# TMG120N03CNF

## N -Channel Enhancement Mosfet

### General Description

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

### Applications

- Load switch
- PWM

### General Features

$V_{DS}$ = 30V $I_D$ = 120A

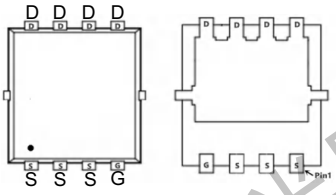
$R_{DS(ON)}$=2.0mΩ(typ.)@$V_{GS}$=10V

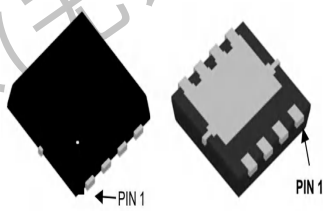
100% UIS Tested

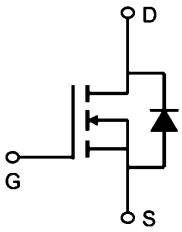
100% $R_g$ Tested

Green Product

NF:DFN5x6-8L(CLIP)




Marking: G120N03C

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

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 120 | A |
| $I_D$@$T_C$=100℃ | Continuous Drain Current, $V_{GS}$ @ 10V | 75 | A |
| $I_{DM}$ | Pulsed Drain Current[1] | 380 | A |
| EAS | Single Pulse Avalanche Energy[2] | 101 | mJ |
| $P_D$@$T_C$=25℃ | Total Power Dissipation | 69 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ℃ |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ℃ |

### Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|---|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient [3] | --- | 62 | ℃/W |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case | --- | 3.6 | ℃/W |

# TMG120N03CNF

## N -Channel Enhancement Mosfet

## Electrical Characteristics ($T_J$ = 25°C, unless otherwise noted)

| Parameter | | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | | |
| Drain-Source Breakdown Voltage | | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ = 250μA | 30 | - | - | V |
| Gate-body Leakage Current | | $I_{GSS}$ | $V_{DS}$ = 0V, $V_{GS}$ = ±20V | - | - | ±100 | nA |
| Zero Gate Voltage Drain Current | $T_J$=25°C | $I_{DSS}$ | $V_{DS}$ = 30V, $V_{GS}$ = 0V | - | - | 1 | μA |
| | $T_J$=125°C | | | - | 2 | - | |
| Gate-Threshold Voltage | | $V_{GS(th)}$ | $V_{DS}$ = $V_{GS}$, $I_D$ = 250μA | 0.9 | 1.2 | 1.5 | V |
| Drain-Source On-Resistance[4] | | $R_{DS(on)}$ | $V_{GS}$ = 10V, $I_D$ = 22.5A | - | 2.0 | 2.4 | mΩ |
| | | | $V_{GS}$ = 4.5V, $I_D$ =22.5A | - | 3.0 | 3.8 | |
| Forward Transconductance[4] | | $g_{fs}$ | $V_{DS}$ = 10V, $I_D$ = 20A | - | 130 | - | S |
| **Dynamic Characteristics[5]** | | | | | | | |
| Input Capacitance | | $C_{iss}$ | $V_{DS}$ = 15V, $V_{GS}$ =0V, f =1MHz | - | 1900 | - | pF |
| Output Capacitance | | $C_{oss}$ | | - | 1419 | - | |
| Reverse Transfer Capacitance | | $C_{rss}$ | | - | 111 | - | |
| Gate Resistance | | $R_g$ | f = 1MHz | - | 2.5 | - | Ω |
| **Switching Characteristics[5]** | | | | | | | |
| Total Gate Charge | | $Q_g$ | $V_{GS}$ = 10V, $V_{DS}$ = 15V, $I_D$= 20A | - | 39 | - | nC |
| Gate-Source Charge | | $Q_{gs}$ | | - | 11 | - | |
| Gate-Drain Charge | | $Q_{gd}$ | | - | 4.5 | - | |
| Turn-On Delay Time | | $t_{d(on)}$ | $V_{GS}$ =10V, $V_{DD}$ = 20V, $R_G$ = 3Ω, $I_D$= 20A | - | 10 | - | ns |
| Rise Time | | $t_r$ | | - | 37 | - | |
| Turn-Off Delay Time | | $t_{d(off)}$ | | - | 45 | - | |
| Fall Time | | $t_f$ | | - | 16 | - | |
| Body Diode Reverse Recovery Time | | $t_{rr}$ | $I_F$=20A, dI/dt=100A/μs | - | 49 | - | ns |
| Body Diode Reverse Recovery Charge | | $Q_{rr}$ | | - | 35 | - | nC |
| **Drain-Source Body Diode Characteristics** | | | | | | | |
| Diode Forward Voltage[4] | | $V_{SD}$ | $I_S$ = 45, $V_{GS}$ = 0V | - | - | 1.4 | V |
| Continuous Source Current | $T_C$=25°C | $I_S$ | - | - | - | 120 | A |

