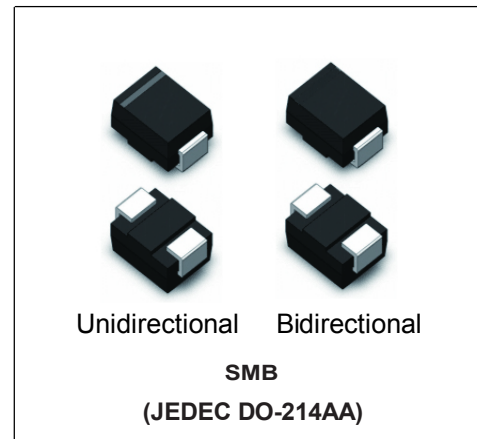


Automotive 600 W

Features

- Peak pulse power:
 - 600 W (10/1000 μ s)
 - 4 kW (8/20 μ s)
- Stand off voltage range: from 5 V to 188 V
- Unidirectional and bidirectional types
- Low leakage current:
 - 0.2 μ A at 25 °C
 - 1 μ A at 85 °C
- Operating $T_{j,max}$: 150 °C
- 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)
- 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 SMB06J 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. SMB06J are packaged in SMB (SMB footprint in accordance with IPC 7531 standard).

Characteristics

Table 1. Absolute maximum ratings ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

Symbol	Parameter		Value	Unit
V_{PP}	Peak pulse voltage	ISO 10605 (C = 330 pF, R = 330 Ω):		
		Contact discharge	30	kV
		Air discharge	30	
		ISO 10605 (C = 150 pF, R = 330 Ω):		
Contact discharge	30			
	Air discharge	30		
P_{PP}	Peak pulse power dissipation ⁽¹⁾	T_j initial = T_{amb}	600	W
T_j	Operating junction temperature range		-40 to 150	$^{\circ}\text{C}$
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

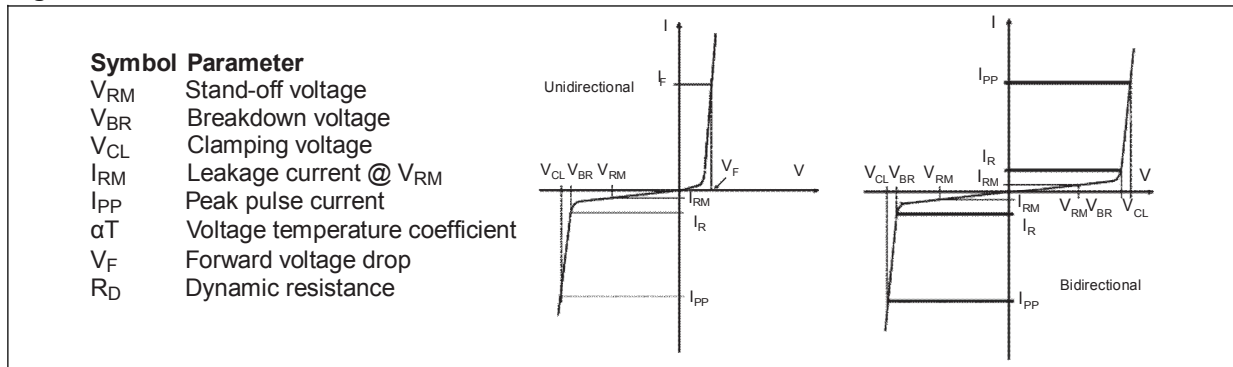


Figure 2. Pulse definition for electrical characteristics

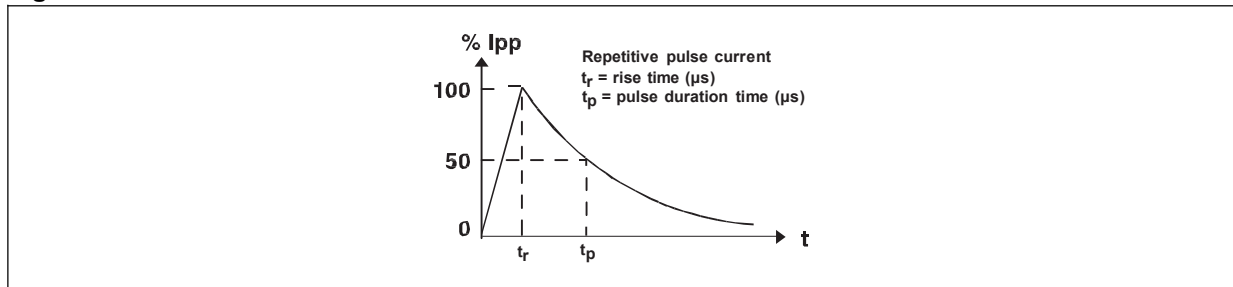


Table 2. Electrical characteristics, parameter values ($T_{amb} = 25\text{ }^{\circ}\text{C}$)

Part Number		Device Marking Code		Reverse Stand-off Voltage	Breakdown Voltage Min.@Ir	Breakdown Voltage Max.@Ir	Test Current	Maximum Clamping Voltage @I _{PP}	Peak Pulse Current	Reverse Leakage @V _{RW M}
UNI	BI	UNI	BI	V _{RW M} (V)	V _{BR} (V)	V _{BR} (V)	I _r (mA)	V _c (V)	I _{PP} (A)	I _R (μ A)
SMB06J05V	SMB06J05B	KE	AE	5.0	6.40	7.00	10	9.2	65.3	800
SMB06J06V	SMB06J06B	KG	AG	6.0	6.67	7.37	10	10.3	58.3	800
SMB06J6V5V	SMB06J6V5B	KK	AK	6.5	7.22	7.98	10	11.2	53.6	500
SMB06J07V	SMB06J07B	KM	AM	7.0	7.78	8.60	10	12.0	50.0	200
SMB06J7V5V	SMB06J7V5B	KP	AP	7.5	8.33	9.21	1	12.9	46.6	100
SMB06J08V	SMB06J08B	KR	AR	8.0	8.89	9.83	1	13.6	44.2	50
SMB06J8V5V	SMB06J8V5B	KT	AT	8.5	9.44	10.40	1	14.4	41.7	20
SMB06J09V	SMB06J09B	KV	AV	9.0	10.00	11.10	1	15.4	39.0	10
SMB06J10V	SMB06J10B	KX	AX	10.0	11.10	12.30	1	17.0	35.3	5
SMB06J11V	SMB06J11B	KZ	AZ	11.0	12.20	13.50	1	18.2	33.0	1
SMB06J12V	SMB06J12B	LE	BE	12.0	13.30	14.70	1	19.9	30.2	1
SMB06J13V	SMB06J13B	LG	BG	13.0	14.40	15.90	1	21.5	28.0	1
SMB06J14V	SMB06J14B	LK	BK	14.0	15.60	17.20	1	23.2	25.9	1
SMB06J15V	SMB06J15B	LM	BM	15.0	16.70	18.50	1	24.4	24.6	1
SMB06J16V	SMB06J16B	LP	BP	16.0	17.80	19.70	1	26.0	23.1	1
SMB06J17V	SMB06J17B	LR	BR	17.0	18.90	20.90	1	27.6	21.8	1
SMB06J18V	SMB06J18B	LT	BT	18.0	20.00	22.10	1	29.2	20.6	1
SMB06J20V	SMB06J20B	LV	BV	20.0	22.20	24.50	1	32.4	18.6	1
SMB06J22V	SMB06J22B	LX	BX	22.0	24.40	26.90	1	35.5	16.9	1
SMB06J24V	SMB06J24B	LZ	BZ	24.0	26.70	29.50	1	38.9	15.5	1
SMB06J26V	SMB06J26B	ME	CE	26.0	28.90	31.90	1	42.1	14.3	1
SMB06J28V	SMB06J28B	MG	CG	28.0	31.10	34.40	1	45.4	13.3	1
SMB06J30V	SMB06J30B	MK	CK	30.0	33.30	36.80	1	48.4	12.4	1
SMB06J33V	SMB06J33B	MM	CM	33.0	36.70	40.60	1	53.3	11.3	1
SMB06J36V	SMB06J36B	MP	CP	36.0	40.00	44.20	1	58.1	10.4	1
SMB06J40V	SMB06J40B	MR	CR	40.0	44.40	49.10	1	64.5	9.3	1
SMB06J43V	SMB06J43B	MT	CT	43.0	47.80	52.80	1	69.4	8.7	1
SMB06J45V	SMB06J45B	MV	CV	45.0	50.00	55.30	1	72.7	8.3	1
SMB06J48V	SMB06J48B	MX	CX	48.0	53.30	58.90	1	77.4	7.8	1
SMB06J51V	SMB06J51B	MZ	CZ	51.0	56.70	62.70	1	82.4	7.3	1
SMB06J54V	SMB06J54B	NE	DE	54.0	60.00	66.30	1	87.1	6.9	1
SMB06J58V	SMB06J58B	NG	DG	58	64.40	71.20	1	93.6	6.5	1

