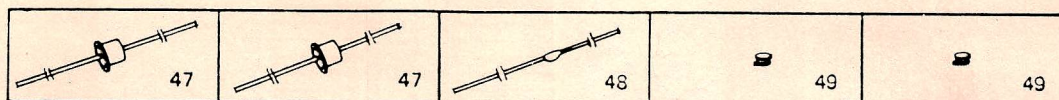


# BACK AND TUNNEL DIODES

## PACKAGES



## APPLICATIONS

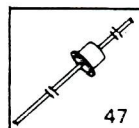
UHF Oscillator Level Detector Peak Sensing Frequency Divider Converter High Speed Logic Sampling Circuits	Detectors Mixers Limiters Compressors Power Monitors	Fast rise time pulse generators Amplitude Discriminator Sampling Circuits Fast threshold detectors Ultra High Speed Logic Level Sensing	Amplifiers and self oscillating mixers through X band Phase array radar Frequency converters Low level digital phase shifters Pulse position modulators	Doppler mixers Detectors Limiters Compressors
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## TYPES AVAILABLE

FREQUENCY IN GHz (f <sub>ROC</sub> )	65			TD400 Tunnel Diodes Microwave	BD400 Back Diodes Microwave
	40				
	20		TD 260 Tunnel Diodes Ultra High Speed Switch		
	3.4	1N3712 Tunnel Diodes General Purpose	BD1 Back Diodes General Purpose		
DC					

## FEATURES

<ul style="list-style-type: none"> <li>• Low Cost</li> <li>• Hermetically Sealed</li> <li>• Electrically &amp; Mechanically Rugged</li> <li>• Mil. Versions Available</li> </ul>	<ul style="list-style-type: none"> <li>• Low Cost</li> <li>• Hermetically Sealed</li> <li>• Electrically &amp; Mechanically Rugged</li> </ul>	<ul style="list-style-type: none"> <li>• Very fast switching.</li> <li>• Very stable at elevated operating temperatures.</li> <li>• Low functional cost.</li> </ul>	<ul style="list-style-type: none"> <li>• Controlled negative conductance</li> <li>• Controlled cutoff frequencies</li> <li>• Low noise</li> <li>• Low package inductance</li> <li>• Stable at elevated operating temperatures</li> </ul>	<ul style="list-style-type: none"> <li>• Low capacitance</li> <li>• Low inductance</li> <li>• Low "on" voltage</li> <li>• Very high frequency capability</li> <li>• Low I/F noise ratio</li> </ul>
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## TUNNEL DIODES GENERAL PURPOSE

+100°C Operation TD-1	I <sub>P</sub> Peak Point Current (mA)	I <sub>V</sub> Valley Point Current Max. (mA)	C Capacitance Max. (pF)	V <sub>P</sub> Peak Point Voltage Typ. (mV)	V <sub>V</sub> Valley Voltage Typ. (mV)	V <sub>FP</sub> Forward Peak Voltage Typ. (mV)	R <sub>S</sub> Series Resist. Max. (Ohms)	-G Negative Conductance (mhos × 10 <sup>-3</sup> )	f <sub>RO</sub> Resistive Cutoff Frequency Typical (GHz)
1N3712	1.0 ± 10%	0.18	10	65	350	500	4.0	8 Typ.	2.3
1N3713 <sup>1</sup>	1.0 ± 2.5%	0.14	5	65	350	510	4.0	8.5 ± 1	3.2
1N3714	2.2 ± 10%	0.48	25	65	350	500	3.0	18 Typ.	2.2
1N3715 <sup>1</sup>	2.2 ± 2.5%	0.31	10	65	350	510	3.0	19 ± 3	3.0
1N3716	4.7 ± 10%	1.04	50	65	350	500	2.0	40 Typ.	1.8
1N3717 <sup>1</sup>	4.7 ± 2.5%	0.60	25	65	350	510	2.0	41 ± 5	3.4
1N3718	10.0 ± 10%	2.20	90	65	350	500	1.5	80 Typ.	1.6
1N3719 <sup>1</sup>	10.0 ± 2.5%	1.40	50	65	350	510	1.5	85 ± 10	2.8
1N3720	22.0 ± 10%	4.80	150	65	350	500	1.0	180 Typ.	1.6
1N3721 <sup>1</sup>	22.0 ± 2.5%	3.10	100	65	350	510	1.0	190 ± 30	2.6
TD-9	0.5 ± 10%	0.10	5	60	—	—	6.0	4.0 Typ.	1.3

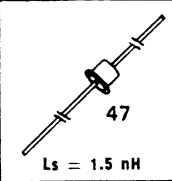
<sup>1</sup> Mil. Versions Available.





