

To all our customers

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Renesas Technology Corp.  
Customer Support Dept.  
April 1, 2003

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Keep safety first in your circuit designs!

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# H5N5004PL

## Silicon N Channel MOS FET High Speed Power Switching

# RENESAS

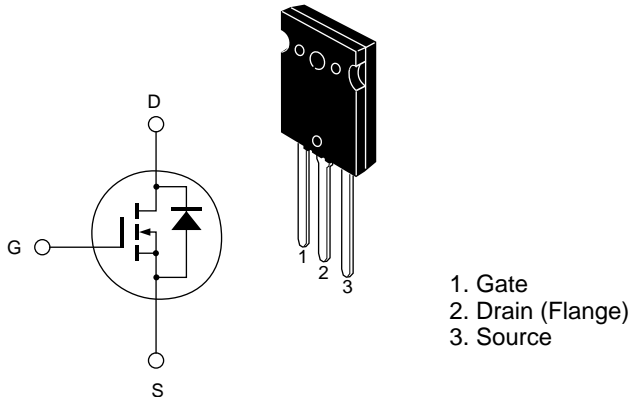
ADE-208-1381 (Z)  
Target Specification 1st. Edition  
Mar. 2001

### Features

- Low on-resistance:  $R_{DS(on)} = 0.09 \Omega$  typ.
- Low leakage current:  $IDSS = 10 \mu A$  max (at  $V_{DS} = 500 V$ )
- High speed switching:  $t_f = 280 ns$  typ (at  $V_{GS} = 10 V$ ,  $V_{DD} = 250 V$ ,  $I_D = 25 A$ )
- Low gate charge:  $Q_g = 220 nC$  typ (at  $V_{DD} = 400 V$ ,  $V_{GS} = 10 V$ ,  $I_D = 50 A$ )
- Avalanche ratings
- Built-in fast recovery diode:  $t_{rr} = 190 ns$  typ

### Outline

TO-3PL



## Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V <sub>DSS</sub>	500	V
Gate to source voltage	V <sub>GSS</sub>	±30	V
Drain current	I <sub>D</sub>	50	A
Drain peak current	I <sub>D (pulse)</sub> <sup>Note1</sup>	200	A
Body-drain diode reverse drain current	I <sub>DR</sub>	50	A
Body-drain diode reverse drain peak current	I <sub>DR (pulse)</sub> <sup>Note1</sup>	200	A
Avalanche current	I <sub>AP</sub> <sup>Note3</sup>	15	A
Channel dissipation	P <sub>ch</sub> <sup>Note2</sup>	250	W
Channel to case Thermal Impedance	θ ch-c	0.5	°C/W
Channel temperature	T <sub>ch</sub>	150	°C
Storage temperature	T <sub>stg</sub>	-55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%

2. Value at Tc = 25°C

3. T<sub>ch</sub> ≤ 150°C

## Electrical Characteristics (Ta = 25°C)

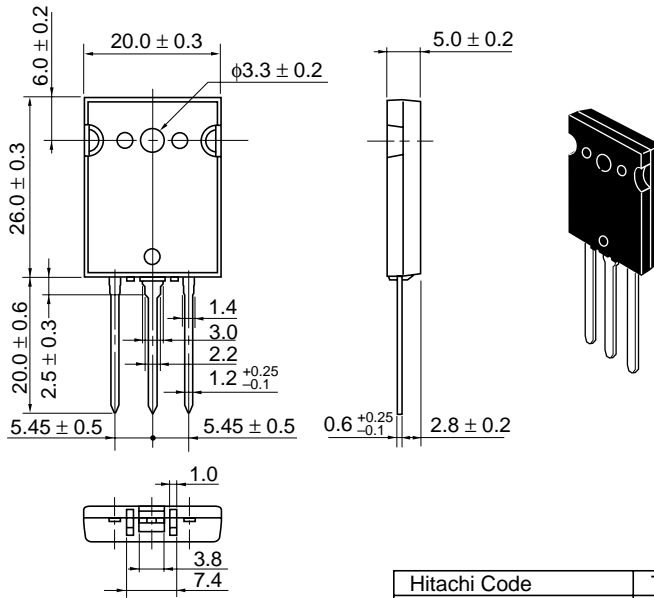
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	500	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = \pm 30 \text{ V}$ , $V_{DS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	10	$\mu\text{A}$	$V_{DS} = 500 \text{ V}$ , $V_{GS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	2.0	—	4.0	V	$V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.09	0.11	$\Omega$	$I_D = 25 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note4</sup>
Forward transfer admittance	$ y_{fs} $	27	45	—	S	$I_D = 25 \text{ A}$ , $V_{DS} = 10 \text{ V}$ <sup>Note4</sup>
Input capacitance	$C_{iss}$	—	7630	—	pF	$V_{DS} = 25 \text{ V}$
Output capacitance	$C_{oss}$	—	770	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	$C_{rss}$	—	160	—	pF	$f = 1 \text{ MHz}$
Turn-on delay time	$t_{d(on)}$	—	90	—	ns	$I_D = 25 \text{ A}$
Rise time	$t_r$	—	340	—	ns	$V_{GS} = 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	370	—	ns	$R_L = 10 \Omega$
Fall time	$t_f$	—	280	—	ns	$R_g = 10 \Omega$
Total gate charge	$Q_g$	—	220	—	nC	$V_{DD} = 400 \text{ V}$
Gate to source charge	$Q_{gs}$	—	30	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	$Q_{gd}$	—	110	—	nC	$I_D = 50 \text{ A}$
Body-drain diode forward voltage	$V_{DF}$	—	0.98	1.5	V	$I_F = 50 \text{ A}$ , $V_{GS} = 0$
Body-drain diode reverse recovery time	$t_{rr}$	—	190	—	ns	$I_F = 50 \text{ A}$ , $V_{GS} = 0$
Body-drain diode reverse recovery charge	$Q_{rr}$	—	1.3	—	$\mu\text{C}$	$diF/dt = 100 \text{ A}/\mu\text{s}$

Note: 4. Pulse test

## Package Dimensions

As of January, 2001

Unit: mm



Hitachi Code	TO-3PL
JEDEC	—
EIAJ	—
Mass (reference value)	9.9 g

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