Part Number		Device Marking Code		Reverse Stand-off Voltage	Breakdown Voltage Min.@Ir	Breakdown Voltage Max.@Ir	Test Current	Maximum Clamping Voltage @I _{PP}	Peak Pulse Current	Reverse Leakage @V _{RM}
UNI	BI	UNI	BI	V _{RM} (V)	V _{BR} (V)	V _{BR} (V)	I _T (mA)	V _C (V)	I _{PP} (A)	I _R (uA)
SMB06J60V	SMB06J60B	NK	DK	60	66.70	73.70	1	96.8	6.2	1
SMB06J64V	SMB06J64B	NM	DM	64	71.10	78.60	1	103.0	5.9	1
SMB06J70V	SMB06J70B	NP	DP	70	77.80	86.00	1	113.0	5.3	1
SMB06J75V	SMB06J75B	NR	DR	75	83.30	92.10	1	121.0	5.0	1
SMB06J78V	SMB06J78B	NT	DT	78	86.70	95.80	1	126.0	4.8	1
SMB06J85V	SMB06J85B	NV	DV	85	94.40	104.00	1	137.0	4.4	1
SMB06J90V	SMB06J90B	NX	DX	90	100.00	111.00	1	146.0	4.1	1
SMB06J100V	SMB06J100B	NZ	DZ	100	111.00	123.00	1	162.0	3.7	1
SMB06J110V	SMB06J110B	PE	EE	110	122.00	135.00	1	177.0	3.4	1
SMB06J120V	SMB06J120B	PG	EG	120	133.00	147.00	1	193.0	3.1	1
SMB06J130V	SMB06J130B	PK	EK	130	144.00	159.00	1	209.0	2.9	1
SMB06J150V	SMB06J150B	PM	EM	150	167.00	185.00	1	243.0	2.5	1
SMB06J160V	SMB06J160B	PP	EP	160	178.00	197.00	1	259.0	2.3	1
SMB06J170V	SMB06J170B	PR	ER	170	189.00	209.00	1	275.0	2.2	1
SMB06J180V	SMB06J180B	PT	ET	180	201.00	222.00	1	292.0	2.1	1
SMB06J200V	SMB06J200B	PV	EV	200	224.00	247.00	1	324.0	1.9	1
SMB06J220V	SMB06J220B	PX	EX	220	246.00	272.00	1	356.0	1.7	1
SMB06J250V	SMB06J250B	PZ	EZ	250	279.00	309.00	1	405.0	1.5	1
SMB06J300V	SMB06J300B	QE	FE	300	335.00	371.00	1	486.0	1.3	1
SMB06J350V	SMB06J350B	QG	FG	350	391.00	432.00	1	567.0	1.1	1
SMB06J400V	SMB06J400B	QK	FK	400	447.00	494.00	1	648.0	0.9	1
SMB06J440V	SMB06J440B	QM	FM	440	492.00	543.00	1	713.0	0.9	1

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:
 $V_{BR} @ T_J = V_{BR} @ 25^\circ C \times (1 + \alpha T \times (T_J - 25))$
 $V_{CL} @ T_J = V_{CL} @ 25^\circ C \times (1 + \alpha T \times (T_J - 25))$
4. Surge capability given for both directions for unidirectional and bidirectional types.

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

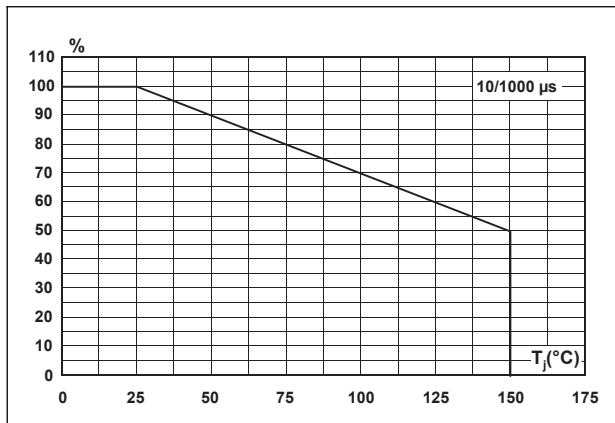


Figure 4. Peak pulse power versus exponential pulse duration

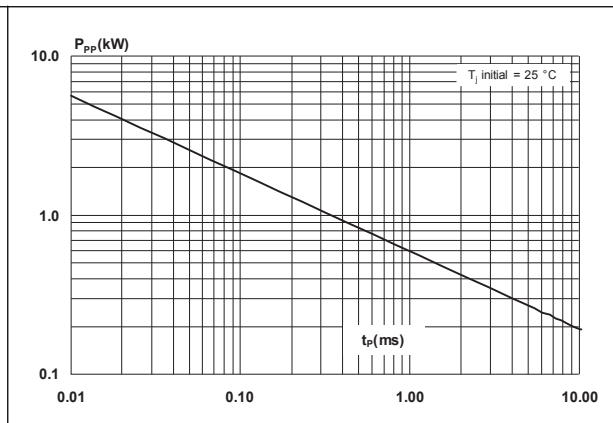


Figure 5. Clamping voltage versus peak pulse current exponential waveform (maximum values)

