2N6034G, 2N6035G, 2N6036G (PNP), 2N6038G, 2N6039G (NPN)

Plastic Darlington Complementary Silicon Power Transistors

Plastic Darlington complementary silicon power transistors are designed for general purpose amplifier and low−speed switching applications.

Features

- ESD Ratings: Machine Model, C; > 400 V
  Human Body Model, 3B; > 8000 V
- Epoxy Meets UL 94 V−0 @ 0.125 in
- These Devices are Pb−Free and are RoHS Compliant*

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector−Emitter Voltage 2N6034G 2N6035G, 2N6038G 2N6036G, 2N6039G	V_{CEO}	 40 60 80	Vdc
Collector−Base Voltage 2N6034G 2N6035G, 2N6038G 2N6036G, 2N6039G	V_{CBO}	 40 60 80	Vdc
Emitter−Base Voltage	V_{EBO}	5.0	Vdc
Collector Current − Continuous	I_C	4.0	Adc
Collector Current − Peak	I_{CM}	8.0	Apk
Base Current	I_B	100	mAdc
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 40 320	 W mW/°C
Total Device Dissipation @ T_C = 25°C Derate above 25°C	P_D	 1.5 12	 W mW/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−65 to +150	°C

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.

THERMAL CHARACTERISTICS

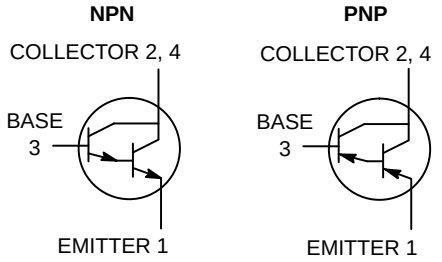
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	3.12	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	83.3	°C/W

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

ON Semiconductor®

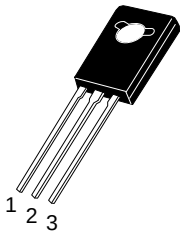
http://onsemi.com

4.0 AMPERES DARLINGTON COMPLEMENTARY SILICON POWER TRANSISTORS 40, 60, 80 VOLTS, 40 WATTS



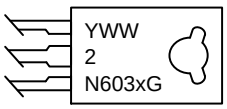
2N6038
2N6039

2N6034
2N6035
2N6036



TO−225
CASE 77−09
STYLE 1

MARKING DIAGRAM



Y = Year
WW = Work Week
2N603x = Device Code
x = 4, 5, 6, 8, 9
G = Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector−Emitter Sustaining Voltage (I_C = 100 mAdc, I_B = 0) 2N6034G 2N6035G, 2N6038G 2N6036G, 2N6039G	$V_{CEO(sus)}$	 40 60 80	 − − −	Vdc
Collector−Cutoff Current (V_{CE} = 40 Vdc, I_B = 0) 2N6034G (V_{CE} = 60 Vdc, I_B = 0) 2N6035G, 2N6038G (V_{CE} = 80 Vdc, I_B = 0) 2N6036G, 2N6039G	I_{CEO}	 − − −	 100 100 100	μA
Collector−Cutoff Current (V_{CE} = 40 Vdc, $V_{BE(off)}$ = 1.5 Vdc) 2N6034G (V_{CE} = 60 Vdc, $V_{BE(off)}$ = 1.5 Vdc) 2N6035G, 2N6038G (V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc) 2N6036G, 2N6039G (V_{CE} = 40 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C) 2N6034G (V_{CE} = 60 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C) 2N6035G, 2N6038G (V_{CE} = 80 Vdc, $V_{BE(off)}$ = 1.5 Vdc, T_C = 125°C) 2N6036G, 2N6039G	I_{CEX}	 − − − − − −	 100 100 100 500 500 500	μA
Collector−Cutoff Current (V_{CB} = 40 Vdc, I_E = 0) 2N6034G (V_{CB} = 60 Vdc, I_E = 0) 2N6035G, 2N6038G (V_{CB} = 80 Vdc, I_E = 0) 2N6036G, 2N6039G	I_{CBO}	 − − −	 0.5 0.5 0.5	mAdc
Emitter−Cutoff Current (V_{BE} = 5.0 Vdc, I_C = 0)	I_{EBO}	 −	 2.0	mAdc
ON CHARACTERISTICS				
DC Current Gain (I_C = 0.5 Adc, V_{CE} = 3.0 Vdc) (I_C = 2.0 Adc, V_{CE} = 3.0 Vdc) (I_C = 4.0 Adc, V_{CE} = 3.0 Vdc)	h_{FE}	 500 750 100	 − 15,000 −	−
Collector−Emitter Saturation Voltage (I_C = 2.0 Adc, I_B = 8.0 mAdc) (I_C = 4.0 Adc, I_B = 40 mAdc)	$V_{CE(sat)}$	 − −	 2.0 3.0	Vdc
Base−Emitter Saturation Voltage (I_C = 4.0 Adc, I_B = 40 mAdc)	$V_{BE(sat)}$	 −	 4.0	Vdc
Base−Emitter On Voltage (I_C = 2.0 Adc, V_{CE} = 3.0 Vdc)	$V_{BE(on)}$	 −	 2.8	Vdc
DYNAMIC CHARACTERISTICS				
Small−Signal Current−Gain (I_C = 0.75 Adc, V_{CE} = 10 Vdc, f = 1.0 MHz)	$\|h_{fe}\|$	25	−	−
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0, f = 0.1 MHz) 2N6034G, 2N6035G, 2N6036G 2N6038G, 2N6039G	C_{ob}	 − −	 200 100	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.
*Indicates JEDEC Registered Data.

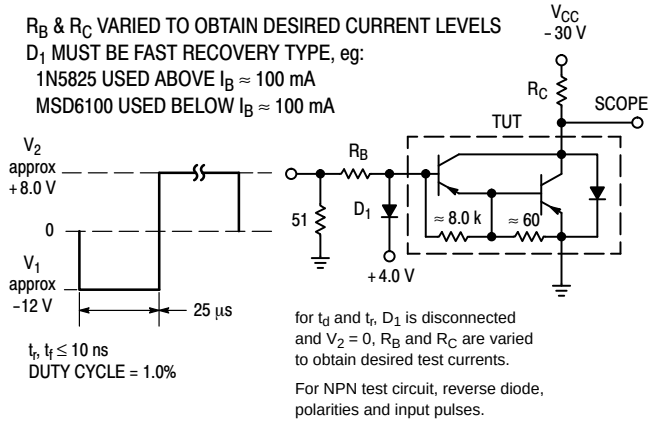


Figure 1. Switching Times Test Circuit

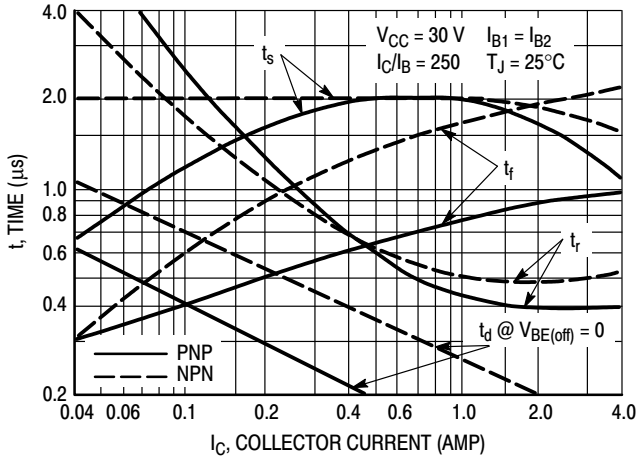


Figure 2. Switching Times

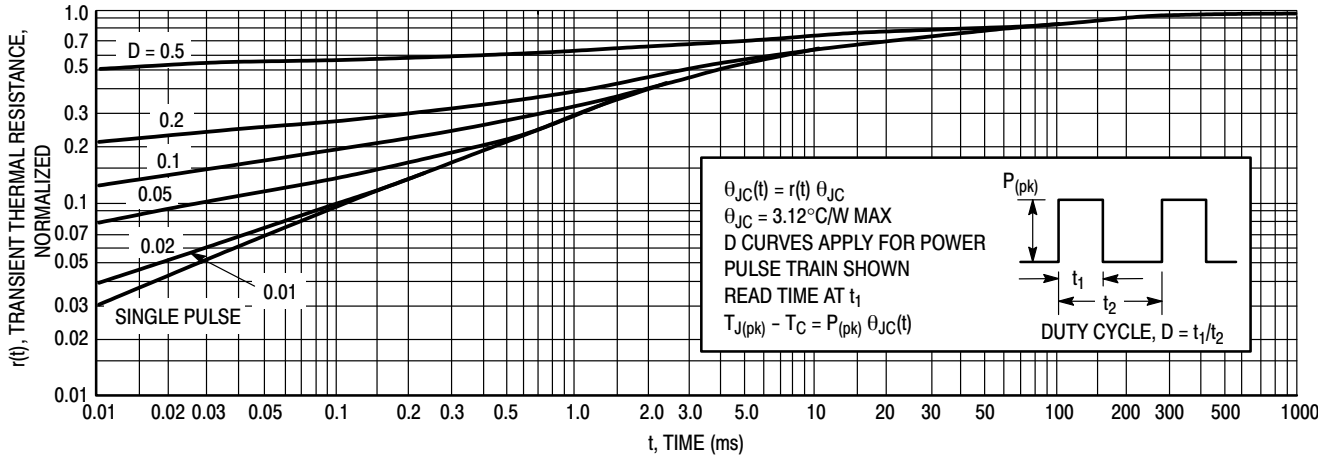


Figure 3. Thermal Response

ACTIVE−REGION SAFE−OPERATING AREA

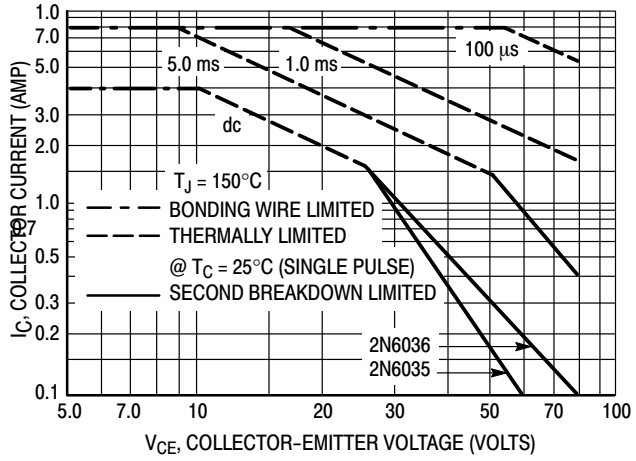


Figure 4. 2N6035, 2N6036

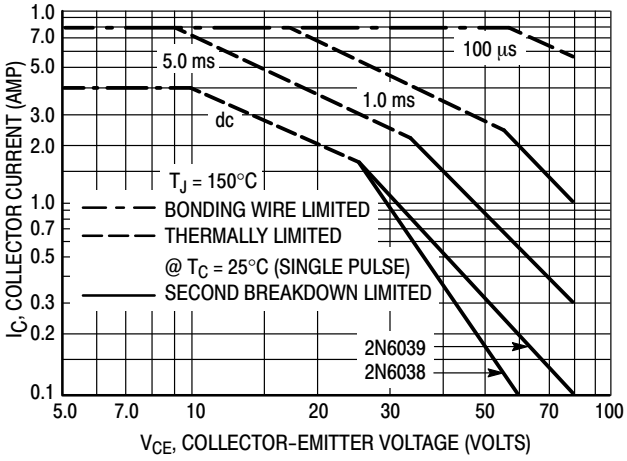


Figure 5. 2N6038, 2N6039

There are two limitations on the power handling ability of a transistor: average junction temperature and second 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.

The data of Figures 4 and 5 is based on $T_{J(pk)}$ = 150°C; T_C is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)}$ < 150°C. $T_{J(pk)}$ may be calculated from the data in Figure 3. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

