

HAT2060R/HAT2060RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

HITACHI

ADE-208-936 (Z)

1st. Edition

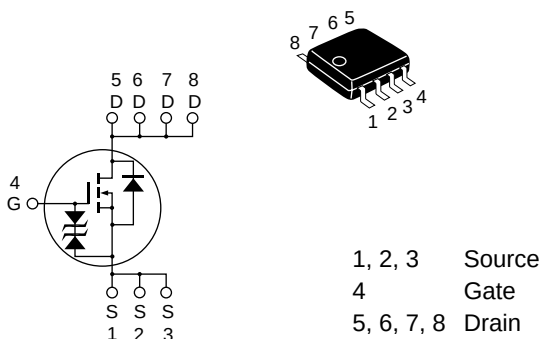
Mar. 2001

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	P_{ch} ^{Note2}	2	2	W
	P_{ch} ^{Note3}	3	3	W
Channel temperature	T_{ch}	150	150	°C
Storage temperature	T_{stg}	−55 to +150	−55 to +150	°C

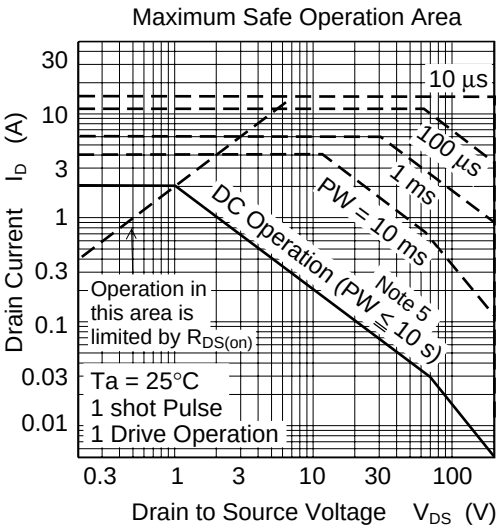
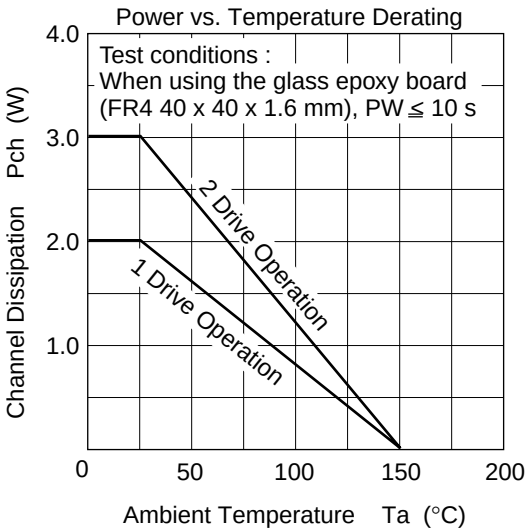
- Notes: 1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$
2. 1 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10 s$
3. 2 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), $PW \leq 10 s$
4. Value $T_{ch} = 25^{\circ}C$, $R_g \geq 50 \Omega$

Electrical Characteristics (Ta = 25°C)

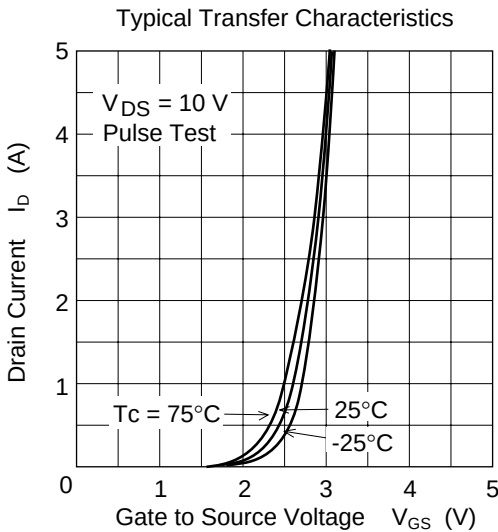
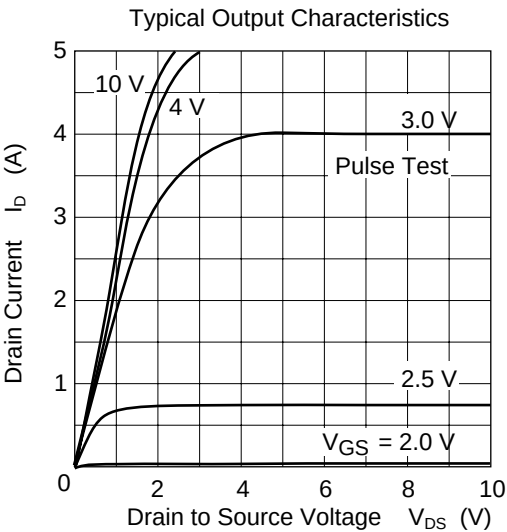
Item		Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage		$V_{(BR)DSS}$	200	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source breakdown voltage		$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Zero gate voltage	HAT2060R	I_{DSS}	—	—	1	μA	$V_{DS} = 200 \text{ V}$, $V_{GS} = 0$
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

