



TECHNICAL DATA

PNP SWITCHING SILICON TRANSISTOR

Qualified per MIL-PRF-19500/290

Devices

2N2904
2N2904A
2N2904AL

2N2905
2N2905A
2N2905AL

Qualified Level

JAN
JANTX
JANTXV
JANS

MAXIMUM RATINGS

Ratings	Symbol	2N2904 2N2905	2N2904A, L 2N2905A, L	Unit
Collector-Emitter Voltage	V_{CEO}	40	60	Vdc
Collector-Base Voltage	V_{CBO}		60	Vdc
Emitter-Base Voltage	V_{EBO}		5.0	Vdc
Collector Current	I_C		600	mAdc
Total Power Dissipation @ $T_A = +25^{\circ}\text{C}$ ⁽¹⁾ @ $T_C = +25^{\circ}\text{C}$ ⁽²⁾	P_T		0.6 3.0	W W
Operating & Storage Junction Temp. Range	T_J, T_{stg}		-65 to +200	$^{\circ}\text{C}$

THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.29	$^{\circ}\text{C}/\text{mW}$

1) Derate linearly 3.43 W/ $^{\circ}\text{C}$ for $T_A > +25^{\circ}\text{C}$

2) Derate linearly 17.2 W/ $^{\circ}\text{C}$ for $T_C > +25^{\circ}\text{C}$



TO-39* (TO-205AD)
2N2904, 2N2904A
2N2905, 2N2905A



TO-5*
2N2904AL, 2N2905AL

*See appendix A for package outline

ELECTRICAL CHARACTERISTICS ($T_A = +25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
-----------------	--------	------	------	------

OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 10 \text{ mAdc}$	2N2904, 2N2905 2N2904A, L, 2N2905A, L	$V_{(BR)CEO}$	40 60	Vdc
Collector-Emitter Cutoff Voltage $V_{CE} = 40 \text{ Vdc}$ $V_{CE} = 60 \text{ Vdc}$	2N2904, 2N2905 2N2904A, L, 2N2905A, L	I_{CES}		1.0 1.0 μAdc
Collector-Base Cutoff Current $V_{CB} = 50 \text{ Vdc}$ $V_{CB} = 60 \text{ Vdc}$	2N2904, 2N2905 2N2904A, L, 2N2905A, L All Types	I_{CBO}		20 10 10 ηAdc μAdc
Emitter-Base Cutoff Current $V_{EB} = 3.5 \text{ Vdc}$ $V_{EB} = 5.0 \text{ Vdc}$		I_{EBO}		50 10 ηAdc μAdc



2N2904, 2N2904A, 2N2904AL, 2N2905, 2N2905A, 2N2905AL JAN SERIES

ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽³⁾				
Forward-Current Transfer Ratio I _C = 0.1 mAdc, V _{CE} = 10 Vdc	h _{FE}	20		
2N2904		35		
2N2905		40		
2N2904A, 2N2904AL		75		
2N2905A, 2N2905AL		25	175	
I _C = 1.0 mAdc, V _{CE} = 10 Vdc		50	450	
2N2904		40	175	
2N2905		100	450	
2N2904A, 2N2904AL		35		
2N2905A, 2N2905AL		75		
I _C = 10 mAdc, V _{CE} = 10 Vdc		40		
2N2904		100		
I _C = 150 mAdc, V _{CE} = 10 Vdc		40	120	
2N2904A, 2N2904AL		100	300	
2N2905, 2N2905A, L		20		
I _C = 500 mAdc, V _{CE} = 10 Vdc		30		
2N2904		40		
2N2905A, 2N2905AL		50		
Collector-Emitter Saturation Voltage I _C = 150 mAdc, I _B = 15 mAdc	V _{CE(sat)}		0.4	Vdc
I _C = 500 mAdc, I _B = 50 mAdc			1.6	
Base-Emitter Voltage I _C = 150 mAdc, I _B = 15 mAdc	V _{BE(sat)}		1.3	Vdc
I _C = 500 mAdc, I _B = 50 mAdc			2.6	

DYNAMIC CHARACTERISTICS

Small-Signal Cutoff Frequency I _C = 1.0 mAdc, V _{CE} = 10 Vdc, f = 1.0 kHz	h _{fe}	25		
2N2904		50		
2N2905		40		
2N2904A, 2N2905A		100		
2N2904AL, 2N2905AL				
Small-Signal Cutoff Frequency, Magnitude I _C = 50 mAdc, V _{CE} = 20 Vdc, f = 100 MHz	h _{fe}	2.0		
Output Capacitance V _{CB} = 10 Vdc, I _E = 0, 100 kHz ≤ f ≤ 1.0 MHz	C _{obo}		8.0	pF
Input Capacitance V _{EB} = 2.0 Vdc, I _C = 0, 100 kHz ≤ f ≤ 1.0 MHz	C _{ibo}		30	pF

SWITCHING CHARACTERISTICS

Turn-On Time V _{CC} = 30 Vdc; I _C = 150 mAdc; I _{B1} = 15 mAdc	t _{on}		45	ns
Turn-Off Time V _{CC} = 30 Vdc; I _C = 150 mAdc; I _{B1} = I _{B2} = 15 mAdc	t _{off}		300	ns

(3) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.