

# SuperSOT

## SOT23 PNP SILICON POWER

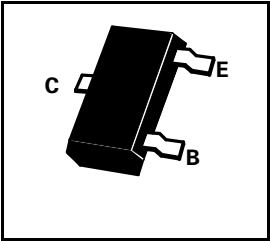
### (SWITCHING) TRANSISTORS

FMMT717 FMMT718  
FMMT720 FMMT722  
FMMT723

ISSUE 3 JUNE 1996

#### FEATURES

- \* **625mW POWER DISSIPATION**
- \*  **$I_C$  CONT 2.5A**
- \*  $I_C$  Up To 10A Peak Pulse Current
- \* Excellent  $h_{fe}$  Characteristics Up To 10A (pulsed)
- \* Extremely Low Saturation Voltage E.g. 10mV Typ.
- \* Exhibits extremely low equivalent on-resistance;  $R_{CE(sat)}$



| DEVICE TYPE | COMPLEMENT | PARTMARKING | $R_{CE(sat)}$                          |
|-------------|------------|-------------|----------------------------------------|
| FMMT717     | FMMT617    | 717         | <b>72m<math>\Omega</math> at 2.5A</b>  |
| FMMT718     | FMMT618    | 718         | <b>97m<math>\Omega</math> at 1.5A</b>  |
| FMMT720     | FMMT619    | 720         | <b>163m<math>\Omega</math> at 1.5A</b> |
| FMMT722     | –          | 722         | -                                      |
| FMMT723     | FMMT624    | 723         | -                                      |

#### ABSOLUTE MAXIMUM RATINGS

| PARAMETER                                                      | SYMBOL                      | FMMT<br>717 | FMMT<br>718 | FMMT<br>720 | FMMT<br>722 | FMMT<br>723 | UNIT        |
|----------------------------------------------------------------|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Collector-Base Voltage                                         | $V_{CBO}$                   | -12         | -20         | -40         | -70         | -100        | V           |
| Collector-Emitter Voltage                                      | $V_{CEO}$                   | -12         | -20         | -40         | -70         | -100        | V           |
| Emitter-Base Voltage                                           | $V_{EBO}$                   | -5          | -5          | -5          | -5          | -5          | V           |
| Peak Pulse Current**                                           | $I_{CM}$                    | -10         | -6          | -4          | -3          | -2.5        | A           |
| <b>Continuous Collector Current</b>                            | <b><math>I_C</math></b>     | <b>-2.5</b> | <b>-1.5</b> | <b>-1.5</b> | <b>-1.5</b> | <b>-1</b>   | <b>A</b>    |
| Base Current                                                   | $I_B$                       | -500        |             |             |             |             | mA          |
| <b>Power Dissipation at <math>T_{amb}=25^{\circ}C^*</math></b> | <b><math>P_{tot}</math></b> | <b>625</b>  |             |             |             |             | <b>mW</b>   |
| Operating and Storage Temperature Range                        | $T_j, T_{stg}$              | -55 to +150 |             |             |             |             | $^{\circ}C$ |

\*Maximum power dissipation is calculated assuming that the device is mounted on a ceramic substrate measuring 15x15x0.6mm

\*\*Measured under pulsed conditions. Pulse width=300 $\mu$ s. Duty cycle  $\leq$  2%  
Spice parameter data is available upon request for these devices

# FMMT718

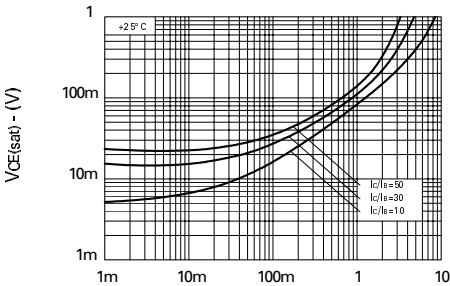
# FMMT720

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

| PARAMETER                             | SYMBOL        | FMMT718 |       |      | FMMT720 |       |      | UNIT     | CONDITIONS.                                                                                                                                                                                                                                                                                                                                                                |
|---------------------------------------|---------------|---------|-------|------|---------|-------|------|----------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       |               | MIN.    | TYP.  | MAX. | MIN.    | TYP.  | MAX. |          |                                                                                                                                                                                                                                                                                                                                                                            |
| Collector-Base Breakdown Voltage      | $V_{(BR)CBO}$ | -20     | -65   |      | -40     | -95   |      | V        | $I_C = -100\mu\text{A}$                                                                                                                                                                                                                                                                                                                                                    |
| Collector-Emitter Breakdown Voltage   | $V_{(BR)CEO}$ | -20     | -55   |      | -40     | -85   |      | V        | $I_C = -10\text{mA}^*$                                                                                                                                                                                                                                                                                                                                                     |
| Emitter-Base Breakdown Voltage        | $V_{(BR)EBO}$ | -5      | -8.8  |      | -5      | -8.8  |      | V        | $I_E = -100\mu\text{A}$                                                                                                                                                                                                                                                                                                                                                    |
| Collector Cut-Off Current             | $I_{CBO}$     |         |       | -100 |         |       | -100 | nA<br>nA | $V_{CB} = -15\text{V}$<br>$V_{CB} = -35\text{V}$                                                                                                                                                                                                                                                                                                                           |
| Emitter Cut-Off Current               | $I_{EBO}$     |         |       | -100 |         |       | -100 | nA       | $V_{EB} = -4\text{V}$                                                                                                                                                                                                                                                                                                                                                      |
| Collector Emitter Cut-Off Current     | $I_{CES}$     |         |       | -100 |         |       | -100 | nA<br>nA | $V_{CES} = -15\text{V}$<br>$V_{CES} = -35\text{V}$                                                                                                                                                                                                                                                                                                                         |
| Collector-Emitter Saturation Voltage  | $V_{CE(sat)}$ |         | -16   | -40  |         | -25   | -40  | mV       | $I_C = -0.1\text{A}, I_B = -10\text{mA}^*$<br>$I_C = -1\text{A}, I_B = -20\text{mA}^*$<br>$I_C = -1\text{A}, I_B = -50\text{mA}^*$<br>$I_C = -1.5\text{A}, I_B = -50\text{mA}^*$<br>$I_C = -1.5\text{A}, I_B = -100\text{mA}^*$                                                                                                                                            |
|                                       |               |         | -130  | -200 |         | -150  | -220 | mV       |                                                                                                                                                                                                                                                                                                                                                                            |
|                                       |               |         | -145  | -220 |         | -245  | -330 | mV       |                                                                                                                                                                                                                                                                                                                                                                            |
|                                       |               |         |       |      |         |       |      | mV       |                                                                                                                                                                                                                                                                                                                                                                            |
| Base-Emitter Saturation Voltage       | $V_{BE(sat)}$ |         | -0.87 | -1.0 |         | -0.89 | -1.0 | V<br>V   | $I_C = -1.5\text{A}, I_B = -50\text{mA}^*$<br>$I_C = -1.5\text{A}, I_B = -75\text{mA}^*$                                                                                                                                                                                                                                                                                   |
| Base-Emitter Turn-On Voltage          | $V_{BE(on)}$  |         | 0.81  | -1.0 |         | -0.80 | -1.0 | V<br>V   | $I_C = -2\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -1.5\text{A}, V_{CE} = -2\text{V}^*$                                                                                                                                                                                                                                                                                   |
|                                       |               |         |       |      |         |       |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
| Static Forward Current Transfer Ratio | $h_{FE}$      | 300     | 475   |      | 300     | 480   |      |          | $I_C = -10\text{mA}, V_{CE} = -2\text{V}^*$<br>$I_C = -0.1\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -1\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -1.5\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -2\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -3\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -4\text{A}, V_{CE} = -2\text{V}^*$<br>$I_C = -6\text{A}, V_{CE} = -2\text{V}^*$ |
|                                       |               | 300     | 450   |      | 300     | 450   |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
|                                       |               |         |       |      | 180     | 290   |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
|                                       |               |         |       |      | 60      | 130   |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
|                                       |               | 150     | 230   |      |         |       |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
|                                       |               |         |       |      | 12      | 22    |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
| Transition Frequency                  | $f_T$         | 150     | 180   |      | 150     | 190   |      | MHz      | $I_C = -50\text{mA}, V_{CE} = -10\text{V}$<br>$f = 100\text{MHz}$                                                                                                                                                                                                                                                                                                          |
|                                       |               |         |       |      |         |       |      |          |                                                                                                                                                                                                                                                                                                                                                                            |
| Output Capacitance                    | $C_{obo}$     |         | 21    | 30   |         | 19    | 25   | pF       | $V_{CB} = -10\text{V}, f = 1\text{MHz}$                                                                                                                                                                                                                                                                                                                                    |
| Turn-On Time                          | $t_{(on)}$    |         | 40    |      |         |       |      | ns       | $V_{CC} = -10\text{V}, I_C = -1\text{A}$<br>$I_{B1} = I_{B2} = -20\text{mA}$                                                                                                                                                                                                                                                                                               |
| Turn-Off Time                         | $t_{(off)}$   |         | 670   |      |         |       |      | ns       |                                                                                                                                                                                                                                                                                                                                                                            |
| Turn-On Time                          | $t_{(on)}$    |         |       |      |         | 40    |      | ns       | $V_{CC} = -15\text{V}, I_C = -0.75\text{A}$<br>$I_{B1} = I_{B2} = -15\text{mA}$                                                                                                                                                                                                                                                                                            |
| Turn-Off Time                         | $t_{(off)}$   |         |       |      |         | 435   |      | ns       |                                                                                                                                                                                                                                                                                                                                                                            |

