(PNP) 2N6034, 2N6035, 2N6036; (NPN) 2N6038, 2N6039

Plastic Darlington Complementary Silicon Power Transistors

Plastic Darlington complementary silicon power transistors are designed for general purpose amplifier and low−speed 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	2N6034 2N6035, 2N6038 2N6036, 2N6039	V_{CEO}	40 60 80	Vdc
Collector−Base Voltage	2N6034 2N6035, 2N6038 2N6036, 2N6039	V_{CB0}	40 60 80	Vdc
Emitter−Base Voltage		V_{EBO}	5.0	Vdc
Collector Current	Continuous Peak	I_C	4.0 8.0	Adc Apk
Base Current		I_B	100	mAdc
Total Device Dissipation @ T_C = 25°C Derate above 25°C		P_D	40 320	W mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C		P_D	1.5 12	W mW/°C
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	$R_{\theta JC}$	3.12	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	83.3	°C/W

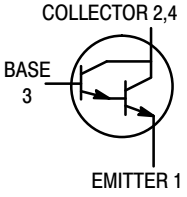
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

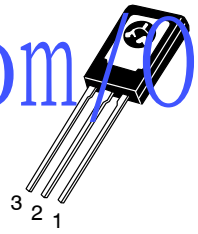
*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ON Semiconductor®

http://onsemi.com

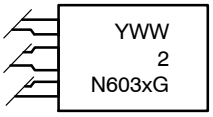
4.0 AMPERES DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS 40, 60, 80 VOLTS, 40 WATTS





TO−225AA
CASE 77
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
2N603x = Device Code
x = 4, 5, 6, 8, 9
G = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 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 = 100 mAdc, I_B = 0)	2N6034 2N6035, 2N6038 2N6036, 2N6039	$V_{CEO(sus)}$	 40 60 80	 – – –	Vdc
Collector–Cutoff Current (V_{CE} = 40 Vdc, I_B = 0) (V_{CE} = 60 Vdc, I_B = 0) (V_{CE} = 80 Vdc, I_B = 0)	 2N6034 2N6035, 2N6038 2N6036, 2N6039	I_{CEO}	 – – –	 100 100 100	μA
Collector–Cutoff Current (V_{CE} = 40 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 60 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CE} = 40 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C) (V_{CE} = 60 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C) (V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C)	 2N6034 2N6035, 2N6038 2N6036, 2N6039 2N6034 2N6035, 2N6038 2N6036, 2N6039	I_{CEX}	 – – – – – –	 100 100 100 500 500 500	μA
Collector–Cutoff Current (V_{CB} = 40 Vdc, I_E = 0) (V_{CB} = 60 Vdc, I_E = 0) (V_{CB} = 80 Vdc, I_E = 0)	 2N6034 2N6035, 2N6038 2N6036, 2N6039	I_{CBO}	 – – –	 0.5 0.5 0.5	mAdc
Emitter–Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)		I_{EBO}	–	2.0	mAdc
ON CHARACTERISTICS					
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 3.0 Vdc) (I_C = 2.0 Adc, V_{CE} = 3.0 Vdc) (I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)		h_{FE}	 500 750 100	 – 15,000 –	–
Collector–Emitter Saturation Voltage (I_C = 2.0 Adc, I_B = 8.0 mAdc) (I_C = 4.0 Adc, I_B = 40 mAdc)		$V_{CE(sat)}$	 – –	 2.0 3.0	Vdc
Base–Emitter Saturation Voltage (I_C = 4.0 Adc, I_B = 40 mAdc)		$V_{BE(sat)}$	–	4.0	Vdc
Base–Emitter On Voltage (I_C = 2.0 Adc, V_{CE} = 3.0 Vdc)		$V_{BE(on)}$	–	2.8	Vdc
DYNAMIC CHARACTERISTICS					
Small–Signal Current–Gain (I_C = 0.75 Adc, V_{CE} = 10 Vdc, f = 1.0 MHz)		$\|h_{fe}\|$	25	–	–
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz)	 2N6034, 2N6035, 2N6036 2N6038, 2N6039	C_{ob}	 – –	 200 100	pF

*Indicates JEDEC Registered Data.

