NVD5803N

Power MOSFET

40 V, 85 A, Single N−Channel, DPAK

Features

- Low $R_{DS(on)}$
- High Current Capability
- Avalanche Energy Specified
- AEC−Q101 Qualified
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- DC Motor Drive
- Reverse Battery Protection
- Glow Plug

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	40	V
Gate−to−Source Voltage − Continuous			V_{GS}	±20	V
Continuous Drain Current ($R_{\theta JC}$) (Note 1)	Steady State	T_C = 25°C	I_D	85	A
		T_C = 100°C		61	
Power Dissipation ($R_{\theta JC}$) (Note 1)		T_C = 25°C	P_D	83	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	228	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to 175	°C
Source Current (Body Diode)			I_S	85	A
Single Pulse Drain−to−Source Avalanche Energy (V_{DD} = 50 V, V_{GS} = 10 V, R_G = 25 Ω, $I_{L(pk)}$ = 40 A, L = 0.3 mH)			E_{AS}	240	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.

THERMAL RESISTANCE MAXIMUM RATINGS

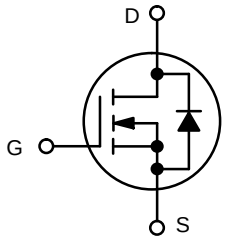
Parameter	Symbol	Value	Unit
Junction−to−Case (Drain)	$R_{\theta JC}$	1.8	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	42	

1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces.

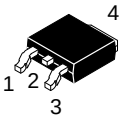
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$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
40 V	5.7 mΩ @ 10 V	85 A

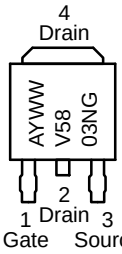


N−CHANNEL MOSFET



DPAK
CASE 369AA
(Surface Mount)
STYLE 2

MARKING DIAGRAM & PIN ASSIGNMENT



A	= Assembly Location*
Y	= Year
WW	= Work Week
5803N	= Device Code
G	= Pb−Free Package

* The Assembly Location code (A) is front side optional. In cases where the Assembly Location is stamped in the package, the front side assembly code may be blank.

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

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		40			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				40		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 40 V	T_J = 25°C			1.0	μA
			T_J = 150°C			100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.5		3.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				−7.4		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 50 A			4.9	5.7	mΩ
		V_{GS} = 5.0 V, I_D = 30 A			6.7		
Forward Transconductance	g_{FS}	V_{DS} = 15 V, I_D = 15 A			13.6		S
CHARGES, CAPACITANCES AND GATE RESISTANCES							
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 25 V			3220		pF
Output Capacitance	C_{oss}				390		
Reverse Transfer Capacitance	C_{rss}				270		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 10 V, V_{DS} = 20 V, I_D = 50 A			51		nC
Threshold Gate Charge	$Q_{G(TH)}$				3.8		
Gate−to−Source Charge	Q_{GS}				12.7		
Gate−to−Drain Charge	Q_{GD}				12.7		
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 10 V, V_{DD} = 32 V, I_D = 50 A, R_G = 2.0 Ω			12.6		ns
Rise Time	t_r				21.4		
Turn−Off Delay Time	$t_{d(off)}$				28.3		
Fall Time	t_f				6.6		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 30 A	T_J = 25°C		0.88	1.2	V
			T_J = 150°C		0.73		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dIs/dt = 100 A/μs, I_S = 30 A			27.2		ns
Charge Time	ta				14		
Discharge Time	tb				13.2		
Reverse Recovery Charge	Q_{RR}				17		nC

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

ORDERING INFORMATION

Order Number	Package	Shipping†
NVD5803NT4G	DPAK (Pb−Free)	2500 / Tape & Reel
SVD5803NT4G	DPAK (Pb−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.

TYPICAL CHARACTERISTICS

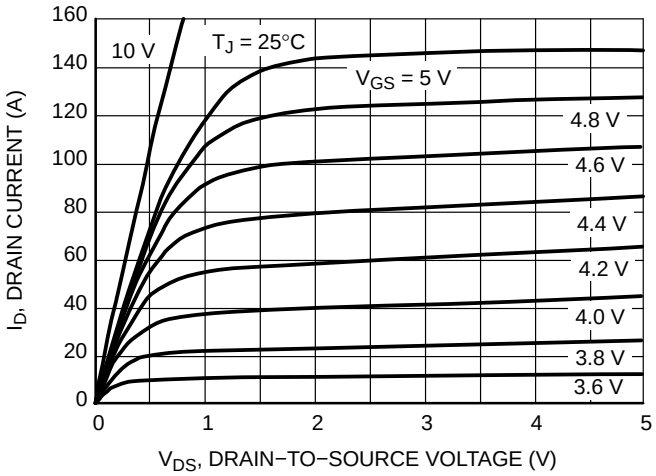


Figure 1. On−Region Characteristics

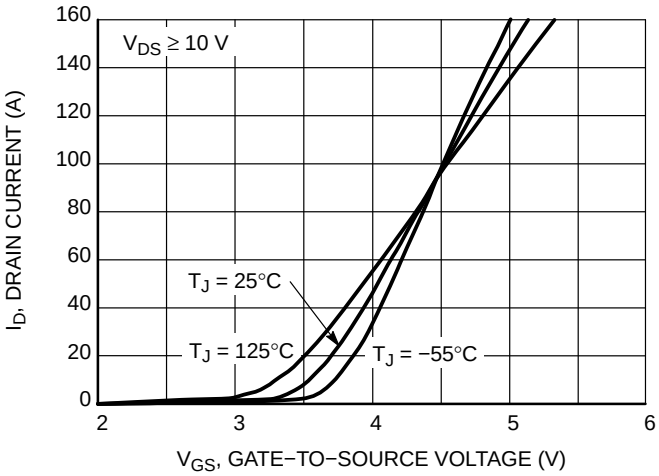


Figure 2. Transfer Characteristics

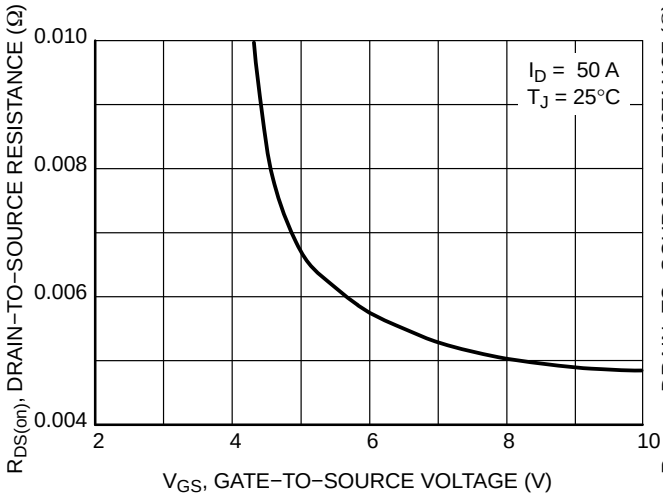


Figure 3. On−Resistance vs. Gate−to−Source Voltage

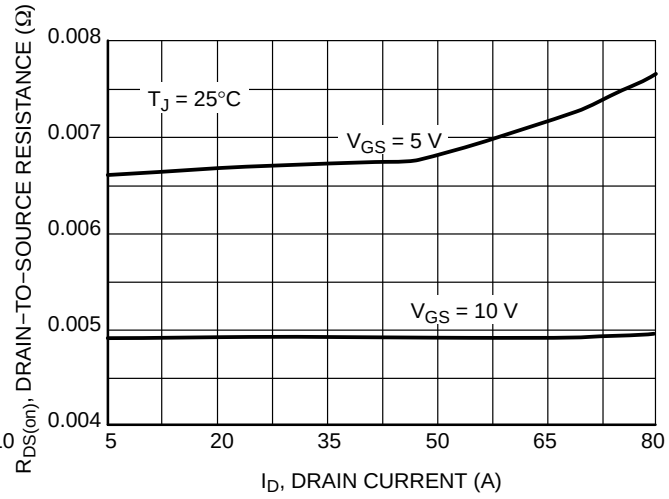


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

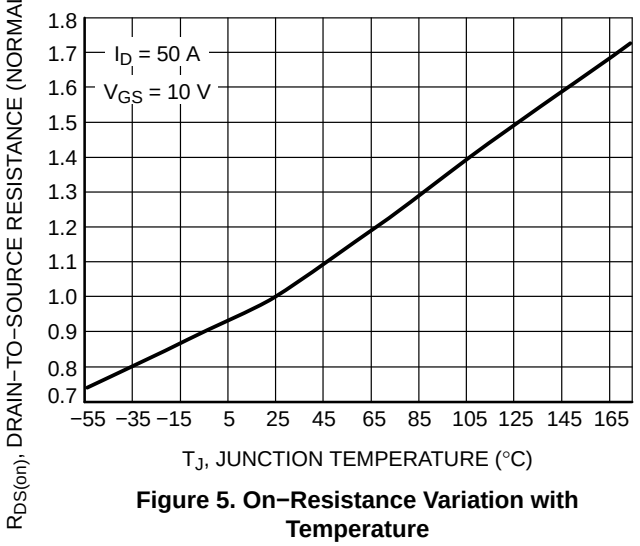


Figure 5. On−Resistance Variation with Temperature

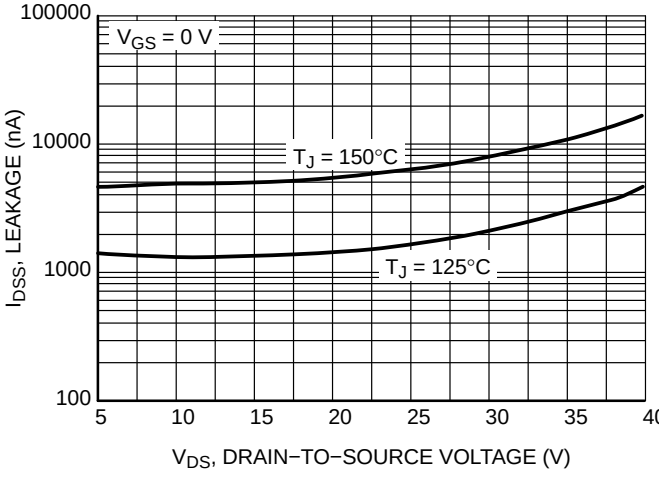


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

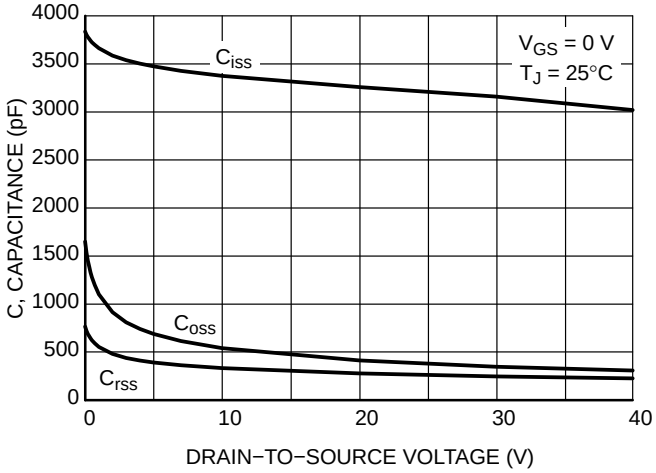


Figure 7. Capacitance Variation

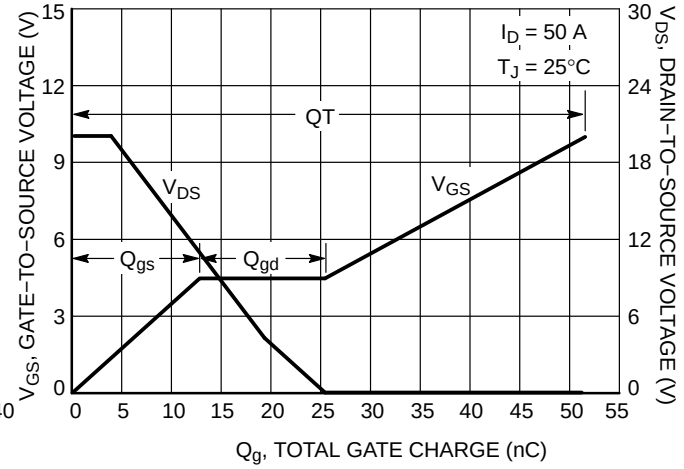


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

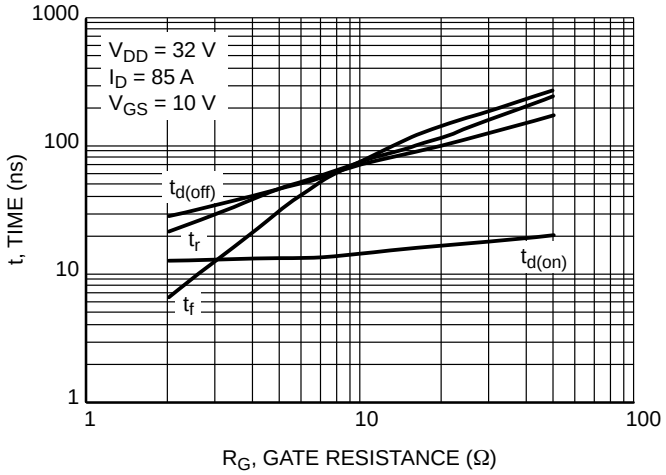


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

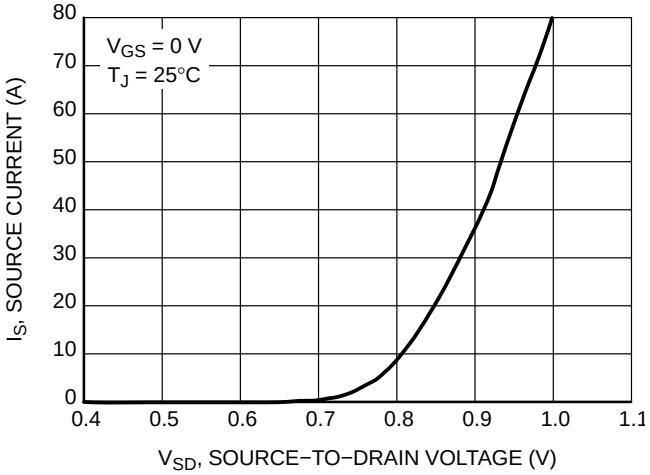


Figure 10. Diode Forward Voltage vs. Current

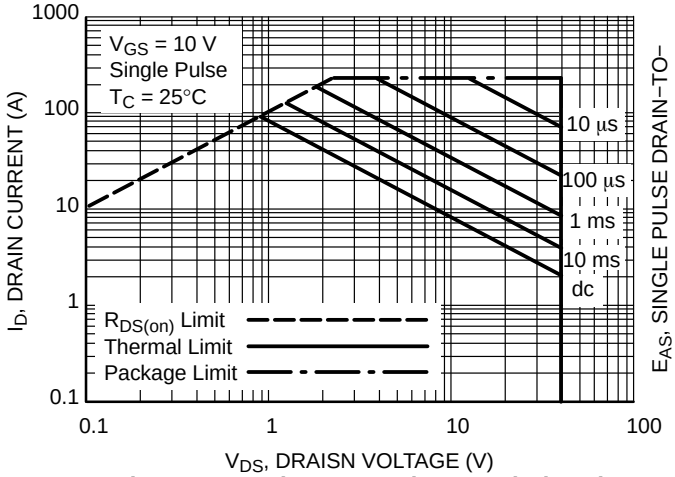


Figure 11. Maximum Rated Forward Biased Safe Operating Area

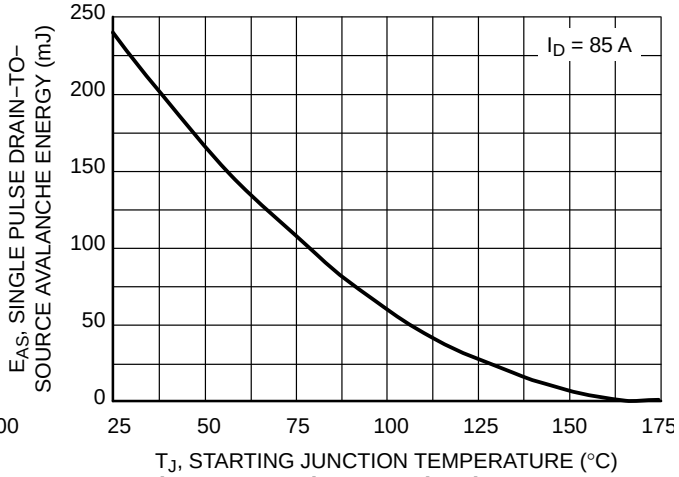


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL CHARACTERISTICS

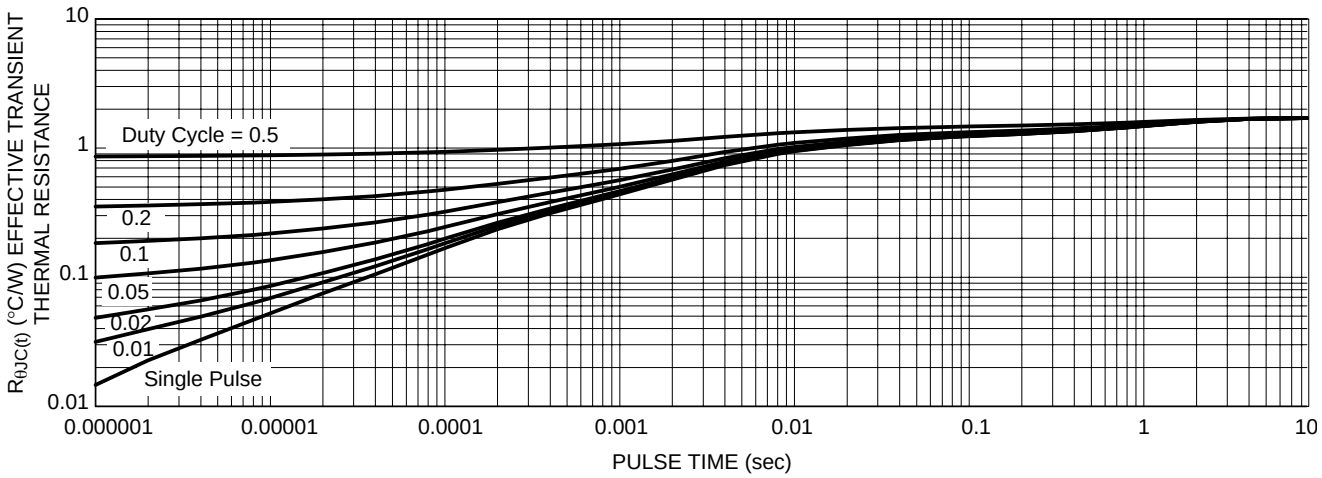
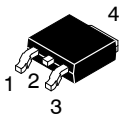


Figure 13. Thermal Response

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

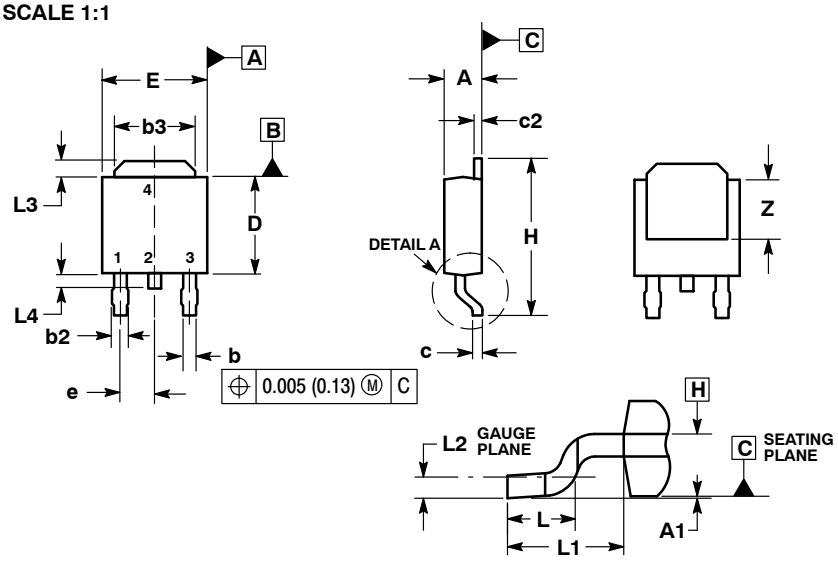
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SCALE 1:1

DPAK (SINGLE GUAGE)
CASE 369AA−01
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.

	INCHES		MILLIMETERS	
DIM	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	−−−

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

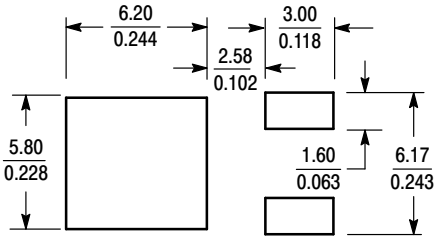
STYLE 4:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE

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

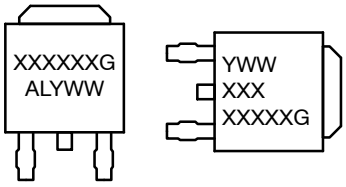
SOLDERING FOOTPRINT*



SCALE 3:1 (mm / inches)

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

GENERIC MARKING DIAGRAM*



IC Discrete

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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