

Complementary NPN-PNP Silicon Power Bipolar Transistors

MJW3281A (NPN) MJW1302A (PNP)

The MJW3281A and MJW1302A are PowerBase power transistors for high power audio, disk head positioners and other linear applications.

Features

- Designed for 100 W Audio Frequency
- Gain Complementary:
Gain Linearity from 100 mA to 7 A
 $h_{FE} = 45$ (Min) @ $I_C = 8$ A
- Low Harmonic Distortion
- High Safe Operation Area – 1 A/100 V @ 1 Second
- High f_T – 30 MHz Typical
- Pb-Free Packages are Available*

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	230	Vdc
Collector-Base Voltage	V_{CBO}	230	Vdc
Emitter-Base Voltage	V_{EBO}	5.0	Vdc
Collector-Emitter Voltage – 1.5 V	V_{CEX}	230	Vdc
Collector Current – Continuous – Peak (Note 1)	I_C	15 25	Adc
Base Current – Continuous	I_B	1.5	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C	P_D	200 1.43	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +150	$^\circ\text{C}$

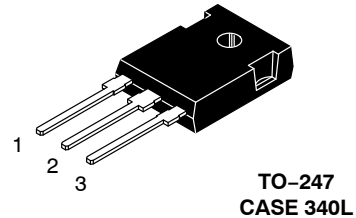
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.625	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	40	$^\circ\text{C/W}$

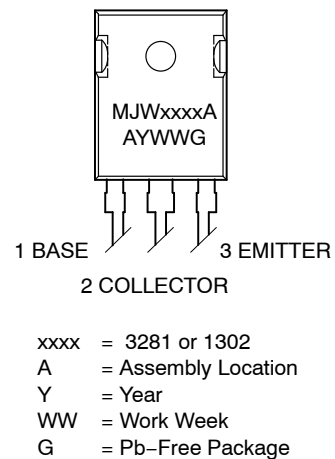
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

15 AMPERES
COMPLEMENTARY
SILICON POWER TRANSISTORS
230 VOLTS 200 WATTS



MARKING DIAGRAM



ORDERING INFORMATION

Device	Package	Shipping
MJW3281A	TO-247	30 Units/Rail
MJW3281AG	TO-247 (Pb-Free)	30 Units/Rail
MJW1302A	TO-247	30 Units/Rail
MJW1302AG	TO-247 (Pb-Free)	30 Units/Rail

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

MJW3281A (NPN) MJW1302A (PNP)

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

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ($I_C = 100\text{ mA}$, $I_B = 0$)	$V_{CEO(sus)}$	230	–	–	Vdc
Collector Cutoff Current ($V_{CB} = 230\text{ Vdc}$, $I_E = 0$)	I_{CBO}	–	–	50	μA
Emitter Cutoff Current ($V_{EB} = 5\text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	–	5	μA

SECOND BREAKDOWN

Second Breakdown Collector with Base Forward Biased ($V_{CE} = 50\text{ Vdc}$, $t = 1\text{ s}$ (non-repetitive)) ($V_{CE} = 100\text{ Vdc}$, $t = 1\text{ s}$ (non-repetitive))	$I_{S/b}$	4 1	– –	– –	Adc
--	-----------	--------	--------	--------	-----

ON CHARACTERISTICS

DC Current Gain ($I_C = 100\text{ mA}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 1\text{ A}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 3\text{ A}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 5\text{ A}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 7\text{ A}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 8\text{ A}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 15\text{ A}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	50 50 50 50 50 45 12	125 – – – 115 – 35	200 200 200 200 200 – –	–
Collector–Emitter Saturation Voltage ($I_C = 10\text{ A}$, $I_B = 1\text{ A}$)	$V_{CE(sat)}$	–	0.4	2	Vdc
Base–Emitter On Voltage ($I_C = 8\text{ A}$, $V_{CE} = 5\text{ Vdc}$)	$V_{BE(on)}$	–	–	2	Vdc

DYNAMIC CHARACTERISTICS

Current–Gain – Bandwidth Product ($I_C = 1\text{ A}$, $V_{CE} = 5\text{ Vdc}$, $f_{test} = 1\text{ MHz}$)	f_T	–	30	–	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f_{test} = 1\text{ MHz}$)	C_{ob}	–	–	600	pF

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

MJW3281A (NPN) MJW1302A (PNP)

PNP MJW1302A

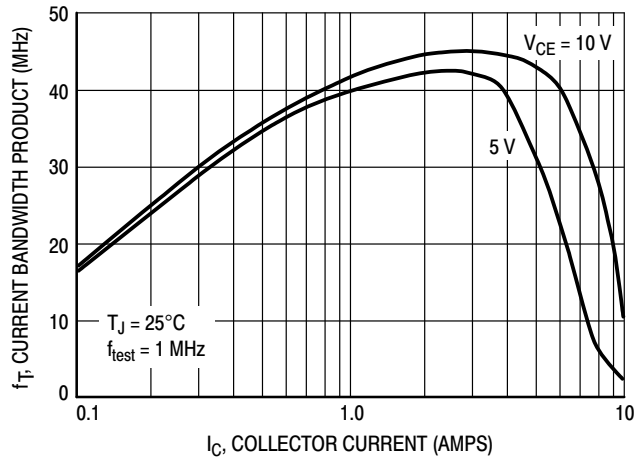


Figure 1. Typical Current Gain Bandwidth Product

NPN MJW3281A

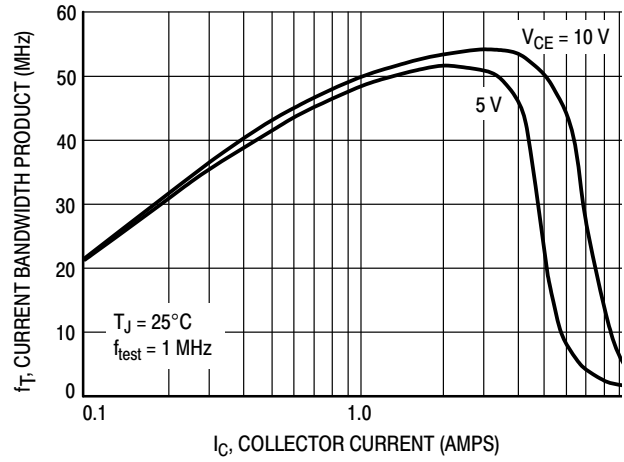


Figure 2. Typical Current Gain Bandwidth Product

PNP MJW1302A

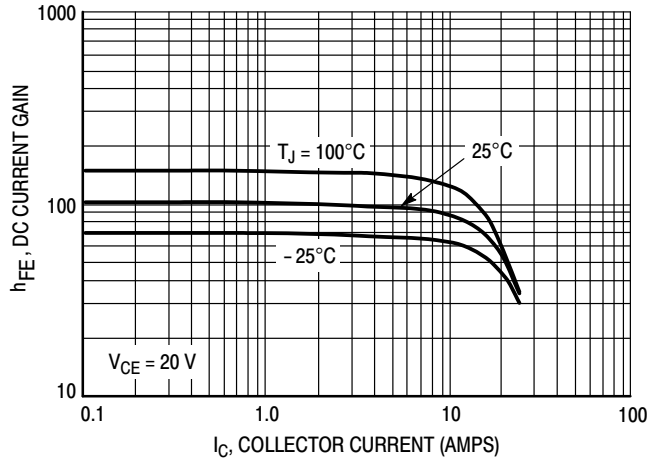


Figure 3. DC Current Gain, $V_{CE} = 20\text{ V}$

NPN MJW3281A

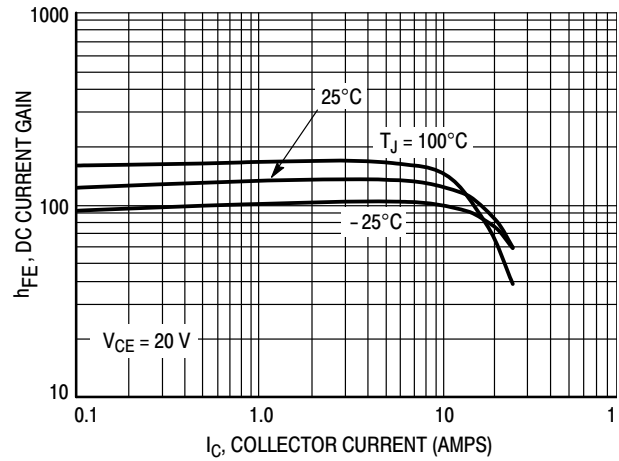


Figure 4. DC Current Gain, $V_{CE} = 20\text{ V}$

PNP MJW1302A

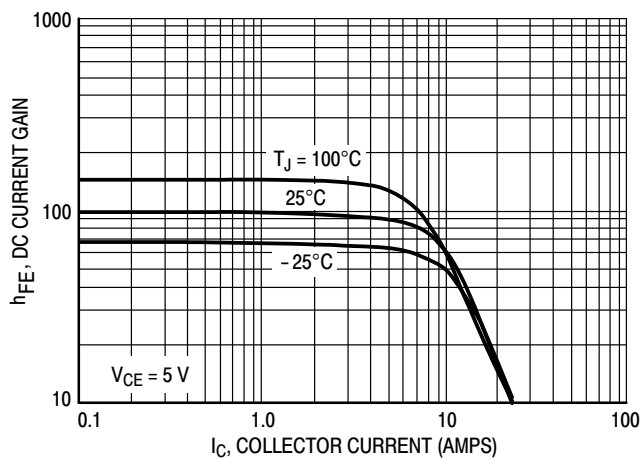


Figure 5. DC Current Gain, $V_{CE} = 5\text{ V}$

NPN MJW3281A

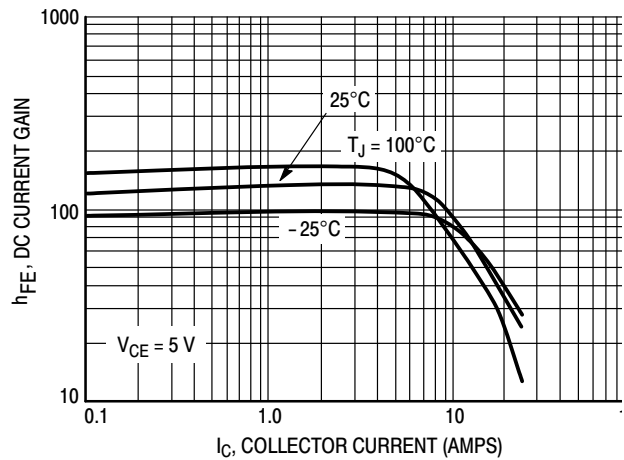


Figure 6. DC Current Gain, $V_{CE} = 5\text{ V}$

MJW3281A (NPN) MJW1302A (PNP)

TYPICAL CHARACTERISTICS

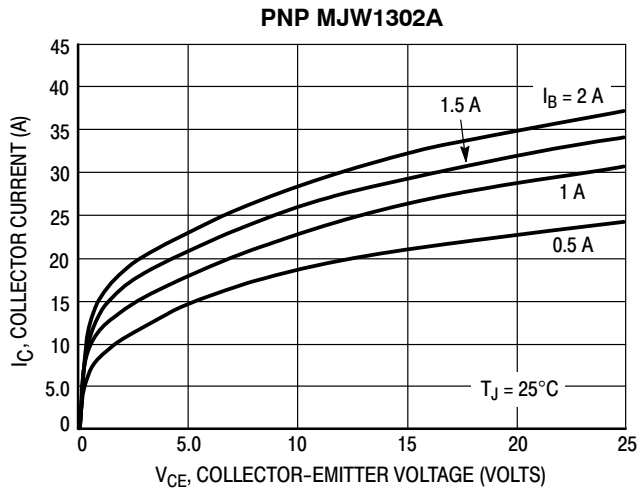


Figure 7. Typical Output Characteristics

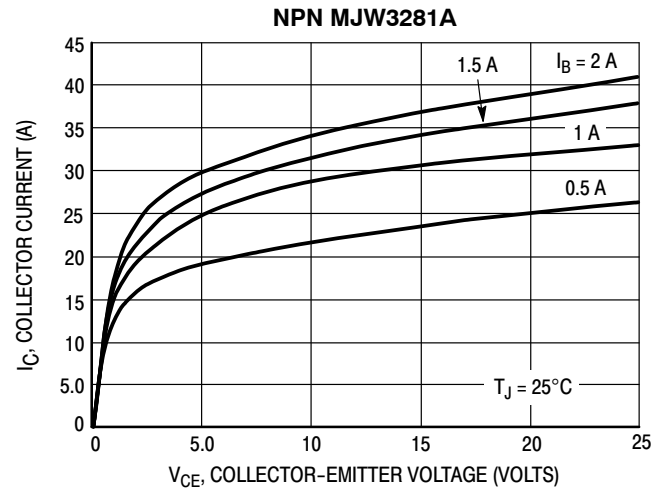


Figure 8. Typical Output Characteristics

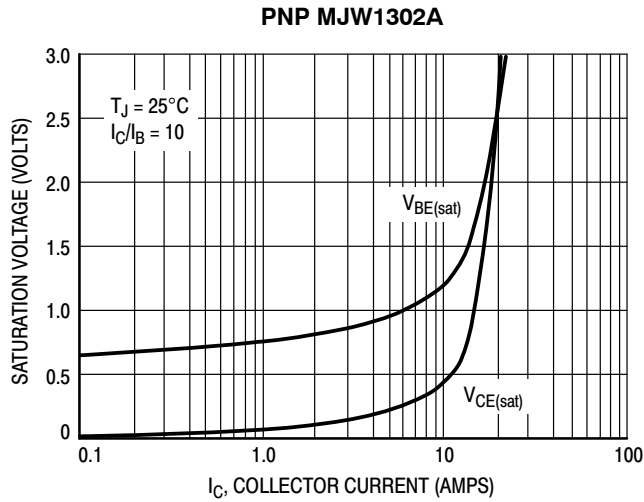


Figure 9. Typical Saturation Voltages

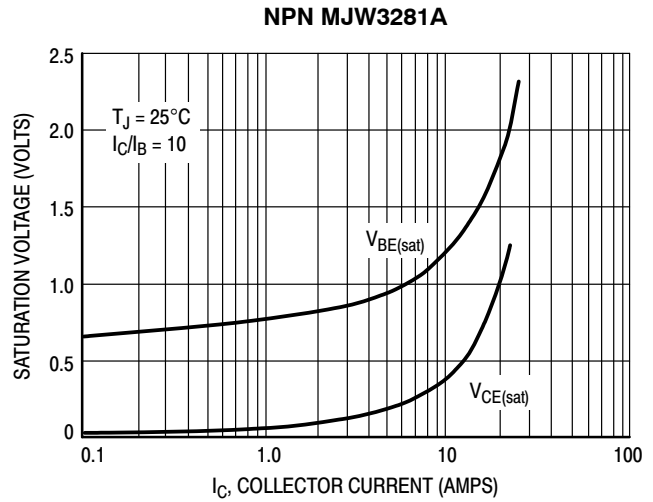


Figure 10. Typical Saturation Voltages

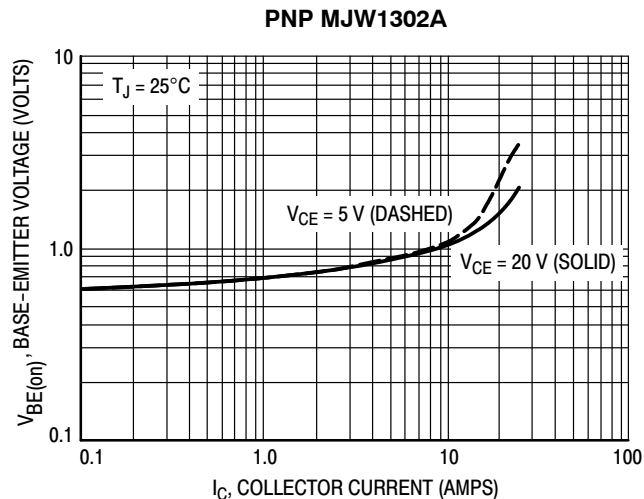


Figure 11. Typical Base-Emitter Voltage

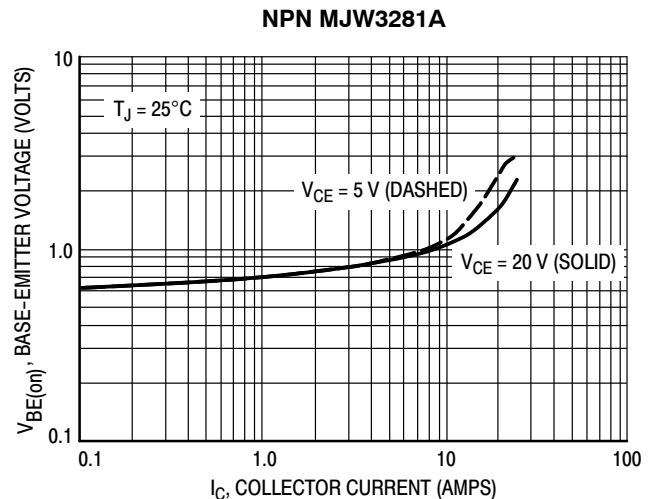


