

## GR-70E100DD: Enhancement Mode Power Transistor

### Description

GR-70E100DD is an enhancement mode GaN on Silicon power transistor. 70E100DD provides high breakdown voltage, high current and high operating speed which is suitable for high power applications.

### Key Specifications

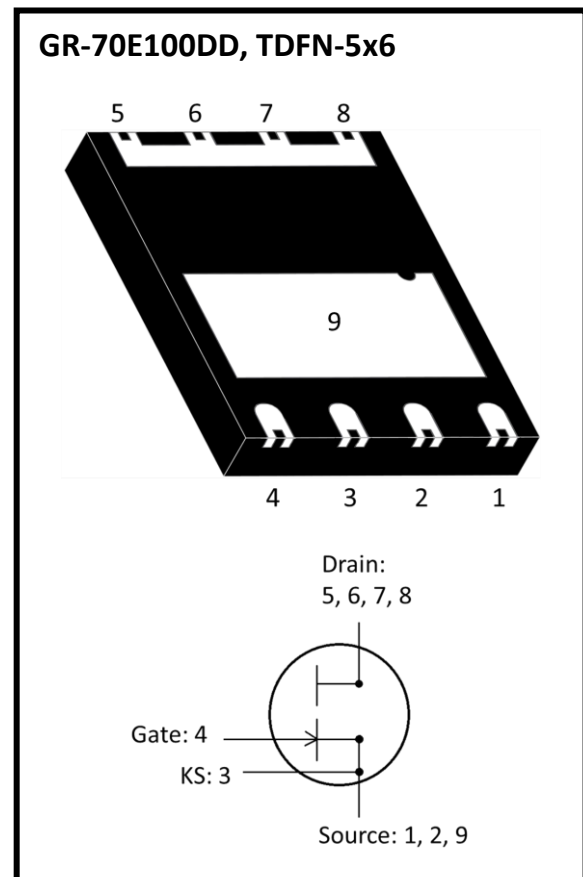
|                                   |               |
|-----------------------------------|---------------|
| Part Number                       | GR-70E100DD   |
| $V_{DS}$ , min.                   | 700V          |
| $I_D$ , continuous (25°C)         | 18.0A         |
| $R_{DS(ON)}$ , typ. @ $V_{GS}=6V$ | 110m $\Omega$ |
| $Q_G$ , typ.                      | 3.4nC         |
| Package                           | TDFN-5x6      |

### Features

- 700 V enhancement mode power transistor
- High operating frequency
- RoHS compliant

### Applications

- Switch Mode Power Supplies (SMPS)
- DC-DC Converters
- Fast Battery Charging
- Appliance Motor Drives



## 1. Electrical Characteristics

➤ **Table 1 Absolute maximum ratings**

| Symbol                | Parameter                                                                               | Value       | Unit             |
|-----------------------|-----------------------------------------------------------------------------------------|-------------|------------------|
| $V_{DSS}$             | Drain-source voltage                                                                    | 700         | V                |
| $V_{(TR)DSS}$         | Transient drain to source voltage <sup>a</sup>                                          | 800         | V                |
| $V_{GSS}$             | Gate- source voltage                                                                    | -6V ~ +7V   | V                |
| $I_D$                 | Drain current (continuous) at $T_C = 25^\circ\text{C}$ operation                        | 18.0        | A                |
|                       | Drain current (continuous) at $T_C = 100^\circ\text{C}$ operation                       | 11.5        | A                |
| $I_{D, \text{Pulse}}$ | Pulsed drain current (pulse width: 10 $\mu\text{s}$ , $V_{GS}=6\text{V}$ ) <sup>b</sup> | 67.5        | A                |
| $P_D$                 | Maximum power dissipation at $T_C = 25^\circ\text{C}$                                   | 74          | W                |
| $T_J$                 | Operating temperature                                                                   | -40 to +150 | $^\circ\text{C}$ |
| $T_S$                 | Storage temperature                                                                     | -40 to +150 | $^\circ\text{C}$ |
| MSL                   | Moisture sensitivity level                                                              | MSL3        | -                |

a. In off-state, spike duty cycle  $D < 0.01$ , spike duration  $< 1\mu\text{s}$

b. Defined by product design and characterization. Value is not tested to full current in production

➤ **Table 2 Thermal Characteristics**

| Symbol          | Parameter                                        | Value | Unit                      |
|-----------------|--------------------------------------------------|-------|---------------------------|
| $R_{\theta JC}$ | Thermal resistance junction-case <sup>a</sup>    | 1.7   | $^\circ\text{C}/\text{W}$ |
| $R_{\theta JA}$ | Thermal resistance junction-ambient <sup>b</sup> | 70    | $^\circ\text{C}/\text{W}$ |

a. Tested in package DFN8-5x6.

b. Device on 1 layer PCB.

