

# Complementary Silicon Plastic Power Transistors

## TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

Designed for use in general purpose amplifier and switching applications.

### Features

- Epoxy Meets UL 94 V-0 @ 0.125 in
- These Devices are Pb-Free and are RoHS Compliant\*

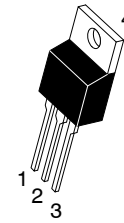
### MAXIMUM RATINGS

Symbol	Rating	Value	Unit
$V_{CEO}$	Collector-Emitter Voltage TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	40 60 80 100	Vdc
$V_{CB}$	Collector-Base Voltage TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	40 60 80 100	Vdc
$V_{EB}$	Emitter-Base Voltage	5.0	Vdc
$I_C$	Collector Current – Continuous	6.0	Adc
$I_{CM}$	Collector Current – Peak	10	Adc
$I_B$	Base Current	2.0	Adc
$P_D$	Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	65 0.52	W W/ $^\circ\text{C}$
$P_D$	Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	2.0 0.016	W W/ $^\circ\text{C}$
E	Unclamped Inductive Load Energy (Note 1)	62.5	mJ
$T_J, T_{stg}$	Operating and Storage Junction, Temperature Range	-65 to +150	$^\circ\text{C}$
HBM	ESD – Human Body Model	3B	V
MM	ESD – Machine Model	C	V

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.

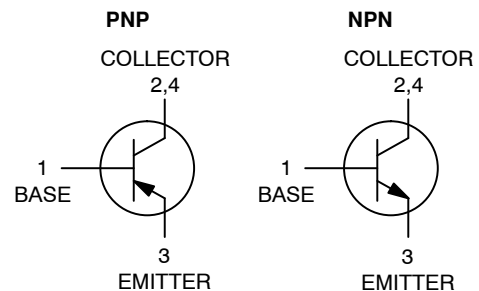
1.  $I_C = 2.5\text{ A}$ ,  $L = 20\text{ mH}$ ,  $P.R.F. = 10\text{ Hz}$ ,  $V_{CC} = 10\text{ V}$ ,  $R_{BE} = 100\ \Omega$ .

\*For additional information on our Pb-Free strategy and soldering details, please download the [onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D](#).

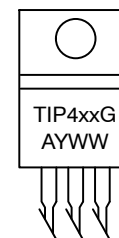


TO-220  
CASE 221A  
STYLE 1

## 6 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 40-60-80-100 VOLTS, 65 WATTS



### MARKING DIAGRAM



TIP4xx = Device Code  
 xx = 1, 1A, 1B, 1C  
       2, 2A, 2B, 2C  
 A = Assembly Location  
 Y = Year  
 WW = Work Week  
 G = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 6.

# TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

## THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.67	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	57	$^{\circ}\text{C}/\text{W}$

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

Min	Characteristic	Symbol	Max	Unit
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### OFF CHARACTERISTICS

40 60 80 100	Collector-Emitter Sustaining Voltage (Note 2) ( $I_C = 30 \text{ mAdc}$ , $I_B = 0$ ) TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	$V_{CEO(sus)}$	– – – –	Vdc
– –	Collector Cutoff Current ( $V_{CE} = 30 \text{ Vdc}$ , $I_B = 0$ ) TIP41G, TIP41AG, TIP42G, TIP42AG ( $V_{CE} = 60 \text{ Vdc}$ , $I_B = 0$ ) TIP41BG, TIP41CG, TIP42BG, TIP42CG	$I_{CEO}$	0.7 0.7	mAdc
– – – –	Collector Cutoff Current ( $V_{CE} = 40 \text{ Vdc}$ , $V_{EB} = 0$ ) TIP41G, TIP42G ( $V_{CE} = 60 \text{ Vdc}$ , $V_{EB} = 0$ ) TIP41AG, TIP42AG ( $V_{CE} = 80 \text{ Vdc}$ , $V_{EB} = 0$ ) TIP41BG, TIP42BG ( $V_{CE} = 100 \text{ Vdc}$ , $V_{EB} = 0$ ) TIP41CG, TIP42CG	$I_{CES}$	400 400 400 400	$\mu\text{Adc}$
–	Emitter Cutoff Current ( $V_{BE} = 5.0 \text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	1.0	mAdc

### ON CHARACTERISTICS (Note 2)

30 15	DC Current Gain ( $I_C = 0.3 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ ) ( $I_C = 3.0 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ )	$h_{FE}$	– 75	–
–	Collector-Emitter Saturation Voltage ( $I_C = 6.0 \text{ Adc}$ , $I_B = 600 \text{ mAdc}$ )	$V_{CE(sat)}$	1.5	Vdc
–	Base-Emitter On Voltage ( $I_C = 6.0 \text{ Adc}$ , $V_{CE} = 4.0 \text{ Vdc}$ )	$V_{BE(on)}$	2.0	Vdc

### DYNAMIC CHARACTERISTICS

3.0	Current-Gain – Bandwidth Product ( $I_C = 500 \text{ mAdc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f_{test} = 1.0 \text{ MHz}$ )	$f_T$	–	MHz
20	Small-Signal Current Gain ( $I_C = 0.5 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $f = 1.0 \text{ kHz}$ )	$h_{fe}$	–	–

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

# TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

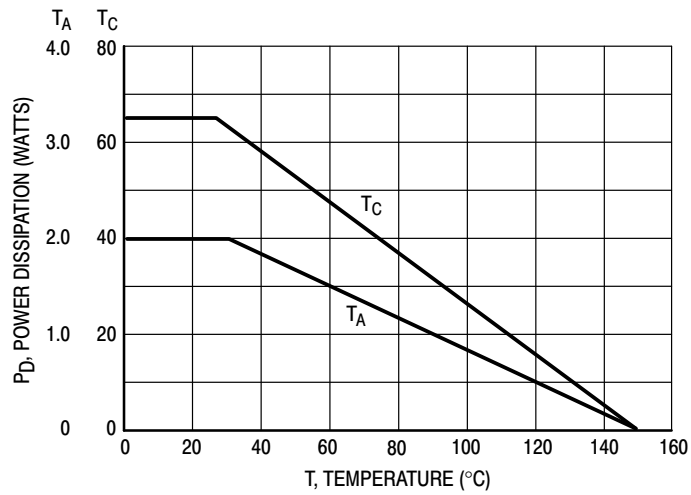
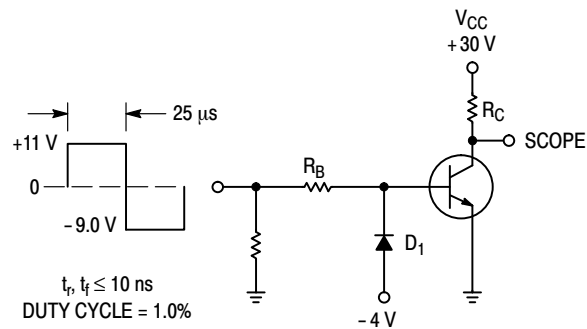


Figure 1. Power Derating



$R_B$  and  $R_C$  VARIED TO OBTAIN DESIRED CURRENT LEVELS  
 $D_1$  MUST BE FAST RECOVERY TYPE, e.g.:  
 1N5825 USED ABOVE  $I_B \approx 100\text{ mA}$   
 MSD6100 USED BELOW  $I_B \approx 100\text{ mA}$

Figure 2. Switching Time Test Circuit

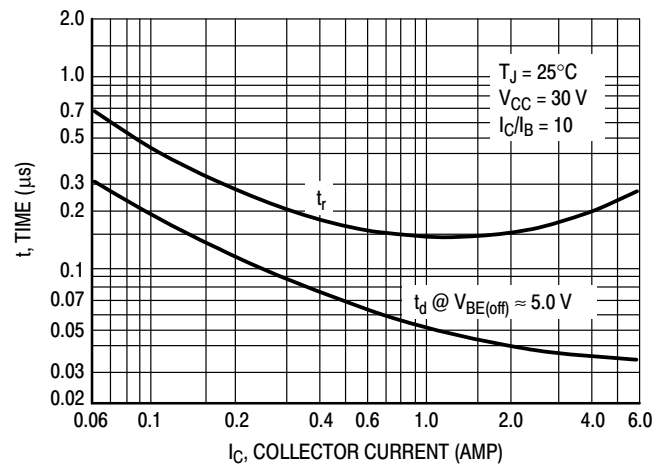


Figure 3. Turn-On Time

# TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

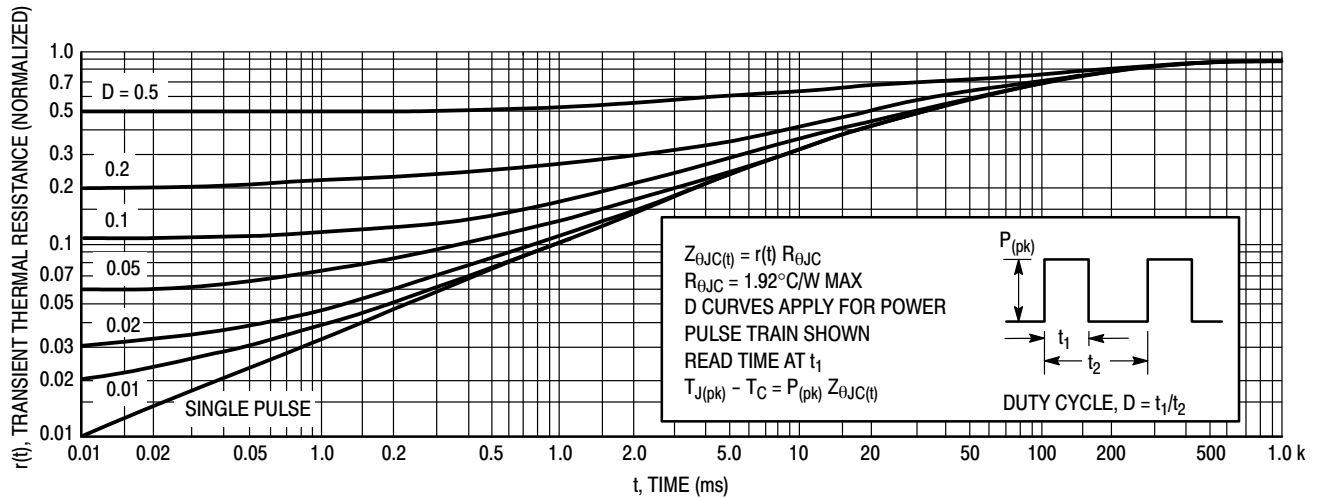


Figure 4. Thermal Response

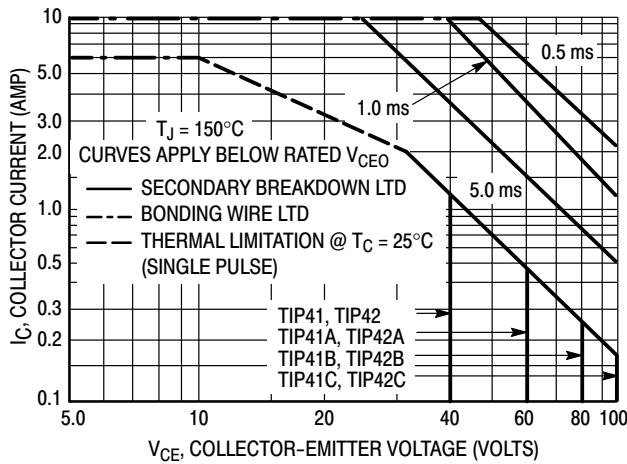


Figure 5. Active-Region Safe Operating Area

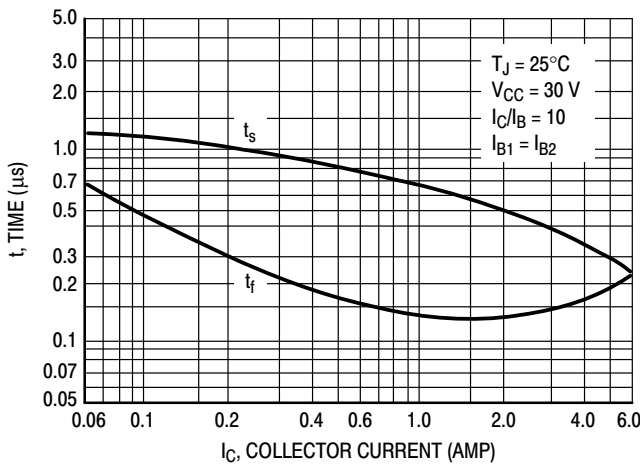


Figure 6. Turn-Off Time

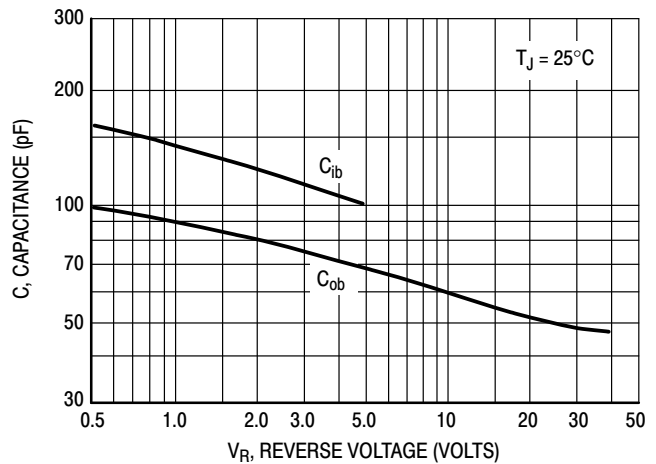


Figure 7. Capacitance

# TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

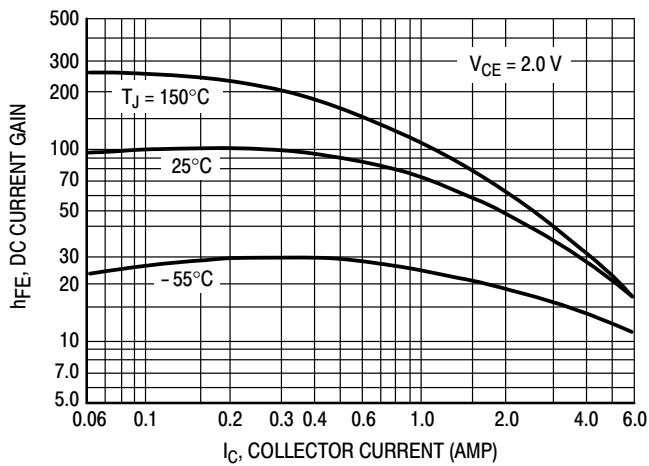


Figure 8. DC Current Gain

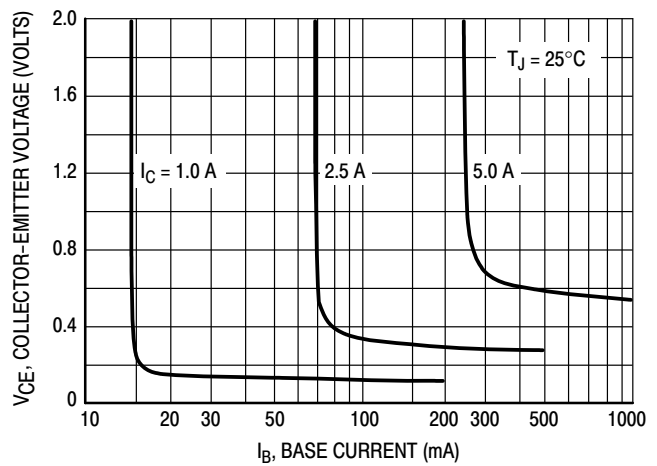


Figure 9. Collector Saturation Region

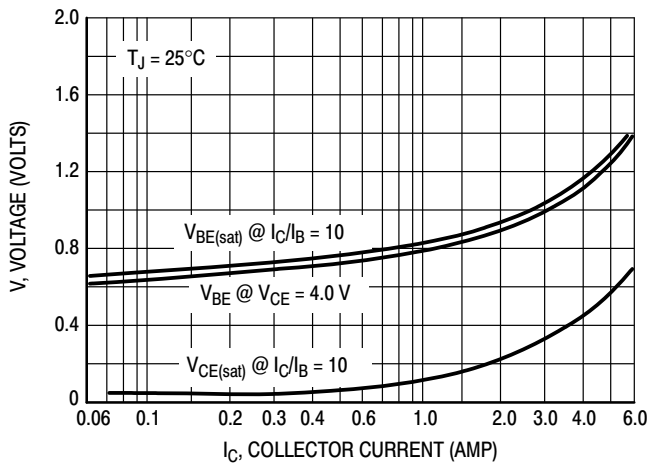


Figure 10. "On" Voltages

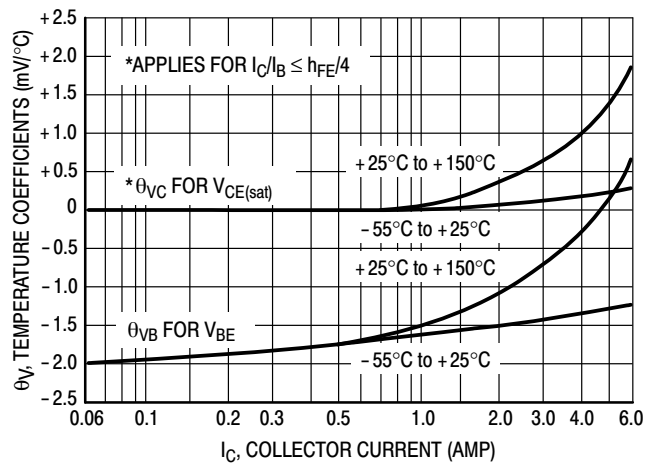


Figure 11. Temperature Coefficients

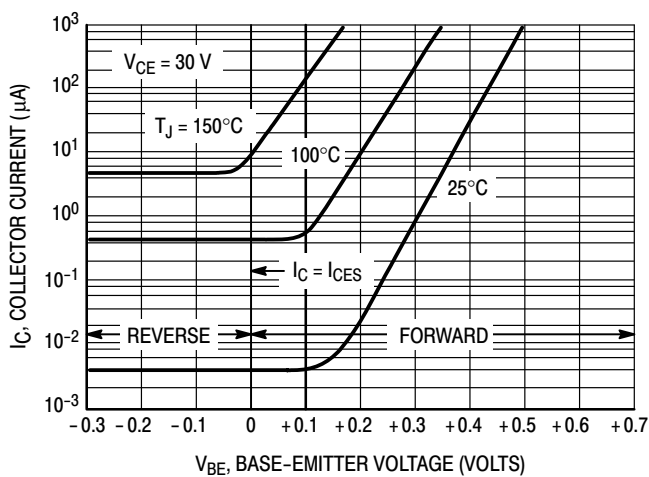


Figure 12. Collector Cut-Off Region

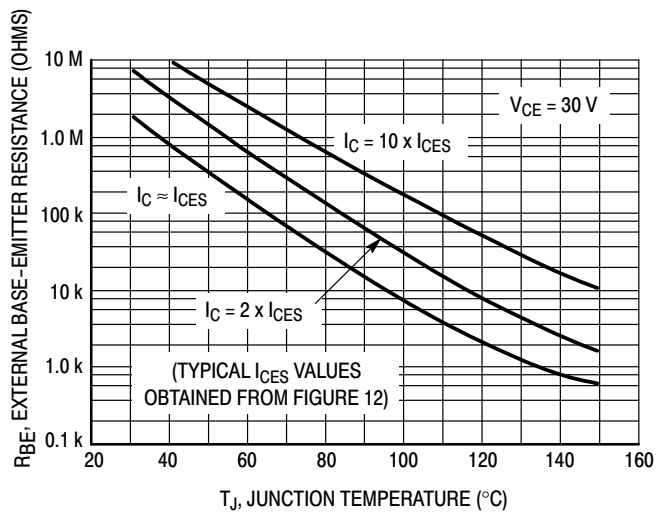


Figure 13. Effects of Base-Emitter Resistance

# TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

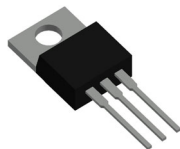
## ORDERING INFORMATION

Device	Package	Shipping
TIP41BG	TO-220 (Pb-Free)	50 Units / Rail
TIP41CG	TO-220 (Pb-Free)	50 Units / Rail
TIP42AG	TO-220 (Pb-Free)	50 Units / Rail
TIP42CG	TO-220 (Pb-Free)	50 Units / Rail

## DISCONTINUED (Note 3)

TIP41G	TO-220 (Pb-Free)	50 Units / Rail
