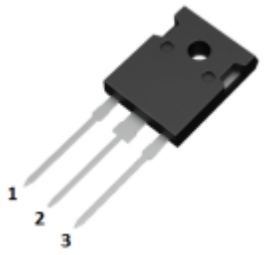
Silicon Carbide SchottkyDiode

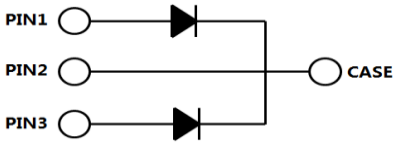
Product Summary

V_{RRM}	=	1200	V
I_F (T_C≤135℃)	=	39	A**
Q_C	=	86	nC**

Package



TO-247-3



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

RoHS

Part Number	Package	Marking
TK3D30120D	TO-247-3	NF3D30120D

Maximum Ratings

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V	T_C = 25˚C	
V_{RSM}	Surge Peak Reverse Voltage	1200	V	T_C = 25˚C	
V_R	DC Blocking Voltage	1200	V	T_C = 25˚C	
I_F	Forward Current (Per leg/Device)	42/84 19.5/39 15/30	A	T_C ≤ 25˚C T_C ≤ 135˚C T_C ≤ 150˚C	
I_{FSM}	Non-Repetitive Forward Surge Current	137*	A	T_C = 25˚C, t_p = 8.3ms, Half Sine Wave	
P_{tot}	Power Dissipation (Per leg/Device)	214/ 428	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		
	TO-247 Mounting Torque	1	Nm	M3 Screw	

*Per Leg, **Per Device

Electrical Characteristics (Per Leg)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.55 2.2	1.8 2.5	V	I_F = 15A, T_J = 25˚C I_F = 15A, T_J = 175˚C	Fig.1
I_R	Reverse Current	5 20	20 200	μA	V_R = 1200V, T_J = 25˚C V_R = 1200V, T_J = 175˚C	Fig.2
C	Total Capacitance	940 70 57	/	pF	V_R = 0V, T_J = 25˚C, f = 1MHz V_R = 400V, T_J = 25˚C, f = 1MHz V_R = 800V, T_J = 25˚C, f = 1MHz	Fig.5
Q_C	Total Capacitive Charge	43	/	nC	V_R = 800V, I_F = 15A 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	0.7* 0.35**	˚C/W	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	80	˚C/W	
T_{sold}	Soldering Temperature	260	˚C	

