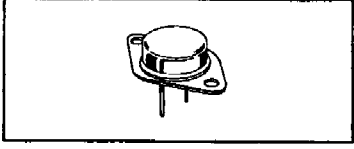


**BUS48
BUS48A**

**15 AMPERES
NPN SILICON
POWER TRANSISTORS**
400 and 450 VOLTS (BVCEO)
850 - 1000 VOLTS (BVCEES)
175 WATTS

**Designer's Data for
"Worst Case" Conditions**
The Designer's Data Sheet permits the design of most circuits entirely from the information presented. Limit data - representing device characteristics boundaries - are given to facilitate "worst case" design.



**SWITCHMODE II⁺ SERIES
NPN SILICON POWER TRANSISTORS**

The BUS 48 and BUS 48A transistors are designed for high-voltage, high-speed, power switching in inductive circuits where fall time is critical. They are particularly suited for line-operated switch-mode applications such as:

- Switching Regulators
- Inverters
- Solenoid and Relay Drivers
- Motor Controls
- Deflection Circuits

Fast Turn-Off Times
60 ns Inductive Fall Time - 25°C (Typ)
120 ns Inductive Crossover Time - 25°C (Typ)

Operating Temperature Range - 65 to +200°C
100°C Performance Specified for:
Reverse-Biased SOA with Inductive Loads
Switching Times with Inductive Loads
Saturation Voltages
Leakage Currents (125°C)

MAXIMUM RATINGS

Rating	Symbol	BUS 48	BUS 48A	Unit
Collector-Emitter Voltage	V _{CEO(sus)}	400	450	V _{dc}
Collector-Emitter Voltage	V _{CEV}	850	1000	V _{dc}
Emitter Base Voltage	V _{EB}	7		V _{dc}
Collector Current - Continuous	I _C	15		A _{dc}
- Peak (1)	I _{CM}	30		
- Overload	I _{OL}	60		
Base Current - Continuous	I _B	5		A _{dc}
- Peak (1)	I _{BM}	20		
Total Power Dissipation - T _C = 25°C	P _D	175		Watts
- T _C = 100°C		100		
Derate above 25°C		1.0		W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	-65 to +200		°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R _{θJC}	1.0	°C/W
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	T _L	275	°C

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle ≤ 10%.

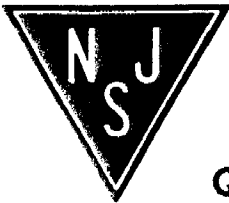
PH L BASE
Z EMITTER
CASE COLLECTOR

NOTES:
1 DIMENSIONS D AND V ARE DATUMS
2 (□) IS SEATING PLANE AND DATUM
3 POSITIONAL TOLERANCES FOR MOUNTING HOLES
4 DIMENSIONS AND TOLERANCES PER ANSI Y14.1-1975

FOR LEADS:
□ 0.13 (0.005) □ 1.0 (0.040) □ 1.0 (0.040) □ 1.0 (0.040)

DIMENSIONS (INCHES)			
DIM.	MIN.	MAX.	REF. DESIG.
A	0.130	0.130	1.000
B	0.130	0.130	1.000
C	0.130	0.130	1.000
D	0.130	0.130	1.000
E	0.130	0.130	1.000
F	0.130	0.130	1.000
G	0.130	0.130	1.000
H	0.130	0.130	1.000
I	0.130	0.130	1.000
J	0.130	0.130	1.000
K	0.130	0.130	1.000
L	0.130	0.130	1.000
M	0.130	0.130	1.000
N	0.130	0.130	1.000
O	0.130	0.130	1.000
P	0.130	0.130	1.000
Q	0.130	0.130	1.000
R	0.130	0.130	1.000
S	0.130	0.130	1.000
T	0.130	0.130	1.000
U	0.130	0.130	1.000
V	0.130	0.130	1.000

FO-3



NJ Semi-Conductors reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However, NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.

