TIP41, TIP41A, TIP41B, TIP41C (NPN); TIP42, TIP42A, TIP42B, TIP42C (PNP)

Complementary Silicon Plastic Power Transistors

Designed for use in general purpose amplifier and switching applications.

Features

- ESD Ratings: Machine Model, C; > 400 V
  Human Body Model, 3B; > 8000 V
- Epoxy Meets UL 94 V−0 @ 0.125 in
- Pb−Free Packages are Available*

MAXIMUM RATINGS

Rating		Symbol	Value	Unit
Collector−Emitter Voltage	TIP41, TIP42 TIP41A, TIP42A TIP41B, TIP42B TIP41C, TIP42C	V_{CEO}	40 60 80 100	Vdc
Collector−Base Voltage	TIP41, TIP42 TIP41A, TIP42A TIP41B, TIP42B TIP41C, TIP42C	V_{CB}	40 60 80 100	Vdc
Emitter−Base Voltage		V_{EB}	5.0	Vdc
Collector Current−	Continuous Peak	I_C	6.0 10	Adc
Base Current		I_B	2.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C		P_D	65 0.52	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	62.5	mJ
Operating and Storage Junction, Temperature Range		T_J, T_{stg}	−65 to +150	°C

THERMAL CHARACTERISTICS

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

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

ON Semiconductor®

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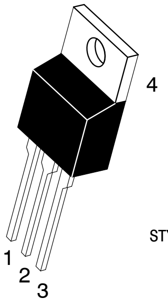
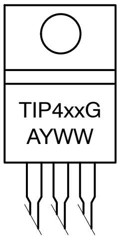
**6 AMPERE
COMPLEMENTARY SILICON
POWER TRANSISTORS
40−60−80−100 VOLTS,
65 WATTS**



**TO−220AB
CASE 221A
STYLE 1**

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

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 in the package dimensions section on page 2 of this data sheet.

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

June, 2012 − Rev. 9

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

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Sustaining Voltage (Note 2)	TIP41, TIP42	$V_{CEO(sus)}$	40	–	Vdc
(I_C = 30 mAdc, I_B = 0)	TIP41A, TIP42A		60	–	
	TIP41B, TIP42B		80	–	
	TIP41C, TIP42C		100	–	
Collector Cutoff Current		I_{CEO}			mAdc
(V_{CE} = 30 Vdc, I_B = 0)	TIP41, TIP41A, TIP42, TIP42A		–	0.7	
(V_{CE} = 60 Vdc, I_B = 0)	TIP41B, TIP41C, TIP42B, TIP42C		–	0.7	
Collector Cutoff Current		I_{CES}			μAdc
(V_{CE} = 40 Vdc, V_{EB} = 0)	TIP41, TIP42		–	400	
(V_{CE} = 60 Vdc, V_{EB} = 0)	TIP41A, TIP42A		–	400	
(V_{CE} = 80 Vdc, V_{EB} = 0)	TIP41B, TIP42B		–	400	
(V_{CE} = 100 Vdc, V_{EB} = 0)	TIP41C, TIP42C		–	400	
Emitter Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	1.0	mAdc
ON CHARACTERISTICS (Note 2)					
DC Current Gain (I_C = 0.3 Adc, V_{CE} = 4.0 Vdc)		h_{FE}	30	–	–
(I_C = 3.0 Adc, V_{CE} = 4.0 Vdc)			15	75	
Collector−Emitter Saturation Voltage (I_C = 6.0 Adc, I_B = 600 mAdc)		$V_{CE(sat)}$	–	1.5	Vdc
Base−Emitter On Voltage (I_C = 6.0 Adc, V_{CE} = 4.0 Vdc)		$V_{BE(on)}$	–	2.0	Vdc
DYNAMIC CHARACTERISTICS					
Current−Gain — Bandwidth Product (I_C = 500 mAdc, V_{CE} = 10 Vdc, f_{test} = 1.0 MHz)		f_T	3.0	–	MHz
Small−Signal Current Gain (I_C = 0.5 Adc, V_{CE} = 10 Vdc, f = 1.0 kHz)		h_{fe}	20	–	–