➤ **Table 3** Electrical Characteristics ( $T_{CASE} = 25\text{ }^{\circ}\text{C}$  unless otherwise stated)

| Symbol        | Parameter                              | Conditions                                                                                               | Values |      |      | Unit      |
|---------------|----------------------------------------|----------------------------------------------------------------------------------------------------------|--------|------|------|-----------|
|               |                                        |                                                                                                          | min.   | typ. | max. |           |
| $V_{(BL)DSS}$ | Drain-source voltage                   | $V_{GS}=0V$                                                                                              | 700    | -    | -    | V         |
| $V_{GS(th)}$  | Gate threshold voltage                 | $V_{GS}=V_{DS}$ , $I_D=1mA$                                                                              | 1.6    | 1.8  | 2.3  | V         |
| $R_{DS(on)}$  | Static drain-source on-resistance      | $V_{GS}=6V$ , $I_D=5A$ , $T_J=25^{\circ}\text{C}$                                                        | -      | 110  | 132  | $m\Omega$ |
|               |                                        | $V_{GS}=6V$ , $I_D=5A$ , $T_J=125^{\circ}\text{C}$                                                       | -      | 248  | -    |           |
| $I_{DSS}$     | Drain-source leakage current           | $V_{GS}=0V$ , $V_{DS}=700V$ , $T_J=25^{\circ}\text{C}$                                                   | -      | 0.7  | 42   | $\mu A$   |
|               |                                        | $V_{GS}=0V$ , $V_{DS}=700V$ , $T_J=150^{\circ}\text{C}$                                                  | -      | 7.5  | -    |           |
| $I_{GSS}$     | Gate-to-source forward leakage current | $V_{DS}=0V$ , $V_{GS}=+6V$                                                                               | -      | 100  | -    | $\mu A$   |
| $C_{ISS}$     | Input capacitance                      | $V_{GS}=0V$ , $V_{DS}=400V$ ,<br>$f=1MHz$                                                                | -      | 89   | -    | pF        |
| $C_{OSS}$     | Output capacitance                     |                                                                                                          | -      | 37.5 | -    |           |
| $C_{RSS}$     | Reverse transfer capacitance           |                                                                                                          | -      | 2.23 | -    |           |
| $Q_G$         | Gate charge                            | $V_{GS}=0\sim 10V$ , $V_{DS}=400V$ ,<br>$I_{DS}=5A$                                                      | -      | 3.4  | -    | nC        |
| $Q_{GS}$      | Gate-source charge                     |                                                                                                          | -      | 0.4  | -    |           |
| $Q_{GD}$      | Drain-source charge                    |                                                                                                          | -      | 1.45 | -    |           |
| $Q_{OSS}$     | Output charge                          | $V_{GS}=0V$ , $V_{DS}=0\sim 400V$                                                                        | -      | 23.3 | -    |           |
| $t_{D(on)}$   | Turn-on delay time                     | $V_{DS}=400V$ , $V_{GS}=0\sim 6V$ ,<br>$I_{DS}=5A$ ,<br>$R_{G(ON)}=15\Omega$ ,<br>$R_{G(OFF)}=2\Omega$ , | -      | 7.0  | -    | ns        |
| $t_R$         | Rise time                              |                                                                                                          | -      | 7.5  | -    |           |
| $t_{D(off)}$  | Turn-off delay time                    |                                                                                                          | -      | 9.5  | -    |           |
| $t_F$         | Fall time                              |                                                                                                          | -      | 22   | -    |           |
| $Q_{RR}$      | Reverse recovery charge                | $I_S=5A$ , $V_{DS}=400V$                                                                                 | -      | 0    | -    | nC        |

