

# NP110N055PUK

## MOS FIELD EFFECT TRANSISTOR

R07DS0591EJ0100

Rev.1.00

Dec 12, 2011

### Description

The NP110N055PUK is N-channel MOS Field Effect Transistor designed for high current switching applications.

### Features

- Super low on-state resistance  
 $R_{DS(on)} = 1.75 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 55 \text{ A)}$
- Low  $C_{iss}$ :  $C_{iss} = 10700 \text{ pF TYP. (} V_{DS} = 25 \text{ V)}$
- Designed for automotive application and AEC-Q101 qualified

### Ordering Information

Part No.	Lead Plating	Packing		Package
NP110N055PUK-E1-AY *1	Pure Sn (Tin)	Tape 800 p/reel	Taping (E1 type)	TO-263 (MP-25ZP)
NP110N055PUK-E2-AY *1			Taping (E2 type)	

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 ( $V_{GS} = 0 \text{ V}$ )	$V_{DSS}$	55	V
Gate to Source Voltage ( $V_{DS} = 0 \text{ V}$ )	$V_{GSS}$	$\pm 20$	V
Drain Current (DC) ( $T_C = 25^\circ\text{C}$ )	$I_{D(DC)}$	$\pm 110$	A
Drain Current (pulse) *1	$I_{D(pulse)}$	$\pm 440$	A
Total Power Dissipation ( $T_C = 25^\circ\text{C}$ )	$P_{T1}$	348	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	$I_{AR}$	66	A
Repetitive Avalanche Energy *2	$E_{AR}$	435	mJ

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

\*2  $R_G = 25 \Omega$ ,  $V_{GS} = 20 \rightarrow 0 \text{ V}$

### Thermal Resistance

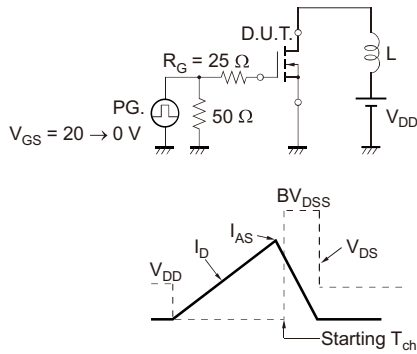
Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.43	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

**Electrical Characteristics (T<sub>A</sub> = 25°C)**

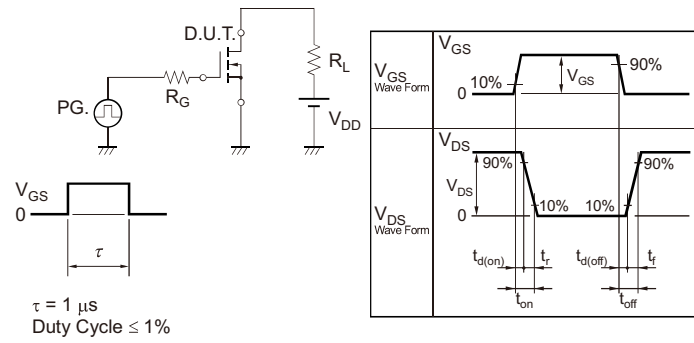
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	—	—	1	μA	V <sub>DS</sub> = 55 V, V <sub>GS</sub> = 0 V
Gate Leakage Current	I <sub>GSS</sub>	—	—	±100	nA	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V
Gate to Source Threshold Voltage	V <sub>GS(th)</sub>	2.0	3.0	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA
Forward Transfer Admittance *1	y <sub>fs</sub>	60	120	—	S	V <sub>DS</sub> = 5 V, I <sub>D</sub> = 55 A
Drain to Source On-state Resistance *1	R <sub>DS(on)</sub>	—	1.45	1.75	mΩ	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 55 A
Input Capacitance	C <sub>iss</sub>	—	10700	16050	pF	V <sub>DS</sub> = 25 V
Output Capacitance	C <sub>oss</sub>	—	1200	1800	pF	V <sub>GS</sub> = 0 V
Reverse Transfer Capacitance	C <sub>rss</sub>	—	380	690	pF	f = 1 MHz
Turn-on Delay Time	t <sub>d(on)</sub>	—	38	90	ns	V <sub>DD</sub> = 28 V, I <sub>D</sub> = 55 A
Rise Time	t <sub>r</sub>	—	19	50	ns	V <sub>GS</sub> = 10 V
Turn-off Delay Time	t <sub>d(off)</sub>	—	140	280	ns	R <sub>G</sub> = 0 Ω
Fall Time	t <sub>f</sub>	—	14	40	ns	
Total Gate Charge	Q <sub>G</sub>	—	196	294	nC	V <sub>DD</sub> = 44 V
Gate to Source Charge	Q <sub>GS</sub>	—	51	—	nC	V <sub>GS</sub> = 10 V
Gate to Drain Charge	Q <sub>GD</sub>	—	45	—	nC	I <sub>D</sub> = 110 A
Body Diode Forward Voltage *1	V <sub>F(S-D)</sub>	—	0.9	1.5	V	I <sub>F</sub> = 110 A, V <sub>GS</sub> = 0 V
Reverse Recovery Time	t <sub>rr</sub>	—	83	—	ns	I <sub>F</sub> = 110 A, V <sub>GS</sub> = 0 V
Reverse Recovery Charge	Q <sub>rr</sub>	—	145	—	nC	di/dt = 100 A/μs

Note: \*1 Pulsed test

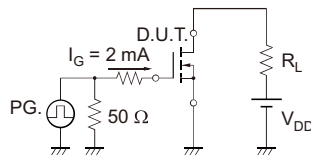
**TEST CIRCUIT 1 AVALANCHE CAPABILITY**



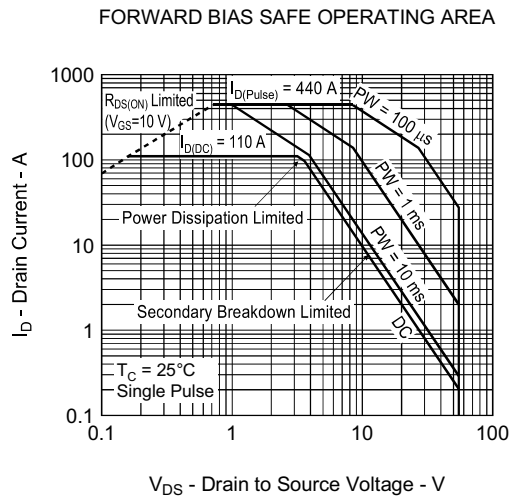
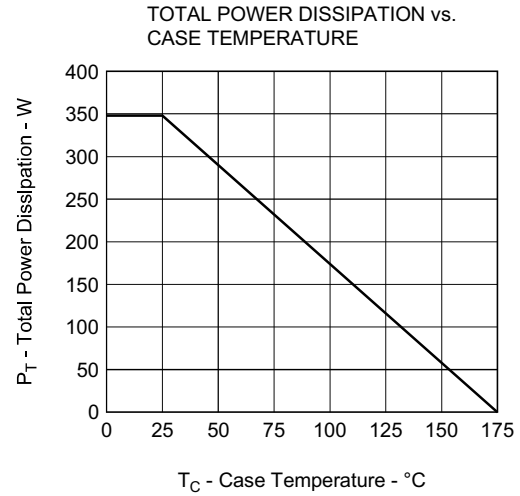
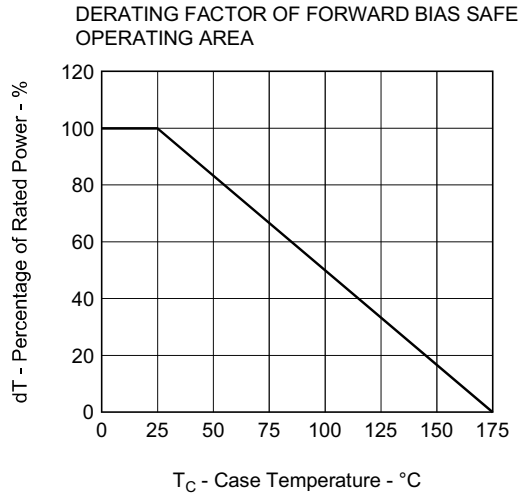
**TEST CIRCUIT 2 SWITCHING TIME**



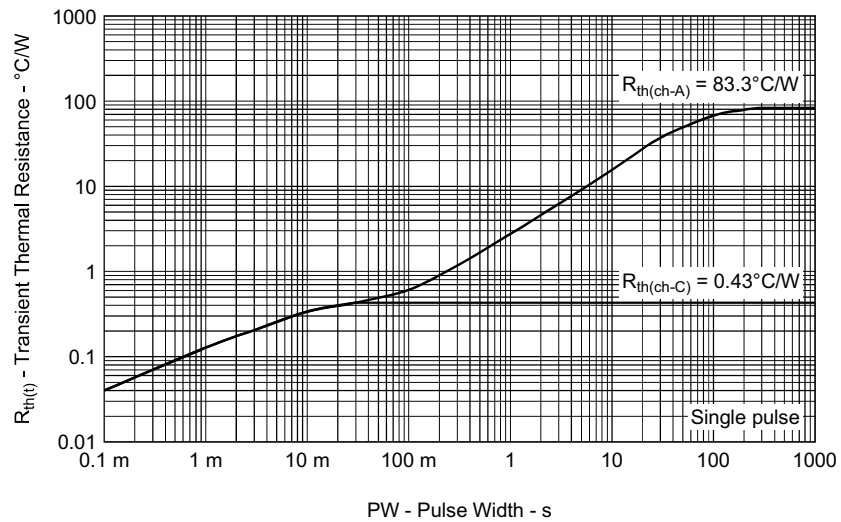
**TEST CIRCUIT 3 GATE CHARGE**



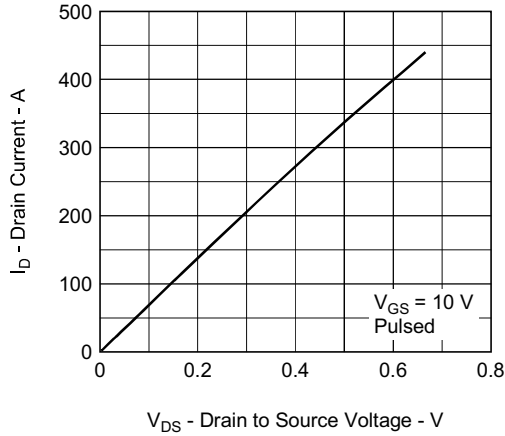
Typical Characteristics ( $T_A = 25^\circ\text{C}$ )



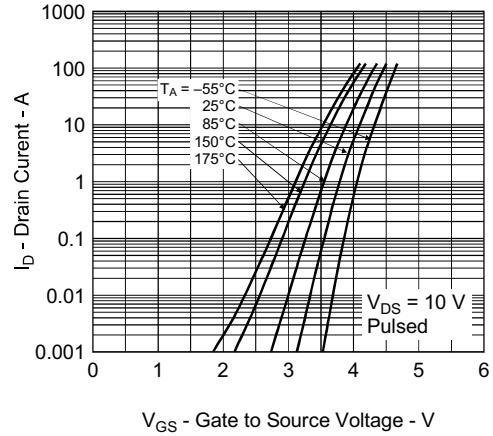
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



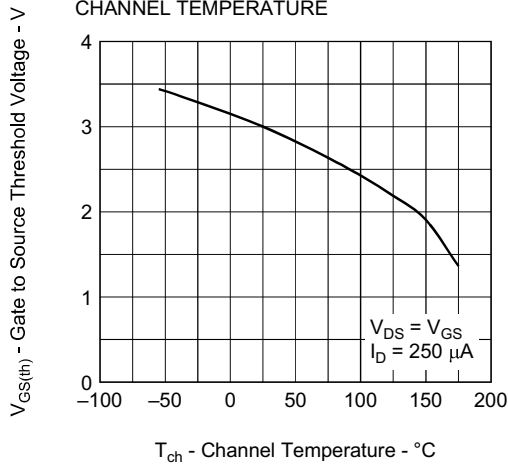
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



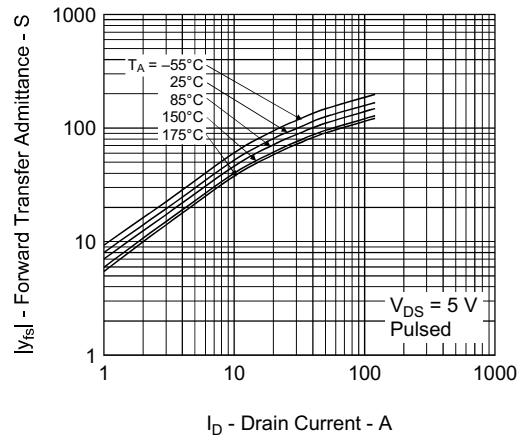
FORWARD TRANSFER CHARACTERISTICS



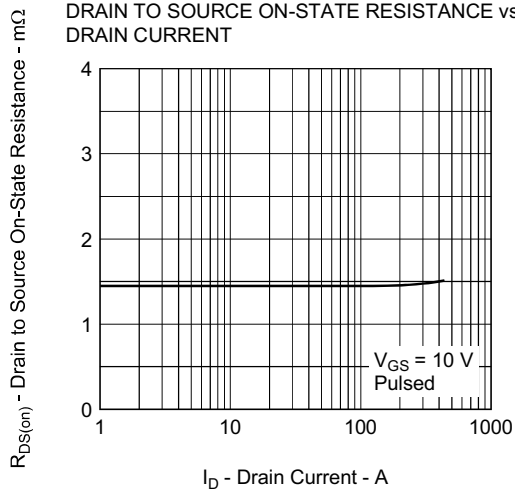
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



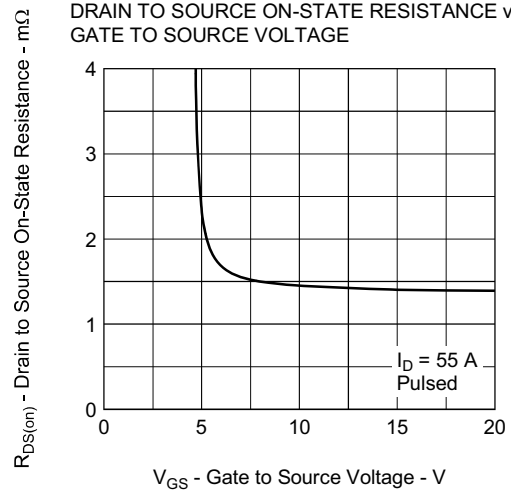
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

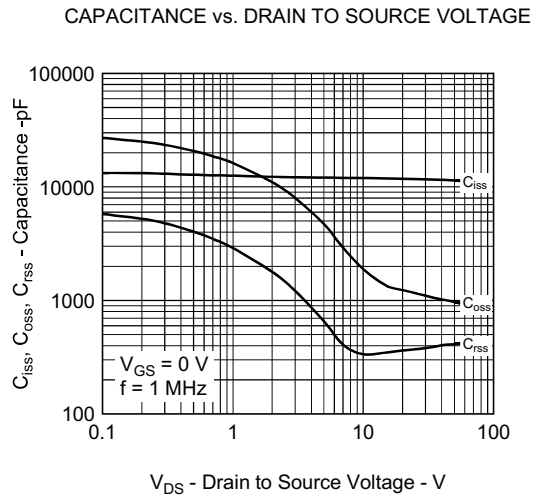
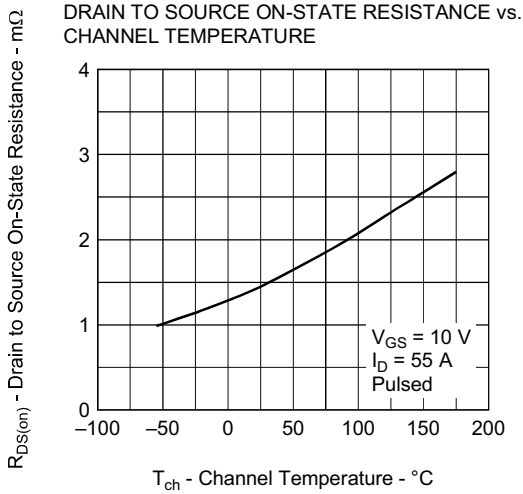


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

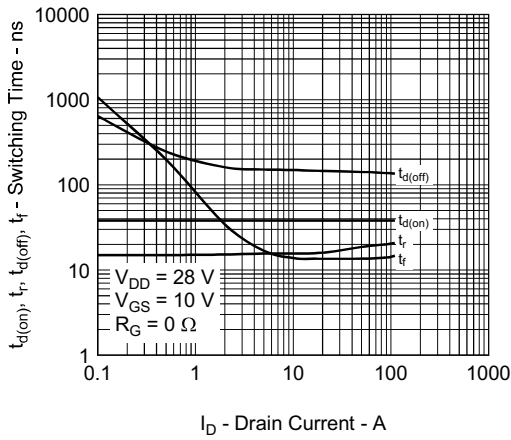


DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

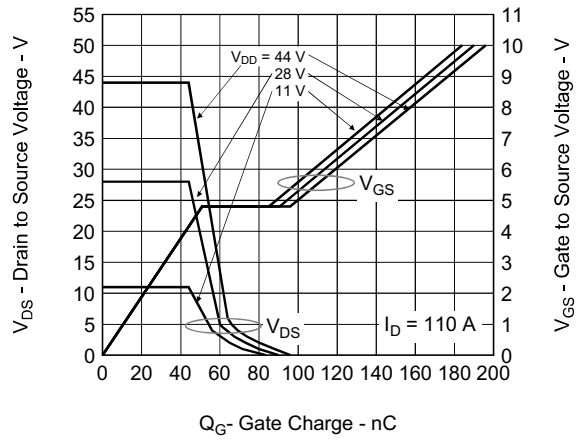




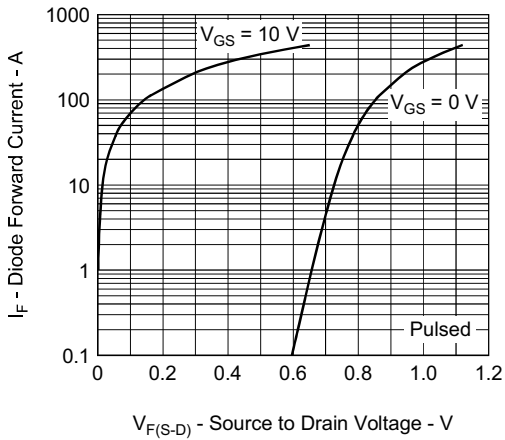
**SWITCHING CHARACTERISTICS**



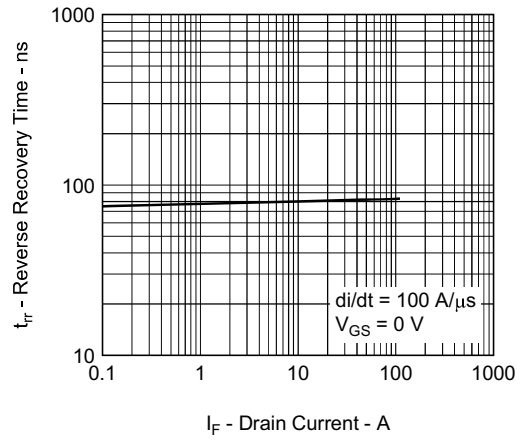
**DYNAMIC INPUT/OUTPUT CHARACTERISTICS**



**SOURCE TO DRAIN DIODE FORWARD VOLTAGE**

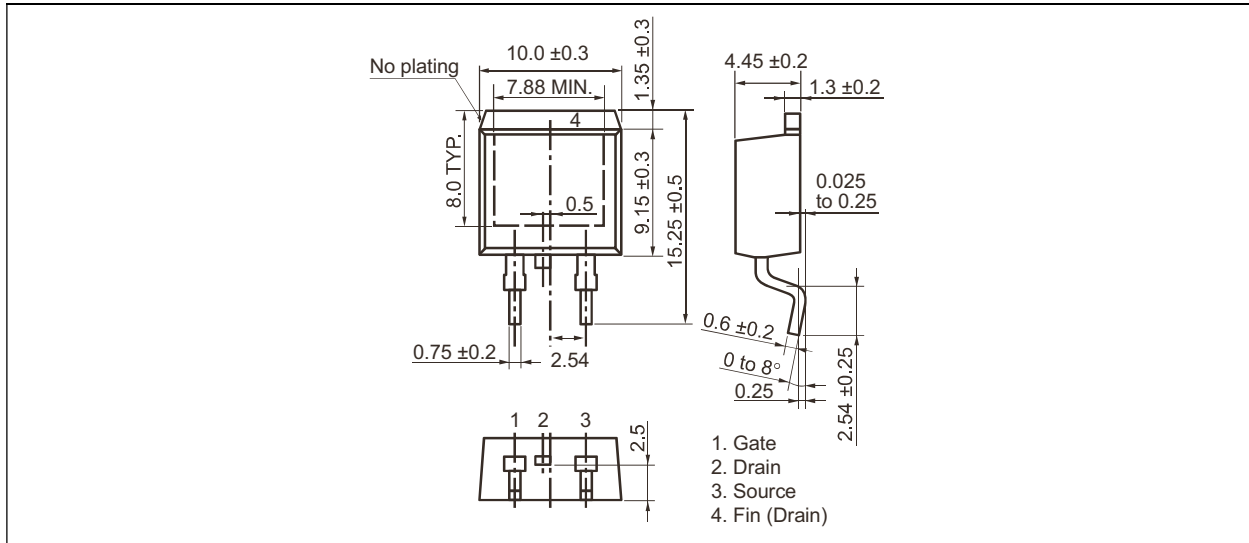


**REVERSE RECOVERY TIME vs. DRAIN CURRENT**

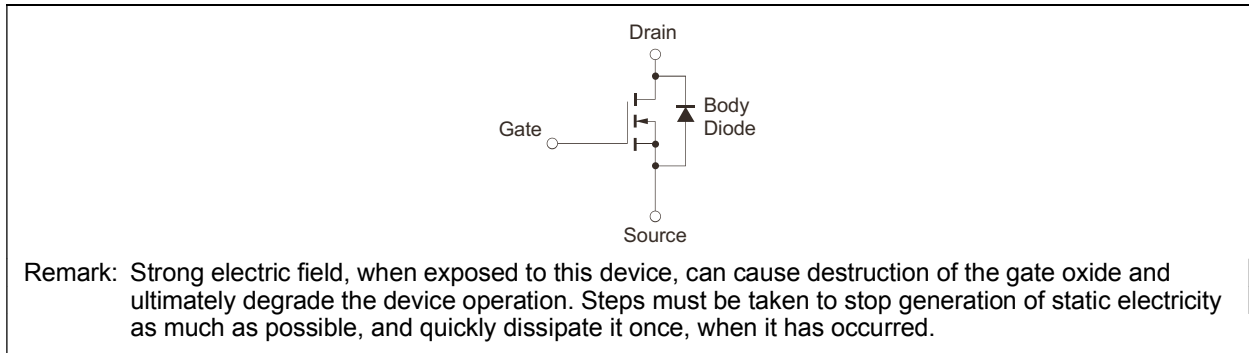


Package Drawing (Unit: mm)

TO-263 (MP-25ZP) (Mass: 1.5 g TYP.)



Equivalent Circuit



<b>Revision History</b>	<b>NP110N055PUK Data Sheet</b>
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Rev.	Date	Description	
		Page	Summary
1.00	Dec 12, 2011	—	First Edition Issued

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