

# 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



HWSON-8

## Ordering Information

Part No.	Lead Plating	Packing	Package
μPA2814T1S-E2-AT *1	Pure Sn	Tape 5000 p/reel	HWSON-8 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	°C
Storage Temperature	$T_{stg}$	-55 to +150	°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	°C/W
Channel to Case (Drain) Thermal Resistance	$R_{th(ch-C)}$	6.3	°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

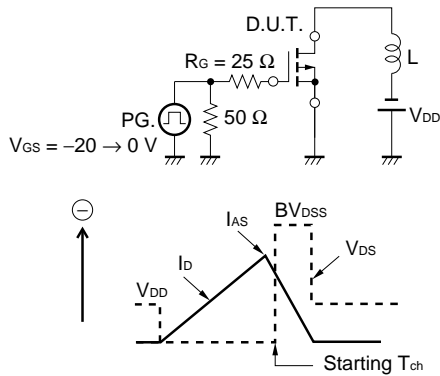
\*3. Starting  $T_{ch} = 25^\circ\text{C}$ ,  $V_{DD} = -15\text{ V}$ ,  $R_G = 25\ \Omega$ ,  $V_{GS} = -20 \rightarrow 0\text{ V}$ ,  $L = 100\ \mu\text{H}$

**Electrical Characteristics (T<sub>A</sub> = 25°C)**

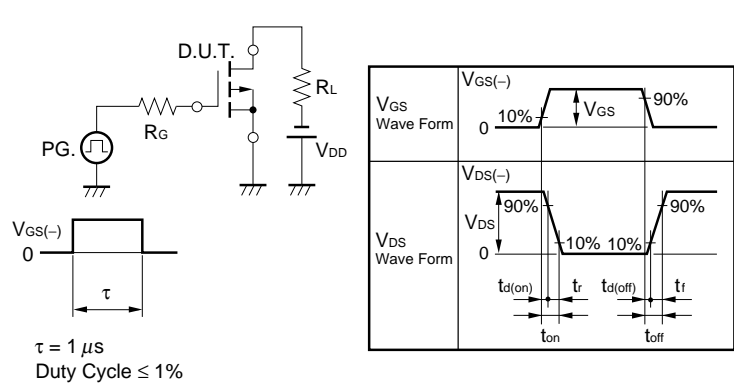
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I <sub>DSS</sub>			-1	μA	V <sub>DS</sub> = -30 V, V <sub>GS</sub> = 0 V
Gate Leakage Current	I <sub>GSS</sub>			±100	nA	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V
Gate Cut-off Voltage	V <sub>GS(off)</sub>	-1.0		-2.5	V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

Note: \*1. Pulsed

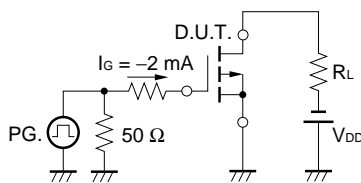
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



**TEST CIRCUIT 2 SWITCHING TIME**

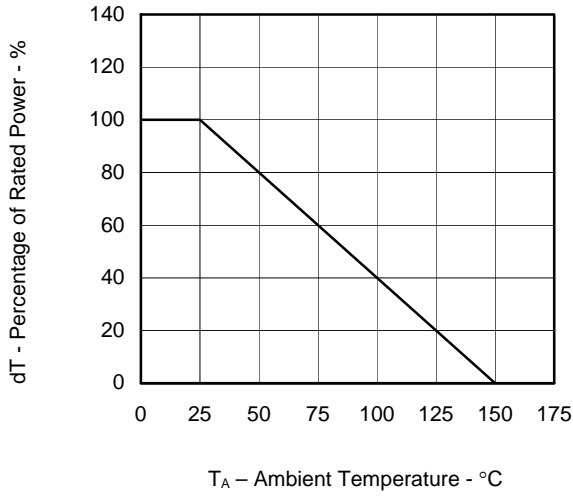


**TEST CIRCUIT 3 GATE CHARGE**

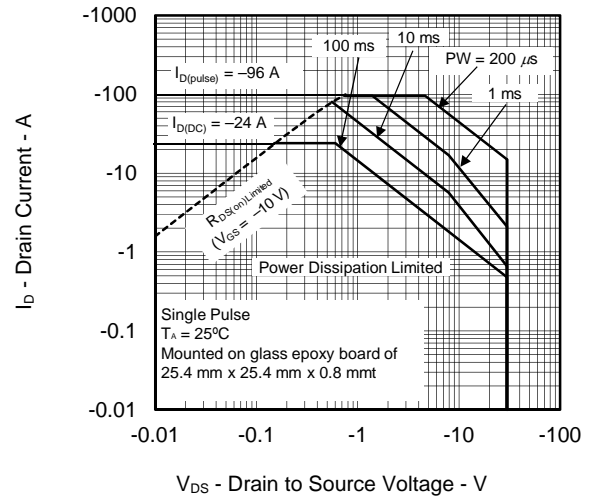


Typical Characteristics (T<sub>A</sub> = 25°C)

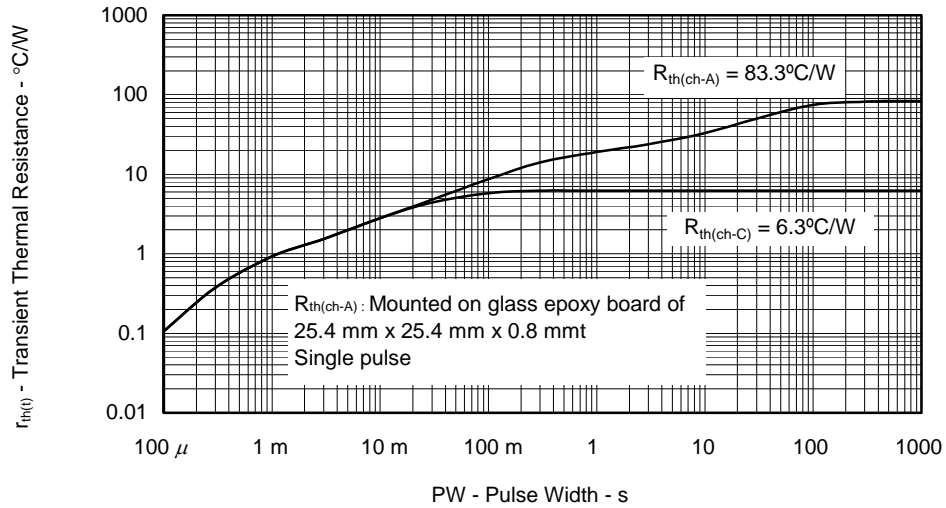
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



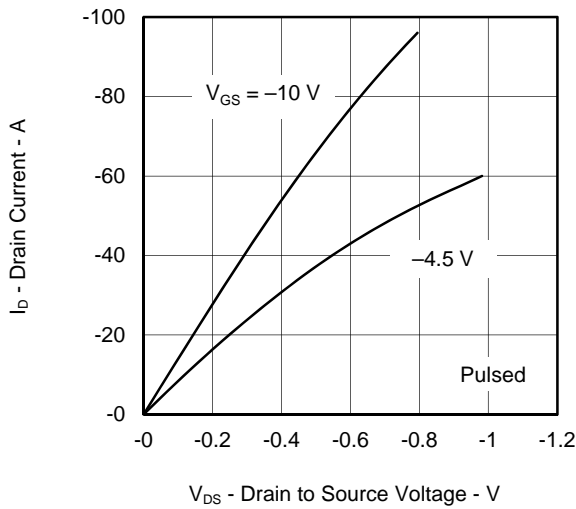
FORWARD BIAS SAFE OPERATING AREA



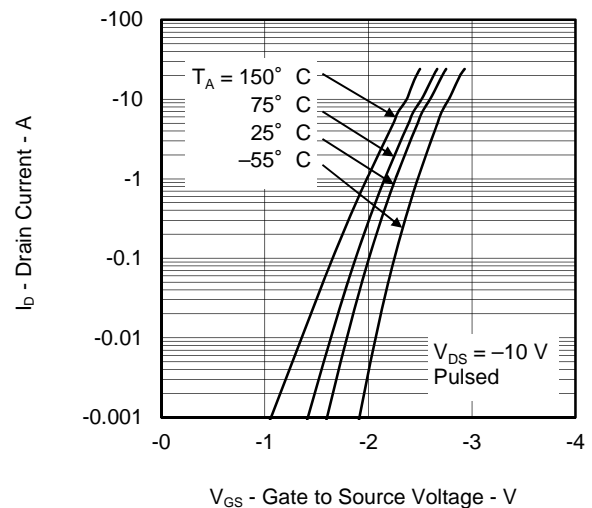
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



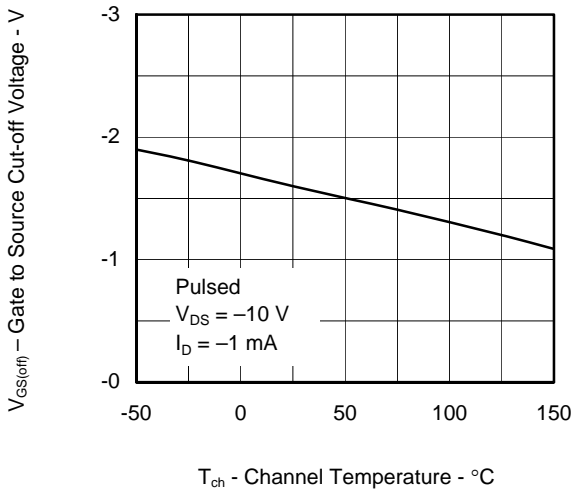
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



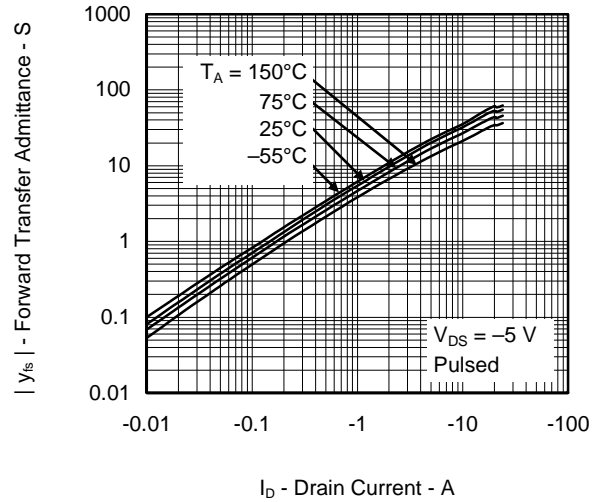
FORWARD TRANSFER CHARACTERISTICS



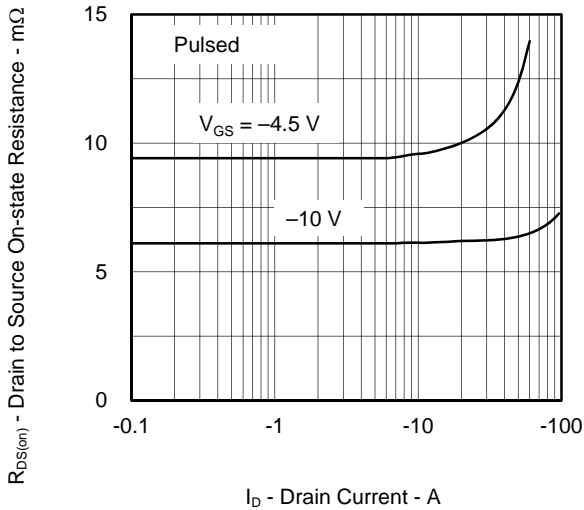
**GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE**



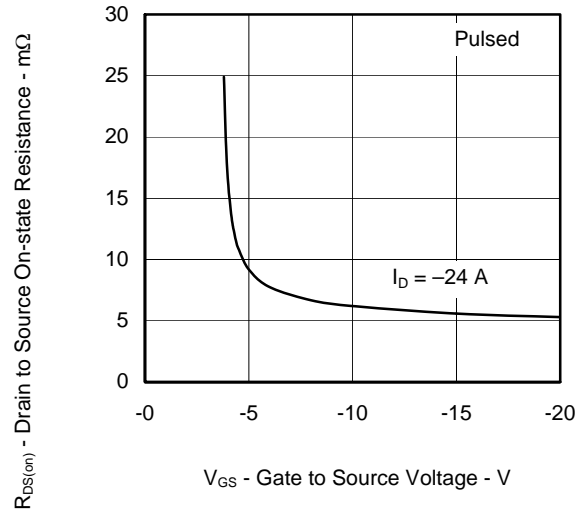
**FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT**