### 2- Typical Characteristic Curves

Fig 1. On-Region Characteristics

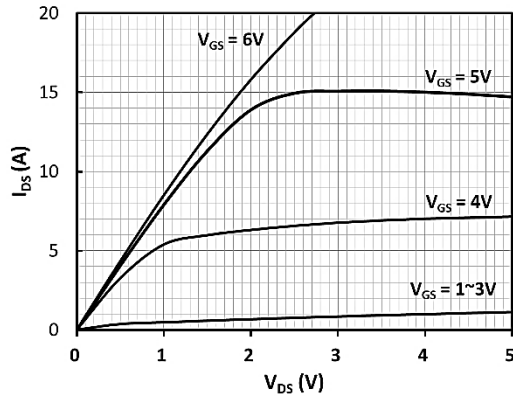


Fig 2. On-Resistance vs Drain Current and Temperature

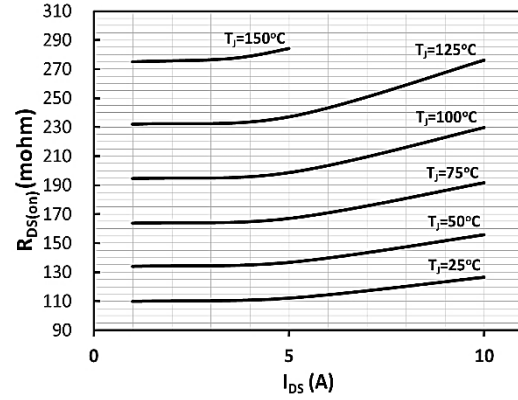


Fig 3. On-Resistance with Drain Current

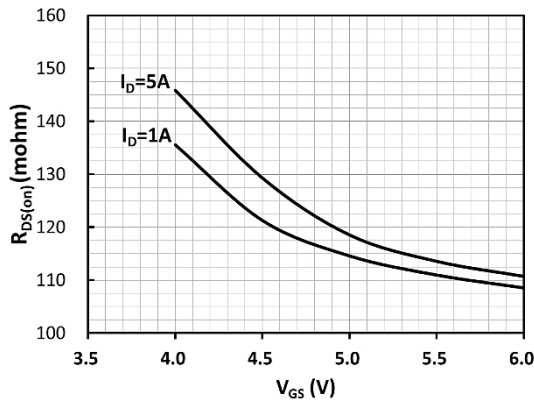


Fig 4. On-Resistance Variation with Temperature

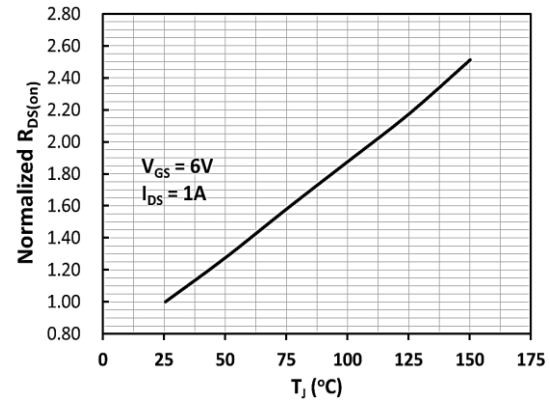


Fig 5. Threshold Voltage with Temperature

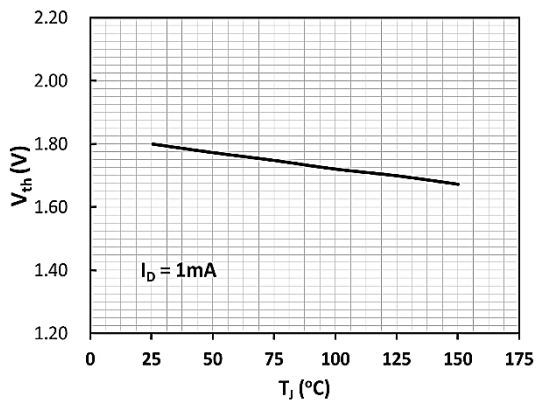


Fig 6. Capacitance Characteristics

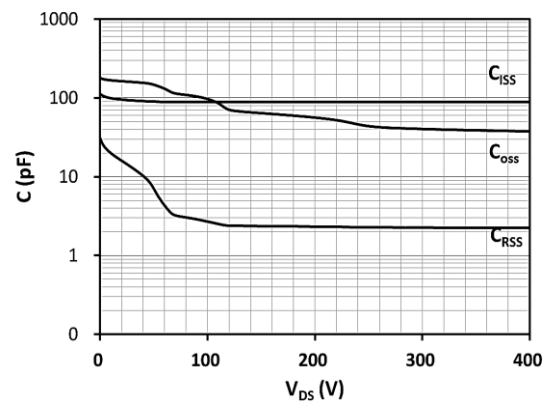


Fig 7. Gate Charge Characteristics,  $Q_g$

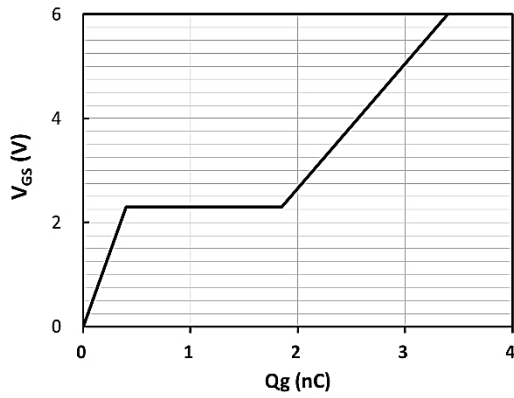


Fig 8. Capacitance Characteristics,  $Q_{oss}$

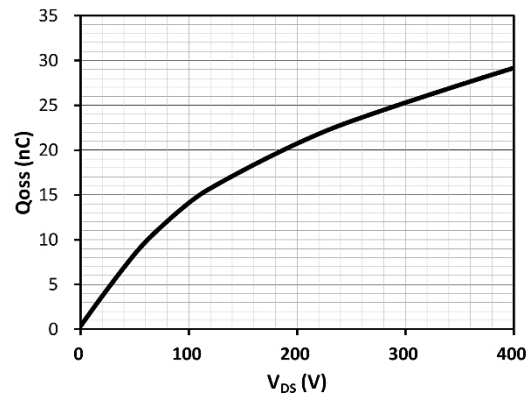
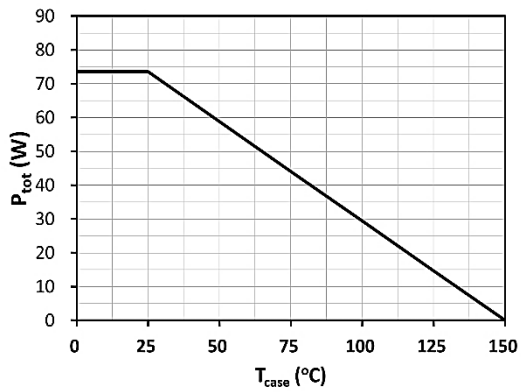
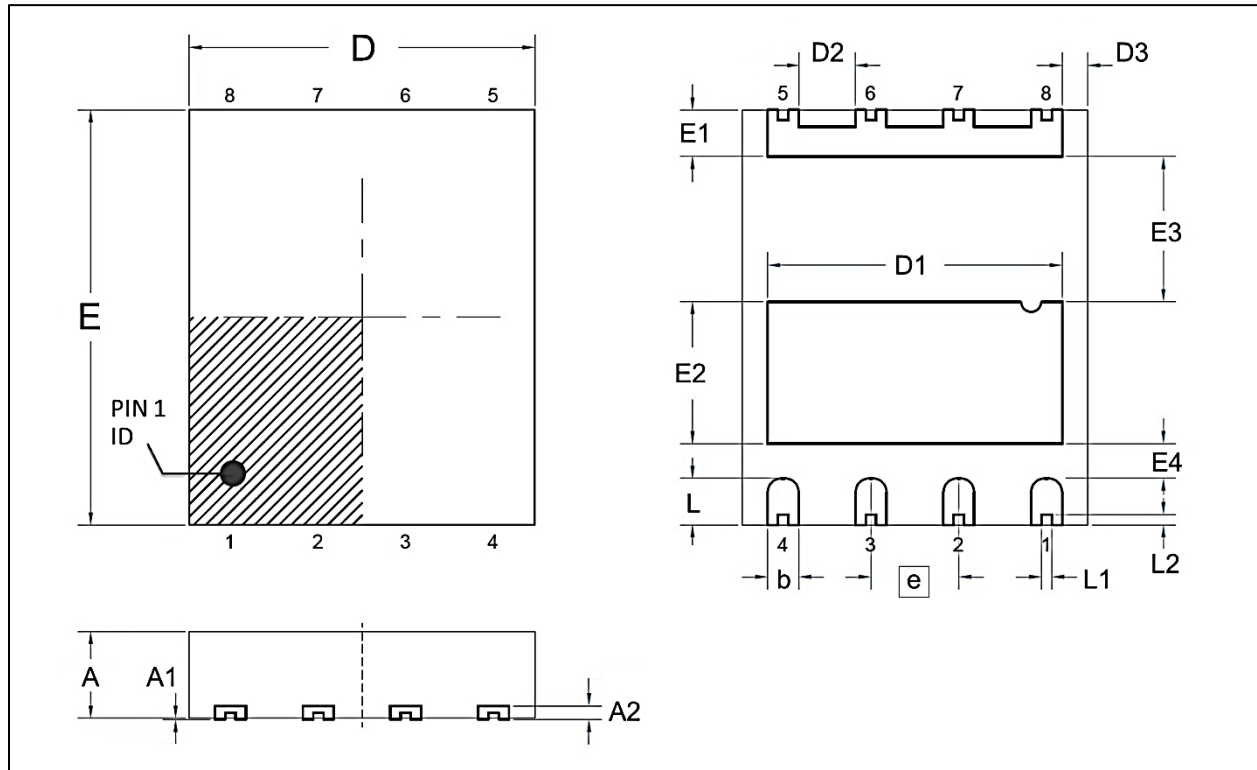


