

# MJW18020

Preferred Devices

## 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.

Main features include:

- High and Excellent Gain Linearity
- Fast and Very Tight Switching Times Parameters  $t_{sj}$  and  $t_{fi}$
- Very Stable Leakage Current due to the Planar Structure
- High Reliability

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Sustaining Voltage	$V_{CEO}$	450	Vdc
Collector-Base 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	Watts 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	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	50	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes: 1/8" from Case for 5 Seconds	$T_L$	275	$^\circ\text{C}$

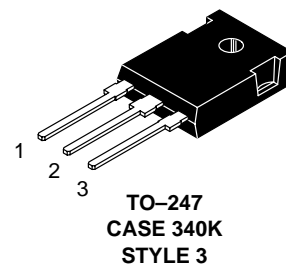
1. Pulse Test: Pulse Width = 5  $\mu\text{s}$ , Duty Cycle  $\leq 10\%$ .



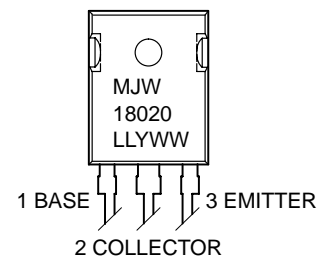
ON Semiconductor™

<http://onsemi.com>

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



### MARKING DIAGRAM



MJW18020= Device Code  
LL = Location Code  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

Device	Package	Shipping
MJW18020	TO-247	30 Units/Rail

Preferred devices are recommended choices for future use and best overall value.

# 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, I <sub>B</sub> = 0)	V <sub>CEO(sus)</sub>	450	–	–	Vdc
Collector Cutoff Current (V <sub>CE</sub> = Rated V <sub>CEO</sub> , I <sub>B</sub> = 0)	I <sub>CEO</sub>	–	–	100	μAdc
Collector Cutoff Current (V <sub>CE</sub> = Rated V <sub>CE(s)</sub> , V <sub>EB</sub> = 0) (T <sub>C</sub> = 125°C)	I <sub>CES</sub>	–	–	100 500	μAdc
Emitter Cutoff Current (V <sub>CE</sub> = 9 Vdc, I <sub>C</sub> = 0)	I <sub>EBO</sub>	–	–	100	μAdc

## ON CHARACTERISTICS

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

## DYNAMIC CHARACTERISTICS

Current Gain Bandwidth Product (I <sub>C</sub> = 1 Adc, V <sub>CE</sub> = 10 Vdc, f <sub>test</sub> = 1 MHz)	f <sub>T</sub>	–	13	–	MHz
Output Capacitance (V <sub>CB</sub> = 10 Vdc, 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 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 2 Adc, 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 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 4 Adc, 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 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 2 Adc)	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 Adc, I <sub>B1</sub> = I <sub>B2</sub> = 4 Adc)	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

