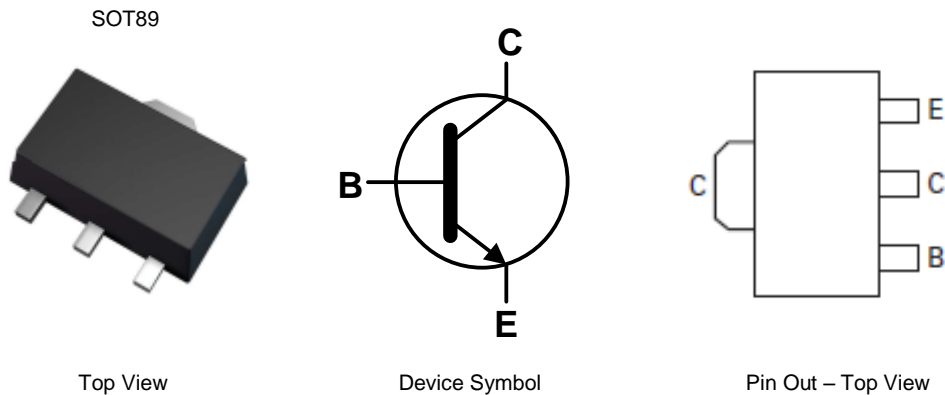


Features

- $BV_{CEO} > 32V$
- 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)



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



DII = 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.)

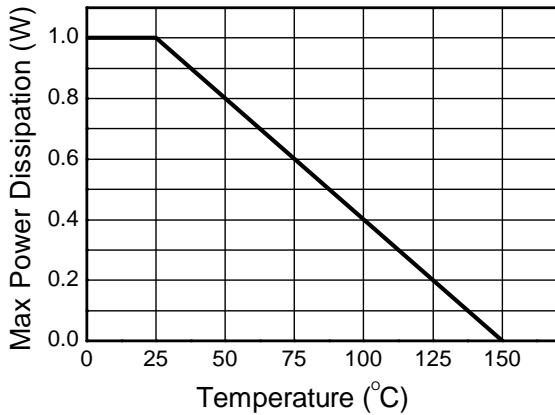
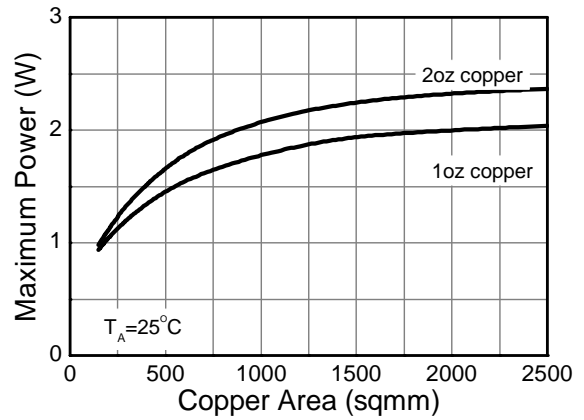
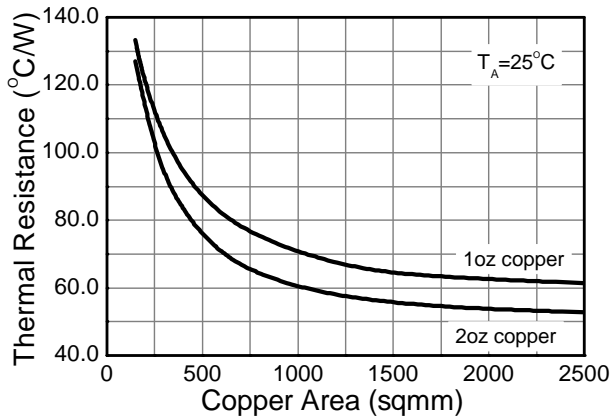
Characteristic	Symbol	Value	Unit
Power Dissipation	P _D	(Note 5)	1
		(Note 6)	1.5
		(Note 7)	2.0
Thermal Resistance, Junction to Ambient Air	R _{θJA}	(Note 5)	125
		(Note 6)	83
		(Note 7)	60
Thermal Resistance, Junction to Case	R _{θJC}	18	°C/W
Thermal Resistance, Junction to Lead	R _{θJL}	22	°C/W
Operating and Storage Temperature Range	T _J , T _{STG}	-55 to +150	°C

