

HAT2210R, HAT2210RJ

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

REJ03G0578-0300

Rev.3.00

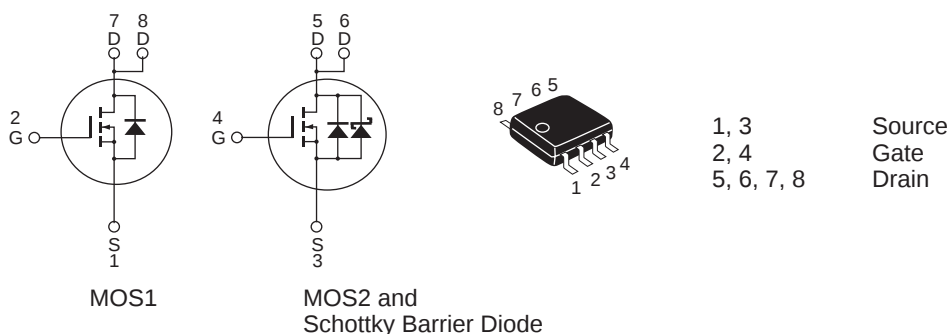
Mar.15.2005

Features

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

Outline

RENESAS Package code: PRSP0008DD-A
(Package name: SOP-8<FP-8DA>)



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings				Unit
		HAT2210R		HAT2210RJ		
		MOS1	MOS2 & SBD	MOS1	MOS2 & SBD	
Drain to source voltage	V _{DSS}	30	30	30	30	V
Gate to source voltage	V _{GSS}	±20	±12	±20	±12	V
Drain current	I _D	7.5	8.0	7.5	8.0	A
Drain peak current	I _{D(pulse)} ^{Note1}	60	64	60	64	A
Reverse drain current	I _{DR}	7.5	8.0	7.5	8.0	A
Avalanche current	I _{AP} ^{Note 2}	—	—	7.5	8.0	A
Avalanche energy	E _{AR} ^{Note 2}	—	—	5.62	6.4	mJ
Channel dissipation	P _{ch} ^{Note3}	1.5	1.5	1.5	1.5	W
Channel temperature	T _{ch}	150	150	150	150	°C
Storage temperature	T _{stg}	−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_{ch} = 25°C, R_g ≥ 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}	—	—	± 0.1	μA	$V_{GS} = \pm 20 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	μA	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0$
Zero gate voltage drain current	HAT2210R	I_{DSS}	—	—	μA	$V_{DS} = 24 \text{ V}$, $V_{GS} = 0$, $T_a = 125^\circ\text{C}$
	HAT2210RJ	I_{DSS}	—	10	μA	
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	$\text{m}\Omega$	$I_D = 3.75 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	27	40	$\text{m}\Omega$	$I_D = 3.75 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	9	15	—	S	$I_D = 3.75 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note4}
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	$I_F = 7.5 \text{ A}$, $V_{GS} = 0$ ^{Note4}
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

