



# HAT1047R, HAT1047RJ

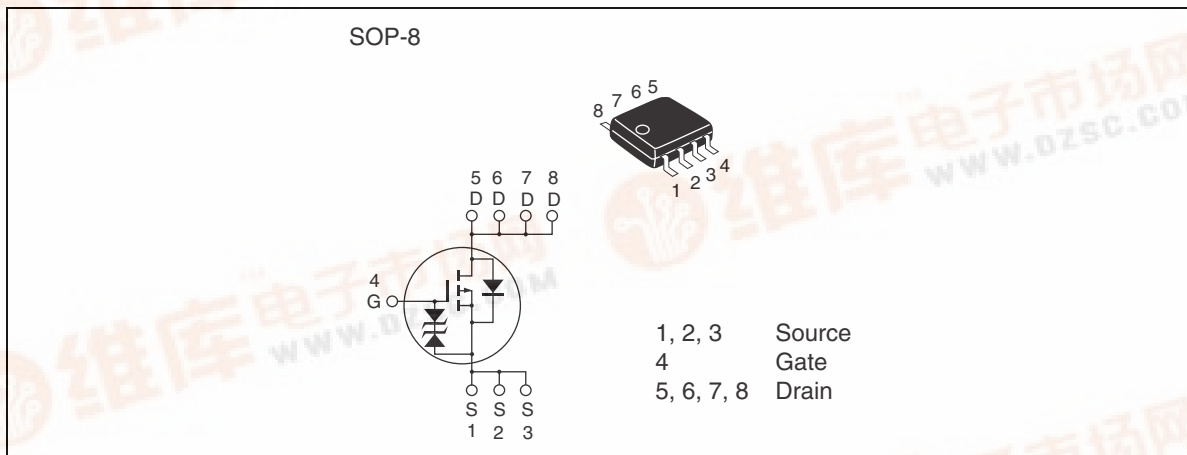
Silicon P Channel Power MOS FET  
High Speed Power Switching

REJ03G0074-0500Z  
(Previous ADE-208-1545D(Z))  
Rev.5.00  
Aug.27.2003

## Features

- For Automotive Application (at Type Code "J")
- Low on-resistance
- Capable of  $-4.5$  V gate drive
- High density mounting

## Outline



## HAT1047R, HAT1047RJ

### Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V <sub>DSS</sub>	−30	V
Gate to source voltage	V <sub>GSS</sub>	±20	V
Drain current	I <sub>D</sub>	−14	A
Drain peak current	I <sub>D(pulse)</sub> <sup>Note1</sup>	−112	A
Body-drain diode reverse drain current	I <sub>DR</sub>	−14	A
Avalanche current	HAT1047R	I <sub>AP</sub> <sup>Note3</sup>	—
	HAT1047RJ	−14	A
Avalanche energy	HAT1047R	E <sub>AR</sub> <sup>Note3</sup>	—
	HAT1047RJ	19.6	mJ
Channel dissipation	P <sub>ch</sub> <sup>Note2</sup>	2.5	W
Channel temperature	T <sub>ch</sub>	150	°C
Storage temperature	T <sub>stg</sub>	−55 to +150	°C

Notes: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1 \%$   
2. When using the glass epoxy board (FR4 40 x 40 x 1.6 mm),  $PW \leq 10s$   
3. Value at T<sub>ch</sub> = 25°C, R<sub>g</sub>  $\geq 50 \Omega$