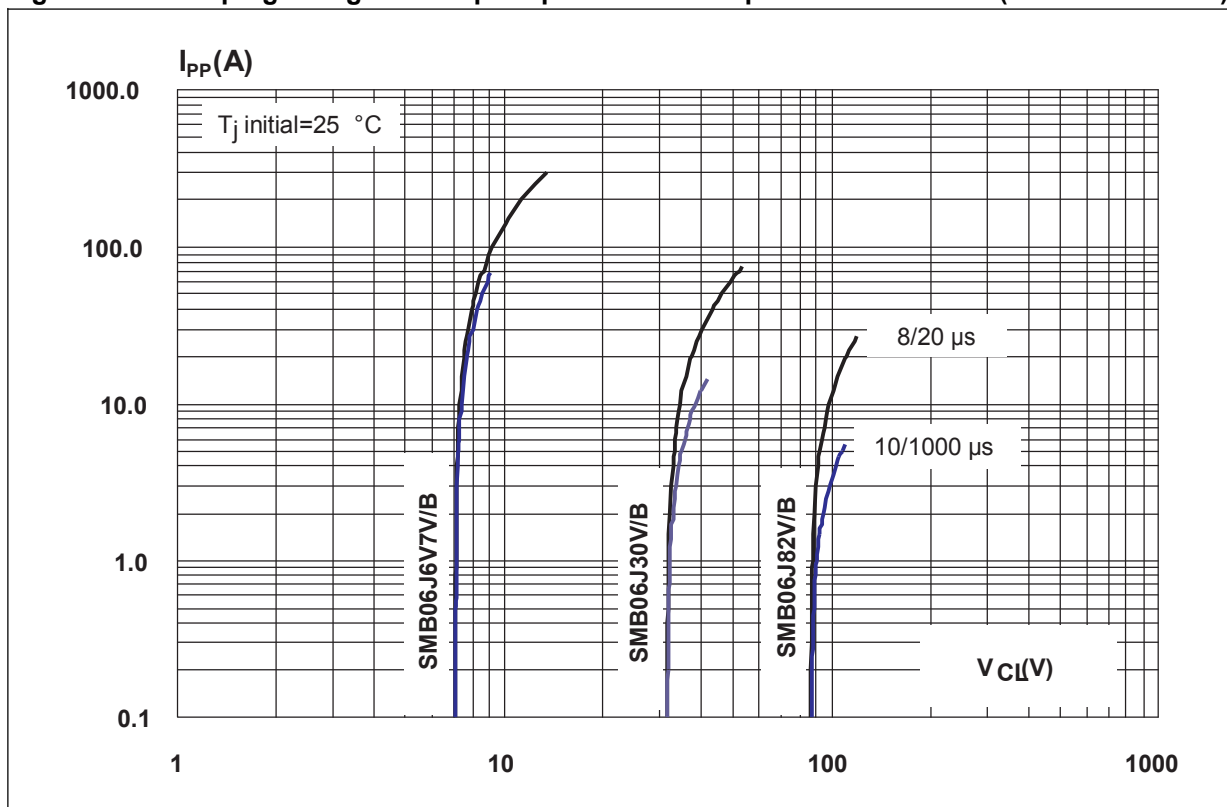


Figure 6. ISO 7637-2 pulse 1 response ($V_S = -100\text{ V}$)

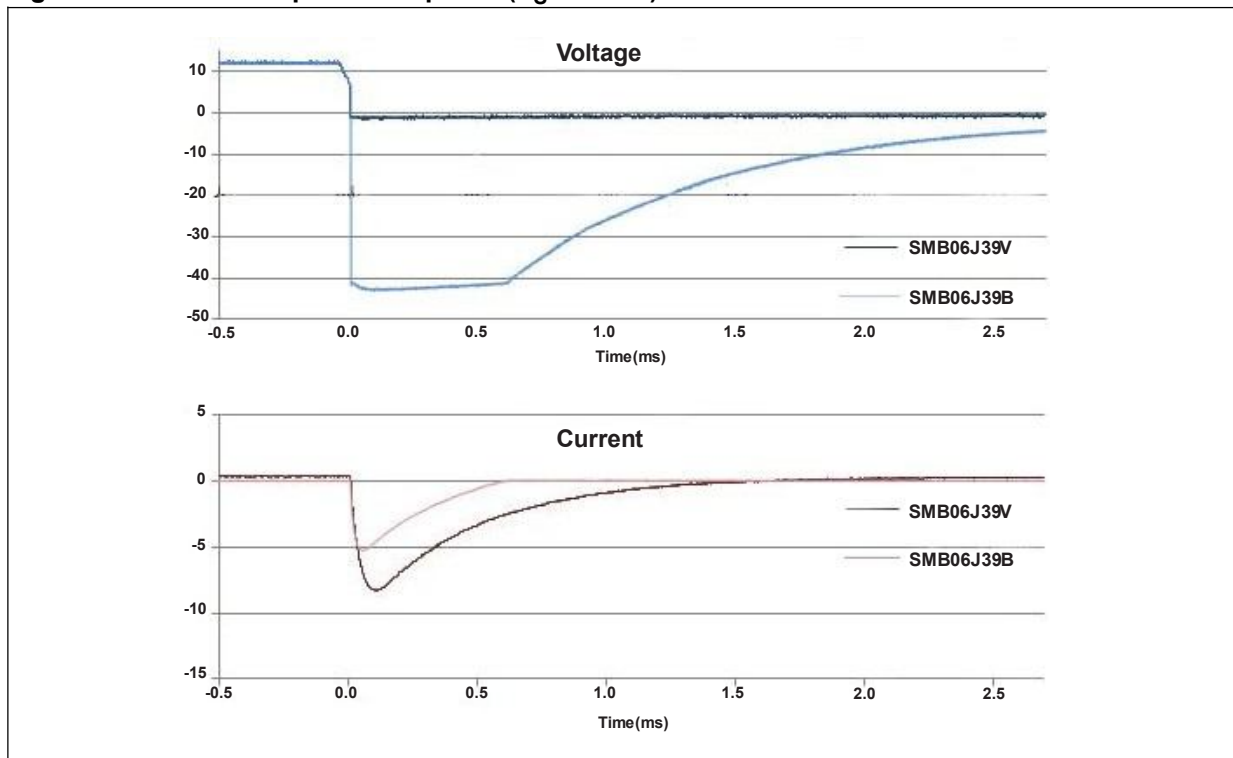


Figure 7. ISO 7637-2 pulse 2a response ($V_S = 50\text{ V}$)

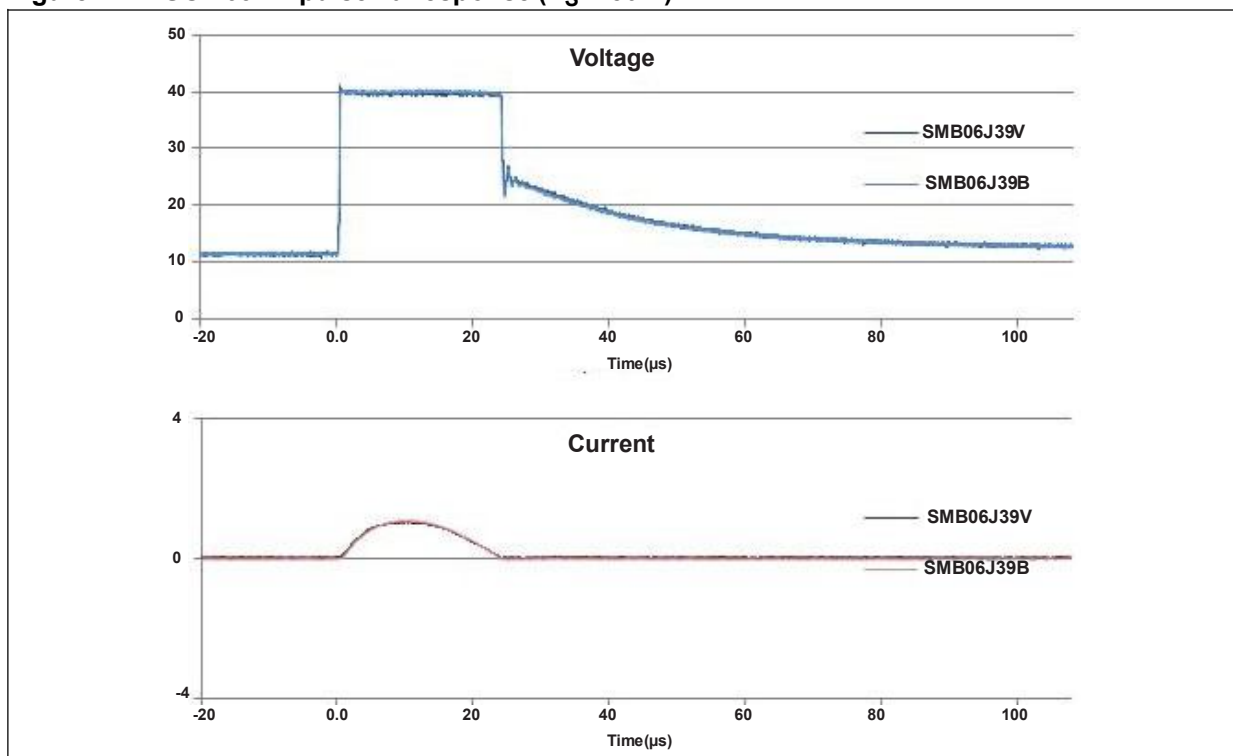


Figure 8. ISO 7637-2 pulse 3a response ($V_S = -150\text{ V}$)

