



Continental Device India Pvt. Limited

An IATF 16949, ISO9001 and ISO 14001 Certified Company



NPN PLANAR SWITCHING TRANSISTORS

2N2221 2N2222



TO-18

**TO-18
Metal Can Package**

APPLICATIONS: Linear amplifications and switching

ABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$) (Unless specified otherwise)

Parameter		Symbol	Value	Unit
Collector Emitter Voltage		V_{CEO}	30	V
Collector Base Voltage		V_{CBO}	60	V
Emitter Base Voltage		V_{EBO}	5	V
Collector Current Continuous		I_c	800	mA
Power Dissipation	@ $T_a=25^\circ\text{C}$	P_D	500	mW
	Derate Above 25°C		2.85	mW/ $^\circ\text{C}$
Power Dissipation	@ $T_a=25^\circ\text{C}$	P_D	1.2	W
	Derate Above 25°C		6.85	mW/ $^\circ\text{C}$
Operating And Storage Junction Temperature Range		T_J, T_{stg}	- 65 to +200	$^\circ\text{C}$



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ELECTRICAL CHARACTERISTICS at $T_a = 25^\circ\text{C}$ (Unless specified otherwise)

DESCRIPTION		SYMBOL	TEST CONDITION	VALUE			UNIT
				MIN	TYP	MAX	
Collector Emitter Voltage		$*V_{CEO}$	$I_C = 10\text{mA}, I_B = 0$	30	--	--	V
Collector Base Voltage		V_{CBO}	$I_C = 10\mu\text{A}, I_E = 0$	60	--	--	V
Emitter Base Voltage		V_{EBO}	$I_E = 10\text{V}, I_C = 0$	5	--	--	V
Collector Cut Off Current		I_{CBO}	$V_{CB} = 50\text{V}, I_E = 0$	--	--	10	nA
			$V_{CB} = 0\text{V}, I_E = 0,$	--	--	10	μA
Collector Cut Off Current		I_{EBO}	$V_{EB} = 3\text{V}, I_C = 0$	--	--	10	nA
DC Current Gain	2N2221	h_{FE}	$*I_C = 0.1\text{mA}, V_{CE} = 10\text{V}$	20	--	--	
	2N2222			35	--	--	
	2N2221		$I_C = 1\text{mA}, V_{CE} = 10\text{V}$	25	--	--	
	2N2222			50	--	--	
	2N2221		$*I_C = 10\text{mA}, V_{CE} = 10\text{V}$	35	--	--	
	2N2222			75	--	--	
	2N2221		$*I_C = 150\text{mA}, V_{CE} = 10\text{V}$	40	--	120	
	2N2222			100	--	136	
	2N2221		$*I_C = 150\text{mA}, V_{CE} = 1\text{V}$	20	--	--	
	2N2222			50	--	--	
	2N2221		$*I_C = 500\text{mA}, V_{CE} = 10\text{V}$	20	--	--	
	2N2222			30	--	--	

SMALL SIGNAL CHARACTERISTICS

Collector Emitter Saturation Voltage	$*V_{CE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$	--	--	0.4 0.6	V
Base Emitter Saturation Voltage	$*V_{BE(sat)}$	$I_C = 150\text{mA}, I_B = 15\text{mA}$ $I_C = 500\text{mA}, I_B = 50\text{mA}$	--	--	1.3 2.6	V
Transition Frequency	$^{**}f_T$	$I_C = 20\text{mA}, V_{CE} = 20\text{V},$ $f = 100\text{MHz}$	250	--		MHz
Output Capacitance	C_{obo}	$V_{CB} = 10\text{V}, I_E = 0,$ $f = 100\text{KHz}$	--	--	8	pF
Input Capacitance	C_{ibo}	$V_{BE} = 0.5\text{V}, I_C = 0,$ $f = 100\text{KHz}$	--	--	30	pF

SWITCHING TIME

Delay Time	t_d	$I_C = 150\text{mA}, I_{B1} = 15\text{mA},$	--	--	10	ns
Rise Time	t_r	$V_{CC} = 30\text{V}, V_{BE(off)} = 0.5\text{V}$	--	--	25	ns
Storage Time	t_s	$I_C = 150\text{mA}, I_{B1} =$	--	--	225	ns
Fall Time	t_f	$I_{B2} = 15\text{mA}, V_{CC} = 30\text{V}$	--	--	60	ns

