

2N4338-2N4876

TYPE	MATERIAL	POLARITY	REPLACE- MENT	PAGE NUMBER	USE	MAXIMUM RATINGS					ELECTRICAL CHARACTERISTICS									
						P _D @ 25°C	Ref Point	T _J °C	V _{CB} (volts)	V _{CE} — (volts)	Subscript	h _{FE} @ I _C		V _{CE(SAT)} @ I _C	Units	h _{FE}	Subscript	f _T	Units	Subscript
2N4338 thru 2N4343																				
2N4346	S	N			LPA	5.0W	A		140	60	O	15	60	2.0A						
2N4347	S	N			LPA	100W	C		140	120	O	15	60	5.0A						
2N4348	S	N			LPA	120W	C		140	120	O	15	60	5.0A						
2N4350	S	N			LPA	7.0W	C		65	40	O	10	200	0.35A				300M	T	
2N4351 thru 2N4352																				
2N4354	S	P			LNA	350M	A	125	60	60	O	25		0.1M				500M	T	
2N4355	S	P			LNA	350M	A	125	60	60	O	60		0.1M				500M	T	
2N4356	S	P			LNA	350M	A	125	80	80	O	25		0.1M				500M	T	
2N4359	S	P			LNA	360M	A	200	45	45	O	50	600	1.0M	0.25	10M	50	E		
2N4360																				
2N4361																				
thru 2N4380																				
2N4381																				
2N4382																				
2N4383	S	N			RFA	800M	A	200	40	30	O						1000	E	120M	T
2N4384	S	N			RFA	500M	A	200	40	30	O						1000	E	120M	T
2N4385	S	N			RFA	800M	A	200	40	30	O						1000	E	120M	T
2N4386	S	N			RFA	500M	A	200	40	30	O						1000	E	120M	T
2N4387	S	P				20W	A	200	40	40	O	25	100	500M						
2N4388	S	P				20W	A	200	60	60	O	25	100	500M						
2N4389	S	P			HSS	200M	A	125	12	12	O	30	180	10M	0.15	10M	4.0	E		
2N4390	S	N			MSS	500M	A	175	120	120	O	20		2.0M				50M	T	
2N4391																				
thru 2N4393																				
2N4395	S	N	2N3715	7-125	LPA	62.5W	C		60	40	O	50	170	2.0A					4M	T
2N4396	S	N	2N3715	7-125	LPA	62.5W	C		80	60	O	40	170	2.0A					4M	T
2N4398	S	P		7-167	LPA	200W	C	200	40	40	O	15	60	15A	1.0	15A	40	E	4M	T
2N4399	S	P		7-167	LPA	200W	C	200	60	60	O	15	60	15A	1.0	15A	40	E	4M	T
2N4400	S	N		5-34	HSA	310M	A	135	60	40	O	50	150	150M	0.4	150M	20	E	200M	T
2N4401	S	N		5-34	HSA	310M	A	135	60	40	O	100	300	150M	0.4	150M	40	E	250M	T
2N4402	S	P		5-39	HSA	310M	A	135	40	40	O	50	150	150M	0.4	150M	30	E	150M	T
2N4403	S	P		5-39	HSA	310M	A	135	40	40	O	100	300	150M	0.4	150M	60	E	200M	T
2N4409	S	N		5-45	MSS	310M	A	135	80	50	O	60	400	1.0M	0.2	1.0M				
2N4410	S	N		5-45	MSS	310M	A	135	120	80	O	60	400	1.0M	0.2	1.0M				
