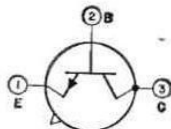


# 2N1613

## TRANSISTOR

Silicon n-p-n type used in a wide variety of small-signal and medium-power applications in industrial and military equipment. It can be used in rf service as an amplifier, mixer, oscillator, and converter; in af service for small- and large-signal driver and power applications; in switching service for high-speed switching circuits requiring transistors having high voltage, high dissipation, high pulse beta, low output capacitance, and exceptionally low noise and leakage characteristics. JEDEC No. TO-5 package; outline 6, Outlines Section. For curve of typical transfer characteristics, refer to type 2N2102.



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### MAXIMUM RATINGS

Collector-to-Base Voltage (with emitter open)	75 max	volts
Collector-to-Emitter Voltage (with external base-to-emitter resistance = 10 ohms or less)	50 max	volts
Emitter-to-Base Voltage (with collector open)	7 max	volts
Collector Current	1 max	ampere
Transistor Dissipation:		
At case temperatures up to 25°C	3 max	watts
At ambient temperatures up to 25°C	0.8 max	watt
At case or ambient temperatures above 25°C	See curve	page 80
Temperature Range:		
Operating (junction)	-65 to 200	°C
Storage	-65 to 300	°C
Lead Temperature (for 10 seconds maximum)	25s max	°C

### CHARACTERISTICS

Collector-to-Base Breakdown Voltage (with collector ma = 0.1 and emitter current = 0)	75 min	volts
Emitter-to-Base Breakdown Voltage (with emitter ma = 0.25 and collector current = 0)	7 min	volts
Collector-to-Emitter Reach-Through Voltage (with emitter-to-base volts = 1.5 and collector ma = 0.1)	75 min	volts

Collector-to-Emitter Sustaining Voltage (with external base-to-emitter resistance = 10 ohms or less and collector ma = 100)	50 min	volts
Base-to-Emitter Saturation Voltage (with collector ma = 150 and base ma = 15)	1.3 max	volts
Collector-to-Emitter Saturation Voltage (with collector ma = 150 and base ma = 15)	1.5 max	volts
Collector-Cutoff Current (with collector-to-base volts = 60 and emitter current = 0)	0.01 max	μa
Emitter-Cutoff Current (with emitter-to-base volts = 5 and collector current = 0)	0.01 max	μa
Thermal Resistance:		
Junction-to-case	58.3 max	°C/watt
Junction to ambient	219 max	°C/watt

### In Common-Base Circuit

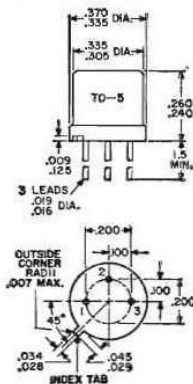
Input Resistance at 1 kilocycle:		
With collector-to-base volts = 5 and collector ma = 1	24 to 34	ohms
With collector-to-base volts = 10 and collector ma = 5	4 to 8	ohms
Input Capacitance (with emitter-to-base volts = 0.5 and collector current = 0)	80 max	pf
Output Capacitance (with collector-to-base volts = 10 and emitter current = 0)	25 max	pf
Output Conductance at 1 kilocycle:		
With collector-to-base volts = 5 and collector ma = 1	0.1 to 0.5	μmho
With collector-to-base volts = 10 and collector ma = 5	0.1 to 1	μmho
Small-Signal Open-Circuit Reverse Voltage-Transfer Ratio at 1 kilocycle:		
With collector-to-base volts = 5 and collector ma = 1	0.0003 max	
With collector-to-base volts = 10 and collector ma = 5	0.0003 max	

### In Common-Emitter Circuit

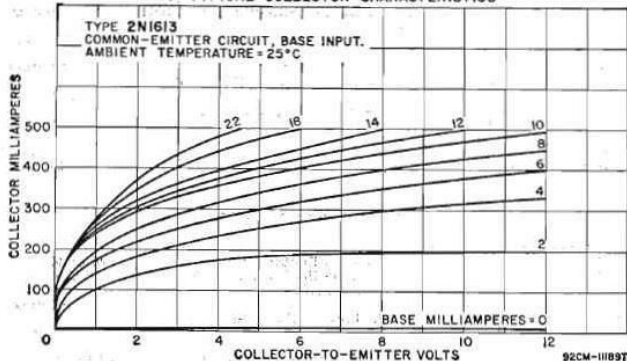
DC-Pulse Forward Current-Transfer Ratio:*		
With collector-to-emitter volts = 10 and collector ma = 150	40 to 120	
With collector-to-emitter volts = 10 and collector ma = 500	20 min	
DC Forward Current-Transfer Ratio:		
With collector-to-emitter volts = 10 and collector ma = 0.1	20 min	
With collector-to-emitter volts = 10 and collector ma = 10	35 min	
Small-Signal Forward Current-Transfer Ratio:		
With collector-to-emitter volts = 5, collector ma = 1, and frequency = 1 kilocycle	30 to 100	
With collector-to-emitter volts = 10, collector ma = 5, and frequency = 1 kilocycle	35 to 150	
With collector-to-emitter volts = 10, collector ma = 50, and frequency = 20 Mc	3 min	
Noise Figure (with collector-to-emitter volts = 10, collector ma = 0.3, generator resistance = 1000 ohms, circuit bandwidth = 15 kilocycles, and signal frequency = 1 kilocycle)	12 max	db
Total Switching Time† (delay time plus rise time plus fall time)	30 max	nsec

\* Pulse duration = 300 μsec; duty factor = 0.018.

† Refer to type 2N2102 for Total-Switching-Time Measurement Circuit.



### TYPICAL COLLECTOR CHARACTERISTICS



### TYPICAL COLLECTOR CHARACTERISTICS

