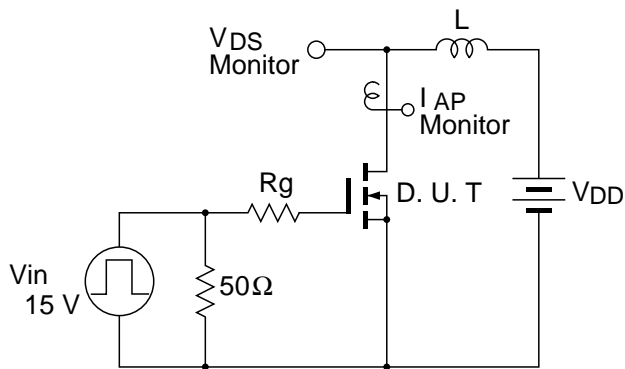
Forward Transfer Admittance vs. Drain Current





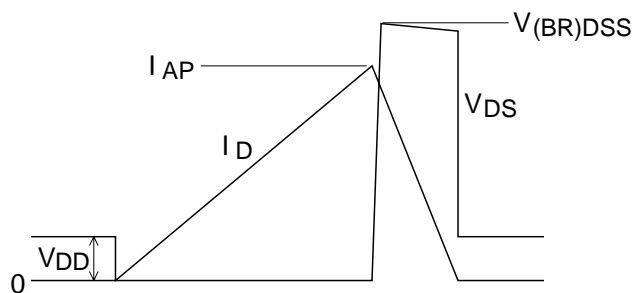


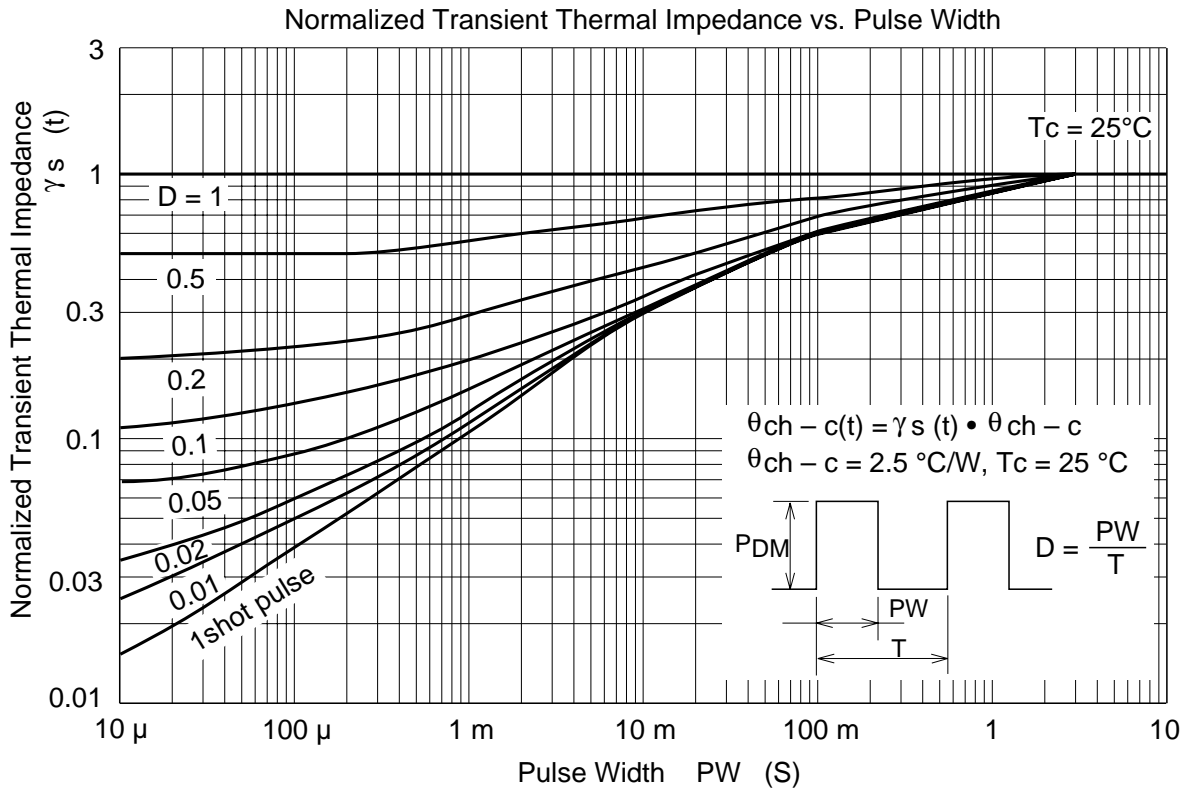
Avalanche Test Circuit



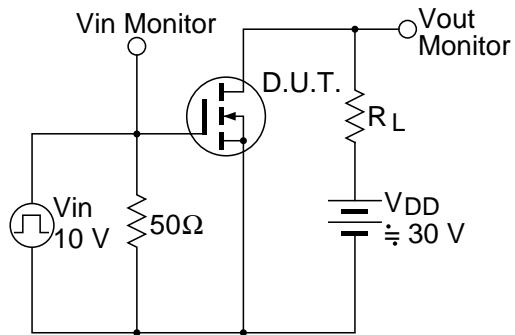
Avalanche Waveform

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

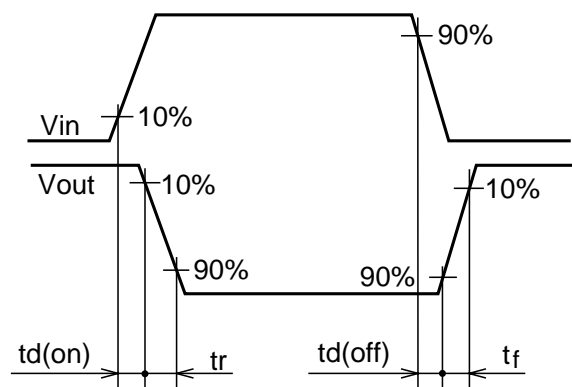




