32V NPN SURFACE MOUNT TRANSISTOR IN SOT89

Features

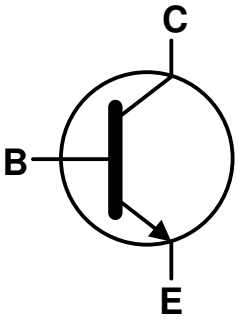
- BV_{CEO} > 32V
- Maximum Continuous Current I_C = 1A
- Epitaxial Planar Die Construction
- Complementary PNP Type Available (2DB1132)
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **Qualified to AEC-Q101 Standards for High Reliability**

Mechanical Data

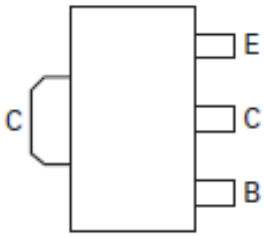
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish ⓔ3
- Weight: 0.055 grams (Approximate)

SOT89

Top View



Device Symbol



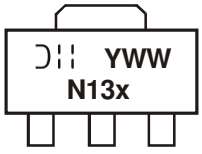
Pin Out – Top View

Ordering Information (Note 4)

Part Number	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
2DD1664P-13	N13P	13	12	2,500
2DD1664Q-13	N13Q	13	12	2,500
2DD1664R-13	N13R	13	12	2,500

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



= Manufacturer's Marking
N13x = Product Type Marking Code:
Where N13P = 2DD1664P
N13Q = 2DD1664Q
N13R = 2DD1664R
YWW = Date Code Marking
Y = Last Digit of Year (ex: 9 = 2019)
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}	40	V
Collector-Emitter Voltage	V_{CEO}	32	V
Emitter-Base Voltage	V_{EBO}	6	V
Continuous Collector Current	I_C	1	A
Peak Pulse Current (Note 6)	I_{CM}	2	A

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

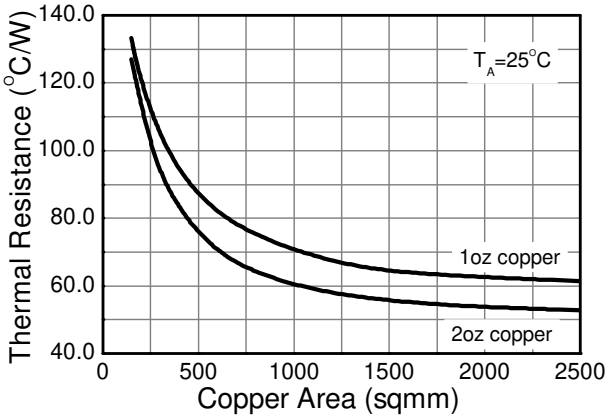
Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	1	W
	(Note 6)		1.5	
	(Note 7)		2.0	
Thermal Resistance, Junction to Ambient Air	(Note 5)	$R_{\theta JA}$	125	°C/W
	(Note 6)		83	
	(Note 7)		60	
Thermal Resistance, Junction to Case	(Note 5)	$R_{\theta JC}$	18	°C/W
Thermal Resistance, Junction to Lead	(Note 8)	$R_{\theta JL}$	22	°C/W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +150	°C

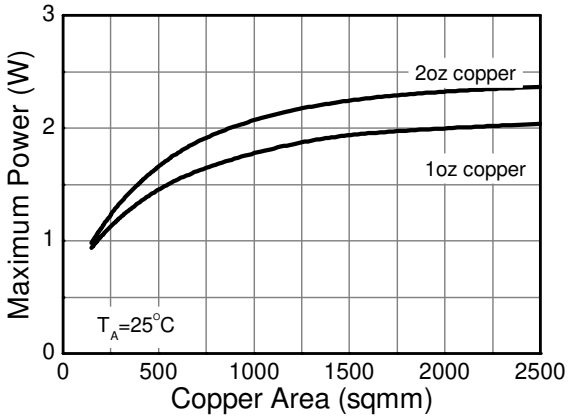
ESD Ratings (Note 9)

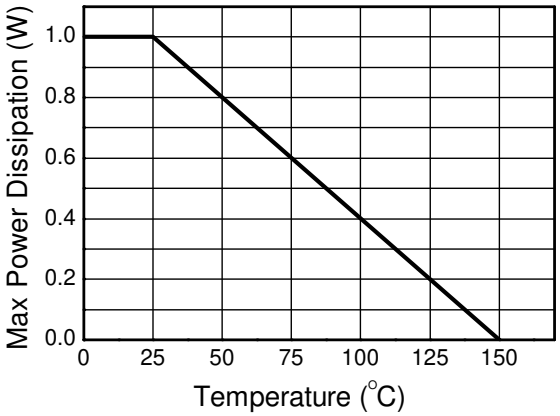
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

Notes:
5. For a device mounted with the 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.
6. Same as note (5), except the device is mounted on 25mm x 25mm 1oz copper.
7. Same as note (5), except the device is mounted on 50mm x 50mm 1oz copper.
8. Thermal resistance from junction to solder-point (on the exposed collector pad).
9. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

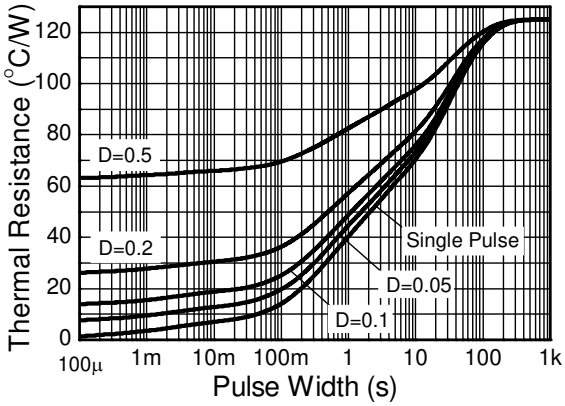
Thermal Characteristics and Derating Information



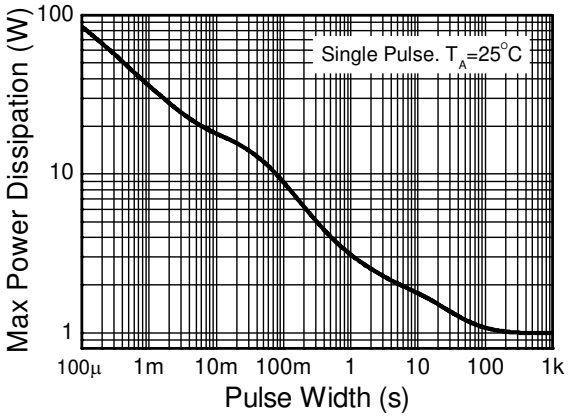




Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

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

Characteristic		Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage		BV_{CBO}	40	—	—	V	I_C = 100μA
Collector-Emitter Breakdown Voltage (Note 10)		BV_{CEO}	32	—	—	V	I_C = 10mA
Emitter-Base Breakdown Voltage		BV_{EBO}	6	—	—	V	I_E = 100μA
Collector-Emitter Cut-Off Current		I_{CES}	—	—	100	nA	V_{CE} = 32V
Collector-Base Cut-Off Current		I_{CBO}	—	—	100	nA	V_{CB} = 36V
Base-Emitter Cut-Off Current		I_{EBO}	—	—	100	nA	V_{EB} = 6V
Static Forward Current Transfer Ratio (Note 10)	2DD1664P	h_{FE}	82	—	180	—	I_C = 100mA, V_{CE} = 3V
	2DD1664Q		120		270		
	2DD1664R		180		390		
Collector-Emitter Saturation Voltage (Note 10)		$V_{CE(SAT)}$	—	120	400	mV	I_C = 500mA, I_B = 50mA
Transition Frequency		f_T	—	280	—	MHz	I_E = 50mA, V_{CE} = 5V, f = 30MHz
Output Capacitance		C_{ob}	—	10	—	pF	I_E = 0A, V_{CB} = 10V, f = 1MHz

Note: 10. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.

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

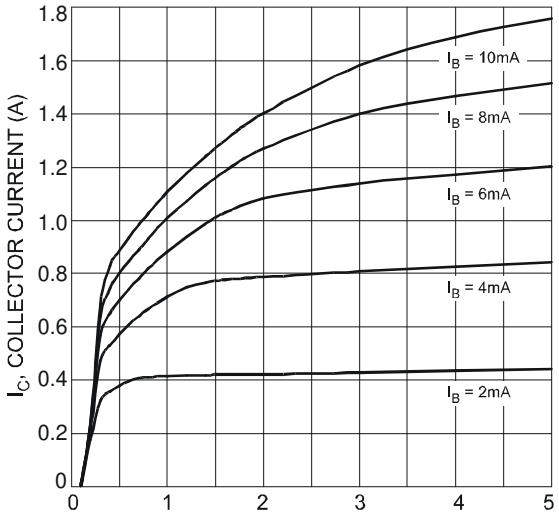


Figure 1. Typical Collector Current vs. Collector-Emitter Voltage

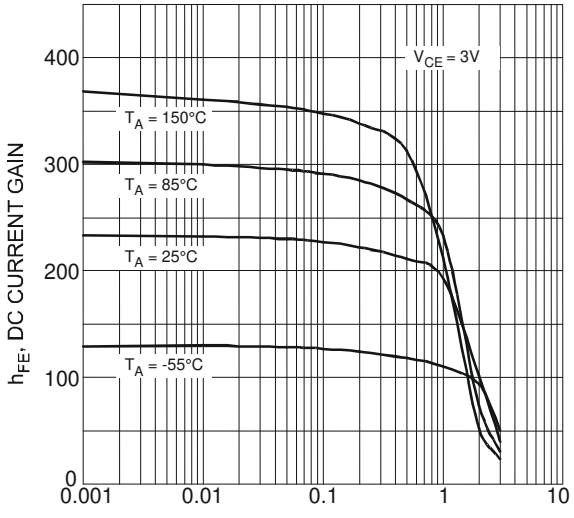


Figure 2. Typical DC Current Gain vs. Collector Current (2DD1664R)

