

Complementary Silicon Plastic Power Transistors

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

Designed for use in general purpose amplifier and switching applications.

Features

- Epoxy Meets UL 94 V-0 @ 0.125 in
- These Devices are Pb-Free and are RoHS Compliant*

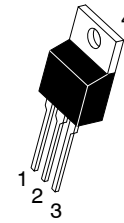
MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V_{CEO}	Collector-Emitter Voltage TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	40 60 80 100	Vdc
V_{CB}	Collector-Base Voltage TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	40 60 80 100	Vdc
V_{EB}	Emitter-Base Voltage	5.0	Vdc
I_C	Collector Current – Continuous	6.0	Adc
I_{CM}	Collector Current – Peak	10	Adc
I_B	Base Current	2.0	Adc
P_D	Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	65 0.52	W W/ $^\circ\text{C}$
P_D	Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above 25°C	2.0 0.016	W W/ $^\circ\text{C}$
E	Unclamped Inductive Load Energy (Note 1)	62.5	mJ
T_J, T_{stg}	Operating and Storage Junction, Temperature Range	-65 to +150	$^\circ\text{C}$
HBM	ESD – Human Body Model	3B	V
MM	ESD – Machine Model	C	V

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.

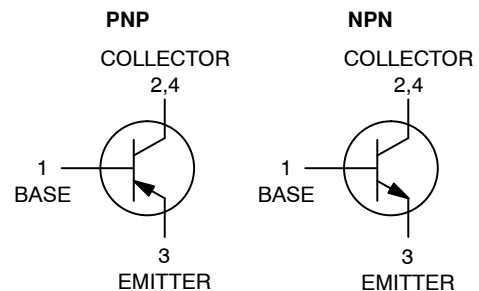
1. $I_C = 2.5\text{ A}$, $L = 20\text{ mH}$, P.R.F. = 10 Hz, $V_{CC} = 10\text{ V}$, $R_{BE} = 100\ \Omega$.

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

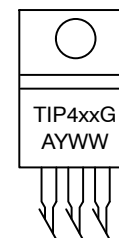


TO-220
CASE 221A
STYLE 1

6 AMPERE COMPLEMENTARY SILICON POWER TRANSISTORS 40-60-80-100 VOLTS, 65 WATTS



MARKING DIAGRAM



TIP4xx = Device Code
 xx = 1, 1A, 1B, 1C
 2, 2A, 2B, 2C
 A = Assembly Location
 Y = Year
 WW = Work Week
 G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 6.

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.67	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	57	$^{\circ}\text{C}/\text{W}$

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

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

OFF CHARACTERISTICS

40 60 80 100	Collector-Emitter Sustaining Voltage (Note 2) ($I_C = 30 \text{ mAdc}$, $I_B = 0$) TIP41G, TIP42G TIP41AG, TIP42AG TIP41BG, TIP42BG TIP41CG, TIP42CG	$V_{CEO(sus)}$	– – – –	Vdc
– –	Collector Cutoff Current ($V_{CE} = 30 \text{ Vdc}$, $I_B = 0$) TIP41G, TIP41AG, TIP42G, TIP42AG ($V_{CE} = 60 \text{ Vdc}$, $I_B = 0$) TIP41BG, TIP41CG, TIP42BG, TIP42CG	I_{CEO}	0.7 0.7	mAdc
– – – –	Collector Cutoff Current ($V_{CE} = 40 \text{ Vdc}$, $V_{EB} = 0$) TIP41G, TIP42G ($V_{CE} = 60 \text{ Vdc}$, $V_{EB} = 0$) TIP41AG, TIP42AG ($V_{CE} = 80 \text{ Vdc}$, $V_{EB} = 0$) TIP41BG, TIP42BG ($V_{CE} = 100 \text{ Vdc}$, $V_{EB} = 0$) TIP41CG, TIP42CG	I_{CES}	400 400 400 400	μAdc
–	Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	1.0	mAdc

ON CHARACTERISTICS (Note 2)

30 15	DC Current Gain ($I_C = 0.3 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$) ($I_C = 3.0 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$)	h_{FE}	– 75	–
–	Collector-Emitter Saturation Voltage ($I_C = 6.0 \text{ Adc}$, $I_B = 600 \text{ mAdc}$)	$V_{CE(sat)}$	1.5	Vdc
–	Base-Emitter On Voltage ($I_C = 6.0 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$)	$V_{BE(on)}$	2.0	Vdc

DYNAMIC CHARACTERISTICS

3.0	Current-Gain – Bandwidth Product ($I_C = 500 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$, $f_{test} = 1.0 \text{ MHz}$)	f_T	–	MHz
20	Small-Signal Current Gain ($I_C = 0.5 \text{ Adc}$, $V_{CE} = 10 \text{ Vdc}$, $f = 1.0 \text{ kHz}$)	h_{fe}	–	–

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.

2. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

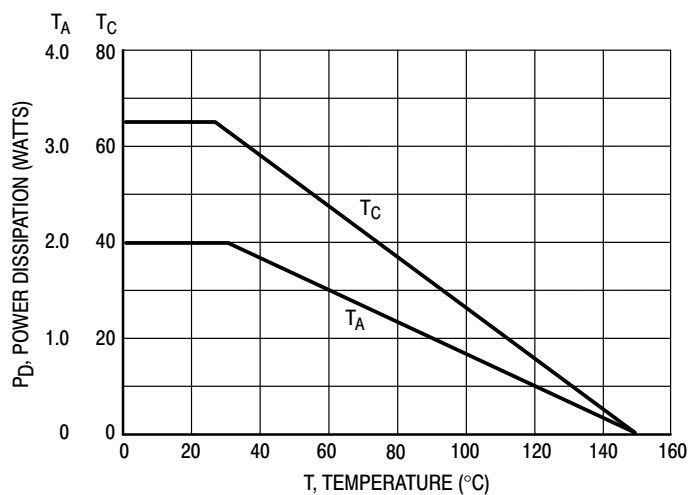
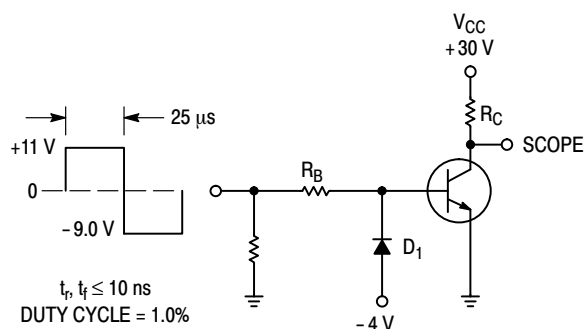


Figure 1. Power Derating



R_B and R_C VARIED TO OBTAIN DESIRED CURRENT LEVELS

D_1 MUST BE FAST RECOVERY TYPE, e.g.:

