RENESAS

HAT2210R, HAT2210RJ

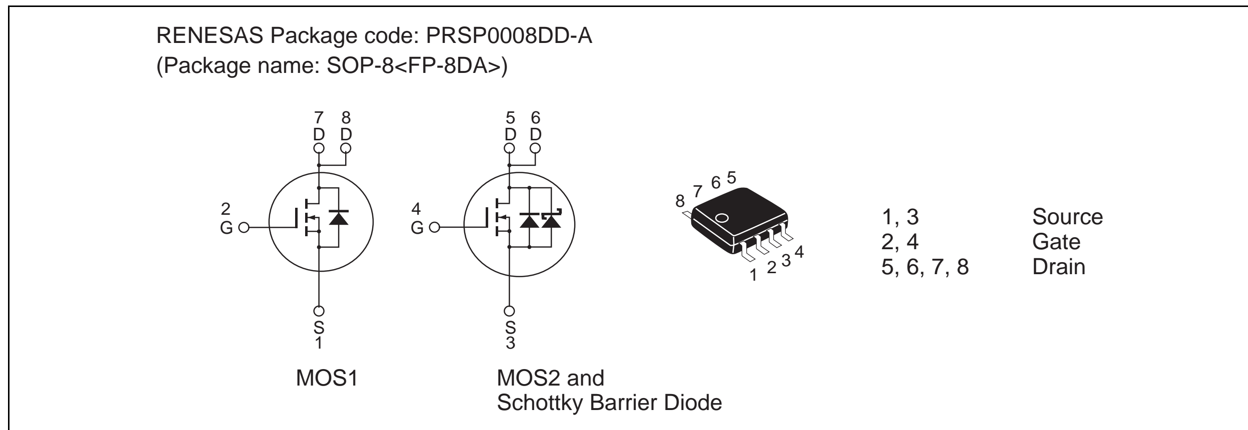
Silicon N Channel Power MOS FET with Schottky Barrier Diode
High Speed Power Switching

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_{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	Pch Note3	1.5	1.5	1.5	1.5	W
Channel temperature	Tch	150	150	150	150	°C
Storage temperature	Tstg	–55 to +150	–55 to +150	–55 to +150	–55 to +150	°C

Notes: 1. PW ≤ 10 µs, duty cycle ≤ 1 %
2. Value at Tch = 25°C, Rg ≥ 50 Ω
3. 1 Drive operation; When using the glass epoxy board (FR4 40 x 40 x 1.6 mm), PW ≤ 10 s

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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 mA, V_{GS} = 0
Gate to source leak current		I_{GSS}	—	—	±0.1	μA	V_{GS} = ±20 V, V_{DS} = 0
Zero gate voltage drain current		I_{DSS}	—	—	1	μA	V_{DS} = 30 V, V_{GS} = 0
Zero gate voltage drain current	HAT2210R	I_{DSS}	—	—	—	μA	V_{DS} = 24 V, V_{GS} = 0, Ta = 125°C
	HAT2210RJ	I_{DSS}	—	—	10	μA	
Gate to source cutoff voltage		$V_{GS(off)}$	1.0	—	2.5	V	V_{DS} = 10 V, I_D = 1 mA
Static drain to source on state resistance		$R_{DS(on)}$	—	19	24	mΩ	I_D = 3.75 A, V_{GS} = 10 V Note4
		$R_{DS(on)}$	—	27	40	mΩ	I_D = 3.75 A, V_{GS} = 4.5 V Note4
Forward transfer admittance		$\|y_{fs}\|$	9	15	—	S	I_D = 3.75 A, V_{DS} = 10 V Note4
Input capacitance		Ciss	—	630	—	pF	V_{DS} = 10 V, V_{GS} = 0, f = 1MHz
Output capacitance		Coss	—	155	—	pF	
Reverse transfer capacitance		Crss	—	57	—	pF	
Total gate charge		Qg	—	4.6	—	nC	V_{DD} = 10 V, V_{GS} = 4.5 V, I_D = 7.5 A
Gate to source charge		Qgs	—	2.2	—	nC	
Gate to drain charge		Qgd	—	1.2	—	nC	
Turn-on delay time		$t_{d(on)}$	—	7	—	ns	V_{GS} =10 V, I_D = 3.75 A, V_{DD} ≈ 10 V, R_L = 2.66 Ω, R_g = 4.7 Ω
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	IF = 7.5 A, V_{GS} = 0 Note4
Body–drain diode reverse recovery time		t_{rr}	—	17	—	ns	IF =7.5 A, V_{GS} = 0 diF/ dt = 100 A/μs