2N4411	S	P		8-302	MSA	150M	A	200	15	12	O	40		0.5M						
2N4412	S	N			RFA	600M	A	200	40	30	O						1000	E	400M	T
2N4412A	S	P			RFA	600M	A	200	60	60	O						120	E	100M	T
2N4413	S	P			RFA	400M	A	200	40	30	O						1000	E	100M	T
2N4413A	S	P			RFA	400M	A	200	60	60	O						120	E	20M	T
2N4414	S	P			RFA	600M	A	200	40	30	O						1000	E	100M	T
2N4414A	S	P			RFA	600M	A	200	60	60	O						100	E	20M	T
2N4415	S	P			RFA	400M	A	200	40	30	O						1000	E	100M	T
2N4415A	S	P			RFA	400M	A	200	60	60	O						100	E	20M	T
2N4416																				
2N4417																				
2N4418	S	N	2N4264	5-29	MSA	250M	A	125	40	40	S	40	120	10M					500M	T
2N4419	S	N	2N4264	5-29	MSA	250M	A	125	30	30	S	30		10M					400M	T
2N4420	S	N	MPS3646	5-95	MSA	250M	A	125	40	40	S	30	120	30M					350M	T
2N4421	S	N	MPS3646	5-95	MSA	250M	A	125	30	30	S	25		30M					300M	T
2N4422	S	N	MPS3646	5-95	MSA	250M	A	125	40	40	S	30	120	30M					350M	T
2N4423	S	N	MPS3640	5-93	MSA	250M	A	125	12	12	S	40	150	30M					400M	T
2N4424	S	N	MPS3711	5-100	MSA	360M	A	150	40	40	O						180	E		
2N4425	S	N			MSA	560M	A	150	40	40	O	180		2M						
2N4427	S	N			LPA	3.5W	C		40	20	O	10	200	0.1A					500M	T
2N4428	S	N			LPA	3.5W	C		55	35	O	20	200	0.05A					700M	T
2N4429	S	N			LPA	5.0W	C		55	35	O	20	200	0.05A					700M	T
2N4430	S	N			LPA	10W	C		55	40	O	20	200	0.1A					600M	T
2N4431	S	N			LPA	18W	C		55	40	O	20	200	0.1A					600M	T
2N4432	S	N			RFA	600M	A		50	30	O	40	130	6.0M			45	E		
2N4432A	S	N			RFA	600M	A		50	30	O	80	150	6.0M			90	E		
2N4440	S	N			LPA	11.6W	C		65	40	O	10	200	0.125A					400M	T
2N4441																				
thru 2N4444																				
2N4576	S	N	2N3716	7-125	HPA	150W	C	200	100	80	O	50	150	1.0A	0.8	5.0A	25	E	30K	E
2N4851																				
thru 2N4853																				
2N4854																			200M	T
2N4855																			200M	T
2N4856																				
thru 2N4861																				
2N4870																				
2N4871	S	P			HSS	700M	C	200	12	12	O	50	120	10M	0.13	1.0M	9.0	E		
2N4872	S	N			HSS	360M	A	200	40	15	O	110	150	10M	0.2	1.0M	7.0	E		
2N4873	S	N			RFA	720M	A	175	30	20	O						200	E	900M	T
2N4874	S	N			RFA	720M	A	175	40	25	O						200	E	800M	T
2N4875	S	N			RFA	720M	A	175	40	30	O						200	E	650M	T
2N4876	S	N			RFA	720M	A	175	40	30	O									

UNIUNION TRANSISTORS INDEX

2N489-2N4949

TYPE	REPLACEMENT	PAGE NUMBER	P _D (mW)	R _{BB} (kΩ)	η	I _V (min) (mA)	I _P (max) (μA)	I _{EO} @ V _{EB2} (μA @ V max)	V _{E(SAT)} I _E @ 50 mA
2N489			450	6.8	0.62	8.0	20	12 @ 60	5.0
2N489A			450	6.8	0.62	8.0	15	12 @ 60	4.0
2N489B			450	6.8	0.62	8.0	6.0	0.2 @ 60	4.0
2N490			450	9.1	0.62	8.0	20	12 @ 60	5.0
2N490A			450	9.1	0.62	8.0	15	12 @ 60	4.0
2N490B			450	9.1	0.62	8.0	6.0	0.2 @ 60	4.0
2N490C			450	9.1	0.51				
2N491			450	6.8	0.68	8.0	20	12 @ 60	5.0
2N491A			450	6.8	0.68	8.0	15	12 @ 60	4.3
2N491B			450	6.8	0.68	8.0	6.0	0.2 @ 60	4.3
2N492			450	9.1	0.68	8.0	20	12 @ 60	5.0
2N492A			450	9.1	0.68	8.0	15	12 @ 60	4.3
2N492B			450	9.1	0.68	8.0	6.0	0.2 @ 60	4.3
2N492C			450	9.1	0.56				
2N493			450	6.8	0.75	8.0	20	12 @ 60	5.0
2N493A			450	6.8	0.75	8.0	15		
2N493B			450	6.8	0.75	8.0	6.0	0.2 @ 60	5.0
2N494			450	9.1	0.75	8.0	20	12 @ 60	5.0
2N494A			450	9.1	0.75	8.0	15	12 @ 60	4.6
2N494B			450	9.1	0.75	8.0	6.0	0.2 @ 60	4.6
2N494C			450	9.1	0.62	8.0	2.0	0.02 @ 60	4.6
2N1671			450	9.1	0.62	8.0	25	12 @ 30	5.0
2N1671A			450	9.1	0.62	8.0	25	12 @ 30	5.0
2N1671B			450	9.1	0.62	8.0	6.0	0.2 @ 30	5.0
2N1671C			450	4.1 -9.1					
2N2160			450	4.0 -12	0.47 -0.80	8.0	25	12 @ 30	
2N2417			390	0.68	0.62	8.0	20	12 @ 60	5.0
2N2417A			390	0.68	0.62	8.0	20	12 @ 60	4.0
2N2417B			300	6.8	0.51 -0.62	8.0	6.0	0.2 @ 30	4.0
2N2418			390	0.68	0.62	8.0	20	12 @ 60	5.0
2N2418A			390	9.1	0.62	8.0	20	12 @ 60	4.0
2N2418B			300	9.1	0.51 - 0.62	8.0	6.0	0.2 @ 60	4.0
2N2419			390	4.7 -6.8	0.68	8.0	20	12 @ 60	5.0
2N2419A			390	6.8	0.68	8.0	20	12 @ 60	4.3
2N2419B			300	6.8	0.56 -0.68	8.0	6.0	0.2 @ 30	4.3
2N2420			390	9.1	0.68	8.0	20	12 @ 60	5.0
2N2420A			390	9.1	0.68	8.0	20	12 @ 60	4.3
2N2420B			300	9.1	0.56 -0.68	8.0	6.0	0.2 @ 30	4.3
2N2421			390	6.8	0.75	8.0	20	12 @ 60	5.0
2N2421A			390	6.8	0.75	8.0	20	12 @ 60	4.6
2N2421B			300	6.8	4.7 -6.8	8.0	6.0	0.2 @ 30	4.6
2N2422			390	9.1	0.75	8.0	20	12 @ 60	5.0
2N2422A			390	9.1	0.75	8.0	20	12 @ 60	4.6
2N2422B			300	9.1	0.62 -0.75	8.0	6.0	0.2 @ 30	
2N2646		4-70	300	4.7 (min)	0.56	4.0	25	12 @ 30	2.0
2N2647		4-70	300	4.7 (min)	0.68	8.0	2.0	0.2 @ 30	2.0
2N2840			300	4.7 -9.1	1.3 -1.5	0.70	10	1.0 @ 30	
2N3406			450			8.0			
2N3479			400	4.7 -9.1	0.47 -0.62	6.0	20	12 @ 30	5.0
2N3480			400	9.1	0.75	4.0	15	12 @ 30	5.0
2N3481			400	9.1	0.85	6.0	15	12 @ 30	5.0
2N3482			400	4.7 -6.8	0.51 -0.62	8.0	2.0	0.02 @ 30	5.0
2N3483			400	9.1	0.72	8.0	2.0	1.0 @ 30	5.0
2N3484			400	9.1	0.85	8.0	2.0	0.2 @ 30	5.0
2N3679			250	9.1	0.80	4.2			
2N3980		4-72	360	8.0					
2N4851		4-74	300	4.7 (min)	0.56 (min)	2.0	2.0	0.1 @ 30	2.5
2N4852		4-74	300	4.7 (min)	0.70 (min)	4.0	2.0	0.1 @ 30	2.5
2N4853		4-74	300	4.7 (min)	0.70 (min)	6.0	0.4	0.05 @ 30	2.5
2N4870		4-78	300	4.0 (min)	0.56 (min)	2.0	5.0	0.05 @ 30	2.5
2N4871		4-78	300	4.0 (min)	0.70 (min)	4.0	5.0	0.05 @ 30	2.5
2N4891			300	4.0 (min)	0.55 (min)	2.0	5.0	0.01 @ 30	4.0
2N4892			300	4.0 (min)	0.51 (min)	4.0	2.0	0.01 @ 30	4.0
2N4893			300	4.0 (min)	0.55 (min)	2.0	2.0	0.01 @ 30	4.0
2N4894			300	4.0 (min)	0.74 (min)	2.0	1.0	0.01 @ 30	4.0
2N4948		4-82	360	4.0 (min)	0.55 (min)	2.0	2.0	0.01 @ 30	2.5
2N4949		4-82	360	4.0 (min)	0.74 (min)	2.0	1.0	0.01 @ 30	2.5

THYRISTOR SELECTOR GUIDE (continued)

BIDIRECTIONAL THYRISTORS — TRIACS (8.0 AMP RMS)

V_{BOM} Peak Blocking Voltage	50 V	MAC1-2		Case 85		Case 86	MAC3-2		Case 87L
	200 V	MAC1-4					MAC3-4		
	400 V	MAC1-6					MAC3-6		

BILATERAL TRIGGER DIODES (3-layer diodes)

	Type	V_{BR} Breakover Voltage (Both Directions)	I_{pulse} Peak Pulse Current @ 30 μ s, 120 Hz	I_{BR} Breakover Current (Both Directions)	ΔV Switchback Voltage (Both Directions)
		Volts (Nom)	Amp (Max)	μ A (Max)	Volts (Min)
	MPT28 MPT32	28 32	2.0 2.0	50 50	7.0 7.0

UNIUNCTION TRANSISTORS

	Type	I_P Peak Point Emitter Current	I_{EB2O} Emitter Reverse Current	η Intrinsic Standoff Ratio		I_V Valley Point Current	P_D Power Dissipation	V_{B2B1} Interbase Voltage
		μ A (Max)	μ A (Max)	Min	Max	mA (Min)	mW	Volts
	2N4870 2N4871	5.0 5.0	1.0 1.0	0.56 0.70	0.75 0.85	2.0 4.0	300 300	35 35

	2N2646	5.0	12.0	0.56	0.75	4.0	300	35
	2N2647	2.0	0.2	0.68	0.82	8.0	300	
	2N3980	2.0	0.01	0.68	0.82	1.0	360	
	2N4851	2.0	0.1	0.56	0.75	2.0	300	
	2N4852	2.0	0.1	0.70	0.85	4.0	300	
	2N4853	0.4	0.05	0.70	0.85	6.0	300	
								35

4-LAYER DIODES (Peak Pulse Current = 10 Amp @ PW = 50 μ s Max)

	Type*	$V_{(BR)F}$ Forward Breakover Voltage @ $T_A = 25^\circ\text{C}$ Volts	I_H Holding Current @ $T_A = 25^\circ\text{C}$ mA
		Min/Max	Min/Max
	$I_F = 150 \text{ mA (Max)}$		
	1N5158(M4L3052)	8/10	1/20
	1N5159(M4L3053)	9/11	1/20
	1N5160(M4L3054)	10/12	1/20
	$I_F = 180 \text{ mA (Max)}$		
	M4L20-3	16/24	1/6
	M4L20M-3	16/24	1/6
	M4L20-8	16/24	1/15
	M4L20M-8	16/24	1/15
	M4L20-28	16/24	14/45
	M4L20M-28	16/24	14/45
	M4L20A	14/26	0.5/60
	M4L30-3	26/34	1/6
	M4L30M-3	26/34	1/6
	M4L30-8	26/34	1/15
	M4L30M-8	26/34	1/15
	M4L30-28	26/34	14/45
	M4L30M-28	26/34	14/45
	M4L30A	24/36	0.5/60

	Type*	$V_{(BR)F}$ Forward Breakover Voltage @ $T_A = 25^\circ\text{C}$ Volts	I_H Holding Current @ $T_A = 25^\circ\text{C}$ mA
		Min/Max	Min/Max
	$I_F = 180 \text{ mA (Max)}$		
	M4L40-3	36/44	1/6
	M4L40M-3	36/44	1/6
	M4L40-8	36/44	1/15
	M4L40M-8	36/44	1/15
	M4L40-28	36/44	14/45
	M4L40M-28	36/44	14/45
	M4L40A	34/46	0.5/60
	M4L50-3	46/54	1/6
	M4L50M-3	46/54	1/6
	M4L50-8	46/54	1/15
	M4L50M-8	46/54	1/15
	M4L50-28	46/54	14/45
	M4L50M-28	46/54	14/45
	M4L50A	44/56	0.5/60

*Suffix "M" designates guaranteed $V_{(BR)F}$ unit over the temperature range, $T_A = -60$ to $+125^\circ\text{C}$.

2N4851 thru 2N4853

**$V_{BB} = 35 \text{ V}$
 $I_e = 50 \text{ mA RMS}$**



Silicon annular unijunction transistors designed for pulse and timing circuits, sensing circuits, and thyristor trigger circuits.

Lead 3 connected to case

CASE 22A

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
RMS Power Dissipation*	P_D^*	300	mW
RMS Emitter Current	I_e	50	mA
Peak-Pulse Emitter Current **	i_e^{**}	1.5	Amp
Emitter Reverse Voltage	V_{B2E}	30	Volts
Interbase Voltage †	$V_{B2B1}^\dagger$	35	Volts
Operating Junction Temperature Range	T_J	-65 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-65 to +200	$^\circ\text{C}$

* Derate 3.0 mW/ $^\circ\text{C}$ increase in ambient temperature.

** Duty cycle $\leq 1\%$, PRR = 10 PPS (see figure 6)

† Based upon power dissipation at $T_A = 25^\circ\text{C}$

FIGURE 1 — UNIJUNCTION TRANSISTOR SYMBOL AND NOMENCLATURE

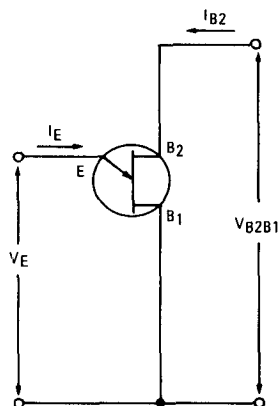


FIGURE 2 — STATIC EMITTER CHARACTERISTICS CURVES

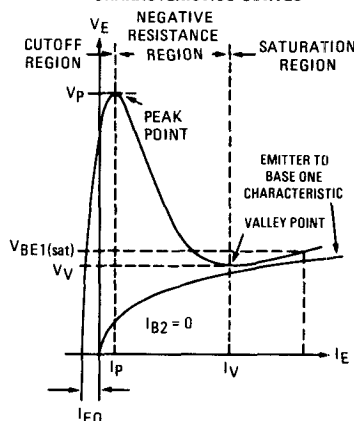
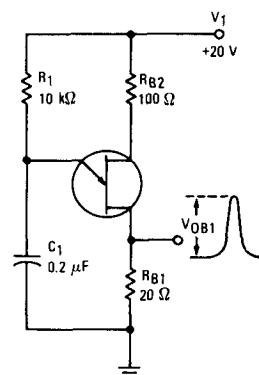


FIGURE 3 — V_{OB1} TEST CIRCUIT



2N4851 thru 2N4853 (continued)

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Figure No.	Symbol	Min	Typ	Max	Unit
Intrinsic Standoff Ratio* ($V_{B2B1} = 10\text{ V}$)	4, 8	η^*	0.56 0.70	— —	0.75 0.85	—
Interbase Resistance ($V_{B2B1} = 3.0\text{ V}$, $I_E = 0$)	11, 12	R_{BB}	4.7	—	9.1	k ohms
Interbase Resistance Temperature Coefficient ($V_{B2B1} = 3.0\text{ V}$, $I_E = 0$, $T_A = -65$ to $+125^\circ\text{C}$)	12	αR_{BB}	0.2	—	0.8	%/ $^\circ\text{C}$
Emitter Saturation Voltage** ($V_{B2B1} = 10\text{ V}$, $I_E = 50\text{ mA}$)		$V_{EB1(\text{sat})}^{**}$	—	2.5	—	Volts
Modulated Interbase Current ($V_{B2B1} = 10\text{ V}$, $I_E = 50\text{ mA}$)		$I_{B2(\text{mod})}$	—	15	—	mA
Emitter Reverse Current ($V_{B2E} = 30\text{ V}$, $I_{B1} = 0$)	7	I_{EB2O}	— —	— —	0.1 0.05	μA
Peak-Point Emitter Current ($V_{B2B1} = 25\text{ V}$)	9, 10	I_P	— —	— —	2.0 0.4	μA
Valley-Point Current** ($V_{B2B1} = 20\text{ V}$, $R_{B2} = 100\text{ ohms}$)	13, 14	I_V^{**}	2.0 4.0 6.0	— — —	— — —	mA
Base-One Peak Pulse Voltage	2N4851 2N4852 2N4853	V_{OB1}	3.0 5.0 6.0	— — —	— — —	Volts
Maximum Frequency of Oscillation	5	$f_{(\text{max})}$	1.0	1.25	—	MHz

* η , Intrinsic standoff ratio, is defined in terms of the peak-point voltage, V_P , by means of the equation: $V_P = \eta V_{B2B1} + V_F$, where V_P is about 0.49 volt at 25°C @ $I_F = 10\text{ }\mu\text{A}$ and decreases with temperature at about $2.5\text{ mV}/^\circ\text{C}$. The test circuit is shown in Figure 4. Components R_1 , C_1 , and the UJT form a relaxation oscillator; the remaining circuitry serves as a peak-voltage detector. The forward drop of Diode D_1 compensates for V_F . To use, the "cal" button is pushed, and R_2 is adjusted to make the current meter, M_1 , read full scale. When the "cal" button is released, the value of η is read directly from the meter, if full scale on the meter reads 1.0.

** Use pulse techniques: $PW = 300\text{ }\mu\text{s}$, duty cycle $\leq 2.0\%$ to avoid internal heating, which may result in erroneous readings.

FIGURE 4 — η TEST CIRCUIT

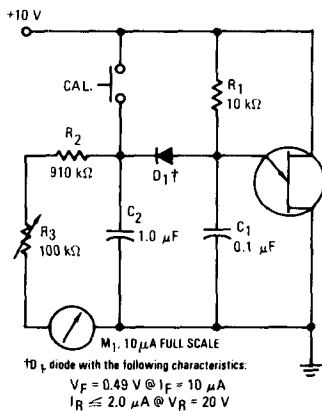


FIGURE 5 — $f_{(\text{max})}$ TEST CIRCUIT

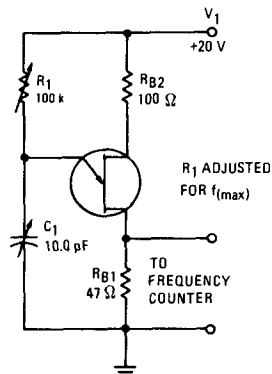
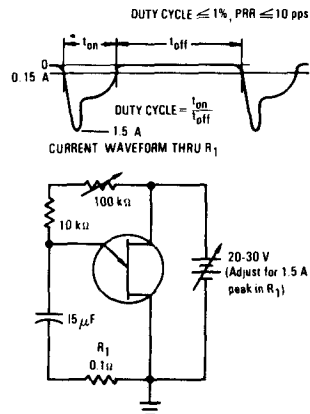
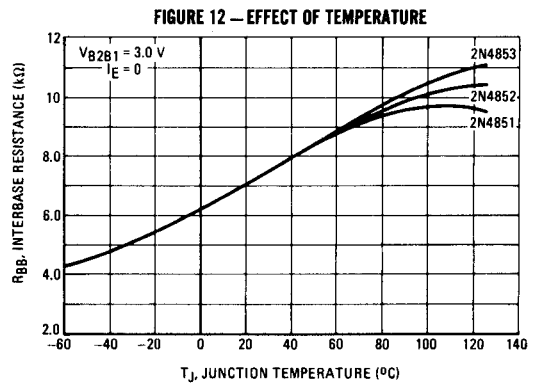
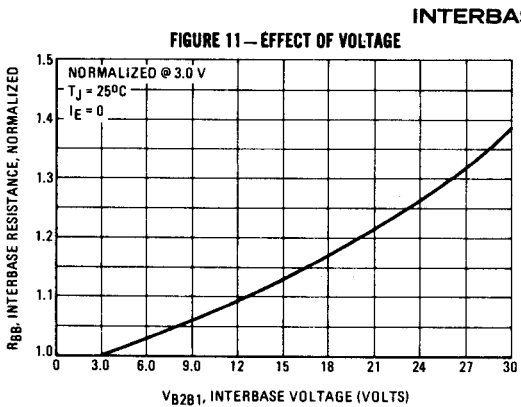
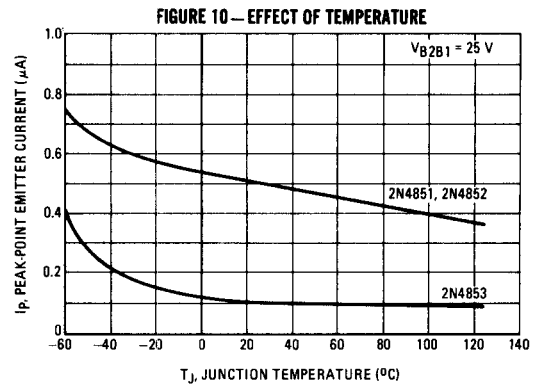
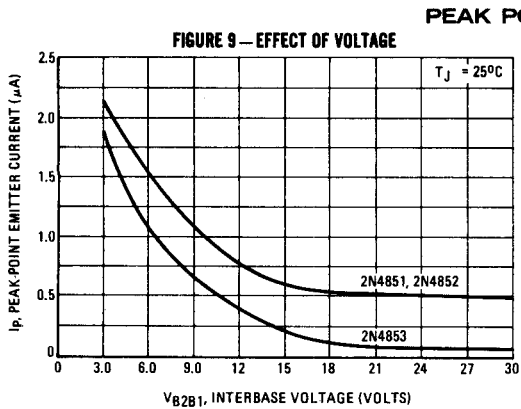
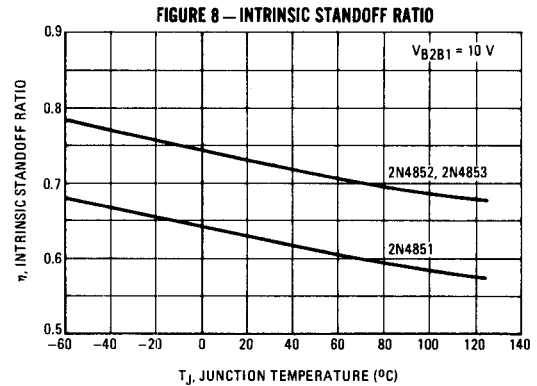
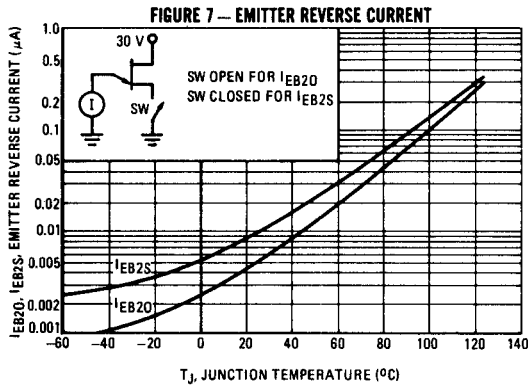


FIGURE 6 — PRR TEST CIRCUIT AND WAVEFORM



2N4851 thru 2N4853 (continued)

TYPICAL CHARACTERISTICS



2N4851 thru 2N4853 (continued)

