To our customers,

Old Company Name in Catalogs and Other Documents

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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
NP83P04PDG

SWITCHING
P-CHANNEL POWER MOSFET

DESCRIPTION

The NP83P04PDG is P-channel MOS Field Effect Transistor designed for high current switching applications.

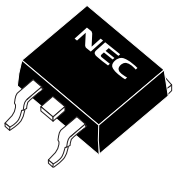
<R> **ORDERING INFORMATION**

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
NP83P04PDG-E1-AY Note	Pure Sn (Tin)	Tape 800 p/reel	TO-263 (MP-25ZP)
NP83P04PDG-E2-AY Note			

Note Pb-free (This product does not contain Pb in external electrode.)

FEATURES

(TO-263)



- Super low on-state resistance

  $R_{DS(on)1}$ = 5.3 mΩ MAX. (V_{GS} = –10 V, I_D = –41.5 A)

  $R_{DS(on)2}$ = 8.0 mΩ MAX. (V_{GS} = –4.5 V, I_D = –41.5 A)

- High current rating: $I_{D(DC)}$ = ∓83 A

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	–40	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	∓20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	∓83	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	∓249	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	150	W
Total Power Dissipation (T_A = 25°C)	P_{T2}	1.8	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	–55 to +175	°C
Single Avalanche Current Note2	I_{AS}	56	A
Single Avalanche Energy Note2	E_{AS}	315	mJ

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Starting T_{ch} = 25°C, V_{DD} = –30 V, R_G = 25 Ω, V_{GS} = –20 → 0 V

THERMAL RESISTANCE

Channel to Case Thermal Resistance	$R_{th(ch-C)}$	1.0	°C/W
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	°C/W

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Document No. D18690EJ3V0DS00 (3rd edition)
Date Published May 2007 NS CP(K)
Printed in Japan

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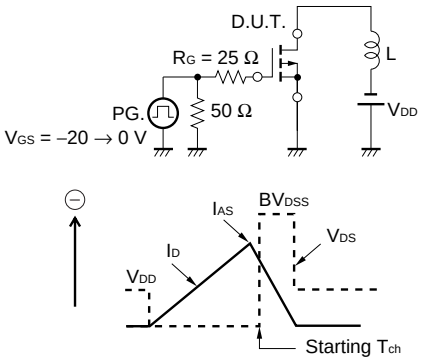
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

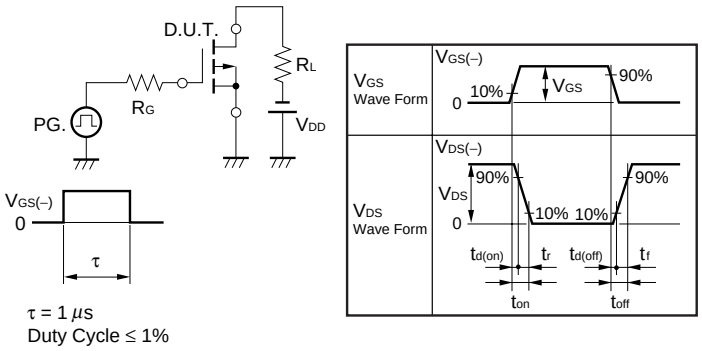
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –40 V, V_{GS} = 0 V			–10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ∓20 V, V_{DS} = 0 V			∓100	nA
Gate to Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = –10 V, I_D = –1 mA	–1.0	–1.6	–2.5	V
Forward Transfer Admittance Note	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –41.5 A	30	60		S
Drain to Source On-state Resistance Note	$R_{DS(on)1}$	V_{GS} = –10 V, I_D = –41.5 A		4.1	5.3	mΩ
	$R_{DS(on)2}$	V_{GS} = –4.5 V, I_D = –41.5 A		5.1	8.0	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V,		9820		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V,		1500		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		850		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –20 V, I_D = –41.5 A,		35		ns
Rise Time	t_r	V_{GS} = –10 V,		21		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 0 Ω		245		ns
Fall Time	t_f			120		ns
Total Gate Charge	Q_G	V_{DD} = –32 V,		200		nC
Gate to Source Charge	Q_{GS}	V_{GS} = –10 V,		25		nC
Gate to Drain Charge	Q_{GD}	I_D = –83 A		53		nC
Body Diode Forward Voltage Note	$V_{F(S-D)}$	I_F = –83 A, V_{GS} = 0 V		0.93	1.5	V
Reverse Recovery Time	t_{rr}	I_F = –83 A, V_{GS} = 0 V,		57		ns
Reverse Recovery Charge	Q_{rr}	di/dt = –100 A/μs		92		nC

Note Pulsed test PW ≤ 350 μs, Duty Cycle ≤ 2%

TEST CIRCUIT 1 AVALANCHE CAPABILITY

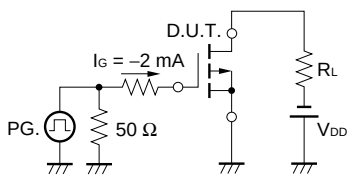


TEST CIRCUIT 2 SWITCHING TIME



τ = 1 μs
Duty Cycle ≤ 1%

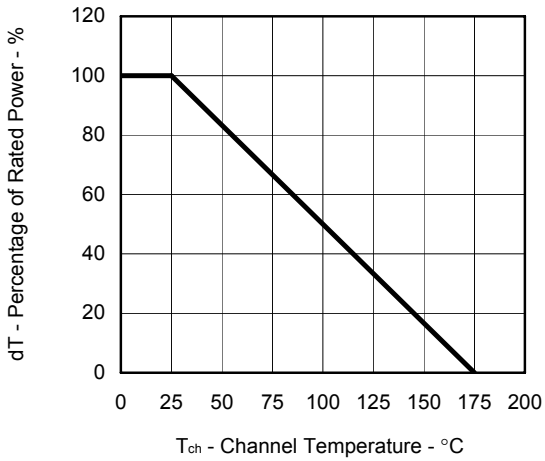
TEST CIRCUIT 3 GATE CHARGE



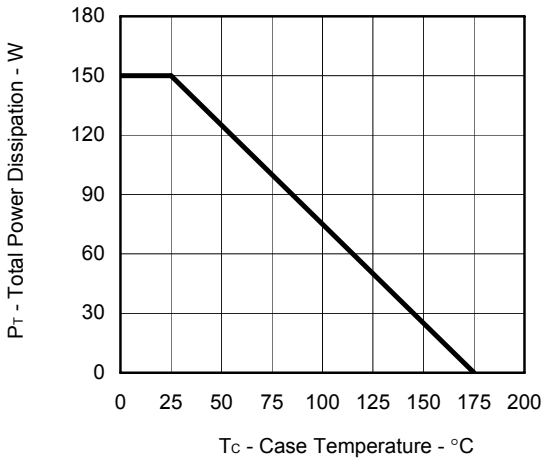
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TYPICAL CHARACTERISTICS (T_A = 25°C)

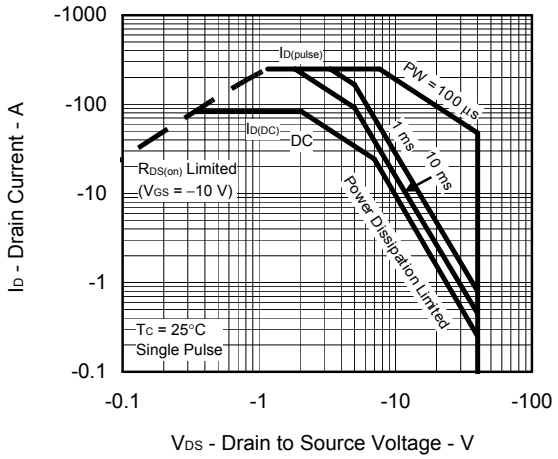
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



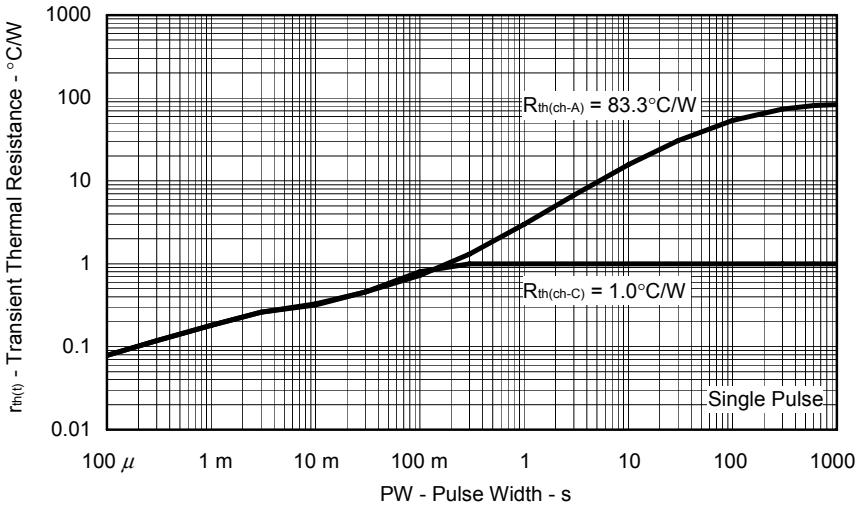
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



FORWARD BIAS SAFE OPERATING AREA

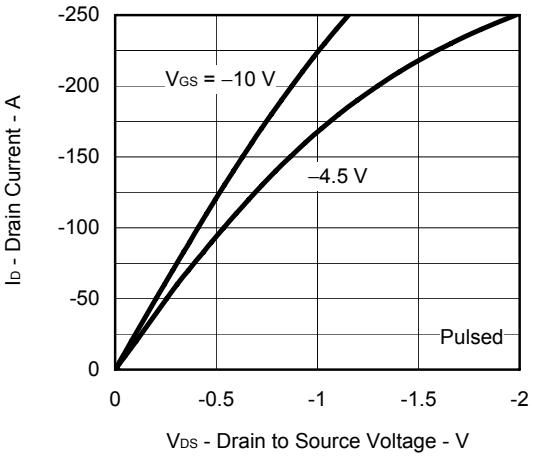


TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

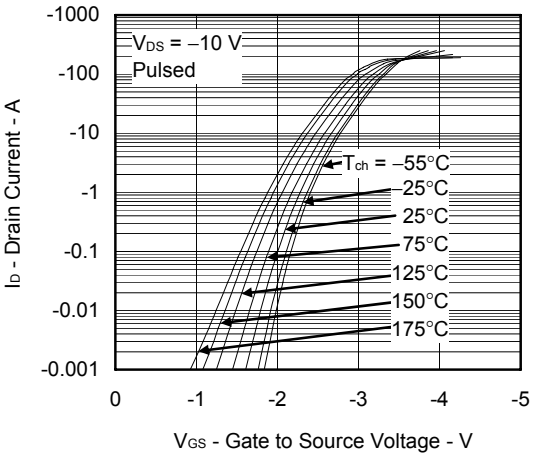


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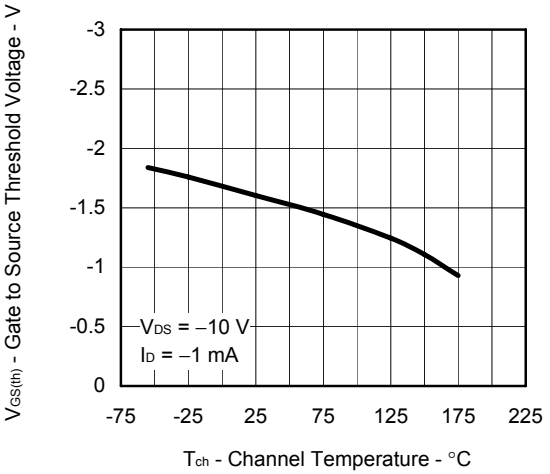
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



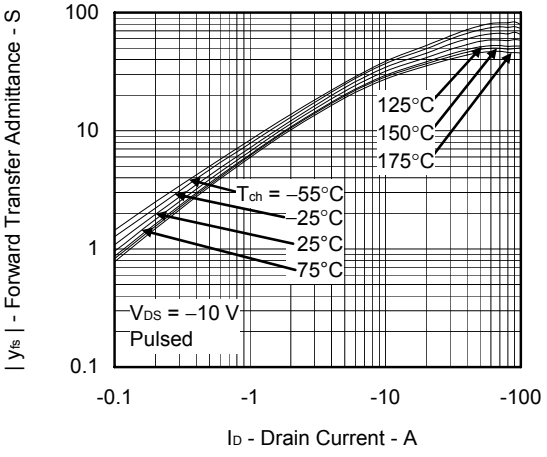
FORWARD TRANSFER CHARACTERISTICS



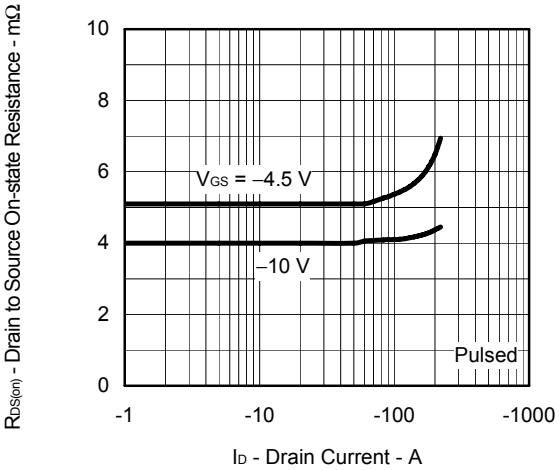
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE



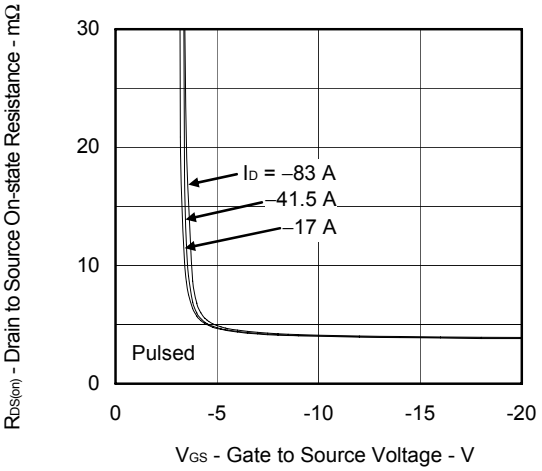
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT

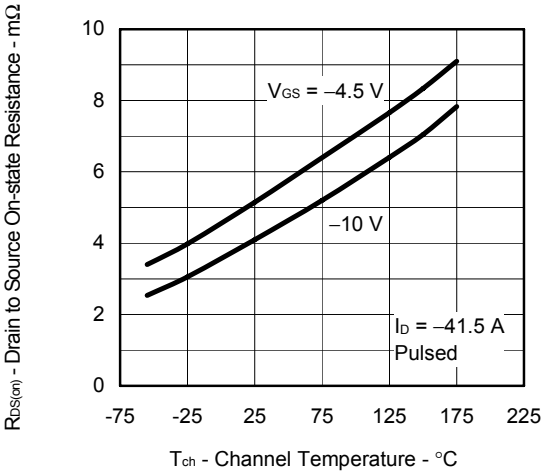


DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE

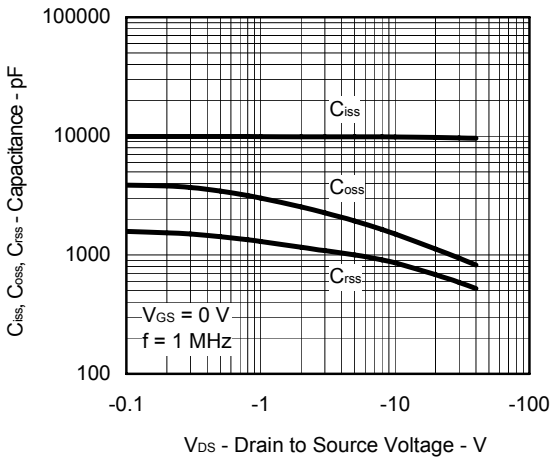


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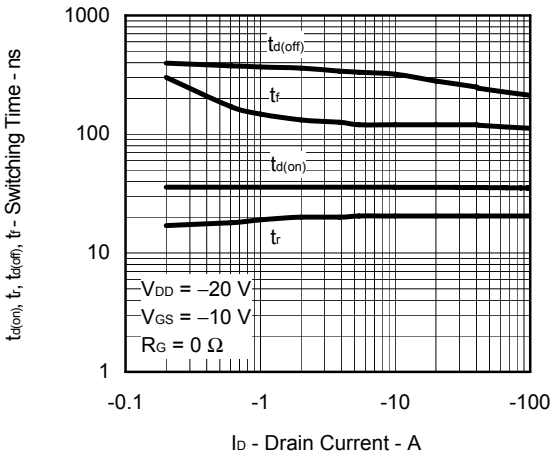
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



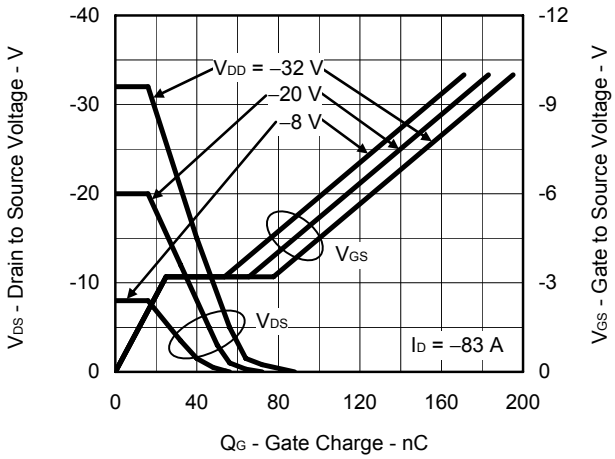
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



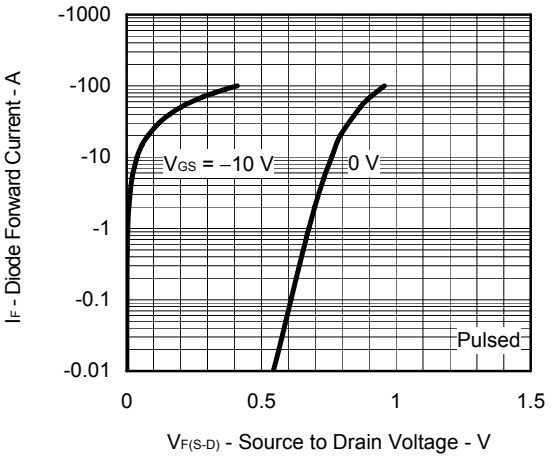
SWITCHING CHARACTERISTICS



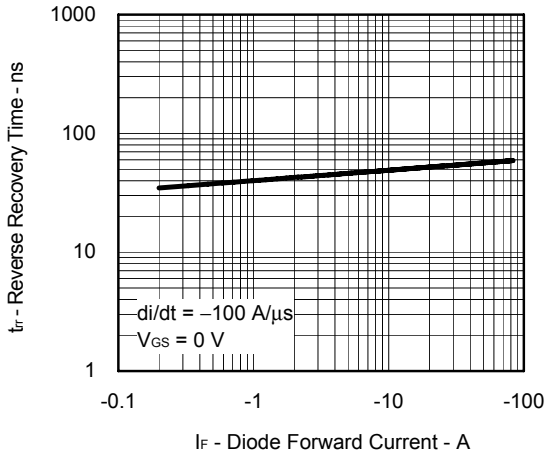
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



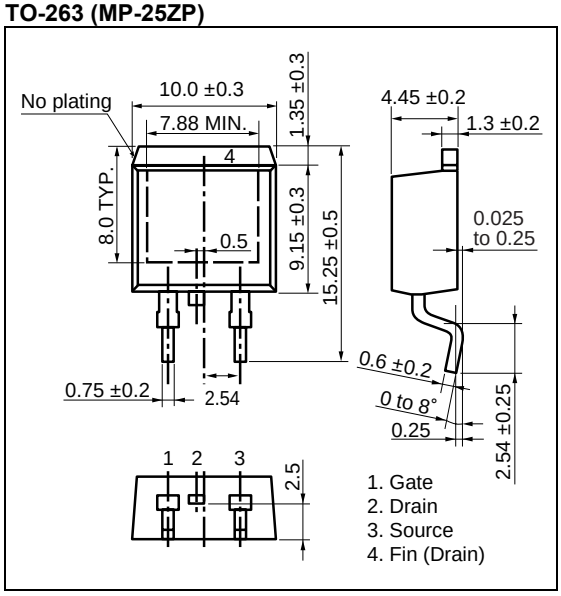
REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT



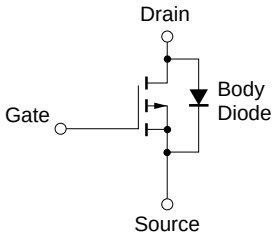
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PACKAGE DRAWING (Unit: mm)

TO-263 (MP-25ZP)



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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