

current regulator diodes designed for . . .

- **Current Regulation**
- **Current Limiting**
- **Biasing**
- **Low Voltage References**

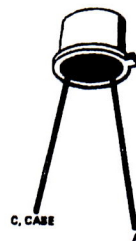
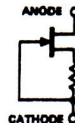
BENEFITS

- Simple Two Lead Current Source
- Current Insensitive to Temperature Changes
Temperature Coefficient Better Than 1500 ppm/°C On All Devices
- TO-18 Package for Improved Current Control
- Simplifies Floating Current Sources
No Power Supplies Required

ABSOLUTE MAXIMUM RATINGS (25°C)

Peak Operating Voltage	100 V
Forward Current	20 mA
Reverse Current	50 mA
Thermal Resistance θ_{JC}	100°C/W
Power Dissipation at $T_C = 25^\circ\text{C}$	1.25 W
Operating Junction Temperature	-55 to +150°C
Storage Temperature	-55 to +200°C

TO-18
See Section 7



ELECTRICAL CHARACTERISTICS (25°C unless otherwise noted)

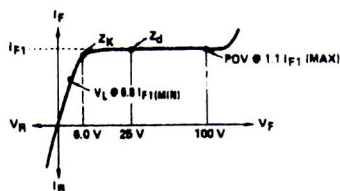
Symbol	I _{F1}			Z _d		Z _k		V _L		POV	θ ₁			G E O M
Parameter	Regulator Current			Dynamic Impedance		Knee Impedance		Limiting Voltage		Peak Operating Voltage	Temperature Coefficient			
Conditions	V _F = 25 V (Note 1)			V _F = 25 V (Note 2)		V _F = 6 V		I _F = 0.8 I _{F1} (Min) (Note 3)		I _F = 1.1 I _{F1} (Max) (Note 4)	V _F = 25 V 55°C < T _A < 25°C	V _F = 25 V 0°C < T _A < 50°C	V _F = 25 V 25°C < T _A < 125°C	
Units	(mA)			MΩ		MΩ		Volts		Min Volts	Typ ppm/°C	Typ ppm/°C	Typ ppm/°C	
	Nom	Min	Max	Min	Typ	Min	Typ	Max	Typ					
CR022	0.22	0.198	0.242	13.0	16.0	2.75	3.5	1.0	0.40	100	+1350	+1060	+750	N K L
CR024	0.24	0.216	0.264	10.0	14.0	2.35	3.0	1.0	0.46	100	+1200	+900	+600	
CR027	0.27	0.243	0.297	9.0	13.0	1.95	2.8	1.0	0.50	100	+1000	+700	+400	
CR030	0.30	0.270	0.330	8.0	12.0	1.60	2.5	1.0	0.55	100	+800	+500	+200	
CR033	0.33	0.297	0.363	6.8	11.0	1.35	2.2	1.0	0.60	100	+600	+300	-50	
CR039	0.39	0.351	0.429	4.10	9.5	1.00	1.80	1.05	0.70	100	+300	+50	-300	
CR043	0.43	0.387	0.473	3.30	8.6	0.87	1.65	1.05	0.78	100	+150	-150	-450	
CR047	0.47	0.423	0.517	2.70	8.0	0.75	1.50	1.10	0.85	100	-50	-300	-600	
CR058	0.58	0.504	0.616	1.90	6.5	0.56	1.25	1.20	0.98	100	-300	-600	-900	
CR082	0.62	0.558	0.682	1.55	6.2	0.47	1.15	1.30	1.10	100	-500	-800	-1100	
CR088	0.68	0.612	0.748	1.35	8.5	0.400	1.70	1.15	0.70	100	+850	+400	-50	N K M
CR075	0.75	0.675	0.825	1.16	7.2	0.335	1.50	1.20	0.75	100	+650	+200	-250	
CR082	0.82	0.738	0.902	1.00	6.0	0.290	1.30	1.25	0.80	100	+450	+50	-450	
CR091	0.91	0.819	1.001	0.88	5.2	0.240	1.10	1.29	0.85	100	+300	-150	-600	
CR100	1.00	0.900	1.100	0.80	4.4	0.205	0.95	1.35	0.95	100	+150	-300	-750	
CR110	1.10	0.990	1.210	0.70	3.8	0.180	0.80	1.40	1.05	100	+50	-450	-900	
CR120	1.20	1.08	1.32	0.64	3.3	0.155	0.71	1.45	1.15	100	150	-600	-1050	
CR130	1.30	1.17	1.43	0.58	3.2	0.135	0.60	1.50	1.25	100	-300	750	-1200	
CR140	1.40	1.26	1.54	0.54	2.5	0.115	0.52	1.55	1.30	100	-400	-850	-1300	
CR150	1.50	1.35	1.65	0.51	2.2	0.105	0.46	1.60	1.35	100	-500	-950	-1400	
CR160	1.60	1.44	1.76	0.475	1.00	0.092	0.35	1.65	0.50	100	+650	+350	+50	N K O
CR180	1.80	1.62	1.98	0.420	0.95	0.074	0.30	1.75	0.55	100	+500	+200	-100	
CR200	2.00	1.80	2.20	0.395	0.88	0.061	0.25	1.85	0.60	100	+350	+50	-250	
CR220	2.20	1.98	2.42	0.370	0.80	0.052	0.22	1.95	0.65	100	+200	-100	-350	
CR240	2.40	2.16	2.64	0.345	0.75	0.044	0.20	2.00	0.70	100	+50	-200	-450	
CR270	2.70	2.43	2.97	0.320	0.68	0.035	0.18	2.15	0.75	100	-100	-300	-550	
CR300	3.00	2.70	3.30	0.300	0.60	0.029	0.14	2.25	0.85	100	-250	-450	-700	
CR330	3.30	2.97	3.63	0.280	0.56	0.024	0.13	2.35	0.90	100	-400	-600	-800	
CR360	3.60	3.24	3.96	0.265	0.52	0.020	0.11	2.50	0.95	100	-550	-750	-900	
CR390	3.90	3.51	4.29	0.255	0.48	0.017	0.10	2.60	1.00	100	-700	-850	-1000	
CR430	4.30	3.87	4.73	0.245	0.45	0.014	0.09	2.75	1.10	100	-850	-950	-1100	N K O
CR470	4.70	4.23	5.17	0.235	0.40	0.012	0.08	2.90	1.40	100	-1000	-1100	-1200	

NOTES:

1. Pulse test — steady state currents may vary.
2. Pulse test — steady state impedances may vary.
3. Min V_F required to insure $I_F > 0.8 I_{F1}(\text{min})$.
4. Max V_F where $I_F < 1.1 I_{F1}(\text{max})$ is guaranteed.

NKL, NKM, NKO

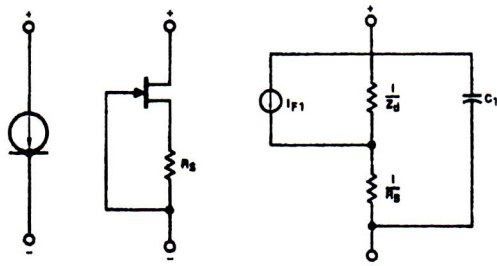
Current-Limiter Diode V-I Characteristic



SYMBOLS AND DEFINITIONS

- A Anode (Drain)
 C Cathode (Source and Gate Shorted)
 I_F Forward Current (Anode Positive)
 I_{F1} Current at a specified Test Voltage, V_F
 POV Peak Operating Voltage
 θ_I Current Temperature Coefficient
 θ_{JC} Thermal Resistance Junction to Case
 θ_{JA} Thermal Resistance Junction to Ambient
 Z_K Knee AC Impedance at specified V_F . Z_K should be as high as possible and is specified as a minimum.
 Z_d Dynamic Impedance at specified V_F . Z_d is specified as a minimum.

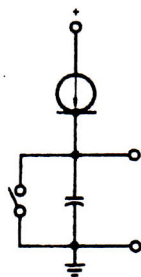
EQUIVALENT CIRCUIT



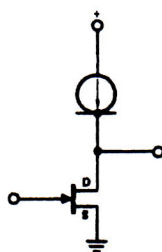
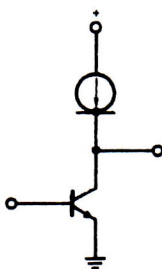
APPLICATIONS

The current-limiter diode is the electrical dual of the Zener diode.

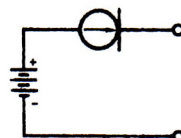
Constant-Current Timing Circuits



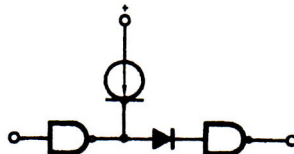
Collector or Drain Hi-Z Load Resistors



Constant-Current Supply or Current-Limiting Element



Logic Circuit Pull-Up Current Source



Emitter or Source Biasing

