
HAT1038R/HAT1038RJ

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	-3.5	A
Drain peak current		$I_{D(pulse)}$ ^{Note1}	-28	A
Body-drain diode reverse drain current		I_{DR}	-3.5	A
Avalanche current	HAT1038R	I_{AP} ^{Note4}	—	—
	HAT1038RJ		-3.5	A
Avalanche energy	HAT1038R	E_{AR} ^{Note4}	—	—
	HAT1038RJ		1.05	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 10µs, duty cycle 1 %
2. 1 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW 10s
3. 2 Drive operation ; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW 10s
4. Value at T_{ch}=25°C, R_g 50

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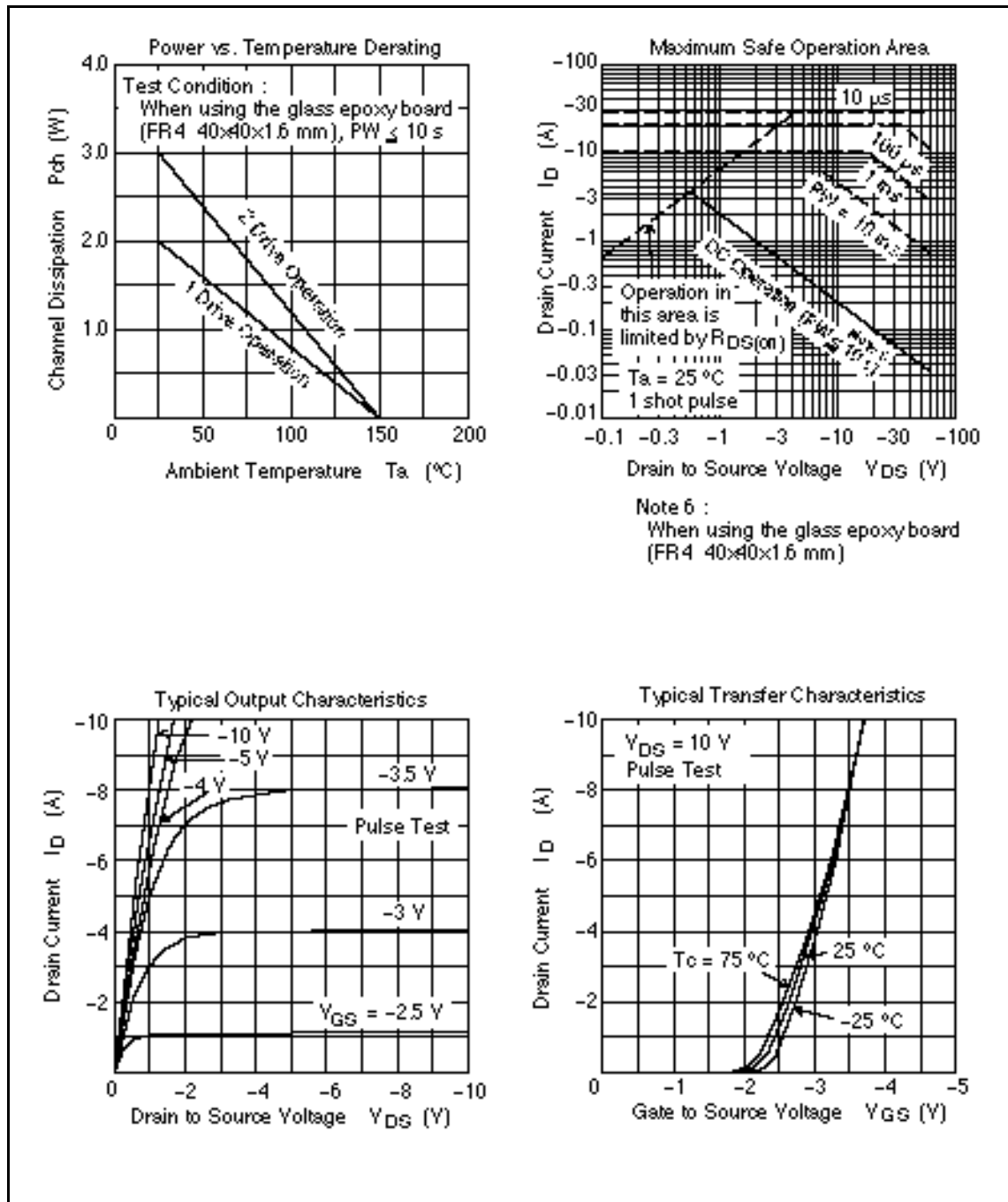
Electrical Characteristics (Ta = 25°C)

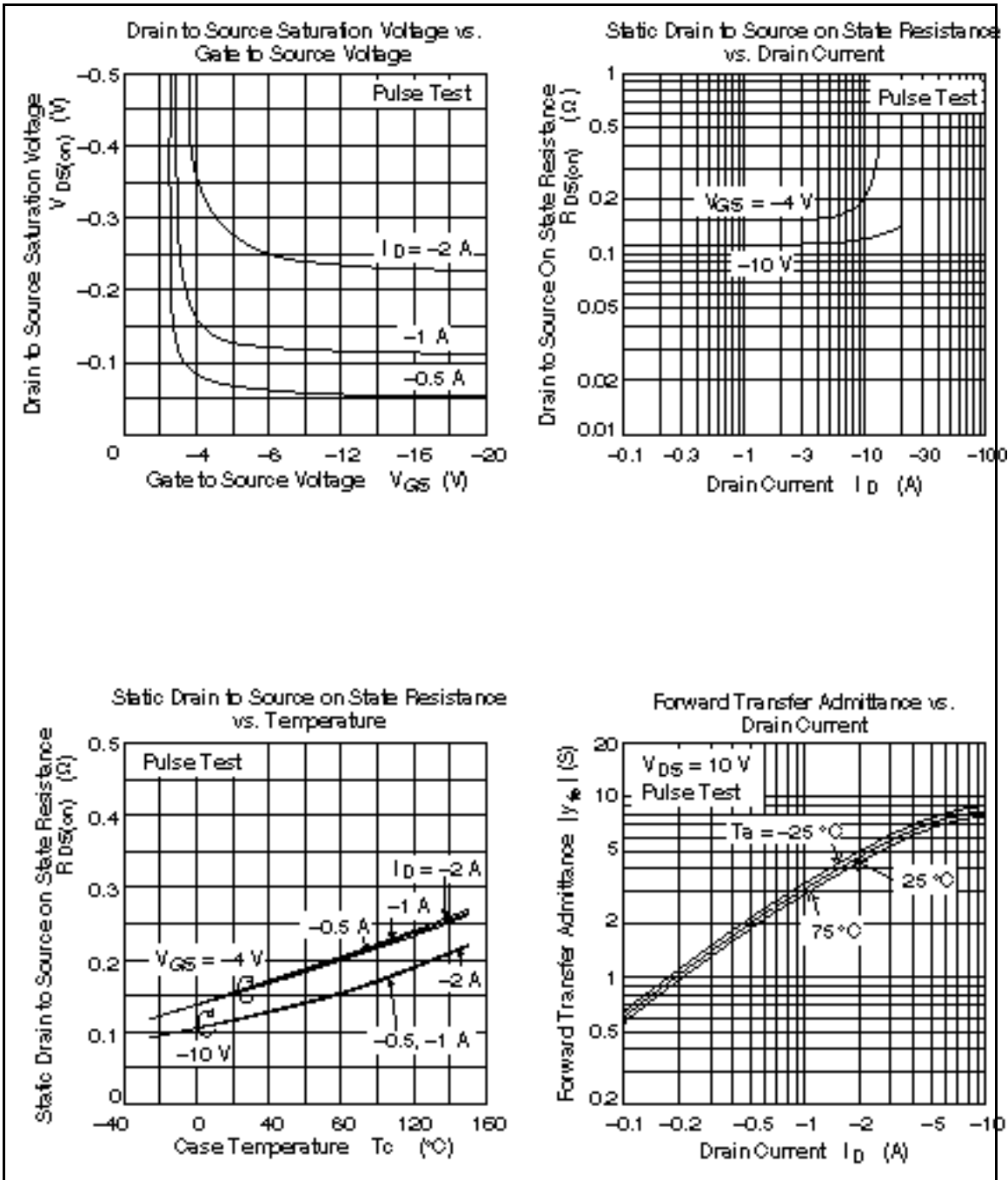
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-60	—	—	V	$I_D = -10\text{mA}$, $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100\mu\text{A}$, $V_{DS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16\text{V}$, $V_{DS} = 0$
Zero gate voltage drain current	HAT1038R HAT1038RJ	I_{DSS}	—	—	μA	$V_{DS} = -60\text{V}$, $V_{GS} = 0$
Zero gate voltage drain current	HAT1038R HAT1038RJ	I_{DSS}	—	—	μA	$V_{DS} = -48\text{V}$, $V_{GS} = 0$ $T_a = 125^\circ\text{C}$
Gate to source cutoff voltage	$V_{GS(off)}$	-1.2	—	-2.2	V	$V_{DS} = -10\text{V}$, $I_D = -1\text{mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.12	0.15		$I_D = -2\text{A}$, $V_{GS} = -10\text{V}$ ^{Note5}
	$R_{DS(on)}$	—	0.16	0.23		$I_D = -2\text{A}$, $V_{GS} = -4\text{V}$ ^{Note5}
Forward transfer admittance	$ y_{fs} $	3	4.5	—	S	$I_D = -2\text{A}$, $V_{DS} = -10\text{V}$ ^{Note5}
Input capacitance	C_{iss}	—	600	—	pF	$V_{DS} = -10\text{V}$
Output capacitance	C_{oss}	—	290	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	75	—	pF	$f = 1\text{MHz}$
Turn-on delay time	$t_{d(on)}$	—	11	—	ns	$V_{GS} = -10\text{V}$, $I_D = -2\text{A}$
Rise time	t_r	—	30	—	ns	$V_{DD} = -30\text{V}$
Turn-off delay time	$t_{d(off)}$	—	100	—	ns	
Fall time	t_f	—	55	—	ns	
Body-drain diode forward voltage	V_{DF}	—	-0.98	-1.28	V	$I_F = -3.5\text{A}$, $V_{GS} = 0$ ^{Note5}
Body-drain diode reverse recovery time	t_{rr}	—	70	—	ns	$I_F = -3.5\text{A}$, $V_{GS} = 0$ $di_F/dt = 50\text{A}/\mu\text{s}$

Note: 5. Pulse test

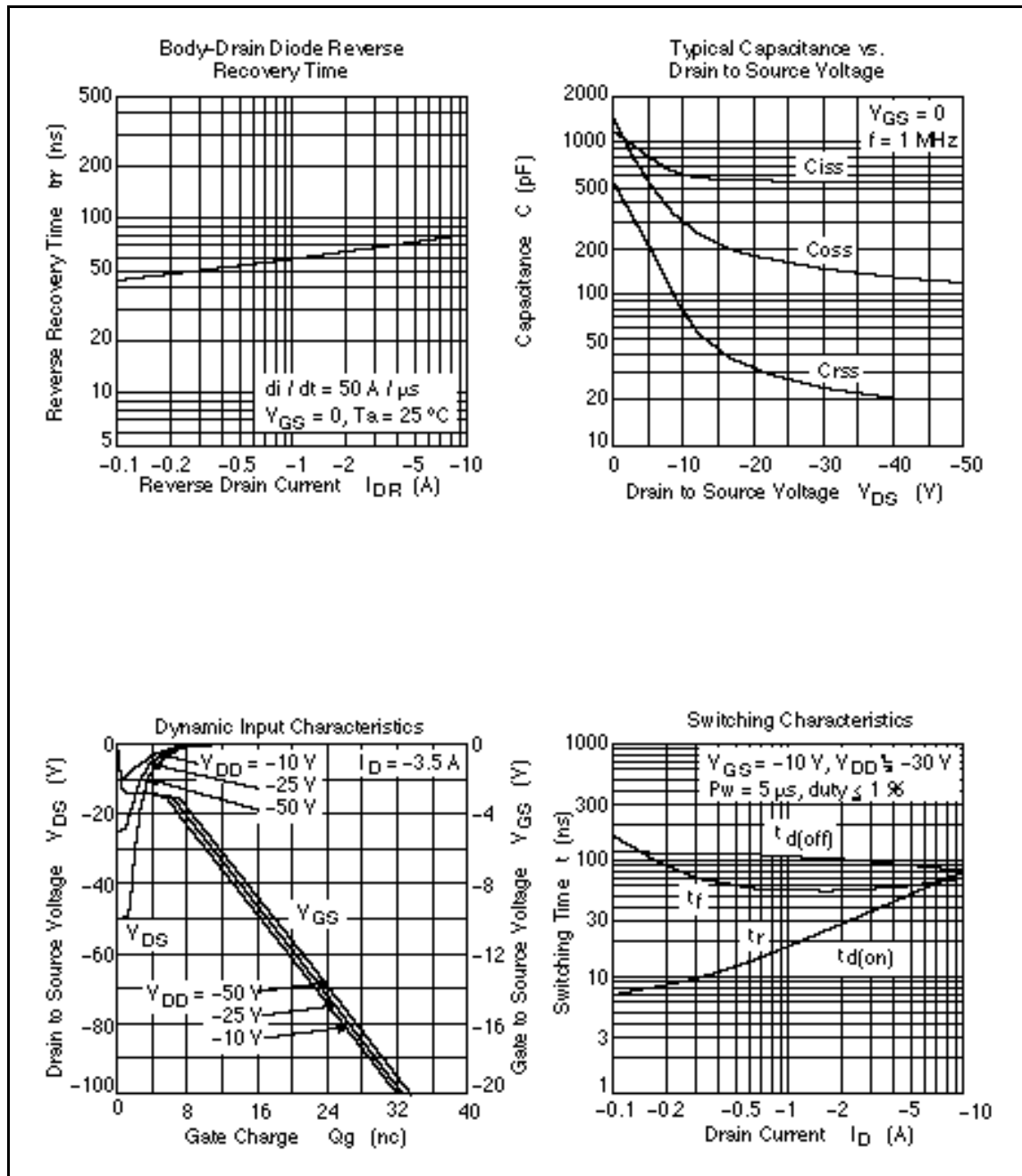
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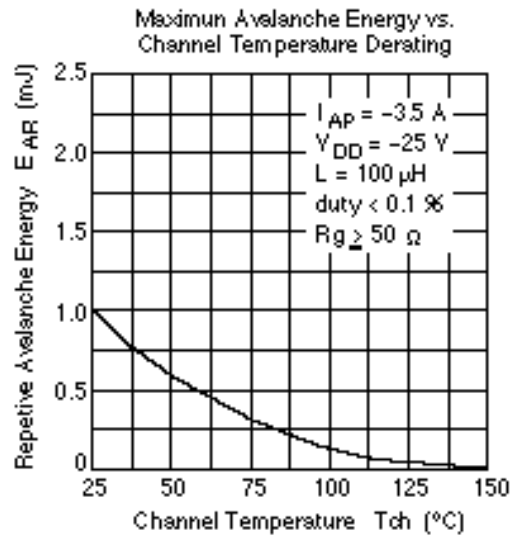
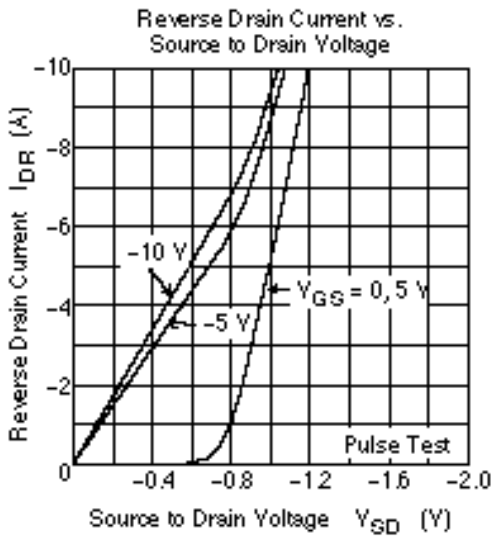
Main Characteristics



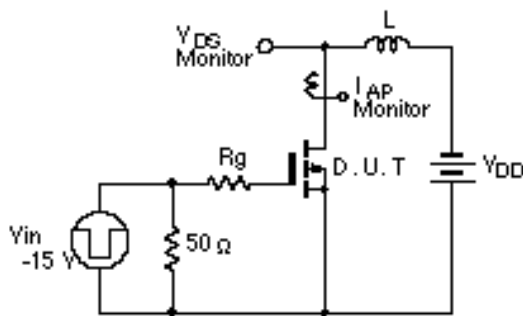


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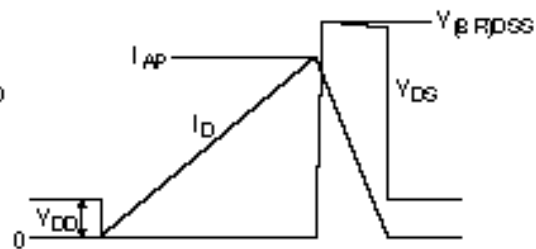


Avalanche Test Circuit

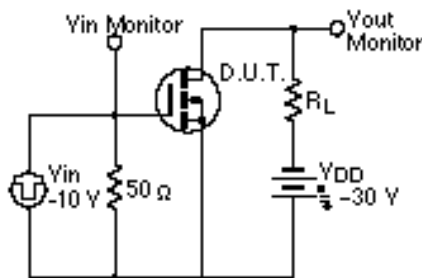


Avalanche Waveform

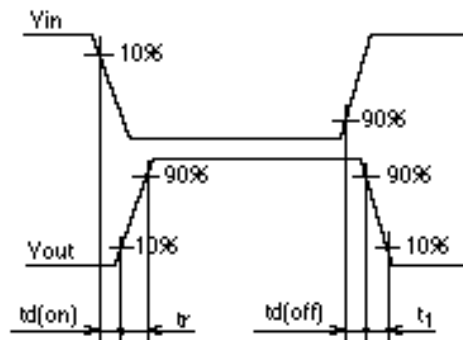
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



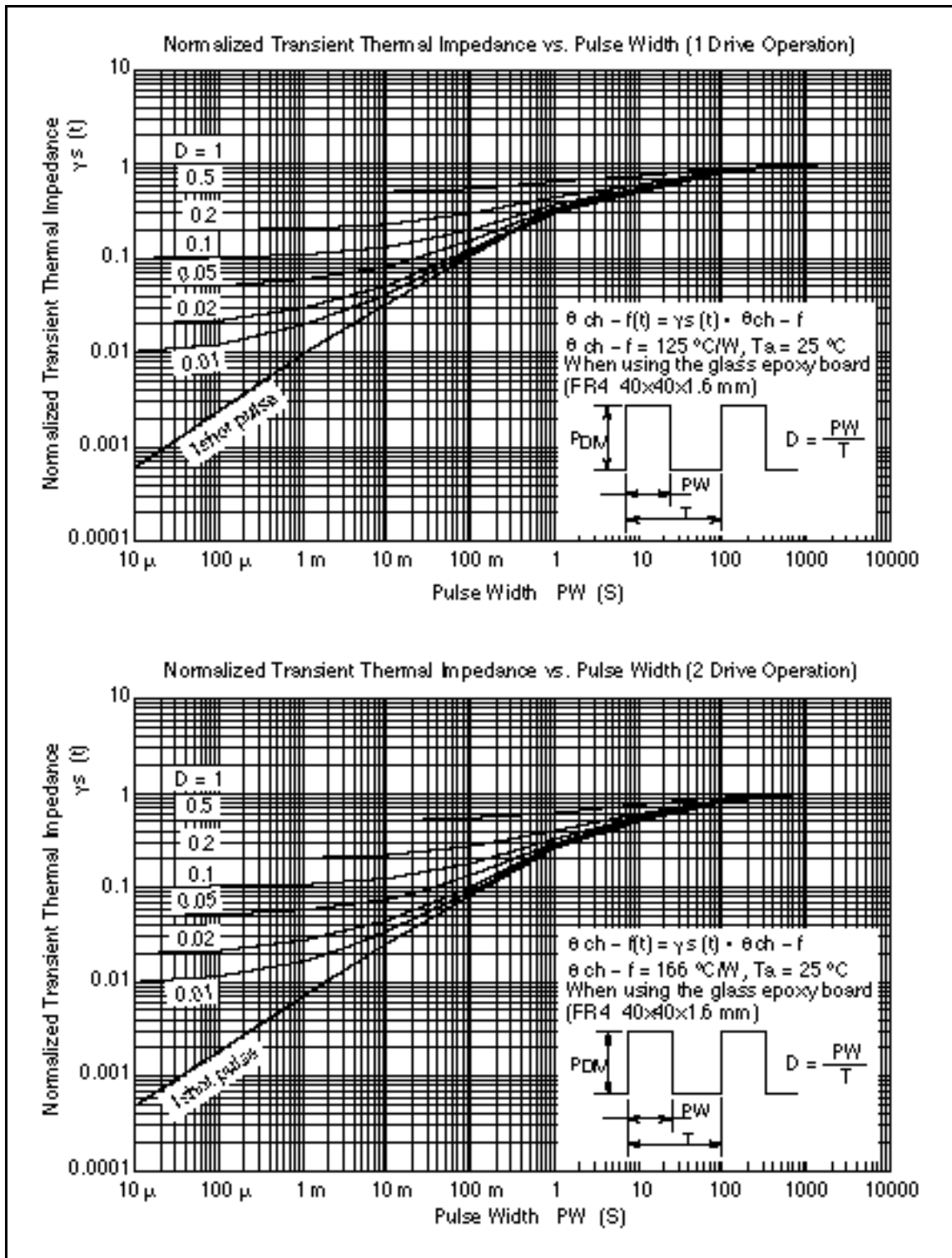
Switching Time Test Circuit



Switching Time Waveform



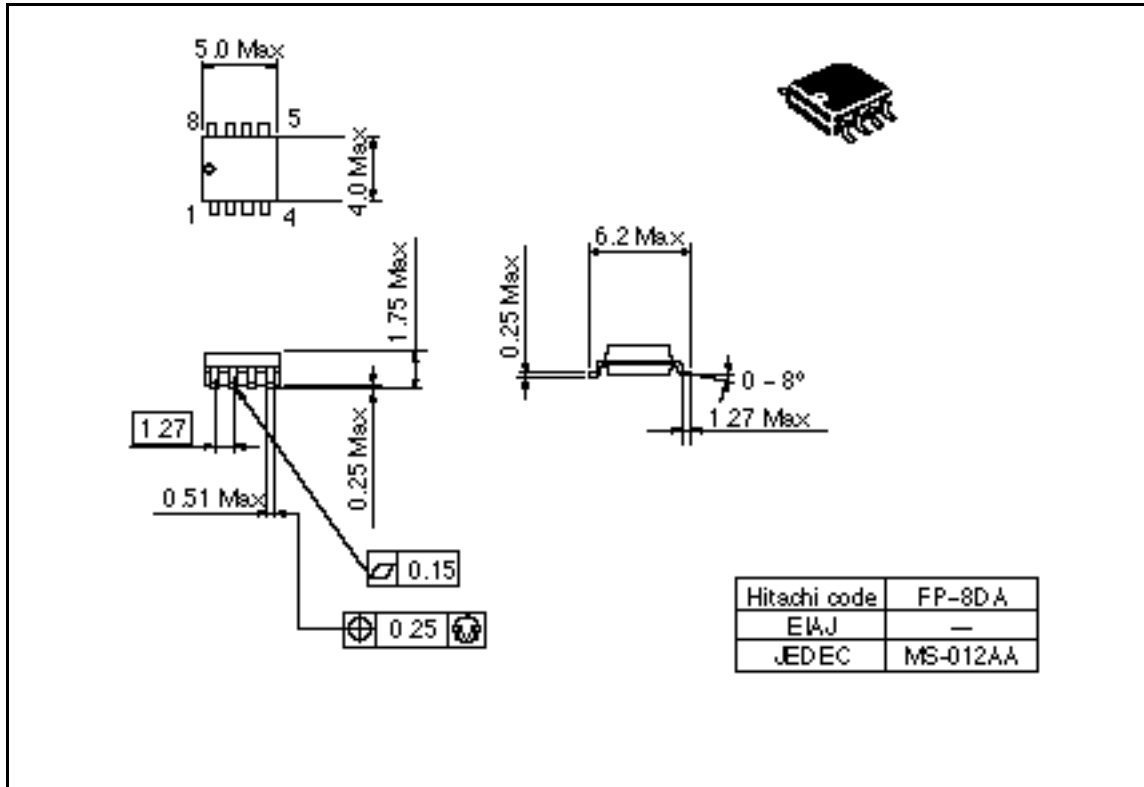
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Package Dimensions

Unit: mm



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