

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

**Features**

- $BV_{CEO} > 50V$
- $I_C = 1.25A$  Continuous Collector Current
- 500mW Power Dissipation
- Low Saturation Voltage  $V_{CE(sat)} < 330mV @ 1.25A$
- $R_{CE(SAT)} = 160m\Omega$  for a Low Equivalent on-Resistance
- Complementary PNP type: FMMTL720
- **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**

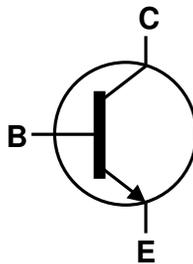
- Case: SOT23
- Case Material: Molded Plastic, "Green" Molding Compound; UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (3)
- Weight 0.008 grams (Approximate)

**Applications**

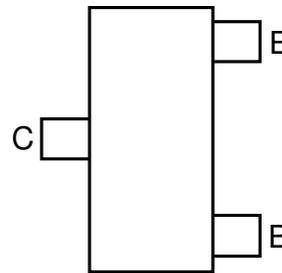
- MOSFET Gate Driving
- DC-DC / DC-AC Converters
- Regulator
- LED Driver
- Motor Control



Top View



Device Symbol



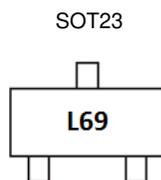
Top View Pin-Out

**Ordering Information** (Note 4)

Product	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMTL619TA	AEC-Q101	L69	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/quality/lead\\_free.html](http://www.diodes.com/quality/lead_free.html) 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/products/packages.html>.

**Marking Information**



L69 = Product Type Marking Code

### Absolute 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>	50	V
Emitter-Base Voltage	V <sub>EBO</sub>	7	V
Continuous Collector Current	I <sub>C</sub>	1.25	A
Peak Pulse Current	I <sub>CM</sub>	2	A
Base Current	I <sub>B</sub>	200	mA

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

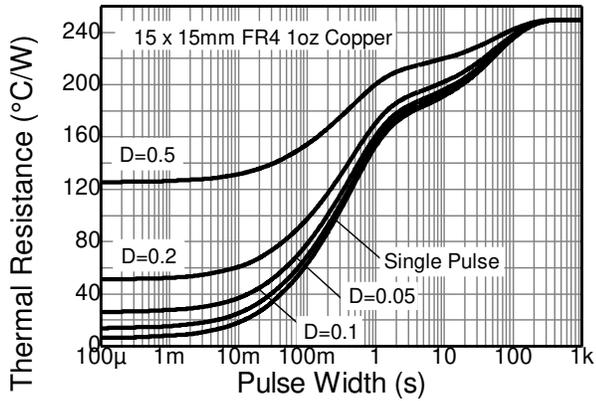
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	500	mW
Power Dissipation (Note 6)	P <sub>D</sub>	675	mW
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	250	°C/W
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	185	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R <sub>θJL</sub>	197	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

### ESD Ratings (Note 8)

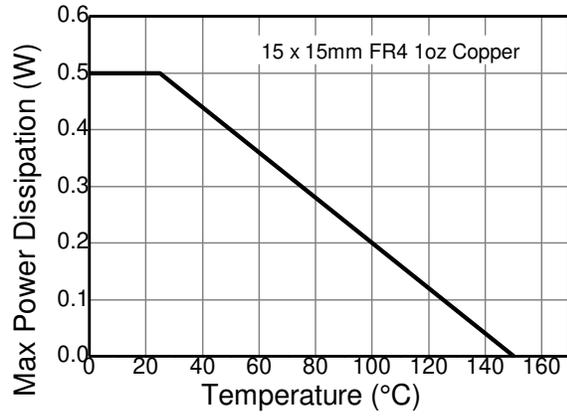
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- Notes:
5. For a device mounted with the collector lead on 15mm x 15mm 1oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions whilst operating in a steady-state.
  6. Same as Note 5, except the device is measured at t ≤ 5 seconds.
  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.

