

General Description

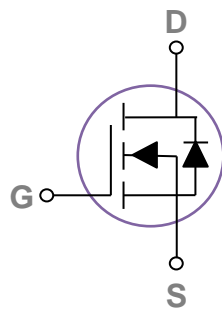
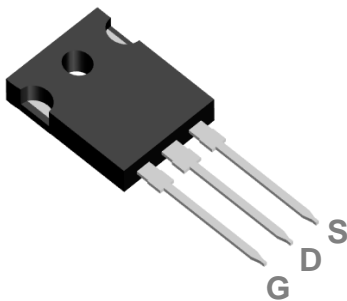
These N-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

| | | |
|-------|-------|------|
| BVDSS | RDSON | ID |
| 200V | 9.3mΩ | 120A |

Features

- 200V, 120A, $R_{DS(ON)} = 9.3m\Omega$ @ $V_{GS} = 10V$
- Improved dv/dt capability
- Fast switching
- Green Device Available

TO247 Pin Configuration



Applications

- Networking
- Load Switch
- LED applications
- Quick Charger

Absolute Maximum Ratings $T_c=25^\circ C$ unless otherwise noted

| Symbol | Parameter | Rating | Units |
|-----------|--|------------|---------------|
| V_{DS} | Drain-Source Voltage | 200 | V |
| V_{GS} | Gate-Source Voltage | ± 20 | V |
| I_D | Drain Current – Continuous ($T_c=25^\circ C$) | 120 | A |
| | Drain Current – Continuous ($T_c=100^\circ C$) | 77 | A |
| I_{DM} | Drain Current – Pulsed ¹ | 480 | A |
| EAS | Single Pulse Avalanche Energy ² | 2048 | mJ |
| IAS | Single Pulse Avalanche Current ² | 64 | A |
| P_D | Power Dissipation ($T_c=25^\circ C$) | 430 | W |
| | Power Dissipation – Derate above $25^\circ C$ | 3.44 | W/ $^\circ C$ |
| T_{STG} | Storage Temperature Range | -55 to 150 | $^\circ C$ |
| T_J | Operating Junction Temperature Range | -55 to 150 | $^\circ C$ |

Thermal Characteristics

| Symbol | Parameter | Typ. | Max. | Unit |
|-----------------|--|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction to ambient | --- | 62 | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | --- | 0.29 | $^\circ C/W$ |

Electrical Characteristics (T_J=25 °C, unless otherwise noted)
Off Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-------------------|--------------------------------|--|------|------|------|------|
| BV _{DSS} | Drain-Source Breakdown Voltage | V _{GS} =0V, I _D =250μA | 200 | --- | --- | V |
| I _{DSS} | Drain-Source Leakage Current | V _{DS} =200V, V _{GS} =0V, T _J =25°C | --- | --- | 1 | μA |
| | | V _{DS} =160V, V _{GS} =0V, T _J =85°C | --- | --- | 10 | μA |
| I _{GSS} | Gate-Source Leakage Current | V _{GS} =±20V, V _{DS} =0V | --- | --- | ±100 | nA |

On Characteristics

| | | | | | | |
|---------------------|-----------------------------------|--|-----|-----|-----|----|
| R _{DS(ON)} | Static Drain-Source On-Resistance | V _{GS} =10V, I _D =40A | --- | 7.7 | 9.3 | mΩ |
| V _{GS(th)} | Gate Threshold Voltage | V _{GS} =V _{DS} , I _D =250μA | 2.5 | 3.5 | 4.5 | V |

Dynamic and switching Characteristics³

| | | | | | | |
|---------------------|------------------------------|--|-----|------|-------|----|
| Q _g | Total Gate Charge | V _{DS} =100V, V _{GS} =10V, I _D =50A | --- | 125 | 190 | nC |
| Q _{gs} | Gate-Source Charge | | --- | 28 | 45 | |
| Q _{gd} | Gate-Drain Charge | | --- | 36 | 55 | |
| T _{d(on)} | Turn-On Delay Time | V _{DD} =100V, V _{GS} =10V, R _G =6Ω I _D =50A | --- | 20 | 30 | ns |
| T _r | Rise Time | | --- | 30 | 45 | |
| T _{d(off)} | Turn-Off Delay Time | | --- | 30 | 45 | |
| T _f | Fall Time | | --- | 45 | 70 | |
| C _{iss} | Input Capacitance | V _{DS} =100V, V _{GS} =0V, F=1MHz | --- | 6950 | 10500 | pF |
| C _{oss} | Output Capacitance | | --- | 500 | 750 | |
| C _{rss} | Reverse Transfer Capacitance | | --- | 24 | 40 | |
| R _g | Gate Resistance | V _{GS} =0V, V _{DS} =0V, F=1MHz | --- | 1.6 | --- | Ω |

Guaranteed Avalanche Energy

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|--------|-------------------------------|---|------|------|------|------|
| EAS | Single Pulse Avalanche Energy | V _{DD} =50V, L=1mH, I _{AS} =45A | 1012 | --- | --- | mJ |

Drain-Source Diode Characteristics and Maximum Ratings

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|-----------------|---------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | 120 | A |
| I _{SM} | Pulsed Source Current | | --- | --- | 240 | A |
| V _{SD} | Diode Forward Voltage | V _{GS} =0V, I _S =1A, T _J =25°C | --- | --- | 1 | V |
| t _{rr} | Reverse Recovery Time | V _R =100V, I _S =10A | --- | 130 | --- | ns |
| Q _{rr} | Reverse Recovery Charge | di/dt=100A/μs, T _J =25°C | --- | 710 | --- | nC |

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V_{DD}=50V, V_{GS}=10V, L=1mH, I_{AS}=64A., R_G=25Ω, Starting T_J=25°C..
3. Essentially independent of operating temperature.

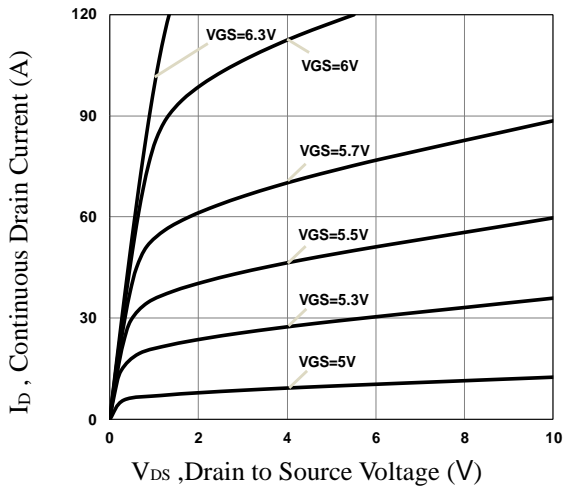


Fig.1 Typical Output Characteristics

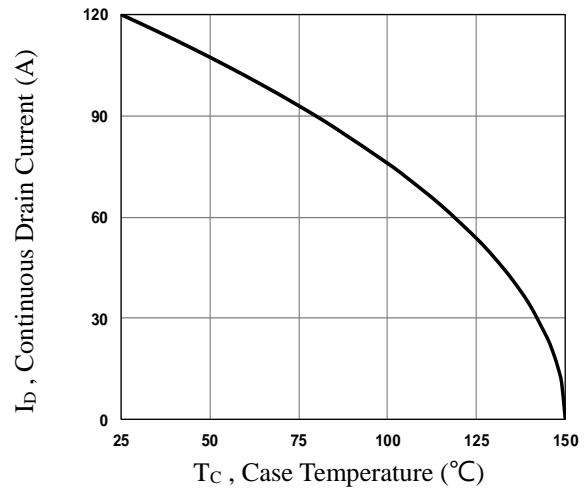


Fig.2 Continuous Drain Current vs. T_c

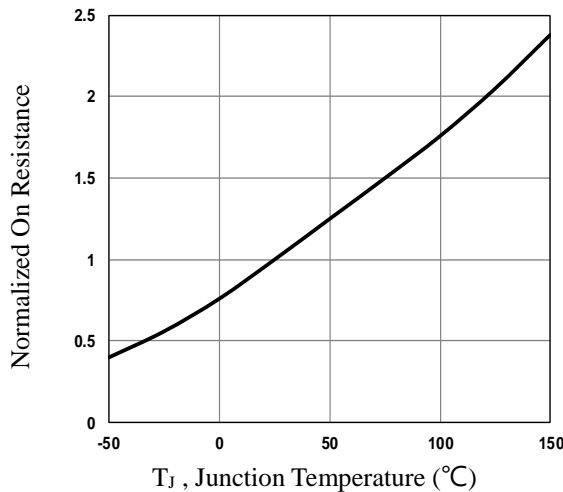


Fig.3 Normalized R_{DS(on)} vs. T_j

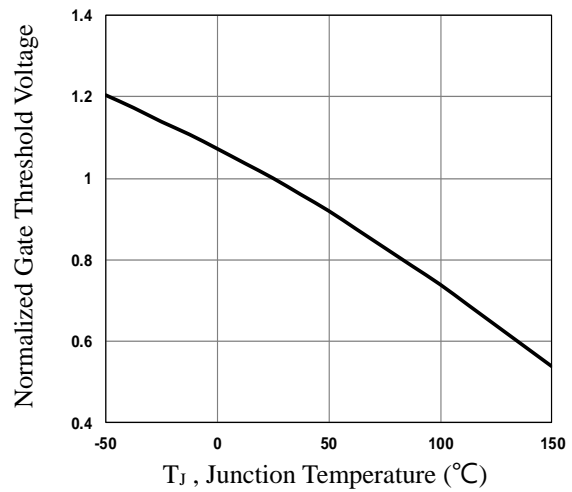


Fig.4 Normalized V_{th} vs. T_j

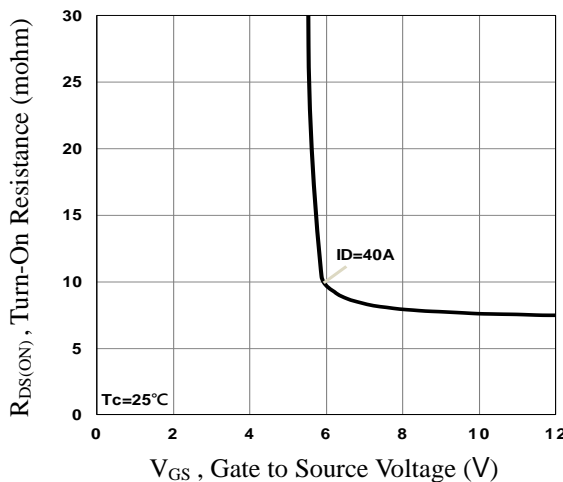


Fig.5 Turn-On Resistance vs. V_{GS}

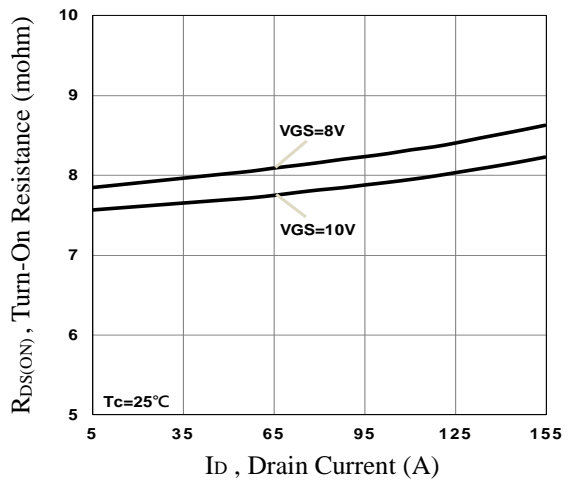


Fig.6 Turn-On Resistance vs. I_D

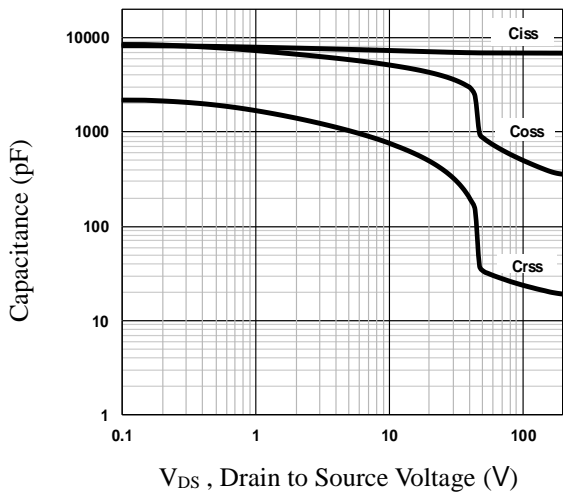


Fig.7 Capacitance Characteristics

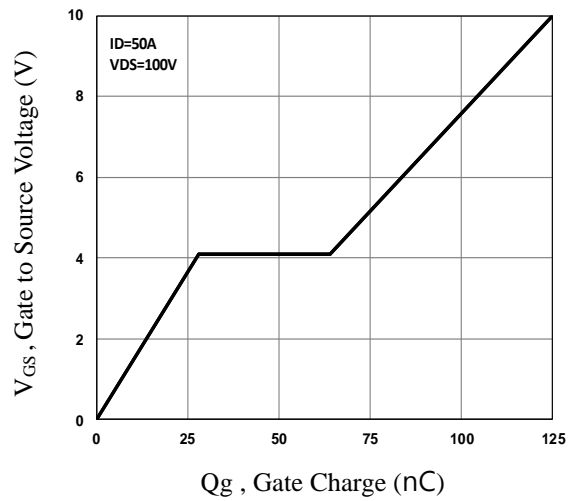


Fig.8 Gate Charge Characteristics

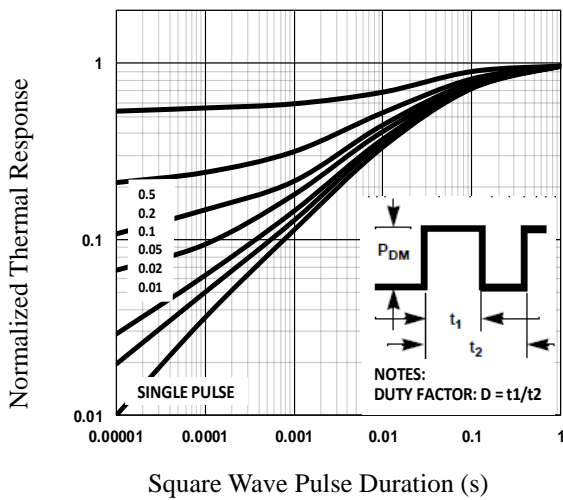


Fig.9 Normalized Transient Impedance

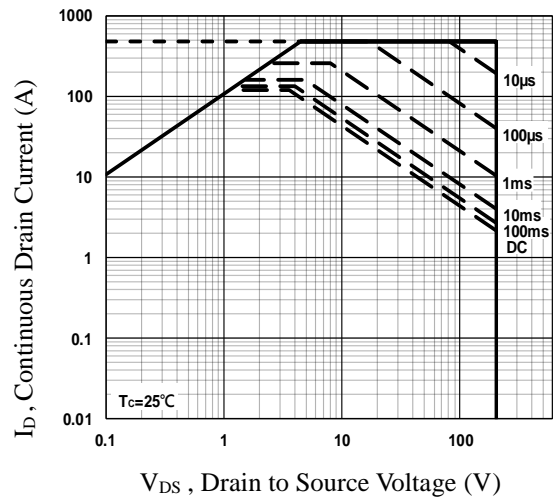


Fig.10 Maximum Safe Operation Area

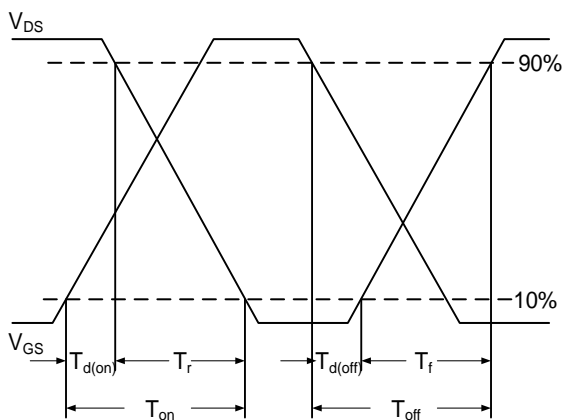


Fig.11 Switching Time Waveform

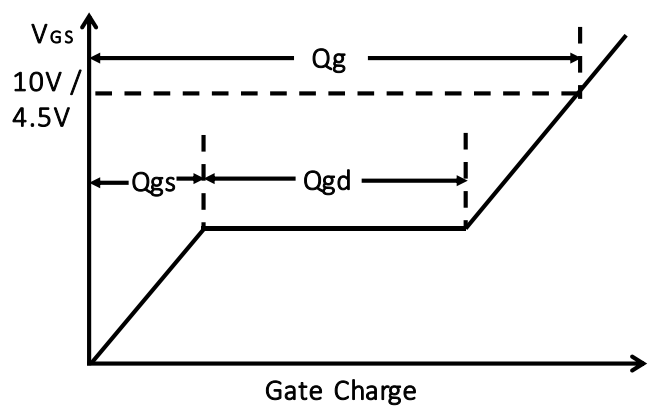
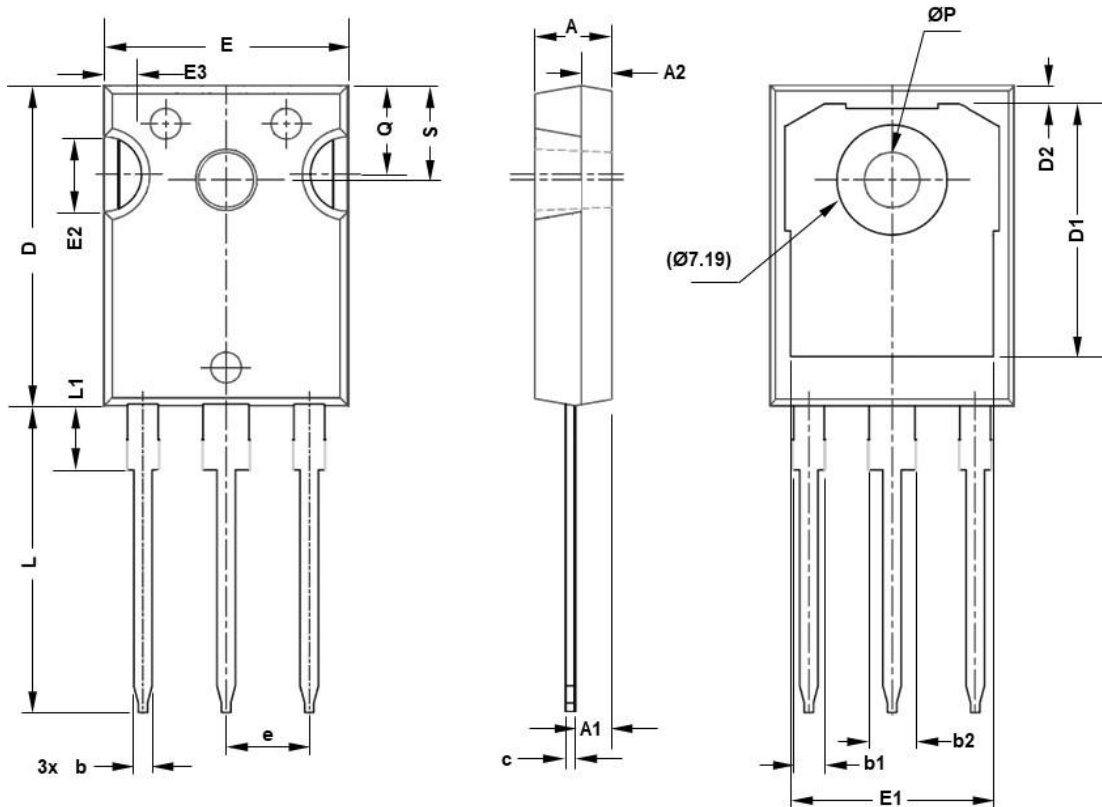


Fig.12 Gate Charge Waveform

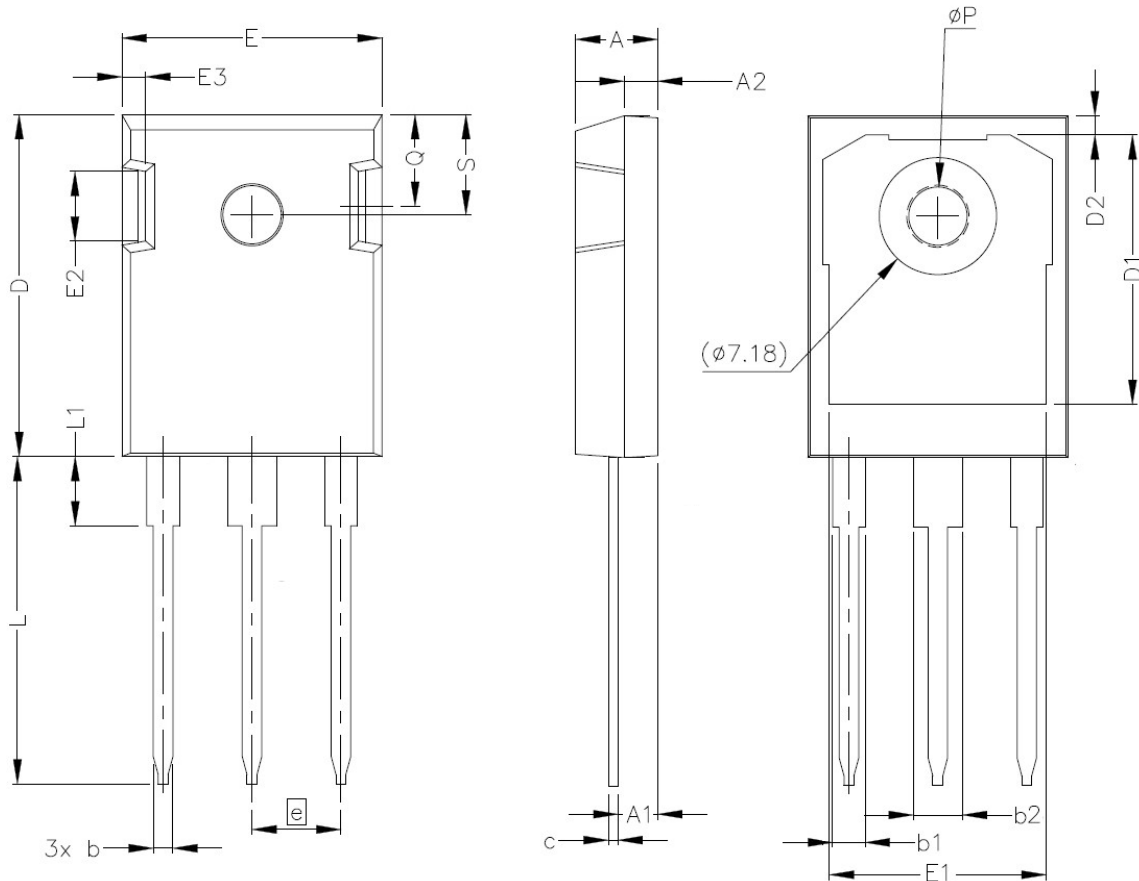
TO247 PACKAGE INFORMATION

VERSION A



| SYMBOL | mm | | SYMBOL | mm | |
|--------|-------|-------|--------|---------|-------|
| | MIN | MAX | | MIN | MAX |
| A | 4.83 | 5.21 | E2 | 4.32 | 5.49 |
| A1 | 2.29 | 2.55 | E3 | 2.15 | 2.80 |
| A2 | 1.50 | 2.49 | e | 5.44BSC | |
| b | 1.12 | 1.33 | L | 19.81 | 20.32 |
| b1 | 1.91 | 2.39 | L1 | 4.10 | 4.40 |
| b2 | 2.87 | 3.22 | ØP | 3.56 | 3.65 |
| C | 0.55 | 0.69 | Q | 5.39 | 6.20 |
| D | 20.80 | 21.10 | S | 6.04 | 6.30 |
| D1 | 16.25 | 17.65 | | | |
| D2 | 0.51 | 1.35 | | | |
| E | 15.75 | 16.13 | | | |
| E1 | 13.46 | 14.16 | | | |

VERSION B



| SYMBOL | mm | | SYMBOL | mm | |
|--------|-------|-------|--------|---------|-------|
| | MIN | MAX | | MIN | MAX |
| A | 4.75 | 5.25 | E2 | 3.70 | 5.30 |
| A1 | 2.16 | 2.66 | E3 | 1.00 | 2.75 |
| A2 | 1.75 | 2.25 | e | 5.44BSC | |
| b | 1.07 | 1.35 | L | 19.52 | 20.32 |
| b1 | 1.90 | 2.41 | L1 | 4.10 | 4.40 |
| b2 | 2.87 | 3.38 | ΦP | 3.35 | 3.85 |
| C | 0.50 | 0.70 | Q | 5.40 | 6.20 |
| D | 20.60 | 21.40 | S | 6.15BSC | |
| D1 | 16.15 | 17.65 | | | |
| D2 | 0.95 | 1.35 | | | |
| E | 15.50 | 16.10 | | | |
| E1 | 12.40 | 13.60 | | | |