RENESAS

DATA SHEET

MOS FIELD EFFECT TRANSISTOR
NP110N055PUJ

SWITCHING
N-CHANNEL POWER MOS FET

DESCRIPTION

The NP110N055PUJ is N-channel MOS Field Effect Transistor designed for high current switching applications.

ORDERING INFORMATION

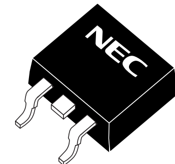
PART NUMBER	LEAD PLATING	PACKING	PACKAGE
NP110N055PUJ-E1B-AY Note	Pure Sn (Tin)	Tape 1000 p/reel	TO-263 (MP-25ZP) typ. 1.5 g
NP110N055PUJ-E2B-AY Note			

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

FEATURES

- Super low on-state resistance
  $R_{DS(on)}$ = 2.4 mΩ MAX. (V_{GS} = 10 V, I_D = 55 A)
- Low input capacitance
  C_{iss} = 9500 pF TYP.
- Designed for automotive application and AEC-Q101 qualified

(TO-263)



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	55	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25°C)	$I_{D(DC)}$	±110	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±440	A
Total Power Dissipation (T_C = 25°C)	P_{T1}	288	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 Energy Note2	E_{AS}	435	mJ
Repetitive Avalanche Current Note3	I_{AR}	66	A
Repetitive Avalanche Energy Note3	E_{AR}	435	mJ

Notes 1. PW ≤ 10 μs, Duty Cycle ≤ 1%

2. Starting T_{ch} = 25°C, V_{DD} = 28 V, R_G = 25 Ω, V_{GS} = 20 → 0 V, L = 100 μH

3. T_{ch} ≤ 150°C, R_G = 25 Ω

THERMAL RESISTANCE

Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.52	°C/W
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	°C/W

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.
Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

Document No. D19731EJ1V0DS00 (1st edition)
Date Published April 2009 NS
Printed in Japan

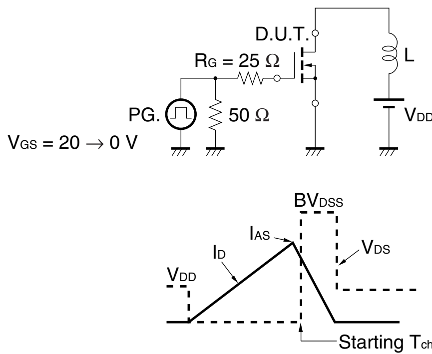
© NEC Electronics Corporation 2009

ELECTRICAL CHARACTERISTICS (T_A = 25°C)

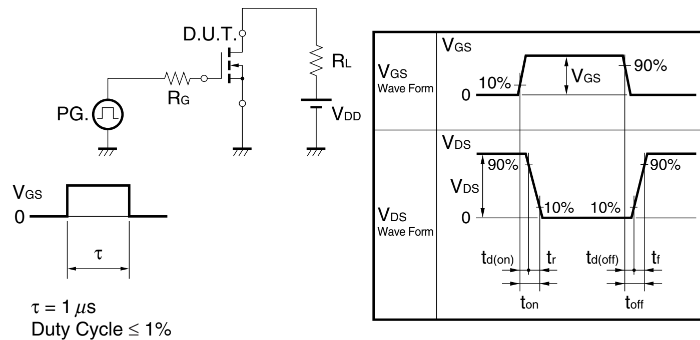
CHARACTERISTICS	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 55 V, V_{GS} = 0 V			1	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±20 V, V_{DS} = 0 V			±100	nA
Gate to Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.0	3.0	4.0	V
Forward Transfer Admittance Note	$\| y_{fs} \|$	V_{DS} = 5 V, I_D = 55 A	55	117		S
Drain to Source On-state Resistance Note	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 55 A		1.9	2.4	mΩ
Input Capacitance	C_{iss}	V_{DS} = 25 V,		9500	14250	pF
Output Capacitance	C_{oss}	V_{GS} = 0 V,		1060	1590	pF
Reverse Transfer Capacitance	C_{rss}	f = 1 MHz		320	580	pF
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 28 V, I_D = 55 A,		45	100	ns
Rise Time	t_r	V_{GS} = 10 V,		20	50	ns
Turn-off Delay Time	$t_{d(off)}$	R_G = 0 Ω		100	200	ns
Fall Time	t_f			10	30	ns
Total Gate Charge	Q_G	V_{DD} = 44 V,		150	230	nC
Gate to Source Charge	Q_{GS}	V_{GS} = 10 V,		35		nC
Gate to Drain Charge	Q_{GD}	I_D = 110 A		45		nC
Body Diode Forward Voltage Note	$V_{F(S-D)}$	I_F = 110 A, V_{GS} = 0 V		0.9	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 110 A, V_{GS} = 0 V,		64		ns
Reverse Recovery Charge	Q_{rr}	di/dt = 100 A/μs		138		nC