## BACK AND TUNNEL DIODES

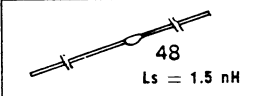
### BACK DIODES GENERAL PURPOSE



**47**

$L_s = 1.5 \text{ nH}$

GE Type	$I_P$ Peak Point Current Max. (mA)	C Total Capacitance Max. (pF)	Reverse Voltage Min.		$I_{F1}$ Forward Current @ $V_{F1} = 90$ $\pm 10 \text{ mV}$ (mA)	$V_{F2}$ Forward Voltage @ $I_{F2} = 3 I_{F1}$ Typical (mV)	$t_r$ Rise Time Typical (psec.)
			$V_{R1}$ @ $I_R = I_P$ max (mV)	$V_{R2}$ @ $I_R = 1 \text{ mA}$ (mV)			
BD-1	1.0	20	440	440	10.0	120	1.0
BD-2	0.5	10	420	465	5.0	130	0.7
BD-3	0.2	10	400	465	2.0	170	0.5
BD-4	0.1	10	380	465	1.0	170	0.4
BD-5	0.05	10	350	465	0.5	160	0.4
BD-6	0.02	10	330	465	0.2	160	0.4
BD-7	0.01	10	300	465	0.1	160	0.4



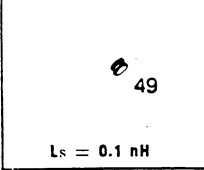
**48**

$L_s = 1.5 \text{ nH}$

### TUNNEL DIODES ULTRA HIGH-SPEED SWITCHING

$-100^\circ\text{C}$ Operation TD-260 (1)	$I_P$ Peak Point Current (mA)	$I_V$ Valley Point Current Max. (mA)	C Capacitance Max. (pF)	$V_P$ Peak Point Voltage Typical (mV)	$V_V$ Valley Point Voltage Typical (mV)	$V_{FP}$ Forward Voltage @ $I_F = I_P$ Typ. (mV)	$R_S$ Series Resist. Typical ( $\Omega$ )	$t_r$ Rise Time Typical (psec.)
TD-261	$2.2 \pm 10\%$	0.31	3.0	70	390	500-700	5.0	430
TD-261A	$2.2 \pm 10\%$	0.31	1.0	80	390	500-700	7.0	160
TD-262	$4.7 \pm 10\%$	0.60	6.0	80	390	500-700	3.5	320
TD-262A	$4.7 \pm 10\%$	0.60	1.0	90	400	500-700	4.0	74
TD-263	$10.0 \pm 10\%$	1.40	9.0	75	400	500-700	1.7	350
TD-263A	$10.0 \pm 10\%$	1.40	5.0	80	410	520-700	2.0	190
TD-263B	$10.0 \pm 10\%$	1.40	2.0	90	420	550-700	2.5	68
TD-264	$22.0 \pm 10\%$	3.80	18.0	90	425	600 Typ.	1.8	185
TD-264A	$22.0 \pm 10\%$	3.80	4.0	100	425	550-700	2.0	64
TD-265	$50.0 \pm 10\%$	8.50	25.0	110	425	625 Typ.	1.4	100
TD-265A	$50.0 \pm 10\%$	8.50	5.0	130	425	640 Typ.	1.5	35
TD-266	$100 \pm 10\%$	17.50	35.0	150	450	650 Typ.	1.1	57
TD-266A	$100 \pm 10\%$	17.50	6.0	180	450	660 Typ.	1.2	22

