HMC12N65K

Silicon Carbide Schottky Diode

V_{RRM}	=	650	V
I_F ($T_C \leq 135°C$)	=	16	A
Q_C	=	30	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

Package

TO-252

RoHS

Part Number	Package	Marking
HMC12N65K	TO-252	HMC12N65K

Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	650	V	$T_C = 25°C$	
V_{RSM}	Surge Peak Reverse Voltage	650	V	$T_C = 25°C$	
V_R	DC Blocking Voltage	650	V	$T_C = 25°C$	
I_F	Forward Current	35 16 12	A	$T_C \leq 25°C$ $T_C \leq 135°C$ $T_C \leq 150°C$	
I_{FSM}	Non-Repetitive Forward Surge Current	108	A	$T_C = 25°C$, t_p = 8.3ms, Half Sine Wave	
P_{tot}	Power Dissipation	150	W	$T_C = 25°C$	Fig.3
T_C	Maximum Case Temperature	150	°C		
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to 175	°C		

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.4	1.65	V	I_F = 12A, T_J = 25°C	Fig.1
		1.7	2.3		I_F = 12A, T_J = 175°C	
I_R	Reverse Current	1	20	µA	V_R = 650V, T_J = 25°C	Fig.2
		5	100		V_R = 650V, T_J = 175°C	
C	Total Capacitance	690		pF	V_R = 0V, T_J = 25°C, f = 1MHz	Fig.5
		68	/		V_R = 200V, T_J = 25°C, f = 1MHz	
		59			V_R = 400V, T_J = 25°C, f = 1MHz	
Q_C	Total Capacitive Charge	30	/	nC	V_R = 650V, I_F = 12A di/dt = 200A/µs, T_J = 25°C	Fig.4

Thermal Characteristics

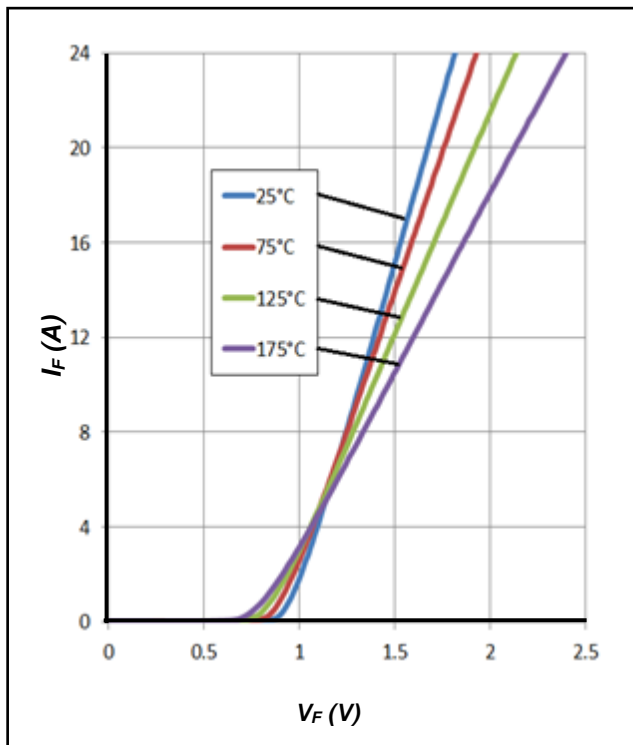| Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	1	°C/W	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	°C/W	
T_{sold}	Soldering Temperature	260	°C	