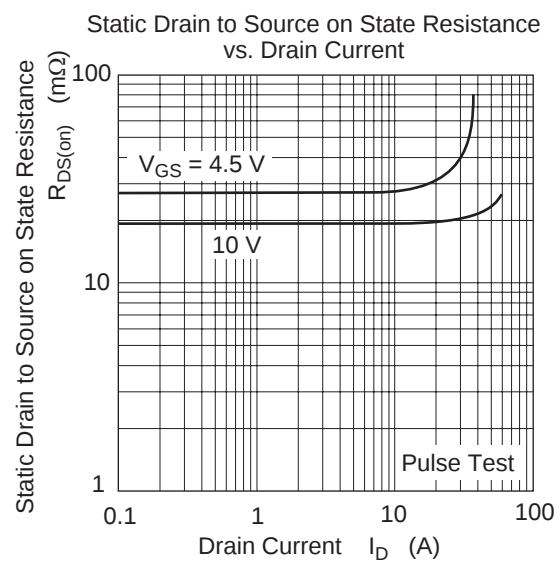
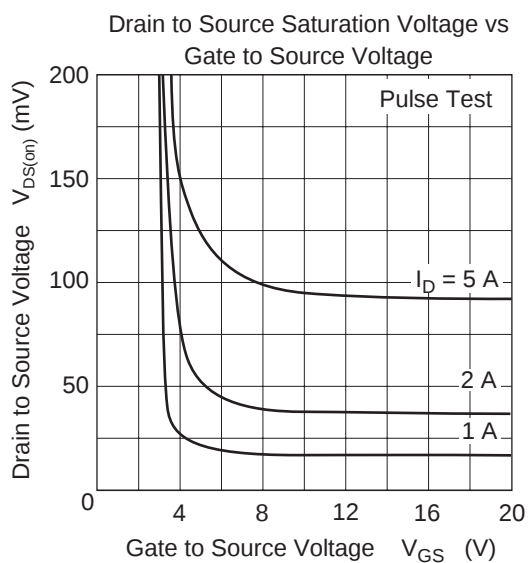
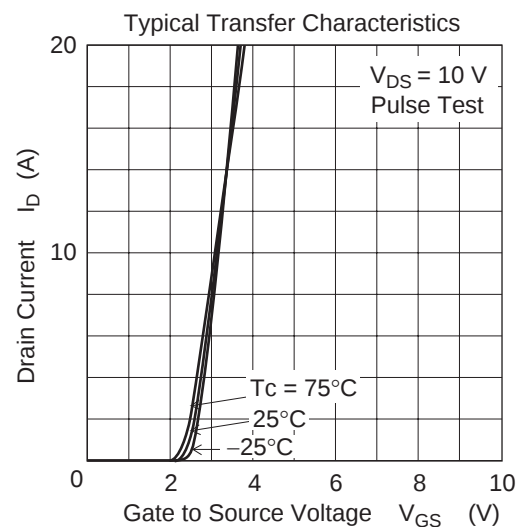
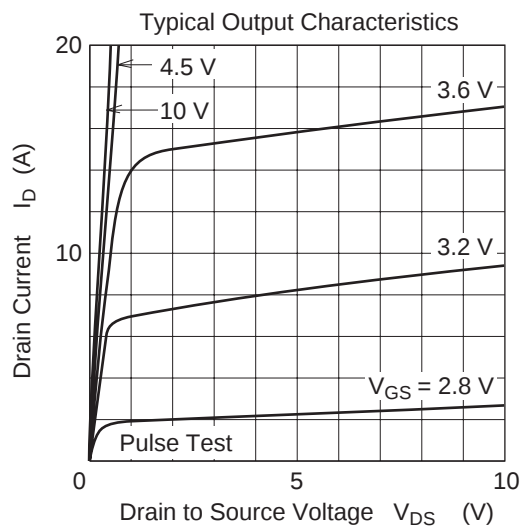
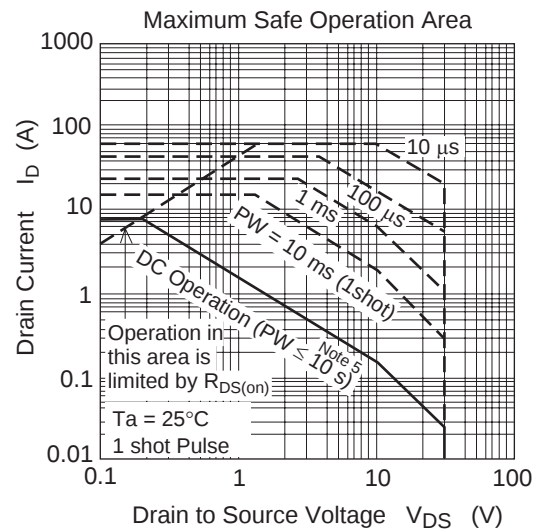
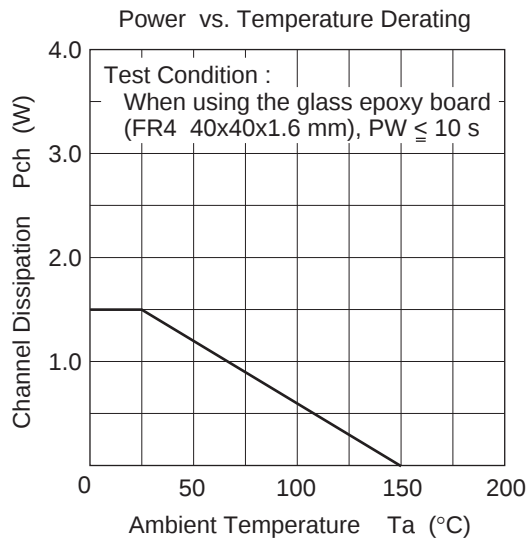
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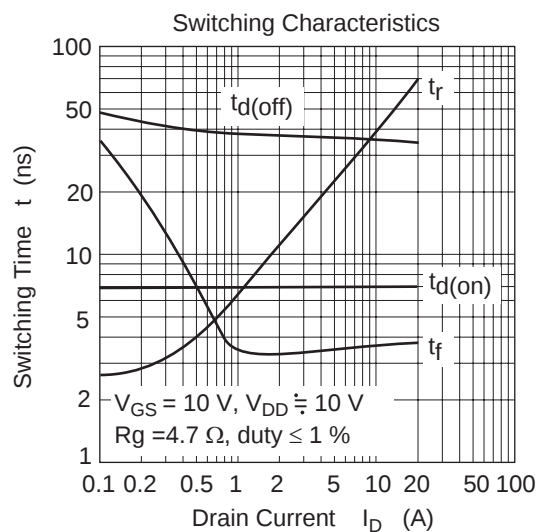
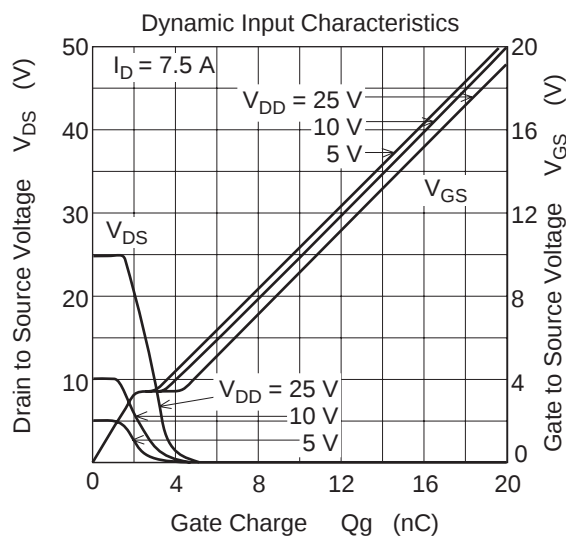
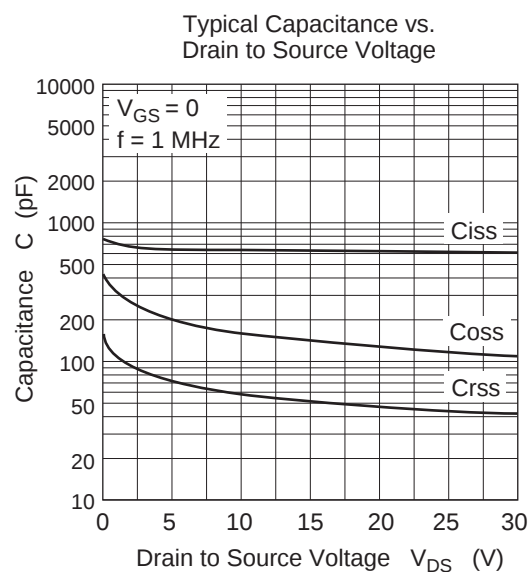
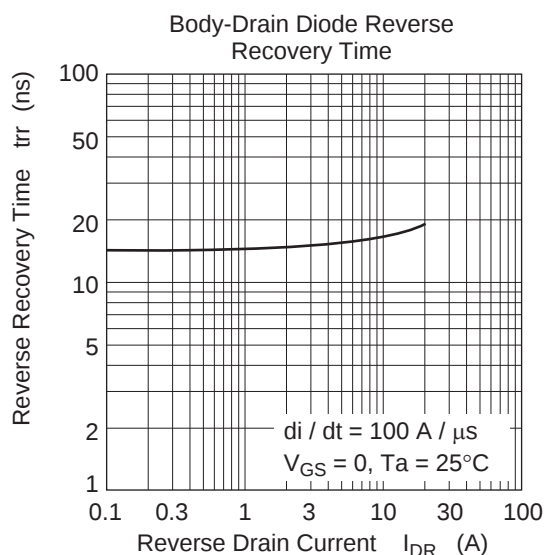
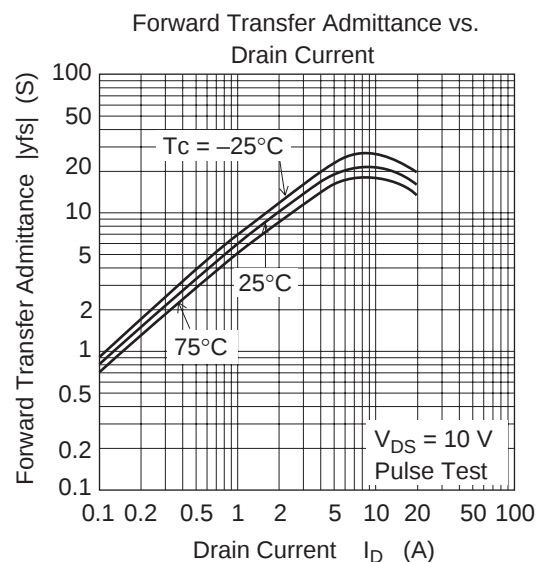
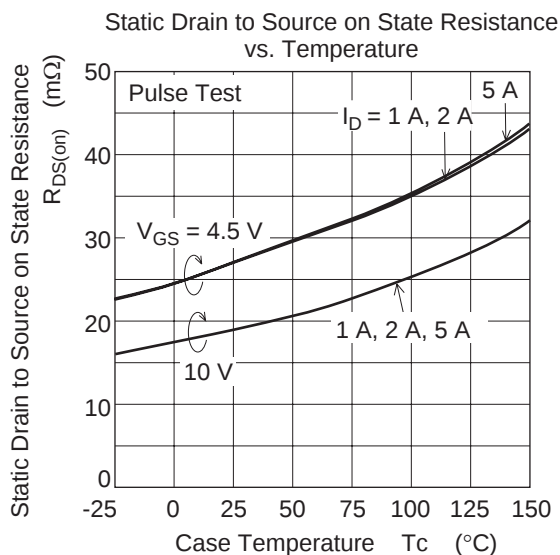
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	$I_D = 10 \text{ mA}$, $V_{GS} = 0$
Gate to source leak current	I_{GSS}	—	—	± 0.1	μA	$V_{GS} = \pm 12 \text{ V}$, $V_{DS} = 0$
Zero gate voltage drain current	I_{DSS}	—	—	1	mA	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0$
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	$\text{m}\Omega$	$I_D = 4 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	21	29	$\text{m}\Omega$	$I_D = 4 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	15	25	—	S	$I_D = 4 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note4}
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	$I_F = 3.5 \text{ A}$, $V_{GS} = 0$ ^{Note4}
Body-drain diode reverse recovery time	t_{rr}	—	15	—	ns	$I_F = 8 \text{ A}$, $V_{GS} = 0$ $diF/dt = 100 \text{ A}/\mu\text{s}$

