

SFT2010 SFT2012 SFT2014

200 AMP

HIGH ENERGY NPN TRANSISTOR

V_{CEO} 100, 120, 140 VOLTS



14830 Valley View Avenue
La Mirada, California 90638
(213) 921-9660
TWX 910-583-4807
FAX 213-921-2396

CASE STYLE R
TO-3 WITH .060 PINS



FEATURES

- BVCBO 250 VOLTS MIN
- 600 WATTS POWER DISSIPATION
- EXCELLENT SOA CURVE
- Es/b OF 800mJ
- GAIN OF OVER 5 AT 200 AMPS
- HIGH REL CONSTRUCTION INCLUDING GOLD EUTECTIC DIE MOUNTING, ALUMINUM WIRING
- PLANAR CHIP CONSTRUCTION WITH LOW LEAKAGE AND VERY FAST SWITCHING

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V _{CEO}	100 120 140	Volts
Collector - Base Voltage	V _{CBO}	250	Volts
Emitter - Base Voltage	V _{EBO}	8	Volts
Collector Current	I _C	200	Amps
Base Current	I _B	75	Amps
Total Device Dissipation @ TC = 50 °C	P _D	600	Watts
Derate above 50 °C		4	W/°C
Operating and Storage Temperature	T _J , T _{stg}	-65 to 200	°C

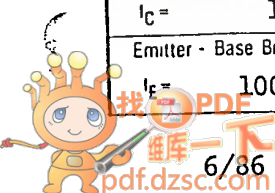
THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	R _{θJC}	0.25	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* I _C = 200 mA _{dc}	BV _{CEO} *	100 120 140		V _{dc}
Collector - Base Breakdown Voltage I _C = 100 μA _{dc}	BV _{CBO}	250		V _{dc}
Emitter - Base Breakdown Voltage I _E = 100 μA _{dc}	BV _{EBO}	8		V _{dc}

NOTE: All specifications subject to change without notice.



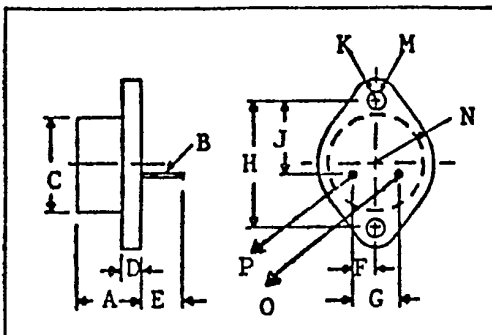
ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CB} = 250$ Vdc)	I_{CBO}		10	μ A
Emitter Cutoff Current ($V_{EB} = 7$ Vdc)	I_{EBO}		10	μ A
DC Current Gain* ($I_C = 10$ Adc, $V_{CE} = 2$ Vdc) ($I_C = 100$ Adc, $V_{CE} = 5$ Vdc) ($I_C = 200$ Adc, $V_{CE} = 5$ Vdc)	h_{FE}	40 30 5		
Collector - Emitter Saturation Voltage* ($I_C = 120$ Adc, $I_B = 12$ Adc) ($I_C = 200$ Adc, $I_B = 30$ Adc)	$V_{CE(SAT)}$		2.0 3.0	Vdc
Base - Emitter Saturation Voltage* ($I_C = 120$ Adc, $I_B = 12$ Adc)	$V_{BE(SAT)}$		2.2	Vdc
Current - Gain - Bandwidth Product ($I_C = 1.0$ Adc, $V_{CE} = 10$ Vdc, $f = 10$ MHz)	f_T	30		MHz
Output Capacitance ($V_{CB} = 10$ Vdc, $f = 0.1 = 1$ MHz)	C_{ob}		1200	pf
RB SOA ($I_B = 1$ Adc, $R_{B1} = R_{B2} = 20$ ohms) ($V_{BE(off)} = 2.0$ Vdc, $L = 1.0$ mH)	$E_{S/b}$	800		mJ
FB SOA ($V_{CE} = 20$ Vdc, $I_C = 30$ Adc) ($V_{CE} = 100$ Vdc, $I_C = 0.75$ Adc)	$I_{S/b}$	1 1		sec
ON TIME	t_{on}		800	ns
Storage Time	t_s	($V_{CC} = 60$ Vdc, $I_C = 10$ Adc)	1500	ns
Fall Time	t_f	($I_{B1} = I_{B2} = 1.0$ Adc)	400	ns

*Pulse Test: Pulse width = 300 us, DutyCycle = 2%

PHYSICAL DIMENSIONS

KEY TO DIMENSIONS:



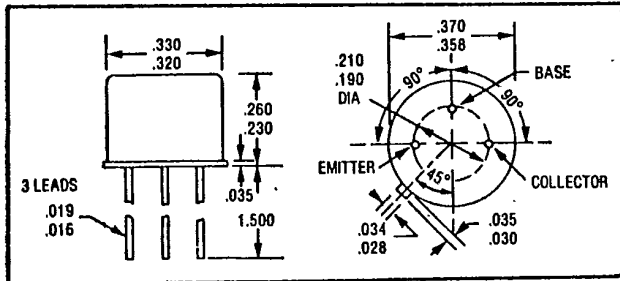
- (Inches)
- A = .250 - .450
 - B = .057 - .062
 - C = .875 MAX.
 - D = .135 MAX.
 - E = .312 MIN.
 - F = .205 - .225
 - G = .420 - .440
 - H = 1.177 - 1.197
 - J = .655 - .675
 - K = .188 MAX.
 - M = .151 - .161
 - N = .525 MAX.
 - U = BASE
 - P = EMITTER



<h1 style="margin: 0;">2N5094 AND 2N5096</h1> <h2 style="margin: 0;">1 AMP</h2> <h3 style="margin: 0;">HIGH VOLTAGE PNP TRANSISTOR</h3> <h3 style="margin: 0;">450-500 VOLTS</h3>	
14830 Valley View Avenue La Mirada, California 90638 (213) 921-9660 TWX 910-583-4807 FAX 213-921-2396	

CASE STYLE W
JEDEC TO-5

FEATURES



- BVCBO TO 500 VOLTS
- LOW SATURATION VOLTAGE
- LOW LEAKAGE AT HIGH TEMPERATURE
- 200°C OPERATING, GOLD EUTECTIC DIE ATTACH
- DESIGNED FOR COMPLEMENTARY USE WITH 2N5095 THRU 2N5097
- 2N5091 AND 2N5093 ALSO AVAILABLE

MAXIMUM RATINGS

Rating	Symbol	2N5094	2N5096	Unit
Collector - Emitter Voltage	V_{CE0}	400	450	Volts
$R_{BE} = 1 \text{ K Ohms}$	V_{CER}	450	500	Volts
Collector - Base Voltage	V_{CBO}	450	500	Volts
Emitter - Base Voltage	V_{EBO}	6.0		Volts
Collector Current	I_C	1.0		Amps
Base Current	I_B	0.5		Amps
Total Device Dissipation @ $T_C = 100^\circ\text{C}$	P_D	2		Watts
Derate above 100 °C		20		mW/°C
Operating and Storage Temperature	T_j, T_{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	50	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 50 \text{ mA dc}$)	BV_{CE0}^*	400		Vdc
($I_C = 100 \text{ uA dc}, R_{BE} = 1 \text{ K Ohms}$)	BV_{CER}^*	450		Vdc
Collector - Base Breakdown Voltage ($I_C = 100 \text{ uA dc}$)	BV_{CBO}	450		Vdc
Emitter - Base Breakdown Voltage ($I_E = 20 \text{ uA dc}$)	BV_{EBO}	6		Vdc

ELECTRICAL CHARACTERISTICS

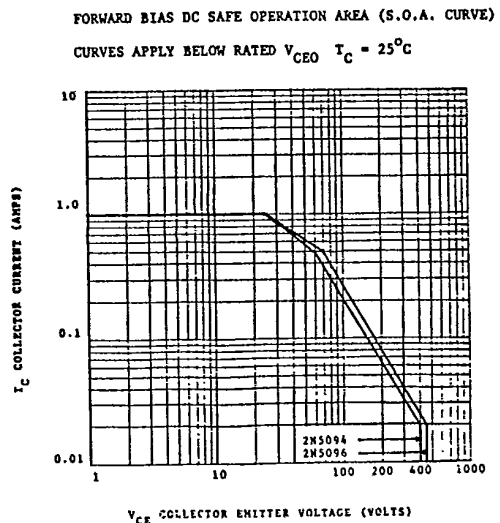
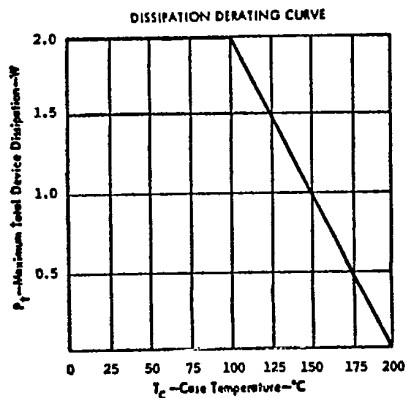
Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current 2N5094 VCB= 450 Vdc 2N5096 VCB= 500 Vdc	I_{CBO}		500	nAdc
Emitter Cutoff Current ($V_{EB} = 4 \text{ Vdc}$)	I_{EBO}		250	nAdc
DC Current Gain* ($I_C = 1 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 25 \text{ mAdc}, V_{CE} = 10 \text{ Vdc}$) ($I_C = 100 \text{ mAdc}, V_{CE} = 15 \text{ Vdc}$)	h_{FE}	20 40 20	200 250 200	
Collector - Emitter Saturation Voltage* ($I_C = 25 \text{ mAdc}, I_B = 2.5 \text{ mAdc}$)	$V_{CE (SAT)}$		3.0	Vdc
Base - Emitter Saturation Voltage* ($I_C = 25 \text{ mAdc}, I_B = 2.5 \text{ mAdc}$)	$V_{BE (SAT)}$		1.0	Vdc
Current - Gain - Bandwith Product ($I_C = 10 \text{ mAdc}, V_{CE} = 20 \text{ Vdc}, f = 5 \text{ MHz}$)	f_T	20		MHz
Output Capacitance ($V_{CB} = 15 \text{ Vdc}, I_E = 0, f = 2 \text{ MHz}$)	C_{ob}		20	pf

SWITCHING TIMES

Delay Time	$(V_{CC} = 150 \text{ Vdc}, I_C = 100 \text{ mAdc}, I_{B1} = I_{B2} = 10 \text{ mAdc})$	t_d	700	ns
Rise Time		t_r	1500	ns
Storage Time		t_s	3	us
Fall Time		t_f	200	ns

*Pulse Test: Pulse width = 300 us, DutyCycle = 2%

TYPICAL OPERATING CURVES




2N4999 AND 2N5001

2 AMP

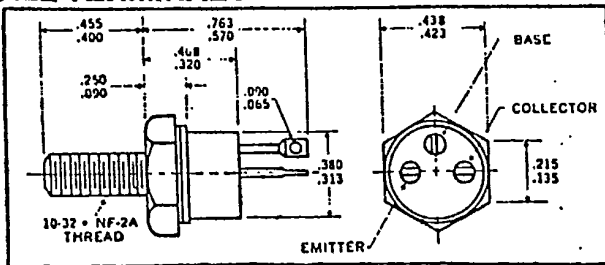
HIGH SPEED PNP TRANSISTOR

100 VOLTS



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CASE STYLE X
JEDEC TO-59
ALL TERMINALS ISOLATED FROM CASE



FEATURES

- RADIATION TOLERANT
- FAST SWITCHING, 200 NSEC MAX t_{on}
- HIGH FREQUENCY, TYPICAL f_T 100 MHZ
- V_{CE0} 80 VOLTS MIN
- HIGH LINEAR GAIN, LOW SATURATION VOLTAGE
- 200 °C OPERATING, GOLD EUTECTIC DIE ATTACH
- DESIGNED FOR COMPLEMENTARY USE WITH 2N3996 AND 2N3997

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V_{CE0}	80	Volts
Collector - Base Voltage	V_{CB0}	100	Volts
Emitter - Base Voltage	V_{EB0}	5.5	Volts
Collector Current	I_C	2	Amps
Base Current	I_B	1	Amps
Total Device Dissipation @ $T_C = 50$ °C	P_D	30	Watts
Derate above 50 °C		200	mW/°C
Operating and Storage Temperature	T_j, T_{stg}	-65 to +200	°C

THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	5.0	°C/W

ELECTRICAL CHARACTERISTICS

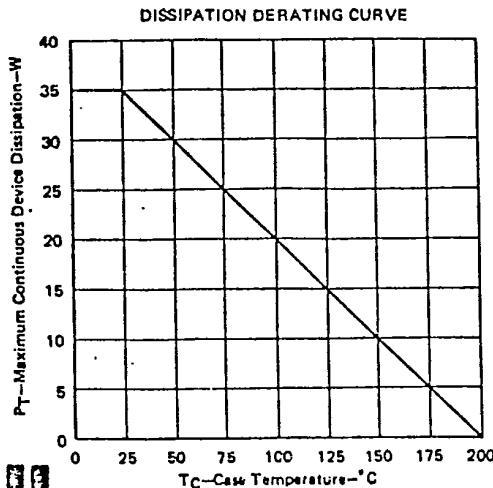
Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 100$ mA Dc)	BV_{CE0}	80		Vdc
Collector - Base Breakdown Voltage ($I_C = 200$ uA Dc)	BV_{CB0}	100		Vdc
Emitter - Base Breakdown Voltage ($I_E = 200$ uA Dc)	BV_{EB0}	5.5		Vdc

ELECTRICAL CHARACTERISTICS

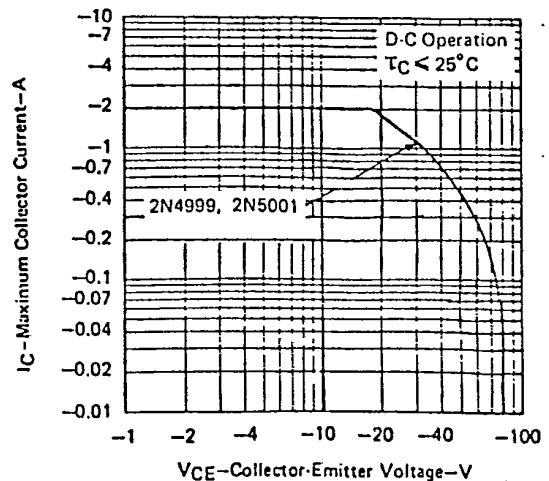
Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CE} = 40 \text{ Vdc}$)	I_{CEO}		50	μAdc
Emitter Cutoff Current ($V_{EB} = 4 \text{ Vdc}$) ($V_{EB} = 5.5 \text{ Vdc}$)	I_{EBO}		1.0 1.0	μAdc mAdc
DC Current Gain* ($I_C = 50 \text{ mAdc}, V_{CE} = 5 \text{ Vdc}$) ($I_C = 1 \text{ Adc}, V_{CE} = 5 \text{ Vdc}$) ($I_C = 3 \text{ Adc}, V_{CE} = 5 \text{ Vdc}$)	h_{FE}	20 50 30 70 5 15	90 200	
Collector - Emitter Saturation Voltage* ($I_C = 1 \text{ Adc}, I_B = 100 \text{ mAdc}$) ($I_C = 2 \text{ Adc}, I_B = 200 \text{ mAdc}$)	$V_{CE(SAT)}$		0.46 0.85	Vdc
Base - Emitter Saturation Voltage* ($I_C = 1 \text{ Adc}, I_B = 100 \text{ mAdc}$) ($I_C = 2 \text{ Adc}, I_B = 200 \text{ mAdc}$)	$V_{BE(SAT)}$		1.2 1.5	Vdc
Current - Gain - Bandwidth Product ($I_C = 200 \text{ Adc}, V_{CE} = 5 \text{ Vdc}, f = 20 \text{ MHz}$)	f_T	50 60		MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 1 \text{ MHz}$)	C_{ob}		120	pf
Base - Emitter Voltage* $V_{CE} = 5 \text{ Vdc}, I_C = 2 \text{ Adc}$	$V_{BE(on)}$		1.5	Vdc
Delay Time ($V_{CC} = 30 \text{ Vdc}$)	t_d		200	ns
Rise Time	t_r			
Storage Time	t_s		400	ns
Fall Time	t_f			

*Pulse Test: Pulse width = 300 us, DutyCycle = 2%

TYPICAL OPERATING CURVES



FORWARD BIAS DC SAFE OPERATION AREA (S.O.A. CURVES)
CURVES APPLY BELOW RATED V_{CEO} $T_C = 25^\circ\text{C}$



SOLID STATE DEVICES, INC.