Switching Time Test Circuit



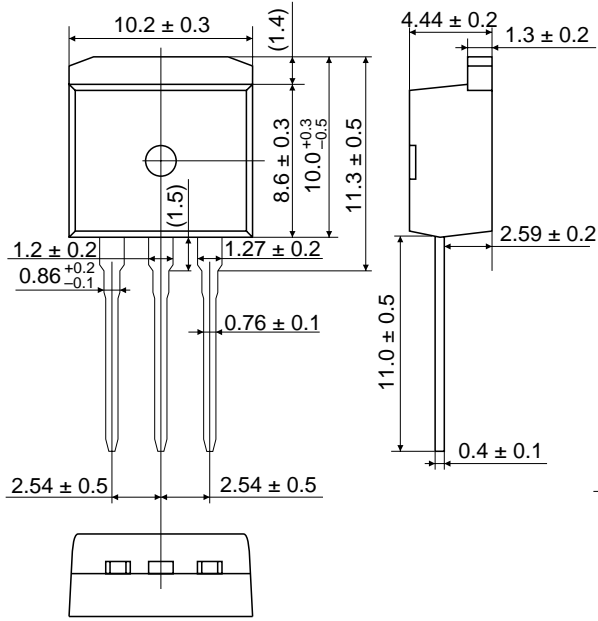
Waveform



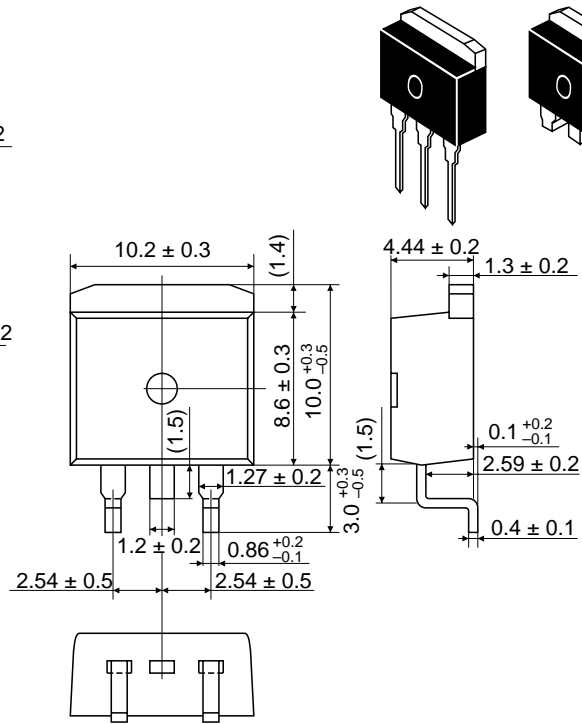
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## Package Dimensions

Unit: mm



Ⓛ type



Ⓢ type

Hitachi Code	LDPAK
EIAJ	—
JEDEC	—



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