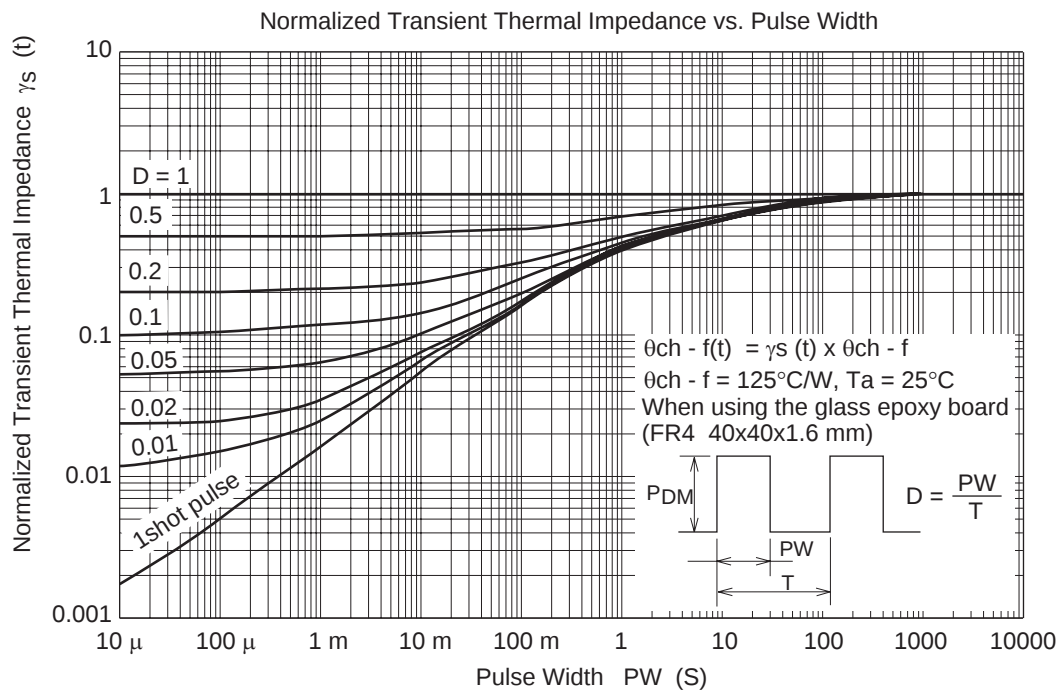
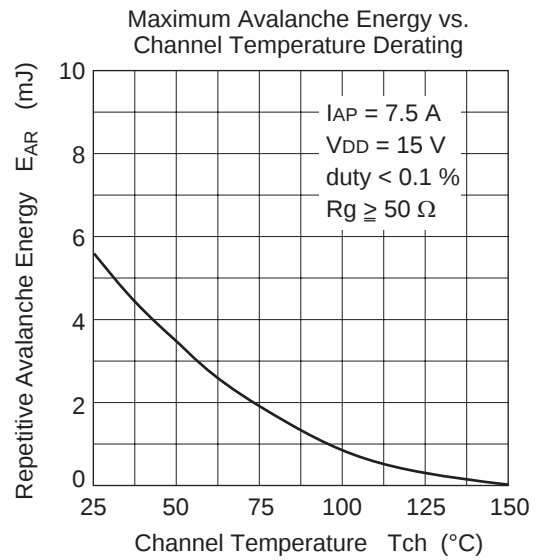
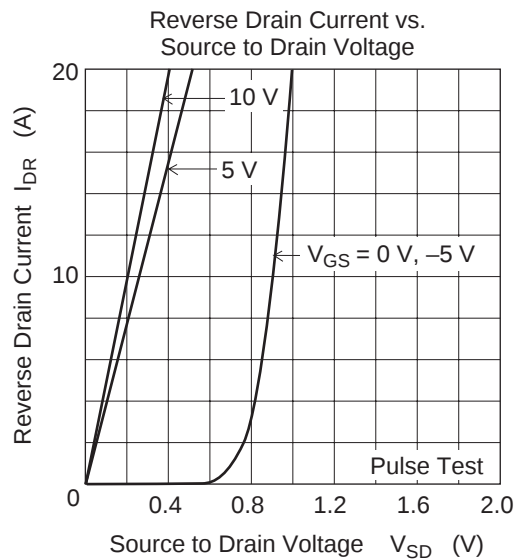
Notes: 4. Pulse test

Main Characteristics

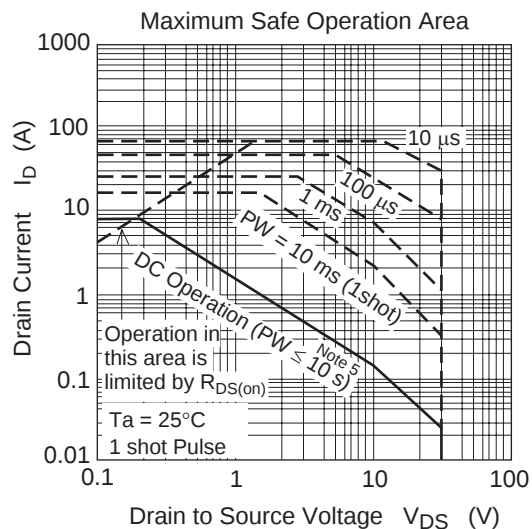
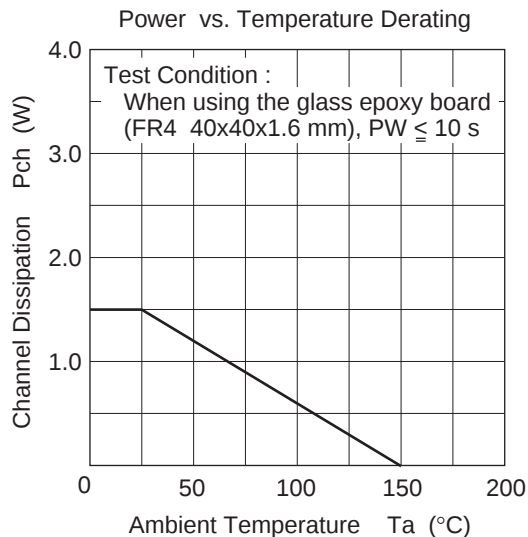
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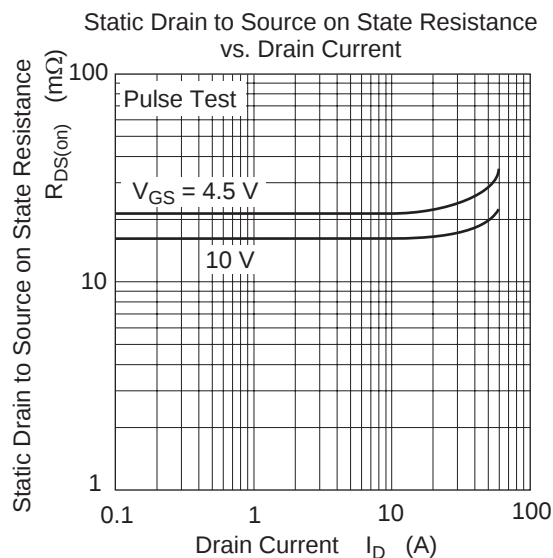
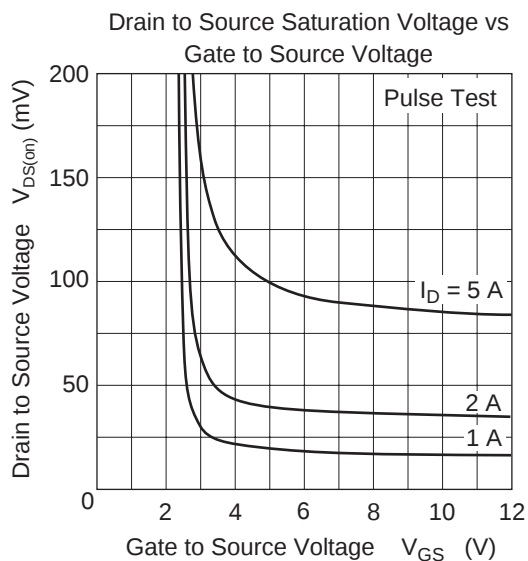
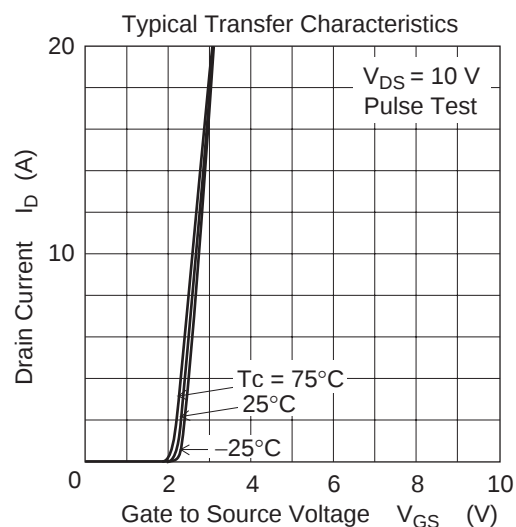
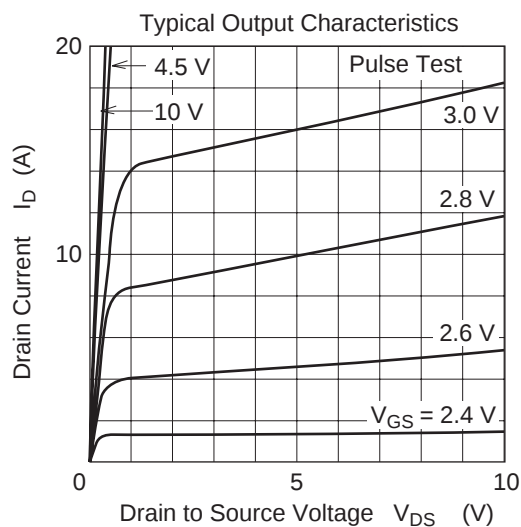


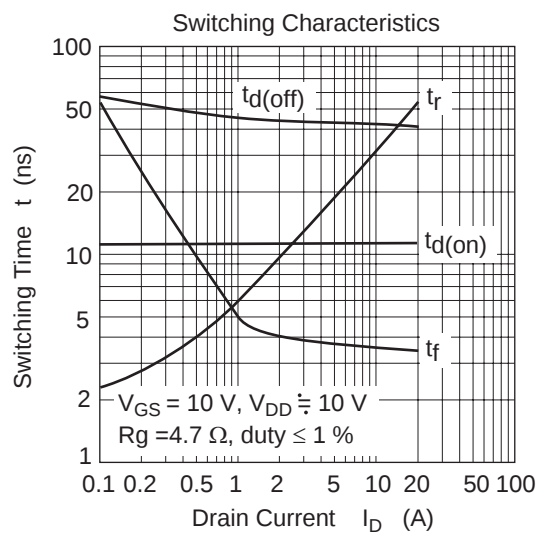
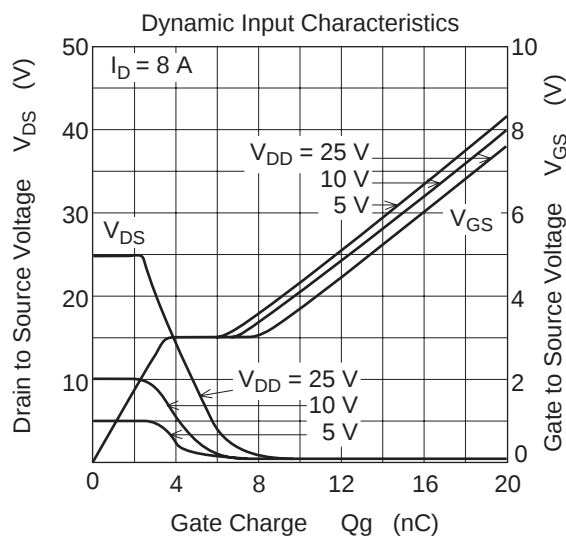
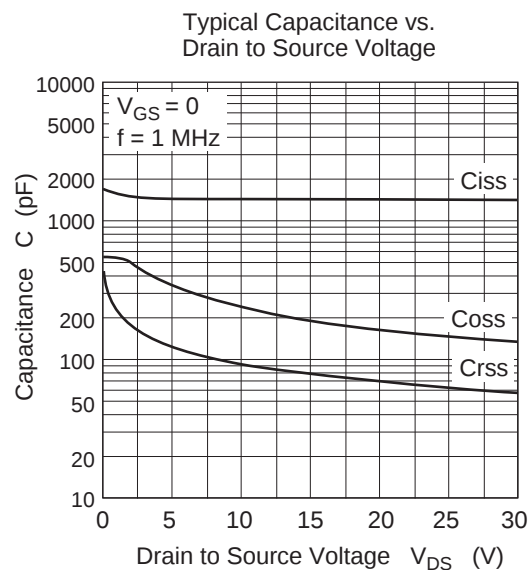
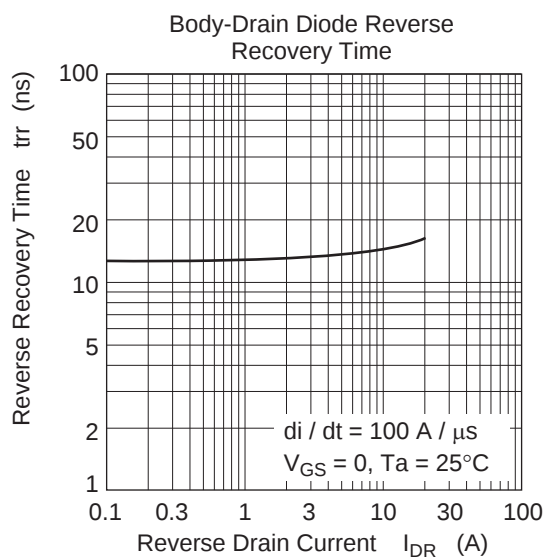
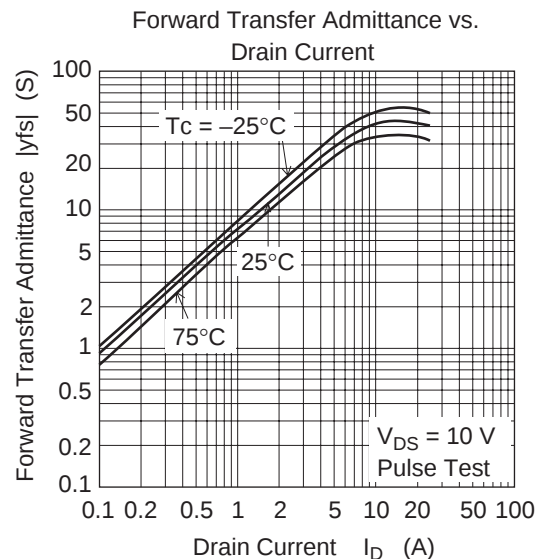
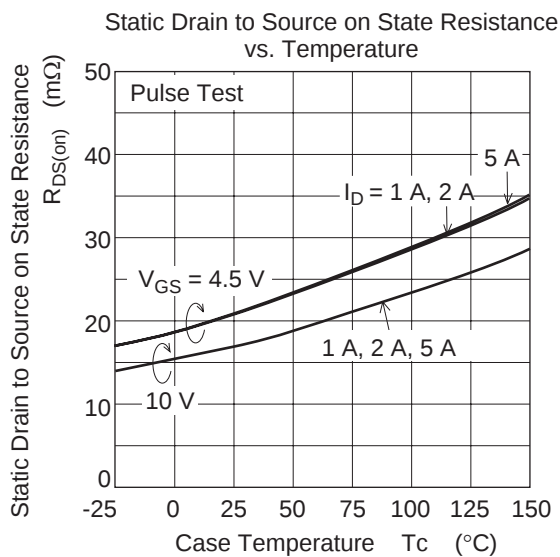


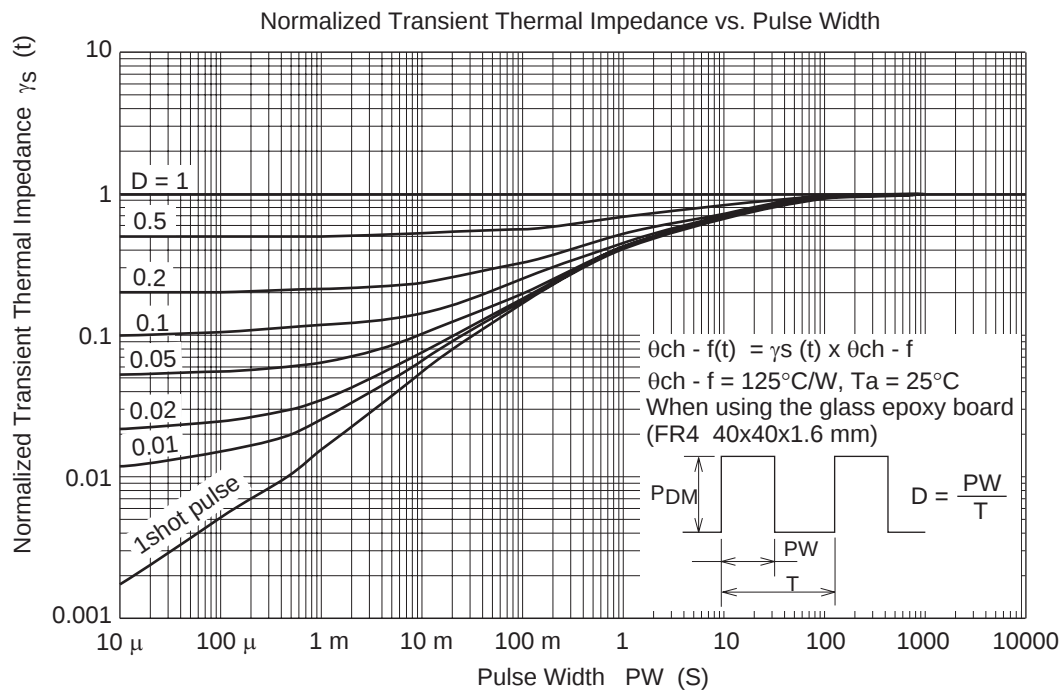
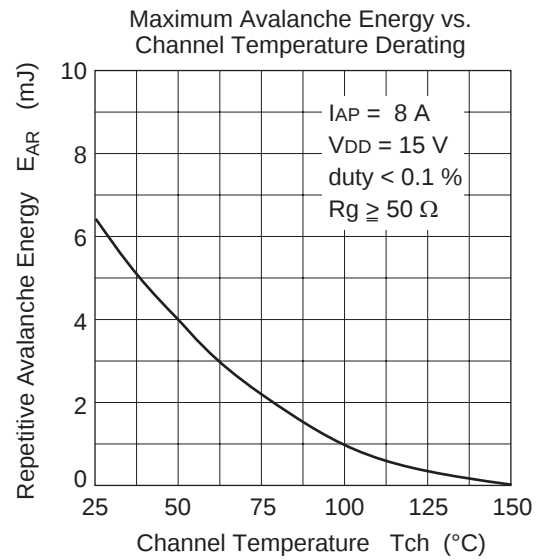
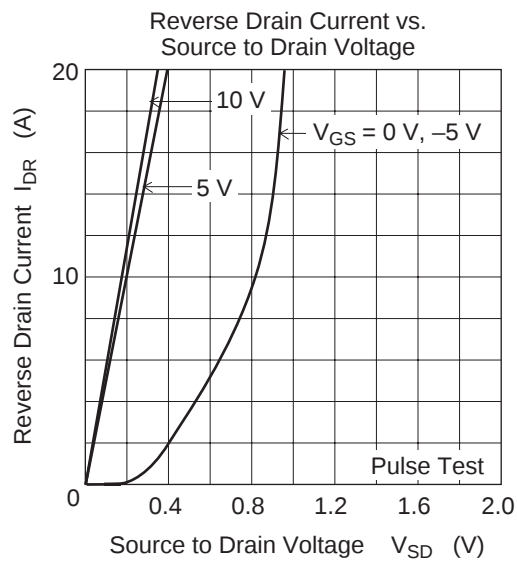
• MOS2 & Schottky Barrier Diode



Note 5 :
When using the glass epoxy board
(FR4 40x40x1.6 mm)