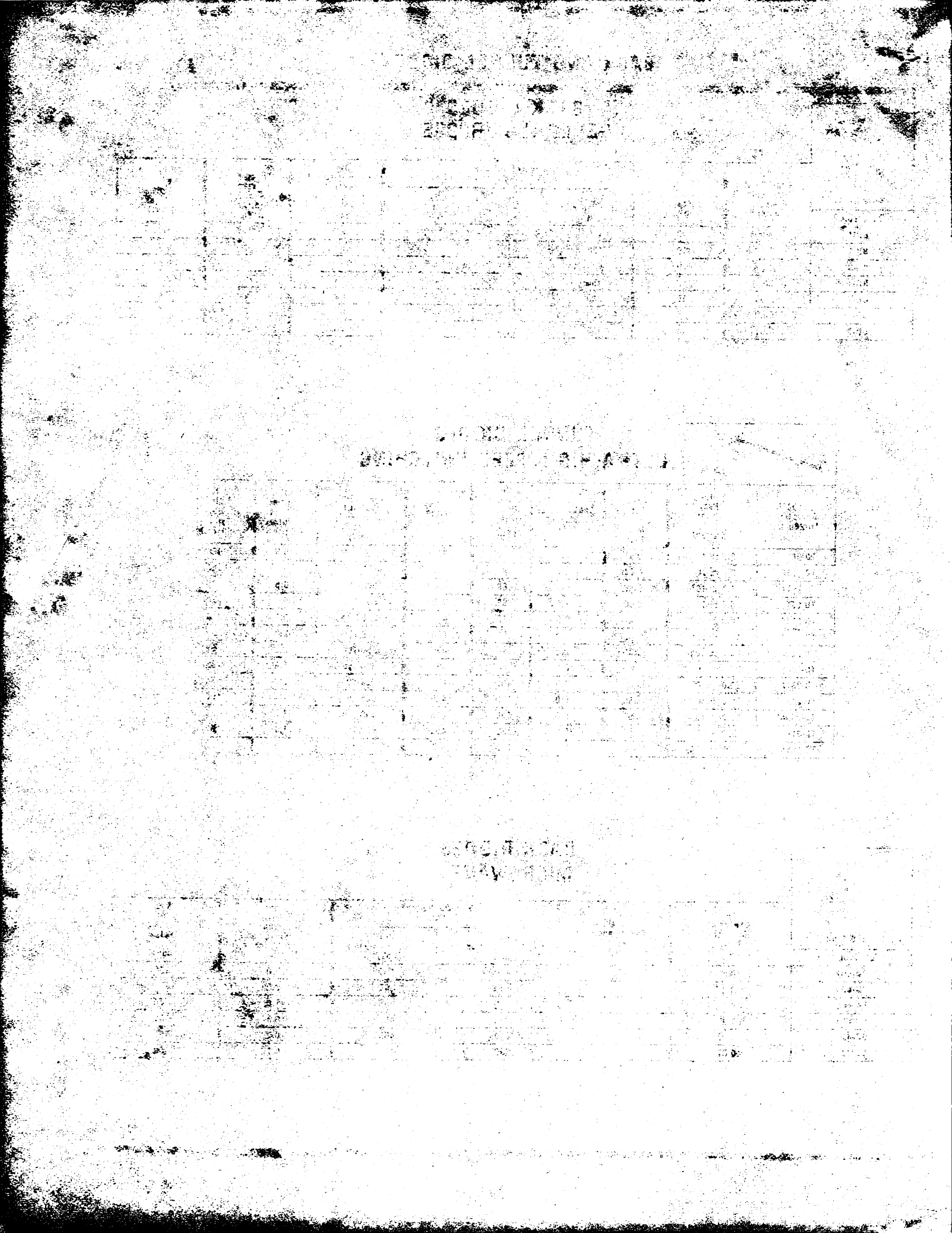
### BACK DIODES MICROWAVE

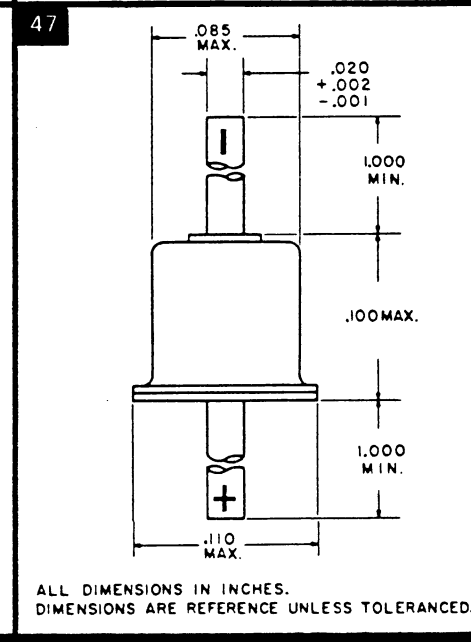
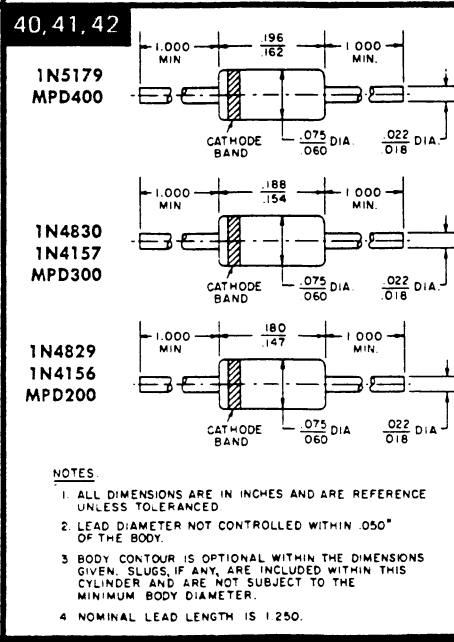
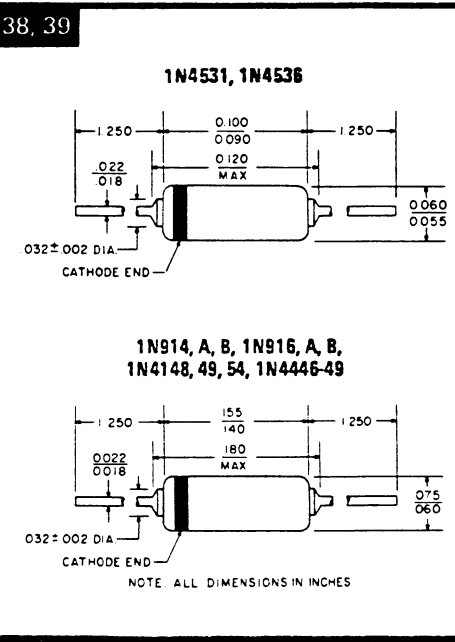
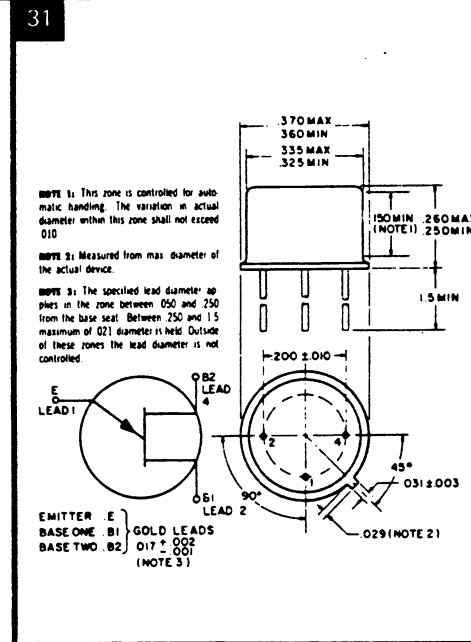
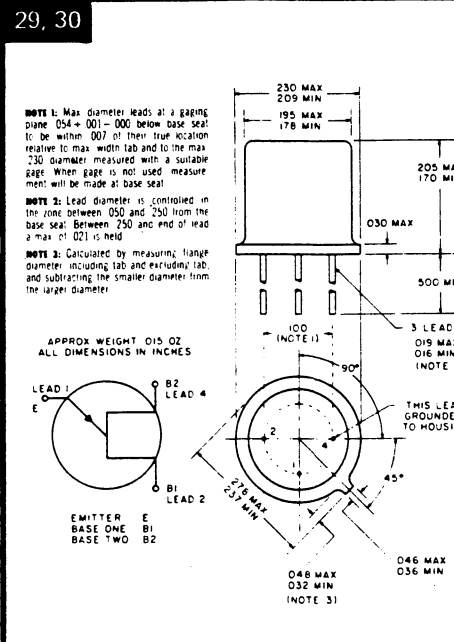
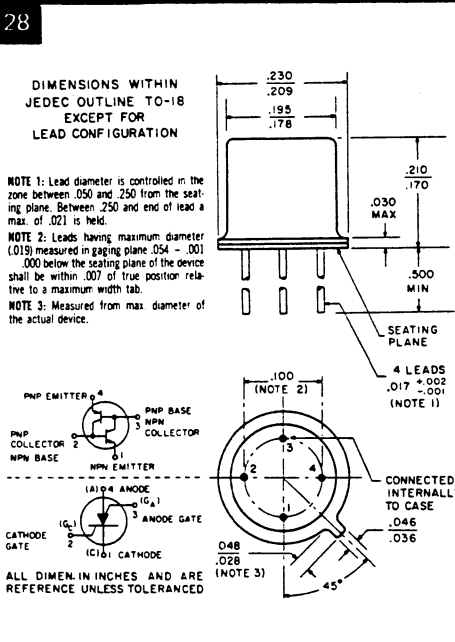
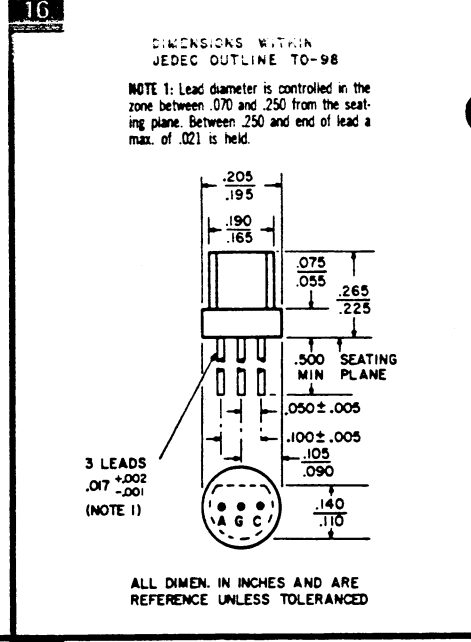
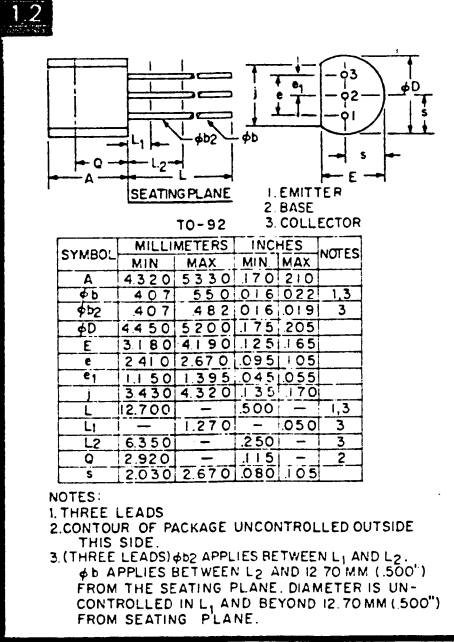
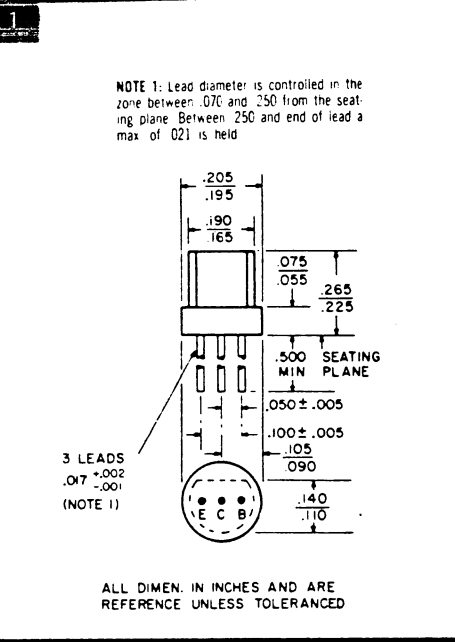


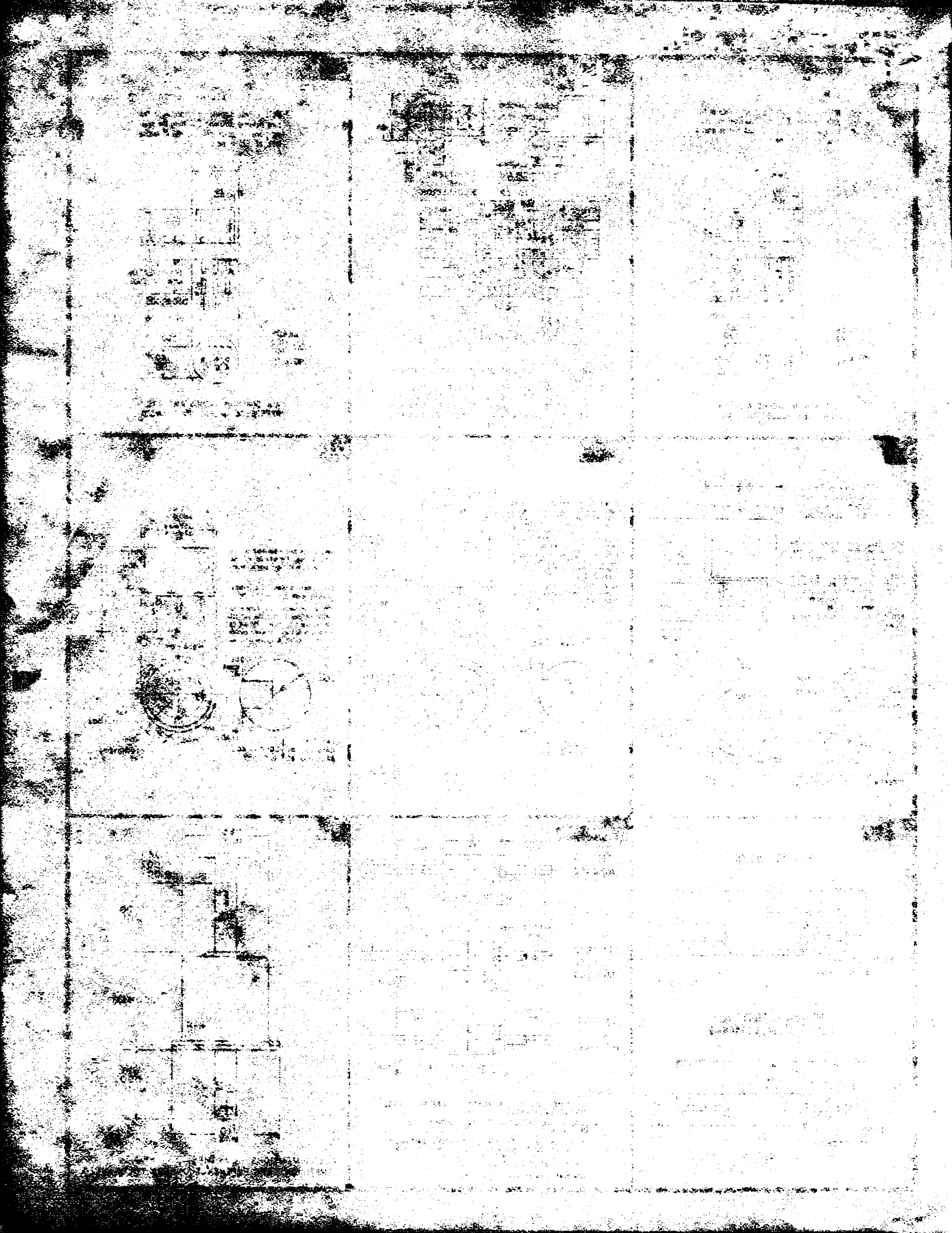
**49**

$L_s = 0.1 \text{ nH}$

GE Type	$I_P$ Peak Point Current Max. (mA)	C Total Capacitance Max. (pF)	Reverse Voltage Min.		$I_{F1}$ Forward Current @ $V_{F1} = 90$ $\pm 10 \text{ mV}$ (mA)	$V_{F2}$ Forward Voltage Typical @ $I_{F2} = 3 I_{F1}$ (mV)
			$V_{R1}$ @ $I_R = I_P$ max (mV)	$V_{R2}$ @ $I_R = 1 \text{ mA}$ (mV)		
BD-402	0.5	3	420	465	5.0	138
BD-403	0.2	1	400	465	2.0	170
BD-404	0.1	1	380	465	1.0	170
BD-405	0.05	1	350	465	0.5	160
BD-406	0.02	1	330	465	0.2	160
BD-407	0.01	1	330	465	0.1	160

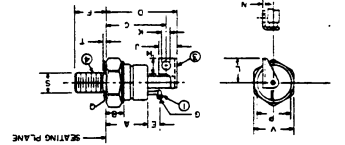






SYM	INCHES	METRIC	SYM	INCHES	METRIC	NOTES
A	1.020	25.90	L	0.300	7.62	MIN MAX MIN MAX
B	0.900	22.86	M	0.400	10.16	MIN MAX MIN MAX
C	1.460	37.09	N	0.080	2.03	REF. 1.47 1.78
D	1.660	42.16	O	0.020	0.51	REF. 42.16 45.72
E	0.212	5.38	P	0.040	1.02	REF. 0.212 0.231
F	0.297	7.54	Q	0.020	0.51	REF. 0.297 0.316
G	0.060	1.52	R	0.020	0.51	REF. 0.060 0.079
H	0.381	9.70	T	0.080	2.03	REF. 0.381 0.400
J	0.445	11.30	V	0.020	0.51	REF. 0.445 0.464
K	1.981	50.28	W	0.020	0.51	REF. 1.981 2.000

- One nut and one lockwasher supplied with each unit.
- Material of hardware is steel, cad plated.
- Dimension is area of unthreaded portion. Complete threads are within 2.5 threads of seating plane.
- Angular orientation of terminals is undefined.



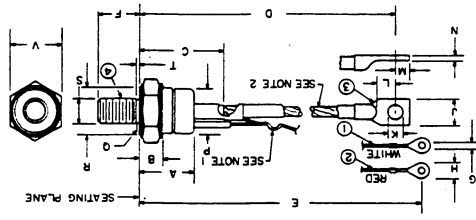
108

MODEL	TERMINAL ①	TERMINAL ②	TERMINAL ③	CATHODE + ANODE	GATE	AUX	CATHODE
C150	①	②	③	+			



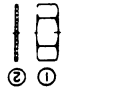
- Gate and auxiliary cathodes leads supplied lightly twisted together.
- Flexible copper lead.
- One nut and one lockwasher supplied with each unit. Material of hardware is steel, cad plated.
- Dimension is diameter of reflective seating area.
- Dimension is area of unthreaded portion. Complete threads are within 2.5 threads of seating plane.
- Angular orientation of terminals is undefined.

SYM	INCHES	METRIC	SYM	INCHES	METRIC	NOTES
A	1.020	25.90	L	0.300	7.62	MIN MAX MIN MAX
B	0.900	22.86	M	0.400	10.16	MIN MAX MIN MAX
C	1.460	37.09	N	0.080	2.03	REF. 1.47 1.78
D	1.660	42.16	O	0.020	0.51	REF. 42.16 45.72
E	0.212	5.38	P	0.040	1.02	REF. 0.212 0.231
F	0.297	7.54	Q	0.020	0.51	REF. 0.297 0.316
G	0.060	1.52	R	0.020	0.51	REF. 0.060 0.079
H	0.381	9.70	T	0.080	2.03	REF. 0.381 0.400
J	0.445	11.30	V	0.020	0.51	REF. 0.445 0.464
K	1.981	50.28	W	0.020	0.51	REF. 1.981 2.000

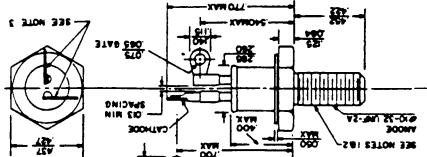


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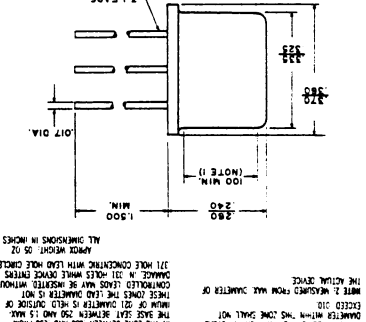
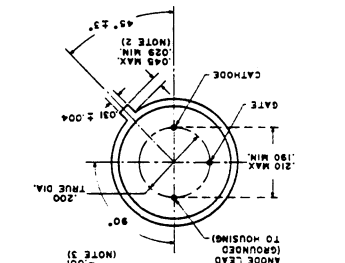
① 10-32 STEEL NUT  
② LOCKWASHER,  
CADMIUM PLATED  
③ CADMIUM PLATED  
STEEL



- Complete threads to extend to OF LEAD.
- 2 DIAMETER OF UNTHREADED PORTION NO MAX.
- 3 ANGULAR ORIENTATION OF THESE TERMINALS IS UNDEFINED.
- 4 CASE IS ANODE CONNECTION.
- 5 ALL DIMENSIONS IN INCHES.



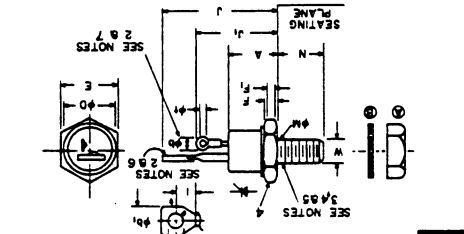
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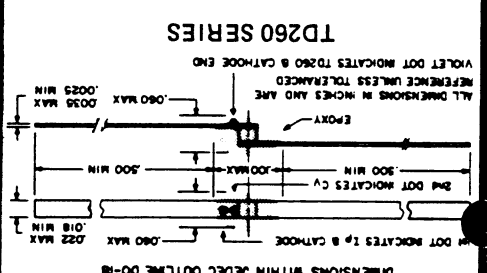
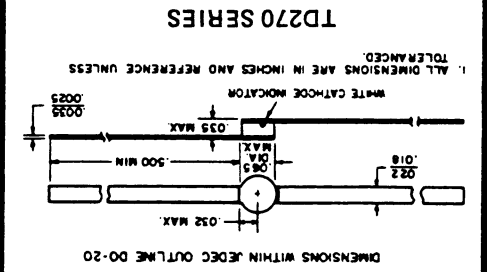
101

INCHES	MILLIMETERS	NOTES
0.001	0.025	MIN. MAX. MIN. MAX.
0.002	0.050	MIN. MAX. MIN. MAX.
0.005	0.125	MIN. MAX. MIN. MAX.
0.010	0.250	MIN. MAX. MIN. MAX.
0.020	0.500	MIN. MAX. MIN. MAX.
0.050	1.250	MIN. MAX. MIN. MAX.
0.100	2.500	MIN. MAX. MIN. MAX.
0.200	5.000	MIN. MAX. MIN. MAX.
0.500	12.500	MIN. MAX. MIN. MAX.
1.000	25.000	MIN. MAX. MIN. MAX.
2.000	50.000	MIN. MAX. MIN. MAX.
5.000	125.000	MIN. MAX. MIN. MAX.
10.000	250.000	MIN. MAX. MIN. MAX.
20.000	500.000	MIN. MAX. MIN. MAX.
50.000	1250.000	MIN. MAX. MIN. MAX.
100.000	2500.000	MIN. MAX. MIN. MAX.

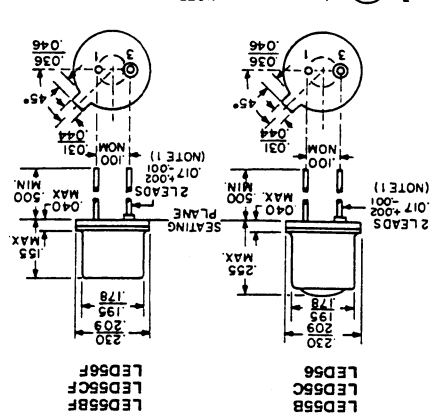
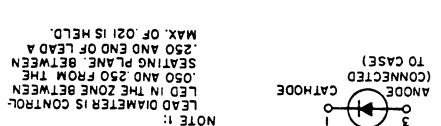
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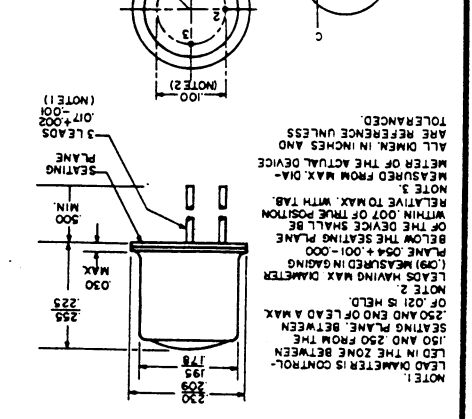
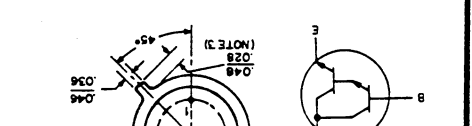
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48, 49



54, 54A



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