

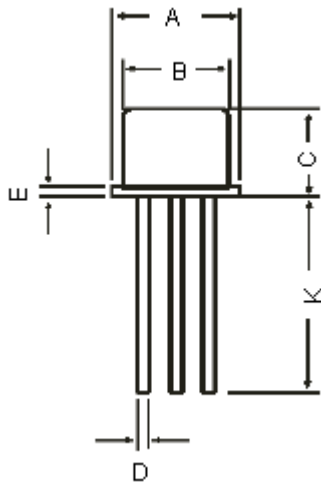
High Speed Switching Transistor



Features:

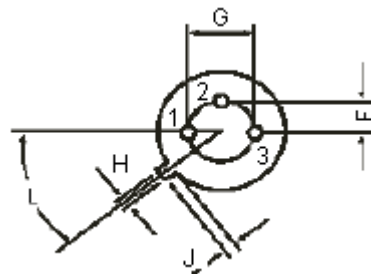
- NPN Silicon Planar Switching Transistor
- Fast switching devices exhibiting short turn-off and low saturation voltage characteristics
- Switching and Linear application DC and VHF Amplifier applications

TO-18 Metal Can Package



Dimensions	Minimum	Maximum
A	5.24	5.84
B	4.52	4.97
C	4.31	5.33
D	0.4	0.53
E	-	0.76
F	-	1.27
G	-	2.97
H	0.91	1.17
J	0.71	1.21
K	12.7	-
L	45°	

Dimensions : Millimetres



Pin Configuration

1. Emitter
2. Base
3. Collector

Absolute Maximum Ratings

Parameter	Symbol	Rating	Unit
Collector - Emitter Voltage	V_{CEO}	40	V
Collector - Base Voltage	V_{CBO}	75	
Emitter - Base Voltage	V_{EBO}	6	
Collector Current Continuous	I_c	800	mA
Power Dissipation at $T_a = 25^\circ\text{C}$ Derate above 25°C	P_D	500 2.28	mW mW / °C
Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	1.2 6.85	W mW / °C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	°C

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

Parameter	Symbol	Test Condition	Value		
			Minimum	Maximum	Unit
Collector - Emitter Voltage	V_{CEO}	$I_C = 10 \text{ mA}, I_B = 0$	40	-	V
Collector - Base Voltage	V_{CBO}	$I_C = 10 \mu\text{A}, I_E = 0$	75	-	
Emitter - Base Voltage	V_{EBO}	$I_E = 10 \mu\text{A}, I_C = 0$	6	-	
Collector - Cut off Current	I_{CBO}	$V_{CB} = 60 \text{ V}, I_E = 0$	-	10	nA
	I_{CEX}	$T_a = 150^\circ\text{C}$ $V_{CB} = 60 \text{ V}, I_E = 0$ $V_{CE} = 60 \text{ V}, V_{EB} = 3 \text{ V}$	-	10 10	μA nA
Emitter - Cut off Current	I_{EBO}	$V_{EB} = 3 \text{ V}, I_C = 0$	-	10	nA
Base - Cut off Current	I_{BL}	$V_{CE} = 60 \text{ V}, V_{EB} = 3 \text{ V}$	-	20	
Collector Emit >35 ter Saturation Voltage	$*V_{CE}(\text{Sat})$	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$	-	0.3	V
		$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$	-	1	
Base Emitter Saturation Voltage	$*V_{BE}(\text{Sat})$	$I_C = 150 \text{ mA}, I_B = 15 \text{ mA}$	-	0.6 to 1.2	
		$I_C = 500 \text{ mA}, I_B = 50 \text{ mA}$	-	2	

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

Parameter	Symbol	Test Condition	Rating	Unit
DC Current Gain	h_{FE}	$I_C = 0.1 \text{ mA}, V_{CE} = 10 \text{ V}$	>35	-
		$I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$	>50	
		$I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	>75	
		$T_a = 55^\circ\text{C}$		
		$I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	>35	
		$I_C = 150 \text{ mA}, V_{CE} = 10 \text{ V}$	100 to 300	
		$I_C = 150 \text{ mA}, V_{CE} = 1 \text{ V}$	>50	
		$I_C = 500 \text{ mA}, V_{CE} = 10 \text{ V}$	>40	
Dynamic Characteristics				
		ALL F = 1 kHz		
Small Signal Current Gain	h_{fe}	$I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	50 to 300 75 to 375	-
Input Impedance	h_{ie}	$I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	2 to 8 0.25 to 1.25	k Ω
Voltage Feedback Ratio	h_{re}	$I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	<8 <4	x10 ⁻⁴
Output Admittance	h_{oe}	$I_C = 1 \text{ mA}, V_{CE} = 10 \text{ V}$ $I_C = 10 \text{ mA}, V_{CE} = 10 \text{ V}$	5 to 35 25 to 200	umhos
Collector Base Time Constant	$rb'Cc$	$I_E = 20 \text{ mA}, V_{CB} = 20 \text{ V}$ $f = 31.8 \text{ MHz}$	<150	ps

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Parameter	Symbol	Test Condition	Rating	Unit
Dynamic Characteristics				
Real Part Common - Emitter High Frequency	$R_{e(hie)}$	$I_C = 20 \text{ mA}, V_{CE} = 20 \text{ V}$	<60	Ω
Input Impedance	-	$f = 300 \text{ MHz}$	-	-
Noise Figure	N_F	$I_C = 100 \mu\text{A}, V_{CE} = 10 \text{ V}$ $R_s = 1 \text{ k}\Omega, f = 1 \text{ kHz}$	<4	dB
Dynamic Characteristics				
Transistors Frequency	f_t	$I_C = 20 \text{ mA}, V_{CE} = 20 \text{ V}$ $f = 100 \text{ MHz}$	>300	MHz
Output Capacitance	C_{ob}	$V_{CB} = 10 \text{ V}, I_E = 0$ $f = 100 \text{ kHz}$	<8	pF
Input Capacitance	C_{ib}	$V_{EB} = 0.5 \text{ V}, I_C = 0$ $f = 100 \text{ kHz}$	<25	
Switching Time				
Delay Time	t_d	$I_C = 150 \text{ mA}, I_{B1} = 15 \text{ mA}$	<10	ns
Rise Time	t_r	$V_{CC} = 30\text{V}, V_{BE} = 0.5 \text{ V}$	<25	
Storage Time	t_s	$I_C = 150 \text{ mA}, I_{B1} =$	<225	
Fall Time	t_f	$I_{B2} = 15 \text{ mA}, V_{CC} = 30 \text{ V}$	<60	

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

Specification Table

V_{CEO} Maximum (V)	I_C Maximum (A)	$V_{CE(sat)}$ Maximum (V) at $I_C = 150 \text{ mA}$	t_{off} Maximum (ns) at $I_C = 150 \text{ mA}$	h_{FE} Minimum at $I_C = 150 \text{ mA}$	P_{tot} at 25°C (mW)	Package and Pin Out	Part Number
40	0.8	0.3	60	100	500	TO-18	2N2222A

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