

NPN Transistor, 100 V, 3.0 A, Low $V_{CE(sat)}$

NSS1C301ET4G

onsemi's e²PowerEdge family of low $V_{CE(sat)}$ transistors are surface mount devices featuring ultra low saturation voltage ($V_{CE(sat)}$) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are DC-DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e²PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

Features

- Complement to NSS1C300ET4G
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

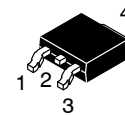
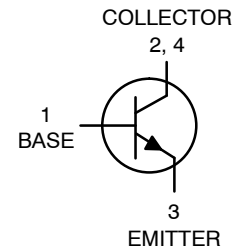
MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

| Rating | Symbol | Max | Unit |
|---|----------------|--------------|--------------------------|
| Collector-Base Voltage | V_{CBO} | 140 | Vdc |
| Collector-Emitter Voltage | V_{CEO} | 100 | Vdc |
| Emitter-Base Voltage | V_{EB} | 6.0 | Vdc |
| Collector Current - Continuous | I_C | 3.0 | Adc |
| Collector Current - Peak | I_{CM} | 6.0 | Adc |
| Base Current | I_B | 0.5 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 33 0.26 | W W/ $^\circ\text{C}$ |
| Total Power Dissipation (Note 1) @ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 2.1 0.017 | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

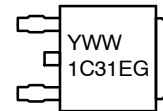
1. These ratings are applicable when surface mounted on the minimum pad sizes recommended.

100 VOLTS, 3.0 AMPS 12.5 WATTS NPN LOW $V_{CE(sat)}$ TRANSISTOR



DPAK
CASE 369C
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
1C31E = Device Code
G = Pb-Free

ORDERING INFORMATION

| Device | Package | Shipping† |
|--------------|-------------------|----------------------|
| NSS1C301ET4G | DPAK (Pb-Free) | 2500/ Tape & Reel |
| NSV1C301ET4G | DPAK (Pb-Free) | 2500/ Tape & Reel |

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, [BRD8011/D](#).

NSS1C301ET4G

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--|-----------------|------|----------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 3.8 | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to-Ambient (Note 2) | $R_{\theta JA}$ | 59.5 | $^{\circ}\text{C/W}$ |

2. These ratings are applicable when surface mounted on the minimum pad sizes recommended.

ELECTRICAL CHARACTERISTICS ($T_A = 25^{\circ}\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|----------------|--------|-----|-----|-----|------|
|----------------|--------|-----|-----|-----|------|

OFF CHARACTERISTICS

| | | | | | |
|---|---------------|-----|---|-----|---------------|
| Collector – Emitter Breakdown Voltage ($I_C = 10\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 100 | – | – | V |
| Collector – Base Breakdown Voltage ($I_C = 0.1\text{ mA}$, $I_E = 0$) | $V_{(BR)CBO}$ | 140 | – | – | V |
| Emitter – Base Breakdown Voltage ($I_E = 0.1\text{ mA}$, $I_C = 0$) | $V_{(BR)EBO}$ | 6.0 | – | – | V |
| Collector Cutoff Current ($V_{CB} = 140\text{ V}$, $I_E = 0$) | I_{CBO} | – | – | 0.1 | μA |
| Emitter Cutoff Current ($V_{EB} = 6.0\text{ V}$) | I_{EBO} | – | – | 0.1 | μA |

ON CHARACTERISTICS

| | | | | | |
|---|---------------|-------------------------|----------------------------------|----------------------------------|-----|
| DC Current Gain (Note 3) ($I_C = 0.1\text{ A}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 0.5\text{ A}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ V}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 2.0\text{ V}$) | h_{FE} | 200 200 120 80 | – – – – | – – 360 – | – |
| Collector – Emitter Saturation Voltage (Note 3) ($I_C = 0.1\text{ A}$, $I_B = 10\text{ mA}$) ($I_C = 1.0\text{ A}$, $I_B = 0.100\text{ A}$) ($I_C = 2.0\text{ A}$, $I_B = 0.200\text{ A}$) ($I_C = 3.0\text{ A}$, $I_B = 0.300\text{ A}$) | $V_{CE(sat)}$ | – – – – | 0.015 0.045 0.080 0.115 | 0.050 0.090 0.150 0.250 | V |
| Base – Emitter Saturation Voltage (Note 3) ($I_C = 1.0\text{ A}$, $I_B = 0.1\text{ A}$) | $V_{BE(sat)}$ | – | – | 1.0 | V |
| Base – Emitter Turn-on Voltage (Note 3) ($I_C = 1.0\text{ A}$, $V_{CE} = 2.0\text{ V}$) | $V_{BE(on)}$ | – | – | 0.90 | V |
| Cutoff Frequency ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 100\text{ MHz}$) | f_T | – | 120 | – | MHz |
| Input Capacitance ($V_{EB} = 5.0\text{ V}$, $f = 1.0\text{ MHz}$) | C_{ibo} | – | 360 | – | pF |
| Output Capacitance ($V_{CB} = 10\text{ V}$, $f = 1.0\text{ MHz}$) | C_{obo} | – | 30 | – | pF |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

