

N2S120040PD2

Silicon Carbide Schottky Diode

V_{RRM}	=	1200V
$I_F(T_C \leq 135^\circ\text{C})$	=	48A
Q_c	=	175nC

Features

- New Thin Wafer Technology
- Low Forward Voltage Drop (V_F)
- Zero Reverse Recovery Current
- Zero Forward Recovery Voltage
- Positive Temperature Coefficient on V_F
- Temperature-independent Switching

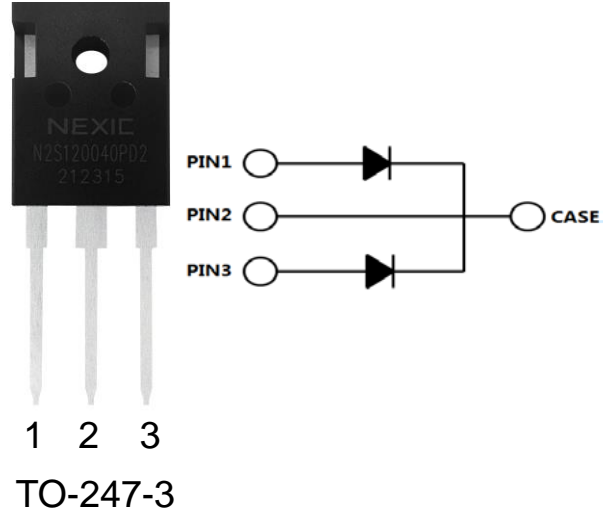
Benefits

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

Applications

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

Package



Part Number	Package	Marking
N2S120040PD2	TO-247-3	N2S120040PD2

Maximum Ratings (Per Device)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{RRM}	Repetitive Peak Reverse Voltage	1200	V	$T_C = 25^\circ\text{C}$	
V_{RSM}	Surge Peak Reverse Voltage	1200	V	$T_C = 25^\circ\text{C}$	
V_R	DC Blocking Voltage	1200	V	$T_C = 25^\circ\text{C}$	
I_F	Forward Current	80	A	$T_C \leq 25^\circ\text{C}$	
		48		$T_C \leq 135^\circ\text{C}$	
		40		$T_C \leq 145^\circ\text{C}$	
I_{FSM}	Non-Repetitive Forward Surge Current	385	A	$T_C = 25^\circ\text{C}$, $t_p = 8.3\text{ms}$, Half Sine Wave	
P_{tot}	Power Dissipation	403.2	W	$T_C = 25^\circ\text{C}$	Fig.3
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to 150	$^\circ\text{C}$		
	TO-247 Mounting Torque	1	Nm	M3 Screw	

Electrical Characteristics (Per Device)

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_F	Forward Voltage	1.46 2.1	1.8 /	V	$I_F = 40A, T_J = 25^\circ C$ $I_F = 40A, T_J = 150^\circ C$	Fig.1
I_R	Reverse Current	4.2 6.0	100 500	μA	$V_R = 1200V, T_J = 25^\circ C$ $V_R = 1200V, T_J = 150^\circ C$	Fig.2
C	Total Capacitance	2340 163 134	/	pF	$V_R = 0.1V, T_J = 25^\circ C, f = 1MHz$ $V_R = 400V, T_J = 25^\circ C, f = 1MHz$ $V_R = 800V, T_J = 25^\circ C, f = 1MHz$	Fig.5
Q_C	Total Capacitive Charge	175	/	nC	$V_R = 800V, I_F = 40A$ $di/dt = 200A/\mu s, T_J = 25^\circ C$	Fig.4

Thermal Characteristics (Per Device)

Symbol	Parameter	Typ.	Unit	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.31	$^\circ C/W$	Fig.6
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	38	$^\circ C/W$	
T_{sold}	Soldering Temperature	260	$^\circ C$	

Typical Performance (Per Device)

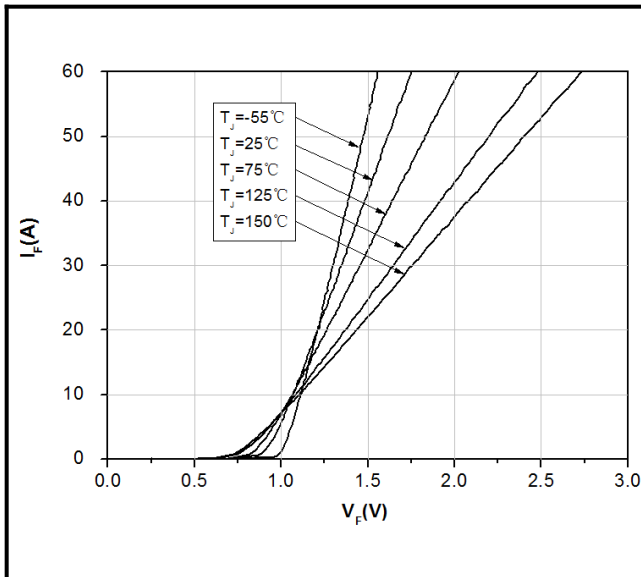


Figure 1. Forward Characteristics

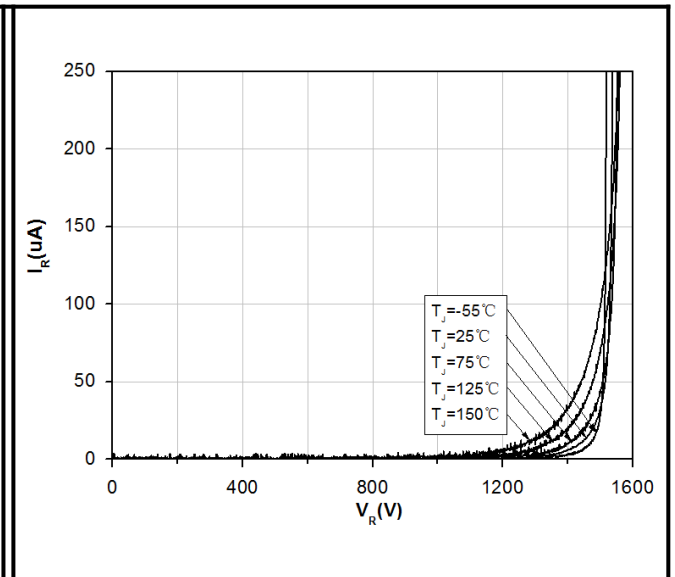


Figure 2. Reverse Characteristics

Typical Performance (Per Device)

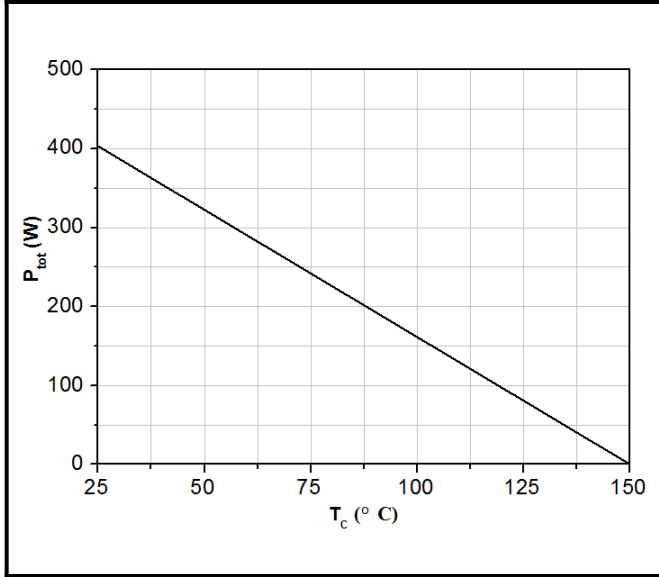


Figure 3. Power Derating

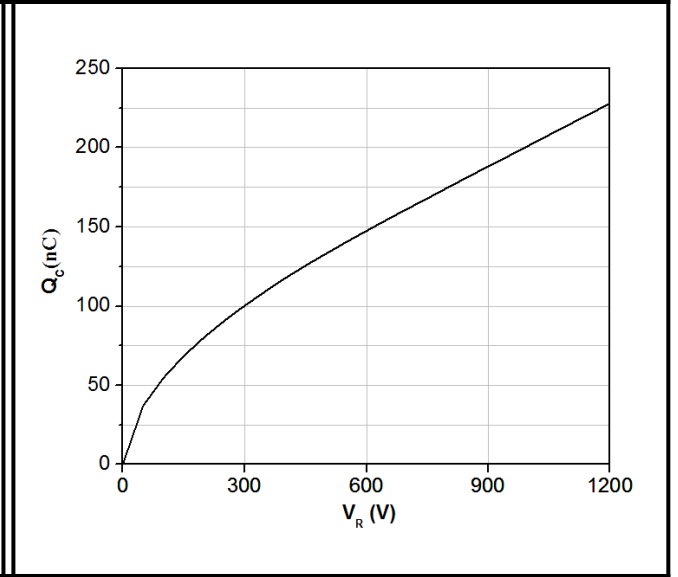


Figure 4. Total Capacitive Charge vs. Reverse Voltage

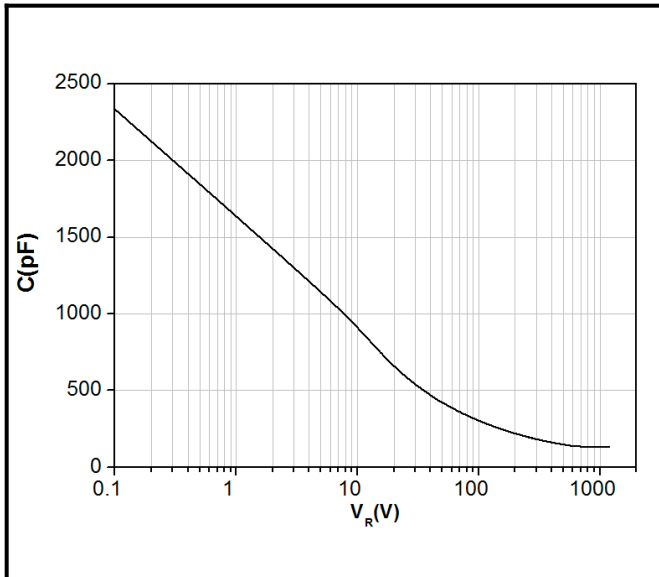


Figure 5. Total Capacitance vs. Reverse Voltage

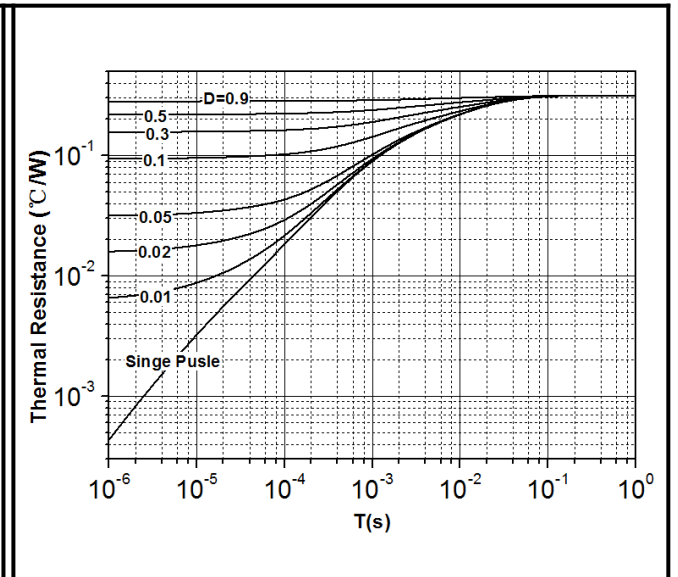
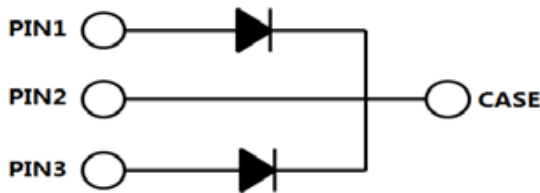
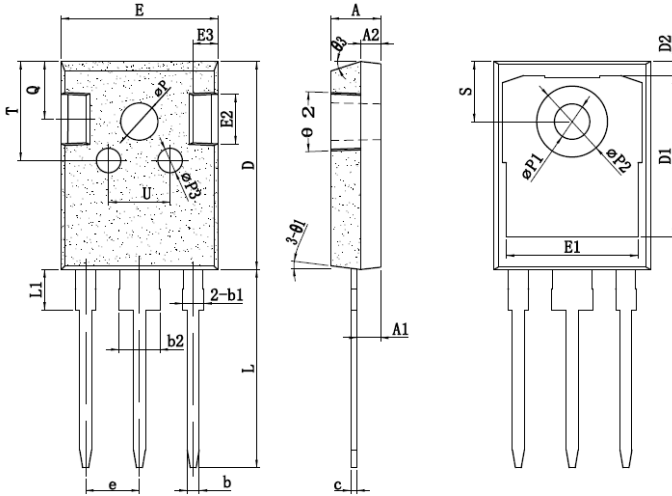


Figure 6. Transient Thermal Impedance

Package Dimensions

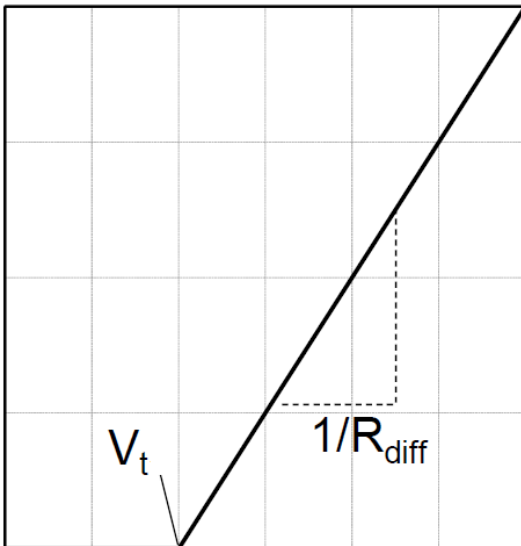
Package TO-247-3



Simplified Diode Model (Per Leg)

SYMBOL	mm		
	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
b	1.15	1.20	1.25
b1	1.95	2.10	2.25
b2	2.95	3.10	3.25
c	0.55	0.60	0.65
D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
e	5.40	5.44	5.48
L	19.80	19.98	20.15
L1	—	—	4.30
φP	3.60	3.70	3.80
φP1	3.45	3.55	3.65
φP2	7.03	7.18	7.33
φP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°

Equivalent IV Curve for Model



Mathematical Equation

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

$$V_t = -0.0014 \times T_j + 0.98 \text{ [V]}$$

$$R_{diff} = 8 \times 10^{-7} \times T_j^2 + 9.5 \times 10^{-5} \times T_j + 0.02 \text{ [\Omega]}$$

Note:

T_j = Diode Junction Temperature In Degrees Celsius, valid from 25°C to 150°C

I_F = Forward Current Less than 40A