



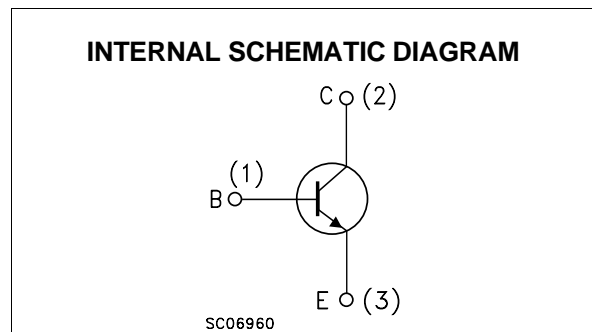
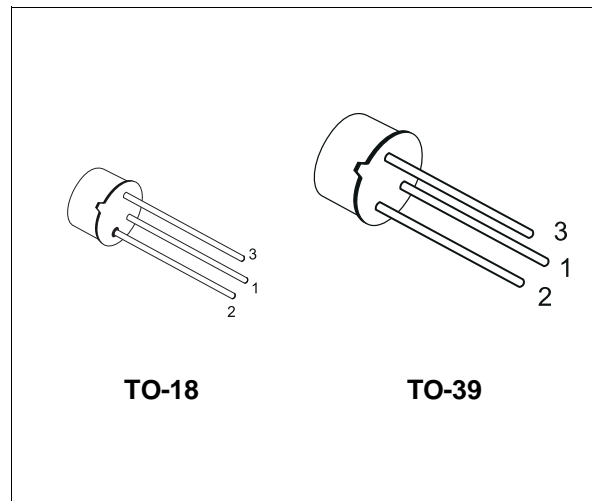
2N2219A
2N2222A

HIGH SPEED SWITCHES

PRELIMINARY DATA

DESCRIPTION

The 2N2219A and 2N2222A are silicon Planar Epitaxial NPN transistors in Jedec TO-39 (for 2N2219A) and in Jedec TO-18 (for 2N2222A) metal case. They are 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

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Base Voltage ($I_E = 0$)	75	V
V_{CEO}	Collector-Emitter Voltage ($I_B = 0$)	40	V
V_{EBO}	Emitter-Base Voltage ($I_C = 0$)	6	V
I_C	Collector Current	0.6	A
I_{CM}	Collector Peak Current ($t_p < 5$ ms)	0.8	A
P_{tot}	Total Dissipation at $T_{amb} \leq 25$ °C for 2N2219A for 2N2222A at $T_C \leq 25$ °C for 2N2219A for 2N2222A	0.8	W
		0.5	W
		3	W
		1.8	W
T_{stg}	Storage Temperature	-65 to 175	°C
T_j	Max. Operating Junction Temperature	175	°C

2N2219A / 2N2222A

THERMAL DATA

			TO-39	TO-18	
R _{thj-case}	Thermal Resistance Junction-Case	Max	50	83.3	°C/W
R _{thj-amb}	Thermal Resistance Junction-Ambient	Max	187.5	300	°C/W

ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{CBO}	Collector Cut-off Current (I _E = 0)	V _{CB} = 60 V V _{CB} = 60 V T _j = 150 °C			10 10	nA μA
I _{CEX}	Collector Cut-off Current (V _{BE} = -3V)	V _{CE} = 60 V			10	nA
I _{BEX}	Base Cut-off Current (V _{BE} = -3V)	V _{CE} = 60 V			20	nA
I _{EBO}	Emitter Cut-off Current (I _C = 0)	V _{EB} = 3 V			10	nA
V _{(BR)CBO}	Collector-Base Breakdown Voltage (I _E = 0)	I _C = 10 μA	75			V
V _{(BR)CEO*}	Collector-Emitter Breakdown Voltage (I _B = 0)	I _C = 10 mA	40			V
V _{(BR)EBO}	Emitter-Base Breakdown Voltage (I _C = 0)	I _E = 10 μA	6			V
V _{CE(sat)*}	Collector-Emitter Saturation Voltage	I _C = 150 mA I _B = 15 mA I _C = 500 mA I _B = 50 mA			0.3 1	V V
V _{BE(sat)*}	Base-Emitter Saturation Voltage	I _C = 150 mA I _B = 15 mA I _C = 500 mA I _B = 50 mA	0.6		1.2 2	V V
h _{FE*}	DC Current Gain	I _C = 0.1 mA V _{CE} = 10 V I _C = 1 mA V _{CE} = 10 V I _C = 10 mA V _{CE} = 10 V I _C = 150 mA V _{CE} = 10 V I _C = 500 mA V _{CE} = 10 V I _C = 150 mA V _{CE} = 1 V I _C = 10 mA V _{CE} = 10 V T _{amb} = -55 °C	35 50 75 100 40 50 35		300	
h _{fe*}	Small Signal Current Gain	I _C = 1 mA V _{CE} = 10 V f = 1KHz I _C = 10 mA V _{CE} = 10 V f = 1KHz	50 75		300 375	
f _T	Transition Frequency	I _C = 20 mA V _{CE} = 20 V f = 100 MHz		300		MHz
C _{EBO}	Emitter-Base Capacitance	I _C = 0 V _{EB} = 0.5 V f = 100KHz			25	pF
C _{CBO}	Collector-Base Capacitance	I _E = 0 V _{CB} = 10 V f = 100 KHz			8	pF
R _{e(hie)}	Real Part of Input Impedance	I _C = 20 mA V _{CE} = 20 V f = 300MHz			60	Ω