ESD Ratings (Note 9)

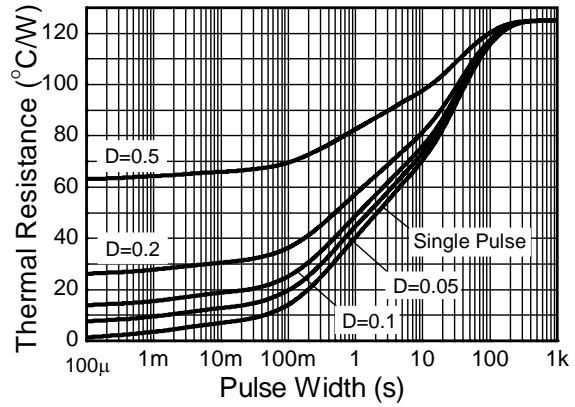
Characteristic	Symbol	Value	Unit	JEDEC Class
Electrostatic Discharge - Human Body Model	ESD HBM	4,000	V	3A
Electrostatic Discharge - Machine Model	ESD MM	400	V	C

- 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.

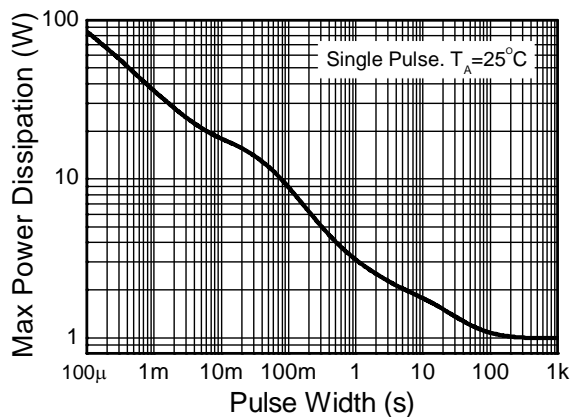
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



Pulse Power Dissipation

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, 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 10)	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 10)	2DD1664P	82	—	180	—	$I_C = 100\text{mA}, V_{CE} = 3\text{V}$
	2DD1664Q	120		270		
	2DD1664R	180		390		
Collector-Emitter Saturation Voltage (Note 10)	$V_{CE(SAT)}$	—	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	$I_E = 0\text{A}, V_{CB} = 10\text{V}, f = 1\text{MHz}$

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

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

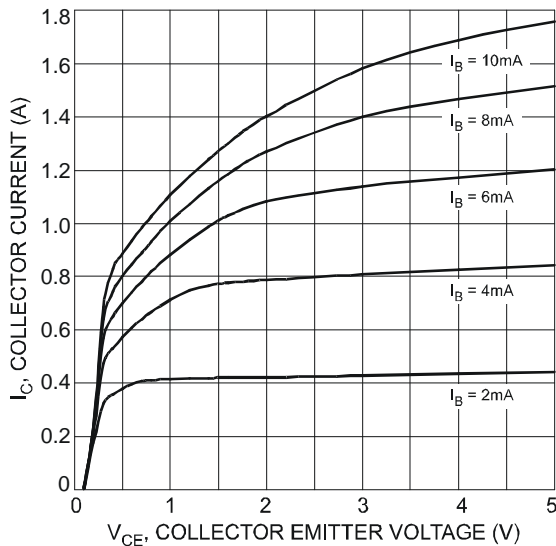


Figure 1. Typical Collector Current vs. Collector-Emitter Voltage

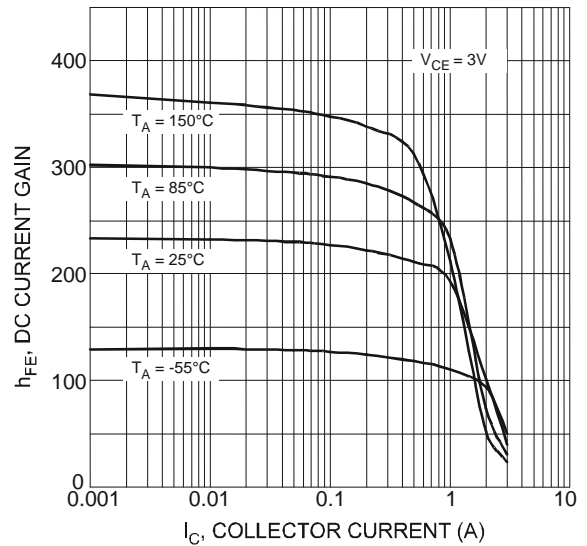


Figure 2. Typical DC Current Gain vs. Collector Current (2DD1664R)

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

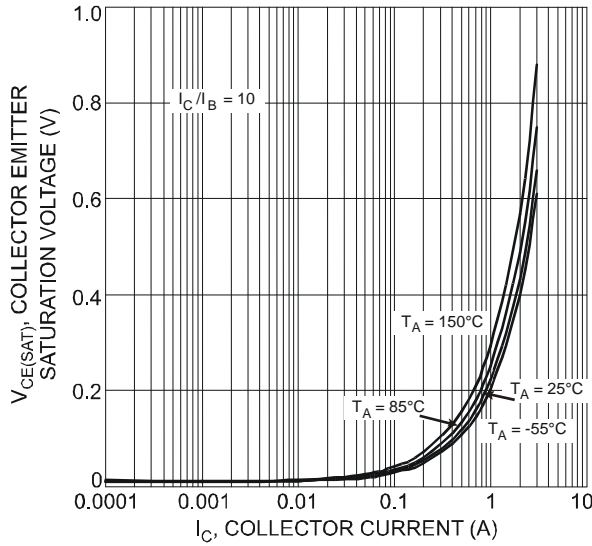


Figure 3. Typical Collector-Emitter Saturation Voltage vs. Collector Current

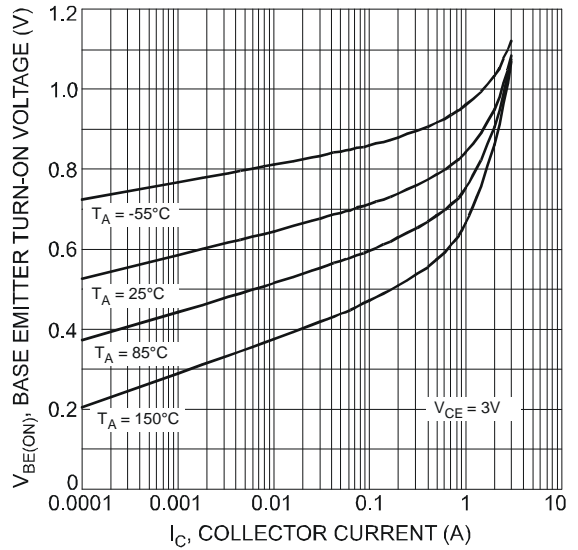


Figure 4. Typical Base-Emitter Turn-On Voltage vs. Collector Current

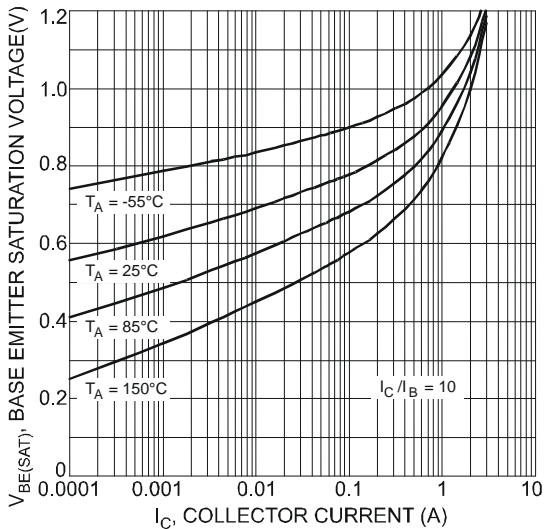


Figure 5. Typical Base-Emitter Saturation Voltage vs. Collector Current

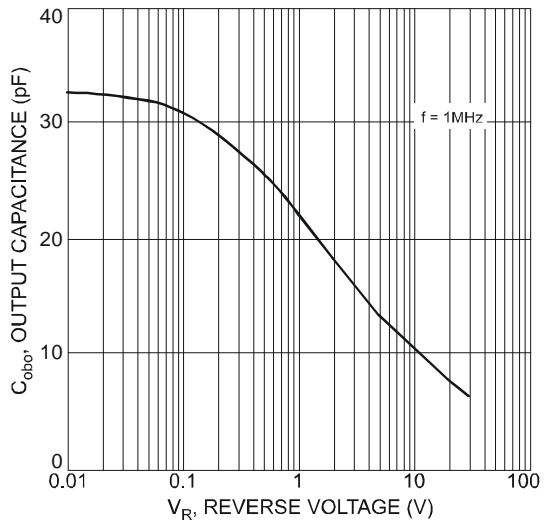