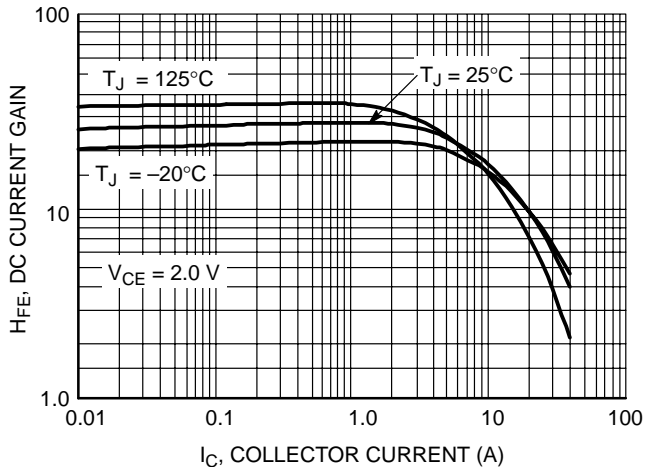


Figure 1. DC Current Gain,  $V_{CE} = 2.0\text{ V}$

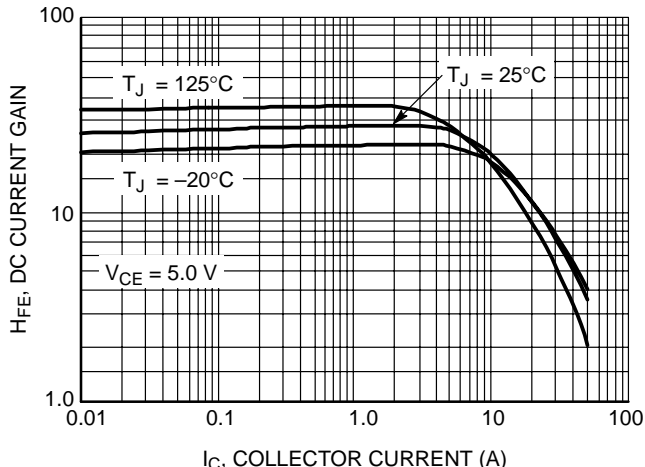


Figure 2. DC Current Gain,  $V_{CE} = 5.0\text{ V}$

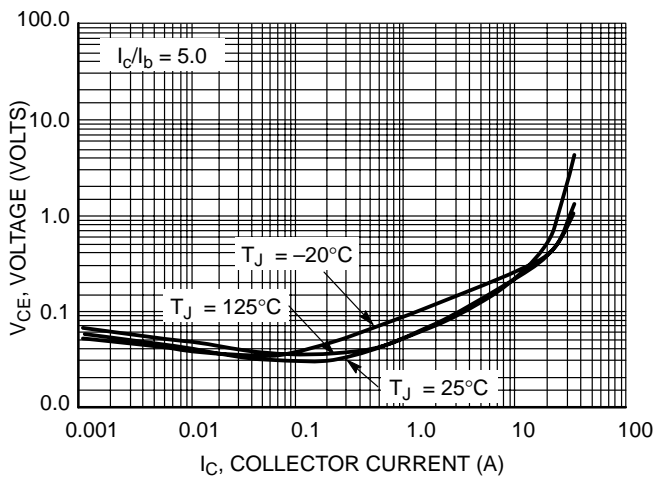


Figure 3. Typical Collector-Emitter Saturation Voltage,  $I_C/I_B = 5.0$

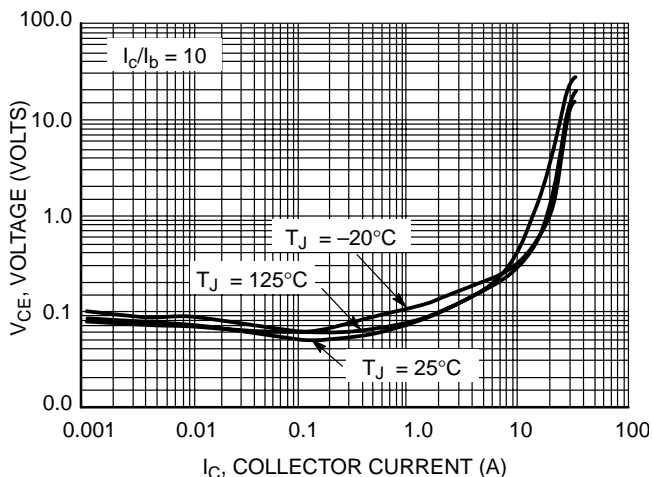


Figure 4. Typical Collector-Emitter Saturation Voltage,  $I_C/I_B = 10$

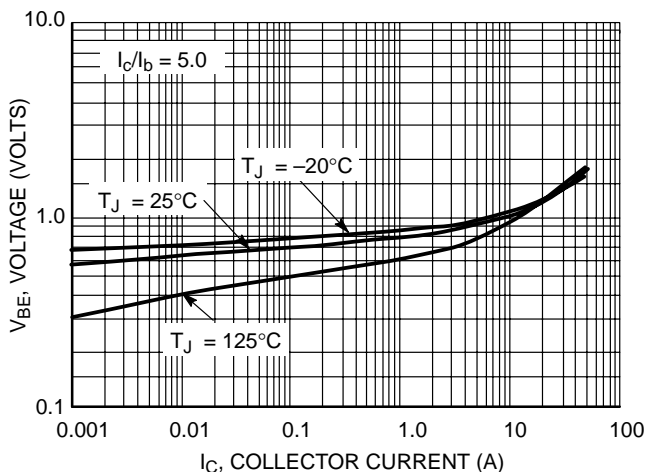


Figure 5. Typical Base-Emitter Saturation Voltage,  $I_C/I_B = 5.0$

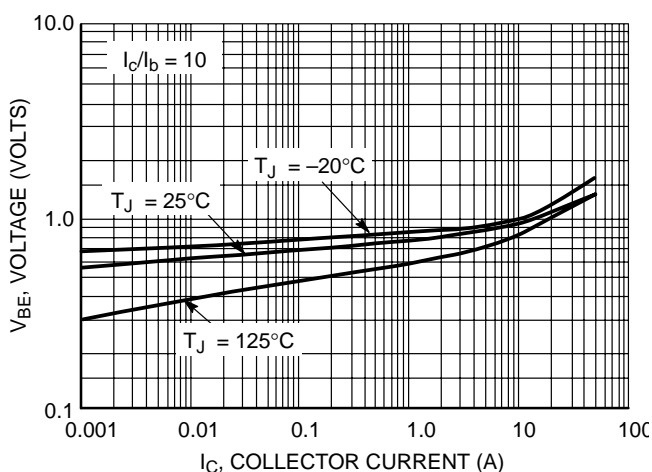


Figure 6. Typical Base-Emitter Saturation Voltage,  $I_C/I_B = 10$

TYPICAL CHARACTERISTICS

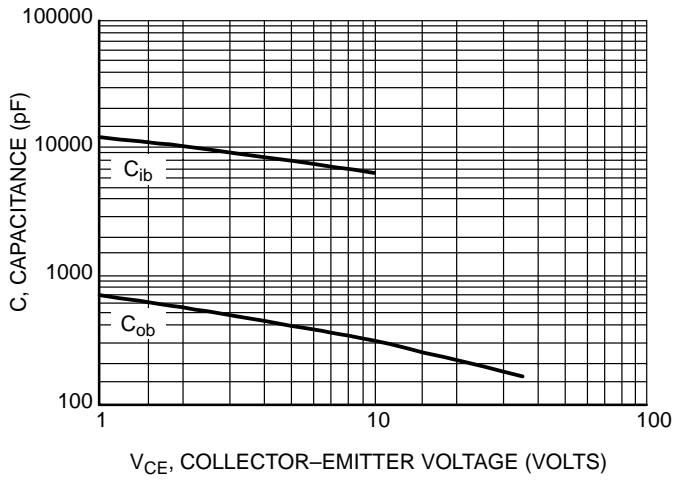


Figure 7. Typical Capacitance

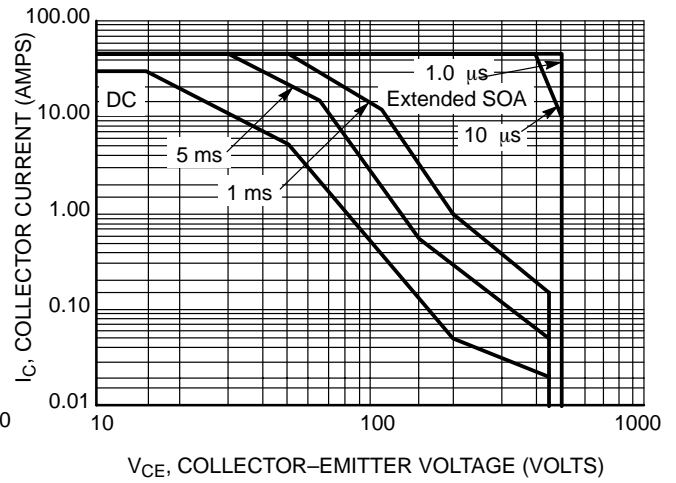


Figure 8. Forward Bias Safe Operating Area

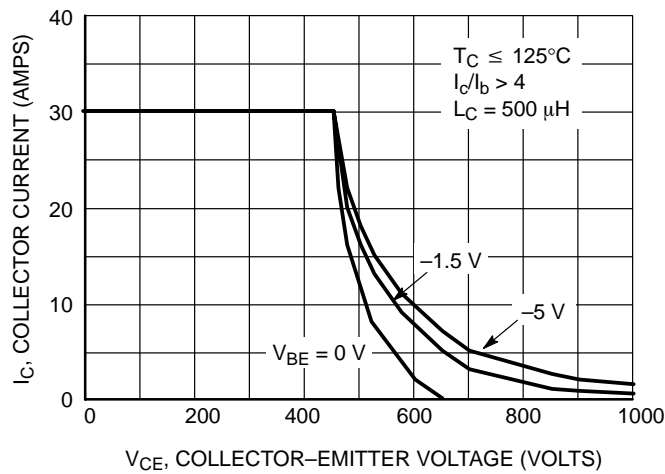
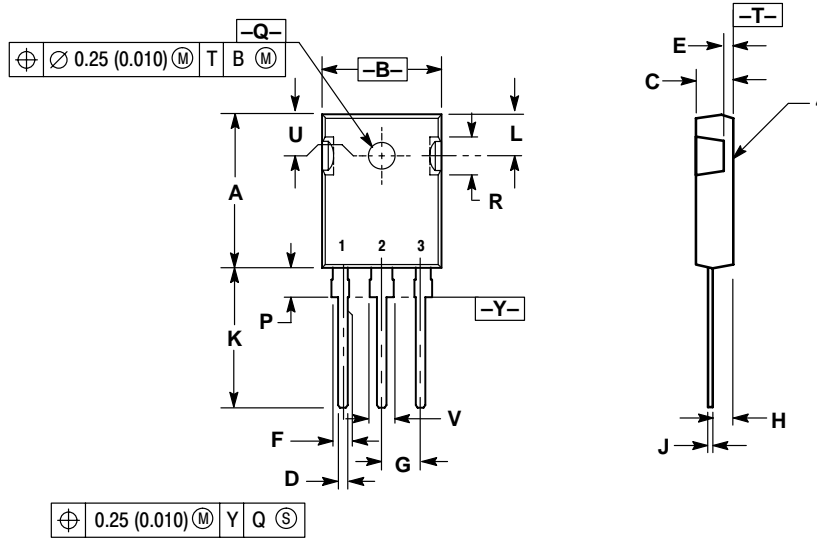


Figure 9. Reverse Bias Safe Operating Area

# MJW18020

## PACKAGE DIMENSIONS

TO-247  
CASE 340K-01  
ISSUE C



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

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	19.7	20.3	0.776	0.799
B	15.3	15.9	0.602	0.626
C	4.7	5.3	0.185	0.209
D	1.0	1.4	0.039	0.055
E	1.27 REF		0.050 REF	
F	2.0	2.4	0.079	0.094
G	5.5 BSC		0.216 BSC	
H	2.2	2.6	0.087	0.102
J	0.4	0.8	0.016	0.031
K	14.2	14.8	0.559	0.583
L	5.5 NOM		0.217 NOM	
P	3.7	4.3	0.146	0.169
Q	3.55	3.65	0.140	0.144
R	5.0 NOM		0.197 NOM	
U	5.5 BSC		0.217 BSC	
V	3.0	3.4	0.118	0.134

- STYLE 3:  
PIN 1: BASE  
2: COLLECTOR  
3: EMITTER  
4: COLLECTOR

**Notes**

**Notes**

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