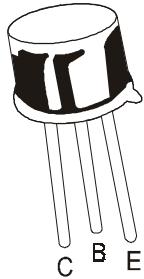


**NPN SILICON PLANAR EPITAXIAL TRANSISTORS**

**2N1613**



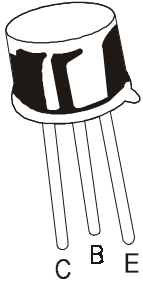
**TO-39  
Metal Can Package**

**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			

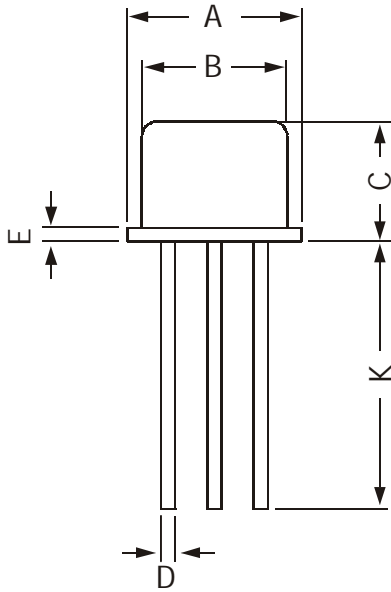


## ELECTRICAL CHARACTERISTICS (Ta=25°C unless specified otherwise)

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

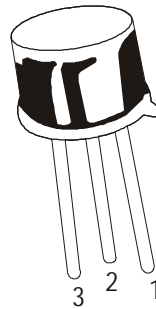
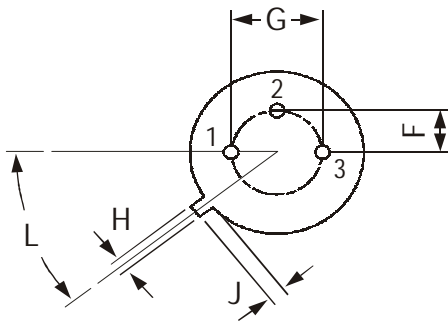
\*Pulse Test: Pulse Length ≤300μs, Duty Cycle ≤1.0%

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**

The product information and the selection guides facilitate selection of the CDIL's Discrete Semiconductor Device(s) best suited for application in your product(s) as per your requirement. It is recommended that you completely review our Data Sheet(s) so as to confirm that the Device(s) meet functionality parameters for your application. The information furnished in the Data Sheet and on the CDIL Web Site/CD is believed to be accurate and reliable. CDIL however, does not assume responsibility for inaccuracies or incomplete information. Furthermore, CDIL does not assume liability whatsoever, arising out of the application or use of any CDIL product; neither does it convey any license under its patent rights nor rights of others. These products are not designed for use in life saving/support appliances or systems. CDIL customers selling these products (either as individual Discrete Semiconductor Devices or incorporated in their end products), in any life saving/support appliances or systems or applications do so at their own risk and CDIL will not be responsible for any damages resulting from such sale(s).

CDIL strives for continuous improvement and reserves the right to change the specifications of its products without prior notice.



CDIL is a registered Trademark of

**Continental Device India Limited**

C-120 Naraina Industrial Area, New Delhi 110 028, India.

Telephone + 91-11-2579 6150, 5141 1112 Fax + 91-11-2579 5290, 5141 1119

email@cdil.com www.cdilsemi.com