3. Pulsed Condition: Pulse Width = 300 μs , Duty Cycle $\leq 2\%$.

TYPICAL CHARACTERISTICS

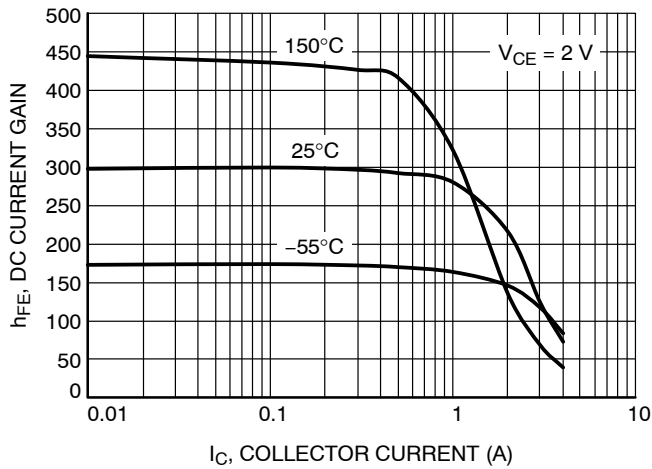


Figure 1. DC Current Gain

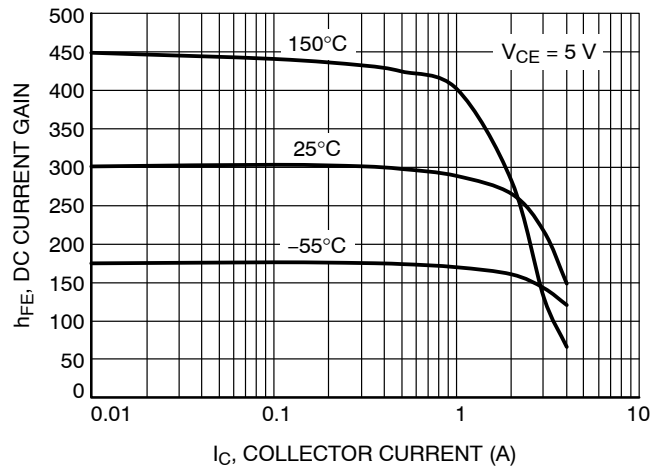


Figure 2. DC Current Gain

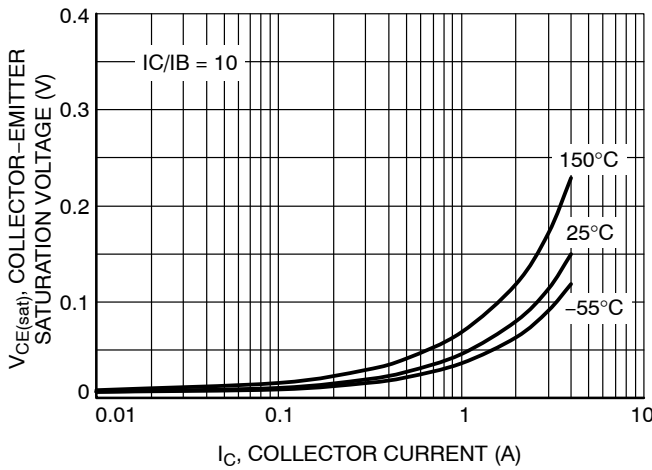


Figure 3. Collector-Emitter Saturation Voltage

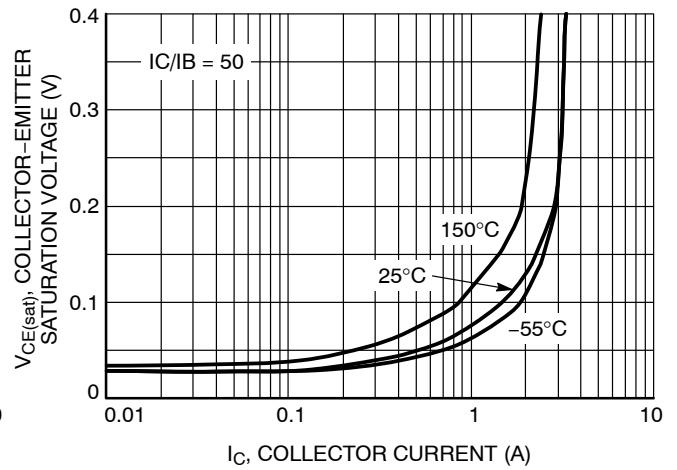


Figure 4. Collector-Emitter Saturation Voltage

