SiC JFET Division

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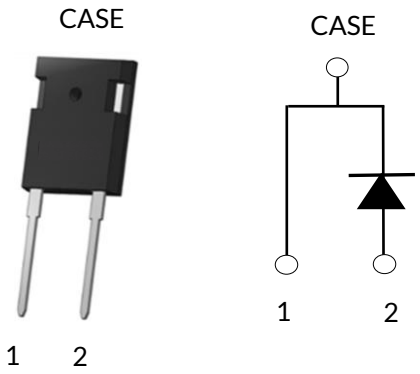
DATASHEET

UJ3D1220K2

Silicon Carbide (SiC) Diode - EliteSiC, TO-247-2L, 20 A, 1200 V SiC Merged PiN-Schottky (MPS) Diode

Rev. C, Jan 2025



Part Number	Package	Marking
UJ3D1220K2	TO-247-2L	UJ3D1220K2

Description

UnitedSiC offers the 3rd generation of high performance SiC Merged-PiN-Schottky (MPS) diodes. With zero reverse recovery charge and 175°C maximum junction temperature, these diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

Features

- Maximum operating temperature of 175°C
- Easy paralleling
- Extremely fast switching not dependent on temperature
- No reverse or forward recovery
- Enhanced surge current capability, MPS structure
- 100% UIS tested
- AEC-Q101 qualified

Typical applications

- Power converters
- Industrial motor drives
- Switch mode power supplies
- Power factor correction modules

Maximum Ratings

Parameter	Symbol	Test Conditions	Value	Units
DC blocking voltage	V_R		1200	V
Repetitive peak reverse voltage, T_J=25°C	V_{RRM}		1200	V
Surge peak reverse voltage	V_{RSM}		1200	V
Maximum DC forward current	I_F	T_C = 135°C	20	A
Non-repetitive forward surge current sine halfwave	I_{FSM}	T_C = 25°C, t_p = 10ms	190	A
		T_C = 110°C, t_p = 10ms	180	
Repetitive forward surge current sine halfwave, D=0.1	I_{FRM}	T_C = 25°C, t_p = 10ms	71.9	A
		T_C = 110°C, t_p = 10ms	40.9	
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25°C, t_p = 10µs	1300	A
		T_C = 110°C, t_p = 10µs	1300	
i^2t value	$\int i^2dt$	T_C = 25°C, t_p = 10ms	181	A^2s
		T_C = 110°C, t_p = 10ms	162	
Power dissipation	P_{tot}	T_C = 25°C	205	W
		T_C = 135°C	55	
Maximum junction temperature	$T_{J,max}$		175	°C
Operating and storage temperature	T_J, T_{STG}		-55 to 175	°C
Soldering temperatures, wavesoldering only allowed at leads	T_{sold}	1.6mm from case for 10s	260	°C

Thermal Characteristics

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Thermal resistance, junction-to-case	$R_{\theta JC}$			0.56	0.73	°C/W

Electrical Characteristics (T_J = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward voltage	V_F	I_F = 20A, T_J=25°C	-	1.52	1.7	V
		I_F = 20A, T_J=150°C	-	2.15		
		I_F = 20A, T_J=175°C	-	2.25		
Reverse current	I_R	V_R=1200V, T_J=25°C	-	18	190	µA
		V_R=1200V, T_J=175°C	-	500		
Total capacitive charge (1)	Q_C	V_R=800V		83		nC
Total capacitance	C	V_R=1V, f = 1MHz		810		pF
		V_R=400V, f = 1MHz		75		
		V_R=800V, f = 1MHz		69		
Capacitance stored energy	E_C	V_R=800V		24.5		µJ

(1) Q_c is independent on T_J, di_F/dt, and I_F as shown in the application note USCi_AN0011.

