

HAT2058R/HAT2058RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

ADE-208-934 (Z)

1st. Edition

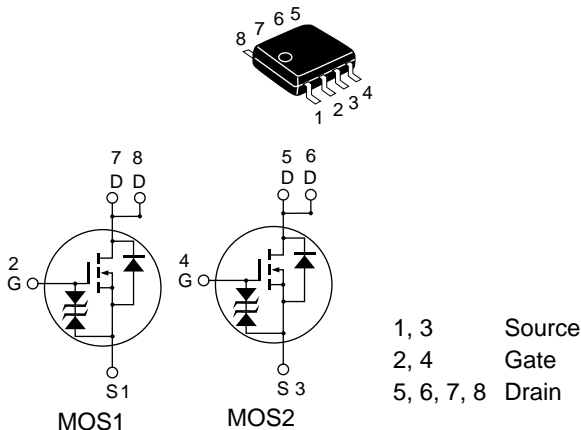
Mar. 2001

Features

- Low on-resistance
- Capable of 4 V gate drive
- Low drive current
- High density mounting
- “J” is for Automotive application
High temperature D-S leakage guarantee
Avalanche rating

Outline

SOP-8



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings		Unit
		HAT2058R	HAT2058RJ	
Drain to source voltage	V_{DSS}	100	100	V
Gate to source voltage	V_{GSS}	±20	±20	V
Drain current	I_D	4	4	A
Drain peak current	I_D (pulse) ^{Note1}	32	32	A
Body-drain diode reverse drain current	I_{DR}	4	4	A
Avalanche current	I_{AP} ^{Note4}	—	4	A
Avalanche energy	E_{AR} ^{Note4}	—	1.6	mJ
Channel dissipation	P_{ch} ^{Note2}	2	2	W
	P_{ch} ^{Note3}	3	3	W
Channel temperature	Tch	150	150	°C
Storage temperature	Tstg	−55 to +150	−55 to +150	°C

Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$

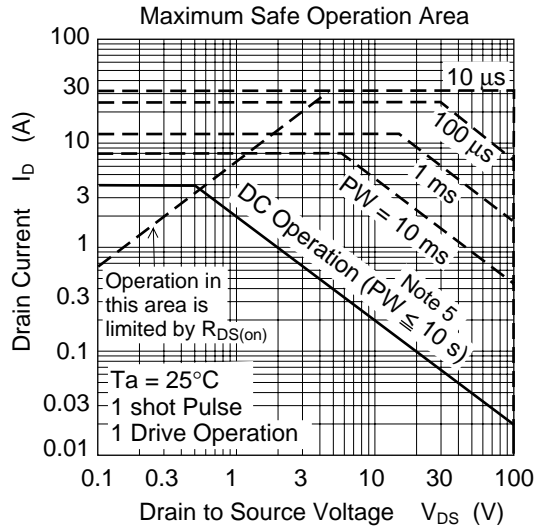
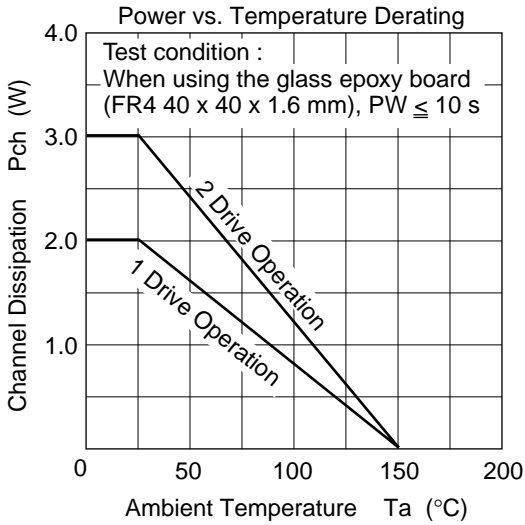
- 1 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10 s$
- 2 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10 s$
- 3 Value at Tch = 25°C, $R_g \geq 50 \Omega$
- 4 Value at Tch = 25°C, $R_g \geq 50 \Omega$

