



**THE DATASHEET OF  
ES1A-13-F**

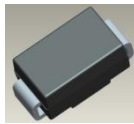


### Features

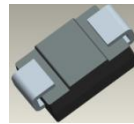
- Glass Passivated Die Construction
- Super-Fast Recovery Time for High Efficiency
- Surge Overload Rating to 30A Peak
- Ideally Suited for Automated Assembly
- **Lead Free Finish; RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free "Green" Device (Note 3)**

### Mechanical Data

- Case: SMA
- Case Material: Molded Plastic. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Annealed over Copper Leadframe Solderable per MIL-STD-202, Method 208
- Polarity: Cathode Band or Cathode Notch
- Weight: 0.064 grams (Approximate)



Top View



Bottom View

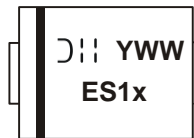
### Ordering Information (Note 4)

Part Number	Case	Packaging
ES1x-13-F	SMA	5000/Tape & Reel

\* x = Device type, e.g. ES1A-13-F

- Notes:
1. EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant. All applicable RoHS exemptions applied.
  2. See [http://www.diodes.com/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
  3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
  4. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

### Marking Information



- ES1x = Product type marking code, ex. ES1A
- DII = Manufacturer's code marking
- YWW = Date code marking
- Y = Last digit of year (ex: 2 for 2002)
- WW = Week code (01 to 53)

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Single phase, half wave, 60Hz, resistive or inductive load.  
For capacitance load, derate current by 20%.

Characteristic	Symbol	ES1A	ES1B	ES1C	ES1D	ES1G	Unit	
Peak Repetitive Reverse Voltage	V <sub>R(RM)</sub>							
Working Peak Reverse Voltage	V <sub>R(WM)</sub>	50	100	150	200	400	V	
DC Blocking Voltage (Note 6)	V <sub>R</sub>							
RMS Reverse Voltage	V <sub>R(RMS)</sub>	35	70	105	140	280	V	
Average Rectified Output Current @ T <sub>T</sub> = +110°C	I <sub>O</sub>	1.0						A
Non-Repetitive Peak Forward Surge Current 8.3ms Single Half Sine-Wave Superimposed on Rated Load	I <sub>FSM</sub>	30						A

**Thermal Characteristics**

Characteristic	Symbol	Value	Unit
Typical Thermal Resistance, Junction to Terminal (Note 5)	R <sub>θJT</sub>	25	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	ES1A	ES1B	ES1C	ES1D	ES1G	Unit	
Minimum Reverse Breakdown Voltage (Note 6)   I <sub>R</sub> = 5μA	V <sub>(BR)R</sub>	50	100	150	200	400	V	
Maximum Forward Voltage Drop   I <sub>F</sub> = 0.6A   I <sub>F</sub> = 1.0A	V <sub>FM</sub>	0.90 0.92				— 1.25	V	
Peak Reverse Current at Rated DC Blocking Voltage (Note 6)   T <sub>A</sub> = +25°C   T <sub>A</sub> = +125°C	I <sub>RM</sub>	5.0 200						μA
Maximum Reverse Recovery Time (Note 7)	t <sub>RR</sub>	25						ns
Typical Total Capacitance (Note 8)	C <sub>T</sub>	20						pF

- Notes:
5. Unit mounted on PC board with 5.0 mm<sup>2</sup> (0.013 mm thick) copper pad as heat sink.
  6. Short duration pulse test used to minimize self-heating effect.
  7. Measured with I<sub>F</sub> = 0.5A, I<sub>R</sub> = 1.0A, I<sub>RR</sub> = 0.25A. See figure 5.
  8. Measured at 1.0MHz and applied reverse voltage of 4.0V DC.

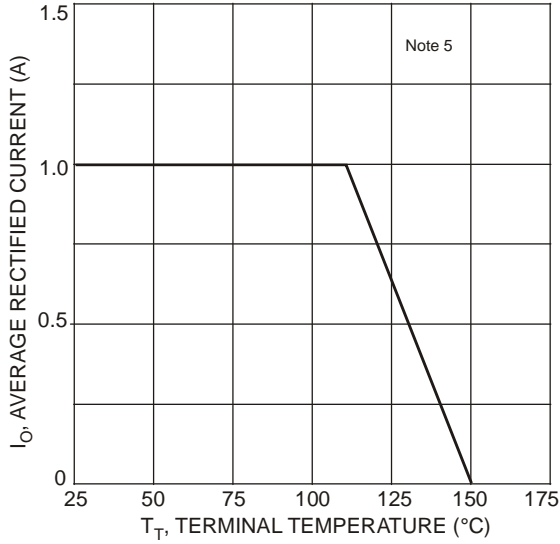


Fig. 1 Forward Current Derating Curve

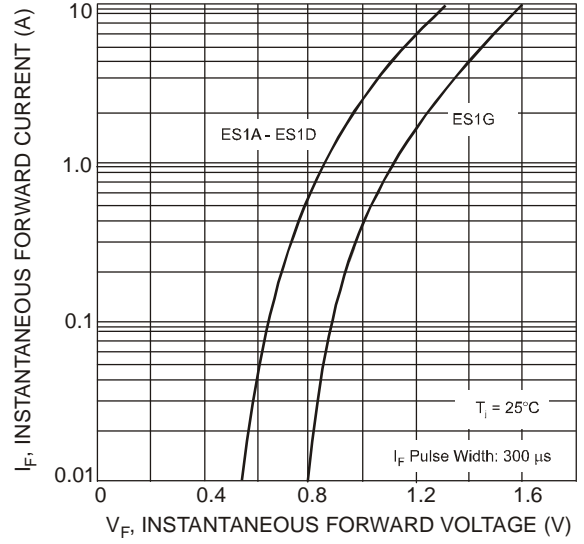


Fig. 2 Typical Forward Characteristics

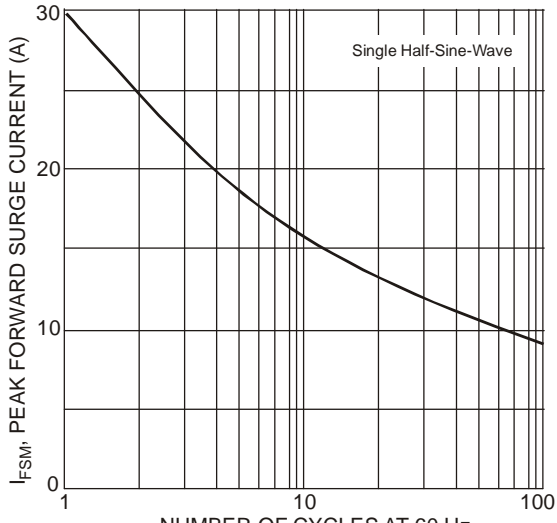


Fig. 3 Surge Current Derating Curve

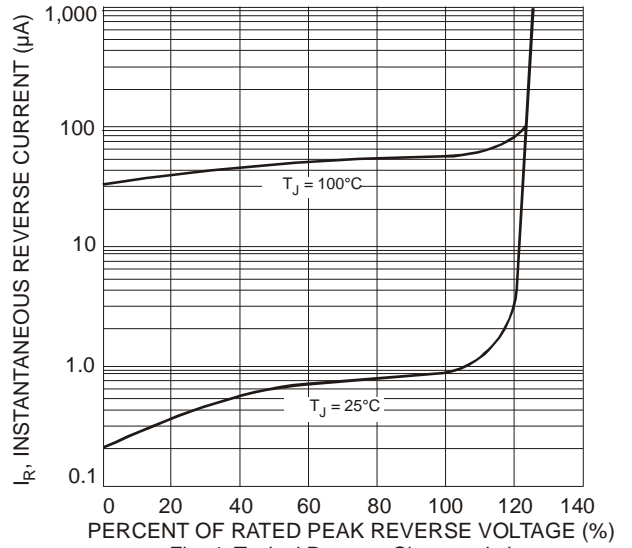
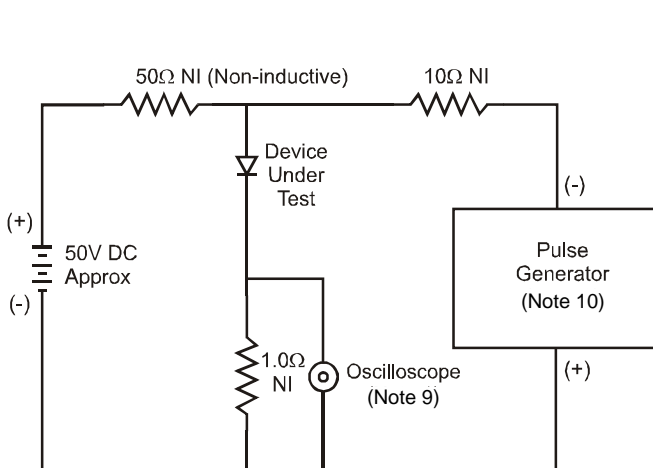
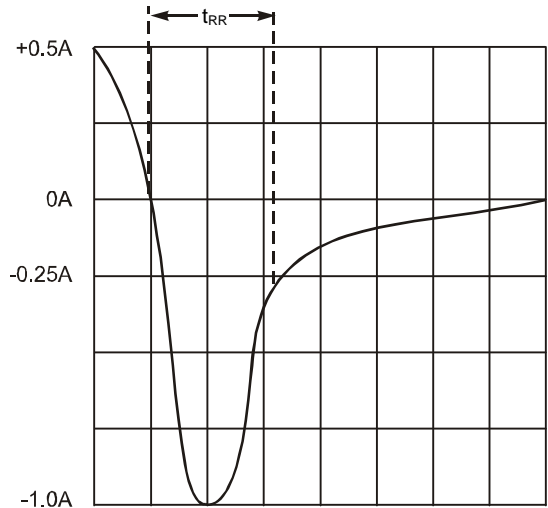


Fig. 4 Typical Reverse Characteristics



- Notes:  
 9. Rise Time = 7.0ns max. Input Impedance = 1.0MΩ, 22pF.  
 10. Rise Time = 10ns max. Input Impedance = 50Ω.

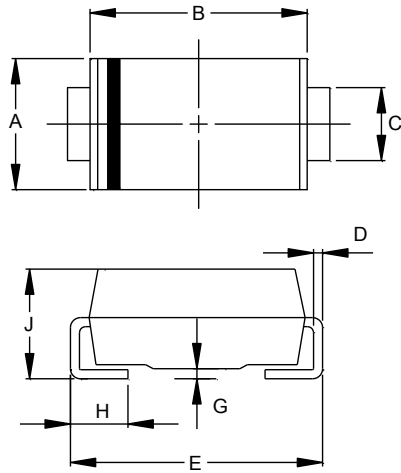


Set time base for 50/100 ns/cm

Fig. 5 Reverse Recovery Time Characteristic and Test Circuit

**Package Outline Dimensions**

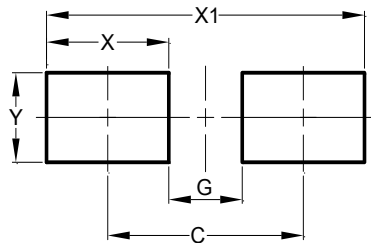
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



SMA		
Dim	Min	Max
A	2.29	2.92
B	4.00	4.60
C	1.27	1.63
D	0.15	0.31
E	4.80	5.59
G	0.05	0.20
H	0.76	1.52
J	1.96	2.40
All Dimensions in mm		

**Suggested Pad Layout**

Please see AP02001 at <http://www.diodes.com/datasheets/ap02001.pdf> for the latest version.



Dimensions	Value (in mm)
C	4.00
G	1.50
X	2.50
X1	6.50
Y	1.70

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