

Plastic Medium-Power Complementary Silicon Transistors

... designed for general-purpose amplifier and low-speed switching applications.

- 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
 $= 80$ Vdc (Min) — 2N6041, 2N6044
 $= 100$ Vdc (Min) — 2N6042, 2N6045
- Low Collector-Emitter Saturation Voltage —
 $V_{CE(sat)} = 2.0$ Vdc (Max) @ $I_C = 4.0$ Adc — 2N6040, 41, 2N6043, 44
 $= 2.0$ Vdc (Max) @ $I_C = 3.0$ Adc — 2N6042, 2N6045
- Monolithic Construction with Built-In Base-Emitter Shunt Resistors

MAXIMUM RATINGS (1)

Rating	Symbol	2N6040 2N6043	2N6041 2N6044	2N6042 2N6045	Unit
Collector-Emitter Voltage	V_{CEO}	60	80	100	Vdc
Collector-Base Voltage	V_{CB}	60	80	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°C	P_D	75 0.60			Watts W/ $^\circ\text{C}$
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	P_D	2.2 0.0175			Watts W/ $^\circ\text{C}$
Operating and Storage Junction, Temperature Range	T_J, T_{stg}	-65 to +150			$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	1.67	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	θ_{JA}	57	$^\circ\text{C/W}$

(1) Indicates JEDEC Registered Data.

