

RJK0389DPA

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

REJ03G1722-0400

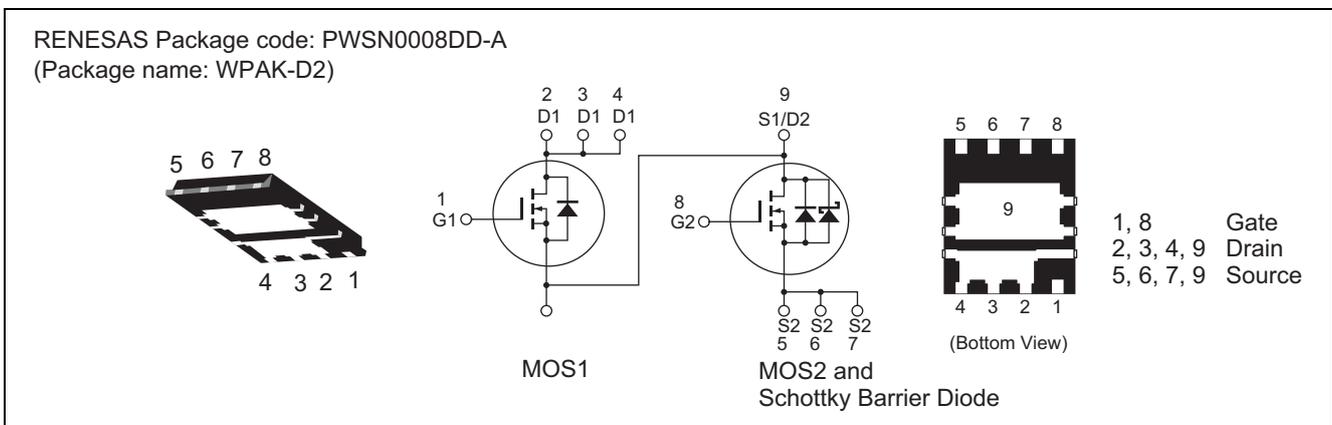
Rev.4.00

Sep 29, 2009

Features

- Low on-resistance
- Capable of 4.5 V gate drive
- High density mounting
- Pb-free
- Halogen-free

Outline



Absolute Maximum Ratings

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

Item	Symbol	Ratings		Unit
		MOS1	MOS2	
Drain to source voltage	V_{DSS}	30	30	V
Gate to source voltage	V_{GSS}	± 20	± 20	V
Drain current	I_D	15	20	A
Drain peak current	$I_{D(pulse)}$ ^{Note 1}	60	80	A
Reverse drain current	I_{DR}	15	20	A
Avalanche current	I_{AP} ^{Note 2}	8	11	A
Avalanche energy	E_{AR} ^{Note 2}	6.4	12.1	mJ
Channel dissipation	P_{ch} ^{Note 3}	10	10	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. Value at $T_{ch} = 25^\circ\text{C}$, $R_g \geq 50 \Omega$

3. $T_c = 25^\circ\text{C}$

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	$V_{DS} = 30 \text{ V}$, $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.2	—	2.5	V	$V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	8.2	10.7	$\text{m}\Omega$	$I_D = 7.5 \text{ A}$, $V_{GS} = 10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	11.8	16.5	$\text{m}\Omega$	$I_D = 7.5 \text{ A}$, $V_{GS} = 4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	—	32	—	S	$I_D = 7.5 \text{ A}$, $V_{DS} = 10 \text{ V}$ ^{Note4}
Input capacitance	C_{iss}	—	860	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	165	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	53	—	pF	$f = 1 \text{ MHz}$
Gate Resistance	R_g	—	4.2	—	Ω	
Total gate charge	Q_g	—	6.3	—	nC	$V_{DD} = 10 \text{ V}$
Gate to source charge	Q_{gs}	—	2.3	—	nC	$V_{GS} = 4.5 \text{ V}$
Gate to drain charge	Q_{gd}	—	1.4	—	nC	$I_D = 15 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	6.9	—	ns	$V_{GS} = 10 \text{ V}$, $I_D = 7.5 \text{ A}$
Rise time	t_r	—	4.1	—	ns	$V_{DD} \cong 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	40.8	—	ns	$R_L = 1.33 \Omega$
Fall time	t_f	—	5.6	—	ns	$R_g = 4.7 \Omega$
Body-drain diode forward voltage	V_{DF}	—	0.84	1.10	V	$I_F = 15 \text{ A}$, $V_{GS} = 0$ ^{Note4}
Body-drain diode reverse recovery time	t_{rr}	—	20	—	ns	$I_F = 15 \text{ A}$, $V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