## HAT1047R, HAT1047RJ

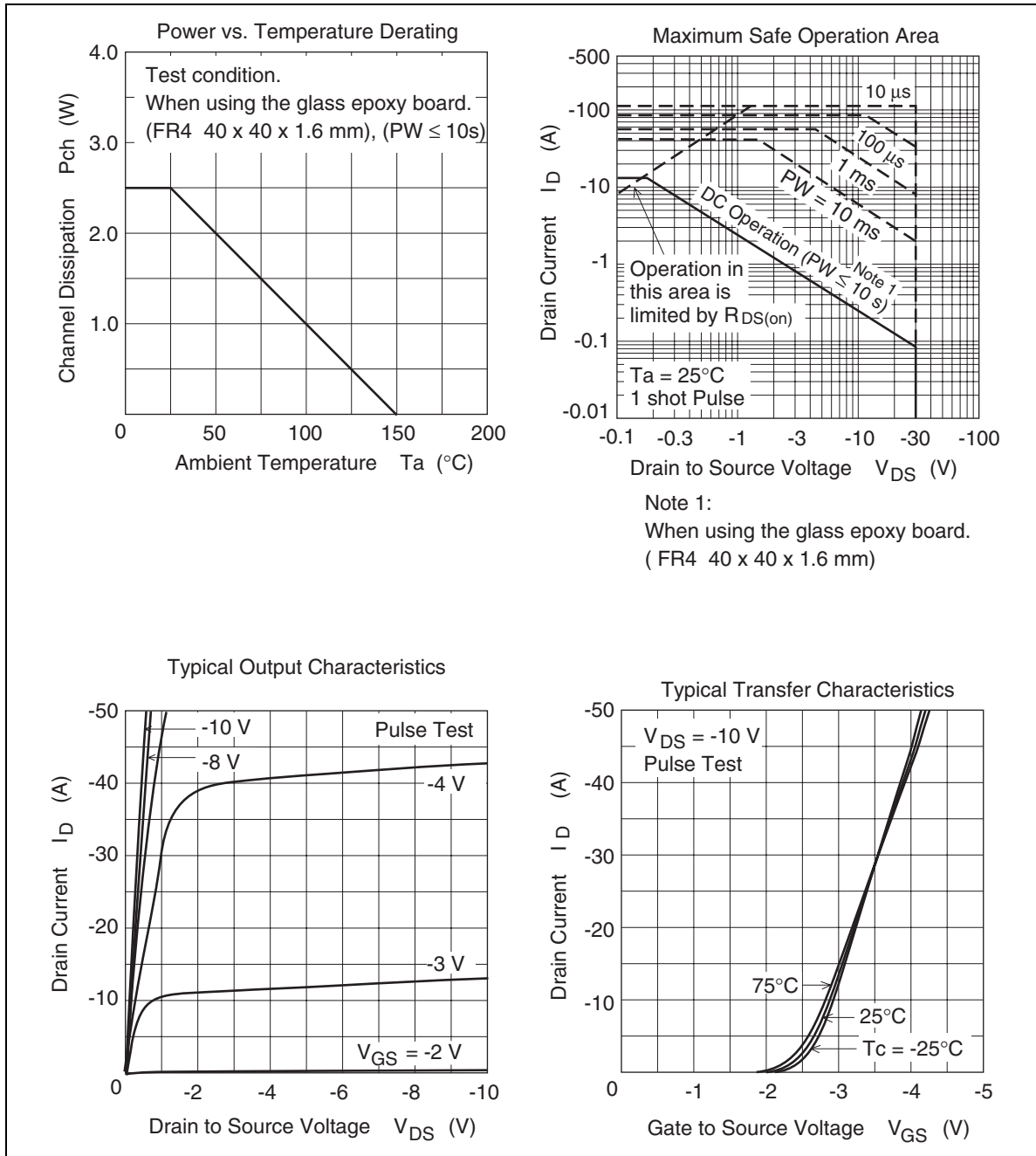
### Electrical Characteristics

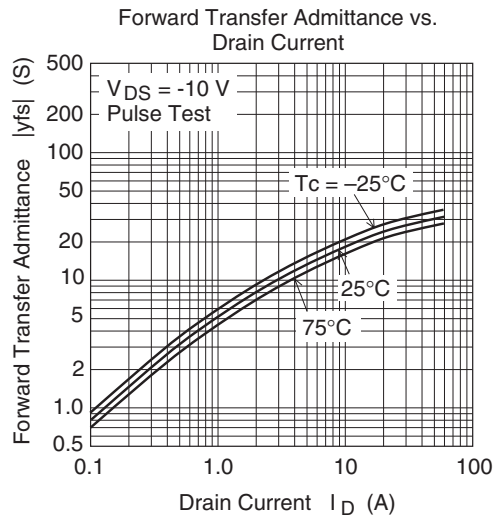