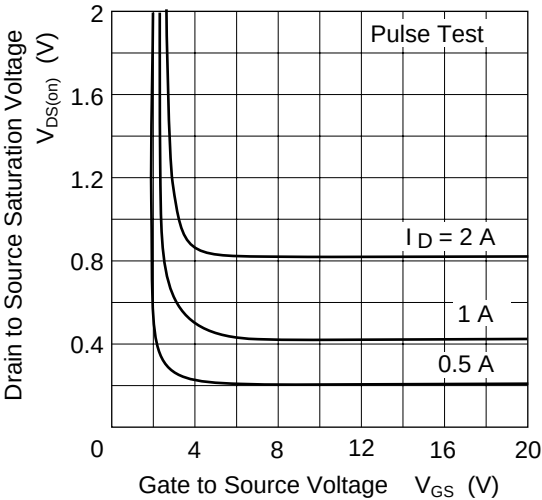
Main Characteristics



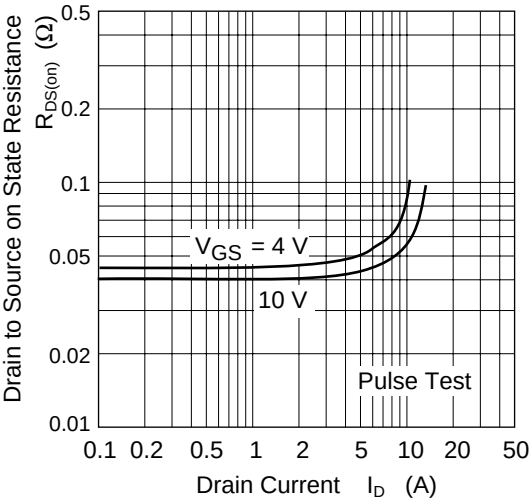
Note 5:
When using the glass epoxy board
(FR4 40 x 40 x 1.6 mm)



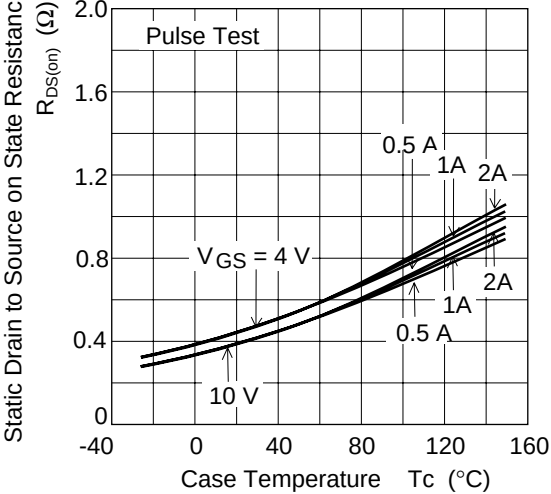
Drain to Source Saturation Voltage vs.
Gate to Source Voltage



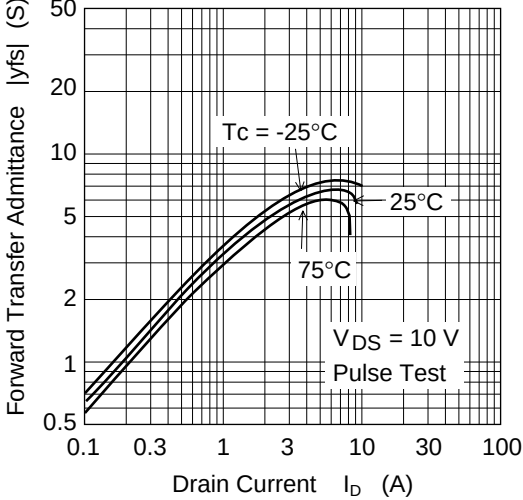
Static Drain to Source on State Resistance
vs. Drain Current

