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PNP

GERMANIUM TYPES

2N1924
2N1925
2N1926

2N1924, 2N1925, and 2N1926 are PNP germanium alloy transistors for high voltage general purpose low frequency applications.

Excellent reliability in use is assured by inclusion of a 100% hermeticity test* and military environmental testing.

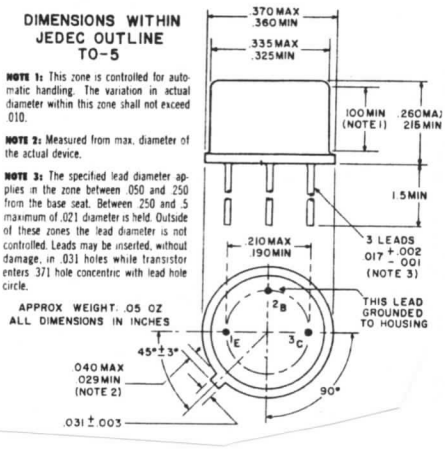
Reliable circuit design is assured by a unique Reliability-Index, and high temperature I_{CBO} and low temperature forward current gain 1000 hour life end points.

The high value of Reliability-Index is achieved by exacting control of parts and processes, and getter encapsulation, to prevent junction contamination.

absolute maximum ratings (25°C)

Voltages		
Collector to Base	V_{CBO}	— 60 volts
Collector to Emitter ($R_{BE} \leqq 10K$)	V_{CER}	— 40 volts
Collector to Emitter ($R_{BE} \leqq 10K$) ($V_{BE} = +1.5v$)	V_{CEX}	— 50 volts
Emitter to Base	V_{EBO}	— 25 volts
Collector Current (RMS)	I_{CM}	— 500 ma
Temperatures		
Storage	T_{STG}	— 65 to + 100°C
Operating	T_J	— 65 to + 85°C
Lead Temperature, 1/16" ±1/32" from case for 10 seconds maximum		260°C
Total Transistor Dissipation	P_T	225 mw

(Derate 3.7 mw/°C increase in ambient temperature above 25°C)



ELECTRICAL CHARACTERISTICS (T_A = 25°C)

TEST	CONDITIONS	SYMBOL	UNITS	2N1924 MIN.	2N1924 TYP.	2N1924 MAX.	2N1925 MIN.	2N1925 TYP.	2N1925 MAX.	2N1926 MIN.	2N1926 TYP.	2N1926 MAX.	AQL	INSP. LEVEL
DC Characteristics														
Subgroup I														
Collector to Base Voltage	I_C = −200 μa	V_{CBO}	volts	−60			−60			−60				
Collector to Emitter Voltage	R_{BE} = 10K ohms, I_C = −600 μa	V_{CER}	volts	−40			−40			−40				
Collector to Emitter Voltage	V_{BE} = +1.5v, R_{BE} = 10K ohms, I_C = −50 μa	V_{CEX}	volts	−50			−50			−50			1%	II
Reach-through Voltage		V_{RT}	volts	−50			−50			−50				
Emitter Cutoff Current	V_{EB} = −25v	I_{EBO}	μa		−3	−10		−3	−10		−3	−10		
Subgroup II														
Collector Cutoff Current	V_{CB} = −45v	I_{CBO}	μa		−4	−10		−4	−10		−4	−10		
Forward Current Transfer Ratio	I_C = −20ma, V_{CE} = −1v (Note 1)	h_{FE}		34(38)	50	(59)65	53(59)	70	(80)90	72(80)	95	(110)121	0.65%	II
Forward Current Transfer Ratio	I_C = −100 ma, V_{CE} = −1v	h_{FE}		30	45		47	60		65	80			
Subgroup III														
Base Input Voltage, Common Emitter	I_C = −20 ma, V_{CE} = −1v	V_{BE}	volts	−.200	−.235	−.300	−.190	−.230	−.290	−.180	−.225	−.280		
Collector Saturation Voltage	I_C = −20 ma, I_B as shown	V_{CE} (SAT)	volts	−.050	−.080	−.110	−.055	−.085	−.110	−.060	−.090	−.110	1%	L6
		@ I_B	ma		−1.33			−1.00			−0.67			
Small Signal Characteristics														
Subgroup I														
AC Forward Current Transfer Ratio	I_E = 1 ma, V_{CE} = −5v, f = 1kc	h_{fe}		30	44	64	44	64	88	60	80	120		
Input Impedance	I_E = 1 ma, V_{CE} = −5v, f = 1kc	h_{ie}	ohms	700	1400	2200	1200	2000	3200	1500	2500	4200		
Output Admittance	I_E = 1 ma, V_{CE} = −5v, f = 1kc	h_{oe}	μmhos	15	30	60	20	35	65	25	40	70	2.5%	L6
Reverse Voltage Transfer Ratio	I_E = 1 ma, V_{CE} = −5v, f = 1kc	h_{re}	x10⁻⁴	2.0	4.5	8.0	3.0	6.0	9.0	4.0	7.0	10.0		
Subgroup II														
Cutoff Frequency	I_E = 1ma, V_{CB} = −5v	f_{hfb}	mc	1.0	3.0		1.3	3.5		1.5	4.0			
Output Capacity	I_E = 1 ma, V_{CB} = −5v, f = 1mc	C_{ob}	pf		18	30		18	30		18	30		

Note 1: A minimum of 95% of the h_{FE} distribution is normally contained between values in parenthesis.

RELIABILITY SPECIFICATIONS

TEST	CONDITIONS	% AQL	SAMPLING LEVEL
Subgroup I	MIL-S-19500		
Physical Inspection		2.5	L5
Appearance		1.0	L8
Lead Solderability		1.0	L8
Subgroup II	MIL-S-19500		
Temperature Cycling	−65° to 100°C, 10 cycles	4.0	L5
Thermal Shock	0° to 85°C, 5 cycles		
Subgroup III	MIL-S-19500		
Shock, operating	1000 G, 5 blows each orientation of approx. 0.8 msec.	4.0	L5
Constant Acceleration	10,000 G		
Vibration Fatigue	10G		
Vibration, Variable Frequency	20G		
Subgroup IV	MIL-S-19500		
Lead Fatigue		4.0	L5

END POINTS (Subgroup II and III)	CONDITIONS	Symbol	Units	Min.	Max.
Collector Cutoff Current	V_{CB} = −30V, T_A = 25°C	I_{CBO}	μa		−15
Forward Current Transfer Ratio	I_C = −20 ma, V_{CE} = −1V, T_A = 25°C				
2N1924		h_{FE}		30	71
2N1925		h_{FE}		48	100
2N1926		h_{FE}		65	133

TEST	CONDITIONS	MAXIMUM FAILURE RATE, λ (in percent per 1000 hours with 90% confidence)
Subgroup V	MIL-S-19500 Method B	
Storage Life (1000 hours)	100° + 10°C, −0°C	5
Subgroup VI	MIL-S-19500 Method B	
Intermittent Power Life (1000 hours)	225 mw, T_A = 25° ± 4°C V_{CB} = − 22.5v, I_E = − 10 ma On 50 ± 2 min, Off 10 ± 2 min	5 (25°C End Points) 10 (−55°C and + 70°C End Points)

END POINTS (Subgroup VI)	CONDITIONS	Symbol	Units	Min.	Typ.	Max.
Reliability-Index	Based on 25°C Forward Current Transfer Ratio, Subgroup VI	RI_1		3.33	12	
Collector Cutoff Current	V_{CB} = − 10v, T_A = + 70° ± 1°C	I_{CBO}	μa		−80	−150
Forward Current Transfer Ratio	I_C = −20 ma, V = −1v, T_A = −55° ± 2°C					
2N1924		h_{FE}		15	33	
2N1925		h_{FE}		24	46	
2N1926		h_{FE}		32	63	

END POINTS (Subgroup V and VI)	CONDITIONS	Symbol	Units	Min.	Typ.	Max.
Collector Cutoff Current	V_{CB} = −30v, T_A = 25°C	I_{CBO}	μa			−15
Forward Current Transfer Ratio	I_C = −20 ma, V_{CE} = −1v, T_A = 25°C					
2N1924		h_{FE}		30		71
2N1925		h_{FE}		48		100
2N1926		h_{FE}		65		133