

# PNP - 2N6040, 2N6042, NPN - 2N6043, 2N6045

2N6043 and 2N6045 are Preferred Devices

## Plastic Medium-Power Complementary Silicon Transistors

Plastic medium-power complementary silicon transistors are designed for general-purpose amplifier and low-speed switching applications.

### Features

- High DC Current Gain -  $h_{FE} = 2500$  (Typ) @  $I_C = 4.0$  Adc
- Collector-Emitter Sustaining Voltage - @ 100 mAdc -  
 $V_{CE(sus)} = 60$  Vdc (Min) - 2N6040, 2N6043  
 $= 100$  Vdc (Min) - 2N6042, 2N6045
- Low Collector-Emitter Saturation Voltage -  
 $V_{CE(sat)} = 2.0$  Vdc (Max) @  $I_C = 4.0$  Adc - 2N6043, 44  
 $= 2.0$  Vdc (Max) @  $I_C = 3.0$  Adc - 2N6042, 2N6045
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V  
Machine Model, C > 400 V
- Pb-Free Packages are Available\*

### MAXIMUM RATINGS (Note 1)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	2N6040 2N6043 2N6042 2N6045	$V_{CEO}$ 60 100	Vdc
Collector-Base Voltage	2N6040 2N6043 2N6042 2N6045	$V_{CB}$ 60 100	Vdc
Emitter-Base Voltage		$V_{EB}$ 5.0	Vdc
Collector Current	Continuous Peak	$I_C$ 8.0 16	Adc
Base Current		$I_B$ 120	mAdc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$		$P_D$ 75 0.60	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

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.

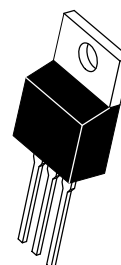
1. Indicates JEDEC Registered Data.

\*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®

## DARLINGTON, 8 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 60 - 100 VOLTS, 75 WATTS



TO-220AB  
CASE 221A-09  
STYLE 1

### MARKING DIAGRAM



2N604x = Device Code  
x = 0, 2, 3, or 5  
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 5 of this data sheet.

**Preferred** devices are recommended choices for future use and best overall value.

# PNP – 2N6040, 2N6042, NPN – 2N6043, 2N6045

## THERMAL CHARACTERISTICS

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

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector-Emitter Sustaining Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 0$ )	$V_{CEO(sus)}$	60 100	- -	Vdc
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 100\text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	- -	20 20	$\mu\text{A}$
Collector Cutoff Current ( $V_{CE} = 60\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 100\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 60\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) ( $V_{CE} = 80\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) ( $V_{CE} = 100\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ )	$I_{CEX}$	- - - - -	20 20 200 200 200	$\mu\text{A}$
Collector Cutoff Current ( $V_{CB} = 60\text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 100\text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	- -	20 20	$\mu\text{A}$
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	-	2.0	mAdc

## ON CHARACTERISTICS

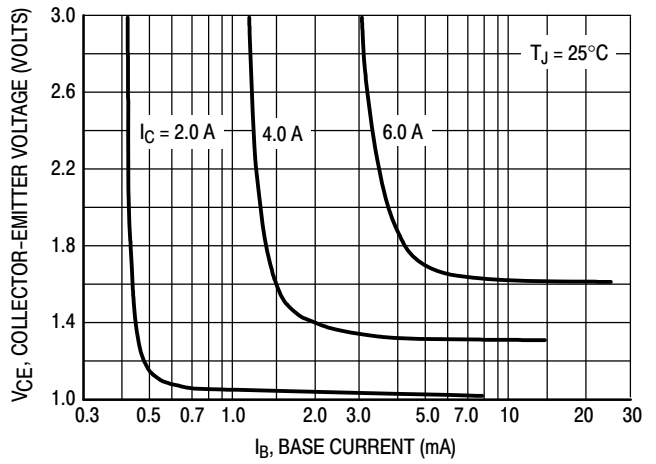
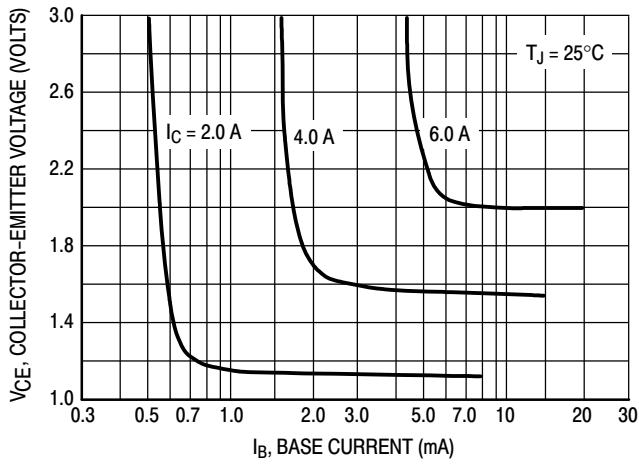
DC Current Gain ( $I_C = 4.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ ) ( $I_C = 8.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$h_{FE}$	1000 1000 100	20,000 20,000 -	-
Collector-Emitter Saturation Voltage ( $I_C = 4.0\text{ Adc}$ , $I_B = 16\text{ mAdc}$ ) ( $I_C = 3.0\text{ Adc}$ , $I_B = 12\text{ mAdc}$ ) ( $I_C = 8.0\text{ Adc}$ , $I_B = 80\text{ Adc}$ )	$V_{CE(sat)}$	- - -	2.0 2.0 4.0	Vdc
Base-Emitter Saturation Voltage ( $I_C = 8.0\text{ Adc}$ , $I_B = 80\text{ mAdc}$ )	$V_{BE(sat)}$	-	4.5	Vdc
Base-Emitter On Voltage ( $I_C = 4.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )	$V_{BE(on)}$	-	2.8	Vdc

