MOTOROLA

2N4260 (SILICON)

2N4261

CASE 20
(TO-72)

PNP silicon annular transistors, designed for high-speed current-mode logic switching applications and for complementary circuitry with NPN types 2N3959 and 2N3960.

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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	15	Vdc
Collector-Base Voltage	V_{CB}	15	Vdc
Emitter-Base Voltage	V_{EB}	4.5	Vdc
Collector Current - Continuous	I_C	30	mAdc
Total Device Dissipation @ $T_A = 25°C$	P_D	200	mW
Derate above 25°C		1.14	mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

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

Characteristic		Fig. No.	Symbol	Min	Max	Unit
OFF CHARACTERISTICS						
Collector-Emitter Breakdown Voltage (I_C = 10 mAdc, I_E = 0)			BV_{CEO}	15	-	Vdc
Collector-Base Breakdown Voltage (I_C = 10 μAdc, I_E = 0)			BV_{CBO}	15	-	Vdc
Emitter-Base Breakdown Voltage (I_E = 10 μAdc, I_C = 0)			BV_{EBO}	4.5	-	Vdc
Collector Cutoff Current (V_{CE} = 10 Vdc, $V_{BE(off)}$ = 2 Vdc)			I_{CEX}	-	0.005	μAdc
(V_{CE} = 10 Vdc, $V_{BE(off)}$ = 2 Vdc, T_A = 150°C)				-	5.0	
(V_{CE} = 10 Vdc, $V_{EB(on)}$ = 0.4 Vdc)				-	0.05	
Base Cutoff Current (V_{CE} = 10 Vdc, $V_{BE(off)}$ = 2 Vdc)			I_{BL}	-	0.005	μAdc
ON CHARACTERISTICS						
DC Current Gain (I_C = 1 mAdc, V_{CE} = 1 Vdc)		1	h_{FE}	25	-	-
(I_C = 10 mAdc, V_{CE} = 1 Vdc)				30	150	
(I_C = 30 mAdc, V_{CE} = 2 Vdc)				20	-	
Collector-Emitter Saturation Voltage (I_C = 1 mAdc, I_B = 0.1 Adc)		2, 3, 4	$V_{CE(sat)}$	-	0.15	Vdc
(I_C = 10 mAdc, I_B = 1 mAdc)				-	0.35	
Base-Emitter On Voltage (I_C = 1 mAdc, V_{CE} = 1 Vdc)		3, 4	$V_{BE(on)}$	-	0.8	Vdc
(I_C = 10 mAdc, V_{CE} = 1 Vdc)				-	1.0	
DYNAMIC CHARACTERISTICS						
Current-Gain — Bandwidth Product (I_C = 5 mAdc, V_{CE} = 4 Vdc, f = 100 MHz)	2N4260	5	f_T	1200	-	MHz
	2N4261			1500	-	
(I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	2N4260			1600	-	
	2N4261			2000	-	
High-Frequency Current Gain (I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 100 MHz)	2N4260		$\lvert h_{fe} \rvert$	16	-	-
	2N4261			20	-	
Output Capacitance (V_{CB} = 4 Vdc, I_E = 0, f = 100 kHz)		8	C_{ob}	-	2.5	pF
Input Capacitance (V_{BE} = 0.5 Vdc, I_C = 0, f = 100 kHz)		8	C_{ib}	-	2.5	pF
Collector-Base Time Constant (I_C = 5 mAdc, V_{CE} = 4 Vdc, f = 31.8 MHz)	2N4260	6	$r_b'C_c$	-	35	ps
	2N4261			-	60	
(I_C = 10 mAdc, V_{CE} = 10 Vdc, f = 31.8 MHz)	2N4260			-	30	
	2N4261			-	50	

			Typical Performance (v_{out} = 1 V)		
TYPICAL SWITCHING TIMES			@ 10 mA	@ 30 mA	
Turn-On Delay Time	Test Circuit Figure 7	$t_{on(delay)}$	1.0	1.2	ns
Rise Time		t_r	0.5	0.9	ns
Turn-Off Delay Time	Test Circuit Figure 7	$t_{off(delay)}$	1.0	1.2	ns
Fall-Time		t_f	1.0	1.2	ns

2N4260, 2N4261 (continued)

FIGURE 1 — DC CURRENT GAIN

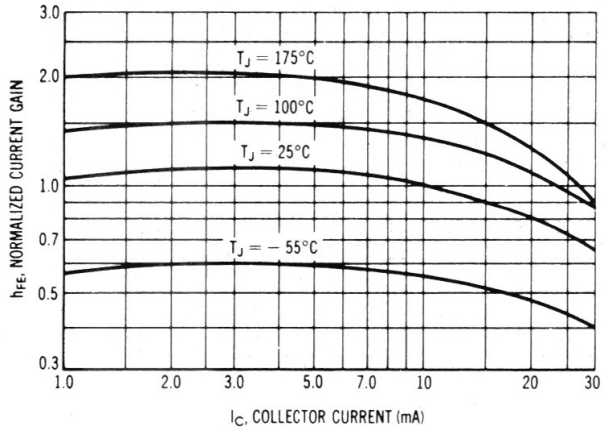


FIGURE 2 — COLLECTOR SATURATION REGION

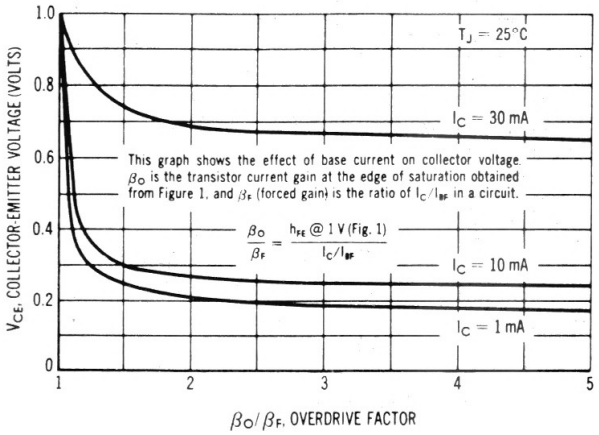


FIGURE 3 — "ON" VOLTAGES

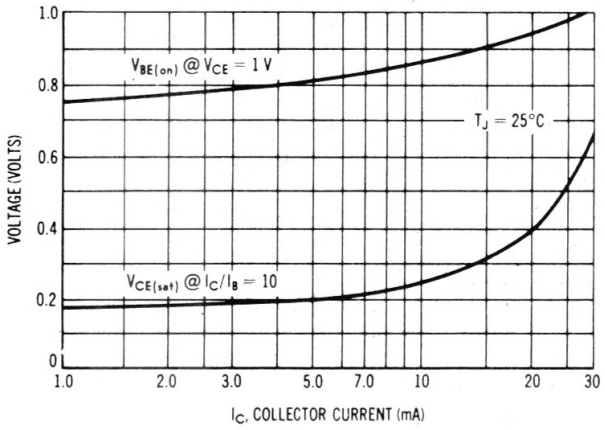


FIGURE 4 — TEMPERATURE COEFFICIENTS

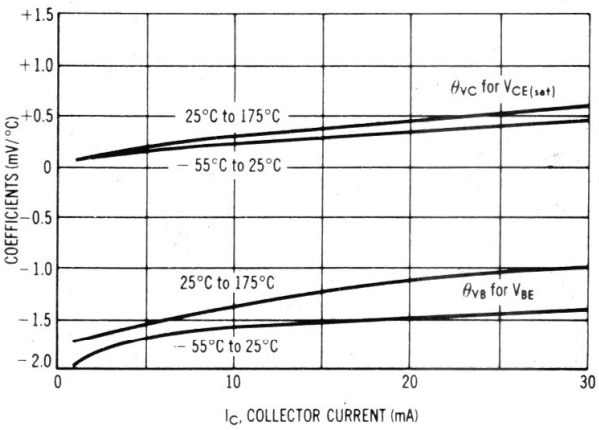


FIGURE 5 — CURRENT-GAIN — BANDWIDTH PRODUCT

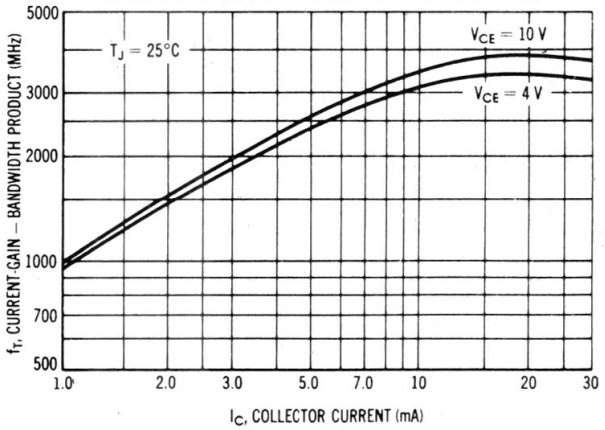


FIGURE 6 — COLLECTOR-BASE TIME CONSTANT

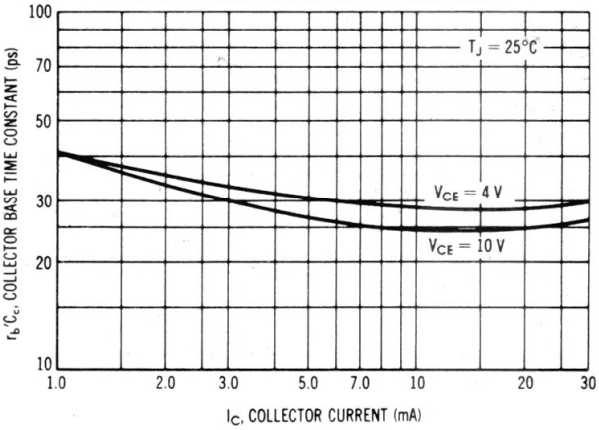
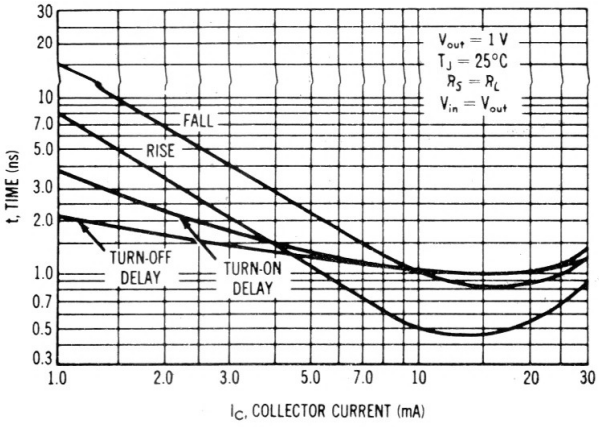
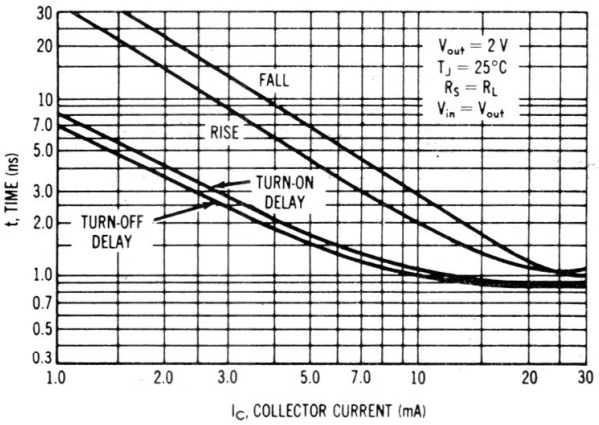
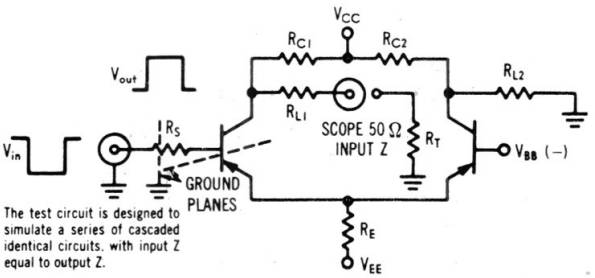


FIGURE 7 — SWITCHING TIMES







The test circuit is designed to simulate a series of cascaded identical circuits, with input Z equal to output Z.

	$V_{in} = V_{out} = 2$ V $V_{BB} = 1$ V $R_{C1} = R_{C2}$							$V_{in} = V_{out} = 1$ V $V_{BB} = 0.5$ V $R_{C1} = R_{C2}$						
I_C mA	R_S ohms	R_C ohms	R_{L1} ohms	R_{L2} ohms	R_E ohms	V_{EE} volts	V_{CC} volts	R_S ohms	R_C ohms	R_{L1} ohms	R_{L2} ohms	R_E ohms	V_{EE} volts	V_{CC} volts
1	2 k	6 k	3 k	3 k	10 k	10	16	1 k	6 k	1.2 k	1.2 k	24 k	24	32
5	360	3.56 k	400	450	2 k	10	47	175	1 k	200	250	3 k	15	27
10	160	1 k	200	250	3 k	30	26.3	75	300	100	150	3 k	30	17
20	62	300	100	150	1 k	20	16	25	150	25	75	1 k	20	11
30	28	157	66	116	1 k	30	13	8	77	0	50	1 k	30	9

FIGURE 8 — CAPACITANCE

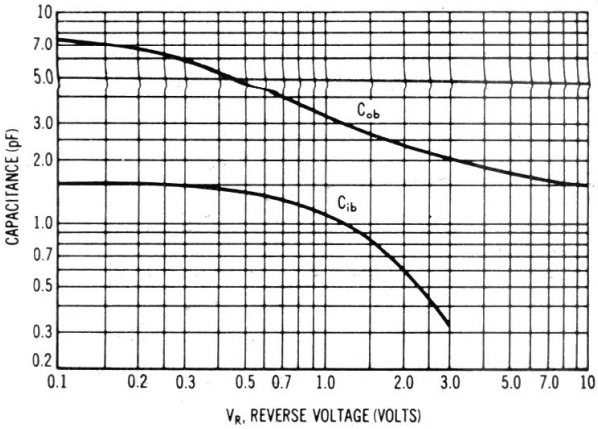


FIGURE 9 — CUT-OFF CHARACTERISTICS