



## TM80N03DF

## N-Channel Enhancement Mosfet

### General Description

- Low  $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

### Applications

- Load switch
- PWM

### General Features

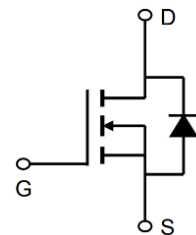
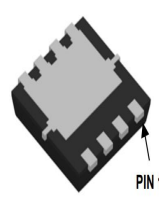
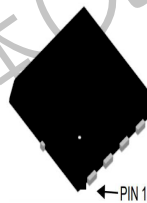
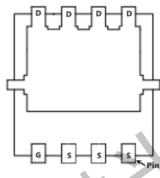
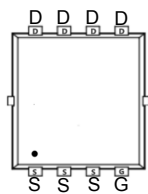
$V_{DS} = 30V$   $I_D = 80A$

$R_{DS(ON)} = 4.0m\Omega$  (typ.) @  $V_{GS} = 10V$

100% UIS Tested  
100%  $R_g$  Tested



DF:PDFN3x3-8L



Marking: 005

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

| Symbol                    | Parameter                                    | Rating     | Units      |
|---------------------------|----------------------------------------------|------------|------------|
| $V_{DS}$                  | Drain-Source Voltage                         | 30         | V          |
| $V_{GS}$                  | Gate-Source Voltage                          | $\pm 20$   | V          |
| $I_D @ T_C = 25^\circ C$  | Continuous Drain Current, $-V_{GS} @ -10V^1$ | 80         | A          |
| $I_D @ T_C = 100^\circ C$ | Continuous Drain Current, $-V_{GS} @ -10V^1$ | 53         | A          |
| $I_{DM}$                  | Pulsed Drain Current <sup>2</sup>            | 330        | A          |
| EAS                       | Single Pulse Avalanche Energy <sup>3</sup>   | 240        | mJ         |
| $P_D @ T_C = 25^\circ C$  | Total Power Dissipation <sup>4</sup>         | 45         | W          |
| $T_{STG}$                 | Storage Temperature Range                    | -55 to 175 | $^\circ C$ |
| $T_J$                     | Operating Junction Temperature Range         | -55 to 175 | $^\circ C$ |

### Thermal Data

| Symbol          | Parameter                                        | Typ. | Max. | Unit         |
|-----------------|--------------------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 62   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 3.12 | $^\circ C/W$ |



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### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise specified)

| Symbol                             | Parameter                                       | Conditions                                                                             | Min | Typ  | Max  | Units |
|------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------|-----|------|------|-------|
| Off Characteristics                |                                                 |                                                                                        |     |      |      |       |
| BV <sub>DSS</sub>                  | Drain-Source Breakdown Voltage                  | V <sub>GS</sub> =0V, I <sub>D</sub> =250 μA                                            | 30  | ---  | ---  | V     |
| I <sub>DSS</sub>                   | Drain-Source Leakage Current                    | V <sub>GS</sub> =0V, V <sub>DS</sub> =24V, T <sub>J</sub> =25℃                         | --- | ---  | 10   | μA    |
| 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 μA                              | 1   | 1.5  | 3    | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance <sup>2</sup>         | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                              | --- | 4.0  | 5.1  | mΩ    |
|                                    |                                                 | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A                                             | --- | 5.2  | 7    |       |
| G <sub>FS</sub>                    | Forward Transconductance                        | V <sub>DS</sub> =5V, I <sub>D</sub> =6A                                                | --- | 13   | ---  | S     |
| Dynamic Characteristics            |                                                 |                                                                                        |     |      |      |       |
| C <sub>iss</sub>                   | Input Capacitance                               | V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz                                      | --- | 1750 | 2350 | pF    |
| C <sub>oss</sub>                   | Output Capacitance                              |                                                                                        | --- | 320  | ---  |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance                    |                                                                                        | --- | 240  | ---  |       |
| R <sub>g</sub>                     | Gate Resistance                                 | f=1MHz                                                                                 | --- | 0.9  | ---  | Ω     |
| Switching Characteristics          |                                                 |                                                                                        |     |      |      |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                              | V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3 Ω, I <sub>D</sub> =15A | --- | 13   | ---  | ns    |
| t <sub>r</sub>                     | Rise Time                                       |                                                                                        | --- | 36   | ---  | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                             |                                                                                        | --- | 43   | ---  | ns    |
| t <sub>f</sub>                     | Fall Time                                       |                                                                                        | --- | 16   | ---  | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                               | V <sub>DS</sub> =24V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A                        | --- | 42   | ---  | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                              |                                                                                        | --- | 3.9  | ---  | nC    |
| Q <sub>gd</sub>                    | Gate-Drain “Miller” Charge                      |                                                                                        | --- | 14   | ---  | nC    |
| Drain-Source Diode Characteristics |                                                 |                                                                                        |     |      |      |       |
| V <sub>SD</sub>                    | Source-Drain Diode Forward Voltage <sup>2</sup> | V <sub>GS</sub> =0V, I <sub>S</sub> =30A, T <sub>J</sub> =25℃                          | --- | ---  | 1.2  | V     |
| t <sub>rr</sub>                    | Reverse Recovery Time                           | V <sub>GS</sub> =0V, I <sub>S</sub> =10A, di/dt=100A                                   | --- | 16   | ---  | nS    |
| Q <sub>rr</sub>                    | Reverse Recovery Charge                         |                                                                                        | --- | 5    | ---  | nC    |

