

N0600N

R07DS0220EJ0100

Rev.1.00

Jan 25, 2011

MOS FIELD EFFECT TRANSISTOR

Description

The N0600N is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Low on-state resistance
 - $R_{DS(on)1} = 25 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 10 \text{ V}$, $I_D = 15 \text{ A}$)
 - $R_{DS(on)2} = 36 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 4.5 \text{ V}$, $I_D = 15 \text{ A}$)
- Low input capacitance
 - $C_{iss} = 1380 \text{ pF TYP.}$ ($V_{DS} = 10 \text{ V}$, $V_{GS} = 0 \text{ V}$)

Ordering Information

Part No.	Lead Plating	Packing	Package
N0600N-S17-AY *1	Pure Sn (Tin)	Tube 50p/tube	Isolated TO-220 typ. 2.2 g

Note: *1. Pb-free (This product does not contain Pb in the 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}	60	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC)	$I_{D(DC)}$	± 30	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 60	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}	2.0	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}	9.2	A
Single Avalanche Energy *2	E_{AS}	12.5	mJ

Thermal Resistance

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

Channel to Ambient Thermal Resistance *2 $R_{th(ch-A)}$ 62.5 $^\circ\text{C/W}$

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

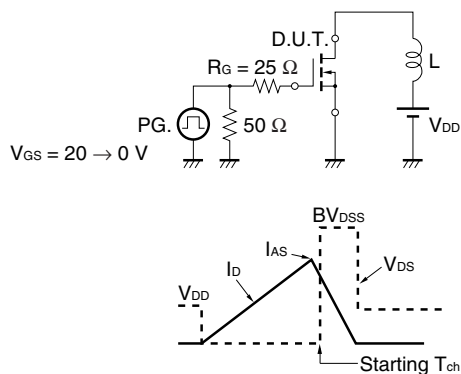
*2. Starting $T_{ch} = 25^\circ\text{C}$, $R_G = 25 \Omega$, $V_{DD} = 30 \text{ V}$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

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

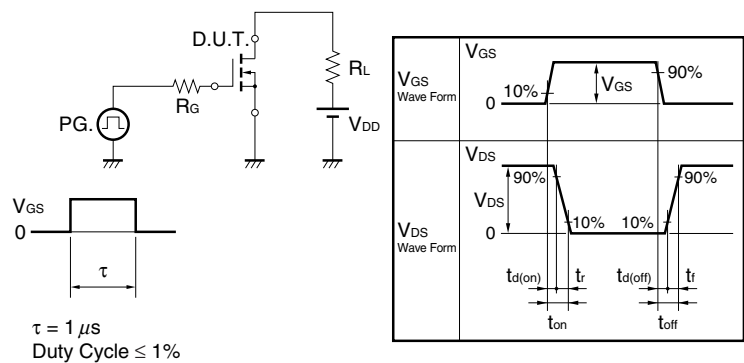
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}			1	μA	$V_{DS} = 60\text{ V}, V_{GS} = 0\text{ V}$
Gate Leakage Current	I_{GSS}			± 100	nA	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$
Gate to Source Cut-off Voltage	$V_{GS(off)}$	1.5	2.0	2.5	V	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$
Forward Transfer Admittance ^{*1}	$ y_{fs} $	4			S	$V_{DS} = 10\text{ V}, I_D = 15\text{ A}$
Drain to Source On-state Resistance ^{*1}	$R_{DS(on)1}$		17.5	25	m Ω	$V_{GS} = 10\text{ V}, I_D = 15\text{ A}$
	$R_{DS(on)2}$		22.3	36	m Ω	$V_{GS} = 4.5\text{ V}, I_D = 15\text{ A}$
Input Capacitance	C_{iss}		1380		pF	$V_{DS} = 10\text{ V},$ $V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$
Output Capacitance	C_{oss}		186		pF	
Reverse Transfer Capacitance	C_{rss}		109		pF	
Turn-on Delay Time	$t_{d(on)}$		5.7		ns	$V_{DD} = 30\text{ V}, I_D = 15\text{ A},$ $V_{GS} = 10\text{ V},$ $R_G = 0\text{ }\Omega$
Rise Time	t_r		6.3		ns	
Turn-off Delay Time	$t_{d(off)}$		33.2		ns	
Fall Time	t_f		3.9		ns	
Total Gate Charge	Q_G		29.8		nC	$V_{DD} = 48\text{ V},$ $V_{GS} = 10\text{ V},$ $I_D = 30\text{ A}$
Gate to Source Charge	Q_{GS}		4.2		nC	
Gate to Drain Charge	Q_{GD}		9.0		nC	
Body Diode Forward Voltage ^{*1}	$V_{F(S-D)}$		0.92	1.5	V	$I_F = 30\text{ A}, V_{GS} = 0\text{ V}$
Reverse Recovery Time	t_{rr}		30		ns	$I_F = 30\text{ A}, V_{GS} = 0\text{ V},$ $di/dt = 100\text{ A}/\mu\text{s}$
Reverse Recovery Charge	Q_{rr}		39.6		nC	

Note: *1. Pulsed

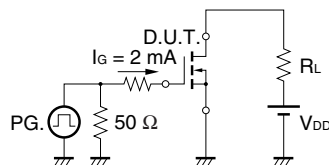
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

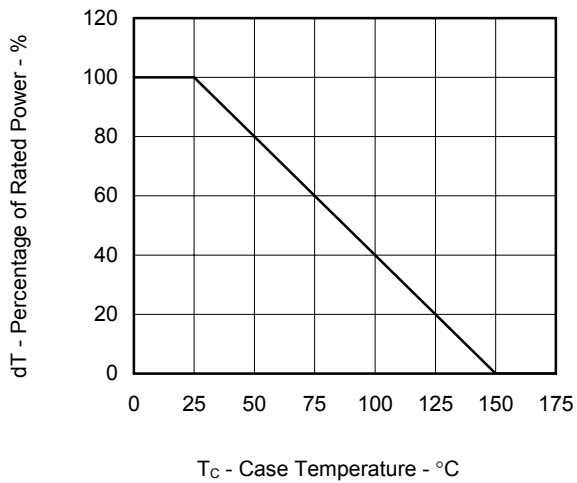


TEST CIRCUIT 3 GATE CHARGE

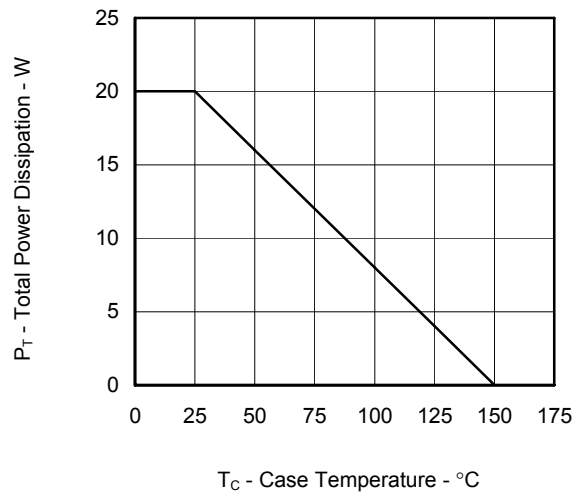


Typical Characteristics ($T_A = 25^\circ\text{C}$)

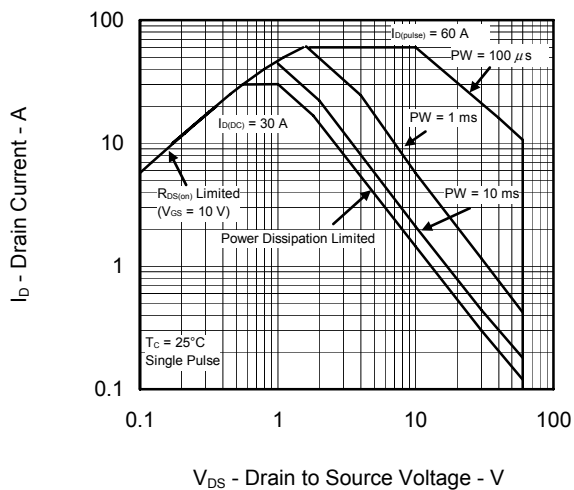
DERATING FACTOR OF FORWARD BIAS SAFE
OPERATING AREA



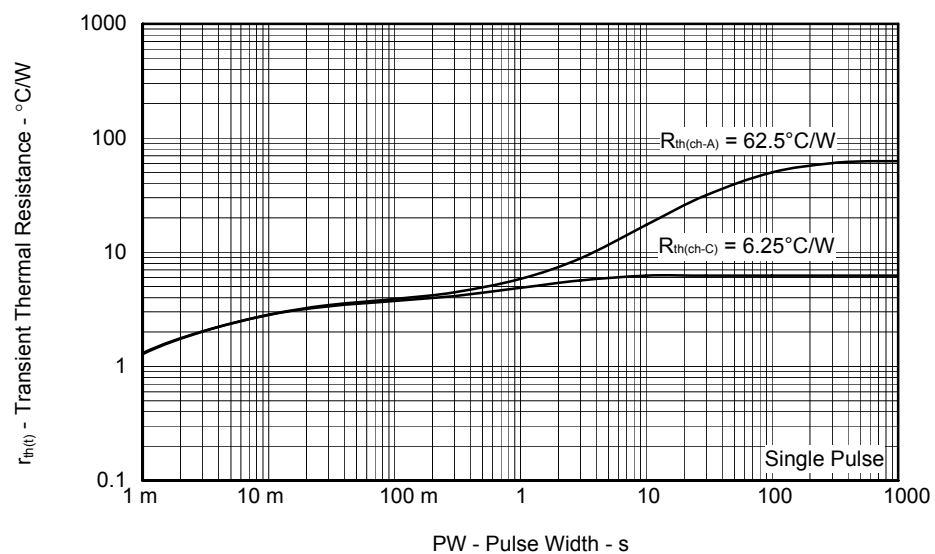
TOTAL POWER DISSIPATION vs.
CASE TEMPERATURE



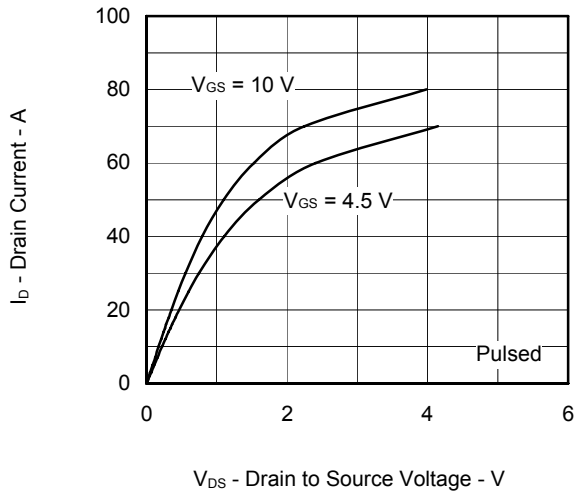
FORWARD BIAS SAFE OPERATING AREA



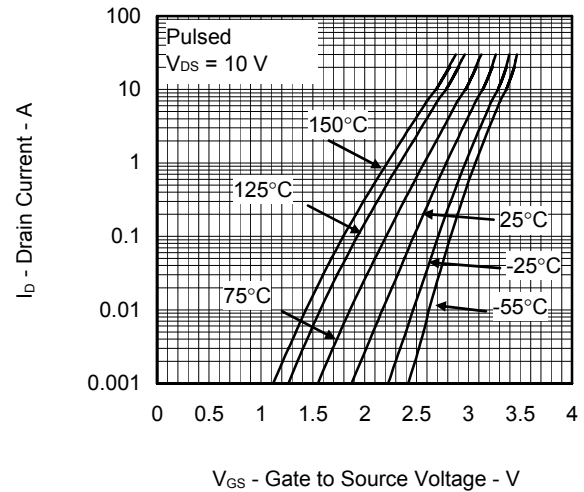
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



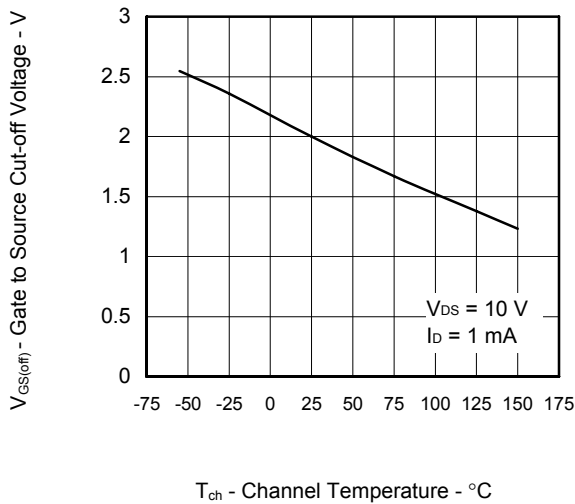
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



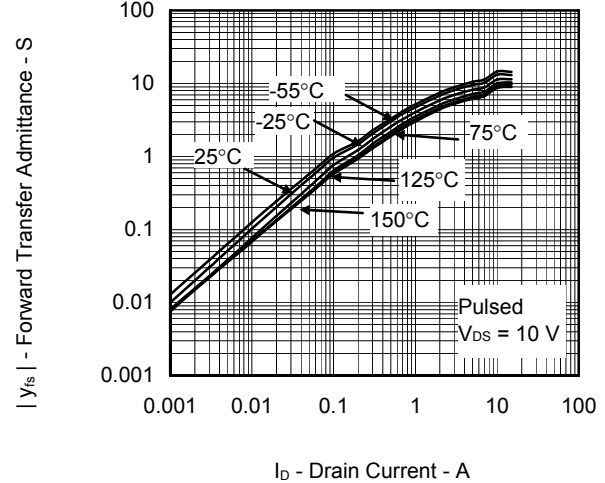
FORWARD TRANSFER CHARACTERISTICS



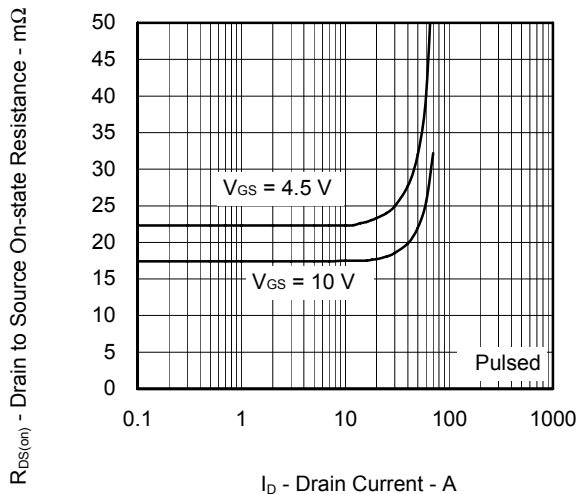
GATE TO SOURCE CUT-OFF VOLTAGE vs.
CHANNEL TEMPERATURE



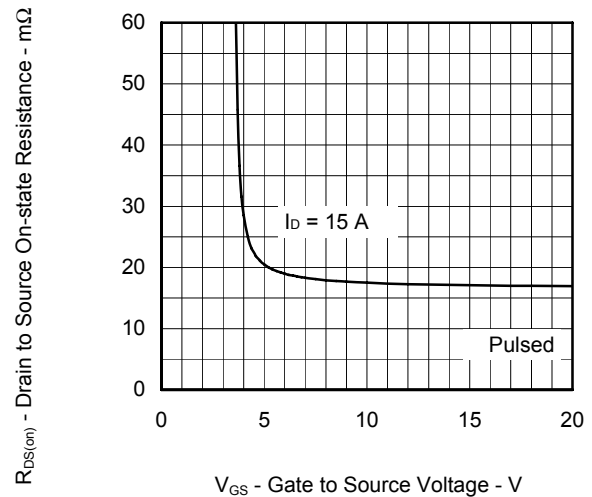
FORWARD TRANSFER ADMITTANCE vs. DRAIN
CURRENT



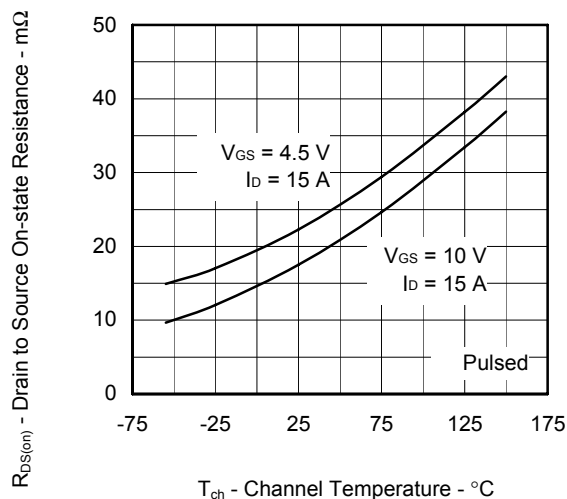
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



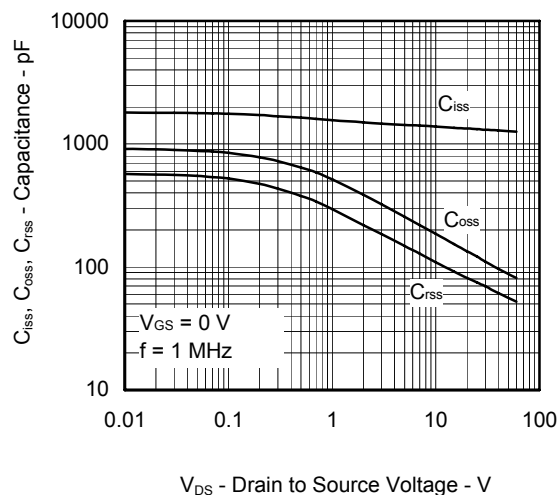
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



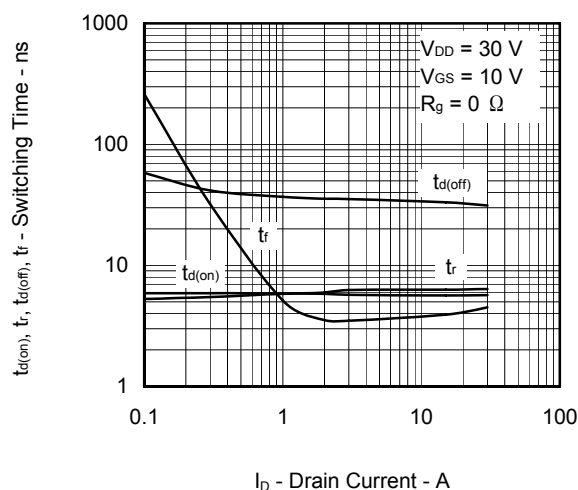
DRAIN TO SOURCE ON-STATE RESISTANCE
vs. CHANNEL TEMPERATURE



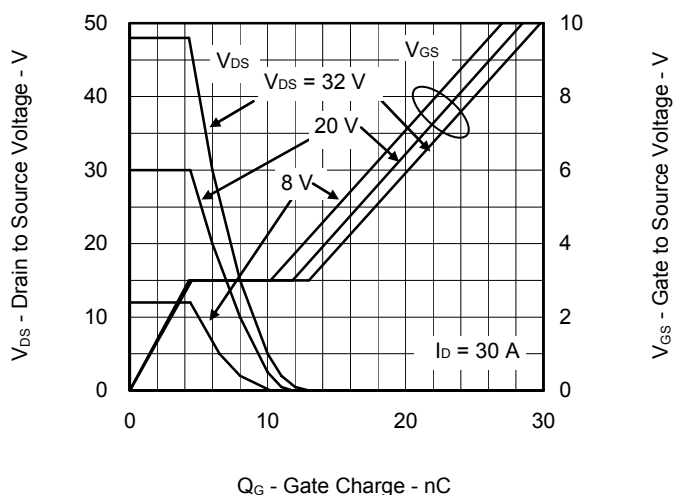
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



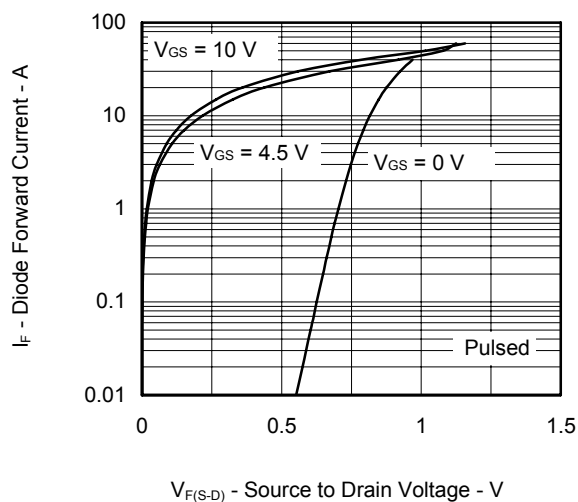
SWITCHING CHARACTERISTICS



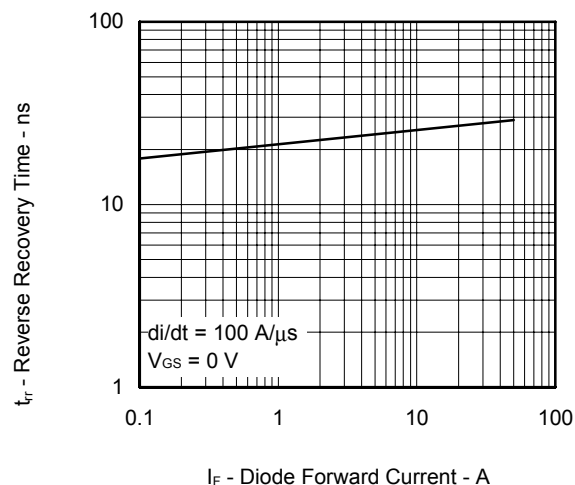
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

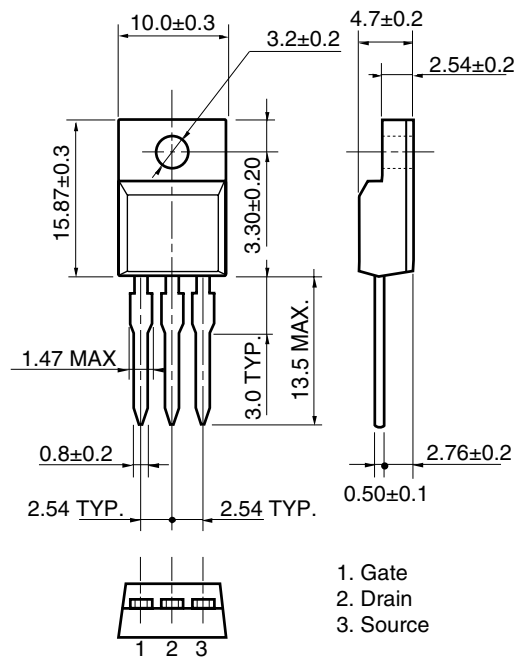


REVERSE RECOVERY TIME vs.
DIODE FORWARD CURRENT

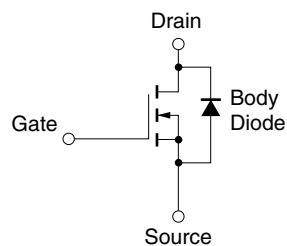


Package Drawings (Unit: mm)

Isolated TO-220



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	N0600N Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Jan 25, 2011	–	First Edition Issued

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