

## N-Channel 80V (D-S) Power MOSFET

### Features

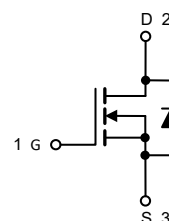
- 100% Avalanche Tested
- Extremely Low Losses with Low FOM  $R_{DS(on)} \cdot Q_g$
- Halogen Free, Pb-Free
- RoHS Compliant



TO-252 (D-PAK)

### Applications

- DC/DC
- Motors, lamps
- Power switching



| Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ unless otherwise noted) |                         |                |             |                  |
|---------------------------------------------------------------------------|-------------------------|----------------|-------------|------------------|
| Parameter                                                                 |                         | Symbol         | Value       | Unit             |
| Drain Source Voltage                                                      |                         | $V_{DS}$       | 80          | V                |
| Gate Source Voltage                                                       |                         | $V_{GS}$       | $\pm 20$    | V                |
| Drain Current, Continuous<br>$V_{GS}=10\text{V}$                          | $T_C=25^\circ\text{C}$  | $I_D$          | 52          | A                |
|                                                                           | $T_C=100^\circ\text{C}$ |                | 33          |                  |
| Drain Current, Pulsed (Note 1)                                            |                         | $I_{DM}$       | 208         | A                |
| Single Avalanche Energy (Note 2)                                          |                         | $E_{AS}$       | 180         | mJ               |
| Power Dissipation                                                         | $T_C=25^\circ\text{C}$  | $P_D$          | 63          | W                |
|                                                                           | $T_C=100^\circ\text{C}$ |                | 25          |                  |
| Operating Junction/ Storage Temperature Range                             |                         | $T_J/ T_{STG}$ | -55 to +150 | $^\circ\text{C}$ |

Note 1: Single pulse;  $t_p \leq 1\mu\text{s}$ .

Note 2:  $V_{DD} = 50\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $L = 0.4\text{mH}$ ,  $R_G = 25\Omega$ , starting  $T_J = 25^\circ\text{C}$ .

| Thermal Characteristics                         |            |      |                    |
|-------------------------------------------------|------------|------|--------------------|
| Parameter                                       | Symbol     | Max  | Unit               |
| Thermal Resistance Junction to Case             | $R_{thJC}$ | 2    | $^\circ\text{C/W}$ |
| Thermal Resistance Junction to Ambient (Note 3) | $R_{thJA}$ | 62.5 | $^\circ\text{C/W}$ |

Note 3: Device mounted on 1 square inch FR4 PCB board, with 2oz single-sided copper, in a  $25^\circ\text{C}$  still air environment.

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

| Parameter                                 | Symbol               | Test Conditions                                                                                    | Min | Typ  | Max  | Unit |
|-------------------------------------------|----------------------|----------------------------------------------------------------------------------------------------|-----|------|------|------|
| Drain Source Breakdown Voltage            | V <sub>(BR)DSS</sub> | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                                                         | 80  | --   | --   | V    |
| Zero Gate Voltage Drain Current           | I <sub>DSS</sub>     | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V                                                          | --  | --   | 1    | uA   |
| Gate Threshold Voltage                    | V <sub>GS(TH)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA                                          | 1   | --   | 2.5  | V    |
| Gate Leakage Current                      | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                         | --  | --   | ±100 | nA   |
| Drain-Source On-state Resistance (Note 4) | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =15A                                                          | --  | 9.5  | 12   | mΩ   |
| Total Gate Charge                         | Q <sub>g</sub>       | V <sub>GS(off)</sub> =0V, V <sub>GS(on)</sub> =10V,<br>V <sub>DD</sub> =40V, I <sub>D</sub> =14.5A | --  | 26   | --   | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>      |                                                                                                    | --  | 6.4  | --   |      |
| Gate-Drain Charge                         | Q <sub>gd</sub>      |                                                                                                    | --  | 3.2  | --   |      |
| Turn-on Delay Time                        | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DD</sub> =40V,<br>I <sub>D</sub> =14.5A, R <sub>G</sub> =3Ω           | --  | 19   | --   | ns   |
| Turn-on Rise Time                         | t <sub>r</sub>       |                                                                                                    | --  | 10   | --   |      |
| Turn-off Delay Time                       | t <sub>d(off)</sub>  |                                                                                                    | --  | 24.6 | --   |      |
| Turn-off Fall Time                        | t <sub>f</sub>       |                                                                                                    | --  | 5    | --   |      |
| Gate Resistance                           | R <sub>g</sub>       | V <sub>GS</sub> =0V, f=1MHz, open drain                                                            | --  | 1.9  | --   | Ω    |
| Input Capacitance                         | C <sub>iss</sub>     | V <sub>GS</sub> =0V, V <sub>DS</sub> =40V, f=1MHz                                                  | --  | 1450 | --   | pF   |
| Output Capacitance                        | C <sub>oss</sub>     |                                                                                                    | --  | 209  | --   |      |
| Reverse Transfer Capacitance              | C <sub>rss</sub>     |                                                                                                    | --  | 4    | --   |      |

## Reverse Diode Characteristics (T<sub>J</sub> = 25°C unless otherwise noted)

| Parameter                      | Symbol          | Test Conditions                                              | Min | Typ | Max | Unit |
|--------------------------------|-----------------|--------------------------------------------------------------|-----|-----|-----|------|
| Forward Current, Continuous    | I <sub>SD</sub> | T <sub>C</sub> =25°C                                         | --  | --  | 68  | A    |
| Diode Forward Voltage (Note 4) | V <sub>SD</sub> | I <sub>F</sub> =15A, V <sub>GS</sub> =0V                     | --  | --  | 1.2 | V    |
| Reverse Recovery Time          | T <sub>rr</sub> | V <sub>R</sub> =40V, I <sub>F</sub> =10A,<br>di/dt = 100A/μs | --  | 17  | --  | ns   |
| Reverse Recovery Charge        | Q <sub>rr</sub> |                                                              | --  | 64  | --  | nC   |

Note 4: Pulse test; pulse width ≤ 380μs, duty cycle ≤ 1%.

## Typical Characteristics Curves ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.1 - Output Characteristics

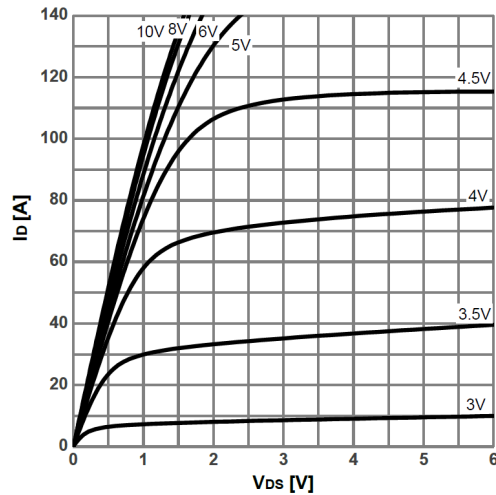


Fig.2 - Transfer Characteristics

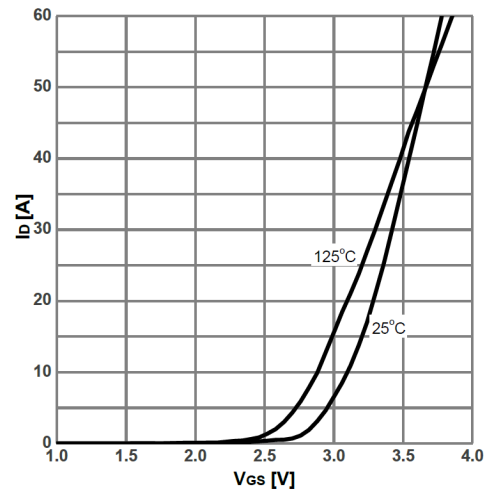


Fig.3 - Drain-Source On-Resistance

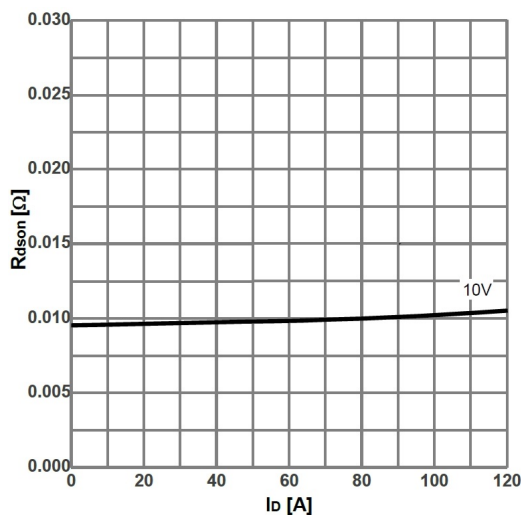


Fig.4 - Drain-Source On-Resistance

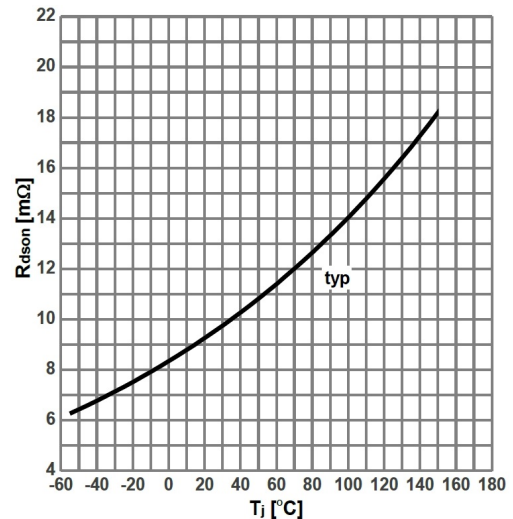


Fig.5 - Drain-Source On-Resistance

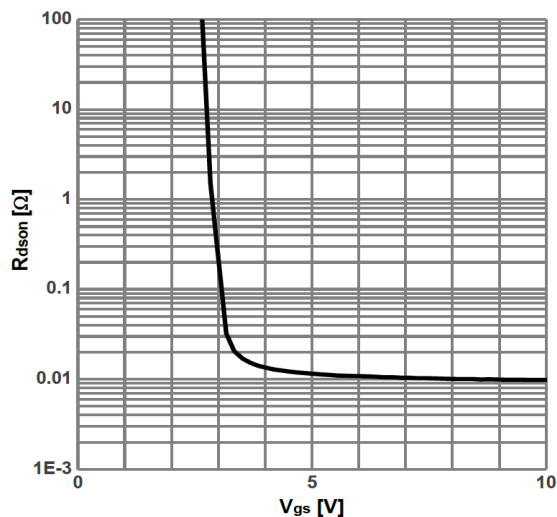
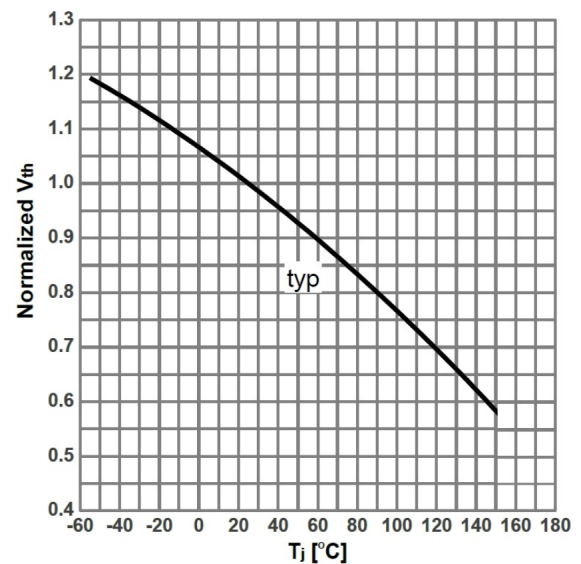