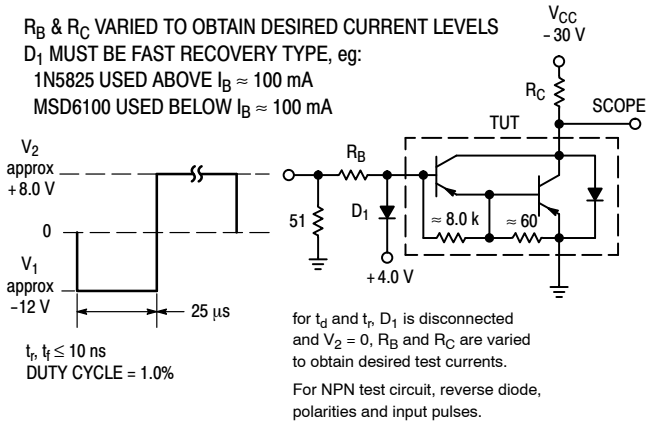


Figure 1. Switching Times Test Circuit

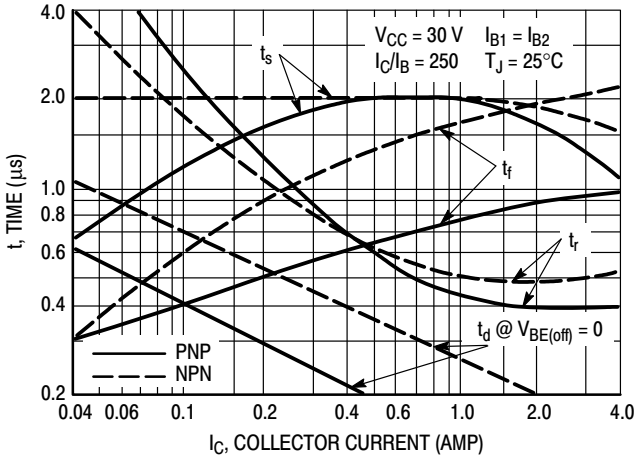


Figure 2. Switching Times

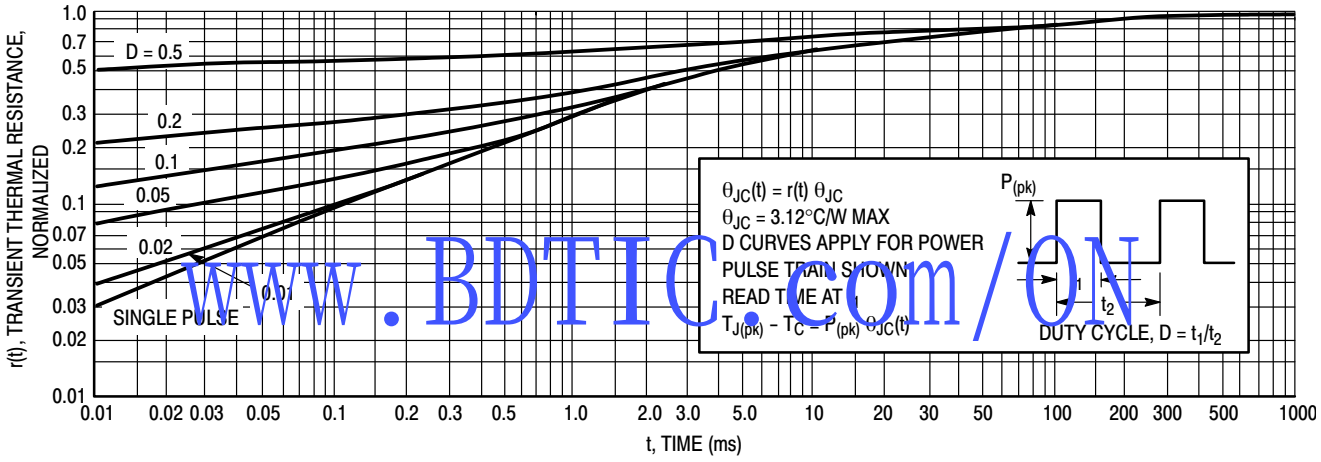


Figure 3. Thermal Response

ACTIVE−REGION SAFE−OPERATING AREA

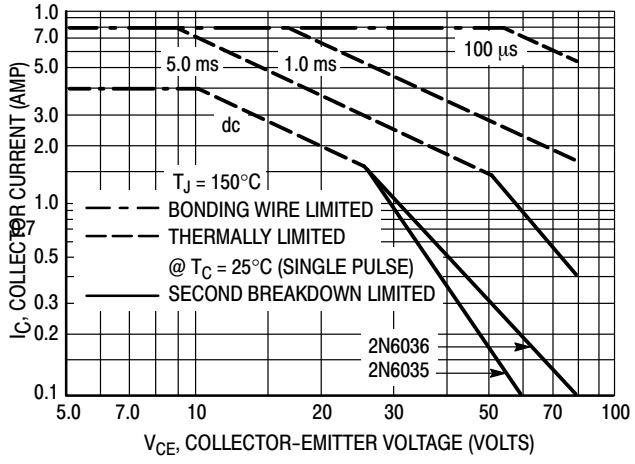


Figure 4. 2N6035, 2N6036

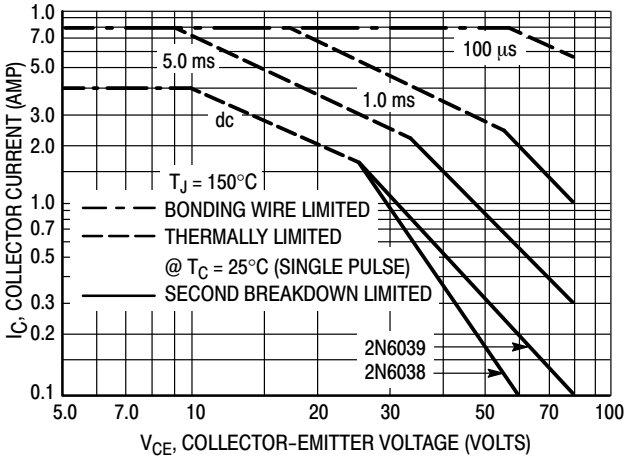


Figure 5. 2N6038, 2N6039

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 Figures 4 and 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 $T_{J(pk)}$ < 150°C. $T_{J(pk)}$ may be calculated from the data in Figure 3. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

