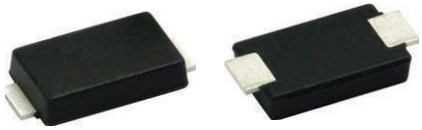
SMAF04J110V

Automotive 400 W

Datasheet – production data

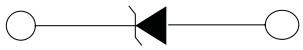
Features

- Peak pulse power:
  –400 W (10/1000 µs)
- Stand off voltage range:110V
- Unidirectional types
- Low leakage current:
  – 5.0 µA at 25 °C
- Operating $T_{j\,max}$: 150 °C
- JEDEC registered package outline
- Resin meets UL 94, V0
- shipping 2000/Tape&Reel



Top View **Bottom View**

DO-221AC (SMAF)



SCHEMATIC SYMBOL

Complies with the following standards

- ISO 10605, C = 150 pF, R = 330 Ω:
  – 30 kV (air discharge)
  – 30 kV (contact discharge)
- ISO 10605, C = 330 pF, R = 330 Ω:
  – 30 kV (air discharge)
  – 30 kV (contact discharge)
- ISO 7637-2[(a)]
  – Pulse 1: V_S = -100 V
  – Pulse 2a: V_S = +50 V
  – Pulse 3a: V_S = -150 V
  – Pulse 3b: V_S = +100 V

Description

The SMAF04J series has been designed to protect sensitive automotive circuits against surges defined in ISO 7637-2 and against electrostatic discharges according to ISO 10605.

The planar technology makes this device compatible with high-end circuits where low leakage current and high junction temperature are required to provide reliability and stability over time. SMAF04J arepa ckage d in SMAF(S MA F footprint in accordance with IPC 7531 standard).

1 Characteristics

Table 1. Absolute maximum ratings (T_{amb} = 25 °C)

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	ISO 10605 (C = 330 pF, R = 330 Ω): Contact discharge Air discharge ISO 10605 (C = 150 pF, R = 330 Ω): Contact discharge Air discharge	 30 30 30 30	kV
P_{PP}	Peak pulse power dissipation(1)	T_j initial = T_{amb}	400	W
T_j	Operating junction temperature range		-40 to 150	°C
T_{stg}	Storage temperature range		-65 to 150	
T_L	Maximum lead temperature for soldering during 10 s.		260	

1. For a surge greater than the maximum values, the diode will fail in short-circuit.

Figure 1. Electrical characteristics - definitions

Symbol	Parameter
V_{RM}	Stand-off voltage
V_{BR}	Breakdown voltage
V_{CL}	Clamping voltage
I_{RM}	Leakage current @ V_{RM}
I_{PP}	Peak pulse current
αT	Voltage temperature coefficient
V_F	Forward voltage drop
R_D	Dynamic resistance

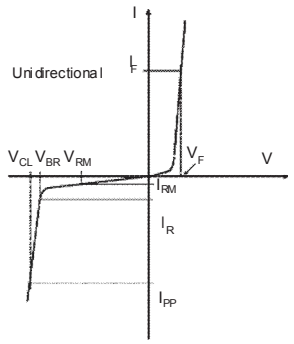


Figure 2. Pulse definition for electrical characteristics

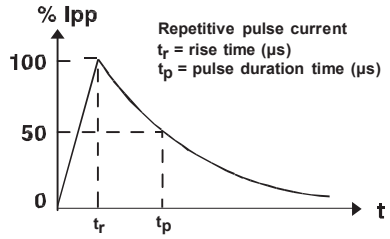


Table 2. Electrical characteristics, parameter values (T_{amb} = 25 °C)

Part Number (Bidirectional)	Reverse Stand-off Voltage	Breakdown Voltage Min.@IT	Breakdown Voltage Max.@IT	Test Current	Maximum Clamping Voltage @IPP	Peak Pulse Current	Reverse Leakage @VRWM
Mode	**VRWM(V)**	**VBR (V)**	**VBR (B)**	**IT(mA)**	**VC(V)**	**IPP(A)**	**IR(uA)**
SMAF04J110V	110.0	122.0	135.0	1	177.0	2.3	5.0

Notes:

1. Pulse test: t_p < 50 ms
2. To calculate maximum clamping voltage at another surge level, use the following formula:
   $V_{CLmax} = V_{CL} - R_D \times (I_{PP} - I_{PPappli})$ where $I_{PPappli}$ is the surge current in the application.
3. To calculate V_{BR} or V_{CL} versus junction temperature, use the following formulas:
   V_{BR} @ $T_J = V_{BR}$ @ 25°C x (1 + αT x (T_J - 25))
   V_{CL} @ $T_J = V_{CL}$ @ 25°C x (1 + αT x (T_J - 25))
4. Surge capability given for both directions for unidirectional and bidirectional types.

