

N6001NZ

N-channel MOSFET
600V, 1A, 9.3Ω

R07DS1025EC0100

Rev.1.00

Feb 18, 2013

Description

The N6001NZ is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Low on-state resistance

$$R_{DS(on)} = 9.3\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 0.5 \text{ A)}$$

- Low input capacitance

$$C_{iss} = 215\text{pF TYP. (} V_{DS} = 10\text{V, } V_{GS} = 0 \text{ V)}$$

- High current

$$I_{D(DC)} = \pm 1.0 \text{ A}$$

- RoHS Compliant

Ordering Information

Part No.	Lead Plating	Packing	Package
N6001NZ-S29-AY *1	Pure Sn (Tin)	Tube 75 p/tube	TO-251 0.3g TYP.

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

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$, all terminals are connected)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	600	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 30	V
Drain Current (DC)	$I_{D(DC)}$	± 1.0	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 4.0	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	20	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.0	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 150	$^\circ\text{C}$
Single Avalanche Current *2	I_{AS}	0.8	A
Single Avalanche Energy *2	E_{AS}	0.4	mJ

Thermal Resistance

Channel to Case (Drain) Thermal Resistance $R_{th(ch-C)}$ 6.25 $^\circ\text{C/W}$

Channel to Ambient Thermal Resistance $R_{th(ch-A)}$ 125 $^\circ\text{C/W}$

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

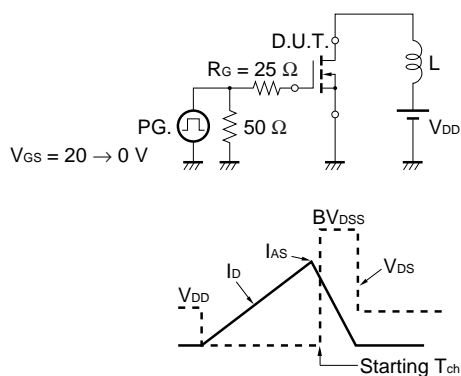
*2. Starting $T_{ch} = 25^\circ\text{C}$, $R_G = 25 \Omega$, $V_{DD} = 150 \text{ V}$, $V_{GS} = 20 \rightarrow 0 \text{ V}$, $L = 1\text{mH}$

Electrical Characteristics ($T_A = 25^\circ\text{C}$, all terminals are connected)

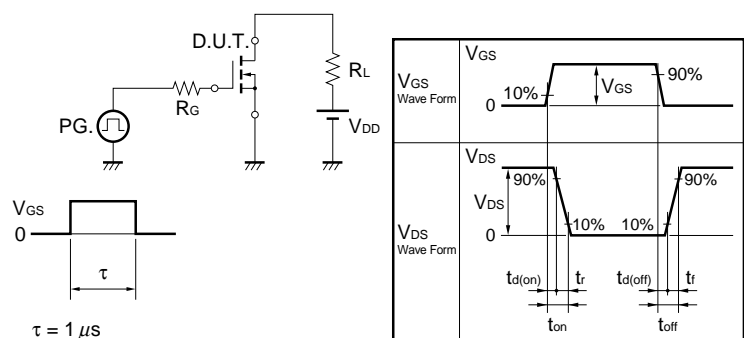
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}			1	μA	$V_{DS} = 600\text{ V}$, $V_{GS} = 0\text{ V}$
Gate Leakage Current	I_{GSS}			± 100	nA	$V_{GS} = \pm 30\text{ V}$, $V_{DS} = 0\text{ V}$
Gate to Source Cut-off Voltage	$V_{GS(off)}$	2.0	3.0	4.0	V	$V_{DS} = 10\text{ V}$, $I_D = 1\text{ mA}$
Forward Transfer Admittance ^{*1}	$ y_{fs} $	0.2	0.7		S	$V_{DS} = 10\text{ V}$, $I_D = 0.5\text{ A}$
Drain to Source On-state Resistance ^{*1}	$R_{DS(on)}$		7.0	9.3	Ω	$V_{GS} = 10\text{ V}$, $I_D = 0.5\text{ A}$
Input Capacitance	C_{iss}		215		pF	$V_{DS} = 10\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$
Output Capacitance	C_{oss}		78		pF	
Reverse Transfer Capacitance	C_{rss}		20		pF	
Turn-on Delay Time	$t_{d(on)}$		9.0		ns	$V_{DD} = 150\text{ V}$, $I_D = 0.5\text{ A}$, $V_{GS} = 10\text{ V}$, $R_G = 10\ \Omega$
Rise Time	t_r		4.2		ns	
Turn-off Delay Time	$t_{d(off)}$		15.8		ns	
Fall Time	t_f		23.0		ns	
Total Gate Charge	Q_G		7.4		nC	$V_{DD} = 450\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 1.0\text{ A}$
Gate to Source Charge	Q_{GS}		1.6		nC	
Gate to Drain Charge	Q_{GD}		3.5		nC	
Body Diode Forward Voltage ^{*1}	$V_{F(S-D)}$		0.83	1.5	V	$I_F = 1.0\text{ A}$, $V_{GS} = 0\text{ V}$
Reverse Recovery Time	t_{rr}		95		ns	$I_F = 1.0\text{ A}$, $V_{GS} = 0\text{ V}$,
Reverse Recovery Charge	Q_{rr}		250		nC	$di/dt = 100\text{ A}/\mu\text{s}$

Note: *1. Pulsed

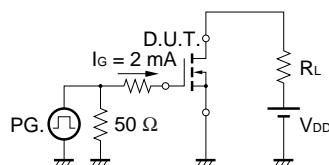
TEST CIRCUIT 1 AVALANCHE CAPABILITY



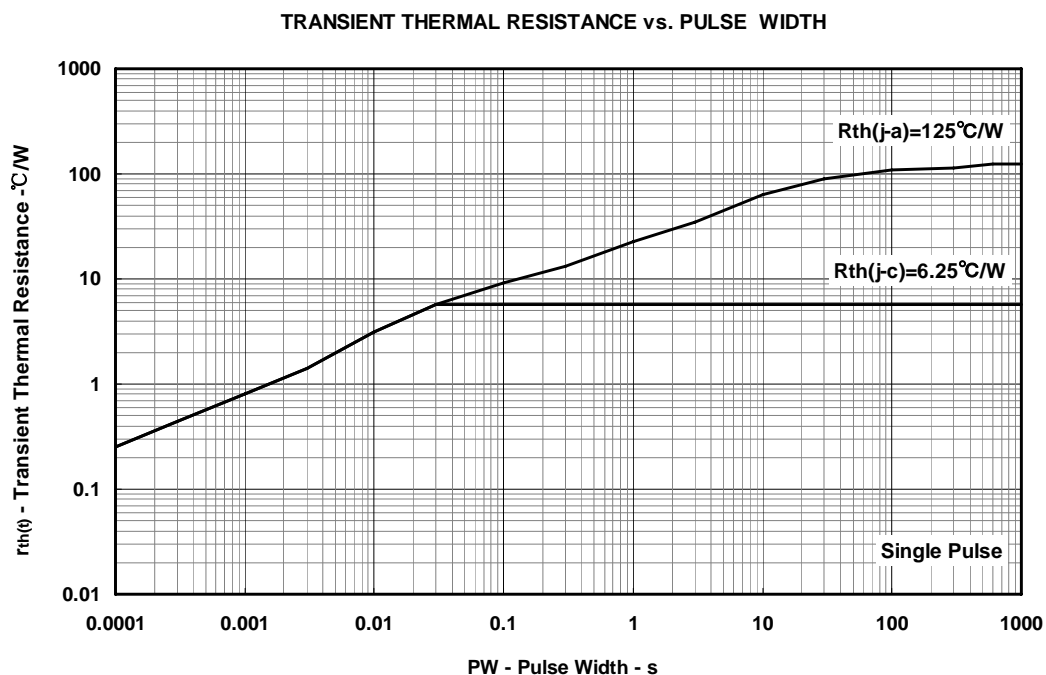
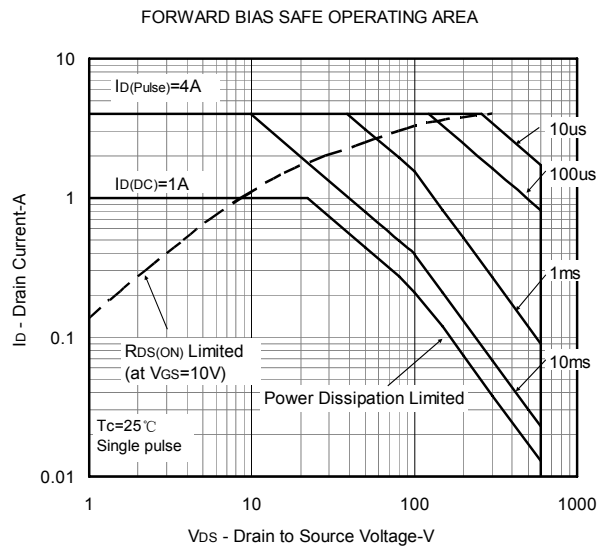
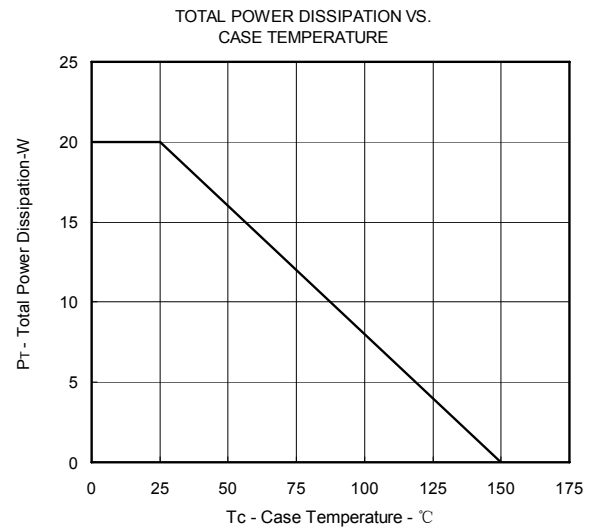
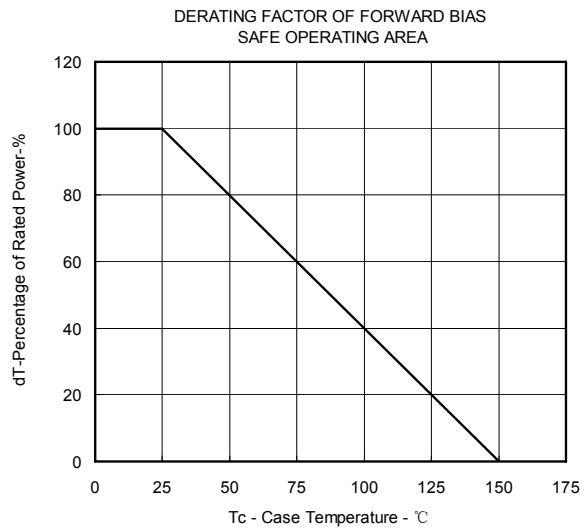
TEST CIRCUIT 2 SWITCHING TIME

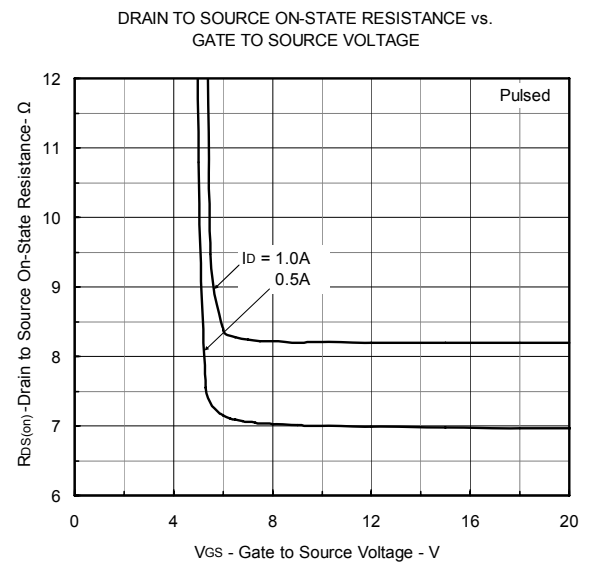
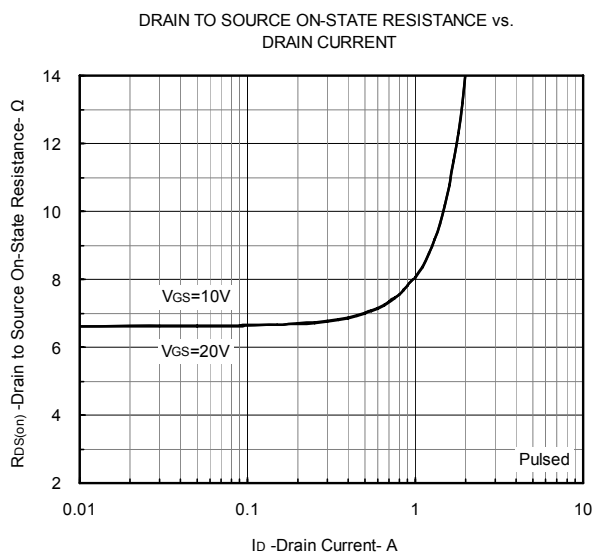
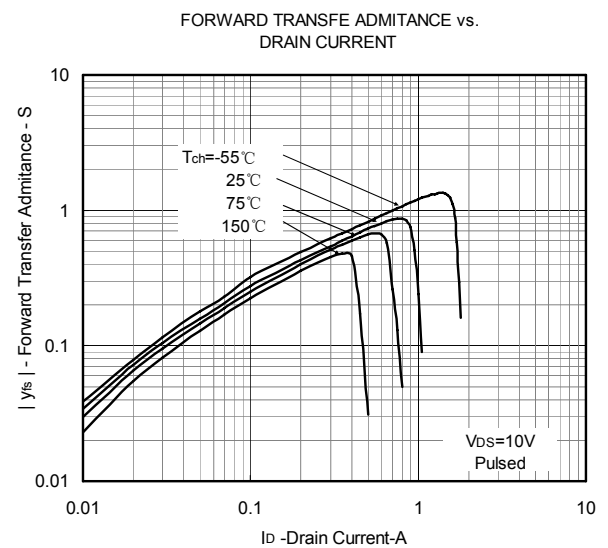
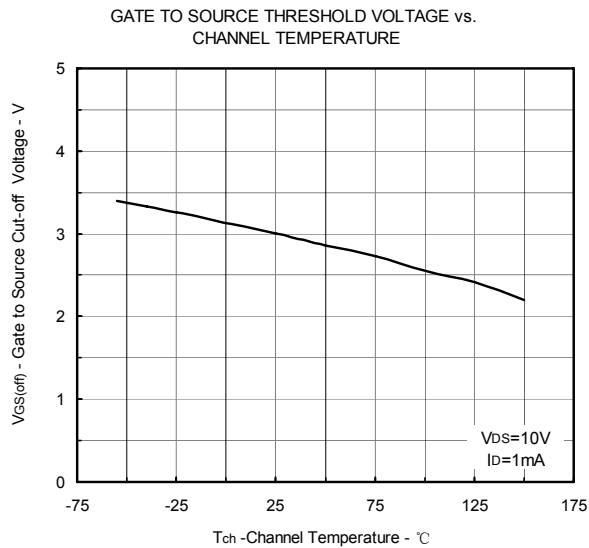
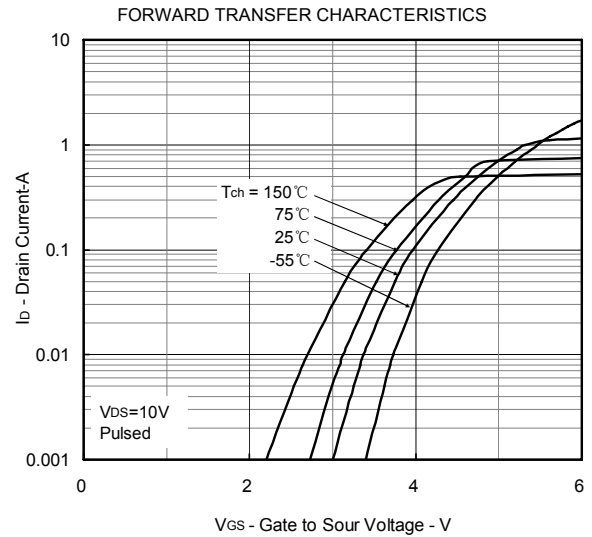
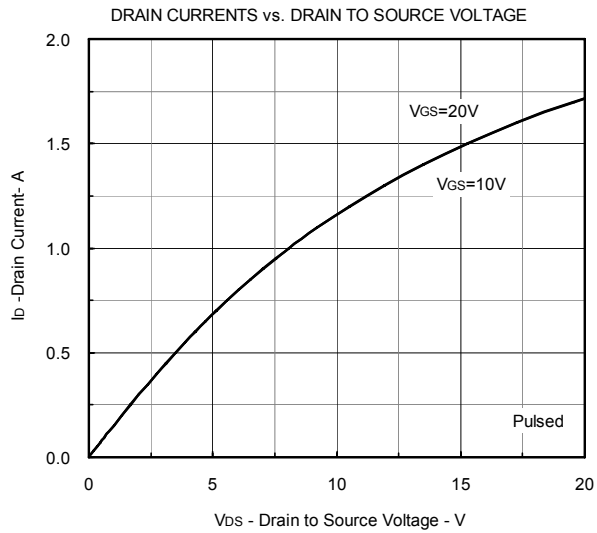


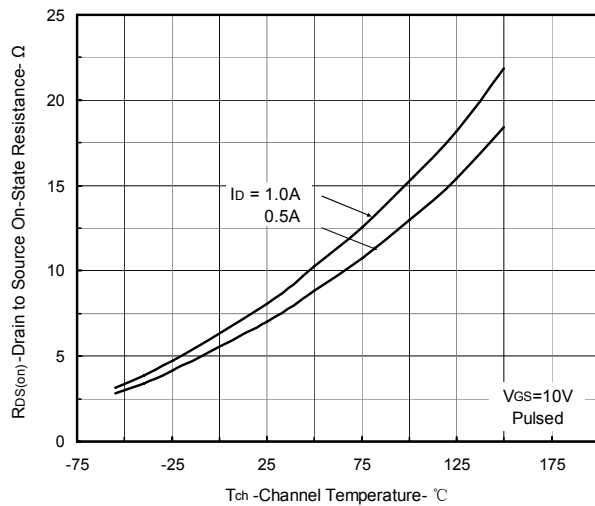
TEST CIRCUIT 3 GATE CHARGE



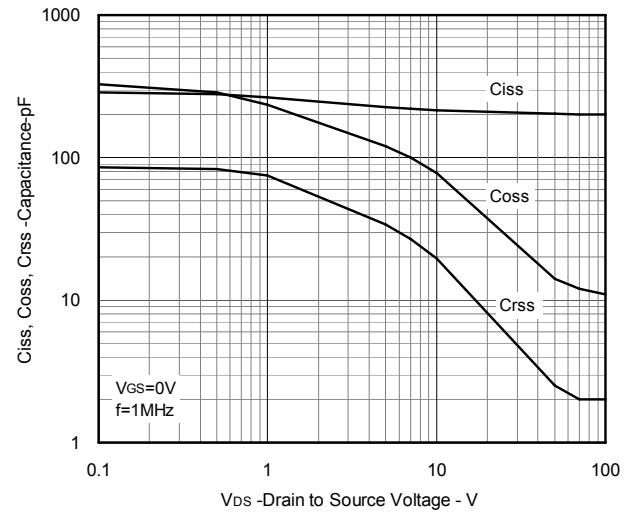
Typical Characteristics ($T_A = 25^\circ\text{C}$)



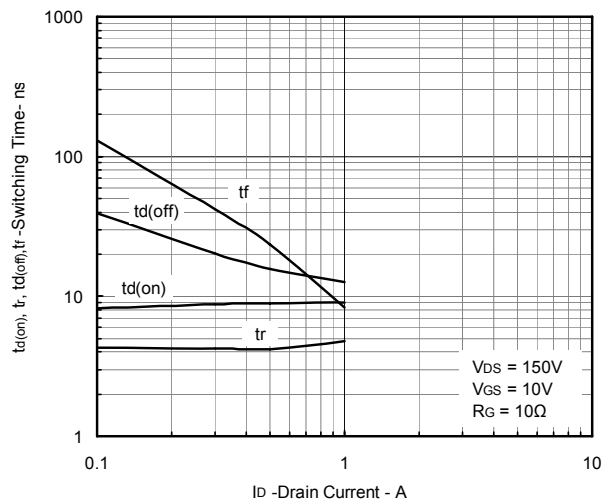


DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE

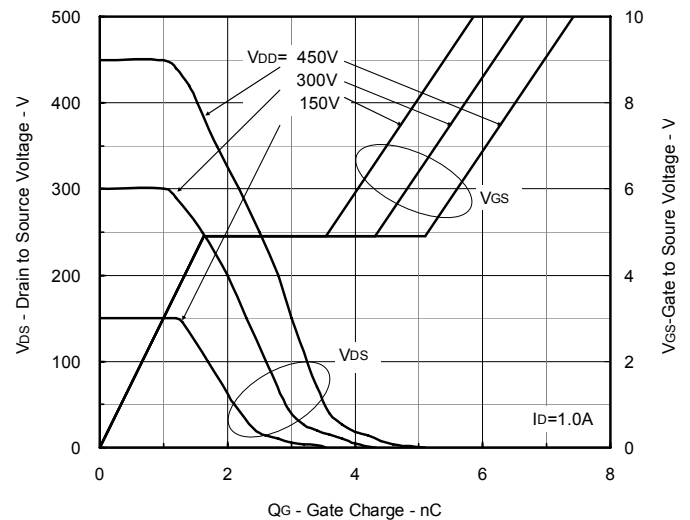
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



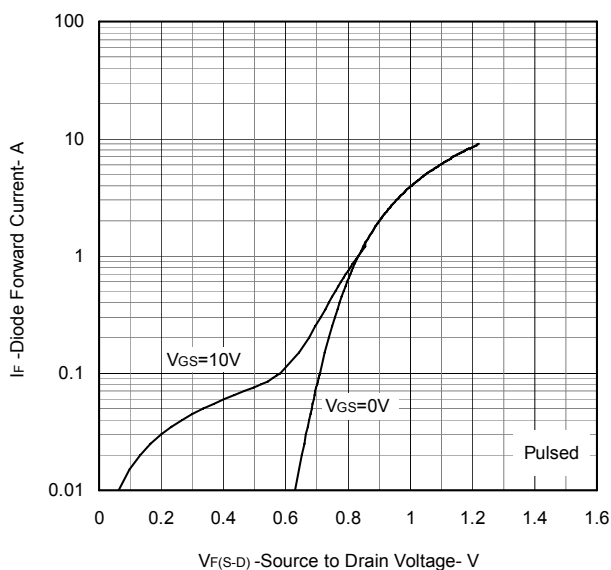
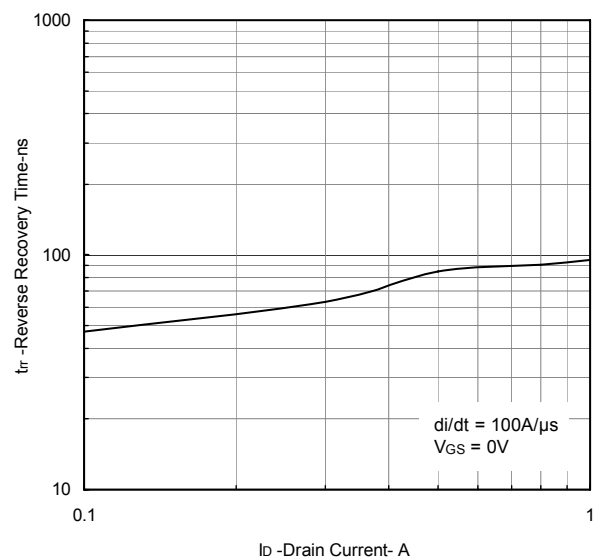
SWITCHING CHARACTERISTICS



DYNAMIC INPUT/OUTPUT CHARACTERISTICS

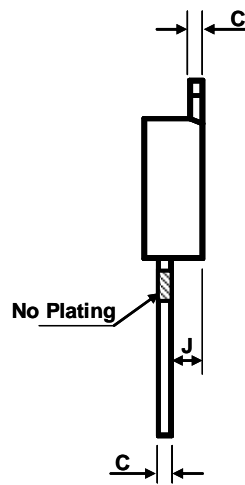
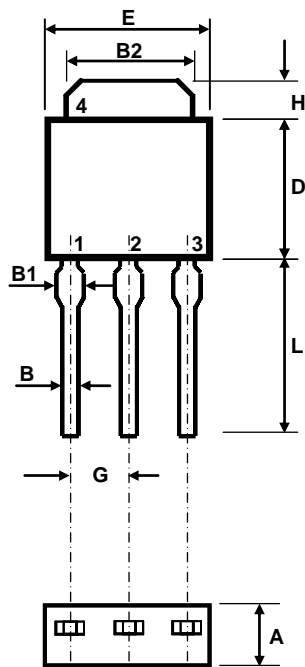


SOURCE TO DRAIN DIODE FORWARD VOLTAGE

REVERSE RECOVERY TIME vs.
DIODE FORWARD CURRENT

Package Drawing (Unit: mm)

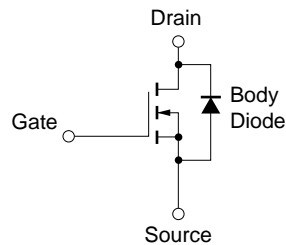
TO-251



- 1. Gate
- 2. Drain
- 3. Source
- 4. Fin (Drain)

Symbol	Package Dimensions	
	Min	Max
A	2.19	2.38
B	0.64	0.89
B1	0.69	0.99
B2	5.23	5.48
C	0.46	0.61
D	5.91	6.28
E	6.21	6.59
G	2.28TYP.	
H	0.89	1.27
J	1.04	1.23
L	8.89	9.65

Equivalent Circuit



Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

Revision History	N6001NZ Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Feb 18, 2013	–	First Edition Issued

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