## N-Channel  Enhancement Mode Power MOSFET

### Description

The G30N03A uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS}$ =30V,$I_D$ =30A

    $R_{DS(ON)}$ <  9m Ω @ $V_{GS}$=10V

    $R_{DS(ON)}$ < 13mΩ @ $V_{GS}$=4.5V

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high $E_{AS}$
- Excellent package for good heat dissipation
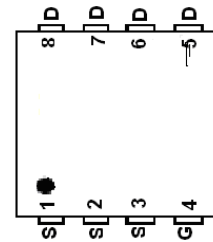- Special process technology for high ESD capability

### Application

- SMPS and general purpose applications
- Hard switched and high frequency circuits
- Uninterruptible power supply

*100% UIS TESTED!*
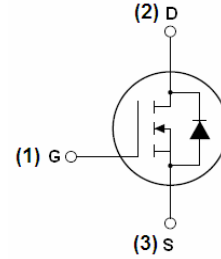


**Schematic diagram**



**Marking and pin assignment**



**DFN3X3-8L**

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

| Parameter | Symbol | Limit | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | $I_D$ | 30 | A |
| Drain Current-Continuous(T$_C$=100℃) | $I_D$ (100℃) | 21 | A |
| Pulsed Drain Current | $I_{DM}$ | 60 | A |
| Maximum Power Dissipation | $P_D$ | 25 | W |
| Derating factor | | 0.2 | W/℃ |
| Single pulse avalanche energy [Note 5] | $E_{AS}$ | 70 | mJ |
| Operating Junction and Storage Temperature Range | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

## Thermal Characteristic

| Thermal Resistance,Junction-to-Case(Note 2) | R$_{\theta JC}$ | 5 | ℃/W |
|---|---|---|---|

## Electrical Characteristics (T$_C$=25℃unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | BV$_{DSS}$ | V$_{GS}$=0V I$_D$=250μA | 30 | 33 | - | V |
| Zero Gate Voltage Drain Current | I$_{DSS}$ | V$_{DS}$=30V,V$_{GS}$=0V | - | - | 1 | μA |
| Gate-Body Leakage Current | I$_{GSS}$ | V$_{GS}$=±20V,V$_{DS}$=0V | - | - | ±100 | nA |
| **On Characteristics** [Note 3] | | | | | | |
| Gate Threshold Voltage | V$_{GS(th)}$ | V$_{DS}$=V$_{GS}$,I$_D$=250μA | 1 | 1.5 | 2.3 | V |
| Drain-Source On-State Resistance | R$_{DS(ON)}$ | V$_{GS}$=10V, I$_D$=10A | - | 6.3 | 9 | mΩ |
| | | V$_{GS}$=4.5V, I$_D$=10A | - | 9.2 | 13 | |
| Forward Transconductance | g$_{FS}$ | V$_{DS}$=5V,I$_D$=20A | 15 | - | - | S |
| **Dynamic Characteristics** [Note4] | | | | | | |
| Input Capacitance | C$_{Iss}$ | V$_{DS}$=15V,V$_{GS}$=0V, F=1.0MHz | - | 1490 | - | PF |
| Output Capacitance | C$_{oss}$ | | - | 220 | - | PF |
| Reverse Transfer Capacitance | C$_{rss}$ | | - | 135 | - | PF |
| **Switching Characteristics** [Note 4] | | | | | | |
| Turn-on Delay Time | t$_{d(on)}$ | V$_{DD}$=15V,I$_D$=10A V$_{GS}$=10V,R$_{GEN}$=1.8Ω | - | 10 | - | nS |
| Turn-on Rise Time | t$_r$ | | - | 8 | - | nS |
| Turn-Off Delay Time | t$_{d(off)}$ | | - | 30 | - | nS |
| Turn-Off Fall Time | t$_f$ | | - | 5 | - | nS |
| Total Gate Charge | Q$_g$ | V$_{DS}$=15V,I$_D$=9A, V$_{GS}$=10V | - | 15 | - | nC |
| Gate-Source Charge | Q$_{gs}$ | | - | 3 | - | nC |
| Gate-Drain Charge | Q$_{gd}$ | | - | 4.5 | - | nC |
| **Drain-Source Diode Characteristics** | | | | | | |
| Diode Forward Voltage [Note 3] | V$_{SD}$ | V$_{GS}$=0V,I$_S$=10A | - | 0.85 | 1.2 | V |
| Diode Forward Current [Note 2] | I$_S$ | | - | - | 25 | A |
| Reverse Recovery Time | t$_{rr}$ | TJ = 25°C, IF = 10A | - | 22 | 35 | nS |
| Reverse Recovery Charge | Qrr | di/dt = 100A/μs(Note3) | - | 12 | 20 | nC |
| Forward Turn-On Time | t$_{on}$ | Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD) | | | | |

