

# CH3D04065A

## Silicon Carbide Schottky Diode

$V_{RRM}$	=	650	V
$I_F (T_C \leq 135^\circ\text{C})$	=	6	A
$Q_C$	=	9	nC

### Features

- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on  $V_F$
- Temperature-independent Switching
- 175°C Operating Junction Temperature

### Benefits

- Replace Bipolar with Unipolar Device
- Reduction of Heat Sink Size
- Parallel Devices Without Thermal Runaway
- Essentially No Switching Losses

### Applications

- Switch Mode Power Supplies
- Power Factor Correction
- Motor drive, PV Inverter, Wind Power Station

### Package



TO-220-2



Part Number	Package	Marking
CH3D04065A	TO-220-2	CH3D04065A

### Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
$V_{RRM}$	Repetitive Peak Reverse Voltage	650	V	$T_C = 25^\circ\text{C}$	
$V_{RSM}$	Surge Peak Reverse Voltage	650	V	$T_C = 25^\circ\text{C}$	
$V_R$	DC Blocking Voltage	650	V	$T_C = 25^\circ\text{C}$	
$I_F$	Forward Current	13 6 4	A	$T_C \leq 25^\circ\text{C}$ $T_C \leq 135^\circ\text{C}$ $T_C \leq 155^\circ\text{C}$	
$I_{FSM}$	Non-Repetitive Forward Surge Current	40	A	$T_C = 25^\circ\text{C}$ , $t_p = 8.3\text{ms}$ , Half Sine Wave	
$P_{tot}$	Power Dissipation	51	W	$T_C = 25^\circ\text{C}$	Fig.3
$T_C$	Maximum Case Temperature	155	$^\circ\text{C}$		
$T_J, T_{STG}$	Operating Junction and Storage Temperature	-55 to 175	$^\circ\text{C}$		
	TO-220 Mounting Torque	1	Nm	M3 Screw	

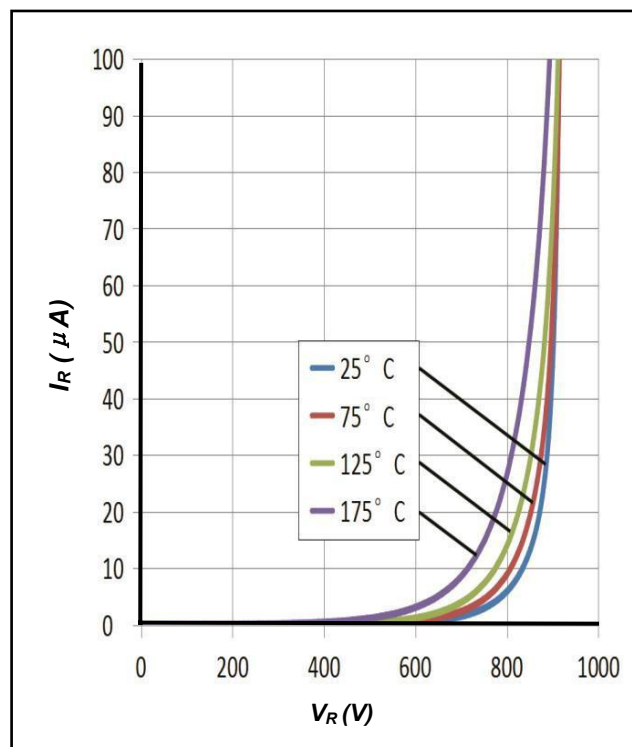
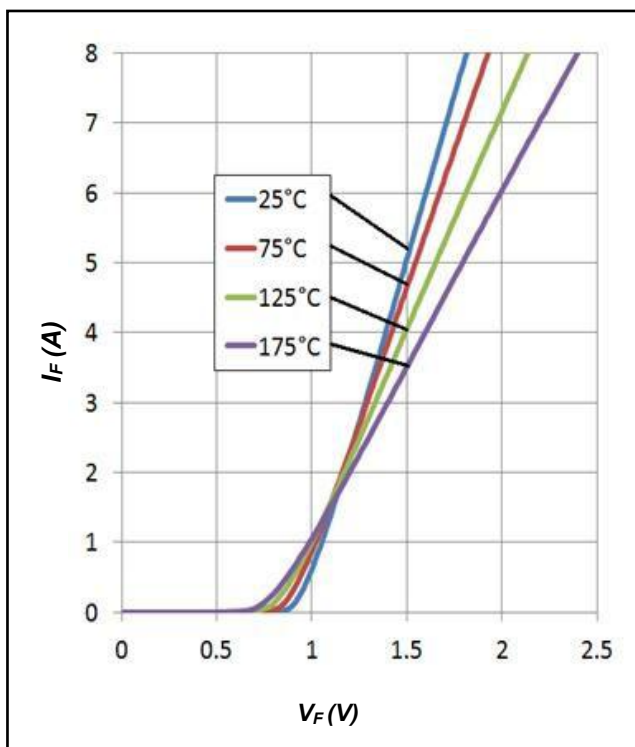
### Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_F$	Forward Voltage	1.4 1.7	1.65 2.3	V	$I_F = 4A, T_J = 25^\circ C$ $I_F = 4A, T_J = 175^\circ C$	Fig.1
$I_R$	Reverse Current	1 5	10 100	$\mu A$	$V_R = 650V, T_J = 25^\circ C$ $V_R = 650V, T_J = 175^\circ C$	Fig.2
C	Total Capacitance	230 24 20	/	pF	$V_R = 0V, T_J = 25^\circ C, f = 1MHz$ $V_R = 200V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$	Fig.5
$Q_C$	Total Capacitive Charge	9	/	nC	$V_R = 650V, I_F = 4A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$	Fig.4

### Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	2.9	$^\circ C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	$^\circ C/W$	
$T_{sold}$	Soldering Temperature	260	$^\circ C$	

### Typical Performance



**Typical Performance**

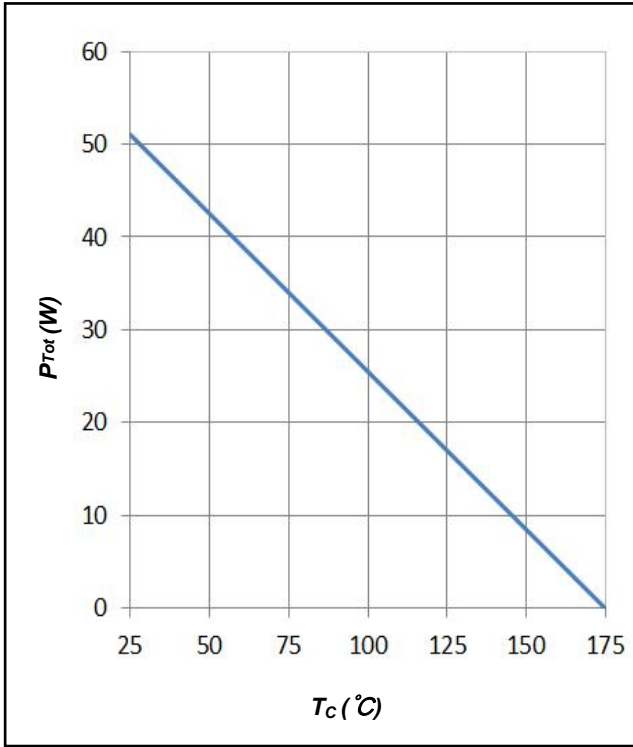


Figure 3. Power Derating

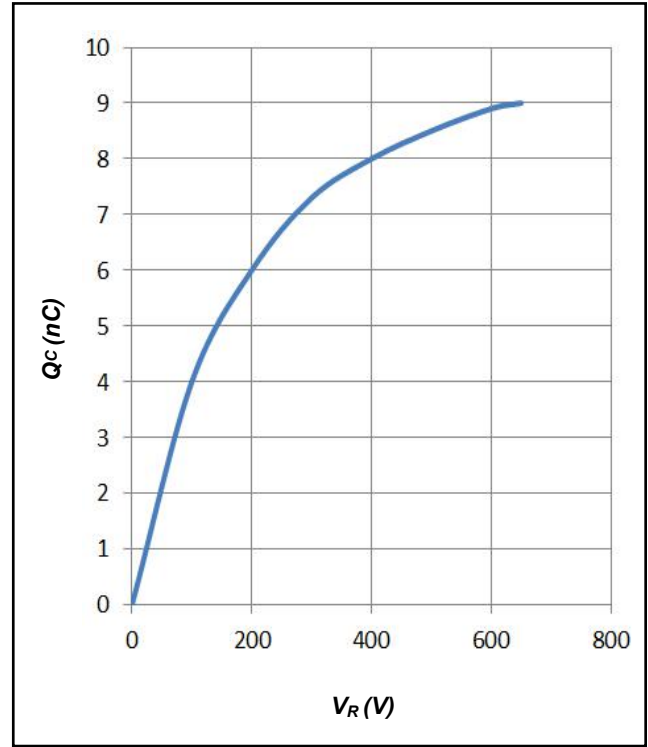


Figure 4. Total Capacitive Charge vs. Reverse Voltage

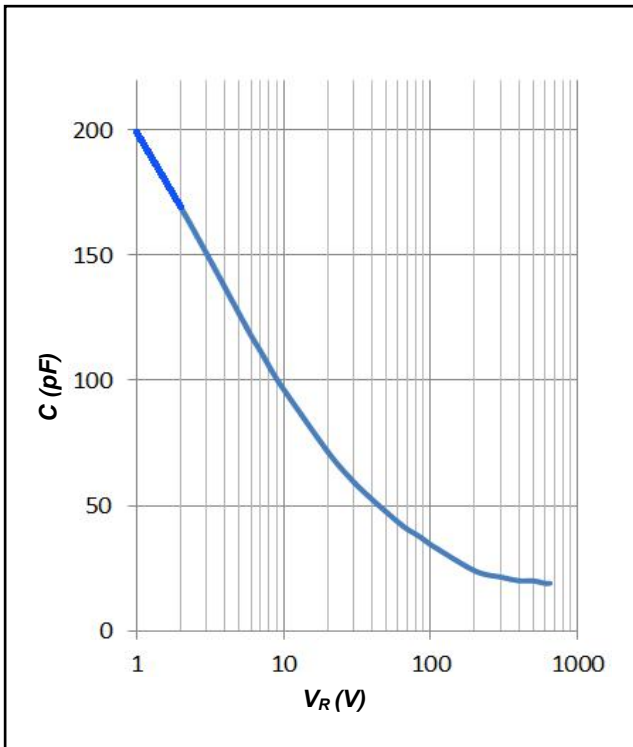


Figure 5. Total Capacitance vs. Reverse Voltage

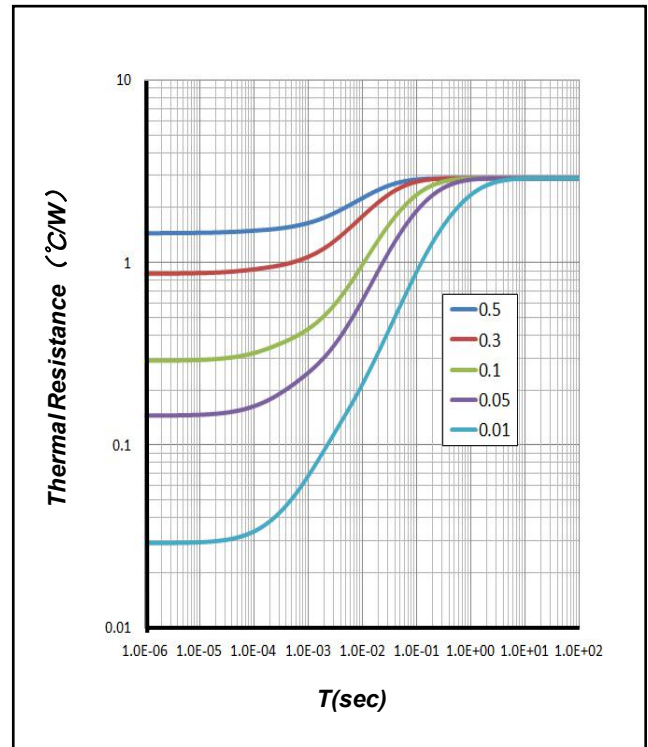
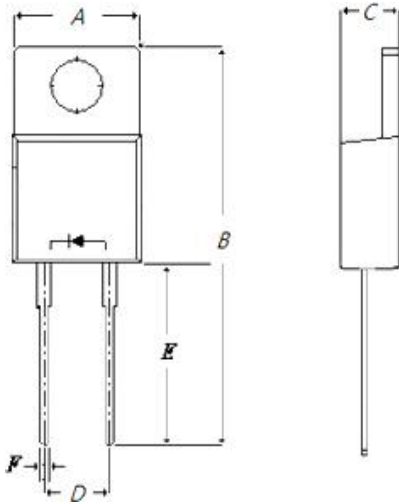


Figure 6. Transient Thermal Impedance

**Package Dimensions**

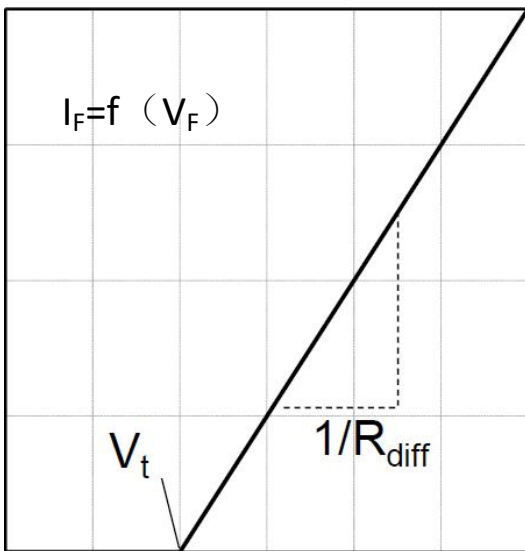
Package TO-220-2



Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	9.17	10.08	10.91
B	27.00	28.58	30.00
C	3.89	4.50	5.00
D	4.20	5.10	5.80
E	11.70	13.30	14.97
F	0.50	0.80	1.21

**Simplified Diode Model**

Equivalent IV Curve for Model



Mathematical Equation

$$V_F = V_t + I_F \times R_{diff}$$

$$V_t = -0.0011 \times T_j + 0.99 \text{ [V]}$$

$$R_{diff} = 1.83 \times 10^{-6} \times T_j^2 + 2.52 \times 10^{-4} \times T_j + 0.099 \text{ [\Omega]}$$

Note:

$T_j$  = Diode Junction Temperature In Degrees Celsius,

valid from 25°C to 175°C

$I_F$  = Forward Current

Less than 8A