

60V NPN MEDIUM POWER TRANSISTOR IN SOT89

Features

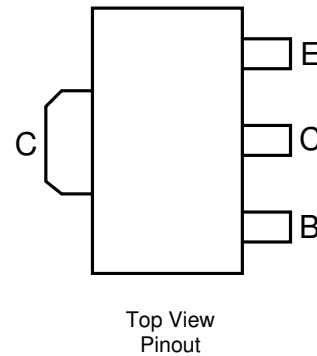
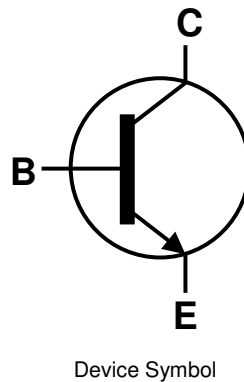
- $BV_{CE0} > 60V$
- $I_C = 3A$ High Continuous Collector Current
- I_{CM} up to 6A Peak Pulse Current
- 2W Power Dissipation
- Low Saturation Voltage $V_{CE(sat)} < 300mV @ 1A$
- Complementary PNP Type: DIODES™ DXT751
- **Totally Lead-Free & Fully RoHS compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **An automotive-compliant part is available under separate datasheet (DXT651Q)**

Mechanical Data

- Package: SOT89
- Package 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 ③
- Weight: 0.052 grams (Approximate)
Max Soldering Temperature +260°C for 30 secs as per JEDEC J-STD-020

Applications

- Load management functions
- Motor controls
- DC-DC / DC-AC converters



Ordering Information (Note 4)

Product	Package	Marking	Reel size (inches)	Tape width (mm)	Packing	
					Qty.	Carrier
DXT651-13	SOT89	KN2	13	12	2,500	Reel
DXT651-13R	SOT89	KN2	13	12	4,000	Reel

- 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 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 <https://www.diodes.com/design/support/packaging/diodes-packaging/>.

Marking Information



KN2 = Product Type Marking Code
 DII = Manufacturer's Marking Code
 YWW = Date Code Marking
 Y = Last Digit of Year (ex: 3 = 2023)
 WW = Week Code (01 to 53)

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

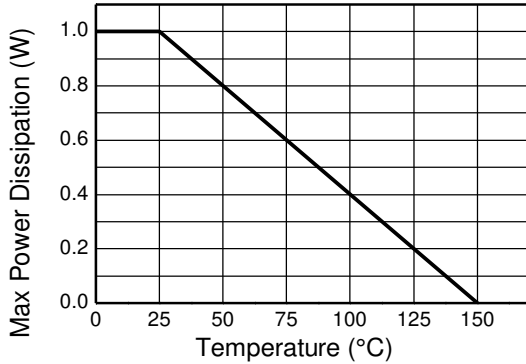
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	80	V
Collector-Emitter Voltage	V_{CEO}	60	V
Emitter-Base Voltage	V_{EBO}	5	V
Collector Current	I_C	3	A
Peak Pulse Collector Current	I_{CM}	6	A
Base Current	I_B	500	mA

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

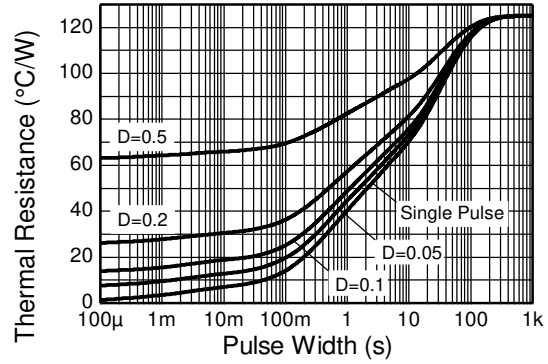
Characteristic	Symbol	Value	Unit
Power Dissipation	P_D	1	W
		2	
Thermal Resistance, Junction to Ambient Air	$R_{\theta JA}$	125	$^\circ\text{C/W}$
		62.5	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	26	$^\circ\text{C/W}$
Thermal Resistance, Junction to Leads	$R_{\theta JL}$	6	$^\circ\text{C/W}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

- Notes:
5. For a device surface mounted on 15mm x 15mm x 0.6mm FR4 PCB with high coverage of single sided 1 oz copper, in still air conditions; the device is measured when operating in steady state condition.
 6. Same as note (5), except the device is mounted on 40mm x 40mm x 1.6mm FR4 PCB.
 7. Thermal resistance from junction to solder-point (on the exposed collector pad).

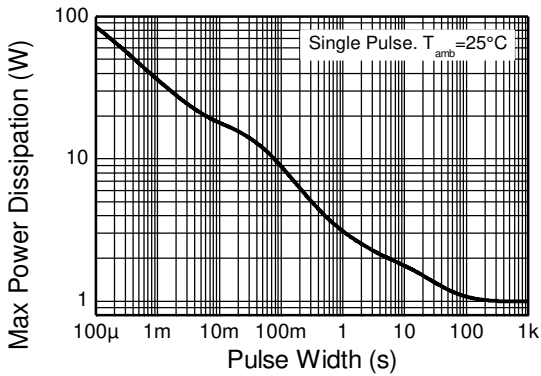
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Conditions
OFF CHARACTERISTICS						
Collector-Base Breakdown Voltage	BV _{CB0}	80	—	—	V	I _C = 100μA
Collector-Emitter Breakdown Voltage (Note 8)	BV _{CEO}	60	—	—	V	I _C = 10mA
Emitter-Base Breakdown Voltage	BV _{EBO}	5	—	—	V	I _E = 100μA
Collector-Base Cutoff Current	I _{CB0}	—	—	0.1 10	μA	V _{CB} = 60V V _{CB} = 60V, T _A = +100°C
Emitter-Base Cutoff Current	I _{EBO}	—	—	0.1	μA	V _{EB} = 4V
ON CHARACTERISTICS (Note 8)						
Collector-Emitter Saturation Voltage	V _{CE(sat)}	—	0.08 0.23	0.3 0.6	V	I _C = 1A, I _B = 100mA I _C = 3A, I _B = 300mA
Base-Emitter Saturation Voltage	V _{BE(sat)}	—	0.85	1.25	V	I _C = 1A, I _B = 100mA
Base-Emitter Turn-On Voltage	V _{BE(on)}	—	0.8	1	V	V _{CE} = 2V, I _C = 1A
DC Current Gain	h _{FE}	70 100 80 40	200 200 185 120	— — 300 —	—	V _{CE} = 2V, I _C = 50mA V _{CE} = 2V, I _C = 500mA V _{CE} = 2V, I _C = 1A V _{CE} = 2V, I _C = 2A
SMALL-SIGNAL CHARACTERISTICS						
Transition Frequency	f _T	140	200	—	MHz	V _{CE} = 5V, I _C = 100mA, f = 100MHz
Output Capacitance	C _{obo}	—	—	30	pF	V _{CB} = 10V, f = 1MHz
Switching Times	t _{on} t _{off}	— —	35 230	— —	ns	V _{CC} = 10V, I _C = 500mA, I _{B1} = -I _{B2} = 50mA

Note: 8. Measured under pulsed conditions. Pulse width ≤ 300μs. Duty cycle ≤ 2%.

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

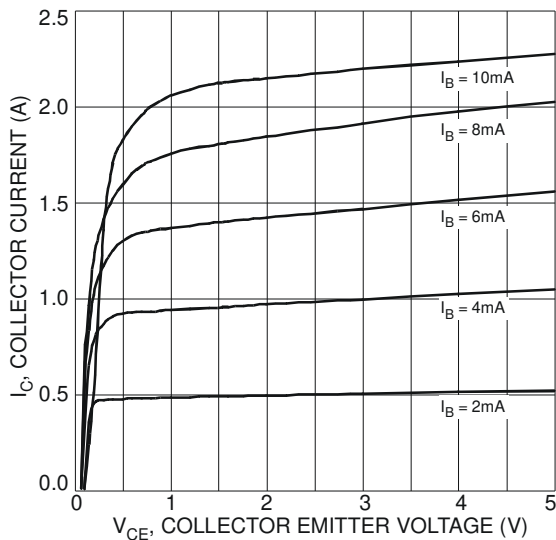


Figure 1 Typical Collector Current vs. Collector-Emitter Voltage

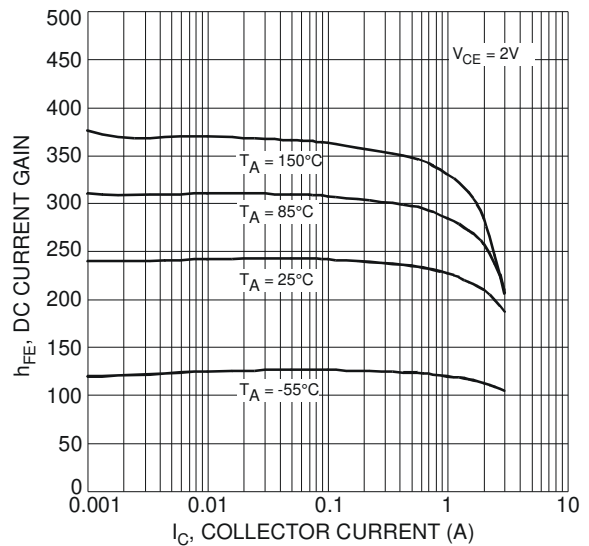


Figure 2 Typical DC Current Gain vs. Collector Current

Typical Electrical Characteristics (Continued)

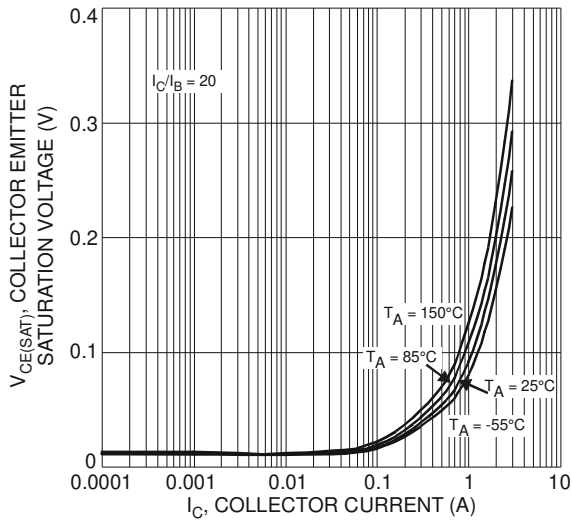


Figure 3 Typical Collector-Emitter Saturation Voltage vs. Collector Current

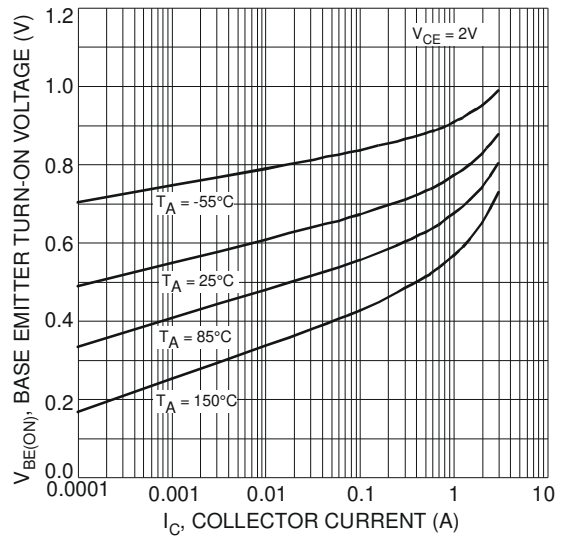


Figure 4 Typical Base-Emitter Turn-On Voltage vs. Collector Current

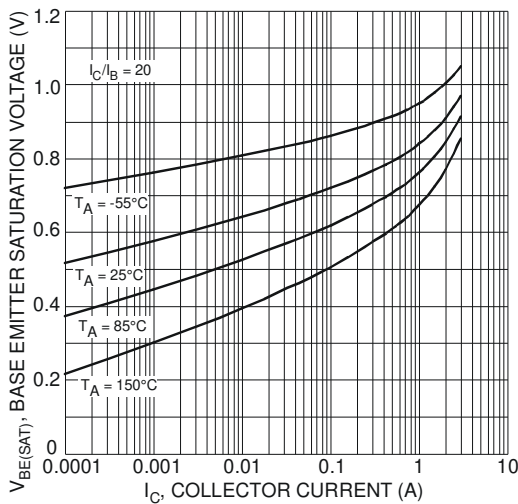


Figure 5 Typical Base-Emitter Saturation Voltage vs. Collector Current

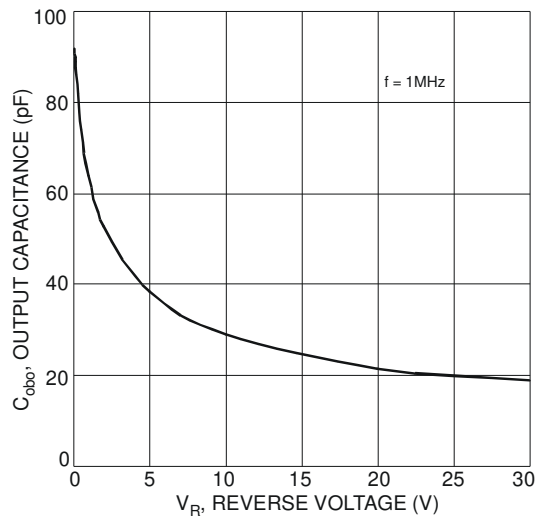


Figure 6 Typical Output Capacitance Characteristics

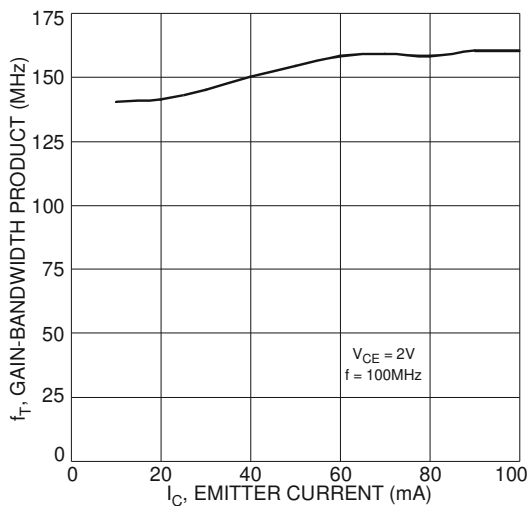
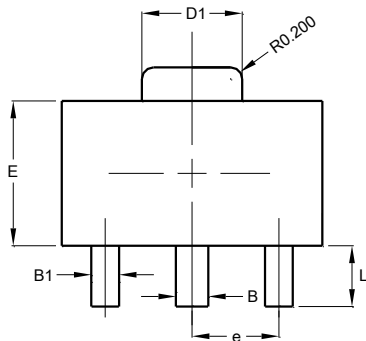


Figure 7 Typical Gain-Bandwidth Product vs. Emitter Current

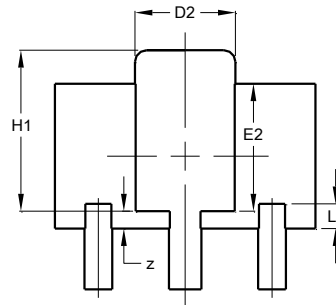
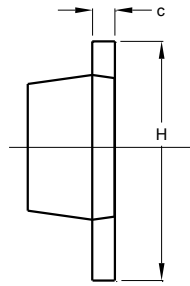
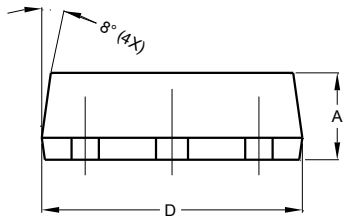
Package Outline Dimensions

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

SOT89



TOP VIEW



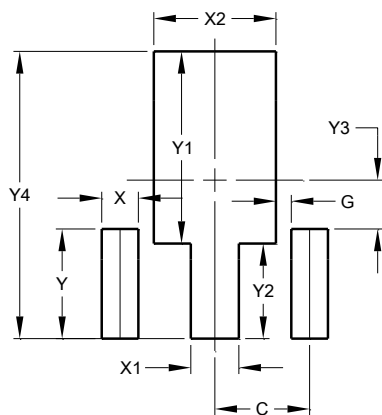
BOTTOM VIEW

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

IMPORTANT NOTICE

1. DIODES INCORPORATED (Diodes) AND ITS SUBSIDIARIES MAKE NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO ANY INFORMATION CONTAINED IN THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR NON-INFRINGEMENT OF THIRD PARTY INTELLECTUAL PROPERTY RIGHTS (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).
2. The Information contained herein is for informational purpose only and is provided only to illustrate the operation of Diodes' products described herein and application examples. Diodes does not assume any liability arising out of the application or use of this document or any product described herein. This document is intended for skilled and technically trained engineering customers and users who design with Diodes' products. Diodes' products may be used to facilitate safety-related applications; however, in all instances customers and users are responsible for (a) selecting the appropriate Diodes products for their applications, (b) evaluating the suitability of Diodes' products for their intended applications, (c) ensuring their applications, which incorporate Diodes' products, comply the applicable legal and regulatory requirements as well as safety and functional-safety related standards, and (d) ensuring they design with appropriate safeguards (including testing, validation, quality control techniques, redundancy, malfunction prevention, and appropriate treatment for aging degradation) to minimize the risks associated with their applications.
3. Diodes assumes no liability for any application-related information, support, assistance or feedback that may be provided by Diodes from time to time. Any customer or user of this document or products described herein will assume all risks and liabilities associated with such use, and will hold Diodes and all companies whose products are represented herein or on Diodes' websites, harmless against all damages and liabilities.
4. Products described herein may be covered by one or more United States, international or foreign patents and pending patent applications. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks and trademark applications. Diodes does not convey any license under any of its intellectual property rights or the rights of any third parties (including third parties whose products and services may be described in this document or on Diodes' website) under this document.
5. Diodes' products are provided subject to Diodes' Standard Terms and Conditions of Sale (<https://www.diodes.com/about/company/terms-and-conditions/terms-and-conditions-of-sales/>) or other applicable terms. This document does not alter or expand the applicable warranties provided by Diodes. Diodes does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.
6. Diodes' products and technology may not be used for or incorporated into any products or systems whose manufacture, use or sale is prohibited under any applicable laws and regulations. Should customers or users use Diodes' products in contravention of any applicable laws or regulations, or for any unintended or unauthorized application, customers and users will (a) be solely responsible for any damages, losses or penalties arising in connection therewith or as a result thereof, and (b) indemnify and hold Diodes and its representatives and agents harmless against any and all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim relating to any noncompliance with the applicable laws and regulations, as well as any unintended or unauthorized application.
7. While efforts have been made to ensure the information contained in this document is accurate, complete and current, it may contain technical inaccuracies, omissions and typographical errors. Diodes does not warrant that information contained in this document is error-free and Diodes is under no obligation to update or otherwise correct this information. Notwithstanding the foregoing, Diodes reserves the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. 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.
8. Any unauthorized copying, modification, distribution, transmission, display or other use of this document (or any portion hereof) is prohibited. Diodes assumes no responsibility for any losses incurred by the customers or users or any third parties arising from any such unauthorized use.
9. This Notice may be periodically updated with the most recent version available at <https://www.diodes.com/about/company/terms-and-conditions/important-notice>

The Diodes logo is a registered trademark of Diodes Incorporated in the United States and other countries.
DIODES is a trademark of Diodes Incorporated in the United States and other countries.
All other trademarks are the property of their respective owners.
© 2023 Diodes Incorporated. All Rights Reserved.

www.diodes.com