Diodes Taiwan Inc.

SBR, Schottky & New ITO-220S Package

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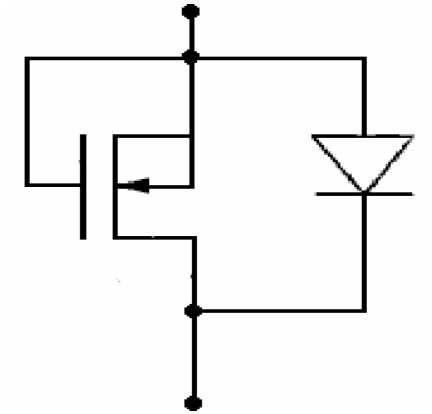
SBR® Technology

Super Barrier Rectifier

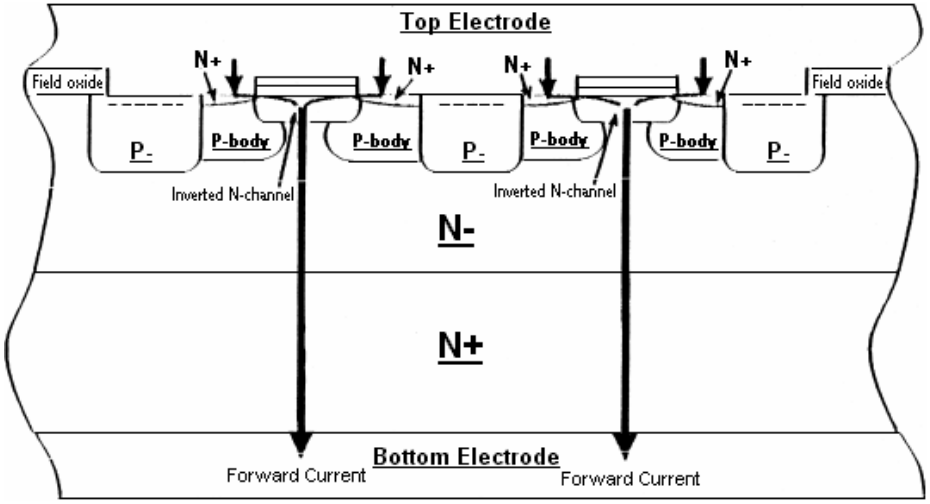
SBR® Structure and Operation

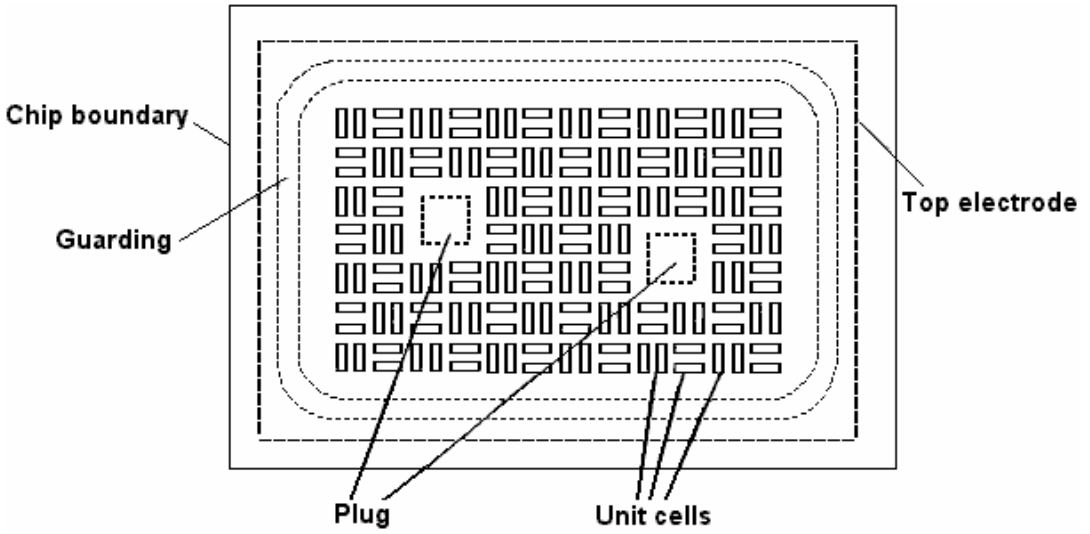
SBR® (Super Barrier Rectifier)



Device Structure Operation of SBR®

- Traditional (two terminal) device by shorting the gate and source, $V_{(GS)} = 0$
- In forward mode, device operates as majority carrier (MOS) with low V_F and fast switching
- In reverse mode, electrostatic behavior causes depletion mode, substantially reducing leakage current
- Cellular design operates as thousands of individual (unit) working in parallel





SBR® Competitive Advantages

- Super Barrier Rectifier (SBR®) combines both a lower forward loss compared to a Schottky Barrier diode (SBD) with the thermal stability of a Fast Recovery diode (FRD)

- These advantages over existing technologies translate to…

  ❑ ***Higher Efficiency and Higher Temperature Operation***

  ☺ SBR® enables lower V_F with more stable reverse leakage current allowing applications to run more efficiently at higher ambient temperature, resulting in more power savings and higher reliability

  ❑ ***Better Performance in Smaller Packages***

  ☺ SBR® patented high density cellular technology enables SBR® to exceed customers' ever increasing demand for high performance in smaller packages

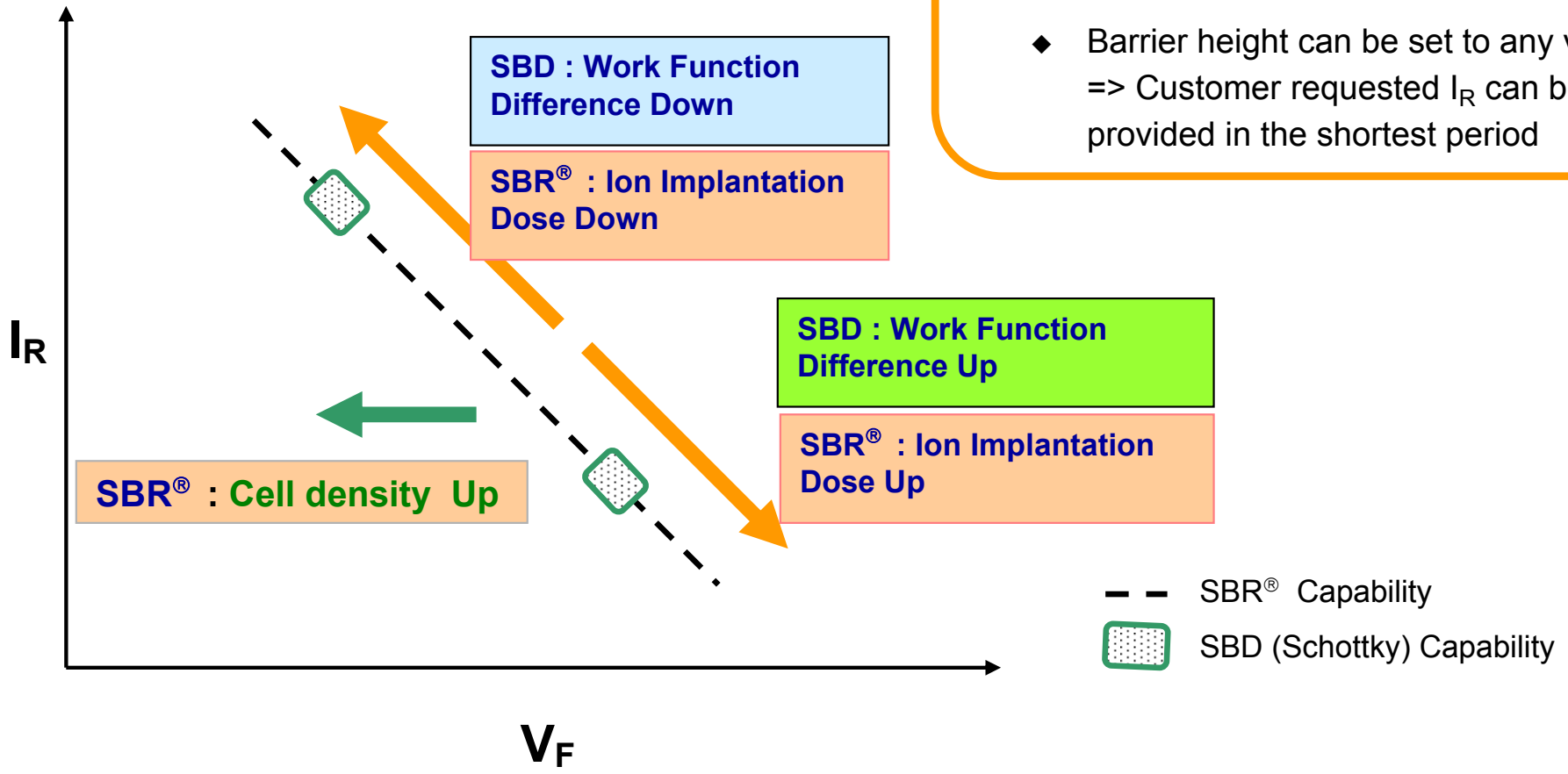
  ❑ ***Scalable technology***

  ☺ Lack of metal Schottky barrier and use of CMOS process allows for a scalable technology from 0.1A to 60A and 20V to 300V without degradation of performance

