multicomp

DCP #	REV	DESCRIPTION	DRAWN	DATE	CHECKD	DATE	APPRVD	DATE
1262	A	RELEASED	HO	12/2/02	JWM	12/2/02	DJC	12/2/02
	B	UPDATED TO ROHS COMPLIANCE	EO	02/03/06	HO	2/6/06	HO	2/6/06

REVISIONS

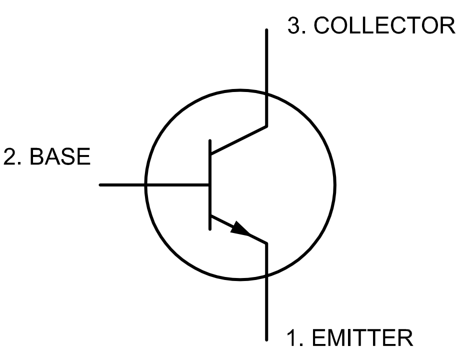
DOC. NO. SPC–F004 * Effective: 7/8/02 * DCP No: 1398

Description:
The 2N2222A is a widely used "Industry Standard" silicon NPN transistor in a TO–18 type case designed for applications such as medium–speed switching and amplifiers from audio to VHF frequencies.

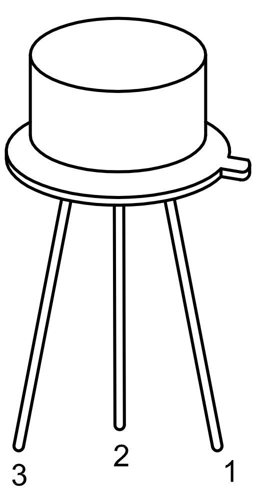
Features:
- Low Collector Saturation Voltage: 1V (Max)
- High Current Gain–Bandwidth Product: f_T = 300MHz (Min) @ I_C = 20mA

RoHS Compliant

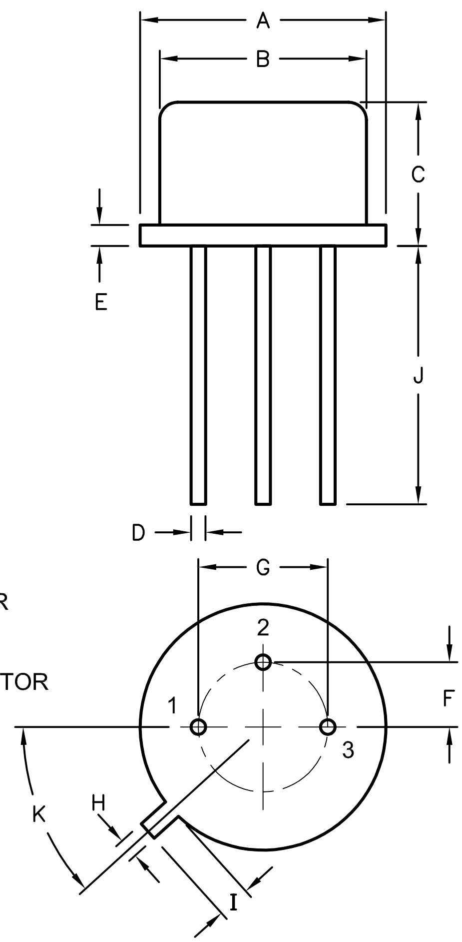
Absolute Maximum Ratings:
- Collector–Base Voltage, V_{CBO} = 75V
- Collector–Emitter Voltage, V_{CEO} = 40V
- Emitter–Base Voltage, V_{EBO} = 6V
- Continuous Collector Current, I_C = 800mA
- Total Device Dissipation (T_A = +25°C), P_D = 400mA
  Derate above 25°C = >2.28mW/°C
- Total Device Dissipation (T_C = +25°C), P_D = 1.2W
  Derate above 25°C = 6.85mW/°C
- Operating Junction Temperature Range, T_J = –65°C ~ +200°C
- Storage Temperature Range, T_{stg} = –65°C ~ +200°C



NPN



1. EMITTER
2. BASE
3. COLLECTOR



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
I	0.71	1.21
J	12.70	-
K	45°	

SPC–F004.DWG

TOLERANCES:
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE FOR REFERENCE PURPOSES ONLY.

	DATE:
DRAWN BY: HISHAM ODISH	12/2/02
CHECKED BY: JEFF MCVICKER	12/2/02
APPROVED BY: DANIEL CAREY	12/2/02

DRAWING TITLE:
Transistor, Silicon, TO–18, NPN, Planar Switching

SIZE	DWG. NO.	ELECTRONIC FILE	REV
A	2N2222A	35C0690.DWG	B

SCALE: NTS | U.O.M.: Millimeters | SHEET: 1 OF 2

Electrical Characteristics: (T_A = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF Characteristics						
Collector–Emitter Breakdown Voltage	$V_{(BR)CEO}$	I_C = 10mA, I_B = 0	40	–	–	V
Collector–Base Breakdown Voltage	$V_{(BR)CBO}$	I_C = 10μA, I_E = 0	75	–	–	V
Emitter–Base Breakdown Voltage	$V_{(BR)EBO}$	I_C = 10μA, I_C = 0	6	–	–	V
Collector Cut–Off Current	I_{CEX}	V_{CE} = 60V, $V_{EB(off)}$ = 3V	–	–	10	nA
	I_{CBO}	V_{CB} = 60V, I_E = 0	–	–	0.01	μA
		V_{CB} = 60V, I_E = 0, T_A = +150°C	–	–	10	μA
Emitter Cut–Off Current	I_{EBO}	V_{EB} = 3V, I_C = 0	–	–	10	nA
Base Cut–Off Current	I_{BL}	V_{CE} = 60V, $V_{EB(off)}$ = 3V	–	–	20	nA
ON Characteristics						
DC Current Gain	h_{FE}	V_{CE} = 10V, I_C = 0.1mA	35	–	–	–
		V_{CE} = 10V, I_C = 1mA	50	–	–	–
		V_{CE} = 10V, I_C = 10mA	75	–	–	–
		V_{CE} = 10V, I_C = 10mA, T_A = –55°C	35	–	–	–
		V_{CE} = 10V, I_C = 150mA	100	–	300	–
		V_{CE} = 10V, I_C = 500mA	40	–	–	–
		V_{CE} = 1V, I_C = 150mA	50	–	–	–
Collector–Emitter Saturation Voltage (Note 1)	$V_{CE(sat)}$	I_C = 150mA, I_B = 15mA	–	–	0.3	V
		I_C = 500mA, I_B = 50mA	–	–	1	V
Base–Emitter Saturation Voltage (Note 1)	$V_{BE(sat)}$	I_C = 150mA, I_B = 15mA	0.6	–	1.2	V
		I_C = 500mA, I_B = 50mA	–	–	2	V
Small-Signal Characteristics						
Current Gain–Bandwidth Product (Note 2)	f_T	V_{CE} = 20V, I_C = 20mA, f = 100MHz,	300	–	–	MHz
Output Capacitance	C_{obo}	V_{CB} = 10V, I_E = 0, f = 1MHz	–	–	8	pF
Input Capacitance	C_{ibo}	V_{BE} = 500mV, I_C = 0, f = 100kHz	–	–	25	pF
Input Impedance	h_{ie}	V_{CE} = 10V, I_C = 1mA, f = 1kHz	2	–	8	kOhm
		V_{CE} = 10V, I_C = 10mA, f = 1kHz	0.25	–	1.25	kOhm
Voltage Feedback Ratio	h_{re}	V_{CE} = 10V, I_C = 1mA, f = 1kHz	–	–	8	$x\ 10^{-4}$
		V_{CE} = 10V, I_C = 10mA, f = 1kHz	–	–	4	$x\ 10^{-4}$
Small–Signal Current Gain	h_{fe}	V_{CE} = 10V, I_C = 1mA, f = 1kHz	50	–	300	–
		V_{CE} = 10V, I_C = 10mA, f = 1kHz	75	–	375	–
Output Admittance	h_{oe}	V_{CE} = 10V, I_C = 1mA, f = 1kHz	5	–	35	μmhos
		V_{CE} = 10V, I_C = 10mA, f = 1kHz	25	–	200	μmhos
Collector–Base Time Constant	$rb'C_c$	V_{CB} = 20V, I_E = 20mA, f = 31.8MHz	–	–	150	ps
Noise Figure	N_F	V_{CE} = 10V, I_C = 100μA, f = 1kHz, R_S = 1KOhm	–	–	4	dB
Real Part of Common–Emitter High Frequency Input Impedance	$Re(h_{ie})$	V_{CE} = 20V, I_C = 20mA, f = 300MHz	–	–	60	Ohm
Switching Characteristics						
Delay Time	t_d	V_{CC} = 30V, I_C = 150mA, $V_{BE(off)}$ = 0.5V, I_{B1} = 15mA	–	–	10	ns
Rise Time	t_r		–	–	25	ns
Storage Time	t_s	V_{CC} = 30V, I_C = 150mA, I_{B1} = I_{B2} = 15mA	–	–	225	ns
Fall Time	t_f		–	–	60	ns

Note 1. Pulse Test: Pulse Width ≦ 300μs, Duty Cycle ≦ 2%.
Note 2. f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity.