



## 100V 1.7mΩ N-Ch Power MOSFET

### Features

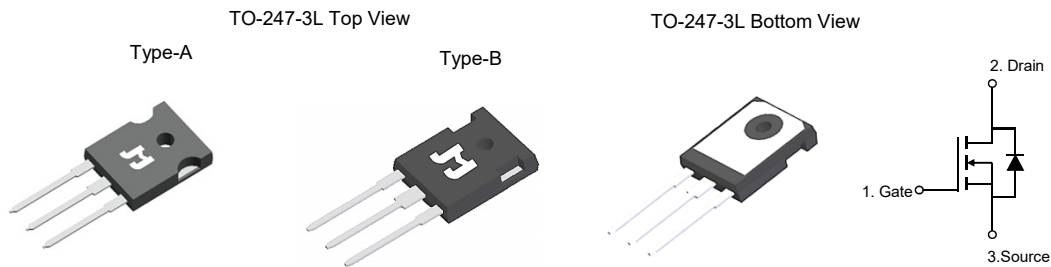
- Ultra-low ON-resistance,  $R_{DS(ON)}$
- Low Gate Charge,  $Q_g$
- 100% UIS and  $R_g$  Tested
- Pb-free Lead Plating
- Halogen-free and RoHS-compliant

### Product Summary

| Parameter                                | Value | Unit |
|--|-------|------|
| $V_{DS}$                                 | 100   | V    |
| $V_{GS(th)}_{Typ}$                       | 2.8   | V    |
| $I_D$ (@ $V_{GS} = 10V$ ) <sup>(1)</sup> | 314   | A    |
| $R_{DS(ON)}_{Typ}$ (@ $V_{GS} = 10V$ )   | 1.7   | mΩ   |

### Applications

- Power Management in Telecom., Industrial Automation, CE
- Motor Driving in Power Tool, E-vehicle, Robotics
- Current Switching in DC/DC & AC/DC Sub-systems

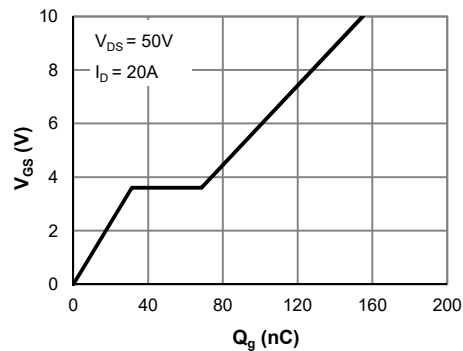
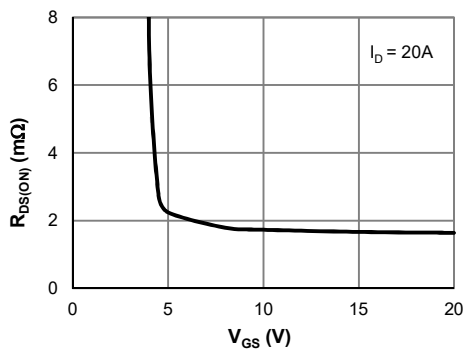


### Ordering Information

| Device       | Package   | # of Pins | Marking | MSL | $T_J$ (°C) | Media | Quantity (pcs) |
|--------------|-----------|-----------|---------|-----|------------|-------|----------------|
| JMSH1002AS-U | TO-247-3L | 3         | SH1002A | N/A | -55 to 175 | Tube  | 30             |

### Absolute Maximum Ratings (@ $T_A = 25^\circ C$ unless otherwise specified)

| Parameter                               | Symbol         | Value               | Unit |
|---|----------------|---------------------|------|
| Drain-to-Source Voltage                 | $V_{DS}$       | 100                 | V    |
| Gate-to-Source Voltage                  | $V_{GS}$       | ±20                 | V    |
| Continuous Drain Current <sup>(1)</sup> | $I_D$          | $T_C = 25^\circ C$  | 314  |
|   |                | $T_C = 100^\circ C$ | 222  |
| Pulsed Drain Current <sup>(2)</sup>     | $I_{DM}$       | 960                 | A    |
| Avalanche Current <sup>(3)</sup>        | $I_{AS}$       | 126                 | A    |
| Avalanche Energy <sup>(3)</sup>         | $E_{AS}$       | 794                 | mJ   |
| Power Dissipation <sup>(4)</sup>        | $P_D$          | $T_C = 25^\circ C$  | 366  |
|   |                | $T_C = 100^\circ C$ | 183  |
| Junction & Storage Temperature Range    | $T_J, T_{STG}$ | -55 to 175          | °C   |



