

To our customers,

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# HAT2210R, HAT2210RJ

Silicon N Channel Power MOS FET with Schottky Barrier Diode  
High Speed Power Switching

REJ03G0578-0300

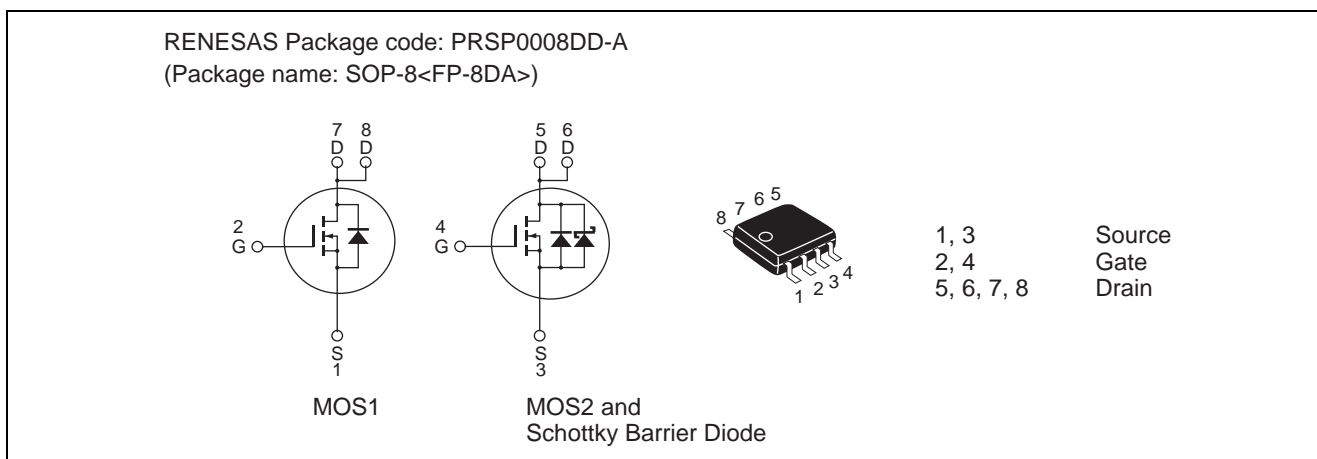
Rev.3.00

Mar.15.2005

## Features

- Low on-resistance
- Capable of 4.5 V gate drive
- High density mounting
- Built-in Schottky Barrier Diode

## Outline



## Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings				Unit
		HAT2210R		HAT2210RJ		
		MOS1	MOS2 & SBD	MOS1	MOS2 & SBD	
Drain to source voltage	V <sub>DSS</sub>	30	30	30	30	V
Gate to source voltage	V <sub>GSS</sub>	±20	±12	±20	±12	V
Drain current	I <sub>D</sub>	7.5	8.0	7.5	8.0	A
Drain peak current	I <sub>D(pulse)</sub> <sup>Note1</sup>	60	64	60	64	A
Reverse drain current	I <sub>DR</sub>	7.5	8.0	7.5	8.0	A
Avalanche current	I <sub>AP</sub> <sup>Note 2</sup>	—	—	7.5	8.0	A
Avalanche energy	E <sub>AR</sub> <sup>Note 2</sup>	—	—	5.62	6.4	mJ
Channel dissipation	P <sub>ch</sub> <sup>Note3</sup>	1.5	1.5	1.5	1.5	W
Channel temperature	T <sub>ch</sub>	150	150	150	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	-55 to +150	-55 to +150	-55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1 %

2. Value at T<sub>ch</sub> = 25°C, R<sub>g</sub> ≥ 50 Ω

3. 1 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s

## Electrical Characteristics

## • MOS1

(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 leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	1	$\mu\text{A}$	$V_{DS} = 30 \text{ V}, V_{GS} = 0$
Zero gate voltage drain current	HAT2210R	$I_{DSS}$	—	—	$\mu\text{A}$	$V_{DS} = 24 \text{ V}, V_{GS} = 0,$ $T_a = 125^\circ\text{C}$
	HAT2210RJ	$I_{DSS}$	—	—	10	
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	$R_{DS(on)}$	—	19	24	$\text{m}\Omega$	$I_D = 3.75 \text{ A}, V_{GS} = 10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	27	40	$\text{m}\Omega$	$I_D = 3.75 \text{ A}, V_{GS} = 4.5 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	9	15	—	S	$I_D = 3.75 \text{ A}, V_{DS} = 10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	630	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0,$ $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	155	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	57	—	pF	
Total gate charge	$Q_g$	—	4.6	—	nC	$V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V},$ $I_D = 7.5 \text{ A}$
Gate to source charge	$Q_{gs}$	—	2.2	—	nC	
Gate to drain charge	$Q_{gd}$	—	1.2	—	nC	
Turn-on delay time	$t_{d(on)}$	—	7	—	ns	$V_{GS} = 10 \text{ V}, I_D = 3.75 \text{ A},$ $V_{DD} \approx 10 \text{ V}, R_L = 2.66 \Omega,$ $R_g = 4.7 \Omega$
Rise time	$t_r$	—	14	—	ns	
Turn-off delay time	$t_{d(off)}$	—	36	—	ns	
Fall time	$t_f$	—	3.4	—	ns	
Body-drain diode forward voltage	$V_{DF}$	—	0.85	1.11	V	
Body-drain diode reverse recovery time	$t_{rr}$	—	17	—	ns	$I_F = 7.5 \text{ A}, V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 4. Pulse test

• MOS2 & Schottky Barrier Diode

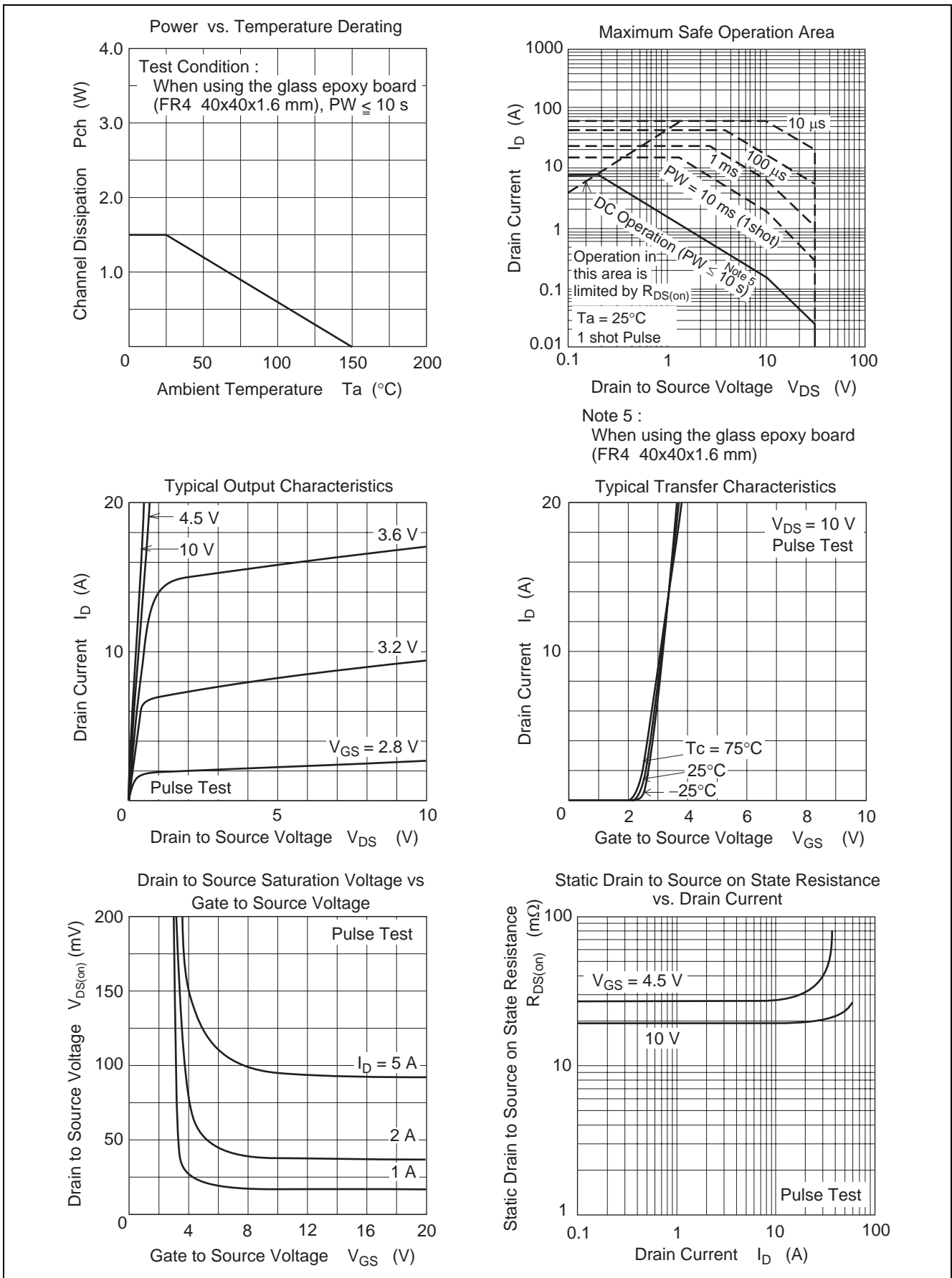
(Ta = 25°C)

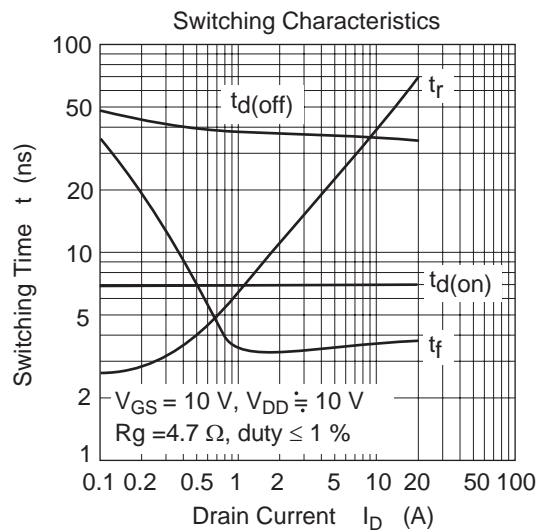
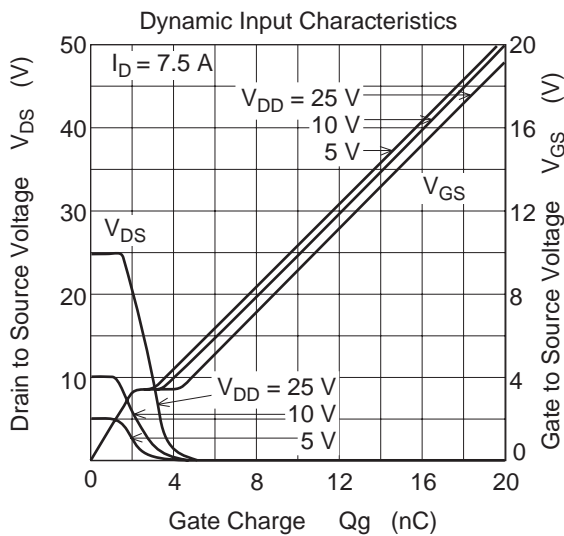
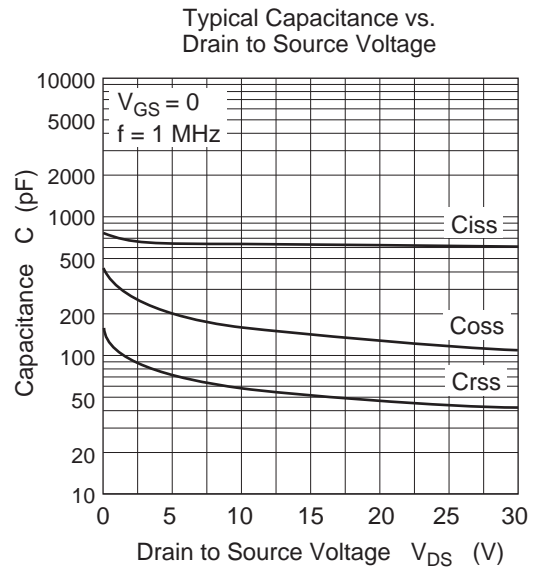
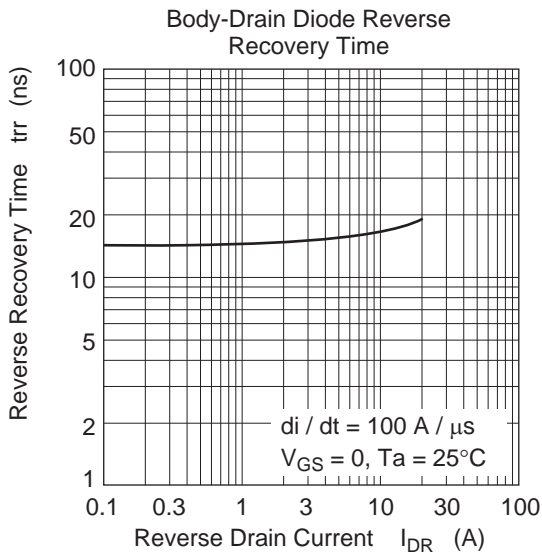
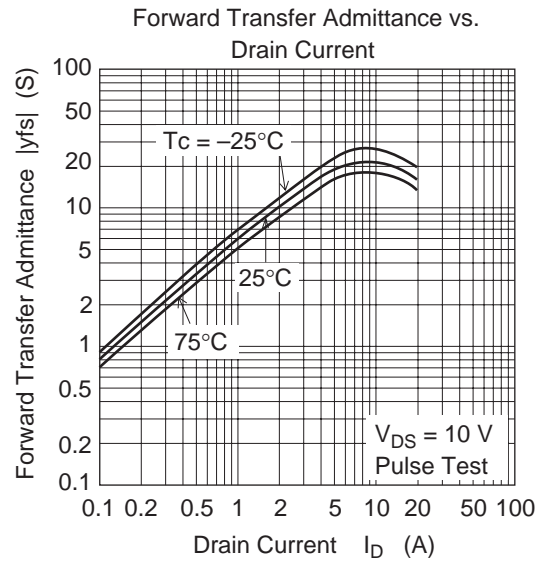
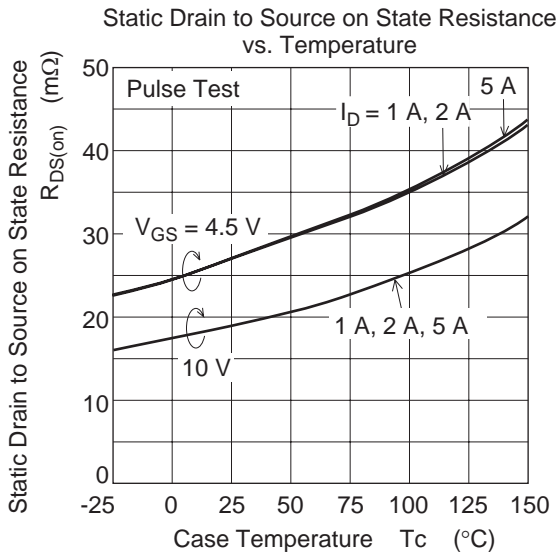
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10 \text{ mA}, V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = \pm 12 \text{ V}, V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	1	mA	$V_{DS} = 30 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.4	—	2.5	V	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	17	22	m $\Omega$	$I_D = 4 \text{ A}, V_{GS} = 10 \text{ V}$ <sup>Note4</sup>
	$R_{DS(on)}$	—	21	29	m $\Omega$	$I_D = 4 \text{ A}, V_{GS} = 4.5 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	15	25	—	S	$I_D = 4 \text{ A}, V_{DS} = 10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	1330	—	pF	$V_{DS} = 10 \text{ V}, V_{GS} = 0,$ $f = 1 \text{ MHz}$
Output capacitance	$C_{oss}$	—	230	—	pF	
Reverse transfer capacitance	$C_{rss}$	—	92	—	pF	
Total gate charge	$Q_g$	—	11	—	nC	$V_{DD} = 10 \text{ V}, V_{GS} = 4.5 \text{ V},$ $I_D = 8 \text{ A}$
Gate to source charge	$Q_{gs}$	—	3.8	—	nC	
Gate to drain charge	$Q_{gd}$	—	3.2	—	nC	
Turn-on delay time	$t_{d(on)}$	—	10	—	ns	$V_{GS} = 10 \text{ V}, I_D = 4 \text{ A},$ $V_{DD} \approx 10 \text{ V}, R_L = 2.5 \Omega,$ $R_g = 4.7 \Omega$
Rise time	$t_r$	—	16	—	ns	
Turn-off delay time	$t_{d(off)}$	—	43	—	ns	
Fall time	$t_f$	—	3.9	—	ns	
Schottky Barrier diode forward voltage	$V_F$	—	0.5	—	V	$I_F = 3.5 \text{ A}, V_{GS} = 0$ <sup>Note4</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	15	—	ns	$I_F = 8 \text{ A}, V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