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

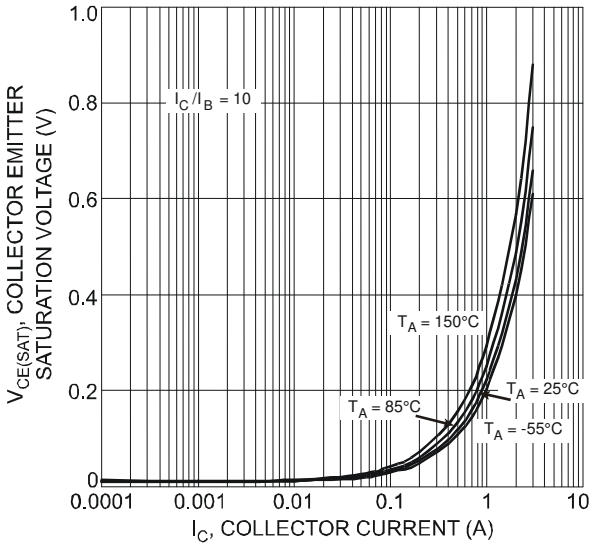


Figure 3. Typical Collector-Emitter Saturation Voltage vs. Collector Current

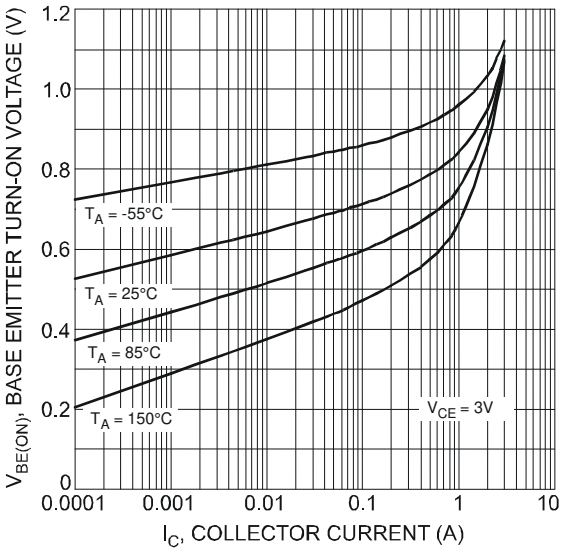


Figure 4. Typical Base-Emitter Turn-On Voltage vs. Collector Current

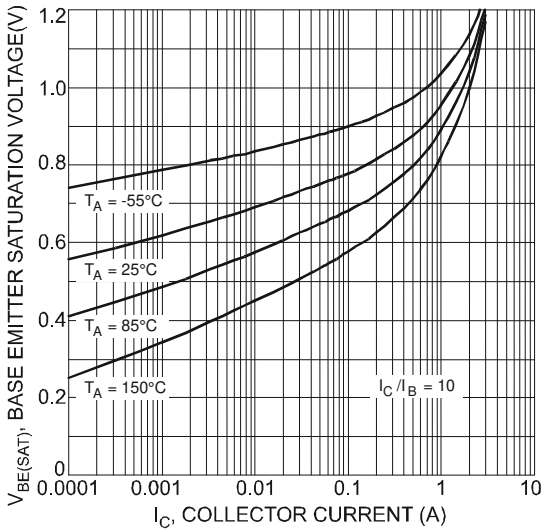


Figure 5. Typical Base-Emitter Saturation Voltage vs. Collector Current

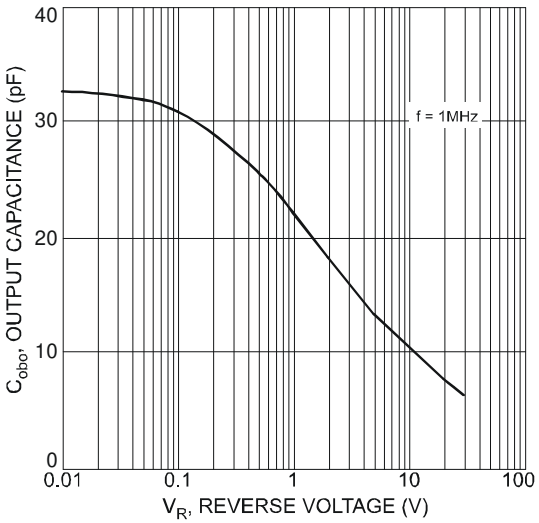


Figure 6. Typical Output Capacitance Characteristics

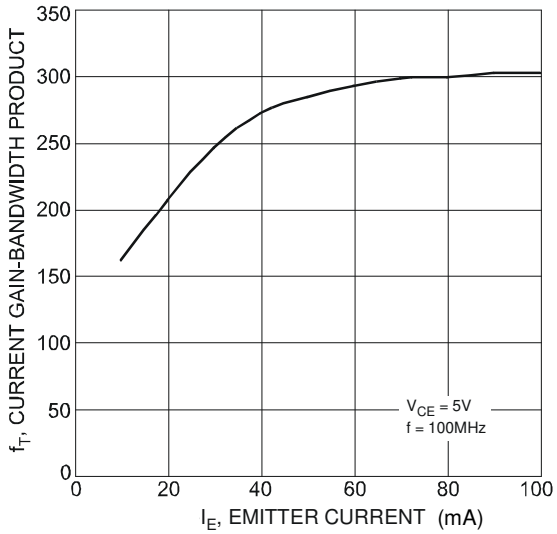


Figure 7. Typical Gain-Bandwidth Product vs. Emitter Current

Package Outline Dimensions

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

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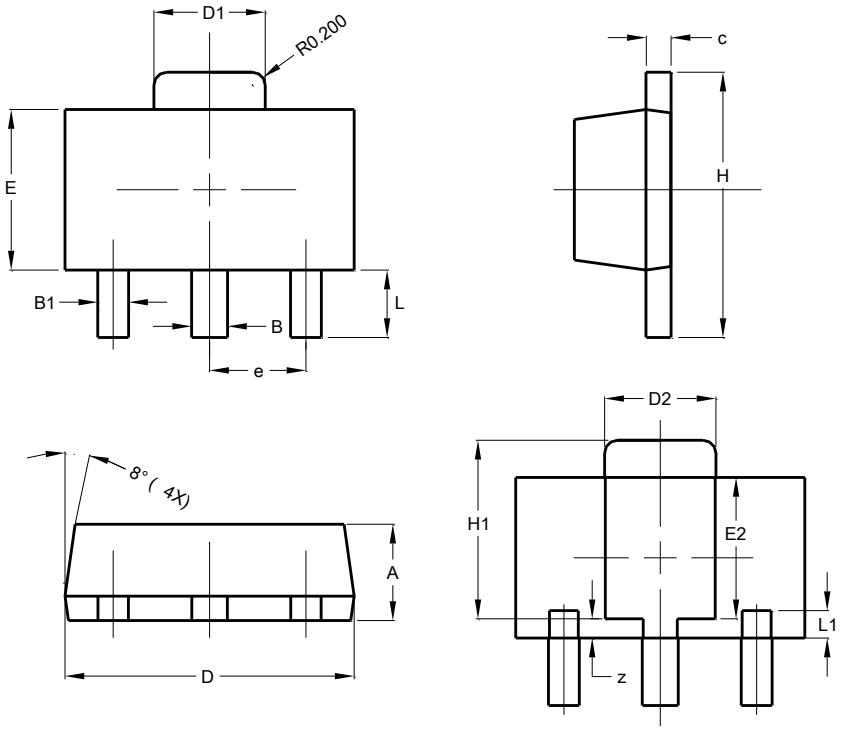

SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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

Suggested Pad Layout

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

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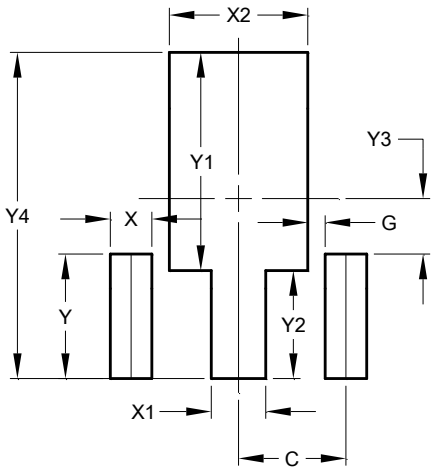

Dimensions	Value (in mm)
C	1.500
G	0.244
X	0.580
X1	0.760
X2	1.933
Y	1.730
Y1	3.030
Y2	1.500
Y3	0.770
Y4	4.530

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