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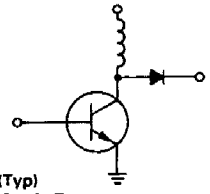
BUS48
BUS48A

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



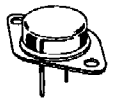
Fast Turn-Off Times
60 ns Inductive Fall Time—25°C (Typ)
120 ns Inductive Crossover Time—25°C (Typ)

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)

15 AMPERES
NPN SILICON
POWER TRANSISTORS
400 and 450 VOLTS (BVCEO)
850 – 1000 VOLTS (BVCES)
175 WATTS

Designer's Data for "Worst Case" Conditions

The Designers▲ 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.



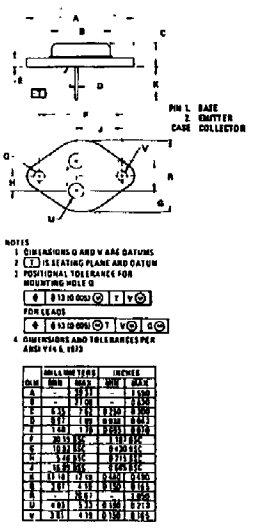
MAXIMUM RATINGS

Rating	Symbol	BUS 48	BUS 48A	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	400	450	Vdc
Collector-Emitter Voltage	V_{CEV}	850	1000	Vdc
Emitter Base Voltage	V_{EB}	7		Vdc
Collector Current – Continuous – Peak(1) – Overload	I_C I_{CM} I_{OL}	15 30 60		Adc
Base Current – Continuous – Peak(1)	I_B I_{BM}	5 20		Adc
Total Power Dissipation – T_C = 25°C – T_C = 100°C Derate above 25°C	P_D	175 100 1.0		Watts 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	$R_{\theta JC}$	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%.



TO-3

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS (1)						
Collector-Emitter Sustaining Voltage (Table 1) (I_C = 200 mA, I_B = 0) L = 25 mH	BUS48 BUS48A	$V_{CEO(sus)}$	400 450	–	–	Vdc
Collector Cutoff Current (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc) (V_{CEV} = Rated Value, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C)		I_{CEV}	– –	– –	0.2 2.0	mAdc
Collector Cutoff Current (V_{CE} = Rated V_{CEV}, R_{BE} = 10 Ω)	T_C = 25°C T_C = 125°C	I_{CER}	–	–	0.5 3.0	mAdc
Emitter Cutoff Current (V_{EB} = 5 Vdc, I_C = 0)		I_{EBO}	–	–	0.1	mAdc
Emitter-base breakdown Voltage (I_E = 50 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 Adc, V_{CE} = 5 Vdc) (I_C = 8 Adc, V_{CE} = 5 V)	BUS48 BUS48A	h_{FE}	8	–	–	
Collector-Emitter Saturation Voltage (I_C = 10 Adc, I_B = 2 Adc) (I_C = 15 Adc, I_B = 3 Adc) (I_C = 10 Adc, I_B = 2 Adc, T_C = 100°C) (I_C = 8 Adc, I_B = 1.6 Adc) (I_C = 12 Adc, I_B = 2.4 Adc) (I_C = 8 Adc, I_B = 1.6 Adc, T_C = 100°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 Adc, I_B = 2 Adc) (I_C = 10 Adc, I_B = 2 Adc, T_C = 100°C) (I_C = 8 Adc, I_B = 1.6 Adc) (I_C = 8 Adc, I_B = 1.6 Adc, T_C = 100°C)	BUS48 BUS48A 	$V_{BE(sat)}$	– – – –	– – – –	1.6 1.6 1.6 1.6	Vdc
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 100 Khz)		C_{ob}	–	–	350	pF
SWITCHING CHARACTERISTICS						
Resistive Load (Table 1)						
Delay Time	(V_{CC} = 250 Vdc, I_C = 10 A, I_{B1} = 2.0 A, t_p = 30 μs, Duty Cycle ≤ 2%, $V_{BE(off)}$ = 5 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 A, I_{B1} = 2.0 A, $V_{BE(off)}$ = 5 V, $V_{CE(cl)}$ = 250 V) (T_C = 25°C)	t_{sv}	–	1.3	–	μs
Fall Time		t_{fi}	–	0.06	–	
Storage Time	(T_C = 100°C)	t_{sv}	–	1.5	2.5	
Crossover Time		t_c	–	0.3	0.6	
Fall Time		t_{fi}	–	0.17	0.35	