

## Features

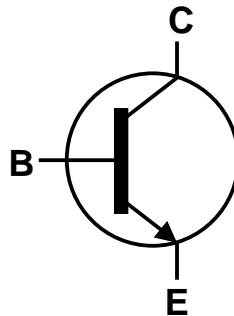
- $BV_{CEO} > 32V$
- Max Continuous Current  $I_C = 1A$
- Epitaxial Planar Die Construction
- Complementary PNP Type Available (2DB1132)
- Ideally Suited for Automated Assembly Processes
- Ideal for Medium Power Switching or Amplification Applications
- **Totally Lead-Free & Fully RoHS compliant (Notes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

## Mechanical Data

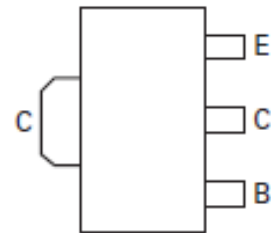
- Case: SOT89
- Case Material: Molded Plastic. "Green" Molding Compound.
- UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Matte Tin Finish (Ⓔ3)
- Weight: 0.055 grams (Approximate)



Top View



Device Symbol



Pin Out – Top View

## Ordering Information (Note 4)

Product	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) compliant.
  2. See <http://www.diodes.com> 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 <http://www.diodes.com>

## Marking Information



N13x = Product Type Marking Code:  
 Where N13P = 2DD1664P  
 N13Q = 2DD1664Q  
 N13R = 2DD1664R  
 YWW = Date Code Marking  
 Y = Last digit of year ex: 1 = 2011  
 WW = Week code (01 – 53)

### Maximum Ratings (@T<sub>A</sub> = +25°C, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V <sub>CB0</sub>	40	V
Collector-Emitter Voltage	V <sub>CEO</sub>	32	V
Emitter-Base Voltage	V <sub>EBO</sub>	6	V
Continuous Collector Current	I <sub>C</sub>	1	A
Peak Pulse Current (Note 6)	I <sub>CM</sub>	2	A

### Thermal Characteristics

Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P <sub>D</sub>	1	W
Thermal Resistance, Junction to Ambient (Note 5)	R <sub>θJA</sub>	125	°C/W
Thermal Resistance, Junction to Leads (Note 7)	R <sub>θJL</sub>	22	°C/W
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>STG</sub>	-55 to +150	°C

- Notes:
- 5. For a device surface mounted on FR-4 PCB with minimum suggested pad layout; high coverage of single sided 1 oz copper, in still air conditions
  - 6. Measured under pulsed conditions. Pulse width = 300μs. Duty cycle ≤ 2%.
  - 7. Thermal resistance from junction to solder-point (at the end of the collector lead).

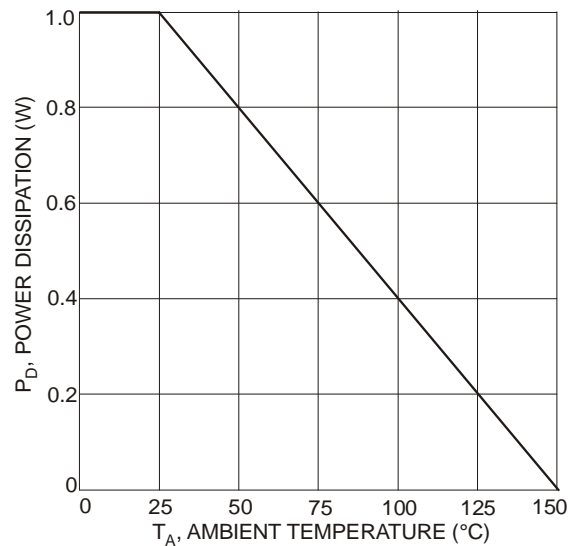


Figure 1. Power Dissipation vs. Ambient Temperature

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

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Base Breakdown Voltage	$BV_{CBO}$	40	-	-	V	$I_C = 100\mu\text{A}$
Collector-Emitter Breakdown Voltage (Note 8)	$BV_{CEO}$	32	-	-	V	$I_C = 10\text{mA}$
Emitter-Base Breakdown Voltage	$BV_{EBO}$	6	-	-	V	$I_E = 100\mu\text{A}$
Collector-Emitter Cut-off Current	$I_{CES}$	-	-	100	nA	$V_{CE} = 32\text{V}$
Collector-Base Cut-off Current	$I_{CBO}$	-	-	100	nA	$V_{CB} = 36\text{V}$
Base-Emitter Cut-off Current	$I_{EBO}$	-	-	100	nA	$V_{EB} = 6\text{V}$
Static Forward Current Transfer Ratio (Note 8)	$h_{FE}$	2DD1664P	82	180	-	$I_C = 100\text{mA}, V_{CE} = 3\text{V}$
		2DD1664Q	120	270		
		2DD1664R	180	390		
Collector-Emitter saturation Voltage (Note 8)	$V_{CE(sat)}$	-	120	400	mV	$I_C = 500\text{mA}, I_B = 50\text{mA}$
Transition frequency	$f_T$	-	280	-	MHz	$I_E = 50\text{mA}, V_{CE} = 5\text{V}, f = 30\text{MHz}$
Output Capacitance	$C_{ob}$	-	10	-	pF	$I_E = 0\text{A}, V_{CB} = 10\text{V}, f = 1\text{MHz}$

Notes: 8. Measured under pulsed conditions. Pulse width = 300 $\mu\text{s}$ . Duty cycle  $\leq 2\%$

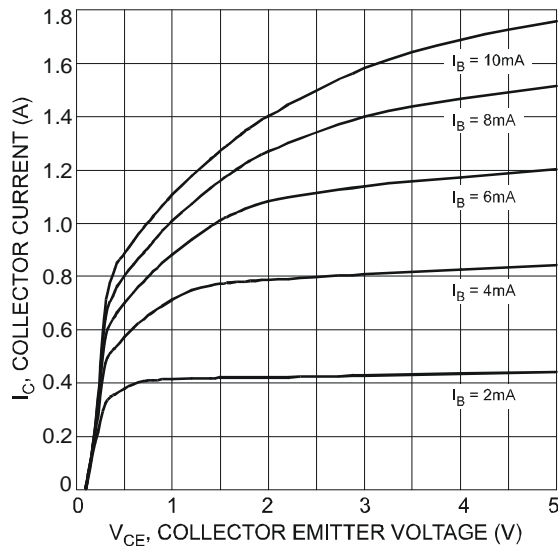
**Electrical Characteristics** (@ $T_A = +25^\circ\text{C}$ , unless otherwise specified.)


Figure 2. Typical Collector Current vs. Collector-Emitter Voltage

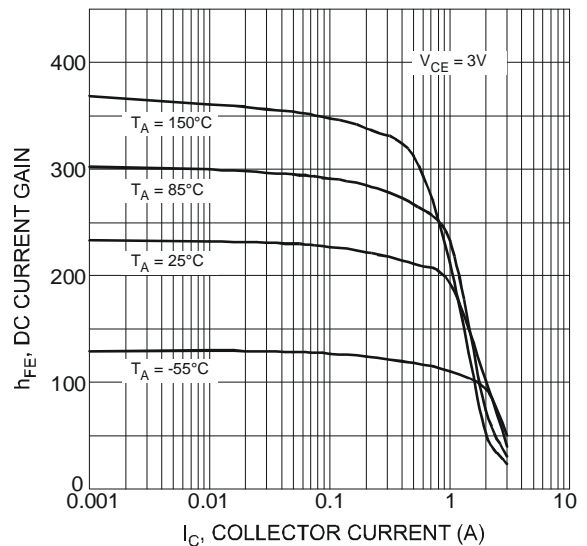


Figure 3. Typical DC Current Gain vs. Collector Current (2DD1664R)

