

## Description

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

## Features

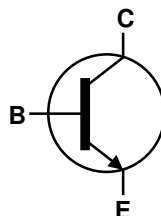
- $BV_{CEO} > 15V$
- Maximum Continuous Collector Current  $I_C = 6A$
- $V_{CE(SAT)} < 30mV @ 1A$
- $R_{CE(SAT)} = 19m\Omega$  Typical
- High Power Dissipation SOT23 Package
- High Peak Current
- Low Saturation Voltage
- 60V Forward Blocking Voltage
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen- and Antimony-Free. "Green" Device (Note 3)**
- **The ZTN23015CFHQ is suitable for automotive applications requiring specific change control; this part is AEC-Q101 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<https://www.diodes.com/quality/product-definitions/>

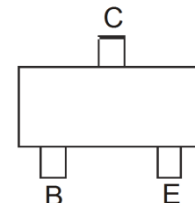
SOT23 (Type DN)



Top View



Device Symbol



Top View  
Pin-Out

## 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 2086 e3
- Weight: 0.008 grams (Approximate)

## Applications

- DC - DC Converters
- MOSFET and IGBT Gate Driving
- Motor Drive
- Relay, Lamp and Solenoid Drive

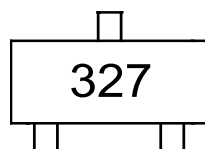
## Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
ZTN23015CFHQTA	Automotive	327	7	8	3,000

- Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
  2. See <https://www.diodes.com/quality/lead-free/> for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and
  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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

## Marking Information

SOT23 (Type DN)



327 = Product Type Marking Code

**Absolute Maximum Ratings** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

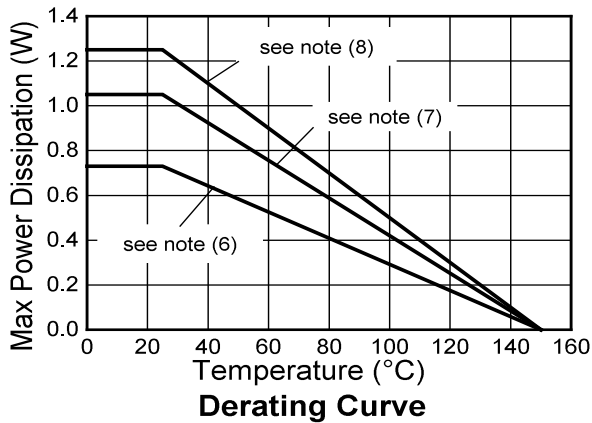
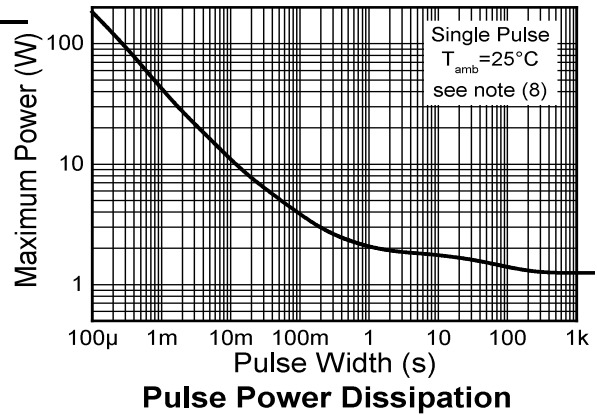
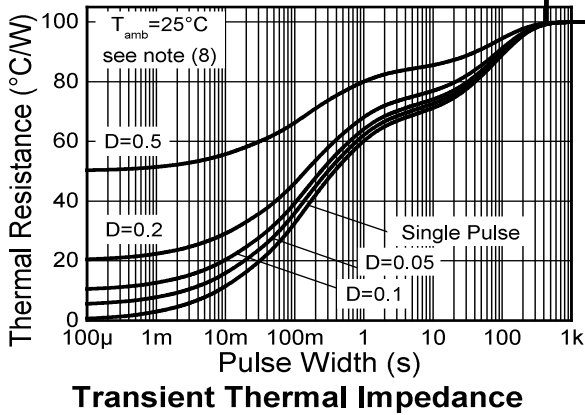
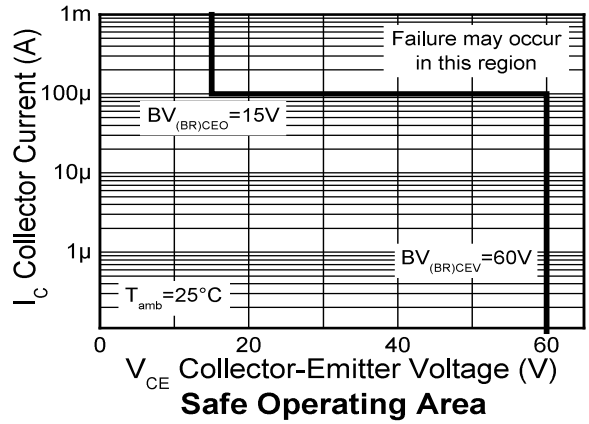
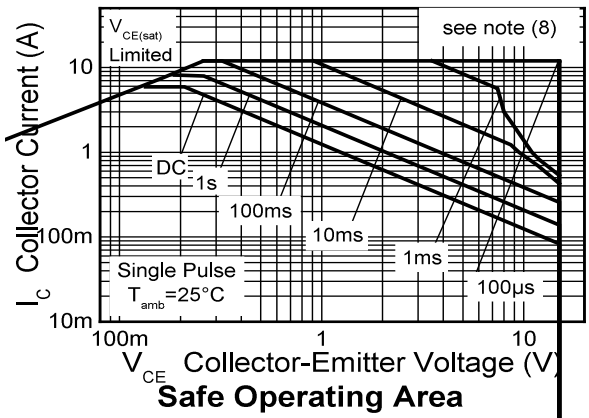
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	$V_{CBO}$	60	V
Collector-Emitter Voltage	$V_{CEV}$	60	V
Collector-Emitter Voltage	$V_{CEO}$	15	V
Emitter-Base Voltage	$V_{EBO}$	7	V
Continuous Collector Current	$I_C$	6	A
Base Current	$I_B$	1.2	A
Peak Pulse Current	$I_{CM}$	12	A

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

Characteristic	Symbol	Value	Unit
Power Dissipation Linear Derating Factor	$P_D$	0.73	W mW/°C
		5.84	
		1.05	
		8.4	
		1.25	
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	9.6	°C/W
		1.81	
		14.5	
		171	
		119	
Operating and Storage Temperature Range	$T_J, T_{STG}$	100	°C
		69	
		-55 to +150	

- Notes:
6. For a device mounted with the collector lead on 15mm × 15mm 1oz copper that is on a single-sided 1.6mm FR-4 PCB; device is measured under still air conditions whilst operating in steady-state.
  7. Mounted on 25mm × 25mm 1.6mm FR-4 PCB with a high coverage of single sided 2oz copper in still air conditions.
  8. Mounted on 50mm × 50mm 1.6mm FR-4 PCB with a high coverage of single sided 2oz copper in still air conditions.
  9. Same as note (8), except measured at  $t < 5$  seconds.

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

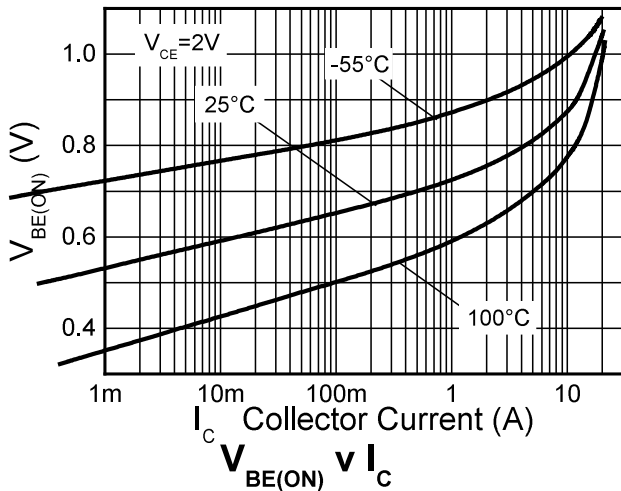
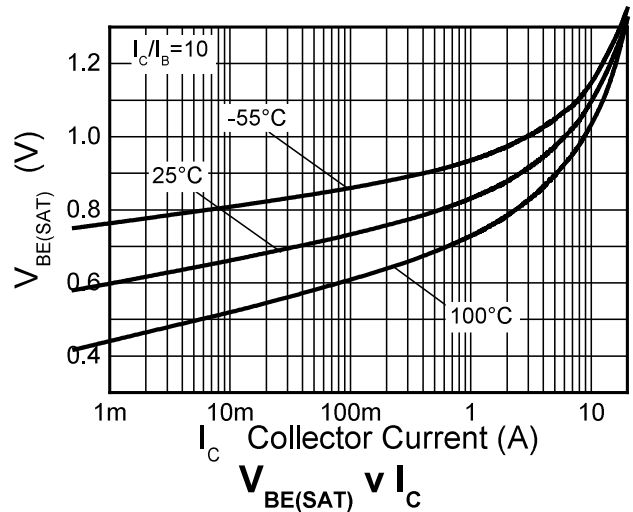
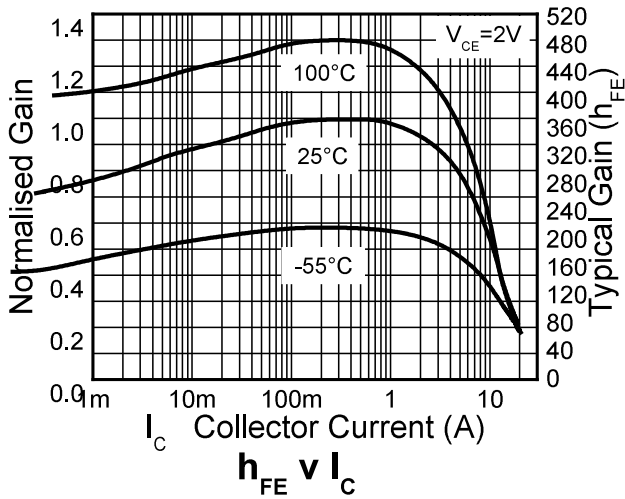
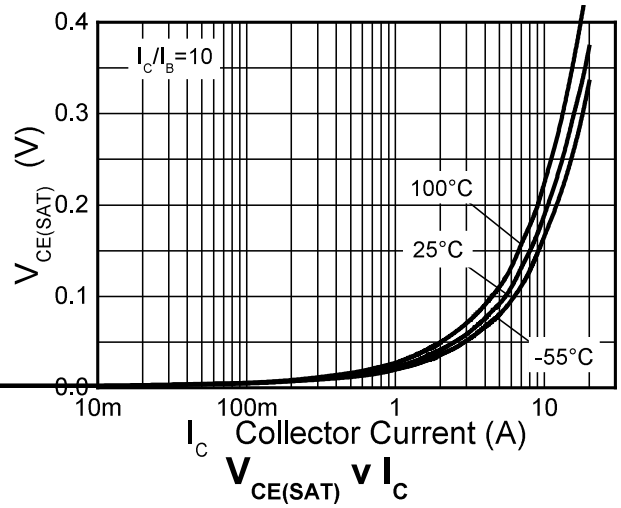
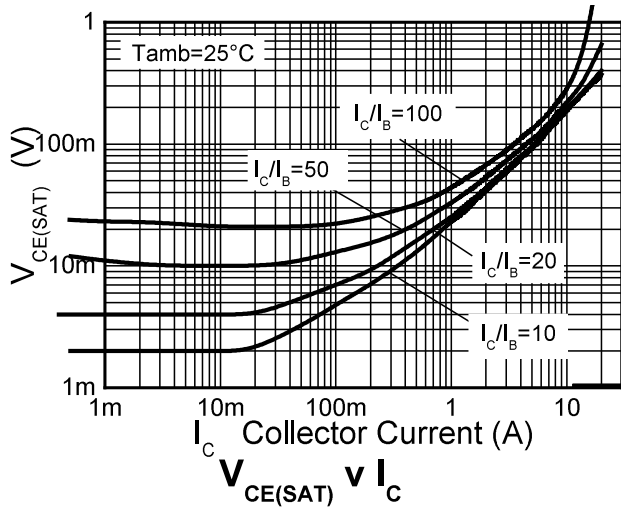


**Electrical Characteristics** (@  $T_A = +25^\circ\text{C}$ , unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	60	85	—	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage	$BV_{CEV}$	60	85	—	V	$I_C = 100\mu\text{A}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Collector-Emitter Breakdown Voltage (Note 10)	$BV_{CEO}$	15	23	—	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	7	8.3	—	V	$I_E = 100\mu\text{A}$
Collector-Base Cutoff Current	$I_{CBO}$	—	< 1	20	nA	$V_{CB} = 48\text{V}$
Collector-Emitter Cutoff Current	$I_{CEV}$	—	—	100	nA	$V_{CE} = 48\text{V}$ , $R_{BE} \leq 1\text{k}\Omega$ or $-1\text{V} < V_{BE} < 0.25\text{V}$
Emitter-Base Cutoff Current	$I_{EBO}$	—	< 1	10	nA	$V_{EB} = 6\text{V}$
Static Forward Current Transfer Ratio (Note 10)	$h_{FE}$	160	300	—	—	$I_C = 10\text{mA}$ , $V_{CE} = 2\text{V}$
		200	350	560		$I_C = 500\text{mA}$ , $V_{CE} = 2\text{V}$
		190	330	—		$I_C = 3\text{A}$ , $V_{CE} = 2\text{V}$
		150	280	—		$I_C = 6\text{A}$ , $V_{CE} = 2\text{V}$
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(sat)}$	—	7	15	mV	$I_C = 0.1\text{A}$ , $I_B = 5\text{mA}$
		—	22	30		$I_C = 1\text{A}$ , $I_B = 100\text{mA}$
		—	70	90		$I_C = 3\text{A}$ , $I_B = 60\text{mA}$
		—	130	180		$I_C = 6\text{A}$ , $I_B = 120\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(sat)}$	—	0.83	0.93	V	$I_C = 3\text{A}$ , $I_B = 60\text{mA}$
		—	0.89	0.98		$I_C = 6\text{A}$ , $I_B = 120\text{mA}$
Base-Emitter Saturation Voltage (Note 10)	$V_{BE(on)}$	—	0.81	0.91	V	$I_C = 6\text{A}$ , $V_{CE} = 2\text{V}$
Output Capacitance	$C_{OBO}$	—	56	—	pF	$V_{CB} = 10\text{V}$ , $f = 1\text{MHz}$
Transition Frequency	$f_T$	—	235	—	MHz	$V_{CE} = 2\text{V}$ , $I_C = 500\text{mA}$ , $f = 50\text{MHz}$
Delay Time	$t_d$	—	15	—	ns	$V_{CC} = 5\text{V}$ , $I_C = 3\text{A}$ , $I_{B1} = -I_{B2} = 150\text{mA}$
Rise Time	$t_r$	—	38.5	—		
Storage Time	$t_{stg}$	—	213	—		
Fall Time	$t_f$	—	19.7	—		

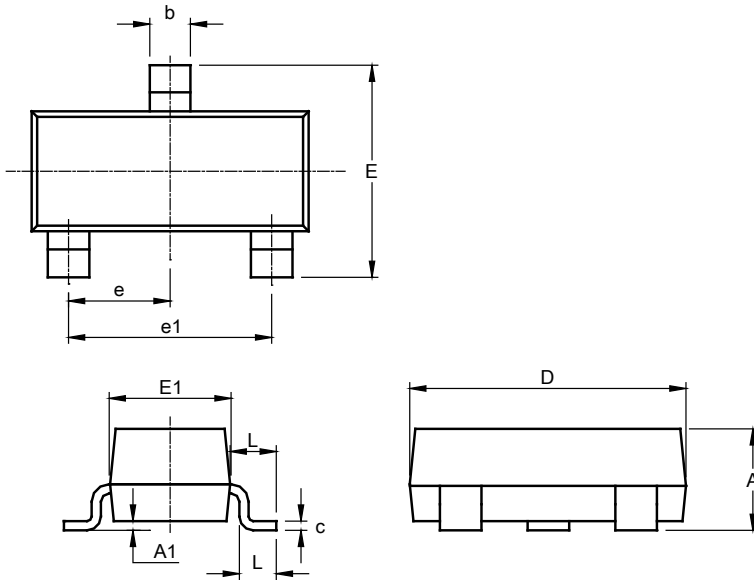
Note: 10. Measured under pulsed conditions. Pulse width  $\leq 300\mu\text{s}$ . Duty cycle  $\leq 2\%$ .

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



**Package Outline Dimensions**

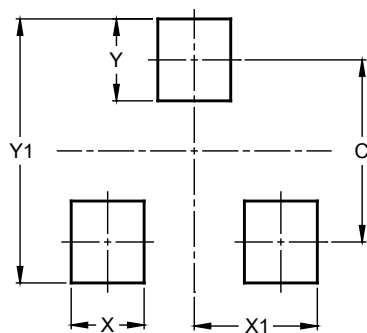
Please see <http://www.diodes.com/package-outlines.html> for the latest version.



SOT23 (Type DN)			
Dim	Min	Max	Typ
A	0.89	1.12	1.00
A1	0.01	0.10	0.05
b	0.30	0.51	0.45
c	0.08	0.20	0.10
D	2.80	3.04	3.00
E	2.10	2.64	2.42
E1	1.20	1.40	1.37
e	0.95 REF		
e1	1.90 REF		
L	0.25	0.60	0.30
L1	0.45	0.62	0.54
All Dimensions in mm			

**Suggested Pad Layout**

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



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

**IMPORTANT NOTICE**

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel. Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

**LIFE SUPPORT**

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

- A. Life support devices or systems are devices or systems which:
  - 1. are intended to implant into the body, or
  - 2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.
- B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2020, Diodes Incorporated

[www.diodes.com](http://www.diodes.com)