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	$I_G = \pm 100 \text{ }\mu\text{A}, V_{DS} = 0$
Zero gate voltage drain current	HAT2058R	I_{DSS}	—	—	1	μA	$V_{DS} = 100 \text{ V}, V_{GS} = 0$
	HAT2058RJ	I_{DSS}	—	—	0.1	μA	
Zero gate voltage drain current	HAT2058R	I_{DSS}	—	—	—	μA	$V_{DS} = 80 \text{ V}, V_{GS} = 0$
	HAT2058RJ	I_{DSS}	—	—	10	μA	$T_a = 125^\circ\text{C}$
Gate to source cutoff voltage		I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$
Static drain to source on state resistance		$V_{GS(off)}$	1.0	—	2.5	V	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$
Forward transfer admittance		$ y_{fs} $	3	5	—	S	$I_D = 2 \text{ A}^{*1}, V_{DS} = 10 \text{ V}$
Static drain to source on state resistance		$R_{DS(on)}$	—	120	145	$\text{m}\Omega$	$I_D = 2 \text{ A}^{*1}, V_{GS} = 10 \text{ V}$
		$R_{DS(on)}$	—	150	180	$\text{m}\Omega$	$I_D = 2 \text{ A}^{*1}, V_{GS} = 4 \text{ V}$
Input capacitance		C_{iss}	—	420	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0$
Output capacitance		C_{oss}	—	180	—	pF	$f = 1 \text{ MHz}$
Reverse transfer capacitance		C_{rss}	—	100	—	pF	
Turn-on delay time		$t_d(on)$	—	10	—	ns	$V_{GS} = 10 \text{ V}, I_D = 2 \text{ A}$
Rise time		t_r	—	30	—	ns	$V_{DD} \cong 30 \text{ V}$
Turn-off delay time		$t_d(off)$	—	110	—	ns	
Fall time		t_f	—	60	—	ns	
Body-drain diode forward voltage		V_{DF}	—	0.85	1.1	V	$I_F = 4 \text{ A}, V_{GS} = 0^{*1}$
Body-drain diode reverse recovery time		t_{rr}	—	75	—	ns	$I_F = 4 \text{ A}, V_{GS} = 0$ $diF/dt = 50 \text{ A}/\mu\text{s}$

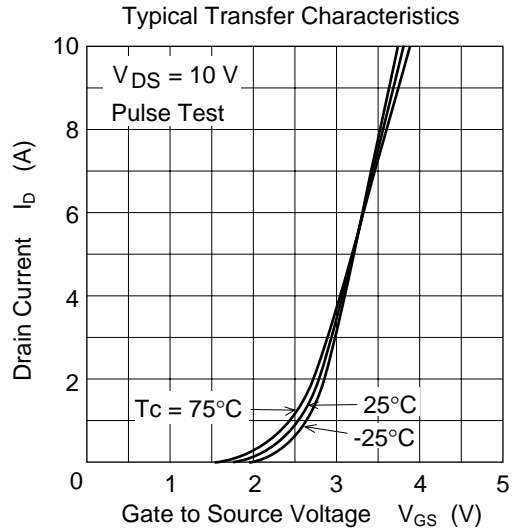
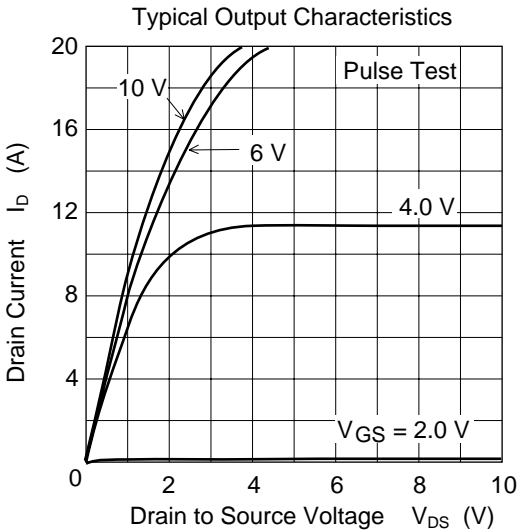
Note: 1. Pulse test

Main Characteristics

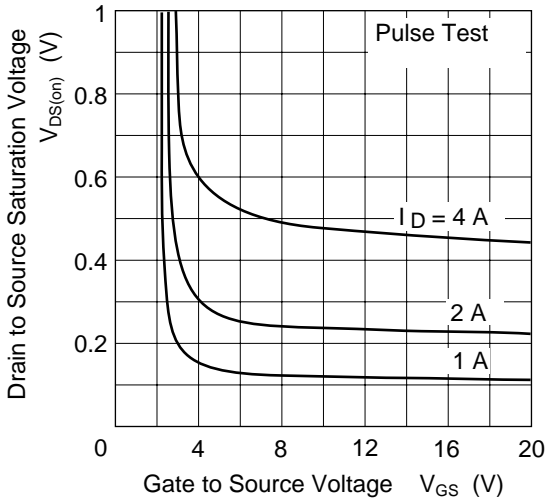


Note 6:

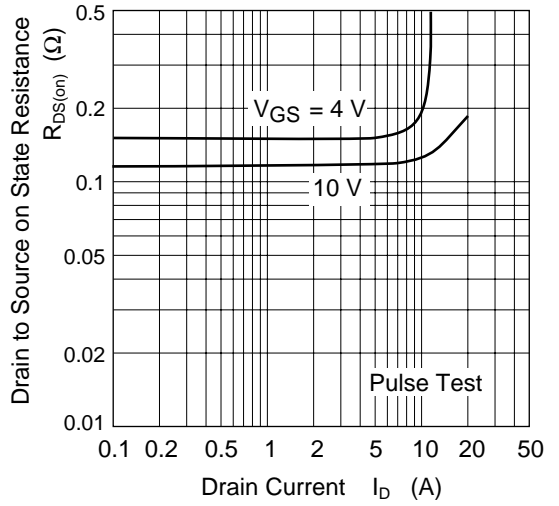
When using the glass epoxy board
(FR4 40 x 40 x 1.6 mm)



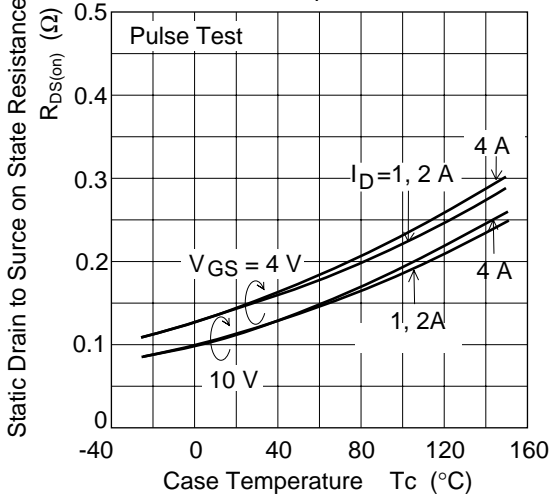
Drain to Source Saturation Voltage vs. Gate to Source Voltage



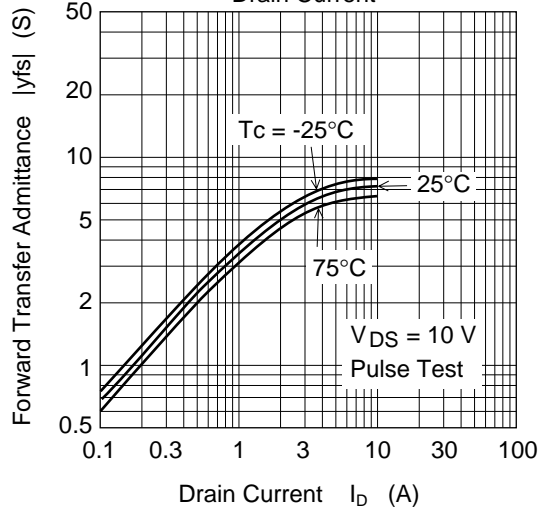
Static Drain to Source on State Resistance vs. Drain Current



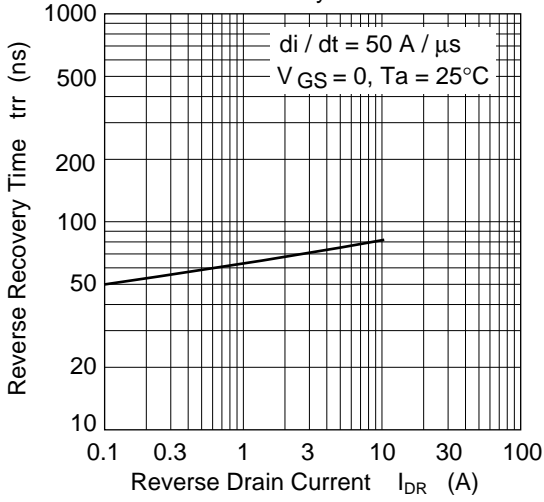
Static Drain to Source on State Resistance vs. Temperature



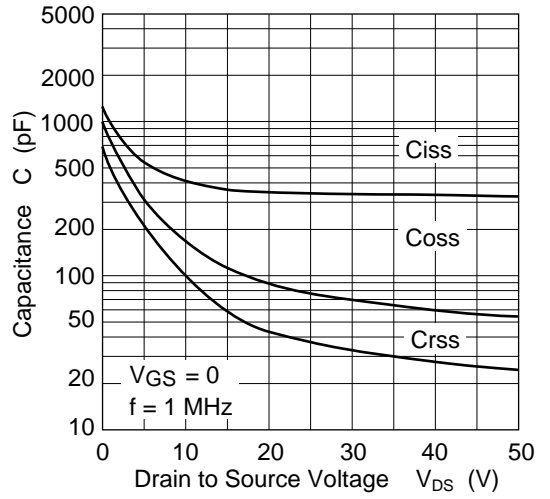
Forward Transfer Admittance vs. Drain Current



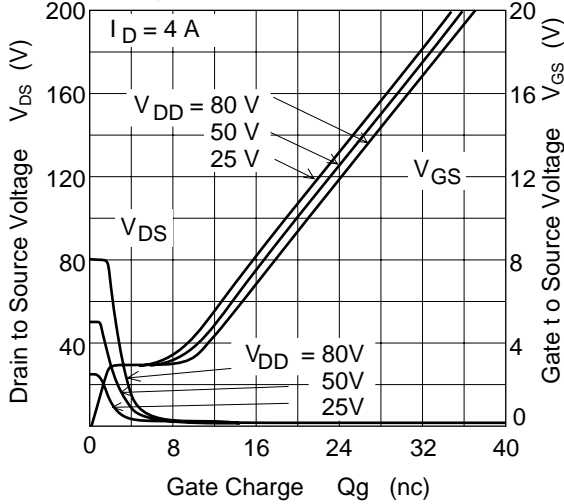
Body-Drain Diode Reverse Recovery Time



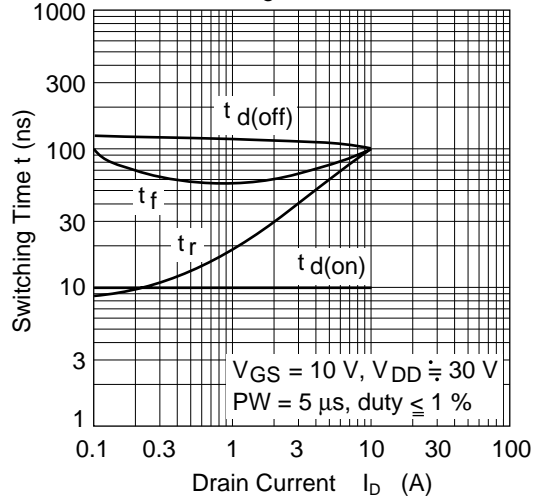
Typical Capacitance vs. Drain to Source Voltage



