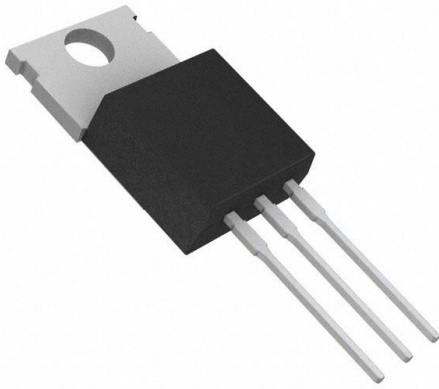


# 2N6388G Datasheet

[www.digi-electronics.com](http://www.digi-electronics.com)



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	2N6388G-DG
Manufacturer	<a href="#">onsemi</a>
Manufacturer Product Number	2N6388G
Description	TRANS NPN DARL 80V 10A TO220
Detailed Description	Bipolar (BJT) Transistor NPN - Darlington 80 V 10 A 2 W Through Hole TO-220



Tel: +00 852-30501935

RFQ Email: [Info@DiGi-Electronics.com](mailto:Info@DiGi-Electronics.com)

DiGi is a global authorized distributor of electronic components.

## Purchase and inquiry

Manufacturer Product Number:

2N6388G

Series:

-

Transistor Type:

NPN - Darlington

Voltage - Collector Emitter Breakdown (Max):

80 V

Current - Collector Cutoff (Max):

1mA

Power - Max:

2 W

Operating Temperature:

-65°C ~ 150°C (TJ)

Package / Case:

TO-220-3

Base Product Number:

2N6388

Manufacturer:

onsemi

Product Status:

Active

Current - Collector (Ic) (Max):

10 A

Vce Saturation (Max) @ Ib, Ic:

3V @ 100mA, 10A

DC Current Gain (hFE) (Min) @ Ic, Vce:

1000 @ 5A, 3V

Frequency - Transition:

-

Mounting Type:

Through Hole

Supplier Device Package:

TO-220

## Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.29.0095

Moisture Sensitivity Level (MSL):

Not Applicable

ECCN:

EAR99

# Plastic Medium-Power Silicon Transistors

## 2N6387, 2N6388

These devices are designed for general-purpose amplifier and low-speed switching applications.

### Features

- High DC Current Gain –  $h_{FE} = 2500$  (Typ) @  $I_C = 4.0$  Adc
- Collector–Emitter Sustaining Voltage – @ 100 mAdc  
 $V_{CE(sus)} = 60$  Vdc (Min) – 2N6387  
 $= 80$  Vdc (Min) – 2N6388
- Low Collector–Emitter Saturation Voltage –  
 $V_{CE(sat)} = 2.0$  Vdc (Max) @  $I_C = 5.0$  Adc – 2N6387, 2N6388
- Monolithic Construction with Built–In Base–Emitter Shunt Resistors
- TO–220AB Compact Package
- These Devices are Pb–Free and are RoHS Compliant\*

### MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	2N6387 2N6388	$V_{CEO}$ 60 80	Vdc
Collector–Base Voltage	2N6387 2N6388	$V_{CB}$ 60 80	Vdc
Emitter–Base Voltage		$V_{EB}$ 5.0	Vdc
Collector Current – Continuous – Peak		$I_C$ 10 15	A dc
Base Current		$I_B$ 250	mA dc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$		$P_D$ 65 0.52	W W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$		$P_D$ 2.0 0.016	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. Indicates JEDEC Registered Data.

### THERMAL CHARACTERISTICS

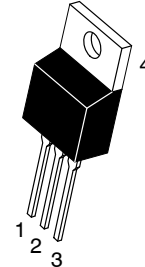
Characteristics	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	1.92	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction–to–Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C}/\text{W}$

\*For additional information on our Pb–Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

## DARLINGTON NPN SILICON POWER TRANSISTORS

### 8 AND 10 AMPERES

### 65 WATTS, 60 – 80 VOLTS



TO–220  
CASE 221A  
STYLE 1

### MARKING DIAGRAM

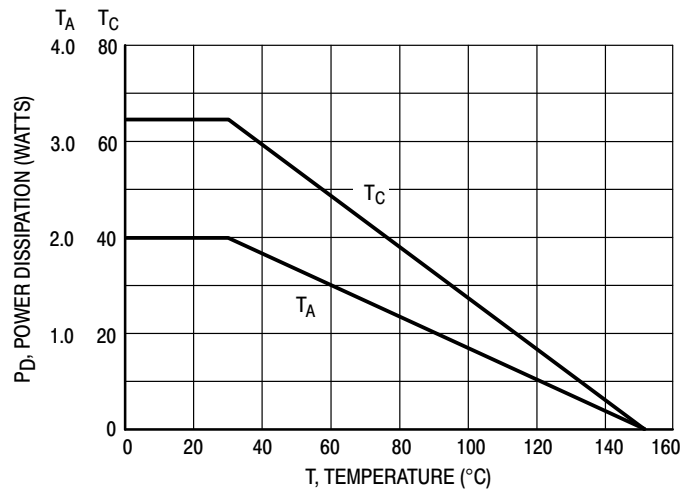


2N638x = Device Code  
 x = 7 or 8  
 G = Pb–Free Package  
 A = Assembly Location  
 Y = Year  
 WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping†
2N6387G	TO–220 (Pb–Free)	50 Units / Rail
2N6388G	TO–220 (Pb–Free)	50 Units / Rail

†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](http://BRD8011/D).

**2N6387, 2N6388****Figure 1. Power Derating****ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  unless otherwise noted) (Note 2)

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Sustaining Voltage (Note 3) ( $I_C = 200\text{ mAdc}$ , $I_B = 0$ )	$V_{CE(sus)}$	60 80	– –	Vdc
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 80\text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	– –	1.0 1.0	mAdc
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 80\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 60\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 125^\circ\text{C}$ ) ( $V_{CE} = 80\text{ Vdc}$ , $V_{EB(off)} = 1.5\text{ Vdc}$ , $T_C = 125^\circ\text{C}$ )	$I_{CEX}$	– – – –	300 300 3.0 3.0	$\mu\text{A}$ dc mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	5.0	mAdc
<b>ON CHARACTERISTICS</b> (Note 3)				
DC Current Gain ( $I_C = 5.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ )	$h_{FE}$	1000 100	20,000 –	–
Collector-Emitter Saturation Voltage ( $I_C = 5.0\text{ Adc}$ , $I_B = 0.01\text{ Adc}$ ) ( $I_C = 10\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{CE(sat)}$	– –	2.0 3.0	Vdc
Base-Emitter On Voltage ( $I_C = 5.0\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ ) ( $I_C = 10\text{ Adc}$ , $V_{CE} = 3.0\text{ Vdc}$ )	$V_{BE(on)}$	– –	2.8 4.5	Vdc
<b>DYNAMIC CHARACTERISTICS</b>				
Small-Signal Current Gain ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )	$ h_{fe} $	20	–	–
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 1.0\text{ MHz}$ )	$C_{ob}$	–	200	pF
Small-Signal Current Gain ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 5.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	1000	–	–

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.

2. Indicates JEDEC Registered Data.

3. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .

### 2N6387, 2N6388

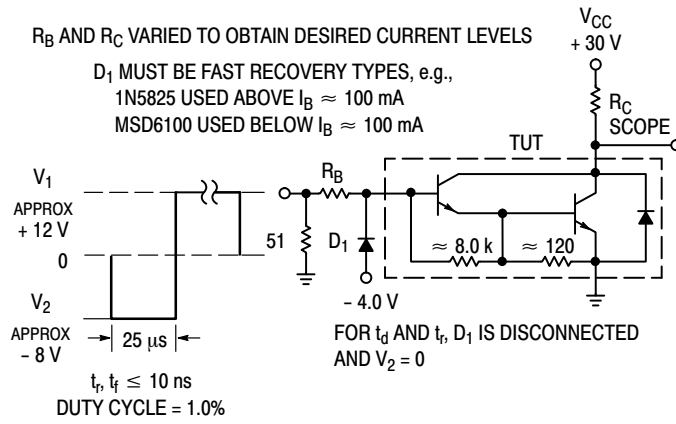


Figure 2. Switching Times Test Circuit

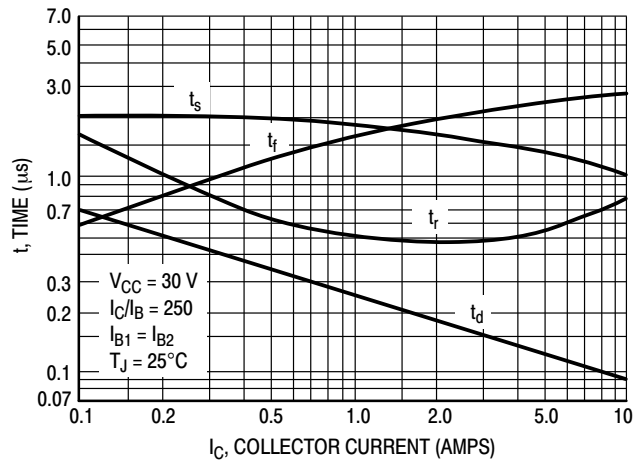


Figure 3. Switching Times

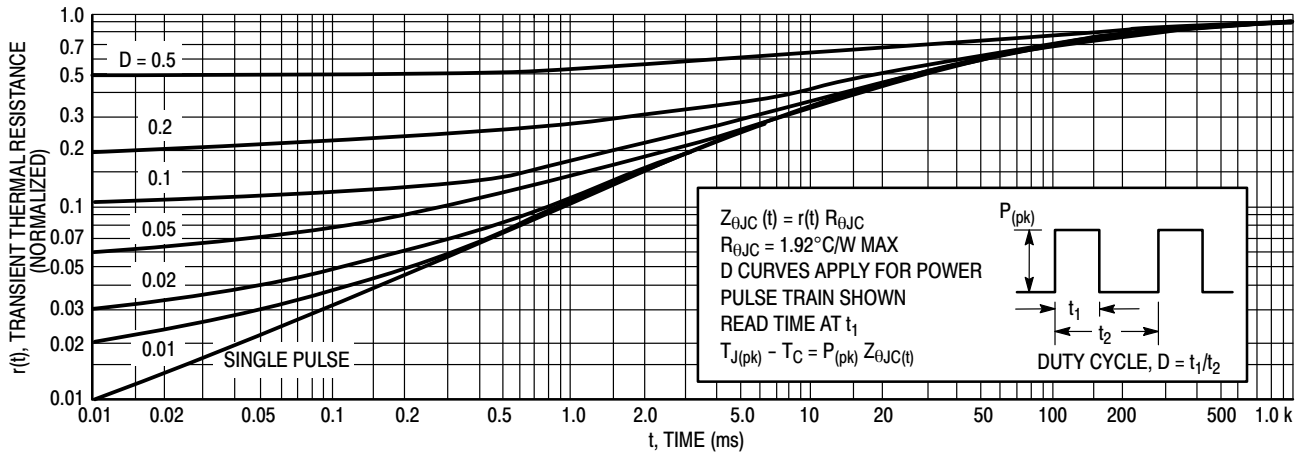
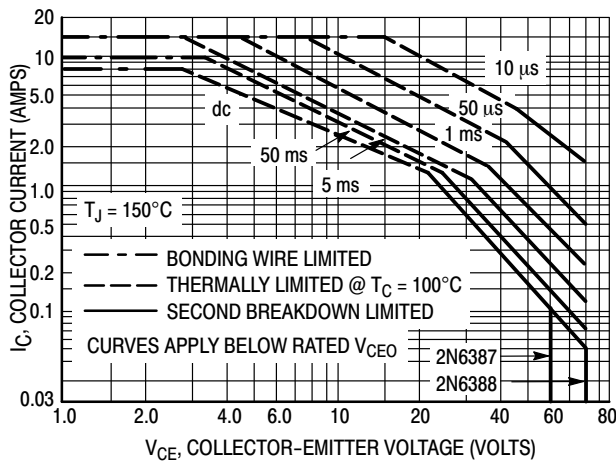