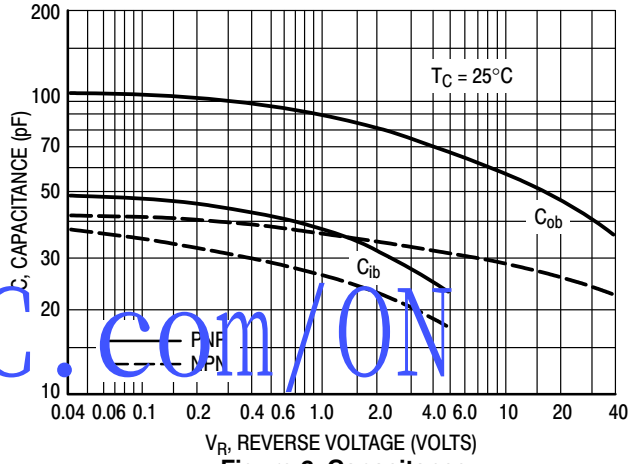


Figure 6. Capacitance

PNP
2N6034, 2N6035, 2N6036

NPN
2N6038, 2N6039

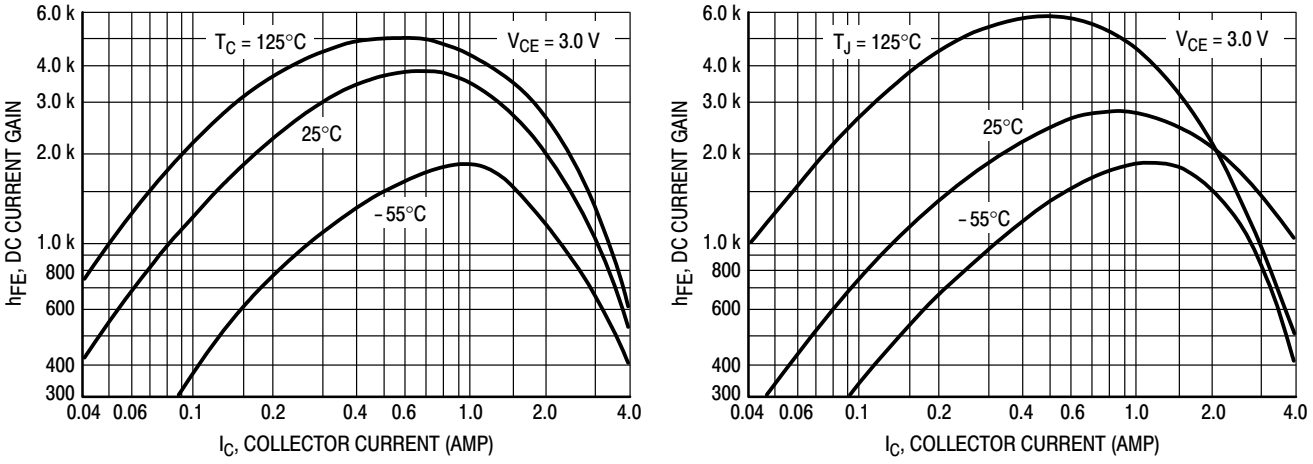


Figure 7. DC Current Gain

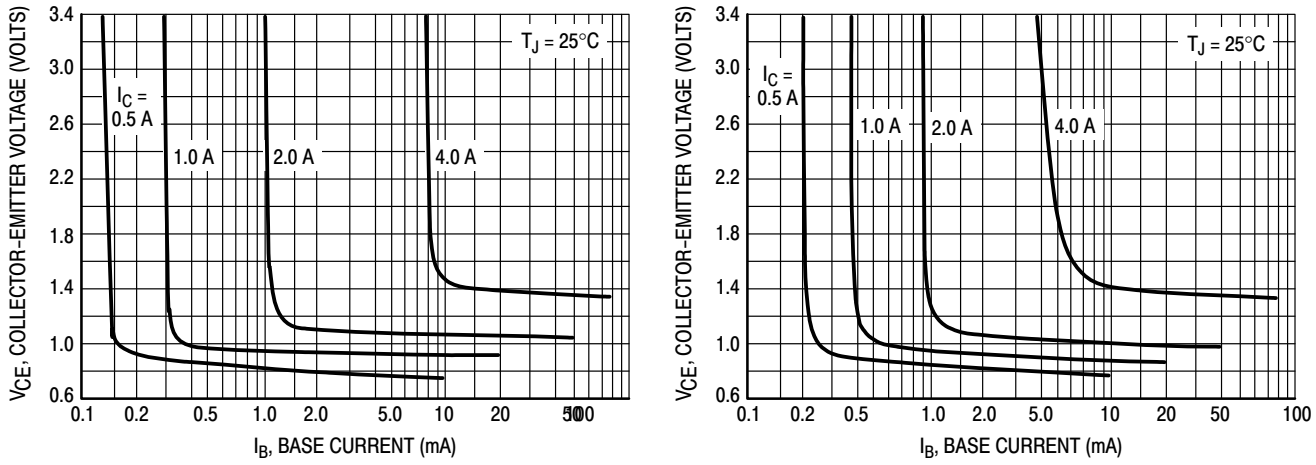


Figure 8. Collector Saturation Region

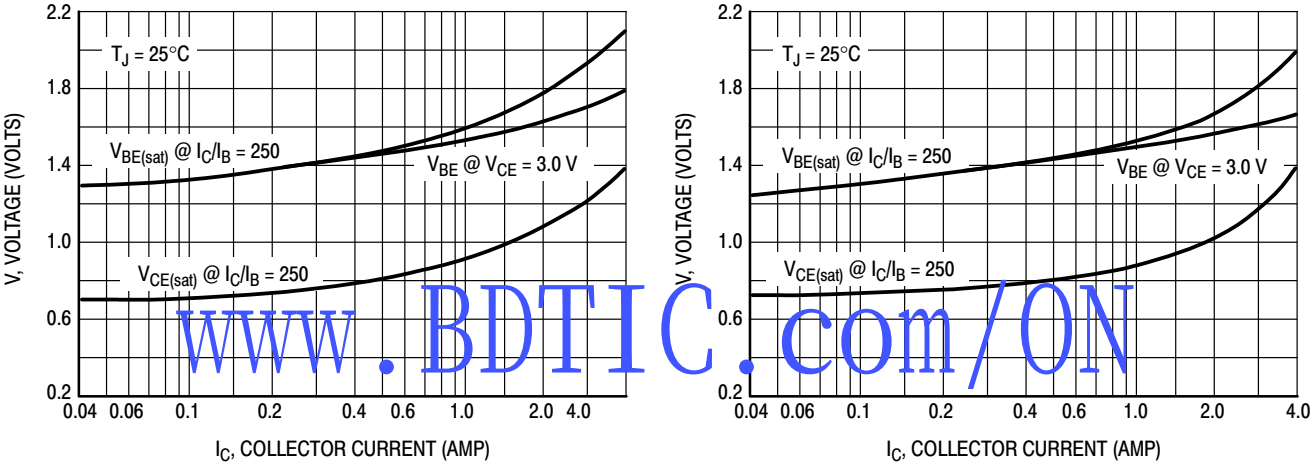


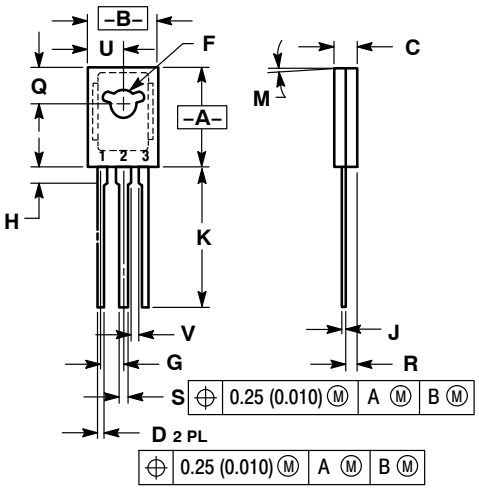
Figure 9. “On” Voltages

ORDERING INFORMATION

Device	Package	Shipping
2N6034	TO−225AA	500 Units / Box
2N6034G	TO−225AA (Pb−Free)	
2N6035	TO−225AA	
2N6035G	TO−225AA (Pb−Free)	
2N6036	TO−225AA	
2N6036G	TO−225AA (Pb−Free)	
2N6038	TO−225AA	
2N6038G	TO−225AA (Pb−Free)	
2N6039	TO−225AA	
2N6039G	TO−225AA (Pb−Free)	

PACKAGE DIMENSIONS

TO−225AA
CASE 77−09
ISSUE Z



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 077−01 THRU −08 OBSOLETE, NEW STANDARD 077−09.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.425	0.435	10.80	11.04
B	0.295	0.305	7.50	7.74
C	0.095	0.105	2.42	2.66
D	0.020	0.026	0.51	0.66
F	0.115	0.130	2.93	3.30
G	0.094 BSC		2.39 BSC	
H	0.050	0.095	1.27	2.41
J	0.015	0.025	0.39	0.63
K	0.575	0.655	14.61	16.63
M	5° TYP		5° TYP	
Q	0.148	0.158	3.76	4.01
R	0.045	0.065	1.15	1.65
S	0.025	0.035	0.64	0.88
U	0.145	0.155	3.69	3.93
V	0.040	---	1.02	---

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910
Japan Customer Focus Center
Phone: 81−3−5773−3850

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative