TIP29, A, B, C (NPN), TIP30, A, B, C (PNP)

Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications. Compact TO−220 package.

Features

- These Devices are Pb−Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector − Emitter Voltage TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG	V_{CEO}	 40 60 80 100	Vdc
Collector − Base Voltage TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG	V_{CB}	 40 60 80 100	Vdc
Emitter − Base Voltage	V_{EB}	5.0	Vdc
Collector Current − Continuous	I_C	1.0	Adc
Collector Current − Peak	I_{CM}	3.0	Adc
Base Current	I_B	0.4	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	 30 0.24	 W W/°C
Total Power Dissipation @ T_A = 25°C Derate above 25°C	P_D	 2.0 0.016	 W W/°C
Unclamped Inductive Load Energy (Note 1)	E	32	mJ
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°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. This rating based on testing with L_C = 20 mH, R_{BE} = 100 Ω, V_{CC} = 10 V, I_C = 1.8 A, P.R.F = 10 Hz

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	4.167	°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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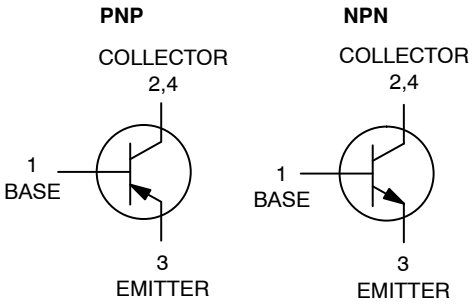
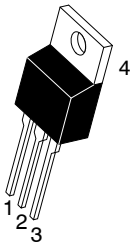
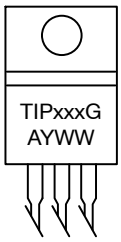
1 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 40, 60, 80, 100 VOLTS, 80 WATTS





TO−220
CASE 221A
STYLE 1

MARKING DIAGRAM



TIPxxx	=	Device Code: 29, 29A, 29B, 29C 30, 30A, 30B, 30C
A	=	Assembly Location
Y	=	Year
WW	=	Work Week
G	=	Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (I_C = 30 mAdc, I_B = 0) (Note 2)	$V_{CEO(sus)}$			Vdc
TIP29G, TIP30G		40	–	
TIP29AG, TIP30AG		60	–	
TIP29BG, TIP30BG		80	–	
TIP29CG, TIP30CG		100	–	
Collector Cutoff Current (V_{CE} = 30 Vdc, I_B = 0)	I_{CEO}			mAdc
TIP29G, TIP29AG, TIP30G, TIP30AG		–	0.3	
(V_{CE} = 60 Vdc, I_B = 0)				
TIP29BG, TIP29CG, TIP30BG, TIP30CG		–	0.3	
Collector Cutoff Current (V_{CE} = 40 Vdc, V_{EB} = 0)	I_{CES}			μAdc
TIP29G, TIP30G		–	200	
(V_{CE} = 60 Vdc, V_{EB} = 0)				
TIP29AG, TIP30AG		–	200	
(V_{CE} = 80 Vdc, V_{EB} = 0)				
TIP29BG, TIP30BG		–	200	
(V_{CE} = 100 Vdc, V_{EB} = 0)				
TIP29CG, TIP30CG		–	200	
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	–	1.0	mAdc
ON CHARACTERISTICS (Note 2)				
DC Current Gain	h_{FE}			–
(I_C = 0.2 Adc, V_{CE} = 4.0 Vdc)		40	–	
(I_C = 1.0 Adc, V_{CE} = 4.0 Vdc)		15	75	
Collector−Emitter Saturation Voltage (I_C = 1.0 Adc, I_B = 125 mAdc)	$V_{CE(sat)}$	–	0.7	Vdc
Base−Emitter On Voltage (I_C = 1.0 Adc, V_{CE} = 4.0 Vdc)	$V_{BE(on)}$	–	1.3	Vdc
DYNAMIC CHARACTERISTICS				
Current−Gain − Bandwidth Product (Note 3) (I_C = 200 mAdc, V_{CE} = 10 Vdc, f_{test} = 1.0 MHz)	f_T	3.0	–	MHz
Small−Signal Current Gain (I_C = 0.2 Adc, V_{CE} = 10 Vdc, f = 1.0 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.

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%
3. $f_T = |h_{fe}| \bullet f_{test}$

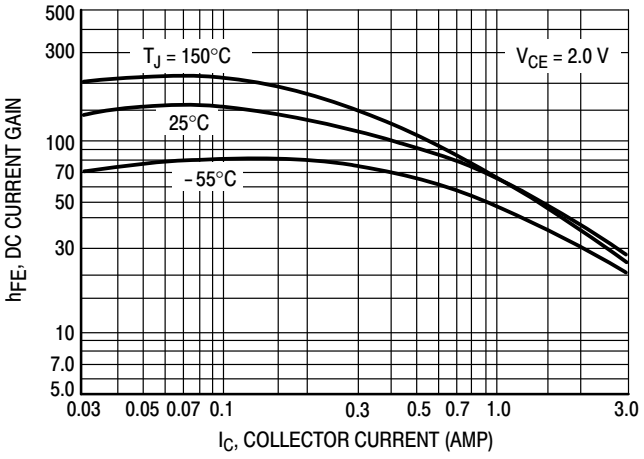


Figure 1. DC Current Gain

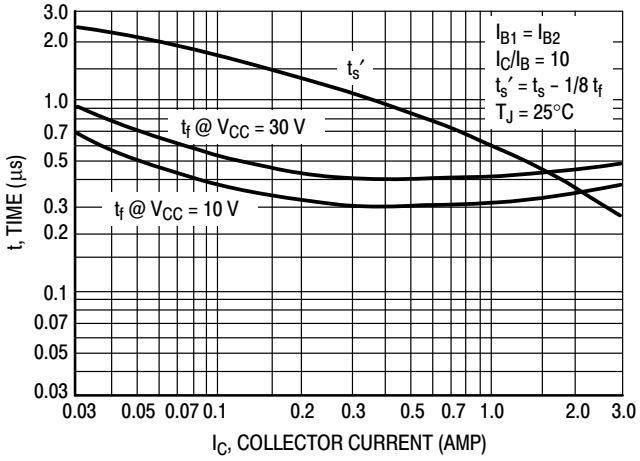


Figure 2. Turn−Off Time

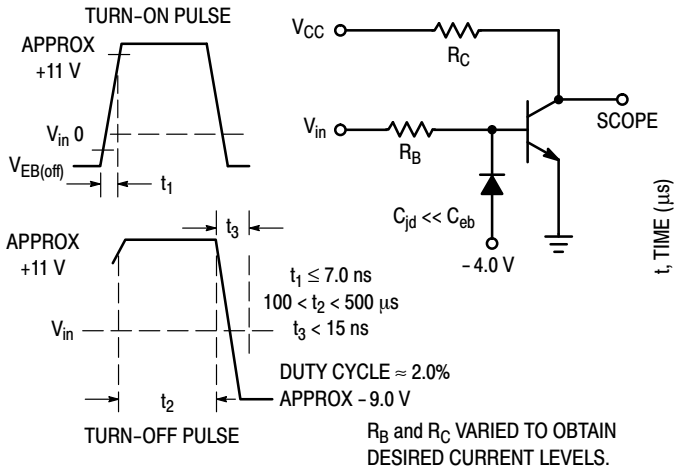


Figure 3. Switching Time Equivalent Circuit

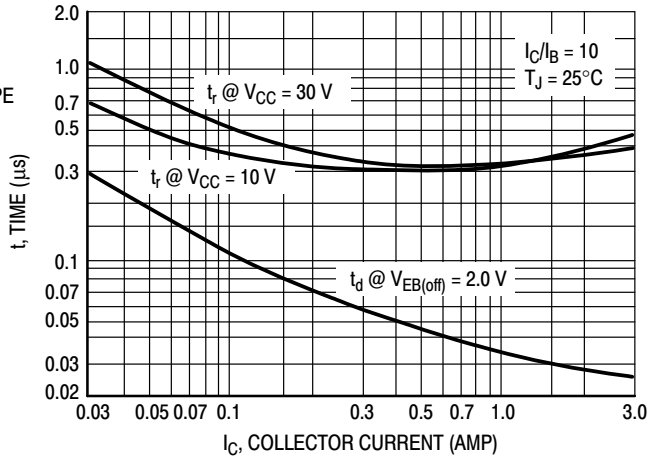


Figure 4. Turn−On Time

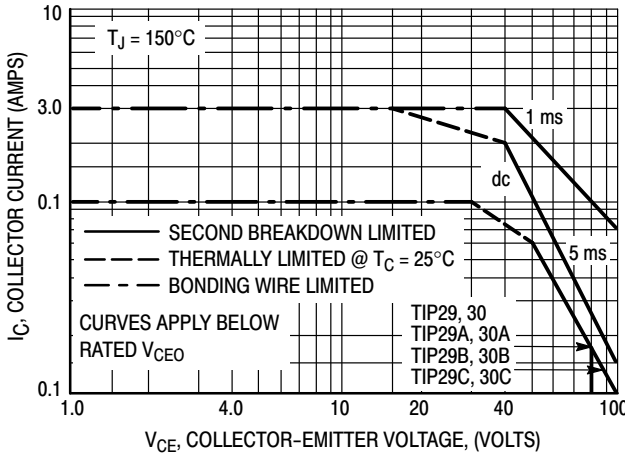


Figure 5. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate $I_C - V_{CE}$ 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°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \le 150°C$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

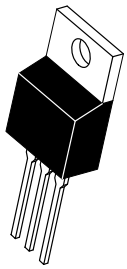
ORDERING INFORMATION

Device	Package	Shipping
TIP29G	TO−220 (Pb−Free)	50 Units / Rail
TIP29AG	TO−220 (Pb−Free)	50 Units / Rail
TIP29BG	TO−220 (Pb−Free)	50 Units / Rail
TIP29CG	TO−220 (Pb−Free)	50 Units / Rail
TIP30G	TO−220 (Pb−Free)	50 Units / Rail
TIP30AG	TO−220 (Pb−Free)	50 Units / Rail
TIP30BG	TO−220 (Pb−Free)	50 Units / Rail
TIP30CG	TO−220 (Pb−Free)	50 Units / Rail

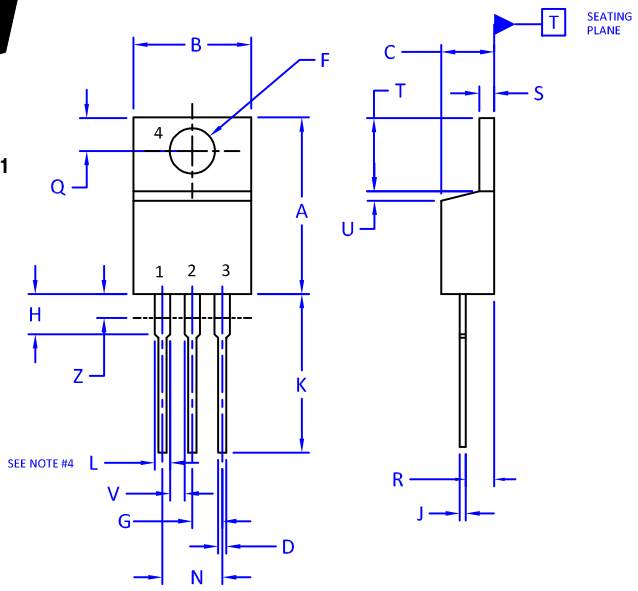
MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

TO−220
CASE 221A
ISSUE AK

DATE 13 JAN 2022



SCALE 1:1



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

	INCHES		MILLIMETERS	
DIM	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 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**	**PAGE 1 OF 1**

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