

N0601N

R07DS0557EJ0100

Rev.1.00

Nov 07, 2011

N-CHANNEL MOSFET FOR SWITCHING

Description

The N0601N is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Low on-state resistance
 $R_{DS(on)} = 4.2 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 50 \text{ A)}$
- Low input capacitance
 $C_{iss} = 7730 \text{ pF TYP. (} V_{DS} = 25 \text{ V, } V_{GS} = 0 \text{ V)}$
- High current
 $I_{D(DC)} = \pm 100 \text{ A}$
- RoHS Compliant

Ordering Information

Part No.	Lead Plating	Packing	Package
N0601N-ZK-E1-AY ^{*1}	Pure Sn (Tin)	Tape 800 p/reel	TO-263 1.39 g TYP.
N0601N-ZK-E2-AY ^{*1}			

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}	60	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC)	$I_{D(DC)}$	± 100	A
Drain Current (pulse) ^{*1}	$I_{D(pulse)}$	± 400	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	156	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.5	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}	55	A
Single Avalanche Energy ^{*2}	E_{AS}	300	mJ

Thermal Resistance

Channel to Case (Drain) Thermal Resistance	$R_{th(ch-C)}$	0.80	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance ^{*2}	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

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

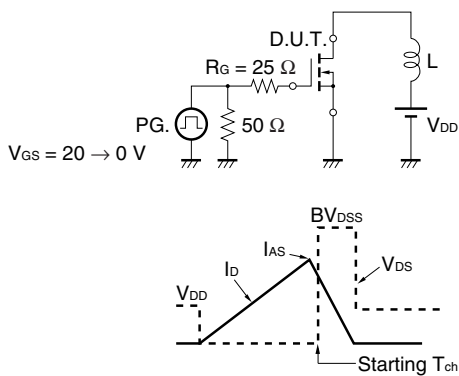
^{*2}. Starting $T_{ch} = 25^\circ\text{C}$, $R_G = 25 \Omega$, $V_{DD} = 30 \text{ V}$, $V_{GS} = 20 \rightarrow 0 \text{ V}$, $L = 100 \mu\text{H}$

Electrical Characteristics (T_A = 25°C, all terminals are connected)

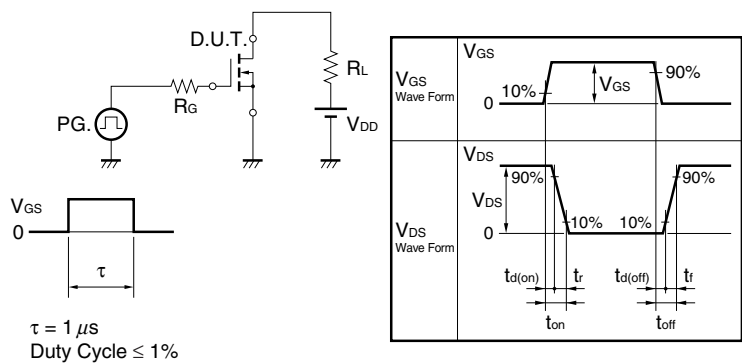
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I _{DSS}			1	μA	V _{DS} = 60 V, V _{GS} = 0 V
Gate Leakage Current	I _{GSS}			±100	nA	V _{GS} = ±20 V, V _{DS} = 0 V
Gate to Source Cut-off Voltage	V _{GS(off)}	2.0		4.0	V	V _{DS} = 10 V, I _D = 1 mA
Forward Transfer Admittance *1	y _{fs}	35			S	V _{DS} = 10 V, I _D = 50 A
Drain to Source On-state Resistance *1	R _{DS(on)}		3.3	4.2	mΩ	V _{GS} = 10 V, I _D = 50 A
Input Capacitance	C _{iSS}		7730		pF	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz
Output Capacitance	C _{oSS}		560		pF	
Reverse Transfer Capacitance	C _{rSS}		290		pF	
Turn-on Delay Time	t _{d(on)}		35		ns	V _{DD} = 30 V, I _D = 50 A, V _{GS} = 10 V, R _G = 0 Ω
Rise Time	t _r		12		ns	
Turn-off Delay Time	t _{d(off)}		76		ns	
Fall Time	t _f		14		ns	
Total Gate Charge	Q _G		133		nC	V _{DD} = 48 V, V _{GS} = 10 V, I _D = 100 A
Gate to Source Charge	Q _{GS}		38		nC	
Gate to Drain Charge	Q _{GD}		38		nC	
Body Diode Forward Voltage *1	V _{F(S-D)}			1.5	V	I _F = 100 A, V _{GS} = 0 V
Reverse Recovery Time	t _{rr}		44		ns	I _F = 50 A, V _{GS} = 0 V,
Reverse Recovery Charge	Q _{rr}		61		nC	di/dt = 100 A/μs

Note: *1. Pulsed

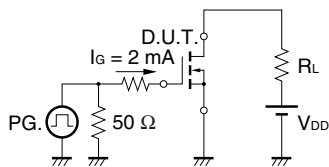
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

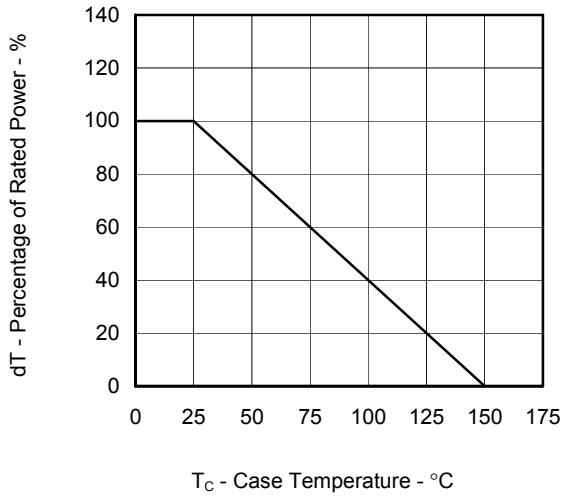


TEST CIRCUIT 3 GATE CHARGE

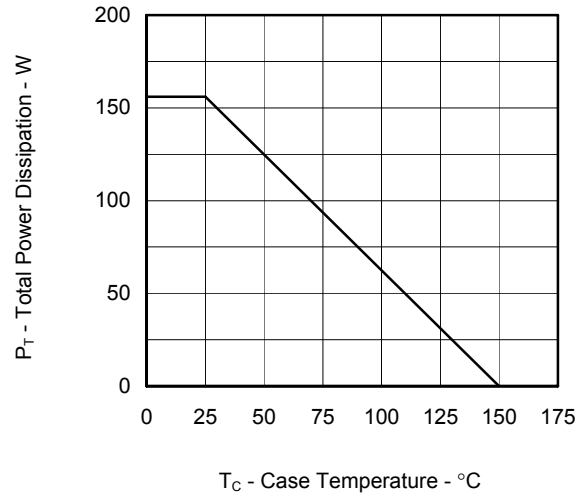


Typical Characteristics (T_A = 25°C)

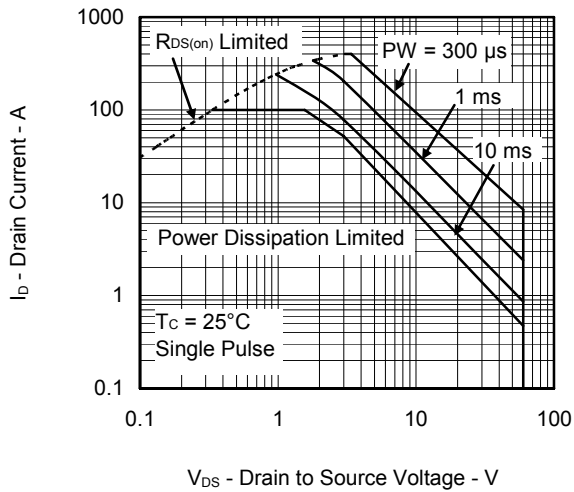
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



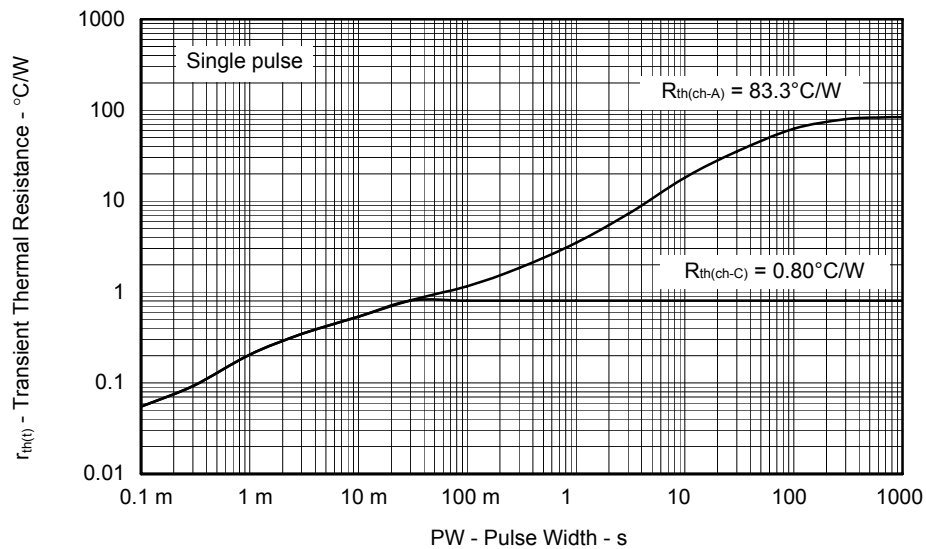
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



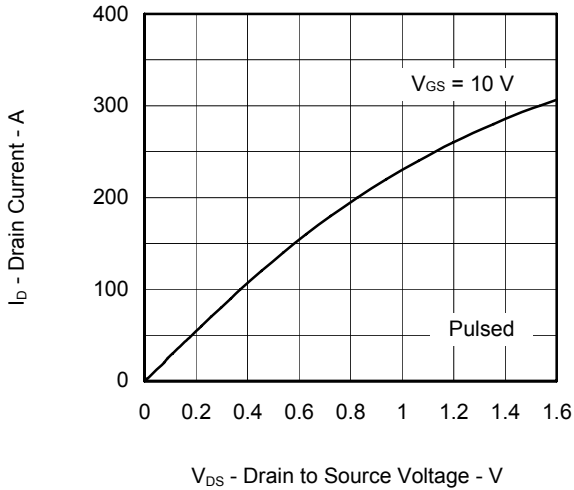
FORWARD BIAS SAFE OPERATING AREA



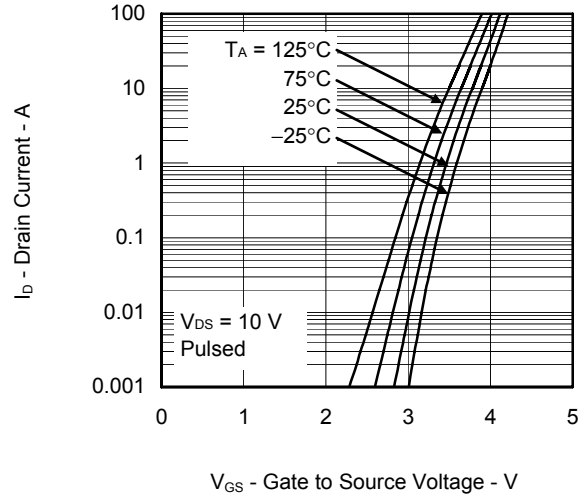
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



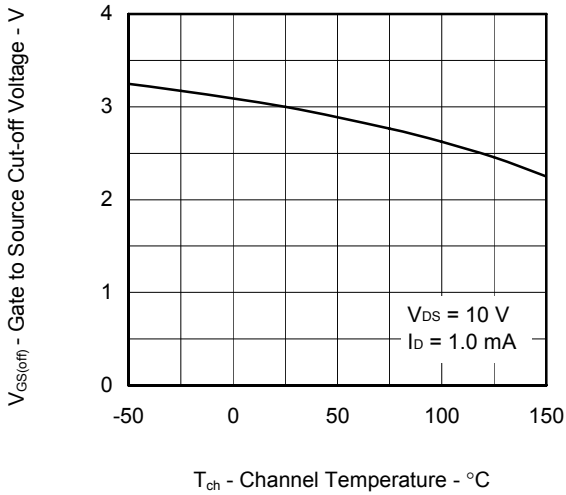
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



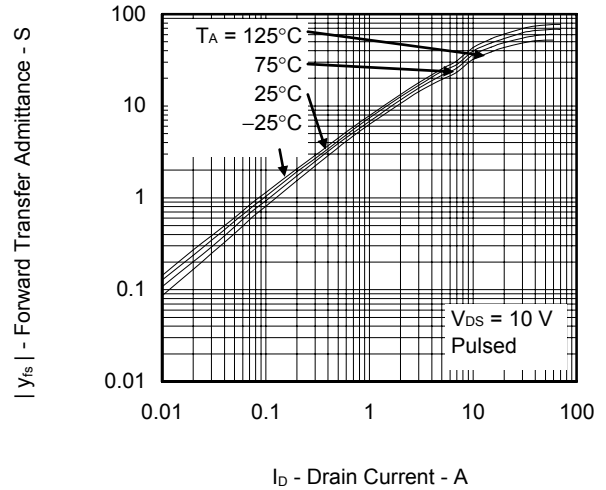
FORWARD TRANSFER CHARACTERISTICS



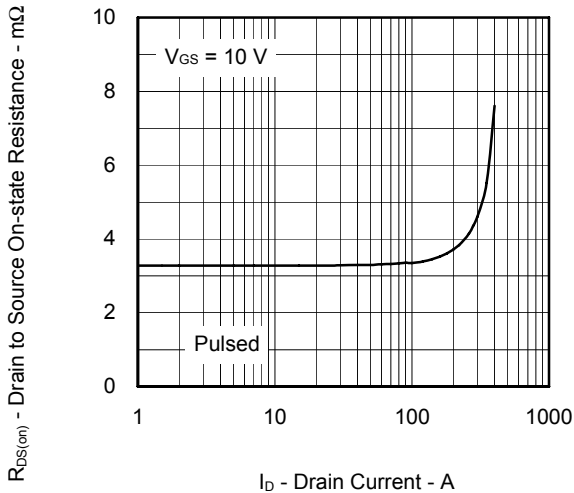
GATE TO SOURCE CUT-OFF VOLTAGE vs. CHANNEL TEMPERATURE



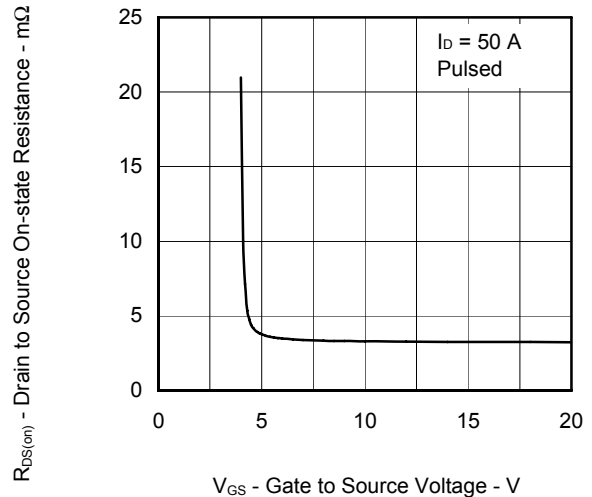
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



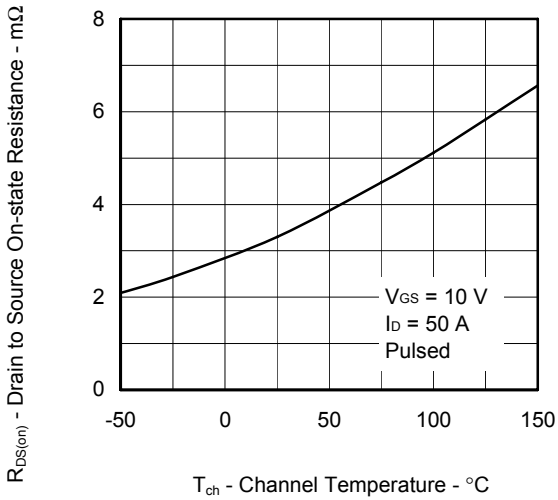
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



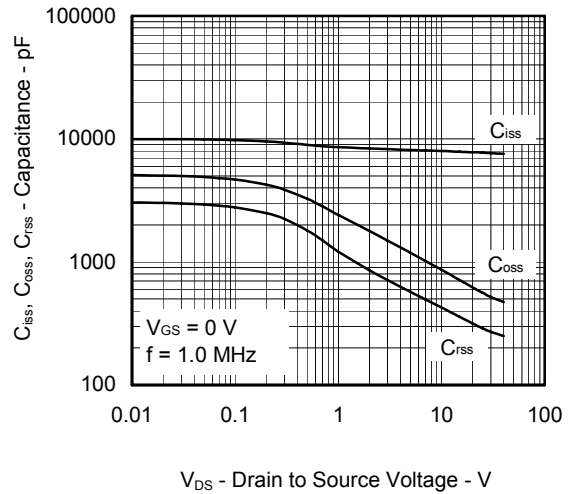
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



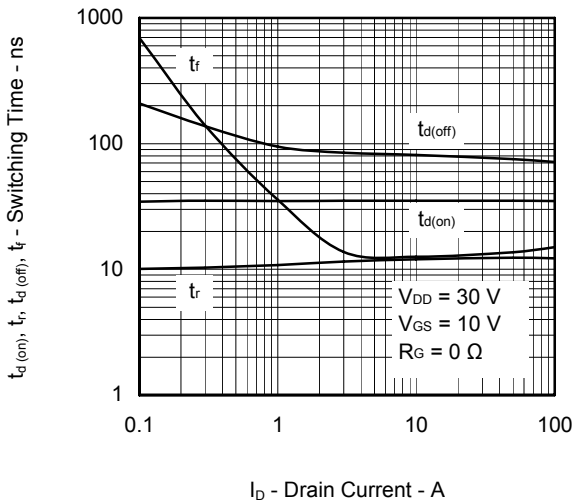
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



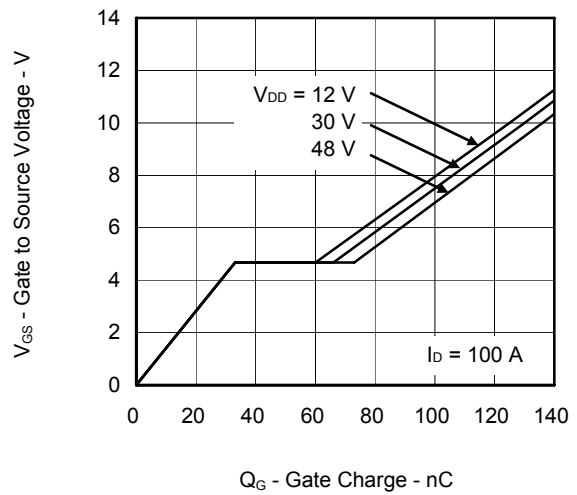
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



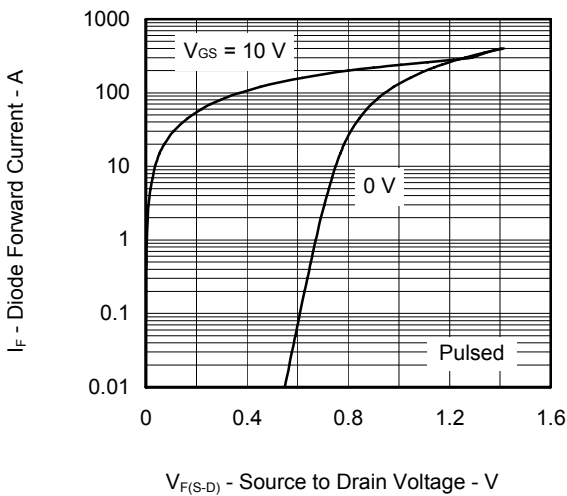
SWITCHING CHARACTERISTICS



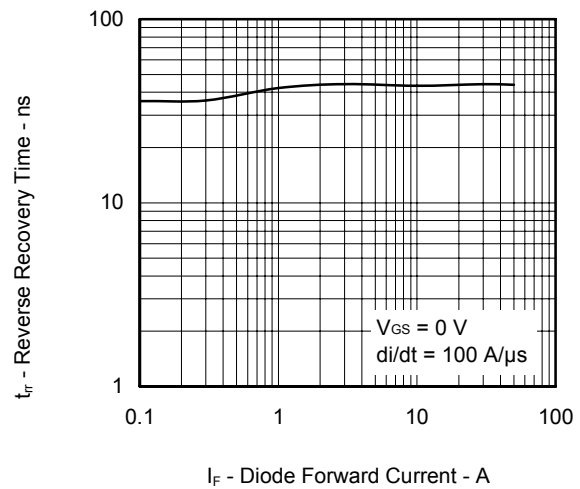
DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

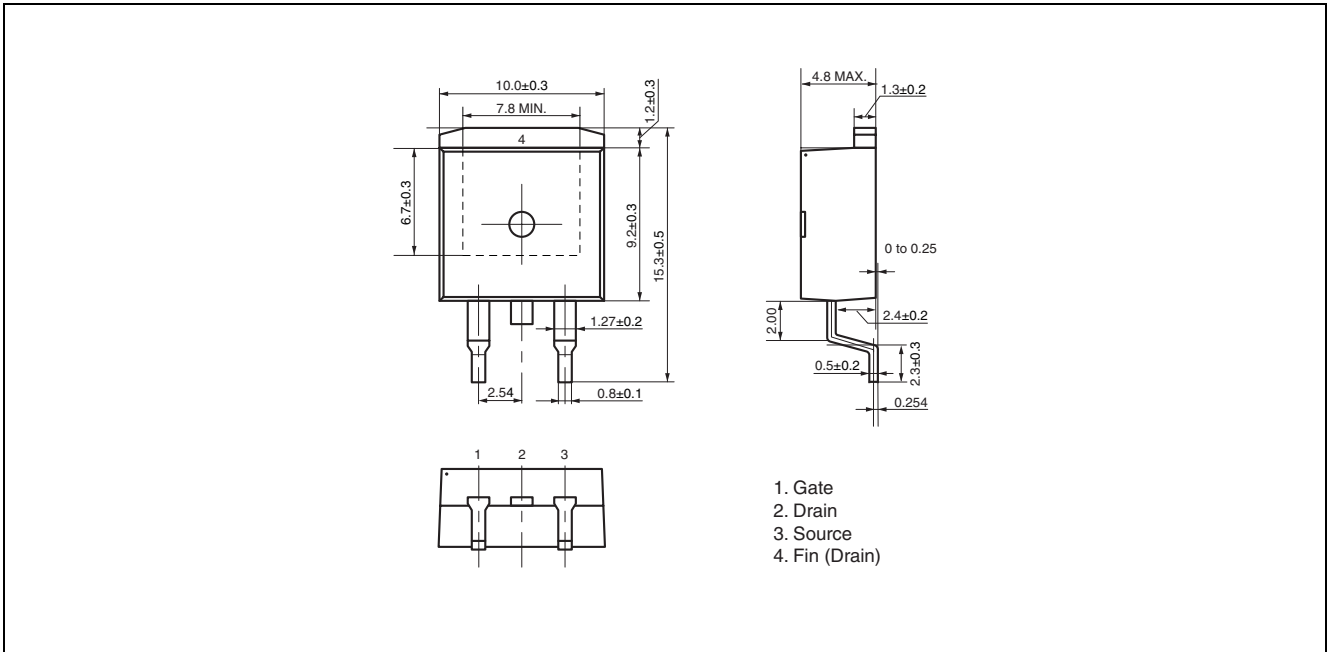


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT

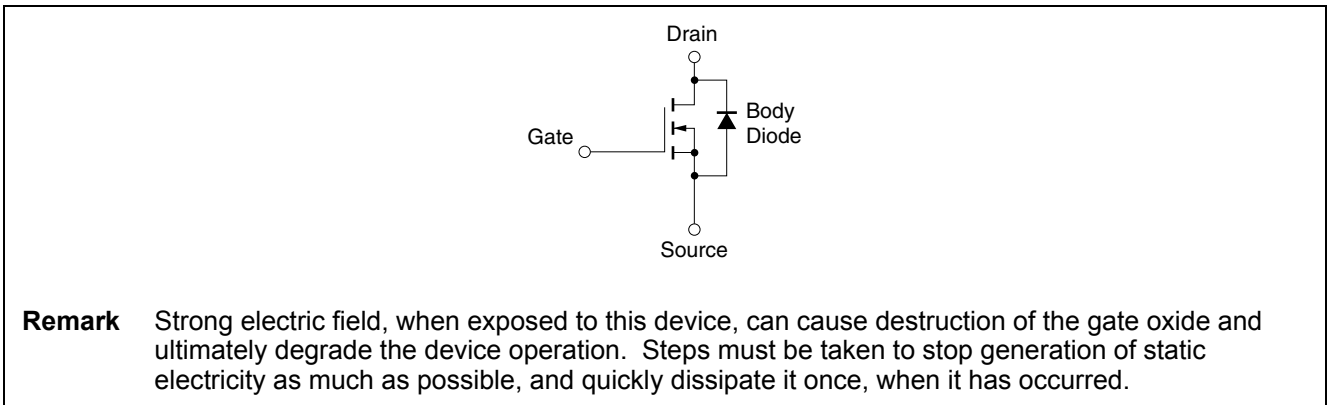


Package Drawing (Unit: mm)

TO-263



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	N0601N Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Nov 07, 2011	-	First Edition Issued

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-586-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6276-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jin Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141