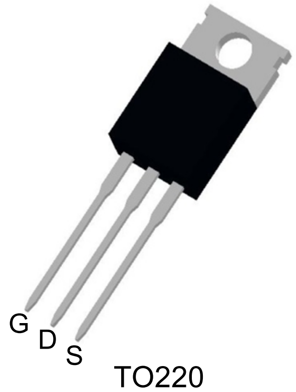
## Features

- 120V/200A,
  $R_{DS\ (ON)}$ =5.8mΩ(Typ.)@$V_{GS}$=10V
- Reliable and Rugged
- Ultra Low On-Resistance
- 100% avalanche tested
- 175°C Operating Temperature
- Lead Free and Green Devices Available (RoHS Compliant)

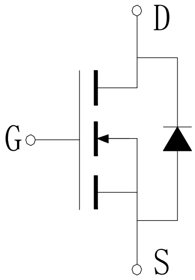
## Applications

- Uninterruptible Power Supplies
- Synchronus Rectification in DC/DC and AC/DC Converters

## Pin Description



TO220



N-Channel MOSFET

## Absolute Maximum Ratings

| Symbol | Parameter | | Rating | Unit |
|---|---|---|---|---|
| **Common Ratings** ($T_C$=25°C Unless Otherwise Noted) | | | | |
| $V_{DSS}$ | Drain-Source Voltage | | 120 | V |
| $V_{GSS}$ | Gate-Source Voltage | | ±25 | |
| $T_J$ | Maximum Junction Temperature | | 175 | °C |
| $T_{STG}$ | Storage Temperature Range | | -55 to 175 | °C |
| $I_S$ | Diode Continuous Forward Current | $T_C$=25°C | 200 | A |
| **Mounted on Large Heat Sink** | | | | |
| $I_{DP}$ ① | 300μs Pulse Drain Current Tested | $T_C$=25°C | 760 | A |
| $I_D$ ② | Continuous Drain Current($V_{GS}$=10V) | $T_C$=25°C | 200 | A |
| | | $T_C$=100°C | 140 | |
| $P_D$ | Maximum Power Dissipation | $T_C$=25°C | 394 | W |
| | | $T_C$=100°C | 197 | |
| $R_{\theta JC}$ | Thermal Resistance-Junction to Case | | 0.38 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance-Junction to Ambient | | 62.5 | °C/W |
| **Drain-Source Avalanche Ratings** | | | | |
| $E_{AS}$ ③ | Avalanche Energy, Single Pulsed | | 900 | mJ |

## Electrical Characteristics ($T_C$=25°C Unless Otherwise Noted)

| Symbol | Parameter | Test Condition | RU12200R | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| **Static Characteristics** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V, $I_{DS}$=250μA | 120 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=120V, $V_{GS}$=0V | | | 1 | μA |
| | | $T_J$=125°C | | | 30 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$, $I_{DS}$=250μA | 2 | | 4 | V |
| $I_{GSS}$ | Gate Leakage Current | $V_{GS}$=±25V, $V_{DS}$=0V | | | ±100 | nA |
| $R_{DS(ON)}$ ④ | Drain-Source On-state Resistance | $V_{GS}$=10V, $I_{DS}$=75A | | 5.8 | 6.5 | mΩ |
| **Diode Characteristics** | | | | | | |
| $V_{SD}$ ④ | Diode Forward Voltage | $I_{SD}$=75A, $V_{GS}$=0V | | | 1.2 | V |
| $t_{rr}$ | Reverse Recovery Time | $I_{SD}$=20A, $dI_{SD}/dt$=100A/μs | | 38 | | ns |
| $Q_{rr}$ | Reverse Recovery Charge | | | 386 | | nC |
| **Dynamic Characteristics**⑤ | | | | | | |
| $R_G$ | Gate Resistance | $V_{GS}$=0V,$V_{DS}$=0V,F=1MHz | | 1.3 | | Ω |
| $C_{iss}$ | Input Capacitance | $V_{GS}$=0V,<br>$V_{DS}$=60V,<br>Frequency=1.0MHz | | 8560 | | pF |
| $C_{oss}$ | Output Capacitance | | | 1460 | | |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 980 | | |
| $t_{d(ON)}$ | Turn-on Delay Time | $V_{DD}$=60V,$I_{DS}$=75A,<br>$V_{GEN}$=10V,$R_G$=2.5Ω | | 45 | | ns |
| $t_r$ | Turn-on Rise Time | | | 156 | | |
| $t_{d(OFF)}$ | Turn-off Delay Time | | | 203 | | |
| $t_f$ | Turn-off Fall Time | | | 73 | | |
| **Gate Charge Characteristics**⑤ | | | | | | |
| $Q_g$ | Total Gate Charge | $V_{DS}$=96V, $V_{GS}$=10V,<br>$I_{DS}$=20A | | 248 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 33 | | |
| $Q_{gd}$ | Gate-Drain Charge | | | 188 | | |

Notes:

①Pulse width limited by safe operating area.

②Calculated continuous current based on maximum allowable junction temperature. The package limitation current is 75A.

③Limited by $T_{Jmax}$, $I_{AS}$ =60A, $V_{DD}$ = 48V, $R_G$ = 50Ω , Starting $T_J$ = 25°C.

④Pulse test;Pulse width≤300μs, duty cycle≤2%.

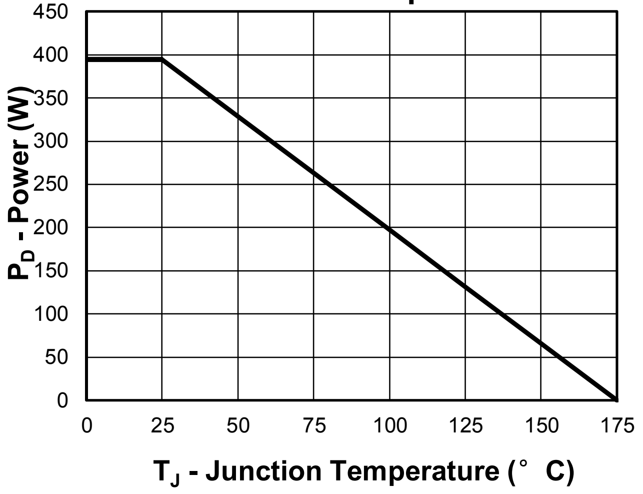
⑤Guaranteed by design, not subject to production testing.

## Ordering and Marking Information

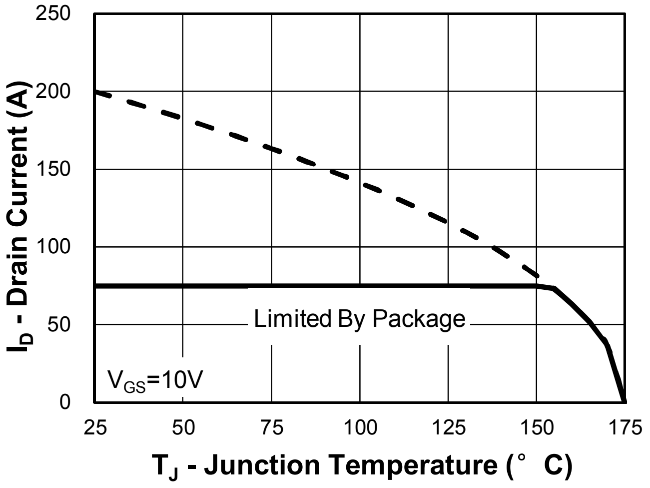
| Device | Marking | Package | Packaging | Quantity | Reel Size | Tape width |
|---|---|---|---|---|---|---|
| RU12200R | RU12200R | TO220 | Tube | 50 | - | - |

## Typical Characteristics

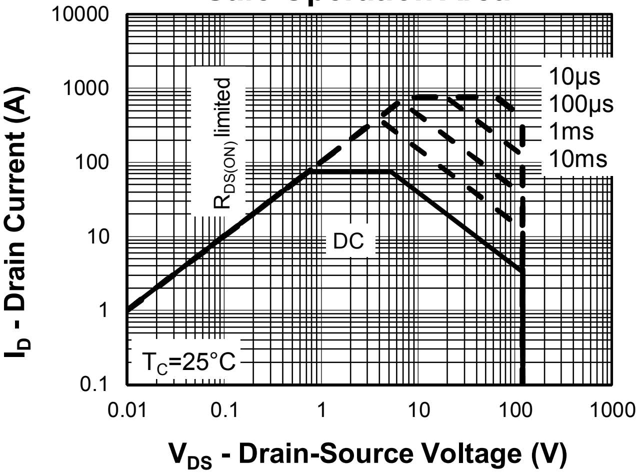
Power Dissipation



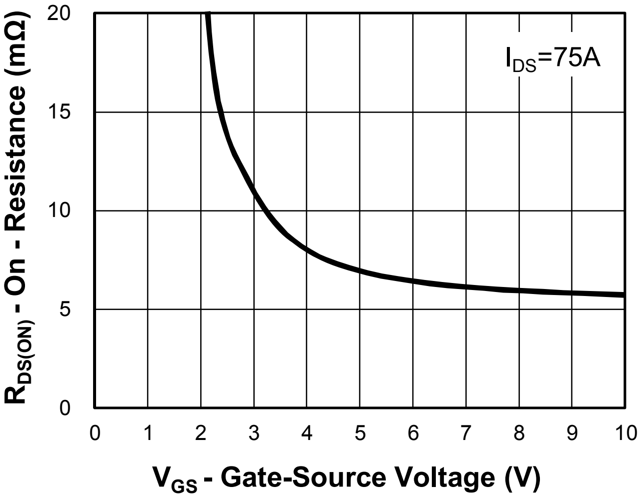
Drain Current



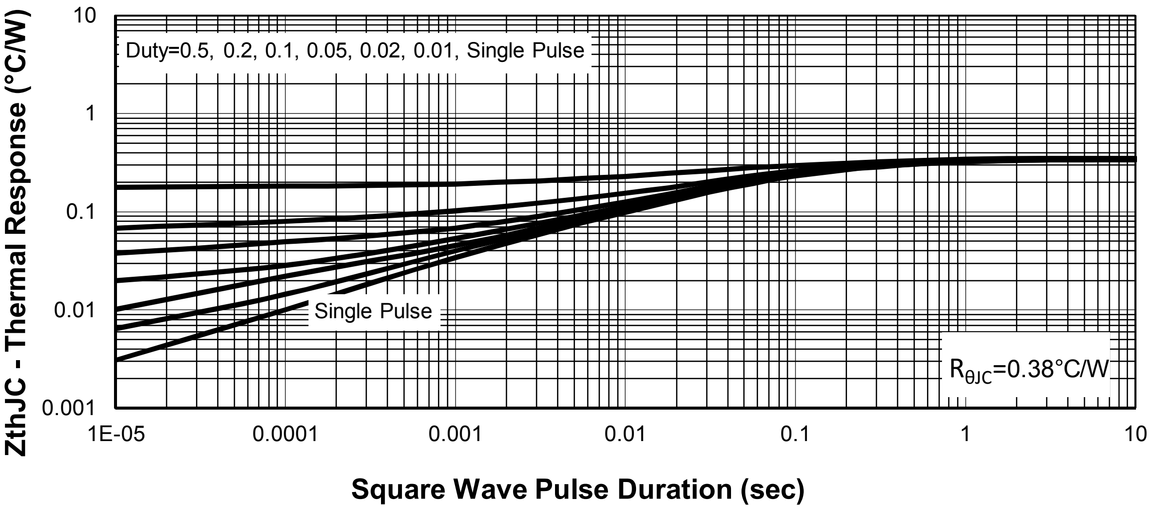
Safe Operation Area



Drain Current

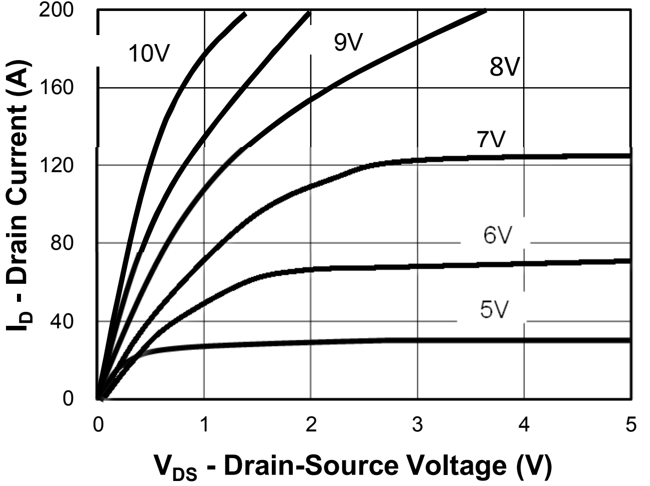


Thermal Transient Impedance

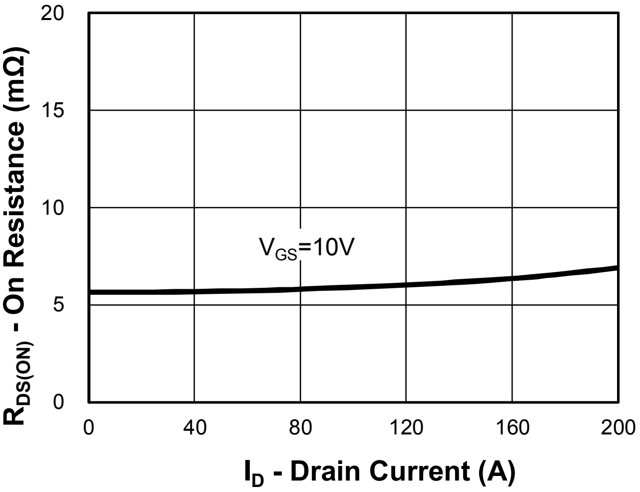


## Typical Characteristics

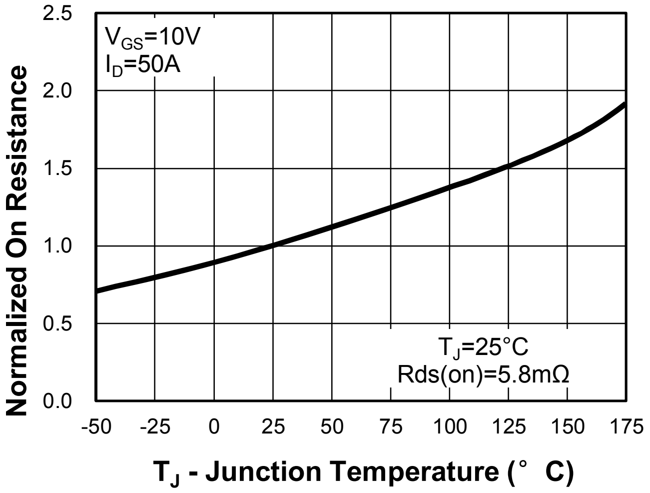
### Output Characteristics



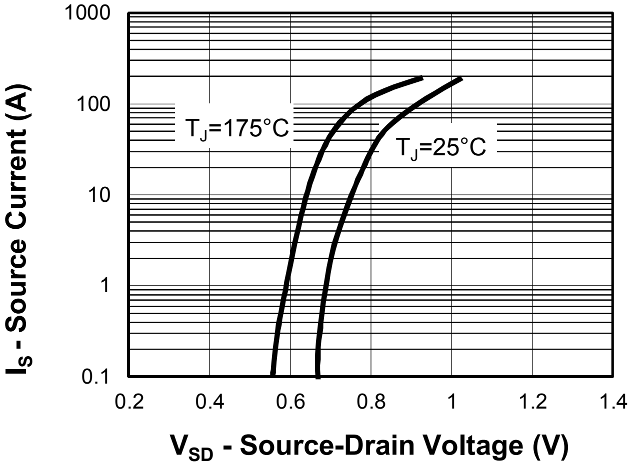
### Drain-Source On Resistance



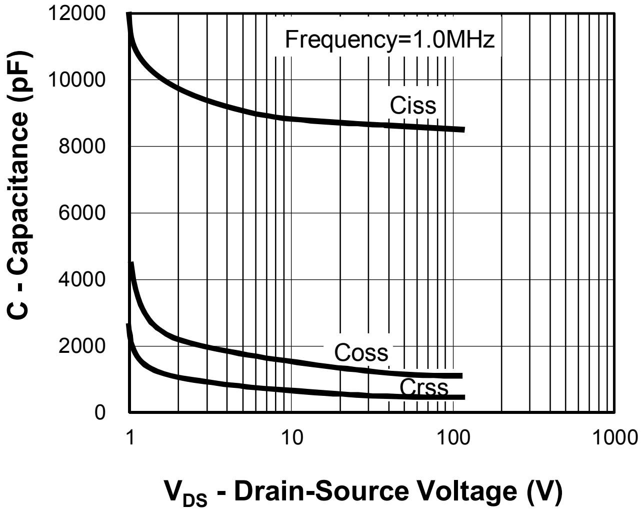
### Drain-Source On Resistance



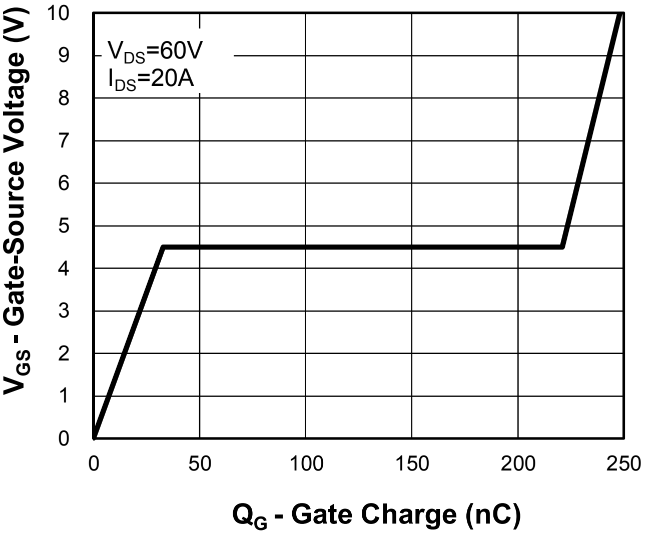
### Source-Drain Diode Forward



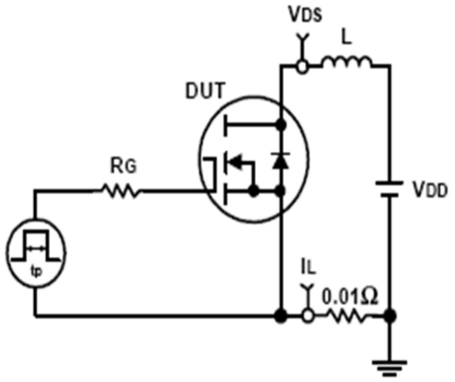
### Capacitance

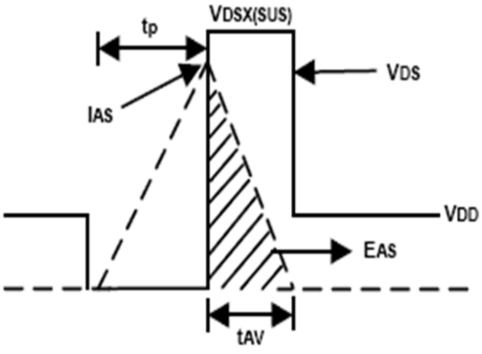


### Gate Charge

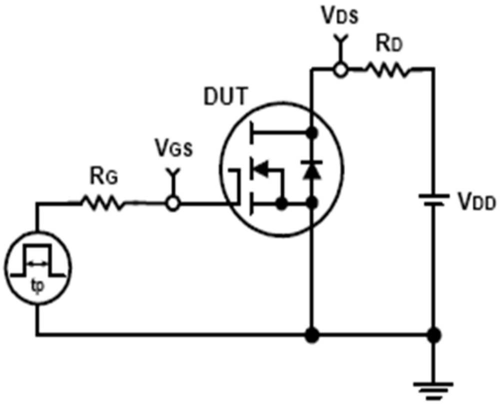


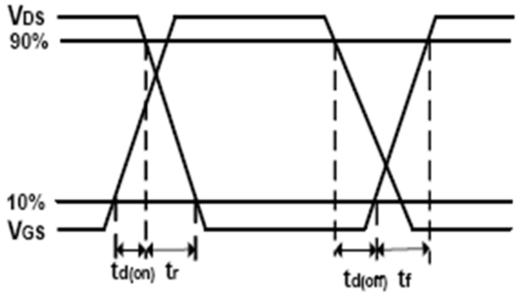
## Avalanche Test Circuit and Waveforms





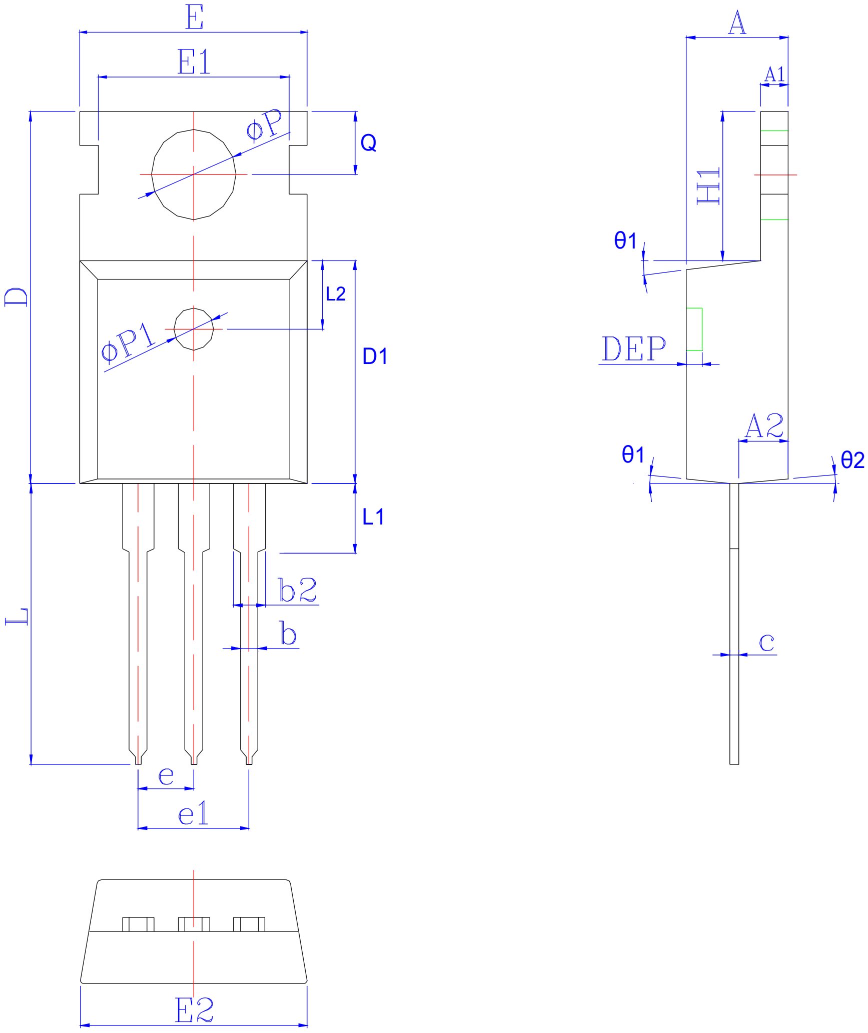
## Switching Time Test Circuit and Waveforms





## Package Information

TO220



| SYMBOL | MM | | | INCH | | | SYMBOL | MM | | | INCH | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | MIN | NOM | MAX | MIN | NOM | MAX | | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 4.30 | 4.54 | 4.77 | 0.169 | 0.179 | 0.188 | Φp1 | 1.40 | 1.50 | 1.60 | 0.055 | 0.059 | 0.063 |
| A1 | 1.15 | 1.30 | 1.40 | 0.045 | 0.051 | 0.055 | e | 2.54 BSC | | | 0.10 BSC | | |
| A2 | 1.90 | 2.25 | 2.60 | 0.075 | 0.089 | 0.102 | e1 | 5.08 BSC | | | 0.20 BSC | | |
| b | 0.60 | 0.80 | 1.00 | 0.024 | 0.031 | 0.039 | H1 | 6.30 | 6.50 | 6.80 | 0.248 | 0.256 | 0.268 |
| b2 | 1.17 | 1.28 | 1.72 | 0.046 | 0.050 | 0.068 | L | 12.70 | 13.18 | 13.65 | 0.500 | 0.519 | 0.537 |
| c | 0.40 | 0.50 | 0.60 | 0.016 | 0.020 | 0.024 | L1 | * | * | 3.95 | * | * | 0.156 |
| D | 15.40 | 15.70 | 16.00 | 0.606 | 0.618 | 0.630 | L2 | 2.50 REF | | | 0.098 REF | | |
| D1 | 8.96 | 9.21 | 9.46 | 0.353 | 0.363 | 0.372 | Φp | 3.50 | 3.60 | 3.75 | 0.138 | 0.142 | 0.148 |
| DEP | * | * | 0.30 | * | * | 0.012 | Q | 2.70 | 2.80 | 3.20 | 0.106 | 0.110 | 0.126 |
| E | 9.66 | 9.97 | 10.28 | 0.380 | 0.393 | 0.405 | θ1 | 5° | 7° | 9° | 5° | 7° | 9° |
| E1 | * | 8.70 | * | * | 0.343 | * | θ2 | 1° | 3° | 5° | 1° | 3° | 5° |
| E2 | 9.80 | 10.00 | 10.20 | 0.386 | 0.394 | 0.402 | | | | | | | |

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