



VARO SEMICONDUCTOR, INC., P.O. BOX 406 1000 NORTH SHILOH, GARLAND, TEXAS 7504 (214) 271-8511 TWX 910-860-5178

DLS 022

June 1981

IBR 10 Amp Silicon Avalanche Integrated Full Wave Bridge Rectifiers

Controlled Avalanche Junctions with 250V, 450V, and 650V, Minimum Avalanche Ratings 10 Amps DC Forward Current at $T_c = 100^{\circ}$ C 100 Amps Peak One Half Cycle Surge Current 2000 Volts DC Minimum Circuit-To-Case Insulation



*ASTERISK DENOTES JEDEC REGISTERED INFORMATION

MAXIMUM RATINGS ⁽¹⁾ (60Hz RESISTIVE AND INDUCTIVE LOAD)	SYMBOL	IN4436	IN4437	IN4438	UNITS
 DC Blocking Voltage Working Peak Reverse Voltage Peak Repetitive Reverse Voltage 	VRM VRWM VRRM	200	400	600	Volts
RMS Raverse Voltage	VR(RMS)	140	280	420	Volts
Power Dissipation In V(BR) Region for 100 µsec Squara Wave	PRM		600		Watts
Continuous Power Dissipation in V(BR) Region at $T_{C} = 50^{\circ}C$	PR		4		Watts/Leg
Peek Surge Currant, ½ Cycla at 60Hz, (Non-Rap) at TC =100°C (Fig. 2)	IFSM		100		Amps
Peak Surge Currant, 1 sec. at 60Hz and $T_C = 100^{\circ}C$ (Fig. 2)	IFRM		30		Amps
Avg. Forward Current at T _c = 100°C (Fig. 1)	lo		10		Amps
# Junction Operating and Storage Tamperatura Range	TJ, TSTG		-65 to +160		°c
	4 A				

NOTE: All measurements taken at T_c = 25^oC unless otherwise specified. Case Tamperatura, T_c, is measured on the bottom of the case within 0.125 inch of cantar.

ELECTRICAL CHARACTERISTICS (At $T_c = 25^{\circ}C$ unless otherwise specified)	SYMBOL	IN4436	IN4437	IN4438	UNITS
Minimum Avalancha Voltage	V(BR)	250	450	650	Volts
Maximum Avalancha Voltage	V(BR)	500	700	900	Volts
Maximum instantaneous Forward Voltage Drop at 10 Amps and T _c = 100 ^o C (Fig. 3)	VFM		1.2		Voits/Leg
Maximum Reverse Current at Rated V_{RM} and T_{C} = 150°C	IRM		0.2		mA
Maximum Tharmal Resistance, Junction to Case	Rej-C		1.5		°c/w
Insulation Strangth, Circult to Case, Min.			2000		Volts DC



LTR	INCHES	MILLIMETERS	LTR	INCHES	MILLIMETERS	LTR	INCHES	MILLIMETERS	LTR	INCHES	MILLIMETERS
A	*.130R	3,30	Η·	*.75057545	19,06-19,16	0	.875	22,23	V	.151161 Dia.	3,83-4,08
В	*.018028 Typ.	0.46-0,71	I	*.060	1,52	Р	.120	3,05	W	.135 Max.	3,42
С	*.070 Dia. Typ.	1,78	J	*.751756	19,06-19,20	Q	1.10	27,94	X	.187	4,75
D	*110130 Typ.	2,79-3,30	к	*.100 Max.	2,54	R	.3440	8,64-10,16	Y	.110 Dia.	2,79
E	*.290330	7,37-8,38	L	.25 Min.	6,35	S	1.177-1.197	29,89-30,40	z	.032 Typ.	0,81
F	*.825 Max.	20,95	м	.125 Typ.	3,18	Т	.525R Max.	13,33	AA	1.0 Max.	25,4
G	*.390-420	9,90-10,67	N	.930 Max.	23.62	U	.188R Max.	4,77			



. IN4437, and IN4438, Integrated Bridge Rectifiers with SAR®(silicon a /al_nche rectifier) characteristics, offer single-phase, full-wave rectification in rigidly constructed, hermetically sealed, welded packages. The electrically isolated grooved packages offer minimum size and maximum ease in mounting.

SAR characteristics insure that the avalanche voltage occurs below the point where, in conventional rectifiers, the junction perimeter is degraded or destroyed under trans-ient overvoltage conditions. SAR characteristics control the avalanche voltage of



FIGURE 1

TYPICAL INSTANTANEOUS FORWARD VOLTAGE DROP (PER LEG) VS DC FORWARD CURRENT

the internal junction so that avalanche occurs across the entire junction area. eliminates the need to buy more expensive, overrated devices to provide adequate protection against voltage transients.

Proper heat sinking of the IN4436, IN4437, and IN4438, allows great flexibility in DC output current range. This feature coupled with the electrically isolated case (insula-tion strength of 2000 volts minimum) allows the IBR to be used in many applications under conditions of reduced space, current, and cost than were previously possible.



FIGURE 2

NOTE: Devices available with optional flag terminals (.187" - 4,75mm) at no extra cost.

To order Flag Terminals, add suffix "F" to part no. To order TO-3 Mount, add suffix "T" to part no. To order Single Stud Mount, add suffix "S" to part no.





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DLS 025

IBR 25 Amp Silicon Avalanche Integrated Rectifiers

June 1981

140V, 280V, and 420V RMS Operation

250V, 450V, and 650V Minimum Avalanche Voltages 25 Amp DC Output Current at $T_c = 100^{\circ}C$ 250 Amp One/Cycle Surge Current 2000V Min. Circuit-To-Case Insulation



VT Series

MAXIMUM RATINGS(1) (60 Hz Resistive and Inductive Load)	SYMBOL	200V	400V	600V	UNIT	CIRCUIT(2)
DC Blocking Voltage Working Peak Reverse Voltage Peak Repetitive Reverse Voltage	VRM VRWM VRRM	200	400	600	Volt	ALL
RMS Reverse Voltage	VR (RMS)	140	280	420	Volt	ALL
Avg. Forward Current at T _C = 100°C (Fig. 2)	lo	(Circuit Output) 2	5	Amp	ALL
Peak Surge Current, $\frac{1}{2}$ Cycle @ 60 Hz (Non-Rep) et Tc = 100°C (Fig. 3)	IFSM		250		Amp/ Leg	ALL
Peak Surge Current, 1 sec et 60 Hz end Tc = 100° C (Non-Rep)	IF(RMS)		53		Amp/ Leg	ALL
Power Dissipation in V(sa) Region for 100 µsec., Squere Weve (Fig. 4)	Рвм		1500		Wett	ALL
Continuous Power Dissipation in $V_{\text{(se)}}$ Region et $T_{\text{C}} = 50^{\circ}\text{C}$	PR		4	Wett/ Leg	ALL	
Junction Operating and Storage Temp. Range	TJ, Tstg.		-65 to + 150		°C	ALL

ELECTRICAL CHARACTERISTICS (At Tc = 25°C unless otherwise specified)	SYMBOL	200V	400V	600V	UNIT	CIRCUIT(2)
Minimum Avalenche Voltage	V(BR)	250	450	650	Voit	ALL
Meximum Avalenche Voltage	V(BR)	700	900	1100	Volt	ALL
Mex. Instanteneous Forward Voltage Drop et 25 Amps	VFM		1.5		Volt/ Leg	ALL
Max. Reverse Current at Rated $V_{\rm RWM}$ end $T_{\rm C}\!=\!150^{\circ}{\rm C}$	Inst		5		mA/ Leg	ALL
Max. Thermel Resistance, Junction-to-Case	Rejc		1(2)		°C/W	VT VTH
Insulation Strength, Circuit-to-Cese		2000 (Min.)		VDC	ALL

Temperature (T_C) is measured on bottom of case within 0.125" (3.18mm) of centor of case. Reverse Side for Pert Number end Circuit Selection Guide. Full Wave Bridge, Single-end Three-Phase. Case See For



Ltr	inches	Millimeters	Ltr	Inches	Millmeters	Ltr	Inches	Millimeters	Ltr	inches	Millimeters
A	.032 Typ.	,81	G	.830 Max	21.08	м	.120	3,05	Т	2.250	57,15
В	1.0 Max.	25,4	н	.930 Max.	23,62	N	.34-40	8,64-10,16	U	1.125	28,58
С	.187 Typ.	4,75	1	.75057545	19,06-19,16	Р	.135 Max.	3,43	V	.156 Dia.	3,96
D	.25 Min.	6,35	J	.875	22,23	Q	1.177-1.197	29,90-30,40	w	.164	4,17
E	.125 Typ.	3,18	к	1.10 Max.	27,94	R	.525R Max.	13,34	х	.375	9,53
F	.110 Dia.	2,79	L	1.20 Max.	30,48	s	.151161 Dia.	3,84-4,09	Y	.50	12,70







FIG. 5



NONREPETITIVE REVERSE POWER SURGE MAXIMUM ALLOWABLE PEAK SQUARE WAVE REVERSE POWER VS PULSE OURATION



PART NUMBER SELECTION CHART TYPE 200V 400V 600V FULL WAVE BRIDGE VT 400 VT 600 VT 200 CENTER TAP COMMON CATHODE VTA200 VTA400 VTA600 CENTER TAP COMMON ANODE VTB200 **VTB400** VTB600 THREE PHASE COMMON CATHODE VTC200 VTC400 VTC600 THREE PHASE COMMON ANODE VTD200 VTD400 VTD600 THREE PHASE FULL WAVE BRIDGE VTH200 VTH400 VTH600

*Assembly of VTC and VTD (200V, 400V, or 600V) in single mounting flange. See drawing.

NOTE: Standard device has flags-only termination. To order TO-3 Mount add /T to part no. To order Single Stud Mount add /S to part no.





DLS 032

IBR: 25 Amp Fast Recovery Time Integrated Rectifiers

VY Series

June 1981

200 Nanosecond Reverse Recovery 100V, 200V, and 400V, V_{RRM} Ratings 150 Amps One Half Cycle Surge Current 2000V Minimum Circuit-To-Case Insulation



MAXIMUM RATINGS AT $T_A \approx 25^{\circ}C$ (unless otherwise specified)	SYMBOL	VY100X	VY200X	VY400X	UNITS
DC Blocking Voltage	V _{RM}			·····	····
Working Peak Reverse Voltage	VRWM	100	200	400	Volts
Peak Repetitive Reverse Voltage	VRRM				
Peak Reverse Voltage, ½ Cycle at 60Hz (non-rep)	V _{RM} (non-rep)	120	240	480	Volts
RMS Reverse Voltage	V _R (RMS)	70	140	280	Volts
Peak Surge Current, ½ Cycle at 60Hz (non-rep) per diode (Fig. 2)	I _{FŞM}		150		Amps
Avg. Forwerd Current at T _c = 100°C (Fig. 1)	l _o		25		Amps
Junction Operating and Storage Temperature Range	TJ, TSTG		-65 to +150		°c
NOTE Case temperature (T _c) is measured on botto	m of case within .125 i	inches of center.			
ELECTRICAL CHARACTERISTICS AT $T_A = 25^{\circ}C$ (unless otherwise specified)	SYMBOL				UNITS
Meximum Instanteneous Forward Voltage Drop at 25 Amps per diode (Fig. 3)	VFM		1.8		Volts
Maximum Reverse Recovery Time, I _F = 1 Amp, I _R = 2 Amp (Fig. 4)	trr		200		nsec
Meximum Reverse Current at Reted V_{RM} and $T_{c} = 150^{\circ}$ C, per diode	I _{RM}		5		mA
Thermal Resistance, Junction to Case	Rej.c		1		°C/W
Insulation Strength, Circuit to Case, Min.			2000		Volts DC



Ltr	Inches	Millimeters	Ltr	Inches	Millimeters	Ltr	Inches	Millimeters	Ltr	Inches	Millimeters
A	.032 Typ.	,81	G	.830 Max.	21,08	м	.120	3,05	т	2.250	57,15
В	1.0 Max.	25,4	н	.930 Max.	23,62	N	.3440	8,64-10,16	U	1.125	28,58
С	.187 Typ.	4,75	1	.75057545	19,06-19,16	P	.135 Max.	3,43	V	.156 Dia.	3,96
D	.25 Min.	6,35	J	.875	22,23	Q	1.177-1.197	29,90-30,40	w	.164	4,17
E	.125 Typ.	3,18	к	1.10 Max.	27,94	R	.525R Max.	13,34	х	.375	9,53
. F	.110 Dia.	2,79	L	1.20 Max.	30,48	S	.151161 Dia.	3,84-4,09	Y	.50	12,70



TYPICAL INSTANTANEOUS FORWARD VOLTAGE DROP (Per Diode) VS DC FORWARD CURRENT



ANY OF THE CIRCUITS SHOWN BELOW ARE AVAILABLE IN THE VY SERIES. SPECIFY BY ADDING LETTERS "A", "B", "C", ETC., AFTER THE "VY" IN THE PART NUMBER. SEE PART NUMBER SELECTION CHART.





FIGURE 2

RECOVERY WAVE FORM



SEE PAGE 45 FOR DIAGRAM

FIGURE 4

CIRCUIT	100V	200V	400V
FULL WAVE BRIDGE	VY100X	VY200X	VY400X
CENTER TAP COMMON CATHODE	VYA100X	VYA200X	VYA400X
CENTER TAP COMMON ANODE	VYB100X	VYB200X	VYB400X
THREE PHASE COMMON CATHODE	VYC100X	VYC200X	VYC400X
THREE PHASE COMMON ANODE	VYD100X	VYD200X	VYD400X
* THREE PHASE FULL WAVE BRIDGE	VYH100X	VYH200X	VYH400X

*Assembly of VYC and VYD (100V, 200V, 400V) in single mounting flange. See drawing.

NOTE: Devices have standard flag terminals as shown (.187"-4.75mm). To order TO-3 Mount add suffix "T" to part no.

To order Single Stud Mount add suffix "S" to part no.





VARO SEMICONDUCTOR, INC., P.O. BOX 400 1000 NORTH SHILOH, GARLAND, TEXAS 750 (214) 271-8511 TWX 910-860-5178

DLS 036

BR 36 Amp, 3 Phase Full-Wave Silicon Integrated Rectifiers

June 1981

R620 Controlled Avalanche Series with 250V, 450V, 650V and 850V Minimum Avalanche Ratings

R630 Series with 100V, 200V, 400V, 600V and 800VV_{RRM} Ratings



MAXIMUM RATINGS	OVINDO	(C) A	ONTR	OLLED NCHE)							UNITS
(At $T_A = 25^{\circ}$ C Unless Otherwise Specified)	STMBOL	R622	R624	R626	R628	R631	R632	R634	R636	R638	01110
DC Blocking Voltage Working Peak Reverse Voltage Peak Repetitive Reverse Voltage	V _{rm} V _{rwm} V _{rrm}	200	400	600	800	100	200	400	600	800	Volt
RMS Reverse Voltage	VR(RMS)	140	280	420	560	70	140	280	420	560	Volt
Avg. Forward Current at $T_c = 100^{\circ}C$	l _o			36				36			Amp
Peak Surge Current, $\frac{1}{2}$ Cycle @ 60 Hz (Non-Rep) at T _c = 100° C (Fig 3)	I _{FSM}		2	50				250			Amp/ Leg
Peak Surge Current, 1 sec. @ 60 Hz, $T_c = 100^{\circ}C$ (Non-Rep)	I _{F(RMS)}			53				53			Amp/ Leg
Power Dissipation in $V_{(BR)}$ Region for 100 μ sec. Square Wave	P _{RM}		15	00				NA			Watt
Continuous Power Dissipation in V $_{\rm (BR)}$ Region at T $_{\rm C}$ = 50° C	P _R			4				NA			Watt/ Leg
Junction Operating and Storage Temp. Range	T _J , T _{stg}				-65	to + 15	0				°C

NOTE: 1. These values may be applied under three-phase, 60 Hz sine wave operation with resistive loads

2. Case Temperature (T_c) is measured on bottom of case within 0.125" (3,18mm) of center

ELECTRICAL CHARACTERISTICS	0.000	(CONTI	NCHE	D						UNITS
(At $T_A = 25^\circ$ unless otherwise specified)	STMBOL	R622	R624	R626	R628	R631	R632	R634	R636	R638	
Minimum Avalanche Voltage	V _(BR)	250	450	650	850			NA			Volt
Maximum Avalanche Voltage	V _(BR)	700	900	1100	1300			NA			Volt
Maximum Instantaneous Forward Voltage Drop per diode at 25 Amps (Fig 2)	V _{FM}		1	.5				1.5			Volt/ Leg
Maximum Reverse Current at Rated V _{RWM}	I _{RM}		5 (T _c =	150°C)		5(1	c = 15	0°C)		mA
Maximum Thermal Resistance, Junction-to-Case	Rθ _{Jc}				0.	75					°C/W



TYPICAL FORWARD VOLTAGE DROP vs FORWARD CURRENT AT VARIOUS TEMPERATURES (Por Leg of Bridge) 1000 500 INSTANTANEOUS FORWARD CURRENT (AMPERES) 01 01 00 $T_1 = 150 \text{ C}$ T, = 25°C 0. 0.6 0.8 1 0 1.2 1.4 1.6 1.8 INSTANTANEOUS FORWARD VOLTAGE (VOLTS) 0.2 0.4 0.6 2.0 22 24 Ó 1.8 FIG. 1





Ltr	Inches	Millimeters
A	.032 Typ.	,81
в	1.0 Max.	25,4
С	.187 Typ.	4,75
D	.25 Min.	6,35
Е	.125 Typ.	3,18
F	.110 Dia.	2,79
G	.830 Max.	21,08
н	.930 Max.	23,62
ł	.75057545	19,06-19,16
J	.875	22,23
к	1.10 Max.	27,94
L	1.20 Max.	30,48
м	. 120	3,05
N	.3440	8,64-10,16
Р	.135 Max.	3,43
Q	1.177-1.197	29,90-30,40
R	.525R Max.	13,34
S	.151161 Dia.	3.84-4.09