Notes:
1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.
2. The EAS data shows Max. rating . The test condition is $V_{DD}$=24,$V_{GS}$=10V,L=0.1mH,Rg=25Ω
3. The data tested by surface mounted on a 1 inch2 FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

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## N -Channel Enhancement Mosfet

## Typical Characteristics

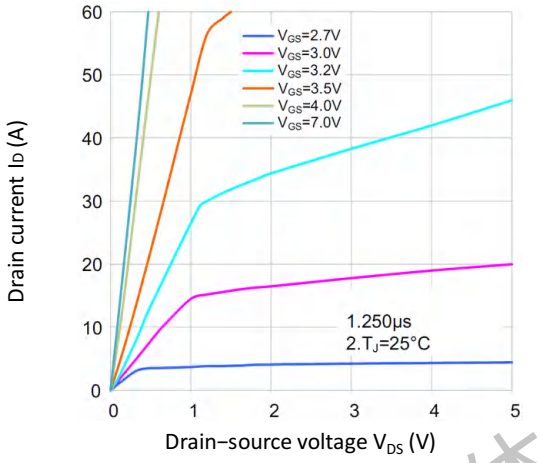



Figure 1. Output Characteristics

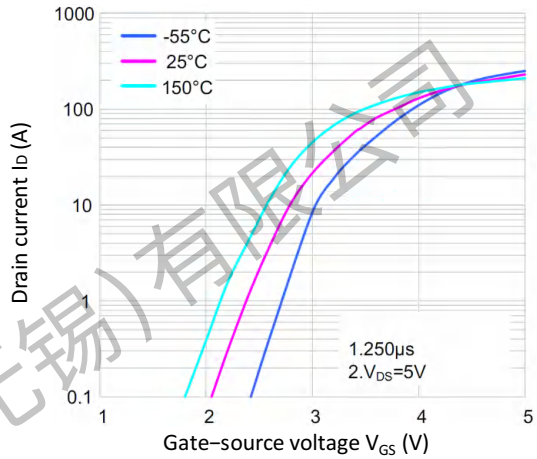



Figure 2. Transfer Characteristics

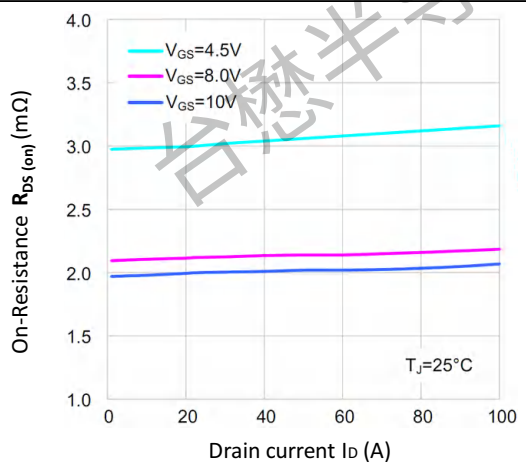



Figure 3. $R_{DS(ON)}$ vs. $I_D$

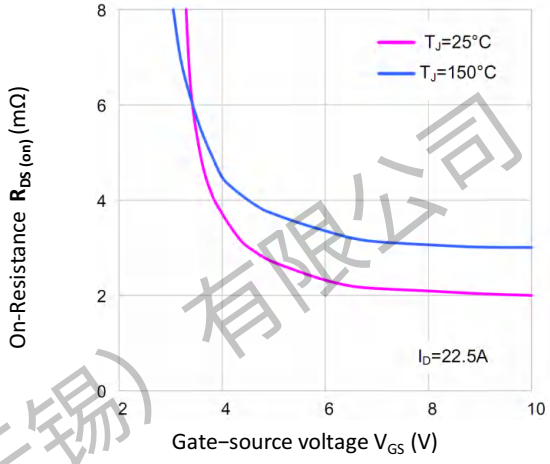



Figure 4. $R_{DS(ON)}$ vs. $V_{GS}$

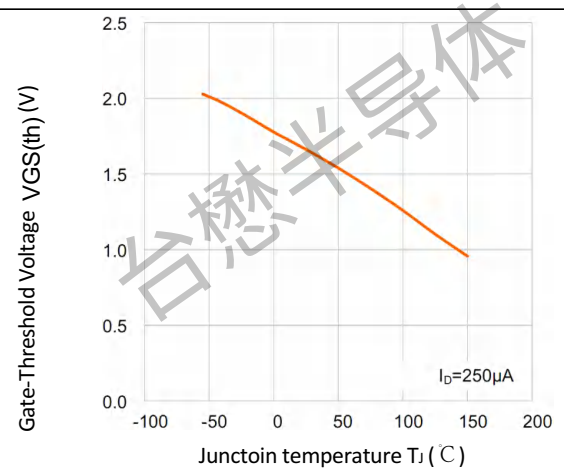



Figure 5. $V_{GS(th)}$ vs. $T_J$

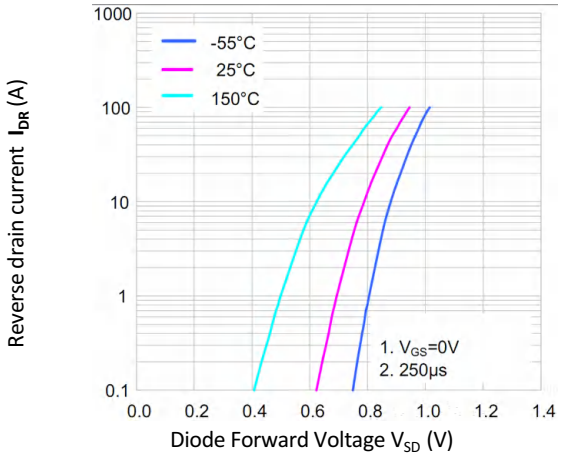



Figure 6. $I_{DR}$ vs. $V_{SD}$

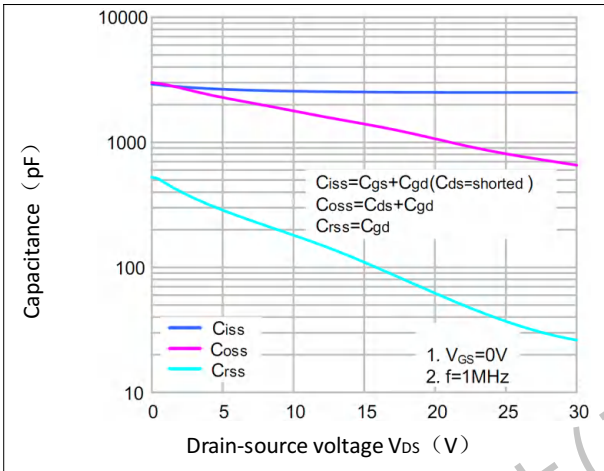



Figure 7. Capacitance Characteristics

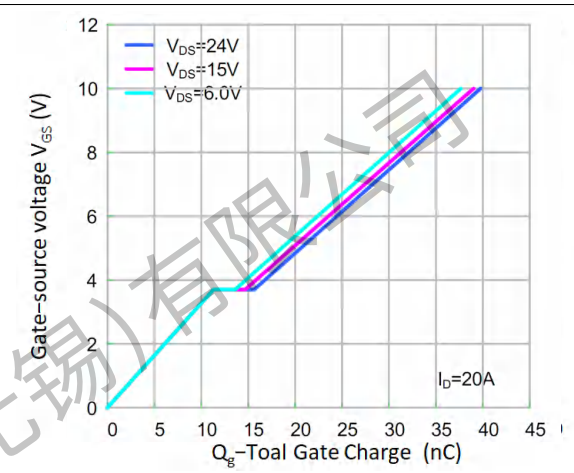



Figure 8 Gate Charge Characteristics

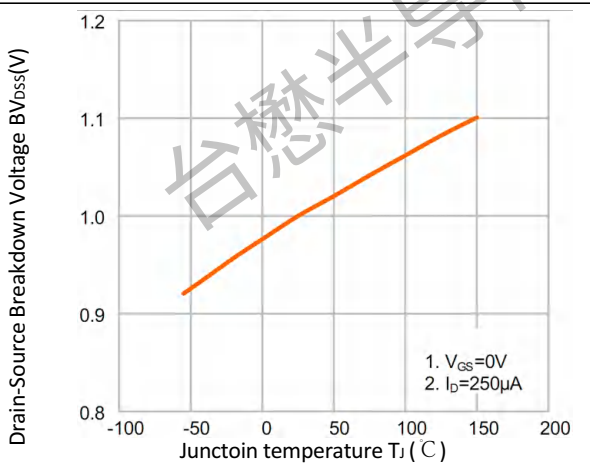



Figure 9. $BV_{DSS}$ VS $T_J$

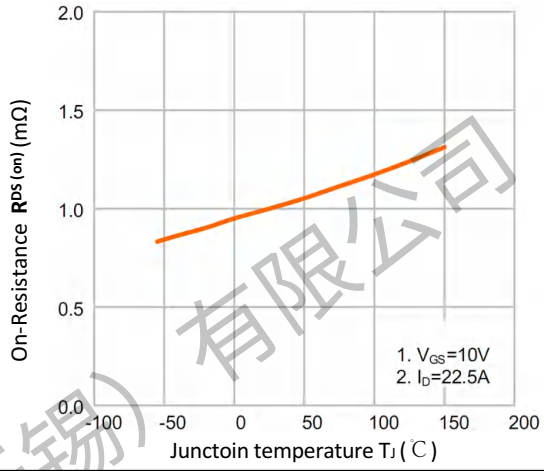