*Pulse Test: Pulse Width < 300 μs , Duty Cycle < 2%

** f_T is defined as the frequency at which $|h_{fe}|$ extrapolates to unity

2N2221_2222
Rev1 27012020EGL

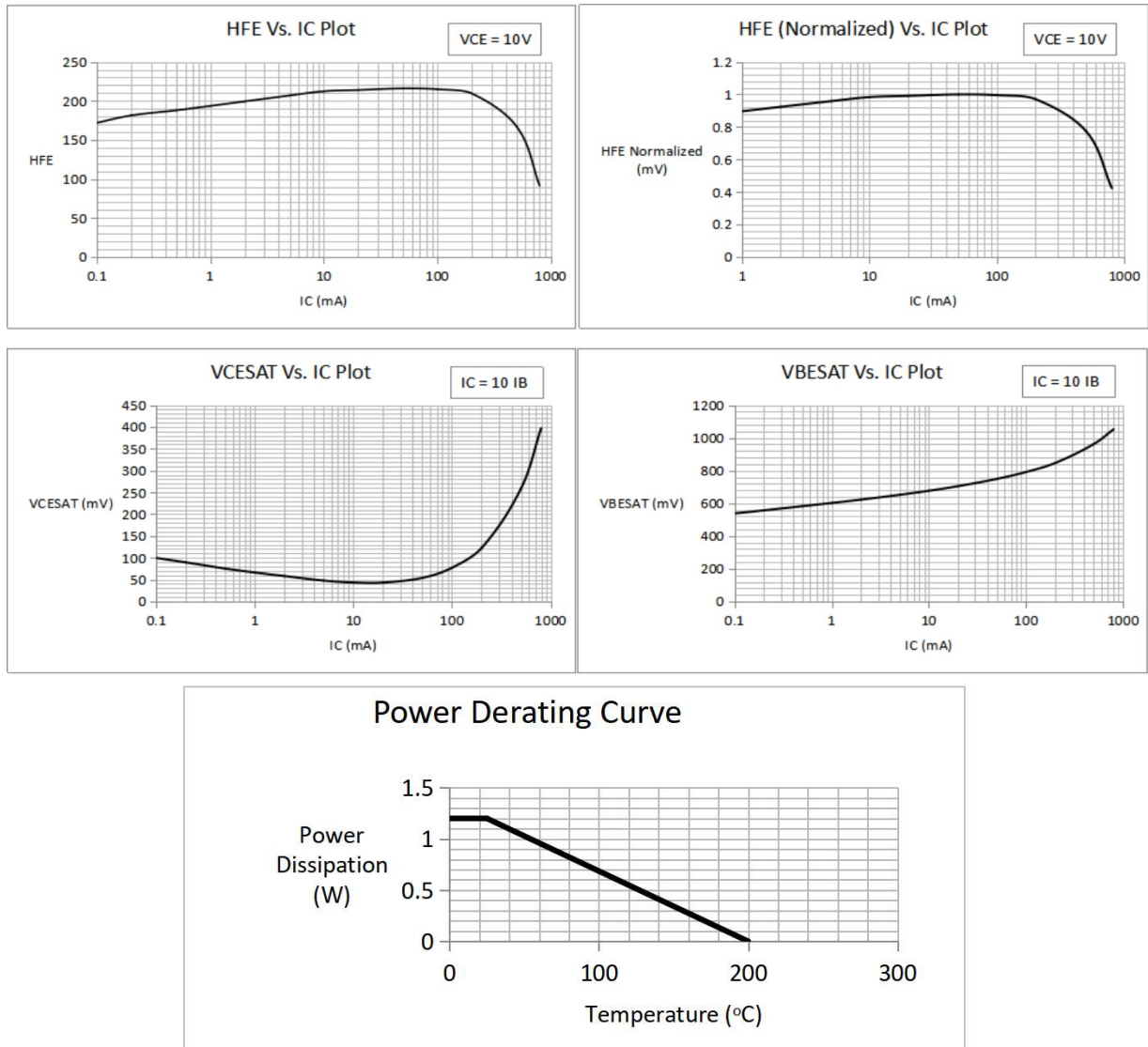


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Typical Characteristic curves



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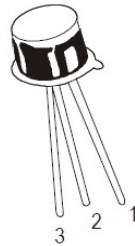
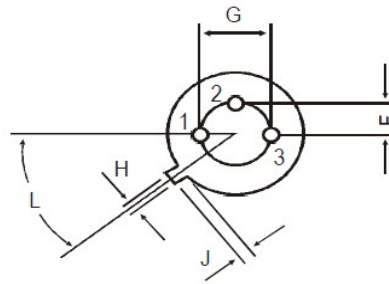
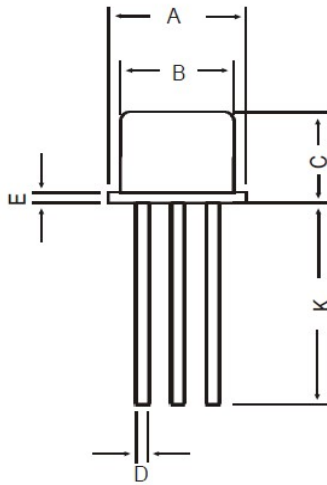
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Package Details

TO-18 Metal Can Package



PIN CONFIGURATION

1. EMITTER
2. BASE
3. COLLECTOR

All dimensions in mm.

DIM	MIN	MAX
A	5.24	5.84
B	4.52	4.97
C	4.31	5.33
D	0.40	0.53
E	—	0.76
F	—	1.27
G	—	2.97
H	0.91	1.17
J	0.71	1.21
K	12.70	—
L	45 DEG	

Activate
Go to Sett

NOTE : For AEC-Q101 compliant products, please use suffix -AQ in the part number while ordering.

Packing Detail

PACKAGE	STANDARD PACK		INNER CARTON BOX		OUTER CARTON BOX		
	Details	Net Weight/Qty	Size	Qty	Size	Qty	Gr Wt
TO-18	1K/polybag	350 gm/1K pcs	3" x 7.5" x 7.5"	5K	17" x 15" x 13.5"	80K	34 kgs



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Recommended Product Storage Environment for Diode and Transistors

This storage environment assumes that the Diodes and transistors are packed properly inside the original packing supplied by CDIL.

- Temperature 5 °C to 30 °C
- Humidity between 40 to 70 %RH
- Air should be clean.
- Avoid harmful gas or dust.
- Avoid outdoor exposure or storage in areas subject to rain or water spraying .
- Avoid storage in areas subject to corrosive gas or dust. Product shall not be stored in areas exposed to direct sunlight.
- Avoid rapid change of temperature.
- Avoid condensation.
- Mechanical stress such as vibration and impact shall be avoided.
- The product shall not be placed directly on the floor.
- The product shall be stored on a plane area. They should not be turned upside down. They should not be placed against the wall.

Shelf Life of CDIL Products

The shelf life of products is the period from product manufacture to shipment to customers. The product can be unconditionally shipped within this period. The period is defined as 2 years.

If products are stored longer than the shelf life of 2 years, the products shall be subjected to quality check as per CDIL quality procedure.

The products are further warranted for another one year after the date of shipment subject to the above conditions in CDIL original packing.

Floor Life of CDIL Products and MSL Level

When the products are opened from the original packing, the floor life will start. For this the following JEDEC table may be referred:

JEDEC MSL Level		
Level	Time	Condition
1	Unlimited	$\leq 30^{\circ}\text{C} / 85\% \text{ RH}$
2	1 Year	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$
2a	4 Weeks	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$
3	168 Hours	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$
4	72 Hours	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$
5	48 Hours	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$
5a	24 Hours	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$
6	Time on Label(TOL)	$\leq 30^{\circ}\text{C} / 60\% \text{ RH}$

Figure 1 Floor Life according to JEDEC MSL Level



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Customer Notes

Component Disposal Instructions

1. CDIL Semiconductor Devices are RoHS compliant, customers are requested to please dispose as per prevailing Environmental Legislation of their Country.
2. In Europe, please dispose as per EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

Disclaimer

The product information and the selection guides facilitate selection of the CDIL's 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 are 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 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.



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CIN No. - U32109DL1964PTC004291