Fig 9. Power Dissipation Derating,  $P_{tot}$



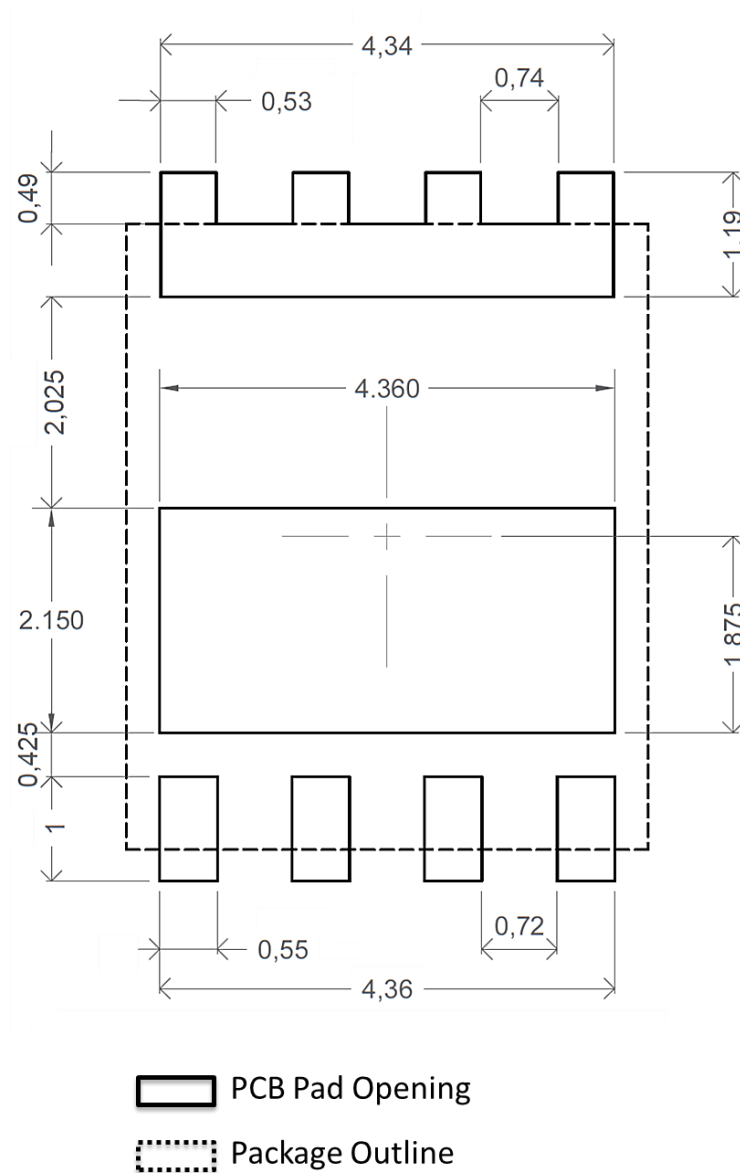
### 3. Package Outline Dimensions (GR-DFN8-5x6)