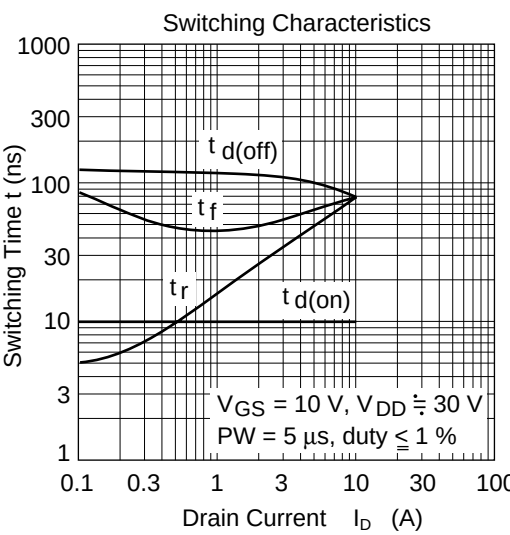
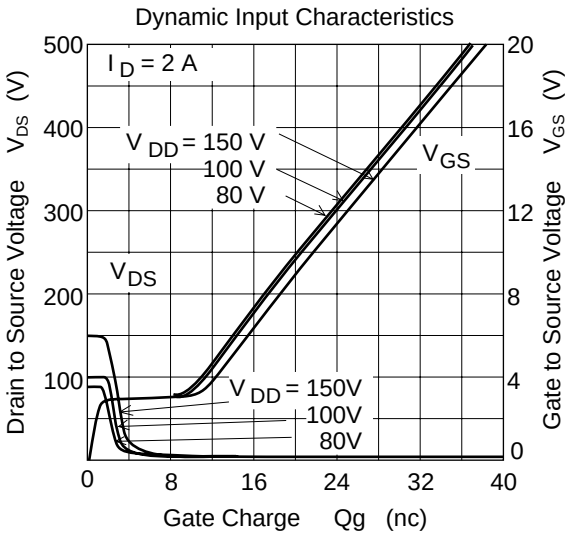
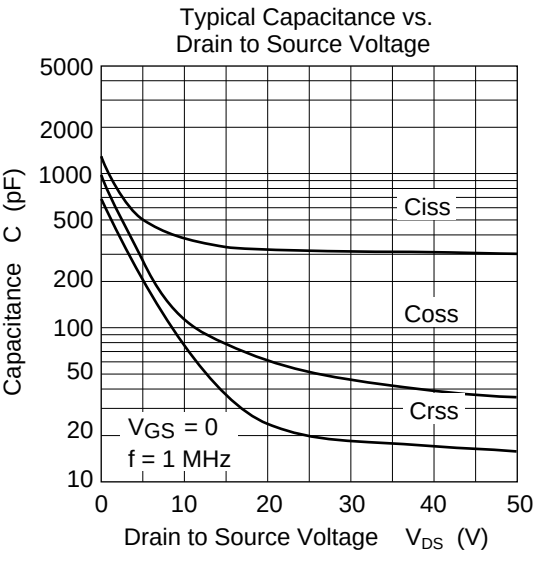
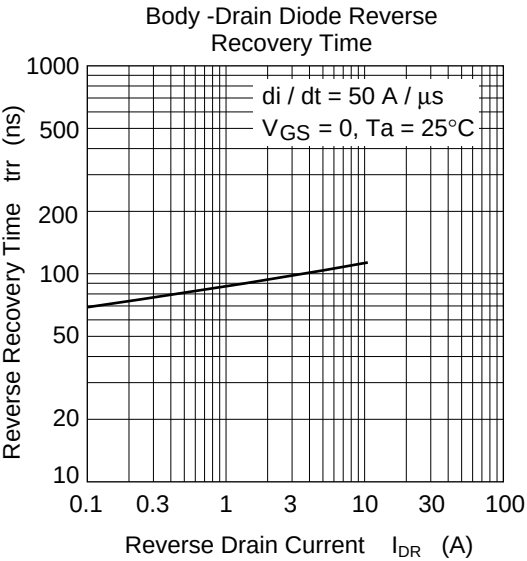