*Per Leg, **Per Device

Typical Performance

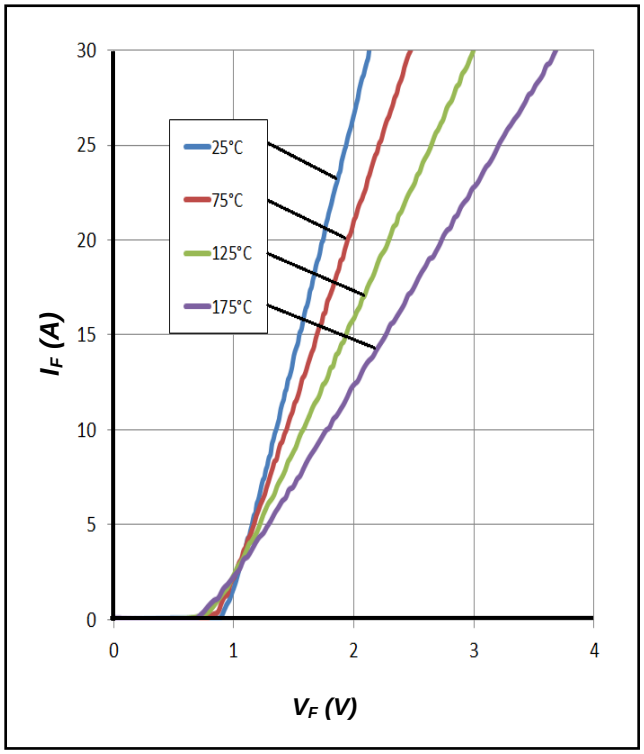


Figure 1. Forward Characteristics

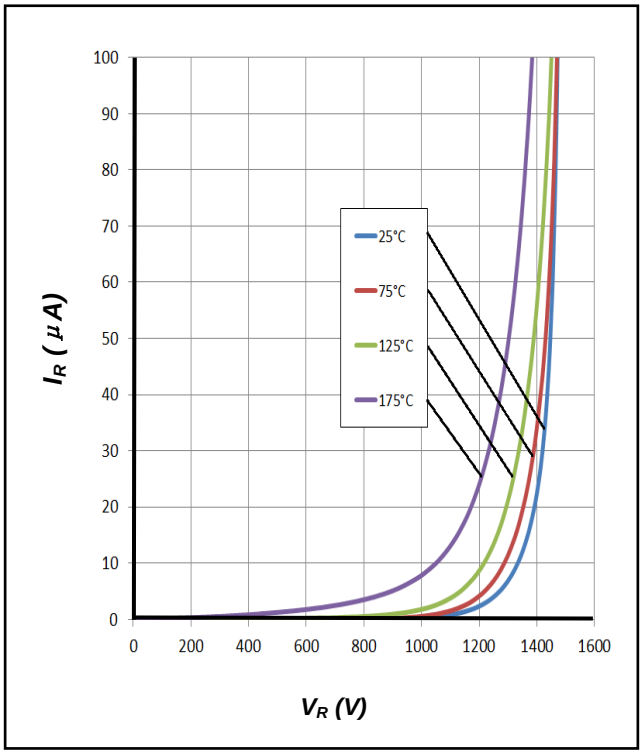


Figure 2. Reverse Characteristics

Typical Performance

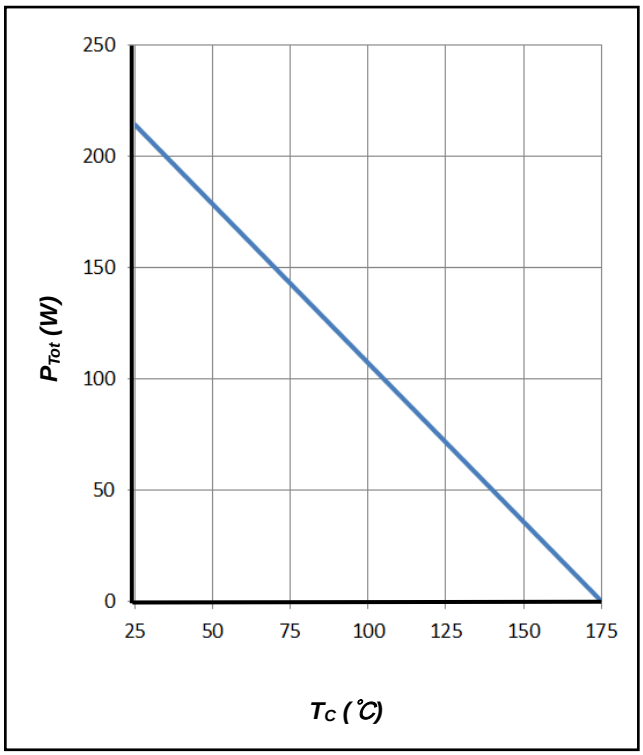


Figure 3. Power Derating

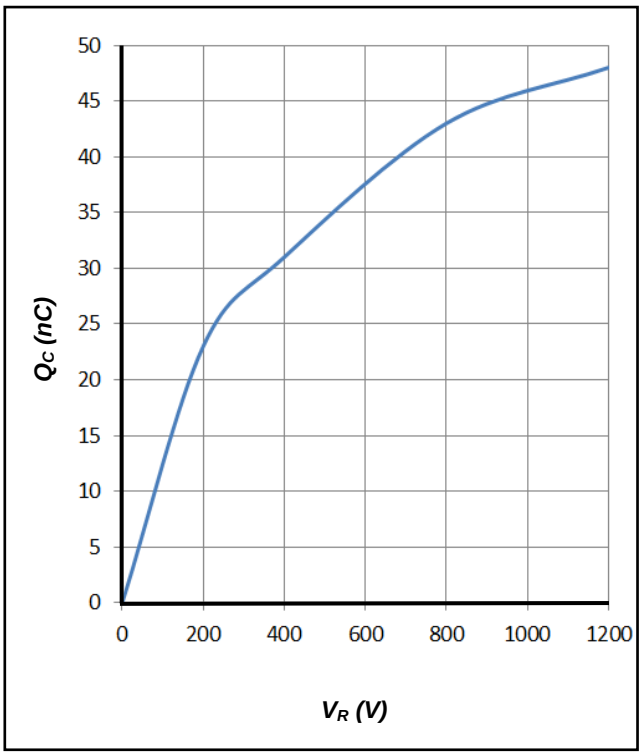


Figure 4. Total Capacitive Charge vs. Reverse Voltage

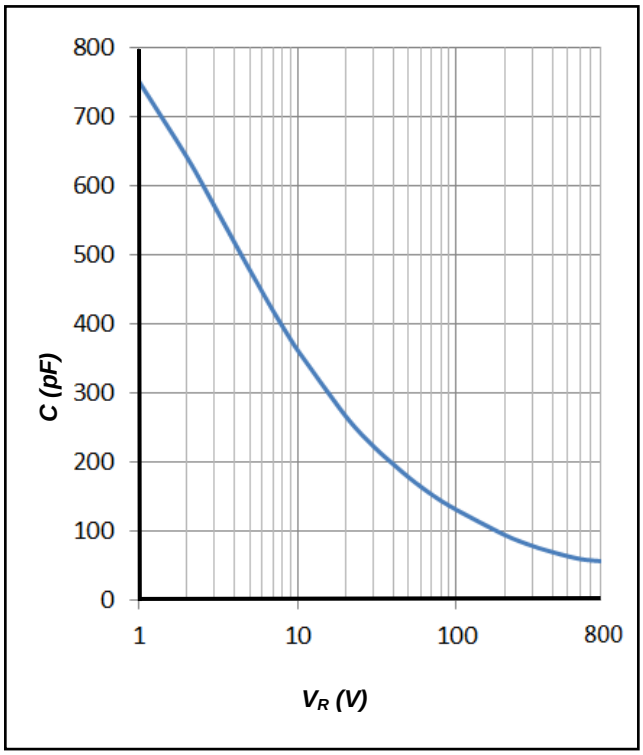


Figure 5. Total Capacitance vs. Reverse Voltage

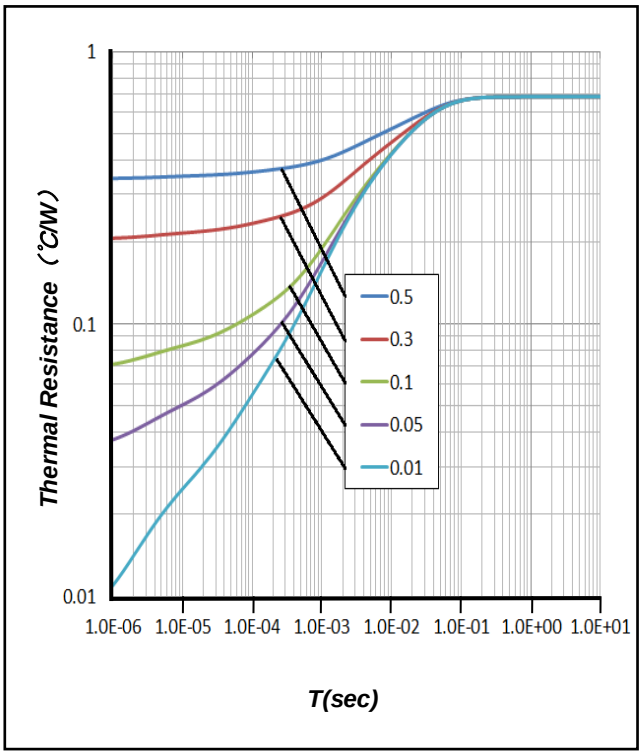
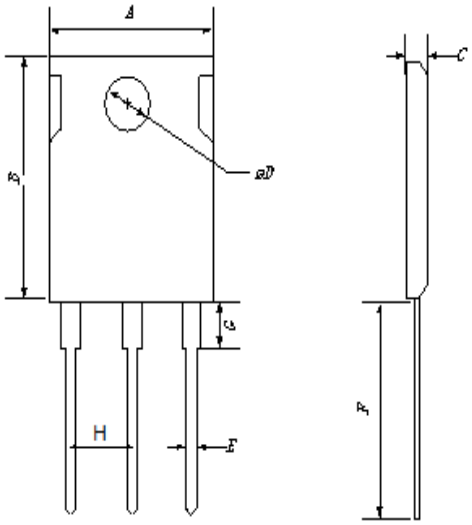
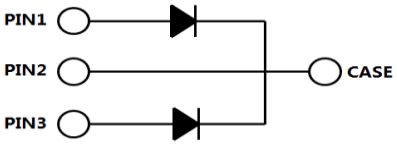


Figure 6. Transient Thermal Impedance

Package Dimensions

Package TO-247-3

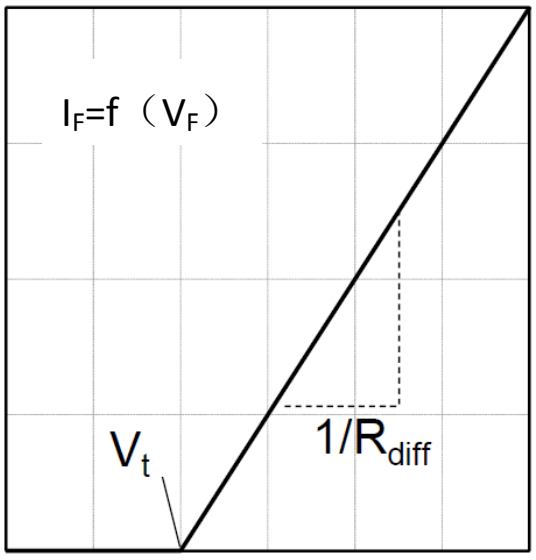




Symbol	Min. (mm)	Typ. (mm)	Max. (mm)
A	14.18	15.75	17.33
B	18.45	20.5	22.55
C	4.50	5.00	5.50
D	3.15	3.50	3.85
E	1.08	1.20	1.32
F	18.27	20.30	22.33
G	4.21	4.68	5.15
H	4.91	5.46	6.01

Simplified Diode Model

Equivalent IV Curve for Model



Mathematical Equation(Per Leg)

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

$V_t = -0.001 \times T_j + 0.9836$ [V]

$R_{diff} = 1\times10^{-6}\times T_j^2 + 1\times10^{-4}\times T_j + 0.0347$ [Ω]

Note:

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

I_F= Forward Current

Less than 30A