

# QSD10HCS500U 5000V 10A Homogeneous Current Silicon Carbide Schottky Diode



VRRM =	5000 V
IF (TC=135 °C) =	66A(TO247-2L)
QC =	365 nC

## General Description

- Replace Bipolar with Unipolar Rectifiers
- Essentially No Switching Losses
- Higher Efficiency
- Reduction of Heat Sink Requirements
- Parallel Devices Without Thermal Runaway

## Package



## Features

- 5kV Schottky Rectifier
- Zero Reverse Recovery Current
- High-Frequency Operation
- Temperature-Independent Switching Behavior
- Extremely Fast Switching

## Typical Applications

- Switch Mode Power Supplies (SMPS)
- Power Factor Correction
- Motor Drives

Part Number	Package	Marking
QSD10HCS500U	TO-247-2L	Queensland Semiconductor

# QSD10HCS500U 5000V 10A Homogeneous Current Silicon Carbide Schottky Diode



## Maximum Rated Values (TC=25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
VRRM	Repetitive Peak Reverse Voltage	5000	V		
VR	DC Peak Reverse Voltage	5000	V		
IF	Continuous Forward Current (TO-247-2L/ceramic)	66/45	A	TC=25°C	Fig. 3 Fig. 9
		33/22		TC=135°C	
		25/16		Tc=152°C	
IFRM	Repetitive Peak Forward Surge Current	63	A	TC=25°C, tP=10 ms, Half Sine Pulse	
		53		TC=110°C, tP=10 ms, Half Sine Pulse	
IFSM	Non-Repetitive Forward Surge Current	81	A	TC=25°C, tP=10 ms, Half Sine Pulse	
		70		TC=110°C, tP=10 ms, Half Sine Pulse	
IF,MAX	Non-Repetitive Forward Surge Current	1150	A	TC=25°C, tP=10µs, Square Wave Pulse	
		950		TC=110°C, tP=10µs, Square Wave Pulse	
Ptot	Power Dissipation (TO-247-2L/ceramic)	833/405	W	TC=25°C	Fig. 4 Fig.10
		361/176		TC=110°C	
TJ	Operating Temperature	-55 to +175	°C		
Tstg	Storage Temperature	-55 to +175	°C		
	TO-247 Mounting Torque	1 8.8	Nm lbf-in	M3 Screw 6-32 Screw	

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## Electrical Characteristics (T<sub>J</sub>=25°C)

Symbol	Parameter	Value			Unit	Test Conditions	Note
		Min.	Typ.	Max.			
VF	Forward Voltage		1.4	1.9	V	IF=10A, T <sub>J</sub> =25°C	Fig. 1
			2.4	3.2		IF=10A, T <sub>J</sub> =175°C	
IR	Reverse Current		0.6		mA	VR=5000V, T <sub>J</sub> =25°C	Fig. 2
			1.4			VR=5000V, T <sub>J</sub> =175°C	
QC	Total Capacitive Charge		365		nC	VR=2000V, IF =10A di/dt=200A/us, T <sub>J</sub> =25°C	Fig. 5
C	Total Capacitance		3880		pF	VR=0V, T <sub>J</sub> =25°C, f=1MHz	Fig. 6
			131			VR=1000V, T <sub>J</sub> =25°C, f=1MHz	
			98			VR=2000V, T <sub>J</sub> =25°C, f=1MHz	
EC	Capacitance Stored Energy		241		μJ	VR=0~2000 V	Fig. 7

## Thermal Characteristics

Symbol	Parameter	Value	Unit	Note
R <sub>θJC</sub>	Thermal Resistance(Junction to Case)	0.18	°C/W	TO-247-2L Fig. 8

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## Typical Performance Characteristics

Figure 1. Forward Characteristics

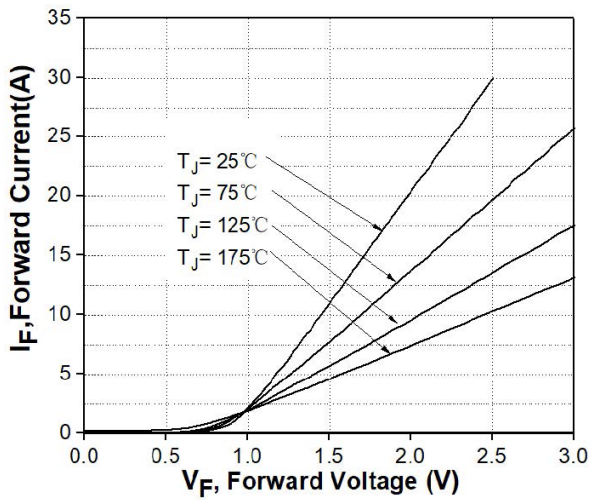


Figure 2. Reverse Characteristics

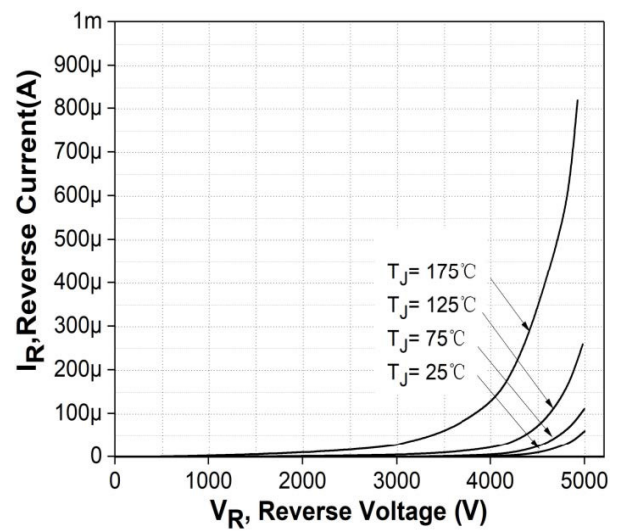


Figure 3. Current Derating (TO-247-2L)

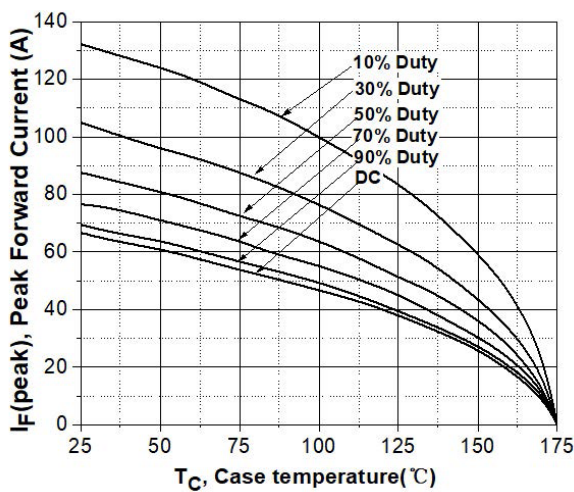
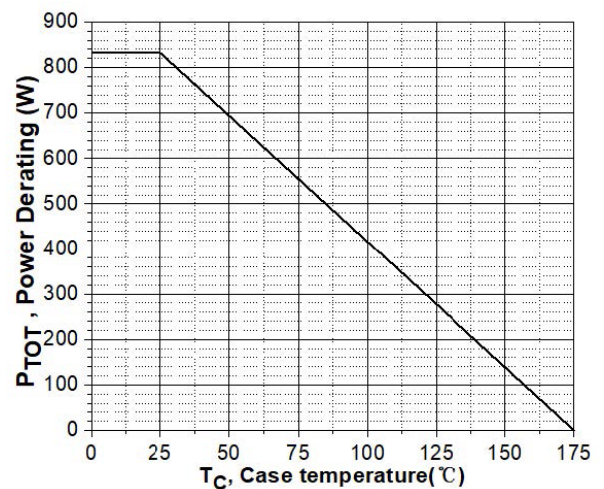


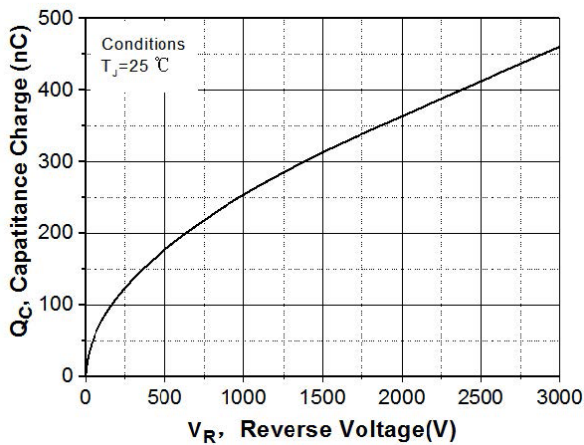
Figure 4. Power Derating (TO-247-2L)



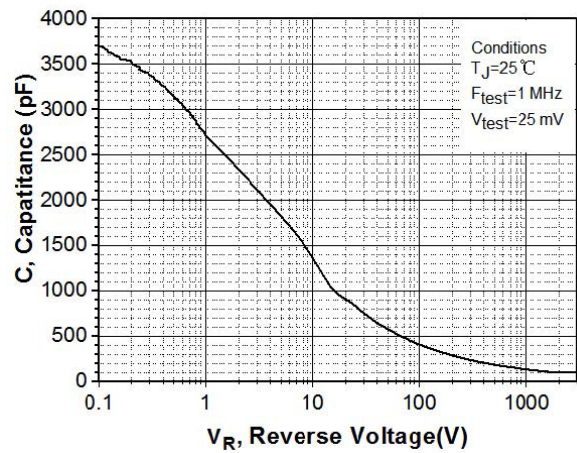
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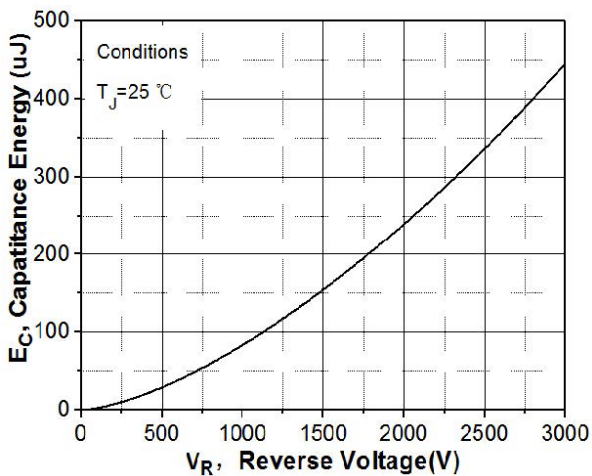
**Figure 5. Capacitance Charge Vs. Reverse Voltage**



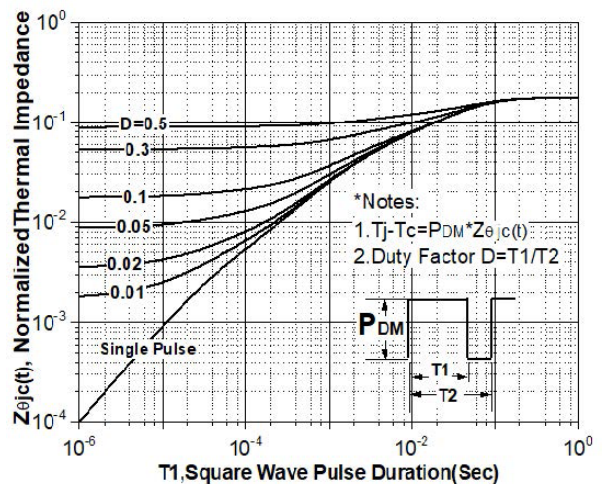
**Figure 6. Capacitance Vs. Reverse Voltage**



**Figure 7. Capacitance Stored Energy**



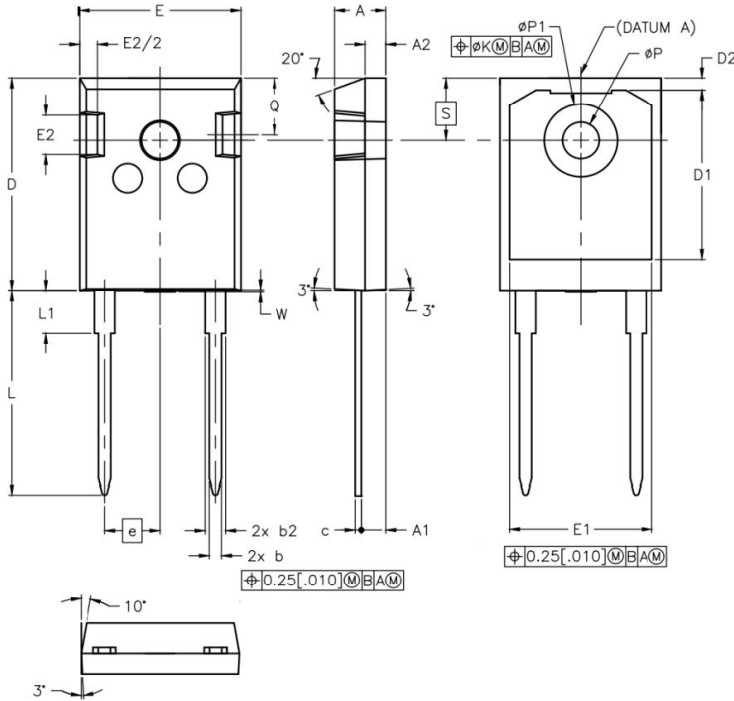
**Figure 8. Transient Thermal Response Curve(Junction-to-Case)(TO-247-2L)**



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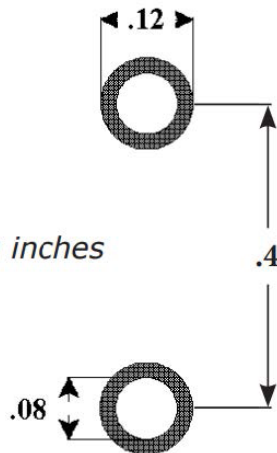
## Package Dimensions



POS	Inches		Millimeters	
	Min	Max	Min	Max
A	.190	.205	4.70	5.31
A1	.087	.102	2.21	2.59
A2	.059	.098	1.50	2.49
b	.039	.055	0.99	1.40
b2	.065	.094	1.65	2.39
c	.015	.035	0.38	0.89
D	.819	.845	20.80	21.46
D1	.515	-	13.08	-
D2	.020	.053	0.51	1.35
E	.620	.640	15.49	16.26
E1	.530	-	13.46	-
E2	.135	.157	3.43	3.99
e	.214		5.44	
$\phi K$	.010		0.25	
L	.780	.800	19.81	20.32
L1	-	.177	-	4.50
$\phi P$	.140	.144	3.56	3.66
$\phi P1$	.278	.291	7.06	7.39
Q	.212	.244	5.38	6.20
S	.243		6.17	
W	-	.006	-	0.15

## Recommended Solder Pad Layout

all units are in inches



Part Number	Package	Marking
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## **Attention**

- Specifications of any and all products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- We assume no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Silicon products described or contained herein.
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