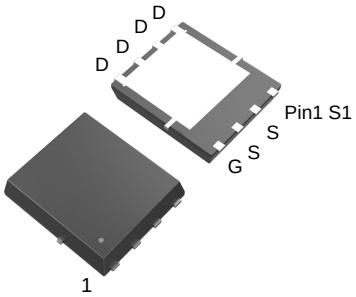
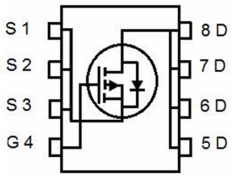
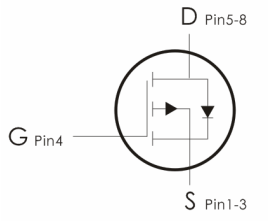
## Description：

This 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：

1) $V_{DS}$=-40V,$I_D$=-130A,$R_{DS(ON)}$<4mΩ @$V_{GS}$=-10V（Typ：3.2mΩ）
2) Low gate charge.
3) Green device available.
4) Advanced high cell denity trench technology for ultra low $R_{DS(ON)}$.
5) Excellent package for good heat dissipation.
6) MSL3

## Package Marking and Ordering Information：

| Part NO. | Marking | Package | Packing |
|---|---|---|---|
| ND004PG | D004P | DFN5*6-8 | 5000 pcs/Reel |

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

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | -40 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$ | Continuous Drain Current[1] | -130 | A |
| | Continuous Drain Current-$T_C$=100℃[1] | -91 | |
| $I_{DM}$ | Pulsed Drain Current[2] | -520 | |
| $P_D$ | Power Dissipation | 104 | W |
| $E_{AS}$ | Single pulse avalanche energy[3] | 272 | mJ |
| $T_J$, $T_{STG}$ | Operating and Storage Junction Temperature Range | -55-+150 | ℃ |

## Thermal Characteristics：

| Symbol | Parameter | Max | Units |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance,Junction to Case | 1.2 | ℃/W |

## 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 | -40 | --- | --- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{GS}$=0V, $V_{DS}$=-40V | --- | --- | -1 | μA |
| $I_{GSS}$ | Gate-Source Leakage Current | $V_{GS}$=±20V, $V_{DS}$=0A | --- | --- | ±100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate-Source Threshold Voltage | $V_{GS}$=$V_{DS}$, $I_D$=250μA | -1 | --- | -2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On Resistance [4] | $V_{GS}$=-10V,$I_D$=-20A | --- | 3.2 | 4 | mΩ |
| | | $V_{GS}$=-4.5V,$I_D$=-10A | --- | 5.2 | 6.5 | mΩ |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-20V, $V_{GS}$=0V, f=1MHz | --- | 6800 | --- | pF |
| $C_{oss}$ | Output Capacitance | | --- | 802 | -- | |
| $C_{rss}$ | Reverse Transfer Capacitance | | --- | 624 | --- | |
| **Switching Characteristic** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{DS}$=-20V, $I_D$=-20A, $R_{ENG}$=3Ω ,$V_{GS}$=-10V | --- | 12 | --- | ns |
| $t_r$ | Rise Time | | --- | 31 | --- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | --- | 336 | --- | ns |
| $t_f$ | Fall Time | | --- | 183 | --- | ns |
| $Q_g$ | Total Gate Charge | $V_{GS}$=-10V, $V_{DS}$=-20V, $I_D$=-20A | --- | 145 | --- | nC |
| $Q_{gs}$ | Gate-Source Charge | | --- | 29 | --- | nC |
| $Q_{gd}$ | Gate-Drain “Miller” Charge | | --- | 31 | --- | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V, $I_{SD}$=-20A | --- | --- | -1.2 | V |
| $I_S$ | Continuous Drain Curren | $V_D$=$V_G$=0V | --- | --- | -130 | A |
| $I_{SM}$ | Pulsed Drain Current | | --- | --- | -250 | A |
| Trr | Reverse Recovery Time | $I_F$=-20A,$T_J$=25℃ dI/dt=100A/us | --- | 130 | --- | ns |
| Qrr | Reverse Recovery Charge | | --- | 220 | --- | 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=-20V,$V_G$=-10V,L=0.5mH
4. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