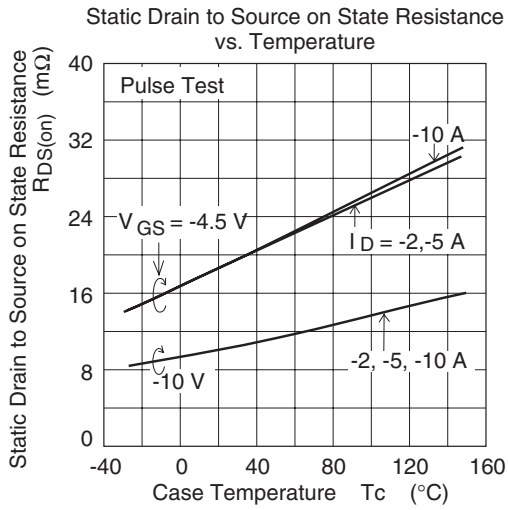
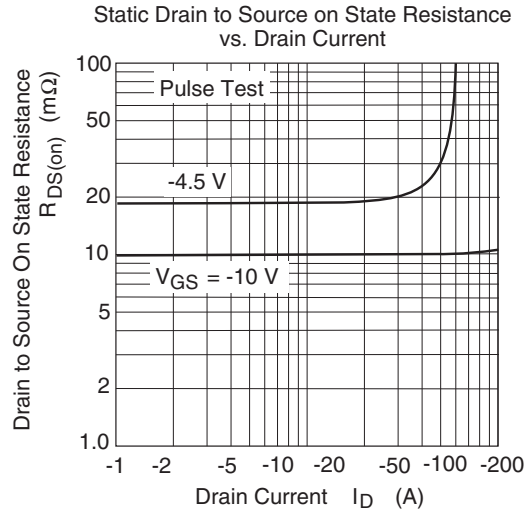
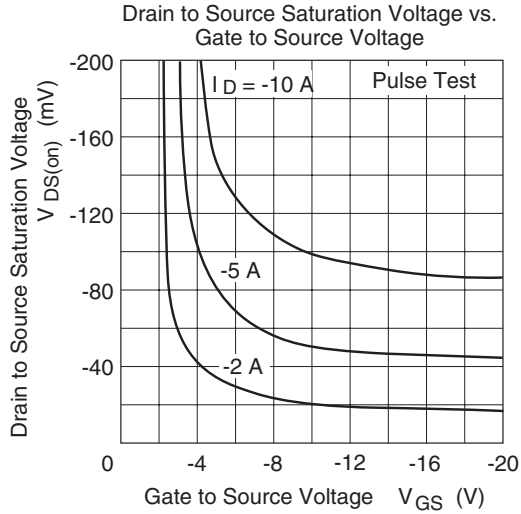
(Ta = 25°C)

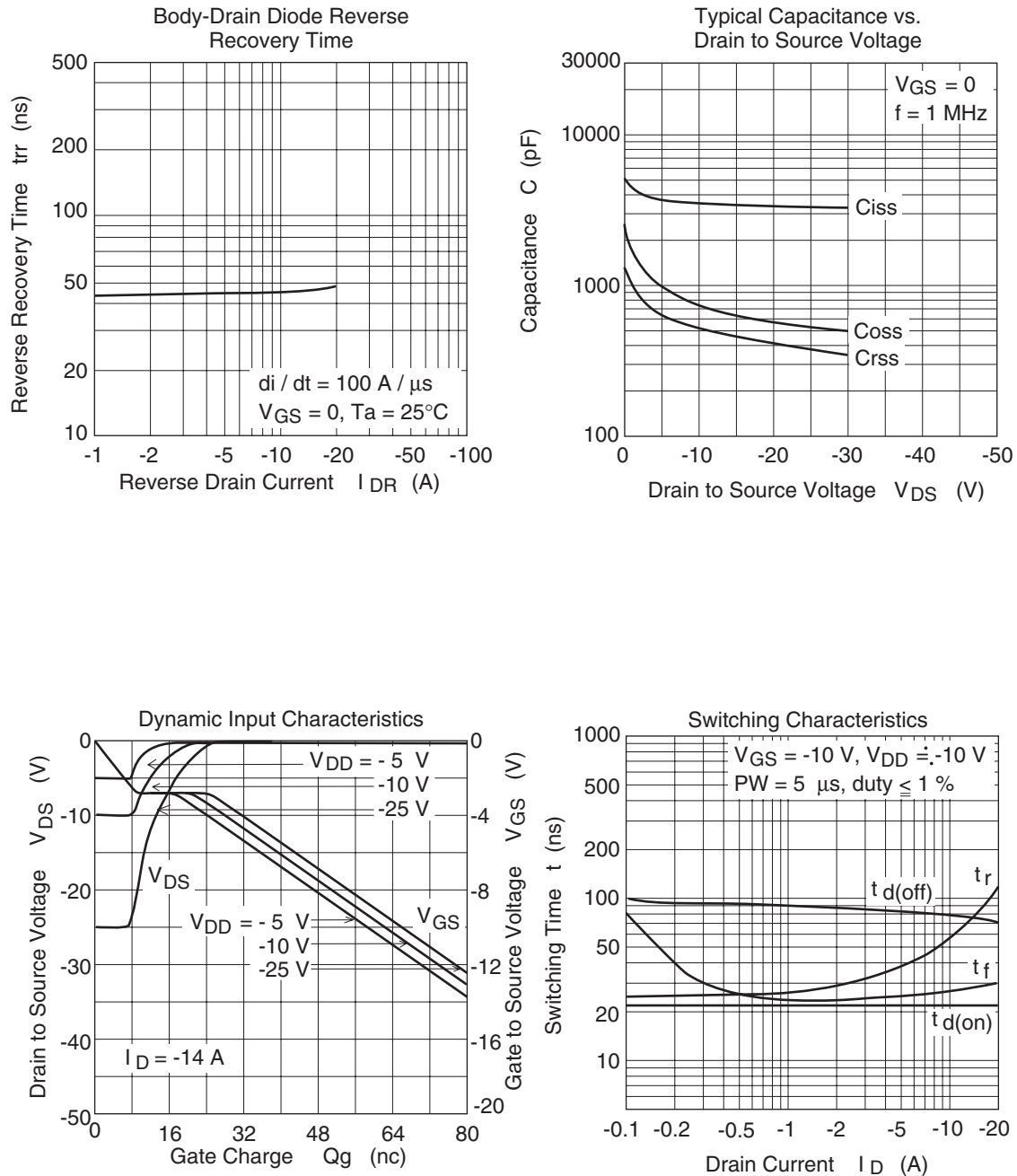
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	-30	—	—	V	$I_D = -10 \text{ mA}$ , $V_{GS} = 0$
Gate to source breakdown voltage	$V_{(BR)GSS}$	$\pm 20$	—	—	mV	$I_G = \pm 100 \text{ }\mu\text{A}$ , $V_{DS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 10$	$\mu\text{A}$	$V_{GS} = \pm 16 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	$\pm 1$	$\mu\text{A}$	$V_{DS} = -30 \text{ V}$ , $V_{GS} = 0$
Zero gate voltage	HAT1047R $I_{DSS}$	—	—	—	$\mu\text{A}$	$V_{DS} = -24 \text{ V}$ , $V_{GS} = 0$
drain current	HAT1047RJ $I_{DSS}$	—	—	-20	$\mu\text{A}$	Ta = 125°C
Gate to source cutoff voltage	$V_{GS(off)}$	-1.0	—	-2.5	V	$V_{DS} = -10 \text{ V}$ , $I_D = -1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	10	12	m $\Omega$	$I_D = -7 \text{ A}$ , $V_{GS} = -10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	19	25	m $\Omega$	$I_D = -7 \text{ A}$ , $V_{GS} = -4.5 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	9.6	16	—	S	$I_D = -7 \text{ A}$ , $V_{DS} = -10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	3500	—	pF	$V_{DS} = -10 \text{ V}$
Output capacitance	$C_{oss}$	—	750	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	520	—	pF	f = 1 MHz
Total gate charge	$Q_g$	—	64	—	nc	$V_{DD} = -10 \text{ V}$
Gate to source charge	$Q_{gs}$	—	10	—	nc	$V_{GS} = -10 \text{ V}$
Gate to drain charge	$Q_{gd}$	—	12	—	nc	$I_D = -14 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	23	—	ns	$V_{GS} = -10 \text{ V}$ , $I_D = -7 \text{ A}$
Rise time	$t_r$	—	45	—	ns	$V_{DD} \cong -10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	80	—	ns	$R_L = 1.43 \text{ }\Omega$
Fall time	$t_f$	—	25	—	ns	$R_L = 4.7 \text{ }\Omega$
Body-drain diode forward voltage	$V_{DF}$	—	-0.82	-1.07	V	$I_F = -14 \text{ A}$ , $V_{GS} = 0$ <sup>Note4</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	45	—	ns	$I_F = -14 \text{ A}$ , $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

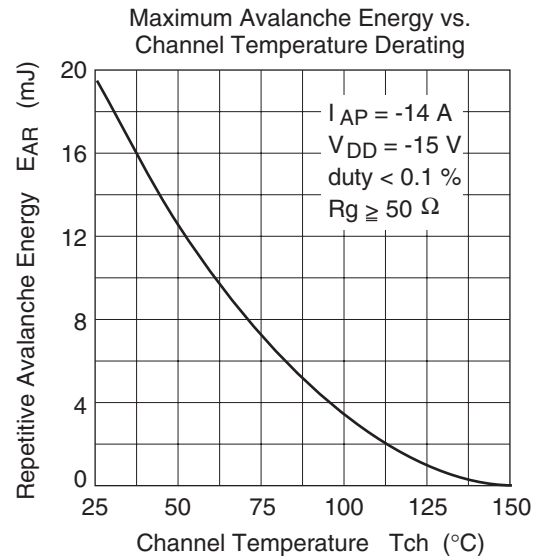
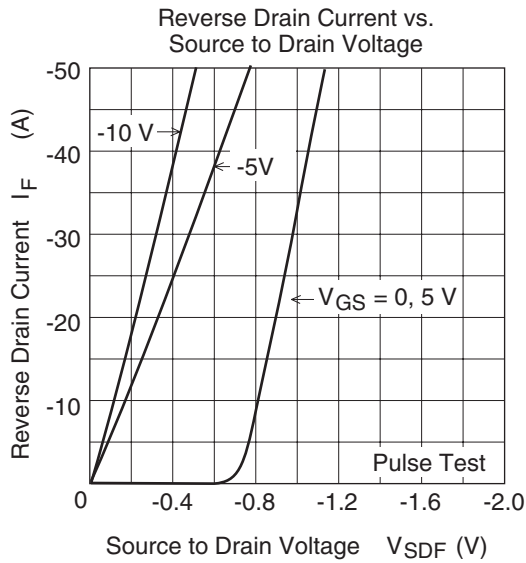
Notes: 4. Pulse test

