SMM4F12AVCL

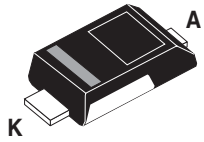
400 W low clamping voltage Transil™

Features

- Typical peak pulse power:
  - 400 W (10/1000 µs)
  - 2.4 kW (8/20 µs)
- Stand off voltage: 12 V
- Unidirectional type
- Low clamping factor
- Low leakage current:
  - 0.2 µA at 25 °C
  - 1 µA at 85 °C
- Operating T_j max: 175 °C
- High power capability at 85 °C: 385 W
- JEDEC registered package outline
- RoHS package
- Halogen free molding compound

Complies with the following standards

- IEC 61000-4-2 level 4:
  - 15 kV (air discharge)
  - 8 kV (contact discharge)
- MIL STD 883G-Method 3015-7: class3
  - 25 kV (human body model)



STmite flat
(DO222-AA)

Description

The SMM4F12AVCL Transil series has been designed to protect sensitive equipment against electro-static discharges according to IEC 61000-4-2, MIL STD 883 Method 3015, and electrical over stress such as IEC 61000-4-4 and 5. They are generally for surges below 400 W 10/1000 µs.

This planar technology makes it compatible with high-end equipment and SMPS where low leakage current and high junction temperature are required to provide reliability and stability over time. Their low clamping voltages provide a better safety margin to protect sensitive circuits with extended life time expectancy such as HDD power combo voltage regulators.

Packaged in STmite flat, this minimizes PCB space consumption (footprint in accordance with IPC 7531 standard).

TM: Transil is a trademark of STMicroelectronics

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage (IEC 61000-4-2 contact discharge)		30	kV
P_{PP}	Peak pulse power dissipation (1)	T_j initial = T_{amb}	400	W
P	Power dissipation on infinite heatsink	T_{amb} = 125 °C	2.5	W
T_{stg}	Storage temperature range		-65 to +175	°C
T_j	Operating junction temperature range		-55 to +175	°C
T_L	Maximum lead temperature for soldering during 10 s		260	°C

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

Table 2. Thermal resistances

Symbol	Parameter	Value	Unit
$R_{th(j-l)}$	Junction to leads	20	°C/W
$R_{th(j-a)}$	Junction to ambient on PCB with recommended pad layout	250	

Figure 1. Electrical characteristics - parameter 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

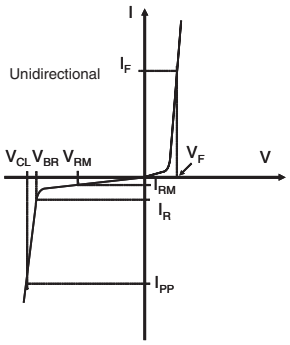


Figure 2. Definition of I_{PP} pulse

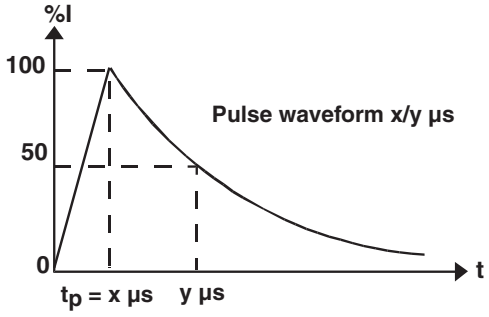


Table 3. Electrical characteristics - parameter values (T_{amb} = 25 °C)(1)

Type	I_{RM} max@V_{RM}			V_{BR} @I_R(2)				V_{CL} @I_{PP} 10/1000 µs		R_D(3) 10/1000 µs	V_{CL} @I_{PP} 8/20 µs		R_D(3) 8/20 µs	αT(4)
	25 °C	85 °C		min	typ	max		max			max			max
	µA		V	V			mA	V	A	Ω	V	A	Ω	10-4/°C
SMM4F12AVCL	0.2	1	12	13	13.5	14	1	14.3	1	0.3	22.9	100	0.09	8.3

1. Surge capability given for both directions
2. Pulse test: t_p <50ms.
3. To calculate maximum clamping voltage at other surge currents, use the following formula $V_{CLmax} = R_D \times I_{PP} + V_{BRmax}$
4. To calculate V_{BR} versus junction temperature, use the following formula: V_{BR} @ $T_j = V_{BR}$ @ 25 °C x (1 + αT x (T_j - 25))

Figure 3. Peak power dissipation versus initial junction temperature

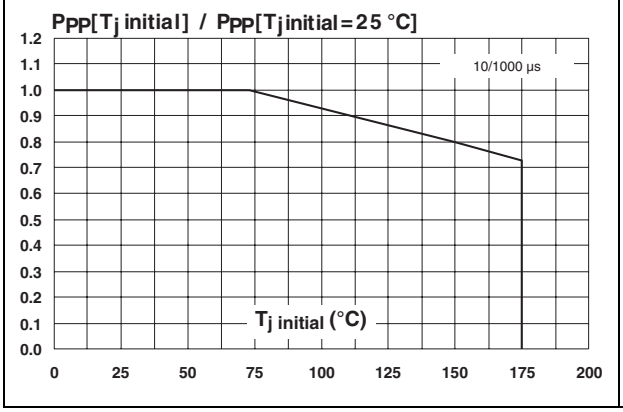


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

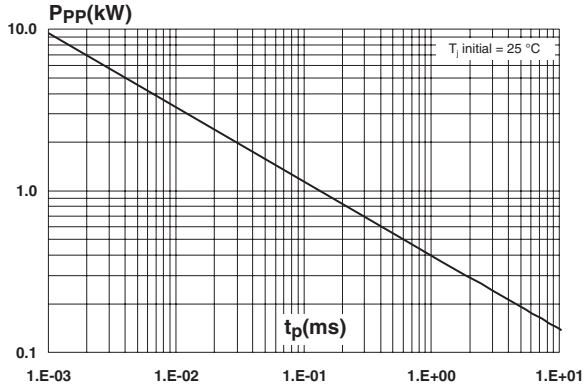


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

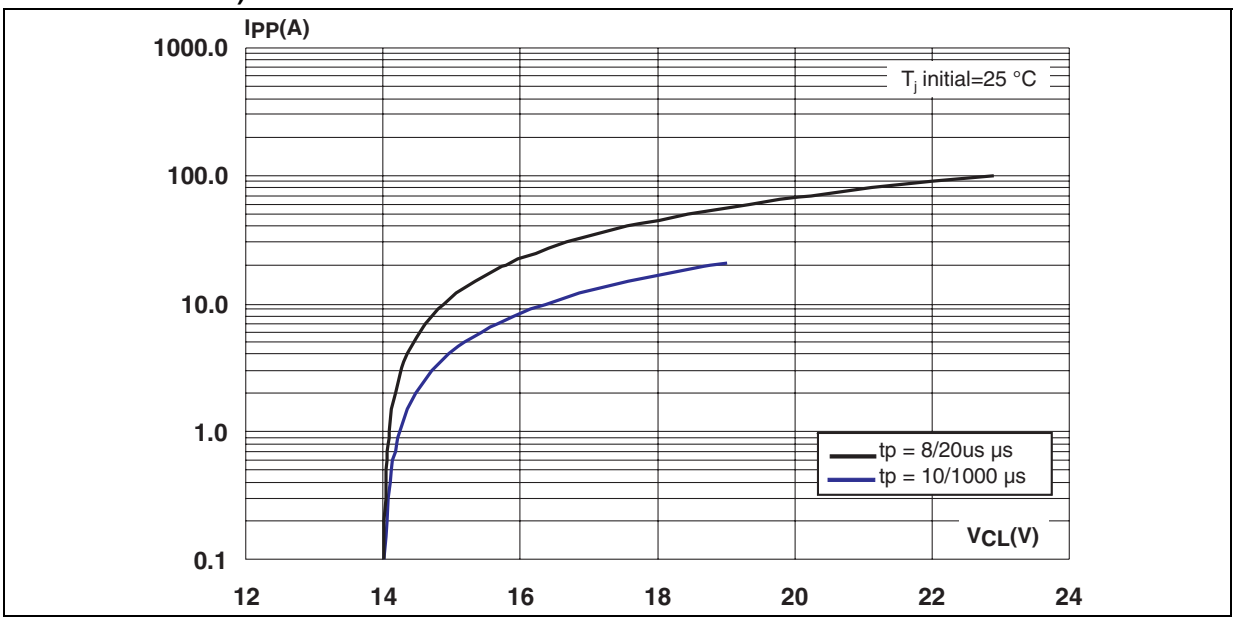


Figure 6. Relative variation of thermal impedance junction to ambient versus pulse duration