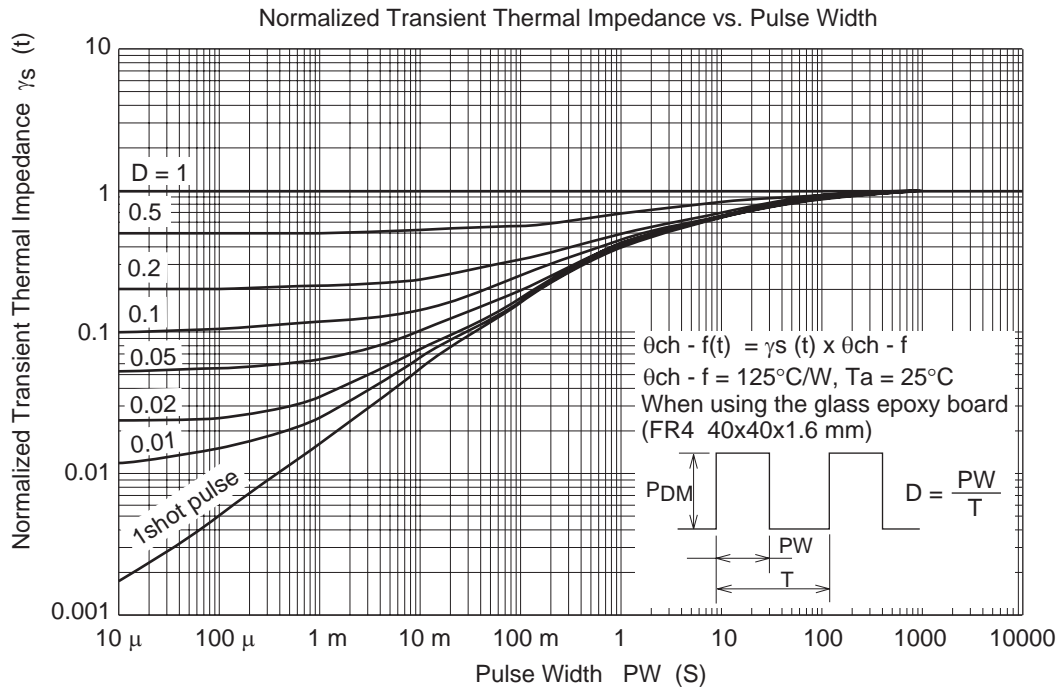
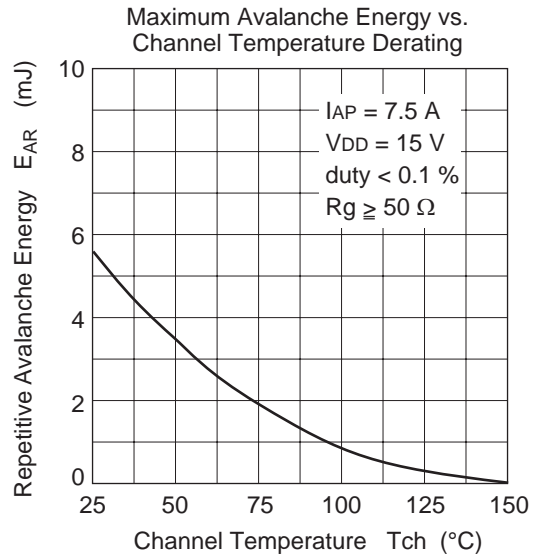
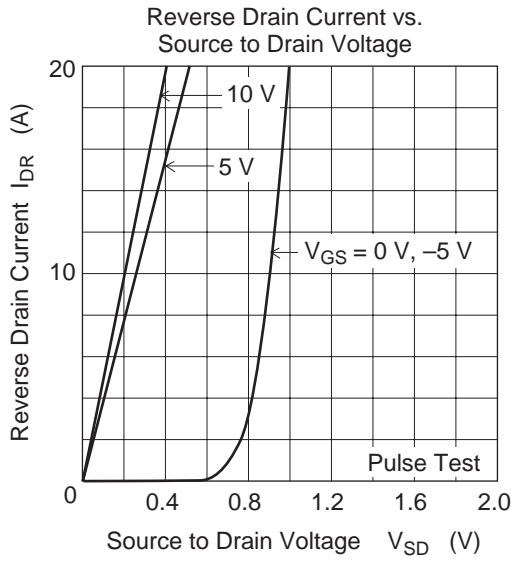
Notes: 4. Pulse test

## Main Characteristics

### • MOS1

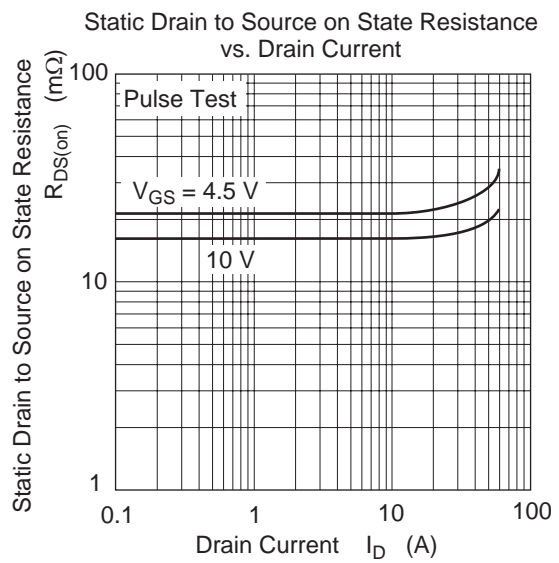
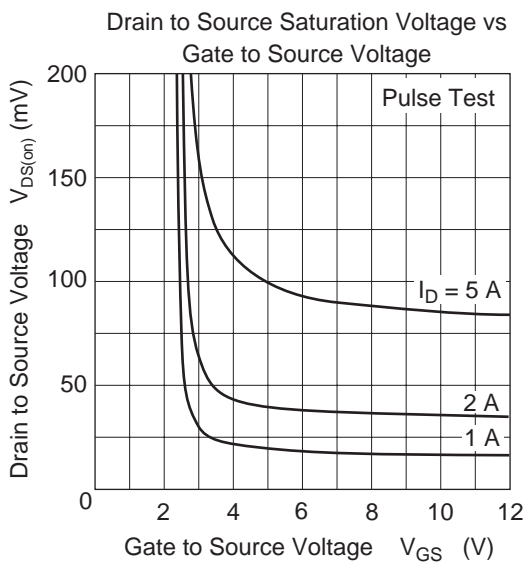
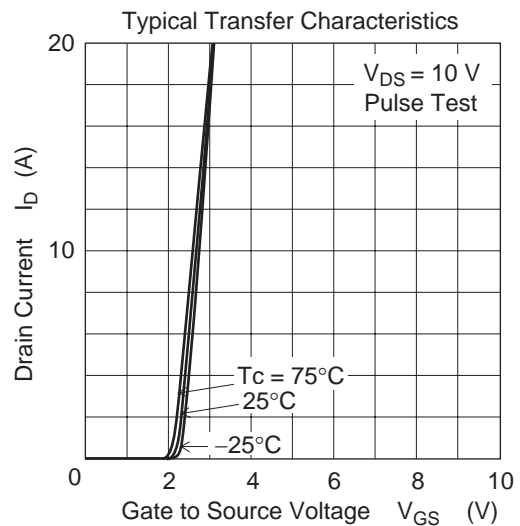
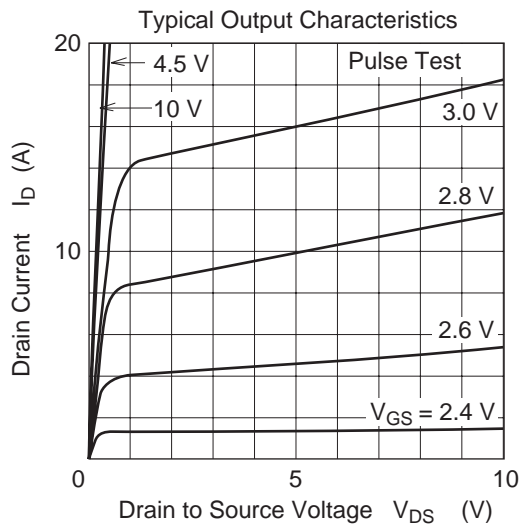
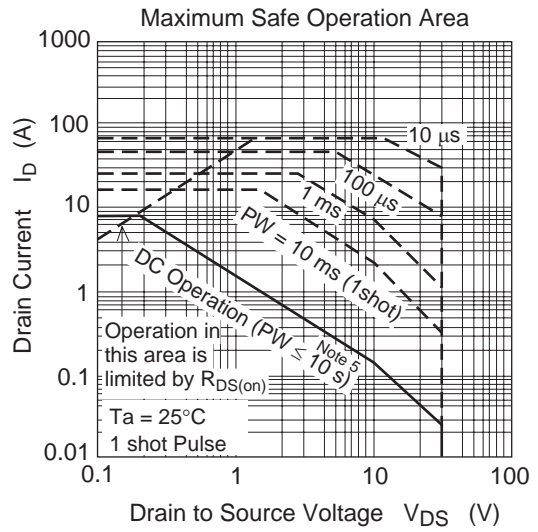
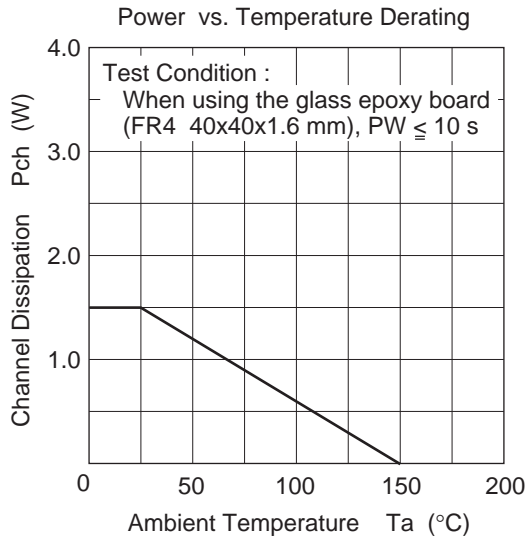