Fig.6 - Normalized Threshold Voltage



## Typical Characteristics Curves ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.7 - Capacitance

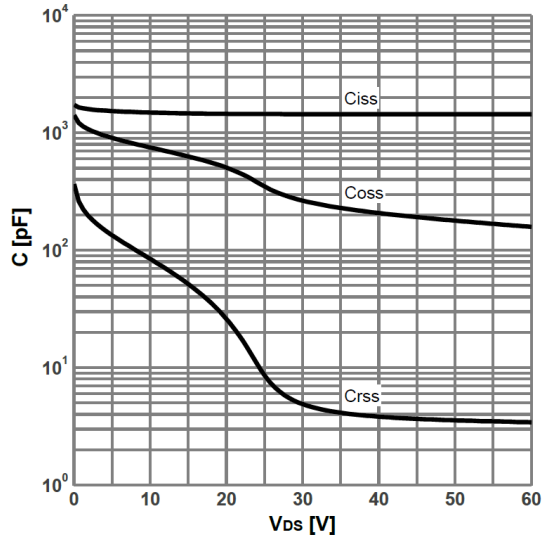


Fig.8 - Gate charge

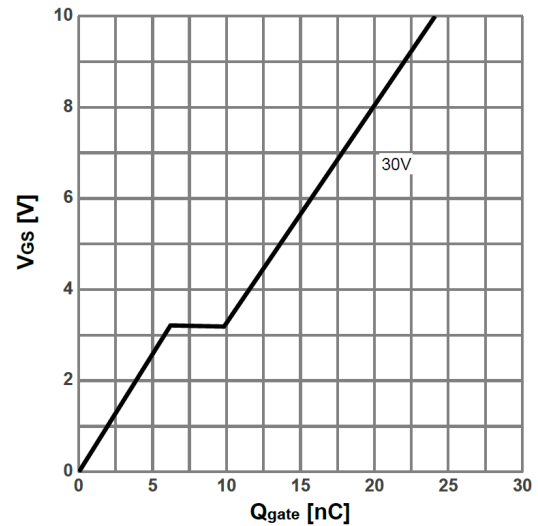


Fig.9 - Forward Characteristic

