2

NPN 2N6515 thru 2N6517 PNP 2N6518 thru 2N6520

CASE 29-02, STYLE 1
TO-92 (TO-226AA)

HIGH VOLTAGE TRANSISTOR

MAXIMUM RATINGS

Rating	Symbol	2N6515 2N6518	2N6516 2N6519	2N6517 2N5520	Unit
Collector-Emitter Voltage	V_{CEO}	250	300	350	Vdc
Collector-Base Voltage	V_{CBO}	250	300	350	Vdc
Emitter-Base Voltage 2N6515, 2N6516, 2N6517 2N6518, 2N6519, 2N6520	V_{EBO}		6.0 5.0		Vdc
Base Current	I_B		250		mAdc
Collector Current — Continuous	I_C		500		mAdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D		0.625 5.0		Watt mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}		−55 to +150		°C
Lead Temperature ≥ 1/16" from case for 10 seconds	T_L		260		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	83.3	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	200	°C/W

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted.)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage(1)		$V_{(BR)CEO}$			Vdc
(I_C = 1.0 mAdc, I_B = 0)	2N6515, 2N6518		250	—	
	2N6516, 2N6519		300	—	
	2N6517, 2N6520		350	—	
Collector-Base Breakdown Voltage		$V_{(BR)CBO}$			Vdc
(I_C = 100 μAdc, I_E = 0)	2N6515, 2N6518		250	—	
	2N6516, 2N6519		300	—	
	2N6517, 2N6520		350	—	
Emitter-Base Breakdown Voltage		$V_{(BR)EBO}$			Vdc
(I_E = 10 μAdc, I_C = 0)	2N6515, 2N6516, 2N6517		6.0	—	
	2N6518, 2N6519, 2N6520		5.0	—	
Collector Cutoff Current		I_{CBO}			nAdc
(V_{CB} = 150 Vdc, I_E = 0)	2N6515, 2N6518		—	50	
(V_{CB} = 200 Vdc, I_E = 0)	2N6516, 2N6519		—	50	
(V_{CB} = 250 Vdc, I_E = 0)	2N6517, 2N6520		—	50	
Emitter Cutoff Current		I_{EBO}			nAdc
(V_{EB} = 5.0 Vdc, I_C = 0)	2N6515, 2N6516, 2N6517		—	50	
(V_{EB} = 4.0 Vdc, I_C = 0)	2N6518, 2N6519, 2N6520		—	50	
ON CHARACTERISTICS(1)					
DC Current Gain		h_{FE}			—
(I_C = 1.0 mAdc, V_{CE} = 10 Vdc)	2N6515, 2N6518		35	—	
	2N6516, 2N6519		30	—	
	2N6517, 2N6520		20	—	
(I_C = 10 mAdc, V_{CE} = 10 Vdc)	2N6515, 2N6518		50	—	
	2N6516, 2N6519		45	—	
	2N6517, 2N6520		30	—	
(I_C = 30 mAdc, V_{CE} = 10 Vdc)	2N6515, 2N6518		50	300	
	2N6516, 2N6519		45	270	
	2N6517, 2N6520		30	200	
(I_C = 50 mAdc, V_{CE} = 10 Vdc)	2N6515, 2N6518		45	220	
	2N6516, 2N6519		40	200	
	2N6517, 2N6520		20	100	
(I_C = 100 mAdc, V_{CE} = 10 Vdc)	2N6515, 2N6518		25	—	
	2N6516, 2N6519		20	—	
	2N6517, 2N6520		15	—	

ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)		—	0.30	
(I_C = 20 mAdc, I_B = 2.0 mAdc)		—	0.35	
(I_C = 30 mAdc, I_B = 3.0 mAdc)		—	0.50	
(I_C = 50 mAdc, I_B = 5.0 mAdc)		—	1.0	
Base-Emitter Saturation Voltage	$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)		—	0.75	
(I_C = 20 mAdc, I_B = 2.0 mAdc)		—	0.85	
(I_C = 30 mAdc, I_B = 3.0 mAdc)		—	0.90	
Base-Emitter On Voltage (I_C = 100 mAdc, V_{CE} = 10 Vdc)	$V_{BE(on)}$	—	2.0	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product(1) (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 20 MHz)	f_T	40	200	MHz
Collector-Base Capacitance (V_{CB} = 20 Vdc, I_E = 0, f = 1.0 MHz)	C_{cb}	—	6.0	pF
Emitter-Base Capacitance (V_{EB} = 0.5 Vdc, I_C = 0, f = 1.0 MHz) 2N6515 thru 2N6517	C_{eb}	—	80	pF
2N6518 thru 2N6520		—	100	
SWITCHING CHARACTERISTICS				
Turn-On Time (V_{CC} = 100 Vdc, $V_{BE(off)}$ = 2.0 Vdc, I_C = 50 mAdc, I_{B1} = 10 mAdc)	t_{on}	—	200	ns
Turn-Off Time (V_{CC} = 100 Vdc, I_C = 50 mAdc, I_{B1} = I_{B2} = 10 mAdc)	t_{off}	—	3.5	ns

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

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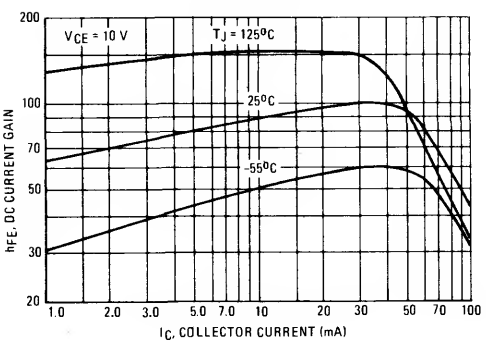
FIGURE 1 – DC CURRENT GAIN

2N6515, 2N6516



2N6518, 2N6519

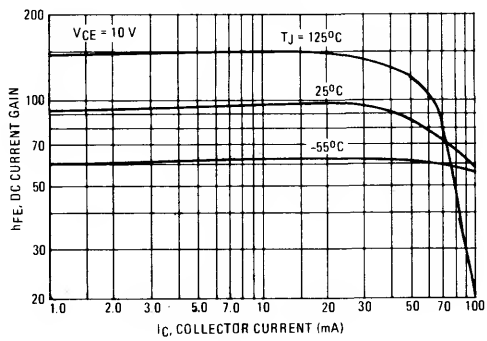


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FIGURE 2 – DC CURRENT GAIN

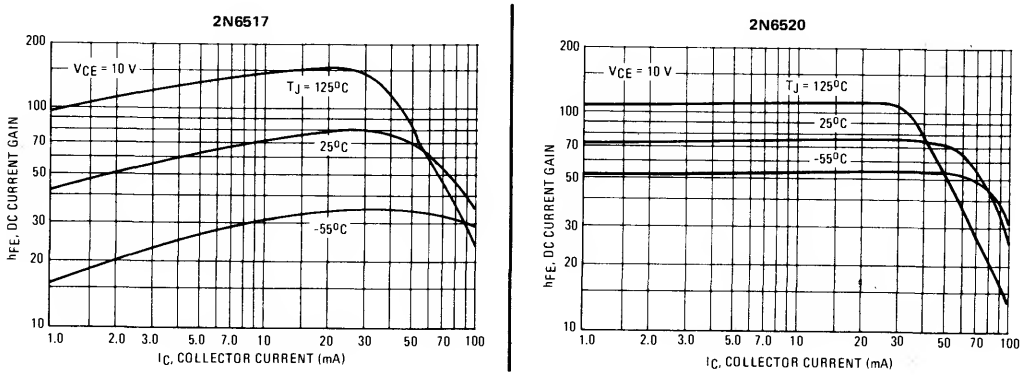


FIGURE 3 – CURRENT-GAIN – BANDWIDTH PRODUCT

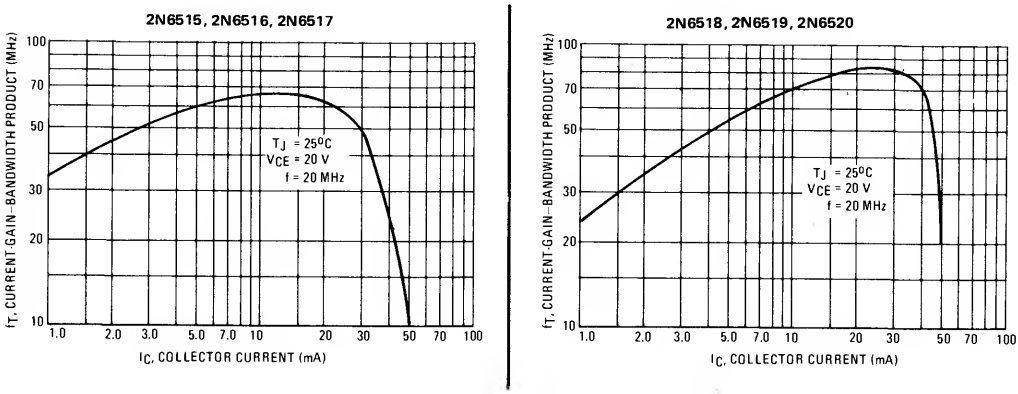


FIGURE 4 – "ON" VOLTAGES

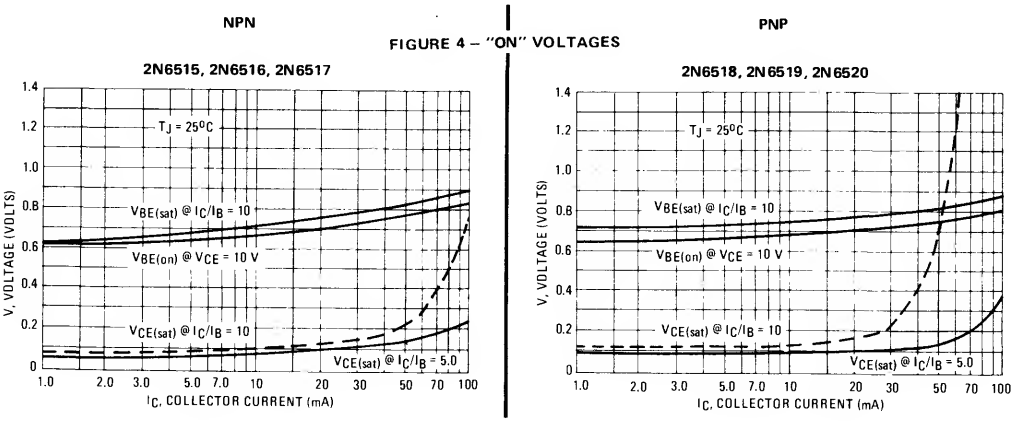
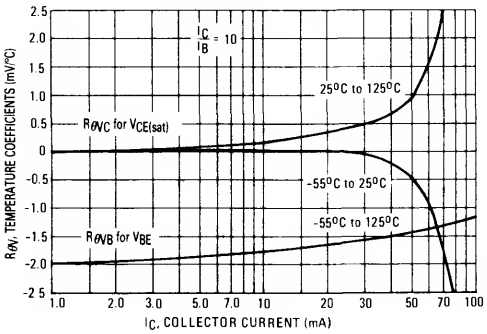


FIGURE 5 – TEMPERATURE COEFFICIENTS

2N6515, 2N6516, 2N6517



2N6518, 2N6519, 2N6520

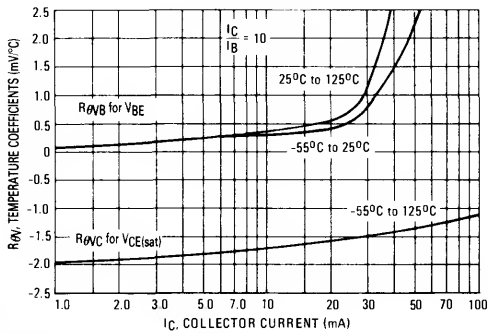
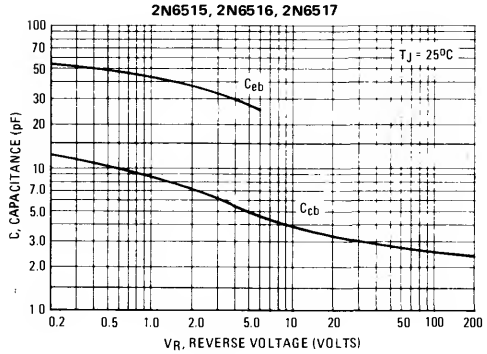


FIGURE 6 – CAPACITANCE

2N6515, 2N6516, 2N6517



2N6518, 2N6519, 2N6520

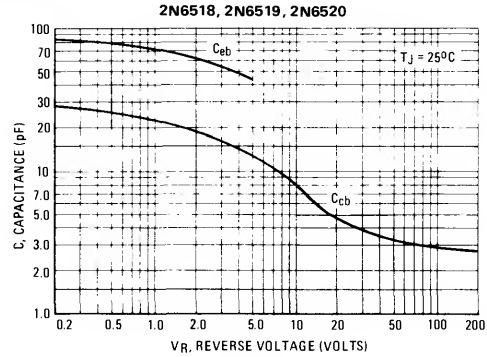


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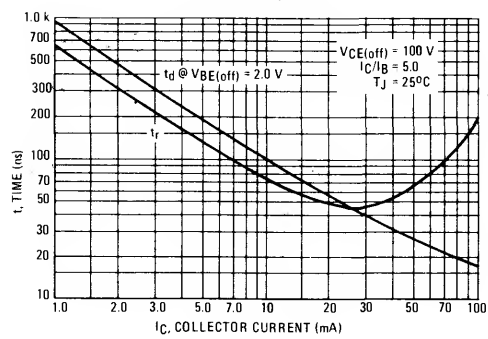
FIGURE 7 – TURN-ON TIME

2N6515, 2N6516, 2N6517



2N6518, 2N6519, 2N6520

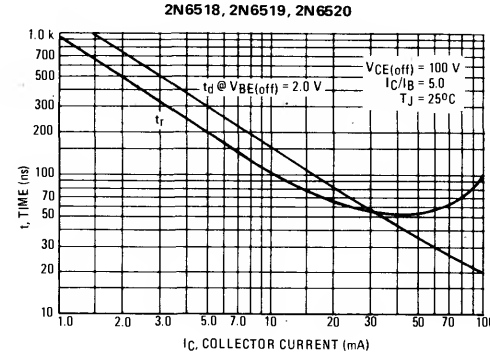


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FIGURE 8 – TURN-OFF TIME

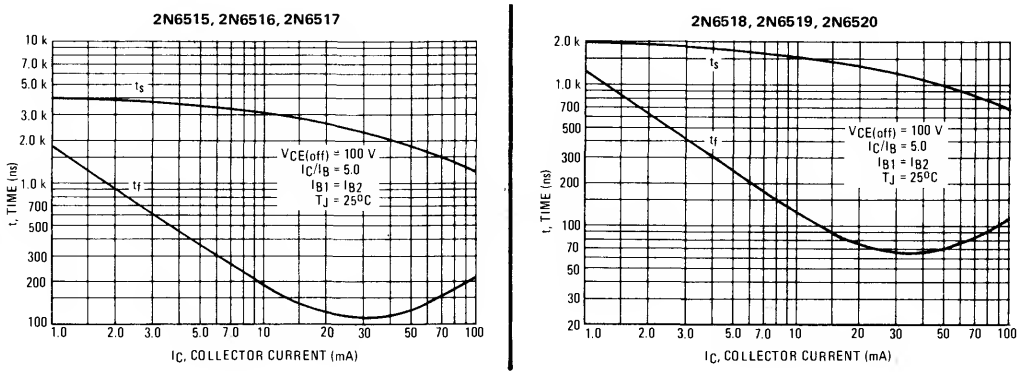


FIGURE 9 – SWITCHING TIME TEST CIRCUIT

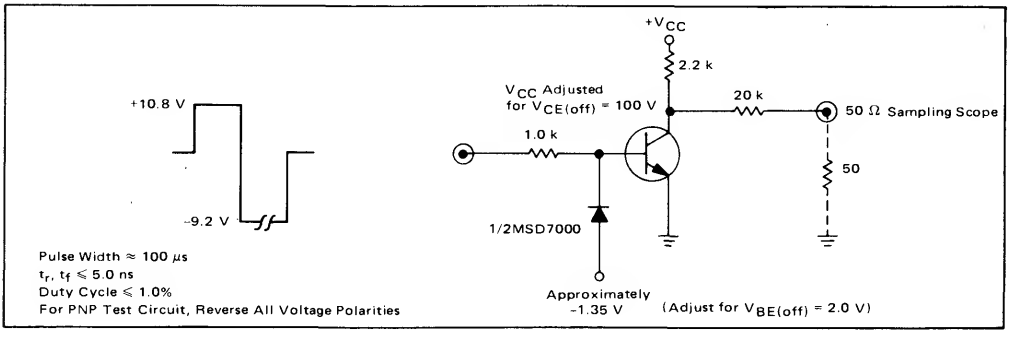


FIGURE 10 – THERMAL RESPONSE

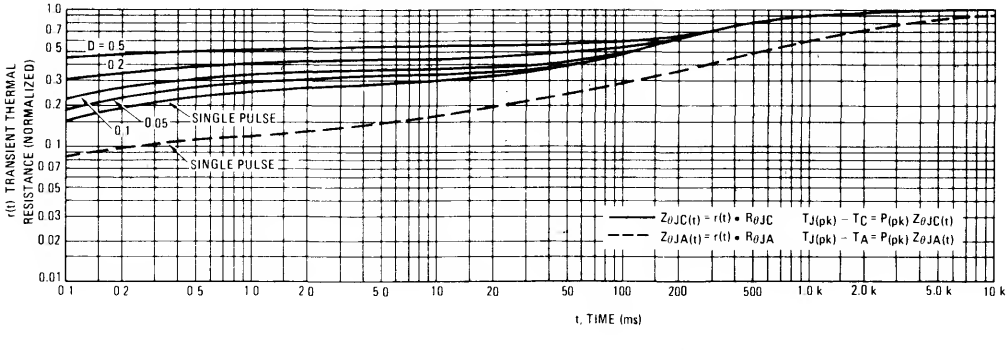
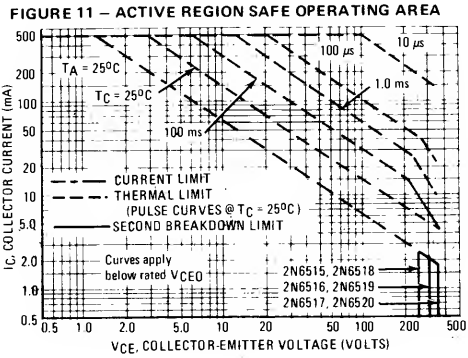
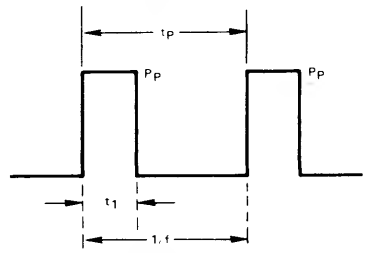


FIGURE 11 – ACTIVE REGION SAFE OPERATING AREA



DESIGN NOTE: USE OF TRANSIENT THERMAL RESISTANCE DATA

Figure A



Duty Cycle = $t_1 f = \frac{t_1}{t_P}$

Peak Pulse Power = P_P