

**50V NPN SILICON LOW SATURATION TRANSISTOR IN SOT23**

**Features**

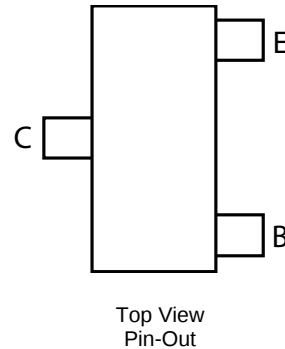
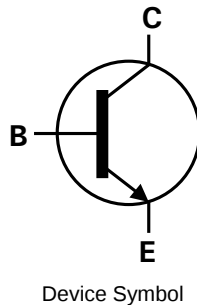
- $BV_{CEO} > 50V$
- $I_C = 2A$  Continuous Collector Current
- 625mW power dissipation
- Low Saturation Voltage  $V_{CE(sat)} < 200mV @ 1A$
- $R_{CE(sat)} = 68m\Omega$  for a low equivalent on-resistance
- $h_{FE}$  characterised up to 6A for high current gain hold-up
- Complementary PNP type: FMMT720
- **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 
- Weight 0.008 grams (approximate)

**Applications**

- MOSFET Gate Driving
- DC-DC / DC-AC Converters
- Regulator
- LED driver
- Motor Control

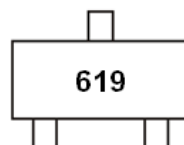


**Ordering Information** (Notes 4 & 5)

| Product    | Compliance | Marking | Reel size (inches) | Tape width (mm) | Quantity per reel |
|------------|------------|---------|--------------------|-----------------|-------------------|
| FMMT619TA  | AEC-Q101   | 619     | 7                  | 8               | 3,000             |
| FMMT619QTA | Automotive | 619     | 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**



619 = Product Type Marking Code

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

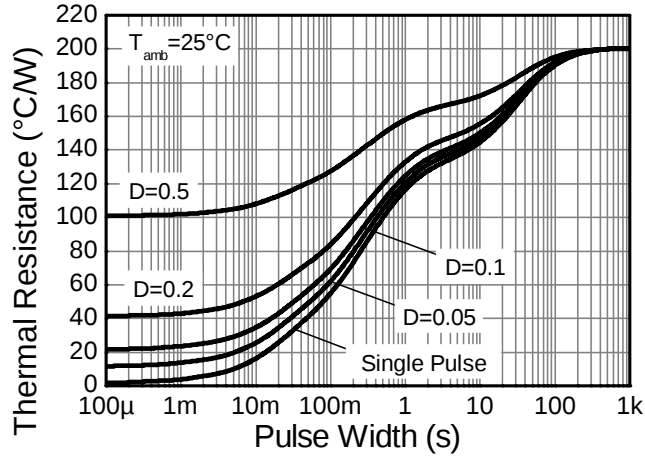
| Characteristic               | Symbol           | Value | Unit |
|------------------------------|------------------|-------|------|
| Collector-Base Voltage       | V <sub>CBO</sub> | 50    | V    |
| Collector-Emitter Voltage    | V <sub>CEO</sub> | 50    | V    |
| Emitter-Base Voltage         | V <sub>EBO</sub> | 7     | V    |
| Continuous Collector Current | I <sub>C</sub>   | 2     | A    |
| Peak Pulse Current           | I <sub>CM</sub>  | 6     | A    |
| Base Current                 | I <sub>B</sub>   | 500   | mA   |

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

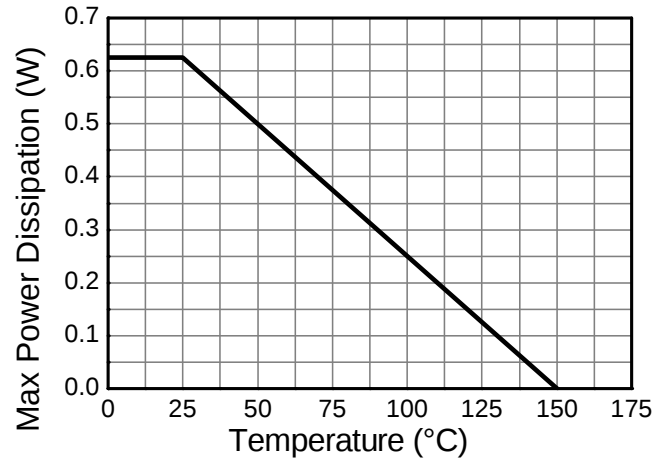
| Characteristic                                   | Symbol                            | Value       | Unit |
|--------------------------------------------------|-----------------------------------|-------------|------|
| Power Dissipation (Note 6)                       | P <sub>D</sub>                    | 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).

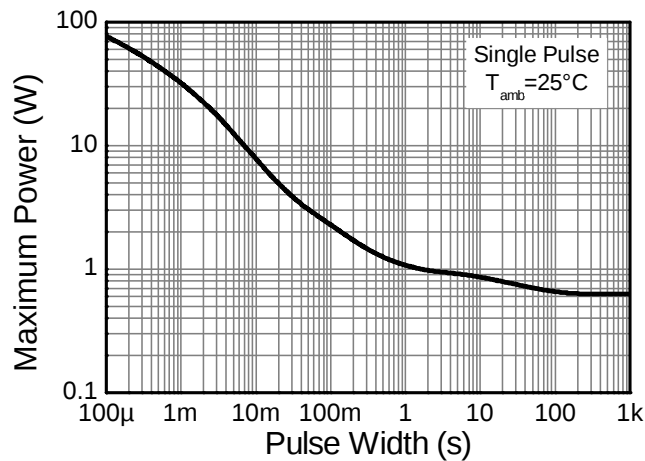
## Thermal Characteristics and Derating information