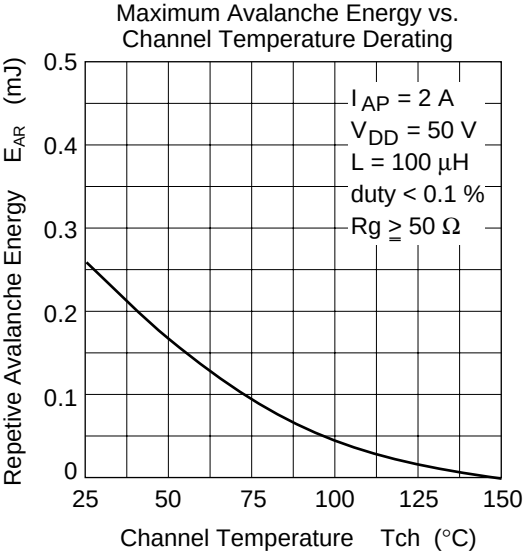
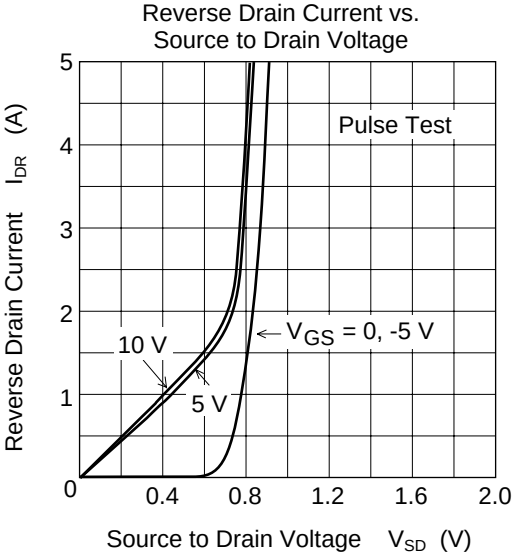
Static Drain to Source on State Resistance
vs. Temperature



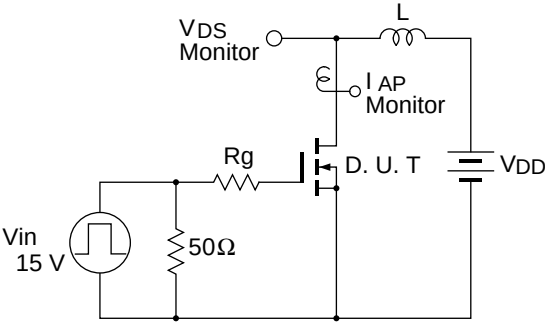
Forward Transfer Admittance vs.
Drain Current





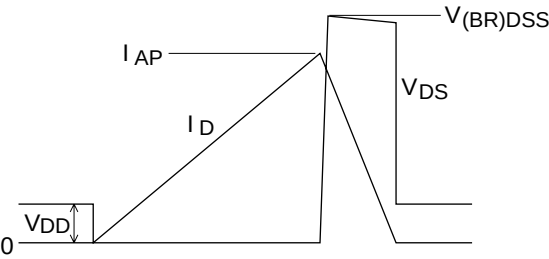


Avalanche Test Circuit

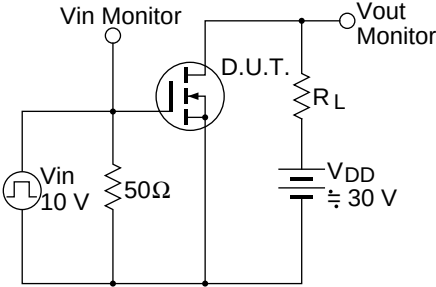


Avalanche Waveform

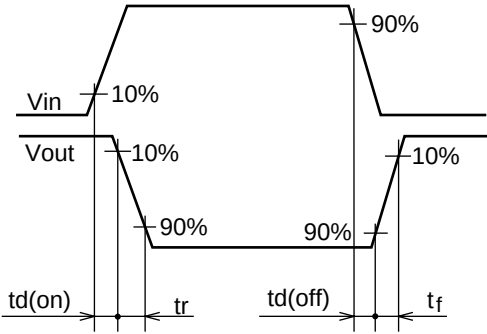
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

