



BRP80N120P8

N-channel Enhancement Mode Power MOSFET

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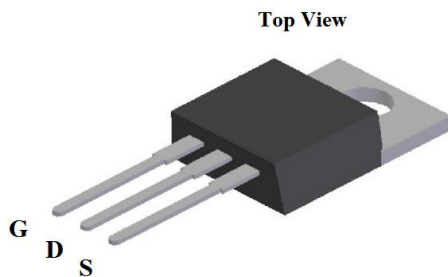
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FEATURES

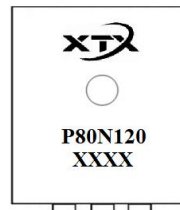
- ◆ 80V, 120A
- ◆ $R_{DS(ON)} < 5.5m\Omega @ V_{GS} = 10V$
- ◆ Ultra-low $R_{DS(ON)}$
- ◆ Low Gate Charge
- ◆ Lead Free

APPLICATIONS

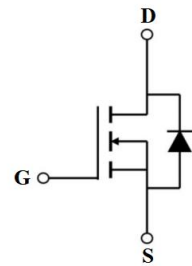
- ◆ Motor Driving in Power Tool, E-vehicle, Robotics
- ◆ Current Switching in DC/DC & AC/DC
- ◆ Power Management



TO220FB-3L



Marking and Pin Assignment



Schematic Diagram

PACKAGE MARKING AND ORDERING INFORMATION

OPN	Marking	Package	Quantity
BRP80N120P8	P80N120	TO220FB-3L	50pcs/Tube

ABSOLUTE MAXIMUM RATINGS

Symbol	Definition		Ratings	Unit
V_{DS}	Drain-to-Source Voltage		80	V
V_{GS}	Gate-to-Source Voltage		± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ C$	120	A
		$T_C = 100^\circ C$	80	A
I_{DM}	Pulsed Drain Current ⁽¹⁾		480	A
E_{AS}	Single Pulsed Avalanche Energy ⁽²⁾		396	mJ
P_D	Power Dissipation, $T_C = 25^\circ C$		182	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		0.65	$^\circ C/W$
T_J, T_{STG}	Junction & Storage Temperature Range		$-55 \sim +150$	$^\circ C$

ELECTRICAL CHARACTERISTICS (All test condition is $T_J=25^{\circ}\text{C}$, 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	80	-	-	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 = 20A		4.4	5.5	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{GS} = 0V, V _{DS} = 40V, f = 1MHz	3507	3570	3832	pF
C _{oss}	Output Capacitance		613	678	712	pF
C _{rss}	Reverse Transfer Capacitance		17	19	22	pF
R _g	Gate Resistance	V _{GS} = 0V, V _{DS} = 0V, f = 1MHz	-	1.5	-	Ω
Q _g	Total Gate Charge	V _{GS} = 0 to 10V V _{DS} = 40V, I _D = 20A	-	51	-	nC
Q _{gs}	Gate Source Charge		-	20	-	nC
Q _{gd}	Gate Drain("Miller") Charge		-	10	-	nC
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{GS} = 10V, V _{DS} = 40V R _L = 2Ω, R _{GEN} = 3Ω	-	15	-	ns
t _r	Turn-On Rise Time		-	23	-	ns
t _{d(off)}	Turn-Off Delay Time		-	31	-	ns
t _f	Turn-Off Fall Time		-	13	-	ns
Drain-Source Diode Characteristics						
I _S	Continuous Source Current		-	-	120	A
V _{SD}	Forward on voltage	V _{GS} = 0V, I _S = 1A	-	-	1.0	V
T _{rr}	Reverse Recovery Time	I _F = 15A, di/dt = 100A/us	-	57	-	ns
Q _{rr}	Reverse Recovery Charge		-	91	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature.
2. E_{AS} condition: Starting $T_J=25^{\circ}\text{C}$, $V_{DD}=40\text{V}$, $V_G=10\text{V}$, $L=3\text{mH}$, $I_{AS}=16.2\text{A}$
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 0.5\%$.

