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# SLN60N02T
# 20V N -Channel MOSFET

## General Description

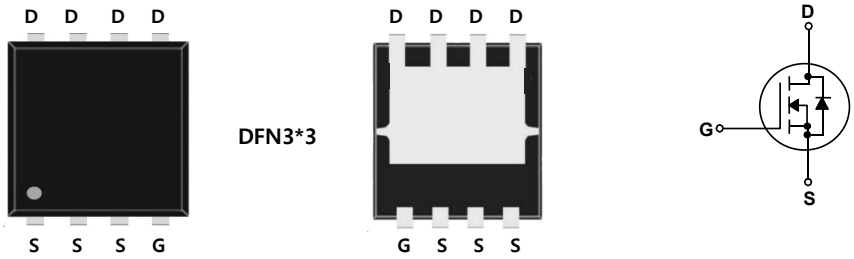
This Power MOSFET is produced using Msemitek's advanced TRENCH technology.
This advanced technology has been especially tailored to minimize conduction loss, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

## Features

- N-Channel:20V 60A
  $R_{DS(on)Typ}$= 4.8mΩ@VGS = 4.5 V
  $R_{DS(on)Typ}$= 6.8mΩ@VGS =2.5 V
- Very Low On-resistance $R_{DS(ON)}$
- Low Crss
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability

## Application

☑ PWM Application
☑ Load Switch
☑ Power Management




## Absolute Maximum Ratings

$T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | SLN60N02T | Units |
|---|---|---|---|
| $V_{DSS}$ | Drain-Source Voltage | 20 | V |
| $I_D$ | Drain Current - Continuous ($T_C$ = 25℃) | 60 | A |
| | - Continuous ($T_C$ = 100℃) | 39 | A |
| $I_{DM}$ | Drain Current - Pulsed (Note 1) | 240 | A |
| $V_{GSS}$ | Gate-Source Voltage | ±20 | V |
| $E_{AS}$ | Single Pulsed Avalanche Energy | 40 | mJ |
| $P_D$ | Power Dissipation ($T_C$ = 25℃) | 31 | W |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 4 | ℃/W |
| $T_J$, $T_{STG}$ | Operating and Storage Temperature Range | -55 to +150 | ℃ |
| $T_L$ | Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds | 300 | ℃ |

* Drain current limited by maximum junction temperature.

## Package Marking

| Part Number | Top Marking | Package | Packing Method | MOQ | QTY |
|---|---|---|---|---|---|
| SLN60N02T | SLN60N02T | PDFN3*3 | Tape & Reel | 5000 | 50000 |

## Electrical Characteristics

$T_C$ = 25°C unless otherwise noted

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$ = 0 V, $I_D$ = 250 uA | 20 | -- | -- | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$ =20 V, $V_{GS}$ = 0 V | -- | -- | 1 | uA |
| $I_{GSSF}$ | Gate-Body Leakage Current, Forward | $V_{GS}$ = 12V, $V_{DS}$ = 0 V | -- | -- | 100 | nA |
| $I_{GSSR}$ | Gate-Body Leakage Current, Reverse | $V_{GS}$ = -12 V, $V_{DS}$ = 0 V | -- | -- | -100 | nA |
| **On Characteristics** | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 uA | 0.4 | - | 1.0 | V |
| $R_{DS(on)}$ | Static Drain-Source On-Resistance | $V_{GS}$ =4.5 V, $I_D$ = 25A | -- | 4.8 | 6.3 | mΩ |
| | | $V_{GS}$ =2.5 V, $I_D$ = 22A | -- | 6.8 | 8.8 | |
| **Dynamic Characteristics** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$ = 10 V, $V_{GS}$ = 0 V, f = 1.0 MHz | -- | 1625 | - | pF |
| $C_{oss}$ | Output Capacitance | | -- | 280 | - | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | -- | 269 | - | pF |
| **Switching Characteristics** | | | | | | |
| $t_{d(on)}$ | Turn-On Delay Time | $V_{GS}$=4.5V, $V_{DS}$=10V, $R_G$ = 3Ω ,$I_D$=30A Tj=25℃ | -- | 17 | -- | ns |
| $t_r$ | Turn-On Rise Time | | -- | 50 | -- | ns |
| $t_{d(off)}$ | Turn-Off Delay Time | | -- | 75 | -- | ns |
| $t_f$ | Turn-Off Fall Time | | -- | 25 | -- | ns |
| $Q_g$ | Total Gate Charge | $V_{DS}$ = 10V, $I_D$ =60A, $V_{GS}$ = 10V | -- | 43.7 | -- | nC |
| $Q_{gs}$ | Gate-Source Charge | | -- | 2.7 | -- | nC |
| $Q_{gd}$ | Gate-Drain Charge | | -- | 10.9 | -- | nC |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| $I_S$ | Maximum Continuous Drain-Source Diode Forward Current | | -- | -- | 60 | A |
| $I_{SM}$ | Maximum Pulsed Drain-Source Diode Forward Current | | -- | -- | 240 | A |
| $V_{SD}$ | Drain to Source Diode Forward Voltage,$V_{GS}$ = 0V, $I_{SD}$ =30A,$T_J$ = 25℃ | | -- | -- | 1.2 | V |

**Notes:**
1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. EAS condition: $T_J$ =25℃, $V_{DD}$ =10V, $V_G$ =10V, L=0.5mH,
3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

## N- Channel Typical Characteristics

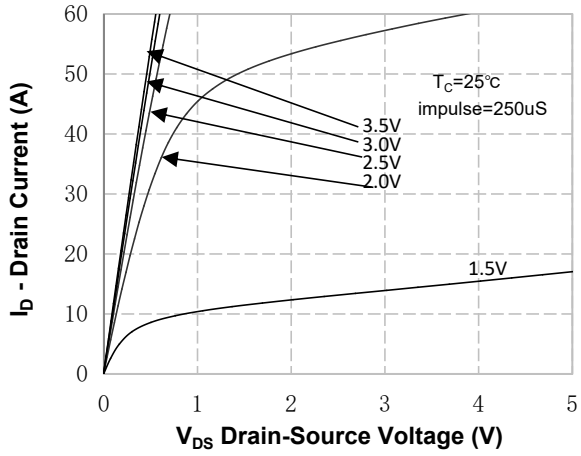



Figure 1. On-Region Characteristics

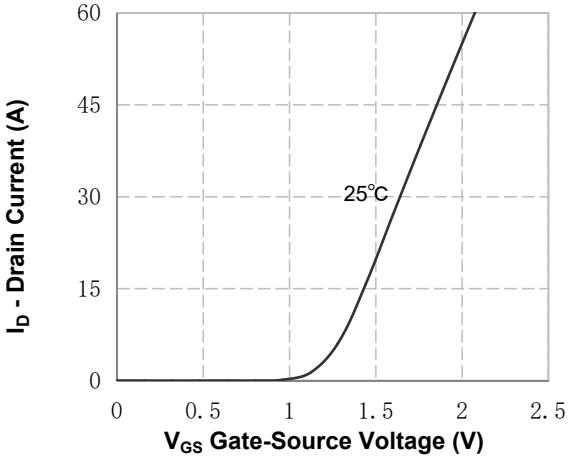



Figure 2. Transfer Characteristics

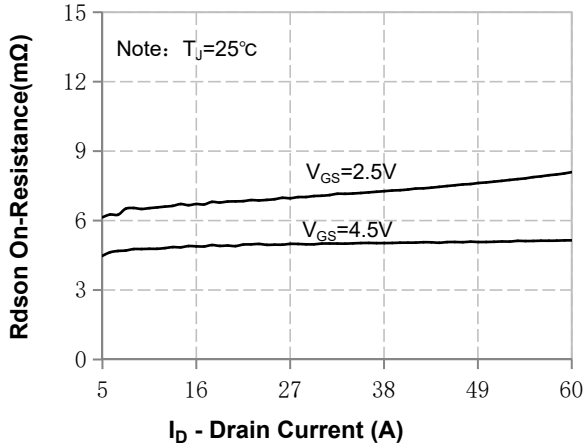



Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

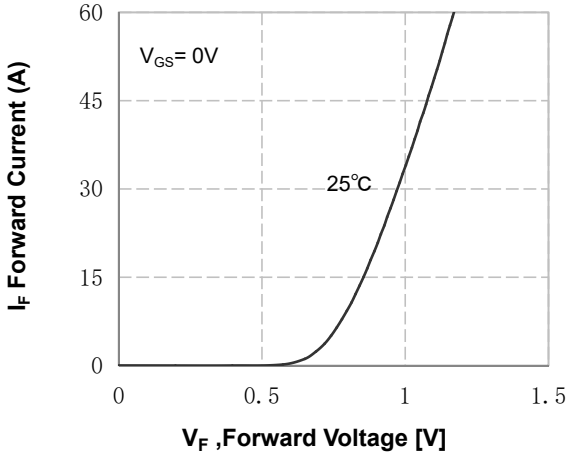



Figure 4. Body Diode Forward Voltage Variation with Source Current

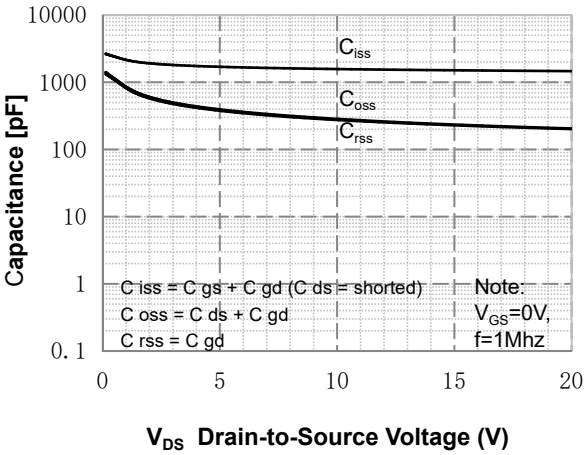



Figure 5. Capacitance Characteristics

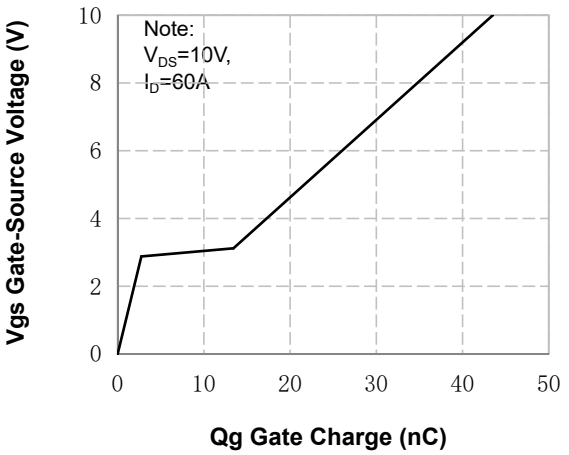



Figure 6. Gate Charge Characteristics

## N- Channel Typical Characteristics (Continued)

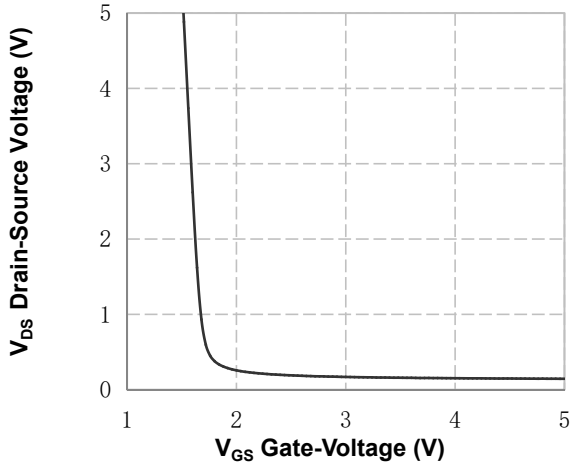



**Figure 7. Vds Drain-Source Voltage vs Gate Voltage**

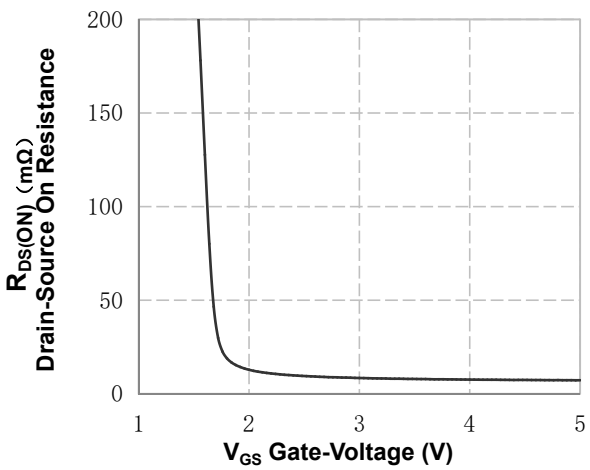



**Figure 8. On-Resistance vs Gate Voltage**

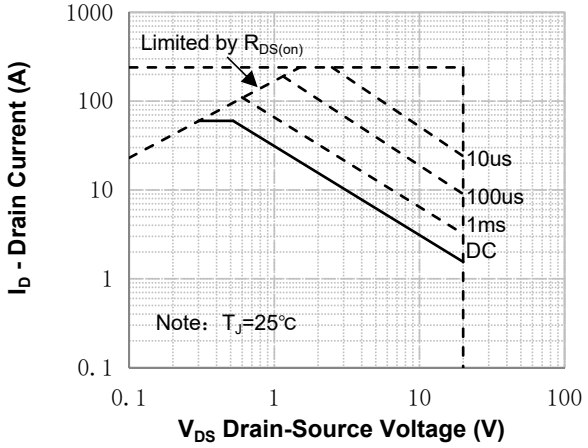



**Figure 9. Maximum Safe Operating Area**

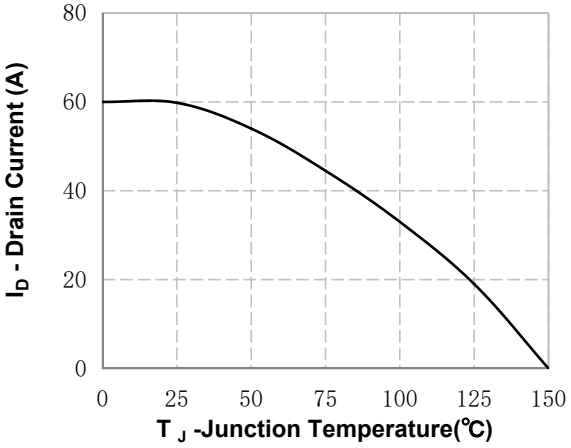



**Figure 10. Maximum Continuous Drain Current vs Case Temperature**

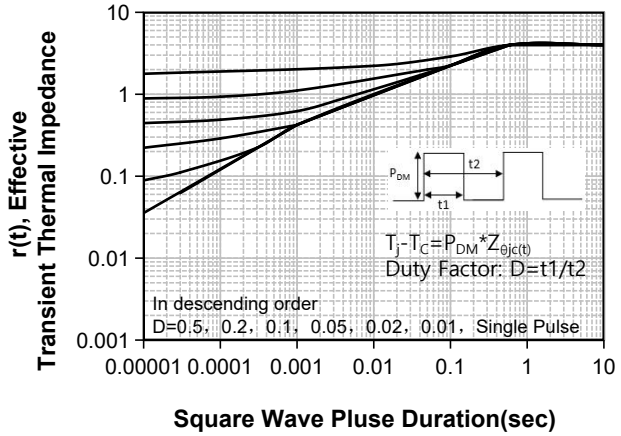
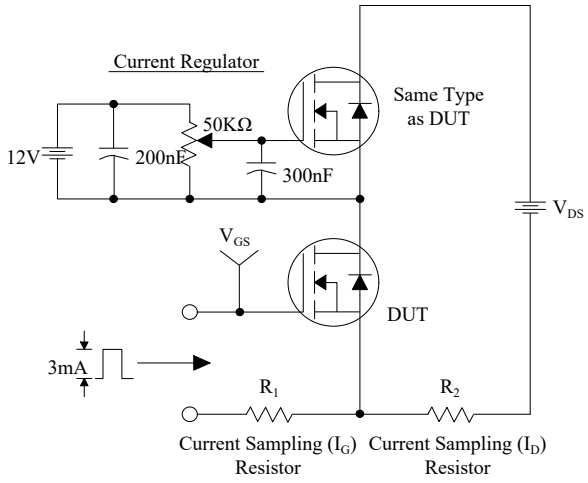
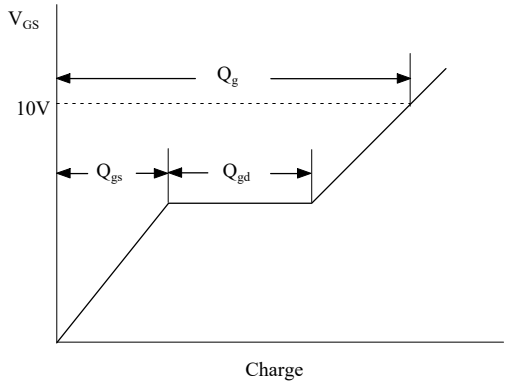


