

HAT2060R/HAT2060RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

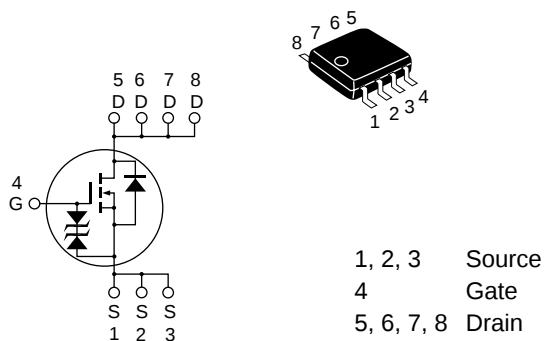
ADE-208-936 (Z)
1st. Edition
Mar. 2001

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

External View

SOP-8



Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings		Unit
		HAT2060R	HAT2060RJ	
Drain to source voltage	V _{DSS}	200	200	V
Gate to source voltage	V _{GSS}	±20	±20	V
Drain current	I _D	2	2	A
Drain peak current	I _D (pulse) ^{Note1}	16	16	A
Body-drain diode reverse drain current	I _{DR}	2	2	A
Avalanche current	I _{AP} ^{Note4}	—	4	A
Avalanche energy	E _{AR} ^{Note4}	—	0.266	mJ
Channel dissipation	Pch ^{Note2}	2	2	W
	Pch ^{Note3}	3	3	W
Channel temperature	Tch	150	150	°C
Storage temperature	Tstg	−55 to +150	−55 to +150	°C

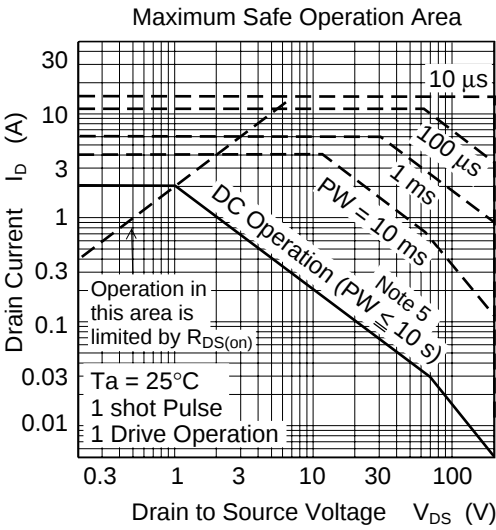
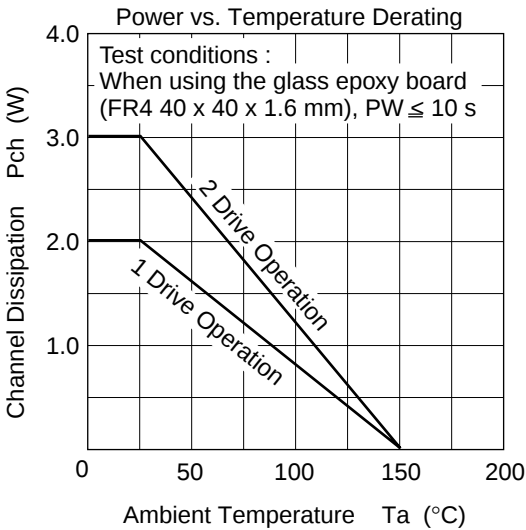
- Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. 1 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
3. 2 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s
4. Value Tch = 25°C, Rg ≥ 50 Ω

Electrical Characteristics (Ta = 25°C)