# Test Circuit

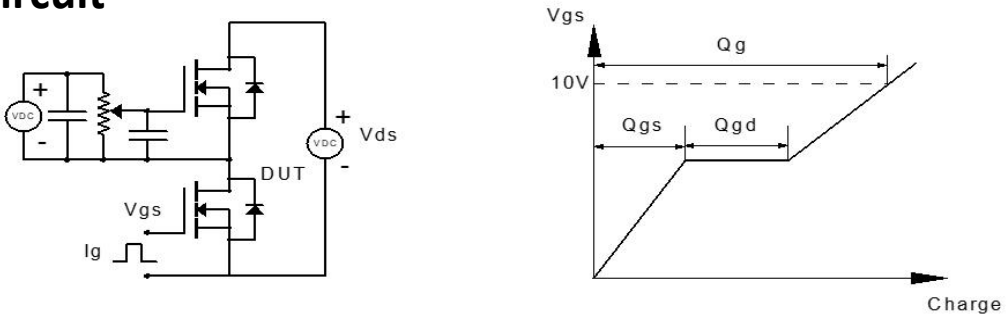



**Figure 1: Gate Charge Test Circuit & Waveform**

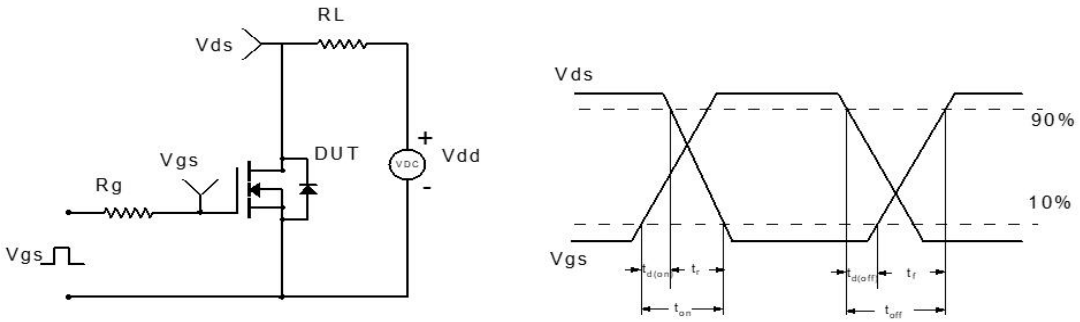



**Figure 2: Resistive Switching Test Circuit & Waveform**

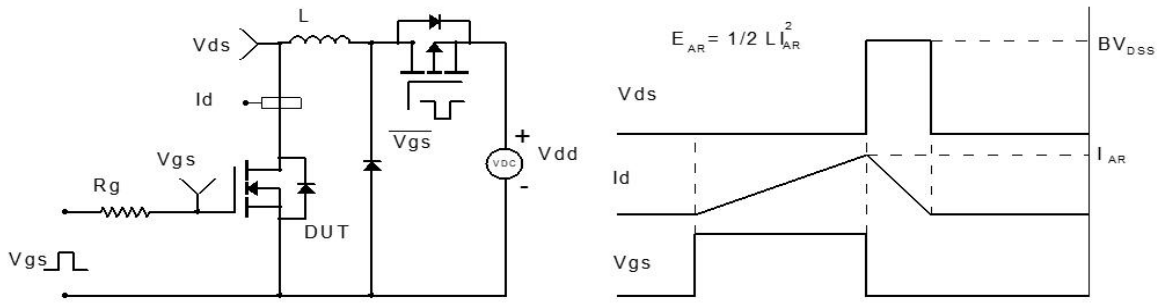



**Figure 3: Unclamped Inductive Switching Test Circuit& Waveform**

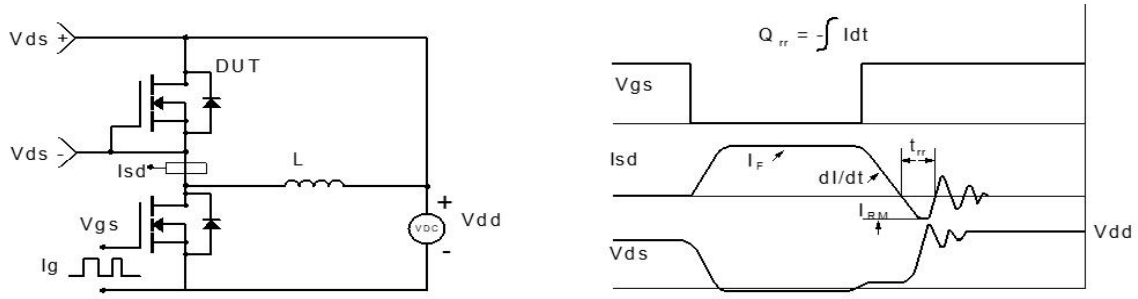
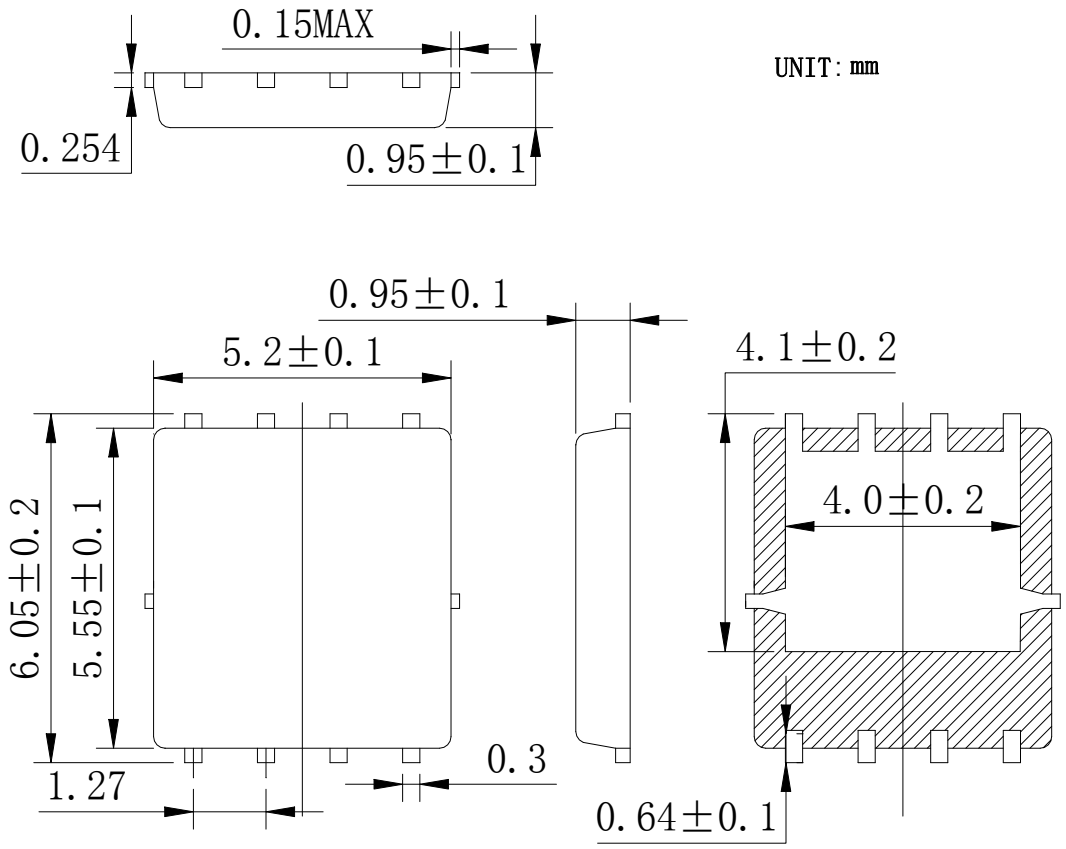


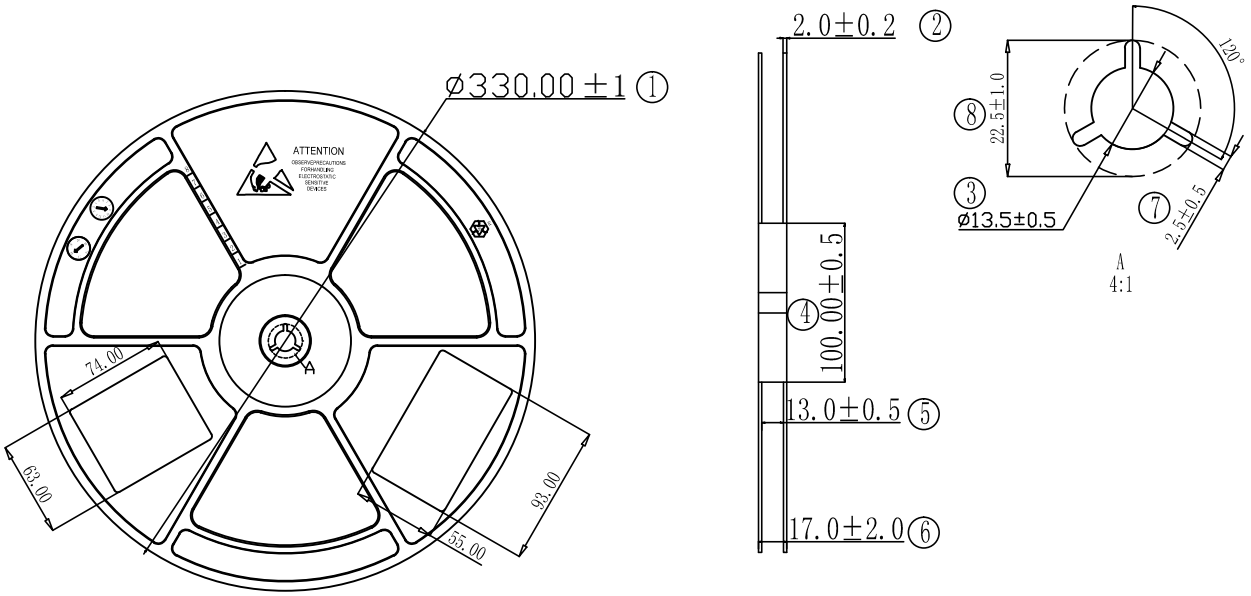

**Figure 4: Diode Recovery Test Circuit & Waveform**

DFN5×6-8 Package Information：

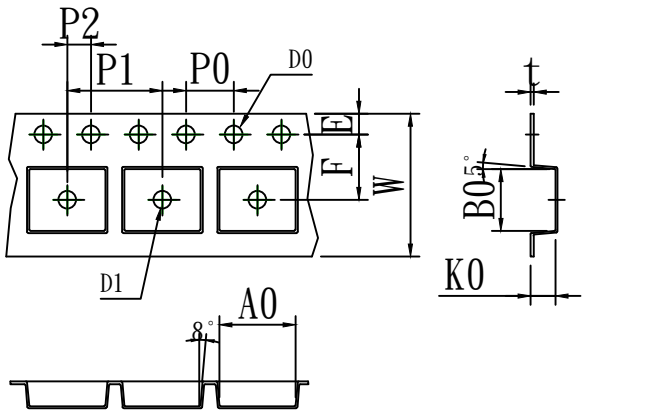


# Tape & Reel Information

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 | | | |




Pulling direction

## Marking Information：

①. Doingter LOGO

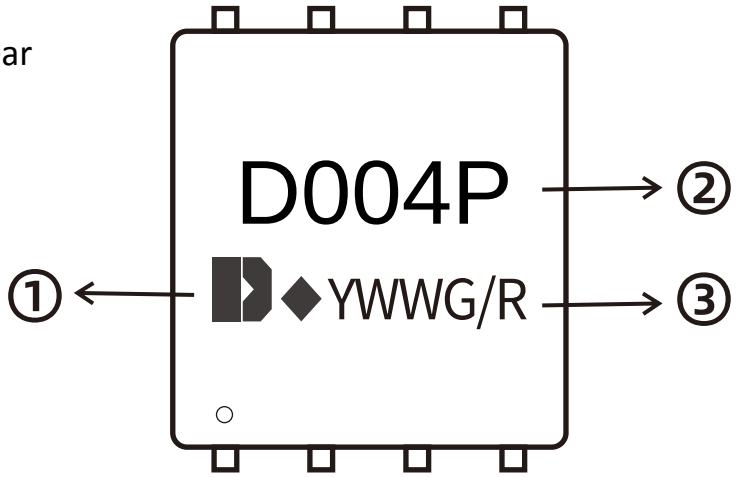
②. Part NO.

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 | 2025-04-12 | Release of final version |

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