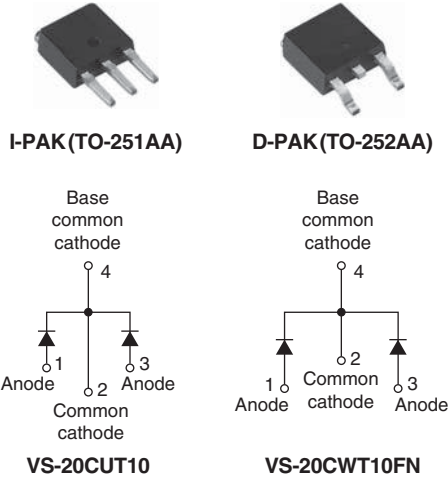




**THE DATASHEET OF  
VS-20CWT10FNTR**



## High Performance Schottky Generation 5.0, 2 x 10 A



### FEATURES

- 175 °C high performance Schottky diode
- Very low forward voltage drop
- Extremely low reverse leakage
- Optimized  $V_F$  vs.  $I_R$  trade off for high efficiency
- Increased ruggedness for reverse avalanche capability
- RBSOA available
- Negligible switching losses
- Submicron trench technology
- Compliant to RoHS Directive 2002/95/EC


**RoHS**  
COMPLIANT

### APPLICATIONS

- High efficiency SMPS
- High frequency switching
- Output rectification
- Reverse battery protection
- Freewheeling
- DC/DC systems
- Increased power density systems

PRODUCT SUMMARY	
Package	D-PAK (TO-252AA), I-PAK (TO-251AA)
$I_{F(AV)}$	2 x 10 A
$V_R$	100 V
$V_F$ at $I_F$	0.66 V
$I_{RM}$ max.	4 mA at 125 °C
$T_J$ max.	175 °C
Diode variation	Common cathode
$E_{AS}$	54 mJ

MAJOR RATINGS AND CHARACTERISTICS			
SYMBOL	CHARACTERISTICS	VALUES	UNITS
$V_{RRM}$		100	V
$V_F$	10 Apk, $T_J = 125$ °C (typical, per leg)	0.615	V
$T_J$	Range	- 55 to 175	°C

VOLTAGE RATINGS				
PARAMETER	SYMBOL	TEST CONDITIONS	VS-20CUT10 VS-20CWT10FN	UNITS
Maximum DC reverse voltage	$V_R$	$T_J = 25$ °C	100	V



ABSOLUTE MAXIMUM RATINGS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average forward current	$I_{F(AV)}$	50 % duty cycle at $T_C = 159^\circ\text{C}$ , rectangular waveform		10	A
				20	
Maximum peak one cycle non-repetitive surge current per leg	$I_{FSM}$	5 $\mu\text{s}$ sine or 3 $\mu\text{s}$ rect. pulse	Following any rated load condition and with rated $V_{RRM}$ applied	610	A
		10 ms sine or 6 ms rect. pulse		110	
Non-repetitive avalanche energy per leg	$E_{AS}$	$T_J = 25^\circ\text{C}$ , $I_{AS} = 3\text{ A}$ , $L = 12\text{ mH}$		54	mJ
Repetitive avalanche current per leg	$I_{AR}$	Limited by frequency of operation and time pulse duration so that $T_J < T_{J\text{ max}}$ . $I_{AS}$ at $T_{J\text{ max}}$ . as a function of time pulse (see fig. 8)		$I_{AS}$ at $T_{J\text{ max}}$ .	A

ELECTRICAL SPECIFICATIONS						
PARAMETER	SYMBOL	TEST CONDITIONS		TYP.	MAX.	UNITS
Forward voltage drop per leg	$V_{FM}^{(1)}$	10 A	$T_J = 25^\circ\text{C}$	0.735	0.810	V
		20 A		0.840	0.890	
		10 A	$T_J = 125^\circ\text{C}$	0.615	0.660	
		20 A		0.730	0.770	
Reverse leakage current per leg	$I_{RM}^{(1)}$	$T_J = 25^\circ\text{C}$	$V_R = \text{Rated } V_R$	-	50	$\mu\text{A}$
		$T_J = 125^\circ\text{C}$		-	4	mA
Junction capacitance per leg	$C_T$	$V_R = 5 V_{DC}$ (test signal range 100 kHz to 1 MHz), $25^\circ\text{C}$		400	-	pF
Series inductance per leg	$L_S$	Measured lead to lead 5 mm from package body		8.0	-	nH
Maximum voltage rate of change	dV/dt	Rated $V_R$		-	10 000	V/ $\mu\text{s}$

**Note**

(1) Pulse width < 300  $\mu\text{s}$ , duty cycle < 2 %

THERMAL - MECHANICAL SPECIFICATIONS					
PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum junction and storage temperature range	$T_J, T_{Stg}$			- 55 to 175	$^\circ\text{C}$
Maximum thermal resistance, junction to case per leg	$R_{thJC}$	DC operation		2	$^\circ\text{C/W}$
Maximum thermal resistance, junction to case per device				1	
Typical thermal resistance, case to heatsink	$R_{thCS}$			0.3	
Approximate weight				0.3	g
				0.01	oz.
Marking device		Case style I-PAK		20CUT10	
		Case style D-PAK		20CWT10FN	

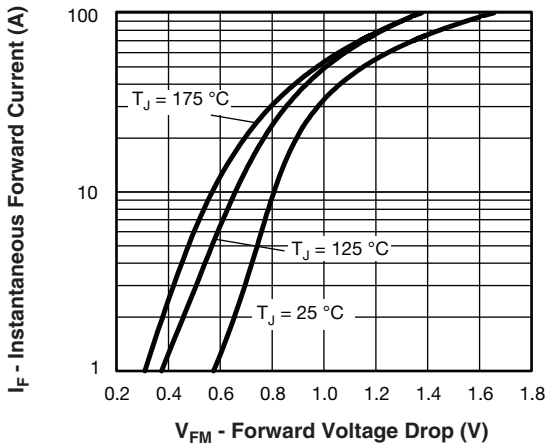


Fig. 1 - Maximum Forward Voltage Drop Characteristics

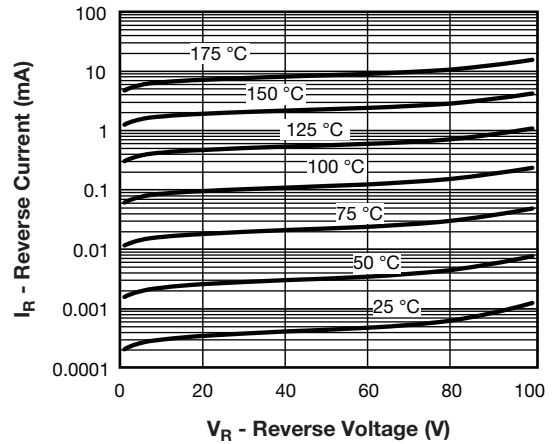


Fig. 2 - Typical Values of Reverse Current vs. Reverse Voltage

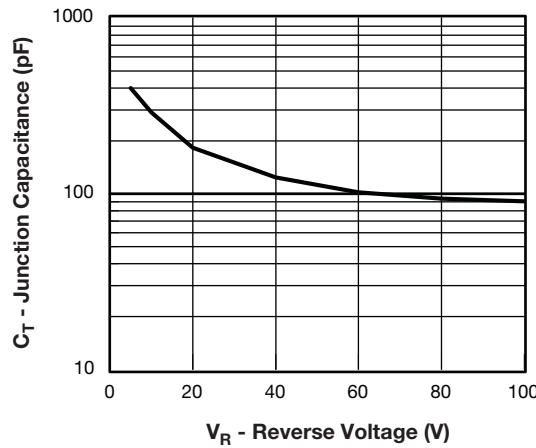


Fig. 3 - Typical Junction Capacitance vs. Reverse Voltage

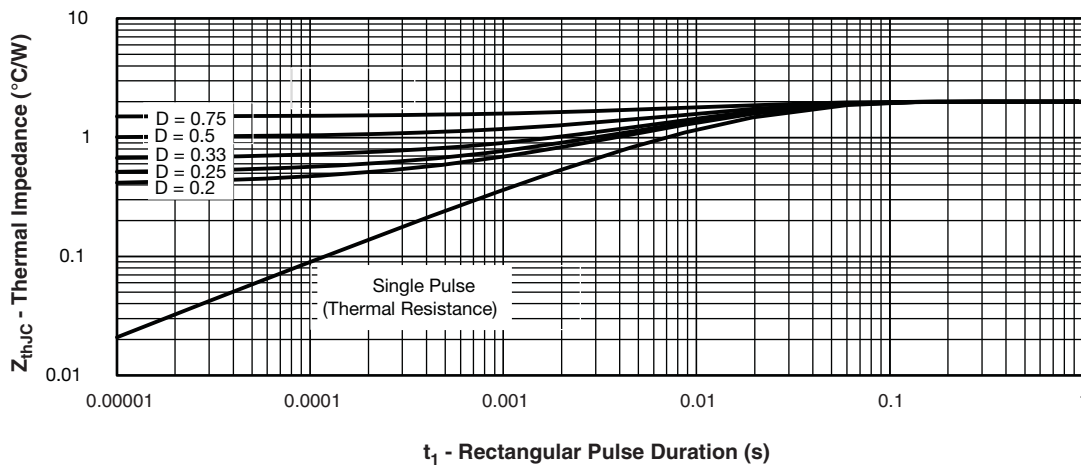


Fig. 4 - Maximum Thermal Impedance  $Z_{thJC}$  Characteristics

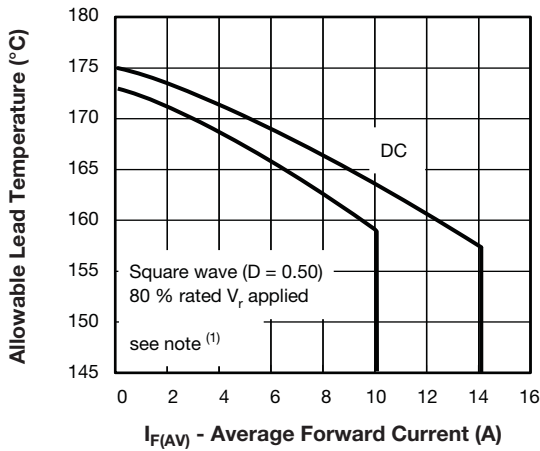


Fig. 5 - Maximum Allowable Case Temperature vs. Average Forward Current

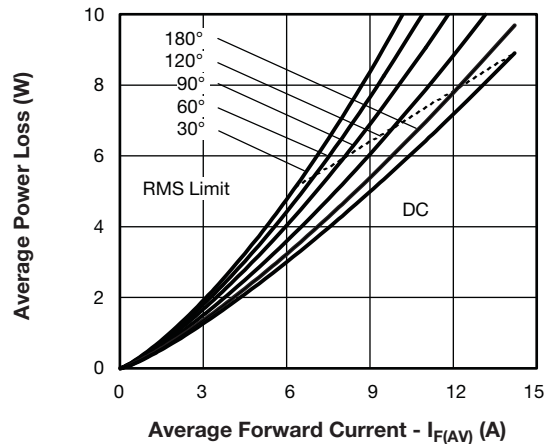


Fig. 6 - Forward Power Loss Characteristics

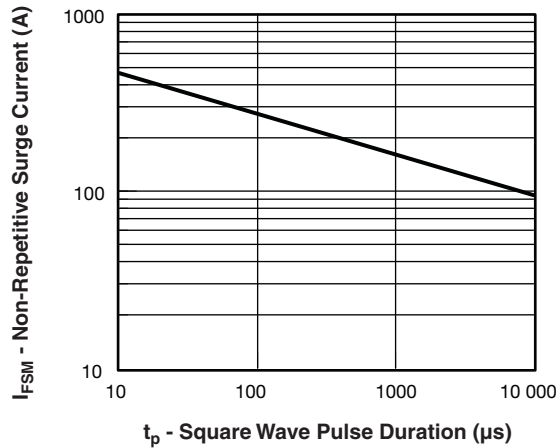


Fig. 7 - Maximum Non-Repetitive Surge Current

**Note**

- (1) Formula used:  $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;
- $P_d$  = Forward power loss =  $I_{F(AV)} \times V_{FM}$  at  $(I_{F(AV)}/D)$  (see fig. 6);
- $P_{d_{REV}}$  = Inverse power loss =  $V_{R1} \times I_R (1 - D)$ ;  $I_R$  at  $V_{R1} = 80\%$  rated  $V_R$

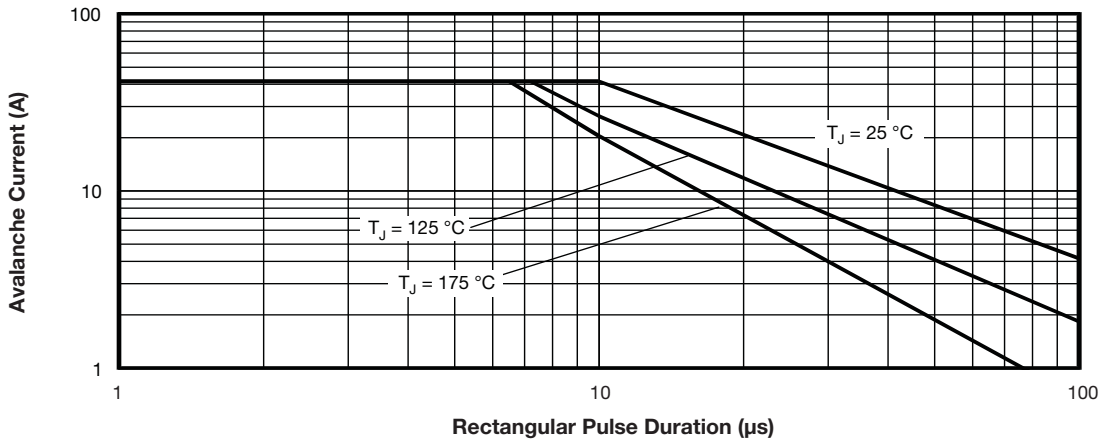
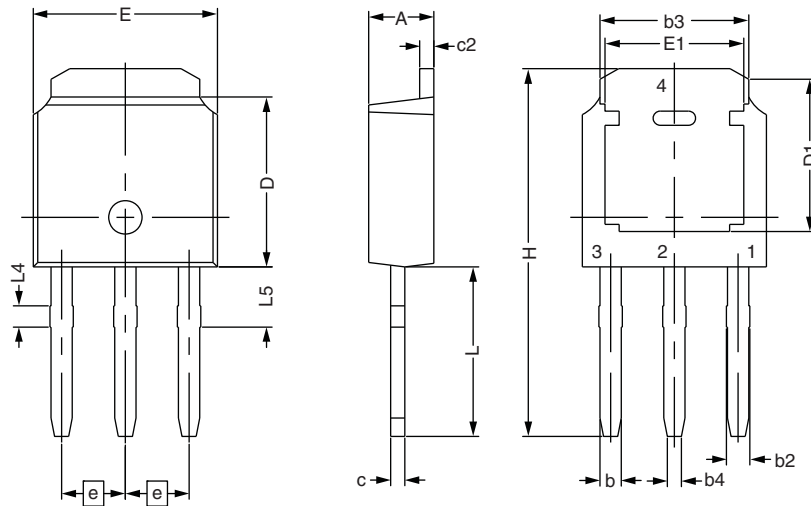


Fig. 8 - Reverse Bias Safe Operating Area (Avalanche Current vs. Rectangular Pulse Duration)



## I-PAK - S

### DIMENSIONS FOR I-PAK - S in millimeters



SYMBOL	DIMENSIONAL REQUIREMENTS		
	MIN.	NOM.	MAX.
E	6.40	6.60	6.70
L	3.98	4.13	4.28
L4	0.66	0.76	0.86
L5	1.96	2.16	2.36
D	6.00	6.10	6.20
H	11.05	11.25	11.45
b	0.64	0.76	0.88
b2	0.77	0.84	1.14
b3	5.21	5.34	5.46
b4	0.41	0.51	0.61
e	2.286 BSC		
A	2.20	2.30	2.38
c	0.40	0.50	0.60
c2	0.40	0.50	0.60
D1	5.30	-	-
E1	4.40	-	-



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