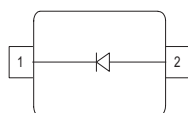


### Silicon Variable Capacitance Diodes

- For tuning of extended frequency band in VHF TV / VTR tuners
- High capacitance ratio
- Low series inductance
- Low series resistance
- Excellent uniformity and matching due to "in-line" matching assembly procedure
- Pb-free (RoHS compliant) package



**BB639**  
**BB659**



| Type  | Package | Configuration | $L_S$ (nH) | Marking  |
|-------|---------|---------------|------------|----------|
| BB639 | SOD323  | single        | 1.8        | yellow S |
| BB659 | SCD80   | single        | 0.6        | DE       |

**Maximum Ratings** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

| Parameter                                            | Symbol    | Value       | Unit             |
|------------------------------------------------------|-----------|-------------|------------------|
| Diode reverse voltage                                | $V_R$     | 30          | V                |
| Peak reverse voltage<br>( $R \geq 5\text{k}\Omega$ ) | $V_{RM}$  | 35          |                  |
| Forward current                                      | $I_F$     | 20          | mA               |
| Operating temperature range                          | $T_{op}$  | -55 ... 150 | $^\circ\text{C}$ |
| Storage temperature                                  | $T_{stg}$ | -55 ... 150 |                  |

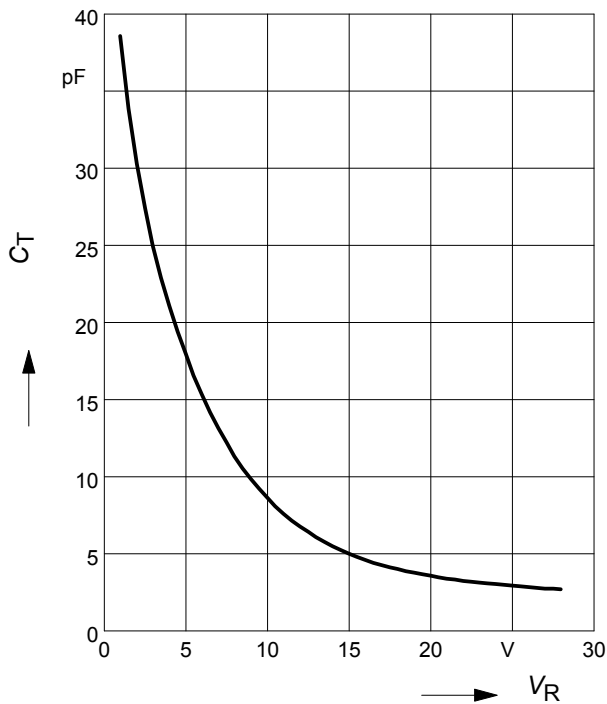
**Electrical Characteristics at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