Figure 12. Typical Base-Emitter Voltage

MJW3281A (NPN) MJW1302A (PNP)

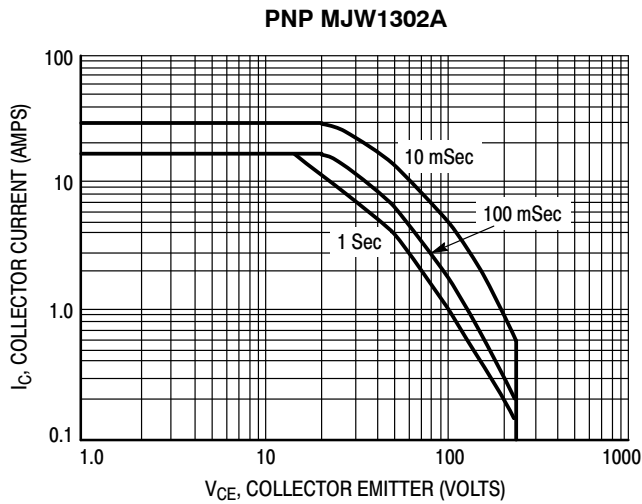


Figure 13. Active Region Safe Operating Area

There are two limitations on the power handling ability of a transistor; average junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

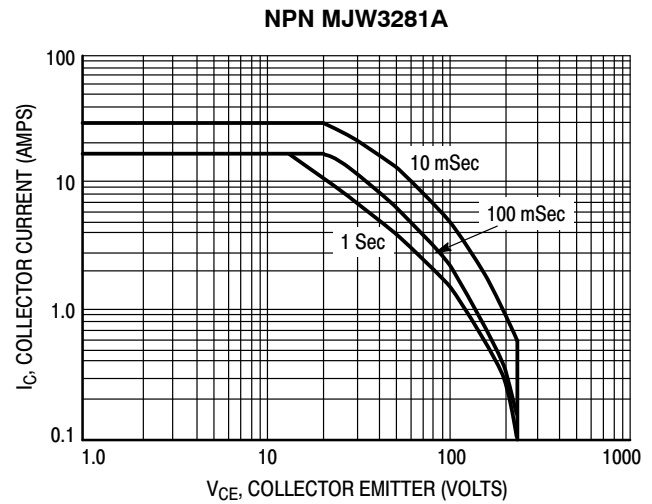


Figure 14. Active Region Safe Operating Area

The data of Figures 13 and 14 is based on $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