Figure 4. Thermal Response

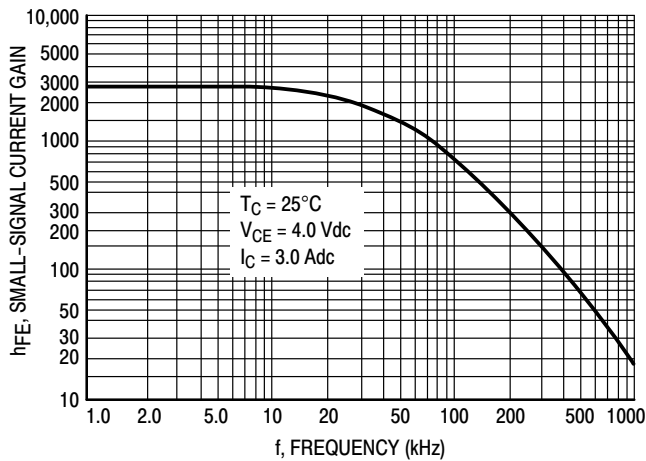
**2N6387, 2N6388**



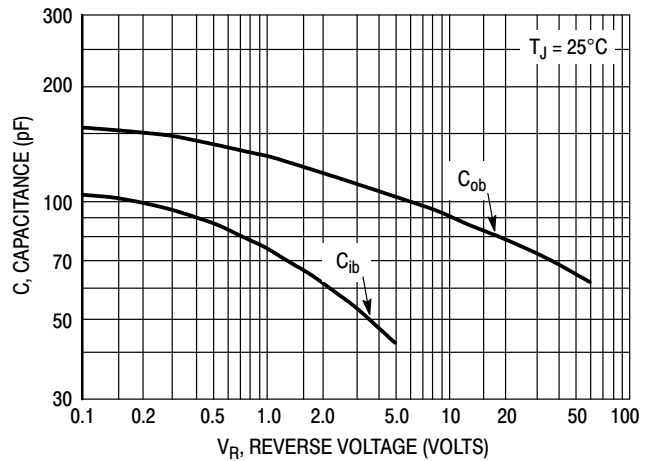
**Figure 5. Active-Region Safe Operating Area**

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

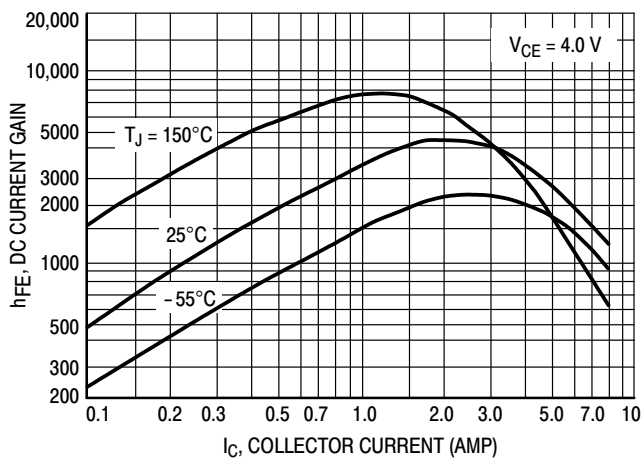
The data of Figure 5 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} < 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 4. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown



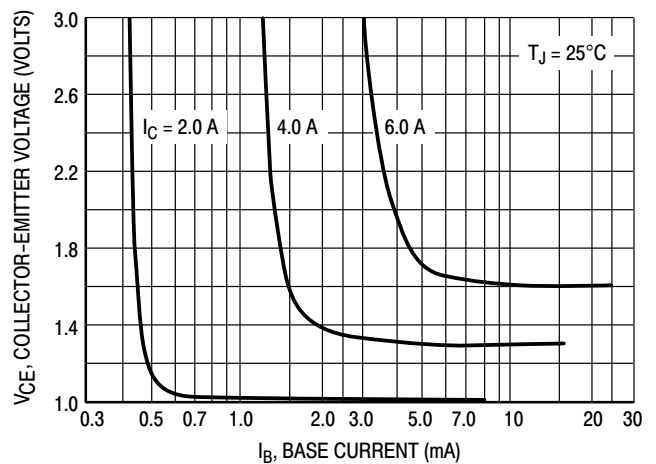
**Figure 6. Small-Signal Current Gain**



**Figure 7. Capacitance**

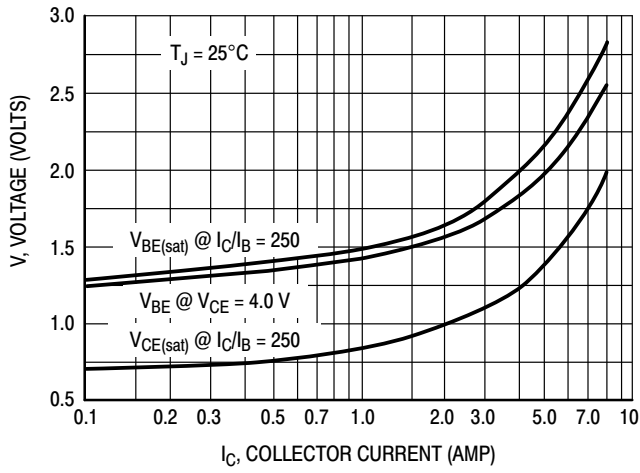


**Figure 8. DC Current Gain**

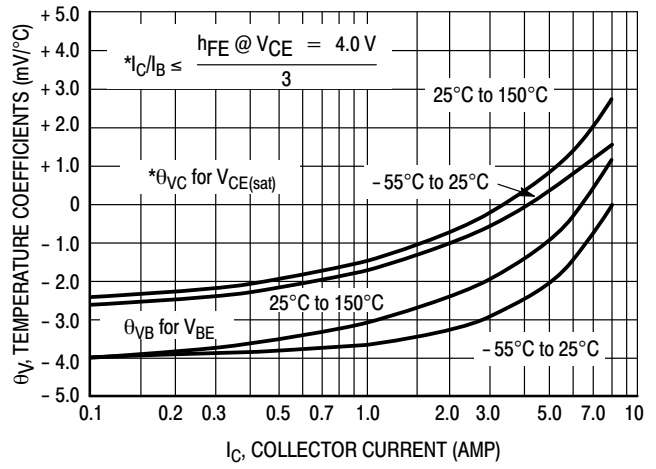


**Figure 9. Collector Saturation Region**

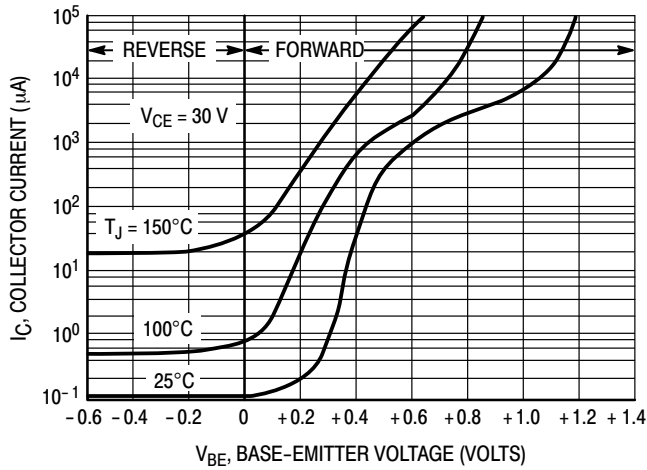
**2N6387, 2N6388**



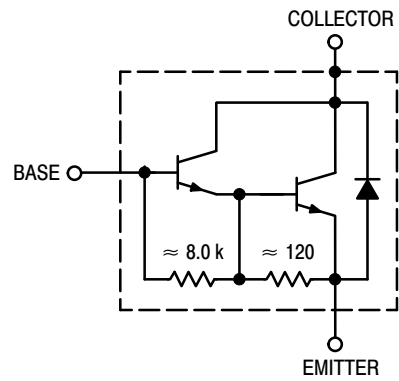
**Figure 10. "On" Voltages**



**Figure 11. Temperature Coefficients**



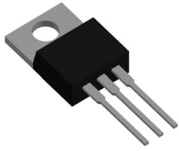
**Figure 12. Collector Cut-Off Region**



**Figure 13. Darlington Schematic**

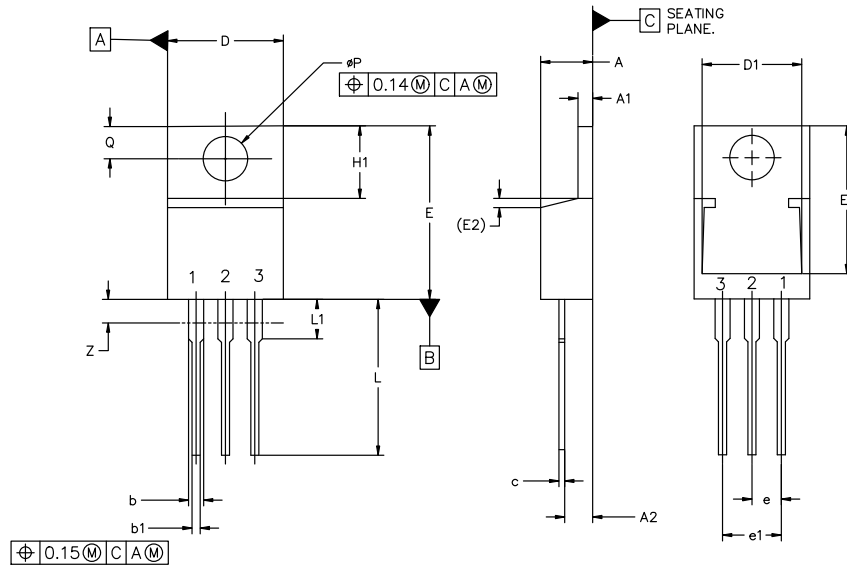


**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**



**TO-220-3 10.10x15.12x4.45, 2.54P**  
**CASE 221A**  
**ISSUE AL**

DATE 05 FEB 2025



MILLIMETERS			
DIM	MIN	NOM	MAX
A	4.07	4.45	4.83
A1	1.15	1.28	1.41
A2	2.04	2.42	2.79
b	1.15	1.34	1.52
b1	0.64	0.80	0.96
c	0.36	0.49	0.61
D	9.66	10.10	10.53
D1	8.43	8.63	8.83
E	14.48	15.12	15.75
E1	12.58	12.78	12.98
E2	1.27 REF		

MILLIMETERS			
DIM	MIN	NOM	MAX
e	2.42	2.54	2.66
e1	4.83	5.08	5.33
H1	5.97	6.22	6.47
L	12.70	13.49	14.27
L1	2.80	3.45	4.10
Q	2.54	2.79	3.04
φP	3.60	3.85	4.09
Z	---	---	3.48

- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

- |  |  |   |  |
|--|--|---|--|
| <p>STYLE 1:<br/>PIN 1. BASE<br/>2. COLLECTOR<br/>3. EMITTER<br/>4. COLLECTOR</p> | <p>STYLE 2:<br/>PIN 1. BASE<br/>2. EMITTER<br/>3. COLLECTOR<br/>4. EMITTER</p> | <p>STYLE 3:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. GATE<br/>4. ANODE</p>    | <p>STYLE 4:<br/>PIN 1. MAIN TERMINAL 1<br/>2. MAIN TERMINAL 2<br/>3. GATE<br/>4. MAIN TERMINAL 2</p> |
| <p>STYLE 5:<br/>PIN 1. GATE<br/>2. DRAIN<br/>3. SOURCE<br/>4. DRAIN</p>          | <p>STYLE 6:<br/>PIN 1. ANODE<br/>2. CATHODE<br/>3. ANODE<br/>4. CATHODE</p>    | <p>STYLE 7:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. CATHODE<br/>4. ANODE</p> | <p>STYLE 8:<br/>PIN 1. CATHODE<br/>2. ANODE<br/>3. EXTERNAL TRIP/DELAY<br/>4. ANODE</p>              |
| <p>STYLE 9:<br/>PIN 1. GATE<br/>2. COLLECTOR<br/>3. EMITTER<br/>4. COLLECTOR</p> | <p>STYLE 10:<br/>PIN 1. GATE<br/>2. SOURCE<br/>3. DRAIN<br/>4. SOURCE</p>      | <p>STYLE 11:<br/>PIN 1. DRAIN<br/>2. SOURCE<br/>3. GATE<br/>4. SOURCE</p>   | <p>STYLE 12:<br/>PIN 1. MAIN TERMINAL 1<br/>2. MAIN TERMINAL 2<br/>3. GATE<br/>4. NOT CONNECTED</p>  |

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<b>DESCRIPTION:</b>	<b>TO-220-3 10.10x15.12x4.45, 2.54P</b>	<b>PAGE 1 OF 1</b>

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