

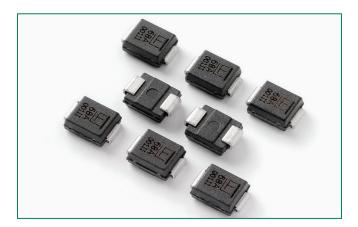
#### **SMBJ Series**











#### **Agency Approvals**

AGENCY	AGENCY FILE NUMBER
<b>!</b>	E128662/E230531

#### **Maximum Ratings and Thermal Characteristics** (T<sub>a</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Peak Pulse Power Dissipation at $T_A$ =25°C by 10x1000 $\mu$ s waveform (Fig.1)(Note 1), (Note 2)	P <sub>PPM</sub>	600	W
Power Dissipation on infinite heat sink at $T_A = 50^{\circ}C$	P <sub>M(AV)</sub>	5.0	W
Peak Forward Surge Current, 8.3ms Single Half Sine Wave (Note 3)	I <sub>FSM</sub>	100	А
Maximum Instantaneous Forward Voltage at 50A for Unidirectional only (Note 4)	V <sub>F</sub>	3.5V/5.0	V
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-65 to 150	°C
Typical Thermal Resistance Junction to Lead	R <sub>wL</sub>	20	°C/W
Typical Thermal Resistance Junction to Ambient	R <sub>uJA</sub>	100	°C/W

- 1. Non-repetitive current pulse , per Fig. 3 and derated above  $T_{\rm A} = 25^{\circ}{\rm C}$  per Fig. 2.
- 2. Mounted on copper pad area of 0.2x0.2" (5.0 x 5.0mm) to each terminal.
- 3. Measured on 8.3ms single half sine wave or equivalent square wave for unidirectional device only, duty cycle=4 per minute maximum.
- 4.  $V_F < 3.5 V$  for  $V_{BB} \le 200 V$  and  $V_F < 5.0 V$  for  $V_{BB} \ge 201 V$ .

#### **Description**

The SMBJ series is designed specifically to protect sensitive electronic equipment from voltage transients induced by lightning and other transient voltage events.

#### **Features**

- Halogen-Free
- RoHS compliant
- For surface mounted applications to optimize board space
- Low profile package
- Built-in strain relief
- Typical maximum temperature coefficient  $\Delta V_{BR} = 0.1\% \times V_{BR}@25^{\circ}C \times \Delta T$  • High Temperature
- Glass passivated chip junction
- 600W peak pulse power capability at  $10 \times 1000 \mu s$ waveform, repetition rate (duty cycles):0.01%

- Fast response time: typically less than 1.0ps from 0V to BV min
- Excellent clamping capability
- Low incremental surge resistance
- Typical I<sub>R</sub> less than 1μA above 12V
- soldering guaranteed: 260°C/40 seconds at terminals
- Plastic package has Underwriters Laboratory Flammability 94V-O
- Matte Tin Lead-free Plated

#### **Applications**

TVS devices are ideal for the protection of I/O Interfaces, V<sub>cc</sub> bus and other vulnerable circuits used in Telecom, Computer, Industrial and Consumer electronic applications.

# **Transient Voltage Suppression Diodes**Surface Mount – 600W > SMBJ series

#### **Electrical Characteristics**

MIN   MIN   MAX   MAX	Part Number (Uni)	Part Number (Bi)	Mar	king	Reverse Stand off Voltage V <sub>R</sub>	Volta	down geV <sub>BR</sub> s) @ I <sub>T</sub>	Test Current	Maximum Clamping Voltage V <sub>c</sub> @ I	Maximum Peak Pulse Current I <sub>pp</sub>	Maximum Reverse Leakage I <sub>R</sub> @ V <sub>B</sub>	Agency Approval
SMB-BIGA   SMB-BIGCA   KG   AG   6.0   6.67   737   10   10.3   58.3   500   X   SMB-BIGAS   SMB-BIGCA   KK   AK   6.5   727   738   10   11.2   53.6   500   X   SMB-BIGAS   SMB-BIGCA   KM   AM   70   778   88.60   10   12.0   60.0   200   X   SMB-BIGAS   SMB-BIGCA   KR   AR   70   778   88.60   10   12.0   60.0   200   X   SMB-BIGA   SMB-BIGCA   KR   AR   8.0   8.89   98.3   1   13.6   44.2   50   X   SMB-BIGA   SMB-BIGCA   KR   AR   8.0   8.89   98.3   1   13.6   44.2   50   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   1   X   SMB-BIGA   SMB-BIGCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   1   X   SMB-BIGA   SMB-BIGCA   LG   BG   13.0   14.40   15.90   1   21.5   28.0   1   X   SMB-BIGA   SMB-BIGCA   LG   BG   13.0   14.40   15.90   1   21.5   28.0   1   X   SMB-BIGA   SMB-BIGCA   LF   BP   16.0   1780   18.50   12.4   24.6   1   X   SMB-BIGA   SMB-BIGCA   LF   BP   16.0   1780   18.50   12.2   25.9   1   X   SMB-BIGA   SMB-BIGCA   LF   BF   16.0   1780   19.70   1   26.0   23.1   1   X   SMB-BIGA   SMB-BIGCA   LF   BF   16.0   1780   19.70   1   26.0   23.1   1   X   SMB-BIGA   SMB-BIGCA   LF   BF   16.0   1780   19.70   1   29.2   20.6   1   X   SMB-BIGA   SMB-BIGCA   LF   BF   16.0   1780   19.70   1   29.2   20.6   1   X   SMB-BIGA   SMB-BIGCA   LF   BF   16.0   1780   19.70   1   29.2   20.6   1   X   SMB-BIGA   SMB-BIGCA   LF   BF   16.0   1780   19.70   1   29.5   2   20.6   1   X   SMB-BIGA   SMB	, , ,	` ′	UNI	BI	(Volts)	MIN	MAX	(mA)	(V) <sup>pp</sup>	(A) pp	(μA)	<b>8</b> 2 <b>0</b>
SMB.B.B.G.A. SMB.B.B.G.C.A. KK	SMBJ5.0A	SMBJ5.0CA	KE	AE	5.0	6.40	7.00	10	9.2	65.3	800	Χ
SMB_170A   SMB_170CA   KM   AM   70   778   8.60   10   12.0   50.0   200   X   SMB_175A   SMB_175CA   KP   AP   75   8.33   9.21   1   12.9   466   100   X   SMB_180A   SMB_180CA   KR   AR   8.0   8.89   9.83   1   13.6   44.2   50   X   SMB_180A   SMB_180CA   KR   AR   8.0   8.89   9.83   1   13.6   44.2   50   X   SMB_180A   SMB_180CA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB_190A   SMB_180CA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB_190A   SMB_190CA   KX   AX   10.0   11.10   12.30   1   170   36.3   5   X   SMB_111CA   SMB_111CA   KZ   AZ   11.0   12.20   13.50   1   18.2   33.0   1   X   SMB_111CA   SMB_111CA   LE   BE   12.0   13.30   14.70   1   19.9   30.2   1   X   SMB_111CA   SMB_111CA   LE   BE   12.0   13.30   14.70   1   19.9   30.2   1   X   SMB_111CA   SMB_111CA   LE   BE   12.0   13.30   14.70   1   19.9   30.2   1   X   SMB_111CA   SMB_111CA   LE   BE   12.0   13.00   14.70   1   19.9   30.2   1   X   SMB_111CA   SMB_111CA   LE   BE   12.0   13.00   14.70   1   29.2   25.9   1   X   SMB_111CA   SMB_111CA   LE   BE   16.0   17.80   19.70   1   22.5   25.9   1   X   SMB_111CA   SMB_111CA   LE   BF   16.0   17.80   19.70   1   26.0   23.1   1   X   SMB_111CA   SMB_111CA   LE   BF   16.0   17.80   19.70   1   26.0   23.1   1   X   SMB_112CA   SMB_113CA   LE   BF   16.0   17.80   19.70   1   26.0   23.1   1   X   SMB_112CA   SMB_112CA   LE   BF   18.0   20.00   22.10   1   29.2   20.6   1   X   SMB_112CA   SMB_112CA   LE   BF   18.0   20.00   22.10   1   29.2   20.6   1   X   SMB_112CA   SMB_112CA   LE   BF   18.0   20.00   22.10   1   29.2   20.6   1   X   SMB_112CA   SMB_112CA   LE   BF   24.0   26.70   29.50   1   38.9   15.5   1   X   SMB_112CA   SMB_112CA   LE   BF   24.0   26.70   29.50   1   38.9   15.5   1   X   SMB_112CA   SMB_112CA   LE   BF   24.0   26.0   27.00   1   38.9   15.5   1   X   SMB_112CA   SMB_112CA   LE   BF   24.0   26.0   33.0   36.70   40.60   1   33.3   11.3   X   SMB_112CA   SMB_112CA   LE   ST   ST   ST   ST   ST   ST   S		SMBJ6.0CA						10			800	
SMB_UFGA   SMB_UFGCA   KP   AP   75   8.33   9.21   1   12.9   46.6   100   X   SMB_UBO A   SMB_UBO CA   KR   AR   8.0   8.89   9.83   1   13.6   44.2   50   X   SMB_UBO S   SMB_UBO CA   KV   AV   9.0   10.00   11.10   1   14.4   417   20   X   SMB_UBO A   SMB_UBO CA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMB_UBO A   SMB_UBO CA   KV   AV   9.0   10.00   11.10   12.20   1   170   35.5   5   X   SMB_UBO A   SMB_UBO CA   KV   AV   9.0   10.00   11.10   12.20   1   170   35.5   5   X   SMB_UBO A   SMB_UBO CA   KV   AV   9.0   10.00   11.10   12.20   1   170   35.5   5   X   SMB_UBO A   SMB_UBO CA   KV   AV   9.0   10.00   11.10   12.20   1   15.4   39.0   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   9.0   10.00   11.10   12.20   1   15.2   33.0   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   10.0   11.00   12.00   1   18.2   33.0   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   40.0   15.90   1   21.5   28.0   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   40.0   15.90   1   21.5   28.0   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   40.0   15.90   1   21.5   28.0   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   40.0   15.90   1   24.4   24.6   1   X   SMB_UBO A   SMB_UBO CA   KV   AV   40.0   17.90   19.70   1   26.0   23.1   1   X   SMB_UBO A   SMB_UBO CA   KV   BV   20.0   22.20   24.50   1   27.8   21.8   1   X   SMB_UBO A   SMB_UBO CA   KV   BV   20.0   22.20   24.50   1   27.8   21.8   1   X   SMB_UBO A   SMB_UBO CA   KV   BV   20.0   22.20   24.40   26.90   1   27.8   21.8   1   X   SMB_UBO A   SMB_UBO CA   KV   BV   20.0   22.20   24.40   26.90   1   35.5   16.9   1   X   SMB_UBO A   SMB_UBO CA   KV   BV   20.0   22.20   24.40   26.90   1   35.5   16.9   1   X   SMB_UBO A   SMB_UBO CA   KV   BV   20.0   22.20   24.40   26.90   1   35.5   16.9   1   X   SMB_UBO A   SMB_UBO CA   KV   CV   45.0   50.00   55.30   1   42.1   14.3   1   X   SMB_UBO A   SMB_UBO CA   KV   CV   45.0   50.00   55.30   1   42.1   14.3   1   X   SMB_UBO A   SMB_UBO CA   KV   CV   45.0   50.00   50.00   1   50.30   1   40.00   1   1										53.6		
SMBBBOA   SMBBBOCA   KR   AR   8.0   8.88   9.83   1   13.6   44.2   50   X   SMBBBAS   SMBBSCA   KT   AT   8.5   9.44   10.40   1   14.4   41.7   20   X   SMBBDOA   SMBBBOCA   KV   AV   9.0   10.00   11.10   1   15.4   39.0   10   X   SMBDIOA   SMBDIOCA   KX   AX   10.0   11.10   12.20   13.50   1   17.0   35.3   5   X   SMBDITA   SMBDICA   KZ   AZ   11.0   12.20   13.50   1   16.2   33.0   1   X   SMBDIDA   SMBDICA   KZ   AZ   11.0   12.20   13.50   1   16.2   33.0   1   X   SMBDIDA   SMBDICA   KZ   AZ   AZ   AZ   AZ   AZ   AZ   A					-			-				
SMBLB BA SMBLB BCA   KT   AT   B.5   9.44   10.40   1   14.4   41.7   20   X   SMBLD A SMBLD			-	-								
SMB, 19												
SMBJIDA   SMBJIDCA   XX					1							
SMB_111CA   KZ												
SMBJ12A   SMBJ13CA   LE   BE   12.0   13.30   14.70   1   19.9   30.2   1   X   SMBJ13CA   LG   BG   13.0   14.40   15.90   1   21.5   28.0   1   X   SMBJ13CA   LK   BK   14.0   15.50   17.20   1   22.2   25.9   1   X   SMBJ13CA   LK   BK   14.0   15.50   17.20   1   23.2   25.9   1   X   SMBJ15CA   LK   BK   14.0   15.50   17.20   1   23.2   25.9   1   X   SMBJ15CA   LM   BM   15.0   16.70   18.50   1   24.4   24.6   1   X   SMBJ15CA   LP   BP   16.0   17.80   19.70   1   26.0   23.1   1   X   SMBJ17CA   LR   BR   17.0   18.90   20.90   1   27.6   21.8   1   X   SMBJ17CA   LR   BR   17.0   18.90   20.90   1   27.6   21.8   1   X   SMBJ18CA   LT   BT   18.0   20.000   22.10   1   22.2   20.6   1   X   SMBJ2CA   SMBJ2CCA   LV   BV   20.0   22.20   24.50   1   32.4   18.6   1   X   SMBJ2CA   SMBJ2CCA   LV   BV   20.0   22.20   24.50   1   32.4   18.6   1   X   SMBJ2CA   SMBJ2CCA   LV   BX   22.0   24.40   26.90   1   35.5   16.9   1   X   SMBJ2CA   SMBJ2CCA   ME   CE   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ2CA   SMBJ2CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ3CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ3GA   SMBJ3GCA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ3GA   SMBJ3GCA   MM   CM   33.3   36.70   40.60   1   53.3   11.3   1   X   SMBJ3GA   SMBJ3GCA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3GA   MR   CR   40.0   66.70   72.70   1   98.8   62.2   1   X   SMBJ3GA   MR   CR   40.0   66.70   72.70   1   98.8   62.2   1   X   SMBJ3GA   MR   CR   40.0   66.70   72.70   1   98.8   62.2   1   X   SMBJ3GA   M												
SMBJ13A   SMBJ14CA   LK   BK   14.0   15.60   17.20   1   21.5   28.0   1   X   SMBJ14A   SMBJ14CA   LK   BK   14.0   15.60   17.20   1   23.2   25.9   1   X   SMBJ15A   SMBJ15CA   LM   BM   15.0   16.70   18.50   1   24.4   24.6   1   X   SMBJ15A   SMBJ15CA   LP   BP   16.0   17.80   19.70   1   26.0   23.1   1   X   SMBJ15A   SMBJ15CA   LP   BP   16.0   17.80   19.70   1   26.0   23.1   1   X   SMBJ15A   SMBJ15CA   LP   BP   16.0   17.80   19.70   1   26.0   23.1   1   X   SMBJ15A   SMBJ15CA   LF   BT   18.0   20.00   22.10   1   29.2   20.6   1   X   SMBJ15A   SMBJ15CA   LV   BV   20.0   22.20   24.50   1   32.4   18.6   1   X   SMBJ2CA   LX   BX   22.0   22.440   26.70   29.50   1   33.5   16.9   1   X   SMBJ22A   SMBJ2CA   LX   BX   22.0   24.40   26.70   29.50   1   33.5   16.9   1   X   SMBJ2CA   LX   BX   22.0   26.70   29.50   1   33.5   16.9   1   X   SMBJ2CA   LX   BX   22.0   22.00   23.10   1   34.4   14.3   1   X   SMBJ2CA   LX   BX   23.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ2CA   MF   CF   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ3CA   MF   CF   26.0   28.90   31.10   34.40   1   45.4   13.3   1   X   SMBJ3CA   MM   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ3CA   MM   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ3CA   MM   CF   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ3CA   MF   CF   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ3CA   MF   CF   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3CA   MF   CF   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3CA   MF   CF   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3CA   MF   CF   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ3CA   MF   CF   40.0   56.70   65.30   58.90   1   77.4   78.3   1   X   SMBJ3CA   MF   CF   40.0   56.70   66.70   66.70   67.70   1   82.4   73.3   1   X   SMBJ3CA   MF   CF   56.70   66.70   66.70   66.70   1   69.4   67.7   1   X   SMBJ3CA   NF   DF   70.0   66.70   66.70   66.70   73.70   1   96.6   6.5   1   X   SMBJ3CA   NF												
SMBJ14A   SMBJ14CA   LK   BK   14.0   15.60   17.20   1   22.2   25.9   1   X   SMBJ15CA   LM   BM   15.0   16.70   18.50   1   24.4   24.6   1   X   SMBJ15CA   LP   BP   16.0   17.80   19.70   1   26.0   23.1   1   X   SMBJ15CA   LP   BP   16.0   17.80   19.70   1   26.0   23.1   1   X   SMBJ17CA   LR   BR   17.0   18.90   20.90   1   27.6   21.8   1   X   SMBJ17CA   LR   BR   17.0   18.90   20.90   1   27.6   21.8   1   X   SMBJ17CA   LR   BR   17.0   18.90   20.90   1   27.6   21.8   1   X   SMBJ18CA   LT   BT   18.0   20.00   22.10   1   29.2   20.6   1   X   SMBJ12CA   LT   BT   18.0   20.00   22.10   1   29.2   20.6   1   X   SMBJ12CA   LT   BT   18.0   20.00   22.20   24.50   1   32.4   18.6   1   X   SMBJ12CA   LX   BX   22.0   24.40   26.90   1   35.5   16.9   1   X   SMBJ12CA   SMBJ2CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ12CA   SMBJ2CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ12CA   SMBJ12CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ13CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ13CA   MG   CG   28.0   31.30   36.80   1   48.4   12.4   1   X   SMBJ13CA   MM   CM   33.0   36.70   40.80   1   53.3   11.3   1   X   SMBJ13CA   SMBJ13CA   MM   CM   33.0   36.70   40.80   1   53.3   11.3   1   X   SMBJ13CA   SMBJ13CA   MM   CM   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ13CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ13CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ13CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ13CA   MT   CT   43.0   47.80   52.80   1   72.7   8.3   1   X   SMBJ13CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ13CA   MT   CT   43.0   65.30   69.90   1   72.7   8.3   1   X   SMBJ13CA   MT   CT   43.0   65.30   69.90   1   72.7   8.3   1   X   SMBJ15CA   MT   CT   43.0   66.50   0.00   66.50   1   77.7   8.3   1   X   SMBJ15CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ15CA   MT				-	1							
SMBJI5GA												
SMBLITA	SMBJ15A		LM	BM	15.0	16.70	18.50	1	24.4	24.6	1	Χ
SMBJ18A   SMBJ18CA   LT   BT   18.0   20.00   22.10   1   29.2   20.6   1   X   SMBJ2DA   SMBJ2DCA   LV   BV   20.0   22.20   24.50   1   32.4   18.6   1   X   SMBJ2CA   SMBJ2CA   LX   BX   22.0   24.40   26.90   1   35.5   16.9   1   X   SMBJ2CA   SMBJ2CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ2CA   SMBJ2CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ2CA   SMBJ2CA   ME   CE   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ2CA   SMBJ2CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ3DA   SMBJ3DCA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ3DA   SMBJ3DCA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ3CA   SMBJ3CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ3CA   SMBJ3CA   MM   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ3CA   SMBJ3CA   MT   CT   43.0   4780   52.90   1   64.5   9.3   1   X   SMBJ3CA   MT   CT   43.0   4780   52.90   1   69.4   8.7   1   X   SMBJ4CA   SMBJ4CA   MV   CV   45.0   50.00   55.50   1   72.7   8.3   1   X   SMBJ4CA   SMBJ4CA   MV   CV   45.0   50.00   55.50   1   72.7   8.3   1   X   SMBJ4CA   SMBJ4CA   MZ   CZ   51.0   56.70   62.70   1   82.4   73   1   X   SMBJ4CA   SMBJ4CA   NE   DE   54.0   60.00   66.50   1   82.1   69.9   1   X   SMBJ4CA   NE   DE   54.0   60.00   66.50   1   82.1   69.9   1   X   SMBJ4CA   NE   DE   54.0   60.00   66.50   1   82.1   69.9   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ5CA   NR   DR   75.0	SMBJ16A	SMBJ16CA	LP	BP	16.0	17.80	19.70	1	26.0	23.1	1	Χ
SMBLJ20A   SMBLJ20CA   LV   BV   20.0   22.20   24.50   1   32.4   18.6   1   X   SMBJ22A   SMBJ22CA   LX   BX   22.0   24.40   26.70   29.50   1   35.5   16.9   1   X   SMBJ24A   SMBJ26CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ26A   SMBJ26CA   ME   CE   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ28A   SMBJ28CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ28A   SMBJ30CA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ33A   SMBJ33CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ33A   SMBJ33CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ36A   SMBJ49CA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ43A   SMBJ49CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ43A   SMBJ49CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ48A   SMBJ49CA   MX   CX   48.0   53.30   58.90   1   77.4   78   1   X   SMBJ48A   SMBJ49CA   MX   CX   48.0   53.30   58.90   1   77.4   78   1   X   SMBJ48A   SMBJ49CA   MX   CX   48.0   53.30   58.90   1   77.4   78   1   X   SMBJ51A   SMBJ51CA   MZ   CZ   51.0   56.70   62.70   1   82.4   73.3   1   X   SMBJ58A   SMBJ58CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58A   SMBJ58CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58A   SMBJ58CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58A   SMBJ58CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58A   SMBJ58CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58CA   NG   DG   58.0   64.40   71.10   78.60   1   13.0   5.3   1   X   SMBJ58CA   NF   DF   76.0   83.30   92.10   1   12.10   5.0   1   X   SMBJ50CA   NF   DF   76.0   83.30   92.10   1   12.10   5.0   1   X   SMBJ50CA   NF   DF   76.0   83.30   92.10   1   12.0   5.0   1   X   SMBJ50CA   NF   DF   76.0   83.30   92.10   1   12.0   0   3.7   1   X   SMBJ10CA   NF   DF	SMBJ17A		LR	BR	17.0	18.90	20.90	1	27.6	21.8	1	
SMBJ22A   SMBJ22CA   LX   BX   22.0   24.40   26.90   1   35.5   16.9   1   X   SMBJ24A   SMBJ24CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ26A   SMBJ26CA   ME   CE   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ26A   SMBJ28CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ30A   SMBJ30CA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ30A   SMBJ30CA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ30A   SMBJ30CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ36A   SMBJ36CA   MM   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ36A   SMBJ36CA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ36A   SMBJ36CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ36A   SMBJ36CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ36A   SMBJ36CA   MX   CX   48.0   53.30   58.90   1   77.4   78.8   1   X   SMBJ36A   SMBJ36CA   MX   CX   48.0   53.30   58.90   1   77.4   78.8   1   X   SMBJ36A   SMBJ36CA   MX   CX   48.0   53.30   58.90   1   77.4   78.8   1   X   SMBJ36A   SMBJ36CA   MX   CX   48.0   53.30   58.90   1   77.4   78.8   1   X   SMBJ36A   SMBJ36CA   MZ   CZ   51.0   56.70   62.70   1   82.4   7.3   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   SMBJ30CA   NG   DG	SMBJ18A	SMBJ18CA	LT	BT	18.0	20.00	22.10	1	29.2	20.6	1	
SMBJ24A   SMBJ24CA   LZ   BZ   24.0   26.70   29.50   1   38.9   15.5   1   X   SMBJ26A   SMBJ26CA   ME   CE   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ26A   SMBJ28CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ30A   SMBJ30CA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ33A   SMBJ33CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ33A   SMBJ33CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ33A   SMBJ33CA   MF   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ33A   SMBJ33CA   MF   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ33A   SMBJ36CA   MF   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ34A   SMBJ34CA   MF   CT   43.0   47.80   52.80   1   64.5   9.3   1   X   SMBJ34A   SMBJ34CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ34A   SMBJ34CA   MV   CV   45.0   50.00   55.30   1   72.7   8.3   1   X   SMBJ34A   SMBJ34CA   MV   CV   45.0   50.00   55.30   1   72.7   8.3   1   X   SMBJ34A   SMBJ34CA   MV   CV   48.0   53.30   58.90   1   77.4   78   1   X   SMBJ54A   SMBJ36CA   MC   CZ   51.0   56.70   62.70   1   82.4   73   1   X   SMBJ54A   SMBJ36CA   NE   DE   54.0   60.00   66.30   1   871   6.9   1   X   SMBJ58A   SMBJ56CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ58A   SMBJ6CA   NM   DM   64.0   71.10   78.60   1   103.0   5.9   1   X   SMBJ54A   SMBJ36CA   NG   DG   58.0   66.70   73.70   1   96.8   6.2   1   X   SMBJ54A   SMBJ36CA   NF   DF   70.0   7780   86.00   1   113.0   5.3   1   X   SMBJ56A   SMBJ56CA   NF   DF   70.0   7780   86.00   1   113.0   5.3   1   X   SMBJ54A   SMBJ56CA   NF   DF   70.0   7780   86.00   1   113.0   5.3   1   X   SMBJ54A   SMBJ56CA   NF   DF   70.0   7780   86.00   1   113.0   5.3   1   X   SMBJ54A   SMBJ56CA   NF   DF   75.0   86.70   95.80   1   126.0   4.8   1   X   SMBJ50CA   NF   DF   75.0   86.70   95.80   1   126.0   4.8   1   X   SMBJ50CA   NF   DF   75.0   86.70   95.80   1   126.0   4.8   1   X   S												
SMBJ26A   SMBJ26CA   ME   CE   26.0   28.90   31.90   1   42.1   14.3   1   X   SMBJ28A   SMBJ28CA   MG   CG   28.0   31.10   34.40   1   45.4   13.3   1   X   SMBJ28A   SMBJ30CA   MK   CK   30.0   33.30   36.80   1   48.4   12.4   1   X   SMBJ30A   SMBJ30CA   MM   CM   33.0   36.70   40.60   1   53.3   11.3   1   X   SMBJ33A   SMBJ36CA   MP   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ36A   SMBJ36CA   MP   CP   36.0   40.00   44.20   1   58.1   10.4   1   X   SMBJ36A   SMBJ36CA   MR   CR   40.0   44.40   49.10   1   64.5   9.3   1   X   SMBJ34A   SMBJ36CA   MT   CT   43.0   47.80   52.80   1   69.4   8.7   1   X   SMBJ34A   SMBJ36CA   MV   CV   45.0   50.00   55.30   1   72.7   8.3   1   X   SMBJ36A   SMBJ36CA   MV   CV   45.0   50.00   55.30   1   72.7   8.3   1   X   SMBJ36A   SMBJ36CA   MX   CX   48.0   53.30   58.90   1   77.4   78   1   X   SMBJ36A   SMBJ36CA   MZ   CZ   51.0   56.70   62.70   1   82.4   73   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   66.30   1   87.1   6.9   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   64.40   71.20   1   93.6   6.5   1   X   SMBJ36A   SMBJ36CA   NG   DG   58.0   66.70   73.70   1   96.8   6.2   1   X   SMBJ36A   SMBJ36CA   NR   DK   60.0   66.70   73.70   1   96.8   6.2   1   X   SMBJ370A   SMBJ370CA   NP   DP   70.0   77.80   86.00   1   133.0   5.9   1   X   SMBJ370A   SMBJ370CA   NP   DP   70.0   77.80   86.00   1   133.0   5.9   1   X   SMBJ370A   SMBJ370CA   NR   DR   75.0   83.30   92.10   1   121.0   5.0   1   X   SMBJ30A   SMBJ30CA   NZ   DZ   100.0   111.00   123.00   1   162.0   3.7   1   X   SMBJ30A   SMBJ30CA   NZ   DZ   100.0   111.00   123.00   1   162.0   3.7   1   X   SMBJ30A   SMBJ30CA   NZ   DZ   100.0   111.00   123.00   1   162.0   3.7   1   X   SMBJ30A   SMBJ30CA   NZ   DZ   100.0   111.00   123.00   1   162.0   3.7   1   X   SMBJ150A   SMBJ150CA   PR   ER   170.0   189.00   209.00   1   275.0   2.2   1   X   SMBJ150A   SMBJ150CA   PR   ER   170.0   1				-	1							
SMBJ28A         SMBJ28CA         MG         CG         28.0         31.10         34.40         1         45.4         13.3         1         X           SMBJ30A         SMBJ30CA         MK         CK         30.0         33.0         36.80         1         48.4         12.4         1         X           SMBJ36A         SMBJ36CA         MP         CP         36.0         40.00         44.20         1         58.1         10.4         1         X           SMBJ36A         SMBJ36CA         MP         CP         36.0         40.00         44.20         1         58.1         10.4         1         X           SMBJ36A         SMBJ36CA         MR         CR         40.0         44.40         49.10         1         64.5         9.3         1         X           SMBJ36A         SMBJ36CA         MR         CR         40.0         44.40         49.10         1         64.5         9.3         1         X           SMBJ36A         SMBJ36CA         MY         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ36A         SMBJ36CA         MW         CX<					-							
SMBJ30A         SMBJ30CA         MK         CK         30.0         33.30         36.80         1         48.4         12.4         1         X           SMBJ33CA         MM         CM         33.0         36.70         40.60         1         53.3         11.3         1         X           SMBJ36A         MP         CP         36.0         40.00         44.20         1         58.1         10.4         1         X           SMBJ40A         SMBJ40CA         MR         CR         40.0         44.40         49.10         1         64.5         9.3         1         X           SMBJ43CA         MT         CT         43.0         4780         52.80         1         69.4         8.7         1         X           SMBJ4SA         SMBJ4SCA         MY         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ51AS         SMBJ4BCA         MX         CX         48.0         55.30         58.90         1         77.4         7.8         1         X           SMBJ51AS         SMBJ51CA         NE         DE         54.0         60.00         66.70												
SMBJ33A         SMBJ33CA         MM         CM         33.0         36.70         40.60         1         53.3         11.3         1         X           SMBJ36A         SMBJ36CA         MP         CP         36.0         40.00         44.20         1         58.1         10.4         1         X           SMBJ40A         SMBJ49CA         MR         CR         40.0         44.40         49.10         1         64.5         9.3         1         X           SMBJ43A         SMBJ45CA         MT         CT         43.0         47.80         52.80         1         69.4         8.7         1         X           SMBJ45A         SMBJ45CA         MV         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ4BA         SMBJ4BCA         MX         CX         48.0         53.30         58.90         1         77.4         78         1         X           SMBJ4BA         SMBJ4BCA         MX         CX         48.0         65.30         1         77.7         78         1         X           SMBJ54A         SMBJ54CA         NE         DE         54.0												
SMBJ36A         SMBJ36CA         MP         CP         36.0         40.00         44.20         1         58.1         10.4         1         X           SMBJ40A         SMBJ40CA         MR         CR         40.0         44.40         49.10         1         64.5         9.3         1         X           SMBJ4SA         SMBJ4SCA         MV         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ4SA         SMBJ4SCA         MX         CX         48.0         53.30         58.90         1         77.4         78         1         X           SMBJ51A         SMBJ51CA         MZ         CZ         51.0         56.70         62.70         1         82.4         7.3         1         X           SMBJ51A         SMBJ56CA         NE         DE         54.0         60.00         66.30         1         87.1         6.9         1         X           SMBJ56A         SMBJ58CA         NG         DG         58.0         64.40         71.20         1         93.6         6.5         1         X           SMBJ60A         SMBJ58CA         NK         DK <td></td>												
SMBJ40A         SMBJ40CA         MR         CR         40.0         44.40         49.10         1         64.5         9.3         1         X           SMBJ43CA         MT         CT         43.0         47.80         52.80         1         69.4         8.7         1         X           SMBJ4SA         SMBJ4SCA         MV         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ4BA         SMBJ4SCA         MX         CX         48.0         53.30         58.90         1         77.4         78         1         X           SMBJ51A         SMBJ51CA         MZ         CZ         51.0         56.70         62.70         1         82.4         73         1         X           SMBJ54A         SMBJ54CA         NE         DE         54.0         60.00         66.30         1         87.1         6.9         1         X           SMBJ6AA         SMBJ58CA         NG         DG         58.0         64.40         71.20         1         93.6         6.5         1         X           SMBJ6AA         SMBJ6CA         NM         DM         64.0												
SMBJ43A         SMBJ45CA         MT         CT         43.0         47.80         52.80         1         69.4         8.7         1         X           SMBJ45CA         MW         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ4BA         SMBJ4BCA         MX         CX         48.0         53.30         58.90         1         77.7         7.8         1         X           SMBJ51A         SMBJ51CA         MZ         CZ         51.0         56.70         62.70         1         82.4         7.3         1         X           SMBJ54A         SMBJ54CA         NE         DE         54.0         60.00         66.30         1         87.1         6.9         1         X           SMBJ56A         SMBJ58CA         NG         DK         60.0         66.70         73.70         1         96.8         6.5         1         X           SMBJ50A         SMBJ56CA         NK         DK         60.0         66.70         73.70         1         96.8         6.2         1         X           SMBJ70A         SMBJ76CA         NR         DR         75.0												
SMBJ45A         SMBJ45CA         MV         CV         45.0         50.00         55.30         1         72.7         8.3         1         X           SMBJ48A         SMBJ48CA         MX         CX         48.0         53.30         58.90         1         774         78         1         X           SMBJ51A         SMBJ51CA         MZ         CZ         51.0         56.70         62.70         1         82.4         7.3         1         X           SMBJ5AA         SMBJ5ACA         NE         DE         54.0         60.00         66.70         1         82.4         7.3         1         X           SMBJ5BA         SMBJ5BCA         NE         DE         54.0         60.00         66.70         1         93.6         6.5         1         X           SMBJ5BA         SMBJ5BCA         NK         DK         60.0         66.70         73.70         1         96.8         6.2         1         X           SMBJ6AA         SMBJ6CA         NM         DM         64.0         71.10         78.60         1         103.0         5.9         1         X           SMBJ6AA         SMBJ70CA         NP         DP												
SMBJ51A         SMBJ51CA         MZ         CZ         51.0         56.70         62.70         1         82.4         7.3         1         X           SMBJ54A         SMBJ54CA         NE         DE         54.0         60.00         66.30         1         87.1         6.9         1         X           SMBJ58A         SMBJ58CA         NG         DG         58.0         64.40         71.20         1         93.6         6.5         1         X           SMBJ60A         SMBJ60CA         NK         DK         60.0         66.70         73.70         1         96.8         6.2         1         X           SMBJ60A         SMBJ64CA         NM         DM         64.0         71.10         78.60         1         103.0         5.9         1         X           SMBJ70A         SMBJ70CA         NP         DP         70.0         77.80         86.00         1         113.0         5.3         1         X           SMBJ78A         SMBJ78CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ85A         SMBJ85CA         NV         DV<			MV	CV				1	72.7	8.3	1	
SMBJ54A         SMBJ54CA         NE         DE         54.0         60.00         66.30         1         87.1         6.9         1         X           SMBJ58A         SMBJ58CA         NG         DG         58.0         64.40         71.20         1         93.6         6.5         1         X           SMBJ60A         SMBJ60CA         NK         DK         60.0         66.70         73.70         1         96.8         6.2         1         X           SMBJ64A         SMBJ64CA         NM         DM         64.0         71.10         78.60         1         103.0         5.9         1         X           SMBJ70A         SMBJ70CA         NP         DP         70.0         77.80         86.00         1         113.0         5.3         1         X           SMBJ75A         SMBJ75CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ85A         SMBJ85CA         NV         DV	SMBJ48A	SMBJ48CA	MX	CX	48.0	53.30	58.90	1	77.4	7.8	1	Χ
SMBJ58A         SMBJ58CA         NG         DG         58.0         64.40         71.20         1         93.6         6.5         1         X           SMBJ60A         SMBJ60CA         NK         DK         60.0         66.70         73.70         1         96.8         6.2         1         X           SMBJ64A         SMBJ64CA         NM         DM         64.0         71.10         78.60         1         103.0         5.9         1         X           SMBJ70CA         NP         DP         77.0         77.80         86.00         1         113.0         5.3         1         X           SMBJ75A         SMBJ75CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ85A         SMBJ85CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ80A         SMBJ85CA         NV         DV         85.0<	SMBJ51A	SMBJ51CA	MZ	CZ	51.0	56.70	62.70	1	82.4	7.3	1	Χ
SMBJ60A         SMBJ60CA         NK         DK         60.0         66.70         73.70         1         96.8         6.2         1         X           SMBJ64A         SMBJ64CA         NM         DM         64.0         71.10         78.60         1         103.0         5.9         1         X           SMBJ70A         SMBJ70CA         NP         DP         70.0         77.80         86.00         1         113.0         5.3         1         X           SMBJ75CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ78A         SMBJ8CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ90A         SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ10OA         SMBJ10CA         PE         EE         11	SMBJ54A	SMBJ54CA	NE	DE	54.0	60.00	66.30	1	87.1	6.9	1	
SMBJ64A         SMBJ64CA         NM         DM         64.0         71.10         78.60         1         103.0         5.9         1         X           SMBJ70A         SMBJ70CA         NP         DP         70.0         77.80         86.00         1         113.0         5.3         1         X           SMBJ75A         SMBJ75CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ98A         SMBJ385CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ10OA         SMBJ10OCA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ110A         SMBJ110CA         PE         EE												
SMBJ70A         SMBJ70CA         NP         DP         70.0         77.80         86.00         1         113.0         5.3         1         X           SMBJ75A         SMBJ75CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ85A         SMBJ85CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ90A         SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ100A         SMBJ10CA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ10CA         SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ130CA         PK         EK												
SMBJ75A         SMBJ75CA         NR         DR         75.0         83.30         92.10         1         121.0         5.0         1         X           SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ85A         SMBJ85CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ90A         SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ100A         SMBJ10CA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ110A         SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ130A         SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150A         SMBJ150CA												
SMBJ78A         SMBJ78CA         NT         DT         78.0         86.70         95.80         1         126.0         4.8         1         X           SMBJ85A         SMBJ85CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ90A         SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ100A         SMBJ100CA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ110A         SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ120A         SMBJ120CA         PG         EG         120.0         133.00         147.00         1         193.0         3.1         1         X           SMBJ130A         SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150A         SMBJ150CA				-								
SMBJ85A         SMBJ85CA         NV         DV         85.0         94.40         104.00         1         137.0         4.4         1         X           SMBJ90A         SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ100A         SMBJ100CA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ120A         SMBJ120CA         PG         EG         120.0         133.00         147.00         1         193.0         3.1         1         X           SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ160CA         PP         EP         160.0         178.00         19700<					-							
SMBJ90A         SMBJ90CA         NX         DX         90.0         100.00         111.00         1         146.0         4.1         1         X           SMBJ100A         SMBJ100CA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ110A         SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ120CA         PG         EG         120.0         133.00         147.00         1         193.0         3.1         1         X           SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ160A         SMBJ160CA         PP         EP         160.0         178.00         19												
SMBJ100A         SMBJ100CA         NZ         DZ         100.0         111.00         123.00         1         162.0         3.7         1         X           SMBJ110A         SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ120CA         PG         EG         120.0         133.00         147.00         1         193.0         3.1         1         X           SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ160A         SMBJ160CA         PP         EP         160.0         178.00         197.00         1         259.0         2.3         1         X           SMBJ170CA         PR         ER         170.0         189.00         209.00         1         275.0         2.2         1         X           SMBJ180A         SMBJ180CA         PT         ET         180.0         201.00 <td< td=""><td></td><td></td><td></td><td></td><td>1</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td></td<>					1		1					