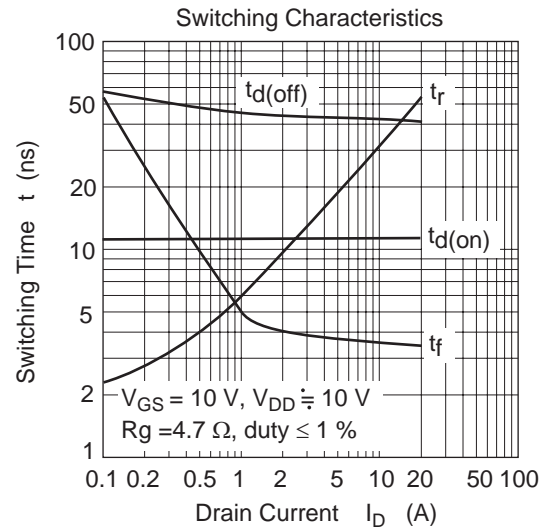
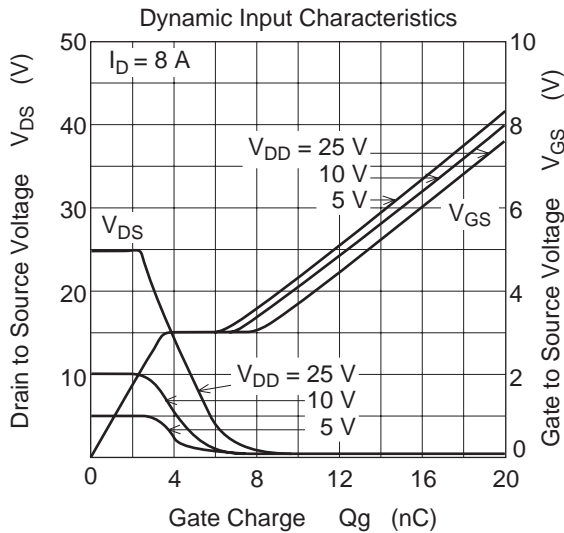
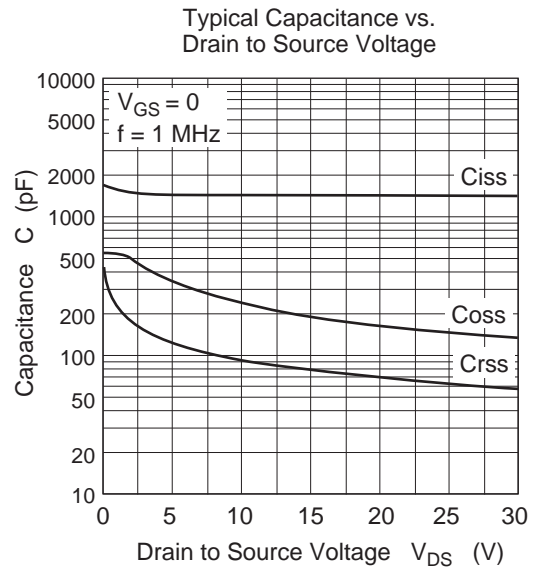
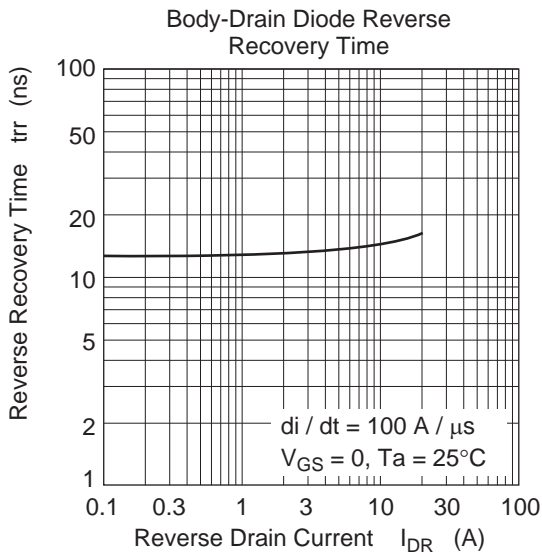
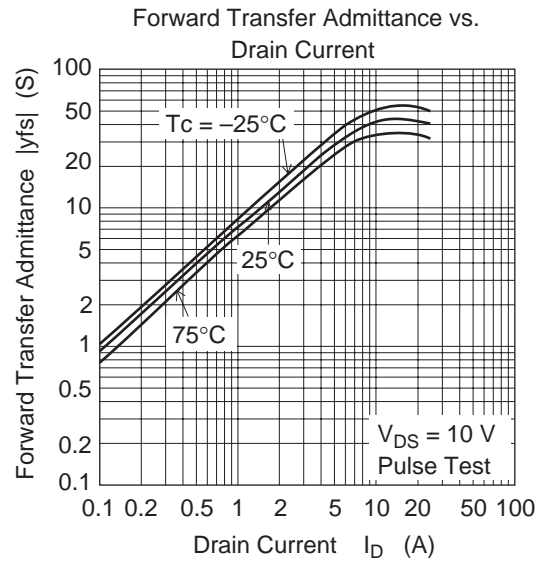
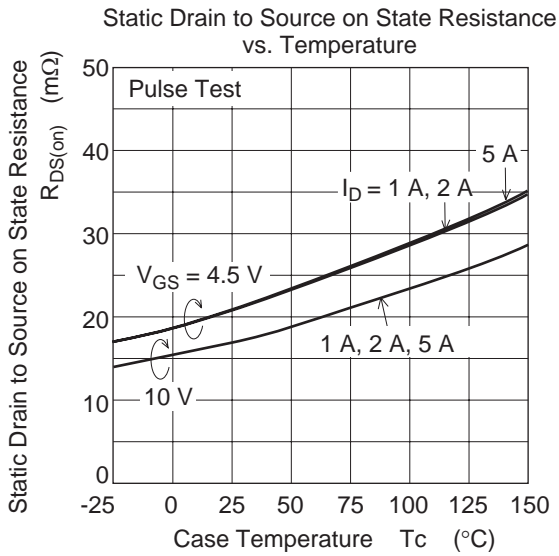


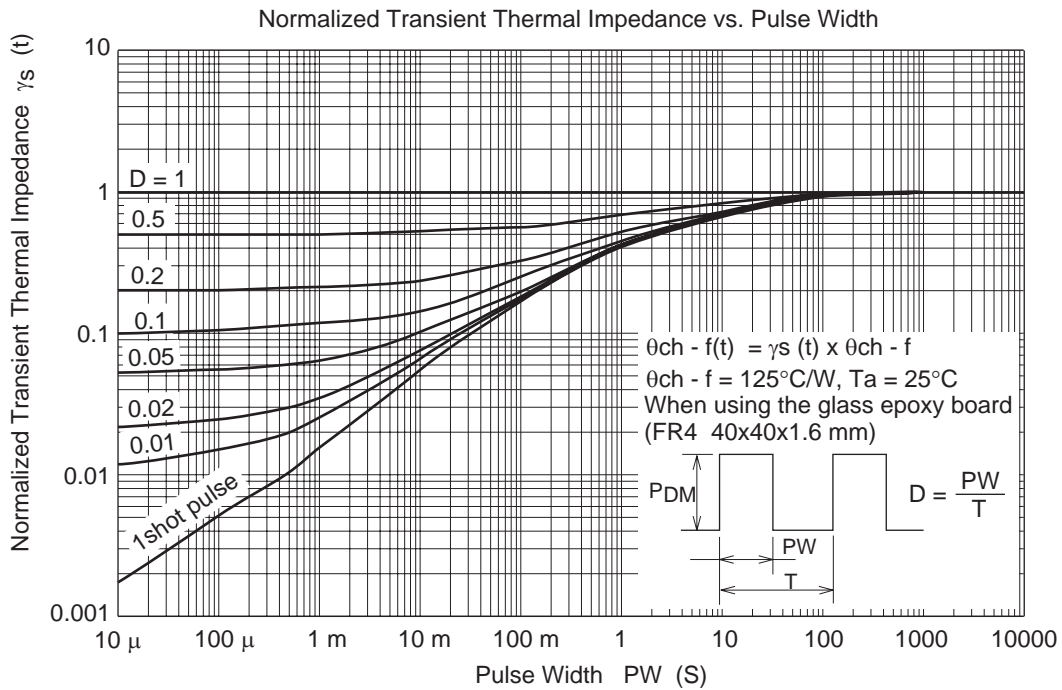
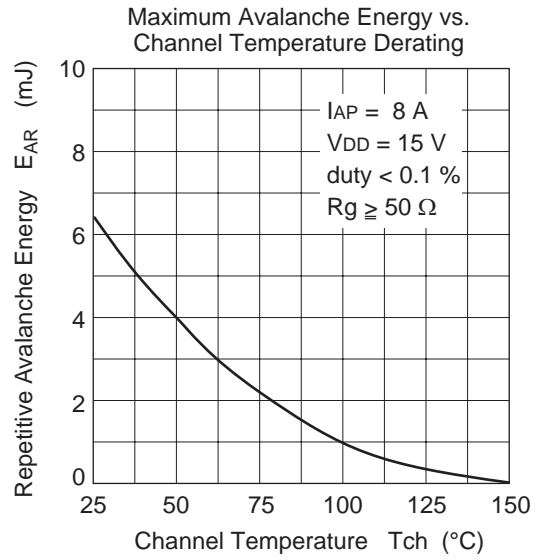
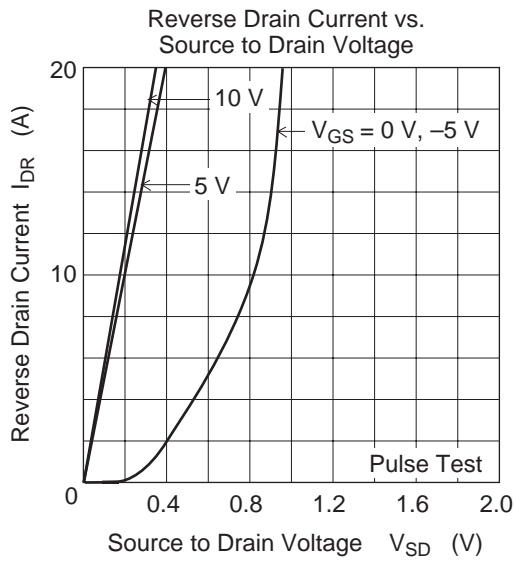




