

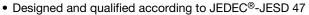
Ultrafast Rectifier, 15 A FRED Pt®



PRIMARY CHARACTERISTICS								
I _{F(AV)}	15 A							
V_{R}	200 V							
V _F at I _F	0.85 V							
t _{rr} typ.	See Recovery table							
T _J max.	175 °C							
Package	TO-220AC 2L							
Circuit configuration	Single							

FEATURES

- Ultrafast recovery time
- · Low forward voltage drop
- 175 °C operating junction temperature
- Low leakage current



 Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>



DESCRIPTION / APPLICATIONS

VS-MUR1520 is the state of the art ultrafast recovery rectifier specifically designed with optimized performance of forward voltage drop and ultrafast recovery time.

The planar structure and the platinum doped life time control, guarantee the best overall performance, ruggedness and reliability characteristics.

These devices are intended for use in the output rectification stage of SMPS, UPS, DC/DC converters as well as freewheeling diode in low voltage inverters and chopper motor drives.

Their extremely optimized stored charge and low recovery current minimize the switching losses and reduce over dissipation in the switching element and snubbers.

ABSOLUTE MAXIMUM RATINGS									
PARAMETER	SYMBOL	TEST CONDITIONS	MAX.	UNITS					
Peak repetitive reverse voltage	V_{RRM}		200	V					
Average rectified forward current	I _{F(AV)}	Total device, rated V _R , T _C = 150 °C	15						
Non-repetitive peak surge current	I _{FSM}		200	Α					
Peak repetitive forward current	I _{FM}	Rated V _R , square wave, 20 kHz, T _C = 150 °C	30						
Operating junction and storage temperatures	T _J , T _{Stg}		-65 to +175	°C					

ELECTRICAL SPECIFICATIONS (T _J = 25 °C unless otherwise specified)										
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNITS					
Breakdown voltage, blocking voltage	V_{BR} , V_{R}	Ι _R = 100 μΑ	200	-	-	.,				
Forward voltage	V _F	I _F = 15 A	1.05	V						
		I _F = 15 A, T _J = 150 °C	-	-	0.85					
Reverse leakage current	I _R	$V_R = V_R$ rated	-	-	10					
neverse leakage current		$T_J = 150 ^{\circ}\text{C}, V_R = V_R \text{rated}$	-	-	500	- μΑ				
Junction capacitance C _T		V _R = 200 V	-	55	-	pF				
Series inductance	L _S	Measured lead to lead 5 mm from package body	1	8.0	-	nΗ				



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DYNAMIC RECOVERY CHARACTERISTICS (T _J = 25 °C unless otherwise specified)									
PARAMETER	SYMBOL	TEST CO	NDITIONS	MIN.	TYP.	MAX.	UNITS		
Reverse recovery time	t _{rr}	$I_F = 1.0 A, dI_F/dt =$	-	-	35				
		T _J = 25 °C		-	22	-	ns A		
		T _J = 125 °C	$I_F = 15 \text{ A}$ $dI_F/dt = 200 \text{ A/µs}$ $V_R = 160 \text{ V}$	=	39	-			
Dools woods on a summent	I _{RRM}	T _J = 25 °C		=	1.6	-			
Peak recovery current		T _J = 125 °C		-	4.1	-			
Reverse recovery charge	Q _{rr}	T _J = 25 °C	,,,	=	19	-	200		
		T _J = 125 °C		-	90	-	nC		

THERMAL - MECHANICAL SPECIFICATIONS										
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNITS				
Maximum junction and storage temperature range	T _J , T _{Stg}		-65	-	175	°C				
Thermal resistance, junction to case	R _{thJC}		-	-	1.5					
Thermal resistance, junction to ambient	R _{thJA}		-	-	50	°C/W				
Thermal resistance, case to heatsink	R _{thCS}	Mounting surface, flat, smooth and greased	-	0.5	-					
Weight			-	2.0	-	g				
vveigiti			-	0.07	-	oz.				
Mounting torque			6.0 (5.0)	-	12 (10)	kgf · cm (lbf · in)				
Marking device		Case style TO-220AC 2L	MUR1520							

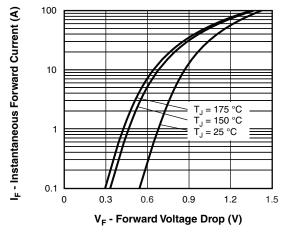


Fig. 1 - Typical Forward Voltage Drop Characteristics

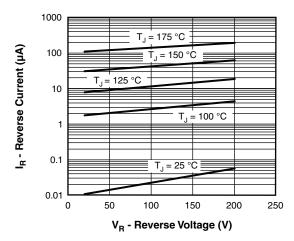


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

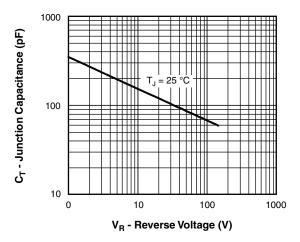


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

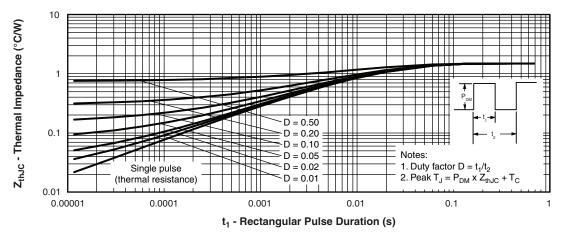


Fig. 4 - Maximum Thermal Impedance Z_{thJC} Characteristics

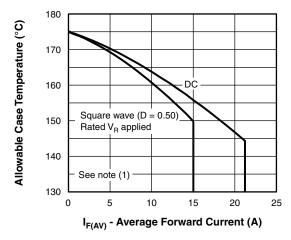


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

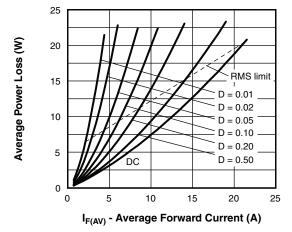


Fig. 6 - Forward Power Loss Characteristics

Note

 $^{(1)}$ Formula used: T_C = T_J - (Pd + Pd_{REV}) x R_{thJC}; Pd = forward power loss = I_{F(AV)} x V_{FM} at (I_{F(AV)}/D) (see fig. 6); Pd_{REV} = inverse power loss = V_{R1} x I_R (1 - D); I_R at V_{R1} = rated V_R

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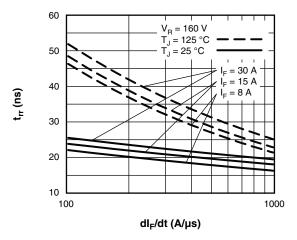


Fig. 7 - Typical Reverse Recovery Time vs. dl_F/dt

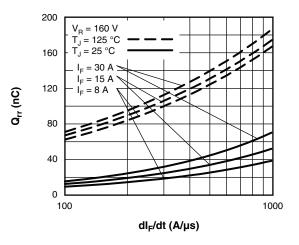
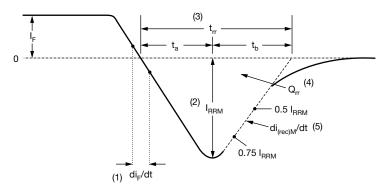


Fig. 8 - Typical Stored Charge vs. dl_F/dt



- (1) di_F/dt rate of change of current through zero crossing
- (2) I_{RRM} peak reverse recovery current
- (3) $\rm t_{rr}$ reverse recovery time measured from zero crossing point of negative going $\rm I_F$ to point where a line passing through 0.75 $\rm I_{RRM}$ and 0.50 $\rm I_{RRM}$ extrapolated to zero current.
- (4) \mathbf{Q}_{rr} area under curve defined by \mathbf{t}_{rr} and \mathbf{I}_{RRM}

$$Q_{rr} = \frac{t_{rr} \times I_{RRM}}{2}$$

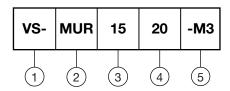
(5) $di_{(rec)M}/dt$ - peak rate of change of current during t_b portion of t_{rr}

Fig. 9 - Reverse Recovery Waveform and Definitions



ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product

2 - Ultrafast MUR series

Current rating (15 = 15 A)

Voltage rating (20 = 200 V)

5 - Environmental digit:

-M3 = halogen-free, RoHS-compliant, and termination lead (Pb)-free

ORDERING INFORMATION (Example)									
PREFERRED P/N BASE QUANTITY PACKAGING DESCRIPTION									
VS-MUR1520-M3	50	Antistatic plastic tubes							

LINKS TO RELATED DOCUMENTS								
Dimensions	www.vishay.com/doc?96156							
Part marking information	www.vishay.com/doc?95391							
SPICE model	www.vishay.com/doc?95271							



TO-220AC 2L

DIMENSIONS in millimeters and inches





Conforms to JEDEC® outline TO-220AC

SYMBOL	MILLIMETERS		INCHES		NOTES	SYMBOL	MILLIMETERS		INCHES		NOTES	
STMBOL	MIN.	MAX.	MIN.	MAX.	NOTES	NOTES	STIVIBOL	MIN.	MAX.	MIN.	MAX.	NOTES
Α	4.25	4.65	0.167	0.183			D2	11.68	13.30	0.460	0.524	6, 7
A1	1.14	1.40	0.045	0.055			Е	10.11	10.51	0.398	0.414	3, 6
A2	2.50	2.92	0.098	0.115			E1	6.86	8.89	0.270	0.350	6
b	0.69	1.01	0.027	0.040			е	2.41	2.67	0.095	0.105	
b1	0.38	0.97	0.015	0.038	4		e1	4.88	5.28	0.192	0.208	
b2	1.20	1.73	0.047	0.068			H1	6.09	6.48	0.240	0.255	6
b3	1.14	1.73	0.045	0.068	4		L	13.52	14.02	0.532	0.552	
С	0.36	0.61	0.014	0.024			L1	3.32	3.82	0.131	0.150	2
c1	0.36	0.56	0.014	0.022	4		ØΡ	3.54	3.91	0.139	0.154	
D	14.85	15.35	0.585	0.604	3		Q	2.60	3.00	0.102	0.118	
D1	8.38	9.02	0.330	0.355				•	•			

Notes

- ⁽¹⁾ Dimensioning and tolerancing as per ASME Y14.5M-1994
- (2) Lead dimension and finish uncontrolled in L1
- (3) Dimension D, D1, and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outermost extremes of the plastic body
- (4) Dimension b1, b3, and c1 apply to base metal only
- Controlling dimensions: inches
- (6) Thermal pad contour optional within dimensions E, H1, D2, and E1
- (7) Outline conforms to JEDEC® TO-220, except D2



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