2N4012 (SILICON)

stud isolated from case

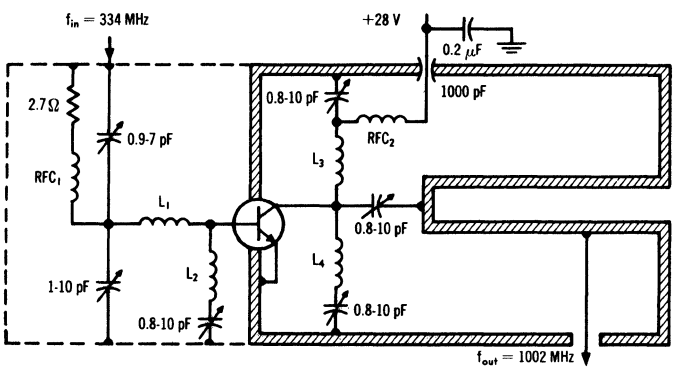
CASE 36
(TO-60)

NPN silicon annular transistor, designed for frequency – multiplication applications.

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

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	40	Vdc
Collector-Emitter Voltage ($V_{EB(off)}$ = 1.5 Vdc)	V_{CEV}	65	Vdc
Collector-Base Voltage	V_{CB}	65	Vdc
Emitter-Base Voltage	V_{EB}	4.0	Vdc
Collector Current	I_C	1.5	Amps
Total Device Dissipation @ T_A = 25°C Derate Above 25°C	P_D	11.6 66.3	Watts mW/°C
Operating and Storage Junction Temperature Range	T_J,T_{stg}	-65 to +200	°C

FIGURE 1 — TRIPLER TEST CIRCUIT



RFC_1 = 0.22 μH
RFC_2 = 0.33 OHMS, W. W. RESISTOR
L_1 = 2 TURNS, ⅜" DIAMETER, NO. 16 WIRE
L_2 = 1/16" WIDTH COPPER STRIP, ⅜" LONG
L_3 = 2 TURNS, ⅜" DIAMETER, NO. 18 WIRE
L_4 = 1½ TURNS, ⅜" DIAMETER, 1/16" COPPER STRIP
OUTPUT CAVITY = 1¼" X 1¼" X 2¼"
CENTER CONDUCTOR = ¼" OD TUBE
OUTPUT DIRECT COUPLE = 1" FROM SHORTED END

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage[1] (I_C = 0 to 200 mAdc, I_B = 0)	BV_{CEO}	40	-	-	Vdc
Collector-Emitter Breakdown Voltage[1] (I_C = 0 to 200 mAdc, $V_{EB(off)}$ = 1.5 Vdc)	BV_{CEV}	65	-	-	Vdc
Collector-Base Breakdown Voltage (I_C = 0.1 mAdc, I_E = 0)	BV_{CBO}	65	-	-	Vdc
Emitter-Base Breakdown Voltage (I_E = 0.1 mAdc, I_C = 0)	BV_{EBO}	4	-	-	Vdc
Collector Cutoff Current (V_{CE} = 30 Vdc, I_B = 0)	I_{CEO}	-	-	0.1	mAdc
ON CHARACTERISTICS					
DC Current-Gain (I_C = 1.0 Adc, V_{CE} = 5.0 Vdc) (I_C = 125 mAdc, V_{CE} = 5.0 Vdc)	h_{FE1} h_{FE2}	4.0 10	- -	40 -	- -
Collector-Emitter Saturation Voltage (I_C = 500 mAdc, I_B = 100 mAdc)	$V_{CE(sat)}$	-	-	1.0	Vdc
DYNAMIC CHARACTERISTICS					
Current-Gain — Bandwidth Product (I_C = 125 mAdc, V_{CE} = 28 Vdc, f = 100 MHz)	f_T	-	350	-	MHz
Collector-Base Cutoff Frequency † (V_{CE} = 28 Vdc, I_C = 0)	f_c	-	25	-	GHz
Output Capacitance (V_{CB} = 30 Vdc, I_E = 0)	C_{ob}	-	-	10	pF
Base-Spreading Resistance (I_C = 250 mAdc, V_{CE} = 28 Vdc, f = 400 MHz)	$r_{bb'}$	-	10	-	Ohms
FUNCTIONAL TEST					
Power Output	Tripler (Test Circuit Figure 1) V_{CE} = 28 Vdc, P_{in} = 1 W, f_{in} = 334 MHz, f_{out} = 1002 MHz	P_{out}	2.5	-	-	Watts
Efficiency		η	25	-	-	%
Power Output	Doubler V_{CE} = 28 Vdc, P_{in} = 1 W, f_{in} = 400 MHz, f_{out} = 800 MHz	P_{out}	-	3.0	-	Watts
Efficiency		η	-	35	-	%

[1] Pulsed through a 25 mH inductor; duty cycle = 50%

† f_c is determined from Q measured at 210 MHz. f_c = Q x 210 MHz.