BRP100N220P6

N-channel Enhancement Mode Power MOSFET

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FEATURES

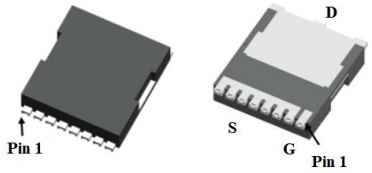
- 100V, 220A

  $R_{DS(ON)}$ < 1.45mΩ @ VGS = 10V
- Ultra-low $R_{DS(ON)}$
- Low Gate Charge
- Lead Free

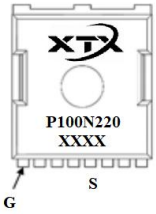
APPLICATIONS

- Motor Driving in Power Tool, E-vehicle, Robotics
- Current Switching in DC/DC & AC/DC
- Power Management

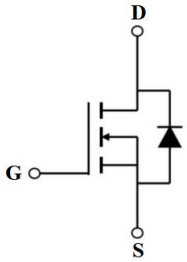
RoHS



TOLL-8



Marking and Pin Assignment



Schematic Diagram

PACKAGE MARKING AND ORDERING INFORMATION

OPN	Marking	Package	Quantity
BRP100N220P6	P100N220	TOLL-8	2000pcs/Reel

ABSOLUTE MAXIMUM RATINGS

Symbol	Definition		Ratings	Unit
V_{DS}	Drain-to-Source Voltage		100	V
V_{GS}	Gate-to-Source Voltage		±20	V
I_D	Continuous Drain Current	T_C = 25°C	220	A
		T_C = 100°C	146	A
I_{DM}	Pulsed Drain Current (1)		880	A
E_{AS}	Single Pulsed Avalanche Energy (2)		648	mJ
P_D	Power Dissipation, T_C = 25°C		500	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.25	°C/W
T_J, T_{STG}	Junction & Storage Temperature Range		-55 ~ +150	°C

ELECTRICAL CHARACTERISTICS（All test condition is T_J=25°C, unless otherwise noted）

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	100	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80V, V_{GS} = 0V	-	-	1	uA
I_{GSS}	Gate-Body Leakage Current	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250uA	2.0	3.0	4.0	V
$R_{DS(ON)}$	Static Drain-Source ON-Resistance(3)	V_{GS} = 10V, I_D = 30A	-	1.2	1.45	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 50V, f = 1MHz	-	13258	-	pF
C_{oss}	Output Capacitance		-	2058	-	pF
C_{rss}	Reverse Transfer Capacitance		-	111	-	pF
R_g	Gate Resistance	V_{GS} = 0V, V_{DS} = 0V, f = 1MHz	-	3.6	-	Ω
Q_g	Total Gate Charge	V_{GS} = 0 to 10V V_{DS} = 50V, I_D = 30A	-	240	-	nC
Q_{gs}	Gate Source Charge		-	60	-	nC
Q_{gd}	Gate Drain("Miller") Charge		-	59	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{GS} = 10V, V_{DS} = 50V I_D = 30A, R_{GEN} = 4.5Ω	-	33	-	ns
t_r	Turn-On Rise Time		-	69	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	172	-	ns
t_f	Turn-Off Fall Time		-	105	-	ns
Drain-Source Diode Characteristics						
I_S	Continuous Source Current		-	-	220	A
V_{SD}	Forward on voltage	V_{GS} = 0V, I_S = 30A	-	-	1.3	V
T_{rr}	Reverse Recovery Time	I_F = 30A, di/dt = 100A/us	-	124	-	ns
Q_{rr}	Reverse Recovery Charge		-	388	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting T_J=25°C, V_{DD}=50V, V_G=10V, L=0.5mH, I_{AS}=50A
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 0.5%.

TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 1 - Typical Output Characteristics

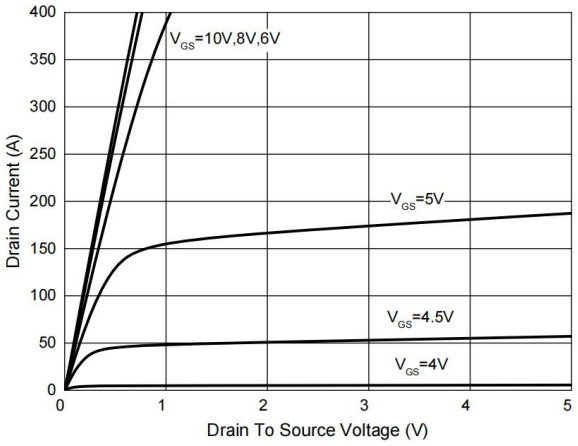


Fig. 2 - Transfer Characteristics

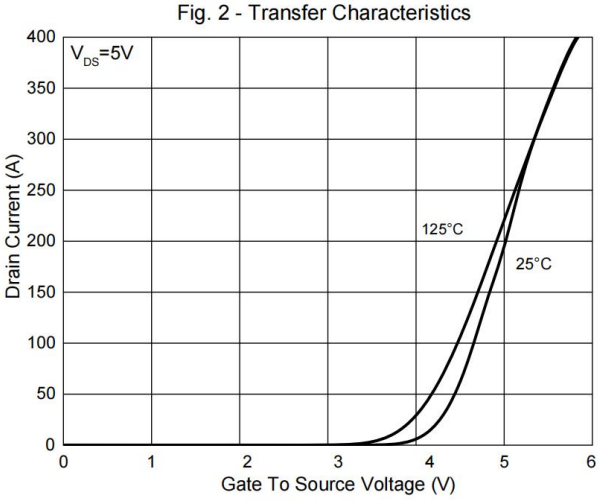


Fig. 3 - $R_{DS(ON)}$—V_{GS}

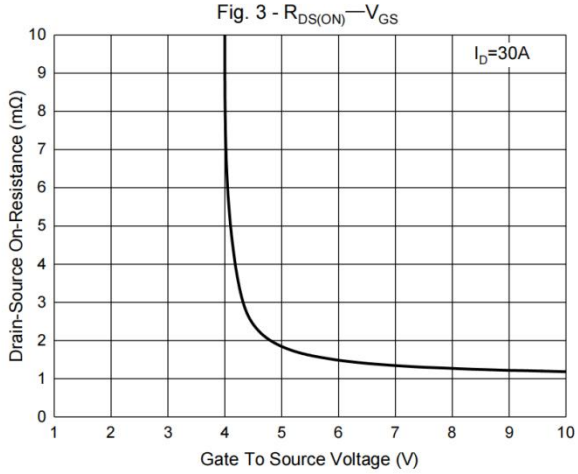


Fig. 4 - $R_{DS(ON)}$—I_D

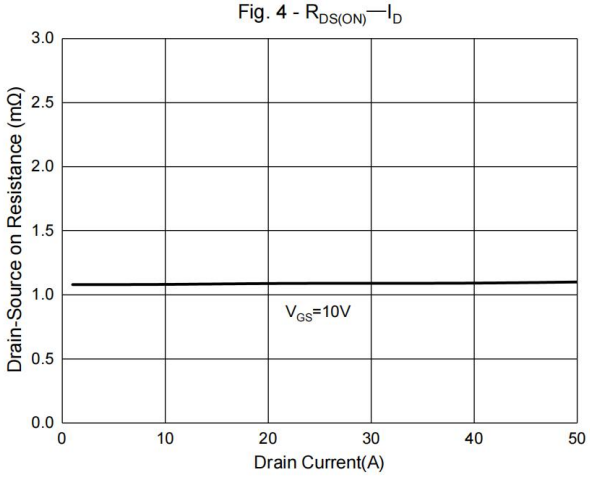


Fig. 5 - Capacitance Characteristics

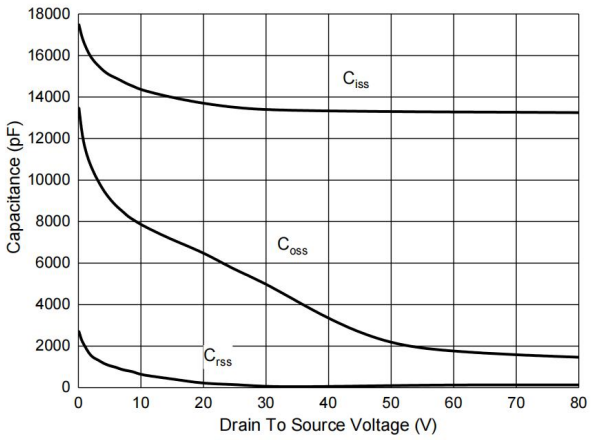
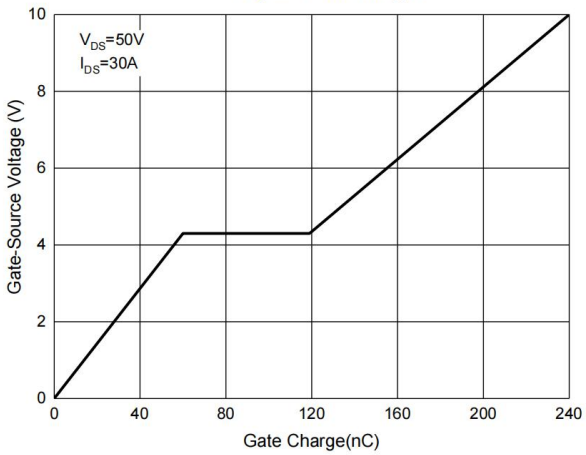


Fig. 6 - Gate Charge



TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 7 - Nomalized Threshold Voltage

