H5N3004P

Silicon N Channel MOS FET
High Speed Power Switching

ADE-208-1523 (Z)

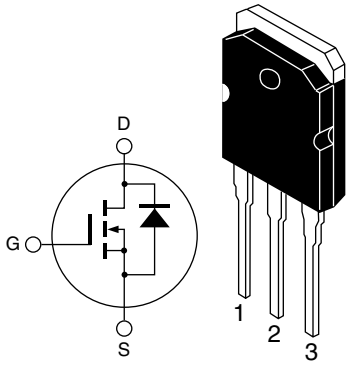
Rev.0
Apr. 2002

Features

- Low on-resistance
- Low leakage current
- High speed switching
- Low gate charge (Qg)
- Avalanche ratings

Outline

TO-3P



1. Gate
2. Drain (Flange)
3. Source

Absolute Maximum Ratings

(Ta=25°C)

Item	Symbol	Ratings	Unit
Drain to source voltage	V_{DSS}	300	V
Gate to source voltage	V_{GSS}	±30	V
Drain current	I_D	25	A
Drain peak current	I_D (pulse) Note1	100	A
Body-drain diode reverse drain current	I_{DR}	25	A
Body-drain diode reverse drain peak current	I_{DR} (pulse) Note1	100	A
Avalanche current	I_{AP} Note3	25	A
Channel dissipation	Pch Note2	150	W
Channel to case Thermal impedance	θch-c	0.833	°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 Tc = 25°C
3. Tch ≤ 150°C

Electrical Characteristics

(Ta=25°C)

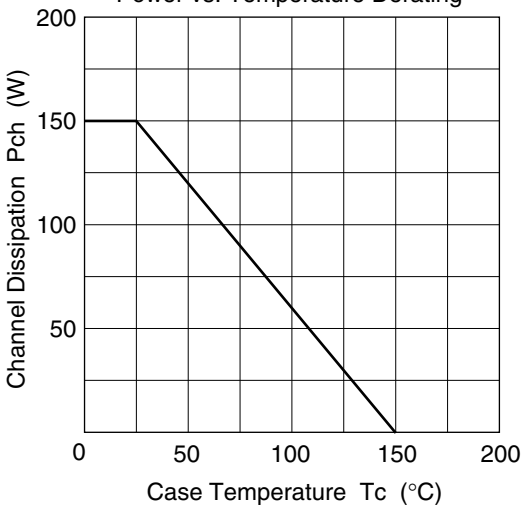
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	300	•	—	V	I_D = 10 mA, V_{GS} = 0
Zero gate voltage drain current	I_{DSS}	—	•	1	µA	V_{DS} = 300 V, V_{GS} = 0
Gate to source leak current	I_{GSS}	—	•	±0.1	µA	V_{GS} = ±30 V, V_{DS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	3.0	•	4.0	V	V_{DS} = 10 V, I_D = 1 mA
Forward transfer admittance	$\|y_{fs}\|$	15	25	—	S	I_D = 12.5 A, V_{DS} = 10 V[Note4]
Static drain to source on state resistance	$R_{DS(on)}$	—	0.076	0. 093	Ω	I_D = 12.5 A, V_{GS}= 10 V[Note4]
Input capacitance	Ciss	—	3600	•	pF	V_{DS} = 25 V
Output capacitance	Coss	—	400	•	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	100	•	pF	f = 1 MHz
Turn-on delay time	td(on)	—	50	•	ns	I_D= 12.5 A
Rise time	tr	—	120	—	ns	R_L = 12 Ω
Turn-off delay time	td(off)	—	180	•	ns	V_{GS} = 10 V
Fall time	tf	—	90	—	ns	Rg = 10 Ω
Total gate charge	Qg	—	110	—	nC	V_{DD} = 240 V
Gate to source charge	Qgs	—	18	—	nC	V_{GS} = 10 V
Gate to drain charge	Qgd	—	55	—	nC	I_D = 25 A
Body-drain diode forward voltage	V_{DF}	—	0.9	1.35	V	I_F = 25 A, V_{GS} = 0
Body-drain diode reverse recovery time	trr	—	250	—	ns	I_F = 25 A, V_{GS} = 0 diF/dt = 100 A/µs
Body-drain diode reverse recovery charge	Qrr	—	2.3	—	µC	

Notes: 4. Pulse test

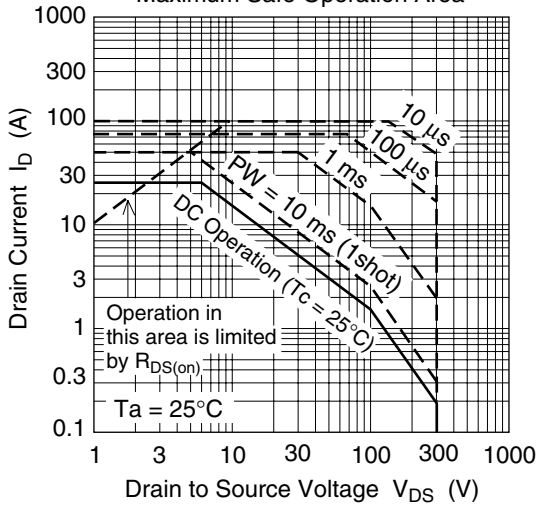
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Main Characteristics

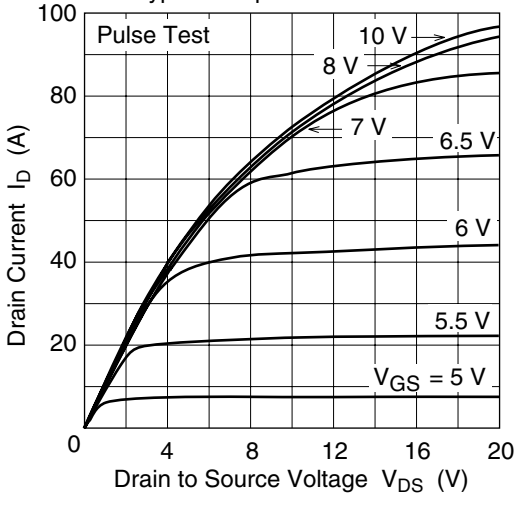
Power vs. Temperature Derating



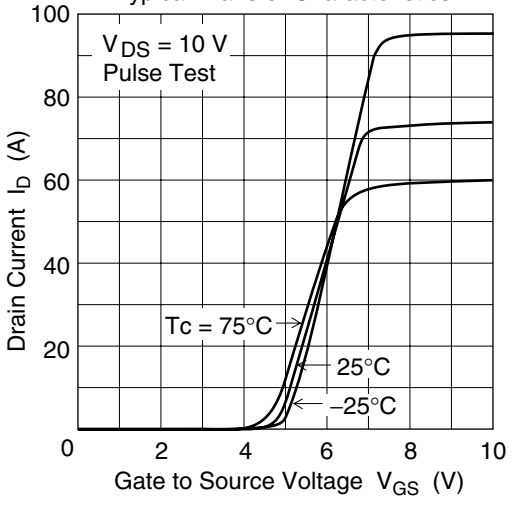
Maximum Safe Operation Area



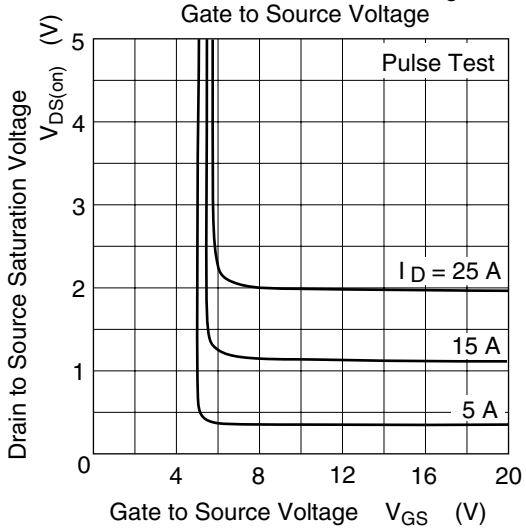
Typical Output Characteristics



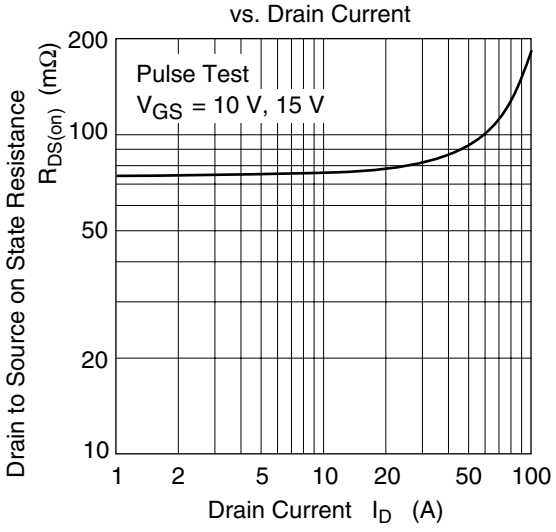
Typical Transfer Characteristics



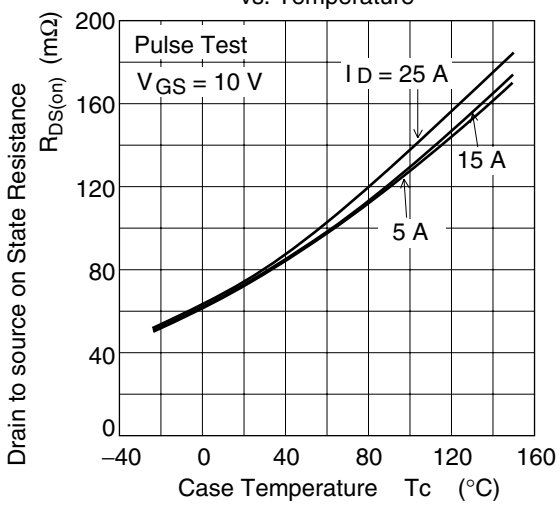
Drain to Source Saturation Voltage vs. Gate to Source Voltage



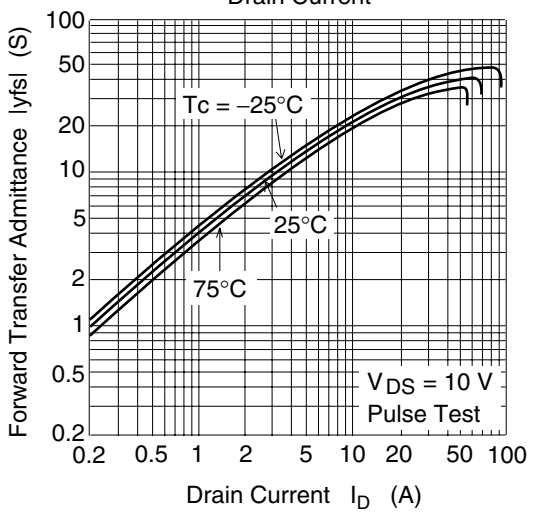
Static Drain to Source on State Resistance vs. Drain Current



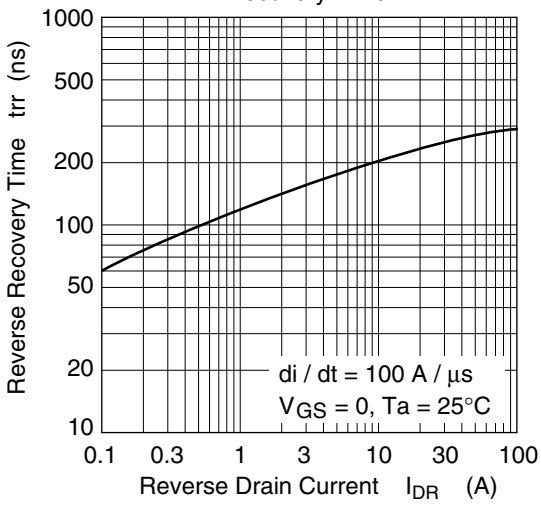
Static Drain to Source on State Resistance vs. Temperature



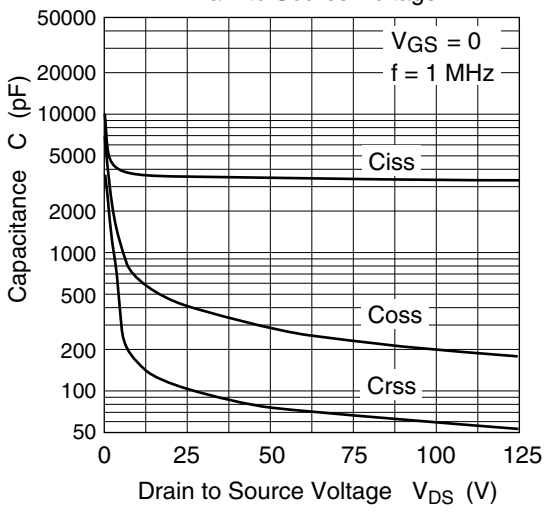
Forward Transfer Admittance vs. Drain Current



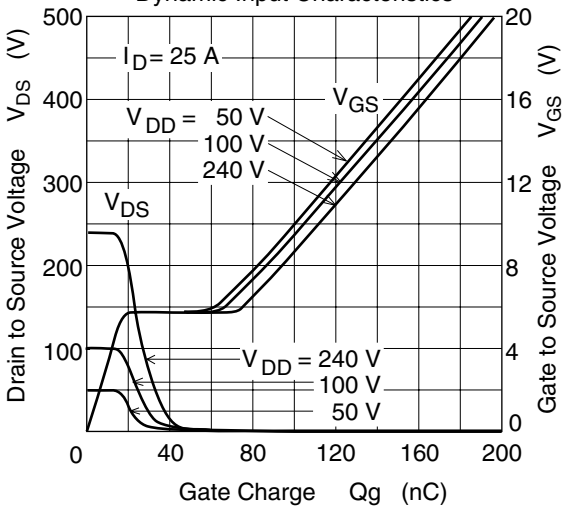
Body-Drain Diode Reverse Recovery Time



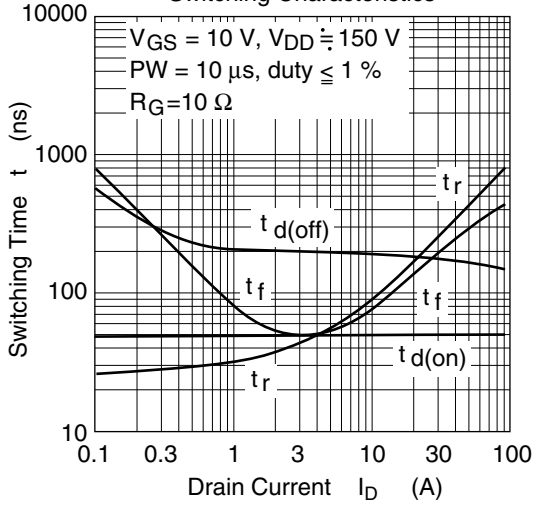
Typical Capacitance vs. Drain to Source Voltage



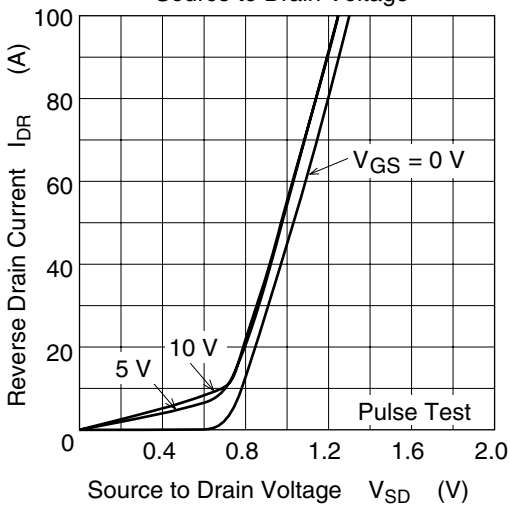
Dynamic Input Characteristics



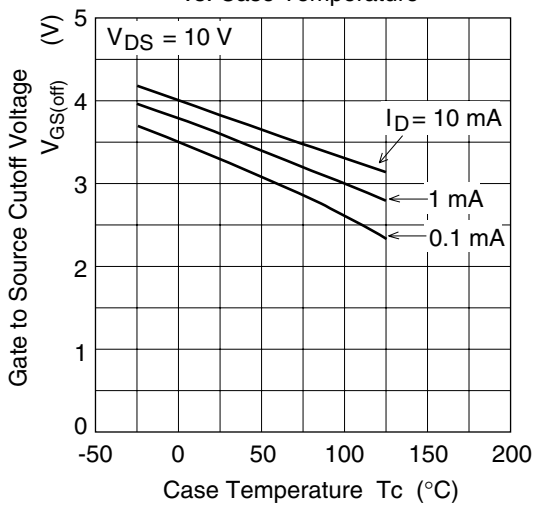
Switching Characteristics



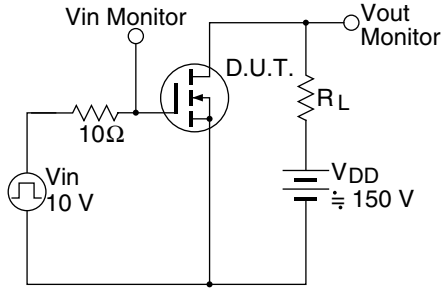
Reverse Drain Current vs. Source to Drain Voltage



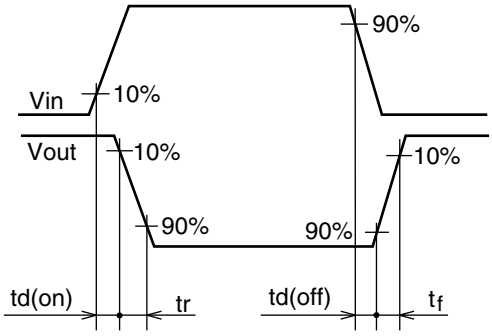
Gate to Source Cutoff Voltage vs. Case Temperature



