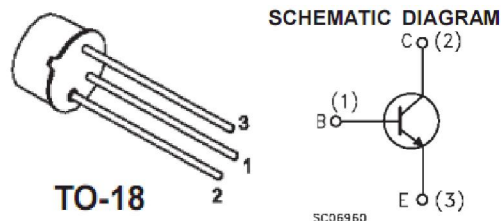


DESCRIPTION

The 2N2222A is silicon planar epitaxial NPN transistors in Jedec TO-18 metal case. It is designed for high speed switching application at collector current up to 500mA, and feature useful current gain over a wide range of collector current, low leakage currents and low saturation voltage.



ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Rating	UNIT	
Collector-Base Voltage ($I_E=0$)	V_{CBO}	75	V	
Collector-Emitter Voltage ($I_B=0$)	V_{CEO}	40	V	
Emitter-Base Voltage ($I_C=0$)	V_{EBO}	6	V	
Collector Current	I_C	800	mA	
Total Dissipation	P_{tot}	at $T_A \leq 25^\circ\text{C}$	0.5	W
		at $T_C \leq 25^\circ\text{C}$	1.8	W
Thermal Resistance Junction to Ambient	R_{thja}	300	$^\circ\text{C/W}$	
Thermal Resistance Junction to Case	R_{thjc}	83.3	$^\circ\text{C/W}$	
Operating Temperature	T_J	175	$^\circ\text{C}$	
Storage Temperature Range	T_{STG}	-65 ~ 200	$^\circ\text{C}$	

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

Parameter	Symbol	Test Condition.	Min.	Max.	Unit
Collector Cut-off Current ($I_E=0$)	I_{CBO}	$V_{CB}=60\text{V}$		10	nA
		$V_{CB}=60\text{V}, T_C=150^\circ\text{C}$		10	μA
Collector Cut-off Current ($V_{BE}=-3\text{V}$)	I_{CEX}	$V_{CE}=60\text{V}$		10	nA
Base Cut-off Current ($V_{BE}=-3\text{V}$)	I_{BEX}	$V_{CE}=60\text{V}$		20	nA
Emitter Cut-off Current ($I_C=0$)	I_{EBO}	$V_{EB}=3\text{V}$		10	nA
Collector-Base Breakdown Voltage ($I_E=0$)	$V_{(BR)CBO}^*$	$I_C=10\mu\text{A}$	75		V
Collector-Emitter Breakdown Voltage ($I_B=0$)	$V_{(BR)CEO}^*$	$I_C=10\text{mA}$	40		V
Emitter-Base Breakdown Voltage ($I_C=0$)	$V_{(BR)EBO}^*$	$I_E=10\mu\text{A}$	6		V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}^*$	$I_C=150\text{mA}, I_B=15\text{mA}$		0.3	V
		$I_C=500\text{mA}, I_B=50\text{mA}$		1	V
Base-Emitter Saturation Voltage	$V_{BE(sat)}^*$	$I_C=150\text{mA}, I_B=15\text{mA}$	0.6	1.2	V
		$I_C=500\text{mA}, I_B=50\text{mA}$		2	V
DC Current Gain	h_{FE}^*	$I_C=0.1\text{mA}, V_{CE}=10\text{V}$	35	300	
		$I_C=1\text{mA}, V_{CE}=10\text{V}$	50		
		$I_C=10\text{mA}, V_{CE}=10\text{V}$	75		
		$I_C=150\text{mA}, V_{CE}=10\text{V}$	100		
		$I_C=500\text{mA}, V_{CE}=10\text{V}$	40		
		$I_C=150\text{mA}, V_{CE}=1\text{V}$	50		
		$I_C=10\text{mA}, V_{CE}=10\text{V}, T_A=-55^\circ\text{C}$	35		
Small Signal Current Gain	h_{fe}^*	$I_C=1\text{mA}, V_{CE}=10\text{V}, f=1\text{KHz}$	50	300	
		$I_C=10\text{mA}, V_{CE}=10\text{V}, f=1\text{KHz}$	75	375	

ELECTRICAL CHARACTERISTICS(continued)

