# GR-10E001DJ: E-mode GaN Power Transistor

## Description

GR-10E001DJ is an enhancement mode GaN on Silicon power transistor. 10E001DJ provides, high current and high operating speed which is suitable for DC to DC power supply applications.

## Key Specifications

| Part Number | GR-10E001DJ |
|---|---|
| $V_{DSS}$, min. | 100V |
| $I_{DS,\ Pulse\ (25°C,\ TPULSE\ =\ 300\ \mu s)}$ | 307A |
| $R_{DS(ON),\ typ.\ @Vgs=5V}$ | 1.2mΩ |
| $Q_G$, typ. | 28nC |

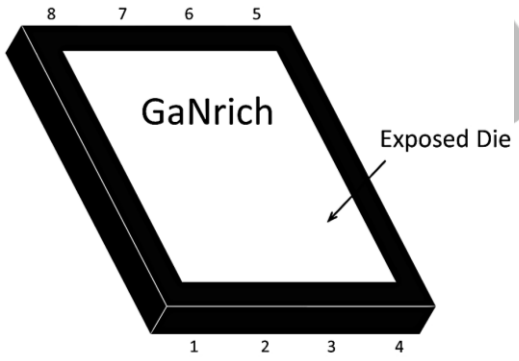
## Features

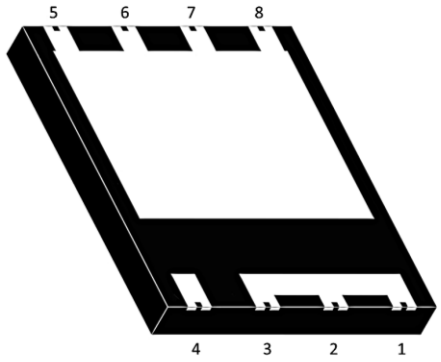
- 100 V enhancement mode power transistor
- High operating frequency
- RDS(on) = Typ. 1.2 mΩ
- RoHS compliant

## Applications

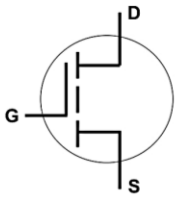
- Switch Mode Power Supplies (SMPS)
- DC-DC Converters
- Fast Battery Charging
- Appliance Motor Drives

**GR-10E001DJ, DFN-5x6**




| Drain | 5, 6, 7, 8 |
|---|---|
| Gate | 4 |
| Source | 1, 2, 3 |




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# 1. Electrical Characteristics

## ➢ Table 1 Absolute maximum ratings

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{DSS}$ | Drain-source voltage | 100 | V |
| $V_{(TR)DSS}$ | Transient drain to source voltage[a] | 120 | V |
| $V_{GSS}$ | Gate- source voltage | -4V ~ +6V | V |
| $I_D$ | Drain current (continuous) at $T_C$ = 25°C operation | 99 | A |
| | Drain current (continuous) at $T_C$ = 100°C operation | - | A |
| $I_{D,Pulse}$ | Pulsed drain current (pulse width: 300μs, Vgs=5V)[b] | 307 | A |
| $T_J$ | Operating temperature | -40 to +150 | °C |
| $T_S$ | Storage temperature | -40 to +150 | °C |

a. In off-state, spike duty cycle D<0.01, spike duration <1μs
b. Defined by product design and characterization. Value is not tested to full current in production

## ➢ Table 2 Thermal Characteristics

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{\Theta JC_Top}$ | Thermal resistance junction-case, Top | 0.50 | °C/W |
| $R_{\Theta JC_Bot}$ | Thermal resistance junction-case, Bottom | 0.50 | °C/W |
| $R_{\Theta JA}$ | Thermal resistance junction-ambient | 60 | °C/W |

a. Tested in package DFN 5x3.

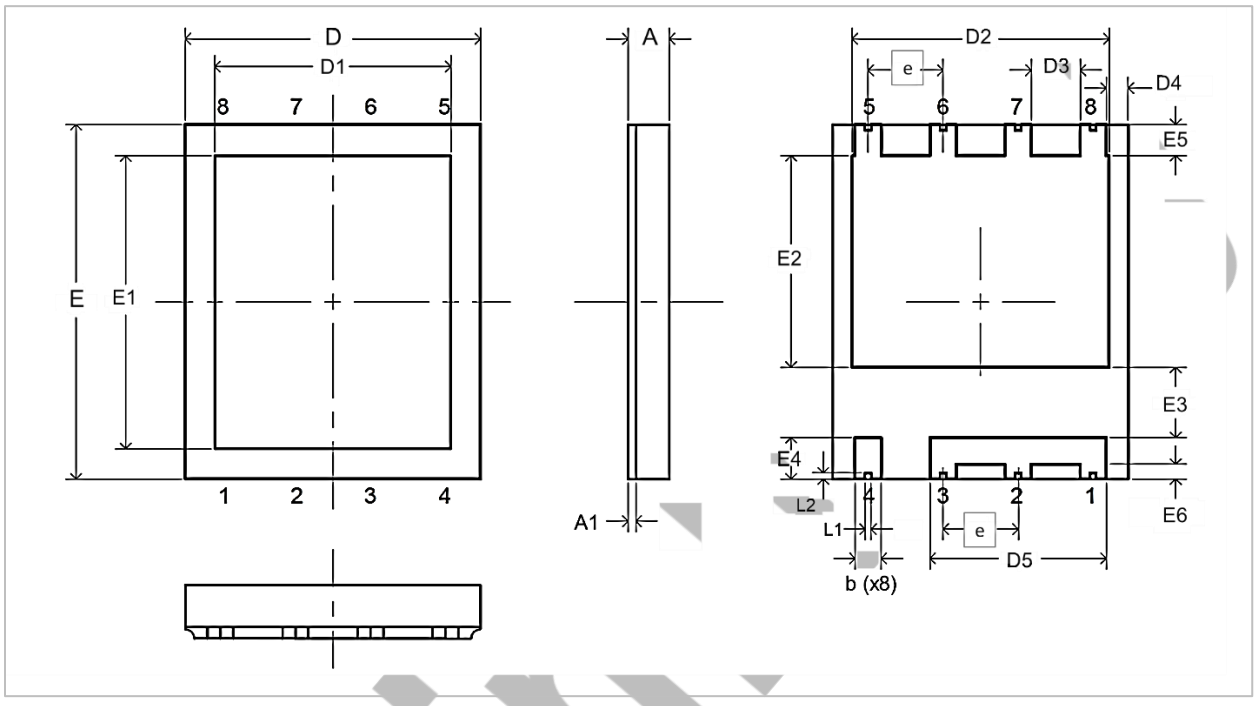
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➢ **Table 3 Electrical Characteristics** ($T_{CASE}$ = 25 °C unless otherwise stated)

| Symbol | Parameter | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| $V_{DSS}$ | Drain-source voltage | $V_{GS}$= 0V, $I_D$= 150μA | 100 | - | - | V |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS}$=$V_{GS}$, $I_D$= 15mA | 0.8 | 1.1 | 1.6 | V |
| $R_{DS(on)}$ | Drain-source on-resistance | $V_{GS}$= 5V, $I_D$= 50A | - | 1.2 | 1.6 | mΩ |
| $I_{DSS}$ | Drain-source leakage current | $V_{DS}$= 80V, $V_{GS}$= 0V | - | 5.0 | 100 | μA |
| $I_{GSS}$ | Gate-to-Source Forward Leakage current | $V_{GS}$ = +5V | - | 190 | 1500 | μA |
| | Gate-to-Source Forward Leakage current | $V_{GS}$ = +5V, $T_J$=125°C | - | 1500 | 5000 | μA |
| | Gate-to-Source Reverse Leakage current | $V_{GS}$ = -4V | - | 2.0 | 60 | μA |
| $C_{ISS}$ | Input capacitance | $V_{DS}$=50V, $V_{GS}$=0V | - | 4750 | - | pF |
| $C_{OSS}$ | Output capacitance | | - | 1350 | - | |
| $C_{RSS}$ | Reverse transfer capacitance | | - | 15 | - | |
| $Q_G$ | Gate charge | $V_{DS}$= 50V, $V_{GS}$= 5V, $I_D$= 50A | - | 28 | - | nC |
| $Q_{GS}$ | Gate-source charge | $V_{DS}$= 50V, $I_D$= 50A | - | 11 | - | |
| $Q_{GD}$ | Gate-drain charge | | | 2.7 | | |
| $Q_{OSS}$ | Output charge | $V_{DS}$= 50V, $V_{GS}$= 0V | - | 110 | - | |
| $Q_{RR}$ | Source-Drain Recovery Charge | - | - | 0 | - | |