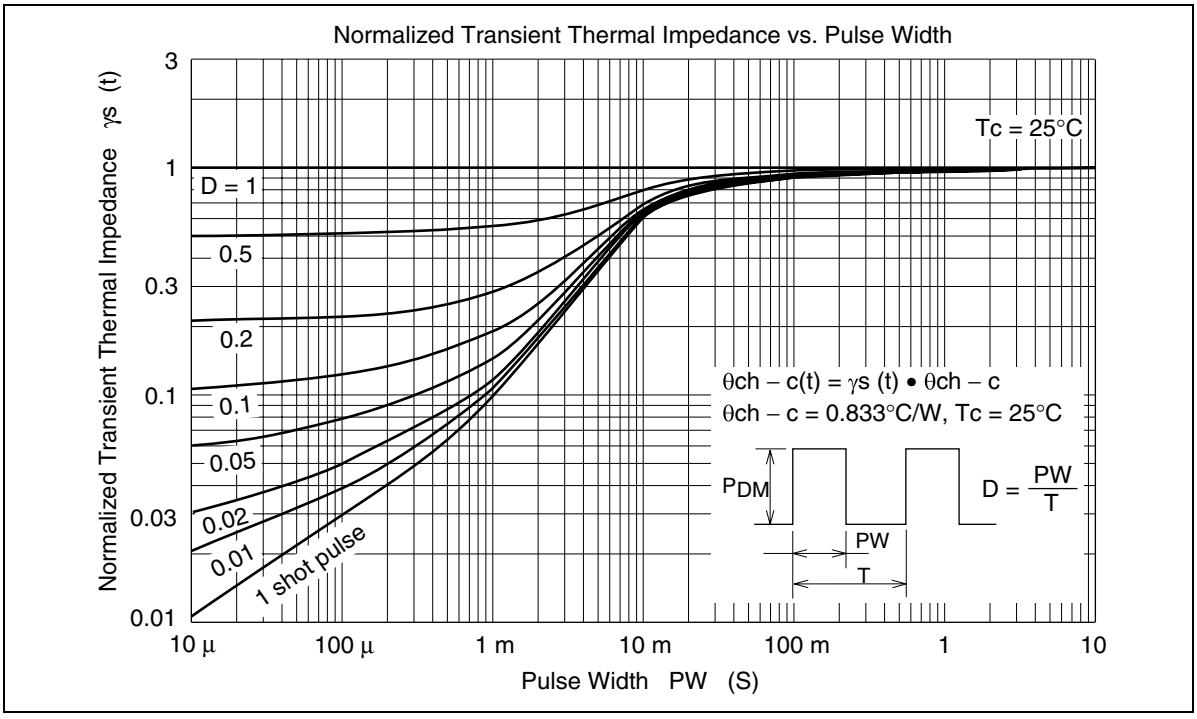
Switching Time Test Circuit



Waveform



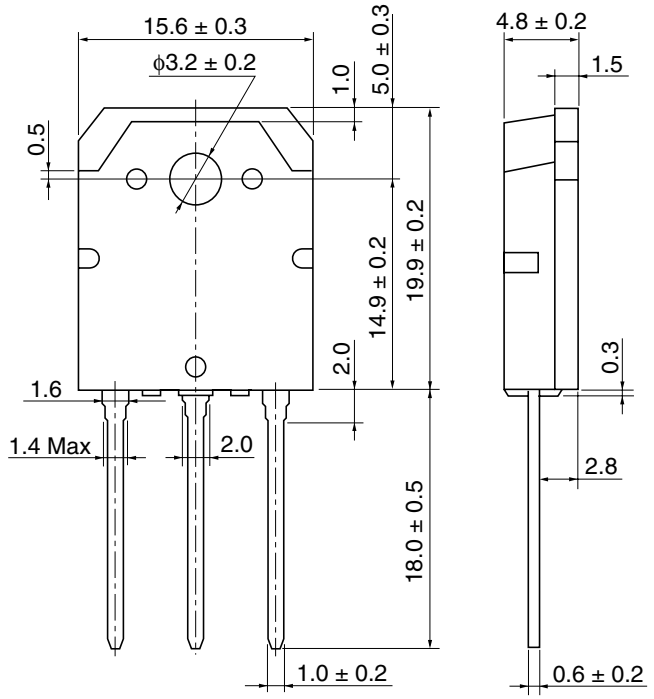
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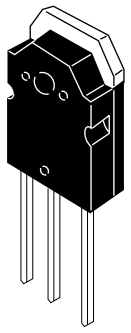

Normalized Transient Thermal Impedance vs. Pulse Width
Normalized Transient Thermal Impedance γs (t)
3
1
0.3
0.1
0.03
0.01
Tc = 25°C
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1 shot pulse
θch – c(t) = γs (t) • θch – c
θch – c = 0.833°C/W, Tc = 25°C
PDM
D = PW / T
PW
T
10 μ
100 μ
1 m
10 m
100 m
1
10
Pulse Width PW (S)

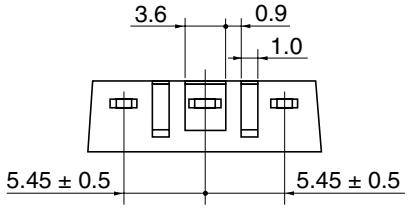
Package Dimensions

As of July, 2001

Unit: mm







Hitachi Code	TO-3P
JEDEC	—
JEITA	Conforms
Mass (reference value)	5.0 g

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