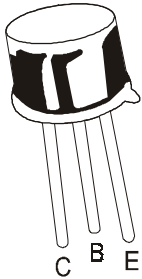


**NPN SILICON PLANAR EPITAXIAL TRANSISTORS**

**2N1613**



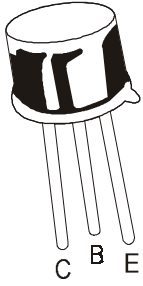
**TO-39  
Metal Can Package**

**ABSOLUTE MAXIMUM RATINGS (Ta=25°C unless specified otherwise)**

DESCRIPTION	SYMBOL	VALUE	UNITS
Collector Emitter Voltage (RBE≤10Ω)	V <sub>CER</sub>	50	V
Collector Base Voltage	V <sub>CBO</sub>	75	V
Emitter Base Voltage	V <sub>EBO</sub>	7.0	V
Collector Current Continuous	I <sub>C</sub>	500	mA
Power Dissipation @ Ta=25°C	P <sub>D</sub>	800	mW
Derate Above 25°C		4.57	mW/°C
Power Dissipation@ Tc=25°C	P <sub>D</sub>	3	W
Derate Above 25°C		17.15	mW/°C
Operating And Storage Junction Temperature Range	T <sub>j</sub> , T <sub>stg</sub>	-65 to +200	°C
<b>THERMAL RESISTANCE</b>			
Junction to Ambient	R <sub>th(j-a)</sub>	218.7	°C/W
Junction to Case	R <sub>th(j-c)</sub>	58.3	°C/W

**ELECTRICAL CHARACTERISTICS (Ta=25°C unless specified otherwise)**

DESCRIPTION	SYMBOL	MIN	TYP	MAX	UNITS
Collector Emitter Breakdown Voltage	V <sub>CER(sus)</sub> * I <sub>C</sub> =100mA, R <sub>BE</sub> ≤10Ω	50			V
Collector Base Breakdown Voltage	BV <sub>CBO</sub> I <sub>C</sub> =100μA, I <sub>E</sub> =0	75			V
Emitter Base Breakdown Voltage	BV <sub>EBO</sub> I <sub>E</sub> =100μA, I <sub>C</sub> =0	7			V
Collector Leakage Current	I <sub>CBO</sub> V <sub>CB</sub> =60V, I <sub>E</sub> =0			10	nA
	V <sub>CB</sub> =60V, I <sub>E</sub> =0, T <sub>A</sub> =150°C			10	μA
Emitter Leakage Current	I <sub>EBO</sub> V <sub>EB</sub> =5V, I <sub>C</sub> =0			10	nA
Collector Emitter Saturation Voltage	V <sub>CE(Sat)</sub> * I <sub>C</sub> =150mA, I <sub>B</sub> =15mA		0.3	1.5	V
Base Emitter Saturation Voltage	V <sub>BE(Sat)</sub> * I <sub>C</sub> =150mA, I <sub>B</sub> =15mA		0.78	1.3	V
DC Current Gain	h <sub>FE</sub> * I <sub>C</sub> =0.1mA, V <sub>CE</sub> =10V	20	35		
	I <sub>C</sub> =10mA, V <sub>CE</sub> =10V	35	50		
	I <sub>C</sub> =150mA, V <sub>CE</sub> =10V	40	80	120	
	I <sub>C</sub> =500mA, V <sub>CE</sub> =10V	20	30		
	I <sub>C</sub> =10mA, V <sub>CE</sub> =10V T <sub>a</sub> =-55°C	20			

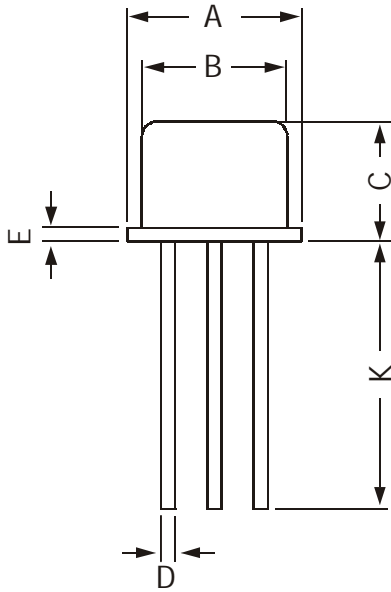


## ELECTRICAL CHARACTERISTICS (Ta=25°C unless specified otherwise)

DESCRIPTION	SYMBOL	TEST CONDITION	MIN	TYP	MAX	UNITS
<b><u>SMALL SIGNAL CHARACTERISTICS</u></b>						
Small Signal Current Gain	h <sub>fe</sub>	I <sub>C</sub> =1mA, V <sub>CE</sub> =5V, f=1kHz	30		100	
		I <sub>C</sub> =5mA, V <sub>CE</sub> =10V, f=1kHz	35		150	
Input Impedance	h <sub>ib</sub>	I <sub>C</sub> =1mA, V <sub>CB</sub> =5V, f=1kHz	24		34	Ω
		I <sub>C</sub> =5mA, V <sub>CE</sub> =10V, f=1kHz	4.0		8.0	Ω
Voltage Feedback Ratio	h <sub>rb</sub>	I <sub>C</sub> =1mA, V <sub>CE</sub> =5V, f=1.0kHz			3.0	X10 <sup>-4</sup>
		I <sub>C</sub> =5mA, V <sub>CE</sub> =10V, f=1kHz			3.0	X10 <sup>-4</sup>
Output Admittance	h <sub>ob</sub>	I <sub>C</sub> =1mA, V <sub>CE</sub> =5V, f=1kHz	0.05		0.5	μmho
		I <sub>C</sub> =5mA, V <sub>CE</sub> =10V, f=1kHz	0.05		0.5	μmho
Current Gain Bandwidth Product	f <sub>T</sub> *	I <sub>C</sub> =50mA, V <sub>CE</sub> =10V, f=20MHz	60			MHz
Output Capacitance	C <sub>ob</sub>	V <sub>CB</sub> =10V, I <sub>E</sub> =0, f=100kHz		10	25	pF
Input Capacitance	C <sub>ib</sub>	V <sub>EB</sub> =0.5V, I <sub>C</sub> =0, f=100kHz		50	80	pF
Noise Figure	NF	I <sub>C</sub> =300μA, V <sub>CE</sub> =10V, R <sub>S</sub> =510Ω f=1kHz			12	dB

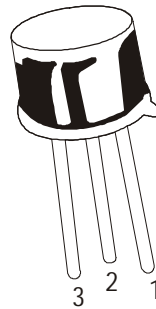
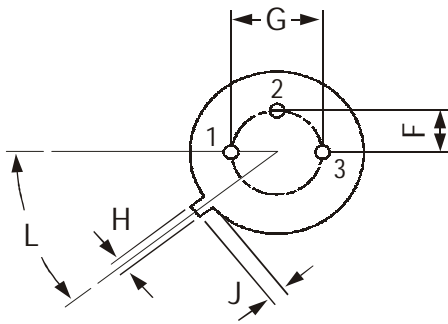
\*Pulse Test: Pulse Length ≤300μs, Duty Cycle ≤1.0%

TO-39 Metal Can Package



All dimensions are in mm

DIM	MIN	MAX
A	8.50	9.39
B	7.74	8.50
C	6.09	6.60
D	0.40	0.53
E	—	0.88
F	2.41	2.66
G	4.82	5.33
H	0.71	0.86
J	0.73	1.02
K	12.70	—
L	42 DEG	48 DEG



PIN CONFIGURATION

1. EMITTER
2. BASE
3. COLLECTOR

Packing Detail

PACKAGE	STANDARD PACK		INNER CARTON BOX		OUTER CARTON BOX		
	Details	Net Weight/Qty	Size	Qty	Size	Qty	Gr Wt
TO-39	500 pcs/polybag	540 gm/500 pcs	3" x 7.5" x 7.5"	20K	17" x 15" x 13.5"	32K	40 kgs

### Disclaimer

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