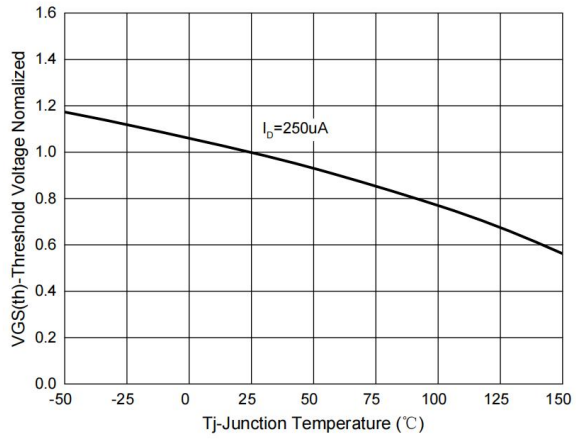


Fig. 8 - Normalized On Resistance Characteristics

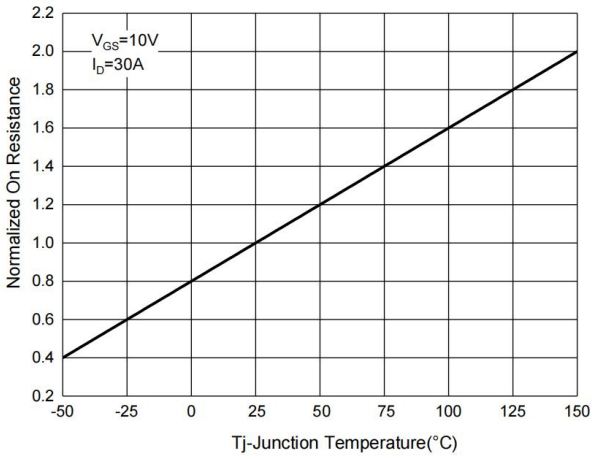


Fig. 9 - I_S—V_{SD}

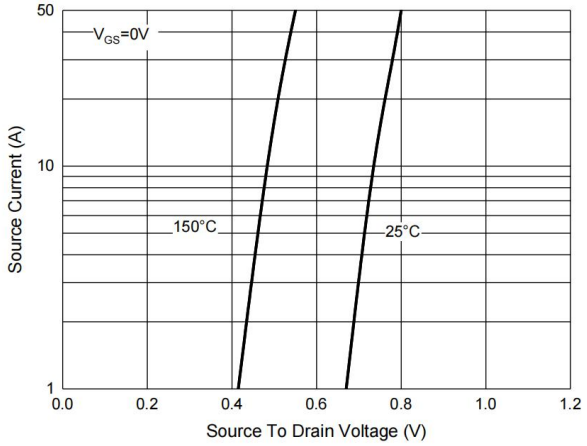


Fig. 10 - Drain Current

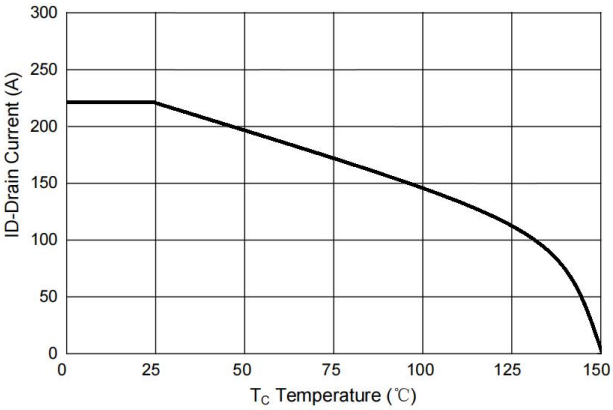


Fig. 11 - PD Dissipation

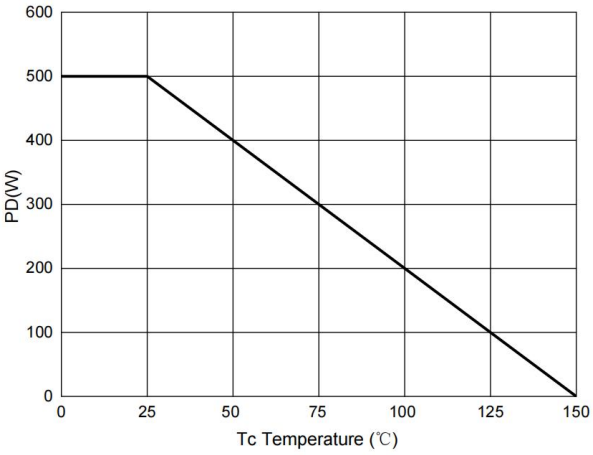
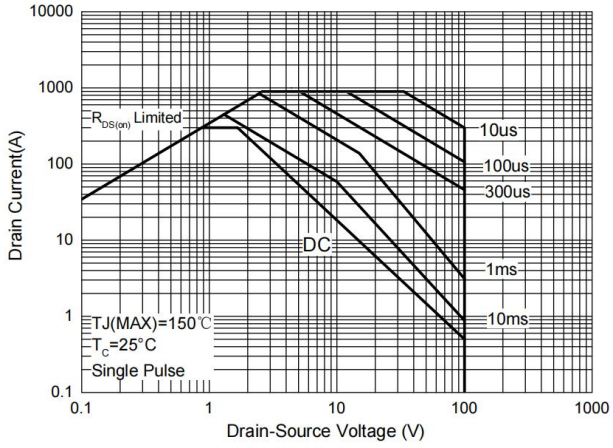
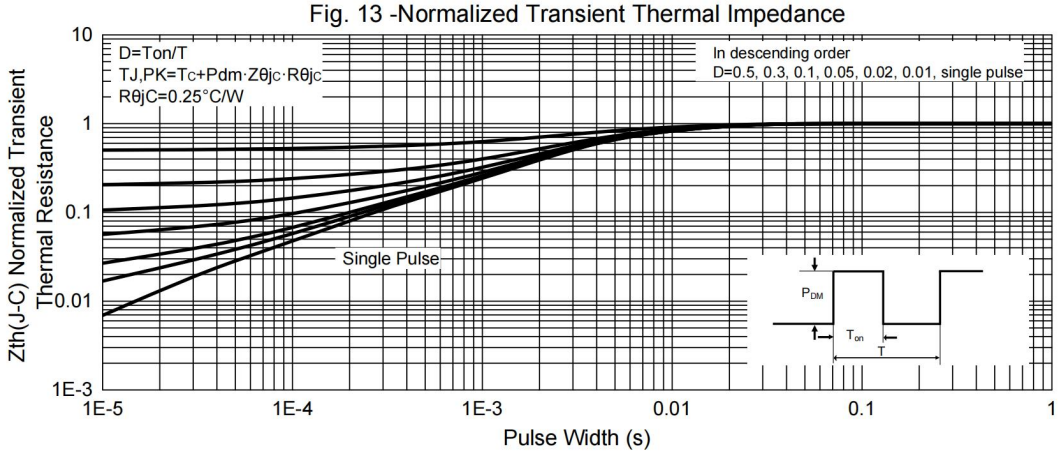