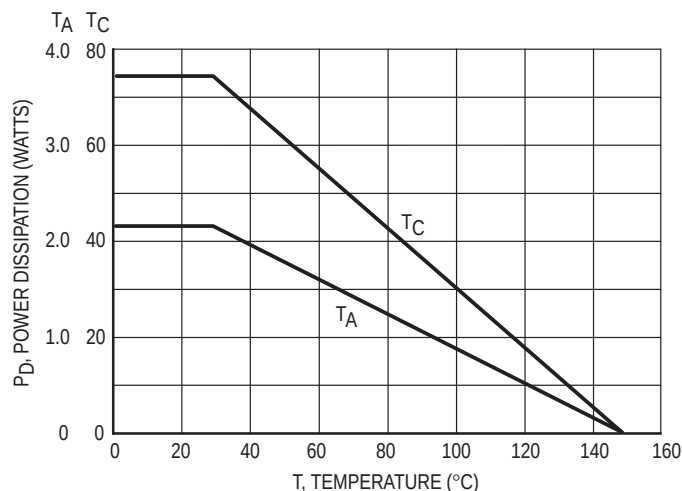


Figure 1. Power Derating

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

PNP
2N6040

thru

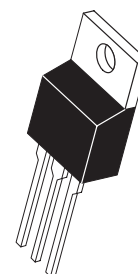
2N6042*
NPN
2N6043

thru

2N6045*

*Motorola Preferred Device

DARLINGTON
8 AMPERE
COMPLEMENTARY
SILICON
POWER TRANSISTORS
60-80-100 VOLTS
75 WATTS



CASE 221A-06
TO-220AB

2N6040 thru 2N6042 2N6043 thru 2N6045

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

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

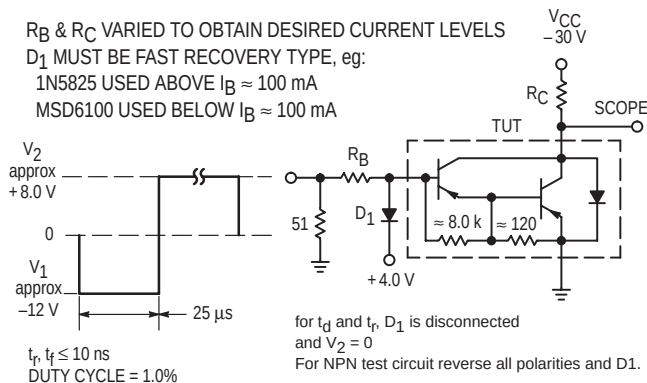


