

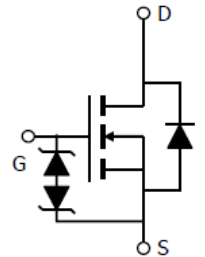
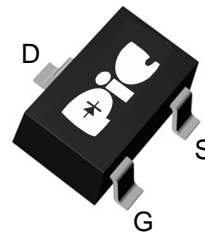
## ➤ General Description

This PAN60E2LKNS N-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent  $R_{ds(On)}$  performance and efficiency for power switching and load switching application., this device also comply with the RoHS and Green Product requirement with full function reliability approved.

## ➤ Feature

- Super high density cell design for extremely Low  $R_{DS(ON)}$
- Exceptional on-resistance and maximum DC current capability
- ESD Protection Diode design-in
- SOT-23S package design

## ➤ SOT-23S



## ➤ Application

- Portable Equipment
- Battery Powered System
- Net Working System

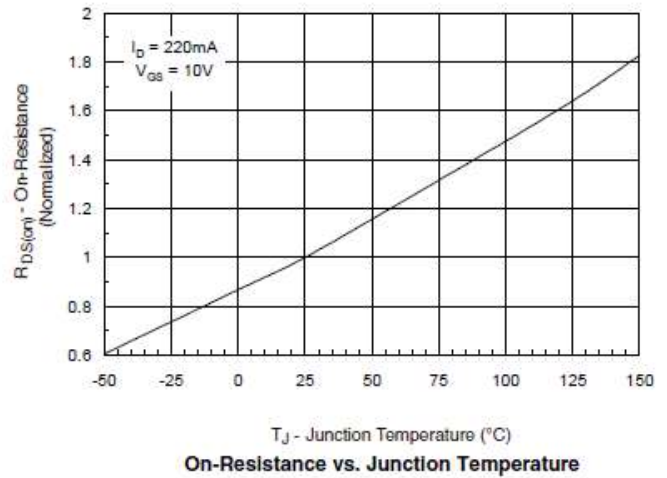
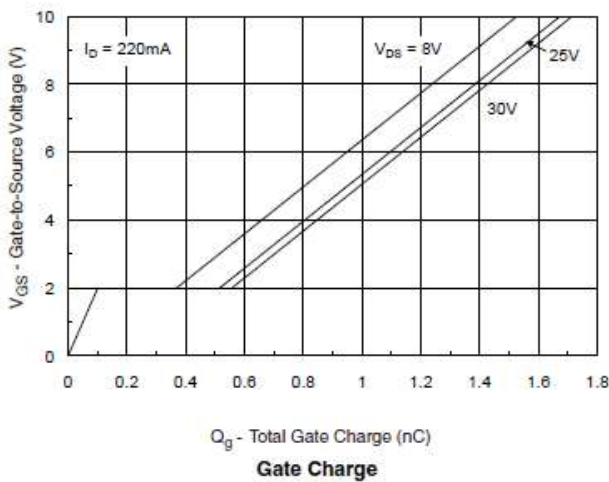
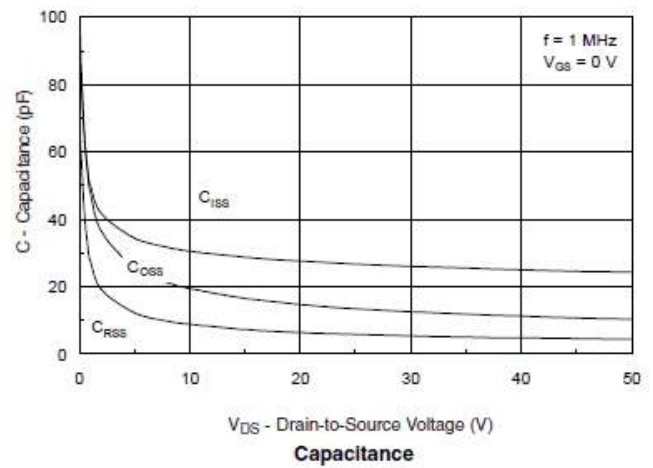
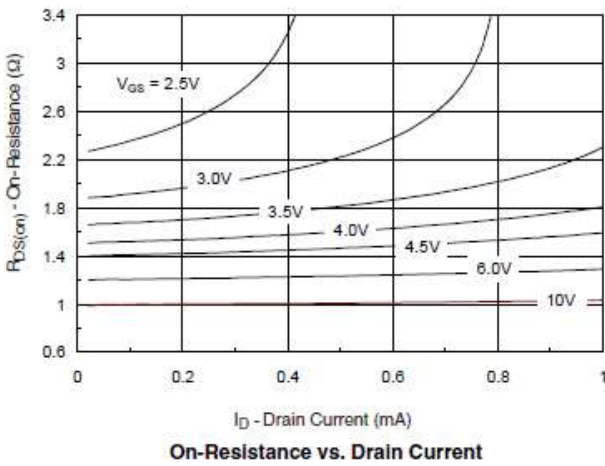
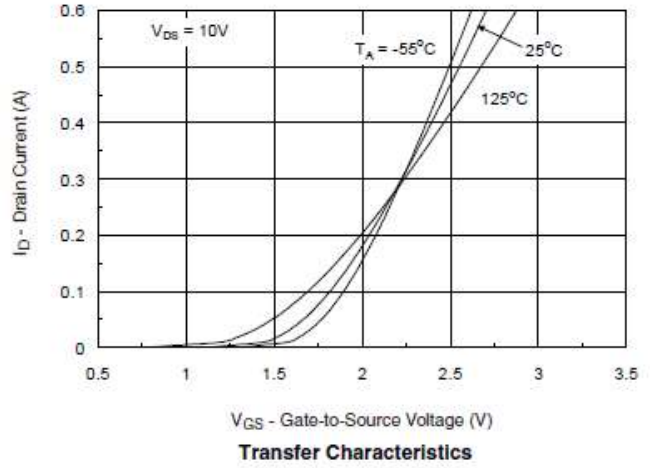
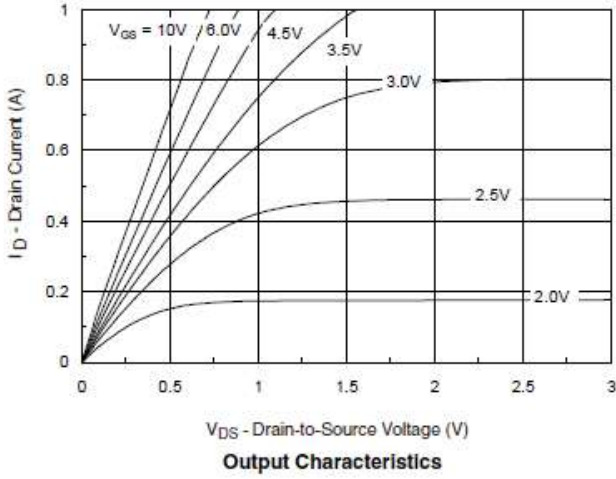
## ➤ Absolute Maximum Ratings

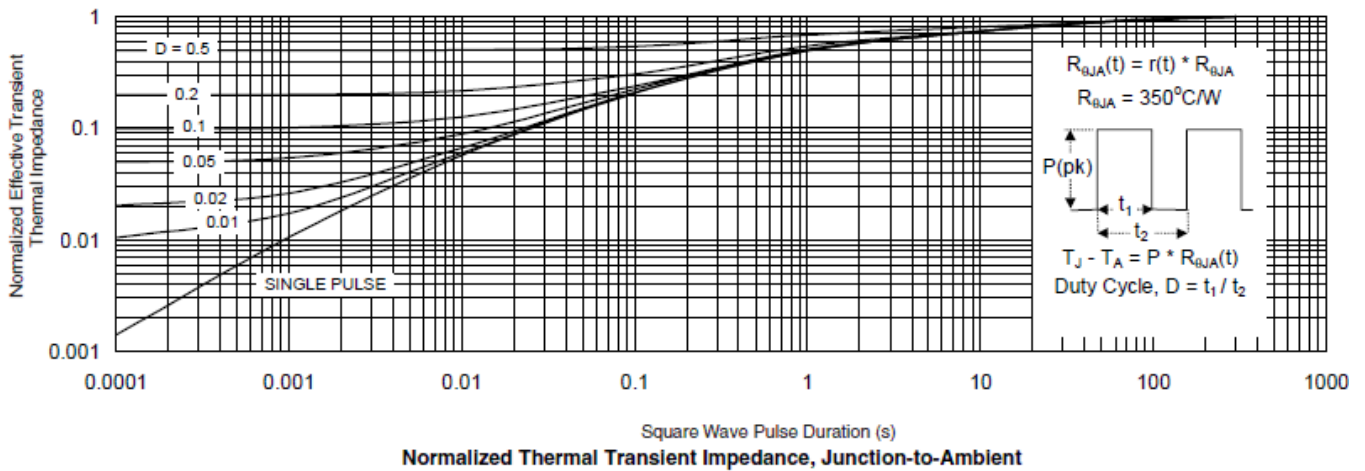
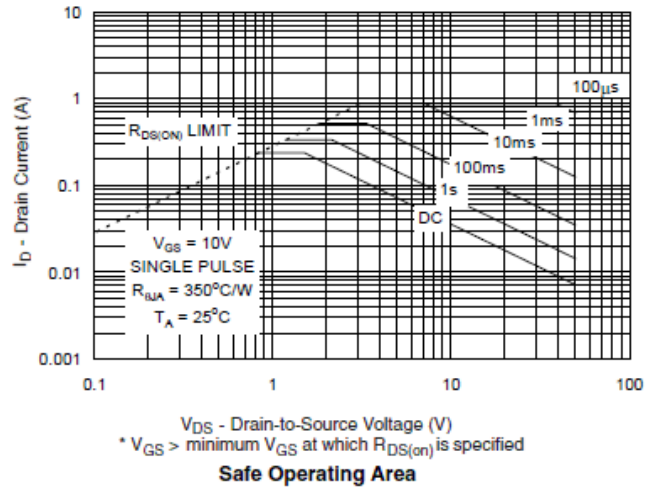
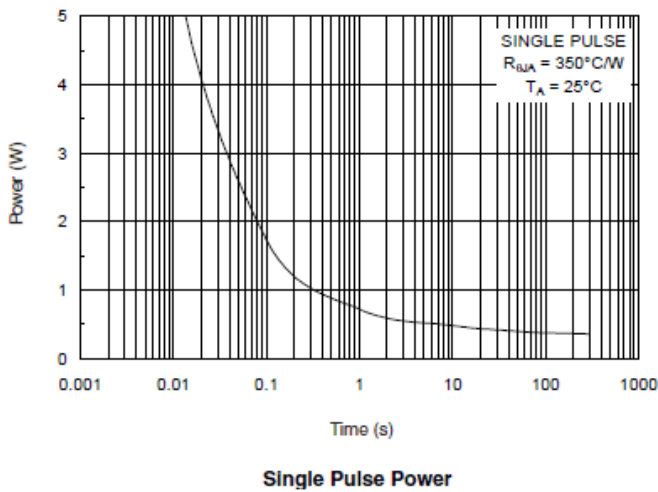
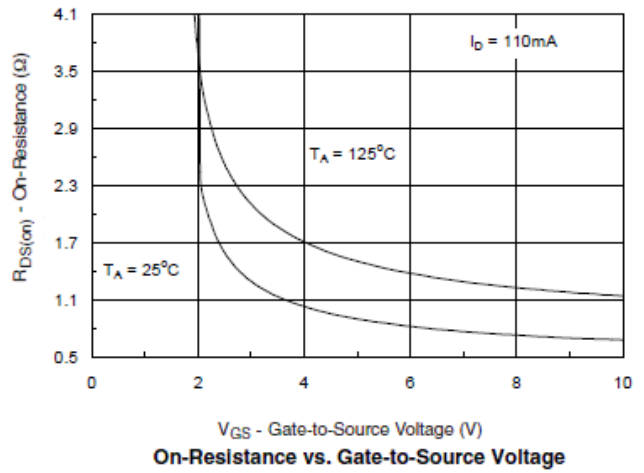
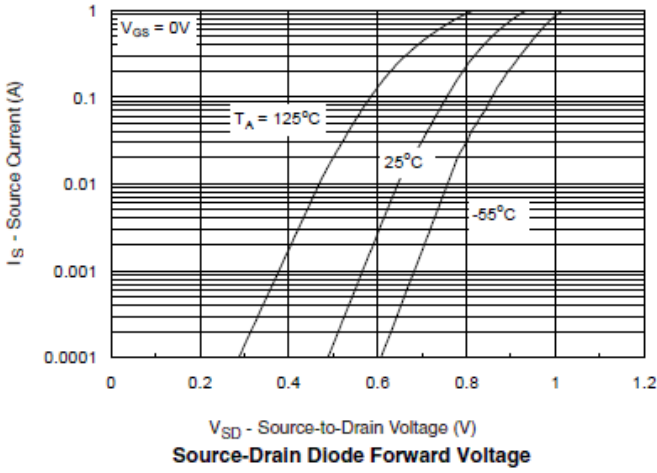
| Parameter                                     | Symbol          | Value            | Unit         |
|---|-----------------|------------------|--------------|
| Drain-Source Voltage                          | $V_{DSS}$       | 60               | V            |
| Gate -Source Voltage                          | $V_{GSS}$       | $\pm 20$         | V            |
| Continuous Drain Current( $T_J=150^\circ C$ ) | $I_D$           | $T_A=25^\circ C$ | 0.5          |
|   |                 | $T_A=70^\circ C$ | 0.2          |
| Pulsed Drain Current                          | $I_{DM}$        | 0.65             | A            |
| Continuous Source Current(Diode Conduction)   | $I_S$           | 0.45             | A            |
| Power Dissipation                             | $P_D$           | $T_A=25^\circ C$ | 1.25         |
|   |                 | $T_A=70^\circ C$ | 0.8          |
| Operating Junction Temperature                | $T_J$           | 150              | $^\circ C$   |
| Storage Temperature Range                     | $T_{STG}$       | -55/150          | $^\circ C$   |
| Thermal Resistance-Junction to Ambient        | $R_{\theta JA}$ | 120              | $^\circ C/W$ |

