

$V_{RM} = 400\text{ V}$, $I_{F(AV)} = 0.7\text{ A}$, $t_{rr} = 1.5\text{ }\mu\text{s}$
Fast Recovery Diode
ES1

Description

The ES1 is a fast recovery diode of 400 V / 0.7 A. The maximum t_{rr} of 1.5 μs is realized by optimizing a life-time control.

Features

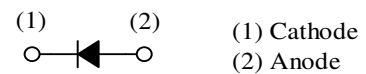
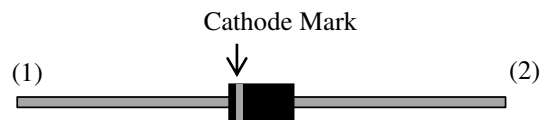
- V_{RM} ----- 400 V
- $I_{F(AV)}$ ----- 0.7 A
- V_F ----- 2.5 V
- t_{rr} ----- 1.5 μs
- Bare Leads: Pb-free (RoHS Compliant)
- Flammability: Equivalent to UL94V-0

Applications

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

Package

Axial ($\phi 2.7 \times 5.0L / \phi 0.78$)



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}		450	V
Repetitive Peak Reverse Voltage	V_{RM}		400	V
Average Forward Current	$I_{F(AV)}$	See Figure 2 and Figure 3.	0.7	A
Surge Forward Current	I_{FSM}	Half cycle sine wave, positive side, 10 ms, 1 shot	30	A
I^2t Limiting Value	I^2t	$1\text{ ms} \leq t \leq 10\text{ ms}$	4.5	A^2s
Junction Temperature	T_J		-40 to 140	$^\circ\text{C}$
Storage Temperature	T_{STG}		-40 to 140	$^\circ\text{C}$

Electrical Characteristics

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Forward Voltage Drop	V_F	$T_J = 25\text{ }^\circ\text{C}$, $I_F = 0.8\text{ A}$	—	—	2.5	V
		$T_J = 100\text{ }^\circ\text{C}$, $I_F = 0.8\text{ A}$	—	0.92	—	V
Reverse Leakage Current	I_R	$V_R = V_{RM}$	—	—	10	μA
Reverse Leakage Current under High Temperature	$H \cdot I_R$	$V_R = V_{RM}$, $T_J = 100\text{ }^\circ\text{C}$	—	—	200	μA
Reverse Recovery Time	t_{rr}	$I_F = I_{RP} = 10\text{ mA}$, 90% recovery point, $T_J = 25\text{ }^\circ\text{C}$	—	—	1.5	μs
Thermal Resistance ⁽¹⁾	$R_{th(J-L)}$	See Figure 1.	—	—	17	$^\circ\text{C/W}$

Mechanical Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Unit
Package Weight		—	0.3	—	g

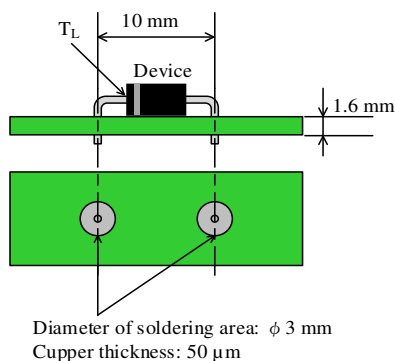


Figure 1. Lead Temperature Measurement Conditions

⁽¹⁾ $R_{th(J-L)}$ is thermal resistance between junction and lead. Lead temperature (T_L) is measured near the root of pin (see Figure 1).

Derating Curves

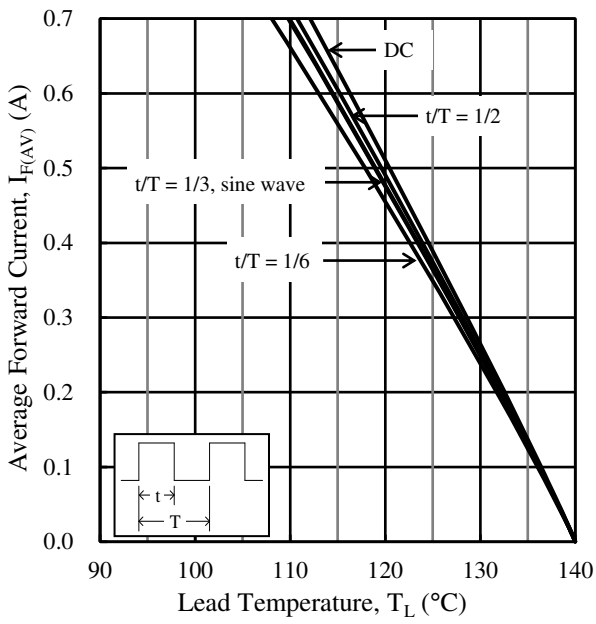


Figure 2. $I_{F(AV)}$ vs. $T_L^{(2)}$ ($T_J = 140\text{ }^\circ\text{C}$, $V_R = 0\text{ V}$)

