SCHOTTKY

DLS-060 / FEBRUARY, 1975

VSK120, VSK130

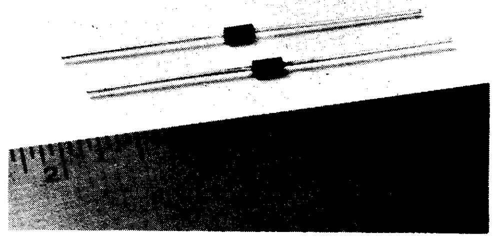
1 AMP SCHOTTKY BARRIER RECTIFIERS

20 VOLT AND 30 VOLT V_{RRM}

.450 VOLT AND .550 VOLT v_F AT i_F = 1.0 AMP

VERY FAST RECOVERY TIME

MINIMUM SIZED, LOW COST EPOXY ENCAPSULATION

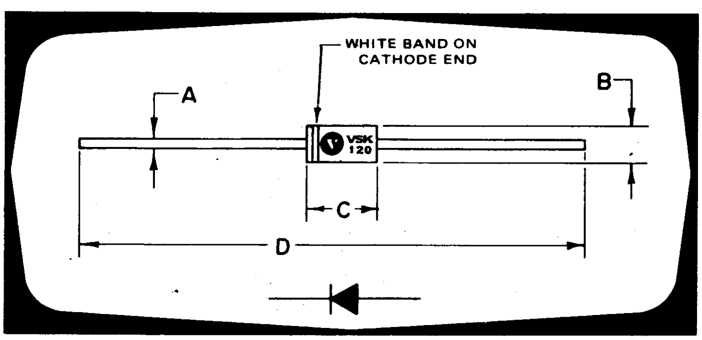


MAXIMUM RATINGS (At T_A = 25°C unless otherwise noted)	SYMBOL	VSK120	VSK130	UNITS
DC Blocking Voltage Working Peak Reverse Voltage Peak Repetitive Reverse Voltage	V_{RM} V_{RWM} V_{RRM}	20	30	Volts
RMS Reverse Voltage	$V_{R(RMS)}$	14	21	Volts
Average Rectified Forward Current (Fig. 5 & 6)	I_O	1.0		Amps
Ambient Temp. @ Rated V_{RM}, $R_{\theta JA} \leq 50$° C/W	T_A	85	80	°C
Peak Surge Current (non-rep), 300 µs Pulse Width (Fig.4)	I_{FSM}	100		Amps
Peak Surge Current (non-rep), ½ cycle, 60Hz (Fig.4)	I_{FSM}	40		Amps
Operating Junction Temperature	T_J	−65 to +125*		°C
Storage Temperature	T_{STG}	−65 to +150		°C

*$V_{RM} \leq 0.1\ V_{RM}$ Max, $R_{\theta JA} \leq 35$°C/W

ELECTRICAL CHARACTERISTICS (At T_A = 25°C unless otherwise noted)		SYMBOL	VSK120	VSK130	UNITS
Maximum Instantaneous Forward Voltage Drop (1)		v_F			
See Fig. 2 for Typical v_F	i_F=0.1 Amp		.320	.330	Volts
	i_F=1.0 Amp		.450	.550	Volts
	i_F=3.0 Amp		.750	.875	Volts
Maximum Instantaneous Reverse Current at Rated V_{RM} (1)		i_R			
See Fig. 1 for Typical i_R	T_L=25° C		1.0		mA
	T_L=100° C		10.0		mA

(1) Pulse Test: Pulse Width = 300 µs, Duty Cycle = 2%



LTR.	INCHES	MILLIMETERS
A	.030–.034 Dia.	.76–.86 Dia.
B	.10–.107 Dia.	2,54–2,72 Dia.
C	.185–.205	4,70–5,21
D	2.40	60,96

VARO

VARO SEMICONDUCTOR, INC. P. O. BOX 676, 1000 NORTH SHILOH, GARLAND, TEXAS 75040, (214) 272-4551 TWX 910-860-5178

1 AMP SCHOTTKY BARRIER RECTIFIERS

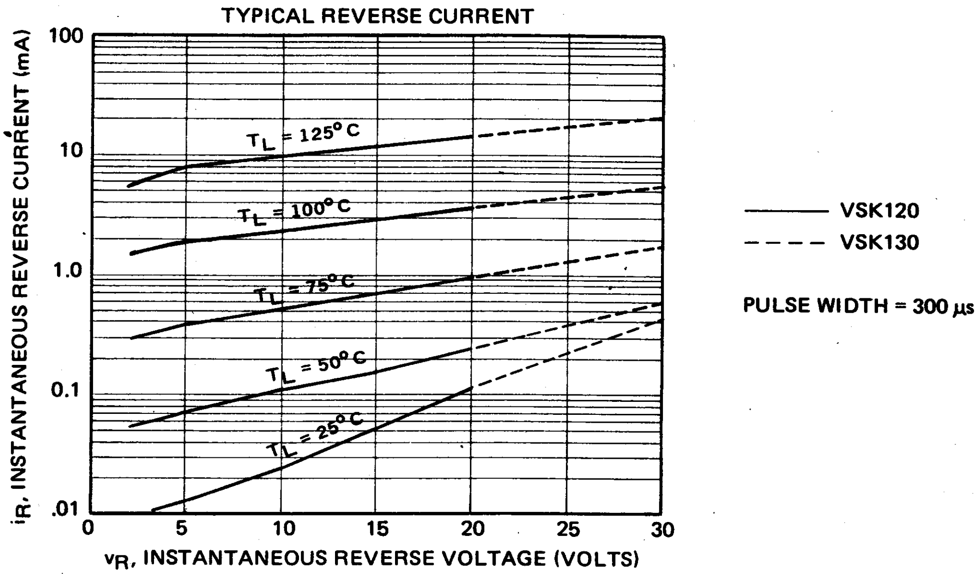


FIGURE 1

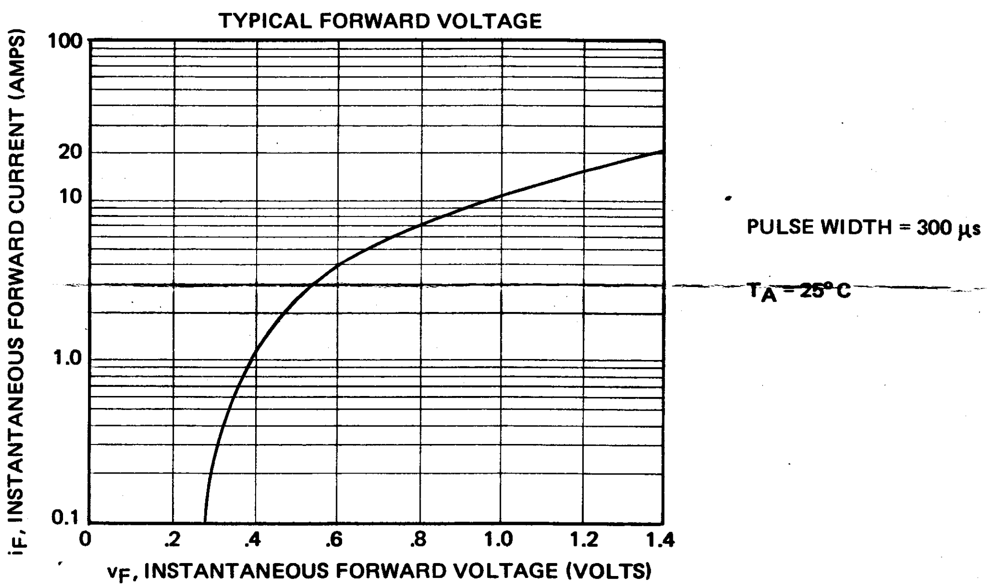
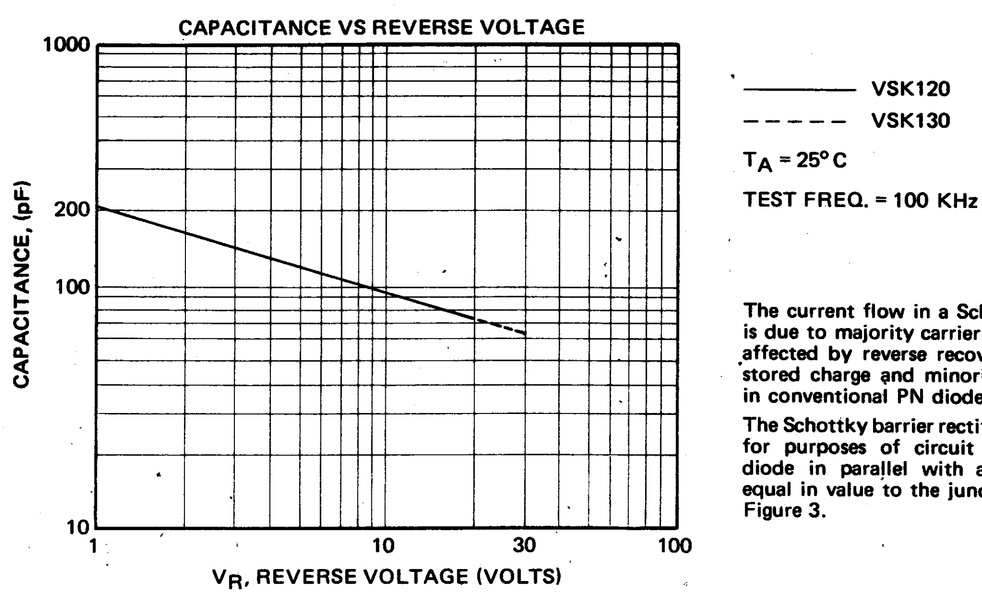


