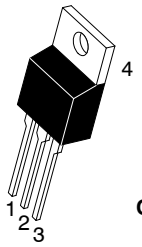
Complementary Silicon Plastic Power Transistors

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

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

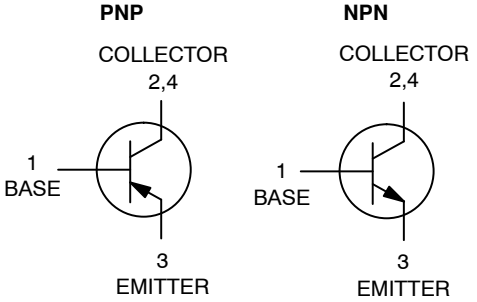


TO−220
CASE 221A
STYLE 1

Features

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

1 AMPERE
POWER TRANSISTORS
COMPLEMENTARY SILICON
40, 60, 80, 100 VOLTS,
80 WATTS



MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{CEO}	Collector − Emitter Voltage TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG	 40 60 80 100	Vdc
V_{CB}	Collector − Base Voltage TIP29G, TIP30G TIP29AG, TIP30AG TIP29BG, TIP30BG TIP29CG, TIP30CG	 40 60 80 100	Vdc
V_{EB}	Emitter − Base Voltage	5.0	Vdc
I_C	Collector Current − Continuous	1.0	Adc
I_{CM}	Collector Current − Peak	3.0	Adc
I_B	Base Current	0.4	Adc
P_D	Total Power Dissipation @ T_C = 25°C Derate above 25°C	 30 0.24	 W W/°C
P_D	Total Power Dissipation @ T_A = 25°C Derate above 25°C	 2.0 0.016	 W W/°C
E	Unclamped Inductive Load Energy (Note 1)	32	mJ
T_J, T_{stg}	Operating and Storage Junction Temperature Range	−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.

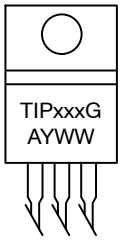
1. This rating based on testing with L_C = 20 mH, R_{BE} = 100 Ω, V_{CC} = 10 V, I_C = 1.8 A, P.R.F = 10 Hz

THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction−to−Ambient	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction−to−Case	4.167	°C/W

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

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)

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

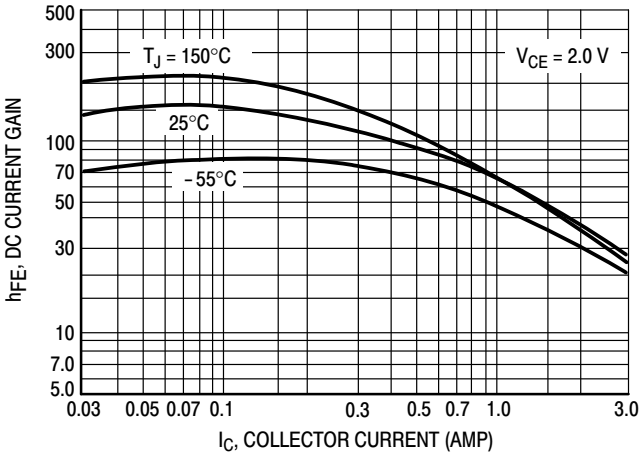


Figure 1. DC Current Gain

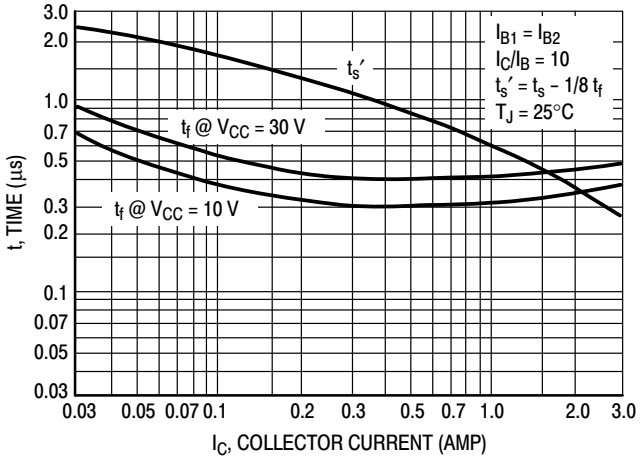


Figure 2. Turn−Off Time

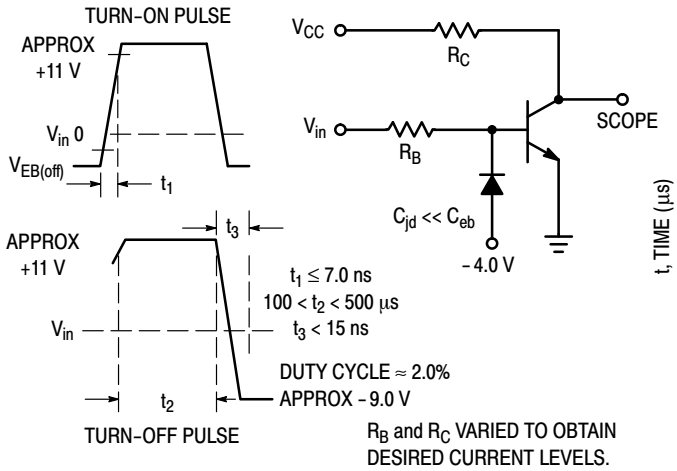


Figure 3. Switching Time Equivalent Circuit

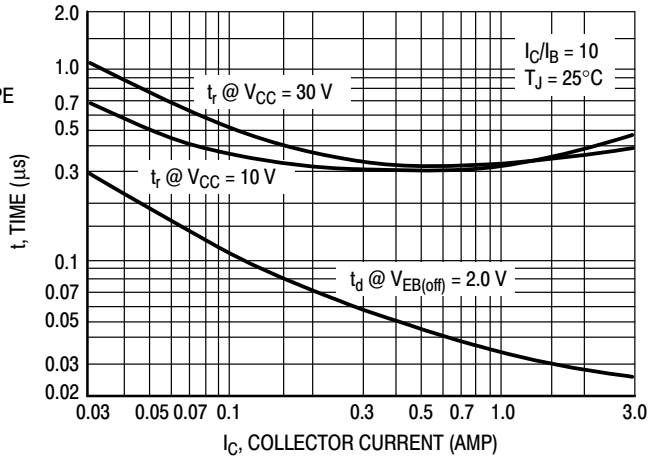


Figure 4. Turn−On Time

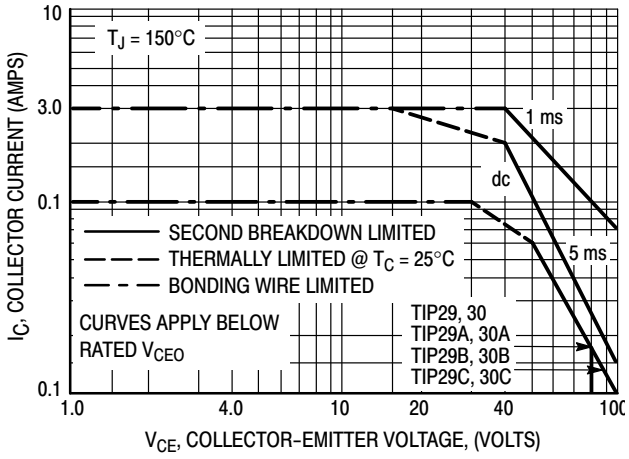


Figure 5. Active Region Safe Operating Area

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.

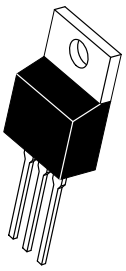
The data of Figure 5 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \le 150°C$. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the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

ORDERING INFORMATION

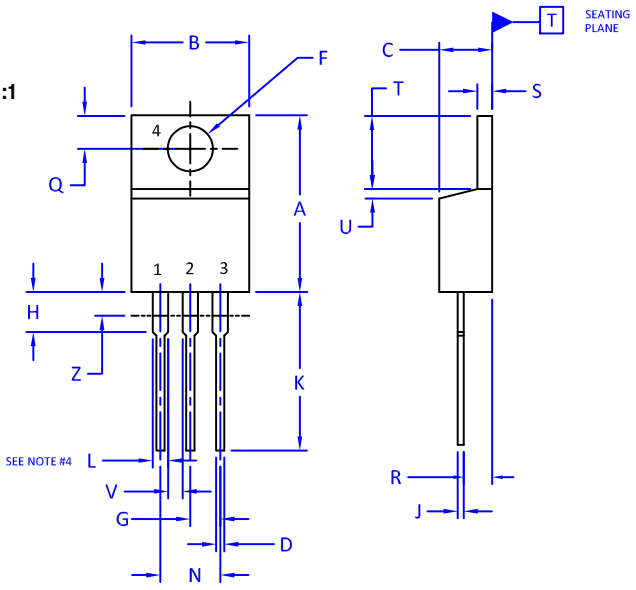
Device	Package	Shipping
TIP29G	TO−220 (Pb−Free)	50 Units / Rail
TIP29AG	TO−220 (Pb−Free)	50 Units / Rail
TIP29BG	TO−220 (Pb−Free)	50 Units / Rail
TIP29CG	TO−220 (Pb−Free)	50 Units / Rail
TIP30G	TO−220 (Pb−Free)	50 Units / Rail
TIP30AG	TO−220 (Pb−Free)	50 Units / Rail
TIP30BG	TO−220 (Pb−Free)	50 Units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

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**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales