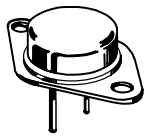
MJ16020
MJ16022

Advance Information

SWITCHMODE Series
NPN Silicon Power Transistors

NPN SILICON POWER TRANSISTOR
30 AMPERES
450 VOLTS



CASE 197A–05
TO–204AE

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

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

Rating	Symbol	Max	Unit
Collector–Emitter Sustaining Voltage	V_{CEO}	450	Vdc
Collector–Emitter Breakdown Voltage	V_{CEV}	850	Vdc
Emitter–Base Voltage	V_{EB}	6	Vdc
Collector Current — Continuous — Peak (1)	I_C I_{CM}	30 40	Adc
Base Current — Continuous — Peak (1)	I_B I_{BM}	20 30	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	250 1.42	Watts 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	$R_{\theta JC}$	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

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

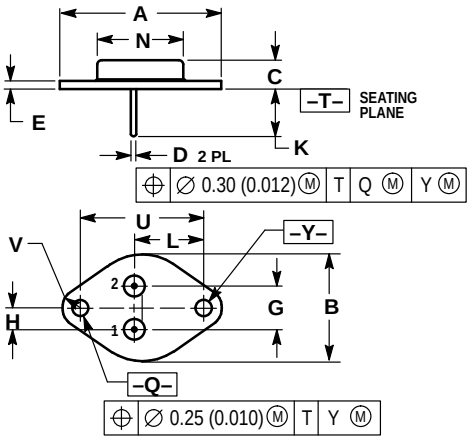
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS*						
Collector–Emitter Sustaining Voltage (I_C = 1 mA, I = 0)		$V_{CEO(sus)}$	450	—	—	Vdc
Collector Cutoff Current (V_{CE} = 850 Vdc, R_{BE} = 50 Ohms, T_C = 100°C)		I_{CER}	—	—	—	mAdc
Collector Cutoff Current		I_{CES}				nAdc
(V_{CE} = 850 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	@ T_C = 25°C		—	—	0.5	
(V_{CE} = 850 Vdc, $V_{EB(off)}$ = 1.5 Vdc)	@ T_C = 100°C		—	—	5	
Emitter Cutoff Current (V_{EB} = 6 Vdc, I_C = 0)		I_{EBO}	—	—	2	nAdc
ON CHARACTERISTICS*						
Base–Emitter Saturation Voltage		$V_{BE(sat)}$				Vdc
(I_C = 20 Adc, I_B = 2 Adc)			—	—	1.5	
(I_C = 20 Adc, I_B = 2 Adc)	@ T_C = 100°C		—	—	1.5	
Collector–Emitter Saturation Voltage		$V_{CE(sat)}$				Vdc
(I_C = 20 Adc, I_B = 1.4 Adc)	@ T_C = 25°C		—	—	2.5	
(I_C = 20 Adc, I_B = 2.6 Adc)	@ T_C = 25°C		—	—	3	
(I_C = 20 Adc, I_B = 2.6 Adc)	@ T_C = 100°C		—	—	3	
DC Current Gain		h_{FE}				—
(I_C = 30 Adc, V_{CE} = 5 Vdc)	MJ16020		5	—	—	
	MJ16022		7	—	—	
DYNAMIC CHARACTERISTICS						
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1 MHz)		C_{ob}	—	—	800	pF

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

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

Characteristic			Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS: MJ16020							
Resistive Load							
Delay Time	(V_{CC} = 250 Vdc, I_C = 20 Adc, I_{B1} = 2.6 Adc, t_p = 30 μs, Duty Cycle < 2%)	I_{B2} = 5.2 Adc, R_B = 1.6 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 Vdc)	t_s	—	650	—	
Fall Time			t_f	—	80	—	
Inductive Load							
Storage Time	(I_C = 20 A, I_{B1} = 2.6 Adc, $V_{CE(pk)}$ = 400 V, $V_{BE(off)}$ = 5 Vdc)	(T_C = 100°C)	t_{sv}	—	800	2000	ns
Crossover Time			t_{fi}	—	50	200	
Fall Time			t_c	—	90	250	
Storage Time	(I_C = 20 A, I_{B1} = 2.6 Adc, $V_{CE(pk)}$ = 400 V, $V_{BE(off)}$ = 5 Vdc)	(T_C = 150°C)	t_{sv}	—	1050	—	
Crossover Time			t_{fi}	—	70	—	
Fall Time			t_c	—	120	—	
SWITCHING CHARACTERISTICS: MJ16022							
Resistive Load							
Delay Time	(V_{CC} = 250 Vdc, I_C = 20 Adc, I_{B1} = 2.6 Adc, t_p = 30 μs, Duty Cycle < 2%)	I_{B2} = 5.2 Adc, R_B = 1.6 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 Vdc)	t_s	—	500	—	
Fall Time			t_f	—	40	—	
Inductive Load							
Storage Time	(I_C = 20 A, I_{B1} = 2.6 Adc, $V_{CE(pk)}$ = 400 V, $V_{BE(off)}$ = 5 Vdc)	(T_C = 100°C)	t_{sv}	—	650	1700	ns
Crossover Time			t_{fi}	—	30	150	
Fall Time			t_c	—	50	200	
Storage Time	(I_C = 20 A, I_{B1} = 2.6 Adc, $V_{CE(pk)}$ = 400 V, $V_{BE(off)}$ = 5 Vdc)	(T_C = 150°C)	t_{sv}	—	850	—	
Crossover Time			t_{fi}	—	30	—	
Fall Time			t_c	—	70	—	

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	1.530 REF		38.86 REF	
B	0.990	1.050	25.15	26.67
C	0.250	0.335	6.35	8.51
D	0.057	0.063	1.45	1.60
E	0.060	0.070	1.53	1.77
G	0.430 BSC		10.92 BSC	
H	0.215 BSC		5.46 BSC	
K	0.440	0.480	11.18	12.19
L	0.665 BSC		16.89 BSC	
N	0.760	0.830	19.31	21.08
Q	0.151	0.165	3.84	4.19
U	1.187 BSC		30.15 BSC	
V	0.131	0.188	3.33	4.77

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

CASE 197A–05
TO–204AE
ISSUE J

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