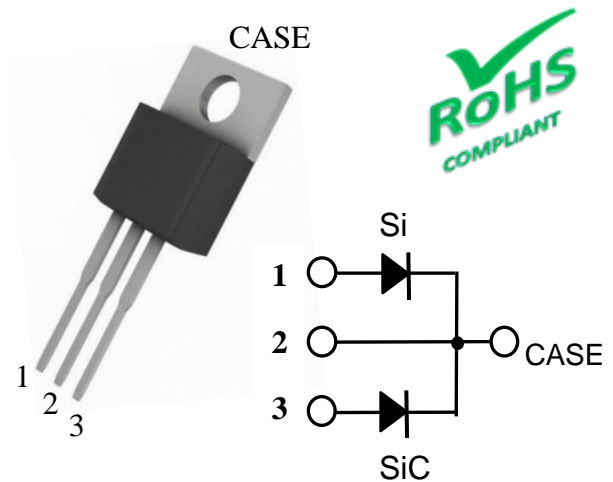


### Features

- Co-packaged surge bypass diode
- 175°C SiC maximum operating junction temperature
- Extremely fast switching not dependent on temperature
- Essentially no reverse or forward recovery
- Positive temperature coefficient for safe operation and ease of paralleling
- RoHS compliant



### Typical Applications

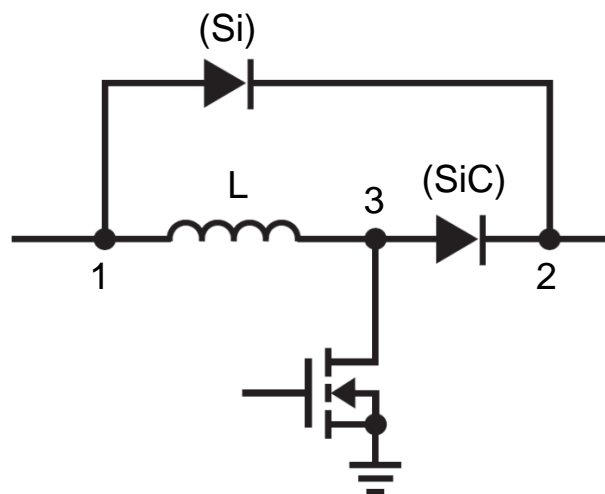
- Power converters
- Switching-mode power supplies
- Power factor correction modules

Part Number	Package	Marking
<b>UJDS06504T</b>	<b>TO-220-3</b>	<b>UJDS06504T</b>

### Descriptions

United Silicon Carbide, Inc offers the xR series of high-performance SiC Schottky diodes. With zero reverse recovery charge and 175°C maximum junction temperature, USCI's diodes are ideally suited for high-frequency and high-efficiency power systems with minimum cooling requirements. This product co-packages a surge bypass silicon diode to reduce component count in PFC circuits.

### Typical Connection in a PFC Circuit



## Maximum Ratings

### SiC Schottky Diode

Parameter	Symbol	Test Conditions	Value	Units
DC Blocking Voltage	$V_{DC}$		650	V
Repetitive Peak Reverse Voltage, $T_j=25^\circ\text{C}$	$V_{RRM}$		650	V
Surge Peak Reverse Voltage	$V_{RSM}$		650	V
Maximum DC Forward Current	$I_F$	$T_C = 138^\circ\text{C}$	4	A
Non-Repetitive Forward Surge Current	$I_{FSM}$	$T_C = 25^\circ\text{C}$ , 8.3ms Half Sine Pulse	22	A
Non-Repetitive Peak Forward Current	$I_{F,max}$	$T_C = 25^\circ\text{C}$ , 10 $\mu\text{s}$	235	A
Non-Repetitive Avalanche Energy	$E_{AS}$	$T_j = 25^\circ\text{C}$ , L = 5mH, Ipk=5.5A, $V_{DD}=100\text{V}$	33	mJ
Power Dissipation	$P_{Tot}$	$T_C = 25^\circ\text{C}$	37	W
		$T_C = 138^\circ\text{C}$	9	
Maximum Junction Temperature	$T_{J,max}$		175	$^\circ\text{C}$
Operating and Storage Temperature	$T_j, T_{STG}$		-55 to 175	$^\circ\text{C}$

