TC ZENER DIODES

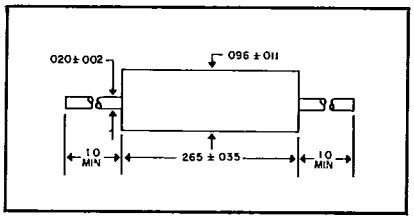
250mW, TC

DO-7 Case

Type	Zener Voltage Min. V_Z	Zener Voltage Max. V_Z	Test Current I_{ZT}	Maximum‡ Dynamic Impedance Z_{ZT} @ I_{ZT}	Voltage Temperature Stability ΔV_{ZT} Max.	Temperature Range	Typical Temperature Coefficient
	V	V	mA	Ω	mV	°C	%/°C
1N821	5.9	6.5	7.5	15	96	−55 to +100	.01
1N821A				10	96	−55 to +100	.01
1N823				15	48	−55 to +100	.005
1N823A				10	48	−55 to +100	.005
1N825				15	19	−55 to +100	.002
1N825A	5.9	6.5	7.5	10	19	−55 to +100	.002
1N827				15	9	−55 to +100	.001
1N827A				10	9	−55 to +100	.001
1N829				15	5	−55 to +100	.0005
1N829A				10	5	−55 to +100	.0005

‡Zener Impedance is derived from the 1kHz voltage created when AC current with RMS value of 10% of DC zener test current is superimposed on the test current.

DO-7 Case



250 mW, TC

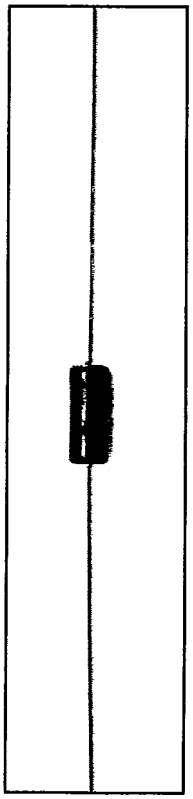
DO-7 Case

Type†	Nominal Zener Voltage V_Z+	Test Current I_{ZT}	Maximum‡ Dynamic Impedance Z_{ZT} @ I_{ZT}	Voltage Temperature Stability ΔV_{ZT} Max.	Temperature Range	Typical Temperature Coefficient
	V	mA	Ω	mV	°C	%/°C
1N4765	9.1	0.5	350	68	0 to + 75	0.01
1N4765A				141	−55 to +100	0.01
1N4766				34	0 to + 75	0.005
1N4766A				70	−55 to +100	0.005
1N4767	9.1	0.5	350	14	0 to + 75	0.002
1N4767A				28	−55 to +100	0.002
1N4768				7	0 to + 75	0.001
1N4768A				14	−55 to +100	0.001
1N4769	9.1	0.5	350	3	0 to + 75	0.005
1N4769A		0.5	350	7	−55 to +100	0.005
1N4770		1.0	200	68	0 to + 75	0.01
1N4770A		1.0	200	141	−55 to +100	0.01
1N4771	9.1	1.0	200	34	0 to + 75	0.005
1N4771A				70	−55 to +100	0.005
1N4772				14	0 to + 75	0.002
1N4772A				28	−55 to +100	0.002
1N4773	9.1	1.0	200	7	0 to + 75	0.001
1N4773A				14	−55 to +100	0.001
1N4774				3	0 to + 75	0.0005
1N4774A				7	−55 to +100	0.0005

‡Standard tolerance is ±5%.
‡Zener Impedance is derived from the 1kHz voltage created when AC current with RMS value of 10% of DC zener test current is superimposed on the test current.

These silicon devices are low level, temperature-compensated, zener reference diodes. Oxide-passivated junctions give long term stability and make these diodes highly reliable reference sources. Glass-enclosed construction provides a rugged, hermetically-sealed unit.

DO-7 Case



250 mW, TC

DO-7 Case

Type	Zener Voltage Min. V_Z	Zener Voltage Max. V_Z	Test Current I_{ZT}	Maximum Dynamic Impedance‡ Z_{ZT} @ I_{ZT}	Voltage Temperature Stability ΔV_{ZT} Max.	Temperature Range	Typical Temperature Coefficient
	V	V	mA	Ω	mV	°C	%/°C
1N3496	5.9	6.5	7.5	15	23	0 to +75	.005
1N3497					9		.002
1N3498					5		.001
1N3499					2		.0005
1N3500					47		.01

‡Zener impedance is derived from the 60 Hz voltage created when AC current with RMS value of 10% of DC zener test current is superimposed on the test current.

AMERICAN POWER DEVICES SELECTION GUIDE

APD devices cross-reference to Motorola part numbers. For applications where output voltages must remain within narrow limits during changes in input voltage, load resistance and temperature.

TEMPERATURE COMPENSATED VOLTAGE REFERENCE DIODES

Nominal Zener Voltage V	Test Current mA dc	Test Temperature Points	Average Temperature Coefficient Over The Operating Range										Case
			0.01%/°C		0.005%/°C		0.002%/°C		0.001%/°C		0.0005%/°C		
			Type	ΔVz Max V	Type	ΔVz Max V	Type	ΔVz Max V	Type	ΔVz Max V	Type	ΔVz Max V	
6.2*	7.5	A	1N821	0.096	1N823	0.048	1N825	0.019	1N827	0.009	1N829	0.005	DO-7
6.2**	7.5	A	1N821A	0.096	1N823A	0.048	1N825A	0.019	1N827A	0.009	1N829A	0.005	
6.4	0.5	B	1N4565	0.046	1N4566	0.024	1N4567	0.010	1N4568	0.005	1N4569	0.002	
	0.5	A	1N4565A	0.099	1N4566A	0.050	1N4567A	0.020	1N4568A	0.010	1N4569A	0.005	
	1.0	B	1N4570	0.048	1N4571	0.024	1N4572	0.010	1N4573	0.005	1N4574	0.002	
	1.0	A	1N4570A	0.099	1N4571A	0.050	1N4572A	0.020	1N4573A	0.010	1N4574A	0.005	
	2.0	B	1M4575	0.048	1N4576	0.024	1N4577	0.010	1N4578	0.005	1N4579	0.002	
	2.0	A	1N4575A	0.099	1N4576A	0.050	1N4577A	0.020	1N4578A	0.010	1N4579A	0.005	
	4.0	B	1N4580	0.048	1N4581	0.024	1N4582	0.010	1N4583	0.005	1N4584	0.002	
	4.0	A	1N4580A	0.099	1N4581A	0.050	1N4582A	0.020	1N4583A	0.010	1N4584A	0.005	
8.4	10	A	1N3154	0.130	1N3155	0.065	1N3156	0.026	1N3157	0.013	....	....	DO-7
	10	C	1N3154A	0.172	1N3155A	0.085	1N3156A	0.034	1N3157A	0.017	....	....	
8.5	0.5	B	1N4775	0.064	1N4776	0.032	1N4777	0.013	1N4778	0.006	1N4779	0.003	
	0.5	A	1N4775A	0.132	1N4776A	0.066	1N4777A	0.026	1N4778A	0.013	1N4779A	0.007	
	1.0	B	1N4780	0.064	1N4781	0.032	1N4782	0.013	1N4783	0.006	1N4784	0.003	
	1.0	A	1N4780A	0.132	1N4781A	0.066	1N4782A	0.026	1N4783A	0.013	1N4784A	0.007	
9.0	7.5	B	1N935	0.067	1N936	0.033	1N937	0.013	1N938	0.006	1N939	0.003	
	7.5	A	1N935A	0.139	1N936A	0.069	1N937A	0.027	1N938A	0.013	1N939A	0.007	
	7.5	C	1N935B	0.184	1N936B	0.092	1N937B	0.037	1N938B	0.018	1N939B	0.009	
9.1	0.5	B	1N4765	0.068	1N4766	0.034	1N4767	0.014	1N4768	0.007	1N4769	0.003	
	0.5	A	1N4765A	0.141	1N4766A	0.070	1N4767A	0.028	1N4768A	0.014	1N4769A	0.007	
	1.0	B	1N4770	0.068	1N4771	0.034	1N4772	0.014	1N4773	0.007	1N4774	0.003	
	1.0	A	1N4770A	0.141	1N4771A	0.070	1N4772A	0.028	1N4773A	0.014	1N4774A	0.007	
11.7	7.5	B	1N941	0.088	1N942	0.044	1N943	0.018	1N944	0.009	1N945	0.004	
	7.5	A	1N941A	0.181	1N942A	0.090	1N943A	0.036	1N944A	0.018	1N945A	0.009	
	7.5	C	1N941B	0 239	1N942B	0.120	1N943B	0.047	1N944B	0.024	1N945B	0.012	

* $Z_{ZT} = 15$
** $Z_{ZT} = 10$

Test Temperature Points	
A	-55, 0, +25, +75, +100
B	0, +25, +75
C	-55, 0, 25, +75, +100, +150
D	0, +25, +70
E	-55, 0, +25, +75, +125
F	-55, 0, +75, +125, +185
G	+25, +75, +100

APD CAN SELECT THE ABOVE PARTS TO 1% AND 2% TOLERANCES
BURN-IN AND SPECIAL TESTING CAN ALSO BE PROVIDED AS REQUIRED

american
power devices, inc.

1N821-1N829
1N821A-1N829A

500 mW temperature compensated zener reference diodes

FEATURES

- 6.2 V stable references
- Guaranteed maximum %/°c
- Hermetically sealed glass package

MAXIMUM RATINGS

- Junction Temperature: -65°C lo +200°C
- Storage Temperature: -65°C to +200°C
- DC Power Dissipation: 500mW @ T_L<50°C
- Derate above 50°C: 3.33mW/°C

These silicon devices are low-level, temperature compensated, zener reference diodes. Oxide-passivated junctions give them stability and make these diodes highly reliable reference sources. Glass-enclosed construction provides a rugged, hermetically sealed unit.

ELECTRICAL CHARACTERISTICS @ T_A = 25°C

JEDEC TYPE NUMBER	ZENER VOLTAGE (Note 1 and 4) V_Z @ I_{ZT}	ZENER TEST CURRENT I_{ZT}	MAXIMUM ZENER IMPEDANCE (Note 3 and 4) Z_{ZT}	VOLTAGE TEMPERATURE STABILITY (ΔV_{ZT} MAX) −55° to +100° (Note 3 and 4)	EFFECTIVE TEMPERATURE COEFFICIENT α_{VZ}
	VOLTS	mA	OHMS	mV	%/°C
1N821	5.9 - 6.5	7.5	15	96	0.01
1N821A	5.9 - 6.5	7.5	10	96	0.01
1N822†	5.9 - 6.5	7.5	15	96	0.01
1N823	5.9 - 6.5	7.5	15	48	0.005
1N823A	5.9 - 6.5	7.5	10	48	0.005
1N824†	5.9 - 6.5	7.5	15	48	0.005
1N825	5.9 - 6.5	7.5	15	19	0.002
1N825A	5.9 - 6.5	7.5	10	19	0.002
1N826	6.2 - 6.9	7.5	15	20	0.002
1N827	5.9 - 6.5	7.5	15	9	0.001
1N827A	5.9 - 6.5	7.5	10	9	0 001
1N828	6.2 - 6.9	7.5	15	10	0.001
1N829	5.9 - 6.5	7.5	15	5	0.0005

† Double anode Electrical specifications apply under both polarities

MECHANICAL CHARACTERISTICS

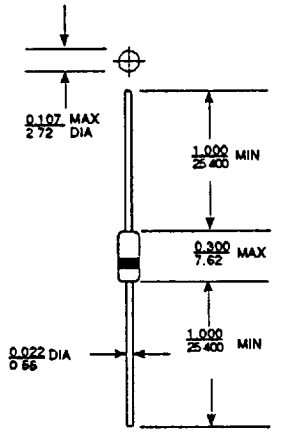


FIGURE 1 all dimensions In INCH mm

CASE: Hermetically sealed glass package (DO-7)
FINISH: Corrosion resistant. Leads are tin plated.
THERMAL RESISTANCE: 250°C/W (typ) junction to ambient.
POLARITY: Cathode banded.
WEIGHT: 0.2 grams (typ).

This series also offered in DO-35 package. Consult factory for availability.

Note 1 The zener impedance is derived from the 60 Hz ac voltage, which results when an ac current having an rms value equal to 10% of the DC zener current (I_{ZT}) is superimposed on I_{ZT}. Zener impedance is measured at two points to insure a sharp knee at breakdown thus eliminating unstable devices.

Note 2 The maximum allowable change over the entire temperature range, i e the diode voltage will not exceed the specified mV at any discrete temperature between the established limits.

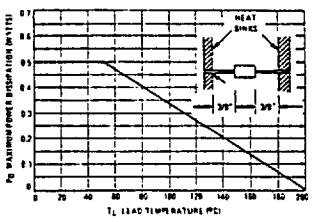


Figure 2 POWER DERATING

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TYPICAL CHARACTERISTICS

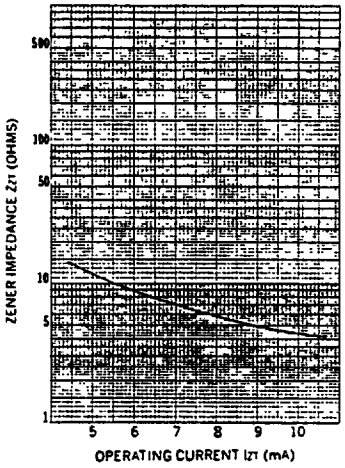

Figure 3 CHANGE OF ZENER IMPEDANCE VERSUS CHANGE IN OPERATING CURRENT

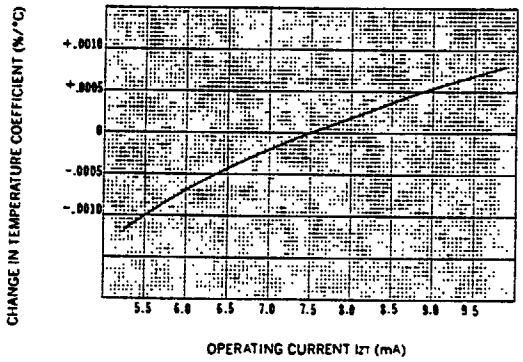

Figure 4 CHANGE OF TEMPERATURE COEFFICIENT VERSUS CHANGE IN OPERATING CURRENT

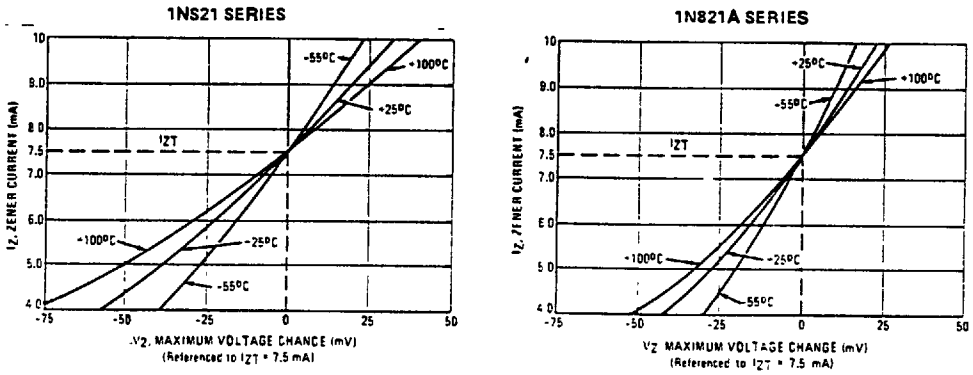

Figure 5 ZENER CURRENT VERSUS MAXIMUM VOLTAGE CHANGE

TC ZENER DIODES

250mW (cont.)

Part #	Nominal Zener Voltage Min.	Nominal Zener Voltage Max.	Test Current	Maximum Dynamic Impedance	Voltage Temperature Stability	Temperature Range	Typical Temperature Coefficient
	V_Z (V)		I_{ZT} (mA)	Z_{ZT} @ I_{ZT} (Ω)	ΔV_{ZT} maximum (mV)	°C	T_C (%/°C)
1N821	5.9	6.5	7.5	15	96	-55/+100	.01
1N821A	5.9	6.5	7.5	10	96	-55/+100	.01
1N823	5.9	6.5	7.5	15	48	-55/+100	.005
1N823A	5.9	6.5	7.5	10	48	-55/+100	.005
1N825	5.9	6.5	7.5	15	19	-55/+100	.002
1N825A	5.9	6.5	7.5	10	19	-55/+100	.002
1N827	5.9	6.5	7.5	15	9	-55/+100	.001
1N827A	5.9	6.5	7.5	10	9	-55/+100	.001
1N829	5.9	6.5	7.5	15	5	-55/+100	.0005
1N829A	5.9	6.5	7.5	10	5	-55/+100	.0005

400mW & 500mW

Part #	Nominal Zener Voltage	Test Current	Maximum Dynamic Impedance	Voltage Temperature Stability	Temperature Range	Typical Temperature Coefficient
	V_Z (V)	I_{ZT} (mA)	Z_{ZT} @ I_{ZT}	ΔV_{ZT} (mV)	°C	T_C (%/°C)
1N4565	6.4	0.5	200	48	0/+75	.01
1N4565A	6.4	0.5	200	99	-55/+100	.01
1N4566	6.4	0.5	200	24	0/+75	.005
1N4566A	6.4	0.5	200	50	-55/+100	.005
1N4567	6.4	0.5	200	9.6	0/+75	.002
1N4567A	6.4	0.5	200	20	-55+/100	.002
1N4568	6.4	0.5	200	4.8	0/+75	.001
1N4568A	6.4	0.5	200	9.9	-55/+100	.001
1N4569	6.4	0.5	200	2.4	0/+75	.0005
1N4569A	6.4	0.5	200	5.0	-55/+100	.0005
1N4570	6.4	1.0	100	48	0/+75	.01
1N4570A	6.4	1.0	100	99	-55+/100	.01
1N4571	6.4	1.0	100	24	0/+75	.005
1N4571A	6.4	1.0	100	50	-55/+100	.005
1N4572	6.4	1.0	100	9.6	0/+75	.002
1N4572A	6.4	1.0	100	20	-55/+100	.002
1N4573	6.4	1.0	100	4.8	0/+75	.001
1N4573A	6.4	1.0	100	9.9	-55+/100	.001
1N4574	6.4	1.0	100	2.4	0/+75	.0005
1N4574A	6.4	1.0	100	5.0	-55/+100	.0005
1N4575	6.4	2.0	50	48	0/+75	.01
1N4575A	6.4	2.0	50	99	-55+/100	.01
1N4576	6.4	2.0	50	24	0/+75	.005
1N4576A	6.4	2.0	50	50	-55+/100	.005
1N4577	6.4	2.0	50	9.6	0/+75	.002
1N4577A	6.4	2.0	50	20	-55/+100	.002
1N4578	6.4	2.0	50	4.8	0/+75	.001
1N4578A	6.4	2.0	50	9.9	-55/+100	.001
1N4579	6.4	2.0	50	2.4	0/+75	.0005
1N4579A	6.4	2.0	50	5.0	-55+/100	.0005
1N4580	6.4	4.0	25	48	0/+75	.01
1N4580A	6.4	4.0	25	99	-55/+100	.01
1N4581	6.4	4.0	25	24	0/+75	.005
1N4581A	6.4	4.0	25	50	-55/+100	.005
1N4582	6.4	4.0	25	9.6	0/+75	.002
1N4582A	6.4	4.0	25	20	-55+/100	.002
1N4583	6.4	4.0	25	4.8	0/+75	.001
1N4583A	6.4	4.0	25	9.9	-55/+100	.001
1N4584	6.4	4.0	25	2.4	0/+75	.0005
1N4584A	6.4	4.0	25	5.0	-55/+100	.0005