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

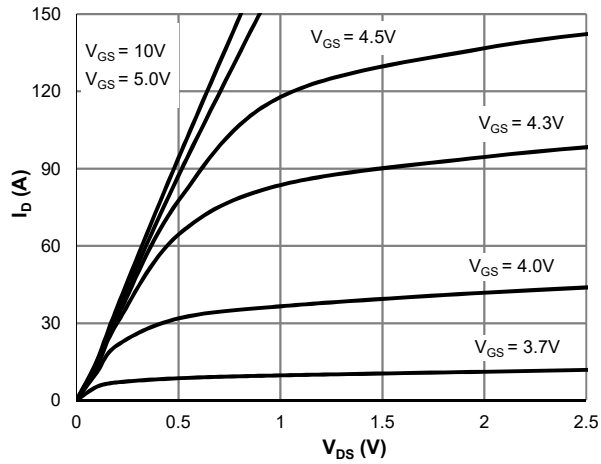
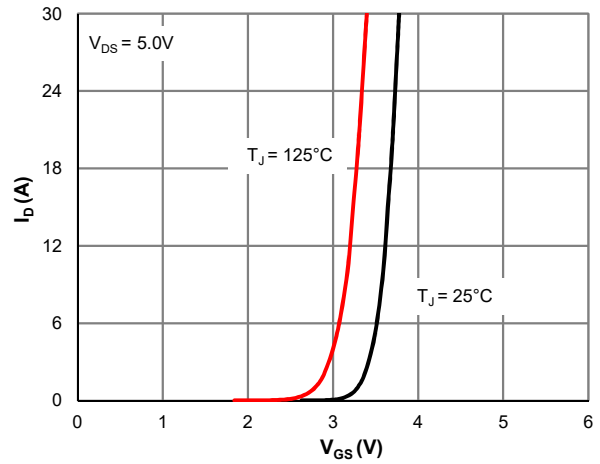
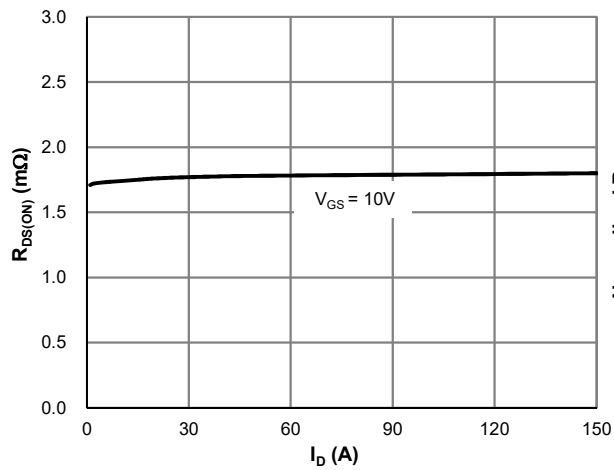
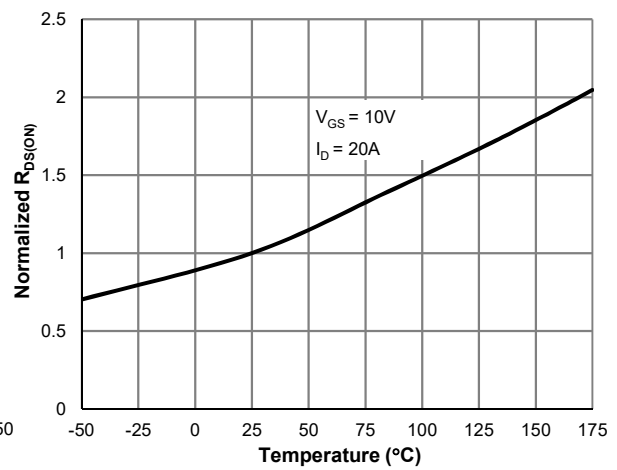
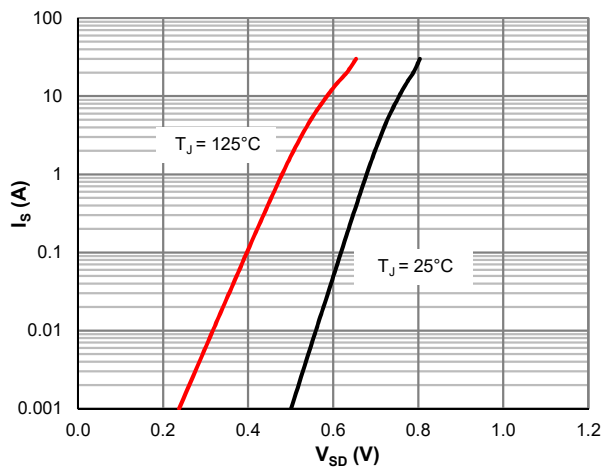
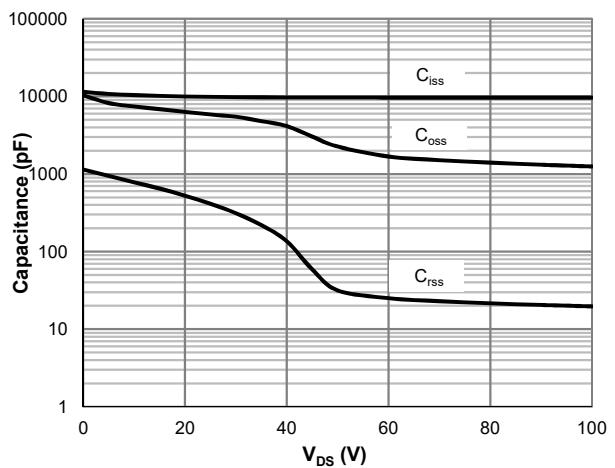
| Parameter                                     | Symbol        | Conditions   | Min.   | Typ. | Max.      | Unit          |
|---|---------------|--|--|------|-----------|---------------|
| <b>STATIC PARAMETERS</b>                      |               |  |  |      |           |               |
| Drain-Source Breakdown Voltage                | $V_{(BR)DSS}$ | $I_D = 250\mu\text{A}$ , $V_{GS} = 0\text{V}$  | 100  |      |           | V             |
| Zero Gate Voltage Drain Current               | $I_{DSS}$     | $V_{DS} = 80\text{V}$ , $V_{GS} = 0\text{V}$<br>$T_J = 55^\circ\text{C}$                 |  |      | 1.0       | $\mu\text{A}$ |
|   |               |  |  |      | 5.0       |               |
| Gate-Body Leakage Current                     | $I_{GSS}$     | $V_{DS} = 0\text{V}$ , $V_{GS} = \pm 20\text{V}$   |  |      | $\pm 100$ | nA            |
| Gate Threshold Voltage                        | $V_{GS(th)}$  | $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$   | 2.0  | 2.8  | 4.0       | V             |
| Static Drain-Source ON-Resistance             | $R_{DS(ON)}$  | $V_{GS} = 10\text{V}$ , $I_D = 20\text{A}$   |  | 1.7  | 2.0       | m $\Omega$    |
| Forward Transconductance                      | $g_{FS}$      | $V_{DS} = 5\text{V}$ , $I_D = 20\text{A}$  |  | 94   |           | S             |
| Diode Forward Voltage                         | $V_{SD}$      | $I_S = 1\text{A}$ , $V_{GS} = 0\text{V}$   |  | 0.7  | 1.0       | V             |
| Diode Continuous Current                      | $I_S$         | $T_C = 25^\circ\text{C}$   |  |      | 366       | A             |
| <b>DYNAMIC PARAMETERS</b> <sup>(5)</sup>      |               |  |  |      |           |               |
| Input Capacitance                             | $C_{iss}$     | $V_{GS} = 0\text{V}$ , $V_{DS} = 50\text{V}$ , $f = 1\text{MHz}$                         |  | 9623 |           | pF            |
| Output Capacitance                            | $C_{oss}$     |  |  | 2091 |           | pF            |
| Reverse Transfer Capacitance                  | $C_{rss}$     |  |  | 32   |           | pF            |
| Gate Resistance                               | $R_g$         | $V_{GS} = 0\text{V}$ , $V_{DS} = 0\text{V}$ , $f = 1\text{MHz}$                          |  | 2.4  |           | $\Omega$      |
| <b>SWITCHING PARAMETERS</b> <sup>(5)</sup>    |               |  |  |      |           |               |
| Total Gate Charge (@ $V_{GS} = 10\text{V}$ )  | $Q_g$         | $V_{GS} = 0$ to $10\text{V}$<br>$V_{DS} = 50\text{V}$ , $I_D = 20\text{A}$               |  | 155  |           | nC            |
| Total Gate Charge (@ $V_{GS} = 6.0\text{V}$ ) | $Q_g$         |  |  | 101  |           | nC            |
| Gate Source Charge                            | $Q_{gs}$      |  |  | 31   |           | nC            |
| Gate Drain Charge                             | $Q_{gd}$      |  |  | 37   |           | nC            |
| Turn-On DelayTime                             | $t_{D(on)}$   | $V_{GS} = 10\text{V}$ , $V_{DS} = 50\text{V}$<br>$R_L = 2.5\Omega$ , $R_{GEN} = 6\Omega$ |  | 34   |           | ns            |
| Turn-On Rise Time                             | $t_r$         |  |  | 67   |           | ns            |
| Turn-Off DelayTime                            | $t_{D(off)}$  |  |  | 145  |           | ns            |
| Turn-Off Fall Time                            | $t_f$         |  |  | 111  |           | ns            |
| Body Diode Reverse Recovery Time              | $t_{rr}$      |  | $I_F = 15\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$ |      | 76        |               |
| Body Diode Reverse Recovery Charge            | $Q_{rr}$      | $I_F = 15\text{A}$ , $di_F/dt = 100\text{A}/\mu\text{s}$                                 |  | 116  |           | nC            |

**Thermal Performance**

| Parameter                               | Symbol          | Typ. | Max. | Unit                      |
|---|-----------------|------|------|---------------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 48   | 58   | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 0.34 | 0.41 | $^\circ\text{C}/\text{W}$ |

**Notes:**

1. Computed continuous current assumes the condition of  $T_{J\_Max}$  while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. This single-pulse measurement was taken under  $T_{J\_Max} = 175^\circ\text{C}$ .
3. This single-pulse measurement was taken under the following condition [ $L = 100\mu\text{H}$ ,  $V_{GS} = 10\text{V}$ ,  $V_{DD} = 50\text{V}$ ] while its value is limited by  $T_{J\_Max} = 175^\circ\text{C}$ .
4. The power dissipation  $P_D$  is based on  $T_{J\_Max} = 175^\circ\text{C}$ .
5. This value is guaranteed by design hence it is not included in the production test.
6. Continuous current rating is limited by the package used.

**Typical Electrical & Thermal Characteristics**

**Figure 1: Saturation Characteristics**

**Figure 2: Transfer Characteristics**

**Figure 3:  $R_{DS(ON)}$  vs. Drain Current**

**Figure 4:  $R_{DS(ON)}$  vs. Junction Temperature**

**Figure 5: Body-Diode Characteristics**

**Figure 6: Capacitance Characteristics**

Typical Electrical & Thermal Characteristics

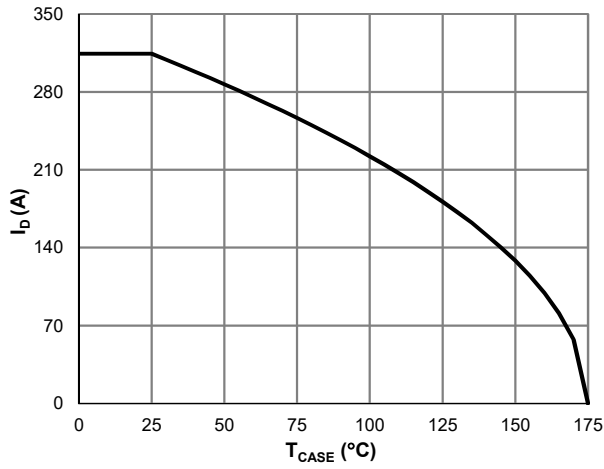


Figure 7: Current De-rating

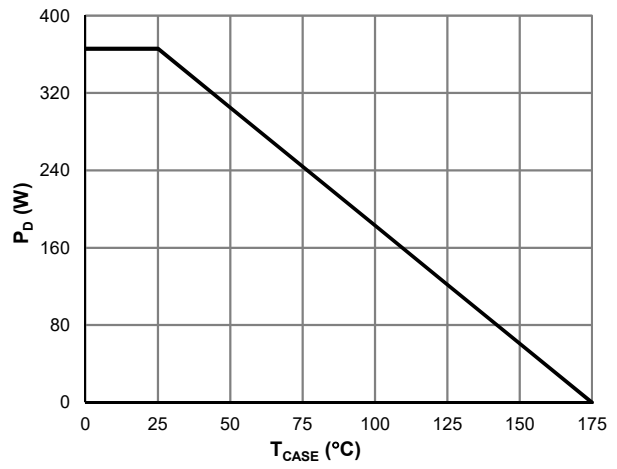


Figure 8: Power De-rating

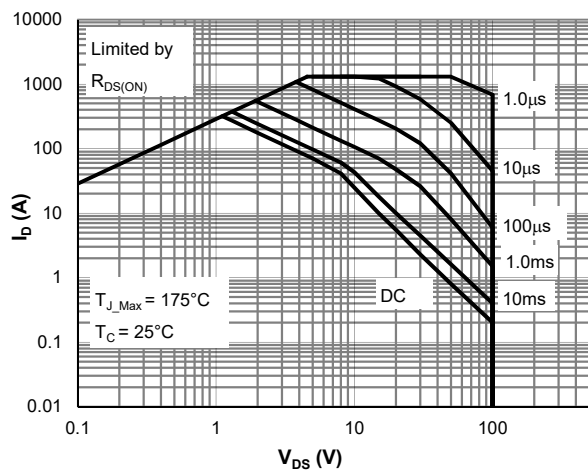


Figure 9: Maximum Safe Operating Area

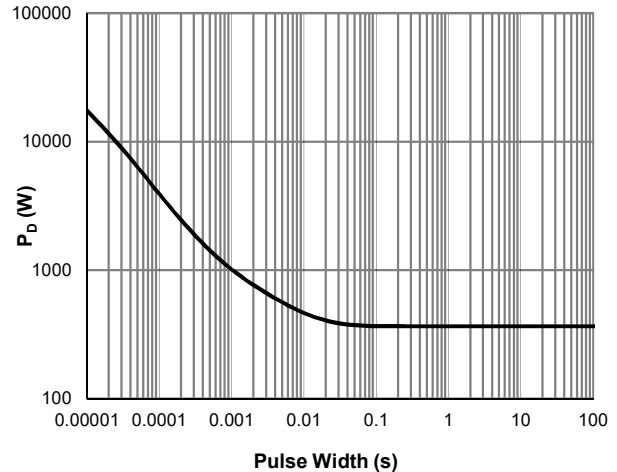


Figure 10: Single Pulse Power Rating, Junction-to-Case

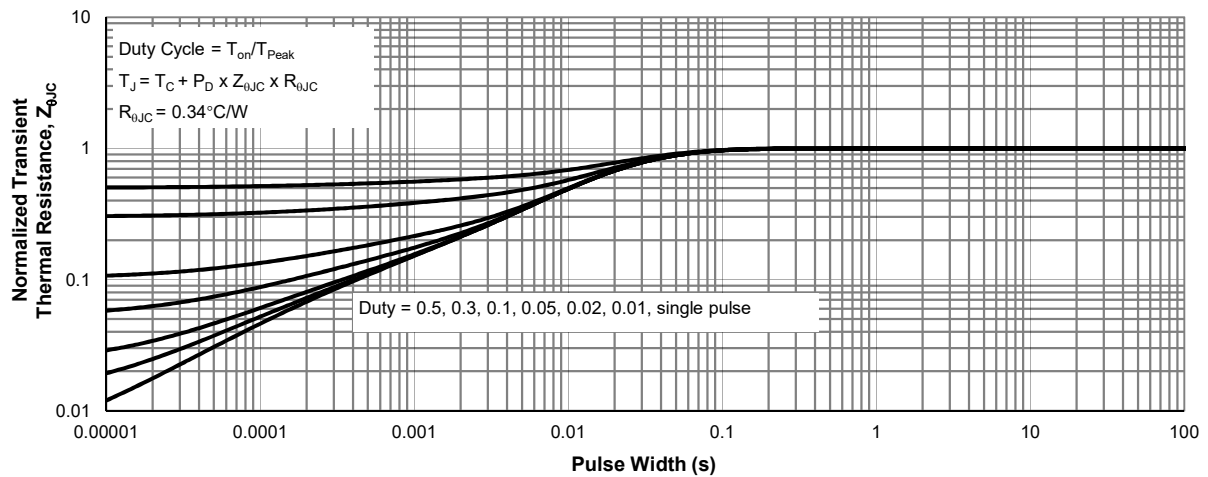
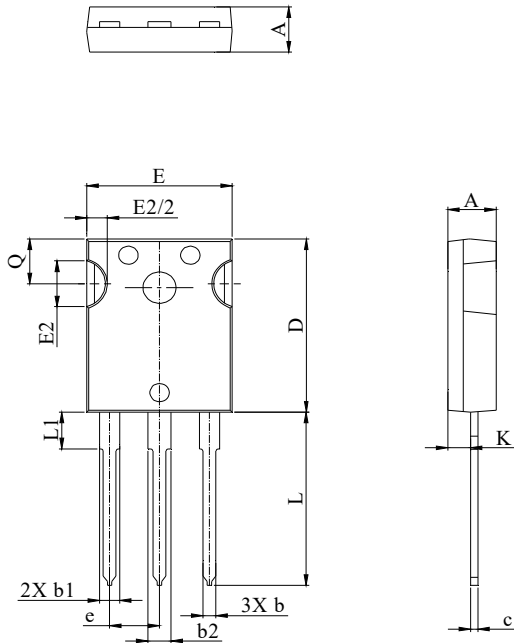
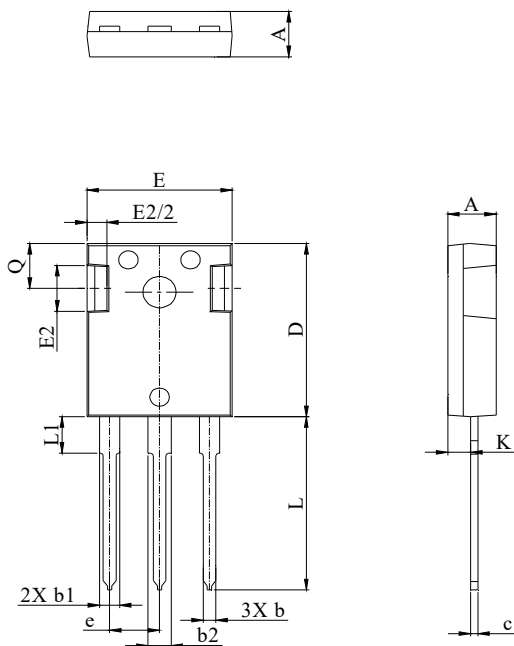


Figure 11: Normalized Maximum Transient Thermal Impedance

**TO-247-3L Package Information**
**Type\_A Package Outline**


| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 4.80       | 5.02  | 5.21  |
| b    | 1.00       | 1.20  | 1.40  |
| b1   | 1.90       | 2.00  | 2.39  |
| b2   | 2.87       | 3.00  | 3.22  |
| c    | 0.41       | 0.60  | 0.79  |
| D    | 20.80      | 21.00 | 21.20 |
| E    | 15.50      | 15.94 | 16.13 |
| E2   | 4.32       |       | 5.49  |
| L    | 19.70      | 20.07 | 20.32 |
| L1   | 4.00       |       | 4.40  |
| K    | 2.20       |       | 2.50  |
| e    | 5.44 BSC   |       |       |

**Type\_B Package Outline**


| DIM. | MILLIMETER |       |       |
|------|------------|-------|-------|
|      | MIN.       | NOM.  | MAX.  |
| A    | 4.80       | 5.02  | 5.21  |
| b    | 1.00       | 1.20  | 1.40  |
| b1   | 1.90       | 2.00  | 2.39  |
| b2   | 2.87       | 3.00  | 3.22  |
| c    | 0.41       | 0.60  | 0.79  |
| D    | 20.80      | 21.00 | 21.20 |
| E    | 15.50      | 15.94 | 16.13 |
| E2   | 4.32       |       | 5.49  |
| L    | 19.70      | 20.07 | 20.32 |
| L1   | 4.00       |       | 4.40  |
| K    | 2.20       |       | 2.50  |
| e    | 5.44 BSC   |       |       |