Typical Performance Diagrams

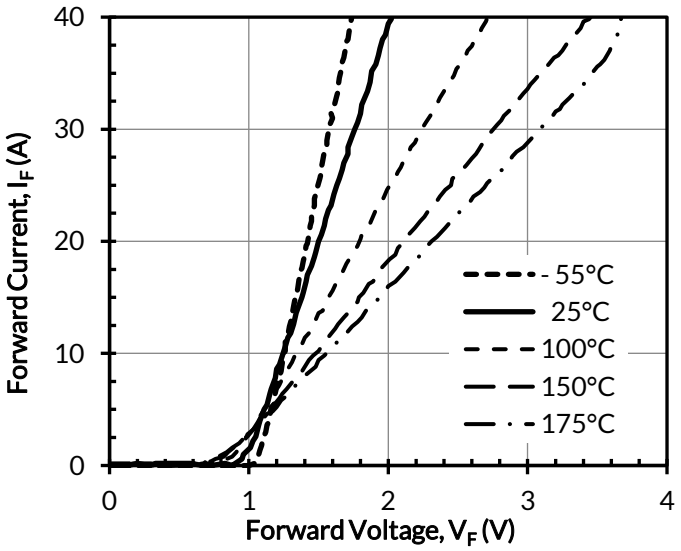


Figure 1. Typical forward characteristics

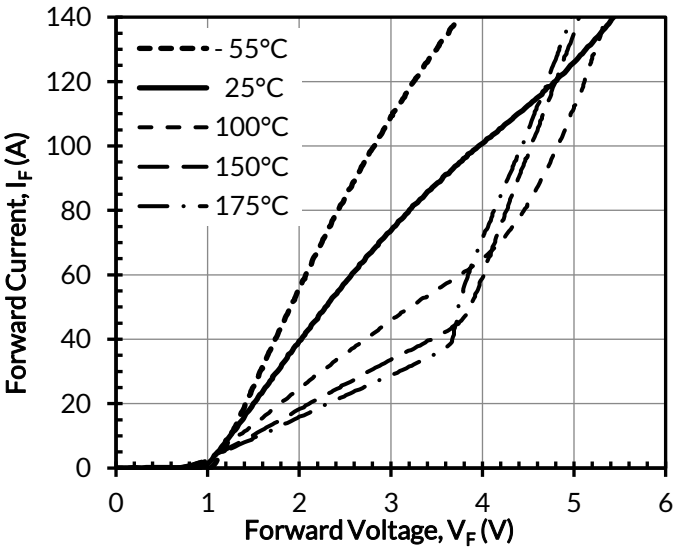


Figure 2. Typical forward characteristics in surge current

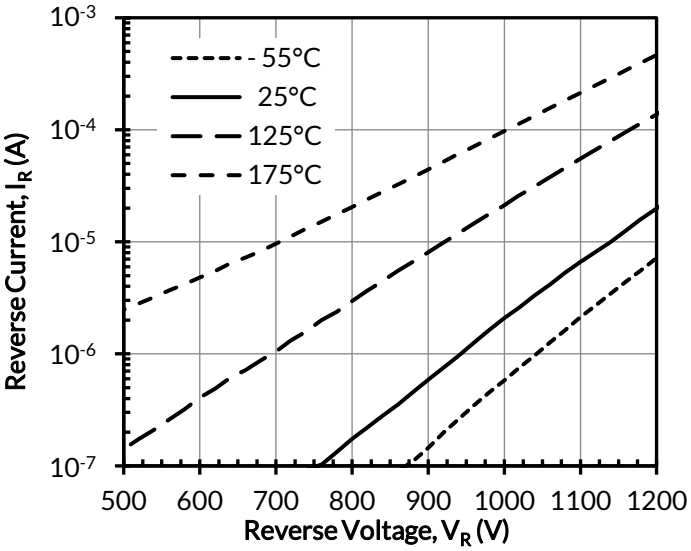


Figure 3. Typical reverse characteristics

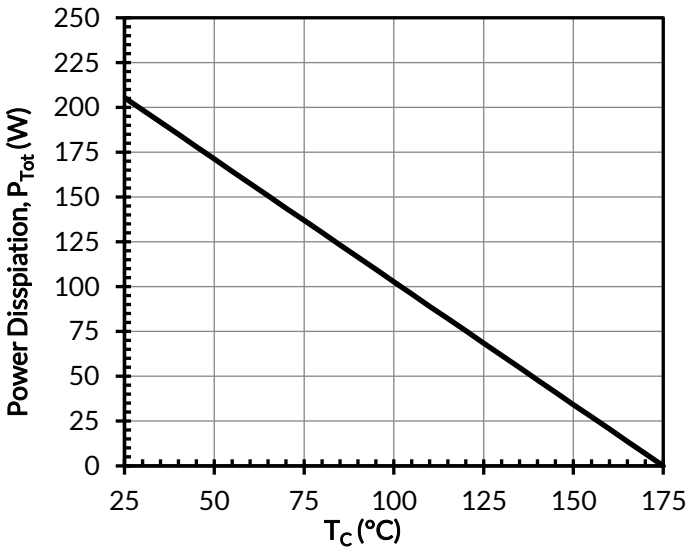


Figure 4. Power dissipation

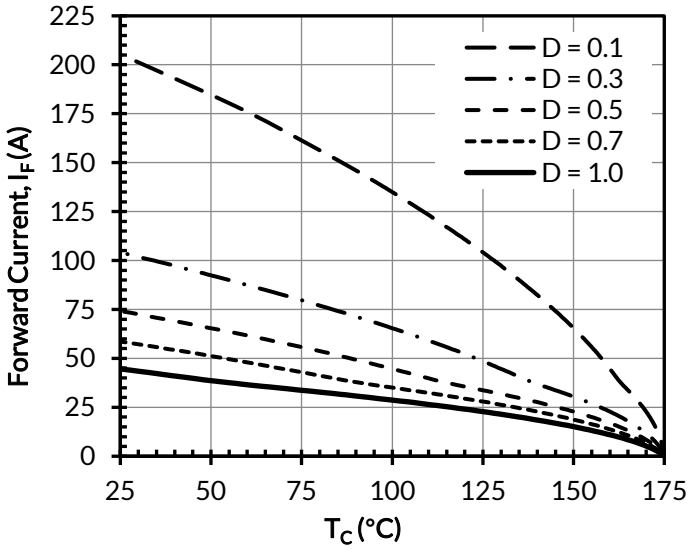


Figure 5. Diode forward current

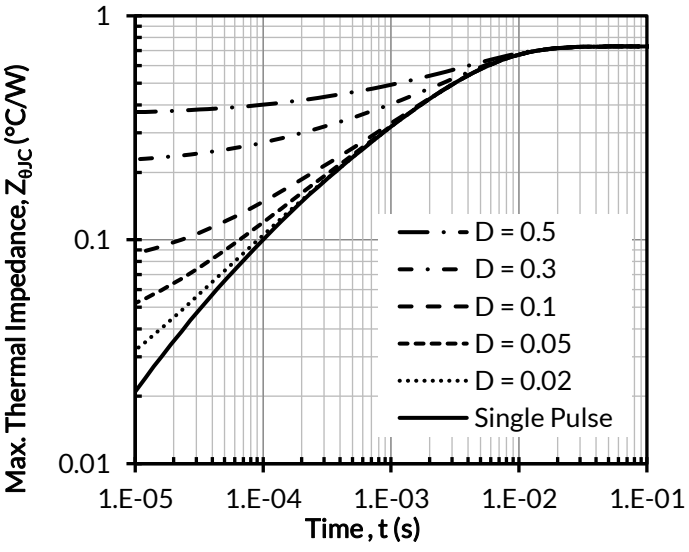


Figure 6. Maximum transient thermal impedance

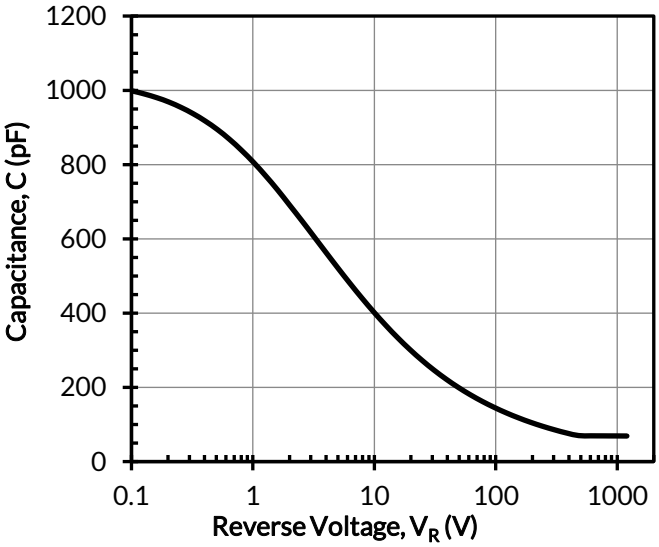


Figure 7. Capacitance vs. reverse voltage at 1MHz

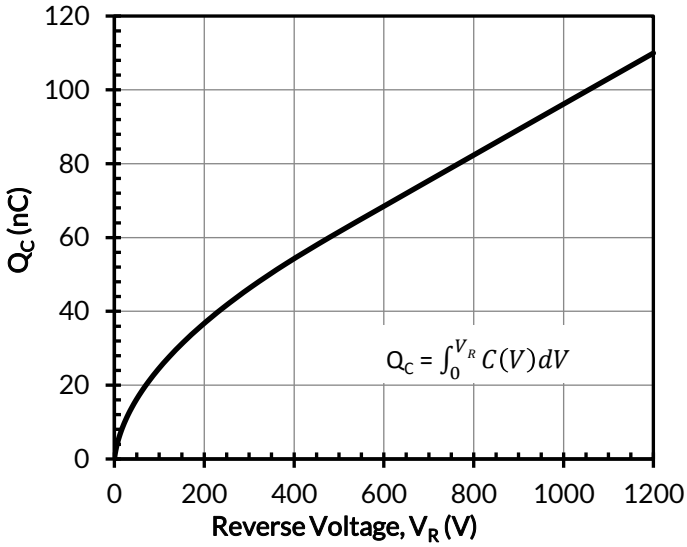


Figure 8. Typical capacitive charge vs. reverse voltage

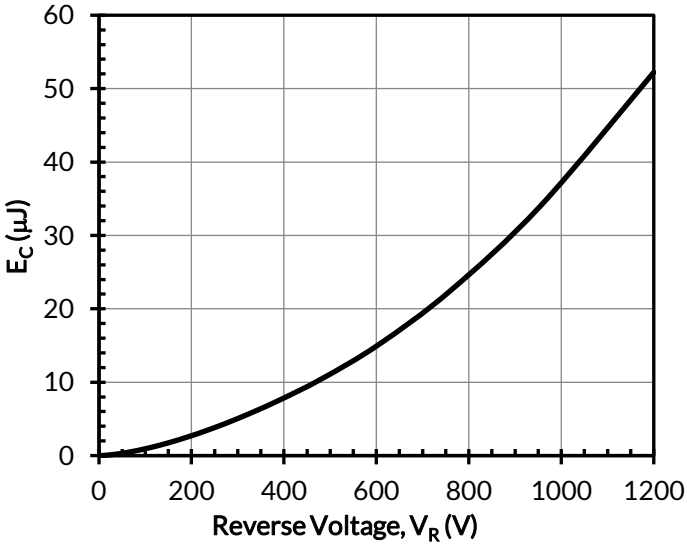


Figure 9. Typical capacitance stored energy vs. reverse voltage

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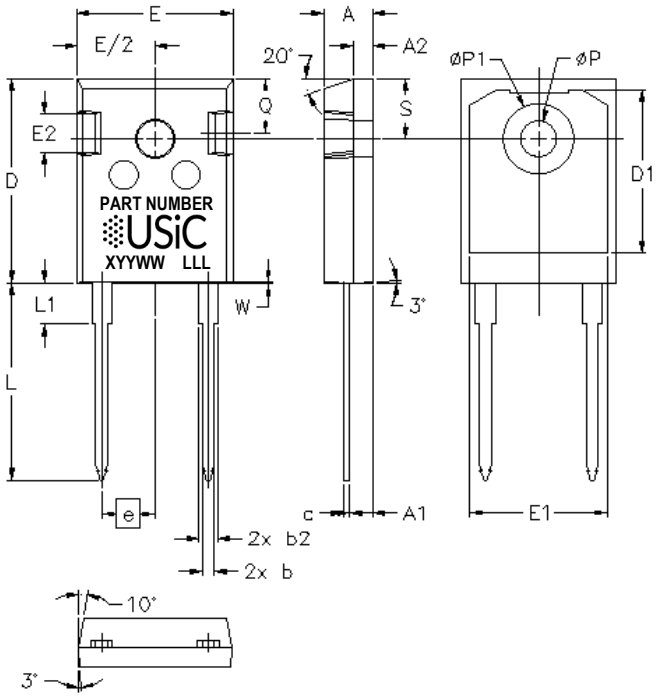
