

μPA2814T1S

P-channel MOSFET

-30 V, -24 A, 7.8 mΩ

R07DS0776EJ0101

Rev.1.01

May 28, 2013

Description

The μPA2814T1S is P-channel MOS Field Effect Transistor designed for DC/DC converter and power management applications of portable equipment.

Features

- $V_{DSS} = -30\text{ V}$ ($T_A = 25^\circ\text{C}$)
- Low on-state resistance
— $R_{DS(on)} = 7.8\text{ m}\Omega\text{ MAX.}$ ($V_{GS} = -10\text{ V}$, $I_D = -24\text{ A}$)
- 4.5 V Gate-drive available
- Small & thin type surface mount package with heat spreader
- Pb-free and Halogen free



HWSO8

Ordering Information

Part No.	Lead Plating	Packing	Package
μPA2814T1S-E2-AT *1	Pure Sn	Tape 5000 p/reel	HWSO8 typ. 0.022 g

Note: *1. Pb-free (This product does not contain Pb in external electrode and other parts.)

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0\text{ V}$)	V_{DSS}	-30	V
Gate to Source Voltage ($V_{DS} = 0\text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 24	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 96	A
Total Power Dissipation *2	P_{T1}	1.5	W
Total Power Dissipation (PW = 10 sec) *2	P_{T2}	3.8	W
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T3}	20	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$
Single Avalanche Current *3	I_{AS}	22	A
Single Avalanche Energy *3	E_{AS}	48.4	mJ

Thermal Resistance

Channel to Ambient Thermal Resistance *2	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$
Channel to Case (Drain) Thermal Resistance	$R_{th(ch-C)}$	6.3	$^\circ\text{C/W}$

Notes: *1. $PW \leq 10\ \mu\text{s}$, Duty Cycle $\leq 1\%$

*2. Mounted on a glass epoxy board of 25.4 mm x 25.4 mm x 0.8 mm

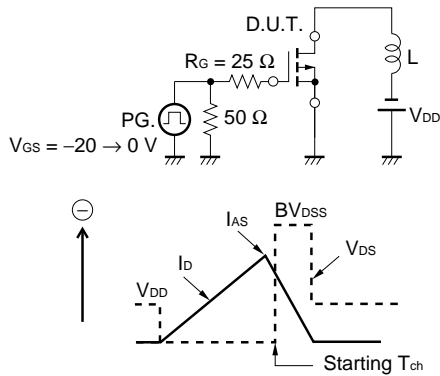
*3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = -15\text{ V}$, $R_G = 25\ \Omega$, $V_{GS} = -20 \rightarrow 0\text{ V}$, $L = 100\ \mu\text{H}$

Electrical Characteristics (T_A = 25°C)

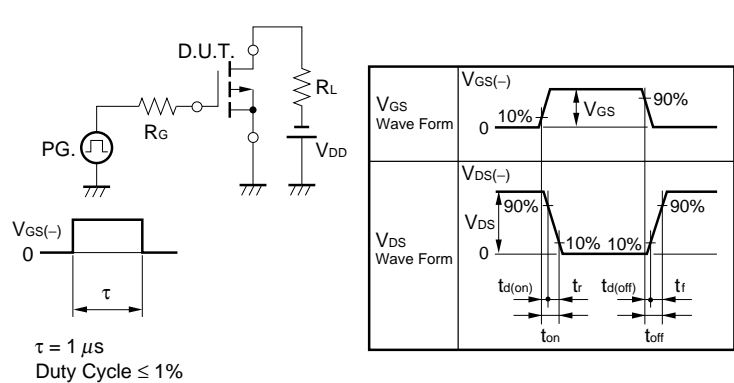
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I _{DSS}			-1	μA	V _{DS} = -30 V, V _{GS} = 0 V
Gate Leakage Current	I _{GSS}			±100	nA	V _{GS} = ±20 V, V _{DS} = 0 V
Gate Cut-off Voltage	V _{GS(off)}	-1.0		-2.5	V	V _{DS} = -10 V, I _D = -1 mA
Forward Transfer Admittance *1	y _{fs}	17			S	V _{DS} = -5 V, I _D = -12 A
Drain to Source On-state Resistance *1	R _{DS(on)1}		6.2	7.8	mΩ	V _{GS} = -10 V, I _D = -24 A
	R _{DS(on)2}		9.6	14.5	mΩ	V _{GS} = -4.5 V, I _D = -12 A
Input Capacitance	C _{iss}		2800		pF	V _{DS} = -10 V, V _{GS} = 0 V, f = 1 MHz
Output Capacitance	C _{oss}		1300		pF	
Reverse Transfer Capacitance	C _{rss}		1160		pF	
Turn-on Delay Time	t _{d(on)}		16		ns	V _{DD} = -15 V, I _D = -12 A, V _{GS} = -10 V, R _G = 10 Ω
Rise Time	t _r		43		ns	
Turn-off Delay Time	t _{d(off)}		130		ns	
Fall Time	t _f		220		ns	
Total Gate Charge	Q _G		74		nC	V _{DD} = -24 V, V _{GS} = -10 V, I _D = -24 A
Gate to Source Charge	Q _{GS}		8.4		nC	
Gate to Drain Charge	Q _{GD}		36		nC	
Body Diode Forward Voltage *1	V _{F(S-D)}		0.9		V	I _F = 24 A, V _{GS} = 0 V
Reverse Recovery Time	t _{rr}		210		ns	I _F = 24 A, V _{GS} = 0 V, di/dt = 100 A/μs
Reverse Recovery Charge	Q _{rr}		370		nC	