Notes: 4. Pulse test

• MOS2

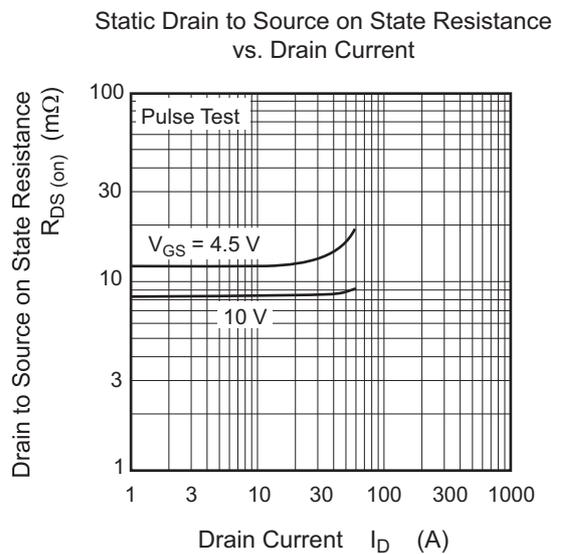
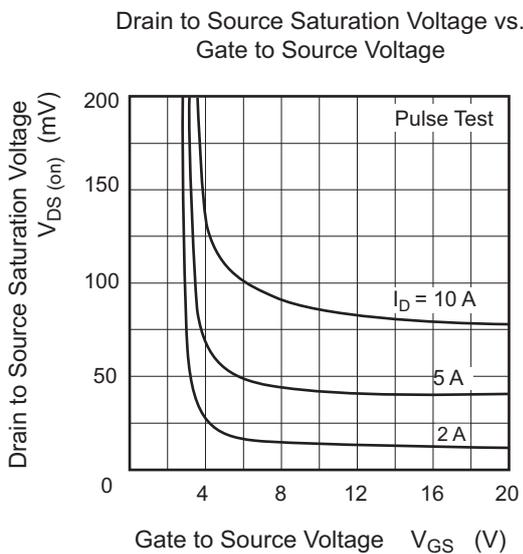
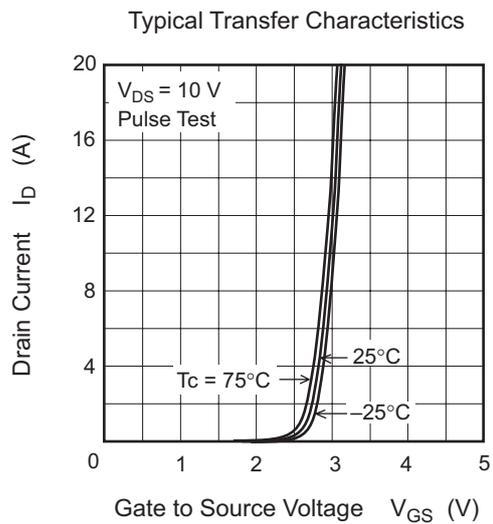
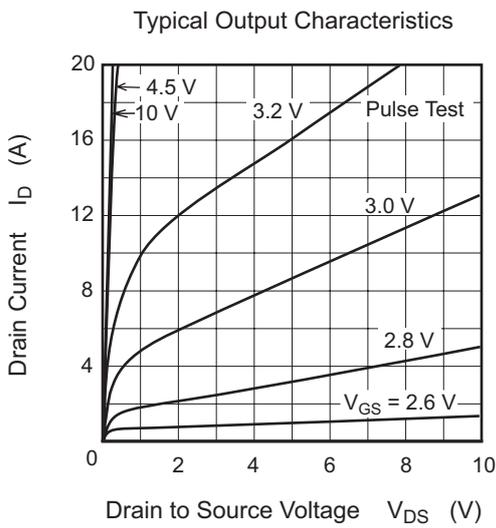
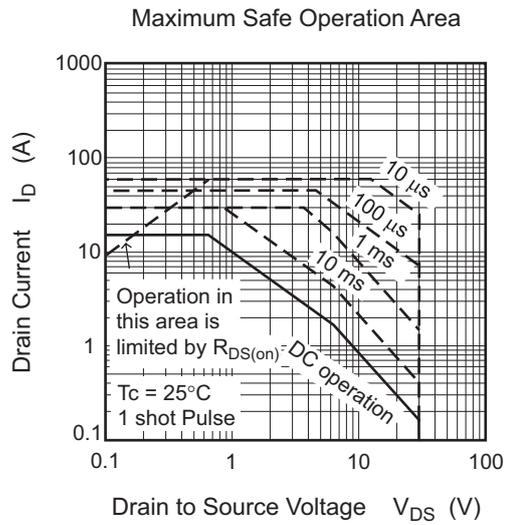
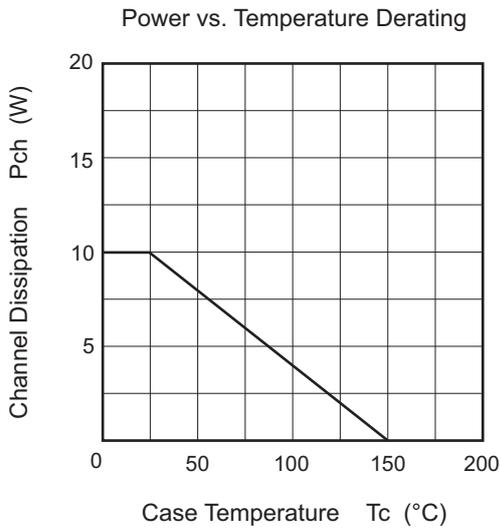
(Ta = 25°C)