FIGURE 2



The current flow in a Schottky barrier rectifier is due to majority carrier conduction and is not affected by reverse recovery transients due to stored charge and minority carrier injection as in conventional PN diodes.

The Schottky barrier rectifier may be considered for purposes of circuit analysis, as an ideal diode in parallel with a variable capacitance equal in value to the junction capacitance. See Figure 3.

FIGURE 3

1 AMP SCHOTTKY BARRIER RECTIFIERS

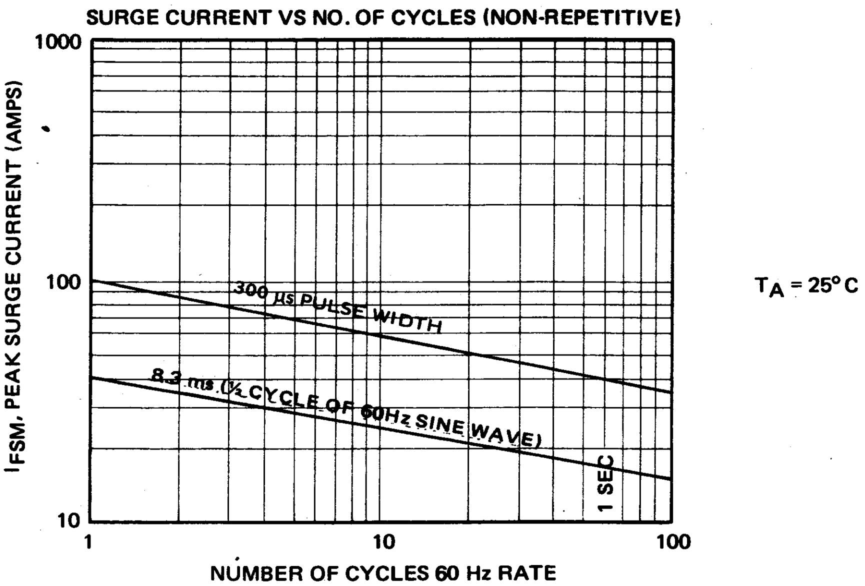
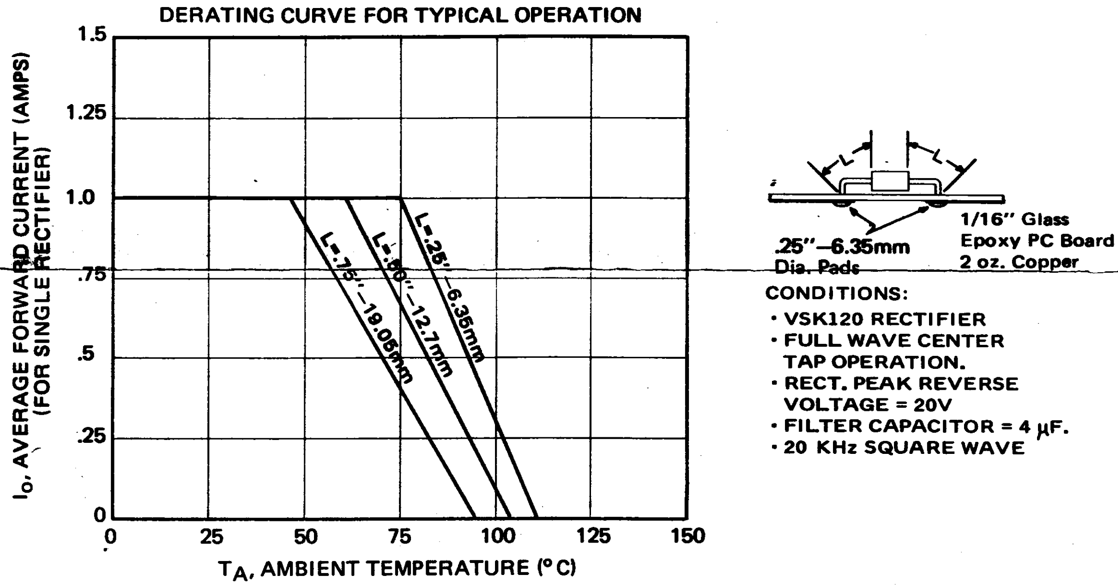
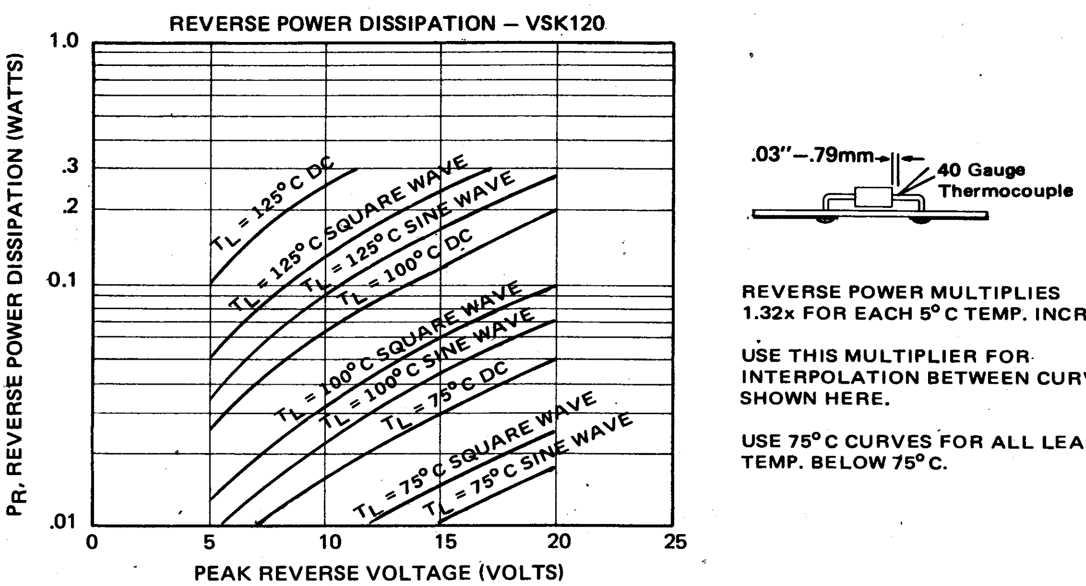


FIGURE 4



CONDITIONS:
- VSK120 RECTIFIER
- FULL WAVE CENTER TAP OPERATION.
- RECT. PEAK REVERSE VOLTAGE = 20V
- FILTER CAPACITOR = 4 μF.
- 20 KHz SQUARE WAVE

FIGURE 5



REVERSE POWER MULTIPLIES 1.32x FOR EACH 5° C TEMP. INCREASE

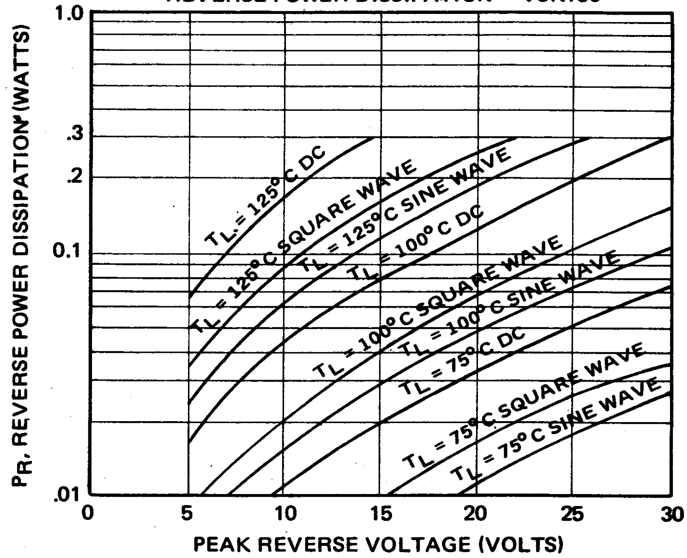
USE THIS MULTIPLIER FOR INTERPOLATION BETWEEN CURVES SHOWN HERE.

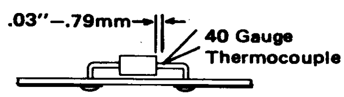
USE 75° C CURVES FOR ALL LEAD TEMP. BELOW 75° C.

FIGURE 6 (A)

1 AMP SCHOTTKY BARRIER RECTIFIERS

REVERSE POWER DISSIPATION — VSK130





REVERSE POWER MULTIPLIES 1.32x FOR EACH 5°C TEMP. INCREASE

USE THIS MULTIPLIER FOR INTERPOLATION BETWEEN CURVES SHOWN HERE.

USE 75°C CURVES FOR ALL LEAD TEMP. BELOW 75°C.

FIGURE 6 (B)

FORWARD POWER DISSIPATION

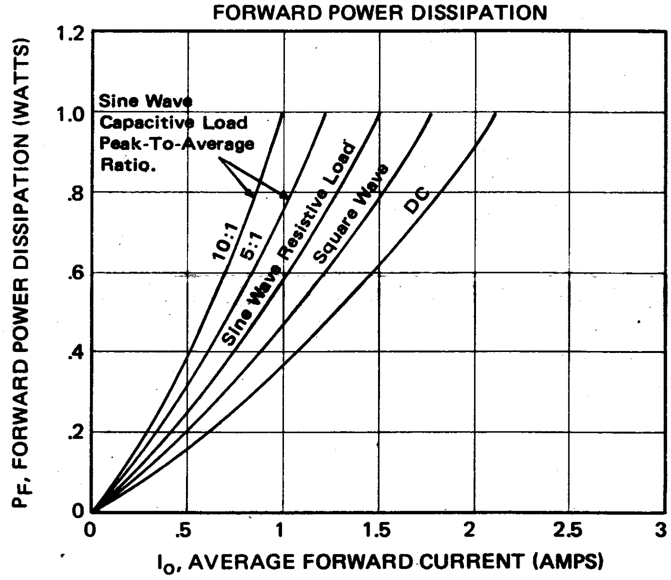


FIGURE 6 (C)

MAXIMUM ALLOWABLE POWER DISSIPATION VS TIE POINT TEMPERATURE

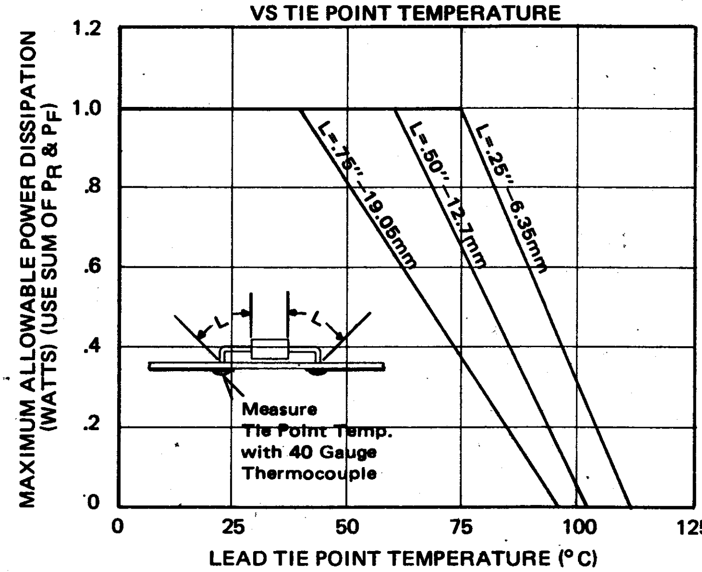


FIGURE 6 (D)

Thermal Considerations:

1. The derating curve of figure 5 may be used for initial design work.
2. Use the curves of figure 6 to study the voltage / current / temperature parameters. These curves are helpful in determining the rectifier capability when connected to a tie point whose temperature is influenced by other heat producing components. To use these curves, add the reverse power dissipation from figure 6 (A) or (B) to the forward power dissipation from figure 6 (C) then go to figure 6 (D) to find the maximum allowable tie point temperature.
3. The heat sink design (tie point) must be designed to keep the temperature at this point below that shown on the figure 6 (D) curve. Thermal runaway is entirely possible on marginal designs due to the inherently large reverse leakage of Schottky barrier rectifiers and the fact that reverse power multiplies about 1.32 times for each 5° C of temperature increase.
4. The curves of figure 6 (D) were based on full rated reverse bias voltage. Slightly higher tie point temperatures can be tolerated at lower voltages. We recommend that all designs be verified at an ambient temperature at least 10° C higher than the maximum at which the equipment will ever have to operate.
5. If the application is such that DC reverse bias is applied nearly 100% of the time, all temperature points on curve 6 (D) should be reduced 13° C.
6. These thermal resistances apply: $R_{\theta JL}$ (measured 1/32" from epoxy) = 12° C/W and the lead = 50° C/W per inch when equal heatsinking is applied to each lead.

SCHOTTKY

DLS-061 / FEBRUARY, 1975

VSK320, VSK330

3 AMP SCHOTTKY BARRIER RECTIFIERS

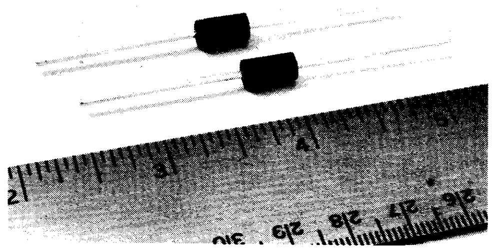
INDEG
INDEG Industrie Elektronik
Gesellschaft für Beratung und Vertrieb mbH
Technisches Büro
7032 SINDELFINGEN 1, Vaihinger Str. 21
Telefon (07031) <875052>

20 VOLT AND 30 VOLT V_{RRM}

.475 VOLT AND .500 VOLT v_F AT i_F = 3.0 AMP

VERY FAST RECOVERY TIME

MINIMUM SIZED, LOW COST EPOXY ENCAPSULATION

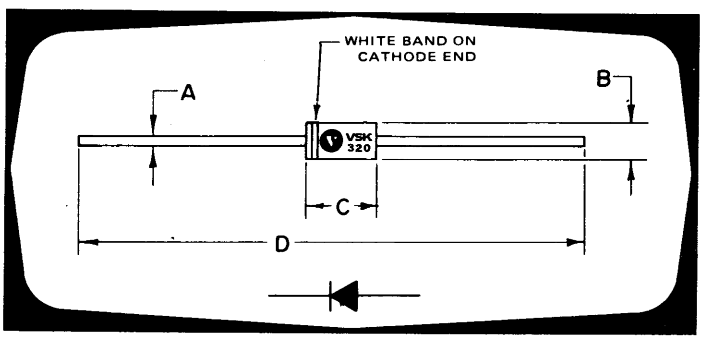


MAXIMUM RATINGS (At T_A = 25°C unless otherwise noted)	SYMBOL	VSK320	VSK330	UNITS
DC Blocking Voltage Working Peak Reverse Voltage Peak Repetitive Reverse Voltage	V_{RM} V_{RWM} V_{RRM}	20	30	Volts
RMS Reverse Voltage	$V_{R(RMS)}$	14	21	Volts
Average Rectified Forward Current (Fig. 5 & 6)	I_O	3.0		Amps
Ambient Temp. @ Rated V_{RM}, $R_{\theta JA} \leq$ 24° C/W	T_A	80	75	°C
Peak Surge Current (non-rep), 300 μs Pulse Width (Fig.4)	I_{FSM}	250		Amps
Peak Surge Current (non-rep), ½ cycle, 60Hz (Fig.4)	I_{FSM}	150		Amps
Operating Junction Temperature	T_J	−65 to +125*		°C
Storage Temperature	T_{STG}	−65 to +150		°C

*$V_{RM} \leq 0.1\ V_{RM}$ Max, $R_{\theta JA} \leq 32°$ C/W

ELECTRICAL CHARACTERISTICS (At T_A = 25°C unless otherwise noted)	SYMBOL	VSK320	VSK330	UNITS
Maximum Instantaneous Forward Voltage Drop (1) See Fig. 2 for Typical v_F — i_F= 1.0 Amp i_F= 3.0 Amps i_F=10.0 Amps	v_F	 .370 .475 .850	 .380 .500 .900	Volts
Maximum Instantaneous Reverse Current at Rated V_{RM} (1) See Fig. 1 for Typical i_R — T_L=25° C T_L=100° C	i_R	 3.0 30.0		mA

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2%



LTR.	INCHES	MILLIMETERS
A	.048–.052 Dia.	1,22–1,32 Dia.
B	.20 Dia.	5,08 Dia.
C	.38	9,65
D	2.75	69,85

VARO

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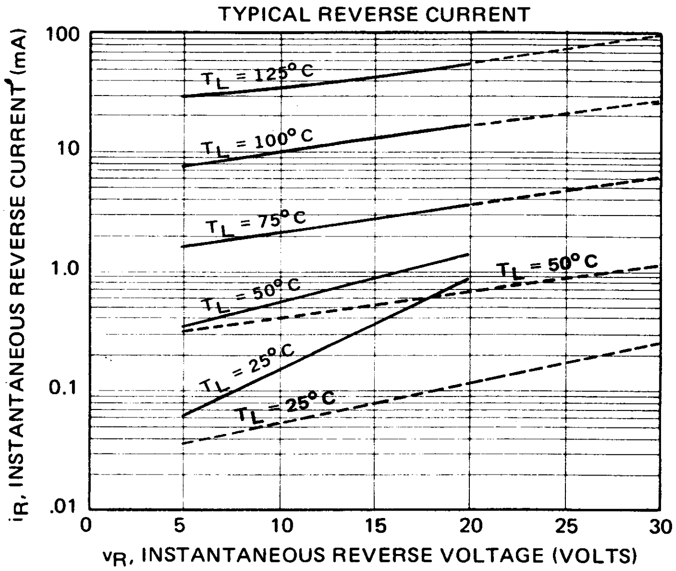
3 AMP SCHOTTKY BARRIER RECTIFIERS



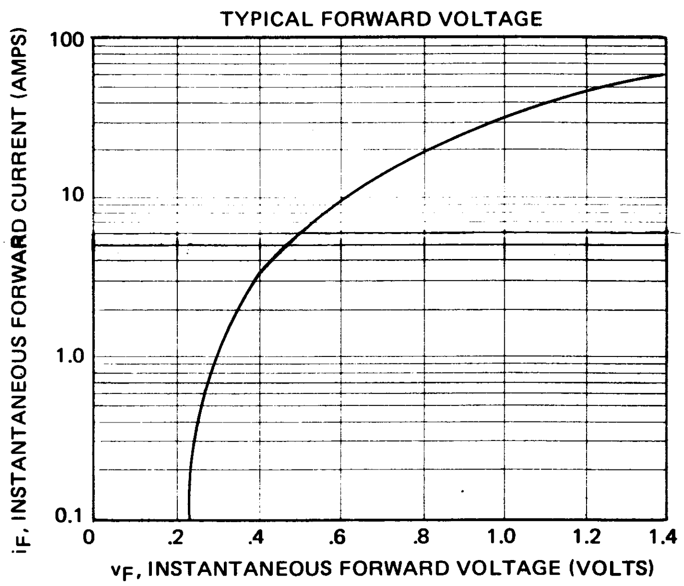
——— VSK320

- - - - VSK330

PULSE WIDTH = 300 μs

T_L = LEAD TEMP. MEASURED .03" – .79mm FROM RECT. BODY WITH 40 GAUGE THERMOCOUPLE.

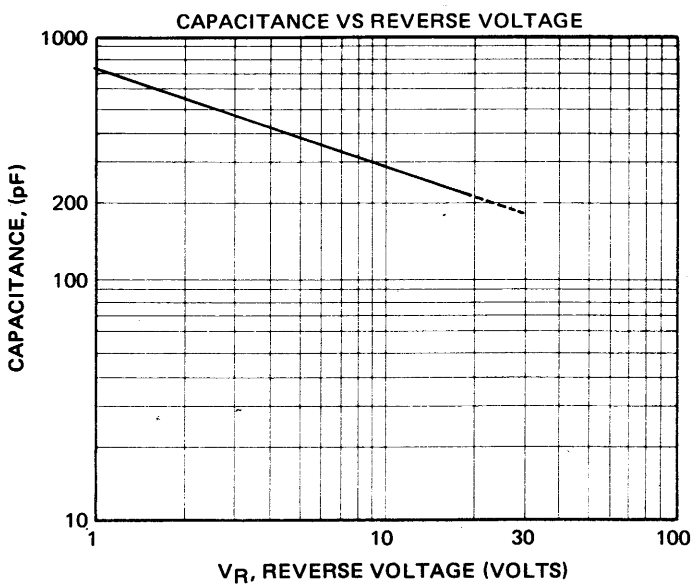
FIGURE 1



PULSE WIDTH = 300 μs

T_A = 25°C

FIGURE 2



——— VSK320

- - - - - VSK330

T_A = 25°C

TEST FREQ. = 100 KHz

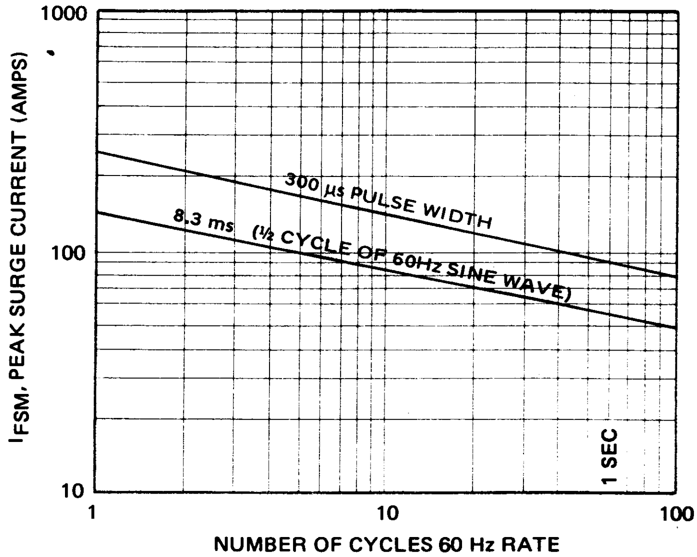
The current flow in a Schottky barrier rectifier is due to majority carrier conduction and is not affected by reverse recovery transients due to stored charge and minority carrier injection as in conventional PN diodes.

The Schottky barrier rectifier may be considered for purposes of circuit analysis, as an ideal diode in parallel with a variable capacitance equal in value to the junction capacitance. See Figure 3.

FIGURE 3

3 AMP SCHOTTKY BARRIER RECTIFIERS

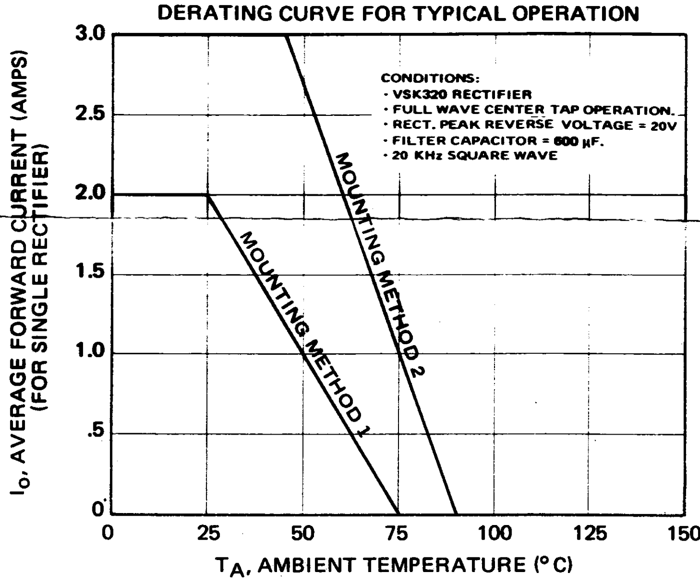
SURGE CURRENT VS NO. OF CYCLES (NON-REPETITIVE)



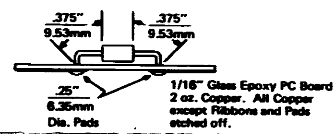
$T_A = 25°C$

FIGURE 4

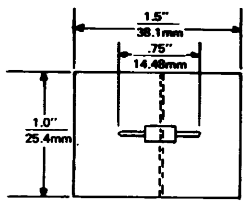
DERATING CURVE FOR TYPICAL OPERATION



MOUNTING METHOD 1



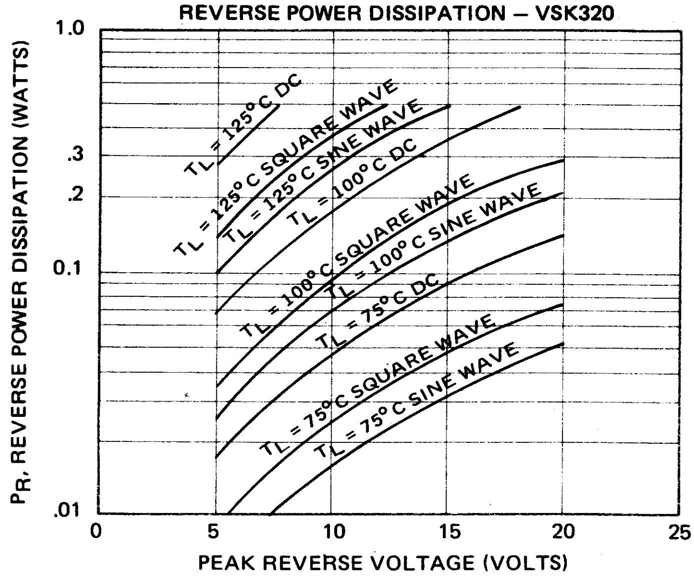
MOUNTING METHOD 2 – TOP VIEW

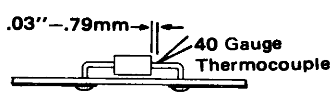


1/16" Glass Epoxy PC Board
2 oz. Copper. Essentially all
Copper remaining on board.

FIGURE 5

REVERSE POWER DISSIPATION – VSK320





REVERSE POWER MULTIPLIES 1.32x FOR EACH 5°C TEMP. INCREASE

USE THIS MULTIPLIER FOR INTERPOLATION BETWEEN CURVES SHOWN HERE.

USE 75°C CURVES FOR ALL LEAD TEMP. BELOW 75°C.

FIGURE 6 (A)

3 AMP SCHOTTKY BARRIER RECTIFIERS

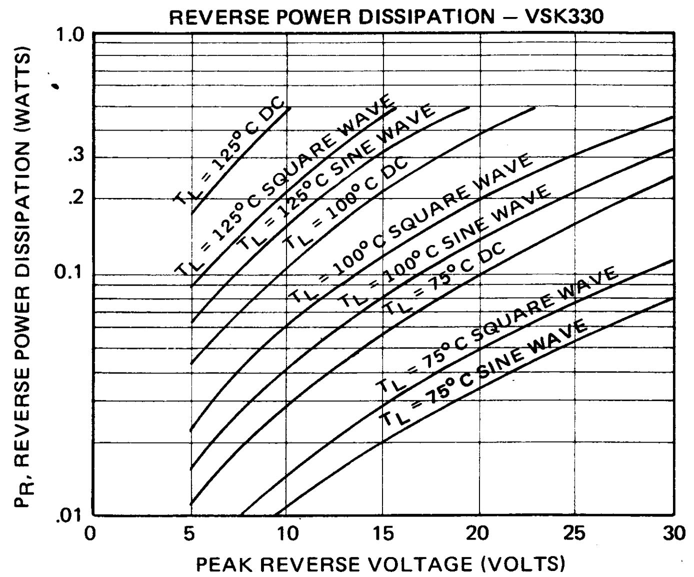
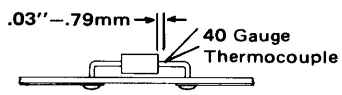


FIGURE 6 (B)



REVERSE POWER MULTIPLIES 1.32x FOR EACH 5° C TEMP. INCREASE

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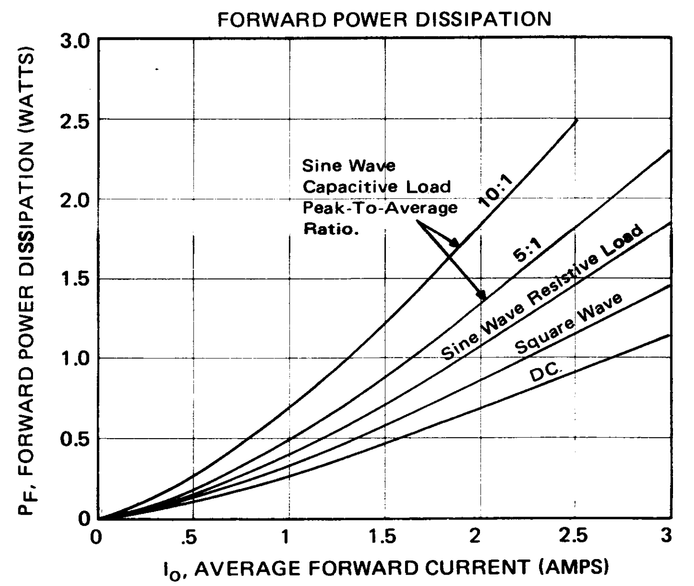


FIGURE 6 (C)

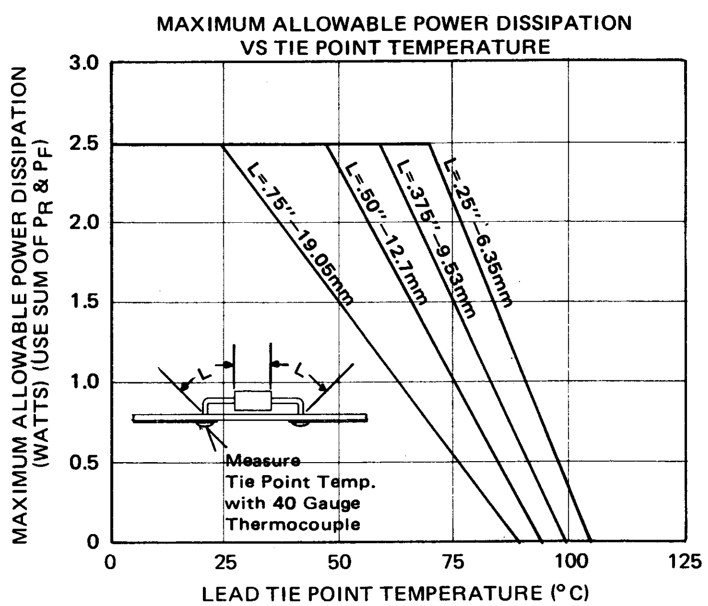


FIGURE 6 (D)

Thermal Considerations:

1. The derating curve of figure 5 may be used for initial design work.
2. Use the curves of figure 6 to study the voltage / current / temperature parameters. These curves are helpful in determining the rectifier capability when connected to a tie point whose temperature is influenced by other heat producing components. To use these curves, add the reverse power dissipation from figure 6 (A) or (B) to the forward power dissipation from figure 6 (C) then go to figure 6 (D) to find the maximum allowable tie point temperature.
3. The heat sink design (tie point) must be designed to keep the temperature at this point below that shown on the figure 6 (D) curve. Thermal runaway is entirely possible on marginal designs due to the inherently large reverse leakage of Schottky barrier rectifiers and the fact that reverse power multiplies about 1.32 times for each 5° C of temperature increase.
4. The curves of figure 6 (D) were based on full rated reverse bias voltage. Slightly higher tie point temperatures can be tolerated at lower voltages. We recommend that all designs be verified at an ambient temperature at least 10° C higher than the maximum at which the equipment will ever have to operate.
5. If the application is such that DC reverse bias is applied nearly 100% of the time, all temperature points on curve 6 (D) should be reduced 13° C.
6. These thermal resistances apply: $R_{\theta JL}$ (measured 1/32" from epoxy) = 7° C/W and the lead = 25° C/W per inch when equal heatsinking is applied to each lead.

SCHOTTKY

DLS-062 / FEBRUARY, 1975

VSK520, VSK530

5 AMP SCHOTTKY BARRIER RECTIFIERS

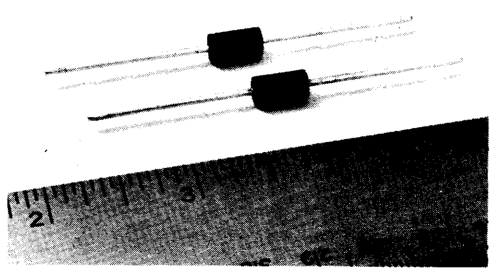
INDEG
I N D E G Industrie Elektronik
Gesellschaft für Beratung und Vertrieb mbH
Technisches Büro
7032 SINDELFINGEN 1, Vaihinger Str. 21
Telefon (07031) <875052>

20 VOLT AND 30 VOLT V_{RRM}

.380 VOLT v_F AT i_F = 5.0 AMP

VERY FAST RECOVERY TIME

MINIMUM SIZED, LOW COST EPOXY ENCAPSULATION

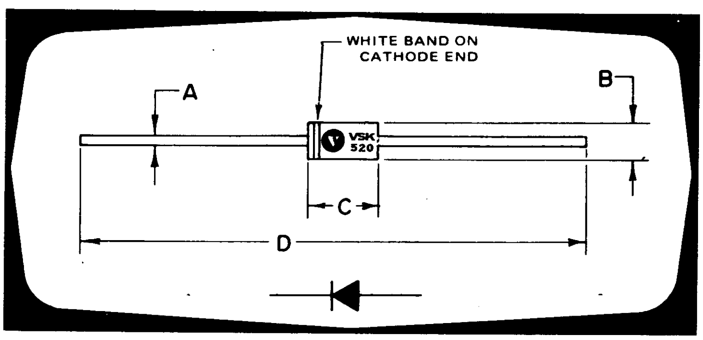


MAXIMUM RATINGS (At T_A = 25°C unless otherwise noted)	SYMBOL	VSK520	VSK530	UNITS
DC Blocking Voltage Working Peak Reverse Voltage Peak Repetitive Reverse Voltage	V_{RM} V_{RWM} V_{RRM}	20	30	Volts
RMS Reverse Voltage	$V_{R(RMS)}$	14	21	Volts
Average Rectified Forward Current (Fig. 5 & 6)	I_O	5.0		Amps
Ambient Temp. @ Rated V_{RM}, $R_{\theta JA} \leq 16°$ C/W	T_A	65	60	°C
Peak Surge Current (non-rep), 300 μs Pulse Width (Fig.4)	I_{FSM}	500		Amps
Peak Surge Current (non-rep), ½ cycle, 60Hz (Fig.4)	I_{FSM}	250		Amps
Operating Junction Temperature	T_J	–65 to +125*		°C
Storage Temperature	T_{STG}	–65 to +150		°C

*$V_{RM} \leq 0.1\ V_{RM}$ Max, $R_{\theta JA} \geq 12°$ C/W

ELECTRICAL CHARACTERISTICS (At T_A = 25°C unless otherwise noted)	SYMBOL	VSK520	VSK530	UNITS
Maximum Instantaneous Forward Voltage Drop (1) See Fig. 2 for Typical v_F — i_F = 3.0 Amps i_F = 5.0 Amps i_F = 15.0 Amps	v_F	 .350 .380 .520		Volts
Maximum Instantaneous Reverse Current at Rated V_{RM} (1) See Fig. 1 for Typical i_R — T_L = 25° C T_L = 100° C	i_R	 10 75		mA

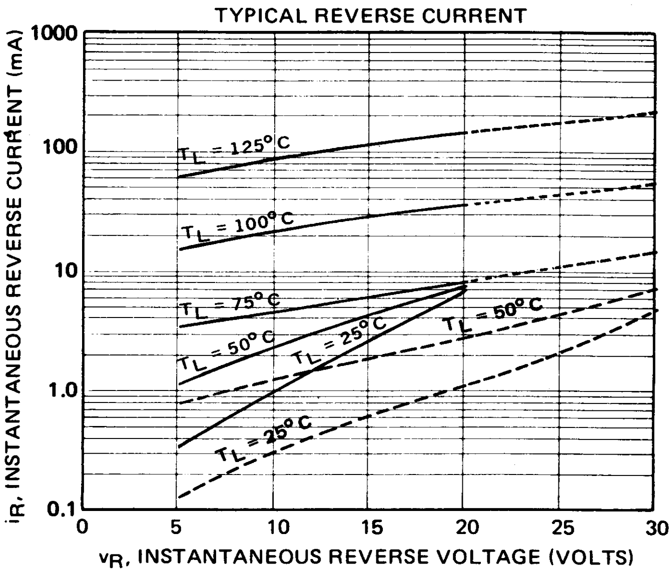
(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle = 2%



LTR.	INCHES	MILLIMETERS
A	.048–.052 Dia.	1,22–1,32 Dia.
B	.20 Dia.	5,08 Dia.
C	.38	9,65
D	2.75	69,85

VARO

5 AMP SCHOTTKY BARRIER RECTIFIERS



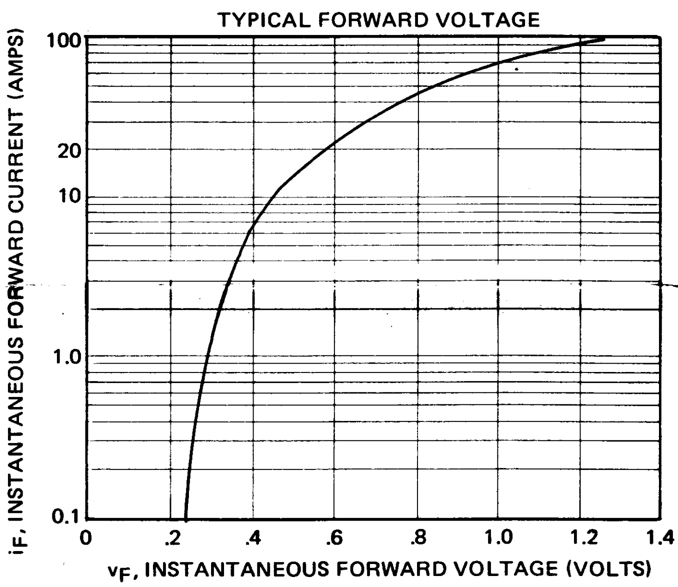
——— VSK520

- - - - VSK530

PULSE WIDTH = 300 μs

T_L = LEAD TEMP. MEASURED .03" – .79mm FROM RECT. BODY WITH 40 GAUGE THERMOCOUPLE

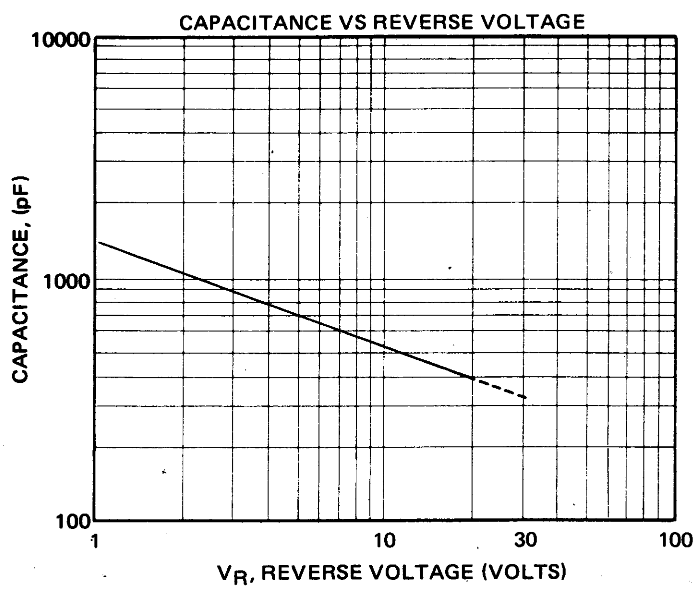
FIGURE 1



PULSE WIDTH = 300 μs

T_A = 25° C

FIGURE 2



——— VSK520

- - - - - VSK530

T_A = 25° C

TEST FREQ. = 100 KHz

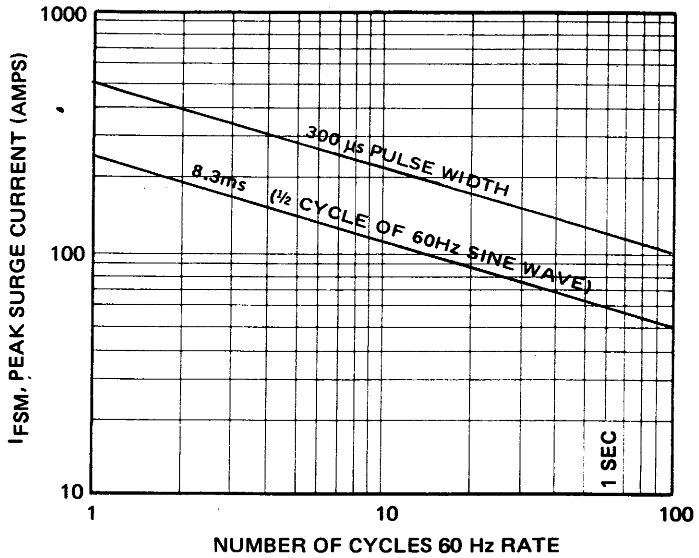
The current flow in a Schottky barrier rectifier is due to majority carrier conduction and is not affected by reverse recovery transients due to stored charge and minority carrier injection as in conventional PN diodes.

The Schottky barrier rectifier may be considered for purposes of circuit analysis, as an ideal diode in parallel with a variable capacitance equal in value to the junction capacitance. See Figure 3.

FIGURE 3

5 AMP SCHOTTKY BARRIER RECTIFIERS

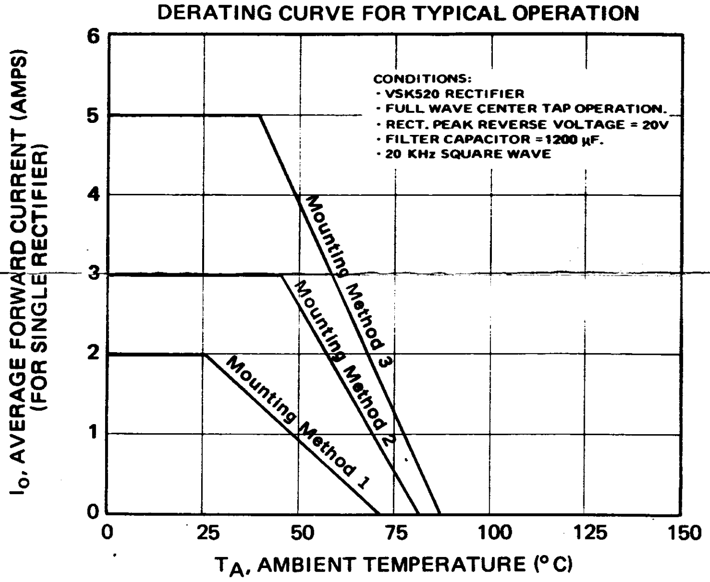
SURGE CURRENT VS NO. OF CYCLES (NON-REPETITIVE)



$T_A = 25°C$

FIGURE 4

DERATING CURVE FOR TYPICAL OPERATION



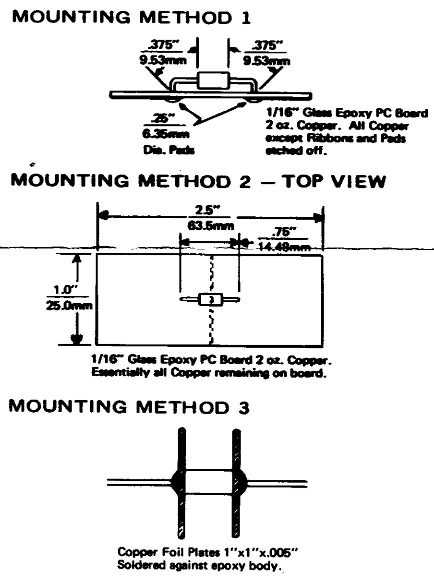
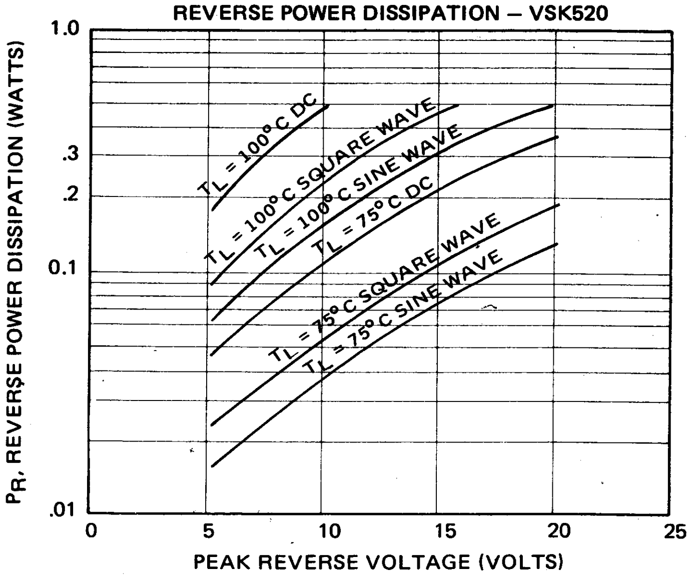
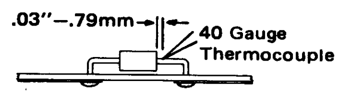


FIGURE 5

REVERSE POWER DISSIPATION — VSK520





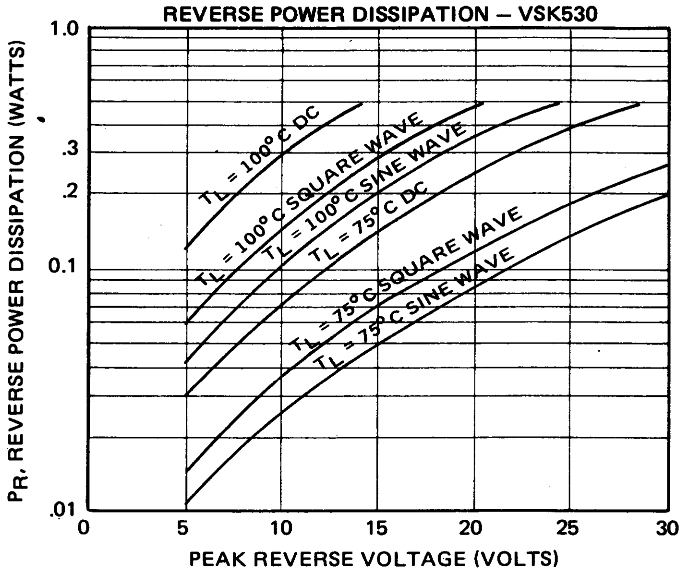
REVERSE POWER MULTIPLIES 1.32x FOR EACH 5°C TEMP. INCREASE

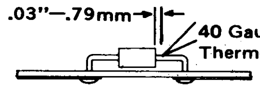
USE THIS MULTIPLIER FOR INTERPOLATION BETWEEN CURVES SHOWN HERE.

USE 75°C CURVES FOR ALL LEAD TEMP. BELOW 75°C.

FIGURE 6 (A)

5 AMP SCHOTTKY BARRIER RECTIFIERS





REVERSE POWER MULTIPLIES 1.32x FOR EACH 5° C TEMP. INCREASE

USE THIS MULTIPLIER FOR INTERPOLATION BETWEEN CURVES SHOWN HERE.

USE 75° C CURVES FOR ALL LEAD TEMP. BELOW 75°C.

FIGURE 6 (B)

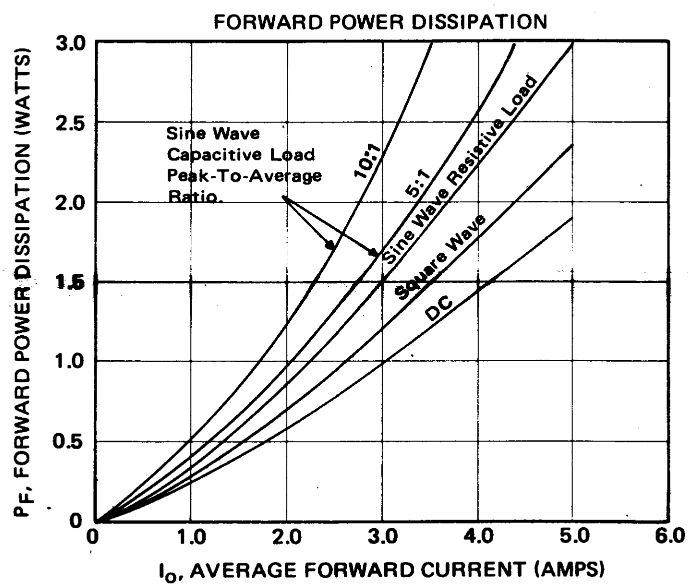


FIGURE 6 (C)

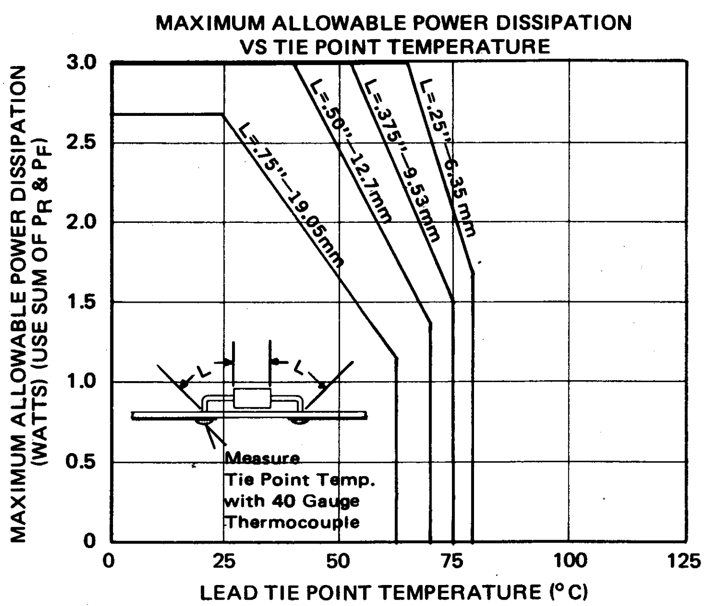


FIGURE 6 (D)

Thermal Considerations:

1. The derating curve of figure 5 may be used for initial design work.
2. Use the curves of figure 6 to study the voltage / current / temperature parameters. These curves are helpful in determining the rectifier capability when connected to a tie point whose temperature is influenced by other heat producing components. To use these curves, add the reverse power dissipation from figure 6 (A) or (B) to the forward power dissipation from figure 6 (C) then go to figure 6 (D) to find the maximum allowable tie point temperature.
3. The heat sink design (tie point) must be designed to keep the temperature at this point below that shown on the figure 6 (D) curve. Thermal runaway is entirely possible on marginal designs due to the inherently large reverse leakage of Schottky barrier rectifiers and the fact that reverse power multiplies about 1.32 times for each 5° C of temperature increase.
4. The curves of figure 6 (D) were based on full rated reverse bias voltage. Slightly higher tie point temperatures can be tolerated at lower voltages. We recommend that all designs be verified at an ambient temperature at least 10° C higher than the maximum at which the equipment will ever have to operate.
5. If the application is such that DC reverse bias is applied nearly 100% of the time, all temperature points on curve 6 (D) should be reduced 13° C.
6. These thermal resistances apply: $R_{\theta JL}$ (measured 1/32" from epoxy) = 6° C/W and the lead = 25° C/W per inch when equal heatsinking is applied to each lead.