



- ★ Super Low Gate Charge
- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

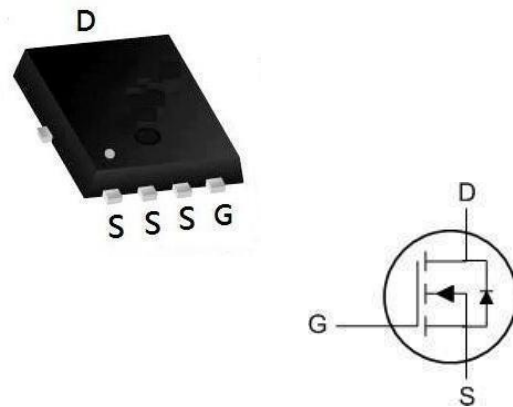
Product Summary

| BVDSS | RDSON | ID |
|-------|-------|-----|
| 30V | 15mΩ | 20A |

Description

The XXW20N03D is the high cell density trenched N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The XXW20N03D meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

PDFN3333-8L Pin Configuration

Absolute Maximum Ratings

| Symbol | Parameter | Rating | | Units |
|------------------------|--|------------|--------------|-------|
| | | 10s | Steady State | |
| V_{DS} | Drain-Source Voltage | 30 | | V |
| V_{GS} | Gate-Source Voltage | ±20 | | V |
| $I_D@T_C=25^{\circ}C$ | Continuous Drain Current, $V_{GS}@10V^1$ | 20 | | A |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}@10V^1$ | 8 | | A |
| I_{DM} | Pulsed Drain Current ² | 38 | | A |
| EAS | Single Pulse Avalanche Energy ³ | 28 | | mJ |
| I_{AS} | Avalanche Current | 13.8 | | A |
| $P_D@T_C=25^{\circ}C$ | Total Power Dissipation ⁴ | 5.5 | | W |
| T_{STG} | Storage Temperature Range | -55 to 175 | | °C |
| T_J | Operating Junction Temperature Range | -55 to 175 | | °C |

Thermal Data

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|---|------|------|------|
| $R_{\theta JC}$ | Thermal Resistance Junction-Case ¹ | --- | 36 | °C/W |

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Units |
|---|---|--|------|------|-----------|------------|
| Off Characteristic | | | | | | |
| $V_{(BR)DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}=0V, I_D=250\mu A$ | 30 | - | - | V |
| I_{DSS} | Zero Gate Voltage Drain Current | $V_{DS}=30V, V_{GS}=0V,$ | - | - | 1.0 | μA |
| I_{GSS} | Gate to Body Leakage Current | $V_{DS}=0V, V_{GS}=\pm 20V$ | - | - | ± 100 | nA |
| On Characteristics | | | | | | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}=V_{GS}, I_D=250\mu A$ | 1.0 | 1.5 | 2.5 | V |
| $R_{DS(on)}$ | Static Drain-Source on-Resistance <small>note3</small> | $V_{GS}=10V, I_D=5A$ | - | 15 | 20 | m Ω |
| | | $V_{GS}=4.5V, I_D=3A$ | - | 21 | 29 | |
| Dynamic Characteristics | | | | | | |
| C_{iss} | Input Capacitance | $V_{DS}=15V, V_{GS}=0V,$ $f=1.0MHz$ | - | 490 | - | pF |
| C_{oss} | Output Capacitance | | - | 79 | - | pF |
| C_{rss} | Reverse Transfer Capacitance | | - | 61 | - | pF |
| Q_g | Total Gate Charge | $V_{DS}=15V, I_D=5.8A,$ $V_{GS}=10V$ | - | 10 | - | nC |
| Q_{gs} | Gate-Source Charge | | - | 1.7 | - | nC |
| Q_{gd} | Gate-Drain("Miller") Charge | | - | 2.5 | - | nC |
| Switching Characteristics | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}=15V, I_D=3A,$ $V_{GS}=10V, R_{REN}=3\Omega$ | - | 6 | - | ns |
| t_r | Turn-on Rise Time | | - | 15 | - | ns |
| $t_{d(off)}$ | Turn-off Delay Time | | - | 17 | - | ns |
| t_f | Turn-off Fall Time | | - | 17 | - | ns |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| I_S | Maximum Continuous Drain to Source Diode Forward Current | | - | - | 9 | A |
| I_{SM} | Maximum Pulsed Drain to Source Diode Forward Current | | - | - | 36 | A |
| V_{SD} | Drain to Source Diode Forward Voltage | $V_{GS}=0V, I_S=9A$ | - | - | 1.2 | V |
| t_{rr} | Body Diode Reverse Recovery Time | $I_F=5A, di/dt=100A/\mu s$ | - | 7 | - | ns |
| Q_{rr} | Body Diode Reverse Recovery Charge | | - | 2 | - | nC |

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=6A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

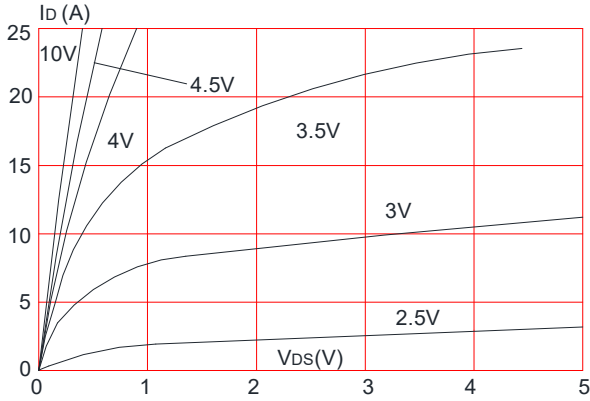


Figure 2: Typical Transfer Characteristics

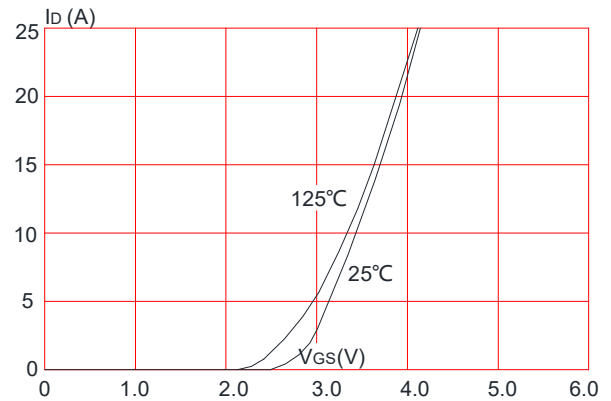


Figure 3: On-resistance vs. Drain Current

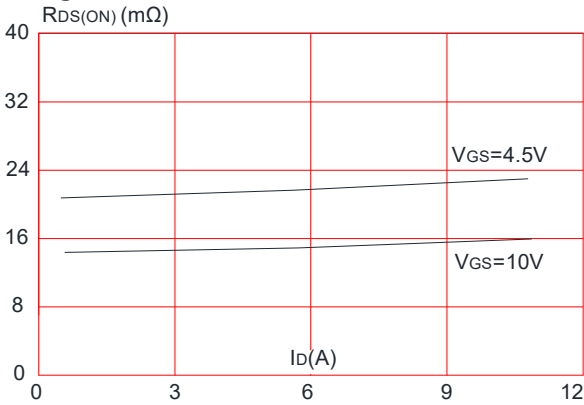


Figure 4: Body Diode Characteristics

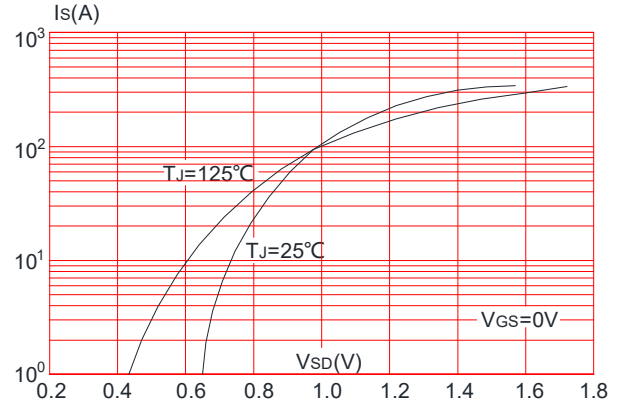


