SGS-THOMSON MICROELECTRONICS

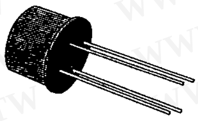
# BFX73-2N918 2N3600

S G S-THOMSON

## HIGH-FREQUENCY OSCILLATORS AND AMPLIFIERS

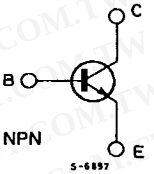
The BFX73, 2N918 and 2N3600 are silicon planar epitaxial NPN transistors in Jedec TO-72 metal case.

They are designed for low-noise VHF amplifiers, oscillators up to 1 GHz, non-neutralized IF amplifiers and non-saturating circuits with rise and fall times of less than 2.5 ns.






### INTERNAL SCHEMATIC DIAGRAM




### ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-base Voltage ($I_E = 0$) | 30 | V |
| $V_{CEO}$ | Collector-emitter Voltage ($I_B = 0$) | 15 | V |
| $V_{EBO}$ | Emitter-base Voltage ($I_C = 0$) | 3 | V |
| $I_C$ | Collector Current | 50 | mA |
| $P_{tot}$ | Total Power Dissipation at $T_{amb} \leq 25$ °C<br>at $T_{amb} \leq 25$ °C | 200<br>300 | mW<br>mW |
| $T_{stg}$, $T_j$ | Storage and Junction Temperature | – 65 to 200 | °C |

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## THERMAL DATA

| | | | | |
|---|---|---|---|---|
| $R_{th\ j\text{-}case}$ | Thermal Resistance Junction-case | Max | 584 | °C/W |
| $R_{th\ j\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 875 | °C/W |

## ELECTRICAL CHARACTERISTICS ($T_{amb}$ = 25 °C unless otherwise specified)

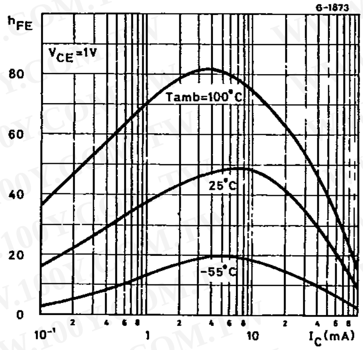
| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $I_{CBO}$ | Collector Cutoff Current ($I_E$ = 0) | $V_{CB}$ = 15 V<br>$V_{CB}$ = 15 V $T_{amb}$ = 150 °C | | | 10<br>1 | nA<br>µA |
| $V_{(BR)CBO}$ | Collector-base Breakdown Voltage ($I_E$ = 0) | $I_C$ = 1 µA | 30 | | | V |
| $V_{CEO\ (sus)}$ | Collector-emitter Sustaining Voltage ($I_B$ = 0) | $I_C$ = 3 mA | 15 | | | V |
| $V_{(BR)\ EBO}$ | Emitter-base Breakdown Voltage ($I_C$ = 0) | $I_E$ = 10 µA | 3 | | | V |
| $V_{CE\ (sat)}$ | Collector-emitter Saturation Voltage | $I_C$ = 10 mA $I_B$ = 1 mA | | | 0.4 | V |
| $V_{BE\ (sat)}$ | Base-emitter Saturation Voltage | $I_C$ = 10 mA $I_B$ = 1 mA | | | 1 | V |
| $h_{FE}$ | DC Current Gain | $I_C$ = 3 mA $V_{CE}$ = 1 V<br>for **2N918/BFX73**<br>for **2N3600** | 20<br>20 | 50 | 150 | |
| $f_T$ | Transition Frequency | for **2N918/BFX73**<br>$I_C$ = 4 mA $V_{CE}$ = 10 V<br>f = 100 MHz<br>for **2N3600**<br>$I_C$ = 5 mA $V_{CE}$ = 6 V<br>f = 100 MHz | 600<br><br>850 | 900 | <br><br>1500 | MHz<br><br>MHz |
| $C_{EBO}$ | Emitter-base Capacitance | $I_C$ = 0 $V_{EB}$ = 0.5 V<br>f = 1 MHz<br>for **2N918/BFX73**<br>for **2N3600** | | <br>1.4 | 2 | pF<br>pF |
| $C_{CBO}$ | Collector-base Capacitance (for **2N918/BFX73** only) | $I_E$ = 0 f = 1 MHz<br>$V_{CE}$ = 0 V<br>$V_{CE}$ = 10 V | | 1.8<br>1 | 3<br>1.7 | pF<br>pF |
| $C_{re}$ | Reverse Capacitance (for **2N3600** only) | $I_C$ = 0 $V_{CB}$ = 10 V<br>f = 1 MHz | | | 1 | pF |
| NF | Noise Figure | $I_C$ = 1.5 mA $V_{CE}$ = 6 V<br>$R_g$ = 50 Ω f = 200 MHz<br>for **2N3600**<br>$I_C$ = 1 mA $V_{CE}$ = 6 V<br>$R_g$ = 400 Ω f = 60 MHz<br>for **2N918/BFX73**<br>for **2N3600** | | | 4.5<br><br>6<br>3 | dB<br><br>dB<br>dB |
| $G_{pe}$ | Power Gain | $R_g$ = 50 Ω f = 200 MHz<br>for **2N918/BFX73**<br>$I_C$ = 6 mA $V_{CE}$ = 12 V<br>for **2N3600**<br>$I_C$ = 5 mA $V_{CE}$ = 6 V | 15<br><br>17 | 21 | <br><br>24 | dB<br><br>dB |

* See test circuits.

