HMC10N65F

Silicon Carbide Schottky Diode

V_{RRM}	=	650	V
I_F (T_C≤123℃)	=	10	A
Q_C	=	23	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

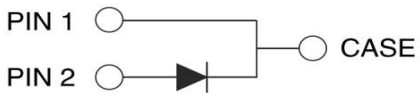
Applications

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

Package

RoHS

TO-220FM



Part Number	Package	Marking
HMC10N65F	TO-220FM	HMC10N65F

Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	650	V	T_C = 25℃	
V_{RSM}	Surge Peak Reverse Voltage	650	V	T_C = 25℃	
V_R	DC Blocking Voltage	650	V	T_C = 25℃	
I_F	Forward Current	18 10 9	A	T_C ≤ 25℃ T_C ≤ 123℃ T_C ≤ 135℃	
I_{FSM}	Non-Repetitive Forward Surge Current	86	A	T_C = 25℃, t_p = 8.3ms, Half Sine Wave	
P_{tot}	Power Dissipation	50	W	T_C = 25℃	Fig.3
T_C	Maximum Case Temperature	123	℃		
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to 175	℃		
	TO-220 Mounting Torque	1	Nm	M3 Screw	

Electrical Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.4 1.75	1.65 2.3	V	I_F = 10A, T_J = 25℃ I_F = 10A, T_J = 175℃	Fig.1
I_R	Reverse Current	1 5	20 100	μA	V_R = 650V, T_J = 25℃ V_R = 650V, T_J = 175℃	Fig.2
C	Total Capacitance	440 57 46	/	pF	V_R = 0V, T_J = 25℃, f = 1MHz V_R = 200V, T_J = 25℃, f = 1MHz V_R = 400V, T_J = 25℃, f = 1MHz	Fig.5
Q_C	Total Capacitive Charge	23	/	nC	V_R = 650V, I_F = 10A di/dt = 200A/μs, T_J = 25℃	Fig.4

Thermal Characteristics

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	3	℃/W	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	℃/W	
T_{sold}	Soldering Temperature	260	℃	

