

## Snubberless 3 Quadrants Standard TRIAC

### FEATURES

- ❑ Repetitive Peak Off-State Voltage : 600V/800V
- ❑ R.M.S On-State Current ( $I_{T(RMS)} = 12A$ )
- ❑ Gate Trigger Current : 50mA
- ❑ High commutation capability.

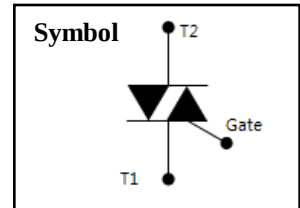
### Applications

General purpose of AC switching, heating control, motor control, etc

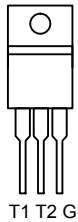
### General Description

Din-Tek's standard TRIAC product is a glass passivated device, has a high commutative performance, stable gate triggering level to temperature and high off state voltage. It is generally suitable for power and phase control in ac application

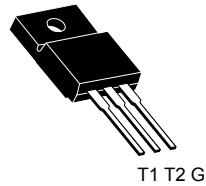
$$\begin{aligned} V_{DRM} &= 600V/800V \\ I_{T(RMS)} &= 12 A \\ I_{TSM} &= 126 A \\ I_{GT} &= 50mA \end{aligned}$$



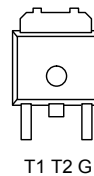
TO-220AB



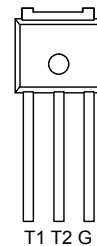
TO-220 FULLPAK



TO-252



TO-251



### Absolute Maximum Ratings

( $T_J = 25^\circ C$  unless otherwise specified )

| Symbol       | Parameter                              | Conditions                                       | Ratings   |           | Unit             |
|--------------|----------------------------------------|--------------------------------------------------|-----------|-----------|------------------|
|              |                                        |                                                  | DTJ12A60M | DTJ12A80M |                  |
| $V_{DRM}$    | Repetitive Peak Off-State Voltage      | Sine wave, 50/60Hz, Gate open                    | 600       | 800       | V                |
| $V_{RRM}$    | Repetitive Peak Reverse Voltage        |                                                  | 600       | 800       | V                |
| $I_{T(AV)}$  | Average On-State Current               | Full sine wave, $T_C = 97.6^\circ C$             | 10.8      |           | A                |
| $I_{T(RMS)}$ | R.M.S. On-State Current                |                                                  | 12        |           | A                |
| $I_{TSM}$    | Surge On-State Current                 | ½ cycle, 50Hz/60Hz, Sine wave, Non repetitive    | 120/126   |           | A                |
| $I^2t$       | Fusing Current                         | $t = 10ms$                                       | 72        |           | A <sup>2</sup> S |
| $P_{GM}$     | Forward Peak Gate Power Dissipation    | $T_J = 125^\circ C$                              | 5         |           | W                |
| $P_{G(AV)}$  | Forward Average Gate Power Dissipation | $T_J = 125^\circ C$ , over any 20ms              | 0.5       |           | W                |
| $I_{FGM}$    | Forward Peak Gate Current              | $T_J = 125^\circ C$ , pulse width $\leq 20\mu s$ | 2         |           | A                |
| $V_{RGM}$    | Reverse Peak Gate Voltage              | $T_J = 125^\circ C$ , pulse width $\leq 20\mu s$ | 5         |           | V                |
| $T_J$        | Operating Junction Temperature         |                                                  | -40~+150  |           | °C               |
| $T_{STG}$    | Storage Temperature                    |                                                  | -40~+150  |           | °C               |

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

| Symbol           | Parameter                                  | Conditions                                                     | Min                     | Typ | Max | Unit                   |
|------------------|--------------------------------------------|----------------------------------------------------------------|-------------------------|-----|-----|------------------------|
| $I_{\text{DRM}}$ | Repetitive Peak Off-State Current          | $V_D = V_{\text{DRM}}$                                         | $T_J=25^\circ\text{C}$  | -   | -   | 50 $\mu\text{A}$       |
|                  |                                            |                                                                | $T_J=125^\circ\text{C}$ | -   | -   | 2 $\text{mA}$          |
| $I_{\text{RRM}}$ | Repetitive Peak Reverse Current            | $V_D = V_{\text{DRM}}$                                         | $T_J=25^\circ\text{C}$  | -   | -   | 50 $\mu\text{A}$       |
|                  |                                            |                                                                | $T_J=125^\circ\text{C}$ | -   | -   | 2 $\text{mA}$          |
| $I_{\text{GT}}$  | Gate Trigger Current                       | $V_D = 12\text{V}$ , $R_L=330\Omega$                           | 1+, 1-, 3-              | -   | -   | 35 $\text{mA}$         |
| $V_{\text{GT}}$  | Gate Trigger Voltage                       | $V_D = 12\text{V}$ , $R_L=330\Omega$                           | 1+, 1-, 3-              | -   | -   | 2.0 $\text{V}$         |
| $V_{\text{GD}}$  | Non-Trigger Gate Voltage <sup>1</sup>      | $V_D = 12\text{V}$ , $R_L=330\Omega$ , $T_J=125^\circ\text{C}$ | 0.2                     | -   | -   | $\text{V}$             |
| $V_{\text{TM}}$  | Peak On-State Voltage                      | $I_T = 17\text{A}$ , $I_G = 20\text{mA}$                       | -                       | 1.2 | 1.6 | $\text{V}$             |
| $dv/dt$          | Critical Rate of Rise of Off-State Voltage | $V_D = 2/3 V_{\text{DRM}}$ , $T_J=125^\circ\text{C}$           | 200                     | -   | -   | $\text{V}/\mu\text{s}$ |
| $I_H$            | Holding current                            | $I_T = 0.2\text{A}$                                            | -                       | 50  | -   | $\text{mA}$            |

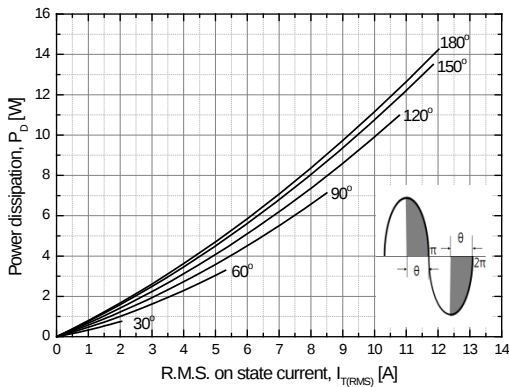
**Notes :**

1. Pulse Width  $\leq 1.0\text{ms}$ , Duty Cycle  $\leq 1\%$

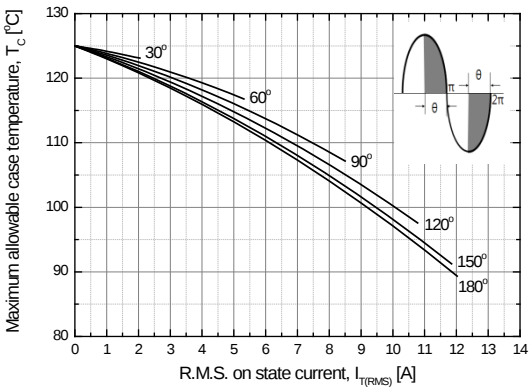
**Thermal Characteristics**

| Symbol                | Parameter          | Conditions          | Min | Typ | Max | Unit                      |
|-----------------------|--------------------|---------------------|-----|-----|-----|---------------------------|
| $R_{\theta\text{JC}}$ | Thermal Resistance | Junction to Case    |     |     | 2.5 | $^\circ\text{C}/\text{W}$ |
| $R_{\theta\text{JA}}$ | Thermal Resistance | Junction to Ambient |     |     | 58  | $^\circ\text{C}/\text{W}$ |