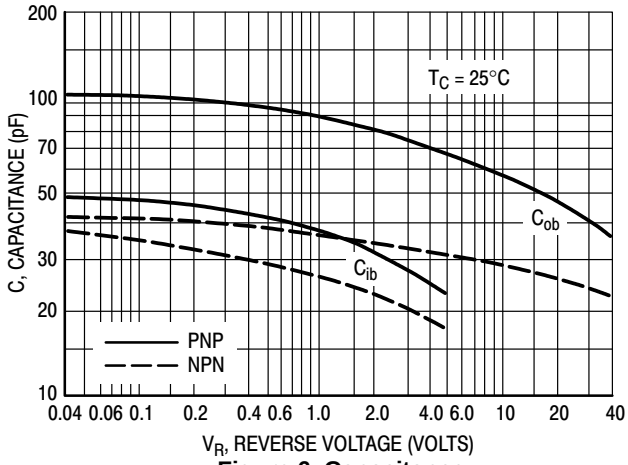


Figure 6. Capacitance

PNP
2N6034, 2N6035, 2N6036

NPN
2N6038, 2N6039

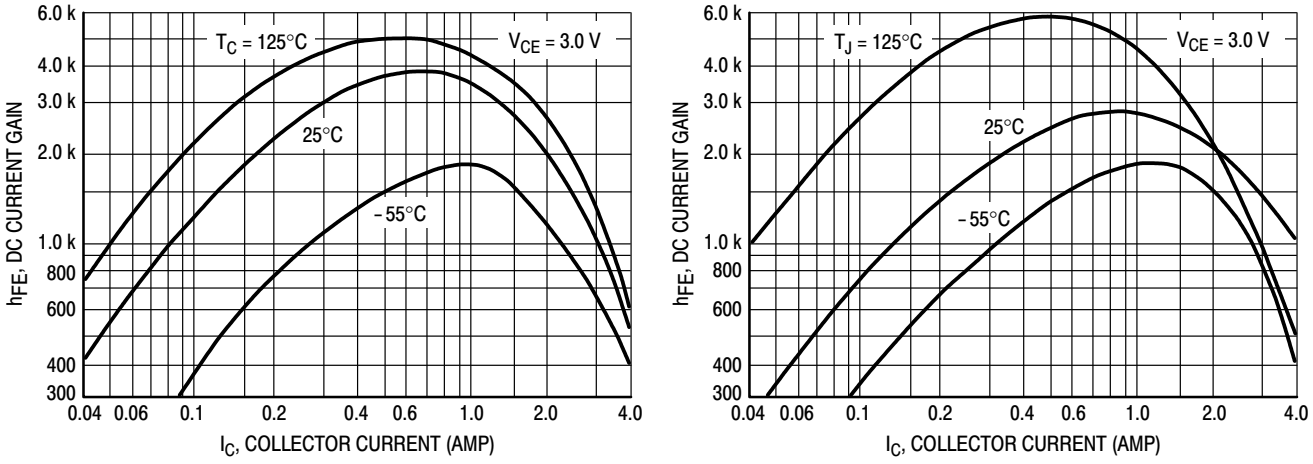


Figure 7. DC Current Gain

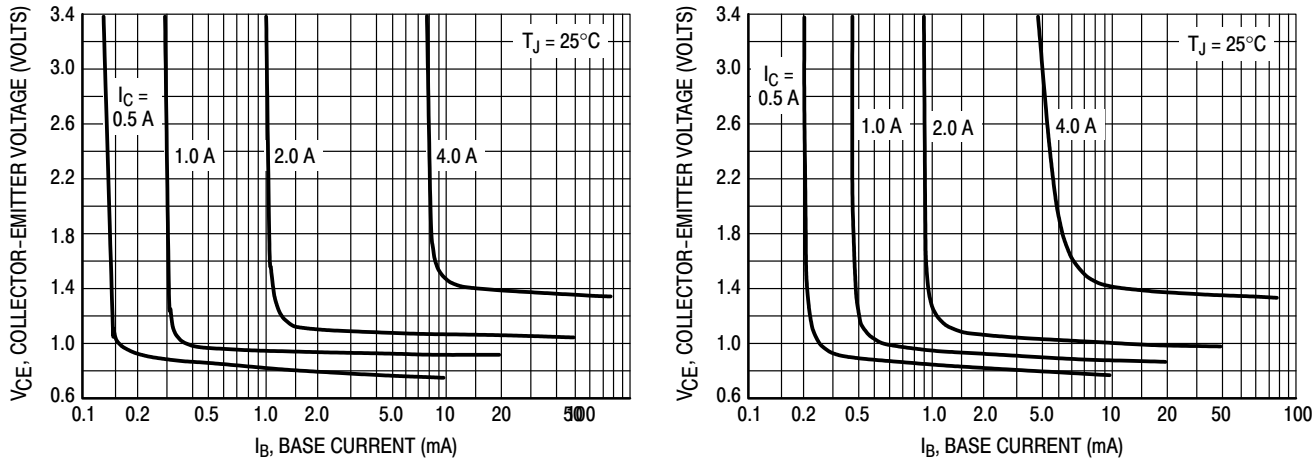


Figure 8. Collector Saturation Region

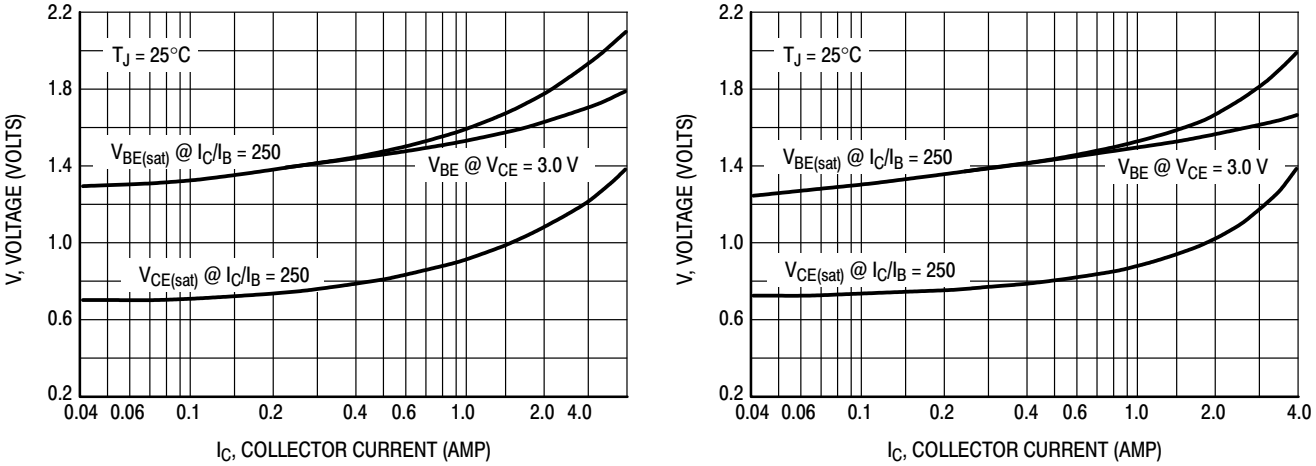


Figure 9. “On” Voltages

ORDERING INFORMATION

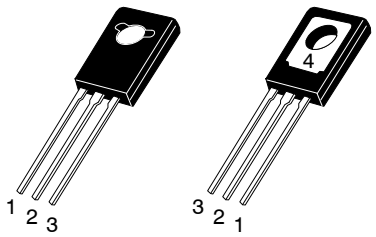
Device	Package	Shipping
2N6034G	TO−225 (Pb−Free)	500 Units / Box
2N6035G	TO−225 (Pb−Free)	500 Units / Box
2N6036G	TO−225 (Pb−Free)	500 Units / Box
2N6038G	TO−225 (Pb−Free)	500 Units / Box
2N6039G	TO−225 (Pb−Free)	500 Units / Box

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

ON Semiconductor®

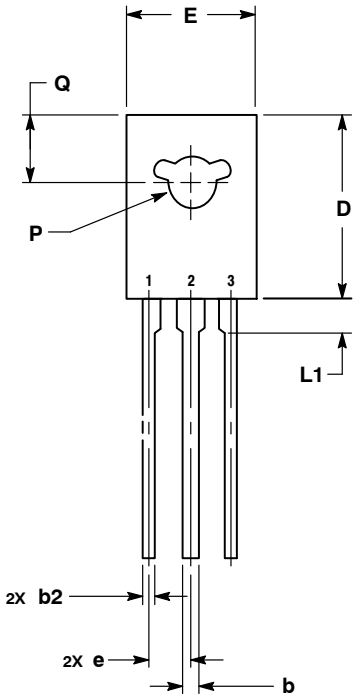
TO−225
CASE 77−09
ISSUE AD

DATE 25 MAR 2015

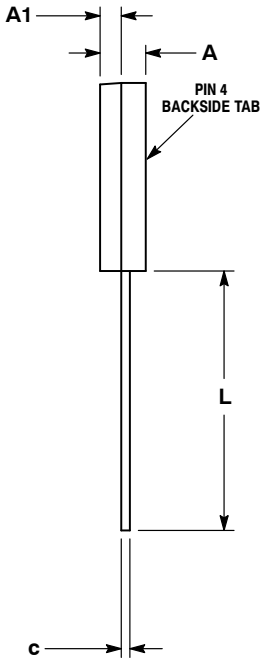


FRONT VIEW **BACK VIEW**

SCALE 1:1



FRONT VIEW

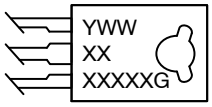


SIDE VIEW

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. NUMBER AND SHAPE OF LUGS OPTIONAL.

	MILLIMETERS	
DIM	MIN	MAX
A	2.40	3.00
A1	1.00	1.50
b	0.60	0.90
b2	0.51	0.88
c	0.39	0.63
D	10.60	11.10
E	7.40	7.80
e	2.04	2.54
L	14.50	16.63
L1	1.27	2.54
P	2.90	3.30
Q	3.80	4.20

GENERIC MARKING DIAGRAM*



Y = Year
WW = Work Week
XXXXX = Device Code
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.

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

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

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

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

STYLE 5:
PIN 1. MT 1
2., 4. MT 2
3. GATE

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

STYLE 7:
PIN 1. MT 1
2., 4. GATE
3. MT 2

STYLE 8:
PIN 1. SOURCE
2., 4. GATE
3. DRAIN

STYLE 9:
PIN 1. GATE
2., 4. DRAIN
3. SOURCE

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

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DESCRIPTION:	**TO−225**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

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