

HAT2028R/HAT2028RJ

Silicon N Channel Power MOS FET
High Speed Power Switching

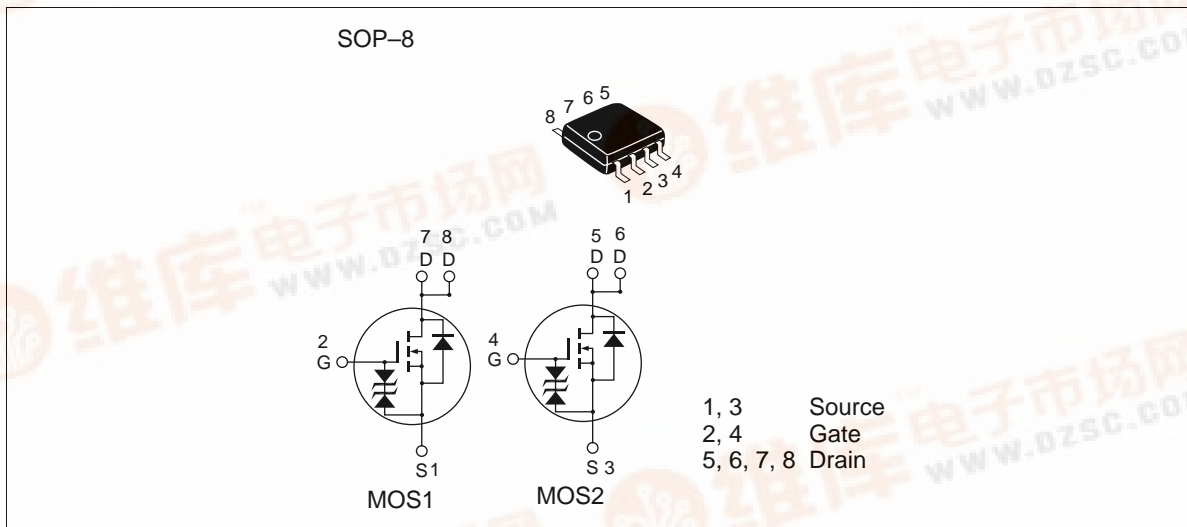
HITACHI

ADE-208-524C (Z)
4th. Edition
February 1999

Features

- For Automotive Application (at Type Code “J “)
- Low on-resistance
- Capable of 4 V gate drive
- High density mounting

Outline



HAT2028R/HAT2028RJ

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	4	A
Drain peak current	$I_{D(pulse)}$ ^{Note1}	32	A
Body-drain diode reverse drain current	I_{DR}	4	A
Avalanche current	HAT2028R	I_{AP} ^{Note4}	—
	HAT2028RJ		4 A
Avalanche energy	HAT2028R	E_{AR} ^{Note4}	—
	HAT2028RJ		1.37 mJ
Channel dissipation	P_{ch} ^{Note2}	2	W
Channel dissipation	P_{ch} ^{Note3}	3	W
Channel temperature	T_{ch}	150	°C
Storage temperature	T_{stg}	– 55 to + 150	°C

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

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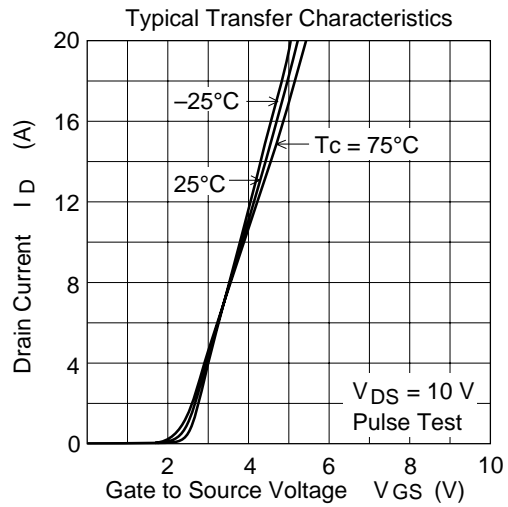
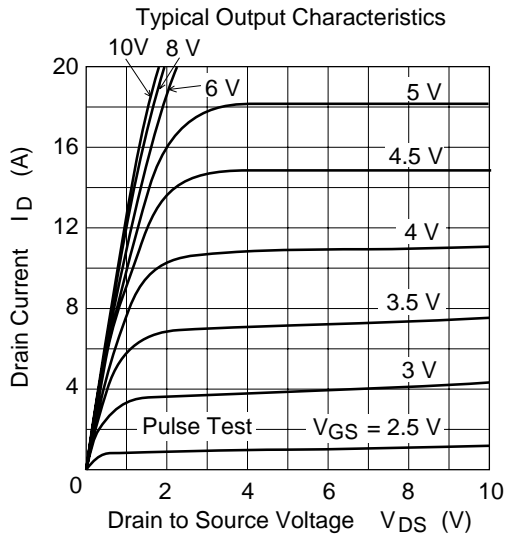
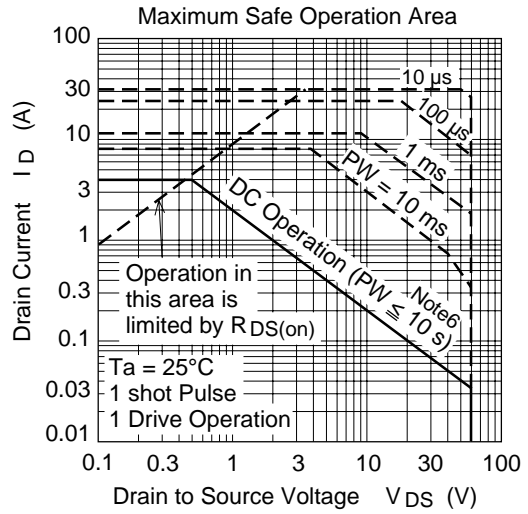
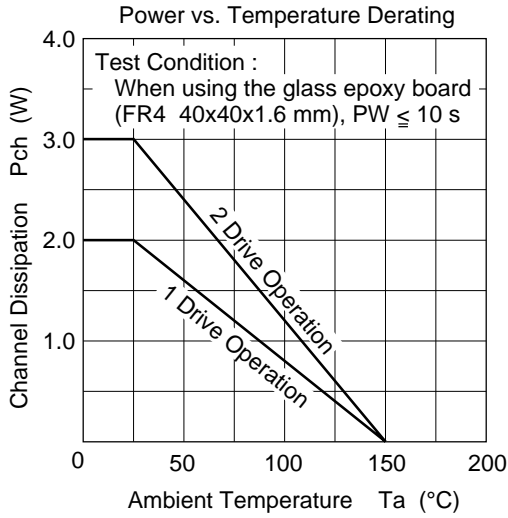
Electrical Characteristics (Ta = 25°C)