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

ORDERING INFORMATION

Device	Package	Shipping
TIP41	TO−220	50 Units / Rail
TIP41G	TO−220 (Pb−Free)	50 Units / Rail
TIP41A	TO−220	50 Units / Rail
TIP41AG	TO−220 (Pb−Free)	50 Units / Rail
TIP41B	TO−220	50 Units / Rail
TIP41BG	TO−220 (Pb−Free)	50 Units / Rail
TIP41C	TO−220	50 Units / Rail
TIP41CG	TO−220 (Pb−Free)	50 Units / Rail
TIP42	TO−220	50 Units / Rail
TIP42G	TO−220 (Pb−Free)	50 Units / Rail
TIP42A	TO−220	50 Units / Rail
TIP42AG	TO−220 (Pb−Free)	50 Units / Rail
TIP42B	TO−220	50 Units / Rail
TIP42BG	TO−220 (Pb−Free)	50 Units / Rail
TIP42C	TO−220	50 Units / Rail
TIP42CG	TO−220 (Pb−Free)	50 Units / Rail

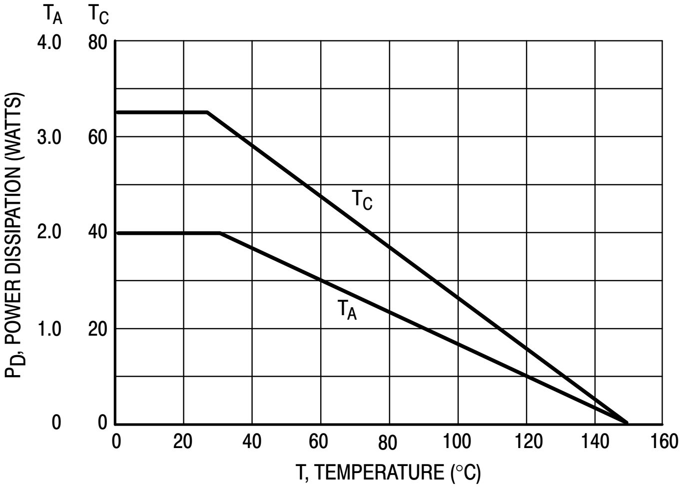


Figure 1. Power Derating

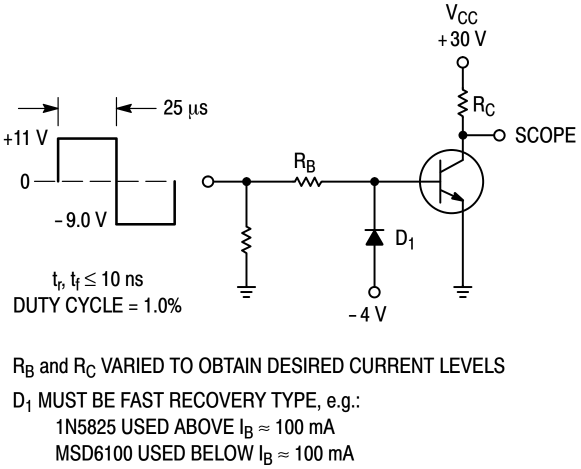


Figure 2. Switching Time Test Circuit

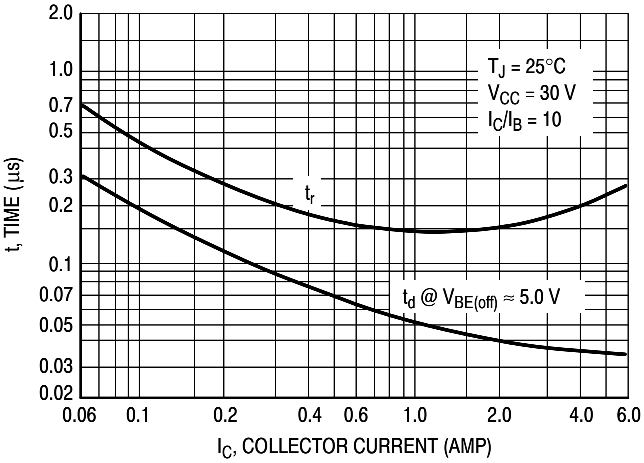


Figure 3. Turn−On Time

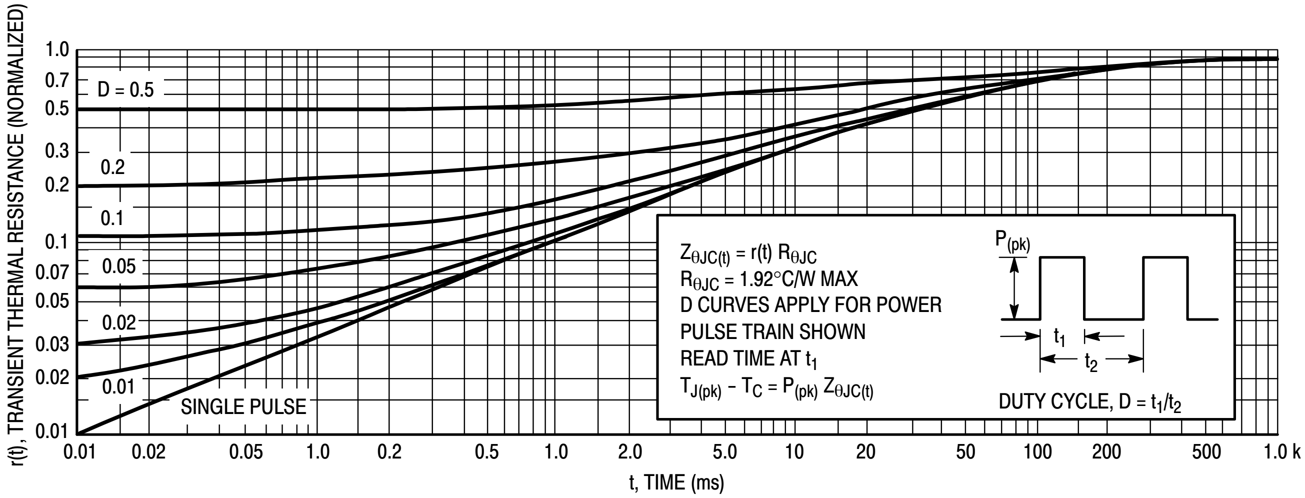


Figure 4. Thermal Response

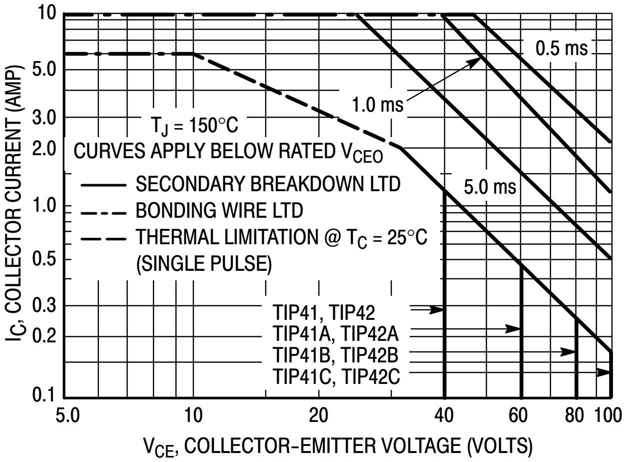


Figure 5. Active−Region Safe Operating Area

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 $T_{J(pk)} = 150°C$; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ 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.

