Description

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

Features

- BV_{CEO} > 75V
- I_C = 3A High Continuous Current
- I_{CM} = 10A Peak Pulse Current
- High Gain Holds up h_{FE} > 300 @ I_C=1A
- Low Equivalent On-Resistance; $R_{CE(SAT)}$ = 78mΩ at 4.5A
- Excellent h_{FE} Characteristics up to 10A
- **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

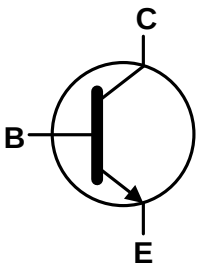
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.05 grams (Approximate)

Applications

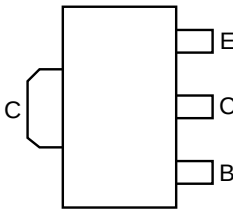
- Emergency Lighting Circuits
- Motor Driving (Including DC Fans)
- Solenoid, Relay and Actuator Drivers
- DC - DC Modules
- Backlight Inverters
- Power Switches
- MOSFET Gate Drivers

SOT89

Top View



Device Symbol



Top View
Pin-Out

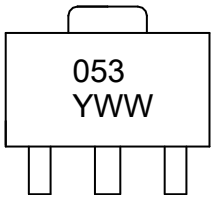
Ordering Information (Notes 4 and 5)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity Per Reel
FCX1053AQTA	053	7	12	1,000

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 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/product_compliance_definitions.html.
5. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

Marking Information

SOT89



053 = Product Type Marking Code
YWW = Date Code Marking
Y = Last Digit of Year (ex: 7 = 2017)
WW = Week Code (01 to 53)

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

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	150	V
Collector-Emitter Voltage	V_{CEO}	75	V
Emitter-Base Voltage	V_{EBO}	7	V
Continuous Collector Current	I_C	3	A
Base Current	I_B	500	mA
Peak Pulse Current	I_{CM}	10	A

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

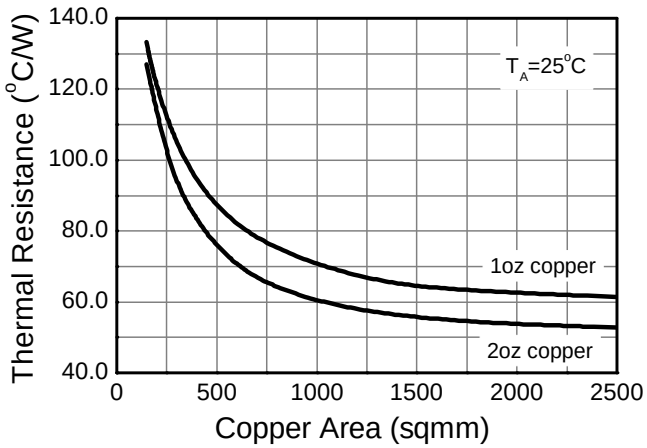
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 6)	P_D	1	W
	(Note 7)		1.6	
	(Note 8)		2.0	
Thermal Resistance, Junction to Ambient Air	(Note 6)	$R_{\theta JA}$	125	°C/W
	(Note 7)		78	
	(Note 8)		62.5	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	3.6	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

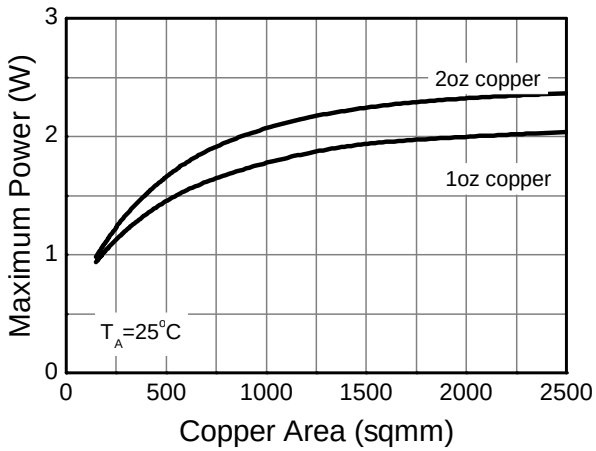
ESD Ratings (Note 10)

