ON Semiconductor

Is Now

To learn more about onsemi™, please visit our website at
www.onsemi.com

MOSFET - N-Channel Shielded Gate PowerTrench®

150 V, 7.3 mΩ, 101 A

NTP7D3N15MC

ON Semiconductor®

www.onsemi.com

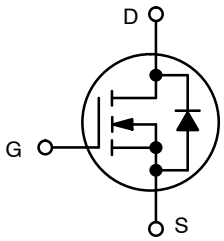
Features

- Shielded Gate MOSFET Technology
- Max $R_{DS(on)}$ = 7.3 mΩ at V_{GS} = 10 V, I_D = 62 A
- 50% Lower Qrr than other MOSFET Suppliers
- Lowers Switching Noise/EMI
- 100% UIL Tested
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Typical Applications

- Synchronous Rectification for ATX / Server / Telecom PSU
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
150 V	7.3 mΩ @ 10 V	101 A



N−CHANNEL MOSFET

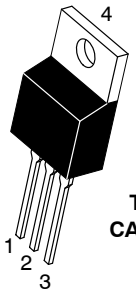
MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	150	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$ (Note 2)	Steady State	T_C = 25°C	I_D	101	A
Power Dissipation $R_{\theta JC}$ (Note 2)	Steady State	T_C = 25°C	P_D	166	W
Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	I_D	12.1	A
Power Dissipation $R_{\theta JA}$ (Notes 1, 2)	Steady State	T_A = 25°C	P_D	2.4	W
Pulsed Drain Current	T_C = 25°C, t_p = 100 μs		I_{DM}	574	A
Operating Junction and Storage Temperature Range			T_J, T_{stg}	−55 to +175	°C
Single Pulse Drain−to−Source Avalanche Energy (I_L = 20 A_{pk}, L = 3 mH)			E_{AS}	600	mJ
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

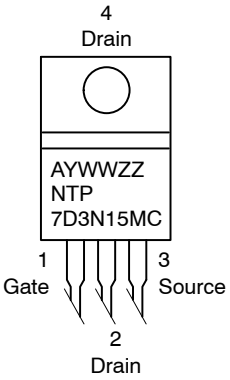
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface−mounted on FR4 board using a 1 in^2, 2 oz. Cu pad.
2. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

MARKING DIAGRAM



TO−220
CASE 221A



NTP7D3N15MC = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

Device	Package	Shipping†
NTP7D3N15MC	TO−220 (Pb−Free)	800 / Tube

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case − Steady State (Note 2)	$R_{\theta JC}$	0.9	°C/W
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	62.5	

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		150			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			71		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 120 V	T_J = 25°C			1.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 342 μA		2.5		4.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$	I_D = 342 μA, ref to 25°C			−7.3		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 62 A			6.2	7.3	mΩ
		V_{GS} = 8 V, I_D = 31 A			6.6	8.4	
Forward Transconductance	g_{FS}	V_{DS} = 10 V, I_D = 62 A			119		S
CHARGES, CAPACITANCES & GATE RESISTANCE							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 75 V			4250		pF
Output Capacitance	C_{OSS}				1250		
Reverse Transfer Capacitance	C_{RSS}				15		
Gate−Resistance	R_G				0.8	1.6	Ω
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 75 V; I_D = 62 A			53		nC
Threshold Gate Charge	$Q_{G(TH)}$				14		
Gate−to−Source Charge	Q_{GS}				23		
Gate−to−Drain Charge	Q_{GD}				8.5		
Plateau Voltage	V_{GP}				5.8		V
Output Charge	Q_{OSS}	V_{DD} = 75 V, V_{GS} = 0 V			133		nC
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DD} = 75 V, I_D = 62 A, R_G = 4.7 Ω			27		ns
Rise Time	t_r				8.5		
Turn−Off Delay Time	$t_{d(OFF)}$				33		
Fall Time	t_f				5.8		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 62 A	T_J = 25°C		0.93	1.2	V
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, V_{DD} = 75 V, dI_S/dt = 300 A/μs, I_S = 62 A			55		ns
Reverse Recovery Charge	Q_{RR}				247		nC
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, V_{DD} = 75 V, dI_S/dt = 1000 A/μs, I_S = 62 A			50		ns
Reverse Recovery Charge	Q_{RR}				720		nC

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.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

