RJK0393DPA

Silicon N Channel Power MOS FET
Power Switching

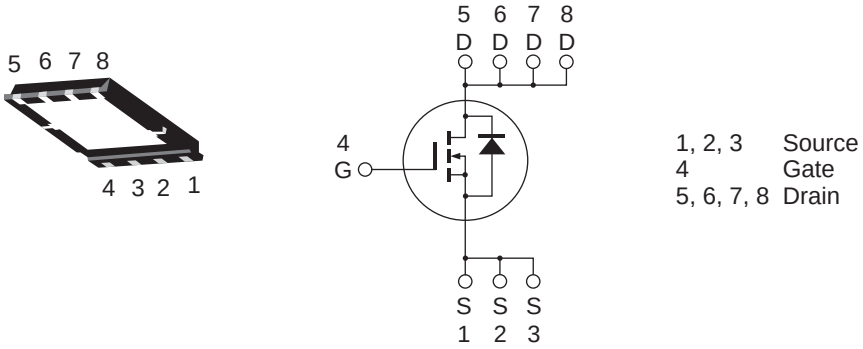
REJ03G1784-0220
Rev.2.20
May 21, 2010

Features

- High speed switching
- Capable of 4.5V gate drive
- Low drive current
- High density mounting
- Low on-resistance
  $R_{DS(on)}$ = 3.3 mΩ typ. (at V_{GS} = 10 V)
- Pb-free
- Halogen-free

Outline

RENESAS Package code: PWSN0008DC-A
(Package name: WPAK(2))



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	30	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	40	A
Drain peak current	$I_{D(pulse)}$ Note1	160	A
Body-drain diode reverse drain current	I_{DR}	40	A
Avalanche current	I_{AP} Note 2	16	A
Avalanche energy	E_{AR} Note 2	25.6	mJ
Channel dissipation	Pch Note3	40	W
Channel to case thermal impedance	θch-C	3.13	°C/W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. Value at Tch = 25°C, Rg ≥ 50 Ω
3. Tc = 25°C

Electrical Characteristics

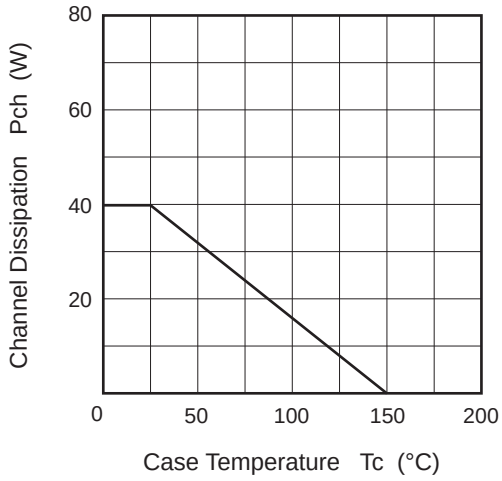
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	30	—	—	V	I_D = 10 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
Gate to source cutoff voltage	$V_{GS(off)}$	1.2	—	2.5	V	V_{DS} = 10 V, I_D = 1 mA
Static drain to source on state resistance	$R_{DS(on)}$	—	3.3	4.3	mΩ	I_D = 20 A, V_{GS} = 10 V Note4
	$R_{DS(on)}$	—	4.2	5.9	mΩ	I_D = 20 A, V_{GS} = 4.5 V Note4
Forward transfer admittance	$\|y_{fs}\|$	—	100	—	S	I_D = 20 A, V_{DS} = 10 V Note4
Input capacitance	Ciss	—	3270	—	pF	V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz
Output capacitance	Coss	—	430	—	pF	
Reverse transfer capacitance	Crss	—	225	—	pF	
Gate Resistance	Rg	—	1.4	—	Ω	
Total gate charge	Qg	—	21	—	nC	V_{DD} = 10 V, V_{GS} = 4.5 V, I_D = 40 A
Gate to source charge	Qgs	—	9.5	—	nC	
Gate to drain charge	Qgd	—	4.7	—	nC	
Turn-on delay time	$t_{d(on)}$	—	13.2	—	ns	V_{GS} = 10 V, I_D = 20 A, V_{DD} ≅ 10 V, R_L = 0.5 Ω, Rg = 4.7 Ω
Rise time	t_r	—	6.0	—	ns	
Turn-off delay time	$t_{d(off)}$	—	52	—	ns	
Fall time	t_f	—	7.1	—	ns	
Body–drain diode forward voltage	V_{DF}	—	0.83	1.08	V	IF = 40 A, V_{GS} = 0 Note4
Body–drain diode reverse recovery time	t_{rr}	—	23.5	—	ns	IF = 40 A, V_{GS} = 0 di_F/dt = 100 A/μs

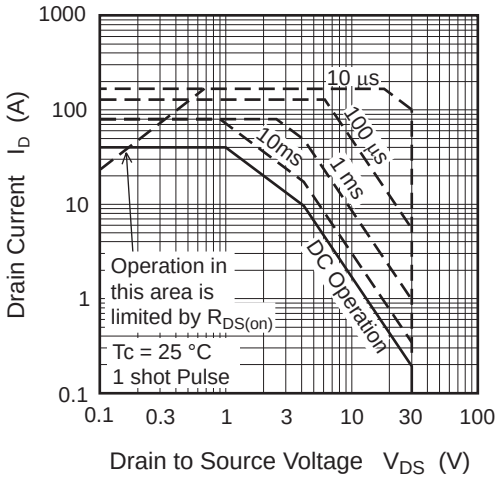
Notes: 4. Pulse test

Main Characteristics

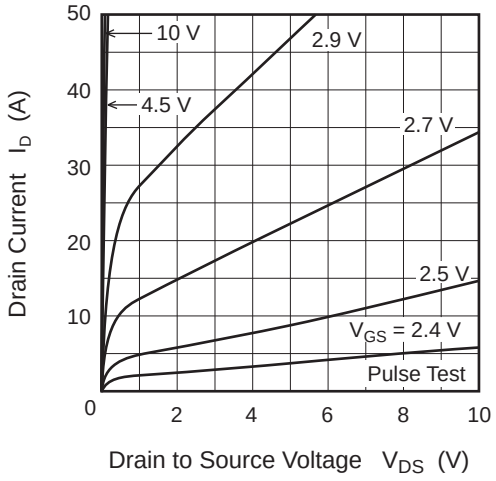
Power vs. Temperature Derating



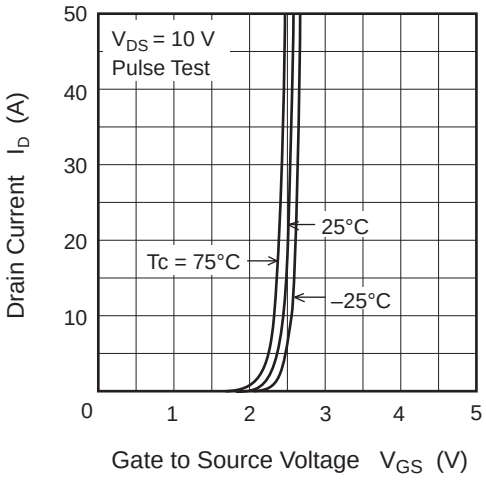
Maximum Safe Operation Area



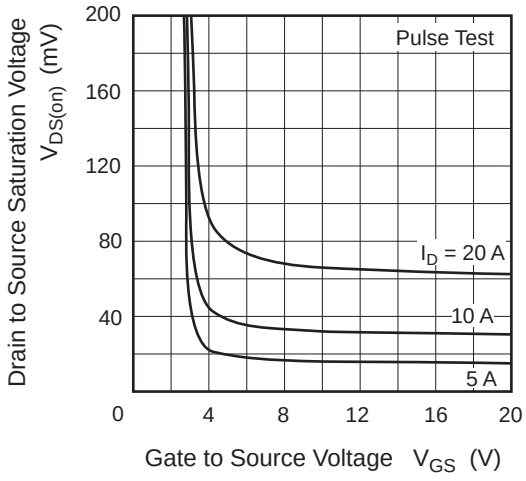
Typical Output Characteristics



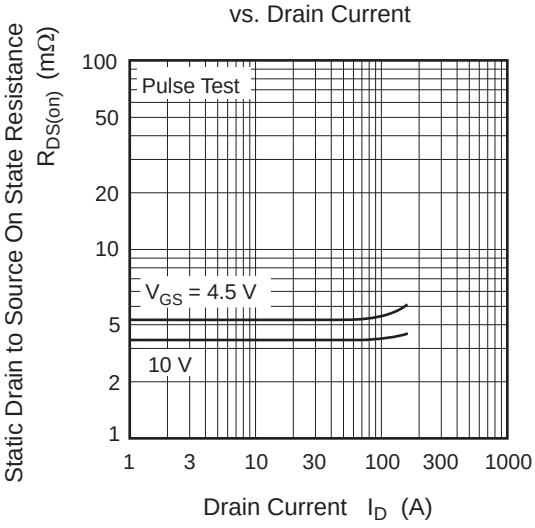
Typical Transfer Characteristics



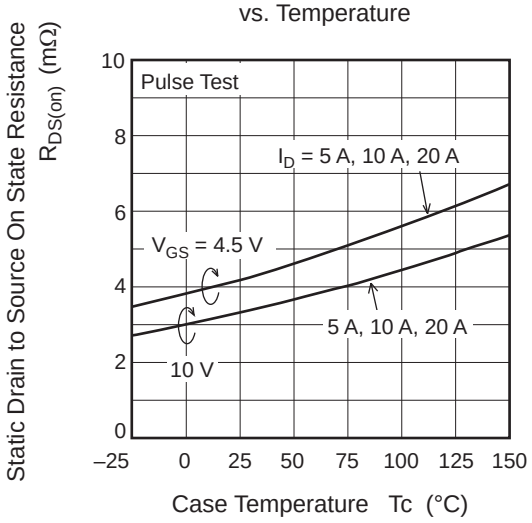
Drain to Source Saturation Voltage vs.
Gate to Source Voltage



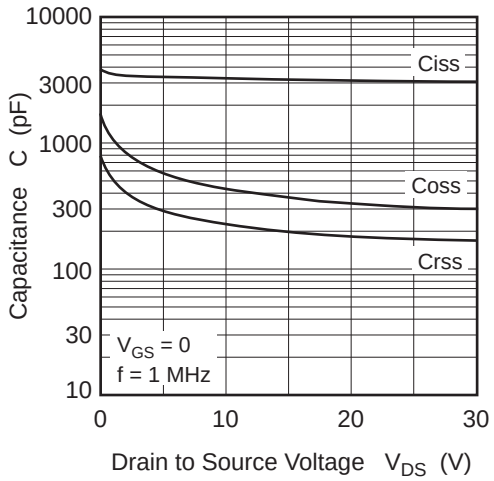
Static Drain to Source On State Resistance
vs. Drain Current



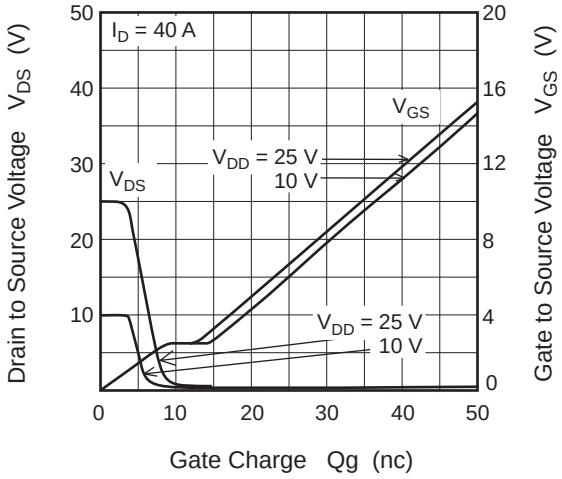
Static Drain to Source On State Resistance vs. Temperature



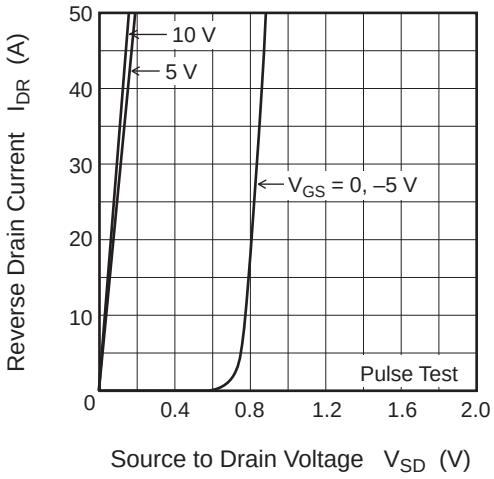
Typical Capacitance vs. Drain to Source Voltage



