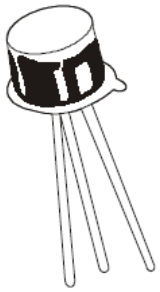
Small Signal General Purpose Transistors (NPN)



TO-18

RoHS Compliant

Features

- Switching and Linear Application
  DC and VHF Amplifier Application
- RoHS Compliant

Mechanical Data

Case:	TO-18, Metal can package
Terminals:	Solderable per MIL-STD-202, Method 208
Weight:	0.35 grams

Maximum Ratings *(T Ambient=25ºC unless noted otherwise)*

Symbol	Description	2N2221A	2N2222A	Unit
	Marking Code	2N2221A	2N2222A	
V_{CEO}	Collector-Emitter Voltage	40		V
V_{CBO}	Collector-Base Voltage	75		V
V_{EBO}	Emitter-Base Voltage	6.0		V
I_C	Collector Current Continuous	800		mA
P_D	Power Dissipation at T_A=25°C	500		mW
	Derate above 25°C	2.28		mW/° C
P_D	Power Dissipation at T_C=25°C	1.2		W
	Derate above 25°C	6.85		mW/° C
T_J ,T_{STG}	Operation and Storage Junction Temperature Range	-65 to +200		° C

Electrical Characteristics *(T Ambient=25ºC unless noted otherwise)*

Symbol	Description	2N2221A		2N2222A		Unit	Conditions
		Min.	Max.	Min.	Max.		
V_{CEO}	Collector-Emitter Voltage	40	-	40	-	V	I_C=10mA, I_B=0
V_{CBO}	Collector-Base Voltage	75	-	75	-	V	I_C=10µA, I_E=0
V_{EBO}	Emitter-Base Voltage	6.0	-	6.0	-	V	I_E=10µA, I_C=0
$V_{CE(sat)}$ *	Collector Emitter Saturation Voltage	-	0.3	-	0.3	V	I_C=150mA, I_B=15mA
		-	1.0	-	1.0		I_C=500mA, I_B=50mA
$V_{BE(sat)}$ *	Base Emitter Saturation Voltage	-	0.6 -1.2	-	0.6 -1.2	V	I_C=150mA, I_B=15mA
		-	2.0	-	2.0		I_C=500mA, I_B=50mA
I_{CBO}	Collector Cut–Off Current	-	10	-	10	nA	V_{CB}=60V, I_E=0
		-	10	-	10	µA	T_A=150°C V_{CB}=60V, I_E=0
I_{CEX}	Collector-Cut-off Current	-	10	-	10	nA	V_{CE}=60V, V_{EB}=3V
I_{EBO}	Emitter Cut–Off Current	-	10	-	10	nA	V_{EB}=3V, I_C=0
I_{BL}	Base Cut–Off Current	-	20	-	20	nA	V_{CE}=60V, V_{EB}=3V
h_{FE}	D.C. Current Gain	20	-	35	-		V_{CE}=10V, I_C=0.1mA
		25	-	50	-		V_{CE}=10V, I_C=1mA
		35	-	75	-		V_{CE}=10V, I_C=10mA
		15	-	35	-		T_A=55°C V_{CE}=10V, I_C=10mA
		40	120	100	300		V_{CE}=10V, I_C=150mA
		20	-	50	-		V_{CE}=1V, I_C=150mA
		25	-	40	-		V_{CE}=10V, I_C=500mA
h_{fe}	Small Signal Current Gain	30	150	50	300		V_{CE}=10V, I_C=1mA f=1KHz,
		50	300	75	375		V_{CE}=10V, I_C=10mA f=1KHz,
h_{ie}	Input Impedance	1.0	3.5	2.0	8.0	kΩ	V_{CE}=10V, I_C=1mA f=1KHz,
		0.2	1.0	0.25	1.25		V_{CE}=10V, I_C=10mA f=1KHz,
h_{re}	Voltage Feedback Ratio	-	5.0	-	8.0	$x10^{-4}$	V_{CE}=10V, I_C=1mA f=1KHz,
		-	2.5	-	4.0		V_{CE}=10V, I_C=10mA f=1KHz,

