

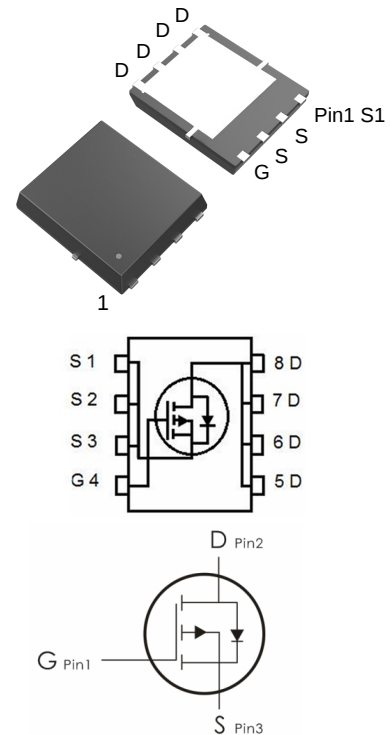
## Description:

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)  $V_{DS}=-40V, I_D=-75A, R_{DS(ON)}<6m\Omega @V_{GS}=-10V$  (Typ:  $5m\Omega$ )
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra low  $R_{DS(ON)}$ .
- 5) Excellent package for good heat dissipation.
- 6) SML3



## Package Marking and Ordering Information:

| Part NO. | Marking | Package  | Packing       |
|----------|---------|----------|---------------|
| ND006PG  | D006P   | DFN5*6-8 | 5000 pcs/Reel |

## Absolute Maximum Ratings: ( $T_C=25^{\circ}C$ unless otherwise noted)

| Symbol         | Parameter                                                 | Ratings  | Units       |
|----------------|-----------------------------------------------------------|----------|-------------|
| $V_{DS}$       | Drain-Source Voltage                                      | -40      | V           |
| $V_{GS}$       | Gate-Source Voltage                                       | $\pm 20$ | V           |
| $I_D$          | Continuous Drain Current <sup>1</sup>                     | -75      | A           |
|                | Continuous Drain Current- $T_C=100^{\circ}C$ <sup>1</sup> | -52.5    |             |
| $I_{DM}$       | Pulsed Drain Current <sup>2</sup>                         | -300     |             |
| $P_D$          | Power Dissipation                                         | 104      | W           |
| $E_{AS}$       | Single pulse avalanche energy <sup>3</sup>                | 110      | mJ          |
| $T_J, T_{STG}$ | Operating and Storage Junction Temperature Range          | -55-+150 | $^{\circ}C$ |

## Thermal Characteristics:

| Symbol          | Parameter                               | Max | Units         |
|-----------------|-----------------------------------------|-----|---------------|
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case    | 1.2 | $^{\circ}C/W$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 54  | $^{\circ}C/W$ |

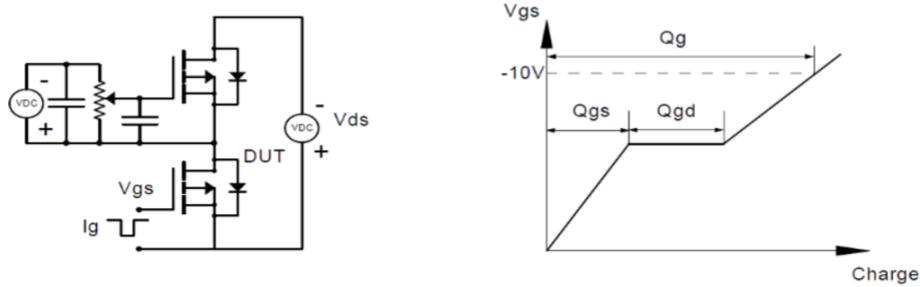
## Electrical Characteristics: ( $T_C=25^{\circ}\text{C}$ unless otherwise noted)

| Symbol                             | Parameter                               | Conditions                                                                                   | Min | Typ  | Max  | Units |
|------------------------------------|-----------------------------------------|----------------------------------------------------------------------------------------------|-----|------|------|-------|
| Off Characteristics                |                                         |                                                                                              |     |      |      |       |
| BV <sub>DSS</sub>                  | Drain-Sourctce Breakdown Voltage        | V <sub>GS</sub> =0V, I <sub>D</sub> =250 μ A                                                 | -40 | ---  | ---  | V     |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current         | V <sub>GS</sub> =0V, V <sub>DS</sub> =-40V                                                   | --- | ---  | -1   | μ A   |
| I <sub>GSS</sub>                   | Gate-Source Leakage Current             | V <sub>GS</sub> =± 20V, V <sub>DS</sub> =0A                                                  | --- | ---  | ±100 | nA    |
| On Characteristics                 |                                         |                                                                                              |     |      |      |       |
| V <sub>GS(th)</sub>                | Gate-Source Threshold Voltage           | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 μ A                                   | -1  | -1.6 | -2.5 | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance <sup>4</sup> | V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A                                                  | --- | 5    | 6    | m Ω   |
|                                    |                                         | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-10A                                                 | --- | 7.5  | 10   | m Ω   |
| Dynamic Characteristics            |                                         |                                                                                              |     |      |      |       |
| C <sub>iss</sub>                   | Input Capacitance                       | V <sub>DS</sub> =-20V, V <sub>GS</sub> =0V, f=1MHz                                           | --- | 4500 | ---  | pF    |
| C <sub>OSS</sub>                   | Output Capacitance                      |                                                                                              | --- | 326  | --   |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance            |                                                                                              | --- | 259  | ---  |       |
| Switching Characteristics          |                                         |                                                                                              |     |      |      |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                      | V <sub>DS</sub> =-20V, I <sub>D</sub> =-10A,<br>R <sub>G</sub> =2.7 Ω ,V <sub>GS</sub> =-10V | --- | 6.7  | ---  | ns    |
| t <sub>r</sub>                     | Rise Time                               |                                                                                              | --- | 6.1  | ---  | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                     |                                                                                              | --- | 107  | ---  | ns    |
| t <sub>f</sub>                     | Fall Time                               |                                                                                              | --- | 122  | ---  | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                       | V <sub>GS</sub> =-10V, V <sub>DS</sub> =-20V,<br>I <sub>D</sub> =-10A                        | --- | 90   | ---  | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                      |                                                                                              | --- | 10.6 | ---  | nC    |
| Q <sub>gd</sub>                    | Gate-Drain “Miller” Charge              |                                                                                              | --- | 11   | ---  | nC    |
| Drain-Source Diode Characteristics |                                         |                                                                                              |     |      |      |       |
| V <sub>SD</sub>                    | Diode Forward Voltage                   | V <sub>GS</sub> =0V, I <sub>SD</sub> =-20A                                                   | --- | ---  | -1.2 | V     |
| I <sub>S</sub>                     | Continuous Drain Curren                 | V <sub>D</sub> =V <sub>G</sub> =0V                                                           | --- | ---  | -75  | A     |
| I <sub>SM</sub>                    | Pulsed Drain Current                    |                                                                                              | --- | ---  | -300 | A     |
| T <sub>rr</sub>                    | Reverse Recovery Time                   | I <sub>F</sub> =-10A, T <sub>J</sub> =25 °C                                                  | --- | 19   | ---  | ns    |
| Q <sub>rr</sub>                    | Reverse Recovery Charge                 | dI/dt=100A/us                                                                                | --- | 11   | ---  | nC    |

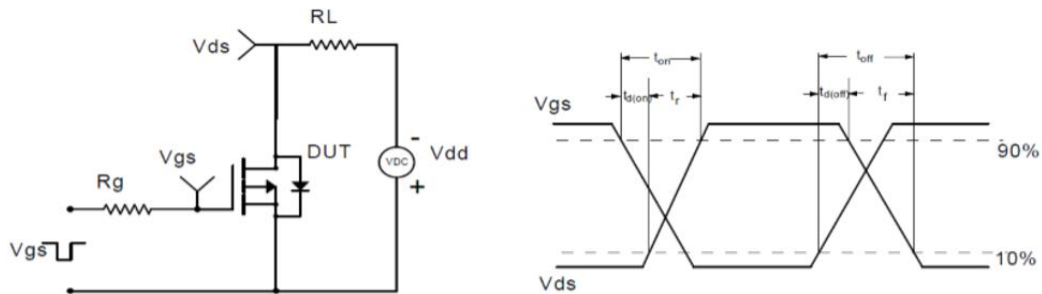
## Notes:

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 :  $T_J=25^{\circ}C$ ,  $V_{DD}=-20V$ ,  $V_G=-10V$ ,  $L=0.5mH$
4. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 0.5\%$

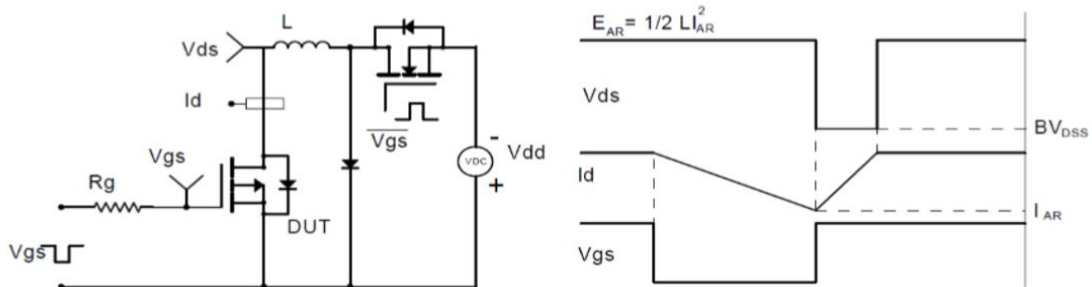
## Test Circuit



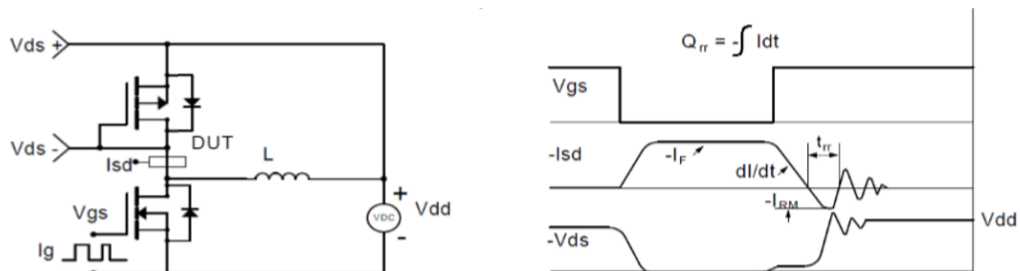
**Figure 1: Gate Charge Test Circuit & Waveform**



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

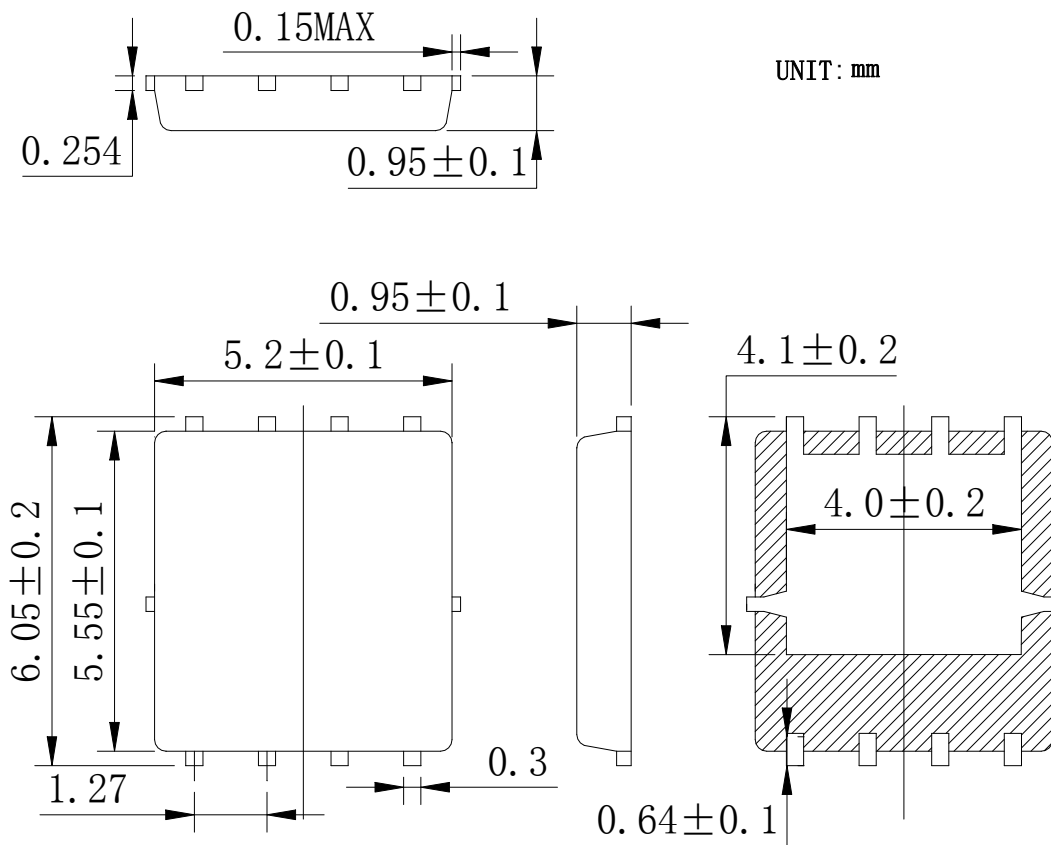


**Figure 3: Unclamped Inductive Switching Test Circuit & Waveform**



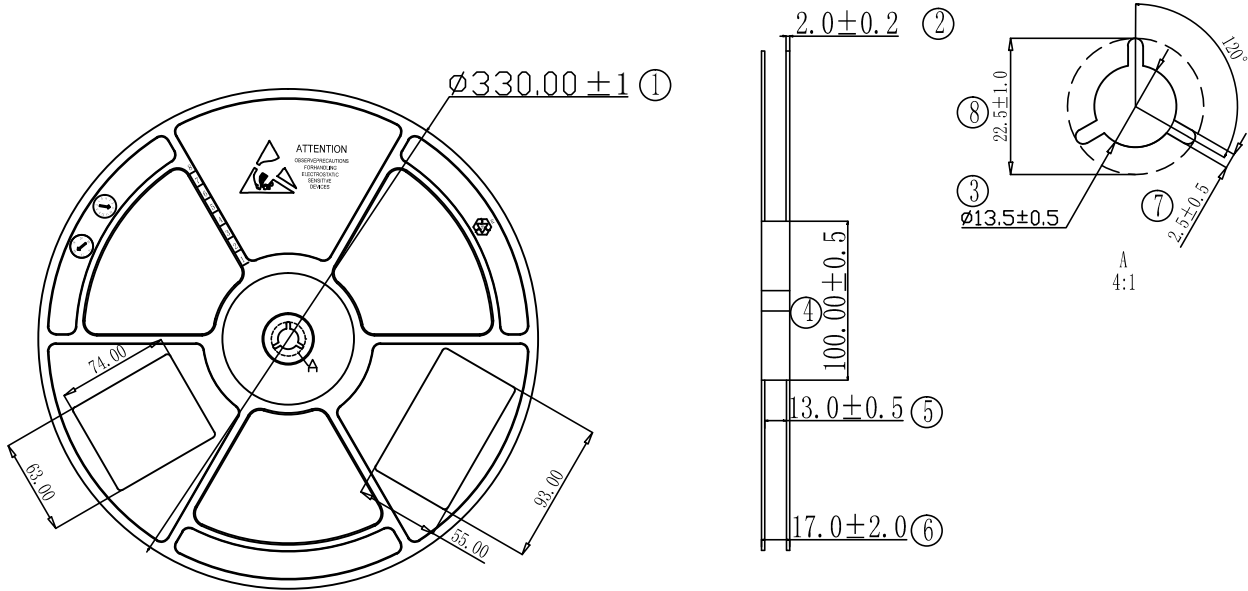
**Figure 4: Diode Recovery Test Circuit & Waveform**

## DFN5x6-8 Package Information:

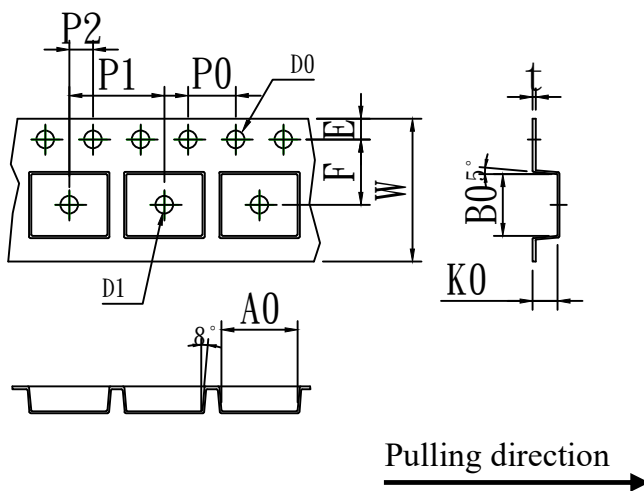


## Tape & Reel Information

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 |           |           |            |



## Marking Information:

①. Doingter LOGO

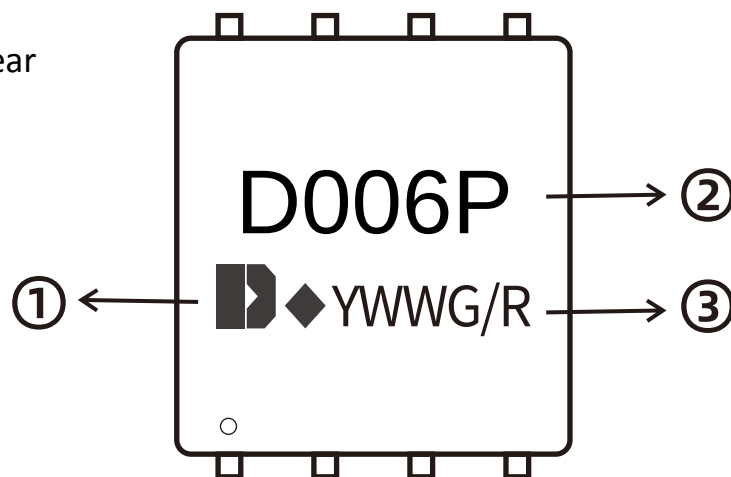
②. Part NO.

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     | 2025-04-10 | Release of final version                     |

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