## DYNAMIC CHARACTERISTICS

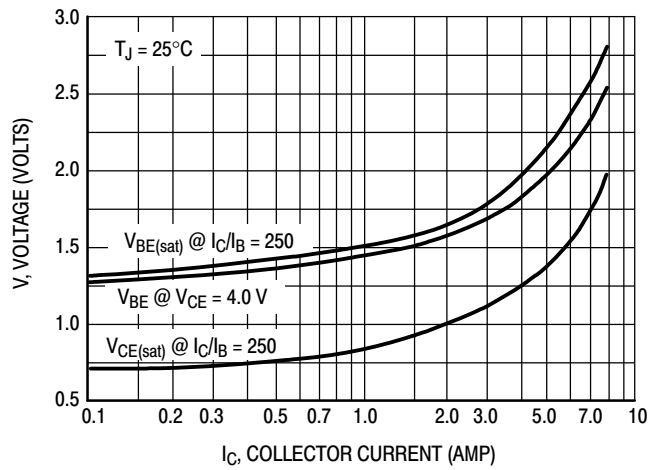
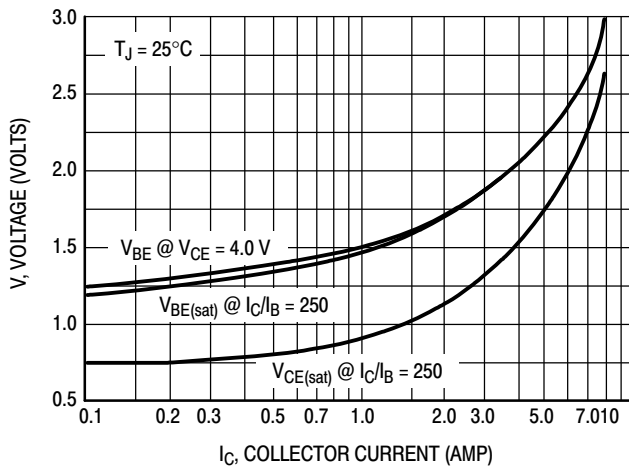
Small Signal Current Gain ( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f = 1.0\text{ MHz}$ )	$ h_{fe} $	4.0	-	
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 0.1\text{ MHz}$ )	$C_{ob}$	- -	300 200	pF
Small-Signal Current Gain ( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	300	-	-

\*Indicates JEDEC Registered Data.

## PNP – 2N6040, 2N6042, NPN – 2N6043, 2N6045



**Figure 9. Collector Saturation Region**



**Figure 10. "On" Voltages**

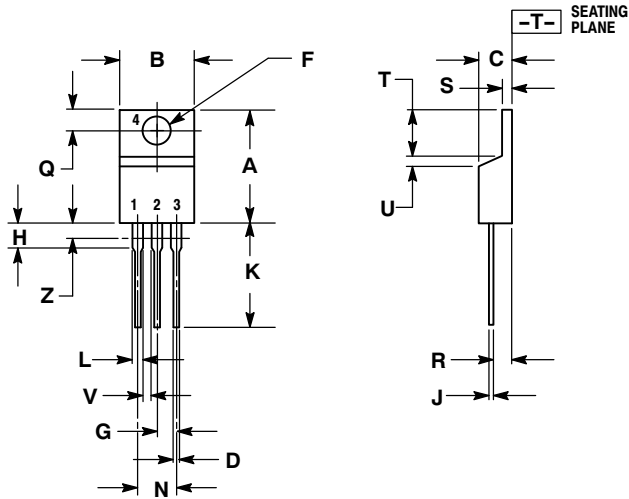
### ORDERING INFORMATION

Device	Package	Shipping
2N6040	TO-220AB	50 Units / Rail
2N6040G	TO-220AB (Pb-Free)	
2N6042	TO-220AB	
2N6042G	TO-220AB (Pb-Free)	
2N6043	TO-220AB	
2N6043G	TO-220AB (Pb-Free)	
2N6045	TO-220AB	
2N6045G	TO-220AB (Pb-Free)	

# PNP – 2N6040, 2N6042, NPN – 2N6043, 2N6045

## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AE



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.

DIM	INCHES		MILLIMETERS	
	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	0.035	0.64	0.88
F	0.142	0.161	3.61	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
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