#### ➤ Electrical Characteristics (T<sub>A</sub>=25°C Unless otherwise noted)

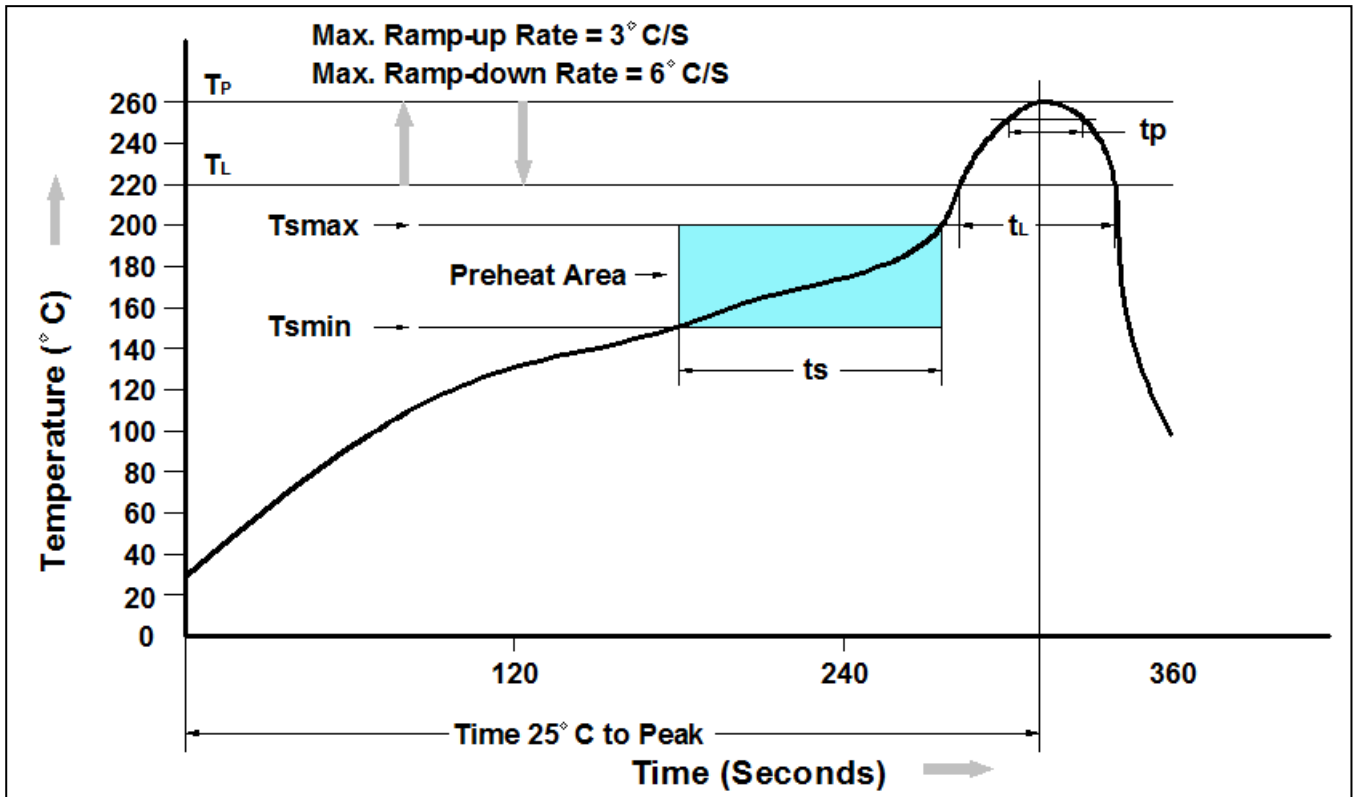
| Parameter                       | Symbol        | Conditions  | Min. | Typ  | Max. | Unit       |
|---------------------------------|---------------|---|------|------|------|------------|
| <b>Static</b>                   |               |   |      |      |      |            |
| Drain-Source Breakdown Voltage  | $V_{(BR)DSS}$ | $V_{GS}=0V, I_D=250\mu A$                             | 60   |      |      | V          |
| Gate Threshold Voltage          | $V_{GS(th)}$  | $V_{DS}=V_{GS}, I_D=250\mu A$                         | 0.7  | 1.0  | 1.3  |            |
| Gate Leakage Current            | $I_{GSS}$     | $V_{DS}=0V, V_{GS}=\pm 20V$                           |      |      | 5    | $\mu A$    |
| Zero Gate Voltage Drain Current | $I_{DSS}$     | $V_{DS}=48V, V_{GS}=0V$                               |      |      | 1    | $\mu A$    |
|                                 |               | $V_{DS}=48V, V_{GS}=0V$<br>$T_J=85^\circ C$           |      |      | 10   |            |
| Drain-Source On-Resistance      | $R_{DS(on)}$  | $V_{GS}=10V, I_D=0.50A$                               |      | 950  | 1600 | m $\Omega$ |
|                                 |               | $V_{GS}=4.5V, I_D=0.40A$                              |      | 1250 | 2500 |            |
|                                 |               | $V_{GS}=2.5V, I_D=0.05A$                              |      | 2650 | 4500 |            |
| Forward Transconductance        | $g_{FS}$      | $V_{DS}=10V, I_D=0.2A$                                |      | 0.2  |      | S          |
| Diode Forward Voltage           | $V_{SD}$      | $I_S=0.2A, V_{GS}=0V$                                 |      | 0.82 | 1.4  | V          |
| <b>Dynamic</b>                  |               |   |      |      |      |            |
| Total Gate Charge               | $Q_g$         | $V_{DS}=30V, V_{GS}=10V$<br>$I_D=0.25A$               |      | 1.5  | 2.5  | pC         |
| Gate-Source Charge              | $Q_{gs}$      |   |      | 0.2  |      |            |
| Gate-Drain Charge               | $Q_{gd}$      |   |      | 0.5  |      |            |
| Input Capacitance               | $C_{iss}$     | $V_{DS}=25V, V_{GS}=0V$<br>$f=1MHz$                   |      | 28   |      | pF         |
| Output Capacitance              | $C_{oss}$     |   |      | 10   |      |            |
| Reverse Transfer Capacitance    | $C_{rss}$     |   |      | 5    |      |            |
| Turn-On Time                    | $t_{d(on)}$   | $V_{DD}=30V, R_G=6\Omega$<br>$I_D=0.25A, V_{GEN}=10V$ |      | 3    | 7    | ns         |
|                                 | $t_r$         |   |      | 12   | 30   |            |
| Turn-Off Time                   | $t_{d(off)}$  |   |      | 18   | 40   |            |
|                                 | $t_f$         |   |      | 8    | 15   |            |

## ➤ Typical Characteristics





➤ Recommend IR Reflow Soldering Thermal Profile

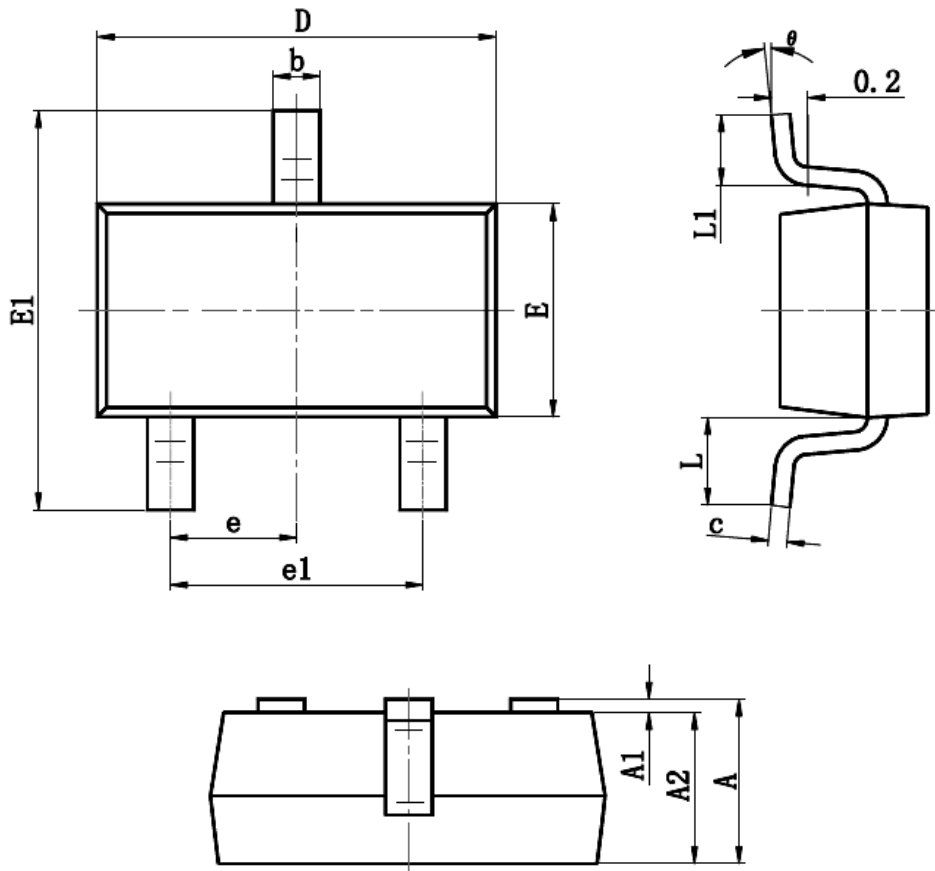


| Profile Feature   | Pb-Free Assembly Profile |
|---|--------------------------|
| Temperature Min. (T <sub>smin</sub> )                                 | 150°C                    |
| Temperature Max. (T <sub>smax</sub> )                                 | 200°C                    |
| Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> ) | 60-120 seconds           |
| Average Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )              | 3°C/second max.          |
| Liquidous Temperature (T <sub>L</sub> )                               | 217°C                    |
| Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )             | 60 – 150 seconds         |
| Peak Temperature  | 260°C +0°C / -5°C        |
| Time (t <sub>P</sub> ) within 5°C of actual Peak Temperature          | 30 seconds               |
| Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )                    | 6°C/second max           |
| Time 25°C to Peak Temperature   | 8 minutes max.           |

➤ Ordering Information

| Part Number | Description  | Quantity |
|-------------|--------------|----------|
| PAN60E2LKNS | SOT-23S Reel | 3000 pcs |

➤ Package Information ( SOT-23S )



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min                       | Max   | Min                  | Max   |
| A      | 0.900                     | 1.200 | 0.035                | 0.043 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.900                     | 1.100 | 0.035                | 0.039 |
| b      | 0.300                     | 0.500 | 0.012                | 0.020 |
| c      | 0.080                     | 0.150 | 0.003                | 0.006 |
| D      | 2.800                     | 3.000 | 0.110                | 0.118 |
| E      | 1.200                     | 1.400 | 0.047                | 0.055 |
| E1     | 2.250                     | 2.550 | 0.089                | 0.100 |
| e      | 0.950 TYP                 |       | 0.037 TYP            |       |
| e1     | 1.800                     | 2.000 | 0.071                | 0.079 |
| L      | 0.550 REF                 |       | 0.022 REF            |       |
| L1     | 0.300                     | 0.500 | 0.012                | 0.020 |
| θ      | 0°                        | 8°    | 0°                   | 6°    |

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