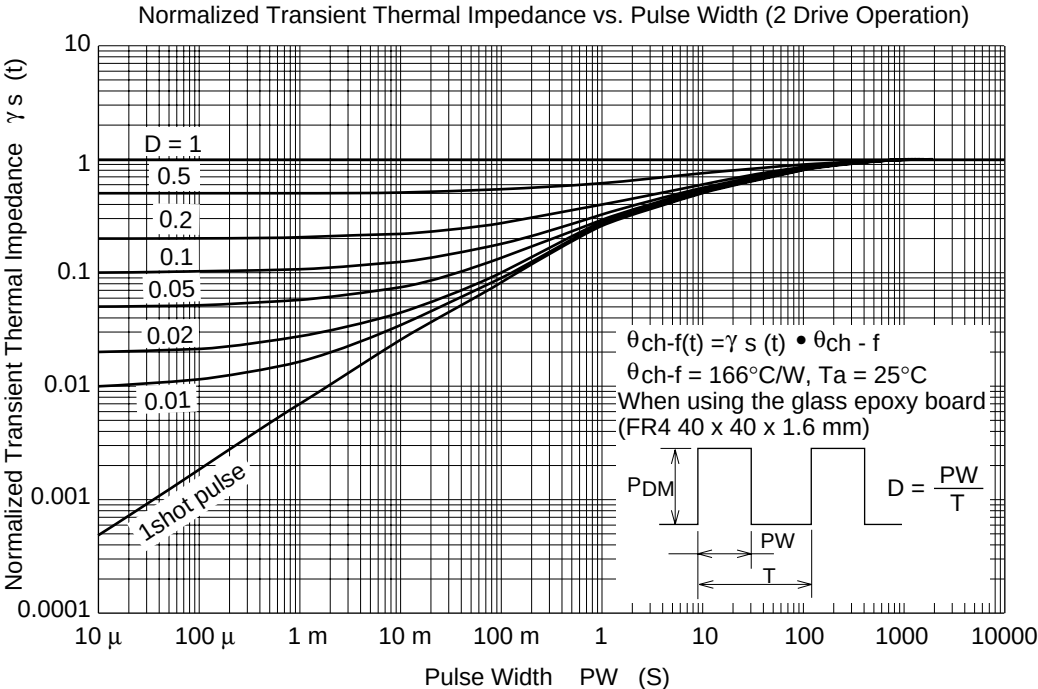
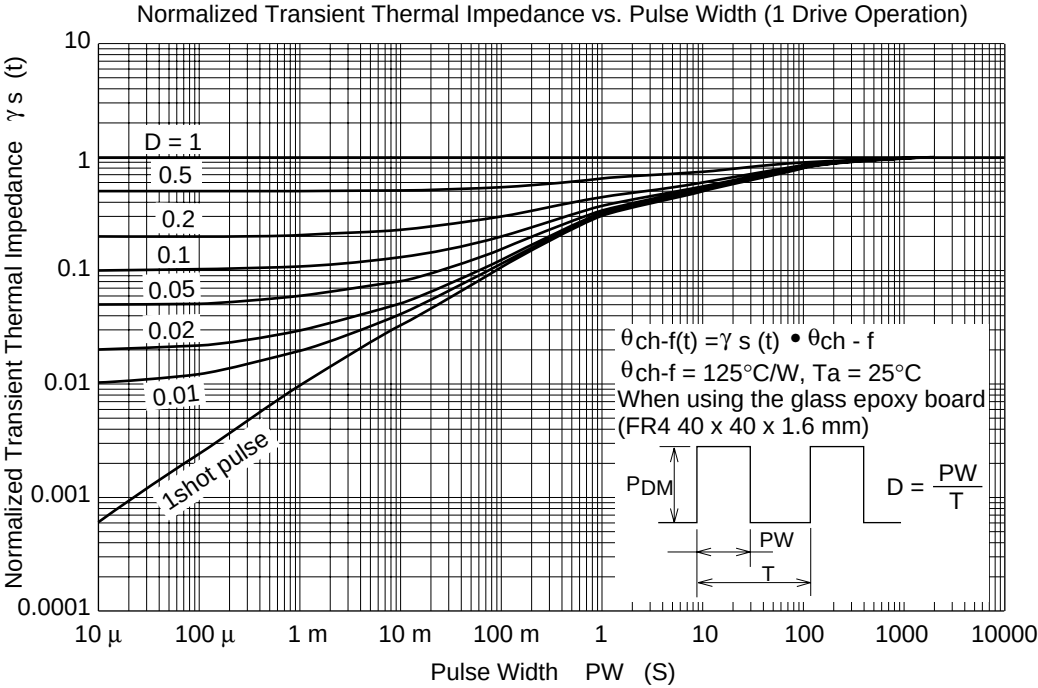


Switching Time Test Circuit



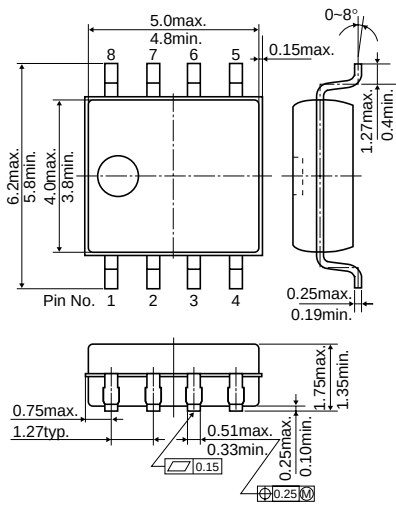
Switching Time Waveform





Package Dimensions

Unit: mm



Hitachi Code	FP-8DA
JEDEC	—
EIAJ	—

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