## Main Characteristics

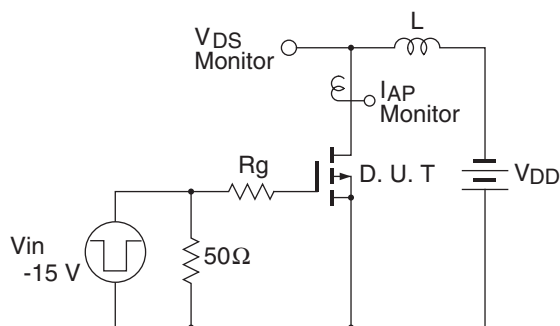




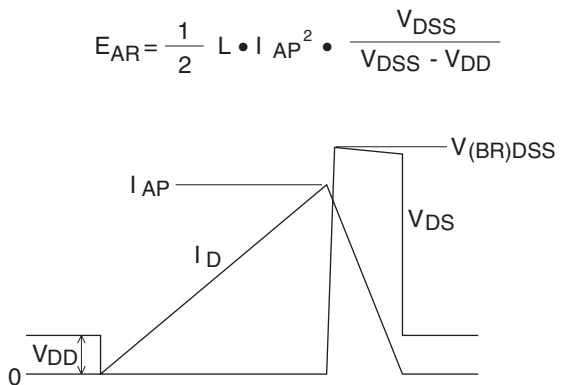


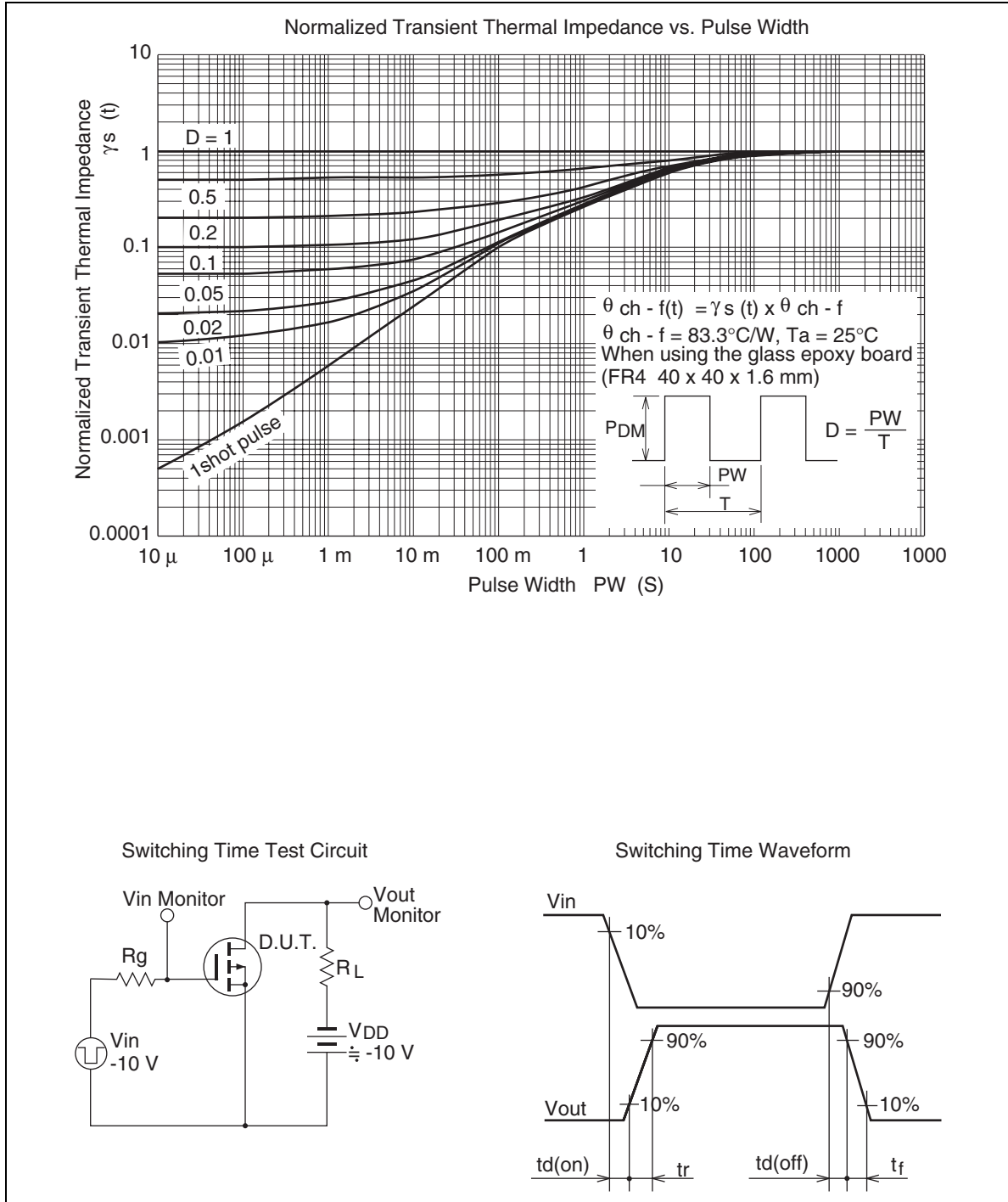


Avalanche Test Circuit



Avalanche Waveform

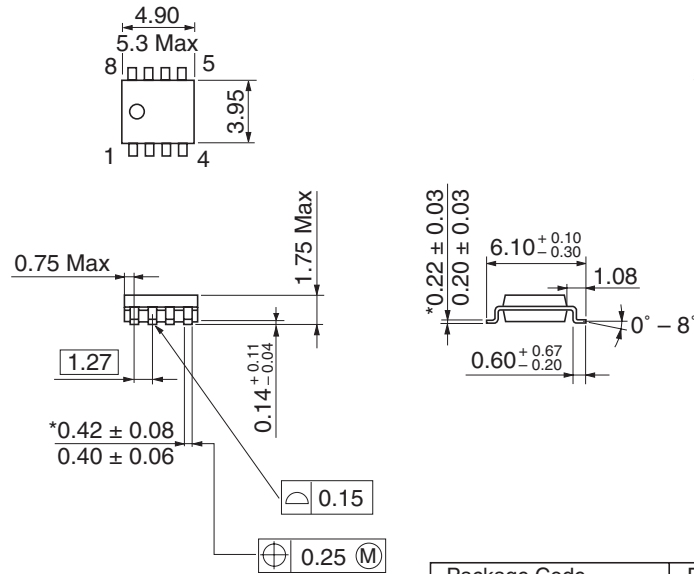




## Package Dimensions

As of January, 2003

Unit: mm



\*Dimension including the plating thickness  
Base material dimension

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