



# MJW18020

## NPN Silicon Power Transistors High Voltage Planar

The MJW18020 planar High Voltage Power Transistor is specifically Designed for motor control applications, high power supplies and UPS's for which the high reproducibility of DC and Switching parameters minimizes the dead time in bridge configurations.

### Features

- High and Excellent Gain Linearity
- Fast and Very Tight Switching Times Parameters  $t_{si}$  and  $t_{fi}$
- Very Stable Leakage Current due to the Planar Structure
- High Reliability
- Pb-Free Package is Available\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Sustaining Voltage	$V_{CEO}$	450	Vdc
Collector-Emitter Breakdown Voltage	$V_{CES}$	1000	Vdc
Collector-Base Voltage	$V_{CBO}$	1000	Vdc
Emitter-Base Voltage	$V_{EBO}$	9.0	Vdc
Collector Current – Continuous – Peak (Note 1)	$I_C$	30 45	Adc
Base Current – Continuous – Peak (Note 1)	$I_B$	6.0 10	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above $25^\circ\text{C}$	$P_D$	250 2.0	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +150	$^\circ\text{C}$

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.5	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	$T_L$	275	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

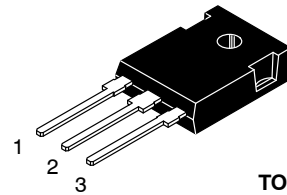
1. Pulse Test: Pulse Width = 5  $\mu\text{s}$ , Duty Cycle  $\leq 10\%$ .



**ON Semiconductor**<sup>®</sup>

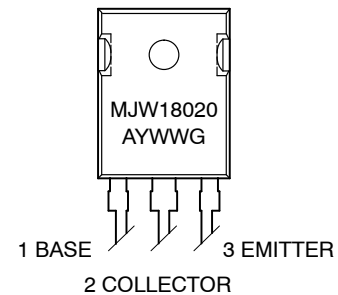
<http://onsemi.com>

**30 AMPERES**  
**1000 VOLTS  $BV_{CES}$**   
**450 VOLTS  $BV_{CEO}$ , 250 WATTS**



TO-247  
CASE 340L

### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
MJW18020	TO-247	30 Units/Rail
MJW18020G	TO-247 (Pb-Free)	30 Units/Rail

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

# MJW18020

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector-Emitter Sustaining Voltage (I <sub>C</sub> = 100 mA <sub>dc</sub> , I <sub>B</sub> = 0)	V <sub>CEO(sus)</sub>	450	–	–	V <sub>dc</sub>
Collector Cutoff Current (V <sub>CE</sub> = Rated V <sub>CEO</sub> , I <sub>B</sub> = 0)	I <sub>CEO</sub>	–	–	100	μA <sub>dc</sub>
Collector Cutoff Current (V <sub>CE</sub> = Rated V <sub>CES</sub> , V <sub>EB</sub> = 0) (T <sub>C</sub> = 125°C)	I <sub>CES</sub>	–	–	100 500	μA <sub>dc</sub>
Emitter Cutoff Current (V <sub>CE</sub> = 9 V <sub>dc</sub> , I <sub>C</sub> = 0)	I <sub>EBO</sub>	–	–	100	μA <sub>dc</sub>

## ON CHARACTERISTICS

DC Current Gain (I <sub>C</sub> = 3 A <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> )  (I <sub>C</sub> = 10 A <sub>dc</sub> , V <sub>CE</sub> = 2 V <sub>dc</sub> )  (I <sub>C</sub> = 20 A <sub>dc</sub> , V <sub>CE</sub> = 2 V <sub>dc</sub> )  (I <sub>C</sub> = 10 mA <sub>dc</sub> , V <sub>CE</sub> = 5 V <sub>dc</sub> )	(T <sub>C</sub> = 125°C)	h <sub>FE</sub>	14 – 8 5 5.5 4 14	30 – 16 14 9 7 25	34 – – – – – –	
	(T <sub>C</sub> = 125°C)					
	(T <sub>C</sub> = 125°C)					
	(T <sub>C</sub> = 125°C)					
	(T <sub>C</sub> = 125°C)					
Base-Emitter Saturation Voltage (I <sub>C</sub> = 10 A <sub>dc</sub> , I <sub>B</sub> = 2 A <sub>dc</sub> ) (I <sub>C</sub> = 20 A <sub>dc</sub> , I <sub>B</sub> = 4 A <sub>dc</sub> )	V <sub>BE(sat)</sub>	–	0.97 1.15	1.25 1.5	V <sub>dc</sub>	
Collector-Emitter Saturation Voltage (I <sub>C</sub> = 10 A <sub>dc</sub> , I <sub>B</sub> = 2 A <sub>dc</sub> )  (I <sub>C</sub> = 20 A <sub>dc</sub> , I <sub>B</sub> = 4 A <sub>dc</sub> )	V <sub>CE(sat)</sub>	– – – –	0.2 0.3 0.5 0.9	0.6 – 1.5 2.0	V <sub>dc</sub>	(T <sub>C</sub> = 125°C) (T <sub>C</sub> = 125°C)

## DYNAMIC CHARACTERISTICS

Current Gain Bandwidth Product (I <sub>C</sub> = 1 A <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , f <sub>test</sub> = 1 MHz)	f <sub>T</sub>	–	13	–	MHz
Output Capacitance (V <sub>CB</sub> = 10 V <sub>dc</sub> , I <sub>E</sub> = 0, f <sub>test</sub> = 1 MHz)	C <sub>ob</sub>	–	300	500	pF
Input Capacitance (V <sub>EB</sub> = 8.0)	C <sub>ib</sub>	–	7000	9000	pF

## SWITCHING CHARACTERISTICS: Resistive Load (D.C. = 10%, Pulse Width = 70 μs)

Turn-On Time	(I <sub>C</sub> = 10 A <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = 2 A <sub>dc</sub> , V <sub>CC</sub> = 125 V)	t <sub>On</sub>	–	540	750	ns
Storage Time		t <sub>s</sub>	–	4.75	6	μs
Fall Time		t <sub>f</sub>	–	380	500	ns
Turn-Off Time		t <sub>Off</sub>	–	5.2	6.5	μs
Turn-On Time	(I <sub>C</sub> = 20 A <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = 4 A <sub>dc</sub> , V <sub>CC</sub> = 125 V)	t <sub>On</sub>	–	965	1200	ns
Storage Time		t <sub>s</sub>	–	2.9	3.5	μs
Fall Time		t <sub>f</sub>	–	350	500	ns
Turn-Off Time		t <sub>Off</sub>	–	3.25	4	μs

## SWITCHING CHARACTERISTICS: Inductive Load (V<sub>clamp</sub> = 300 V, V<sub>CC</sub> = 15 V, L = 200 μH)

Fall Time	(I <sub>C</sub> = 10 A <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = 2 A <sub>dc</sub> )	t <sub>fi</sub>	–	142	250	ns
Storage Time		t <sub>si</sub>	–	4.75	6	μs
Crossover Time		t <sub>c</sub>	–	320	500	ns
Fall Time	(I <sub>C</sub> = 20 A <sub>dc</sub> , I <sub>B1</sub> = I <sub>B2</sub> = 4 A <sub>dc</sub> )	t <sub>fi</sub>	–	350	500	ns
Storage Time		t <sub>si</sub>	–	3.0	3.5	μs
Crossover Time		t <sub>c</sub>	–	500	750	ns

TYPICAL CHARACTERISTICS

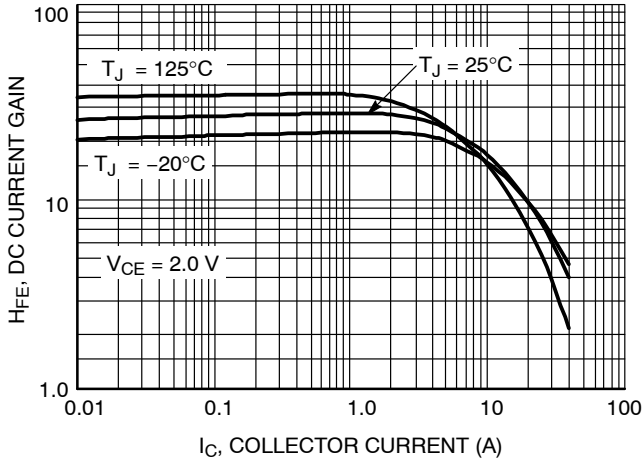


Figure 1. DC Current Gain,  $V_{CE} = 2.0\text{ V}$

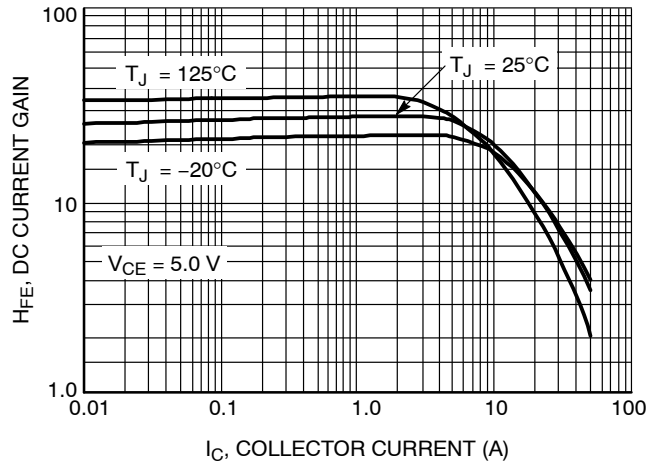


Figure 2. DC Current Gain,  $V_{CE} = 5.0\text{ V}$

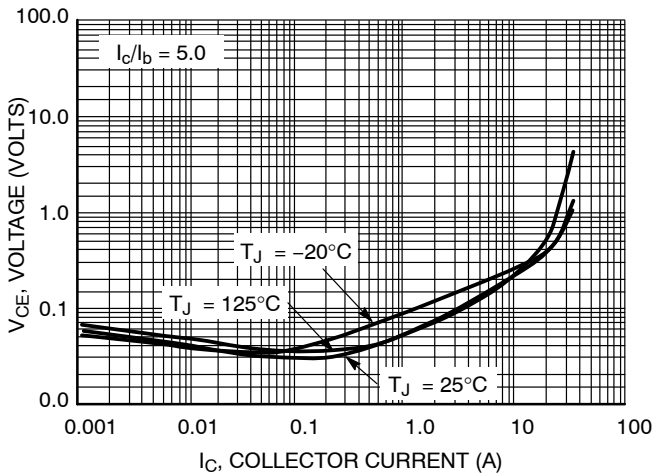


Figure 3. Typical Collector-Emitter Saturation Voltage,  $I_C/I_B = 5.0$

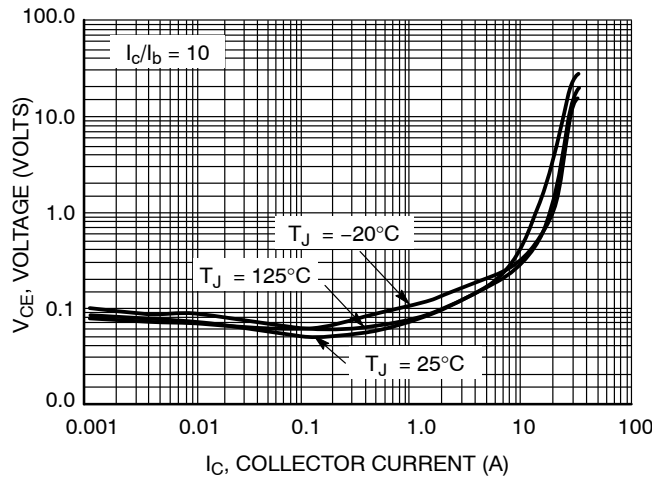


Figure 4. Typical Collector-Emitter Saturation Voltage,  $I_C/I_B = 10$

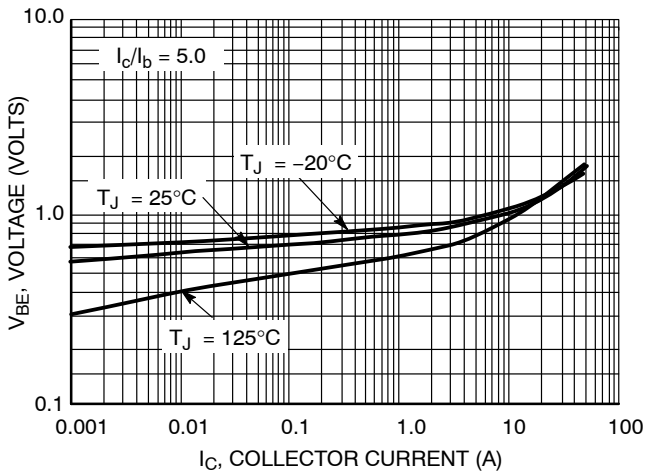


Figure 5. Typical Base-Emitter Saturation Voltage,  $I_C/I_B = 5.0$

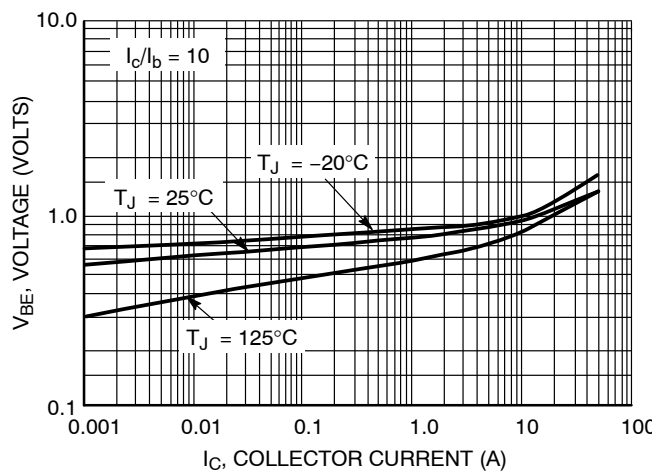


Figure 6. Typical Base-Emitter Saturation Voltage,  $I_C/I_B = 10$

TYPICAL CHARACTERISTICS

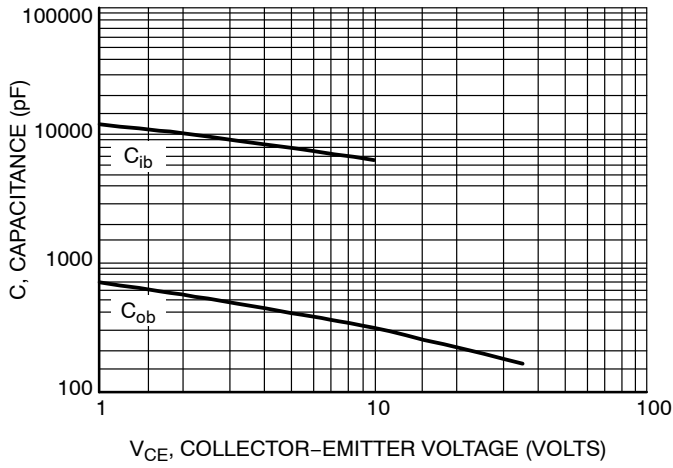


Figure 7. Typical Capacitance

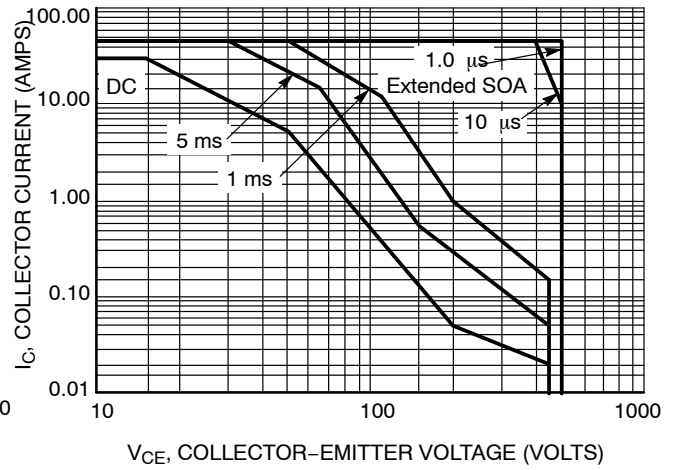


Figure 8. Forward Bias Safe Operating Area

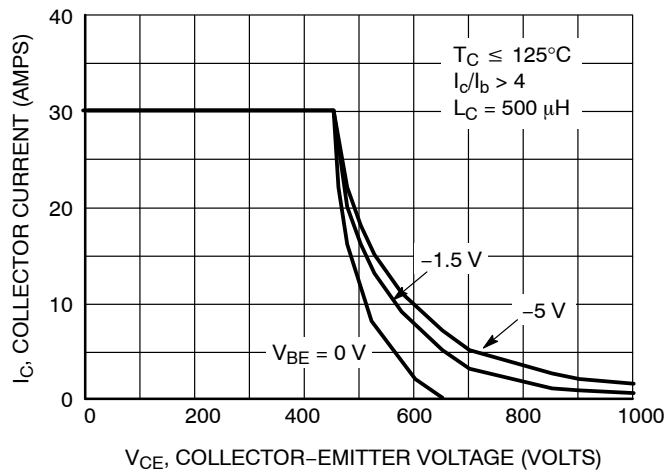
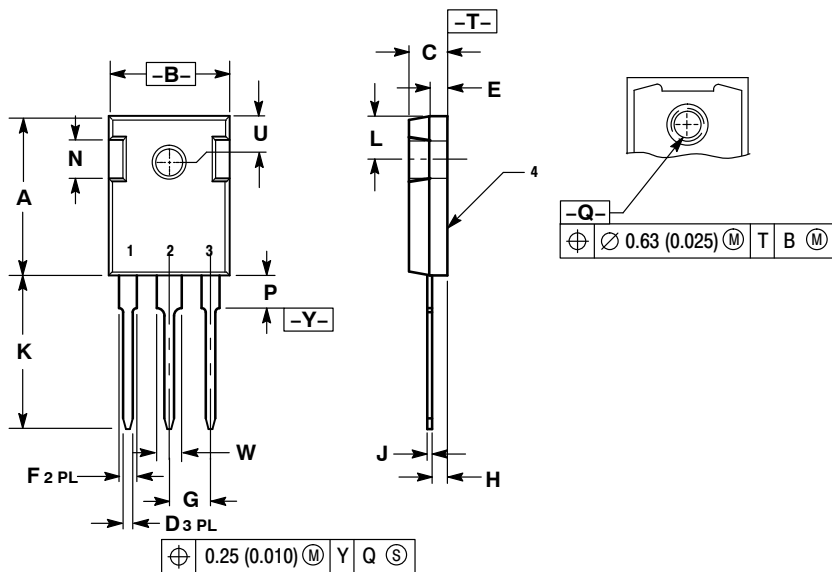


Figure 9. Reverse Bias Safe Operating Area

# MJW18020

## PACKAGE DIMENSIONS

TO-247  
CASE 340L-02  
ISSUE E



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	20.32	21.08	0.800	0.830
B	15.75	16.26	0.620	0.640
C	4.70	5.30	0.185	0.209
D	1.00	1.40	0.040	0.055
E	1.90	2.60	0.075	0.102
F	1.65	2.13	0.065	0.084
G	5.45 BSC		0.215 BSC	
H	1.50	2.49	0.059	0.098
J	0.40	0.80	0.016	0.031
K	19.81	20.83	0.780	0.820
L	5.40	6.20	0.212	0.244
N	4.32	5.49	0.170	0.216
P	---	4.50	---	0.177
Q	3.55	3.65	0.140	0.144
U	6.15 BSC		0.242 BSC	
W	2.87	3.12	0.113	0.123

ON Semiconductor and are registered trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

### PUBLICATION ORDERING INFORMATION

**LITERATURE FULFILLMENT:**  
Literature Distribution Center for ON Semiconductor  
P.O. Box 5163, Denver, Colorado 80217 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** orderlit@onsemi.com

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada  
**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local Sales Representative

## Looking for pricing, stock, or lifecycle information?

Click below to explore more details on WIN SOURCE:

 [View MJW18020G](#) on WIN SOURCE

 [ON Semiconductor](#) Information

## Optimize Your Supply Chain with WIN SOURCE Solutions

-  Global Sourcing Solution
-  Obsolete Management
-  Cost Control Management
-  Shortage Management
-  Alternative Solution
-  Excess Inventory Management