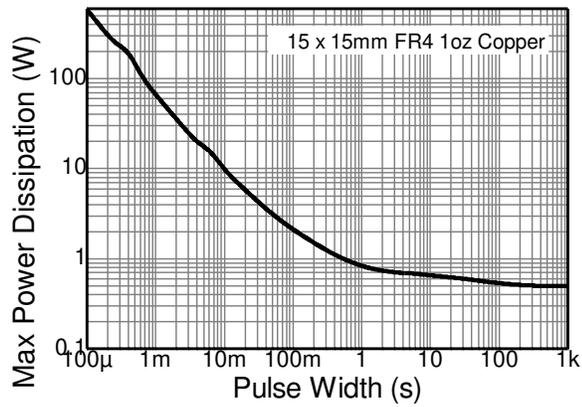
**Thermal Characteristics and Derating information**



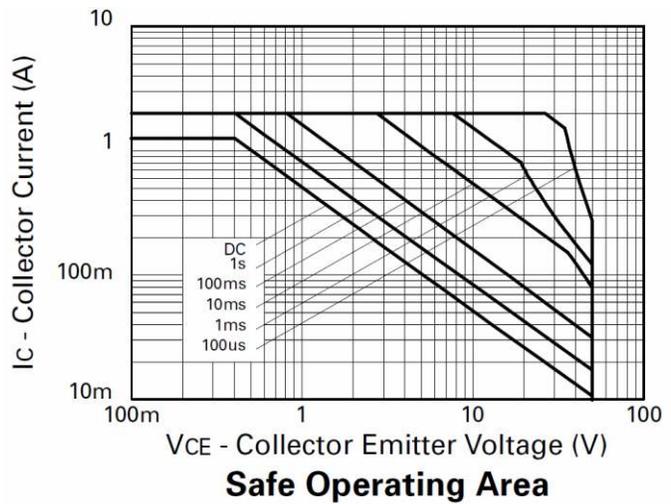
**Transient Thermal Impedance**



**Derating Curve**



**Pulse Power Dissipation**



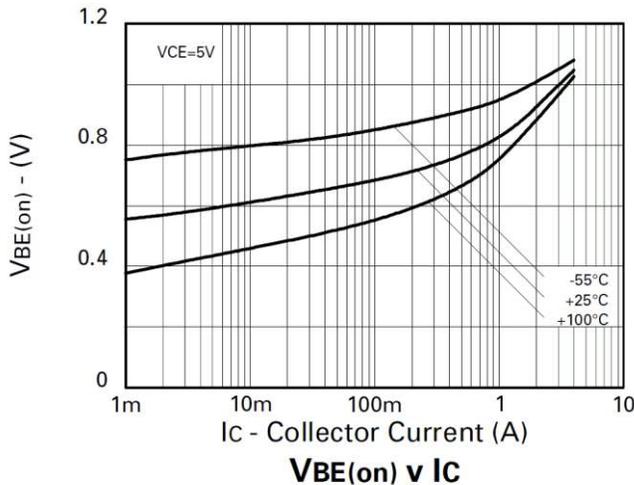
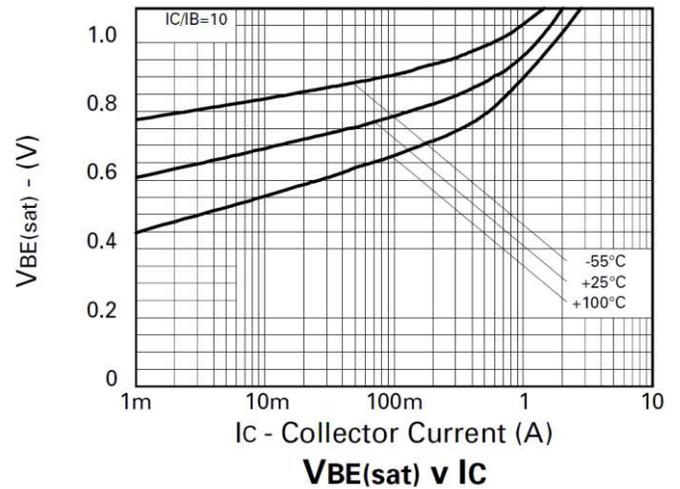
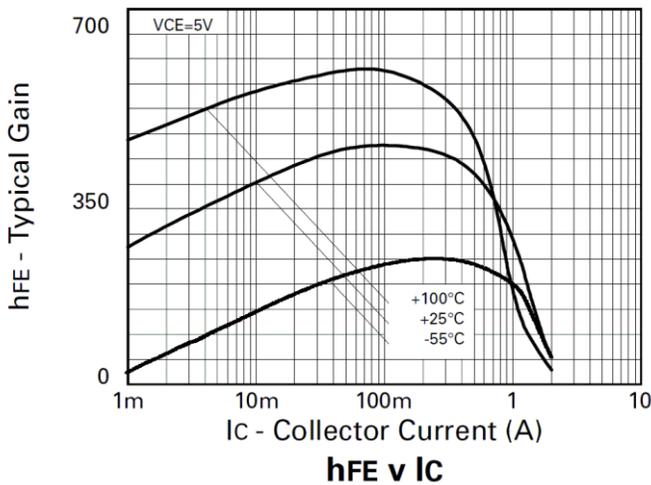
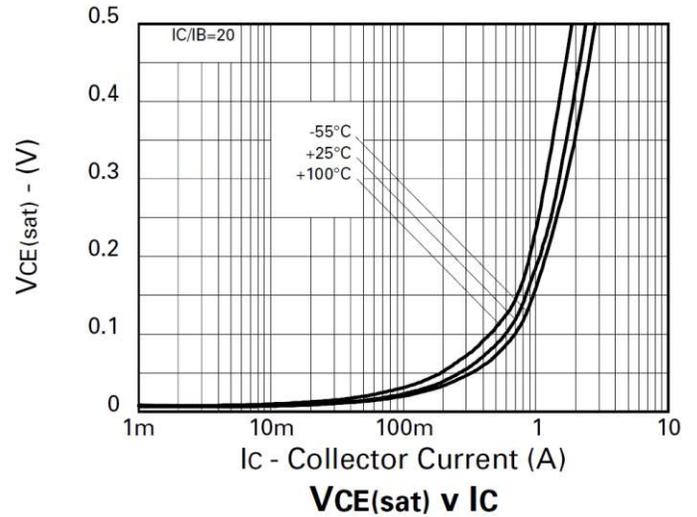
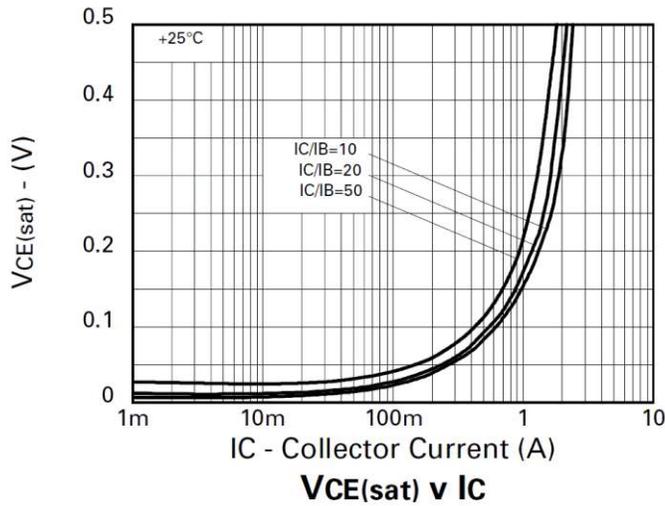
**Safe Operating Area**