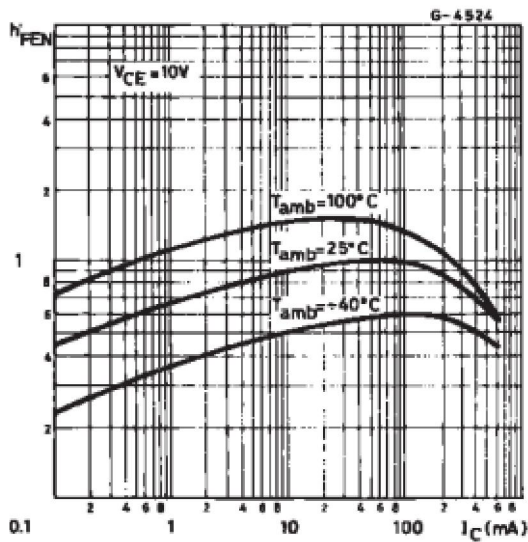
Parameter	Symbol	Test Condition.	Min.	Max.	Unit
Transition Frequency	f_T	$I_C=20\text{mA}$ $V_{CE}=20\text{V}$ $f=100\text{MHz}$	300		MHz
Emitter Base Capacitance	C_{EBO}	$I_C=0$ $V_{EB}=0.5\text{V}$ $f=100\text{KHz}$		25	pF
Collector Base Capacitance	C_{CBO}	$I_E=0$ $V_{CB}=10\text{V}$ $f=100\text{KHz}$		8	pF
Real Part of Input Impedance	$R_{e(hie)}$	$I_C=20\text{mA}$ $V_{CE}=20\text{V}$ $f=300\text{MHz}$		60	Ω
Noise Figure	NF	$I_C=0.1\text{mA}$ $V_{CE}=10\text{V}$ $f=1\text{KHz}$ $R_g=1\text{K}\Omega$	4(Typ.)		dB
Input Impedance	h_{ie}	$I_C=1\text{mA}$ $V_{CE}=10\text{V}$	2	8	$\text{k}\Omega$
		$I_C=10\text{mA}$ $V_{CE}=10\text{V}$	0.25	1.25	$\text{k}\Omega$
Reverse Voltage Ratio	h_{re}	$I_C=1\text{mA}$ $V_{CE}=10\text{V}$		8	10^{-4}
		$I_C=10\text{mA}$ $V_{CE}=10\text{V}$		4	10^{-4}
Output Admittance	h_{oe}	$I_C=1\text{mA}$ $V_{CE}=10\text{V}$	5	35	μS
		$I_C=10\text{mA}$ $V_{CE}=10\text{V}$	25	200	μS
Delay Time	t_{d*}	$V_{CC}=30\text{V}$ $I_C=150\text{mA}$ $I_{B1}=15\text{mA}$ $V_{BB}=-0.5\text{V}$		10	nS
Rise Time	t_{r*}	$V_{CC}=30\text{V}$ $I_C=150\text{mA}$ $I_{B1}=15\text{mA}$ $V_{BB}=-0.5\text{V}$		25	nS
Storage Time	t_{s*}	$V_{CC}=30\text{V}$ $I_C=150\text{mA}$ $I_{B1}=-I_{B2}=15\text{mA}$		225	nS
Fall Time	t_{f*}	$V_{CC}=30\text{V}$ $I_C=150\text{mA}$ $I_{B1}=-I_{B2}=15\text{mA}$		60	nS
Feedback Time Constant	$r_{bb'} C_d' c$	$I_C=20\text{mA}$ $V_{CE}=20\text{V}$ $f=31.8\text{MHz}$		150	pS

