

PRELIMINARY DATA SHEET 5-8-85

# SFT1002 AND SFT1004

## 100 AMP

### HIGH SPEED NPN TRANSISTOR

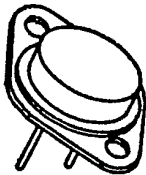
## 250 VOLTS



14830 Valley View Avenue  
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#### CASE STYLE R

#### TO-3 WITH .060 PINS



#### FEATURES

- RADIATION TOLERANT
- FAST SWITCHING
- HIGH FREQUENCY, 80 MHZ TYPICAL
- BVCEO 150 VOLTS MIN.
- HIGH LINEAR GAIN
- LOW LEAKAGE AND SATURATION VOLTAGE
- 200°C OPERATING, GOLD EUTECTIC DIE ATTACH
- DESIGNED FOR COMPLEMENTARY USE WITH SFT1001 AND SFT1003

#### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	$V_{CEO}$	150	Volts
Collector - Base Voltage	$V_{CBO}$	250	Volts
Emitter - Base Voltage	$V_{EBO}$	10	Volts
Collector Current	$I_C$	100	Amps
Base Current	$I_B$	20	Amps
Total Device Dissipation @ $T_C = 25^\circ\text{C}$	$P_D$	200	Watts
Derate above 25 °C		1.14	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	$R_{\theta JC}$	0.875	°C/W

#### ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ( $I_C = 50$ mA Adc)	$BV_{CEO}^*$	150		Vdc
Collector - Base Breakdown Voltage ( $I_C = 200$ $\mu$ Adc)	$BV_{CBO}$	250		Vdc
Emitter - Base Breakdown Voltage ( $I_E = 200$ $\mu$ Adc)	$BV_{EBO}$	10		Vdc

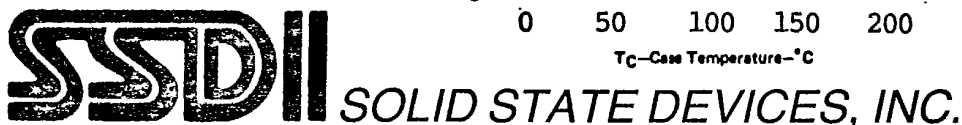
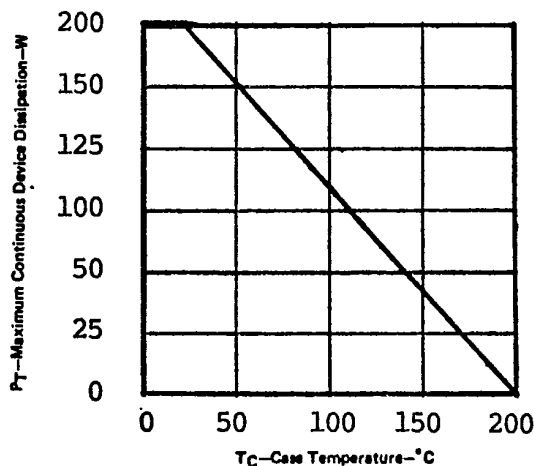
**ELECTRICAL CHARACTERISTICS**

Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ( $V_{CE} = 120 \text{ V}$ )	$I_{CE0}$		10	$\mu\text{Adc}$
Collector Cutoff Current ( $V_{CB} = 150 \text{ V}$ )	$I_{CB0}$		10	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{EB} = 10 \text{ V}$ )	$I_{EB0}$		1	$\mu\text{Adc}$
DC Current Gain* ( $I_C = 50 \text{ Adc}, V_{CE} = 5 \text{ Vdc}$ ) ( $I_C = 100 \text{ Adc}, V_{CE} = 5 \text{ Vdc}$ )	$h_{FE}$	10 25		
		5 15		
Collector - Emitter Saturation Voltage* ( $I_C = 50 \text{ Adc}, I_B = 5 \text{ Adc}$ ) ( $I_C = 100 \text{ Adc}, I_B = 10 \text{ Adc}$ )	$V_{CE(SAT)}$		0.7 1.3	Vdc
Base - Emitter Saturation Voltage* ( $I_C = 50 \text{ Adc}, I_B = 5 \text{ Adc}$ ) ( $I_C = 100 \text{ Adc}, I_B = 10 \text{ Adc}$ )	$V_{BE(SAT)}$		1.5 2.0	Vdc
Current - Gain - Bandwith Product ( $I_C = 1.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 10 \text{ MHz}$ )	$f_T$	50		MHz
Output Capacitance ( $V_{CB} = 10 \text{ Vdc}, I_E = 0, f = 1 \text{ MHz}$ )	$C_{ob}$		800	pf
Input Capacitance ( $V_{BE} = 10 \text{ Vdc}, I_C = 0, f = 1 \text{ MHz}$ )	$C_{ib}$		2000	pf
Delay Time	$(V_{CC} = 100 \text{ Vdc},$ $I_C = 20 \text{ Adc},$ $I_{B1} = I_{B2} = 2 \text{ Adc})$	$t_d$	100	ns
Rise Time		$t_r$	500	ns
Storage Time		$t_s$	800	ns
Fall Time		$t_f$	100	ns

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

**TYPICAL OPERATING CURVES**

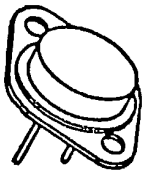
**DISSIPATION DERATING CURVE**



**SFT1010 SFT1012 SFT1014**  
**100 AMP**  
**HIGH ENERGY NPN TRANSISTORS**  
**V<sub>CEO</sub> 100, 120, 140 VOLTS**



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**CASE STYLE R****TO-3 WITH .060 PINS****FEATURES**

- BV<sub>CEO</sub> 250 VOLTS MIN
- 300 WATTS POWER DISSIPATION
- EXCELLENT SOA CURVE
- E<sub>s</sub>/b OF 400mJ
- GAIN OF OVER 5 AT 100 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 SFT1010 SFT1012 SFT1014	V <sub>CEC</sub>	100 120 140	Volts
Collector - Base Voltage	V <sub>CB0</sub>	250	Volts
Emitter - Base Voltage	V <sub>EB0</sub>	8	Volts
Collector Current	I <sub>C</sub>	100	Amps
Base Current	I <sub>B</sub>	35	Amps
Total Device Dissipation @ TC = 50°C Derate above 50°C	P <sub>D</sub>	300 2	Watts W/°C
Operating and Storage Temperature	T <sub>i</sub> , T <sub>stg</sub>	-65 to 200	°C

**THERMAL CHARACTERISTICS**

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	0.5	°C/W

**ELECTRICAL CHARACTERISTICS**

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* (I <sub>C</sub> = 200 mA <sub>DC</sub> ) SFT1010 SFT1012 SFT1014	BV <sub>CEO</sub> *	100 120 140		V <sub>DC</sub>
Collector - Base Breakdown Voltage (I <sub>C</sub> = 100 μA <sub>DC</sub> )	BV <sub>CB0</sub>	250		V <sub>DC</sub>
Emitter - Base Breakdown Voltage (I <sub>E</sub> = 100 μA <sub>DC</sub> )	BV <sub>EB0</sub>	8		V <sub>DC</sub>

NOTE: All specifications subject to change without notice.

**ELECTRICAL CHARACTERISTICS**

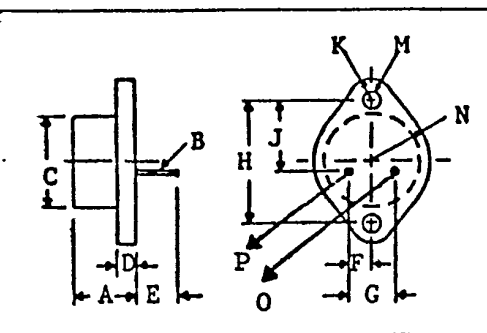
Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ( $V_{CB} = 250 \text{ Vdc}$ )	$I_{CBO}$		10	$\mu\text{A dc}$
Emitter Cutoff Current ( $V_{EB} = 7 \text{ Vdc}$ )	$I_{EBO}$		10	$\mu\text{A dc}$
DC Current Gain* ( $I_C = 10$ Adc, $V_{CE} = 2 \text{ Vdc}$ ) ( $I_C = 50$ Adc, $V_{CE} = 5 \text{ Vdc}$ ) ( $I_C = 100$ Adc, $V_{CE} = 5 \text{ Vdc}$ )	$h_{FE}$	40 30 7		
Collector - Emitter Saturation Voltage* ( $I_C = 50$ Adc, $I_B = 5 \text{ Adc}$ ) ( $I_C = 100$ Adc, $I_B = 10 \text{ Adc}$ )	$V_{CE(SAT)}$		2 4	Vdc
Base - Emitter Saturation Voltage* ( $I_C = 100$ Adc, $I_B = 10 \text{ Adc}$ )	$V_{BE(SAT)}$		2.5	Vdc
Current - Gain - Bandwith Product ( $I_C = 1$ Adc, $V_{CE} = 10 \text{ Vdc}$ , $f = 10 \text{ MHz}$ )	$f_T$	35		MHz
Output Capacitance ( $V_{CB} = 10 \text{ Vdc}$ , $I_E = 0$ , $f = 1 \text{ MHz}$ )	$C_{ob}$		600	pf
RBSOA ( $I_B = 1 \text{ Adc}$ , $R_{B1} = R_{B2} = 20 \text{ ohms}$ , $V_{BE(off)} = 2.0 \text{ Vdc}$ , $L = 1.0 \text{ mH}$ )	$E_{s/b}$	400		$\mu\text{J}$
FBSOA ( $V_{CE} = 20 \text{ Vdc}$ , $I_C = 15 \text{ Adc}$ ) ( $V_{CE} = 100 \text{ Vdc}$ , $I_C = 0.4 \text{ Adc}$ )	$I_{s/b}$	1 1		sec
ON TIME ( $V_{CC} = 60 \text{ Vdc}$ , $I_C = 10 \text{ Adc}$ )	$t_{on}$		800	ns
Storage Time ( $I_{B1} = I_{B2} = 1.0 \text{ Adc}$ )	$t_s$		1500	ns
Fall Time	$t_f$		400	ns

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

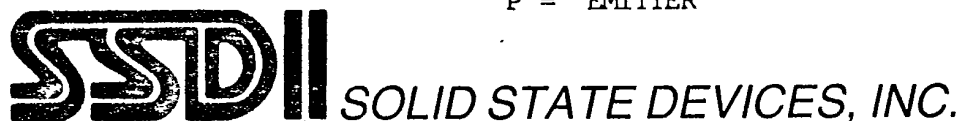
**PHYSICAL DIMENSIONS**

**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.
- O = BASE
- P = EMITTER



SFT1016

SFT1018

SFT1020

T-33-15

SSDI

100 AMP

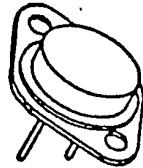
HIGH ENERGY NPN TRANSISTORS

VCEO 160, 180, 200 VOLTS

14830 VALLEY VIEW  
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CASE STYLE TO-3

FEATURES



- ▶ BVCEO 350 VOLTS MIN.
- ▶ 300 WATTS POWER DISSIPATION
- ▶ EXCELLENT SOA CURVE
- ▶ Es/b OF 400mJ
- ▶ GAIN OF OVER 5 AT 100 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 SFT1016 SFT1018 SFT1020	VCEO	160 180 200	Volts
Collector-Base Voltage	VCBO	350	Volts
Emitter-Base Voltage	VEBO	8	Volts
Collector Current	IC	100	Amps
Base Current	IB	35	Amps
Total Device Dissipation @ Tc = 50°C	PD	300	Watts
Derate Above 50°C		2	W/°C
Operating and Storage Temperature	TJ, Tstg	-65 to +200	°C

## THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	VALUE	UNIT
Thermal Resistance, Junction to Case	RθJC	0.5	°C/W

## ELECTRICAL CHARACTERISTICS

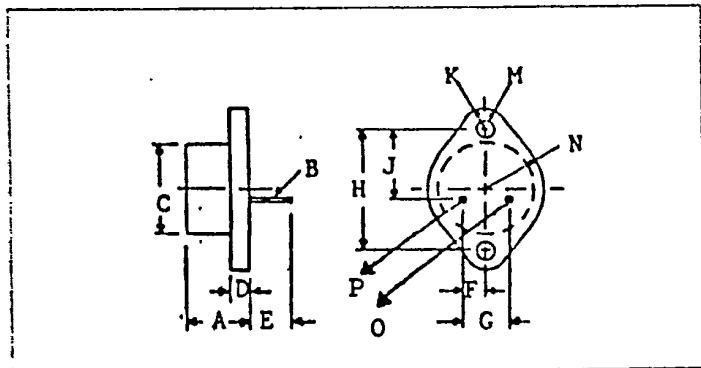
Characteristics	Symbol	Min	Max	Unit
Collector-Emitter Breakdown Voltage* (IC = 200mAdc)	BVCEO SFT1016 SFT1018 SFT1020	160 180 200		Volts
Collector-Base Breakdown Voltage (IC = 100uAdc)	BVCBO	350		Volts

# ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min	Max	Unit
Emitter-Base Breakdown Voltage (IE = 100uAdc)	BVEBO	8		Vdc
Collector Cutoff Current (VCB = 350Vdc)	ICBO		10	uAdc
Emitter Cutoff Current (VEB = 7Vdc)	IEBO		10	uAdc
DC Current Gain* (IC = 10Adc, VCE = 2Vdc) (IC = 50Adc, VCE = 5Vdc) (IC = 100Adc, VCE = 5Vdc)	hFE	40 30 7		
Collector-Emitter Saturation Voltage* (IC = 50Adc, IB = 5Adc) (IC = 100Adc, IB = 10Adc)	VCE (SAT)		2 4	Vdc
Base-Emitter Saturation Voltage* (IC = 100Adc, IB = 10Adc)	VBE (SAT)		2.5	Vdc
Current Gain Bandwidth Product (IC = 1Adc, VCE = 10Vdc, f = 10MHz)	fT	40		MHz
Output Capacitance (VCB = 10Vdc, IE = 0Adc, f = 1MHz)	Cob		1200	pf
Energy, Secondary Breakdown (IB = 1Adc, RB1 = RB2 = 20ohms) VBE(off) = 2.0Vdc, L = 1.0mH)	Es/b	400		mJ
Current, Secondary Breakdown (VCE = 20Vdc, IC = 15Adc) (VCE = 100Vdc, IC = 0.4Adc)	Is/b	1 1		sec
Dn Time  Storage Time  Fall Time	(VCC = 60Vdc, IC = 10Adc, IB1 = IB2 = 1.0Adc)	ton	800	ns
		ts	1500	ns
		tf	400	ns

\*Pulse Test: Pulse Width = 300us, Duty Cycle = 2%

## PHYSICAL DIMENSIONS



### KEY TO DIMENSIONS:

(Inches)

A = .250 - .450	M = .151 - .161
B = .057 - .062	N = .525 Max.
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