**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>	100	210	-	V	I <sub>C</sub> = 100μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	50	70	-	V	I <sub>C</sub> = 5mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	7	8.5	-	V	I <sub>E</sub> = 100μA
Collector Cut-Off Current	I <sub>CBO</sub>	-	-	10	nA	V <sub>CB</sub> = 80V
Emitter Cut-Off Current	I <sub>EBO</sub>	-	-	10	nA	V <sub>EB</sub> = 6V
Collector Emitter Cut-Off Current	I <sub>CES</sub>	-	-	10	nA	V <sub>CES</sub> = 50V
<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> = 5V
		300	450	-		I <sub>C</sub> = 200mA, V <sub>CE</sub> = 5V
		200	400	-		I <sub>C</sub> = 500mA, V <sub>CE</sub> = 5V
		100	230	-		I <sub>C</sub> = 1A, V <sub>CE</sub> = 5V
		30	50	-		I <sub>C</sub> = 2A, V <sub>CE</sub> = 5V
Collector-Emitter Saturation Voltage	V <sub>CE(sat)</sub>	-	24	45	mV	I <sub>C</sub> = 100mA, I <sub>B</sub> = 10mA
		-	60	100		I <sub>C</sub> = 250mA, I <sub>B</sub> = 10mA
		-	100	180		I <sub>C</sub> = 500mA, I <sub>B</sub> = 25mA
		-	195	330		I <sub>C</sub> = 1.25A, I <sub>B</sub> = 125mA
Base-Emitter Saturation Voltage	V <sub>BE(sat)</sub>	-	1020	1100	mV	I <sub>C</sub> = 1.25A, I <sub>B</sub> = 125mA
Base-Emitter Turn-On Voltage	V <sub>BE(on)</sub>	-	895	1000	mV	I <sub>C</sub> = 1.25A, V <sub>CE</sub> = 2V
<b>SMALL SIGNAL CHARACTERISTICS</b>						
Transition Frequency	f <sub>T</sub>	-	180	-	MHz	I <sub>C</sub> = 50mA, V <sub>CE</sub> = 10V, f = 100MHz
Collector Output Capacitance	C <sub>obo</sub>	-	6	8	pF	V <sub>CB</sub> = 10V, f = 1MHz
Turn-On Time	t <sub>(on)</sub>	-	182	-	ns	V <sub>CC</sub> = 10V, I <sub>C</sub> = 1A,
Turn-Off Time	t <sub>(off)</sub>	-	379	-	ns	I <sub>B1</sub> = -I <sub>B2</sub> = 10mA

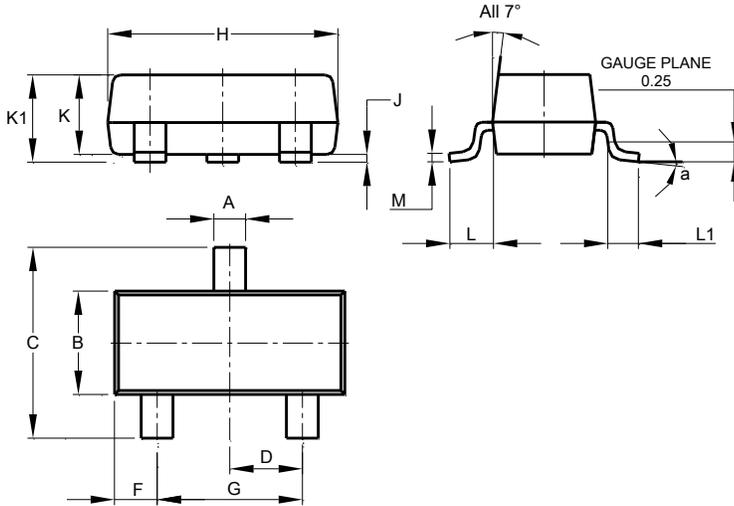
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



### Package Outline Dimensions

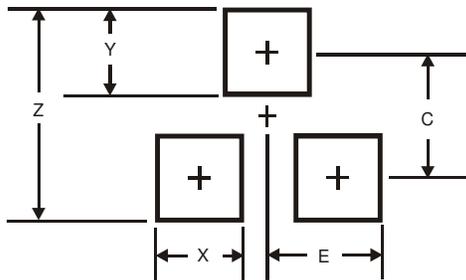
Please see AP02002 at <http://www.diodes.com/datasheets/ap02002.pdf> for the latest version.



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	0.890	1.00	0.975
K1	0.903	1.10	1.025
L	0.45	0.61	0.55
L1	0.25	0.55	0.40
M	0.085	0.150	0.110
a	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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