

**SEMICONDUCTOR
TECHNICAL DATA**

**2N3019SJAN, JTX, JTXV, JANS
2N3057AJAN, JTX, JTXV, JANS
2N3700JAN, JTX, JTXV, JANS**

Processed per MIL-S-19500/391

**NPN Silicon
Small-Signal Transistors**

...designed for general-purpose switching and amplifier applications.

CRYSTALONCS
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MAXIMUM RATINGS					
Rating	Symbol	2N3019S	2N3057A	2N3700	Unit
Collector-Base Voltage	V _{CBO}		140		Vdc
Collector-Emitter Voltage	V _{CEO}		80		Vdc
Emitter-Base Voltage	V _{EBO}		7.0		Vdc
Collector Current	I _C		1.0		Adc
Device Dissipation	P _T			0.5	Watts
@ T _A = 25 °C		0.8	0.4	2.65	mW/°C
Derate above 25 °C		4.6	2.3	1.8	Watts
@ T _C = 25 °C		5.0	1.8	10.3	mW/°C
Derate above 25 °C		28.5	10.3		
Operating Junction and Storage Temperature Range	T _J , T _{stg}	-65 to 200			°C

ELECTRICAL CHARACTERISTICS (T _C = 25 °C unless otherwise noted)				
Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Breakdown Voltage (I _C = 30 mAdc)	V _{(BR)CEO}	80	—	Vdc
Emitter-Base Breakdown Voltage (I _E = 100 μAdc)	V _{(BR)EBO}	7.0	—	Vdc
Collector-Base Breakdown Voltage (I _C = 100 μAdc)	V _{(BR)CBO}	140	—	Vdc
Collector Cutoff Current (V _{CE} = 90 Vdc)	I _{CES}	—	10	nAdc
(V _{CE} = 90 Vdc; T _A = 150 °C)		—	10	μAdc
Emitter Cutoff Current (V _{BE} = 90 Vdc)	I _{EBO}	—	10	nAdc



2N3019S
CASE 79-04, STYLE 1
TO-205AD (TO-39)



2N3700
CASE 22-03, STYLE 1
TO-206AA (TO-18)



2N3057A
CASE 26-03, STYLE 1
TO-206AB (TO-46)

ELECTRICAL CHARACTERISTICS — continued (T _C = 25°C unless otherwise noted.)				
Characteristic	Symbol	Min	Max	Unit
ON CHARACTERISTICS				
DC Current Gain (V _{CE} = 10 Vdc, I _C = 150 mAdc) ⁽¹⁾ (V _{CE} = 10 Vdc, I _C = 0.1 mAdc) (V _{CE} = 10 Vdc, I _C = 10 mAdc) ⁽¹⁾ (V _{CE} = 10 Vdc, I _C = 500 mAdc) ⁽¹⁾ (V _{CE} = 10 Vdc, I _C = 1.0 mAdc) (V _{CE} = 10 Vdc, I _C = 150 mAdc, T _A = -65°C) ⁽¹⁾	h _{FE}	100 50 90 50 15 40	300 200 — 200 — —	—
Collector-Emitter Saturation Voltage ⁽¹⁾ (I _C = 150 mAdc, I _B = 15 mAdc) (I _C = 500 mAdc, I _B = 50 mAdc)	V _{CE(sat)}	— —	0.2 0.5	Vdc
Base-Emitter Saturation Voltage ⁽¹⁾ (I _C = 150 mAdc, I _B = 15 mAdc)	V _{BE(sat)}	—	1.1	Vdc
SMALL-SIGNAL CHARACTERISTICS				
Small-Signal Current Gain (V _{CE} = 5.0 Vdc, I _C = 1.0 mAdc, f = 1.0 kHz) (V _{CE} = 10 Vdc, I _C = 50 mAdc, f = 20 MHz)	h _{fe}	80 5.0	400 20	—
Input Capacitance (V _{EB} = 0.5 Vdc, I _C = 0, f = 0.1 to 1.0 MHz)	C _{ibo}	—	60	pF
Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f = 0.1 to 1.0 MHz)	C _{obo}	—	12	pF
Noise Figure (V _{CE} = 10 Vdc, I _C = 100 μAdc, f = 1.0 kHz R _G = 1.0 kohm, P _{wr} , B. W. = 200 Hz)	NF	—	4.0	dB
Collector Base Time Constant (V _{CB} = 10 Vdc, I _C = 10 mAdc, f = 79.6 MHz)	t _b C _c	—	400	ps
SWITCHING CHARACTERISTICS (See Figure 21)				
Turn-On + Turn-Off Time	t _{on} + t _{off}	—	30	ns
SAFE OPERATING AREA				
DC Tests (T _C = 25°C, t ≥ 10 ms, one cycle)				
Test 1 (I _C = 500 mAdc, V _{CE} = 10 Vdc) 2N3019 (I _C = 180 mAdc, V _{CE} = 10 Vdc) 2N3700, 2N3057A				
Test 2 (I _C = 125 mAdc, V _{CE} = 40 Vdc) 2N3019 (I _C = 45 mAdc, V _{CE} = 40 Vdc) 2N3700, 2N3057A				
Test 3 (I _C = 60 mAdc, V _{CE} = 80 Vdc) 2N3019 (I _C = 22.5 mAdc, V _{CE} = 80 Vdc) 2N3700, 2N3057A				
END POINT ELECTRICAL MEASUREMENTS				
Collector-Emitter Cutoff Current (V _{CE} = 90 Vdc) (Relaxed Limit)	I _{CES}	—	20	nAdc
Collector-Base Saturation Voltage ⁽¹⁾ (I _C = 150 Vdc, I _B = 15 mAdc)	V _{CE(sat)}	—	0.2	Vdc
DC Current Gain ⁽¹⁾ (V _{CE} = 10 Vdc, I _C = 150 mAdc)	h _{FE}	100	300	—

⁽¹⁾ Pulsed Pulse With 250 to 200 μs, Duty Cycle 1:1 to 2:1.

ASSURANCE TESTING (Pre-Post Burn-In)				
Burn-In Conditions: T _A = 25 ± 5°C, V _{CB} = 80 Vdc, 10 Vdc JANS P _T = 600 mW 2N3019S, 400 mW 2N3057A, 500 mW 2N3700				
Characteristics Tested	Symbol	Initial and End Point Limits		Unit
		Min	Max	
Collector Cutoff Current (V _{CE} = 90 Vdc)	I _{CES}	—	10	nAdc
DC Current Gain ⁽¹⁾ (V _{CE} = 10 Vdc, I _C = 150 mAdc)	h _{FE}	100	300	—
Delta from Pre-Burn-In Measured Values		Min	Max	% of Initial Value nAdc
Delta Collector Cutoff Current	ΔI _{CES}	—	±100 or ±5.0 whichever is greater	
Delta DC Current Gain ⁽¹⁾	Δh _{FE}	—	±15	% of Initial Value