BUS48, BUS48A

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit		
OFF CHARACTERISTICS (1)							
Collector-Emitter Sustaining Voltage (Table 1) ($I_C = 200\text{ mA}$, $I_B = 0$) $L = 26\text{ mH}$	BUS48 BUS48A	$V_{CE0(sus)}$	400 450	—	—	Vdc	
Collector Cutoff Current ($V_{CEV} = \text{Rated Value}$, $V_{BE(off)} = 1.5\text{ Vdc}$) ($V_{CEV} = \text{Rated Value}$, $V_{BE(off)} = 1.5\text{ Vdc}$, $T_C = 125^\circ\text{C}$)		I_{CEV}	—	—	0.2 2.0	mAdc	
Collector Cutoff Current ($V_{CE} = \text{Rated } V_{CEV}$, $R_{BE} = 10\ \Omega$)	$T_C = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$	I_{CER}	—	—	0.5 3.0	mAdc	
Emitter Cutoff Current ($V_{EB} = 5\text{ Vdc}$, $I_C = 0$)		I_{EBO}	—	—	0.1	mAdc	
Emitter-base breakdown Voltage ($I_E = 50\text{ mA}$, $I_C = 0$)		B_{VEBO}	7.0	—	—	Vdc	
SECOND BREAKDOWN							
Second Breakdown Collector Current with Base Forward Biased	$I_{S/b}$	See Figure 12					
Clamped Inductive SOA with Base Reverse Biased	RBSOA	See Figure 13					
ON CHARACTERISTICS (1)							
DC Current Gain ($I_C = 10\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 8\text{ Adc}$, $V_{CE} = 5\text{ V}$)	BUS48 BUS48A	h_{FE}	8	—	—		
Collector-Emitter Saturation Voltage ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$) ($I_C = 15\text{ Adc}$, $I_B = 3\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$, $T_C = 100^\circ\text{C}$) ($I_C = 8\text{ Adc}$, $I_B = 1.6\text{ Adc}$) ($I_C = 12\text{ Adc}$, $I_B = 2.4\text{ Adc}$) ($I_C = 8\text{ Adc}$, $I_B = 1.6\text{ Adc}$, $T_C = 100^\circ\text{C}$)	BUS48 BUS48A	$V_{CE(sat)}$	—	—	1.5 5.0 2.0 1.5 5.0 2.0	Vdc	
Base-Emitter Saturation Voltage ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$) ($I_C = 10\text{ Adc}$, $I_B = 2\text{ Adc}$, $T_C = 100^\circ\text{C}$) ($I_C = 8\text{ Adc}$, $I_B = 1.6\text{ Adc}$) ($I_C = 8\text{ Adc}$, $I_B = 1.6\text{ Adc}$, $T_C = 100^\circ\text{C}$)	BUS48 BUS48A	$V_{BE(sat)}$	—	—	1.6 1.8 1.6 1.6	Vdc	
DYNAMIC CHARACTERISTICS							
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f_{test} = 100\text{ KHz}$)		C_{ob}	—	—	350	pF	
SWITCHING CHARACTERISTICS							
Resistive Load (Table 1)							
Delay Time	($V_{CC} = 250\text{ Vdc}$, $I_C = 10\text{ A}$, $I_{B1} = 2.0\text{ A}$, $t_p = 30\ \mu\text{s}$, Duty Cycle $< 2\%$, $V_{BE(off)} = 5\text{ V}$)	t_d	—	0.1	0.2	μs	
Rise Time		t_r	—	0.4	0.7		
Storage Time		t_s	—	1.3	2.0		
Fall Time		t_f	—	0.2	0.4		
Inductive Load, Clamped (Table 1)							
Storage Time	($I_C(pk) = 10\text{ A}$, $I_{B1} = 2.0\text{ A}$, $V_{BE(off)} = 5\text{ V}$, $V_{CE(s1)} = 250\text{ V}$)	($T_C = 25^\circ\text{C}$)	t_{sv}	—	1.3	—	μs
Fall Time		t_{fi}	—	0.08	—		
Storage Time		($T_C = 100^\circ\text{C}$)	t_{sv}	—	1.5	2.5	
Crossover Time			t_c	—	0.3	0.6	
Fall Time			t_{fi}	—	0.17	0.36	