Note Pulsed test

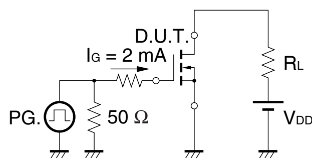
TEST CIRCUIT 1 AVALANCHE CAPABILITY



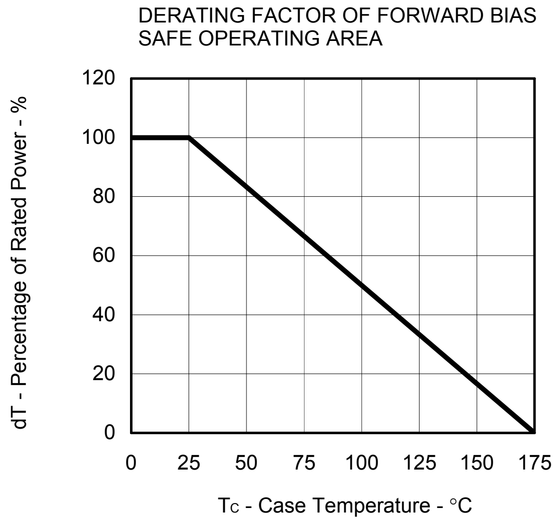
TEST CIRCUIT 2 SWITCHING TIME

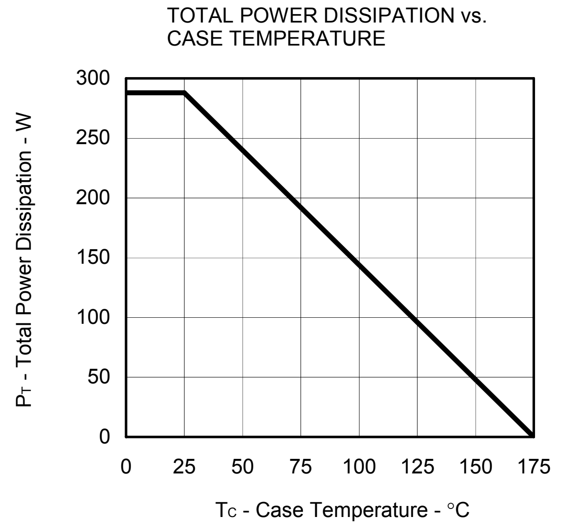


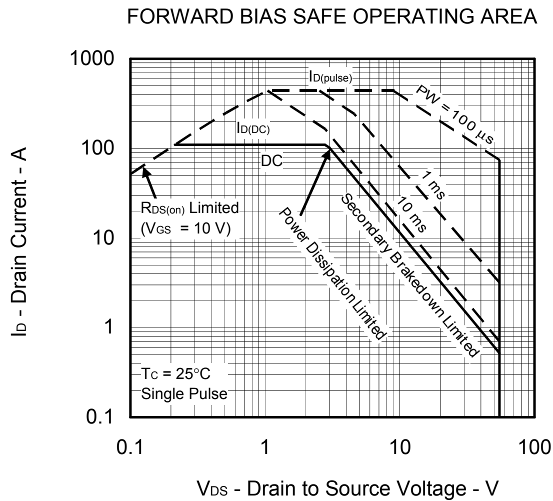
TEST CIRCUIT 3 GATE CHARGE

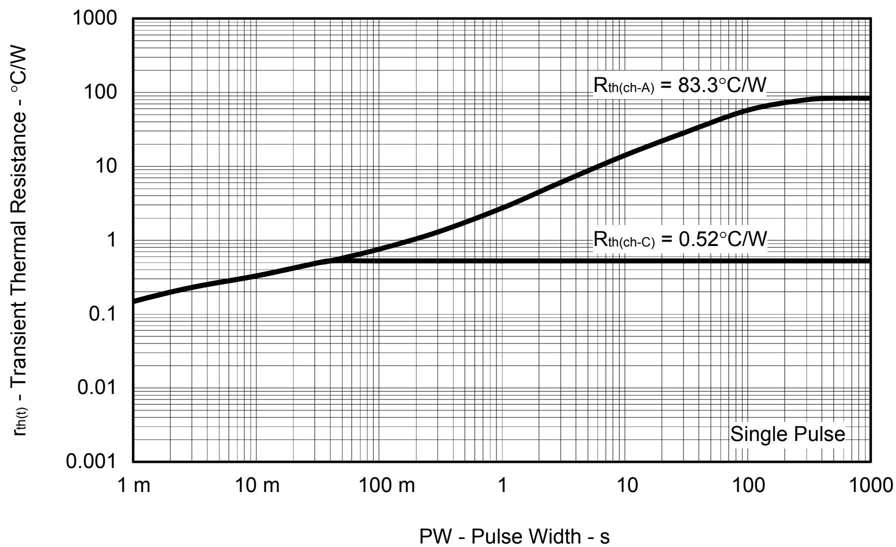


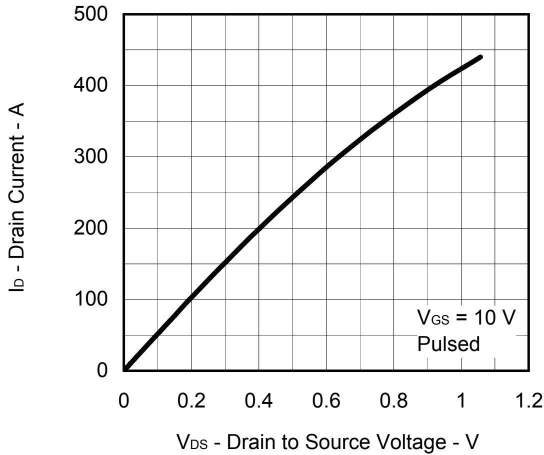
TYPICAL CHARACTERISTICS (T_A = 25°C)



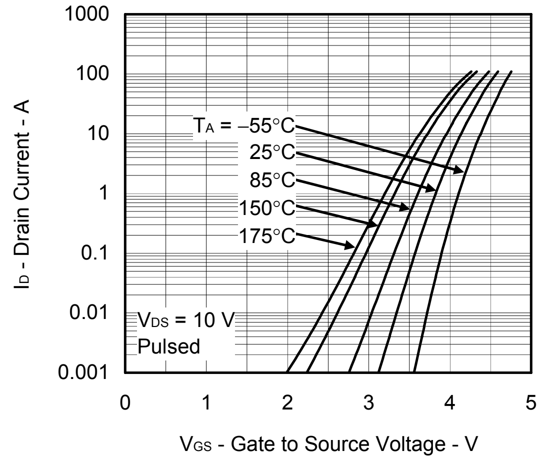




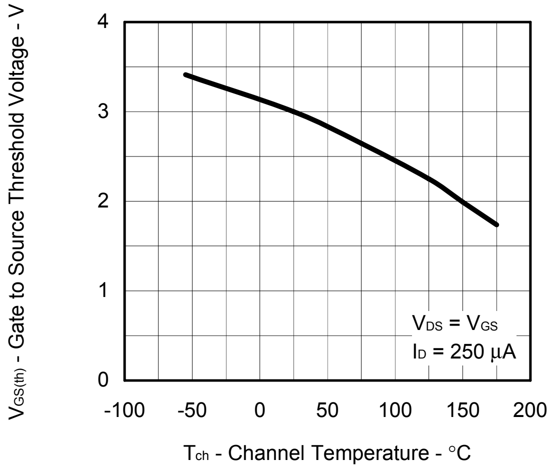




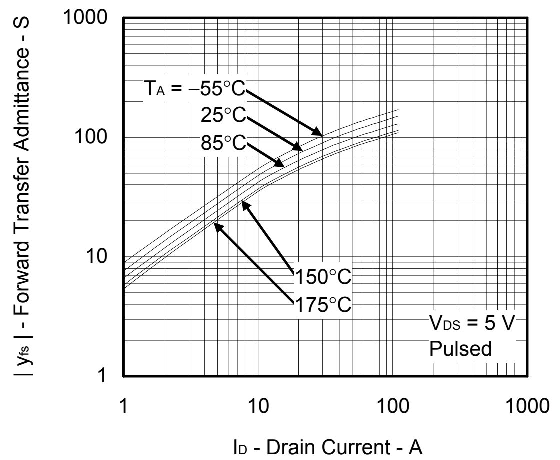
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE
500
400
300
200
100
0
0
0.2
0.4
0.6
0.8
1
1.2
ID - Drain Current - A
VDS - Drain to Source Voltage - V
VGS = 10 V
Pulsed



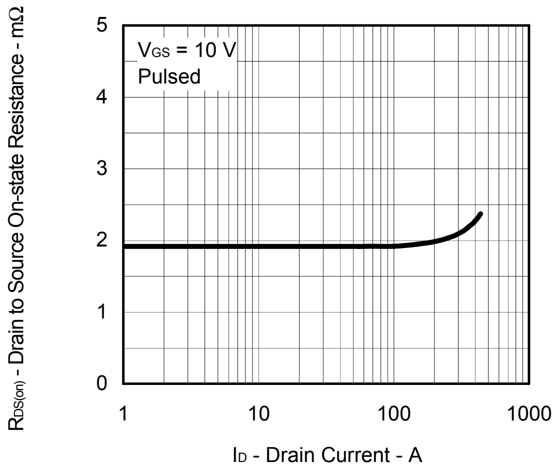
FORWARD TRANSFER CHARACTERISTICS
1000
100
10
1
0.1
0.01
0.001
0
1
2
3
4
5
ID - Drain Current - A
VGS - Gate to Source Voltage - V
TA = –55°C
25°C
85°C
150°C
175°C
VDS = 10 V
Pulsed



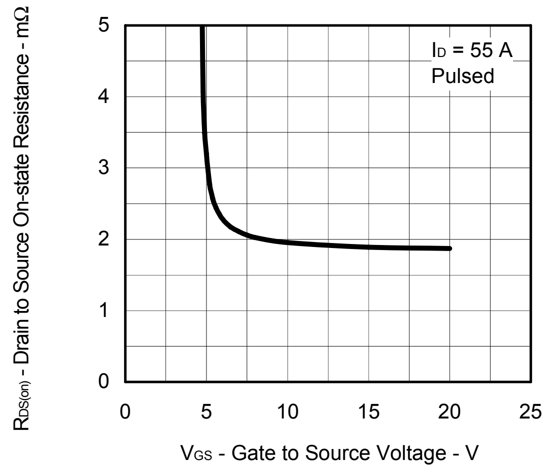
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE
4
3
2
1
0
-100
-50
0
50
100
150
200
VGS(th) - Gate to Source Threshold Voltage - V
Tch - Channel Temperature - °C
VDS = VGS
ID = 250 μA



FORWARD TRANSFER ADMITTANCE vs.
DRAIN CURRENT
1000
100
10
1
1
10
100
1000
| yfs | - Forward Transfer Admittance - S
ID - Drain Current - A
TA = –55°C
25°C
85°C
150°C
175°C
VDS = 5 V
Pulsed

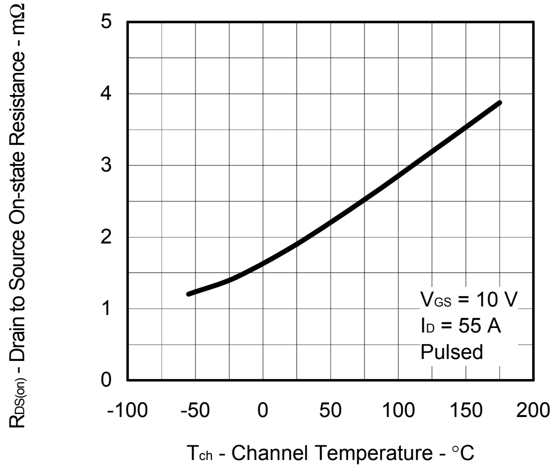


DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT
5
4
3
2
1
0
1
10
100
1000
RDS(on) - Drain to Source On-state Resistance - mΩ
ID - Drain Current - A
VGS = 10 V
Pulsed

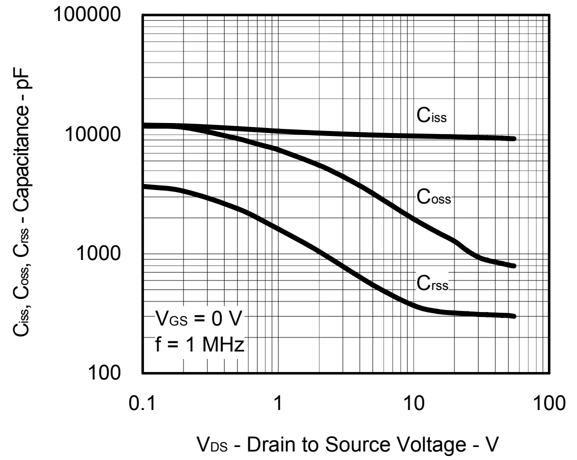


DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE
5
4
3
2
1
0
0
5
10
15
20
25
RDS(on) - Drain to Source On-state Resistance - mΩ
VGS - Gate to Source Voltage - V
ID = 55 A
Pulsed

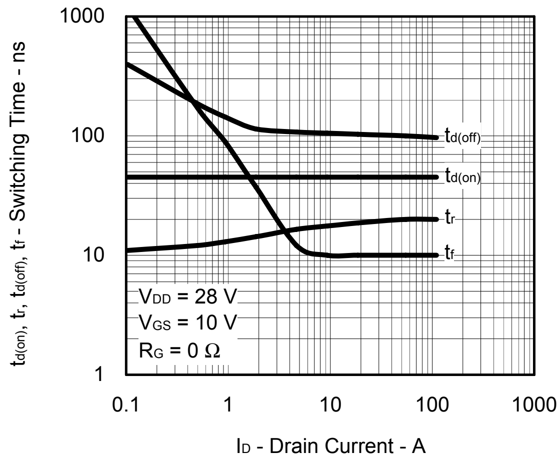
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



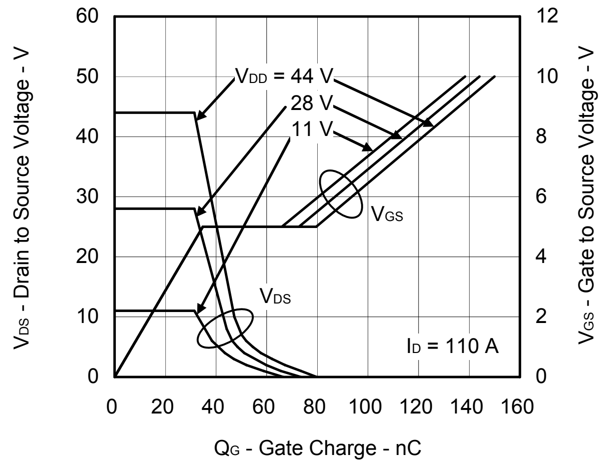
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



