

NDD03N80Z

N-Channel Power MOSFET

800 V, 4.5 Ω

Features

- ESD Diode-Protected Gate
- 100% Avalanche Tested
- 100% R_g Tested
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	800	V
Continuous Drain Current $R_{\theta JC}$	I_D	2.9	A
Continuous Drain Current $R_{\theta JC}$, $T_A = 100^\circ\text{C}$	I_D	1.9	A
Pulsed Drain Current, $V_{GS} @ 10\text{ V}$	I_{DM}	12	A
Power Dissipation $R_{\theta JC}$	P_D	96	W
Gate-to-Source Voltage	V_{GS}	± 30	V
Single Pulse Avalanche Energy, $I_D = 2.5\text{ A}$	E_{AS}	100	mJ
ESD (HBM) (JESD22-A114)	V_{esd}	2300	V
RMS Isolation Voltage ($t = 0.3\text{ sec.}$, R.H. $\leq 30\%$, $T_A = 25^\circ\text{C}$)	V_{ISO}	4500	V
Peak Diode Recovery (Note 1)	dv/dt	4.5	V/ns
Continuous Source Current (Body Diode)	I_S	3.3	A
Maximum Temperature for Soldering Leads	T_L	260	$^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. $I_S = 3.3\text{ A}$, $di/dt \leq 100\text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, $T_J = +150^\circ\text{C}$

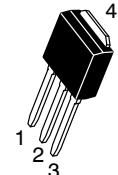
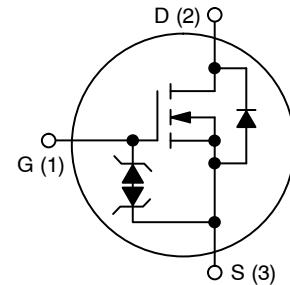


ON Semiconductor®

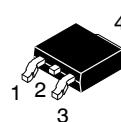
<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$
800 V	4.5 Ω @ 10 V

N-Channel



NDD03N80Z-1G
IPAk
CASE 369D



NDD03N80ZT4G
DPAk
CASE 369AA

MARKING AND ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

NDD03N80Z

THERMAL RESISTANCE

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	1.3	$^{\circ}\text{C/W}$
Junction-to-Ambient Steady State (Note 3) NDD03N80Z (Note 2) NDD03N80Z-1	$R_{\theta JA}$	33 96	

2. Insertion mounted

3. Surface mounted on FR4 board using 1" sq. pad size (Cu area = 1.127" sq [2 oz] including traces).

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

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0 \text{ V}$, $I_D = 1 \text{ mA}$	800			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(\text{BR})\text{DSS}/T_J}$	Reference to 25°C , $I_D = 1 \text{ mA}$		870		$\text{mV/}^{\circ}\text{C}$
Drain-to-Source Leakage Current	I_{DSS}	$V_{\text{DS}} = 800 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$	$T_J = 25^{\circ}\text{C}$		1.0	μA
			$T_J = 125^{\circ}\text{C}$		50	
Gate-to-Source Leakage Current	I_{GSS}	$V_{\text{GS}} = \pm 20 \text{ V}$			± 10	μA

ON CHARACTERISTICS (Note 4)

Gate Threshold Voltage	$V_{\text{GS}(\text{TH})}$	$V_{\text{DS}} = V_{\text{GS}}$, $I_D = 50 \mu\text{A}$	3.0	4.1	4.5	V
Negative Threshold Temperature Coefficient	$V_{\text{GS}(\text{TH})/T_J}$	Reference to 25°C , $I_D = 50 \mu\text{A}$		11		$\text{mV/}^{\circ}\text{C}$
Static Drain-to-Source On Resistance	$R_{\text{DS}(\text{ON})}$	$V_{\text{GS}} = 10 \text{ V}$, $I_D = 1.2 \text{ A}$		3.7	4.5	Ω
Forward Transconductance	g_{FS}	$V_{\text{DS}} = 15 \text{ V}$, $I_D = 1.2 \text{ A}$		2.1		S