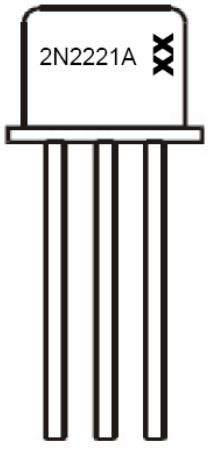
2N2221A/2N2222A

Symbol	Description	2N2221A		2N2222A		Unit	Conditions
		Min.	Max.	Min.	Max.		
h_{oe}	Output Admittance	3.0	15	5.0	35	μΩ	V_{CE}=10V, I_C=1mA f=1KHz,
		10	100	25	200		V_{CE}=10V, I_C=10mA f=1KHz,
rb'Cc	Collector-Base Time Constant	-	150	-	150	pS	V_{CB}=20V, I_E=20mA f=31.8MHz,
$R_{e(hie)}$	Real Part Common-Emitter High Frequency Input Impedance	-	60	-	60	Ω	V_{CE}=20V, I_C=20mA f=300MHz
NF	Noise Figure	-	-	-	4.0	dB	V_{CE}=10V, I_C=100μA, R_S=1KΩ, f=1KHz
f_T	Transistors Frequency	250	-	300	-	MHz	V_{CE}=20V, I_C=20mA, f=100MHz
C_{ob}	Output Capacitance	-	8.0	-	8.0	pF	V_{CB}=10V, I_E=0 f=100KHz,
C_{ib}	Input Capacitance	-	25	-	25	pF	V_{EB}=0.5V, I_C=0 f=100KHz,
t_d	Delay Time	-	10	-	10	nS	V_{CC}=30V, V_{BE}=0.5V I_C=150mA, I_{B1}=15mA
t_r	Rise Time	-	25	-	25	nS	
t_s	Storage Time	-	225	-	225	nS	V_{CC}=30V, I_C=150mA I_{B1}=I_{B2}=15mA
t_f	Fall Time	-	60	-	60	nS	

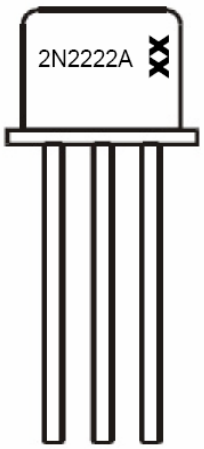
*Pulse Condition: Pulse Width=300μs, Duty Cycle=2%

Marking Information:

2N2221A



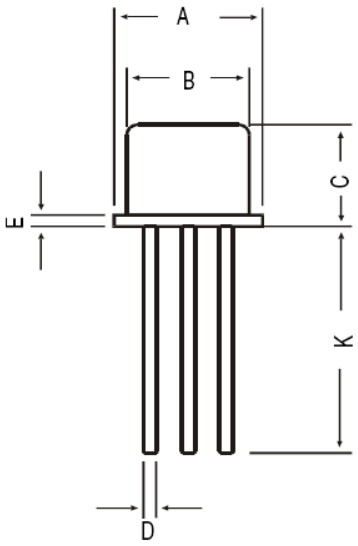
2N2222A

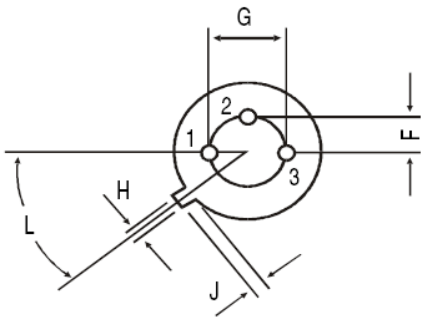


XX = Date Code

Dimensions in mm

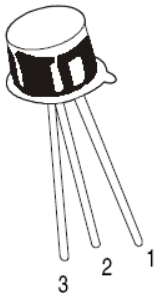
TO-18





All diminsions in mm.

DIM	MIN	MAX
A	5.24	5.84
B	4.52	4.97
C	4.31	5.33
D	0.40	0.53
E	—	0.76
F	—	1.27
G	—	2.97
H	0.91	1.17
J	0.71	1.21
K	12.70	—
L	45 DEG	



PIN CONFIGURATION
1. EMITTER
2. BASE
3. COLLECTOR

Packing Information:

Standard Pack	
Details	Net Weight/Qty.
1k/polybag	350gm/1k pcs

Carton Information:

Inner Carton Box	
Size	Qty.
3’ x 7.5’ x 7.5’	5k pcs

Outer Carton Box		
Size	Qty.	Gross Weight
17’ x 15’ x 13.5’	80k pcs	34kgs

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