

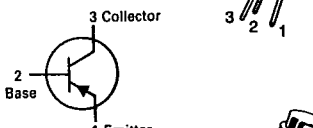
MAXIMUM RATINGS

Rating	Symbol	2N869A	2N4453	Unit
Collector-Emitter Voltage	V _{CEO}	18	18	V _{dc}
Collector-Emitter Voltage	V _{CES}	25		V _{dc}
Collector-Base Voltage	V _{CBO}	25	25	V _{dc}
Emitter-Base Voltage	V _{EBO}	5.0		V _{dc}
Collector Current — Continuous	I _C	200		mAdc
Total Device Dissipation @ T _A = 25°C Derate above 25°C	P _D	360 2.06	400 2.29	mW mW/°C
Total Device Dissipation @ T _C = 25°C TC = 100°C Derate above 25°C	P _D	1.2 0.686 6.86	2.0 1.03 11.3	Watts Watts mW/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200		°C


THERMAL CHARACTERISTICS

Characteristic	Symbol	2N869A	2N4453	Unit
Thermal Resistance, Junction to Case	R _{θJC}	146	97.5	°C/W
Thermal Resistance, Junction to Ambient	R _{θJA}	486	585	°C/W

2N869A
 JAN, JTX, JTXV AVAILABLE
 CASE 22-03, STYLE 1
 TO-18 (TO-206AA)



2N4453
 JAN, JANTX AVAILABLE
 CASE 26-03, STYLE 1
 TO-46 (TO-206AB)



SWITCHING TRANSISTORS
 PNP SILICON

T-37-15

3

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage(1) (I _C = 10 mAdc, I _B = 0)	V _{(BR)CEO}	18	—	V _{dc}
Collector-Emitter Breakdown Voltage (I _C = 10 μAdc, V _{BE} = 0)	V _{(BR)CES}	25	—	V _{dc}
Collector-Emitter Sustaining Voltage(1) (I _C = 10 mAdc, I _B = 0)	V _{CEO(sus)}	18	—	V _{dc}
Collector-Base Breakdown Voltage (I _C = 10 μAdc, I _E = 0)	V _{(BR)CBO}	25	—	V _{dc}
Emitter-Base Breakdown Voltage (I _E = 10 μAdc, I _C = 0)	V _{(BR)EBO}	5.0	—	V _{dc}
Collector Cutoff Current (V _{CB} = 15 Vdc, I _E = 0, T _A = 150°C)	I _{CBO}	—	25	μAdc
Collector Cutoff Current (V _{CE} = 15 Vdc, V _{BE} = 0)	I _{CES}	—	10	nAdc
Emitter Cutoff Current (V _{EB} = 4.5 Vdc, I _C = 0)	I _{EBO}	—	10	nAdc
Base Current (V _{CE} = 15 Vdc, V _{BE} = 0)	I _B	—	10	nAdc
ON CHARACTERISTICS(1)				
DC Current Gain (I _C = 10 mAdc, V _{CE} = 0.3 Vdc) (I _C = 10 mAdc, V _{CE} = 5.0 Vdc)	h _{FE}	30 40	— 120	—
(I _C = 30 mAdc, V _{CE} = 0.5 Vdc)		40	120	
(I _C = 30 mAdc, V _{CE} = 0.5 Vdc, T _A = -55°C)		17	—	
(I _C = 100 mAdc, V _{CE} = 1.0 Vdc)		25	—	
Collector-Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 30 mAdc, I _B = 1.5 mAdc) (I _C = 30 mAdc, I _B = 3.0 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc)	V _{CE(sat)}	— — — —	0.15 0.25 0.2 0.5	V _{dc}
Base-Emitter Saturation Voltage (I _C = 10 mAdc, I _B = 1.0 mAdc) (I _C = 30 mAdc, I _B = 1.5 mAdc) (I _C = 30 mAdc, I _B = 3.0 mAdc) (I _C = 100 mAdc, I _B = 10 mAdc)	V _{BE(sat)}	0.78 0.8 0.85 —	0.98 1.1 1.2 1.7	V _{dc}

查海2N4453/供应商 ELECTRICAL CHARACTERISTICS (continued) (T_A = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
SMALL-SIGNAL CHARACTERISTICS				
Current-Gain — Bandwidth Product(1)(2) (I _C = 10 mA _{dc} , V _{CE} = 15 V _{dc} , f = 100 MHz)	f _T	400	—	MHz
Output Capacitance (V _{CB} = 5.0 V _{dc} , I _E = 0, f = 140 kHz)	C _{obo}	—	6.0	pF
Input Capacitance (V _{BE} = 0.5 V _{dc} , I _C = 0, f = 150 kHz)	C _{ibo}	—	6.0	pF
Collector-Base Capacitance (V _{CB} = 5.0 V _{dc} , I _E = 0, f = 1.0 MHz)	C _{cb}	—	6.0	pF
Emitter-Base Capacitance (V _{BE} = 0.5 V _{dc} , I _C = 0, f = 1.0 MHz)	C _{eb}	—	6.0	pF
SWITCHING CHARACTERISTICS				
Turn-On Time	I _C = 30 mA _{dc} , V _{CC} = 2.0 V _{dc} 2N869A I _{B1} = 1.5 mA _{dc} V _{CC} = 3.0 V _{dc} 2N4453	t _{on}	—	50 ns
Delay Time		t _d	—	35 ns
Rise Time		t _r	—	20 ns
Turn-Off Time	I _C = 30 mA _{dc} , V _{CC} = 2.0 V _{dc} 2N869A I _{B1} = I _{B2} = 1.5 mA _{dc} V _{CC} = 3.0 V _{dc} 2N4453	t _{off}	—	80 ns
Storage Time		t _s	—	65 ns
Fall Time		t _f	—	20 ns

(1) Pulse Test; Pulse Width ≤ 300 μs, Duty Cycle = 1.0%.
 (2) f_T is defined as the frequency at which |h_{fe}| extrapolates to unity.

TYPICAL SWITCHING CHARACTERISTICS

FIGURE 1 — CAPACITANCE

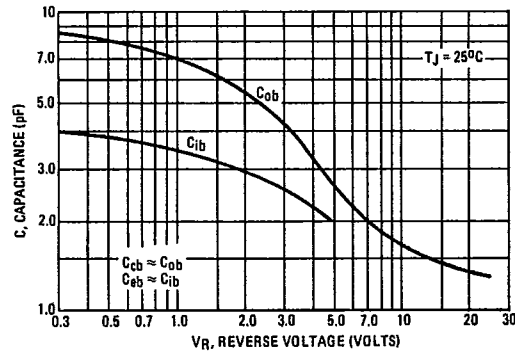


FIGURE 2 — DC CURRENT GAIN

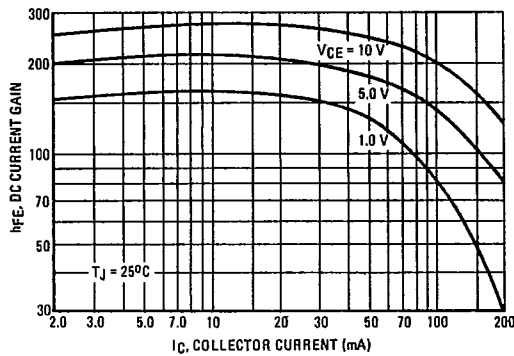


FIGURE 3 — "ON" VOLTAGES

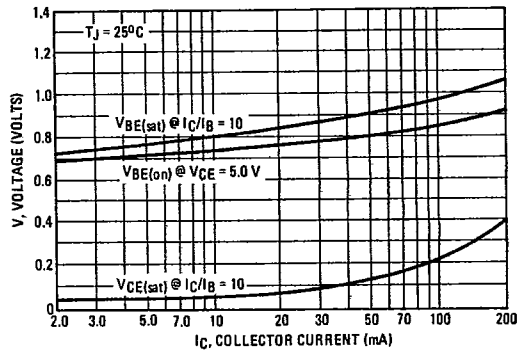


FIGURE 4 — CURRENT GAIN — BANDWIDTH PRODUCT

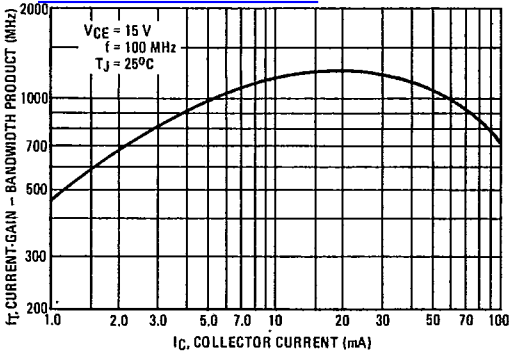


FIGURE 5 — TURN-ON TIME

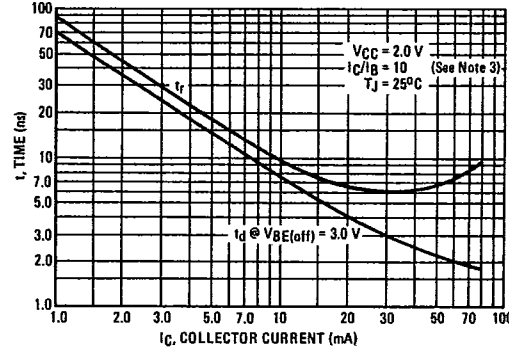


FIGURE 6 — TURN-OFF TIME

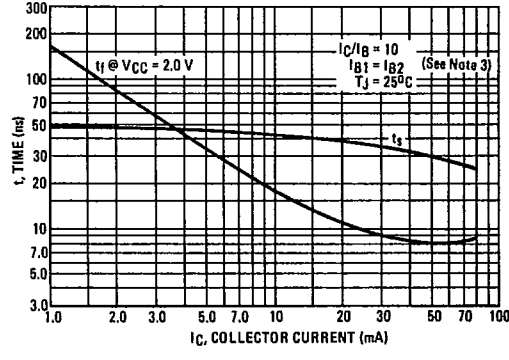


FIGURE 7 — SWITCHING TIME TEST CIRCUIT

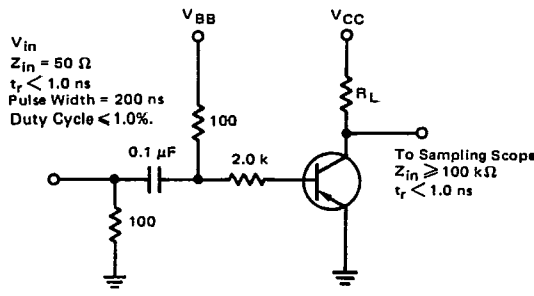


FIGURE 8 — SWITCHING TEST CIRCUIT VALUES

		V _{in} Volts	V _{BB} Volts	V _{CC} Volts	R _L Ohms	I _C mA	I _{B1} ⁽⁴⁾ mA	I _{B2} ⁽⁴⁾ mA
t _{on} , t _r , t _d	2N869A	-7.0	3.0	2.0	62	30	1.5	—
	2N4453	-7.0	3.0	3.0	91	30	1.5	—
t _{off} , t _s , t _f	2N869A	+6.0	-4.0	2.0	62	30	1.5	1.5
	2N4453	+6.0	-4.0	3.0	91	30	1.5	1.5

(3) I_C/I_B = 10. Switching is shown to reflect current industry practices. Compare the values shown in Figures 1 and 2 @ I_C = 30 mA to the typical values in the Electrical Characteristics table @ I_C/I_B = 20.
 (4) I_{B1} = I_{B2} = 3.0 mA @ I_C/I_B = 10

3