

# TMG90N06NF

## N-Channel Enhancement Mosfet

### General Description

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

### Applications

- Load switch
- PWM

### General Features

$V_{DS} = 60V$   $I_D = 90A$

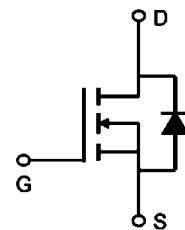
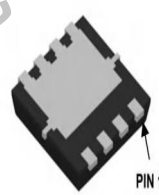
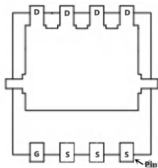
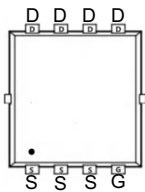
$R_{DS(ON)} = 4.3 m\Omega (typ.) @ V_{GS} = 10V$

100% UIS Tested

100%  $R_g$  Tested



NF:DFN5x6-8L



Marking: G90N06

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

| Symbol                    | Parameter                                | Rating     | Units      |
|---------------------------|------------------------------------------|------------|------------|
| $V_{DS}$                  | Drain-Source Voltage                     | 60         | V          |
| $V_{GS}$                  | Gate-Source Voltage                      | $\pm 20$   | V          |
| $I_D @ T_c = 25^\circ C$  | Continuous Drain Current, $V_{GS} @ 10V$ | 90         | A          |
| $I_D @ T_c = 100^\circ C$ | Continuous Drain Current, $V_{GS} @ 10V$ | 63         | A          |
| $I_{DM}$                  | Pulsed Drain Current                     | 310        | A          |
| EAS                       | Single Pulse Avalanche Energy            | 66         | mJ         |
| $P_D$                     | Total Power Dissipation                  | 87         | W          |
| $T_{STG}$                 | Storage Temperature Range                | -55 to 150 | $^\circ C$ |
| $T_J$                     | Operating Junction Temperature Range     | -55 to 150 | $^\circ C$ |

### Thermal Data

| Symbol          | Parameter                           | Typ. | Max. | Unit         |
|-----------------|-------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient | ---  | 62   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case    | ---  | 3.6  | $^\circ C/W$ |



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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                                                     | 60  | ---   | ---   | V     |
| I <sub>DSS</sub>                   | Zero Gate Voltage Drain Current    | V <sub>GS</sub> =0V, V <sub>DS</sub> =60V                                                        | --- | ---   | 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   | 2     | 3     | V     |
| R <sub>DS(ON)</sub>                | Drain-Source On Resistance         | V <sub>GS</sub> =10V, I <sub>D</sub> =20A                                                        | --- | 4.3   | 5     | m Ω   |
|                                    |                                    | V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A                                                       | --- | 5.1   | 7     |       |
| Dynamic Characteristics            |                                    |                                                                                                  |     |       |       |       |
| C <sub>iss</sub>                   | Input Capacitance                  | V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz                                                | --- | 2136  |       | pF    |
| C <sub>oss</sub>                   | Output Capacitance                 |                                                                                                  | --- | 331.5 |       |       |
| C <sub>rss</sub>                   | Reverse Transfer Capacitance       |                                                                                                  | --- | 10.6  |       |       |
| Switching Characteristics          |                                    |                                                                                                  |     |       |       |       |
| t <sub>d(on)</sub>                 | Turn-On Delay Time                 | V <sub>GS</sub> =10 V,<br>V <sub>DS</sub> =50 V,<br>R <sub>G</sub> =2 Ω,<br>I <sub>D</sub> =25 A | --- | 22.9  |       | ns    |
| t <sub>r</sub>                     | Rise Time                          |                                                                                                  | --- | 6.5   |       | ns    |
| t <sub>d(off)</sub>                | Turn-Off Delay Time                |                                                                                                  | --- | 45.7  |       | ns    |
| t <sub>f</sub>                     | Fall Time                          |                                                                                                  | --- | 20.4  |       | ns    |
| Q <sub>g</sub>                     | Total Gate Charge                  | I <sub>D</sub> =25 A,<br>V <sub>DS</sub> =50 V,<br>V <sub>GS</sub> =10 V                         | --- | 30    |       | nC    |
| Q <sub>gs</sub>                    | Gate-Source Charge                 |                                                                                                  | --- | 5.8   |       | nC    |
| Q <sub>gd</sub>                    | Gate-Drain “Miller” Charge         |                                                                                                  | --- | 6.1   |       | nC    |
| Drain-Source Diode Characteristics |                                    |                                                                                                  |     |       |       |       |
| Symbol                             | Parameter                          | Conditions                                                                                       | Min | Typ   | Max   | Units |
| V <sub>SD</sub>                    | Source-Drain Diode Forward Voltage | V <sub>GS</sub> =0V, I <sub>S</sub> =20A                                                         | --- |       | 1.3   | V     |
| trr                                | Continuous Source Current          | I <sub>S</sub> =25 A,<br>di/dt=100 A/μs                                                          | --- | 50.3  |       | ns    |
| qrr                                | Pulsed Source Current              |                                                                                                  | --- | 45.1  |       | nC    |

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## N-Channel Enhancement Mosfet

### Typical Characteristics

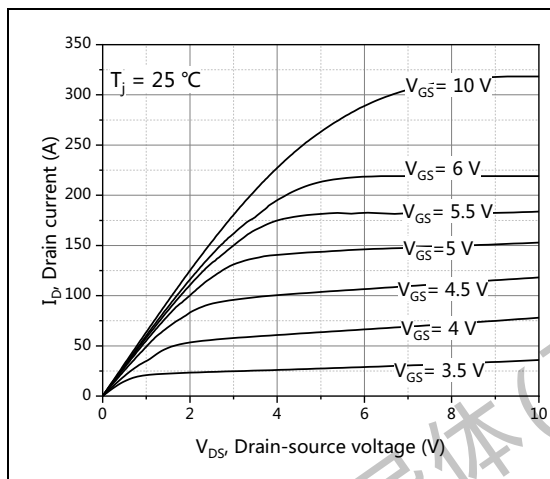


Figure 1, Typ. output characteristics

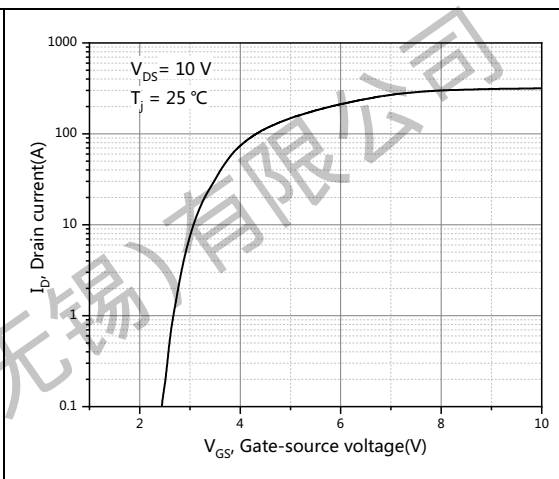


Figure 2, Typ. transfer characteristics

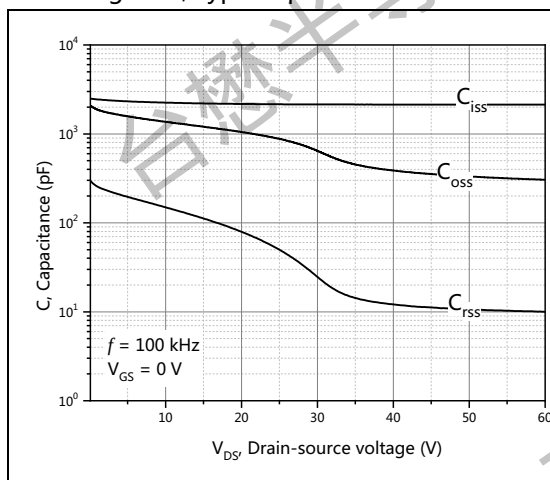


Figure 3, Typ. capacitances

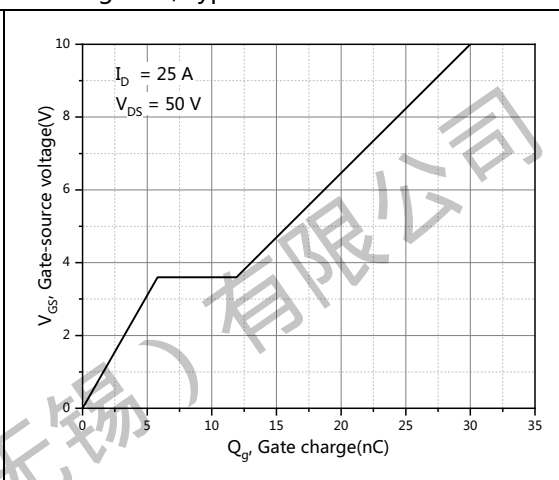


Figure 4, Typ. gate charge

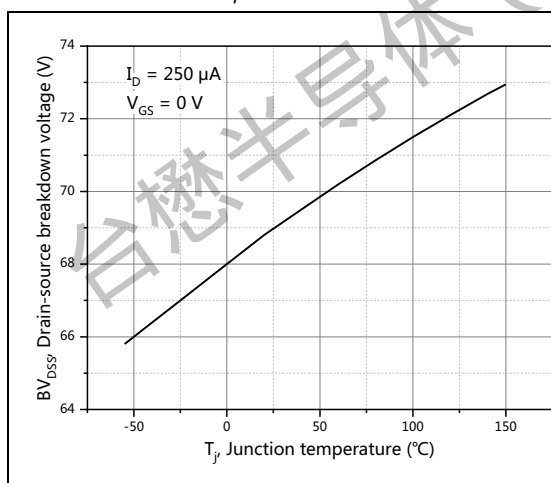


Figure 5, Drain-source breakdown voltage

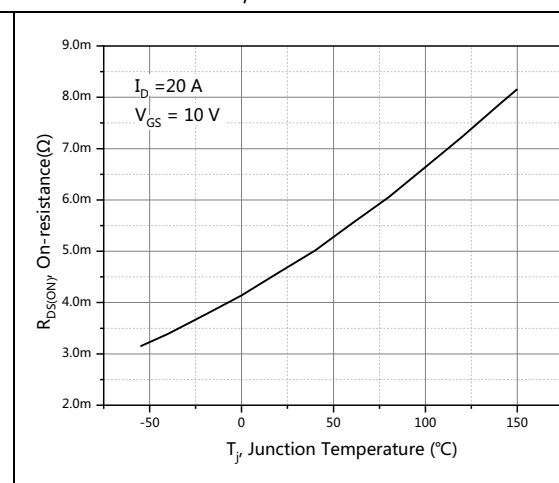


Figure 6, Drain-source on-state resistance

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## N-Channel Enhancement Mosfet

