

BD241C (NPN), BD242B (PNP), BD242C (PNP)

Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications.

Features

- High Current Gain – Bandwidth Product
- Compact TO-220 AB Package
- Epoxy Meets UL94 V-0 @ 0.125 in
- These Devices are Pb-Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	BD242B	BD241C BD242C	Unit
Collector-Emitter Voltage	V_{CEO}	80	100	Vdc
Collector-Emitter Voltage	V_{CES}	90	115	Vdc
Emitter-Base Voltage	V_{EB}		5.0	Vdc
Collector Current – Continuous	I_C		3.0	Adc
Collector Current – Peak	I_{CM}		5.0	Adc
Base Current	I_B		1.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D		40 0.32	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}		-65 to +150	$^\circ\text{C}$
ESD – Human Body Model	HBM		3B	V
ESD – Machine Model	MM		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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62.5	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.125	$^\circ\text{C/W}$

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

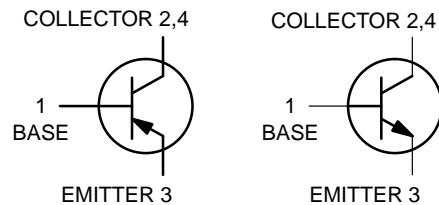


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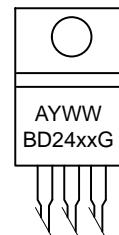
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POWER TRANSISTORS
COMPLEMENTARY
SILICON
3 AMP
80–100 VOLTS
40 WATTS

COMPLEMENTARY



MARKING DIAGRAM



BD24xx = Device Code
xx = 1C, 2B, or 2C
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

ORDERING INFORMATION

Device	Package	Shipping [†]
BD241CG	TO-220 (Pb-Free)	50 Units/Rail
BD242BG	TO-220 (Pb-Free)	50 Units/Rail
BD242CG	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.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 30 \text{ mA}_\text{dc}$, $I_B = 0$) BD242B BD241C, BD242C	V_{CEO}	80 100		Vdc
Collector Cutoff Current ($V_{\text{CE}} = 50 \text{ Vdc}$, $I_B = 0$) ($V_{\text{CE}} = 60 \text{ Vdc}$, $I_B = 0$) BD242B BD241C, BD242C	I_{CEO}		0.3	mA_dc
Collector Cutoff Current ($V_{\text{CE}} = 80 \text{ Vdc}$, $V_{\text{EB}} = 0$) ($V_{\text{CE}} = 100 \text{ Vdc}$, $V_{\text{EB}} = 0$) BD242B BD241C, BD242C	I_{CES}		200	μA_dc
Emitter Cutoff Current ($V_{\text{BE}} = 5.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}		1.0	mA_dc
ON CHARACTERISTICS (Note 1)				
DC Current Gain ($I_C = 1.0 \text{ Adc}$, $V_{\text{CE}} = 4.0 \text{ Vdc}$) ($I_C = 3.0 \text{ Adc}$, $V_{\text{CE}} = 4.0 \text{ Vdc}$)	h_{FE}	25 10		
Collector-Emitter Saturation Voltage ($I_C = 3.0 \text{ Adc}$, $I_B = 0.6 \text{ Adc}$)	$V_{\text{CE}(\text{sat})}$		1.2	Vdc
Base-Emitter On Voltage ($I_C = 3.0 \text{ Adc}$, $V_{\text{CE}} = 4.0 \text{ Vdc}$)	$V_{\text{BE}(\text{on})}$		1.8	Vdc
DYNAMIC CHARACTERISTICS				
Current Gain – Bandwidth Product (Note 2) ($I_C = 500 \text{ mA}_\text{dc}$, $V_{\text{CE}} = 10 \text{ Vdc}$, $f_{\text{test}} = 1.0 \text{ MHz}$)	f_T	3.0		MHz
Small-Signal Current Gain ($I_C = 0.5 \text{ Adc}$, $V_{\text{CE}} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	20		

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.

1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.
2. $f_T = |h_{\text{fe}}| \cdot f_{\text{test}}$.

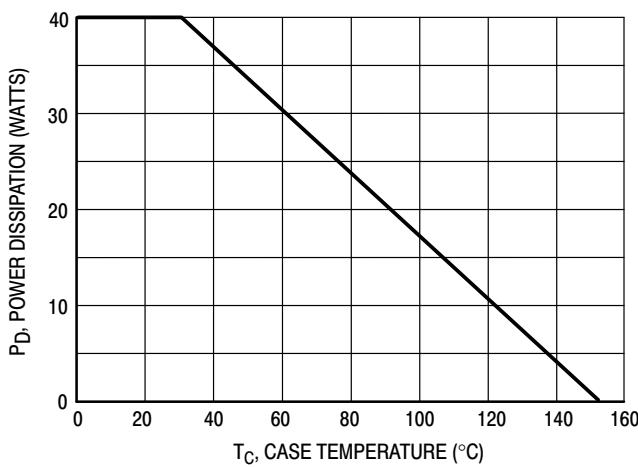


Figure 1. Power Derating

BD241C (NPN), BD242B (PNP), BD242C (PNP)

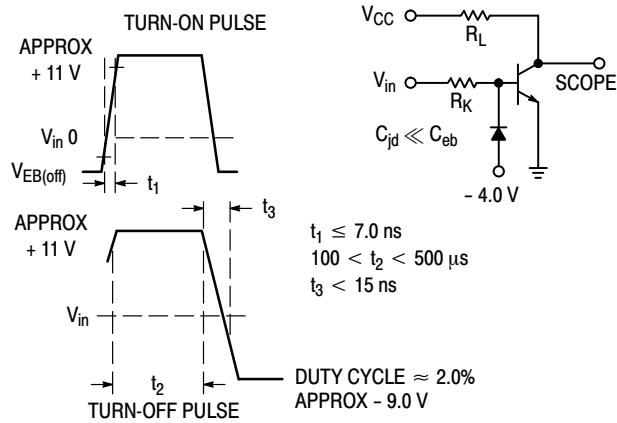


Figure 2. Switching Time Equivalent Circuit

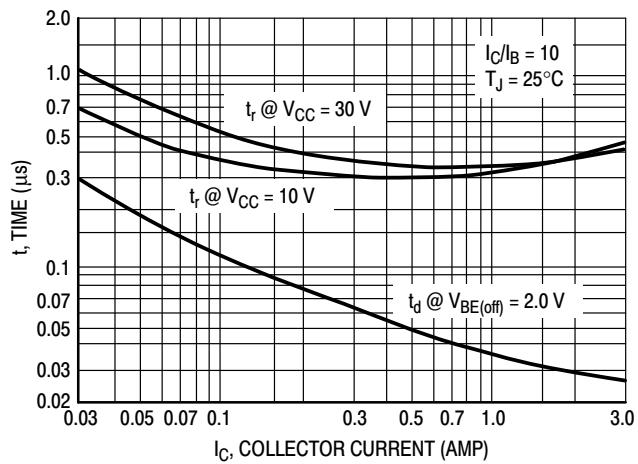


Figure 3. Turn-On Time

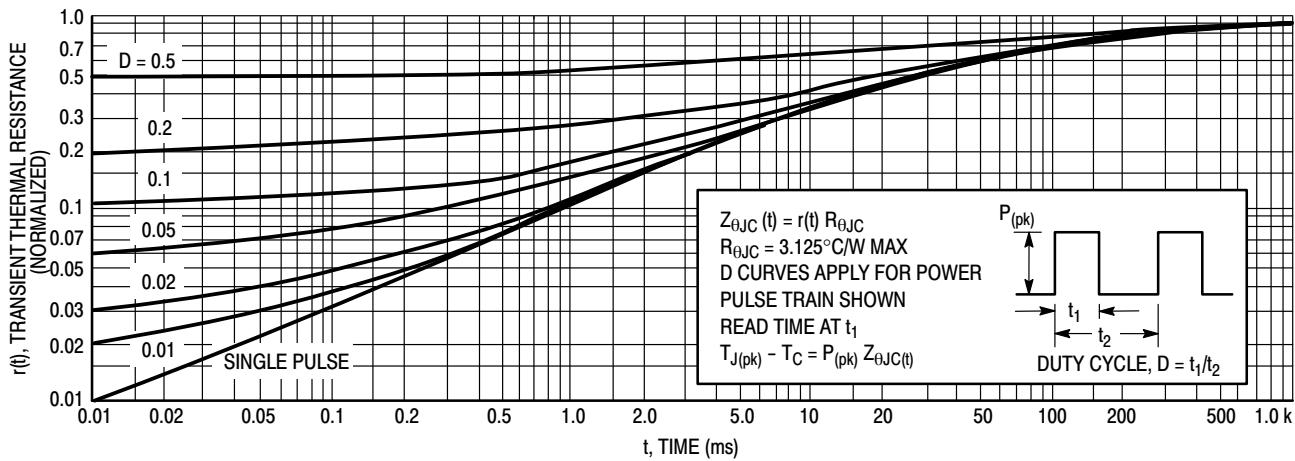


Figure 4. Thermal Response

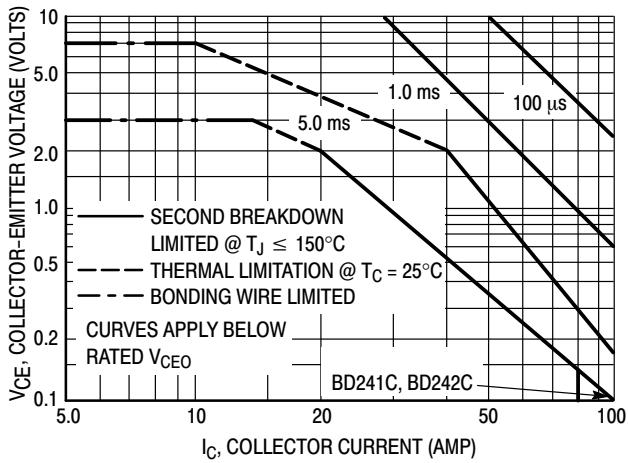


Figure 5. Active Region Safe Operating Area

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 $T_{j(pk)} \leq 150^\circ\text{C}$. $T_{j(pk)}$ 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.

BD241C (NPN), BD242B (PNP), BD242C (PNP)

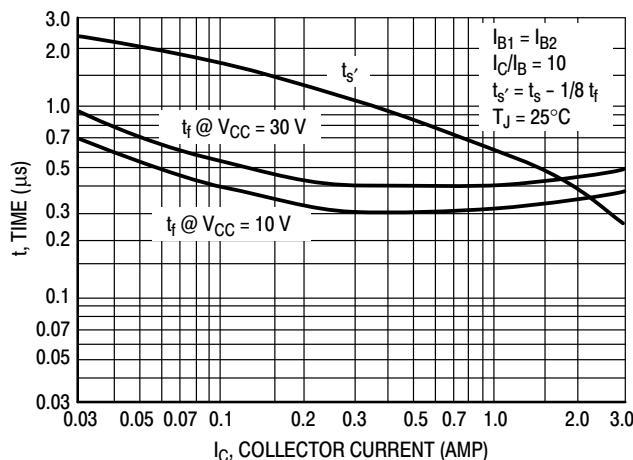


Figure 6. Turn-Off Time

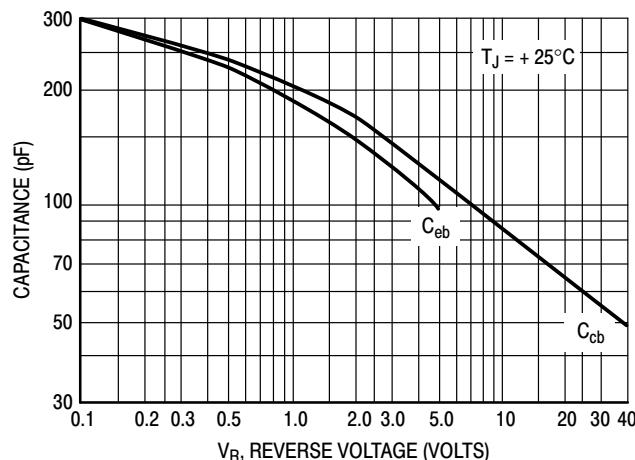


Figure 7. Capacitance

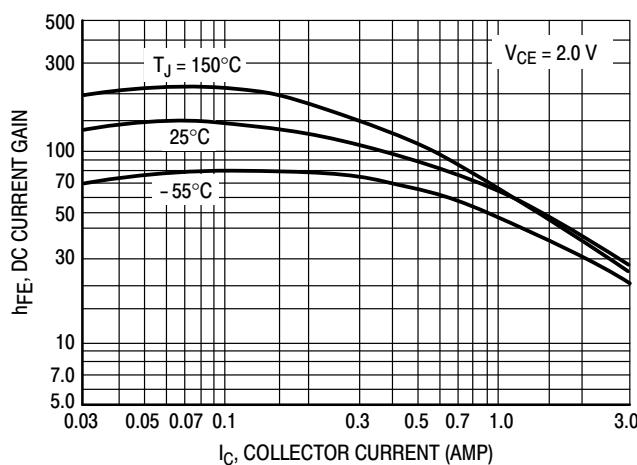


Figure 8. DC Current Gain

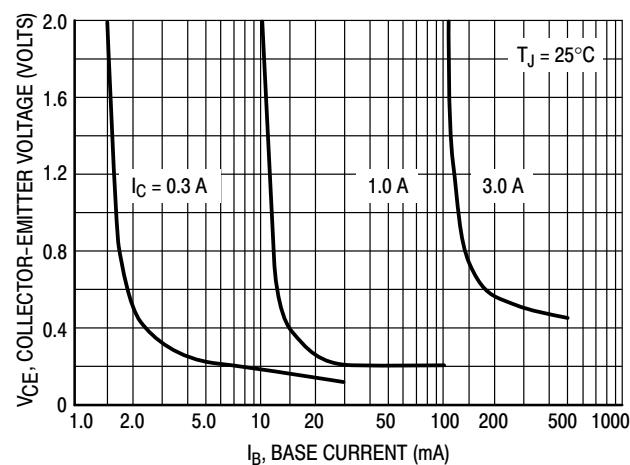


Figure 9. Collector Saturation Region

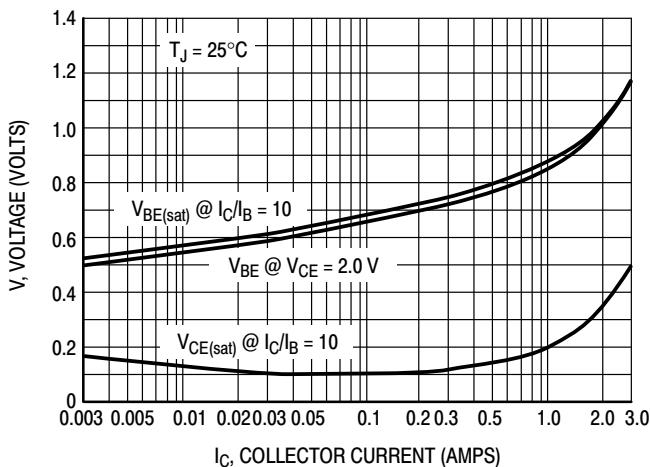


Figure 10. "On" Voltages

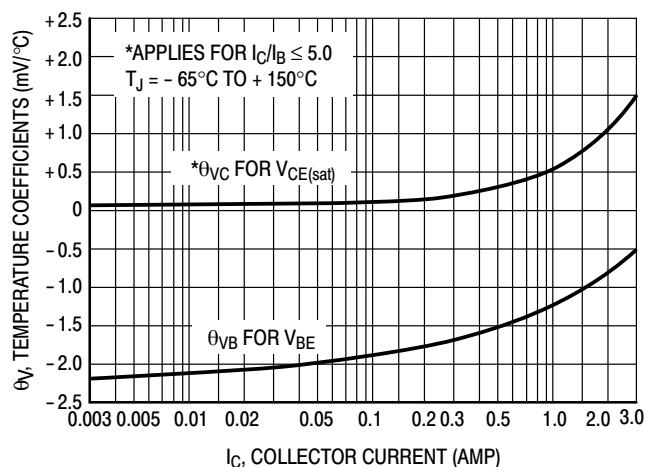


Figure 11. Temperature Coefficients

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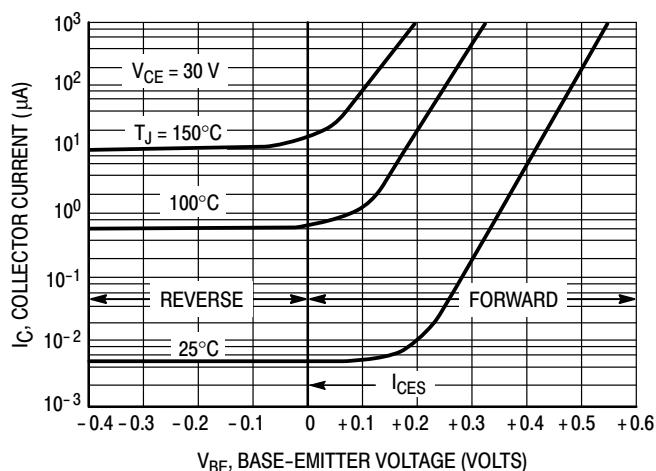


Figure 12. Collector Cut-Off Region

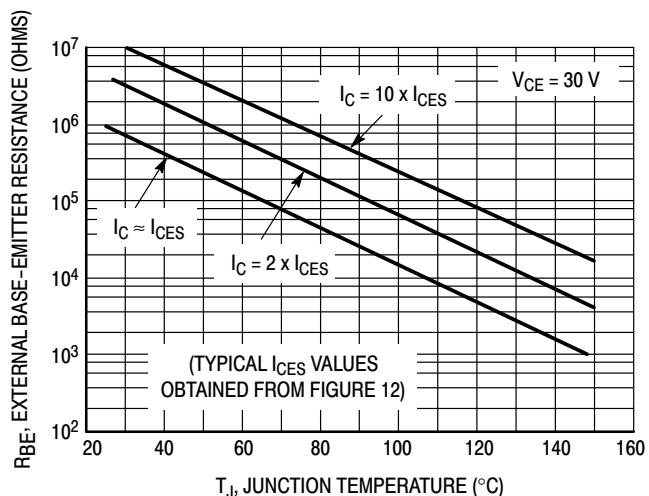


Figure 13. Effects of Base-Emitter Resistance

MECHANICAL CASE OUTLINE

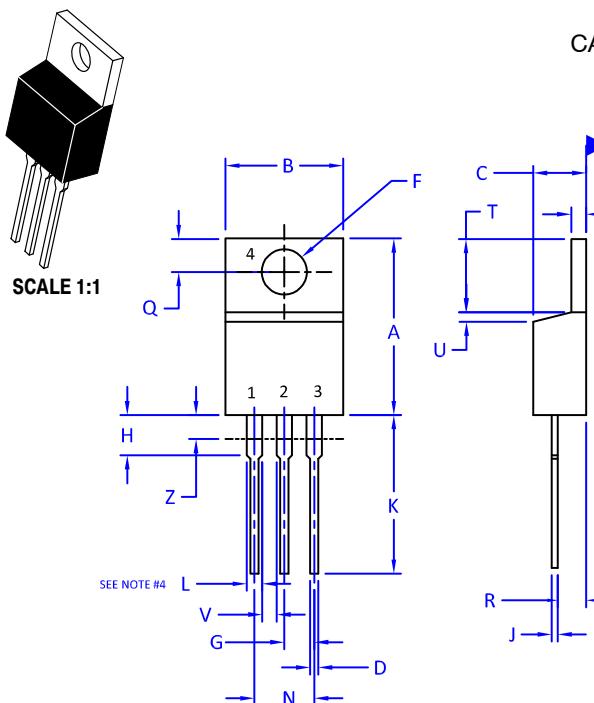
PACKAGE DIMENSIONS

ON Semiconductor®



TO-220 CASE 221A-09 ISSUE AJ

DATE 05 NOV 2019



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

DIM	INCHES		MILLIMETERS	
	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.41
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	----	1.15	---
Z	----	0.080	---	2.04

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

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

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

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

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

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

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

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

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

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

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

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

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DESCRIPTION:	TO-220	PAGE 1 OF 1

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