Flexible Control of V_F and I_R

Advantage of SBR®

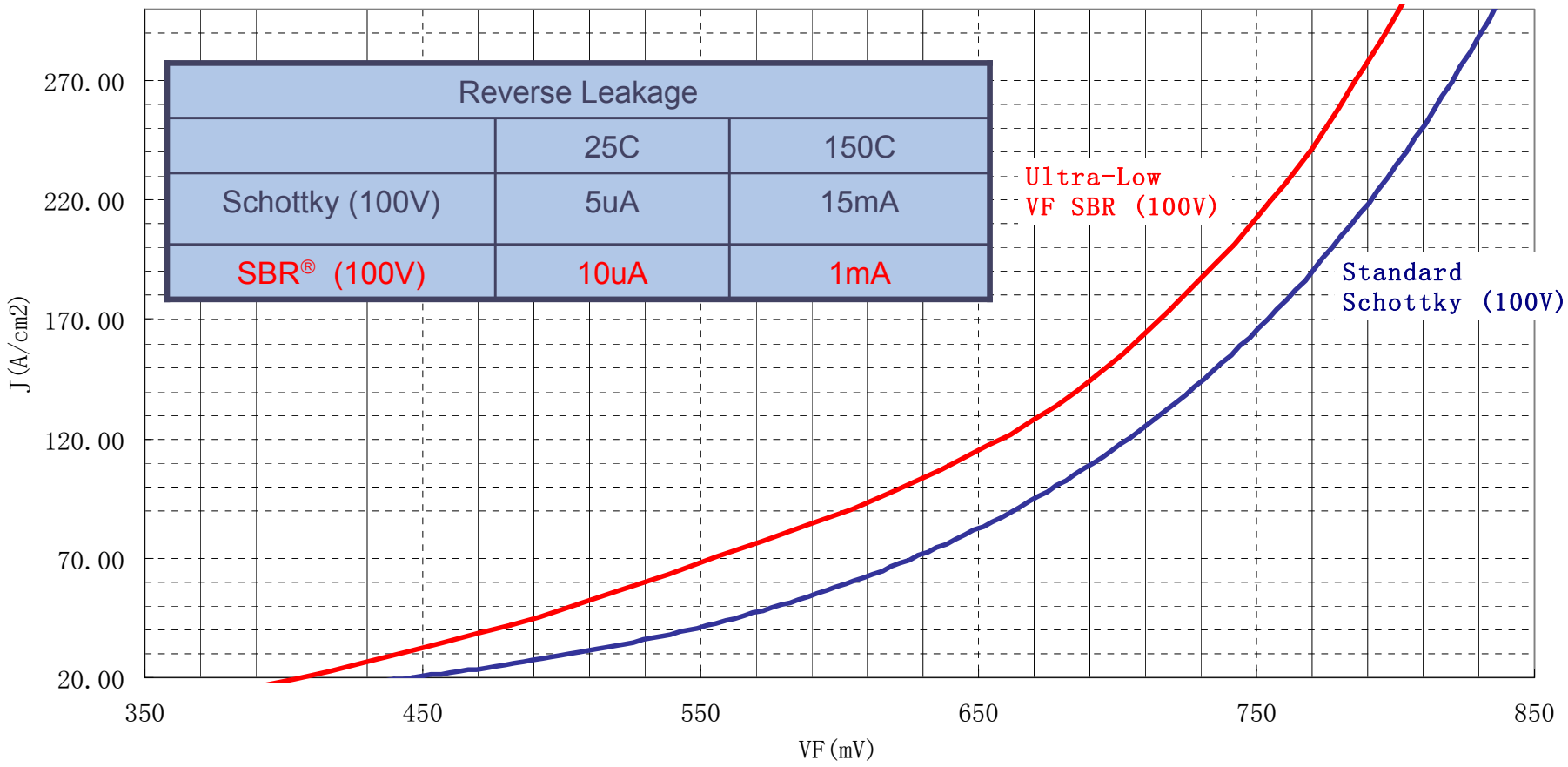
- Only SBR® can overcome the trade-off between V_F and I_R by increasing the cell density of SBR®
- Barrier height can be set to any value => Customer requested I_R can be provided in the shortest period



V_F Benchmark Performance

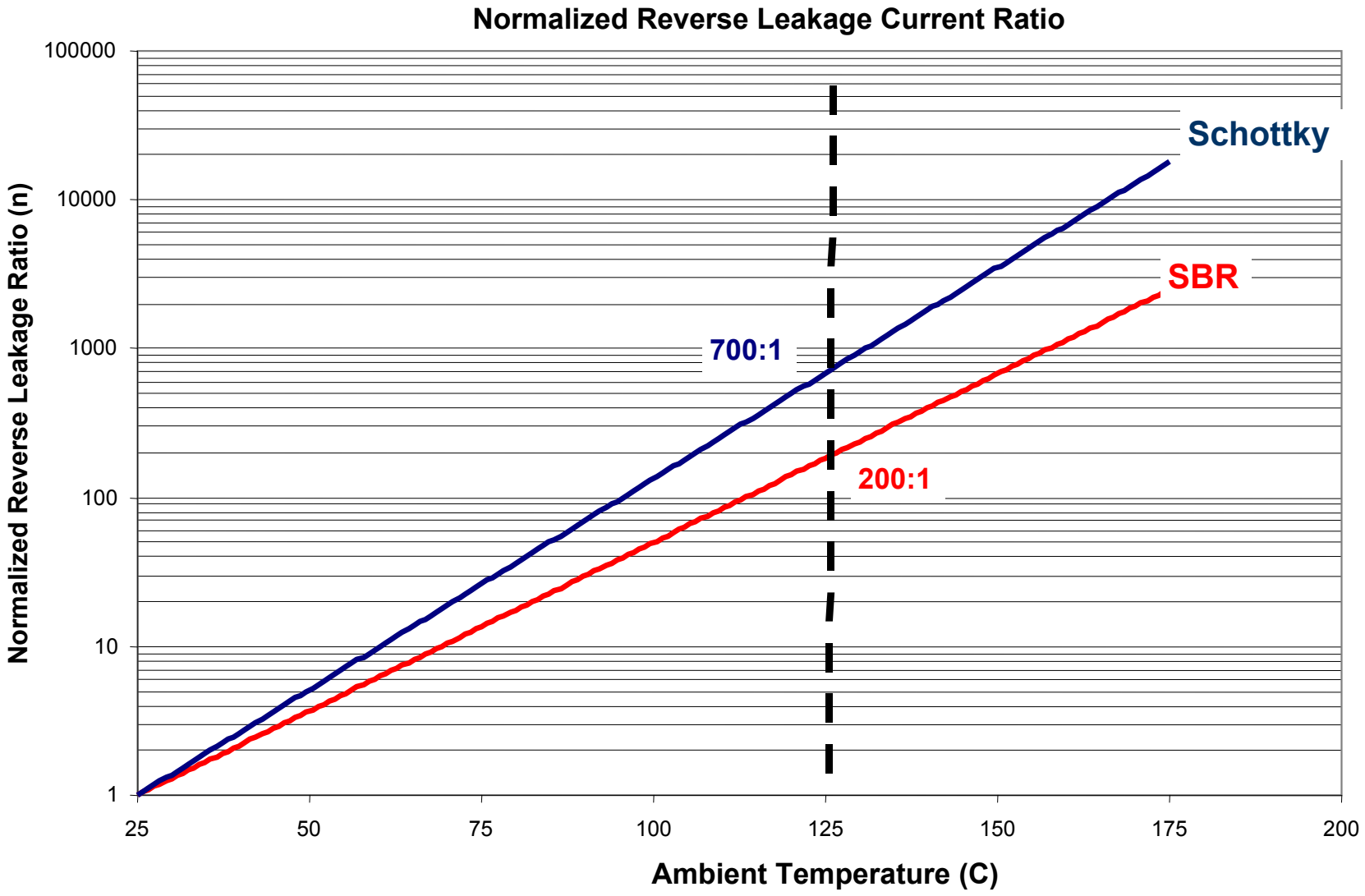
- ***The Ultra-Low VF SBR™ has significantly lower forward voltage (V_F) than competitive Schottky devices in the market***

Current Density Comparison between Schottky and SBR



Normalized Reverse Leakage Ratio

- ***SBR® technology has significantly lower normalized reverse leakage ratio at higher temperature than conventional Schottky devices***