TYPICAL CHARACTERISTICS

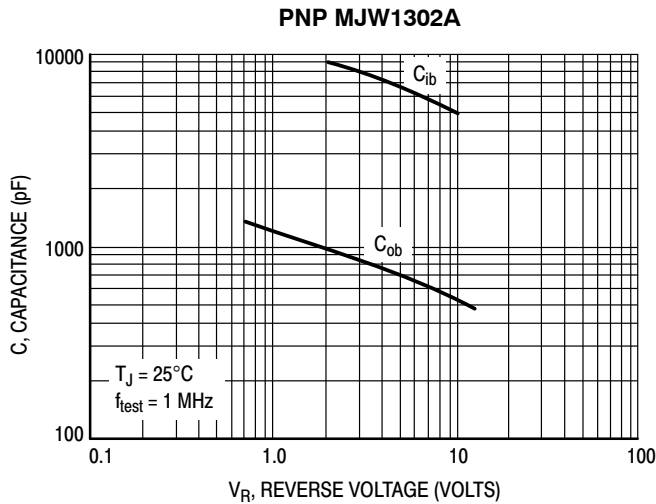


Figure 15. MJW1302A Typical Capacitance

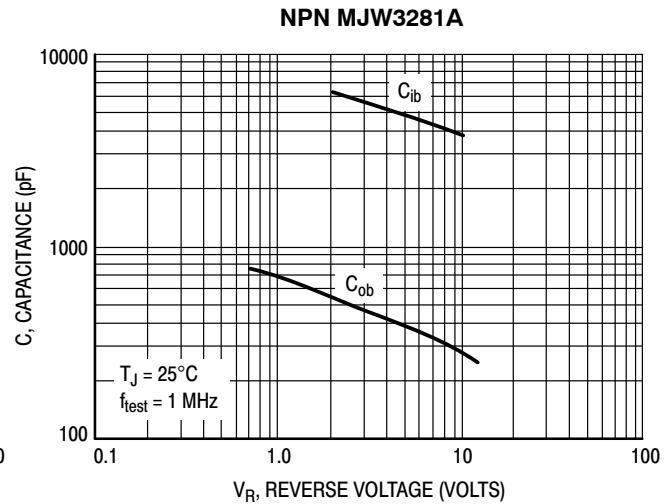
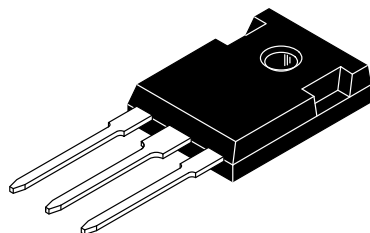


Figure 16. MJW3281A Typical Capacitance



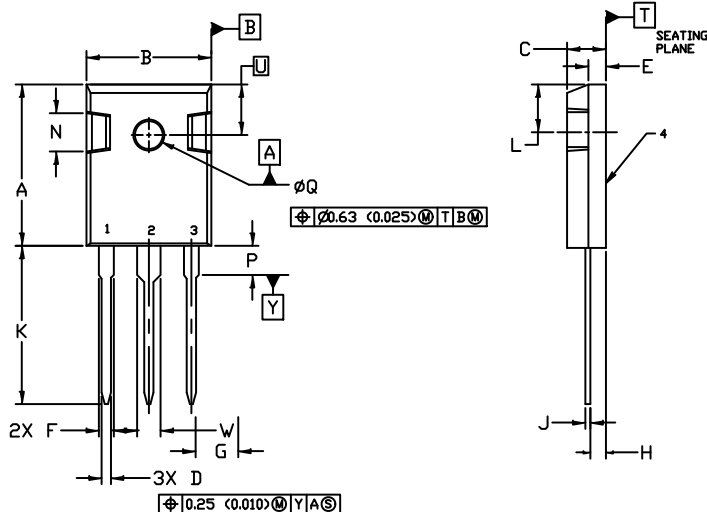
SCALE 1:1

TO-247
CASE 340L
ISSUE G

DATE 06 OCT 2021

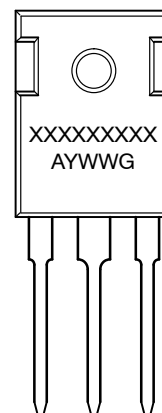
NOTES:

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



	MILLIMETERS		INCHES	
DIM	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

GENERIC MARKING DIAGRAM*



STYLE 1:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 2:
PIN 1. ANODE
2. CATHODE (S)
3. ANODE 2
4. CATHODES (S)

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

STYLE 4:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 5:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

STYLE 6:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

XXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "•", may or may not be present. Some products may not follow the Generic Marking.

DOCUMENT NUMBER:	98ASB15080C	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-247	PAGE 1 OF 1

onsemi and **onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** 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. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** 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. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** 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. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** 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 **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales