

## Small Signal Product

## 350mW, PNP Small Signal Transistor

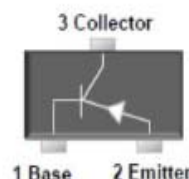
**FEATURES**

- Epitaxial planar die construction
- Surface device type mounting
- Moisture sensitivity level 1
- Matte Tin (Sn) lead finish with Nickel (Ni) underplate
- Pb free version and RoHS compliant
- Packing code with suffix "G" means green compound (halogen-free)


**SOT-23**

**MECHANICAL DATA**

- Case: SOT- 23, molded plastic
- Terminal: Matte tin plated, lead free, solderable per MIL-STD-202, Method 208 guaranteed
- High temperature soldering guaranteed: 260°C/10s
- Weight: 0.008g (approximately)
- Marking Code: 2A



| MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS (T <sub>A</sub> =25°C unless otherwise noted) |                                   |              |      |
|--|-----------------------------------|--------------|------|
| PARAMETER  | SYMBOL                            | VALUE        | UNIT |
| Power Dissipation  | P <sub>D</sub>                    | 350          | mW   |
| Collector-Base Voltage   | V <sub>CB0</sub>                  | -40          | V    |
| Collector-Emitter Voltage  | V <sub>CEO</sub>                  | -40          | V    |
| Emitter-Base Voltage   | V <sub>EBO</sub>                  | -5           | V    |
| Collector Current  | I <sub>C</sub>                    | -200         | mA   |
| Thermal Resistance Junction-Ambient  | R <sub>θJA</sub>                  | 357          | °C/W |
| Junction and Storage Temperature Range   | T <sub>J</sub> , T <sub>STG</sub> | -55 to + 150 | °C   |

Notes: 1. Valid provided that electrodes are kept at ambient temperature

| PARAMETER  | SYMBOL               | MIN   | MAX   | UNIT |
|--|----------------------|---|-------|------|
| Collector-Base Breakdown Voltage<br>I <sub>C</sub> = 10 μA I <sub>E</sub> = 0  | V <sub>(BR)CBO</sub> | -40   | -     | V    |
| Collector-Emitter Breakdown Voltage<br>I <sub>C</sub> = -1 mA I <sub>B</sub> = 0   | V <sub>(BR)CEO</sub> | -40   | -     | V    |
| Emitter-Base Breakdown Voltage<br>I <sub>E</sub> = -10 μA I <sub>C</sub> = 0   | V <sub>(BR)EBO</sub> | -5  | -     | V    |
| Collector Base Cut-off Current<br>V <sub>CB</sub> = -40 V  | I <sub>CBO</sub>     | -   | -100  | nA   |
| Emitter Base Cut-off Current<br>V <sub>EB</sub> = -6 V   | I <sub>EBO</sub>     | -   | -50   | nA   |
| DC Current Gain  | h <sub>FE</sub>      | V <sub>CE</sub> = -1 V I <sub>C</sub> = -0.1 mA | 60    | 300  |
|  |                      | V <sub>CE</sub> = -1 V I <sub>C</sub> = -1 mA   | 80    |      |
|  |                      | V <sub>CE</sub> = -1 V I <sub>C</sub> = -10 mA  | 100   |      |
|  |                      | V <sub>CE</sub> = -1 V I <sub>C</sub> = -50 mA  | 60    |      |
|  |                      | V <sub>CE</sub> = -1 V I <sub>C</sub> = -100 mA | 30    |      |
| Collector-Emitter Saturation Voltage<br>I <sub>C</sub> = -10 mA I <sub>B</sub> = -1 mA<br>I <sub>C</sub> = -50 mA I <sub>B</sub> = -5 mA | V <sub>CE(sat)</sub> | -   | -0.25 | V    |
|  |                      | -   | -0.4  |      |
| Base-Emitter Saturation Voltage<br>I <sub>C</sub> = -10 mA I <sub>B</sub> = -1 mA<br>I <sub>C</sub> = -50 mA I <sub>B</sub> = -5 mA      | V <sub>BE(sat)</sub> | -0.65   | -0.85 | V    |
|  |                      | -   | -0.95 |      |
| Gain-Bandwidth Product<br>V <sub>CE</sub> = -20 V I <sub>C</sub> = -10 mA f = 100MHz   | f <sub>T</sub>       | 250   | -     | MHz  |
| Output Capacitance<br>V <sub>CB</sub> = -5 V I <sub>E</sub> = 0 f = 1MHz   | C <sub>obo</sub>     | -   | 4.5   | pF   |
| Delay time<br>V <sub>CC</sub> = -3 V V <sub>BE</sub> = -0.5 V I <sub>C</sub> = -10 mA  | t <sub>d</sub>       | -   | 35    | ns   |
| Rise time<br>I <sub>B1</sub> = -1.0 mA   | t <sub>r</sub>       | -   | 35    | ns   |
| Storage time<br>V <sub>CC</sub> = -3 V I <sub>C</sub> = -10 mA   | t <sub>s</sub>       | -   | 225   | ns   |
| Fall time<br>I <sub>B1</sub> = I <sub>B2</sub> = -1.0 mA   | t <sub>f</sub>       | -   | 75    | ns   |

