

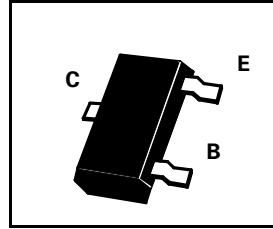
# SOT23 NPN SILICON PLANAR SWITCHING TRANSISTORS

ISSUE 2 – SEPTEMBER 94

**FMMT3903**  
**FMMT3904**

COMPLIMENTARY TYPES – FMMT3903 - FMMT3905  
FMMT3904 - FMMT3906

PARTMARKING DETAIL – FMMT3903 - 1W  
FMMT3904 - 1A



## ABSOLUTE MAXIMUM RATINGS.

| PARAMETER                                  | SYMBOL         | VALUE       | UNIT        |
|--------------------------------------------|----------------|-------------|-------------|
| Collector-Base Voltage                     | $V_{CBO}$      | 60          | V           |
| Collector-Emitter Voltage                  | $V_{CEO}$      | 40          | V           |
| Emitter-Base Voltage                       | $V_{EBO}$      | 6           | V           |
| Continuous Collector Current               | $I_C$          | 200         | mA          |
| Power Dissipation at $T_{amb}=25^{\circ}C$ | $P_{tot}$      | 330         | mW          |
| Operating and Storage Temperature Range    | $T_j; T_{stg}$ | -55 to +150 | $^{\circ}C$ |

## ELECTRICAL CHARACTERISTICS (at $T_{amb} = 25^{\circ}C$ unless otherwise stated).

| PARAMETER                             | SYMBOL        | FMMT3903                   |              | FMMT3904                    |              | UNIT | CONDITIONS.                                                                                                                          |
|---------------------------------------|---------------|----------------------------|--------------|-----------------------------|--------------|------|--------------------------------------------------------------------------------------------------------------------------------------|
|                                       |               | MIN.                       | MAX.         | MIN.                        | MAX.         |      |                                                                                                                                      |
| Collector Base Breakdown Voltage      | $V_{(BR)CBO}$ | 60                         |              | 60                          |              | V    | $I_C=10\mu A, I_E=0$                                                                                                                 |
| Collector-Emitter Breakdown Voltage   | $V_{(BR)CEO}$ | 40                         |              | 40                          |              | V    | $I_C=1mA, I_B=0^*$                                                                                                                   |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$ | 6                          |              | 6                           |              | V    | $I_E=10\mu A, I_C=0$                                                                                                                 |
| Collector-Emitter CutOff Current      | $I_{CEX}$     |                            | 50           |                             | 50           | nA   | $V_{CE}=30V, V_{BE(off)}=3V$                                                                                                         |
| Base CutOff Current                   | $I_{BEX}$     |                            | 50           |                             | 50           | nA   | $V_{CE}=30V, V_{EB(off)}=3V$                                                                                                         |
| Static Forward Current Transfer Ratio | $h_{FE}$      | 20<br>35<br>50<br>30<br>15 | 150          | 40<br>70<br>100<br>60<br>30 | 300          |      | $I_C=0.1mA, V_{CE}=1V^*$<br>$I_C=1mA, V_{CE}=1V^*$<br>$I_C=10mA, V_{CE}=1V^*$<br>$I_C=50mA, V_{CE}=1V^*$<br>$I_C=100mA, V_{CE}=1V^*$ |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ |                            | 0.2<br>0.3   |                             | 0.2<br>0.3   | V    | $I_C=10mA, I_B=1mA^*$<br>$I_C=50mA, I_B=5mA^*$                                                                                       |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$ | 0.65                       | 0.85<br>0.95 | 0.65                        | 0.85<br>0.95 | V    | $I_C=10mA, I_B=1mA^*$<br>$I_C=50mA, I_B=5mA^*$                                                                                       |
| Transition Frequency                  | $f_T$         | 250                        |              | 300                         |              | MHz  | $I_C=10mA, V_{CE}=20V$<br>$f=100MHz$                                                                                                 |
| Output Capacitance                    | $C_{obo}$     |                            | 4            |                             | 4            | pF   | $V_{CB}=5V, I_E=0, f=100KHz$                                                                                                         |
| Input Capacitance                     | $C_{ibo}$     |                            | 8            |                             | 8            | pF   | $V_{BE}=0.5V, I_C=0, f=100KHz$                                                                                                       |

# FMMT3903 FMMT3904

## SWITCHING CHARACTERISTICS (at $T_{amb} = 25^{\circ}\text{C}$ unless otherwise stated).

| PARAMETER    | SYMBOL | FMMT3903 |      | FMMT3904 |      | UNIT | CONDITIONS.                                                                                                               |
|--------------|--------|----------|------|----------|------|------|---------------------------------------------------------------------------------------------------------------------------|
|              |        | MIN.     | MAX. | MIN.     | MAX. |      |                                                                                                                           |
| Noise Figure | N      |          | 6    |          | 5    | dB   | $V_{CE}=5\text{V}$ $I_C=200\mu\text{A}$ ,<br>$R_g=2\text{K}\Omega$<br>$f=30\text{Hz}$ to $15\text{KHz}$ at<br>-3dB points |
| Delay Time   | $t_d$  |          | 35   |          | 35   | ns   | $V_{CC}=3\text{V}$ , $I_C=10\text{mA}$ ,<br>$I_{B1}=1\text{mA}$<br>$V_{BE(off)}=0.5\text{V}$<br>(See Figure1)             |
| Rise Time    | $t_r$  |          | 35   |          | 35   | ns   |                                                                                                                           |
| Storage Time | $t_s$  |          | 175  |          | 200  | ns   | $V_{CC}=3\text{V}$ , $I_C=10\text{mA}$<br>$I_{B1}=I_{B2}=1\text{mA}$<br>(See Figure2)                                     |
| Fall Time    | $t_f$  |          | 50   |          | 50   | ns   |                                                                                                                           |

\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$



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