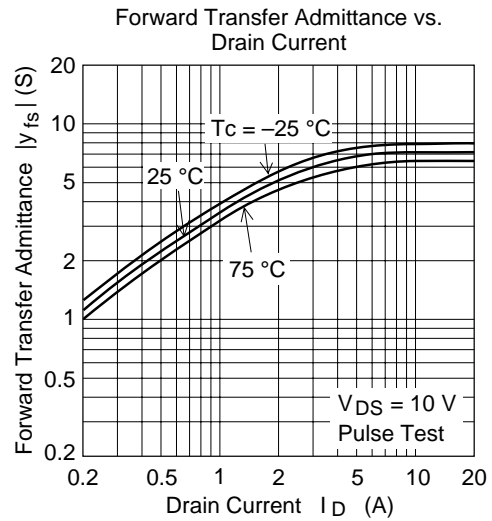
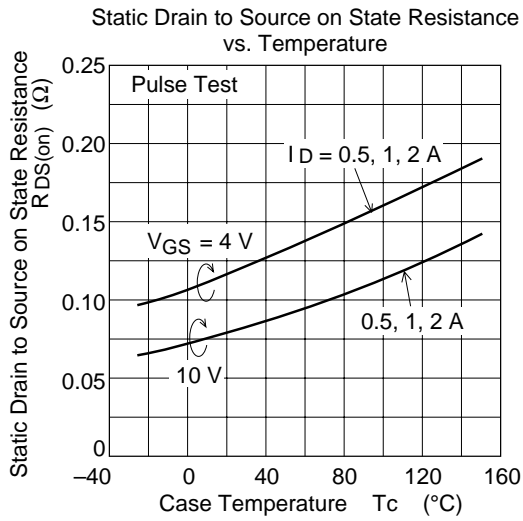
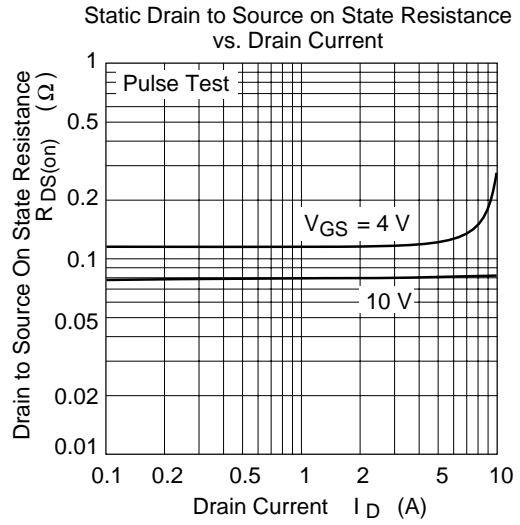
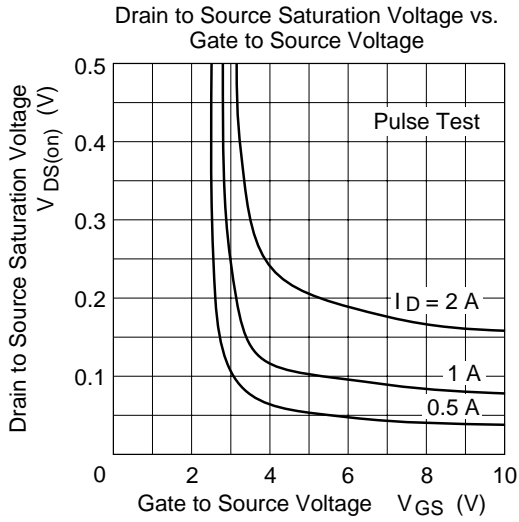
Item	Symbol	Min	Typ	Max	Unit	Test Conditions	
Drain to source breakdownvoltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$	
Gate to source breakdownvoltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}, V_{DS} = 0$	
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0$	
Zero gate voltage drain current	HAT2028R HAT2028RJ	I_{DSS}	—	—	1 0.1	μA μA	$V_{DS} = 60 \text{ V}, V_{GS} = 0$
Zero gate voltage drain current	HAT2028R HAT2028RJ	I_{DSS}	—	—	—	10 μA	$V_{DS} = 48 \text{ V}, V_{GS} = 0$ $T_a = 125^\circ\text{C}$
Gate to source cutoff voltage	$V_{GS(off)}$	1.3	—	2.3	V	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$	
Static drain to source on state resistance	$R_{DS(on)}$	—	0.08	0.1	Ω	$I_D = 2 \text{ A}, V_{GS} = 10 \text{ V}$ ^{Note5}	
	$R_{DS(on)}$	—	0.12	0.16	Ω	$I_D = 2 \text{ A}, V_{GS} = 4 \text{ V}$ ^{Note5}	
Forward transfer admittance	$ y_{fs} $	3.3	5	—	S	$I_D = 2 \text{ A}, V_{DS} = 10 \text{ V}$ ^{Note5}	
Input capacitance	C_{iss}	—	280	—	pF	$V_{DS} = 10 \text{ V}$	
Output capacitance	C_{oss}	—	150	—	pF	$V_{GS} = 0$	
Reverse transfer capacitance	C_{rss}	—	55	—	pF	$f = 1\text{MHz}$	
Turn-on delay time	$t_{d(on)}$	—	15	—	ns	$V_{GS} = 4 \text{ V}, I_D = 2 \text{ A}$	
Rise time	t_r	—	100	—	ns	$V_{DD} \cong 30 \text{ V}$	
Turn-off delay time	$t_{d(off)}$	—	35	—	ns		
Fall time	t_f	—	45	—	ns		
Body–drain diode forwardvoltage	V_{DF}	—	0.88	1.15	V	$I_F = 4 \text{ A}, V_{GS} = 0$ ^{Note5}	
Body–drain diode reverse recovery time	t_{rr}	—	40	—	ns	$I_F = 4 \text{ A}, V_{GS} = 0$ $diF/dt = 50 \text{ A}/\mu\text{s}$	

