

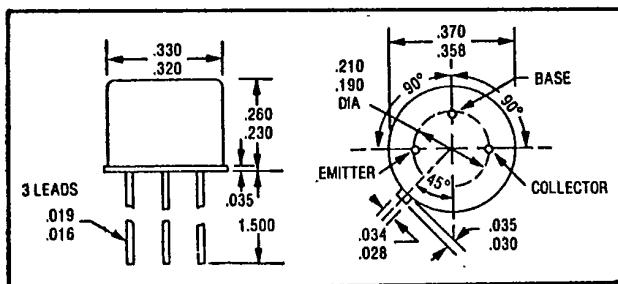
2N5338 AND 2N5339
5 AMP
HIGH SPEED NPN TRANSISTOR
100 VOLTS



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

- RADIATION TOLERANT
- FAST SWITCHING, 100 NSEC MAX t_d
- HIGH FREQUENCY, TYPICAL f_T 100 MHZ
- BVCEO 100 VOLTS MIN
- HIGH LINEAR GAIN, LOW SATURATION VOLTAGE
- 200°C OPERATING, GOLD EUTECTIC DIE ATTACH
- DESIGNED FOR COMPLEMENTARY USE WITH
2N6192 AND 2N6193
- 2N5334 THRU 2N5337 ALSO AVAILABLE

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V_{CEO}	100	Volts
Collector - Base Voltage	V_{CBO}	100	Volts
Emitter - Base Voltage	V_{EBO}	6	Volts
Collector Current	I_C	5	Amps
Base Current	I_B	1	Amps
Total Device Dissipation @ $T_C = 25^\circ C$	P_D	6	Watts
Derate above $25^\circ C$		34.3	mW/ $^\circ C$
Operating and Storage Temperature	T_j, T_{stg}	-65 to +200	$^\circ C$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Value	Unit
Thermal Resistance, Junction to Case	R _{θJC}	29.2	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 50 \text{ mA}$)	BV_{CE0}	100		Vdc
Collector - Base Breakdown Voltage ($I_C = 200 \text{ uA}$)	BV_{CBO}	100		Vdc
Emitter - Base Breakdown Voltage ($I_E = 200 \text{ uA}$)	BV_{EBO}	6		Vdc

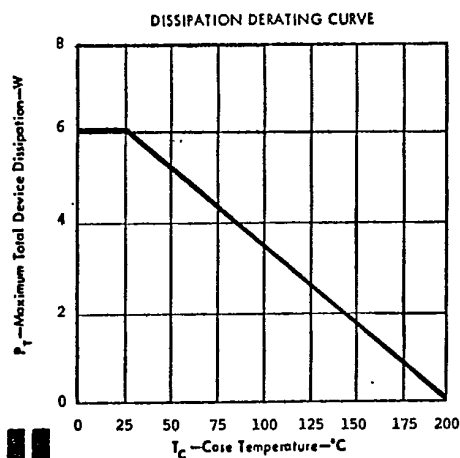
NOTE: All specifications subject to change without notice.

ELECTRICAL CHARACTERISTICS

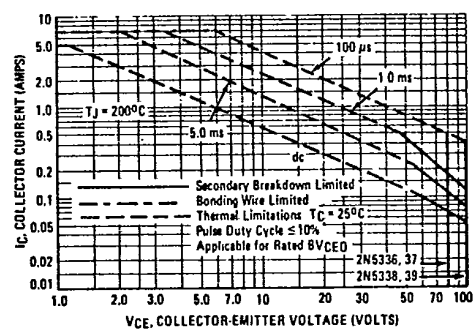
Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CE} = 90 \text{ Vdc}$) ($V_{CE} = 90 \text{ Vdc}$, $V_{EB} = 1.5 \text{ Vdc}$) ($V_{CE} = 90 \text{ Vdc}$, $V_{EB} = 1.5 \text{ Vdc}$, $T_C = 150^\circ\text{C}$)			100 10 1.0	μA μA mA
Collector Cutoff Current ($V_{CB} = 100 \text{ Vdc}$)	I_{CBO}		10	μA
Emitter Cutoff Current ($V_{EB} = 6 \text{ Vdc}$)	I_{EBO}		100	μA
DC Current Gain* ($I_C = 500 \text{ mA}$, $V_{CE} = 2 \text{ Vdc}$) ($I_C = 2 \text{ A}$, $V_{CE} = 2 \text{ Vdc}$) ($I_C = 5 \text{ A}$, $V_{CE} = 2 \text{ Vdc}$)	h_{FE}	30 60 30 60 20 40	120 240	
Collector - Emitter Saturation Voltage* ($I_C = 2 \text{ A}$, $I_B = 200 \text{ mA}$) ($I_C = 5 \text{ A}$, $I_B = 500 \text{ mA}$)	$V_{CE(SAT)}$		0.7 1.2	Vdc
Base - Emitter Saturation Voltage* ($I_C = 2 \text{ A}$, $I_B = 200 \text{ mA}$) ($I_C = 5 \text{ A}$, $I_B = 500 \text{ mA}$)	$V_{BE(SAT)}$		1.2 1.8	Vdc
Current - Gain - Bandwidth Product ($I_C = 500 \text{ mA}$, $V_{CE} = 10 \text{ Vdc}$, $f = 10 \text{ MHz}$)	f_T	30		MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 100 \text{ KHz}$)	C_{ob}		250	pF
Input Capacitance ($V_{BE} = 2 \text{ Vdc}$, $I_C = 0$, $f = 100 \text{ KHz}$)	C_{ib}		1000	pF
Delay Time ($V_{CC} = 40 \text{ Vdc}$, $I_C = 2.0 \text{ A}$, $V_{EB}(\text{Off}) = 3.0 \text{ Vdc}$, $I_{B1} = I_{B2} = 200 \text{ mA}$)	t_d		100	ns
Rise Time	t_r		100	ns
Storage Time	t_s		2.0	μs
Fall Time	t_f		200	ns

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

TYPICAL OPERATING CURVES



FORWARD BIAS DC SAFE OPERATION AREA (S.O.A. CURVE)

CURVES APPLY BELOW RATED V_{CEO} $T_C = 25^\circ\text{C}$ 

SOLID STATE DEVICES, INC.

2N3996 AND 2N3997

5 AMP

HIGH SPEED NPN TRANSISTOR

100 VOLTS

SSDI

14830 Valley View Avenue
La Mirada, California 90638
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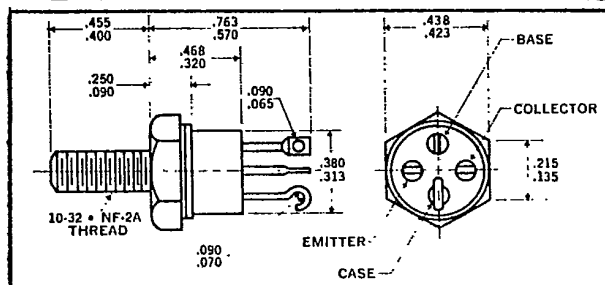
CASE STYLE Z

JEDEC TO-111

ALL TERMINALS ISOLATED FROM CASE

FEATURES

- RADIATION TOLERANT
- FAST SWITCHING, 300 NSEC MAX t_{on}
- HIGH FREQUENCY, TYPICAL f_T 100 MHZ
- V_{CEO} 80 VOLTS MIN
- HIGH LINEAR GAIN, LOW SATURATION VOLTAGE
- 200°C OPERATING, GOLD EUTECTIC DIE ATTACH
- DESIGNED FOR COMPLEMENTARY USE WITH 2N4999 AND 2N5001



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector - Emitter Voltage	V_{CEO}	80	Volts
Collector - Base Voltage	V_{CBO}	100	Volts
Emitter - Base Voltage	V_{EBO}	8	Volts
Collector Current	I_C	5	Amps
Base Current	I_B	1	Amps
Total Device Dissipation @ $T_C = 100^\circ\text{C}$	P_D	30	Watts
Derate above 100 °C		300	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	$R_{\theta JC}$	3.33	°C/W

ELECTRICAL CHARACTERISTICS

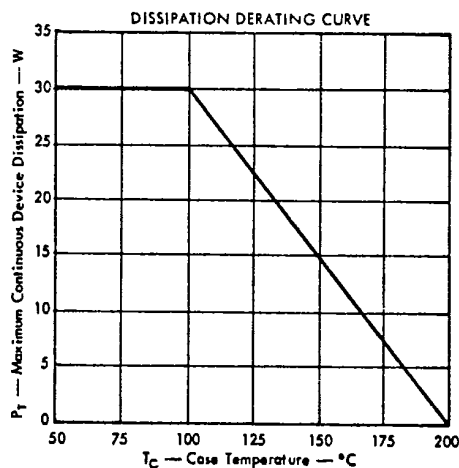
Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 50$ mA)	BV_{CEO}	80		Vdc
Collector - Base Breakdown Voltage ($I_C = 200$ uA)	BV_{CBO}	100		Vdc
Emitter - Base Breakdown Voltage ($I_E = 200$ uA)	BV_{EBO}	8		Vdc

ELECTRICAL CHARACTERISTICS

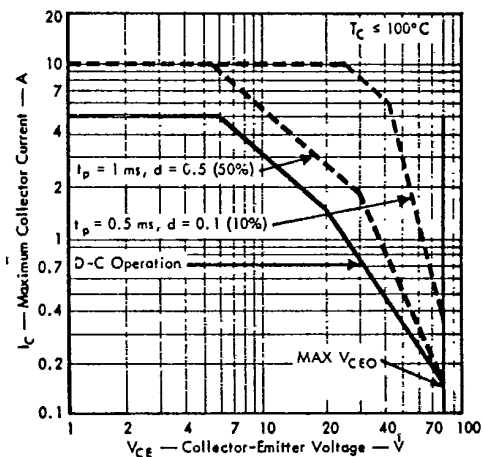
Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$)	I_{CEO}		10	μAdc
Collector Cutoff Current ($V_{CE} = 90 \text{ Vdc}$) ($V_{CE} = 90 \text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CES}		5 50	μAdc μAdc
Emitter Cutoff Current ($V_{EB} = 5 \text{ Vdc}$) ($V_{EB} = 8 \text{ Vdc}$)	I_{EBO}		500 10	nAdc μAdc
DC Current Gain* ($I_C = 50 \text{ mAdc}$, $V_{CE} = 2 \text{ Vdc}$) ($I_C = 1 \text{ Adc}$, $V_{CE} = 2 \text{ Vdc}$) ($I_C = 5 \text{ Adc}$, $V_{CE} = 2 \text{ Vdc}$)	h_{FE}	30 60 40 80 15 20	120 240	
Collector - Emitter Saturation Voltage* ($I_C = 1 \text{ Adc}$, $I_B = 100 \text{ mAdc}$) ($I_C = 5 \text{ Adc}$, $I_B = 500 \text{ mAdc}$)	$V_{CE(SAT)}$		0.25 2.0	Vdc
Base - Emitter Saturation Voltage* ($I_C = 1 \text{ Adc}$, $I_B = 100 \text{ mAdc}$) ($I_C = 5 \text{ Adc}$, $I_B = 500 \text{ mAdc}$)	$V_{BE(SAT)}$	0.6	1.2 1.6	Vdc
Current - Gain - Bandwidth Product ($I_C = 1 \text{ Adc}$, $V_{CE} = 5 \text{ Vdc}$, $f = 10 \text{ MHz}$)	f_T	40		MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0.1 = 1 \text{ MHz}$)	C_{ob}		150	pf
Delay Time ($V_{CC} = 20 \text{ Vdc}$)	t_d			
Rise Time ($I_C = 1 \text{ Adc}$)	t_r		300	ns
Storage Time ($V_{EB}(\text{Off}) = 3.7 \text{ Vdc}$, $I_{B1} = I_{B2} = 100 \text{ mAdc}$)	t_s			
Fall Time ($R_L = 20 \text{ Ohms}$)	t_f		1.5	μs

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

TYPICAL OPERATING CURVES



FORWARD BIAS DC SAFE OPERATION AREA (S.O.A.) CURVE

CURVES APPLY BELOW RATED V_{CEO} $T_C = 25^\circ\text{C}$ 

SOLID STATE DEVICES, INC.

2N5002 AND 2N5004

5 AMP

HIGH SPEED NPN TRANSISTOR

100 VOLTS

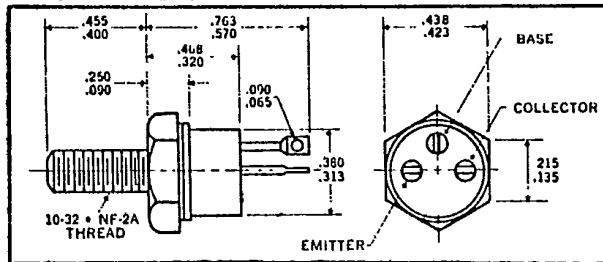


14830 Valley View Avenue
La Mirada, California 90638
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TWX 910-583-4807
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CASE STYLE X

JEDEC TO-59

ALL TERMINALS ISOLATED FROM CASE



FEATURES

- RADIATION TOLERANT
- FAST SWITCHING, TYPICAL 200 NSEC 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 2N5003 AND 2N5005

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}	6	Volts
Collector Current	I_C	5	Amps
Base Current	I_B	2	Amps
Total Device Dissipation @ $T_C = 50^\circ\text{C}$	P_D	50	Watts
Derate above 50 °C		333	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	$R_{\theta JC}$	3.0	°C/W

ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector - Emitter Breakdown Voltage* ($I_C = 100 \text{ mAdc}$)	BV_{CE0}^*	80		Vdc
Collector - Base Breakdown Voltage ($I_C = 200 \text{ uAdc}$)	BV_{CB0}	100		Vdc
Emitter - Base Breakdown Voltage ($I_E = 200 \text{ uAdc}$)	BV_{EB0}	6		Vdc

