NP33N06YDG

MOS FIELD EFFECT TRANSISTOR

R07DS0015EJ0100
Rev.1.00
Jul 01, 2010

Description

The NP33N06YDG is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Low on-state resistance
  — $R_{DS(on)}$ = 14 mΩ MAX. (V_{GS} = 10 V, I_D = 16.5 A)
- Low Ciss: Ciss = 2600 pF TYP. (V_{DS} = 25 V, V_{GS} = 0 V)
- Logic level drive type
- Designed for automotive application and AEC-Q101 qualified
- Small size package 8-pin HSON

Ordering Information

Part No.	LEAD PLATING	PACKING	Package
NP33N06YDG -E1-AY *1	Pure Sn (Tin)	Tape 2500 p/reel	8-pin HSON, Taping (E1 type)
NP33N06YDG -E2-AY *1			8-pin HSON, Taping (E2 type)

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

Absolute Maximum Ratings (T_A = 25°C)

Item	Symbol	Ratings	Unit
Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	60	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±33	A
Drain Current (pulse) *1	$I_{D(pulse)}$	±66	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	97	W
Total Power Dissipation (T_A = 25°C) *2	P_{T2}	1.0	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	–55 to +175	°C
Repetitive Avalanche Current *3	I_{AR}	16	A
Repetitive Avalanche Energy *3	E_{AR}	26	mJ

Thermal Resistance

Channel to Case Thermal Resistance	$R_{th(ch-C)}$	1.55	°C/W
Channel to Ambient Thermal Resistance *2	$R_{th(ch-A)}$	150	°C/W

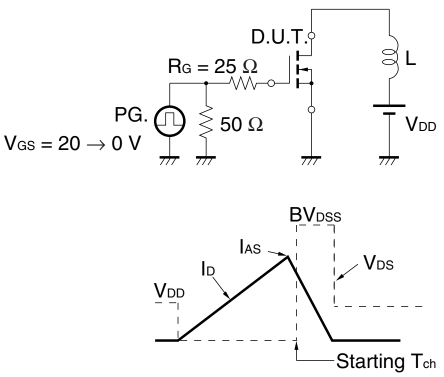
Notes: *1. T_C = 25°C, PW ≤ 10 μs, Duty Cycle ≤ 1%
*2. Mounted on glass epoxy substrate of 40 mm x 40 mm x 0.8 mmt
*3. $T_{ch(peak)}$ ≤ 150°C, R_G = 25 Ω

Electrical Characteristics (T_A = 25°C)

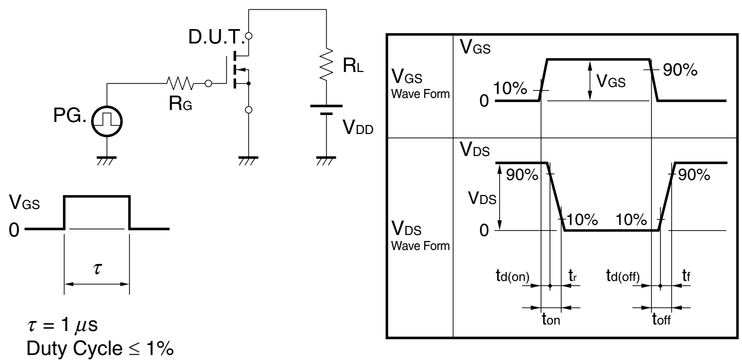
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}			1	μA	V_{DS} = 60 V, V_{GS} = 0 V
Gate Leakage Current	I_{GSS}			±100	nA	V_{GS} = ±20 V, V_{DS} = 0 V
Gate to Source Threshold Voltage	$V_{GS(th)}$	1.4	1.8	2.5	V	V_{DS} = V_{GS}, I_D = 250 μA
Forward Transfer Admittance *1	$\mid y_{fs} \mid$	13	26		S	V_{DS} = 5 V, I_D = 16.5 A
Drain to Source On-state Resistance *1	$R_{DS(on)1}$		11.2	14	mΩ	V_{GS} = 10 V, I_D = 16.5 A
	$R_{DS(on)2}$		12.8	20	mΩ	V_{GS} = 5 V, I_D = 16.5 A
Input Capacitance	C_{iss}		2600	3900	pF	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz
Output Capacitance	C_{oss}		200	300	pF	
Reverse Transfer Capacitance	C_{rss}		120	220	pF	
Turn-on Delay Time	$t_{d(on)}$		16	32	ns	V_{DD} = 30 V, I_D = 16.5 A, V_{GS} = 10 V, R_G = 0 Ω
Rise Time	t_r		12	29	ns	
Turn-off Delay Time	$t_{d(off)}$		54	108	ns	
Fall Time	t_f		6	15	ns	
Total Gate Charge	Q_G		52	78	nC	V_{DD} = 48 V, V_{GS} = 10 V, I_D = 33 A
Gate to Source Charge	Q_{GS}		9		nC	
Gate to Drain Charge	Q_{GD}		16		nC	
Body Diode Forward Voltage *1	$V_{F(S-D)}$		0.9	1.5	V	I_F = 33 A, V_{GS} = 0 V
Reverse Recovery Time	t_{rr}		36		ns	I_F = 33 A, V_{GS} = 0 V, di/dt = 100 A/μs
Reverse Recovery Charge	Q_{rr}		47		nC	

Note: *1. Pulsed

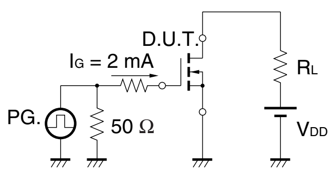
TEST CIRCUIT 1 AVALANCHE CAPABILITY



TEST CIRCUIT 2 SWITCHING TIME

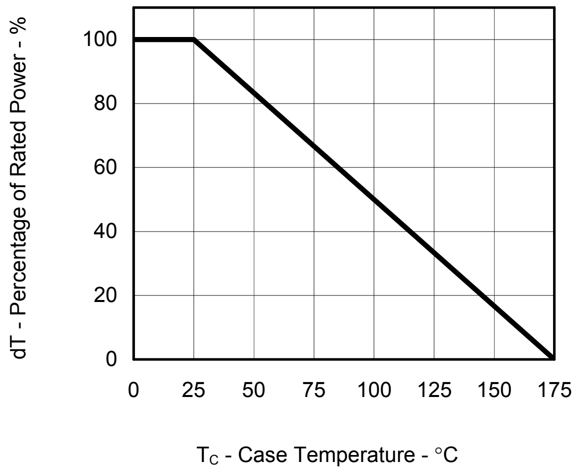


TEST CIRCUIT 3 GATE CHARGE

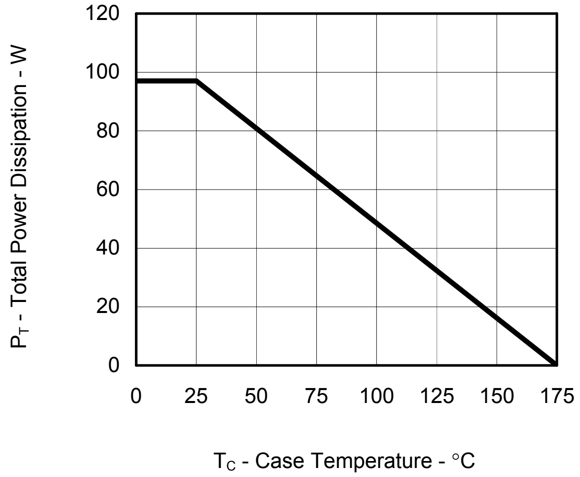


Typical Characteristics (T_A = 25°C)

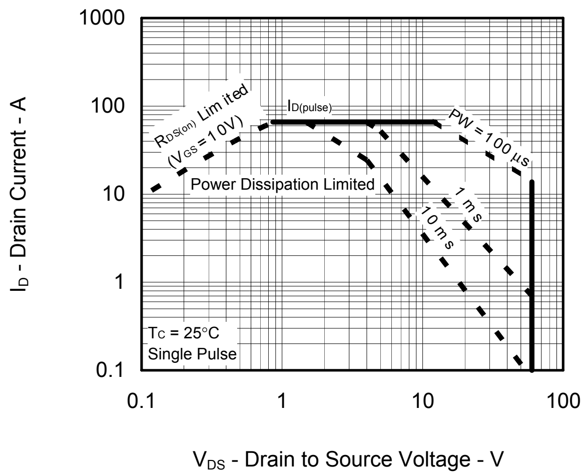
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



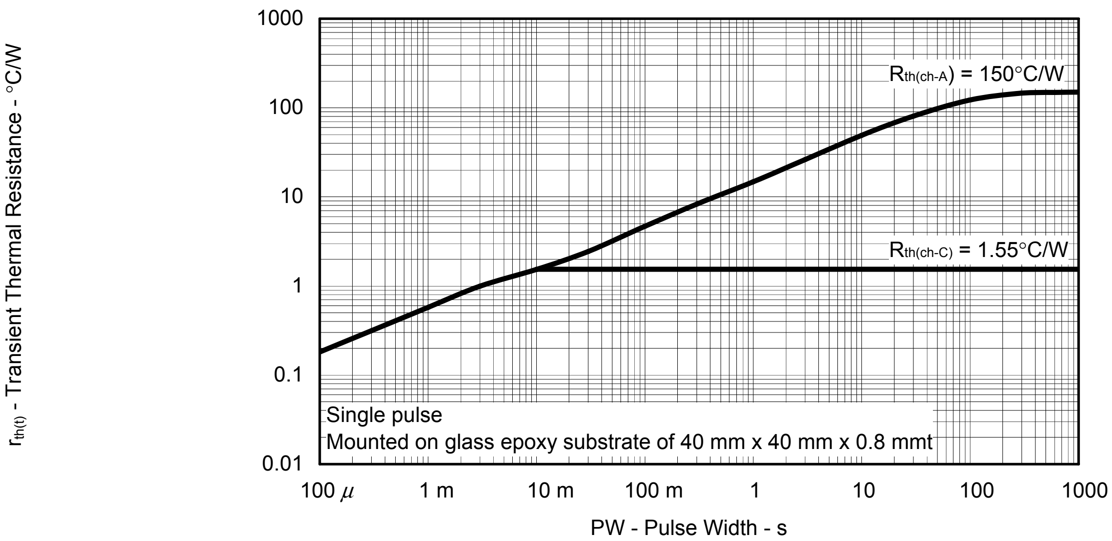
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



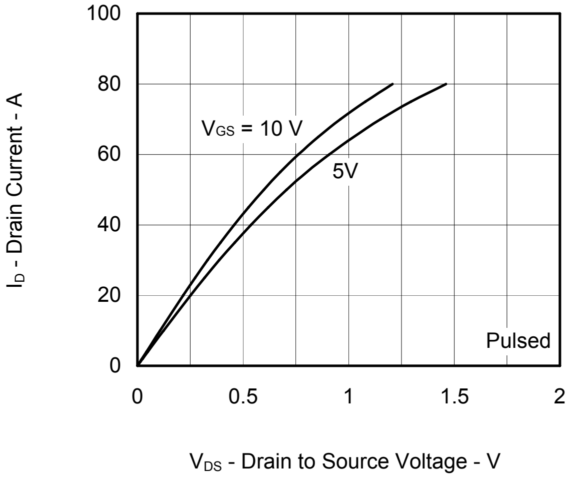
FORWARD BIAS SAFE OPERATING AREA



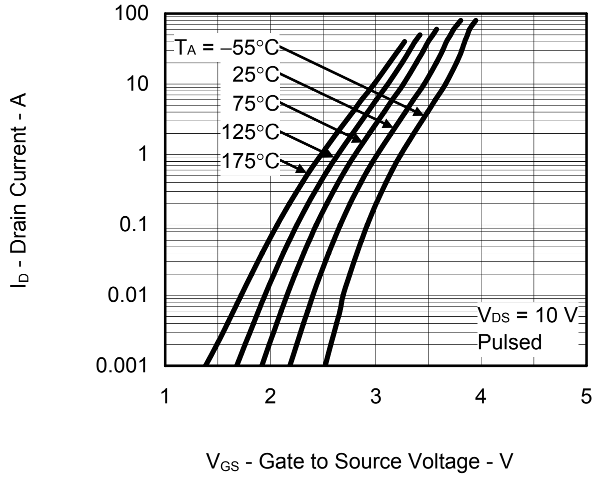
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



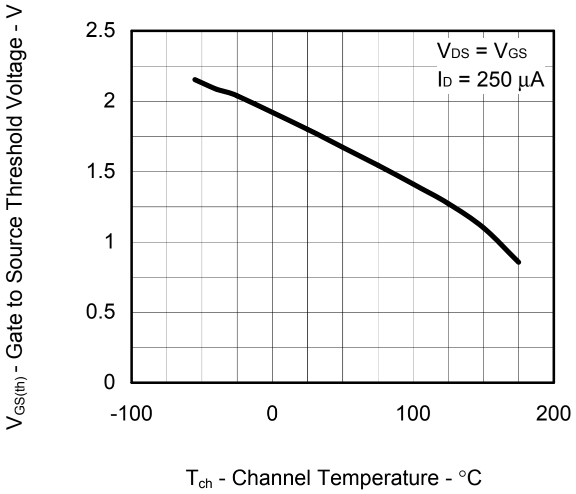
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



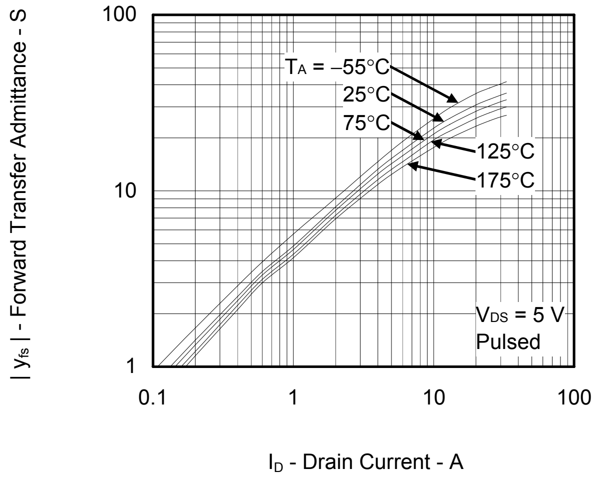
FORWARD TRANSFER CHARACTERISTICS



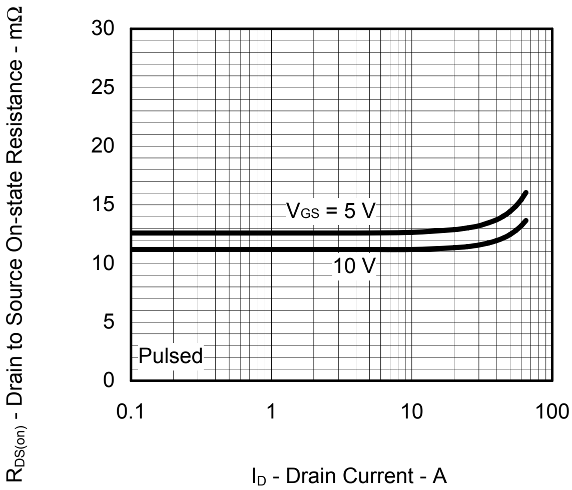
GATE TO SOURCE THRESHOLD VOLTAGE
vs. CHANNEL TEMPERATURE



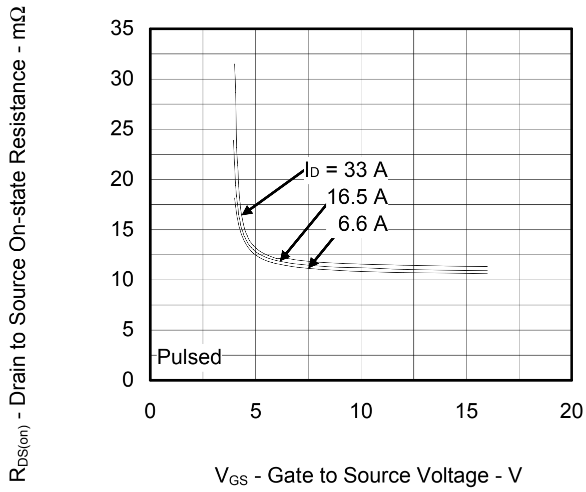
FORWARD TRANSFER ADMITTANCE vs. DRAIN
CURRENT



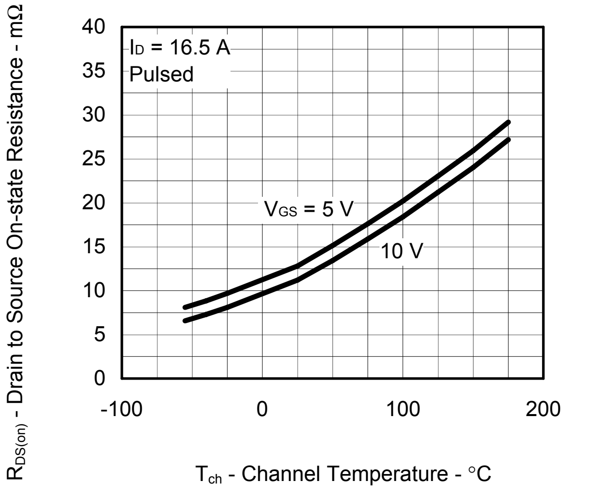
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



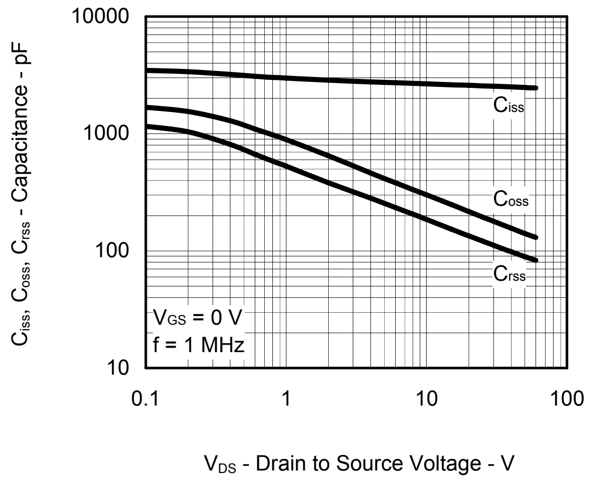
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



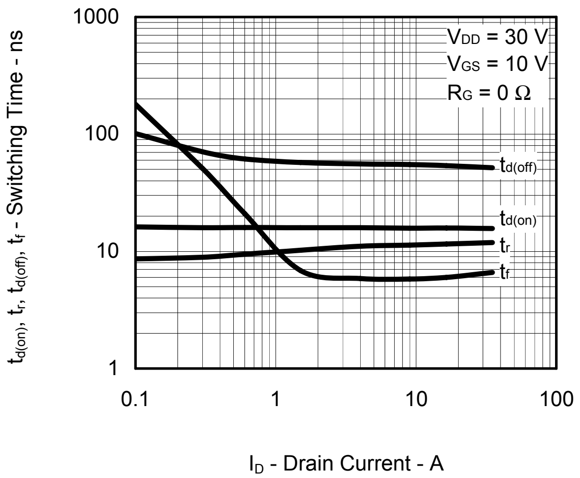
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



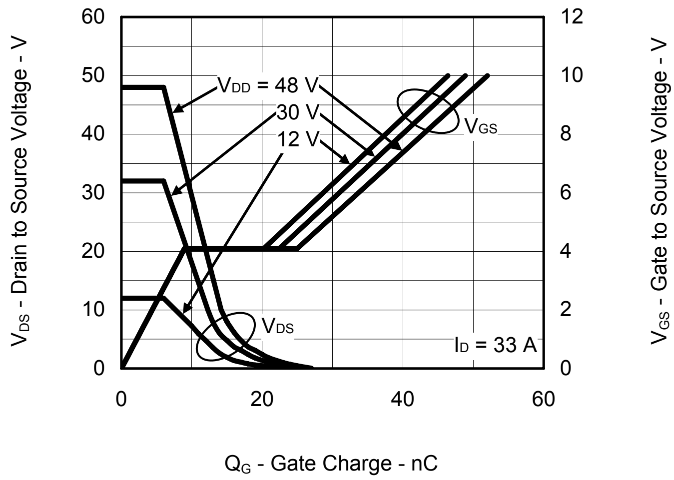
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