Note: *1. Pulsed

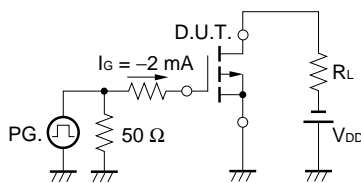
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

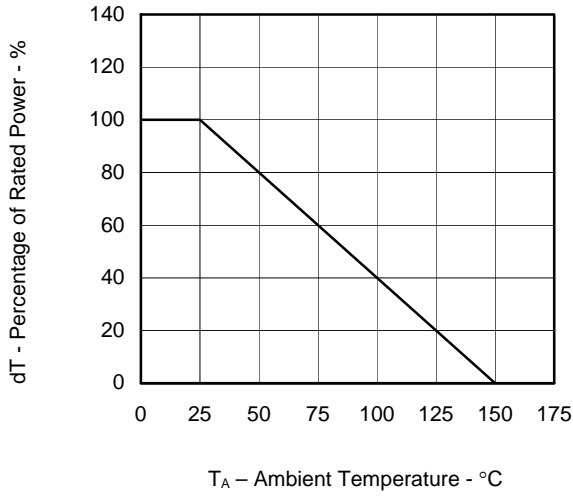


TEST CIRCUIT 3 GATE CHARGE

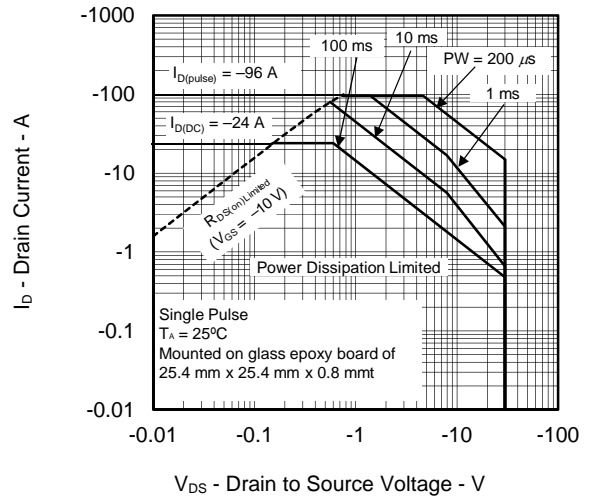


Typical Characteristics (T_A = 25°C)