Typical Performance

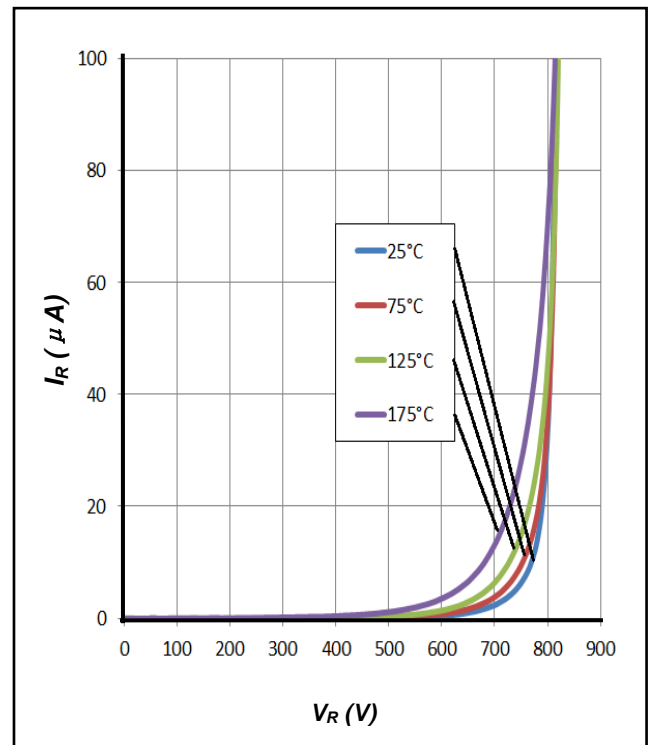Figure 1. Forward Characteristics

Figure 2. Reverse Characteristics
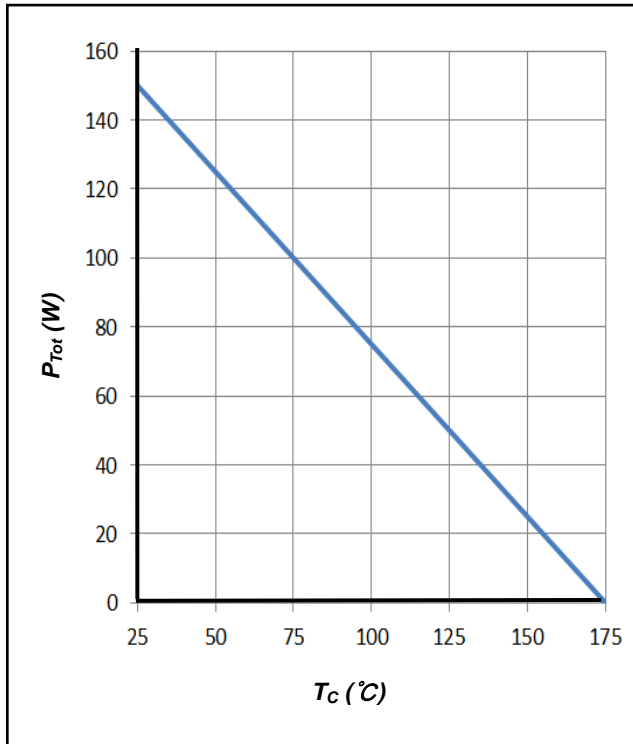
Typical Performance

Figure 3. Power Derating
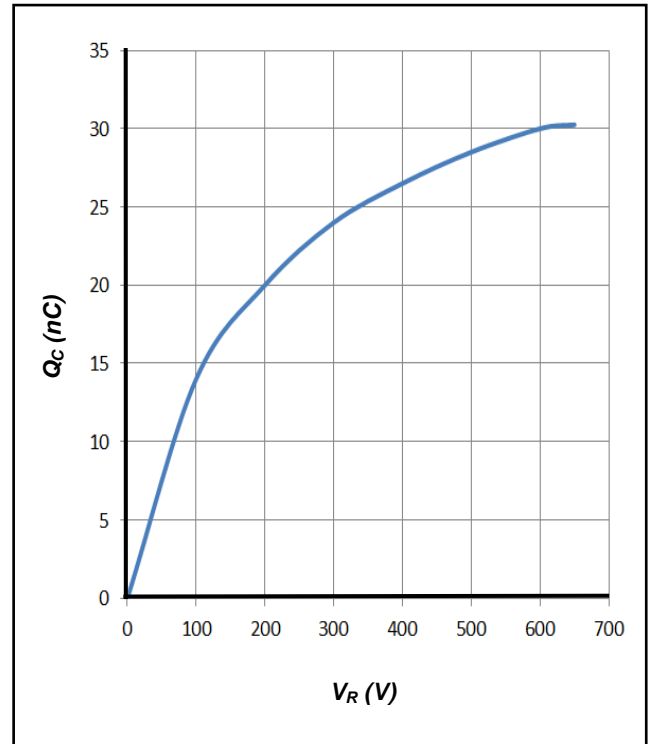

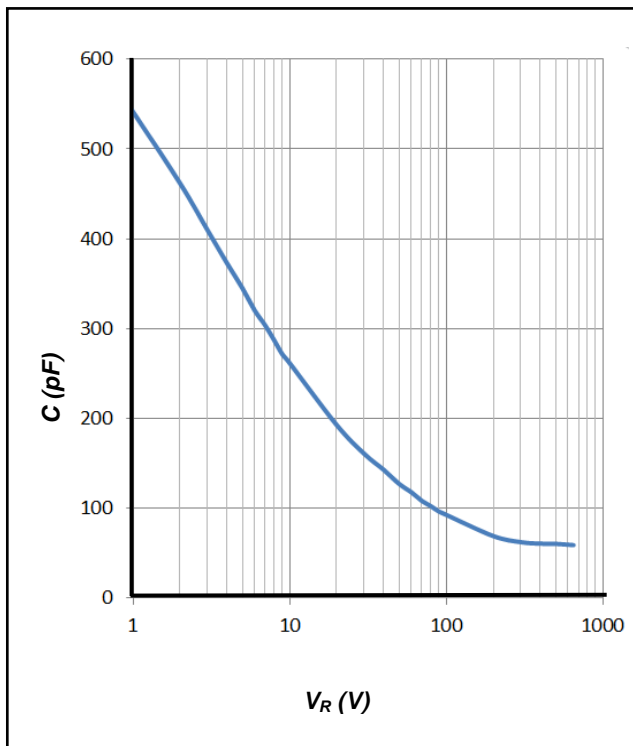Figure 4. Total Capacitive Charge vs. Reverse Voltage

