

## AUIPS6031(S)(R)

Done please find

### INTELLIGENT POWER HIGH SIDE SWITCH

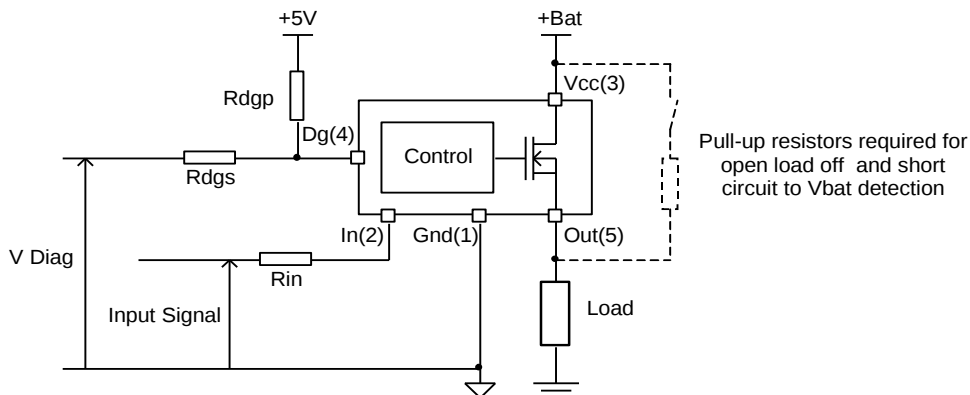
#### Features

- Over temperature shutdown (with auto-restart)
- Short circuit protection (current limit)
- Reverse battery protection (turns On the MOSFET)
- Full diagnostic capability (short circuit to battery)
- Active clamp
- Open load detection in On and Off state
- Ground loss protection
- Logic ground isolated from power ground
- ESD protection
- Lead Free and RoHS compliant

#### Description

The AUIPS6031(S)(R) is a five terminal Intelligent Power Switch (IPS) for use in a high side configuration. It features short circuit, over-temperature, ESD protection, inductive load capability and diagnostic feedback. The output current is limited to the Ilim value. The current limitation is activated until the thermal protection acts. The over-temperature protection turns off the device if the junction temperature exceeds the Tshutdown value. It will automatically restart after the junction has cooled 7°C below the Tshutdown value. The reverse battery protection turns On the MOSFET. A diagnostic pin provides different voltage levels for each fault condition. The double level shifter circuitry will allow large offsets between the logic and load ground.

#### Typical Connection



#### Product Summary

|           |            |
|-----------|------------|
| Rds(on)   | 60mΩ max.  |
| Vclamp    | 39V        |
| I Limit   | 16A        |
| Open load | 3V / 0.55A |

#### Packages



TO-220  
AUIPS6031



D²Pak  
AUIPS6031S



D-Pak  
AUIPS6031R

## Qualification Information<sup>†</sup>

|                                   |                                      |                                                                                                                                                                               |                                                     |
|-----------------------------------|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|
| <b>Qualification Level</b>        |                                      | Automotive<br>(per AEC-Q100 <sup>††</sup> )                                                                                                                                   |                                                     |
|                                   |                                      | Comments: This family of ICs has passed an Automotive qualification. IR's Industrial and Consumer qualification level is granted by extension of the higher Automotive level. |                                                     |
| <b>Moisture Sensitivity Level</b> |                                      | D2PAK-5L                                                                                                                                                                      | MSL1, 260°C<br>(per IPC/JEDEC J-STD-020)            |
|                                   |                                      | TO-220                                                                                                                                                                        | Not applicable<br>(non-surface mount package style) |
|                                   |                                      | DPAK-5L                                                                                                                                                                       | MSL1, 260°C<br>(per IPC/JEDEC J-STD-020)            |
| <b>ESD</b>                        | Machine Model                        | Class <b>M2 (+/-150V)</b> <sup>†††</sup><br>(per AEC-Q100-003)                                                                                                                |                                                     |
|                                   | Human Body Model                     | Class <b>H1C (+/-1500V)</b> <sup>†††</sup><br>(per AEC-Q100-002)                                                                                                              |                                                     |
|                                   | Charged Device Model<br>(DPAK,D2PAK) | Class <b>C4 (+/-900V)</b> <sup>†††</sup><br>(per AEC-Q100-011)                                                                                                                |                                                     |
|                                   | Charged Device Model<br>(TO220)      | Class <b>C3B (+/-750V)</b> <sup>†††</sup><br>(per AEC-Q100-011)                                                                                                               |                                                     |
| <b>IC Latch-Up Test</b>           |                                      | Class II, Level <b>A</b><br>(per AEC-Q100-004)                                                                                                                                |                                                     |
| <b>RoHS Compliant</b>             |                                      | Yes                                                                                                                                                                           |                                                     |

† Qualification standards can be found at International Rectifier's web site <http://www.irf.com/>

†† Exceptions to AEC-Q100 requirements are noted in the qualification report.

††† Passing voltage level

## Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are referenced to Ground lead. T<sub>j</sub>= -40°C..150°C, V<sub>cc</sub>=6..35V (unless otherwise specified).

| Symbol                | Parameter                                                            | Min.                | Max.                 | Units |
|-----------------------|----------------------------------------------------------------------|---------------------|----------------------|-------|
| V <sub>out</sub>      | Maximum output voltage                                               | V <sub>cc</sub> -35 | V <sub>cc</sub> +0.3 | V     |
| V <sub>offset</sub>   | Maximum logic ground to load ground offset                           | V <sub>cc</sub> -35 | V <sub>cc</sub> +0.3 |       |
| V <sub>in</sub>       | Maximum input voltage                                                | -0.3                | 5.5                  |       |
| V <sub>cc</sub> max.  | Maximum V <sub>cc</sub> voltage                                      | —                   | 36                   |       |
| V <sub>cc</sub> cont. | Maximum continuous V <sub>cc</sub> voltage                           | —                   | 28                   |       |
| V <sub>cc</sub> sc.   | Maximum V <sub>cc</sub> voltage with short circuit protection        | —                   | 30                   | mA    |
| I <sub>in</sub> max.  | Maximum I <sub>N</sub> current                                       | -3                  | 10                   |       |
| I <sub>dg</sub> max.  | Maximum diagnostic output current                                    | -3                  | 10                   |       |
| V <sub>dg</sub>       | Maximum diagnostic output voltage                                    | -0.3                | 5.5                  | V     |
| P <sub>d</sub>        | Maximum power dissipation (internally limited by thermal protection) | —                   | —                    | W     |
|                       | R <sub>th</sub> =5°C/W AUIPS6031                                     | —                   | 25                   |       |
|                       | R <sub>th</sub> =40°C/W AUIPS6031S 1" sqrt. footprint                | —                   | 3.1                  |       |
|                       | R <sub>th</sub> =50°C/W AUIPS6031R 1" sqrt. footprint                | —                   | 2.5                  |       |
| T <sub>j</sub> max.   | Max. storage & operating temperature junction temperature            | -40                 | 150                  | °C    |

## Thermal Characteristics

| Symbol           | Parameter                                                                               | Typ. | Max. | Units |
|------------------|-----------------------------------------------------------------------------------------|------|------|-------|
| R <sub>th1</sub> | Thermal resistance junction to ambient AUIPS6031 TO220 free air                         | 50   | —    | °C/W  |
| R <sub>th2</sub> | Thermal resistance junction to case AUIPS6031 TO220                                     | 3.8  | —    |       |
| R <sub>th1</sub> | Thermal resistance junction to ambient AUIPS6031S D <sup>2</sup> Pak std. footprint     | 60   | —    |       |
| R <sub>th2</sub> | Thermal resistance junction to ambient AUIPS6031S D <sup>2</sup> Pak 1" sqrt. footprint | 40   | —    |       |
| R <sub>th3</sub> | Thermal resistance junction to case AUIPS6031S D <sup>2</sup> Pak                       | 3.8  | —    |       |
| R <sub>th1</sub> | Thermal resistance junction to ambient AUIPS6031R D-Pak std. footprint                  | 70   | —    |       |
| R <sub>th2</sub> | Thermal resistance junction to ambient AUIPS6031R D-Pak 1" sqrt. footprint              | 50   | —    |       |
| R <sub>th3</sub> | Thermal resistance junction to case AUIPS6031R D-Pak                                    | 3.8  | —    |       |

## Recommended Operating Conditions

These values are given for a quick design. For operation outside these conditions, please consult the application notes.

| Symbol            | Parameter                                                                                        | Min. | Max. | Units |
|-------------------|--------------------------------------------------------------------------------------------------|------|------|-------|
| V <sub>IH</sub>   | High level input voltage                                                                         | 4    | 5.5  | A     |
| V <sub>IL</sub>   | Low level input voltage                                                                          | 0    | 0.9  |       |
| I <sub>out</sub>  | Continuous drain current, T <sub>ambient</sub> =85°C, T <sub>j</sub> =125°C, V <sub>in</sub> =5V | —    | —    |       |
|                   | R <sub>th</sub> =5°C/W AUIPS6031                                                                 | —    | 8.9  |       |
|                   | R <sub>th</sub> =40°C/W AUIPS6031S 1" sqrt. footprint                                            | —    | 3.1  | kΩ    |
|                   | R <sub>th</sub> =50°C/W AUIPS6031R 1" sqrt. footprint                                            | —    | 2.8  |       |
| R <sub>in</sub>   | Recommended resistor in series with I <sub>N</sub> pin                                           | 4    | 10   |       |
| R <sub>dg</sub> s | Recommended resistor in series with DG pin for reverse battery protection                        | 4    | 20   | kHz   |
| R <sub>dg</sub> p | Recommended pull-up resistor for DG                                                              | 4    | 20   |       |
| R <sub>ol</sub>   | Recommended pull-up resistor for open load detection                                             | 5    | 100  |       |
| F max.            | Max. switching frequency                                                                         | —    | 2.5  |       |

## Static Electrical Characteristics

T<sub>j</sub>=-40°C..150°C, V<sub>cc</sub>=6..28V (unless otherwise specified), typical values are given for V<sub>cc</sub>=14V and T<sub>j</sub>=25°C

| Symbol               | Parameter                                                                  | Min. | Typ. | Max. | Units | Test Conditions                                                                       |
|----------------------|----------------------------------------------------------------------------|------|------|------|-------|---------------------------------------------------------------------------------------|
| R <sub>ds(on)</sub>  | ON state resistance T <sub>j</sub> =25°C                                   | —    | 46   | 60   | mΩ    | V <sub>in</sub> =5V, I <sub>out</sub> =5A                                             |
|                      | ON state resistance T <sub>j</sub> =150°C                                  | —    | 83   | 100  |       | V <sub>in</sub> =5V, I <sub>out</sub> =5A                                             |
|                      | ON state resistance T <sub>j</sub> =25°C, V <sub>cc</sub> =6V              | —    | 55   | 70   |       | V <sub>in</sub> =5V, I <sub>out</sub> =2.5A                                           |
|                      | ON state resistance during reverse battery T <sub>j</sub> =25°C            | —    | 60   | 80   |       | V <sub>cc</sub> -Gnd=-14V                                                             |
| V <sub>cc op.</sub>  | Operating voltage range                                                    | 6    | —    | 28   | V     |                                                                                       |
| V clamp 1            | V <sub>cc</sub> to Out clamp voltage 1                                     | 37   | 39   | 43   |       | I <sub>out</sub> =30mA                                                                |
| V clamp 2            | V <sub>cc</sub> to Out clamp voltage 2                                     | —    | 40   | —    |       | I <sub>out</sub> =4A (see Fig. 1)                                                     |
| I <sub>cc Off</sub>  | Supply current when Off and V <sub>out</sub> connected to ground with R<4Ω | —    | 4    | 9    | μA    | V <sub>in</sub> =0V, V <sub>out</sub> =0V, T <sub>j</sub> =25°C, V <sub>cc</sub> =14V |
| I <sub>cc On</sub>   | Supply current when On                                                     | —    | 2.2  | 5    | mA    | V <sub>in</sub> =5V, V <sub>cc</sub> =14V                                             |
| V <sub>ih</sub>      | Input high threshold voltage                                               | —    | 2.5  | 3    | V     |                                                                                       |
| V <sub>il</sub>      | Input low threshold voltage                                                | 1.5  | 2    | —    |       |                                                                                       |
| I <sub>n hyst.</sub> | Input hysteresis                                                           | 0.2  | 0.5  | 1    |       |                                                                                       |
| I <sub>in On</sub>   | Input current when device is On                                            | —    | 40   | 100  | μA    | V <sub>in</sub> =5V                                                                   |
| I <sub>dg</sub>      | Dg leakage current                                                         | —    | 0.1  | 10   |       | V <sub>dg</sub> =5V                                                                   |
| V <sub>dg</sub>      | Low level DG voltage                                                       | —    | 0.25 | 0.4  | V     | I <sub>dg</sub> =1.6mA                                                                |

## Switching Electrical Characteristics

V<sub>cc</sub>=14V, Resistive load=6Ω, V<sub>in</sub>=5V, T<sub>j</sub>=-40°C..150°C, typical values are given for T<sub>j</sub>=25°C

| Symbol      | Parameter                   | Min. | Typ. | Max. | Units | Test Conditions |
|-------------|-----------------------------|------|------|------|-------|-----------------|
| Tdon        | Turn-on delay time          | —    | 8    | 25   | μs    | see Fig. 3      |
| Tr1         | Rise time to Vout=Vcc-5V    | —    | 5    | 20   |       |                 |
| Tr2         | Rise time to Vout=0.9 x Vcc | —    | 8    | 35   |       |                 |
| dV/dt (On)  | Turn On dV/dt               | —    | 1.5  | —    | V/μs  |                 |
| EOn         | Turn On energy              | —    | 150  | —    | μJ    |                 |
| Tdoff       | Turn-off delay time         | —    | 20   | 45   | μs    |                 |
| Tf          | Fall time to Vout=0.1 x Vcc | —    | 9    | 30   |       |                 |
| dV/dt (Off) | Turn Off dV/dt              | —    | 3    | —    |       |                 |
| EOff        | Turn Off energy             | —    | 65   | —    | μJ    |                 |

## Protection Characteristics

T<sub>j</sub> = -40°C..150°C, V<sub>cc</sub> = 6..28V (unless otherwise specified), typical values are given for V<sub>cc</sub> = 14V and T<sub>j</sub> = 25°C

| Symbol             | Parameter                                           | Min.   | Typ. | Max. | Units | Test Conditions                              |
|--------------------|-----------------------------------------------------|--------|------|------|-------|----------------------------------------------|
| I <sub>lim</sub>   | Internal current limit                              | 10     | 16   | 23   | A     | V <sub>out</sub> = 0V, T <sub>j</sub> = 25°C |
| T <sub>sd+</sub>   | Over temperature high threshold                     | 150(1) | 165  | —    | °C    | See fig. 2                                   |
| T <sub>sd-</sub>   | Over temperature low threshold                      | —      | 158  | —    |       |                                              |
| V <sub>sc</sub>    | Short-circuit detection voltage(2)                  | 2      | 3    | 4    |       |                                              |
| UV+                | Under voltage protection V <sub>cc</sub> going up   | —      | 5    | 6.2  | V     |                                              |
| UV-                | Under voltage protection V <sub>cc</sub> going down | —      | 4.5  | 5.8  |       |                                              |
| VOL Off            | Open load detection threshold                       | 2      | 3    | 4    |       |                                              |
| I <sub>OL</sub> On | Open load detection threshold                       | 0.15   | 0.4  | 0.65 | A     | T <sub>j</sub> = -40..25°C                   |
|                    |                                                     | 0.15   | 0.4  | 0.55 |       | T <sub>j</sub> = 25..150°C                   |

(1) Guaranteed by design

(2) Reference to V<sub>cc</sub>

## True Table

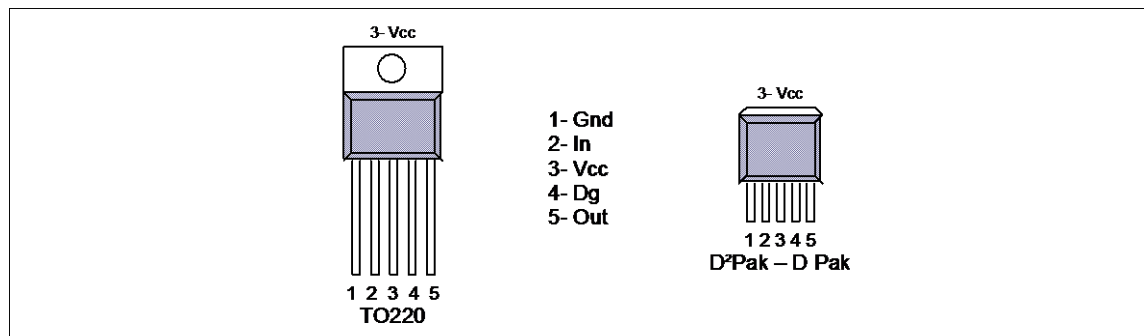
| Operating Conditions                 | IN | OUT | DG    |
|--------------------------------------|----|-----|-------|
| Normal                               | H  | H   | H     |
| Normal                               | L  | L   | H     |
| Open Load                            | H  | H   | L     |
| Open Load (3)                        | L  | H   | L     |
| Short circuit to Gnd                 | H  | L   | L     |
| Short circuit to Gnd                 | L  | L   | H     |
| Short circuit to V <sub>cc</sub>     | H  | H   | L (4) |
| Short circuit to V <sub>cc</sub> (5) | L  | H   | L     |
| Over-temperature                     | H  | L   | L     |
| Over-temperature                     | L  | L   | H     |

(3) With a pull-up resistor connected between the output and V<sub>cc</sub>.

(4) V<sub>ds</sub> lower than 10mV.