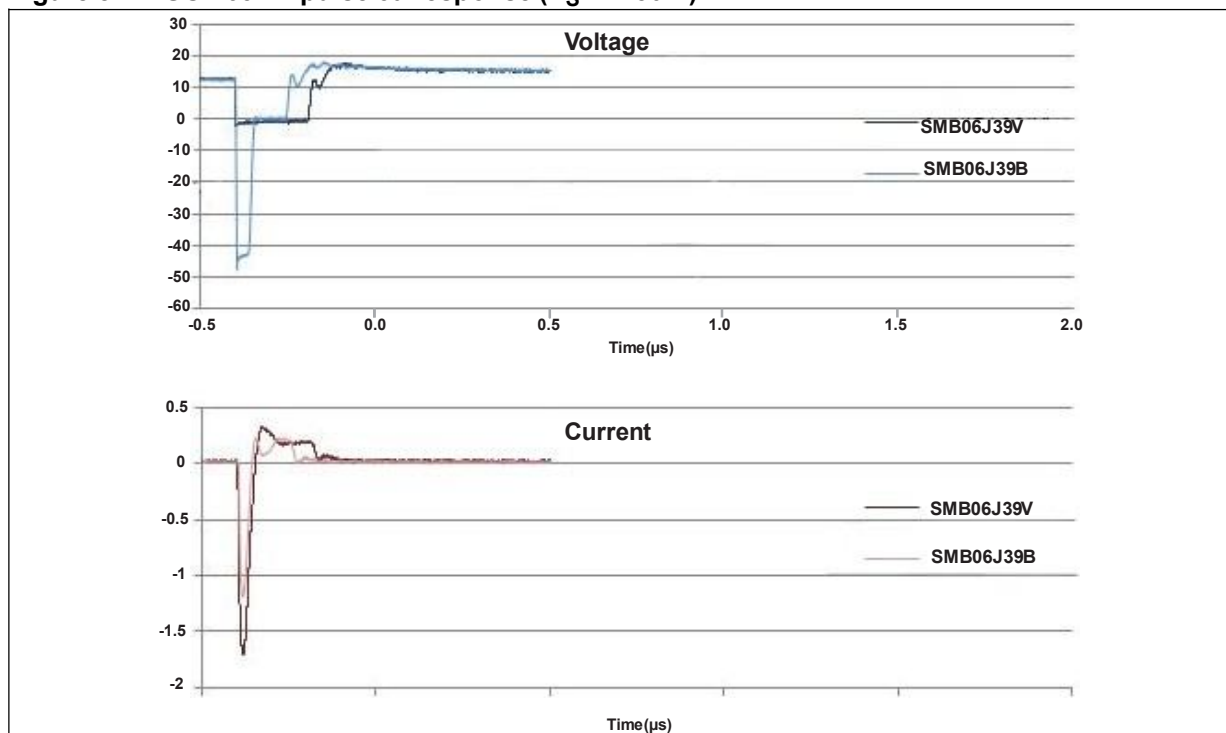
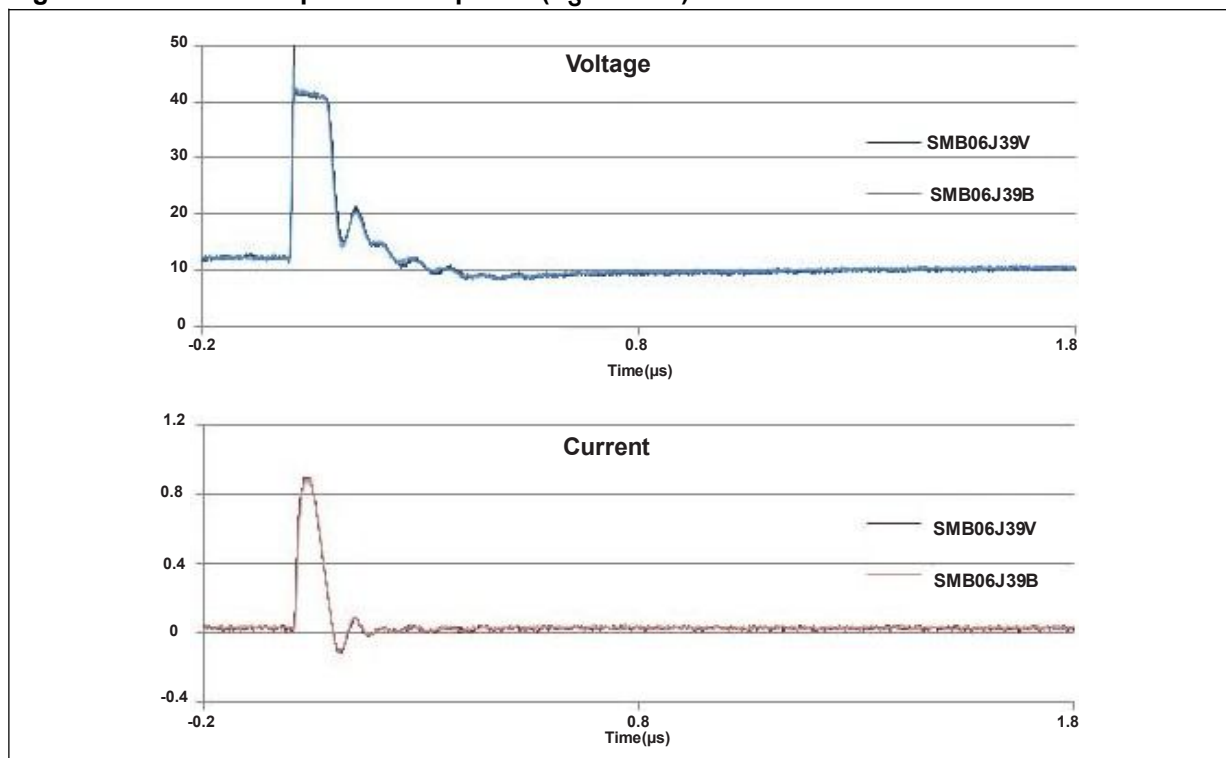


Figure 9. ISO 7637-2 pulse 3b response ($V_S = 100\text{ V}$)



Note: ISO7637-2 pulses responses are not applicable for products with a stand off voltage lower than the average battery voltage (13.5 V).

Figure 10. Junction capacitance versus reverse applied voltage for unidirectional types (typical values)

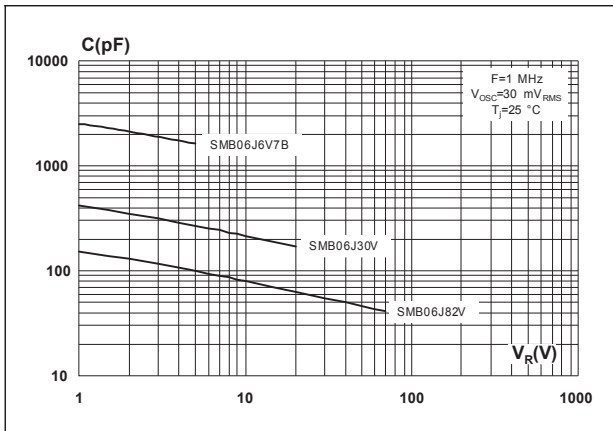


Figure 11. Junction capacitance versus reverse applied voltage for bidirectional types (typical values)

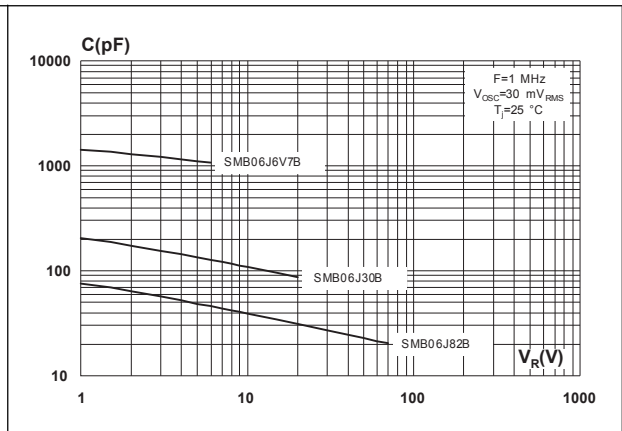


Figure 12. Relative variation of thermal impedance, junction to ambient, versus pulse duration

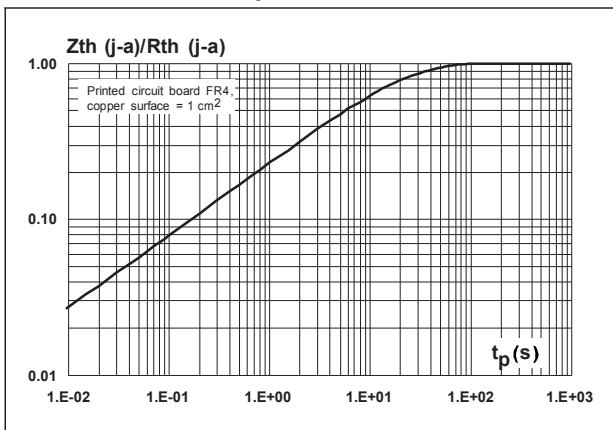


Figure 13. Thermal resistance junction to ambient versus copper surface under each lead

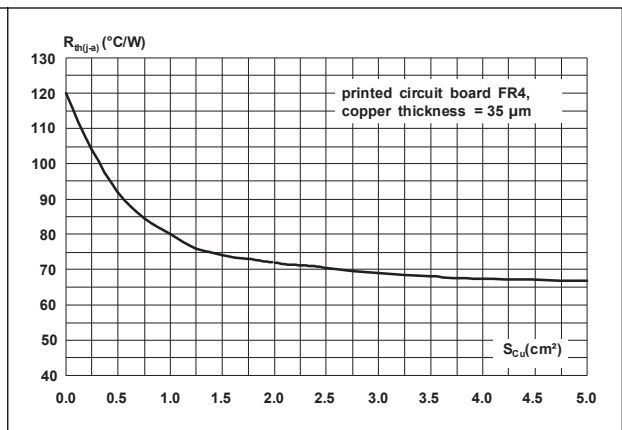


Figure 14. Leakage current versus junction temperature (typical values)

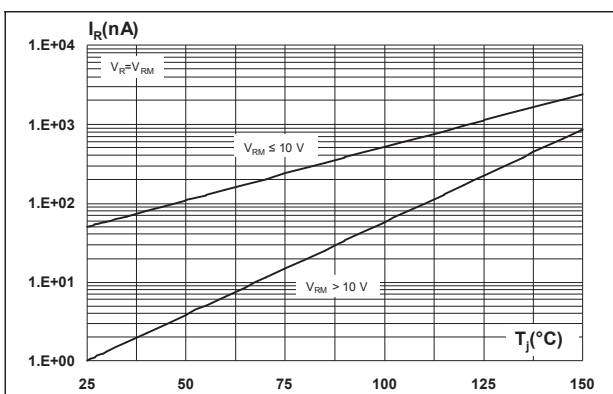
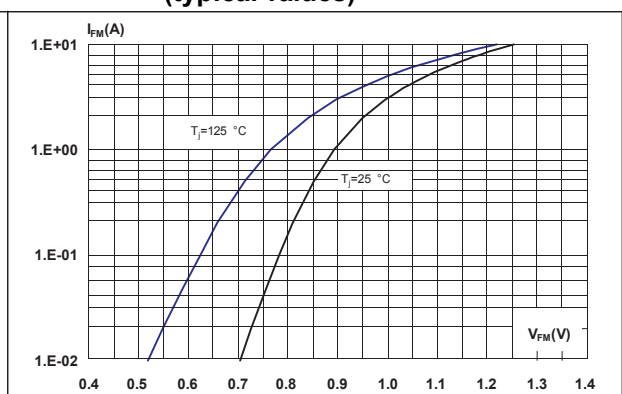


Figure 15. Peak forward voltage drop versus peak forward current (typical values)

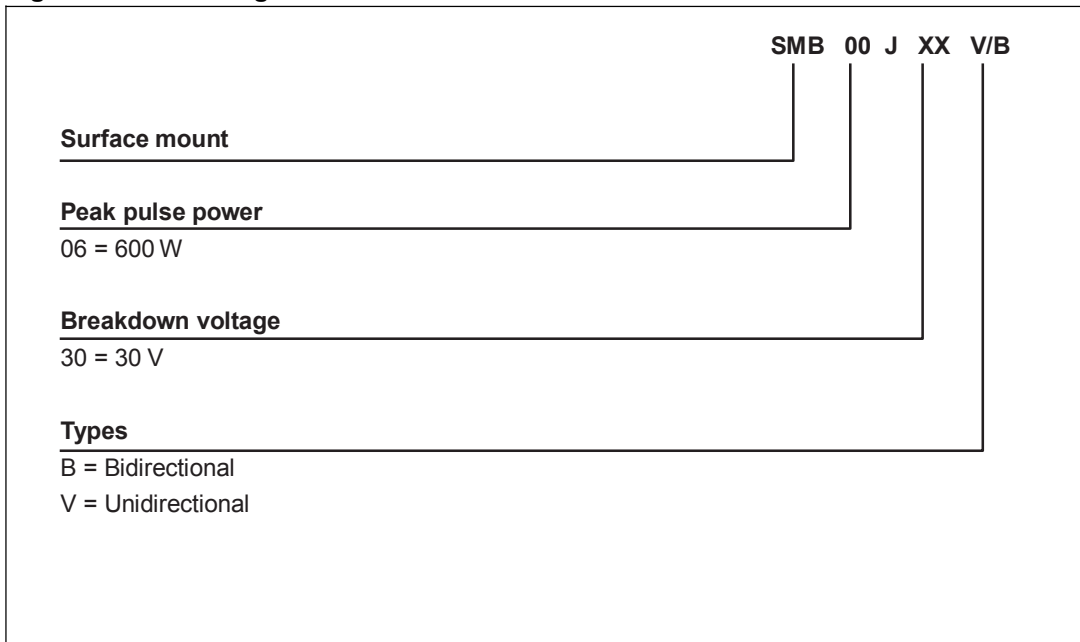


Application and design guidelines

More information is available in the ASIM Application note AN2689 "Protection of automotive electronics from electrical hazards, guidelines for design and component selection".

Ordering information scheme

Figure 16. Ordering information scheme

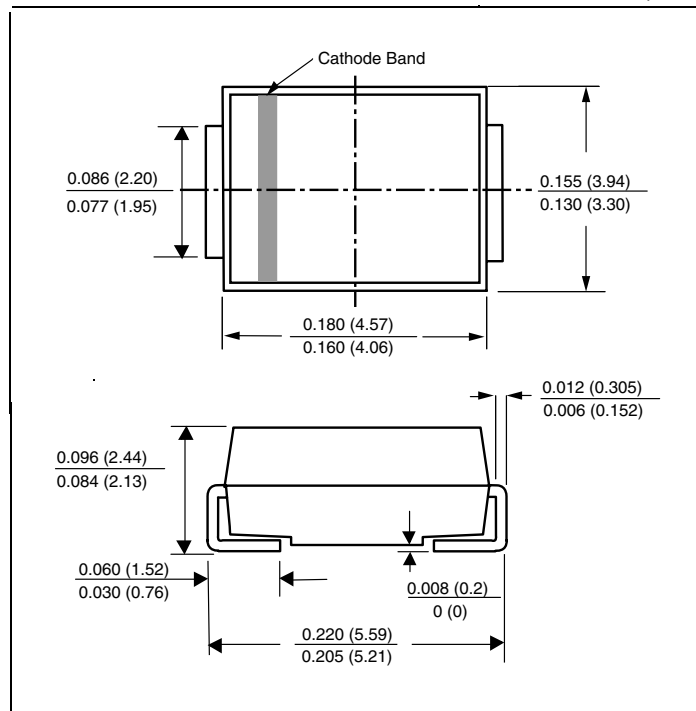


Packaging information

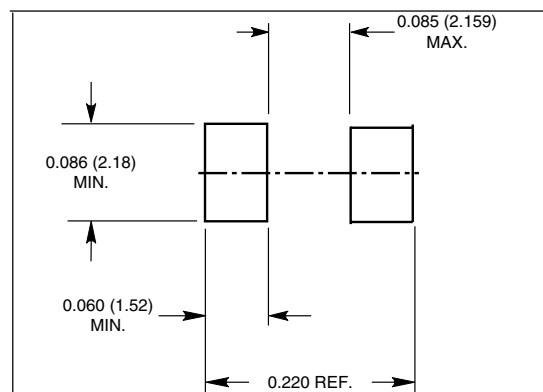
- Case: JEDEC DO-214AA molded plastic over planar junction
- Terminals: solder plated, solderable as per MIL-STD-750, Method 2026
- Polarity: for unidirectional types the band indicates cathode
- Flammability: epoxy meets UL 94, V0
- RoHS package

DO-214AA (SMB-J-Bend)

Table 3. **PACKAGE OUTLINE DIMENSIONS** in inches (millimeters)



DO-214AA (SMB-J-Bend)



Mounting Pad Layout

1. Marking layout can vary according to assembly location.