2N6032, 2N6033

NPN High Power Silicon Transistor

Rev. V2

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/528
- TO-3 (TO-204AA) Package
- Ideal for High Speed Switching and Linear Amplifier Applications

Electrical Characteristics (T_A = +25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	I_C = 200 mA dc; f = 30-60 Hz; L = 15 mH 2N6032 2N6033	$V_{(BR)CEO}$	V dc	 90 120	 —
Collector - Emitter Breakdown Voltage	I_C = 200 mA dc; f = 30-60 Hz; L = 15 mH 2N6032 2N6033	$V_{(BR)CER}$	V dc	 110 140	 —
Collector - Emitter Breakdown Voltage	I_C = 200 mA dc; f = 30-60 Hz; L = 2 mH 2N6032 2N6033	$V_{(BR)CEX}$	V dc	 120 150	 —
Collector - Base Cutoff Current	V_{CB} = 120 V dc, 2N6032 V_{CB} = 150 V dc, 2N6033	I_{CBO}	mA dc	—	25 25
Emitter - Base Cutoff Current	V_{EB} = 7.0 V dc	I_{EBO}	mA dc	—	10
Collector - Emitter Cutoff Current	V_{CE} = 110 V dc, V_{BE} = -1.5 V dc, 2N6032 V_{CE} = 135 V dc, V_{BE} = -1.5 V dc, 2N6033	I_{CEX1}	µA dc	—	250 250
Collector - Emitter Cutoff Current	V_{CE} = 80 V dc, Both	I_{CEO}	mA dc	—	10
Forward Current Transfer Ratio	V_{CE} = 2.6 V dc; I_C = 50 A dc, 2N6032 V_{CE} = 2.0 V dc; I_C = 40 A dc, 2N6033	h_{FE1}	-	10 10	50 50
Collector - Emitter Saturation Voltage	I_C = 50 A dc; I_B = 5.0 A dc 2N6032 I_C = 40 A dc; I_B = 4.0 A dc 2N6033	$V_{CE(sat)}$	V dc	—	1.3 1.0
Base - Emitter Saturation Voltage	I_B = 5.0 A; I_C = 50 A dc, 2N6032 I_B = 4.0 A; I_C = 40 A dc, 2N6033	$V_{BE(sat)}$	V dc	—	2.0 2.0

Electrical Characteristics (T_A = +25°C unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Cutoff Current	T_A = +150°C V_{CE} = 100 V dc; V_{BE} = -1.5 V dc, 2N6032 V_{CE} = 100 V dc; V_{BE} = -1.5 V dc, 2N6033	I_{CEX2}	mA dc	—	15 10
Forward - Current Transfer Ratio	T_A = -55°C V_{CE} = 2.6 V dc; I_C = 50 A dc, 2N6032 V_{CE} = 2.0 V dc; I_C = 40 A dc, 2N6033	h_{FE2}	-	5 5	

Dynamic Characteristics					
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio	V_{CE} = 10 V dc; I_C = 2.0 A dc; f = 5.0 MHz	$\lvert h_{fe} \rvert$		10	40
Open Circuit Output Capacitance	V_{CB} = 10 V dc; I_E = 0; f = 100 kHz ≤ f ≤ 1 MHz	C_{obo}	pF	—	1000

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Absolute Maximum Ratings (T_A = +25°C unless otherwise noted)

Ratings	Symbol	Value
Collector - Emitter Voltage 2N6032 2N6033	V_{CEO}	 90 V dc 120 V dc
Collector - Base Voltage 2N6032 2N6033	V_{CBO}	 120 V dc 150 V dc
Emitter - Base Voltage	V_{EBO}	7.0 V dc
Base Current	I_B	10 A dc
Collector Current 2N6032 2N6033	I_C	 50 A dc 40 A dc
Total Power Dissipation @ T_C = +25°C (1)	P_T	140 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to +200°C

(1) Between T_C = +25°C and T_C = +200°C, linear derating factor (average) = 800mW/°C.

Thermal Characteristics

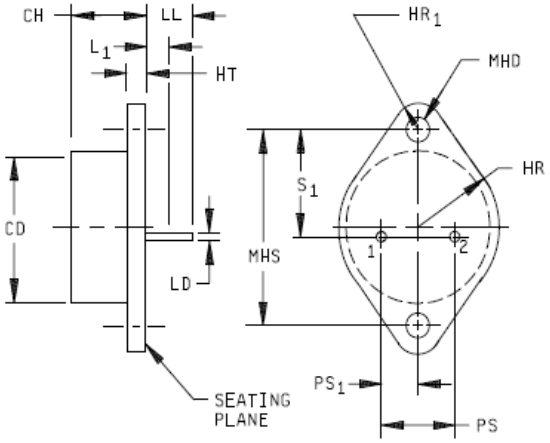
Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.25°C/W

Switching Characteristics	Symbol	Max. Value
V_{CC} = 30 V dc ±2; I_C = 50 A dc; I_{B1} = 5.0 A dc 2N6032 V_{CC} = 30 V dc ±2; I_C = 40 A dc; I_{B1} = 4.0 A dc 2N6033	t_{on}	0.5 µS
V_{CC} = 30 V dc ± 2; I_C = 50 A dc; I_{B2} = 5.0A dc, I_{B2} = -5.0 A dc 2N6032 V_{CC} = 30 V dc ± 2; I_C = 40 A dc; I_{B1} = 4.0 A dc I_{B2} = -4.0 A dc 2N6033	t_{off}	2.0 µS

Safe Operating Area		
DC Tests:	T_C = +25 °C; 1Cycle; t = 1.0 s	
Test 1:	V_{CE} = 2.8 V dc; I_C = 50 A dc	2N6032
Test 2:	V_{CE} = 3.5 V dc; I_C = 40 A dc	2N6033
Test 3:	V_{CE} = 24 V dc; I_C = 5.8 A dc	Both types
Test 4:	V_{CE} = 40 V dc; I_C = 0.9 A dc	Both types
Test 5:	V_{CE} = 90 V dc; I_C = 0.18 A dc	2N6032
Test 6:	V_{CE} = 120 V dc; I_C = 0.1 A dc	2N6033

Outline Drawing (TO-3)

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.22	3
CH	.250	.450	6.35	11.43	
HR	.495	.525	12.57	13.34	
HR_1	.131	.188	3.33	4.78	
HT	.050	.135	1.27	3.43	
L_1		.050		1.27	5, 9
LD	.059	.061	1.50	1.55	5, 9
LL	.312		7.92		5
MHD	.151	.161	3.84	4.09	7
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	4
PS_1	.205	.225	5.21	5.72	4, 5
S_1	.655	.675	16.64	17.14	4



NOTES:
1. Dimensions are in inches.
* 2. Millimeters are given for general information only.
3. Body contour is optional within zone defined by CD.
4. These dimensions shall be measured at points .050 (1.27 mm) to .055 (1.40 mm) below seating plane. When gauge is not used, measurement shall be made at seating plane.
5. Both terminals.
6. At both ends.
7. Two holes.
8. Terminal 1 is the emitter, terminal 2 is base. The collector shall be electrically connected to the case.
* 9. LD applies between L_1 and LL. Lead diameter shall not exceed twice LD within L_1.
10. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.

* FIGURE 1. Physical dimensions (similar to TO-3).