*Pulsed: Pulse duration =300us, duty cycle≤1%

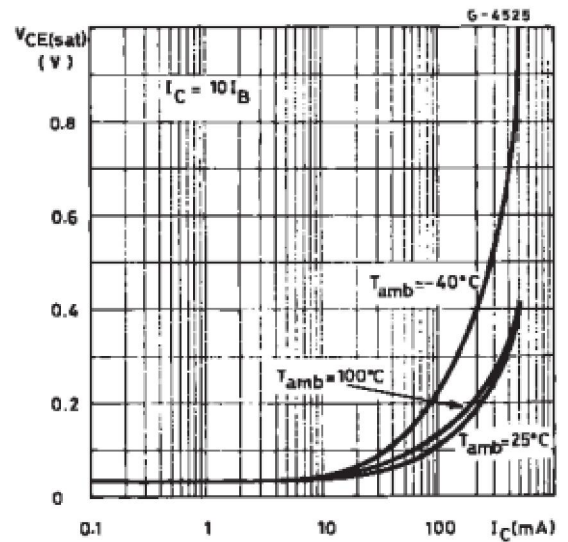
**see test circuit

RATINGS AND CHARACTERISTICS CURVES

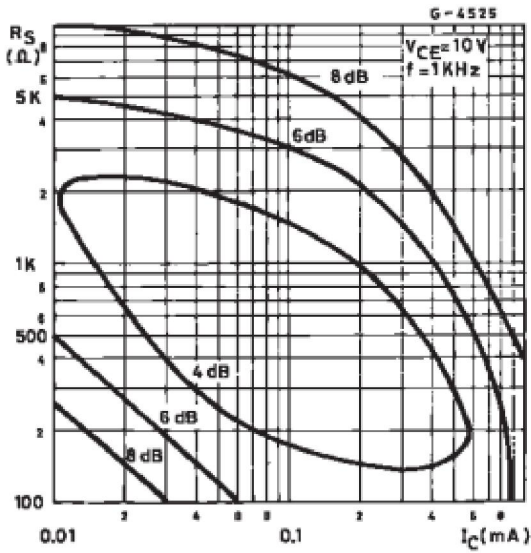
Normalized DC Current Gain.



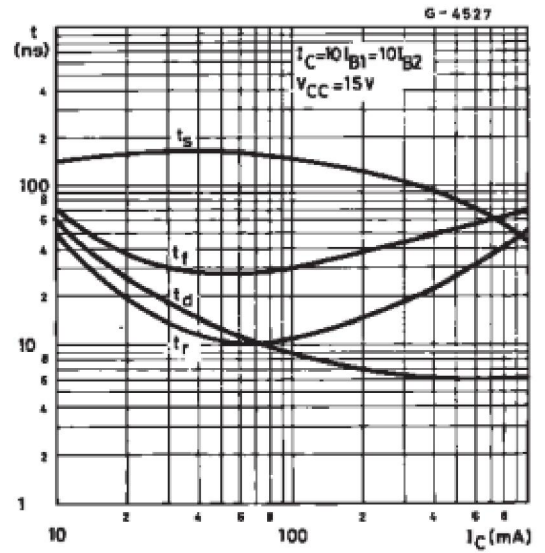
Collector-emitter Saturation Voltage.



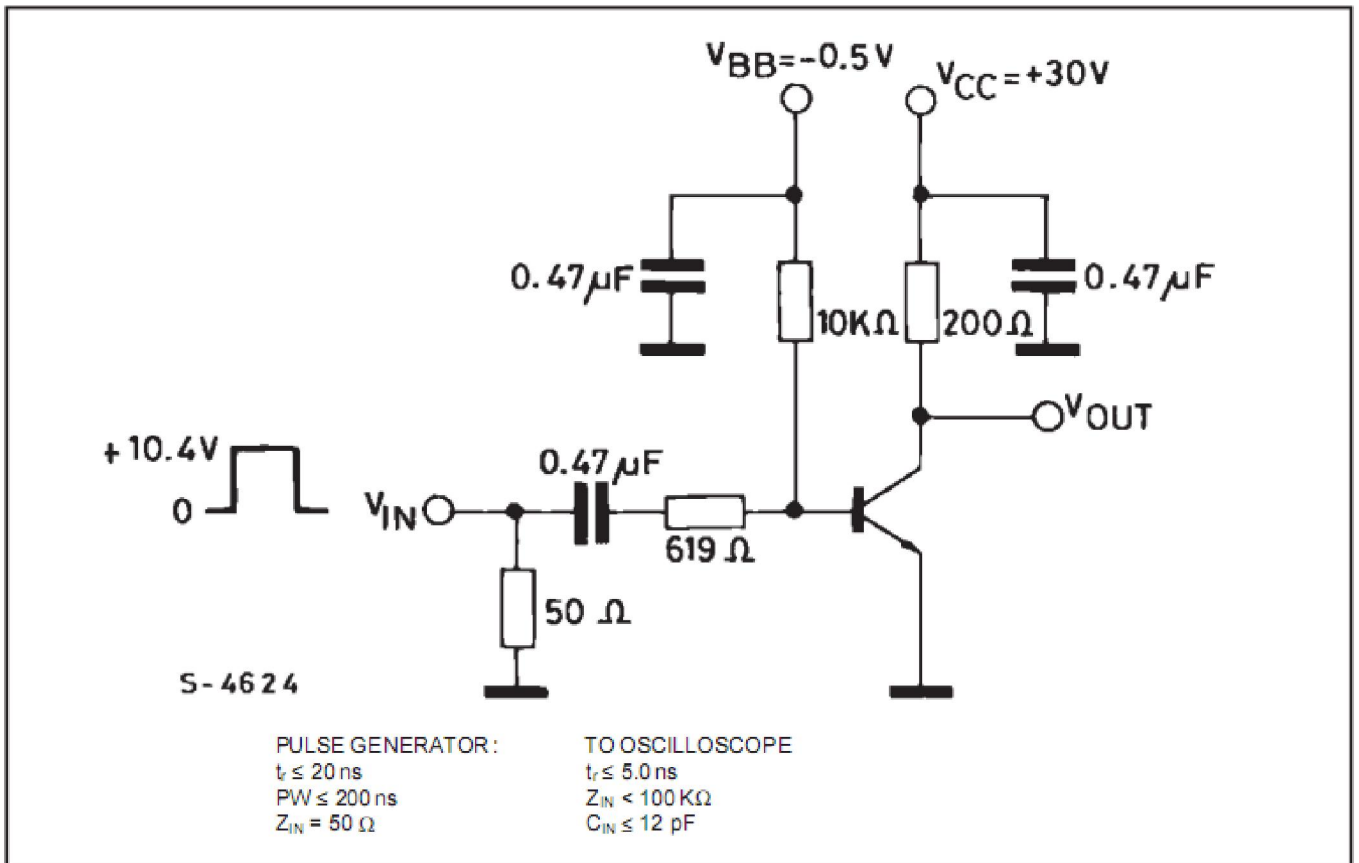
Contours of Constant Narrow Band Noise Figure.



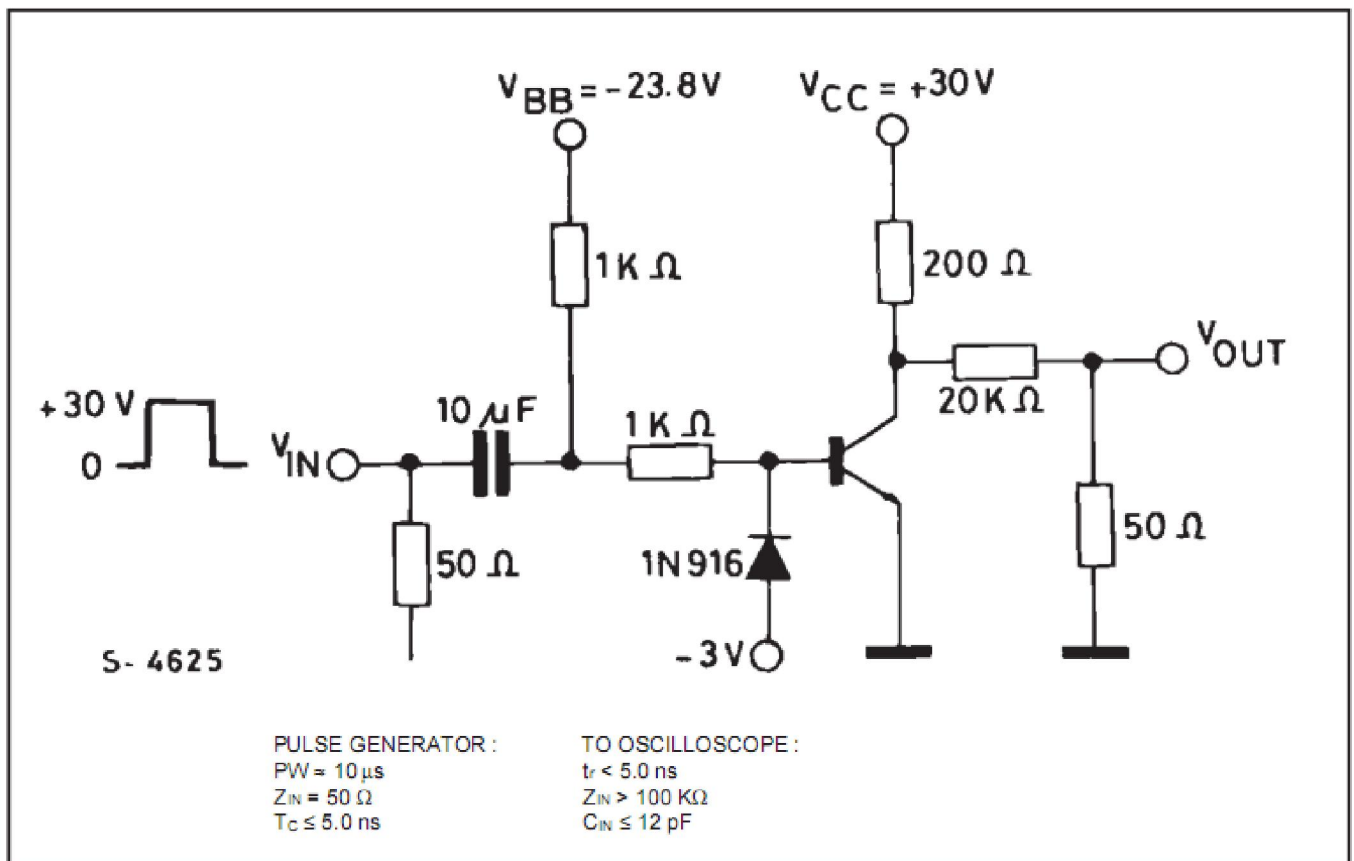
Switching Time vs. Collector Current.



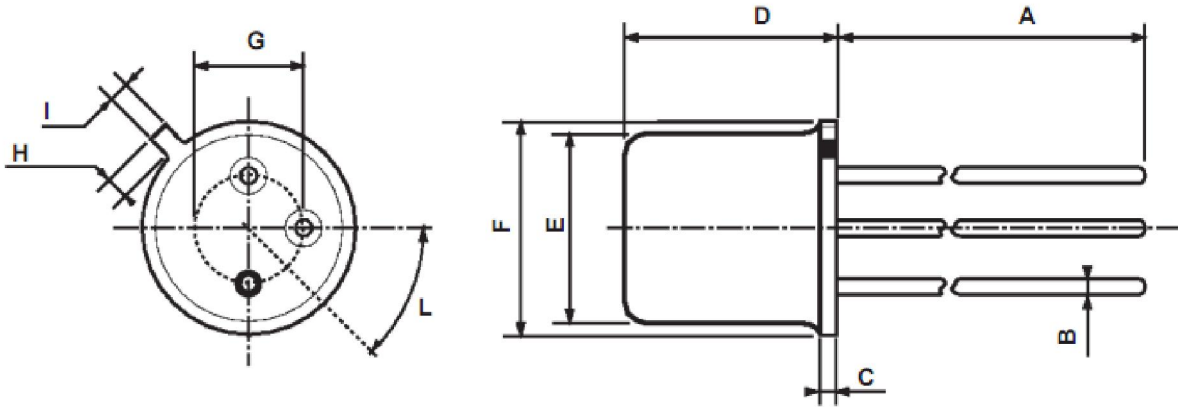
Test Circuit for t_d , t_r .



Test Circuit for t_d , t_r



PACKAGE OUTLINE DIMENSIONS (TO-18 PACKAGE)



DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		