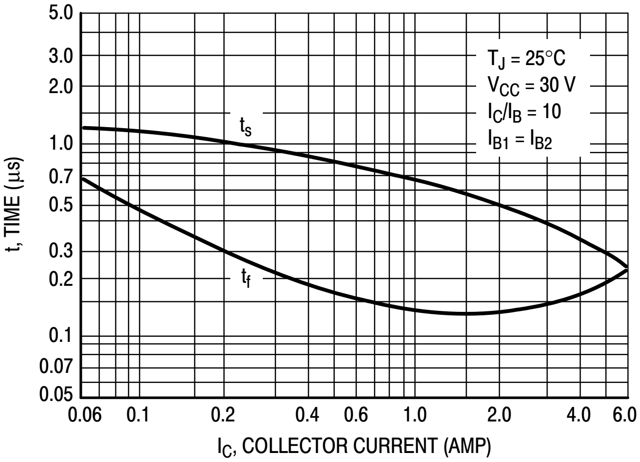


Figure 6. Turn−Off Time

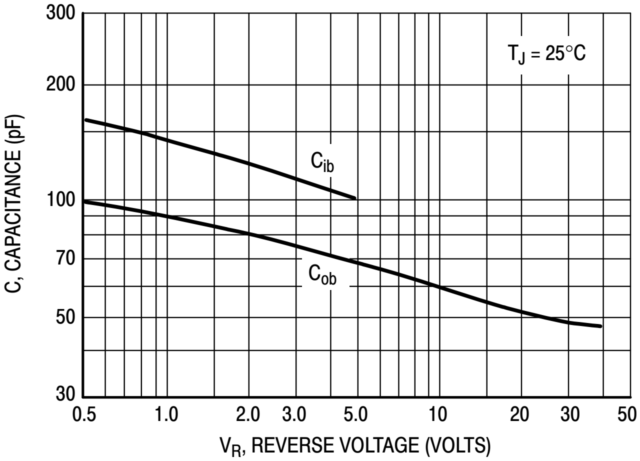


Figure 7. Capacitance

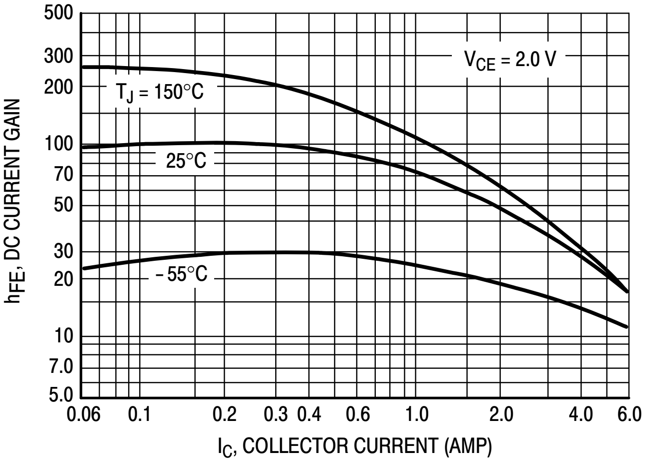


Figure 8. DC Current Gain

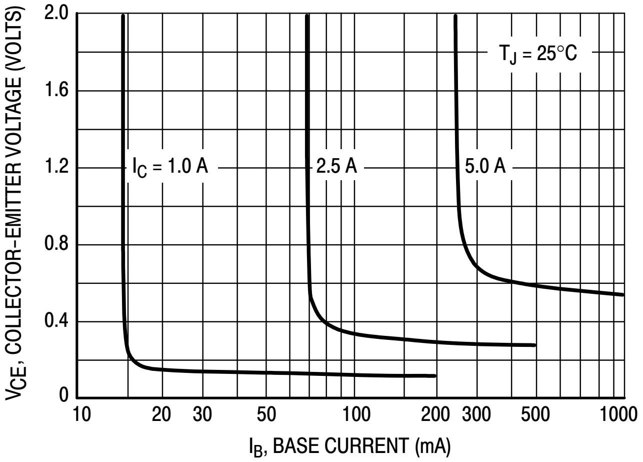


Figure 9. Collector Saturation Region

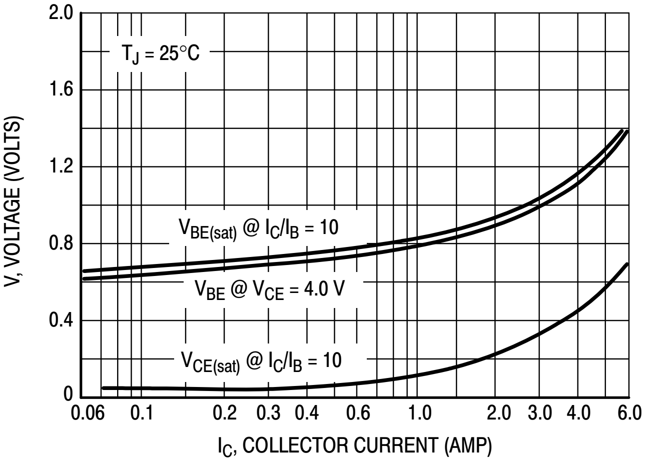


Figure 10. “On” Voltages

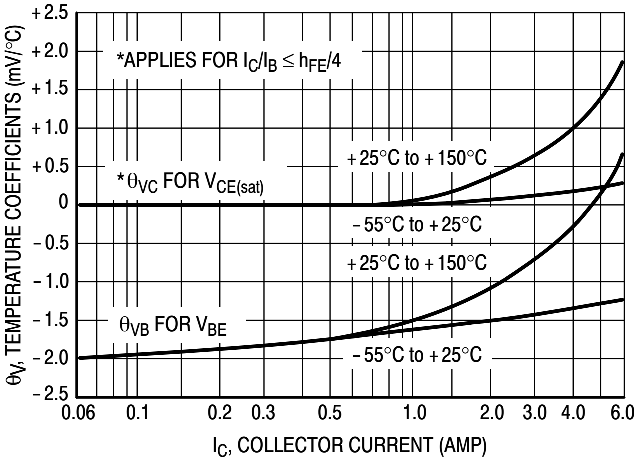


Figure 11. Temperature Coefficients

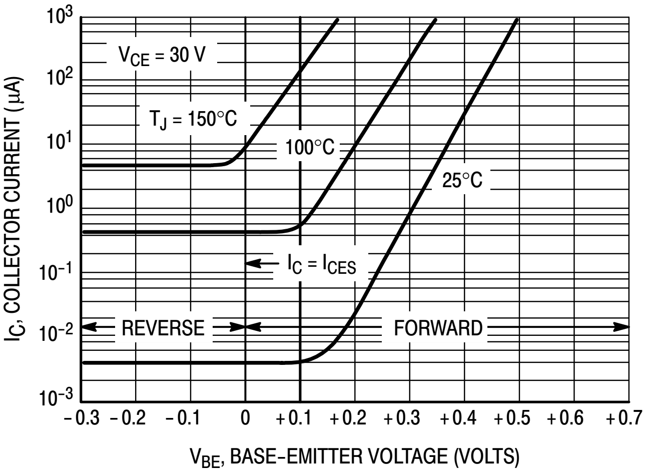


Figure 12. Collector Cut-Off Region

