

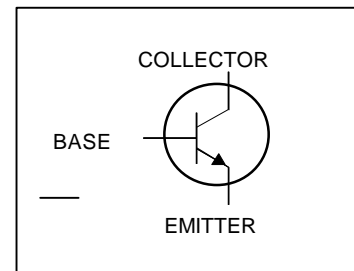
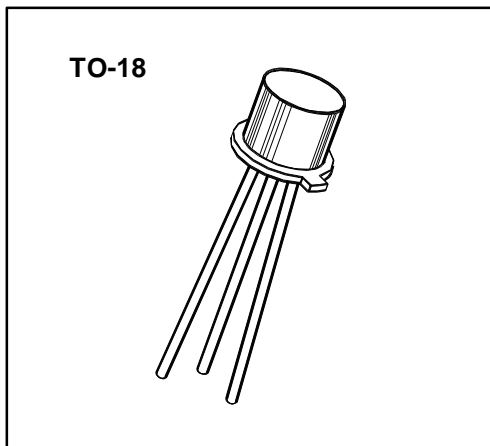
2N2222A

Features

- Meets MIL 19500 /255
- Collector - Base Voltage 75 V
- Collector - Current 800 mA
- High Speed, Medium Current Bipolar Transistor

SWITCHING
 TRANSISTOR
 JAN, JANTX, JANTXV

SMALL SIGNAL
 BIPOLAR
 NPN SILICON



Maximum Ratings

RATING	SYMBOL	VALUE	UNIT
Collector - Emitter Voltage	V_{CEO}	50	Vdc
Collector - Base Voltage	V_{CBO}	75	Vdc
Emitter - Base Voltage	V_{EBO}	6	Vdc
Collector Current -- Continuous	I_C	800	mAdc
Total Device Dissipation @ $T_A = 25\text{ }^\circ\text{C}$	P_D	500	mW
Derate above 25 $^\circ\text{C}$		2.85	mW/ $^\circ\text{C}$
Total Device Dissipation @ $T_C = 25\text{ }^\circ\text{C}$	P_D	1.8	WATTS
Derate above 25 $^\circ\text{C}$		10.3	mW/ $^\circ\text{C}$
Operating Junction&Storage Temperature Range	T_J, T_{stg}	- 65 to + 200	$^\circ\text{C}$

Thermal Characteristics

CHARACTERISTIC	SYMBOL	MAX	UNIT
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	350	$^\circ\text{C/W}$

Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

OFF CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
Collector - Emitter Breakdown Voltage (1) ($I_C = 10 \text{ mA dc}$, $I_B = 0$)	$V(BR)_{CEO}$	50		Vdc
Collector - Base Breakdown Voltage (1) ($I_C = 10 \text{ mAdc}$, $I_E = 0$)	$V(BR)_{CBO}$	75		Vdc
Emitter - Base Breakdown Voltage (1) ($I_E = 10 \text{ mAdc}$, $I_C = 0$)	$V(BR)_{EBO}$	6		Vdc
Collector - Emitter Cutoff Current ($V_{CE} = 50 \text{ Vdc}$, $V_{BE(off)} = 0 \text{ V}$)	I_{CES}		50	nAdc
Collector - Base Cutoff Current ($V_{CB} = 60 \text{ Vdc}$, $I_E = 0$) ($V_{CB} = 60 \text{ Vdc}$, $I_E = 0$, $T_A = 150^\circ\text{C}$)	I_{CBO}		10 10	nAdc mAdc
Emitter - Base Cutoff Current ($V_{EB} = 4 \text{ Vdc}$)	I_{EBO}		10	nAdc

ON CHARACTERISTIC	SYMBOL	MIN	MAX	UNIT
DC Current Gain ($I_C = 100 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 1 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 150 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$) (1) ($I_C = 500 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$) (1) ($I_C = 10 \text{ mA dc}$, $V_{CE} = 10 \text{ Vdc}$, $T_J = -55^\circ\text{C}$)	h_{FE}	50 75 100 100 30 35	325 300	
Collector - Emitter Saturation Voltage ($I_C = 150 \text{ mAdc}$, $I_B = 15 \text{ mAdc}$) (1) ($I_C = 500 \text{ mAdc}$, $I_B = 50 \text{ mAdc}$) (1)	$V_{CE(sat)}$		0.3 1.0	Vdc Vdc
Base - Emitter Saturation Voltage ($I_C = 150 \text{ mAdc}$, $I_B = 15 \text{ mAdc}$) (1) ($I_C = 500 \text{ mAdc}$, $I_B = 50 \text{ mAdc}$) (1)	$V_{BE(sat)}$	0.6	1.2 2.0	Vdc Vdc

1. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$

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Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

SMALL - SIGNAL CHARACTERISTICS	SYMBOL	MIN	MAX	UNIT
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, 100kHz &f &1 MHz)	C_{obo}		8	pF
Input Capacitance ($V_{EB} = 0.5\text{ Vdc}$, $I_C = 0$, 100kHz &f &1 MHz)	C_{ibo}		25	pF

SWITCHING CHARACTERISTICS	SYMBOL	MIN	MAX	UNIT
Turn - On Time ($V_{CC} = 30\text{ Vdc}$, $I_C = 150\text{ mAdc}$, $I_{B1} = 15\text{ mAdc}$) (See FIGURE 1)	t_{on}		35	ns
Turn - Off Time ($V_{CC} = 30\text{ Vdc}$, $I_C = 150\text{ mAdc}$, $I_{B1} = -I_{B2} = 15\text{ mAdc}$) (See FIGURE 2)	t_{off}		300	ns

Small - Signal AC Characteristics ($T_A = 25^\circ\text{C}$)

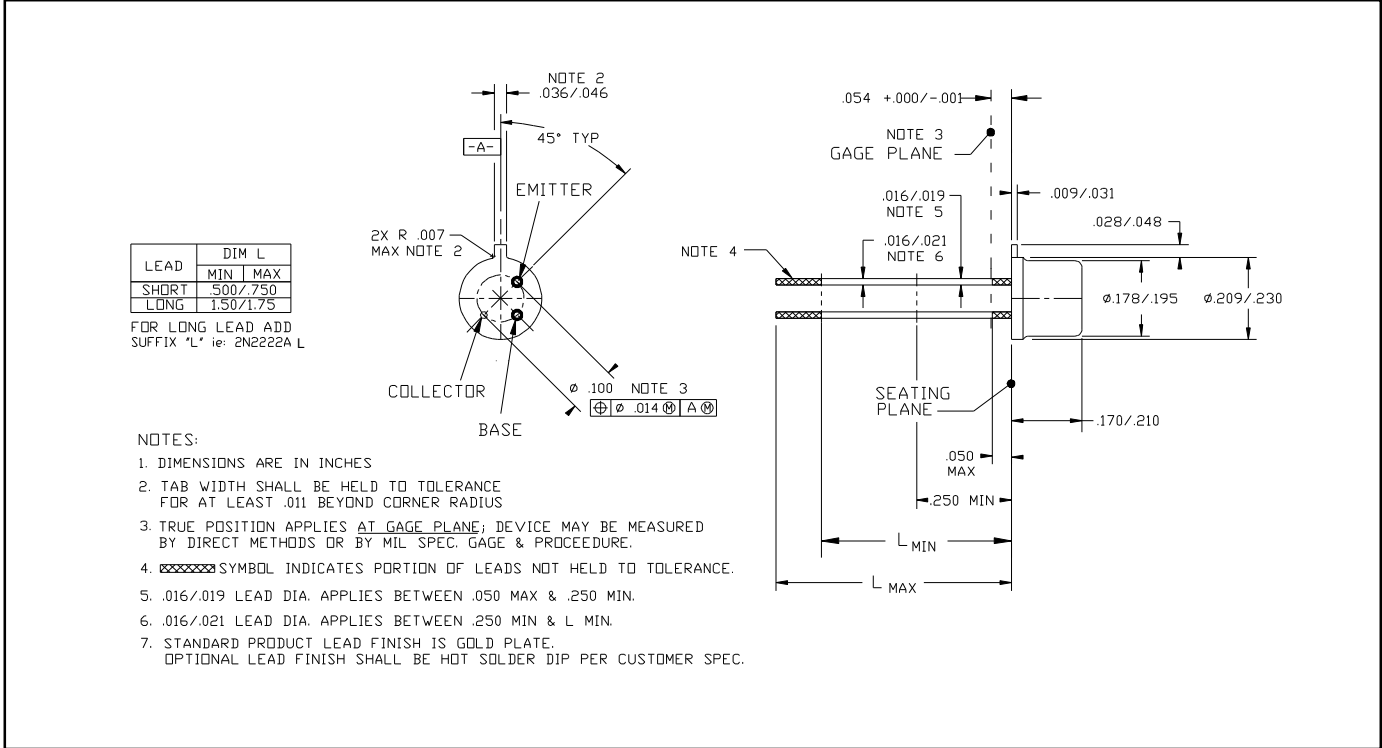
LOW FREQUENCY	SYMBOL	MIN	MAX	UNIT
Common - Emitter Forward Current Transfer Ratio ($I_C = 1\text{ mA}$, $V_{CE} = 10\text{ V}$, $f = 1\text{ kHz}$)	h_{fe}	50		
HIGH FREQUENCY				
Common - Emitter Forward Current Transfer Ratio ($I_C = 20\text{ mA}$, $V_{CE} = 20\text{ V}$, $f = 100\text{ MHz}$)	$ h_{fe} $	2.5		

Spice Model (based upon typical device characteristics) *1

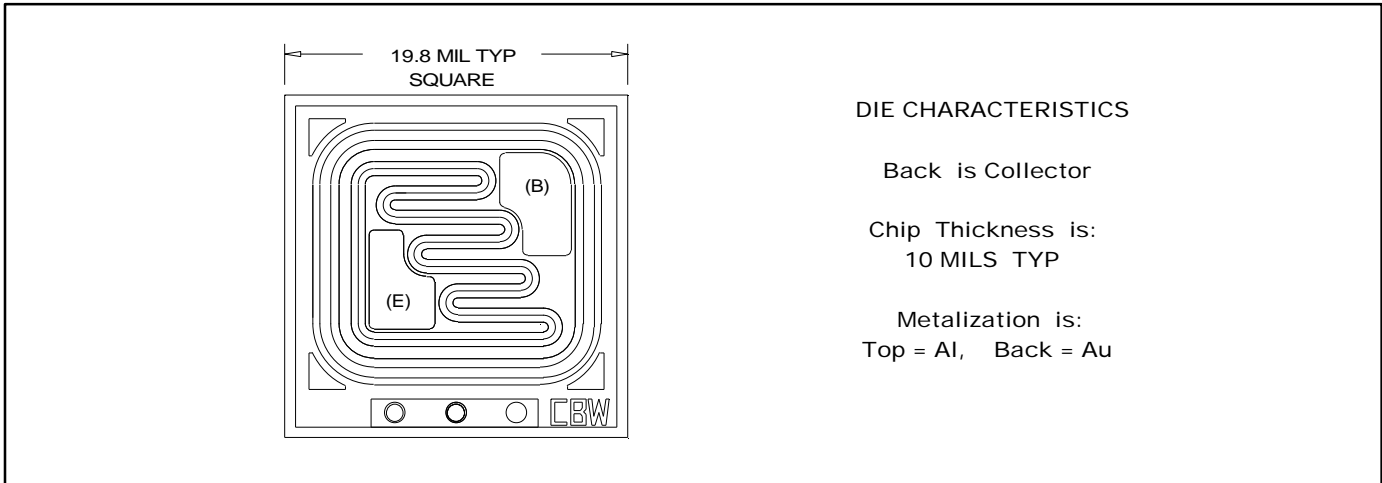
Q2N2222A NPN (IS = 19.34n XT = 3.0 EG = 1.11 VAF=250.3 BF = 163.8 ISE =174.3f
 + NE = 1.647 IKF = 3.0 NK = 0.3052 XTB = 1.5 BR = 11.49 ISC = 19.9f
 + NC = 1.88 IKR = 10.75 RC = 0.3567 CJC = 11.02p VJC = 0.3869 MJC = 0.3292
 + FC = 0.5 CJE = 29.31p VJE = 0.9036 MJE = 0.4101 TR = 38.32n TF =361.8p
 + ITF = 5.282 XTF = 249.9 VTF=10)

*1. Microsemi Corp. claims no responsibility for misapplication of Spice Model information. Spice modeling should be used as a precursor guide to in-circuit performance. Actual performance is the responsibility of the user/designer.

2N2222A



TO 18 CASE OUTLINE



DIE OUTLINE

2N2222A

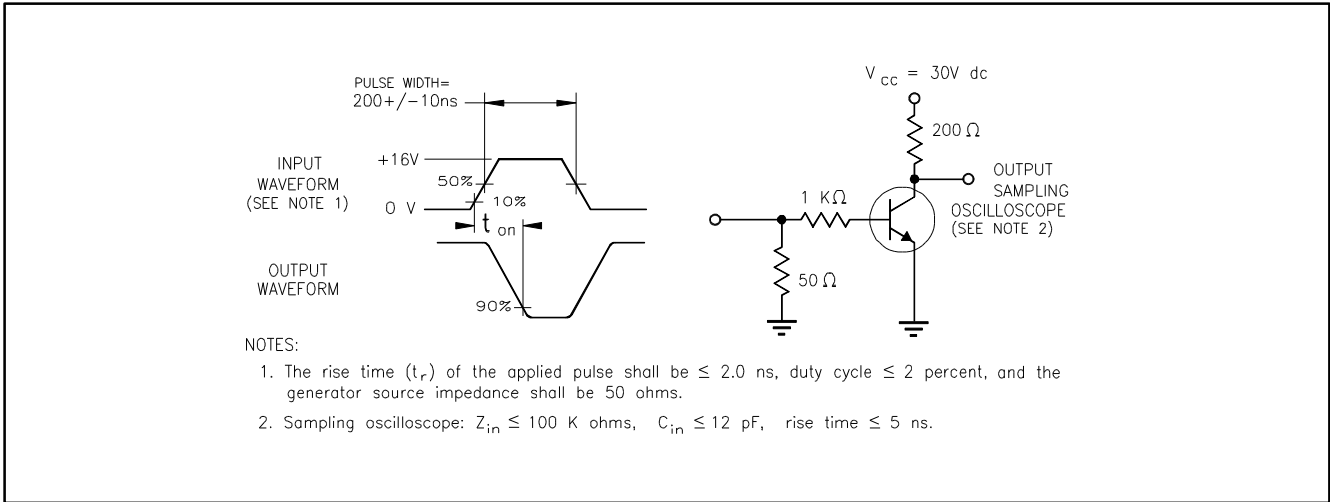


FIGURE 1 Saturated Turn-on Time Test Circuit

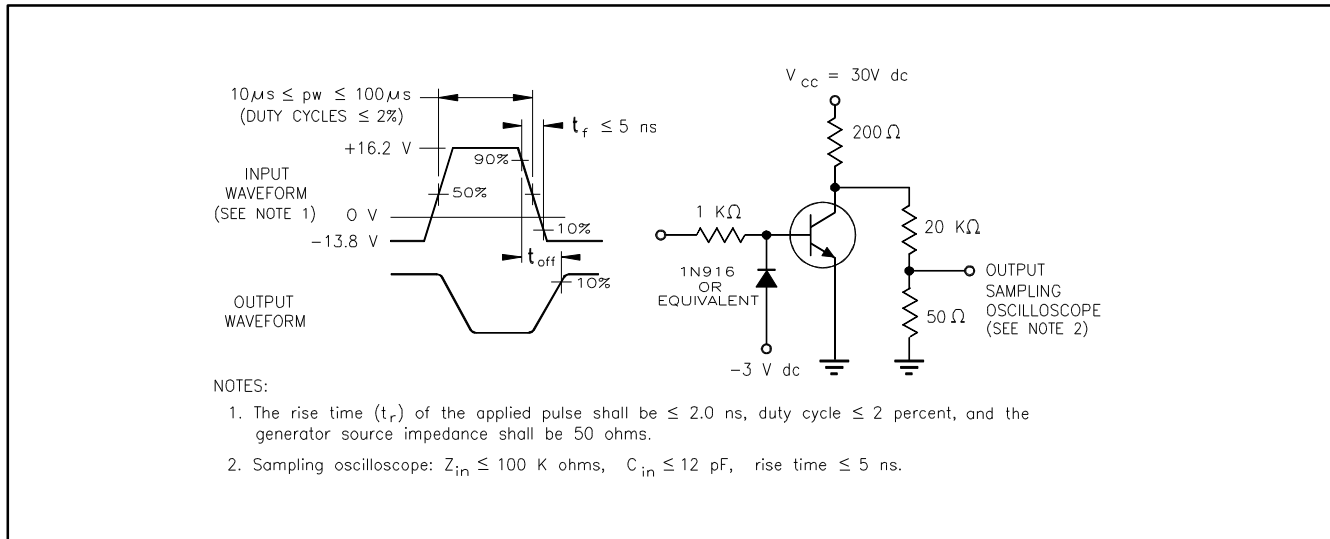


FIGURE 2 Saturated Turn-off Time Test Circuit

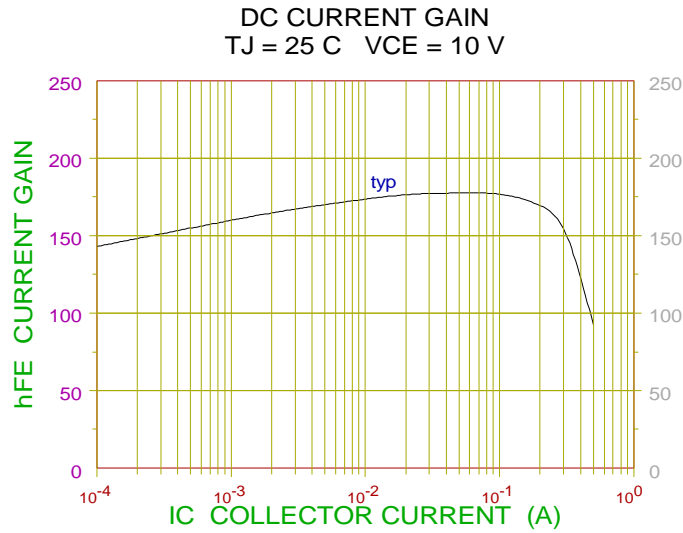


FIGURE 3

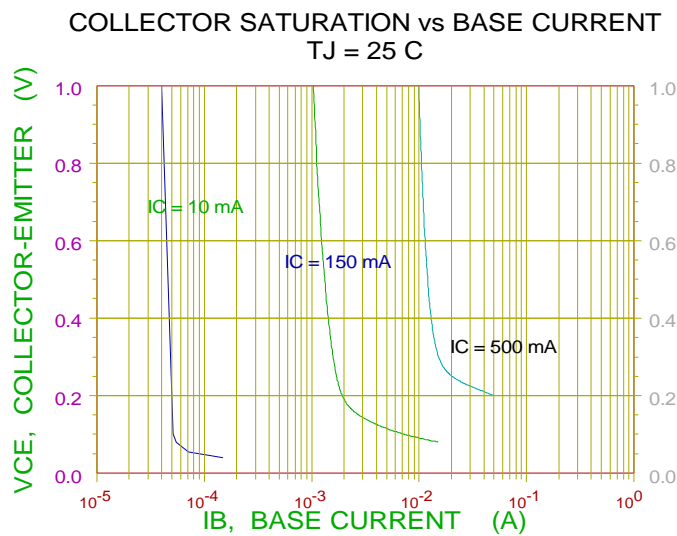


FIGURE 4

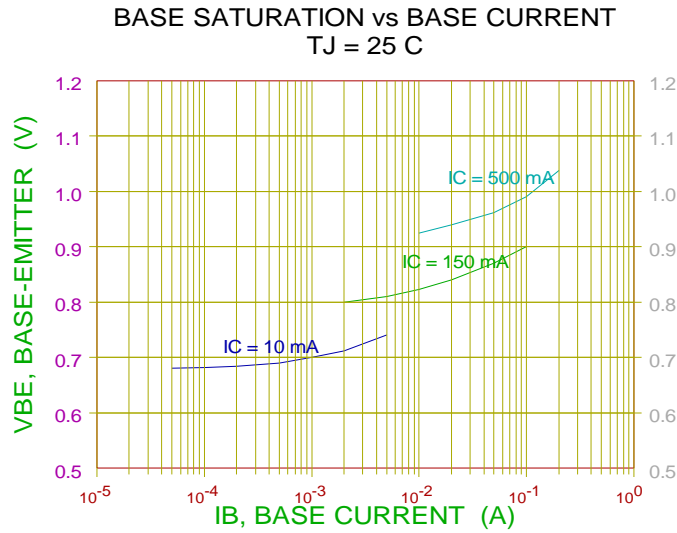


FIGURE 5

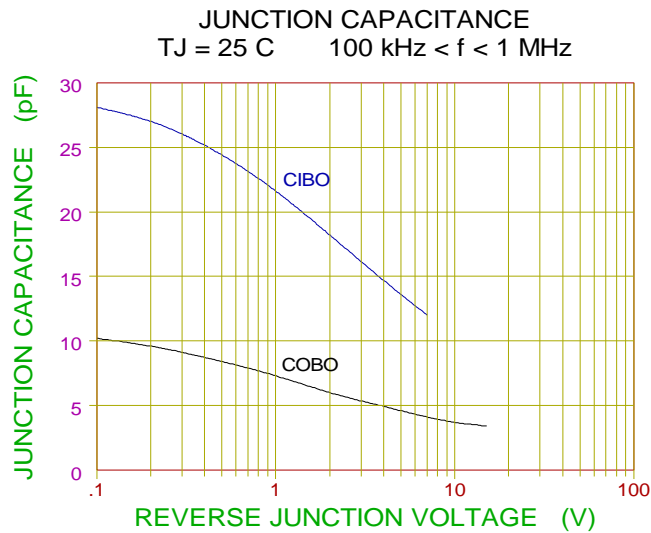


FIGURE 6

SMALL SIGNAL CURENT GAIN vs COLLECTOR CURRENT
TJ = 25 C VCE = 10 V f = 1kHz

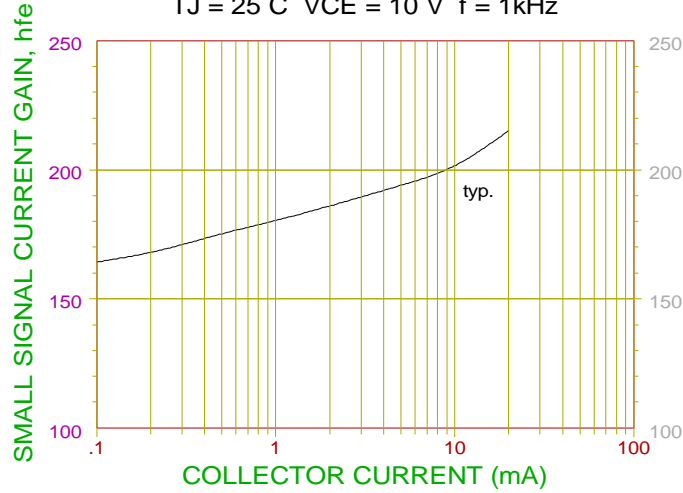


FIGURE 7

HIGH FREQUENCY GAIN
TJ = 25 C VCE = 20 V f = 100 MHz

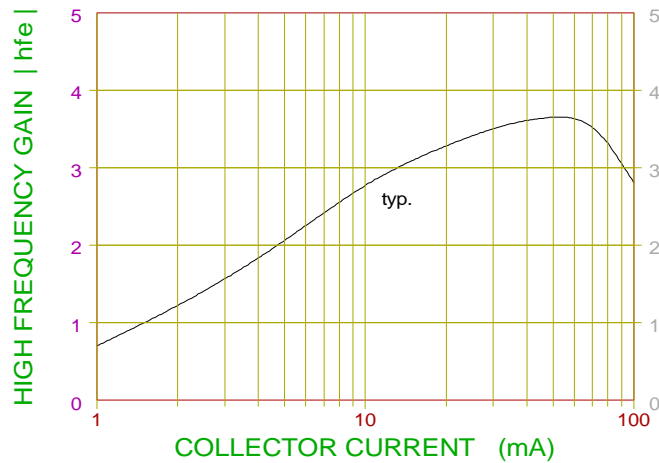


FIGURE 8

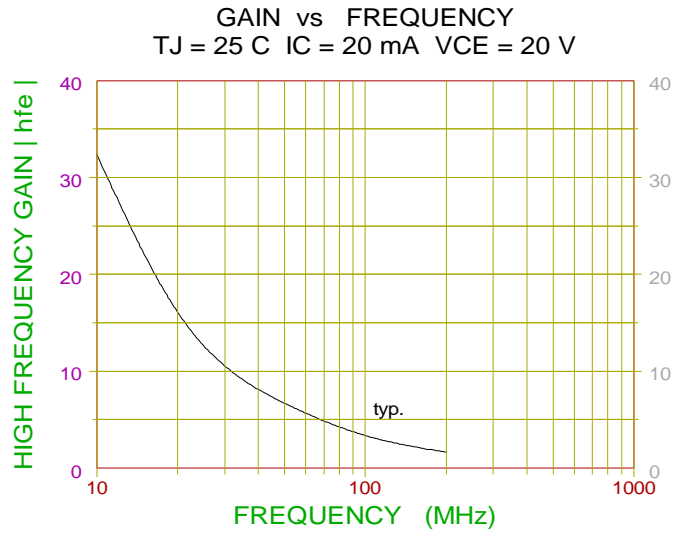


FIGURE 9



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