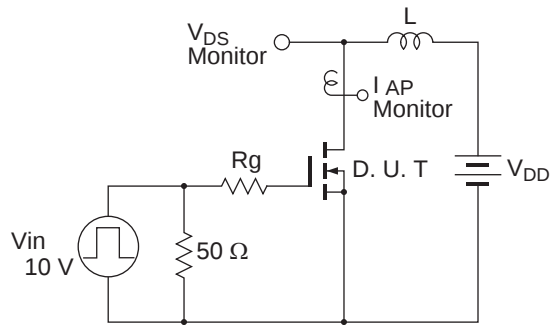






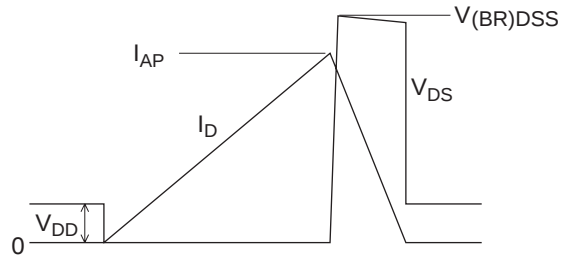
• Common

Avalanche Test Circuit

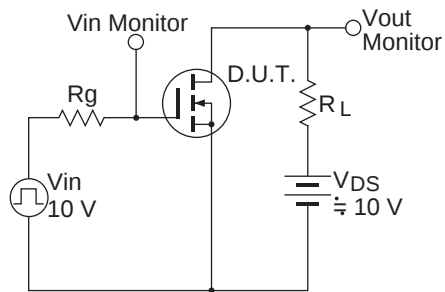


Avalanche Waveform

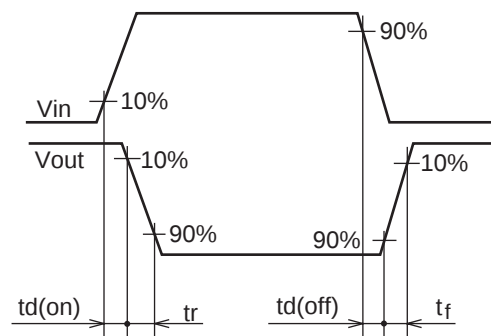
$$E_{AR} = \frac{1}{2} L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



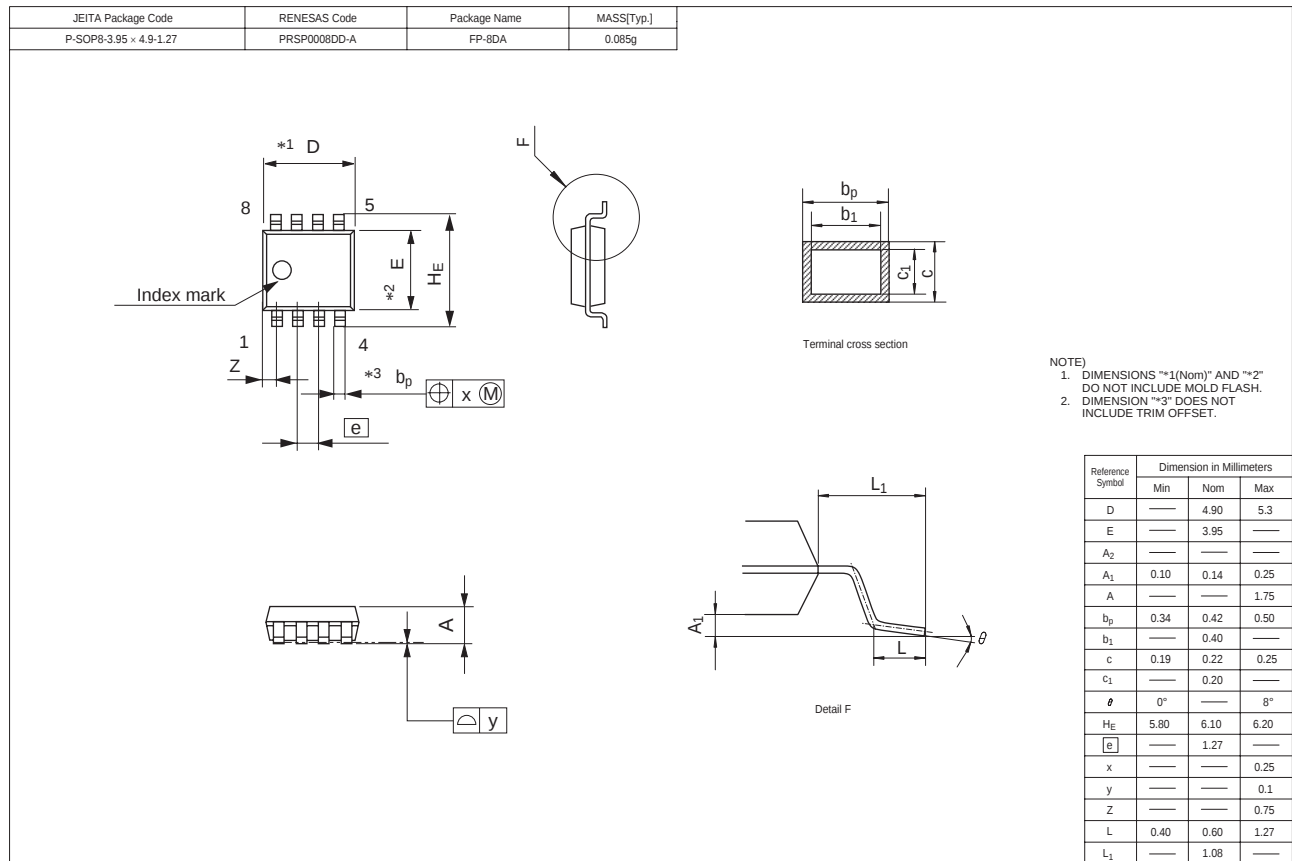
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

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

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