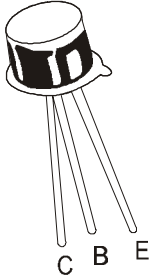


**NPN SILICON PLANAR SWITCHING TRANSISTORS**

**2N2221 2N2222**



**TO-18  
Metal Can Package**

**General Purpose Transistor**

**ABSOLUTE MAXIMUM RATINGS**

DESCRIPTION	SYMBOL	VALUE	UNIT
Collector Emitter Voltage	$V_{CEO}$	30	V
Collector Base Voltage	$V_{CBO}$	60	V
Emitter Base Voltage	$V_{EBO}$	5	V
Collector Current Continuous	$I_C$	800	mA
Power Dissipation @ $T_a=25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	500 2.85	mW mW/°C
Power Dissipation @ $T_c=25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	1.2 6.85	W mW/°C
Operating And Storage Junction Temperature Range	$T_j, T_{stg}$	- 65 to +200	°C

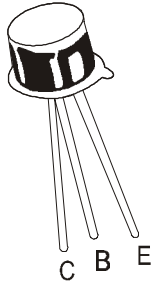
**ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$  unless specified otherwise )**

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Voltage	$*V_{CEO}$	$I_C=10\text{mA}, I_B=0$	30			V
Collector Base Voltage	$V_{CBO}$	$I_C=10\mu\text{A}, I_E=0$	60			V
Emitter Base Voltage	$V_{EBO}$	$I_E=10\mu\text{A}, I_C=0$	5			V
Collector Cut Off Current	$I_{CBO}$	$V_{CB}=50\text{V}, I_E=0$			10	nA
		$V_{CB}=50\text{V}, I_E=0,$ $T_a=150^\circ\text{C}$			10	$\mu\text{A}$
Collector Cut Off Current	$I_{EBO}$	$V_{EB}=3\text{V}, I_C=0$			10	nA

			<b>2N2221</b>	<b>2N2222</b>	
DC Current Gain	$h_{FE}$	$*I_C=0.1\text{mA}, V_{CE}=10\text{V}$	>20	>35	
		$I_C=1\text{mA}, V_{CE}=10\text{V}$	>25	>50	
		$*I_C=10\text{mA}, V_{CE}=10\text{V}$	>35	>75	
		$*I_C=150\text{mA}, V_{CE}=10\text{V}$	40 - 120	100 - 300	
		$*I_C=150\text{mA}, V_{CE}=1\text{V}$	>20	>50	
		$*I_C=500\text{mA}, V_{CE}=10\text{V}$	>20	>30	

**\*Pulse Test: Pulse Width  $\leq 300\text{ms}$ , Duty Cycle  $\leq 2\%$**

2N2221\_2222Rev\_1 310303E



TO-18  
Metal Can Package

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

SMALL SIGNAL CHARACTERISTICS

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Collector Emitter Saturation Voltage	$*V_{CE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$			0.4	V
		$I_C=500\text{mA}, I_B=50\text{mA}$			1.6	V
Base Emitter Saturation Voltage	$*V_{BE(sat)}$	$I_C=150\text{mA}, I_B=15\text{mA}$			1.3	V
		$I_C=500\text{mA}, I_B=50\text{mA}$			2.6	V
Transition Frequency	$**f_T$	$I_C=20\text{mA}, V_{CE}=20\text{V},$ $f=100\text{MHz}$	250			MHz
Output Capacitance	$C_{obo}$	$V_{CB}=10\text{V}, I_E=0,$ $f=100\text{KHz}$			8.0	pF
Input Capacitance	$C_{ibo}$	$V_{BE}=0.5\text{V}, I_C=0,$ $f=100\text{KHz}$			30	pF

SWITCHING TIME

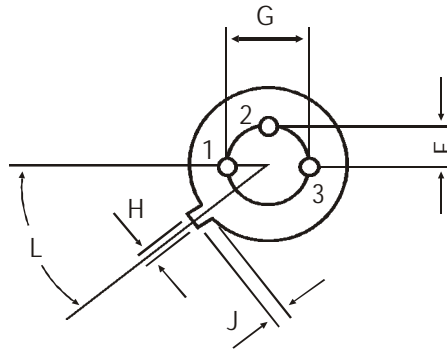
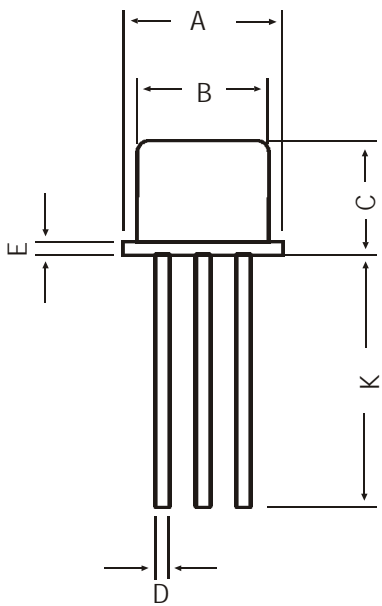
DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNIT
Delay Time	$t_d$	$I_C=150\text{mA}, I_{B1}=15\text{mA},$ $V_{CC}=30\text{V}, V_{BE(off)}=0.5\text{V}$			10	ns
Rise Time	$t_r$				25	ns
Storage Time	$t_s$	$I_C=150\text{mA}, I_{B1}=$ $I_{B2}=15\text{mA}, V_{CC}=30\text{V}$			225	ns
Fall Time	$t_f$				60	ns

\*Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

\*\*  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity

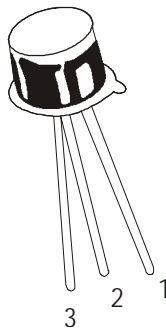
**TO-18  
Metal Can Package**

**TO-18 Metal Can Package**



All dimensions 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 Detail**

PACKAGE	STANDARD PACK		INNER CARTON BOX		OUTER CARTON BOX		
	Details	Net Weight/Qty	Size	Qty	Size	Qty	Gr Wt
TO-18	1K/polybag	350 gm/1K pcs	3" x 7.5" x 7.5"	5K	17" x 15" x 13.5"	80K	34 kgs

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