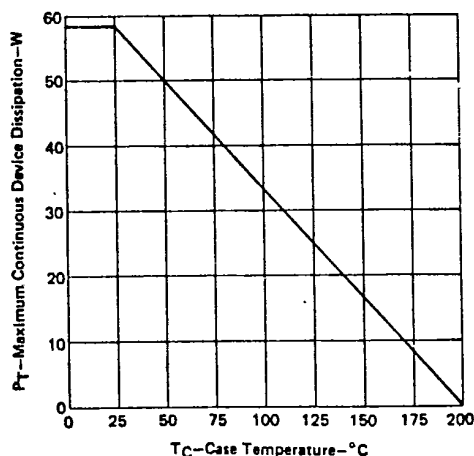
ELECTRICAL CHARACTERISTICS

Characteristics	Symbol	Min.	Max.	Unit
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$, $V_{BE} = 2 \text{ Vdc}$, $T_C = 150^\circ\text{C}$) ($V_{CE} = 40 \text{ Vdc}$)	I_{CEV} I_{CEO}		500 50	μAdc μAdc
Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}$) ($V_{CE} = 100 \text{ Vdc}$)	I_{CES}		1.0 1.0	μAdc mAdc
Emitter Cutoff Current ($V_{EB} = 5 \text{ Vdc}$) ($V_{EB} = 6 \text{ Vdc}$)	I_{EBO}		1.0 1.0	μAdc mAdc
DC Current Gain* ($I_C = 50 \text{ mAdc}$, $V_{CE} = 5 \text{ Vdc}$) ($I_C = 2.5 \text{ Adc}$, $V_{CE} = 5 \text{ Vdc}$) ($I_C = 5 \text{ Adc}$, $V_{CE} = 5 \text{ Vdc}$)	h_{FE}	20 50 30 70 20 40	90 200	
Collector - Emitter Saturation Voltage* ($I_C = 2.5 \text{ Adc}$, $I_B = 250 \text{ mAdc}$) ($I_C = 5 \text{ Adc}$, $I_B = 500 \text{ mAdc}$)	$V_{CE(SAT)}$		0.75 1.5	Vdc
Base - Emitter Saturation Voltage* ($I_C = 2.5 \text{ Adc}$, $I_B = 250 \text{ mAdc}$) ($I_C = 5 \text{ Adc}$, $I_B = 500 \text{ mAdc}$)	$V_{BE(SAT)}$		1.45 2.2	Vdc
Current - Gain - Bandwidth Product ($I_C = 500 \text{ mAdc}$, $V_{CE} = 5 \text{ Vdc}$, $f = 20 \text{ MHz}$)	f_T	60 70		MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0.1 \text{ mA}$, $f = 1 \text{ MHz}$)	C_{ob}		250	pF
Base - Emitter Voltage* ($V_{CE} = 5 \text{ Vdc}$, $I_C = 2.5 \text{ Adc}$)	$V_{BE(ON)}$		1.45	Vdc
Delay Time ($V_{CC} = 30 \text{ Vdc}$, $I_C = 5 \text{ Adc}$)	$t_d + t_r$		500	ns
Rise Time ($V_{EB(Off)} = 3.7 \text{ Vdc}$, $I_{B1} = I_{B2} = 500 \text{ mAdc}$, $R_L = 6 \text{ Ohms}$)	$t_s + t_f$		1.3	μs
Storage Time				
Fall Time				

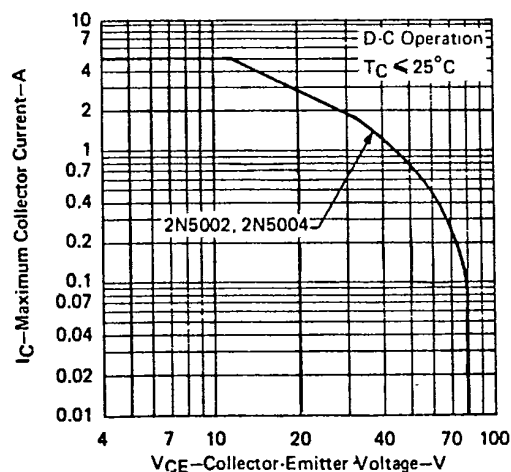
*Pulse Test: Pulse width = 300 μs , DutyCycle = 2%

TYPICAL OPERATING CURVES

DISSIPATION DERATING CURVE



FORWARD BIAS DC SAFE OPERATION AREA (S.O.A. CURVE)

CURVES APPLY BELOW RATED V_{CEO} $T_C = 25^\circ\text{C}$ 

SOLID STATE DEVICES, INC.