

NDD03N80Z

N-Channel Power MOSFET

800 V, 4.5 Ω

Features

- ESD Diode-Protected Gate
- 100% Avalanche Tested
- 100% Rg 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. $I_S = 3.3 \text{ A}$, $di/dt \leq 100 \text{ A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, $T_J = +150^\circ\text{C}$

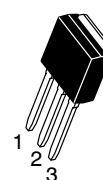
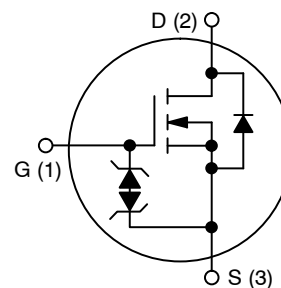


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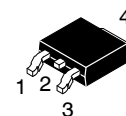
<http://onsemi.com>

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

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

ON CHARACTERISTICS (Note 4)

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

DYNAMIC CHARACTERISTICS

Input Capacitance (Note 5)	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		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	$V_{DS} = 400\text{ V}, I_D = 3.3\text{ A}, V_{GS} = 10\text{ V}$		17		nC
Gate-to-Source Charge (Note 5)	Q_{gs}			3.5		
Gate-to-Drain ("Miller") Charge (Note 5)	Q_{gd}			9.1		
Plateau Voltage	V_{GP}			6.5		V
Gate Resistance	R_g			5.5		Ω

RESISTIVE SWITCHING CHARACTERISTICS (Note 6)

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

SOURCE-DRAIN DIODE CHARACTERISTICS

Diode Forward Voltage	V _{SD}	I _S = 3.0 A, V _{GS} = 0 V	T _J = 25°C		0.9	1.6	V
			T _J = 100°C		0.8		
Reverse Recovery Time	t _{rr}	V _{GS} = 0 V, V _{DD} = 30 V I _S = 3.3 A, d _I /d _t = 100 A/μs			360		ns
Charge Time	t _a				81		
Discharge Time	t _b				280		
Reverse Recovery Charge	Q _{rr}				1.3		

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

5. Guaranteed by design.

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

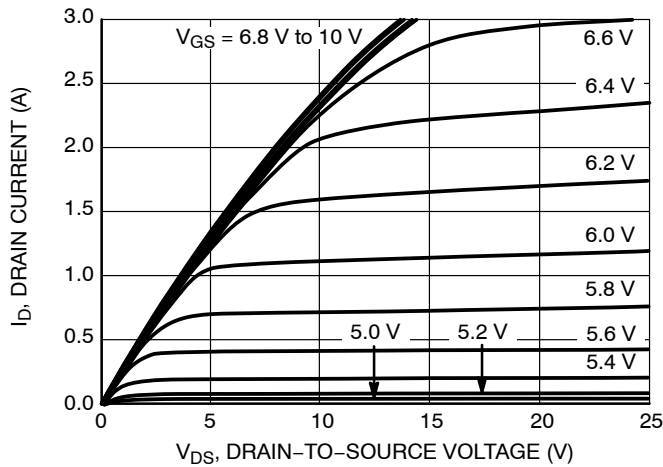


Figure 1. On-Region Characteristics

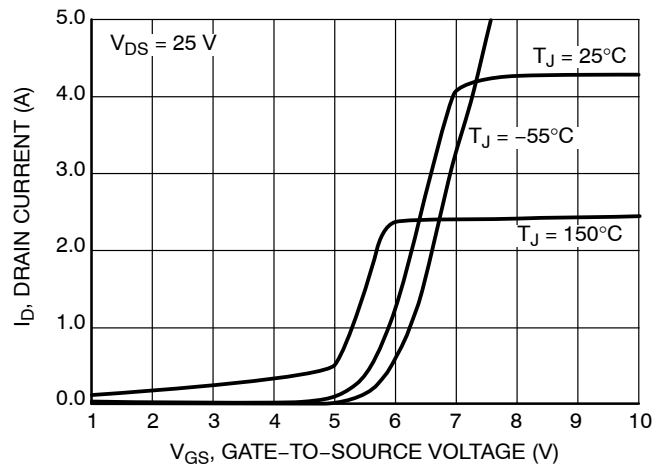


Figure 2. Transfer Characteristics

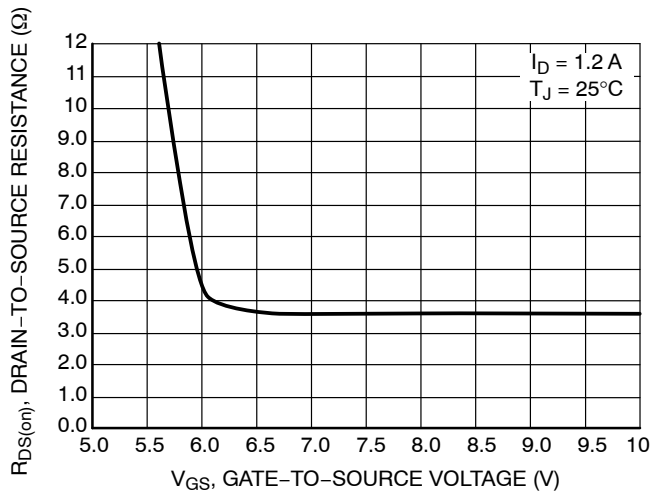


Figure 3. On-Region versus Gate-to-Source Voltage

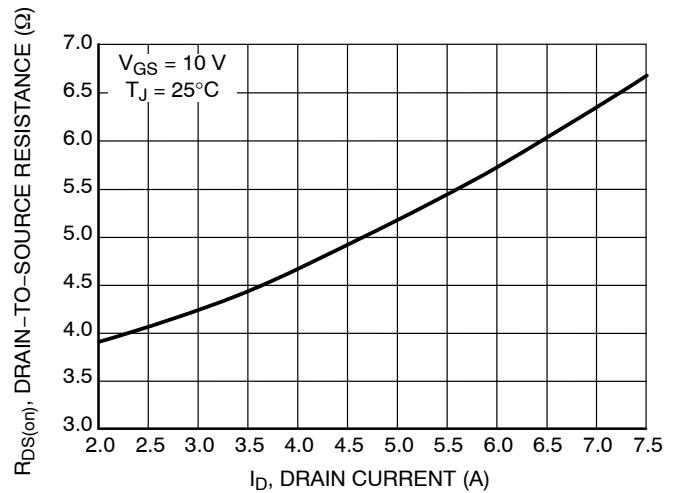


Figure 4. On-Resistance versus Drain Current and Gate Voltage

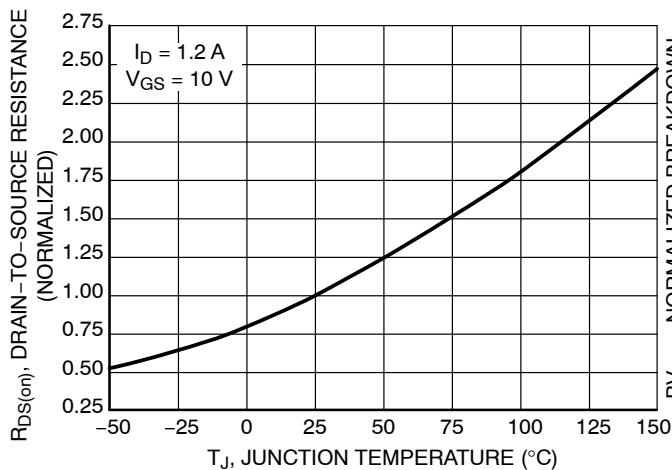


Figure 5. On-Resistance Variation with Temperature

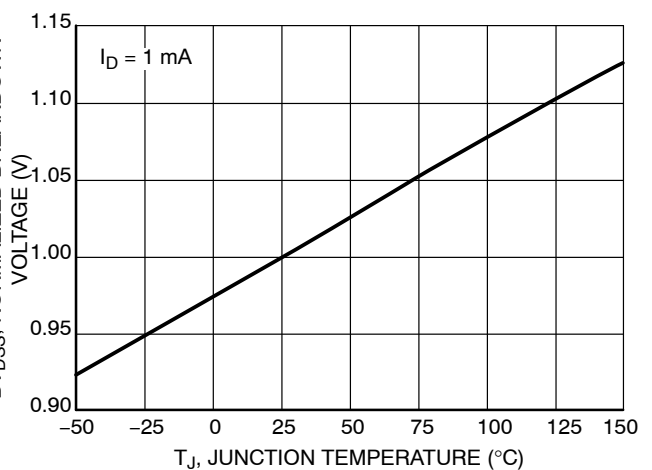


Figure 6. BV_{DSS} Variation with Temperature

TYPICAL CHARACTERISTICS

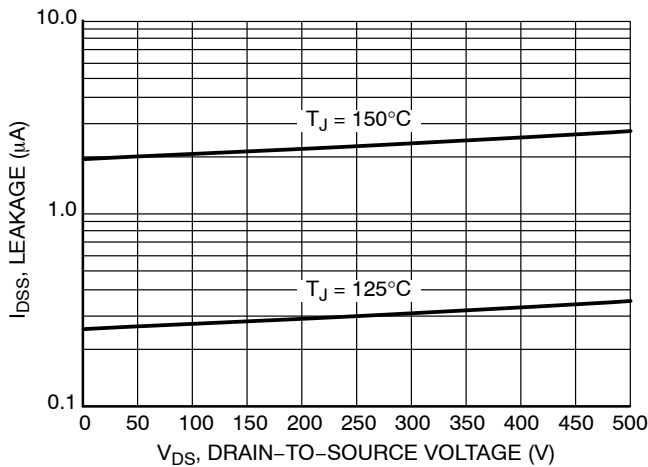


Figure 7. Drain-to-Source Leakage Current versus Voltage

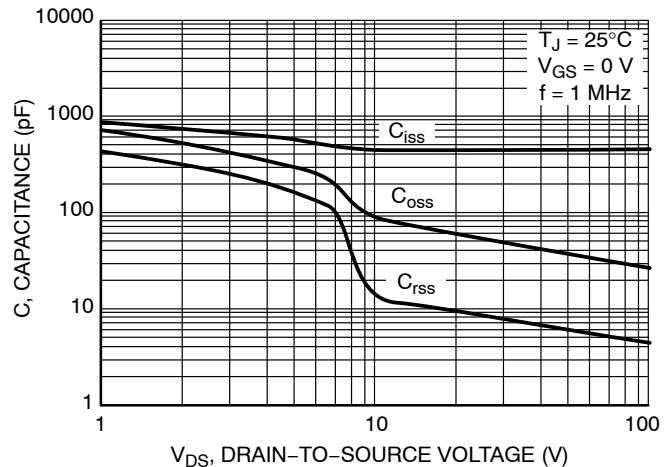


Figure 8. Capacitance Variation

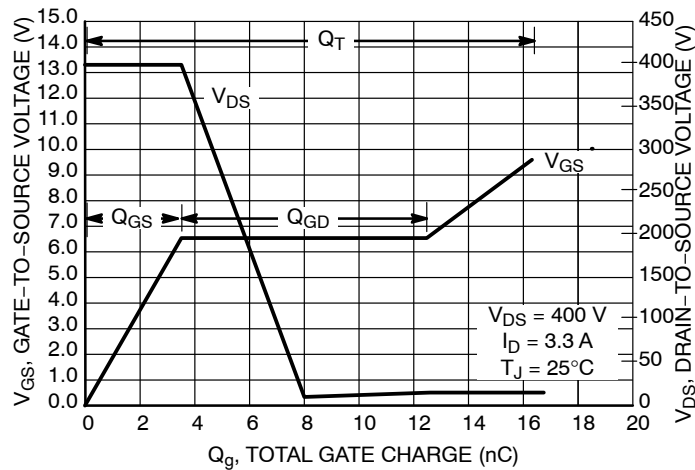


Figure 9. Gate-to-Source Voltage and Drain-to-Source Voltage versus Total Charge

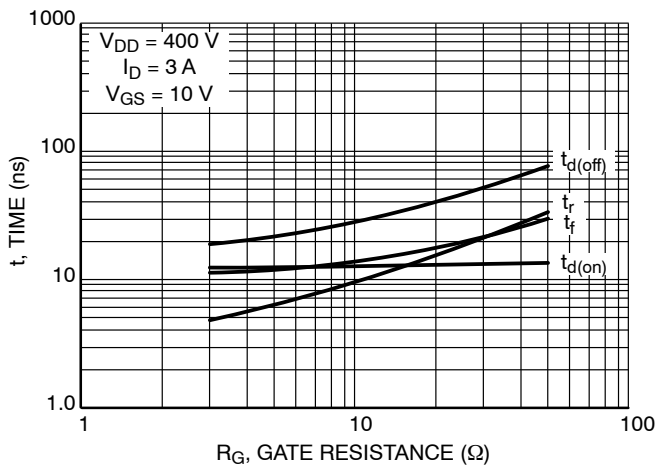


Figure 10. Resistive Switching Time Variation versus Gate Resistance

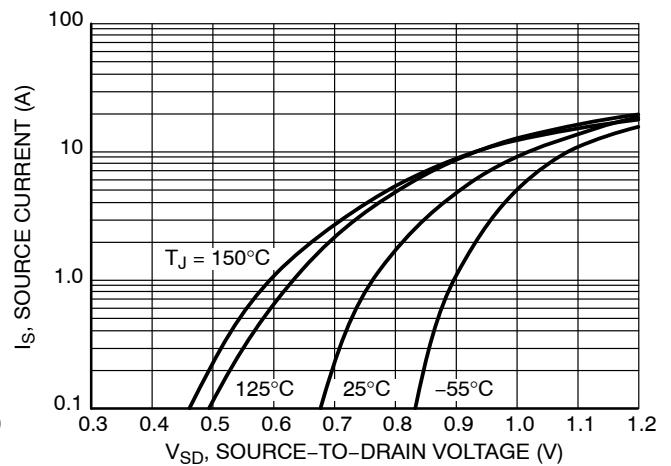


Figure 11. Diode Forward Voltage versus Current

TYPICAL CHARACTERISTICS

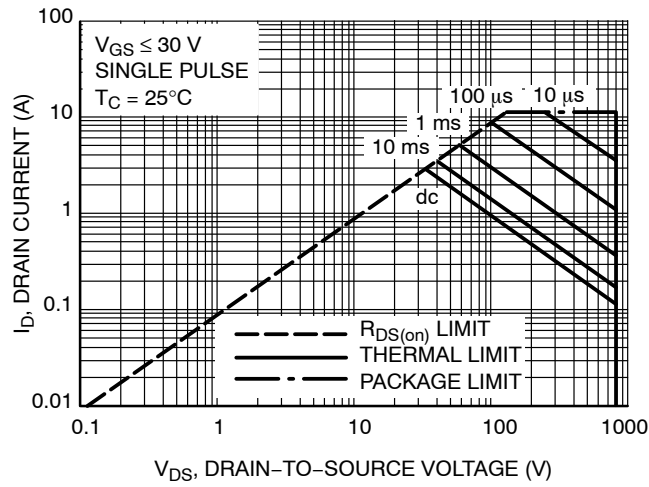


Figure 12. Maximum Rated Forward Biased Safe Operating Area

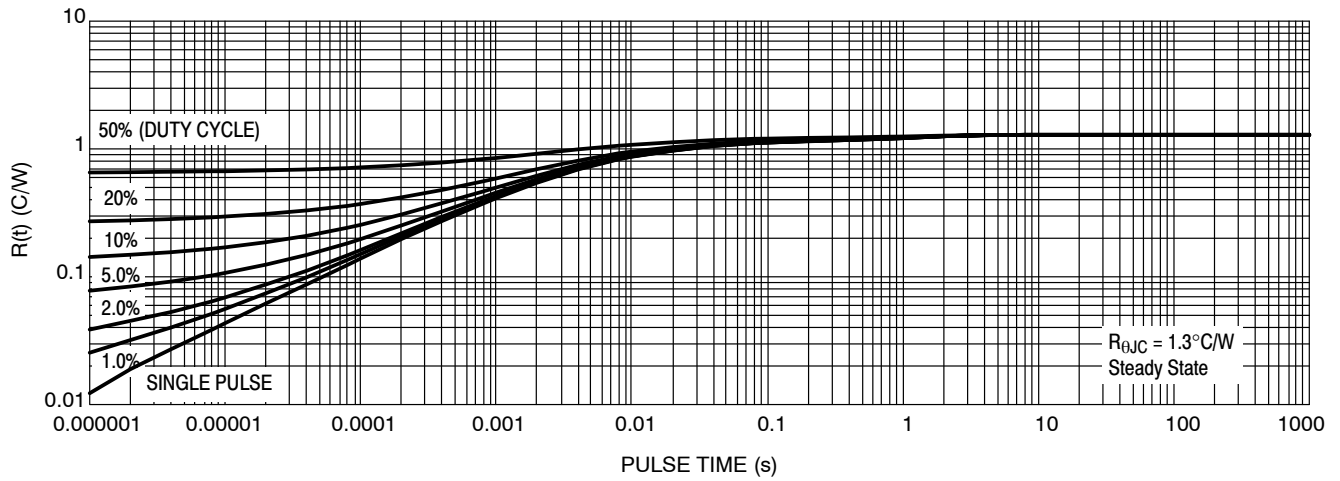


Figure 13. Thermal Impedance (Junction-to-Case)

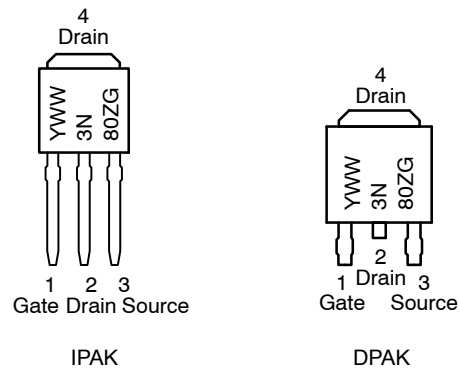
NDD03N80Z

Table 1. ORDERING INFORMATION

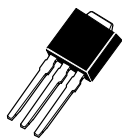
Device	Package	Shipping [†]
NDD03N80Z-1G	IPAK (Pb-Free, Halogen-Free)	75 Units / Rail
NDD03N80ZT4G	DPAK (Pb-Free, Halogen-Free)	2500 / Tape & Reel

[†]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



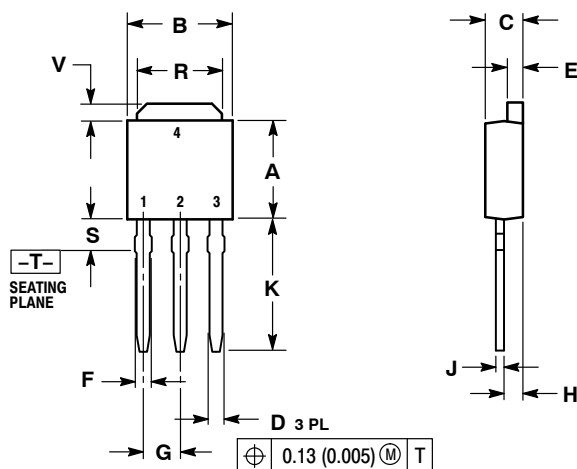
A = Location Code
 Y = Year
 WW = Work Week
 G, H = Pb-Free, Halogen-Free Package



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

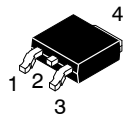
STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

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

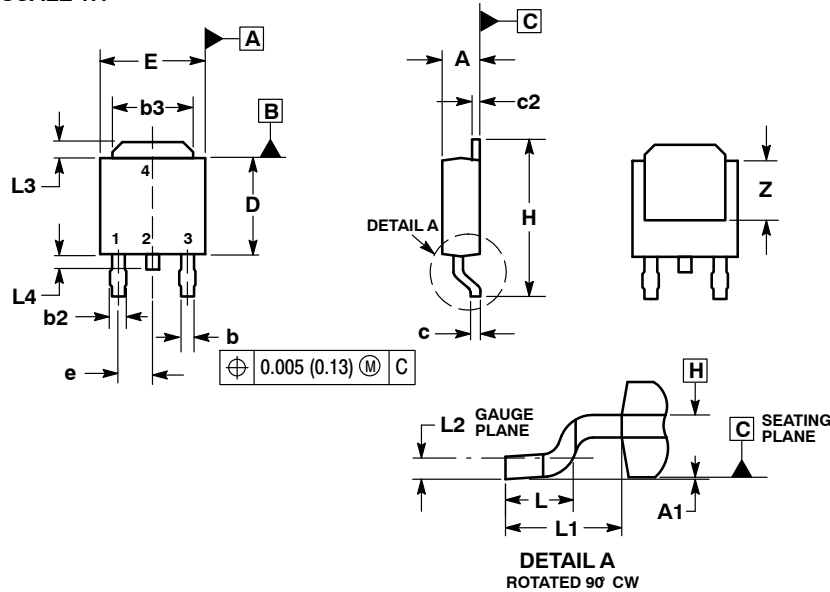
STYLE 6:
PIN 1. MT1
2. MT2
3. GATE
4. MT2

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SCALE 1:1



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

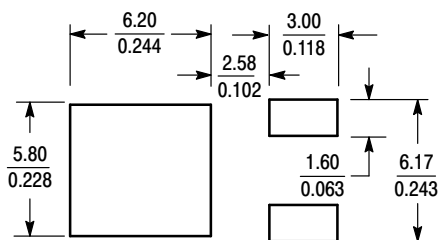
STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

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)

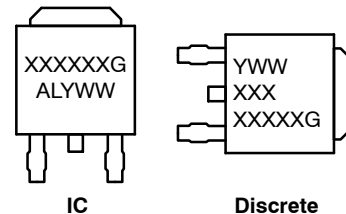
*For additional information on our Pb-Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
- CONTROLLING DIMENSION: INCHES.
- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
- 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.
- DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
- DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

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.

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