**Notes:**

**1.** Repetitive Rating: Pulse width limited by maximum junction temperature.

**2.** Surface Mounted on FR4 Board, t ≤ 10 sec.

**3.** Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

**4.** Guaranteed by design, not subject to production

**5.** EAS condition：Tj=25℃,V$_{DD}$=15V,V$_G$=10V,L=0.1mH,Rg=25Ω
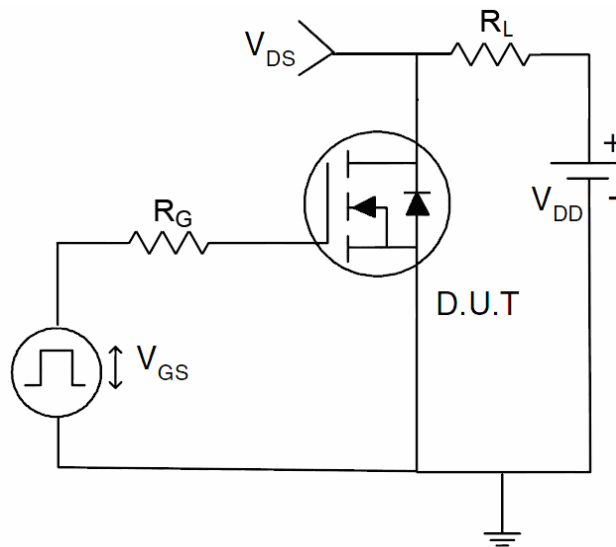
**Test Circuit**

**1) E$_{AS}$ Test Circuit**
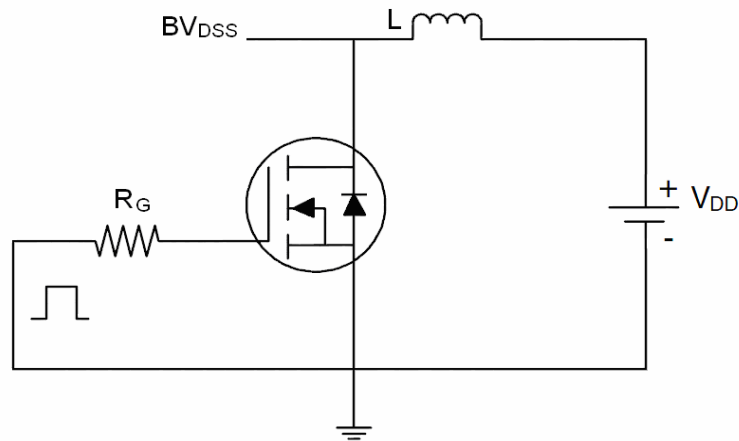


**2) Gate Charge Test Circuit**
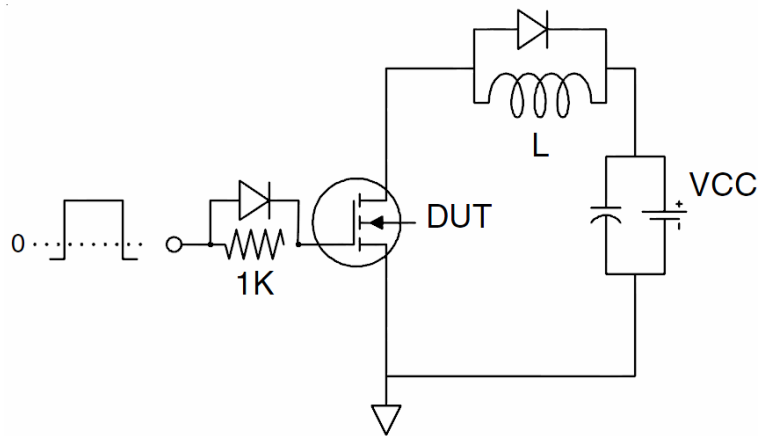


**3) Switch Time Test Circuit**

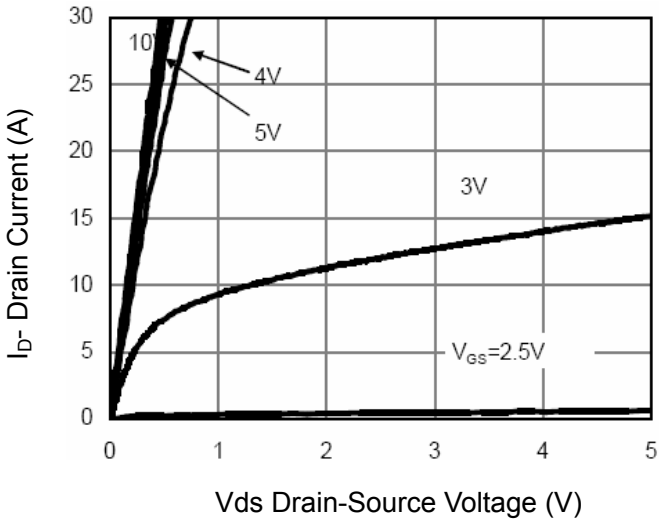## Typical Electrical and Thermal Characteristics (Curves)
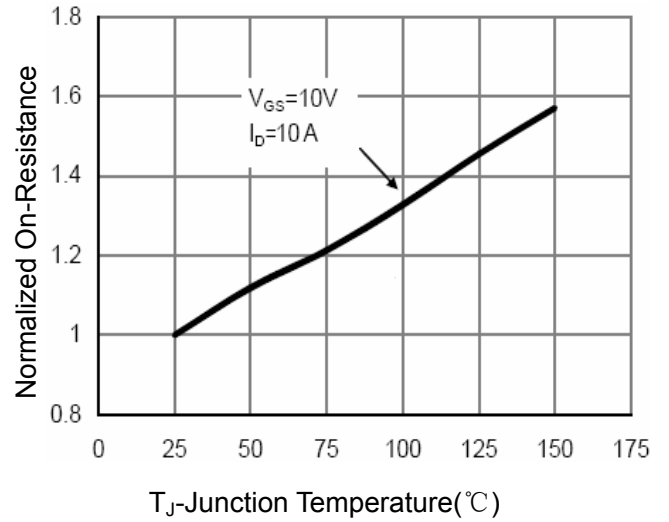
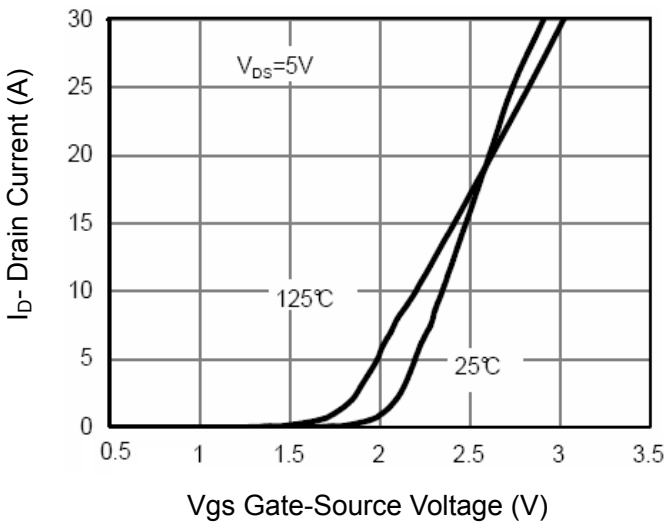**Figure 1 Output Characteristics**

**Figure 2 Transfer Characteristics**

**Figure 3 Rdson- Drain Current**

**Figure 1 Output Characteristics**

**Figure 4 Rdson-Junction Temperature**
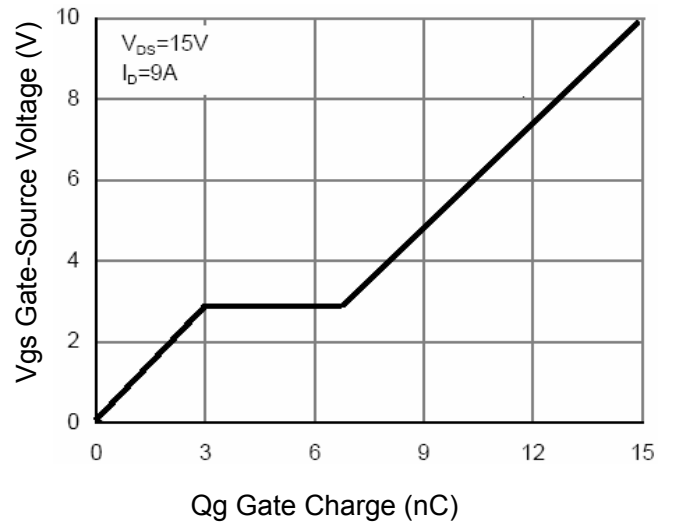
**Figure 5 Gate Charge**
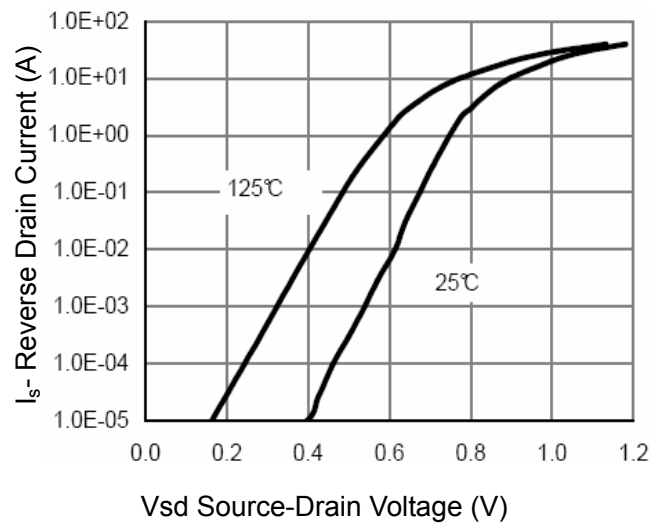
**Figure 6 Source- Drain Diode Forward**
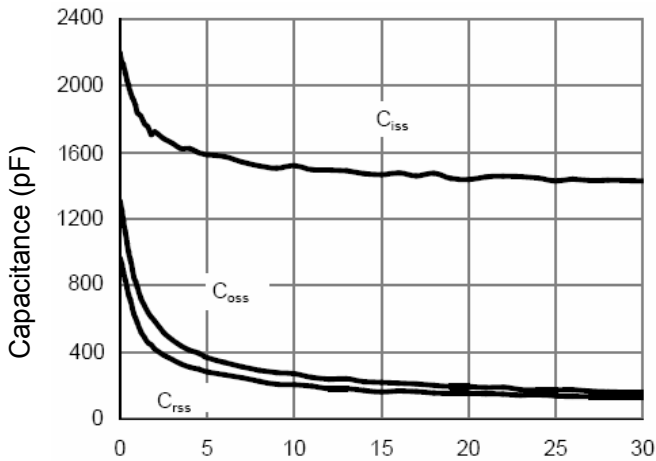
Figure 7 Capacitance vs Vds
