



**FMMT620**

**80V NPN SILICON LOW SATURATION TRANSISTOR IN SOT23**

**Features**

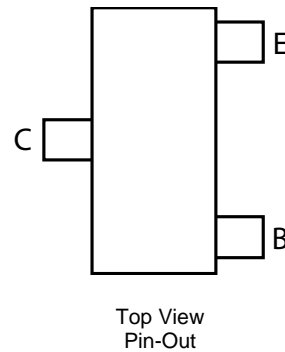
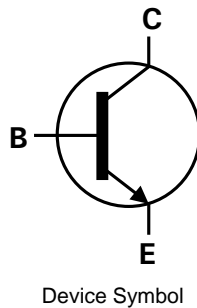
- $BV_{CEO} > 80V$
- $I_C = 1.5A$  Continuous Collector Current
- $R_{CE(SAT)} = 90m\Omega$  for a low equivalent On-Resistance
- 625mW Power dissipation
- $h_{FE}$  specified up to 5A for high current gain hold up
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP capable (Note 4)**

**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 Modules
- Power Management Functions
- Motor control and drive functions
- CCFL Backlighting Inverters

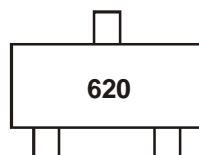


**Ordering Information** (Notes 4 & 5)

| Product    | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------|------------|---------|--------------------|-----------------|-------------------|
| FMMT620TA  | AEC-Q101   | 620     | 7                  | 8               | 3,000             |
| FMMT620QTA | Automotive | 620     | 7                  | 8               | 3,000             |

- 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. Automotive products are AEC-Q101 qualified and are PPAP capable. Automotive, AEC-Q101 and standard products are electrically and thermally the same, except where specified.
  5. For packaging details, go to our website at <http://www.diodes.com>

**Marking Information**



620 = Product Type Marking Code

**Maximum Ratings** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

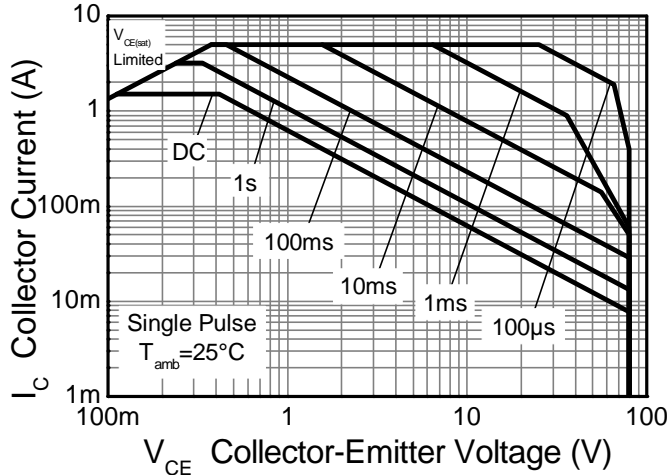
| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | 100   | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 80    | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | I <sub>C</sub>   | 1.5   | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | 5     | A    |
| Base Current                 | I <sub>B</sub>   | 500   | mA   |

**Thermal Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

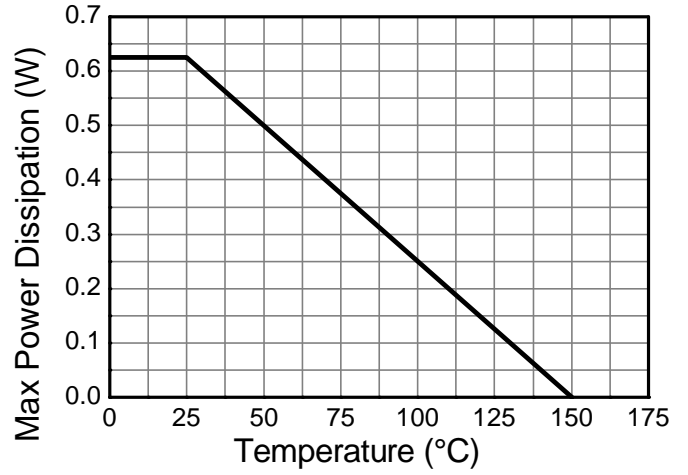
| Characteristic                                   | Symbol                            | Value       | Unit |
|--|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)                       | P <sub>D</sub>                    | 625         | mW   |
| Power Dissipation (Note 7)                       | P <sub>D</sub>                    | 806         | mW   |
| Thermal Resistance, Junction to Ambient (Note 6) | R <sub>θJA</sub>                  | 200         | °C/W |
| Thermal Resistance, Junction to Ambient (Note 7) | R <sub>θJA</sub>                  | 155         | °C/W |
| Thermal Resistance, Junction to Leads (Note 8)   | R <sub>θJL</sub>                  | 194         | °C/W |
| Operating and Storage Temperature Range          | T <sub>J</sub> , T <sub>STG</sub> | -55 to +150 | °C   |

- Notes:
6. 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.
  7. Same as note 6, except the device is measured at t ≤ 5 sec.
  8. Thermal resistance from junction to solder-point (at the end of the collector lead).

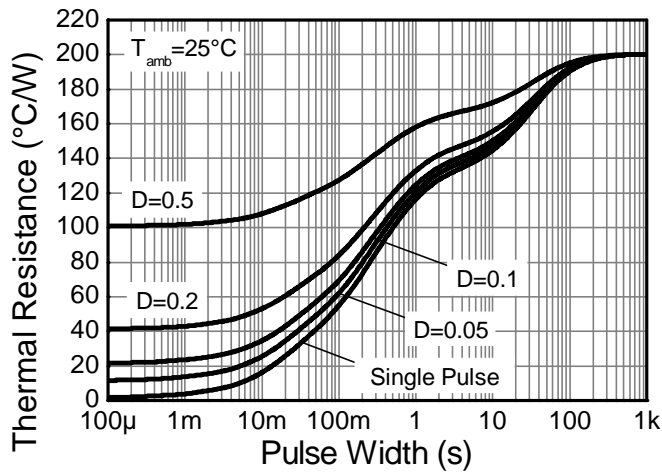
**Thermal Characteristics and Derating information**



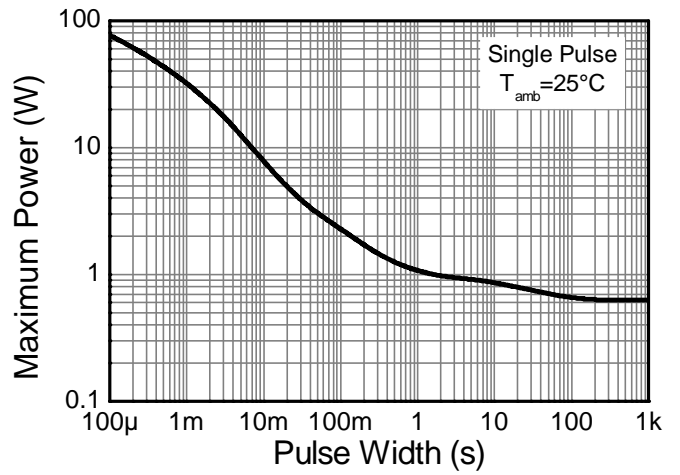
**Safe Operating Area**



**Derating Curve**



**Transient Thermal Impedance**



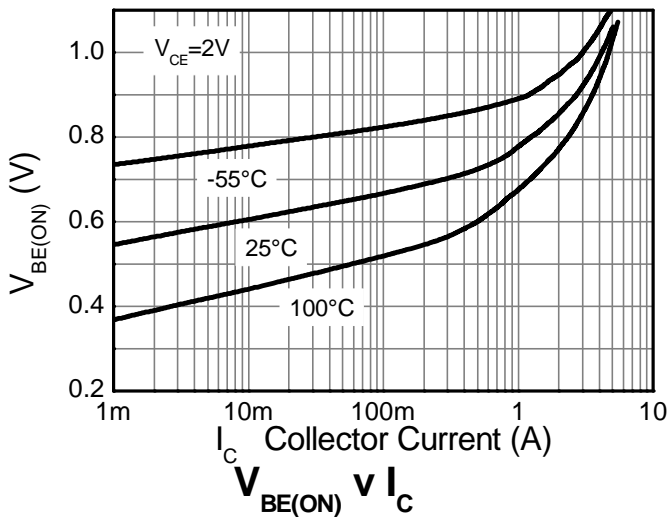
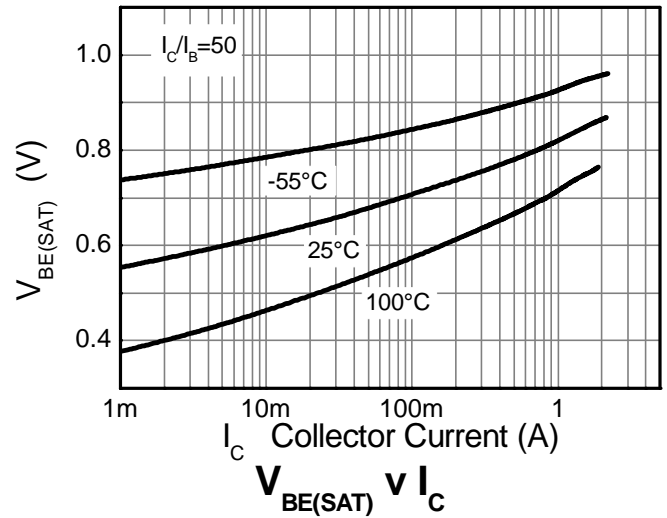
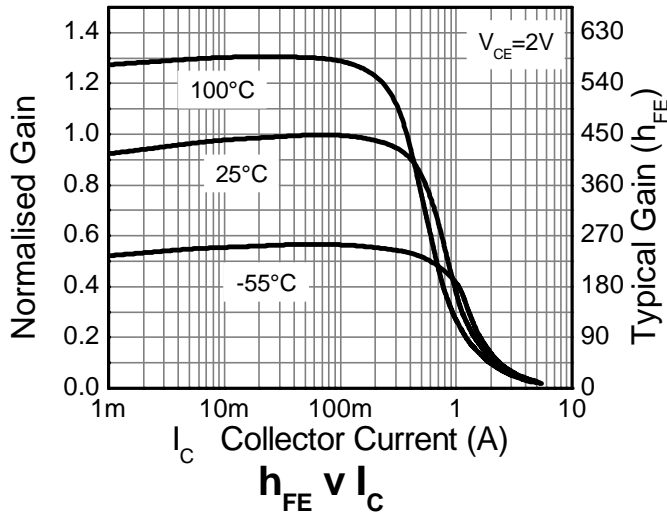
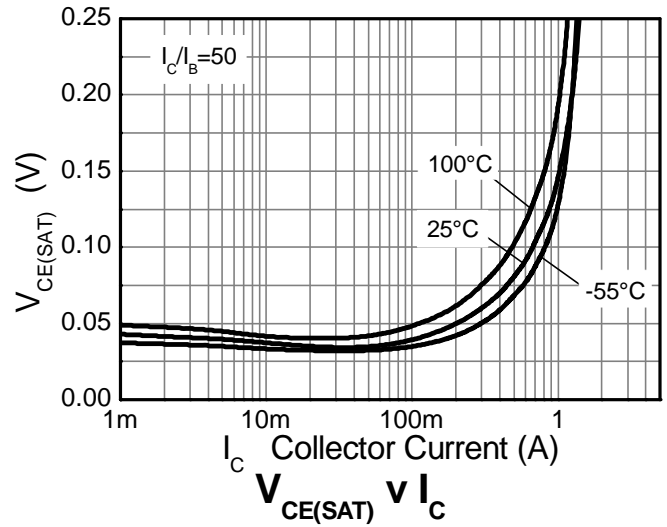
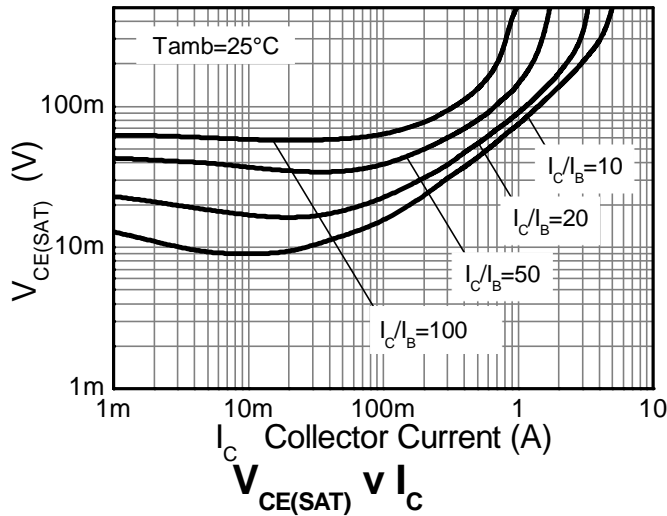
**Pulse Power Dissipation**

**Electrical Characteristics** (@T<sub>A</sub> = +25°C, unless otherwise specified.)

| Characteristic                                 | Symbol               | Min                                | Typ                                 | Max                          | Unit | Test Condition  |
|--|----------------------|------------------------------------|-------------------------------------|------------------------------|------|---|
| Collector-Base Breakdown Voltage               | BV <sub>CBO</sub>    | 100                                | 180                                 | -                            | V    | I <sub>C</sub> = 100μA  |
| Collector-Emitter Breakdown Voltage (Note 9)   | BV <sub>CEO</sub>    | 80                                 | 110                                 | -                            | V    | I <sub>C</sub> = 1mA  |
| Emitter-Base Breakdown Voltage                 | BV <sub>EBO</sub>    | 7                                  | 8                                   | -                            | V    | I <sub>E</sub> = 100μA  |
| Collector Cut-off Current                      | I <sub>CBO</sub>     | -                                  | -                                   | 100                          | nA   | V <sub>CB</sub> = 80V   |
| Emitter Cut-off Current                        | I <sub>EBO</sub>     | -                                  | -                                   | 100                          | nA   | V <sub>EB</sub> = 6.0V  |
| Collector Emitter Cut-off Current              | I <sub>CES</sub>     | -                                  | -                                   | 100                          | nA   | V <sub>CES</sub> = 80V  |
| Static Forward Current Transfer Ratio (Note 9) | h <sub>FE</sub>      | 200<br>300<br>110<br>60<br>20<br>- | 450<br>450<br>170<br>90<br>30<br>10 | -<br>900<br>-<br>-<br>-<br>- | -    | I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V<br>I <sub>C</sub> = 200mA, V <sub>CE</sub> = 2V<br>I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V<br>I <sub>C</sub> = 1.5A, V <sub>CE</sub> = 2V<br>I <sub>C</sub> = 3A, V <sub>CE</sub> = 2V<br>I <sub>C</sub> = 5A, V <sub>CE</sub> = 2V |
| Collector-Emitter Saturation Voltage (Note 9)  | V <sub>CE(sat)</sub> | -<br>-<br>-<br>-                   | 15<br>45<br>145<br>160              | 20<br>60<br>185<br>200       | mV   | I <sub>C</sub> = 0.1A, I <sub>B</sub> = 10mA<br>I <sub>C</sub> = 0.5A, I <sub>B</sub> = 50mA<br>I <sub>C</sub> = 1A, I <sub>B</sub> = 20mA<br>I <sub>C</sub> = 1.5A, I <sub>B</sub> = 20mA  |
| Base-Emitter Saturation Voltage (Note 9)       | V <sub>BE(sat)</sub> | -                                  | 0.86                                | 1.0                          | V    | I <sub>C</sub> = 1.5A, I <sub>B</sub> = 50mA  |
| Base-Emitter Saturation Voltage (Note 9)       | V <sub>BE(on)</sub>  | -                                  | 0.82                                | 0.95                         | V    | I <sub>C</sub> = 1.5A, V <sub>CE</sub> = 2V   |
| Transition Frequency                           | f <sub>T</sub>       | 100                                | 160                                 | -                            | MHz  | I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V,<br>f = 100MHz   |
| Collector Output Capacitance                   | C <sub>obo</sub>     | -                                  | 11.5                                | 18                           | pF   | V <sub>CB</sub> = 10V, f = 1MHz   |
| Turn-On Time                                   | t <sub>(on)</sub>    | -                                  | 86                                  | -                            | ns   | V <sub>CC</sub> = 10V, I <sub>C</sub> = 500mA,  |
| Turn-Off Time                                  | t <sub>(off)</sub>   | -                                  | 1128                                | -                            | ns   | I <sub>B1</sub> = -I <sub>B2</sub> = 25mA   |

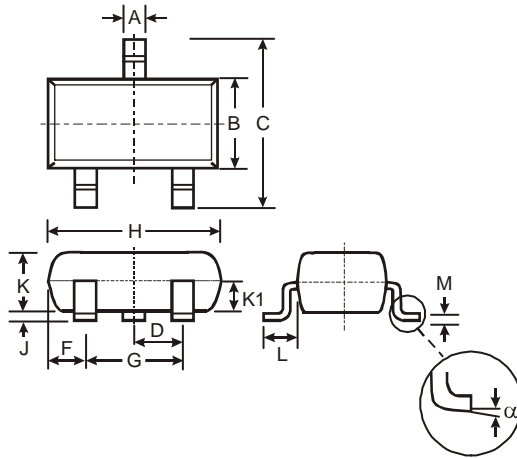
Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

**Typical Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)



### Package Outline Dimensions

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

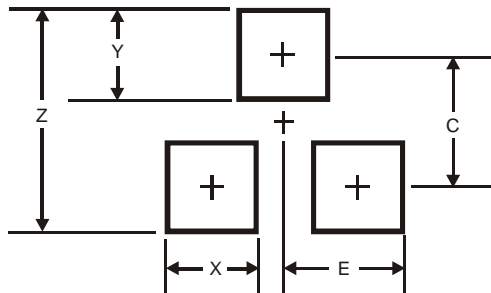


| SOT23 |       |      |       |
|-------|-------|------|-------|
| Dim   | Min   | Max  | Typ   |
| A     | 0.37  | 0.51 | 0.40  |
| B     | 1.20  | 1.40 | 1.30  |
| C     | 2.30  | 2.50 | 2.40  |
| D     | 0.89  | 1.03 | 0.915 |
| F     | 0.45  | 0.60 | 0.535 |
| G     | 1.78  | 2.05 | 1.83  |
| H     | 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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