20V PNP MEDIUM POWER TRANSISTOR IN SOT89

Features

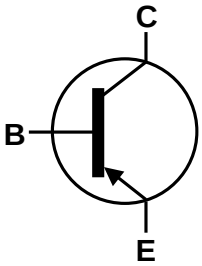
- BV_{CEO} > -20V
- I_C = -5A High Continuous Current
- Low Saturation Voltage $V_{CE(sat)}$ < -1V @ -4A
- Complementary NPN Type: 2DD2098
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q100/101/200, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Mechanical Data

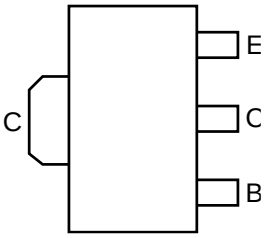
- Case: SOT89
- Case Material: Molded Plastic, "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.052 grams (Approximate)

SOT89

Top View



Device Symbol



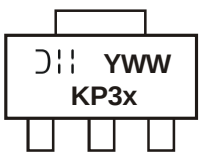
Pin Out – Top View

Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
2DB1386Q-13	Standard	KP3Q	13	12	2,500
2DB1386Q-13R	Standard	KP3Q	13	12	4,000
2DB1386R-13	Standard	KP3R	13	12	2,500
2DB1386RTC	Standard	KP3R	13	12	4,000

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 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
KP3x = Product Type Marking Code,
where: KP3Q = 2DB1386Q
KP3R = 2DB1386R
YWW = Date Code Marking
Y = Last Digit of Year (ex: 0 = 2020)
WW = Week Code (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

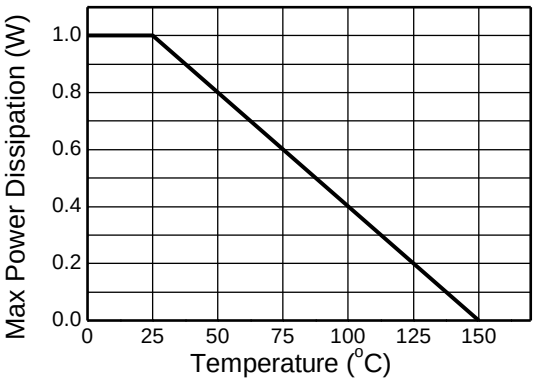
Characteristic	Symbol	Value	Unit
Collector-Base Voltage	V_{CBO}	-30	V
Collector-Emitter Voltage	V_{CEO}	-20	V
Emitter-Base Voltage	V_{EBO}	-6	V
Continuous Collector Current	I_C	-5	A
Peak Pulse Collector Current (Single Pulse)	I_{CM}	-10	A
Base Current	I_B	-500	mA

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

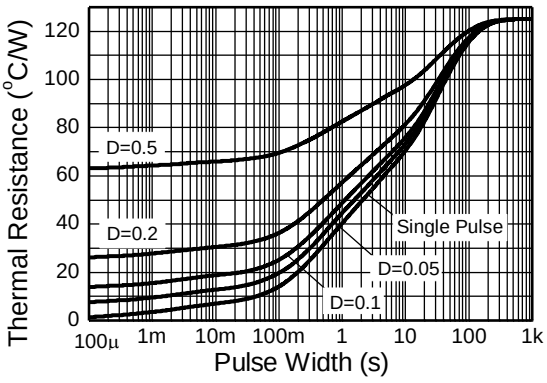
Characteristic	Symbol	Value	Unit
Power Dissipation (Note 5)	P_D	1	W
Thermal Resistance, Junction to Ambient Air (Note 5)	$R_{\theta JA}$	125	°C/W
Thermal Resistance, Junction to Leads (Note 6)	$R_{\theta JL}$	19	°C/W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	°C

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. Thermal resistance from junction to solder-point (on the exposed collector pad).

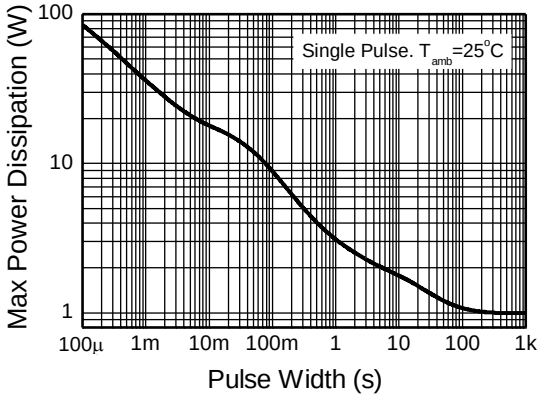
Thermal Characteristics and Derating Information



Derating Curve



Transient Thermal Impedance



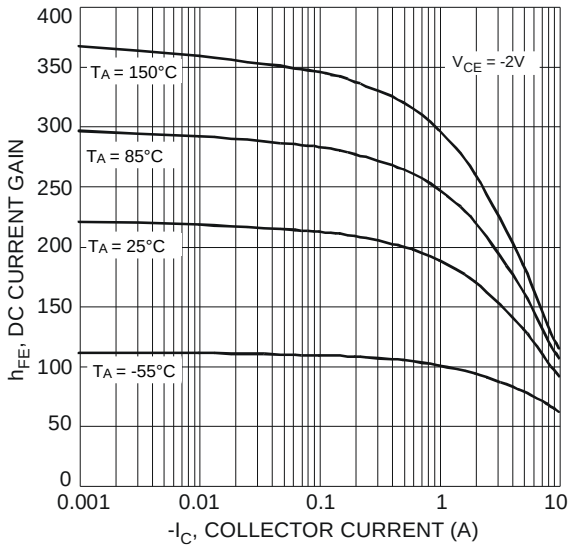
Pulse Power Dissipation

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

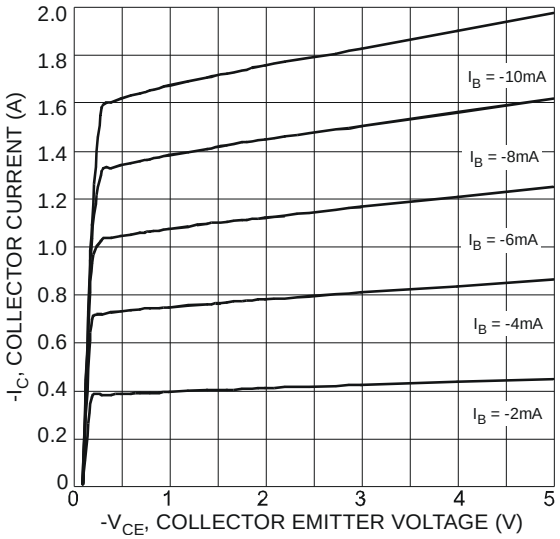
Characteristic		Symbol	Min	Typ	Max	Unit	Conditions
OFF CHARACTERISTICS (Note 7)							
Collector-Base Breakdown Voltage		BV_{CBO}	-30	—	—	V	I_C = -50µA, I_E = 0
Collector-Emitter Breakdown Voltage		BV_{CEO}	-20	—	—	V	I_C = -1mA, I_B = 0
Emitter-Base Breakdown Voltage		BV_{EBO}	-6	—	—	V	I_E = -50µA, I_C = 0
Collector Cut-Off Current		I_{CBO}	—	—	-0.5	µA	V_{CB} = -20V, I_E = 0
Emitter Cut-Off Current		I_{EBO}	—	—	-0.5	µA	V_{EB} = -5V, I_C = 0
ON CHARACTERISTICS (Note 7)							
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	—	-0.25	-1.0	V	I_C = -4A, I_B = -0.1A
DC Current Gain	2DB1386Q	h_{FE}	120	—	270	—	I_C = -0.5A, V_{CE} = -2V
	2DB1386R		180	—	390		
SMALL SIGNAL CHARACTERISTICS							
Output Capacitance		C_{obo}	—	55	—	pF	V_{CB} = -20V, I_E = 0, f = 1MHz
Current Gain-Bandwidth Product		f_T	—	100	—	MHz	V_{CE} = -6V, I_E = 50mA, f = 30MHz

Note: 7. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

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

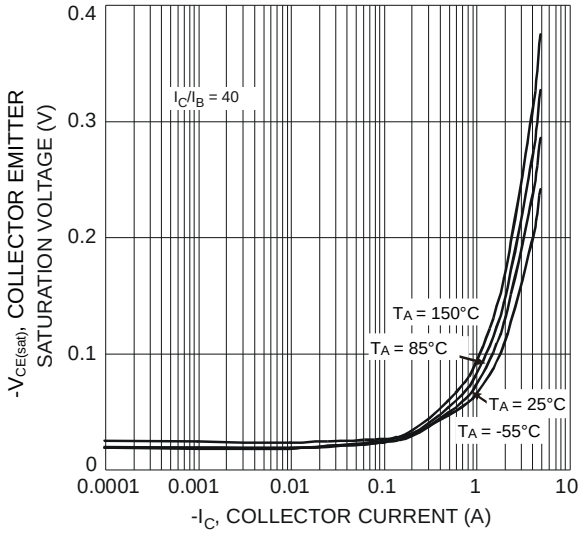


h_{FE} v I_C

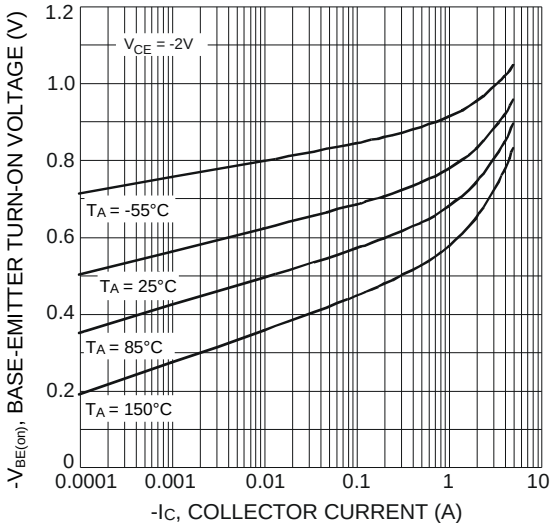


I_C v V_{CE}

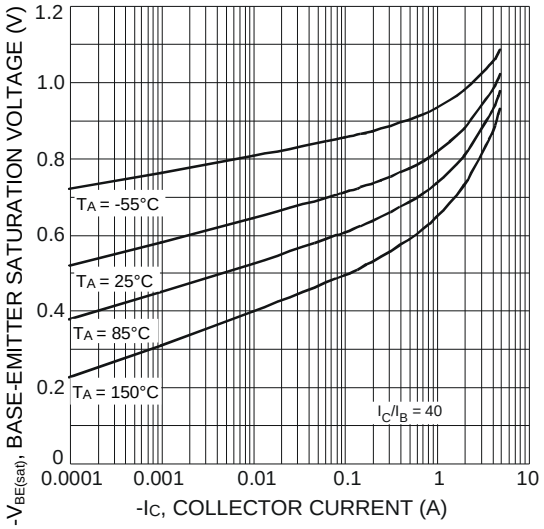
Typical Electrical Characteristics (Continued)



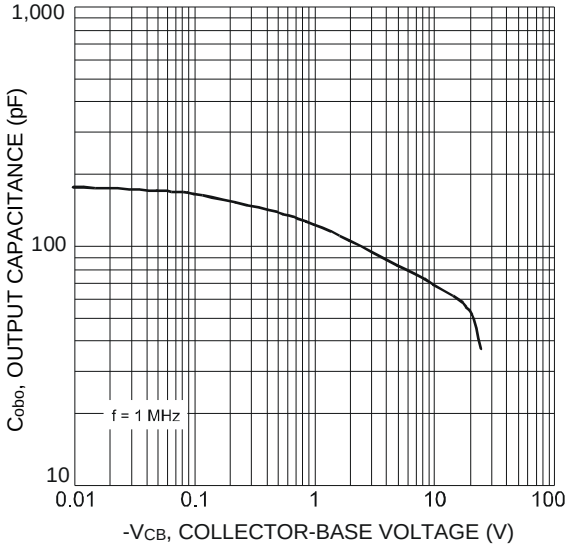
$V_{CE(sat)}$ v I_C



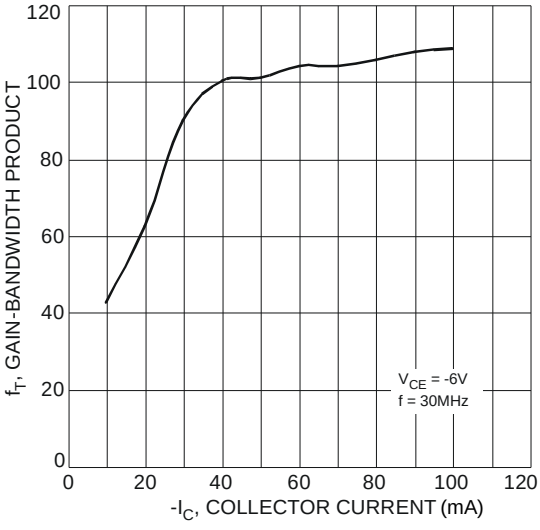
$V_{BE(on)}$ v I_C



$V_{BE(sat)}$ v I_C



C_{OBO} v V_{CB}

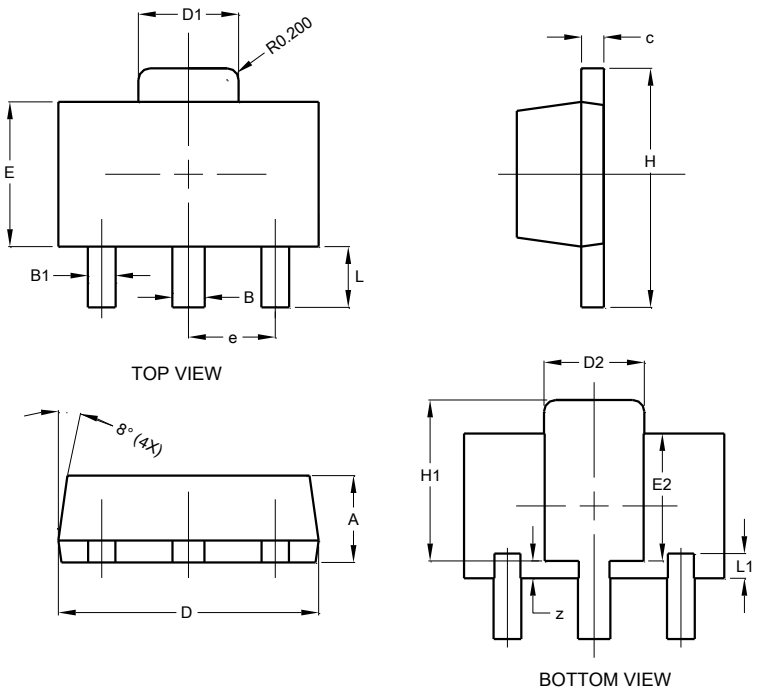


f_T v I_C

Package Outline Dimensions

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

SOT89

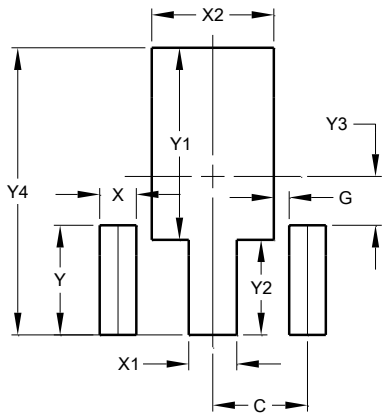


SOT89			
Dim	**Min**	**Max**	**Typ**
A	1.40	1.60	1.50
B	0.50	0.62	0.56
B1	0.42	0.54	0.48
c	0.35	0.43	0.38
D	4.40	4.60	4.50
D1	1.62	1.83	1.733
D2	1.61	1.81	1.71
E	2.40	2.60	2.50
E2	2.05	2.35	2.20
e	-	-	1.50
H	3.95	4.25	4.10
H1	2.63	2.93	2.78
L	0.90	1.20	1.05
L1	0.327	0.527	0.427
z	0.20	0.40	0.30
All Dimensions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