TYPICAL PERFORMANCE CHARACTERISTICS

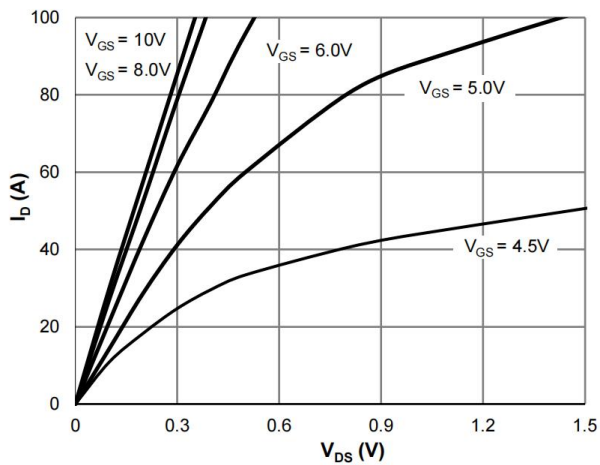


Figure 1: Saturation Characteristics

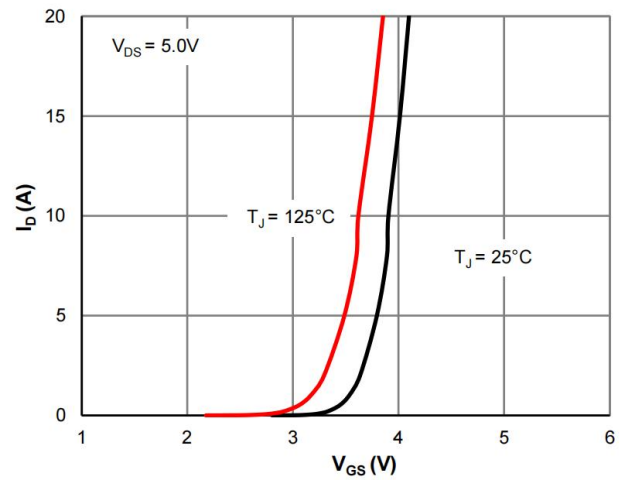


Figure 2: Transfer Characteristics

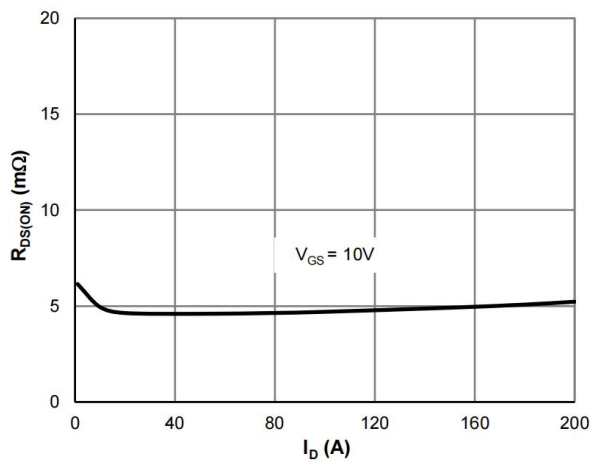


Figure 3: $R_{DS(ON)}$ vs. Drain Current

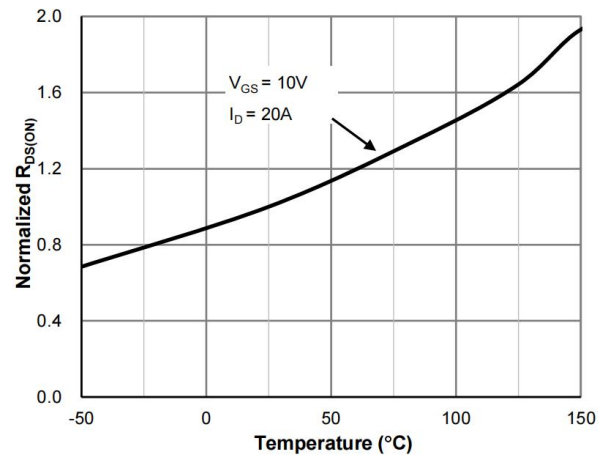


Figure 4: $R_{DS(ON)}$ vs. Junction Temperature

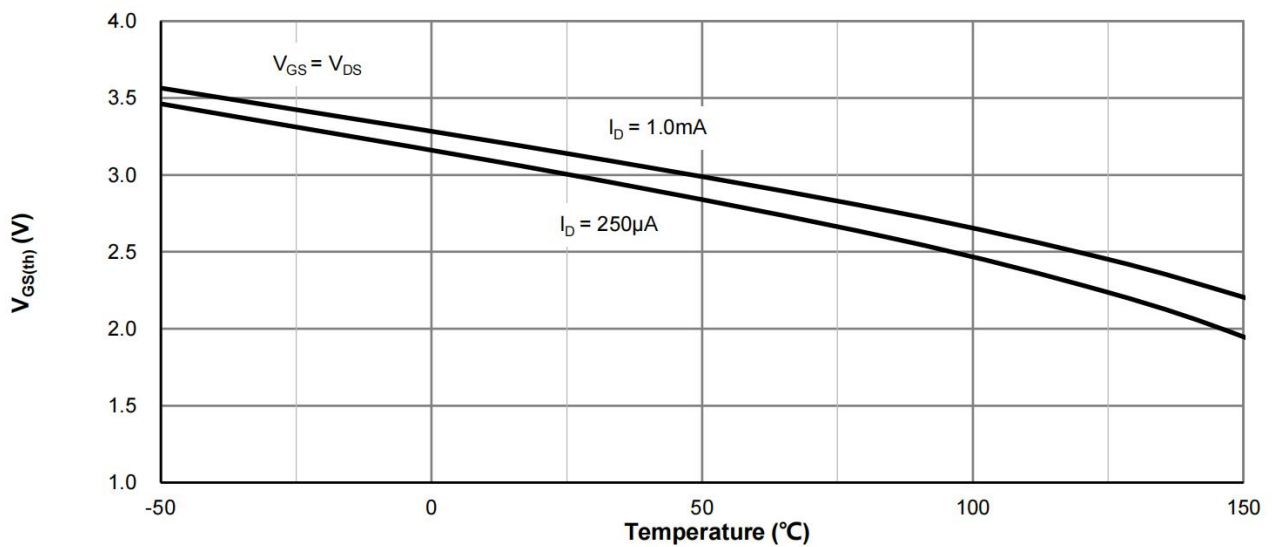


Figure 5: $V_{GS(th)}$ vs. Junction Temperature

TYPICAL PERFORMANCE CHARACTERISTICS

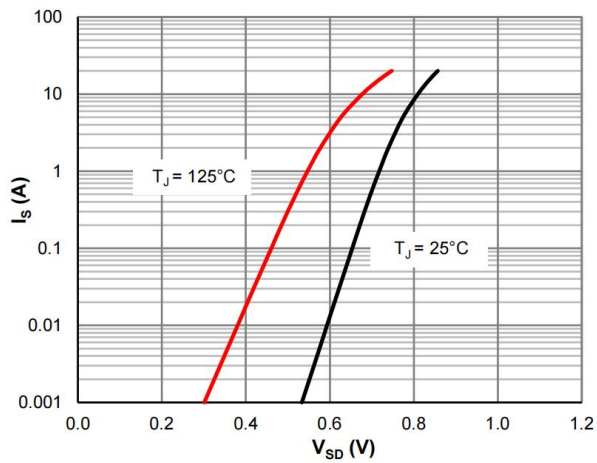


Figure 7: Body-Diode Characteristics

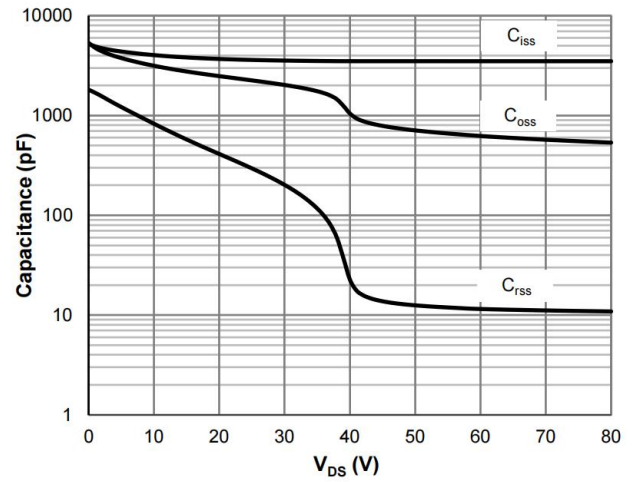


Figure 8: Capacitance Characteristics

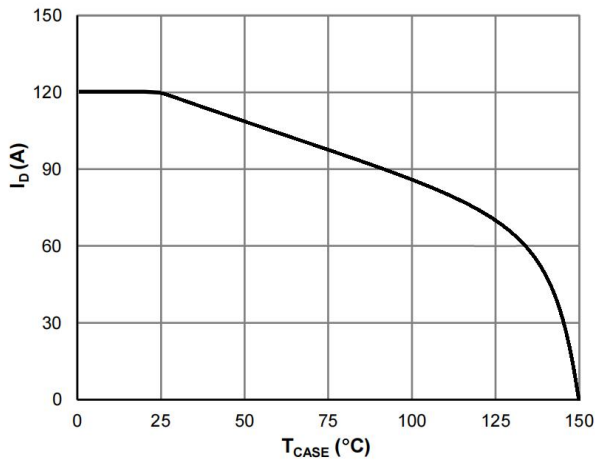


Figure 9: Current De-rating

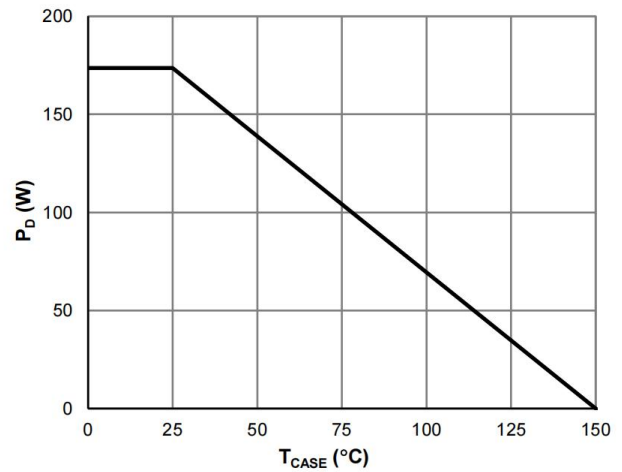


Figure 10: Power De-rating

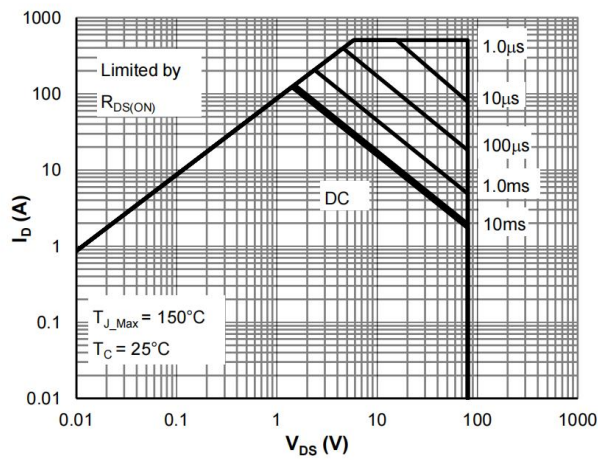


Figure 11: Maximum Safe Operating Area

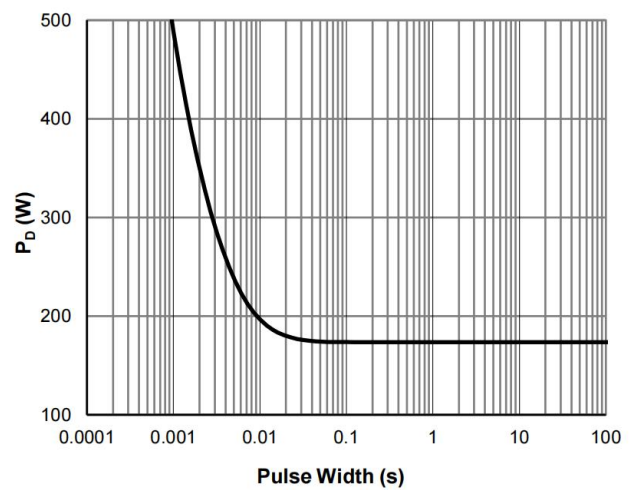