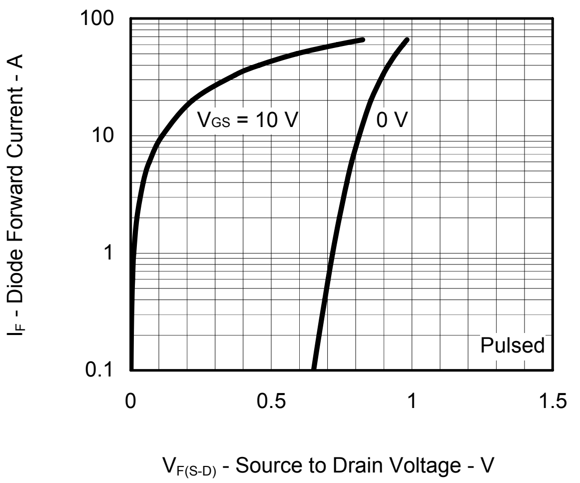
SWITCHING CHARACTERISTICS



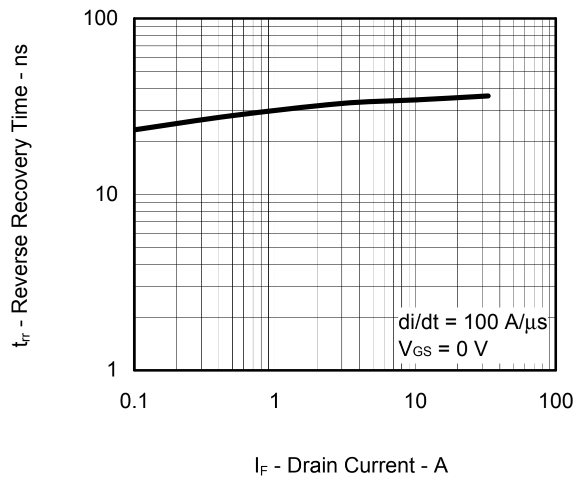
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

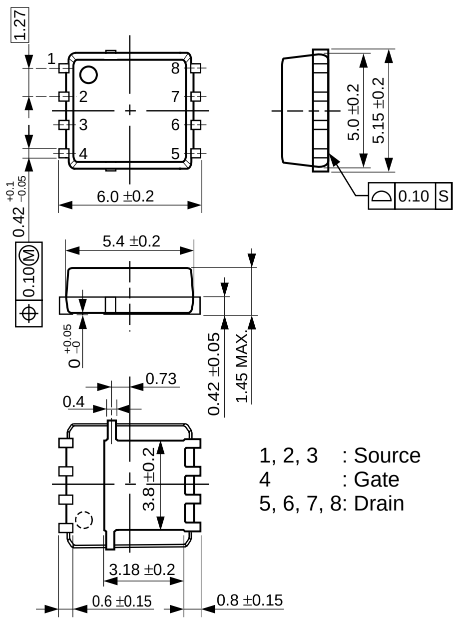


REVERSE RECOVERY TIME vs. DRAIN CURRENT

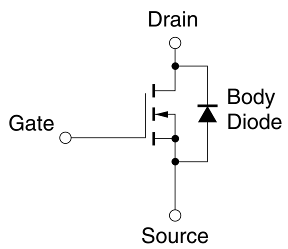


Package Drawings (Unit: mm)

8-pin HSON (Mass: 0.13 g TYP.)



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	NP33N06YDG

Rev.	Date	Description	
		Page	Summary
1.00	Jul 01, 2010	–	First Eddition Issued

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