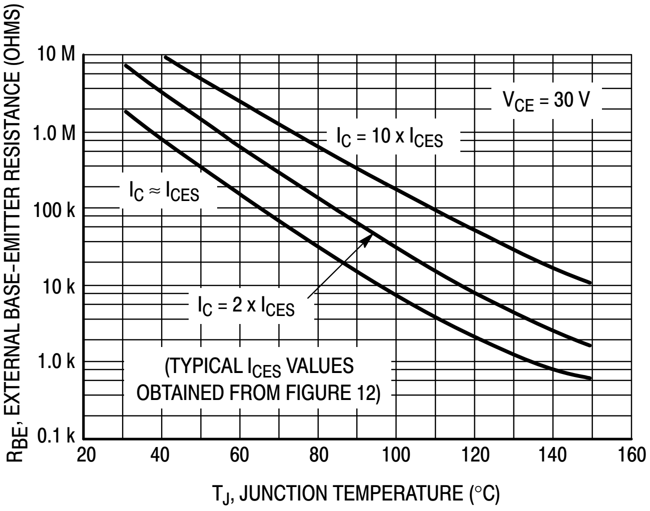
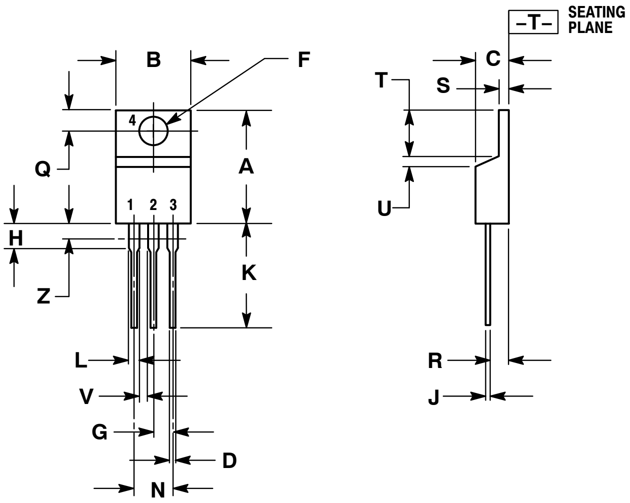


Figure 13. Effects of Base-Emitter Resistance

PACKAGE DIMENSIONS

TO−220

CASE 221A−09
ISSUE AG



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.036	0.64	0.91
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.025	0.36	0.64
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	1.39
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
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