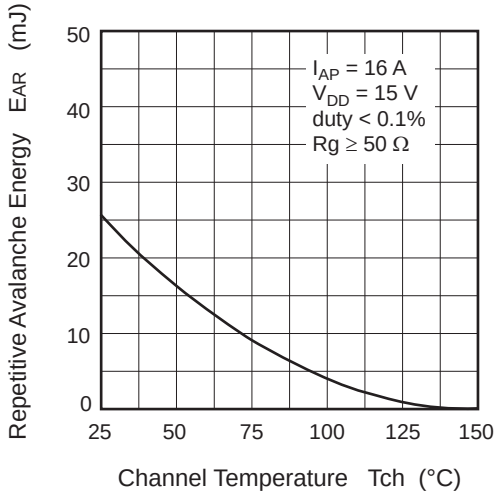
Dynamic Input Characteristics



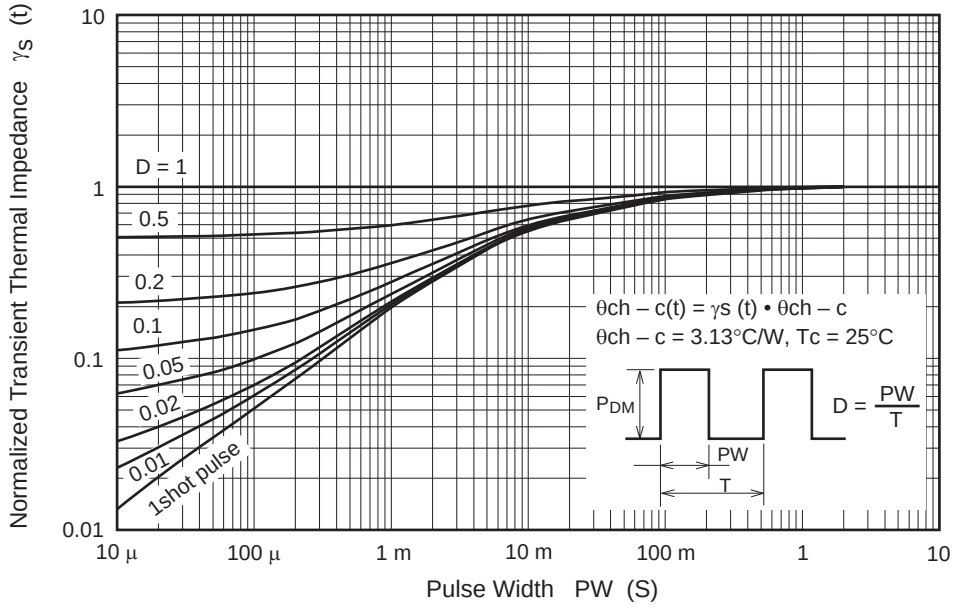
Reverse Drain Current vs. Source to Drain Voltage



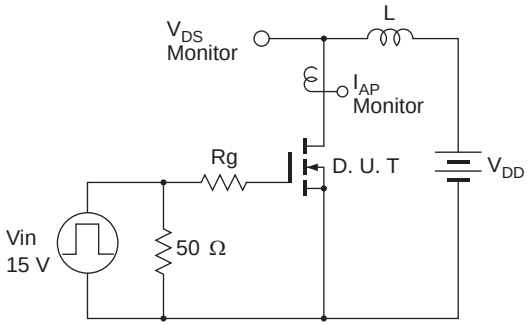
Maximum Avalanche Energy vs. Channel Temperature Derating



Normalized Transient Thermal Impedance vs. Pulse Width

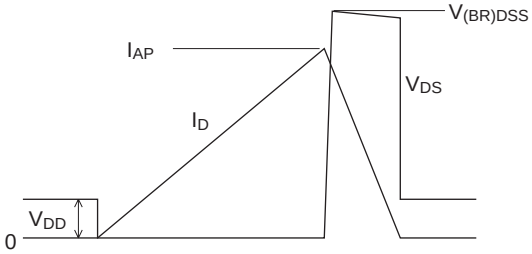


Avalanche Test Circuit

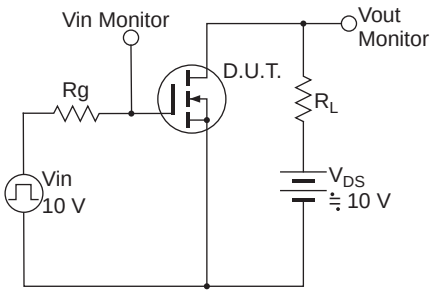


Avalanche Waveform

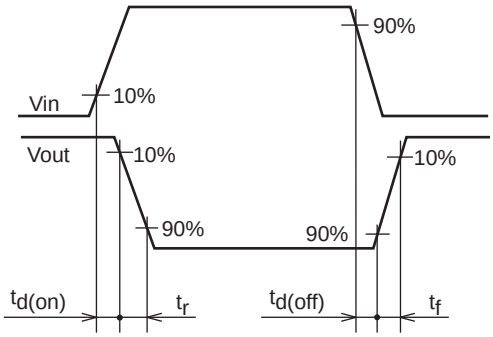
$$E_{AR} = \frac{1}{2} L \bullet I_{AP}^2 \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



Switching Time Test Circuit



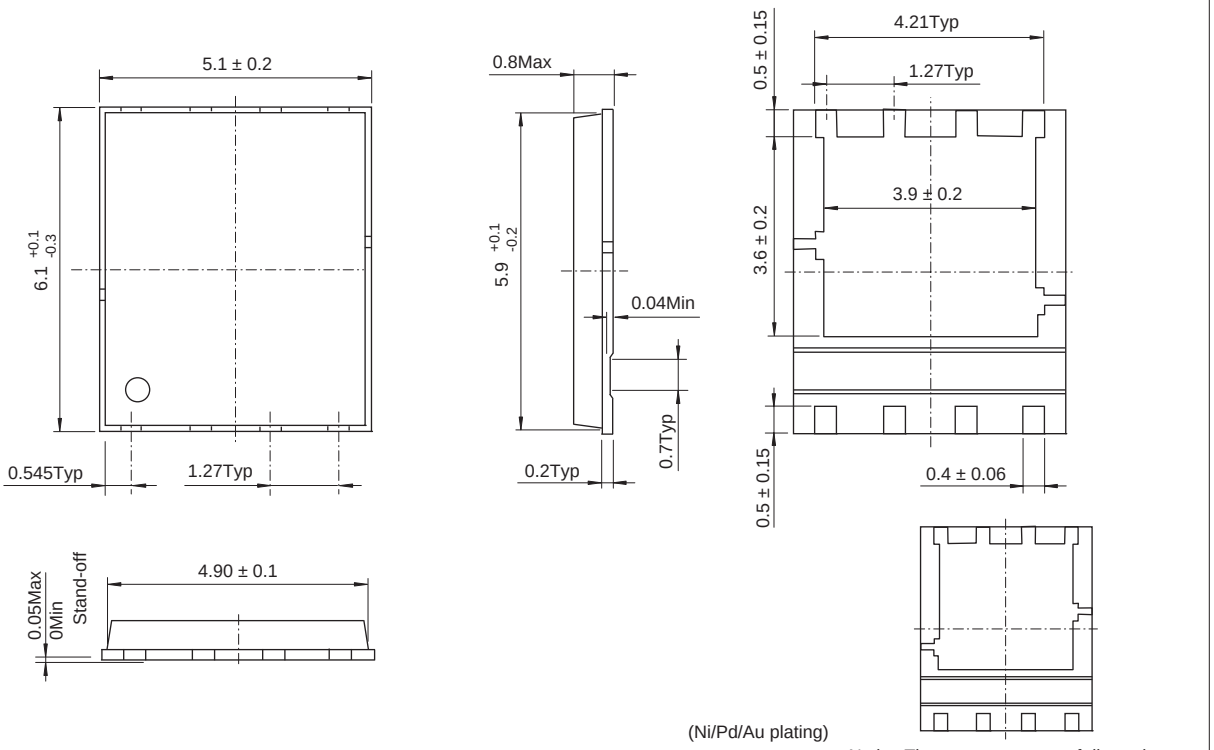
Switching Time Waveform



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
WPAK(2)	—	PWSN0008DC-A	WPAK(2)V	0.07g

Unit: mm



Ordering Information

Part No.	Quantity	Shipping Container
RJK0393DPA-00-J53	3000 pcs	Taping