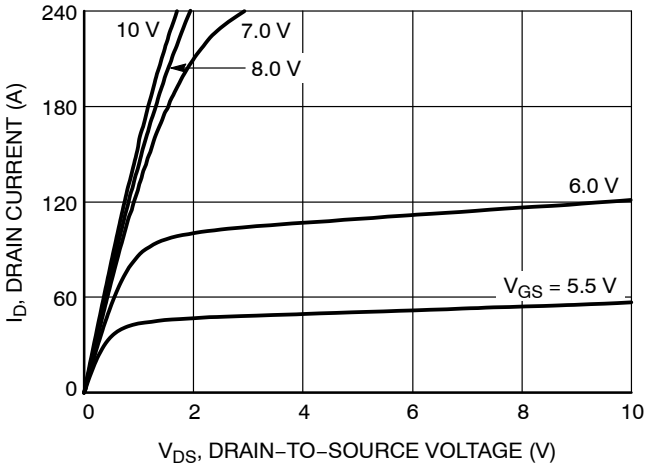


Figure 1. On−Region Characteristics

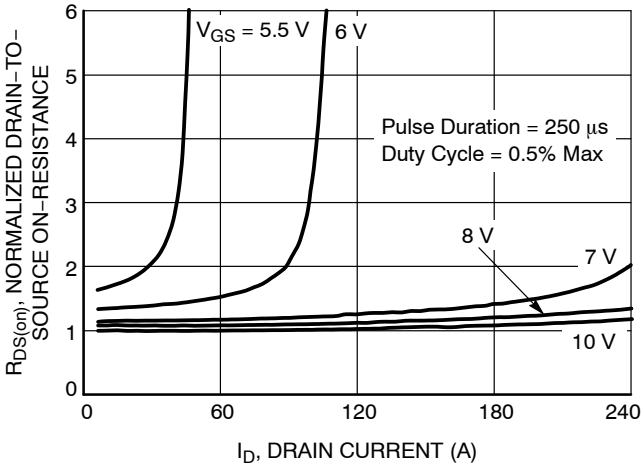


Figure 2. Normalized On−Resistance vs. Drain Current and Gate Voltage

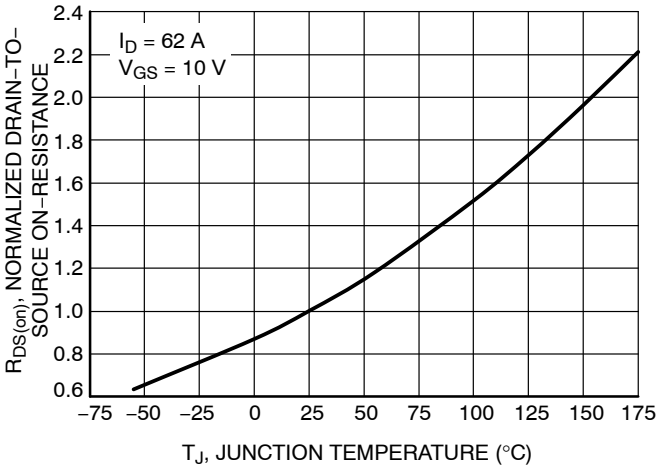


Figure 3. Normalized On−Resistance vs. Junction Temperature

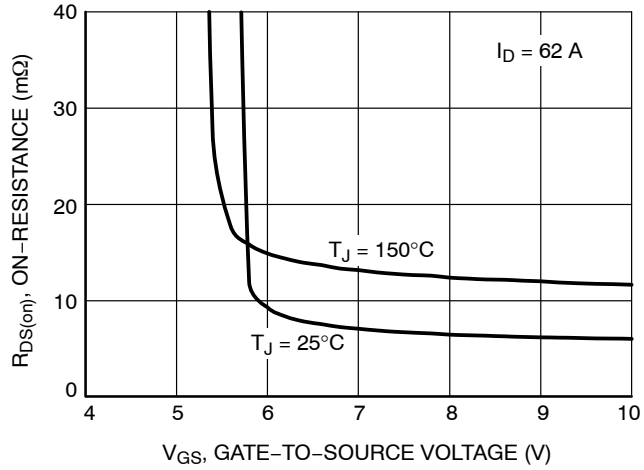


Figure 4. On−Resistance vs. Gate−to−Source Voltage

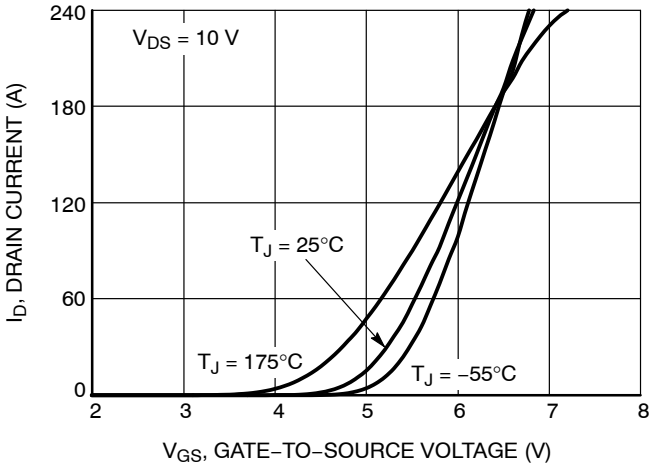


Figure 5. Transfer Characteristics

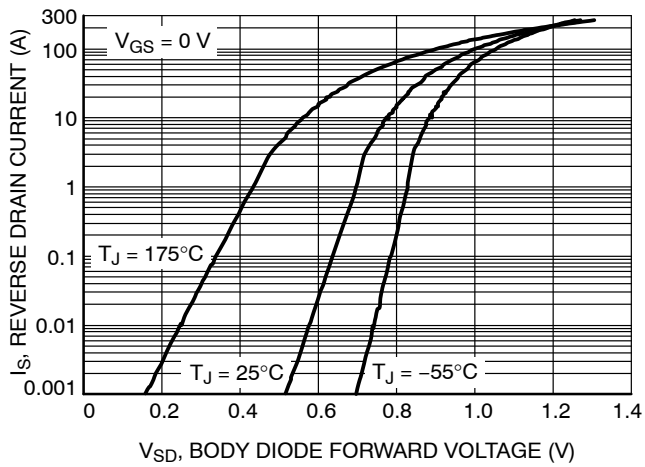


Figure 6. Source−to−Drain Diode Forward Voltage vs. Source Current

TYPICAL CHARACTERISTICS

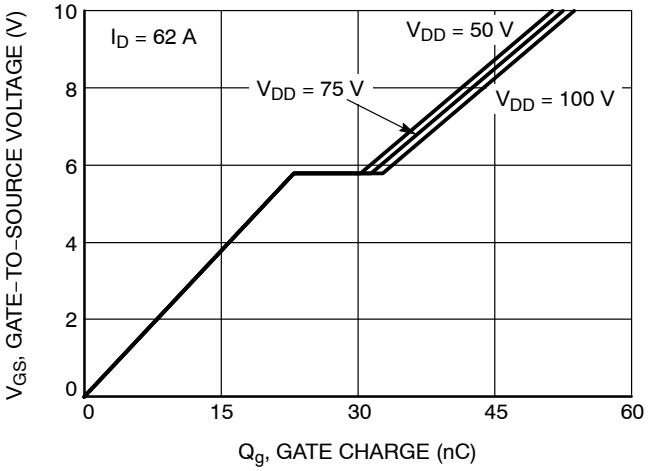


Figure 7. Gate Charge Characteristics

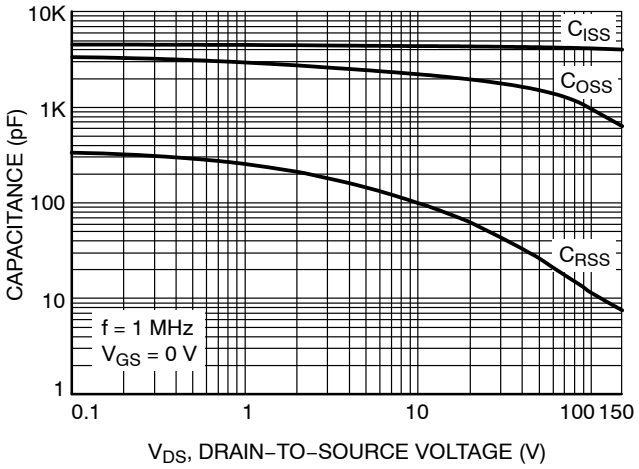


Figure 8. Capacitance vs. Drain−to−Source Voltage

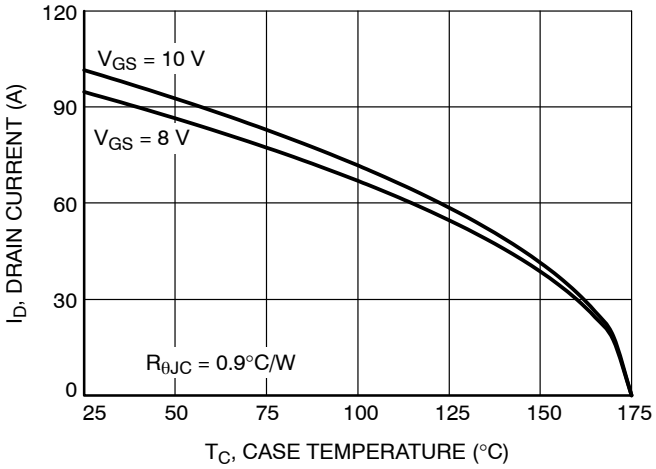


Figure 9. Drain Current vs. Case Temperature

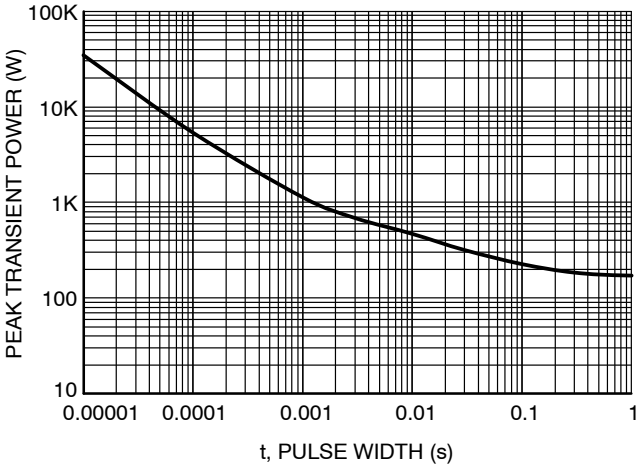


Figure 10. Peak Power

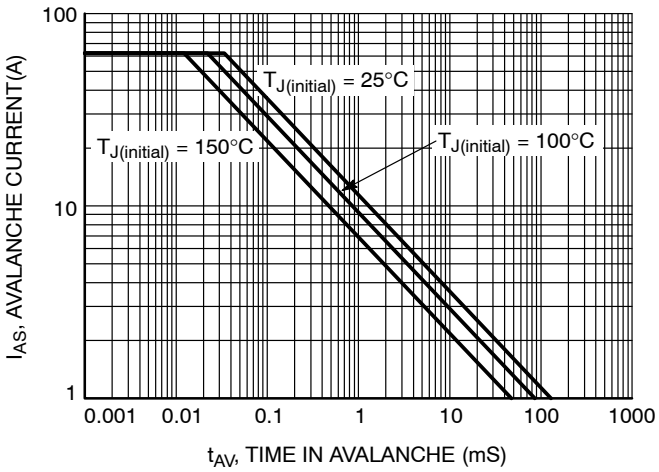


Figure 11. Unclamped Inductive Switching Capability

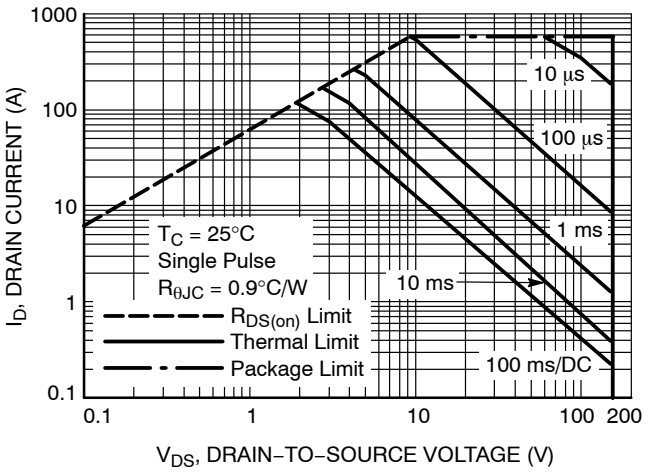


Figure 12. Forward Bias Safe Operating Area

TYPICAL CHARACTERISTICS

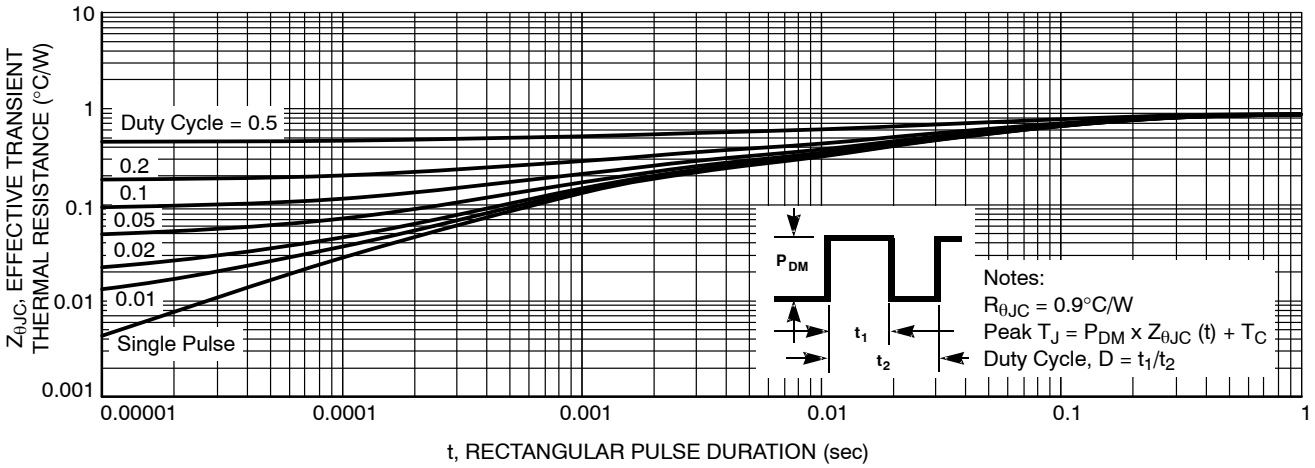


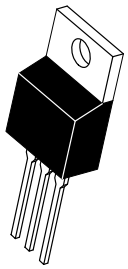
Figure 13. Transient Thermal Impedance

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

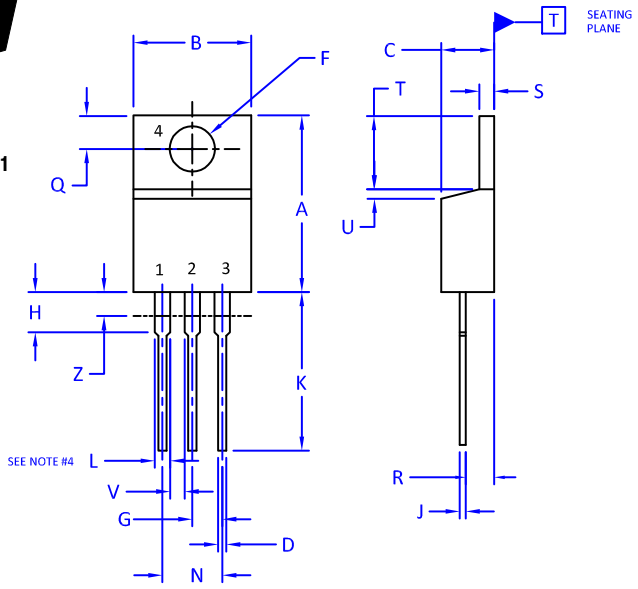
ON Semiconductor®

TO−220
CASE 221A−09
ISSUE AJ

DATE 05 NOV 2019



SCALE 1:1



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 2009.
2. CONTROLLING DIMENSION: INCHES
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.
4. MAX WIDTH FOR F102 DEVICE = 1.35MM

	INCHES		MILLIMETERS	
DIM	MIN.	MAX.	MIN.	MAX.
A	0.570	0.620	14.48	15.75
B	0.380	0.415	9.66	10.53
C	0.160	0.190	4.07	4.83
D	0.025	0.038	0.64	0.96
F	0.142	0.161	3.60	4.09
G	0.095	0.105	2.42	2.66
H	0.110	0.161	2.80	4.10
J	0.014	0.024	0.36	0.61
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.41
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	----	1.15	---
Z	----	0.080	---	2.04

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**	**PAGE 1 OF 1**

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Email Requests to: orderlit@onsemi.com

ON Semiconductor Website: www.onsemi.com

TECHNICAL SUPPORT
North American Technical Support:
Voice Mail: 1 800−282−9855 Toll Free USA/Canada
Phone: 011 421 33 790 2910

Europe, Middle East and Africa Technical Support:
Phone: 00421 33 790 2910
For additional information, please contact your local Sales Representative

◊