Lead-free Green

**FMMT624**

# 125V NPN LOW SATURATION TRANSISTOR IN SOT23

## Features

- $BV_{CEO}$ > 125V
- $I_C$ = 1A high Continuous Collector Current
- $I_{CM}$ = 3A Peak Pulse Current
- $R_{CE(sat)}$ = 160mΩ for a low equivalent On-Resistance
- 625mW Power dissipation
- $h_{FE}$ specified up to 3A for high current gain hold up
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

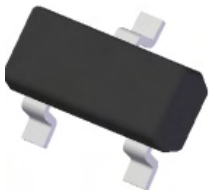
## Mechanical Data

- Case: SOT23
- Case Material: molded plastic, "Green" molding compound
- UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight 0.008 grams (approximate)

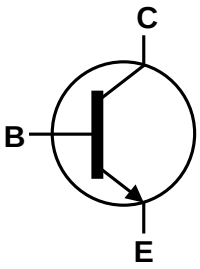
## Applications

- DC-DC / DC-AC Modules
- Regulator
- LED driver
- CCFL Backlighting Inverters

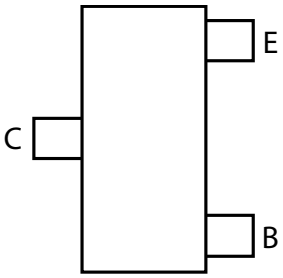
SOT23



Top View




Device Symbol



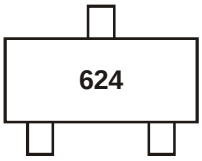

Top View
Pin-Out

## Ordering Information (Note 4)

| Product | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|---|---|---|---|---|
| FMMT624TA | 624 | 7 | 8 | 3,000 |
| FMMT624TC | 624 | 13 | 8 | 10,000 |

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com for more information about Diodes Incorporated's definitions of Halogen and Antimony free, "Green" and Lead-Free.
3. Halogen and Antimony free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at http://www.diodes.com.

## Marking Information




624 = Product Type Marking Code

## Maximum Ratings (@$T_A$ = +25°C, unless otherwise specified.)

| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Base Voltage | $V_{CBO}$ | 125 | V |
| Collector-Emitter Voltage | $V_{CEO}$ | 125 | V |
| Emitter-Base Voltage | $V_{EBO}$ | 7 | V |
| Continuous Collector Current | $I_C$ | 1 | A |
| Peak Pulse Current (Note 5) | $I_{CM}$ | 3 | A |
| Base Current | $I_B$ | 500 | mA |

## Thermal Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

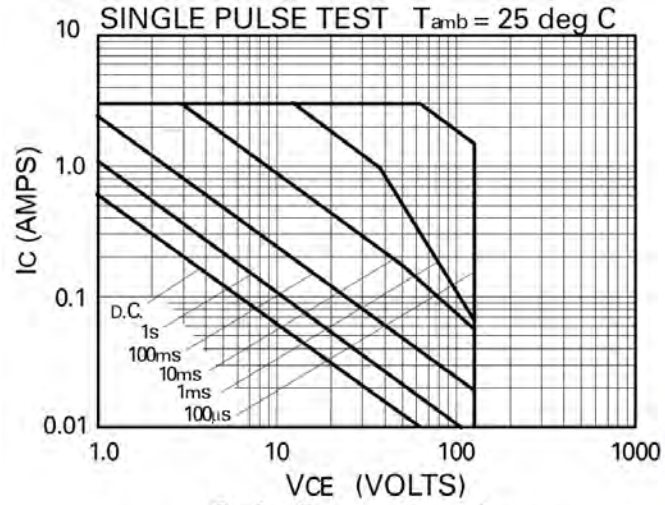
| Characteristic | Symbol | Value | Unit |
|---|---|---|---|
| Power Dissipation (Note 5) | $P_D$ | 625 | mW |
| Power Dissipation (Note 6) | $P_D$ | 806 | mW |
| Thermal Resistance, Junction to Ambient (Note 5) | $R_{\theta JA}$ | 200 | °C/W |
| Thermal Resistance, Junction to Ambient (Note 6) | $R_{\theta JA}$ | 155 | °C/W |
| Thermal Resistance, Junction to Leads (Note 7) | $R_{\theta JL}$ | 194 | °C/W |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55 to +150 | °C |

