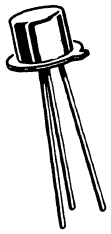
2N3211 (SILICON)



CASE 22
(TO-18)

NPN silicon high frequency switching transistor designed for high speed, saturated switching applications for industrial service.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CB}	40	Vdc
Emitter-Base Voltage	V_{EB}	6.0	Vdc
Collector Current	I_C	500	mAdc
Total Device Dissipation @ T_A = 25°C	P_D	0.36	Watt
Derate above 25°C		2.06	mW/°C
Total Device Dissipation @ T_C = 25°C	P_D	1.2	Watts
Derate above 25°C		6.9	mW/°C
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I_C = 30 mAdc, I_B = 0)	BV_{CEO}	15	-	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)	BV_{CBO}	40	-	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)	BV_{EBO}	6.0	-	Vdc
Collector Cutoff Current (V_{CE} = 20 Vdc, $V_{EB(off)}$ = 3.0 Vdc)	I_{CEX}	-	25	nAdc
Base Cutoff Current (V_{CE} = 20 Vdc, $V_{EB(off)}$ = 3.0 Vdc)	I_{BL}	-	0.025	μAdc
(V_{CE} = 20 Vdc, $V_{EB(off)}$ = 3.0 Vdc, T_A = 85°C)		-	10	
ON CHARACTERISTICS				
DC Current Gain (1)	h_{FE}			-
(I_C = 100 μAdc, V_{CE} = 1.0 Vdc)		20	-	
(I_C = 1.0 mAdc, V_{CE} = 1.0 Vdc)		50	-	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc)		50	150	
(I_C = 10 mAdc, V_{CE} = 1.0 Vdc, T_A = -55°C)		20	-	
(I_C = 50 mAdc, V_{CE} = 1.0 Vdc)		40	-	
(I_C = 100 mAdc, V_{CE} = 1.0 Vdc)		30	-	
(I_C = 500 mAdc, V_{CE} = 5.0 Vdc)		10	-	
Collector-Emitter Saturation Voltage (1)	$V_{CE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)		-	0.2	
(I_C = 50 mAdc, I_B = 5.0 mAdc)		-	0.3	
(I_C = 100 mAdc, I_B = 10 mAdc)		-	0.4	
Base-Emitter Saturation Voltage (1)	$V_{BE(sat)}$			Vdc
(I_C = 10 mAdc, I_B = 1.0 mAdc)		-	0.85	
(I_C = 50 mAdc, I_B = 5.0 mAdc)		-	1.0	
(I_C = 100 mAdc, I_B = 10 mAdc)		-	1.2	

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

2N3211 (continued)

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

Characteristic		Symbol	Min	Max	Unit
DYNAMIC CHARACTERISTICS					
Current-Gain – Bandwidth Product (I_C = 10 mAdc, V_{CE} = 20 Vdc, f = 100 MHz)		f_T	350	-	MHz
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 100 kHz)		C_{ob}	-	4.0	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz)		C_{ib}	-	7.0	pF
Charge-Storage Time Constant ($I_C \approx I_{B1} \approx I_{B2} \approx$ 10 mAdc)	(Figure 1)	τ_s	-	15	ns
Total Control Charge (I_C = 10 mAdc, I_B = 1.0 mAdc)	(Figure 2)	Q_T	-	60	pC
Active Region Time Constant (I_C = 10 mAdc, I_B = 1.0 mAdc)	(Figure 3)	τ_A	-	2.5	ns

FIGURE 1 – CHARGE STORAGE TIME CONSTANT TEST CIRCUIT

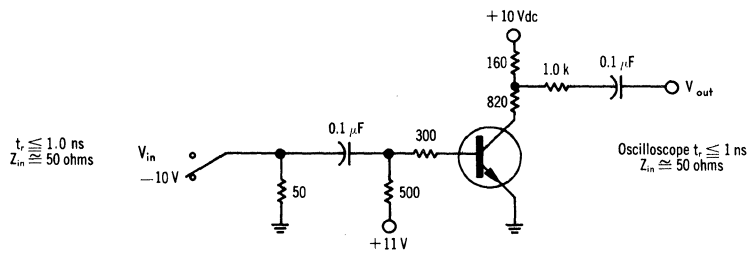


FIGURE 2 – TOTAL CONTROL CHARGE TEST CIRCUIT

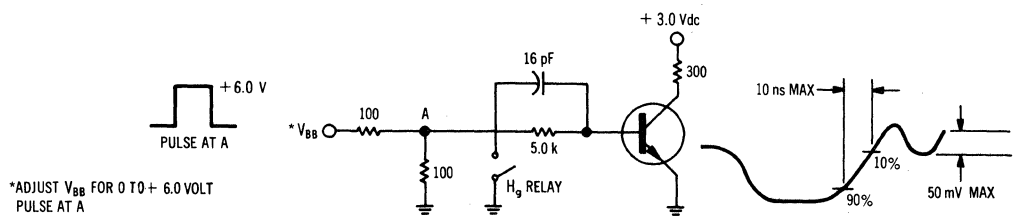
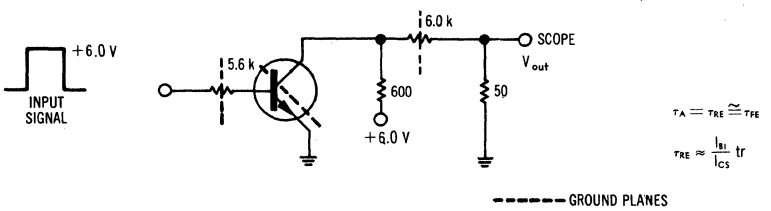


FIGURE 3 – ACTIVE REGION TIME CONSTANT TEST CIRCUIT



NOTES FOR FIGURES 2, 3

INPUT PULSE – TRANSITION TIME TO +6.0 Vdc ≦ 2.0 ns
INPUT PULSE – OPTIONAL GENERATOR OUTPUT IMPEDANCE: ADJUST FOR + 6.0 Vdc
SCOPE INPUT CAPACITANCE = 3.0 pF MAX
SCOPE INPUT IMPEDANCE = 10 MEGOHMS
SCOPE RISE TIME ≦ 0.7 ns

2N3227 (SILICON) For Specifications, See 2N2369 Data.