TYPICAL CHARACTERISTICS

VALLEY CURRENT

FIGURE 13 — EFFECT OF VOLTAGE

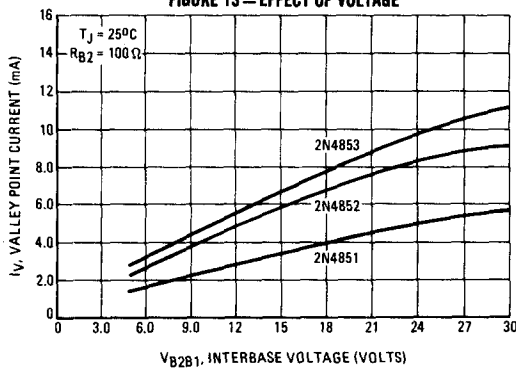
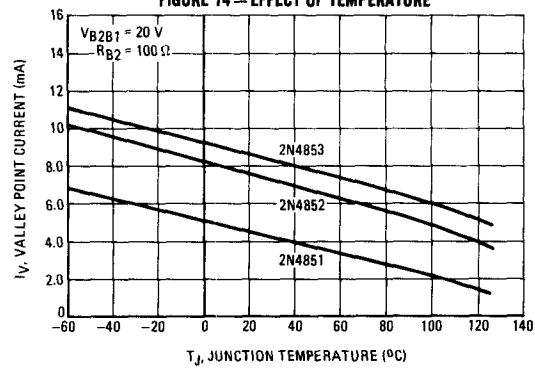


FIGURE 14 — EFFECT OF TEMPERATURE



VALLEY VOLTAGE

FIGURE 15 — EFFECT OF VOLTAGE

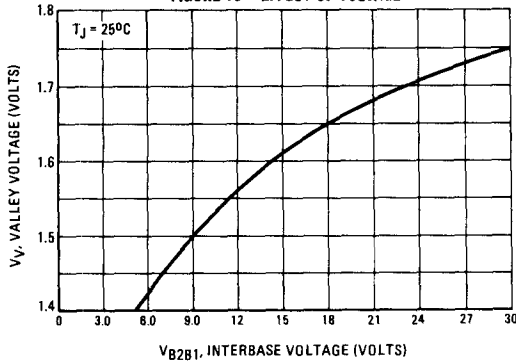


FIGURE 16 — EFFECT OF TEMPERATURE

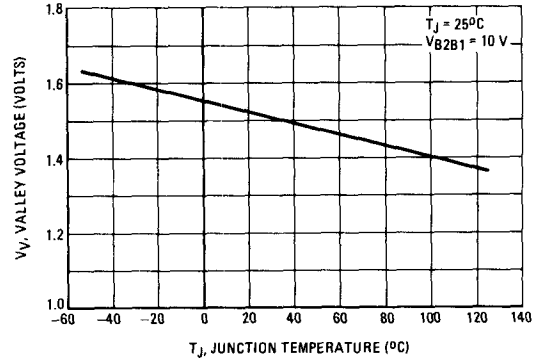
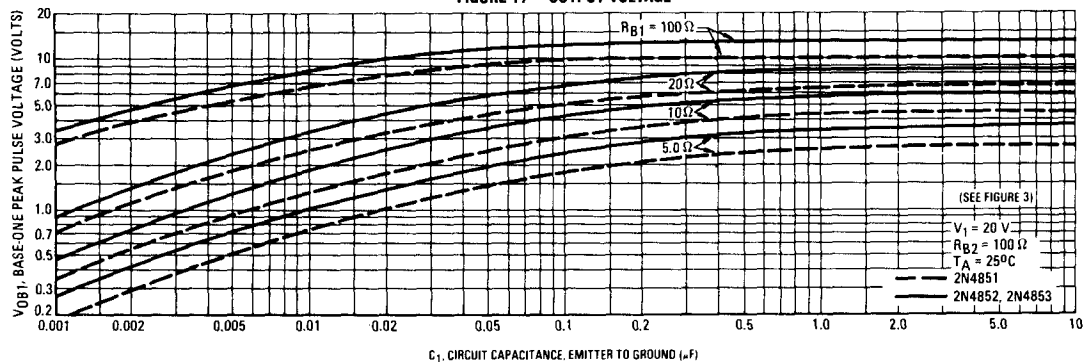


FIGURE 17 — OUTPUT VOLTAGE



C_1 , CIRCUIT CAPACITANCE, EMITTER TO GROUND (μF)