Available on commercial versions

PNP POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/535

Qualified Levels:
JAN, JANTX, and JANTXV

DESCRIPTION

This high speed transistor is rated at 5 amps and is military qualified up to a JANTXV level. This TO-59 isolated package is available with a 180 degree lead orientation. Microsemi also offers numerous other products to meet higher and lower power voltage regulation applications.

Important: For the latest information, visit our website http://www.microsemi.com.

Marking may vary.

TO-59 (TO-210AA)
Isolated Package

FEATURES

- JEDEC registered 2N5003 and 2N5005.
- Internal metallurgical bond option available.
- JAN, JANTX, and JANTXV, qualification per MIL-PRF-19500/535 available.
- RoHS compliant versions available (commercial grade only).

APPLICATIONS / BENEFITS

- Fast switching capable - 0.5 μs rise time.
- High frequency response.
- TO-59 case with Isolated terminals.
- Class 3B to ESD per MIL-STD-750 Method 1020.

MAXIMUM RATINGS

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	-65 to +200	°C
Thermal Resistance Junction-to-Ambient	$R_{\Theta JA}$	88	°C/W
Thermal Resistance Junction-to-Case	$R_{\Theta JC}$	3.0	°C/W
Collector Current	I_C I_C (3)	5.0 10	A
Collector-Emitter Voltage	V_{CEO}	80	V
Collector-Base Voltage	V_{CBO}	100	V
Emitter-Base Voltage	V_{EBO}	5.5	V
Steady-State Power Dissipation @ T_A = +25°C (1) @ T_C = +25°C (2)	P_D	2.0 58	W

Notes:
1. Derate linearly 11.4 mW/°C for T_A > +25°C.
2. Derate linearly 331 mW/°C for T_C > +25°C.
3. This value applies for PW ≤ 8.3 ms, duty cycle ≤ 1%.

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MECHANICAL and PACKAGING

- CASE: Nickel Plated.
- TERMINALS: Solder Dip over Nickel Plating. RoHS compliant Matte/Tin available on commercial grade only.
- MARKING: Manufacturer's ID, Date Code, Part Number, BeO.
- POLARITY: See Package Outline Drawing on last page.
- See Package Dimensions on last page.

PART NOMENCLATURE

JAN **2N5003** **(e3)**

Reliability Level
JAN = JAN Level
JANTX = JANTX Level
JANTXV = JANTXV Level
Blank = Commercial

JEDEC type number
(see Electrical Characteristics table)

RoHS Compliance
e3 = RoHS Compliant (available on commercial grade only)
Blank = non-RoHS Compliant

SYMBOLS & DEFINITIONS

Symbol	Definition
C_{obo}	Common-base open-circuit output capacitance.
I_{CEO}	Collector cutoff current, base open.
I_{CES}	Collector emitter cutoff current, circuit between base and emitter.
I_{EBO}	Emitter cutoff current, collector open.
h_{FE}	Common-emitter static forward current transfer ratio.
V_{CEO}	Collector-emitter voltage, base open.
V_{CBO}	Collector-emitter voltage, emitter open.
V_{EBO}	Emitter-base voltage, collector open.

ELECTRICAL CHARACTERISTICS @ T_C = 25°C unless otherwise noted.

Characteristic		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage I_C = 100 mA		$V_{(BR)CEO}$	80		V
Collector-Emitter Cutoff Current V_{CE} = 40 V, I_B = 0		I_{CEO}		50	µA
Collector-Emitter Cutoff Current V_{CE} = 60 V, V_{BE} = 0 V_{CE} = 100 V, V_{BE} = 0		I_{CES}		1.0 1.0	µA mA
Emitter-Base Cutoff Current V_{BE} = 4.0 V, I_C = 0 V_{BE} = 5.5 V, I_C = 0		I_{EBO}		1.0 1.0	µA mA
ON CHARACTERISTICS					
Forward-Current Transfer Ratio I_C = 50 mA, V_{CE} = 5.0 V I_C = 2.5 A, V_{CE} = 5.0 V I_C = 5.0 A, V_{CE} = 5.0 V I_C = 50 mA, V_{CE} = 5.0 V I_C = 2.5 A, V_{CE} = 5.0 V I_C = 5.0 A, V_{CE} = 5.0 V	2N5003 2N5005	h_{FE}	20 30 20 50 70 40	90 200	
Base-Emitter Voltage Non-saturated V_{CE} = 5.0 V, I_C =2.5 A		V_{BE}		1.45	V
Collector-Emitter Saturation Voltage I_C = 2.5 A, I_B = 250 mA I_C = 5.0 A, I_B = 500 mA		$V_{CE(sat)}$		0.75 1.5	V
Base-Emitter Saturation Voltage I_C = 2.5 A, I_B = 250 mA I_C = 5.0 A, I_B = 500 mA		$V_{BE(sat)}$		1.45 2.2	V
DYNAMIC CHARACTERISTICS					
Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 100 mA, V_{CE} = 5.0 V, f = 1 kHz	2N5003 2N5005	h_{fe}	20 50		
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 500 mA, V_{CE} = 5.0 V, f = 10 MHz	2N5003 2N5005	$\|h_{fe}\|$	6.0 7.0		
Output Capacitance V_{CB} = 10 V, I_E = 0, f = 1 MHz		C_{obo}		250	pF
SWITCHING CHARACTERISTICS					
Turn-On Time I_C = 5 A; I_{B1}= 500 mA		t_{on}		0.5	µs
Storage Time	I_{B2}= -500 mA	t_s		1.4	µs
Fall Time	$V_{BE(OFF)}$ = 3.7 V	t_f		0.5	µs
Turn-Off Time R_L = 6 Ohms		t_{off}		1.5	µs

ELECTRICAL CHARACTERISTICS @ T_C = 25°C unless otherwise noted. (continued)

SAFE OPERATING AREA (See Figure below and MIL-STD-750,Test Method 3053)

DC Tests

T_C = +25°C, V_{CE} = 0, t_P = 1 second 1 Cycle

Test 1

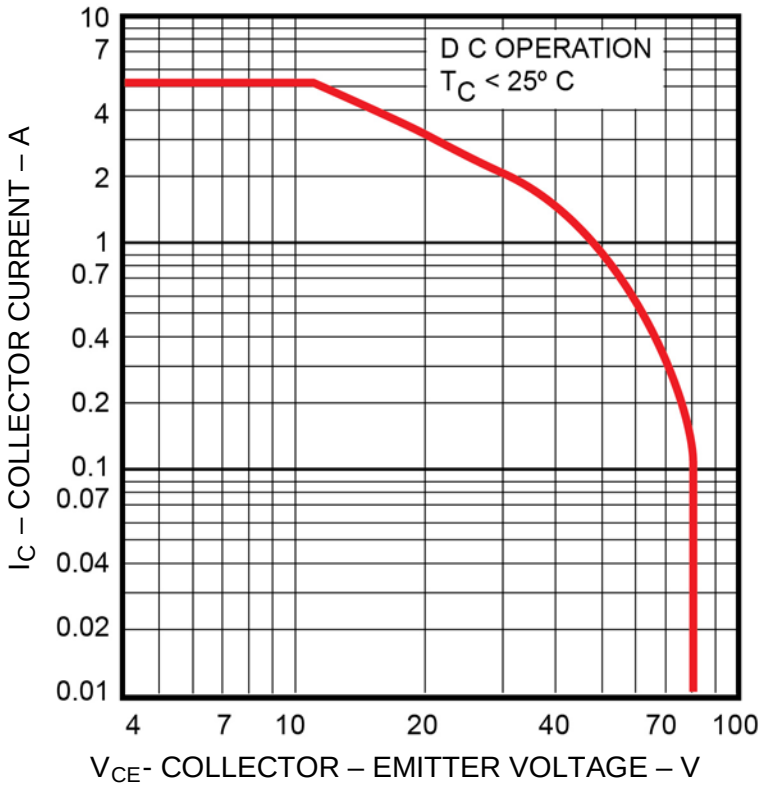
V_{CE} = 12 V, I_C = 5 A

Test 2

V_{CE} = 32 V, I_C = 1.7 A

Test 3

V_{CE} = 80 V, I_C = 100 mA



Maximum safe operating area

GRAPHS

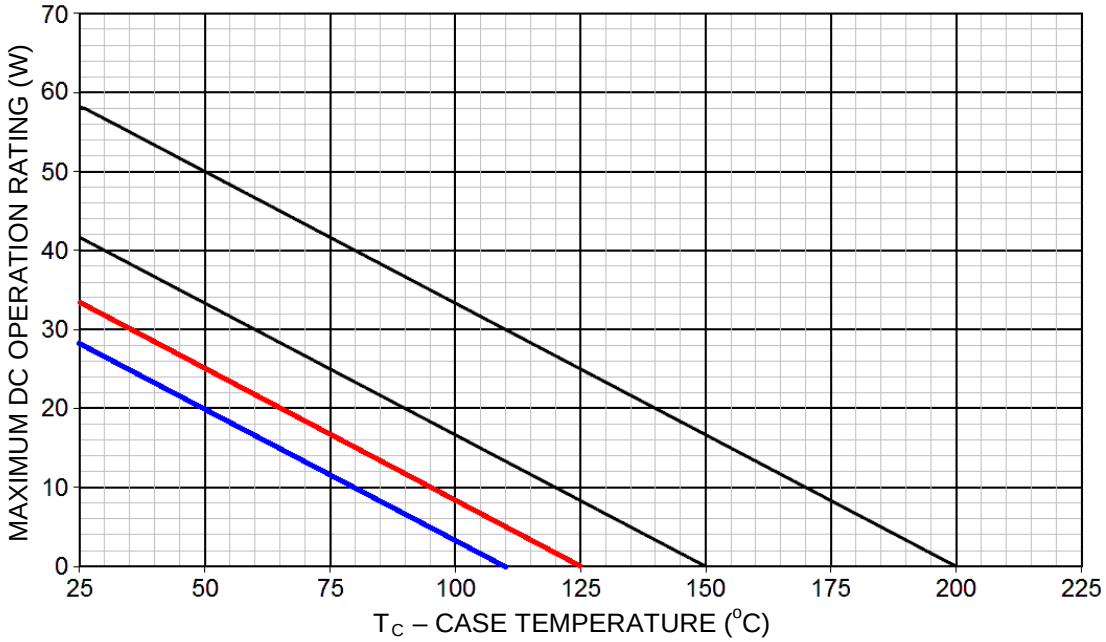


FIGURE 1
Temperature-Power Derating

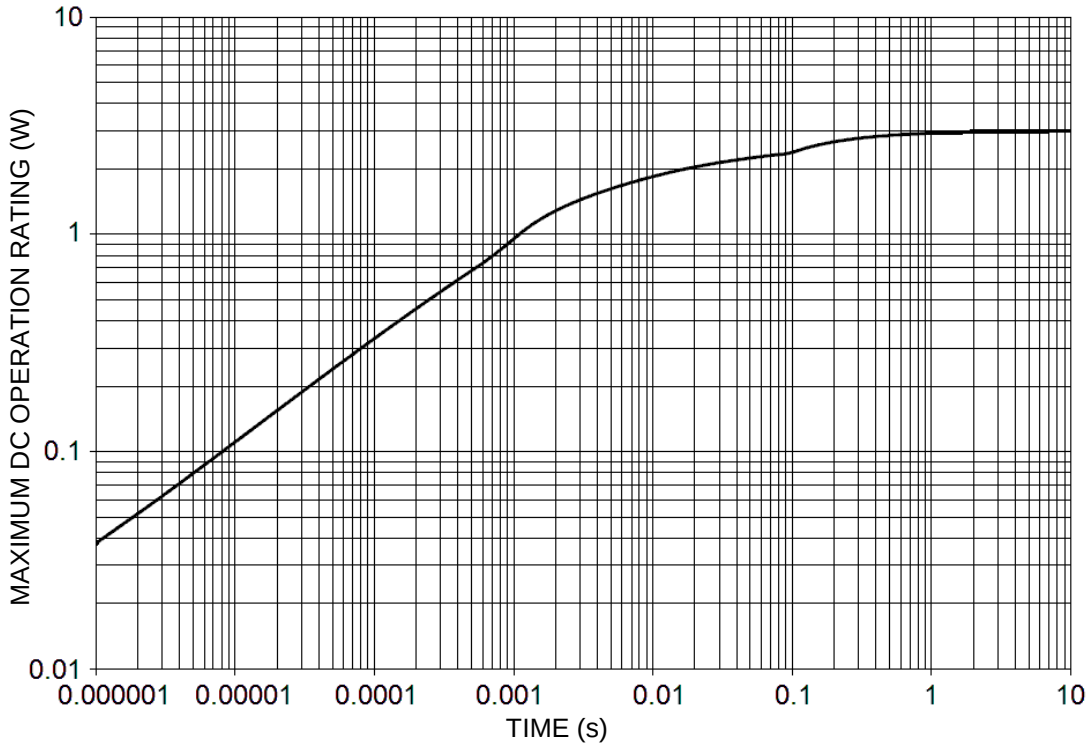
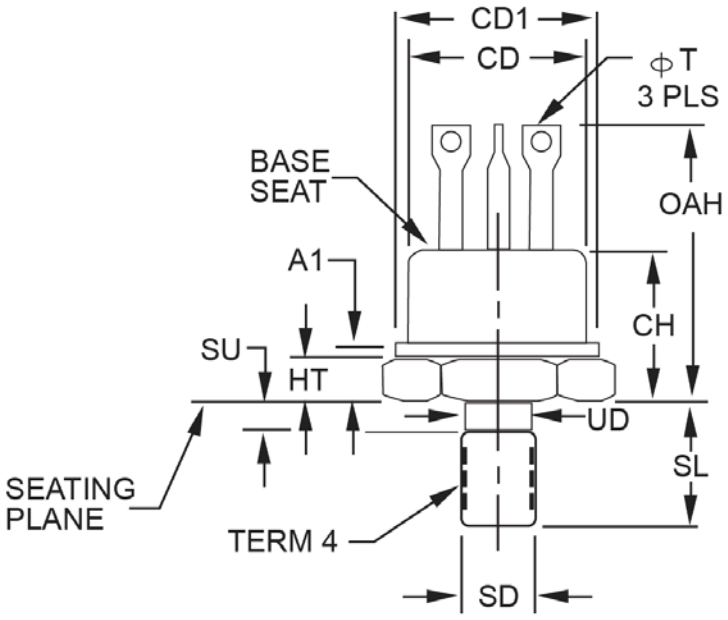
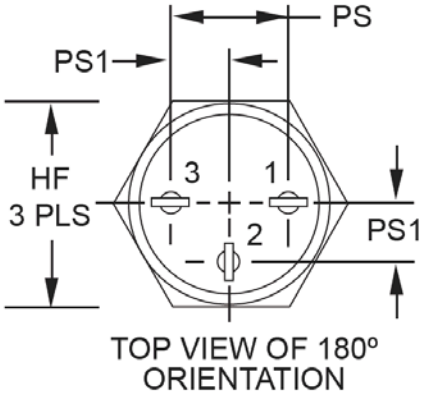


FIGURE 2
Thermal Impedance

PACKAGE DIMENSIONS





NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. See NSB Handbook H28, “Screw-Thread Standards for Federal Services”.
4. The orientation of the terminals in relation to the hex flats is not controlled.
5. All three terminals.
6. The case temperature may be measured anywhere on the seating plane within .125 inch (3.18 mm) of the stud.
7. Terminal spacing measured at the base seat only.
8. This dimension applies to the location of the center line of the terminals.
9. Terminal - 1, emitter; terminal - 2, base; terminal - 3, collector. Collector lead is isolated from the case.
10. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

Symbol	Dimension				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A_1		.250		6.35	
CD	.330	.360	8.38	9.14	
CD_1	.370	.437	9.40	11.10	
CH	.320	.468	8.13	11.89	
HF	.424	.437	10.77	11.10	
HT	.090	.150	2.29	3.81	
OAH	.575	.763	14.61	19.38	5
PS	.185	.215	4.70	5.46	4, 8
PS_1	.090	.110	2.29	2.79	4, 8
SL	.400	.455	10.16	11.56	
SU		.078		1.98	7
T	.040	.065	1.02	1.65	
UD	.155	.189	3.94	4.80	

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