

TOSHIBA Zenzer Diode Silicon Epitaxial Planar Type

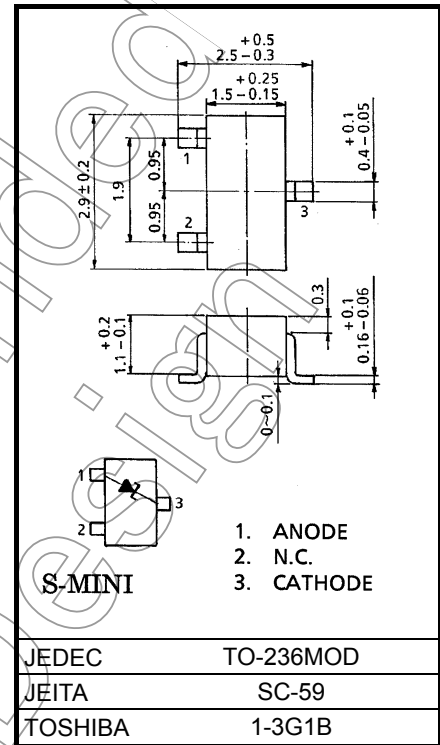
# 02CZ2.0~02CZ47

Constant Voltage Regulation Applications

Reference Voltage Applications

- Small package: SC-59
- Nominal voltage tolerance about  $\pm 2.5\%$  (4.3V~24V)

Unit in mm



Weight: 0.012g

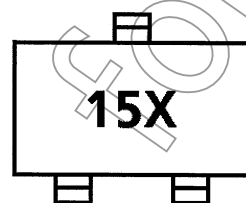
## Absolute Maximum Ratings (Ta = 25°C)

| Characteristic            | Symbol           | Rating  | Unit |
|---------------------------|------------------|---------|------|
| Power dissipation         | P                | 200     | mW   |
| Junction temperature      | T <sub>j</sub>   | 150     | °C   |
| Storage temperature range | T <sub>stg</sub> | -55~150 | °C   |

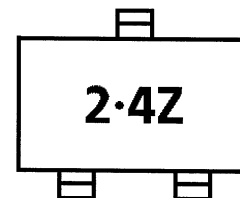
Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

## Marking



(02CZ15-X)



(02CZ2.4-Z)

## Electrical Characteristics (Ta = 25°C)

| Type No.     | Zener Voltage        |       |                     | Dynamic Impedance  |                     | Knee Dynamic Impedance |                     | Reverse Current     |                    |
|--------------|----------------------|-------|---------------------|--------------------|---------------------|------------------------|---------------------|---------------------|--------------------|
|              | * V <sub>Z</sub> (V) |       | I <sub>Z</sub> (mA) | Z <sub>Z</sub> (Ω) | I <sub>Z</sub> (mA) | Z <sub>ZK</sub> (Ω)    | I <sub>Z</sub> (mA) | I <sub>R</sub> (μA) | V <sub>R</sub> (V) |
|              | Min                  | Max   |                     | Max                |                     | Max                    |                     | Max                 |                    |
| 02CZ2.0 (**) | 1.85                 | 2.15  | 5                   | 100                | 5                   | 1000                   | 0.5                 | 120                 | 1.0                |
| 02CZ2.2 (**) | 2.05                 | 2.38  | 5                   | 100                | 5                   | 1000                   | 0.5                 | 120                 | 1.0                |
| 02CZ2.4      | 2.28                 | 2.60  | 5                   | 100                | 5                   | 1000                   | 0.5                 | 120                 | 1.0                |
| 02CZ2.7      | 2.50                 | 2.90  | 5                   | 110                | 5                   | 1000                   | 0.5                 | 120                 | 1.0                |
| 02CZ3.0      | 2.80                 | 3.20  | 5                   | 120                | 5                   | 1000                   | 0.5                 | 50                  | 1.0                |
| 02CZ3.3      | 3.10                 | 3.50  | 5                   | 130                | 5                   | 1000                   | 0.5                 | 20                  | 1.0                |
| 02CZ3.6      | 3.40                 | 3.80  | 5                   | 130                | 5                   | 1000                   | 0.5                 | 10                  | 1.0                |
| 02CZ3.9      | 3.70                 | 4.10  | 5                   | 130                | 5                   | 1000                   | 0.5                 | 10                  | 1.0                |
| 02CZ4.3      | 4.00                 | 4.50  | 5                   | 130                | 5                   | 1000                   | 0.5                 | 5                   | 1.0                |
| 02CZ4.7      | 4.40                 | 4.90  | 5                   | 120                | 5                   | 1000                   | 0.5                 | 5                   | 1.0                |
| 02CZ5.1      | 4.80                 | 5.40  | 5                   | 70                 | 5                   | 1000                   | 0.5                 | 1                   | 1.5                |
| 02CZ5.6      | 5.30                 | 6.00  | 5                   | 40                 | 5                   | 900                    | 0.5                 | 1                   | 2.5                |
| 02CZ6.2      | 5.80                 | 6.60  | 5                   | 30                 | 5                   | 500                    | 0.5                 | 1                   | 3.0                |
| 02CZ6.8      | 6.40                 | 7.20  | 5                   | 25                 | 5                   | 150                    | 0.5                 | 0.5                 | 5.0                |
| 02CZ7.5      | 7.00                 | 7.90  | 5                   | 23                 | 5                   | 120                    | 0.5                 | 0.5                 | 6.0                |
| 02CZ8.2      | 7.70                 | 8.70  | 5                   | 20                 | 5                   | 120                    | 0.5                 | 0.5                 | 6.5                |
| 02CZ9.1      | 8.50                 | 9.60  | 5                   | 18                 | 5                   | 120                    | 0.5                 | 0.5                 | 7.0                |
| 02CZ10       | 9.40                 | 10.60 | 5                   | 15                 | 5                   | 120                    | 0.5                 | 0.5                 | 8.0                |
| 02CZ11       | 10.40                | 11.60 | 5                   | 15                 | 5                   | 120                    | 0.5                 | 0.5                 | 8.5                |
| 02CZ12       | 11.40                | 12.60 | 5                   | 15                 | 5                   | 110                    | 0.5                 | 0.5                 | 9.0                |
| 02CZ13       | 12.40                | 14.10 | 5                   | 15                 | 5                   | 110                    | 0.5                 | 0.5                 | 10                 |
| 02CZ15       | 13.80                | 15.60 | 5                   | 15                 | 5                   | 110                    | 0.5                 | 0.5                 | 11                 |
| 02CZ16       | 15.30                | 17.10 | 5                   | 18                 | 5                   | 150                    | 0.5                 | 0.5                 | 12                 |
| 02CZ18       | 16.80                | 19.10 | 5                   | 20                 | 5                   | 150                    | 0.5                 | 0.5                 | 14                 |
| 02CZ20       | 18.80                | 21.20 | 5                   | 25                 | 5                   | 200                    | 0.5                 | 0.5                 | 15                 |
| 02CZ22       | 20.80                | 23.30 | 5                   | 30                 | 5                   | 200                    | 0.5                 | 0.5                 | 17                 |
| 02CZ24       | 22.80                | 25.60 | 5                   | 40                 | 5                   | 200                    | 0.5                 | 0.5                 | 19                 |
| 02CZ27       | 25.10                | 28.90 | 2                   | 70                 | 2                   | 250                    | 0.5                 | 0.5                 | 21                 |
| 02CZ30       | 28.00                | 32.00 | 2                   | 80                 | 2                   | 250                    | 0.5                 | 0.5                 | 23                 |
| 02CZ33       | 31.00                | 35.00 | 2                   | 80                 | 2                   | 250                    | 0.5                 | 0.5                 | 25                 |
| 02CZ36       | 34.00                | 38.00 | 2                   | 90                 | 2                   | 250                    | 0.5                 | 0.5                 | 27                 |
| 02CZ39       | 37.00                | 41.00 | 2                   | 100                | 2                   | 250                    | 0.5                 | 0.5                 | 30                 |
| 02CZ43       | 40.00                | 45.00 | 2                   | 130                | 2                   | —                      | —                   | 0.5                 | 33                 |
| 02CZ47       | 44.00                | 49.00 | 2                   | 150                | 2                   | —                      | —                   | 0.5                 | 36                 |

(\*)Test time : t = 30ms (\*\*) Product by order

**Zener Voltage Classification**

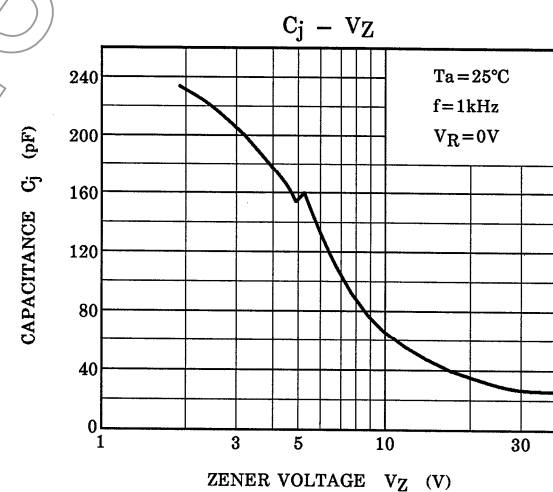
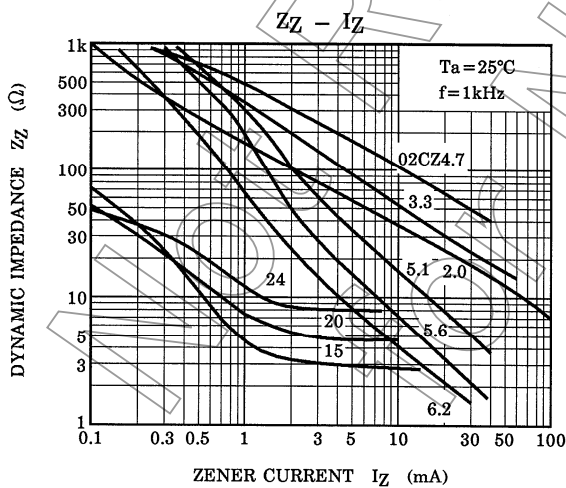
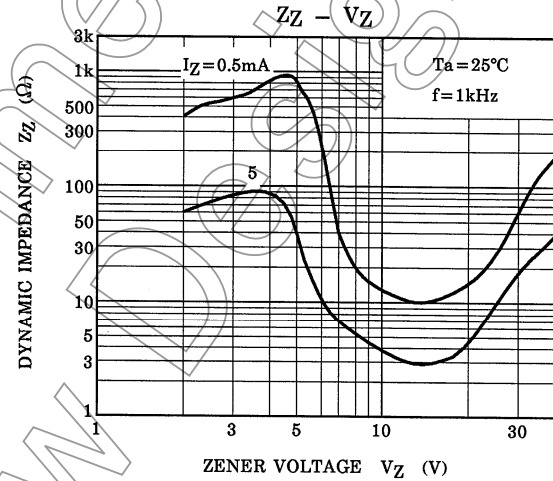
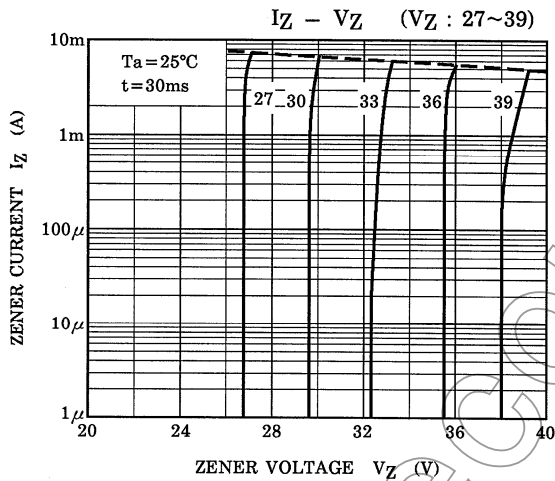
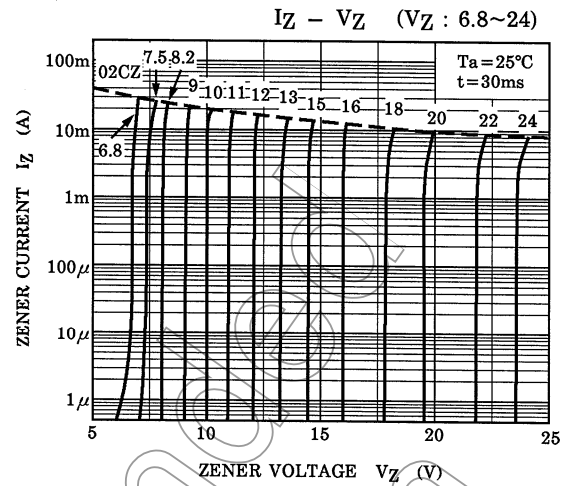
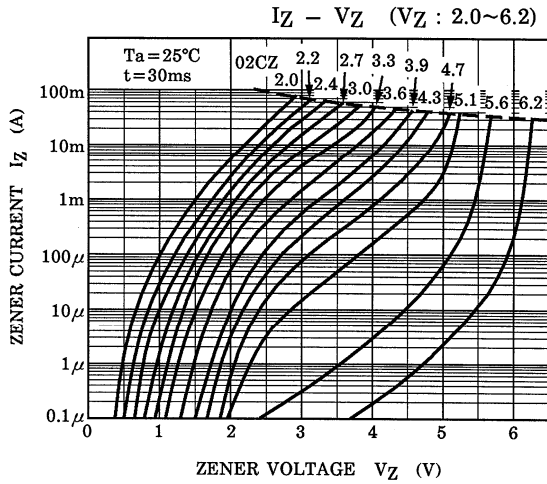
| Type No.  |   | Zener Voltage $V_Z$ (V) $t = 30\text{ms}$ $I_Z = 5\text{mA}$ |      |
|-----------|---|--------------------------------------------------------------|------|
|           |   | Min                                                          | Max  |
| 02CZ2.0-X | X | 1.85                                                         | 2.05 |
| 02CZ2.0-Z | Z | 1.95                                                         | 2.15 |
| 02CZ2.2-X | X | 2.05                                                         | 2.26 |
| 02CZ2.2-Z | Z | 2.16                                                         | 2.38 |
| 02CZ2.4-X | X | 2.28                                                         | 2.50 |
| 02CZ2.4-Z | Z | 2.40                                                         | 2.60 |
| 02CZ2.7-X | X | 2.50                                                         | 2.75 |
| 02CZ2.7-Z | Z | 2.65                                                         | 2.90 |
| 02CZ3.0-X | X | 2.80                                                         | 3.05 |
| 02CZ3.0-Z | Z | 2.95                                                         | 3.20 |
| 02CZ3.3-X | X | 3.10                                                         | 3.35 |
| 02CZ3.3-Z | Z | 3.25                                                         | 3.50 |
| 02CZ3.6-X | X | 3.40                                                         | 3.65 |
| 02CZ3.6-Z | Z | 3.55                                                         | 3.80 |
| 02CZ3.9-X | X | 3.70                                                         | 3.97 |
| 02CZ3.9-Z | Z | 3.87                                                         | 4.10 |
| 02CZ4.3-X | X | 4.00                                                         | 4.23 |
| 02CZ4.3-Y | Y | 4.13                                                         | 4.35 |
| 02CZ4.3-Z | Z | 4.25                                                         | 4.50 |
| 02CZ4.7-X | X | 4.40                                                         | 4.63 |
| 02CZ4.7-Y | Y | 4.53                                                         | 4.76 |
| 02CZ4.7-Z | Z | 4.66                                                         | 4.90 |
| 02CZ5.1-X | X | 4.80                                                         | 5.07 |
| 02CZ5.1-Y | Y | 4.97                                                         | 5.24 |
| 02CZ5.1-Z | Z | 5.14                                                         | 5.40 |
| 02CZ5.6-X | X | 5.30                                                         | 5.63 |
| 02CZ5.6-Y | Y | 5.43                                                         | 5.81 |
| 02CZ5.6-Z | Z | 5.61                                                         | 6.00 |

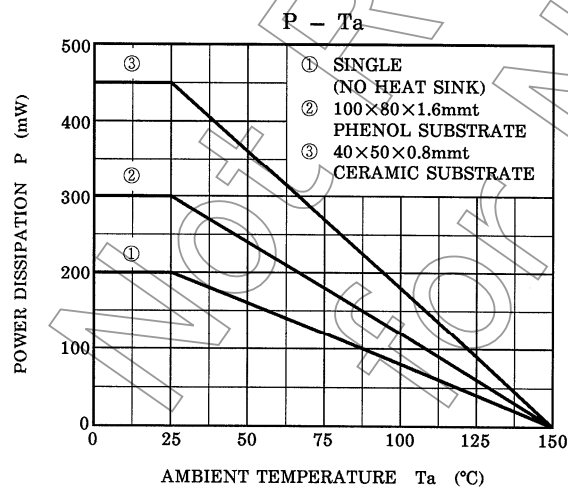
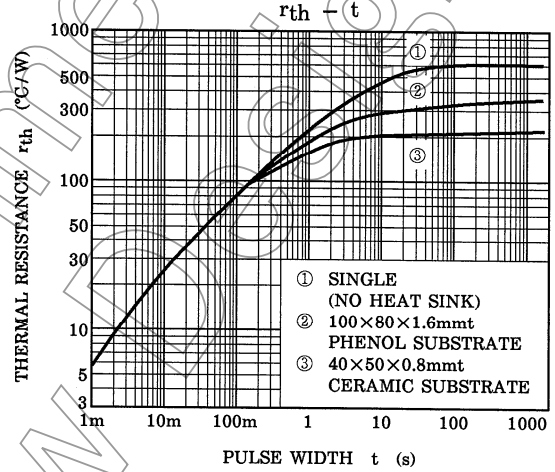
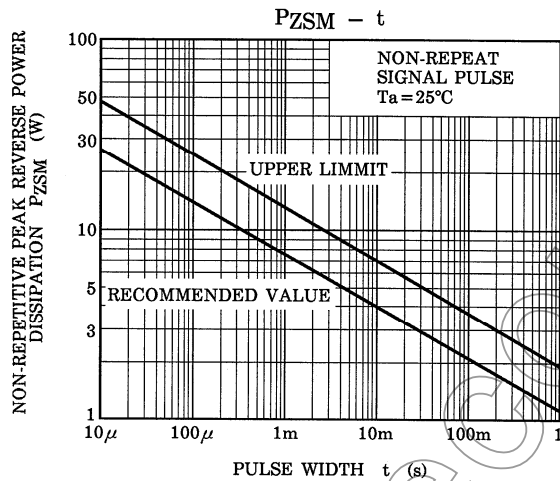
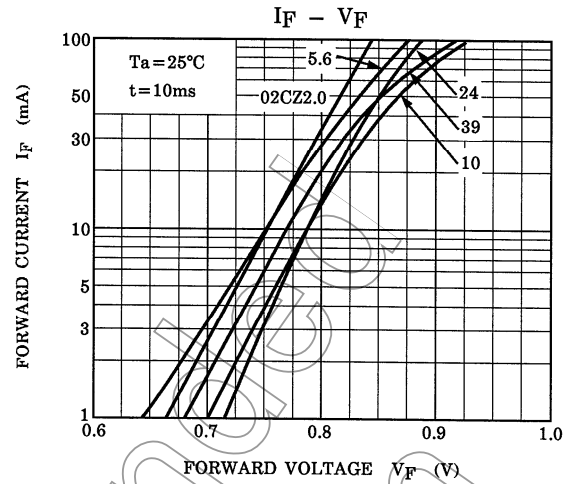
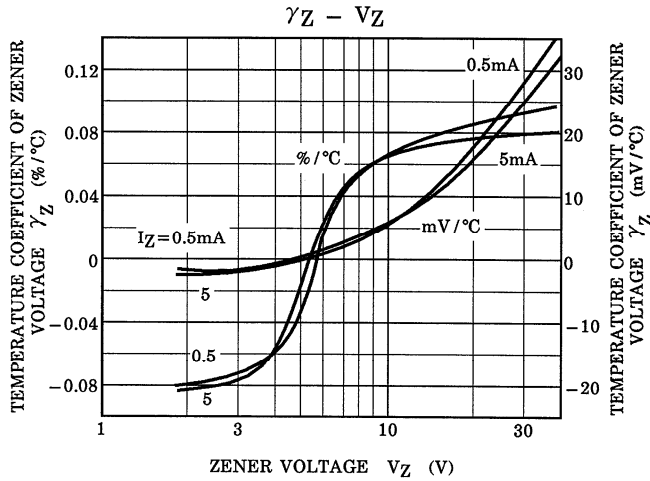
## Zener Voltage Classification

| Type No.  |   | Zener Voltage $V_Z$ (V) $t=30ms$ $I_Z = 5mA$ |       |
|-----------|---|----------------------------------------------|-------|
|           |   | Min                                          | Max   |
| 02CZ6.2-X | X | 5.80                                         | 6.20  |
| 02CZ6.2-Y | Y | 6.00                                         | 6.39  |
| 02CZ6.2-Z | Z | 6.19                                         | 6.60  |
| 02CZ6.8-X | X | 6.40                                         | 6.80  |
| 02CZ6.8-Y | Y | 6.60                                         | 7.02  |
| 02CZ6.8-Z | Z | 6.82                                         | 7.20  |
| 02CZ7.5-X | X | 7.00                                         | 7.43  |
| 02CZ7.5-Y | Y | 7.23                                         | 7.66  |
| 02CZ7.5-Z | Z | 7.46                                         | 7.90  |
| 02CZ8.2-X | X | 7.70                                         | 8.16  |
| 02CZ8.2-Y | Y | 7.96                                         | 8.43  |
| 02CZ8.2-Z | Z | 8.23                                         | 8.70  |
| 02CZ9.1-X | X | 8.50                                         | 9.00  |
| 02CZ9.1-Y | Y | 8.80                                         | 9.30  |
| 02CZ9.1-Z | Z | 9.10                                         | 9.60  |
| 02CZ10-X  | X | 9.40                                         | 9.93  |
| 02CZ10-Y  | Y | 9.73                                         | 10.26 |
| 02CZ10-Z  | Z | 10.06                                        | 10.60 |
| 02CZ11-X  | X | 10.40                                        | 10.98 |
| 02CZ11-Y  | Y | 10.73                                        | 11.26 |
| 02CZ11-Z  | Z | 11.06                                        | 11.60 |
| 02CZ12-X  | X | 11.40                                        | 11.93 |
| 02CZ12-Y  | Y | 11.73                                        | 12.26 |
| 02CZ12-Z  | Z | 12.06                                        | 12.60 |
| 02CZ13-X  | X | 12.40                                        | 13.08 |
| 02CZ13-Y  | Y | 12.88                                        | 13.57 |
| 02CZ13-Z  | Z | 13.37                                        | 14.10 |