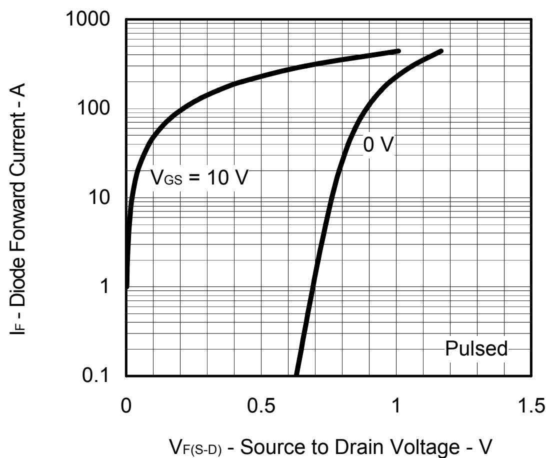
SWITCHING CHARACTERISTICS



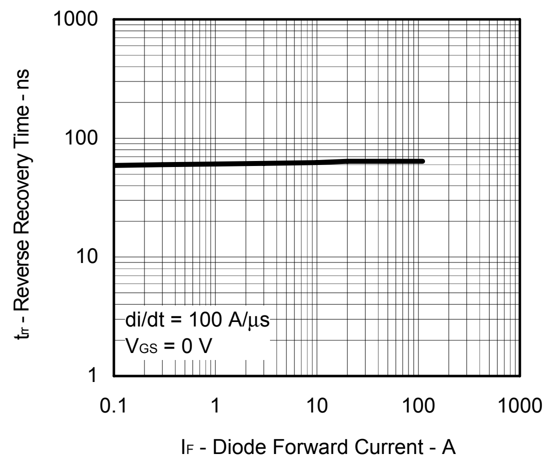
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

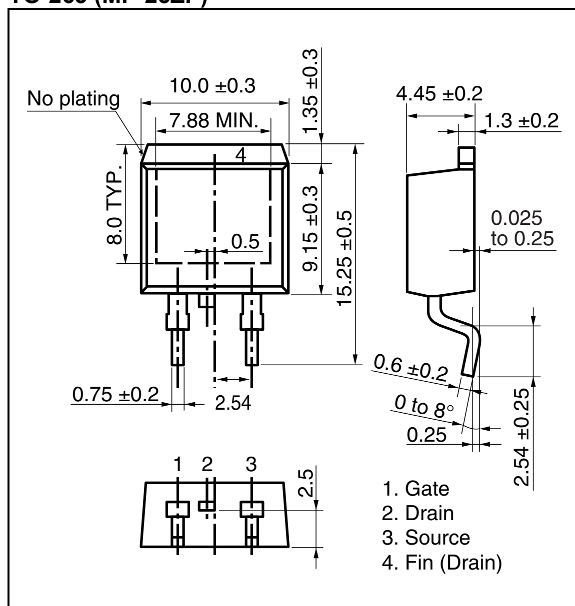


REVERSE RECOVERY TIME vs. DIODE FORWARD CURRENT

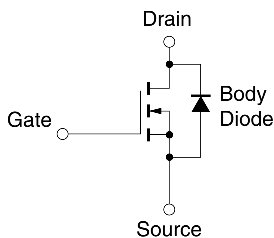


PACKAGE DRAWING (Unit: mm)

TO-263 (MP-25ZP)



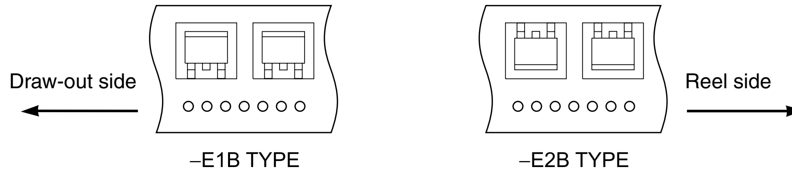
EQUIVALENT CIRCUIT



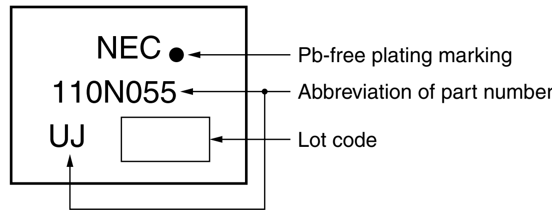
Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

TAPE INFORMATION

There are two types (-E1B, -E2B) of taping depending on the direction of the device.



MARKING INFORMATION



RECOMMENDED SOLDERING CONDITIONS

The NP110N055PUJ should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, please contact an NEC Electronics sales representative.

For technical information, see the following website.

Semiconductor Device Mount Manual (http://www.necel.com/pkg/en/mount/index.html)

Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared reflow	Maximum temperature (Package's surface temperature): 260°C or below Time at maximum temperature: 10 seconds or less Time of temperature higher than 220°C: 60 seconds or less Preheating time at 160 to 180°C: 60 to 120 seconds Maximum number of reflow processes: 3 times Maximum chlorine content of rosin flux (percentage mass): 0.2% or less	IR60-00-3
Partial heating	Maximum temperature (Pin temperature): 350°C or below Time (per side of the device): 3 seconds or less Maximum chlorine content of rosin flux: 0.2% (wt.) or less	P350

Caution Do not use different soldering methods together (except for partial heating).