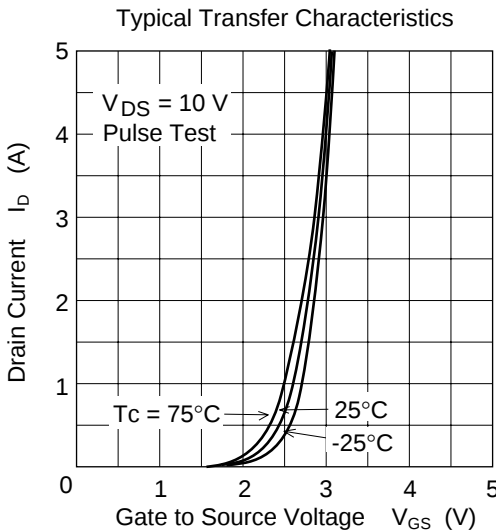
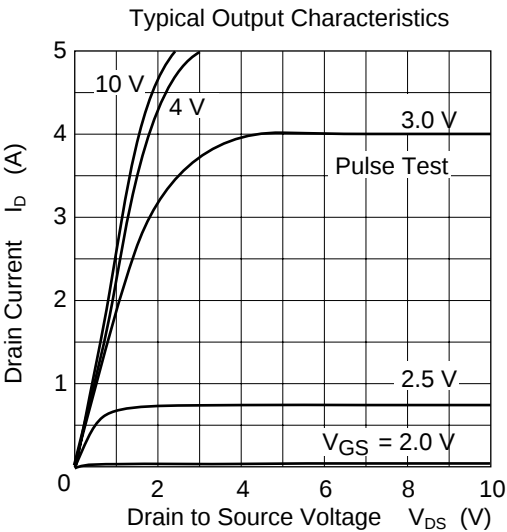
Item		Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage		$V_{(BR)DSS}$	200	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage		$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Zero gate voltage	HAT2060R	I_{DSS}	—	—	1	μA	$V_{DS} = 200 \text{ V}$, $V_{GS} = 0$
drain current	HAT2060RJ	I_{DSS}	—	—	0.1	μA	
Zero gate voltage	HAT2060R	I_{DSS}	—	—	—	μA	$V_{DS} = 160 \text{ V}$, $V_{GS} = 0$
drain current	HAT2060RJ	I_{DSS}	—	—	10	μA	Ta = 125°C
Gate to source leak current		I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Gate to source cutoff voltage		$V_{GS(off)}$	1.0	—	2.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Forward transfer admittance		$ y_{fs} $	2	3.2	—	S	$I_D = 1 \text{ A}$ ^{Note1} , $V_{DS} = 10 \text{ V}$
Stataic drain to source on state resistance		$R_{DS(on)}$	—	410	450	m Ω	$I_D = 1 \text{ A}$ ^{Note1} , $V_{GS} = 10 \text{ V}$
		$R_{DS(on)}$	—	450	550	m Ω	$I_D = 1 \text{ A}$ ^{Note1} , $V_{GS} = 4 \text{ V}$
Input capacitance		Ciss	—	380	—	pF	$V_{DS} = 10 \text{ V}$, $V_{GS} = 0$
Output capacitance		Coss	—	125	—	pF	f = 1 MHz
Reverse transfer capacitance		Crss	—	75	—	pF	
Turn-on delay time		td(on)	—	10	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 1 \text{ A}$
Rise time		tr	—	17	—	ns	$V_{DD} \cong 30 \text{ V}$
Turn-off delay time		td(off)	—	110	—	ns	
Fall time		tf	—	45	—	ns	
Body-ddrain diode forward voltage		V_{DF}	—	0.82	1.07	V	$I_F = 2 \text{ A}$, $V_{GS} = 0^{*1}$
Body-drain diode reverse recovery time		trr	—	95	—	ns	$I_F = 2 \text{ A}$, $V_{GS} = 0$ diF/dt = 50 A/ μs