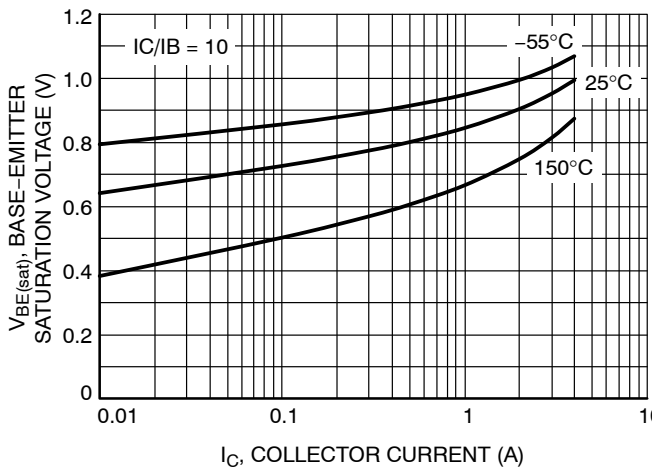


Figure 5. Base-Emitter Saturation Voltage

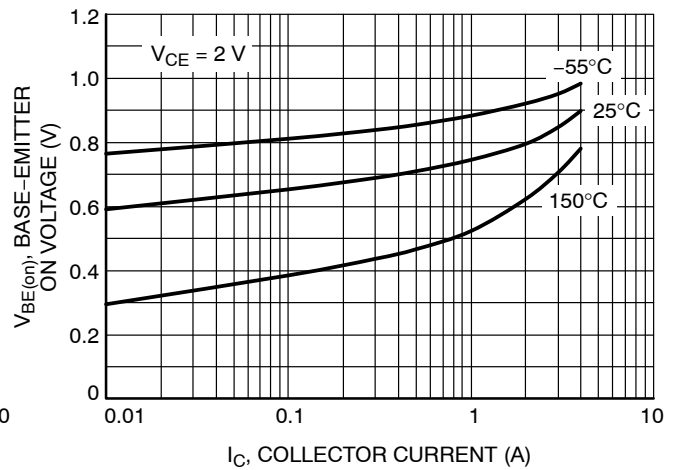


Figure 6. Base-Emitter "On" Voltage

TYPICAL CHARACTERISTICS

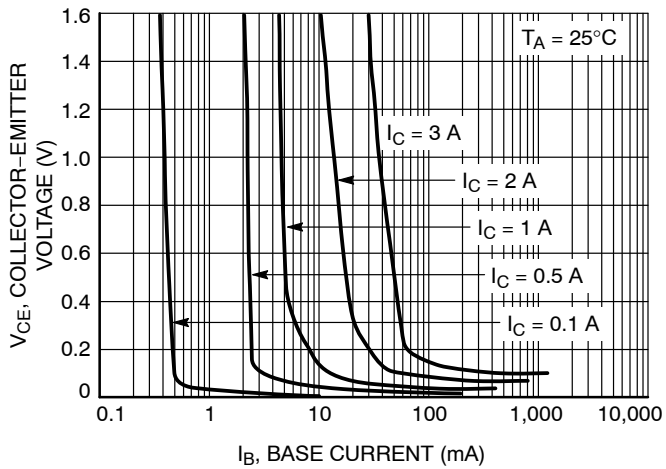


Figure 7. Collector Saturation Region

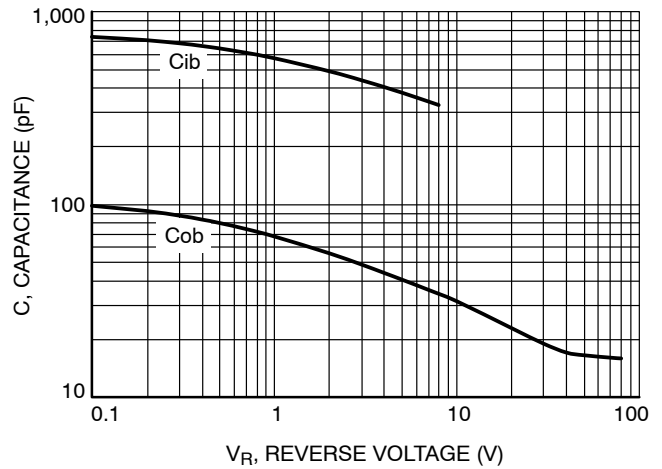


Figure 8. Capacitance

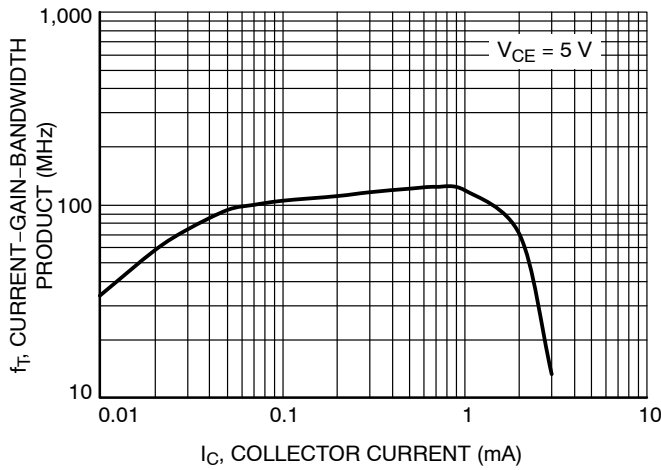


Figure 9. Current-Gain-Bandwidth Product