SMBJ110A         SMBJ110CA         PE         EE         110.0         122.00         135.00         1         177.0         3.4         1         X           SMBJ120A         SMBJ120CA         PG         EG         120.0         133.00         147.00         1         193.0         3.1         1         X           SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ160A         SMBJ160CA         PP         EP         160.0         178.00         197.00         1         259.0         2.3         1         X           SMBJ170A         SMBJ170CA         PR         ER         170.0         189.00         209.00         1         275.0         2.2         1         X           SMBJ180A         SMBJ180CA         PT         ET         180.0         <				-	1		<u> </u>					
SMBJ120A         SMBJ120CA         PG         EG         120.0         133.00         147.00         1         193.0         3.1         1         X           SMBJ130A         SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150A         SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ160A         SMBJ160CA         PP         EP         160.0         178.00         197.00         1         259.0         2.3         1         X           SMBJ170A         SMBJ170CA         PR         ER         170.0         189.00         209.00         1         275.0         2.2         1         X           SMBJ180A         SMBJ180CA         PT         ET         180.0         201.00         222.00         1         292.0         2.1         1         X           SMBJ200A         SMBJ200CA         PV         EV         200.0         224.00         247.00         1         324.0         1.9         1           SMBJ250A         SMBJ250CA         P							-					
SMBJ130A         SMBJ130CA         PK         EK         130.0         144.00         159.00         1         209.0         2.9         1         X           SMBJ150A         SMBJ150CA         PM         EM         150.0         167.00         185.00         1         243.0         2.5         1         X           SMBJ160A         SMBJ160CA         PP         EP         160.0         178.00         197.00         1         259.0         2.3         1         X           SMBJ170A         SMBJ170CA         PR         ER         170.0         189.00         209.00         1         275.0         2.2         1         X           SMBJ180A         SMBJ180CA         PT         ET         180.0         201.00         222.00         1         292.0         2.1         1           SMBJ200A         SMBJ20CA         PV         EV         200.0         224.00         247.00         1         324.0         1.9         1           SMBJ220A         SMBJ220CA         PX         EX         220.0         246.00         272.00         1         356.0         1.7         1           SMBJ350A         SMBJ350CA         QE         FE			PG		1	133.00	147.00	1				
SMBJ160A         SMBJ160CA         PP         EP         160.0         178.00         197.00         1         259.0         2.3         1         X           SMBJ170A         SMBJ170CA         PR         ER         170.0         189.00         209.00         1         275.0         2.2         1         X           SMBJ180A         SMBJ180CA         PT         ET         180.0         201.00         222.00         1         292.0         2.1         1           SMBJ200A         SMBJ200CA         PV         EV         200.0         224.00         247.00         1         324.0         1.9         1           SMBJ220A         SMBJ220CA         PX         EX         220.0         246.00         272.00         1         356.0         1.7         1           SMBJ250A         SMBJ250CA         PZ         EZ         250.0         279.00         309.00         1         405.0         1.5         1           SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350CA         QG         FG         350.0         391.00         432.00	SMBJ130A	SMBJ130CA	PK		130.0	144.00	159.00	1			1	
SMBJ170A         SMBJ170CA         PR         ER         170.0         189.00         209.00         1         275.0         2.2         1         X           SMBJ180A         SMBJ180CA         PT         ET         180.0         201.00         222.00         1         292.0         2.1         1           SMBJ200A         SMBJ200CA         PV         EV         200.0         224.00         247.00         1         324.0         1.9         1           SMBJ220A         SMBJ220CA         PX         EX         220.0         246.00         272.00         1         356.0         1.7         1           SMBJ250A         SMBJ250CA         PZ         EZ         250.0         279.00         309.00         1         405.0         1.5         1           SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1	SMBJ150A	SMBJ150CA	PM	-	150.0	167.00	185.00	1	243.0			
SMBJ180A         SMBJ180CA         PT         ET         180.0         201.00         222.00         1         292.0         2.1         1           SMBJ200A         SMBJ200CA         PV         EV         200.0         224.00         247.00         1         324.0         1.9         1           SMBJ220A         SMBJ220CA         PX         EX         220.0         246.00         272.00         1         356.0         1.7         1           SMBJ250A         SMBJ250CA         PZ         EZ         250.0         279.00         309.00         1         405.0         1.5         1           SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350A         SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1					1							
SMBJ200A         SMBJ200CA         PV         EV         200.0         224.00         247.00         1         324.0         1.9         1           SMBJ220A         SMBJ220CA         PX         EX         220.0         246.00         272.00         1         356.0         1.7         1           SMBJ250A         SMBJ250CA         PZ         EZ         250.0         279.00         309.00         1         405.0         1.5         1           SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350A         SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1				i								X
SMBJ220A         SMBJ220CA         PX         EX         220.0         246.00         272.00         1         356.0         1.7         1           SMBJ250A         SMBJ250CA         PZ         EZ         250.0         279.00         309.00         1         405.0         1.5         1           SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350A         SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1					1							
SMBJ250A         SMBJ250CA         PZ         EZ         250.0         279.00         309.00         1         405.0         1.5         1           SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350A         SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1					1		i					
SMBJ300A         SMBJ300CA         QE         FE         300.0         335.00         371.00         1         486.0         1.3         1           SMBJ350A         SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1					1							
SMBJ350A         SMBJ350CA         QG         FG         350.0         391.00         432.00         1         567.0         1.1         1				-								
0.01 0.01 0.00 0.00 0.00 0.00 0.00 0.00				-	-							
SMBJ440A SMBJ440CA QM FM 440.0 492.00 543.00 1 713.0 0.9 1												

For bidirectional type having  $V_{\rm R}$  of 10 volts and less, the  $I_{\rm R}$  limit is double.

For parts without A , the  $\rm V_{BR}$  is  $\pm~10\,\%$  and Vc is 5% higher than with A parts.



### Ratings and Characteristic Curves (T<sub>A</sub>=25°C unless otherwise noted)

Figure 1 - Peak Pulse Power Rating

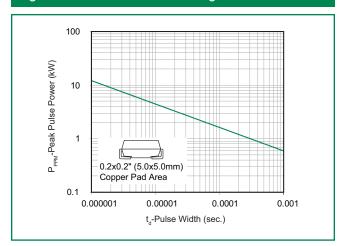


Figure 2 - Pulse Derating Curve

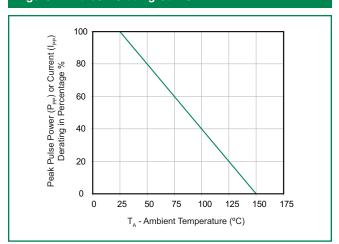
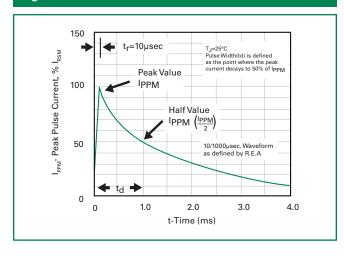


Figure 3 - Pulse Waveform



**Figure 4 - Typical Junction Capacitance** 

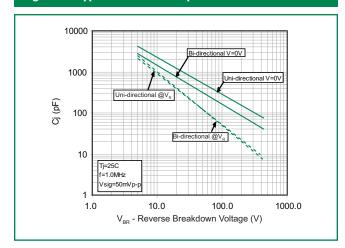


Figure 5 - Steady State Power Dissipation Derating Curve

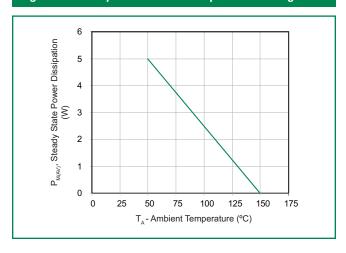
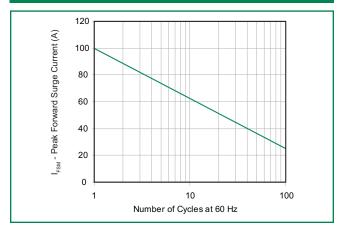


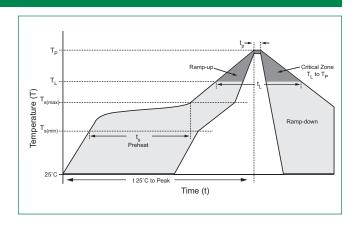
Figure 6 - Maximum Non-Repetitive Peak Forward Surge Current Uni-Directional Only



## **Transient Voltage Suppression Diodes**Surface Mount – 600W > SMBJ series

#### **Soldering Parameters**

Reflow Co	ndition	Lead-free assembly		
	-Temperature Min (T <sub>s(min)</sub> )	150°C		
Pre Heat	-Temperature Max (T <sub>s(max)</sub> )	200°C		
	-Time (min to max) (t <sub>s</sub> )	60 - 180 secs		
Average ra	amp up rate (Liquidus Temp ık	3°C/second max		
T <sub>S(max)</sub> to T <sub>L</sub>	- Ramp-up Rate	3°C/second max		
Reflow	-Temperature (T <sub>L</sub> ) (Liquidus)	217°C		
	-Time (min to max) (t <sub>s</sub> )	60 – 150 seconds		
PeakTemp	perature (T <sub>P</sub> )	260 <sup>+0/-5</sup> °C		
Time with	in 5°C of actual peak ure (t <sub>p</sub> )	20 - 40 seconds		
Ramp-dov	vn Rate	6°C/second max		
Time 25°C	to peakTemperature (T <sub>P</sub> )	8 minutes Max.		
Do not exc	ceed	280°C		



#### **Physical Specifications**

Weight	0.003 ounce, 0.093 grams
Case	JEDEC DO214AA. Molded plastic body over glass passivated junction
Polarity	Color band denotes cathode except Bidirectional
Terminal	Matte Tin-plated leads, Solderable per JESD22-B102D

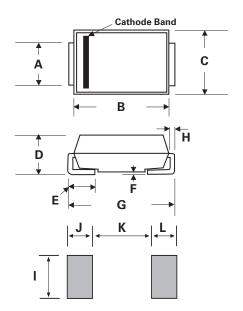
#### **Environmental Specifications**

Temperature Cycle	JESD22-A104
Pressure Cooker	JESD22-A102
High Temp. Storage	JESD22-A103
HTRB	JESD22-A108
Thermal Shock	JESD22-A106

#### **Dimensions**

SMBJ Series

#### DO-214AA (SMB J-Bend)

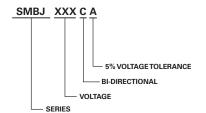


Dimensions	Inc	hes	Millimeters		
Dimensions	Min	Max	Min	Max	
А	0.077	0.086	1.950	2.200	
В	0.160	0.180	4.060	4.570	
С	0.130	0.155	3.300	3.940	
D	0.084	0.096	2.130	2.440	
Е	0.030	0.060	0.760	1.520	
F	-	0.008	-	0.203	
G	0.205	0.220	5.210	5.590	
Н	0.006	0.012	0.152	0.305	
1	0.089	-	2.260	-	
J	0.085	-	2.160	-	
K	-	0.107	-	2.740	
L	0.085	-	2.160	-	

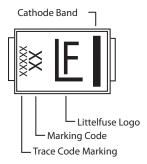
### **Transient Voltage Suppression Diodes**

Surface Mount – 600W > SMBJ series

#### **Part Numbering System**



#### **Part Marking System**



#### **Packaging**

Part number	Component Package	Quantity	Packaging Option	Packaging Specification
SMBJxxxXX	DO-214AA	3000	Tape & Reel – 12mm/13" tape	EIA STD RS-481

#### **Tape and Reel Specification**

