

MOTOROLA SEMICONDUCTOR TECHNICAL DATA

BUS51

ADVANCED INFORMATION SWITCHMODE SERIES NPN SILICON POWER TRANSISTOR

The BUS51 transistor is designed for low voltage, high-speed, power switching in inductive circuits where fall time is critical. It is particularly suited for battery switchmode applications such as:

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

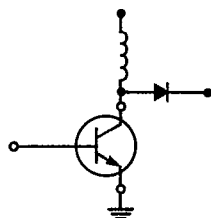
Fast Turn-Off Times

300 ns Inductive Fall Time -25°C (Typ)

Operating Temperature Range -65 to +200°C

100°C Performance Specified for:

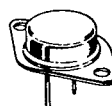
- Reverse-Biased SOA with Inductive Loads
- Switching Times with Inductive Loads
- Saturation Voltages
- Leakage Currents (125°C)



50 AMPERES
NPN SILICON
POWER TRANSISTOR
200 VOLTS $V_{(BR)CEO}$
350 WATTS
300 $V_{(BR)CES}$

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.



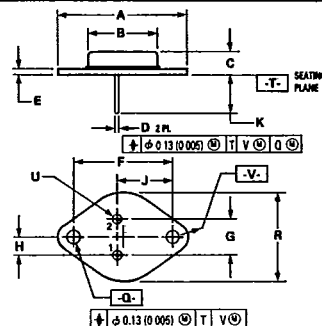
MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	200	Vdc
Collector-Emitter Voltage	V_{CEV}	300	Vdc
Emitter Base Voltage	V_{EB}	7.0	Vdc
Collector Current — Continuous	I_C	50	Adc
— Peak (1)	I_{CM}	100	
— Overload	I_{OI}	—	
Base Current — Continuous	I_B	10	Adc
— Peak (1)	I_{BM}	—	
Total Power Dissipation — $T_C = 25^\circ\text{C}$	P_D	350	Watts
— $T_C = 100^\circ\text{C}$		200	
Derate above 25°C		2.0	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	$R_{\theta JC}$	0.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from Case for 5 Seconds	T_L	275	°C

(1) Pulse Test: Pulse Width = 5.0 ms, Duty Cycle $\leq 10\%$.



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION, INCH.
3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	—	39.37	—	1.550
B	—	21.08	—	0.830
C	6.35	8.25	0.250	0.325
D	0.97	1.09	0.038	0.043
E	1.40	1.77	0.055	0.070
F	30.15 BSC		1.187 BSC	
G	10.32 BSC		0.406 BSC	
H	5.48 BSC		0.215 BSC	
J	16.89 BSC		0.665 BSC	
K	11.18	12.19	0.440	0.480
Q	3.84	4.19	0.151	0.165
R	—	26.67	—	1.050
U	4.83	5.33	0.190	0.210
V	3.84	4.19	0.151	0.165

STYLE 1:
PIN 1. BASE
2. EMITTER
CASE COLLECTOR

CASE 1-06
TO-204AA
(TO-3)

BUS51

T-33-15

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) ($I_C = 200\text{ mA}$, $I_B = 0$, $L = 25\text{ mH}$)	$V_{CEO(sus)}$	200	—	—	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	mA
Collector Cutoff Current ($V_{CEO} = \text{Rated Value}$)	I_{CEO}	—	—	1.0	mA
Emitter Cutoff Current ($V_{EB} = 7.0\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	—	2.0	mA

ON CHARACTERISTICS (1)

DC Current Gain ($I_C = 5.0\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$) ($I_C = 50\text{ Adc}$, $V_{CE} = 4.0\text{ Vdc}$)	h_{FE}	20 15	— —	— —	
Collector-Emitter Saturation Voltage ($I_C = 30\text{ Adc}$, $I_B = 2.0\text{ Adc}$) ($I_C = 50\text{ Adc}$, $I_B = 5.0\text{ Adc}$)	$V_{CE(sat)}$	— —	— —	1.0 1.5	Vdc
Base-Emitter Saturation Voltage ($I_C = 30\text{ Adc}$, $I_B = 2.0\text{ Adc}$) ($I_C = 50\text{ Adc}$, $I_B = 5.0\text{ Adc}$)	$V_{BE(sat)}$	— —	— —	1.8 2.0	Vdc

SWITCHING CHARACTERISTICS**Resistive Load (Table 1)**

Turn-On Time	$(I_C(pk) = 50\text{ A}$, $I_{B1} = 5.0\text{ A}$, $V_{BE(off)} = 5.0\text{ V}$, $V_{CE(c1)} = 150\text{ V})$	($T_C = 25^\circ\text{C}$) ($T_C = 100^\circ\text{C}$)	t_{on}	— —	— —	1.0 —	μs
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Inductive Load, Clamped (Table 1)

Storage Time	$(I_C(pk) = 50\text{ A}$, $I_{B1} = 5.0\text{ A}$, $V_{BE(off)} = 5.0\text{ V}$, $V_{CE(c1)} = 150\text{ V}$)	(T _C = 25°C)	t_{sv}	—	—	2.0	μs
Fall Time			t_{fi}	—	—	0.3	
Storage Time		(T _C = 100°C)	t_{sv}	—	—	—	
Crossover Time			t_c	—	—	—	
Fall Time			t_{fi}	—	—	—	

(1) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.