1N5825 USED ABOVE $I_B \approx 100$ mA

MSD6100 USED BELOW $I_B \approx 100$ mA

Figure 2. Switching Time Test Circuit

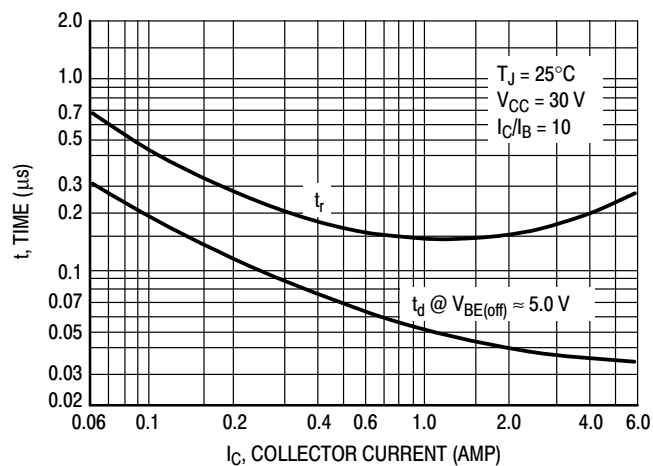


Figure 3. Turn-On Time

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

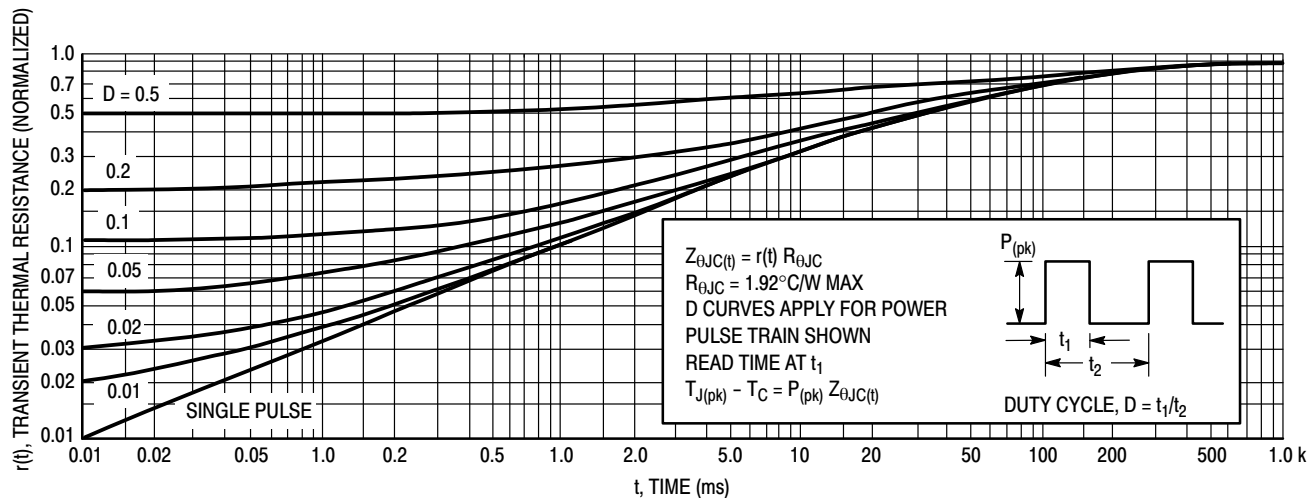


Figure 4. Thermal Response

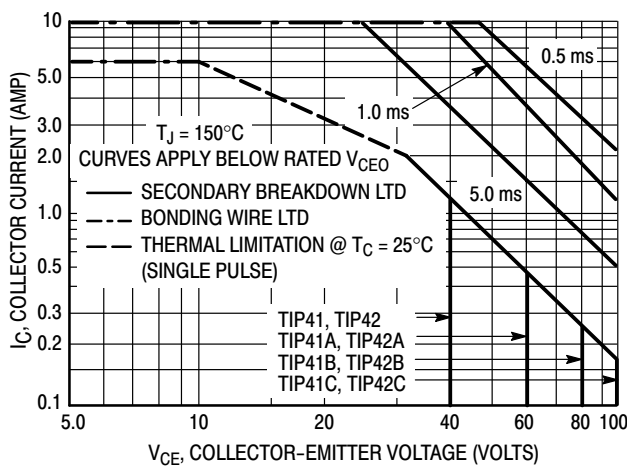


Figure 5. Active-Region Safe Operating Area

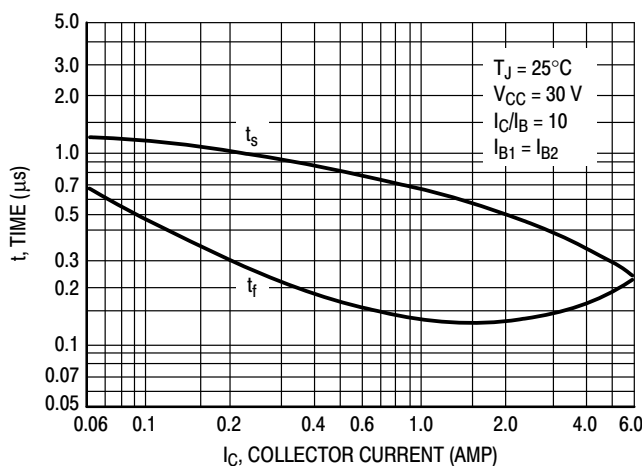


Figure 6. Turn-Off Time

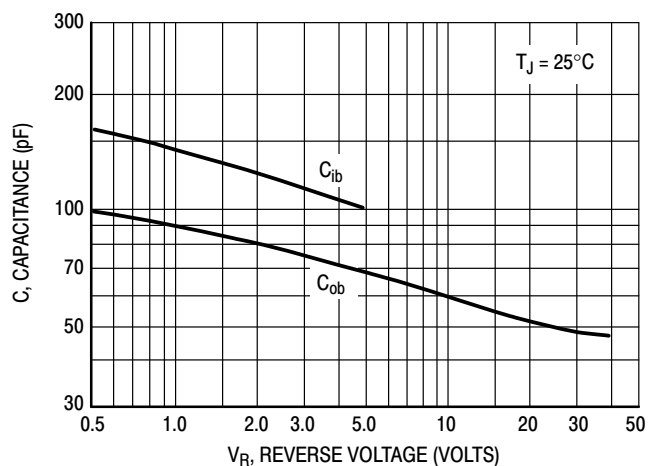


Figure 7. Capacitance

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

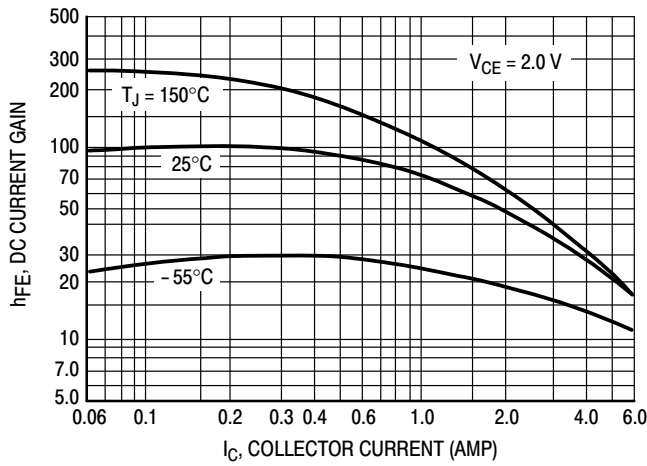


Figure 8. DC Current Gain

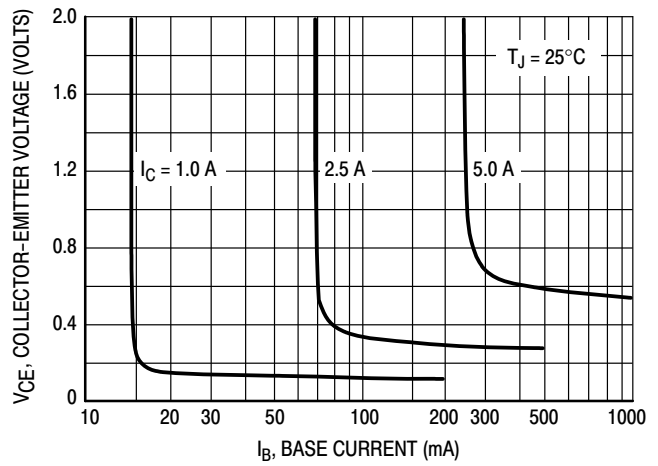


Figure 9. Collector Saturation Region

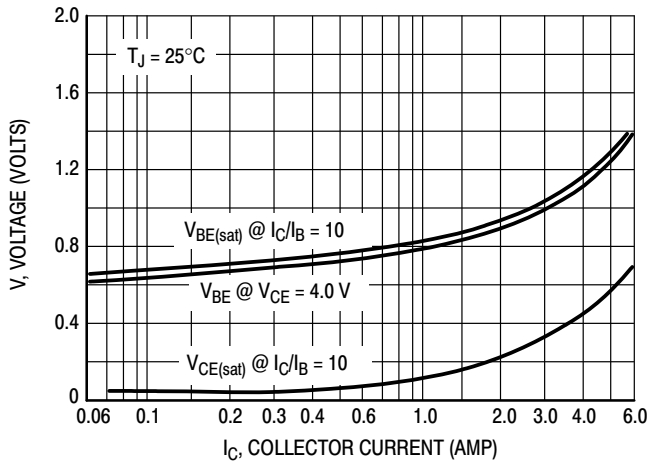


Figure 10. "On" Voltages

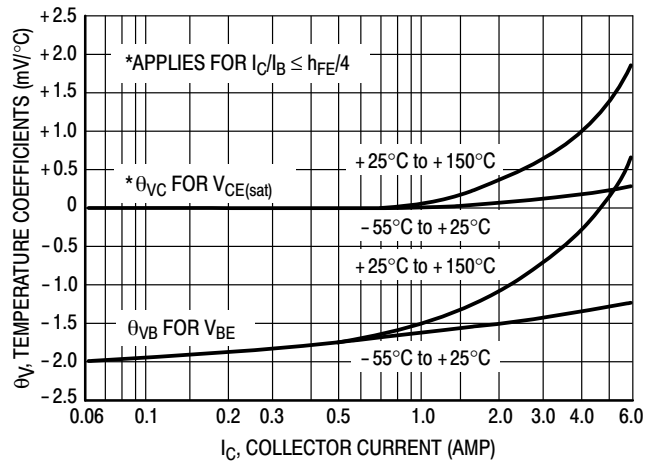


Figure 11. Temperature Coefficients

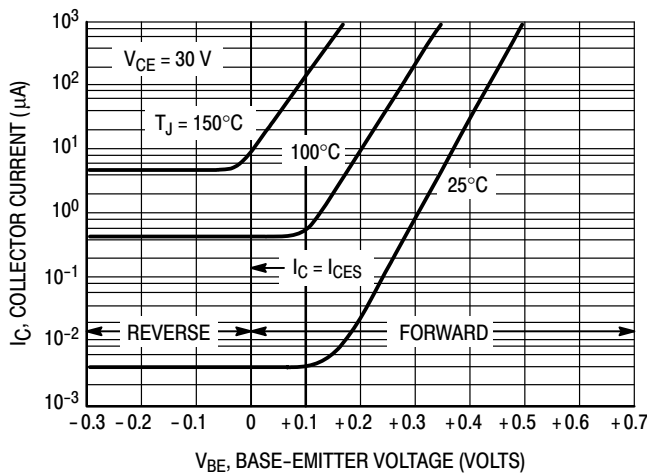


Figure 12. Collector Cut-Off Region

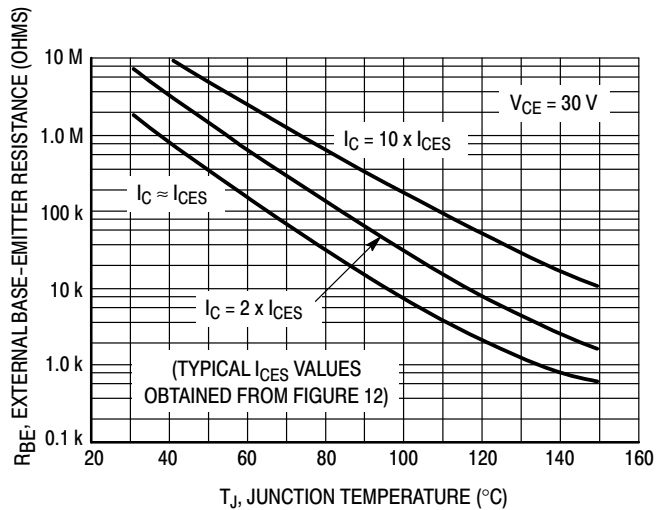


Figure 13. Effects of Base-Emitter Resistance