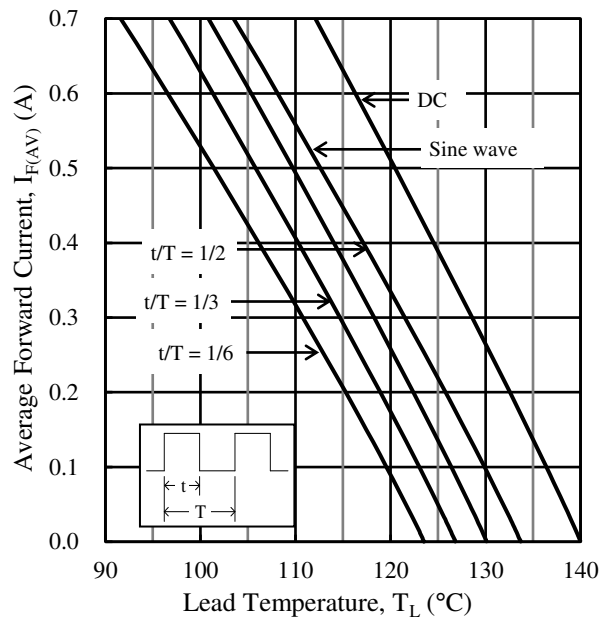


Figure 3. $I_{F(AV)}$ vs. $T_L^{(2)}$ ($T_J = 140\text{ }^\circ\text{C}$, $V_R = 400\text{ V}$)

⁽²⁾ See Figure 1 for the lead temperature measurement conditions.

Characteristic Curves

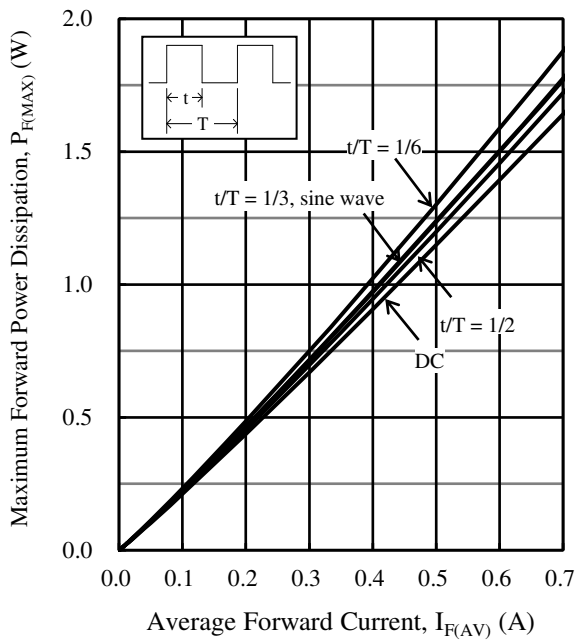


Figure 4. $P_{F(MAX)}$ vs. $I_{F(AV)}$ ($T_J = 140\text{ }^\circ\text{C}$)

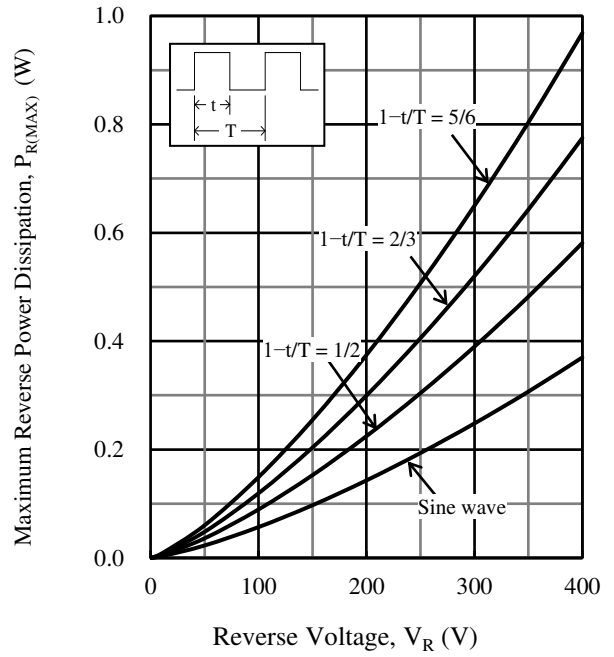


Figure 5. $P_{R(MAX)}$ vs. V_R ($T_J = 140\text{ }^\circ\text{C}$)

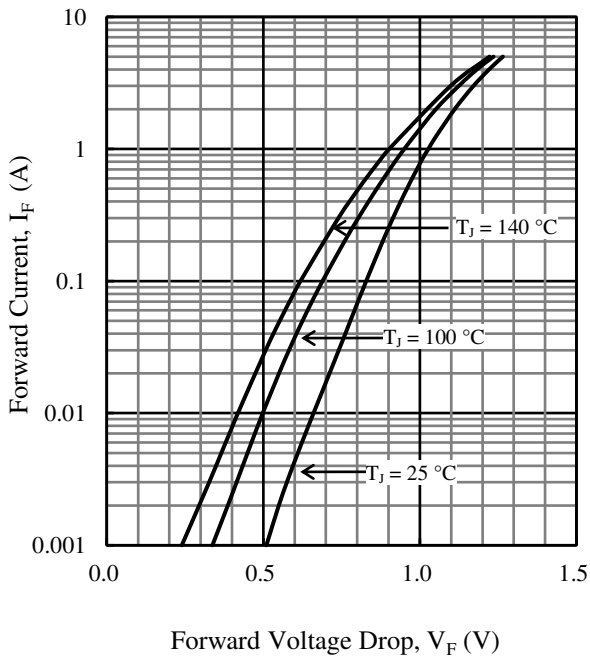


Figure 6. Typical Characteristics: I_F vs. V_F

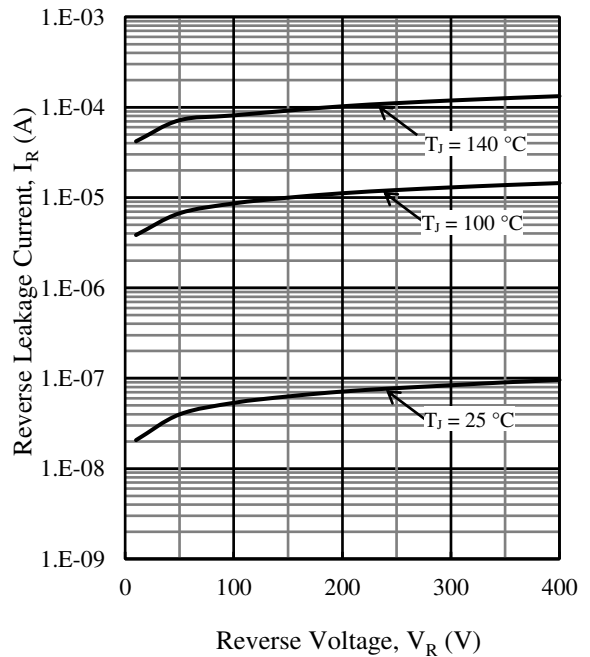


Figure 7. Typical Characteristics: I_R vs. V_R

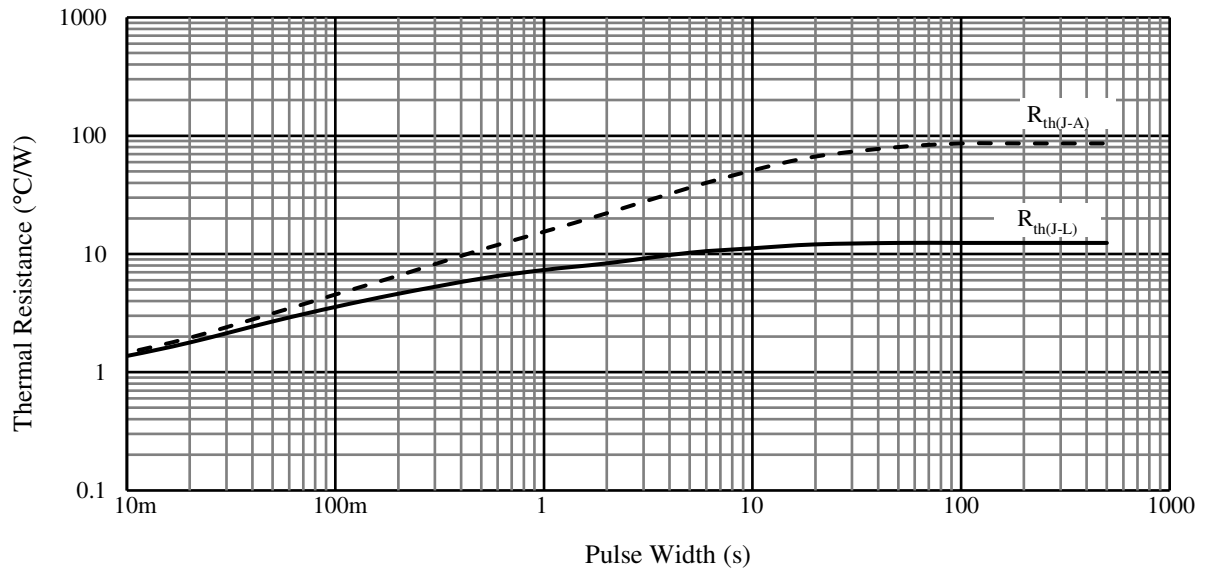
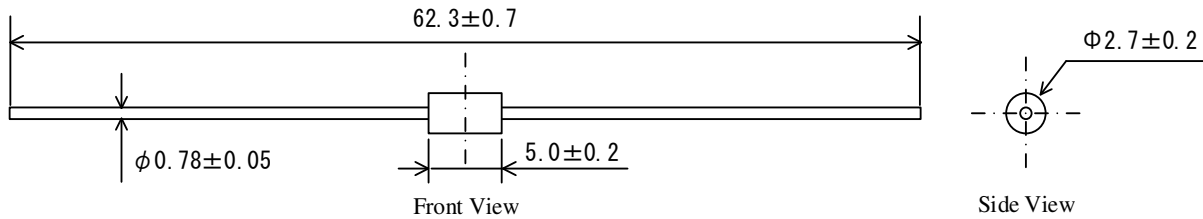


Figure 8. Typical Transient Thermal Resistance Characteristics

ES1

Physical Dimensions

- Axial ($\phi 2.7 \times 5.0L / \phi 0.78$)



NOTES:

- Dimensions in millimeters
- Bare leads: Pb-free (RoHS compliant)
- The total length of the product is the dimension when delivered separately and depends on the taping and lead forming specifications.
- The allowance position of body against the center of the total length of the product is 0.5 mm (max.); see Front View.
- The allowance position of lead against the center of body is 0.2 mm (max.); see Side View.
- The burr may exist up to 2 mm from the body of lead root.
- When soldering the products, it is required to minimize the working time within the following limits:
 Flow: $260\text{ }^{\circ}\text{C} / 10\text{ s}$, 1 time
 Soldering Iron: $350\text{ }^{\circ}\text{C} / 3.5\text{ s}$, 1 time (Soldering should be at a distance of at least 1.5 mm from the body of the product.)

Marking Diagram

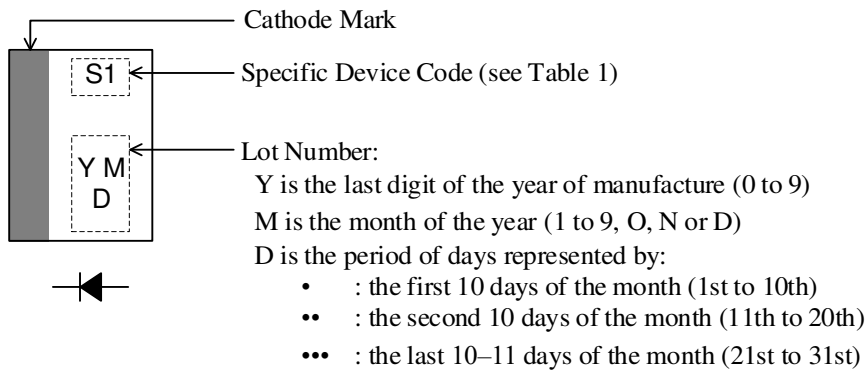


Table 1. Specific Device Code

Specific Device Code	Part Number
S1	ES1

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