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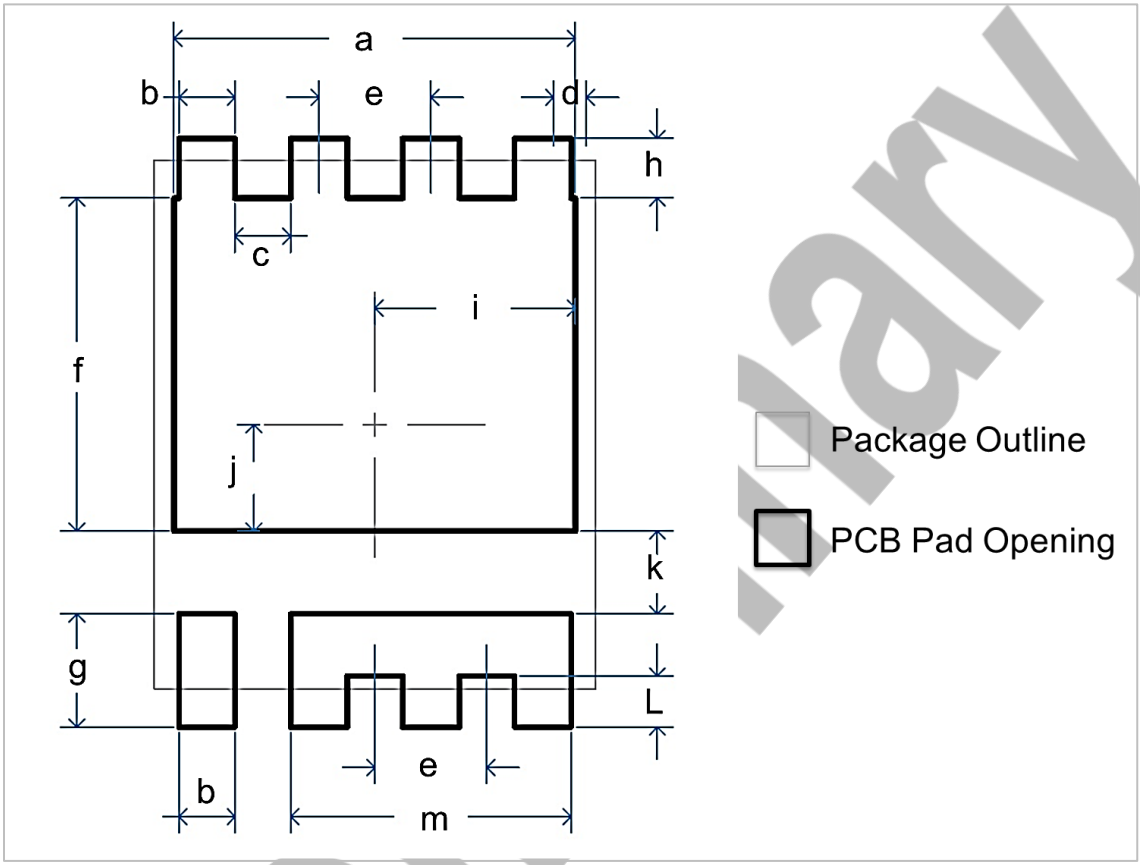
## 2. Package Outline Dimensions




➢ **Table 4 Dimension of GR-DFN-5x6**

| SYMBOL | DIMENSION (IN MM) | | | SYMBOL | DIMENSION (IN MM) | | |
|---|---|---|---|---|---|---|---|
| | MIN. | NOM. | MAX. | | MIN. | NOM. | MAX. |
| **A** | --- | --- | 0.70 | **D5** | 2.88 | 2.98 | 3.08 |
| **A1** | | 0.13 | | **E1** | | 4.957 REF | |
| **A2** | 0.42 | 0.45 | 0.48 | **E2** | 3.48 | 3.58 | 3.68 |
| **D** | 4.90 | 5.00 | 5.10 | **E3** | 1.09 | 1.19 | 1.29 |
| **E** | 2.90 | 6.00 | 3.10 | **E4** | 0.60 | 0.70 | 0.80 |
| **e** | | 1.27 BSC | | **E5** | 0.43 | 0.53 | 0.63 |
| **b** | 0.34 | 0.44 | 0.54 | **E6** | 0.15 | 0.25 | 0.35 |
| **D1** | | 3.994 REF | | **L1** | 0.05 | 0.10 | 0.20 |
| **D2** | 4.25 | 4.35 | 4.45 | **L2** | 0.05 | 0.10 | 0.20 |
| **D3** | 0.73 | 0.83 | 0.93 | | | | |
| **D4** | 0.275 | 0.375 | 0.475 | | | | |

## 3. Recommended PCB footprint




➢ **Table 5 PCB Footprint Dimension**

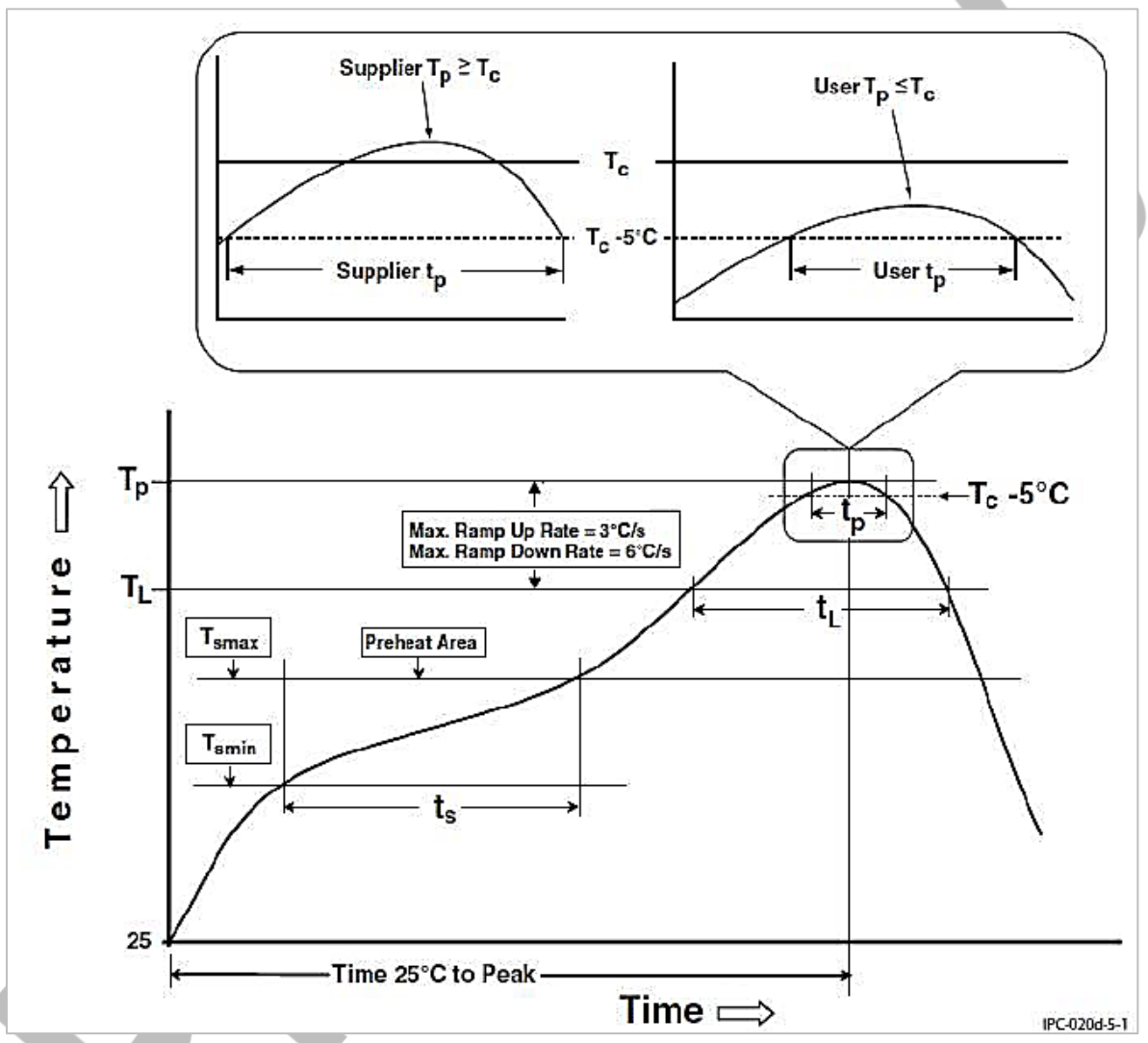
| SYMBOL | DIMENSION | SYMBOL | DIMENSION |
|---|---|---|---|
| **a** | 4.550 | **h** | 0.680 |
| **b** | 0.640 | **i** | 2.275 |
| **c** | 0.630 | **j** | 1.210 |
| **d** | 0.375 | **k** | 0.940 |
| **e** | 1.270 | **L** | 0.580 |
| **f** | 3.780 | **m** | 3.180 |
| **g** | 1.280 | **-** | **-** |

Notes:
(1) All dimensions are in mm.
(2) Drawing is not to Scale.

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## 4. Reflow Soldering Profile

**Recommended Reflow Soldering Condition (IPC/JEDEC J-STD-020D.1)**



➢ **Table 6 Recommended Reflow Soldering Condition**

| Profile Feature | Pb-Free Assembly |
|---|---|
| **Preheat/Soak**<br>Temperature Min ($T_{smin}$)<br>Temperature Max ($T_{smax}$)<br>Time ($t_s$) from ($T_{smin}$ to $T_{smax}$) | <br>150°C<br>200°C<br>60-120 seconds |
| Ramp-up rate ($T_L$ to $T_P$) | 3°C/second max. |
| Liquidous temperature ($T_L$)<br>Time ($t_L$) maintained above $T_L$ | 217°C<br>60-150 seconds |
| Time ($t_p$)* within 5°C of the specified classification temperature ($T_c$)**, see Reflow Soldering Profile above. | 30* seconds |
| Ramp-down rate ($T_p$ to $T_L$) | 6°C/second max. |
| Time 25°C to peak temperature | 8 minutes max. |

**($t_P$)*** The highest temperature that an individual package body reaches during MSL classification.

**($T_C$)**** The maximum body temperature at which the component manufacturer guarantees the component MSL as noted on the caution and/or bar code label (per J-STD-033).

**30* seconds** Reflow profiles in this document are for classification/preconditioning and are not meant to specify board assembly profiles. Actual board assembly profiles should be developed based on specific process needs and board designs and should not exceed the parameters in **Table 5**.
For example, if **Tc** is 260 °C and time tp is 30 seconds, this means the following for the supplier and the user.
For a supplier: The peak temperature must be at least 260 °C. The time above 255 °C must be at least 30 seconds.
For a user: The peak temperature must not exceed 260 °C. The time above 255 °C must not exceed 30 seconds

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## 5. Change Log

| Version | Date | Description |
|---|---|---|
| 0.1 | March 28, 2025 | Initial version |
| 0.2 | September 26, 2025 | Revised version |

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

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