

## General Description

The WSR200N08 is the highest performance trench N-Ch MOSFET with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

The WSR200N08 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

## Features

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

## Product Summary

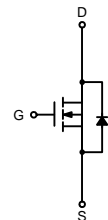
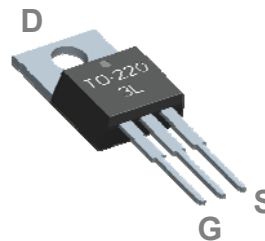
| BV <sub>DSS</sub> | R <sub>DS(on)</sub> | I <sub>D</sub> |
|-------------------|---------------------|----------------|
| 80V               | 2.9mΩ               | 200A           |

## Applications

Switching application

Power Management for Inverter Systems.

## TO-220FB-3L Pin Configuration



## Absolute Maximum Ratings

| Symbol                                | Parameter  | Rating     | Units |
|---------------------------------------|--|------------|-------|
| V <sub>DS</sub>                       | Drain-Source Voltage   | 80         | V     |
| V <sub>GS</sub>                       | Gate-Source Voltage  | ±25        | V     |
| I <sub>D</sub> @T <sub>C</sub> =25°C  | Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup> | 200        | A     |
| I <sub>D</sub> @T <sub>C</sub> =100°C | Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup> | 144        | A     |
| I <sub>DM</sub>                       | Pulsed Drain Current <sup>2</sup> , T <sub>C</sub> =25°C     | 790        | A     |
| EAS                                   | Avalanche Energy, Single pulse, L=0.5mH                      | 1496       | mJ    |
| I <sub>AS</sub>                       | Avalanche Current, Single pulse, L=0.5mH                     | 200        | A     |
| P <sub>D</sub> @T <sub>C</sub> =25°C  | Total Power Dissipation <sup>4</sup>                         | 345        | W     |
| P <sub>D</sub> @T <sub>C</sub> =100°C | Total Power Dissipation <sup>4</sup>                         | 173        | W     |
| T <sub>STG</sub>                      | Storage Temperature Range                                    | -55 to 175 | °C    |
| T <sub>J</sub>                        | Operating Junction Temperature Range                         | 175        | °C    |

## Thermal Data

| Symbol           | Parameter  | Typ. | Max. | Unit |
|------------------|--|------|------|------|
| R <sub>θJA</sub> | Thermal Resistance Junction-Ambient <sup>1</sup> | ---  | 62.5 | °C/W |
| R <sub>θJC</sub> | Thermal Resistance Junction-Case <sup>1</sup>    | ---  | 0.43 | °C/W |

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

| Symbol                              | Parameter                                      | Conditions  | Min. | Typ.  | Max. | Unit  |
|-------------------------------------|--|---|------|-------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA  | 80   | ---   | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BV <sub>DSS</sub> Temperature Coefficient      | Reference to 25°C, I <sub>D</sub> =1mA  | ---  | 0.096 | ---  | V/°C  |
| R <sub>DS(ON)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =100A  | ---  | 2.9   | 3.5  | mΩ    |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                            | 2.0  | 3.0   | 4.0  | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    |   | ---  | -5.5  | ---  | mV/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                     | ---  | ---   | 1    | uA    |
|                                     |  | V <sub>DS</sub> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                     | ---  | ---   | 10   |       |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±25V, V <sub>DS</sub> =0V  | ---  | ---   | ±100 | nA    |
| R <sub>g</sub>                      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                    | ---  | 3.2   | ---  | Ω     |
| Q <sub>g</sub>                      | Total Gate Charge (10V)                        | V <sub>DS</sub> =80V, V <sub>GS</sub> =10V, I <sub>D</sub> =30A                     | ---  | 197   | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             |   | ---  | 31    | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |   | ---  | 75    | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             | V <sub>DD</sub> =50V, V <sub>GS</sub> =10V, R <sub>G</sub> =3Ω, I <sub>D</sub> =30A | ---  | 28    | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      |   | ---  | 18    | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            |   | ---  | 42    | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |   | ---  | 54    | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                   | ---  | 8154  | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             |   | ---  | 1029  | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |   | ---  | 650   | ---  |       |

**Guaranteed Avalanche Characteristics**

| Symbol | Parameter                                  | Conditions  | Min. | Typ. | Max. | Unit |
|--------|--|---|------|------|------|------|
| EAS    | Single Pulse Avalanche Energy <sup>5</sup> | V <sub>DD</sub> =25V, L=0.5mH, I <sub>AS</sub> =28A | 160  | ---  | ---  | mJ   |

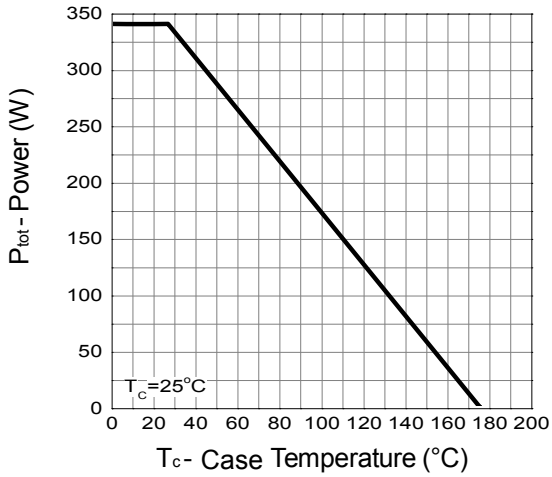
**Diode Characteristics**

| Symbol          | Parameter                                | Conditions   | Min. | Typ. | Max. | Unit |
|-----------------|--|--|------|------|------|------|
| I <sub>S</sub>  | Continuous Source Current <sup>1,6</sup> | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current              | ---  | ---  | 200  | A    |
| I <sub>SM</sub> | Pulsed Source Current <sup>2,6</sup>     |  | ---  | ---  | 350  | A    |
| V <sub>SD</sub> | Diode Forward Voltage <sup>2</sup>       | V <sub>GS</sub> =0V, I <sub>S</sub> =15A, T <sub>J</sub> =25°C | ---  | ---  | 1.2  | V    |
| t <sub>rr</sub> | Reverse Recovery Time                    | I <sub>F</sub> =15A, dI/dt=100A/μs, T <sub>J</sub> =25°C       | ---  | 30   | ---  | nS   |
| Q <sub>rr</sub> | Reverse Recovery Charge                  |  | ---  | 52   | ---  | nC   |

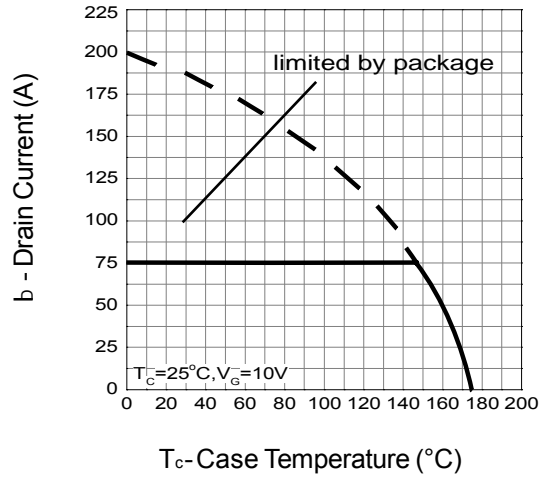
Note \* : Pulse test ; pulse width ≤300μs, duty cycle ≤2%.

**Typical Operating Characteristics**

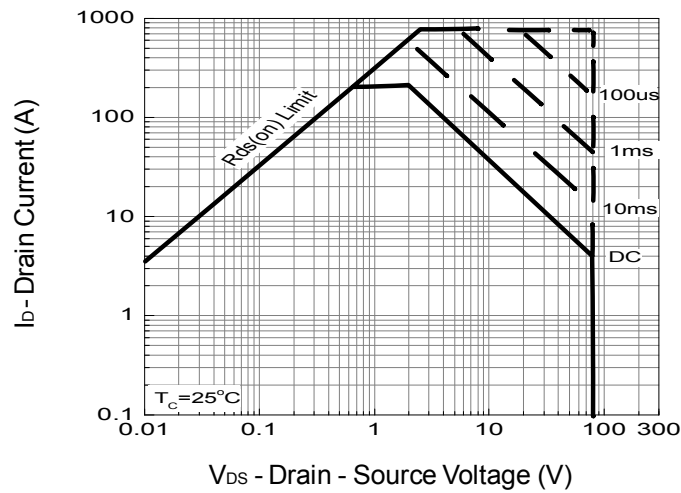
**Power Dissipation**



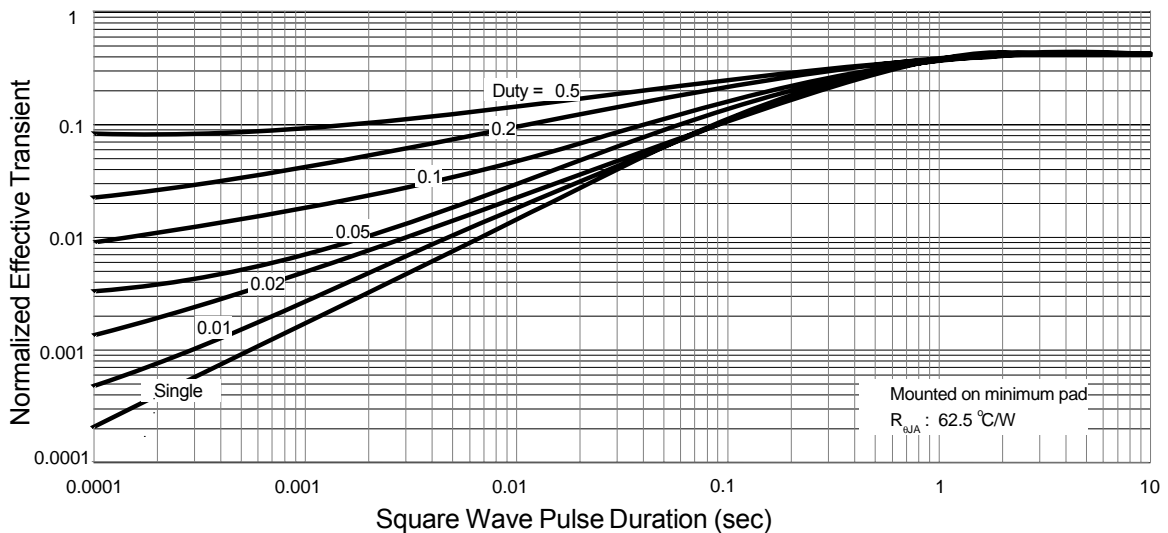
**Drain Current**



**Safe Operation Area**

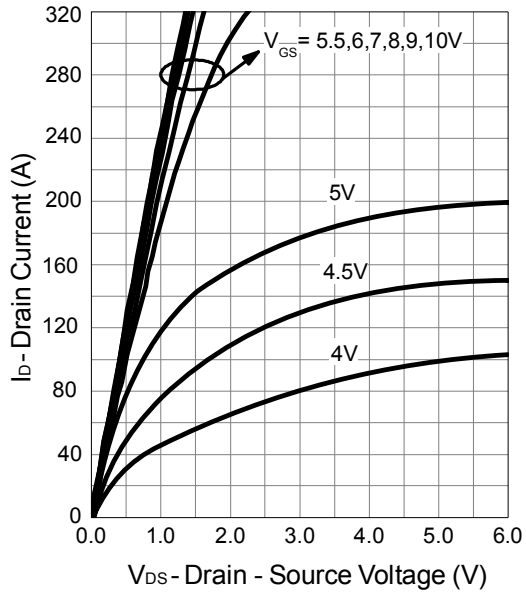


**Thermal Transient Impedance**

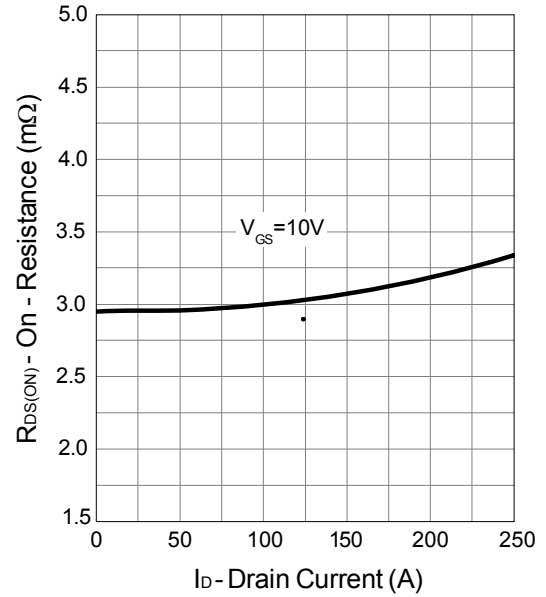


**Typical Operating Characteristics (Cont.)**

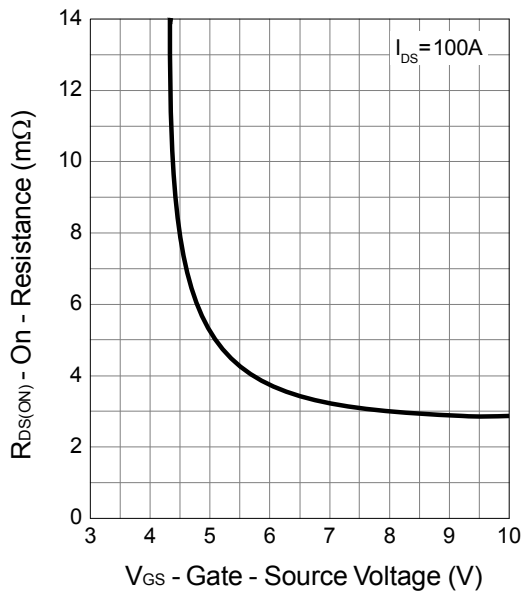
**Output Characteristics**



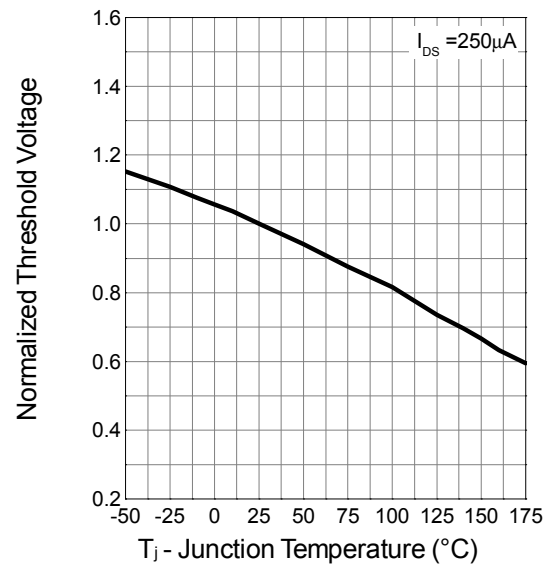
**Drain-Source On Resistance**



**Gate-Source On Resistance**

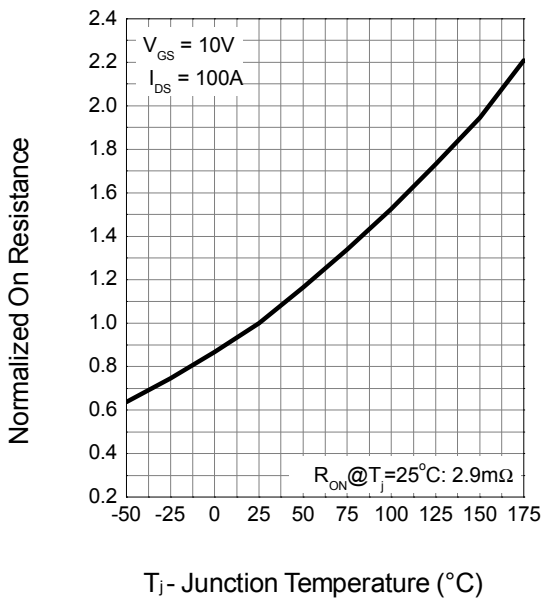


**Gate Threshold Voltage**

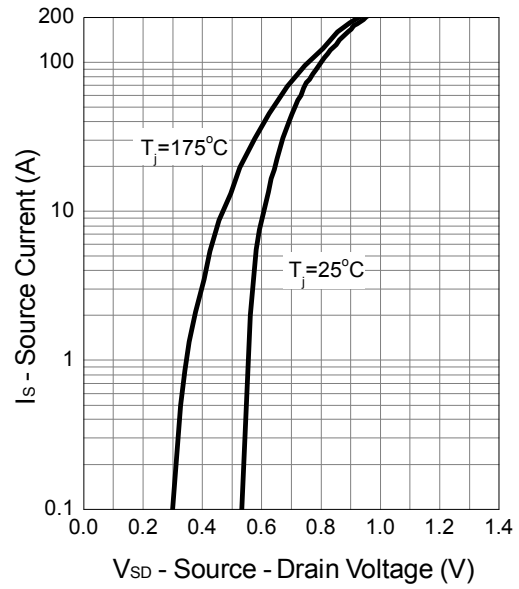


**Typical Operating Characteristics (Cont.)**

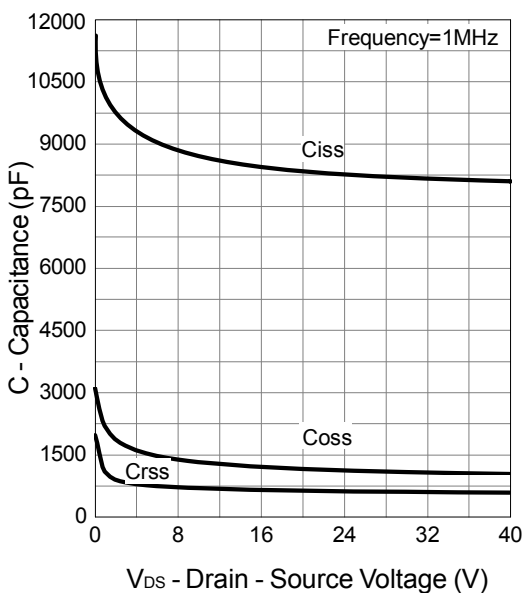
**Drain-Source On Resistance**



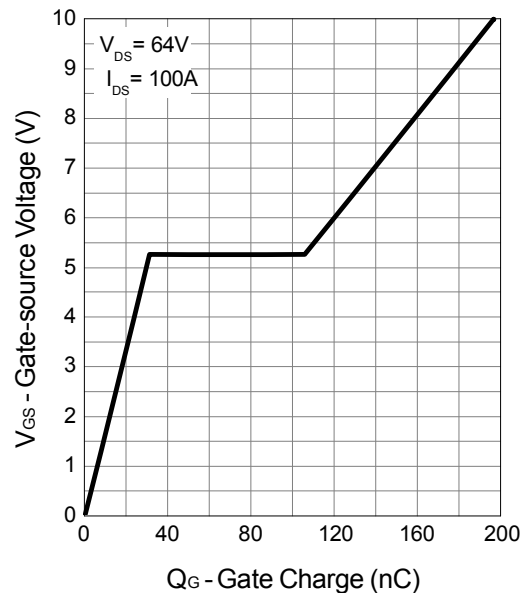
**Source-Drain Diode Forward**

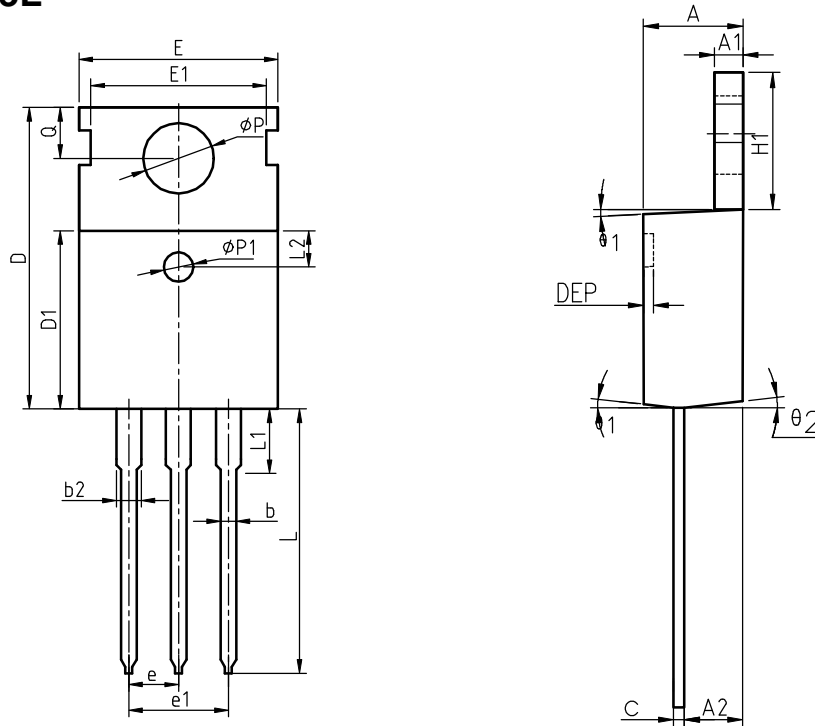


**Capacitance**



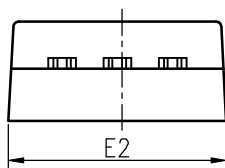
**Gate Charge**



**Package Information TO-220AB**
**TO-220FB-3L**


COMMON DIMENSIONS

| SYMBOL  | MIN   | NOM   | MAX   | MIN   | NOM   | MAX   |
|---------|-------|-------|-------|-------|-------|-------|
| A       | 4.40  | 4.57  | 4.70  | 0.173 | 0.180 | 0.185 |
| A1      | 1.27  | 1.30  | 1.33  | 0.050 | 0.051 | 0.052 |
| A2      | 2.35  | 2.40  | 2.50  | 0.093 | 0.094 | 0.098 |
| b       | 0.77  | 0.80  | 0.90  | 0.030 | 0.031 | 0.035 |
| b2      | 1.17  | 1.27  | 1.36  | 0.046 | 0.050 | 0.054 |
| c       | 0.48  | 0.50  | 0.56  | 0.019 | 0.020 | 0.022 |
| D       | 15.40 | 15.60 | 15.80 | 0.606 | 0.614 | 0.622 |
| D1      | 9.00  | 9.10  | 9.20  | 0.354 | 0.358 | 0.362 |
| DEP     | 0.05  | 0.10  | 0.20  | 0.002 | 0.004 | 0.008 |
| E       | 9.80  | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| E1      | -     | 8.70  | -     | -     | 0.343 | -     |
| E2      | 9.80  | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 |
| e       |       | 2.54  | BSC   |       | 0.100 | BSC   |
| e1      |       | 5.08  | BSC   |       | 0.200 | BSC   |
| H1      | 6.40  | 6.50  | 6.60  | 0.252 | 0.256 | 0.260 |
| L       | 12.75 | 13.50 | 13.65 | 0.502 | 0.531 | 0.537 |
| L1      | -     | 3.10  | 3.30  | -     | 0.122 | 0.130 |
| L2      |       | 2.50  | REF   |       | 0.098 | REF   |
| P       | 3.50  | 3.60  | 3.63  | 0.138 | 0.142 | 0.143 |
| P1      | 3.50  | 3.60  | 3.63  | 0.138 | 0.142 | 0.143 |
| Q       | 2.73  | 2.80  | 2.87  | 0.107 | 0.110 | 0.113 |
| theta 1 | 5°    | 7°    | 9°    | 5°    | 7°    | 9°    |
| theta 2 | 1°    | 3°    | 5°    | 1°    | 3°    | 5°    |
| theta 3 | 1°    | 3°    | 5°    | 1°    | 3°    | 5°    |





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