Figure 12: Single Pulse Power Rating, Junction-to-Case

TYPICAL PERFORMANCE CHARACTERISTICS

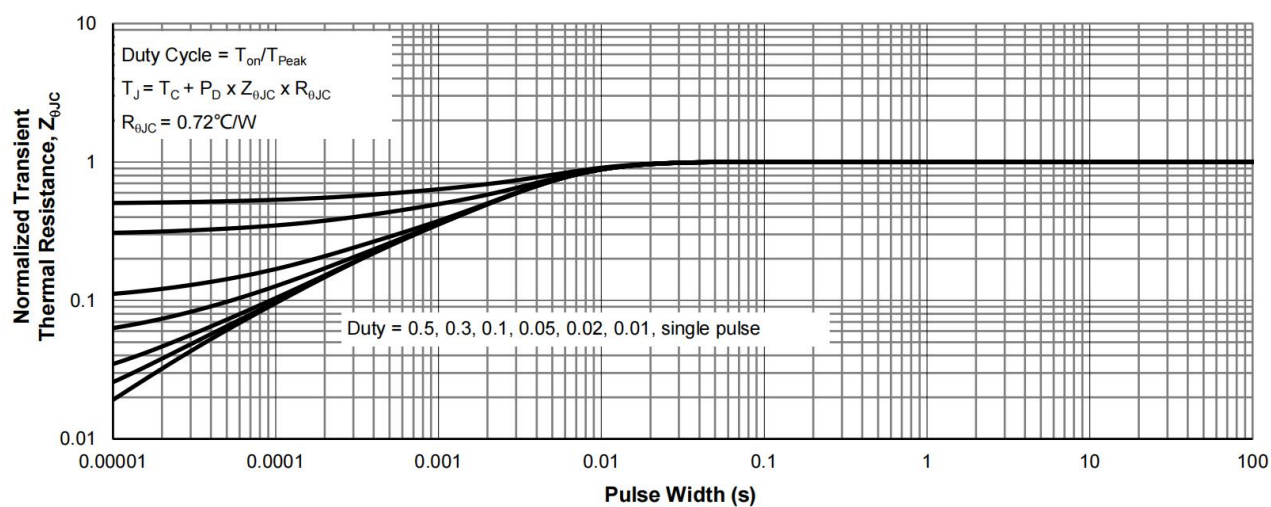


Figure 13: Normalized Maximum Transient Thermal Impedance

TEST CIRCUIT

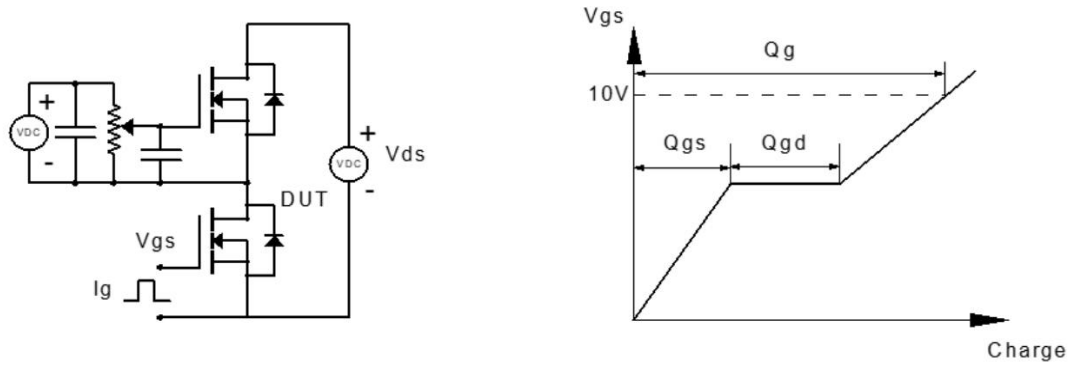


Figure 14: Gate Charge Test Circuit & Waveform