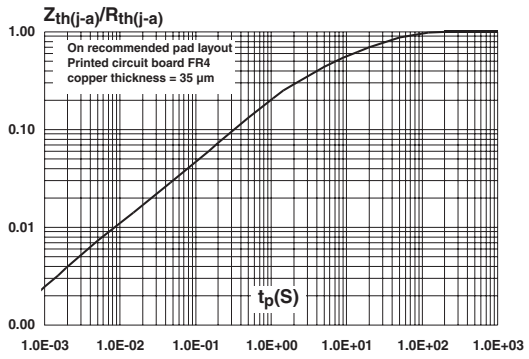
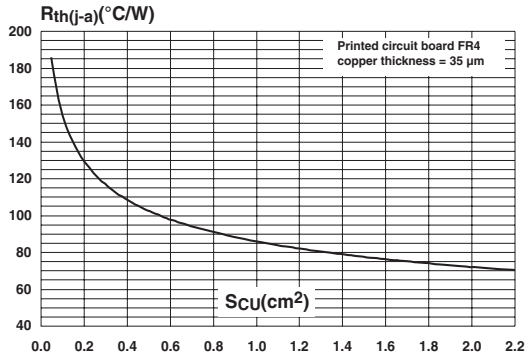
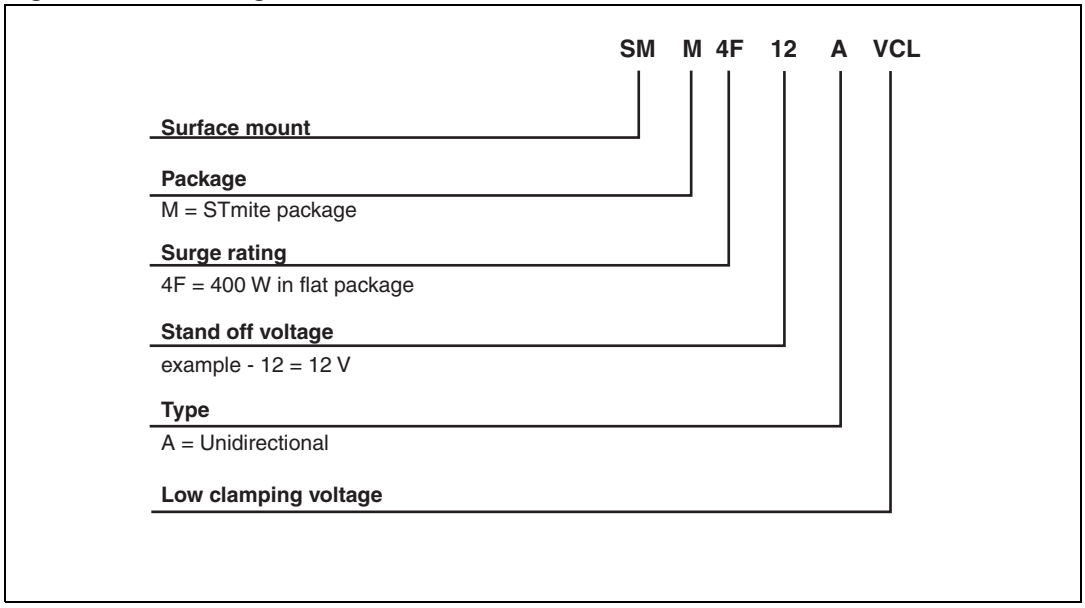


Figure 7. Thermal resistance junction to ambient versus copper surface under each lead



2 Ordering information scheme

Figure 8. Ordering information scheme

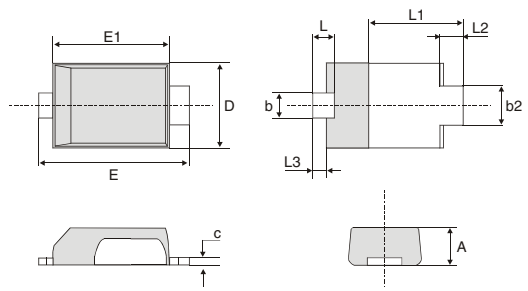


3 Package information

- Case: JEDEC DO-222AA molded plastic over Planar junction
- Terminals: Solder plated, solderable per MIL-STD-750, Method 2026
- Polarity: The band indicates cathode.
- Flammability: Epoxy meets UL94V-0
- RoHS package

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK® packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: *www.st.com*. ECOPACK® is an ST trademark.

Table 4. STmite flat dimensions



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80	0.85	0.95	0.031	0.033	0.037
b	0.40	0.55	0.65	0.016	0.022	0.026
b2	0.70	0.85	1.00	0.027	0.033	0.039
c	0.10	0.15	0.25	0.004	0.006	0.009
D	1.75	1.90	2.05	0.069	0.075	0.081
E	3.60	3.80	3.90	0.142	0.150	0.154
E1	2.80	2.95	3.10	0.110	0.116	0.122
L	0.50	0.55	0.80	0.020	0.022	0.031
L1	2.10	2.40	2.60	0.083	0.094	0.102
L2	0.45	0.60	0.75	0.018	0.024	0.030
L3	0.20	0.35	0.50	0.008	0.014	0.020

Figure 9. STmite flat footprint dimensions

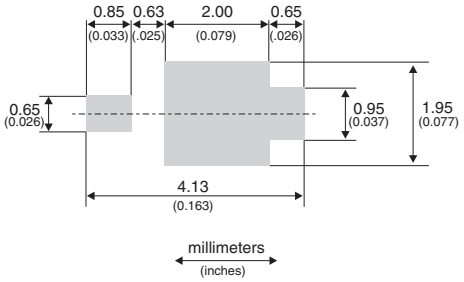
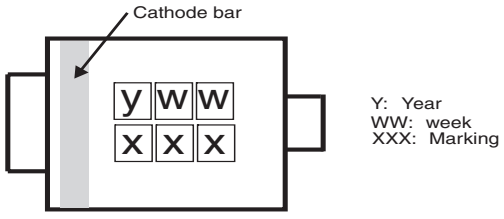


Figure 10. Marking information



4 Ordering information

Table 5. Ordering information

Order code	Marking	Package	Weight	Base qty	Delivery mode
SMM4F12AVCL	4UL	STmite flat	16.7 mg	12000	Tape and reel

5 Revision history

Table 6. Document revision history

Date	Revision	Changes
13-Sep-2011	1	First issue.

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