Figure 10. $R_{DS(ON)}$ VS $T_J$

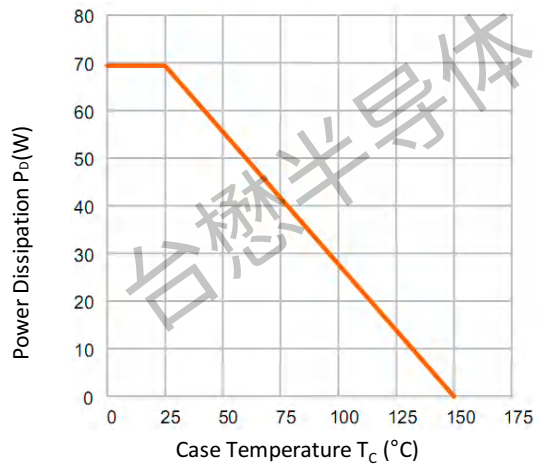



Figure 11. Power Dissipation

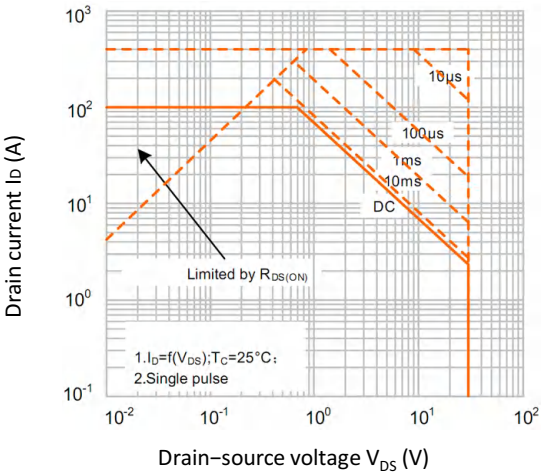



Figure 12. Safe Operating Area

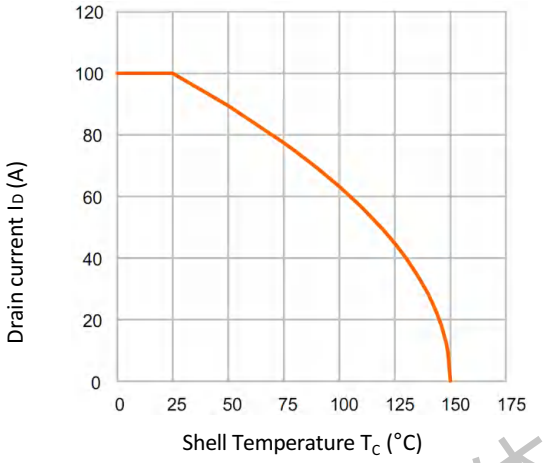



Figure 13.Drain current VS Shell Temperature

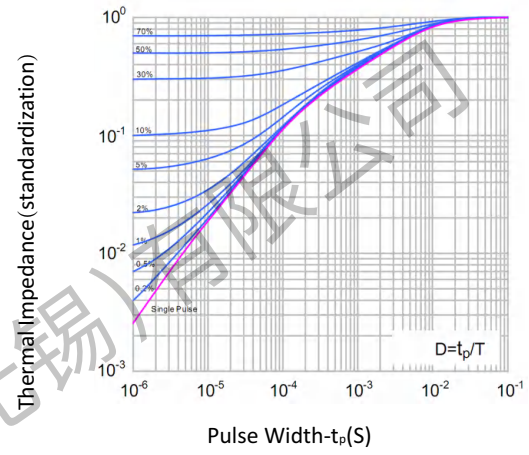
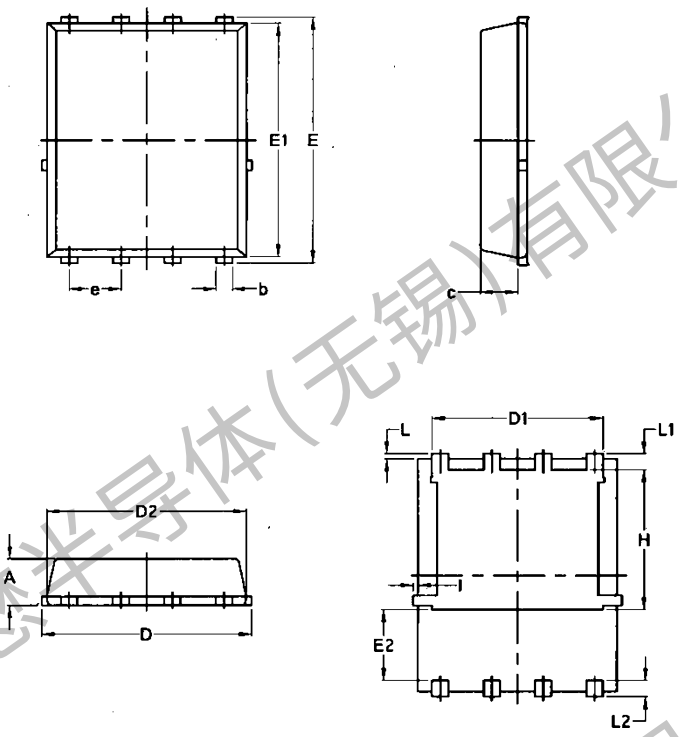



Figure 14 Transient thermal impedance VS Pulse Width

## Package Mechanical Data:DFN5x6-8L(CLIP)

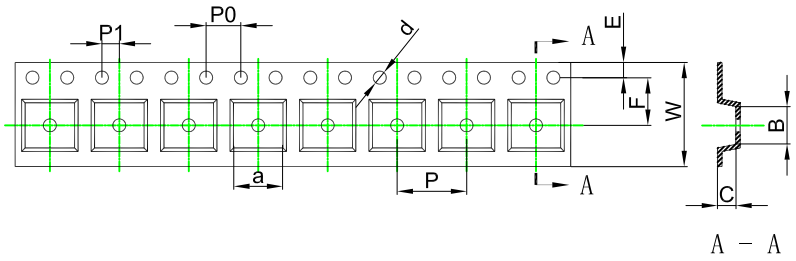



| Symbol | Common | | | |
|---|---|---|---|---|
| | mm | | Inch | |
| | Mim | Max | Min | Max |
| A | 1.03 | 1.17 | 0.0406 | 0.0461 |
| b | 0.34 | 0.48 | 0.0134 | 0.0189 |
| c | 0.824 | 0.0970 | 0.0324 | 0.082 |
| D | 4.80 | 5.40 | 0.1890 | 0.2126 |
| D1 | 4.11 | 4.31 | 0.1618 | 0.1697 |
| D2 | 4.80 | 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 |

# TMG120N03CNF

## N -Channel Enhancement Mosfet

### PDFN5×6-8L Embossed Carrier Tape



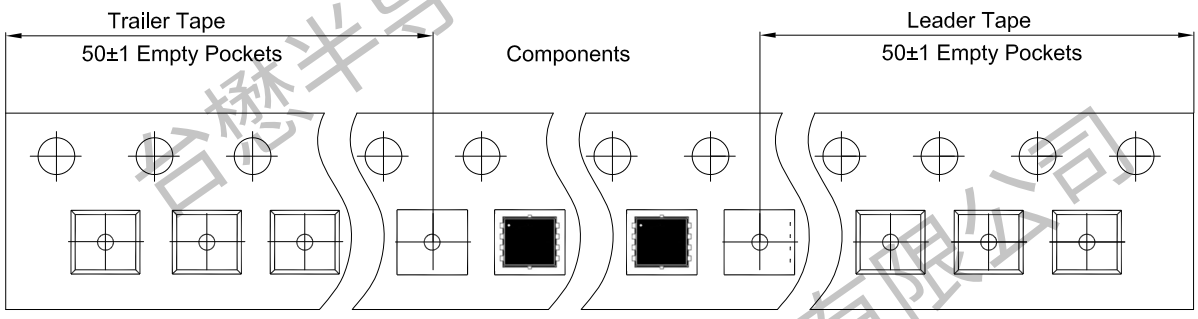

Packaging Description:

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).

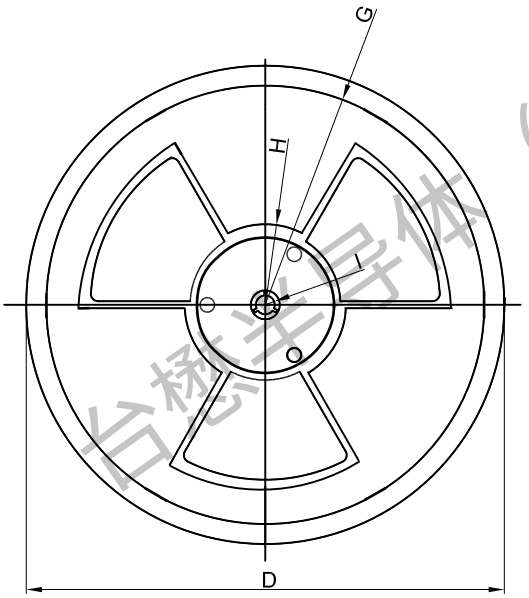
ALL DIM IN mm

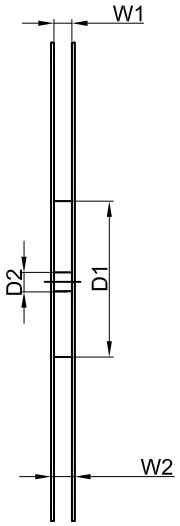
| Dimensions are in millimeter | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Pkg type | a | B | C | d | E | F | P0 | P | P1 | W |
| PDFN5×6-8L | 6.40 | 5.40 | 2.10 | Ø1.50 | 1.75 | 5.50 | 4.00 | 8.00 | 2.00 | 12.00 |

### 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 |
|---|---|---|---|
| 2023.08.16 | 23.08 | Original | |