

**100V NPN DARLINGTON MEDIUM POWER TRANSISTOR IN SOT23**
**Description**

This Bipolar Junction Transistor (BJT) is designed to meet the stringent requirements of Automotive Applications.

**Features**

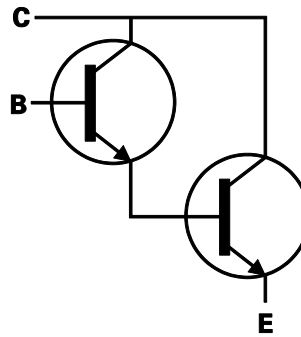
- $BV_{CEO} > 100V$
- $I_C = 0.5A$  High Continuous Collector Current
- $I_{CM} = 2A$  Peak Pulse Current
- 500mW Power Dissipation
- Darlington transistor with high  $h_{FE}$  up to 5k at  $I_C = 0.5A$
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**
- **PPAP Capable (Note 4)**

**Mechanical Data**

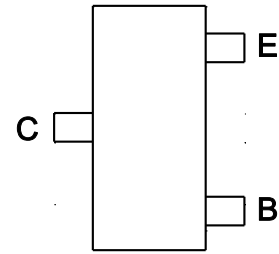
- Case: SOT23
- Case material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish – Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 (E3)
- Weight: 0.008 grams (Approximate)



Top View



Device Symbol

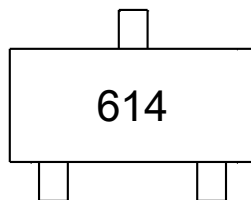


Top View Pin-Out

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

Part Number	Compliance	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
FMMT614QTA	Automotive	614	7	8	3,000
FMMT614QTC	Automotive	614	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/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. Automotive products are AEC-Q101 qualified and are PPAP capable. Refer to [http://www.diodes.com/quality/product\\_compliance\\_definitions/](http://www.diodes.com/quality/product_compliance_definitions/).
  5. For packaging details, go to our website at <http://www.diodes.com/products/packages.html>.

**Marking Information**


614 = 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>CB0</sub>	120	V
Collector-Emitter Voltage	V <sub>CEO</sub>	100	V
Emitter-Base Voltage	V <sub>EBO</sub>	10	V
Continuous Collector Current	I <sub>C</sub>	500	mA
Peak Pulse Current	I <sub>CM</sub>	2	A

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

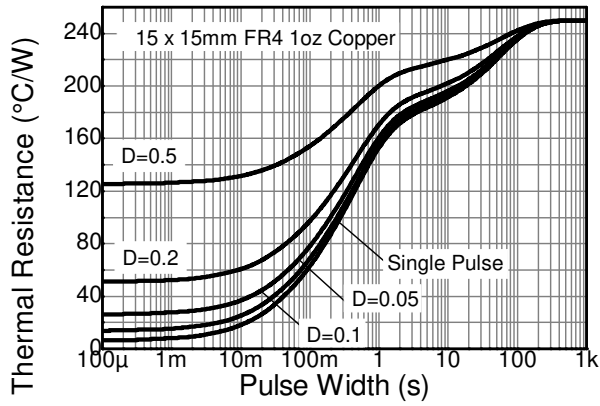
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 6)	P <sub>D</sub>	500	mW
Thermal Resistance, Junction to Ambient (Note 6)	R <sub>θJA</sub>	250	°C/W
Thermal Resistance, Junction to Lead (Note 7)	R <sub>θJL</sub>	197	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>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

**ESD Ratings** (Note 8)

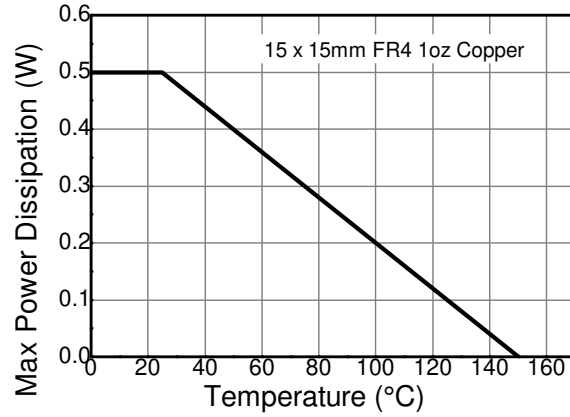
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	2,000	V	2
Electrostatic Discharge - Machine Model	ESD MM	200	V	B

- Notes:
6. For a device mounted on 15mm X 15mm 1oz weight copper that is on a single-sided FR4 PCB; device is measured under still air conditions while operating in a steady-state.
  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.

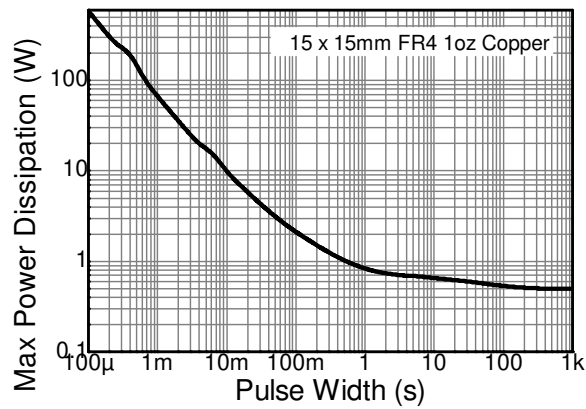
**Thermal Characteristics and Derating Information**



**Transient Thermal Impedance**



**Derating Curve**



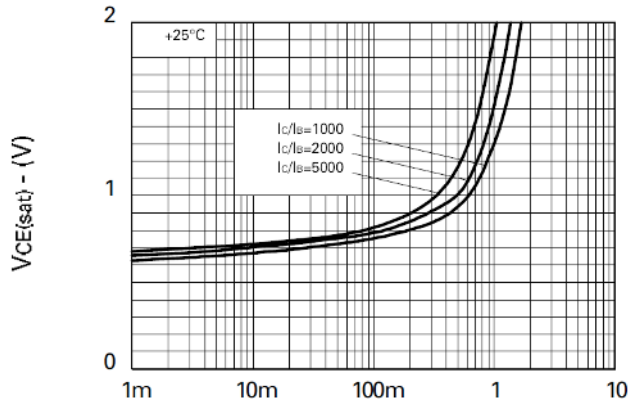
**Pulse Power Dissipation**

**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>	120	300	—	V	I <sub>C</sub> = 10μA
Collector-Emitter Breakdown Voltage (Note 9)	BV <sub>CEO</sub>	100	130	—	V	I <sub>C</sub> = 10mA
Emitter-Base Breakdown Voltage	BV <sub>EBO</sub>	10	14	—	V	I <sub>E</sub> = 10μA
Collector Cutoff Current	I <sub>CBO</sub>	—	0.02	10	nA	V <sub>CB</sub> = 100V
Emitter Cutoff Current	I <sub>EBO</sub>	—	—	100	nA	V <sub>EB</sub> = 8V
Collector Emitter Cutoff Current	I <sub>CES</sub>	—	—	10	μA	V <sub>CE</sub> = 100V
Static Forward Current Transfer Ratio (Note 9)	h <sub>FE</sub>	15k 5k	— —	— —	—	I <sub>C</sub> = 100mA, V <sub>CE</sub> = 5V I <sub>C</sub> = 500mA, V <sub>CE</sub> = 5V
Collector-Emitter Saturation Voltage (Note 9)	V <sub>CE(sat)</sub>	—	0.9 0.78	1.0 0.9	V V	I <sub>C</sub> = 500mA, I <sub>B</sub> = 5mA I <sub>C</sub> = 100mA, I <sub>B</sub> = 0.1mA
Base-Emitter Turn-On Voltage(Note 9)	V <sub>BE(on)</sub>	—	1.5	1.8	V	I <sub>C</sub> = 500mA, V <sub>CE</sub> = 5V
Base-Emitter Saturation Voltage(Note 9)	V <sub>BE(sat)</sub>	—	1.7	1.9	V	I <sub>C</sub> = 500mA, I <sub>B</sub> = 5mA
Output Capacitance	C <sub>obo</sub>	—	6	—	pF	V <sub>CB</sub> = 10V, f = 100mHz
Switching Times	t <sub>on</sub>	—	0.7	—	μs	I <sub>C</sub> = 100μA, I <sub>B</sub> = 0.1mA,
	t <sub>off</sub>	—	2.5	—	μs	V <sub>S</sub> = 10V

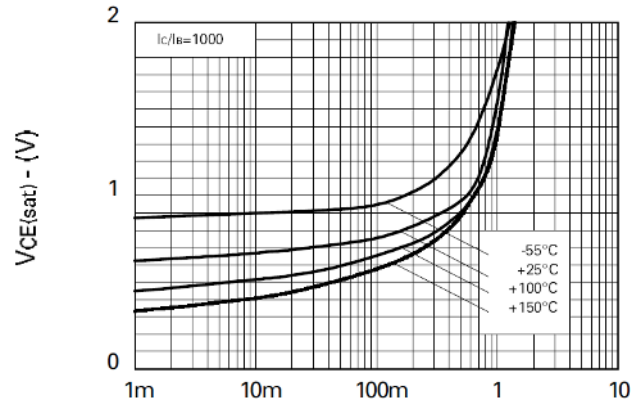
Note: 9. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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



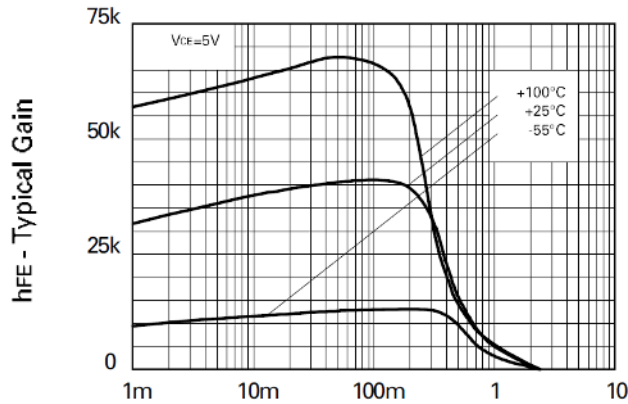
IC - Collector Current (A)

**$V_{CE(sat)}$  v  $I_C$**



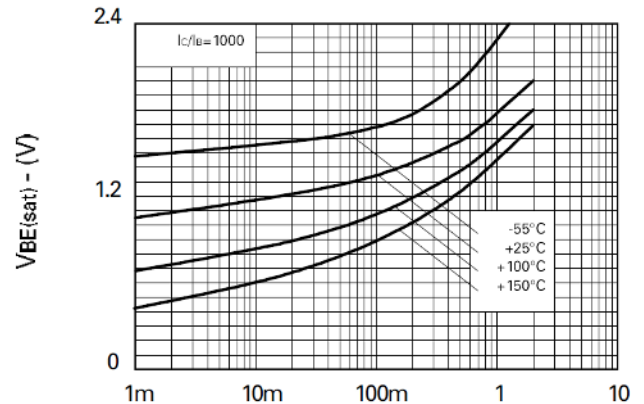
IC - Collector Current (A)

**$V_{CE(sat)}$  v IC**



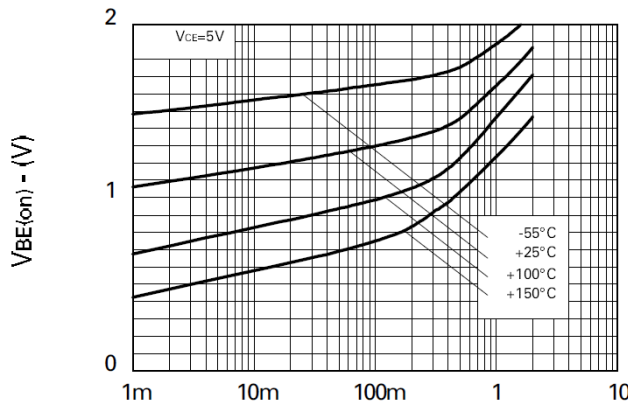
IC - Collector Current (A)

**$h_{FE}$  v IC**



IC - Collector Current (A)

**$V_{BE(sat)}$  v IC**

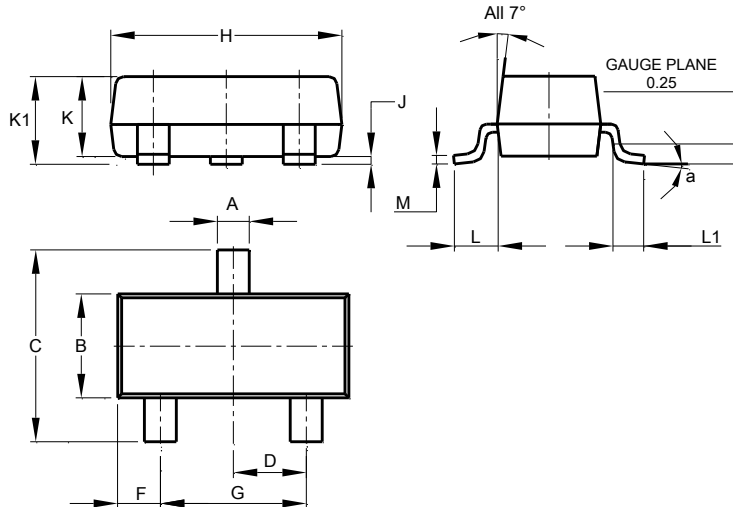


IC - Collector Current (A)

**$V_{BE(on)}$  v IC**

**Package Outline Dimensions**

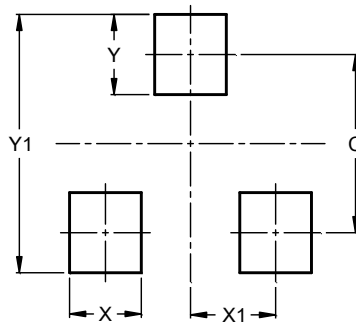
Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.



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	0°	8°	--
All Dimensions in mm			

**Suggested Pad Layout**

Please see AP02001 at [http://www.diodes.com/\\_files/datasheets/ap02001.pdf](http://www.diodes.com/_files/datasheets/ap02001.pdf) for the latest version.



Dimensions	Value (in mm)
C	2.0
X	0.8
X1	1.35
Y	0.9
Y1	2.9

Note : For high voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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