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	mA	$V_{DS} = 30 \text{ V}, V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	1.2	—	2.5	V	$V_{DS} = 10 \text{ V}, I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	6.8	8.9	$\text{m}\Omega$	$I_D = 10 \text{ A}, V_{GS} = 10 \text{ V}$ ^{Note4}
	$R_{DS(on)}$	—	10.5	14.7	$\text{m}\Omega$	$I_D = 10 \text{ A}, V_{GS} = 4.5 \text{ V}$ ^{Note4}
Forward transfer admittance	$ y_{fs} $	—	38	—	S	$I_D = 10 \text{ A}, V_{DS} = 10 \text{ V}$ ^{Note4}
Input capacitance	C_{iss}	—	1000	—	pF	$V_{DS} = 10 \text{ V}$
Output capacitance	C_{oss}	—	240	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	C_{rss}	—	100	—	pF	$f = 1 \text{ MHz}$
Gate Resistance	R_g	—	4.5	—	Ω	
Total gate charge	Q_g	—	7.2	—	nC	$V_{DD} = 10 \text{ V}$
Gate to source charge	Q_{gs}	—	2.9	—	nC	$V_{GS} = 4.5 \text{ V}$
Gate to drain charge	Q_{gd}	—	2.2	—	nC	$I_D = 20 \text{ A}$
Turn-on delay time	$t_{d(on)}$	—	8.5	—	ns	$V_{GS} = 10 \text{ V}, I_D = 10 \text{ A}$
Rise time	t_r	—	4.0	—	ns	$V_{DD} \cong 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	39	—	ns	$R_L = 1.0 \Omega$
Fall time	t_f	—	6.6	—	ns	$R_g = 4.7 \Omega$
Schottky Barrier diode forward voltage	V_F	—	0.44	—	V	$I_F = 2 \text{ A}, V_{GS} = 0$ ^{Note4}
Body-drain diode reverse recovery time	t_{rr}	—	12	—	ns	$I_F = 20 \text{ A}, V_{GS} = 0$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

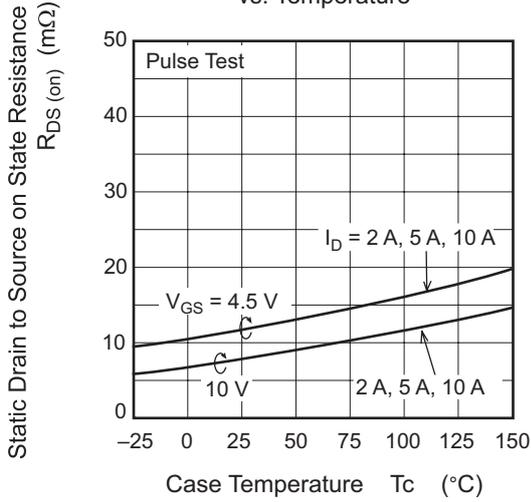
Notes: 4. Pulse test

Main Characteristics

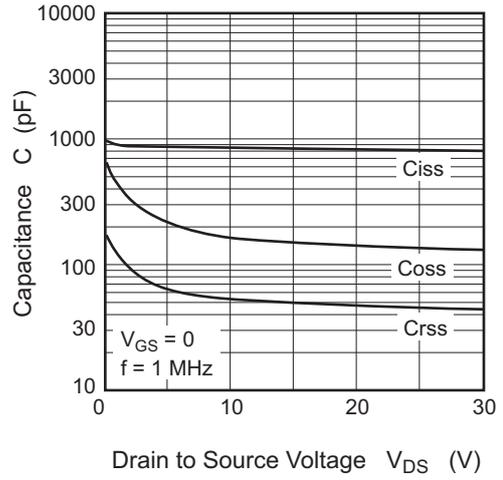
• MOS1



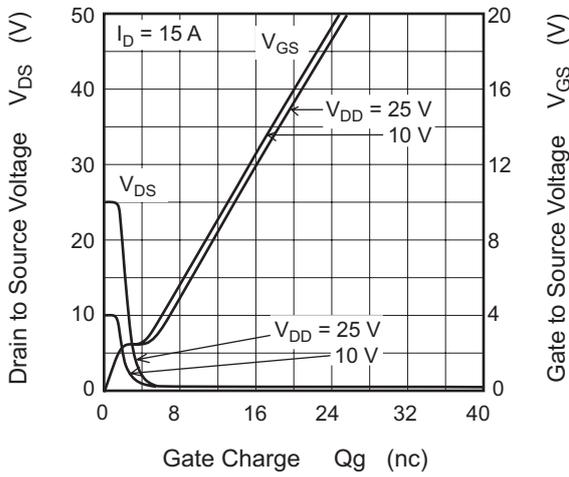
Static Drain to Source on State Resistance vs. Temperature



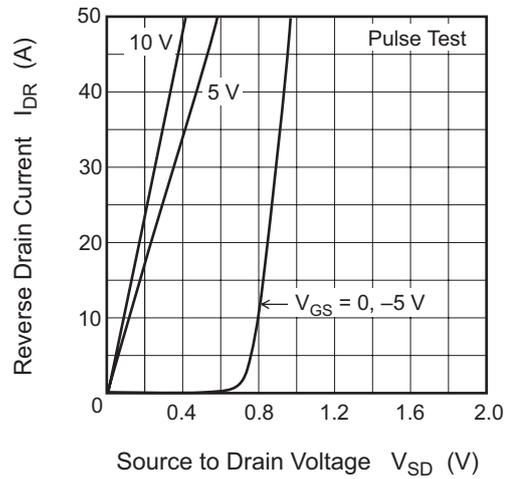
Typical Capacitance vs. Drain to Source Voltage



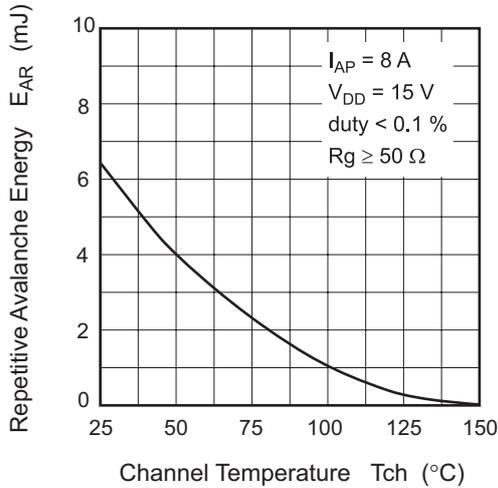
Dynamic Input Characteristics

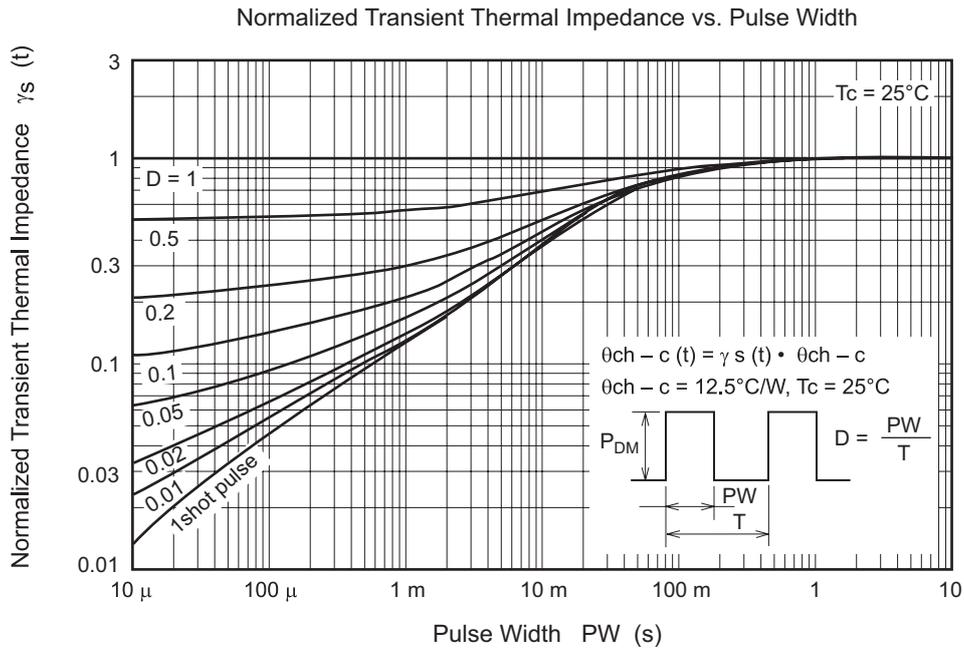


Reverse Drain Current vs. Source to Drain Voltage

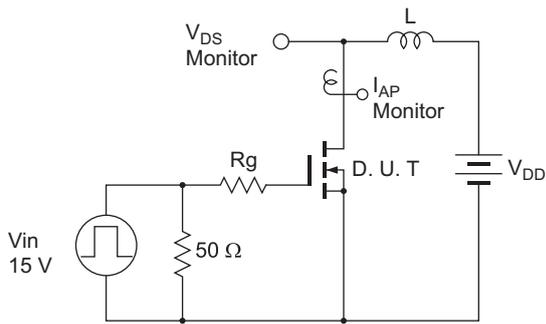


Maximum Avalanche Energy vs. Channel Temperature Derating

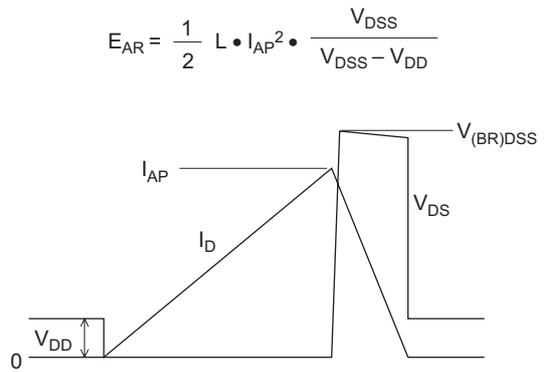




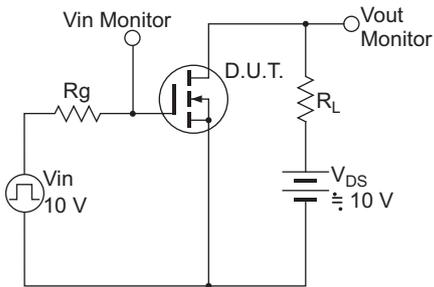
Avalanche Test Circuit



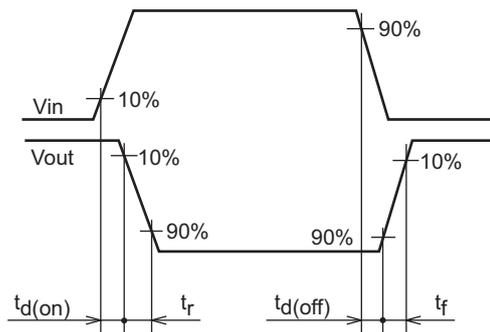
Avalanche Waveform



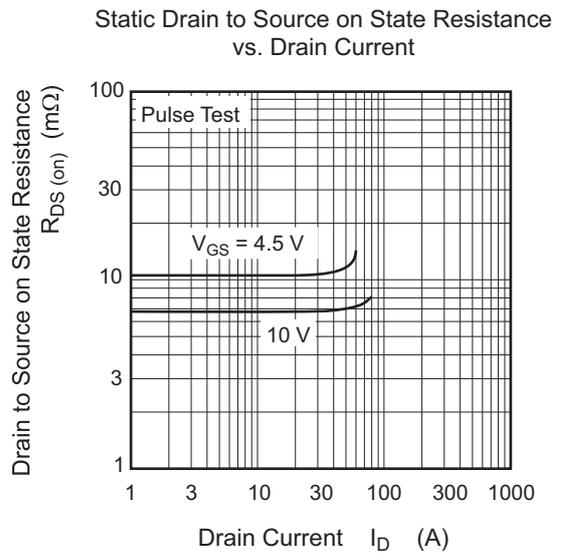
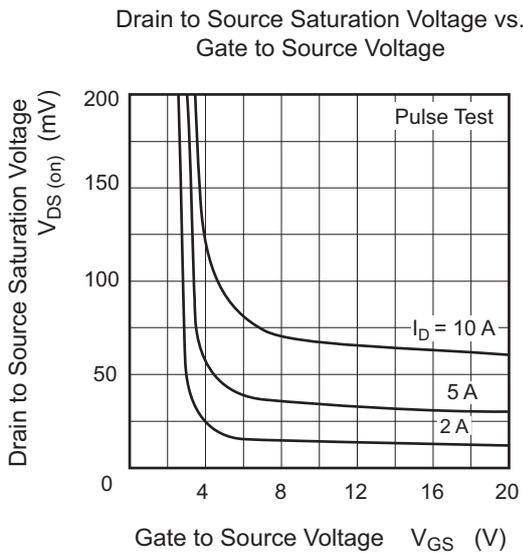
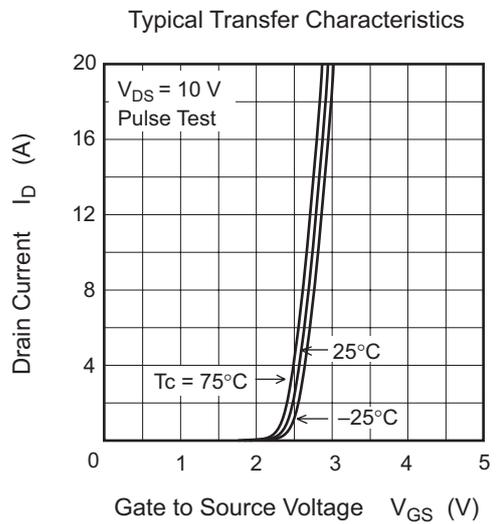
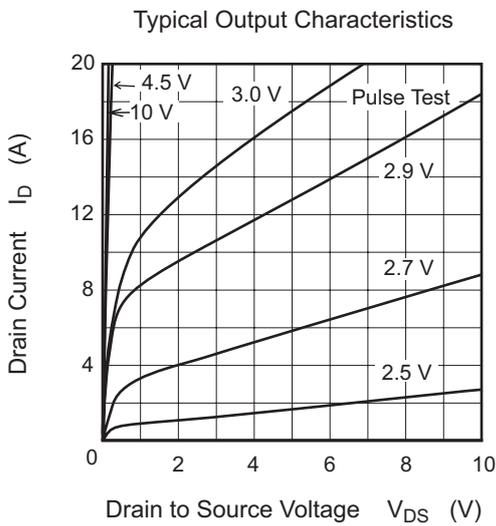
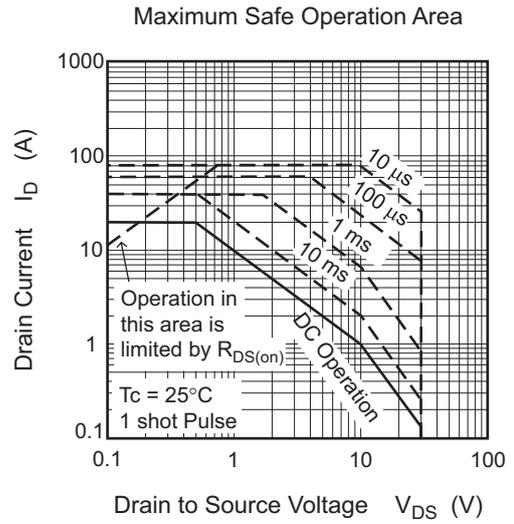
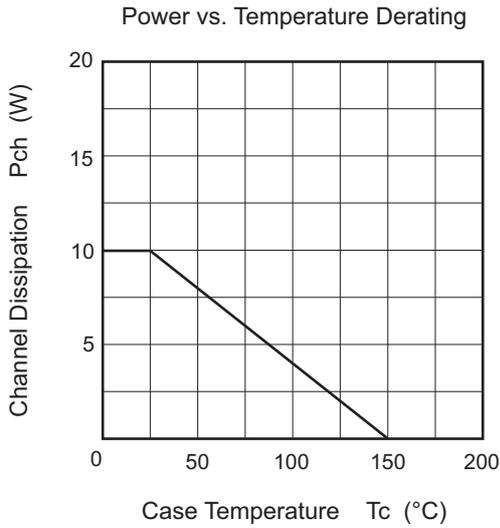
Switching Time Test Circuit