Fig. 12 - Safe Operation Area



TYPICAL PERFORMANCE CHARACTERISTICS

Fig. 13 -Normalized Transient Thermal Impedance



TEST CIRCUIT

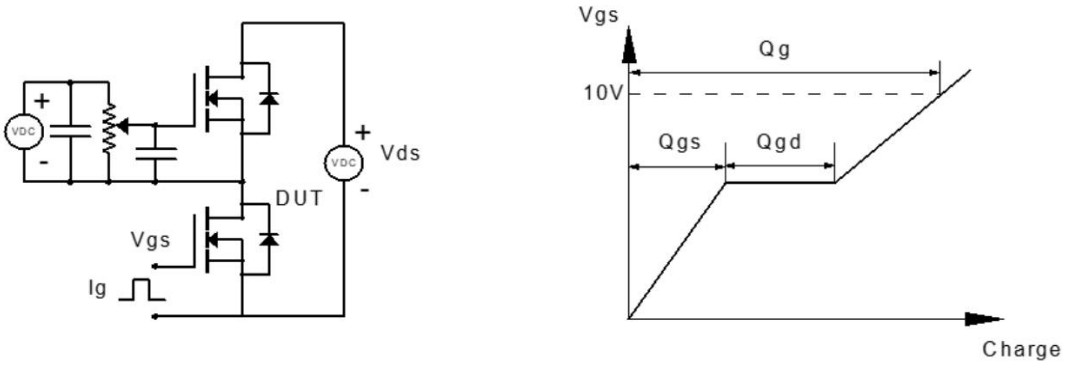


Figure 14: Gate Charge Test Circuit & Waveform

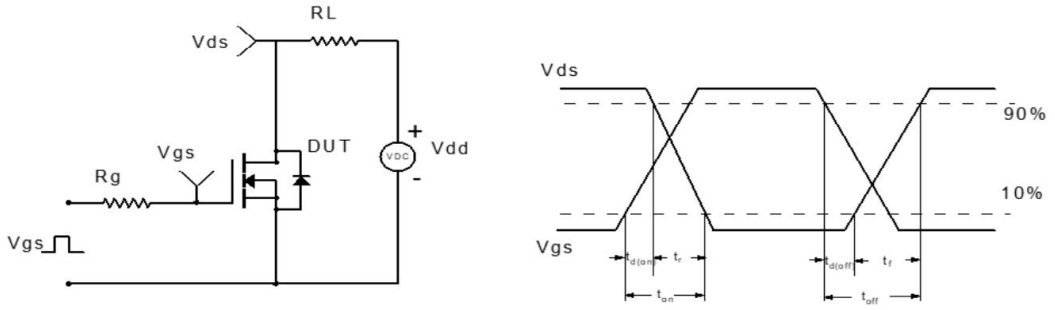


Figure 15: Resistive Switching Test Circuit & Waveform

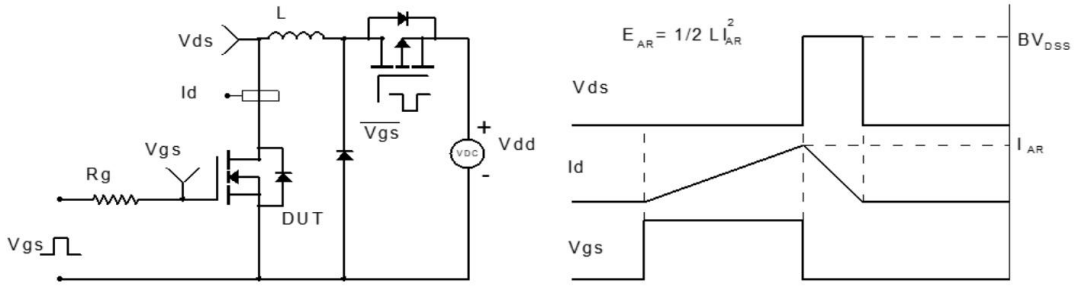


Figure 16: Unclamped Inductive Switching Test Circuit & Waveform

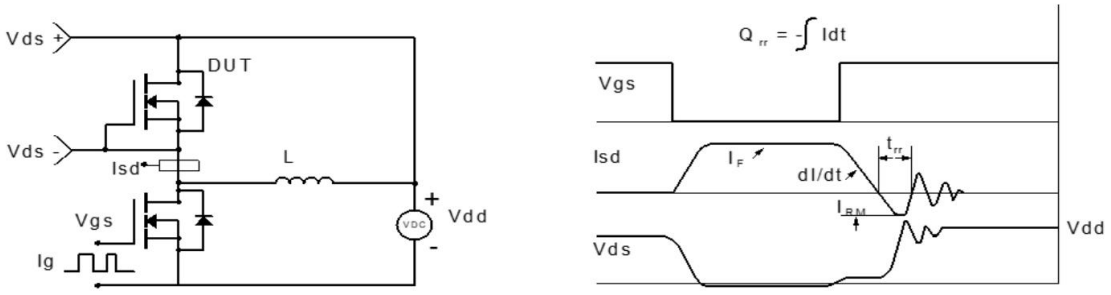
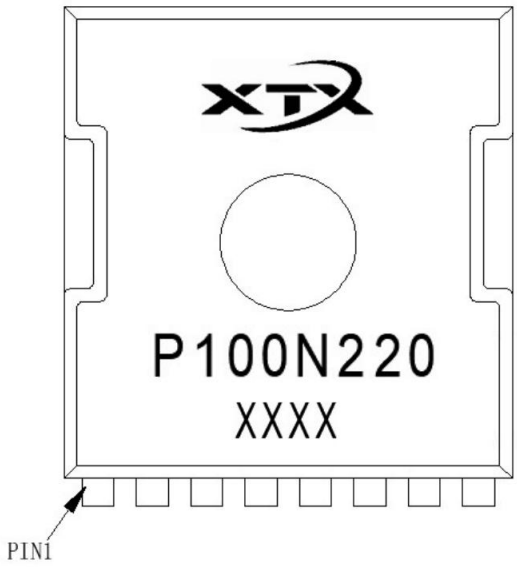


Figure 17: Diode Recovery Test Circuit & Waveform

MARKING INFORMATION



1st Line: XTX Logo

2nd Line: Part Number（P100N220）

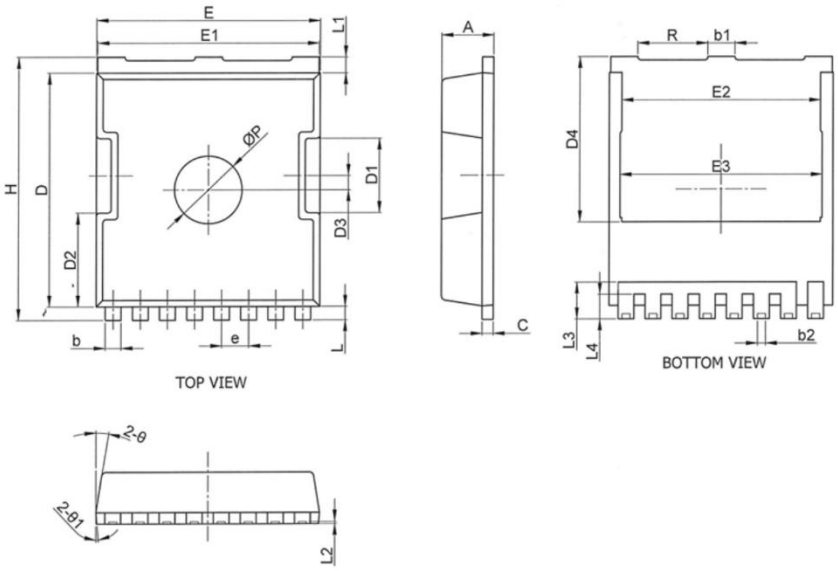
3rd Line: Date Code （XXXX）

XX: Year

XX: Week（01 to 53）

Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033
Code	21	22	23	24	25	26	27	28	29	30	31	32	33

DETAIL PACKAGE OUTLINE DRAWING（TOLL-8）



SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	2.20	2.30	2.40
b	0.60	0.70	0.80
b1	1.10	1.20	1.30
b2	0.26	0.36	0.51
C	0.40	0.50	0.60
D	10.30	10.40	10.50
D1	3.20	3.30	3.40
D2	4.08	4.18	4.28
D3	0.53	0.63	0.73
D4	7.25	7.35	7.50
E	9.80	9.90	10.00
E1	9.70	9.80	9.90
E2	8.70	8.80	8.90
E3	8.85	8.95	9.05
e	1.20 BSC		
H	11.50	11.70	11.90
L	0.50	0.60	0.70
L1	0.60	0.70	0.80
L2	0.05	0.10	0.20
L3	1.45	1.65	1.85
L4	0.90	1.10	1.30
P	2.00	3.00	4.00
R	3.00	3.10	3.20
θ	7°	9°	11°
θ1	3°	5°	7°

REVISION HISTORY

Number	Description
Rev 1.0	BRP100N220P6 datasheet release