TIP41G, TIP41AG, TIP41BG, TIP41CG (NPN), TIP42G, TIP42AG, TIP42BG, TIP42CG (PNP)

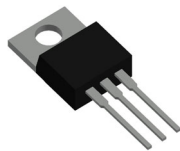
ORDERING INFORMATION

Device	Package	Shipping
TIP41BG	TO-220 (Pb-Free)	50 Units / Rail
TIP41CG	TO-220 (Pb-Free)	50 Units / Rail
TIP42AG	TO-220 (Pb-Free)	50 Units / Rail
TIP42CG	TO-220 (Pb-Free)	50 Units / Rail

DISCONTINUED (Note 3)

TIP41G	TO-220 (Pb-Free)	50 Units / Rail
TIP41AG	TO-220 (Pb-Free)	50 Units / Rail
TIP42G	TO-220 (Pb-Free)	50 Units / Rail
TIP42BG	TO-220 (Pb-Free)	50 Units / Rail

3. **DISCONTINUED:** These devices are not recommended for new design. Please contact your **onsemi** representative for information. The most current information on these devices may be available on www.onsemi.com.


TO-220-3 10.10x15.12x4.45, 2.54P

CASE 221A

ISSUE AL

DATE 05 FEB 2025



MILLIMETERS			
DIM	MIN	NOM	MAX
A	4.07	4.45	4.83
A1	1.15	1.28	1.41
A2	2.04	2.42	2.79
b	1.15	1.34	1.52
b1	0.64	0.80	0.96
c	0.36	0.49	0.61
D	9.66	10.10	10.53
D1	8.43	8.63	8.83
E	14.48	15.12	15.75
E1	12.58	12.78	12.98
E2	1.27 REF		

MILLIMETERS			
DIM	MIN	NOM	MAX
e	2.42	2.54	2.66
e1	4.83	5.08	5.33
H1	5.97	6.22	6.47
L	12.70	13.49	14.27
L1	2.80	3.45	4.10
Q	2.54	2.79	3.04
ϕP	3.60	3.85	4.09
Z	---	---	3.48

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

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

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

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

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

STYLE 5:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

STYLE 6:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

STYLE 7:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. ANODE

STYLE 8:
PIN 1. CATHODE
2. ANODE
3. EXTERNAL TRIP/DELAY
4. ANODE

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

STYLE 10:
PIN 1. GATE
2. SOURCE
3. DRAIN
4. SOURCE

STYLE 11:
PIN 1. DRAIN
2. SOURCE
3. GATE
4. SOURCE

STYLE 12:
PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. NOT CONNECTED

DOCUMENT NUMBER: 98ASB42148B

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-220-3 10.10x15.12x4.45, 2.54P

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