PN2222A

SMALL SIGNAL NPN TRANSISTOR

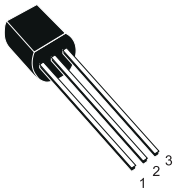
PRELIMINARY DATA

Ordering Code	Marking	Package / Shipment
PN2222A	PN2222A	TO-92 / Bulk
PN2222A-AP	PN2222A	TO-92 / Ammopack

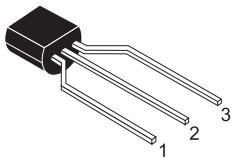
- SILICON EPITAXIAL PLANAR NPN TRANSISTOR
- TO-92 PACKAGE SUITABLE FOR THROUGH-HOLE PCB ASSEMBLY
- THE PNP COMPLEMENTARY TYPE IS PN2907A

APPLICATIONS

- WELL SUITABLE FOR TV AND HOME APPLIANCE EQUIPMENT
- SMALL LOAD SWITCH TRANSISTOR WITH HIGH GAIN AND LOW SATURATION VOLTAGE

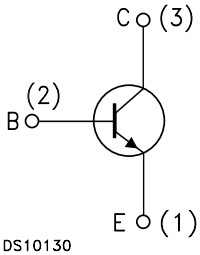


TO-92
Bulk



TO-92
Ammopack

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CBO}	Collector-Emitter 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} = 25 °C	500	mW
T_{stg}	Storage Temperature	-65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

THERMAL DATA

$R_{thj\text{-}amb}$ •	Thermal Resistance Junction-Ambient Max	250	°C/W
$R_{thj\text{-}case}$ •	Thermal Resistance Junction-Case Max	83.3	°C/W

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{CEX}	Collector Cut-off Current (V_{BE} = -3 V)	V_{CE} = 60 V			10	nA
I_{BEX}	Base Cut-off Current (V_{BE} = -3 V)	V_{CE} = 60 V			20	nA
I_{CBO}	Collector Cut-off Current (I_E = 0)	V_{CB} = 75 V V_{CB} = 75 V T_j = 150 °C			10 10	nA µA
I_{EBO}	Emitter Cut-off Current (I_C = 0)	V_{EB} = 3 V			15	nA
$V_{(BR)CEO}$*	Collector-Emitter Breakdown Voltage (I_B = 0)	I_C = 10 mA	40			V
$V_{(BR)CBO}$	Collector-Base Breakdown Voltage (I_E = 0)	I_C = 10 µA	75			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
$V_{BE(sat)}$*	Collector-Base 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 = 150 mA V_{CE} = 1 V I_C = 500 mA V_{CE} = 10 V	35 50 75 100 50 40		 300 	
f_T	Transition Frequency	I_C = 20 mA V_{CE} = 20V f = 100MHz		270		MHz
C_{CBO}	Collector-Base Capacitance	I_E = 0 V_{CB} = 10 V f = 1 MHz		4	8	pF
C_{EBO}	Emitter-Base Capacitance	I_C = 0 V_{EB} = 0.5 V f = 1MHz		20	25	pF
NF	Noise Figure	I_C = 0.1 mA V_{CE} = 10 V f = 1 KHz Δf = 200 Hz R_G = 1 KΩ		4		dB
h_{ie}*	Input Impedance	V_{CE} = 10 V I_C = 1 mA f = 1 KHz V_{CE} = 10 V I_C = 10 mA f = 1 KHz	2 0.25		8 1.25	KΩ KΩ
h_{re}*	Reverse Voltage Ratio	V_{CE} = 10 V I_C = 1 mA f = 1 KHz V_{CE} = 10 V I_C = 10 mA f = 1 KHz			8 4	10^{-4} 10^{-4}
h_{fe}*	Small Signal Current Gain	V_{CE} = 10 V I_C = 1 mA f = 1 KHz V_{CE} = 10 V I_C = 10 mA f = 1 KHz	50 75		300 375	
h_{oe}*	Output Admittance	V_{CE} = 10 V I_C = 1 mA f = 1 KHz V_{CE} = 10 V I_C = 10 mA f = 1 KHz	5 25		35 200	µS µS

* Pulsed: Pulse duration = 300 µs, duty cycle ≤ 2 %

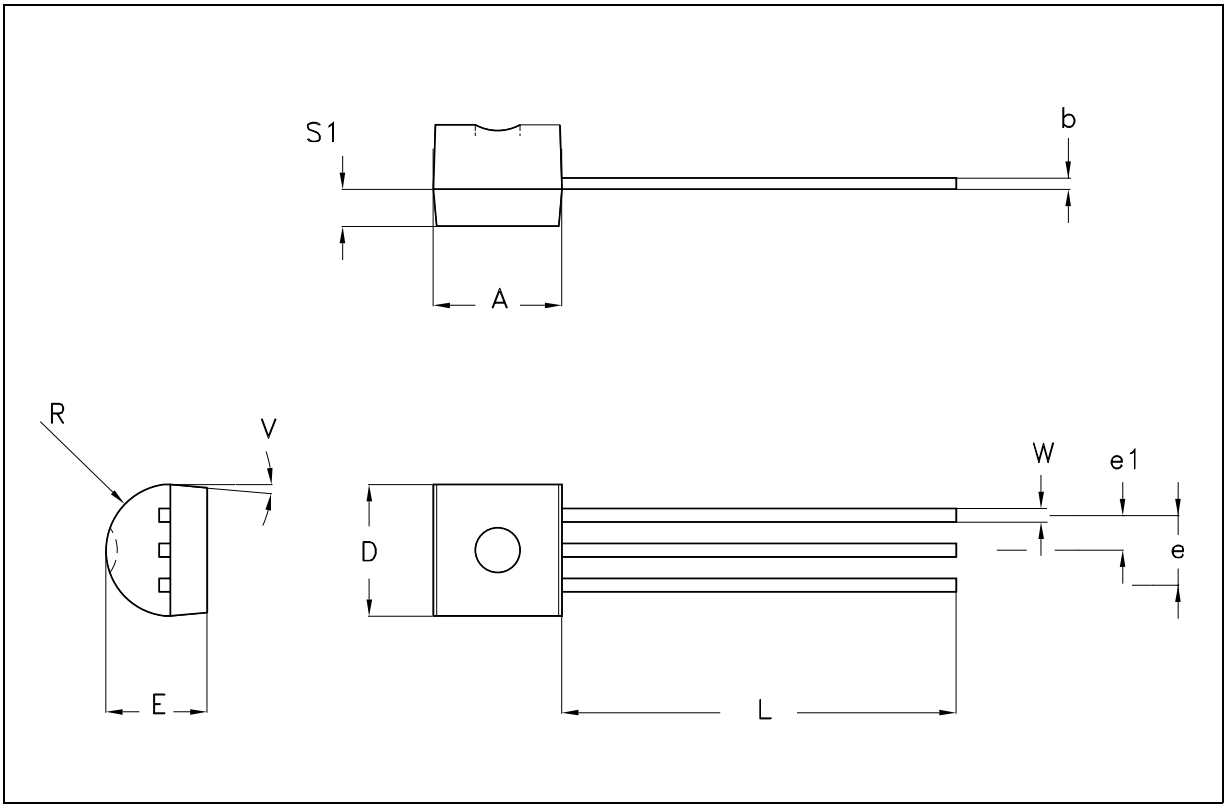
ELECTRICAL CHARACTERISTICS (Continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_d	Delay Time	I_C = 150 mA I_B = 15 mA V_{CC} = 30 V		5	10	ns
t_r	Rise Time			12	25	ns
t_s	Storage Time	I_C = 150 mA I_{B1} = - I_{B2} = 15 mA V_{CC} = 30 V		185	225	ns
t_f	Fall Time			24	60	ns

∗ Pulsed: Pulse duration = 300 μs, duty cycle ≤ 2 %

TO-92 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.32		4.95	0.170		0.195
b	0.36		0.51	0.014		0.020
D	4.45		4.95	0.175		0.194
E	3.30		3.94	0.130		0.155
e	2.41		2.67	0.095		0.105
e1	1.14		1.40	0.045		0.055
L	12.70		15.49	0.500		0.609
R	2.16		2.41	0.085		0.094
S1	1.14		1.52	0.045		0.059
W	0.41		0.56	0.016		0.022
V	4 degree		6 degree	4 degree		6 degree



TO-92 AMMOPACK SHIPMENT (Suffix"-AP") MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A1			4.80			0.189
T			3.80			0.150
T1			1.60			0.063
T2			2.30			0.091
d			0.48			0.019
P0	12.50	12.70	12.90	0.492	0.500	0.508
P2	5.65	6.35	7.05	0.222	0.250	0.278
F1,F2	2.44	2.54	2.94	0.096	0.100	0.116
delta H	-2.00		2.00	-0.079		0.079
W	17.50	18.00	19.00	0.689	0.709	0.748
W0	5.70	6.00	6.30	0.224	0.236	0.248
W1	8.50	9.00	9.25	0.335	0.354	0.364
W2			0.50			0.020
H	18.50		20.50	0.728		0.807
H0	15.50	16.00	16.50	0.610	0.630	0.650
H1			25.00			0.984
D0	3.80	4.00	4.20	0.150	0.157	0.165
t			0.90			0.035
L			11.00			0.433
l1	3.00			0.118		
delta P	-1.00		1.00	-0.039		0.039