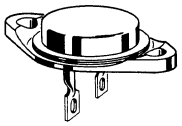
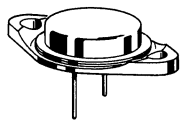
2N1651 thru 2N1653 (Germanium)

2N2285 thru 2N2287 (Germanium)



CASE 161
(TO-41)
2N1651 thru 2N1653
Collector connected to case



CASE 3A
(TO-3 modified)
2N2285 thru 2N2287

PNP Germanium power transistors designed for high-current switching applications requiring low saturation voltages and fast switching times in addition to good safe operating area.

MAXIMUM RATINGS

Rating	Symbol	2N1651 2N2285	2N1652 2N2286	2N1653 2N2287	Unit
Collector-Emitter Voltage	V_{CEO}	30	60	80	Vdc
Collector-Base Voltage	V_{CB}	60	100	120	Vdc
Emitter-Base Voltage	V_{EB}	←	1.5	→	Vdc
Collector Current - Continuous	I_C	←	25	→	Adc
Base Current - Continuous	I_B	←	5.0	→	Adc
Total Device Dissipation @ $T_C = 25°C$ Derate above 25°C	P_D	←	106 1.25	→	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	←	-65 to +110	→	°C

THERMAL CHARACTERISTICS

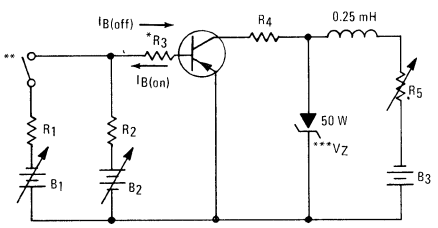
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	θ_{JC}	0.8	°C/W

FIGURE 1 – SUSTAINING VOLTAGE TEST CIRCUIT

R_1 = 1.0 Ohm, 20 Watts
R_2 = 7.5 Ohms, 2.0 Watts
R_3 = 0.1 Ohm, 1.0%
$R_4 \leq$ 0.04 Ohm

R_5: I_C Adjust @ $V_{CE} = V_Z$
B_1: Adjust for $I_{B(on)} = \frac{I_C}{10}$
B_2 = 1.5 Vdc, Adjust for $I_{B(off)}$ = 0.2 Adc
B_3 = 12 Vdc

*Not required if current probe is used to read I_{B1}
**PRF ≈ 60 Hz
***Zener selected to establish Sustaining Voltage.
NOTE: Series impedance and inductance must be kept to a minimum.



2N1651 thru 2N1653/2N2285 thru 2N2287 (continued)

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage (I_C = 100 mAdc, I_B = 0)	2N1651, 2N2285	BV_{CEO}	30	-	Vdc
	2N1652, 2N2286		60	-	
	2N1653, 2N2287		80	-	
Collector-Emitter Sustaining Voltage (See Figure 1) (I_C = 25 Adc)	2N1651, 2N2285	$V_{CE(sus)}$	40	-	Vdc
	2N1652, 2N2286		45	-	
	2N1653, 2N2287		50	-	
Collector Cutoff Current (V_{CB} = 2.0 Vdc, I_E = 0)		I_{CBO1}	-	200	μAdc
Collector Cutoff Current		I_{CBO2}			mAdc
(V_{CB} = 40 Vdc, I_E = 0)	2N1651, 2N2285		-	5.0	
(V_{CB} = 80 Vdc, I_E = 0)	2N1652, 2N2286		-	5.0	
(V_{CB} = 100 Vdc, I_E = 0)	2N1653, 2N2287		-	5.0	
Collector Cutoff Current		I_{CBO3}			mAdc
(V_{CB} = 40 Vdc, I_E = 0, T_C = 100°C) (+0, -3.0°C)	2N1651, 2N2285		-	35	
(V_{CB} = 80 Vdc, I_E = 0, T_C = 100°C) (+0, -3.0°C)	2N1652, 2N2286		-	35	
(V_{CB} = 100 Vdc, I_E = 0, T_C = 100°C) (+0, -3.0°C)	2N1653, 2N2287		-	35	
Collector Cutoff Current		I_{CBO4}			mAdc
(V_{CB} = 60 Vdc, I_E = 0)	2N1651, 2N2285		-	20	
(V_{CB} = 100 Vdc, I_E = 0)	2N1652, 2N2286		-	20	
(V_{CB} = 120 Vdc, I_E = 0)	2N1653, 2N2287		-	20	
Emitter Cutoff Current (V_{EB} = 1.5 Vdc, I_C = 0)		I_{EBO}	-	50	mAdc
ON CHARACTERISTICS					
DC Current Gain		h_{FE}			-
(I_C = 10 Adc, V_{CE} = 2.0 Vdc)			35	140	
(I_C = 25 Adc, V_{CE} = 1.5 Vdc)			20	-	
Collector-Emitter Saturation Voltage (I_C = 25 Adc, I_B = 2.5 Adc)		$V_{CE(sat)}$	-	0.30	Vdc
Base-Emitter Saturation Voltage (I_C = 25 Adc, I_B = 2.5 Adc)		$V_{BE(sat)}$	-	0.65	Vdc
SMALL-SIGNAL CHARACTERISTICS					
Small-Signal Current Gain (I_C = 0.5 Adc, V_{CE} = 6.0 Vdc, f = 30 kHz)		h_{fe}	20	-	-
SWITCHING CHARACTERISTICS					
Rise Time	(I_C = 25 Adc, $I_{B(on)}$ = 2.5 Adc, $I_{B(off)}$ = 2.5 Adc) (See Figure 2)	t_r	-	12	μs
Storage Time		t_s	-	10	μs
Fall Time		t_f	-	8.0	μs

FIGURE 2 – SWITCHING TIME TEST CIRCUIT