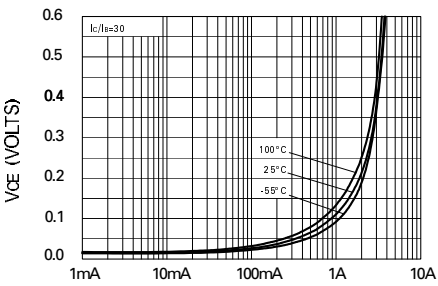
\*Measured under pulsed conditions. Pulse width=300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

TYPICAL CHARACTERISTICS



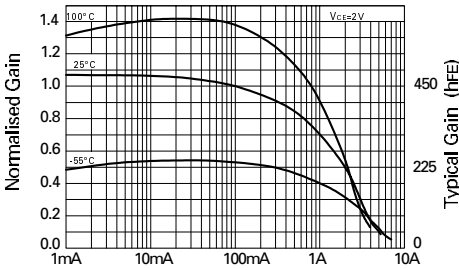
IC - Collector Current (A)

VCE(SAT) v IC



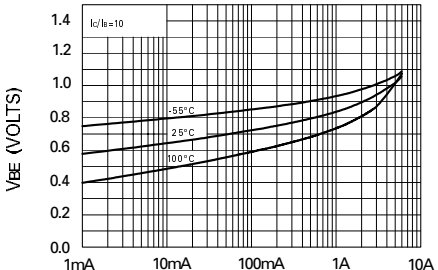
Collector Current

VCE(SAT) vs IC



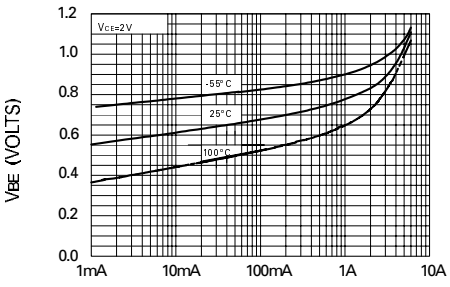
Collector Current

hFE vs IC



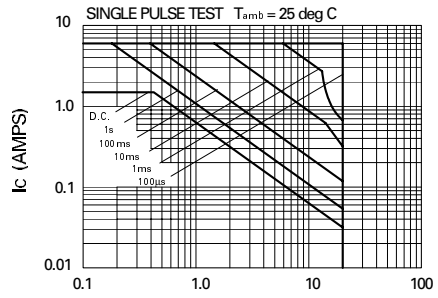
Collector Current

VBE(SAT) vs IC



Collector Current

VBE(ON) vs IC



VCE (VOLTS)

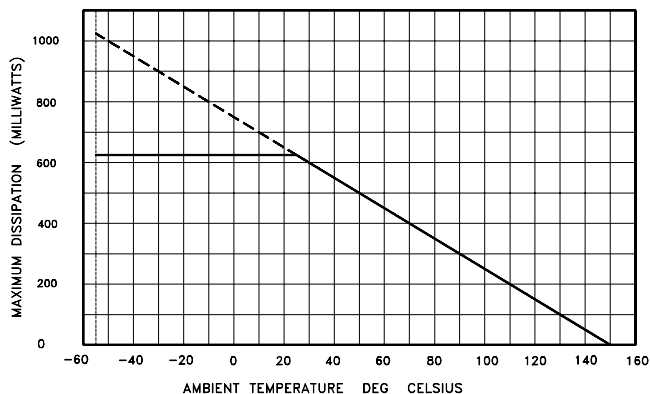
Safe Operating Area

FMMT617 FMMT624  
FMMT618 FMMT625  
FMMT619

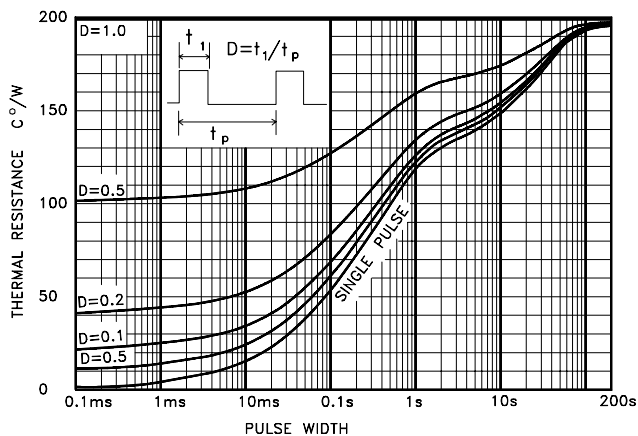
## SuperSOT Series

FMMT717 FMMT722  
FMMT718 FMMT723  
FMMT720

### THERMAL CHARACTERISTICS AND DERATING INFORMATION



DERATING CURVE



MAXIMUM TRANSIENT THERMAL RESISTANCE

\* Reference above figures, Devices were mounted on a 15mmx15mm ceramic substrate