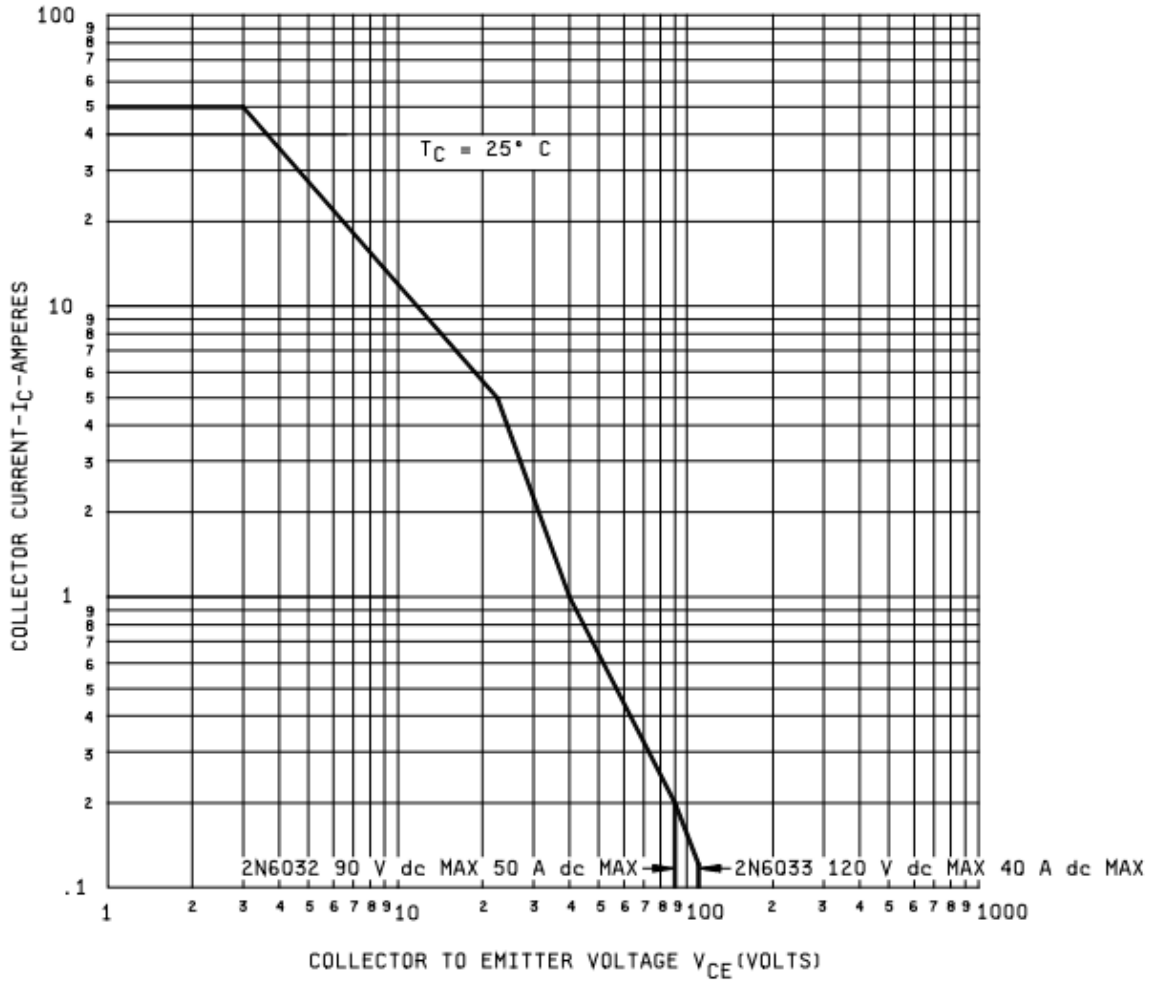


FIGURE 4. Maximum safe operating area graph (continuous dc).

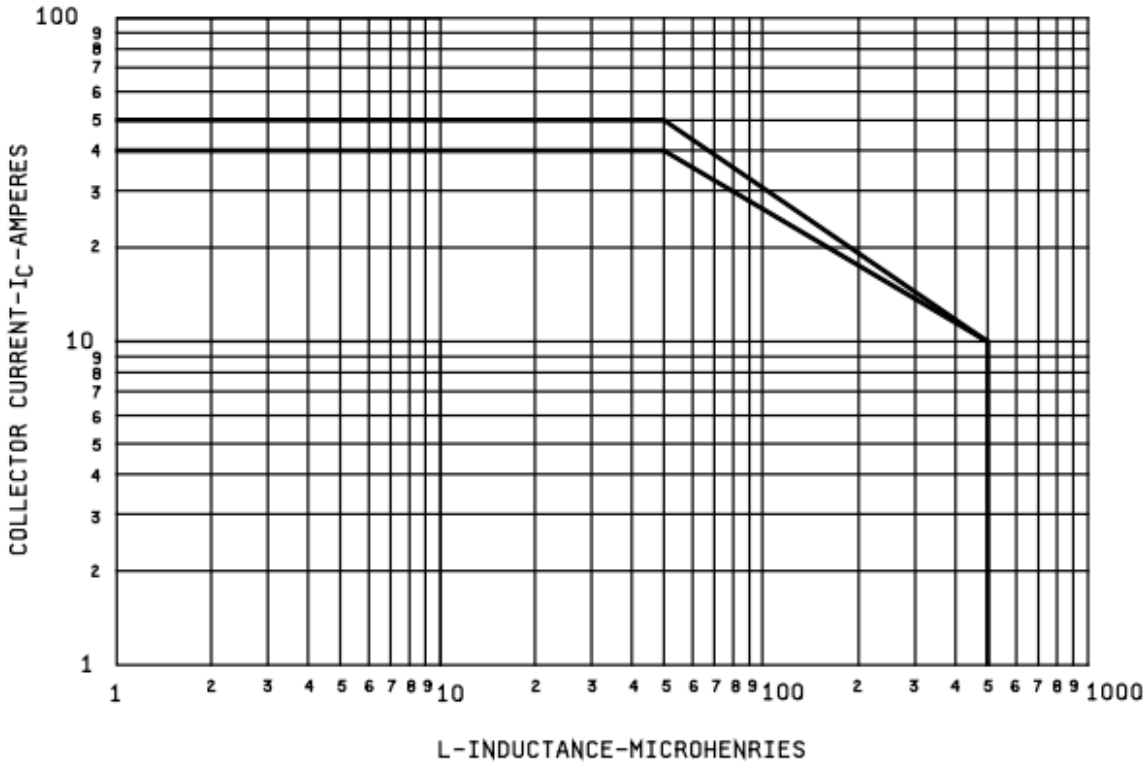


FIGURE 5. Safe operating area for switching between saturation and cutoff (unclamped inductive load).