DYNAMIC CHARACTERISTICS

Input Capacitance (Note 5)	C_{iss}	$V_{\text{DS}} = 25 \text{ V}$, $V_{\text{GS}} = 0 \text{ V}$, $f = 1 \text{ MHz}$		440		pF
Output Capacitance (Note 5)	C_{oss}			52		
Reverse Transfer Capacitance (Note 5)	C_{rss}			9.0		
Total Gate Charge (Note 5)	Q_g	$V_{\text{DS}} = 400 \text{ V}$, $I_D = 3.3 \text{ A}$, $V_{\text{GS}} = 10 \text{ V}$		17		nC
	Q_{gs}			3.5		
	Q_{gd}			9.1		
	V_{GP}			6.5		
	R_g			5.5		

RESISTIVE SWITCHING CHARACTERISTICS (Note 6)

Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = 400 \text{ V}$, $I_D = 3.3 \text{ A}$, $V_{\text{GS}} = 10 \text{ V}$, $R_G = 0 \Omega$		9.0		ns
Rise Time	t_r			7.0		
Turn-off Delay Time	$t_{\text{d}(\text{off})}$			17		
Fall Time	t_f			9.0		

SOURCE-DRAIN DIODE CHARACTERISTICS

Diode Forward Voltage	V_{SD}	$I_S = 3.0 \text{ A}$, $V_{\text{GS}} = 0 \text{ V}$	$T_J = 25^{\circ}\text{C}$		0.9	1.6	V
			$T_J = 100^{\circ}\text{C}$		0.8		
Reverse Recovery Time	t_{rr}	$V_{\text{GS}} = 0 \text{ V}$, $V_{\text{DD}} = 30 \text{ V}$ $I_S = 3.3 \text{ A}$, $d_i/dt = 100 \text{ A}/\mu\text{s}$			360		ns
Charge Time	t_a				81		
Discharge Time	t_b				280		
Reverse Recovery Charge	Q_{rr}				1.3		

4. Pulse Width $\leq 380 \mu\text{s}$, Duty Cycle $\leq 2\%$.

5. Guaranteed by design.

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

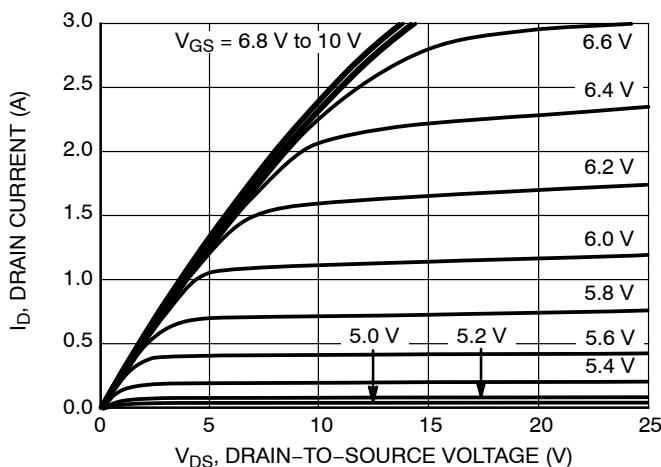


Figure 1. On-Region Characteristics

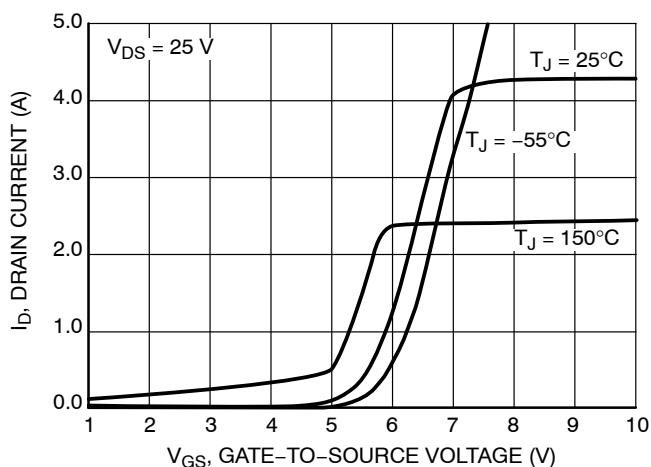


Figure 2. Transfer Characteristics

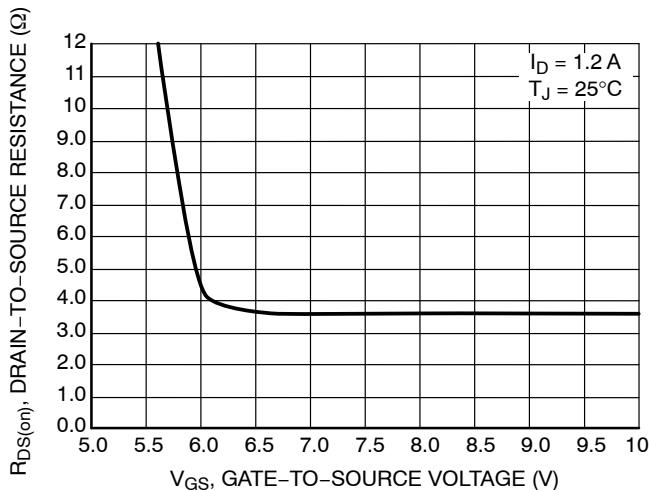


Figure 3. On-Region versus Gate-to-Source Voltage

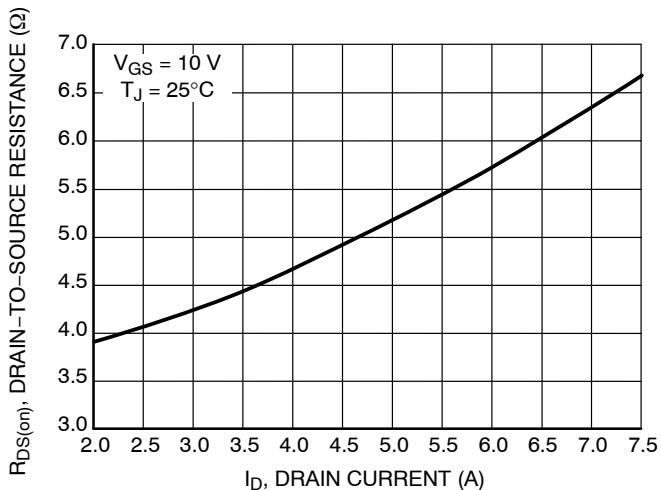


Figure 4. On-Resistance versus Drain Current and Gate Voltage

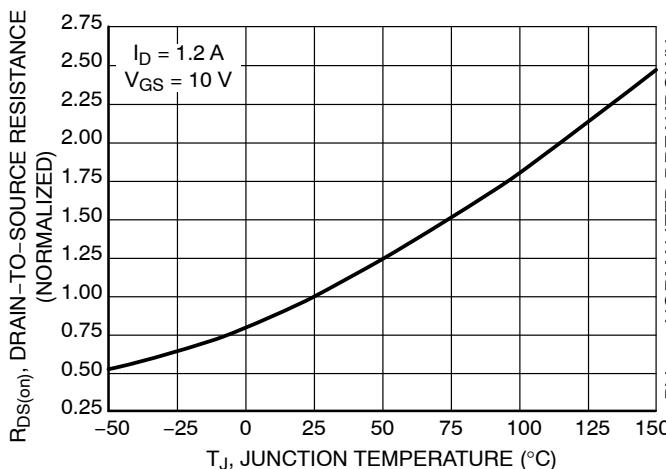
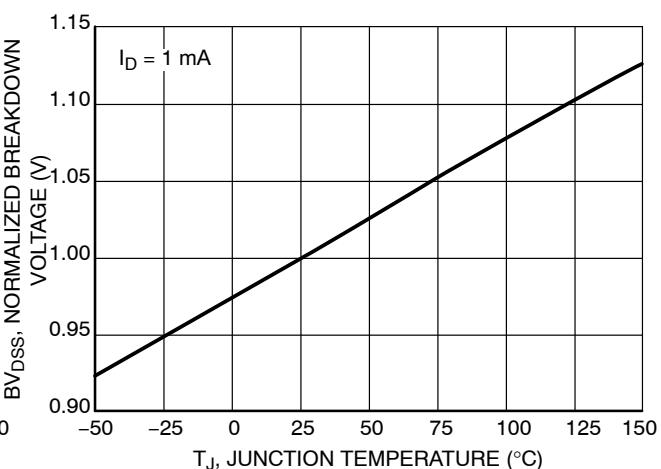


Figure 5. On-Resistance Variation with Temperature

Figure 6. BV_{DSS} Variation with Temperature

TYPICAL CHARACTERISTICS

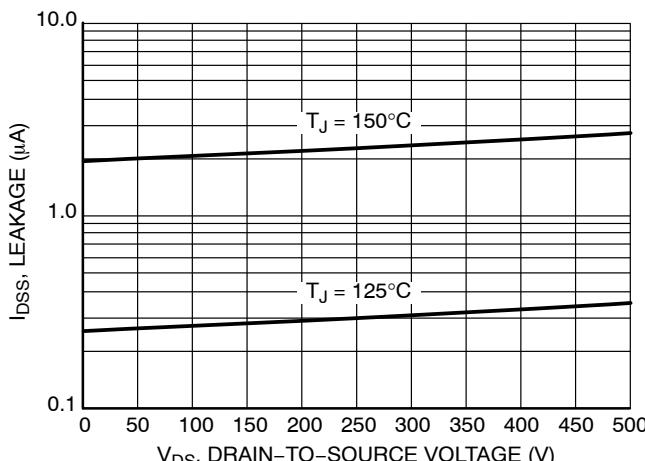


Figure 7. Drain-to-Source Leakage Current versus Voltage

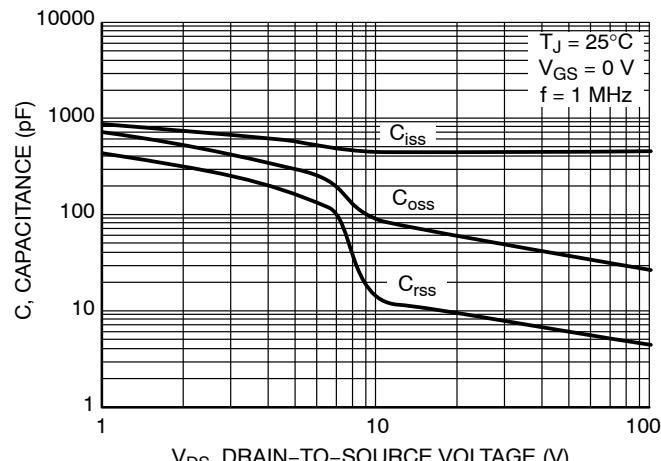


Figure 8. Capacitance Variation

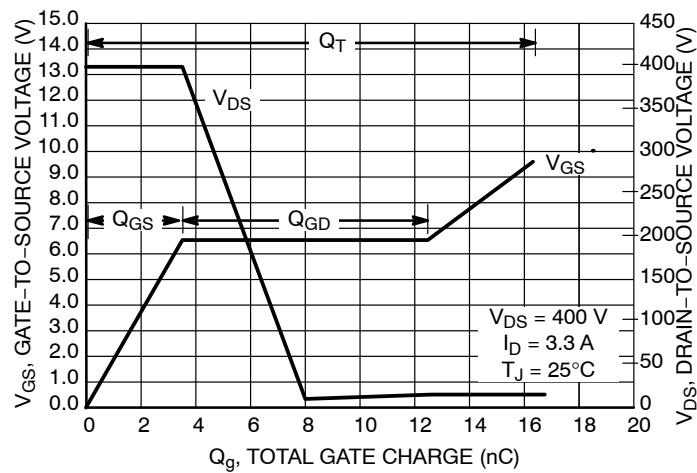


Figure 9. Gate-to-Source Voltage and Drain-to-Source Voltage versus Total Charge

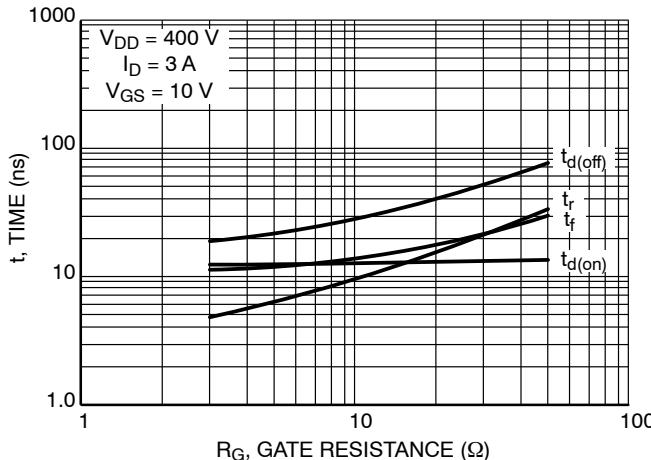


Figure 10. Resistive Switching Time Variation versus Gate Resistance

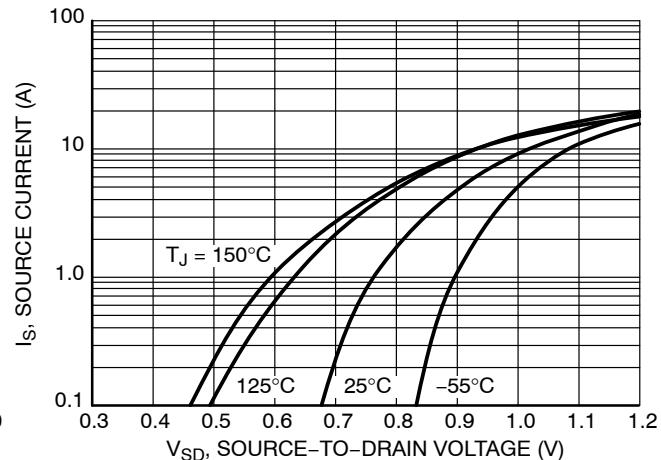


Figure 11. Diode Forward Voltage versus Current

TYPICAL CHARACTERISTICS

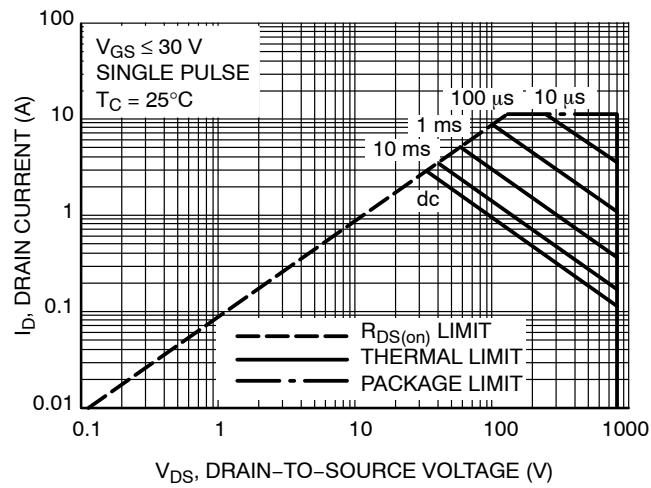


Figure 12. Maximum Rated Forward Biased
Safe Operating Area

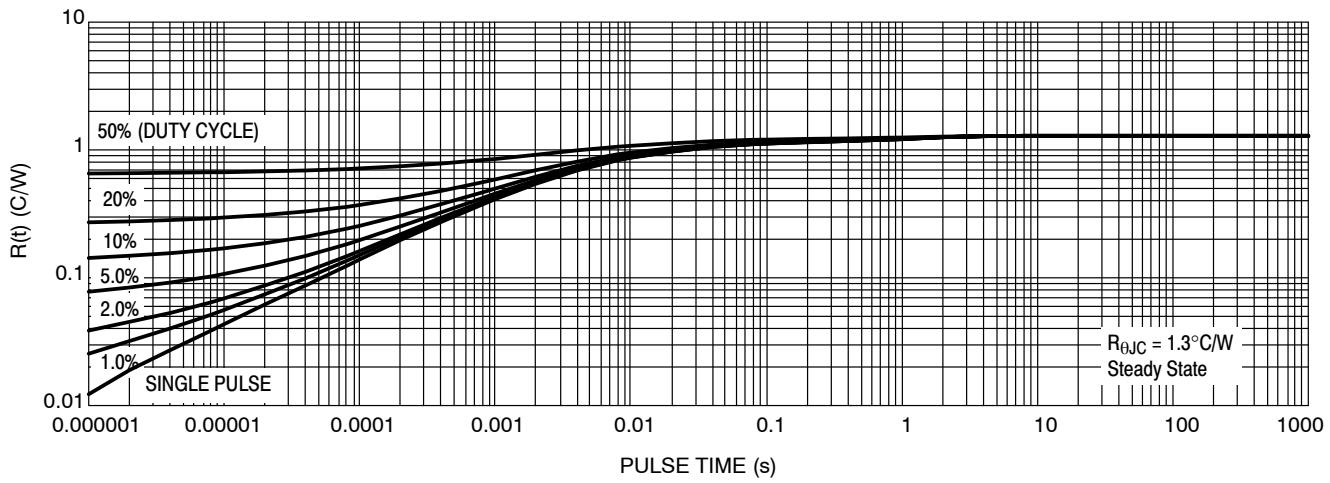


Figure 13. Thermal Impedance (Junction-to-Case)

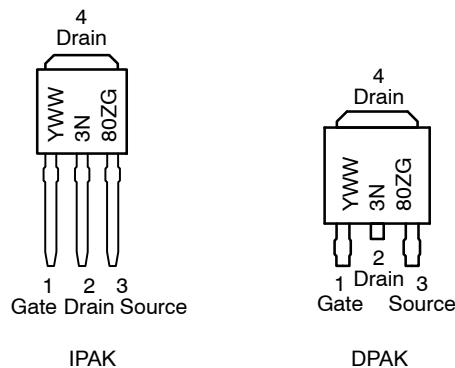
NDD03N80Z

Table 1. ORDERING INFORMATION

Device	Package	Shipping [†]
NDD03N80Z-1G	IPAK (Pb-Free, Halogen-Free)	75 Units / Rail
NDD03N80ZT4G	DPAK (Pb-Free, Halogen-Free)	2500 / Tape & Reel

[†]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.

MARKING DIAGRAMS



IPAK

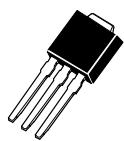
DPAK

A = Location Code

Y = Year

WW = Work Week

G, H = Pb-Free, Halogen-Free Package

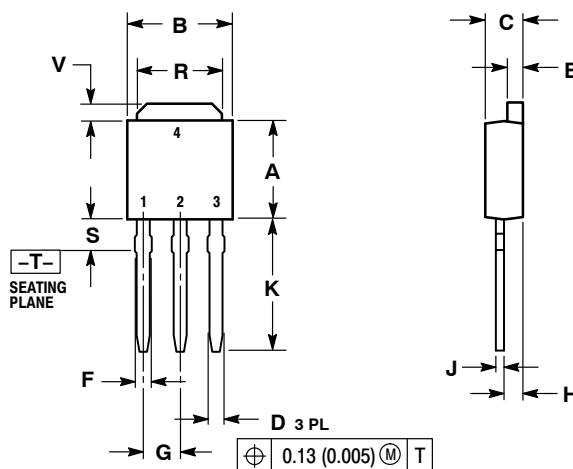


DPAK INSERTION MOUNT

CASE 369
ISSUE O

DATE 02 JAN 2000

SCALE 1:1



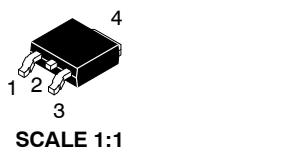
NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.250	5.97	6.35
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.033	0.040	0.84	1.01
F	0.037	0.047	0.94	1.19
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.175	0.215	4.45	5.46
S	0.050	0.090	1.27	2.28
V	0.030	0.050	0.77	1.27

STYLE 1: PIN 1. BASE 2. COLLECTOR 3. Emitter 4. COLLECTOR	STYLE 2: PIN 1. GATE 2. DRAIN 3. SOURCE 4. DRAIN	STYLE 3: PIN 1. ANODE 2. CATHODE 3. ANODE 4. CATHODE	STYLE 4: PIN 1. CATHODE 2. ANODE 3. GATE 4. ANODE	STYLE 5: PIN 1. GATE 2. ANODE 3. CATHODE 4. ANODE	STYLE 6: PIN 1. MT1 2. MT2 3. GATE 4. MT2
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DESCRIPTION:	DPAK INSERTION MOUNT	PAGE 1 OF 1

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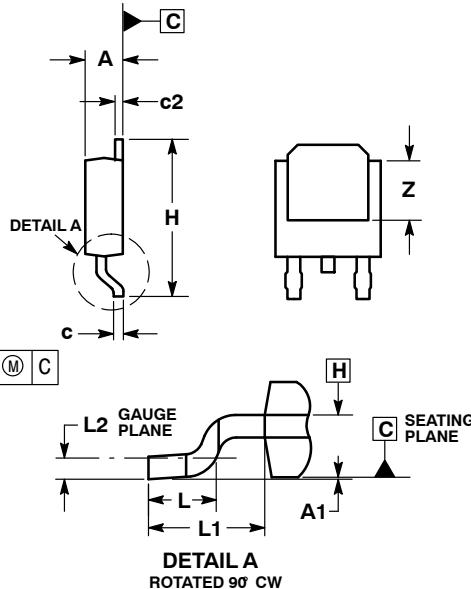
SCALE 1:1

DPAK (SINGLE GAUGE)
CASE 369AA
ISSUE B

DATE 03 JUN 2010

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.



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

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

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

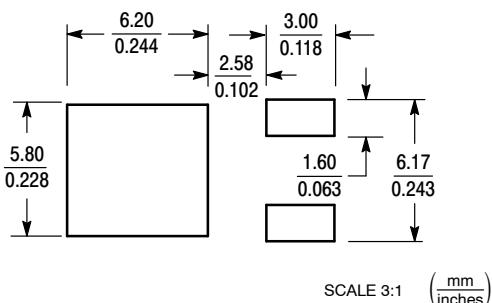
STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

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

STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

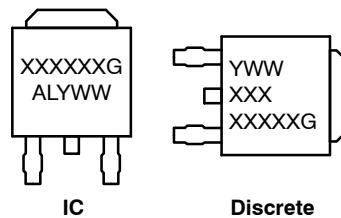
STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. Emitter
4. COLLECTOR

SOLDERING FOOTPRINT*



SCALE 3:1 (mm/inches)

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090	BSC	2.29	BSC
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108	REF	2.74	REF
L2	0.020	BSC	0.51	BSC
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

GENERIC
MARKING DIAGRAM*

XXXXXX = Device Code
A = Assembly Location
L = Wafer Lot
Y = Year
WW = Work Week
G = Pb-Free Package

*This information is generic. Please refer to device data sheet for actual part marking.

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

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