## Zener Voltage Classification

| Type No. |   | Zener Voltage $V_Z$ (V) $t = 30\text{ms}$ $I_Z = 5\text{mA}$ |       |
|----------|---|--------------------------------------------------------------|-------|
|          |   | Min                                                          | Max   |
| 02CZ15-X | X | 13.80                                                        | 14.63 |
| 02CZ15-Y | Y | 14.33                                                        | 15.11 |
| 02CZ15-Z | Z | 14.81                                                        | 15.60 |
| 02CZ16-X | X | 15.30                                                        | 16.10 |
| 02CZ16-Y | Y | 15.80                                                        | 16.60 |
| 02CZ16-Z | Z | 16.30                                                        | 17.10 |
| 02CZ18-X | X | 16.80                                                        | 17.76 |
| 02CZ18-Y | Y | 17.46                                                        | 18.43 |
| 02CZ18-Z | Z | 18.13                                                        | 19.10 |
| 02CZ20-X | X | 18.80                                                        | 19.78 |
| 02CZ20-Y | Y | 19.48                                                        | 20.46 |
| 02CZ20-Z | Z | 20.16                                                        | 21.20 |
| 02CZ22-X | X | 20.80                                                        | 21.88 |
| 02CZ22-Y | Y | 21.48                                                        | 22.56 |
| 02CZ22-Z | Z | 22.16                                                        | 23.30 |
| 02CZ24-X | X | 22.80                                                        | 24.11 |
| 02CZ24-Y | Y | 23.61                                                        | 24.92 |
| 02CZ24-Z | Z | 24.42                                                        | 25.60 |





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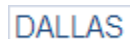
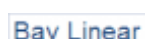
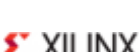
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