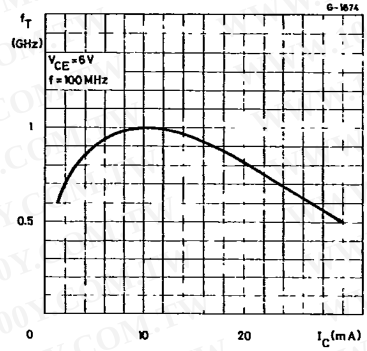
## ELECTRICAL CHARACTERISTICS (continued)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $P_o$* | Output Power | $I_C$ = 12 mA $V_{CB}$ = 10 V<br>f = 500MHz<br>for **2N918/BFX73**<br>for **2N3600** | <br><br>30<br>20 | <br><br>40 | | <br><br>mW<br>mW |
| π | Collector Efficiency<br>(for **2N918/BFX73** only) | $I_C$ = 12 mA $V_{CB}$ = 10 V<br>f = 500 MHz | 25 | | | % |
| $r_{b'b}, C_{b'c}$ | Feedback Time Constant<br>(for **2N3600** only) | $I_C$ = 5 mA $V_{CB}$ = 6 V<br>f = 31.9 MHz | 4 | | 15 | ps |

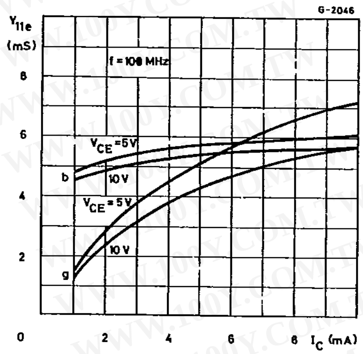
DC Current Gain.



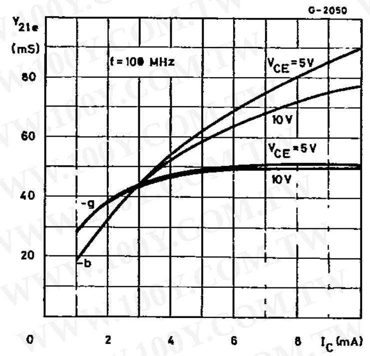

Transition Frequency.



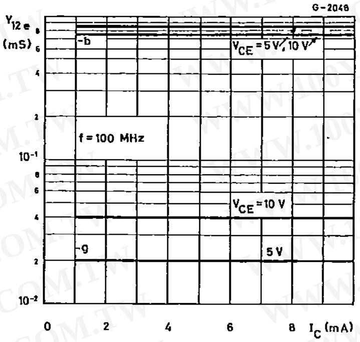

Input Admittance vs. Collector Current.



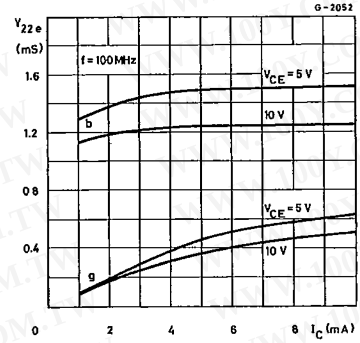

Forward Transadmittance vs. Collector Current.



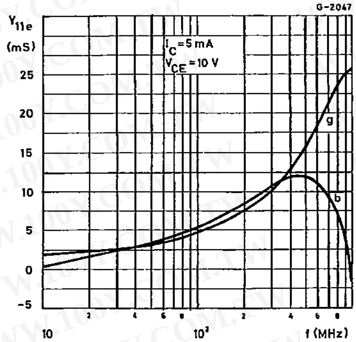
Reverse Transadmittance vs. Collector Current.



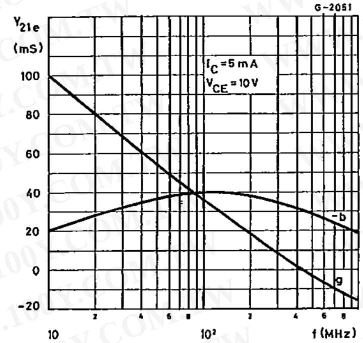

Output Admittance vs. Collector Current.



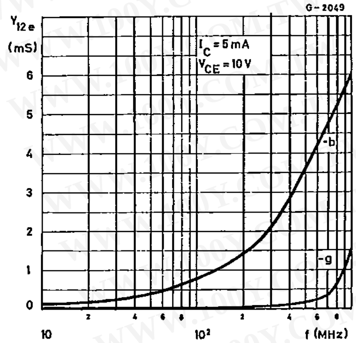

Input Admittance vs. Frequency.




Forward Transadmittance vs. Frequency.




Reverse Transadmittance vs. Frequency.




Output Admittance vs. Frequency.

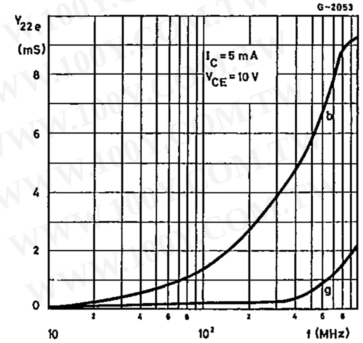


Figure 1 : 500 MHz Oscillator Test Circuit.