

NP100N04NUJ

R07DS0364EJ0100

Rev.1.00

Jun 13, 2011

MOS FIELD EFFECT TRANSISTOR

Description

The NP100N04NUJ is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Super low on-state resistance
— $R_{DS(on)} = 3.0 \text{ m}\Omega \text{ MAX.}$ ($V_{GS} = 10 \text{ V}$, $I_D = 50 \text{ A}$)
- Low C_{iss} : $C_{iss} = 5600 \text{ pF TYP.}$ ($V_{DS} = 25 \text{ V}$, $V_{GS} = 0 \text{ V}$)
- High current rating: $I_{D(DC)} = \pm 100 \text{ A}$
- Designed for automotive application and AEC-Q101 qualified

Ordering Information

Part No.	Lead Plating	Packing	Package
NP100N04NUJ-S18-AY *1	Pure Sn (Tin)	Tube 50 p/tube	TO-262 (MP-25SK) TYP. 1.8g

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

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	40	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 100	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 400	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	220	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.8	W
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +175	$^\circ\text{C}$
Repetitive Avalanche Current *2	I_{AR}	60	A
Repetitive Avalanche Energy *2	E_{AR}	360	mJ

Thermal Resistance

Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.68	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance *2	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

Notes: *1. $T_C = 25^\circ\text{C}$, $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

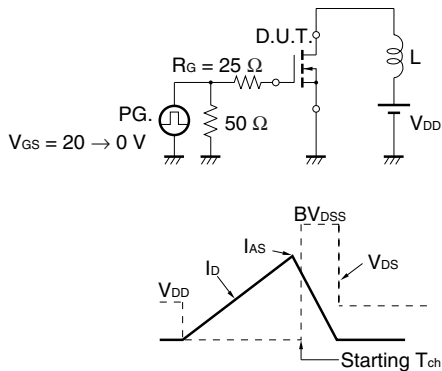
*2. $T_{ch(peak)} \leq 150^\circ\text{C}$, $R_G = 25 \Omega$

Electrical Characteristics (T_A = 25°C)

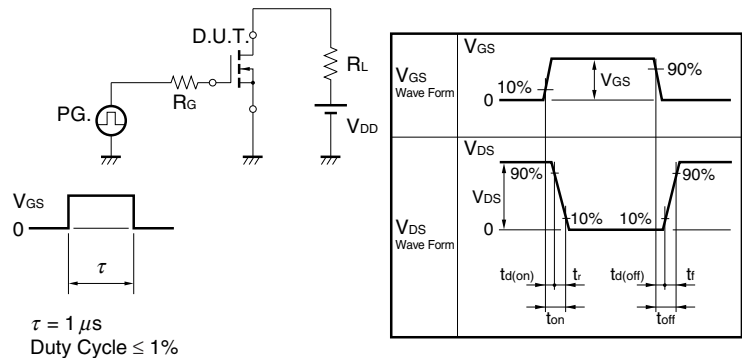
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I _{DSS}			1.0	μA	V _{DS} = 40 V, V _{GS} = 0 V
Gate Leakage Current	I _{GSS}			±100	nA	V _{GS} = ±20 V, V _{DS} = 0 V
Gate to Source Threshold Voltage	V _{GS(th)}	2.0	3.0	4.0	V	V _{DS} = V _{GS} , I _D = 250 μA
Forward Transfer Admittance *1	y _{fs}	45	87		S	V _{DS} = 5 V, I _D = 50 A
Drain to Source On-state Resistance *1	R _{DS(on)}		2.5	3.0	mΩ	V _{GS} = 10 V, I _D = 50 A
Input Capacitance	C _{iss}		5600	8400	pF	V _{DS} = 25 V, V _{GS} = 0 V, f = 1 MHz
Output Capacitance	C _{oss}		920	1380	pF	
Reverse Transfer Capacitance	C _{rss}		340	620	pF	
Turn-on Delay Time	t _{d(on)}		25	60	ns	V _{DD} = 20 V, I _D = 50 A, V _{GS} = 10 V, R _G = 0 Ω
Rise Time	t _r		15	40	ns	
Turn-off Delay Time	t _{d(off)}		93	190	ns	
Fall Time	t _f		13	40	ns	
Total Gate Charge	Q _G		110	170	nC	V _{DD} = 32 V, V _{GS} = 10 V, I _D = 100 A
Gate to Source Charge	Q _{GS}		22		nC	
Gate to Drain Charge	Q _{GD}		32		nC	
Body Diode Forward Voltage *1	V _{F(S-D)}		0.9	1.5	V	I _F = 100 A, V _{GS} = 0 V
Reverse Recovery Time	t _{rr}		55		ns	I _F = 100 A, V _{GS} = 0 V,
Reverse Recovery Charge	Q _{rr}		77		nC	di/dt = 100 A/μs

Note: *1. Pulsed test

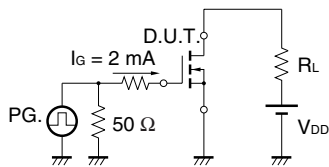
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

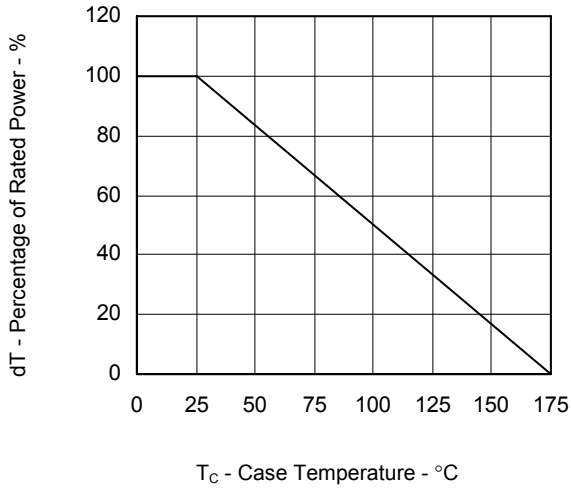


TEST CIRCUIT 3 GATE CHARGE

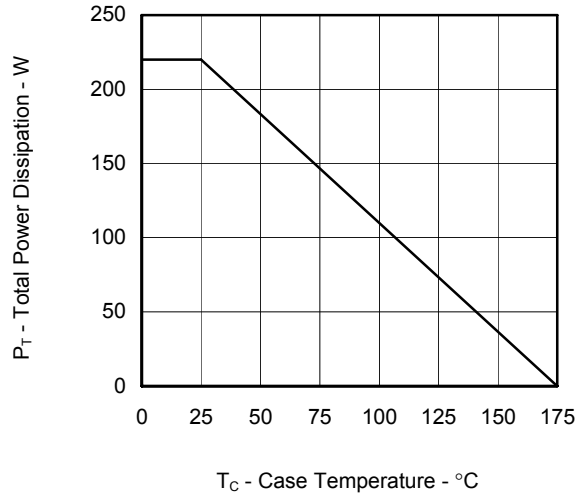


Typical Characteristics (T_A = 25°C)

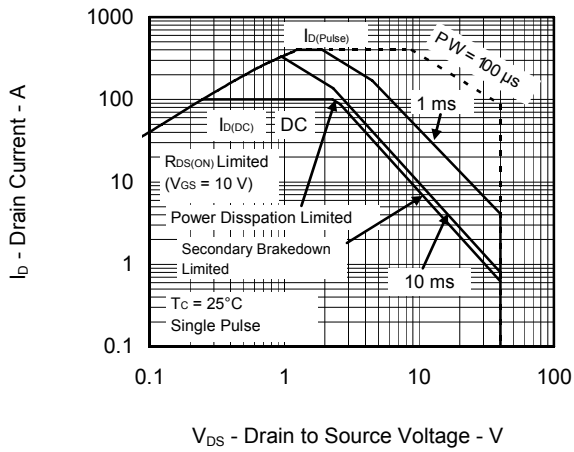
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



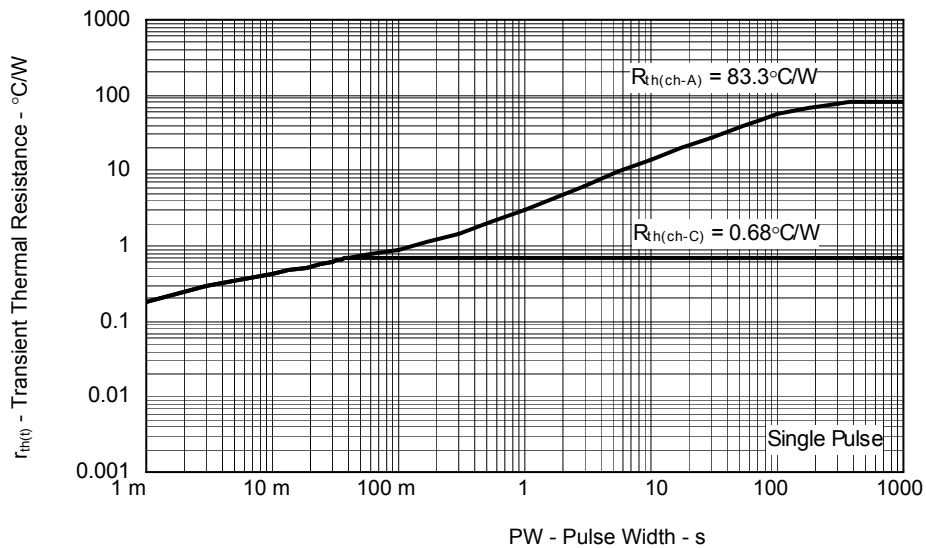
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



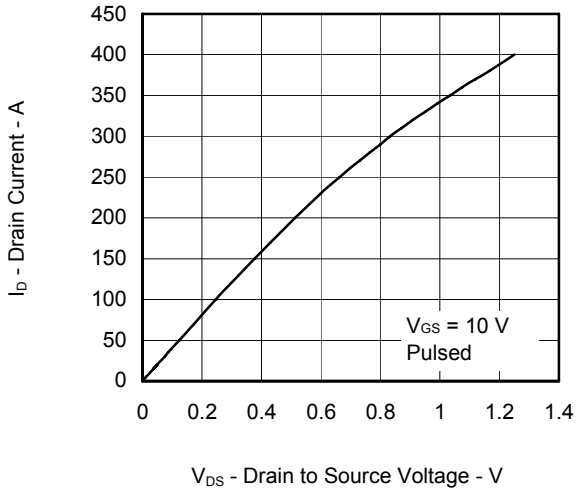
FORWARD BIAS SAFE OPERATING AREA



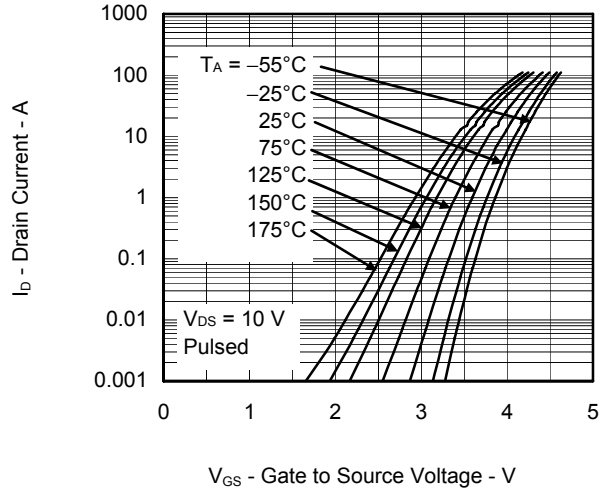
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



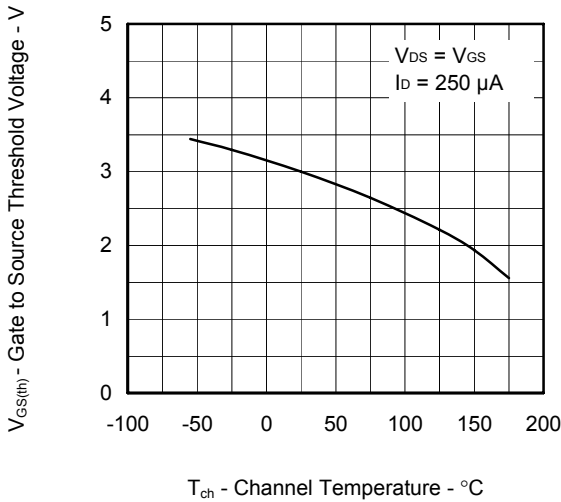
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



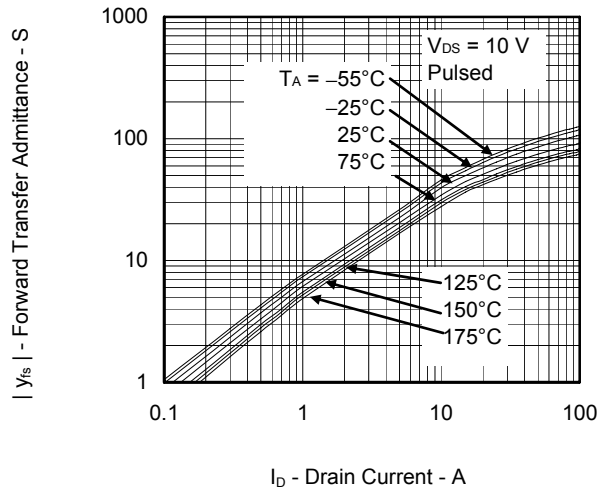
FORWARD TRANSFER CHARACTERISTICS



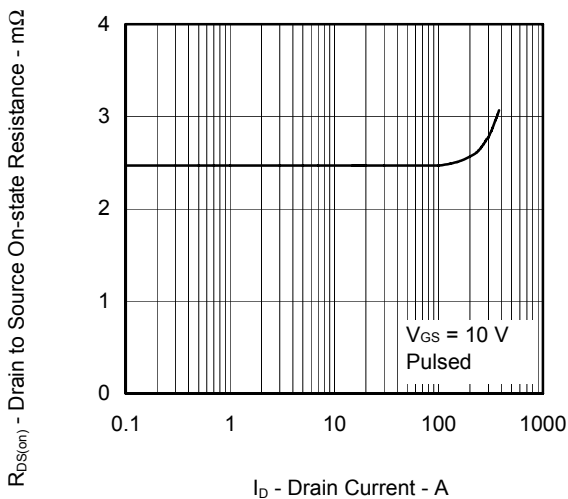
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



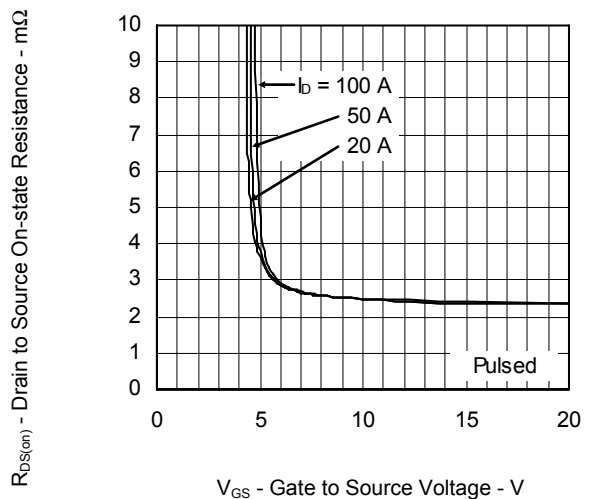
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



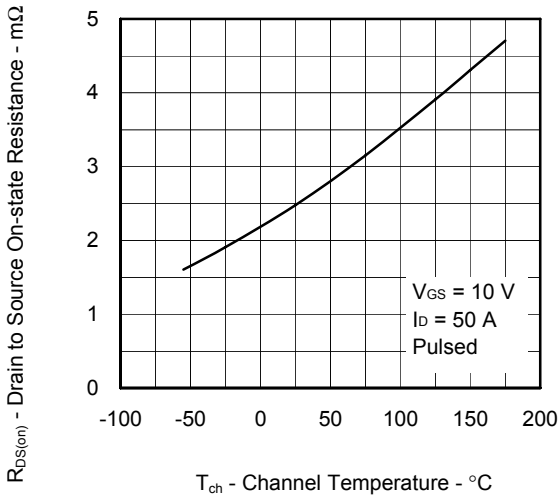
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



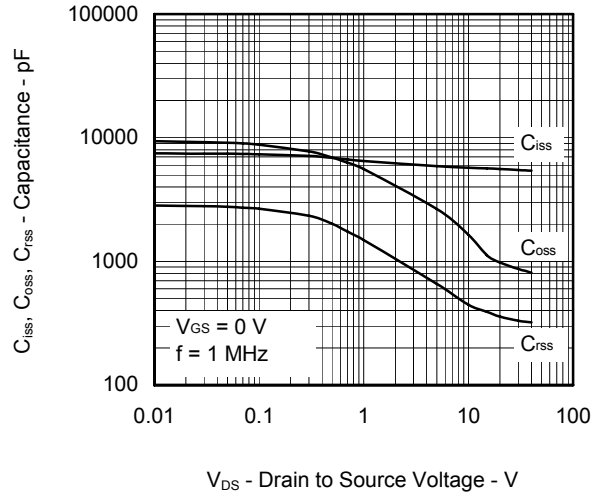
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



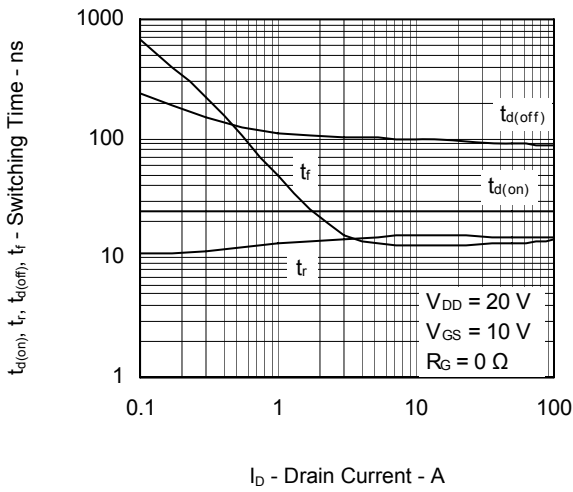
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



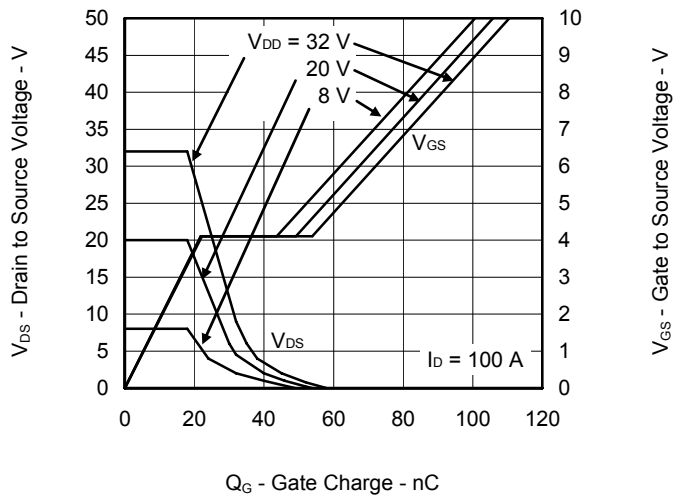
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



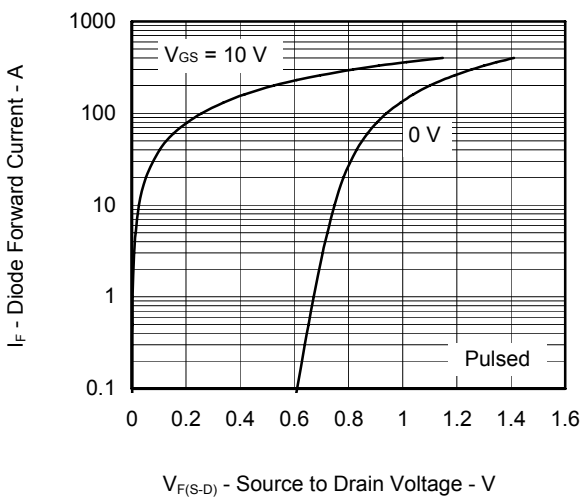
SWITCHING CHARACTERISTICS



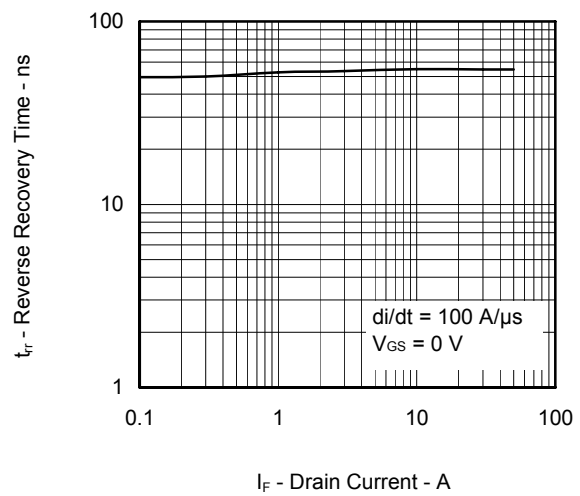
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

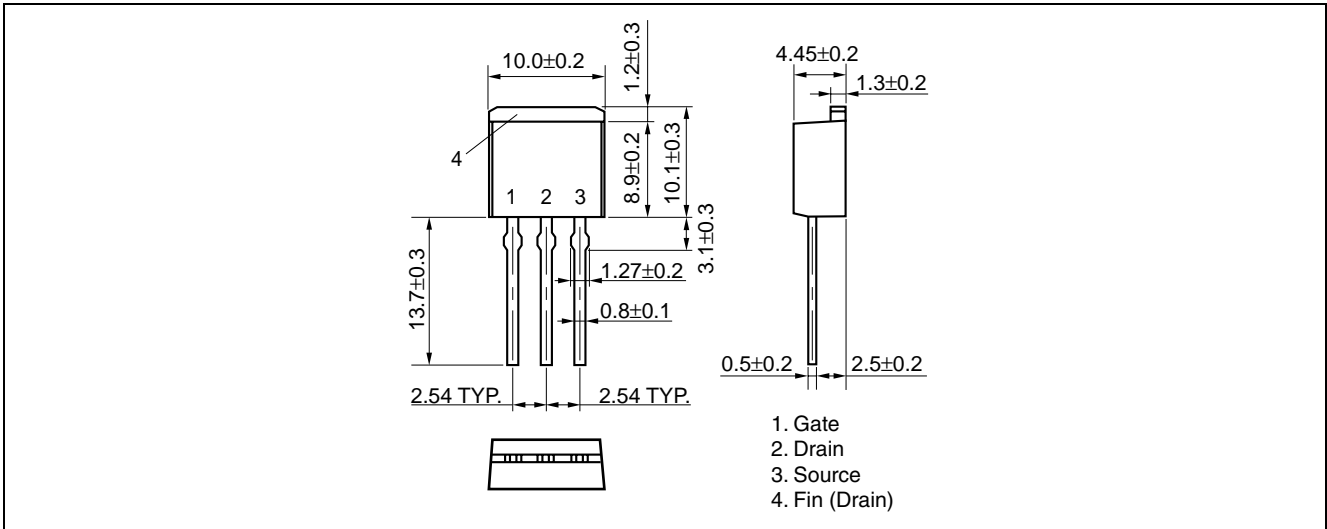


REVERSE RECOVERY TIME vs. DRAIN CURRENT

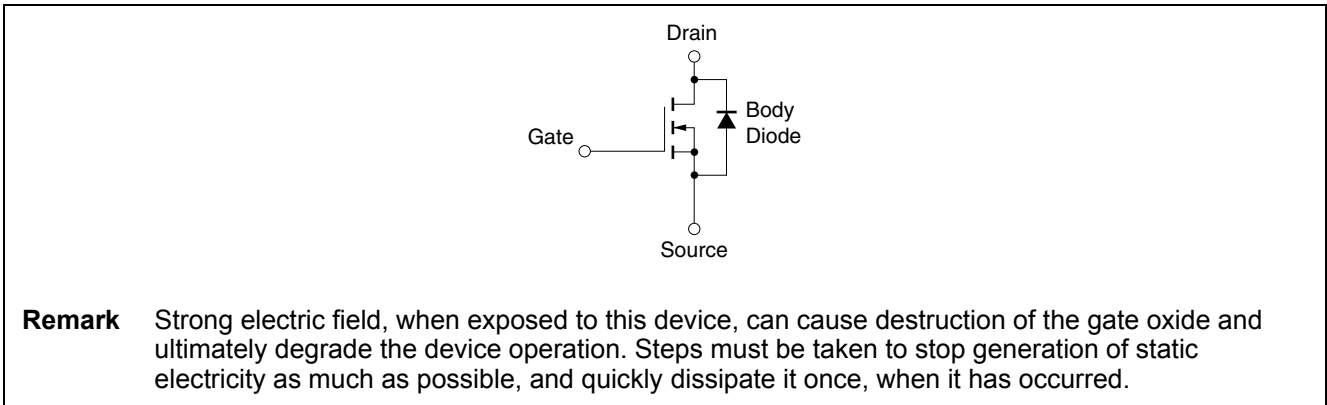


Package Drawings (Unit: mm)

TO-262 (MP-25SK)



Equivalent Circuit



Revision History	NP100N04NUJ Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Jun 13, 2011	-	First Edition Issued

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