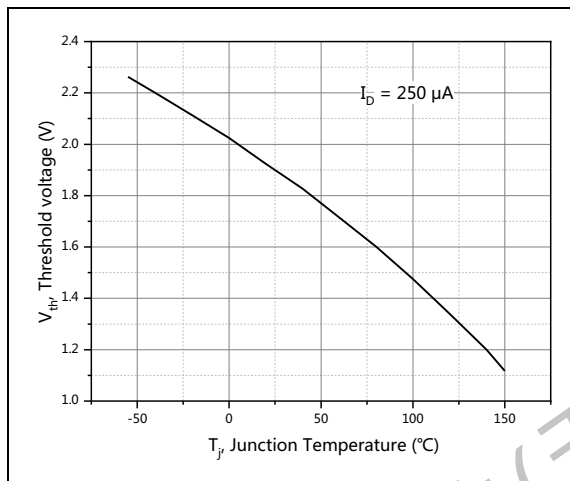


Figure 7, Threshold voltage

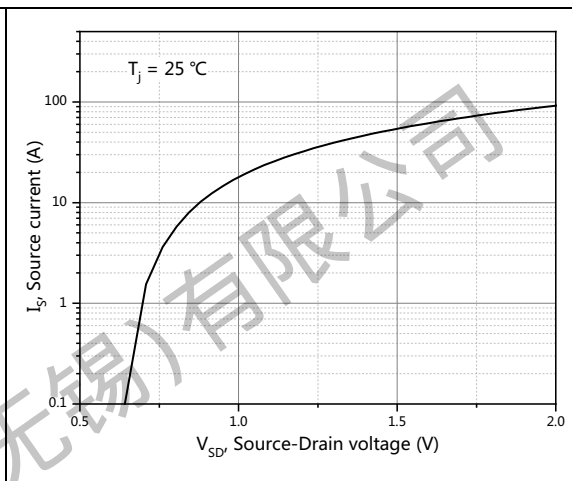


Figure 8, Forward characteristic of body diode

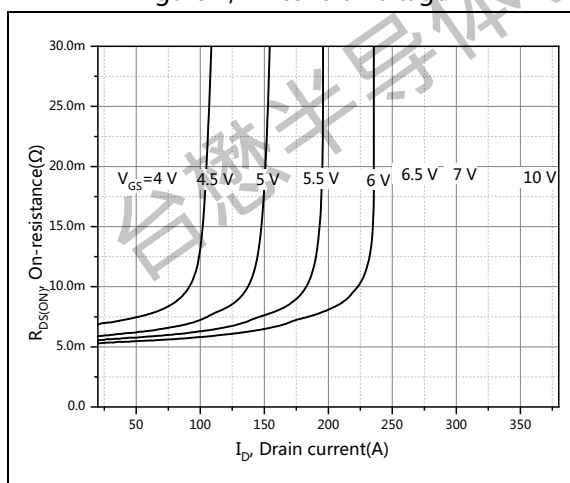


Figure 9, Drain-source on-state resistance

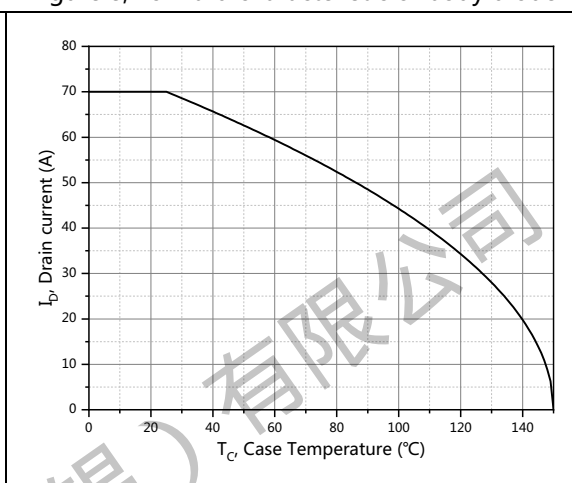


Figure 10, Drain current

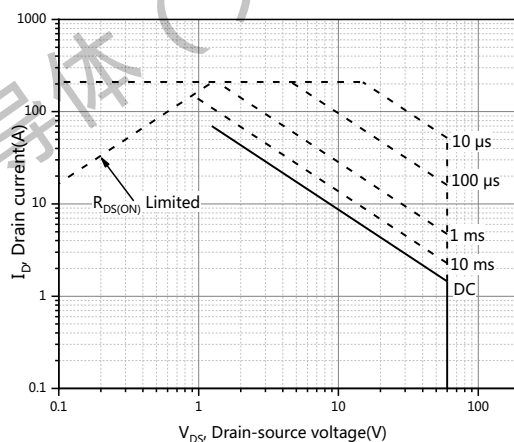
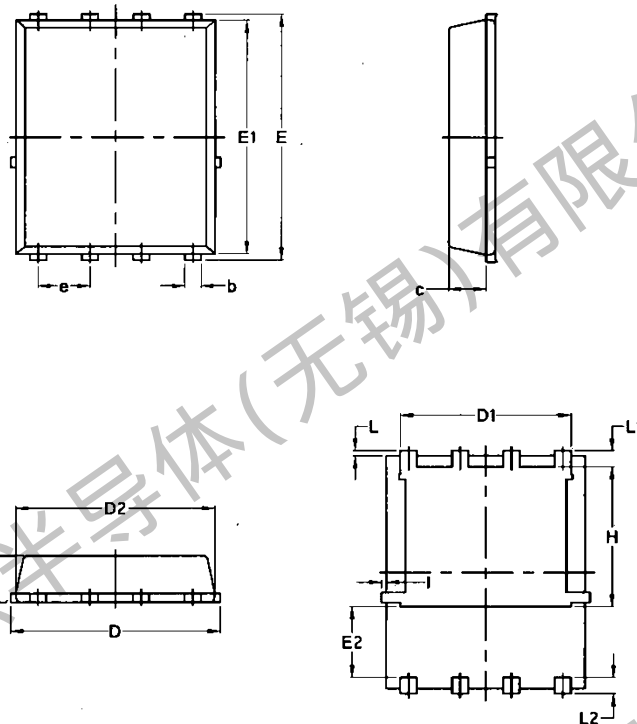


Figure 11, Safe operation area

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## N-Channel Enhancement Mosfet

### Package Mechanical Data:DFN5x6-8L

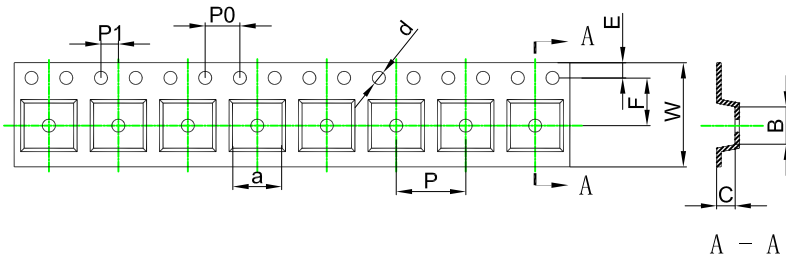


| Symbol | Common   |        |          |        |
|--------|----------|--------|----------|--------|
|        | mm       |        | Inch     |        |
|        | Mim      | Max    | Min      | Max    |
| A      | 1.03     | 1.17   | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48   | 0.0134   | 0.0189 |
| c      | 0.824    | 0.0970 | 0.0324   | 0.082  |
| D      | 4.80     | 5.40   | 0.1890   | 0.2126 |
| D1     | 4.11     | 4.31   | 0.1618   | 0.1697 |
| D2     | 4.80     | 5.00   | 0.1890   | 0.1969 |
| E      | 5.95     | 6.15   | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85   | 0.2224   | 0.2303 |
| E2     | 1.60     | /      | 0.0630   | /      |
| e      | 1.27 BSC |        | 0.05 BSC |        |
| L      | 0.05     | 0.25   | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50   | 0.1299   | 0.1378 |
| I      | /        | 0.18   | /        | 0.0070 |