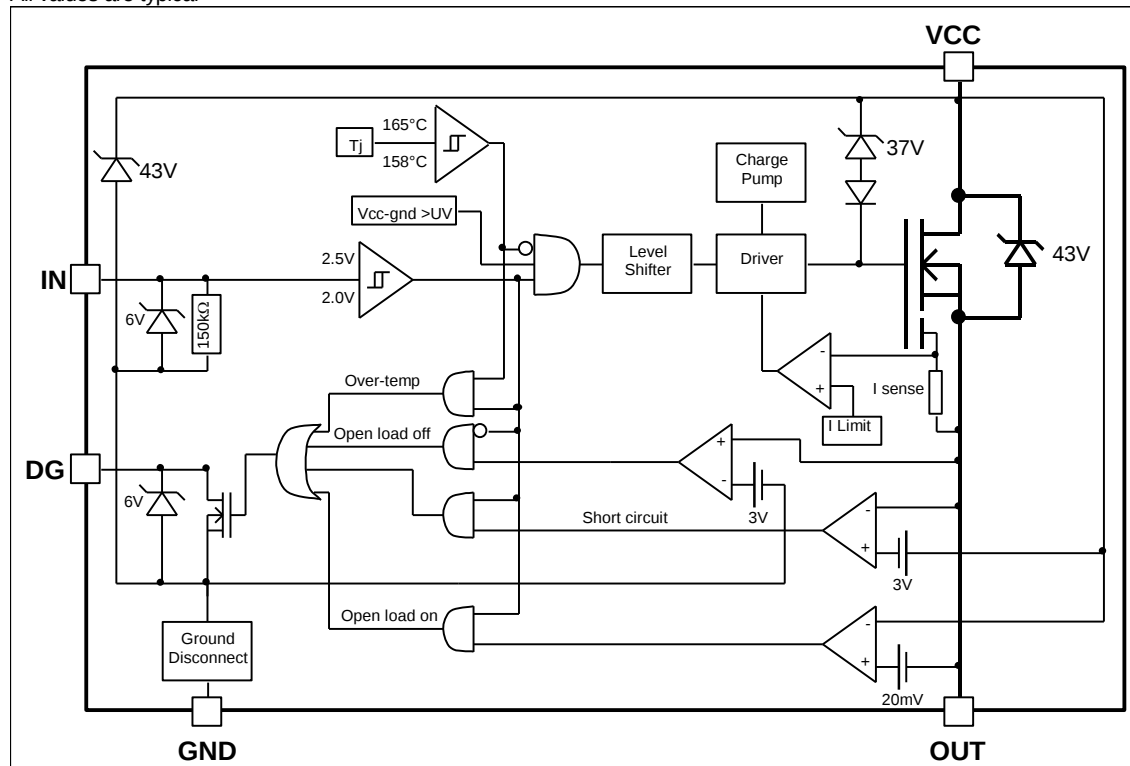
(5) Without a pull-up resistor connected between the output and V<sub>cc</sub>.

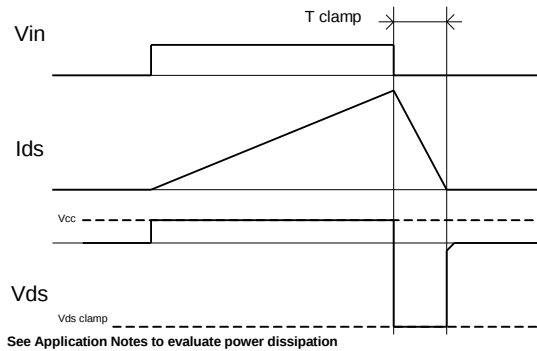
## Lead Assignments



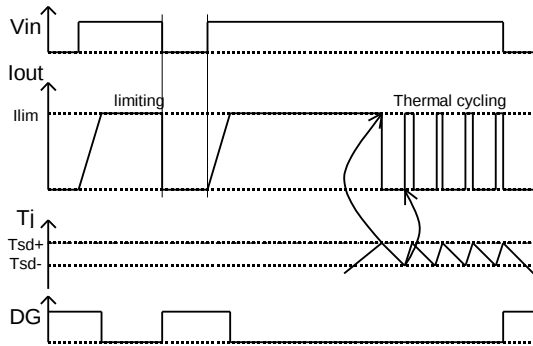
## Functional Block Diagram

All values are typical

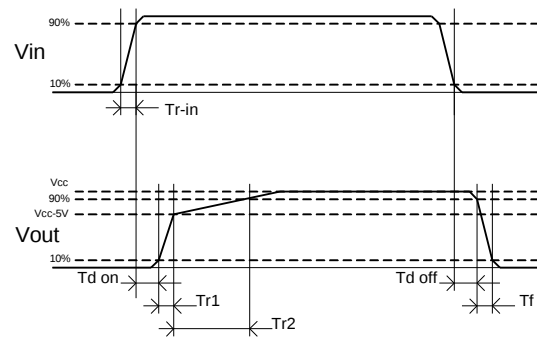




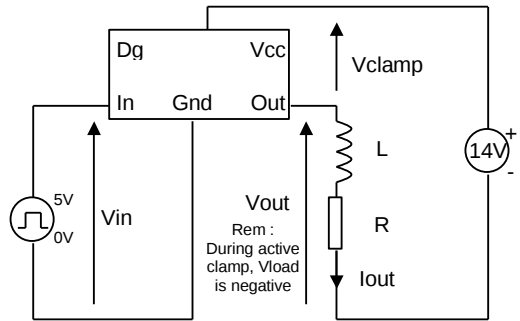
**Figure 1 – Active clamp waveforms**



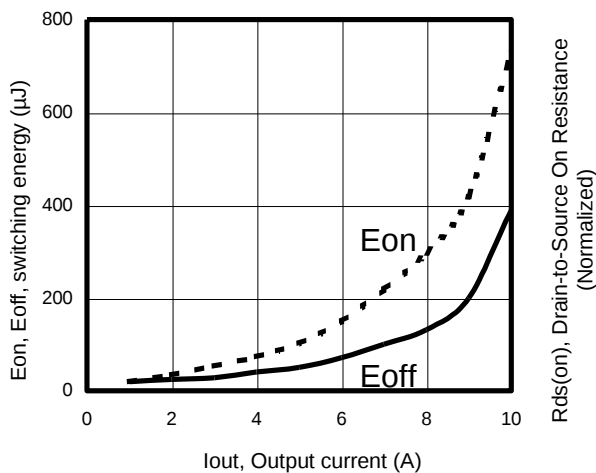
**Figure 2 – Protection timing diagram**



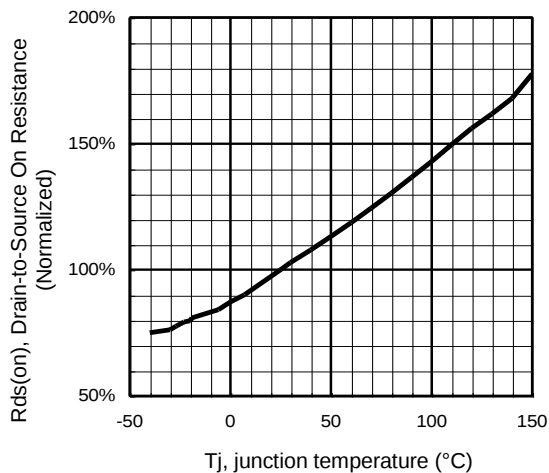
**Figure 3 – Switching times definitions**



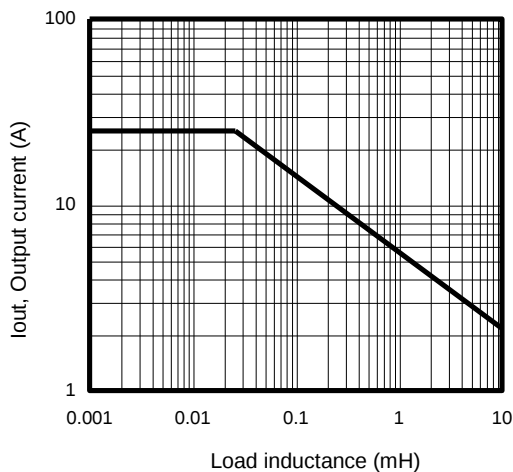
**Figure 4 – Active clamp test circuit**



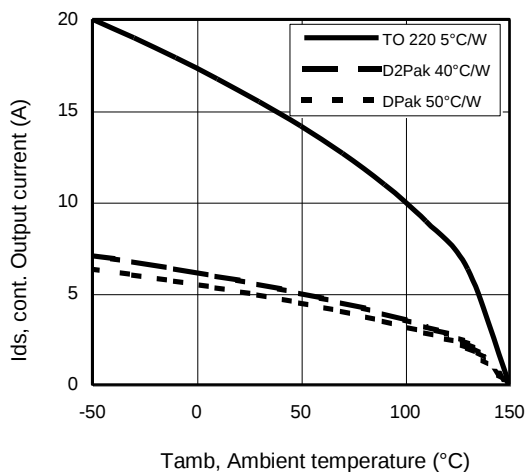
**Figure 5 – Switching energy (μJ) Vs Output current (A)**



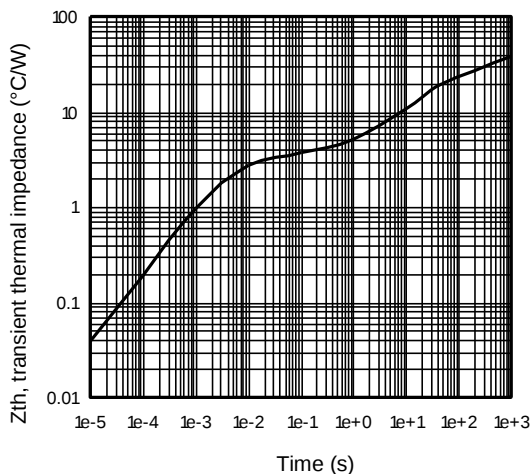
**Figure 6 - Normalized  $R_{ds(on)}$  (%) Vs  $T_j$  (°C)**



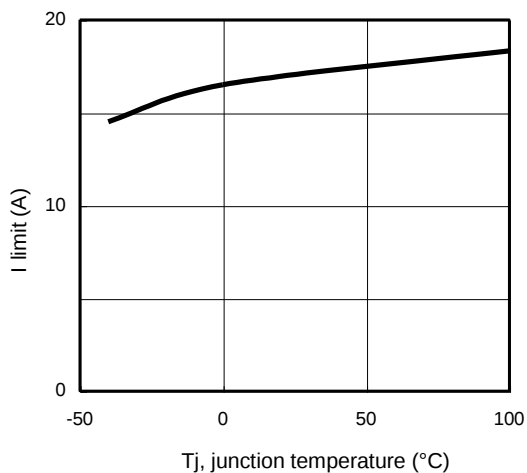
**Figure 7 – Max. Output current (A) Vs Load inductance (mH)**



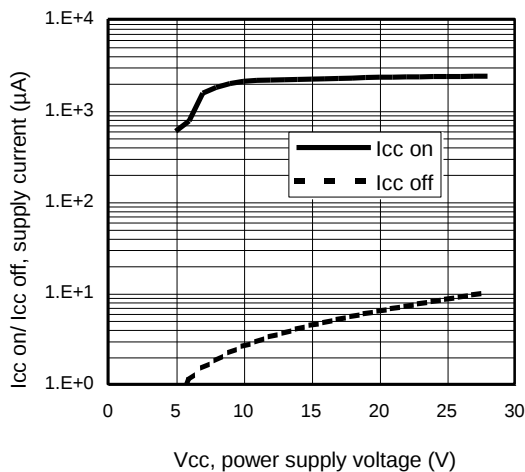
**Figure 8 – Max. output current (A) Vs Ambient temperature (°C)**



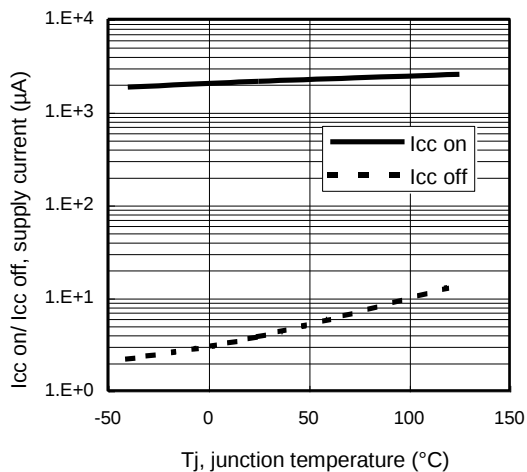
**Figure 9 – Transient thermal impedance ( $^{\circ}\text{C/W}$ ) Vs time (s)**



**Figure 10 –  $I_{limit}$  (A) Vs junction temperature ( $^{\circ}\text{C}$ )**



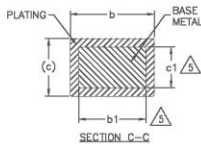
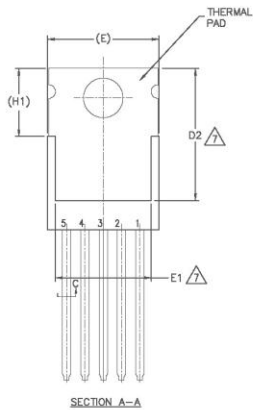
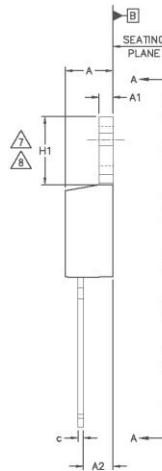
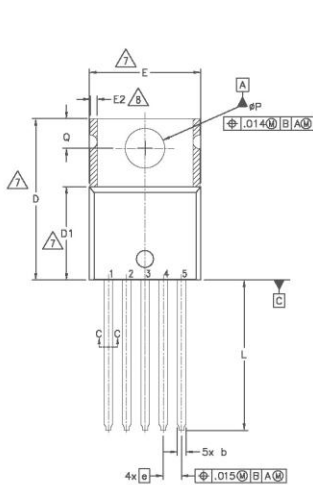
**Figure 11 –  $I_{cc}$  on/  $I_{cc}$  off ( $\mu\text{A}$ ) Vs  $V_{cc}$  (V)\***



**Figure 12 –  $I_{cc}$  on/  $I_{cc}$  off ( $\mu\text{A}$ ) Vs  $T_j$  ( $^{\circ}\text{C}$ )\***

\* $V_{out}$  connected to ground with  $R < 4\Omega$

## Case Outline - TO220 (5 leads)

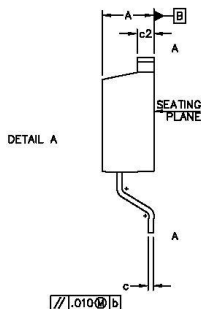
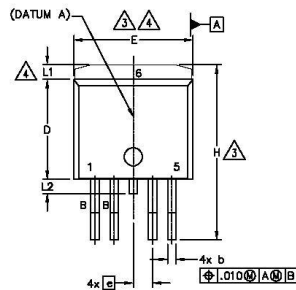
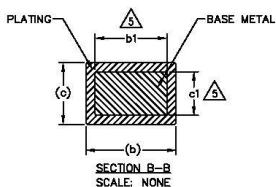
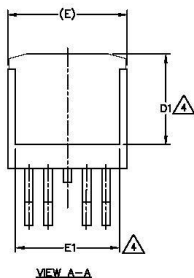
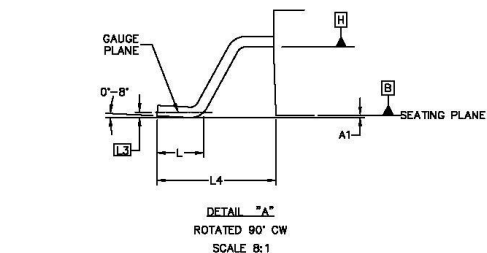


| SYMBOL | DIMENSIONS  |       |          |      | NOTES |
|--------|-------------|-------|----------|------|-------|
|        | MILLIMETERS |       | INCHES   |      |       |
|        | MIN.        | MAX.  | MIN.     | MAX. |       |
| A      | 3.56        | 4.83  | .140     | .190 |       |
| A1     | 0.51        | 1.40  | .020     | .055 |       |
| A2     | 2.03        | 2.92  | .080     | .115 |       |
| b      | 0.64        | 0.89  | .025     | .035 | 5     |
| b1     | 0.64        | 0.84  | .025     | .033 |       |
| c      | 0.36        | 0.61  | .014     | .024 |       |
| c1     | 0.36        | 0.56  | .014     | .022 | 5     |
| D      | 14.22       | 16.51 | .560     | .650 | 4     |
| D1     | 8.38        | 9.02  | .330     | .355 |       |
| D2     | 11.68       | 12.88 | .460     | .507 | 7     |
| E      | 9.65        | 10.67 | .380     | .420 | 4,7   |
| E1     | 6.86        | 8.89  | .270     | .350 | 7     |
| E2     | —           | 0.76  | —        | .030 | 8     |
| e      | 1.70 BSC    |       | .067 BSC |      |       |
| H1     | 5.84        | 6.86  | .230     | .270 | 7,8   |
| L      | 12.70       | 14.73 | .500     | .580 |       |
| Wp     | 3.53        | 3.73  | .139     | .147 |       |
| Q      | 2.54        | 3.05  | .100     | .120 |       |

### NOTES:

- 1.— DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M— 1994.
- 2.— DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS].
- 3.— LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
- 4.— DIMENSION D, D1 & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- 5.— DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
- 6.— CONTROLLING DIMENSION : INCHES.
- 7.— THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS E,H1,D2 & E1.
- 8.— DIMENSION E2 X H1 DEFINE A ZONE WHERE STAMPING AND SINGULATION IRREGULARITIES ARE ALLOWED.
- 9.— OUTLINE CONFORMS TO JEDEC TO-220, EXCEPT A2 (max.) AND D2 (min.) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.
- 10.— LEADS AND DRAIN ARE PLATED WITH 100% Sn

## Case Outline D2PAK - 5 Leads

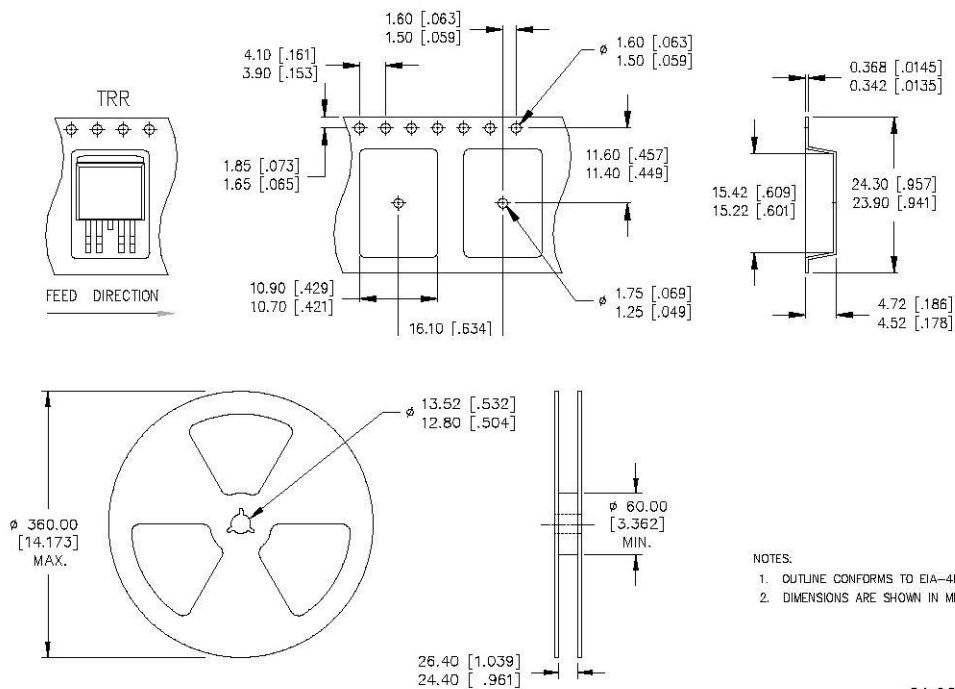


### NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263BA.
9. LEADS AND DRAIN ARE PLATED : 100% Sn

| SYM<br>BO<br>L | DIMENSIONS  |       |        |      | NOTES |
|----------------|-------------|-------|--------|------|-------|
|                | MILLIMETERS |       | INCHES |      |       |
|                | MIN.        | MAX.  | MIN.   | MAX. |       |
| A              | 4.06        | 4.83  | .160   | .190 | 4     |
| A1             | —           | 0.254 | —      | .010 |       |
| b              | 0.51        | 0.99  | .020   | .039 |       |
| b1             | 0.51        | 0.89  | .020   | .035 |       |
| c              | 0.38        | 0.74  | .015   | .029 | 4     |
| c1             | 0.38        | 0.58  | .015   | .023 |       |
| c2             | 1.14        | 1.65  | .045   | .065 | 3     |
| D              | 8.38        | 9.65  | .330   | .380 |       |
| D1             | 6.86        | —     | .270   | —    | 3     |
| E              | 9.65        | 10.67 | .380   | .420 |       |
| E1             | 6.22        | —     | .245   | —    | 3     |
| e              | 1.70        | BSC   | .067   | BSC  |       |
| H              | 14.61       | 15.88 | .575   | .625 | 3     |
| L              | 1.78        | 2.79  | .070   | .110 |       |
| L1             | —           | 1.68  | —      | .066 | 3     |
| L2             | —           | 1.78  | —      | .070 |       |
| L3             | 0.25        | BSC   | .010   | BSC  | 3     |
| L4             | 4.78        | 5.28  | .188   | .208 |       |

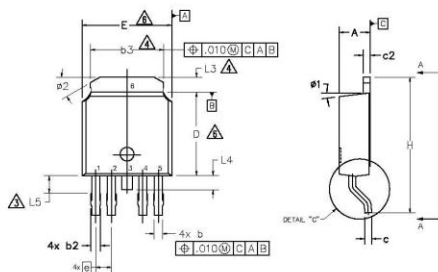
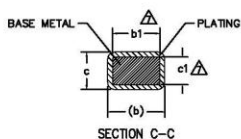
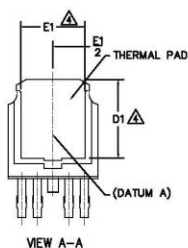
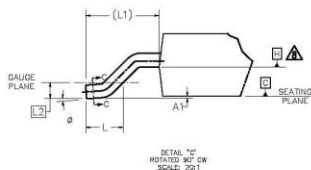
## Tape & Reel D2PAK - 5 Leads



- NOTES:
1. OUTLINE CONFORMS TO EIA-481 & EIA-541.
  2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].

01-3071 00 / 01-3072 00

## Case Outline DPAK - 5 Leads

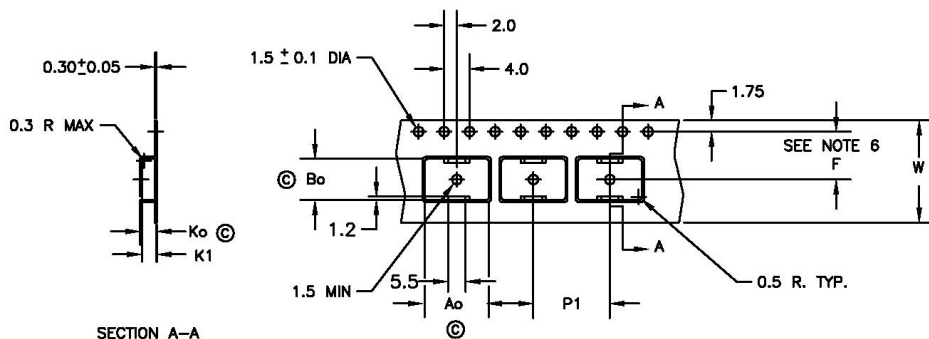


| SYMBOL | DIMENSIONS  |       |           |      | NOTES |
|--------|-------------|-------|-----------|------|-------|
|        | MILLIMETERS |       | INCHES    |      |       |
|        | MIN.        | MAX.  | MIN.      | MAX. |       |
| A      | 2.18        | 2.39  | .086      | .094 | 2     |
| A1     | —           | 0.13  | —         | .005 |       |
| b      | 0.56        | 0.79  | .022      | .031 | 2     |
| b1     | .056        | 0.74  | .022      | .029 |       |
| b2     | 0.65        | 0.89  | .026      | .035 | 2     |
| b3     | 4.95        | 5.46  | .195      | .215 |       |
| c      | 0.46        | 0.61  | .018      | .024 | 2     |
| c1     | 0.41        | 0.56  | .016      | .022 |       |
| c2     | 0.46        | 0.89  | .018      | .035 | 3     |
| D      | 5.97        | 6.22  | .235      | .245 |       |
| D1     | 5.21        | —     | .205      | —    | 3     |
| E      | 6.35        | 6.73  | .250      | .265 |       |
| E1     | 4.32        | —     | .170      | —    | 3     |
| e      | 1.14 BSC    |       | .045 BSC  |      |       |
| H      | 9.40        | 10.41 | .370      | .410 | 3     |
| L      | 1.40        | 1.78  | .055      | .070 |       |
| L1     | 2.74 BSC    |       | .108 REF. |      | 3     |
| L2     | 0.51 BSC    |       | .020 BSC  |      |       |
| L3     | 0.89        | 1.27  | .035      | .050 | 3     |
| L4     | —           | 1.02  | —         | .040 |       |
| L5     | 1.14        | 1.52  | .045      | .060 | 3     |
| ø      | 0"          | 10"   | 0"        | 10"  |       |
| ø1     | 0"          | 15"   | 0"        | 15"  | 3     |
| ø2     | 28"         | 32"   | 28"       | 32"  |       |

### NOTES:

- 1.— DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
- 2.— DIMENSIONS ARE SHOWN IN INCHES [MILLIMETERS]
- 3.— LEAD DIMENSION UNCONTROLLED IN L5.
- 4.— DIMENSION D1, E1, L3 & b3 ESTABLISH A MINIMUM MOUNTING SURFACE FOR THERMAL PAD.
- 5.— SECTION C-C DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN .005 AND 0.10 [0.13 AND 0.25] FROM THE LEAD TIP.
- 6.— DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005 [0.13] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- 7.— DIMENSION b1 & c1 APPLIED TO BASE METAL ONLY.
- 8.— DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
- 9.— OUTLINE CONFORMS TO JEDEC OUTLINE TO-252.
- 10.— LEADS AND DRAIN ARE PLATED WITH 100% Sn

## Tape & Reel DPAK - 5 Leads

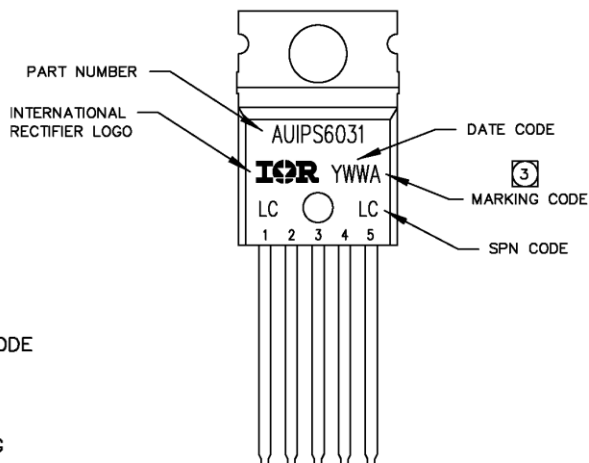
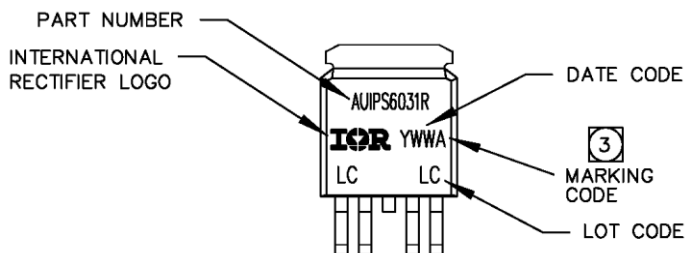
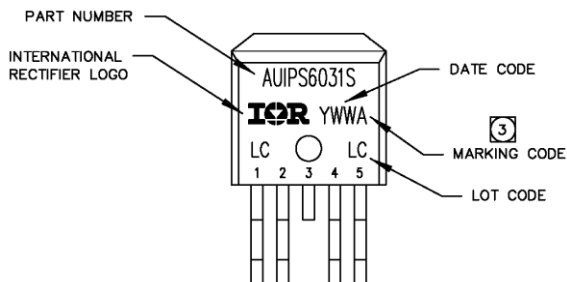


Ao = 10.5 mm  
 Bo = 7.0 mm  
 Ko = 2.8 mm  
 K1 = 2.4 mm  
 F = 7.5 mm  
 P1 = 12.0 mm  
 W = 16.0 ± .3 mm

### NOTES:

1. 10 SPROCKET HOLE PUNCH CUMULATIVE TOLERANCE ±.02
2. CAMBER NOT TO EXCEED 1mm IN 100mm
3. MATERIAL: CONDUCTIVE BLACK POLYSTYRENE
4. Ao AND Bo MEASURED ON A PLANE 0.3mm ABOVE THE BOTTOM OF THE POCKET
5. Ko MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER
6. POCKET POSITION RELATIVE TO THE SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE
7. VENDOR: (OPTIONAL)
8. MUST ALSO MEET REQUIREMENTS OF EIA STANDARD #EIA-481A, TAPING OF SURFACE-MOUNT COMPONENTS FOR AUTOMATIC PLACEMENT.
9. TOLERANCE TO BE MANUFACTURER STANDARD
10. SURFACE RESISTIVITY OF MOLDED MATL: MUST MEASURE LESS THAN OR EQUAL TO 10<sup>8</sup> OHMS PER SQUARE. MEASURED IN ACCORDANCE TO PROCEDURE GIVEN IN ASTM D-257 & ASTM D-991 (REF. C-9000 SPEC.)
11. TOTAL LENGTH PER REEL MUST BE 79 METERS
12. © CRITICAL DIMENSION

## Part Marking Information



## Ordering Information

| Base Part Number | Package Type   | Standard Pack       |          | Complete Part Number |
|------------------|----------------|---------------------|----------|----------------------|
|                  |                | Form                | Quantity |                      |
| AUIPS6031        | TO220-5-Leads  | Tube                | 50       | AUIPS6031            |
| AUIPS6031S       | D2-Pak-5-Leads | Tube                | 50       | AUIPS6031S           |
|                  |                | Tape and reel left  | 800      | AUIPS6031STRL        |
|                  |                | Tape and reel right | 800      | AUIPS6031STRR        |
| AUIPS6031R       | D-Pak-5-Leads  | Tube                | 75       | AUIPS6031R           |
|                  |                | Tape and reel       | 2000     | AUIPS6031RTR         |
|                  |                | Tape and reel left  | 3000     | AUIPS6031RTRL        |
|                  |                | Tape and reel right | 3000     | AUIPS6031RTRR        |

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**WORLD HEADQUARTERS:**

101 N Sepulveda Blvd., El Segundo, California 90245  
Tel: (310) 252-7105

## Revision History

| Revision | Date                 | Notes/Changes                                       |
|----------|----------------------|-----------------------------------------------------|
| B        | September, 12th 2011 | AU release                                          |
| C        | May 15, 2012         | Add the test condition for the ICC (off) parameters |
|          |                      |                                                     |
|          |                      |                                                     |
|          |                      |                                                     |
|          |                      |                                                     |
|          |                      |                                                     |
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|          |                      |                                                     |