

Vishay Semiconductors

High Voltage Surface Mount Input Rectifier Diode, 20 A



PRIMARY CHARACTERISTICS			
I _{F(AV)}	20 A		
V _R	800 V, 1200 V		
V _F at I _F	1.1 V		
I _{FSM}	300 A		
T _J max.	150 °C		
Package	D ² PAK (TO-263AB)		
Circuit configuration	Single		

FEATURES

- Glass passivated pellet chip junction
- Meets MSL level 1, per J-STD-020, LF maximum peak of 245 °C



FREE

- \bullet Designed and qualified according to JEDEC $^{\textcircled{B}}\text{-}JESD$ 47
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Input rectification
- Vishay Semiconductors switches and output rectifiers which are available in identical package outlines

DESCRIPTION

The VS-20ETS...S-M3 rectifier High Voltage Series has been optimized for very low forward voltage drop, with moderate leakage. The glass passivation technology used has reliable operation up to 150 $^{\circ}$ C junction temperature.

OUTPUT CURRENT IN TYPICAL APPLICATIONS					
APPLICATIONS	SINGLE-PHASE BRIDGE	THREE-PHASE BRIDGE	UNITS		
Capacitive input filter $T_A = 55 \text{ °C}$, $T_J = 125 \text{ °C}$ common heatsink of 1 °C/W	16.3	21	А		

MAJOR RATINGS AND CHARACTERISTICS					
SYMBOL	CHARACTERISTICS	VALUES	UNITS		
I _{F(AV)}	Sinusoidal waveform	20	A		
V _{RRM}		800/1200	V		
I _{FSM}		300	A		
V _F	20 A, T _J = 25 °C	1.1	V		
Тј		-40 to +150	°C		

VOLTAGE RATINGS						
PART NUMBER	V _{RRM} , MAXIMUM PEAK REVERSE VOLTAGE V	V _{RSM} , MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I _{RRM} AT 150 °C mA			
VS-20ETS08S-M3	800	900	4			
VS-20ETS12S-M3	1200	1300	Ι			

ABSOLUTE MAXIMUM RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum average forward current	I _{F(AV)}	$T_C = 105$ °C, 180° conduction half sine wave	20	
Maximum peak one cycle	1	10 ms sine pulse, rated V_{RRM} applied	250	А
non-repetitive surge current	IFSM	10 ms sine pulse, no voltage reapplied	300	
Maximum 1 ² t for fusing	12+	10 ms sine pulse, rated V_{RRM} applied	316	A2c
Maximum - t for fusing	1-1	10 ms sine pulse, no voltage reapplied	442	A-2
Maximum I ² \sqrt{t} for fusing	l²√t	t = 0.1 ms to 10 ms, no voltage reapplied	4420	A²√s

Revision: 16-Dec-2021

Document Number: 94889

For technical questions within your region: <u>DiodesAmericas@vishay.com</u>, <u>DiodesAsia@vishay.com</u>, <u>DiodesEurope@vishay.com</u> THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT <u>www.vishay.com/doc?91000</u>

1



VS-20ETS08S-M3, VS-20ETS12S-M3 Series

www.vishay.com

Vishay Semiconductors

ELECTRICAL SPECIFICATIONS							
PARAMETER	SYMBOL	TEST (CONDITIONS	VALUES	UNITS		
Maximum forward voltage drop	V _{FM}	20 A, T _J = 25 °C		1.1	V		
Forward slope resistance	r _t	T 150 °C	10.4	mΩ			
Threshold voltage	V _{F(TO)}	1J = 150 C	0.85	V			
Maximum roverse leakage current	I _{RM}	T _J = 25 °C	V Potod V	0.1	~		
Maximum reverse leakage current		T _J = 150 °C	VR - naleu VRRM	1.0	ША		

THERMAL - MECHANICAL SPECIFICATIONS						
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS	
Maximum junction and storage tempe	rature range	T _J , T _{Stg}		-40 to +150	°C	
Maximum thermal resistance, junction to case		R _{thJC}	R _{thJC} DC operation			
Maximum thermal resistance, junction to ambient		R _{thJA} ⁽¹⁾	For D ² PAK version	62	°C/W	
Typical thermal resistance, case to heatsink		R _{thCS}	Mounting surface, smooth, and greased	0.5		
Approximate weight				2	g	
				0.07	OZ.	
minimum				6.0 (5.0)	kgf · cm	
ma	maximum			12 (10)	(lbf · in)	
Marking davias			C_{222} at the D ² DAK (TO 262AB)	20ETS08S		
			Case signed FAR (10-203AD)	20ET	20ETS12S	

Note

⁽¹⁾ When mounted on 1" square (650 mm²) PCB of FR-4 or G-10 material 4 oz. (140 μm) copper 40 °C/W For recommended footprint and soldering techniques refer to application note #AN-994



Fig. 1 - Current Rating Characteristics



Fig. 2 - Current Rating Characteristics



VS-20ETS08S-M3, VS-20ETS12S-M3 Series

Vishay Semiconductors



Fig. 3 - Forward Power Loss Characteristics



Fig. 4 - Forward Power Loss Characteristics





Fig. 5 - Maximum Non-Repetitive Surge Current



Fig. 6 - Maximum Non-Repetitive Surge Current

Fig. 7 - Forward Voltage Drop Characteristics

VS-20ETS08S-M3, VS-20ETS12S-M3 Series

Vishay Semiconductors

Fig. 8 - Thermal Impedance Z_{thJC} Characteristics

ORDERING INFORMATION TABLE

		r			r		1	1	
Device code	vs-	20	E	т	s	12	s	TRL	-M3
		(2)	(3)	4	5	6	(7)	8	(9)
	-	. Vis	hav Sen	nicondu	ctors pro	oduct	-	-	-
	H	C	rant rati	ng (20 -	- 20 4)	Judot			
		- Cui		ng (20 -	- 20 A)				
	3 -	- Ciro	cuit conf	iguratio	า				
		E	= single	9					
	4 -	- Pac	kage:						
		Т	= D ² PA	K (TO-2	263AB)				
	5 -	• Тур	e of silio	con:					
		S	= stand	lard reco	overy re	ctifier			
	6 -	- Vol	tage coo	de x 100	= V _{RRM}	/		08 = 8	300 V
	<u> </u>	- S=	surface	mounta	ible			12 = 1	200 V
		• N	one = tu	be					
		• TI	21 – tan	e and r	ool (loft	oriontor	4)		
		- TI					1)		
		•	ττ = ιap	be and h	eei (rigr	it orient	ed)		
	9 -	M3	s = halog	gen-free	, RoHS	-complia	ant, and	termina	ations le

www.vishay.com

Vishay Semiconductors

ORDERING INFORMATION (Example)						
PREFERRED P/N	BASE QUANTITY	PACKAGING DESCRIPTION				
VS-20ETS08S-M3	50	Antistatic plastic tube				
VS-20ETS08STRR-M3	800	13" diameter reel				
VS-20ETS08STRL-M3	800	13" diameter reel				
VS-20ETS12S-M3	50	Antistatic plastic tube				
VS-20ETS12STRR-M3	800	13" diameter reel				
VS-20ETS12STRL-M3	800	13" diameter reel				

LINKS TO RELATED DOCUMENTS				
Dimensions	www.vishay.com/doc?96164			
Part marking information	www.vishay.com/doc?95444			
Packaging information	www.vishay.com/doc?96424			
SPICE model	www.vishay.com/doc?95409			

Vishay Semiconductors

D²PAK

DIMENSIONS in millimeters and inches

otated	90 °C
Scale	<u>e:</u> 8:1

SAMBOI	MILLIM	ETERS	INC	HES	NOTES	
STINDUL	MIN.	MAX.	MIN.	MAX.	NOTES	
А	4.06	4.83	0.160	0.190		
A1	0.00	0.254	0.000	0.010		
b	0.51	0.99	0.020	0.039		
b1	0.51	0.89	0.020	0.035	4	
b2	1.14	1.78	0.045	0.070		
b3	1.14	1.73	0.045	0.068	4	
С	0.38	0.74	0.015	0.029		
c1	0.38	0.58	0.015	0.023	4	
c2	1.14	1.65	0.045	0.065		
D	8.51	9.65	0.335	0.380	2	

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	NOTES
D1	6.86	8.00	0.270	0.315	3
E	9.65	10.67	0.380	0.420	2, 3
E1	7.90	8.80	0.311	0.346	3
е	2.54 BSC		0.100 BSC		
Н	14.61	15.88	0.575	0.625	
L	1.78	2.79	0.070	0.110	
L1	-	1.65	-	0.066	3
L2	1.27	1.78	0.050	0.070	
L3	0.25 BSC		0.010 BSC		
L4	4.78	5.28	0.188	0.208	

Notes

⁽¹⁾ Dimensioning and tolerancing per ASME Y14.5 M-1994

Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at (2) the outmost extremes of the plastic body

(3) Thermal pad contour optional within dimension E, L1, D1 and E1

⁽⁴⁾ Dimension b1 and c1 apply to base metal only

(5) Datum A and B to be determined at datum plane H

(6) Controlling dimension: inches

⁽⁷⁾ Outline conforms to JEDEC[®] outline TO-263AB

Revision: 13-Jul-17

1

Document Number: 96164

For technical questions within your region: DiodesAmericas@vishav.com, DiodesAsia@vishav.com, DiodesEurope@vishav.com THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE. THE PRODUCTS DESCRIBED HEREIN AND THIS DOCUMENT ARE SUBJECT TO SPECIFIC DISCLAIMERS, SET FORTH AT www.vishav.com/doc?91000

Vishay

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, "Vishay"), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay's knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer's responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer's technical experts. Product specifications do not expand or otherwise modify Vishay's terms and conditions of purchase, including but not limited to the warranty expressed therein.

Hyperlinks included in this datasheet may direct users to third-party websites. These links are provided as a convenience and for informational purposes only. Inclusion of these hyperlinks does not constitute an endorsement or an approval by Vishay of any of the products, services or opinions of the corporation, organization or individual associated with the third-party website. Vishay disclaims any and all liability and bears no responsibility for the accuracy, legality or content of the third-party website or for that of subsequent links.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.