| Parameter                                                                                                                                                                                                                                                                                                                 | Symbol           | Values                   |                              |                          | Unit     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|--------------------------|------------------------------|--------------------------|----------|
|                                                                                                                                                                                                                                                                                                                           |                  | min.                     | typ.                         | max.                     |          |
| DC Characteristics                                                                                                                                                                                                                                                                                                        |                  |                          |                              |                          |          |
| Reverse current<br>$V_R = 30\text{ V}$<br>$V_R = 30\text{ V}, T_A = 85\text{ }^{\circ}\text{C}$                                                                                                                                                                                                                           | $I_R$            | -<br>-                   | -<br>-                       | 10<br>200                | nA       |
| AC Characteristics                                                                                                                                                                                                                                                                                                        |                  |                          |                              |                          |          |
| Diode capacitance<br>$V_R = 1\text{ V}, f = 1\text{ MHz}$<br>$V_R = 2\text{ V}, f = 1\text{ MHz}$<br>$V_R = 25\text{ V}, f = 1\text{ MHz}$<br>$V_R = 28\text{ V}, f = 1\text{ MHz}$                                                                                                                                       | $C_T$            | 36<br>27.7<br>2.5<br>2.4 | 38.3<br>29.75<br>2.85<br>2.6 | 40<br>31.8<br>3.2<br>2.9 | pF       |
| Capacitance ratio<br>$V_R = 1\text{ V}, V_R = 28\text{ V}, f = 1\text{ MHz}$                                                                                                                                                                                                                                              | $C_{T1}/C_{T28}$ | 13.5                     | 14.7                         | -                        |          |
| Capacitance ratio<br>$V_R = 2\text{ V}, V_R = 25\text{ V}, f = 1\text{ MHz}$                                                                                                                                                                                                                                              | $C_{T2}/C_{T25}$ | 9.8                      | 10.4                         | -                        |          |
| Capacitance matching <sup>1)</sup><br>$V_R = 1\text{ V}, V_R = 28\text{ V}, f = 1\text{ MHz}$ , <b>7</b> diode sequenc<br>BB639<br>$V_R = 1\text{ V}, V_R = 28\text{ V}, f = 1\text{ MHz}$ , <b>4</b> diode sequenc<br>BB659<br>$V_R = 1\text{ V}, V_R = 28\text{ V}, f = 1\text{ MHz}$ , <b>7</b> diode sequenc<br>BB659 | $\Delta C_T/C_T$ | -<br>-<br>-              | -<br>0.3<br>0.4              | 2.5<br>1<br>2            | %        |
| Series resistance<br>$V_R = 5\text{ V}, f = 470\text{ MHz}$                                                                                                                                                                                                                                                               | $r_S$            | -                        | 0.65                         | 0.7                      | $\Omega$ |

<sup>1</sup>For details please refer to Application Note 047.

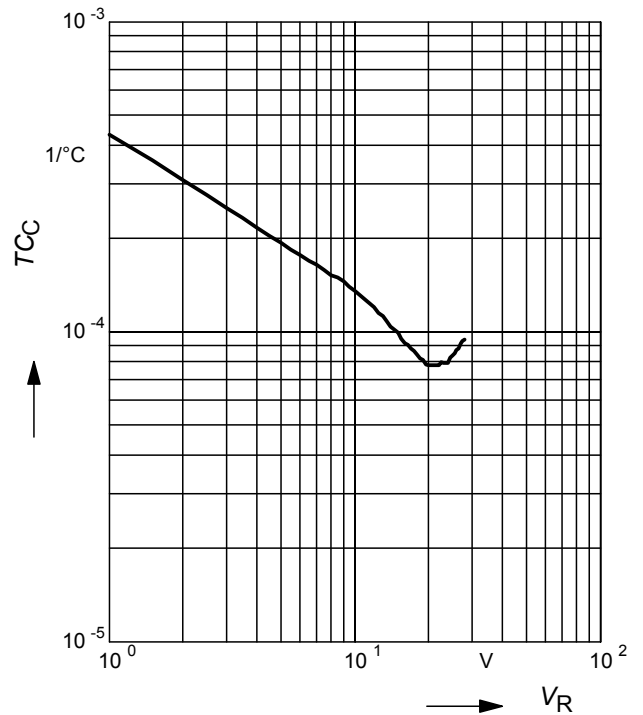
**Diode capacitance  $C_T = f(V_R)$**

$f = 1\text{MHz}$



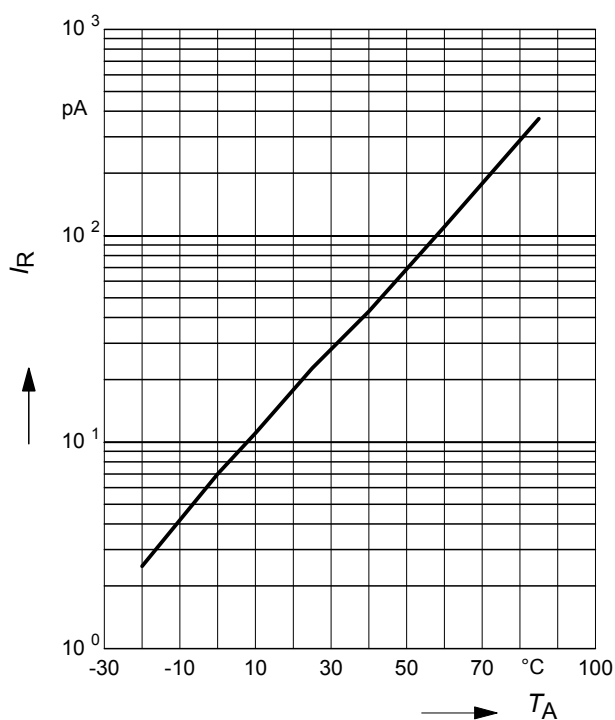
**Temperature coefficient of the diode**

**capacitance  $T_{CC} = f(V_R)$**



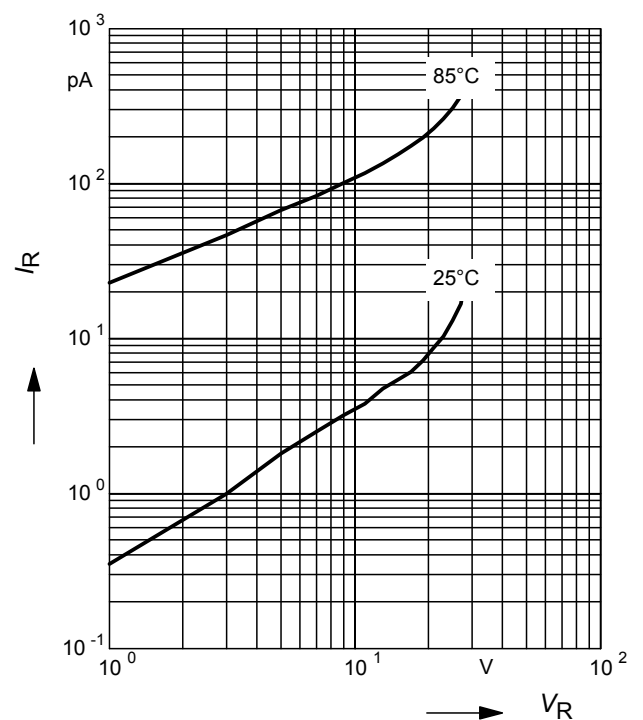
**Reverse current  $I_R = f(T_A)$**

$V_R = 28\text{V}$

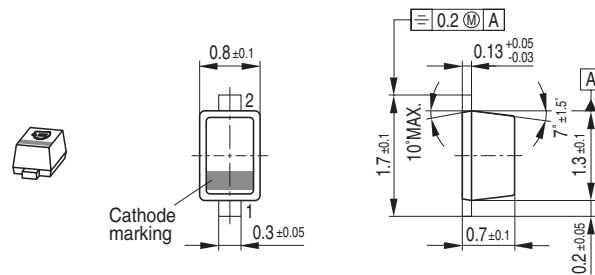


**Reverse current  $I_R = f(V_R)$**

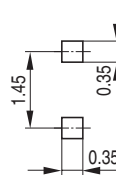
$T_A = \text{Parameter}$



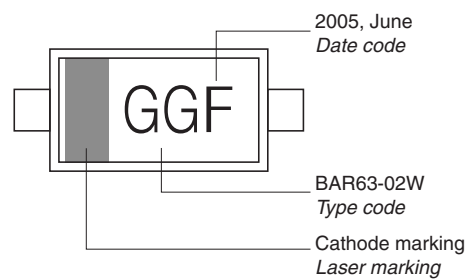
## Package Outline



## Foot Print

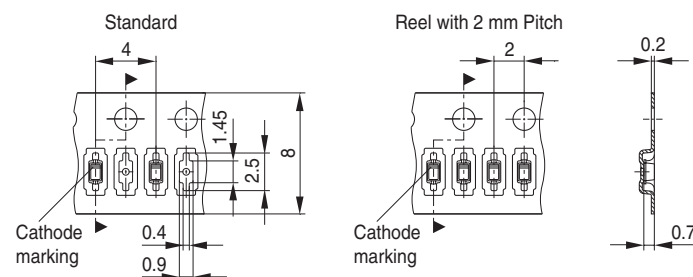


## Marking Layout (Example)



## Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel  
 Reel ø180 mm = 8.000 Pieces/Reel (2 mm Pitch)  
 Reel ø330 mm = 10.000 Pieces/Reel

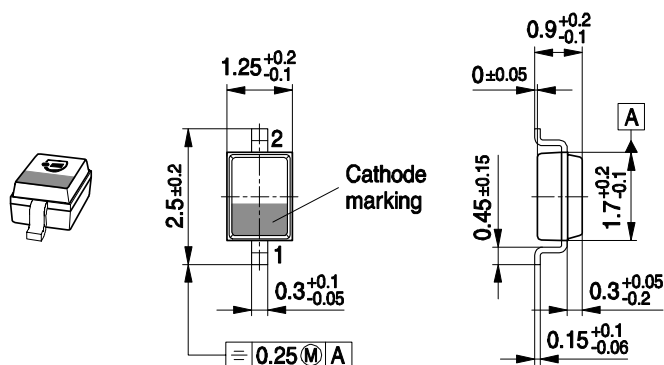


Date Code marking for discrete packages with one digit (SCD80, SC79, SC75<sup>1)</sup>) CES-Code

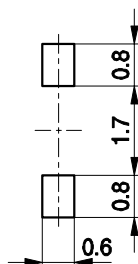
| Month | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 |
|-------|------|------|------|------|------|------|------|------|------|------|------|------|
| 01    | a    | p    | A    | P    | a    | p    | A    | P    | a    | p    | A    | P    |
| 02    | b    | q    | B    | Q    | b    | q    | B    | Q    | b    | q    | B    | Q    |
| 03    | c    | r    | C    | R    | c    | r    | C    | R    | c    | r    | C    | R    |
| 04    | d    | s    | D    | S    | d    | s    | D    | S    | d    | s    | D    | S    |
| 05    | e    | t    | E    | T    | e    | t    | E    | T    | e    | t    | E    | T    |
| 06    | f    | u    | F    | U    | f    | u    | F    | U    | f    | u    | F    | U    |
| 07    | g    | v    | G    | V    | g    | v    | G    | V    | g    | v    | G    | V    |
| 08    | h    | x    | H    | X    | h    | x    | H    | X    | h    | x    | H    | X    |
| 09    | j    | y    | J    | Y    | j    | y    | J    | Y    | j    | y    | J    | Y    |
| 10    | k    | z    | K    | Z    | k    | z    | K    | Z    | k    | z    | K    | Z    |
| 11    | l    | 2    | L    | 4    | l    | 2    | L    | 4    | l    | 2    | L    | 4    |
| 12    | n    | 3    | N    | 5    | n    | 3    | N    | 5    | n    | 3    | N    | 5    |

1) New Marking Layout for SC75, implemented at October 2005.

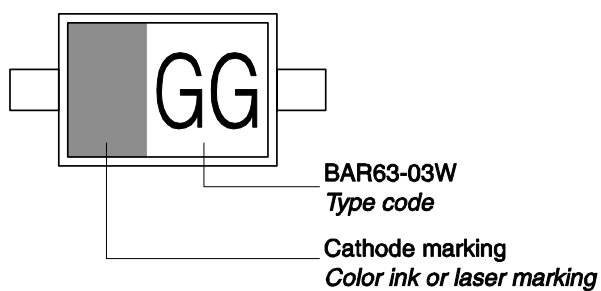
## Package Outline



## Foot Print

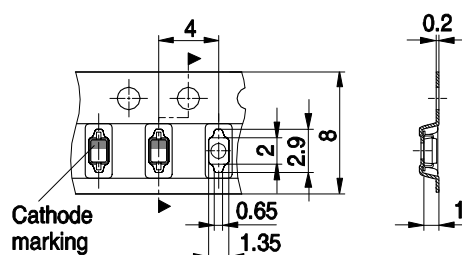


## Marking Layout (Example)



## Standard Packing

Reel  $\varnothing 180$  mm = 3.000 Pieces/Reel  
 Reel  $\varnothing 330$  mm = 10.000 Pieces/Reel



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