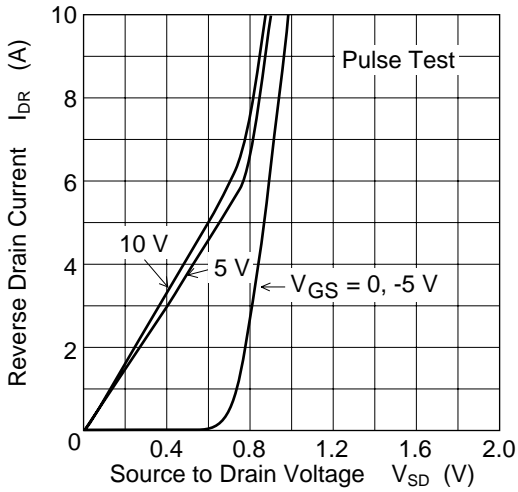
Dynamic Input Characteristics



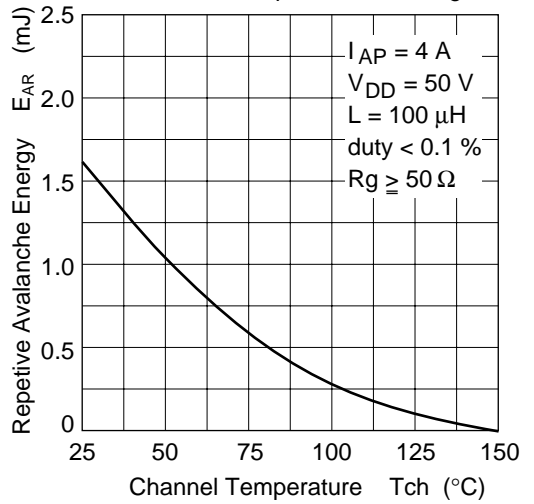
Switching Characteristics



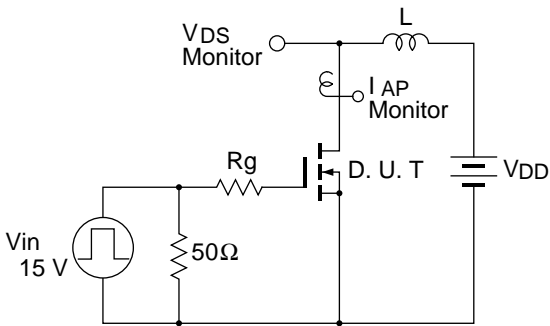
Reverse Drain Current vs. Source to Drain Voltage



Maximum Avalanche Energy vs. Channel Temperature Derating

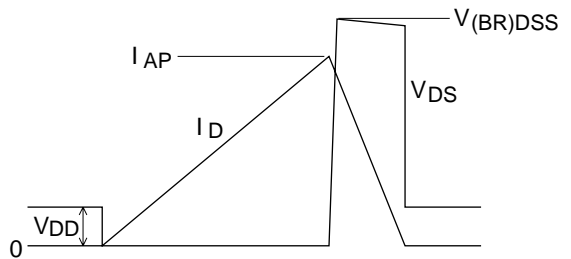


Avalanche Test Circuit

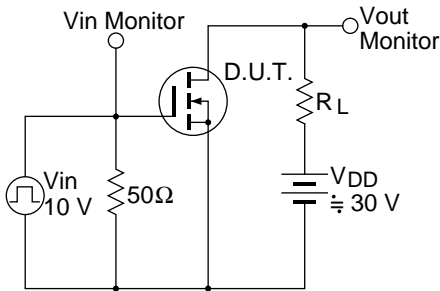


Avalanche Waveform

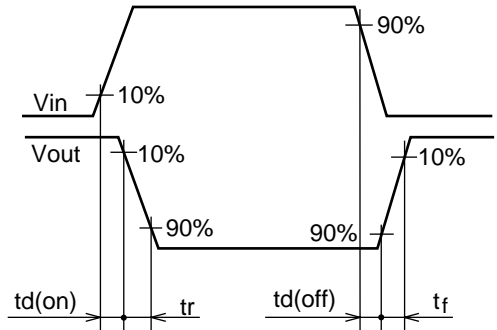
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

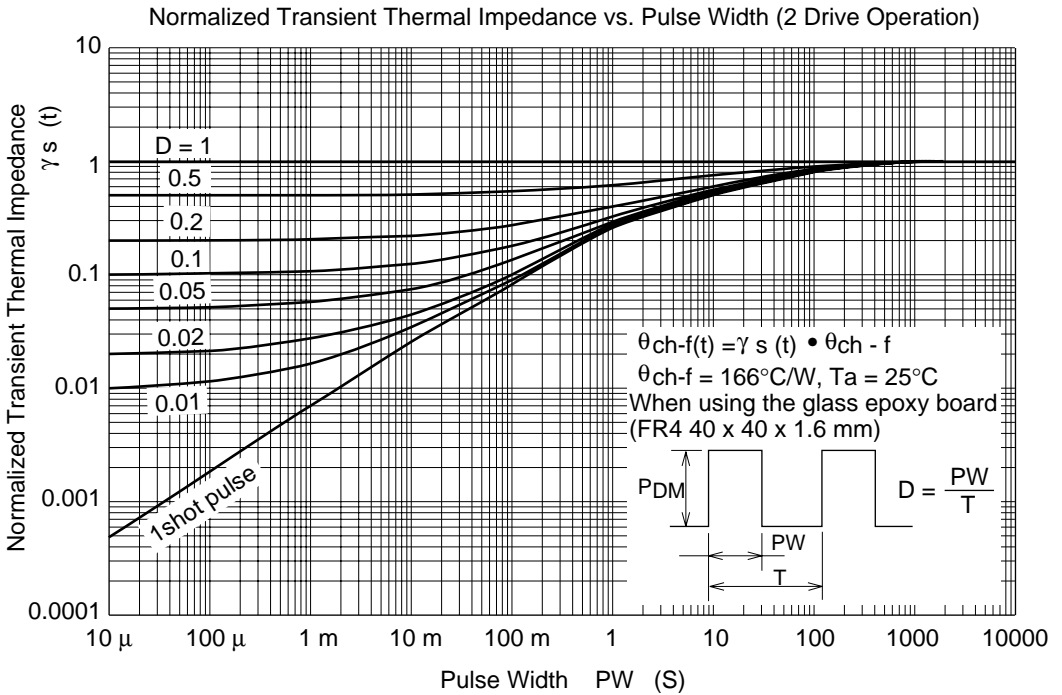
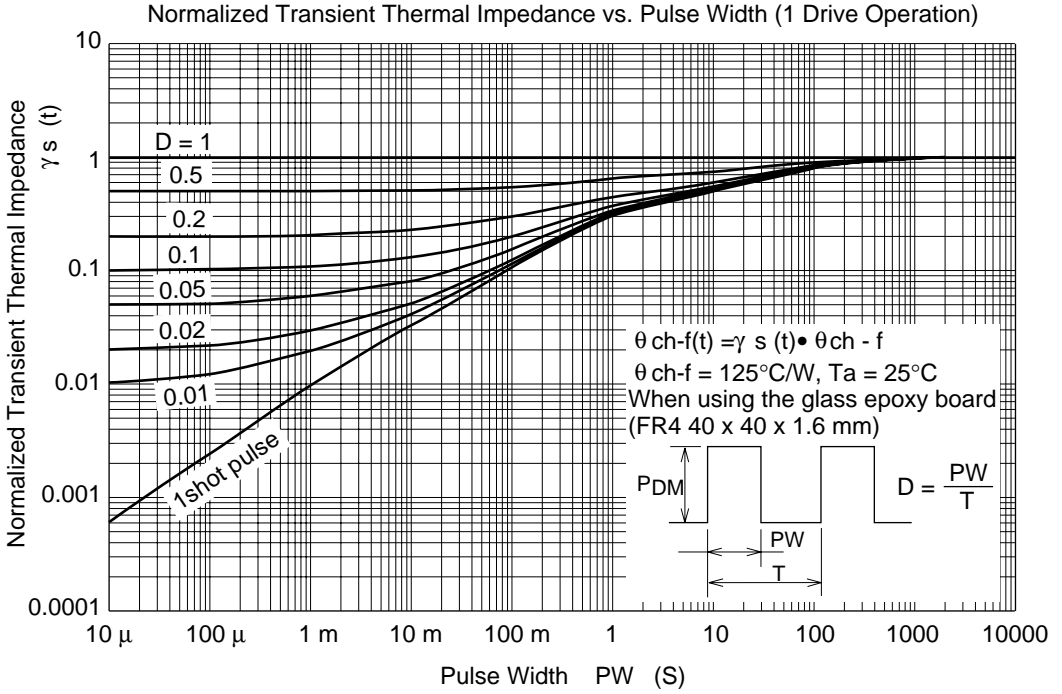


Switching Time Test Circuit



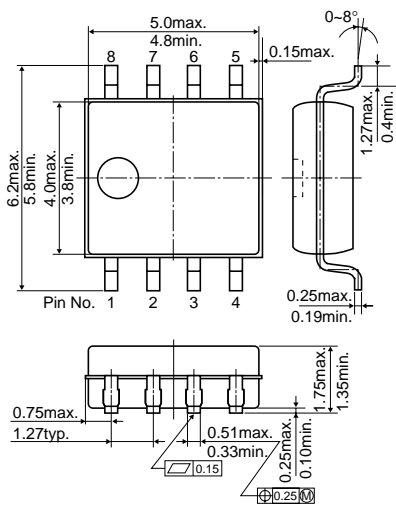
Switching Time Waveform





Package Dimensions

Unit: mm



Hitachi Code	FP-8DA
JEDEC	—
EIAJ	—

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