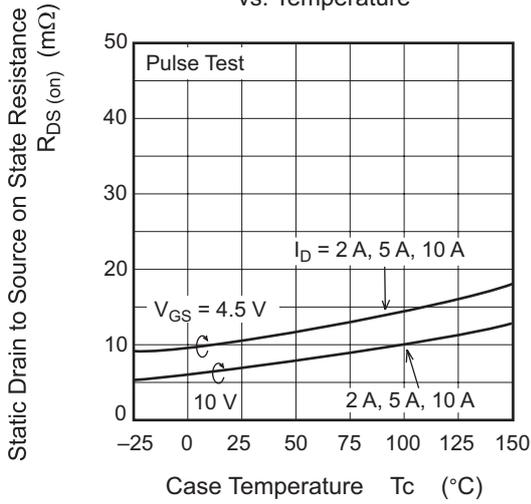
Switching Time Waveform



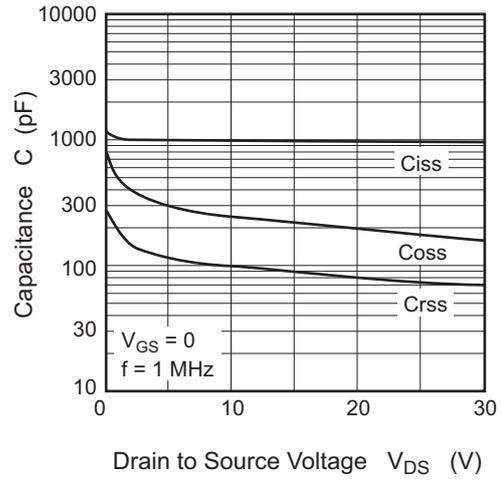
• MOS2 and Schottky Barrier Diode



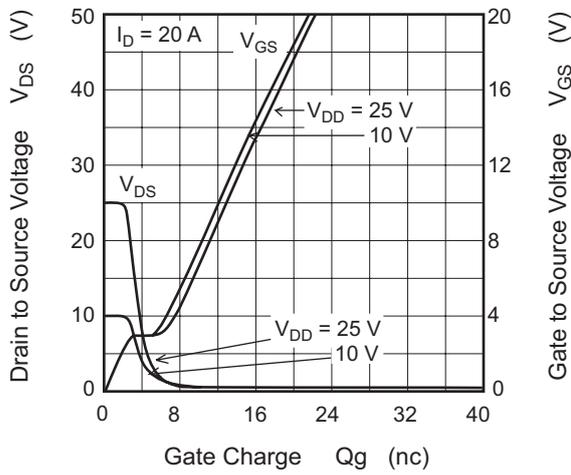
Static Drain to Source on State Resistance vs. Temperature