TO-247-2L PACKAGE OUTLINE, PART MARKING AND TUBE SPECIFICATIONS

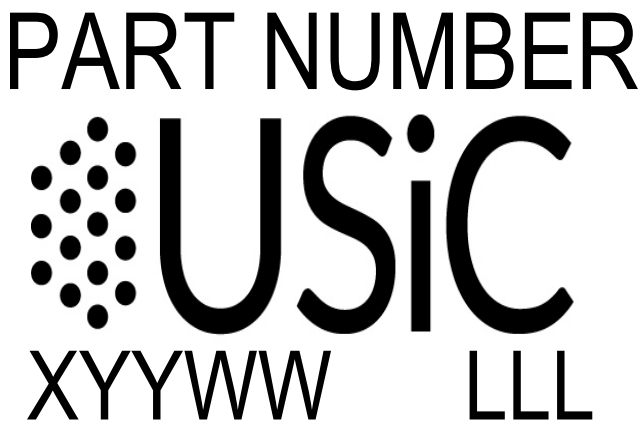
PACKAGE OUTLINE



SYM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.185	0.209	4.70	5.31
A1	0.087	0.102	2.21	2.61
A2	0.059	0.098	1.50	2.49
b	0.039	0.055	0.99	1.40
b2	0.065	0.094	1.65	2.39
b4	0.102	0.135	2.59	3.43
c	0.015	0.035	0.38	0.89
D	0.819	0.845	20.80	21.46
D1	0.515	-	13.08	-
D2	0.02	0.053	0.51	1.35
E	0.610	0.640	15.49	16.26
e	0.214 BSC		5.44 BSC	
E1	0.530	-	13.46	-
E2	0.135	0.157	3.43	3.99
L	0.780	0.800	19.81	20.32
L1	-	0.177	-	4.50
ØP	0.140	0.144	3.56	3.66
ØP1	0.278	0.291	7.06	7.39
Q	0.212	0.244	5.39	6.20
S	0.243 BSC		6.17 BSC	
W	-	0.006	-	0.15

TO-247-2L PACKAGE OUTLINE, PART MARKING AND TUBE SPECIFICATIONS

PART MARKING



PART NUMBER = REFER TO DS_PN DECODER FOR DETAILS

X = ASSEMBLY SITE
YY = YEAR
WW = WORK WEEK
LLL = LOT ID

PACKING TYPE

ANTI-STATIC TUBE

QUANTITY /TUBE : 30 UNITS

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