

DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR NP100P04PDG

SWITCHING P-CHANNEL POWER MOSFET

DESCRIPTION

The NP100P04PDG is P-channel MOS Field Effect Transistor designed for high current switching applications.

<R> ORDERING INFORMATION

PART NUMBER	LEAD PLATING	PACKING	PACKAGE
NP100P04PDG-E1-AY ^{Note}	Pure Sn (Tin)	Tape 800 p/reel	TO-263 (MP-25ZP)
NP100P04PDG-E2-AY ^{Note}			

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

FEATURES

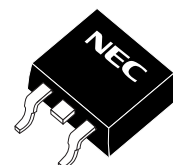
- Super low on-state resistance

$R_{DS(on)1} = 3.5 \text{ m}\Omega \text{ MAX. (} V_{GS} = -10 \text{ V, } I_D = -50 \text{ A)}$

$R_{DS(on)2} = 5.1 \text{ m}\Omega \text{ MAX. (} V_{GS} = -4.5 \text{ V, } I_D = -50 \text{ A)}$

- High current rating: $I_{D(DC)} = \mp 100 \text{ A}$

(TO-263)



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	-40	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	∓ 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	∓ 100	A
Drain Current (pulse) ^{Note1}	$I_{D(pulse)}$	∓ 300	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	200	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	$^\circ\text{C}$
Single Avalanche Current ^{Note2}	I_{AS}	74	A
Single Avalanche Energy ^{Note2}	E_{AS}	550	mJ

Notes 1. $PW \leq 10 \text{ }\mu\text{s}$, Duty Cycle $\leq 1\%$

2. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = -30 \text{ V}$, $R_G = 25 \text{ }\Omega$, $V_{GS} = -20 \rightarrow 0 \text{ V}$

THERMAL RESISTANCE

Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.75	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

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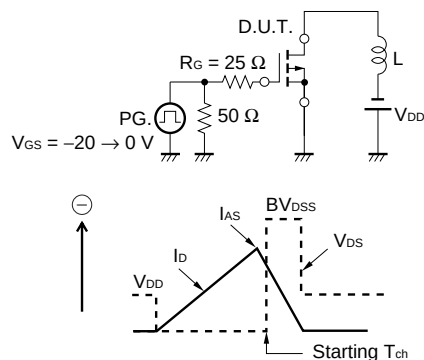
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ELECTRICAL CHARACTERISTICS (T_A = 25°C)

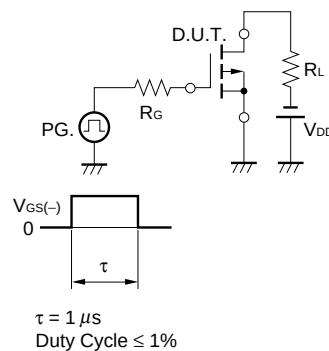
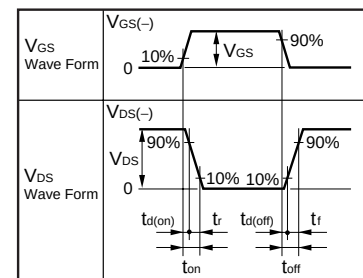
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -40 V, V _{GS} = 0 V			-10	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±100	nA
Gate to Source Threshold Voltage	V _{GS(th)}	V _{DS} = -10 V, I _D = -1 mA	-1.0	-1.6	-2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = -10 V, I _D = -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	3.5	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 = -45 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%

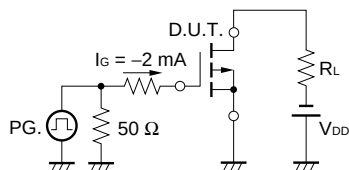
TEST CIRCUIT 1 AVALANCHE CAPABILITY



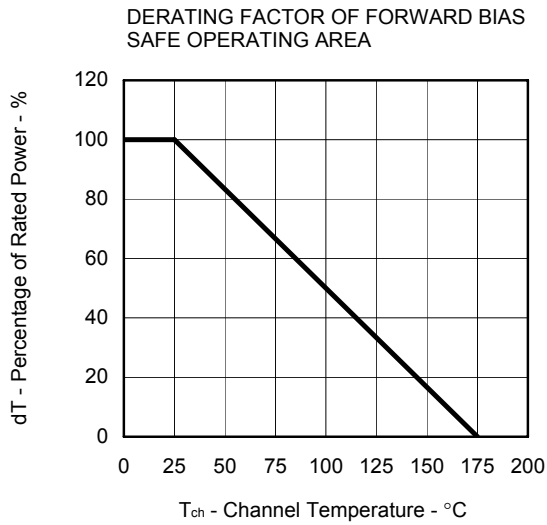
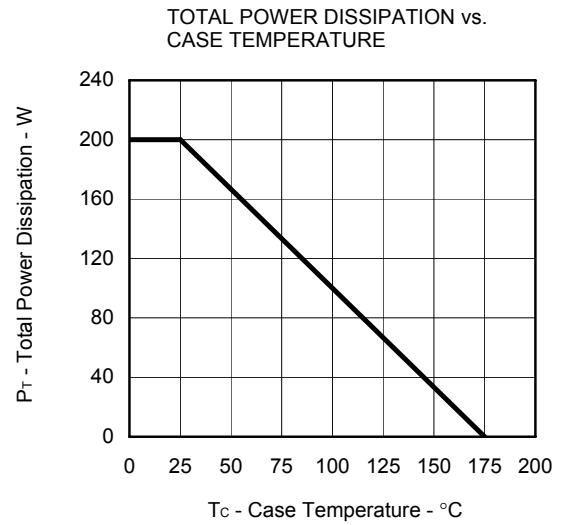
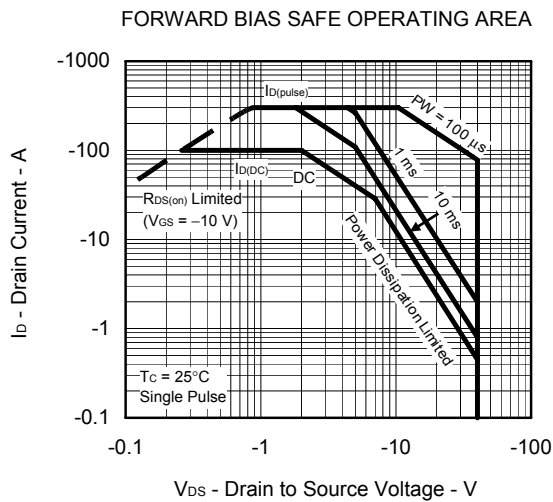
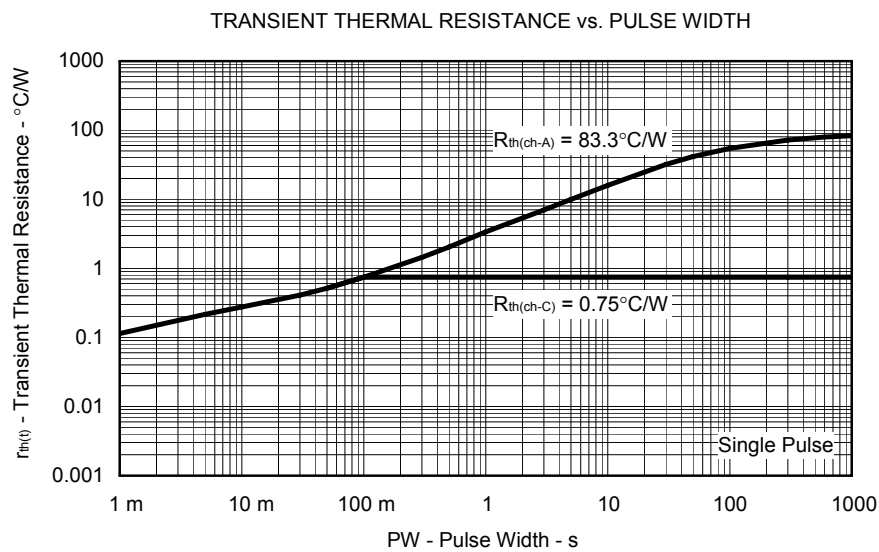
TEST CIRCUIT 2 SWITCHING TIME



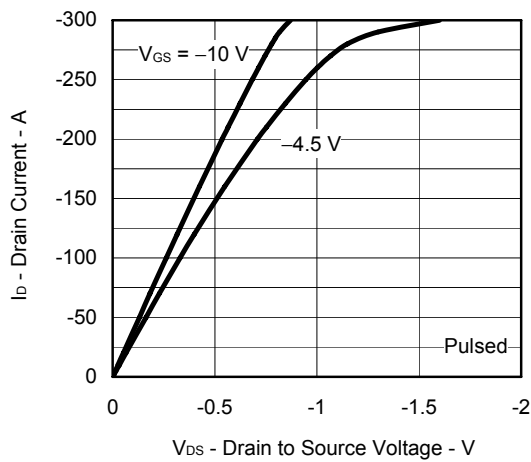
TEST CIRCUIT 3 GATE CHARGE



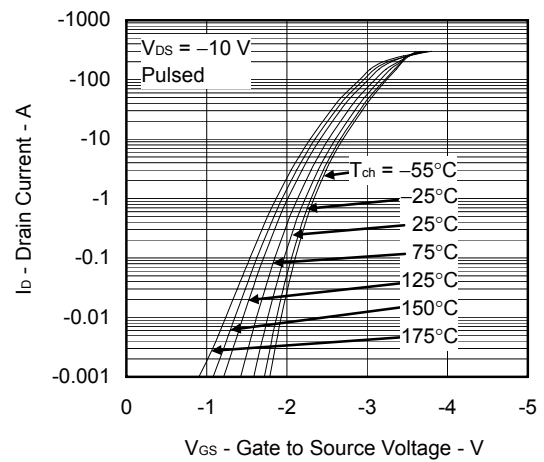
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)



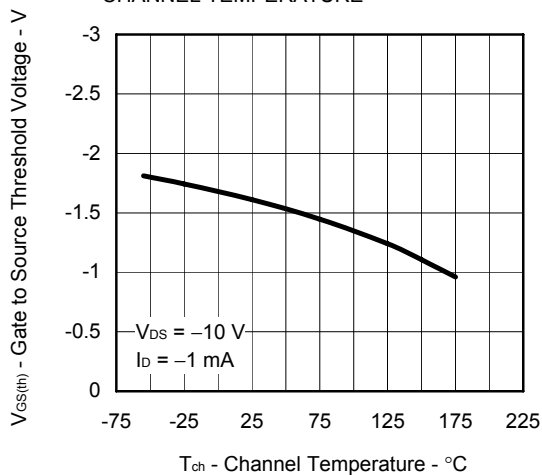
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



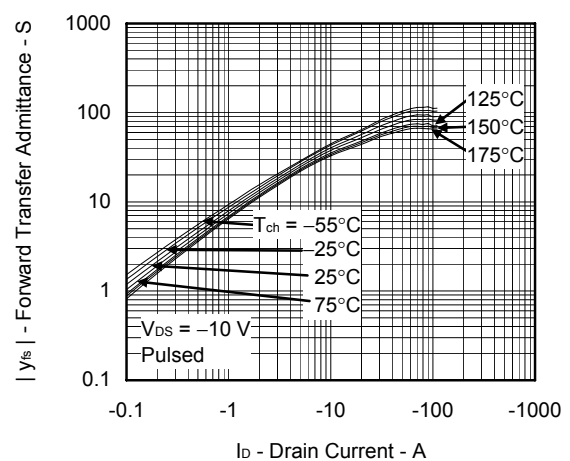
FORWARD TRANSFER CHARACTERISTICS



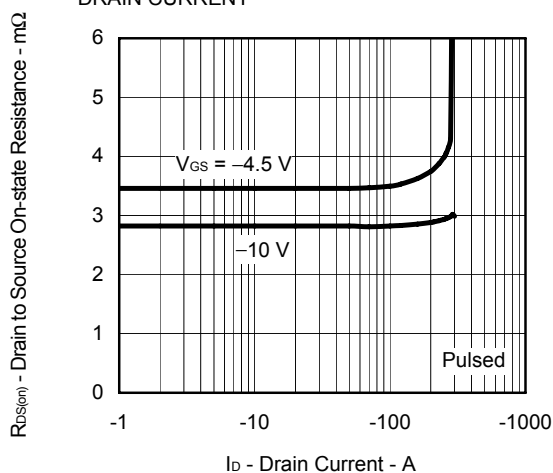
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE



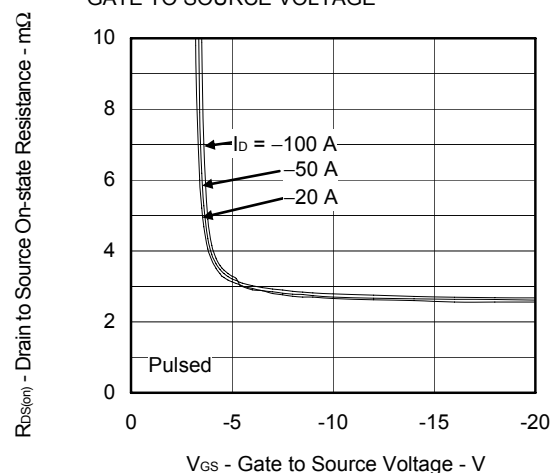
FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT

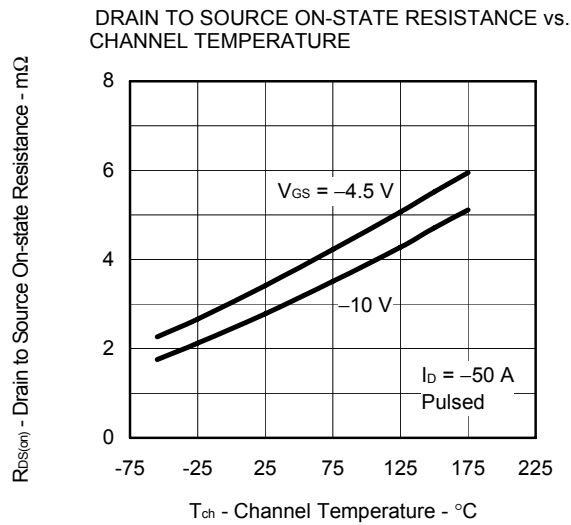
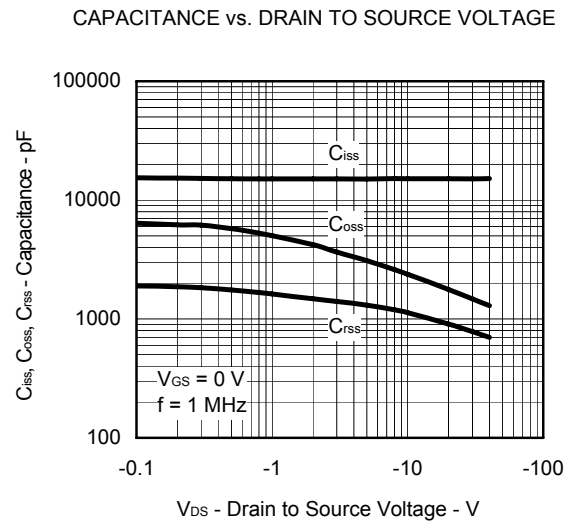
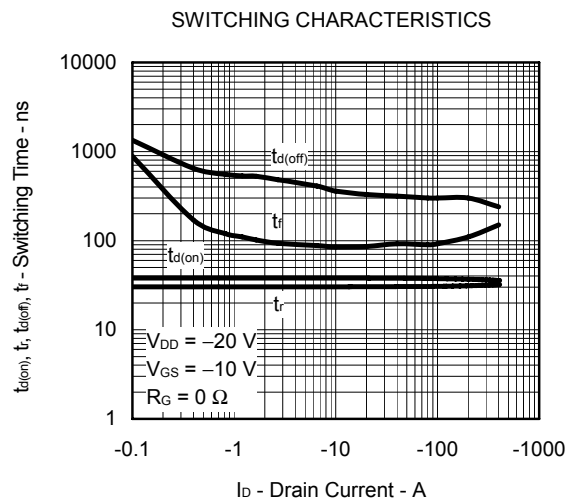
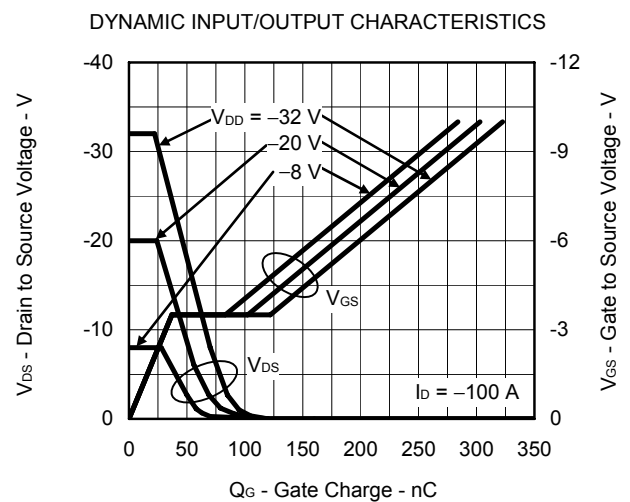
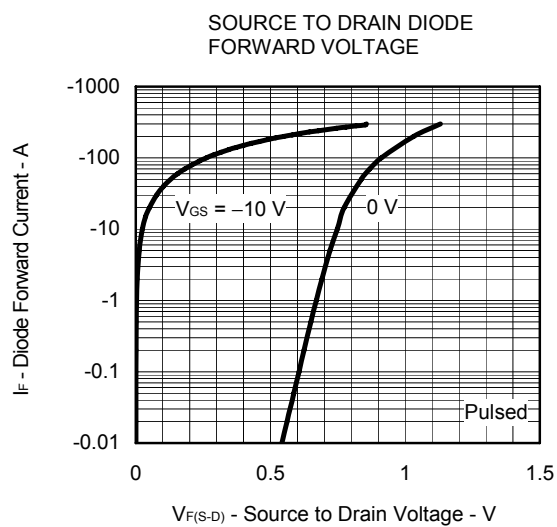
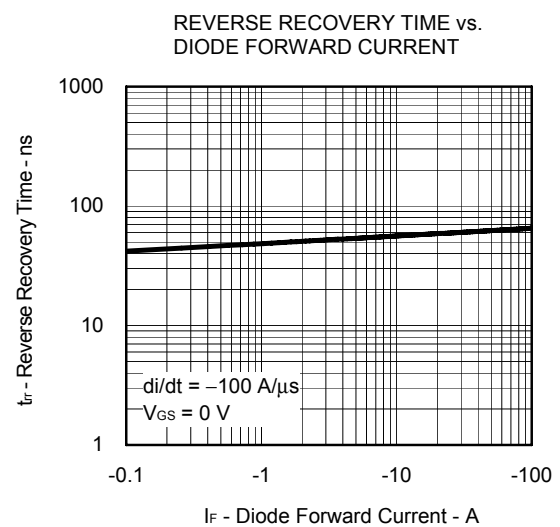


DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



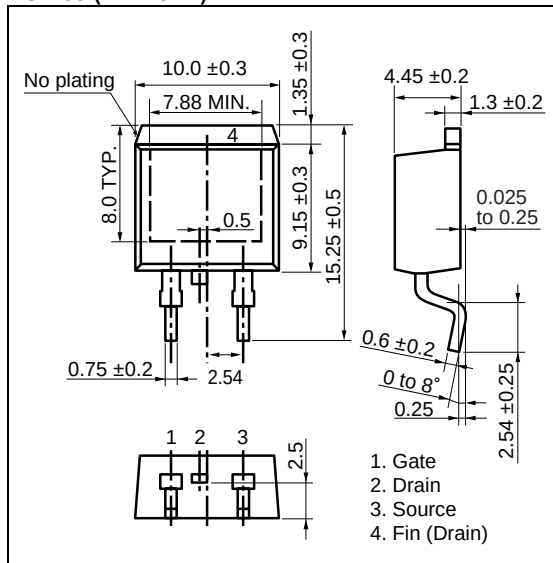
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



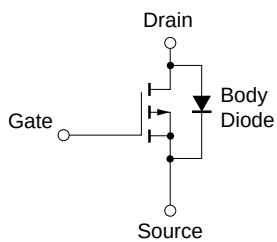


PACKAGE DRAWING (Unit: mm)

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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