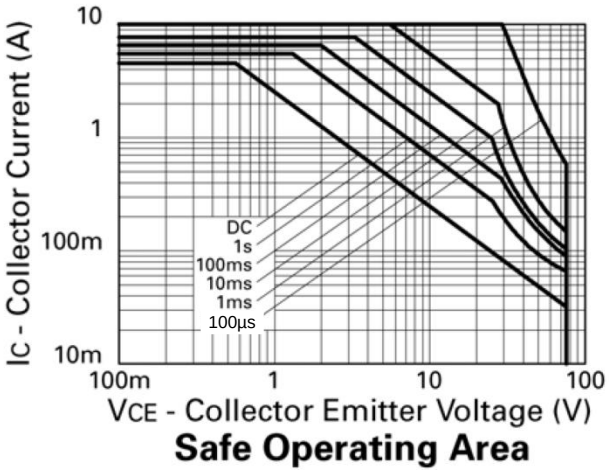
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
6. For a device mounted with the exposed collector pad 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.
7. Same as note 6, except the device is mounted on 25mm x 25mm 1oz copper.
8. Same as note 6, except the device is mounted on 50mm x 50mm 1oz copper.
9. Thermal resistance from junction to solder-point (on the exposed collector pad).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

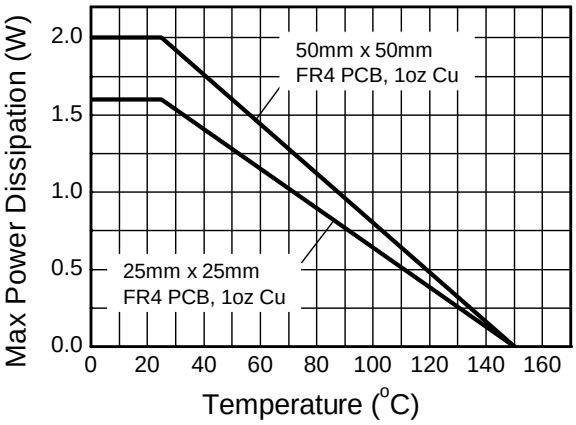
Thermal Characteristics and Derating Information