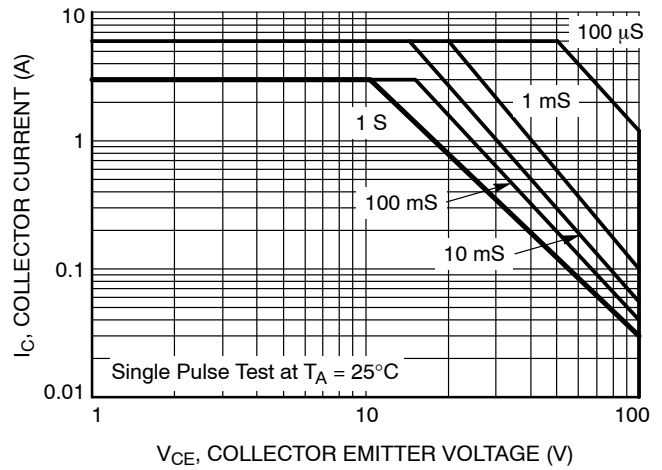


Figure 10. Safe Operating Area

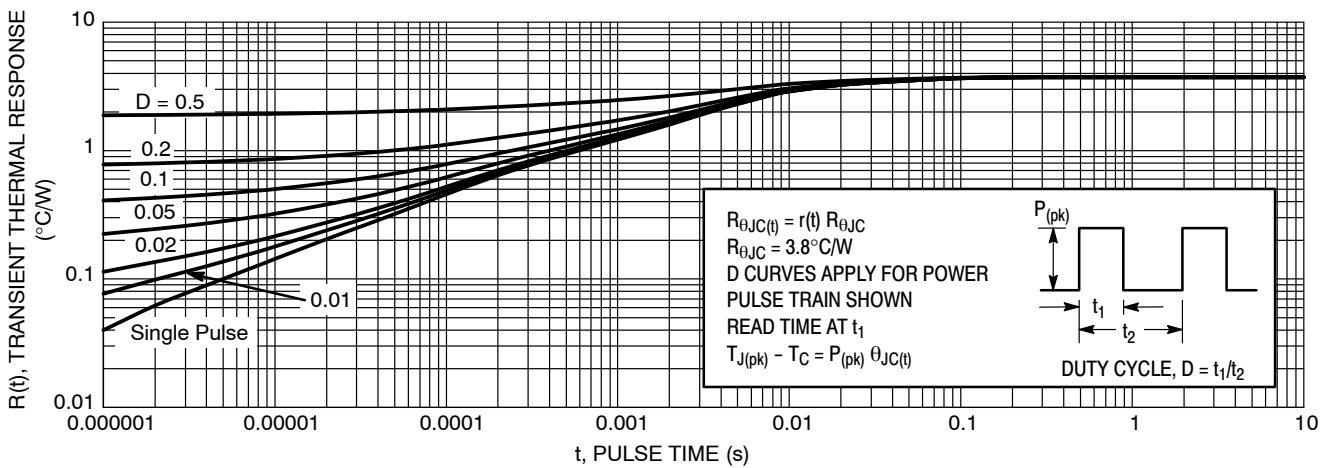
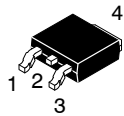


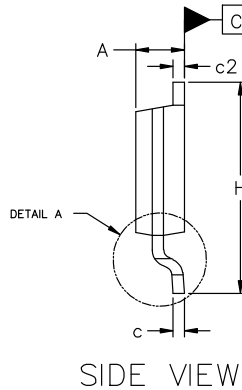
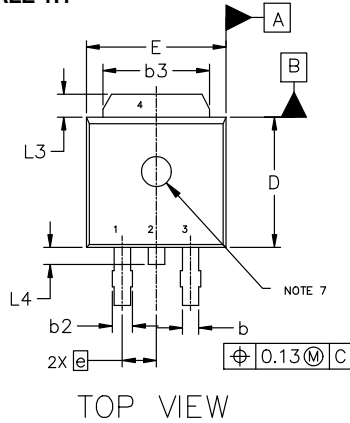
Figure 11. Typical Transient Thermal Response, Junction-to-Case



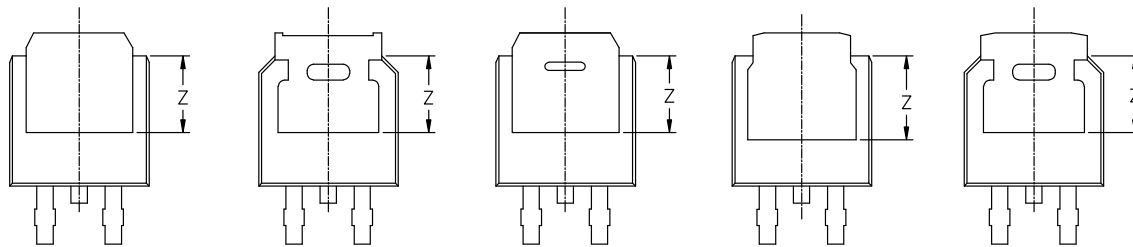
DPAK3 6.10x6.54x2.28, 2.29P
CASE 369C
ISSUE J