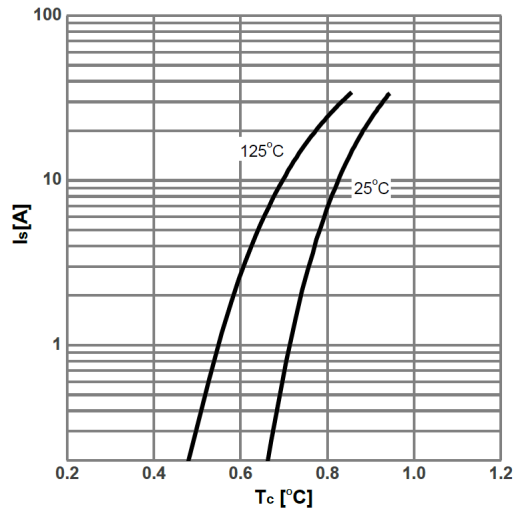


Fig.10 - Safe Operating Area

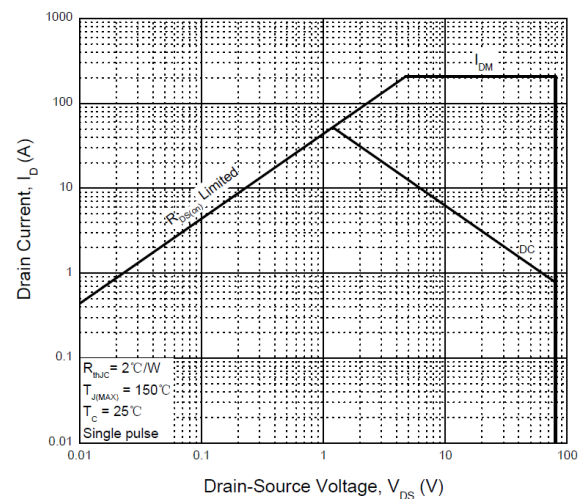


Fig.11 - Thermal Impedance, Junction-Case

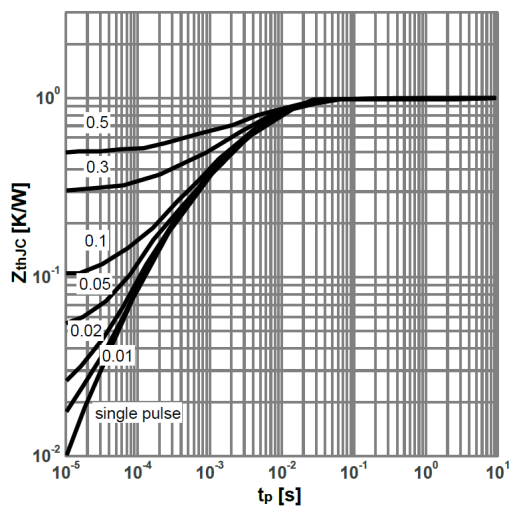
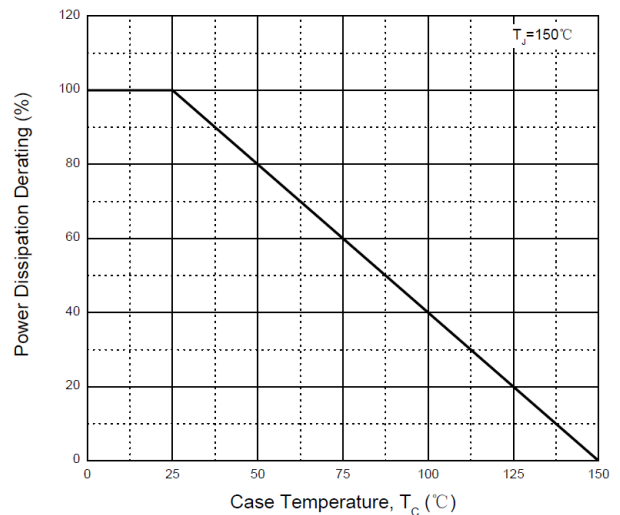
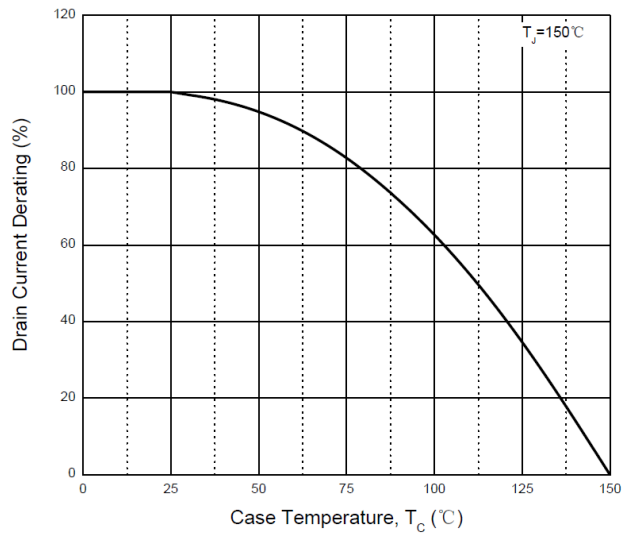


Fig.12 - Power Derating



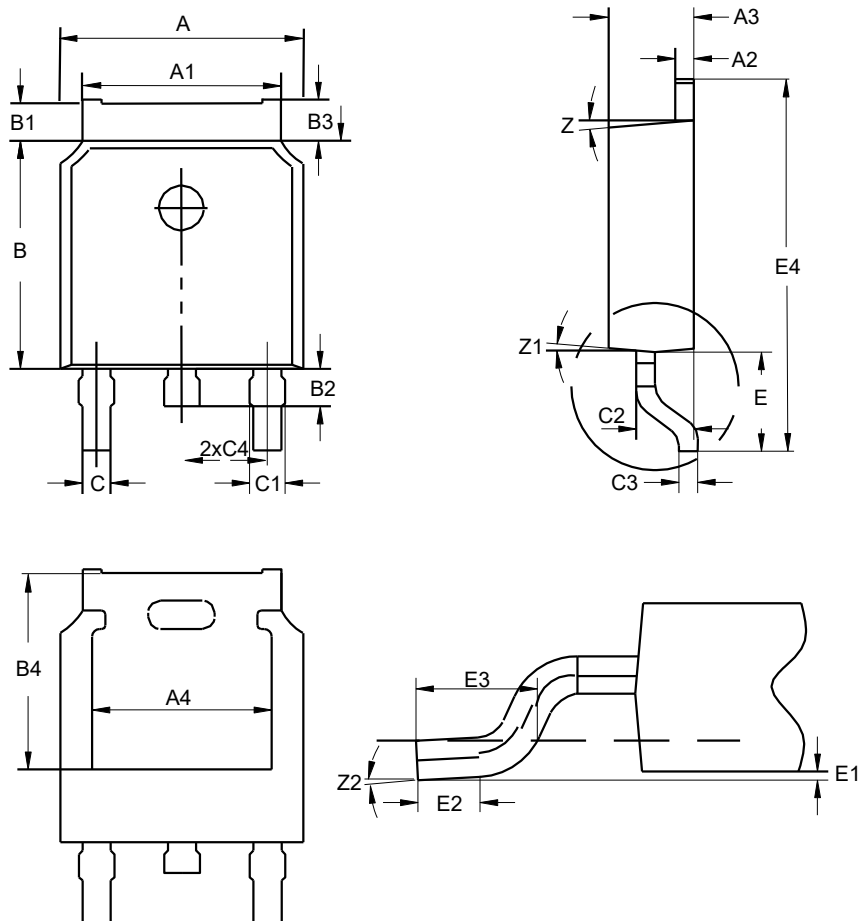
## Typical Characteristics Curves ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.13 - Drain Current Derating



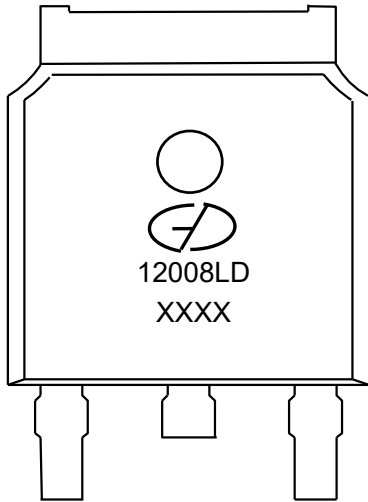
## Package Outline Dimensions (Unit: millimeters)

### TO-252(D-PAK)



| TO-252 |      |      |      |    |      |      |      |
|--------|------|------|------|----|------|------|------|
|        | Min. | Nom. | Max. |    | Min. | Nom. | Max. |
| A      | 6.34 | 6.54 | 6.74 | C2 | 1.34 | 1.54 | 1.74 |
| A1     | 5.2  | 5.3  | 5.4  | C3 | 0.4  | 0.5  | 0.6  |
| A2     | 0.4  | 0.5  | 0.6  | C4 | 2.09 | 2.29 | 2.49 |
| A3     | 2.08 | 2.28 | 2.48 | E  | 2.6  | 2.9  | 3.2  |
| A4     | 4.6  | 4.8  | 5.0  | E1 | 0    | -    | 0.15 |
| B      | 5.8  | 6.1  | 6.4  | E2 | 0.7  | -    | -    |
| B1     | 0.82 | 1.02 | 1.22 | E3 | 1.3  | 1.6  | 1.9  |
| B2     | 0.8  | 1    | 1.2  | E4 | 9.8  | 10.1 | 10.4 |
| B3     | 0.9  | 1.1  | 1.3  | Z  | -    | 7°   | -    |
| B4     | 5.05 | 5.25 | 5.45 | Z1 | -    | 7°   | -    |
| C      | 0.66 | 0.76 | 0.86 | Z2 | 0°   | -    | 10°  |
| C1     | 0.65 | 0.85 | 1.05 | -  | -    | -    | -    |

## Marking Outline



Part Name: GMN12008LD

1. Logo Mark: 
2. P/N Mark: 12008LD
3. Date Code: XXXX

## Revision History

| Version | Date       | Major Changes    |
|---------|------------|------------------|
| Rev.A   | 2024.04.30 | Official Release |
|         |            |                  |
|         |            |                  |

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