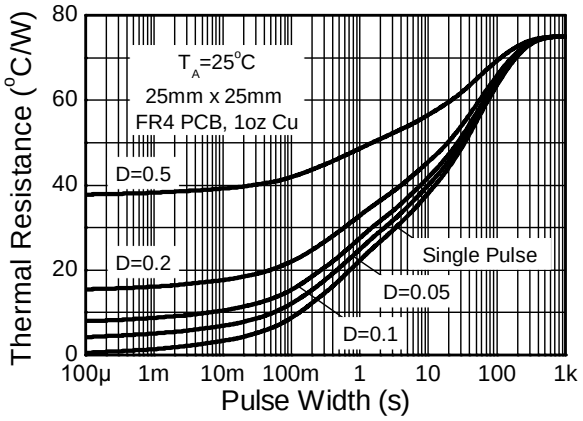




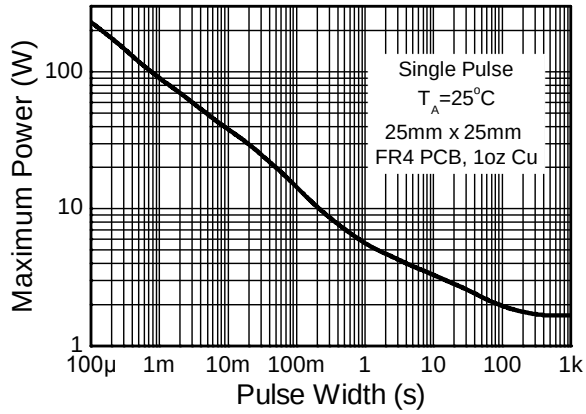
Safe Operating Area



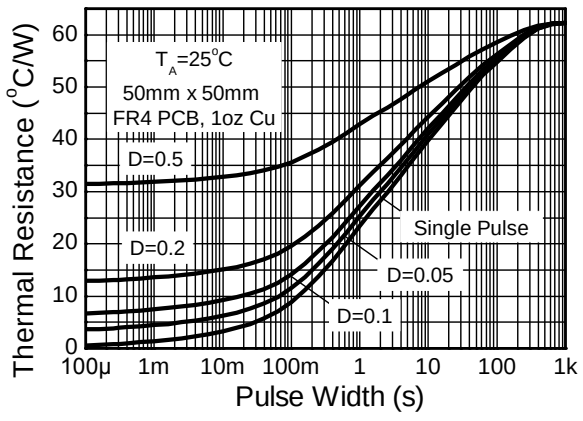
Derating Curve



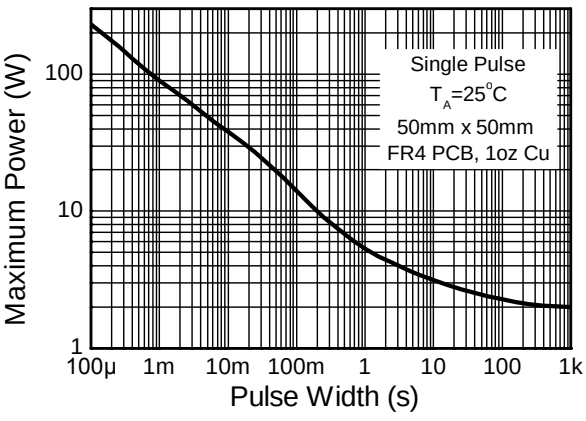
Transient Thermal Impedance



Pulse Power Dissipation



Transient Thermal Impedance



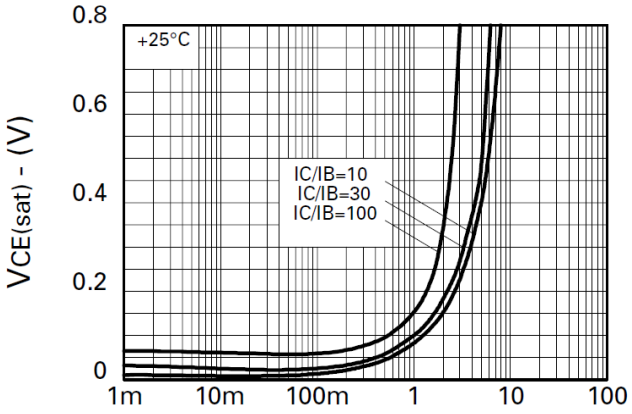
Pulse Power Dissipation

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

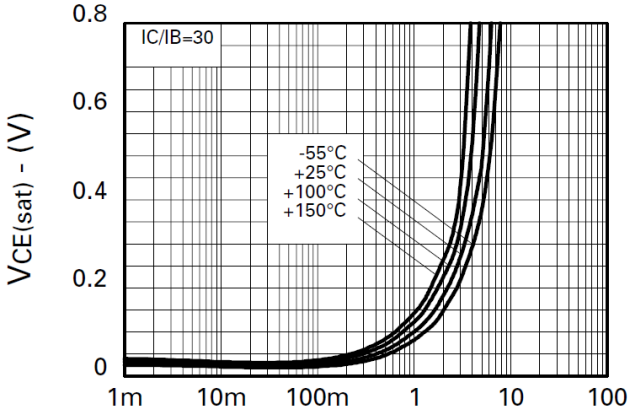
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	BV_{CBO}	150	250	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage	BV_{CES}	150	250	—	V	I_C = 100µA
Collector-Emitter Breakdown Voltage (Note 11)	BV_{CEO}	75	100	—	V	I_C = 10mA
Collector-Emitter Breakdown Voltage	BV_{CEV}	150	250	—	V	I_C = 100µA, V_{EB} = 1V
Emitter-Base Breakdown Voltage	BV_{EBO}	7	8.8	—	V	I_E = 100µA
Collector Cutoff Current	I_{CBO}	—	0.9	50	nA	V_{CB} = 120V
Collector Cutoff Current	I_{CES}	—	1.5	50	nA	V_{CES} = 120V
Emitter Cutoff Current	I_{EBO}	—	0.3	20	nA	V_{EB} = 5.6V
DC Current Transfer Static Ratio (Note 11)	h_{FE}	270 300 300 40 —	440 450 450 60 20	— 1200 — — —	—	I_C = 10mA, V_{CE} = 2V I_C = 0.5A, V_{CE} = 2V I_C = 1A, V_{CE} =2V I_C = 4.5A, V_{CE} = 2V I_C = 10A, V_{CE} = 2V
Collector-Emitter Saturation Voltage (Note 11)	$V_{CE(SAT)}$	—	21 55 150 160 350	30 75 200 210 440	mV	I_C = 0.2A, I_B = 20mA I_C = 0.5A, I_B = 20mA I_C = 1A, I_B = 10mA I_C = 2A, I_B = 100mA I_C = 4.5A, I_B = 200mA
Base-Emitter Saturation Voltage (Note 11)	$V_{BE(SAT)}$	—	900	1000	mV	I_C = 3A, I_B = 100mA
Base-Emitter Turn-on Voltage (Note 11)	$V_{BE(ON)}$	—	825	950	mV	I_C = 3A, V_{CE} = 2V
Transitional Frequency	f_T	—	140	—	MHz	I_C = 50mA, V_{CE} = 10V, f = 100MHz
Output Capacitance	C_{obo}	—	21	30	pF	V_{CB} = 10V, f = 1MHz
Switching Time	t_{ON}	—	162	—	ns	V_{CC} = 50V, I_C = 2A, I_{B1} = -I_{B2} = ±20mA
	t_{OFF}		900		ns	

Note: 11. Measured under pulsed conditions. Pulse width = 300µs. Duty cycle ≤ 2%.

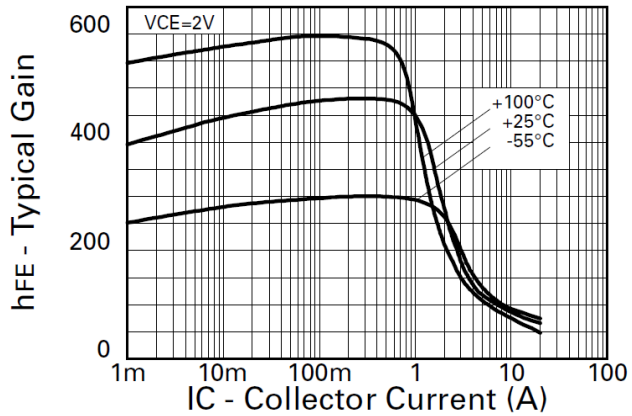
Typical Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)



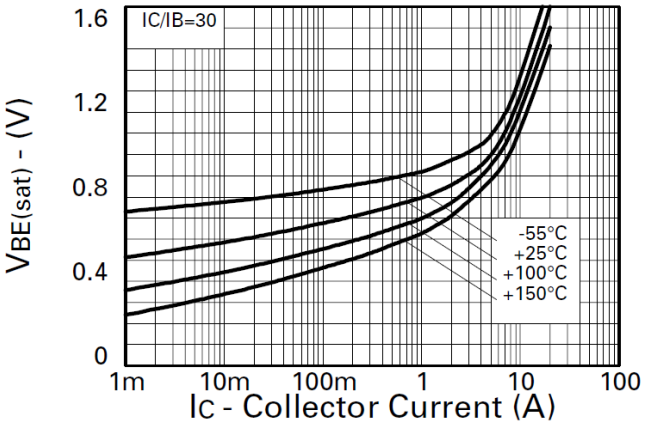
VCE(sat) v IC



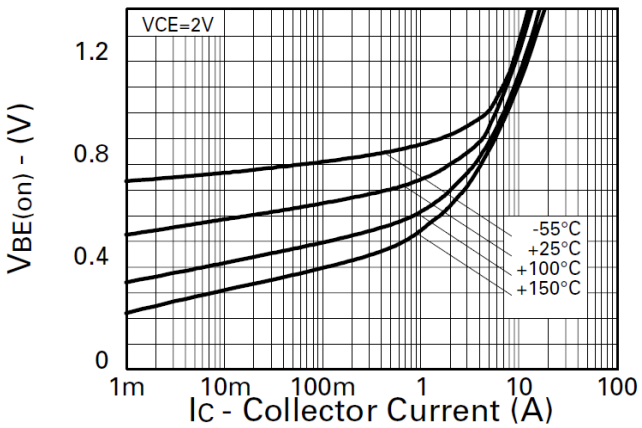
VCE(sat) v IC



hFE v IC



VBE(sat) v IC



VBE(on) v IC

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

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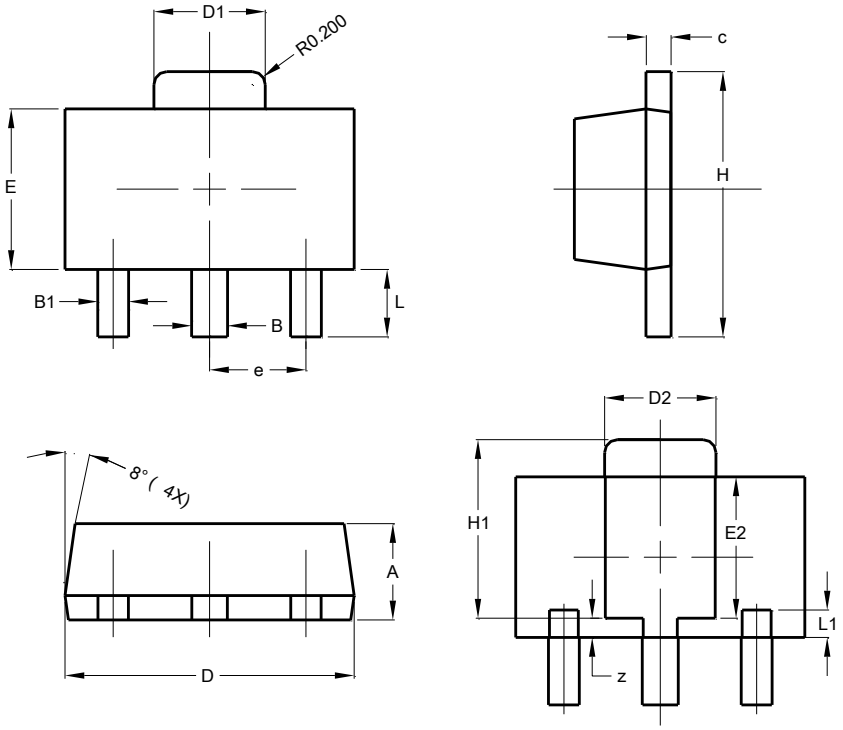
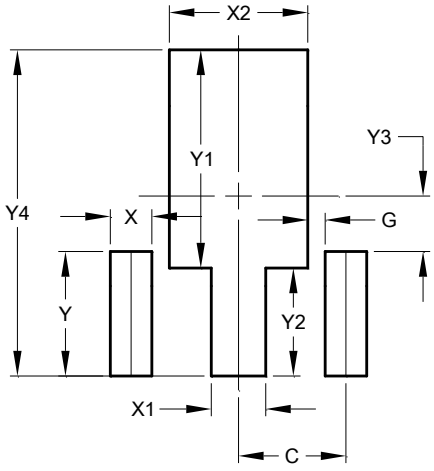


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in mm			

Suggested Pad Layout

Please see http://www.diodes.com/package-outlines.html for the latest version.

SOT89



Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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