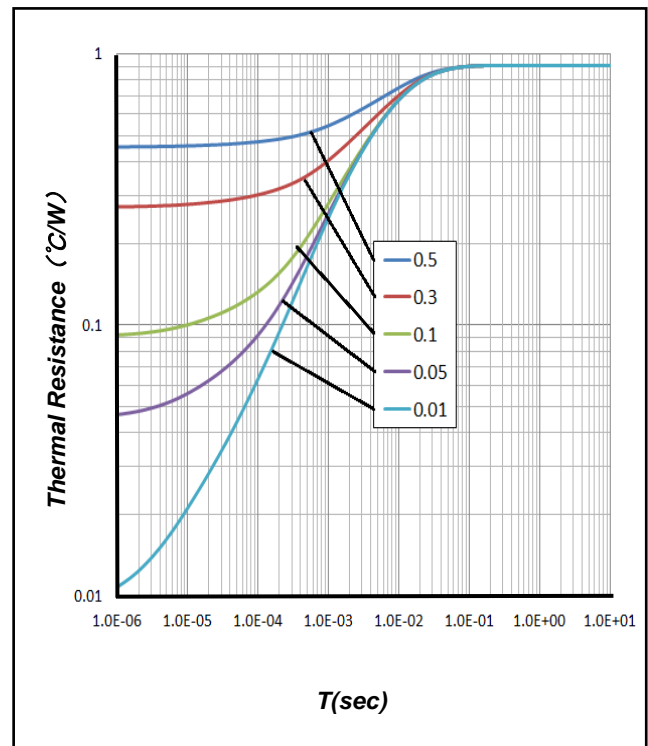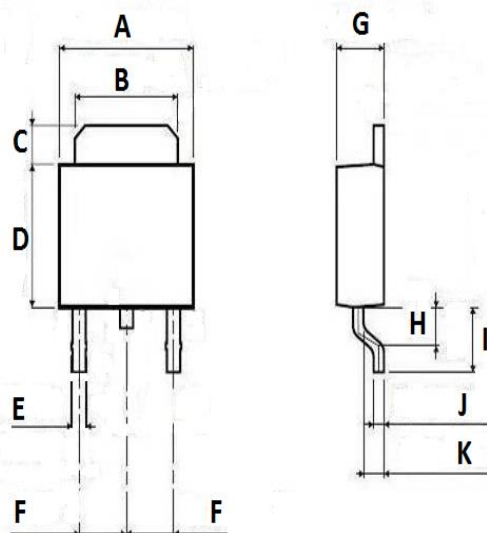Figure 5. Total Capacitance vs. Reverse Voltage

Figure 6. Transient Thermal Impedance
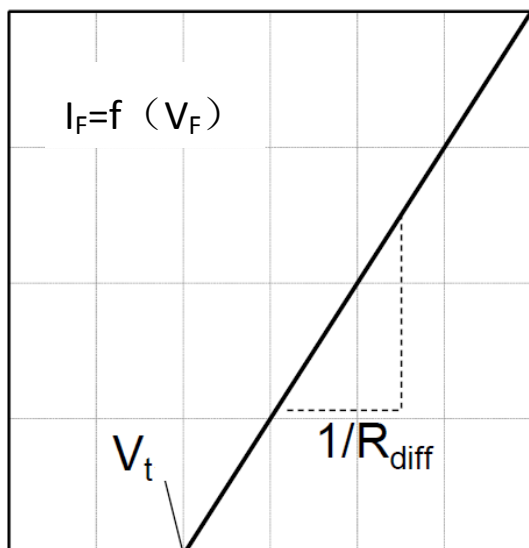
Package Dimensions

Package TO-252

Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	6.3	6.5	6.7
B	5.2	5.3	5.4
C	1.15	1.25	1.35
D	5.7	5.9	6.1
E	0.65	0.7	0.75
F	2.1	2.3	2.5
G	2.2	2.3	2.4
H	1.45	1.5	1.55
I	2.9	3.0	3.1
J	0.45	0.5	0.55
K	0.9	1	1.1

Simplified Diode Model

Equivalent IV Curve for Model

$I_F = f(V_F)$

V_t

$1/R_{diff}$

Mathematical Equation

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

$V_t = -0.001 \times T_j + 0.98 \quad [V]$

$R_{diff} = 7.2 \times 10^{-7} \times T_j^2 + 1 \times 10^{-4} \times T_j + 0.04 \quad [\Omega]$

Note:

Tj = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 175°C

I_F = Forward Current

Less than 24A