SOLID STATE INC.
46 FARRAND STREET
BLOOMFIELD, NEW JERSEY 07003
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1N6097
1N6098

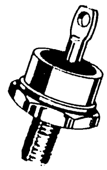
SWITCHMODE POWER RECTIFIERS

. . . using a platinum barrier metal in a large area metal-to-silicon power diode. State-of-the-art geometry features epitaxial construction with oxide passivation and metal overlap contact. Ideally suited for use as rectifiers in low-voltage, high-frequency inverters, free-wheeling diodes, and polarity-protection diodes.

- Guaranteed Reverse Avalanche
- Extremely Low v_F
- Low Stored Charge, Majority Carrier Conduction
- Guardring for Stress Protection
- Low Power Loss/High Efficiency
- 150°C Operating Junction Temperature Capability
- High Surge Capacity

SCHOTTKY BARRIER RECTIFIERS

60 AMPERES
20 to 45 VOLTS



DO-5

MAXIMUM RATINGS

Rating	Symbol	1N6097*	1N6098*		Unit
Peak Repetitive Reverse Voltage Working Peak Reverse Voltage DC Blocking Voltage	V_{RRM} V_{RWM} V_R	30	40		Volts
Peak Repetitive Forward Current (Rated V_R, Square Wave, 20 kHz)	I_{FRM}	—	—		Amps
Average Rectified Forward Current (Rated V_R)	I_O	50 T_C = 70°C	50 T_C = 70°C		Amps
Case Temperature (Rated V_R)	T_C	115	115		°C
Nonrepetitive Peak Surge Current (Surge applied at rated load conditions halfwave, single phase, 60 Hz)	I_{FSM}	←	800	→	Amps
Peak Repetitive Reverse Surge Current (2) (2.0 μs, 1.0 kHz) See Figure 10.	I_{RRM}	←	2.0	→	Amps
Operating Junction Temperature Range (Reverse Voltage Applied)	T_J	-65 to +125	-65 to +125		°C
Storage Temperature Range	T_{stg}	-65 to +125	-65 to +125		°C
Voltage Rate of Change (Rated V_R)	dv/dt	—	—		V/μs

THERMAL CHARACTERISTICS

Characteristic	Symbol	1N6097*	1N6098*		Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	←	1.0	→	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	1N6097*	1N6098*		Unit
Maximum Instantaneous Forward Voltage (2)	v_F				Volts
(i_F = 157 Amp, T_C = 70°C)		0.86	0.86		
(i_F = 60 Amp)		—	—		
(i_F = 60 Amp, T_C = 125°C)		—	—		
(i_F = 120 Amp, T_C = 125°C)		—	—		
Maximum Instantaneous Reverse Current (2)	i_R				mA
(Rated Voltage, T_C = 125°C)		250	250		
(Rated Voltage, T_C = 25°C)		—	—		
DC Reverse Current (Rated Voltage, T_C = 115°C)	I_R	250	250		mA
Maximum Capacitance (100 kHz ≤ f ≤ 1.0 MHz)	C_t	7000 V_R = 1.0 Vdc	7000 V_R = 1.0 Vdc		pF

*Indicates JEDEC Registered Data.
(1) Not a JEDEC requirement, but of Motorola product capability.
(2) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2.0%.

1N6097, 1N6098

FIGURE 1 — MAXIMUM FORWARD VOLTAGE

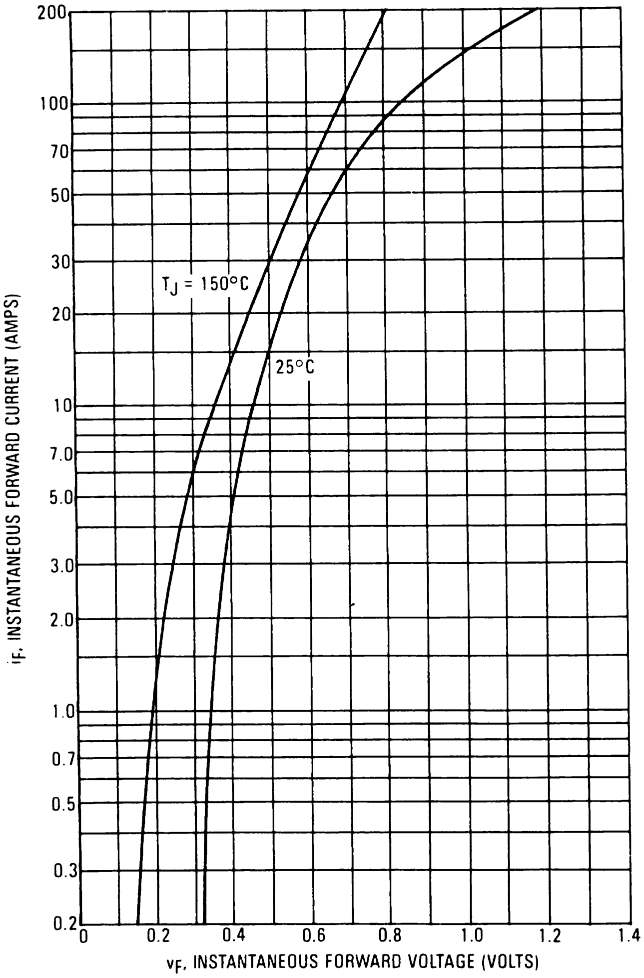


FIGURE 2 — MAXIMUM REVERSE CURRENT

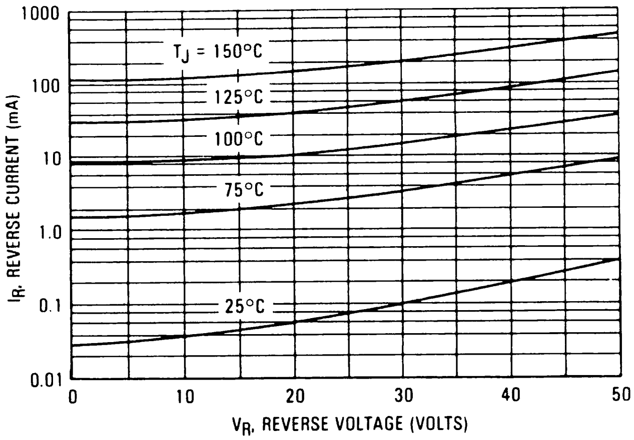
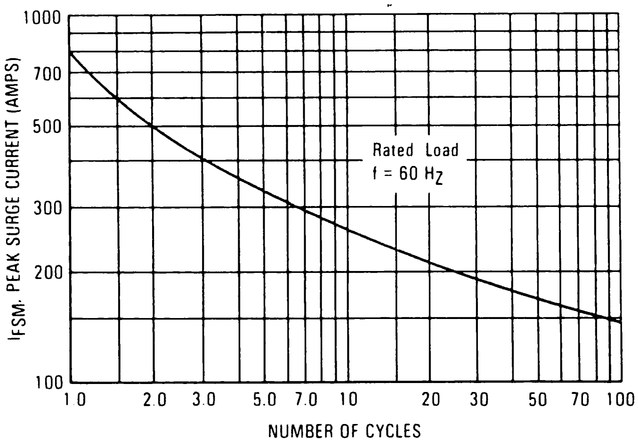


FIGURE 3 — MAXIMUM SURGE CAPABILITY



NOTE 1
HIGH FREQUENCY OPERATION

Since current flow in a Schottky rectifier is the result of majority carrier conduction, it is not subject to junction diode forward and reverse recovery transients due to minority carrier injection and stored charge. Satisfactory circuit analysis work may be performed by using a model consisting of an ideal diode in parallel with a variable capacitance. (See Figure 4.)

Rectification efficiency measurements show that operation will be satisfactory up to several megahertz. For example, relative waveform rectification efficiency is approximately 70 per cent at 2.0 MHz, e.g., the ratio of dc power to RMS power in the load is 0.28 at this frequency, whereas perfect rectification would yield 0.406 for sine wave inputs. However, in contrast to ordinary junction diodes, the loss in waveform efficiency is not indicative of power loss; it is simply a result of reverse current flow through the diode capacitance, which lowers the dc output voltage.

FIGURE 4 — CAPACITANCE

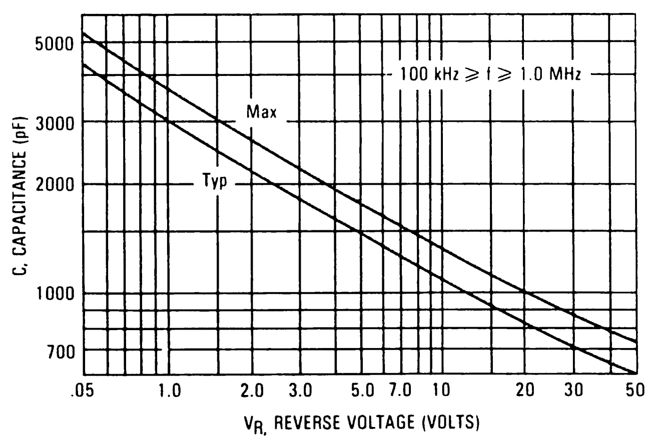


FIGURE 6 — CURRENT DERATING (1N6097/1N6098)

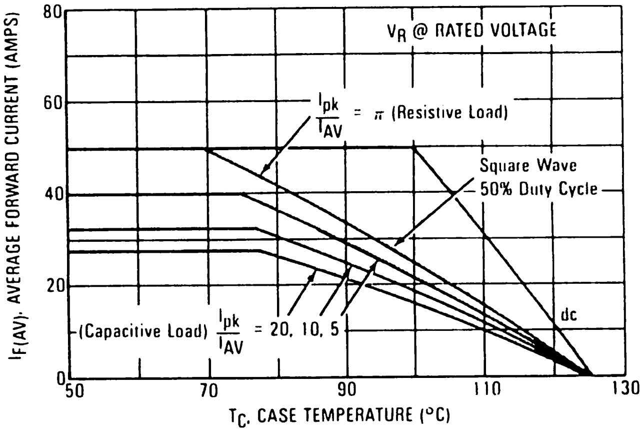
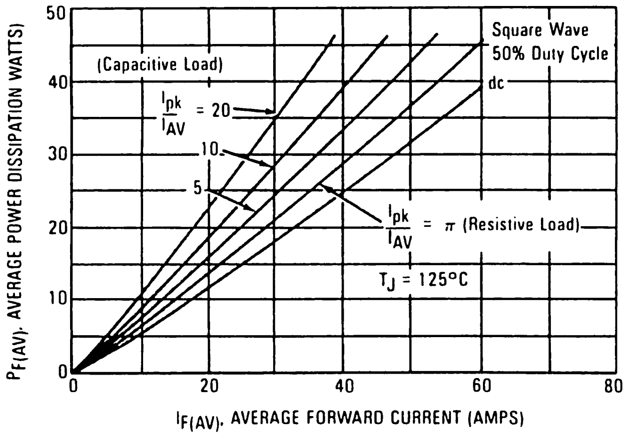
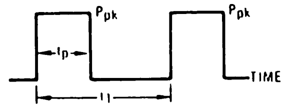


FIGURE 7 — POWER DISSIPATION



NOTE 2



DUTY CYCLE, $D = t_p/t_1$
PEAK POWER, P_{pk}, is peak of an equivalent square power pulse

To determine maximum junction temperature of the diode in a given situation, the following procedure is recommended:

The temperature of the case should be measured using a thermocouple placed on the case. The thermal mass connected to the case is normally large enough so that it will not significantly respond to heat surges generated in the diode as a result of pulsed operation once steady-state conditions are achieved. Using the measured value of T_C, the junction temperature may be determined by:

$$T_J = T_C + \Delta T_{JC}$$

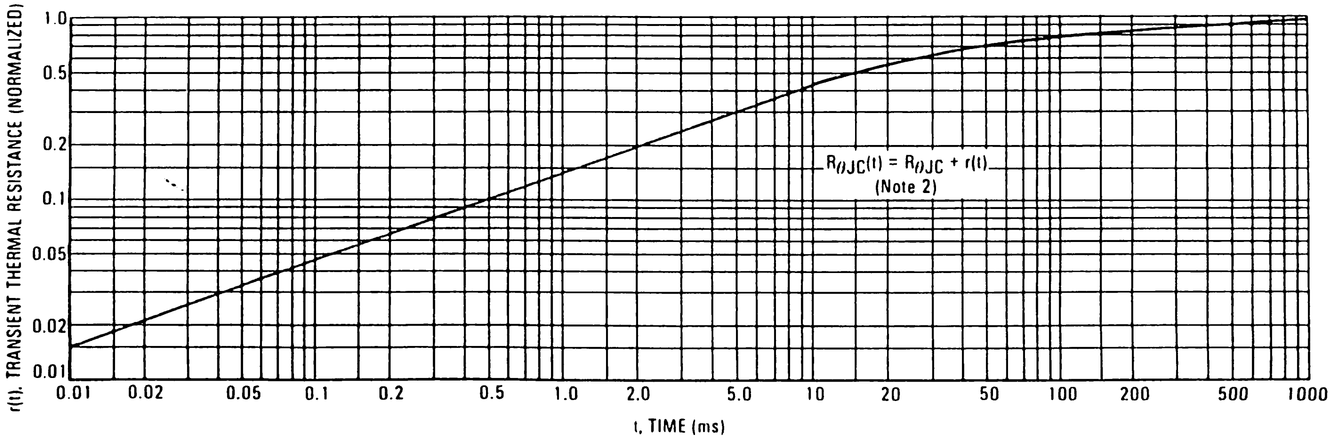
where ΔT_C is the increase in junction temperature above the case temperature. It may be determined by:

$\Delta T_{JC} = P_{pk} \cdot R_{\theta JC}[D + (1 - D) \cdot r(t_1 + t_p) + r(t_p) - r(t_1)]$ where

$r(t)$ = normalized value of transient thermal resistance at time, t, from Figure 8, i.e.,

$r(t_1 + t_p)$ = normalized value of transient thermal resistance at time $t_1 + t_p$

FIGURE 8 — THERMAL RESPONSE



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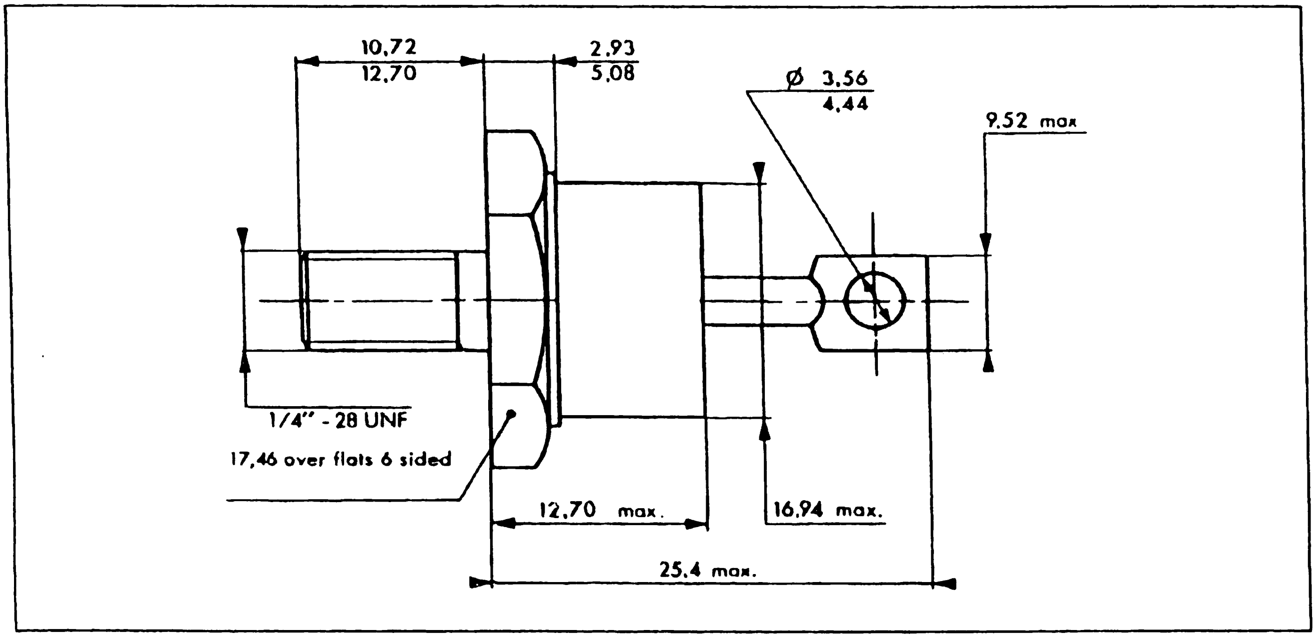
PACKAGE MECHANICAL DATA

DO 5 Metal



Marking : Cathode connected to case