New Jersey Semi-Conductor Products, Inc.

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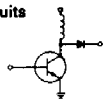
MJ16018
MJH16018

Designers Data Sheet

1.5 kV SWITCHMODE III 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.

Typical Applications:
- Switching Regulators
- Inverters
- Solenoids
- Relay Drivers
- Motor Controls
- Deflection Circuits

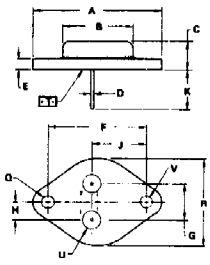


Features:
- Collector-Emitter Voltage — V_{CEX} = 1500 Vdc
- Fast Turn-Off Times
  - 280 ns Inductive Fall Time – 100°C (Typ)
  - 470 ns Inductive Crossover Time – 100°C (Typ)
  - 2.6 μs Inductive Storage Time – 100°C (Typ)
- 100°C Performance Specified for:
  - Reverse-Biased SOA with Inductive Load
  - Switching Times with Inductive Loads
  - Saturation Voltages
  - Leakage Currents

10 AMPERE

NPN SILICON POWER TRANSISTORS

800 VOLTS
150 AND 175 WATTS



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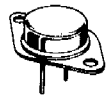
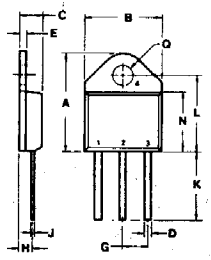


STYLE 1
PIN 1. BASE
2. EMITTER
CASE COLLECTOR

NOTES:
1. DIMENSIONS Q AND V ARE DATUMS.
2. T IS SEATING PLANE AND DATUM.
3. POSITIONAL TOLERANCE FOR MOUNTING HOLE Q:
   ⌖ ∅0.13 (0.005) M T V M
   FOR LEADS:
   ⌖ ∅0.13 (0.005) M T V M Q M
4. DIMENSIONS AND TOLERANCES PER ANSI Y14.5, 1973.

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	–	39.37	–	1.550
B	–	21.08	–	0.830
C	4.35	5.12	0.170	0.200
D	0.97	1.09	0.038	0.043
E	1.45	1.78	0.055	0.070
F	39.75 BSC		1.187 BSC	
G	10.97 BSC		0.430 BSC	
H	5.46 BSC		0.215 BSC	
J	19.00 BSC		0.885 BSC	
K	11.18	12.19	0.440	0.480
Q	3.81	4.19	0.151	0.165
S	–	26.67	–	1.050
U	4.83	5.33	0.190	0.210
V	3.81	4.19	0.151	0.165

TO-204AA
(TO-3 TYPE)



MJH16018

STYLE 1
1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

DIM	MILLIMETERS MIN	MILLIMETERS MAX	INCHES MIN	INCHES MAX
A	20.32	21.08	0.800	0.830
B	15.49	15.90	0.610	0.626
C	4.19	5.08	0.165	0.200
D	1.02	1.65	0.040	0.065
E	1.35	1.65	0.053	0.065
G	5.21	5.72	0.205	0.225
H	2.41	3.20	0.095	0.126
J	0.38	0.64	0.015	0.025
K	12.70	15.49	0.500	0.610
L	15.88	16.51	0.625	0.650
N	12.19	12.70	0.480	0.500
Q	4.09	4.22	0.161	0.166

TO-218AC

MAXIMUM RATINGS

Rating	Symbol	MJ16018	MJH16018	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	800		Vdc
Collector-Emitter Voltage	V_{CEX}	1500		Vdc
Emitter-Base Voltage	V_{EB}	6.0		Vdc
Collector Current — Continuous — Peak (1)	I_C I_{CM}	10 15		Adc
Base Current — Continuous — Peak (1)	I_B I_{BM}	8.0 12		Adc
Total Device Dissipation @ T_C = 25°C @ T_C = 100°C Derate above 25°C	P_D	 175 100 1.0	 150 50 1.0	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to 200	−55 to 150	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max		Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.0	1.0	°C/W
Lead Temperature for Soldering Purposes, 1/8" from Case for 5 Seconds.	T_L	275		°C

(1) Pulse Test: Pulse Width ≤ 5.0 μs, Duty Cycle ≤ 10%.

Designer's Data for "Worst Case" Conditions

The Designer's Data Sheet permits the design of most circuits entirely from the information presented. Limit Curves — representing boundaries on device characteristics — are given to facilitate "worst case" design.

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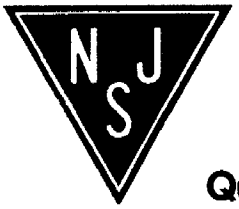
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic			Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Collector-Emitter Sustaining Voltage (Table 2) (I_C = 100 mA, I_B = 0)			$V_{CEO(sus)}$	800	—	—	Vdc
Collector Cutoff Current (V_{CEV} = 1500 Vdc, $V_{BE(off)}$ = 1.5 Vdc) (V_{CEV} = 1500 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 100°C)			I_{CEV}	— —	— —	0.25 1.5	mAdc
Collector Cutoff Current (V_{CE} = 1500 Vdc, R_{BE} = 50 Ω, T_C = 100°C)			I_{CER}	—	—	2.5	mAdc
Emitter Cutoff Current (V_{EB} = 6.0 Vdc, I_C = 0)			I_{EBO}	—	—	1.0	mAdc
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)							
Collector-Emitter Saturation Voltage (I_C = 5.0 Adc, I_B = 1.0 Adc) (I_C = 10 Adc, I_B = 4.0 Adc) (I_C = 5.0 Adc, I_B = 1.0 Adc, T_C = 100°C)			$V_{CE(sat)}$	— — —	— — —	1.5 1.5 2.0	Vdc
Base-Emitter Saturation Voltage (I_C = 5.0 Adc, I_B = 1.0 Adc) (I_C = 5.0 Adc, I_B = 1.0 Adc, T_C = 100°C)			$V_{BE(sat)}$	— —	— —	1.5 1.5	Vdc
DC Current Gain (I_C = 5.0 Adc, V_{CE} = 5.0 Vdc)			h_{FE}	7.0	—	—	—
DYNAMIC CHARACTERISTICS							
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f_{test} = 1.0 kHz)			C_{ob}	—	—	400	pF
SWITCHING CHARACTERISTICS							
Resistive Load (Table 1)							
Delay Time	(I_C = 5.0 Adc, V_{CC} = 250 Vdc, I_{B1} = 1.0 Adc, PW = 30 μs, Duty Cycle ≤ 2.0%)	(I_{B2} = 2.0 Adc, R_{B2} = 3.0 Ω)	t_d	—	50	100	ns
Rise Time			t_r	—	300	400	
Storage Time			t_s	—	2000	3000	
Fall Time			t_f	—	900	1200	
Storage Time		($V_{BE(off)}$ = 2.0 Vdc)	t_s	—	1600	2400	
Fall Time			t_f	—	500	650	
Inductive Load (Table 2)							
Storage Time	(I_C = 5.0 Adc, I_{B1} = 1.0 Adc, $V_{BE(off)}$ = 2.0 Vdc, $V_{CE(pk)}$ = 400 Vdc)	(T_J = 25°C)	t_{sv}	—	2000	3000	ns
Fall Time			t_{fi}	—	200	400	
Crossover Time			t_c	—	350	500	
Storage Time		(T_J = 100°C)	t_{sv}	—	2600	3600	
Fall Time			t_{fi}	—	280	460	
Crossover Time			t_c	—	470	620	

(1) Pulse Test: PW = 300 μs, Duty Cycle ≤ 2.0%.



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