

Advance Information

SWITCHMODE Series

NPN Silicon Power Transistors

These 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 switchmode applications. The MJ16022 is a selected high-gain version of the MJ16020 for applications where drive current is limited.

Features:

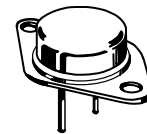
- Fast Switching Times:
 - 30 ns (Typ) Inductive Fall Time
 - 50 ns (Typ) Inductive Crossover Time
 - 800 ns (Typ) Inductive Storage Time
- 100°C Performance Specified for:
 - Reverse-Biased SOA with Inductive Loads
 - Switching Times with Inductive Loads
 - Saturation Voltages

Typical Applications:

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

MJ16020
MJ16022

**NPN SILICON POWER
TRANSISTOR
30 AMPERES
450 VOLTS**



**CASE 197A-05
TO-204AE**

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Max	Unit
Collector-Emitter Sustaining Voltage	V _{CEO}	450	V _{dc}
Collector-Emitter Breakdown Voltage	V _{CEV}	850	V _{dc}
Emitter-Base Voltage	V _{EB}	6	V _{dc}
Collector Current — Continuous	I _C	30	A _{dc}
— Peak (1)	I _{CM}	40	
Base Current — Continuous	I _B	20	A _{dc}
— Peak (1)	I _{BM}	30	
Total Power Dissipation @ T _C = 25°C	P _D	250	Watts
Derate above 25°C		1.42	W/°C
Operating and Storage Temperature	T _J , T _{stg}	-65 to 200	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance — Junction to Case	R _{θJC}	0.7	°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%.

This document contains information on a new product. Specifications and information herein are subject to change without notice.

REV 7

MJ16020 MJ16022

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS*					
Collector–Emitter Sustaining Voltage ($I_C = 1\text{ mA}$, $I = 0$)	$V_{CEO(sus)}$	450	—	—	Vdc
Collector Cutoff Current ($V_{CE} = 850\text{ Vdc}$, $R_{BE} = 50\text{ Ohms}$, $T_C = 100^\circ\text{C}$)	I_{CER}	—	—	—	mAdc
Collector Cutoff Current ($V_{CE} = 850\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 850\text{ Vdc}$, $V_{EB(off)} = 1.5\text{ Vdc}$)	I_{CES}	— —	— —	0.5 5	nAdc
Emitter Cutoff Current ($V_{EB} = 6\text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	—	2	nAdc
ON CHARACTERISTICS*					
Base–Emitter Saturation Voltage ($I_C = 20\text{ Adc}$, $I_B = 2\text{ Adc}$) ($I_C = 20\text{ Adc}$, $I_B = 2\text{ Adc}$)	$V_{BE(sat)}$	— —	— —	1.5 1.5	Vdc
Collector–Emitter Saturation Voltage ($I_C = 20\text{ Adc}$, $I_B = 1.4\text{ Adc}$) ($I_C = 20\text{ Adc}$, $I_B = 2.6\text{ Adc}$) ($I_C = 20\text{ Adc}$, $I_B = 2.6\text{ Adc}$)	$V_{CE(sat)}$	— — —	— — —	2.5 3 3	Vdc
DC Current Gain ($I_C = 30\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	5 7	— —	— —	—
DYNAMIC CHARACTERISTICS					
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f_{test} = 1\text{ MHz}$)	C_{ob}	—	—	800	pF

* Indicates Pulse Test: Pulse Width = 300 μs Max, Duty Cycle = 2%.

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

Characteristic	Symbol	Min	Typ	Max	Unit		
SWITCHING CHARACTERISTICS: MJ16020							
Resistive Load							
Delay Time	$(V_{CC} = 250\text{ Vdc},$ $I_C = 20\text{ Adc},$ $I_{B1} = 2.6\text{ Adc},$ $t_p = 30\ \mu\text{s},$ Duty Cycle < 2%)	$I_{B2} = 5.2\text{ Adc}$ $R_B = 1.6\ \text{Ohm}$	t_d	—	20	—	ns
Rise Time			t_r	—	200	—	
Storage Time			t_s	—	1200	—	
Fall Time		t_f	—	200	—		
Storage Time		$(V_{BE(off)} = 5\text{ Vdc})$	t_s	—	650	—	
Fall Time			t_f	—	80	—	
Inductive Load							
Storage Time	$(I_C = 20\text{ A}, I_{B1} = 2.6\text{ Adc},$ $V_{CE(pk)} = 400\text{ V},$ $V_{BE(off)} = 5\text{ Vdc})$	$(T_C = 100^\circ\text{C})$	t_{sv}	—	800	2000	ns
Crossover Time			t_{fi}	—	50	200	
Fall Time			t_c	—	90	250	
Storage Time	$(I_C = 20\text{ A}, I_{B1} = 2.6\text{ Adc},$ $V_{CE(pk)} = 400\text{ V},$ $V_{BE(off)} = 5\text{ Vdc})$	$(T_C = 150^\circ\text{C})$	t_{sv}	—	1050	—	ns
Crossover Time			t_{fi}	—	70	—	
Fall Time			t_c	—	120	—	

SWITCHING CHARACTERISTICS: MJ16022

Resistive Load							
Delay Time	$(V_{CC} = 250\text{ Vdc},$ $I_C = 20\text{ Adc},$ $I_{B1} = 2.6\text{ Adc},$ $t_p = 30\ \mu\text{s},$ Duty Cycle < 2%)	$I_{B2} = 5.2\text{ Adc}$ $R_B = 1.6\ \text{Ohm}$	t_d	—	20	—	ns
Rise Time			t_r	—	200	—	
Storage Time			t_s	—	900	—	
Fall Time		t_f	—	150	—		
Storage Time		$(V_{BE(off)} = 5\text{ Vdc})$	t_s	—	500	—	
Fall Time			t_f	—	40	—	
Inductive Load							
Storage Time	$(I_C = 20\text{ A}, I_{B1} = 2.6\text{ Adc},$ $V_{CE(pk)} = 400\text{ V},$ $V_{BE(off)} = 5\text{ Vdc})$	$(T_C = 100^\circ\text{C})$	t_{sv}	—	650	1700	ns
Crossover Time			t_{fi}	—	30	150	
Fall Time			t_c	—	50	200	
Storage Time	$(I_C = 20\text{ A}, I_{B1} = 2.6\text{ Adc},$ $V_{CE(pk)} = 400\text{ V},$ $V_{BE(off)} = 5\text{ Vdc})$	$(T_C = 150^\circ\text{C})$	t_{sv}	—	850	—	ns
Crossover Time			t_{fi}	—	30	—	
Fall Time			t_c	—	70	—	