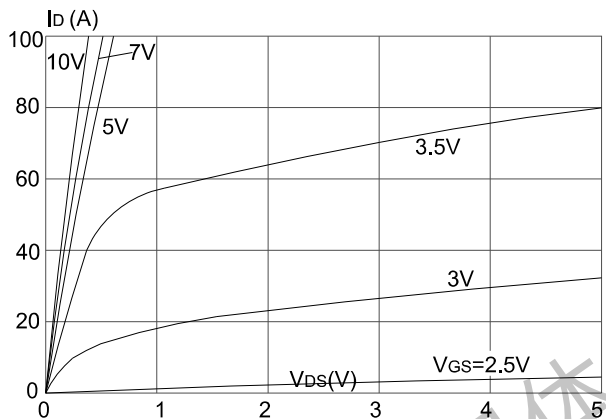
#### Notes:

1. Pulse width limited by max. junction temperature
2. Pulse test
3. Surface mounted on 1 in<sup>2</sup> copper pad of FR4 board

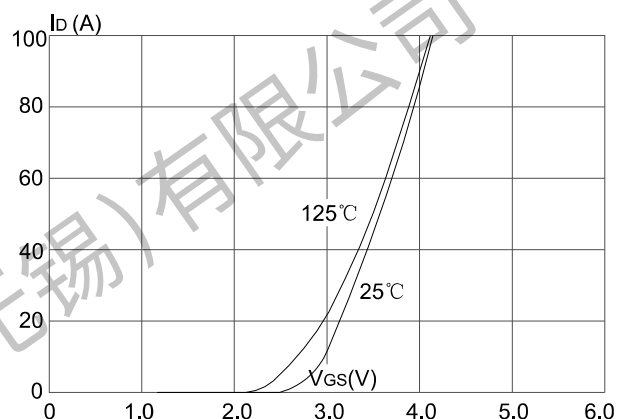
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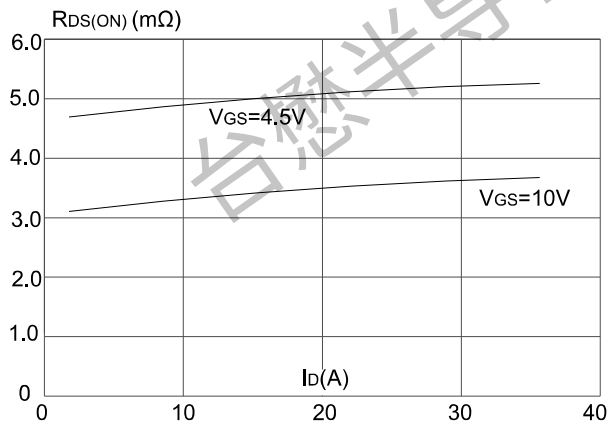
### Typical Characteristics



