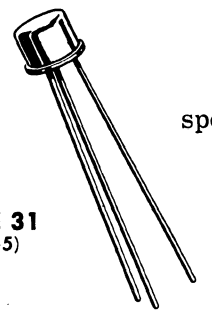
2N3013
2N3014

For Specifications, See 2N3009 Data.

2N3015 (SILICON)



CASE 31
(TO-5)

Collector connected to case

NPN silicon annular transistor designed for high-speed, medium-power saturated switching applications.

MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage*	V_{CEO}*	30	Vdc
Collector-Base Voltage	V_{CB}	60	Vdc
Emitter-Base Voltage	V_{EB}	5.0	Vdc
Total Device Dissipation @ T_A = 25°C Derate above 25°C	P_D	800 4.6	mW mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	3.0 17.2	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

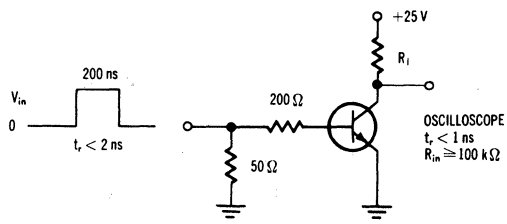
*Applicable from 1.0 mA to 30 mA (Pulsed)

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage* (I_C = 30 mAdc, I_B = 0)	$BV_{CEO(sus)}$*	30	—	Vdc
Collector-Base Breakdown Voltage (I_C = 100 μAdc, I_E = 0)	BV_{CBO}	60	—	Vdc
Emitter-Base Breakdown Voltage (I_E = 100 μAdc, I_C = 0)	BV_{EBO}	5.0	—	Vdc
Collector-Cutoff Current (V_{CE} = 30 Vdc, V_{BE} = 0)	I_{CES}	—	0.2	μAdc
Collector-Cutoff Current (V_{CB} = 30 Vdc, I_E = 0, T_A = 125°C)	I_{CBO}	—	200	μAdc
Base Leakage Current (V_{CE} = 30 Vdc, V_{BE} = 0)	I_{BL}	—	0.2	μAdc
ON CHARACTERISTICS				
DC Current Gain* (I_C = 150 mAdc, V_{CE} = 10 Vdc) (I_C = 300 mAdc, V_{CE} = 0.7 Vdc)	h_{FE}*	30 10	120 —	—
Collector-Emitter Saturation Voltage* (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	$V_{CE(sat)}$*	— —	0.4 1.0	Vdc
Base-Emitter Saturation Voltage* (I_C = 150 mAdc, I_B = 15 mAdc) (I_C = 500 mAdc, I_B = 50 mAdc)	$V_{BE(sat)}$*	— —	1.2 1.6	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain—Bandwidth Product (I_C = 50 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	f_T	250	—	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 140 kHz)	C_{ob}	—	8.0	pF
Turn-On Time (Figure 1) (V_{CC} = 25 Vdc, I_C ≈ 300 mAdc, I_{B1} ≈ 30 mAdc) (V_{CC} = 25 Vdc, I_C ≈ 500 mAdc, I_{B1} ≈ 50 mAdc)	t_{on}	— —	40 40	ns
Turn-Off Time (Figure 2) (V_{CC} = 25 Vdc, I_C ≈ 300 mAdc, I_{B1} ≈ I_{B2} = 30 mAdc) (V_{CC} = 25 Vdc, I_C ≈ 500 mAdc, I_{B1} ≈ I_{B2} = 50 mAdc)	t_{off}	— —	60 60	ns

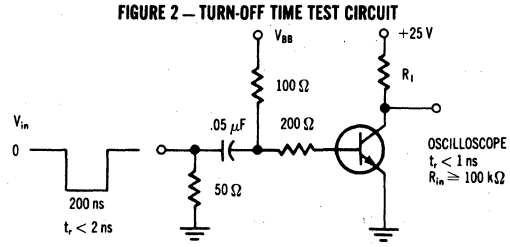
*Pulse Test: Pulse Width = 300 μs; Duty Cycle ≤ 2%

FIGURE 1 — TURN-ON TIME TEST CIRCUIT



I_C mA	V_{in} Volts	R_l ohms
300	7.0	80
500	11	48

FIGURE 2 — TURN-OFF TIME TEST CIRCUIT



I_C mA	V_{in} Volts	V_{BB} Volts	R_l ohms
300	−13	10	80
500	−21	16	48