Note: 5. Pulse test

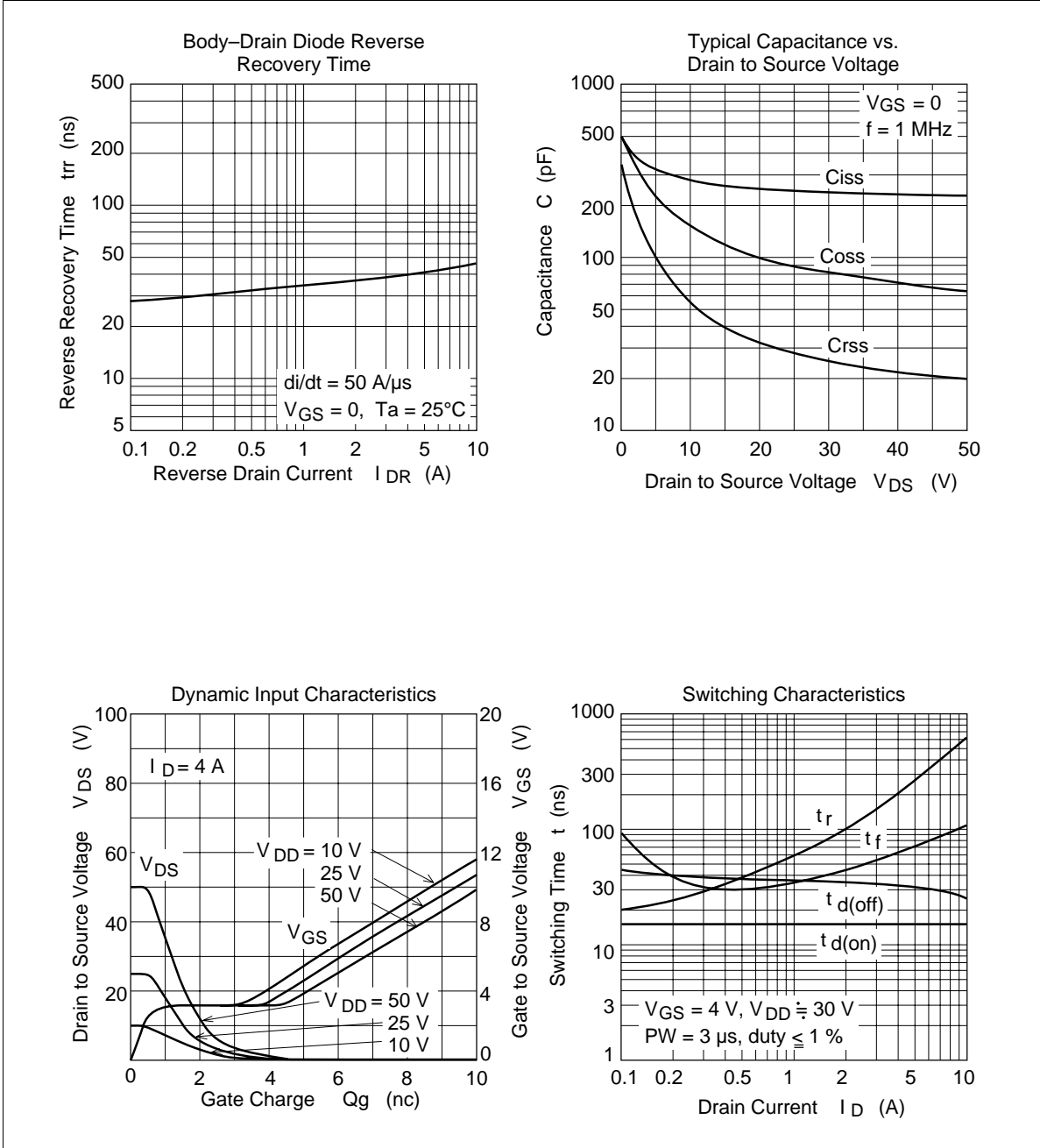
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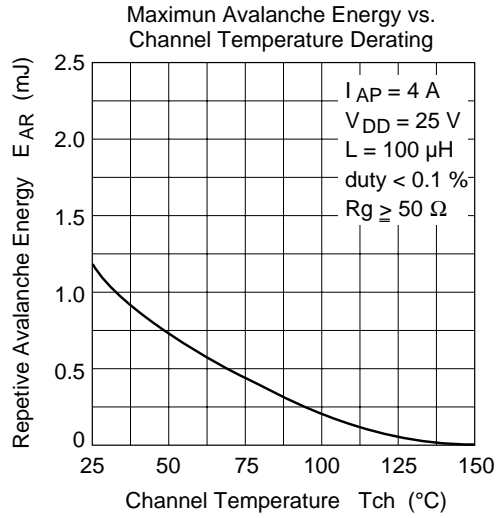
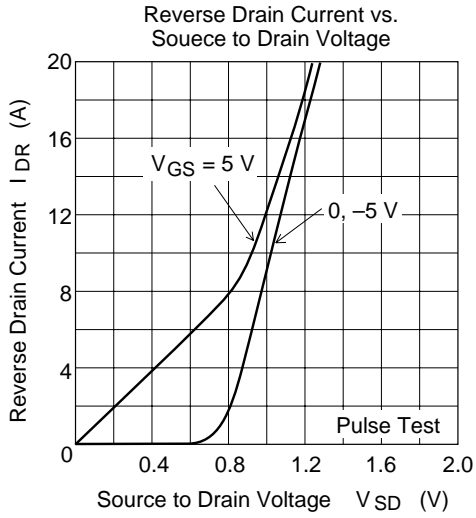
Main Characteristics



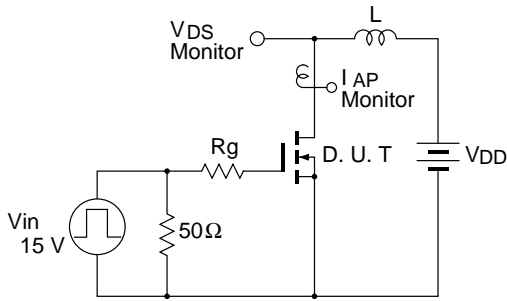


HAT2028R/HAT2028RJ



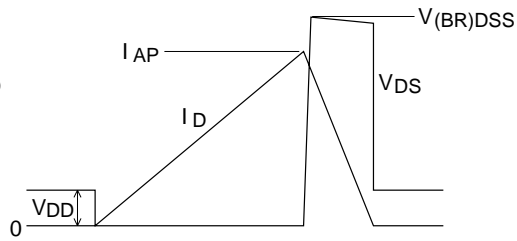


Avalanche Test Circuit

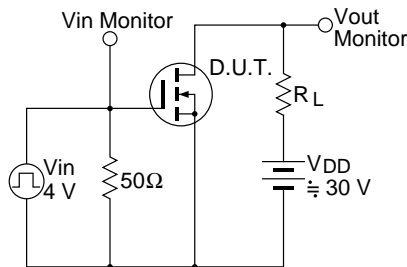


Avalanche Waveform

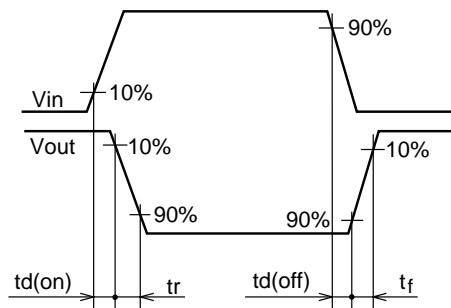
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



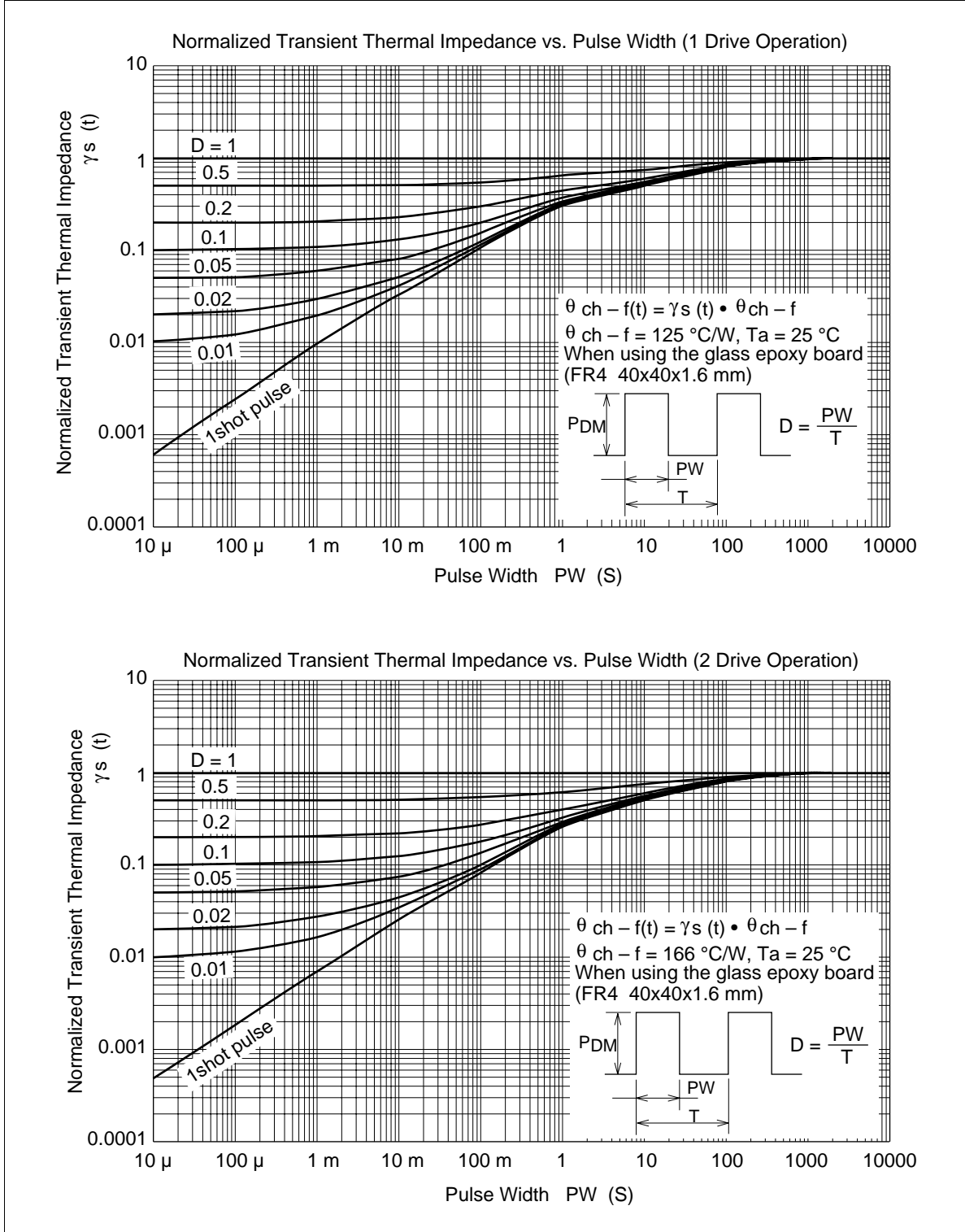
Switching Time Test Circuit



Switching Time Waveform



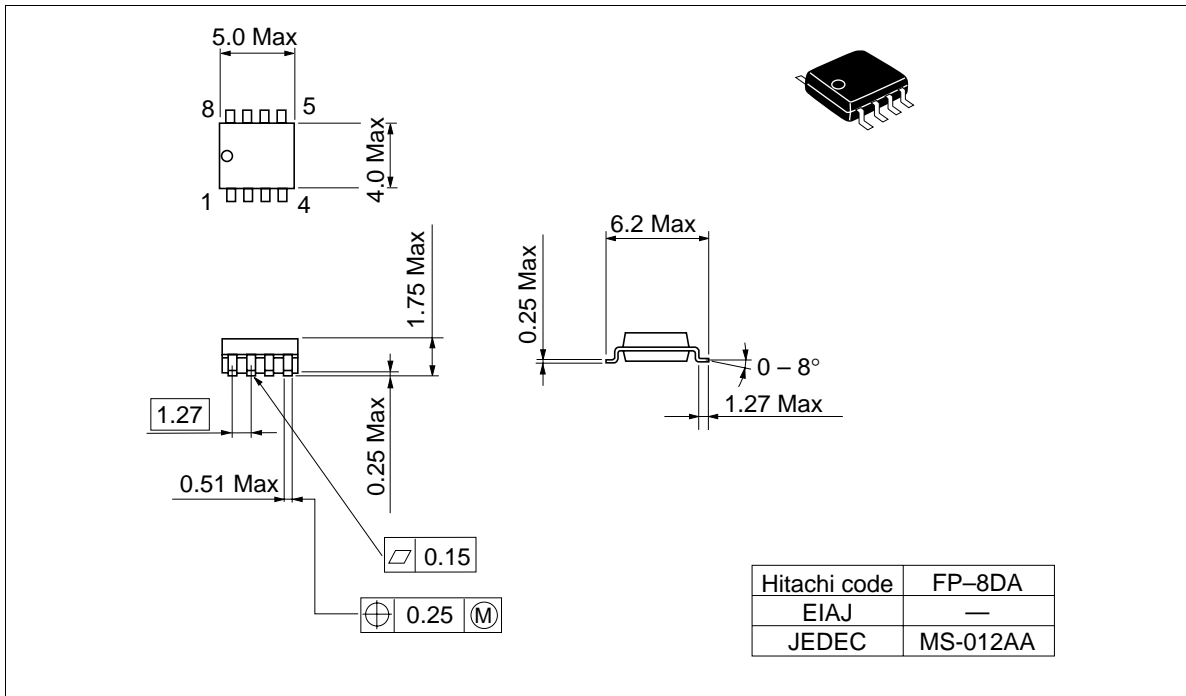
HAT2028R/HAT2028RJ



HAT2028R/HAT2028RJ

Package Dimensions

Unit: mm



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