Notes: 4. Pulse test

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- **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 mA, V_{GS} = 0
Gate to source leak current	I_{GSS}	—	—	±0.1	µA	V_{GS} = ±12 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	1	mA	V_{DS} = 30 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.4	—	2.5	V	V_{DS} = 10 V, I_D =1 mA
Static drain to source on state resistance	$R_{DS(on)}$	—	17	22	mΩ	I_D =4 A, V_{GS} = 10 V [Note4]
	$R_{DS(on)}$	—	21	29	mΩ	I_D = 4 A, V_{GS} = 4.5 V [Note4]
Forward transfer admittance	$\|y_{fs}\|$	15	25	—	S	I_D = 4 A, V_{DS} = 10 V [Note4]
Input capacitance	Ciss	—	1330	—	pF	V_{DS} = 10 V, V_{GS} = 0, f = 1MHz
Output capacitance	Coss	—	230	—	pF	
Reverse transfer capacitance	Crss	—	92	—	pF	
Total gate charge	Qg	—	11	—	nC	V_{DD} = 10 V, V_{GS} = 4.5 V, I_D = 8 A
Gate to source charge	Qgs	—	3.8	—	nC	
Gate to drain charge	Qgd	—	3.2	—	nC	
Turn-on delay time	$t_{d(on)}$	—	10	—	ns	V_{GS} = 10 V, I_D = 4 A, V_{DD} ≈ 10 V, R_L = 2.5 Ω, R_g = 4.7 Ω
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	IF = 3.5 A, V_{GS} = 0 [Note4]
Body–drain diode reverse recovery time	t_{rr}	—	15	—	ns	IF = 8 A, V_{GS} = 0 diF/ dt = 100 A/µs

Notes: 4. Pulse test

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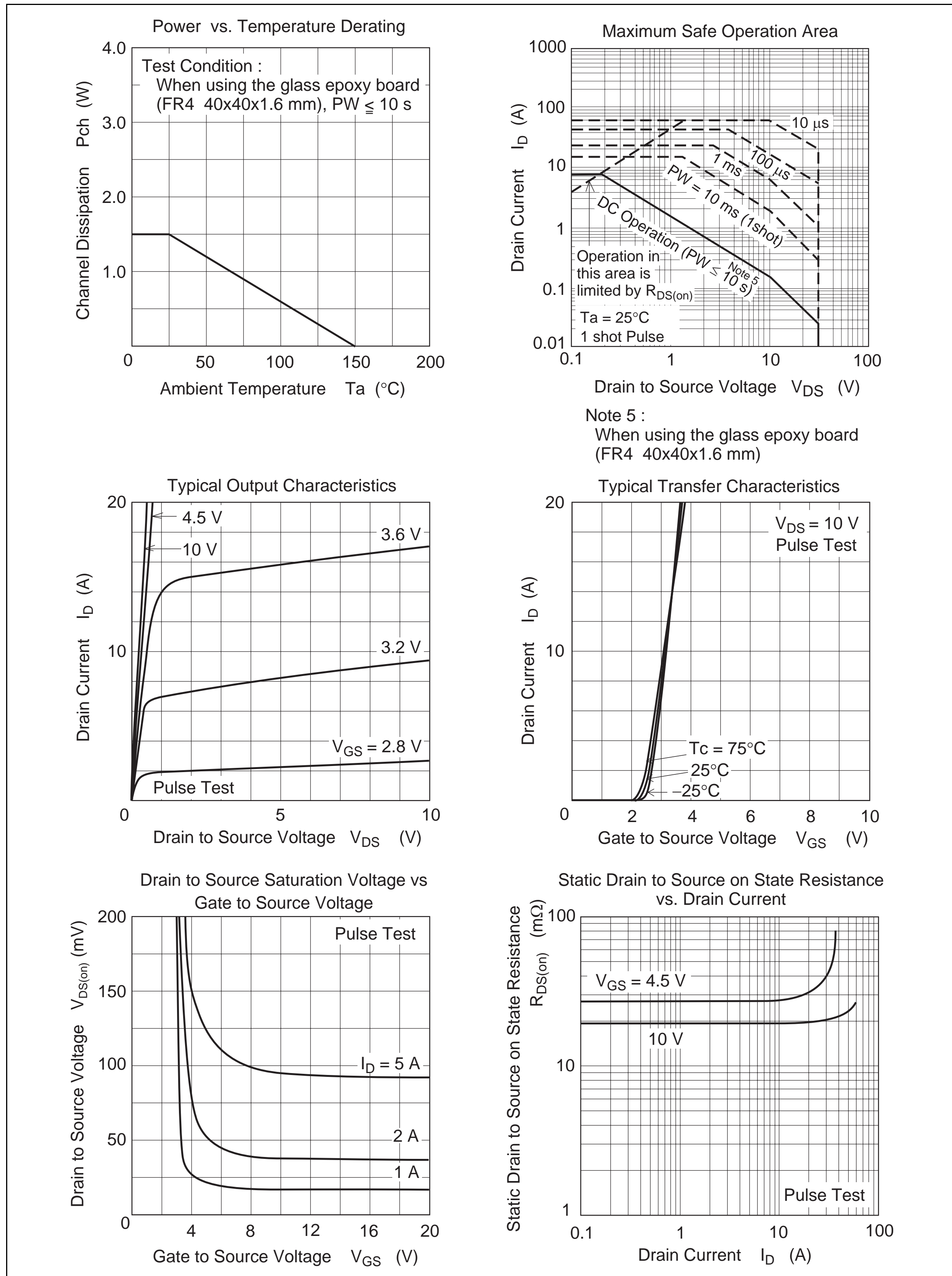
Main Characteristics

- **MOS1**



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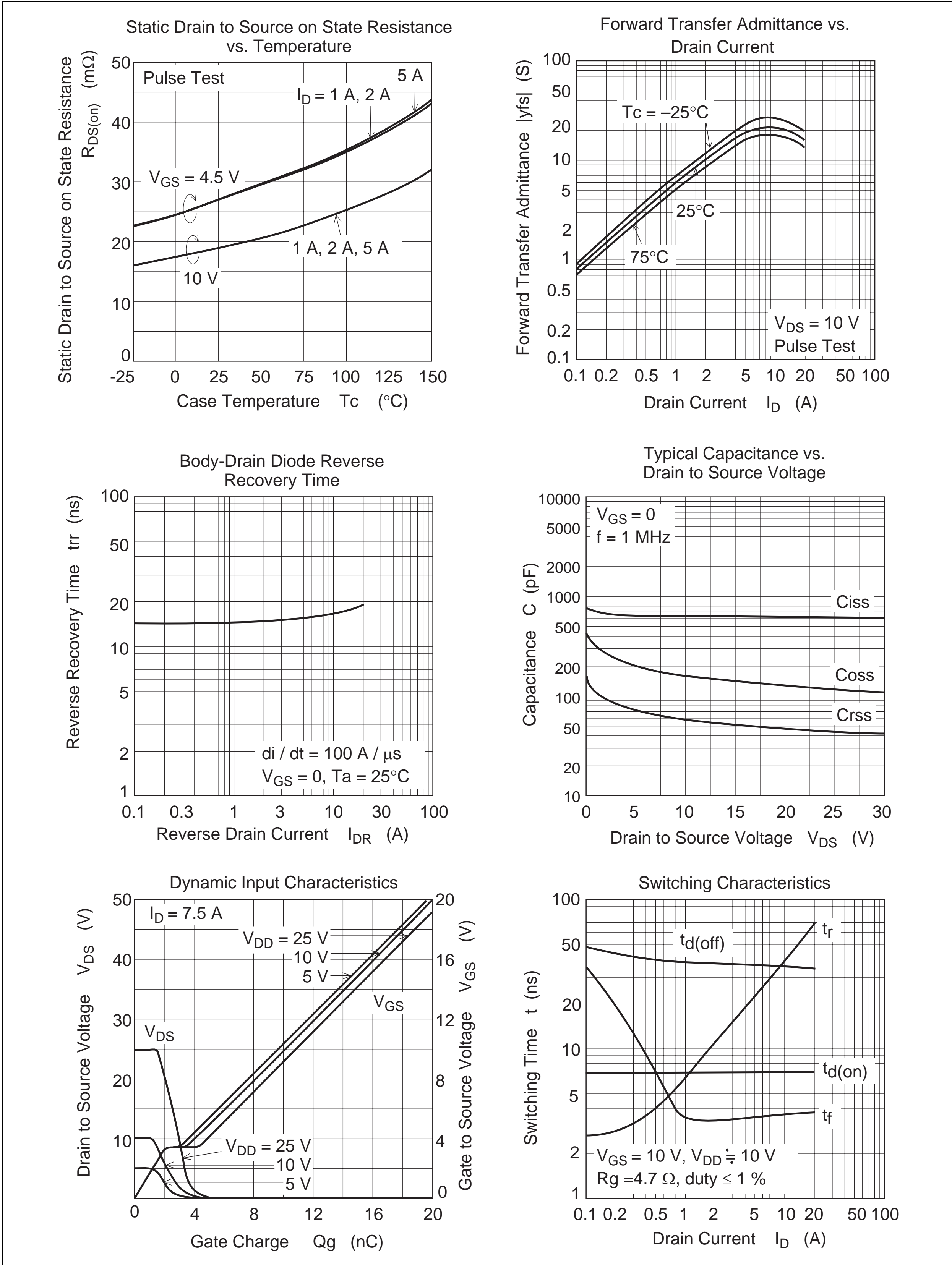

