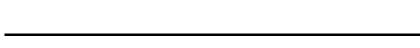
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Renesas Electronics website: http://www.renesas.com

April 1st, 2010 Renesas Electronics Corporation

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MOS FIELD EFFECT TRANSISTOR NP55N055SDG

SWITCHING N-CHANNEL POWER MOS FET

DESCRIPTION

The NP55N055SDG is N-channel MOS Field Effect
Transistor designed for high current switching applications.

ORDERING INFORMATION

PART NUMBER	PACKAGE
NP55N055SDG	TO-252 (MP-3ZK)

FEATURES

- Channel temperature 175 degree rating
- Super low on-state resistance

 $R_{DS(on)1} = 9.5 \text{ m}\Omega \text{ MAX.} \text{ (Vgs} = 10 \text{ V, Ip} = 28 \text{ A)}$

- Low Ciss: Ciss = 3200 pF TYP.
- · Logic level drive type

(TO-252)



ABSOLUTE MAXIMUM RATINGS (TA = 25°C)

Drain to Source Voltage (Vgs = 0 V)	VDSS	55	V
Gate to Source Voltage (V _{DS} = 0 V)	Vgss	±20	V
Drain Current (DC) (Tc = 25°C)	ID(DC)	±55	Α
Drain Current (pulse) Note1	D(pulse)	±220	Α
Total Power Dissipation (Tc = 25°C)	P _{T1}	77	W
Total Power Dissipation (T _A = 25°C)	P _{T2}	1.2	W
Channel Temperature	Tch	175	°C
Storage Temperature	T _{stg}	-55 to +175	°C
Repetitive Avalanche Current Note2	lar	27	Α
Repetitive Avalanche Energy Note2	Ear	73	mJ

Notes 1. PW \leq 10 μ s, Duty Cycle \leq 1%

2. Tch < 150°C, VdD = 28 V, Rg = 25 Ω , Vgs = 20 \rightarrow 0 V

THERMAL RESISTANCE

Channel to Case Thermal Resistance	Rth(ch-C)	1.95	°C/W
Channel to Ambient Thermal Resistance	Rth(ch-A)	125	°C/W

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ELECTRICAL CHARACTERISTICS (TA = 25°C)

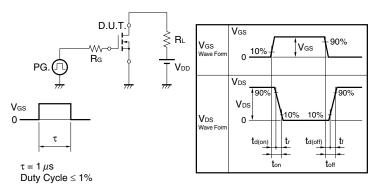
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	IDSS	V _{DS} = 55 V, V _{GS} = 0 V			1.0	μΑ
Gate Leakage Current	Igss	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
Gate to Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$	1.5	2.0	2.5	V
Forward Transfer Admittance Note	y _{fs}	V _{DS} = 10 V, I _D = 28 A	15	32		S
Drain to Source On-state Resistance Note	RDS(on)1	V _{GS} = 10 V, I _D = 28 A		7.4	9.5	mΩ
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 28 A		8.9	12	mΩ
Input Capacitance	Ciss	V _{DS} = 25 V		3200	4800	pF
Output Capacitance	Coss	V _{GS} = 0 V		270	410	pF
Reverse Transfer Capacitance	Crss	f = 1 MHz		170	310	pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 28 V, I _D = 28 A		17	38	ns
Rise Time	tr	V _{GS} = 10 V		16	40	ns
Turn-off Delay Time	td(off)	R _G = 0 Ω		71	142	ns
Fall Time	tf			6	15	ns
Total Gate Charge	Q _G	V _{DD} = 44 V		64	96	nC
Gate to Source Charge	Qgs	V _{GS} = 10 V		10		nC
Gate to Drain Charge	Q _{GD}	I _D = 55 A		18		nC
Body Diode Forward Voltage Note	V _{F(S-D)}	I _F = 55 A, V _{GS} = 0 V		0.94	1.5	V
Reverse Recovery Time	trr	I _F = 55 A, V _{GS} = 0 V		35		ns
Reverse Recovery Charge	Qrr	di/dt = 100 A/ <i>μ</i> s		38		nC

Note Pulsed

TEST CIRCUIT 1 AVALANCHE CAPABILITY

$V_{GS} = 20 \rightarrow 0 \text{ V}$ V_{DD} V_{DD}

TEST CIRCUIT 2 SWITCHING TIME

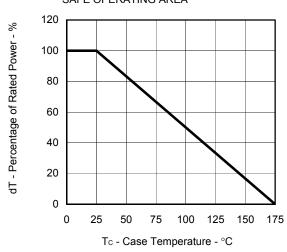


TEST CIRCUIT 3 GATE CHARGE

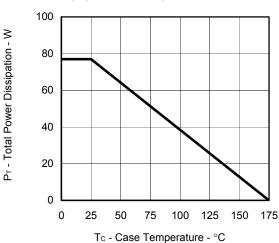
$$\begin{array}{c|c} D.U.T. \\ \hline I_G = 2 \text{ mA} \\ \hline \hline W \\ \hline \end{array}$$

TYPICAL CHARACTERISTICS (TA = 25°C)

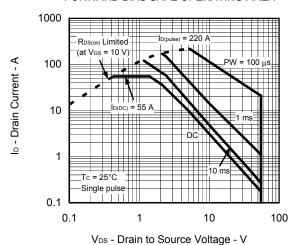
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA

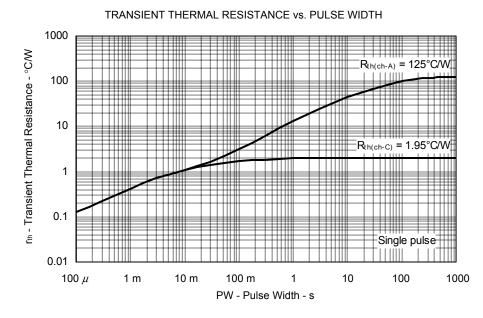


TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



FORWARD BIAS SAFE OPERATING AREA



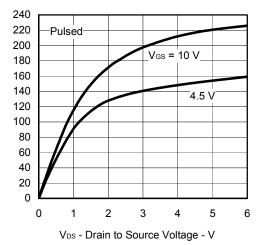


3

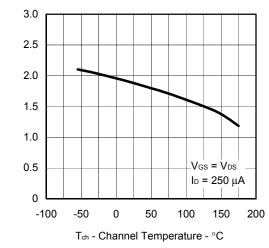
lo - Drain Current - A

Ves(th) - Gate to Source Threshold Voltage - V

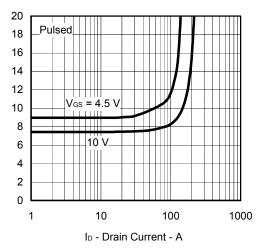
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



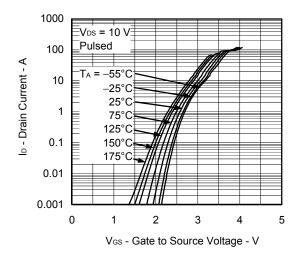
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



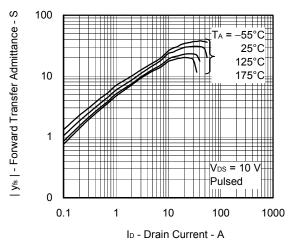
DRAIN TO SOURCE ON-STATE RESISTANCE vs. **DRAIN CURRENT**



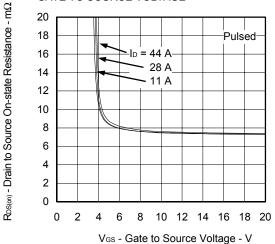
FORWARD TRANSFER CHARACTERISTICS



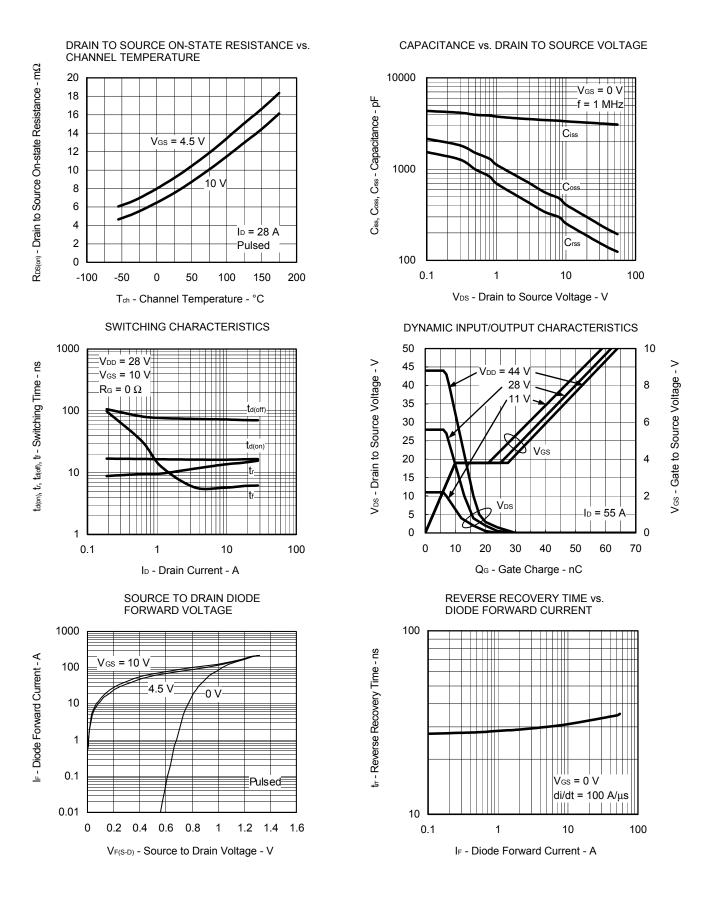
FORWARD TRANSFER ADMITTANCE vs. **DRAIN CURRENT**



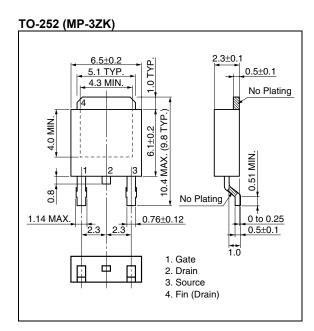
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



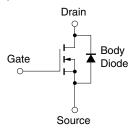
 $R_{DS(cm)}$ - Drain to Source On-state Resistance - $m\Omega$



★ PACKAGE DRAWING (Unit: mm)



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.

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