

**$V_{RM} = 200\text{ V}$ ,  $I_{F(AV)} = 5\text{ A}$ ,  $t_{rr} = 30\text{ ns}$**   
**Fast Recovery Diode**  
**FMX-12S**

**Description**

The FMX-12S is a fast recovery diode of 200 V / 5 A. The maximum  $t_{rr}$  of 30 ns is realized by optimizing a life-time control.

**Features**

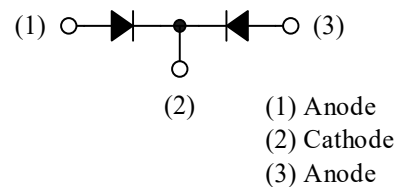
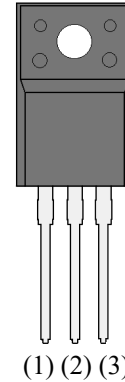
- $V_{RM}$  ----- 200 V
- $I_{F(AV)}$  ----- 5 A
- $V_F$  ----- 0.98 V
- $t_{rr1}$  ----- 30 ns
- Bare Lead Frame: Pb-free (RoHS Compliant)
- Flammability: Equivalent to UL94V-0

**Applications**

- Secondary-side Rectifier Diode  
(Flyback Converter, LLC Converter, etc.)
- Freewheel Diode  
(Offline Buck Converter, Offline Buck-boost Converter, etc.)

**Package**

TO220F-3L



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 <sup>(1)</sup> | $V_{RSM}$   |                                                       | 200        | V                    |
| Repetitive Peak Reverse Voltage <sup>(1)</sup>    | $V_{RM}$    |                                                       | 200        | V                    |
| Average Forward Current                           | $I_{F(AV)}$ | See Figure 1 and Figure 2                             | 5          | A                    |
| Surge Forward Current <sup>(1)</sup>              | $I_{FSM}$   | Half cycle sine wave,<br>positive side, 10 ms, 1 shot | 35         | A                    |
| $I^2t$ Limiting Value <sup>(1)</sup>              | $I^2t$      | $1\text{ ms} \leq t \leq 10\text{ ms}$                | 6.1        | $\text{A}^2\text{s}$ |
| Junction Temperature                              | $T_J$       |                                                       | -40 to 150 | $^{\circ}\text{C}$   |
| Storage Temperature                               | $T_{STG}$   |                                                       | -40 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 <sup>(1)</sup>                           | $V_F$         | $T_J = 25\text{ }^{\circ}\text{C}$ , $I_F = 2.5\text{ A}$                                                          | —    | —    | 0.98 | V                    |
|                                                               |               | $T_J = 100\text{ }^{\circ}\text{C}$ , $I_F = 2.5\text{ A}$                                                         | —    | 0.74 | —    | V                    |
| Reverse Leakage Current <sup>(1)</sup>                        | $I_R$         | $V_R = V_{RM}$                                                                                                     | —    | —    | 50   | $\mu\text{A}$        |
| Reverse Leakage Current under High Temperature <sup>(1)</sup> | $H \cdot I_R$ | $V_R = V_{RM}$ , $T_J = 150\text{ }^{\circ}\text{C}$                                                               | —    | —    | 10   | mA                   |
| Reverse Recovery Time <sup>(1)</sup>                          | $t_{rr1}$     | $I_F = I_{RP} = 100\text{ mA}$ ,<br>90% recovery point,<br>$T_J = 25\text{ }^{\circ}\text{C}$                      | —    | —    | 30   | ns                   |
|                                                               | $t_{rr2}$     | $I_F = 100\text{ mA}$ ,<br>$I_{RP} = 200\text{ mA}$ ,<br>75% recovery point,<br>$T_J = 25\text{ }^{\circ}\text{C}$ | —    | —    | 25   | ns                   |
| Thermal Resistance <sup>(2)</sup>                             | $R_{th(J-C)}$ |                                                                                                                    | —    | —    | 4.0  | $^{\circ}\text{C/W}$ |

## Mechanical Characteristics

| Parameter                      | Conditions | Min.  | Typ. | Max.  | Unit |
|--------------------------------|------------|-------|------|-------|------|
| Heatsink Mounting Screw Torque |            | 0.490 | —    | 0.686 | N·m  |
| Package Weight                 |            | —     | 1.8  | —     | g    |

<sup>(1)</sup> Specifies a value per chip; the FMX-12S consists of two chips.

<sup>(2)</sup>  $R_{th(J-C)}$  is thermal resistance between junction and the case. The case temperature is measured at the back side near the screw hole.

# Derating Curves

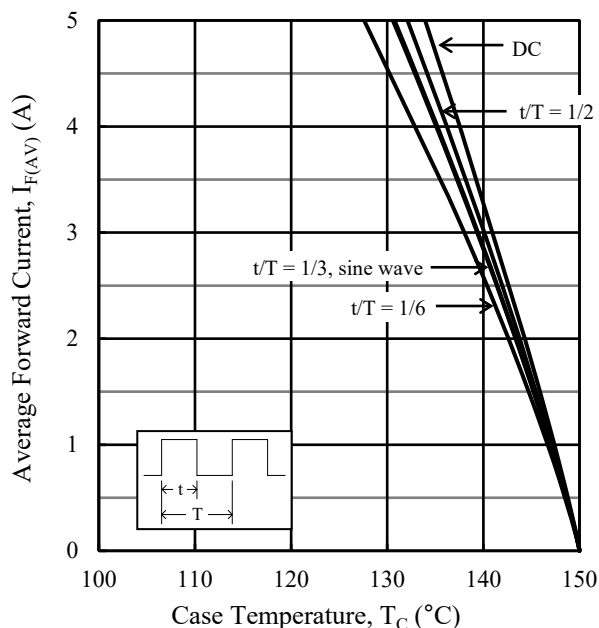


Figure 1.  $I_{F(AV)}$  vs.  $T_C$  ( $T_J = 150$  °C,  $V_R = 0$  V)

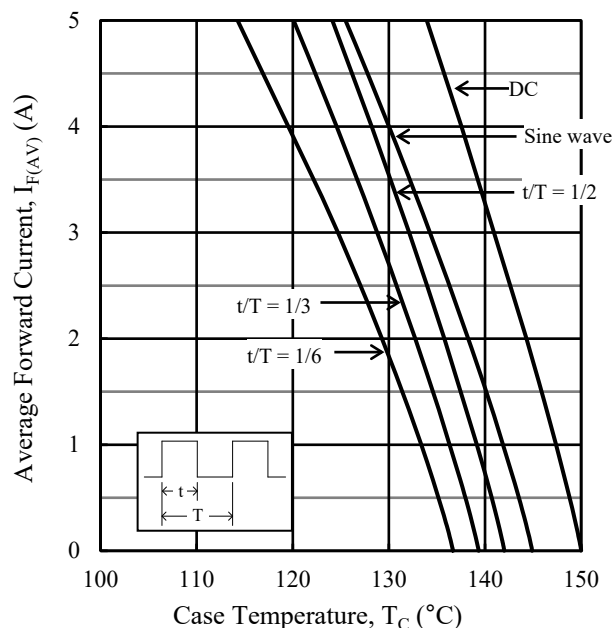


Figure 2.  $I_{F(AV)}$  vs.  $T_C$  ( $T_J = 150$  °C,  $V_R = 200$  V)

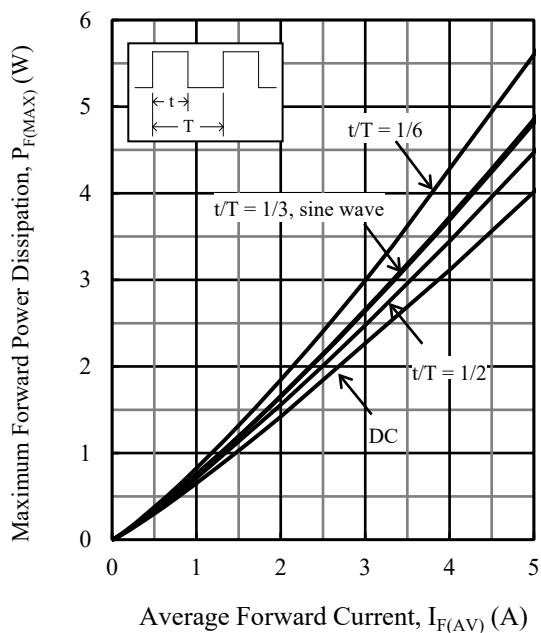


Figure 3.  $P_{F(MAX)}$  vs.  $I_{F(AV)}$  ( $T_J = 150$  °C)

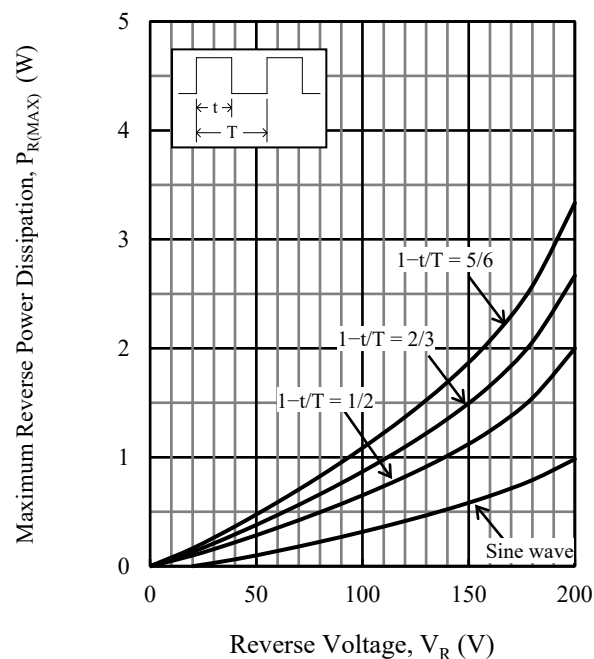


Figure 4.  $P_{R(MAX)}$  vs.  $V_R$  ( $T_J = 150$  °C)

Characteristic Curves

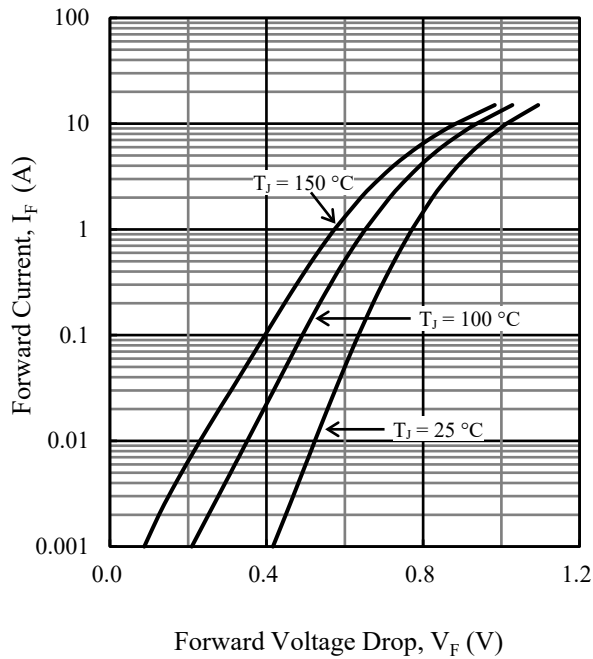


Figure 5. Typical Characteristics:  $I_F$  vs.  $V_F$

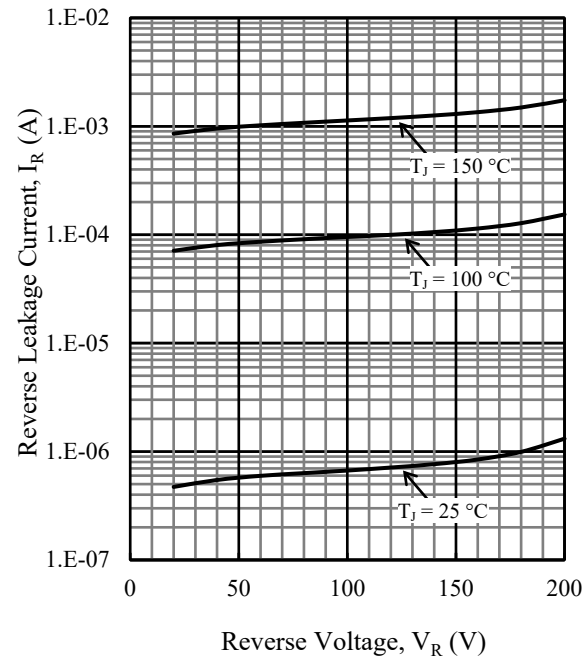


Figure 6. Typical Characteristics:  $I_R$  vs.  $V_R$

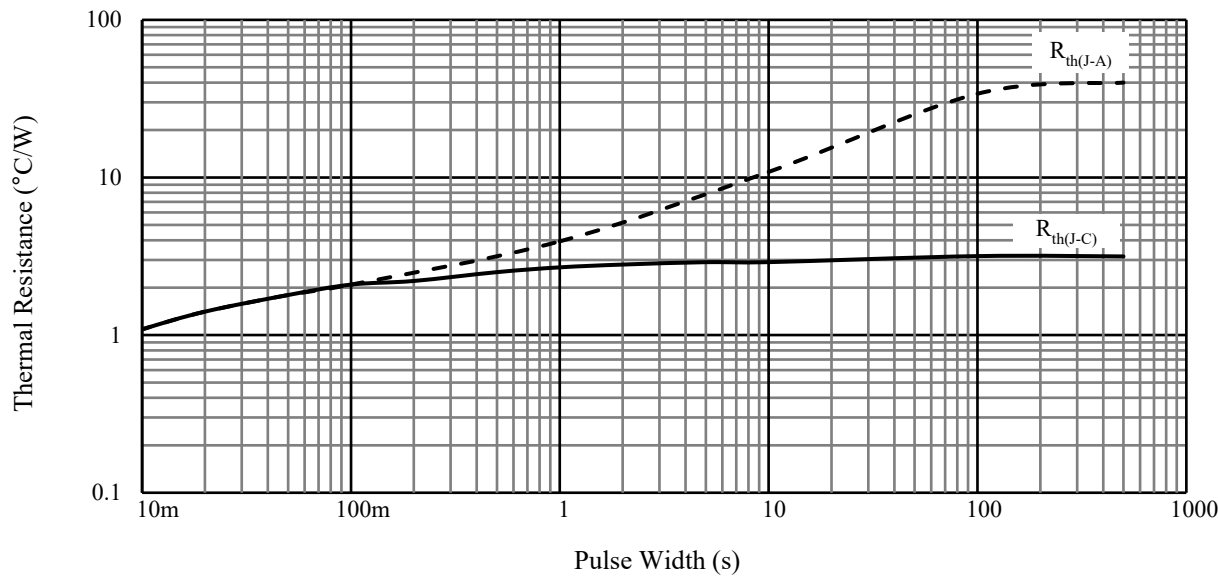
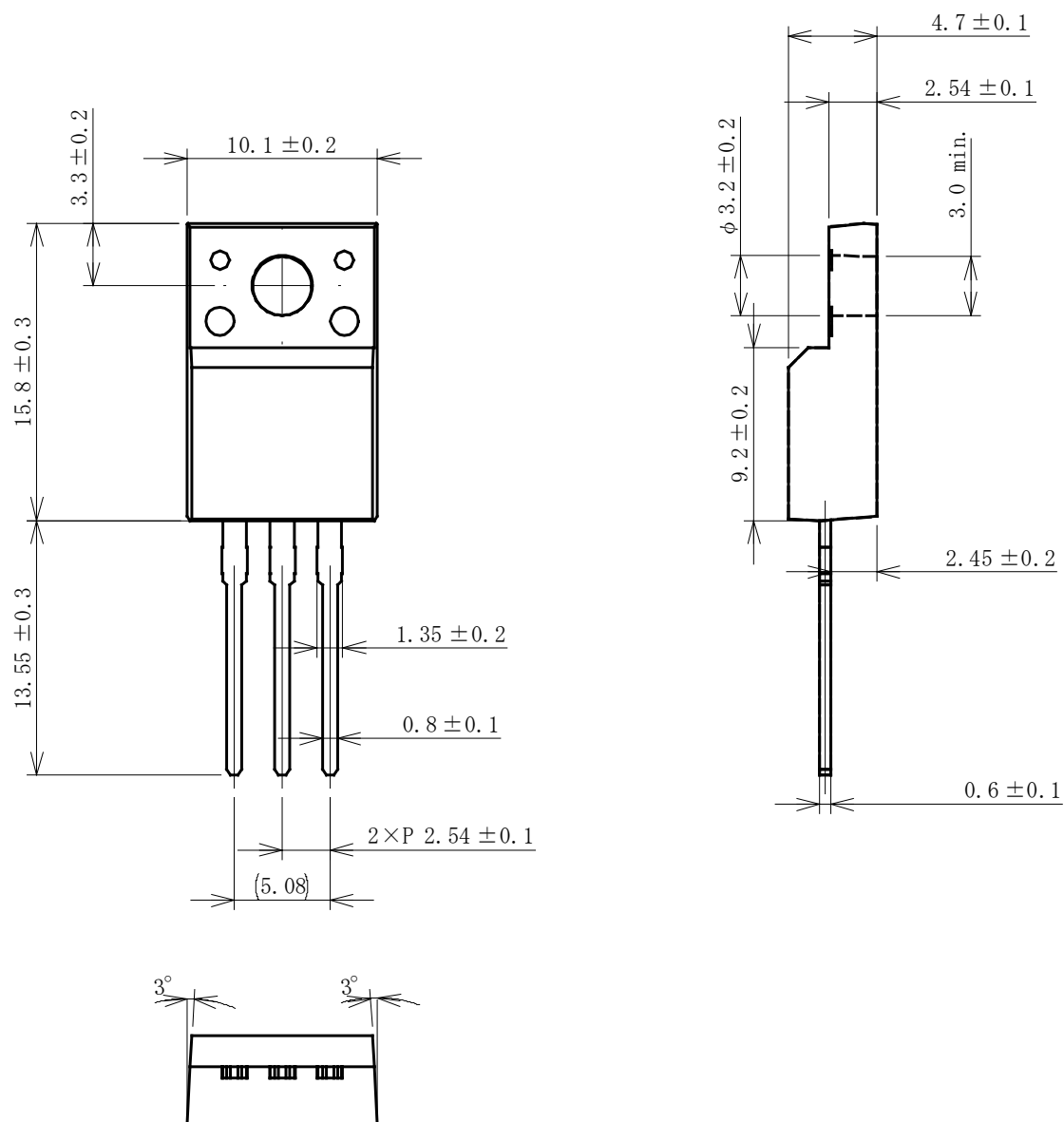


Figure 7. Typical Transient Thermal Resistance Characteristics

# Physical Dimensions

## • TO220F-3L



### NOTES:

- Dimensions in millimeters
- All the dimensions exclude mold flashes.
- Bare lead frame: Pb-free (RoHS compliant)
- When soldering the products, it is required to minimize the working time within the following limits:  
 Flow:  $270^\circ\text{C} / 7 \text{ s}, 1 \text{ time}$   
 Soldering Iron:  $350^\circ\text{C} / 3.5 \text{ s}, 1 \text{ time}$   
 Soldering should be at a distance of at least 1.5 mm from the body of the product.

Marking Diagram

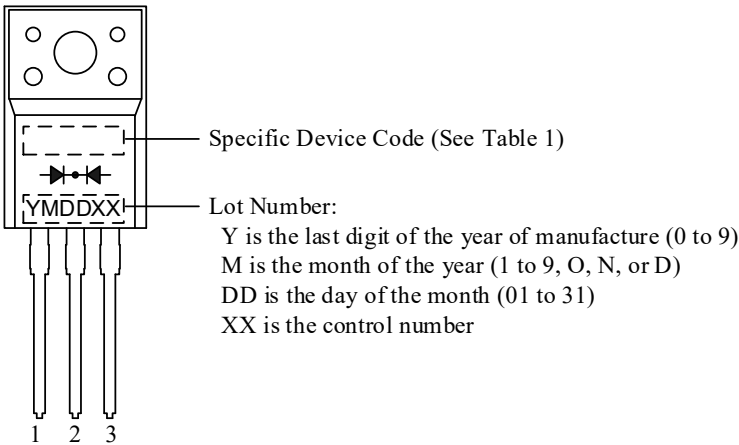


Table 1. Specific Device Code

| Specific Device Code | Part Number |
|----------------------|-------------|
| FMX12S               | FMX-12S     |

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