2N5527 2N5531

NPN SILICON POWER TRANSISTORS
RADIATION RESISTANT

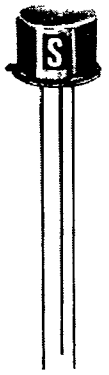
5 AMPERES

FEATURES

MEDIUM POWER
RADIATION EXPOSURE LEVEL TO 5×10^{14} nvt
TOTAL NEUTRON FLUX GREATER THAN 10 KEV

APPLICATIONS

POWER AMPLIFIER
RADIATION ENVIRONMENTS
ULTRA HIGH FREQUENCY



TO-5

ABSOLUTE MAXIMUM RATINGS

		2N5527	2N5531
V_{CBO}	COLLECTOR-BASE VOLTAGE	60 V	90 V
V_{CEO}	COLLECTOR-EMITTER VOLTAGE	40 V	75 V
V_{EBO}	EMITTER-BASE VOLTAGE	3 V	3 V
I_C	CONTINUOUS COLLECTOR CURRENT	5 A	5 A
I_B	CONTINUOUS BASE CURRENT	1 A	1 A
T_J	OPERATING JUNCTION TEMPERATURE	−65°C to +200°C	
T_{stg}	STORAGE TEMPERATURE	−65°C to +200°C	
$R_{\theta JC}$	THERMAL RESISTANCE, JUNCTION TO CASE	35°C/W	
P_D	POWER DISSIPATION (25°C)	5 W	

8-83-2R

RADIATION RESISTANT NPN SILICON POWER TRANSISTORS

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ELECTRICAL CHARACTERISTICS (T_C = 25°C UNLESS OTHERWISE NOTED)

CHARACTERISTICS		SYMBOL	MIN.	MAX.	UNITS
COLLECTOR EMITTER SUSTAINING VOLTAGE(1)		$V_{CEO(sus)}$			
(I_C = 50 mA)	2N5527		40		V
	2N5531		75		V
(I_C = 50 mA, NOTE 2)	2N5527		40		V
	2N5531		75		V
COLLECTOR-CUTOFF CURRENT		I_{CEX}			
(V_{CE} = 30V, V_{BE} = 0, T_C = 100°C)				1.0	mA
COLLECTOR-CUTOFF CURRENT		I_{CBO}			
(V_{CB} = RATED)				1.0	mA
(V_{CB} = RATED, NOTE 2)				1.0	mA
COLLECTOR-CUTOFF CURRENT		I_{CBO}			
(V_{CB} = 30V)				0.1	mA
(V_{CB} = 30V, NOTE 2)				1.0	mA
COLLECTOR-CUTOFF CURRENT		I_{CEO}			
(V_{CE} = RATED)				50	mA
EMITTER CUTOFF CURRENT		I_{EBO}			
(V_{EB} = 3.0V)				1.0	mA
(V_{EB} = 3.0V, NOTE 2)				1.0	mA
EMITTER FLOATING POTENTIAL		V_{EBF}			
(V_{CB} = RATED, I_E = 0)				1.0	V
DC CURRENT GAIN(1)		h_{FE}			
(V_{CE} 5.0V, I_C = 0.5A)	2N5527		40	300	
(V_{CE} 5.0V, I_C = 0.5A)	2N5531		25	300	
(V_{CE} 5.0V, I_C = 3.0A)	2N5527		40	200	
(V_{CE} 5.0V, I_C = 3.0A)	2N5531		30	150	
(V_{CE} 5.0V, I_C = 5.0A)	2N5527		25		
(V_{CE} 5.0V, I_C = 5.0A)	2N5531		20		
(V_{CE} 5.0V, I_C = 3.0A NOTE 2)	2N5527		15		
(V_{CE} 5.0V, I_C = 3.0A NOTE 2)	2N5531		7.0		
COLLECTOR-EMITTER SATURATION VOLTAGE(1)		$V_{CE(sat)}$			
(I_C = 3.0A, I_B = 0.3A)	2N5527			1.25	V
(I_C = 3.0A, I_B = 0.5A)	2N5531			1.25	V
(I_C = 5.0A, I_B = 0.2A)	2N5527			5.0	V
(I_C = 5.0A, I_B = 0.25A)	2N5531			5.0	V
(I_C = 3.0A, I_B = 0.3A, NOTE 2)	2N5527			2.0	V
(I_C = 3.0A, I_B = 0.5A, NOTE 2)	2N5531			3.0	V
BASE-EMITTER SATURATION VOLTAGE(1)		$V_{BE(sat)}$			
(I_C = 3.0A, I_B = 0.3A)	2N5527			1.5	V
(I_C = 3.0A, I_B = 0.5A)	2N5531			1.5	V
BASE-EMITTER VOLTAGE		V_{BE}			
(V_{CE} = 5.0V, I_C = 3.0A)				1.5	V
MAGNITUDE OF SMALL SIGNAL GAIN		$\|h_{fe}\|$			
(V_{CE} = 28V, I_C = 0.5A, f = 25 MHz)			8.0		
SMALL SIGNAL GAIN		h_{fe}			
(V_{CB} = 5.0V, I_C = 0.5A, f = 1.0 KHz)	2N5527		20		
	2N5531		15		
OUTPUT CAPACITANCE		C_{obo}			
(V_{CB} = 30V, f = 1.0 MHz)				75	pF
PROMPT PRIMARY PHOTO CURRENT ($\dot{\gamma}$ = 1×10^9 R/sec, $\epsilon \geq$ 1.0 MeV, V_{CB} = 10V)		I_{ppc}		500	mA(PK)

Note 1: Pulsed 300 μsec, 1.8 Duty Cycle

Note 2: After exposure, 1×10^{14} nvt, FLUX ≥ 10 KEV

RADIATION RESISTANT NPN SILICON POWER TRANSISTORS

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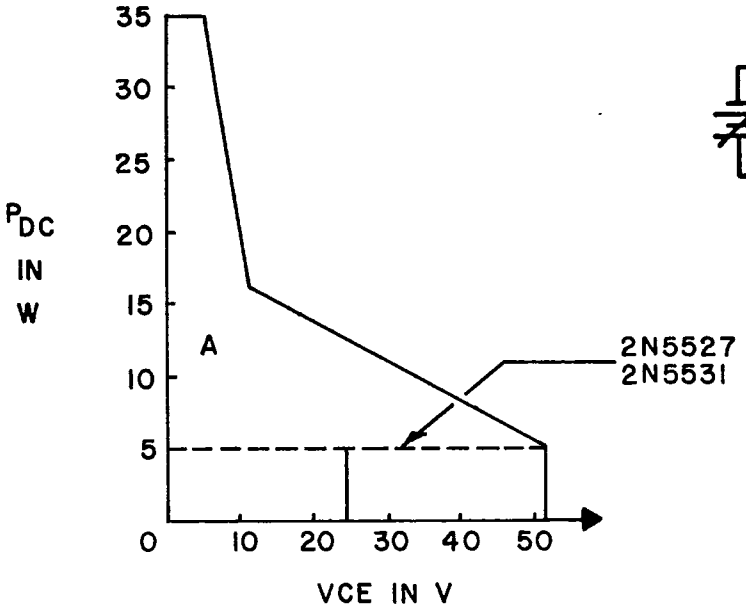
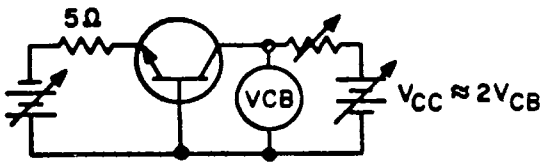
SAFE OPERATING AREA (SOAR)
CONTINUOUS DC OPERATION

SOAR VALUES

TYPE NUMBER	V1 V	V2 V
2N5527	30	60
2N5531	65	90

Conditions: 1. $T_J = T_{CASE} + \Theta_{J-C}$ PDC ≤ 200°C
2. PDC = PDC max rating for specified transistor type
3. PDC = PDC = f (V_{CE}) Area A
4. V_{CE} = 0.8V1 rating for specified transistor type



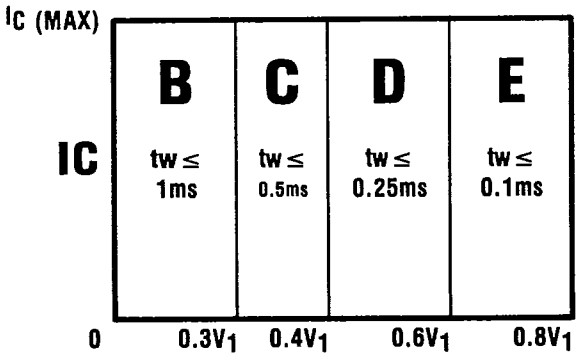


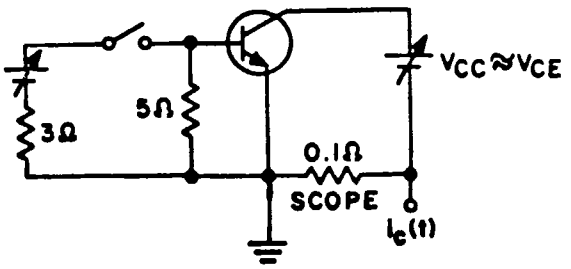
PULSED OPERATION

Conditions: 1. $T_J = T_{CASE} + \Theta_{J-C}$ Pavg ≤ 200°C

2. $Pavg = \frac{1}{2ms} \int_0^{2ms} ic\ vce\ dt \leq$ the allowed DC power dissipation for a V_{CE} equal to the highest v_{ce} applied to the transistor

3. Operation in the active region should be limited to a maximum pulse width of tw = 1 ms for Area B, tw = 0.5 ms for Area C, tw = 0.25 ms for Area D, and tw = 0.10 ms for Area E. tr≤ 20 μs and tf ≤ 20μs for Areas B-E.





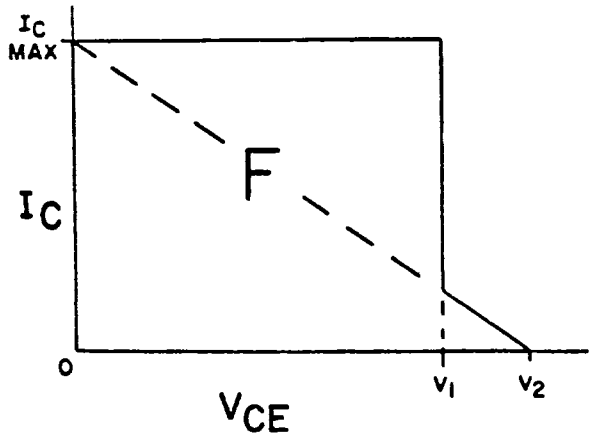
RADIATION RESISTANT NPN SILICON POWER TRANSISTORS

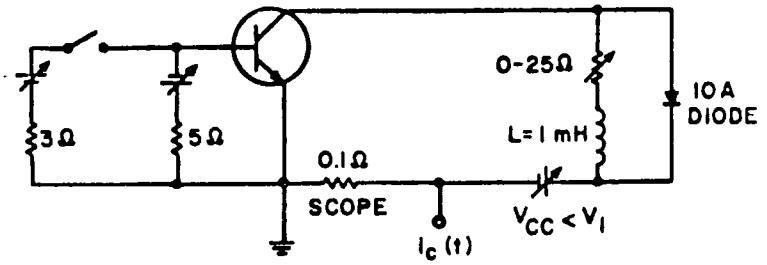
RESISTIVE AND CLAMPED INDUCTIVE SWITCHING

(Switching from saturation to cutoff)

Conditions:

1. $T_J = T_C + \Theta_{J-C}$ Pavg $\leq$ 200°C
2. Pavg $= \frac{1}{2ms} \int_0^{2ms}$ ic vce dt $\leq$ PDC max.
3. For the resistive loadline, L = 0 and $V_{CC} = V2$
4. tr $\leq 2\mu s$, tf $\leq 2\ \mu s$ in Area F



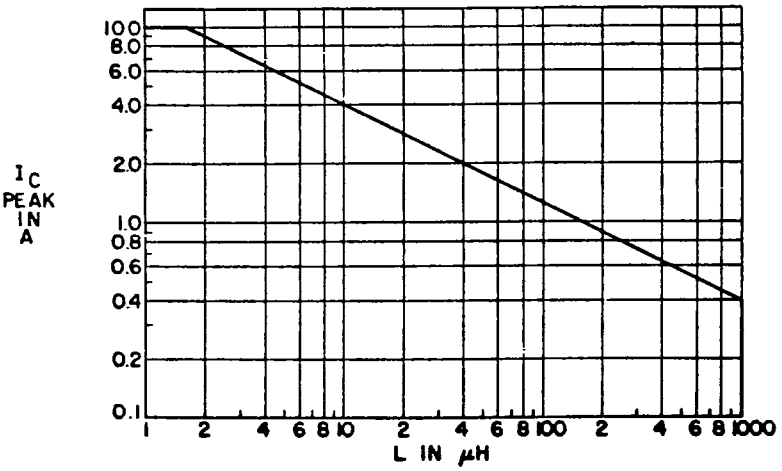


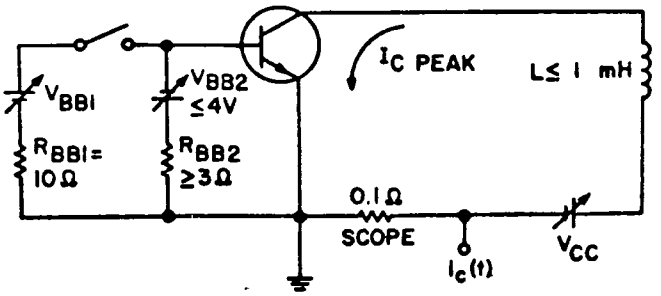
UNCLAMPED SWITCHING

(Switching from saturation to cutoff)

Conditions:

1. $T_J = T_C + \Theta_{J-C}$ Pavg $\leq$ 200°C
2. Pavg $= \frac{1}{2ms} \int_0^{2ms}$ ic vce dt $\leq$ PDC max.
3. I_C peak $\leq I_C$ max rating for specified transistor type
4. ½ $LIC^2 \leq 80\mu Ws$





RADIATION RESISTANT NPN SILICON POWER TRANSISTORS

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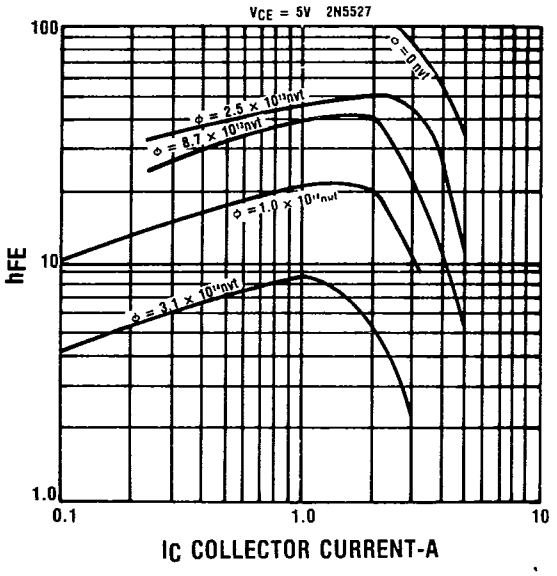
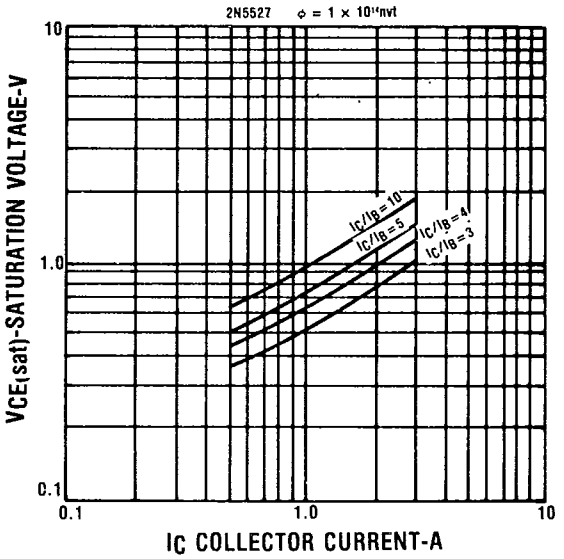
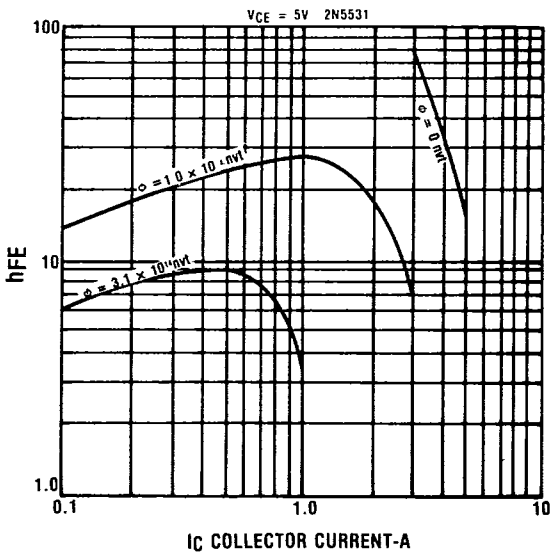
TYPICAL STATIC FORWARD CURRENT TRANSFER RATIO



TYPICAL COLLECTOR-EMITTER SATURATION VOLTAGE



TYPICAL STATIC FORWARD CURRENT TRANSFER RATIO



TYPICAL COLLECTOR-EMITTER SATURATION VOLTAGE