### Si Diode

Parameter	Symbol	Test Conditions	Value	Units
DC Blocking Voltage	$V_{DC}$		600	V
Repetitive Peak Reverse Voltage, $T_j=25^\circ\text{C}$	$V_{RRM}$		600	V
Surge Peak Reverse Voltage	$V_{RSM}$		600	V
Maximum DC Forward Current	$I_F$	$T_C = 150^\circ\text{C}$	10	A
Non-Repetitive Forward Surge Current	$I_{FSM}$	$T_C = 25^\circ\text{C}$ , 8.3ms Half Sine Pulse	100	A
Non-Repetitive Peak Forward Current	$I_{F,max}$	$T_C = 25^\circ\text{C}$ , 10 $\mu\text{s}$	750	A
Power Dissipation	$P_{Tot}$	$T_C = 25^\circ\text{C}$	107	W
		$T_C = 150^\circ\text{C}$	17	
Maximum Junction Temperature	$T_{J,max}$		175	$^\circ\text{C}$
Operating and Storage Temperature	$T_j, T_{STG}$		-55 to 175	$^\circ\text{C}$

## Thermal Characteristics

Parameter	symbol	Component	Value			Units
			Min	Typ	Max	
Thermal Resistance	$R_{\theta JC}$	SiC Diode			4	$^\circ\text{C}/\text{W}$
Thermal Resistance	$R_{\theta JC}$	Si Diode			1.4	$^\circ\text{C}/\text{W}$

### Electrical Characteristics

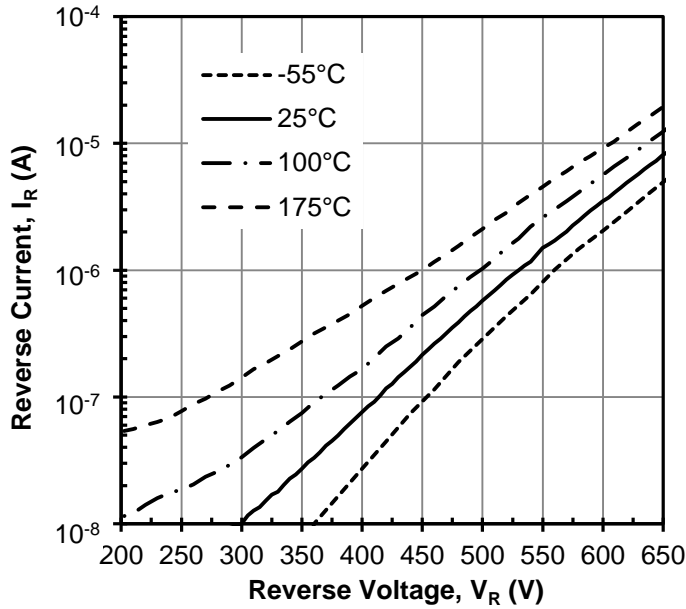
#### SiC Schottky Diode ( $T_J = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward Voltage	$V_F$	$I_F = 4\text{A}, T_J = 25^\circ\text{C}$	-	1.5	1.7	V
		$I_F = 4\text{A}, T_J = 150^\circ\text{C}$	-	1.8	2.1	
		$I_F = 4\text{A}, T_J = 175^\circ\text{C}$	-	2	2.25	
Reverse Current	$I_R$	$V_R = 650\text{V}, T_J = 25^\circ\text{C}$	-	10	170	$\mu\text{A}$
		$V_R = 650\text{V}, T_J = 175^\circ\text{C}$	-	20	550	
Total Capacitive Charge	$Q_C$	$V_R = 400\text{V}, I_F = 4\text{A},$ $di/dt = 250\text{A}/\mu\text{s}$		6		nC
Total Capacitance	C	$V_R = 1\text{V}, f = 1\text{MHz}$		125		pF
		$V_R = 300\text{V}, f = 1\text{MHz}$		16		
		$V_R = 600\text{V}, f = 1\text{MHz}$		13		

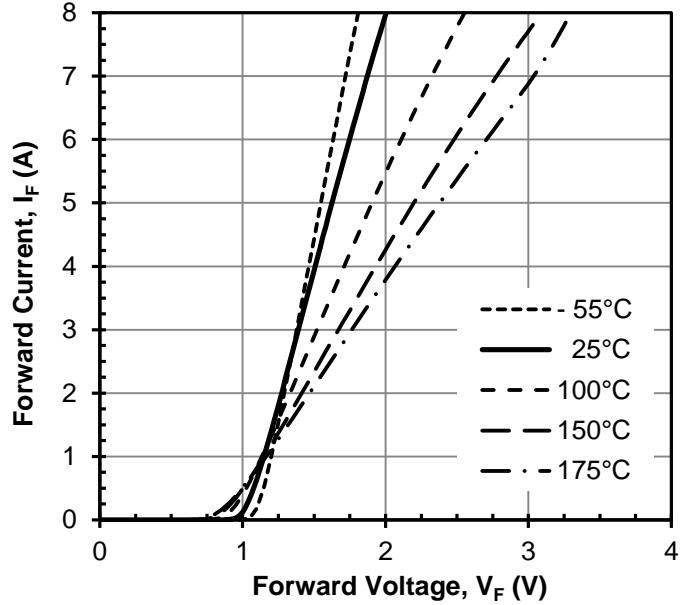
#### Si Diode ( $T_J = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Value			Units
			Min	Typ	Max	
Forward Voltage	$V_F$	$I_F = 10\text{A}, T_J = 25^\circ\text{C}$	-	1.4	-	V
		$I_F = 10\text{A}, T_J = 150^\circ\text{C}$	-	1.16	1.38	
		$I_F = 10\text{A}, T_J = 175^\circ\text{C}$	-	1.12	1.34	
Reverse Current	$I_R$	$V_R = 600\text{V}, T_J = 25^\circ\text{C}$	-	-	10	$\mu\text{A}$
		$V_R = 600\text{V}, T_J = 150^\circ\text{C}$	-	-	250	
Reverse Recovery Time	$t_{rr}$	$V_R = 30\text{V}, I_F = 1\text{A},$ $di/dt = 50\text{A}/\mu\text{s},$ Ramp Recovery	-	-	75	ns
		$V_R = 30\text{V}, I_F = 1\text{A},$ $di/dt = 100\text{A}/\mu\text{s},$ Ramp Recovery	-	35	-	

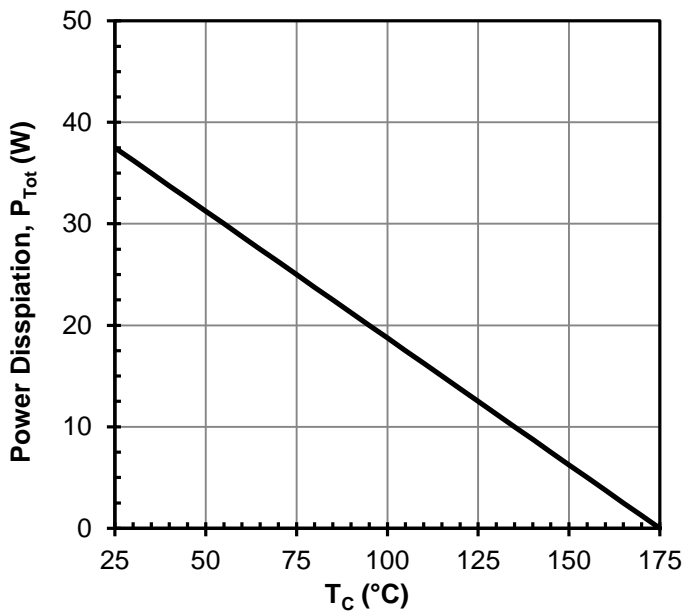
**Typical Performance**  
**SiC Schottky Diode**



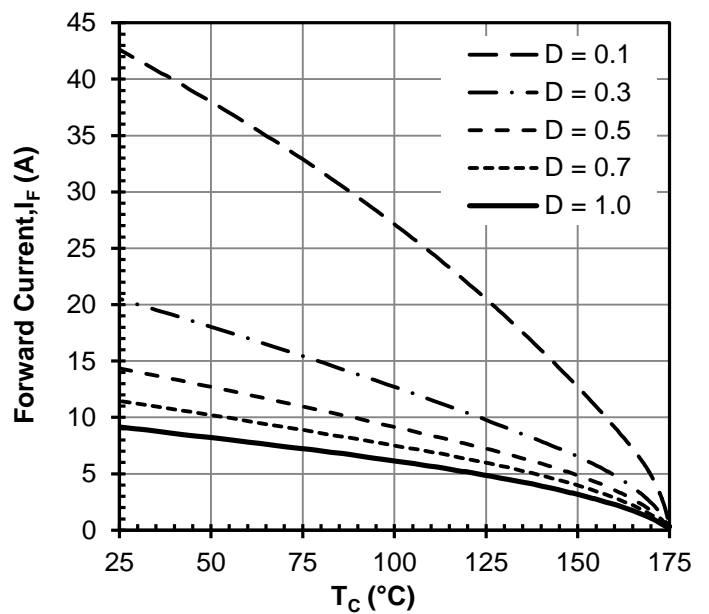
**Figure 1 Typical reverse characteristics**



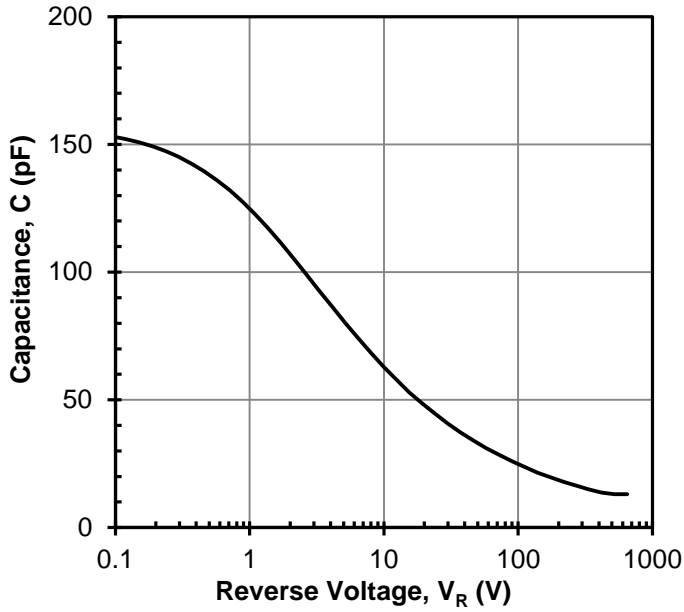
**Figure 2 Typical forward characteristics**



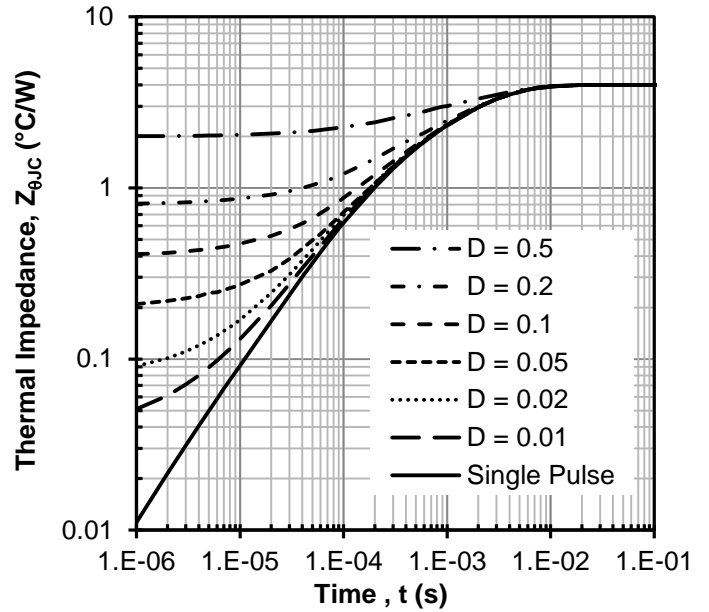
**Figure 3 Power dissipation**



**Figure 4 Diode forward current**

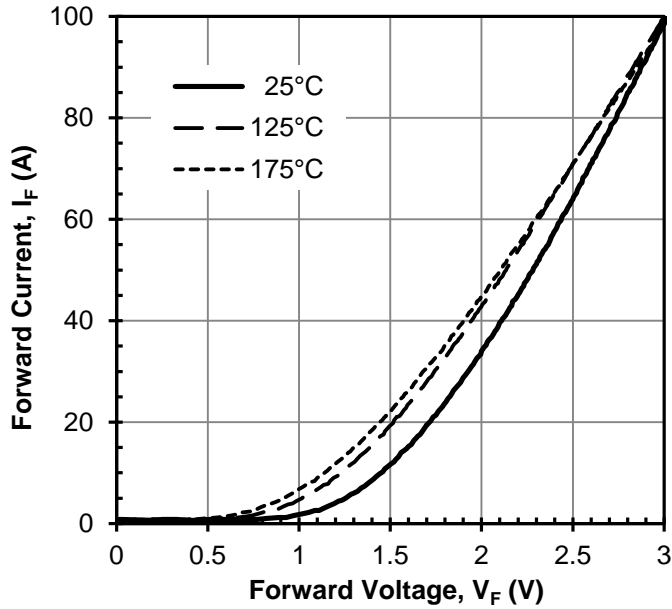


**Figure 5 Capacitance vs. reverse voltage**



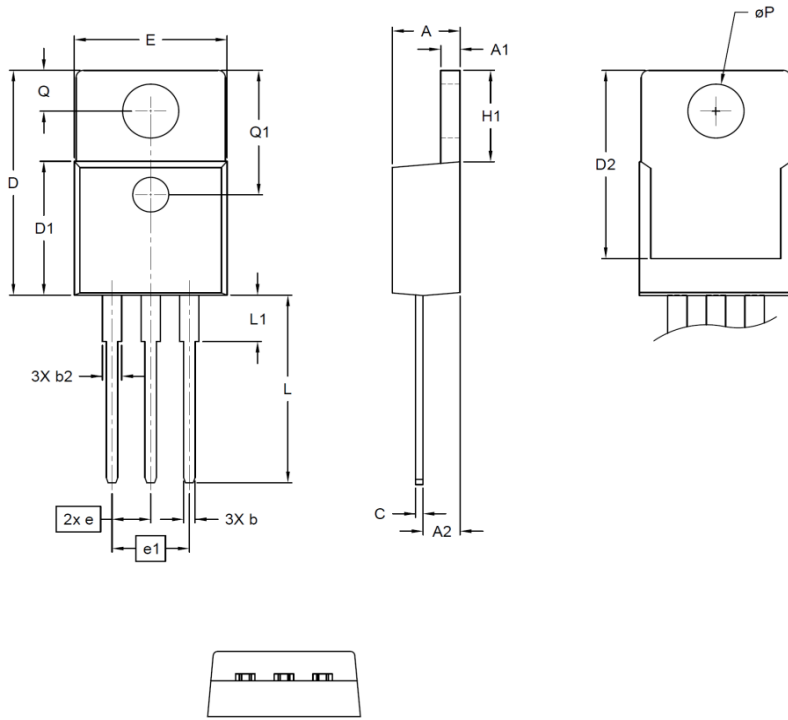
**Figure 6 Transient thermal impedance**

**Si Diode**



**Figure 7 Typical forward characteristics**

### Mechanical Characteristics



	INCH			MILLIMETER		
	MIN	NOM	MAX	MIN	NOM	MAX
A	.140	.175	.190	3.56	4.45	4.83
A1	.020	.050	.055	0.51	1.27	1.40
A2	.080	.096	.115	2.03	2.44	2.92
b	.015	.030	.040	0.38	7.62	1.02
b2	.040	.050	.070	1.02	1.27	1.78
C	.014	.019	.030	0.36	0.48	0.76
D	.560	.605	.650	14.22	15.37	16.51
D1	.330	.360	.370	8.38	9.14	9.40
D2	.480	.507	.517	12.19	12.88	13.13
E	.380	.386	.420	9.65	9.80	10.67
e	.100 BSC.			2.54 BSC.		
e1	.200 BSC.			5.08 BSC.		
L	.495	.505	.580	12.57	12.82	14.73
L1	----	.125	.250	----	3.18	6.35
øP	.139	.145	.161	3.53	3.68	4.09
H1	.230	.245	.270	5.84	6.22	6.86
Q	.100	.110	.135	2.54	2.79	3.43
Q1	.330	.335	.340	8.38	8.51	8.64

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