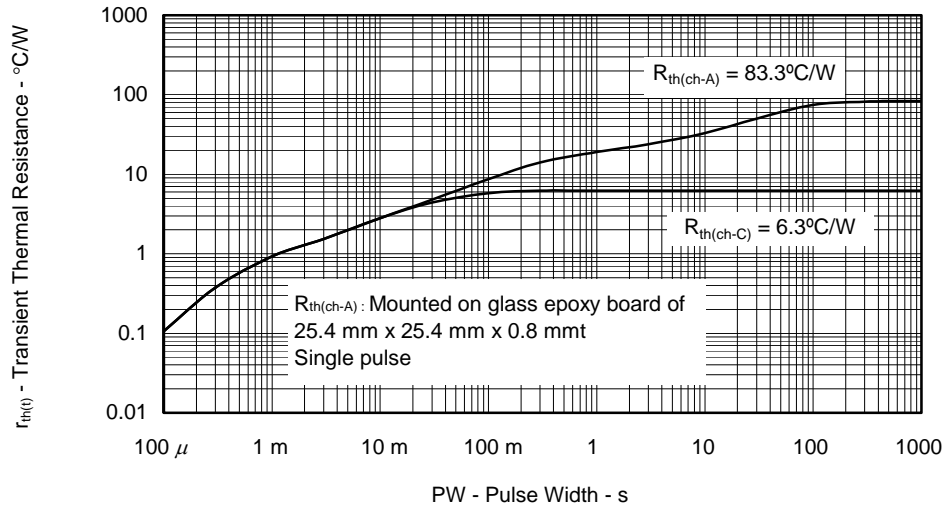
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



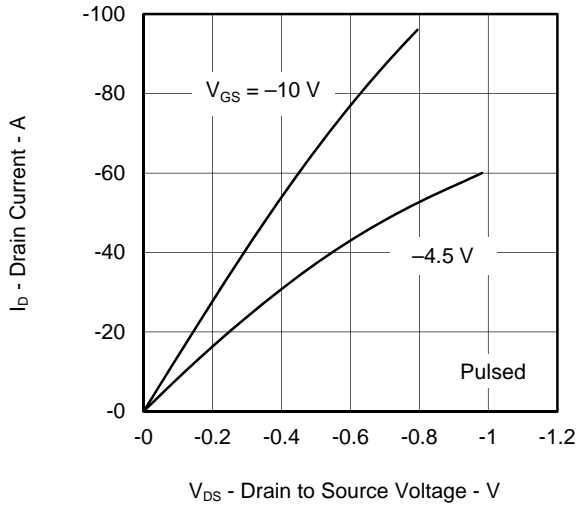
FORWARD BIAS SAFE OPERATING AREA



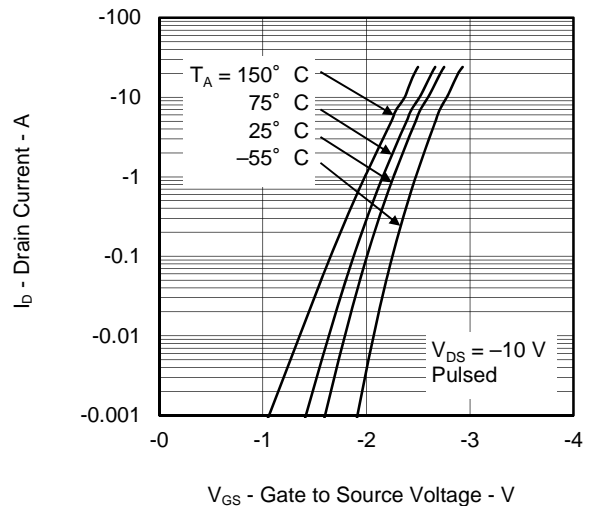
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



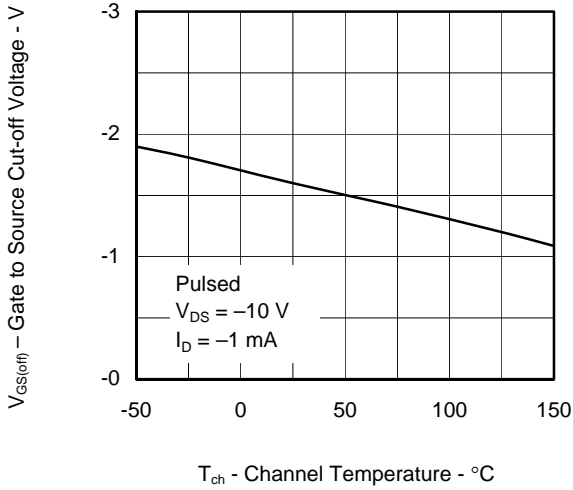
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



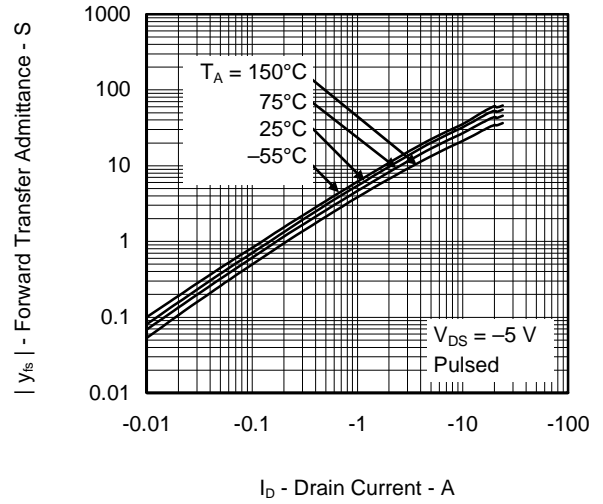
FORWARD TRANSFER CHARACTERISTICS



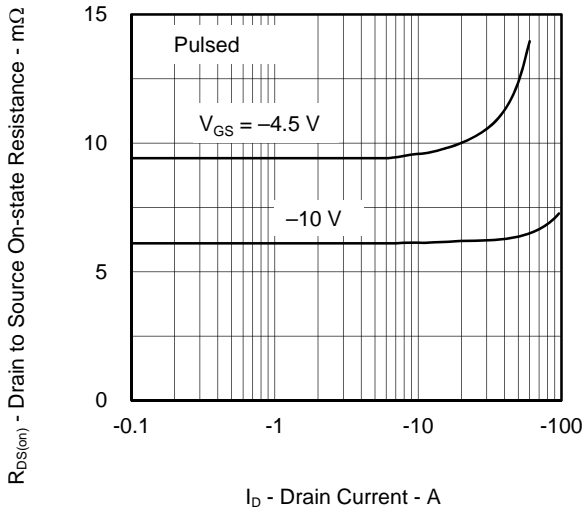
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



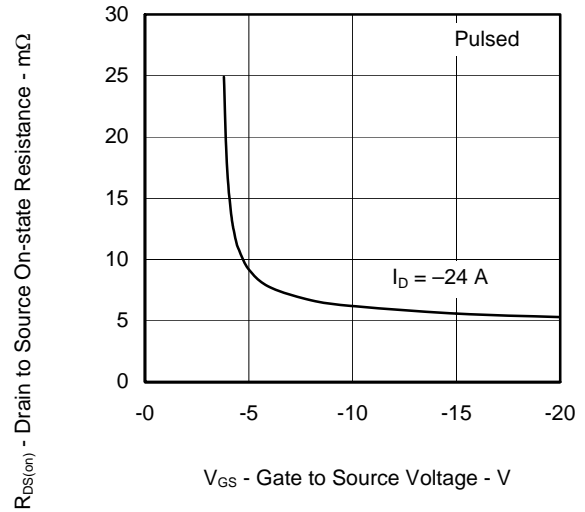
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



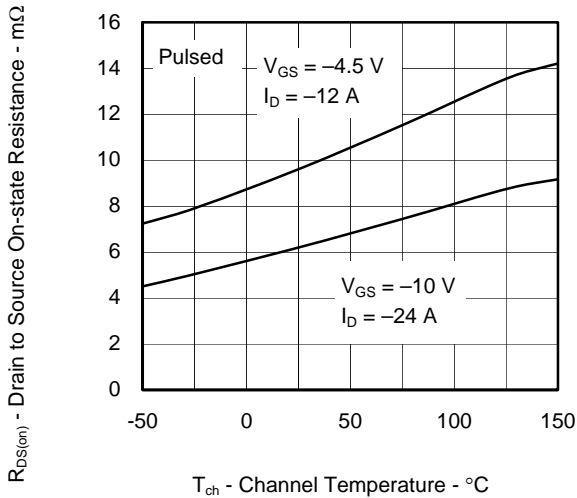
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



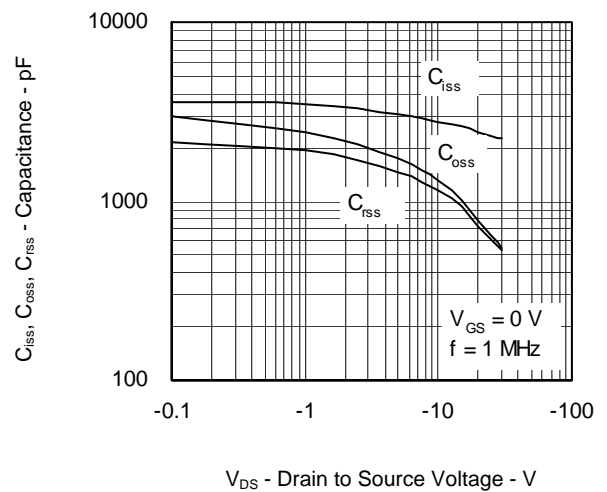
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



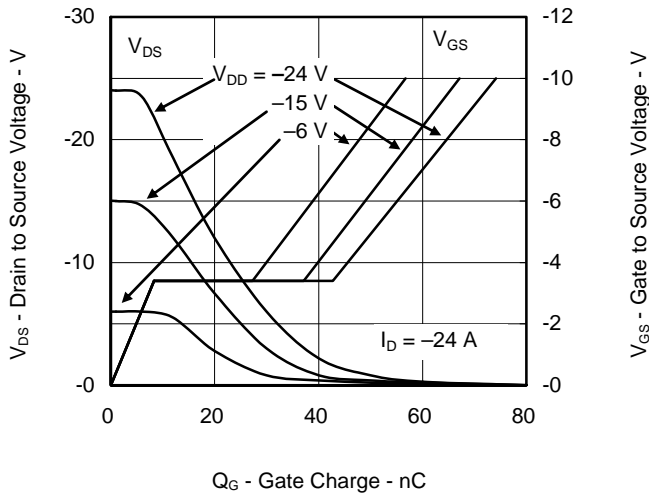
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



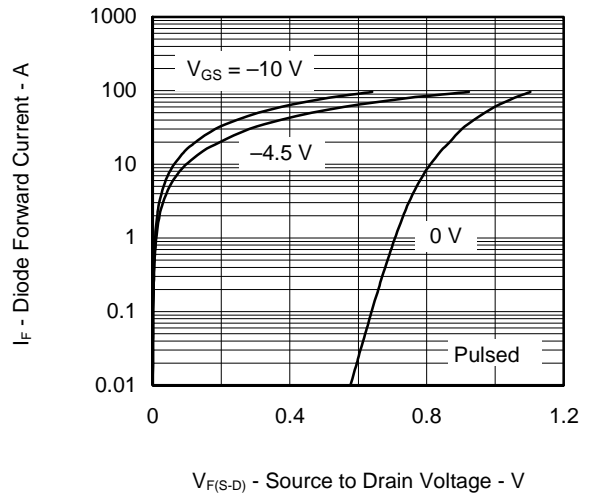
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS

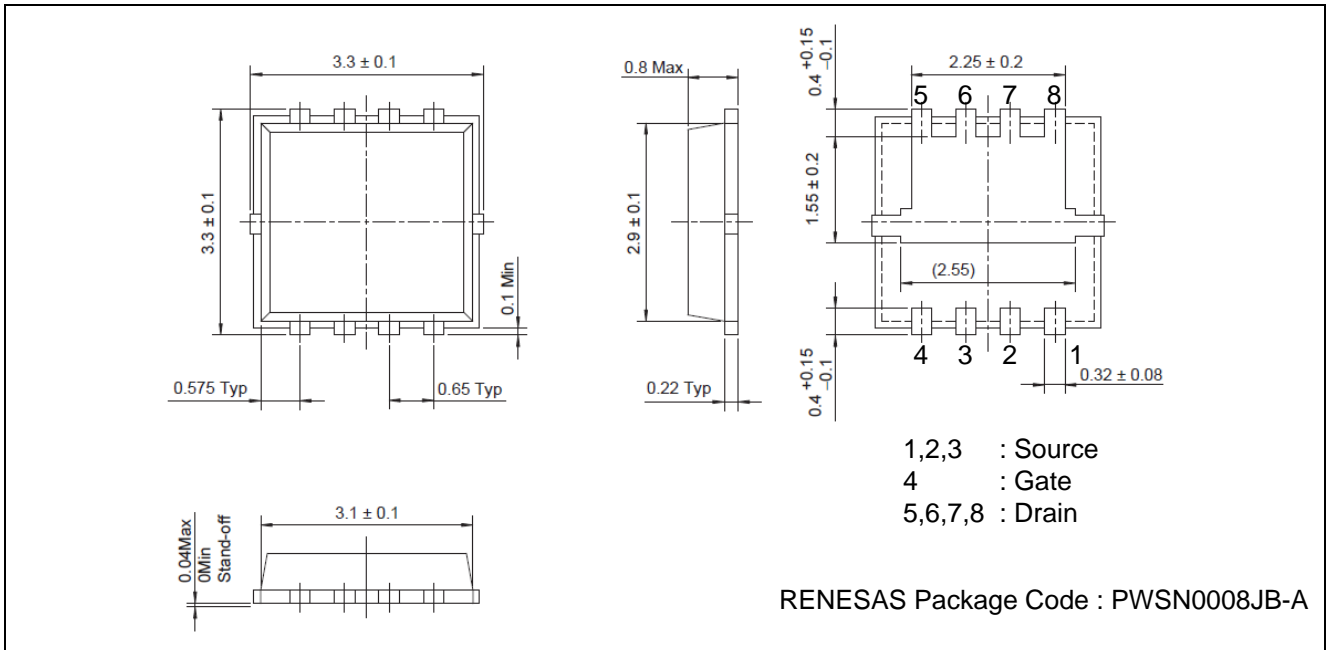


SOURCE TO DRAIN DIODE FORWARD VOLTAGE

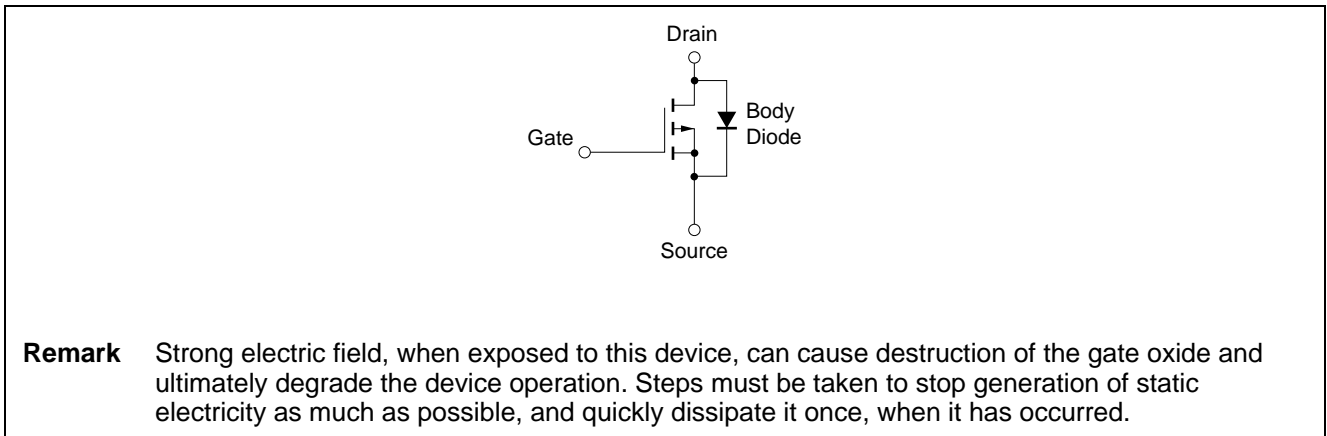


Package Drawings (Unit: mm)

HWSO8-8



Equivalent Circuit



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2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 Zhichunlu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
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Тел: +7 (812) 336 43 04 (многоканальный)

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