Small Signal Product

RATINGS AND CHARACTERISTICS CURVES

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

Fig. 1 Capacitance

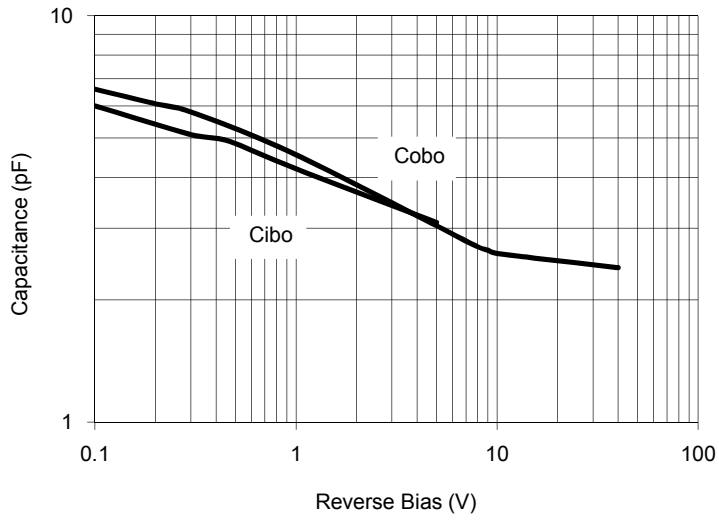


Fig. 2 Charge Data

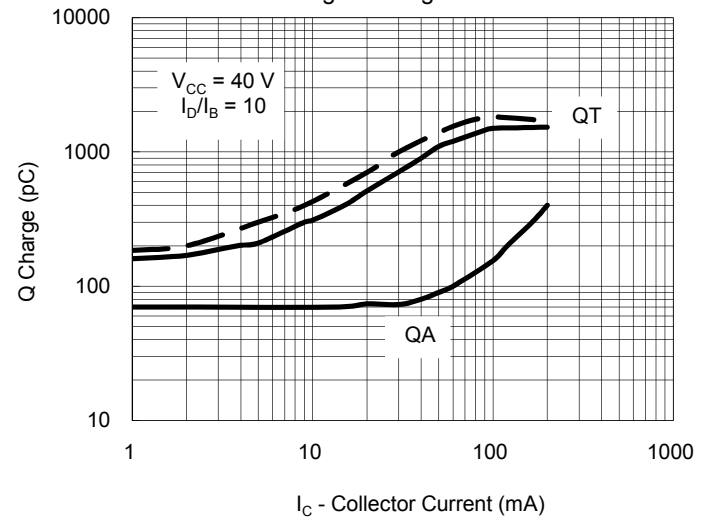


Fig. 3 Turn - On Time

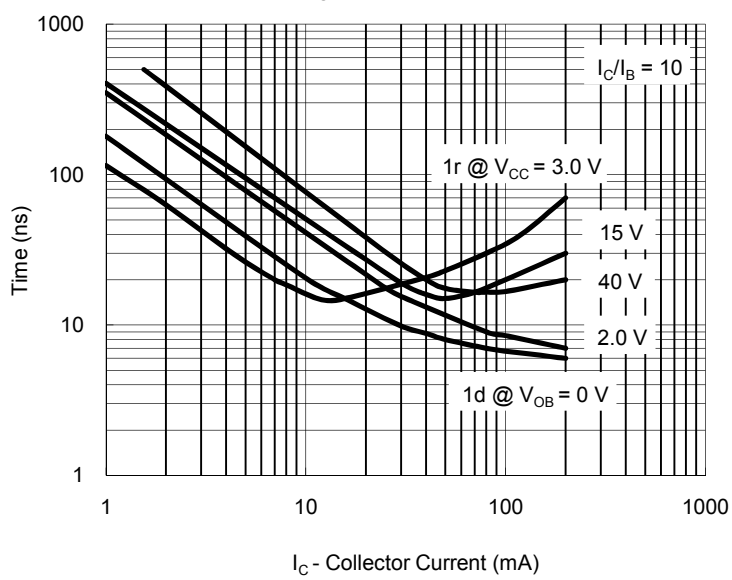


Fig. 4 Fall Time

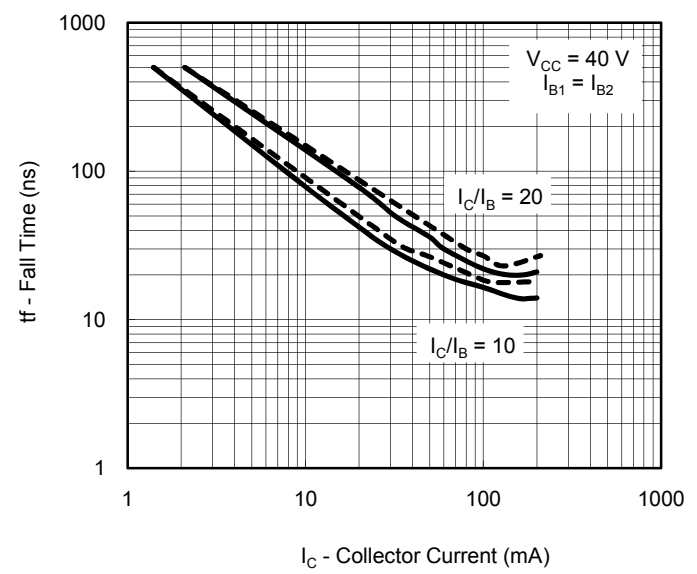


Fig. 5 Noise Figure VS. Frequency

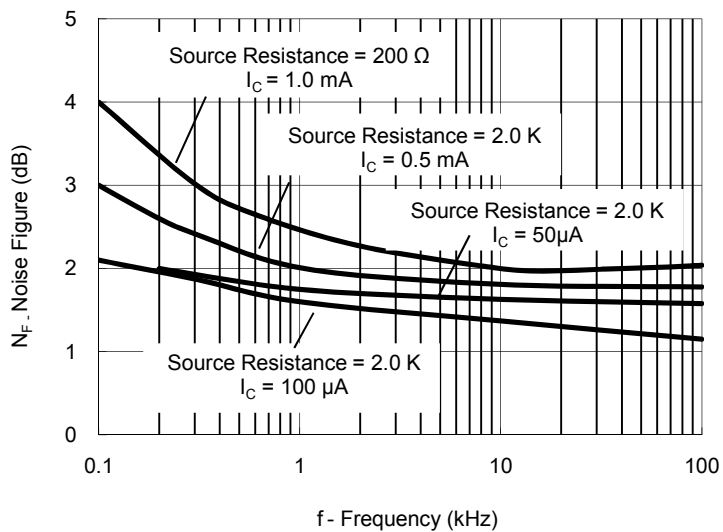
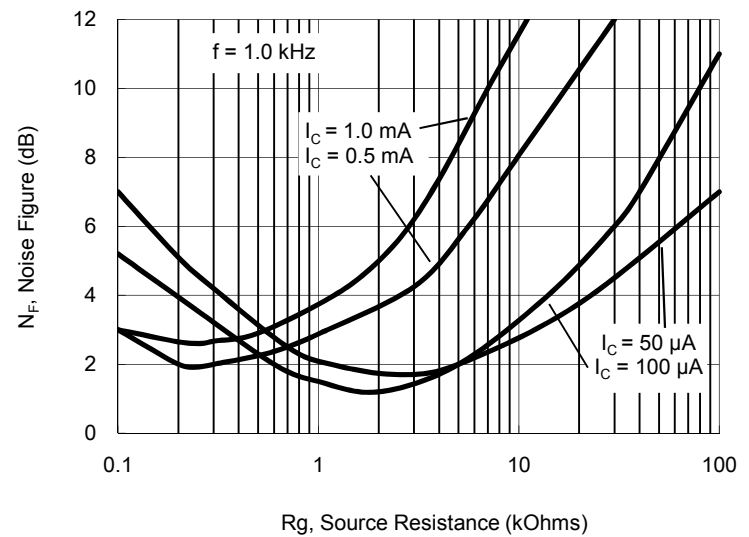


Fig. 6 Noise Figure VS. Source



Small Signal Product

h Parameters (  $V_{CE} = -10 V_{DC}$ ,  $f = 1.0 \text{ kHz}$ ,  $T_A = 25^\circ \text{C}$  )

Fig. 7 Current Gain

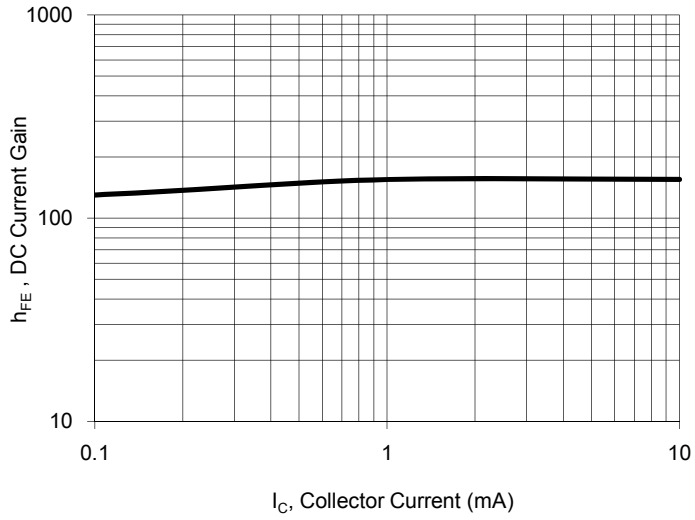


Fig. 8 Output Admittance

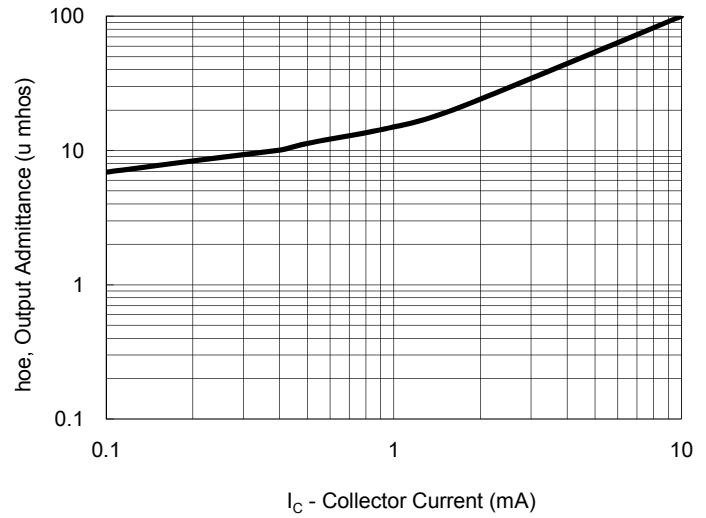


Fig. 9 Input Impedance

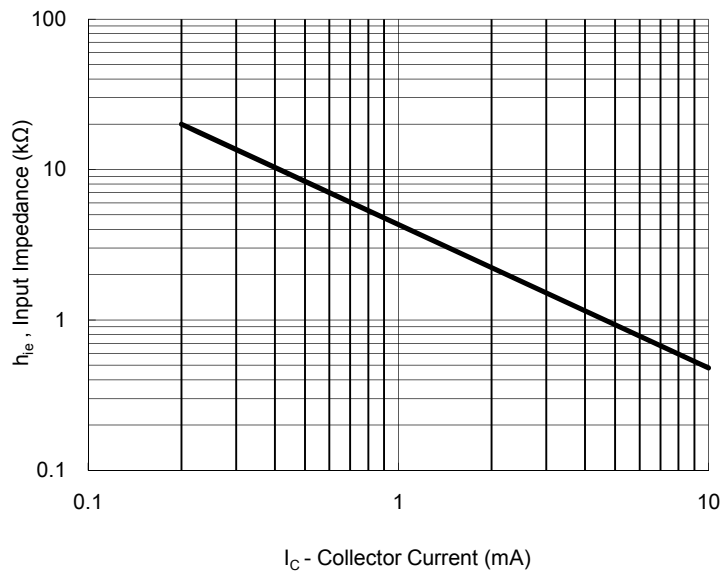


Fig. 10 Voltage Feedback Ratio

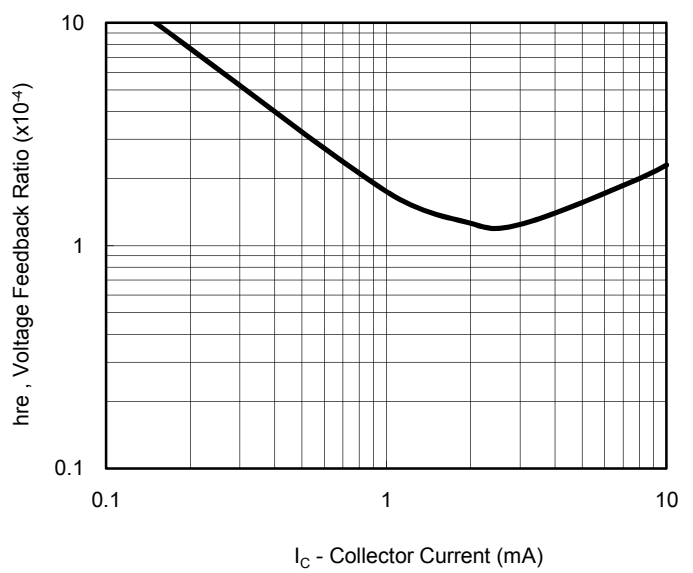


Fig. 11 "ON" Voltages

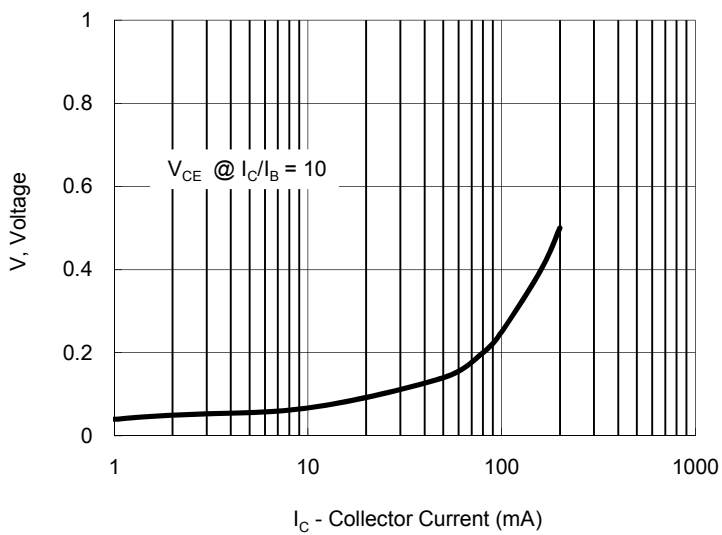
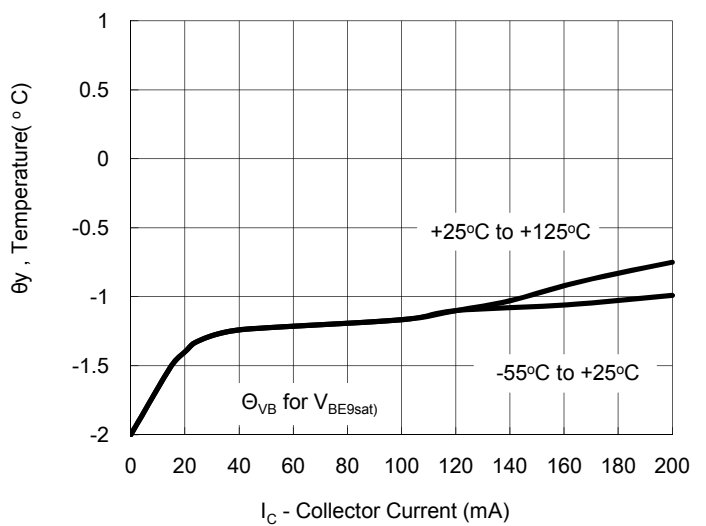


Fig. 12 Temperature Coefficients



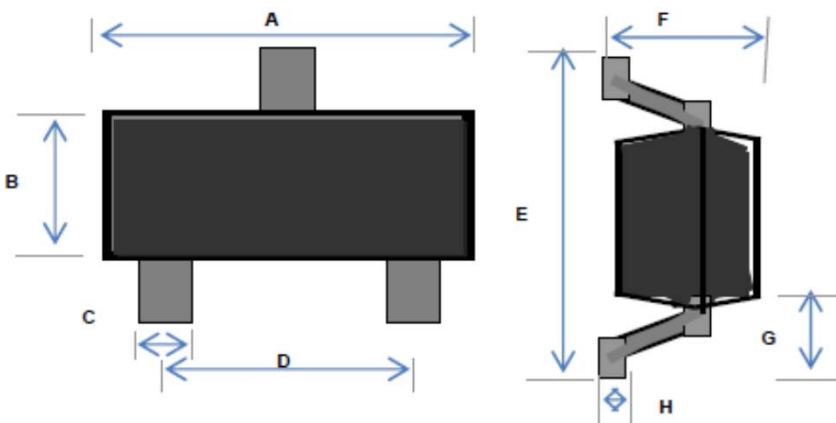
Small Signal Product

| ORDERING INFORMATION |                          |              |                     |         |                |
|----------------------|--------------------------|--------------|---------------------|---------|----------------|
| PART NO.             | PART NO. SUFFIX (Note 1) | PACKING CODE | PACKING CODE SUFFIX | PACKAGE | PACKING        |
| MMBT3906             | -xx                      | RF           | G                   | SOT-23  | 3K / 7" Reel   |
|                      |                          | R5           |                     |         | 10K / 13" Reel |

Note 1: Part No. Suffix „-xx “ would be used for special requirement

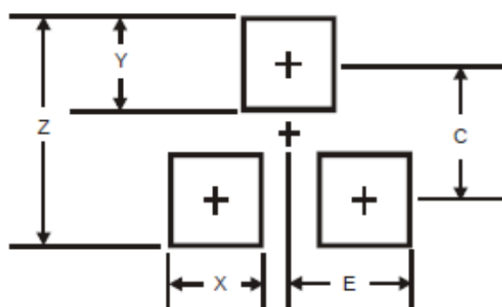
| EXAMPLE         |          |                 |              |                     |   |
|-----------------|----------|-----------------|--------------|---------------------|---|
| PREFERRED P/N   | PART NO. | PART NO. SUFFIX | PACKING CODE | PACKING CODE SUFFIX | DESCRIPTION                                   |
| MMBT3906 RF     | MMBT3906 |                 | RF           |                     | Multiple manufacture source                   |
| MMBT3906 RFG    | MMBT3906 |                 | RF           | G                   | Multiple manufacture source<br>Green compound |
| MMBT3906-D0 RFG | MMBT3906 | -D0             | RF           | G                   | Defined manufacture source<br>Green compound  |
| MMBT3906-B0 RFG | MMBT3906 | -B0             | RF           | G                   | Defined manufacture source<br>Green compound  |

PACKAGE OUTLINE DIMENSIONS



| DIM. | Unit(mm) |      | Unit(inch) |       |
|------|----------|------|------------|-------|
|      | Min      | Max  | Min        | Max   |
| A    | 2.70     | 3.10 | 0.106      | 0.122 |
| B    | 1.10     | 1.50 | 0.043      | 0.059 |
| C    | 0.30     | 0.51 | 0.012      | 0.020 |
| D    | 1.78     | 2.04 | 0.070      | 0.080 |
| E    | 2.10     | 2.64 | 0.083      | 0.104 |
| F    | 0.89     | 1.30 | 0.035      | 0.051 |
| G    | 0.55 REF |      | 0.022 REF  |       |
| H    | 0.10 REF |      | 0.004 REF  |       |

SUGGEST PAD LAYOUT



| DIM | Unit (mm) | Unit (inch) |
|-----|-----------|-------------|
|     | TYP       | TYP         |
| Z   | 2.8       | 0.11        |
| X   | 0.7       | 0.03        |
| Y   | 0.9       | 0.04        |
| C   | 1.9       | 0.07        |
| E   | 1.0       | 0.04        |

Small Signal Product

### Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.