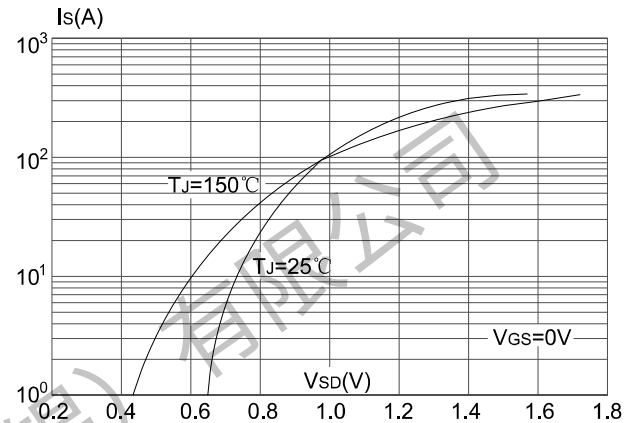
**Figure 1: Output Characteristics**



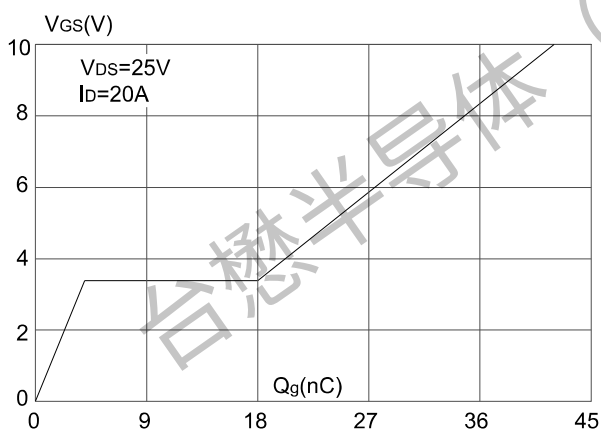
**Figure 2: Typical Transfer Characteristics**



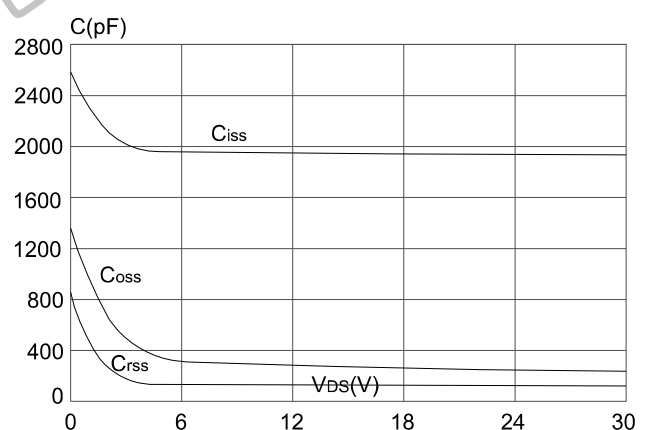
**Figure 3: On-resistance vs Drain Current**



**Figure 4: Body Diode Characteristics**



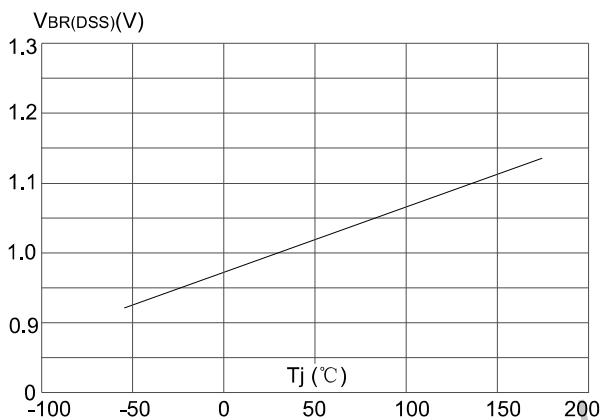
**Figure 5: Gate Charge Characteristics**



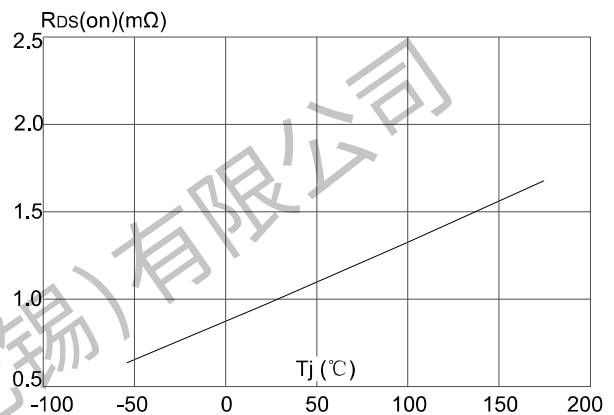
**Figure 6: Capacitance Characteristics**

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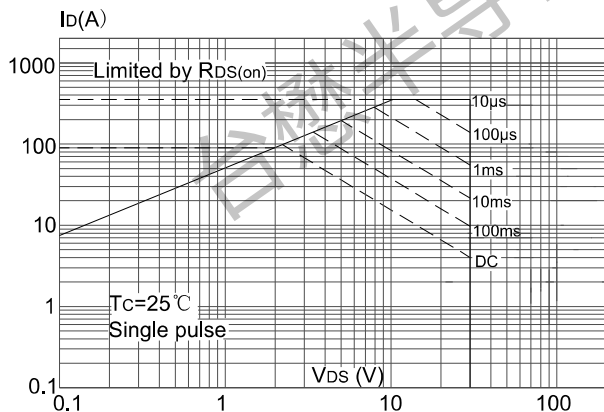
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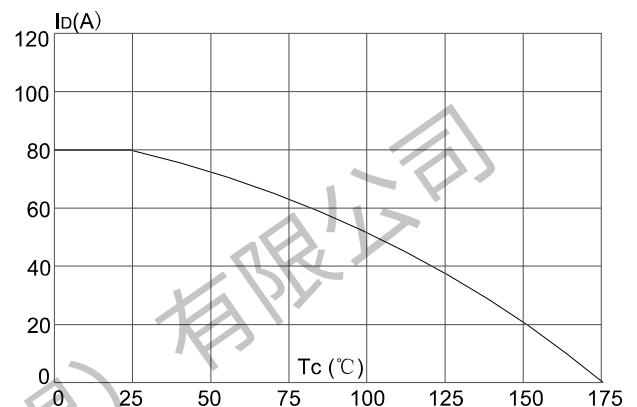
**Figure 7: Normalized Breakdown Voltage vs.**



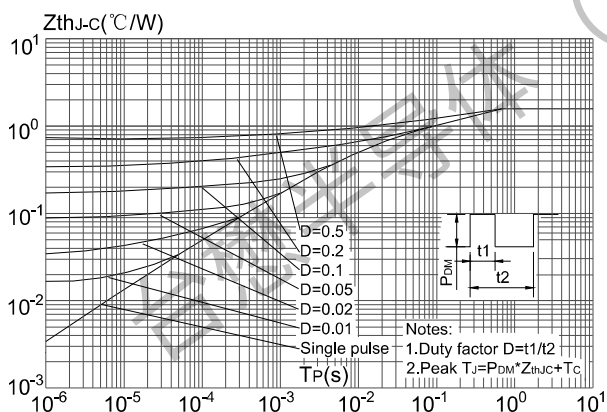
**Figure 8: Normalized on Resistance vs.**