➤ Table 4 Dimension of GR-DFN8-5x6

| SYMBOL    | DIMENSION (MM) |      |      | SYMBOL    | DIMENSION (IN MM) |       |       |
|-----------|----------------|------|------|-----------|-------------------|-------|-------|
|           | MIN.           | NOM. | MAX. |           | MIN.              | NOM.  | MAX.  |
| <b>A</b>  | 0.80           | 0.85 | 0.90 | <b>E1</b> | 0.575             | 0.675 | 0.775 |
| <b>A1</b> | --             | 0.02 | 0.05 | <b>E2</b> | 1.95              | 2.05  | 2.15  |
| <b>A3</b> | 0.203 REF      |      |      | <b>E3</b> | 2.00              | 2.10  | 2.20  |
| <b>b</b>  | 0.35           | 0.45 | 0.55 | <b>E4</b> | 0.40              | 0.50  | 0.60  |
| <b>D</b>  | 4.90           | 5.00 | 5.10 | <b>L</b>  | 0.575             | 0.675 | 0.775 |
| <b>E</b>  | 5.90           | 6.00 | 6.10 | <b>L1</b> | 0.05              | 0.10  | 0.20  |
| <b>D1</b> | 4.16           | 4.26 | 4.36 | <b>L2</b> | 0.05              | 0.10  | 0.20  |
| <b>D2</b> | 0.72           | 0.82 | 0.92 | -         | -                 | -     | -     |
| <b>D3</b> | 0.27           | 0.37 | 0.47 | -         | -                 | -     | -     |

#### 4. Recommended PCB Soldering Footprint, GR-TDFN-5x6

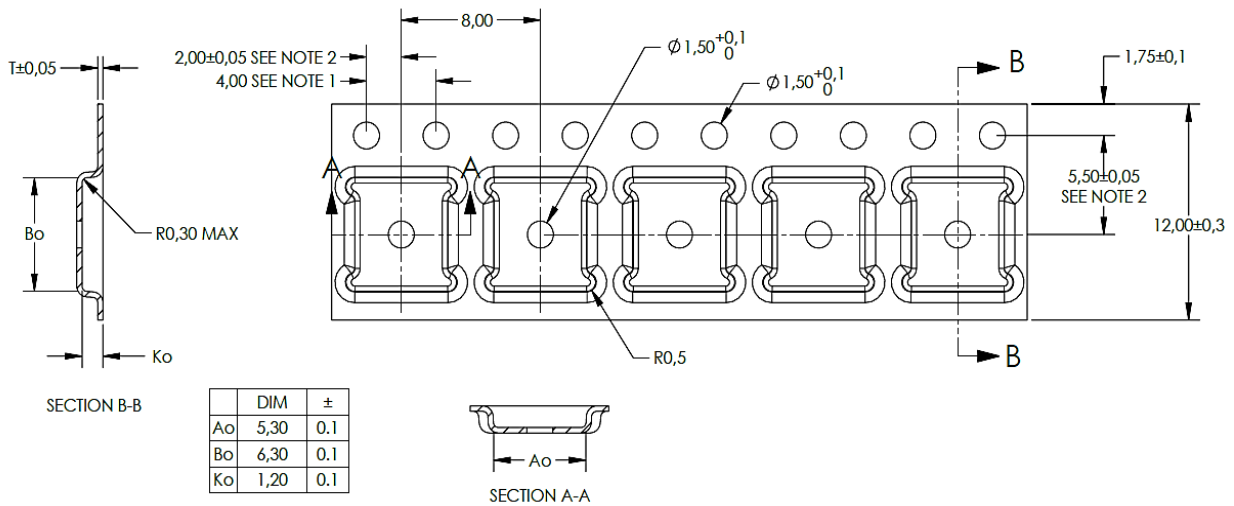


Notes:

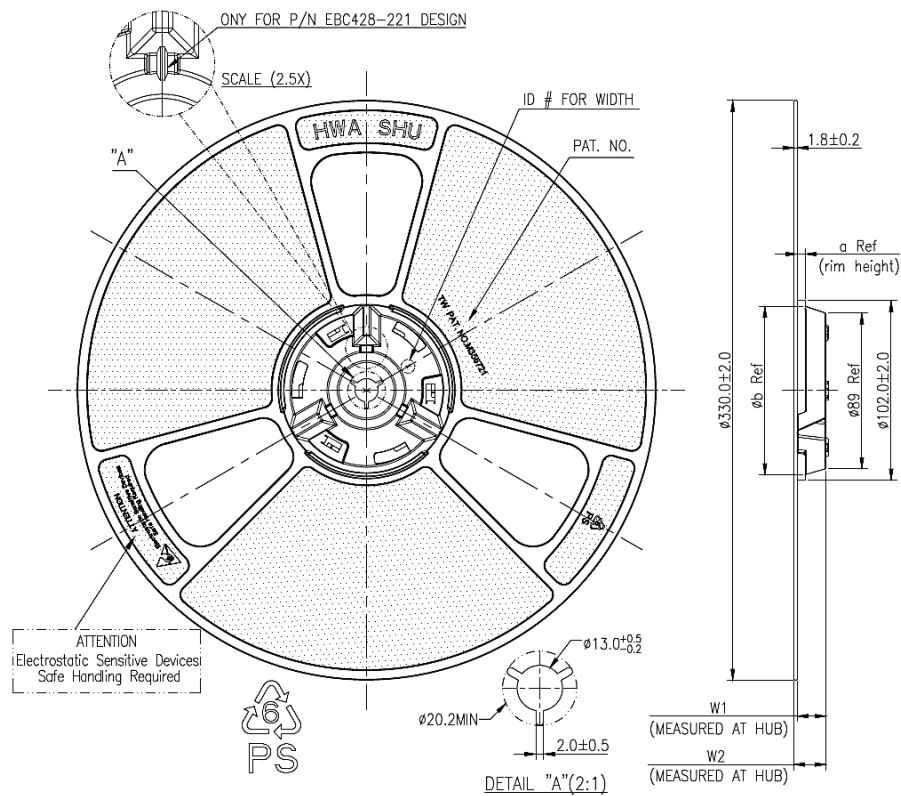
- (1) Drawing is not to scale.
- (2) All dimension are in millimeters

## 5. Tape Reel and Package Information

TDFN-5x6 Carrier Tape (13" Reel, W=12mm)

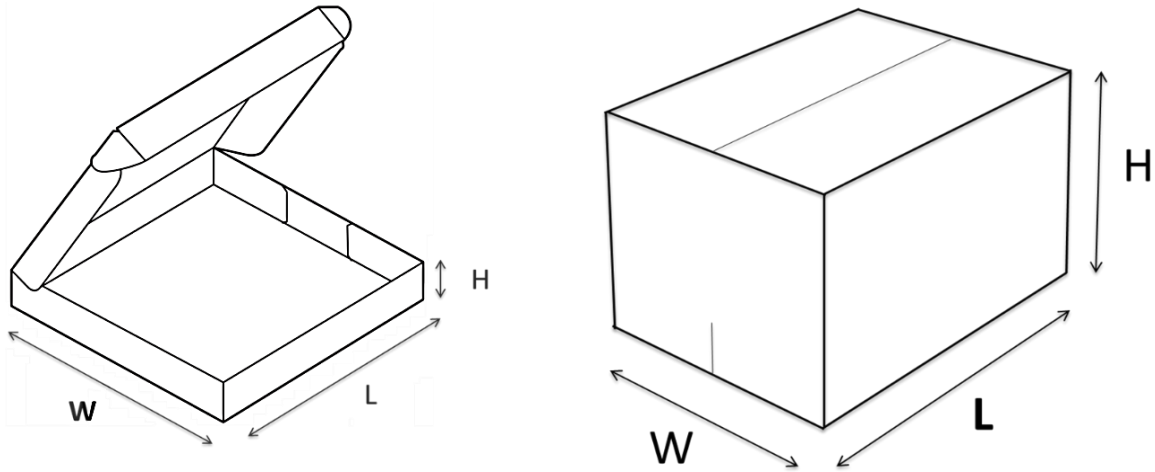


Unit: mm





## TDFN-5x6 Package Information



|   | Inner BOX, mm | Outer Carton, mm |
|---|---------------|------------------|
| L | 355           | 370              |
| W | 345           | 370              |
| H | 50            | 282              |

## Notes

One inner box contains 3,500 components.

The weight of one inner box is approximately 1.15kg.

Each Carton contains 5 boxes, Total of 12500 components.

The weight of one outer carton is approximately 5.75kg.

## 6. Change Log

| Version | Date           | Description                                                          |
|---------|----------------|----------------------------------------------------------------------|
| 0.1     | NOV 24, 2024   | Initial version                                                      |
| 0.2     | NOV 12, 2025   | Add Characteristic Curve & Reel Information                          |
| 0.3     | April 16, 2026 | Electrical characteristics and typical characteristic curves revised |

- **Note:** GaNrich semiconductor reserves the right to revise products and/or specifications without notice.