## ESD Ratings (Note 8)

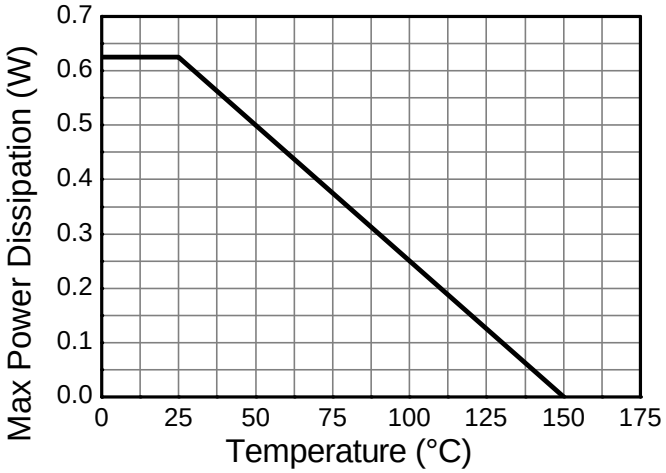
| Characteristic | Symbol | Value | Unit | JEDEC Class |
|---|---|---|---|---|
| Electrostatic Discharge - Human Body Model | ESD HBM | 4,000 | V | 3A |
| Electrostatic Discharge - Machine Model | ESD MM | ≥ 400 | V | C |

Notes:
5. For a device surface mounted on 25mm X 25mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in a steady-state condition.
6. Same as note 5, except the device is measured at t ≤ 5 sec.
7. Thermal resistance from junction to solder-point (at the end of the collector lead).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

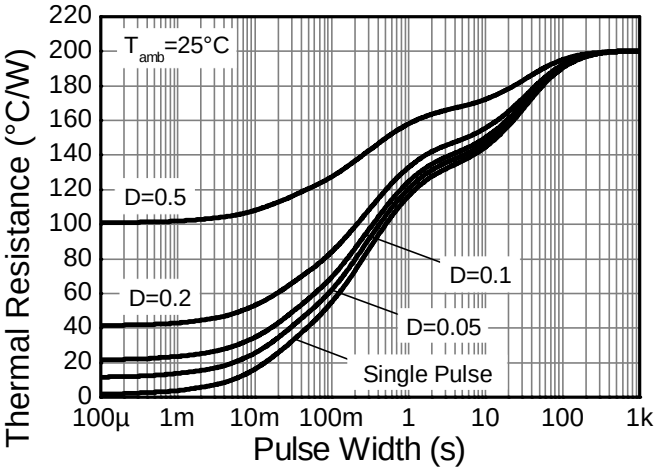
## Thermal Characteristics and Derating information



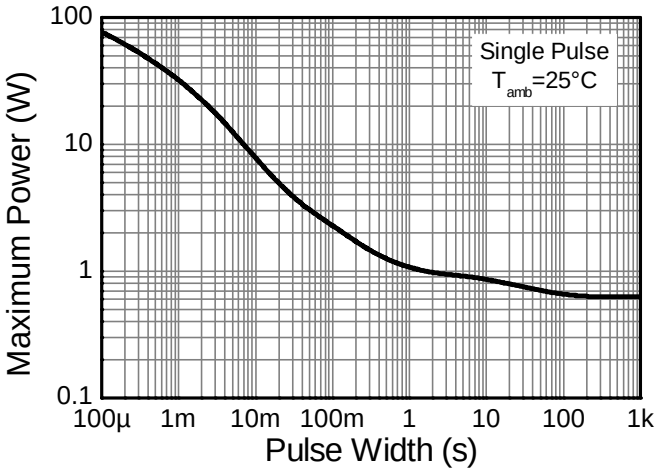

**Safe Operating Area**




**Derating Curve**




**Transient Thermal Impedance**



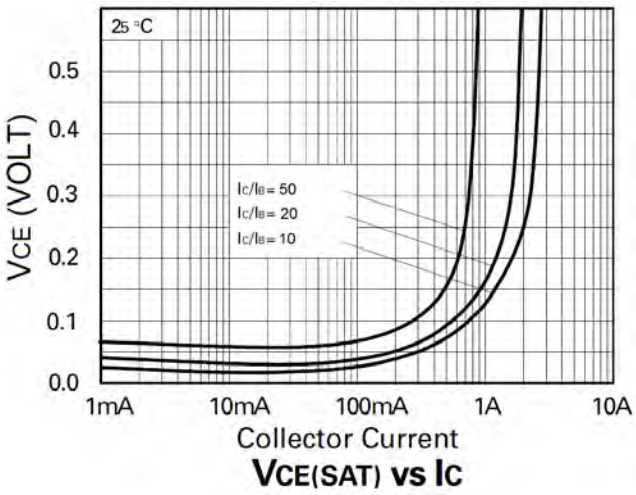

**Pulse Power Dissipation**

## Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)

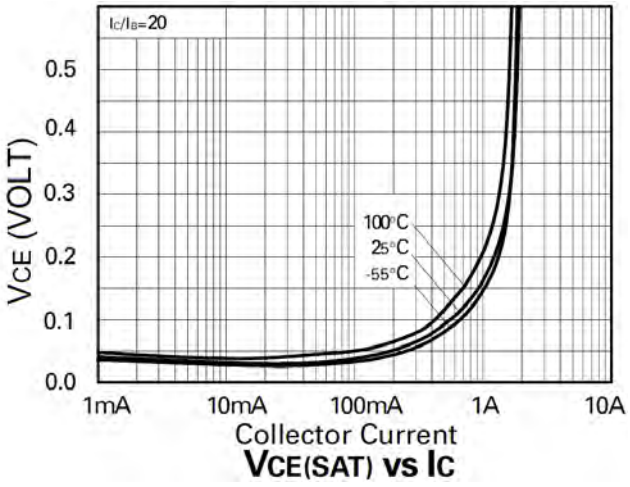
| Characteristic | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Collector-Base Breakdown Voltage | $BV_{CBO}$ | 125 | 250 | - | V | $I_C$ = 100µA |
| Collector-Emitter Breakdown Voltage (Note 9) | $BV_{CEO}$ | 125 | 160 | - | V | $I_C$ = 1mA |
| Emitter-Base Breakdown Voltage | $BV_{EBO}$ | 7 | 8.3 | - | V | $I_E$ = 100µA |
| Collector Cut-off Current | $I_{CBO}$ | - | <10 | 100 | nA | $V_{CB}$ = 100V |
| Emitter Cut-off Current | $I_{EBO}$ | - | <10 | 100 | nA | $V_{EB}$ = 6.0V |
| Collector Emitter Cut-off Current | $I_{CES}$ | - | <10 | 100 | nA | $V_{CES}$ = 100V |
| Static Forward Current Transfer Ratio (Note 9) | $h_{FE}$ | 200<br>300<br>100<br>- | 400<br>450<br>140<br>18 | -<br>-<br>-<br>- | - | $I_C$ = 10mA, $V_{CE}$ = 10V<br>$I_C$ = 200mA, $V_{CE}$ = 10V<br>$I_C$ = 1A, $V_{CE}$ = 10V<br>$I_C$ = 3A, $V_{CE}$ = 10V |
| Collector-Emitter Saturation Voltage (Note 9) | $V_{CE(sat)}$ | -<br>-<br>-<br>- | 26<br>70<br>160<br>165 | 50<br>150<br>220<br>250 | mV | $I_C$ = 0.1A, $I_B$ = 10mA<br>$I_C$ = 0.5A, $I_B$ = 50mA<br>$I_C$ = 0.5A, $I_B$ = 10mA<br>$I_C$ = 1A, $I_B$ = 50mA |
| Base-Emitter Saturation Voltage (Note 9) | $V_{BE(sat)}$ | - | 0.85 | 1.0 | V | $I_C$ = 1A, $I_B$ = 50mA |
| Base-Emitter Saturation Voltage (Note 9) | $V_{BE(on)}$ | - | 0.70 | 1.0 | V | $I_C$ = 1A, $V_{CE}$ = 10V |
| Transition Frequency | $f_T$ | 100 | 155 | - | MHz | $I_C$ = 50mA, $V_{CE}$ = 10V, f = 100MHz |
| Collector Output Capacitance | $C_{obo}$ | - | 7 | 15 | pF | $V_{CB}$ = 10V, f = 1MHz |
| Turn-On Time | $t_{(on)}$ | - | 60 | - | ns | $V_{CC}$ = 50V, $I_C$ = 0.5A, $I_{B1}$ = -$I_{B2}$ = 50mA |
| Turn-Off Time | $t_{(off)}$ | - | 1300 | - | ns | |

Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%

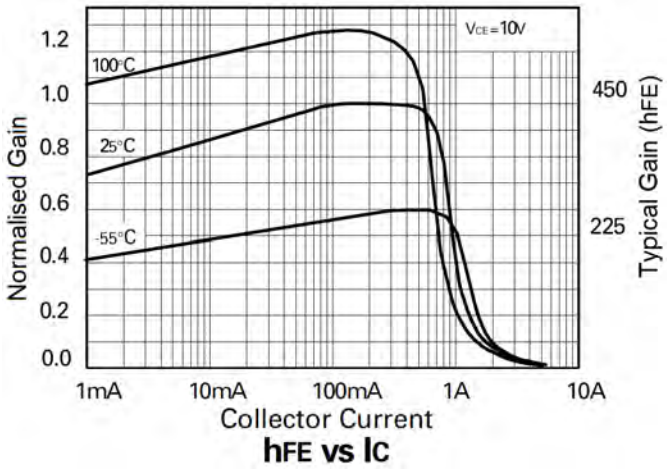
## Typical Electrical Characteristics (@$T_A$ = +25°C, unless otherwise specified.)



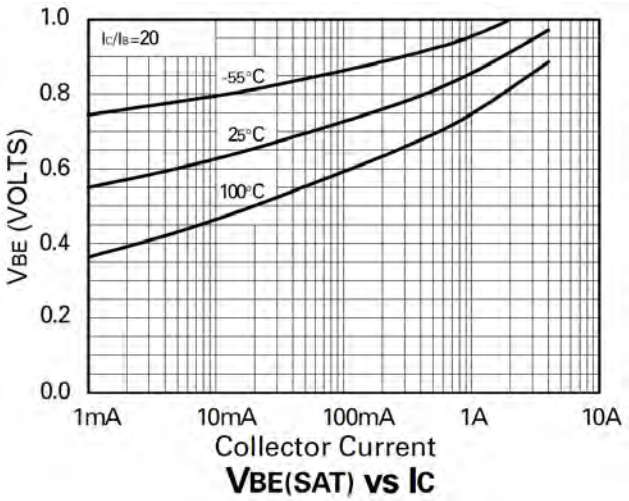

**VCE(SAT) vs IC**



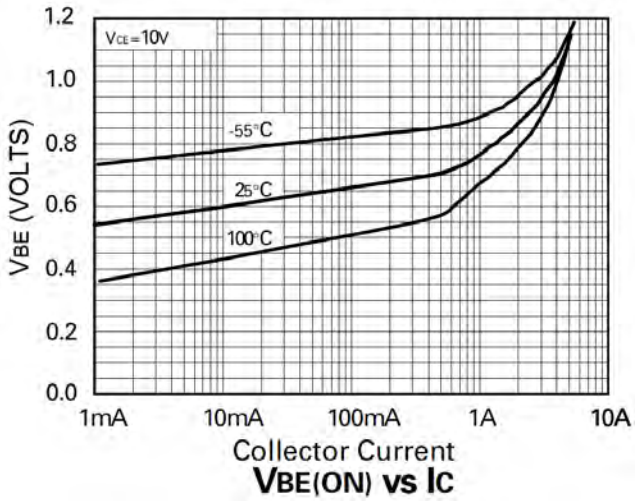

**VCE(SAT) vs IC**




**hFE vs IC**



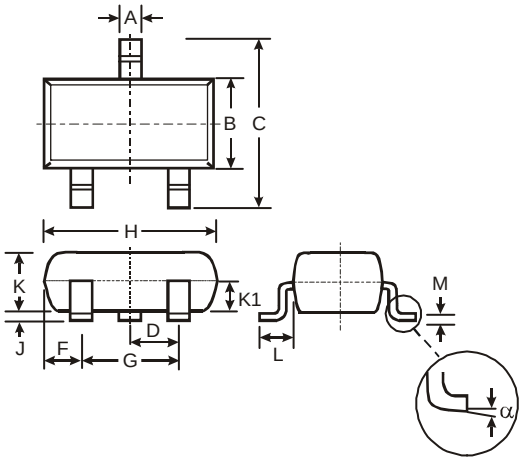

**VBE(SAT) vs IC**




**VBE(ON) vs IC**

## Package Outline Dimensions

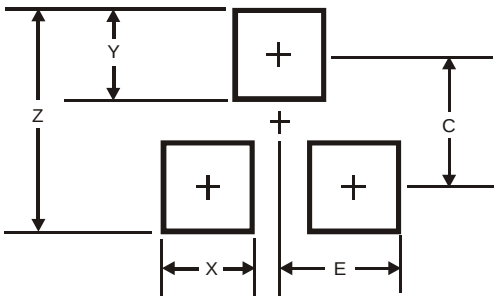
Please see AP02002 at http://www.diodes.com/datasheets/ap02002.pdf for latest version.




| SOT23 | | | |
|---|---|---|---|
| **Dim** | **Min** | **Max** | **Typ** |
| **A** | 0.37 | 0.51 | 0.40 |
| **B** | 1.20 | 1.40 | 1.30 |
| **C** | 2.30 | 2.50 | 2.40 |
| **D** | 0.89 | 1.03 | 0.915 |
| **F** | 0.45 | 0.60 | 0.535 |
| **G** | 1.78 | 2.05 | 1.83 |
| **H** | 2.80 | 3.00 | 2.90 |
| **J** | 0.013 | 0.10 | 0.05 |
| **K** | 0.903 | 1.10 | 1.00 |
| **K1** | - | - | 0.400 |
| **L** | 0.45 | 0.61 | 0.55 |
| **M** | 0.085 | 0.18 | 0.11 |
| **α** | 0° | 8° | - |
| **All Dimensions in mm** | | | |

## Suggested Pad Layout

Please see AP02001 at http://www.diodes.com/datasheets/ap02001.pdf for the latest version.




| Dimensions | Value (in mm) |
|---|---|
| **Z** | 2.9 |
| **X** | 0.8 |
| **Y** | 0.9 |
| **C** | 2.0 |
| **E** | 1.35 |

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