TIP41AG	TO-220 (Pb-Free)	50 Units / Rail
TIP42G	TO-220 (Pb-Free)	50 Units / Rail
TIP42BG	TO-220 (Pb-Free)	50 Units / Rail

3. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on [www.onsemi.com](http://www.onsemi.com).

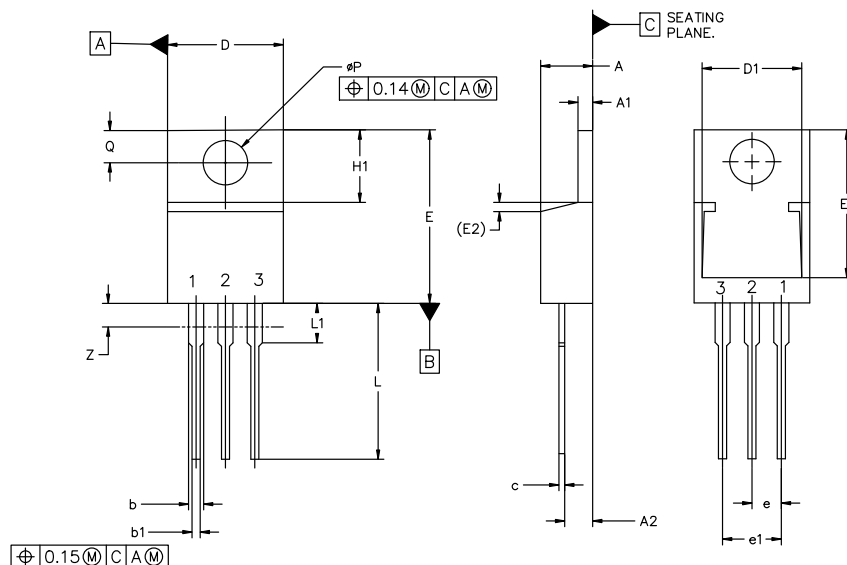


TO-220-3 10.10x15.12x4.45, 2.54P

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
øP	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.

STYLE 1:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

STYLE 2:  
PIN 1. BASE  
2. EMITTER  
3. COLLECTOR  
4. EMITTER

STYLE 3:  
PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

STYLE 4:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. MAIN TERMINAL 2

STYLE 5:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE  
4. DRAIN

STYLE 6:  
PIN 1. ANODE  
2. CATHODE  
3. ANODE  
4. CATHODE

STYLE 7:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE  
4. ANODE

STYLE 8:  
PIN 1. CATHODE  
2. ANODE  
3. EXTERNAL TRIP/DELAY  
4. ANODE

STYLE 9:  
PIN 1. GATE  
2. COLLECTOR  
3. EMITTER  
4. COLLECTOR

STYLE 10:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN  
4. SOURCE

STYLE 11:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE  
4. SOURCE

STYLE 12:  
PIN 1. MAIN TERMINAL 1  
2. MAIN TERMINAL 2  
3. GATE  
4. NOT CONNECTED

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

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