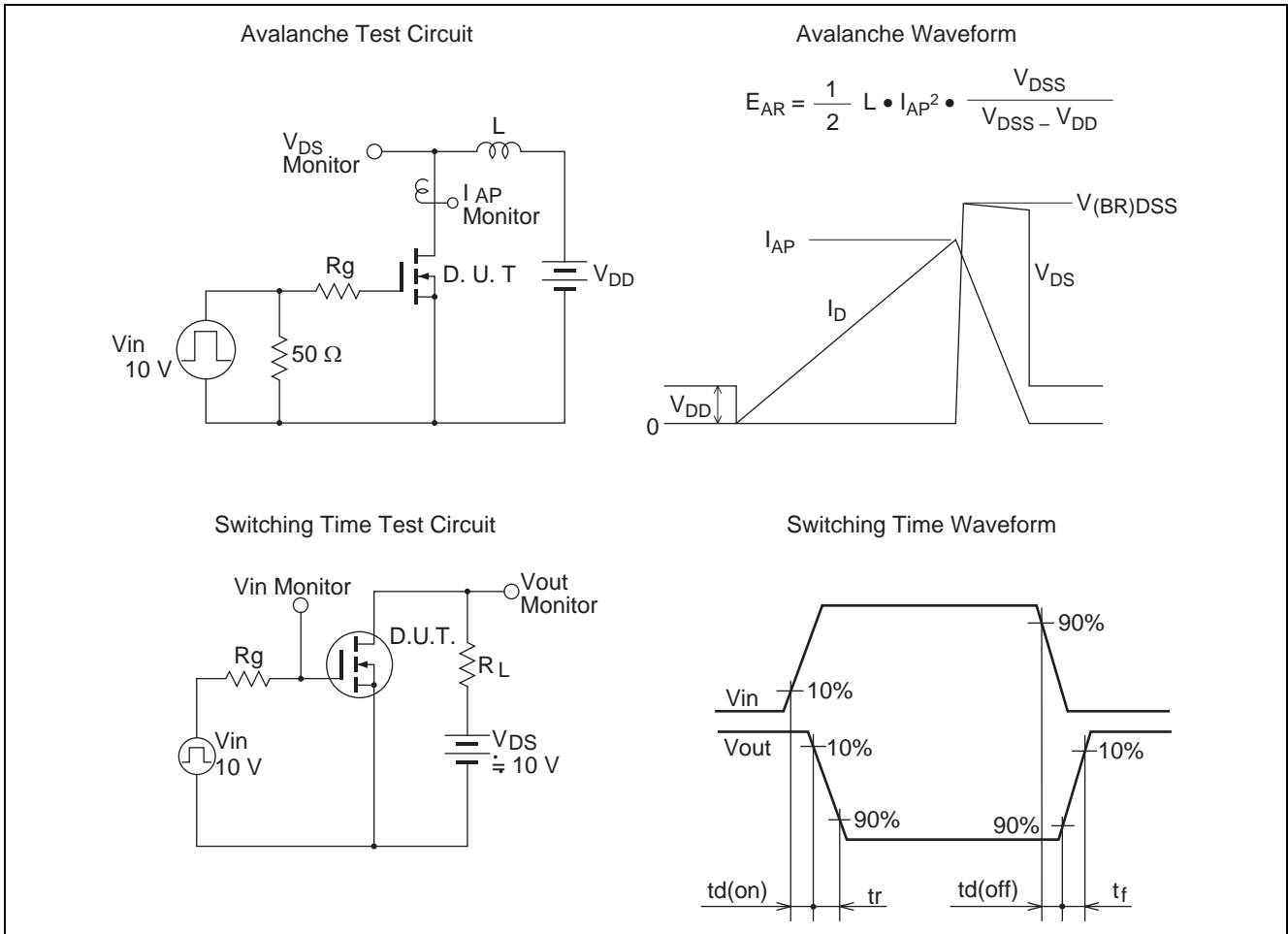
• MOS2 & Schottky Barrier Diode



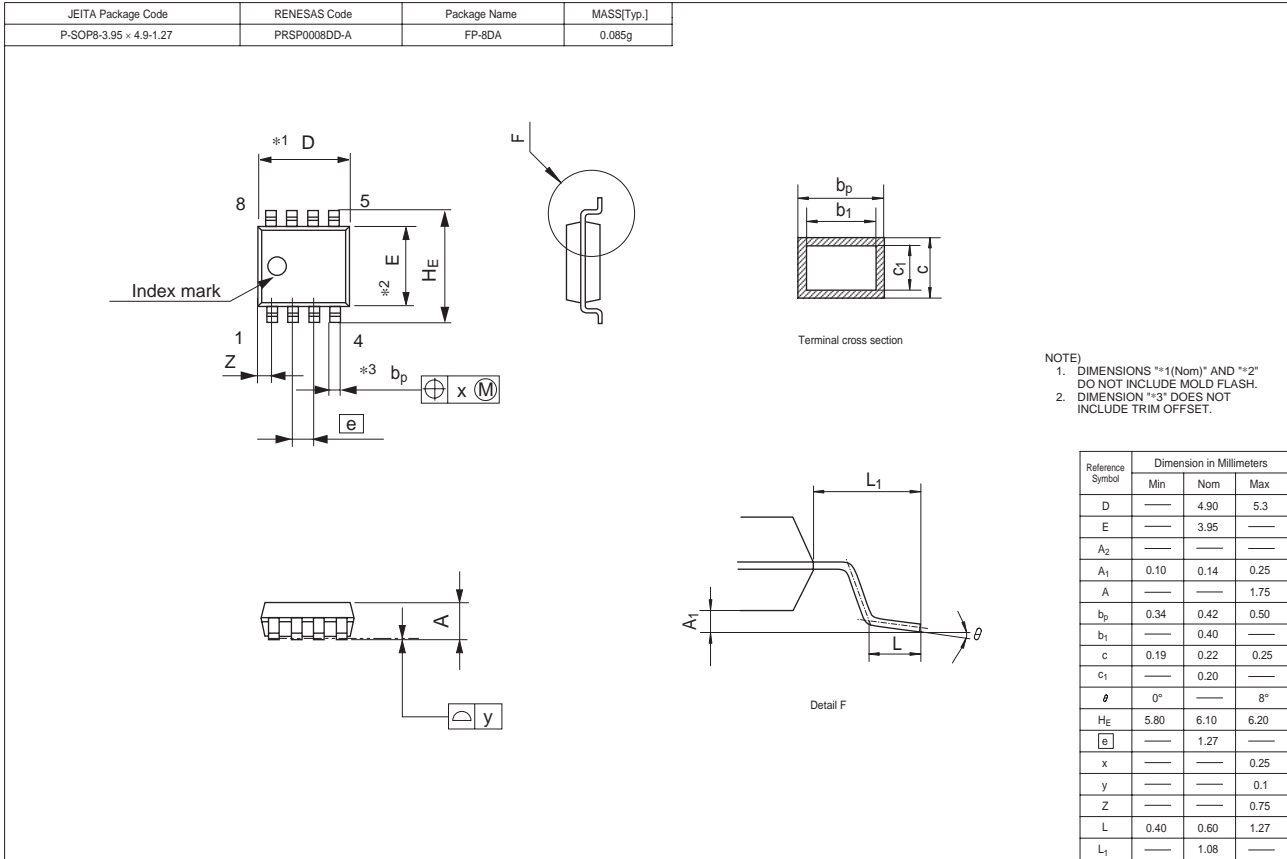




• Common



### Package Dimensions



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Part Name	Quantity	Shipping Container
HAT2210R-EL-E	2500 pcs	Taping
HAT2210RJ-EL-E	2500 pcs	Taping

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[NTE6400](#) [JANTX2N6796U](#) [JANTX2N6784U](#) [JANTXV2N5416U4](#) [SQM110N05-06L-GE3](#) [SIHF35N60E-GE3](#)