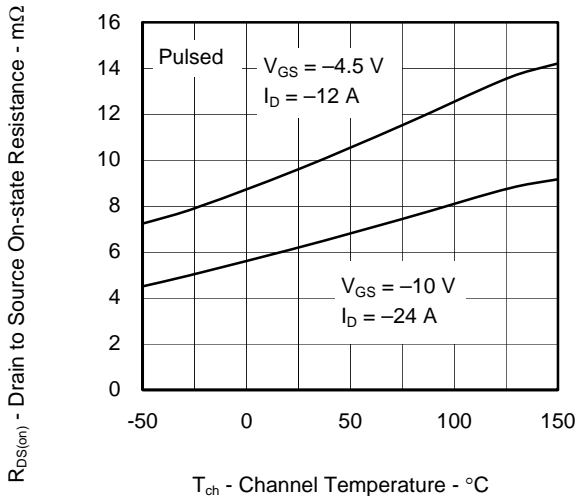
**DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT**



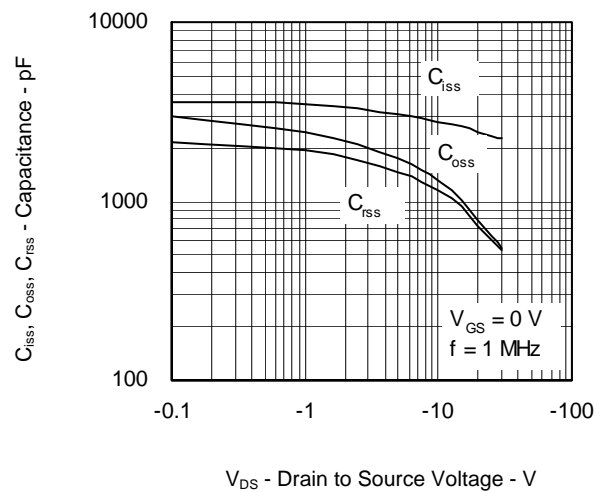
**DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE**



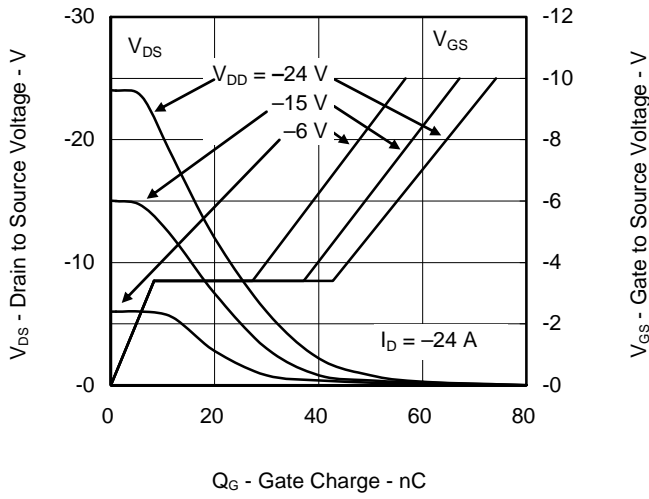
**DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE**



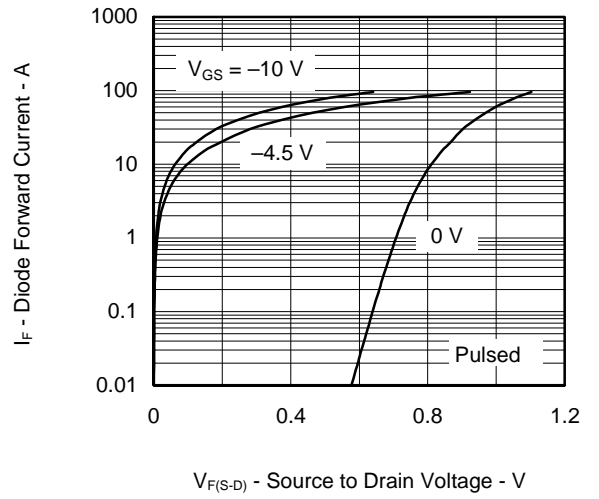
**CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE**