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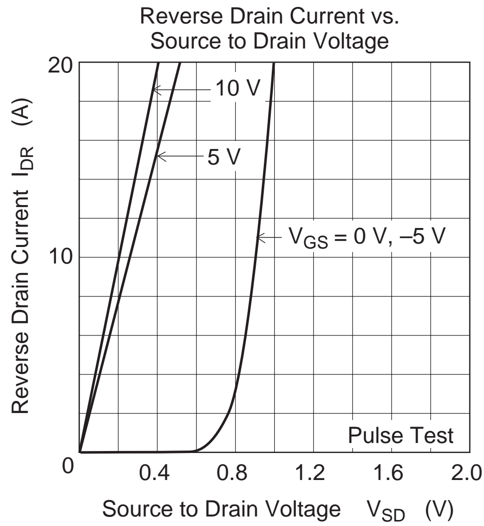

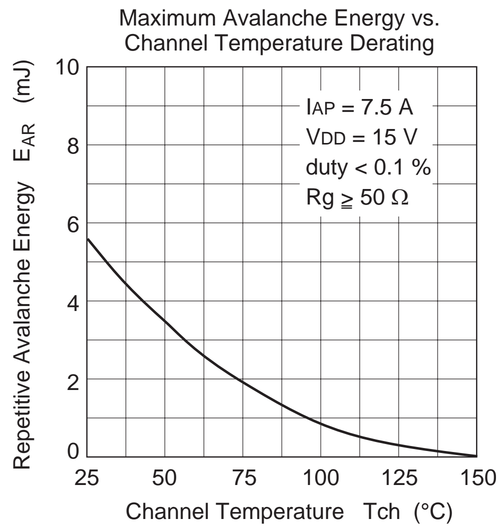

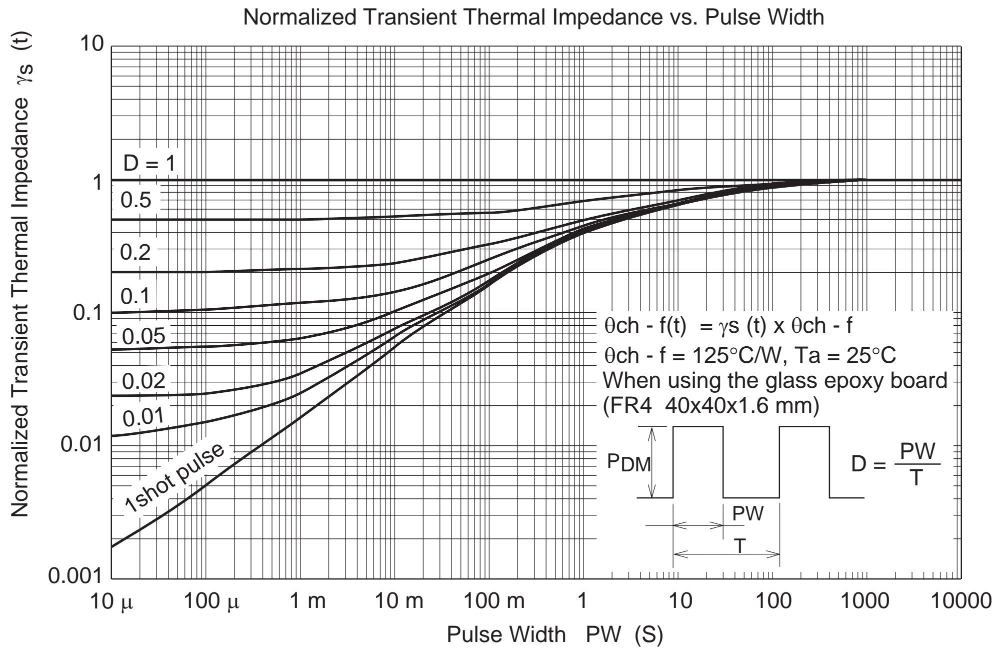

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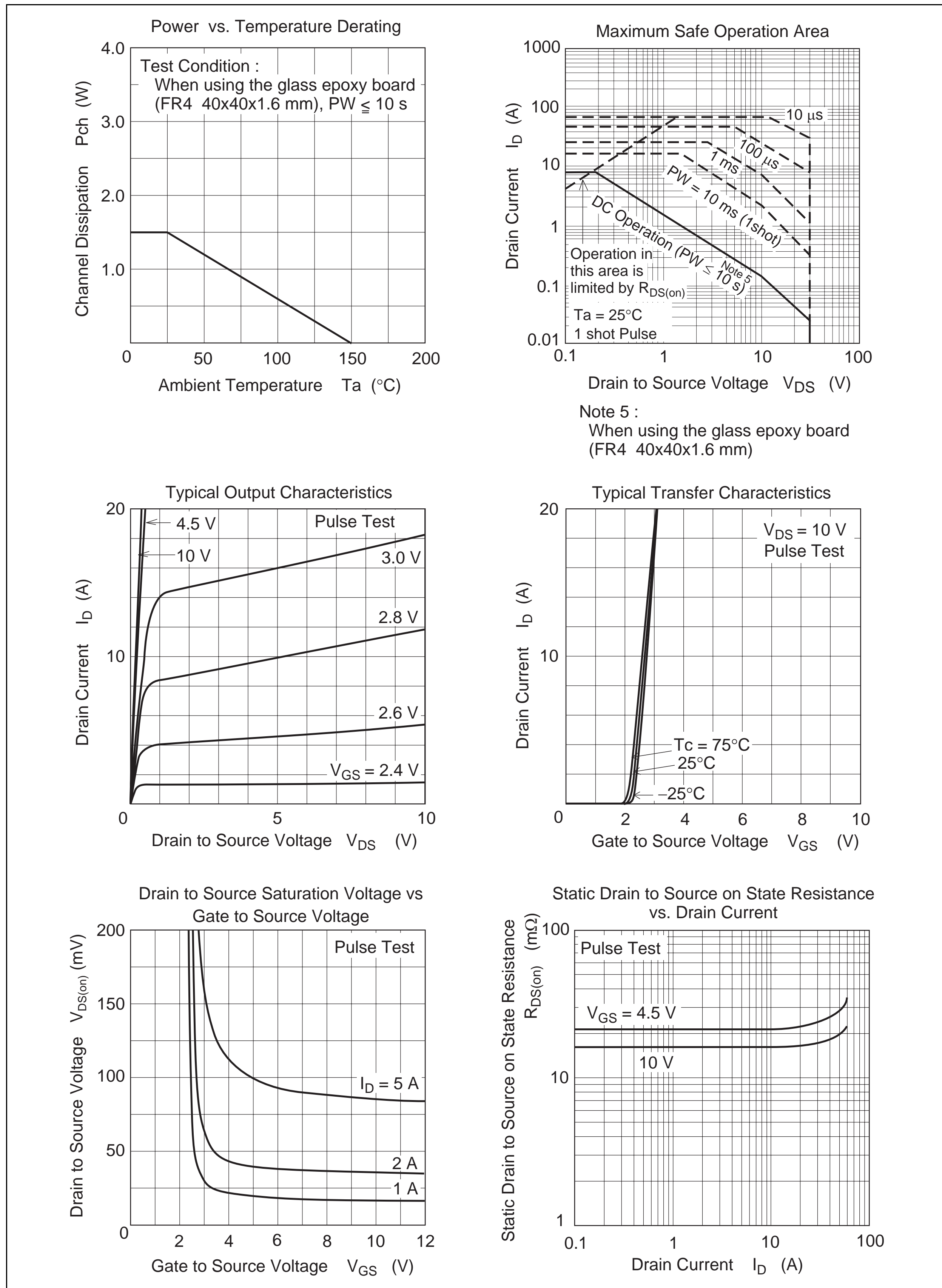
• **MOS2 & Schottky Barrier Diode**



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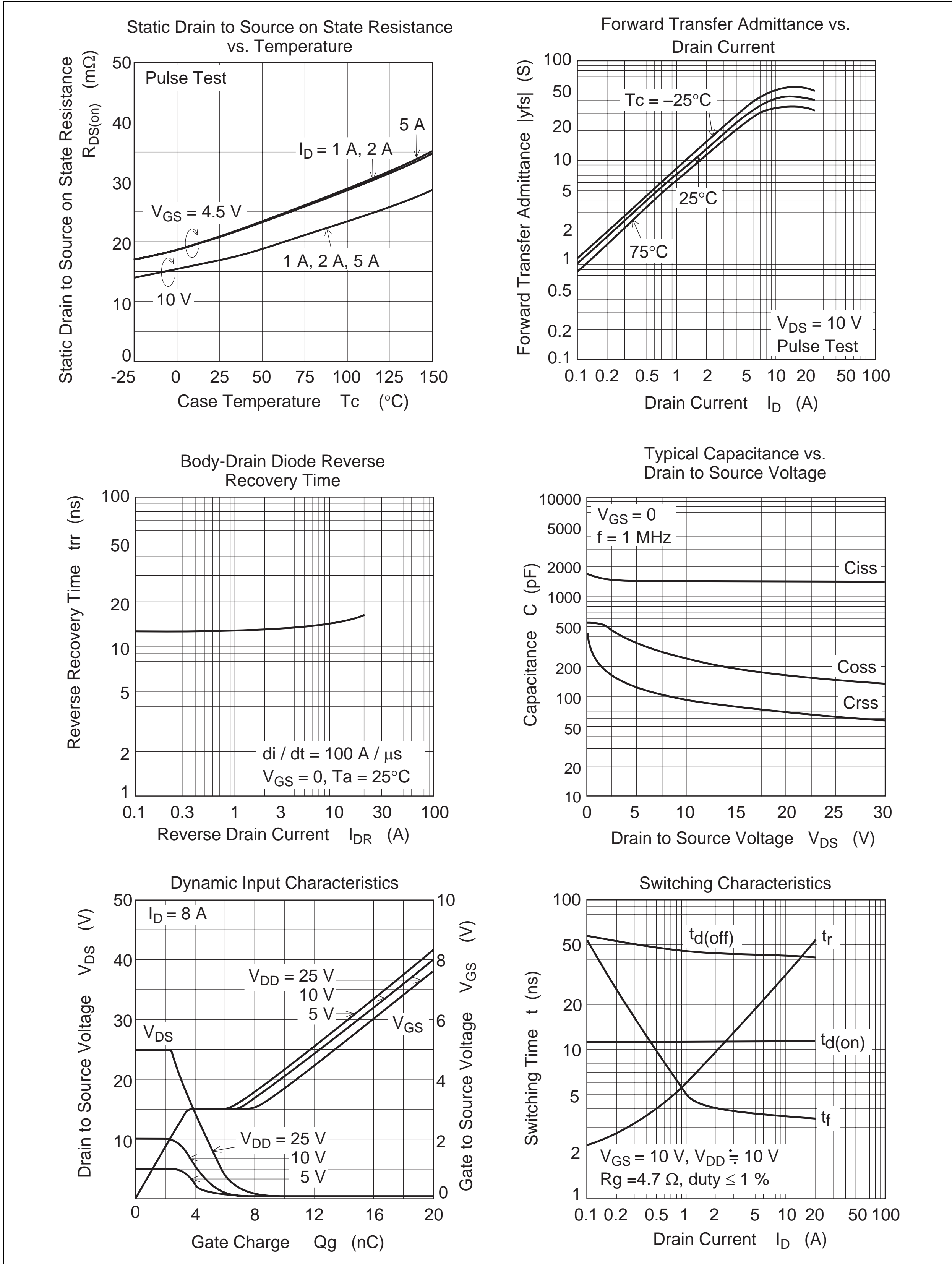

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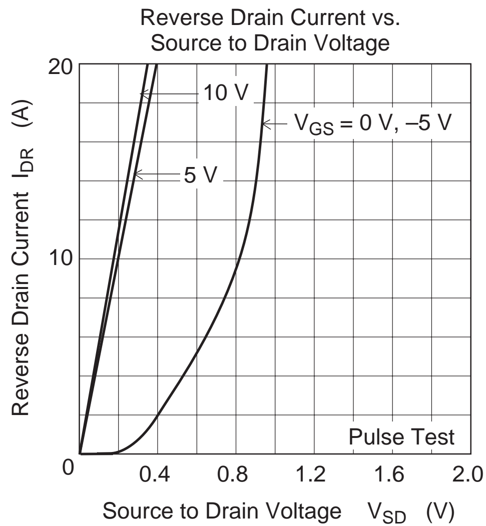

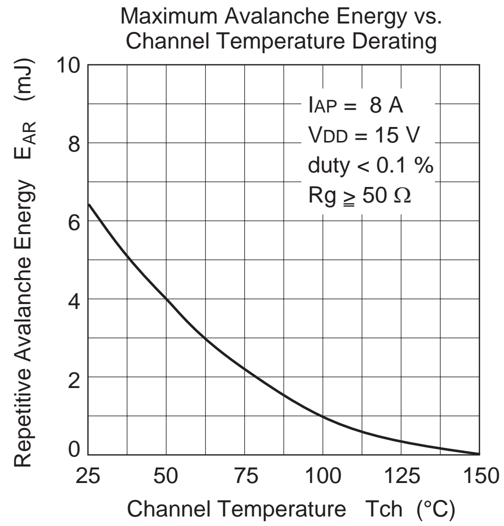

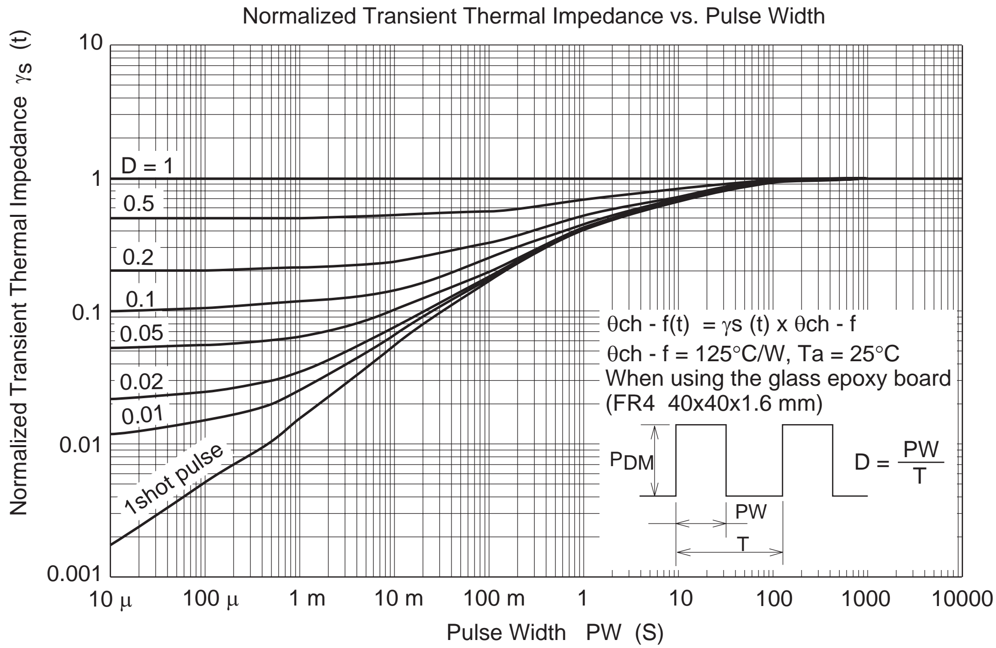

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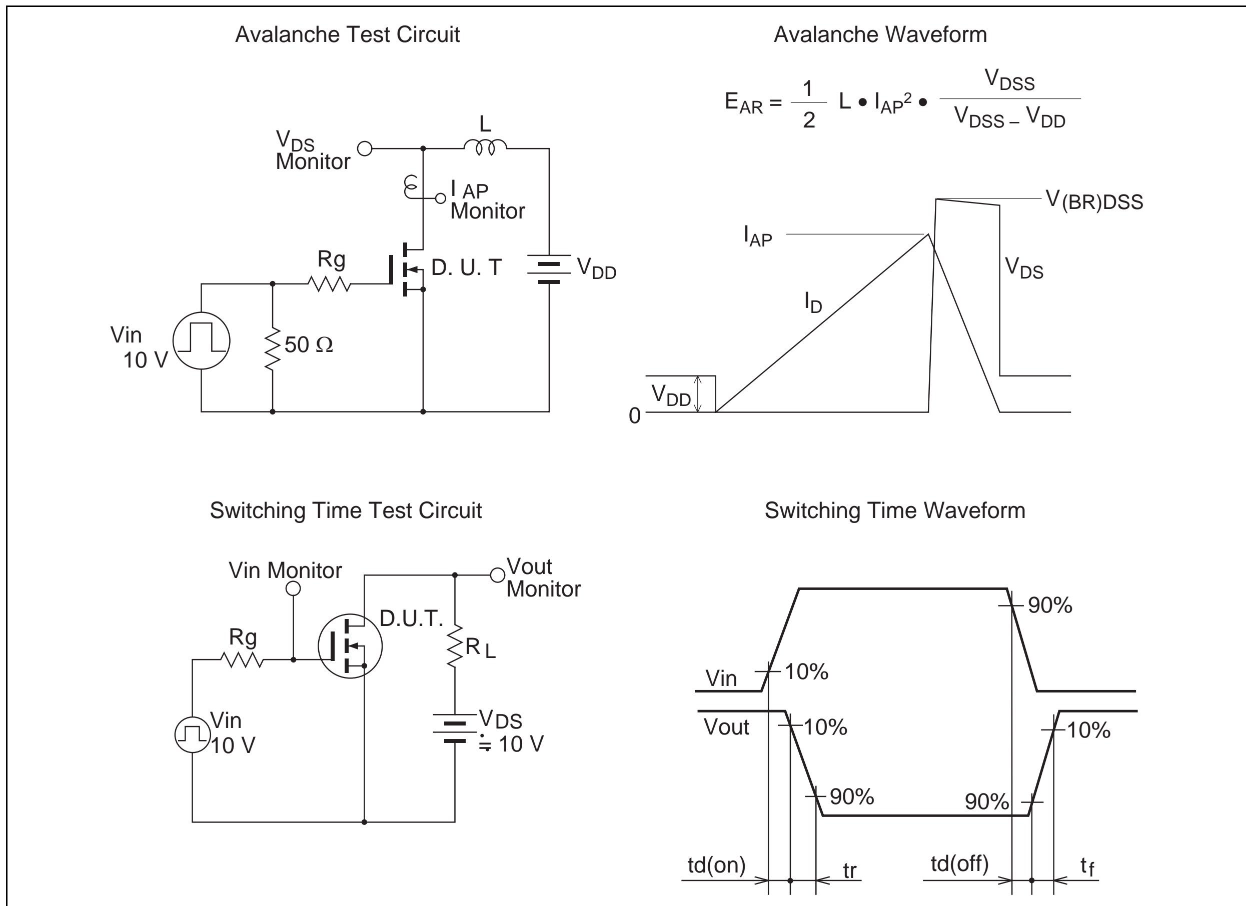
- **Common**



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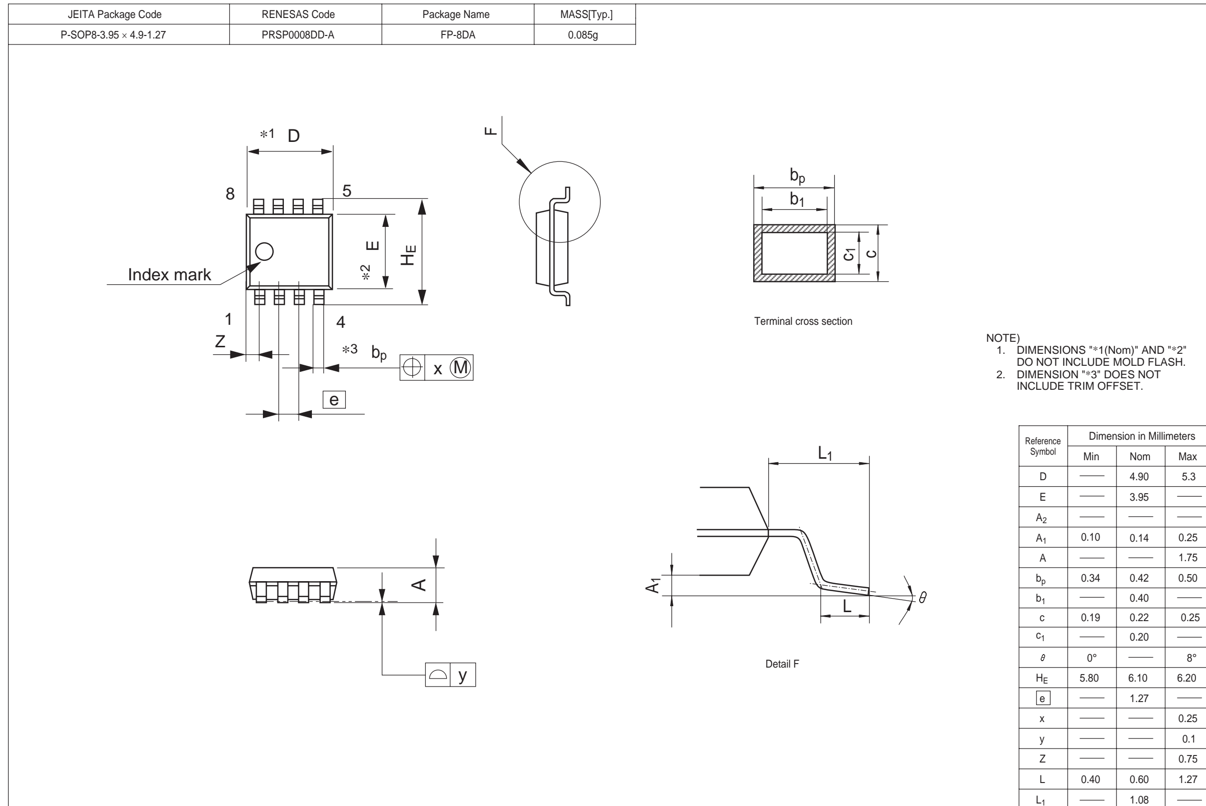
Package Dimensions



JEITA Package Code	RENESAS Code	Package Name	MASS[Typ.]
P-SOP8-3.95 × 4.9-1.27	PRSP0008DD-A	FP-8DA	0.085g

NOTE)
1. DIMENSIONS "*1(Nom)" AND "*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION "*3" DOES NOT INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.90	5.3
E	—	3.95	—
A_2	—	—	—
A_1	0.10	0.14	0.25
A	—	—	1.75
b_p	0.34	0.42	0.50
b_1	—	0.40	—
c	0.19	0.22	0.25
c_1	—	0.20	—
θ	0°	—	8°
H_E	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.1
Z	—	—	0.75
L	0.40	0.60	1.27
L_1	—	1.08	—

Ordering Information

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

Note: For some grades, production may be terminated. Please contact the Renesas sales office to check the state of production before ordering the product.

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