**Figure 9: Maximum Safe Operating Area**



**Figure 10: Maximum Continuous Drain Current vs. Case Temperature**



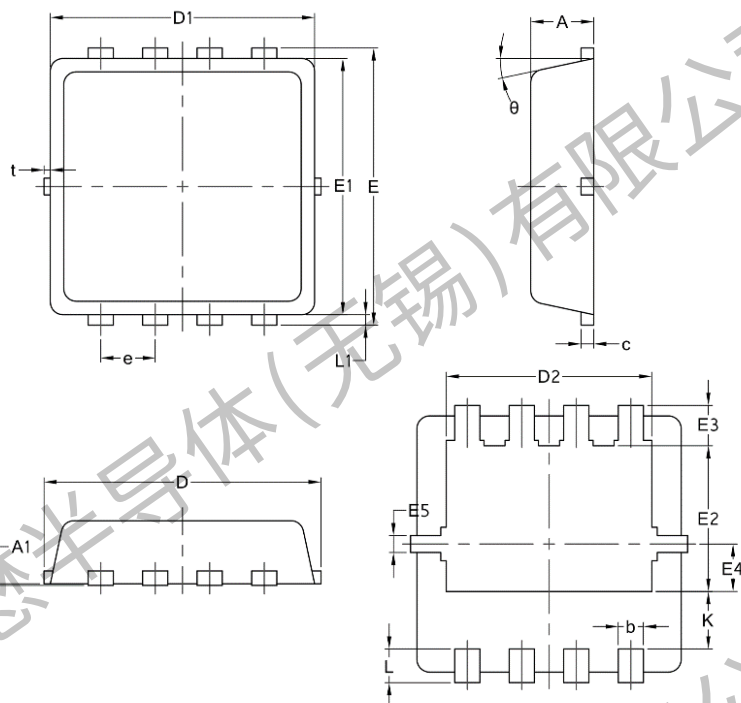
**Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case**



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### Package Mechanical Data:DFN3x3-8L

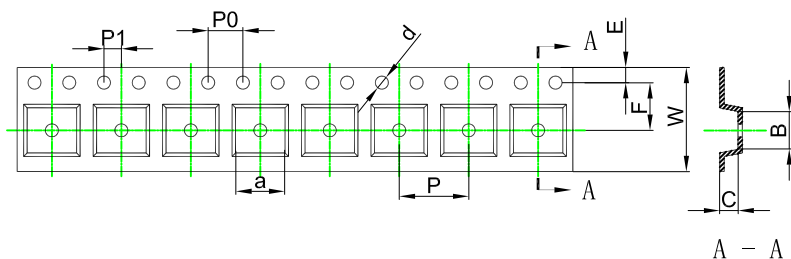


| Symbol | Common |       |      |
|--------|--------|-------|------|
|        | mm     |       |      |
|        | Mim    | Nom   | Max  |
| A      | 0.70   | 0.75  | 0.85 |
| A1     | /      | /     | 0.05 |
| b      | 0.20   | 0.30  | 0.40 |
| c      | 0.10   | 0.152 | 0.25 |
| D      | 3.15   | 3.30  | 3.45 |
| D1     | 3.00   | 3.15  | 3.25 |
| D2     | 2.29   | 2.45  | 2.65 |
| E      | 3.15   | 3.30  | 3.45 |
| E1     | 2.90   | 3.05  | 3.20 |
| E2     | 1.54   | 1.74  | 1.94 |
| E3     | 0.28   | 0.48  | 0.65 |
| E4     | 0.37   | 0.57  | 0.77 |
| E5     | 0.10   | 0.20  | 0.30 |
| e      | 0.60   | 0.65  | 0.70 |
| K      | 0.59   | 0.69  | 0.89 |
| L      | 0.30   | 0.40  | 0.50 |
| L1     | 0.06   | 0.125 | 0.20 |
| t      | 0      | 0.075 | 0.13 |
| Φ      | 10     | 12    | 14   |

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### PDFN3×3-8L Embossed Carrier Tape



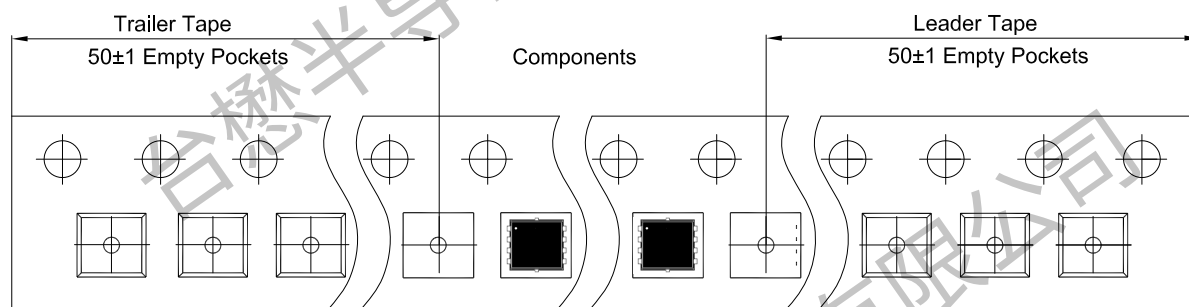
#### Packaging Description:

SOP-8L parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).

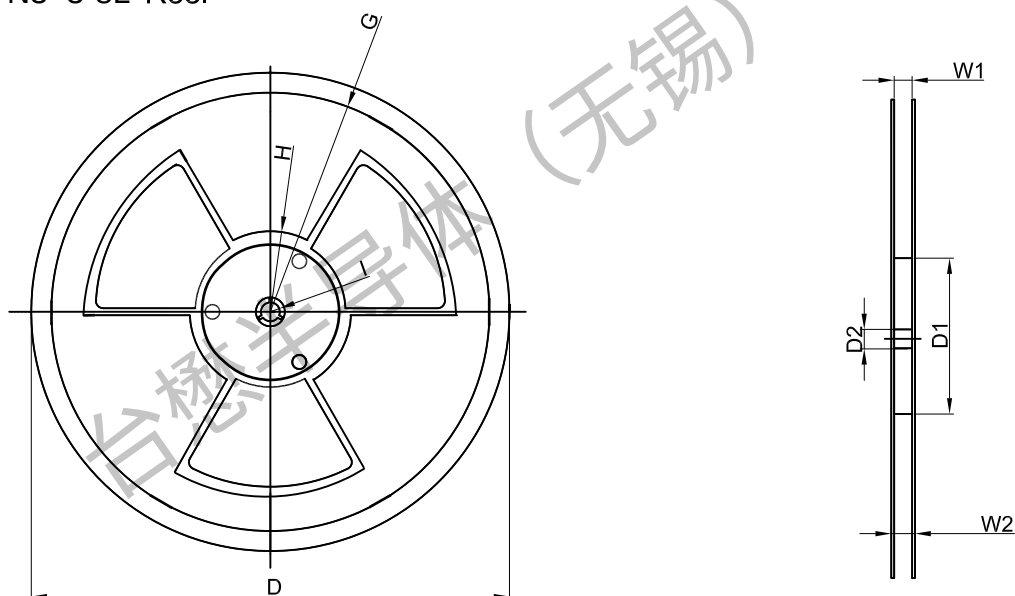
ALL DIM IN mm

| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |       |
|------------------------------|------|------|------|-------|------|------|------|------|------|-------|
| Pkg type                     | a    | B    | C    | d     | E    | F    | P0   | P    | P1   | W     |
| PDFN3×3-8L                   | 6.40 | 5.40 | 2.10 | Ø1.50 | 1.75 | 5.50 | 4.00 | 8.00 | 2.00 | 12.00 |

### PDFN3×3-8L Tape Leader and Trailer



### PDFN3×3-8L Reel



| Dimensions are in millimeter |         |        |       |         |        |       |       |       |
|------------------------------|---------|--------|-------|---------|--------|-------|-------|-------|
| Reel Option                  | D       | D1     | D2    | G       | H      | I     | W1    | W2    |
| 13"Dia                       | Ø330.00 | 100.00 | 13.00 | R135.00 | R55.00 | R6.50 | 12.00 | 14.00 |

| REEL      | Reel Size | Box        | Box Size(mm) | Carton     | Carton Size(mm) | G.W.(kg) |
|-----------|-----------|------------|--------------|------------|-----------------|----------|
| 5,000 pcs | 13 inch   | 10,000 pcs | 370×355×52   | 50,000 pcs | 400×360×368     |          |

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Revision history:

| Date       | Rev   | Description | Page |
|------------|-------|-------------|------|
| 2023.06.13 | 23.06 | Original    |      |