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Renesas Electronics website: <http://www.renesas.com>

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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HAT2114R, HAT2114RJ

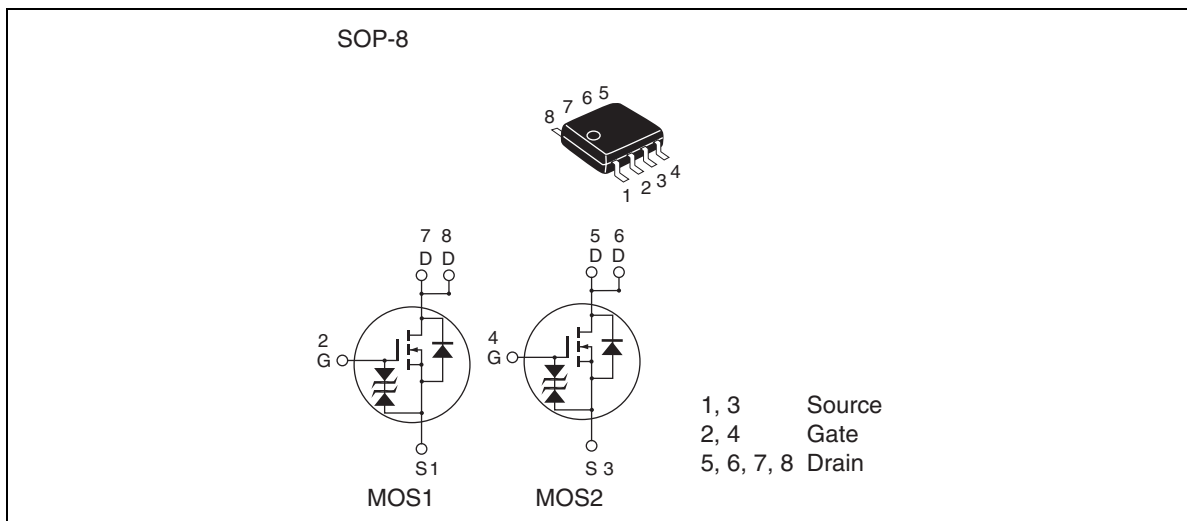
Silicon N Channel Power MOS FET
High Speed Power Switching

REJ03G0120-0100Z
(Previous ADE-208-1544(Z))
Rev.1.00
Oct.06.2003

Features

- Low on-resistance
- Capable of 4.5V gate drive
- High density mounting
- “J” is for Automotive application
High temperature D-S leakage guarantee
Avalanche rating

Outline



HAT2114R, HAT2114RJ

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

Item	Symbol	Ratings		Unit
		HAT2114R	HAT2114RJ	
Drain to source voltage	V_{DSS}	60	60	V
Gate to source voltage	V_{GSS}	± 20	± 20	V
Drain current	I_D	6	6	A
Drain peak current	I_D (pulse) ^{Note1}	48	48	A
Avalanche current	I_{AP} ^{Note4}	—	6	A
Avalanche energy	E_{AR} ^{Note4}	—	3.08	mJ
Channel dissipation	P_{ch} ^{Note2}	2	2	W
Channel dissipation	P_{ch} ^{Note3}	3	3	W
Channel temperature	T_{ch}	150	150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	-55 to +150	$^\circ\text{C}$

Notes: 1. $PW \leq 10\mu\text{s}$, 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 at $T_{ch} = 25^\circ\text{C}$, $R_g \geq 50 \Omega$

HAT2114R, HAT2114RJ

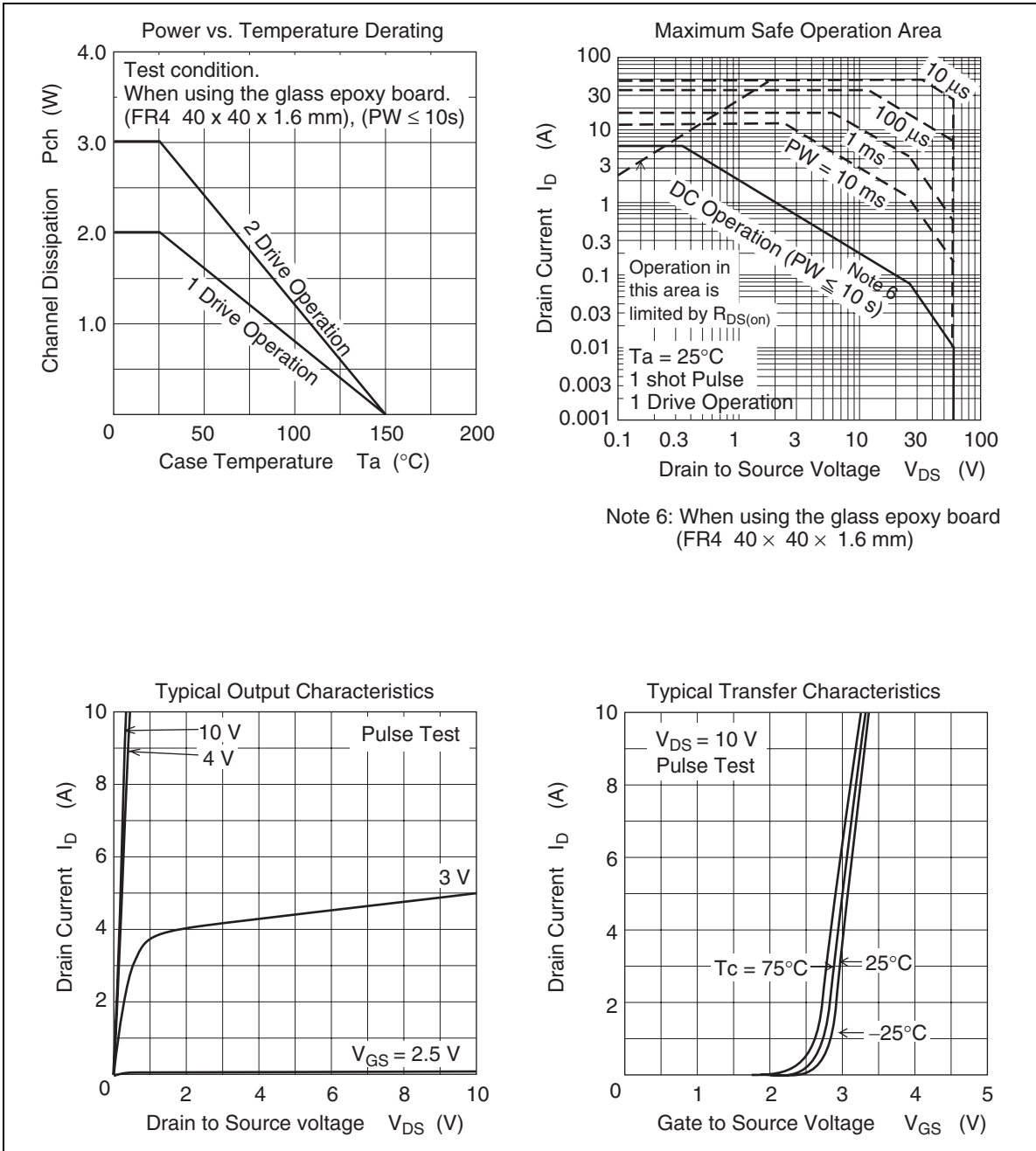
Electrical Characteristics

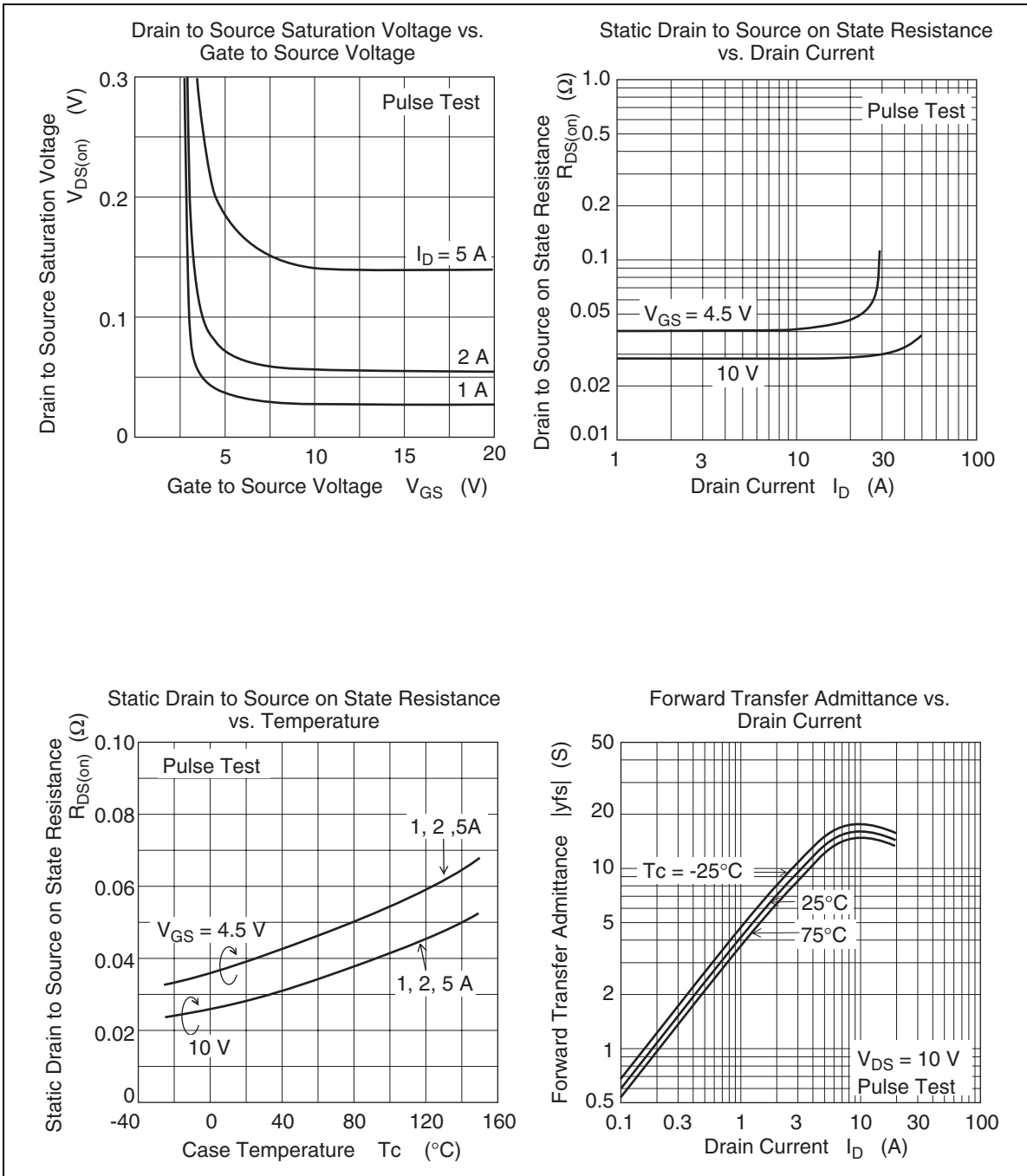
(Ta = 25°C)

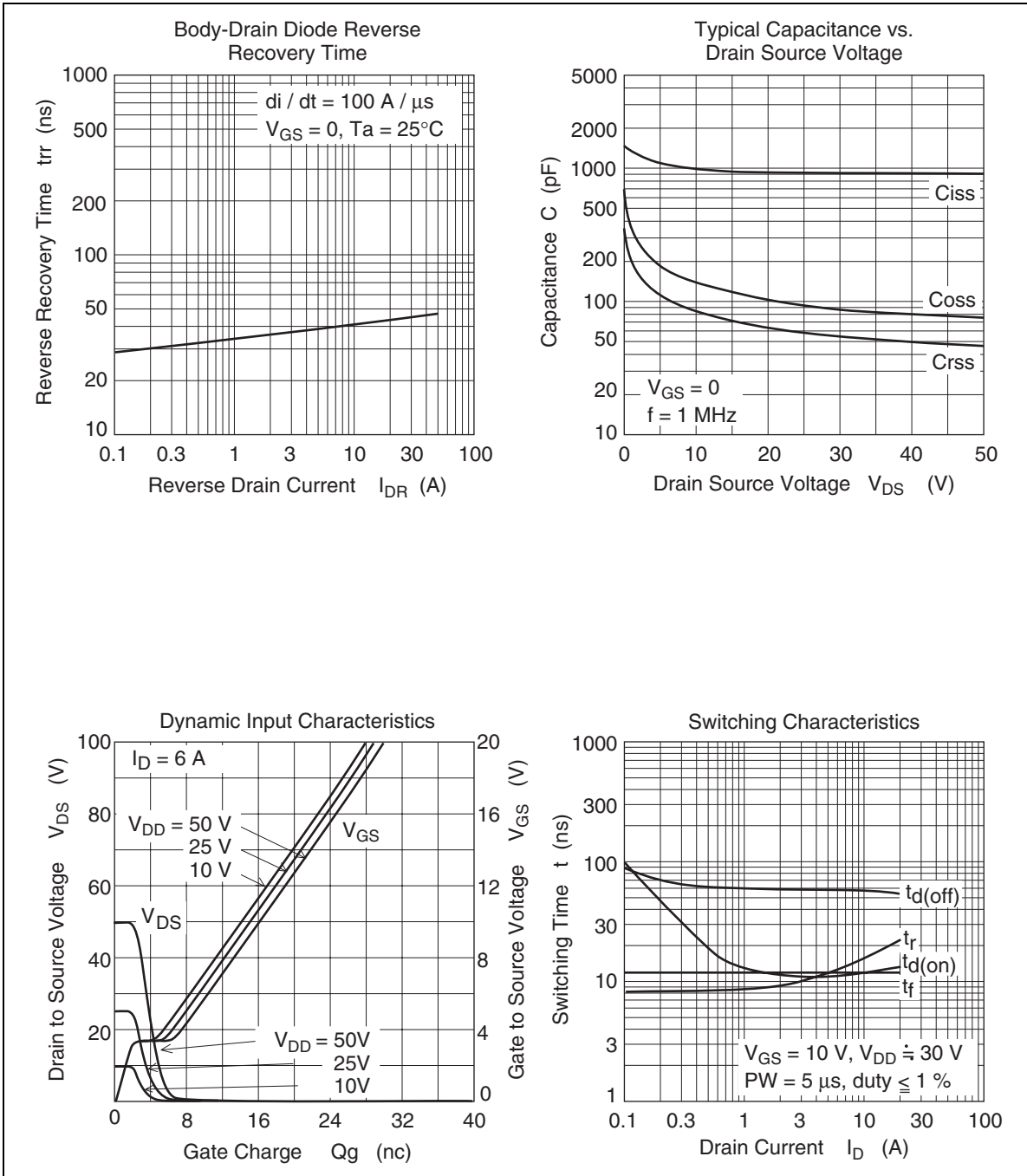
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	60	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to Source breakdown voltage	$V_{(BR)GSS}$	± 20	—	—	V	$I_G = \pm 100 \text{ }\mu\text{A}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 60 \text{ V}$, $V_{GS} = 0$
Zero gate voltage drain current	HAT2114R	I_{DSS}	—	—	μA	$V_{DS} = 48 \text{ V}$, $V_{GS} = 0$
	HAT2114RJ	I_{DSS}	—	10	μA	$T_a = 125^\circ\text{C}$
Gate to source leak current	I_{GSS}	—	—	± 10	μA	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.5	—	2.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Forward transfer admittance	$ y_{fs} $	6	9.5	—	S	$I_D = 3 \text{ A}^{\text{Note5}}$, $V_{DS} = 10 \text{ V}$
Static drain to source on state resistance	$R_{DS(on)}$	—	28	32	$\text{m}\Omega$	$I_D = 3 \text{ A}^{\text{Note5}}$, $V_{GS} = 10 \text{ V}$
	$R_{DS(on)}$	—	40	50	$\text{m}\Omega$	$I_D = 3 \text{ A}^{\text{Note5}}$, $V_{GS} = 4.5 \text{ V}$
Input capacitance	C_{iss}	—	1000	—	pF	$V_{DS} = 10 \text{ V}$, $V_{GS} = 0$
Output capacitance	C_{oss}	—	145	—	pF	$f = 1 \text{ MHz}$
Reverse transfer capacitance	C_{rss}	—	85	—	pF	
Total gate charge	Q_g	—	15	—	nC	$V_{DD} = 25 \text{ V}$
Gate to source charge	Q_{gs}	—	2	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Q_{gd}	—	3	—	nC	$I_D = 6 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	12	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 3 \text{ A}$
Rise time	t_r	—	10	—	ns	$V_{DD} \cong 30 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	60	—	ns	$R_L = 10 \text{ }\Omega$
Fall time	t_f	—	11	—	ns	$R_G = 4.7 \text{ }\Omega$
Body-drain diode forward voltage	V_{DF}	—	0.82	1.07	V	$I_F = 6 \text{ A}$, $V_{GS} = 0^{\text{Note5}}$
Body-drain diode reverse recovery time	t_{rr}	—	40	—	ns	$I_F = 6 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

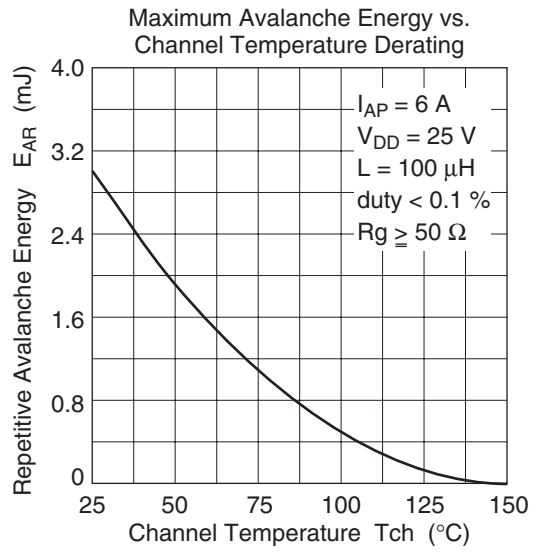
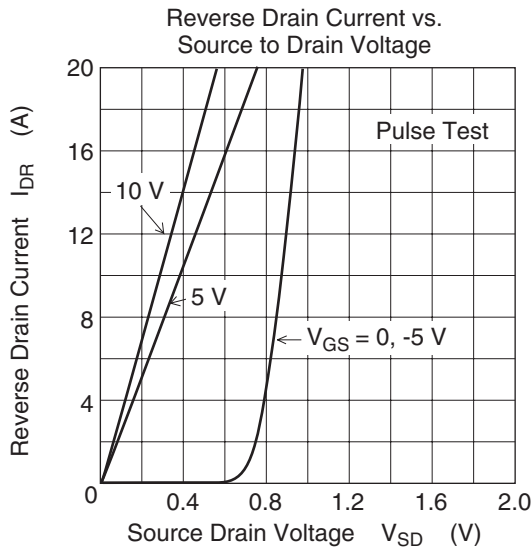
Notes: 5. Pulse test

Main Characteristics

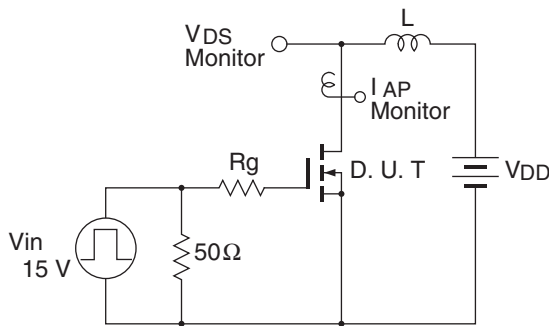






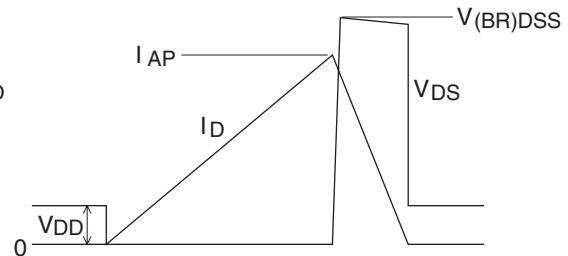


Avalanche Test Circuit

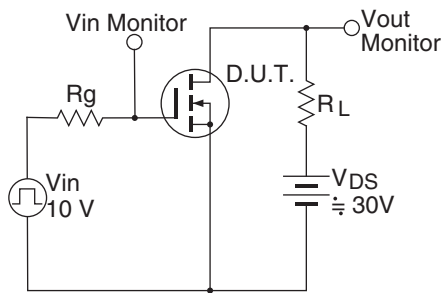


Avalanche Waveform

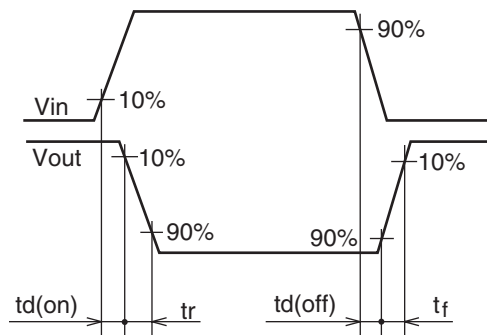
$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

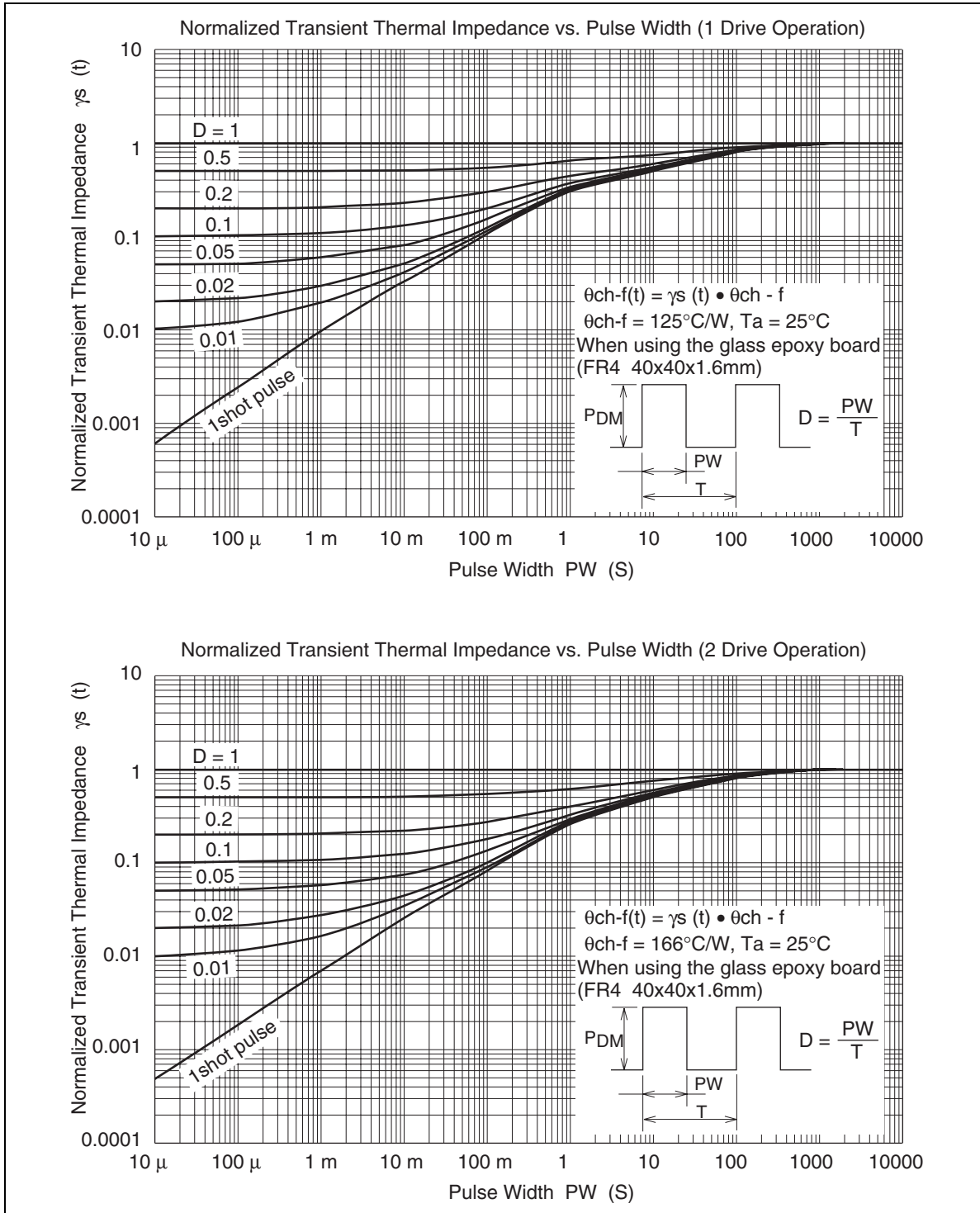


Switching Time Test Circuit



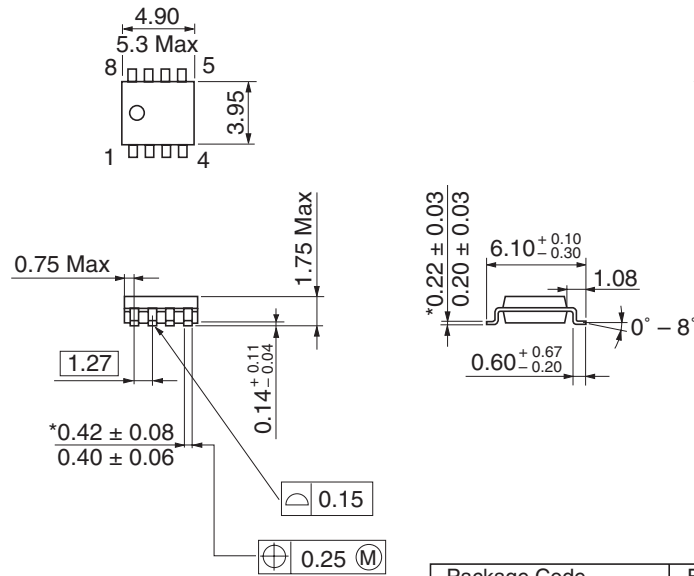
Switching Time Waveform





Package Dimensions

As of January, 2003
Unit: mm



*Dimension including the plating thickness
Base material dimension

Package Code	FP-8DA
JEDEC	Conforms
JEITA	—
Mass (reference value)	0.085 g

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