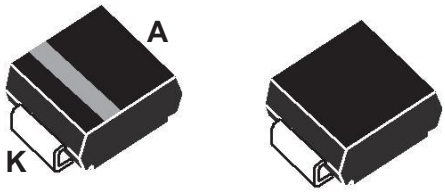
ASIM

SMD50J

Automotive 5000 W

Datasheet – production data

- 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



Unidirectional **Bidirectional**

SMD

Description

The SMD50J series has been designed to protect automotive sensitive circuits against surges defined in ISO 7637-2 and against electrostatic discharges according to ISO 10605.

The Planar technology makes it compatible with high -end circuits where low leakage current and high junction temperature are required to provide reliability and stability over time. The SMD50J devices are packaged in SMD (SMD footprint in accordance with IPC 7531 standard).

Features

- Peak pulse power:
  - 5000 W (10/1000 µs)
  - Up to 28 kW (8/20 µs)
- Stand off voltage range: from 22 V to 170 V
- Unidirectional and bidirectional types
- Operating $T_{j\ max}$: 150 °C
- High power capability at T_{jmax}:
  – 5000 W (10/1000 µs)
- SMD50J registered package outline
- Resin meets UL 94, V0

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)

1 Characteristics

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

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	ISO10605 (C = 330 pF, R = 330 Ω) contact discharge air discharge IEC 61000-4-2 /ISO10605 (C = 150 pF, R = 330 Ω) contact discharge air discharge	 30 30 30 30	kV
P_{PP}	Peak pulse power dissipation(1)	$T_{j\ initial} = T_{amb}$	5000	W
T_{stg}	Storage temperature range		-65 to + 150	°C
T_j	Operating junction temperature range		-55 to + 150	°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.

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

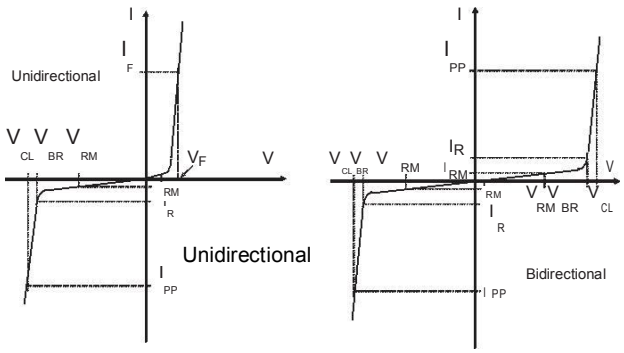


Figure 2. Pulse definition for electrical characteristics

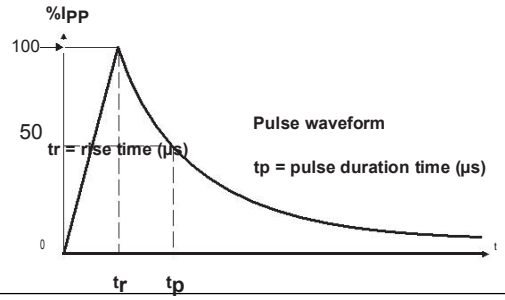


Table 2. Electrical characteristics, parameter values (T_{amb} = 25 °C)

Part Number (Uni)	Reverse Stand off Voltage V_R (Volts)	Breakdown Voltage V_{BR} (Volts) @ I_T		Test Current I_T (mA)	Maximum Clamping Voltage V_C @ I_{PP} (V)	Maximum Peak Pulse Current I_{PP} (A)	Maximum Reverse Leakage I_R @V_R (uA)
		MIN	MAX				
SMD50J22V/B	22.0	24.40	26.90	1	35.5	141.00	5
SMD50J24V/B	24.0	26.70	29.50	1	38.9	129.00	5
SMD50J26V/B	26.0	28.90	31.90	1	42.1	119.00	5
SMD50J28V/B	28.0	31.10	34.40	1	45.4	110.00	5
SMD50J30V/B	30.0	33.30	36.80	1	48.4	103.00	5
SMD50J33V/B	33.0	36.70	40.60	1	53.3	93.90	5
SMD50J36V/B	36.0	40.00	44.20	1	58.1	86.10	5
SMD50J40V/B	40.0	44.40	49.10	1	64.5	77.60	5
SMD50J43V/B	43.0	47.80	52.80	1	69.4	72.10	5
SMD50J45V/B	45.0	50.00	55.30	1	72.7	68.80	5
SMD50J48V/B	48.0	53.30	58.90	1	77.4	64.70	5
SMD50J51V/B	51.0	56.70	62.70	1	82.4	60.70	5
SMD50J54V/B	54.0	60.00	66.30	1	87.1	57.50	5
SMD50J58V/B	58.0	64.40	71.20	1	93.6	53.50	5
SMD50J60V/B	60.0	66.70	73.70	1	96.8	51.70	5
SMD50J64V/B	64.0	71.10	78.60	1	103.0	48.60	5
SMD50J70V/B	70.0	77.80	86.00	1	113.0	44.30	5
SMD50J75V/B	75.0	83.30	92.10	1	121.0	41.40	5
SMD50J78V/B	78.0	86.70	95.80	1	126.0	39.70	5
SMD50J85V/B	85.0	94.40	104.00	1	137.0	36.50	5
SMD50J90V/B	90.0	100.00	111.00	1	146.0	34.30	5
SMD50J100V/B	100.0	111.00	123.00	1	162.0	30.90	5
SMD50J110V/B	110.0	122.00	135.00	1	177.0	28.30	5
SMD50J120V/B	120.0	133.00	147.00	1	193.0	26.00	5
SMD50J130V/B	130.0	144.00	159.00	1	209.0	24.00	5
SMD50J150V/B	150.0	167.00	185.00	1	243.0	20.60	5
SMD50J160V/B	160.0	178.00	197.00	1	259.0	19.30	5
SMD50J170V/B	170.0	189.00	209.00	1	275.0	18.20	5

1. Pulse test: t_p < 50 ms
2. To calculate maximum clamping voltage at other surge level, use the following formula: $V_{CL}max = V_{CL} - R_D \times (I_{PP} - I_{PPappli})$ 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} at $T_J = V_{BR}$ at 25 °C x (1 + T x (T_J - 25))

V_{CL} at $T_J = V_{CL}$ at 25 °C x (1 + T x (T_J - 25))

4. Surge capability given for both directions for unidirectional and bidirectional types.

Figure 3. Peak pulse power dissipation versus initial junction temperature (typical value)

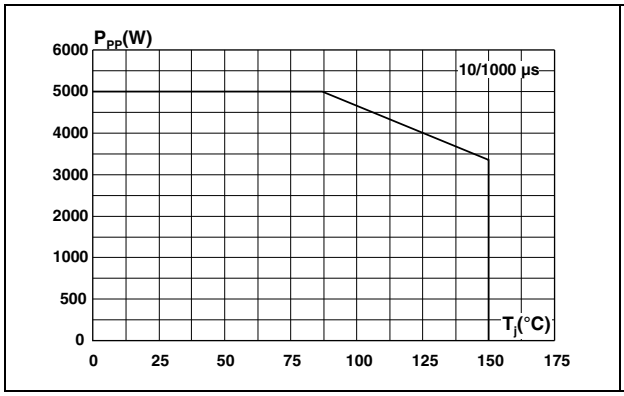


Figure 4. Peak pulse power versus exponential pulse duration (T_j initial = 25 °C)

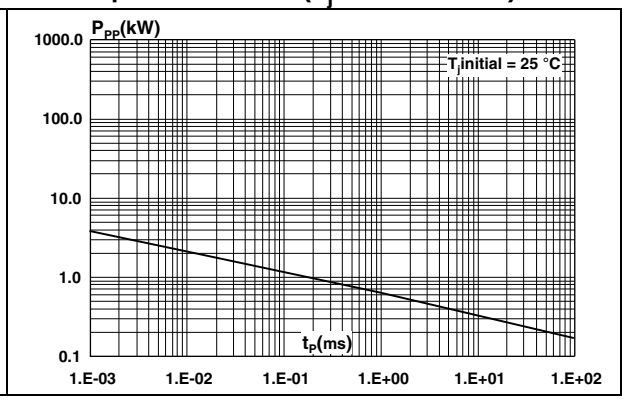


Figure 5. Clamping voltage versus peak pulse current (exponential waveform, maximum values)

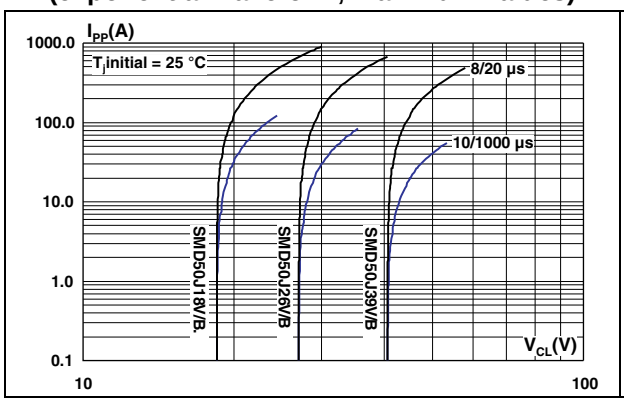


Figure 6. Junction capacitance versus reverse applied voltage for unidirectiona types (typical values)

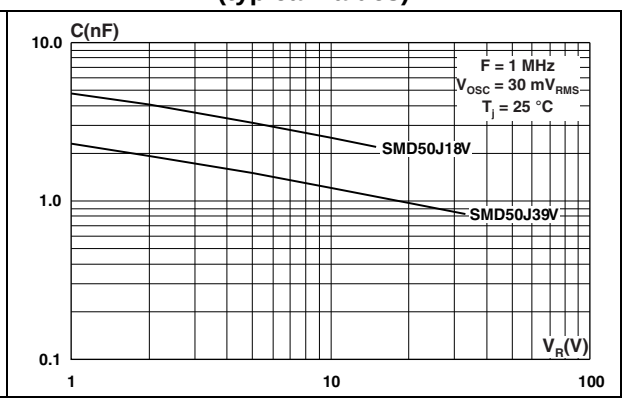


Figure 7. Junction capacitance versus reverse applied voltage for bidirectional types (typical values)

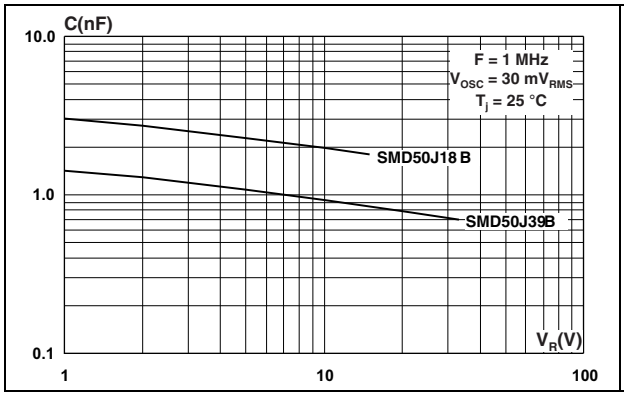


Figure 8. Leakage current versus junction temperature (typical values)

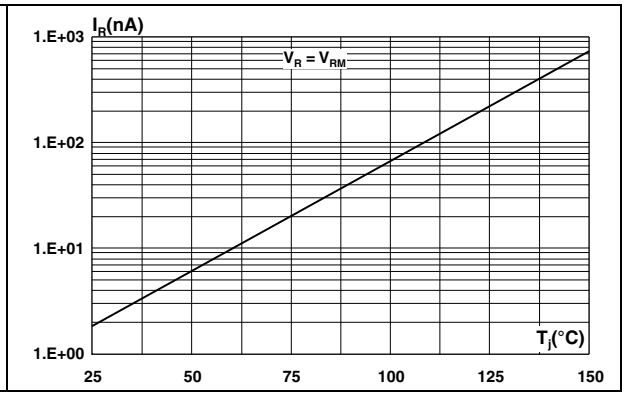


Figure 9. Peak forward voltage drop versus peak forward current (typical values)

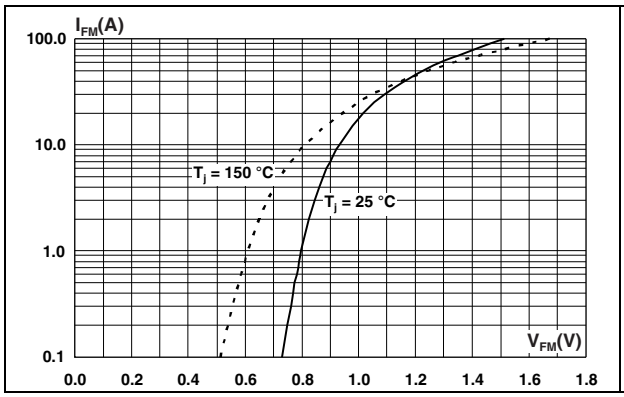


Figure 10. Relative variation of thermal impedance, junction to ambient, versus pulse duration

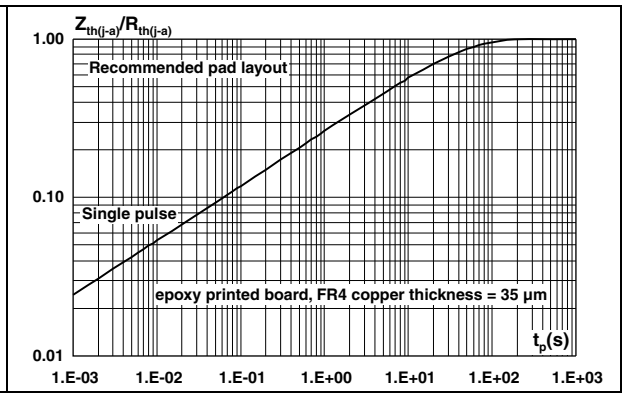
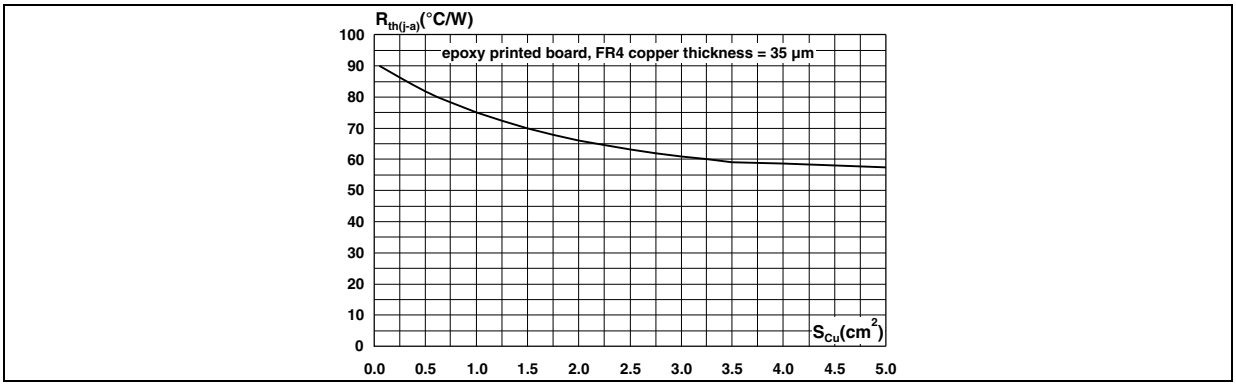


Figure 11. Thermal resistance junction to ambient versus copper surface under each lead



2 Package information

- Case: SMD50J DO-214AB 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 is rated UL 94, V0
- RoHS package

Figure 12. IPAK dimension definitions

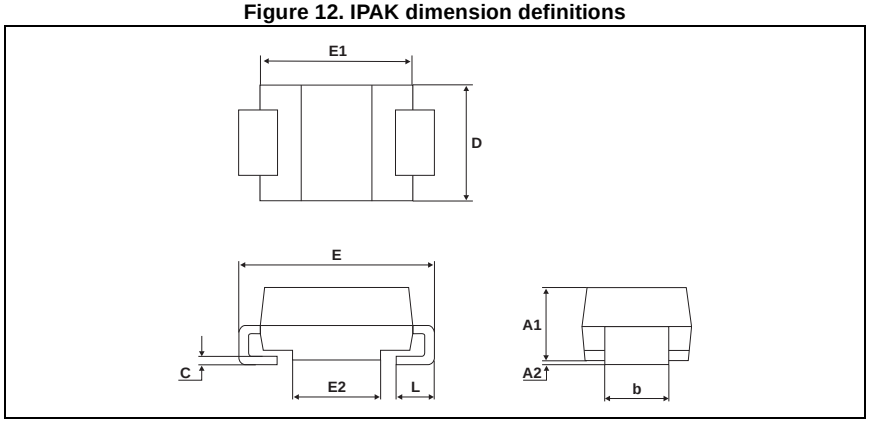
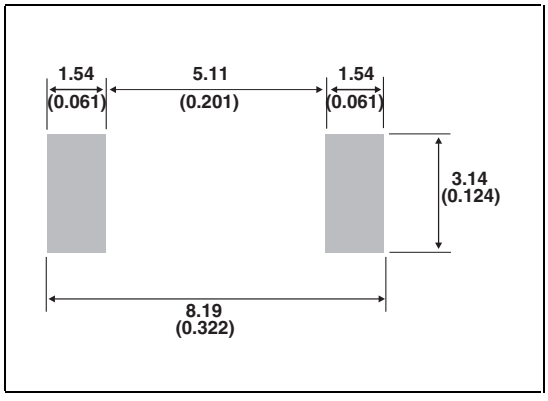


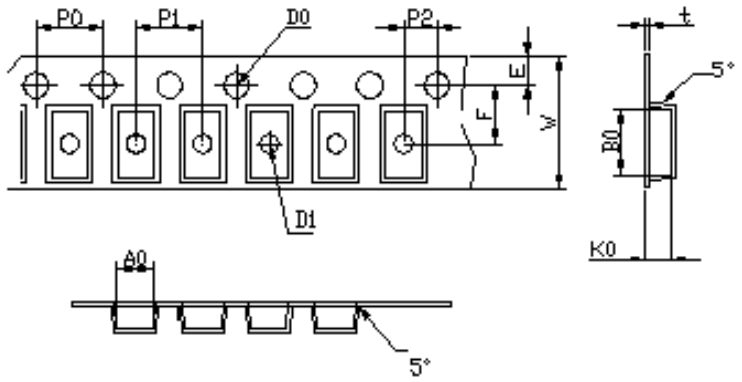
Table 3. SMD dimension values

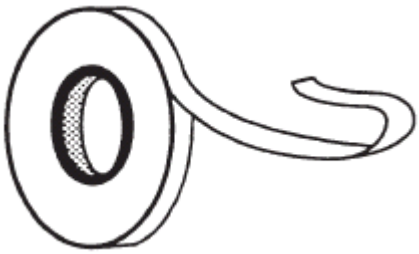
Ref.	Dimensions			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A1	1.90	2.45	0.075	0.096
A2	0.05	0.20	0.002	0.008
b	2.90	3.20	0.114	0.126
c	0.15	0.40	0.006	0.016
D	5.55	6.25	0.218	0.246
E	7.75	8.15	0.305	0.321
E1	6.60	7.15	0.260	0.281
E2	4.40	4.70	0.173	0.185
L	0.75	1.50	0.030	0.059

Figure 17. SMD footprint dimensions in mm (inches)



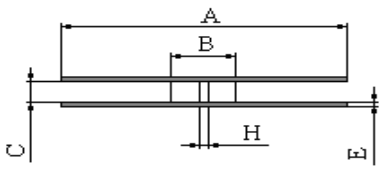
3 Packing Specification For Finished Products

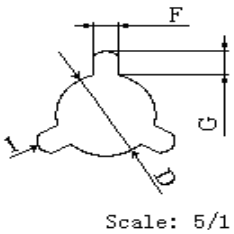




STRIP

category / size (mm)	SMD
W	16.00±0.30
E	1.75±0.10
F	7.50±0.05
D0	1.50±0.10
D1	1.50±0.10
P0	4.00±0.10
P1	8.00±0.10
P2	2.00±0.05
*A0	6.05±0.10
*B0	8.31±0.10
K0	2.54±0.10
*t	0.25±0.10





Scale: 5/1

Disk Szie

project	SMD
A(mm)	178.0±1.0
B(mm)	54.0±1.0
C(mm)	16.5±0.5
D(mm)	13.5±0.5
E(mm)	1.35±1.0
F(mm)	> 2.3
G(mm)	> 4.5
H(mm)	> 2.8
I(mm)	
J(mm)	> 5

4 Recommended Soldering Conditions

Recommended Conditions

Re"ow Condition		Pb-Free assembly (see Fig.1)
Pre Heat	-Temperature Min($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time(Min to Max)(t_s)	60-180secs
Average ramp up rate (Liquidus Temp(T_L) to peak)		3℃/sec.Max.
$T_{s(max)}$ to T_L -Ramp-up Rate		3℃/sec.Max.
Re"ow	-Temperature(T_L)(Liquidus)	+217℃
	-Temperature(t_L)	60-150secs
Peak Temp(T_P)		+260(+0/-5)℃
Time within 5℃ of actual Peak Temp(t_P)		30 secs.Max.
Ramp-down Rate		6℃/sec.Max.
Time 25℃ to Peak Temp(T_P)		8 min.Max.
Do not exceed		+260℃

Reflow Soldering