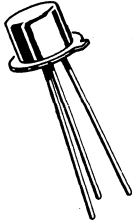


**2N2256, 2N2257 (SILICON)**

**2N2258 (GERMANIUM)**

**2N2259 (GERMANIUM)**



NPN silicon and PNP germanium mesa complementary transistors for high-speed non-saturated switching applications.

**CASE 22**  
(TO-18)

Collector connected to case

**MAXIMUM RATINGS**

Rating	Symbol	2N2256 2N2257	2N2258 2N2259	Unit
Collector-Emitter Voltage	$V_{CEO}$	7.0	7.0	Vdc
Collector-Base Voltage	$V_{CB}$	7.0	7.0	Vdc
Emitter-Base Voltage	$V_{EB}$	1.0	1.0	Vdc
Collector Current-Continuous	$I_C$	100	100	mAdc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	300 2.0	150 2.0	mW mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1000 6.67	300 4.0	mW mW/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +175	-65 to +100	$^\circ\text{C}$

**TRANSISTOR SELECTION CHART**

TYPE	TYPE		$h_{FE} @ I_C = 25 \text{ mA}$	
	NPN	PNP	20	40
2N2256	X		X	
2N2257	X			X
2N2258		X	X	
2N2259		X		X

**2N2256 thru 2N2259 (continued)**

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

Characteristic	Symbol	Min	Typ	Max	Unit
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**OFF CHARACTERISTICS**

Collector-Emitter Breakdown Voltage ( $I_C = 100 \mu\text{Adc}$ , $V_{BE} = 0$ )	$BV_{CES}$	7.0	15	-	Vdc
Collector-Base Breakdown Voltage ( $I_C = 100 \mu\text{Adc}$ , $I_E = 0$ )	$BV_{CBO}$	7.0	15	-	Vdc
Emitter-Base Breakdown Voltage ( $I_E = 100 \mu\text{Adc}$ , $I_C = 0$ )	$BV_{EBO}$	1.0	-	-	Vdc
Collector Cutoff Current ( $V_{CB} = 6 \text{ Vdc}$ , $I_E = 0$ ) ( $V_{CB} = 6 \text{ Vdc}$ , $I_E = 0$ , $T_A = 65^\circ\text{C}$ )	$I_{CBO}$	-	3.0	10	$\mu\text{Adc}$
		-	30	100	

**ON CHARACTERISTICS**

DC Current Gain ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 1 \text{ Vdc}$ )	$h_{FE}$	17	30	-	-
2N2256, 2N2258 2N2257, 2N2259		40	50	-	
( $I_C = 25 \text{ mAdc}$ , $V_{CE} = 1 \text{ Vdc}$ )		20	35	-	
2N2256, 2N2258 2N2257, 2N2259		40	55	-	
Base-Emitter On Voltage ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 1 \text{ Vdc}$ )	$V_{BE(\text{on})}$	-	0.70	0.8	Vdc
2N2256, 2N2257 2N2258, 2N2259		-	0.35	0.5	
( $I_C = 25 \text{ mAdc}$ , $V_{CE} = 1 \text{ Vdc}$ )		-	0.8	0.9	
2N2256, 2N2257 2N2258, 2N2259		-	0.45	0.6	
Conduction Threshold Base-Emitter Voltage* ( $I_C = 200 \mu\text{Adc}$ , $V_{CE} = 1 \text{ Vdc}$ )	$V_T$	0.5	-	-	Vdc
2N2256, 2N2257 2N2258, 2N2259		0.1	-	-	

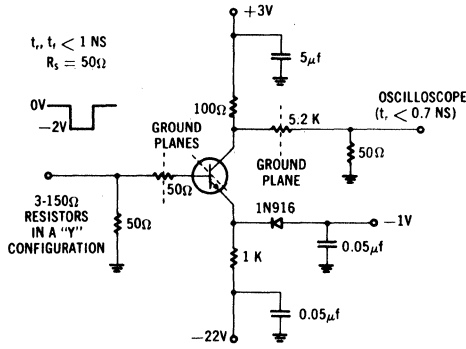
**DYNAMIC CHARACTERISTICS**

Current-Gain – Bandwidth Product ( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 1 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	$f_T$	250	320	-	MHz
2N2258, 2N2259		250	320	-	
( $I_C = 10 \text{ mAdc}$ , $V_{CE} = 15 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )					
2N2256, 2N2257					
Output Capacitance ( $V_{CB} = 5 \text{ Vdc}$ , $I_E = 0$ , $f = 4 \text{ MHz}$ )	$C_{ob}$	-	4.0	5.0	pF
2N2256, 2N2257 2N2258, 2N2259		-	4.0	8.0	
Base Resistance ( $I_E = 5 \text{ mAdc}$ , $V_{CB} = 2 \text{ Vdc}$ , $f = 300 \text{ MHz}$ )	$r'_b$	-	50	100	Ohms
2N2256, 2N2257 2N2258, 2N2259		-	75	125	
Turn-On Time	$t_{on}$	-	3.0	7.0	ns
2N2256, 2N2257 See Fig. 1		-	4.0	8.0	
2N2258, 2N2259 See Fig. 2					
Turn-Off Time	$t_{off}$	-	4.0	7.0	ns
2N2256, 2N2257 See Fig. 1		-	3.0	7.0	
2N2258, 2N2259 See Fig. 2					

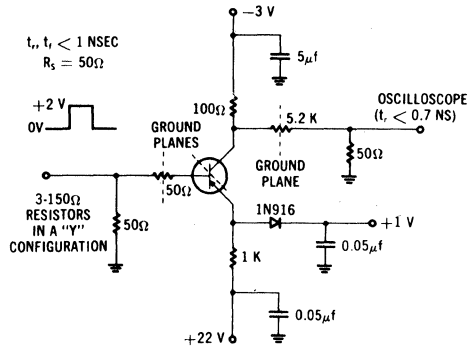
\*Base-to-emitter forward bias voltage at which transistor will be at the threshold of conduction; i. e. that base-to-emitter voltage at which the collector current is less than or equal to the specified amount under a given collector-to-emitter voltage condition.

## 2N2256 thru 2N2259 (continued)

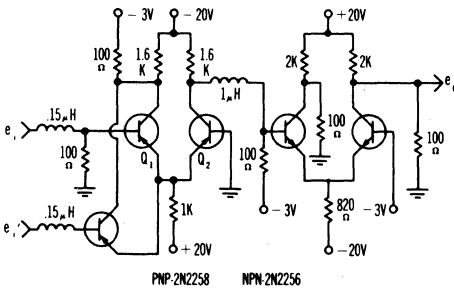
**FIGURE 1 — NPN SWITCHING TIME TEST CIRCUIT**



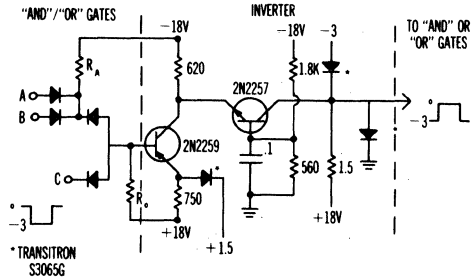
**FIGURE 2 — PNP SWITCHING TIME TEST CIRCUIT**



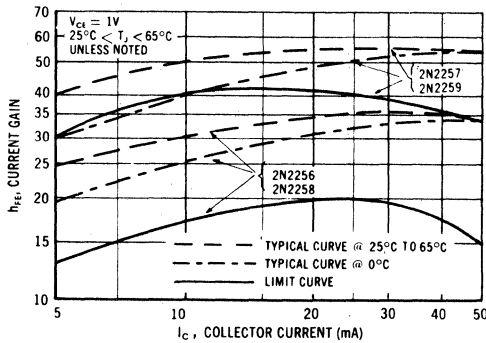
**FIGURE 3 — CASCADE COMPLEMENTARY GATE**



**FIGURE 4 — CURRENT MODE INVERTER FOR USE WITH DIODE LOGIC PROPAGATION DELAY TIME 10 ns**



**FIGURE 5 — CURRENT GAIN CHARACTERISTICS**



**FIGURE 6 — CURRENT GAIN-BANDWIDTH PRODUCT CHARACTERISTICS**

