

**$V_{RM} = 600\text{ V}$ ,  $I_{F(AV)} = 10\text{ A}$ ,  $t_{rr} = 100\text{ ns}$**   
**Fast Recovery Diode**  
**SPNS-1106S**

**Description**

The SPNS-1106S is a fast recovery diode of 600 V / 10 A. Well-balanced characteristics between lower  $V_F$  and fast recovery are ensured, achieving loss reduction. The maximum  $t_{rr}$  of 100 ns is realized by optimizing a life-time control. The low thermal resistance package achieves high performance in terms of heat dissipation.

**Features**

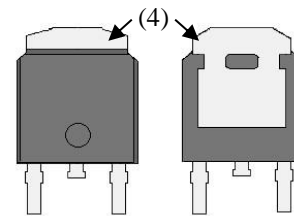
- $V_{RM}$ ----- 600 V
- $I_{F(AV)}$ ----- 10 A
- $V_F$ ----- 1.3 V
- $t_{rr}$ ----- 100 ns
- Bare Leads: Pb-free (RoHS Compliant)
- Flammability: Equivalent to UL94V-0
- Flow Soldering Available (MSL 1)

**Applications**

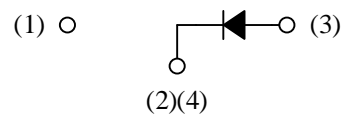
- PFC Circuit
- Freewheeling Diode  
 (Offline Buck Converter, Offline Buck-boost Converter, etc.)

**Package**

TO252-2L



(1) (2) (3)



- (1) NC
- (2) Cathode
- (3) Anode
- (4) Cathode

Not to scale

**Absolute Maximum Ratings**

Unless otherwise specified,  $T_A = 25\text{ }^\circ\text{C}$ .

Parameter	Symbol	Conditions	Rating	Unit
Nonrepetitive Peak Reverse Voltage	$V_{RSM}$		600	V
Repetitive Peak Reverse Voltage	$V_{RM}$		600	V
Average Forward Current	$I_{F(AV)}$	See Figure 3 and Figure 4	10	A
Surge Forward Current	$I_{FSM}$	Half cycle sine wave, positive side, 10 ms, 1 shot	100	A
$I^2t$ Limiting Value	$I^2t$	$1\text{ ms} \leq t \leq 10\text{ ms}$	50	$\text{A}^2\text{s}$
Junction Temperature	$T_J$		-55 to 150	$^\circ\text{C}$
Storage Temperature	$T_{STG}$		-55 to 150	$^\circ\text{C}$

**Electrical Characteristics**

Unless otherwise specified,  $T_A = 25\text{ }^\circ\text{C}$ .

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	$V_F$	$T_J = 25\text{ }^\circ\text{C}$ , $I_F = 10\text{ A}$	—	—	1.3	V
		$T_J = 100\text{ }^\circ\text{C}$ , $I_F = 10\text{ A}$	—	1.0	—	V
Reverse Leakage Current	$I_R$	$V_R = V_{RM}$	—	—	100	$\mu\text{A}$
Reverse Leakage Current under High Temperature	$H \cdot I_R$	$V_R = V_{RM}$ , $T_J = 150\text{ }^\circ\text{C}$	—	—	10	mA
Reverse Recovery Time	$t_{rr}$	$I_F = I_{RP} = 100\text{ mA}$ , 90% recovery point, $T_J = 25\text{ }^\circ\text{C}$	—	—	100	ns
						ns
Thermal Resistance <sup>(1)</sup>	$R_{th(J-C)}$	<sup>(2)</sup>	—	—	5.0	$^\circ\text{C/W}$

**Mechanical Characteristics**

Parameter	Conditions	Min.	Typ.	Max.	Unit
Package Weight		—	0.32	—	g

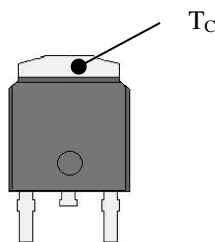


Figure 1. Case Temperature Measurement

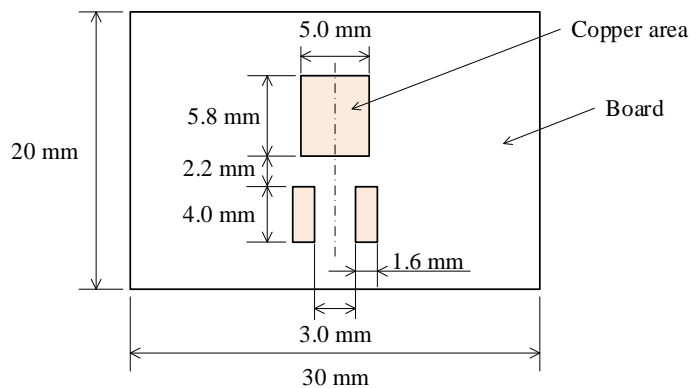


Figure 2. Glass-epoxy Board

<sup>(1)</sup> Refers to thermal resistance between junction and the case.

<sup>(2)</sup> The device is mounted on the glass-epoxy board (PCB: 42 mm × 32 mm in size, 1 mm in thickness, copper area: see Figure 2).

Derating Curves

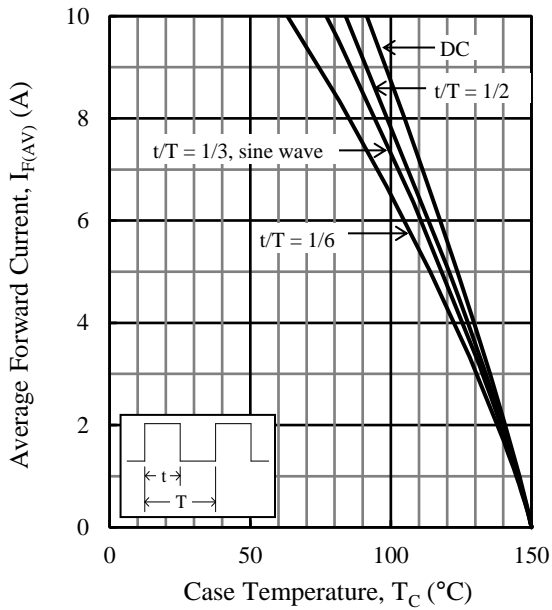


Figure 3.  $I_{F(AV)}$  vs.  $T_C$  ( $T_J = 150\text{ }^\circ\text{C}$ ,  $V_R = 0\text{ V}$ )

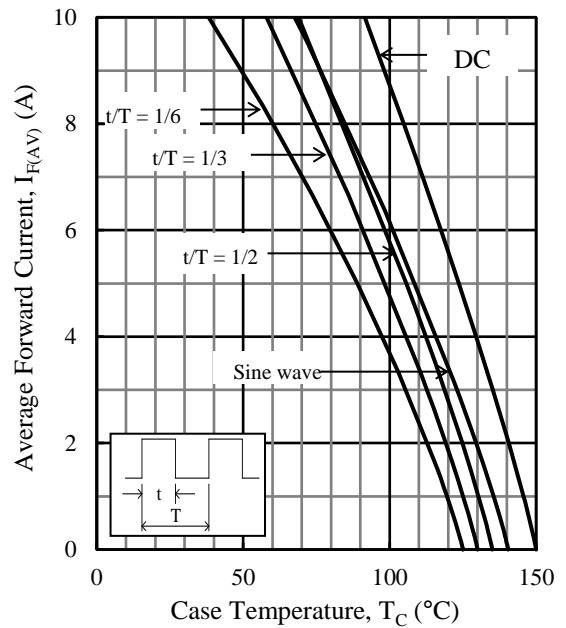


Figure 4.  $I_{F(AV)}$  vs.  $T_C$  ( $T_J = 150\text{ }^\circ\text{C}$ ,  $V_R = 600\text{ V}$ )

Characteristic Curves

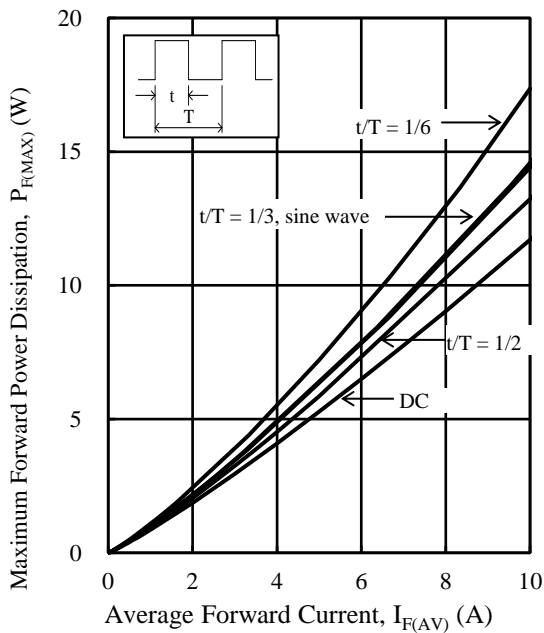


Figure 5.  $P_{F(MAX)}$  vs.  $I_{F(AV)}$  ( $T_J = 150\text{ }^\circ\text{C}$ )

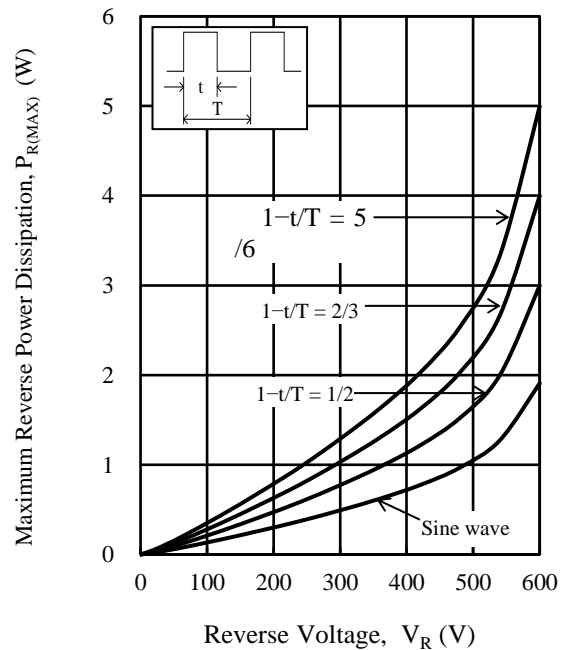


Figure 6.  $P_{R(MAX)}$  vs.  $V_R$  ( $T_J = 150\text{ }^\circ\text{C}$ )

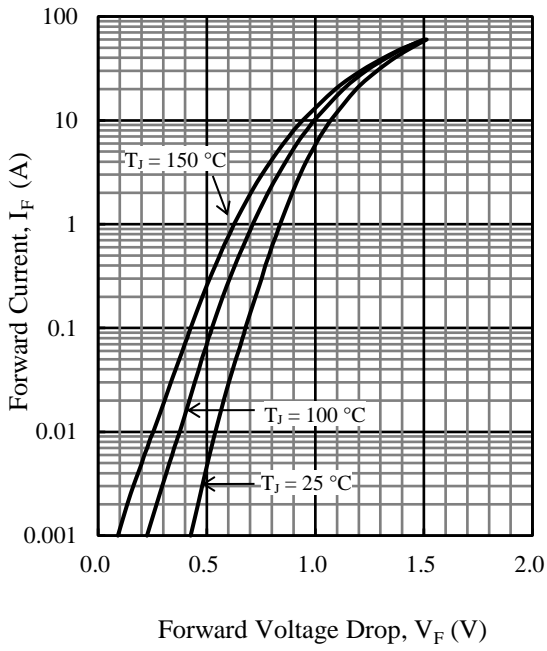


Figure 7. Typical Characteristics:  $I_F$  vs.  $V_F$

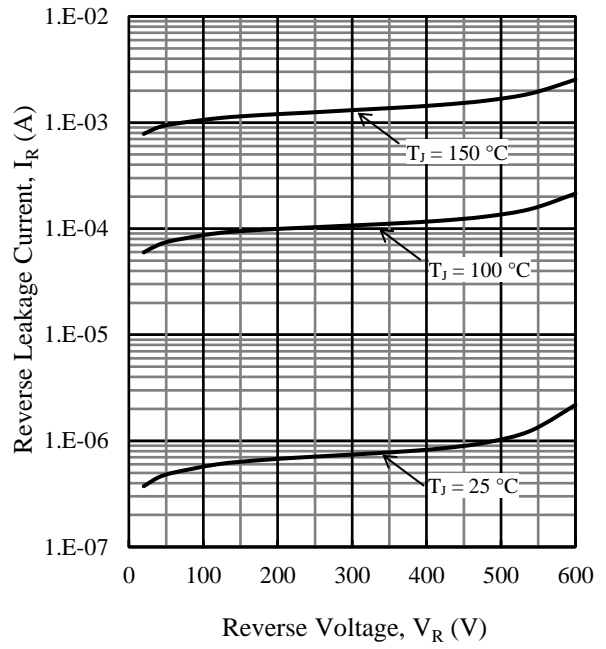


Figure 8. Typical Characteristics:  $I_R$  vs.  $V_R$

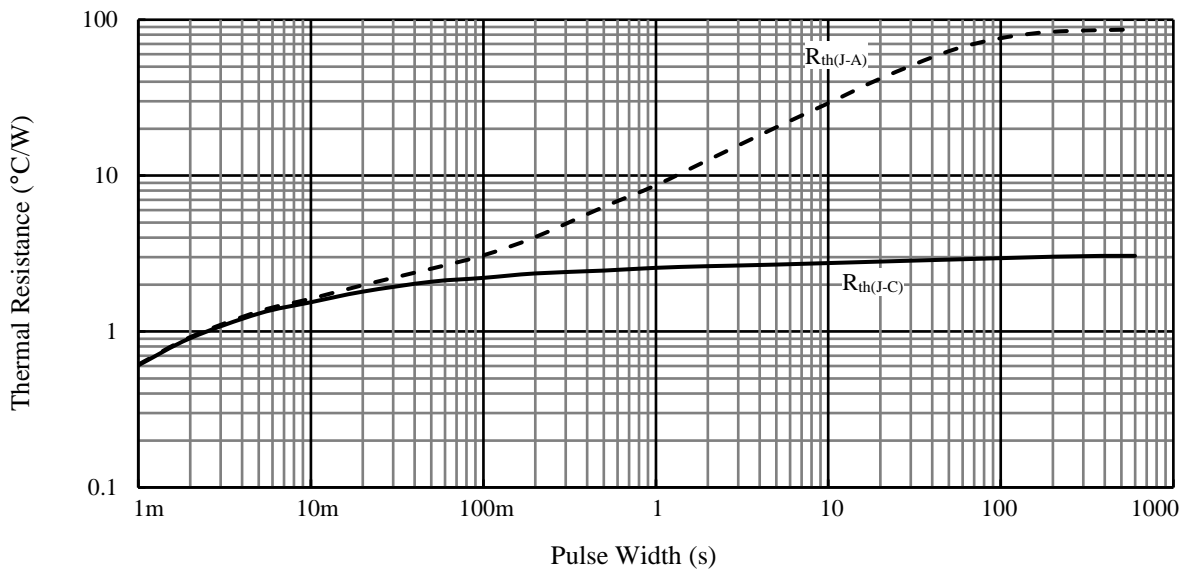
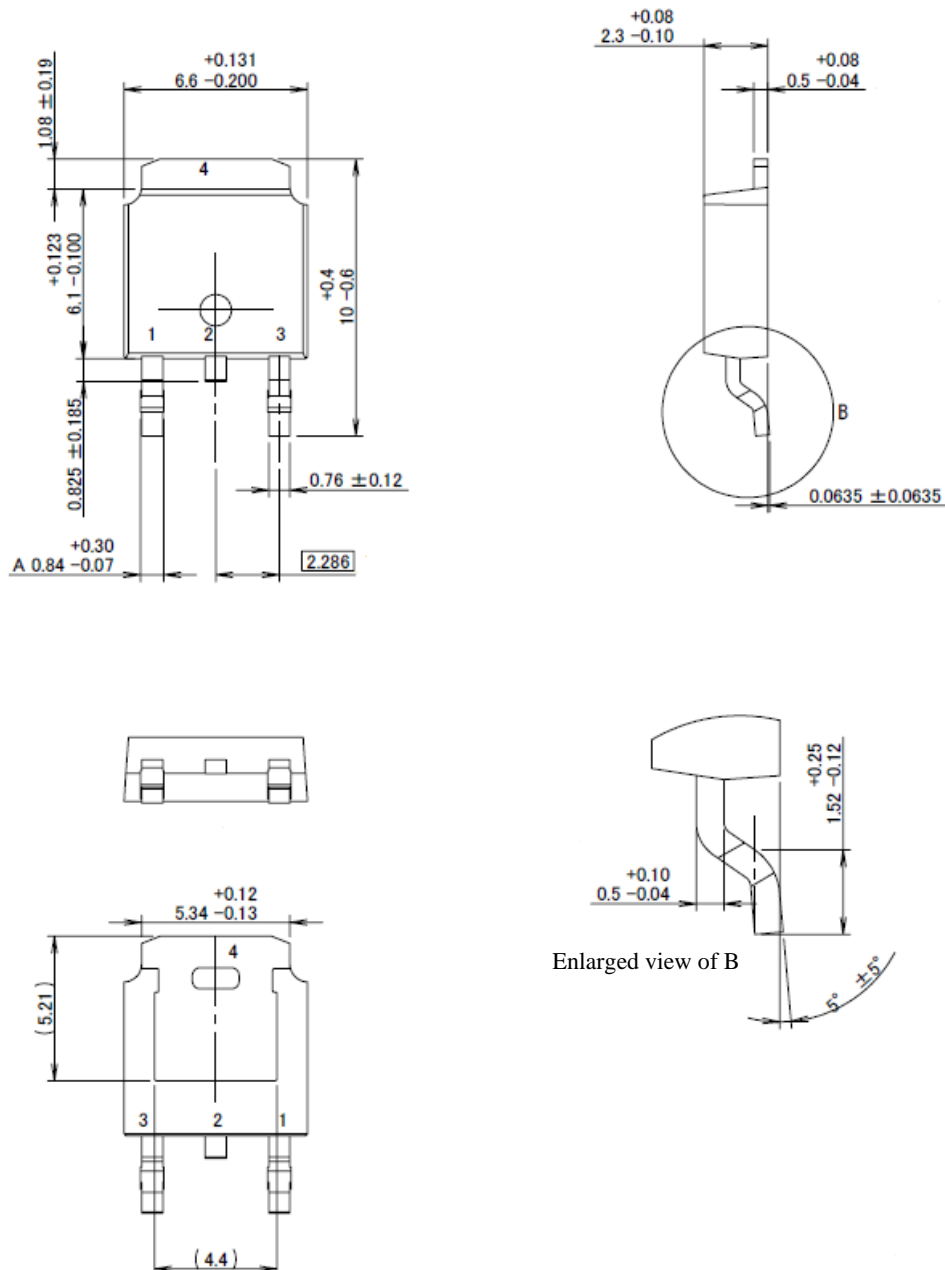


Figure 9. Typical Transient Thermal Resistance Characteristics

# SPNS-1106S

## Physical Dimensions

### • TO252-2L Package

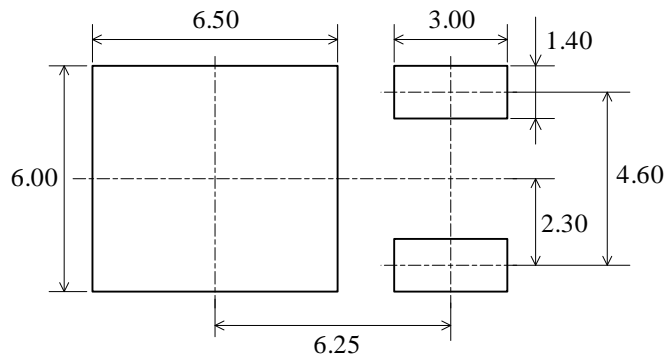


### NOTES:

- Dimensions in millimeters
- All the dimensions exclude mold flashes, protrusions, and gate burrs.
- Bare lead frame: Pb-free (RoHS compliant)
- Moisture Sensitivity Level 1 (MSL 1)
- When soldering the products, it is required to minimize the working time within the following limits:  
Flow:  $260^\circ\text{C} / 10\text{ s}$ , 1 time  
Reflow:  
  Preheat:  $150^\circ\text{C}$  to  $200^\circ\text{C} / 60\text{ s}$  to  $120\text{ s}$   
  Solder heating:  $255^\circ\text{C} / 30\text{ s}$ , 2 times ( $260^\circ\text{C}$  peak)  
  Soldering Iron:  $350^\circ\text{C} / 3.5\text{ s}$ , 1 time

# SPNS-1106S

## • TO252-2L Land Pattern Example



Dimensions in millimeters

## Marking Diagram

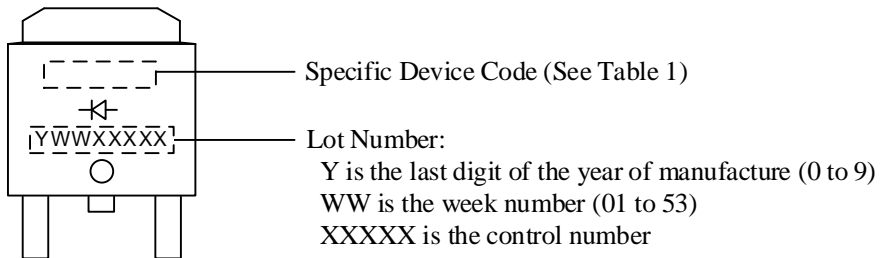


Table 1. Specific Device Code

Specific Device Code	Part Number
NS1106	SPNS-1106S

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