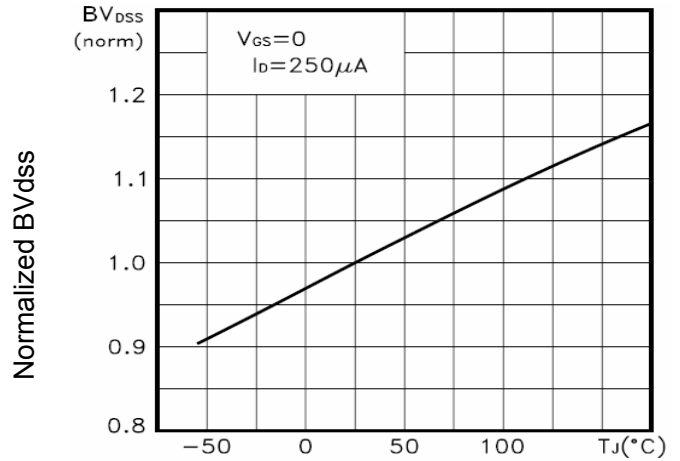
Figure 9 BV$_{DSS}$ vs Junction Temperature
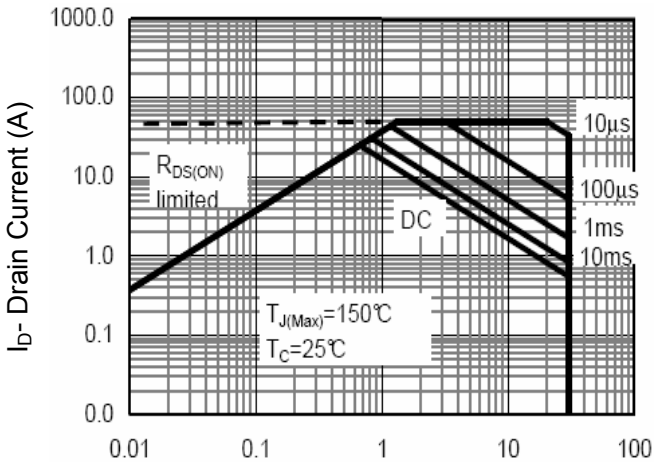
Figure 8 Safe Operation Area
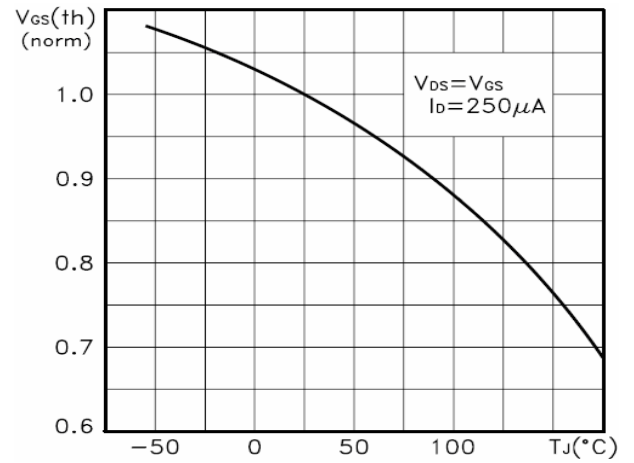
Figure 10 V$_{GS(th)}$ vs Junction Temperature
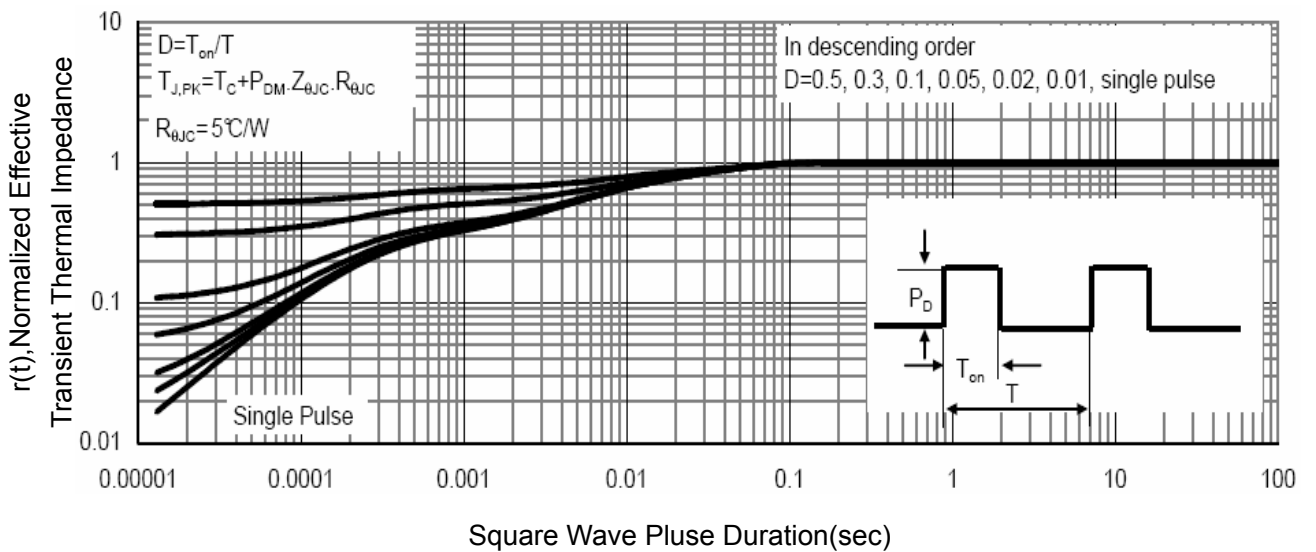
Figure 11 Normalized Maximum Transient Thermal Impedance

**DFN3X3 EP Package Information**
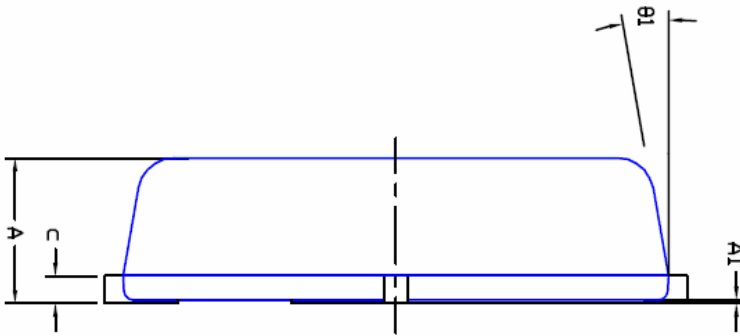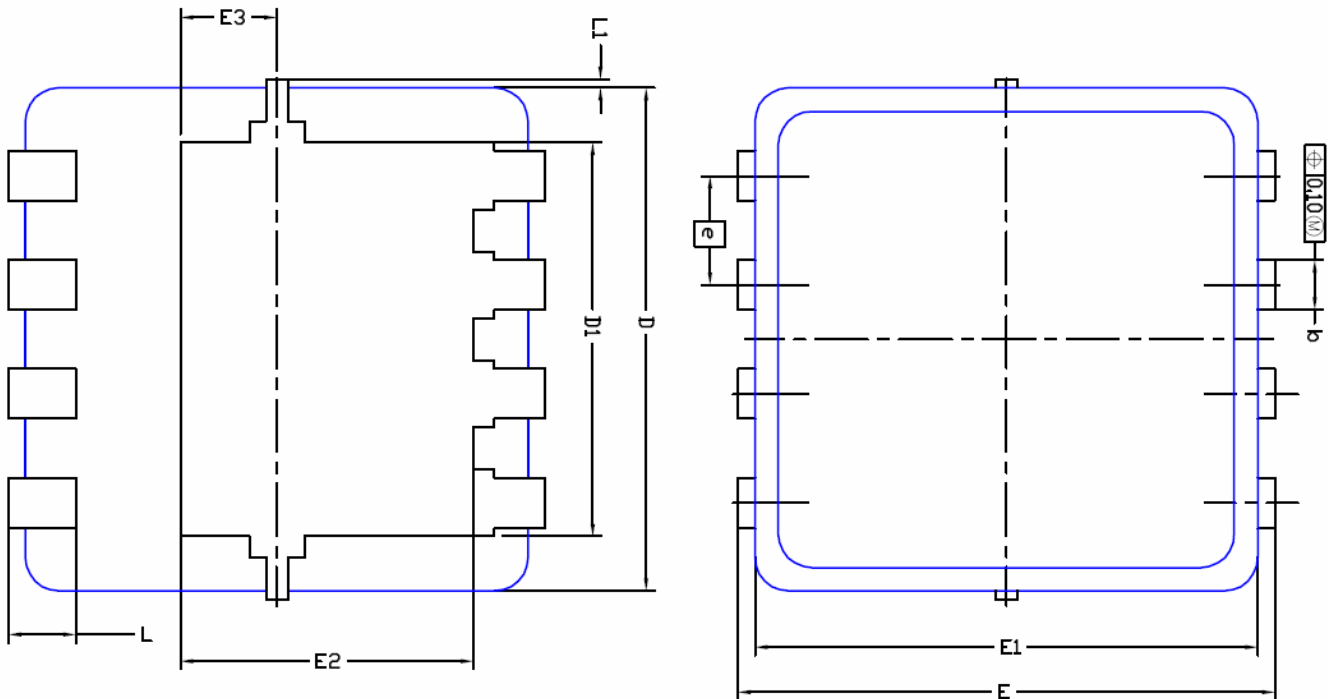


| DIM. | MILLIMETERS | | | INCHES | | |
|------|-----|-----|-----|-----|-----|-----|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.700 | 0.80 | 0.900 | 0.0276 | 0.0315 | 0.0354 |
| A1 | 0.00 | --- | 0.05 | 0.000 | --- | 0.002 |
| b | 0.24 | 0.30 | 0.35 | 0.009 | 0.012 | 0.014 |
| c | 0.10 | 0.152 | 0.25 | 0.004 | 0.006 | 0.010 |
| D | 3.00 BSC | | | 0.118 BSC | | |
| D1 | 2.35 BSC | | | 0.093 BSC | | |
| E | 3.20 BSC | | | 0.126 BSC | | |
| E1 | 3.00 BSC | | | 0.118 BSC | | |
| E2 | 1.75 BSC | | | 0.069 BSC | | |
| E3 | 0.575 BSC | | | 0.023 BSC | | |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.30 | 0.40 | 0.50 | 0.0118 | 0.0157 | 0.0197 |
| L1 | 0 | --- | 0.100 | 0 | --- | 0.004 |
| θ1 | 0° | 10° | 12° | 0° | 10° | 12° |

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