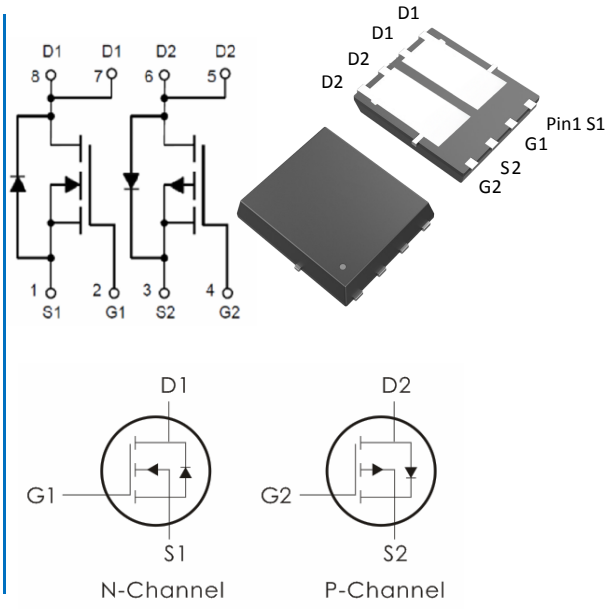
Description：

This N+P Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge.

It can be used in a wide variety of applications.



Features：

N-Channel:V_{DS}=20V,I_D=120A,$R_{DS(ON)}$<3.5mΩ @V_{GS}=4.5V（Typ：2.8mΩ）

P-Channel: V_{DS}=-20V,I_D=-120A,$R_{DS(ON)}$<4.5mΩ @V_{GS}=-4.5V（Typ：3.6mΩ）

1) Low gate charge.
2) Green device available.
3) Advanced high cell denity trench technology for ultra low $R_{DS(ON)}$.
4) Excellent package for good heat dissipation.
5) MSL3

Package Marking and Ordering Information：

Part NO.	Marking	Package	Packing
DON120NP02	120NP02	DFN5*6-8D	5000 pcs/Reel

Absolute Maximum Ratings：（T_C=25℃ unless otherwise noted）

Symbol	Parameter	N-Channel	P-Channel	Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	±12	±12	V
I_D	Continuous Drain Current- T_C=25℃[1]	120	-120	A
	Continuous Drain Current-T_C=100℃[1]	84	-84	
I_{DM}	Pulsed Drain Current [2]	480	-480	A
E_{AS}	Single pulse avalanche energy[3]	150	100	mJ
P_D	Power Dissipation - T_C=25℃	45	39	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +150		℃

Thermal Characteristics：

Symbol	Parameter	N-CH	P-CH	Units
$R_{\theta JC}$	Thermal Resistance,Junction to Cast	2.8	3.2	℃/W

N-Channel Electrical Characteristics: (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	20	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=20V	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V, V_{DS}=0A	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	0.5	0.66	1	V
$R_{DS(ON)}$	Drain-Source On Resistance[4]	V_{GS}=4.5V,I_D=20A	---	2.8	3.5	mΩ
		V_{GS}=2.5V,I_D=10A	---	3.8	4.5	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V, f=1MHz	---	4000	---	pF
C_{oss}	Output Capacitance		---	890	---	
C_{rss}	Reverse Transfer Capacitance		---	860	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DS}=10V, I_D=40A, R_{ENG}=1Ω ,V_{GS}=4.5V	---	7.5	---	ns
t_r	Rise Time		---	25	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	57	---	ns
t_f	Fall Time		---	37	---	ns
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=15V, I_D=40A	---	55	---	nC
Q_{gs}	Gate-Source Charge		---	6.3	---	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	25	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Diode Forward Voltage	V_{GS}=0V, I_{SD}=30A	---	---	1.2	V
I_S	Continuous Drain Curren	V_D=V_G=0V	---	---	120	A
I_{SM}	Pulsed Drain Current		---	---	480	A
Trr	Reverse Recovery Time	I_F=40A,T_J=25℃ dI/dt=100A/us	---	41	---	ns
Qrr	Reverse Recovery Charge		---	68	---	nC

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=10V,V_G=4.5V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

N-Typical Characteristics: (T_C=25℃ unless otherwise noted)

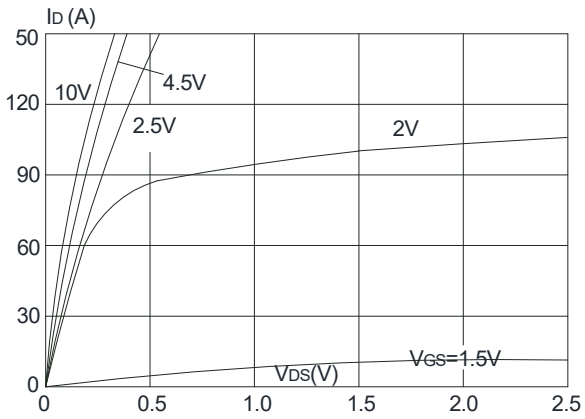


Figure1: Output Characteristics

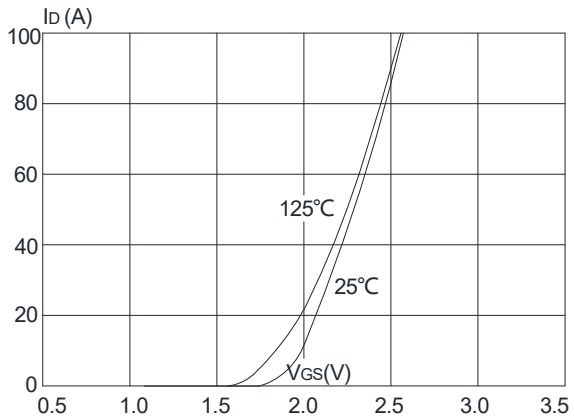


Figure 2: Typical Transfer Characteristics

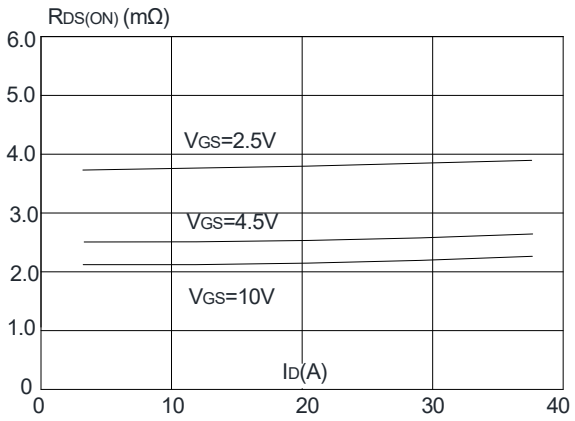


Figure 3: On-resistance vs. Drain Current

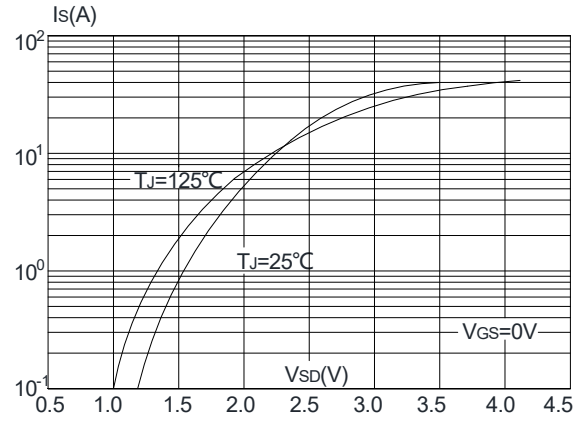


Figure 4: Body Diode Characteristics

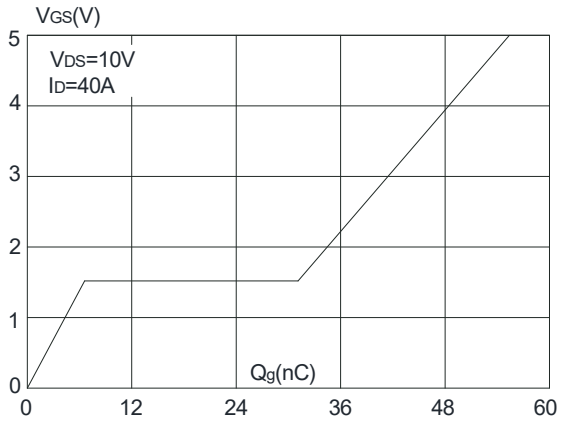


Figure 5: Gate Charge Characteristics

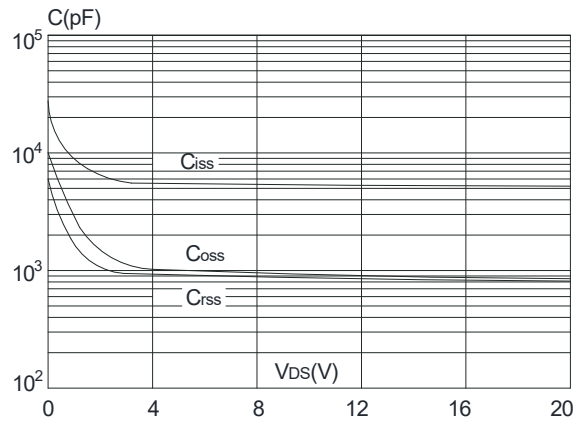


Figure 6: Capacitance Characteristics

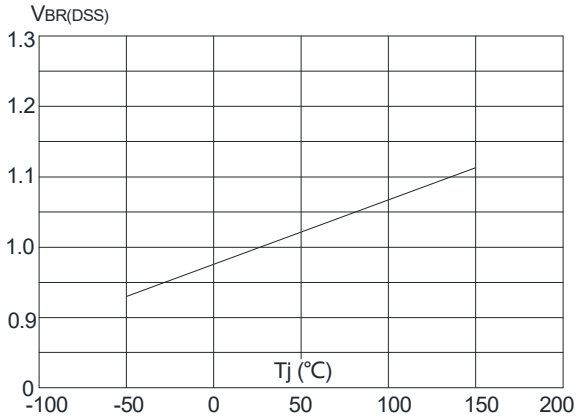


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

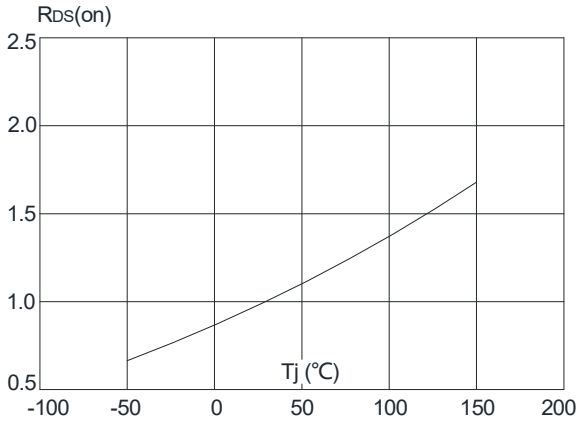


Figure 8: Normalized on Resistance vs. Junction Temperature

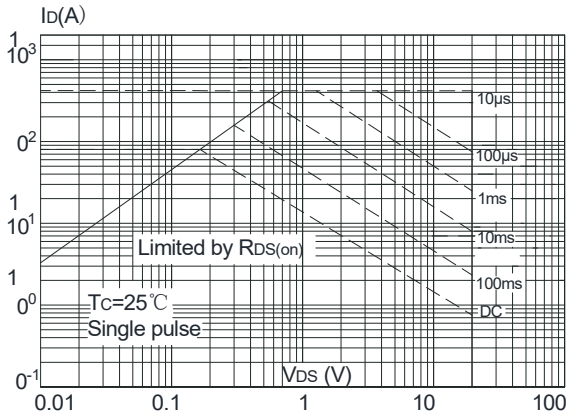


Figure 9: Maximum Safe Operating Area

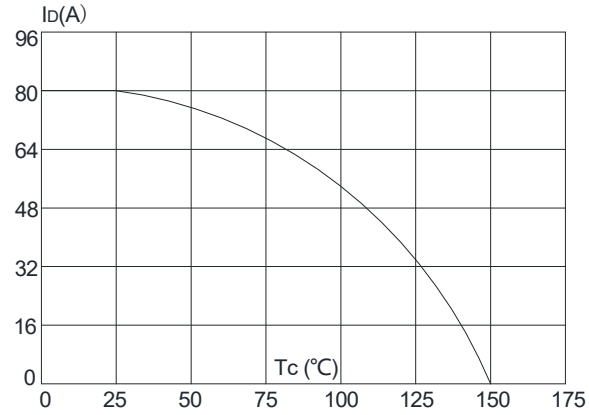


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

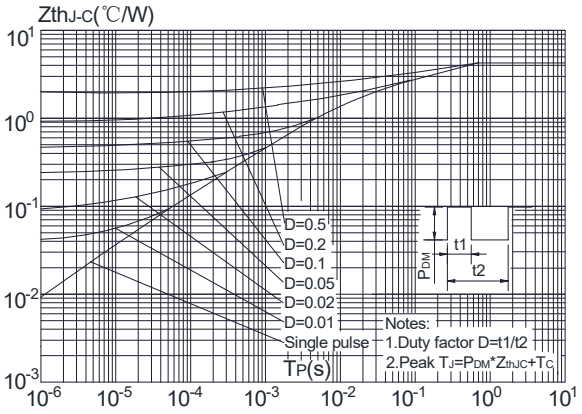


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Channel Electrical Characteristics: (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Sourtce Breakdown Voltage	V_{GS}=0V,I_D=250μA	-20	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS}=0V, V_{DS}=-20V	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V, V_{DS}=0A	---	---	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate-Source Threshold Voltage	V_{GS}=V_{DS}, I_D=250μA	-0.5	-0.66	-1	V
$R_{DS(ON)}$	Drain-Source On Resistance[4]	V_{GS}=-4.5V,I_D=-20A	---	3.6	4.5	mΩ
		V_{GS}=-2.5V,I_D=-10A	---	4.5	5.5	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-10V, V_{GS}=0V, f=1MHz	---	3500	---	pF
C_{oss}	Output Capacitance		---	966	---	
C_{rss}	Reverse Transfer Capacitance		---	832	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD}= -10V， I_D=-19A V_{GS}= -4.5V, R_{GEN}=3Ω	---	21	---	ns
t_r	Rise Time		---	52	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	285	---	ns
t_f	Fall Time		---	247	---	ns
Q_g	Total Gate Charge	V_{GS}=-4.5V,V_{DS}=-10V, I_D=-19A	---	48	---	nC
Q_{gs}	Gate-Source Charge		---	7	---	nC
Q_{gd}	Gate-Drain “Miller” Charge		---	19	---	nC
Drain-Source Diode Characteristics						
I_S	Continuous Drain to Source Diode	V_D=V_G=0V	---	---	-120	A
I_{SM}	Pulsed Drain to Source Diode		---	---	-480	---
Trr	Reverse Recovery Time	I_F=-19A,T_J=25℃ dI/dt=100A/us	---	243	---	ns
Qrr	Reverse Recovery Charge		---	591	---	nC
V_{SD}	Source-Drain Diode Forward Voltage	V_{GS}=0V,I_S=-19A	---	---	-1.2	V

Notes:

1. Computed continuous current assumes the condition of $T_{j,Max}$ while the actual continuous current depends on the thermal & electro-mechanical application board design
2. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
3. EAS condition : TJ=25℃,VDD=-10V,V_G=-4.5V,L=1mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Test Circuit & Waveform

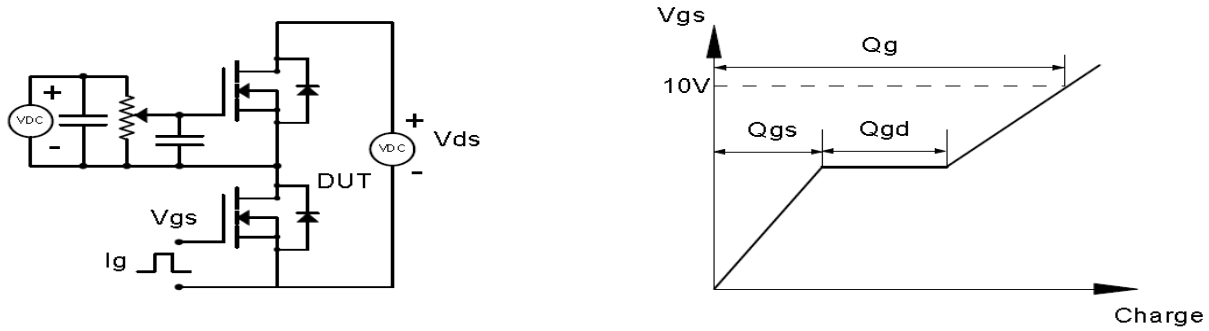


Figure1: Gate Charge Test Circuit & Waveform

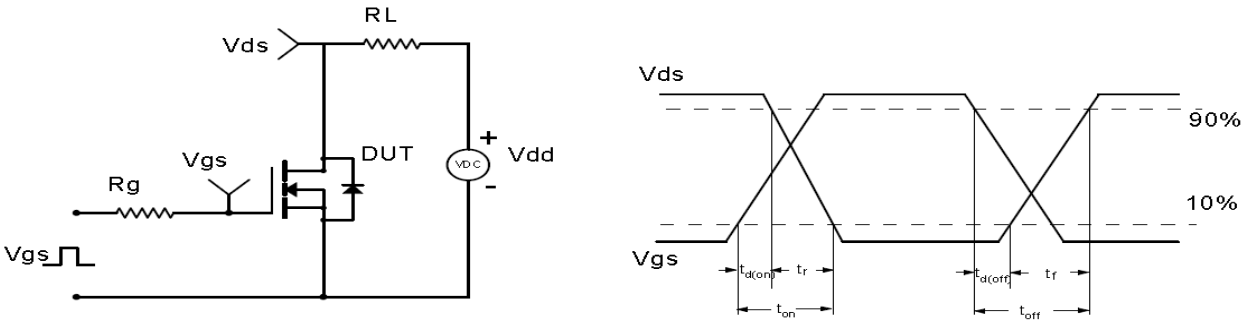


Figure 2: Resistive Switching Test Circuit & Waveforms

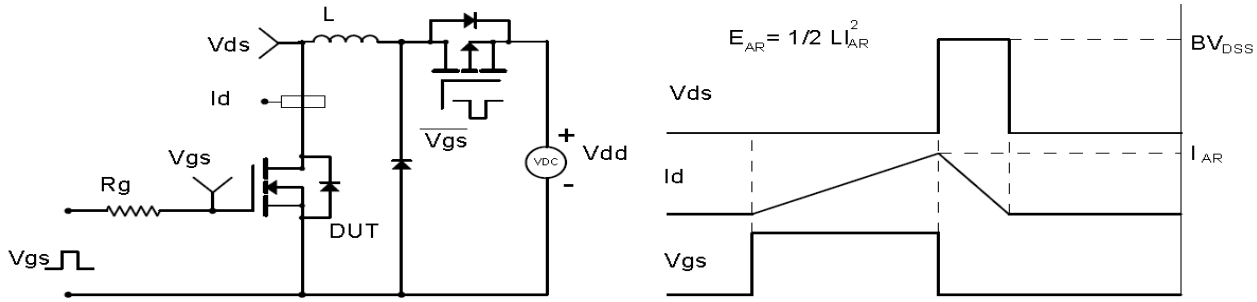


Figure 3: Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

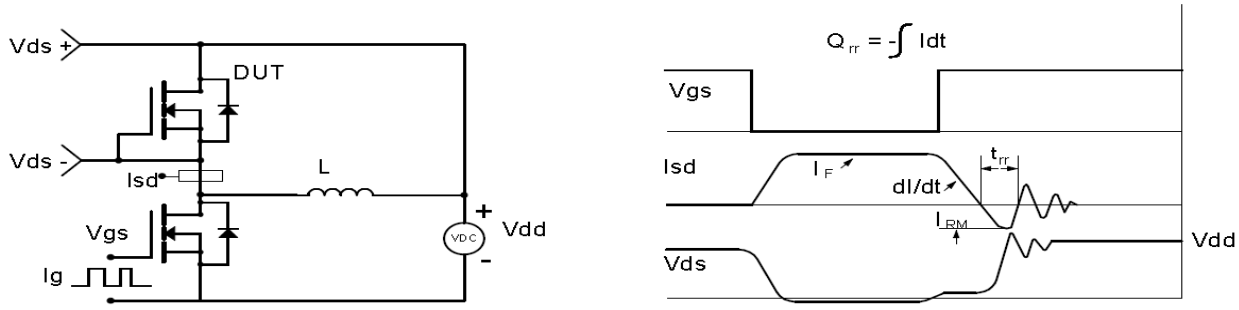
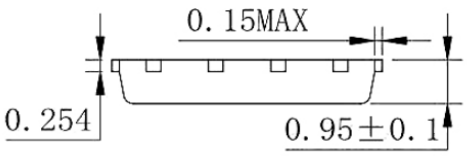
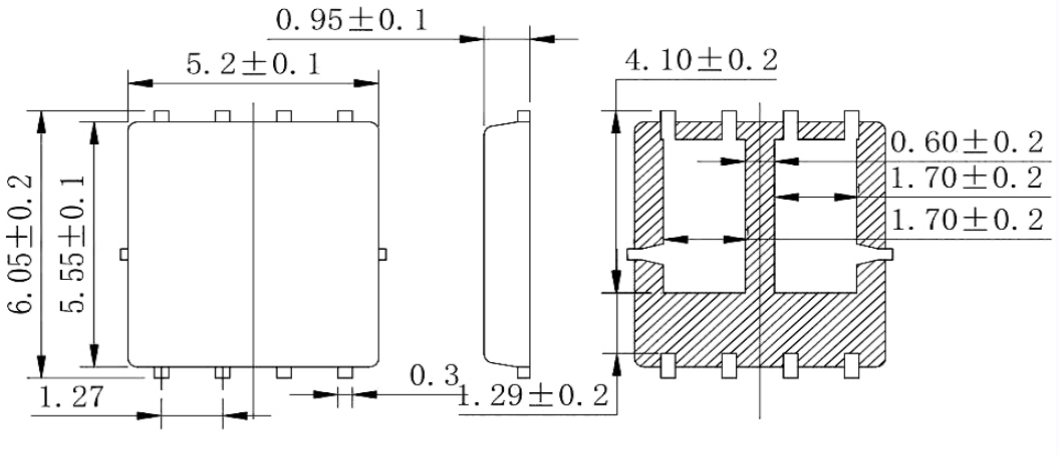


Figure 4: Diode Recovery Test Circuit & Waveforms

DFN5×6-8D Package Information：

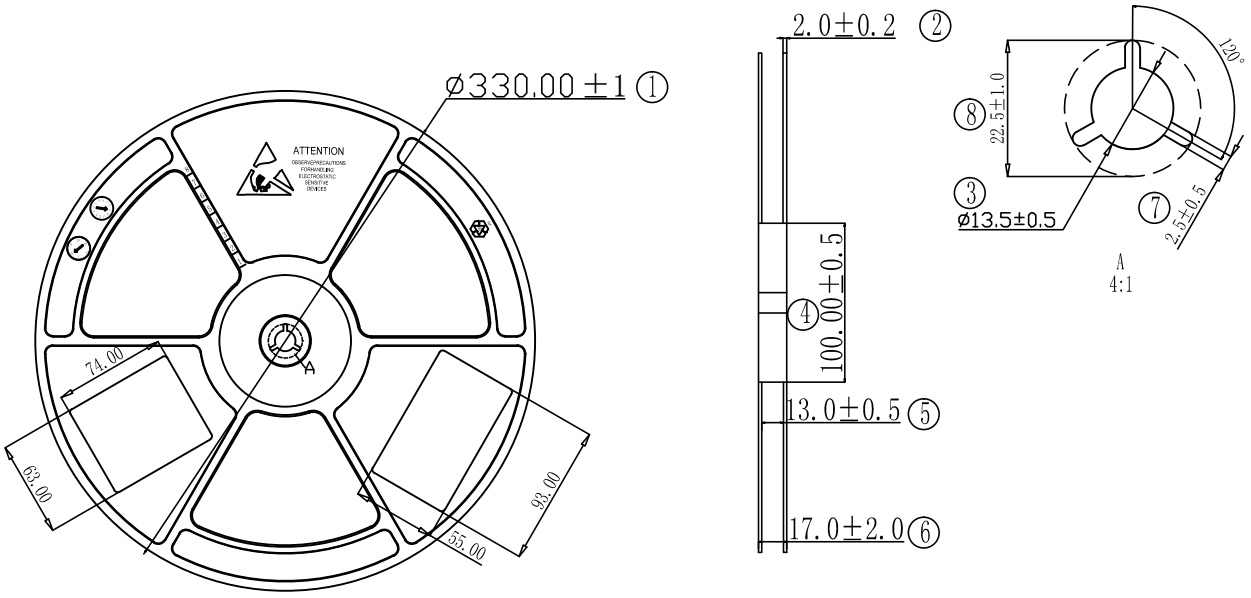


UNIT：mm

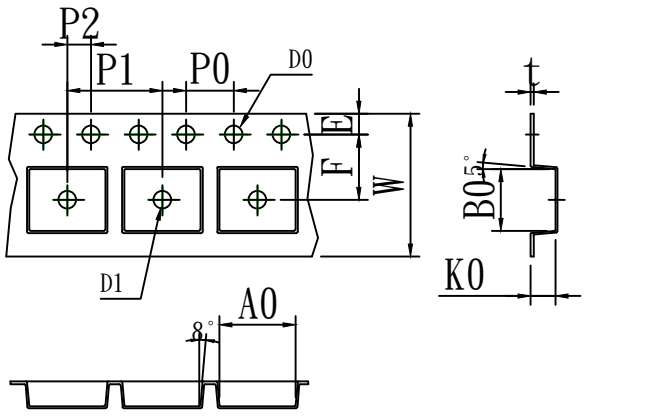


Tape & Reel Information

Dimensions in mm



Symbol	A0	B0	K0	D0	D1	P0	P1	10*P0
Spec	6.15±0.10	5.40±0.10	1.30±0.10	1.55±0.10	1.55±0.10	4.00±0.10	8.00±0.10	40.00±0.10
Symbol	W	E	F	P2	t			
Spec	12.00±0.10	1.75±0.10	5.50±0.10	2.00±0.10	0.20±0.05			



Marking Information：

①. Doingter LOGO

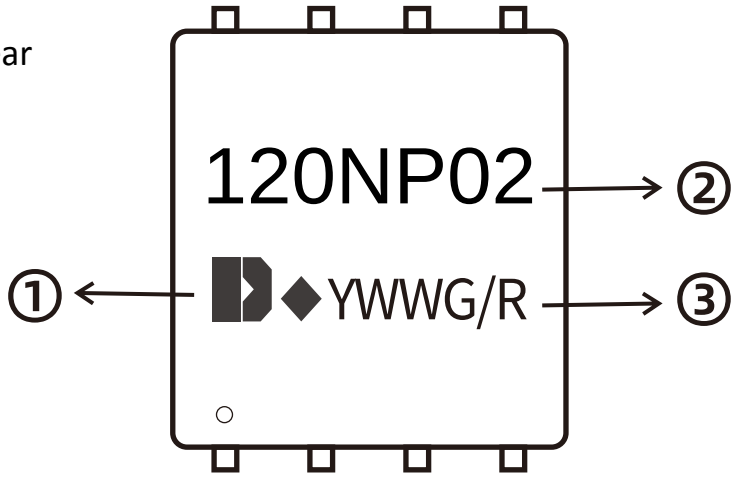
②. Part NO.

③. Date Code(YWWG / R)

Y：Year Code , last digit of the year

WW：Week Code(01-53)

G/R：G(Green) /R(Lead Free)



Previous Version

Version	Date	Subjects (major changes since last revision)
1.0	2025-04-02	Release of final version

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