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

ELECTRICAL CHARACTERISTICS (continued)

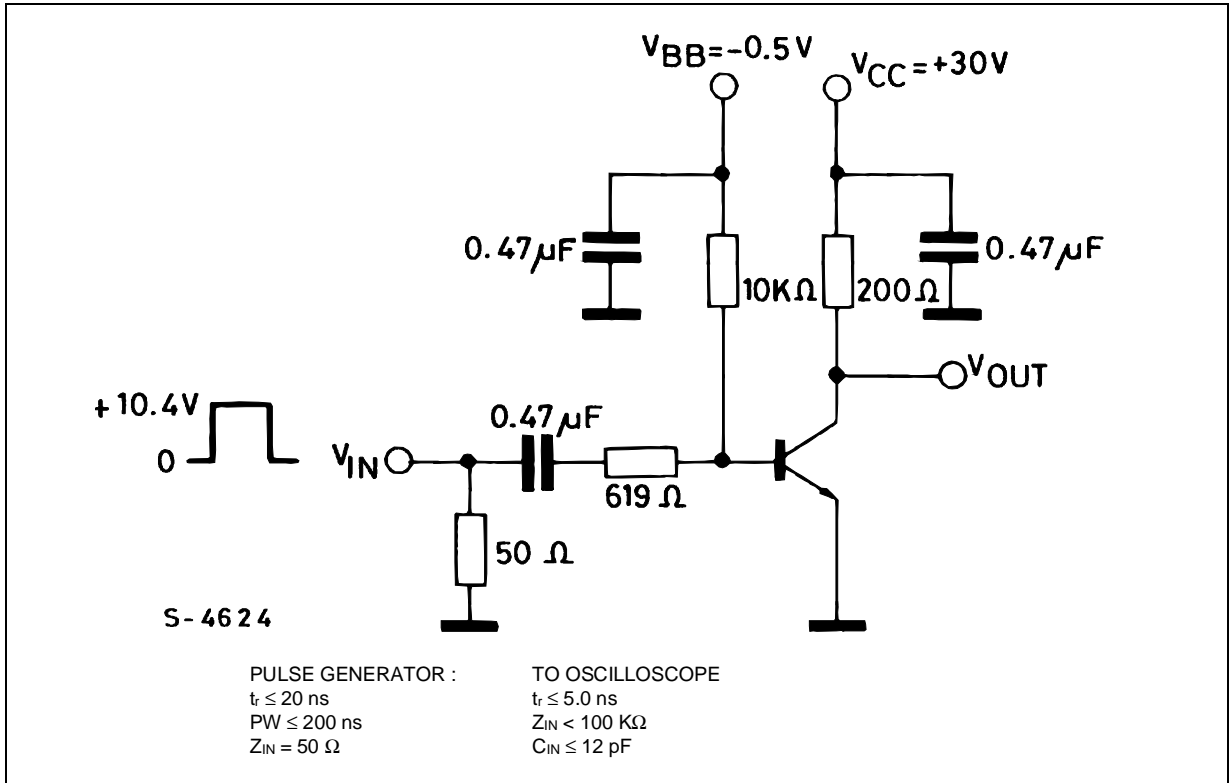
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
NF	Noise Figure	$I_C = 0.1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $f = 1\text{KHz}$ $R_g = 1\text{K}\Omega$		4		dB
h_{ie}	Input Impedance	$I_C = 1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$	2 0.25		8 1.25	$\text{k}\Omega$ $\text{k}\Omega$
h_{re}	Reverse Voltage Ratio	$I_C = 1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$			8 4	10^{-4} 10^{-4}
h_{oe}	Output Admittance	$I_C = 1 \text{ mA}$ $V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}$ $V_{CE} = 10 \text{ V}$	5 25		35 200	μS μS
t_d^{**}	Delay Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = 15 \text{ mA}$ $V_{BB} = -0.5 \text{ V}$			10	ns
t_r^{**}	Rise Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = 15 \text{ mA}$ $V_{BB} = -0.5 \text{ V}$			25	ns
t_s^{**}	Storage Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = -I_{B2} = 15 \text{ mA}$			225	ns
t_f^{**}	Fall Time	$V_{CC} = 30 \text{ V}$ $I_C = 150 \text{ mA}$ $I_{B1} = -I_{B2} = 15 \text{ mA}$			60	ns
$r_{bb'}$, $C_{b'c}$	Feedback Time Constant	$I_C = 20 \text{ mA}$ $V_{CE} = 20 \text{ V}$ $f = 31.8\text{MHz}$			150	ps

* Pulsed: Pulse duration = 300 μs , duty cycle $\leq 1\%$

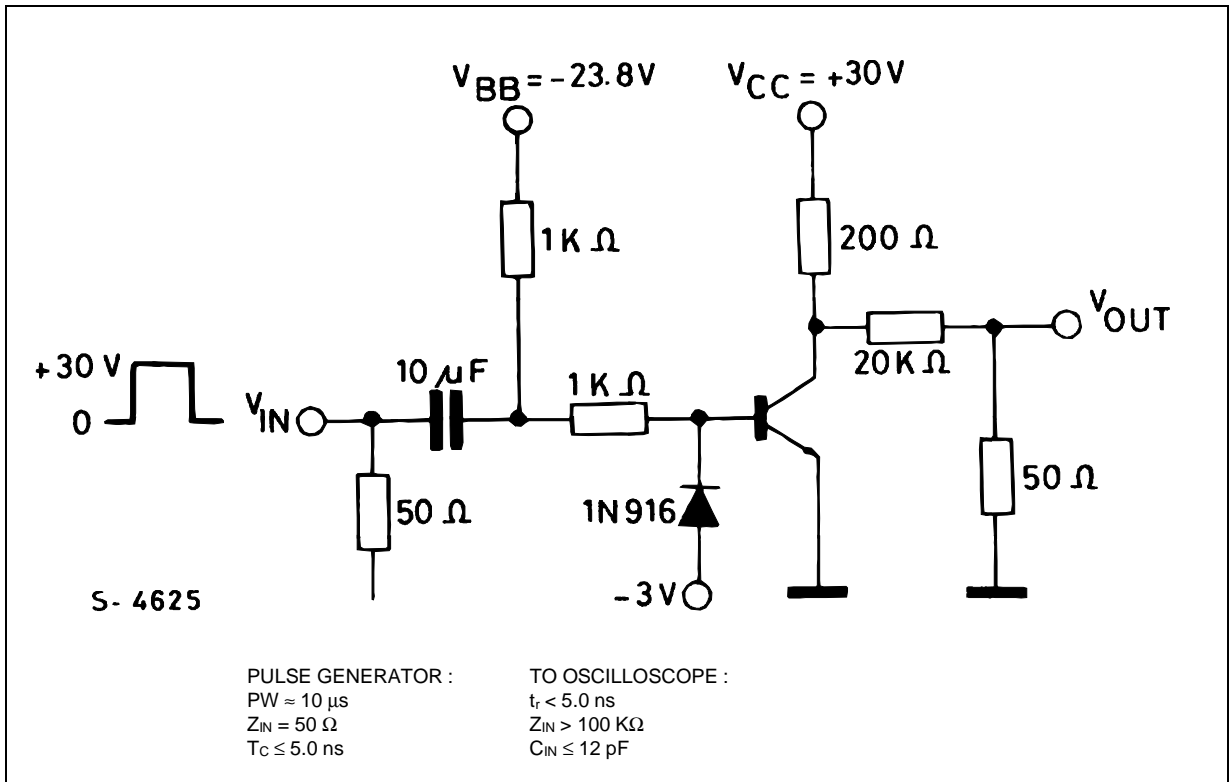
** See test circuit

2N2219A / 2N2222A

Test Circuit for t_d , t_r



Test Circuit for t_d , t_r



TO-18 MECHANICAL DATA

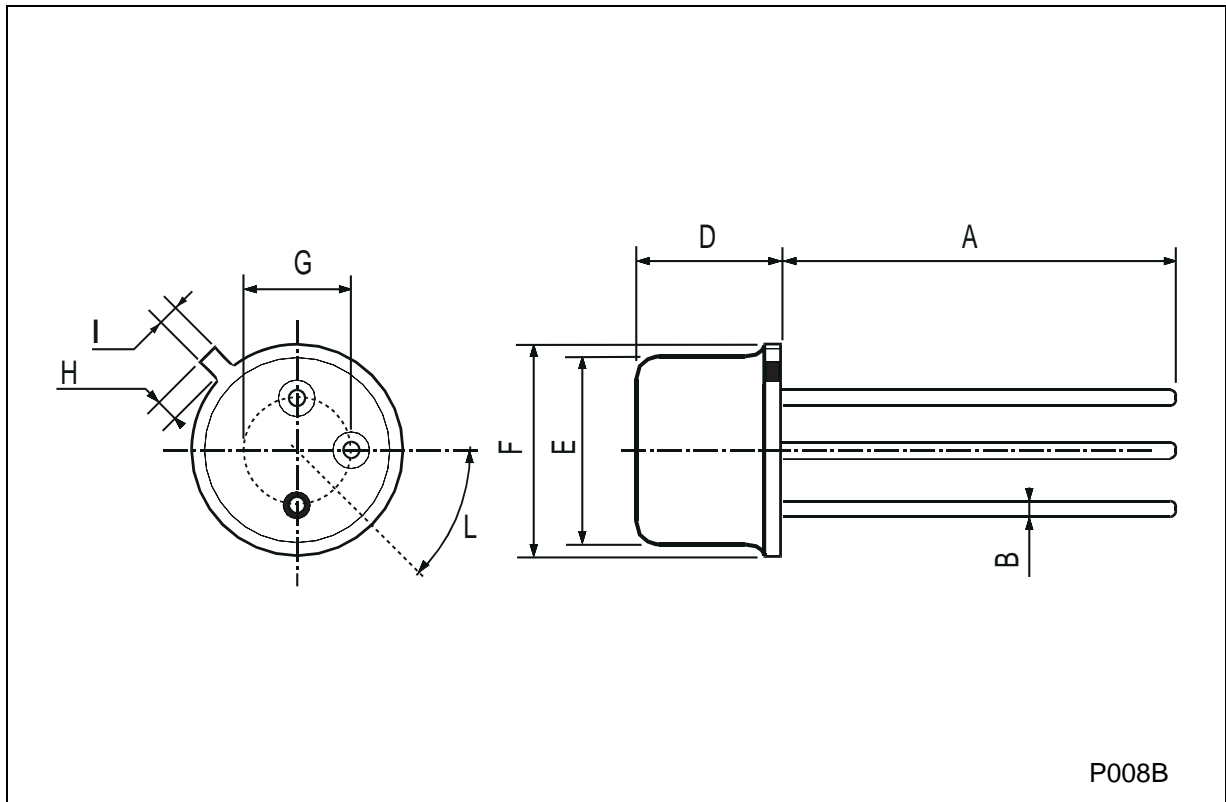
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		12.7			0.500	
B			0.49			0.019
D			5.3			0.208
E			4.9			0.193
F			5.8			0.228
G	2.54			0.100		
H			1.2			0.047
I			1.16			0.045
L	45°			45°		



0016043

TO-39 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	12.7			0.500		
B			0.49			0.019
D			6.6			0.260
E			8.5			0.334
F			9.4			0.370
G	5.08			0.200		
H			1.2			0.047
I			0.9			0.035
L	45° (typ.)					



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a trademark of STMicroelectronics

© 2003 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>