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

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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MOS FIELD EFFECT TRANSISTOR
NP100P04PLG

SWITCHING
P-CHANNEL POWER MOSFET

DESCRIPTION

The NP100P04PLG is P-channel MOS Field Effect Transistor designed for high current switching applications.

<R> **ORDERING INFORMATION**

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
NP100P04PLG-E1-AY Note	Pure Sn (Tin)	Tape 800 p/reel	TO-263 (MP-25ZP)
NP100P04PLG-E2-AY Note			

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

FEATURES

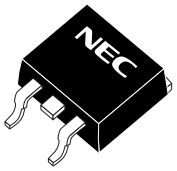
- Super low on-state resistance

  $R_{DS(on)1}$ = 3.7 mΩ MAX. (V_{GS} = –10 V, I_D = –50 A)

  $R_{DS(on)2}$ = 5.1 mΩ MAX. (V_{GS} = –4.5 V, I_D = –50 A)

- High current rating: $I_{D(DC)}$ = ∓100 A
- Built-in gate protection diode

(TO-263)



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)	$I_{D(DC)}$	∓100	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	∓300	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	200	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}	74	A
Single Avalanche Energy Note2	E_{AS}	550	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	$R_{th(ch-C)}$	0.75	°C/W
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	°C/W

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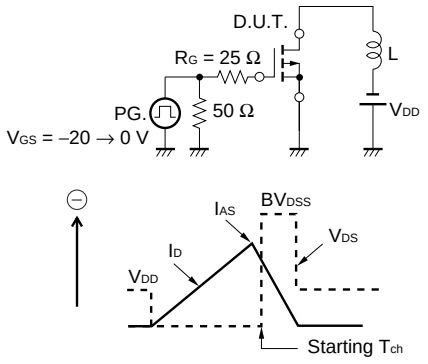
The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

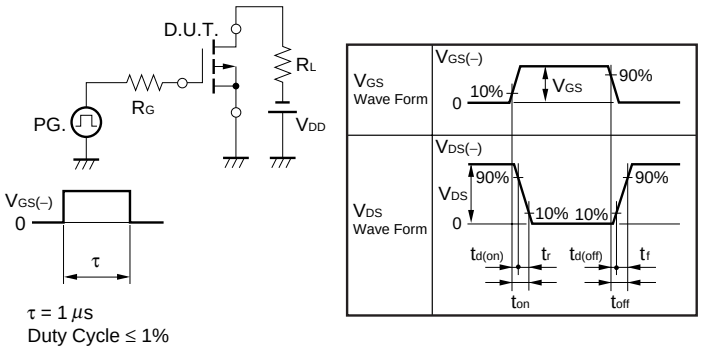
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = –40 V, V_{GS} = 0 V			–10	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ∓20 V, V_{DS} = 0 V			∓10	μA
Gate to Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = –10 V, I_D = –1 mA	–1.0	–1.6	–2.5	V
Forward Transfer Admittance **Note**	$\|y_{fs}\|$	V_{DS} = –10 V, I_D = –50 A	43	88		S
Drain to Source On-state Resistance **Note**	$R_{DS(on)1}$	V_{GS} = –10 V, I_D = –50 A		2.8	3.7	mΩ
	$R_{DS(on)2}$	V_{GS} = –4.5 V, I_D = –50 A		3.4	5.1	mΩ
Input Capacitance	C_{iss}	V_{DS} = –10 V,		15100		pF
Output Capacitance	C_{oss}	V_{GS} = 0 V,		2400		pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		1130		pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = –20 V, I_D = –50 A,		38		ns
Rise Time	t_r	V_{GS} = –10 V,		30		ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 0 Ω		300		ns
Fall Time	t_f			100		ns
Total Gate Charge	Q_G	V_{DD} = –32 V,		320		nC
Gate to Source Charge	Q_{GS}	V_{GS} = –10 V,		37		nC
Gate to Drain Charge	Q_{GD}	I_D = –100 A		85		nC
Body Diode Forward Voltage **Note**	$V_{F(S-D)}$	I_F = –100 A, V_{GS} = 0 V		0.91	1.5	V
Reverse Recovery Time	t_{rr}	I_F = –100 A, V_{GS} = 0 V,		70		ns
Reverse Recovery Charge	Q_{rr}	di/dt = –100 A/μs		123		nC

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

TEST CIRCUIT 1 AVALANCHE CAPABILITY

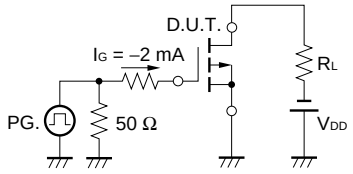


TEST CIRCUIT 2 SWITCHING TIME



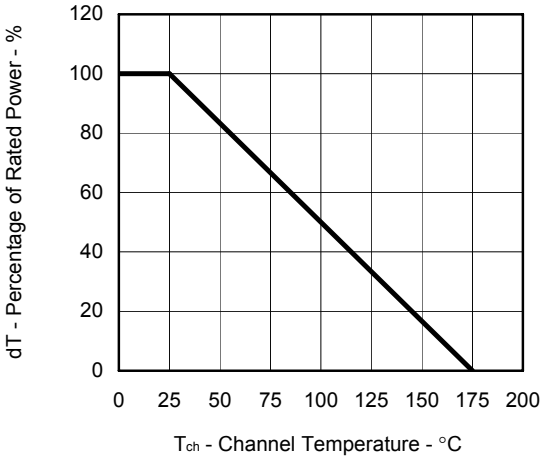
τ = 1 μs
Duty Cycle ≤ 1%

TEST CIRCUIT 3 GATE CHARGE

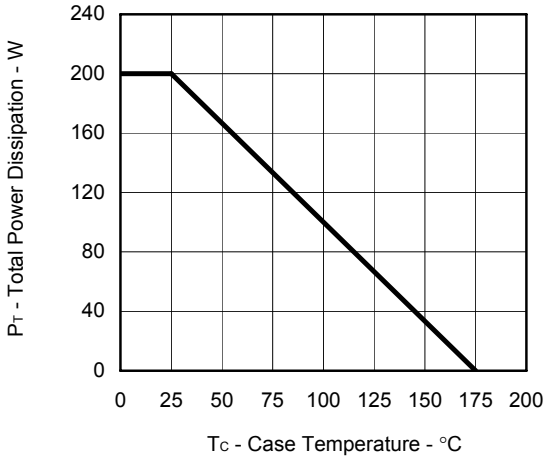


TYPICAL CHARACTERISTICS (T_A = 25°C)

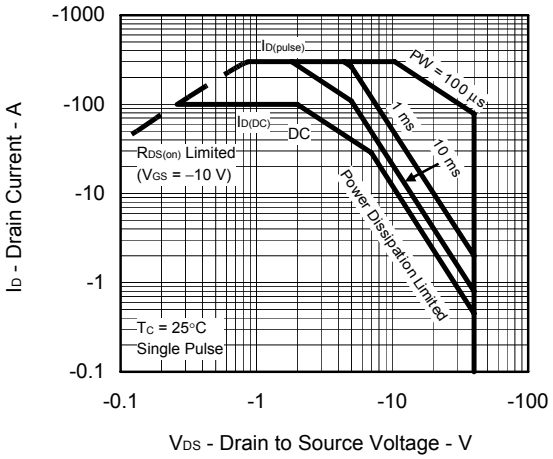
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



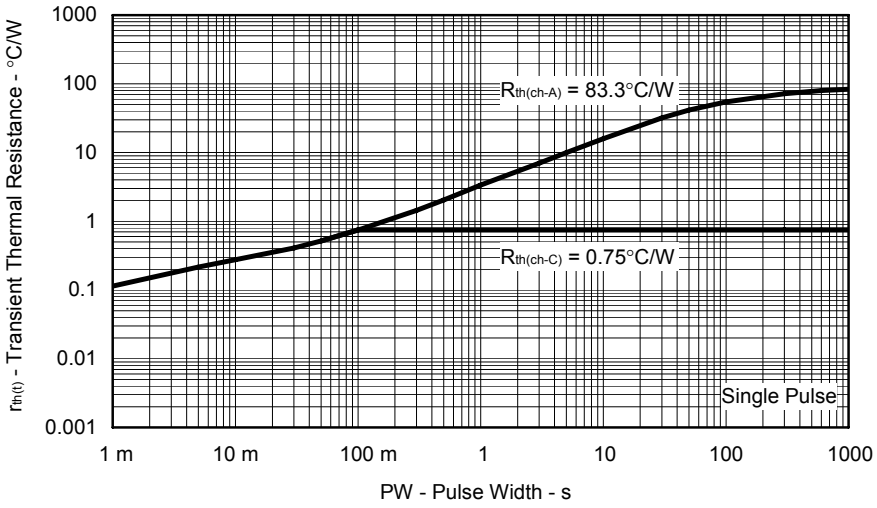
TOTAL POWER DISSIPATION vs. CASE TEMPERATURE



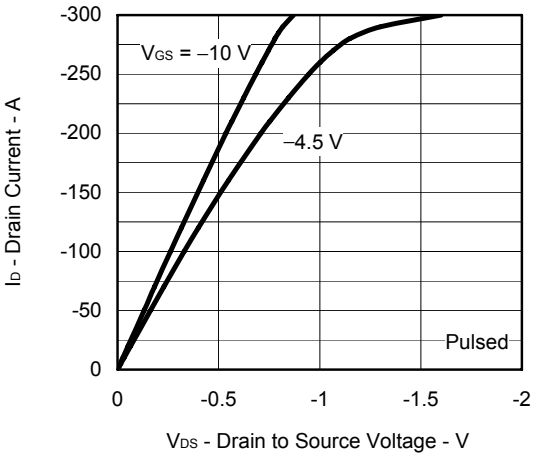
FORWARD BIAS SAFE OPERATING AREA



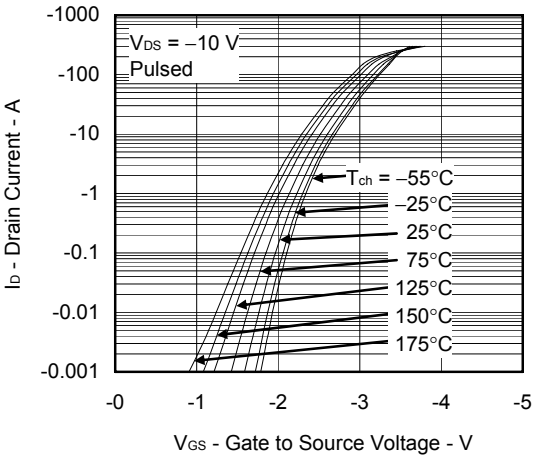
TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH



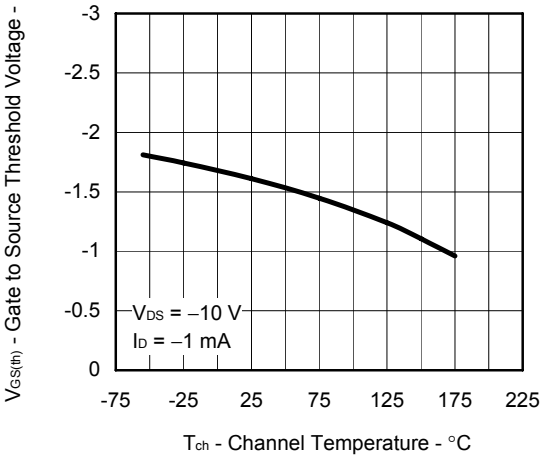
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



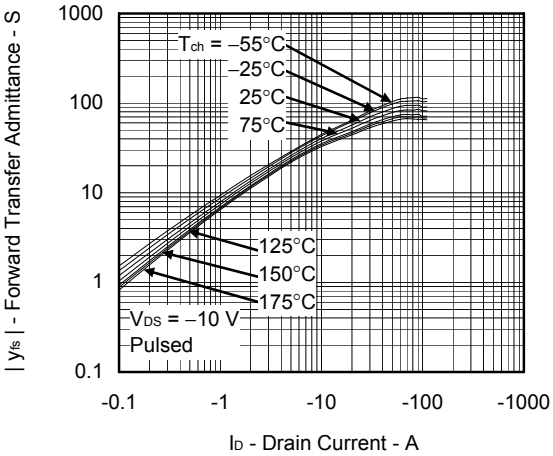
FORWARD TRANSFER CHARACTERISTICS



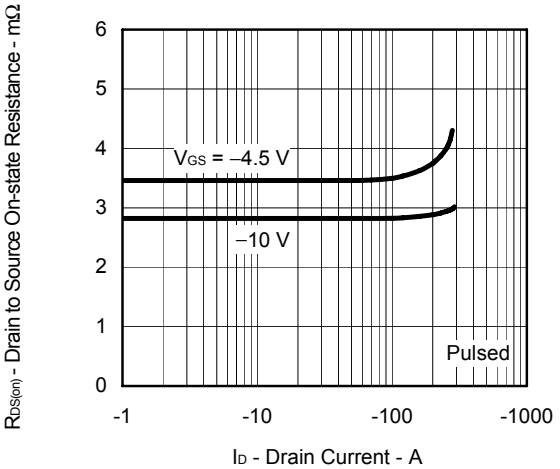
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE



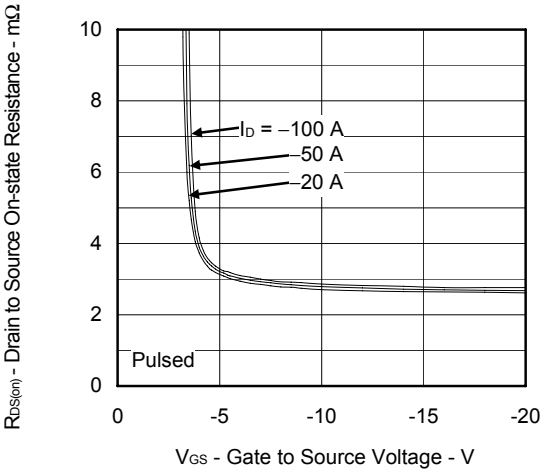
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT



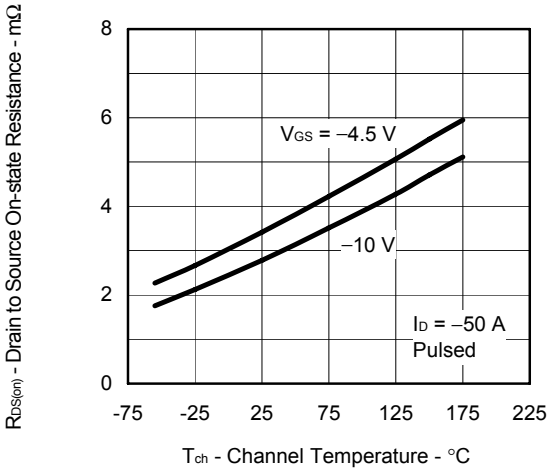
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



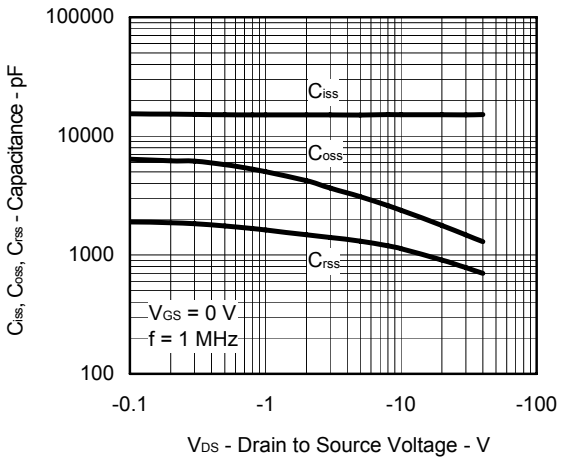
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



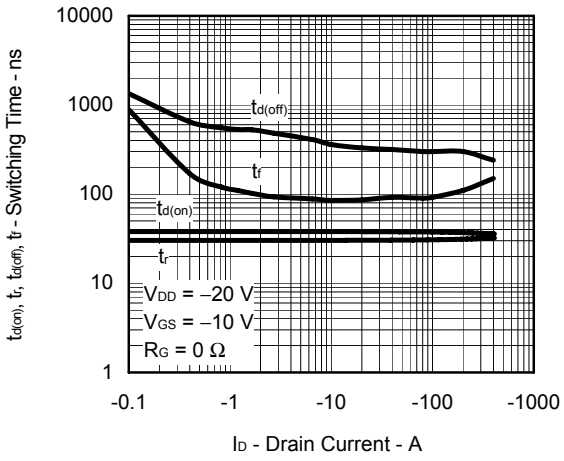
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



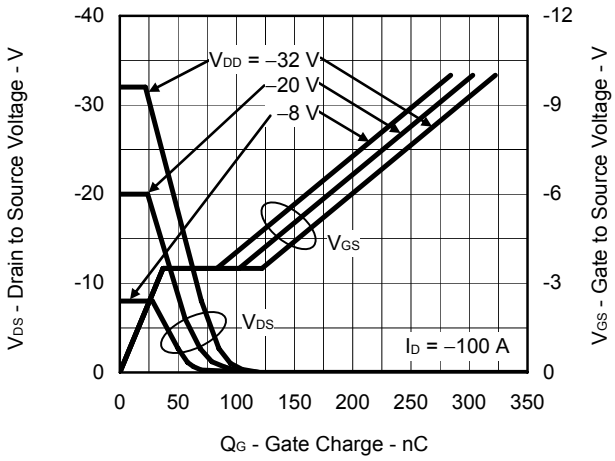
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



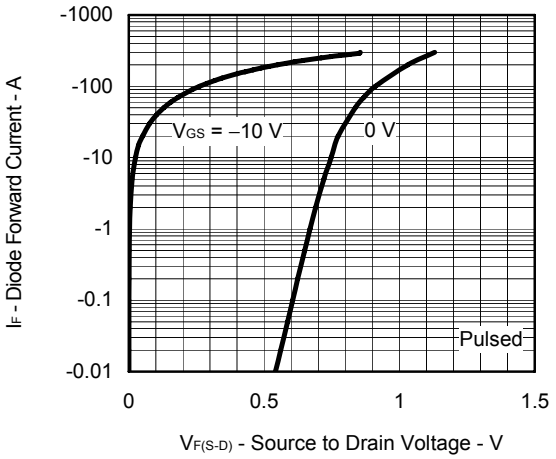
SWITCHING CHARACTERISTICS



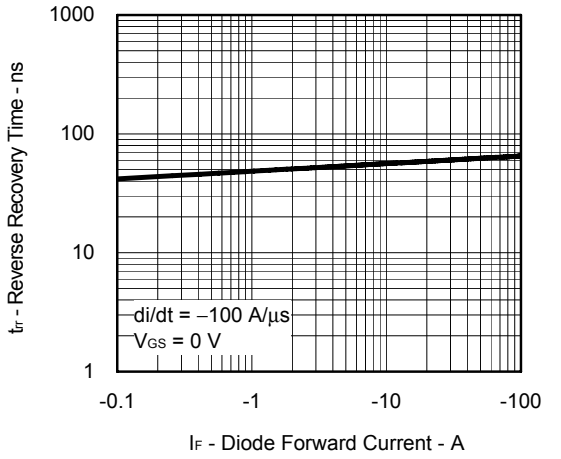
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

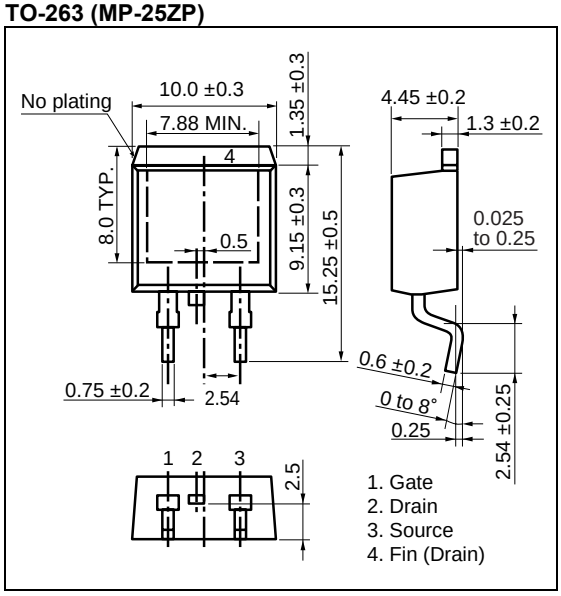


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT

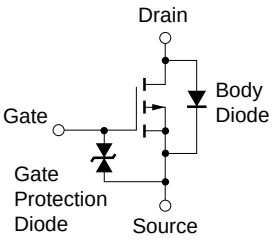


PACKAGE DRAWING (Unit: mm)

TO-263 (MP-25ZP)



EQUIVALENT CIRCUIT



Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

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