Figure 2. Switching Times Equivalent Circuit

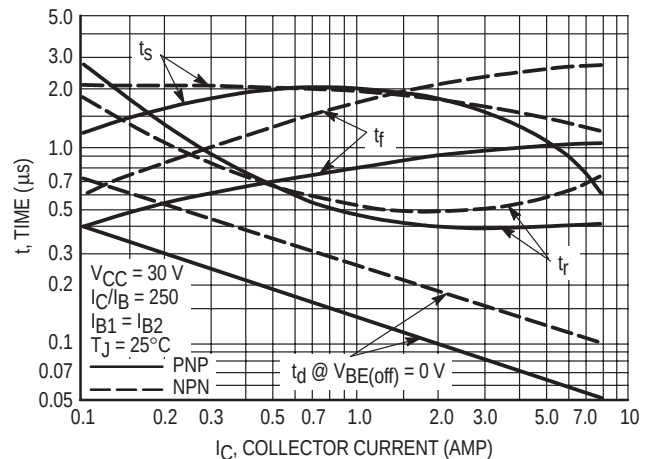


Figure 3. Switching Times

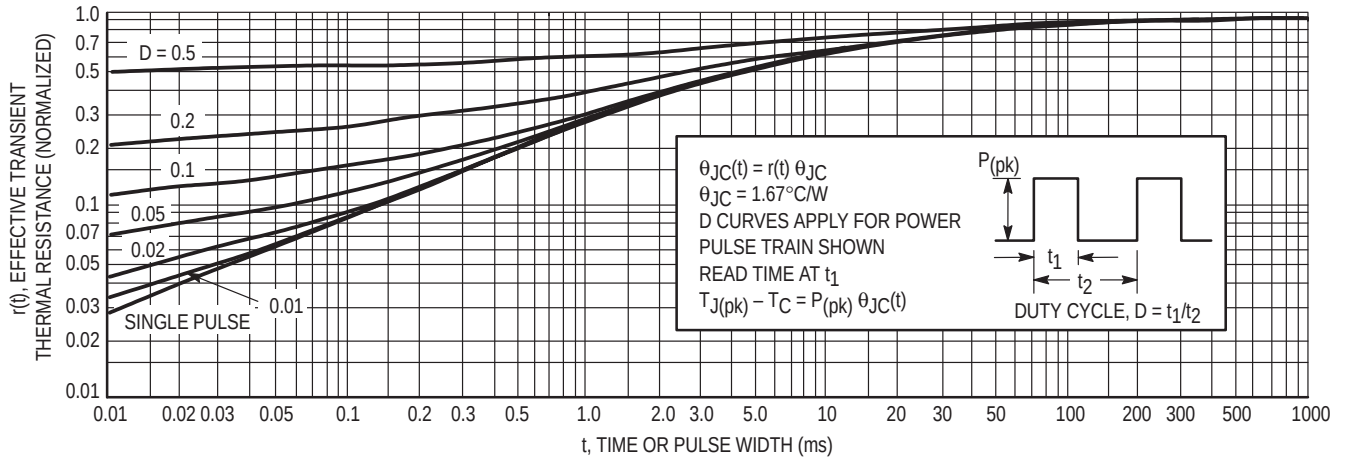


Figure 4. Thermal Response

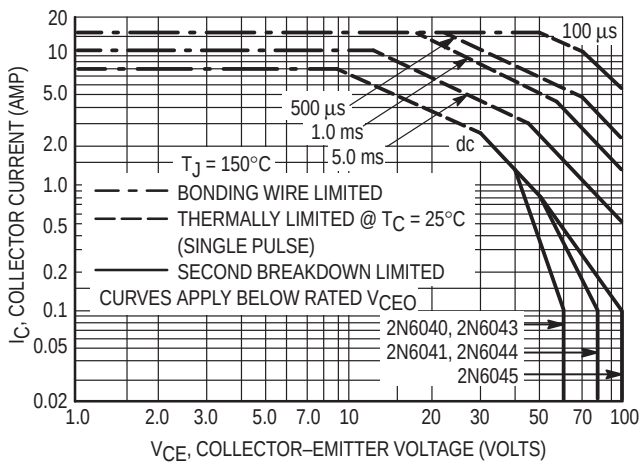


Figure 5. Active-Region Safe Operating Area

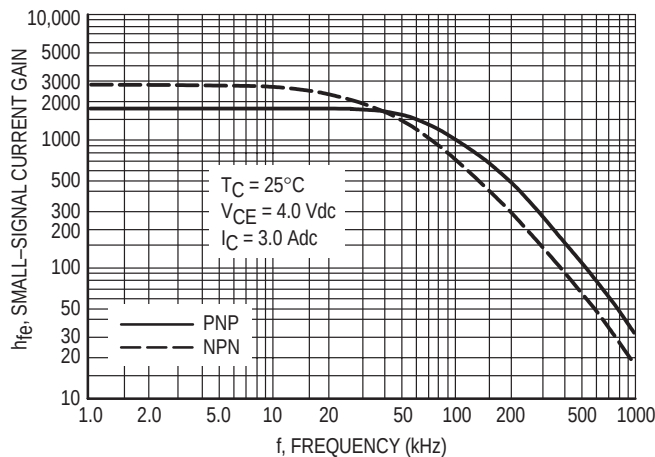


Figure 6. Small-Signal Current Gain

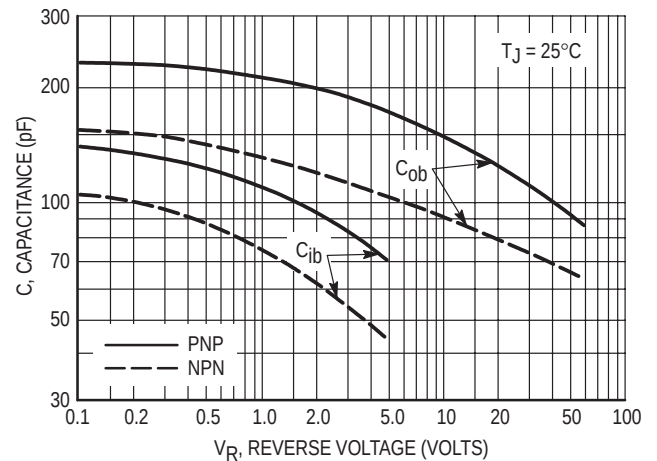


Figure 7. Capacitance

2N6040 thru 2N6042 2N6043 thru 2N6045

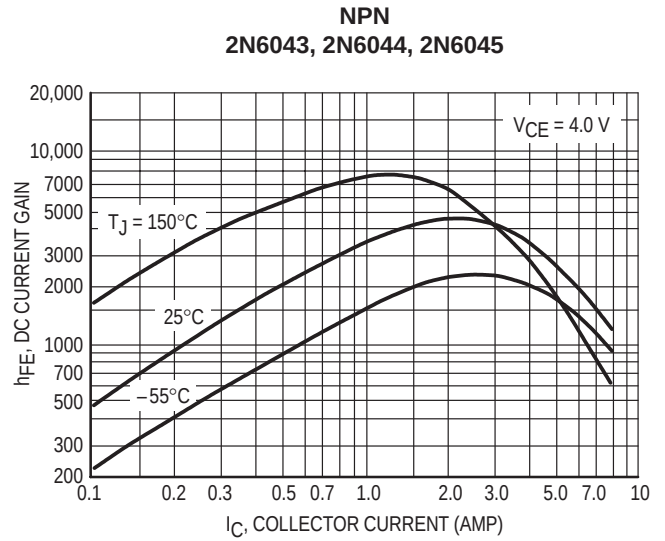
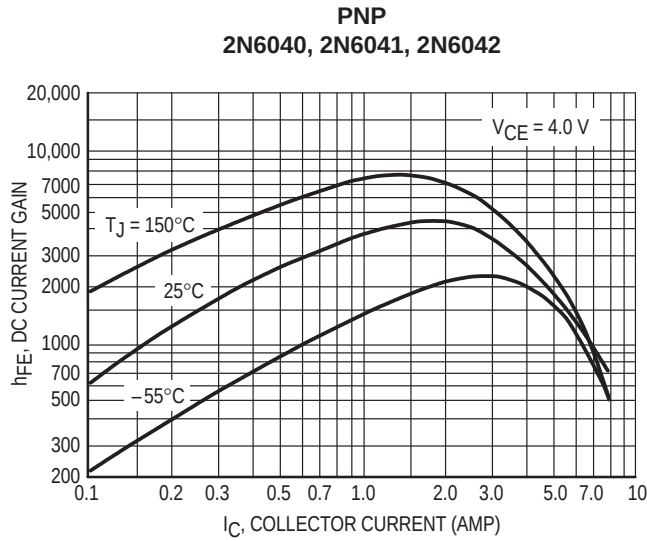


Figure 8. DC Current Gain

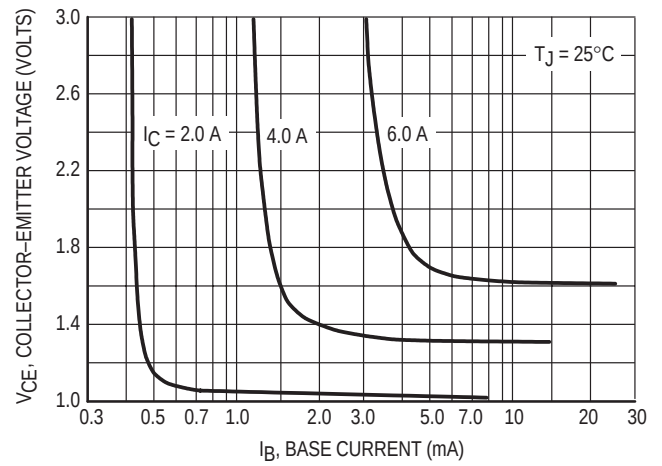
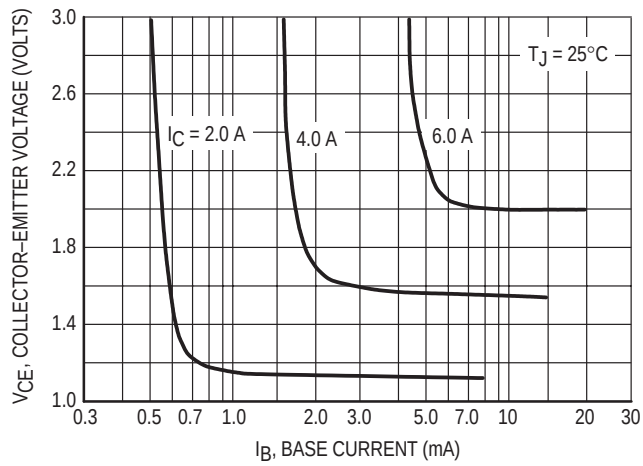


Figure 9. Collector Saturation Region

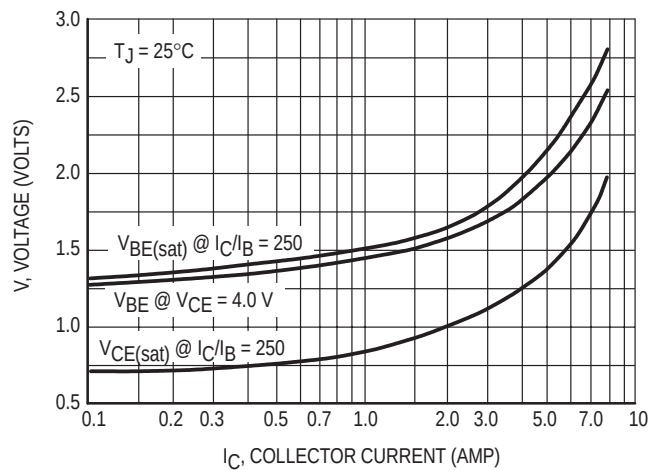
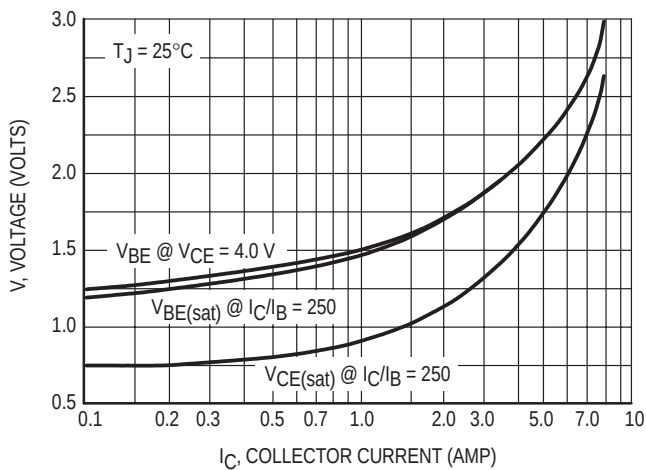


Figure 10. "On" Voltages