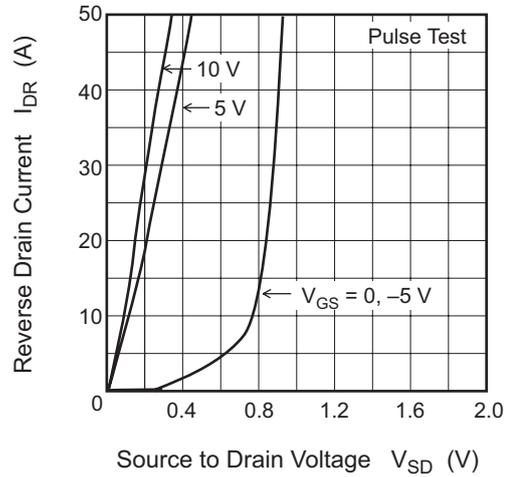
Typical Capacitance vs. Drain to Source Voltage



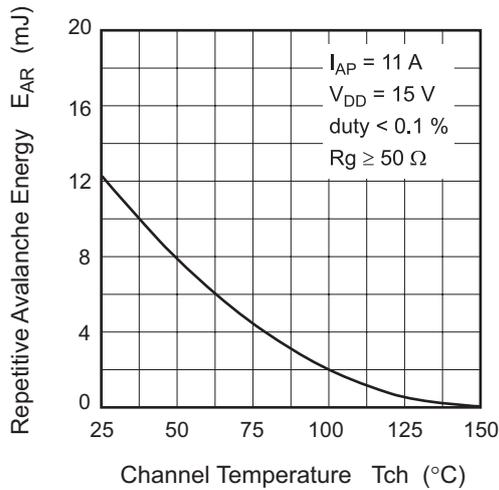
Dynamic Input Characteristics



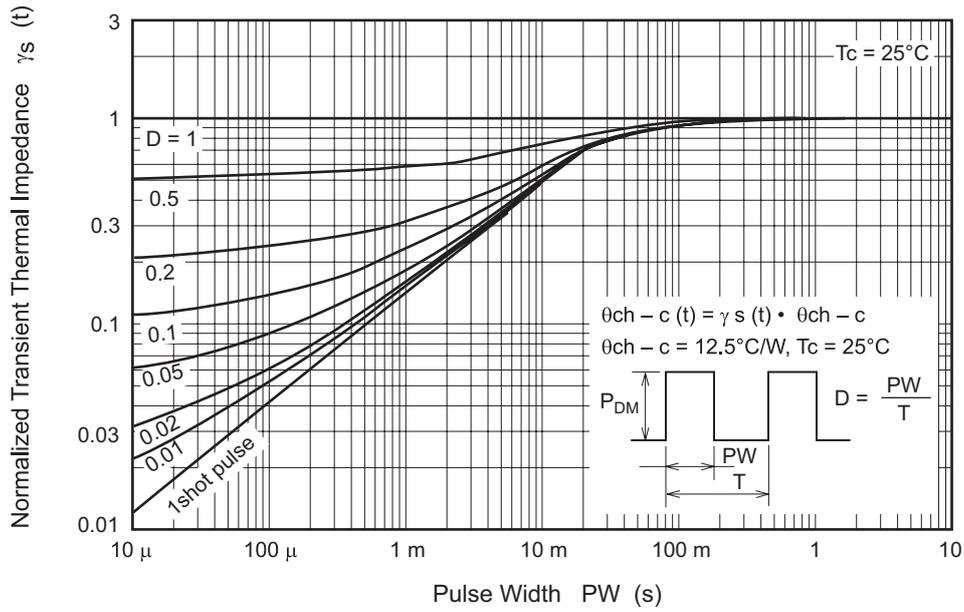
Reverse Drain Current vs. Source to Drain Voltage



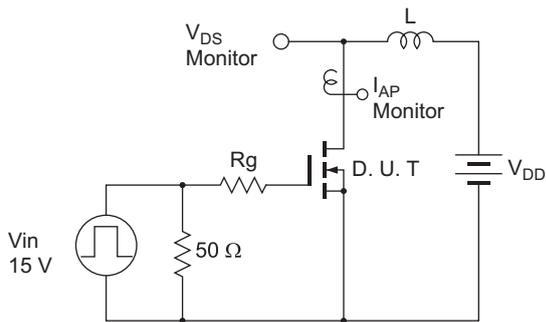
Maximum Avalanche Energy vs. Channel Temperature Derating



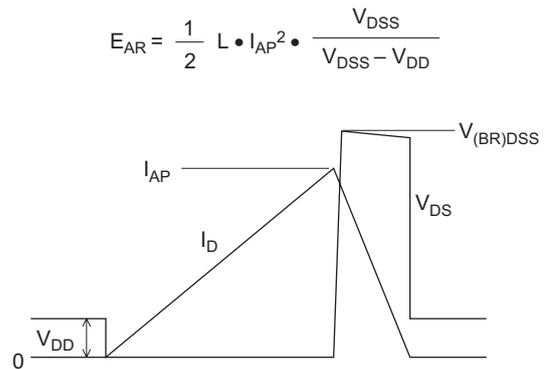
Normalized Transient Thermal Impedance vs. Pulse Width



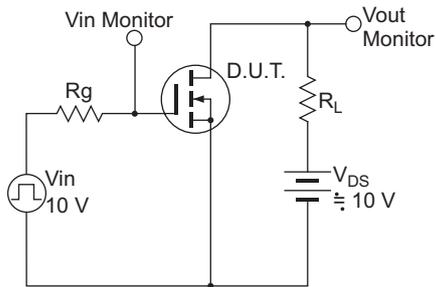
Avalanche Test Circuit



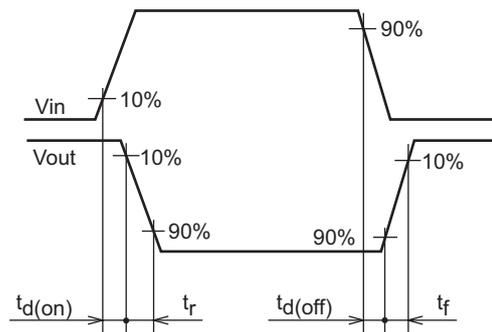
Avalanche Waveform



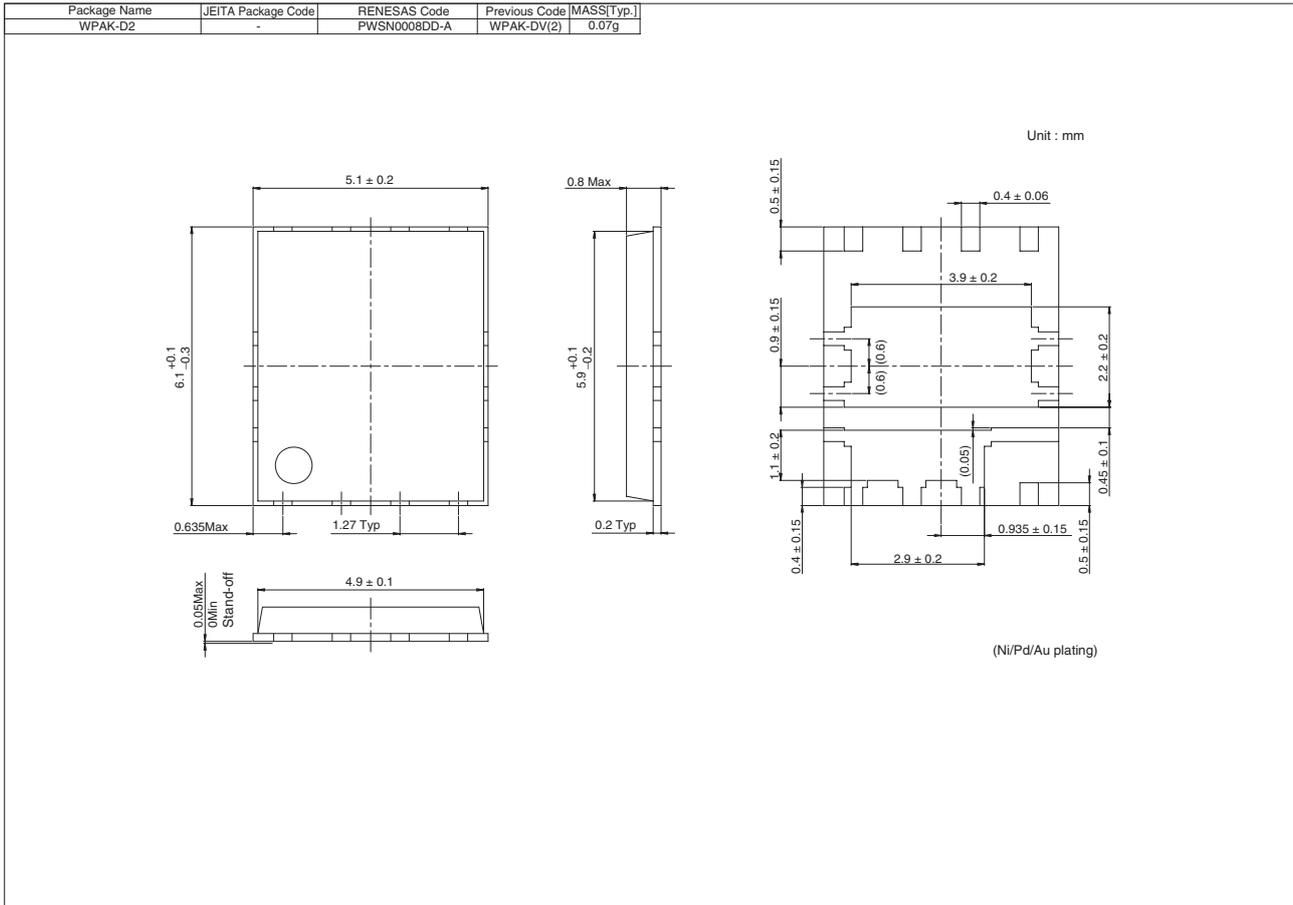
Switching Time Test Circuit



Switching Time Waveform



Package Dimensions



Ordering Information

Part No.	Quantity	Shipping Container
RJK0389DPA-00-J53	3000 pcs	Taping

Notes:

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