Figure 5: Gate Charge Characteristics

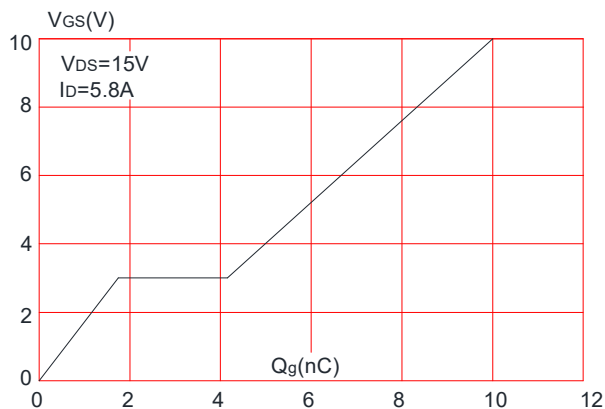


Figure 6: Capacitance Characteristics

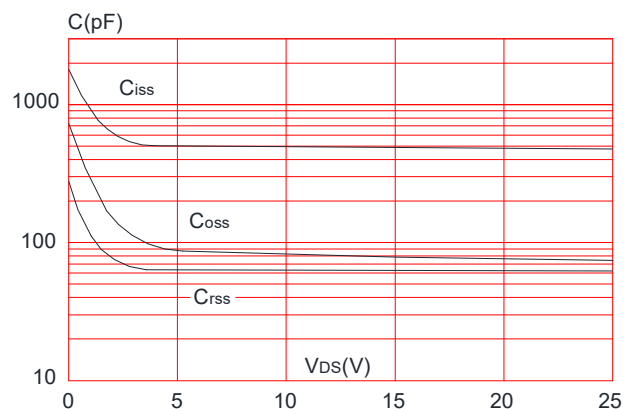
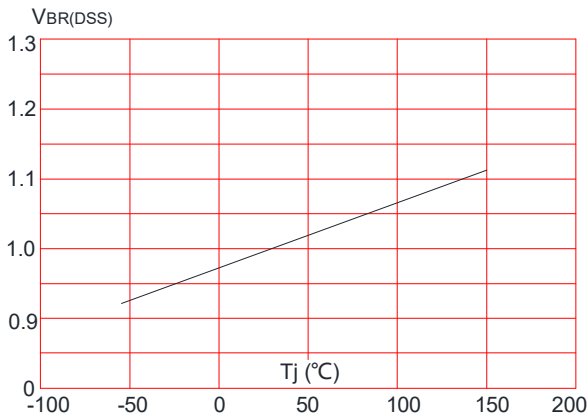
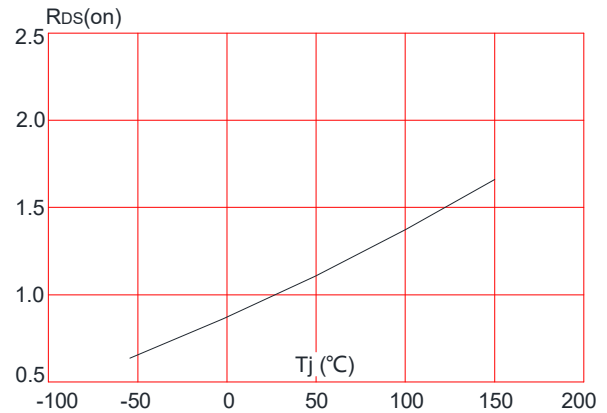
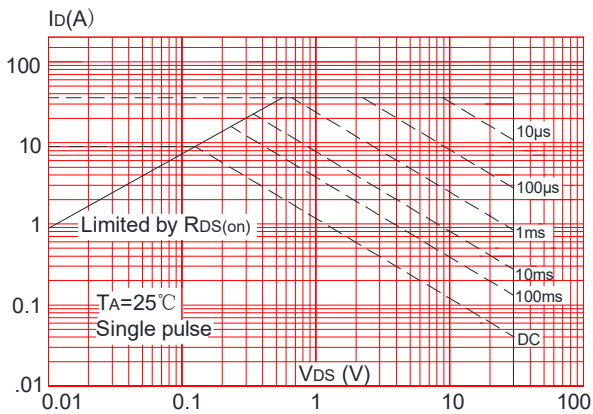
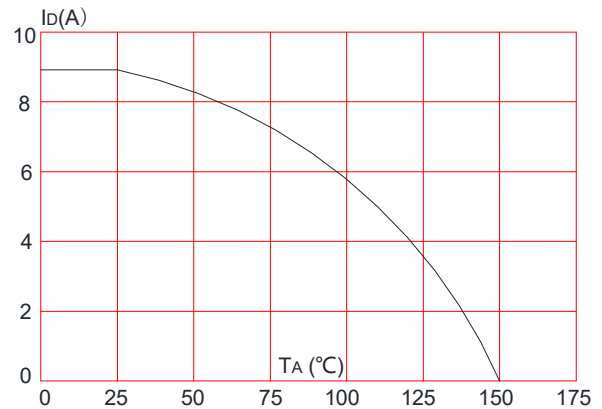
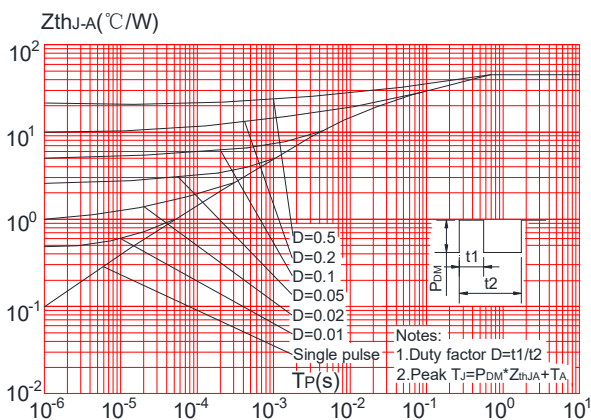


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

Figure 8: Normalized on Resistance vs. Junction Temperature

Figure 9: Maximum Safe Operating Area

Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

Figure 11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient


Test Circuit

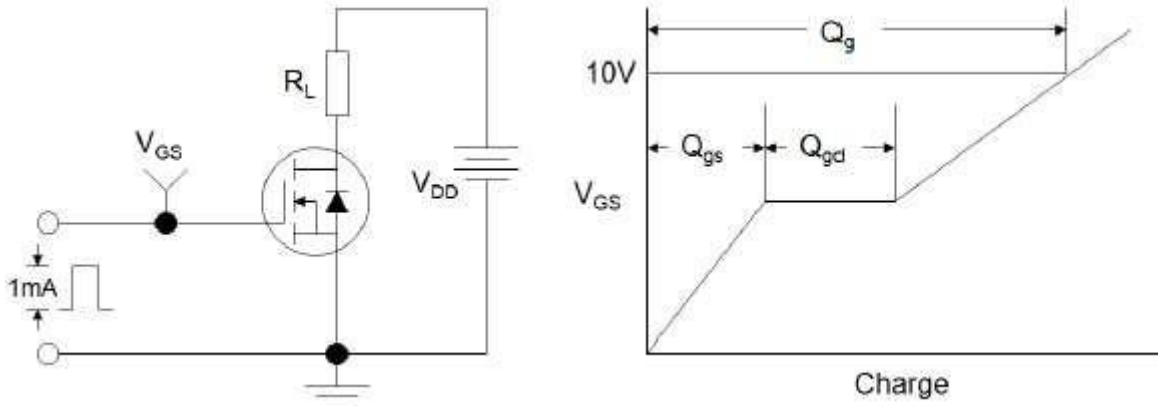


Figure1:Gate Charge Test Circuit & Waveform

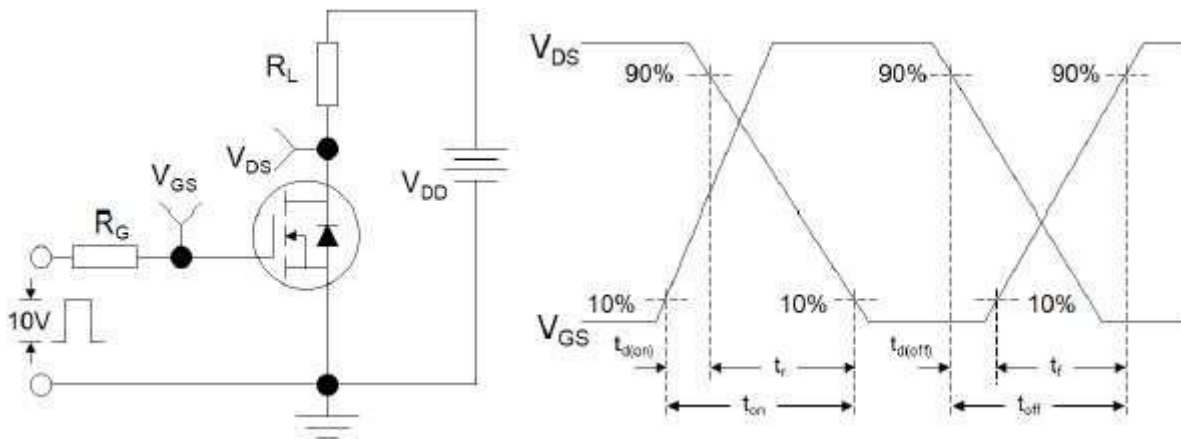


Figure 2: Resistive Switching Test Circuit & Waveforms

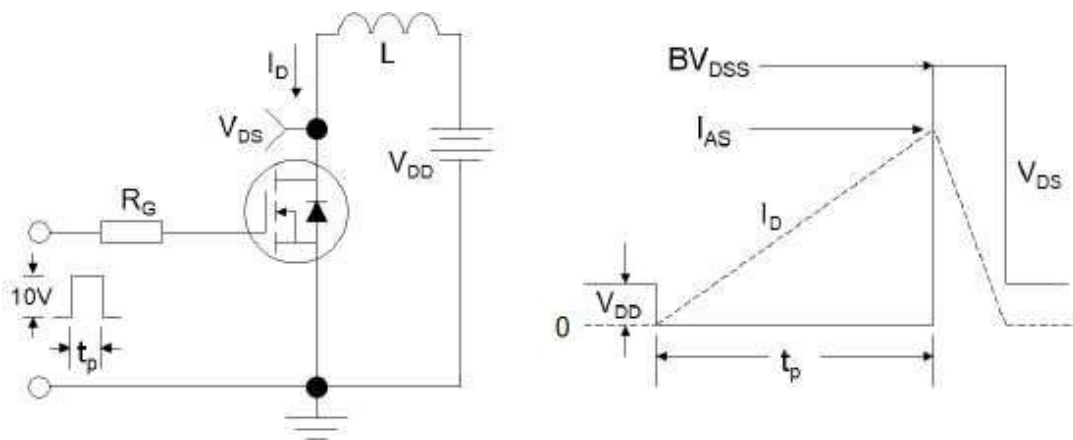
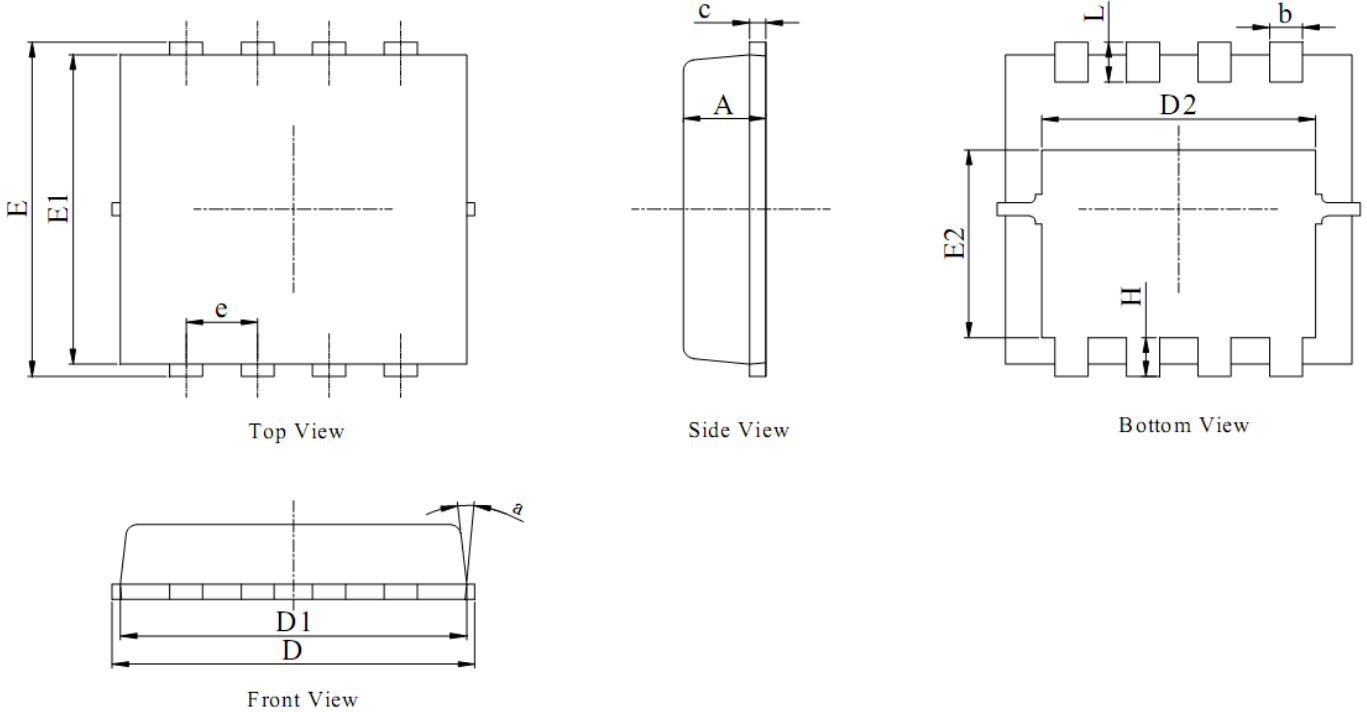
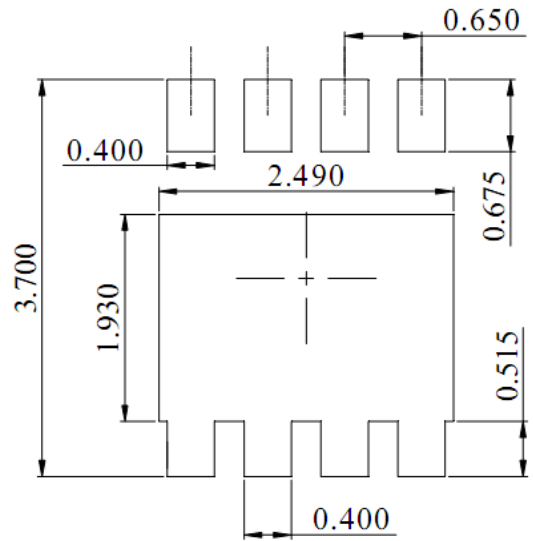


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Mechanical Data-PDFN3333-8L-Single

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M,1994.
2. ALL DIMENSIONS IN MILLIMETER (ANNGLE IN DEGREE).
3. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

| DIM. | MILLIMETER | | |
|------|------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.70 | 0.75 | 0.80 |
| b | 0.25 | 0.30 | 0.35 |
| c | 0.10 | 0.20 | 0.25 |
| D | 3.00 | 3.15 | 3.25 |
| D1 | 2.95 | 3.05 | 3.15 |
| D2 | 2.39 | 2.49 | 2.59 |
| E | 3.20 | 3.30 | 3.40 |
| E1 | 2.95 | 3.05 | 3.15 |
| E2 | 1.70 | 1.80 | 1.90 |
| e | 0.65 BSC | | |
| H | 0.30 | 0.40 | 0.50 |
| L | 0.25 | 0.40 | 0.50 |
| a | --- | --- | 15° |



DIMENSIONS:MILLIMETERS