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## N-Channel Enhancement Mosfet

### PDFN5×6-8L Embossed Carrier Tape



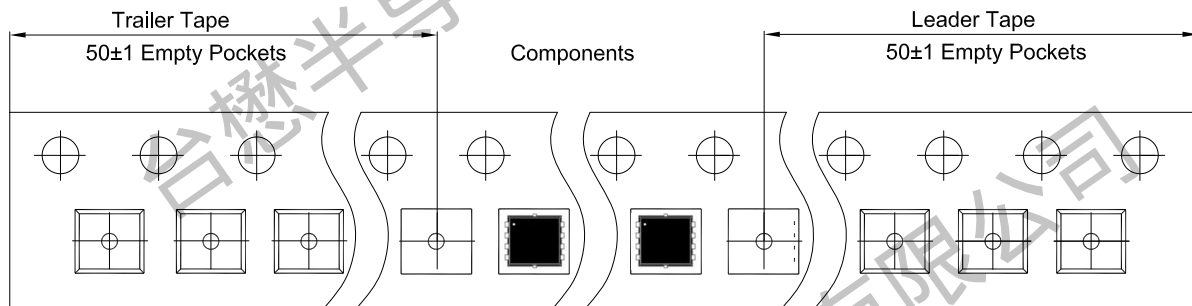
#### Packaging Description:

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).

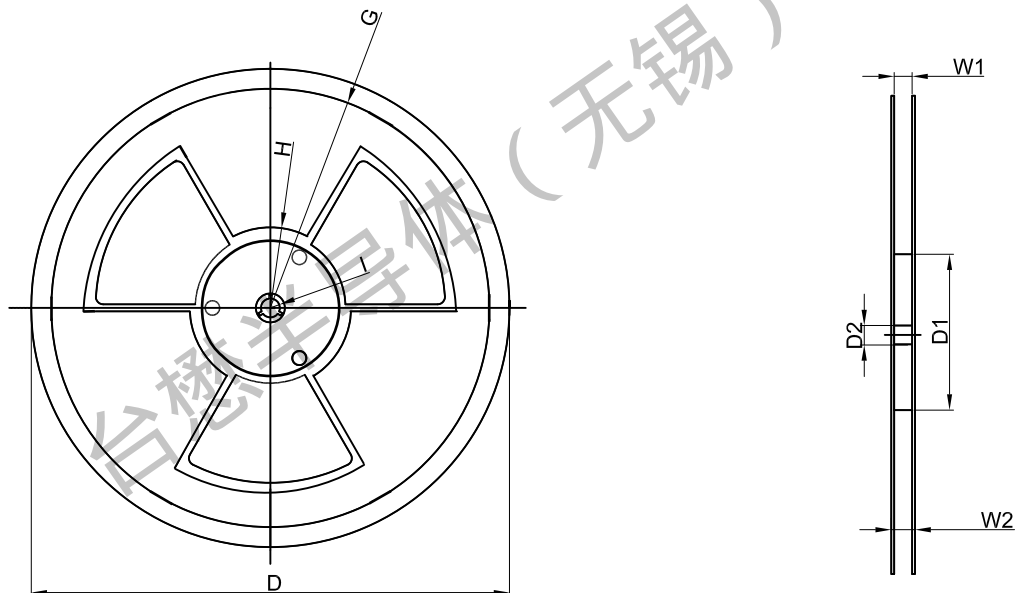
ALL DIM IN mm

| Dimensions are in millimeter |      |      |      |       |      |      |      |      |      |       |
|------------------------------|------|------|------|-------|------|------|------|------|------|-------|
| Pkg type                     | a    | B    | C    | d     | E    | F    | P0   | P    | P1   | W     |
| PDFN5×6-8L                   | 6.40 | 5.40 | 2.10 | Ø1.50 | 1.75 | 5.50 | 4.00 | 8.00 | 2.00 | 12.00 |

### PDFN5×6-8L Tape Leader and Trailer



### PDFN5×6-8L 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 |
|------------|-------|-------------|------|
| 2023.05.14 | 23.05 | Original    |      |