**Transient Thermal Impedance**



**Derating Curve**



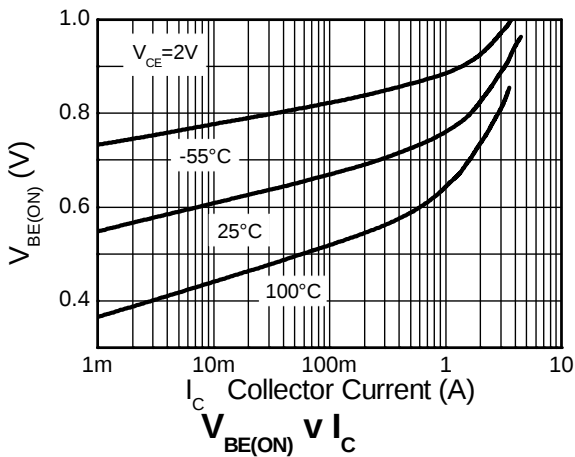
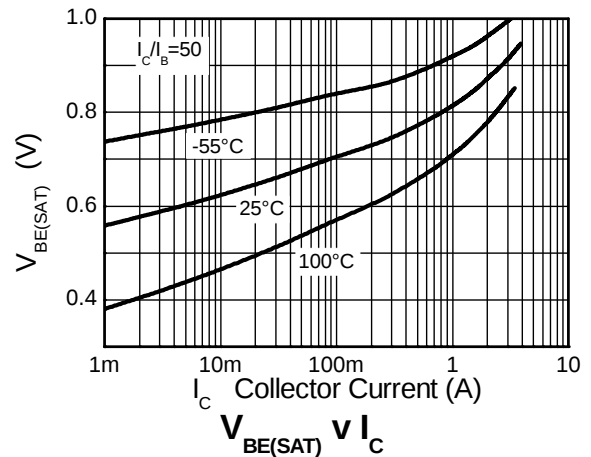
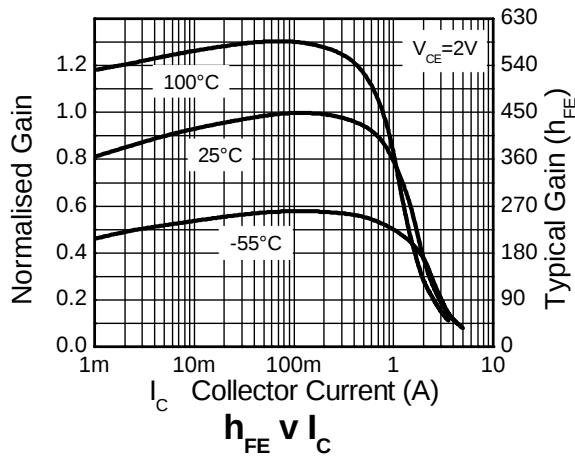
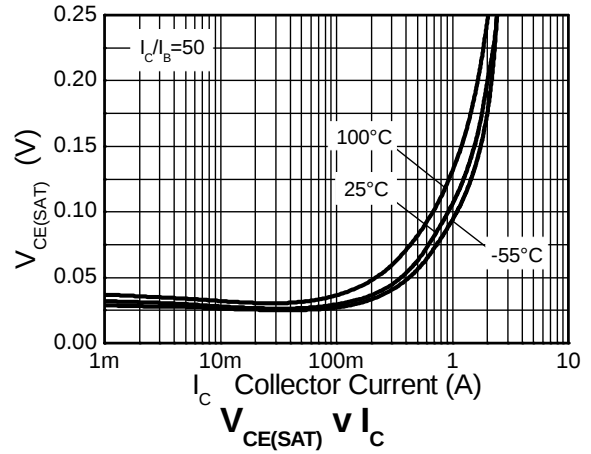
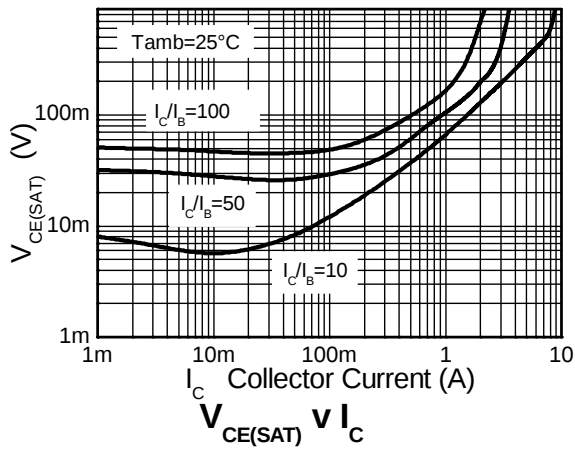
**Pulse Power Dissipation**

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

| Characteristic                               | Symbol               | Min | Typ  | Max | Unit | Test Condition                                           |
|----------------------------------------------|----------------------|-----|------|-----|------|----------------------------------------------------------|
| <b>OFF CHARACTERISTICS</b>                   |                      |     |      |     |      |                                                          |
| Collector-Base Breakdown Voltage             | BV <sub>CBO</sub>    | 50  | 190  | -   | V    | I <sub>C</sub> = 100μA                                   |
| Collector-Emitter Breakdown Voltage (Note 9) | BV <sub>CEO</sub>    | 50  | 65   | -   | V    | I <sub>C</sub> = 10mA                                    |
| Emitter-Base Breakdown Voltage               | BV <sub>EBO</sub>    | 7   | 8.3  | -   | V    | I <sub>E</sub> = 100μA                                   |
| Collector Cut-off Current                    | I <sub>CBO</sub>     | -   | -    | 100 | nA   | V <sub>CB</sub> = 40V                                    |
| Emitter Cut-off Current                      | I <sub>EBO</sub>     | -   | -    | 100 | nA   | V <sub>EB</sub> = 6V                                     |
| Collector Emitter Cut-off Current            | I <sub>CES</sub>     | -   | -    | 100 | nA   | V <sub>CES</sub> = 40V                                   |
| <b>ON CHARACTERISTICS (Note 9)</b>           |                      |     |      |     |      |                                                          |
| Static Forward Current Transfer Ratio        | h <sub>FE</sub>      | 200 | 400  | -   | -    | I <sub>C</sub> = 10mA, V <sub>CE</sub> = 2V              |
|                                              |                      | 300 | 450  | -   |      | I <sub>C</sub> = 200mA, V <sub>CE</sub> = 2V             |
|                                              |                      | 200 | 400  | -   |      | I <sub>C</sub> = 1A, V <sub>CE</sub> = 2V                |
|                                              |                      | 100 | 225  | -   |      | I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V                |
|                                              |                      | -   | 40   | -   |      | I <sub>C</sub> = 6A, V <sub>CE</sub> = 2V                |
| Collector-Emitter Saturation Voltage         | V <sub>CE(sat)</sub> | -   | 10   | 20  | mV   | I <sub>C</sub> = 0.1A, I <sub>B</sub> = 10mA             |
|                                              |                      | -   | 125  | 200 |      | I <sub>C</sub> = 1A, I <sub>B</sub> = 10mA               |
|                                              |                      | -   | 150  | 220 |      | I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA               |
| Base-Emitter Saturation Voltage              | V <sub>BE(sat)</sub> | -   | 0.87 | 1.0 | V    | I <sub>C</sub> = 2A, I <sub>B</sub> = 50mA               |
| Base-Emitter Saturation Voltage              | V <sub>BE(on)</sub>  | -   | 0.82 | 1.0 | V    | I <sub>C</sub> = 2A, V <sub>CE</sub> = 2V                |
| <b>SMALL SIGNAL CHARACTERISTICS</b>          |                      |     |      |     |      |                                                          |
| Transition Frequency                         | f <sub>T</sub>       | 100 | 165  | -   | MHz  | I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V, f = 100MHz |
| Collector Output Capacitance                 | C <sub>obo</sub>     | -   | 12   | 20  | pF   | V <sub>CB</sub> = 10V, f = 1MHz                          |
| Turn-On Time                                 | t <sub>(on)</sub>    | -   | 170  | -   | ns   | V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A,              |
| Turn-Off Time                                | t <sub>(off)</sub>   | -   | 750  | -   | ns   | I <sub>B1</sub> = -I <sub>B2</sub> = 10mA                |

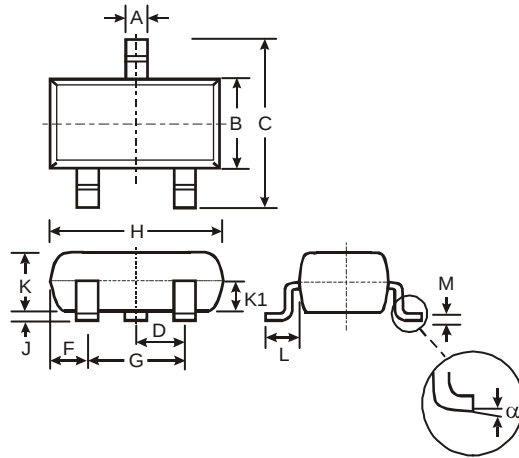
Notes: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%

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



## Package Outline Dimensions

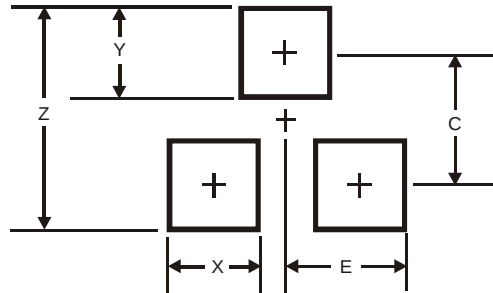
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for latest version.



| 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  |
| $\alpha$             | 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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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А