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

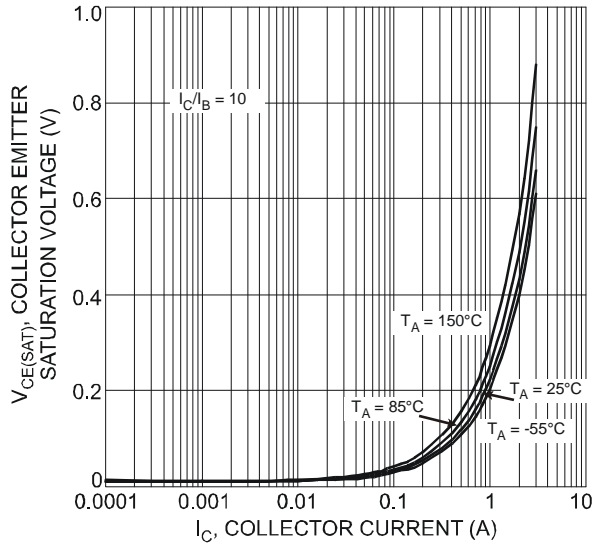


Figure 4. Typical Collector-Emitter Saturation Voltage vs. Collector Current

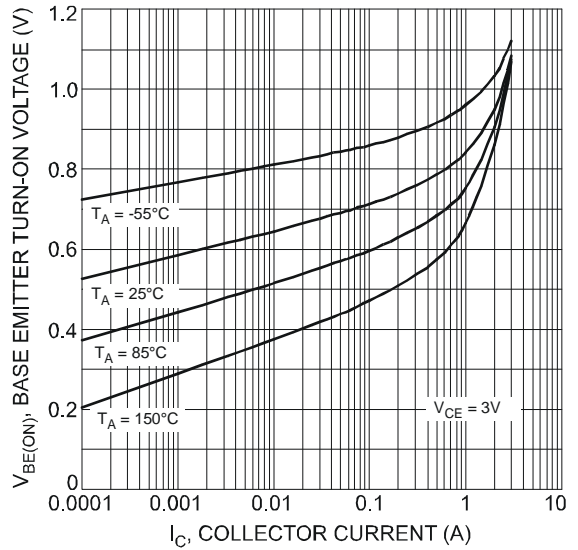


Figure 5. Typical Base-Emitter Turn-On Voltage vs. Collector Current

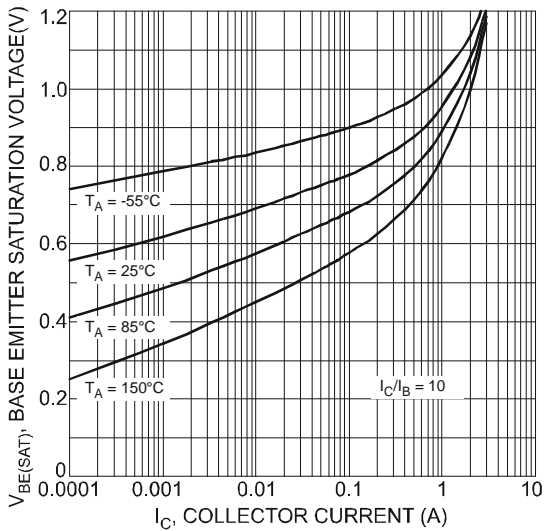


Figure 6. Typical Base-Emitter Saturation Voltage vs. Collector Current

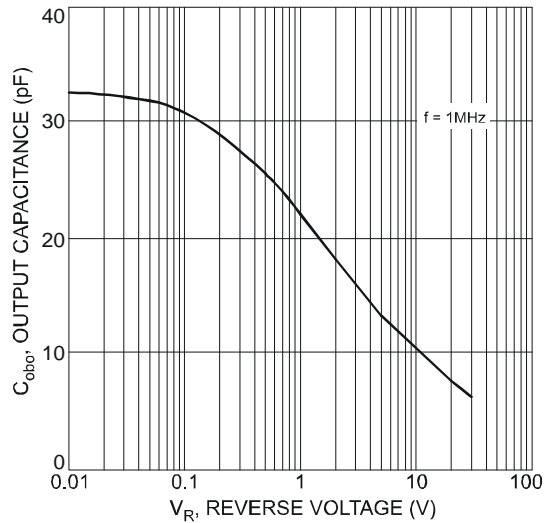


Figure 7. Typical Output Capacitance Characteristics

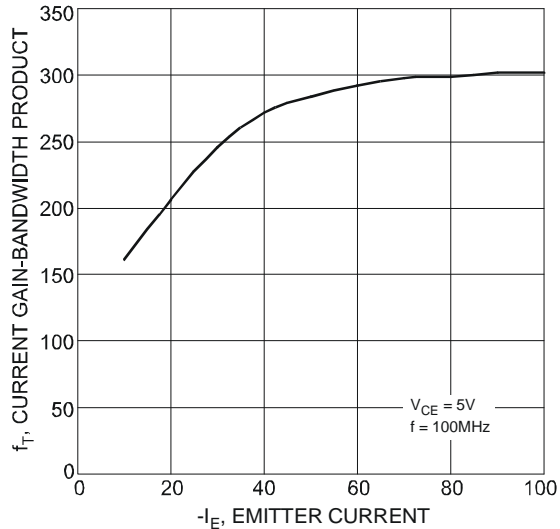
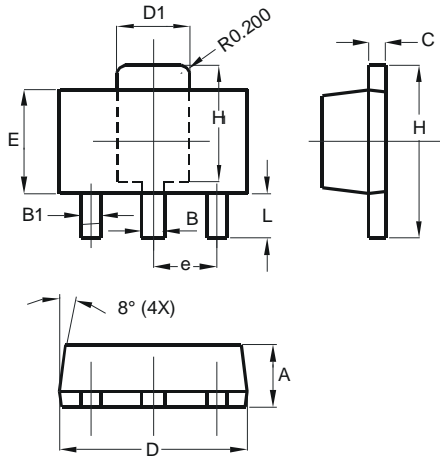


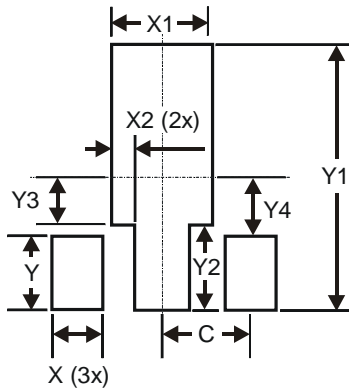
Figure 8. Typical Gain-Bandwidth Product vs. Emitter Current

**Package Outline Dimensions**



SOT89		
Dim	Min	Max
A	1.40	1.60
B	0.44	0.62
B1	0.35	0.54
C	0.35	0.44
D	4.40	4.60
D1	1.62	1.83
E	2.29	2.60
e	1.50 Typ	
H	3.94	4.25
H1	2.63	2.93
L	0.89	1.20
All Dimensions in mm		

**Suggested Pad Layout**



Dimensions	Value (in mm)
X	0.900
X1	1.733
X2	0.416
Y	1.300
Y1	4.600
Y2	1.475
Y3	0.950
Y4	1.125
C	1.500

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