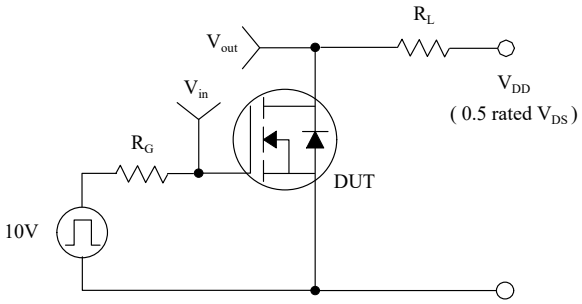

**Figure 11. Transient Thermal Response Curve**

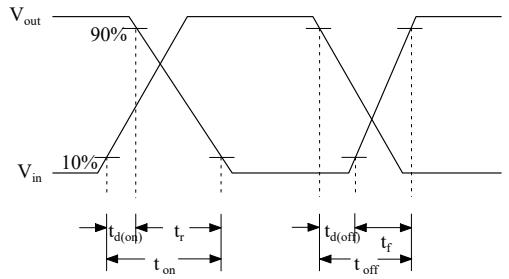
## Gate Charge Test Circuit & Waveform



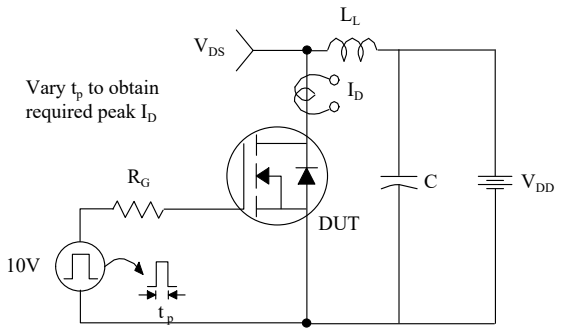




## Resistive Switching Test Circuit & Waveforms

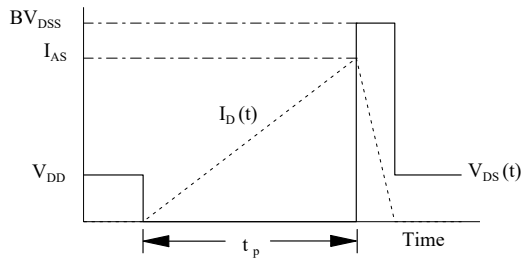


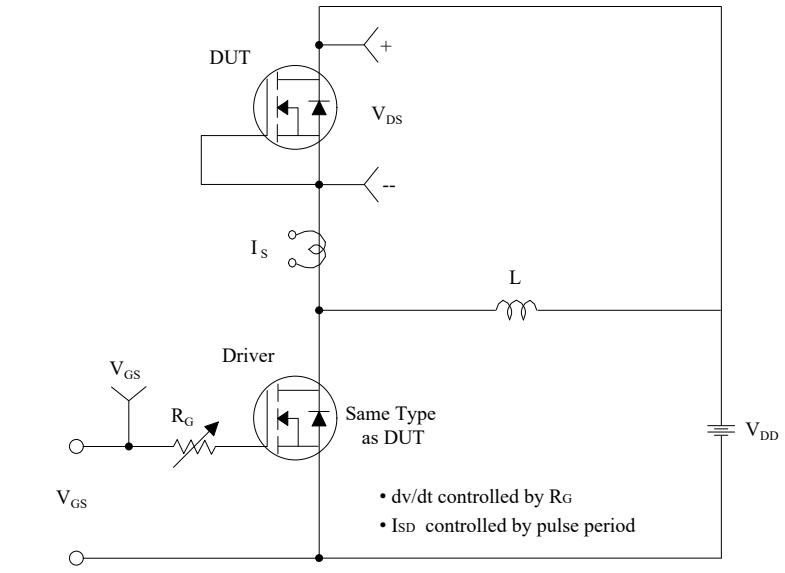

## Unclamped Inductive Switching Test Circuit & Waveforms

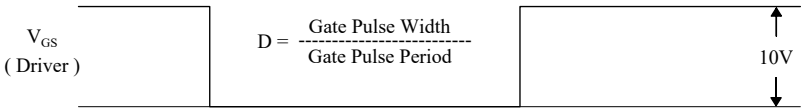


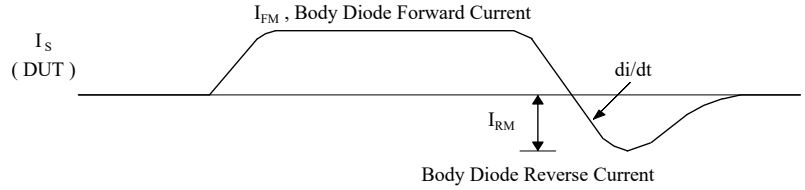

$$E_{AS} = \frac{1}{2} L_L I_{AS}^2$$

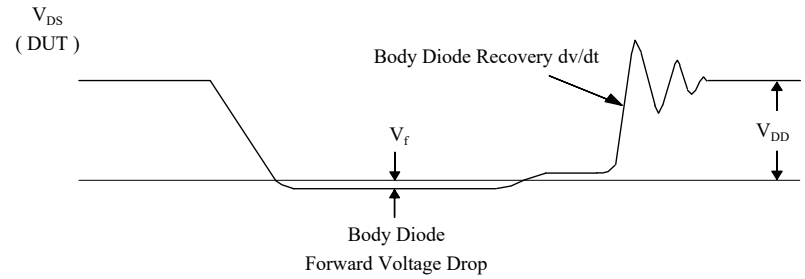


## Peak Diode Recovery dv/dt Test Circuit & Waveforms

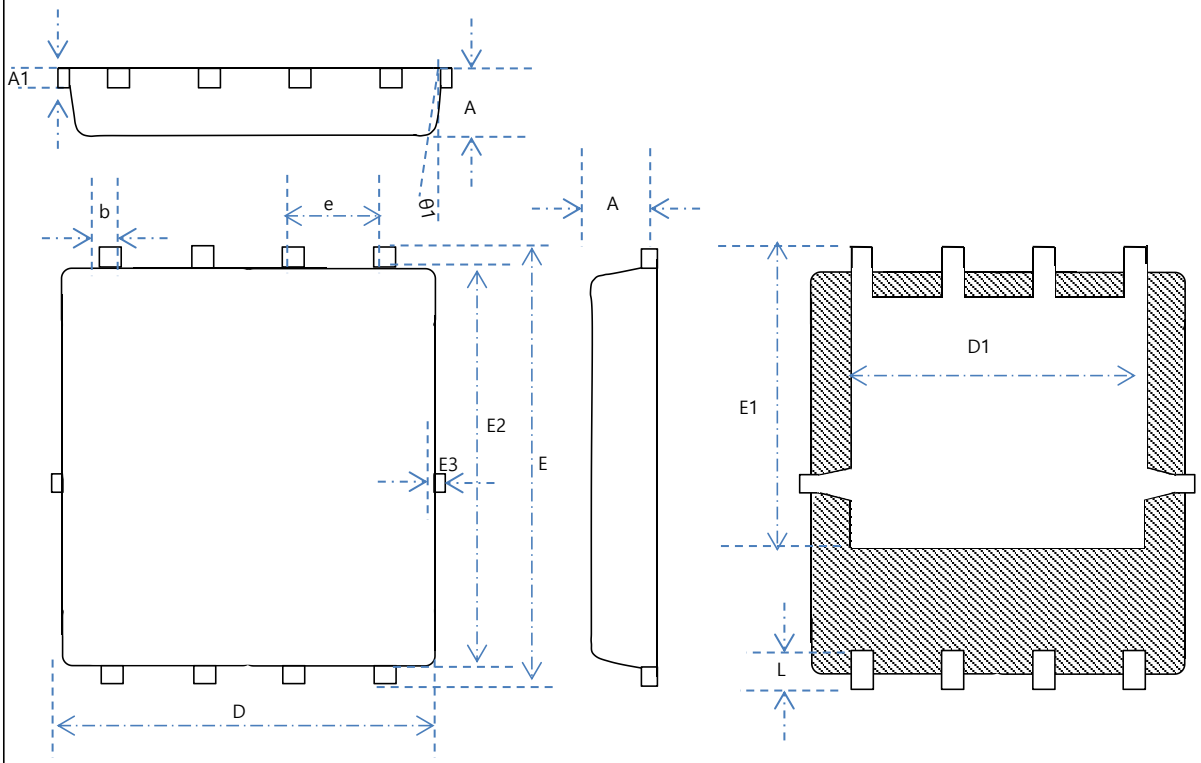


# DFN 3*3 OUTLINE




| SYMBOL | Mechanical Dimensions/mm | | | SYMBOL | Mechanical Dimensions/mm | | |
|---|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | | MIN | NOM | MAX |
| A | 0.725 | 0.775 | 0.825 | D | 3.05 | 3.15 | 3.25 |
| A1 | 0.152 REF | | | e | 0.65 TYPE | | |
| b | 0.27 | 0.32 | 0.37 | D1 | 2.25 | 2.45 | 2.65 |
| E | 3.25 | 3.35 | 3.45 | L | 0.28 | 0.38 | 0.48 |
| E1 | 1.63 | 1.73 | 1.83 | | | | |
| E2 | 3.0 | 3.1 | 3.2 | θ1 | $8^0$ | $10^0$ | $12^0$ |
| E3 | - | - | 0.10 | | | | |

| NAME | DFN 3*3 OUTLINE | UNIT | mm | DESIGNED | Shawn | THIRD ANGLE SYSTEM |
|---|---|---|---|---|---|---|
| DWGNO | | PAGE | 1 OF 1 | CHECKED | | |
| VERSION | Ver1.0 | ISSUE DATE | | APPROVED | | |

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