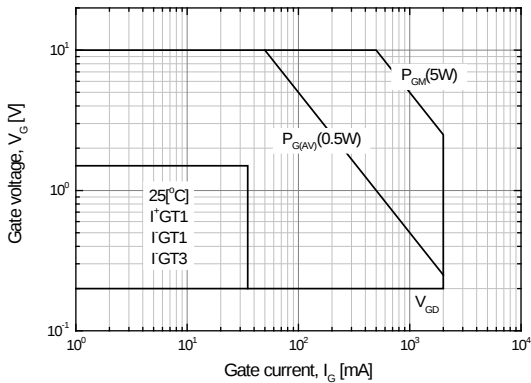
# Typical Characteristics



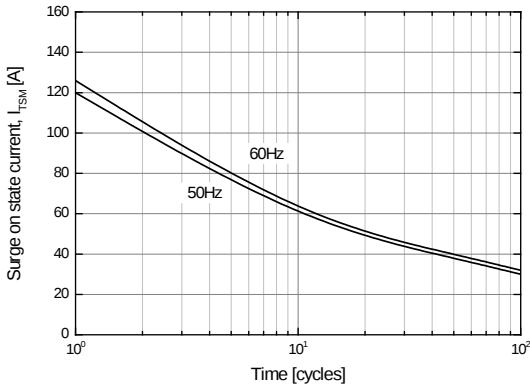
**Fig 1. R.M.S. current vs. Power dissipation**



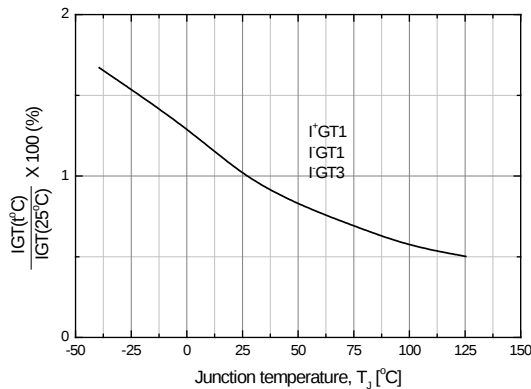
**Fig 2. R.M.S. current vs. Case temperature**



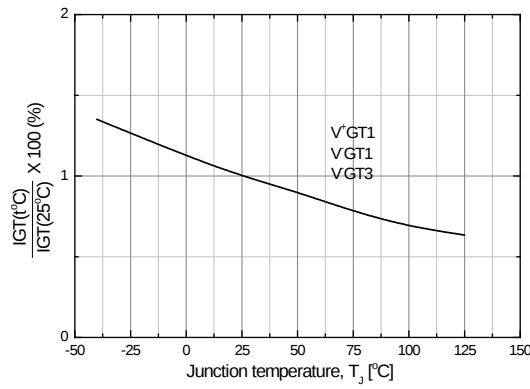
**Fig 3. Gate power characteristics**



**Fig 4. Surge on state current rating (Non-repetitive)**

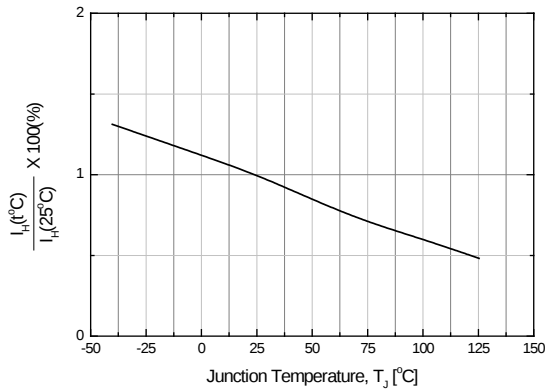


**Fig 5. Gate trigger current vs. junction temperature**

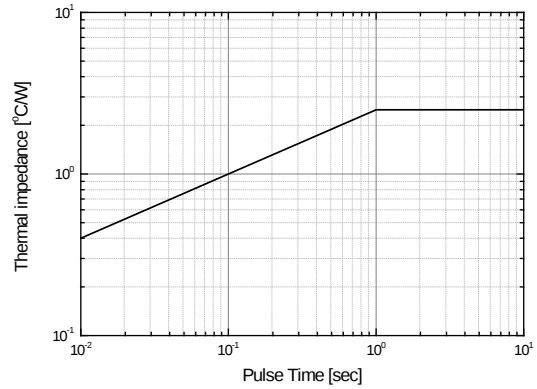


**Fig 6. Gate trigger voltage vs. junction temperature**

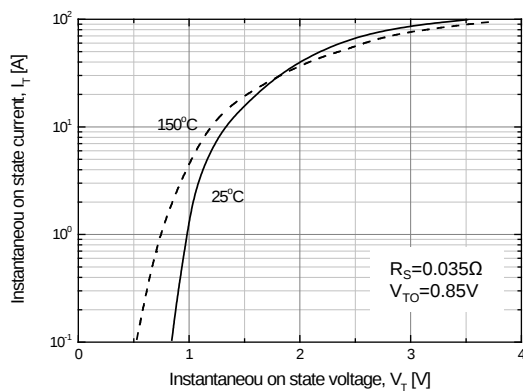
## Typical Characteristics



**Fig 7. Holding current vs. Junction temperature**

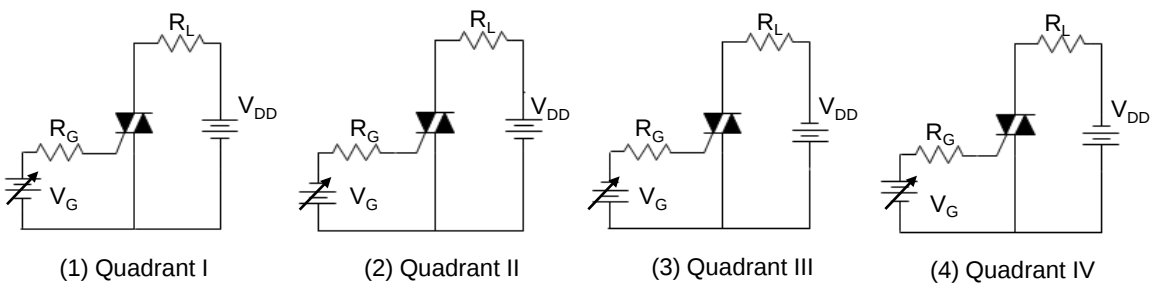


**Fig 8. Thermal Impedance vs. pulse time**



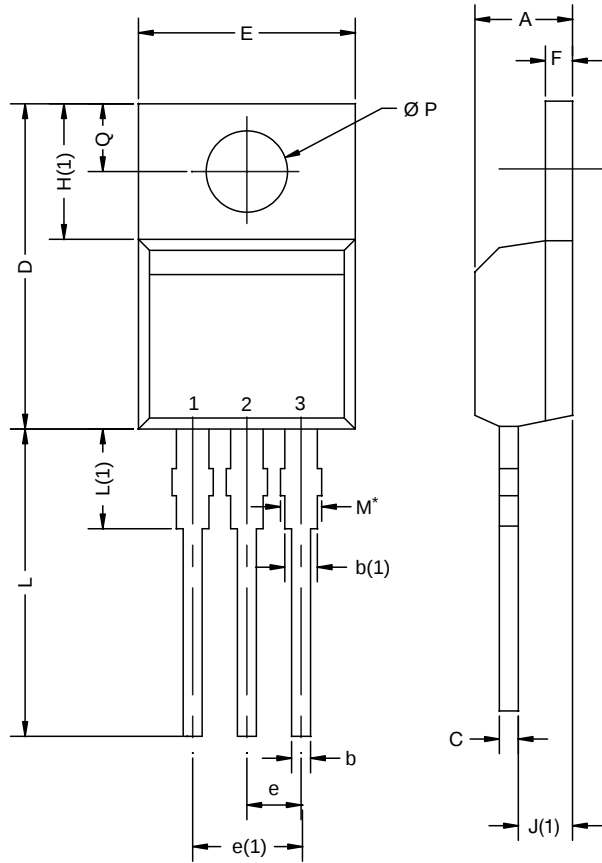
**Fig 9. Instantaneous on state current vs. Instantaneous on state voltage**

## Measurement of gate trigger current



Note. Whole parameter and test condition can not be over absolute maximum ratings in this datasheet.

## TO-220AB

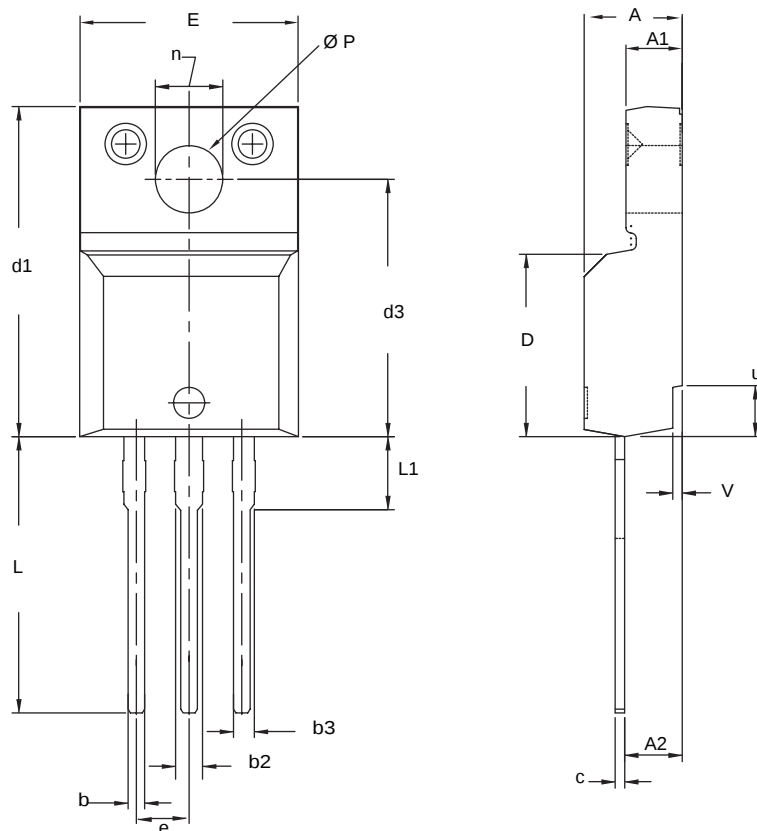


| DIM.                                         | MILLIMETERS |       | INCHES |       |
|----------------------------------------------|-------------|-------|--------|-------|
|                                              | MIN.        | MAX.  | MIN.   | MAX.  |
| A                                            | 4.25        | 4.65  | 0.167  | 0.183 |
| b                                            | 0.69        | 1.01  | 0.027  | 0.040 |
| b(1)                                         | 1.20        | 1.73  | 0.047  | 0.068 |
| c                                            | 0.36        | 0.61  | 0.014  | 0.024 |
| D                                            | 14.85       | 15.49 | 0.585  | 0.610 |
| E                                            | 10.04       | 10.51 | 0.395  | 0.414 |
| e                                            | 2.41        | 2.67  | 0.095  | 0.105 |
| e(1)                                         | 4.88        | 5.28  | 0.192  | 0.208 |
| F                                            | 1.14        | 1.40  | 0.045  | 0.055 |
| H(1)                                         | 6.09        | 6.48  | 0.240  | 0.255 |
| J(1)                                         | 2.41        | 2.92  | 0.095  | 0.115 |
| L                                            | 13.35       | 14.02 | 0.526  | 0.552 |
| L(1)                                         | 3.32        | 3.82  | 0.131  | 0.150 |
| $\varnothing P$                              | 3.54        | 3.94  | 0.139  | 0.155 |
| Q                                            | 2.60        | 3.00  | 0.102  | 0.118 |
| ECN: X12-0208-Rev. N, 08-Oct-12<br>DWG: 5471 |             |       |        |       |

### Notes

\* M = 1.32 mm to 1.62 mm (dimension including protrusion)  
Heatsink hole for HVM

**TO-220 FULLPAK (HIGH VOLTAGE)**



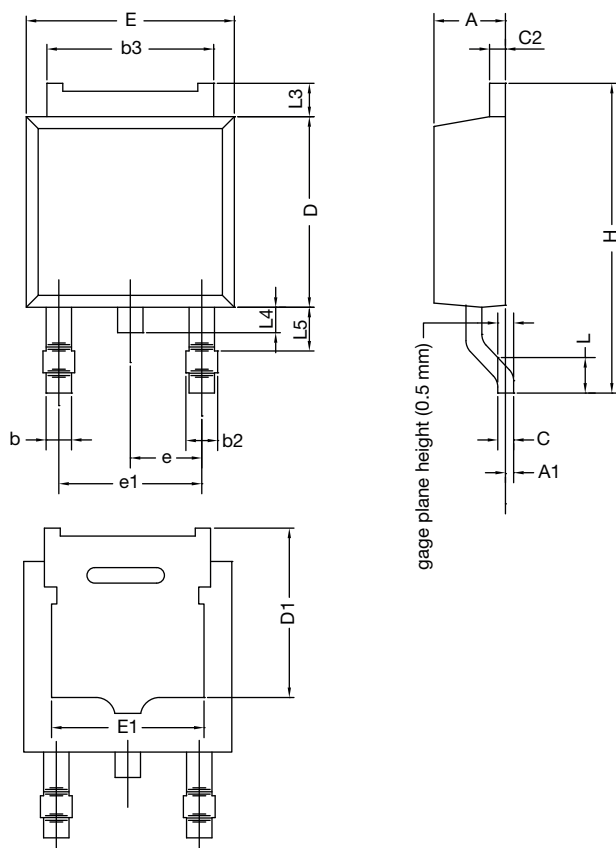
| DIM. | MILLIMETERS |        | INCHES    |       |
|------|-------------|--------|-----------|-------|
|      | MIN.        | MAX.   | MIN.      | MAX.  |
| A    | 4.570       | 4.830  | 0.180     | 0.190 |
| A1   | 2.570       | 2.830  | 0.101     | 0.111 |
| A2   | 2.510       | 2.850  | 0.099     | 0.112 |
| b    | 0.622       | 0.890  | 0.024     | 0.035 |
| b2   | 1.229       | 1.400  | 0.048     | 0.055 |
| b3   | 1.229       | 1.400  | 0.048     | 0.055 |
| c    | 0.440       | 0.629  | 0.017     | 0.025 |
| D    | 8.650       | 9.800  | 0.341     | 0.386 |
| d1   | 15.88       | 16.120 | 0.622     | 0.635 |
| d3   | 12.300      | 12.920 | 0.484     | 0.509 |
| E    | 10.360      | 10.630 | 0.408     | 0.419 |
| e    | 2.54 BSC    |        | 0.100 BSC |       |
| L    | 13.200      | 13.730 | 0.520     | 0.541 |
| L1   | 3.100       | 3.500  | 0.122     | 0.138 |
| n    | 6.050       | 6.150  | 0.238     | 0.242 |
| Ø P  | 3.050       | 3.450  | 0.120     | 0.136 |
| u    | 2.400       | 2.500  | 0.094     | 0.098 |
| v    | 0.400       | 0.500  | 0.016     | 0.020 |

ECN: X09-0126-Rev. B, 26-Oct-09  
DWG: 5972

**Notes**

1. To be used only for process drawing.
2. These dimensions apply to all TO-220, FULLPAK leadframe versions 3 leads.
3. All critical dimensions should C meet  $C_{pk} > 1.33$ .
4. All dimensions include burrs and plating thickness.
5. No chipping or package damage.

## TO-252AA CASE OUTLINE

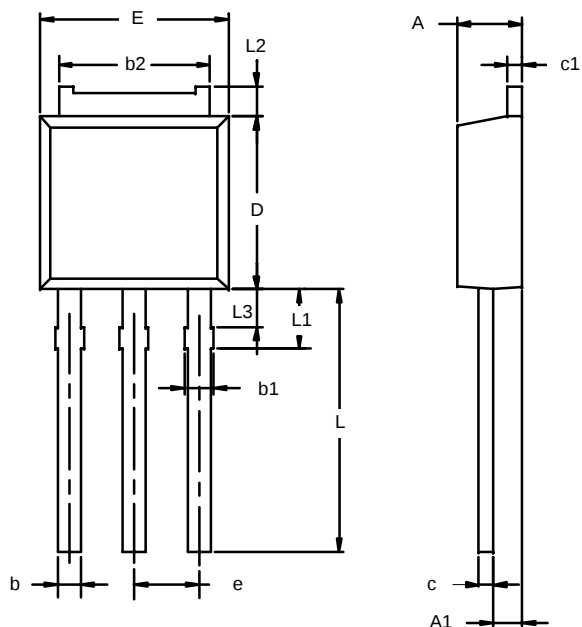


| DIM.                            | MILLIMETERS |       | INCHES    |       |
|---------------------------------|-------------|-------|-----------|-------|
|                                 | MIN.        | MAX.  | MIN.      | MAX.  |
| A                               | 2.18        | 2.38  | 0.086     | 0.094 |
| A1                              | -           | 0.127 | -         | 0.005 |
| b                               | 0.64        | 0.88  | 0.025     | 0.035 |
| b2                              | 0.76        | 1.14  | 0.030     | 0.045 |
| b3                              | 4.95        | 5.46  | 0.195     | 0.215 |
| C                               | 0.46        | 0.61  | 0.018     | 0.024 |
| C2                              | 0.46        | 0.89  | 0.018     | 0.035 |
| D                               | 5.97        | 6.22  | 0.235     | 0.245 |
| D1                              | 5.21        | -     | 0.205     | -     |
| E                               | 6.35        | 6.73  | 0.250     | 0.265 |
| E1                              | 4.32        | -     | 0.170     | -     |
| H                               | 9.40        | 10.41 | 0.370     | 0.410 |
| e                               | 2.28 BSC    |       | 0.090 BSC |       |
| e1                              | 4.56 BSC    |       | 0.180 BSC |       |
| L                               | 1.40        | 1.78  | 0.055     | 0.070 |
| L3                              | 0.89        | 1.27  | 0.035     | 0.050 |
| L4                              | -           | 1.02  | -         | 0.040 |
| L5                              | 1.14        | 1.52  | 0.045     | 0.060 |
| ECN: X12-0247-Rev. M, 24-Dec-12 |             |       |           |       |
| DWG: 5347                       |             |       |           |       |

**Note**

- Dimension L3 is for reference only.

**TO-251AA (DPAK)**



Note: Dimension L3 is for reference only.

| Dim                                         | MILLIMETERS |      | INCHES    |       |
|---------------------------------------------|-------------|------|-----------|-------|
|                                             | Min         | Max  | Min       | Max   |
| <b>A</b>                                    | 2.21        | 2.38 | 0.087     | 0.094 |
| <b>A1</b>                                   | 0.89        | 1.14 | 0.035     | 0.045 |
| <b>b</b>                                    | 0.71        | 0.89 | 0.028     | 0.035 |
| <b>b1</b>                                   | 0.76        | 1.14 | 0.030     | 0.045 |
| <b>b2</b>                                   | 5.23        | 5.43 | 0.206     | 0.214 |
| <b>c</b>                                    | 0.46        | 0.58 | 0.018     | 0.023 |
| <b>c1</b>                                   | 0.46        | 0.58 | 0.018     | 0.023 |
| <b>D</b>                                    | 5.97        | 6.22 | 0.235     | 0.245 |
| <b>E</b>                                    | 6.48        | 6.73 | 0.255     | 0.265 |
| <b>e</b>                                    | 2.28 BSC    |      | 0.090 BSC |       |
| <b>L</b>                                    | 8.89        | 9.53 | 0.350     | 0.375 |
| <b>L1</b>                                   | 1.91        | 2.28 | 0.075     | 0.090 |
| <b>L2</b>                                   | 0.89        | 1.27 | 0.035     | 0.050 |
| <b>L3</b>                                   | 1.15        | 1.52 | 0.045     | 0.060 |
| ECN: S-03946—Rev. E, 09-Jul-01<br>DWG: 5346 |             |      |           |       |

## Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Din-Tek Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Din-Tek"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Din-Tek makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Din-Tek disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Din-Tek's knowledge of typical requirements that are often placed on Din-Tek products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and/or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Din-Tek's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Din-Tek products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Din-Tek product could result in personal injury or death. Customers using or selling Din-Tek products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Din-Tek personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Din-Tek. Product names and markings noted herein may be trademarks of their respective owners.

## Material Category Policy

**Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as RoHS-Compliant fulfill the definitions and restrictions defined under Directive 2011/65/EU of The European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) - recast, unless otherwise specified as non-compliant.**

**Please note that some Din-Tek documentation may still make reference to RoHS Directive 2002/95/EC. We confirm that all the products identified as being compliant to Directive 2002/95/EC conform to Directive 2011/65/EU.**

**Din-Tek Intertechnology, Inc. hereby certifies that all its products that are identified as Halogen-Free follow Halogen-Free requirements as per JEDEC JS709A standards. Please note that some Din-Tek documentation may still make reference to the IEC 61249-2-21 definition. We confirm that all the products identified as being compliant to IEC 61249-2-21 conform to JEDEC JS709A standards.**