Typical Performance

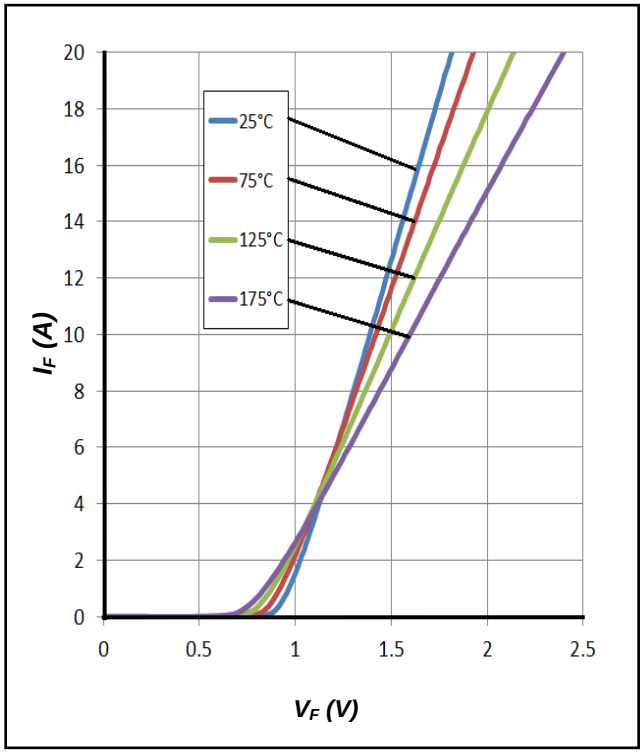


Figure 1. Forward Characteristics

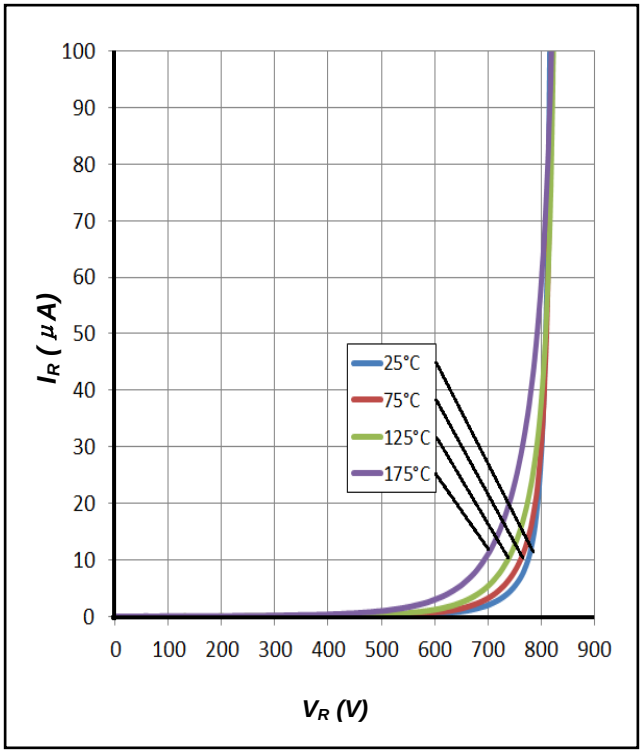


Figure 2. Reverse Characteristics

Typical Performance

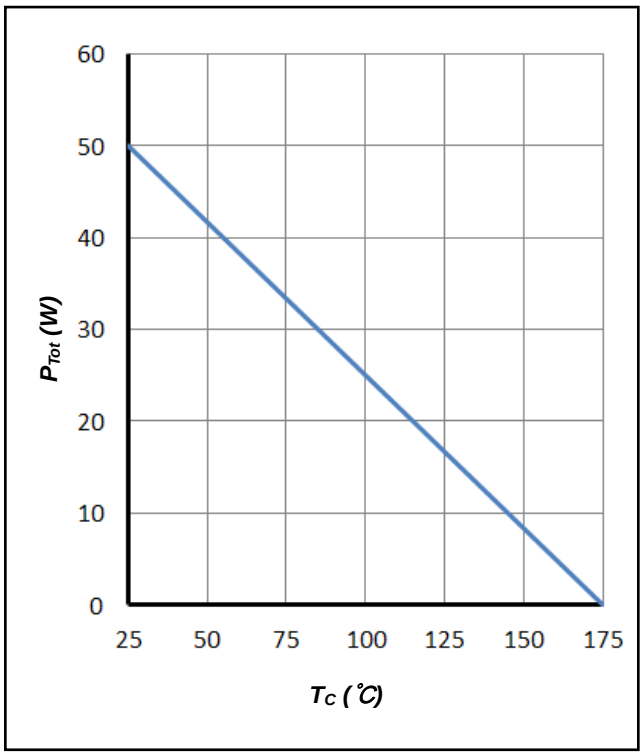


Figure 3. Power Derating

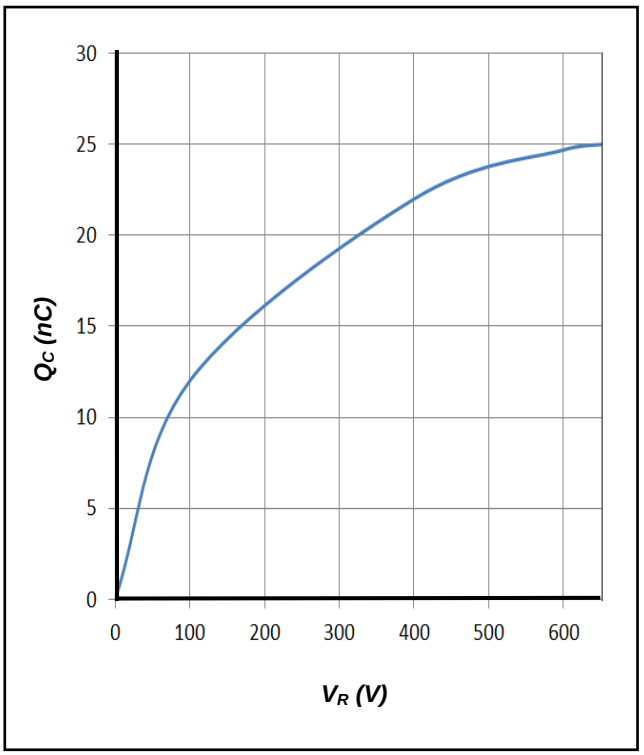


Figure 4. Total Capacitive Charge vs. Reverse Voltage

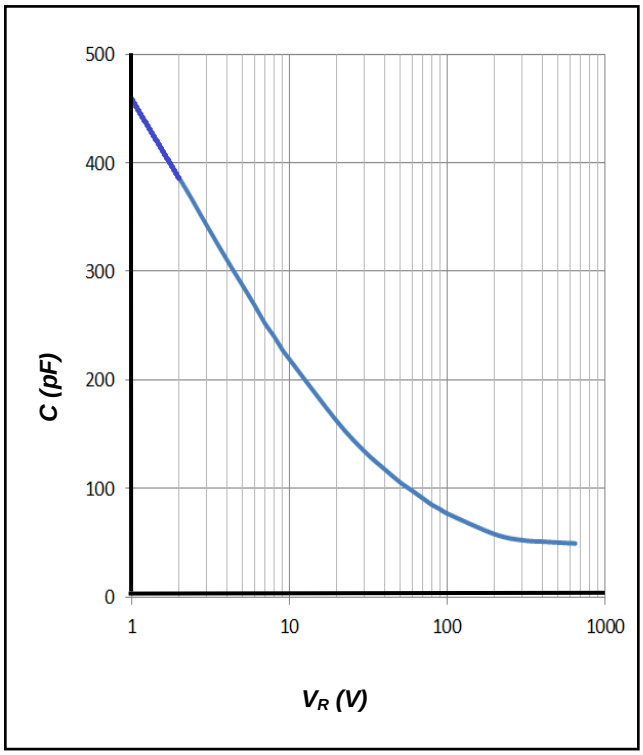


Figure 5. Total Capacitance vs. Reverse Voltage

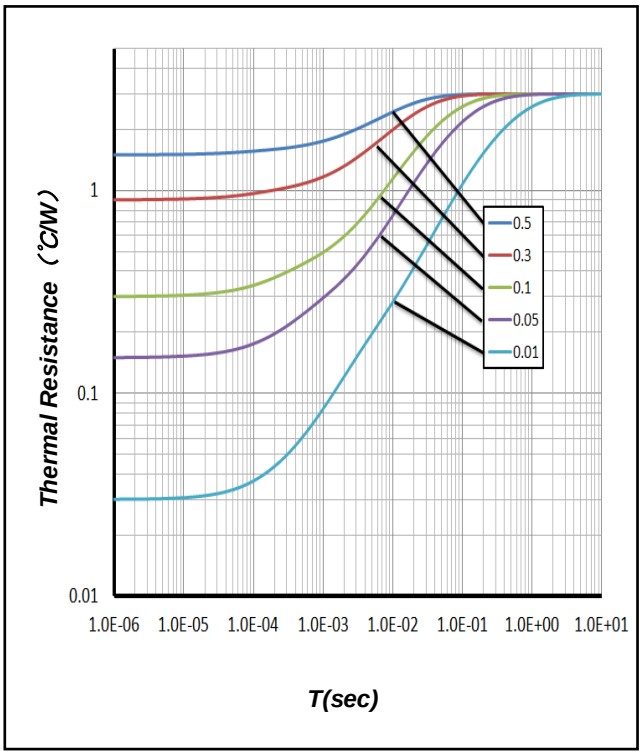
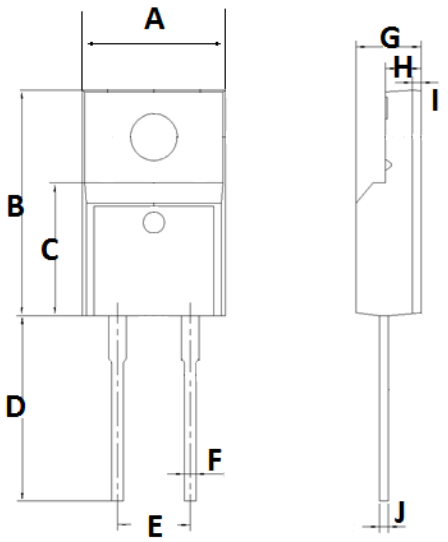
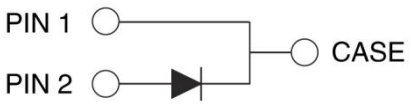


Figure 6. Transient Thermal Impedance

Package Dimensions

Package TO-220FM

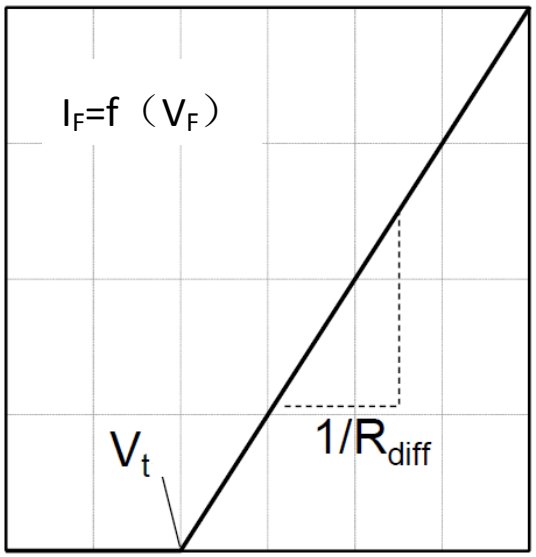




Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	9.90	10.10	10.30
B	15.80	16.00	16.20
C	9.10	9.30	9.50
D	12.90	13.20	13.50
E	4.70	5.00	5.30
F	0.60	0.80	1.00
G	4.55	4.75	4.95
H	2.40	2.60	2.80
I	0.40	0.60	0.80
J	0.42	0.50	0.58

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation

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

$V_t = -0.0011 \times T_j + 0.96$ [V]

$R_{diff} = 8.85 \times 10^{-7} \times T_j^2 + 1.07 \times 10^{-4} \times T_j + 0.044$ [Ω]

Note:

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

I_F= Forward Current

Less than 20A