Note: 1. Pulse test

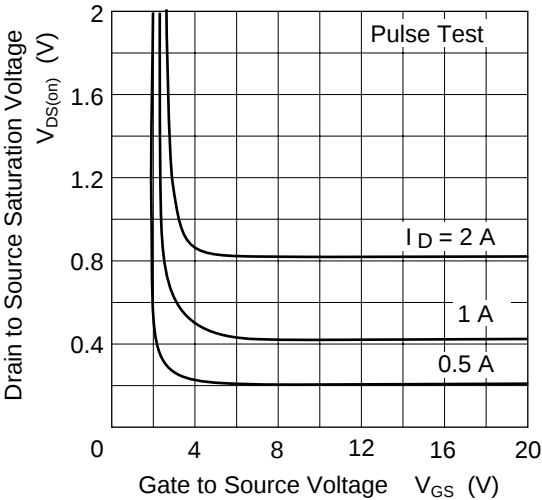
Main Characteristics



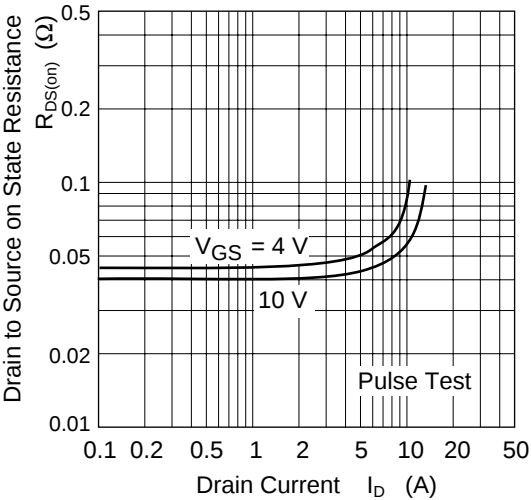
Note 5:
When using the glass epoxy board
(FR4 40 x 40 x 1.6 mm)



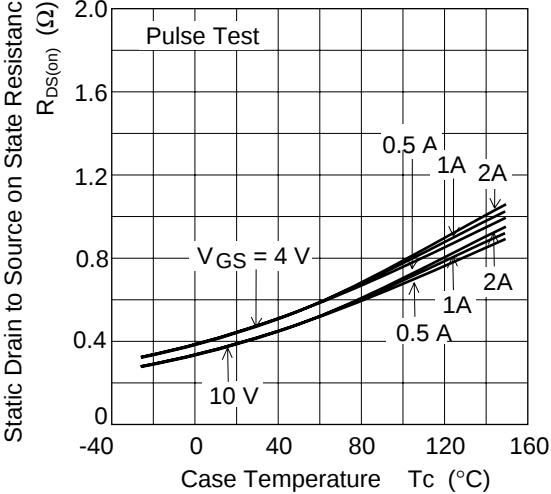
Drain to Source Saturation Voltage vs.
Gate to Source Voltage



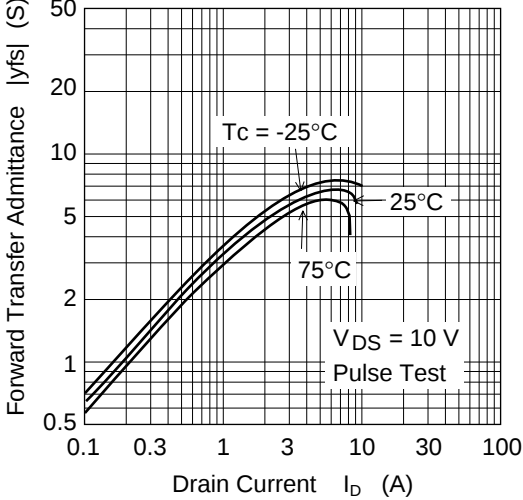
Static Drain to Source on State Resistance
vs. Drain Current

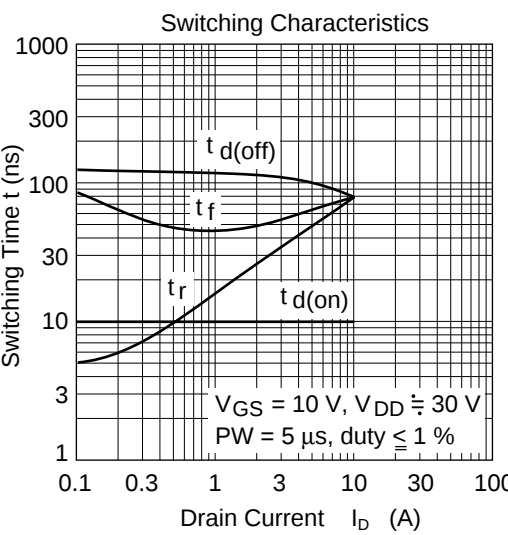
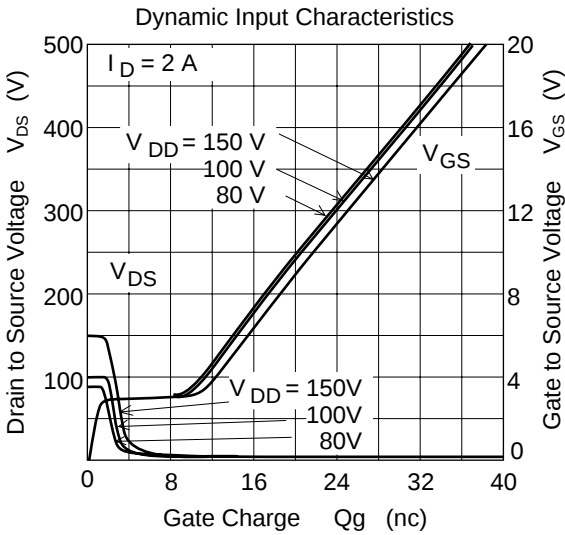
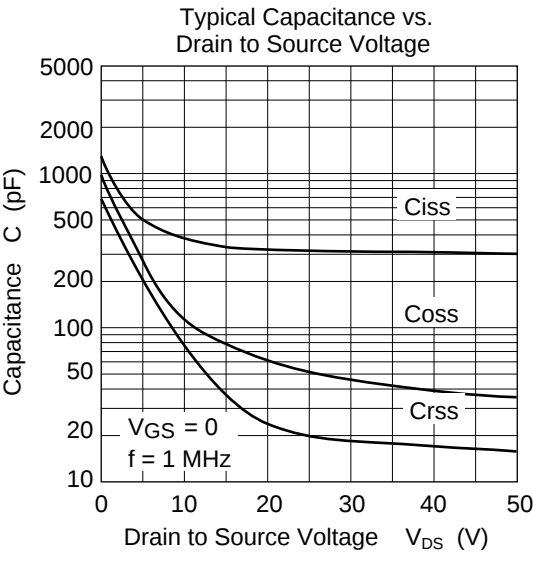
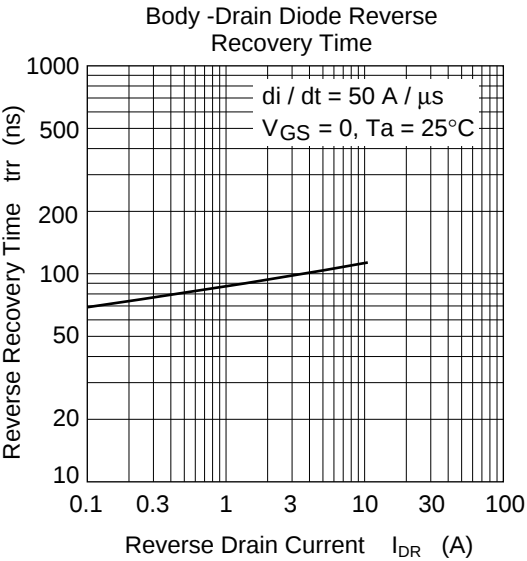


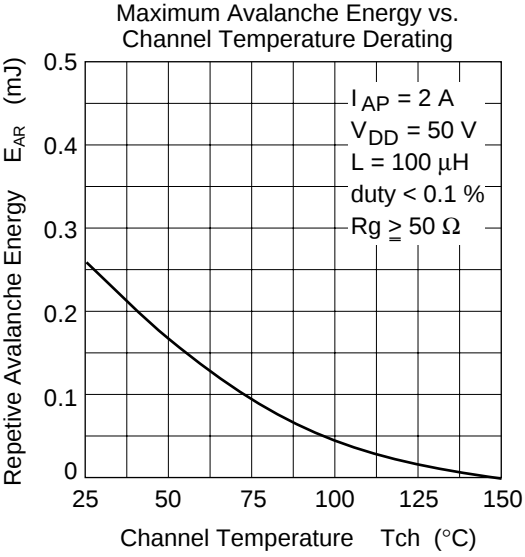
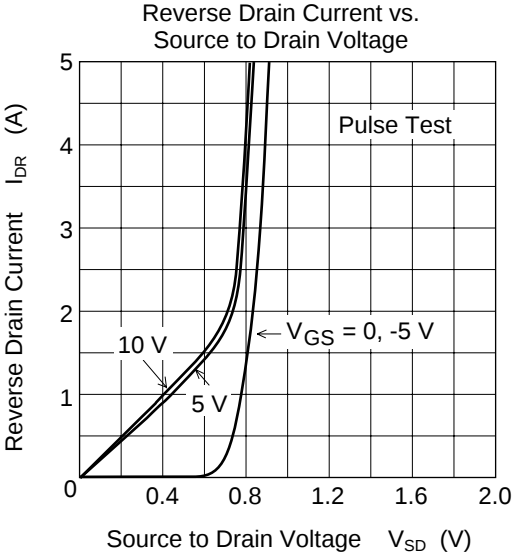
Static Drain to Source on State Resistance
vs. Temperature



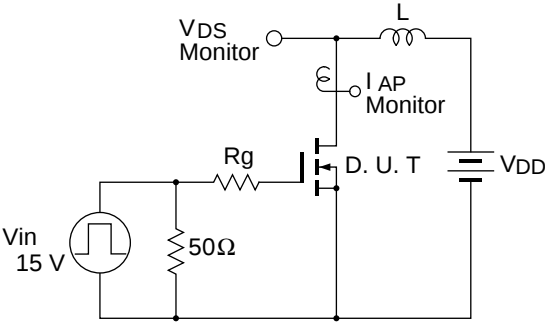
Forward Transfer Admittance vs.
Drain Current





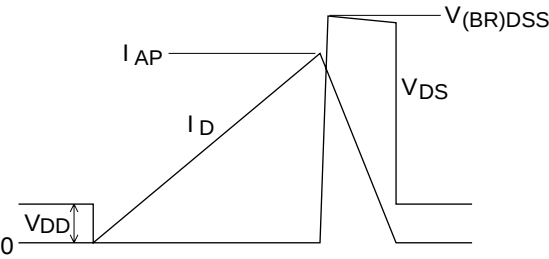


Avalanche Test Circuit

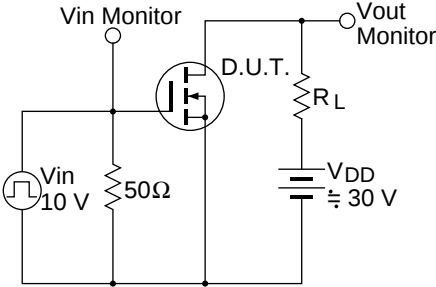


Avalanche Waveform

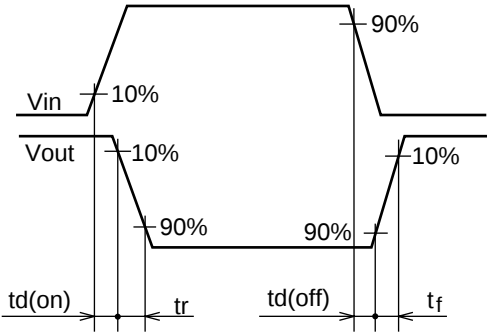
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

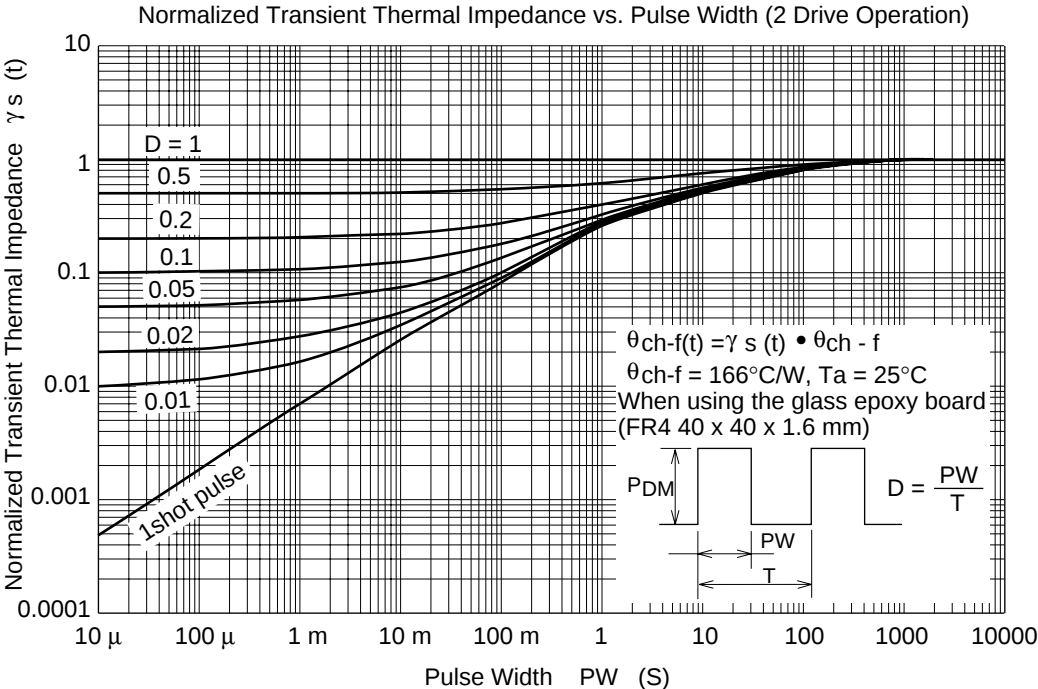
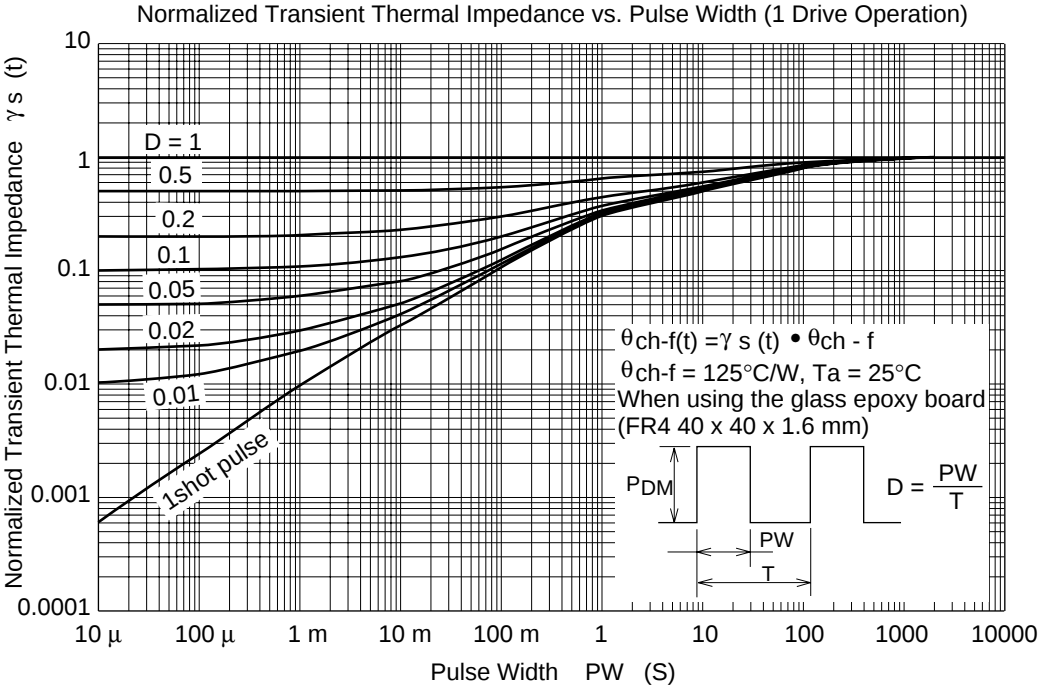


Switching Time Test Circuit



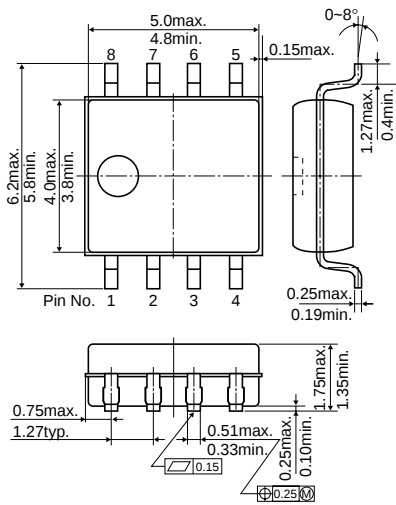
Switching Time Waveform





Package Dimensions

Unit: mm



Hitachi Code	FP-8DA
JEDEC	—
EIAJ	—

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