DATE 12 AUG 2025

SCALE 1:1

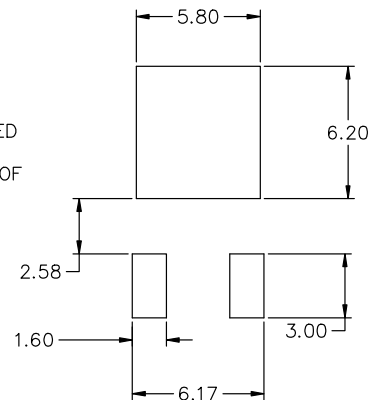
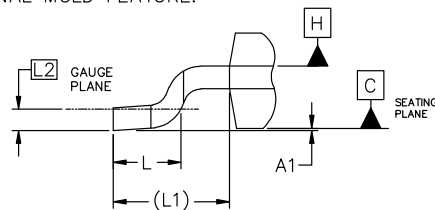


| MILLIMETERS | | | |
|-------------|----------|------|-------|
| DIM | MIN | NOM | MAX |
| A | 2.18 | 2.28 | 2.38 |
| A1 | 0.00 | --- | 0.13 |
| b | 0.63 | 0.76 | 0.89 |
| b2 | 0.72 | 0.93 | 1.14 |
| b3 | 4.57 | 5.02 | 5.46 |
| c | 0.46 | 0.54 | 0.61 |
| c2 | 0.46 | 0.54 | 0.61 |
| D | 5.97 | 6.10 | 6.22 |
| E | 6.35 | 6.54 | 6.73 |
| e | 2.29 BSC | | |
| H | 9.40 | 9.91 | 10.41 |
| L | 1.40 | 1.59 | 1.78 |
| L1 | 2.90 REF | | |
| L2 | 0.51 BSC | | |
| L3 | 0.89 | --- | 1.27 |
| L4 | --- | --- | 1.01 |
| Z | 3.93 | --- | --- |



NOTES:

1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3, AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15mm PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.



RECOMMENDED MOUNTING FOOTPRINT*

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

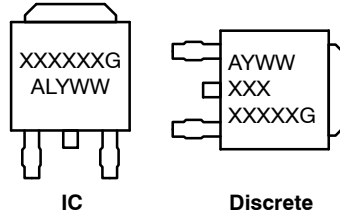
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DPAK3 6.10x6.54x2.28, 2.29P
CASE 369C
ISSUE J

DATE 12 AUG 2025

GENERIC
MARKING DIAGRAM*



XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.

| | | | | |
|---|---|--|--|---|
| STYLE 1: PIN 1. BASE 2. COLLECTOR 3. EMITTER 4. COLLECTOR | STYLE 2: PIN 1. GATE 2. DRAIN 3. SOURCE 4. DRAIN | STYLE 3: PIN 1. ANODE 2. CATHODE 3. ANODE 4. CATHODE | STYLE 4: PIN 1. CATHODE 2. ANODE 3. GATE 4. ANODE | STYLE 5: PIN 1. GATE 2. ANODE 3. CATHODE 4. ANODE |
| STYLE 6: PIN 1. MT1 2. MT2 3. GATE 4. MT2 | STYLE 7: PIN 1. GATE 2. COLLECTOR 3. EMITTER 4. COLLECTOR | STYLE 8: PIN 1. N/C 2. CATHODE 3. ANODE 4. CATHODE | STYLE 9: PIN 1. ANODE 2. CATHODE 3. RESISTOR ADJUST 4. CATHODE | STYLE 10: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. ANODE |

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