Figure 6. Typical Output Capacitance Characteristics

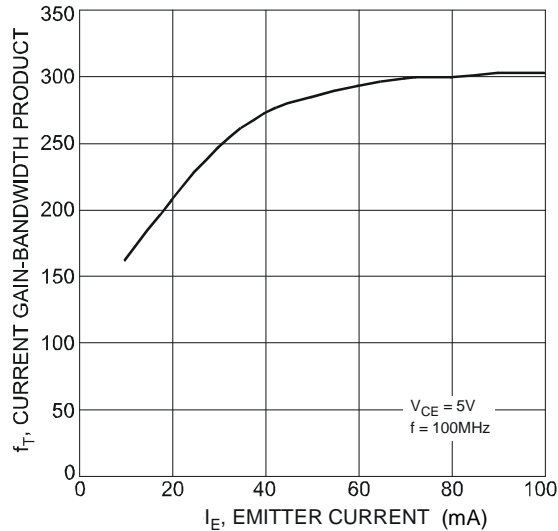
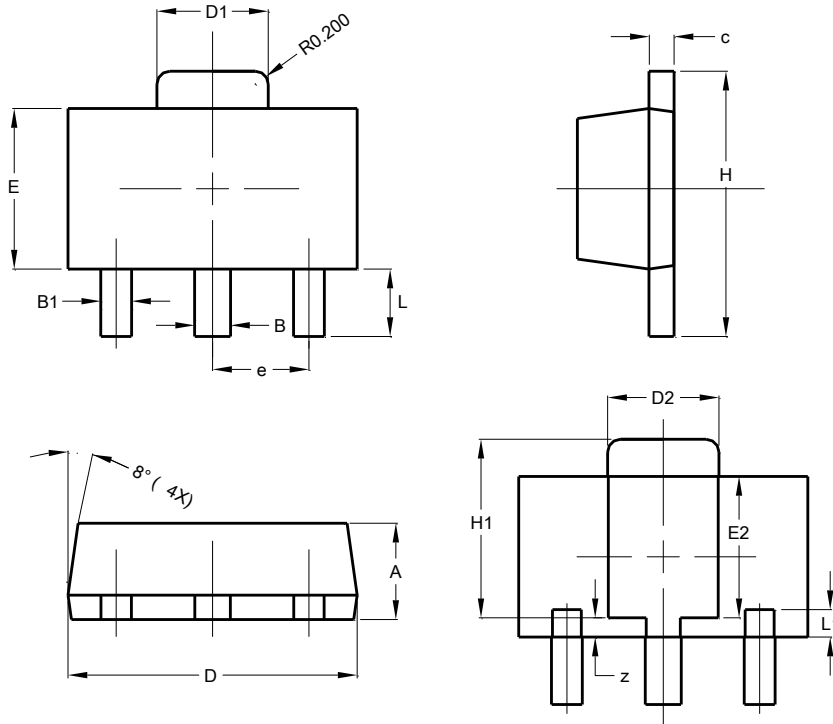


Figure 7. Typical Gain-Bandwidth Product vs. Emitter Current

Package Outline Dimensions

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

SOT89

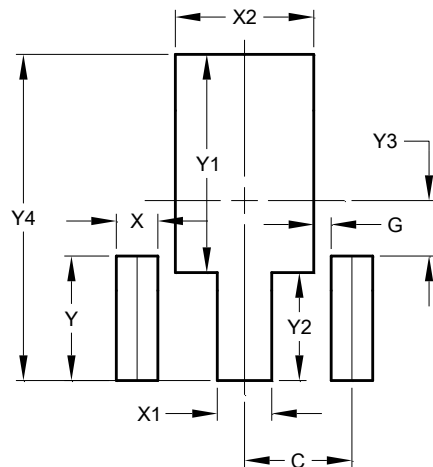


SOT89			
Dim	Min	Max	Typ
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions in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