DIODES
INCORPORATED

INNOVATIVE RECTIFIERS FOR MODERN APPLICATIONS

COMPANY OVERVIEW

DIODES INCORPORATED'S (DIODES) PRODUCTS ARE DESIGNED FOR HIGH PERFORMANCE ACROSS A WIDE RANGE OF EXISTING AND EMERGING APPLICATIONS.

Diodes is a leading global designer and manufacturer of discrete, analog, mixed-signal, and logic semiconductors.

We enable innovation by leveraging our broad product portfolio, company-owned operations, and leading-edge packaging technology to meet your needs.

Our broad-range of application-specific solutions, coupled with a worldwide network of engineering, testing, manufacturing, and customer service sites, positions us as a premier provider for high-volume, high-growth markets.

As part of our global footprint, we focus on high-growth, high-volume market segments such as Automotive, Communications, Computing, Consumer, and Industrial.

Our discrete, analog, mixed-signal and logic products provide customers with leading-edge solutions for next generation systems.

Discrete products include bipolar transistors, MOSFETs, IGBTs, diodes, rectifiers, Super Barrier Rectifiers (SBR®), protection products and functional arrays.

Analog and mixed-signal products cover these main areas: power management ICs, LED drivers, standard linear, sensors, signal switching, signal integrity, connectivity and timing products.

Logic products include single-gate, dual-gate and standard logic gates, as well as level translators, analog switches, registers and multiplexers.

A FOCUS ON ADVANCEMENT OF TECHNOLOGY, INNOVATIVE PRODUCTS AND COLLABORATION WITH CUSTOMERS FROM DESIGN TO PRODUCTION HAS RESULTED IN DIODES INCORPORATED'S SBR PORTFOLIO'S CONTINUAL MARKET ADOPTION AND INCREASING MARKET SHARE.

SBR – THE NEW GENERATION OF RECTIFIERS

Super Barrier Rectifier (SBR) is a proprietary and patented Diodes Inc technology that utilizes a MOS manufacturing process (traditional Schottky uses a bipolar process) to create a superior two terminal device that has a lower forward voltage (V_F) than comparable Schottky diodes while possessing the thermal stability and high reliability characteristics of PN epitaxial diodes.

Super Barrier Rectifier (SBR) diode is designed for high power, low loss and fast switching applications. The presence of a MOS channel within its structure forms a low potential barrier for the majority carriers, thus SBR's forward bias operation at low voltage is similar to Schottky diode.

However, the leakage current is lower than Schottky diode in reverse bias due to the overlap of the P-N depletion layers and the absence of potential barrier reduction due to the image charge.

The Diodes SBR portfolio is ideally suited to meet the circuit requirements of:

- Switch Mode Power Supplies (SMPS)
- Buck/Boost Diodes for DC-DC Conversion
- Battery Chargers
- Reverse Polarity Protection
- Solar Panels
- LED Lighting
- Automotive Applications

Diodes Incorporated's SBR product development strategy is focused on high performance value added products for growth market segments such as the Solar Panel, LED Lighting, High Efficiency SMPS, and automotive.

TRENCH SUPER BARRIER RECTIFIERS (SBRT)

Trench SBR is the next evolution which gives us the performance member in the SBR family. By using a highly advanced trench technology, SBRT offers an even smaller V_F for applications where ultra-low forward voltages are important. While further technology enhancements are being continually applied to the SBRT, these efforts result in the ever more advanced and power friendly member – SBRTF.

SBRT diodes, and its latest enhancement SBRTF, are designed for a wide range of high-end applications, including:

- Power Adapters (SBRT25U60SLP)
- TV-Power Supplies (SBRT40V100CT)
- LED-Drivers (SBRT3M40P1)

SBR® SUPER BARRIER RECTIFIER

THE NEW GENERATION OF RECTIFIERS...

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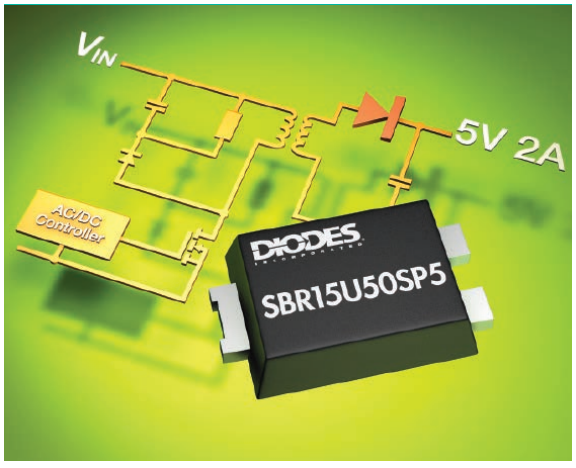
20V – 40V SBR SUPER BARRIER RECTIFIERS

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR0220LP	Single	0.2	20	0.48	50	5	X1-DFN1006-2
SBR0220T5	Single	0.2	20	0.47	40	5	SOD523
SBR05U20LP	Single	0.5	20	0.5	50	5	X1-DFN1006-2
SBR05U20LPS	Single	0.5	20	0.5	50	6	X2-DFN1006-2
SBR07U20LPS	Single	0.7	20	0.55	50	7	X2-DFN1006-2
SBR1A20T5	Single	1	20	0.52	200	10	SOD523
SBR3U20SA	Single	3	20	0.39	500	66	SMA
SBR8E20P5	Single	8	20	0.45	500	180	PowerDI5
SBR8U20SP5	Single	8	20	0.51	500	180	PowerDI5
SBR0230T5	Single	0.2	30	0.61	2	5	SOD523
SBR02M30LP	Single	0.2	30	0.61	500	5	X1-DFN1006-2
SBR02U30LP	Single	0.2	30	0.48	50	5	X1-DFN1006-2
SBR0330CW	Dual	0.3	30	0.58	5	1	SOT323
SBR130S3	Single	1	30	0.41	100	18	SOD323
SBR130SV	Single	1	30	0.56	100	2.5	SOT563
SBR1A30T5	Single	1	30	0.57	200	10	SOD523
SBR1U30SV	Single	1	30	0.51	150	2.5	SOT563
SBR2A30P1	Single	2	30	0.45	200	75	PowerDI123
SBR2M30P1	Single	2	30	0.46	200	75	PowerDI123
SBR2U30P1	Single	2	30	0.4	400	75	PowerDI123
SBR2U30SA	Single	2	30	0.39	400	66	SMA
SBR3M30P1	Single	3	30	0.51	200	75	PowerDI123
SBR3U30P1	Single	3	30	0.4	400	75	PowerDI123
SBR15A30SP5	Single	15	30	0.59	100	136	PowerDI5
SBR15U30SP5	Single	15	30	0.49	500	250	PowerDI5
SBR30U30CT	Dual	30	30	0.45	1500	280	TO220AB
SBR0240LP	Single	0.25	40	0.59	10	5	X1-DFN1006-2
SBR140LP	Single	1	40	0.55	500	5	X1-DFN1411-3
SBR140S1F	Single	1	40	0.51	100	30	SOD123F

15A SUPER BARRIER RECTIFIER - HELPS REDUCE CHARGER SIZE



THE **DIODES**™ ADVANTAGE

- **Ultra-Low Forward Voltage (V_F)**
  Ultra-low forward voltage minimizes conduction losses reducing power dissipation
- **Low Reverse Leakage (I_R)**
  Low reverse leakage minimizes reverse leakage power losses
- **Thermally Efficient Package**
  Low junction to ambient thermal resistance $R_{\theta JA}$ of 40°C/W
- **Small Form Factor Package**
  The PowerDI®5 package has an off board profile of <1.1mm enabling thinner Adaptor solutions. The PowerDI5 package occupies 40% of the PCB area than the industry standard DPak (TO252) package

20V – 40V SBR SUPER BARRIER RECTIFIERS (CONTINUED)

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR1A40S1	Single	1	40	0.55	500	20	SOD123
SBR1A40S3	Single	1	40	0.55	500	20	SOD323
SBR1A40SA	Single	1	40	0.5	500	25	SMA
SBR1U40LP	Single	1	40	0.49	50	5	X1-DFN1411-3
SBR2A40BLP	Bridge	2	40	0.5	100	70	V-DFN5060-4
SBR2A40P1	Single	2	40	0.5	100	75	PowerDI123
SBR2A40SA	Single	2	40	0.55	100	25	SMA
SBR3A40SA	Single	3	40	0.5	400	50	SMA
SBR3A40SAF	Single	3	40	0.53	400	50	SMAF
SBR3U40P1	Single	3	40	0.47	400	75	PowerDI123
SBR3U40S1F	Single	3	40	0.49	180	50	SOD123F
SBR1040CT	Dual	10	40	0.55	500	120	TO220AB
SBR1040CTB	Dual	10	40	0.6	500	85	TO263AB (D2PAK)
SBR1040CTFP	Dual	10	40	0.55	500	120	ITO220AB
SBR10U40CT	Dual	10	40	0.52	500	150	TO220AB
SBR10U40CTFP	Dual	10	40	0.44	500	150	ITO220AB
SBR2040CT	Dual	20	40	0.53	500	120	TO220AB
SBR2040CTFP	Dual	20	40	0.53	500	120	ITO220AB
SBR20A40CT	Dual	20	40	0.5	500	180	TO220AB
SBR20A40CTFP	Dual	20	40	0.5	500	180	ITO220AB
SBR20U40CT	Dual	20	40	0.47	500	200	TO220AB
SBR20U40CTFP	Dual	20	40	0.47	500	200	ITO220AB
SBR3040CT	Dual	30	40	0.55	500	200	TO220AB
SBR3040CTFP	Dual	30	40	0.55	500	200	ITO220AB
SBR30A40CT	Dual	30	40	0.5	100	250	TO220AB
SBR30A40CTFP	Dual	30	40	0.5	500	250	ITO220AB
SBR30M40CTFP	Dual	30	40	0.65	75	250	ITO220AB
SBR4040CT	Dual	40	40	0.53	500	280	TO220AB
SBR4040CTFP	Dual	40	40	0.53	500	280	ITO220AB

POWERDI123 SBR PRODUCT FAMILY

THE **DIODES™** ADVANTAGE

- PowerDI123 is a low profile power package that delivers a superior thermal performance from a footprint that is 60% smaller than the industry standard SMA.
- Industry leading 3A current rating (SBR3U30P1) with high maximum junction temperature of 150˚C in a miniature package outline.
- Highest ESD ±16 kV HBM (Grade 3B, 16kV) rating and ±25kV ESD Protection (IEC61000-4-2 Level 4, Air Discharge).
- Much higher avalanche power rating for ruggedness and high reliability compared to traditional Schottky.
- Large safe operating area (SOA) with maximum junction temperature of 150°C provides extra margin for high temperature applications.
- Qualified to rigorous AEC-Q101 (automotive) standards for high reliability, compliant with RoHS environmental standards.

45V – 65V SBR SUPER BARRIER RECTIFIERS

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR545D1	Single	5	45	0.49	500	90	TO252 (DPAK)
SBR545SAF	Single	5	45	0.56	200	100	SMAF
SBR5E45P5	Single	5	45	0.6	280	120	PowerDI5
SBR8A45SP5	Single	8	45	0.6	300	180	PowerDI5
SBR8E45P5	Single	8	45	0.51	350	140	PowerDI5
SBR1045CTL	Dual	10	45	0.55	500	90	TO252 (DPAK)
SBR1045D1	Single	10	45	0.58	500	90	TO252 (DPAK)
SBR1045SD1	Single	10	45	0.55	450	180	DO-201AD
SBR1045SP5	Single	10	45	0.55	450	180	PowerDI5
SBR10A45SP5	Single	10	45	0.53	400	180	PowerDI5
SBR10B45P5	Single	10	45	0.55	380	140	PowerDI5
SBR10E45P5	Single	10	45	0.47	280	275	PowerDI5
SBR10U45D1	Single	10	45	0.58	500	125	TO252 (DPAK)
SBR10U45SD1	Single	10	45	0.47	300	200	DO-201AD
SBR10U45SP5	Single	10	45	0.47	300	275	PowerDI5
SBRFP10U45D1	Single	10	45	0.44	200	190	TO252 (DPAK)
SBR12A45SD1	Single	12	45	0.48	300	200	DO-201AD
SBR12A45SP5	Single	12	45	0.66	300	280	PowerDI5
SBR12E45LH1	Single	12	45	0.52	300	300	PowerDI5SP (Type B)
SBR12U45LH1	Single	12	45	0.5	300	300	PowerDI5SP (Type B)
SBR2045CT	Dual	20	45	0.54	500	120	TO220AB
SBR2045CTFP	Dual	20	45	0.54	500	120	ITO220AB
SBR20A45CT	Dual	20	45	0.5	500	180	TO220AB
SBR20A45CTFP	Dual	20	45	0.5	500	180	ITO220AB
SBR20A45D1	Single	20	45	0.59	500	140	TO252 (DPAK)
SBR20M45D1	Single	20	45	0.61	100	140	TO252 (DPAK)
SBRFP20U45CTB	Dual	20	45	0.44	180	190	TO263AB (Standard)
SBR3045CT	Dual	30	45	0.55	500	200	TO220AB
SBR3045CTB	Dual	30	45	0.7	500	180	TO263AB (D2PAK)
SBR3045CTFP	Dual	30	45	0.55	500	200	ITO220AB

SBR12U45LH - SBR FOR SOLAR PANELS

THE **DIODES**™ ADVANTAGE

- **Low profile package with maximum height of only 0.75mm**
  PowerDI5SP enables integration of the bypass diode within the solar panel, which effectively removes the need for separate junction boxes.
- **Centrally mounted leads on each side of the package**
  Allows the package to be mounted into recesses in the panel adding only 0.21mm to the total solar panel depth.
- **Industry's lowest forward voltage drop for 45V rectifier**
  Low V_F of 0.38V at 12A and 125°C ensures negligible temperature rise during operation, resulting in more reliable operation of solar panels.
- **Fully functional over the temperature range from -65°C to 200°C**
  Enables compliance with the thermal test requirement of Solar Safety Standard IEC61730-2.
- **For further information, visit Diodes.com**

45V – 65V SBR SUPER BARRIER RECTIFIERS (CONTINUED)

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR3045SCTB	Dual	30	45	0.65	500	220	TO263AB (D2PAK)
SBR30A45CT	Dual	30	45	0.5	500	250	TO220AB
SBR30A45CTB	Dual	30	45	0.55	500	175	TO263AB (D2PAK)
SBR30A45CTFP	Dual	30	45	0.5	500	250	ITO220AB
SBR30E45CT	Dual	30	45	0.55	480	250	TO220AB
SBR30E45CTB	Dual	30	45	0.55	480	250	TO263AB (D2PAK)
SBR4045CT	Dual	40	45	0.55	500	280	TO220AB
SBR4045CTFP	Dual	40	45	0.55	500	280	ITO220AB
SBR40U45CT	Dual	40	45	0.52	600	280	TO220AB
SBR60A45CT	Dual	60	45	0.6	1000	350	TO220AB
SBR15U50SP5	Single	15	50	0.52	500	256	PowerDI5
SBR20U50SLP	Single	20	50	0.52	100	100	PowerDI5060-8
SBR30A50CT	Dual	30	50	0.55	500	260	TO220AB
SBR0560S1	Single	0.5	60	0.5	100	15	SOD123
SBR05M60BLP	Bridge	0.5	60	0.49	100	8	U-DFN3030-4
SBR160S23	Single	1	60	0.6	100	15	SOT23
SBR2M60S1F	Single	2	60	0.7	0.8	30	SOD123F
SBR2U60S1F	Single	2	60	0.51	150	35	SOD123F
SBR3U60P1	Single	3	60	0.65	100	80	PowerDI123
SBR3U60P5	Single	3	60	0.6	60	80	PowerDI5
SBR3U60SA	Single	3	60	0.65	100	60	SMA
SBR5E60P5	Single	5	60	0.52	220	170	PowerDI5
SBR660CTL	Dual	6	60	0.57	500	80	TO252 (DPAK)
SBR8A60P5	Single	8	60	0.62	500	160	PowerDI5
SBR8B60P5	Single	8	60	0.6	220	170	PowerDI5
SBR8E60P5	Single	8	60	0.53	580	180	PowerDI5
SBR8U60P5	Single	8	60	0.53	500	280	PowerDI5
SBR1060CT	Dual	10	60	0.68	500	120	TO220AB
SBR1060CTFP	Dual	10	60	0.68	500	120	ITO220AB
SBR10U60CT	Dual	10	60	0.48	500	150	TO220AB
SBR10U60CTFP	Dual	10	60	0.48	500	150	ITO220AB
SBRFP10U60D1	Single	10	60	0.47	200	190	TO252 (DPAK)
SBR2060CT	Dual	20	60	0.7	500	150	TO220AB
SBR2060CTFP	Dual	20	60	0.7	500	150	ITO220AB
SBR20A60CT	Dual	20	60	0.65	500	180	TO220AB
SBR20A60CTB	Dual	20	60	0.65	500	180	TO263AB (D2PAK)
SBR20A60CTFP	Dual	20	60	0.65	500	180	ITO220AB
SBR20U60CT	Dual	20	60	0.57	500	200	TO220AB
SBR20U60CTFP	Dual	20	60	0.57	500	200	ITO220AB
SBR3060CT	Dual	30	60	0.7	500	200	TO220AB
SBR3060CTB	Dual	30	60	0.62	500	200	TO263AB (D2PAK)
SBR3060CTFP	Dual	30	60	0.7	500	200	ITO220AB
SBR30A60CT	Dual	30	60	0.6	500	250	TO220AB
SBR30A60CTB	Dual	30	60	0.63	500	180	TO263AB (D2PAK)
SBR30A60CTFP	Dual	30	60	0.6	500	250	ITO220AB
SBR4060CT	Dual	40	60	0.7	500	280	TO220AB
SBR4060CTFP	Dual	40	60	0.7	500	280	ITO220AB
SBR40U60CT	Dual	40	60	0.6	500	280	TO220AB
SBR40U60CTE	Dual	40	60	0.6	500	230	TO262
SBR60A60CT	Dual	60	60	0.62	200	280	TO220AB
SBR2065D1	Single	20	65	0.63	400	140	TO252 (DPAK)

100V – 150V SBR SUPER BARRIER RECTIFIERS

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR02U100LP	Single	0.25	100	0.8	1	5	X1-DFN1006-2
SBR05M100BLP	Bridge	0.5	100	0.73	25	8	U-DFN3030-4
SBR2U100LP	Single	1.5	100	0.85	50	18	X1-DFN1411-3
SBR2M100SAF	Single	2	100	0.78	1	65	SMAF
SBR2M100SB	Single	2	100	0.78	1	65	SMB
SBR3M100SAF	Single	3	100	0.81	1	65	SMAF
SBR3M100SB	Single	3	100	0.81	1	65	SMB
SBR3U100LP	Single	3	100	0.79	200	32	U-DFN3030-8
SBR6100CTL	Dual	6	100	0.74	200	78	TO252 (DPAK)
SBR8M100P5	Single	8	100	0.88	2	160	PowerDI5
SBR10100CT	Dual	10	100	0.8	100	120	TO220AB
SBR10100CTB	Dual	10	100	0.84	200	80	TO263AB (D2PAK)
SBR10100CTFP	Dual	10	100	0.8	100	120	ITO220AB
SBR10100CTL	Dual	10	100	0.84	200	110	TO252 (DPAK)
SBR10U100CT	Dual	10	100	0.82	200	150	TO220AB
SBR10U100CTFP	Dual	10	100	0.82	200	150	ITO220AB
SBR12U100P5	Single	12	100	0.71	250	250	PowerDI5
SBR15U100CTL	Dual	15	100	0.8	80	100	TO252 (DPAK)
SBR20100CT	Dual	20	100	0.82	100	150	TO220AB
SBR20100CTE	Dual	20	100	0.82	100	180	TO262
SBR20100CTFP	Dual	20	100	0.82	100	150	ITO220AB
SBR20A100CT	Dual	20	100	0.75	100	250	TO220AB
SBR20A100CTB	Dual	20	100	0.75	100	250	TO263AB (D2PAK)
SBR20A100CTE	Dual	20	100	0.75	100	250	TO262
SBR20A100CTFP	Dual	20	100	0.75	100	250	ITO220AB
SBR20B100CT	Dual	20	100	0.82	95	220	TO220AB
SBR20E100CT	Dual	20	100	0.75	100	250	TO220AB
SBR20U100CT	Dual	20	100	0.7	500	200	TO220AB
SBR20U100CTE	Dual	20	100	0.7	500	200	TO262
SBR20U100CTFP	Dual	20	100	0.7	500	200	ITO220AB

POWERDI5 PRODUCT FAMILY FOR SMPS AND SOLAR APPLICATIONS

THE DIODES™ ADVANTAGE

- **Ultra-Low Forward Voltage (V_F)**
  Provides better efficiency and cooler operation to the device
- **Lower Profile Package Height**
  PowerDI5 footprint occupies only 45% compared to SMC package, along with a package height of less than 1.1mm. The smaller footprint and profile will provide reduced PCB board for flexibility in placement and reduced cost.
- **High Forward Current Rating (I_{FSM})**
  A high forward surge current rating protects against poor AC line input current, large current surges and lighting strikes.
- **"Green" Antimony and Bromine-Free Mold Compound**
  Continual commitment of manufacturing environmental friendly products.

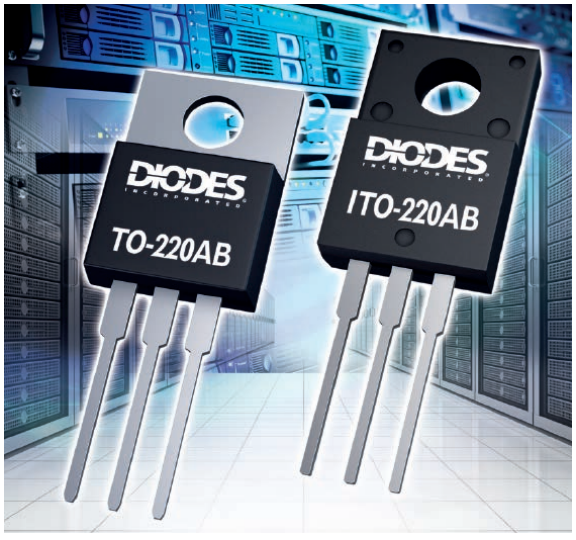
100V – 150V SBR SUPER BARRIER RECTIFIERS (CONTINUED)

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (μA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR30100CT	Dual	30	100	0.85	100	200	TO220AB
SBR30100CTFP	Dual	30	100	0.85	100	200	ITO220AB
SBR30A100CT	Dual	30	100	0.8	100	250	TO220AB
SBR30A100CTB	Dual	30	100	0.85	100	180	TO263AB (D2PAK)
SBR30A100CTE	Dual	30	100	0.8	100	250	TO262
SBR30A100CTFP	Dual	30	100	0.8	100	250	ITO220AB
SBR30E100CT	Dual	30	100	0.8	100	230	TO220AB
SBR30M100CT	Dual	30	100	0.85	12	250	TO220AB
SBR30M100CTFP	Dual	30	100	0.85	12	250	ITO220AB
SBR40100CT	Dual	40	100	0.82	100	280	TO220AB
SBR40100CTFP	Dual	40	100	0.82	100	280	ITO220AB
SBR40U100CT	Dual	40	100	0.72	500	235	TO220AB
SBR40U100CTE	Dual	40	100	0.78	500	240	TO262
SBR60A100CT	Dual	60	100	0.84	500	350	TO220AB
SBR10120CTL	Dual	10	120	0.88	100	110	TO252 (DPAK)
SBR12M120P5-13	Single	12	120	0.83	200	300	PowerDI5
SBR12M120P5-13D	Single	12	120	0.83	200	300	PowerDI5
SBR12U120P5	Single	12	120	0.8	250	250	PowerDI5
SBR20A120CT	Dual	20	120	0.79	100	180	TO220AB
SBR20A120CTE	Dual	20	120	0.79	100	180	TO262
SBR20A120CTFP	Dual	20	120	0.79	100	180	ITO220AB
SBR20E120CT	Dual	20	120	0.79	90	180	TO220AB
SBR30A120CT	Dual	30	120	0.88	100	250	TO220AB
SBR30A120CTE	Dual	30	120	0.83	100	250	TO262
SBR30A120CTFP	Dual	30	120	0.88	100	250	ITO220AB
SBR40U120CT	Dual	40	120	0.86	500	300	TO220AB
SBR40U120CTE	Dual	40	120	0.86	500	300	TO262
SBR4U130LP	Single	4	130	0.75	100	40	U-DFN3030-8
SBR1U150SA	Single	1	150	0.7	100	42	SMA
SBR2U150SA	Single	2	150	0.8	75	42	SMA
SBR3150SB	Single	3	150	0.82	50	80	SMB
SBR3U150LP	Single	3	150	0.83	10	33	U-DFN3030-8
SBR10150CT	Dual	10	150	0.88	250	120	TO220AB
SBR10150CTE	Dual	10	150	0.92	250	100	TO262
SBR10150CTFP	Dual	10	150	0.88	250	120	ITO220AB
SBR10150CTL	Dual	10	150	0.94	100	100	TO252 (DPAK)
SBR10U150CT	Dual	10	150	0.79	200	150	TO220AB
SBR10U150CTFP	Dual	10	150	0.88	200	150	ITO220AB
SBR20150CT	Dual	20	150	0.88	100	150	TO220AB
SBR20150CTFP	Dual	20	150	0.88	100	150	ITO220AB
SBR20A150CT	Dual	20	150	0.82	100	180	TO220AB
SBR20A150CTFP	Dual	20	150	0.82	100	180	ITO220AB
SBR20U150CT	Dual	20	150	0.78	500	200	TO220AB
SBR20U150CTFP	Dual	20	150	0.78	500	200	ITO220AB
SBR30150CT	Dual	30	150	0.92	100	200	TO220AB
SBR30150CTFP	Dual	30	150	0.92	100	200	ITO220AB
SBR30A150CT	Dual	30	150	0.88	100	250	TO220AB
SBR30A150CTFP	Dual	30	150	0.88	100	250	ITO220AB
SBR40150CT	Dual	40	150	0.9	100	280	TO220AB
SBR40150CTFP	Dual	40	150	0.9	100	280	ITO220AB
SBR40U150CT	Dual	40	150	0.86	500	240	TO220AB
SBR60A150CT	Dual	60	150	0.93	500	250	TO220AB

200V – 400V SBR SUPER BARRIER RECTIFIERS

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBR1U200P1	Single	1	200	0.82	50	40	PowerDI123
SBR6200CTL	Dual	6	200	0.85	100	80	TO252 (DPAK)
SBR10200CT	Dual	10	200	0.9	100	110	TO220AB
SBR10200CTB	Dual	10	200	0.92	50	80	TO263AB (D2PAK)
SBR10200CTFP	Dual	10	200	0.9	100	110	ITO220AB
SBR10200CTL	Dual	10	200	0.94	100	110	TO252 (DPAK)
SBR10U200CT	Dual	10	200	0.82	200	150	TO220AB
SBR10U200CTB	Dual	10	200	0.88	200	150	TO263AB (D2PAK)
SBR10U200CTFP	Dual	10	200	0.88	200	150	ITO220AB
SBR10U200P5	Single	10	200	0.88	100	180	PowerDI5
SBR20A200CT	Dual	20	200	0.86	100	180	TO220AB
SBR20A200CTB	Dual	20	200	0.84	100	180	TO263AB (D2PAK)
SBR20A200CTFP	Dual	20	200	0.86	100	180	ITO220AB
SBR30200CT	Dual	30	200	0.98	100	200	TO220AB
SBR30200CTFP	Dual	30	200	0.98	100	200	ITO220AB
SBR40U200CT	Dual	40	200	0.89	200	240	TO220AB
SBR40U200CTB	Dual	40	200	0.93	200	240	TO263AB (D2PAK)
SBR60A200CT	Dual	60	200	0.96	100	250	TO220AB
SBR10H300D1	Single	10	300	0.92	10	110	TO252 (DPAK) (Type TH)
SBR10U300CT	Dual	10	300	0.86	200	150	TO220AB
SBR10U300CTFP	Dual	10	300	0.92	200	150	ITO220AB
SBR15300D1	Single	15	300	1.01	10	110	TO252 (DPAK) (Type TH)
SBR20A300CT	Dual	20	300	0.92	100	180	TO220AB
SBR20A300CTB	Dual	20	300	0.92	100	180	TO263AB (D2PAK)
SBR20A300CTFP	Dual	20	300	0.92	100	180	ITO220AB
SBR30300CT	Dual	30	300	1.03	100	200	TO220AB
SBR30300CTFP	Dual	30	300	1.03	100	200	ITO220AB
SBR40U300CT	Dual	40	300	0.89	100	235	TO220AB
SBR40U300CTB	Dual	40	300	0.92	100	200	TO263AB (D2PAK)
SBR60A300CT	Dual	60	300	0.94	100	235	TO220AB
SBR1A400P1	Single	1	400	1.1	50	40	PowerDI123
SBR1U400P1	Single	1	400	0.9	50	40	PowerDI123

300V SBR PRODUCT FAMILY



THE **DIODES™** ADVANTAGE

- 300V SBR Ultra-Low V_F and Low V_F version packaged in standard TO220AB and ITO220AB packages with wide current offering from 10A to 60A.
- A significant 20-25% improvement in forward voltage drop (V_F) compared to Ultra-Fast rectifiers with similar switching speed.
- SBR60A300CT – the only 60A, 300V V_{RRM} rated rectifier rated to 175°C.
- Maximum junction temperature of 175°C to meet the requirements of high ambient temperature operating environments.
- Fast switching speed 50 nS (maximum value) and faster for RG1 test conditions (I_F = 0.5A, I_{RR} = 0.25A, I_R = 1A).
- The higher V_{RRM} of 300V SBR's enable designers to simplify circuit design and reduce cost by replacing 200V V_{RRM} rectifiers and removing snubber circuits that would otherwise be required to suppress transient voltage spikes.

SBR SOLUTIONS FOR AC/DC CHARGERS AND ADAPTERS

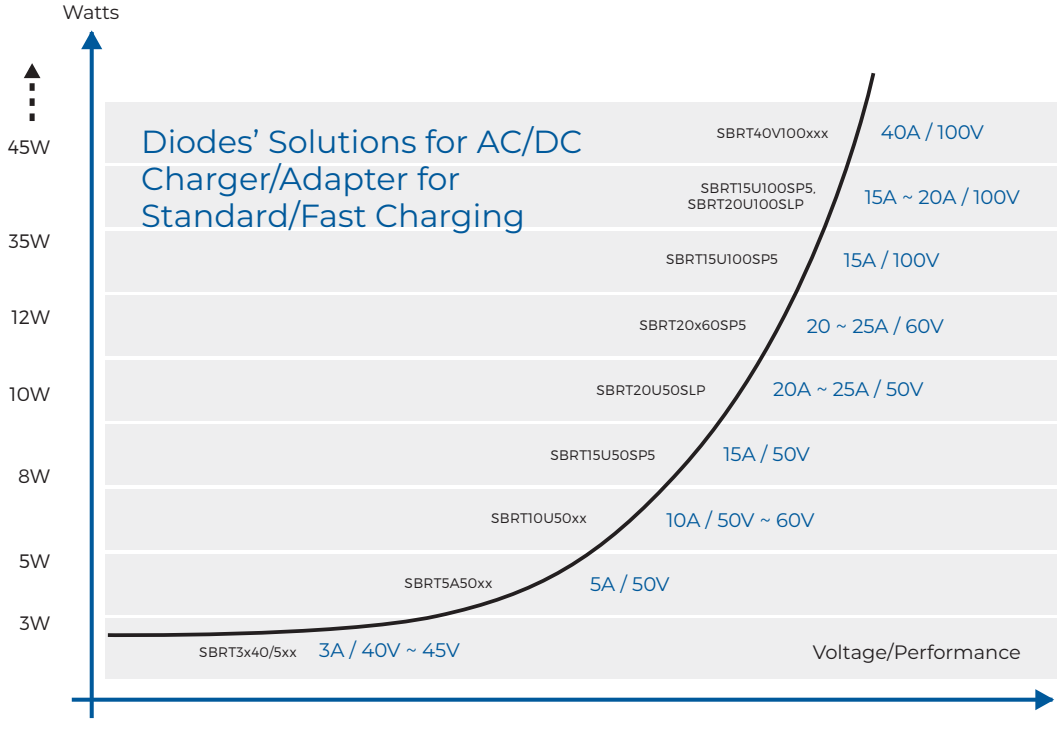
In the mobile internet life-style prevalent today, consumers and business travelers are constantly looking for a 24/7 connection to their friends or associates for updates to their personal or business data stored in the cloud for entertainment or work.

Therefore a smartphone which is always running, becomes an indispensable tool that most people will carry wherever they go.

The proliferation of an eventual universal connector like the USB Type-C, as well the fast charging technology like the USB Power Delivery, enable the end-users to re-charge the depleted battery in their smartphones to 50% or more in 30 minutes or less.

To meet different requirements across a diverse range of applications, Diodes has a wide range of SBR families: E-series for best price-performance, A-series for low-V_F, U-series for lowest V_F, M-series for low I_R, and the SBRT/TF for super performance.

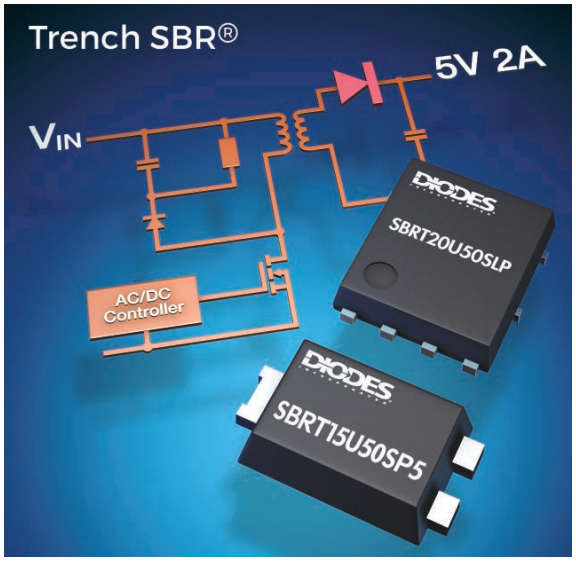
	PN Junction Diode	Schottky Barrier Diode	"Fast Recovery Diode"	SBR
Forward Voltage V_F	High	High	Very High	Low
Reverse Leakage Current, I_{RM}	Low	High	Low	Low
Breakdown Voltage, V_{RRM}	High	Medium	High	High
Surge Reliability	High	Low	High	High
Thermal Immunity	High	Low	High	High
Switching Speed, $(1/T_{RR})$	Low	High	High	High



TRENCH SUPER BARRIER RECTIFIERS

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBRT2M10LP	Single	2	10	0.4	250	25	X1-DFN1411-3
SBRT05U20LPS	Single	0.5	20	0.39	50	10	X2-DFN1006-2
SBRT05U20S3	Single	0.5	20	0.4	70	10	SOD323
SBRT3M30LP	Single	3	30	0.49	20	30	U-DFN3030-8
SBRT4U30LP	Single	4	30	0.5	100	45	U-DFN2020-2 (Type B)
SBRT3M40P1	Single	3	40	0.53	30	70	PowerDI123
SBRT3U40P1	Single	3	40	0.49	180	75	PowerDI123
SBRT3U45SA	Single	3	45	0.48	150	50	SMA
SBRT3U45SAF	Single	3	45	0.48	150	50	SMAF
SBRT20V45CT	Dual	20	45	0.52	300	180	TO220AB
SBRT30A45CT	Dual	30	45	0.51	400	240	TO220AB
SBRT30A45CTFP	Dual	30	45	0.51	400	240	ITO220AB
SBRT5A50SA	Single	5	50	0.53	150	100	SMA
SBRT5A50SAF	Single	5	50	0.53	150	100	SMAF
SBRT10U50SP5	Single	10	50	0.45	300	320	PowerDI5
SBRT15U50SP5	Single	15	50	0.47	500	290	PowerDI5
SBRT20U50SLP	Single	20	50	0.5	500	200	PowerDI5060-8
SBRT25M50SLP	Single	25	50	0.55	120	220	PowerDI5060-8
SBRT60U50CT	Dual	60	50	0.52	50	350	TO220AB
SBRT3M60P1	Single	3	60	0.59	100	70	PowerDI123
SBRT3U60P1	Single	3	60	0.56	150	70	PowerDI123
SBRT3U60SAF	Single	3	60	0.53	500	40	SMAF
SBRT10U60D1	Single	10	60	0.52	400	140	TO252 (DPAK)
SBRT20M60SP5	Single	20	60	0.57	180	320	PowerDI5
SBRT20U60SP5	Single	20	60	0.53	400	320	PowerDI5
SBRT20V60CT	Dual	20	60	0.55	300	190	TO220AB
SBRT25U60SLP	Single	25	60	0.55	400	220	PowerDI5060-8

TRENCH SBR EXCEEDS CHARGER REQUIREMENTS



THE DIODES™ ADVANTAGE

- SBRT15U50SP5's forward voltage of 0.47V at 15A and SBRT20U50SLP's forward voltage of 0.5V at 20A, coupled with an operating temperature of +90°C, means conduction losses are minimized and charger efficiencies are increased.
- Trench SBRs meet the requirements of the charger output rectifier diode, easily coping with the shorter current pulses of 36KHz discontinuous mode charger designs.
- Trench SBR devices span a reverse voltage range from 10V to 100V and a current handling capability from 0.2A to 40A
- They come in a variety of different package options, including Diodes' space-saving PowerDI123, PowerDI5 and PowerDI5060.

TRENCH SUPER BARRIER RECTIFIERS (CONTINUED)

Part Number	Configuration	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBRT30A60CT	Dual	30	60	0.56	400	220	TO220AB
SBRT30A60CTFP	Dual	30	60	0.56	400	220	ITO220AB
SBRT60U60CT	Dual	60	60	0.62	60	320	TO220AB
SBRT40M80CTB	Dual	40	80	0.72	1	230	TO263AB (D2PAK)
SBRT10A100CTL	Dual	10	100	0.78	180	85	TO252 (DPAK)
SBRT15U100SP5	Single	15	100	0.7	250	250	PowerDI5
SBRT20U100SLP	Single	20	100	0.7	300	180	PowerDI5060-8
SBRT40V100CT	Dual	40	100	0.73	300	180	TO220AB
SBRT40V100CTE	Dual	40	100	0.73	300	180	TO262
SBRT40V100CTFP	Dual	40	100	0.73	300	180	ITO220AB
SBRT60U100CT	Dual	60	100	0.78	300	320	TO220AB

AUTOMOTIVE SUPER BARRIER RECTIFIERS

Part Number	Configuration	AEC Qualified	Compliance (Only Automotive supports PPAP)	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBRT05U20LPSQ	Single	Yes	Automotive	0.5	20	0.39	50	10	X2-DFN1006-2
SBRT05U20S3Q	Single	Yes	Automotive	0.5	20	0.4	70	10	SOD323
SBR8U20SP5Q	Single	Yes	Automotive	8	20	0.51	300	180	PowerDI5
SBR15U30SP5Q	Single	Yes	Automotive	15	30	0.49	300	280	PowerDI5
SBR0240LPWQ	Single	Yes	Automotive	0.2	40	0.59	10	5	X1-DFN1006-2 (SWP) (Type C)
SBR140S1FQ	Single	Yes	Automotive	1	40	0.51	100	30	SOD123F
SBR1A40S3Q	Single	Yes	Automotive	1	40	0.55	500	20	SOD323
SBR2A40P1Q	Single	Yes	Automotive	2	40	0.5	100	50	PowerDI123
SBR3A40SAQ	Single	Yes	Automotive	3	40	0.5	400	45	SMA
SBR3U40P1Q	Single	Yes	Automotive	3	40	0.47	400	75	PowerDI123
SBR3U40S1FQ	Single	Yes	Automotive	3	40	0.49	180	50	SOD123F
SBR545SAFQ	Single	Yes	Automotive	5	45	0.56	200	100	SMAF
SBR1045CTLQ	Dual	Yes	Automotive	10	45	0.55	300	90	TO252 (DPAK)
SBR1045D1Q	Single	Yes	Automotive	10	45	0.58	300	90	TO252 (DPAK)
SBR1045SP5Q	Single	Yes	Automotive	10	45	0.55	450	180	PowerDI5
SBR10A45SP5Q	Single	Yes	Automotive	10	45	0.53	400	180	PowerDI5
SBR10U45D1Q	Single	Yes	Automotive	10	45	0.57	300	125	TO252 (DPAK)
SBR10U45SP5Q	Single	Yes	Automotive	10	45	0.47	300	275	PowerDI5
SBR20M45D1Q	Single	Yes	Automotive	20	45	0.61	100	140	TO252 (DPAK)
SBR3045CTBQ	Dual	Yes	Automotive	30	45	0.7	500	180	TO263AB (D2PAK)
SBR30A45CTBQ	Dual	Yes	Automotive	30	45	0.55	500	175	TO263AB (D2PAK)
SBRT20U50SLPQ	Single	Yes	Automotive	20	50	0.5	500	200	PowerDI5060-8
SBR0560S1Q	Single	Yes	Automotive	0.5	60	0.5	100	15	SOD123
SBR2M60S1FQ	Single	Yes	Automotive	2	60	0.7	0.8	30	SOD123F
SBR2U60S1FQ	Single	Yes	Automotive	2	60	0.51	150	35	SOD123F
SBR3U60P1Q	Single	Yes	Automotive	3	60	0.62	100	80	PowerDI123
SBR3U60P5Q	Single	Yes	Automotive	3	60	60	0.06	80	PowerDI5
SBR3U60SLDQ	Dual	Yes	Automotive	3	60	0.6	100	60	PowerDI5060-8 (Type D)

AUTOMOTIVE SUPER BARRIER RECTIFIERS (CONTINUED)

Part Number	Configuration	AEC Qualified	Compliance (Only Automotive supports PPAP)	Maximum Average Rectified Current I_O (A)	Peak Repetitive Reverse Voltage V_{RRM} (V)	Forward Voltage Drop V_F (V)	Maximum Reverse Current I_R (µA)	Peak Forward Surge Current I_{FSM} (A)	Package
SBRT3U60P1Q	Single	Yes	Automotive	3	60	0.56	150	70	PowerDI123
SBR660CTLQ	Dual	Yes	Automotive	6	60	0.57	300	80	TO252 (DPAK)
SBR8U60P5Q	Single	Yes	Automotive	8	60	0.53	330	280	PowerDI5
SBRT10U60D1Q	Single	Yes	Automotive	10	60	0.52	400	140	TO252 (DPAK)
SBR20A60CTBQ	Dual	Yes	Automotive	20	60	0.79	500	180	TO263AB (D2PAK)
SBR30A60CTBQ	Dual	Yes	Automotive	30	60	0.63	330	180	TO263AB (D2PAK)
SBR02U100LPQ	Single	Yes	Automotive	0.25	100	0.8	1	5	X1-DFN1006-2
SBR6100CTLQ	Dual	Yes	Automotive	6	100	0.74	100	78	TO252 (DPAK)
SBR8M100P5Q	Single	Yes	Automotive	8	100	0.88	2	130	PowerDI5
SBR10M100P5Q	Single	Yes	Automotive	10	100	0.88	2	220	PowerDI5
SBR12U100P5Q	Single	Yes	Automotive	12	100	0.78	250	250	PowerDI5
SBR15U100CTLQ	Dual	Yes	Automotive	15	100	0.8	100	100	TO252 (DPAK)
SBR1U150SAQ	Single	Yes	Automotive	1	150	0.7	100	42	SMA
SBR20M150D1Q	Single	Yes	Automotive	20	150	0.9	50	160	TO252 (DPAK)
SBR1U200P1Q	Single	Yes	Automotive	1	200	0.82	50	40	PowerDI123
SBR10U200P5Q	Single	Yes	Automotive	10	200	0.88	100	180	PowerDI5
SBR40U200CTBQ	Dual	Yes	Automotive	40	200	0.93	200	280	TO263AB (D2PAK)

SBR 'Q' PORTFOLIO MEETS THE NEEDS OF AUTOMOTIVE APPLICATIONS

THE DIODES™ ADVANTAGE

- Automotive SBRs are qualified to the AEC-Q101 high-reliability standard and backed by PPAP level 3 documentation.
- The parts are 100% avalanche tested and proven to deliver a reverse-avalanche capability of between three to ten times greater than the competing Schottky alternatives.
- Offering current ratings up to 60A and reverse voltage ratings up to 100V, the SBR "Q" portfolio is also characterized by significantly lower reverse leakage current at higher temperatures, helping to minimize circuit losses and increasing protection against thermal runaway.
- The SBR forward voltage drop is also lower than that of the competing Schottky alternatives, meaning conduction losses are less. As a result the overall efficiency in common reverse polarity protection and free-wheeling diode circuits is improved.

FAQs SUPER BARRIER RECTIFIERS

1. How does an SBR work?

A Super Barrier Rectifier (SBR) is effectively a MOSFET with its gate and source shorted together.

With the application of forward bias, the external voltage lowers the barrier height on the semiconductor side and large current can flow through the FET channel.

In reverse bias, the opposite takes place: the barrier height increases and free charge in the semiconductor channel gets "pinched off" from the overlapping depletion layers, reducing the reverse leakage current.

2. What are the key features and benefits of a Super Barrier Rectifier (SBR)?

- Reverse voltage (V_{RRM}) up to 400V
- Lower forward voltage (V_F) than competing solution ("U" grade)
- Lower normalized reverse leakage current (I_R) than Schottky diodes
- Fast reverse recovery times (T_{RR}) matches those of the competing solutions
- Avalanche ratings up to 50% higher than competing solutions

3. Where is SBR used?

SBR can be used as:

- Output rectifier
- Free-wheeling diode
- Buck/boost diode
- Reverse polarity protection diode
- Solar application or solar by-pass diode

4. What is the difference between SBR and Ultrafast rectifiers?

SBR has switching speed and other characteristics comparable to that of an ultrafast rectifier. An added benefit is having a forward voltage (V_F) that is 20 to 25% lower, especially at high ambient temperatures.

This reduced V_F can lead to a substantial reduction in power savings, and improvement to power efficiency.

5. What does an SBR compete against?

Voltage (V)	Competing Solution	SBR Benefit
<30V	Schottky Diodes	Lower V_F, fast T_{RR}, lower reverse leakage (I_R)
>30V – 150V	Schottky Diodes	Lower V_F, fast T_{RR}, lower reverse leakage (I_R) improved ruggedness
150V to 400V	Ultrafast/Hyperfast diodes	Much Lower V_F, fast T_{RR}, improved ruggedness

6. How fast is the T_{RR} of an SBR?

A SBR has a T_{RR} comparable to that of Schottky and ultrafast rectifiers.

For SBR of rating 150V or higher (similar to Schottky), minority carriers can be injected in the drift region, resulting in a slightly slower but softer recovery.

7. How has SBR technology evolved?

Since the SBR series products were first announced in 2006, a lot of innovations have been made. Today, the trench process makes it possible to further reduce the forward voltage (V_F), T_{RR}, yet the reverse leakage current (I_R) is kept well under control.

These advancements, when combined together, result in the latest SBRT and SBRTF with even lower V_F, I_R, and T_{RR}.

Customers can be assured that the train of innovation at Diodes Incorporated continues. For example, SBR/SBRTs are now offered in the low-profile DFN package for use in the small sensor modules popular in the modern automobiles.

8. What is the latest SBR evolution?

SBRTF is the latest evolution of the SBR technology. It can significantly reduce power loss and lower operating temperature at V_{RRM} higher than 100V.

When used as output rectifiers in quick chargers and power adapters for mobile devices, SBRs can improve power efficiency up to 2% more and reduce the operating temperature by up to 10%, when compared to the competing Schottky alternatives.

In addition, the SBRTF rectifiers offer high forward surge current capability, up to 200A, enabling them to endure high, short-duration, non-repetitive peak currents.

They are also avalanche rugged with a rating of 340mJ. Consequently, they can comfortably withstand the unclamped switching events commonly found in harsh working environments.

9. Why is the SBR technology good for the automotive & industrial applications?

Several of the intrinsic characteristics make the SBR technology suitable for reliable operation in harsh environments typical of industrial and automotive applications.

For instance, at high ambient temperatures, SBR products often exhibit lower reverse current I_R and forward voltage V_F than many of the competing Schottky diodes.

As such, the junction temperature inside the product is at a considerably lower level thus leading to stable operation at high efficiency.

At Diodes Incorporated, the multiple generations of innovation developed in-house enable our SBR products to better meet the stringent requirements inherent in automotive and industrial applications.

The SMA-packaged SBR3A40SAQ exhibits low manufacturing defects, which is deemed imperative in automotive applications.

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April 2022