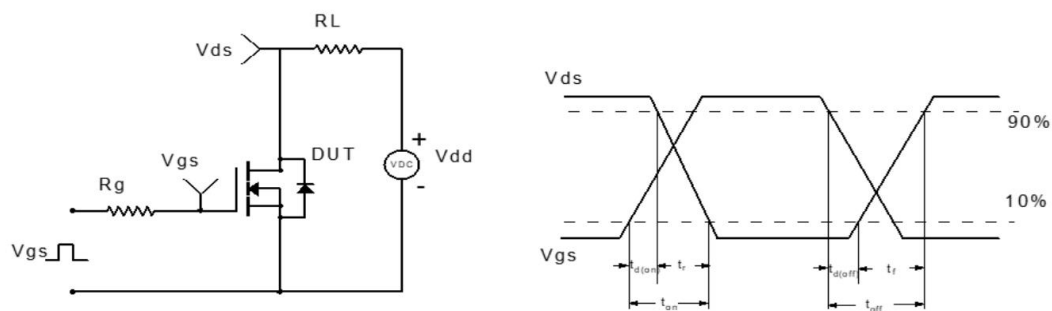


Figure 15: Resistive Switching Test Circuit & Waveform

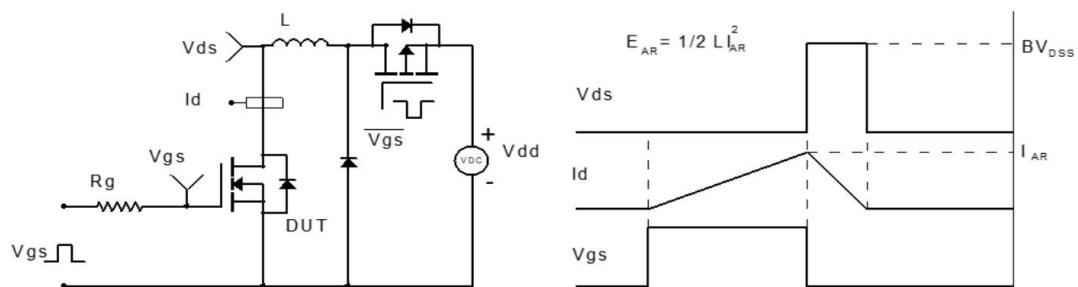


Figure 16: Unclamped Inductive Switching Test Circuit & Waveform

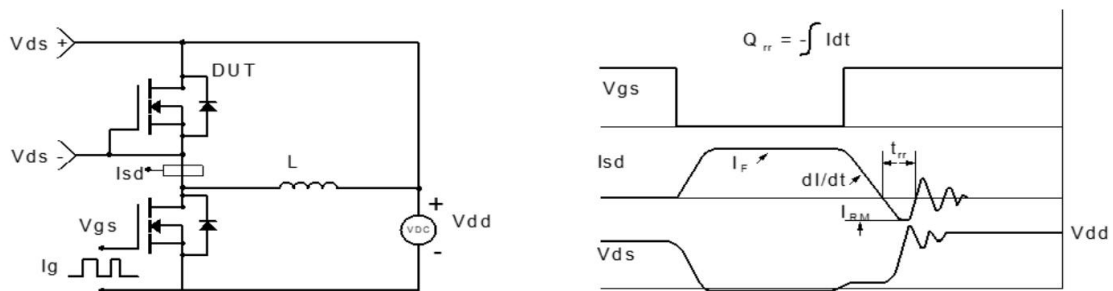
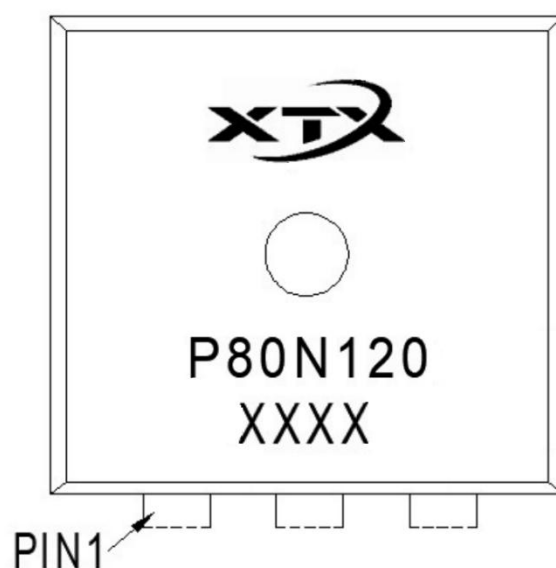


Figure 17: Diode Recovery Test Circuit & Waveform

MARKING INFORMATION



1st Line: XTX Logo

2nd Line: Part Number (P80N120)

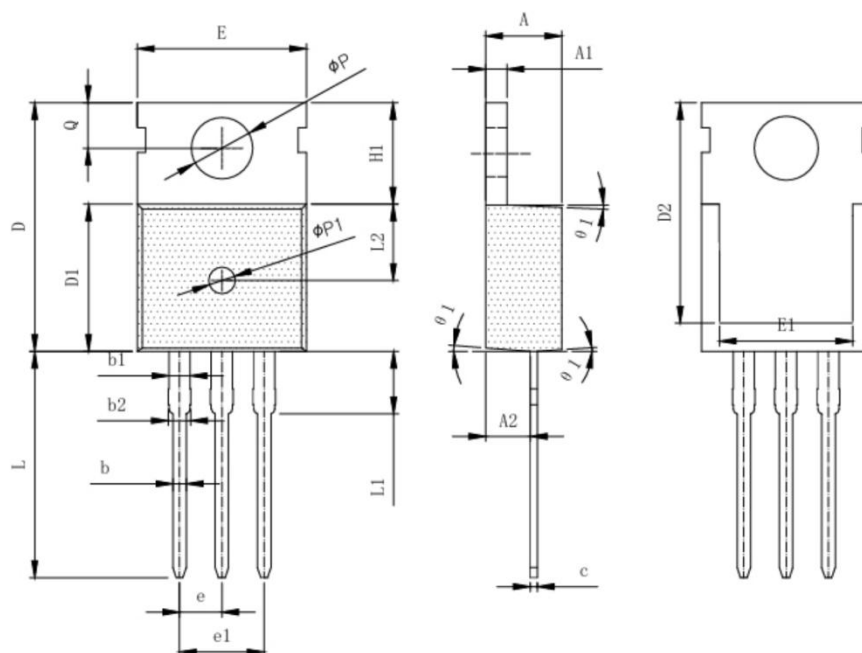
3rd Line: Date Code (XXXX)

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 (TO220FB-3L)



SYMBOL	MILLIMETERS		
	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.25	1.30	1.35
A2	2.30	2.40	2.50
b	0.70	0.80	0.90
b1	1.21	1.27	1.40
b2	1.25	1.35	1.45
c	0.40	0.50	0.60
D	15.40	15.70	16.00
D1	9.10	9.20	9.30
D2	13.14	13.24	13.70
E	9.70	9.90	10.20
E1	7.60	8.00	8.40
e	2.54 BSC		
e1	5.08 BSC		
H1	6.30	6.50	6.70
L	12.75	13.08	13.50
L1	-	-	3.10
L2	4.30	4.60	4.90
ΦP	3.50	3.60	3.70
ΦP1	1.40	1.50	1.60
Q	2.70	-	2.90
θ1	1°	3°	5°

REVISION HISTORY

Number	Description
Rev 1.0	BRP80N120P8 datasheet release