**DYNAMIC INPUT/OUTPUT CHARACTERISTICS**

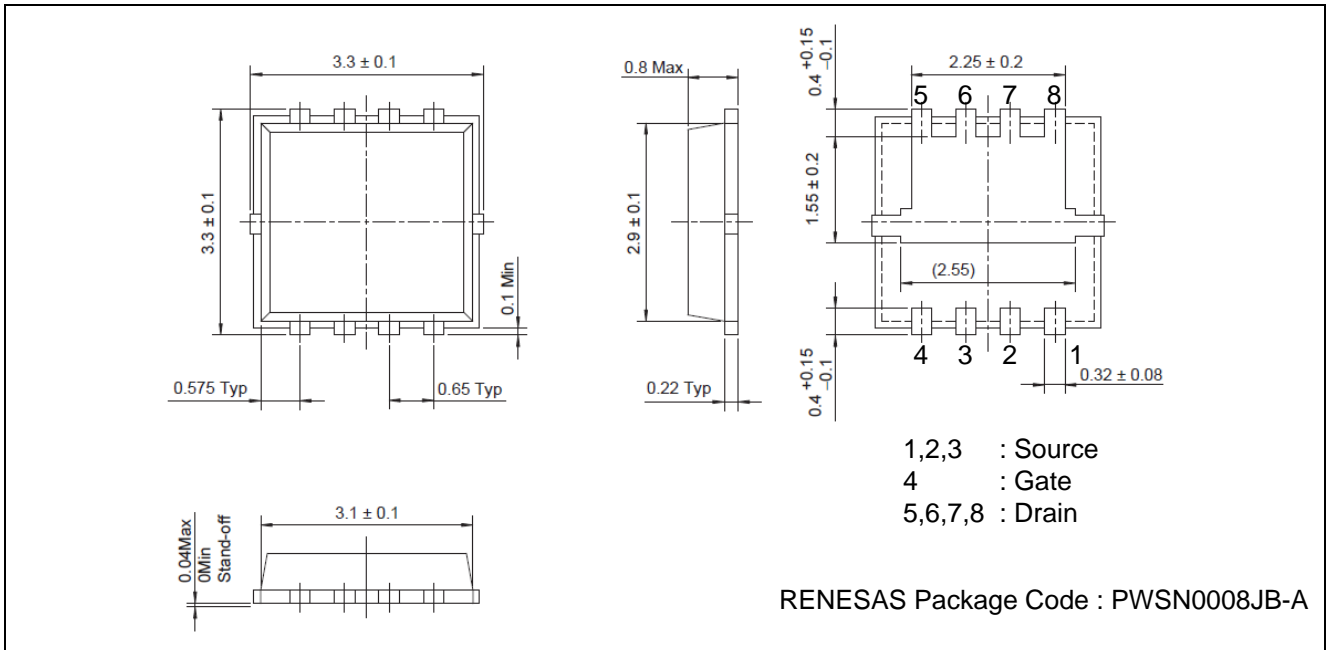


**SOURCE TO DRAIN DIODE FORWARD VOLTAGE**

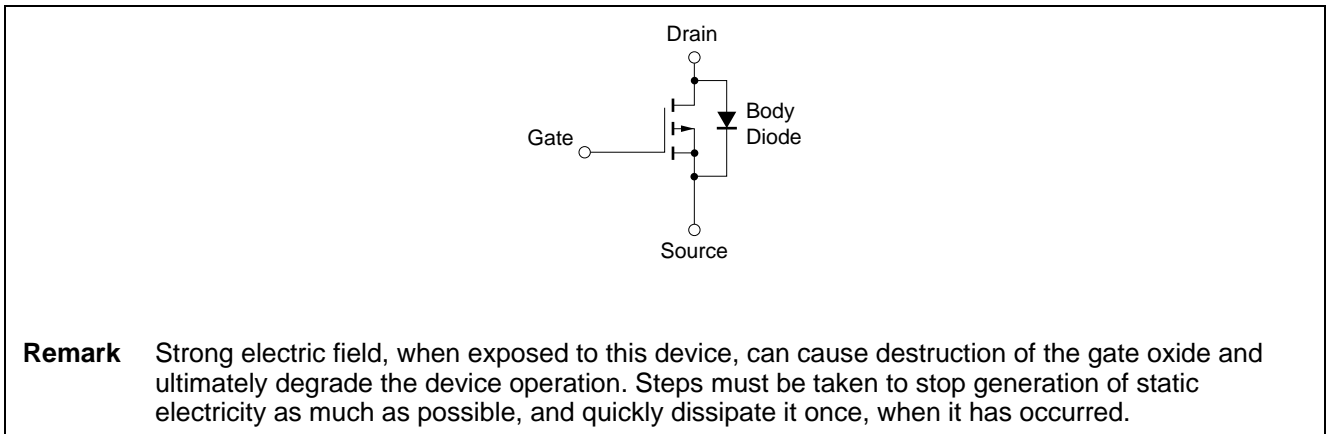


### Package Drawings (Unit: mm)

#### HWSO8-8



### Equivalent Circuit



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