Figure 3. Relative variation of peak power versus initial junction temperature

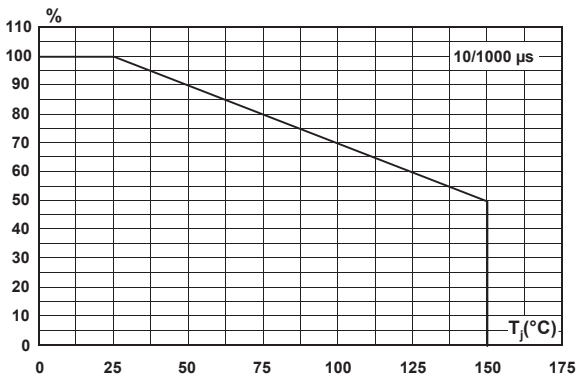


Figure 4. Peak pulse power versus exponential pulse duration

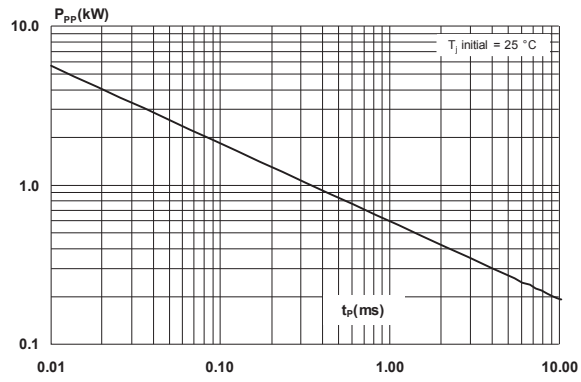


Figure 5. Clamping voltage versus peak pulse current exponential waveform (maximum values)

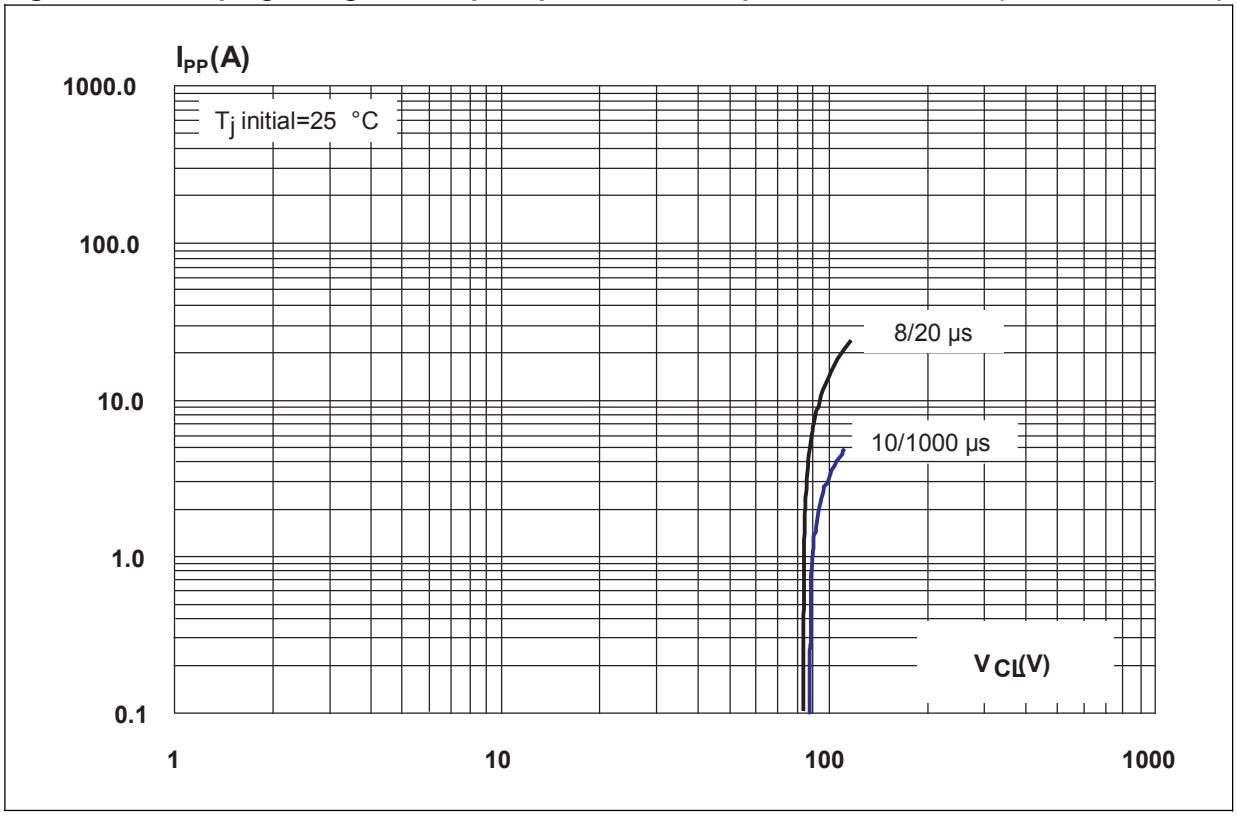


Figure 6. Relative variation of thermal impedance, junction to ambient, versus pulse duration

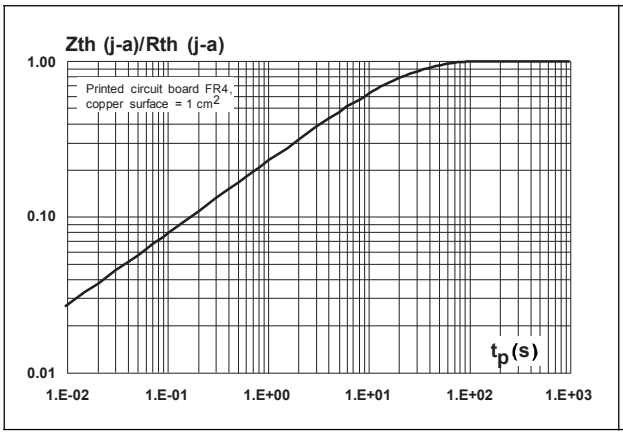


Figure 7. Thermal resistance junction to ambient versus copper surface under each lead

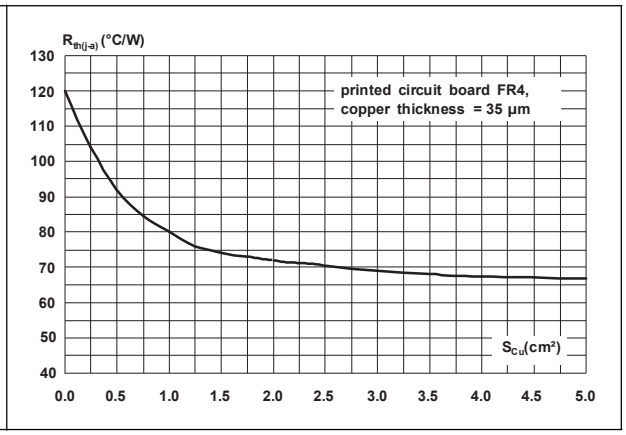


Figure 8 . Leakage current versus junction temperature (typical values)

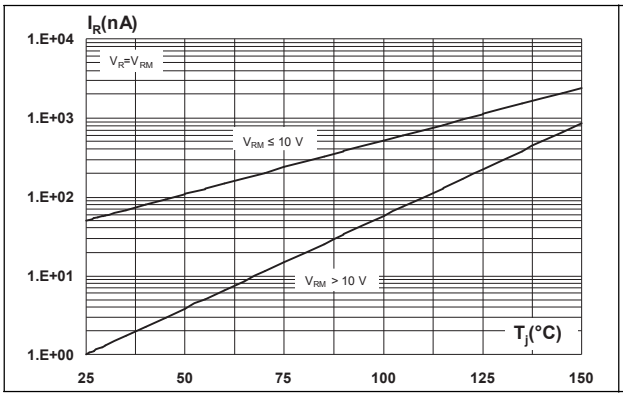
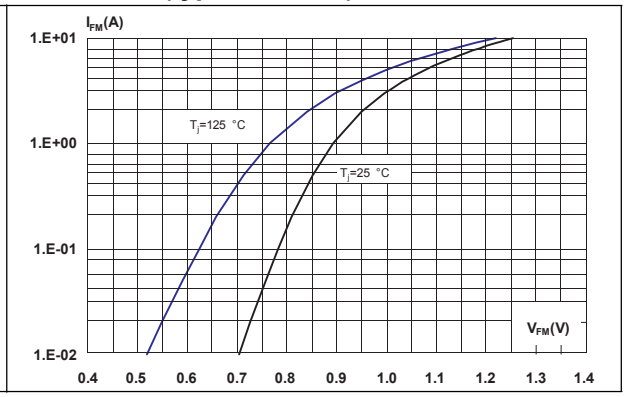


Figure 9 . Peak forward voltage drop versus peak forward current (typical values)



3 Packaging information

- Case: JEDEC DO-221AC molded plastic over planar junction
- Terminals: solder plated, solderable as per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy meets UL 94, V0
- RoHS package

DO-221AC (SMAF)