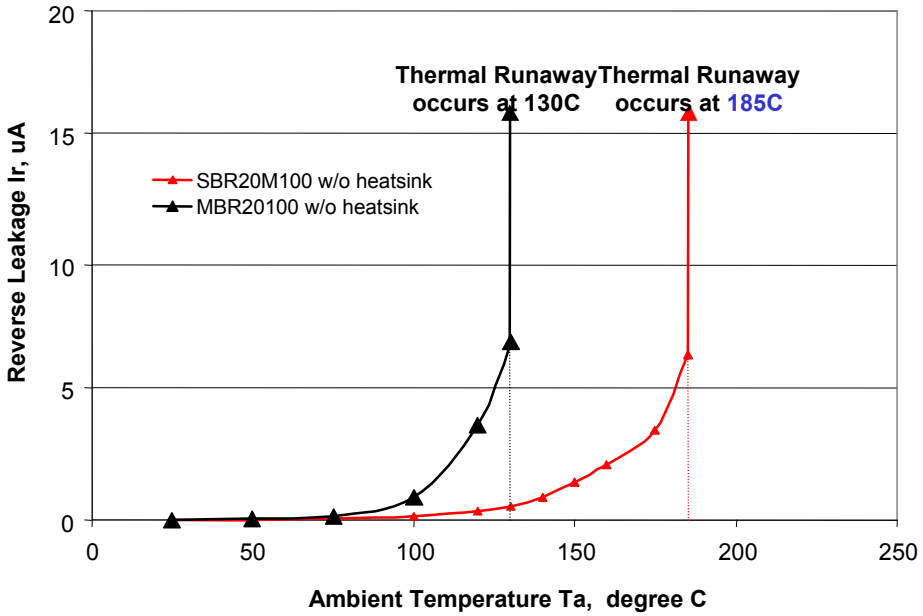


Thermal Breakdown

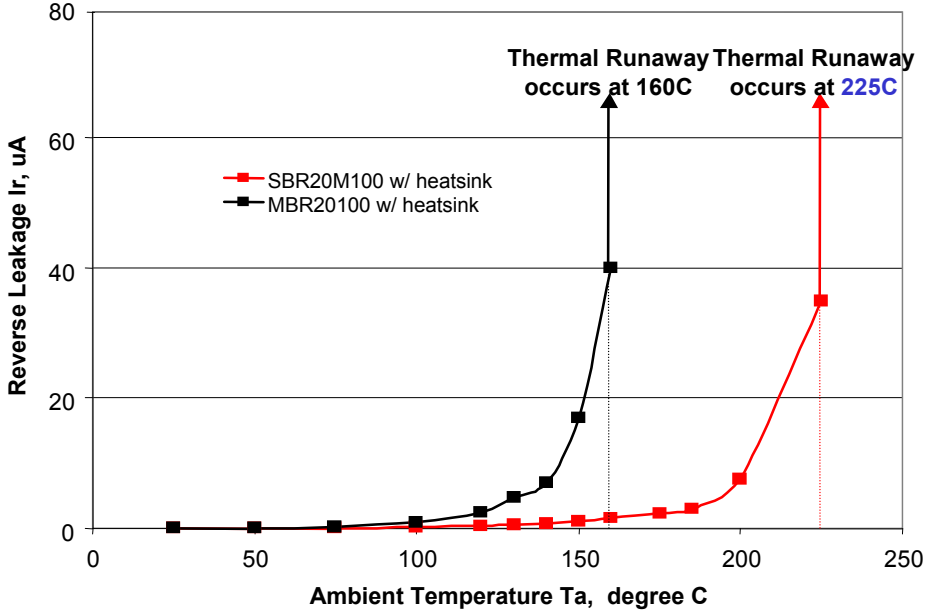
Due to lack of a metal barrier, SBR® has significantly higher thermal runaway capability than a Schottky, resulting in…

- ***Higher operating temperature rating: 150℃ to 175℃***
- ***Less susceptible to thermal runaway***
- ***Potential of eliminating the use of a heat sink***

HTRB: Diodes SBR20M100 vs. IR MBR20100 without Heatsink



HTRB: Diodes SBR20M100 vs. IR MBR20100 with Heatsink



Avalanche Energy Characteristic

Definition

- Avalanche energy is used in determining a power diodes ability to safely handle relatively large reverse power levels as seen in power supply applications.

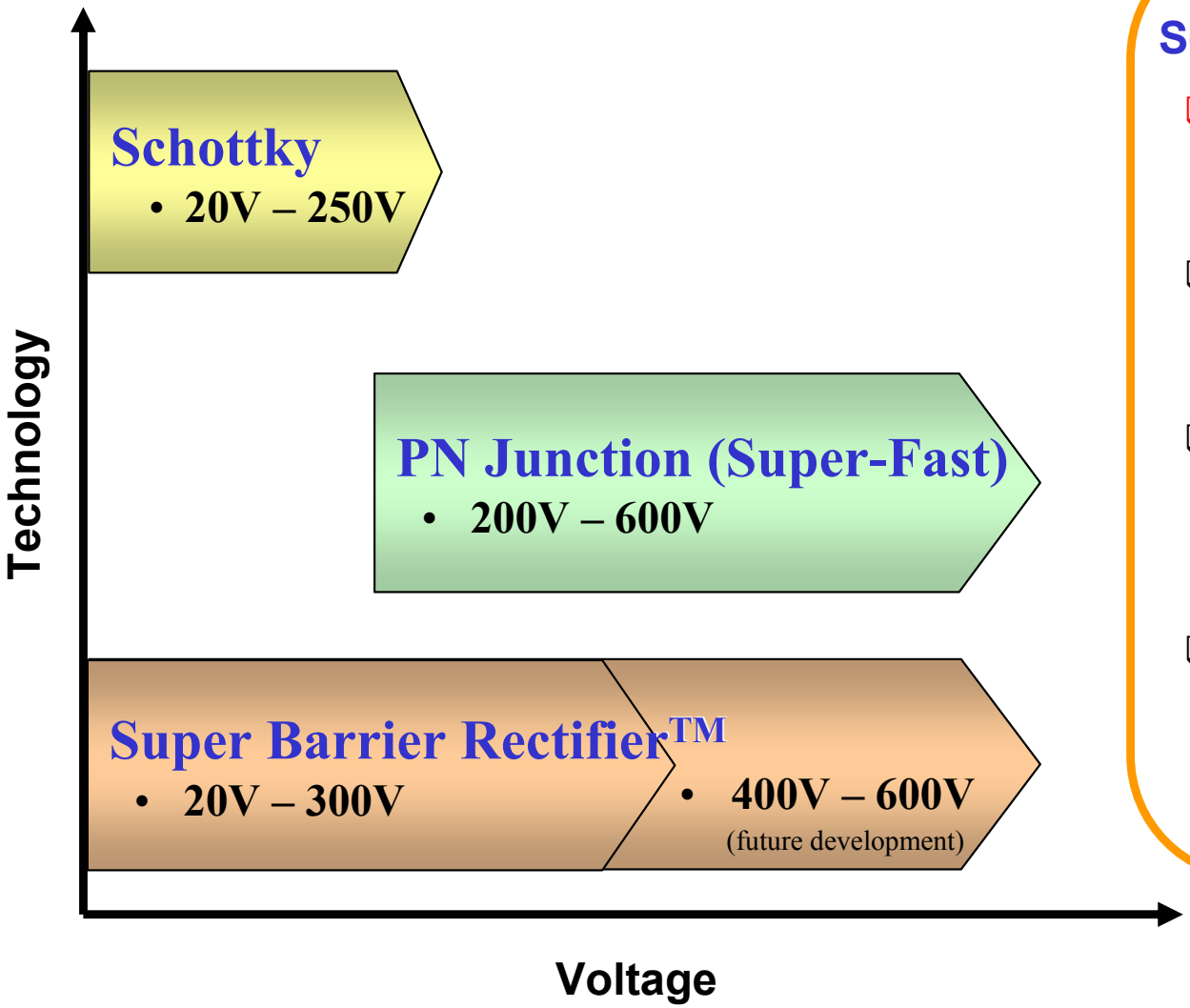
SBR advantage

- Due to the absence of a metal barrier, the Super Barrier Rectifier (SBR®) has a significantly greater avalanche capability compared to the standard Schottky diode
- This significantly increases the reliability of the SBR® diodes against any large reverse surge currents

Vendor	Part No.	Max I_{RRM}* (A)	Max Avalanche Energy E_{AS}** (mJ)
Competitor 1 (Tier1)	20A/100V	0.5	24
Competitor 2 (Tier 1)	20A/100V	1	120
Diodes (SBR)	**SBR20A100CT**	**3**	**205**

** 2uS, 1kHz Repetitive Squarewave Pulse*
*** As tested, T_J = 25 °C, I_{AS} = 2 A, L = 12 mH*

Scalability of SBR® Technology



Scalability of SBR® technology

- SBR is the only technology that can be scaled from 20V to 600V without any loss in performance
- Technology can be scaled by current from 0.2A to 60A without loss in performance
- High voltage SBR® (>200V) has significantly lower V_F and faster switching speed (T_{RR}) than Super-Fast PN junction diodes
- One simple solution to cover all range of voltage application requirements

SBR Positioning & Nomenclature

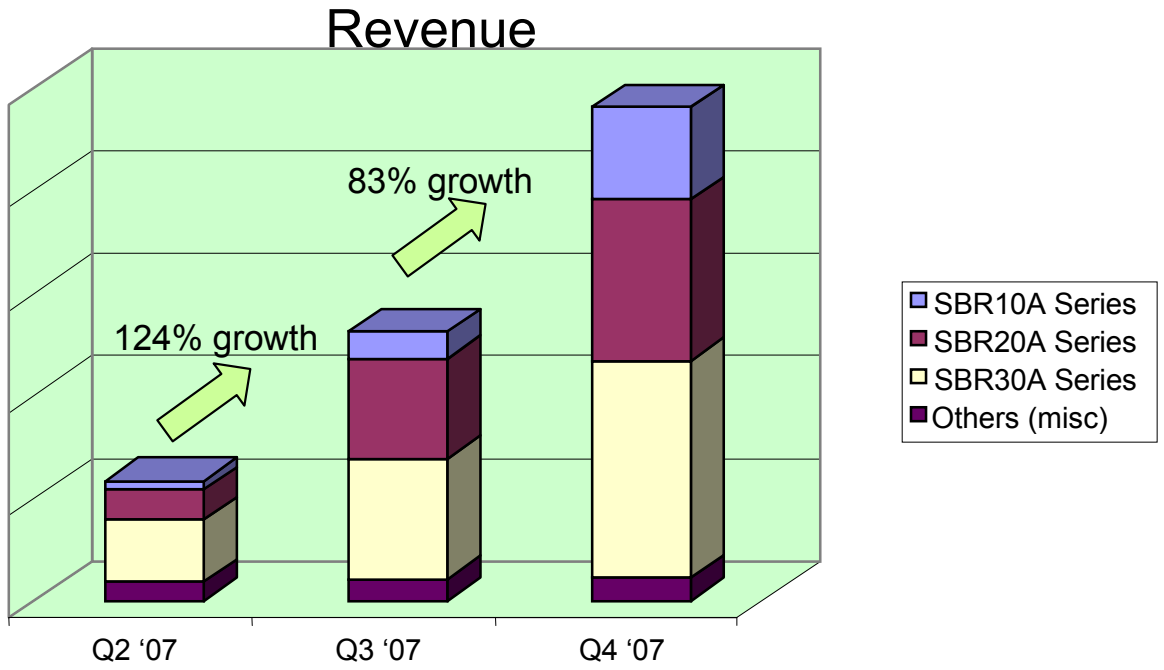
- *Four-grade product offering : SBR's value to the customer is the "M", "A", and "U" product lines*

	Standard	Low V_F ("A" Line)	Ultra Low V_F ("U" Line)	Low I_R ("M" Line)
Definition	In par with standard spec	In par with Tier 1's low V_F specs	V_F is lower than low V_F spec by 50-70mV	IR spec is lower than lowest spec available
Selling Feature	Good performance / cost ratio	Low heat dissipation High performance	Unique to SBR™ Lowest V_F in the market	Unique to SBR™ Tj = 200C for TO package
Focus Market	Open-frame power adapter	Switch-mode power supply DC/DC converter	**Switch-mode power supply (80+)** Portable device market with low V_F	**Automotive market** that requires high Tj Portable device market with low I_R (e.g. battery protection)

SBR 20 A 100 CT
A B C D E

- A: Super Barrier Rectifier TM
- B: Current Ratings
  - 01 = 100mA
  - 1 = 1A
  - 20 = 20A, etc.
- C: Product Type
  - Standard – "n/a"
  - Low VF = "A"
  - Low IR = "M"
  - Ultra-Low VF = "U"
- D: Voltage Ratings
  - 20 = 20V
  - 100 = 100V, etc.
- E: Package Code
  - **CT: TO-220AB**
  - **CTFP: ITO-220AB**
  - **CTP: ITO-220S**
  - **PT: TO-247**
  - CTB: TO-263
  - CTL/D1: TO-252
  - P5/SP5: PowerDI5
  - P1: PowerDI123
  - P3:PowerDI323
  - SA: SMA
  - S3: SOD-323
  - SN: SC-59
  - S23: SOT-23
  - SD1: DO-201

SBR Product Portfolio

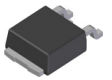
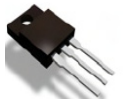


Strong growth across SBR product line

Product Portfolio & Offerings

- *SBR product portfolio include both small and large package outline*
  - Small outline package: Leading edge performance for mobile phone & portable electronics applications
  - Large outline package: Most cost effective solution for power supply rectifier applications

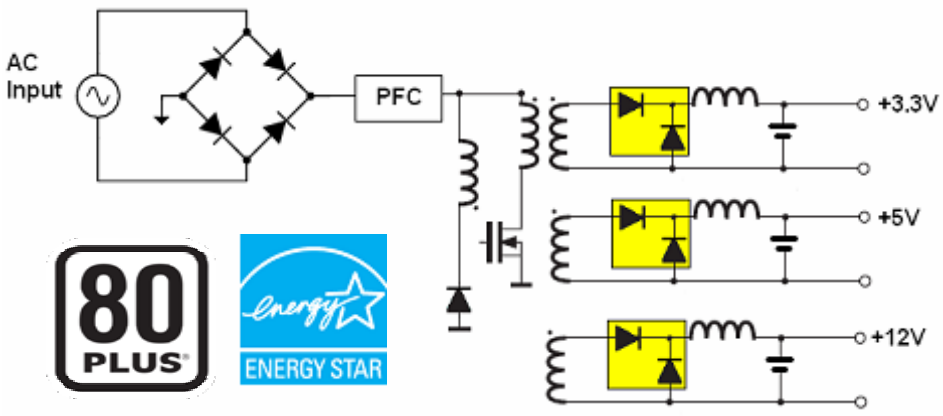
SBR Current Product Offering and Development

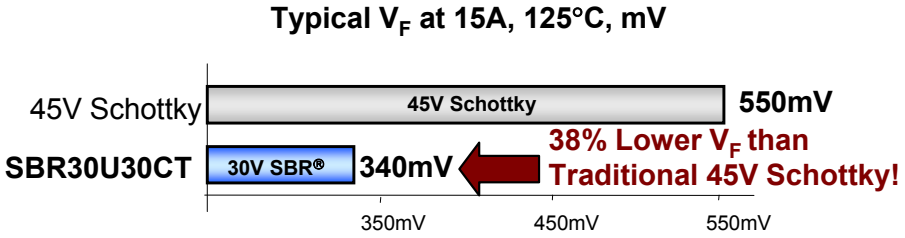
Reverse Voltage (V)	0.2A	0.2A - 0.7A	1A	1A	2A - 3A	3A	1A - 3A	10A	5A-15A	10A-60A	10-40A	10-60A	40-60A
													
	SOD-523	DFN1006-2	DFN1411-3	SOD-323	PowerDI-123	DFN3030-8	SMA	PowerDI-5	DPAK	D2PAK	ITO-220AB	TO-220AB	TO-247
20	●	●					●						
30	●	●		●	●		●		●			●	
40-45			●	●	●		●	●	●	●	●	●	●
60									●	●	●	●	●
100		●				●			●	●	●	●	●
150						●	●		●	●	●	●	●
200									●	●	●	●	●
300										●	●	●	●

● Current Product Offering
● In Development

Output Rectifiers (80 PLUS PC Power)

- Since the largest power loss in most SMPS is the forward conduction loss through the output rectifiers, designers can reduce the VF greatly by using a lower voltage device that can withstand higher avalanche spikes.





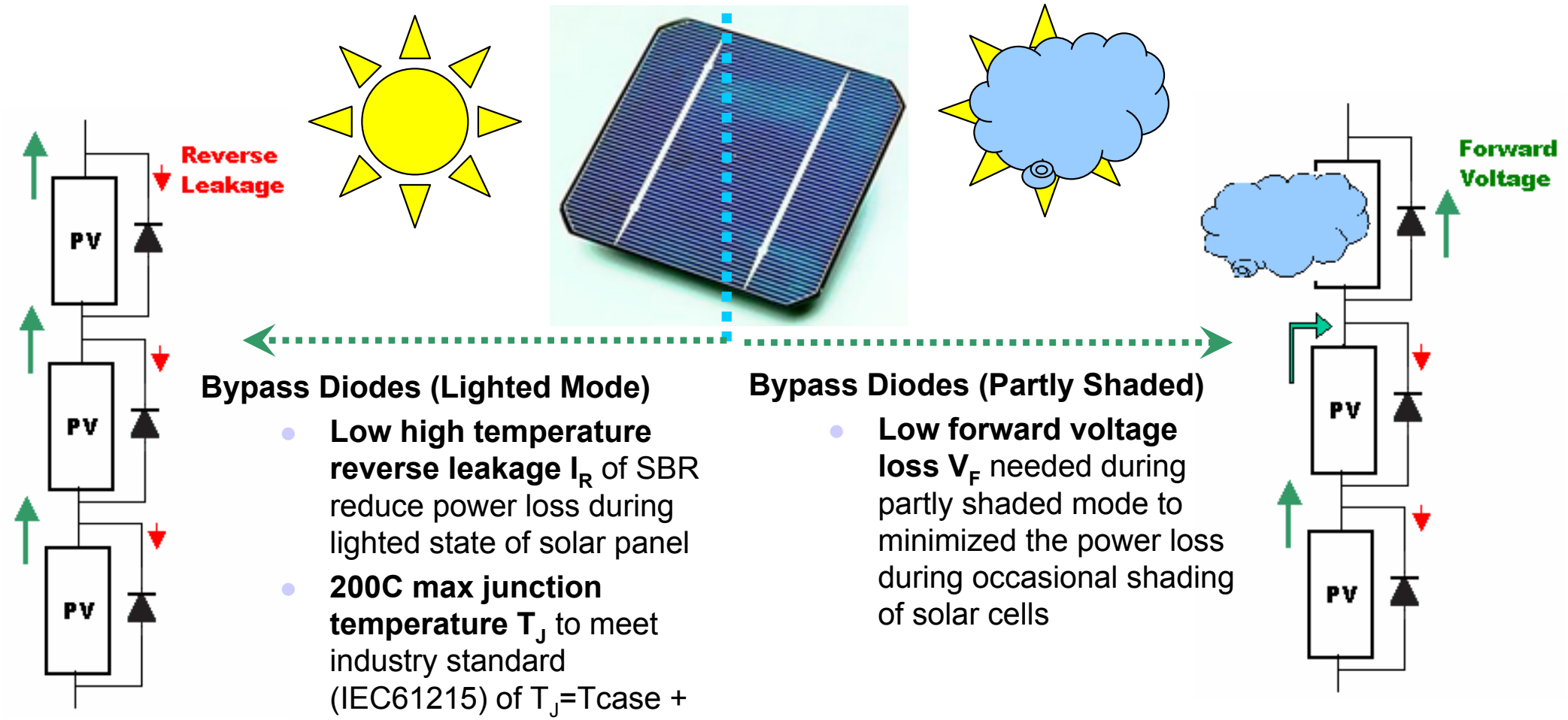
Typical 250W SMPS
Output: +3.3V, 10A
+5V, 20A
+12V, 10A

SMPS Output	Part Number	Pfwd Loss (Watts)
3.3V, 10A	45V Schottky	4.9
	SBR30U30CT	3.0
5V, 20A	45V Schottky	9.8
	SBR30U30CT	6.0
Estimated Power Savings:		**5.7**

Efficiency Improvement:
Total Power Savings: 5.7W
Estimated Overall Efficiency Improvement: **2.3%***

Product Application – Solar Panel Market

Bypass Diodes in High Temperature Solar Panels Applications



Bypass Diodes (Lighted Mode)

- **Low high temperature reverse leakage I_R** of SBR reduce power loss during lighted state of solar panel
- **200C max junction temperature T_J** to meet industry standard (IEC61215) of T_J=Tcase + R_{thJC}*(U_D)*I_D

Bypass Diodes (Partly Shaded)

- **Low forward voltage loss V_F** needed during partly shaded mode to minimized the power loss during occasional shading of solar cells

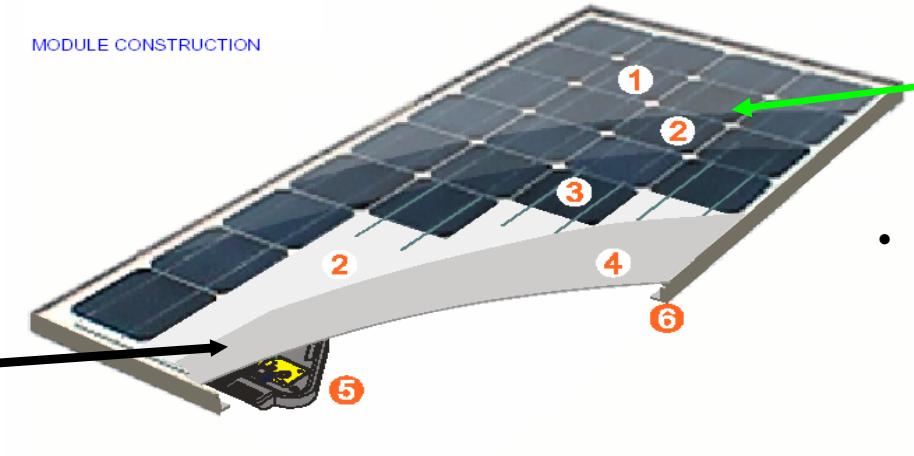
Product Application – Solar Panel Market

Use of Bypass Diodes for Series-Connected PV Modules

- *Bypass Diodes in Solar Panels*
  - **The new SBR10U45SP5 and SBR1045SP5 are the industry's first low profile bypass diodes specifically designed in accordance with the high temperature requirements of the IEC 61730-2 solar panel safety standard.**

New SBRs for Solar Panel Market						
Part No.	Description	Package	Max T_J	V_F @ rated current 125°C, Typ	I_R @ rated voltage, 125°C, Typ	Samples Availability
SBR10U45SP5	10 Amperes / 45 Volts, Ultra-Low VF SBR	PowerDI-5	200C*	0.38V	9mA	Avaliable Now !
SBR1045SP5	10 Amperes / 45 Volts, Standard Version SBR	PowerDI-5	200C*	0.47V	7mA	Avaliable Now !
SBR10U45SD1	10 Amperes / 45 Volts, Ultra-Low VF SBR	DO-201	200C*	0.38V	9mA	Avaliable Now !
SBR12A45SD1	12 Amperes / 45 Volts, Low VF SBR	DO-201	200C*	0.40V	9mA	Q3 F2008
*Selectively Rated						

- **Many module manufacturers will provide modules with the bypass diodes integrated into the module junction box.**



PowerDI™5

- **With low profile height, new SBR bypass diodes can be possibly integrated into the solar panel**

New Product - TO-220 Package

- ***SBR60A60CT*** *- High efficiency Ultra-Low VF for PC power rectifiers market*
- *Features & Applications*
  - ❑ Substantially lower high temperature reverse leakage (IR) for more thermal stability
  - ❑ High avalanche power capability and rating for ruggedness and reliability compared
  - ❑ Ultra-low forward voltage loss to improve SMPS efficiency
  - ❑ Ideal for output rectifiers in PC, telecom, and medical power supplies

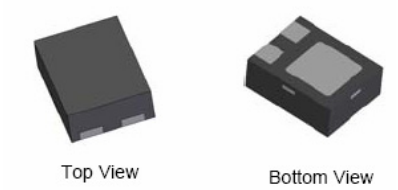
New SBR Ultra-Low VF Ptoduct Family for SMPS							
Part No.	**Description**	**V_{RRM} (V)**	**I_O (A)**	**V_F @ I_F (Typ, 125C°)**	**I_R @ V_R (Typ, 125C°)**	**Max T_J (C°)**	**Package**
SBR30U30CT	Ultra-Low VF SBR	30	30	0.34V @ 30A	40mA @ 30V	150	TO-220
SBR30A40CT	Low VF SBR	40	30	0.42V @ 30A	20mA @ 40V	150	TO-220
SBR30A45CT	Low VF SBR	45	30	0.42V @ 30A	20mA @ 45V	150	TO-220
SBR30A60CT	Low VF SBR	60	30	0.53V @ 30A	20mA @ 60V	150	TO-220
SBR40U45CT	Ultra-Low VF SBR	45	40	0.39V @ 40A	20mA @ 45V	150	TO-220
SBR40U60CT	Ultra-Low VF SBR	60	40	0.54V @ 40A	15mA @ 60V	150	TO-220
SBR60A45CT	Low VF SBR	45	60	0.49V @ 60A	20mA @ 60V	150	TO-220
SBR60A60CT	Low VF SBR	60	60	0.58V @ 60A	15mA @ 60V	150	TO-220

P.S. V_F @ I_F , I_F is per device

Product Application – Portables Solutions

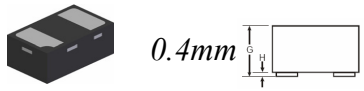
- *Buck/Boost & Reverse Polarity Diodes for Portable Electronics*
  - Designed to enable further miniaturization and improve efficiency resulting in extended battery life to meet the higher power requirements of today's multi-functional portable electronics such as digital audio players, mobile phones and digital cameras.

Smallest 1A Fully Rated Rectifier



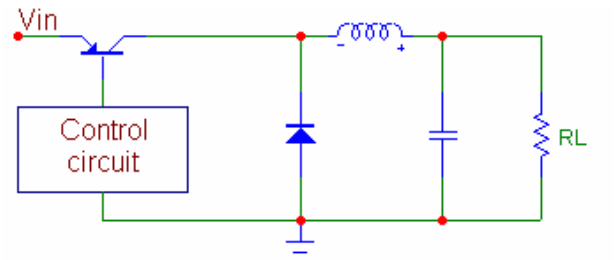
DFN1411-3 1.4mm x 1.1mm x 0.5mm

Thinner Package (0.4mm height)

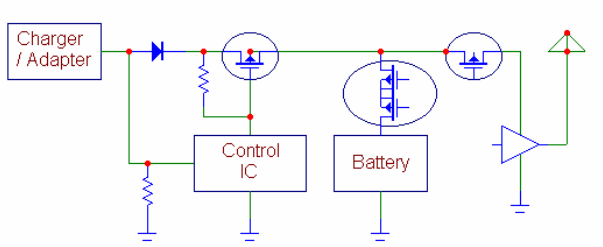


DFN1006-2 1.0mm x 0.6mm

Typical Circuit Applications:



(Buck Converter)



(Reverse Battery Protection)

New Product - PowerDI-123 Package

- ***SBR3U30P1*** - *Industry leading 3A with Tj (max) of 150 C in a miniature package*

▪Application: mobile phones, MP3 Players, 1/8th and 1/16th DC/DC converters, digital cameras, automotive applications

▪Highest ESD ±16 kV HBM (Grade 3B, 16kV) rating and ±25kV ESD Protection (IEC61000-4-2 Level 4, Air Discharge) (traditional Schottky ±8 kV HBM)

▪ Much higher avalanche power rating for ruggedness and high reliability (traditional Schottky 30mJ)

▪ Large safe operating area (SOA) with maximum T_J of 150˚C/175 ˚C provides extra margin for high temperature applications (traditional Schottky 125 ˚C)

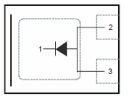
▪ Qualified to AEC-Q101 (automotive) standards for high reliability

Part No.	Description	Max T_J	ESD Rating	Max E_{AV}	VF@ Iomax, 25℃, Typ	IR@ Vr, 125℃, Typ
SBR3U30P1	3 Amperes / 30 Volts, Ultra-Low VF	150℃	±16kV HBM	105mJ	0.39V	12mA
SBR3U40P1	3 Amperes / 40 Volts, Ultra-Low VF	150℃	±16kV HBM	-	0.42V	8mA
SBR2U30P1	2 Amperes / 30 Volts, Ultra-Low VF	150℃	±16kV HBM	105mJ	0.36V	12mA
SBR2A30P1	2 Amperes / 30 Volts, Low VF	150℃	±16kV HBM	-	0.4V	7mA
SBR2A40P1	2 Amperes / 40 Volts, Low VF	150℃	±16kV HBM	-	0.45V	2.1mA
SBR3M30P1	3 Amperes / 30 Volts, Ultra-Low Leakage	175℃	±16kV HBM	105mJ	0.46V	3.1mA
SBR2M30P1	2 Amperes / 30 Volts, Ultra-Low Leakage	175℃	±16kV HBM	105mJ	0.42V	3.1mA

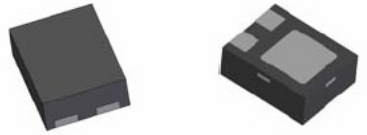
New Product - DFN Package

- ***SBR1U40LP*** *– The Smallest Fully Rated 1 Amp Rectifier in the Market!*
- *Features & Applications*
  - ❑ Ultra-Low VF for reduced power loss, improve efficiency, and extend battery life
  - ❑ Industry Leading Max Junction Temperature (T_J) 175C
  - ❑ Ideal for end user applications like digital audio players, multi-functional mobile phones, digital cameras and other portable electronics

Part No.	Description	V_{RRM} (V)	I_{FM} (A)	V_F @ I_F (Max)	I_R @ V_R (Max)	Max T_J (C°)	Package
SBR0220LP	Standard SBR	20	0.2	480mV @ 200mA	50uA @ 20V	150	DFN1006-2
SBR02M30LP	Ultra-Low Leakage SBR	30	0.2	610mV @ 200mA	0.5uA @ 30V	175	DFN1006-2
SBR02U100LP	Ultra-Low VF SBR	100	0.2	800mV @ 200mA	1.0uA @ 75V	150	DFN1006-2
SBR05U20LP	Ultra-Low VF SBR	20	0.5	500mV @ 500mA	50uA @ 20V	175	DFN1006-2
SBR05U20LPS	Ultra-Low VF SBR	20	0.5	500mV @ 500mA	50uA @ 20V	150	DFN1006H4-2
SBR07U20LPS	Ultra-Low VF SBR	20	0.7	550mV @ 700mA	50uA @ 20V	175	DFN1006H4-2
SBR1U40LP	Ultra-Low VF SBR	40	1	490mV @ 1A	50uA @ 40V	175	DFN1411-3
SBR3U100LP	Ultra-Low VF SBR	100	3	710mV @ 3A	250uA @ 100V	150	DFN3030-8
SBR3U150LP	Ultra-Low VF SBR	150	3	820mV @ 3A	250uA @ 100V	150	DFN3030-8
SBR4U130LP	Ultra-Low VF SBR	130	4	750mV @ 4A	100uA @ 130V	150	DFN3030-8



1.4mm x 1.1mm



New Product - SOD Package

- ***SBR130S3*** *- Industry leading 1A with Tj (max) of 150˚C in SOD-323 package*
- *Features & Applications*
  - ❑ Highest ESD ±16 kV HBM (Grade 3B, 16kV) rating and ±25kV ESD Protection (IEC61000-4-2 Level 4, Air Discharge)
  - ❑ AEC-Q101 (automotive) & RoHS complaint
  - ❑ Ideal for popular high volume USB charging circuits for smaller MP3 players, cellular phones and portable electronics

New SBR® SOD-323/SOD-523 Product Family						
Part No.	**Description**	**Max T_J**	**ESD Rating**	**V_F @ rated current 25˚C, Typ**	**I_R @ rated voltage 25˚C, Typ**	**I_R @ rated voltage 125˚C, Typ**
SBR130S3	1 Amperes / 30 Volts, low V_F & low leakage SBR®	150˚C	±16kV HBM	0.42V	10uA	1.3mA
SBR140S3	1 Amperes / 40 Volts, low V_F & low leakage SBR®	150˚C	±16kV HBM	0.46V	8uA	1.2mA
SBR0220T5	0.2 Amperes / 20 Volts, low V_F & low leakage SBR®	150˚C	±8kV HBM	0.46V	3.8uA	0.25mA
SBR0230T5	0.2 Amperes / 30 Volts, Ultra-low leakage SBR®	150˚C	±8kV HBM	0.58V	0.1uA	0.017mA
SBR05U20T5	0.5 Amperes / 20 Volts, Ultra-low leakage SBR®	150˚C	±8kV HBM	0.47V	6uA	0.6mA

Upcoming SBR New Products

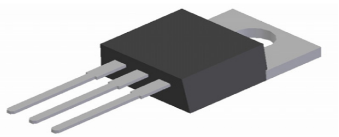
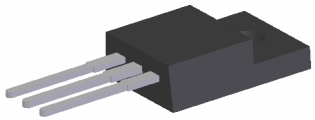
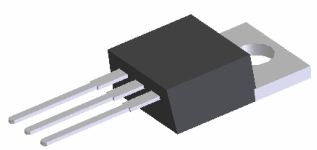
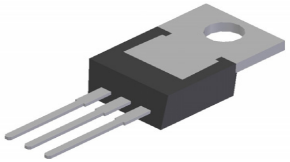
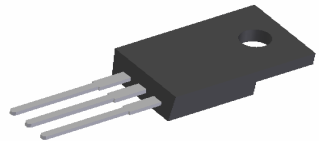
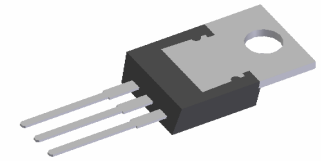
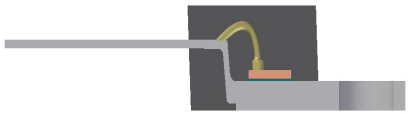
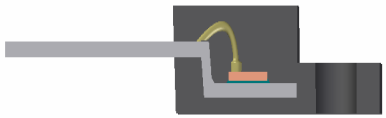
Type	Project Name	RTP Date	Packages	Target Customer/MKT
SBR	SBR0230CW	Q3F2008	SOT-563	Commodity
SBR	SBR0230V	Q3F2008	SOT-563	Commodity
SBR	SBR60A100PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR60A150PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR60A200PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR40U45PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR40U60PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR40U100PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR40U150PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR40U200PT	Q3F2008	TO-247	AC/DC SMPS
SBR	SBR5U45P5	Q4F2008	PDI-5	Portable Electronics
SBR	SBR5U60P5	Q4F2008	PDI-5	Portable Electronics
SBR	SBR5A100P5	Q4F2008	PDI-5	Portable Electronics
SBR	SBR10U200P5	Q4F2008	PDI-5	General Market
SBR	SBR5U300P5	Q4F2008	PDI-5	General Market
SBR	SBR10A300P5	Q4F2008	PDI-5	General Market
SBR	SBR1U20P3	Q4F2008	PDI323	Portable Electronics
SBR	SBR1U30P3	Q4F2008	PDI323	Portable Electronics
SBR	SBR1U40P3	Q4F2008	PDI323	Portable Electronics APPLE
SBR	SBR1U60P3	Q4F2008	PDI323	Portable Electronics

ITO-220S

New Insulated Package with Better Thermal Performance

New Package - ITO220S

- Comparison

Package		TO-220	ITO-220	ITO-220S
View	Top			
	Bottom			
	Internal			
Rthja (C/W)	w/ heatsink	16	19.4	12.8
	w/o heatsink	53.7	55.8	56.7

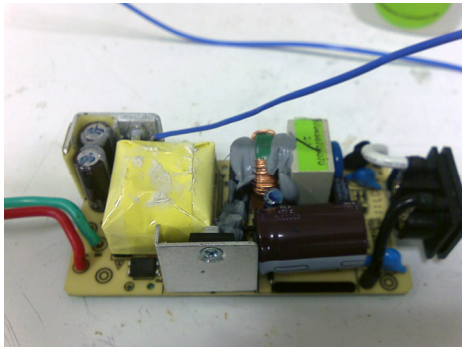
New Package - ITO220S

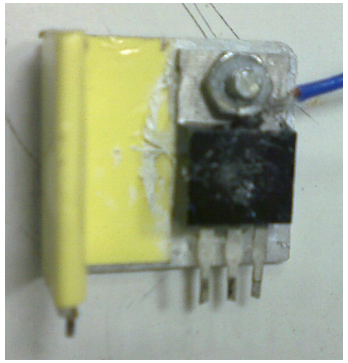
- Diodes introduces Schottky Rectifier in ITO-220S package to target LIPS of LCD TV, Desktop Power & Power Adapter market.
  - Provide additional selection to customers in addition to SBR
  - ITO-220S provide better thermal performance compared to traditional ITO-220
- Below Schottky p/n are available for promotion with additional p/n to be introduced

P/N	Package	Samples Available
MBR10100CTP	ITO-220S	now
MBR20100CTP	ITO-220S	now
SBL1040CTP	ITO-220S	now
SBL1060CTP	ITO-220S	now
SBL2045CTP	ITO-220S	now
SBL2060CTP	ITO-220S	now
SBL3040CTP	ITO-220S	now
SBL3045CTP	ITO-220S	now
SBL3060CTP	ITO-220S	now
MBR10150CTP	ITO-220S	July‘08
MBR20150CTP	ITO-220S	July‘08

Thermal Performance – ITO-220S vs TO-220

- Tested system: 9.8Vo /3A Adaptor. (size 98mm x 48 mm x 30mm)
- Thermal performance of ITO-220S is similar to standard TO-220 at the same chip (the same wafer process).
- ITO-220S package provide a cost-sown advantage
  - **Save the cost of silicon insulator ($0.004~0.02) and bushing ($0.003~0.005).**
  - **Save expensive assembler cost and time of manpower.**





MBR10100	ITO-220S		TO-220	
Leg	A	B	A	B
VF@IF 5A (mA)	785	785	782	783
VB@IR 1mA (V)	126.3	126.3	121.7	121.8
IR@VR 100V (uA)	0.6	0.5	1.1	1.2
MBR20100	ITO-220S		TO-220	
Leg	A	B	A	B
VF@IF 10A (mA)	793	794	782	783
VB@IR 1mA (V)	122.5	122.4	130.9	130.9
IR@VR 100V (uA)	1	1.1	1.8	1.9

MBR10100CTP (ITO-220S)	90V	110V	240V	264V
VR@Vo=9.78V/0.5A (V)	31.4	34.6	65.5	71
Temperature@Io=2.5A TA=27.4 (℃)	92.8	89.7	88.1	88
MBR10100CT (TO-220)	90V	110V	240V	264V
VR@Vo=9.78V/0.5A (V)	33.8	38	67.5	74
Temperature@Io=2.5A TA=25.7(℃)	90.6	86.5	84	82.3

MBR20100CTP (ITO-220S)	90V	110V	240V	264V
VR@Vo=9.78V/0.5A (V)	34.8	39.6	69.5	75
Temperature@Io=3A TA=27.4 (℃)	108.6	95.8	93.6	89.8
MBR20100CT (TO-220)	90V	110V	240V	264V
VR@Vo=9.78V/0.5A (V)	37	42.6	74	79
Temperature@Io=3A TA=25.7 (℃)	111.1	98.3	92.4	91

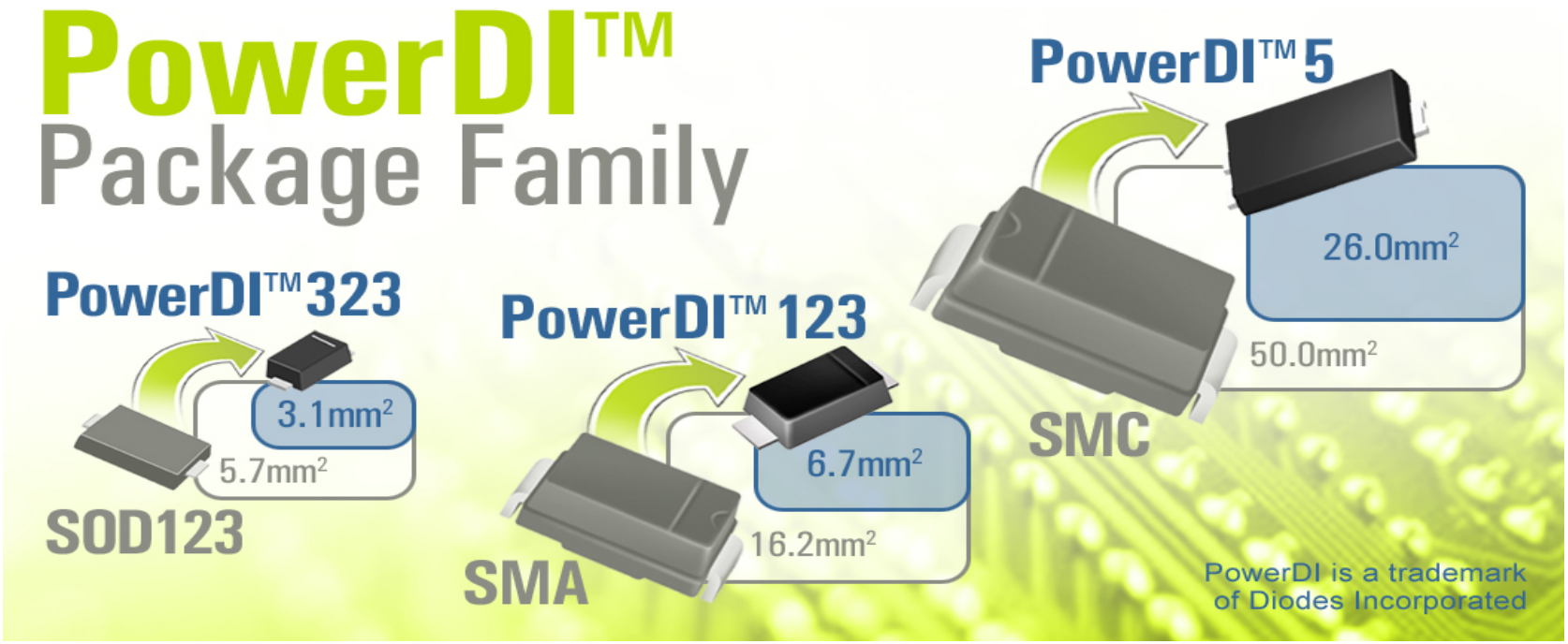
High Power Density Package

PowerDI™323

PowerDI™123

PowerDI™5

PowerDI Package



45% PCB Area reduction from SOD-123

- **750mW Package Power Dissipation**
- **$R\theta_{JA}$ = 175ºC/W***
- **Power Density = 242mW/mm²***
- **Low Profile, 0.7mm max package height**

59% PCB Area reduction from SMA

- **1W Package Power Dissipation**
- **$R\theta_{JA}$ = 125ºC/W***
- **Power Density = 149mW/mm²***
- **Low Profile, 1.0mm max package height**

48% PCB Area reduction from SMC

- **1.5W Package Power Dissipation**
- **$R\theta_{JA}$ = 85ºC/W***
- **Power Density = 58mW/mm²***
- **Low Profile, 1.15mm max package height**

* FR-4 PCB, 2 oz. Copper, minimum recommended pad layout per http://www.diodes.com/datasheets/ap02001.pdf.

	PowerDI 323	SOD-323	SOD-123	PowerDI 123	SMA	PowerDI 5	D pack	SMC
Height (max)	0.7mm	typ 1.05mm	1.35mm	1mm	2.6mm	1.15mm	2.39mm	2.62mm
PCB Footprint	3.13mm²	3.25mm²	6.55mm²	6.75mm²	16.32mm²	26.73mm²	70.06mm²	50.57mm²

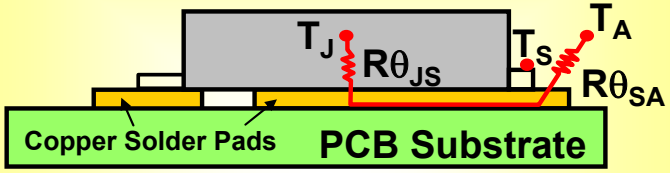
Higher Power Density Alternative

Package Highlights

- RoHS Compliant - **Green** Molding Compound
- Pb-Free, 100% Matte Tin Plating

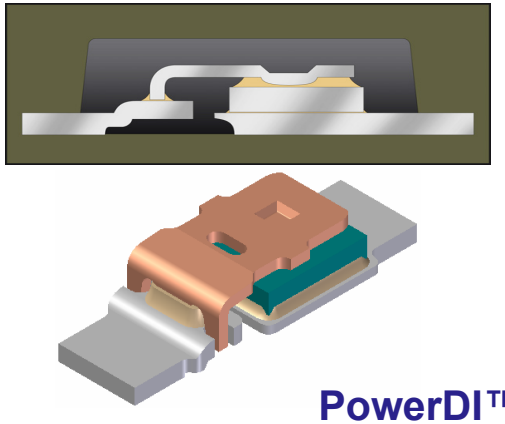
Package Construction

- Optimized for efficient heat transfer to PCB, Low $R\theta_{JS}$
  - ☺ PowerDI™323 $R\theta_{JS} \approx 15$
  - ☺ PowerDI™123 $R\theta_{JS} \approx 5$ ˚C/W
  - ☺ PowerDI™5 $R\theta_{JS} \approx 1.5$ ˚C/W
- Solid Anode Clip offers robust Surge Current Ratings

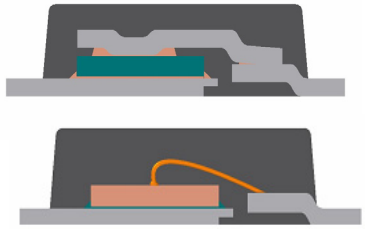


Withstands 260˚C Solder Reflow
Moisture Sensitivity Level (MSL) 1

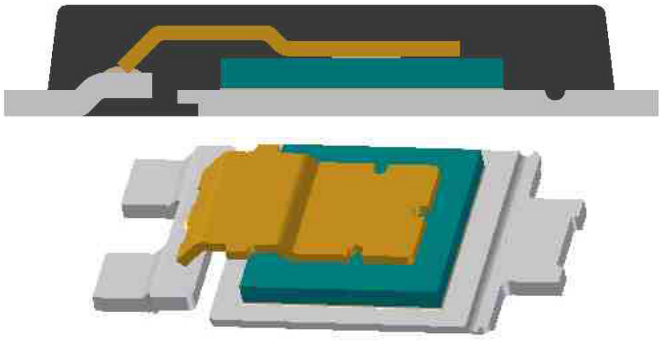
PowerDI™123
Internal Construction

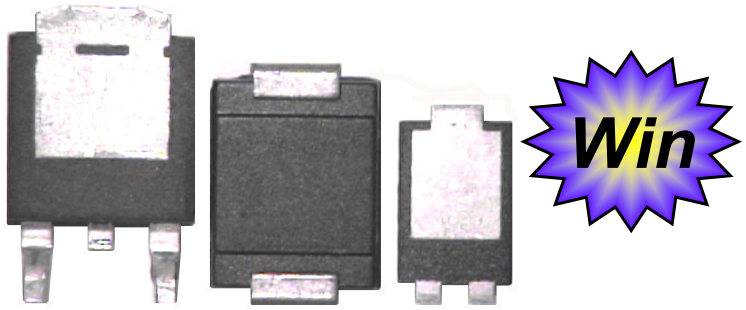


PowerDI™323
Internal Construction



PowerDI™5
Internal Construction

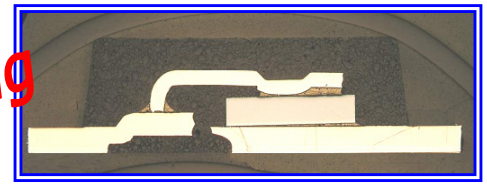




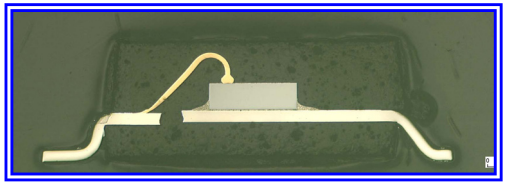
DPak SMC PowerDI™5

PowerDI™ Construction Comparison

Patent Pending

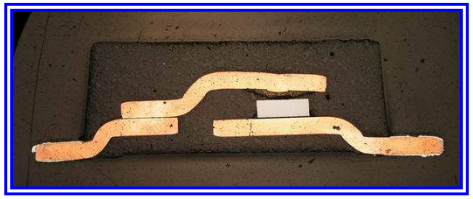


Diodes Inc.: PowerDI™123



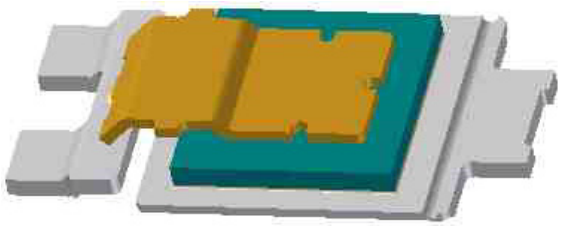
Diodes Inc.:Standard SOD-123

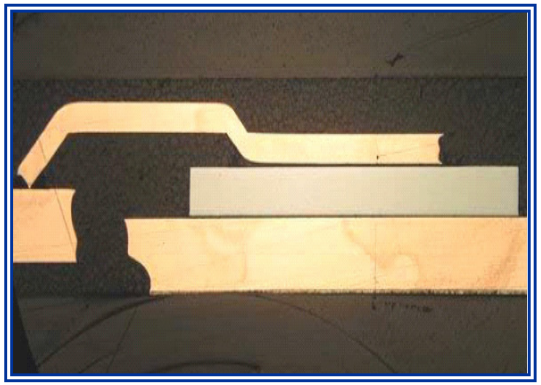
Toshiba: S-Flat



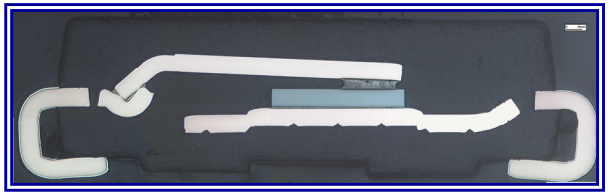
Vishay: SMF

ON Semi: SOD-123FL





Cross-Section: PowerDI™5

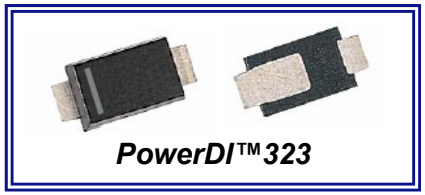


Cross-Section: SMC

PowerDI™ Package Compatibility

PowerDI™ Package Compatibility

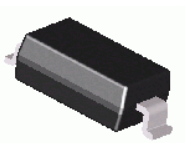
- PowerDI™323 is Drop-in Compatible* with:
  - SOD-110 Recommended Solder Pads (Philips)
  - US-FLAT Recommended Solder Pads (Toshiba)
  - TUMD2 Recommended Solder Pads (Rohm)
- PowerDI™123 is Drop-in Compatible* with:
  - SOD-123 Recommended Solder Pads
  - SOD-123FL Recommended Solder Pads (On Semi)
  - SMF Recommended Solder Pads (Vishay)
  - M1F Recommended Solder Pads (Shindengen)
- PowerDI™5 is Drop-in Compatible with:
  - PowerMite™3 Recommended Solder Pads (Microsemi)
  - SMPC (TO-277A) Recommended Solder Pads (Vishay)


PowerDI™323


SOD-110

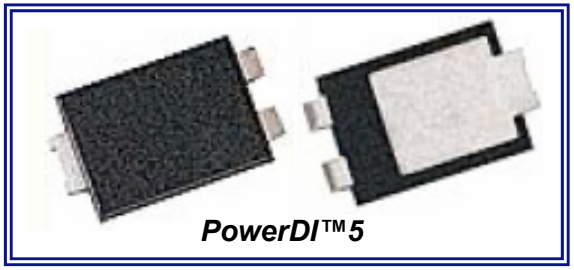

US-FLAT


PowerDI™123


SOD-123


SMF

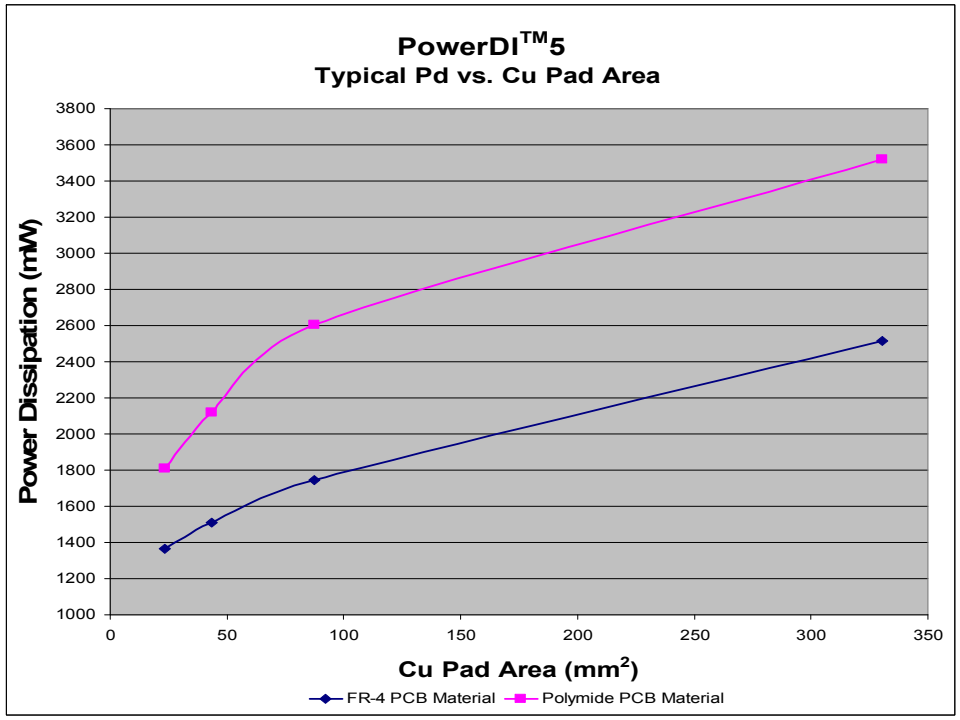

SOD-123FL

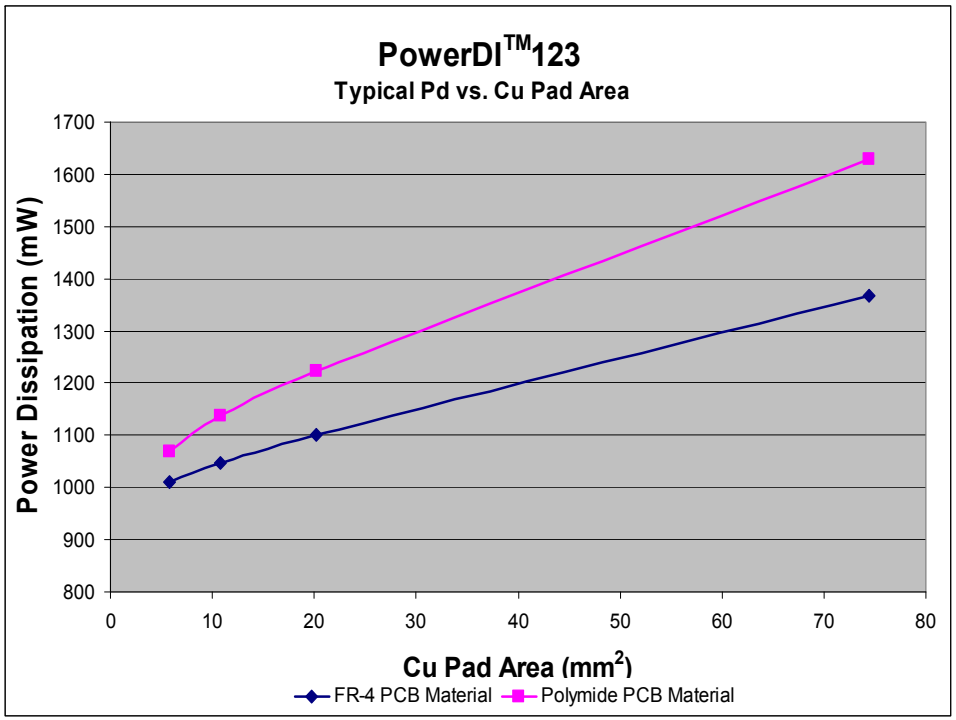

PowerDI™5

* Compatible in most soldering conditions. Individual Verification Recommended

Power Dissipation

PowerDI™ Package Power Capability vs. Mounting Conditions





PowerDI™5

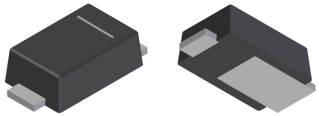
- $R\theta_{JA}$ (Mounted on 1"x1" 1oz Copper Pad, GETEK PCB) **= 65 ºC/W**
- $R\theta_{JA}$ (Mounted on Min, Recommended Pads, FR-4 PCB) **= 85 ºC/W**

PowerDI™123

- $R\theta_{JA}$ (Mounted on 1"x1" 1oz Copper Pad, GETEK PCB) **= 54 ºC/W**
- $R\theta_{JA}$ (Mounted on Min, Recommended Pads, FR-4 PCB) **= 180 ºC/W**

PowerDI™323 Product Rollout

- **Small Signal Schottky Diodes**
  - PD3S0230 (200mA, 30V)
    - Cross to Philips BAT254 (SOD-110)
- **1 Amp Schottky Rectifiers**
  - PD3S120L (1A, 20V, Low V_F)
  - PD3S130L (1A, 30V, Low V_F)
    - Cross to Toshiba CUS01 (US-Flat)
  - PD3S130H (1A, 30V, Low I_R)
    - Cross to Toshiba CUS02 (US-Flat)
  - PD3S140 (1A, 40V)
    - Cross to Toshiba CUS03 (US-Flat)
  - PD3S160 (1A, 60V)
    - Cross to Toshiba CUS04 (US-Flat)



PowerDI™323

PowerDI is a trademark of Diodes Incorporated

PowerDI™123 Product Offering

- 1 Amp Schottky Rectifiers
  - DFLS120L (1A, 20V, Low V_F)
  - DFLS130 (1A, 30V)
  - DFLS130L (1A, 30V, Low V_F)
  - **DFLS140** (1A, 40V)
  - DFLS140L (1A, 40V, Low V_F)
- 2 Amp Schottky Rectifiers
  - DFLS220L (2A, 20V, Low V_F)
  - DFLS230 (2A, 30V)
  - DFLS230LH (2A, 30V, Low V_F &I_R)
  - DFLS230L (2A, 30V, Low V_F)
  - **DFLS240** (2A, 40V)
  - DFLS240L (2A, 40V, Low V_F)

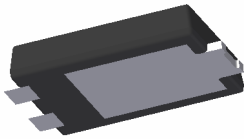
PowerDI™5 Product Offering

Schottky Rectifiers

- PDS340 - PDS3100
  - 3 Amp, 40V, 60V, 100V
- **PDS540** – PDS5100
  - 5 Amp, 40V, 60V, 100V
- PDS760
  - 7 Amp, 60 Volt
- PDS835L
  - 8 Amp, 35 Volt - Low V_F
- **PDS1040** (very popular in NB)
  - 10 Amp, 40 Volt
- PDS1045
  - 10 Amp, 45 Volt
- PDS1040L
  - 10 Amp, 40 Volt – Low V_F
- PDS1040CTL
  - 10 Amp, 40 Volt - High Efficiency, Dual Common Cathode

High Voltage Schottky Rectifiers

- PDS3200
  - 3 Amp, 200 Volt - Low I_R
- PDS4150
  - 4 Amp, 150 Volt - Low I_R
- PDS5100H
  - 5 Amp, 100 Volt - Low I_R
- PDS4200H
  - 4 Amp, 200 Volt - Low I_R



Q & A

Thank You!