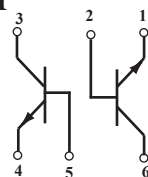
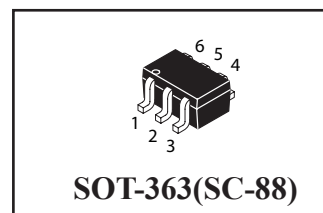


### Surface Mount Dual Bias Resistor Transistor NPN Silicon

 Lead(Pb)-Free



NPN+NPN



### Maximum Ratings

| Rating                    | Symbol           | Value | Unit             |
|---------------------------|------------------|-------|------------------|
| Collector-Emitter Voltage | V <sub>CEO</sub> | 50    | V <sub>dc</sub>  |
| Collector-Base Voltage    | V <sub>CB0</sub> | 50    | V <sub>dc</sub>  |
| Collector Current         | I <sub>C</sub>   | 100   | mA <sub>dc</sub> |

### Thermal Characteristics

| Characteristics (1)                           | Symbol                           | Max                                      | Unit        |
|-----------------------------------------------|----------------------------------|------------------------------------------|-------------|
| Total Device Dissipation T <sub>A</sub> =25°C | P <sub>D</sub>                   | 187 (2)<br>256 (3)<br>1.5 (2)<br>2.0 (3) | mW<br>mW/°C |
| Thermal Resistance, Junction to Ambient       | R <sub>θJA</sub>                 | 670(2)<br>490(3)                         | °C/W        |
| Junction and Storage, Temperature             | T <sub>J</sub> ,T <sub>stg</sub> | -55 to +150                              | °C          |

1.One Junction Heated

2.FR-4 @ Minimum Pad

3.FR-4 @ 1.0×1.0 Inch Pad

### Device Marking and Resistor Values

| Device    | Marking | R1(K) | R2(K) | Device    | Marking | R1(K) | R2(K) |
|-----------|---------|-------|-------|-----------|---------|-------|-------|
| MUN5211DW | 7A      | 10    | 10    | MUN5231DW | 7H      | 2.2   | 2.2   |
| MUN5212DW | 7B      | 22    | 22    | MUN5232DW | 7J      | 4.7   | 4.7   |
| MUN5213DW | 7C      | 47    | 47    | MUN5233DW | 7K      | 4.7   | 47    |
| MUN5214DW | 7D      | 10    | 47    | MUN5234DW | 7L      | 22    | 47    |
| MUN5215DW | 7E      | 10    | ∞     | MUN5235DW | 7M      | 2.2   | 47    |
| MUN5216DW | 7F      | 4.7   | ∞     | MUN5236DW | 7N      | 100   | 100   |
| MUN5230DW | 7G      | 1.0   | 1.0   | MUN5237DW | 7P      | 47    | 22    |

**Electrical Characteristics** (TA=25°C Unless Otherwise noted)

| Characteristics | Symbol | Min | Max | Unit |
|-----------------|--------|-----|-----|------|
|-----------------|--------|-----|-----|------|

**Off Characteristics**

|                                                                                   |                      |    |      |      |
|-----------------------------------------------------------------------------------|----------------------|----|------|------|
| Collector-Base Cutoff Current (V <sub>CB</sub> =50Vdc, I <sub>E</sub> =0)         | I <sub>CBO</sub>     | -  | 100  | nAdc |
| Collector-Emitter Cutoff Current(V <sub>CE</sub> =50Vdc, I <sub>B</sub> =0)       | I <sub>CEO</sub>     | -  | 500  | nAdc |
| Emitter-Base Cutoff Current (V <sub>EB</sub> =6.0Vdc, I <sub>C</sub> =0)          | I <sub>EBO</sub>     | -  | 0.5  | mAdc |
| MUN5211DW                                                                         |                      | -  | 0.2  |      |
| MUN5212DW                                                                         |                      | -  | 0.1  |      |
| MUN5213DW                                                                         |                      | -  | 0.2  |      |
| MUN5214DW                                                                         |                      | -  | 0.9  |      |
| MUN5215DW                                                                         |                      | -  | 1.9  |      |
| MUN5216DW                                                                         |                      | -  | 4.3  |      |
| MUN5230DW                                                                         |                      | -  | 2.3  |      |
| MUN5231DW                                                                         |                      | -  | 1.5  |      |
| MUN5232DW                                                                         |                      | -  | 0.18 |      |
| MUN5233DW                                                                         |                      | -  | 0.13 |      |
| MUN5234DW                                                                         |                      | -  | 0.2  |      |
| MUN5235DW                                                                         |                      | -  | 0.05 |      |
| MUN5236DW                                                                         |                      | -  | 0.13 |      |
| MUN5237DW                                                                         |                      | -  |      |      |
| Collector-Base Breakdown Voltage (I <sub>C</sub> =10uAdc, I <sub>E</sub> =0)      | V <sub>(BR)CBO</sub> | 50 | -    | Vdc  |
| Collector-Emitter Breakdown Voltage(4) (I <sub>C</sub> =2.0mA, I <sub>B</sub> =0) | V <sub>(BR)CEO</sub> | 50 | -    | Vdc  |

4. Pulse Test: Pulse Width &lt; 300us, Duty Cycle &lt; 2.0%

## Electrical Characteristics ( $T_A=25^{\circ}\text{C}$ unless otherwise noted) (Continued)

| Characteristics | Symbol | Min | Typ | Max | Unit |
|-----------------|--------|-----|-----|-----|------|
|-----------------|--------|-----|-----|-----|------|

### On Characteristics (4)

|                                                                                                                                                                                                                                                                                                                      |                                                                                        |               |     |     |      |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|---------------|-----|-----|------|-----|
| DC Current Gain<br>( $I_C = 5.0\text{mA}$ , $V_{CE} = 10\text{V}$ )                                                                                                                                                                                                                                                  | MUN5211DW                                                                              | $H_{FE}$      | 35  | 60  | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5212DW                                                                              |               | 60  | 100 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5213DW                                                                              |               | 80  | 140 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5214DW                                                                              |               | 80  | 140 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5215DW                                                                              |               | 160 | 350 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5216DW                                                                              |               | 160 | 350 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5230DW                                                                              |               | 3.0 | 5.0 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5231DW                                                                              |               | 8.0 | 15  | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5232DW                                                                              |               | 15  | 30  | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5233DW                                                                              |               | 80  | 200 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5234DW                                                                              |               | 80  | 150 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5235DW                                                                              |               | 80  | 140 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5236DW                                                                              |               | 80  | 150 | -    |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5237DW                                                                              |               | 80  | 140 | -    |     |
| Collector-Emitter Saturation Voltage<br>( $I_C = 10\text{mA}$ , $I_B = 0.3\text{mA}$ )<br>( $I_C = 10\text{mA}$ , $I_B = 5.0\text{mA}$ ) MUN5230DW/MUN5231DW<br>( $I_C = 10\text{mA}$ , $I_B = 1.0\text{mA}$ ) MUN5215DW/MUN5216DW<br>MUN5232DW/MUN5233DW/MUN5234DW                                                  |                                                                                        | $V_{CE(sat)}$ | -   | -   | 0.25 | Vdc |
| Output Voltage (on)<br>( $V_{CC} = 5.0\text{V}$ , $V_B = 2.5\text{V}$ , $R_L = 1.0\text{k}\Omega$ )                                                                                                                                                                                                                  | MUN5211DW                                                                              | $V_{OL}$      | -   | -   | 0.2  | Vdc |
|                                                                                                                                                                                                                                                                                                                      | MUN5212DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5214DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5215DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5216DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5230DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5231DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5232DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5233DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5234DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | MUN5235DW                                                                              |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | ( $V_{CC} = 5.0\text{V}$ , $V_B = 3.5\text{V}$ , $R_L = 1.0\text{k}\Omega$ ) MUN5213DW |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | ( $V_{CC} = 5.0\text{V}$ , $V_B = 5.5\text{V}$ , $R_L = 1.0\text{k}\Omega$ ) MUN5236DW |               | -   | -   | 0.2  |     |
|                                                                                                                                                                                                                                                                                                                      | ( $V_{CC} = 5.0\text{V}$ , $V_B = 4.0\text{V}$ , $R_L = 1.0\text{k}\Omega$ ) MUN5237DW |               | -   | -   | 0.2  |     |
| Output Voltage (off)<br>( $V_{CC} = 5.0\text{V}$ , $V_B = 0.5\text{V}$ , $R_L = 1.0\text{k}\Omega$ )<br>( $V_{CC} = 5.0\text{V}$ , $V_B = 0.05\text{V}$ , $R_L = 1.0\text{k}\Omega$ ) MUN5230DW<br>( $V_{CC} = 5.0\text{V}$ , $V_B = 0.25\text{V}$ , $R_L = 1.0\text{k}\Omega$ ) MUN5215DW<br>MUN5216DW<br>MUN5233DW |                                                                                        | $V_{OL}$      | 4.9 | -   | -    | Vdc |

4. Pulse Test: Pulse Width < 300us, Duty Cycle < 2.0%

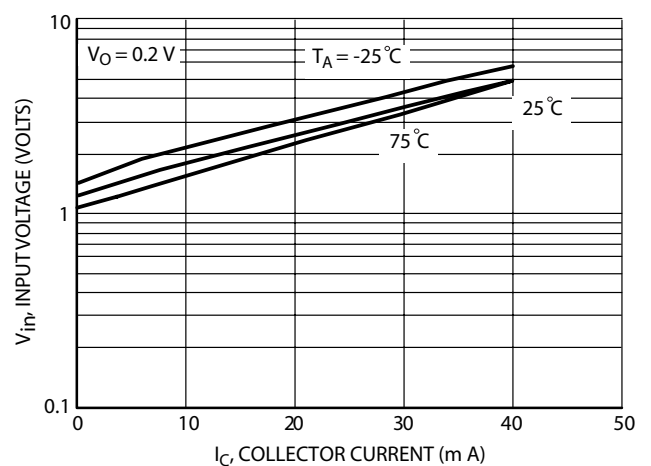
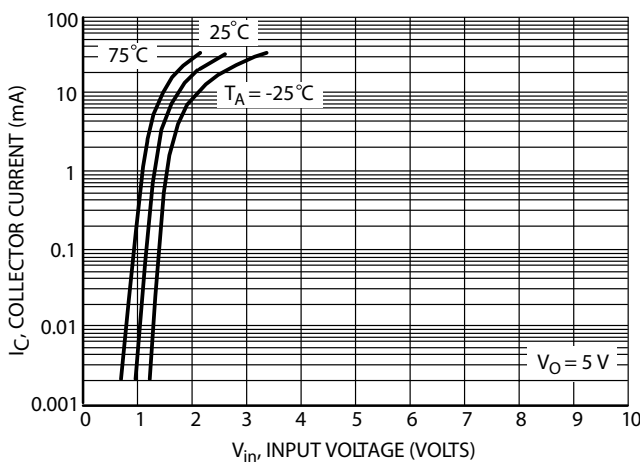
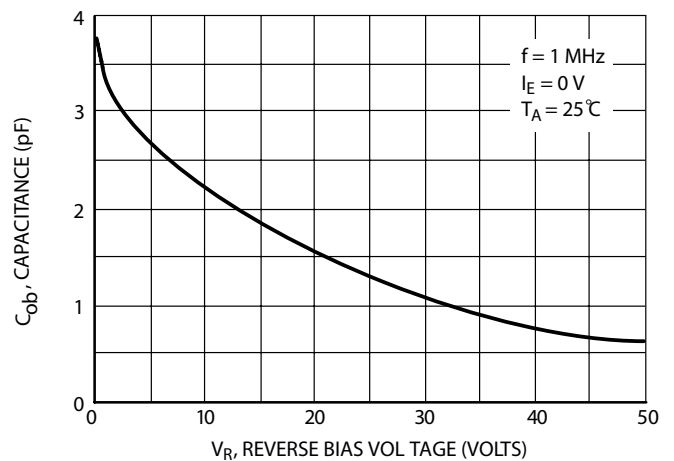
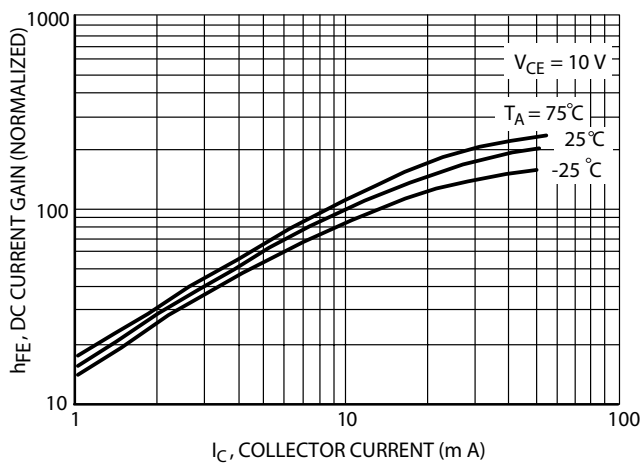
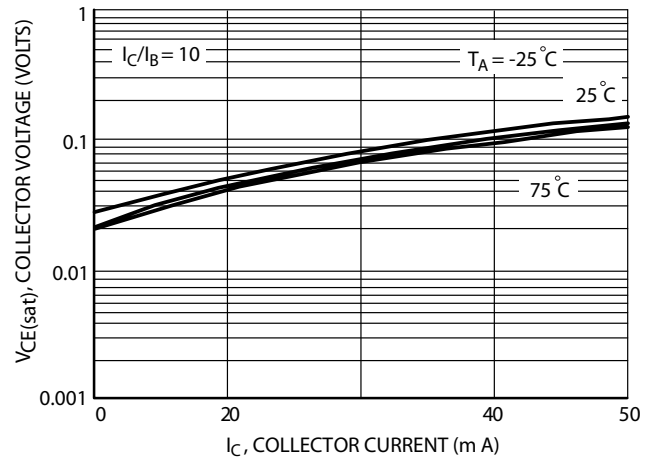
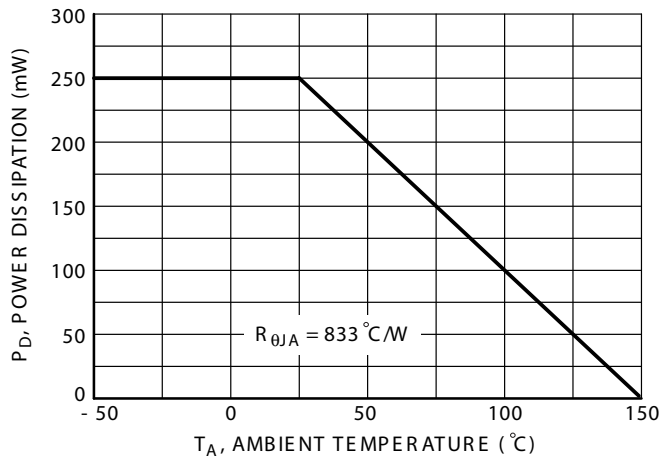
**Electrical Characteristics** ( $T_A=25^{\circ}\text{C}$  unless otherwise noted) (Continued)

| Characteristics | Symbol | Min | Typ | Max | Unit |
|-----------------|--------|-----|-----|-----|------|
|-----------------|--------|-----|-----|-----|------|

**On Characteristics** <sup>(5)</sup>

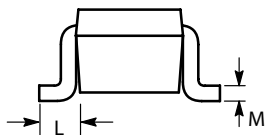
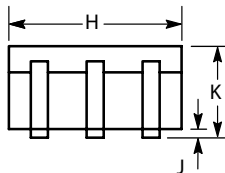
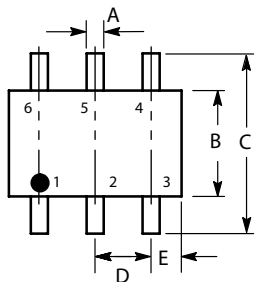
|                |                               |       |       |       |       |            |
|----------------|-------------------------------|-------|-------|-------|-------|------------|
| Input Resistor | MUN5211DW                     | R1    | 7.0   | 10    | 13    | k $\Omega$ |
|                | MUN5212DW                     |       | 15.4  | 22    | 28.6  |            |
|                | MUN5213DW                     |       | 32.9  | 47    | 61.1  |            |
|                | MUN5214DW                     |       | 7.0   | 10    | 13    |            |
|                | MUN5215DW                     |       | 7.0   | 10    | 13    |            |
|                | MUN5216DW                     |       | 3.3   | 4.7   | 6.1   |            |
|                | MUN5230DW                     |       | 0.7   | 1.0   | 1.3   |            |
|                | MUN5231DW                     |       | 1.5   | 2.2   | 2.9   |            |
|                | MUN5232DW                     |       | 3.3   | 4.7   | 6.1   |            |
|                | MUN5233DW                     |       | 3.3   | 4.7   | 6.1   |            |
|                | MUN5234DW                     |       | 15.4  | 22    | 28.6  |            |
|                | MUN5235DW                     |       | 1.54  | 2.2   | 2.86  |            |
|                | MUN5236DW                     |       | 70    | 100   | 130   |            |
|                | MUN5237DW                     |       | 32.9  | 47    | 61.1  |            |
| Resistor Ratio | MUN5211DW/MUN5212DW           | R1/R2 | 0.8   | 1.0   | 1.2   |            |
|                | MUN5213DW/MUN5236DW           |       | 0.17  | 0.21  | 0.25  |            |
|                | MUN5214DW                     |       | -     | -     | -     |            |
|                | MUN5215DW/MUN5216DW           |       | 0.8   | 1.0   | 1.2   |            |
|                | MUN5230DW/MUN5231DW/MUN5232DW |       | 0.055 | 0.1   | 0.185 |            |
|                | MUN5233DW                     |       | 0.38  | 0.47  | 0.56  |            |
|                | MUN5234DW                     |       | 0.038 | 0.047 | 0.056 |            |
|                | MUN5235DW                     |       | 1.7   | 2.1   | 2.6   |            |
|                | MUN5237DW                     |       |       |       |       |            |

5. Pulse Test: Pulse Width < 300  $\mu\text{s}$ , Duty Cycle < 2.0%



SOT-363 Package Outline Dimensions

Unit:mm



| SOT-363 |          |      |
|---------|----------|------|
| Dim     | Min      | Max  |
| A       | 0.10     | 0.30 |
| B       | 1.15     | 1.35 |
| C       | 2.00     | 2.20 |
| D       | 0.65 REF |      |
| E       | 0.30     | 0.40 |
| H       | 1.80     | 2.20 |
| J       | -        | 0.10 |
| K       | 0.80     | 1.10 |
| L       | 0.25     | 0.40 |
| M       | 0.10     | 0.25 |